



RAILROAD RESEARCH BULLETIN



**Autumn 1975
Volume 2 Number 2**

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

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16. Abstract This publication contains 1,106 abstracts of journal articles and research reports selected by RRIS from current railroad literature, 93 descriptions of computer programs, and 404 summaries of ongoing research activities in the railroad field. This material 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 journal and report abstracts and computer program descriptions, and one for ongoing project summaries. The book also contains subject term, author, and source indexes. It supplements the material contained in the five prior Railroad Research Bulletins which should be retained for a complete file of RRIS data. The publication is available on a regular subscription basis from Railroad Research Information Service, Transportation Research Board, 2101 Constitution Avenue, N.W., Washington, D.C. 20418. Batch-mode computerized and manual file searches of specific subject areas are available directly from RRIS.					
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RAILROAD RESEARCH BULLETIN

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RAILROAD RESEARCH BULLETIN

Autumn 1975
Volume 2 Number 2
Publication 7502

This Bulletin, containing 1,106 abstracts of journal articles and research reports, 93 descriptions of computer programs and 404 summaries of ongoing research activities in the railroad field, is produced by the Railroad Research Information Service. Financial support for the operation of RRIS within the Transportation Research Board is provided by the Federal Railroad Administration of the U.S. Department of Transportation.

Each Bulletin contains new information and is not cumulative. Previous editions should be retained to ensure that the user has a complete record of the RRIS accessions.

Railroad Research Information Service
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Railroad Research Information Service

The Railroad Research Information Service (RRIS) was developed within the National Research Council under contract to the Federal Railroad Administration of the U.S. Department of Transportation.

The RRIS 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.

The scope of RRIS includes rail rapid 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 Systems" in the Subject Term Index, where the accession numbers for such items are listed.

Three types of data are stored in the RRIS system—abstracts of articles and reports that are within the RRIS scope, descriptions of computer programs, and summaries of ongoing and recently completed research projects. The abstracts, descriptions, and summaries are arranged in separate

sections, as indicated in the Table of Contents. In addition to acquisition and selection, RRIS work includes the classification, indexing, storage, retrieval, and dissemination of abstracts and summaries. Concepts and procedures are similar to those of the other transportation research information services within the National Research Council—the Highway Research Information Service (HRIS) and the Maritime Research Information Service (MRIS).

The Railroad Research Bulletin, published semiannually, contains abstracts, descriptions, and summaries added to the RRIS file during the preceding 6 months. Previous editions should be retained. While 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 an "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.

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Paul E. Irick
Assistant Director for Special Projects
Transportation Research Board

H. Stanley Schofer
Manager, Systems Development and Operations
Transportation Research Board

Sharon A. Derr
Information Operations Supervisor

Charles C. Kim
Systems Programmer

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Manager, Railroad Research Information Service
Transportation Research Board

Suzanne D. Scruggs
Documentation Specialist
Railroad Research Information Service

Linda Kowalczykowski, Information Technician
Shirley A. Morin, Information Technician

James H. Seamon
Rail Transportation Specialist
Transportation Research Board

Office Address: 2100 Pennsylvania Avenue, N.W., Washington, D.C.
Telephone: 202-389-6611

Mail Address: Transportation Research Board, 2101 Constitution Avenue, N.W.
Washington, D.C. 20418

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Using the Railroad Research Bulletin

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

If you are interested in reviewing reports of completed research and other published documents, turn to the abstracts section, which begins on page 1. The material in this section is arranged by RRIS subject categories according to the numbered subject areas indicated in the Table of Contents. The category with its corresponding code number appears at the top of each page.

If you are interested in summaries of ongoing research projects, turn to the ongoing research section, which begins on page 179. These summaries are also arranged by subject areas, with each category appearing at the top of the page, along with the corresponding code number followed by an A (for active) to indicate that this is an ongoing project.

If you can identify your interest by subject, turn to the Subject Term Index starting on page 287. Each term in this index is followed by the accession numbers of applicable abstracts or ongoing research summaries. Each accession number consists of two digits that identify the subject area and six digits that identify the individual document

under that subject area. Again, if an A follows the subject category digits, this indicates that the particular item is a summary of an ongoing research report; these are printed in italics in each index listing. The items are arranged in order of ascending accession numbers in their respective sections.

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 on page 276. Look for the individual's last name in the alphabetized listing. Again note the accession numbers and turn to the abstracts or summaries 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 performing organization, turn to the Source Index on page 257. Again note the accession numbers and turn to the proper abstracts or summaries section.

While the Subject Term Index will give a general idea of the scope of the RRIS classification system, there are many other terms that do not happen to appear in this issue but for which there is information available.

Abbreviations

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

*See page ix for availability of papers and research reports.

Availability of Research Reports and Journal Articles

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

mation Service, be sure to give the NTIS accession number (PB plus six digits) as well as the title and other information. When no availability is specified with an abstract, it is suggested that the user consult an established transportation library. Because a large number of documents are available from a few sources, space and printing costs have been reduced by abbreviating these sources as follows:

AAR

Association of American Railroads
1920 L Street, N.W.
Washington, D.C. 20036

AIAA

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

AREA

American Railway Engineering Association
59 East Van Buren Street
Chicago, Illinois 60605

ASCE

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

ASME

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

CIGGT

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

DOT

U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590

ECMT

All documents available through OECD (see below)

ESL

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

FRA

Federal Railroad Administration
2100 Second Street, S.W.
Washington, D.C. 20590

GPO

U.S. Government Printing Office
Superintendent of Documents
Washington, D.C. 20402

IEEE

Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, New York 10017

IPC

IPC (America), Incorporated
205 East 42nd Street
New York, New York 10017

NAE/NAS/NRC

National Academy of Sciences
Publication Sales
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

NTIS

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

OECD

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

ORE

See UIC/ORE below

OST

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

RPI

Railway Progress Institute
801 North Fairfax Street
Alexandria, Virginia 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, Pennsylvania 15096

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

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

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

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:
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

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

XUM
Xerox University Microfilms
300 North Zeeb Road
Ann Arbor, Michigan 48106

RRIS File Searches

The RRIS primary file is maintained on magnetic computer tape. A secondary file is kept in the form of a computer printout of entries. Either file may be searched for specific information. The key to searching either file is the use of appropriate subject terms. The primary (computer) file is searched by the computer; the secondary (printed) file is searched manually.

The RRIS file contains summaries of research projects in progress and abstracts of published works, together with the appropriate documentation and bibliographic data. The output from the file search is in the form of a computer-printed list from a search of the magnetic tape file and as photocopies of listings in the case

of a manual file search. Such computer-generated lists are similar in format to those used in this publication.

The fee schedule for RRIS file searches reflects the primary support for the service from the Federal Railroad Administration and the nonprofit nature of all National Research Council information services:

Computer Retrieval	\$50 per request plus 25 cents per printout page after screening
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Whether computer retrieval or, optionally, a manual retrieval is used is generally decided by mutual agreement between the RRIS staff and the requester after consultation. A written authorization or purchase order is required before the retrieval is actually made.

Availability of RRIS Publications

Previous issues of the Railroad Research Information Service publications are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151. Order by title and NTIS Accession Number (PB plus six digits).

Title	Special Bibliography: Safety-Related Technology	Railroad Research Bulletin, Developmental Issue	Railroad Research Bulletin, Vol. 1, No. 1	Railroad Research Bulletin, Vol. 1, No. 2	Railroad Research Bulletin, Vol. 2, No. 1
Date	March 1973	Autumn 1973	Spring 1974	Autumn 1974	Spring 1975
RRIS Number	73S1	7301	7401	7402	7501
NTIS Accession Number . . .	PB 220 220	PB 226 784	PB 233 880	PB 241 042	PB 243 353

NTIS Prices:

Domestic

Papercopy	\$9.00	\$8.00	\$9.25	\$11.25	\$8.50
Microfiche	\$2.25	\$2.25	\$2.25	\$2.25	\$2.25

Outside United States

Papercopy	\$11.50	\$10.50	\$11.75	\$13.75	\$11.00
Microfiche	\$3.75	\$3.75	\$3.75	\$3.75	\$3.75

Sample Abstracts

Abstracts are classified according to an eight-digit code. The first two digits are used to place the abstracts in the proper subject areas according to the RRIS classification scheme (page v). The first two digits appear at the tops of the pages in the abstracts section of this publication along with the category designation. These two digits and a space precede

the final six digits that appear at the top of each abstract. The six-digit number is the RRIS reference assigned to that specific item. Abstracts in each category appear in ascending order of reference numbers, although these usually will not be consecutive. Examples of a report abstract and of a journal article abstract appear below.

Reference Number →
Title →

00 071760

RESEARCH TO IMPROVE TUNNEL SUPPORT SYSTEMS

Studies are described that were directed toward improving the design of certain types of tunnel support systems. Studies to predict the interaction of a circular liner with the medium performed with a linear finite element computer program and a closed form solution are described. Two construction techniques that give different interaction solutions and thus different liner loadings were simulated. Results are presented in the form of dimensionless plots from which moment, thrust, shear and deformation can be predicted. Steel-fiber-reinforced regulated-set-cement concrete has been proposed for use in a slipformed tunnel liner system. Mix design, pumping characteristics and mechanical properties of this material are described. Also, test results for two specimens which represent a portion of the slipformed liner are presented. Behavior of the liner and resisting mechanism was found to be highly nonlinear and to have a great deal of reserve strength beyond the linear range. Eleven large-scale tests which simulate steel horseshoe sets in rock tunnels are described and the effects of connection characteristics, blocking stiffness, load distribution and load inclination on the set behavior are discussed. Both the concrete liners and the steel sets that were tested, were simulated by a linear (STRUDL) and a nonlinear analysis (NASTRAN) and the results compared with those obtained from the tests.

Research Report Abstract →

Supplementary Notes →

This study was sponsored by and prepared for the Federal Railroad Administration, DOT.

Authors, Publication Data, Document Data →

Paul, SL Gaylord, EH Hendron, AJ Kesler, CE Mohraz, B Peck, RB Illinois University, Urbana, (UILU-ENG-74-2016) Final Rpt. FRA-ORD7D 74-51, June 1974, 235 pp, Figs., Tabs., 1 App.

Activity Data →

Contract DOT-FR-30022

Source of Abstract →

ACKNOWLEDGMENT: FRA

Availability →

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-235762, DOTL NTIS

Reference Number →
Title →

00 071769

EFFECT OF ENVIRONMENT ON RAPID TRANSIT CONSTRUCTION

Rapid transit systems must be constructed in a hostile environment. The space required for construction is already crowded. Hinderance of traffic must be avoided or minimized. Existing utility systems and adjacent structures must be maintained and remain useful during construction and must be restored to as good as, or better than, original condition upon completion. Care must be exercised to minimize imitation or harm to the public. All these factors cost extra expense and time, but the effect may be lessened by preparatory work, by vigorous public relations, by working closely with governing officials, and by timely acquisition of real estate.

Journal Article Abstract →

Author, Publication Data, Document Data →

Kline, GO *ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE2, 9751, May 1973, pp 367-370

Source of Abstract →

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering

Availability →

PURCHASE FROM: ESL Repr. PC, Microfilm

Sample Summary of Ongoing Research

The ongoing project summaries in the section beginning on page 179 describe research activities currently in progress or recently completed. Each record describes who is performing the project, who is funding it, and how the research goal is to be attained. A project summary is not a

document surrogate; that is, there is not necessarily a full report published on the project. The summaries use the following format, although it should be noted that each record may or may not contain all the elements described below.

Reference 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 technical 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, Development and Demonstrations
Contract Monitor	→	RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel. 202-426-0855)
Project Data	→	STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$ 1325255 Contract DOT-FR-40023
Source of this Summary	→	ACKNOWLEDGMENT: FRA

Abstracts of Reports and Journal Articles

00 052599

FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES. FATIGUE OF LARGE BUTT WELDS ON BRIDGES

The report describes fatigue tests on large butt-welded beams and concludes that strength is lower than would be predicted from results using small specimens, or from many codes of practice. Tests incorporated shop and site welds and attachments provoking local stress concentration.

International Union of Railways D130/RP 1/E, Apr. 1974, Figs., Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

00 052609

INVESTIGATION OF BRIDGE DECKS WITH CONCRETE ENCASED GIRDERS. STATIC TESTS ON EXPERIMENTAL DECKS WITH CONCRETE ENCASED GIRDERS NOS. 4 AND 5

This report consists of two parts: Description and result of the static tests on experimental deck No. 4 (RP 3A). The tested concrete deck had a span of 3.60 m and the same principal dimensions as the bridge deck models tested previously. Steel sheets fastened to the underside, however, resulted in better use being made of the steel, which remained comparable in the cross-sectional area with the girders used in experimental deck No. 1. Description and result of the static tests on experimental deck No. 5 (RP 3B). Steel sheets were fastened to the underside of the experimental deck, the principal dimensions again remaining unchanged. The cross-sectional area of the steel was, in this connection, reduced to attain a total section modulus similar to that of experimental deck No. 1.

International Union of Railways D123/RP 3/E, Apr. 1974, 39 pp, Figs., Tabs., Photos.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

00 052648

STATISTICAL DISTRIBUTION OF AXLE-LOADS AND STRESSES IN RAILWAY BRIDGES, REPORT OF ENQUIRY CONCERNING THE ROLLING STOCK AND BRIDGES

The report summarises the replies to two questionnaires. It concerns, first of all, the questionnaire "Bridges", supplying data on the most frequently occurring types of bridges and spans built by the Administrations during the last 12 years. The replies to the questionnaire "Vehicles" furnishes information concerning the present rolling stock and traffic. The information will be used, at a later date, for the determination of stress spectra.

International Union of Railways D128/RP 2/E, Apr. 1974, 21 pp, Figs., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

00 083030

MAJOR PROGRESS ON LT FLEET LINE INCLUDING TWO STEP-PLATE JUNCTION TUNNELS

The 21-mile twin-tunnel construction linking Baker Street station on the Bakerloo Stanmore branch with the new Fleet Line tunnels bored to

Strand station which incorporate two step-plate junctions, these encircling existing running bore shells which are now to be dismantled. An enterprisingly executed task enabling train running to continue with a minimum of delay.

Rail Engineering International Vol. 4 No. 9, Nov. 1974, pp 422-424

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 083038

HARDINGE BRIDGE SPAN REPAIR

The bottom chords and diagonal members of one of the 345-ft (105 m) Petit type riveted through spans of Hardinge bridge were damaged by explosion during the war in 1971. As a result the span was out of shape and also was unfit for use. The span was repaired by temporarily securing the damaged truss from adjacent spans with the help of pin-connected link members. The damaged truss was jacked up from two steel barges specially strengthened for the purpose and the load was applied by pumping out water from (built-in) compartments in the barges. The job was of a challenging nature considering the unfavorable river condition and the short time available for restoration work. A computerized analysis of the damaged span was carried out to establish the stress condition of the various members of the damaged span.

Ghoshal, A Ganguly, JC Banerjee, HK Kapoor, MP *ASCE Journal of the Construction Division* Vol. 100 No. CO4, Dec. 1974, pp 631-646, 16 Fig., 2 Ref.

ACKNOWLEDGMENT: ASCE Journal of the Construction Division
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 083043

SECOND PROGRESS REPORT ON PERFORMANCE OF FILTER MATERIALS

Tentative results of the first phase of the cooperative program indicated that the stability of the filter adjacent to the pipe perforation was not a function of material sorting and consequent bridging of large grain sizes. Further study of this tentative finding was undertaken by means of a series of flow tests in which the filter materials was compacted to six different specific weights. The major conclusions developed during the present phase of the investigation are as follows: 1. There is an optimum compaction of concrete sand when used as a filter material. The optimum compaction is a function of velocity of flow through the filter. The optimum compaction applies to both filter stability and flow capacity. 2. Compaction of the filter in excess of the optimum results in filter destruction, while compaction less than the optimum leads to readjustment of the filter and eventual stability. 3. Readjustment of the filter material is accomplished by the migration of fine particles toward the pipe perforations. This migration continues until the number of fines passing through the coarser material adjacent to the perforations causes physical binding. After binding the filter is stable for all velocities equal to or less than the velocity at the time of binding. 4. Determination of the required size of drain pipe for a hypothetical case indicates that many subdrains are being installed with pipe diameters at least 75 percent oversize.

This is a cooperative research program conducted by the Association of American Railroads and the University of Illinois.

Guillou, JC Lanyon, RF (Illinois University, Urbana)
Association of American Railroads Technical Center #ER-12, May 1961, 18 pp, 7 Fig., 2 Tab., 4 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 083044

THIRD PROGRESS REPORT ON PERFORMANCE OF FILTER MATERIALS FOR UNDERGROUND DRAINS

The purpose of this report is to present further substantiation of the filter readjustment hypothesis, to compare the action of corrugated metal sub-drains with perforations located at the top of the pipe with drains having the holes at the bottom of the pipe, and to indicate the hydraulic capacity of various types of subsurface drain pipes. Principal conclusions obtained from the present test program include: 1. Initial compaction is a major factor in the development of filter stability. Over-compaction of a concrete sand filter may lead to failure of the bed, and will materially reduce the infiltration capacity of the system. 2. Stability of the filter at the pipe opening is not established by washing out the fines and bridging of the remaining large particles. Stability is established by the binding of pore spaces near the opening with fine particles which were moving toward the opening. 3. Corrugated metal subdrains should be installed with perforations at the bottom of the pipe for maximum security from filter failure. 4. Concrete sand may suitably be used as filter material with either clay drain tile or plastic pipe if the conduit is properly installed.

Guillou, JC (Illinois University, Urbana)
Association of American Railroads Technical Center #ER-29, Feb. 1963, 16 pp, 9 Fig., 4 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 083045

LABORATORY INVESTIGATION TO DETERMINE STATIC AND REPEATED LOAD STRENGTH OF FULL-SIZE DOUGLAS FIR GLUED LAMINATED STRINGERS

This report contains a description and analysis of data recorded during the investigation of 24 dry, untreated, combination 10, Douglas fir, glued-laminated bridge stringers in the AAR Research Center Laboratory. A complete summary of the data obtained during this investigation can be found in Tables 1, 2 and 3. This report also contains a description and analysis of data pertaining to the growth characteristics and physical properties of the wood used in these stringers as determined by the Forest Products Laboratory, Madison, Wisconsin. The data obtained during this investigation can be found in Tables 6 to 8.

Digest, A
Association of American Railroads Technical Center #ER-26, Oct. 1962, 10 pp, 21 Fig., Tabs., 1 App.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

00 083051

MELBOURNE RAIL LOOP PIERCES VARIED GEOLOGY

Australian contractors are piggybacking two pairs of tunnels under Melbourne to provide a four-track commuter rail loop for the central business district. Because of varying geology, construction methods range from a tunnel boring machine (TBM) to drift mining, plus cut and cover. The 8-mile loop is an extension of the existing suburban rail system, connecting radial lines.

Engineering News-Record Jan. 1975, 2 pp, Photos.

ACKNOWLEDGMENT: Engineering News-Record
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 083906

DYNAMIC STABILITY OF A BEAM LOADED BY A SEQUENCE OF MOVING MASS PARTICLES

The dynamic stability for the lateral response of a finite Bernoulli-Euler beam loaded by a continuous sequence of identical, equally spaced, mass particles attached to and traveling at a constant speed across the beam is investigated. This paper points out that, in general, multiple regions of unstable response will occur. However, for certain particle spacings and foundation moduli a single region of unstable response occurs. In general, the critical speed ratio β_{cr} (or the nondimensional particle speed at which instability of the beam occurs) is increased by decreasing αT , the nondimensional particle mass; increasing ρ , the nondimensional particle spacing; increasing γ , the nondimensional foundation stiffness; increasing P^* , the nondimensional axial tensile force on the beam; increasing $\xi_{sub n}$, the damping coefficient.

Benedetti, GA (Sandia Laboratories) *ASME Journal of Applied Mechanics* Vol. 41 No. 4, Series E, Dec. 1974, pp 1069-71, 5 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 083907

DYNAMIC STABILITY OF A BEAM LOADED BY A SEQUENCE OF MOVING, MULTI-AXLE, MASS VEHICLES

An approximate method is presented for determining the dynamic stability of the lateral response for a finite Bernoulli-Euler beam loaded by a continuous sequence of vehicles traveling at a constant speed. The beam, which can also be loaded by a constant axial force, is uniform and simply supported and rests on a massless, uniform elastic foundation. Damping for the beam and foundation is provided by a combined uniform viscous damping coefficient. The vehicles which are identical, equally spaced, and attached to the beam, each consist of a rigid body mass supported by two separate axles or wheel masses. Consequently, the vehicles can rotate (or pitch) and translate laterally. The Galerkin method is used to generate a set of approximate equations of motion which contain periodic coefficients. Hence, multiple regions of dynamic instability can occur. The coupled equations are simplified by using a one-term Galerkin approximation which, under certain conditions, reduces to a Mathieu equation. Thus, the critical vehicle speeds, which correspond to dynamic instability, are predicted in terms of the physical system parameters by simple algebraic expressions.

Benedetti, GA (Sandia Laboratories) *High Speed Ground Transportation Journal* Vol. 9 No. 1, Mar. 1975, pp 483-493, 8 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 083923

FAST SET SHOTCRETE IN CONCRETE CONSTRUCTION

Shotcrete as a supporting material for tunnel and for tunnel lining has not been used a great deal in North America. This paper discusses the technique of coarse aggregate shotcreting and how it is being used today. In the past shotcreting was used on a limited basis, mainly as a rock sealant technique. With advances in technology and equipment, an increased use of coarse aggregate shotcrete in tunnels and underground mines is expected. The main thrust is coming from the ability to use accelerators in wet mix shotcrete.

Stenson, HN *American Concrete Institute, Journal of* Vol. 71 No. 6, June 1974, pp 289-295

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: ESL Repr. PC, Microfilm

00 083930

RIP-RAP PROJECTS NOT AS SIMPLE AS THEY APPEAR

Potential problems for the contractor on riprap work include grading of rock, keyway excavation, and skip placement. Specifications must be read carefully before starting a job. A rock rake is an essential tool in spreading the riprap while permitting undesirable material to pass through. Availability for rock that will break to specifications should be considered. Most keys are dug using a 40- or 50-ton crane with clamshell bucket. If the distance is 30 ft or less from road to eroded area, the backhoe may be used

for fast keyway excavation; a crane or dragline bucket will also be needed to dress and comb slopes.

Lapinski, M *Western Construction* Vol. 49 No. 12, Dec. 1974, pp 32-33
PURCHASE FROM: ESL Repr. PC, Microfilm

00 083950

PRACTICAL TUNNEL DRIVING

This volume is confined primarily to the practical side of tunnel driving. The authors endeavored to explain in detail the fundamental operations that form the basis for each tunnel job, large and small, in soft ground or hard. In recognition of the fact that no two tunnels present the same driving conditions, this book gives several variations of fundamental procedures such as ground support, drilling, shooting, mucking, track installation and haulage, shaft operations, pumping, concrete lining, and others. The new edition has been annotated to incorporate changes in tunneling technology over the three decades since initial publication.

Richardson, HW Mayo, RS
McGraw-Hill Book Company 1960, 447 pp, Figs., Photos., 1 App.

PURCHASE FROM: McGraw-Hill Book Company 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

DOTL TGB 8200.R51

00 084726

DEAD LOAD DESIGN OF CURVED I GIRDER BRIDGES

In recent years we have witnessed an ever-increasing demand for curved girder bridge systems. This has created a need for reliable methods by which such systems may be designed and analyzed. Methods developed to date do not adequately account for the effects of both girder warping and the interaction of adjacent girders due to radial diaphragm action. For bridge systems subjected to dead load with no composite action, significant error in the calculation warping stress (flange bending) may result. The objective of this report was to develop a method of analysis for curved girder bridge systems and to develop a set of design aids to facilitate their design. Vaslov's Equations expressed in finite difference form are used to describe the structural response of the individual girders. The stiffness method is employed to express diaphragm action in terms of relative displacements of the adjacent girders. Inclusion of the expressions for diaphragm action into the finite difference form of Vaslov's Equations yields a system of linear algebraic equations which gives the behavior of curved bridge systems. This method of analysis is incorporated into a computer program, which is then used to conduct a parametric study. A thorough study of the interaction of the various bridge parameters has resulted in a set of design aids. These design aids can be used to determine the effects of curved bridge system parameters upon the maximum bending and warping stresses when the system is subjected only to dead load. Any assumptions pertaining to the magnitude of live load stresses may be subsequently verified by running the aforementioned computer program.

This study was sponsored by the Maryland Department of Transportation, State Highway Administration in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

Murphy, EL Heins, CP
Maryland University, College Park Intrm Rpt. 52, Mar. 1973, 115 pp, 47 Fig., 9 Tab.

Contract AW-73-133-46

ACKNOWLEDGMENT: Maryland Department of Transportation
PURCHASE FROM: Maryland University, College Park Civil Engineering Department, College Park, Maryland, 20742 Repr. PC

DOTL TGB1330.M88

00 084913

SYSTEMATIZATION OF FLOOD CONTROL MEASURES

A general review is given of trends in flood control, as seen by the writer. Five significant areas in systematization of flood control measures are: prevention; prediction; flood-plain proofing, physical measures of flood control (divided into extensive and intensive); and flood insurance. The extensive physical measures are divided into eight groups: levees and dikes; release basins; reservoirs; increased channel capacity; parallel channels; diversion channels, flood-plain polders; and flood-plain platforms. The classification scheme is an attempt for systematization of flood control measures mainly from the point of view of application of systems analysis, with a particular stress on the joint use of several flood control measures simultaneously.

Yevjevich, V *ASCE Journal of the Hydraulics Division* Proc Paper Vol. 100 No. HY11, No. 10943, Nov. 1974, pp 1537-48

ACKNOWLEDGMENT: ASCE Journal of the Hydraulics Division
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 084932

MODEL EXPERIMENT ON LATERAL RESISTANCE OF FOOTING FOUNDATION IN CRUSHED STONE BED

This report covers model experiments with lateral strength of footing foundations, necessary to resist the forces which might develop in the course of an earthquake. To define the resistance of such foundations in sand and cohesive soils, a three-dimensional model was used. The cross section of the sliding surface and the scope of the rupture field were observed at the ultimate displacement. Determined were the passive coefficient in the passive state and the coefficient of horizontal subgrade reaction.

Also available from ESL.

Moriyama, S Suzuki, Y *Railway Technical Research Institute Quart Rpt.* Vol. 15 No. 4, Dec. 1974, pp 219-220, 5 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

00 084933

ESTIMATING METHODS OF IN SITU ROCK-STRENGTH BY NON-CORE BORING

This report describes the investigation of three methods of non-core boring: Correlation of cutting speed and thrust; Correlation of boring power and cutting speed; Use of a cutting coefficient. The first and third methods agree with results determined by actual core drilling. It is proposed that to further refine the non-core method, it would be necessary to correct for abrasion of the bit, to speed up the analysis by using digital data management; and to correlate results with actual tunneling rather than merely with core drilling.

Also available from ESL.

Misawa, S Takahashi, A *Railway Technical Research Institute Quart Rpt.* Vol. 15 No. 4, Dec. 1974, pp 217-218, 6 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

00 084938

PRESSURE VARIATIONS, AERODYNAMIC DRAG OF TRAIN, AND NATURAL VENTILATION IN SHIN KANSEN TYPE TUNNEL

The aerodynamic problems of high-speed trains and tunnel ventilation have been investigated using a one dimensional unsteady flow model. Pressure variations in a tunnel must involve the compressibility of air, the friction between the side of the train and the tunnel wall, particularly when trains are 300 to 400 m long. In a double-tracked tunnel the passing of two trains must also be studied. In this case, the superposition of characteristic waves serves suitably. In long underwater tunnels, the problems of ventilating heat and gases must be considered since piston effects are insufficient to ventilate double-track tunnels. Results are given for the double-track Shin Kansen tunnel at speeds up to 500 kph.

Also available from ESL.

Yamamoto, A *Railway Technical Research Institute Quart Rpt.* Vol. 15 No. 4, Dec. 1964, pp 207-214, 5 Fig., 4 Ref.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

00 084940

AN ESTIMATING METHOD OF SLOPE SAFETY BY AERIAL PHOTOGRAPHS

This paper describes a method estimating slope safety along railways by interpretation of aerial photographs. The method of rough investigation

techniques reveals potential dangerous spots on slopes and streams along the JNR by a marking system. The method consists essentially of scoring each factor by a quantification theory, using maps depicting the topography, geology and vegetation. In the future these aerial photo techniques will be combined with infrared and false color photography.

Also available from ESL.

Kobashi, S Imai, T Sakazaki, K *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 4, Dec. 1974, pp 173-176, 7 Fig., 1 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

00 084941

EXPLORATION OF LANDSLIDE AREA ON TOHOKU SHIN KANSEN

A massive embankment including counterweight fills was adopted for the Tohoku SHIN KANSEN Line at a small landslide area near Mizusawa. In this paper an outline of the results of soil explorations and field observations to understand the state of the landslide is presented first. Then some problems about the stability of the slope and of the embankment against sliding failure are discussed.

Also available from ESL.

Watanabe, S *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 4, Dec. 1974, pp 184-185, 8 Fig., 8 Ref.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

00 084947

CONCRETE DECK SLIDE-IN TECHNIQUES APPLIED TO MOTORWAY UNDERPASS BENEATH NS MARSHALLING YARD COMPLEX

Occasional weekend possession to civil engineers led to developing step-by-step sliding-in of ready-laid three track deck sections of 3,700 ton mass cast adjacent to site to straddle four lane motorway construction south of Amsterdam. Bored piling was required to curtail noise and because of limited space, machines were developed for the purpose.

Bakker, HH *Rail Engineering International* Vol. 5 No. 1, Jan. 1975, 9 pp, Figs., 9 Phot.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 090026

STUDY AND DEVELOPMENT OF ADVANCED SURVEY SYSTEMS AND TECHNIQUES

The purpose of this study was to examine the feasibility of developing a relatively inexpensive technique by which aerial photography could be accomplished using retroreflectors as survey control points. Strobe lights mounted next to the aerial camera and synchronized to the shutter would produce the light that is reflected from the retroreflectors into the camera aperture producing target images on the aerial negative. It was determined that a strobe camera system could be used to obtain target images at 1500 feet flying heights using standard highway delineators as targets. The delineator targets are economical and satisfactory for higher altitude flights if the strobe light candlepower is increased.

Herd, LO Laasi, A
Ohio Department of Transportation, Federal Highway Administration
Final Rpt. OHIO-HWY-10-73, Sept. 1974, 70 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238117/6ST, DOTL NTIS

00 090031

PREDICTION OF LONG TERM DEFORMATION OF A COMPACTED COHESIVE SOIL EMBANKMENT OVER A SOFT FOUNDATION

The study is concerned with prediction of the long-term deformation of a compacted cohesive soil embankment over a soft foundation. The prediction of embankment performance was made using the finite element

method of analysis incorporating a nonlinear viscoelastic model of the fill behavior and a quasielastic representation of the foundation. A full-scale test embankment was constructed and instrumented to permit evaluation of the predictive approach. Samples of subsurface and the embankment material were tested in the laboratory to determine numerical values of desired material parameters. The performance of the test embankment was monitored both during and after its construction.

Prepared in cooperation with the Indiana State Highway Commission, Indianapolis.

Chen, YN

Purdue and Indiana State Highway Commission JHRP, Federal Aviation Administration, Indiana State Highway Commission, (HPR-PR-1(10)) Final Rpt. Rept. No JHRP-74-4, May 1974, 202p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238159/8ST, DOTL NTIS

00 090179

EROSION EVALUATION STUDY

The final report is concerned with the Erosion Evaluation Study which was to develop a tentative laboratory procedure by which new chemical additives or mulches for retarding soil erosion can be evaluated. The field phase of the study was also to determine the effectiveness of the various agents tested on seed germination, grass stand growth and control or retardation of soil erosion. The laboratory phase of the study was concerned with the development of a tentative laboratory test procedure to test and evaluate these erosion agents, thereby eliminating less promising ones so that the better ones could be further tested in the field. In conducting the laboratory phase of the study, a rainfall-simulator was designed and constructed. Operation and evaluation of the rainfall-simulator was successful and a tentative laboratory test procedure was developed. The degree of effectiveness of the various erosion control products tested was determined both in the field and in the laboratory.

Law, SM Vaccaro, SJ

Louisiana Department of Highways, Bureau of Public Roads, (HPR-PR-L(11)) Final Rpt. RR-76, June 1974, 84 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238875/9ST, DOTL NTIS

00 090328

SLOPE STABILITY ANALYSIS: A COMPUTERIZED SOLUTION OF BISHOP'S SIMPLIFIED METHOD OF SLICES

A computer program based on Bishop's simplified method of slices (1954) and capable of analyzing the slope stability of a multilayered soil mass is described. The computer program was specifically developed for analyzing the slope stability of highway bridge approach embankments; however, it can be applied to a broad spectrum of practical slope configurations and bearing capacity problems. Details of the use, applications, and accuracy of the program are presented. Important features of the computer program include a grid type, search operation for locating the critical shear surface and a ledger printout of the forces acting on each individual slice. The latter feature was included so that results of the computer program could be compared to those obtained from manual computations. Pore pressures in the computer program are handled in a manner described by Bishop (1954). Additionally, for seepage, cases, infinite slope conditions are assumed and used to simulate a flow net.

Yoder, SM Hopkins, TC

Kentucky Department of Highways, (KYHPR-64-17) Intrm Rpt. RR-358, Feb. 1973, 73p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238954/2ST, DOTL NTIS

00 090403

FOCUSED LASER BEAMS TO ASSIST ROCK EXCAVATION

A study was performed to assess the feasibility of using a focused CO2 laser beam to cut the gage of a hard-rock tunnel being excavated by a continuous tunnel-boring machine. Laser rock-kerfing tests were conducted on isolated samples of granite, diabase and quartzite rock with a Navy-owned electric-discharge CO2 laser located at the United Aircraft Research Laboratories. The tests were performed to verify previously

made extrapolations which were used to predict full-scale power requirements for the laser gage-kerfing concept. Laser powers and kerfing speeds were extended from previously tested maximum values of 5 kW and 21.2 cm/sec to 16.5 kW and 125 cm/sec. In addition, the test program included a comparison of the use of 50.8 cm-focal-length spherical and cylindrical focusing mirrors.

Jurewicz, BR Greenwald, LE Brown, CO
United Aircraft Research Laboratories, Federal Railroad Administration
Final Rpt. UARL-N971543-11, Nov. 1974, 161 pp

Contract DOT-FR-20021

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr PC, Microfiche

PB-239426/0ST, DOTL NTIS

00 090408

THE EFFECT OF DENSIFICATION ON THE ENGINEERING CHARACTERISTICS OF ORGANIC SOILS. VOLUME I

Mixtures of clay, silt, and sand with known organic contents were molded at their liquid limits in special cylinders and statically loaded for 48 hours under various simulated overburden pressures. Both unconfined and quick triaxial compression tests indicated usable shear strengths of 0.3 to 0.7 ksf. Static surcharging also increased the dry densities, reduced the moisture contents, and resulted in greatly reduced permeabilities of the clays and silts. Shear strengths generally increased directly with the surcharge and organic content. From standard consolidation tests, only the square root-of-time plots provided classically-shaped curves that could be used to determine the end of primary consolidation. Primary consolidation of organic soils occurs in two overlapping stages. Organic soils gain in stiffness under cyclic loading, generally after six cycles. Extensive appendices provide data for the preliminary estimating of settlement rates. The text gives numerical examples of embankment settlements and shear distribution based on the finite-element analyses.

See also Volume 2, PB-239 538. Prepared in cooperation with the Louisiana Dept. of Highways, Baton Rouge.

Arman, A Munfakh, GA
Louisiana State University, Baton Rouge, Louisiana Department of Highways Final Rpt Bulletin 113, Dec. 1973, 119 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr PC, Microfiche

PB 239537/4ST, DOTL NTIS

00 090409

THE EFFECT OF DENSIFICATION ON THE ENGINEERING CHARACTERISTICS OF ORGANIC SOILS. VOLUME II. APPENDICES

Volume II provides appendices on test results. Plots of density, moisture content and strength versus static surcharges are included. This report also contains flow charts and computer programs for data reduction.

See also Volume I, PB-239 537. Prepared in cooperation with the Louisiana Dept. of Highways, Baton Rouge.

Arman, A Munfakh, GA
Louisiana State University, Baton Rouge, Louisiana Department of Highways Final Rpt No. 2, Bulletin 113, 1973, 226 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr PC, Microfiche

PB-239538/2ST, DOTL NTIS

00 090465

STATIC THREE DIMENSIONAL ANALYSIS OF ELEVATED STEEL TRANSPORTATION STRUCTURES

A three-dimensional finite element modeling technique that may be used to statistically analyze many classes of steel elevated transportation structures for design, analysis, and maintenance studies was developed and tested. Parameter studies on a typical class of steel elevated transit structure found in many cities showed that: (1) a 50 foot long built-up plate girder representation modeled as 50 beam elements and 100 plate elements gave calculated shear and moment values that compared well with analytical values. The errors resulting from the use of fewer elements were found to be large. (2) Locations on the structure subjected to stress reversals or stress concentration are clearly indicated by the technique and show where damage due to fatigue and deterioration is likely to occur. (3)

Forces in cross-bracing and sway frames, which are not readily obtained in a conventional analysis, may be easily obtained. (4) Calculated deflection taking into account the three-dimensional effects of bracing and sway frames may be determined and compared with allowable values.

Traubenik, M Silver, ML Belytschko, TB
Illinois University, Chicago, Department of Transportation Intrm Rpt.
Nov. 1974, 64 pp

Contract DOT-OS-30092

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239870/9SL, DOTL NTIS

00 090497

A LABORATORY EVALUATION OF FULL SIZE ELASTOMERIC BRIDGE BEARING PADS

The results of a series of physical tests conducted on full size elastomeric bridge bearing pads are presented. Various shapes and sizes of pads up to seven square feet in plan area and 5 inches in thickness were subjected to compressive, cycling, creep, translation, rotation, and ultimate strength tests. Test conditions were selected to simulate actual in-service physical environment. Typical pads consisted of 55 durometer neoprene reinforced at 1/2 inch intervals with steel, polyester, or fiberglass reinforcement. All tests were performed at room temperature.

Crozier, WF Stoker, JR Martin, VC Nordlin, EF
California Division of Highways Final Rpt. CA-TL-6574-1-74-26, June 1974, 66 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240250/0SL, DOTL NTIS

00 090499

HIGH-STRENGTH STEEL AS REINFORCEMENT FOR CONCRETE BRIDGES

Two experimental concrete bridge structures reinforced with high-yield-strength steel were designed and constructed in 1964 on arterial highways in Rochester, New York, and instrumented to determine their live-load and long-term dead-load performance. Eight years of deflection measurements and crack surveys are summarized and analyzed. Measured deflections are also compared with theoretical values. The test results indicate that the ACI Code 318-71 method, with Branson's suggested revisions, is adequate for prediction of total long-term dead-load deflection, and that Yu and Winter's Method C, used in the design, significantly underestimates this deflection. It is concluded that drying shrinkage is a major contributor to time-dependent deflection of concrete bridge structures reinforced with high-strength steel.

Zell, JB Beal, DB
New York State Department of Transportation, Federal Highway Administration Final Rpt. NYSDOT-ERD-74-RR-25, Nov. 1974, 29 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-24-277/4SL, DOTL NTIS

00 090626

FATIGUE BEHAVIOR OF WELDED REINFORCEMENT IN REINFORCED CONCRETE BEAMS

Fatigue tests were conducted on reinforcing bars subjected to axial loadings and reinforcing bars embedded in concrete beams. Major emphasis was placed on determining the effect of both welding and type of bar material on the fatigue behavior of the beam reinforcement. To this end a variety of butt and lap-welded joint types were studied. In addition, the relative fatigue behavior of intermediate grade and high strength reinforcing bars was investigated.

Report on Illinois Cooperative Highway Research Program Ser-149.

Barone, MR Cannon, JP Munse, WH
Illinois University, Urbana, Illinois Department of Transportation, (IHR-64) Intrm Rpt. Series 407, May 1974, 173 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240367/3ST, DOTL NTIS

00 090680

CONSTRUCTION EQUIPMENT (A BIBLIOGRAPHY WITH ABSTRACTS)

Construction equipment used in roadbuilding, mining, earth handling and general construction are described and analyzed in these Government-sponsored research reports. Translations of foreign literature are not included. (Contains 174 abstracts).

Supersedes COM-73-11378.

Habercom, GEJ
National Technical Information Service Bibliog May 1975, 179 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
NTIS/PS-75/391/3ST, DOTL NTIS

00 090701

ROCK INDEX PROPERTIES TO PREDICT TUNNEL BORING MACHINE PENETRATION RATES

To successfully bid a tunneling contract by machine, a contractor must have a reliable estimate of expected penetration rates and cutter costs. Preferably, these predictions should be independent of those supplied by machine and cutter manufacturers. Therefore, a series of rock index tests have been developed and incorporated in routine Rock Mechanics testing for the purpose of predicting rock boreability. Index properties were evaluated empirically by using rock samples and pertinent construction records from recently machined tunnels. Samples were taken from the completed tunnel walls, tested parallel to machine penetration, and results were compared to localized rates of penetration.

Tarkoy, PJ
Illinois University, Urbana, National Science Foundation PJT-6, June 1974, 48 pp

Grant NSF-GI-36468

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-239664/6ST, DOTL/NTIS

00 090832

BRIDGES: CONSTRUCTION AND CONSTRUCTION MATERIALS (A BIBLIOGRAPHY WITH ABSTRACTS)

Bridge design, construction, construction materials, and the structural/mechanical properties thereof are reviewed in these Government-sponsored reports. Approximately 104 abstracts of the reports, covering the past four years, are included in this bibliography.

Habercom, GEJ
National Technical Information Service Report Jan. 1975, 109 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
NTIS/PS/751076/0ST, DOTL NTIS

00 090839

SUPPORT DETERMINATION METHODS

The Bureau of Mines acting as agent for the Advanced Research Projects Agency (ARPA), managed a program in Rock Mechanics and Rapid Excavation. The portion of the program assigned to the Spokane Mining Research Center (SMRC) concerned analytical and empirical techniques for ground support with emphasis upon: case history studies, instrumentation, evaluation and development, theoretical modeling of medium and structure interaction, and field studies. No work was done by SMRC in field studies. SMRC in-house and contract work performed under case history studies covered research areas of finding means of predicting rock loads, and developing the methodology for determining rock loads.

Skinner, EH
Bureau of Mines, Advanced Research Projects Agency Techn Rpt. P89-2B, Oct. 1973, 42 pp

Contract ARPA Order-1579

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-003891/9ST, DOTL NTIS

00 090841

MICROTHESAURUS OF SOIL MECHANICS TERMS

This microthesaurus lists in depth over 4000 terms in the subject fields of soil mechanics, soil dynamics, rock mechanics, engineering geology, and pavements, arranged in the format prescribed by Committee on Scientific and Technical Information, Federal Council for Science and Technology, displaying the hierarchical relationships among the terms.

Waterways Experiment Station, (DA-I-E-865803-M-728) Apr. 1974, 356 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-003812/5ST, DOTL NTIS

00 090847

SUBSURFACE INVESTIGATION, SECTION A013, ROCKVILLE ROUTE

Results are summarized of 65 test borings made at the locations of aerial structure piers and cut-and-cover construction in Section A013 of Rockville Route, generally following Rockville Pike north of the Capital Beltway in Montgomery County, Maryland, of the Washington Metropolitan Area Metro system. The report includes a continuous geological section along the centerline of the METRO structures through the test borings, logs of these borings, results of laboratory tests on soil samples and comments on potential design and construction problems.

Meuser, Rutledge Wentworth and Johnston, Washington Metropolitan Area Transit Authority WRWJ-75-127, Feb. 1975, 87p

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240906/8ST, DOTL NTIS

00 090926

SUBSURFACE INVESTIGATION, SECTION J001, SPRINGFIELD ROUTE

Results are presented of 32 borings and a number of probings made along the line of Section J001, Springfield Route, in the Valley of Cameron Run, City of Alexandria, Virginia of the Washington Metropolitan Area Metro system. The work was done for investigation of embankments and structures on the running line of METRO trackage, an aerial structure crossing over loop tracks of the Huntington-Springfield yards and certain ancillary structures. The report contains a continuous geological section along the centerline of track through the test borings, logs of these borings, results of laboratory tests on soil samples and conclusions regarding anticipated design and construction problems.

Mueser, Rutledge, Wentworth, & Johnston, Washington Metropolitan Area Transit Authority MRWJ-75-125, Mar. 1975, 57 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240270/9ST, DOTL NTIS

00 090981

SUBSURFACE INVESTIGATION, SECTION K007, VIENNA ROUTE

Results are summarized of 125 testborings and 8 test pits made for the investigation of subsoil conditions in Section K007 of Vienna Route of the Washington Metropolitan Area Metro System generally between Dunn-Loring and Vienna Stations along Interstate I-66 west of its intersection with the Capital Beltway. The report contains geological sections along the line of the METRO construction and for a number of ancillary structures and locations surrounding the stations, logs of the supplementary test borings, results of laboratory tests on undisturbed samples, and comments on anticipated design and construction problems.

Prepared in cooperation with De Leuw, Cather and Co., Inc., Washington, D.C.

Mueser, Rutledge, Wentworth, & Johnston, Washington Metropolitan Area Transit Authority, De Leuw, Cather and Company MRWJ-75-122, Feb. 1975, 152 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-239698/4ST, DOTL NTIS

00 091292

A SAMPLE COMPARISON OF THE GEOMORPHIC CHARACTER OF TWO RIVER BASINS AS RELATED TO SUSCEPTIBILITY TO BRIDGE FAILURE

All rivers undergo continuous changes in geometry and flow conditions; some of these changes are vigorous and some are less noticeable. Those rivers with vigorous changes are often classified as unstable, the others are called stable rivers. It is the purpose of the study to investigate the geomorphic differences between two drainage basins with stable and unstable characteristics by numerical description of the drainage basins and channel networks and to indicate important factors that should be considered in the selection of bridge sites and in predicting the vulnerability of existing bridges to flood damage.

Chang, FFM

Chang (Fred FM), Federal Highway Administration Final Rpt. Oct. 1974, 41 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240167/7ST, DOTL NTIS

00 091361

FIELD EVALUATION OF A DIRECT TRANSMISSION TYPE NUCLEAR MOISTURE-DENSITY GAUGE

Results obtained by a nuclear moisture-density gauge were correlated to those obtained by a balloon type volume device and oven drying. The nuclear testing modes were direct transmission for wet density and backscatter for moisture. Comparison tests were made on active construction projects in each of 10 soil types and graded aggregate bases from 10 stone formations. The test sites were located throughout the state. The test results were analyzed statistically by regression, correlation coefficient and t test (comparison of the means). It was found that the manufacturer's wet density calibration curve provided acceptable results in all of the Missouri soil types and stone formations tested but that the manufacturer's water calibration curve frequently furnished unacceptable values for moisture content. However, acceptable moisture content values were obtained with the nuclear gauge by use of a computed correction factor. This factor was found to be a constant for a particular soil type or stone formation on a project.

Missouri State Highway Commission, Federal Highway Administration Final Rpt. 74-2, Jan. 1975, 24p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241440/7ST, DOTL NTIS

00 091372

CONSTRUCTION MONITORING OF SOFT GROUND RAPID TRANSIT TUNNELS. VOLUME I: A DEFINITION OF NEEDS AND POTENTIAL DEVELOPMENTS

The Urban Mass Transportation Administration (UMTA) Tunneling Program Concentrates its efforts on reducing tunneling costs, minimizing environmental impact and enhancing safety as it applies to the planning, organization, design, construction and maintenance cycles of rapid transit tunnels in the urban environment. This study investigates the area of construction monitoring of rapid transit tunnels in soft ground. Soft ground tunnel construction monitoring has the potential to reduce construction costs, safety hazards and environmental impacts. Monitoring can diagnose face stability and ground movement problems, and allow appropriate preventive or remedial action. Monitoring provides data for prediction of ground movements and allows the compilation of useful legal documentation. Such data are also required for improving design and prediction methods.

Prepared in cooperation with Soil and Rock Instrumentation, Inc., Newton Upper Falls, Mass. Paper copy also available in set of 2 reports as PB-241 535-SET, PC\$11.00.

Schmidt, B Dunicliff, CJ

Parsons, Brinckerhoff, Quade and Douglas, Inc, Transportation Systems Center, Soil and Rock Instrumentation, Incorporated Final Rpt., 3-V1 DOT-TSC-UMTA-75-9-V1, Nov. 1974, 189p

Contract DOT/TSC-661

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241536/2ST, DOTL NTIS

00 091373

CONSTRUCTION MONITORING OF SOFT GROUND RAPID TRANSIT TUNNELS. VOLUME II: APPENDICES

The Urban Mass Transportation Administration (UMTA) Tunneling Program Concentrates its efforts on reducing tunneling costs, minimizing environmental impact and enhancing safety as it applies to the planning, organization, design, construction and maintenance cycles of rapid transit tunnels in the urban environment. This study investigates the area of construction monitoring of rapid transit tunnels in soft ground. Monitoring practices now in use do not usually allow full utilization of the data for the project from which they were gathered. Deficiencies in present practices are pointed out, and a systematic approach to monitoring is presented. Information presented will aid owners, designers, specification writers and instrumentation engineers. A computer program for data storage, interpretation and retrieval is proposed. An interim quality control specification for instrumentation procurement is presented, and instrumentation hardware improvements are suggested.

Prepared in cooperation with Soil and Rock Instrumentation, Inc., Newton Upper Falls, Mass. Paper copy also available in set of 2 reports as PB-241 535-SET, PC\$11.00.

Schmidt, B Dunicliff, CJ

Parsons, Brinckerhoff, Quade and Douglas, Inc, Transportation Systems Center, Soil and Rock Instrumentation, Incorporated Final Rpt., 3-V2 DOT-TSC-UMTA-75-9-V2, Nov. 1974, 104p

Contract DOT/TSC-661

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241537/0ST, DOTL NTIS

00 091421

WATER DRAINAGE FROM HIGHWAY FILLS

The objectives of the present study are to determine the conditions that lead to fill slides on highways in Kansas and to develop means of preventing or halting such slides. This interim report is being prepared to relate progress in the study, describe the general fill conditions, installation of drains to remove trapped water, and the observations made to date.

Clark, PC Crumpton, CF Gilliland, WJ

Kansas State Highway Commission, Federal Highway Administration Intrm Rpt. K-I-72-1, 1974, 45p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241790/5ST, DOTL NTIS

00 095215

NOISE-CONTROLLED TRUSS BRIDGES FOR RAILWAYS

Steel truss bridges have been widely used in Japan, because of their lightness in weight and ease of erection. But they are very noisy, and have become a serious nuisance to residents along the line. The article describes: the general principles of controlling noise by barriers and walls with sound-absorbing linings; practical methods of noise prevention on existing bridges; future design of bridges incorporating various noise prevention measures. However, further studies are required to determine certain details of these bridges.

Abe, H *Permanent Way* Vol. 15 No. 4, June 1974, pp 1-8, 10 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 095216

CONCERNING THE MECHANICS OF SOILS AND SOLIDS [Sur la mecanique des sols et des solides]

Basing his arguments on theories of plasticity, the author has carried out a very detailed study on the states of equilibrium of a land mass by vertical plane sections thus reduced to two-dimensional space. He defines the equilibrium clearance conditions and shows, with precision, the difference existing between the shearing curves in the elastic phase and the sliding curves in the plastic phase which play an essential role. He envisages certain particular situations and outlines a general theory in the case where the intrinsic curve of the material considered is of no consequence: the case of concrete or of certain metals, for example. [French]

Layrangues, P *Technique des Travaux* No. 247, May 1974, pp 131-148, 23 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

00 095217

FICTITIOUS LOADS FOR CALCULATING THE SERVICE RESISTANCE OF SINGLE-TRACK STEEL RAIL BRIDGES
[Lastannahmen fuer einen Betriebsfestigkeitsnachweis bei eingleisigen stahlernen Eisenbahnbruecken]

In order to calculate the values of stress systems in service (coefficient of the number of loads supported N_k), it is necessary to have details of the loads that will run over the bridge during its operational life. A definition is made of standard vehicles and trains of equivalent load to represent, in the calculations, actual vehicles and trains of different categories to simplify dimensioning studies. The fictitious loads provide an adequate reflection of the fatigue effect of actual trains crossing steel rail bridges. [German]

Naumann, G *DET Eisenbahntechnik* Vol. 22 No. 8, pp 269-372, 4 Fig., 1 Tab., 8 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: VEB Verlag Technik Oranienburgerstrasse 13-14, 102 Berlin, East Germany Repr. PC

00 095218

PROBLEMS IN LATERAL PRESTRESSING APPLIED TO PRESTRESSED CONCRETE BRIDGES

Fractures have been observed in the lateral prestressing bars of prestressed concrete railway T-girder bridges, built by the post-tensioned structural system. They were caused by stress corrosion, owing to inadequate grouting. Systematic investigations were then carried out on all bridges of this type, by random examination of the grouting where possible, and by field radiography using an iridium-192 gamma ray source. Inadequate grouting of the bars inside the sheaths, allowing air and moisture to enter, was found in many cases. The report gives an account of this inspection, together with a study of the causes of inadequate grouting, suggestions for improvements, and a very short discussion on the respective merits of solid prestressing bars or wire tendons.

Tamura, S *Permanent Way* Vol. 15 No. 4, June 1974, pp 9-30, 35 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 095242

TUNNEL COST MODEL

The Tunnel Cost Model is a computer-based simulation model of hard rock tunnel construction intended to improve the assessment of uncertainty in the preparation of tunnel estimates. The model comprises three submodels: a geologic submodel, a construction submodel, and a tunnel simulator. The geologic model uses the available geologic information expressed in terms of subjective probabilities to generate the likelihood of occurrence of various geologic conditions at defined locations in the tunnel. The construction submodel simulates cycles of construction operations under the various possible geologic conditions to assess the impact of these operations on time and cost. The tunnel simulator brings together the information produced by the two other submodels to simulate cycles of construction operations in many possible geologic profiles. Results of these simulations are time/cost distributions reflecting the uncertainty inherent in the estimate. To illustrate the use of the model, an example problem of a 12,000-foot tunnel in shale/limestone geology is presented. Results indicate a range of total direct cost of \$7.7 to 10.5 million, and a time of 210 to 305 days. These ranges provide a quantitative indication of the uncertainty inherent in a final tunnel time and cost estimate.

Moavenzadeh, F (Massachusetts Institute of Technology); Markow, MJ Wyatt, RD Minott, CH *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 2, June 1974, pp 1721-39, 2 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095255

RAPID EXCAVATION RESEARCH-ELEMENTS OF A NEW EXCAVATION TECHNOLOGY

Paper reviews some of the significant research accomplishments obtained under a three-year, \$6.6 million research program in rock mechanics and rapid excavation sponsored by the Defense Department's Advanced Research Projects Agency (ARPA) and managed by the U.S. Bureau of Mines. In addition to the rock mechanics research five major phases of excavation systems analysis, geologic production, rock disintegration ground support, and materials handling, were represented by the projects funded under the ARPA program. Major research areas summarized in the paper encompass: computer modeling; geologic prediction; rock breakage methods (novel techniques and innovative applications of conventional energy sources); ground support; as well as materials handling.

Olson, JJ *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 2 June 1974, pp 1503-35, 54 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095258

HIGH SPEED GROUND TRANSPORTATION BRINGS NEW DRAINAGE PROBLEMS

The large-radius vertical and horizontal curves necessary for high speed ground transportation require cuts and fills that modify the natural topography so much that many new drainage channels are required. The capacity of natural channels may be overtaxed by quick runoff from impervious paved areas. Methods of protecting channels against erosion are described and the deficiencies of current practices are explained. Experimental and field evidence is presented showing the necessity of using Terzaghi's inverted filter to minimize loss of soil by leaching. Terzaghi conceived the idea of preventing this type of failure by covering the danger zone with a filter layer incorporating material many times as pervious as the soil that might be washed away, but with interstices small enough to keep the soil particles from penetrating it. He formulated criteria for the necessary grain size relationships and patented and successfully used the system in Austria 50 years ago. It has since been universally accepted among dam designers. Experience and research indicate that only slight modifications of his original quantitative relationships are necessary for channels.

Posey, CJ (Committee on Hazardous Materials) *High Speed Ground Transportation Journal* Vol. 8 No. 1, 1974, pp 165-175, 10 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 095267

RAPID EXCAVATION AND TUNNELING CONFERENCE, PROCEEDINGS, 1974

Proceedings (in 2 volumes) of the 1974 Rapid Excavation and Tunneling Conference (R.E.T.C.), held at San Francisco, California on June 24-27, 1974, that was sponsored by the Am Soc of Civ Eng and the Am Inst of Min, Metall and Pet Eng. contains 115 papers (some as abstracts only). Main topics covered by the papers were: civil applications and planning; site investigation; planning construction; small-size tunnels; soil and rock mechanics; safety; environmental aspects; tunnel supports; materials handling; mining applications; shafts; legal aspects; engineering geology; tunneling machinery; as well as special techniques. Individual papers are provided with bibliographic references. Selected papers are indexed separately.

This is a 2 volume report.

Pattison, HC D'Appollonia, E *Rapid Excavation and Tunneling Conf, 2nd Proc* June 1974, 1843 pp

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095268

SIMULATION AS A TUNNELING RESEARCH AND PROJECT PLANNING TOOL

This paper describes and demonstrates the application of systems analysis and mathematical modeling techniques in the planning of actual tunnel projects and research and development to improve tunneling techniques.

A recently completed tunnel project located in Utah is used as an example. Although cost estimating computer programs are used in tunnel project planning, the introduction of performance modeling, simulating the time to excavate, has added advantages that are explored here. The performance/cost tunneling model (TM) described herein mathematically simulates on a high-speed digital computer the important activities of a number of tunneling techniques accounting for activity interactions, variable external environments, mechanical failure, and other uncertainties. A cost accounting segment is included to facilitate cost-effectiveness comparisons. It is shown that, when combined with informed judgment and appreciation of limitations, the TM can be a useful tool that may help improve tunneling operations and cost estimation, for example, by achieving more balanced system designs or bounding the performance/cost implications of geologic and other uncertainties. Ultimately, this might lead to more competitive bids and greater profits.

Pietrzak, L (General Research Corporation); McJunkin, M *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 1 June 1974, pp 165-184, 9 Ref.

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095269

PNEUMATIC-HYDRAULIC MATERIAL TRANSPORT SYSTEM FOR THE RAPID EXCAVATION OF MACHINE-BORED TUNNELS

In the long run, rapid excavation involving large tonnages can best be accomplished by integrated continuous systems. Such systems show promise of being inherently safer and more amenable to automation than existing conventional haulage systems. The concept of a pneumatic-hydraulic pipelines as a rapid excavation system, evaluated on a cost-performance basis appears to be technically and economically feasible. A system analysis approach to rapid excavation by pipeline can be achieved with the aid of a digital computer. With reasonable cost-performance data for commercially available equipment, a powerful analytical tool can be created to aid in the evaluation of rapid excavation systems. Further analyses are in progress to evaluate the effect of particle size and distribution on crushing costs, pipelining costs, and dewatering costs for the various alternate systems.

Faddick, RR (Colorado School of Mines); Martin, JW *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 1 June 1974, pp 729-745, 10 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095270

RAPID EXCAVATION USING TRACKLESS TECHNIQUE

The role of trackless methods in underground excavation has increased rapidly over the past two decades. In paper it is attempted to define the general parameters within which this expansion will most likely continue, and to outline the areas of most promising application. The pitfalls have not been ignored. They are there, waiting especially for the planner who is convinced that trackless is the answer to all underground excavation. Obviously it isn't; nor is boring, conventional rail, or any of the other basic methods. But for the planner who is knowledgeable about trackless, or seeks to learn from those who are knowledgeable, the opportunities to benefit from this technique are virtually unlimited.

Lewis, SP (Envirotech Corporation); Sundeen, RL *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 1 June 1974, pp 747-763, 8 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095271

ROCK DISINTEGRATION TESTS OF A WATER CANNON

Modern tunnel boring machines are subject to excessive cutter wear and bearing failures when used in hard and abrasive rock. In very hard rock, the high cost of cutter and bearing replacement, combined with slower excavation progress, make it more economical to drive tunnels by conventional drill and blast methods. The use of high pressure water jets to break rock provides a promising alternative. Experimental data indicate that the

specific energy (the energy expended per unit volume of rock broken) decreases as the water jet pressure increases. Continuous jets are generally limited to pressures below 100,000 psi, whereas pulsed jets from a water cannon can attain much higher pressures. This paper reports the results of laboratory tests with pulsed jets against large rock samples at pressures of 125,000 to 650,000 psi and field tests against dolomitic limestone and granitic gneiss at pressures near 450,000 psi. Although initial tests were made with a small nozzle, operating at off-design conditions, this paper only covers results with the full-size nozzle, including 55 laboratory test shots and 67 field test shots.

Cooley, WC (Terraspace Incorporated) *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 1 June 1974, pp 805-823, 6 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095272

UNDERGROUND TESTS OF THE REAM METHOD OF ROCK FRAGMENTATION FOR HIGH-SPEED TUNNELING

REAM (for Rapid Excavation And Mining) is a method of rock fragmentation by high-velocity projectile impact developed by Physics International Company. This paper reports the results of field testing over the last two years. The success of the method is based on the fact that the amount of rock broken per shot scales nonlinearly with projectile impact energy. Thus, high energy impact yields spectacularly low specific energies for rock breakage. The field work reported used 90-and 105-mm military guns to accelerate 8 1/2-and 10-pound concrete and steel projectiles to velocities of 5000 to 5500 fps. All tests were performed in a competent 25,000 psi granodiorite at Hope Valley, California.

Lungquist, RG *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 1 June 1974, pp 825-840, 7 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095273

PREDICTION OF SETTLEMENTS DUE TO TUNNELING IN SOIL: THREE CASE HISTORIES

Decisions regarding underpinning, real estate acquisitions and tunneling methods have in the past usually been made on the basis of conservative judgment. It now appears possible to inject a measure of rationality into this judgment, and as more case histories are recorded and digested, our confidence in the use of rational semi-empirical methods of prediction will improve. Monitoring of construction performance is required for construction control, reduction of costs, and increase of safety.

Schmidt, B (Parsons, Brinckerhoff, Quade and Douglas, Inc) *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 2 June 1974, pp 1179-99, 9 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095274

SUBSIDENCE OVER SOFT GROUND TUNNEL

Knowing the potential causes of and being capable of reducing subsidence during a tunneling operation is important, as well as means of forecasting the magnitude and distribution of settlements prior to tunneling. This paper describes the existing soil and ground water conditions encountered, as well as the construction procedures used in advancing a machine-mined tunnel in soft ground. Settlement data obtained from a comprehensive instrumentation program performed during tunnel construction are presented. A favorable comparison is made between the data obtained for the tunnel in question and that published for other soft ground tunnels. This comparison makes it possible to apply a mathematical expression (the error function) to approximate the subsidence profile. An overall look at soil responses to construction practices and shield dimensions further substantiates findings that the magnitude of subsidence obtained in soft ground tunneling is directly related to the soil encountered and techniques used to reduce the magnitude of source disturbance in the area of tunneling.

Butler, RA (Mathews (AA), Incorporated); Hampton, D *ASCE Journal of the Geotechnical Engineering Div* Vol. 101 No. 1, Jan. 1975, pp 35-49

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

00 095276

LARGE-SCALE TESTS OF TUNNEL SUPPORTS

Several types of tunnel supports are being investigated experimentally and analytically at the University of Illinois at Urbana-Champaign under the sponsorship of the Federal Railroad Administration, Department of Transportation. The results of work on two types are discussed here. These are steel sets and continuous, monolithic steel-fiber-reinforced concrete liners. The latter is a model of a short length of liner that might result from a continuous slipforming operation in a tunnel excavated with a boring machine. Tests have been performed on both types of support and analyses are being developed which will greatly broaden the scope of the test program. The objective of these studies is to improve the understanding of basic behavior of these supports, and to develop techniques for their analysis.

Paul, SL (Illinois University, Urbana) *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 2 June 1974, 22 pp, 3 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095278

PRE-FORMED LININGS IN TUNNELING PRACTICE

Based on a detailed description of the applications for preformed metallic and concrete segmental lining in Europe and North America paper concludes that the use of pre-formed segmental linings instead of *in situ* placed linings in tunnels will predominate where the physical characteristics of the ground require the placing of a support system quickly after excavation and where economic considerations show that a permanent lining can be achieved in a single process. These linings are more usefully employed in soft ground, possibly water bearing, varying from sands and gravel through cohesive clays, mudstones and chalks rather than hard rock conditions although even in regard to the latter the choice must depend on the degree of competence of the rock. A reduction in lining thickness in some grounds may be achieved by allowing the newly excavated cavity at a tunnel face to redistribute ground stresses before placing the permanent lining. Because of the time element, and the need to protect the tunnel, either a temporary flexible support is required or pre-formed linings must be devised which will partially collapse through frangible packings to take up the initial deformations of the ground. In the former case a permanent lining would eventually be formed to encompass the temporary work, while the latter in a single construction perhaps provides the more economic solution.

Tough, SC (Transit and Tunnel Consultant, Incorporated); Noskiewicz, TM *Rapid Excavation and Tunneling Conf, 2nd Proc* Vol. 1 June 1974, pp 643-668, 16 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: American Inst of Mining, Metallurg & Petrol Engrs 345 East 47th Street, New York, New York, 10017 Repr. PC

00 095279

PILOT SCALE MACHINE FOR TUNNEL BORING RESEARCH

This report describes the development and design of a pilot-scale boring machine with a 1 m diam head for rock cutting research. The machine has three main uses including the testing of a small number of full-size rock cutting tools, the study of 1/4 to 1/8 scaled model of large arrays of cutting tools, and the development and proving of instrumentation. The cutting head is mounted on a hydraulic motor driven by a variable output pump powered by a 44 kW electric motor. These units and the control gear are assembled on a chassis running on rails.

Hignett, HJ Howard, TR
Transport and Road Research Laboratory TRRL Rep LR 632, 1974, 19 pp, 8 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

00 095280

THE FLATHEAD TUNNEL. A GEOLOGIC, OPERATIONS, AND GROUND SUPPORT STUDY, BURLINGTON NORTHERN RAILROAD, SALISH MOUNTAINS, MONTANA

The 70 mile Flathead Tunnel, located in the central Salish Mountains of northwestern Montana, was constructed between 1966 and 1969. With the contract awarded April 19, 1966, drill and blast tunnel excavation began September 30, 1966, and was completed June 21, 1968, in 488 tunnel-driving days. Peak advance was 66 feet per day. On June 27, 1969, all tunnel concrete lining was completed. Average wall and arch concrete placing rates exceeded 1,700 cubic yards daily, with nearly half of the concrete placed during a severe winter season. Major cost savings in concrete tunnel lining were achieved through a value engineering clause in the contract. Achieving consistent results and high rates of placement in concrete lining ranked equal to ground control in overall tunnel problems. Ground control problems exceeded expectations and were of continual concern throughout excavation. One support collapse in the tunnel and one portal slide condition developed during construction. Critical surface geologic exposures were largely obscured; only a portion could be accurately projected underground. An instrumentation program to gather basic data on rock deformation near the heading face for support purposes was a pioneering effort. The Flathead Tunnel was placed in service on November 7, 1970.

Order from Catalog No. I28.27:8552; Stock No. 2404-01719.

Skinner, EH
Bureau of Mines 1974, 98 pp, 41 Fig.

ACKNOWLEDGMENT: Bureau of Mines
PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

00 095290

PERFORMANCE OF EARTH RETAINING STRUCTURES AND PILE FOUNDATIONS

A persistent problem in design is evaluation of the performance of a retaining structure on pile foundations. To develop more effective design methods and also to evaluate construction procedures, a symposium was held to gain additional exposure for measurement systems now being used and to define the abilities and limitations of each. The seven papers cover earth pressure measurements, end bearing of piles, downdrag on piles, enlarged-tip piles, lateral load tests, displacements in deep excavations and field performance.

Included are Seven Reports prepared for the 53rd Annual Meeting of the Highway Research Board.

Transportation Research Record #517, 1974, 93 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Publications Off Orig. PC

DOTL RP

00 095375

PROTECTION AGAINST RUST FOR RAILWAY BRIDGES USING ZINC COATING [Der Korrosionsschutz staehlerner Eisenbahnbruecken mit Zinkstaubfarben]

The author describes the DR's practical experience using zinc coating on railway bridges. Despite positive results, there remain a few problems to be cleared up such as those of long term behavior and durability. For these, observation is necessary over a long period. [German]

Zimmer, R *Signal und Schiene* Vol. 18 No. 7, 1974, 4 pp, 3 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Transpress VEB Verlag fuer Verkehrswesen
Franzoesische Strasse 13-14, 108 Berlin, East Germany Repr. PC

00 095382

USE OF NEW METHODS IN TOPOGRAPHICAL WORK [Utilisation de methodes nouvelles pour les travaux topographiques]

The progress achieved in electronics has allowed for the development of electro-optical telemeters adapted to all requirements for the study of new line lay-outs. The "Geodimetre A 6" unit used by the SNCF in establishing the polygonation of a section of the new Paris-Lyons line serves as theodolite, length measuring device and tachymeter. For topographical considerations, the tape-recorded data can be exploited by computer or calculating machines linked to tracing tables. [French]

Boutonnier, J *Informations Techn SNCF-Direction de l'Equipement*
No. 13, June 1974, pp 73-83, 10 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Societe Nationale des Chemins de Fer Francais Paris,
France Repr. PC

00 095440

**FOUR TRACKS FROM TIBER TO ARNO: THE NEW DIRECT
LINK ROME-FLORENCE [Vier Gleise vom Tiber zum Arno Die neue
Direttissima Roma-Firenze]**

In tracing the historical development of the railway network and the excessive operating load on the Rome-Florence route, the Author shows the need for the conversion of the latter to a four-track link. The new tracks will be independent of the existing, but will have several connections with these, and will be built for a top speed of 250 km/h. The technical data for the track alignment and the fixed installations for electric traction and train working are discussed, and the article concludes with a report on the present stage of the construction work and details of bridges viaducts and tunnels. [German]

Misiti, L *Eisenbahntechnische Rundschau* Jan. 1975, pp 2-10, 15 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West
Germany Repr. PC

DOTL JC

00 095441

**THE SURVEYOR'S ROLE IN THE CONSTRUCTION OF NEW
RAILWAY ROUTES [Vermessungsarbeiten beim Bau von
Neubaustrecken]**

The surveyor fulfills an important function in the planning and construction of new railway routes, whether in the Central Management of the German Federal Railway, the Divisional Managements, or in private surveying offices. The following article traces his work, from the processing of documents relating to area planning and consent-granting procedures with the aid of the most modern aids and reproduction methods to the preparation of noise emission maps. This is followed by a resume of the surveyor's role in land acquisition and in the supervision of works construction right to its completion and thereafter. [German]

Mueller, H Siems, E *Eisenbahntechnische Rundschau* Jan. 1975, pp 15-20, 9 Fig., 7 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West
Germany Repr. PC

DOTL JC

00 095444

**TUNNEL CONSTRUCTION ON THE GERMAN FEDERAL
RAILWAY'S NEW ROUTES [Der Tunnelbau im Zuge der
Neubaustrecken der Deutschen Bundesbahn]**

The difficult matter of tunnel profile selection on new railway routes is discussed from the standpoint of the consulting engineer. The possibility of mechanized advance is assumed in all cases, and is examined in detail in relation to the size of the excavation, the cross-sectional form, equipment use and safety measures. Various tunnel cross-sections for single- and double-track operation at 300 km/h are put forward for consideration. [German]

Berger, H *Eisenbahntechnische Rundschau* Jan. 1975, pp 21-25, 10 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West
Germany Repr. PC

DOTL JC

00 095622

**NEW TYPE OF CONTINUOUS COMPOSITE STEEL AND
CONCRETE BRIDGE**

A new type of continuous composite steel and concrete bridge has been developed in the Bridge Section of the Department of the Main Roads, New South Wales, Australia. In this type of bridge, simply supported steel beams are connected without field riveting, bolting or welding in such a way that full continuity and composite action of concrete deck slab and

steel beams is achieved. Ease of erection and weight saving in steel beams and consequently greater economy and the feasibility of longer spans are made possible in composite steel and concrete bridges. Design criteria are briefly described and illustrated.

Fried, A (Department of Main Roads, Australia) *Acier/Stahl/Steel*
Vol. 39 No. 11, Nov. 1974, pp 482-486

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 095660

**ON A THEORY CONCERNING THE DYNAMICAL BEHAVIOR
OF STRUCTURES CARRYING MOVING MASSES**

Two new methods are presented in order to determine the behavior of a structure carrying moving masses. The first method is analytic in nature and represents a modified asymptotic method in the theory of nonlinear phenomena. The second method is an exact numerical technique general enough to be used for solving exactly a set of differential equations with singular coefficients. The results show that the analytical method is in excellent agreement with the exact one obtained by means of a numerical technique. Furthermore, it is shown that the effect of the response of the structure to the moving mass has to be properly considered.

Stanisic, MM (Purdue Research Foundation); Euler, JA
Montgomery, ST *Ingenieur Archiv* Vol. 43 No. 5, pp 295-305, 10 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

00 095681

**IN ACHIEVING ECONOMICAL EFFECTIVE WEED CONTROL,
WHO'S RESPONSIBLE FOR WHAT?**

The results are given of a survey in which railroad vegetation control specialists, herbicide manufacturers and contract applicators were asked to describe each others' spheres of responsibility in vegetation control. The article is divided in three parts: Responsibilities of herbicide manufacturers, responsibilities of the contract applicators, and responsibilities of the railroads.

Railway Track and Structures Vol. 71 No. 2, Feb. 1975, pp 19-24

PURCHASE FROM: XUM Repr. PC

DOTL JC

00 095683

**FATIGUE RESISTANCE OF QUARTER-SCALE BRIDGE
STRINGERS IN FLEXURE AND SHEAR**

Scaled specimens of Douglas-fir and southern pine were evaluated under several combinations of variables to obtain information on the behavior in flexure and shear under repeated loading. Fatigue strengths are summarized.

Lewis, WC
Association of American Railroads Technical Center No. ER-39, Dec.
1963, 28 pp, 33 Fig., 2 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical
Center
PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 095684

**LABORATORY INVESTIGATION OF PRESTRESSED CONCRETE
RAILWAY BRIDGE BEAMS**

This report contains a description and analysis of laboratory tests made during 1960, 1961, and 1962 on 23 full-size prestressed concrete beams. These beams are 18 in. deep, 15 in. wide, and 19 ft. long and were patterned after the full-size slabs reported in AREA Proc. Vol. 59, p. 133. This investigation was directed toward a study of the effect of size of strand and level of prestress on their static and fatigue strength, and is an extension of one conducted at Lehigh University on similar beams, and reported in AREA Proc. Vol. 60, p. 1. From this tests, it can be concluded that: 1. In the static tests, the cracking loads and the deflection were affected by the level of prestress but not by the size of strand. Taking into

consideration the difference in concrete strength the ultimate strength apparently is not affected by level of prestress or by size of strand. 2. Fatigue strength was influenced by the level of prestress. 3. The test results were inconclusive with regard to the relationship between fatigue strength and size of strand. 4. The mode of failure in the static tests was by crushing of the concrete accompanied by large strains of steel strands, while breakage of the steel strands caused failure in the fatigue tests. 5. The ultimate load varied from 2.5 to 3.0 times design load for static tests and from 1.3 to 1.8 times design load for fatigue tests. 6. Fatigue life decreased as the cycling load increased. 7. Strains and deflections changed only slightly for those beams which did not fail for 2,000,000 cycles of repetitive loading. 8. There was no evidence of strand slip. 9. Recorded ultimate static moments compared favorably with values computed by using the formula given in the current AREA Specifications. 10. The fatigue strength of beams could be predicted by using an idealized stress-moment diagram combined with a failure envelope for the steel strands.

Association of American Railroads Technical Center No. ER-36, Dec. 1963, 17 pp, 22 Fig.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 095686

TUNNEL LININGS: COMPARATIVE DESIGNS AND COSTS

This two-part article describes the various types of lining used in cavity or tunnel construction in Rhine slate rock. The experience gained from excavation of 175,000 cubic meters of tunnel walls is used to demonstrate the advantages and disadvantages of the type of lining, their areas of application, and the way in which costs are assessed.

von der Au *Tunnels and Tunnelling* Vol. 7 No. 2, Mar. 1975, 5 pp, 2 Fig., 2 Tab.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 095687

JET TUNNELING MACHINES: A GUIDE FOR DESIGN

Rock erosion by high-speed water jets has been the subject of recent research by the University of California. The object has been to produce firm guidelines for the design of jet tunneling machines which have proven to be capable of excavation rates far higher than those obtainable by other practical methods.

Crow, SC *Tunnels and Tunnelling* Vol. 7 No. 2, Mar. 1975, 6 pp, 3 Fig., 15 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 095688

NATURE FLOW OF LANDSLIDES

The article deals with the results obtained by investigating the conditions for the development of flow landslides. Their manifestation is stipulated by the periodical deformation of the structure of water-saturated clayey soil with coagulation contacts between particles. It has been established that the structural deformation of soil is associated with a considerable increase in the pore-water pressure developed in the body of the landslide.

Goldstein, MN (Dnepropetrovsk Institute of Railway Engineers); Turovskaya, AY *Rail International* Vol. 6 No. 1, Jan. 1975, pp 14-18, 4 Fig., 3 Tab., 2 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 095696

MINIMUM COST DESIGN OF RETAINING WALLS BY OPTIMIZATION

The use of an improved version of optimization subroutines described in earlier work is demonstrated for the minimum cost design of reinforced concrete cantilever retaining walls. A particular design situation is considered and the costs of nine different geometric wall sections are compared

for a range of heights and ground bearing capacities and two different fill materials behind the wall. Other investigations include an examination of the effect of changes in the cost.

Wills, J

Transport and Road Research Laboratory Sup. Rpt. #120 UC, 1974, 23 pp, 17 Fig.

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU, England Repr. PC

00 095705

INVESTIGATION OF 60 FT. GLUED LAMINATED BEAMS ON THE WEYERHAEUSER TIMBER COMPANY RAILROAD

The purpose of this test was to determine the strains and deflections in the 60 ft. beams of the glued laminated, open deck timber bridge built by the Weyerhaeuser Timber Company near Castle Rock, Washington. These beams are the longest timber beams in this country carrying railroad loading. It was concluded that: 1. The simultaneous recorded maximum static flexural strains in the four glulam beams average approximately 13 percent less than calculated. The maximum live load tensile stress was 1,320 psi and the maximum live load compressive stress was 1,350 psi. 2. The simultaneous recorded maximum static horizontal shear stresses in the two beams for which measurements were made varied considerably, being approximately 12.5 percent less and 47.0 percent greater than calculated according to accepted design equation. The maximum live load horizontal shear stress was 118 psi. 3. Measurements of shear stress indicated an effective transfer of stress across a glue line. 4. The study indicated that horizontal shear becomes a maximum when the first wheel of a truck was 1.7 to 2.0 times the depth of the beam from the bearing as the locomotive moved across the span: 5. Impact tended to increase with speed with the maximum recorded impact in flexure 12-1/2 percent at a speed of 34 mph. 6. Distribution of maximum simultaneous flexural stress to the four beams was reasonably consistent with the eccentricity of track. Distribution of maximum recorded shear stress to the two beams tested was unequal due to a difference in reaction to each beam.

Association of American Railroads Technical Center ER-1, Jan. 1961, 17 pp, 6 Fig., 1 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 095706

LABORATORY INVESTIGATION TO DETERMINE STATIC AND REPEATED LOAD STRENGTH OF FULL SIZE SOUTHERN PINE SOLID SAWN STRINGERS

This report contains a description and analysis of data recorded during the laboratory investigation of twenty four full-size, solid-sawn, treated southern pine stringers at the Association of American Railroads in cooperation with the Forest Products Laboratory, Madison, Wisconsin. The purpose of the investigation was to determine the static and the repeated load shear strength of full-size, treated southern pine stringers and the effect of load placement. The test specimens were divided in three groups, six were loaded with the first load point 1-1/2d stringer depths from the support, eleven at 2-1/4d and seven at 3d stringer depths from the support, respectively. The two load points were 4 ft-8 in apart in each case. The stringers were loaded in increments of the shear design load. Design load was that which produced allowable design shear stress of 125 psi. The following observations may be made from the recorded data: Static Loading; 1. The three stringers loaded statically 1-1/2d, 2-1/4d and 3d failed at shear stresses of 727 psi, 580 psi and 513 psi, respectively. Failure was in tension for 1-1/2d and 3d, and was in compression for 2-1/4d type loading. 2. Eleven stringers which did not fail after 2,000,000 cycles were later tested statically. One stringer loaded at 1-1/2d failed in horizontal shear at shear stress of 852 psi. Of eight stringers loaded at 2-1/4d, five failed in tension at shear stresses from 488 psi to 679 psi, two failed due to horizontal shear at shear stresses of 644 and 649 psi, and one failed in compression at shear stress of 620 psi. Two stringers were loaded at 3d, one sustained a bearing failure at 555 psi while the other failed in tension at 520 psi. 3. Inspection for Decay: A visual inspection of each specimen was

made to determine any evidence of decay. A pick test also was made on each specimen. From these evaluations, no decay was found.

Association of American Railroads Technical Center ER-76, Oct. 1967, 15 pp, 35 Fig., 4 Tab., 29 Phot.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 095707

LABORATORY INVESTIGATION TO DETERMINE STATIC AND REPEATED LOAD STRENGTH OF FULL-SIZE DOUGLAS FIR SOLID SAWN STRINGERS

This report contains a description and analysis of data recorded during the laboratory investigation of 24 full-size solid-sawn treated Douglas fir stringers at the Association of American Railroads and a description of certain physical properties as determined by the Forest Products Laboratory at Madison, Wisconsin. The purpose of the investigation was to determine the static and repeated load shear strength of the stringers and effect of load placement. A third of the stringers were loaded with the first load 1-1/2d stringer depths from the support, a third with the load 2-1/4d and the remaining third 3d from the support. The stringers were loaded in increments of the shear design load with load points 4 ft-8 in. apart. Design load was that which produced allowable design shear stress of 100 psi.

Association of American Railroads Technical Center ER-70, Jan. 1967, 14 pp, 36 Fig., 4 Tab., 31 Phot.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 095708

LABORATORY INVESTIGATION TO DETERMINE STATIC AND REPEATED LOAD STRENGTH OF FULL-SIZE SOUTHERN PINE GLUED LAMINATED STRINGERS

This report contains the analysis of data recorded during the laboratory investigation of 24 full size southern pine glued laminated stringers at the Association of American Railroads Research Center and a description of certain physical properties as determined by the Forest Products Laboratory at Madison, Wisconsin. The purpose of the investigation was to determine the static and repeated load strength of the stringers and the effect of load placement. The stringers were loaded in increments of the shear design load with the load points that were 4 ft-8 in. apart and with the first load point at 1-1/2d, 2-1/4d and 3d from center line of bearing. Design load was that load which produced an allowable design shear stress of 180 psi. The following observations may be made from the recorded data: 1. The three stringers tested statically at load points 1-1/2d, 2-1/4d, and 3d failed at 5.34, 4.71, 3.72 shear design increments. Failure was in bearing for 1-1/2d and 2-1/4d loading; and tension for 3d loading. The deflection and flexural strains were linear up to failure. Pending failure was not noticeable and it occurred quite rapidly 2. Four stringers which did not fail after 2,000,000 cycles of repeated loading were later tested statically. One stringer was tested at 1-1/2d, one at 2-1/4d, and two at 3d loading. The shear design increments were 5.04, 4.41, and 3.83 respectively. The stringer at 1-1/2d and the two at 3d did not fail since the capacity of the loading jack was reached first. At 2-1/4d the stringer failed in horizontal shear. 3. Five stringers were tested under repeated loads positioned at 1-1/2d. Of the two stringers loaded at 2.13 times shear design load, one did not fail and one failed at 882,000 cycles because of a knot within the lamination. One stringer was subjected to a shear stress design load ratio of 2.33 and it did not fail. Another stringer was subjected to a shear design load of 2.72 and failed in bearing at 1,365,000 cycles. The final stringer was subjected to 3.11 shear design load and it failed in horizontal shear at 666,200 cycles. 4. Seven stringers were tested under repeated loads positioned at 2-1/4d. One stringer was tested at a shear design load 2.18 or 25,500 lbs per load point and it did not fail. Another stringer subjected to the same shear load ratio failed in horizontal shear after only 417,000 cycles of repeated loading. Failure was attributed to a knot.

Association of American Railroads Technical Center ER-52, Dec. 1964, 16 pp, 23 Fig., 4 Tab., 12 Phot.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 095710

TUNNEL DESIGN CONSIDERATIONS: ANALYSIS OF MEDIUM-SUPPORT INTERACTION

Practical aspects of the application of analytical techniques to geotechnical problems are reviewed with emphasis on medium-support interaction problems in underground structures. It is recognized that the analysis should be carried out in several stages, reflecting the initial state of stress in the medium, the construction process and the period of operation. A finite element program called GEOSYS that is capable of performing this type of analysis is described. The capabilities and the limitations of this and other current analytical techniques in regard to the multi-stage analysis are discussed. The results from a series of two-dimensional, plane-strain, finite element analyses of medium-liner interaction for a circular tunnel are presented. Three types of medium properties are considered, namely, linearly elastic, elasto-plastic and time-dependent. Also considered in these analyses is a simple sequence of excavation and liner placement. A comparative study of the effect of the material properties on the liner forces is made.

Ghaboussi, J Ranken, RE
Illinois University, Urbana, (UILU-ENG 74-2032) Final Rpt. FRA-ORD&D 75-24, Nov. 1974, 84 pp

Contract DOT-FR-30022

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240216/2SL, DOTL NTIS

00 095871

FIELD INVESTIGATION OF PRESTRESSED CONCRETE BEAMS ON THE CHICAGO AND EASTERN ILLINOIS RAILROAD

This report contains a description and analysis of data on precast, prestressed concrete spans. Two spans having the same type section were investigated, one span was 33 ft-6 in. in length and the other 40 ft-6 in. The spans were composed of six box beams each, 3 ft wide and 3 ft-6 in deep for a total width of deck of 18 ft. Each beam has a rectangular void. The purpose of this investigation was to determine static and dynamic strains in the beam spans over a full range of speeds by a test train. Stresses shown in the report had been calculated from the measured strains using an assumed modulus of elasticity, E equal to 5,000,000 psi for the concrete. The static and dynamic effects of a test train operating over a speed range of from 5 to 60 mph on two prestressed concrete spans were measured, and from the analysis of the test data, it can be concluded that; 1. The distribution of the live load to the six beams which comprised each span varied widely, the inside beams carrying up to three times as much load as the outside beams. This may be attributed to the extreme width of the deck, and the arrangement of the tie bars. 2. The maximum recorded live load and impact stresses in the bottom fiber were very low as compared to the calculated precompression of the bottom fibers based on Cooper's E 72 loading. 3. All maximum recorded live load plus impact stresses were lower than the calculated values based on the test locomotive loading. 4. The recorded impacts, except for a very few values for the outside beams which carried only a small proportion of the live load, were considerably lower than the values computed on the basis of the current AREA impact formula. 5. Recorded live load stresses and recorded maximum impacts were larger for cars than for locomotives. 6. For a speed range from 10 mph to 60 mph there was no appreciable increase in recorded impact.

Conducted under sponsorship of AREA Committee 30-Impact and Bridge Stresses.

Association of American Railroads Technical Center ER-64, Mar. 1966, 8 pp, 10 Fig., 3 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 095878

FIELD INVESTIGATION OF TWO CONCRETE BRIDGES ON SEABOARD AIRLINE RAILROAD

This report contains a description and analysis of data on two concrete bridges. One bridge, 401.9, consists of solid concrete slabs, 15 ft—6 in long and 21 ft long, reinforced in the conventional manner with bars. The other bridge, 402.5, consists of prestressed, hollow, rectangular slabs 24 ft long and prestressed, octagonal piles. The purpose of the investigation was to obtain static and dynamic stresses in the slab spans permitting a comparison of the two design types and to obtain stresses in the piles of bridge 402.5 under vertical loads and from longitudinal forces of braking and traction. All data was obtained with 2-unit diesel locomotive and a test train. A brief summary of the data follows: Loading effects of the prestressed piling in two bents of the prestressed bridge were also investigated. The analysis indicated that: 1. Longitudinal forces due to braking and traction were predominately carried through the rails, with the resulting stresses to the piling being considerably less than that which would occur from forces of the magnitude recommended in the current AREA specifications; 2. Higher bending stresses occurred in the higher bent with the greatest influences being, respectively, (a) vertical loads moving across the bridge, (b) braking, and (c) traction. Static and dynamic effects of a train operating over two bridges having similar length spans—one bridge of conventional reinforced concrete and the other of prestressed concrete were analyzed for the purpose of comparing the different types of construction. From the test data, it can be concluded that: 1. With few exceptions, all recorded stresses were less than calculated for both bridges. 2. Transverse load distribution was nearly uniform across the decks of both bridges. 3. Impact increased slightly with speed for the conventionally reinforced spans, but remained nearly constant for the prestressed span. 4. The recorded impacts were considerably less in the prestressed span than in the conventional spans. 5. Maximum impacts occurred predominantly under the locomotive, but maximum live load plus impact stresses occurred under the cars. 6. Wheel irregularities caused high impacts of very short duration in both bridges. 7. A rail joint on one of the conventional spans influenced total impact values.

Conducted under sponsorship of AREA Committee 30-Impact and Bridge Stresses.

Association of American Railroads Technical Center ER-48, Aug. 1964, 19 pp, 12 Fig., 7 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 096371

SOIL STABILIZATION TEST AT THE SWEDEN BRIDGE IN VIENNA-A NEW APPLICATION OF RADIO NUCLIDES IN BUILDING [Badenverfestigungsversuch Bei Der Schwedenbuecke In Wien Eine Neue Anwendung Von Radionukliden In Der Bauwirtschaft]

As part of the preliminary work for the construction of the underground railway tunnel tubes under the Danube canal, experimental injections were made to stabilize the soil, but these were not successful. Following this an attempt was made to develop a control procedure for routine injections using radioactive marking substances. Based on measurements made of filter rate and direction of flow, an assessment was able to be made of the condition of the soil and thus of the effectiveness of soil stabilizing injections. The testing methodology (central boreholes in which to introduce the water and the inspection equipment) are described in detail. The results of the four tests showed that the method used appears to effect a workable control of injections for stabilization and possible also for support. /TRRL/ [German]

Rank, D Nussbaumer, W *Oesterreichische Ingenieur Zeitschrift* Vol. 16 No. 10, Oct. 1973, pp 331-38, 8 Fig.

ACKNOWLEDGMENT: Road Safety Board, Austria Federal Institute of Road Research, Inzel, W Ger Transport and Road Research Laboratory (IRRD 30175)

PURCHASE FROM: ESL Repr. PC, Microfilm

00 096373

SEEPAGE FLOWS AND STRESSES IN SOILS [Sickerstroemungen und Spannungen in Boeden]

The first part of the book reviewed here deals with the level potential movement of the water and graphic determination of a flow network;

difference method; calculation of seepage losses from infiltrating construction pit water; effect of horizontal drains; well productivity; and alteration with time of the free water level of a radial flow network. The second part deals with the distribution of stress in the subsoil; stress-deformation-relations in ideally elastic soil; airy's stress function; distribution of stress under concentrated and distributed loads; and influence of anisotropy. /TRRL/ [German]

Boelling, WH *Oesterreichische Ingenieur Zeitschrift* Vol. 16 No. 5, May 1973, pp 185

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 301710)

PURCHASE FROM: ESL Repr. PC, Microfilm

00 096564

OUR TOUGHEST NEW-LINE CONSTRUCTION PROJECT

The chief engineer of the Norfolk & Western describes the \$53-million line relocation along the Guyandot River in West Virginia necessitated by construction of the R. D. Bailey flood-control lake by the U.S. Army Engineers. N&W abandoned 27.6 miles of track and constructed 32.2 miles of new trackage. The railroad opted to use welded rail in the new line. Details of the construction of four concrete-lined tunnels and 14 concrete-and-steel bridges are given, along with information on the construction of the roadbed and the tracklaying.

Proceedings of the Seventy-Ninth Annual Convention of the American Railway Bridge & Building Association, held at Chicago, Illinois, October 1-3, 1974.

Durham, LA, Jr (Norfolk and Western Railway) American Railway Bridge & Building Association Oct. 1974, pp 22-31, 3 Phot.

PURCHASE FROM: American Railway Bridge & Building Association 18154 Harwood Avenue, Homewood, Illinois, 60430 Repr. PC

00 096566

INNER AND OUTER GUARD RAILS ON BRIDGES

This committee report describes a survey of railroad practices with respect to guard rails as a means of minimizing damage which could be inflicted by derailed equipment. There is no unanimity of opinion on the effectiveness of such rails, some railroads feeling that inner guard rails can confine derailment damage to replacement of damaged ties. Others feel that derailed cars may be deflected more than would otherwise occur, actually increasing damage to adjacent structures. Outer guard rails are used on bridges primarily as a means of assuring tie spacing rather than as a means of ameliorating the effects of derailments.

Proceedings of the Seventy-Ninth Annual Convention of the American Railway Bridge & Building Association, held at Chicago, Illinois, October 1-3, 1974.

American Railway Bridge & Building Association Oct. 1974, pp 48-50

PURCHASE FROM: American Railway Bridge & Building Association 18154 Harwood Avenue, Homewood, Illinois, 60430 Repr. PC

00 096567

PROTECTION OF BRIDGES OVER NAVIGABLE STREAMS

The problems associated with railroad crossings of the 27,000 miles of navigable waterways in the U.S. are outlined. Because federal navigation laws provide for no federal responsibility for navigation protection, railroads are confronted with major bridge engineering and maintenance problems. The committee report concludes that there is evidence that locks and other construction are now being planned for depths in excess of existing legal channels which can trigger another cycle of major navigation improvements, another round of increasing damage. It is advised that navigation protection systems should become a federal responsibility just as locks and dredging are now.

Proceedings of the Seventy-Ninth Annual Convention of the American Railway Bridge & Building Association, held at Chicago, Illinois, October 1-3, 1974.

American Railway Bridge & Building Association Oct. 1974, pp 51-55

PURCHASE FROM: American Railway Bridge & Building Association 18154 Harwood Avenue, Homewood, Illinois, 60430 Repr. PC

00 096568

BRIDGES AND NAVIGATION INTERESTS

The growth of inland waterways traffic and the introduction of larger barges, tow boats and tows have complicated operations through railroad drawbridges built for packet boats. The law requires the bridge owner to provide for the safe, prompt and efficient passage of vessels through the draw. The Coast Guard is charged with assuring that railroad bridges never unreasonably interfere with navigation. It is emphasized that the fundamental law is not that navigation of a stream is not a matter of economics with engineering considerations, but of public right. It is the Federal position that protection cells and similar structures are appurtenances of the bridge and are the responsibility of the bridge owner, except under provisions of the Truman-Hobbs Act.

Proceedings of the Seventy-Ninth Annual Convention of the American Railway Bridge & Building Association held at Chicago, Illinois, October 1-3, 1974.

Thoroughman, SW (Second Coast Guard District)
American Railway Bridge & Building Association Oct. 1974, pp 55-58

PURCHASE FROM: American Railway Bridge & Building Association
18154 Harwood Avenue, Homewood, Illinois, 60430 Repr. PC

00 096570

FIELD INVESTIGATION OF TWO TRUSS SPANS ON THE SOUTHERN PACIFIC COMPANY

A.R.E.A. Committee 30-Impact and Bridge Stresses, has an assignment for the study of stresses in steel trusses. In connection with this assignment, the committee requested the Technical Center to conduct a study on the Devil's River Bridge on the Southern Pacific Company, Texas and Louisiana Lines near Del Rio, Texas in the fall of 1965. This bridge consists of two 300 ft spans and four 400 ft spans. All spans are through trusses of the curved chord, Warren type, with ballasted decks. The purpose of the investigation was the determination of static stress, maximum stress, roll effect and total impact as well as frequency of maximum stress occurrences in various members of a 300 ft span and a 400 ft span, and this report contains a description and analysis of field tests on these spans, except for the frequency data which will appear in a future report. The impact tests were conducted with a test train, but the frequency data was obtained over a one week period with trains in regular service.

Association of American Railroads Technical Center ER-82, May 1968, 19 pp, 21 Fig., 3 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 096571

FIELD INVESTIGATION OF A TRUSS SPAN ON THE GREAT NORTHERN RAILWAY

A.R.E.A. Committee 30-Impact and Bridge Stresses, has an assignment for the study of stresses and impact in steel bridges. In connection with this assignment, the committee requested the Technical Center to conduct a study of the Priest River Bridge on the Great Northern Railway near Priest River, Idaho. This work was conducted in September, 1966 and this report contains a description of the work and analysis of data obtained on the 200 ft. open deck, Warren type, through truss span. The purpose of the investigation was to determine the impact effects and maximum stresses in various truss members by use of a test train operating over a wide range of speeds. It is known the effect of the spring-borne weight of the locomotives oscillating about a longitudinal axis is to increase the pressure on one rail with a corresponding decrease in pressure on the other rail, although it would be unlikely that all cars were rolling in the same direction simultaneously. The variation in pressure on the rails produces a change in the direct mean stresses of the truss members. The roll effect at the centerline of rails observed during runs of the test train is shown of Figure 3. This value was obtained by computing the vertical forces, applied at the rails, that would produce the same moment as the forces recorded in the trusses. The roll forces in the truss members were obtained by expressing the difference between the mean stress for the member in one truss and the average of simultaneous mean stresses for corresponding members in both trusses, corrected for eccentricity of the load, as a percent of the average static mean stress. The effect of roll on the end post and upper chord

indicates an increase with an increase of speed. It can be noted that the lower chord values are scattered and the maximum equivalent roll of 21 percent occurred at an intermediate speed. With the exception of two values, all roll effects were within the A.R.E.A. Specification limits. The highest equivalent maximum roll effect was 21.2 percent at a speed of 32 mph which occurred in bottom chord member L2L3. The following stresses or effects were reported on: 1. Static Stresses, 2. Roll Effect, 3. Total Impact, 4 Maximum Stress.

Association of American Railroads Technical Center ER-81, May 1968, 9 pp, 7 Fig., 2 Tab., 1 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 096572

FLEXURAL BEHAVIOR OF LARGE GLUED-LAMINATED BEAMS

Six glued-laminated beams, 9 inches wide by 31 1/2 inches deep by 50 feet long, containing 21 Douglas-fir laminations, were evaluated. Three beams, designated as clear, were designed as clear straight-grained wood beams and three were designed as structural beams containing strength-reducing characteristics as could be found in commercially produced laminated beams. The average modulus of rupture and modulus of elasticity for clear beams were 8,400 and 2,090,000 pounds per square inch, respectively, and for structural beams were 4,450 and 1,930,000 pounds per square inch. The average strength of the clear beams was within 2 percent of that estimated by a size-effect relationship recently published. The average strength of structural beams was about one-third less than that given by the I sub K/I sub G concept. The modulus of elasticity for all beams was within the range expected of Douglas-fir beams. These results should lead to new design procedures to account for the effect of size on the bending strength of wood beams. The study also indicates the need for further research to obtain a better understanding of the effect of knots on the strength of laminated beams.

Bohannon, B
Association of American Railroads Technical Center ER-72, Feb. 1967, 16 pp, 12 Fig., 3 Tab., 4 Phot., 7 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 096573

FIELD INVESTIGATION OF REINFORCED CONCRETE CULVERT PIPE

This report contains a description and analysis of a field investigation of a 5 ft 8 in by 6 ft 2 in elliptical concrete pipe culvert installed under a deep fill in a yard of one of the railroads in this country. The investigation was made to determine the strains in the reinforcement and pressure on the pipe as a fill of up to 40 ft was placed and for a period of nearly three years after filling was completed. On the basis of this investigation: 1) Strains from the load of the fill tend to become constant after a lapse of about two years after fill is placed. 2) The supporting strength of the pipe used in this installation was not sufficient for the type of bedding and backfill used. In the selection of a pipe proper attention must be given to the actual installation that the method of backfilling and bedding is consistent with the strength of pipe used.

Conducted under sponsorship of AREA Committee 30-Impact and Bridge Stresses

Association of American Railroads Technical Center ER-78, Dec. 1967, 9 pp, 5 Fig., 1 Tab., 2 Phot.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 096574

FIELD INVESTIGATION OF LONGITUDINAL FORCES IN A SANTA FE RAILWAY CONCRETE TRESTLE

This report contains a description and analysis of data obtained on a 660 ft long concrete trestle. The trestle contains 20 spans of 33 ft prestressed concrete box beams on reinforced concrete caps and columns. The height, base of rail to ground line, was uniform throughout at 26 ft. The purpose of this investigation was to determine the effect on the trestle of braking and traction as developed by a 278 ft long test train. Direct and bending stresses were obtained in the bents and axial stresses obtained in the rails at each abutment. Runs were made with both tight and loosened rail joints. In addition to the braking and traction runs, normal speed runs were made to determine stresses in the box beams and columns. On the basis of tests on this structure it may be concluded that: 1) The maximum longitudinal bent force measured was from braking and was 23 percent of the force computed on the basis of 15 percent of the test train bent reaction. 2) With tight rail joints the percentage range of total longitudinal braking force resisted by the bents was 41 to 56 percent, by the rails was 20 to 46 percent and by the backwalls apparently was 5 to 30 percent. 3) That portion of the longitudinal braking force transmitted to the bents was resisted by all bents of the bridge, acting as cantilevers, including those which carried no vertical live load. The distribution of longitudinal force was not uniform throughout the length of the bridge, but was highest for bents under the test train and gradually decreased with increase in distance from the test train. Loosening the rail joints at the ends of the bridge increased the longitudinal force resisted by the bents. 4) The maximum longitudinal force resulting from braking was 158 kips, which was 12 percent of the weight of the train. 5) The maximum longitudinal force resulting from traction of the locomotives was 76 kips, which was 15 percent of the weight on drivers. 6) Bending stresses were lower than those resulting from longitudinal forces. Also, bending stresses due to eccentricity were highest near the tops of the bents, while the stresses due to longitudinal forces were highest near the ground line. 7) For the test span, the arrangement of transverse tie rods, and the shear keys used was effective in producing a very nearly uniform distribution of the live load to each of the box beams comprising the span. 8) For the test span, the ratio of recorded to calculated strains due to bending, ranged from 0.83 to 0.94.

Conducted under sponsorship of AREA Committee 30-Impact and Bridge Stresses.

Association of American Railroads Technical Center ER-67, Aug. 1966, 22 pp, 46 Fig., 5 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 096575

EPOXY RESIN COATINGS ON STEEL AND CONCRETE. 2ND REPORT

Engineering Research Report ER-43 contains a description of several epoxy resin coatings on steel plate specimens together with an inspection report of their coatings condition after two years exposure on the Huey Long Bridge, New Orleans, Louisiana, where there is a temperate climate, high humidity and heavy concentration of salt brine from refrigerator cars. This Second Report presents the observations of the condition of these coatings after four years exposure. In addition, a description of the condition of a zinc-rich epoxy resin coating after one year exposure is given. From the appearance of these coatings after four years exposure, it is apparent that the one-coat systems, P1 and C1, the tar-filled systems 242-2 and the proprietary one have completely failed and are offering little if any protection to the base metal. The coating failure is characterized by large blisters, scale and rust. As reported in ER-43, blisters had formed after only eight months exposure. These become enlarged and spread over the plate surface as exposure continued. Scaling and rusting followed. The two-coat systems, 285-1, 385-6 and 385-22, 632-1255 are offering some protection to the plates after four years exposure, as indicated on Table 3. Of these two systems, the 285-22, 632-1255 appears to be offering the most protection. The coating failure of these is characterized by blisters and some peeling, but the blisters are noticeably smaller and have not enlarged and spread to the extent of those in the one-coat systems. The plates in Set B are shown in Photograph 1. The plates having the zinc-rich coatings were placed on the bridge on February 4, 1965 and inspected on January

26, 1966. After one year exposure all of these coatings appear to be in excellent condition with no evidence of any blisters, rusting or other coating breakdown.

Conducted under sponsorship of AREA Committees 7-Wood Bridges and Trestles, 8-Masonry, and 15-Iron and Steel Structures.

Drew, FP

Association of American Railroads Technical Center ER-65, Apr. 1966, 14 pp, 5 Tab., 3 Phot.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 096585

ANALYSIS AND PREDICTION OF SCOUR AT RAILWAY BRIDGES IN NEW ZEALAND

This paper summarizes an investigation into past scour failures at a number of railroad bridges and describes some of the characteristics associated with these events. A new method of predicting the extent of scour, evolved from data collected in the investigation, is suggested for use in bridge design and analysis. The parameters discussed were evaluated for each of the investigated scour cases, and values for some of the more important basic factors are given in table.

Holmes, PS (New Zealand Railways) *New Zealand Engineering* Vol. 29 No. 11, Nov. 1974, pp 313-320, 16 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

00 096608

SHIN KANMON CONNECTION

The world's second longest undersea tunnel, linking the main Japanese islands of Honshu and Kyushu, is now open. It forms an essential link in the development of Japanese National Railways' high-speed network. This tunnel, 18,713 m long, has been driven at the depth of 67 m under sea level level and necessitated about 2.5-million cu. m of excavation, and about 400,000 cu. m of concrete. Geology of the rock strata, main construction work, shotcrete support and grouting operations are described.

Brown, RL *Tunnels and Tunneling* Vol. 7 No. 1, Feb. 1975, 3 pp

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096609

TECHNIQUES ADOPTED FOR THE CONSTRUCTION OF THE 10,265 M LONG ST. LUCIA RAILROAD TUNNEL UNDER THE CITY OF SALERNO FOR THE DIRECT SALERNO-NAPLES LINE [Tecniche adottate per la costruzione sotto la città di Salerno della galleria ferroviaria "Santa Lucia" di Km. 10,265 per la direttissima Salerno-Napoli]

Problems encountered during the construction of the St. Lucia tunnel under the city of Salerno between the 0 and 1000 m marks are described. The tunnel passes under the city with an 85.3 m² section of the excavation, the minimum distance between the tunnel roof and the foundations of the buildings above it being 7.5 m and the maximum distance being 25 m. In addition, there is a partially covered brook between the 350 and 1000 m mark in the zone above the tunnel. After a consideration of geohydrological and geotechnical conditions of the zone, the technical solutions adopted and the phenomena observed are described. Such techniques as the driving of root piles, subfoundations, freezing, chemical injections, etc. are elucidated. Many diagrams and photographs illustrate the paper. [Italian]

Macchi, A (Impresa Recchi, Italy) *ASCE Journal of the Environmental Engineering Div* Vol. 29 No. 11, Nov. 1974, pp 29-70, 30 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096610

NEW NOCERA INFERIORE-SALERNO SECTION ON THE NAPLES- BATTIPAGLIA-REGGIO CALABRIA LINE. PROBLEMS OF CONSTRUCTION OF THE ST. LUCIA TUNNEL [Il nuovo tratto di linea Nocera Inferiove-Salerno della linea Napoli-Battipaglia-Reggio Calabria, con particolare esposizione dei problemi e delle soluzioni adottate per la costruzione della galleria Santa Lucia]

This is an introductory article to a series of three detailed articles by A. Macchi and V. Anelli on the new 10,265 m long tunnel designed to straighten out the line between Salerno and Naples in South Italy. Difficult geological conditions of the tunnel section which was driven under heavily built-up city area of Salerno and the solutions adopted are described. [Italian]

Misiti, L. (Ferrovie dello Stato, Italy) *Ingegneria Ferroviaria* Vol. 29 No. 11, Nov. 1974, pp 3-6

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096611

GEOLOGY AND HYDROLOGY OF THE TERRITORY OF THE ST. LUCIA RAILROAD TUNNEL, 10,265 M LONG, FOR THE DIRECT SALERNO-NAPLES LINE [Geologia ed idrologia del territorio interessato dalla galleria ferroviaria L. Lucia di km 10,265 per la direttissima Salerno-Napoli]

A description is given of the conditions of construction of the St. Lucia tunnel between 1000 and 6063 m marks from the Salerno tunnel entrance. Technological systems adopted for the construction are described. Particular attention is given to a new type of preliminary revetment with prefabricated slabs put in place by a special prototype machine. The way that particular situations were dealt with (faults, caverns), statics of the revetment and impermeabilization are described in detail. The article is richly illustrated. [Italian]

Macchi, A (Impresa Recchi, Italy) *Ingegneria Ferroviaria* Vol. 29 No. 11, Nov. 1974, pp 7-28, 26 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096612

CONSTRUCTION OF THE SANTA LUCIA TUNNEL BETWEEN THE NORTHERN ENTRANCE AND THE 4200 M MARK [Variante ferroviaria della linea Napoli-Salerno fra le stazioni di Nocera Inferiore e Salerno. Galleria Santa Lucia. Costruzione della galleria fra l'imbocco nord e la progressiva 4.200]

The construction of the first 4200 m of the Northern section of the St. Lucia tunnel linking the Nocera Inferiore-Salerno stations on the Naples-Salerno line is described. The problems posed by the presence of a water fault and solutions adopted are described. A part of the tunnel was built starting from a side tunnel approach 2690 m from the Northern entrance. [Italian]

Anelli, V (Impresa Dipenta, Italy) *Ingegneria Ferroviaria* Vol. 29 No. 11, Nov. 1974, pp 71-82

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096625

AERODYNAMIC PHENOMENA IN TUNNELS AS CRITERIA FOR THE PREPARATION OF PROJECTS AND THE CONSTRUCTION OF TUNNELS ON NEW LINES [Die aerodynamischen Verhältnisse im Tunnel als Kriterium fuer die Planung und den Bau von Tunneln auf Neubaustrecken]

Aerodynamic phenomena are particularly important when drawing up projects and building tunnels through which trains will travel at high-speeds. The most dangerous phenomena are sudden changes in pressures, since these can have an effect on passenger comfort and, in extreme cases, can endanger the safety of passengers and train crew. The increase of air resistance in long tunnels can prevent trains from running at maximum speeds which are normally possible. Moreover, when trains pass through long tunnels, difficulties can arise with engine ventilation in motive power units and with air-conditioning in passenger compartments.

Gackenholtz, L *Glaser's Annalen ZEV* Vol. 98 No. 9, Sept. 1974, pp 310-314, 4 Fig., 8 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096644

FIFTY-YEAR DEVELOPMENT: CONSTRUCTION OF STEEL ARCH BRIDGES

During the past 50 yrs. there have been major changes in the engineering, fabrication, and construction of steel arch bridges. The laser surveying instruments, high-strength steels, numerically controlled drilling, welding, and high-strength bolts have all had tremendous impact on field construction. The methods of erecting have also vastly improved the efficiency, time, and safety of bridge construction. Erection methods vary from supporting the arch by falsework or wire rope tiebacks to jacking large heavy spans several hundred feet above river level. Fifty years ago, falsework was made of square timber formed into bents supported by wooden piles. Today, it is made from light reusable steel sections. Large floating derricks are used to lift heavy pieces, often eliminating the need for travelers mounted on the bridge.

Hollingsworth, WF *ASCE Journal of the Construction Division Proc Paper* Vol. 101 No. CO1, #11187, Mar. 1975, pp 85-103

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096645

FIFTY YEAR DEVELOPMENT: CONSTRUCTION OF STEEL SUSPENSION BRIDGES

During the past 50 years there have been changes in the construction of steel suspension bridges. The design of bridges with longer spans has had an impact on the methods used for construction. The methods used for tower erection have changed with the use of heavier and taller towers. Longer spans have resulted in larger diameter cables. This has affected the design and erection of catwalks and the methods and equipment used for cable spinning, stiffening truss erection, and cable wrapping. The development of the methods used to erect the towers, main cables, and suspended steelwork of suspension bridges is traced by reviewing the construction of notable suspension bridges built in the United States.

Dwyer, JD *ASCE Journal of the Construction Division Proc Paper* Vol. 101 No. CO1, #11176, Mar. 1975, pp 105-125

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096646

DEVELOPMENTS IN TRENCH-TYPE TUNNEL CONSTRUCTION

The basic concept of the subaqueous trench-type tunnel dates back to antiquity. It is known that a tunnel of this type was constructed in Babylon in 2180-2160 B.C. The modern revival of this old idea dates from before 1854. A review is presented of the various methods of construction proposed in the years following, culminating in the construction of the first true trench-type tunnel, the Detroit River Tunnel of the Michigan Central Railroad (1906-1910). Construction of this tunnel and other early tunnels, i.e., the Posey Tube, Alameda (1926-1928); the Detroit-Windsor Tunnel (1928-1930), the Bankhead Tunnel, Mobile, Ala. (1939-1940); the Maas River Tunnel (1938-1941) is described in general terms. The inherent advantages of trench-type tunnels were demonstrated in these early works and led to the widespread use of this type in the ensuing years.

Palmer, WF, Roberts, KC *ASCE Journal of the Construction Division Proc Paper* Vol. 101 No. CO1, #11183, Mar. 1975, pp 37-49

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096647

MAINTENANCE OF SERVICES DURING CONSTRUCTION

During the construction of the underground and depressed sections of the East-West Expressway in downtown Montreal, public utilities and essential services had to be maintained across the right-of-way. These utilities

and services included electric power, communications and controls, telephone, water supply, gas mains, sewers, vehicular traffic, and pedestrian crossings. Types of supporting structures include beam and girder bridges, trusses, and suspension bridges of the one, two, and three-cable varieties. The solutions selected at diverse locations are described.

Cossette, C Zbinden, E *ASCE Journal of the Construction Division* Proc Paper Vol. 101 No. CO1, #11186, Mar. 1975, pp 155-163

ACKNOWLEDGMENT: ASCE

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096648

LINER-MEDIUM INTERACTION IN TUNNELS

Results from a number of elastic finite element solutions for determination of forces and deformation in tunnel liners are presented. The effect on forces and deformations in the liner of the properties of the medium, loading conditions, and the extension of the tunnel longitudinally are examined. Several loadings were assumed in the solutions. The results indicate that small absolute values of the coefficients of moment, shear, and deflection are obtained irrespective of the loading condition assumed.

Mohraz, B Hendron, AJ, Jr Ranken, RE Salem, MH *ASCE Journal of the Construction Division* Proc Paper Vol. 101 No. CO1, #11174, Mar. 1975, pp 127-141

ACKNOWLEDGMENT: ASCE

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096649

EFFECTIVE STRESS-STRAIN-STRENGTH MODEL FOR SOILS

An analytical model is proposed that treats soil as an elastic-plastic strain-hardening or strain softening, frictional material. The formulation, which is based on the critical state model developed by Cambridge University, ties together undrained and drained loading situations, and nonlinear behavior is accounted for by specifying appropriate yield functions and using an associative flow rule. Mathematically simple but realistic yield functions are proposed to facilitate closed-form solutions. The incremental stress-strain relationships are developed for use in finite element analyses, and, as an illustration, the drained expansion of a cylindrical cavity (pressure meter test) is analyzed.

Prevost, JH Hoeg, K *ASCE Journal of the Geotechnical Engineering Div* Proc Paper Vol. 101 No. GT3, #11157, Mar. 1975, pp 259-278

ACKNOWLEDGMENT: ASCE

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096650

EMBANKMENT ON SOFT AND SENSITIVE CLAY FOUNDATION

A test embankment built on a soft sensitive clay foundation has failed at a computed safety factor higher than one, thus confirming the allegation that the field vane test overestimates the shear strength in this type of clay. The increased shear strength values measured by the vane, as compared to the shear strength mobilized at failure, are explained by the affect of the rate of loading (time effect) and by the anisotropy of the clay. However, correcting the measured vane shear strength for these two factors, as recommended by Bjerrum (1973), results in a computed safety factor at failure still higher than one. This is due to the progressive failure phenomenon, which tends to develop in sensitive clays (liquidity index higher than one). Pore pressure and deformation measurements carried out during construction have confirmed the development of this progressive failure. The writers recommended the use of semi-empirical correction factors as functions of the plasticity index, anisotropy, and progressive failure.

Dascal, O Tournier, JP *ASCE Journal of the Geotechnical Engineering Div* Proc Paper Vol. 101 No. GT3, #11193, Mar. 1975, pp 297-314

ACKNOWLEDGMENT: ASCE

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096659

ORTHOTROPIC, STEEL-PLATE DECK BRIDGES

This paper discusses the use of steel orthotropic deck construction for bridges. It reviews the development of this form of construction and the

factors involved in this development. Reference is made to construction details and to various existing design manuals. The theory of analysis of orthotropic plates, together with the design approach are also briefly outlined. Typical dimensions are given for the various elements which go to make up this type of bridge and, finally, comparison is made between torsionally 'soft' and torsionally 'stiff' stringers and between orthotropic steel-plate deck bridges and more conventional bridges. Author/TRRL/

Buchan, AR *Institution of Municipal Engineers, Journal of* Vol. 101 No. 11, Nov. 1974, pp 285-288, 5 Fig., 8 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211817)

PURCHASE FROM: ESL Repr. PC, Microfilm

00 096663

TUNNEL CONSTRUCTION IN ARTIFICIALLY FROZEN SOIL [TUNNELBYGGNAD I FRYST JORD]

This is a description of a tunnel construction project in Gothenberg, Sweden, especially two parts of the tunnel, driven through soil. The freezing of the soil, a sandy silt and a till were performed by means of evaporation of freon gas in steel pipes surrounding the tunnel tube. The pipes had the same strength as the respective part of the tunnel and were installed parallel to the tunnel tube in a circle, 700 mm outside the tube. Thus a layer of frozen soil about 1 m. thick, surrounded the tunnel tube. /TRRL/ [Swedish]

Groenblad, G Karlsson, L *Boggnadsindustrin* Vol. 44 No. 20, 1974, pp 22023, 1 Fig., 2 Phot.

ACKNOWLEDGMENT: National Swedish Road & Traffic Research Institute Transport and Road Research Laboratory (IRRD 210534S)
PURCHASE FROM: National Swedish Road & Traffic Research Institute Fack, S-581 01 Linköping 1, Sweden Repr. PC

00 096664

FINITE ELEMENT ANALYSIS OF THE EFFECTS OF INSTALLATION ON PILE LOAD-SETTLEMENT BEHAVIOUR

A finite element analysis for an axially loaded pile has been developed in which the pile and soil are analyzed as separate bodies and equilibrium and displacement compatibility at the pile-soil interface is then imposed to obtain a solution for the settlement of the pile. This analysis has been used to investigate the effects of installation of a pile on its load-settlement behaviour. Installation of the pile has been simulated by introducing a zone of disturbed soil around the pile, having different strength and deformation properties from the undisturbed soil. The theoretical results indicate that the load-settlement behaviour of the pile is influenced by the nature and extent of the disturbed zone, but to a lesser extent than the ultimate load of the pile which depends almost entirely on the strength properties of the disturbed zone. For practical predictions of pile settlements, it appears adequate to use the theoretical solutions for a pile in a homogeneous soil with an equivalent constant Young's modulus. However for detailed investigation of soil settlement distribution around a pile, it is essential to take account of the non-homogeneous nature of the soil arising from pile installation. Measured distributions of soil settlement around a pile in London clay are consistent with those predicted from the finite element analysis. /TRRL/

Balaam, HP Poulos, HG Booker, JR
Sydney University Res. Rpt. R246, June 1974, 21 pp, 8 Fig., 12 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 22126S)

PURCHASE FROM: Sydney University, Australia School of Civil Engineering, Sydney, New South Wales, Australia Repr. PC

00 096668

TRIAXIAL TESTS ON SOILS: CORRECTIONS FOR EFFECT OF MEMBRANE AND FILTER DRAIN

In the triaxial test for measuring the shear-strength properties of soils, the specimen is enclosed in a rubber membrane and a paper filter drain is used to accelerate the removal of water during consolidation. A correction must be made to the observed stresses to allow for the restraint imposed by the rubber membrane and paper filter drain. For tests continued to large strain in which failure takes place along a single plane, such as occurs during the determination of residual strength on specimens containing a natural or pre-cut slip surface, the factors governing the restraint are com-

plex and it is not possible to calculate the magnitude of the correction required. This report describes some experimental work to determine the correction necessary for the effect of the restraint of the membrane and filter drain for failure on a single plane inclined at an angle of 52 degrees to the horizontal. The tests were carried out using a cylindrical perspex specimen 38mm in diameter by 76mm in length (1 1/2 in x 3 in) having a specially prepared shear plane on which the friction was reduced to a very small value. Charts are given for the corrections to be applied to the shear and normal stress for a range of cell pressures. /Author/TRRL/

Balkie, T Marsh, AD
Transport and Road Research Laboratory Supp. Rpt. #90 uC, 1974, 24 PP, 16 Fig., 4 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211357S)

PURCHASE FROM: Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU, England Repr. PC

00 096670

TECHNIQUES AND EQUIPMENT FOR DETECTING UNDERGROUND SERVICES

This report is intended to be a guide to engineers who wish to employ specialist techniques to locate underground services. The tasks may range from checking a whole site for the existence of buried pipes or cables to tracing the routes of services already known to be present. The need for such techniques arises at various stages in road works from the preliminary survey for a new scheme to the maintenance of an old road. The characteristics of the service to be located and the conditions under which this must be done vary widely and few of the devices available fulfil multiple roles. To assist the engineer in choosing the most appropriate equipment, the report includes brief notes on the principles of operation of most types of device and lists a wide range of commercially available instruments together with an indication of the likely applications of each. /Author/TRRL/

Keir, WG

Transport and Road Research Laboratory Supp. Rpt. #69 uc, 1974, 7 pp, 1 Tab.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211350S)

PURCHASE FROM: Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU, England Repr. PC

00 096671

VIBRATION OF SOLIDS AND STRUCTURES UNDER MOVING LOADS

The effects of moving loads on elastic and inelastic solids, elements and parts of structures and on elastic media are analysed. Vibration of beams, frames, arches, strings, plates, elastic space, thin-wall bars, rigid-plastic beams are dealt with. The vibrations are produced by various types of load, by vehicles with the invertical effects of the mass and by random load, which move with constant or other velocity along the structure. The theoretical formulation of the problem, the mathematical solution, the application to civil, mechanical, transport and aircraft structures are given. Stochastic processes in relation to moving loads are included. The book is an English translation, by D. Hajsmanova, of the original published in Czech by Academia Prague. /TRRL/

Fryba, L (Research Institute of Transport, Czechoslovakia)
Noordhoff International Publishing 1972, 484 pp, Figs., Tabs., 272 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211005S)

PURCHASE FROM: Noordhoff International Publishing P.O. Box 26,
Leiden, Netherlands Repr. PC

00 096673

HIGH SPEED BRIDGE FOR HIGH SPEED TRAINS

The construction of a precast bridge, which can be built in 60 hours, is described. The system features the exclusive use of pre-cast units and a new method of forming bridge abutments using steel sheet and "h" piles compositely. Previously welded Unissen piles were used. The abutments consisted of 9.5m long sections of Larssen 10a and 10b/20 sheet piling welded to 16m long sections of universal beams, which carry bridge loads

in end bearing and provide lateral 'support' to the sheets. These retain the ground by spanning between the main piles. The system is sensitive to ground conditions and would be unsuitable for boulder clay or similar unpredictable materials. Composite piles were successfully used for the railway bridge construction at Shrivernham, which will carry high speed trains. /TRRL/

New Civil Engineer No. 104, Aug. 1974, p 25, 1 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 210983S)

PURCHASE FROM: Institution of Civil Engineers 1-7 Great George Street,
Westminster, London SW1P 3AA, England Repr. PC

00 096674

THE APPLICATION OF CHEMICAL GROUTS TO GROUND CONSOLIDATION

The author gives a brief history of the development of this process which, until recently, was mostly based on the gelling of sodium silicate solution by the use of calcium chloride. Details are given of the two-shot methods that have been developed to inject the chemical into the ground and of typical equipment and methods used. This is followed by an account of the one shot method which has subsequently been developed and which makes use of chemicals that slow down the gelling process. After listing the requirements of a one-shot silicate grout, the author points out that they often exhibit undesirable characteristics for some applications. Alternative grouts are next discussed, these include a grout based on sulphite lye, acrylic polymers and other resins, such as certain tannins, which have a viscosity approaching that of water and can therefore be used to penetrate silty sands. The conclusion deals with the selection of grouts for particular applications, (referring to the guide specifications set up by the American Society of Civil Engineers) and to the choice of equipment. /TRRL/

Plaisted, AC (Chemical Building Products Limited) *Ground Engineering*
Vol. 7 No. 4, July 1974, pp 42-44, 2 Fig., 4 Phot., 7 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 210978S)

PURCHASE FROM: Foundation Publications Limited 7 Ongar Road,
Brentwood CM15 9AM, England Repr. PC

00 096683

THE BRUSSELS UNDERGROUND RAILWAY, CONSTRUCTION METHODS USED FOR ENGINEERING STRUCTURES [Le metro de Bruxelles, procedes d'execution des ouvrages de genie civil]

The advantage and disadvantages of the various construction methods used are discussed: metal sheet piles, lined excavation building pits, slurry trench walls, secant piles, shield, semi-elliptic shield, freezing of the ground, false deep wells, etc. A study was also made of the use of the space above the tunnel for an underground parking garage. This paper was presented at the 5th International Congress of Underground Techniques and Town Planning, Madrid, 5-11 October 1969. /TRRL/ [French]

Woitichik, M

Societe des Transports Intercommunaux de Bruxelles R&D Rpt. Oct. 1971, 47 pp, Figs.

ACKNOWLEDGMENT: National Scientific & Tech Res Ctr of Cement
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PURCHASE FROM: Societe des Transports Intercommunaux de Bruxelles
15 Avenue de la Toison d'Or, 1050 Bruxelles, Belgium Repr. PC

00 096684

INTRODUCTION TO GEOTECHNICS [Introduction a la geotechnique]

After recalling that the aim of geotechnics is to enable adequate foundations to be built, the author studies (1) the physico-chemical characteristics of soil (skeleton, effects of pore water, settlements under load, weathering of rocks); (2) the mechanical characteristics of soil (elasticity and failure, friction and stress); measurement of shear strength; strength of loose soil: clay, sand, gravel, silt; liquefaction of loose soil; strength of fissured and non-fissured rocks; use of loose soil as construction materials: reinforced earth and compacted soil; dispersion of test results; soil me-

chanics; (3) underground flow (water tables, principles of the study of underground flows, filtration wells, dewatering of excavations, effect of underground flow); (4) explosions, earthquakes, effect of soil vibrations on structures, foundations for vibratory machines. Three appendices and an extensive bibliography are included. /TRRL/ [French]

Cambefort, H
Eyrolles 1971, 368 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées
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00 096685
PILING PRACTICE

This book is divided into two parts. The first describes the main types of piles, construction methods, manufacture, and advantages and disadvantages of each type. The second part reviews the various stages of construction of piled foundations, from the initial survey of the terrain to the completion of the work and control tests. The aim of the book is to present data on the selection of techniques for different conditions and details of the organization of piling foundation operations. /TRRL/

West, AS
Butterworths & Company, Limited 1972, 114 pp, Figs., Tabs., Photos., Refs.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées
Transport and Road Research Laboratory (IRRD 100354)
PURCHASE FROM: Butterworth and Company, Limited 88 Kingsway,
London WC2B 6AB, England Repr. PC

00 096686
ROCK SLOPE STABILITY [Stabilité des talus rocheux]

The most serious disorders which can occur in slopes are (1) the sliding of block(s) along the discontinuing surfaces which exist at the opening of trenches and (2) rock falls or sliding of block(s) resulting from the rapid change in the mechanical characteristics of the rock bench which supports them. The forecast of simple slides is based on the detailed analysis of the geometry of discontinuing surfaces. This analysis can often be very difficult because of insufficiently precise data on discontinuity distribution and evolution in shear strength. The prediction of mass rock falls caused by the rapid change in rock benches liable to weathering is based on a detailed geological and mineralogical study and laboratory test results. These weathering test can give an assessment of the weathering properties of materials taking account of the special physico-chemical conditions of a given structure. By taking into consideration the results of the above studies and tests, it is possible to select a satisfactory solution which is a happy medium between safety, and economy. See also IRRD abstract no. 100546. /TRRL/ [French]

Struillou, R *Cahiers du Comité Français de Mécanique des Roches* Conf Paper July 1971, pp 81-88, 3 Phot.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées
Transport and Road Research Laboratory (IRRD 100545)
PURCHASE FROM: Cahiers du Comité Français de Mécanique des
Roches Saint-Etienne, France Repr. PC

00 096687
**SPLITTING AND PRESPLITTING OF ROCK WITH
EXPLOSIVES. THEORETICAL ASPECTS. PRACTICAL ASPECTS**
[Decoupage et predecoupage a l'explosif-aspects theoriques aspects
pratiques]

The splitting and presplitting of rocks consist in creating a crack along a rock wall by means of simultaneous blasting operations in blast-holes with a light charge. These techniques have been extensively used for the last few years in the construction of large-scale rock cuttings. They facilitate the cutting of regular faces and limit cracks in the remaining in-situ rock thus limiting also the surface weathering of the rock, rock falls and, consequently, maintenance costs. The development of these techniques took place of experimental sites, and theoretical studies gave a better understanding of the failure plane linking two blast-holes simultaneously fired. These methods have been very successfully used in underground construc-

tion works resulting in large savings in temporary supports and volume of placed concrete. See also IRRD abstract 100543. /TRRL/ [French]

Weber, P Panet, M *Cahiers du Comité Français de Mécanique des Roches* Conf Paper July 1971, pp 89-98, 2 Fig., 6 Phot.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées
Transport and Road Research Laboratory (IRRD 100546)
PURCHASE FROM: Cahiers du Comité Français de Mécanique des
Roches Saint-Etienne, France Repr. PC

00 096688
**EXPERIMENTAL METHOD OF CLASSIFYING SOILS
ACCORDING TO THEIR SUSCEPTIBILITY TO FROST [Méthode
experimentale de classement des sols selon leur degré de gelivité]**

Details are given of an experimental method of studying the behaviour of different soils subjected to the same freezing process. The method enables the soils to be classified according to their frost susceptibility characterized by the gradient of the straight line representing their swelling as a function of the square root of the frost index. The equipment, which allows the simultaneous study of six samples, is described together with the first tests carried out. The results obtained which are reproducible have facilitated the classification of eight types of soil over a wide range of frost susceptibility. /TRRL/ [French]

Aguirre-Puente, J Dupas, A Philippe, A *Bulletin de Liaison des Lab des Ponts et Chaussées* No. 60, July 1972, pp 105-116, 1 Fig., 1 Tab., 4 Phot., 16 Ref.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées
Transport and Road Research Laboratory (IRRD 100550)
PURCHASE FROM: Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU, England Orig. PC

00 096689
**SEISMIC LOGGING TECHNIQUE IN CIVIL ENGINEERING [La
technique du carottage sismique en génie civil]**

The seismic methods currently used in civil engineering permit only large quantities of soil to be detected and identified, the equipment utilized stretching over several dozen meters. Seismic logging allows the identification of much smaller quantities of soil. The measuring apparatus comprises a seismic probe equipped with a wave transmission system, one or several sensors and a device which facilitates the application of the transmission head and detection head to the side of a borehole. The signals transmitted by the sensors can be seen on an oscilloscope. This article briefly describes two measurement circuits together with the main results obtained with them. The identification of longitudinal and transverse waves is discussed as well as the calculation of the modulus of elasticity and Poisson's ratio that can be derived from them. The results of measurements of the velocity of longitudinal waves in a limestone mass are compared with other characteristics measured in the same soil: natural radioactivity, velocity on samples and simple compression strength. Results show that this technique facilitates the determination of in-situ characteristics which cannot be obtained by other methods. /TRRL/ [French]

Allard, P Grenet, C *Bulletin de Liaison des Lab des Ponts et Chaussées* No. 60, July 1972, pp 125-136, Figs., 1 Tab., 3 Phot., 12 Ref.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées
Transport and Road Research Laboratory (IRRD 100552)
PURCHASE FROM: Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU, England Orig. PC

00 096691
**PHOTOGRAMMETRIC MEASUREMENT OF LANDSLIDES BY
MEANS OF TESTS ON SMALL-SCALE MODELS [Mesure
photogrammetrique des glissements de terres par l'essai sur modele
reduit]**

This article discusses the various applications of photogrammetry. On principle, it is accepted in problems of measurement, that, if the object can be photographed, there exists a means of determining qualitative/quantitative characteristics identifiable in the photograph taken. The so-called "short-distance" photogrammetry is an essential process for determining settlement and failure of a soil sample subjected to centrifugal force up to a speed of 45 m/s. [French]

El-Beik, AHA Schofield, AN (Manchester University, England) *Revue Iena* No. 3, 1972, pp 144-148, 1 Fig., 2 Tab., 5 Phot., 4 Ref.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées Transport and Road Research Laboratory

PURCHASE FROM: VEB Carl Zeiss Jena Carl-Zeiss Strasse 1, 69 Jena, East Germany Repr. PC

00 096692

LIMIT ANALYSIS OF PILE GROUPS WITH LATERAL SOIL REACTION [Calcul a la rupture des fondations sur groupes de pieux avec reaction laterale des terrains]

A new method is proposed for determining the maximum intensity of stresses that can be applied to a group of piles. The model does not take into account the distribution of stresses in the soil in the elastic phase, but is based on results of the lateral loading tests conducted by Kerisel and Adam (1967). The safety range for a pile as regards the external stresses applied is defined. This range results from the soil/pile limit equilibrium conditions and from the conditions of the pile internal equilibrium. Further conditions are also defined which result from the fact that the piles belong to one group. Finally, the principles on which to base an effective method of determining the limit stress for a group of piles are also determined. See IRRD abstract no. 100334. /TRRL/ [French]

Presented at the 5th European Conference on Soil

Demonsablon, PH

Sociedad Espanola de Mecanica del Suelo y Cemento Conf Paper 1972, pp 247-355, 8 Fig., 8 Ref.

ACKNOWLEDGMENT: Transportation & Soil Mechanics Laboratory, Spain Laboratoire Central des Ponts et Chaussées Transport and Road Research Laboratory (IRRD 100343)

PURCHASE FROM: Sociedad Espanola de Mecanica del Suelo y Cemento Laboratorio del Transporte y Mecanica del Suelo, Alfonso XII, Madrid, Spain Repr. PC

00 096693

STATISTICAL STUDY OF DISORDERS IN DEEP EXCAVATIONS [Etude statistique des desordres dans les fouilles a grande profondeur]

The decomposition of soil is classified into two types: powdery soil of low cohesion, and slightly powdery cohesive soil. Six statistical curves are proposed which express the percentage between the number of disorders and the number of excavations studied. Some observations of an experimental nature are presented to facilitate the discussion on the shape of the different curves. See IRRD abstract no. 100334. /TRRL/ [French]

Presented at the 5th European Conference on Soil.

Collin, B Dufour, C

Sociedad Espanola de Mecanica del Suelo y Cemento Conf Paper 1972, pp 445-459, 7 Fig.

ACKNOWLEDGMENT: Transportation & Soil Mechanics Laboratory, Spain Laboratoire Central des Ponts et Chaussées Transport and Road Research Laboratory (IRRD 100346)

PURCHASE FROM: Sociedad Espanola de Mecanica del Suelo y Cemento Laboratorio del Transporte y Mecanica del Suelo, Alfonso XII, Madrid, Spain Repr. PC

00 096774

EMBANKMENTS CONSTRUCTED DURING THE WINTER [Vinterbyggda Bankar]

The purpose of this investigation was to determine the factors influencing vertical long-term deformations in earth embankments constructed during the winter, and based on these studies to suggest methods of reducing the settlements. Test embankments were constructed, all with filling material of relatively coarse grained fill with A certain content of rock and stone, a common soil in Sweden. The air temperature was between -26 degrees C and -3 degrees C during the time of construction and the thickness of the embankment layers varied between 30 and 120 cm. The settlements were measured by levelling during the two summers following the construction period. The investigation shows that earth embankments can be constructed satisfactorily during the winter if certain performance criteria are fulfilled. The following points should be considered in order to minimize the settlements: the choice of a soil with a low water content; the removal of cooling of earth masses and minimization of cooling before the compaction is performed; the use of thinner layers or heavier vibrating compactors when the temperature is lower. /TRRL/ [Swedish]

Oerbom, B Lundgren, N (National Swedish Road & Traffic Research Institute)

Svenska Byggnadsrenoveringsforeningen R&D Rpt. Report 10, 1973, 68 pp, 19 Fig., 9 Tab., 12 Phot., Refs.

ACKNOWLEDGMENT: National Swedish Road & Traffic Research Institute (VTIN20020E), Transport and Road Research Laboratory (IRRD 212464)

00 096782

JACKING IN AT BRENT CROSS

The article discusses the installation of two concrete box unit tunnel sections under existing embankments at the Brent Cross flyover, London. The two tunnels are claimed to be the world's largest such units to be installed using pipe-jacking or thrust boring techniques. Each of the precast concrete units are 32 ft wide, 22 ft high and have lengths of 33 ft and 45 ft. The rear jacking capability is provided by a bank of 28 110 ton capacity hydraulic rams. /TRRL/

Concrete Vol. 8 No. 12, Dec. 1974, pp 32-33, 4 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212034)

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096799

A VIADUCT FOR THE ENVIRONMENT

The article discusses the design of and method of construction used for the E Dale Road Viaduct, Derbyshire, built to replace an existing rail bridge built in 1930 to carry railway traffic from the Associated Portland Cement Manufacturer's Hope Works. Increased rail traffic made it necessary to not only replace the existing bridge but also to strengthen the Peaks Hole Culvert and to construct a pedestrian footbridge. The constructions required special attention to their design due to environmental considerations of the local countryside. The reinforced concrete, box-girder type viaduct was built directly alongside the old bridge, the new abutments being located on the existing embankments. Large longitudinal forces due to traction, braking and wind loads are carried by reinforced concrete raking struts at the north end, while the longitudinal reaction is carried by a horizontal plate anchor at the south end. The transverse reaction is carried by reinforced concrete foundations in conjunction with a retaining wall. /TRRL/

Butler, AW (Oscar Faber and Partners) *Concrete* Vol. 8 No. 9, Oct. 1974, pp 34-35, 3 Fig., 2 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212026)

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 096950

CONSTRUCTION MATERIALS AND TESTING TECHNIQUES FOR SOIL STABILISATION WITH CEMENT [Baustoffkundliche und Prueftechnische Fragen bei der Planung und Ausfuehrung von Bodenverfestigungen mit Zement]

Roadbase improvement by cement stabilisation of cohesive and noncohesive soils was practised 40 years ago, but has become very popular again. There is therefore a great need for revising the guidelines for cement stabilisation published in 1956. The paper reports on compressive strength limits, the method of testing, the effect of soil moisture, and quality control. Finally, experiences with special types of cement are described and examples of the exact specifications for stabilisation work are given. /TRRL/ [German]

Henk, B *Strassenbau-Technik* Vol. 25 No. 18, Sept. 1972, pp 38-42, 1 Tab., 15 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 300930)

PURCHASE FROM: Verlagsgesellschaft Rudolf Mueller Stolberger Strasse 84, D-5000 Koeln-41, West Germany Orig. PC

00 096951

CEMENT STABILIZATION OF SOILS [Bodenverfestigung mit Zement]

The paper describes a method of testing the cement content by means of the calorimeter. The reaction of soil-cement to hydrochloric acid releases a

certain amount of heat by which the cement content can be determined. Sponsored by the Forschungsgesellschaft fuer das Strassenwesen, research was carried out on 6 different types of soil and 4 different types of cement. This method can be used for quickly determining cement contents on construction sites. /TRRL/

Tophinke, G *Strassenbau-Technik* Vol. 25 No. 18, Sept. 1972, pp 42-44, 3 Fig., 1 Tab.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 300931)

PURCHASE FROM: Verlagsgesellschaft Rudolf Mueller Stolberger Strasse 84, D-5000 Koeln-41, West Germany Repr. PC

DOTL

00 096968

TRENDS IN PRESTRESSED CONCRETE BRIDGE BUILDING [Entwicklungstendenzen im Spannbetonbrueckenbau]

The design of multiple span prestressed concrete bridges in the Dresden area is described chronologically (1961-1971) and examples given of completed and projected structures. Principles, elements and technologies which have changed during this period are highlighted and the reasons for the changes are given. Many technical aids such as for example steel scaffolding systems have been tested. As regards production it is suggested that variable building height should not be chosen except for special reasons. Coloration of the concrete and processing are now rarer and natural stone walling is confined to special cases because of the cost. /TRRL/ [German]

Fischer, KH *Strasse* Vol. 12 No. 10, Oct. 1972, pp 424-28, 7 Fig., 9 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 300956)

PURCHASE FROM: VEB Entwurfs-und Ingenieurbuero des Strassenwesen BT Berlin, Bruederstrasse 26, 102 Berlin, East Germany Repr. PC

00 096986

CONSTRUCTION GUIDE FOR SOILS AND FOUNDATIONS

This book is intended to provide contractors and subcontractors with the practical aspects of foundation construction. It discusses soils, soil behaviour and the construction of foundations, emphasizing that the soil is as much a part of the overall structure as are the components of the superstructure. Potential problems in specifications, contracts, soils data, etc., are pointed out and some solutions offered. Special emphasis is given to: the importance of obtaining all available information on subsurface, rock, and groundwater conditions; the difficulties in the installation of specialized foundation elements such as piles, caissons and underpinning; and the necessity for the proper engineering of all temporary construction, excavation slopes, sheeting and bracing, and other measures to prevent property damage. /TRRL/

Fletcher, GA Smoots, VA
Wiley (John) and Sons, Limited Textbook 1974, 60 pp, Figs., Tabs.,
Photos., 60 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212258)

PURCHASE FROM: Wiley (John) and Sons, Incorporated 605 Third Avenue, New York, New York, 10016 Repr. PC

00 097062

NEW TYPE OF PREFABRICATED BRIDGE [NUEVO TIPO DE PUENTE PREFABRICADO]

Details are given of a type of prefabricated bridge for spanning railway lines. Thanks to prefabrication and maximum lightness, installation is reduced to the simple in-situ excavation of the foundations and erection of the precast units. The project described consists of three semi-continuous spans (elimination of transverse joints) 7.70, 12.60 and 7.70 m respectively. The structure comprises three components: pier, box girder and deck slab. The flexibility of the system facilitates the construction of a wide variety of spans and the erection of one-, two- or three-lane structures. The erection process, equipment needed and calculation assumptions are described. /TRRL/ [Spanish]

Aquilo, M Ordonez, JA Martinez, J *Hormigon Y Acero* No. 102, Jan. 1972, pp 101-108, 8 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 100813)

PURCHASE FROM: Ultimas Noticias de Hormigon Pretensado Instituto Eduardo Torroja, Madrid 16, Spain Repr. PC

00 097064

ANALYSIS OF A RAILWAY BRIDGE STRUCTURE [Análisis del Sistema Estructural Puente Para Ferrocarril]

Details are given of an analytical method of study, which leads to the classification of available data with a view to their direct use by draughtsmen. A series of subtypes is defined within the framework of the structural system studied, and the available data are classified for each subtype. A series of graphs relates the different data to the structural aspects. /TRRL/ [Spanish]

Martinez-Villanova, J *Ferrocarriles y Tranvias* Vol. 34 No. 392, Apr. 1972, pp 135-140, 13 Fig.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 100855)

PURCHASE FROM: Ferrocarriles y Tranvias Paseo Del Prado, 12 Madrid, Spain Repr. PC

00 097242

MANEUVERABLE TUNNEL MOLE NAVIGATES AROUND OBSTACLES

When surface congestion prevented open-cut construction, a mole with 39 cutter heads twisted and turned its way past the foundations of historic buildings to bore a 1.6-mi subway tunnel 82 ft below the streets of central Paris.

Sullivan, M *Construction Methods and Equipment* Vol. 56 No. 10, Oct. 1974, pp 56-57, 5 Phot.

ACKNOWLEDGMENT: Construction Methods and Equipment
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 097243

MULTI-PRONGED SUBWAY WORK ADVANCES WITHOUT TRAFFIC TIEUP

Prefabbed steel shoring grids and specially built bridging panels speed construction of subway facilities beneath busy San Francisco streets without seriously disrupting traffic overhead.

Drossel, MR *Construction Methods and Equipment* Vol. 56 No. 10, Oct. 1974, pp 70-72, 9 Phot.

ACKNOWLEDGMENT: Construction Methods and Equipment
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 097252

1963 CONDITION REPORT ON ASPHALT TREATMENT OF BALLAST AND BRIDGE DECKS

All of the asphalt treated ballast test sections applied in 1959 and 1960 on various railroads and a representative number of the bridge deck treatments on the Pittsburgh and West Virginia Railway applied in 1959 and 1960 were inspected during the summer and fall of 1962 by representatives of AAR and Asphalt Institute. Results of inspections are given in report.

Conducted under sponsorship of AREA Committee I-Roadway and Ballast.

Association of American Railroads Technical Center ER-30, Feb. 1963, 10 pp, 1 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 097257

REPORT ON ASPHALT TREATMENT OF BALLAST AND BRIDGE DECKS

This report deals with the asphalt ballast treatments made during 1960 on five roads and the bridge deck treatments on two roads. In addition, a progress report is presented on the nine track sections and one bridge project treated in 1959. The general features of these latter projects were

described last year and appear in the Proceedings, Vol. 61, 1960, page 715. These treatments are the result of the research project jointly sponsored by the Roadway and Ballast Committee of the American Railway Engineering Association, of the Asphalt Institute and the Research Department of the AAR. Special equipment for the process has been developed and used, the description of which appears in the Proceedings, Vol. 60, 1959, page 712. The applications were made possible by the complete and excellent cooperation of the participating railroads who bore the cost of the materials and application with such technical assistance as required from the staff of the Asphalt Institute and the AAR. The special equipment has been made available upon request to any railroad without charge. It is expected that after revisions and repairs indicated during service in 1960 they will also be available to Member Roads in 1961 upon request to the Research Department, AAR. Some difficulty was experienced with the equipment on this project and full coverage was not obtained under the rail, through the restricted station area. Also, the application of the cover coat was not fully uniform. The project appeared fairly satisfactory upon completion. The 1960 ballast treatments covered a wide range of conditions. They will be valuable in determining the effects of climate and track characteristics on such treatments. Work this year has further demonstrated that good coverage can be obtained which should serve very effectively toward tie preservation and protection of track fittings against corrosion. With the use of extended spray nozzles directed under the rail, full coverage and a good seal of the full ballast section was obtained in most cases, particularly where there was an opening under the rail in the cribs. The equipment in transfer movements from project to project indicated several deficiencies in security fastenings and appreciable damage occurred. This damage at times interfered with full production on the treatments reducing efficiency and raising costs to some extent. Careful note has been made of all sub-standard conditions and plans have been made for their correction including a number of betterments. If programs during 1961 indicate the need for the cars these changes will be made prior to the season and the cars will be available without charge to the roads on request to the Research Department, AAR.

Conducted under sponsorship of AREA Committee 1-Roadway and Ballast.

Smith, R
Association of American Railroads Technical Center ER-10, Feb. 1961, 6 pp

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 097258

FIELD INVESTIGATION OF SOUTHERN PACIFIC COMPANY, TEXAS AND LOUISIANA LINES PRESTRESSED CONCRETE GIRDER SPANS

A description and analysis of tests made on two spans under diesel locomotives at speeds from 5 to 20 mph comprise this report. One span consisted of four pre-tensioned girders 30 ft. long. The other span consisted of five girders 55 ft. 0 in. long which were first pre-tensioned and later post-tensioned. The purpose of the tests was to determine static effects, vertical and transverse distribution of strains and maximum strains. A brief summary of the data follows: The effect of diesel locomotive loadings on two prestressed concrete girder spans was analyzed, and from the test data it can be concluded that: (1) recorded static strains were less than the calculated values; (2) composite action was attained between the deck and the girders; (3) Transverse distribution was the best for the longer span having the closer girder spacing; (4) there was little increase in strains with increase in speed; however, the diesels operated up to speeds of only 20 mph.

Conducted under sponsorship of AREA Committee 30-Impact and Bridges Stresses.

Wilki, DW
Association of American Railroads Technical Center ER-25, Oct. 1962, 6 pp, 6 Fig., 1 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 097260

LABORATORY INVESTIGATION TO DETERMINE THE REPEATED LOAD STRENGTH OF TIMBER IN COMPRESSION PERPENDICULAR TO THE GRAIN

This is a report of progress in the investigation to determine the repeated load strength of timber in compression perpendicular to the grain. A simulated stringer cap bearing is used with full-size members. The results of the tests indicate that a much longer life with less total deformation of the stringer cap bearing surface could be expected when the growth rings in the stringers and cap are oriented 90 degrees relative to the bearing surface, as compared to a 45 degrees orientation.

Conducted under sponsorship of AREA Committee 7-Wood Bridges and Trestles.

Association of American Railroads Technical Center ER-3, Jan. 1961, 3 pp, 2 Fig.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 097263

QUANTITATIVE ANALYSIS OF IN-PLACE TREATMENT

This report contains the results of laboratory analyses of various piling specimens removed from pile trestles after in-place treatment with an organic solvent solution of pentachlorophenol, hereafter referred to as penta preservative. The results of these analyses can be summarized as follows: 1. Piling removed from a trestle immediately after it has received in-place internal preservative treatment with a penta solution and analysed three months later showed that the depth of penetration outwardly from the void was about 1/2 in. After one year the indicated depth of penetration in this same pile was about 1 in. 2. Piling removed from a trestle eleven years after in-place penta treatment indicated that the penetration outwardly from the void was 3 to 4 in. 3. Piling removed from a trestle three months after in-place treatment and analysed three months later indicated that the penta solution had penetrated about 2-1/2 in. into the shell of sound wood. 4. The Gainesville, Florida, test plot data indicates that life of 15 to 20 years can be expected from specimens having a retention of only 0.23 lb per cu. ft. The last inspection was made after an exposure of 124 months, but the downward slope of the three retention curves would indicate that a total life of 15 to 20 years might be expected from the treated specimens. As shown, the untreated specimens lasted only about 3 years. No specimens were treated to retentions less than 0.23 lb. per cu. ft., however, it seems reasonable that a curve showing the decay rate of specimens with lower retention would fall somewhere between the 0.23 lb. per cu. ft. retention curve and the no treatment curve. Some of the retention values found in the piling specimens and reported herein are less than 0.23 lb. per cu. ft. and the decay of such piles can be expected to continue at a faster rate than those with the higher retentions. The specimens in the Gainesville test plot are under a severe exposure of decay and represent conditions below ground. For specimens above ground the indicated rate of decay would be less than that shown on Figure 13 with a greater expected specimen life. G. Discussion and Conclusions. The results of this analysis comprise two groups of investigations: First: Both quantity of retention of penta and depth of penetration into the timber immediately or shortly after it had received in-place treatment; Secondly: After a considerable time interval that affected both the depth of penetration and the distribution of penta retention in the wood.

Association of American Railroads Technical Center ER-86, May 1969, 19 pp, 13 Fig., Tabs., Photos.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 097264

INVESTIGATION OF FATIGUE AND STATIC STRENGTH OF 50 YEAR OLD TIMBER STRINGERS FROM A.T. AND S.F. RY. BRIDGE NEAR LA JUNTA, COLORADO

The report contains a description and analysis of data obtained during the test of a three-span creosoted timber ballast-deck trestle. Information was

desired on 50-year old stringers in order to correlate field loading conditions with future laboratory research. Since Bridge 589.6 was to be replaced with a concrete culvert in the near future making the old stringers available for laboratory tests, it was decided to conduct a field test. The significant results of the test were that the maximum recorded strain at the center line of either test span was 357 micro inches/inch on the bottom of stringer 3 at the center line of span, and the maximum recorded strain over the center line of bent was 420 micro inches/inches on the top of stringer 7. These strains are equivalent to stresses of 714 psi and 840 psi, respectively, based on an assumed modulus of elasticity of 2,000 psi.

Conducted under sponsorships of AREA Committee 7-Wood Bridges and Trestles.

Association of American Railroads Technical Center ER-2, Jan. 1961, 21 pp, 1 Fig., Photos.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 097265

THE EFFECT OF UNIT TRAINS ON STRESS OCCURRENCES IN A CHICAGO AND NORTH WESTERN RAILWAY BRIDGE

This report contains a description and analysis of data obtained on the stringers and floor beams of a Chicago and North Western railway bridge to determine the frequency of occurrence of maximum stresses in these short span bridge elements which carry unit trains as well as regular service freight trains. The results may be summarized as follows: Track without rail joint: 1. The frequency of occurrence of maximum stress was in the range of 3.0 to 4.0 ksi in the stringers and the floor beam under the combined loading of unit trains and regular service freights and was on the order of 2 to 9 percent of the total occurrence respectively. 2. The loaded unit trains comprised 5 percent of the total cars recorded and produced 46 percent of the maximum stress occurrences greater than 3 ksi in the floor beam and 7 percent in the stringers respectively. Track with Rail Joint: 1. The frequency of occurrence of maximum stress under combined loading of unit trains and regular service freights was on the order of 4 percent for the floor beam and 1 to 3 percent for the stringers of the total occurrence.

Conducted under sponsorship of AREA Committee 30-Impact and Bridge Stresses.

Association of American Railroads Technical Center ER-87, June 1969, 12 pp, 7 Fig., 6 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

00 097273

RAIL MOUNTED INSPECTION UNIT PERMITTING ALL ROUND FIXED-STRUCTURE SURVEY WITH ARCH UNDERSIDE INSPECTION FACILITY

In the light of the higher stresses being imposed on the bridges and viaducts by today's train loads and speeds, British Railways has pursued a three-year inspection of all such facilities. To monitor any potential deterioration a three-boom jib with telescopic reach and an inspection bucket, remotely controlled by the operator, permits the necessary close-up survey of any structure on which track is laid. The road chassis of a commercial unit was replaced with a modified well-type flat car.

Rail Engineering International Vol. 5 No. 2, Feb. 1975, pp 76-78, 3 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 097275

TUNNEL LININGS: COMPARATIVE DESIGNS AND COSTS

This second installment of an analysis of tunnel lining examines the Bernold lining system. With the Bernold shutter reinforced concrete system, stamped and shaped steel plates are laid on arch frameworks. During the concreting cycle, these sheets act as a skin and at the end of the concreting

operation, function as the steel reinforcement. Comparisons of various lining methods are given in tables.

von der Au *Tunnels and Tunnelling* Vol. 7 No. 3, May 1975, pp 88-90

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 097276

TUNNELS IN MINING AND CIVIL ENGINEERING-COMMON GROUND

While tunnels utilized in mining are of smaller cross-section, the volume of material removed from British coal mines was over three times greater than that removed from civil engineering works in Britain. Civil engineering tunnels are generally constructed in less favorable ground than mining tunnels, leading to higher cost which is further raised by the longer design life and higher standard of finish necessary. However, in rock cutting research, partial-face tunneling machines, tunnel lining and probing in advance of excavation there is considerable technology exchange possible. With the increasing need for mechanization in both fields, there is need for even closer liaison in the future.

Boden, B West, G (Transport and Road Research Laboratory); Harrad, CJ (National Coal Board, England) *Tunnels and Tunnelling* Vol. 7 No. 3, May 1975, 4 pp, 5 Fig., 18 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 097277

EXTENDING THE PARIS METRO

The Regie Autonome des Transports Parisiens (RATP) has been engaged in construction of a new "Regional Express Rail" transit system and in extension of the existing Paris Metro system. Many differing construction methods have had to be utilized because of the variety of soil and geological conditions. Construction under many of the city's landmarks produced other problems. Each new work has been analyzed and several solutions are studied to find the most suitable solution. After technical and economic analysis, contracts are let. This is the first of two installments.

This article was presented to the British Tunneling Society on 6 February 1975.

Bougard, JF (Regie Autonome des Transports Parisiens) *Tunnels and Tunnelling* Vol. 7 No. 3, May 1975, pp 43-48, 9 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 097301

FIELD EVALUATION OF TENTATIVE DESIGN PROCEDURE FOR RIPRAP-LINED CHANNELS

The objective of National Cooperative Highway Research Program Project 15-2 has been to develop criteria and design procedures for the use of aggregate or riprap linings for drainage channels suitable for conditions intermediate between those for which turf cover performs satisfactorily and those for which paved channels or pipe flumes are more economical. NCHRP Report, Tentative Design Procedures for Riprap-Lined Channels, reported on previous research on sediment transport and, based on this, linings for five channels were developed. Four of these types have been installed for field evaluation and have been performing satisfactorily.

An NCHRP Staff digest of the essential findings from the final report on the field evaluation phase of NCHRP Project 15-2, Design to Control Erosion in Roadside Drainage Channels, by A.G. Anderson, University of Minnesota.

Research Results Digest #67, Feb. 1975, 4 pp

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

00 097349

THE STABILIZATION OF COHESIVE SOILS WITH LIME [Verfestigung Bindiger Boeden Mit Kalk]

At the Fourteenth World Road Congress in Prague the experiences of several European countries with lime stabilisation were described. It is reported that there is extensive cohesive soil between Belgium and the USSR and that lime treatment is cheaper than exposure. Observations of test sections with various lime additives show good results. Even after many years comparative values of land with and without lime show marked increases of strength. In the Federal German Republic it is pro-

posed that all sections which have been lying for years should be systematically tested for lime stabilisation and practical evaluation made. /TRRL/ [German]

Buergen, W *Strassenbau-Technik* Vol. 25 No. 18, Sept. 1972, pp 45-52, 7 Fig., 6 Tab., 23 Ref.

ACKNOWLEDGMENT: Research Association for Road Communications, W Gr (BAST21065E), Transport and Road Research Laboratory (IRRD 300965)

PURCHASE FROM: Verlagsgesellschaft Rudolf Mueller Stolberger Strasse 84, D-5000 Koeln-41, West Germany Repr. PC

00 097606

CHINNOR TUNNELLING TRIALS-BACKGROUND & PROGRESS

This article gives the background to the Chinnor tunnelling trials and an outline of the progress that has been made. Because the rate of tunnelling is a critical factor affecting costs, TRRL's tunnelling research has concentrated on excavation and primary mucking systems. The Chinnor trials represent the first full-scale studies that back up laboratory and pilot scale studies. After discussing the choice of the site (in the lower chalk) the authors outline the scope of the work which is primarily aimed at obtaining data relating to the performance of tunnelling machines and how it is affected by various factors; secondary objectives are the development of instrumentation and data processing systems, the study of debris clearance and performance of the machine, the study of the relation between site investigation and actual conditions, and the study of ground movements caused by tunnelling. The authors give details of the cutting head and tunnelling machine used at Chinnor and briefly discuss the initial trials. This is followed by a discussion of the principal factors being studied; rock cutting tool forces, head rotation speed, rate of advance and alignment of the head, hydraulic delivery pressure to the head, machine thrust, energy consumption and hydraulic oil pressure supplied to the reaction ring. Data acquisition is next discussed followed by an outline of the programme of tunnelling to be employed. This includes a diagram showing the proposed stages of the rock cutting experiments which are designed to provide data useful in the selection of tools appropriate to different rock formations. /TRRL/

Higne, HJ Boden, JB (Transport and Road Research Laboratory) *Tunnels and Tunnelling* Vol. 6 No. 6, Nov. 1974, pp 65-70, 5 Fig., 1 Tab., 1 Phot., 3 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212139)

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

00 097811

THE APPLICATION OF TWO MORPHOMETRIC TERRAIN-CLASSIFICATION

Morphometric terrain-classification systems developed in recent years have made comparatively little use of air-photo interpretation methods in providing their basic data. This is surprising in view of the very detailed landscape model which is provided by stereoscopic examination of air photos. In this study two morphometric classification systems were examined: the quantitative terrain data system and the characteristic plan-profile system, and modifications were made in their methodology so that the terrain parameters required by the systems could be obtained using air-photo interpretation methods. The applicability of the two systems, as modified, was tested in the laurentian area of eastern Canada with reference to sample areas in three different rock types. Measurements of terrain attributes were obtained from panchromatic air photos at a scale of 1:34,400, and it was demonstrated that, in their modified form, the two systems provided a detailed, objective method of terrain analysis, which was sufficiently sensitive to respond to variations in surface texture resulting from structural and lithological differences. In their modified form the two terrain-classification systems are considerably more versatile since they can be applied where topographic map coverage is lacking or inadequate. /Author/TRRL/

Parry, JT Beswick, JA *Photogrammetria* Vol. 29 No. 5, 1973, pp 153-186, 17 Fig., 9 Tab., 15 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211995)

PURCHASE FROM: ESL Repr. PC, Microfilm

00 097812

A PRELIMINARY REPORT ON NEW PHOTOLOGICAL STUDIES TO DETECT UNSTABLE NATURAL SLOPES

A preliminary investigation of the stability problems of natural slopes in southern England was carried out in 1968/69 using air photographs in conjunction with existing literature and a limited field study. General photoreconnaissance included the study of slopes consisting of the inferior oolite overlying the lias south of Leicester, but with special attention to the scarp face of the cotswold hills between Broadway and Bath, the lower greensand overlying the weald clay on the escarpment south and west of Sevenoaks in Kent and the upper greensand overlying the gault on the Isle of Wight and in Dorset. This study indicated that instability on slopes consisting of a clay overlain by a bed of significantly greater permeability was widespread enough to merit special attention. The following hypothesis was suggested to define the scope of further investigation. /Author/TRRL/

Watson, I (Imperial College of Science & Technology, England) *Quarterly Journal of Engineering Geology* Vol. 4 No. 2, 1971, pp 133-137, 1 Fig., 4 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212203)

PURCHASE FROM: ESL Repr. PC, Microfilm

00 097833

PROPOSAL FOR THE STUDY OF MOVEMENTS AND STRESS DISTRIBUTION IN A MASS AROUND A CAVITY OF ANY TRANSVERSE CROSS-SECTION [Vorschlag Zur Ermittlung Der Spannungsverteilung Und Der Verschiebungen Im Gebirge Rund Um Einen Hohlraum Mit Beliebiger Geformtem Querschnitt]

In order to obtain rapidly the stress distribution, displacements and deformation of plastic zones in a rock mass around a proposed cavity or tunnel, it is possible to use the theory of perforated isotropic plates of infinite dimension. It is necessary to obtain a function characterizing as best as possible the section to be studied. The type of function to be derived is given in the article together with methods of exploiting the results obtained by means of formulae. /TRRL/ [German]

Wisser, E *Bauingenieur, Der* Vol. 47 No. 3, Mar. 1972, pp 97-100, 4 Fig., 7 Ref.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées Transport and Road Research Laboratory (IRRD 100941)

00 097835

CONSOLIDATION UNDER VARIABLE LOAD SETTLEMENT AND PORE PRESSURE. THEORETICAL AND EXPERIMENTAL STUDY [Consolidation Sous Charge Variable, Tassements et Pression Interstitielle, Etude Theorique et Experimentale]

The construction of high embankments on compressible soil lasts several months or even several years. To prevent failure, it is necessary to establish a load application programme for the subgrade. In-situ soil layers are subjected to a total variable pressure as a function of time. Stability studies and settlement forecasts are conducted based on the assumption of instantaneous loading, which does not take into account the real phenomena occurring during construction. The comparison of in-situ measurements in the forecasts is practically impossible. In order to obtain data on the evolution in pore pressure and settlement during loading time, it is necessary to study the consolidation under total variable load as a function of time. The first part of the article outlines the Schiffman theory and the Terzaghi approximate method. The second part describes the experimental study carried out at the Angers laboratory on compressible soils. Full details are given of the instrumentation and main results obtained as regards evolution in settlement and pore pressure. Approximate formulae are proposed for solving basic problems. Results show that the Terzaghi method gives an acceptable settlement value. The Schiffman theory is verified during loading time as regards evaluation of the degree of consolidation. Attention is drawn to the fact that the last stages of loading can increase pore pressure greatly thus threatening the stability of the embankment. /TRRL/ [French]

Peignaud, M (LRPC Angers) *Annales de l'Institut Tech du Batiment Travaux Pub* No. 289, Jan. 1972, pp 117-36, Figs., 2 Tab., 2 Phot., 5 Ref.

ACKNOWLEDGMENT: Laboratoire Central des Ponts et Chaussées Transport and Road Research Laboratory (IRRD 100688)

00 097875

FROM RAILS TO TRAILS

Reuse of old railroad lines and the multiple use of transportation and utility corridors offer outstanding recreation opportunities for walking and bicycling at a relatively modest price. This booklet is directed to community leaders, state and local recreation planners, and interested citizens who wish to preserve and utilize an important resource. Each step, from locating trails to developing a finished surface, is discussed. Four case studies illustrate citizen action in establishing right-of-way trails.

U.S. Citizens Adv Comm on Environmental Quality SN040-000-00330-4, Feb. 1975, 68 pp

PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

DOTL RP

00 097944

ELEMENTS OF SOIL MECHANICS FOR CIVIL AND MINING ENGINEERS. THIRD EDITION METRIC

The book concisely presents the applications of soil mechanics now being used in civil engineering. The third edition is fully metricated and contains a new chapter on soil suction and partial saturation. The book is arranged under the following headings: classification and identification properties of soil; soil water, permeability and flow; other solutions to seepage problems; shear strength of soils; stability of slopes; earth pressure; elements of stress analysis; bearing capacity of soils; foundation settlement, soil compression; the rate of foundation settlement; compaction and soil mechanics aspects of highway design; soil suction and partial saturation; and site investigation. Notation, subject and author indexes are included. See also IRRD abstract no. 48081. /TRRL/

Smith, GN

Crosby Lockwood Staples Dec. 1973, 418 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211982)

PURCHASE FROM: Crosby Lockwood Staples Framere, St. Albans, Hertfordshire, England Orig. PC

00 097948

THE APPLICATION OF PHOTOGRAMMETRY TO THE STABILITY OF EXCAVATED ROCK SLOPES

The use of photostereographic photography and the subsequent photogrammetric measurements as the basis for slope stability analysis in open pit mines is described together with the application of stereometric photography to the measurement of roughness profiles on real and model rock samples. A single camera technique for the measurement of displacements occurring during the excavation of a model rock slope is explained. / Author/TRRL/

Wickens, EH (University College, London); Barton, NR (Imperial College of Science & Technology, England) *Photogrammetric Record* Vol. 7 Apr. 1971, pp 46-54, 4 Fig., 4 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211940)

PURCHASE FROM: Photogrammetric Society 47 Tothill Street, London SW1, England Orig. PC

7501125

00 098021

FUTURE OUTLOOK OF PILE DRIVING BY VIBRATION [Hat die Vibrationsrammung noch eine Zukunft?]

Introducing the problems involved by the use of vibratory pile hammers and the fundamental differences between the German and the Russian versions, results and achievements so far attained by means of this pile driving method are reported. As an essential factor the adaptation of the four sizes frequency, centrifugal force, amplitude and acceleration is stressed. The special technical features and range of application of Japanese vibratory pile hammers with particular reference to special cases of use are reported. [German]

Kuehn, G *Baumaschine und Bautechnik* Vol. 21 No. 9, Sept. 1974, pp 293-302

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

00 098023

BRIDGE AND GIRDER SYSTEMS

This paper presents a review of the software systems available for bridge design. Also, the individual girder design programs are summarized. An actual bridge which was designed by conventional means is used to compare the bridge design systems.

Presented at the Struct. Mech. Comput. Programs Symposium held at University of Maryland, College Park, June 1974.

McKeel, W (Virginia Highway & Transportation Research Council); Korf, J Vannoy, D Pilkey, W
Virginia University Press Proc Paper 1974, pp 359-410, 4 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: Virginia University Press Charlottesville, Virginia

00 098062

PREDICTION FOR SAFETY LEVEL OF CUTTING SLOPE FAILURE

This paper describes an estimating method for the safety of slopes along railways. The method aims at pinpointing dangerous spots in cut slopes using a rating system. The main feature of this method is a scoring process using a quantification theory, requiring objective input data. A simple seismic test and simple penetration test are conducted to produce the quantitative data. Measurements and the test apparatus are discussed.

Kabashi, S Imai, T Imai, S *Railway Technical Research Institute* Vol. 16 No. 1, Mar. 1975, pp 6-10, 6 Fig., 3 Tab.

PURCHASE FROM: Ken-yusha 1-45-6 Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

00 098065

BRIDGES: THE SPANS OF NORTH AMERICA

Railroads loomed large in the early evolution of bridges. Widespread use of wood is peculiar to North America, because it was plentiful and the need for quick construction made use of this economical material mandatory. Iron bridges were built intensively between 1850 and 1890, but the absence of tensile strength of cast iron soon saw wrought iron take over. Trusses and suspension systems could use wrought iron. After 1860, steel was utilized. The text has details of many American bridges and their builders, along with extensive illustrations. For bridge builders, this volume constitutes a comprehensive history of major spans on this continent.

Plowden, D

Viking Press No Date, 326 pp

PURCHASE FROM: Viking Press 625 Madison avenue, New York, New York, 10022 Orig. HC

00 098072

INFLUENCE OF TESTING CONDITIONS ON CREEP BEHAVIOR OF CLAY

The excavation of an underground opening produces changes in the state of stress which cause deformations composed of both time-dependent and time-independent components. In some soils and rocks the time-dependent component of deformation is large. Internal structural supports are provided to limit the creep displacements, resulting in an increase in the radial stresses acting on the supports. The increase depends on the creep propensity of the soil or rock. A creep testing system (CTS) is developed to simultaneously perform four consolidated-undrained triaxial creep tests on cylindrical specimens. The CTS consists of: triaxial cells; lever-arm loading mechanisms; cell pressure-control panel board; temperature-control water baths; load, pore pressure and deformation measuring devices; and data logger system. The testing program consists of a series of twenty five step-type creep tests which were performed on samples of kaolinite and slaked Cucaracha clay-shale. The influence of testing conditions, such as loading procedure, magnitude of consolidation pressure, overconsolidation and secondary compression, on the creep behavior of clays was investigated.

This was sponsored by Federal Railroad Administration, DOT.

Febres-Cordero, E Mesri, G
Illinois University, Urbana, (UIIU-ENG-74-2031) Final Rpt. FRA-ORD&D-75-29, Nov. 1974, 232 pp, Figs., Refs., 3 App.

Contract DOT-FR-30022

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

00 098102

PROBABILISTIC APPROACH TO DESIGN OF EMBANKMENTS

Safety factors of embankments are analyzed in relation to the variabilities and the uncertainties of soil properties. It is concluded that the unconfined compression strength of a saturated homogeneous clay layer and strength parameters of an unsaturated homogeneous silty soil layer follow the theoretical normal distributions. Such physical properties as moisture content and moist density of those soil layers and moist density of an embankment just after construction are also shown to be taken as the normal random variables. A new design factor is defined and the relation between the design factor and the probability of sliding failure of an embankment is formulated under consideration of the randomness of the soil properties. Numerical and practical examples show that the embankment with an ordinary value of the design factor (1.1-1.5) has an unexpected high value of the probability of sliding failure (15%-20%). /TRRL/

Matsuo, M (Nagoya University); Kuroda, K (Kyoto University) *Soils and Foundation* Vol. 14 No. 2, June 1974, PP 1-17, 19 Fig., 7 Tab., 13 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212108)

PURCHASE FROM: Japanese Society of Soil Mech & Foundation Engrs 13-5, 1-chome, Nishi Shimbashi, Minato-ku, Tokyo, Japan Repr. PC

00 098686

SINGLE BOX CULVERTS, DESIGN AND ANALYSIS

This computer program conforms generally to A.R.E.A. recommended practice. The program computes either the moment only or the moments and steel areas.

Pieprgrass, EB
Canadian Pacific 1969

ACKNOWLEDGMENT: AREA (AREA 01-01-001)

PURCHASE FROM: Canadian Pacific Windsor Station, Montreal, Quebec H3C 3E4, Canada

00 098687

TWIN BOX CULVERTS, DESIGN AND ANALYSIS

Computer Program. Given an opening size and the depth of cover, the program computes the most critical moments and shears from eight loading conditions. From these values, minimum wall and slab thicknesses are chosen, and required steel areas computed.

Pieprgrass, EB
Canadian Pacific 1969

ACKNOWLEDGMENT: AREA (AREA 01-01-002)

PURCHASE FROM: Canadian Pacific Windsor Station, Montreal, Quebec H3C 3E4, Canada

00 098688

CONCRETE BOX-CULVERT ANALYSIS

Computer program. Analysis of single, double or triple reinforced concrete box culvert. Input: Type of box dimensions of concrete cross section, reinforcing steel data for section at midspan and supports of each member, allowable stresses and elasticity factors, loading data. Output: for each potentially critical case of loads combination. 1. Value of F.E. Moments, adjusted end moments, maximum moments in span, end shear and shear at "d" distance from supports for each member. 2. List of all members and sections experiencing some kind of overstressing, with indication of required steel section.

Nichols, CA Ko, P
Southern Pacific Transportation Company Feb. 1973

ACKNOWLEDGMENT: AREA (AREA 01-01-003)

PURCHASE FROM: Southern Pacific Transportation Company 1 Market Street, San Francisco, California, 94105

00 098689

SUBGRADE OR BASE OF RAIL ELEVATIONS

File name is ENGR. GRADE: This program is designed to calculate subgrade or base of rail elevations. Given the elevation and engineering station of the point of beginning; stations of the PI's and lengths of vertical curves; and the slopes of the courses, the program will calculate subgrade or base of rail elevations for full stations or full stations plus 50 feet

if specified. In addition, output will include calculated stations to all control points along with all pertinent grade data.

Robinson, RE
Atchison, Topeka and Santa Fe Railway 1968

ACKNOWLEDGMENT: AREA (AREA 01-02-001)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

00 098690

LEVEL SECTION GRADING QUANTITIES

File name is ENLE. This program is designed to calculate "level section" center line grading quantities from data taken from a line located on contour sheets. The program is of great benefit in helping location or design engineers in estimating quantities based on different alignments or grade variations. The program accepts roadbeds of various widths or slope and as many as two benches and/or two berms. It will convert grade line information into subgrade elevation for each level section and determine whether the section is in cut or fill, if benches or berms are involved, and will calculate the applicable end areas and volumes taking vertical curve corrections into account. The program will determine where 0.0 sections occur and where benches and berms begin and end. Output will include, at each engineering station shown in the input, the cumulative embankment volume; cumulative excavation volume; cumulative rock excavation volume. (This is a percent of the total excavation. The percentage used is input and can vary from cut to cut); subgrade elevation, center line ground elevations, and height of fill and/or depth of cut; output will also include engineering stations at calculated 0.0 sections and beginnings and ends of benches and berms. Sections need be shown at major break points only; the program will interpolate all intermediate stations and end areas so as to reduce the error factor. Grade elevations are input separate from ground elevations which allows analysis of several grades or combinations of grades with a given ground line profile. Another use of the program would be in estimating contractors "pay quantities" where the ground line would vary monthly as compared to a fixed grade line.

Robinson, RE
Atchison, Topeka and Santa Fe Railway 1968

ACKNOWLEDGMENT: AREA (AREA 01-02-002)

PURCHASE FROM: Atchison, Topeka and Santa Fe 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

00 098691

CUT AND FILL PROGRAM

File name is START. This program is divided into two components: 1. Cut and fill for design. 2. Cut and fill for existing boundary lines. The cut and fill used for design purposes can determine the volume of earth involved and balance the cut and fill. The input is in a form of template along with existing ground coordinates (in three dimensions). The existing boundary program generates cut, fill and volume for any subgrade configuration. (no balancing). The output may be printed by section or plotted in three views (plan, elevation and cross-section).

Eimer, N
Penn Central Transportation Company 1969

ACKNOWLEDGMENT: AREA (AREA 01-02-003)

PURCHASE FROM: Penn Central Transportation Company 6 Penn Central Plaza, Philadelphia, Pennsylvania, 19104

00 098712

ABUTMENT ON PILES-ANALYSIS

File name is DC-S61. Computer Program. Given the physical dimensions of the cross section of a cantilever type abutment on piles, and the loads from the superstructure, approach slab and backfill behind the wall, the program will determine the required reinforcement for, and thickness of the stem at any pre-determined section. Nine loading combinations may be used. Input consists of the basic physical dimensions of the abutment, gravity and lateral loads, pile values, number of rows and pitch of piles, batter of piles, allowable stresses and loading combination desired. Output includes factor of safety against overturning, total horizontal and vertical loads, toe and heel pile loads, horizontal force per foot of abutment to be resisted by piles, allowable horizontal force each pile resists in bending, depth and reinforcement for shear and moment in the toe, heel and stem.

Meyer, RH
De Leuw, Cather and Company Feb. 1972

ACKNOWLEDGMENT: AREA (AREA 08-01-001)
PURCHASE FROM: De Leuw, Cather and Company 1030 15th Street, SW,
Railroad Division, Washington, D.C., 20005

00 098713
SOIL BEARING ABUTMENT ANALYSIS

File name is DC-S56. Computer Program. Given the physical dimensions of the cross section of a cantilever type soil bearing abutment, and the loads from the superstructure, approach slab and backfill behind the wall, the program will determine the required reinforcement for, and thickness of the stem at any predetermined section. Nine loading combinations may be used. Input consists of the basic physical dimensions of the abutment, gravity and lateral loads, hydrostatic forces, allowable stresses and loading combinations desired. Output includes factors of safety against overturning and sliding, effective footing width, required reinforcement and depth for moment and shear at stem and base.

Meyer, RH
De Leuw, Cather and Company Feb. 1972

ACKNOWLEDGMENT:
PURCHASE FROM: De Leuw, Cather and Company 1030 15th Street,
NW, Washington, D.C., 20005

00 098714
DRILLED SHAFT ANALYSIS

File name is SHAFT 1. This is a time sharing program which analyzes a spirally reinforced, circular concrete drilled shaft. No other geometric patterns are permitted. Working stress design is used. A design approach can be used by utilizing a what-if concept. Program computes section properties, and performs a column and footing analysis. User builds a data file from keyboard input; input consists of bridge number, location, bent numbers, shaft diameter, number of reinforcing bars, bar size, distances from top of shaft to column analysis point and bottom of footing, axial loads and moments. Teletypewriter output consists of bridge number, location, bent numbers, section properties, column analysis (eccentricity ratios, allowable and equivalent axial equivalent axial loads, combined and allowable fiber stresses), and footing analysis (tons per square foot for shaft alone plus three belled footings using six inch increments). Program will abort if any A.R.E.A. allowables are exceeded. See A.R.E.A. manual, Chapter 8. Program actually performs a double analysis, one for primary loading (live load, dead load, centrifugal force) and the other for secondary forces added (other lateral plus longitudinal forces). Under primary loading with secondary loading added, allowables are increased 25%.

Hope, RW
Alberta University Dec. 1971

ACKNOWLEDGMENT: AREA (AREA 08-01-003)
PURCHASE FROM: Missouri Pacific Railroad 210 North 13th Street, 1211
Mo Pac Building, Bridge Dept., St Louis, Missouri, 63103

00 098717
ANALYSIS OF WELDED PLATE GIRDERS BY THE AISC SPECIFICATION

File name is GRB. Program analyzes plate girders fabricated by welding together a web plate and a flange plate for compliance with the AISC Specification for Structural Steel for Buildings when subjected to a specified combination of shear and moment. Messages are printed to indicate dimensional incompatibilities or specification violations. Moments of inertia, stresses, and other information are printed to aid the designer in evaluating the section or making another selection. Data input is free-form. Program is on approximately 140 cards. Program was developed primarily for use in teaching structural steel design.

Lewis, ADM
Purdue University May 1970

ACKNOWLEDGMENT: AREA (AREA 08-08-001)
PURCHASE FROM: Purdue University Civil Engineering Building, West
Lafayette, Indiana, 47907

00 098718
ANALYSIS OF RIVETED PLATE GIRDERS BY AREA 1973 SPECIFICATIONS

File name is GRD. Program analyzes a riveted plate girder with or without cover plates in compliance with the 1973 AREA Specification when

subjected to a given moment, and shear. Messages are printed to indicate dimensional incompatibilities or specification violations. Moments of inertia, stresses, and other information are printed to aid the designer in evaluating a girder or making another selection. Data input is free-form. Program is on approximately 240 cards. Program was developed primarily for use in teaching structural steel design.

Lewis, ADM
Purdue University Apr. 1970

ACKNOWLEDGMENT: AREA (AREA 08-08-002)
PURCHASE FROM: Stelma, Incorporated Civil Engineering Building,
West Lafayette, Indiana, 47907

00 098719
CONTINUOUS BEAM DESIGN FOR AASHO LOADING (OVERHEAD STRUCTURES)

File name is DC-S93. Computer program designs continuous steel beams of not over 5 spans, either composite or non-composite type, and subjected to any AASHO loading. Input includes dead loads, sidewalk live load, type of AASHO loading, allowable stresses in steel and concrete, slab data, span lengths, number of spans, beam spacings, minimum plate thickness and variation in values of assumed moments of inertia. Output, in addition to selecting beam size, cover plates and cut-off points, includes shears, reactions and moments at each tenth point of each span, shear connector spacings, flange horizontal stresses in plate girder design, fatigue stresses of base metal and stiffener spacing.

Meyer, RH
De Leuw, Cather and Company Feb. 1972

ACKNOWLEDGMENT: AREA (AREA 08-08-003)
PURCHASE FROM: De Leuw, Cather and Company 1030 15th Street,
NW, Washington, D.C., 20005

00 098720
CONTINUOUS BEAM DESIGN FOR RAILWAY LOADING

The file name is DC-S51. This computer program designs continuous steel beams of not over 5 spans, either composite or non-composite, and subjected to railway loadings. Input includes dead loads, railway loadings, allowable stresses in steel and concrete, slab data, span lengths, beam spacings, minimum plate thickness and variation in values of assumed moments in inertia. Output includes shears, moments and reactions at each tenth point of each span, beam size, cover plates and cut-off points, shear connector spacings, flange horizontal stresses in plate girder design, fatigue stresses of base metal and stiffener spacing.

Meyer, RH
De Leuw, Cather and Company Feb. 1972

ACKNOWLEDGMENT: AREA (AREA 08-08-004)
PURCHASE FROM: De Leuw, Cather and Company 1030 15th Street,
NW, Washington, D.C., 20005

00 098721
STRINGER SKEW

File name is SKEW 1. Computer program. Application: Used for ordering most replacement stringers on existing bends of trestles. This program makes all calculations required to order new trestle stringers on existing trestle bents, all of which are usually skewed somewhat and are defined by field measurements. Input includes location information, distance from centerline of track each side on caps that field measurements were taken, cumulative distances left and right to each bent, and bent numbers at which string joints are desired. Output includes documentation of input, computed cumulative distance to each bent for the centerline of each line of stringer, length of each stringer in each stringer line, and a complete list of all required hardware. This program would not necessarily apply for use by another railroad without alteration to provide for differences in trestle designs and configurations.

Alford, HT
Southern Railway System Dec. 1970

ACKNOWLEDGMENT: AREA (AREA 08-08-005)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW,
Atlanta, Georgia, 30303

00 098722

TWO SPAN CONTINUOUS BEAM ANALYSIS

File name is OEB8014901. This program determines moments, shears and reactions for Cooper Engine loading moving across a two span continuous beam on one ft. increments. Calculations are at 1/20 points. Any Cooper loading can be entered. Span length total must not exceed 140 ft. Punched card input consists of span lengths, distribution factors, dead load, Cooper load factor and impact percentage. Output consists of input data dump, moments, shears and reactions at one ft. increments. A summary page gives maximum and minimum values of live load, impact and dead load moments at each 1/20 point. Program is currently in a test mode and is being enlarged to provide for a longer span length total and include deflections.

Thielemier, RL

Missouri Pacific Railroad Aug. 1973

ACKNOWLEDGMENT: AREA (AREA 08-08-006)

PURCHASE FROM: Missouri Pacific Railroad 210 North 13th Street, 1211 Mo Pac Building, Bridge Dept., St Louis, Missouri, 63103

00 098723

THREE SPAN CONTINUOUS FRAME BRIDGE ANALYSIS

File name is FRABRI3. Computer Program. Analysis of frame type (3 continuous spans of uniform cross section with 2 intermediate columns) bridge for D.L. and LL (E-72 Cooper loading) plus Impact effects. Input: Span and column lengths, weight of deck per lin. ft. and weight of columns, inertia moments, elasticity factors, % of impact and edge distances for each span and column. Output: 1. Schematic sketch of a bridge. 2. Amount and locations of DL maximum moments in spans. 3. Amounts of DL, LL and Total moment and location of Maximum moment in each span. 4. Amounts of DL, LL and Total Maximum moments at support face for each span and column. 5. Maximum shear forces for each decimal point of each span (DL, LL and Total). 6. Maximum and minimum vertical reaction (DL, LL and Total) for each support. 7. Maximum horizontal reaction (DL, LL and Total) for each column (outward and inward).

Granitow, WW

Southern Pacific Transportation Company May 1973

ACKNOWLEDGMENT: AREA (AREA 08-08-007)

PURCHASE FROM: Southern Pacific Transportation Company 1 Market Street, San Francisco, California, 94105

00 098724

ANALYSIS AND RATING OF PLATE GIRDER RAILWAY BRIDGES. PROGRAM NO. 5 OCTOBER 69

File name is AAR 5. This program is used to analyze and rate single plate girder railway bridges. All rating is in accordance with the 1969 AREA specifications and is based on member cross section only. The girders may be deck or through and may be ballasted. Seven common types of girder cross-section are considered and each may have cover plates both top and bottom. For rating purposes, eight classes of steel may be specified. If an analysis is required the structure may be considered subject to the basic types of loading used in Program No. 1. For rating purposes, the girders are analyzed for a Cooper E80 load automatically. A maximum of 10 points on the girder can be analyzed or rated. The input required is girder section properties, total uniform dead load for the girder weight, track weight, and other dead loads; various live loads, impact and wind. Output includes a listing of member sections entered and a listing of dead load shears and moments. If the girder is rated, moments, shears and stresses are output for an E80 loading without impact as well as a rating for moment and shear for all sections for train speeds of 40, 30 20 and 10 mph. If the girder is to be analyzed, live load moments, shears and stresses are output without impact. Total values including dead load, live load and impact are also output. It is possible to analyze a girder for shear and moment only, thus reducing the input considerably.

Association of American Railroads Technical Center No Date

ACKNOWLEDGMENT: AREA (AREA 08-08-008)

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

00 098725

PRESTRESSED CONCRETE BOX-GIRDER

File name is PRESTRES. Computer Program. Design and Analysis of prestressed concrete Box-Girder (Single or double box). Design version: Input: 1. Dimensions of Box-Girder cross section. 2. Type of prestressing

strands path, span length and loads data. 3. Location of diaphragms and hold down points and prestr. strands characteristics. 4. Strength of concrete and prestr. steel and stirrups characteristics. 5. Number of sections to be analyzed, location and LL Moment for each sect. Output: 1. Area of cross section and Moment of Inertia. 2. Stresses at extreme fibers due to external loads. 3. Number of strands required and location of centroid at mid-span and support. 4. Extreme fiber stresses for initial prestress, full DL and total load. 5. Ultimate moment required and number of strands needed to provide this moment at various concrete strengths. Analysis version: Additional input: Number of alternatives and number of strands and location of centroid at mid-span and end sections for each alternative. Output: for each alternative. 1) Extreme fiber stresses at initial prestress full DL and Total load. 2) Ultimate Moment provided. 3) Required stirrup spacing at 1/4 and 1/3 span points. 4) Deflections under DL and LL.

Southern Pacific Transportation Company Aug. 1966

ACKNOWLEDGMENT: AREA (AREA 08-08-09)

PURCHASE FROM: Southern Pacific Transportation Company 1 Market Street, San Francisco, California, 94105

00 098726

MASTER-BRIDGES SUPPORTING TRACKS

File name is MASTER — BRIDGE SUPPORTING TRACKS (T372). This program produces a master file for all system railroad bridges and includes update capability. The input includes milepost location, a six-character structure code, track number, date constructed, length, capacity, system company operating division, number and type of tracks, line segment code, degree and direction of curvature, height, weight, last date repaired, cost center, maintenance responsibility, B&B supervisor code, general supervisor, file number, a narrative description of bridge, and name (location). The output in addition to the tape master, includes a request report consisting of a display of the input sorted by cost center, B&B supervisor, general supervisor, company, division, and milepost range. The output also includes a 8-character sequence number assigned by the program to permit easy update and corrections to the file. In addition to the display described above, the file is accessed by a generalized picker program which can select and sort on almost any field in the master.

Fondren, RW Driver, MM

Southern Railway System 1974

ACKNOWLEDGMENT: AREA (AREA 08-10-001)

PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

00 098727

MOVING LOAD RATING

File name is ED 005. This program produces moments, shears, floor-beam reactions, equivalent uniform loads and E-ratings at various span lengths from 10 ft thru 400' for predetermined loading arrangements representing cars, locomotives and other rolling equipment. Input consists of wheel loads and spacing between adjacent axles of the subject load, together with similar information for spacer cars (if any) and the adjacent cars of the train in which subject load is to be handled. Input punched directly on tape. Output consists of span lengths with corresponding values of maximum moment, maximum quarter-point moment, maximum end shear, maximum quarter-point shear, maximum center shear and maximum floor-beam (or pier) reaction, together with the equivalent E-rating and equivalent uniform load for each above value.

Messman, DV Newlin, CH Brooks, BL

Southern Railway System 1960

ACKNOWLEDGMENT: AREA (AREA 08-10-002)

PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

00 098728

BRIDGE DECK TIE LOADS

File name is TIELOAD. Computer Program. Application: Used for determining number of ties supporting an axle load on bridge decks on bridges with wide girder centers where the existing bridge deck is substandard based on TIERATE and a 3 tie design. Indicates the effect caused by changing the tie depth and tie spacing. This program computes the number of ties in a bridge deck that effectively support one axle of one or a series of axle loads, based on the simultaneous acting as a continuous

beam on a continuous elastic base (AREA proceedings of 1918, Vol. 19, pages 875-1058). The formulas are based on those derived by E.S. Birkenwald and C.H. Newlin November 11, 1944 for AREA committee 15, but never published because of their complexity. Input consists of dimensions of top flange girder components, center to center girders, tie width, depth, and spacing, and axle load spacings. Output includes documentation of the input, modulus of elasticity of the rails, ties, and rail support, and the load distribution for one axle to "x" ties for 6 common rail sizes.

Alford, HT
Southern Railway System Dec. 1972

ACKNOWLEDGMENT: AREA (AREA 08-10-003)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW,
Atlanta, Georgia, 30303

00 098729
BRIDGE DECK TIE SPACINGS

File name is DECK. Computer Program. Application: Used during the ordering of virtually every bridge deck on a steel bridge. Further refinements are planned. This program locates ends of cover plates, number and location of each tie and tie spacing, and location and length of each guard timber. Input includes span identification, lengths of span and cover plates, information for non symmetrical and skewed spans, maximum tie spacing desired, location of end ties, and additional length to backwalls. Output includes span documentation, cover plate locations and lengths, number and grouping of tie spaces, location of center line of each tie, and location and length of each guard timber.

Alford, HT
Southern Railway System

ACKNOWLEDGMENT: AREA (AREA 08-10-004)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW,
Atlanta, Georgia, 30303

00 098730
CURVE OFFSETS FOR TIES ON BRIDGE DECKS

File name is OFFSET. Computer Program. Application: Used as required for detailing all bridge decks on sharp curves. This program computes offsets from a chord to a circular curve for every tie on a bridge on a curve. This has application on severe curves where it may be necessary for certain tie details to follow the centerline of the track and for other details to follow the centerline of the span or offset chord. Input includes bridge identification, degree of curve, superelevation, and spacing of each tie on the bridge. Output includes documentation of the input, computed span length from the tie spacings, maximum midordinate offset for the span length, cumulative distance to each tie, offsets from curve to long chord for each tie, offsets from curve to offset chord tangent to curve at centerline of span for each tie, and tie depth correction for each tie due to curve running up and down level of tie.

Alford, HT
Southern Railway System Nov. 1972

ACKNOWLEDGMENT: AREA (AREA 08-10-005)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW,
Atlanta, Georgia, 30303

00 098733
RATING OF MOVING LOADS

File name is EN981551. This program determines E rating, shears and moments on different spans for heavy loads. Any combination of loads and axle spacing up to 20 axle may be used. Input consists of punched cards containing information on number of cars, number of axle and axle loads. Output consists of span length, bending moment, bending E-rating, shear, shear E-rating, axle under which maximum moment occurs and the distance from that axle to the support. Span length varies from 8 ft. to 400 ft.

Zednik, EV Schwaner, WA
Union Pacific Railroad Mar. 1970

ACKNOWLEDGMENT: AREA (AREA 08-10-008)
PURCHASE FROM: Union Pacific Railroad 1416 Dodge Street, Omaha,
Nebraska, 68102

00 098734
MOMENT AND SHEAR TABLES FOR HEAVY DUTY CARS ON BRIDGES

File name is OEB4010102. This program is a modified version AAR Program No. 1, 1969 revision. Modifications are: 1. Cooper E10 Load Table has been placed on a 3330 disk unit thereby eliminating the need for punched card input data for every program run. 2. An infinite number of runs can be handled. Program determines E rating, shears and moments on different spans (8'-400') for heavy loads. A maximum of 250 axle may be entered. Punched card input contains load description, type of loading, number of axles, axle loads and distances to next axle. Output consists of span length, bending moment, bending E-rating, shear, shear E-rating, floor beam reaction and floor beam E-rating. Span length varies from 8 ft. through 400 ft. (31 spans).

Wilson, EN Hope, RW
Missouri Pacific Railroad Nov. 1973

ACKNOWLEDGMENT: AREA (AREA 08-10-009)
PURCHASE FROM: Missouri Pacific Railroad 210 North 13th Street, 1211
Mo Pac Building, Bridge Dept., St Louis, Missouri, 63103

00 098735
MOMENT AND SHEAR TABLES FOR HEAVY DUTY CARS ON BRIDGES PROGRAM NO 1-REVISED APRIL 1969

File name is AAR 1. This program calculates the maximum values and Cooper equivalents of bending moment, end shear and floor beam reactions in simply supported spans due to a set of moving concentrated loads. The program has been modified to include the option of using other than a train of 50 ton loaded box cars preceding and following special cars or following locomotives. The program makes possible an analysis with a maximum of 250 concentrated loads on spans up to 400 feet in length.

Association of American Railroads Technical Center No Date

ACKNOWLEDGMENT: AREA (AREA 08-10-010)
PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616

00 098736
TIMBER BRIDGE ANALYSIS FOR LOCOMOTIVE

File name is KOLOCO. Computer Program. Timber Trestle Bridge Analysis Program For Single Locomotive: Input: Span, Number of Stringers, Width of Stringers, depth of stringers, tie length, bridge configuration, number of locomotive axle, weight of locomotive, axle spacings. Output: Stress (maximum bending stress and maximum horizontal stress).

Ko, P
Southern Pacific Transportation Company 1974

ACKNOWLEDGMENT: AREA (AREA 08-10-011)
PURCHASE FROM: Southern Pacific Transportation Company 1 Market
Street, San Francisco, California, 94105

00 098737
ANALYSIS AND RATING OF RAILWAY BRIDGE FLOORS (PROGRAM NO. 6 DECEMBER 1970)

The file name is AAR 6. This program is used to analyze and rate floor systems of railway bridges. All rating is in accordance with the 1969 AREA specifications and is based on member cross section only. The deck is not analyzed or rated. Five types of floor system may be selected and seven common types of member cross-section are considered as in Program No. 5. For rating purposes, eight classes of steel may be specified. If an analysis is required the floor system may be considered subject to the basic types of loading used in Program No. 1 and No. 5. For rating purposes, members are analyzed for a Cooper E80 load automatically. A maximum of 10 points on members can be analyzed or rated. The input required includes member span lengths and section properties uniform dead load on members, member spacing, track location and weight, and other dead loads; various live loads, impact and wind. Output includes a listing of member sections entered and a listing of dead load shears and moments. If the members are rated, moments, shears and stresses are output for an E80 loading without impact as well as a rating for moment and shear for all sections for train speeds of 40, 30, and 10 mph. If the members are to be analyzed, live moments, shears and stresses are putput without impact. Total values including dead load, live load and impact are also output. It is possible to analyze members for shear and moment only, thus reducing the input considerably.

Association of American Railroads Technical Center No Date

ACKNOWLEDGMENT: AREA (AREA 08-10-012)
PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616

00 098739

BRIDGE OPENINGS

The file name is ENPOND. A program to determine bridge size required to handle flow from a given drainage area. The railroad embankment forms a dam thus creating a reservoir having a water level well above the structure, typically a multiple box, thus partially containing the inflow and increasing the capacity of the structure. Input describes the water shed, probable storm characteristics, and the reservoir. Output is the geometry of the box, or boxes, required.

Stane, RA

Atchison, Topeka and Santa Fe Railway No Date

ACKNOWLEDGMENT: AREA (AREA 08-14-002)
PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and
Jackson Streets, Information Systems Department, Topeka, Kansas,
66628

00 098740

CALCULATE COOPER E NUMBER

The file name is HEAVY. Computer Program. Moment, Shear Floor Beam Reaction computation and equivalent cooper ratings for locomotives and car for span 8 ft. to 400 ft. Input: Gross on Rail, Number of Axles, Axle load, axle spacing. Output: Moment, shear and floor beam reaction and equivalent Cooper E Rating.

Luttrell, NW

Southern Pacific Transportation Company 1968

ACKNOWLEDGMENT: AREA (AREA 08-14-003)
PURCHASE FROM: Southern Pacific Transportation Company 1 Market
Street, San Francisco, California, 94105

00 098741

ANALYSIS OF RIVETED BOX COMPRESSION MEMBERS WITH COVER PERFORATED PLATES BY THE 1973 AREA SPECIFICATION

The file name is CMC. Program analyzes riveted box compression members with perforated cover plates for compliance with the AREA 1973 Specification. Messages are printed to indicate dimensional incompatibilities or specification violations. Moments of inertia, stresses, and other information are printed to aid the designer in evaluating a section or making another selection. Data input is free-form. Program is on approximately 220 cards. Program was developed primarily for use in teaching structural steel design.

Lewis, ADM

Purdue University Mar. 1970

ACKNOWLEDGMENT: AREA (AREA 08-18-001)
PURCHASE FROM: Purdue University Civil Engineering Building, West
Lafayette, Indiana, 47907

00 098742

ANALYSIS OF RIVETED BOX TENSION MEMBERS BY THE 1973 AREA SPECIFICATION

File name is TMC. Program analyzes riveted box tension members with perforated cover plates for compliance with the AREA 1973 Specification. Messages are printed to indicate dimensional incompatibilities or specification violations. Net areas, stresses, and other information are printed to aid the designer in evaluating the section or making another selection. Data input is free-form. Program is on approximately 170 cards. Program was developed primarily for use in teaching structural steel design.

Lewis, ADM

Purdue University Feb. 1970

ACKNOWLEDGMENT: AREA (AREA 08-18-002)
PURCHASE FROM: Purdue University Civil Engineering Building, West
Lafayette, Indiana, 47907

00 098743

TIMBER TRESTLE BRIDGE ANALYSIS

The file name is KOTIMBER. Computer Program. Scope: Timber Trestle analysis: Input: Number of stringers per chord, width of stringer, depth of stringers, width of bridge, the length in inches. Output: Stress (Maximum Bending stress and Maximum horizontal stress).

Ko, P

Southern Pacific Transportation Company 1974

ACKNOWLEDGMENT: AREA (AREA 08-20-001)
PURCHASE FROM: Southern Pacific Transportation Company 1 Market
Street, San Francisco, California, 94105

00 098744

TRUSS RATING PROGRAM

The file name is RATRS. This program generates a speed table for each member of a truss based on cooper loading is generated through the use of 1130 STRES program which analyses structures. The influence line is obtained by loading the truss at each panel point within a unit load. The result is filed for use by RATRS. The input consists of member number, gross and net areas, moment of inertia (compression members only) and D.L. and/or L.L. stresses when counters are involved.

Eimer, N

Penn Central Transportation Company 1973

ACKNOWLEDGMENT: AREA (AREA 08-26-001)
PURCHASE FROM: Penn Central Transportation Company 6 Penn
Central Plaza, Philadelphia, Pennsylvania, 19104

00 098745

RAILWAY TRUSS BRIDGE ANALYSIS (PROGRAM NO. 2 REVISED DECEMBER 1970)

The file name is AAR 2. This program calculates maximum forces and truss reactions of any configuration due to stationary or moving loads. Trusses may be simply supported, continuous over several supports, internally indeterminate or contain counter diagonals. The maximum span length cannot exceed 620 feet for a Cooper loading nor 1000 feet for other systems of moving loads. The truss can have no more than 50 joints or 100 members or 25 panels, and the number of panels with counter diagonals cannot exceed 10. Restrictions placed on trusses containing counters are: 1. Whipple trusses cannot be analyzed, 2. subdivided trusses containing counters are not acceptable, 3. continuous trusses of over two spans with counters cannot be used, and 4. panels containing counters must be located symmetrically with respect to mid-span for simple trusses and with respect to the center reaction for continuous trusses. The input required is the truss geometry, cross sectional areas, the dead loading and live loading. Output includes the dead load, live load, AREA AREA impact and total forces in each truss member and the truss reactions.

Association of American Railroads Technical Center No Date

ACKNOWLEDGMENT: AREA (AREA 08-26-002)
PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616

00 098746

PRATT, HOWE AND WARREN TYPE RAILWAY TRUSS BRIDGE ANALYSIS (PROGRAM NO. 3 APRIL 1968)

File name is AAR 3. This program is a modification of Program No. 2 written specifically for simple supported and symmetrical common types of trusses not exceeding 600 feet or 20 panels. Input is simplified and output is similar to the earlier program.

Association of American Railroads Technical Center No Date

ACKNOWLEDGMENT: AREA (AREA 08-26-003)
PURCHASE FROM: Association of American Railroads Technical Center
3140 South Federal Street, Chicago, Illinois, 60616

00 098747

RATING OF RAILWAY TRUSS BRIDGES (PROGRAM NO. 4 REVISED DECEMBER)

The file name is AAR 4. This program calculates the Cooper rating of each member in trusses of any configuration. The restrictions placed on trusses containing counters described for Program No. 2, apply to this program. Trusses may be simply supported, continuous over several supports, internally indeterminate or contain counter diagonals. The span

cannot exceed 620 feet, the truss can have no more than 50 joints or 100 members or 25 panels, and the number of panels with counters cannot exceed 10. No compression member may have a slenderness ratio (L/r) greater than 200. The input data required is the dead loading the truss geometry, properties of members, the type of materials and riveted or pinned connections. Output is similar to the earlier program but includes Cooper rating of each member with full steam impact at synchronous speed or with full diesel impact (40 mph) and at reduced speeds of 30, 20 and 10 mph for diesel impact. Rating is in accordance with 1967 AREA specifications; however, wind loads are not considered.

Association of American Railroads Technical Center No Date

ACKNOWLEDGMENT: AREA (AREA 08-26-004)

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

00 098748

PLAIN CONCRETE TUNNEL ROOF DESIGN

The file name is K8ARCH. Computer Program. Design Plain Concrete Arch of Tunnel Roofs to support Uniform Vertical Load. By given span of arch and allowable stresses of compression and tension of concrete, a group of curves with various loads, radii and thicknesses will be printed out. The load varies from 2,000 psf to 16,000 psf with 2,000 psf increment. The radius varies from 1/2 span to 3/2 span with 1/2 ft. increment. The thickness varies from 0 to 10 ft. with 1/8 ft. increment.

Huang, K
New York City Transit Authority Mar. 1974

ACKNOWLEDGMENT: AREA (AREA 08-30-001)

PURCHASE FROM: New York City Transit Authority 370 Jay Street,
Brooklyn, New York, 11201

00 098749

PLAIN CONCRETE ARCH WALL DESIGN

The file name is KZARCH. Computer Program. Design plain concrete wall as an arch to support the side pressure. By given wall thickness, span, load and allowable stresses for tension and compression, the program will make ten(10) wall arch trails for each run. The thrust, shear, moment, shear stress and normal stress of inside and outside of wall will be printed out, if the arch is not overstressed. Word "overstressed" will be printed out in case the arch is overstressed. Computer will go back the position for input of second trail or new data.

Huang, K
New York City Transit Authority Jan. 1974

ACKNOWLEDGMENT: AREA (AREA 08-30-002)

PURCHASE FROM: New York City Transit Authority 370 Jay Street,
Brooklyn, New York, 11201

00 098750

STEEL RIB STRESS ANALYSIS

The file name is RIB. This program computes the maximum thrust and maximum moment in a steel tunnel support, or rib having a constant radius and selects the appropriate steel member. The method of analysis used is that given by Commercial Shearing and Stamping Co. in its book, "Rock Tunneling With Steel Supports", by Proctor and White. The input required is the radius of the rib, width of tunnel, assumed overbreak, assumed blocking point spacing, rock loading and rib spacing. The output consists of the following: Vertical Rock Load at each Blocking Point, Maximum Thrust, Moment, the steel W section to be used for rib, the length of the rib, and total weight of steel required for ribs for the particular length of design in question.

Kadnar, P
New York City Transit Authority 1974

ACKNOWLEDGMENT: AREA (AREA 08-30-003)

PURCHASE FROM: New York City Transit Authority 370 Jay Street,
Brooklyn, New York, 11201

00 098752

HIGH AND WIDE CLEARANCE PROGRAM

The file name is CLEAR. This program clears a load for high and wide considerations for involving various types of load configuration (from single to double overhang). The program is made up of the following components: 1. Network-as described for heavy loads in RRIS #098751. 2.

Clearance data-The Railroad network was sectionalized into grids describing a stretch of homogeneous railroad for a track. All geometric obstructions are coded by segments and by general diagram information (location, track No.). The input consists of car configuration geometric description of and type of car assembly. The route is set up in the same manner as in the Heavy Load Program. In fact if this program could be on line with the heavy load program then they could be run simultaneously.

Eimer, N
Penn Central Transportation Company 1973

ACKNOWLEDGMENT: AREA (AREA 09-01-001)

PURCHASE FROM: Penn Central Transportation Company 6 Penn
Central Plaza, Philadelphia, Pennsylvania, 19104

00 098753

CLEARANCES AROUND A CAR IN HORSESHOE TUNNELS

the file name is FREICL. Program computes the clearances around car in a Horseshoe shaped tunnel. The radius of roof arch can be varied as well as the height of the spring line. The program takes into consideration any excess and super-elevation if the section under investigation is on a curve.

Edwards, FR
New York City Transit Authority 1973

ACKNOWLEDGMENT: AREA (AREA 09-01-002)

PURCHASE FROM: New York City Transit Authority 370 Jay Street,
Brooklyn, New York, 11201

00 098754

HORIZONTAL TRACK CLEARANCE FOR TUNNELS

The file name is GF EXP. (Output) Program computes from the centerline of survey (which may be any combination of straight lines and circular curves), the required offset to the outside and inside of curves (track alignment may be any combination of straight lines, parallel or at an angle to the centerline of survey, and circular curves and Crandall's transition curves); clearances required normal to the outside and inside of track; and angular corrections required when the columns are not radial to the centerline of track. These computations are done for each bent, (Input) required is basic track alignment and its relationship to the centerline of survey.

Feinstein, G
New York City Transit Authority 1972

ACKNOWLEDGMENT: AREA (AREA 09-01-003)

PURCHASE FROM: New York City Transit Authority 370 Jay Street,
Brooklyn, New York, 11201

00 098755

HIGH SIDE DATA BASE

The file name is EN983857. Computer Program. Takes data from digitizer and computes a continuous structural outline to give clearance information. Program structures and maintains data base for all clearances using random access methods. Presently, data base information is check by using TEKTRONIX Graphic Terminal to obtain minimum clearance over a given section of line.

Schwamer, WA
Union Pacific Railroad Feb. 1974

ACKNOWLEDGMENT: AREA (AREA 09-01-004)

PURCHASE FROM: Union Pacific Railroad 1416 Dodge Street, Omaha,
Nebraska, 68102

00 098756

CURVE BOOK REPORT

The file name is EN986131. Computer Program. Creates and maintains data base of all main and branch line curve information and prints on special forms to produce curve books, which are distributed to Division Engineers, Roadmasters, and Engineering personnel at headquarters. Changes in curve information are entered through this program which updates master file and produces new pages to replace current information in books.

Jenkins, JW Schwamer, WA
Union Pacific Railroad Jan. 1973

ACKNOWLEDGMENT: AREA (AREA 09-01-005)

PURCHASE FROM: Union Pacific Railroad 1416 Dodge Street, Omaha,
Nebraska, 68102

00 098757

MOVING LOAD PROGRAM

The file name is SCLOD. The moving load program generates maximum moments, shear, and floor beam reactions as well as deflection factors for simple spans. Maximum load on bridge is determined in order to accommodate weight bridges. The program also generates Cooper's equivalence tables for use by the heavy load computer system. Optional given allowable stresses and deflection. The program will generate the minimum requirement for a section modulus (based on movement) and minimum required moment of inertia (based on deflection). The input consists of car configuration and required spans along with E10/rail equivalences.

Eimer, N

Penn Central Transportation Company 1972

ACKNOWLEDGMENT: AREA (AREA 09-02-001)

PURCHASE FROM: Penn Central Transportation Company 6 Penn Central Plaza, Philadelphia, Pennsylvania, 19104

00 098766

GEOMETRIC PROGRAM SOLVER

The file name is CNTRL, REPLY. This Computer Program is composed of various geometric solving routines with particular emphasis on railroad applications. It consists of two parts. 1. CNTRL-which generates file points for surveying problems through the use of routines that solve basic functions such as intersection of lines, tangents, offsets, etc. 2. REPLY-is geared to solving special railroad applications such as, traverse, reverse curves, perimeters, alignment and other problems. The two parts were designed to complement each other and shear the same output file.

Eimer, N

Penn Central Transportation Company 1971

ACKNOWLEDGMENT: AREA (AREA 10-03-001)

PURCHASE FROM: Penn Central Transportation Company 6 Penn Central Plaza, Philadelphia, Pennsylvania, 19104

00 098777

CALCULATION OF LAND TRAVERSES

The file name is ENTRAV. Computer Program. Input requirements. Bearing and distance of each course (curves can be handled by using either the semi-tangent or long chord); Radius, Arc length and Delta of each curve. This program will not calculate an unknown side, i.e., exempt from adjustment. Output forms provide copy of the original data, adjusted traverse, error of closure, precision of survey, algebraic sum of Lat. and Dep. and the area in square feet and acres.

Robinson, RE

Atchison, Topeka and Santa Fe Railway 1968

ACKNOWLEDGMENT: AREA (AREA 13-02-001)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

00 098778

CALCULATION OF LAND CLOSURES

The file name is ENCL. Computer Program. Input requirements: Bearing and distance of each course and when applicable, Radius of each curve. (Delta, length, etc., for curves are calculated by the program). NOTE: This program will not accept Chord lengths of curves. The program will perform "forced closure" calculation. It will also allow all but one side to be held exempt from adjustment. The program will accept several small surveys as independent input and after calculating each, then tie them together into one traverse. An example of this would be when four random traverses are required to establish the four sides of a section, which could result in four "forced closures" and then the result of combining these four answers. Output forms provide copy of the original data, adjusted traverse, error of closure, precision of survey, algebraic sum of Lat. and Dep. and the area in square feet and acres.

Robinson, RE

Atchison, Topeka and Santa Fe Railway 1968

ACKNOWLEDGMENT: AREA (AREA 13-02-002)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

00 098779

COMPUTE EARTHWORK QUANTITIES

File name is ENCOQ. Program will compute earthwork quantities in cubic yards by the average end area method when cross section data are given as coordinates of points around the perimeters of the sections. Elevations: either real or hypothetical, are the vertical coordinates; while distance, left or right, from a fixed base line are the horizontal coordinates. Input: In addition to section data, consists of engineering station and specific identification data such as whether the section is in cut or fill; a repeat section; 0.0 section; etc. Output: In addition to user identification, job description and section data as input, will contain end areas, accumulated volumes and total quantities.

Robinson, RE

Atchison, Topeka and Santa Fe Railway 1968

ACKNOWLEDGMENT: AREA (AREA 13-03-001)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson, Streets, Information Systems Department, Topeka, Kansas, 66628

01 052603

UNCONVENTIONAL TRACKS, TEST TRACK AT RADCLIFFE-ON-TRENT CONSTRUCTION AND RUNNING EXPERIENCE

This description of experience with various types of ballastless track using in situ concrete slab indicates some of the practical aspects of installation and standards of accuracy obtained. Most of the test lengths have shown no significant deterioration in four years of service carrying normal traffic.

International Union of Railways D87/RP 7/E, Apr. 1974, 19 pp, 9 Fig., 12 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

01 052608

OPTIMUM ADAPTION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC. RHEOLOGICAL PROPERTIES OF THE TRACK

The laboratory tests carried out with a view to determining the dynamic modulus of elasticity of the ballast and described in the present report show that, from the point of view of vibratory phenomena, the real behaviour of the track can be simulated on the small test rig. The vibrations of the track have been analysed in the frequency range comprised between 20 and 90 Hz and it has been established that the use of sleepers of different types affects the modulus of elasticity and the position of the resonance peaks. It has thus been possible to show that heavy sleepers are better suited for high speeds.

International Union of Railways D117/RP 4/E, Apr. 1974, 41 pp, Figs., 10 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

01 052632

OPTIMUM ADAPTATION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC. DEFORMATION OF RAILWAY BALLAST UNDER REPEATED LOADING (TRIAxIAL TESTS)

This report describes the results of a series of laboratory triaxial tests concerning the deformation of dry limestone ballast under repeated applications of load. The results show that the deformation of ballast is: 1. Proportional to the log of the number of load cycles. 2. Proportional to the superimposed axial stress raised to an exponent within the range 1 to 3. 3. Determined mainly by the largest load when two load levels are applied. 4. Reduced if full load removal is not allowed between load cycles. The elastic properties of the ballast are also examined and the report concludes with the practical implications of the test results.

International Union of Railways D117/RP 5/E, Oct. 1974, 24 pp, 32 Fig.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

01 052653

UNCONVENTIONAL TRACKS. BRITISH RAILWAYS PROTOTYPE MAIN LINE PAVED CONCRETE TRACK AT DUFFIELD-CONSTRUCTION AND RUNNING EXPERIENCE

This report briefly describes the construction and running experience of the prototype main line paved concrete track at Duffield. The slab design and construction is described and measurements of the behaviour under traffic are summarised. A number of minor maintenance works have been necessary but overall the behaviour of the paved concrete track during the first year of service can be considered satisfactory.

International Union of Railways D87-RP 9/E, Apr. 1975, 25 pp, Figs., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

01 052654

UNCONVENTIONAL TRACKS. BRITISH RAILWAYS PROTOTYPE PAVED CONCRETE TRACK AT RADCLIFF-ON-TRENT (PHASE II) 1971-2

The report briefly describes the second concrete-based test track constructed at Radcliffe-on-Trent and put into service in June 1972. Construction accuracy and behaviour in service are discussed.

International Union of Railways D87/RP 10/E, Apr. 1975, 19 pp, Figs., Photos.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

01 083042

ULTRASONIC FLAW DETECTION IN THERMIT-WELDED JOINTS

Although not usually considered suitable for testing thermit welds, ultrasonic flaw detection equipment has been used for this purpose in India where gamma ray testing equipment could not be made available.

Bhatnager, SK *Railway Gazette International* Vol. 131 No. 1, Jan. 1975, p 31, 1 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 083057

NEW CONCRETE-TIE SERVICE TEST FOR THE SANTA FE

Since late in 1974, Santa Fe trains have been operating over a concrete-tie test section which is reported to represent the latest in concrete-tie technology as learned from previous test sections on this road and from other sources. Two types of ties and several types of fastenings were used in a segment of the mainline in Illinois. Special attention was given to providing a subgrade and ballast bed which would give maximum support to the ties which will be subjected to 20 million gross tons annually with trains operating at up to 79 mph.

Weber, JW *Railway Track and Structures* Vol. 71 No. 1, Jan. 1975, pp 32-34

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 083058

NEW EQUIPMENT SPEEDS CHANGE-OUT OF DEFECTIVE RAILS

Outfit developed on Santa Fe includes special prime-mover truck plus an abrasive saw and a multiple-spindle drill, both operated hydraulically from power unit activated from a power take-off on the truck.

Railway Track and Structures Vol. 71 No. 1, Jan. 1975, p 26-28

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 083065

FLASH-BUTT WELDING OF NATURAL HARDENING RAILS OF SPECIAL QUALITY CHROME-MANGENESE STEEL

The conditions for obtaining good and fully reliable rail welds were derived from many tests as described in this article. Progressive flashing is important to insure a clean weld seam with good static bending characteristics and hardening at the rail running surface.

This publication is available in German, English, French and Spanish editions.

Schweitzer, R Heller, W *Eisenbahntechnische Rundschau* Vol. 23 No. 12, Dec. 1974, pp 506-515

PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

01 083066

STRENGTHENING THE RAILWAY TRACK WITH THIN PRESTRESSED CONCRETE SLABS

For some years the Czechoslovak State Railway (CSD) has been seeking to increase the load-bearing capacity of their tracks on heavily-worked routes in poor ground by inserting thin prestressed concrete slabs between the formation and the ballast bed. The design of the slabs, laboratory testing thereof, and some test track sections are described.

This publication is available in German, English, French and Spanish Editions.

Tyc, P *Eisenbahntechnische Rundschau* Vol. 23 No. 12, Dec. 1974, pp 516-521

PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

01 083067

HIGH SPEED TRACK AND ITS MAINTENANCE

The author discusses the conditions necessary for technically and economically acceptable track construction on high-speed routes with mixed-traffic working, taking into consideration the track alignment and the construction elements. Already at the planning and design stage, the track-building conditions and economical maintenance of heavily-worked routes must be given full consideration, and also adhered to later during regular operation. Proper staff training is also important. But further tests, for example with concrete-slab track structure under heavy working loads, are necessary before final decisions are made.

This publication is available in German, English, French and Spanish editions.

Fastenrath, F *Eisenbahntechnische Rundschau* Vol. 23 No. 12, Dec. 1974, pp 491-498

PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

01 083073

JOINING AND HARDFACING OF RAILS, POINTS AND CROSSINGS USING MANUAL METAL-ARC WELDING ON THE SWEDISH RAILWAYS

A detailed account is given of work done in developing a suitable technique and filler materials to meet two main objectives. The first main task was to reduce maintenance costs for rail material by the hard surfacing and joining of rail ends and crossings and later also points (switches). The second main task was to further develop a technique and backing material for the joining of rails by means of manual mold welding. The aim was to obtain such a high quality in the form welds that the technique would be approved without any limitations for the joining of rails with a nominal minimum U.T.S. (ultimate tensile strength) of 800 and 900 N/mm². The following requirements were to be fulfilled: Specifications of the various electrode materials are given, listing weld-metal composition, welding data, and applications.

Ljunggren, J *Svetsaren-English Edition* No. 2, 1974, 7 pp

ACKNOWLEDGMENT: EI (EI 75 005215)

PURCHASE FROM: ESL Repr. PC, Microfilm

01 084914

TRACK MEASUREMENT FOR TODAY'S RAILROAD SYSTEMS

This brochure describes the FRA Improved Track Inspection and Data Collection Technology Programs which utilize the Track Geometry Test Cars and Vehicle Dynamic Measurement Systems for the purpose of improving railroad safety, efficiency and economy. The data produced by the cars—through precise measurement of existing track structures—are used to plan effective track maintenance programs and to support the design of tomorrow's high-speed railroads.

Federal Railroad Administration 13 pp, Photos.

PURCHASE FROM: FRA Repr. PC

DOTL RP

01 084917

CHIEF ENGINEERS APPRAISE PENN CENTRAL

A "Chief Engineers' Report" compiled by the chief engineers of six major railways has indicated that it will cost \$4.6 billion to rehabilitate the Penn Central. The report comments on yard and mainline track conditions, including ballast, rail wear, etc. Because of the extremely poor condition of the railway, the report stresses that rebuilding the railway should begin now and not wait for Conrail.

Progressive Railroading Vol. 18 No. 2, Feb. 1975, pp 55-56

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

01 084924

UNSTABLE TRACK: CAUSES AND CURES

The effectiveness of ballast is of prime importance to the stability of track. Burlington Northern has found there are four main factors affecting the durability of ballast. Continuous welded rail is the most significant devel-

opment. In addition, the quality of the ballast, the condition of the sub-grade and the compactions of the ballast all affect the condition of the track.

Progressive Railroading Vol. 17 No. 11, Nov. 1974, pp 61-64

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

01 084927

WELDED RAIL ALL THE WAY ON THE SANTA FE

The Santa Fe has laid over 5,000 miles of welded rail on its system. A new rail welding plant has been constructed at Amarillo, Texas. The plant also reclaims rail that has been removed when welded rail is installed. The old rail is shipped to the Amarillo plant in 1,440 sections where it is disassembled and reclaimed.

Progressive Railroading Vol. 17 No. 9, Sept. 1974, pp 82-88

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

01 084937

STRESS ANALYSIS OF CONCRETE TRACK SLABS ON AN ELASTIC FOUNDATION BY THE FINITE ELEMENT METHOD

In analyzing the track slab stress, it has been revealed that the beam theory has led to certain discrepancies and left unexplainable parts of the actual phenomena. But it is found that these drawbacks can be eliminated by assuming that the rail supporting elasticity is concentrated at fastening devices and considering the track slab as a plate, with the aid of a mechanical model analysis. For the analysis of the plate the finite element method is employed for its flexibility in applying the boundary conditions. The slab track is divided into many triangular elements and analyzed by using the hybrid type potential energy principle. The theoretical results thus obtained are in good agreement with those observed and they are practically employed in the slab track designing.

Also available from ESL.

Saito, T *Railway Technical Research Institute Quart Rpt.* Vol. 15 No. 4, Dec. 1974, pp 186-190, 4 Fig., 2 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute

PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

01 084949

TERMITE CONTROL INVESTIGATION. INSPECTION OF SPECIMENS AFTER 40 MONTHS EXPOSURE

This report embraces a description and analysis of data secured during the inspection of oak, fir and pine untreated control specimens and specimens treated with none different preservatives after 40 months exposure to severe decay and termite attack.

See also RRIS #072587, Section 09, RRIS Bulletin 7501 and RRIS #084950 Through 084956, Section 01, RRIS Bulletin 7502. Conducted under sponsorship of AREA Committee 3-Ties and Wood Preservation.

Association of American Railroads Technical Center ER-16, Oct. 1961, 13 pp, 2 Fig., 8 Tab.

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 084950

TERMITE CONTROL INVESTIGATION. INSPECTION OF SPECIMENS AFTER 52 MONTHS EXPOSURE

This is a report of progress in the investigation to determine the most effective preservative with minimum retention to be used in either oak, pine or fir species to reduce decay and termite attack. The results of the investigation after 52 months exposure of the specimens are: 1) Specimens treated with retention 1 of Coal Tar Creosote show less decay and termite attack than specimens treated with the other preservatives. 2) Chromated

Zinc Chloride and Tanalith are affording less protection against decay and termite attack than the other preservatives. 3) The rate of decay and termite attack is reduced considerably by treating the specimens even with the lower retentions of Chromated Zinc Chloride or Tanalith. From the data secured during the inspection of treated specimens of oak, fir and pine species after 52 months exposure, it seems logical to conclude that Coal Tar Creosote is affording more resistance to decay and termite attack than the other preservatives.

See also RRIS #072587, Section 09, RRIS Bulletin 7501 and RRIS #084949 and 084951 through 084956, section 01 RRIS Bulletin 7502. Conducted under sponsorship of AREA Committee 3-Ties and Wood Preservation.

Association of American Railroads Technical Center ER-23, Feb. 1962, 10 pp, 3 Fig., 7 Tab.

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 084951

TERMITE CONTROL INVESTIGATION. INSPECTION OF SPECIMENS AFTER 64 MONTHS EXPOSURE

From the data secured during the inspection of treated specimens of oak, fir and pine species after 64 months exposure, it seems logical to conclude that: 1) Coal Tar Creosote is affording more resistance to decay and termite attack than the other preservatives.

See also RRIS #072587, Section 09, RRIS Bulletin 7501 and RRIS #084949, 084950 and #084952 through 084956, Section 01, RRIS Bulletin 7502. Conducted under sponsorship AREA Committee 3-Ties and Wood Preservation.

Association of American Railroads Technical Center ER-38, Feb. 1963, 14 pp, 5 Fig., 8 Tab.

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 084952

TERMITE CONTROL INVESTIGATION INSPECTION OF SPECIMENS AFTER 76 MONTHS EXPOSURE

This is a report of progress in the 15-year investigation to determine the most effective preservative with minimum retention to be used in treating either oak, pine or fir species to reduce decay and termite attack. The results of the investigation after 76 months exposure of the specimens are: 1) Specimens treated with Coal Tar Creosote show less decay and termite attack than specimens treated with other preservatives. 2) Chromated Zinc Chloride and Tanalith are affording less protection against decay and termite attack than the other preservatives. 3) In general, the fir specimens treated with most of the preservatives, are subject to less decay and termite attack than the oak and pine specimens. 4) The rate of decay and termite attack is reduced considerably by treating the specimens with the lower retentions of Chromated Zinc Chloride or Tanalith. From the data secured during the inspection of treated specimens of oak, fir and pine species after 76 month exposure, it seems logical to conclude that coal tar creosote is affording more resistance to decay and termite attack than the other preservatives.

See also RRIS #072587, Section 09, RRIS Bulletin 7501 and RRIS #084949 through #084951 and #084953 through #084956, Section 01, RRIS Bulletin 7502. Conducted under sponsorship of AREA Committee 3-Ties and Wood Preservation.

Association of American Railroads Technical Center Feb. 1964, 14 pp, 5 Fig., 6 Tab.

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 084953

TERMITE CONTROL INVESTIGATION. INSPECTION OF SPECIMENS AFTER 88 MONTHS EXPOSURE

This is a report of progress in the 15-year investigation to determine the most effective preservative with minimum retention to be used in treating either oak, pine or fir species to reduce decay and termite attack. The

results of the investigation after 88 months exposure of the specimens are: 1) Specimens treated with Coal Tar Creosote show less decay and termite attack than specimens treated with other preservatives. 2) Chromated Zinc Chloride and Tanalith are affording less protection against decay and termite attack than the other preservatives. 3) In general, the fir specimens treated with most of the preservatives, are subject to less decay and termite attack than the oak and pine specimens. 4) The rate of decay and termite attack is reduced considerably by treating the specimens with the lower retentions of Chromated Zinc Chloride or Tanalith. From the data secured during the inspection of treated specimens of oak, fir and pine species after 88 months exposure, it seems logical to conclude that coal tar creosote is affording more resistance to decay and termite attack than the other preservatives.

See also RRIS #072587, Section 09, RRIS Bulletin 7501, and RRIS #084949 through #084952 and #084954 through #084956, Section 01, RRIS Bulletin 7502. Conducted under sponsorship of AREA Committee 3-Ties and Wood Preservation.

Association of American Railroads Technical Center ER-59, Feb. 1965, 16 pp, 6 Fig., 7 Tab.

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 084954

TERMITE CONTROL INVESTIGATION INSPECTION OF SPECIMENS AFTER 100 MONTHS EXPOSURE

This is a report of progress in the 15-year investigation to determine the most effective preservative with minimum retention to be used in treating either oak, pine or fir species to reduce decay and termite attack. The results of the investigation after 100 months exposure of the specimens are: 1) Specimens treated with Coal Tar Creosote show less decay and termite attack than specimens treated with other preservatives. 2) Chromated Zinc Chloride and Tanalith are affording less protection against decay and termite attack than the other preservatives. 3) In general, the fir specimens treated with most of the preservatives, are subject to less decay and termite attack than the oak and pine specimens, however, oak is generally more resistant to decay and termite attack than pine or fir when not treated. 4) The decay and termite attack is quite rapid in the untreated specimens but this can be reduced considerably by treating the specimens with the lower retentions of any of the preservatives, even Chromated Zinc Chloride or Tanalith. From the data secured during the inspection of treated specimens of oak, fir and pine species after 100 months exposure, it seems logical to conclude that Coal Tar Creosote is affording more resistance to decay and termite attack than the other preservatives.

See also RRIS #072587, Section 09, RRIS Bulletin 7501 and RRIS #084949 through #084953, #084955 and #084956, Section 01, RRIS Bulletin 7502. Conducted under sponsorship of AREA Committee 3-Ties and Wood Preservation.

Association of American Railroads Technical Center ER-66, Feb. 1966, 24 pp, 13 Fig., 7 Tab.

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 084955

TERMITE CONTROL INVESTIGATION. INSPECTION OF SPECIMENS AFTER 112 MONTHS EXPOSURE

This is a report of progress in the 15-year investigation to determine the most effective preservative with minimum retention to be used in treating either oak, pine or fir species to reduce decay and termite attack. The results of the investigation after 112 months exposure of the specimens are: 1) Specimens treated with Coal Tar Creosote show less decay and termite attack than specimens treated with other preservatives. 2) Chromated Zinc Chloride and Tanalith are affording less protection against decay and termite attack than the other preservatives. 3) In general, the fir specimens treated with most of the preservatives, are subject to less decay and termite attack than the oak and pine specimens, however, oak is generally more resistant to decay and termite attack than pine or fir when not treated. 4) The average index rating increases with the amount of preservative in the specimens. 5) The analysis of one fir stake treated with Pentachlorophenol indicated considerable loss in preservative in that part of the stake buried in the ground for 112 months. From the data secured

during the inspection of treated specimens of oak, fir and pine species after 112 months exposure, it seems logical to conclude that Coal Tar Creosote is affording more resistance to decay and termite attack than the other preservatives.

See also RRIS #072587, Section 09, RRIS Bulletin 7501 and RRIS #084949 through #084954 and #084956, Section 01, RRIS Bulletin 7502. Conducted under sponsorship of AREA Committee 3-Ties and Wood Preservation.

Association of American Railroads Technical Center Jan. 1967, 27 pp, 15 Fig., 7 Tab.

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 084956

TERMITE CONTROL INVESTIGATION. INSPECTION OF SPECIMENS AFTER 124 MONTHS EXPOSURE

This is a report of progress in the 15-year investigation to determine the most effective preservative with minimum retention to be used in treating either oak, pine or fir species to reduce decay and termite attack. The results of the investigation after 124 months exposure of the specimens are: 1) Specimens treated with Coal Tar Creosote show less decay and termite attack than specimens treated with other preservatives. 2) Chromated Zinc Chloride and Tanalith are affording less protection against decay and termite attack than the other preservatives. 3) In general, the fir specimens treated with most of the preservatives, are subject to less decay and termite attack than the oak and pine specimens, however, oak is generally more resistant to decay and termite attack than pine or fir when not treated. 4) The average index rating increases with the amount of preservative in the specimens. 5) In general, specimens treated with Coal Tar Creosote afford more protection against decay and termite attack than those treated with combinations of creosote with coal tar or petroleum. From the data secured during the inspection of treated specimens of oak, fir and pine species after 124 months exposure, it seems logical to conclude that coal tar creosote is affording more resistance to decay and termite attack, in general, than the other preservatives.

See also RRIS #072587, Section 09, RRIS Bulletin 7501, and RRIS #084949 through 084955, Section 01, RRIS Bulletin 7502. Conducted in collaboration with AREA Committee 3-Ties and Wood Preservation.

Association of American Railroads Technical Center ER-84, Aug. 1968, 28 pp, 14 Fig., 8 Tab.

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 091294

ACQUISITION AND USE OF TRACK GEOMETRY DATA IN MAINTENANCE-OF-WAY PLANNING

The report describes data acquisition by the FRA Measurement Cars and subsequent use of the collected track geometry data by the Bessemer and Lake Erie (B and LE) and the Denver and Rio Grande Western (D and RGW) Railroads. These two railroads, in conjunction with ENSCO, Inc., have prepared the report for the Federal Railroad Administration. The major emphasis of the report is placed on use of the track geometry data by B and LE and D and RGW for immediate maintenance and maintenance planning. Also provided are descriptions of data processing reports, system and measurement repeatability data, and the Track Geometry Measurement System onboard the FRA Measurement Cars.

The information herein is intended for use by maintenance-of-way personnel who are concerned with the utilization of track geometry data collected by track measurement cars and by management personnel who are involved in maintenance planning. This report was sponsored by the Federal Railroad Administration.

Bradley, K Price, B Woll, T Burnes, R Gerber, R ENSCO, Incorporated, Federal Railroad Administration, Bessemer and Lake Erie Railroad, Denver and Rio Grande Western Railroad, (DOT-FR-75-1) Tech Rpt. FRA-ORD&D-75-27, Mar. 1975, 130 pp

Contract DOT-FR-20032

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241196/AS, DOTL NTIS

01 091354

TEST TRAIN PROGRAM

This progress report covers a 12-month period of engineering, data collection and analysis efforts related to the Rail Research Program. Subjects include operation of the DOT Rail Research Cars, associated testing programs, test car upgrading, expansion of the Rail Research Program, data management and data analysis tasks which have been undertaken to benefit railroad technology.

See also report dated Jun 72, PB-226 048.

ENSCO, Incorporated, Federal Railroad Administration Prog. Rpt. #5, June 1973, 86p

Contract DOT-FR-20032

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241419/1ST, DOTL NTIS

01 095211

MEASUREMENT AND CALCULATION OF TRACK CURVES FROM ANGULAR CO-ORDINATES [Die Vermessung und Berechnung von Gleisboegen aus Winkelkoordinaten]

Track-geometry determination in conjunction with open track alignment using normal trigonometrical methods requires considerable quantities of instruments and major calculations. The author describes a method based on angular coordinates which achieves the desired objective without special instruments. [German]

Bose, E *Eisenbahningenieur* Vol. 25 No. 6, 1974, pp 200-209, 5 Fig., 6 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Dr. Arthur Tetzlaff-Verlag Niddastrasse 64, Frankfurt am Main, West Germany Repr. PC

01 095213

THE EFFECTS OF VARIATIONS IN HEAT TREATMENT ON THE STRENGTH AND TOUGHNESS OF RAIL STEEL

Because of the growing number of incidents due to rail failures, research is being made into possible improvements. The AAR and Carnegie-Mellon University have jointly sponsored a research programme into the possibility of improving rail strength (which determines what axle load can be supported without any permanent rail deformation), and toughness (defined as the measure of the steel's resistance to brittle fracture or the slowness with which a defect spreads) by simply altering the heat treatment conditions (rolling or austenization temperature, isothermal transformation temperature or cooling rate). The general tendencies of the phenomenon have been determined. Strength and hardness are unaffected by austenization temperatures between 1470 degrees F and 1830 degrees F but toughness decreases. Resistance increases as isothermal transformation temperature rises (between 1010 degrees F and 1155 degrees F and toughness would reach its maximum at about the lowest temperatures tested). This unfinished study should make it possible to decide whether the improvements that can thus be obtained are adequate for justifying a transformation of the heat treatment process or whether this line of research is pointless.

Hyzak, JM *AREA Bulletin* No. 648, June 1974, pp 776-778, 2 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

01 095214

MEANS AND METHODS TO INCREASE TRACK STABILITY

The author deals with the means and methods of preventing the decreases in track stability following maintenance operations. Above all, he refers to the so-called Plasser-all-side-system RS-System and gives an account of some tests to determine the best conditions for its use. He goes on to provide graphs showing: the results of a large number of measurements of track resistance to lateral deformation; the conditions of buckling stability deduced from theoretical and relative formulae either in the case of simple buckling of a perfectly straight track or that of deformation of a track with a slight flaw at the outset. He comes to the familiar conclusions as far as conditions for good stability are concerned: high standard of track geometry; increased lateral resistance of the ballast bed by use of modern equipment; increased track stiffness with wing-ties, used so successfully by the Austrian Federal Railways.

Riessberger, KH *AREA Bulletin* No. 648, June 1974, pp 797-811, 3 Fig., 6 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

01 095225

STEADY-STATE VIBRATIONS OF RAIL ON AN ELASTIC DAMPED FOUNDATION SUBJECTED TO AN AXIAL FORCE AND A MOVING LOAD

The recent practice of continuously welded railroad rails suggests that considerable axial forces may be induced in the rails due to a change in temperature. This paper presents an analytical solution for the effect of an axial force on the steady-state vibrations of a rail continuously supported on an elastic damped (viscoelastic of the Kelvin type) foundation and subjected to a moving load. The presence of damping is shown to result in an unsymmetric dynamic deflection of the rail. Due to phase shift the largest deflection occurs slightly behind the point of application of the moving load, and the deflection ahead is always larger than the deflection behind the point of maximum deflection. The results are relevant to present studies of the temperature buckling of continuously welded railway rails. If the rail is near to the point of buckling due to thermal strains, additional longitudinal strain in the rail due to a moving load may result in buckling of the rail ahead of the moving load.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Dokainish, MA Elmaraghy, W (McMaster University)
American Society of Mechanical Engineers 75-RT-3, Apr. 1975, 8 pp, 6 Fig., 10 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

01 095233

"ENGINEERED" TRACK, PART I: EFFECTIVE SUBGRADE AND BALLAST

The article discusses the importance of various components to make an effective subgrade and ballast. Soil types, drainage, ballast types and sizes, and the problems of dynamic forces are briefly described. Nine references are listed for further information of the various aspects of the track.

See also RRIS 01 099201, RRIS Bulletin 7502.

Hay, WW (Illinois University, Urbana) *Progressive Railroading* Vol. 18 No. 3, Mar. 1975, 4 pp

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

01 095235

THE CONCRETE TIE AND OPTIMUM TRACK

The Santa Fe Railway has installed a concrete tie test section near Streator, Illinois. The company is testing two types of ties and three types of rail clips. The track has continuous welded rail. It carries about 20 million gross tons of traffic annually, with train speeds up to 79 mph. Certain ties have 18 strain gauges permanently installed to record tie and track performance.

Progressive Railroading Vol. 18 No. 3, Mar. 1975, pp 61-64

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

01 095237

IS IT GOOD ENOUGH?

Many track engineers believe that present conventional track is inadequate for today's heavy fast trains, a new track research laboratory is being built in Chicago to test such track components as ballast, subgrade and fittings and to investigate maintenance practices, wheel loading and track stability. In addition, the Santa Fe has built a test section into its main line to study eight different types of track structures. The following article describes the development of the concrete tie and discusses its success in several sites in North America.

Modern Railroads Vol. 30 No. 3, Mar. 1975, pp 47-51

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

01 095294

A NON-DESTRUCTIVE METHOD OF MEASURING INTERNAL RAIL FORCE

Stability of continuously welded rail (cwr) can be monitored by determining the longitudinal force that exists at all times in the rail. British Rail Scientists have developed a rail-force transducer which permits rapid simple accurate measurements to be made of stress changes unaccompanied by changes of length. Using the results, the stress-free temperature of the rail is easily calculated. Transducers are cylindrical in shape and are installed by gluing in holes of the standard fishbolt size drilled in the rail's neutral axis. Readings from the transducers are taken at any time by using a portable measuring instrument.

Modern Railroads Vol. 32 No. 318, Mar. 1975, p 123

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 095377

THE DR'S POINTS WITH PARABOLIC TONGUES [Weichen mit Parabeizungen bei der Deutschen Reichsbahn]

Following details of the importance of the geometrical shape of the tongues of points on the standard of the working of the points, the author explains the principle of the parabolic tongue while pointing out that the length of the point structure remains unchanged. The advantage of parabolic tongues for points is the reduced level of wear and extended useful life. The DR will be using the new system for the points to be fitted with R 65 section rails. [German]

Kohler, J *Signal und Schiene* Vol. 18 No. 7, 1974, pp 226-228, 4 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Transpress VEB Verlag fuer Verkehrswesen
Franzoesische Strasse 13-14, 108 Berlin, East Germany Repr. PC

01 095379

TRACK SUPERSTRUCTURE-CONDITION SINE QUA NON [Der Oberbau-condition sine qua non]

Superstructure is subjected to static and dynamic stresses. In the interests of safety and productivity, wear in equipment must be foreseen in time. To avoid disturbing traffic as far as possible because of work on superstructures, the use of S 60 type rails has been introduced. First class track on main and secondary lines with traffic volumes of more than 25,000 tonnes/day should be composed of S 60 type rails. By 1985, the DB plans to lay 16,000 km of track and fit 15,000 points with heavy rails (S 60 and S 54). Lastly, the author deals with the problem of collaboration with rail manufacturing works and the organization of the superstructure section. [German]

Fastenrath, F *Die Bundesbahn* Vol. 50 No. 9, Sept. 1974, pp 557-564, 7 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

01 095380

TESTING OF NON-BALLASTED TRACK IN FRANCE AND OTHER COUNTRIES [Essais de voie sans ballast en France et a l'etranger]

This brief summary of the latest experiments with track on slabs in France and other countries stresses, for each type of track-laying, the original character of the tests. An examination of the advantages and drawbacks of the various laying methods reveals the value there would be in carrying out fresh research aimed at reducing the maintenance costs for conventional track, since the laying of track on concrete slabs does not appear to be indicated, even for speeds in the region of 300 km/h. [French]

Erieau, J *Informations Techn SNCF-Direction de l'Equipement* No. 13, June 1974, pp 63-72, 14 Fig., 2 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Societe Nationale des Chemins de Fer Francais Paris, France Repr. PC

01 095414

ANALYSIS OF TRACK PARAMETER HETEROGENEITY AS A COMPLEMENT TO GEOMETRICAL METHODS OF TRACK CONDITION RATING

The condition of a track may be defined by track rating indices (W indices at the PKP) taken from recordings by a track inspection car, or obtained by geometrical measurements (longitudinal dip and cross-sectional irregularities, without load or with a moving load, lateral displacement, etc.). By track heterogeneity, the writer means the differences that such indices reveal on lengths of line with identical make-up, similar age, and used by the same traffic. These heterogeneities, which may be caused by the laying or maintenance of the track, or by constructional features with different characteristics, are also likely to result in great differences in the rapidity with which these lengths of line deteriorate, necessitating earlier continuous track renewal. The article proposes methods of assessing these heterogeneities by tests based on classic statistics laws. Numerical examples thus deal with: heterogeneities in the W index, by the X to the 2nd power test; heterogeneities in the track gauge by a method called the "ZM test" taken from an American book referred to in the bibliography; correlations between rail dip and lateral displacement under a moving load, by an analysis of sequential correlation. These complex analyses are not used as a basis of routine maintenance decisions, but in investigations for the purpose of explaining abnormal phenomena.

Baluch, H *Rail International* Vol. 5 No. 7-8, Aug. 1974, pp 537-546, 6 Fig., 4 Tab., 6 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

01 095633

CHARACTERISTICS OF THE ORIGIN AND DEVELOPMENT OF INTERNAL FATIGUE CRACKS AS EXEMPLIFIED BY RAIL FRACTURE [Osobennosti Zarozhdeniya i Razvitiya Vnutrennikh Treshchin Ustalosti na Primere Razrusheniya Rel'sov]

Experimental data are presented that have been obtained during an investigation into the failure of railroad rails. Specific features of this kind of fracture are studied. They are connected with cold hardening of the rail surface layer and generation of cracks within the material. [Russian]

Ravitskaya, TM *Problemy Prochnosti* Vol. 6 No. 11, Nov. 1974, pp 77-82, 23 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

01 095670

TRACKWORK IN STREETS

This article reviews street railway track practices. Although written for railfans, the article contains much excellent technical information on trackwork in streets, and is based largely on American Electric Railway Association material. Track layout, turnouts, switches, girder rail, and operational aspects of track are covered.

This article is contained in the book "Traction Guidebook for Model Railroads", edited by Mike Schafer, Kalmbach Books, 1974.

Clouser, WJ

Kalmbach Books 1974, pp 53-63, 33 Fig.

PURCHASE FROM: Kalmbach Books 1027 North Seventh Street, Milwaukee, Wisconsin, 53233 Repr. PC

01 095673

M/W COSTS: HOW THEY ARE AFFECTED BY CAR WEIGHTS AND THE TRACK STRUCTURE

Using a combination of theory and actual field measurements, the author develops the relative maintenance costs associated with axle loads and the type and condition of the track. The article attaches definite values to variables such as total tonnage carried, track condition and car size. The Illinois Central Gulf considers that 53% of total track expense and capital investment is incremental—varying with the tonnage moving over the railroad. This incremental cost is then broken into its own increments based on rail deflection, rail bending stress, rail life and miscellaneous costs.

Ahlf, RE (Illinois Central Gulf Railroad) *Railway Track and Structures* Vol. 71 No. 3, Mar. 1975, 7 pp, 6 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 095674

SANTA FE LOOKS FAR AHEAD IN M/W PROGRAMMING

Maintenance of way requirements on this road are projected as far as 20 years into the future. To bring out the thinking behind this practice, including the expected benefits, the Santa Fe's chief executive officer, vice president operations and chief engineer participated in a roundtable which is reported in this article. The long-term planning is aimed at overcoming peaks and valleys in earnings by avoiding peaks and valleys in maintenance operations.

Railway Track and Structures Vol. 71 No. 3, Mar. 1975, pp 20-24

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 095677

SOLID TRACKBED CROSSOVERS IN HEITERSBERG TUNNEL

Anticipating the construction of a new Gotthard tunnel, Swiss Federal Railways has completed a dummy run for laying concrete slab track, considered essential for a long tunnel with a high traffic density because a conventional ballasted trackbed would require undue time for maintenance. The tunnel on the new cutoff between Zurich and Berne was laid entirely with 9.5 km of solid trackbed, including four crossovers. The Heitsberg tunnel trackbed was laid with virtually the same construction methods used in a test section in the Bozberg tunnel in 1966 which has since required no maintenance and has been entirely satisfactory.

Railway Gazette International Vol. 131 No. 2, Feb. 1975, p 73, 2 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 095679

EXPERIMENTAL ASPHALT-BASED TRACK BUILT IN ENGLAND

Construction at British Rail's research center consists of 9-in. asphalt base on which rails are supported by prestressed concrete beams and transverse bearing members. The work is a cooperative effort of British Rail's Research & Development Division and Esso Petroleum's Research Center. Asphalt can be subjected to traffic loading within a few hours of laying, unlike concrete slabs which require much longer curing before they can be used in service. Asphalt-based track might prove suitable for track replacement where services can only be interrupted for a short time. The site has been exhaustively instrumented to determine stresses and deflection.

Railway Track and Structures Vol. 71 No. 4, Apr. 1975, pp 26-27, 2 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 095680

PANELIZED STEEL-TIE TRACK FILLS A NEED ON THIS PROJECT

The construction of a six-mile in-plant railroad serving the Tilden iron-ore mine and pelletizing plant near Ishpeming, Mich., was accomplished with all-steel panelized track. A total of 845 pre-assembled steel-tie track panels and 16 all-steel turnouts were used. The panelized track concept was credited with not only maintaining the original construction schedule, but also staying within budget estimates. While the original cost was in excess of that for the same amount of trackage on wood ties, savings in construction labor and time were achieved. It is expected that maintenance will also be lower.

Railway Track and Structures Vol. 71 No. 4, Apr. 1975, pp 28-29, 3 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 095682

FLAME HARDENING OF RAIL BY THE HAMMON CONTINUOUS PROCESS AND PHYSICAL AND ROLLING LOAD TEST RESULTS

Since the standard carbon rail is removed from track due to abrasion, head flow on the low rail of the curves and shelling on the high rail, it is of interest to the industry to investigate any process that alleviates this problem. Failures due to shelling alone amount to 40 percent of all types of failures. Alloy rail steel chemistries and heat treatment have been found helpful in extending rail life where the above conditions existed. In the area of heat treatment, various types of flame hardening of the rail head

have been found applicable economically and available in all parts of the United States. Summarizing, features of this process that may be of interest to railroads are: 1. Evaluation of rail flame hardened by this process at the Research Center and the University of Illinois indicates that it should give good service performance. 2. It is claimed that it will be economical because of its ability to use propane or natural gas for heating the rail. 3. Rail of any length can be continuously flame hardened, before or after welding. 4. The equipment can be mounted on railroad cars to be used either at the welding or cropping site.

Association of American Railroads Technical Center No. ER-44, Apr. 1964, 3 pp, 10 Fig., 4 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 095691

SURVEYING AND CALCULATION OF CURVED TRACK, USING ANGLE CONFIGURATION CO-ORDINATES

The method described for surveying and calculation of curved track with the aid of angle configuration coordinates is not inferior to values calculated on the strength of normal coordinates and has the following advantages: Less mathematical effort compared with polar marking and surveyings; work can be carried out with instruments currently available (measuring tapes and theodolites); application of calculators with the well known angle- Configuration method. The formulas which apparently are complicated can be derived without major effort from the calculation sketch for each individual case.

Bose, E *Rail International* Vol. 6 No. 1, Jan. 1975, pp 55-61, 5 Fig., 6 Ref.

ACKNOWLEDGMENT: Rail International

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

01 095704

LABORATORY TESTS OF JARRAH WOOD-A PRODUCT OF AUSTRALIA

Greenheart (Demerara) Inc., who market Jarrah wood in this country requested the AAR to conduct laboratory tests with the view of determining its usefulness as material for ties. Request was based on premise that Jarrah wood would have greater strength and be more resistant to wear than creosoted red oak.

Association of American Railroads Technical Center ER-19, Nov. 1961, 6 pp, 2 Fig., 1 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 095720

TRACK GEOMETRY SURVEY DEVICE FOR LIM RESEARCH VEHICLE TEST TRACK

A track survey device was designed, built and operated to measure the geometry of the FRA Linear Induction Motor Test Track at Pueblo, Colorado. A laser beam is used for the measurement of profile and alignment; an electronic level for the measurement of superelevation and mechanical sensors for both support rail and reaction rail gages. The measurement is stored in magnetic tape for processing.

Sponsored by the Federal Railroad Administration.

Medeck, H Panunzio, S
General Applied Science Laboratories, Incorporated, (GASL TR-776)
Final Rpt. FRA-ORD & D-74-36, Oct. 1973, 110 pp, Figs., Tabs.,
Photos.

Contract DOT-FR-10016

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241313/AS, DOT NTIS

01 095873

PRESTRESSED CONCRETE TIE INVESTIGATION-2ND REPORT

This is a summary of some five years experience and field tests with strain gages and measurements of electrical resistance.

Conducted under sponsorship of AREA Committee 3-Ties and Wood Preservation and AREA Committee 5-Track.

Association of American Railroads Technical Center ER-58, Apr. 1965, 65 pp, 21 Fig., 1 Tab., 1 Phot., 1 App.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 095874

RAIL STUDY BESSEMER AND LAKE ERIE RAILROAD

Because of the ever increasing concern with shelling of rail and its possible connection with wheel loads and the present day trend to still heavier wheel loads, a study was conducted on the Bessemer and Lake Erie Railroad to analyze their rail conditions in conjunction with their use of 90-ton cars for transporting of ore. This railroad has been using these 90-ton capacity hopper cars since 1931, with practice being to load ore for southbound movement to capacity, thus creating loads averaging 32,300 lbs. per wheel. It has been noted over the years that even with these wheel loads and rather high annual tonnages, the Bessemer has had little or not shelling of their rail. This study was prompted to see if an answer could be derived as to why no shelling problem exists here. In particular, two locations on the railroad were checked where the present rail in track is 131 lb., laid in 1938, and has had over 400,000,000 gross tons of traffic, most of which consisted of ore carried in these 90-ton hopper cars. The northmost location is at Springboro, Pennsylvania, where there is a length of one mile of the 131 lb. rail in track (north and south of Mile Post 116). The other location is through and to the south of Grove City, Pennsylvania, Mile Post 60-63, where there is a 3-mile section of 131 lb. rail in track. Both of these sections of 131 lb. rail now carry both northbound and southbound tonnage, but prior to single tracking and installation of C.T.C. in 1957, this trackage was the southbound main track in both instances and carried the predominant southbound ore traffic. At both locations of 131 lb. rail, rail profiles were taken, degree and superelevation of curves were noted, predominant speeds of tonnage trains in both directions were noted, condition of the entire track structure and, in particular, condition of the rail both on tangent and curves were noted. Photographs were taken to show the rail condition. Because of curvature in the locations not exceeding 3 degrees, other locations on the railroad were chosen to make like studies, these locations having the same or less annual tonnages, and having different weights of rail of shorter service life, but having greater degree of curvature. Rail profiles and photographs were taken at these locations also. Along with the study of the rail and track conditions, a study of the 90-ton B & LE hopper cars was conducted, obtaining all pertinent data, prints, and photographs having to do with their construction and maintenance. The Bessemer's rail replacement policy is guided by the formula— $T = .703 \times W \times D \times 565$ where T = Life of rail in million gross tons. W = Weight of rail in lbs. per yard. D = Traffic density in million gross tons per year.

Conducted under sponsorship of AAR Joint Committee on Relation Between Track and Equipment.

Association of American Railroads Technical Center ER-55, Mar. 1965, 3 pp, 4 Fig., 3 Phot.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 095876

INVESTIGATION FOR REPAIRS BY WELDING OF HEAT TREATED AND FLAME HARDENED RAIL IN BOLTED RAIL CROSSINGS

In 1952 a program was developed to provide for investigation of heat treated rail and flame hardened rail in crossing frogs by means of service installations followed by laboratory studies of welding techniques to be used in field repairs to worn and battered units. A contract was made with the Chicago, Milwaukee, St. Paul and Pacific Railroad for installation of

three test panels of crossing intersections at Manheim, Illinois, each of the three test panels to consist of eight simulated crossing intersections three of carbon-steel rail, heat treated by various methods; three of flame hardened carbon-steel rail; one carbon-steel panel of control cooled rail (as rolled) and one panel of chrome-vanadium rail. The studies of welding techniques were carried out at the AAR Research Center and the University of Illinois. 1. The flame hardened units held up generally well following welding with electric procedures used as indicated in Table 5. 2. The gas welds on the flame hardened units were less effective than the electric techniques and must be considered to be inferior. 3. The three types of electric welds and two types of gas welds used on the heat treated units gave comparable results and may be considered as satisfactory. 4. The best performing weld on chrome-vanadium rail was the electric weld in the west panel probably due to the hardness obtained by the process used. 5. On the open hearth units the best performance was obtained with gas weld 1G on unit E8. It is difficult to appraise the poor performance of weld 2G on unit C8 as this weld procedure gave good results on the flame hardened and heat treated units.

Conducted under sponsorship of AREA Committee 5-Track.

Association of American Railroads Technical Center ER-51, Nov. 1964, 14 pp, 65 Fig, 5 Tab., Photos.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 095877

SERVICE INVESTIGATION OF VARIOUS TYPES OF JOINT BARS ON SANTA FE AND NORTHWESTERN RAILWAYS

This report covers the service investigation of various types of joint bars and variations of bolt spacing on the Atchison, Topeka and Santa Fe Railway near Streator, Illinois and on the Chicago and Northwestern Railway at Sterling, Illinois. 1. All design of joint bars have been adequate throughout the service period of 16 years. 2. Four bolts in 36 in joints with 9-9 1/8-9 in spacing are adequate to hold the rail, but do not provide sufficient rail end support, hence, create additional batter and droop of the rail ends compared with 6-bolt bars. 3. There appears to be little difference in the performance of the current AREA bolt hole spacing of 6-6-7 1/8-6-6 in compared with the 6 1/2-6 1/2-5 1/8-6 1/2-6 1/2 in spacing where such a comparison can be made in the Santa Fe test. Inasmuch as the current AREA spacing has been shown to produce less stress concentration at the bolt holes and this service test has shown no disadvantage in other respects, it has confirmed the desirability of continuing the current AREA bolt hole spacing.

Conducted under sponsorship of AREA Committee 4-Rail.

Lampert, LR

Association of American Railroads Technical Center 6 pp, 12 Fig., Photos., 10 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 095879

METALLURGICAL, PHYSICAL AND ROLLING LOAD TEST RESULTS OF RAIL ROLLED FROM CONTINUOUSLY CAST BLOOMS

The development of information relative to any new process applicable to producing rail more economically is of interest to the industry. The opportunity of investigating the application of continuous casting in rolling rail presented itself when the M.W. Kellogg Company became interested in investigating this process on behalf of a Mexican client. The AAR Research Center cooperated in developing the metallurgical, physical and rolling load test results of rail rolled to the S49 section from continuously cast blooms. The results on the same type of tests as described above tested in the 12 in stroke rolling load machine are shown on Table 4. The S49 rails and the oxyacetylene pressure butt welded rail joints did not fail. The flash butt welded rail joints failed prematurely due to grinding cracks away from the weld caused by heavy cold grinding as shown in Figs. 8 and 9. The drop test results of the rail as shown on Table 5 indicate that the rail met the AREA specification. Fig. 10 illustrates the effect of the drop

test. As mentioned before, very few butt welded rail joints have withstood the standard drop test for rail. The structure of these fractures were noted to be fibrous. The results of the investigation of the S49 rail rolled from continuously cast blooms at the AAR Research Center and comparable results of the investigation by Dr. Janiche indicate that rail produced by this process is of equal quality to rail produced by the standard process. The results are surprising in this first attempt of producing rail in this manner. As the art of continuous casting in reference to rail is advanced, all of the defects such as segregations will undoubtedly be eliminated. The economy of the process is predicated on the elimination of mold and teeming practices as well as soaking pits and primary mill installations. It is of interest to call attention to the last paragraph of the attached report which states that the UIC specification for rolling rail calling for a bloom cross section of at least 20 times larger than the rail cross section was not met in this case. In the above rolling, the ratio amounted to 15 to 1 in the case of the 30 d rail and 9 to 1 in the case of the S49 rail.

Association of American Railroads Technical Center ER-45, Aug. 1964, 6 pp, 13 Fig., 6 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 096535

DEVELOPMENT OF UNCONVENTIONAL TRACK BY JNR

JNR has been developing an unconventional, maintenance-free track which may be applicable not only from technical aspects, but also from economical aspects, in comparison with the conventional track structure consisting of sleepers and ballast. This new track will be used on the New San-yo Line (NSL) between Okayama and Hakata which uses standard gauge track, taking into account a maximum speed of 250 km/h, and also on the Kosei Line, the Musashino Line, etc., which use narrow gauge track with a maximum speed of 120 km/h. This paper discusses the technical, economical and social backgrounds, and the history of technical development in changing from the conventional structure, together with relevant problems.

Miyamoto, T Watanabe, K Aoki, M *Rail International* Vol. 6 No. 3, Mar. 1975, pp 189-203, 14 Fig., 9 Tab.

ACKNOWLEDGMENT: Rail International

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

01 096546

THE BASICS OF TRACK INSPECTION-PLUS OTHER HELPFUL KNOWLEDGE FOR THOSE WITH NEW RESPONSIBILITIES IN TRACK MAINTENANCE

In this first of three installments, the author tells a new man how to get started on his territory. Next, the common rail defects are described and hints given on how to identify them. Problems encountered at joints are discussed and malfunctions of rail anchors are noted. Tie conditions to watch are explained and the need for maintaining a well-drained ballast section is emphasized. Split fills are discussed and methods of correcting them conclude this segment.

Blanchard, LC *Railway Track and Structures* Vol. 71 No. 5, May 1975, pp 38-40, 1 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

01 096626

THE LANDS TEST SITE. POINTS AND CROSSINGS FOR SWITCHING TRAINS AT HIGH-SPEEDS [Le chantier d'essai des Landes. Appareils de voie franchissables en deviation a' grande vitesse]

Photographic report with brief technical particulars on the characteristics and layout of the points and crossings being tested by the SNCF on the Bordeaux-Dax line, which make it possible to switch trains onto turnout tracks at speeds of 220 km/h at least. The blade alone extends over 36 m, for a switch with a total length of 210 m; the radius of the curve is about 10,000 m (tg 0.0162). [French]

Chemins de fer No. 307, Apr. 1974, pp 207-210, 13 Fig.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

01 096654

MINERAL WASTES AS RAILROAD BALLAST

Approximately half of the \$100 million allocated annually by Canadian railways for track maintenance is for the purchase, haulage, installation and maintenance of ballast. With the growth of Canadian rail traffic, it has been estimated that the nation will have to undertake major new rail construction in the next few years. Good quality ballast is not available all across Canada, particularly in the prairies. There are sources for the material in several locations, some of which would be the wastes from mining and metallurgical operations. The report discusses the function, characteristics, appraisal and sources of ballast. It is noted that Canadian railways are placing increased emphasis on the materials to be utilized as subballast and ballast in their track.

For presentation at the Annual General Meeting, Canadian Institute of Mining and Metallurgy, Toronto, Canada, 5-7 May 1975.

Feasby, DG (Mineral Sciences Laboratories)

Canada Centre for Mineral and Energy Technology MRP/MSL 75-76(OP), Apr. 1975, 17 pp, 1 Tab., 7 Ref.

PURCHASE FROM: Canadian Institute of Mining and Metallurgy 906-1117 Ste Catherine Street, West, Montreal 110, Quebec, Canada Repr. PC

DOTL RP

01 096657

DOT TEST TRAIN PROGRAM SYSTEM INSTRUMENTATION MANUAL-FIFTH EDITION

This manual describes track measurement instrumentation which has been developed during the reporting period, and covers all instrumentation currently installed aboard the FRA Test Cars. The major emphasis of this report deals with the operation and calibration of the Track Geometry Measurement System installed aboard Test Car T-3. Ancillary systems, and equipment aboard Test Cars T-1, T-2 and T-4 is also summarized. The information herein is intended for use by technical personnel who are involved in the operation of FRA Test Car instrumentation, and by engineering and research personnel involved in the application of track geometry measurement techniques.

This was sponsored by Federal Railroad Administration, US DOT.

Anderson, L MacIntyre, S Kolczyznski, N
ENSCO, Incorporated, (DOT-FR-74-13) Ann. Rpt. FRA-ORD&D-7504, Dec. 1973, 140 pp, Figs., Tabs.

Contract DOT-FR-20032

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

01 097253

AN INVESTIGATION OF VARIOUS WELDING TECHNIQUES FOR BUILDING UP BATTERED RAIL ENDS

The building up of battered rail ends by means of different welding procedures and the evaluation of welding rods and electrodes used in these procedures is of considerable importance to the railroads. An investigation on this subject using 12 in. stroke rolling load machines at the Technical Center of the Association of American Railroads has been carried on under the general direction of G.M. Magee, director of engineering research, by Kurt Kannowski, metallurgical engineer. A definite program was outlined and followed in this investigation. The data in this investigation indicate that, in spite of variations in rods and welding procedures, the oxyacetylene welding method performs well in building up battered rail ends. The occurrence of the porosity near the interface of the weld and rail metal as well as the sharp demarcation line between the rail and weld metal have caused the failures of the electric arc welds rather than the practice of not pre or post heating. The failures of electric arc welds are often caused by a variable that was not given consideration in this investigation. These welds are subject to the human element variations that may be expected due to the welder depositing the metal. This effect on the quality of the weld is gradually being eliminated by improvements in the automatic feed and wire electrode welding process. Welds produced by this method are now under the rolling load test as well as in an extensive service test on the New York Central System. Results from both show considerable promise.

Kannowski, K

Association of American Railroads Technical Center ER-32, Mar. 1963, 3 pp, 25 Fig., Tabs., Photos.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 097254

REPORT ON OPEN HEARTH SLAG FOR RAILROAD BALLAST

The test results on the open hearth slag as included in this report are for a sample furnished by the U.S. Steel Corporation from Lorain, Ohio. Although these results indicate that this material should prove satisfactory from the conductivity standpoint, it must be noted that this will not necessarily apply to open hearth slag material from other sources. We are of the opinion that open hearth slag can be processed to produce acceptable ballast material. However, control of the processing, particularly for the elimination of particles high in metallic content, is very important. In addition to the above tests a field inspection was made on a railroad in Michigan whose main line track is ballasted for a distance of approximately 90 miles with an open hearth slag ballast. The track has been in service with this ballast for a period of about five years without any difficulty being encountered with the signal system. The ballast is performing well in service having apparently resisted breakdown due to weathering and abrasion. Inspections of this nature are planned on other railroads using open hearth slag ballast with samples being taken for laboratory tests.

Conducted under sponsorship of AREA Committee 1-Roadway and Ballast.

Hinueber, GL

Association of American Railroads Technical Center ER-24, Sept. 1962, 5 pp

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 097255

INVESTIGATION OF SPECIAL JOINT BARS AND RAIL PLUGS FOR USE IN JOINING LENGTHS OF CONTINUOUS WELDED RAIL

This report covers laboratory tests of two completely assembled special rail joints with rail plugs (Dutchmen) to determine if such joints will stand up under traffic. A member road developed the special joint for use in connection with laying continuous welded rail at low temperatures and requested that tests be made in the rolling load machines at the Technical Center. It was felt that this subject matter would be of interest to other member roads and arrangements were made for tests of two joints. The purpose of the rail plug with a special length joint is to provide means of adjusting expansion of continuous lengths of rail laid at low temperatures without creating an additional joint for a short length of rail used by some railroads when joining continuous lengths. The special joints are made of regular cross section design, metallurgy and heat treatment, but the bars are lengthened to provide for the length of the plug and the spacing between the center bolt holes increased a corresponding amount. In laying continuous welded rail at below mean temperatures, the special joints with plugs would be used, the length of joint and plug being selected according to the amount the rail temperature when laying was below the mean temperature. At some later and convenient date, when the rail temperature was near the mean temperature the special joints and plugs would be removed, rail anchors removed to allow the rail ends to close the gap, and regular joint bars applied. The special joints and plugs would then be held for use on the next rail laying job as needed.

Association of American Railroads Technical Center ER-7, Feb. 1961, 2 pp, 4 Fig., Photos.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 097256

PHYSICAL TEST RESULTS OF OXY-ACETYLENE PRESSURE BUTT WELDS OF HEAT TREATED RAILS

In order to develop all pertinent data in regards to continuous welded rail rolling load, flexure, drop and slow bend tests were performed on oxy-acetylene pressure butt welded fully heat treated rails at the request of the Norfolk and Western Railway Company. The fully heat treated rails, 132 lb. RE section, were supplied by the Bethlehem Steel Corporation and the welds were made by the Norfolk and Western Railway Company at their Roadway Material Yard in Roanoke. Eight of these welds were made by the oxy-acetylene pressure butt welding process. They were also normalized. Each of the tests were 6 ft. long with the weld in the center. The rolling load, flexure and drop tests were made at the AAR Technical Center and the slow bend tests were made at the University of Illinois by Professor R.E. Cramer. Two of the weld specimens were subjected to the rolling load test in a 12 in. stroke rolling load machine using a wheel load of 60,000 lb. with the weld placed 2 in. from the support on the cantilever end of rail. Since the wheel path is 10 in. beyond the weld, the weld was subjected to a bending moment of 600,000 in. lb. Under this test procedure, 2,000,000 load applications or cycles without failure is considered a run out. Both of the test specimens ran out at 2,000,000 cycles without failure. The flexure test was performed on a multi-press using a 60,000 lb. repeated load applied on the center of the weld on the rail head with a wheel shaped contact. The rail was supported on its base to have a 48 in. span. Thus, for each cycle of loading the bending moment at the weld varied from 0 to 720,000 in. lb. with the base in tension, giving a calculated maximum stress at the extreme fiber of 26,000 psi tension. Two of the test specimens were subjected to 2,000,000 flexures each without a failure. The two flexure test specimens, as well as two other test specimens, were then subjected to the drop test on a standard rail drop test machine. A 2,000 lb. tup was dropped 22 ft. on the center of weld with the rail head up. The rail was supported on a 48 in. span. As shown on Table 2, the two flexure test specimens failed at the first blow. One test specimen broke through the weld and a welding defect from a pop out on the outer edge of the base was noted. The other flexure test specimen failed 6 in. away from the weld and a transverse progressive defect in the head originating from a grinding crack was noted. One of the two regular test specimens failed outside the weld area after two blows. The other test specimen failed at the first blow through the weld. It was noted that the lower part of the web and the base were partially fused. The slow bend test results were obtained at the University of Illinois by Professor Cramer. The tests were made with the head up on supports 48 in. apart. The load was applied at two points 6 in. on each side of the weld. Thus, the applied bending moment between these load points was nine times the applied load in in. lb. One of the tests failed prematurely through weld. It was noted that the lower web and the base were partially fused. The other test performed excellently and broke 5 in. from the weld at the edge of the heat affected zone. The data obtained under the testing procedure indicates that even though the benefit from the heat treatment has been eliminated in that part of the rail heated above the critical temperature during the welding process, that fully heat treated rail welded by this process will perform as well as standard control cooled rail in the weld zone. Oxy-acetylene pressure butt welds with control cooled rail are in use extensively without failures if properly welded. The failures noted in these tests are not different from those that have been experienced in laboratory tests and field service in welds made by this process with standard control cooled rail.

Association of American Railroads Technical Center ER-8, Feb. 1961, 3 pp

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 097267

DEVELOPMENT OF AN INNER BRACING FOR SWITCH STOCK RAILS ON THE GERMAN FEDERAL RAILWAY [Entwicklung einer inneren Backenschiene-Verspannung fuer Weichen der Deutschen Bundesbahn]

The stock rails of switches have hitherto always had outside bracings of various designs, but with increasing speeds, shorter intervals between trains, higher axle loadings and hence greater stresses on the switches, these outside and indirect-acting supports are no longer adequate. The Author describes the development of an inner bracing which with the aid

of a specially-designed tension piece provides a flexible and permanently force-locking connection. Details of its design, basis of calculation, and testing by the German Federal Railway are given. [German]

Heim, A *Eisenbahntechnische Rundschau* Vol. 24 Apr. 1975, pp 117-122, 6 Fig., 7 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

01 097268

INVESTIGATION OF DIFFERENT FORMATION PROTECTIVE LAYERS [Untersuchung verschiedener Planumsschutzschichten fuer den Schotteroberbau]

The Authors calculate the stresses in relation to different deformation moduli for the formation in respect of a ballast bed without a formation protective layer, with a 30-cm gravel underlayer, and with a cement-consolidated layer of 20 or 25 cm thickness. The limits of their suitability are determined, and recommendations made for the practical application of the various layers. [German]

Eisenmann, J Schneider, E *Eisenbahntechnische Rundschau* Vol. 24 Apr. 1975, pp 111-116, Figs., 12 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

01 097269

NEW MONITORING SYSTEM FOR USAGE OF PERMANENT-WAY MACHINERY [Neue Arbeitsorganisation zur Ueberwachung des Baumaschineneinsatzes im Oberbau]

The useful employment of permanent-way machinery can be substantially improved by means of continuously analysing the productive and idle time components. Exact data on the actual attainable performance under different operational and site conditions with machinery of different makes and type is also necessary for realistic planning of the work at future sites. The Author describes how the data acquisition equipment fitted on all the large p.w. machines of the German Federal Railway is used to obtain this information. [German]

Sauerwein, H *Eisenbahntechnische Rundschau* Vol. 24 Apr. 1975, 4 pp, 2 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

01 097270

DIRECT CONCRETE ENCASING OF NON-BALLASTED AND SLEEPER-LESS HIGH-SPEED TRACKS [Unmittelbares Einbetonieren bettungs-und Schwellenloser Schnellfahrgeleise]

The Kolner Verkehrs-Betriebe AG has developed a track without ballast or sleepers which can be laid in tunnels, on bridges and on normal earth formations. The rails with their fastenings are mounted in their exact position on strong assembly equipment and then immediately encased in concrete. The track is built, so to say, from the top downwards. The system is cheaper than the experimental methods tried out by the German Federal Railway, and should also be capable of being developed for the latter's new routes. [German]

Braitsch, H *Eisenbahntechnische Rundschau* Vol. 24 Apr. 1975, pp 129-134, 6 Fig., Photos., 19 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

01 097297

THE CONTINUOUSLY SUPPORTED RAIL SUBJECTED TO AN AXIAL FORCE AND A MOVING LOAD

The recent practice of welding railroad rails to each other suggests that considerable axial compression forces may be induced in the rails because of a rise in temperature. This in turn may reduce the critical velocity for

the track to the range of operational velocities of modern high-speed trains. The purpose of the paper is to demonstrate that this is indeed a possibility.

Kerr, AD (New York University, New York) *International Journal of Mechanical Sciences* Vol. 14 1972, pp 71-78, 5 Fig., 8 Ref.

ACKNOWLEDGMENT: International Journal of Mechanical Sciences
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

01 098005

WELDING OF RAILS WITH FLASH REMOVAL IN THE FLASH WELDING MACHINE

Results are presented of experiments conducted with flash welding of rails using a flash remover positioned between the moving column and the rigid frame of the welding machine.

Genken, TZ Gridin, AP *Welding Production* Vol. 21 No. 7, July 1974, pp 36-41

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

01 098006

CORRUGATION AND PITTING OF ROLLING SURFACES-ARE THEY CONTINGENT UPON ULTRASONICS?

This article is an abridged version of essay number 28/1973 held in the Archiv fuer Eisenbahntechnik. Rail corrugations, which were a familiar phenomenon in the 1890's and similar periodic forms of wear occur in other rolling contact combinations. An attempt is made in this paper to explain these manifestations. It is suggested in conclusion that it would appear that troublesome corrugations and perhaps damaging pitting could be avoided if, besides the attenuation of low-frequency oscillations, a means could be found to prevent the agitation and propagation of intensive ultrasonic fields within the area of the running surfaces.

Werner, K *Wear* Vol. 32 No. 2, Apr. 1975, pp 233-248, 18 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

01 098048

OPTIMUM TRACK: WHAT IS IS. WHAT IT COSTS. WHAT IT SAVES

There is general agreement savings in maintenance costs can be realized by converting poor track into what might be called 'optimum' track. While recognizing that many variables are involved, this article uses a hypothetical case in an attempt to calculate the economics possible through rehabilitation.

Railway Track and Structures Vol. 71 No. 6, June 1975, pp 14-16

ACKNOWLEDGMENT: Railway Track and Structures
PURCHASE FROM: XUM Repr. PC

DOTL JC

01 098049

OPTIMUM TRACK: THE ELEMENTS AND THEIR ECONOMICS

Each of the elements of optimum track, whether a stable roadbed, clean ballast, sound rail, or some other feature, produces savings compared with a less desirable condition. Purpose of this article to examine the benefits of each of the elements and to state the savings in tangible terms wherever possible.

Railway Track and Structures Vol. 71 No. 6, June 1975, 4 pp

ACKNOWLEDGMENT: Railway Track and Structures
PURCHASE FROM: XUM Repr. PC

DOTL JC

01 098050

THE BASICS OF TRACK INSPECTION-PLUS OTHER HELPFUL KNOWLEDGE FOR THOSE WITH NEW RESPONSIBILITIES IN TRACK MAINTENANCE

In this article, the second of three installments, the author gives hints on how to check the condition of the track, especially gauge, discusses problems that can occur on curves in the presence of snow and ice, gives advice on inspection and maintenance of highway crossings, urges familiarity

with operating and safety rules and discusses responsibilities in connection with communications, signals and bridges.

See also RRIS 01 096546, RRIS Bulletin 7502.

Blanchard, LC *Railway Track and Structures* Vol. 71 No. 6, June 1975, 3 pp

ACKNOWLEDGMENT: Railway Track and Structures
PURCHASE FROM: XUM Repr. PC

DOTL JC

01 098073

FRA TRACK GEOMETRY MEASUREMENT SYSTEM VALIDATION REPORT

This report covers an extensive testing program which was conducted to validate the track geometry measurement system installed aboard the Department of Transportation Rail Test Cars. The tests were conducted to establish the accuracy and repeatability of measurements made with the high-speed electronic measurement system installed aboard the DOT Test Cars. The validation procedure involved both laboratory and field tests of the electronic measurement system. Comparisons were made between manual and high-speed electronic measurements of rail gage, crosslevel, profile and alignment. Results of these comparisons under various dynamic conditions, speeds, types of rail and rail loads are included in this report. The information contained in this report includes considerable detail which is intended for use by engineering and research personnel who are involved in the design, development, and validation of rail measuring devices.

This program sponsored by the Federal Railroad Administration, Office of Research and Development, US DOT.

Yang, TL

ENSCO, Incorporated, (DOT-FR-73-08) Engr. Rpt. FRA-ORD&D-75-05, June 1974, 156 pp, Figs., Tabs., 3 App.

Contract DOT-FR-20032

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-243677/AS, DOTL NTIS

01 098079

THE FRACTURE TOUGHNESS OF CARBON-STEEL, ALLOY-STEEL AND HEAT-TREATED RAILWAY RAILS

The static and dynamic fracture toughness of standard carbon steel rail was determined using precracked Charpy bars. The static, fracture toughness was found to be higher than the dynamic fracture toughness across the entire range of railway operating conditions. Since rails are subjected to dynamic loading conditions, dynamic fracture toughness tests were conducted on specimens from alloy-steel and heat-treated rails in order to compare fracture properties. In addition, the standard British rail steel and two heat-treated grades of British rail steel were evaluated. It was found that carbon levels above 0.55 w/o did not affect fracture toughness while increasing silicon decreased fracture toughness in both high and low carbon rails. In line with earlier work, it was found that decreasing pearlite spacing increased fracture toughness. In addition, the effects of manganese, chromium and molybdenum are discussed.

Stone, DH

Association of American Railroads Technical Center, (R-014) R-163, Sept. 1974, 23 pp, 7 Fig., 1 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 098080

THE EFFECTS OF MICROSTRUCTURAL VARIATIONS ON THE STRENGTH AND TOUGHNESS OF RAIL STEELS

An experimental program was carried out on fully-pearlitic rail steel to determine the effects of microstructural variations on tensile and impact properties. A heat treating schedule was developed to isolate the effects of prior austenitic grain size, pearlite interlamellar spacing, and to a minor extent, pearlite colony size. Grain size was varied by a factor of ten, and pearlite spacing by a factor of two. Room temperature yield strength increased monotonically with decreasing interlamellar spacing, with the lat-

ter controlled by the transformation temperature and prior austenitic grain size. Charpy impact tests were performed to obtain an evaluation of toughness, and showed that toughness increased with decreasing grain size, and was largely independent of an influence of pearlite spacing. Dynamic fracture toughness values, (K_{ID}), obtained from instrumented impact testing of precracked Charpy bars, were compared with the standard Charpy results, and yielded similar findings. Thus, it was found that strength and toughness are controlled by different microstructural parameters, and can be varied independent of each other to optimize service performance.

Hyzak, JM Bernstein, IM (Carnegie-Mellon University); Stone, DH Association of American Railroads Technical Center, (R-021) R-168, Apr. 1974, 33 pp, Figs., 16 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 098081

SUMMARY OF PERFORMANCE OF STANDARD-CARBON AND VARIOUS WEAR-RESISTANT RAILS IN TEST CURVES ON THE CHESSE SYSTEM-SECOND REPORT

This report contains the summary of the second annual inspection of a service test installation of fully heat-treated, induction head-hardened, intermediate-manganese and standard control-cooled rail on the Chessie System. The field inspection is part of the cooperative effort on rail research of the American Railway Engineering Association, the American Iron and Steel Institute and the Association of American Railroads to observe and analyze those rails in curved track that display some potential for improvement in wear-resistance and retarding the onset of shelling. Measurements were made and recorded of curvature, superelevation and gage of four service test curves located near Oakland, Maryland. General track conditions were observed also. Rail head cross-section contours were taken and recorded of the 80 test rails contained in these curves. Rail wear has been calculated for the second year of service for the various types of rail in test.

Schoeneberg, KW Association of American Railroads Technical Center, (R-057) R-171, Apr. 1975, 70 pp, 25 Fig., 1 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 098082

ACOUSTIC EMISSION MONITORING OF SHOP AND FIELD WELDS OF RAIL

A short program was conducted utilizing state-of-the-art acoustic emission instrumentation to monitor both thermite cast welding and electric flash butt welding of rail. The primary objective of the program was to investigate the applicability of acoustic emission techniques for establishing the quality of the weld. Welds on continuous rail strings were monitored during electric flash butt welding, weld cool-down and weld anneal. The specimen welds were fabricated to represent a variety of good and poor conditions. Piped rail sections, for example, were joined to good rail and electrode burns were purposely made, as were good welds. The acoustic emission data, both location and number have been correlated with mechanical properties established by physical tests of the welds. Fractographs of the rail sections are shown. The acoustic emission data gathered during the weld anneal cycle shows a tentative relationship with the strength of the weld. A total of seven welds were monitored where acoustic emission data was obtained. Thermite cast welding, as used in the field joining of rail, was also monitored with the same acoustic emission instruments. Variations in the weld procedure were used to produce good and poor quality welds during this portion of the program. The acoustic emission data was obtained both during the pour and subsequent weld cool-down. A total of three welds were monitored. The instruments, techniques and test results present a clear description of the ease of performing acoustic emission monitoring. Due to the limited number of thermite welds monitored, the data by itself is inconclusive, however, analysis of the weld

sections provides some rationale which tends to support the creditability of the technique. The data obtained during the electric flash butt welding shows a good to excellent possibility of usefulness as a quality control monitor.

Stone, DH Association of American Railroads Technical Center, (R-047) R-162, Sept. 1974, 71 pp, 44 Fig., Tabs., 9 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

01 098685

ON THE TORSIONAL RIGIDITY OF RAIL FASTENERS IN THE LATERAL PLANE

This paper deals with the resistance of the rail fastener to torsion in the plane of the track, as a factor affecting the stability of the track structure. In addition to a review of the various mathematical models used to simulate the track, this paper also reports on the results of experimental measurements of the torsional rigidity of various types of rail fasteners in use in both the United States and Western Europe, including the type of rail fastener utilized in the construction of the high speed test track at the High Speed Ground Test Center of the Department of Transportation, Federal Railroad Administration, located at Pueblo, Colorado. The results of these tests indicate a scheme for increasing the torsional rigidity of track panels. In conclusion, important considerations for the design and selection of rail fasteners for use on continuously welded rail are described.

McConnell, DP New York University, Bronx Final Rpt. NYU-AM-72-35, Nov. 1972, 35 pp, 12 Fig., 1 Tab., 14 Ref.

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC

DOTL NTIS

01 098692

TRACK ALIGNMENT

File names are ENAL and ENBL. Program provides complete detail for simple or complex alignments including spiralized or simple curves. Input requirements are: Azimuth and distance between PI's or control points; degree or curve and spiral length when applicable. Output will include Engineering stations for all curves and control points; ordinates and coordinates of all PI's and control points, all curve data i.e., length, delta, semi-tangents, etc., and deflections for spirals and curves. In the event of long curves which must be traversed, the program will calculate direction and distance along the radial line between traverse points and the curve, as well as stationing and deflection angles and POC's as determined. This program was designed as a supplement to ENAL to convert random traverse data, which has control points along a predescribed alignment, into distances and azimuths along the alignment course. It will also provide ordinates and coordinates of all points. Calculating the relationship of triangulation control points to the "preliminary" line in new location work is an example of the function of this program.

Robinson, RE Atchison, Topeka and Santa Fe Railway 1968

ACKNOWLEDGMENT: AREA (AREA 01-03-001)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9 th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

01 098693

TRACK CHARTS

This computer program plots the track charts. The track charts contain relevant information about track condition such as type and weight of rail, surfacing information, tie installation, ballast cleaning, etc. The various types of information are plotted on the plotter in a form of a bar chart which reflects the location of the bars within the railroad system. The data base is entered through card. It is hoped to file all this information on disk file for other useful purposes.

Glickstein, DL
Penn Central Transportation Company 1971

ACKNOWLEDGMENT: AREA (AREA 01-03-002)
PURCHASE FROM: Penn Central Transportation Company 6 Penn
Central Plaza, Philadelphia, Pennsylvania, 19104

01 098694
CURVE CALCULATOR-MASTER

Program calculates curve data and necessary geometry for staking turnout given the master angle between two diverging tracks, the turnout number, and the degree of curve desired.

Rankins, AD
St Louis - San Francisco Railway Company 1970

ACKNOWLEDGMENT: AREA (AREA 01-03-003)
PURCHASE FROM: St Louis - San Francisco Railway Company 3253 East
Trafficway, Springfield, Missouri, 65802

01 098695
REVERSE CURVE CALCULATOR-REVERS

Program calculates curve data and necessary geometry for staking turnout given the perpendicular distance between two parallel tracks, and the number of turnout and degree of turnout and degree of curve.

Rankins, AD
St Louis - San Francisco Railway Company 1970

ACKNOWLEDGMENT: AREA (AREA 01-03-004)
PURCHASE FROM: St Louis - San Francisco Railway Company 3253 East
Trafficway, Springfield, Missouri, 65802

01 098696
INDUSTRY TRACK ESTIMATING PROGRAM-INDTRK

Program calculates estimated unit costs of various weights of rail used as basis for estimating cost of construction of trackage for serving industries. Unit prices of component parts are stored in the program, and the output is in tabular form for ease of use by engineer making estimate.

Jaeger, BW
St Louis - San Francisco Railway Company Oct. 1971

ACKNOWLEDGMENT: AREA (AREA 01-03-005)
PURCHASE FROM: St Louis - San Francisco Railway Company 3253 East
Trafficway, Springfield, Missouri, 65802

01 098697
RAIL ESTIMATING PROGRAM-RAILES

Program calculates estimated total cost, additions and betterments, and equilization amounts of proposed New Rail and Relay Rail programs using tables of unit prices stored in the program. Input consists of number of miles of track, number of miles of curvemaster rail, weight of rail, number and size of turnouts involved, etc. Output if formatted to provide finished document suitable for attaching to form G-18.

Jaeger, BW
St Louis - San Francisco Railway Company Jan. 1972

ACKNOWLEDGMENT: AREA (AREA 01-03-006)
PURCHASE FROM: St Louis - San Francisco Railway Company 3253 East
Trafficway, Springfield, Missouri, 65802

01 098698
TRACK PROFILES

This program permits computer generation of track profiles using a Calcomp plotter. Accurate milepost location of each track element is required. Unless existing manual records are both accurate and current, new data from the field is necessary. This can be accomplished with a track geometry car or any test car where accurate distance measurement is an output. The program utilizes data in a three-step process. The first is to input the type and milepost location of each track element in the symbol master. The output from this step consists of two reports—a symbol listing in milepost order and the distance between each milepost. Elements include yard track locations, spring switches, railroad crossings, private crossings, three types of public crossings, railroad bridges, rivers, underpasses, overhead bridges, tunnels, hot box detectors, 13 types of train signals. The second step merges the symbol master data from step 1, grade and curve data from the track characteristics master, and milepost loca-

tions from the milepost master. Output from this step is a printed listing of each track element in milepost order and a plot tape. The third step uses the plot tape as input to drive a Calcomp plotter and produce the track profile (generally on a paper original). Plot scale is two inches to the mile (5280 feet). Height of the profile is 4 1/2 inches and can be of any length. Plot consists of a milepost line dividing distance between adjacent mileposts into ten equal parts regardless of actual distance, a grade line, a track line showing single track, double track, sidings, spurs, and all track elements and a curve line.

Brooks, BL
Southern Railway System 1973

ACKNOWLEDGMENT: AREA (AREA 01-03-007)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW,
Atlanta, Georgia, 30303

01 098699
TRACK ECCENTRICITIES CALCULATION

The file name is CURVBR. Auxiliary program to compute track eccentricities for various elements of bridge on curve, needed as input data for CARES steel bridge analysis program. Input: Curve radius, span length, back-wall to back-wall distance, panel number and length. Output: Eccentricities of track at midspan and at support and eccentricities for each bridge element.

Granitow, WW
Southern Pacific Transportation Company Mar. 1968

ACKNOWLEDGMENT: AREA (AREA 01-03-008)
PURCHASE FROM: Southern Pacific Transportation Company 1 Market
Street, San Francisco, California, 94105

01 098700
CURVE STUDY

File name is ENCS. Program accepts specific curve characteristics, including curve number; degree; central angle, spiral lengths, boarded speeds and super elevation, which is used to prepare curve record denoting in addition to the input, analysis as to the comparison of boarded speeds against current standards and special message depicting the results of the analysis.

Robinson, RE
Atchison, Topeka and Santa Fe Railway 1968

ACKNOWLEDGMENT: AREA (AREA 01-03-009)
PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and
Jackson Streets, Information Systems Department, Topeka, Kansas,
66628

01 098701
RAIL FAILURE SYSTEM

File name is ENRF. Computer program. The "Rail Failure" application is designed to compile statistics of all types of rail failures. The system employs two highly regimented input forms entitled "Rail Removal Order" and "Rail Insertion Report" which also serve to cause the appropriate physical action to take place. The system is modular and as such contains over twenty (20) separate programs re: data validity edits, maintenance and print routines which can provide monthly, year-to-date and yearly statistics, e.g.: (a) "Audigage and Reflectoscope; Detector Car; and Service Rail Failure Statement": a three part statement, i.e., a separate report for each potential input source, giving a complete description by Division and District of type of track, location of rail, position, grade, weight, mill, etc. of all failures reported. (b) "Rail Insertion Report Statement Covering Service and Detected Rail Removal Orders"; this statement lists all rail that has had a defect and that has been replaced by a new rail, angle bar repaired or taken out of service. (c) "Annual Report of Rail Failures, Service and Detected, in Rail of All Ages and Sections". (d) "Rail Removal Orders not Covered by Insertion Reports on the Eastern, Western and Coast Lines". Report will flag any removal order over 30 days old for which as-insertion report has not been issued. (e) The "Transverse Fissure Rail Heat Statement": This statement provides listing of all transverse fissure heat failures over the system. The statement is written out in mill order and year rolled plus pertinent detail data. (f) The "Thermite and Butt Welded Joint Failure Statement"; This statement lists all thermite and butt welded rail failures by division, district, mile post, type track, weight or rail, mill and year rolled. Each report is year to date.

Robinson, RE
Atchison, Topeka and Santa Fe Railway 1972

ACKNOWLEDGMENT: AREA (AREA 02-01-001)
PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

01 098702
RAIL STRESS CALCULATIONS-UNIT LOAD OF 1 KIP

For given rail sections, the program produces a table of rail stresses by inches from the load point up to 300 inches, for a unit load of 1 Kip. The stress values are shown for various values of the modulus of foundation, ranging from 400 to 3,000 lb/in.

Holt, RW
Canadian Pacific 1974

ACKNOWLEDGMENT: AREA (AREA 02-01-002)
PURCHASE FROM: Canadian Pacific Windsor Station, Montreal, Quebec H3C 3E4, Canada

01 098703
RAIL STRESS CALCULATIONS FOR MULTIPLE LOADS

For a given set of rail sections, the program calculates stress values for given load configurations. For each loading, the rail stress is calculated under each axle and at the mid-point between axles. Also, for each rail section, the program calculates maximum equipment operating speeds within a stress safety limit of 35 Kips (30 Kips for C.W.R.) using maximum tension value found on the rail base.

Holt, RW
Canadian Pacific 1972

ACKNOWLEDGMENT: AREA (AREA 02-01-003)
PURCHASE FROM: Canadian Pacific Windsor Station, Montreal, Quebec H3C 3E4, Canada

01 098704
ALLOWABLE GROSS LOADS ON VARIOUS RAIL SECTIONS

File name is RAILSTR. Computer Program. Application: Used as a one-time guide for determining the maximum allowable loading on various rail sections. Contains many assumptions and some "retrofit" based on actual loadings previously known to have been carried. This program computes the maximum allowable total gross weight for any type rail equipment with identical axle loads on 15 different rail sections. The theory and formulas are based on the rail acting as a continuous beam on a continuous elastic base (AREA proceedings of 1918, Vol. 19, pages 875-1058). Two moduli of elasticity of rail support are assumed for each rail section, one for "good roadbed and one for "poor" roadbed. Input consists of all information required about the axle configuration of the equipment being considered. Output includes documentation of the input, a listing of each rail weight and the assumed impact for each, and the allowable gross weight for good and poor roadbed for each rail section. This program makes many assumptions having to do with roadbed, impact, and unit stresses which may or may not be justified.

Alford, HT
Southern Railway System Apr. 1970

ACKNOWLEDGMENT: AREA (AREA 02-01-004)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

01 098705
RAIL AND TRACK CHARACTERISTICS PICKER PROGRAM

File name is Track Characteristics Master, Rail Defect Master, Derailment Master. Computer Program. The purpose of the rail and track characteristics picker program is to provide the information with which to develop the relationships between various rail and track characteristics and their correlation with rail failures, rail defects, and derailment frequency. The Track Characteristics Master contains rail type (jointed versus welded, kind of steel) weight, rail rolled and laid dates, history of surfacing dates, rail and track inspection and test data, grades, curves, load limits, and traffic density (tons per year) for all system track. Locations of rail failures, rail defects, and exceptions to track geometry standards found by testing and inspection are contained in the rail defect master. The derailment master contains pertinent data on all derailments.

The rail and track characteristics picker program selects and prints out track locations from the track characteristics master with user-defined selection criteria; these can be minimums and/or maximum for any combination of the characteristics listed above. Up to 50 different combinations, i.e., cells in a matrix can be requested at one time. For each cell or specific request, the number of miles of track and the number of ton-miles is printed out. In addition for each cell, the program gives the types and numbers of rail defects and derailments reported over a time period selected by the user. Once relationships have been established, the program can be used for developing rail laying and timbering and surfacing programs, anchor and double spiking programs, problem area identification, budgeting, and other applications.

Brooks, BL
Southern Railway System 1974

ACKNOWLEDGMENT: AREA (AREA 02-01-005)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

01 098706
RAIL CONSIST AND HISTORY

File name is EN980930. Computer reporting program of all pertinent information on main line and branch track of Union Pacific Railroad. This track information can be reported to one one-hundredth of a mile accuracy for main line and branch track. The output shows milepost from, milepost to, track miles involved, degrees of curve, weight of rail, what company rolled the steel and type of treatment of the steel, the length of the rail in either 39 feet, 78 feet, or CWR, the year laid, work order number, if the steel was transposed, cropped, welded, or ground the size of the plates and year installed, million gross tons, of traffic over given segments of rail, passenger and freight speed allowable, and failures reported for the last two years broken down into three classes of failure, then combined to show defects per mile per month. This Consist and History program evolves from four other basic programs plus a failed rail master. The four programs used to generate Consist and History are a tonnage master (EN9601), the description table (EN9602), an initial track master file (EN9603), and a revolving track master file (EN9805). EN9601 is a program which generates a tonnage table and a tonnage code. The railroad is broken down into segments depending on the million gross ton miles per year run over those segments. This program is fed into the initial track master file, EN9805, for a basis to calculate the million gross ton miles in the Consist and History report. The tonnage table for a given section of track has been calculated from our Way Bills to insure accuracy. EN9602 is a program which generates heading information for given sections of track (e.g. direction, and milepost limits). Also, it generates a cost center description so that the final report can be produced either by cost center or divisions. This program also generates an order number, which we have assigned to help us segregate different parts of track. EN9601 and EN9602 are combined into EN9603 which begins to set up the initial master file. EN9603 at this time inputs all of the curve information of the railroad. EN9805 then adds the actual track relay information into the program.

Zednik, EV Jenkins, JW
Union Pacific Railroad Mar. 1970

ACKNOWLEDGMENT: AREA (AREA 02-01-006)
PURCHASE FROM: Union Pacific Railroad 1416 Dodge Street, Omaha, Nebraska, 68102

01 098707
FAILED RAIL REPORT

File name is EN470230. Computer program compiles all of statistics for failed rails and their locations. This program is used in conjunction with EN9809 to produce the defects per mile per month in the Consist and History report. There are also three programs assigned with this program, EN8801, EN8802, and EN8803, what mill and date rolled and date laid, and the third, what means the defect was found.

Zednik, EV Jenkins, JW
Union Pacific Railroad Mar. 1970

ACKNOWLEDGMENT: AREA (AREA 02-01-007)
PURCHASE FROM: Union Pacific Railroad 1416 Dodge Street, Omaha, Nebraska, 68102

01 098709**RAIL STRESS COMPUTATION**

File name is STRAIL. Computer Program to calculate stresses in base of rail due to vertical live loadings. Input: Class of Locomotive, Series number, Number of axles, Overall length of loco, Gross Wt, on rail, Spacing of axle. Output: Stress in base of Rail Section for various speeds.

Luttrell, NW
Southern Pacific Transportation Company 1969

ACKNOWLEDGMENT: AREA (AREA 02-01-009)
PURCHASE FROM: Southern Pacific Transportation Company 1 Market Street, San Francisco, California, 94105

01 098710**COMPUTE RAIL STRESSES**

File name is RAILST. Computer program. Computer Rail Stresses for non-standard and in various road bed conditions. Input: Rail Wt. moment of inertia, Section Modulus, Foundation Modulus, No. of Units (LOCO or CAR), Class of LOCO, Series number, Length, Axle Load, spacing. Output: Stress in base of rail, Section for various speeds.

Luttrell, NW
Southern Pacific Transportation Company 1969

ACKNOWLEDGMENT: AREA (AREA 02-01-010)
PURCHASE FROM: Southern Pacific Transportation Company 1 Market Street, San Francisco, California, 94105

01 098731**CURVE SPIRAL ON A BRIDGE DECK**

File name is SPIRAL. Computer Program. Application: Used during the detailing of all bridge decks on spirals. This program computes bevel dimensions for bridge ties on the spiral of a curve. Input includes bridge identification, tie length, bevel length, spacing of each tie on the bridge, location of the beginning and ending of the spiral on the bridge, and amount of the superelevation at the beginning and ending of the bridge. Output includes documentation of the input, cumulative distance to each tie, superelevation of each tie, total bevel of each tie, and amount of bevel from low end of tie to low rail.

Alford, HT
Southern Railway System Apr. 1971

ACKNOWLEDGMENT: AREA (AREA 08-10-006)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

01 098732**BRIDGE DECK TIE RATING**

File name is TIERATE. Computer Program. Application: One time program used for generating a series of bridge tie design tables for various type supporting girders. This program computes in tabular form the E rating based on a 3 tie design for bridge ties on steel bridges from 6' 6" and from 7 1/2" deep ties to 20" deep ties. Input consists of top flange component descriptions. Output includes the E rating in moment and the E rating in horizontal shear. The horizontal shear rating is based on the Forest Products Formula on page 7-2-12 paragraph 5B of the AREA Manual.

Alford, HT
Southern Railway System Jan. 1972

ACKNOWLEDGMENT: AREA (AREA 08-10-007)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

01 098769**PRODUCTION GANG**

The file name is MWI. This computer program monitors the gang production on a weekly basis. Information is gathered at the division level and includes locations of work, track, number, time worked delays, transportation, production weekly and accumulates relevant information. Accumulative report is generated for any given period and total production, delays, etc. is recorded. In addition the program projects future production by each gang based on its production case history.

Glickstein, DL
Penn Central Transportation Company 1968

ACKNOWLEDGMENT: AREA (AREA 10-05-001)
PURCHASE FROM: Penn Central Transportation Company 6 Penn Central Plaza, Philadelphia, Pennsylvania, 19104

01 099201**"ENGINEERED" TRACK-PART TWO: BALLAST STABILITY AND PROLONGED RAIL LIFE**

This is the second, and final article on the design of modern track. The article discusses the identification of qualities lending high stability to ballast, the role of ties in transmitting loads and holding gauge, and the factors tending to produce rail failure.

See also RRIS 01 095233, RRIS Bulletin 7502.

Progressive Railroading Vol. 18 No. 4, Apr. 1975, pp 49-52

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

02 052633

INTERACTION BETWEEN VEHICLES AND TRACK. EQUATIONS OF MOTION OF A RAILWAY VEHICLE

The equations of motion of a railway vehicle are derived using Newtonian methods of summing all the forces acting on each mass element. As an understanding of the dynamics of a wheelset is fundamental to the study of a complete vehicle, the equations of motion of a wheelset are derived first, followed by the equations of motion of three example vehicles.

International Union of Railways C116/RP 4/E, Oct. 1974, 52 pp, Figs., 4 Ref., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

02 052637

PERMISSIBLE MASSES PER AXLE FOR TRAILER VEHICLES AS A FUNCTION OF THE WHEEL DIAMETER AND SPEED. INVESTIGATION OF THE PERMISSIBLE AXLE-LOADS FOR WAGONS WITH Y25 BOGIES (920 MM WHEELS) AT HIGH SPEED (BEYOND 120 KM/H)

This report contains a description of the line tests, carried out on a bogie wagon of the SNCF with Y 25 bogies. It concerns measurements on the wagon at speeds to 160 km/h and masses per axle to 20 t. The report also contains some recommendations for the maximum masses per axle depending on the speed from the points of view of the harmful effects exerted by the vehicle on the track and the riding stability.

International Union of Railways C113/RP 3/E, Oct. 1974, 45 pp, 21 Fig., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

02 052643

ESTIMATION OF MULTIVARIABLE RAILWAY VEHICLE DYNAMICS FROM NORMAL OPERATING RECORDS. LABORATORY OF APPLIED MECHANICS DELFT UNIVERSITY OF TECHNOLOGY, THE NETHERLANDS

This paper discusses a procedure developed in order to estimate the parameters in a mathematical model describing the generation of the lateral motions of railway vehicles from measurements under normal operating conditions. Computations for a cyclical least squares model reference technique are carried out on a hybrid computer. In an illustrative example for a second order system it is shown that the use of two models in parallel can substantially improve the convergence, especially if the system output is disturbed by additive noise. The first results of experiments on vehicles, which are presented, show an encouraging correspondence between the important responses of the model and the actual bogie.

Broersen, PMT

International Union of Railways DT 36, Oct. 1974, 27 pp, 4 Fig., 2 Tab., 8 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

02 052649

ADHESION

This supplement to the B44 Adhesion Bibliography published in October 1973 has two parts: 1) A new set of abstracts supplementing those in the original document (Volume 2) and covering the period up to December 1973. 2) A new index, which replaces the pages 89-114 of Volume 1 of the original.

See also RRIS #052530 Section 02, RRIS Bulletin 7402, UIC/ORE DT 28, Bibliography on Adhesion.

International Union of Railways DT 28, Jan. 1975, 115 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

02 052663

INTERACTION BETWEEN VEHICLES AND TRACK. METHODS FOR DETERMINING THE VIBRATORY PARAMETERS OF EXISTING RAILWAY VEHICLES

This report contains theoretical considerations and a description of some simple practical methods for the experimental determination of the geo-

metric, elasticity, inertia and damping parameters to be used in a mathematical model for studying the dynamic behaviour of a railway vehicle.

International Union of Railways C116/RP 5/E, Apr. 1975, 45 pp, Figs., 6 Ref., 5 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

02 083032

THE SPEED-RESPONSIVE HYDRAULIC DAMPER, THE NEXT STAGE IN DAMPER DEVELOPMENT

Riding qualities and dynamic forces on the track have been thoroughly evaluated but the understanding of dampers in relation to reduced maintenance, both vehicular and track is also pertinent. Degree of magnitude of vertical and sinusoidal irregularities are expressed as a function of acceptable acceleration, excitation frequencies and amplitude. Ride-index values important in determining riding qualities but suspension characteristics in terms of reduced amplitude at higher speeds show speed-sensitive damping is desirable although the control system could be complex.

Koffman, JL *Rail Engineering International* Vol. 4 No. 9, Nov. 1974, 3 pp, Figs.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 083911

SPECIFICATION OF RIDE QUALITY CRITERIA FOR TRANSPORTATION SYSTEMS: THE STATE OF THE ART AND A NEW APPROACH

The current state-of-the-art of ride quality criteria is reviewed. In particular the existing technique of describing the guideway in terms of its spectral density and of defining the ride quality standard as the acceleration spectral density is outlined. By utilizing linear system theory an alternative deterministic approach is presented. A deterministic ride quality standard is proposed and an analytical technique to design vehicle-suspension systems to meet this standard is presented.

Fearnside, JJ (Department of Transportation); Hendrick, JK
Firouztash, H *High Speed Ground Transportation Journal* Vol. 8 No. 2, June 1974, pp 125-132, 17 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 083912

ANALYSIS OF THE DYNAMICS OF A RAIL CAR FROM ITS RESPONSE TO RANDOM INPUT

The parameters which define the dynamic behavior of a physical system can be determined by analyzing the response of the system to a random input. Application of the random process technique to one of the U.S. Department of Transportation's rail research cars is described. One of these railcars was instrumented, operated over selected portions of main-line track between Washington and Baltimore, and analyzed for its dynamic properties. The theory and experiment are described, and the dynamic model of the railcar which was used is briefly presented. Results including natural frequencies for the car system, mode shapes for the principle modes, and revised values for important parameters are presented.

Hutchens, WA (Mitre Corporation); Haight, EC
Milner, JL *High Speed Ground Transportation Journal* Vol. 9 No. 1, Mar. 1975, pp 449-457

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 083919

ELASTIC-PLASTIC ANALYSIS OF A WHEEL ROLLING ON A RIGID TRACK

A consistent finite element model for a circular wheel is developed based on triangular and quasi-triangular domains and a piecewise linear displacement field. The minimum stress-rate principle of plasticity is used to obtain the solution of this two-dimensional continuum problem with internal unloading. A piecewise approximation of the Tresca yield condition is

used. Elastic-plastic solutions of a wheel rolling on a rigid track under its own weight and a hub load are obtained for the first few revolutions until a steady state condition is reached. Shake-down conditions for the wheel are demonstrated.

Garg, VK (Illinois Institute of Technology); Anand, SC Hodge, PG *International Journal of Solids and Structures* Vol. 10 No. 9, Sept. 1974, pp 945-956, 10 Ref.

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

02 083920
THE TRIBOLOGY OF WHEEL ON RAIL

The functioning of wheels and rails as a supporting and guiding system depends on a Hertzian contact of 1.2×10 to minus 4th power sq m (0.2 in sq) area. In addition to its supporting function, this area must withstand tangential forces to enable the functions of traction, braking and guidance to be fulfilled. Such traction forces are accompanied by a deflection known as 'creep' and classical estimates of this quantity are compared with measurements made on the track. Modes of wear of wheel and rail are described and alternative systems which avoid contact are discussed.

Barwell, FT *Tribology* Vol. 7 No. 4, Aug. 1974, pp 146-150

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

02 083927
THEORETICAL STUDIES OF THE RUNNING STABILITY OF TRUCKS

Under simplifying assumptions the study of the running stability of a truck vehicle can be limited to that of a truck, for whose determination, primarily characterized by the amount of the limiting velocity, a DGL system is mentioned. This applies to the journey in the ideally straight and inelastic track and wear pattern of the tire tread. An assumed truck serves as an example to describe the limiting velocity for stable truck running, with the design of the horizontal axle springing discussed in particular in connection with the influence exerted by rotary sliding. A suitable design of the springing diminishes in part the destabilizing influence of rotary sliding which becomes effective when using the wear pattern of the tire tread. [German]

Fischer, W *Eisenbahntechnik* Vol. 22 No. 8, Aug. 1974, pp 352-354

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: Bohmann Verlag Canovagasse 5, A-1010 Vienna, Austria Repr. PC

02 083928
NEWER KNOWLEDGE OF THE RUNNING (HORIZONTAL-TRANSVERSE) OF RAIL VEHICLES

By means of a complete statement of forces the influence is investigated, which is exerted by different parameters on the behavior of horizontal movement of a wheel set in the track. It is shown under what conditions stability or instability of the wheel-set course can be attained. A stable running behaviour can be attained if the hinge of a running gear is well adapted to the body of the car, and is suitably adapted to the parameters between wheel set and rail. [German]

Hanneforth, W *Eisenbahntechnik* Vol. 22 No. 8, Aug. 1974, pp 349-352

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: Bohmann Verlag Canovagasse 5, A-1010 Vienna, Austria Repr. PC

02 083932
MATRIX COMPUTER METHODS OF VIBRATION ANALYSIS

Vibration analysis, matrix algebra and computational methods are combined to form a single workable technique in an attempt to fill the gap which exists between the conventional treatments of vibrational analysis and advanced specialist works. The theory of matrix methods of analysis is clearly explained and the solution of vibration problems is dealt with in a practical way with the aid of flow charts and the development of programming methods. Although a knowledge of Fortran or some other high level language is necessary for understanding of the programming part of the work, those without such expertise can still gain an understanding of the theory from this book.

Hatter, DJ
Butterworth & Company, Limited 1973, 206 pp

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: Butterworth & Company, Limited 88 Kingsway, London WE2B 6AB, England Repr. PC

02 083939
PROCEEDINGS OF THE SECOND INTERNATIONAL CONFERENCE ON VEHICLE MECHANICS

This volume reports the simultaneous technical sessions that were held on four major subjects—automobile dynamics, rail-vehicle systems, off-the-road vehicle systems, and ships and hovercraft. Presented are manuscripts and abstracts of the lecture presentations. The railway engineering topics include: Basic Theory on the Torsional Strength of Freightcar Body and Container; Modern Trucks for Very High Speeds (in French); Metro on Rubber Tires (in French); Development of a Computer Model for Simulating Railroad Track Structures; Statistical Analysis of Track Defects and their effects on Vehicle Ride (in French); Vertical Dynamics of a Rail Vehicle (in French); Theoretical Study of Transverse Stability of Rail Vehicles and Initial Experimental Results.

Conference held at Paris VI University, September 6-9, 1971.

Swets and Zeitlinger B.V. 1973, 496 pp, Figs., Tabs., Photos.

PURCHASE FROM: Swets and Zeitlinger B.V. Amsterdam, Netherlands
Repr. PC

DOTL TL 243.17

02 083946
STABILITY AND RIDING QUALITY OF RAILWAY VEHICLES

The so-called critical speed of a linearized railway vehicle is shown to be no useful measure for the stability of the system in practice. The improvement interaction between vehicle and track can be taken into account by the riding quality for a certain vehicle on every particular piece of track. The riding quality is determined by the accelerations transmitted to the payload, weighted according to comfort standards, and the relative displacements between wheel and rail. From the riding quality demands both for vehicle design and for maintenance of the track can be derived.

Broersen, P (Delft University of Technology, Netherlands) *Vehicle System Dynamics* Vol. 3 No. 2, Sept. 1974, pp 109-121, 6 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

02 083948
BASIC RESEARCH AND TEST OF THE Y32 TRUCK [Le bogie Y32 etudes de base et essais]

The author gives the results of the basic research on the vertical dynamics and the transversal dynamics of the Y 32 truck and compares them with those obtained during line tests. The reference to a mathematical model has been perfected by means of spectroscopic analysis methods based on the energy density spectrum notion.

The full English article can be found in French Railway Techniques, N1, pp 12-22, 1975.

Daffos, J (French National Railways) *Revue Generale des Chemins de Fer* Vol. 93 Sept. 1974, pp 509-519

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 084732
ON THE EFFECT OF TRACK IRREGULARITIES ON THE DYNAMIC RESPONSE OF RAILWAY VEHICLES

The steady state response for models of a six-axle locomotive running on a sinusoidally irregular track has been investigated. Two mathematical models have been set up, a full model for the "stationary" vehicle in which creep between wheels and rails was neglected, and a full model for the "moving" vehicle in which creep forces, gravity stiffness effects and wheel tread profiles were considered. The use of the generalized method of complex algebra to obtain the steady state response of the railway vehicle components to varying input frequencies was used. The results given in this paper are for the case of sinusoidal lateral track irregularities only, but the method is general enough to allow also for vertical track irregularities. For the "stationary" vehicle the input frequency is increased from zero to 3 cycles per second. For the "moving" vehicle the input frequency is a

function of the track wave length and the vehicle forward speed and is given in terms of the vehicle speed. The frequency response curves are computer plotted in each case. For the "moving" vehicle, responses for the cases of both new and worn wheels are obtained. The natural frequencies for the full model are also calculated. The results obtained show the effect of the creep forces and the condition of the wheels on the steady state response. It is recommended that slip and corresponding creep forces, wheel tread and rail profiles, and the gravity stiffness effect be included in the steady state response analysis of railway vehicles to track irregularities.

Dokainish, MA Siddall, JN Elmaraghy, W (McMaster University) *ASME Transactions* Vol. 96 No. 4, Nov. 1974, pp 1147-58, 14 Fig., 13 Ref.

ACKNOWLEDGMENT: ASME Transactions
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 084733

NONLINEAR WHEELSET DYNAMIC RESPONSE TO RANDOM LATERAL RAIL IRREGULARITIES

The nonlinear equations of motion for a railway vehicle wheelset having profiled wheels and contact of the wheel flange with flexible rails are presented. The effects of spin creep and gyroscopic terms are included. The rails are considered to have random lateral irregularities which are described by prescribed power spectra. The equations of motion are integrated numerically and the effects on the dynamic response of quantities such as speed, track roughness, wheel wear, flange clearance, and lateral stiffness of the rails are investigated.

Law, EH (Clemson University) *ASME Transactions* Vol. 96 No. 4, Nov. 1974, pp 1168-76, 9 Fig., 20 Ref.

ACKNOWLEDGMENT: ASME Transactions
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 084946

THE "CREEP" OF LOCOMOTIVE DRIVING WHEELS (PART 1)

Creep, or the additional rotation of a wheel transmitting tractive force due to the elasticity of the tire and rail, is important in solving many riding and other problems and there appears to be some difficulty in its calculation because estimated values often do not agree with actual measurements. The author presents the problem in a simpler manner and a revised expression is obtained from which creep can be easily calculated.

See also RRIS 02 097274, RRIS Bulletin 7502.

Andrews, HI *Rail Engineering International* Vol. 5 No. 1, Jan. 1975, pp 8-10, Figs.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 090530

COMPARATIVE ANALYSIS OF DYNAMICS OF FREIGHT AND PASSENGER RAIL VEHICLES

This comparative analysis was an examination of the vehicle-track interactive dynamics where several types of trains are required to operate over the same route at different speeds. Two areas of concern were examined: the effects of track geometry (surface, crosslevel and alignment) on vehicle response and track loads, and the effects of lateral force components acting on curves. A linear, 14-degree-of-freedom computer model was used to simulate a number of rail vehicles on a conventional track structure of rails, ties and ballast, including the Metroliner, passenger and freight cars, TurboTrain, and several locomotives.

Ahlbeck, DR Prause, RH Day, JB Meacham, HC
Battelle Columbus Laboratories, Federal Railroad Administration
Final Rpt. Mar. 1974, 207 pp

Contract DOT-FR-20077

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240329/3ST, DOTL NTIS

02 090911

TRACK-TRAIN DYNAMIC ANALYSIS AND TEST PROGRAM, TRUCK STATIC TEST

A series of tests were conducted to define the characteristics of an ASF 11 Ride Truck Assembly including joint slop, friction and stiffness. Loading

to the truck assembly included vertical load to simulate the car/pool loading combined with lateral or moment loading that resulted in desired truck deflections for the various phases of testing. All seven test conditions were successfully completed with load and deflection data being collected. No attempt is made to reduce the applicable data other than to provide computer plots. (Author)

Nemes, AG
Martin Marietta Corporation NASA-CR-120583, Nov. 1974, 351 pp
Contract NAS8-29882

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

N75-16850/0ST, DOTL NTIS

02 091034

TRACK/TRAIN DYNAMICS TEST PROCEDURE TRANSFER FUNCTION TEST

A transfer function vibration test was made on an 80 ton open hopper freight car in an effort to obtain validation data on the car's nonlinear elastic model. Test configuration, handling, test facilities, test operations, and data acquisition/reduction activities necessary to meet the conditions of test requirements are given. (Author)

Vigil, RA
Martin Marietta Corporation, (TP-005-TF) NASA-CR-120590, Jan. 1975, 23 pp

Contract NAS8-29882

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

M75-15064/9ST, DOTL

02 095223

LATERAL STABILITY OF A SIX-AXLE LOCOMOTIVE

The problem of lateral stability of a six-axle locomotive is investigated. The linear equations of motion for a locomotive model with 21 degrees of freedom are derived. A linearized theoretical analysis is made which indicates the importance of various design parameters for high speed operation. Parameters found to have a significant effect on the critical speed for hunting oscillations are: truck wheel base, wheel tread taper angle, the lateral stiffness and amount of damping in the primary suspension, and the yaw moment of inertia of the wheel set and truck frame. Some limitations of the model are pointed out for future investigations.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Garg, VK Mels, KD (General Motors Corporation)
American Society of Mechanical Engineers 75-RT-7, Apr. 1975, 15 pp, 11 Fig., 2 Tab., 13 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

02 095277

WHEEL/RAIL ADHESION-BOUNDARY LUBRICATION BY OILY FLUIDS

The observed variations in wheel/rail adhesion on dry rails are most readily associated with changes in the quantity of oil on the surface. Chemical changes have little influence in comparison. Ambient humidity has a noticeable effect such that significantly higher wheel/rail adhesion is encountered on most rails in dry air conditions.

Beagley, TM (Railway Technical Centre); McEwen, IJ Pritchard, C
Wear Vol. 31 No. 1, Jan. 1975, pp 77-88, 10 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

02 095443

SYSTEM-ORIENTED METHODS IN THE DEFINITION PHASE FOR A HIGH-SPEED RAIL VEHICLE [Systemtechnische Methoden in der Definitionsphase fuer ein Hochgeschwindigkeits-Triebfahrzeug]

High-speed rail vehicles operating at the limit of their performance produce particularly strong interactions with the permanent way and catenary systems. Using modern work procedures and taking account of these mutual interactions, an attempt has been made, as described here, to optimize the vehicle concept for overall operating economy. [German]

Pleger, J *Eisenbahntechnische Rundschau* Jan. 1975, pp 35-43, 4 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

02 095698

VERTICAL ACTION OF FORCES BETWEEN WHEEL AND RAIL WHEN CROSSING A RAIL JOINT

An example serves to determine the maximum dynamic vertical wheel force when a modern coach crosses a rail joint. The problem is described mathematically by a system of ordinary differential equations and is solved by means of an analog computer. The high dynamic vertical wheel forces obtained linearly increase with the travelling speed. As a result, the demand of more elastic wheels is made for railway vehicles travelling at high speed, besides that of a high quality of the permanent way. [German]

Beer, R Gudacker, E Ebert, J *DET Eisenbahntechnik* Vol. 22 No. 11, Nov. 1974, pp 509-511

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: VEB Verlag Technik Oranienburgerstrasse 13-14, 102 Berlin, East Germany Repr. PC

02 096533

THE ERLANGEN TEST SECTION AND ITS TRACK EQUIPMENT [Die Erlanger Erprobungsstrecke und ihre Fahrbahn]

The author describes the facilities at Erlangen for testing the components for high-speed, high-capacity railway lines, examines concepts for test vehicles and routes, and considers in detail the construction of the permanent way with its supporting, guidance, drive and energy-supply equipment.

Friedrich, R *Eisenbahntechnische Rundschau* Vol. 24 Mar. 1975, pp 80-86, 16 Fig

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

02 096559

CHOICE OF THE MODE OF EXCITATION IN DYNAMIC STUDIES OF NON-SPRINGING MASSES

Various modes of excitation originating from the wheel or from the rail are investigated by means of a vibration model of non-springing masses of a coach with lateral V-belt drive for the power supply unit. A comparison of theoretical and experimental results obtained by an analog computer, or in a rolling test stand, serves to recommend certain modes of excitation for studying vibration processes of the model described. [German]

Chelnokov, II *Eisenbahntechnik* Vol. 23 No. 1, Jan. 1975, pp 12-16

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: Bohmann Verlag Canovagasse 5, A-1010 Vienna, Austria Repr. PC

02 096594

DYNASIM 3: A COMPUTER PROGRAM FOR SIMULATION OF VEHICLE RIDING MOTIONS

The purpose of this paper is to present analytical techniques for evaluating the dynamic riding behavior of a vehicle. These techniques have been applied to a fairly sophisticated model of a bus, where a three-dimensional structure, elastic frame and non-linear shock-absorbers have been considered.

Donati, F (Politec di Torino, Italy); Genesio, R Leurentini, A Mauro, V Menga, G Milanese, M *Vehicle System Dynamics* Vol. 3 No. 3, Nov. 1974, pp 141-161, 7 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: Swets and Zeitlinger BV 3476 Heerweg, Publications Department, Lisse, Netherlands Repr. PC

02 096596

PROBLEMS ASSOCIATED WITH ROLLER TEST BENCH INVESTIGATIONS WITH VIEWS TO THE DETERMINATION OF THE RESPONSE OF FRICTIONAL CONNECTION BETWEEN WHEEL AND RAIL [Zur Problematik von Waelzpruefstandsversuchen im Hinblick auf die Ermittlung des Kraftschlussverhaltens Zwischen rad und Schiene]

The theorem associated with frictional connection and its most important parameters are discussed, with emphasis on the effects of location and time. The study is of importance in conjunction with plans for increasing the speed of railroad trains. [German]

Kretterk, O (Tech Hochsch, Germany) *Elektrische Bahnen* Vol. 45 No. 11, Nov. 1974, pp 258-264, 9 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 096597

PROPAGATION OF WAVES IN A SEMI-INFINITE CHAIN OF MATERIAL POINTS AND SPRINGS REPRESENTING A LONG TRAIN

The dynamical behavior of the longitudinal motion of a long train on which tractive or braking forces apply, often is investigated by representing the train by a model consisting of a continuous bar in which longitudinal vibrations can occur. In the present publication a model consisting of a chain of material points and springs is proposed. It can be investigated by means of difference equation methods and of Laplace transformations. In certain respects the discrepancies of the results with those obtained for a continuous model, are considerable and it may be concluded that a more complete investigation of the discrete model is necessary.

De Pater, AD (Delft University of Technology, Netherlands) *Vehicle System Dynamics* Vol. 3 No. 3, Nov. 1974, pp 123-140

ACKNOWLEDGMENT: EI
PURCHASE FROM: Swets and Zeitlinger BV 3476 Heerweg, Publications Department, Lisse, Netherlands Repr. PC

02 096599

INSTRUMENTATION FACILITIES FOR DYNAMIC TESTING OF RAILWAY ROLLING STOCK

A wide variety of instrumentation facilities are used for dynamic testing of railroad rolling stock. For evaluating stability, measurements of the lateral force and vertical load on the wheel are required. The former is measured with the help of a load cell and the latter by measuring spring deflections using a linear variable differential transformer. For determining riding quality the average ride index is calculated and acceleration is measured using a seismic accelerometer. A transducer system is used to convert the physical parameters to electrical signals. As the electrical signals generated by the transducer are in the range of microvolts they are amplified by amplifiers which feed the signal to the recorder where the signals actuate pens, which trace out the signals in ink on paper.

Kumar, I (Res Des and Stand Organization, India) *Institution Eng (India) Journal Elect Tele Eng Div* Vol. 54 PtET3, Aug. 1974, pp 93-98, 2 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

02 096653

5000 MILE BOX CAR VIBRATION TEST

There has been much research and testing to measure shock and vibration. However, such work has usually been restricted to specialized objectives over a limited territory and without complete instrumentation. This paper describes a 5000-mile test of an instrumented box car in revenue trains over five different railroads. It was part of the AAR Technical Center's Freight Loss and Damage Program and the RPI/AAR Cooperative Truck Safety Research and Test Project. The 60-foot, 70-ton car was operated between Chicago and the West Coast on a round trip involving two different routes.

This paper was prepared for a Panel Discussion on Freight Car Dynamics at the Rail Transportation Division of the ASME, Winter Annual Meeting, New York, New York, 19-20 November 1974.

Guins, SG Olson, LL (Association of American Railroads)
American Society of Mechanical Engineers Nov. 1974, 22 pp, 12 Fig.,
1 Tab.

PURCHASE FROM: ASME Repr. PC

DOTL RP

02 096655

**WHEEL/RAIL ADHESION-THE INFLUENCE OF RAILHEAD
DEBRIS**

Evidence is given that rust is a major source of railhead debris, being found to possess similar surface characteristics. Particles are observed to spread on the wear band in wet weather and to be worn off in the dry. Laboratory experiments show that debris has little effect on friction except when mixed with an oil. Friction is then reduced depending on the quantity of oil and the surface area of the particles. A considerable proportion of oil is needed to reduce friction to its lowest value, and railhead debris normally bears so little it helps maintain high adhesion in dry conditions. Water can also substantially reduce friction on debris covered surfaces. This aspect is to be described in a later publication but, in this paper, a correlation is demonstrated between friction and humidity in which the friction coefficient is shown to be a simple function of the amount of water absorbed.

Beagley, TM McEwen, IJ Pritchard, C (Railway Technical Centre)
Wear Vol. 33 No. 1, June 1975, pp 141-152, 4 Fig., 1 Tab., 10 Ref.

ACKNOWLEDGMENT: Wear

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

02 097274

THE "CREEP" OF LOCOMOTIVE DRIVING WHEELS (PART 2)

The first part of this article showed that there has been some misunderstanding about the value of creep obtained in a driving wheel exerting a tractive effort and a revised expression for this was obtained. In this second part, values so calculated are compared with values measured both in the laboratory and in service. While the estimated values of creep are confirmed, it is shown that there are certain other factors occurring in service which must also be taken into account.

See also RRIS 02 084946, RRIS Bulletin 7502.

Andrews, HI *Rail Engineering International* Vol. 5 No. 2, Feb. 1975, pp
45-49, 8 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 097306

A REVIEW OF RAIL-WHEEL CONTACT STRESS PROBLEMS

From its earliest days, railroad technology has been limited by an inadequate understanding of the mechanics of load transfer between wheel and rail. It is the purpose of this paper to indicate the major problems in this area, and to review the progress made to date in the solution thereof. Attention is focussed upon investigations of the stresses (normal pressure and tangential shear) on the contact patch, rather than upon studies of bending stresses in the rail. The physical basis of Hertz's widely used analysis is outlined, and the assumptions and limitations of that analysis are indicated. The need is shown for the development of solutions to important non-Hertzian problems such as: coformal contact (e.g. between worn wheels and track), contact of rough bodies, rolling friction, adhesion, and creep. The literature on these problems, as well as work in progress, is reviewed. A detailed mathematical treatment is avoided, but the principal results of much of the theory are illustrated through geometrical and physical descriptions. Recent works on the effects of surface waviness, plastic deformation, and residual stresses in rail, are reviewed.

This paper was presented at the Railroad Track Mechanics Symposium, Princeton University, 22 April, 1975.

Paul, B

Pennsylvania University, Philadelphia MEAM 75-1, Apr. 1975, 52 pp,
Figs., Refs.

Contract DOT-OS-40093

ACKNOWLEDGMENT: Pennsylvania University, Philadelphia
PURCHASE FROM: Pennsylvania University, Philadelphia Department of
Mechanical Engineering and Applied Mechanics, Philadelphia,
Pennsylvania, 19104 Repr. PC

DOTL RP

02 098022

**RESPONSE OF A BEAM TO A ROLLING MASS IN THE
PRESENCE OF ADHESION**

The simultaneous bending and longitudinal vibrations of a beam are investigated. The vibrations are caused by a rigid disk rolling on the beam and the friction (adhesion) between the disk and the beam is taken into account. Special attention is paid to starting and braking conditions of the disk. The system of differential equations for the bending and longitudinal vibration of the beam and for the movement of the rolling disk, with special conditions expressing the adhesion, is solved. The effect of some dimensionless parameters (e.g. the effect of the speed, of the mass of the beam and of the disk, of the coefficient of adhesion etc.) are considered.

Fryba, L (Railway Research Institute, Czechoslovakia) *Acta Technica*
Vol. 19 No. 6, 1974, pp 673-687

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

02 098026

**VIBRATION ANALYSIS OF A TILTING VEHICLE WITH
INCLINED STRUT SUSPENSION**

A tilting vehicle with inclined strut suspensions is investigated as an example of the vehicle of this type and the characteristics of its vibration are analyzed. A vibration model that can be used for digital computer analysis was derived and the principal modes, frequency responses, and transient response to a curved track were calculated. These calculations have been carried out on three cases by changing the parameters of the tilting link. The first and second cases correspond to tilting vehicles with different heights of the tilting axis. The third case corresponds to a non-tilting vehicle. Discussions are made on the effects of the tilting suspension on the characteristics of the vibration by comparing these numerical results in each case.

Ishida, S Ishii, M Nakai, M *Japan Society of Mechanical Engineers,
Bulletin* Vol. 18 No. 116, Feb. 1975, pp 131-139, 4 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

02 098059

**ALLOWABLE LIMIT OF VERTICAL DEFLECTION FOR GIRDER
OF SHIN KANSEN**

The purpose of this report is to investigate the dynamic property of a car that is running through the deflected track on a bridge girder and to propose the allowable limit for the girder from the view point of riding comfort and running safety. By this investigation a tentative limit of deflections are proposed for SHIN KANSEN bridge girder.

Matsuura, A *Railway Technical Research Institute* Vol. 16 No. 1, Mar.
1975, pp 1-5, 13 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute

PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo,
Japan Repr. PC

DOTL JC

02 098076

**THE AERODYNAMIC ANALYSIS OF SINGLE AND MULTIPLE
VEHICLES ENTERING AND TRAVELING IN OPEN TUNNELS**

The analyses required to calculate the aerodynamic effects of tunnel entry, tunnel venting and multiple vehicle motions in open ended tunnels are presented. Results for several cases of open ended tunnel travel and various entry configurations are presented and described. The effects of an earlier vehicle's motion on the pressure peak associated with a second vehicle entering a tunnel are presented and discussed.

Strom, CR

Mitre Corporation, (MTR-6755) Tech. Rpt. FRA-ORD&D-75-16, Jan.
1975, 43 pp, Figs., 3 Ref.

Contract DOT-FR-54090

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

02 098677

**A SIMPLIFIED MODEL FOR LONGITUDINAL TRACK-TRAIN
DYNAMICS**

This report contains: Task I-Rapid digital simulation investigation utilizing the Canadian National draft gear representation; Task II-Develop-

ment of a functional relationship for draft gear characteristics; Task III Equations of motion for longitudinal track-train dynamics; Task IV-Modal expansion equations for longitudinal track-train dynamics.

Genin, J Ginsberg, JH Leonard, RG Ting, EC Ward, ED
Purdue University TRG-7329, Dec. 1973, 62 pp, Figs., 11 Ref.

Contract # 7329

ACKNOWLEDGMENT: AAR

PURCHASE FROM: Purdue University Department of Mechanical Engineering, West Lafayette, Indiana, 47906 Repr. PC

DOTL RP

02 098684

EFFECT OF WAGON-BOGIE SUSPENSION CHARACTERISTICS ON DYNAMIC LOADS

Recent British Railways tests show total forces induced by track joints, frogs and crossings are influenced by the square root of unsprung mass as well as other criteria. Sprung and unsprung mass accelerations call for careful damping. Load deflection characteristics examined show the need for closer scrutiny and suspensions must be designed to give satisfactory ride in normal speed ranges. Ride index and rotational resistance are important.

Koffman, JL *Rail Engineering International* Vol. 5 No. 3, Apr. 1975, pp 87-90, 3 Fig., 2 Tab., 8 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

02 098708

SLOW SPEED DERAILMENTS ON CURVES

File name is RECLIMB. Computer program measures, through simulation, forces tending to derail empty cars positioned near the head end of high powered heavy trains negotiating sharp curves, lugging down to slow speeds because of steep grades. Input consists of punched cards describing the track, train, speed, and throttle setting. The output details lateral and vertical forces promoting wheel climb and rail roll.

Stane, RA

Atchison, Topeka and Santa Fe Railway No Date

ACKNOWLEDGMENT: AREA (AREA 02-01-008)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

02 098751

HEAVY LOAD PROGRAM

File name is HEAVY. Computer program clears a load over a railroad network which involves testing a load for weight (stresses) over bridges and rail. The program is made up of following components: 1. Car rating-Coopers (E) tables for selected spans. 2. Network-All relevant stations are assembled into routes and segments. 3. Bridge data-member rating data, and allowable Time Table speed, etc. 4. Rail data-weight of rail, and description. The input requires car name, load, allowable speed and nature of move (clear, not clear). The route is described by the junction points common to two or more routes.

Eimer, N

Penn Central Transportation Company 1972

ACKNOWLEDGMENT: AREA (AREA 09-02-002)

PURCHASE FROM: Penn Central Transportation Company 6 Penn Central Plaza, Philadelphia, Pennsylvania, 19104

02 098760

EMERGENCY BRAKE APPLICATION

The file name is REEBA. A computer program which models an emergency brake application of railroad trains. The input consists of: the locomotive and train consist, grade or location of train, the initial speed and train handling information. The output provides: the stopping distance and time, if an intratrain collision would take place, if the train would separate, and the approximate coupler forces developed during the application.

Tallen, SM

Atchison, Topeka and Santa Fe Railway No Date

ACKNOWLEDGMENT: AREA (AREA 09-02-005)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

02 099173

COMPUTER SIMULATION OF TANK CAR HEAD PUNCTURE MECHANISMS. CLASSIFICATION YARD ACCIDENTS

A number of railroad accidents have been aggravated by couplers puncturing the shell head of hazardous material tank cars. Development of means for identifying possible puncture mechanisms and quantifying the coupler forces involved is the subject of this report. A mathematical model, capable of simulating train action in the vertical plane, has been developed and used for simulation of three classification yard accidents. A detailed description of the model and the results of simulation are presented. The conclusions of this report must be considered tentative until the results of verification studies become available.

Prepared for the Department of Transportation, Federal Railroad Administration.

Hohenemser, KH Diboll, WB Yin, SK Szabo, BA
Washington University, St Louis, (64274) Prelim Rpt FRA-OR&D-75-23, Feb. 1975, 74 pp

Contract DOT-OS-40106

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

02 099179

TRACK TRAIN DYNAMICS INTERACTION. SECOND CONFERENCE, VOLUME 1

These proceedings record the accomplishments of Phase I of the International Government-Industry Research Program on Track Train Dynamics by December 1974. The papers in this volume: The Role of Research in Solving Problems for the Industry; Impact "TTD" Program Will Have on Railroad Operations; General Review; Philosophy of Interim Guidelines; Current Applications of Guidelines by Railroads; Collection and Analysis of Engineman Sensitivity Data; Power Force Indicator; Slack-Buffer Indicator; Train Tonnage Profile; Philosophy of Modeling Techniques for Evaluating Train Operations; Steel Coil Train Test; Characterization of Air Brake Systems; Characterization of Cushioning Devices; Analysis of Draft Gear Data; Train Performance Calculator; Detail Train Action Model; Application of Models in the Railroad Industry; Use of Computer Models in Task 11 of Phase I of TTD Research Project.

Proceedings of an International Government-Industry Research Program on Train-Track Dynamics conference held at Chicago, Illinois, 4-6 December 1974. The cost of the 2 volumes is \$20.00

Association of American Railroads Technical Center 1975, 317 pp, Figs., Tabs., Photos.

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

DOTL RP

02 099180

TRACK TRAIN DYNAMICS INTERACTION. SECOND CONFERENCE, VOLUME 2

These proceedings record the accomplishments of Phase I of the International Government-Industry Research Program on Track Train Dynamics by December 1974. The papers in this volume; Locomotive Tests and Model; Locomotive Curving and Hunting Models; Truck Component Characterization; Roller Bearing Characterization; Freight Car System Tests; Introduction to Truck Hunting, Curving and Ride Quality Problems; Truck-Carbody Model; Rock and Roll Report; Methodology for Car Characterization Via Simplified Mathematic Models; Mathematical Model; Characterizing Alignment Control; Lateral Stability Tests; Quasi-Static Lateral Train Stability Model; Introduction to L/V; L/V Testing; L/V Model; Vertical Train Stability Efforts; An Investigation of Factors Contributing to Wide Gage on Tangent Railroad Track; Application of Models to Investigate Operating and Component Parameters; Canadian Research Activities in Connections with Track-Train Dynamics; Introduction to Phase II.

Proceedings of an International Government-Industry Research Program on Train-Track Dynamics conference held at Chicago, Illinois, 4-6 December 1974. The cost of the 2 volumes is \$20.00.

Association of American Railroads Technical Center 1975, 450 pp

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

DOTL RP

03 052601

STANDARDIZATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. STANDARD REPORT FORM INTENDED FOR USE DURING THE ACCEPTANCE TESTING OF LARGE CONTAINERS AND FOR THE POSSIBLE ISSUE OF CERTIFICATES

This document outlines the bases adopted for the drawing up of a draft of a trilingual test report form intended for general use during the acceptance testing of large containers and for the possible issue of certificates. The test report forms the subject of the appendix to the above-mentioned document.

International Union of Railways B112/RP 11/E, Oct. 1973, Figs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052602

STANDARDIZATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. 60' BOGIE WAGON, WITH SHOCK-ABSORBING SYSTEM, FOR THE CONVEYANCE OF LARGE CONTAINERS IN ORDINARY TRAINS

This report contains a technical specification for the development of a standard 60' bogie wagon, with shock-absorbing system, for the conveyance of large containers in ordinary trains.

International Union of Railways B112/RP 12/E, Apr. 1974, 12 pp, Figs., 1 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052605

VIENNA ARSENAL VEHICLE TESTING STATION. THE MODERNIZATION OF VIENNA ARSENAL

The report describes the modernisation project undertaken in 1973-74 to improve the technical performance of the Vehicle Testing Station at Vienna Arsenal. The new air treatment plant and the brake test rig are fully described. The results of the commissioning tests of the new climatic plant are appended.

International Union of Railways AZ 30/RP 14/E, Apr. 1974, 28 pp, Figs., 1 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052606

STANDARDIZATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. 80' WAGON FOR CARRYING LARGE CONTAINERS IN LINER TRAINS

This report outlines the principles of work and covers the work shown necessary for the standardisation of this type of wagon. A description of the design and also drawings are provided, together with a summary of the tests carried out and of the criteria adopted in deciding upon the standard wagon.

International Union of Railways B112/RP 10/E, Oct. 1973, 15 pp, Tabs., 4 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052607

TEST ON AUTOMATIC COUPLERS. WORK OF COMMITTEE B51 FROM JANUARY 1972 TO DECEMBER 1973 AND THE CURRENT STATE OF THE STUDIES AND TESTS RELATING TO THE INTRODUCTION OF THE AUTOMATIC COUPLER

The report gives an account of the current state of the work carried out in connection with the introduction of the automatic coupler and the studies and tests made for this purpose from January 1972 to December 1973. Special attention was given to the following questions: Studies and tests relating to the design of the basic type of the automatic coupler and completion of this work; Studies and tests relating to the riding stability of wagons with automatic centre buffer couplers with the object of a) limiting

the longitudinal compressive forces in the train by a suitable choice of elastic systems and variation of the brake characteristics b) controlling the longitudinal compressive forces in the train by the use of a stabilising articulation with vertical and horizontal alignment control, in short, a universal articulation; studies and tests with passenger coaches equipped with automatic couplers, mixed air couplings, intermediate parts for train ferry services and different types of electric plug contacts, relating to the question of coupler wear in service, to the need for protection covers and to shunting procedures to be used for wagons equipped with automatic couplers; current state of the work on the compilation and revision of several UIC and Joint UIC/OSJD Specification Leaflets.

International Union of Railways B51/RP 15/E, Apr. 1974, 64 pp, Figs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052629

RUNNING SAFETY OF VEHICLES FITTED WITH THE AUTOMATIC COUPLER. ADVISABILITY OF THE SYSTEMATIC FITTING OF A VERTICAL AND HORIZONTAL STABILIZING ARTICULATION (PART 1: TWO-AXLED WAGONS); CALCULATION BASES FOR DETERMINING THE PERMISSIBLE LONGITUDINAL COMPRESSIVE FORCE FOR TWO-AXLED WAGONS WITHOUT ALLOWING FOR THE INTRODUCTION OF A PROGRESSIVE SUSPENSION SYSTEM. PART 1: REPORT

The report contains the results of different calculations made using a method, described in the appendix to the report, permitting the calculation of the maximum compressive longitudinal force which a given wagon can withstand without becoming derailed. The results are distinguished according to two cases, namely: a) The results of the comparative calculations for two-axled wagons fitted with a complete vertical and horizontal stabilizing articulation and for two-axled wagons fitted with a classical UIC articulation clearly show that all existing and future two-axled wagons should be fitted with complete vertical and horizontal stabilizing articulation systems; b) The results of different calculations made for two-axled wagons fitted with a complete vertical and horizontal stabilizing articulation, viz. for a certain number of wagons standardized in accordance with UIC leaflet 571 as well as for a whole range of possible wagon dimensions. The results are given in the form of diagrams and lists which clearly show the influence of certain parameters (e.g. the tare-weight of the wagon, the wheelbase or the c/a ratio, the stiffness of the suspension springs, the torsional stiffness of the wagon body). As indicated in the calculation methods, these take into account neither the progressive suspension nor the effect of the component of gravity due to superelevation. In the meantime, a method has been developed for two-axled wagons which enables these two factors to be taken into account. This method is at present being checked. It will form the subject of a supplement to the present report.

See also RRIS numbers 03 052630 and 03 052631 in Bulletin 7502.

International Union of Railways B125/RP 3/E, Apr. 1974, 47 pp, 1 Tab., 4 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052630

RUNNING SAFETY OF VEHICLES FITTED WITH THE AUTOMATIC COUPLER. ADVISABILITY OF THE SYSTEMATIC FITTING OF A VERTICAL AND HORIZONTAL STABILIZING ARTICULATION (PART 1: TWO-AXLED WAGONS); CALCULATION BASES FOR DETERMINING THE PERMISSIBLE LONGITUDINAL COMPRESSIVE FORCE FOR TWO-AXLED WAGONS WITHOUT ALLOWING FOR THE INTRODUCTION OF A PROGRESSIVE SUSPENSION SYSTEM. PART 2: CALCULATION BASES FOR TWO-AXLED WAGONS WITH ALLOWING FOR THE INTRODUCTION OF A PROGRESSIVE SUSPENSION SYSTEM

No Abstract.

See also RRIS numbers 03 052629 and 03 052631 in Bulletin 7502.

International Union of Railways B125/RP 3/E, Apr. 1974, 29 pp, Figs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052631

RUNNING SAFETY OF VEHICLES FITTED WITH THE AUTOMATIC COUPLER. ADVISABILITY OF THE SYSTEMATIC FITTING OF A VERTICAL AND HORIZONTAL STABILIZING ARTICULATION (PART 1: TWO-AXLED WAGONS); CALCULATION BASES FOR DETERMINING THE PERMISSIBLE LONGITUDINAL COMPRESSIVE FORCE FOR TWO-AXLED WAGONS WITHOUT ALLOWING FOR THE INTRODUCTION OF A PROGRESSIVE SUSPENSION SYSTEM. PART 3: DIAGRAMS, FIGURES, LISTS A & B

No Abstract.

See also RRIS numbers 03 052629 and 03 052630 in Bulletin 7502.

International Union of Railways B125/RP 3/E, Apr. 1974, Figs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052634

DEVELOPMENT OF A DEVICE FOR THE DETECTION OF WHEEL-FLATS OF A CERTAIN SIZE. TESTING OF THE SYSTEM RECOMMENDED BY THE A110 SPECIALISTS COMMITTEE FOR THE DETECTION OF WHEEL FLATS

The report deals with devices for the automatic detection and indication of wheel-flats, developed on the MAV and SJ. A detailed account is given of test results and applications of the MAV and SJ devices. A cost/benefit analysis for the MAV device is given.

International Union of Railways A110/RP 3/E, Oct. 1974, 18 pp, Figs., 7 Ref., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052641

STANDARDIZATION OF WAGONS. STANDARD BOGIE VAN WITH SLIDING WALLS, SERIES "HABISS"

This report describes the design of the covered bogie van with sliding walls, series, Habiss, and contains the conditions applicable to the construction of these vans equipped with selected sliding-wall devices and load protection systems.

International Union of Railways B12/RP 22/E, Apr. 1974, 10 pp, Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052646

WHEELSETS WITH ASSEMBLED AXLEBOXES: DESIGN, MAINTENANCE AND STANDARDIZATION. STANDARDIZATION WHEELSETS WITH ASSEMBLED AXLEBOXES FOR WAGONS EQUIPPED WITH 920 MM DIAMETER WHEELS

The wheelset with assembled axlebox and fitted with 920 mm wheels has been designed: 1) for taking 22 t axleloads 2) to be interchangeable with existing UIC wheelsets 3) for use with two-axled or bogie wagons. It has: 1) a short journal 2) a solid rim-sprayed wheel without offset and with curved web. The recommendations of ORE Committees B 95 (RP 3 and RP 4), B 98 (RP 9) and S 1002 (RP 2) are applicable to this standardised wheelset.

International Union of Railways B136/RP 1/E, Apr. 1974, 17 pp, Figs., Tabs., 2 Phot.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052656

GENERAL PROBLEMS CONNECTED WITH WHEELS AND THEIR ASSEMBLY: SOLID CAST-STEEL WHEELS, WHEELS OF DIFFERENT DIAMETER AND SHAPE. PROBLEM OF THE GRADE OF STEEL AND SHAPE OF SOLID ROLLED-STEEL WHEELS FOR WAGONS AND COACHES—RECOMMENDATIONS. VOLUME 1: TEST AND APPENDICES 1, 2 & 3

This report covers generally the tests carried out by the ORE B 98 Committee with solid rolled-steel wheels. It summarizes the tests covered by the interim reports Nos. 2, 6 and 7 and describes those which have since been carried out, in giving the general conclusions which have been drawn as regards the grade of steel and shape to be adopted, in conformity with the provisions of the technical specification drawn up by the ORE B 98 Committee (1), for wheels with the following diameters: 660/630-760/680-840/760-920/840 mm. In each instance, it provides a drawing of the corresponding wheel which satisfies all the tests carried out so far. This document thus answers the questions raised by the Working Group "Wheels for trailer stock acceptable for use in international traffic" of the UIC.

International Union of Railways B98/RP 9/E, Oct. 1973, 30 pp, Figs., Phots., 3 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052657

GENERAL PROBLEMS CONNECTED WITH WHEELS AND THEIR ASSEMBLY: SOLID CAST-STEEL WHEELS, WHEELS OF DIFFERENT DIAMETER AND SHAPE. PROBLEM OF THE GRADE OF STEEL AND SHAPE OF SOLID ROLLED-STEEL WHEELS FOR WAGONS AND COACHES—RECOMMENDATIONS. VOLUME 2: APPENDICES 4.1 & 4.2

This report covers generally the tests carried out by the Ore B 98 Committee with solid rolled-steel wheels. It summarizes the tests covered by the interim reports Nos. 2, 6 and 7 and describes those which have since been carried out, in giving the general conclusions which have been drawn as regards to grade of steel and shape to be adopted, in conformity with the provisions of the technical specification drawn up by the ORE B 98 Committee (1), for wheels with the following diameters: 660/630-760/680-840/760-920/840 mm. In each instance, it provides a drawing of the corresponding wheel which satisfies all the tests carried out so far. This document thus answers the questions raised by the Working Group "Wheels for trailer stock acceptable for use in international traffic" of the UIC.

International Union of Railways B98/RP 9/E, Oct. 1973, Figs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 052658

GENERAL PROBLEMS CONNECTED WITH WHEELS AND THEIR ASSEMBLY: SOLID CAST-STEEL WHEELS, WHEELS OF DIFFERENT DIAMETER AND SHAPE. PROBLEM OF THE GRADE OF STEEL AND SHAPE OF SOLID ROLLED-STEEL WHEELS FOR WAGONS AND COACHES—RECOMMENDATIONS. VOLUME 3: APPENDICES 4.3 & 5

Appendix 4.3.1: Report on the hauling runs with braked wheels of 920 and 840 mm diameter, type 1A, ORE B 98, and comparison of the test results with those of the tests on the wheel testing machine. Appendix 4.3.2: Braking tests on the wheel testing machine of the DB, with wheels of 920 mm diameter, type 1B and 1C, and comparison with the hauling runs on flat track carried out with the same wheels. Appendix 5: Laboratory investigations on solid rolled-steel wheels with curved web.

International Union of Railways B98/RP 9/E, Oct. 1973, Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

03 083061

FINAL REPORT ON THE EVALUATION OF CUSHIONED UNDERFRAMES

This report covers a study and evaluation of special cushioning devices under impact conditions. The types of devices tested included sliding cen-

ter sill, end of car hydraulic draft gears and column connected draft gears. Each device was evaluated with both canned goods and steel lading which respectively represented a resilient type of lading and a heavy rigid type of lading. This study indicates that the commodity protection needs under impact are not entirely a function of the special cushioning device but are also related to loading methods and types of packaging. In these tests the indications of cushioning protection provided by different shock absorption systems as summarized from the conclusions made in this report are: 1. Sliding sill type cars with 18 to 30 in. travel gave the highest degree of protection of lading through reduction of body force and resultant acceleration, followed in descending order by end of car hydraulic draft gears, column connected draft gears and standard draft gears. 2. The non-continuous or "split" design of sliding center sill provided the maximum protection to the car structure under dynamic squeeze, followed in descending order by end of car hydraulic draft gears, conventional continuous or through designs of sliding center sills and column connected draft gears. 3. Length of travel of sliding center sill is not an absolute indication of overall performance, particularly under dynamic squeeze conditions. 4. Small differences in sliding sill travel do not significantly change the performance characteristics. 5. Floating loads shift excessively, even with sliding center sill cars. 6. Energy absorption means are needed at the couplers in sliding center sill cars. 7. Sliding sills require high column strength to prevent bending.

Association of American Railroads Technical Center MR-443, Aug. 1965, 89 pp, 38 Fig., 35 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center
PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

03 083062

LABORATORY INVESTIGATION OF THE HOLDING ABILITY OF VARIOUS TYPES OF NAILS USED FOR SECUREMENT OF BOX CAR LININGS

Following issuance of Bulletin No. P-452, NAIL DAMAGE, by the AAR Freight Loss and Damage Prevention Section, the Superintendent of Claim Prevention of a Member Road requested that an investigation be made by the AAR to determine the best type of nail to be used for securing box car linings. The records of various railroads showed that a large percentage of the damage claims on bagged products, such as flour, starch, various other food products, etc., were caused by the containers having been torn by protruding nails in the box car lining. This report is the result of a joint program of investigation carried out by the Container and Loading Research Division and the Mechanical Research Division at the AAR Research Center.

Association of American Railroads Technical Center MR-358, Oct. 1959, 19 pp, 9 Fig., 3 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center
PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

03 083075

MEASUREMENT AND ANALYSIS OF MECHANICAL VIBRATIONS APPLIED TO HEAT ENGINES AND ROLLING STOCK. DIAGNOSIS OF OPERATIONAL ANOMALIES [La mesure et l'analyse des vibrations mecaniques appliquees aux moteurs thermiques et au materiel roulant. Diagnostic des anomalies fonctionnelles]

Methods of analysis of mechanical vibrations developed and used by the Belgian National Railways are described. The application of these methods is illustrated by the example of diesel locomotives and roller bearings for railroad rolling stock.

Hennuit, M *Revue M[Mecanique]* Vol. 20 No. 3, 1974, pp 257-269

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

03 083080

HEADLAMPS AND TAIL LAMPS FOR BRITISH RAIL

While British trains had operated without headlights and with oil marker lights until recently, electric lamps are now used for both purposes on the latest equipment and trainsets. This article explains the importance of a

bright light, even in brilliant sunlight, as a warning for track workers and other railroad employees. Details of both electric lamps are given.

Hargroves, RA *Light and Lighting and Environmental Design* Vol. 68 No. 1, Jan. 1975, pp 34-35, 2 Fig.

ACKNOWLEDGMENT: Light and Lighting and Environmental Design
PURCHASE FROM: Illuminating Engineering Society York House, 199 Westminster Bridge Road, London SE1 7UN, England Repr. PC

DOTL JC

03 083905

METALLURGY OF ROLLING BEARINGS

A rolling bearing must resist deformation and wear under conditions of heavy loading. Races, balls or rollers must have high hardness and elastic limit and resistance to fatigue failure. The factors which affect fatigue (cleanness of steel, structure of free carbides and heat treatment) are evaluated. The chemical composition and hardenability of six through-hardening steels are listed in chart form.

Robinson, JL *Metals and Materials* Vol. 8 No. 9, Sept. 1974, pp 399-403

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 083908

PROBLEMS OF NOISE AND VIBRATION WITH AIR CONDITIONING EQUIPMENT FOR RAILWAY VEHICLES. METHODS USED TO REDUCE NOISE AND VIBRATION EMITTED BY AIR CONDITIONING EQUIPMENT IN MODERN RAIL COACHES [Problemes de bruits et vibrations dans les installations de conditionnement d'air des vehicules ferroviaires. Moyens utilises pour reduire les bruits et vibrations provenant des installations de conditionnement d'air dans les voitures modernes]

The author examines the specific characteristics of all machinery that are capable of producing noise and vibration, and investigates various positions to attenuate these disorders with the view to suppressing them altogether in the passenger spaces. One important factor is the proper sound insulation of the rail coach body itself. [French]

The paper was presented at the International Institute of Refrigeration Meeting held in Vienna, Austria, Sept. 3-7, 1973.

Robert, J (French National Railways)
Institut International du Froid 1973, pp 175-182

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

03 083909

PROBLEMS OF NOISE AND VIBRATION WITH AIR CONDITIONING EQUIPMENT FOR RAILWAY VEHICLES. GENERALITIES, RESULTS OF MEASUREMENTS CARRIED OUT ON MODERN RAILWAY VEHICLES [Problemes de bruits et vibrations dans les installations de conditionnement d'air des vehicules ferroviaires. Generalites resultant de mesures effectuees sur des vehicules modernes]

This report deals particularly with the problem of passenger comfort aboard modern railroad vehicles equipped with a fairly new innovation, viz, air conditioning of passenger rail coaches. The author analyzes these problems and presents the results of various practical measurements that were carried out. [French]

This paper was presented at the International Institute of Refrigeration Meeting held in Vienna, Austria, Sept. 3-7, 1973.

Robert, J (French National Railways)
Institut International du Froid 1973, pp 161-174

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

03 083910

OVERALL ECONOMIC EFFICIENCY OF REFRIGERATION SYSTEMS AND AIR-CONDITIONING UNITS FOR RAILWAY COACHES, AND THE SIGNIFICANCE OF ENERGY SUPPLY WITH RESPECT TO THEIR DESIGN

Air conditioning system and unit for open coaches is described in which cooling is effected by means of compressors and a halogenated hydrocarbon refrigerant; the energy transmission to the coach is effected by utiliz-

ing the required amount of inflowing air as an energy carrier; air injection occurs in front of the windows by adding secondary air through effective induction of the inflowing air; and the air delivery systems to the compartments can be laid out as a dual or single-duct installation with electric reheating in the compartments.

This paper was presented at the International Institute of Refrigeration Meeting held in Vienna, Austria, Sept. 3-7, 1973.

Knau, U
Institut International du Froid 1973, pp 319-332

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

03 083926
COACH DESIGN FOR THE HELSINKI UNDERGROUND

After more than 20 years of planning, an underground system will be opened in Helsinki in 1978. In 1972, a short line was constructed, with six coaches for experiments. This article describes an analysis of these coaches from the point of view of ergonomics. A travelling experiment was organized, designed to simulate the final travelling situation. After the experiment the subjects filled out a questionnaire. During the trip the behavior of the subjects and their moving in and out was observed by two TV recorders and two film cameras.

Saari, JT *Applied Ergonomics* Vol. 5 No. 3, Sept. 1974, pp 149-152

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

03 083935
DRIVERS' CABS ARE BEING MODERNISED AND WILL BE WINDPROOF AND WARM

During the next few years the SJ will make large investments to improve the working environment for the locomotive drivers. By covering the piping of the cabs in plastics the draught will be eliminated and the working place will be more pleasant and easier to clean. Air-conditioning will be tested in some locomotives. The improvement of the working environment can in some cases cost up to 70,000 Skr per locomotive.

Lantz, S *Arbetsmiljo* No. 6, 1974, 13 pp

PURCHASE FROM: Foereningen Foer Arbetarskydd Kungsholms Hamrylan 3, S11220 Stockholm, Sweden Repr. PC

03 083947
NEW TRUCK DEVELOPED FROM THE TYPE Y28 TO THE TYPE Y32 FOR HIGH SPEED ROLLING STOCK [Un nouveau bogie pour les voitures a grande vitesse du type Y 28 au type Y 32]

The new truck is intended for main line rolling stock suitable for 200 km/hr operation. The author explains the design and gives a full description of the parts of the pneumatic suspension of this truck which has disk brakes combined with shoe brakes, a solution giving the best adhesion. The tests gave excellent results up to 250 km/hr. [French]

The full English article can be found in French Railway Techniques, N1, pp 1-12, 1975.

Moron, P (French National Railways) *Revue Generale des Chemins de Fer* Vol. 93 Sept. 1974, pp 497-508

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 084731
DETAIL SPECIFICATION FOR STATE-OF-THE-ART CAR
This document is the detail specification for the State-of-the-Art Car (SOAC). This specification represents the SOAC configuration as delivered to the Urban Mass Transportation Administration (UMTA) for test and demonstration. The SOAC has been developed under UMTA's Urban Rapid Rail Vehicle and Systems program which has the objective of enhancing the attractiveness of rapid rail transportation to the urban traveler by providing him with transit vehicles that are as comfortable, reliable, safe and economical as possible. The SOAC is one phase of this program. This specification was prepared by St. Louis Car Division, General Steel Industries, Inc. It has been reorganized into the format of the "Guideline for Urban Rail Cars" by the Boeing Vertol Company, Systems Manager for the Urban Rapid Rail Vehicle and Systems Program.

This program was sponsored by the Department of Transportation, Urban Mass Transportation Administration, Office of Research Development and Demonstrations.

Boeing Company, (D174-10018-1) IT-06-0026-73-2, May 1973, 200 pp, Figs, 1 App

Contract DOT-UT-10007

ACKNOWLEDGMENT: DOT
PURCHASE FROM: NTIS Repr. PC, Microfiche
DOTL NTIS, DOTL TA1205.B63

03 090415
THE ELECTRIC RAILWAY PRESIDENT'S CONFERENCE COMMITTEE STREETCAR RESEARCH AND DEVELOPMENT PROGRAM: FIVE TECHNICAL BULLETINS, 1931-1933

The street railway industry experienced a period of economic difficulty in the late 1920's as costs for new equipment and operating costs rapidly escalated, and automobile ownership increased dramatically. Industry leaders agreed on a unique industry research and development program to develop a totally different, technologically advanced street railway car that would compete in performance characteristics with the automobile, be less expensive to purchase, and that would increase transit ridership. The research program was financed by street railway companies and commercial firms in the transit supply business. They pioneered use of rubber suspension systems, unitized all-welded steel body construction, and advanced illumination.

Hirschfeld, CF
Electric Railway President's Conference Committee, Urban Mass Transportation Administration Spec Rpt. Bulletin 1, Sept. 1931, 143 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr PC, Microfiche
PB0239996/2ST, DOTL NTIS

03 091313
COST/BENEFIT ANALYSIS OF THERMAL SHIELD COATINGS APPLIED TO 112A/114A SERIES TANK CARS

A cost/benefit analysis of thermal shield coatings on 112A/114A tank cars was performed. Thermal shield coatings are coatings which are applied to the outside of a tank to act as an insulator in the event of a fire. The intent is that the coating prevent or delay overheating and overpressurization of the tank which could lead to tank rupture and large loss of life and property. The data for the analysis were taken from Railway Progress Institute (RPI)-Association of American Railroads (AAR) cooperative research program reports. The RPI/AAR determined accident data for the years 1965-1970 and based their cost/benefit analysis on this data. In this report, the data of RPI/AAR is updated to present dollars and a re-evaluation of the accident losses is made.

Adams, DE
Calspan Corporation, Federal Railroad Administration Final Rpt. CALSPAN-ZL-5226-D-3, Dec. 1974, 29 pp

Contract DOT-FR-20069

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-241295/15ST, DOTL NTIS

03 095221
LIFE CYCLE COSTING: A KEY TO FREIGHT CAR COMPONENT EVALUATION

The cost of repairing and replacing freight car components represents a very sizeable expenditure for the railroad industry. Of major concern to the railroad industry are the "costs" associated with various components. These costs include not only the direct costs of procuring and servicing such components but also related costs such as occur in derailments, train delays, and train handling mishaps. Phase II of the International Government-Industry Research Program on Track Train Dynamics is concerned with improving freight train performance and operating safety through the development of performance specifications and design guidelines for car components. If this activity is to be effective, it is essential that present and potential costs of component ownership be thoroughly evaluated. The authors have pursued this end through the development of a life Cycle Cost Model. Once necessary data sources are developed, this model will be used to evaluate research and implementation strategies for the program.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Byers, RH (Battelle Columbus Laboratories); Hawthorne, KL (Association of American Railroads Technical Center)
American Society of Mechanical Engineers 75-RT-9, Apr. 1975, 9 pp, 3 Fig., 1 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

03 095222

SIMULATED OPERATING STRESSES IN 28-IN.-DIA WHEELS

An analytical stress analysis of B-28 and CB-28 wheels of various designs is presented. Simulated service inputs of vertical, lateral, and brake shoe forces producing thermal loads from emergency braking are used. Octahedral stress mapping is used to display the stress fields generated in the wheels under combination of the above loading conditions. The results show that both wheels have low octahedral stresses when only vertical or vertical and lateral loads are applied, but under combined loading conditions including tread braking the stress levels in the B-28 contour exceed those in the CB-28 wheels.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Novak, GE (Del Engineering, Incorporated); Greenfield, LP (Trailer Train Company); Stone, DH (Association of American Railroads Technical Center)
American Society of Mechanical Engineers 75-RT-10, Apr. 1975, 8 pp, 19 Fig., 6 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

03 095227

ALUMINUM CENTER WHEELS FOR RAPID TRANSIT RAIL SERVICE

This paper is a report on the experience with aluminum-center steel rim wheels used on the rapid transit cars on Bay Area Rapid Transit. These wheels are exhibiting some properties not noticed previously. Some particular problems encountered are cited and the measures taken to counteract their effect are described. It is intended as a preliminary report to the industry, with further data to follow, as they become available.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Van Overveen, JP (San Francisco Bay Area Rapid Transit District); Grosser, JF (Westinghouse Electric Corporation)
American Society of Mechanical Engineers 75-RT-5, Apr. 1975, 8 pp, 11 Fig., 4 Tab., 1 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

03 095229

EVOLUTION OF A NEW TRUCK DESIGN FOR NEW YORK CITY TRANSIT AUTHORITY

This paper describes the specification, design, and testing required to develop the new lightweight air spring truck design for cars presently under construction for the New York City Transit Authority (NYCTA) under Equipment Contract R-46. The design is of particular significance since the trucks are part of the largest rail passenger car contract in history and for the largest rapid transit property in the world. This paper also summarizes the design characteristics of trucks which have been operating under transit cars on the New York City Transit System during the past seven decades.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Curtis, RD (Pullman-Standard Car Manufacturing Company); Maisch, LD (Rockwell International); Sebastiano, J (New York City Transit Authority)
American Society of Mechanical Engineers 75-RT-4, June 1975, 12 pp, 3 Fig., 1 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

03 095409

DEFINITION OF HELICAL SPRINGS. APPLICATION IN RAILWAY ROLLING STOCK SUSPENSIONS [Une détermination des ressorts en hélice. Application a la suspension de matériels ferroviaires]

For the study of new, high performance vehicles, more accurate knowledge was required of helical-spring behavior. In the first part, the authors describe a calculation method for studying the distribution of stresses, analytical resolution of balance and deformation equations and the corresponding computer calculation programme. The second part deals with the problems posed by the materials since improvements could be made by presetting and protection methods. The third part concerns the definition of suspension springs for SNCF Y32 bogies. [French]

Revillon, A Leluán, A *Revue Generale des Chemins de Fer* Vol. 93 July 1974, pp 442-455, 18 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 095411

DETERMINATION OF CONSTRAINTS OF THERMAL ORIGIN IN THE SOLID CAST WHEELS OF RAILWAY ROLLING STOCK [Détermination des contraintes d'origine thermique dans les roues monoblocs du matériel ferroviaire]

Two methods are proposed for the mathematical study and determination of constraints and deformations in a disc and in a solid cast wheel subjected to shoe braking: the method of finite differences, where the partial derivatives are replaced by approximate formulae; the conventional method which consists in expressing the equilibrium of an elementary toric sector whose dimensions are stretched towards zero. The displacement equations are obtained on the basis of the equilibrium equations, and the constraints are expressed with the help of behavior relationships. Two examples illustrate the influence of the thermal gradient value, the position of the heat source and the form of the wheel on constraints of thermal origin. [French]

Doctoral thesis in Physical Sciences.

Barbe, P *Universite Paris VI* Vol. 1 June 1973, 234 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Universite Paris VI Paris, France Repr. PC

03 095415

CONSIDERATIONS FOR LAYOUT OF EQUIPMENTS IN ELECTRIC LOCOMOTIVES

This exhaustive list of considerations may be considered as a general specification for the ideal motive power unit, and includes the following items: equipment on the roof and under the body; the arrangement of equipment in the cab, and electrical equipment; pneumatic equipment; vicinity with connected equipment; precautions against excessive local heat generation, and vibrations; accessibility for maintenance; balanced distribution of weight on the rails; internal lay-out of the locomotive, and arrangement of body side-walls; aesthetics and safety measures.

Thakur, AS *Indian Railway Technical Bulletin* Vol. 30 No. 190, Aug. 1973, pp 116-120

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Research Design and Standards Organization
Alambagh, Lucknow 5, India Repr. PC

DOTL JC

03 095620

HOPPER "UADGS" OF THE SWISS FEDERAL RAILWAYS FOR THE TRANSPORT OF GRAIN AND OTHER GRANULAR MATERIALS [Silowagen "UADGS" der SBB fuer den Transport von Getriebe und Anderen Koernigen Materialien]

The design problems involved in designing railroad freight cars of light metals in general are outlined. Emphasis is then placed on the description of the design, static properties, and performance characteristics of an aluminum alloy hopper for grain and similar granular materials. [German]

Scherer, C *Schweizer Alumin Rundschau/Revue Suisse de Alumin* No. 11, Nov. 1974, pp 356-360

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

03 095647

DESIGN AND BUILDING OF A DINING-CAR WITH SECOND-DEGREE COMFORT [Die Planung und Entwicklung eines Speisewagens fuer die Sweite Komfortstufe]

A dining-car with second-degree comfort facilities, measuring 27.5 m, has been built for express and fast trains. The article states the characteristics matching the requirements of a modern, economical, self-service dining-car, and explains the layout arrangements for hot and cold dishes. [German]

Haack, PU *Die Bundesbahn* Vol. 50 No. 8, Aug. 1974, pp 507-510, 2 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

03 095661

HUMAN FACTORS ANALYSIS OF THE DIESEL-ELECTRIC LOCOMOTIVE CAB

Using information collected over 6-1/2 years, a human factors analysis was completed of the diesel-electric locomotive cab. The analysis was directed towards displays, control design and arrangement, and environmental quality. Nineteen recommendations were provided for the modification of existing cabs and the design of new cabs to enable future locomotive crews to work more efficiently and safely in a more comfortable work environment.

Gamst, FC (Rice University, Houston) *Human Factors* Vol. 17 No. 2, Apr. 1975, pp 149-156, 1 Fig., 3 Ref.

ACKNOWLEDGMENT: Human Factors

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

03 095676

HIGH SPEED TRAIN PROTOTYPE PROVES ITS WORTH

Unhappy experience with small batches of diesel locomotives ordered off the drawing board in the 1950s ensured that extensive prototype testing would precede series production of British Rail's next generation of 200 km/h intercity trains. The prototype High Speed Train completed in 1972 has already proved its value, but further modifications are continually being introduced so as to prove their acceptability before they are incorporated in the next batch of production trains.

Sephton, BG (British Railways) *Railway Gazette International* Vol. 131 No. 2, Feb. 1975, pp 58-62, 3 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

03 095685

RAIL TRANSIT CAR COSTS. A REVIEW ANALYSIS AND PROJECTIONS

The purpose of the report is to provide the elected officials and technical staffs involved in transportation planning in Southern California with some essential background data to the planning efforts for rail transit. Considering the lead time between planning and implementation and the current rate of inflation and technological advances being engineered into rail transit vehicles, this paper attempts to forecast car costs for rapid transit, commuter rail and light rail vehicles. The operational characteristics of each of the rail systems is discussed under System Characteristics. This includes headways, speeds, power etc., as well as, a tabulation of the

equipment used by each operator and a summarization of system characteristics. The Analysis chapter looks at the division of the rail car market by the manufacturers. It also compares the expenditures made for each of commuter rail, rapid transit and light rail transit by City, by Transit Property and by Type of Equipment including a further breakdown for locomotive-hauled cars versus electrically-propelled cars. The Prognosis chapter attempts to forecast what cars will cost between 1975 and 1980 based on a complete documentation of all car orders between 1962 and the present. A major finding of the study has been the possible cost projection for the various rail car types in use throughout the U.S. and Canada and what the cost of equipment suitable for the Los Angeles area might be.

Southern California Association of Governments Feb. 1975, 158 pp, Figs., Tabs., Photos., Refs.

ACKNOWLEDGMENT: Southern California Association of Governments
PURCHASE FROM: Southern California Association of Governments 600 South Commonwealth Avenue, Suite 1000, Los Angeles, California, 90005 Repr. PC

03 095689

TANK CAR DESIGN

This article describes the methods of tank calculation used in the USSR which have been considerably refined due to studies carried out by the Moscow Institute of Railway Engineers, as well as by the Zdanov Heavy Machinery Works, and other organizations. The authors who have personally contributed to improving the methods of calculating tank car shells are sure that an exchange of experience in this problem would facilitate a further development of progressive tank car designs.

Shadur, L (Moscow Institute of Railway Engineers); Koturanov, V *Rail International* Vol. 6 No. 1, Jan. 1975, pp 19-40, 6 Fig., 5 Tab., 9 Ref.

ACKNOWLEDGMENT: Rail International

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 095709

1974 RAIL TRANSPORTATION PROCEEDINGS

This publication incorporates the 19 papers presented at the Joint ASME/IEEE Railroad Conference in Pittsburgh April 3-4, 1974 and at the Winter Annual Meeting of the ASME in Detroit, November 11-15, 1973. Formal discussions of the papers are also included. While most of the papers deal with the design of rolling stock and rolling stock components and with track-train dynamics, two papers cover proposed advanced urban transportation system and heat in subways. All these papers are entered individually in the RRSIS system.

American Society of Mechanical Engineers 1974

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL TFS .A73 1974

03 096531

THE PROTOTYPES OF THE EUROPEAN STANDARD PASSENGER COACH [Die Prototypen des europaischen Standard-Reisenzugwagens]

After thorough study by UIC committees and working groups, a specification was drawn up for the development of a European standard passenger coach, after which a consortium of manufacturers led by Linke-Hofmann-Busch produced ten prototypes. The Author describes these vehicles, including bodywork construction, draw and buffing gear, bogies, brakes, entrances, the intercommunicating gangways, and windows, also thermal and sound insulation, energy supplies for air conditioning and lighting. Space is also devoted to the interior furnishings and the various external colour schemes of the passenger rolling stock which will in future populate Europe's railways. [German]

Braemert, P *Eisenbahntechnische Rundschau* Vol. 24 Mar. 1975, pp 70-79, Photos.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr PC

DOTL JC

03 096534

VEHICLE STANDARDIZATION WITHIN THE FRAMEWORK OF THE UIC [Die Normung des Fahrzeugmaterials im Rahmen der UIC]

Since the earliest days of the railways, efforts have been made internationally to standardize rolling and traction stock as well as operating regulations so as to allow cross-frontier services to be operated between the various countries. Over the last 100 years a number of international organizations have applied themselves to the achievement of greater standardization. These endeavours received new impulse after the last war, when it was sought not only to simplify cross-frontier procedures but also better to meet the needs of railway users and to achieve greater economy in vehicle procurement and upkeep. As a further step in this direction, in 1974 the UIC "Vehicles and Railway Traction" committee redefined the scope of its standardization efforts.

Dewald, E *Eisenbahntechnische Rundschau* Vol. 24 Mar. 1975, pp 87-93, 4 Fig., 1 Tab.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

03 096541

BRUSSELS METRO COMPARES WELDED AND RIVETED ALLOY BODIES

In designing the equipment for full-scale rapid-transit operation of the Brussels Metro, which was built for light-rail operation initially, prototypes were built utilizing riveted wide extrusions and welded extrusions of more conventional design. Previously the weight savings of aluminum alloys had been adopted; the method of construction had to be established. Since wide aluminum extrusions could become popular for high speed intercity trainsets and for urban railways, the STIB tests have compared the alternate construction techniques.

Railway Gazette International Vol. 131 No. 4, Apr. 1975, pp 156-157, 2 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

03 096558

STRESSES IN THE TREADS OF RAILWAY WHEELS

The stresses arising in and below the tread of a rail vehicle wheel are very complex. The wheel material, which is in no way of a homogeneous nature, is subjected to greatly differing forces varying in magnitude, as well as to frictional forces, thermal stresses, manifold tensile stresses and wear mechanisms. Because of the great many imponderabilities, resulting from the track position and riding quality of the vehicle, a prediction of the expected life or anticipated mileage is practicable to a limited extent only. Nevertheless, it is possible to picture the complex stresses acting on the wheel tread. For practical use, a new factor is proposed, permitting an estimate of the permissible axle load for wheel sets dependent on the wheel diameter. [German]

Brohl, W Brinkmann, P *Glaser's Annalen ZEV* Vol. 99 No. 1, Jan. 1975, pp 1-10

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 096593

SAFETY CONSIDERATIONS IN DESIGN OF NEW TRANSIT BUS SEATS

This paper describes the results of a program to develop advanced cantilevered transit bus seats. The Department of Transportation's Urban Mass Transportation Administration funded the \$26 million Transbus Program. The paper is divided into two parts. The first part describes the results of a detailed analysis of passenger accidents on-board current transit buses. The second part describes the results of sled tests that evaluated the safety of three new cantilevered seat-sidewall section designs proposed for Transbus relative to the safety of current transit buses. The testing facilities and procedures are described, along with a summary of the results of 16 sled test runs that employed four different sizes of anthropometric dummies. The results clearly indicate that the new seats have safety characteristics superior to current transit bus seats, especially in severe crash situations.

Proceedings of 18th Stapp Car Crash Conference, University of Michigan, Ann Arbor, Dec 4-5 1974.

Mateyka, JA (Booz-Allen Applied Research, Incorporated)

Society of Automotive Engineers Pap 741178, 1974, pp 71-87, 5 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: SAE Repr. PC

03 096618

THE IMPACT OF STONES HITTING AGAINST THE LOCOMOTIVE WINDSCREENS [Steine gegen Lokomotivscheiben]

The windscreens on motive power units must be strong to protect drivers from the impact of solid objects, especially since train speeds are increasing. The author describes an experimental measuring device to help in choosing windscreens which are acceptable both from the technical and and the economic point of view and which provide satisfactory protection for locomotive drivers. A solid propellant is used to project a stone weighing one kg at 400 km/h in a tube measuring one metre long and with an inside diameter of 100 mm. A photoelectric method is used to measure the speed of the stone before it hits the the windscreen. [German]

Kalkbrenner, E *Eisenbahningenieur* Vol. 25 No. 10, Oct. 1974, pp 345-346, 3 Fig.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: Dr Arthur Tetzlaff-Verlag Niddastrasse 64, Frankfurt Am Main, West Germany Repr. PC

03 096620

AN EXAMINATION OF FATIGUE STRENGTH IN THE CONSTRUCTION OF RAILWAY VEHICLES [Beruecksichtigung der Betriebsfestigkeit bei der Konstruktion von Schienen]

The author discusses the importance of fatigue strength in the construction of railway vehicles and problems connected with designing construction components which will withstand stress, taking into account their service life. Moreover, construction elements which undergo great stress must often weigh as little as possible and therefore careful attention must be given to the properties of specific materials and to the field of force.

Umback, R *Glaser's Annalen ZEV* Vol. 98 No. 10, Oct. 1974, pp 253-359, 15 Fig., 2 Tab., 10 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 096621

TESTS ON THE RESISTANCE TO DEFORMATION OF BOGIE FRAMES [Gestaltfestigkeitspruefung an Drehgestellrahmen]

The bogie testing plant at the German Federal Railways Test Centre in Minden (Westphalia) simulates static and dynamic stresses on railway vehicle running gear in service. The author describes the test programme, the tests carried out and the results on bogies of the Y 25 wagon series. The test programme takes account of the fact that the frame should be loaded without initial stress, in addition to the inherent static load in a Z shaped system of coordinates with Z and Y basic load alternations which are arranged so that they correspond to the running load on curves and with higher frequency superimposed oscillations from excitation caused by track unevenness. [German]

Schenk, H *Glaser's Annalen ZEV* Vol. 98 No. 10, Oct. 1974, pp 347-352, 9 Fig., 1 Tab., 9 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 096629

BOX CAR BODY BOLSTER PROBED IN STRESS STUDY

The DOT, AAR and American Car and Foundry have started on a 2 year study, in collaboration with Washington University in Saint-Louis, and 42,200 dollars have been allocated for this project. Its purpose is to study ways of increasing the life of railway rolling stock by computer processing a model of the stress to which the main parts of the stock are subjected. The article gives general information about the methods envisaged for solving these problems, in particular for box car body bolster, using a finite element model.

Railway Locomotives and Cars Vol. 48 No. 6, Sept. 1974, pp 24-28, Figs.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 097189

GUIDELINES FOR THE DESIGN OF FUTURE HEAVY VEHICLES IN EUROPE [Tendencias en el Proyecto de Vehiculos Comerciales de Transporte Pesado en el Futuro Proximo en Europa]

The tendency in commercial vehicles seems to be towards heavier vehicles of greater capacity, especially containers. At the present time laws governing axle load, power/weight ratio, gross weight, pollution and safety are being enacted; these laws will have a significant influence on future freight transport vehicles. Tendencies are that: (1) regulations concerning 13 t might be accepted, (2) there could be an increase in the power/weight ratio up to 89 hp/t and the gross weight, which could reach 45 t, (3) new regulations concerning rear axles and tandems, servo-assisted steering, emergency brakes and tyres and rims might be established. /TRRL/ [Spanish]

Carreras, C. *Sociedad de Tecnicos de Automobiles* No. 91, Apr. 1971, pp 21-26, 2 Fig.

ACKNOWLEDGMENT: Transportation & Soil Mechanics Laboratory, Spain Laboratoire Central des Ponts et Chaussees Transport and Road Research Laboratory (IRRD 100845)

PURCHASE FROM: Sociedad de Tecnicos de Automobiles Avenida Generalisimo Franco, 999, Barcelona 17, Spain Orig. PC

03 097259

LABORATORY INVESTIGATION OF THE HOLDING POWER OF NAILS IN TREATED AND UNTREATED OPEN TOP FLOOR DECKING

Tests were conducted to determine whether the holding power of nails used in the blocking and bracing of shipments in open top equipment was affected by the application treatment of various types of preservatives to the floor decking. The review indicates the preservative does not affect holding power of nails used for blocking and bracing on such deckboards. The holding power will vary for different species of lumber; with the denser lumber having a greater holding power. This work was conducted using Douglas fir (coast type) and the values of withdrawal loads would have to be adjusted in accordance with the wood density of other types of deckboard. The original destination car report indicated a condition where the car decking was evidently saturated with some oily substance causing the nails to be lubricated with resultant reduction in holding power. In contrast, the floor decking materials in this study were chemically treated under commercial conditions. It is estimated that any extreme service condition, such as oil saturation of the decking boards, would equally affect all of the types of treatments considered in this report. From analysis of the results it is concluded that the nail holding power in deckboards used in open top car service when properly treated with pentachlorophenol, creosote, cresosote-coal tar mix, or Wolman salts compares favorably with untreated decking lumber in nail holding ability for the same type and size of nail.

Association of American Railroads Technical Center MR-445, Nov. 1967, 10 pp, 5 Fig.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

03 097262

BEHAVIOR OF FREIGHT CAR CONSTRUCTION MATERIALS AT CRYOGENIC TEMPERATURES

The purpose of this study was to explore the action of wood and steel construction materials when impacted at low temperatures. Cooling and heating rates were also determined since these properties affect the quantity of coolant used to produce cryogenic temperatures and the time available for demolition after the material has been cooled. Liquid nitrogen (B.P. 77.4 degrees K or 320.4 degrees F) was used in the study since this chemical is readily available in laboratory quantities and is less susceptible to explosion hazards than hydrogen or oxygen. The laboratory tests of thermal properties of wood and steel at cryogenic temperatures showed that both materials cool rapidly when immersed in liquid nitrogen with steel cooling about five times more rapidly than wood. These materials also heat rapidly when removed from the liquid nitrogen environment with steel having about five times the heating rate of wood. In the tests conducted, wood exhibited little change in fracture characteristics when the temperature was lowered to that of liquid nitrogen. Conversely, steel,

at this temperature, shows brittle fracture properties as compared to ductile properties of steel at room temperature. Based on the tests conducted, scrapping wood freight cars by lowering the temperature to cryogenic levels would be impractical. Large quantities of relatively expensive coolant would be required to lower the car temperature which would heat rapidly as soon as the coolant was removed. In this scheme of scrapping freight cars, it was thought that wood shattering would take place with heavy impact blows. The laboratory tests did not show any shattering effect of the wood at cryogenic temperatures but it is possible that some steel shattering might occur if the impact blows were struck quickly after the car was cooled.

Association of American Railroads Technical Center MR-444, Jan. 1967, 11 pp, 4 Fig.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

03 097272

ALUMINUM APPLIED TO ROLLING STOCK CONSTRUCTION WITH PARTICULAR REFERENCE TO LARGE EXTRUSIONS

Traction energy saving and reduced structural maintenance offer substantial advantages, but modern welding techniques require careful stress evaluation during design, and corrosion traps must be eliminated. Truck design and lightweight structures were comprehensively reported in four sessions comprising some 30 papers at the Aluminum Vehicles for Guided Transport seminar organized by Aluminum-Zentrale in Dusseldorf and attended by delegates from railways and industry.

Bordoni, F. *Rail Engineering International* Vol. 5 No. 2, Feb. 1975, pp 51-62, Photos.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 097307

COOPERATIVE RESEARCH EFFORT AMONG RAILROADS, RAILROAD ASSOCIATIONS, INDUSTRY AND GOVERNMENT

This 11th Annual Railroad Engineering Conference, now sponsored by the Federal Railroad Administration, had as its purpose: To provide a forum for parties interested in the promotion, well-being and progress of the free system of transport by rail to discuss the engineering aspects of railway freight equipment and its interface with track structure and thereby formulate answers to problems and develop advancements in the state of the art. Transcripts of 12 addresses and the 13 technical papers presented at the four sessions are included.

Proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974, some individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13, 097310, 04 097311, 03 097312, 03 097313, 04 097314, 03 097315, 03 097316, 03 097317, 03 097318, 03 097319. All of these are contained in Bulletin 7502.

Federal Railroad Administration FRA-ORD&D-75-73, 1974, 113 pp, Figs., Photos.

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241730/2ST, DOTL NTIS

03 097308

MODIFIED THREE-PIECE TRUCK REDUCES HUNTING AND IMPROVES CURVING

Analysis of dynamic truck oscillations shows that hunting can be controlled by elastic links which connect the diagonally opposed journal boxes of the two wheelsets of a truck. Yaw constraint of the wheelsets in relation to the truck frame can then be minimized and full advantage taken of the ability of conical wheelsets to align themselves radially on curved track. This stability ensures that tread profile concavity does not change as wheels wear and stability can be maintained for long periods. South African Railways has incorporated such a diagonal suspension truck with encouraging test results. Although sharp curves are prevalent on the track where tests were conducted, flange wear has been negligible.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097309, 13 097310, 04 097311, 03 097312, 03 097313, 04 097314, 03 097315, 03 097316, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in the Bulletin 7502.

Scheffel, H (South African Railways)
Federal Railroad Administration 1974, pp 41-46, 13 Fig., 5 Ref.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097309

THE FREIGHT CAR TRUCK "CAPABILITY GAP"

The freight car truck is discussed as background to the question of what can be done about it. Because of the greater demands of today's freight service, a capability gap has developed between the truck performance required and that provided by contemporary running gear. The evolution of the three-piece truck, from the archbar design through stages to the contemporary arrangements, is illustrated. Some other car problems are covered and the possible end of cut-and-try design in running gear is foreseen. The possibility that a premium truck might be cost effective is suggested.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 13 097310, 04 097311, 03 097312, 03 097313, 04 097314, 03 097315, 03 097316, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in the Bulletin 7502.

Smith, LW (Dresser Industries, Incorporated)
Federal Railroad Administration 1974, pp 26-32, 25 Fig.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097312

INNOVATIVE CONCEPTS IN UNIT TRAIN OPERATION

The transition to haulage of taconite pellets on the Duluth, Missabe & Iron Range Railway found unit train services attractive. To achieve optimum train operation, DM&IR coupled its short ore cars in four-car sets with drawbars, introduced the Wabco straight-air retainer system, and eliminated angle-cocks and air-hose connectors where the drawbars are installed. The road uses a planned 1,188 cars assembled in "miniquads" in 124-car unit trains. With this operation so successful, attention has now turned to on-train monitoring of derailed equipment and plans for a more comprehensive real-time measurement of condition throughout any unit train. It is concluded that more can be done to improve the operational control, efficiency and safety of unit trains.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309; 13 097310, 04 097311, 03 097313, 04 097314, 03 097315, 03 097316, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in Bulletin 7502.

Abramson, JE Ojard, DR (Duluth, Missabe & Iron Range Railway Company)
Federal Railroad Administration 1974, pp 78-84, 6 Fig.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097313

A MAINTENANCE OFFICER'S VIEW ON THE EFFECTS OF FREIGHT CAR DYNAMICS

The interrelationship between equipment and track is stressed in this article. Efforts over the past two decades have led to the strengthening of critical areas of freight cars. However, the track has been subjected to increasing wear as larger and heavier cars were introduced. The beneficial effects of the railroad/supplier/government efforts, the Track Train Dynamics program will be of great importance to the industry. Until there are major fixed-plant changes, it is urged that the geometry of cars better accommodate today's track, and that the industry consider shorter trains.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13 097310, 04 097311, 03 097312, 04 097314, 03 097315, 03 097316, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in Bulletin 7502.

German, JG (Missouri Pacific System)
Federal Railroad Administration 1974, pp 49-52

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097315

THE ESTIMATION OF POTENTIAL BENEFITS FROM IMPROVED OPERATION WITH ADVANCED COUPLING SYSTEMS

The discussion of the AAR/RPI Advanced Coupling Concepts Project is introduced by a description of the automatic air line connectors which have been tested since the 1920s. Several such systems are now in routine service. The requirements of advanced coupling systems are developed and the fundamental objectives of the AAR/RPI project are outlined. The factors which could be benefits of an advanced coupler are listed, and the process of using a sensitivity analysis and appraisal of the economic and operating benefits are listed.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13 097310, 04 097311, 03 097312, 03 097313, 04 097314, 03 097316, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in Bulletin 7502.

Punwani, SK (Association of American Railroads)
Federal Railroad Administration 1974, pp 61-67, 20 Fig.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097316

FREIGHT CAR TRUCK DESIGN OPTIMIZATION PROJECT: PURPOSE, ORGANIZATION, AND PROGRAM

This FRA-sponsored project was undertaken with Southern Pacific as the prime contractor to develop the technology required to establish technically sound and economically feasibility specifications for new and improved trucks. This involves performance evaluation of existing freight car trucks, then determine through cost benefit analysis the feasibility of improving truck performance by modifications of existing trucks or the introduction of new designs. There would also be specifications developed for freight car suspensions and finally the study of advanced concepts of integrated carbody support systems. The scheduling and organization of Phase 1 are described.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1975. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13 097310, 04 097311, 03

097312, 03 097313, 04 097314, 03 097315, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in Bulletin 7502.

Byrne, R (Southern Pacific Transportation Company)
Federal Railroad Administration 1974, pp 33-40, 13 Fig.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097317

FREIGHT CAR DYNAMICS—ONE CARBUILDER'S APPROACH

Amcar Division of ACF Industries, like the other carbuilders, is taking on additional responsibilities for all aspects of car dynamics design and test, particularly with respect to carbody structure. Explained is the ACF computerized system for analysis of carbody structural dynamics, intended to combat fatigue problems. Mathematical modeling is used to develop load paths and stress profiles of complex structures. Road testing is important in developing environmental data and ACF has acquired an instrument car for this purpose. Modified Goodman Diagrams are developed and their use is discussed.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13 097310, 04 097311, 03 097312, 03 097313, 04 097314, 03 097315, 03 097316, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in Bulletin 7502.

Billingsley, RH, Jr (ACF Industries, Incorporated)
Federal Railroad Administration 1974, pp 11-15, 10 Fig.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097318

FREIGHT CAR MAINTENANCE: MATERIAL-ENERGY-COST CONSERVATION

The Shippers Car Line Division of ACF Industries has a fleet of 36,000 freight cars which are maintained on a planned basis. Railroad shops perform much of the running repair. Because of the extensive data which has been acquired on its fleet, Shippers pinpoints car parts which are high-maintenance items and suggests procedures that would minimize costs and out-of-service time. The cost analysis of various maintenance policies are mentioned.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13 097310, 04 097311, 03, 097312, 03 097313, 04 097314, 03 097315, 03 097316, 03 097317, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in Bulletin 7502.

Ruprecht, WJ (ACF Industries, Incorporated)
Federal Railroad Administration 1974, pp 17-26, 12 Fig.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097319

DEVELOPMENT AND PRODUCTION OF BESSEMER AND LAKE ERIE QUICK-DROP SELF-CLEARING OPEN-TOP HOPPER CARS

The railroad and carbuilder cooperated in development of a specialized open-top car for handling coal and ore, taking into account granular material characteristics, bin design, material behavior under different weather conditions, compaction and car geometry. Gate design was particularly critical and prototype cars displayed problems which had not been anticipated. When other problems developed in production cars, inspections and statistical studies were made of impact speeds, car-handling techniques, use of car shakers and dimensional variations. It was developed

that periodic maintenance would be necessary to assure the availability and productivity for which these cars were designed.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13 097310, 04 097311, 03 097312, 03 097313, 04 097314, 03 097315, 03 097316, 03 097317, 03 097318. The entire proceedings 03 097307 has also been accessioned. All of these are contained in Bulletin 7502.

Rousseau, GL (Pullman-Standard Car Manufacturing Company)
Federal Railroad Administration 1974, pp 6-11

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-241730/1ST, DOTL NTIS

03 097997

IMPROVED METHOD FOR MEASURING THE RESIDUAL STRESSES IN RAILROAD SOLID WHEELS

In order to estimate the residual stress in railroad solid wheels, a new technique called plate-cut-out method has been developed. Fundamental idea of this method consists in that the residual stress in the wheel can be separated into two constituent components, by taking account of wheel geometry. These constituent components of the residual stress are determined respectively through simple strain measurements and elastic stress calculations.

Nishimura, S Morita, Y Tokimasa, K *Japan Society of Mechanical Engineers, Bulletin* Vol. 18 No. 116, Feb. 1975, pp 114-122, 8 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

03 098019

TYPE B'B'B' CLASS BE 8/8 DOUBLE-ARTICULATED TRAMS NO. 1 TO 16 OF THE CITY OF BERN TRANSPORT AUTHORITY

The electric equipment for a series of double-articulated trams with four single-motor bogies is described in detail. The conventional switchgear equipment (electro-pneumatic contactors) is controlled through traction electronics. This permits constant acceleration or deceleration during starting and braking and also constant speed downhill running. The electrical equipment was designed to facilitate operation with trailers. As a result, the carrying capacity can be adapted to peak period demands.

Venez, R *Brown Boveri Review* Vol. 61 No. 12, Dec. 1974, pp 540-545

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

03 098024

AIR CONDITIONING SYSTEMS FOR PASSENGER ROLLING STOCK

Air conditioning systems in trains have to satisfy a great number of different requirements, determined on the one hand by the construction of the coach and the degree of comfort demanded and on the other by economic considerations. The basic technical ways of solving these problems are similarly varied. The article shows that the needs of the railways can each be met satisfactorily.

Thomann, F *Brown Boveri Review* Vol. 61 No. 12, Dec. 1974, pp 570-575

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

03 098025

CLIMATE IN PASSENGER TRAINS

Whether a train is pleasant for the passenger depends greatly on climatic conditions in the compartment. In a train with good lighting and good climatic conditions, one can travel not only safely, but also in comfort. The quality of the atmosphere is much more important on long journeys than for short trips. However, the cost of modifying these conditions rises sharply with passenger requirements. Warm-air heating and forced ventilation are at present considered sufficient for journeys of less than an hour. Modern suburban trains are therefore fitted with equipment of this kind.

Long-distance coaches are today usually equipped with air conditioning systems which, in addition, include refrigeration facilities for cooling, and drying the air.

Thomann, F *Brown Boveri Review* Vol. 61 No. 12, Dec. 1974, pp 564-569

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

**03 098027
FLUORESCENT LIGHTING FOR PASSENGER COACHES**

The demands to be met in respect of good train lighting in passenger coaches are discussed and the advantages to be gained by using transistor inverter ballast units with fluorescent lighting are reviewed.

Tapavica, K *Brown Boveri Review* Vol. 61 No. 12, Dec. 1974, pp 576-580

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

**03 098054
SUSPENSION AND STRUCTURE: SOME FUNDAMENTAL DESIGN CONSIDERATIONS FOR RAILWAY VEHICLES**

Some of the fundamental criteria which affect the design of suburban passenger equipment are reviewed. There are many design approaches to both suspension and structure. The goals for cars for commuter and rapid transit service are minimum weight, maximum comfort, and maximum reliability at minimum cost. Based on U.S. DOT ride quality specifications, the authors recommend air bag secondary suspension and combined natural frequencies as low as 0.6 Hz which will require active self-centering and frequency-sensitive damping along with anti-roll bars at each truck. Natural frequencies of a typical carbody may be close to a natural frequency of truck frames. Lightweight all-welded carbodies are at a disadvantage because of the minimal structural damping within them.

Newland, DE Cassidy, RJ *Railway Engineering Journal* Vol. 4 No. 2, Mar. 1975, pp 4-26, 48 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

**03 098067
THE DIESEL RAILCAR CLASS 614 [Der Dieseltriebzug Baureihe 614]**

The German Federal Railway has put new diesel railcars into service on non-electrified main and secondary lines. A development from the BR 624/634 diesel railcar is the three-unit type BR 614/914. Particular importance was attached to the wishes of travellers in the design of the passenger spaces, with air suspension and noise deadening adding further to passenger comfort. Details of the new railcar series are given. [German]

Kottenhahn, V *Eisenbahntechnische Rundschau* Vol. 24 May 1975, pp 173-180, 13 Fig., 3 Tab., 9 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

**03 098077
PHASE 10 REPORT ON DEVELOPMENT OF SHELF COUPLERS**

The Type E top and bottom shelf coupler development program has been completed to the state where approval of applications of these couplers to tank cars is to be sought from the AAR and DOT. Service tests of 100 Carsets are being arranged, retrofitting 112A or 114A cars having Type F couplers. The early study is appended as information. Shelves in the final design, as now approved, are somewhat different from that considered in the preliminary stages of this phase of the project.

This is an RPI-AAR Cooperative Program.

Association of American Railroads Technical Center, (RA-10-5-30) R-166, Sept. 1974, 53 pp, Figs., 1 App.

ACKNOWLEDGMENT: Association of American Railroads Technical Center
PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

**03 098078
PHASE 05 REPORT ON JUNE 9, 1974 ACCIDENT INVOLVING HEAD SHIELDS**

The head shield was recommended as a cost effective device for prevention of catastrophic punctures of tank car heads and 104 new cars for liquefied petroleum gas service were so equipped after 1972. One of these cars was involved in a derailment on the Norfolk & Western in Iowa. While the service trial was not to evaluate the shields' effectiveness in accidents, and statistically it was unlikely that a car would be so involved, this derailment did show the shield performing well. It was not possible to conclude it prevented a head puncture definitely, but it is probable it did so. Method of attachment appears good. No conclusion could be drawn about the effectiveness of mated F couplers because of the conditions of this specific accident.

This is an RPI-AAR Cooperative Program.

Association of American Railroads Technical Center, (RA-05-2-29) R-165, Aug. 1974, 9 pp, Photos.

ACKNOWLEDGMENT: Association of American Railroads Technical Center
PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

**03 098083
EXPERIMENTAL STRESS ANALYSIS OF LATERAL LOADS ON RAILWAY WHEELS**

An experimental stress analysis was conducted to determine the strain due to lateral loading in the front hub-plate fillets of thirteen railway wheels of various designs. It was found that the maximum strain occurs at the point of minimum depression of the hub-plate fillet. The effects of wheel geometry are such that predictions of strain as a function of geometry cannot be made over a wide range of wheel designs with a high level of confidence. The geometric variables which have the greatest effect on the plate strain due to lateral loading are thickness at minimum rim-plate depression, plate angle and rim-plate fillet radius. Increasing any of these dimensions tends to decrease the strain.

Stone, DH
Association of American Railroads Technical Center, (R-003) R-167, Mar. 1975, 54 pp, 20 Fig., 17 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center
PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

**03 098682
DEVELOPMENT OF THE MINDEN-DEUTZ BOGIE FOR SPEEDS ABOVE 200 KM/H**

German Federal Railway and Klockner-Humboldt-Deutz collaborated to design a good riding truck incorporating long wheelbase, long bolster swing links, coil suspension throughout and hydraulic dampers. Further development has involved graduated bolster side swing and worn-tread profiles on wheels. Most recently control of truck rotation has been introduced to allow speeds to 250 kph.

Eschenauer, KP *Rail Engineering International* Vol. 5 No. 3, Apr. 1975, pp 91-97, 12 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

**03 099175
ADVANCED DESIGN TECHNOLOGY FOR RAIL TRANSPORTATION VEHICLES**

This is an interim report on a cooperative research project between Washington University and AMCAR Division of ACF Industries Inc. The purpose of the project is development of a new finite element stress analysis capability which is more cost effective and better suited for fatigue life evaluation than existing finite element computer programs. The report contains a general outline of the method, description of the algorithm structure and methods by which the computational efficiency can be further increased. A benchmark problem established by experimentation and by computation using an existing finite element computer program (STARDYNE) is presented.

The Association of American Railroads and AMCAR Division of ACF Industries, Inc. provided for partial funding of this project.

Szabo, BA Katz, IN Rossow, MP Rodin, EY Peano, A Lee, JC
Washington University, St Louis, (64262) Intrm Rpt. DOT-OS-30108-
2, June 1974, 153 pp, Figs.

Contract DOT-OS-30108

ACKNOWLEDGMENT: DOT

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

03 099176

LINEAR EQUALITY CONSTRAINTS IN FINITE ELEMENT APPROXIMATION

A new approach to the formulation of finite element approximation problems is presented. The characteristic feature of this approach is that it permits simultaneous satisfaction of the completeness and continuity requirements, making convergence with respect to both increasing orders of polynomial approximation and reduced element sizes possible. When C sub I continuity is enforced, the joint requirements of completeness and continuity introduce linear dependencies among the nodal variables. This precludes inversion of the transformation matrix between the polynomial coefficients and nodal variables at the element level. However, because the linear equations that express interelement continuity possess a block-diagonal structure, it is possible to perform most of the required operations at the element level. The linear dependencies among the constraint equations and among the nodal variables can be evaluated by means of a modified version of the simplex method. The computational procedure is outlined.

The Association of American Railroads and AMCAR Division of ACF Industries, Inc. provided for partial funding of this project.

Szabo, BA Kassos, T
Washington University, St Louis, (64262) Tech. Rpt. DOT-OS-30108,
Sept. 1973, 41 pp, 20 Ref.

Contract DOT-OS-30108

ACKNOWLEDGMENT: DOT

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

03 099177

COMPUTER IMPLEMENTATION OF THE CONSTRAINT METHOD

A computer program based on the constraint method approach to finite elements is described. The program permits the user to select arbitrarily polynomial orders for the various fields to be approximated. A set of nodal variables enforcing C sub I continuity for arbitrary polynomial order is presented, and those aspects of the program algorithm which differ from conventional finite element programs are described, including the numerical determination of a set of independent variables. An example is presented and the results obtained by the constraint method program compared with results from a conventional program. The constraint method approach is seen to be competitive with the conventional approach.

The Association of American Railroads, AMCAR Division of ACF Industries, Inc., and Pullman-Standard, a Division of Pullman Inc. Provided for partial funding of this project.

Rossow, MP Lee, JC Chen, KC
Washington University, St Louis, (64262) Tech. Rpt. DOT-OS-30108-
3, Jan. 1975, 33 pp, 16 Ref.

Contract DOT-OS-30108

ACKNOWLEDGMENT: DOT

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

03 099178

1974 CAR AND LOCOMOTIVE CYCLOPEDIA

This reference volume incorporates technical, statistical and buying information for those involved in the design, rebuilding, repair and maintenance of cars and locomotives. Its sections: Dictionary of car and locomotive terms; Freight car design fundamentals; Freight train cars; Freight car construction; Railway service cars; Industrial and export cars; Passenger and transit cars; Couplers; Draft gears and cushion underframes; Air brakes; Brake gear; Safety appliances; Car and locomotive trucks; Axle journals and bearings; Diesel-electric locomotives; Diesel engines; Diesel-electric transmissions; electrical fundamentals; Car and locomotive maintenance facilities.

Simmons-Boardman Publishing Corporation 1974, 1020 pp

PURCHASE FROM: Simmons-Boardman Publishing Corporation 350
Broadway, New York, New York, 10013 Repr. PC

03 099190

Z 7001 TESTS PAVE THE WAY FOR ELECTRIC TGVs

For the Paris South East high-speed line, electric trainsets are being designed by French National Railways. A prototype has been used to test various mechanical and electrical elements. The main purpose was to try a new power truck design. This truck involves body-mounted motors and linear motor railhead brakes. With motors body mounted, the reduction in truck weight more than compensates for the brake. In addition to a description of the truck and brake, the traction system of the experimental rail car is also described.

Railway Gazette International Vol. 131 No. 6, June 1975, pp 213-216, 3 Fig., 1 Tab.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 099191

RIGA'S 200 KM/H EMU READY FOR MOSCOW-LENINGRAD LINE

The first six cars of the ER200, Russia's first 200 km/h train, have already achieved 206 km/h on the Sherbinka test track near Moscow. Higher speeds will be attained on a fast section of SZD track before the full 14-car train begins pre-service trials on the Moscow-Leningrad line, and after an 18-month test program is completed, the train will enter passenger service. The cars have aluminum alloy bodies. Trucks have welded box-section frames with pneumatic secondary suspension. The unmotored cab cars at each end of the train contain buffets; all the intermediate cars are fully motored and have two-and-two reclining seats throughout.

Dimant, Y Zhivs, V (Riga Carriage Works) *Railway Gazette International* Vol. 131 No. 6, June 1975, pp 220-22, 1 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 099192

PILOT LIGHT-ALLOY BODYSHELL PROVES APT TRAILER CAR DESIGN

In advance of three prototype trains, a complete trailer bodyshell has been constructed, using aluminum alloy extrusions for longitudinal body members. Static load tests produced predicted stress and deflection readings; resonance tests will be carried out before the 36 trailer cars are built. At this stage tooling for series production of this structure is being developed.

Ellis, BR *Railway Gazette International* Vol. 131 No. 6, June 1975, pp 225-27, 2 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 099193

DSB'S FLOW-LINE DEPOT SAVES 53 PERCENT OF MAN-HOURS

Danish State Railways has opened a new shop for the maintenance of the 450 electric multiple unit cars which are used for operation of the Copenhagen suburban service. In designing this new heavy maintenance facility, inefficient work practices were abandoned. Management consultants collaborated to evolve a flow-line system which has raised throughput and saves 95,000 man-hours annually. In converting to an assembly-line system, consideration was given to the psychological effects on the staff.

Jensen, NM (Danish State Railways) *Railway Gazette International* Vol. 131 No. 6, June 1975, pp 217-219, 1 Fig., 2 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

03 099200

CHESSIE "AUTOMATES" BOLSTER BOWL REPAIR

The Chessie System has developed a new technique for repairs on bolster bowls. The new welding and finishing procedure reduces the repair time from four to six hours to one hour.

Progressive Railroading Vol. 18 No. 4, Apr. 1975, p 45

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

03 099202

CONVERT REEFERS FOR FASTER LOADING/UNLOADING

Western Fruit Express Company rebuilt 152 mechanically refrigerated cars for faster loading and unloading of bulk potatoes. Conveyors are built into the floor of the cars. The floor can be sloped into the center to provide gravity feed to the conveyors. When not used for bulk potatoes the floor can be changed to a flat position for loading bagged or boxed perishables.

Progressive Railroading Vol. 18 No. 4, Apr. 1975, p 55

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

03 099203

"SPECIAL" CARS FOR RENT

North American Car Corporation recently designed three new unloading systems for bulk products. One car is equipped to liquify certain bulk products, such as sugar, at the unloading site. The product can then be easily pumped out, reducing handling costs. In another case, a new unloading valve was designed for covered hoppers that handle plastic pellets and resins. Product flow is easier to control and the chance of binding or wedging is reduced. The last car design uses air pressure to discharge the product. The hopper is pressurized to about 15 p.s.i. and then the discharge valve is opened, forcing the product out. The system eliminates moving parts, reduces contamination of the product and reduces handling costs.

Progressive Railroading Vol. 18 No. 5, May 1975, pp 47-48

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

03 099352

**FREIGHT CAR TRUCK DESIGN OPTIMIZATION
METHODOLOGY FOR A COMPREHENSIVE STUDY OF TRUCK
ECONOMICS**

As a part of the Federal Railroad Administration's Truck Design Optimization Project (TDOP) a determination of the economics associated with particular freight car truck designs is needed. Although TDOP centers around the development of performance and testing specifications for rail freight car trucks the methodology for evaluating the economic benefits to be derived from efficient truck designs is not at hand. Accordingly, it has been necessary to develop a systematic approach to identifying the cost elements associated with truck ownership. A methodology is proposed for developing the necessary truck economic data first through a pilot study and subsequently through the collection and verification of the data from a wide base of sources. A subsequent report is to outline the findings of this research.

This project was sponsored by U.S. DOT, Federal Railroad Administration's Office of Research and Development.

April, D
Southern Pacific Transportation Company Tech Rpt. FRA-OR&D 75-58, Apr. 1975, 27 pp, 1 App.

Contract DOT FR-40023

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

03 099355

ODOMETERS FOR RAIL APPLICATION

Available mileage counters were evaluated, anticipating the possibility of using mileage intervals, rather than elapsed time, for freight car inspection. Simple, reliable and reasonably low costing devices were required.

Only two unpowered mileage counting odometers were uncovered, one built in the U.S., the other in Switzerland. The Swiss device is not currently available in this country, presumably because of its particular suitability to European style trucks. The American built device was tested in eccentric rotation and for accuracy at both low and average freight car speeds. It was concluded that the American unit could serve satisfactorily in freight service, without modification, at what would appear to be acceptable cost levels.

This project was sponsored by US DOT, Federal Railroad Administration's Office of Research and Development.

Seekell, FM
Transportation Systems Center, (DOT-TSC-FRA-75-9) Intrm Rpt. FRA OR&D-75-70, May 1975, 16 pp, 4 Fig.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

03 099358

THE "FLIP TOP" LID

To prevent windage loss of lading, exclude moisture and avoid freezing problems, the 232 100-ton gondola cars used to haul low-sulfur lignite in unit trains from a North Dakota mine to a South Dakota power plant have covers which are opened automatically at the loading site and swing clear when the car goes through a rotary dumper for unloading. The five-section roof has each segment fitted with a vertical post on which is a horizontal roller above the clearance line of the train's locomotive and caboose. This roller contacts a scroll above the track which is contoured to open and then close the lids. Features of the train and its operation are discussed.

Progressive Railroading Vol. 18 No. 6, June 1975, pp 50-53

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

03 099362

**EFFECTS OF LONGITUDINAL IMPACT FORCES ON FREIGHT
CAR TRUCK BOLSTERS**

The design of truck bolster center plate rims was investigated as a result of increased reports of their failure on 100-ton capacity freight cars. The damage occurs when cars are coupled at moderate to high speeds, since the rapid deceleration of the truck causes high loads between the truck and body bolsters. Test measurements were made on an unloaded 100-ton hopper car impacting a string of loaded cars. The forces between the truck and body bolsters on the moving car were determined at impact speeds from 2.9 to 9.2 mph. Tests were made with two different energy absorbing capacities of draft gear. Loads at the truck-bolster/body-bolster interface averaged approximately 40,000 lbs for impact velocities up to 5 mph and reached 100,000 lbs at 7 mph. A peak load of 160,000 lbs was measured at 8.4 mph. Within the lower speed range there were no significant differences in load associated with the two draft gear, but at 6.7 mph the loads with the higher capacity gear were 25 percent less. Strain gages placed near the center rim indicated yielding on the first impact at 2.9 mph. Additional yielding continued as the impact velocity was increased. A finite-element stress analysis showed that loads of the magnitude measured on the test would cause severe stresses in the center plate rim and that yielding of the material would be expected. Several potential modifications of the truck bolster center plate rim were analyzed which showed that significant improvements could be obtained by making the rim wider and by increasing the radius of the fillet at the inside of the rim.

The project was sponsored by US DOT, Federal Railroad Administration's Office of Research and Development. IIT Research Institute was under contract to US DOT, Transportation Systems Center.

Johnson, MR
IIT Research Institute, (DOT-TSC-FRA-74-7) Final Rpt. FRA ORD&D-75-10, Sept. 1974, 42 pp, 18 Fig., 2 App.

Contract DOT-TSC-727

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-244225/AS, DOTL NTIS

04 052635

APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. STUDIES WITH D.C. CHOPPER CONTROLLED TRAINSETS. TESTS ON THE NS 1.5 KV D.C. POWER SUPPLY SYSTEM

The report gives an account of tests made by the Netherlands Railways (NS) with d.c. chopper controlled trainsets in September 1971. The harmonic interference produced by the d.c. chopper under different operating conditions were measured. Also investigated were sub-station harmonics and the effect on signalling and telecommunications installations. In addition, radio interference was measured. For comparison purposes similar tests were made with trainsets equipped with conventional control (rheostatic control). When working d.c. chopper controlled trainsets, the interference level measured in the telecommunications installation was higher than that produced by trainsets with conventional control. Except on coil-loaded lines the interference measured stayed under the CCITT recommended limiting values for telephone lines and data transmission. Special measures for the protective of NS signalling installations (track circuits, automatic train control) are not required.

International Union of Railways A122/RP 12E, Oct. 1974, 36 Fig., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

04 052636

OFFICIAL ACCEPTANCE AND MAINTENANCE OF DIESEL ENGINES. MAINTENANCE OF CYLINDER HEADS, VALVES AND ACCESSORIES

This report is based on a critical comparison of the experience of eight administrations. In confining itself merely to the technological aspect of maintenance, it describes the different, most frequently encountered defects, the causes and most common development trends of these and also the most currently used inspection and repair methods. The report also proposes the prescribed limits at the end of the official acceptance tests on engines, and includes a terminology in five languages. The Working Group has already prepared three reports on the maintenance of diesel engines, namely: Crank shafts (Report No. 12) Pistons, gudgeon pins, piston rings and cylinder liners (Report No. 14) Prevention of corrosion in diesel engine cooling circuits (Report No. 16).

International Union of Railways B13/RP 18/E, Apr. 1974, 54 pp, Figs., Photos., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

04 052655

ACCEPTANCE TESTING AND MAINTENANCE OF DIESEL ENGINES. MANUAL FOR THE CARRYING OUT OF 360-HOUR ENDURANCE TESTING OF DIESEL TRACTION ENGINES ON THE TEST BED, ACCORDING TO THE REGULATIONS OF ORE REPORT B13/RP 15

This document is mainly intended for the use of ORE supervisors controlling the 360-hour endurance testing of railway diesel traction engines on the test bed. It is in supplement to the documentation series needed for the acceptance tests.

International Union of Railways B13/FP 20/E, Oct. 1974, Figs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

04 052661

CONSTRUCTIONAL ARRANGEMENTS FOR IMPROVING THE RIDING STABILITY AND GUIDING QUALITY OF ELECTRIC AND DIESEL LOCOMOTIVES AND VEHICLES. SUMMARY OF TEST RESULTS AND VEHICLE DESIGN RECOMMENDATIONS

During the investigations and studies relating to the riding stability and guiding quality of tractive units, various data have been collected which have enabled constructional recommendations to be elaborated. These have been grouped together in such a way that it will be possible to choose, from among these recommendations, those which are apt to reduce the forces between wheel and rail to the greatest possible extent, while a good riding stability of the tractive unit is still ensured.

International Union of Railways B10/RP 15/E, Oct. 1974, 59 pp, Figs., 25 Ref., 2 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

04 052664

APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. TESTS WITH A SERIES 420 16-2/3 HZ A.C. TRAINSET EQUIPPED WITH DIFFERENT ASYMMETRIC THYRISTOR BRIDGES WITH CONTROLLED WAVE TURN-OFF

The present report gives an account of tests with the trainset 420 075 of the German Federal Railways which was equipped with three different types of thyristor gate pulse and wave turn-off control. The object of the tests was to determine by how much it is possible to improve the power factor by wave gate firing and turn-off control and to measure the harmonics spectrum and frequency weighted interference current generated by this system. From the results it may be concluded that the reactive and r.m.s. kVA can be reduced at the cost of more electronic equipment by gate firing and turn-off control, resulting in an improvement of the power factor. The effect on the harmonics and the frequency weighted interference current differs depending on the circuit design and the interference current increases in some cases.

International Union of Railways Apr. 1975, 26 pp, Figs., 1 Tab., 2 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

04 083029

POWER BOGIES OF THE DB 200 KM/H ET 403 INCORPORATING BODY TILT THROUGH THE SECONDARY AIR-SUSPENSION

Frame-mounted traction motors and curve-dependent body-tilting through the air-springs embodied in the MAN-designed traction-motor bogies on which the ET 403 is mounted throughout. Experience with the Ek 420 enables the development of a high-speed bogie with much in common.

Kaysersling, U *Rail Engineering International* Vol. 4 No. 9, Nov. 1974, pp 414-418, Figs.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 083031

BELGIAN NATIONAL RAILWAYS FOUR-CURRENT C-C ELECTRIC LOCOMOTIVES FOR INTERNATIONAL SERVICES

Six locomotives of Alstom design built under license agreement by Brugeoise et Nivelles based on SNCF Series CC 40,100 but updated to meet the operating requirements over severe grades in the Liege district. Air duct and circuit improved to enable existing machines to accommodate increased output compared with SNCF forerunners.

Rail Engineering International Vol. 4 No. 9, Nov. 1974, pp 428-432, Figs.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 083033

TRIALS BY SNCF OF A NEW BOGIE DESIGNED FOR VERY HIGH SPEEDS

The Y226 bogie design with a body-suspended drive studied by SNCF, built by industry in 12 months, and applied to a multiple-unit power car remodelled to run as a self-sufficient vehicle incorporating a mobile laboratory. The Y226 embodies newly-developed primary suspension and secondary suspension adapted from the RTG which is giving such good results at 300 km/h as to promote their application to the TGV concept for the Paris-Lyons high-speed line, both for gas-turbine and electric traction.

Garde, R (French National Railways) *Rail Engineering International* Vol. 4 No. 9, Nov. 1974, pp 399-405

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 083041
NEW YORK SUBWAY TRIES OUT FLYWHEEL ENERGY STORAGE

Backed by a DOT grant, Garrett AiResearch has developed a flywheel energy storage system which is being tried out in New York. NYCTA's traction supply is becoming overloaded, but energy savings through choppers and regenerative braking were not considered to be a technically satisfactory solution.

Railway Gazette International Vol. 131 No. 1, Jan. 1975, pp 23-24, 1 Fig., 1 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

04 083052
GAS TURBINE DRIVE FOR NEW HIGH SPEED TRAINS

After numerous tests over the last 40 years, the aircraft gas turbine of two-shaft design has emerged as the most promising power unit for high-powered, fast and lightweight rail vehicles of the future. The performance characteristics, superior to those of the diesel engine, are complemented either by an electrical transmission system or a hydraulic transmission unit. The advantage of the gas turbine lies in its compactness and lightness in weight, allowing a doubling of power and savings in space. Viewed from a commercial standpoint, this means a covering of fuel costs. In respect of noise development and exhaust gas emission, the gas turbine is also more favorable than the diesel engine. The most successful series-built vehicles powered by gas turbines are the turbotrains of the SNCF which have also been imported into the USA where they are to be built under license.

This paper was contributed by the Gas Turbine Division of ASME for presentation at the Gas Turbine Conference & Products Show, Houston, Texas, March 2-6, 1975.

Keller, R (Voith Getriebe KG)
 American Society of Mechanical Engineers 75-GT-88, Dec. 1974, 13 pp, 26 Fig.

ACKNOWLEDGMENT: ASME
 PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04 083053
THE ST6 GAS TURBINE IN TRAINS. OPERATING EXPERIENCE

This paper outlines the operating experience of the ST6 gas turbine installed in trains. Some of the problems encountered and the solutions used are discussed. The duty is compared to other more widely known duties. Some thoughts are offered for future applications of gas turbines to rail vehicles.

This paper was contributed by the Gas Turbine Division of ASME for presentation at the Gas Turbine Conference & Products Show, Houston, Texas, March 2-6, 1975.

Coffin, WM (United Aircraft of Canada Limited)
 American Society of Mechanical Engineers 75-GT-91, Dec. 1974, 9 pp, 10 Fig.

ACKNOWLEDGMENT: ASME
 PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04 083054
GAS TURBINE TRAIN DEVELOPMENT IN FRANCE

This paper presents a discussion on aircraft type gas-turbine train development. For railway traction purposes, the turbo-engines used on aircraft would improve the quality of the service provided in the electrified lines. The gas turbine should insure high speed and satisfactory acceleration. It would enable relatively lightweight construction to be carried out and run at a higher speed than trains on non-electrified lines. The gas turbine will not completely replace the diesel engine, but it will enable rolling stock to be constructed for which the diesel is unsuitable, especially in the case of high-speed, lightweight trainsets and, in the future, very high-power units.

This paper was contributed by the Gas Turbine Division of ASME for presentation at the Gas Turbine Conference & Products Show, Houston, Texas, March 2-6, 1975.

Garde, MR (French National Railways)
 American Society of Mechanical Engineers 75-GT-122, Dec. 1974, 8 pp, 10 Fig.

ACKNOWLEDGMENT: ASME
 PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04 083055
THE AMERICAN TURBOLINER

The background for selection of turbine trains for corridor service is examined and characteristics of the RTG Turbine Train power units described. Design criteria for future performance requirements are also developed.

This paper was contributed by the Gas Turbine Division of ASME for presentation at the Gas Turbine Conference & Products Show, Houston, Texas, March 2-6, 1975.

Pier, JR Foster, JL (Rohr Industries, Incorporated)
 American Society of Mechanical Engineers 75-GT-108, Dec. 1974, 8 pp, 10 Fig.

ACKNOWLEDGMENT: ASME
 PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04 083056
INTRODUCTION OF AIRCRAFT-DERIVED GAS TURBINES IN RAILROAD SERVICE

In 1963, the Deutsche Bundesbahn (German Federal Railway), together with KHD, studied the situation concerning a successful way of introducing gas turbines in rail-borne traffic. As a result, the Booster Locomotive V 169 (DL 219) was developed and introduced into service in 1965. This application, the first full service locomotive powered by a lightweight gas turbine, was presented to the public in 1965 at the World Traffic Exhibition in Munich and in 1966 at the International Gas Turbine Conference in Zurich, and gave an impulse to various other successful gas turbine applications in railroad traffic. The experience gained with the DL 219 led to the introduction of the DL 210 and VT 602 in 1971-1973. In the meantime, 25,000 hr of experience have been accumulated. Some highlights are presented and discussed in this paper.

This paper was contributed by the Gas Turbine Division of ASME for presentation at the Gas Turbine Conference & Products Show, Houston, Texas, March 2-6, 1975.

de la Croix, L Oberlander, G (Klocker-Humbolt-Deutz AG)
 American Society of Mechanical Engineers 75-GT-92, Dec. 1974, 8 pp, 7 Fig., 9 Ref.

ACKNOWLEDGMENT: ASME
 PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04 083917
COMPUTER SIMULATION OF A DIESEL ENGINE

Precise and detailed information and data are required to design new diesel engines and to improve the old ones. It is shown that such information can be obtained by detailed thermodynamic analysis on a computer with a small amount of experimentation. A theoretical model for complete thermodynamic cycle analysis is given keeping a balance between complexity of calculations and adequacy of results. Details of the computer program for the closed cycle and results of parametric studies made with the program are also given.

Garg, RD Agarwal, KK Desikachari, R *Institution of Eng (India) Journal, Mech Eng Div* Vol. 55 Part ME2, Nov. 1974, pp 67-75, 28 Ref.

ACKNOWLEDGMENT: EI (EI 75 008536)
 PURCHASE FROM: ESL Repr. PC, Microfilm

04 083944
DEVELOPMENT OF THEORETICAL AND EXPERIMENTAL RESEARCH FOR IMPROVING AND BOOSTING THE WORKING PROCESS OF DIESELS AND SUPERCHARGING SYSTEMS
 [Razvitie Teoreticheskikh i Eksperimental'nykh napravlenii po Sovershenstvovaniyu i Forsirovke Rabocheho Protssessa Dizelei i Sistem Nadduva]

The work carried out at the Central Scientific Research Institute of Diesel Engineering in the USSR on the work process of diesels and supercharg-

ing is described. It is concluded that modern diesels with high supercharging can be further improved. When mean effective pressure is raised above 25-30 kgf/cm², new problems of maintaining high diesel efficiency arise when maximum combustion pressures are limited within reasonable bounds due to design conditions. [Russian]

Ivanchenko, NN Ivanov, PV *Energomashinostroenie* No. 9, Sept. 1974, pp 8-10

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

04 083945
THYRISTOR CHOPPER CONTROLLER FOR SUBURBAN RAILCARS

The present status of chopper controllers for electric railways is discussed and some recent developments in chopper control engineering are described. These developments include the simplification of circuit configurations and decreasing the number of power semiconductor devices in order to minimize the size and weight of chopper controllers.

Jinzenji, T *Toshiba Review* No. 93, Sept. 1974, pp 20-27

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

04 084934
DYNAMIC LOADS ON THE GEARS OF TRACTION MOTORS

The gears of railcars and locomotives operate under more severe conditions than other types of gearing because of the high power they must transmit in limited space, and because of the high speed and vibrations to which they are subjected. JNR traction gears are relieved and/or crowned at the tooth face to avoid high tooth pressures which can lead to failure. It is not possible to calculate the strength of a gear without accurate knowledge of the load. The dynamic loads imposed on traction gears passing over switch frogs have great effect on their strength, particularly as involved in the Cardan drive (parallel shafts) on the high-speed Skin Kansen cars. A new type of drive which protects gears from dynamic loads is described.

Also available from ESL.

Miyaniishi, K Fukushima, Y Iyama, K Abe, H *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 4, Dec. 1974, pp 205-206, 5 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

04 084935
RE-ACTIVATION OF DETERIORATED POCKET-TYPE ALKALINE STORAGE BATTERIES

After prolonged service, pocket-type alkaline storage batteries deteriorate so that it is impossible to restore their capacity by overcharging. For such batteries, a new activation process had been developed, based on reversing the polarity during from 15 to 30 hours with current at the 5-hour rate and then recharging the battery completely at the same rate.

Available also from ESL.

Sugita, K *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 4, Dec. 1974, pp 203-204

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

04 084948
PERFORMANCE OF EXPERIMENTAL INVERTER LOCOMOTIVE CLASS BE 4/4 NO. 12001 OF SWISS FEDERAL RAILWAYS

The Be 4/4 inverter locomotive No. 12001 of Swiss Federal Railways (SBB) was commissioned in November 1972. The electrical equipment, supplied by Brown Boveri was installed by SBB at their maintenance shop in Yverdon. The locomotive has been thoroughly tested under all conditions and has been in regular service since the autumn of 1973.

Bohli, WU Brechbuhler, M (Brown Boveri and Company, Limited)
Rail Engineering International Vol. 5 No. 1, Jan. 1975, pp 13-17, 10 Fig.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 090118
REVENUE SERVICE OPERATION, 1973. AC PROPULSION PROJECT

This report discusses the integration of three AC powered cars into the Cleveland Transit System's revenue operation during 1973. The year of operation was divided into two distinct operating periods. In the first period, January through June, the three AC cars were not compatible with the remaining Airporter fleet. During the second period, July through December, the three AC cars were modified in such a manner as to render them compatible with the DC cars and were operated the remainder of the year in mixed service.

Prepared in cooperation with Westinghouse Air Brake Co., Wilmerding, Pa. Westinghouse Air Brake Div.

Smith, RD Skantar, ET
Cleveland Transit System, Urban Mass Transportation Administration, Westinghouse Air Brake Company, (UMTA-OH-06-0006) Tech Rpt. Apr. 1974, 79p

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB 238568/0ST, DOTL NTIS

04 090455
ACCELERATION-TIME INTEGRATOR

An electronic unit is described that integrates acceleration forces with respect to time and stores the accumulated value continuously in an electrochemical coulometer cell as a function of electro-plated metal. The stored-value can be remembered indefinitely, and be read out digitally on a metal de-plating unit.

Pizer, RS
National Highway Traffic Safety Administration, (T-1010) Intrim Rpt. DOT-HS-801-380, Jan. 1975, 7 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239844/4SL, DOTL NTIS

04 095219
APPLICATION OF STATISTICAL DATA TO IMPROVE LARGE BORE ENGINE LUBE OIL CONSUMPTION

Factorial testing has been a valuable tool for improving the performance of small bore engines by introducing modifications to piston ring and piston designs. Laboratory tests have produced advanced improvements in such parameters as oil consumption and blow-by, factors that are currently of utmost importance in endeavoring to reduce the usage of oil and the pollution of air. Many of the results obtained from small engine tests are applicable to large bore engines. This paper expands on the numerous theories gleaned from factorial testing of small bore engines and applied to large bore engines and the results obtained from a series of engines successfully tested in the field.

Contributed by the Diesel & Gas Engine Power Division of the American Society of Mechanical Engineers for presentation at the Diesel & Gas Engine Power Conference & Exhibit, New Orleans, La. April 6-10, 1975.

Culp, JB Curtis, JM (Koppers Company, Incorporated)
American Society of Mechanical Engineers 75-DGP-8, Apr. 1975, 12 pp, 4 Fig., 4 Tab., 3 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04 095228
LOCOMOTIVE TRACTION PERFORMANCE MEASUREMENT

The tonnage rating of a modern locomotive, the maximum train weight it is capable of hauling over a given line without undue risk of stalling, is primarily limited by track adhesion considerations rather than by limitations in the locomotive itself. The maximum tonnage ratings of two locomotives are thus in direct proportion to their maximum tractive efforts when operating on identical track adhesion conditions. Establishing this tractive effort ratio by direct measurement has proven difficult due to unpredictable track adhesion variations. These introduce a great deal of scatter in the tractive effort measurements. A test and analysis method which takes track adhesion variation into account is presented. This method allows the relative hauling capability of two different locomotive types to be evaluated quickly and accurately. Typical test results are presented. Correlation of results with recent operating experience is outlined.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Scott, WM Skene, RB Biglow, BA (Canadian National Railways)
American Society of Mechanical Engineers 75-RT-8, Apr. 1975, 11 pp, 7 Fig., 1 Tab., 6 Ref.

ACKNOWLEDGMENT: ASME

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04.095234

BATTERY-POWERED TRAINS CRISSCROSS GERMANY

The German Federal Railway currently operates 230 railcars powered entirely by storage batteries. These cars average 56,000 miles per year per car with speeds up to 60 mph and a 250 mile range per battery charge. The primary advantage of a battery-powered car is the combination of the economy of electric propulsion and the flexibility of self-powered units. The article contains a technical description of the cars and battery system.

Progressive Railroading Vol. 18 No. 3, Mar. 1975, pp 53-56

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

04 095264

ENERGY REGENERATION AND CONVERSION EFFICIENCY IN A HYDRAULIC HYBRID PROPULSION SYSTEM

An energy storage system having a limited capacity is employed for the purpose of (i) removing the burden of acceleration from internal and external-combustion type prime movers used in rubber-tired and rail urban mass transit vehicles and (ii) providing an efficient regenerative braking system to significantly increase fuel economy during typical stop-start vehicle schedules. Energy is stored in a hydraulic accumulator which is designed to be an integral part of the propulsion system. Data from laboratory tests are presented to indicate achievable energy conversion efficiencies. Computer simulation of various size vehicles being driven over typical transit-vehicle schedules is used to estimate the reduction in vehicular emissions and energy consumption resulting from the energy storage capability. An increase in fuel economy of up to 30% and an emissions reduction of up to 36% (NO sub x) were observed for the spark-ignited prime mover. When a simple cycle, single shaft gas turbine was simulated, the maximum increase in fuel economy was 24% with up to 50% reduction in emissions.

Wojciechowski, PH (Rochester Institute of Technology); Dunn, H
High Speed Ground Transportation Journal Vol. 9 No. 1, 1975, pp 383-392, 12 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 095283

CHEC A NEW EXCITATION SYSTEM FOR DIESEL-ELECTRIC LOCOMOTIVES

This paper describes the objectives sought in the development of a new System of Electronic Control of Traction Alternator Excitation for Diesel Electric Locomotives, describes the system itself to show how these objectives were achieved, and discusses field experience with Horsepower Excitation Control.

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Application Society for presentation at the 1975 Joint ASME/IEEE Railroad Conference, San Francisco, Cal., April 13-16, 1975.

Johansson, AV (General Electric Company)
Institute of Electrical and Electronics Engineers Conf Paper C-75-352-0-IA, Mar. 1975, 9 pp, 12 Fig., 4 Ref.

ACKNOWLEDGMENT: IEEE

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04 095284

AN APPROACH TO THE METROLINER UPDATING PROGRAM

The Metroliners have operated in high speed intercity service in the Northeast Corridor for several years. During this period of time, they have

received public acceptance as a fast, convenient and comfortable mode of transportation. However, a further expansion of service to greater passenger volume has been prevented by the low availability of the fleet. In late 1970, the Department of Transportation instituted a Metroliner Updating Program designed to improve the availability of the fleet. The program is proceeding in three major phases 1) Program Definition, 2) Engineering Design and Prototype Hardware, 3) Verification Testing. At this writing four of the present cars have been modified to prototype configuration and are ready for verification testing. This paper describes the approach to the program taken by Westinghouse Electric Corporation who updated two of the cars. An analysis of the causes of low reliability and poor maintainability led to a definition of the updating program. Simplified performance requirements and major modifications to several car systems are expected to increase reliability by a factor of four over that of the present car. Designs which are directed toward ease of maintenance together with monitoring and failure diagnosis equipment are expected to improve the maintainability so that 80% rather than the present 20% of all problems can be diagnosed and repaired within the turn-around time of one hour at the terminal.

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Application Society for presentation at the 1975 Joint ASME/IEEE Railroad Conference, San Francisco, Cal., April 13-16, 1975.

Uber, RA (Westinghouse Electric Corporation)
Institute of Electrical and Electronics Engineers Conf Paper C-75-354-6-IA, Mar. 1975, 18 pp, 22 Fig., 11 Tab., 4 Ref.

ACKNOWLEDGMENT: IEEE

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

04 095404

TECHNICAL PROGRAM IN LOCOMOTIVE EQUIPMENT. NINTH FIVE-YEAR PLAN: SOME ASSESSMENTS AND PROSPECTS IN THE DEVELOPMENT OF RAILWAY TRACTIVE STOCK

[*Tehniceskij progress v lokomotivnom hozjajstve. Devjataja pjatiletka; nekotorye itogi i perspektivy razvitiya tjogavyh sredstv zeleznodoroznogo transporta*]

Within the context of the plan for renewing railway equipment, tests are currently being carried out on models of electric and diesel locomotives, for both freight and passenger traffic and also on new types of motive and trailer stock. The writer briefly examines the technical characteristics of the new locomotives and their constructional features. He describes the modernization work on old rolling stock, and the improvement of production line rolling stock. Some of the major improvements obtained in freight locomotives are as follows: increase in axle load to 27-30 t for a.c. electric locomotives, and to 25-27 t for d.c. electric locomotives; increase in the axle rating to 700-800 kW for d.c. electric locomotive, to 1,000 kW for a.c. electric locomotives with 27-tonne axle loads, and to 1,300-1,500 kW for a.c. electric locomotives with 30-tonne axle loads. For diesel locomotives, it is planned to increase the rating to 1,000 h.p; fitting of regenerative braking on a.c. locomotives; use of non-commutator motors and multiple-unit running. With regard to the future of a.c. electric freight locomotives, it is planned to construct an 8-axle locomotive with a rating of 10,000 to 12,000 kW (1,300-1,500 kW per axle). For high-speed, d.c. lines, technical specifications have been drawn up for the supply of a CS200 model double electric passenger locomotive, with 8-axes and an output of 8,400 kW, designed for a maximum speed of 220 km/h. [Russian]

Nikiforov, BD *Elektriceskaja i Teplovoznaja Tiaga* No. 4, 1974, pp 6-10, 1 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Ministerstvo Putei Soobshchenia SSSR Moscow, USSR Repr. PC

04 095406

SYNCHRONOUS RUNNING OF DIESEL ENGINES AND HYDRODYNAMIC-TRANSMISSION SYSTEMS IN RAILWAY VEHICLES [Der Zusammenlauf von Dieselmotoren und Hydrodynamischen Getrieben in Schienenfahrzeugen]

The author represents and examines the characteristic curves of the coupler and hydraulic converter: in the process, he indicates the sector of these curves which is used during operation, the possibilities of connecting several converters and couplers in an hydrodynamic transmission, and the

characteristic curves of the whole system. Finally, he describes the problems linked with the construction of the transmission, and with the tuning of the tractive engine. [German]

Feulner, A *Eisenbahntechnische Rundschau* Vol. 23 No. 5, May 1974, pp 190-197, 15 Fig., 2 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

04 095407

SOME MAJOR TECHNICAL CHOICES MADE BY THE SNCF
[Quelques grandes options techniques de la SNCF]

Text of a talk given by the Director of the SNCF Rolling Stock Department on 16 May 1974 before the Plenary Assembly of the Association of European Thermic and Electric Locomotive Builders (CELTE) on the policy adopted as regards tractive units. This trend of progress towards a better quality of the service given and greater productivity was illustrated by techniques chosen by the SNCF: gas turbine, thyristor, monomotor bogie. According to the author, choice of such techniques should help the railways to face up to their competitors over the next twenty years. [French]

Dupuy, J *Revue Generale des Chemins de Fer* Vol. 93 Aug. 1974, pp 397-403, 3 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 095408

COMMUTATOR MOTORS WILL STAY ALIVE WELL INTO THE 1980S

Thyristor control, carbon fibre brushes, and the continued survival of variable speed commutator motors are likely future trends.

Beatson, C *Engineer* Vol. 239 No. 6185, Sept. 1974, pp 44-45, 4 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Morgan-Grampian Limited 30 Calderwood Street, London SE18 6QH, England Repr. PC

04 095445

BASIC RELATIONSHIPS IN DIMENSIONING TRACTION MOTORS AND INVERTERS FOR ASYNCHRONOUS MOTOR DRIVE
[Grundsätzliche Abhängigkeiten der Fahrmotor-und Wechselrichter-Dimensionierung beim Asynchronmotorantrieb]

The basic relationships in dimensioning traction motors and inverters for asynchronous motor drive are illustrated by means of examples, and the need for temperature-dependent slip-frequency adjustment for torque optimization demonstrated. The Author also deals with the effects of timing pulses and procedures on the inverter use factor, and the use of the computer as a design aid. [German]

Teich, W *Eisenbahntechnische Rundschau* Jan. 1975, pp 44-50, 16 Fig., 11 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

04 095623

CONSIDERATION OF SATURATION OF AN ELECTRIC MOTOR IN CALCULATIONS OF THE CHARACTERISTICS OF FREQUENCY-CONTROLLED ELECTRIC DRIVE
[Uchet Nasyshcheniya Asinkhronnogo Elektrodvigatelya pri Raschetakh Kharakteristik Chastotnereguliruemogo Elektroprivoda]

In calculating the characteristics of an asynchronous motor in an electric drive with frequency control of angular velocity, particularly in traction drive, it is necessary to take into account changes in the magnetizing circuit of the asynchronous motor following changes in the magnetic current. For this purpose, it is necessary to solve a system of three equations, one of which is nonlinear. The sequence of calculation is described and a subprogram is compiled which permits computer-aided computation of the characteristics of an asynchronous electric drive. [Russian]

Novikov, GV *Izvestiya Vysshikh Ucheb Zaved, Elektromekhanika* No. 11, Nov. 1974, pp 1218-21

ACKNOWLEDGMENT: EI PURCHASE FROM: ESL Repr. PC, Microfilm

04 095641

EFFECT OF TORQUE OSCILLATIONS OF RAILROAD MOTORS ON THE EFFICIENCY OF THE STATIC FRICTION
[Einfluss der Drehmomentschwingungen von Bahnmotoren auf die Ausnutzung der Haftreibung]

Measurements related to the effect of torque oscillations are reported, along with computational results. Experiments and calculations show that the magnitude of the variable forces at the circumference of the driving gear in ac and undulatory-current traction motors is basically the same, and in case of modern drive systems is of no significance. [German]

Behmann, U (Bundesbahnberrat, Germany) *Elektrische Bahnen* Vol. 45 No. 9, Sept. 1974, pp 213-215, 4 Ref.

ACKNOWLEDGMENT: EI PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 095646

OSCILLATIONS FROM THE ROTATION OF THE DRIVE AXLES OF ELECTRIC TRACTIVE UNITS
[Drehschwingungen von Triebachsen elektrischer Triebfahrzeuge]

Study into drive wheelsets of tractive units concerning rotation oscillations shows the relationships between the extent of pseudo-slip and oscillations. Calculations using models reveal the importance of fast acting anti-skid devices and the essential differences between unilateral and bilateral transmission with elastic or, as the case may be, rigid suspensions. [German]

Doppler, S *E und M/Elektrotechnik und Maschinenbau* Vol. 91 No. 7, 1974, pp 272-379, 8 Fig., 5 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

04 095651

MODERN DIESEL TECHNOLOGY
[Dieseltechnik heute]

As part of the work allocation between diesel and electric traction based on profitability criteria, diesel traction has been given a viable role in the context of the current programme for standard tractive units. The assigned objective of diesel traction is to adapt this model-programme to the requirements of future tasks by producing improved turbines and engines, by developing three phase-power transmission and electric heating, by replacing the two-axle railcar with 614 and 617-type units. Replacement of shunting locomotives types 260 and 261 by cardan-drive units should be considered. [German]

Kuckuck, R Niekamp, K *Die Bundesbahn* Vol. 50 No. 8, Aug. 1974, pp 495-500, 5 Fig., 4 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

04 095653

THE VARIATION IN SPEED OF AVERAGE AND HIGH POWER ALTERNATING CURRENT MOTORS USING STATIC FREQUENCY CONVERTERS
[La variation de vitesse des moteurs a courant alternatif de moyennes et grandes puissances par variateurs statiques de frequence]

The author points out that two main variable speed systems are competing with each other: the thyristor controlled direct current motor, at present the most wide-spread, and the alternating current motor fed at variable frequency by natural switching circuits: cyclo-converters, direct and indirect converters; the choice of system is determined each time by economic and electromagnetic considerations. The article deals successively with the theoretical and the technical aspect and with the behaviour of the motor-converter systems mentioned. The author ends with a description of the parts making up a synchronous 500 kVA machine successfully fitted with a variable speed system, fed by a direct converter and used for the drive of steam turbine components and to put them under load. [French]

Cordier, JP *Revue ACEC* No. 1-2, 1974, pp 3-24, 26 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Revue ACEC Charleroi, Belgium Repr. PC

04 095654

ENERGY ECONOMICS THROUGH SOLID-STATE POWER CONVERSION
[Energibesparing vid anvandning av halvledarteknik for jarnvagsdrift]

Energy savings of about 30 percent can be achieved on rapid transit systems through the use of thyristor choppers and blended regenerative/

rheostatic braking schemes. In a.c. traction scope for energy saving through the use of thyristors is more limited, but replacement of rotary machines by solid state frequency converters reduces substation losses by up to 40 percent. [Swedish]

Bjerkehagen, O Kollberg, B *Jarnvagstechnik* Vol. 42 No. 3, 1974, pp 54-57, 6 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Jarnvagstechnik P.O. Box 265, S-10123 Stockholm, Sweden Repr. PC

04 095656

AXLE-DRIVE DYNAMICS FOR HIGH RUNNING SPEEDS OF A DIESEL LOCOMOTIVE [La dynamique d'entraînement de l'essieu pour vitesses de marche élevées d'une locomotive Diesel]

A study of the vibratory movement of the drive system using seven coordinates to define vertical displacement, angular direction and inertia moments in relation to their balancing position. From an analysis of the specific example of a locomotive driven independently by an electric transmission it has been possible to reach the following conclusions: a tangentially flexible wheel reduces dynamic stresses by 40 percent over rigid transmission; the flexible suspension of the engine reduces the torque whilst improving the rate of adherence; for speeds between 10 and 200 km/h, the maximum axle discharge value is virtually constant. [French] Zahradka, J *L'Industrie Lourde Tchécoslovaque* No. 11, 1973, pp 6-10, Figs.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: L'Industrie Lourde Tchécoslovaque Prague, Czechoslovakia Repr. PC

04 095659

PROSPECTS FOR IMPROVING ELECTRIC TRACTION MOTORS [Perspektivy soversensstvovanija tjagovyh elektrodvigatelej]

A traction motor determines the characteristics and service capacity of electric locomotives to a large extent. The characteristics and parameters of the motor have an influence on the technical and economic aspects of electric traction as a whole. Before examining the prospects of the electric traction motor, the author briefly describes achievements made thus far and, on the basis of criteria shown in a table, he evaluates progress made in building electric tractive units in the USSR. A rated output of 1300-1400 kW per axle will be required for electric tractive units in the future. A very difficult problem remaining is that of developing a commutator motor having a 1300-1400 kW rating when the torque is increased and its mass and dimensions remain the same. At present, it has been found possible to use alternating current motors without commutators (synchronous or asynchronous) fed from a variable-frequency phase converter with thyristors for electric engines. The article gives an evaluation of the synchronous and asynchronous motors used on the Soviet Railways. Tests carried out on electric trainsets powered by a motor without a commutator have confirmed their theoretical capabilities in service. However, it is not likely that these locomotives will be produced in series in the near future. There are other possibilities of obtaining a high rating for given dimensions. The author describes aspects of using a traction motor without a commutator in the form of a disc. Driving several axles with a single motor will also open even more possibilities for obtaining a high output. [Russian]

Kurbasov, AS *Elektriceskaja i Teolovoznaja Tiaga* Vol. 18 No. 8, 1974, pp 20-23, 4 Fig., 1 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Ministerstvo Putei Soobshchenia SSSR Moscow, USSR Repr. PC

04 095678

THREE PHASE MOTORS FOR DIESEL AND ELECTRIC TRACTION

After four years of development, solid-state power conversion devices have proved a satisfactory and reliable way of gaining the benefits of asynchronous three-phase induction motors for traction. These include better adhesion characteristics as well as a lighter and more robust motor needing less maintenance. Now one of three diesel-electric prototypes is in service in straight electric form, proving the versatility of this form of drive.

Korber, J (Brown Boveri and Cie AG); Teich, W *Railway Gazette International* Vol. 131 No. 2, Feb. 1975, pp 64-71, 3 Fig., 1 Tab.

PURCHASE FROM: XUM Repr. PC

DOTL JC

04 095692

BASIC CRITERIA FOR THE DESIGN OF ELECTRIC MOTIVE POWER UNITS WITH ASYNCHRONOUS TRACTION MOTORS

Recent advances in power semi-conductor techniques permit the use of the three-phase asynchronous motor without commutator, which is advantageous to railway traction. The advantages compared with conventional commutator motors are discussed. Attention is drawn to the equipment required for feeding the traction motors in the vehicle body. Of particular importance is the supply performance. By introducing the four-quadrant setter (4q-S), it is possible to achieve a power factor in excess of 0.96 at full load as well as a very good performance at part load. Reference is made to the possible use of this equipment, advantageous to permanent way and catenary alike, for locomotives and high-speed vehicles using the 16.2/3 c/s, 15 kV traction system.

Korber, J *Rail International* Vol. 6 No. 1, Jan. 1975, pp 46-54, 12 Fig., 9 Ref.

ACKNOWLEDGMENT: Rail International PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 095695

INDUSTRIAL APPLICATIONS OF COMPRESSED AIR

The past 30 years has seen a continuous increase in the application of compressed air for pneumatic devices used in mechanical engineering. In many cases it is so much more efficient as to be virtually irreplaceable by alternative power sources: not only its safety and flexibility makes it unique. And remarkable power-to-space/weight ratio results in a high degree of compactness and miniaturisation. This article gives some examples of how airpower is being applied today; the tools and the industries in which they are used, including the most recent ingenious application—that of fluidics control.

Eriksson, HB *Chartered Mechanical Engineer* Vol. 21 No. 11, Dec. 1974, 6 pp

ACKNOWLEDGMENT: British Railways PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 095867

DYNAMIC BRAKING

The kinetic energy of rapid transit trains that is normally dissipated as heat during braking can be converted to potential energy. The use of a flywheel energy storage system is an old idea that has recently been revived. A competitive idea being advanced is the thyristor inverter-recuperative system. While extensive operational experience is not yet available for either, both are currently being tested. The flywheel system is being tested on the New York Transit Authority and the regenerative system on the Sao Paulo, Brazil, Metro. It appears that the regenerative system is more efficient and requires less maintenance, thereby justifying the additional capital investment.

Kalra, P (Bechtel Corporation) *IEEE Spectrum* Vol. 12 No. 5, May 1975, pp 63-66, 4 Fig., Refs.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

04 096587

DEVELOPMENT AND FUTURE TRENDS OF THE UNDERGROUND ELECTRIC TROLLEY LOCOMOTIVE SYSTEMS

The introduction of the locomotive in British Coal mines as a means of underground transport is described together with the relative utilization of the electric trolley locomotive as compared to the diesel and battery locomotives. The experience gained in the United Kingdom and Germany with the underground electric trolley locomotives is discussed and comparisons made of the regulations. The relative advantages and disadvantages of ac and dc powered trolley wires together with double wire and single wire/rail return are illustrated and forecasts are made of the type of electric trolley locomotive system that could be utilized for future underground duties in the United Kingdom.

Gilbert, S (National Coal Board, England) *Mining Technology* Vol. 56 No. 650, Dec. 1974, pp 468-470

ACKNOWLEDGMENT: EI PURCHASE FROM: ESL Repr. PC, Microfilm

04 096592

CONTRIBUTIONS TO THE STUDY OF AN ELECTRONIC COMMUTATION MOTOR [Contributions a l'etude de la machine a commutation electronique]

Study and synthesis of an electronic commutator digital control system used in conjunction with a three-phase, four-pole AC machine. In the basic device, the static commutator replacing the mechanical commutator is a naturally commutated thyristor bridge. Since the system is used to test a theoretical model of the brushless DC machine, the control system was designed to attain a good flexibility and a high accuracy in the selection of the commutation angle. [French]

Labrigue, F (Louvain Catholic University, Belgium); Ducas, Y *Revue E Electricite, Electro Gen, Cour Forts & App* Vol. 7 No. 10, 1974, pp 257-264, 12 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: Societe Royale Belge des Electriciens Brussels, Belgium Repr. PC

04 096598

COMMUTATORLESS MOTOR FOR ROLLING STOCK

Commutatorless motors are synchronous motors or induction motors which use semiconductors. In rolling stock applications improve traction motor performance, increase output and eliminate maintenance. Speed control can be achieved by controlling the applied voltage and frequency. Several commutatorless motor systems for rolling stock applications are described. The specifications and performance of a 110 kw self-controlled thyristor motor are outlined.

Sato, H Sawa, K Fujiwara, Y Okamoto, K *Fuji Electric Review* Vol. 20 No. 4, 1974, pp 154-163

ACKNOWLEDGMENT: EI

PURCHASE FROM: Fuji Electric Review Japan Repr. PC

04 096619

DIRECT CURRENT CONVERTER FOR MOTORS AND GENERATORS OF DIRECT CURRENT SERIES MOTORS [Gleichstromsteller fuer den motorischen und generatorischen Betrieb der Gleichstrom-Reihenschlussmaschine]

Traction/braking switching of an induced circuit and excitation of the direct current series motors of the motive power units has generally been by means of contacts. This article describes an arrangement with thyristors and diodes for rapid change-over. The induced current and inducting current are uncoupled without the action of contacts. Another mounting for switching without inverse voltage protects against large voltage surges on the energizing winding. A simple extension of the mounting for regenerative braking and rheostatic braking is possible.

Kahlen, H *Elektrotechnische Zeitschrift, Ausgabe B* Vol. 95 No. 9, Sept. 1974, pp 441-445, 14 Fig., 17 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: VDE Verlag GmbH Bismarckstrasse 33, Berlin Charlottenbug, West Germany Repr. PC

04 097311

NEW LOCOMOTIVE DEVELOPMENTS AT ELECTRO-MOTIVE DIVISION

Details of new diesel-electric and electric locomotives are described. The problems of exhaust emission control are discussed. Various locomotive components and the reasons for their development are mentioned.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13 097310, 03 097312, 03 097313, 04 097314, 03 097315, 03 097316, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in the Autumn 1975 Bulletin.

Addie, AN (General Motors Corporation)
Federal Railroad Administration 1974, pp 94-101, 20 Fig.

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC

04 097314

RECENT DEVELOPMENTS IN ELECTRIC AND DIESEL ELECTRIC LOCOMOTIVES

Discussed are trends in design of diesel electric locomotives, trends in design of electric locomotives, and the increasing sophistication of testing. A list of the user's values in locomotive use is included. Some of the effects of current environmental regulations on locomotive design are discussed. Improvements in locomotive components are described.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 13 097310, 04 097311, 03 097312, 03 097313, 03 097315, 03 097316, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in the Bulletin 7502.

Bellis, MW (General Electric Company)
Federal Railroad Administration 1974, pp 85-94, 45 Fig.

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC

DOTL NTIS

04 097994

POWER SUPPLIES FOR PASSENGER TRAINS

Coaches fitted with air conditioning and other services require an extensive and high-capacity power supply system to feed the lighting and heating, refrigerating plant, fans providing forced ventilation to the passenger compartments, hot water storage tanks and, in coaches with sleeping berths or couchettes, the refrigerators. The three-phase power systems used in passenger rolling stock are at present still equipped with rotary converters. Suitable motor-generator sets have proved to be reliable. The only drawback is the need to check the commutator motor regularly. For traction vehicles, the change from commutator machines to induction motors is well under way. In the future, static frequency changers can be expected to replace the rotary converter for supplying power to multi-system coaches. Existing rolling stock with a three-phase system can then be modernized at reasonable cost by replacing the motor-generator with a static frequency changer.

Strub, P *Brown Boveri Review* Vol. 61 No. 12, Dec. 1974, pp 559-563

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

04 098001

THYRISTOR CHOPPER CONTROLS FOR D.C. TRACTION SYSTEMS

Choppers were first designed more than ten years ago. Owing to the advantages of this design, such as the low-loss and stepless control of the motor voltage and current without using mechanical contacts, as opposed to conventional rheostatic control, the chopper is finding increasing application in short-distance traction systems. The article describes design concepts for the running and braking schemes developed to date as well as the equipment required.

Wagner, R *Siemens Review* Vol. 42 No. 1, Jan. 1975, pp 39-43, 7 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

04 098002

DIESEL ENGINE DESIGN TRENDS

Paper indicates how legislative pressures have emerged as having a significant (perhaps dominant) influence in diesel engine design. Economic and engineering considerations begin to assume a subordinate role.

Automotive Engineering Vol. 83 No. 1, Jan. 1975, 3 pp

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

04 098003

RECENT IMPROVEMENT ON THE FATIGUE STRENGTH OF SOLID TYPE FORGED STEEL CRANKSHAFTS

Deals with the improvement of fatigue limit and reliability of both solid type crankshafts made of C-steel and Cr-Mo higher tensile strength steel

DOTL NTIS

associated with continuous grain flow forging (RR crankshafts), and describes the strengthening effects of fillet cold rolling for a Cr-Mo higher tensile strength steel crankshaft.

Fukui, Y (Kobe Steel, Limited); Nishihara, M
Marine Engineering Society Tech Paper 1973, pp 19-42

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

04 098057
A CALCULATING METHOD OF TEMPERATURE CHARACTERISTICS OF AN ARMATURE OF A TRACTION MOTOR

To calculate temperature rise in several portions of an armature of a traction motor; the armature is divided into 5 portions and the heat flows in it are simulated by an equivalent circuit with the same lumped constants as the electrical circuit. The present studies are made to determine the various thermal constants of the armature, the losses and the heat capacities which are necessary to calculate an armature temperature rise in designing the motor. The temperature rise curves for several portions of an armature at arbitrary operating conditions of the motor can thus be estimated by differential equations about the equivalent circuit.

Yamazaki, S *Railway Technical Research Institute* Vol. 16 No. 1, Mar. 1975, pp 11-14, 6 Fig., 2 Tab., 4 Ref.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

04 098066
SELTRAC OPERATING CONTROL SYSTEM FOR LOCAL TRANSPORT [Die Betriebsablaufsteuerung SELTRAC fuer Nahverkehrssysteme]

The SELTRAC (registered trademark) operating control system has been developed by SEL for tracked urban transport applications such as underground and rapid transit railways and also large cabin systems. The modular hardware and software allows the degree and extent of system automation to be extended step by step as required. Full automation can be achieved in several stages, starting from a purely monitoring system. Described here are the basic operating concept, operating sequences and possible alternatives, also vehicle distribution in the network and planning of the running schedules. Even with a high degree of automation a central controller is required, and his workplace and scope for action are described. In conclusion there is a description of the layout and function of a SELTRAC demonstration system. [German]

Dobler, KU *Eisenbahntechnische Rundschau* Vol. 24 May 1975, pp 181-186, 5 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

04 098069
ELECTRICAL SYSTEM OF THE GERMAN FEDERAL RAILWAY'S CLASS 627-628 DIESEL RAILCARS [Die elektrische Anlage der Dieseltriebwagen Baureihe 627 und 628 Der Deutschen Bundesbahn]

A new diesel railcar, classed as 627 for the single unit and as 628 for the double unit, has been developed by the DB's Central Research Office in Munich together with manufacturers as a replacement for the 795/798 two-axle rail-bus. The Author describes the layout and operation of the new railcar's electrical system, with special reference to the engine control and monitoring equipment; it is the first time that all-electronic controls have been applied to a diesel traction unit. Also described are the 110.V power supply, the driver's console and the safety and ancillary equipment. [German]

Thomas, K *Eisenbahntechnische Rundschau* Vol. 24 May 1975, pp 153-164, 17 Fig., 4 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

04 098774
TRACTION MOTOR RELIABILITY

Computer program: MAIN DIESEL COMPONENT INVENTORY, CAR MOVEMENT HISTORY FILE. Program produces a family of reports giving traction motor reliability data by model. Reports provide basis for decision rules for vendor selection, and preferred combinations of traction motor model—locomotive model. Input consists of traction motor application (to locomotive units) and removal records, traction motor disassembly and reassembly records. Mileage is obtained from the car movement history file. Output consists of the following reports: 1. Traction motor overhaul data by motor serial number. 2. Traction motor overhaul data by armature serial number. 3. Traction motor armature overhaul rates by armature manufacturer for each 100,000 mile increment since manufacture or rewinding. 4. Traction motor model-locomotive model failure rates by combination showing number of motors in class, mileage last 3 months; reason for overhaul and number of overhauls.

Tritt, RF
Southern Railway System 1969

ACKNOWLEDGMENT: AREA (AREA 12-01-003)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

05 052604

BRAKE PADS FOR DISC BRAKES AND COMPOSITION BRAKE BLOCKS. DEVELOPMENT OF PHYSICAL-MECHANICAL AND CHEMICAL-ANALYTICAL TEST PROCEDURES FOR ACCEPTANCE TESTING AND QUALITY CONTROL OF BRAKE PADS

Provisional specifications for the acceptance testing of disc brake pads have been compiled in B 126/RP 1. For the final version of this document, further tests need to be carried out. Some of these, covering physical, mechanical and chemical properties of pad "composition" materials are described in the present report. Considerable variations in property levels due to material heterogeneity have been noted. The application of a number of the test methods studied as quality control and acceptance testing techniques seems quite feasible. Further experimental work will be required before correlation between the properties studied and the braking performance of "composition" materials is possible.

International Union of Railways B126/RP 2/E, Oct. 1974, 16 pp, Figs., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

05 052640

BRAKE PADS FOR DISC BRAKES AND COMPOSITION BRAKE BLOCKS. ENQUIRY UNDERTAKEN IN 1973 CONCERNING THE USE OF COMPOSITION BRAKE BLOCKS

The enquiry undertaken in 1971 concerning the use of composition brake blocks and circulated to 12 ORE Administrations (Administrations represented by members in the ORE B 64 Committee) was repeated in 1973 and then extended to all 43 ORE Member Administrations. In general, the use of brake blocks is found to be growing; they are applied on shunting and main line locomotives, passenger coaches, goods wagons and also on suburban and city railways. The economic advantages and environmental protection are of decisive importance for their application. For the problems still existing despite the active research into this field, solutions are sought by further studies within the scope of those undertaken by the ORE B 126 Committee and the continued exchange of experience.

International Union of Railways B126/RP 3/E, Oct. 1974, 28 pp, Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

05 052652

BRAKING AND ACCELERATION FORCES ON BRIDGES. BRAKING TESTS ON STRAIGHT TRACK WITH A LONG TRAIN

The tests were designed to establish whether some reduction of peak braking effort might be obtained due to propagation time in a long train. Performed, more expediently on plain line with a train of oil tank wagons, some advantage for long bridges was proved, particularly with loose coupling. The tests serve to explain how, in a long train of 20 wagons, the resultant frictional coefficient falls below the value of 0.15 of the individual wagons. For economy they were performed in a station track at Reichertshofen with full and with shortened train, and with both close and loose coupling.

International Union of Railways Apr. 1975, 24 pp, Figs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

05 095226

HOT SPOT HEATING BY COMPOSITION SHOES

It is generally understood that uneven heating of the tread of a wheel during braking is possible. A method has been devised to measure the intensity and frequency of hot spots on the wheel tread surface. After a description of the measurement apparatus and technique, results of a study of hot spots during constant speed brake applications with single composition shoes are presented. Possible lowering of the hot spot level by increasing the conformability of the brake shoe is studied by cutting one slot across each pad of a brake shoe. This method of hot spot study may be useful for future analysis and improvement of brake shoes.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Wetenkamp, HR Kipp, RM (Illinois University, Urbana)
American Society of Mechanical Engineers 75-RT-2, Apr. 1975, 5 pp, 7 Fig., 1 Tab., 12 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

05 095230

COMBINATION FRICTION BRAKING SYSTEMS FOR FREIGHT CARS

The improvement in railroad capacity requires among other things, the ability to safely increase speeds on significant downgrades. A means of doing this by way of a combination of on tread and off tread brakes is shown along with dynamometer data to support the method both technically and economically. An historical review of the need for supplementary braking is also included.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Blaine, DG Cabble, GM Grejda, FJ (Westinghouse Air Brake Company)
American Society of Mechanical Engineers 75-RT-11, Apr. 1975, 16 pp, 30 Fig., 3 Tab., 8 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

05 095245

CAUSE FOR THE FORMATION OF GROOVES ON THE WHEELS OF BLOCK-BRAKED RAILROAD ROLLING STOCK AND THEIR PREVENTION [Ursache der Rillenbildung und Deren Vermeidung bei Raedern Klotzgebremster Schienefahrzeuge]

Grooves on the friction surface of block-braked car and locomotive wheels are not formed as a result of hard structural constituents in the cast-iron brake blocks, but rather as a result of partial melting and displacement of the wheel steel softened by heating in excess of the solids temperature during the friction process. The displaced steel collects for the most part on the braking surface of the block in the form of foil laminations. The cause for this phenomenon lies in an excessively high softening temperature of the brake block material. To prevent the occurrence of this defect, it is suggested to use cast iron containing low-melting structural constituents in adequate quantity and distribution. [German]

Pahl, E (Bundesbahn-Versuchsanst, Germany) *Maschinenschaden*
Vol. 47 No. 3, 1974, pp 107-114, 30 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

05 095630

MEAN SPEED OF BRAKING THE TRACTION VEHICLE [Die Mittlere Geschwindigkeit beim Bremsen eines Triebfahrzeuges]

The characteristic data, such as traveling time, traveling speed, are obtained by solving the d'Alembert basic equation. The calculation of the braking procedure has so far been based on a mean speed corresponding to half the braking speed. In this paper the corrected mean speed is computed under consideration of the nonlinear motional resistance. [German]

Sliwa, H *Glaser's Annalen ZEV* Vol. 98 No. 12, Dec. 1974, pp 414-416, 3 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

05 095657

THE LIMITATIONS OF THE BRAKING POWER OF COMBINED BRAKE SYSTEMS [Leistungsgrenzen kombinierter Bremssysteme]

The author explains the brake systems of high speed trains and describes braking to a stop in detail. He then discusses the limitations of the braking power of brakes and explains the problem of the coefficient of adhesion, as

well as suitable combinations of brakes. Providing that each bogie is loaded at 12 tonnes per axle, various combined brake systems can be used for speeds of up to 350 km/h. Electromagnetic eddy-current brakes are very important for braking over short distances. [German]

This paper was presented at the 15th Colloquium on Railway Rolling Stock, Graz, 10 April 1974.

Saumweber, E *Glaser's Annalen ZEV* Vol. 98 No. 7-8, July 1974, pp 259-265, 17 Fig., 2 Tab., 9 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

05 096556

PRESENT STAGE OF DEVELOPMENT OF SYNTHETIC FRICTION MATERIALS FOR RAILWAY VEHICLES

A survey is given of the present stage of development of synthetic friction materials for rail vehicles. With block brakes, the speed limit for the use of synthetic brake blocks appears to be 140 km/h for lightweight vehicles and 120 km/h for heavy vehicles. For higher speeds, the disc preferably in conjunction with a block brake, should be used. Suitable brake linings are available for nearly all applications. Further development can only be realised by close co-operation between vehicle manufacturers, railways administrations, brake manufacturers and lining manufacturers. Regarding vehicles with synthetic brake linings, the procedures for the determination of the braked weight will have to be extended to include the low-speed range.

Ehlers, H *Glaser's Annalen ZEV* Vol. 99 No. 1, Jan. 1975, pp 11-16

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: Siemens (Georg) Verlagsbuchhandlung Luetzowstrasse 105-196, 1 Berlin 30, West Germany Repr. PC

DOTL JC

05 096557

ELECTRIC BRAKING IS ESSENTIAL: HISTORY AND ADVANTAGES OF ELECTRIC BRAKING: TECHNOLOGY AND PERFORMANCE

In the first article, the author, who is Rolling Stock Manager of the SNCF, explains the functioning of electric braking, its development and how it is employed. He lists its various advantages and states that electric brakes are essential for speeds above 180 km/h. High-speed running experiments have therefore produced a new technology in this field. The author refers to the economic benefits of this braking system and concludes by describing the developments which, by employing electronic power-control systems, have led to present applications. In the second article, the author, who is Head of the Electronics Division at the SNCF Rolling Department, gives details of the SNCF electric motive power fleet fitted with electric brakes, which are essential for high-speed running. The characteristics and

operation of electric braking equipment are described on the most modern direct-current, single-phase and dual-current locomotives (CC 6500, BB 7200 BB 15000 and BB 22200 series), as well as on the experimental high-speed Z 7100 railcar. The locomotives have two different electric brake systems (one for normal braking, the other for emergency braking); the railcar is provided with an eddy-current linear brake system. [French]

Bouley, J Cossie, A *Revue Generale des Chemins de Fer* Vol. 93 Dec. 1974, pp 713-723

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

05 096622

REGENERATIVE BRAKING FOR RAIL VEHICLES. AN OVERALL VIEW [Nutzbremsung bei Schienenfahrzeugen Eine Uebersicht]

By means of thyristor rectifiers and electronic regulator devices, the old problem of regenerating the braking energy of rail vehicles has been solved and, at the same time, full safety in use is assured. Conventional solutions in the past did not provide a fast enough reaction speed to protect the devices against the harmful effects of excessive voltages and currents. Furthermore, electronic solutions give better performance and results. The article deals with the principles of regenerative braking with separate excitation and self-excitation for direct and alternating current engines. [German]

Scholtis, G *Elektronik* Vol. 22 No. 11, 1973, pp 383-386, 16 Fig.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: ESL Repr. PC, Microfilm

05 096623

THE CAUSE OF SCALING ON RAIL VEHICLE WHEELS FITTED WITH BRAKE SHOES, HOW TO RECOGNIZE IT [Ursache de Rillenbildung und deren Vermeidung bei Raedern Klotzgebremster Schienenfahrzeuge]

Scaling on the running surface of rail vehicle wheels fitted with brake shoes is caused by segregation through melting and upsetting of the steel of the wheel which is heated to the temperature limit for solids and softened during braking. Scaled steel gathers on the brake shoes's friction surface as the scales pile up. The reason for this phenomenon is the very high softening temperature of the brake shoe material. The scaling phenomenon can be stopped by using cast iron with structural elements that have a low fusion temperature. Phosphorus forms a eutectic in the Fe-C-P system which melts at 950 degrees C. [German]

Pahl, E *Maschinenschaden* Vol. 47 No. 3, 1974, pp 107-114, 8 Fig., 3 Tab., 30 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: ESL Repr. PC, Microfilm

06 052598

ELECTRONIC TEST INSTALLATION (VIENNA-ARSENAL). TESTS MADE BY THE ELECTRONIC TEST INSTALLATION DURING THE TIME FROM SEPTEMBER 1, 1971 TO AUGUST 31, 1972

This is the fifth annual report of the electronic test installation (formerly installation for testing data transmission equipment), erected and operated in Vienna jointly by the Office for Research and Experiments (ORE) of the International Union of Railways (UIC) and the Austrian Federal Research and Test Institute. In the course of the financial year, one modem for a modulation rate of 600/1200 bauds was tested. As a result of this, the number of modem types entered in the comparative table and in the comparative curves has risen to 16. This report also contains the results of measuring the interference on the telephone circuits of the NS, UBB, and FS due to thyristor-controlled electric locomotives. In addition, the report contains CCITT documents on recommendations for testing modems, the tests being based on the design of the installations for testing data transmission equipment at Vienna Arsenal.

This is a confidential report available only to the Member Administrations of ORE.

International Union of Railways AZ32/RP 5/E, Nov. 1973, Figs., Tabs., 1 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

06 052611

A COMPUTER-BASED SYSTEM FOR INTERLOCKING CONTROL

In the Amsterdam and Utrecht stations, a computer system will be used as a means to control local and remote interlockings. This will include such functions as train identification (using scheduled train sequences), train describer (on standard peripheral crt devices), train route optimization (including conflict resolution in case of slight disturbances), route control, control of platform indicators, train reporting, statistics, field control of a part of shunting movements, and man-machine communications. After some introductory remarks, the paper describes design philosophy, system configuration (including interface equipment) and in a more detailed manner the software for route optimization and conflict resolution.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Weidema, J
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

06 052615

AUTOMATIC ROUTE SETTING BY TRAIN NUMBER EVALUATION

Automatic setting of train movements at junctions requires routing criteria. For this purpose the train number which includes the train destination and the route to it is well adapted. A limited capacity computer is especially suited for evaluation of the train number and the resulting route setting. SBB will use the reconstruction of the track system in Zurich Oerlikon station, an important junction, to install an automatic train routing system with a processor. INTEGRA AG has in this connection developed a simulation program for a PDP 8e computer which, in off-line operation, permits the simulation of all technical and operating conditions which need to be allowed for. Every train entering the control area is guided over a predetermined route to its destination without being diverted and, in accordance with the criterion of "first come-first served" decision principle, without considering any priorities. This type of automatic train routing provides an economical and flexible solution which will enable even more complicated decision algorithms to be performed when the time comes.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Stalder, O
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

06 052619

COMPUTER CALCULATION OF TYPICAL TRAIN RUNS AND APPLICATION OF SIGNAL POSITIONING FOR TRAIN HEADWAYS

Train movement simulation program permitting the elaboration (and plotting) of typical runs and the calculation of stopping distances and safety intervals. This program offers the possibility of optimizing the running speed for obtaining a given interval (at present with moving and variable block section) and a signal interpositioning (in the course of study-application to a signalling system adapted to the automatic pilot working of trains on the PARIS urban network).

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Perrin, J Cervoni, G
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

06 052639

SIMPLIFIED VARIANTS OF THE LINEAR TRAIN CONTROL SYSTEM. INTERFACE CONDITIONS OF THE INTEGRATED SYSTEM. SIMPLIFIED VARIANTS OF THE INTEGRATED LINEAR TRAIN CONTROL SYSTEM

In this report, the interface conditions of the integrated system are introduced in the form of a UIC Leaflet (Appendix 5). Furthermore, the possibilities of simplifying the integrated system of linear train control are described allowing for the following items: technical feasibility; performance of the simplified solution; evaluation of possible savings with respect to the full integrated system. Special attention was given to the question of interpenetration (compatibility) and possible expansion to the full integrated system. Four variants are recommended in this report for use on the systems of the administrations according to their particular requirements.

International Union of Railways S1005/RP 1/E, Oct. 1974, 25 pp, Figs., Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

06 052659

APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. PROGRESS OF WORK AND SUMMARY OF RESULTS RELATING TO INTERFERENCE FROM THYRISTOR CONTROL SYSTEMS

This report gives a brief account, referring to each individual point of the working programme, of the current state of work concerning the use of thyristors in railway engineering and the influence factors so far discovered and investigated, including the effect on information transmission installations. So far as possible, conclusions of general validity are given based on the results outlined in reports A 122/RP 14 which, however, relate to conditions on individual railway administrations. For more detailed information, attention is drawn to the summary in the appendix of the reports compiled by the Committee and other publications generally available.

International Union of Railways A 122/RP 16/E, Oct. 1974, 22 pp, 18 Ref., 2 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

06 052660

APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. INVESTIGATION OF INTERFERENCE IN TRACK CIRCUITS FROM STATIC CONVERTERS USED FOR ELECTRIC PASSENGER TRAIN HEATING

The present report gives an account of tests made by the German Federal Railways (DB) on the Yugoslav Railways (JZ) route system with the object of investigating whether static converters for 1000 V, 16-2/3 Hz heating supply systems cause interference in track circuits. Measurements were obtained with 6 different single-rail insulated track circuits (a.c. and d.c.) under different earthed rail conditions. In every case and even under the

most adverse conditions, which would in practice only rarely be met, misfunctioning of track circuits did not occur. Under certain circumstances described in more detail in the report it may become necessary to use a fundamental frequency of 22 Hz (A) instead of 16-2/3 Hz.

International Union of Railways A122/RP 18/E, Apr. 1975, 30 pp, 20 Fig., 8 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

06 052662

ELECTRONIC TEST INSTALLATION (VIENNA ARSENAL). TESTS MADE AT THE ELECTRONIC TEST INSTALLATION IN THE YEAR 1972/73 (FROM 1ST SEPTEMBER 1972 TO 31ST AUGUST 1973)

This is the sixth annual report on the electronic test installation, set up in Vienna jointly by the Office for Research and Experiments (ORE) of the International Union of Railways (UIC) and the Austrian Federal Research and Test Institute for data transmission and electronics questions relating to railway engineering. The work carried out in the year covered by the report focused on two subjects: the continuation of intensive testing of interference on railway telephone lines from thyristor locomotives started in the preceding year on behalf of Specialists Committee A 122 and the extension of the MODEM test methods introduced by Specialists Committee A 76 to "NGD-Modems" (low voltage d.c. data transmission modems). A new test programme was prepared at the test installation for this purpose and measurements were made of a new modem.

This report is confidential and available only to the ORE Member Administrations.

International Union of Railways AZ32/RP 6/E, Oct. 1974, 99 pp, Figs., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

06 083039

IMPLICATIONS OF MODERN TRANSIT SIGNALING CONCEPTS FOR MAINLINE RAILROAD OPERATION

As automatic train protection (ATP), automatic train operation (ATO) and train-wayside communications (TWC) have been perfected for transit applications, they offer the potential for mainline railroads. While certain of the technology would need further refinement, the author feels that with proper economic impetus the concepts can be developed into practical control systems. Developments in signaling and control imply greater use of automatic control systems. While the primary imperative is safety of operation through elimination of human error, automatic equipment employing computer and system engineering techniques can ensure dependable efficient railroad operation also.

Railway System Controls Vol. 6 No. 1, Jan. 1975, pp 22-26, 5 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

06 083040

GETTING THE BUGS OUT OF BART

With the full 114-km network now in operation, the Bay Area Rapid Transit is still struggling to bring signaling and car reliability problems under control so that planned levels of service can be achieved this year. The author explains what went wrong and how the problems are being tackled, but he also points out that BART has established high aesthetic and comfort standards which set the pace for the second generation of transit systems in the U.S.

Middleton, WD *Railway Gazette International* Vol. 131 No. 1, Jan. 1975, pp 14-17, 2 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

06 083059

FIXING BART

This article deals with the retrofits, primarily the backup for the automatic train protection system which has been installed at a cost of \$1.3 million and stems from the Bay Area Rapid Transit's "Blue Ribbon Panel" report. The principal problems and disagreements centered on the original

procurement procedures and on the selection and implementation of the automatic train control (ATC) system. The supplier of BART's primary train protection subsystem stands firm in its insistence that this is an unnecessary elaboration.

Friedlander, GD *IEEE Spectrum* Vol. 12 No. 2, Feb. 1975, pp 43-45

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

06 083925

POSITIVE TRAIN IDENTIFICATION

Until opening of the Victoria Line, train descriptions on London Transport railways had been initiated by signalmen or, latterly, by programme machines. These stages of development are described in an historical introduction, leading to a review of the Identra system used on the Victoria Line in which descriptions are set by the train operator in the cab and recognized by lineside equipment. Experience has shown the need for more information than can be conveyed by a code of eight frequencies and so a new system is under development in which a 40-bit message will carry train numbers and crew duty roster numbers as well as train destination. The paper describes the prototype installation of a Positive Train Identification (P.T.I.) system developed by London Transport which is being made on the District Line between Putney Bridge and Earls Court. It concludes with an examination of future design possibilities in areas such as information display techniques and integration of P.T.I. with on-line computer control.

Hurford, NS

Institution of Railway Signal Engineers Oct. 1974, 12 pp

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Institution of Railway Signal Engineers 1 Asbourne Close, London W5, England Repr. PC

06 083934

THYRISTOR CHOPPER CONTROL AND THE INTRODUCTION OF HARMONIC CURRENT INTO TRACK CIRCUITS

Alternating currents will generally be present in a d.c. traction supply owing to the action of synchronously switched power-control equipment and also to the presence of mains-frequency-harmonic voltage ripple. This paper describes the factors that determine the magnitude and frequency of such current in the power rails, for various conditions of d.c.-chopper operation. Models that describe the introduction of harmonic current into track circuits are developed from power-circuit considerations, and theoretical predictions are compared with practical results obtained from measurements undertaken by London Transport. The use of multiphase chopper equipments to reduce the size of the input filter is considered, and it is shown that, when normal-load unbalance conditions are considered, no advantage is gained by using more than two phases.

Lowe, TJ Mellitt, B *Institution of Electrical Engineers, Proceedings* Vol. 121 No. 4, Apr. 1974, pp 269-275

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

06 083949

INDUCTIVE INTERFERENCE OF THE SIGNAL AND PROTECTION SYSTEM OF THE NETHERLANDS RAILWAYS BY HIGH VOLTAGE OVERHEAD LINES RUNNING PARALLEL WITH THE RAILWAYS

This report deals with the inductive interference of the signal and protection system of sections of the Netherlands Railways by high voltage overhead lines running parallel with the railways. The signal and protection system of many railway sections in the Netherlands has a 50 Hz ac supply. The 50 Hz currents in the high voltage line running parallel with the railway induce 50 Hz currents in the rails. These parasitic currents can endanger the operation of the signal and protection system of the railway if both the level of the parasitic currents is too high and there is a rail fracture. Based on measurements and calculations it is shown that the amplitude of the parasitic currents in the rails depend upon many factors such as: the distance between the railway and transmission line, the presence of ground wires, the sequence of the phases on the tower when two circuits of the high voltage line have a symmetrical power load and the amplitude of the currents in the high voltage line. Some methods are given which can either decrease the parasitic currents in the rails or eliminate

the dangerous influence of these currents on the signal and protection system of the railways.

This paper was presented at the 25th Session held in Paris, France, August 21-29, 1974.

Manders, AHE Hofkens, GA Schoenmakers, H
International Conf on Large High Tension Elect Sys Paper 36-02,
1974, 14 pp

ACKNOWLEDGMENT: EI

PURCHASE FROM: International Conf on Large High Tension Elec Sys
112 Boulevard Haussmann, 75008 Paris, France Repr. PC

06 084718

INDUCTIVE INFERENCE MEASUREMENTS

This report contains measurements carried out by General Cable Corp. on circuits paralleling a section of the East Erie Commercial Railroad over which has been installed a 50 kV catenary. The tests determined the levels of induced voltage and noise in the paralleling communications and signal circuits. It is concluded that although interference should not be beyond acceptable limits on properly maintained circuits, good practice would be to ground any unused open wire circuits at each end of a section that is susceptible to external interference since each grounded conductor will contribute to shielding.

Pehrson, VW (General Cable Corporation)
Electrack Incorporated Aug. 1973, 24 pp, Figs., 7 Tab.

PURCHASE FROM: Electrack Incorporated 2414 Morris Avenue, Union,
New Jersey, 07083 Repr. PC

DOTL RP

06 084725

KEEPING UP WITH BART

The elaborate communications system of the Bay Area Rapid Transit is discussed. There are over 300 communication channels used in the wire line system in addition to the four radio channels. All intelligence, voice, automatic train control, digital transmission for remote control and indications of malfunctions are all integrated into the communication net.

Lee, DY *Communications* Oct. 1974, pp 12-18, 4 Phot.

PURCHASE FROM: Communications Publishing Corporation 1900 West
Yale, Englewood, Colorado, 80110 Repr. PC

DOTL JC

06 084727

MEASUREMENTS OF LEAKY COAXIAL CABLES AND POSSIBLE APPLICATIONS TO TRAIN COMMUNICATION

The electrical and radiation properties of the Radiax have been measured. The main results are: i) the surface wave exists, ii) the radial radiation follows $1/\sqrt{r}$ relation for frequency below 190 MHz and $1/r$ relation for frequency near 400 MHz, iii) the transverse radiation pattern is nearly omnidirectional, iv) the coherent band-width is on the order of 3 MHz and the operating frequency range is several hundred megahertz; and v) better coupling efficiency is observed at lower frequency. Possible applications for railroad communication are discussed.

Yoh, P Esposito, R Gagnon, R Kodis, RD
Transportation Systems Center, (DOT-TSC-FRA-73-15) Final Rpt.
FRA-ORD&D-74-43, May 1974, 90 pp, 57 Fig., 4 Tab.

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL TF23.U68A34, DOTL NTIS

06 084740

MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (MAVI) SYSTEM

A system for identifying moving objects such as vehicles, trucks, buses, containers, etc., in which a passive label having a number of dipoles in accordance with a code is attached to the object, is described. A synthetic aperture radar consisting of a Gunn diode mounted within a resonant cavity and connected to a horn is used to illuminate the label. The Gunn diode operates as a homodyne so that signals from the label are also detected by the diode as a number of overlapping chirp signals, which are sent to a computer for processing. The computer output is a pulse train with pulses corresponding to dipoles in the label. A number of tests have been made indicating that labels can be read regardless of range and vehicle speed. A number of horns may be strategically located in a city or

along a highway, and these horns can be multiplexed into a common computer to provide an inexpensive all weather automatic vehicle identification system.

Constant, JN (RCS Associates, Incorporated) *IEEE Transactions on Vehicular Technology* Vol. VT23 No. 2, May 1974, pp 44-54, 7 Fig., 80 Ref.

ACKNOWLEDGMENT: IEEE Transactions on Vehicular Technology

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

06 084925

NEW DIMENSION IN CTC

Computer, solid state electronics and cathode ray tube displays are adding new dimensions to centralized traffic control. A new concept called "area dispatching" allows the dispatcher to visualize the interaction between events over a much larger area. Computer systems have now been developed to handle entire "meets" and to select routes through large terminal areas.

Progressive Railroading Vol. 17 No. 9, Sept. 1974, pp 70-72

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton
Street, Chicago, Illinois, 60606 Repr. PC.

DOTL JC

06 095370

THE HAMMING CODE H (8,4)-A GIFT FROM HEAVEN TO THE MODERN SIGNAL ENGINEER [Hammingkoden H (8,4)-en gudagava at den moderna signalsakerhetstekniken]

The Hamming code H (8,4) has great advantages compared to other error-correcting codes when used for railway signalling purposes. Its format and capacity makes it well suited to the various tasks in signalling systems as well as to the hardware available in the market. The article describes some of these advantageous properties and gives some examples of how they can be used to combat dangerous failures (failures to the wrong side) in transmission as well as in computation of information in railway signalling systems. [Swedish]

Sterner, B *Jarnvagstechnik* 1974, pp 62-65, 5 Fig., 8 Ref.

ACKNOWLEDGMENT: Syracuse University

PURCHASE FROM: Jarnvagstechnik P.O. Box 265, S-10123 Stockholm,
Sweden Repr. PC

06 095371

INFORMATION PROCESSING AS AN INSTRUMENT OF RAILWAY TRAFFIC CONTROL [Informatic zur Steuerung des Schienenverkehrs]

Modern signalling technology is an essential condition for sound and economical management, in order to ensure the rapid, and at the same time highly automated, progress of railway traffic operations. The author gives a detailed report on signalling techniques covering long and short-distance traffic and, for the new lines envisaged, the themes concerning centres for traffic management and for the integrated control of transport. [German]

Wehner, L *Eisenbahningenieur* Vol. 28 No. 7, July 1974, pp 223-228, 6 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Dr Authur Tetzlaff-Verlag Niddastrasse 64, Frankfurt
am Main, West Germany Repr. PC

06 095372

ELECTRONICS AND AUTOMATION IN THE SERVICE OF THE PKP [Elektronika i automatyka dla potrzeb PKP]

After outlining the requirements of the Polish State Railways in the sphere of electronic and automatic systems, the author gives brief comments on the activities of the Electronics and Automation Department of the PKP Institute of Railway Research. He then describes certain equipment and systems recently finalized, in particular: the USZ type amplifier for the COB-58 type coded impulse automatic block, the electronic installation of MS type automatic block with electronic track occupation device, the remote control display appliance and the receiver used in conjunction with an electronic traffic regulation device for central control points. [Polish]

Gruchala, N *Przegląd Kolejowy Elektrotechniczny* Vol. 21 No. 8, 1974, pp 1-5, 7 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Wydawnictwa Komunikacji i Łączności
Kazimierzowska 52, Warsaw 12, Poland Repr. PC

06 095373

**REMOTE CONTROL AND TRANSMISSION OF DATA BY RADIO
[Funkfernsteuerung mit Dateneübertragung]**

This appliance makes possible the remote control of 10 shunting locomotives through one radio channel. The device operates on a selective call system and the transmission data on a simplex channel in the 160 or 460 MHz frequency bands, with a data transmission speed of 2,400 Bands. A self-check code ensures correct transmission from the transmitter to the vehicle. Repetition by the vehicle is unnecessary because of the inherent safety of the system. The radius of action of the installation is 600 m. In the case of breakdown in the transmitter or the vehicle device, as well as in the case of a severance of communication, the "emergency stop" process will be triggered off, and this can only be cancelled by special instruction.

Escher, R *Technische Mitteilungen AEG-Telefunken* Vol. 64 No. 4, 1974, pp 129-131, 2 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Allgemeine Elektrizitäts-Gesellschaft-Telefunken
Hohenzollerndamm 150, Berlin 33, West Germany Repr. PC

06 095403

**APPLICATION OF A PROCESS CONTROL COMPUTER FOR
THE AMSTERDAM INTERLOCKING SYSTEM**

The article consists of two parts: 1. An introduction—general description, primary requirements, implementation and functions of the system—is given by J. Weidema. 2. A. Bos describes the system configuration, route-selection, through-routing, route reservation, conflict resolution, route initiation and monitoring.

Weidema, J Bos, A *Algemene Sein Industrie B.V.* 1974, 10 pp, 6 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Algemene Sein Industrie B.V. Utrecht, Netherlands
Repr. PC

06 095412

**MODERN DEVELOPMENT IN GEOGRAPHICAL CIRCUITRY
TECHNIQUES**

Over the past 10 years the geographical circuitry system has been developed to meet all the varied requirements of BR traffic. The paper reviews the design of the original system and traces the changes which were made in the light of operating experience. In 1972 the BR provisional Specification was issued, and its requirements were met by further improvements to hardware combined with measures to provide still further flexibility of application. Current developments in circuitry for approach locking, swinging overlaps, and route holding are described.

Paper presented to the Institution of Railway Signal Engineers, London, November 5, 1974.

Smith, GC

Institution of Railway Signal Engineers Nov. 1974, 12 pp, 10 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Institution of Railway Signal Engineers 21 Avalon
Road, Earley Reading Berks, England Repr. PC

06 095619

**SAFETY OF PARALLEL REDUNDANT SWITCHGEAR—A
SYSTEM COMPARISON [Die Sicherheit von Parallelredundanten
Schaltwerken-Ein Systemvergleich]**

To avoid hazards due to the failure of components in protective systems, identical systems arranged in parallel can be operated so that any inequality in system output signals will cause the overall system to be shut down on the fail-safe principle. This eliminates all hazards except in the case of the same class of failures of all systems during the interval between the detection of the failure and the resulting shutdown. The influence of this shutdown, delay, an important safety parameter, is investigated for the first time with the aid of Markoff chains. It is in this way possible to judge system variants from the aspects of safety and reliability. [German]

Schneider, W *Siemens Forsch Entwicklungsber, Res Dev Rep* Vol. 4 No. 1, 1974, pp 39-44, 9 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

06 095621

**MODULARITIES AND FLEXIBILITIES OF THE "L.M.
ERICSSON-FATME JZA 700" SYSTEM [Modularità e flessibilità del
sistema "L.M. Ericsson Fatme JZA 700" per la supervisione e il
controllo del traffico ferroviario]**

After a short introductory note, a description is given of the JZA system prepared by the FATME in Rome, for the supervision and control of railway traffic. A list is made of the criteria and the constructional techniques which characterize the system in its realization and functionality (press-button direct, by points of functionality, with reduced schematic plan or by combination). Mention is made of the ambient conditions of operation, of the limits of temperature, very wide, and of feed (dc or ac at various frequencies), as well as the possible applications of the system on the FS network of the more complex installations and numerous realizations already in progress in the USA, Spain, Sweden, Egypt. [Italian]

Caporossi, R *Ingegneria Ferroviaria* Vol. 29 No. 10, Oct. 1974, pp 3-12

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

06 095629

**CONTRIBUTION TO THE INVESTIGATION OF
COMPATIBILITY OF THYRISTOR-CONTROLLED DC RAIL
MOTOR CARS WITH SIGNAL AND TELECOMMUNICATION
EQUIPMENT [Beitrag zur Untersuchung der Kompatibilität von
Thyristorgesteuerten Gleichstrom-Triebfahrzeugen mit den Signal-und
Fernmeldeeinrichtungen]**

It is shown how distortion effects in the thyristor control circuitry can be drastically reduced or completely eliminated by the proper selection of components. The use of dc circuits, operating in the audio-frequency region, appears to be best for train protection. [German]

Wagner, R (Schweiz Lokomotiv und Maschinenfabr, Switzerland)
Elektrische Bahnen Vol. 45 No. 9, Sept. 1974, pp 198-204, 7 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTI JC

06 095631

**RADIO TECHNOLOGY FOR RAILROADS WITH
INSUFFICIENTLY DEVELOPED SIGNALING AND
TELECOMMUNICATION SYSTEM [Funktechnik fuer Bahnen mit
Wenig Ausgebautem Signal-und Fernmeldesystem]**

In the case of railroads with low traffic density and simple operating conditions, the use of radio equipment will result in a considerably higher flexibility of operations and in a higher profit-earning capacity of the transport undertaking. This requires in the first place the setting up of a radio network with fixed stations and radio link systems. Such a system is described in more detail. [German]

Fischer, K (Telefunken, Germany) *Glaser's Annalen ZEV* Vol. 98 No. 12, Dec. 1974, 5 pp, 16 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

06 095632

TELECOMMUNICATION FOR BRITISH RAIL

The principal object of the National Telecommunications Plan (NTP), a railway-owned and maintained telecommunication network, is to provide an automatic extension-to-extension trunk-dialing telephone network between all business centers on the railway, as well as a good base for data-transmission services. The trunk cable network connecting the business centers is installed in lineside routes. It has sufficient bandwidth capacity to serve all telephone traffic as well as for an automatic switched teleprinter network. It also provides for all the expected requirements for low-, medium- and high-speed data transmission for purposes like the total operations processing system (TOPS) and seat reservation systems, etc.

Boura, J (British Railways) *Electronics and Power* Vol. 20 No. 9, May 1974, pp 360-363

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

06 095643

AUTOMATED PROCESS FOR TRAIN RUNNING [Automatische Disposition bei der Steuerung des Zugbetriebes]

Real-time computerisation facilitates the centralised control of train-running and appreciably reduces the workload of traffic control staff. After analysing the traffic flow process, the author presents and explains various concepts on the subject. Such concepts as punctual or linear arrangements are discussed in detail. An initial software element covering linear arrangements (arrangements over a line) is presented by way of example. As an experiment involving the Hanover cybernetics complex, a process computer supplying the arrangements for a 120 km railway line (Hanover-Bremen), presented arrangements corresponding in 80-90% of cases to the decisions of the line dispatcher.

Schenk, O *Signal und Draht* Vol. 66 No. 8, Apr. 1974, pp 134-138, 1 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Dr Arthur Tetzlaff-Verlag Niddastrasse 64, Frankfurt Am Main, West Germany Repr. PC

06 095693

TRAIN REGULATION STRATEGY: THE METHOD OF AXIAL ROUTE INTERSECTION

Several intuitive strategies for train regulation are shown to be special cases of a more general technique. This technique provides a structure for studying train regulation strategies using railway area simulation programs and for implementing these strategies in real time train control or advisory systems. The way in which the technique is related to the available mathematical methods of event sequencing is also described.

Stewart, JM *Rail International* Vol. 6 No. 1, Jan. 1975, pp 7-13, 5 Fig., 6 Ref.

ACKNOWLEDGMENT: Rail International

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

06 096551

COMPUTER AIDED DESIGN OF SIGNALLING CIRCUITS

A computer has been used in the Chief Signal Engineer's Department, London Transport to perform certain functions of safety signal circuit design which involve essential but repetitive work. The preparation of schedules was considered the most suitable area of application, and the computer has been used to automate this process, reducing the skilled manpower requirement and the time scale while preserving the responsibility of the circuit designer for the integrity of the design. The paper describes in detail the method of calculating signal overlaps and the production of signal and point circuits, together with the associated schedules. Numerous diagrams clarify the process and there are examples of the form in which the resultant information is printed out on the computer. Among the developments envisaged for the future is the ability to call up circuit information from the computer store and present it on a visual display unit superimposed on the actual condition of track circuits, points and signals as an aid to maintenance staff in deciding where a fault is likely to be found after an incident has occurred.

Paper presented to the Institution of Railway Signal Engineers, February 5th, 1975.

Heaton, MW

Institution of Railway Signal Engineers Feb. 1975, 17 pp

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Institution of Railway Signal Engineers 1 Asbourne Close, London W5, England Repr. PC

06 096553

"URTL"-AN ELECTRONIC FAIL SAFE LOGIC IN RAILWAY SIGNALLING

After stressing the importance of the fail-safe requirements of signalling equipment, the author describes the development of special circuit logics, named URTL so designated by Siemens.

Paper presented to the Institution of Railway Signal Engineers, February 21st, 1975.

Lohmann, HJ

Institution of Railway Signal Engineers Feb. 1975, 11 pp

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Institution of Railway Signal Engineers 1 Asbourne Close, London W5, England Repr. PC

06 096579

ELECTRICAL NOISE: GET IT OUT OF THE SIGNAL PLANT

The growing use of delicate, sensitive and sophisticated interference-susceptible electronic apparatus in signal and communications applications has produced operating and maintenance problems. The inherently low power and voltage levels prevailing in communications installations have forced communications engineers to develop methods for solving the problem. This article discusses primarily problems and solutions for phenomena such as false operation of computer-controlled devices, erroneous indications and spurious occurrences of other types in signal systems.

Pace, NCJ *Railway System Controls* Vol. 6 No. 4, Apr. 1975, p 24, 5 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

06 096601

LATEST DEVELOPMENTS IN RAILROAD TELECOMMUNICATIONS [Les telecommunications au chemin de fer. Tendances nouvelles]

The author mentions the salient points of recent developments in telecommunications equipment and the Railroads contribution to the progress achieved. The scope of the article is limited to the developments in conventional electronic telephone switch gear. Examples of the latest French National Railroad standard equipment; electronic manual switching, and spatial automatic telephone dialing systems are given. [French]

Gourdon, C *Revue Generale des Chemins de Fer* Vol. 93 Dec. 1974, pp 745-756

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

06 096617

THE USE OF COMPUTER SCIENCE FOR AUTOMATING RAILWAY OPERATING PROCESSES [Der Einsatz der Informatik zur Automatisierung der Betriebsvorgange bei den Eisenbahnen]

The author describes the role of data processing for automating operational tasks on the railways; he shows some systems already operating, or being set up and points out briefly the problems and difficulties with these solutions. Where automating isolated operations is concerned, for example train movements and shunting, there is the problem of meeting safety and reliability conditions. Starting from the automation of separate individual operations, development leads to control within a system with the aim of optimising the pattern of all operations and processes as a whole, as far as reliability, productivity and economic viability are concerned. [German]

Delpy, A *Signal und Draht* Vol. 66 No. 9, Sept. 1974, pp 150-158, 12 Fig., 16 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: Dr Arthur Tetzlaff - Verlag Niddastrasse 64, Frankfurt Am Main, West Germany Repr. PC

06 097238

IEEE RECOMMENDED PRACTICE FOR EMERGENCY AND STANDBY POWER SYSTEMS

Along with the description of supply units and their characteristics, the book treats the various weaknesses and strong points of each type, covering both initial selections and operation over the service life. The bulk of the information comes from practical experience in operating such systems in industrial and commercial services, avoiding the idealized claims of equipment manufacturers. In addition to the hardware section, the book also deals with the design of the emergency system.

Institute of Electrical and Electronics Engineers 1974, 111 pp

PURCHASE FROM: IEEE Orig. PC

06 097261

TEST OF SUSTAMID JOINT BARS FOR 129 LB. TR RAIL

The joints were made of sustamid special type 0.4K 88/04K90. The joint was applied to 129 lb. TR rail ends furnished by the Burlington Railroad.

The large deflection this joint takes under load will result in putting larger loads on the ties supporting the joint and increase the track maintenance required. It will also have poor strength to resist high loads that may be imposed under unusual conditions, such as excessive play in track and large lateral forces from poor alignment or equipment nosing action. Further tests were not deemed worthwhile.

Conducted under sponsorship of AREA Committee 4-Rail, New Methods of Insulating Rail Joints.

Association of American Railroads Technical Center ER-6, Jan. 1961, 4 pp, 1 Phot.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

06 097266

IMPROVED SPEED MONITORING WITH AUTOMATIC TRAIN CONTROL [Ausbau der Geschwindigkeitsueberwachung bei der induktiven Zugbeeinflussung]

Existing automatic train control (A.T.C.) is to be augmented with intermittent monitoring to ensure correct train braking. A.T.C. equipment is described. By adding an electronic braking-distance monitor, it is possible to have distant-dependent, continuous speed control after application of 1,000 or 500 Hz induction so that the train is braked automatically every time the permitted speed is exceeded. [German]

Prechel, H *Eisenbahntechnische Rundschau* Vol. 24 Apr. 1975, pp 123-128, Figs., Tabs.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

06 098046

PROBLEMS AND TECHNIQUES IN THE USE OF AUDIO FREQUENCY TRACK CIRCUITS

The electronic, or audio frequency, track circuit is growing in popularity because insulated joints are eliminated and two or more track circuits may be overlapped without repeating relays. In the use of audio frequency track circuit equipment there are the following problems: Rail impedance, ballast resistance variation, interfering signals, lightning damage, and complex test procedures. After discussing these, and suggesting solutions for each, the author concludes with the observation that to solve audio frequency track circuit problems, railroads and suppliers must have the "ability to think 'AC'."

Harmon, RE (Harmon Industries) *Railway System Controls* Vol. 6 No. 5, May 1975, pp 22-25, 3 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

06 098056

RUNNING TIME CONTROL SYSTEM BASED ON ATC CENTER-CONTROLLED

Running Time Control for trains between stations is considered to be one of the important functions required in future for automation of traffic control on the nationwide SHIN KANSEN Network. The authors have studied its control system for the past basic algorithm available to COMTRAC (Computer Aided Traffic Control) in the future. This paper introduces an outline of the Model system and programs applied to it.

Osada, N Itakura, E *Railway Technical Research Institute* Quart Rpt. Vol. 16 No. 1, Mar. 1975, pp 21-28, 8 Fig., 3 Tab., 4 Ref.

ACKNOWLEDGMENT: Railway Technical Research Institute

PURCHASE FROM: Ken - yusha 1-45-6 Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

06 098676

RAILROAD ACCIDENT REPORT: LONG ISLAND RAILROAD COMPANY DOOR ACCIDENT, HUNTINGTON STATION, NEW YORK, DECEMBER 1, 1974

At 9:48 a.m., e.s.t., December 1, 1974, a man was killed as a Long Island Rail Road commuter train departed Huntington Station, N.Y. The victim had attempted to exit the standing train, but he was initially trapped

between two sliding doors as they closed on him. This kept the doors open far enough for the door power-interlock to prevent the engineer from starting the train. When the man succeeded in moving the upper part of his body to the outside, the doors closed and locked on his right ankle, enabling the train to start. Since none of the crewmembers had observed the victim's entrapment, the conductor gave the "all clear" signal, and the engineer started the train. The victim was dragged backward off the platform; there, he contacted the third rail and was electrocuted. The conductor, who was alerted by a person outside the train and by a passenger, signaled the engineer; who stopped the train after it had travelled approximately 180 feet. The National Transportation Safety Board determines that the probable cause of this accident was the design of the sliding doors which permitted the train to be moved without a positive means for detecting the presence of a person caught between the doors. Contributing to the cause were: a. Absence of procedures that required the conductor to monitor visually all doors. b. The lack of knowledge on the part of passengers in regard to the means available to respond to the emergency.

This report contains Railroad Safety Recommendations R-75-23 and R-75-24.

National Transportation Safety Board NTSB-RAR-75-5, Apr. 1975, 23 pp, 5 Fig., 3 App.

ACKNOWLEDGMENT: National Transportation Safety Board

PURCHASE FROM: NTIS Repr. PC

DOTL NTIS

06 098771

MICROWAVE DESIGN CALCULATIONS

Computer program: ENMICRW. Microwave program performs path calculations necessary for the proper design of a microwave system. This program takes the same approach as used by the Federal Communications Commission and should give results identical to that program. The method used is an adaptation from the "Inverse Position Computation" set out on Page 14 of "Special Publication No. 8", Coast and Geodetic Survey: Formulas and Tables for the Computation of Geodetic Positions. This method takes into account the oblateness of the earth, and therefore gives more precise values than an uncorrected great-circle calculation method. Inputs: Inputs for this program are as follows: (1) Latitude and longitude for the sites. (2) Waveguide length for the sites. (3) Antenna dish size for the sites. (4) Transmitter power in DBM. (5) Transmitter frequency for the sites. (6) Receiver detection threshold. (7) Distance from one site other than midpoint, where fresnel is to be calculated. Outputs: The outputs from this program are as follows: (1) Printed outputs of the latitudes and longitudes that were specified between individual hops. (2) Azimuth from Site 1 to Site 2. (3) Azimuth from Site 2 to Site 1. (4) Distance from Site 1 to Site 2 expressed in feet and miles. (5) Freespace loss. (6) Waveguide loss. (7) Total path loss in DB. (8) Total gain in DB. (9) Net path loss in DB. (10) Median received signal in DB. (11) Carrier/Noise Ratio in DB. (12) Fade margin to 52 DBA per channel. (13) Fresnel at the midpoint.

Robinson, RE

Atchison, Topeka and Santa Fe Railway 1972

ACKNOWLEDGMENT: AREA (AREA 11-01-001)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

06 099197

FOR THE SP, COMPUTER-BASED CTC

The Southern Pacific recently completed a 670 mile CTC project in Texas that employs computers and microwave communication. The entire route is controlled from on center in Houston. Southern Pacific is also developing a computerized train dispatching system that will handle all aspects of the operation. The system will tie in with departments that affect train dispatching, such as maintenance of way, yard office, etc.

Progressive Railroading Vol. 18 No. 5, May 1975, pp 34-42

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

07 052647

AUTOMATIC WARNING OF TRACK MAINTENANCE GANGS. LABORATORY TESTS AND CONCLUSIONS CONCERNING THE CHOICE OF THE OPTIMUM ACOUSTIC SIGNALS FOR WARNING TRACK MAINTENANCE GANGS

The report describes laboratory tests carried out concerning the possibility of perceiving acoustic warning signals in the presence of severe background noise. Those tests have been carried out under simulated operating conditions (anechoic chamber, magnetic tape recordings of the noise produced by track maintenance machines) with a large number of combinations of the following factors: characteristics of the warning signals used (fundamental frequencies, types, wave shapes, modulation depths and frequencies, frequency spectra), type of background masking noise, auditory qualities of test persons. The conclusion of the report mentions the characteristics which an acoustic signal should possess in order to offer the greatest efficiency as regards the intended object of this signal for the aural warning of maintenance gangs working on the track.

International Union of Railways A124/RP 5/E, Apr. 1974, 26 pp, Figs., 7 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

07 090522

RESULTS OF THE FIRST SEMI-ANNUAL QUALIFICATION TESTING OF DEVICES TO MEASURE BREATH ALCOHOL

Eight evidential breath testers were performance tested according to the Standard for Devices to Measure Breath Alcohol Federal Register, Vol 38, No. 212, November 5, 1973. In addition, a prototype breath tester not commercially available was tested. Test results are presented.

Flores, AL
Transportation Systems Center, National Highway Traffic Safety Administration Intrm Rpt. DOT-TSC-NHTSA-74-6, Jan. 1975, 24 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240104/0ST, DOTL NTIS

07 090972

TASK ANALYSIS FOR THE JOBS OF TRAIN CONDUCTOR AND BRAKEMAN

The document describes the results of a research effort undertaken to detail the tasks of freight train conductors and brakemen. Included with text are detailed operational sequence diagrams for both conductor and brakeman.

Sanders, MS Jankovich, JJ Goodpaster, PR
Naval Ammunition Depot NAD-CR-RDTR-263, 235 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-A007528/3ST, DOTL NTIS

07 091377

ANALYSIS OF HIGH RISK GROUPS FOR ALCOHOL COUNTERMEASURES

The study plan defines a number of high risk drinking driver groups, specifies variables to be used in developing a predictive model of high risk drinking driving within these groups, and presents a design for a survey research operation which will discover these groups of high risk drinking drivers in the field, gather data on the relevant variables, and inductively develop best predicting equations from the data collected. Questionnaire forms are included, sampling plans and instructions, in preparation to begin Phase 2 of the research project, the conduct of the survey.

Also included report nos. DOT-HS-801 434 thru DOT-HS-801 435.

Wagner, MH Bigelow, JH Cobb, J Goldstein, L Kirkpatrick, RE
Technical Research Associates, Incorporated, National Highway Traffic Safety Administration Final Rpt. Mar. 1975, 351p

Contract DOT-HS-4-00989

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-241567/7ST, DOTL NTIS

07 095247

HUMAN FACTOR AND HARDWARE DESIGN CONSIDERATIONS FOR PASSENGER PROTECTION IN HIGH SPEED CRASHES

Included in the objective of the paper are the identification and summary of significant human factor considerations for restraint and protection of passengers involved in barrier-type collisions at speeds up to 300 miles per hour. These considerations result in computed values of minimum stopping distance as a function of initial velocity. The bases of the calculations are upper limits of tolerable deceleration which are a function of impact duration. Two types of lap and shoulder restraint schemes for achieving optimal restraint conditions are described. The advantages and disadvantages of each are discussed. A totally passive hydraulic/pneumatic shock isolation system for constraining the deceleration levels to acceptable and approximately constant values is described. Typical results of digital computer simulation studies demonstrate the significance of energy dissipation by means of structural deformation of the vehicle. Also, the simulation results demonstrate that the passive shock isolation system can be utilized to achieve an approximately constant and safe deceleration.

Wilkins, LO (Texas University, Arlington); Hullender, DA *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 425-433, 16 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

07 095291

TRANSPORTATION FOR THE POOR, THE ELDERLY, AND THE DISADVANTAGED

This publication contains five papers that examine various aspects of transportation needs of the poor, disadvantaged and elderly, and the use of public transportation in meeting these needs. Schnell reports on interviews about the most efficient and economical means of insuring the availability of public transportation. Paaswell and Recker identify who and where those without cars are and what transportation alternatives exist for them. Kidder examines the ways social service agencies in a small city cope with the transportation of immobile clients. Weaver and Herrin studied the needs of elderly citizens in medium-sized cities. Dajani and Egan report on income-distribution effects of the proposed Atlanta transit system.

Included are Five reports prepared for the 53rd Annual Meeting of the Highway Research Board.

Transportation Research Record #516, 1974, 47 pp, Figs., Tabs., Refs.
PURCHASE FROM: TRB Publications Off Orig. PC

DOTL RP

07 095393

HERBICIDE EXPOSURE, MORTALITY AND TUMOR INCIDENCE. AN EPIDEMIOLOGICAL INVESTIGATION ON SWEDISH RAILWAY WORKERS

The investigation shows a slightly dose-dependent and significantly increased tumor incidence and mortality among workers exposed to amitrol (3-animo-1,2,4-triazole), whereas those exposed to phenoxy acids (2,4-dichlorophenoxyacetic acid = 2,4-D and 2,4,5-trichlorophenoxyacetic acid = 2,4,5-T) have about normal tumor incidence and mortality. Based on animal experiments, there is some evidence that amitrol may cause malignant tumors in different tissues, although tumors in the thyroid gland and the liver have been observed and discussed most frequently. Although the investigations may be criticized, the result, being in agreement with animal data, suggests precautions in using amitrol. [Finnish]

This paper was also published by Lakartidningen, Stockholm, Sweden, pp 2466-70, 1974.

Axelsson, O Sundell, L *Work, Environment, Health* 1974, pp 21-28, 15 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Occupational Health Foundation of Finland
Haartmanink 1, SF-00290 Helsinki 29, Finland Repr. PC

07 095395

EYE STRAIN WHEN READING MICROFILMS IN DIFFERENT ENLARGERS [Synbesvar vid lasning av mikrofilm i olika forstringsapparater]

No Abstract. [Swedish]

Hultgren, G Knave, B Werner, M *Nordisk Hygienisk Tidskrift* 1973, pp 137-151, 3 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hygeiniska Institute Umeaa University, S-901 87 Umeaa, Sweden Repr. PC

07 095625

INDIVIDUAL DIFFERENCES IN RESPONSE TO THE ENVIRONMENT

In assessing the effects of environmental stress three points are made. (1) Comfort and working efficiency cannot necessarily be equated. (2) The optimal experimental design for assessing individual differences differs fundamentally from that required for establishing population means. Reliable individual differences will only be revealed by repeated measures of a given effect upon the same people and under the same conditions. (3) Regarding the assessment of what individuals find comfortable as regards temperature, or acceptable as regards noise, two difficulties are noted. (a) In terms of what they are prepared to do about it, individuals may differ in what they mean when they tick one of a number of terms indicating varying degrees of discomfort or annoyance. (b) Where an observer experiences a range of conditions he will tend to place the center point of the rating scale at the center of the range of conditions sampled. Over a group of observers this may bias the average comfort or acceptability vote away from its true point. The presentation of a standard followed by a single test condition will avoid difficulties due to range effects but may encounter others due to suggestion or contrast effects.

Wilkinson, RT (Medical Res Counc, Appl Psychol Unit, England) *Ergonomics* Vol. 17 No. 6, Nov. 1974, pp 745-756, 21 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

07 095626

COLD-INDUCED VASODILATATION ONSET AND MANUAL PERFORMANCE IN THE COLD

This study is an investigation of manual dexterity capabilities during whole-body cold exposure as a function of time to vasodilatation during local cooling. Thirty male subjects were divided into three equal groups on the basis of the time for a 3deg F (1.7deg C) rise in index finger temperature during immersion of the hand in 4.4deg C water: (450 sec group, 450-900 sec group, and)900 sec group. Subsequently, each subject was exposed to ambient temperatures of 15.6deg and -6.7deg C for three hours while performing a battery of six manual tasks bare-handed. Manual performance on all tasks was affected adversely at the -6.7deg C ambient and worsened with continued cold exposure. The drop in performance on three tasks involving skilled movements of the wrist and fingers was greatest for the 450 sec group. Within the limits of the present study, the early onset of vasodilatation in local cooling per se appears to be associated with initially superior performance and subsequently inferior performance on specific manual tasks with increasing durations of whole-body cold exposure.

Bensel, CK (Army Natick Laboratories); Lockhart, JM *Ergonomics* Vol. 17 No. 6, Nov. 1974, pp 717-730, 16 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOLT JC

07 095664

SUBWAY ENVIRONMENTAL DESIGN CRITERIA

This milestone report focuses on the development of human comfort criteria for subway systems. The psychological and physiological aspects of thermal comfort are reviewed. The common indices of comfort are evaluated and the effective temperature and a modification to the relative strain index are selected as the most suitable for use in developing criteria in a subway rapid transit system. The concept of relative comfort is introduced as a means of computing the temperature required to achieve the desired comfort level. Criteria for rapid pressure changes, high air velocities and air quality are also given.

This report was prepared for the Institute for Rapid Transit, Washington, D.C. and sponsored by the Urban Mass Transportation Administration, U.S. DOT. See also RRIS Nos. 095662, 095663 and 095665 through 095668, Section 23, RRIS Bulletin 7502.

Kaiser Engineers UMTA-DC-MTD-7-71-26, Sept. 1971, 85 pp

Contract DOT-UT-290

ACKNOWLEDGMENT: Institute for Rapid Transit
PURCHASE FROM: NTIS Repr. PC

PB-206896, DOTL NTIS, DOTL TF845.K26

07 095694

MOTION DISCOMFORT AND TRANSPORTATION GUIDEWAY FORM

A three-dimensional theory of motion discomfort is developed by defining scalar indices measuring discomfort due to acceleration and jerk. These indices are functions of effective acceleration and jerk vectors and their orientation to the preferred configuration of a subject. The optimal bank angle of a guideway is defined and shown to minimize acceleration discomfort. Isotropic approximations to the discomfort indices are proposed. Expressions for the indices are obtained in terms of the vehicle motion and guideway geometry. Detailed analyses of motion along optimally banked circular helical and three-dimensional spiral curves are presented. Motion with zero fore-aft thrust on a curve in a vertical plane is also detailed. The approach assumes a smooth guideway and so vibrational inputs are not included. The analysis should be followed up by an experimental program before it is taken too seriously in design.

Dais, JL Balachandra, M *Transportation Research* Vol. 8 No. 6, Dec. 1974, pp 523-531

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

07 095700

ON THE FLUID MECHANICS OF HUMAN CROWD MOTION

The paper presents a theory of the flow of people along a channel which may be of variable width, or have a partial blockage in it. The results are presented in kinetic form to facilitate comparison with observation. It is shown that a crowd fluid may exhibit anomalous gas dynamic behaviour caused by a change in the sign of a well known derivative. This indicates that expansion shocks are possible in crowd fluids.

Henderson, LF. *Transportation Research* Vol. 8 No. 6, Dec. 1974, pp 509-515

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

07 096549

HUMAN FACTORS IN URBAN TRANSPORTATION SYSTEMS

Urban growth and the development of the megalopolis have forced a re-examination of all urban transportation systems in terms of their ability to satisfy human needs and preferences. Encouraging the re-emergence of public transportation in cities requires a total assessment of the physical and behavioral characteristics of the user population as well as their economic, social, and esthetic preferences. This population includes many groups not normally considered in human engineering design, such as the physically or functionally handicapped and the aged. Existing data are reviewed and research needs are identified for the design of urban transportation systems.

Hoag, LL (Oklahoma University) *Human Factors* Vol. 17 No. 2, Apr. 1975, pp 119-131, 7 Tab., 31 Ref.

ACKNOWLEDGMENT: Human Factors
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

07 096662

STATISTICS IN HUMAN ENGINEERING

This paper presents a discussion on the use and abuse of statistics in human engineering experiments. The topics briefly discussed include experimental design, statistical and practical significance, randomization and some aspects of the use of averages, distributions and correlation. A section is devoted to the reporting of experiments. Some notes about averaging of decibels and complex numbers are given in an appendix. /Author/TRRL/

Maslen, W
Royal Aircraft Establishment Tech. Memo EP548, July 1973, 35 pp, 4
Fig., 2 Tab., 19 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD
211425S)

PURCHASE FROM: Royal Aircraft Establishment Farnborough,
Hampshire, England Repr. PC

07 097251

TRAIN CONTROL, STRESS AND VIGILANCE

Modern railway operation, due to the control exerted on the man-machine-pathway combination is the safest form of transportation available. The vehicle pathway is continuously monitored and both front and rear end protection is provided to prevent collisions. Man although extremely versatile is known to be the weak link in the man machine system. Consequently, his duties need to be arranged to match his capabilities. An examination is made of human factor research, levels of arousal, driving efficiency and driver stress, fatigue, diurnal bodily rhythm and vigilance. Accident rates have been progressively reduced by various safeguards instituted to guard against human failure. Measurements of driver stress under various conditions of high speed train operation have been carried out and changes in stress in accordance with train speed, hours of duty, periods of rest, and day and night operation determined. There are a series of railway signalling and vigilance control devices which successively reduce the effect of the human element. These have further developed into semi-automatic and automatic train operation.

Paper presented at the 10th Annual Conference.

Cox, JJ
Ergonomics Society of Australia and New Zealand Nov. 1973, 22 pp

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: Ergonomics Society of Australia and New Zealand
Repr. PC

07 097604

CONTACT LENSES AND DRIVERS [Kontaktlinsen und Kraftfahrer]

The advantages of adhesive lenses for correcting errors of refraction have to be set against the disadvantages, particularly for drivers. Restrictions of the field of vision are possible because of the optical structure of the edge zones and the fairly thick lacrimal film. Alterations in field of vision can be balanced out with use. Special contact lens shapes have to be used under certain conditions in order to achieve good visual acuity. Vision in darkness and dusk is usually impaired by adhesive lenses, night myopia increases, and increased formation of scattered light and over-sensitivity to light lead to greater dazzle. Dark adaptation may be considerably impaired by dark adhesive lenses. After the contact lenses have been removed unclear vision often occurs for up to 21 days, and this is not compensated for by the immediate wearing of spectacles. Smaller lenses are best in this respect. These again cause noticeable formation of scattered light. A questionnaire study of wearers of contact lenses showed that judgment of distance was mostly much better with contact lenses. The greater field of vision was regarded as particularly favourable. /TRRL/ [German]

Stone, J *Augenoptik* Vol. 89 No. 2/3, 1972, 4 pp, 5 Fig., 18 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD
301752)

PURCHASE FROM: VER Verlag Technik Oranienburger Strasse 13/14,
102 Berlin, East Germany

07 097605

DIABETES AND DRIVING APTITUDE [Diabetes und Fahrtuechtigkeit]

Despite the frequency of diabetes mellitus, the sugar disease and its complications and the side effects associated with its treatment only rarely affects driving aptitude. There is no call for a general ban on driving for

diabetics, and discrimination against them on the roads has to be avoided. Diabetics involved in accidents have to be judged individually. There are guidelines on this published by the German government. The author discusses aspects of civil law involved in the judgment of diabetics. /TRRL/ [German]

Petzoldt, R *Arzt und Auto* Vol. 48 No. 10, Oct. 1972, pp 13-15, 28 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD
301754)

PURCHASE FROM: Kraftfahrverband Deutscher Aerzte eV (KVDA)
Frankfurt am Main, West Germany

07 098012

QUANTIFICATION OF THE COMFORT VARIABLE

The objective of this work is to develop a set of quantitative measures of comfort. This is achieved by use of modern psychometric techniques. Principal factors of comfort are defined and various travel modes are represented as a set of points in this comfort space. From the position of each point as well as from the variability of an individual's perception, an index of comfort is defined which describes the level of comfort of a particular travel mode to the particular individual.

Nicolaidis, GC (Cornell University) *Transportation Research* Vol. 9
No. 1, Feb. 1975, pp 55-66, 23 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

07 098028

PSYCHOLOGICAL DESIGN FACTORS IN URBAN PUBLIC TRANSPORTATION VEHICLES

Recent trends in transportation have shown a reluctance to accept public transportation as a viable alternative to the automobile. Even some advanced systems such as BART have not been well received. A major source of this reluctance has been attributed to the failure to successfully meet the psychological needs and preferences of the traveler in designing passenger compartments of public vehicles. A discussion is presented on important psychological variables such as personal space, situation control, esthetics, perceived safety, privacy, and forced interaction with other travelers. Recommendations are given for improving the design of urban public transportation vehicles.

Presented at the 18th Annual Meeting held in Huntsville, Alabama,
Oct. 15-17, 1974.

Adams, SK (Iowa State University, Ames)
Human Factors Society Proc Paper 1974, pp 5-12, 12 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

07 098047

DESIGNING FOR THE DISADVANTAGED: OPTIMUM DESIGN CONSIDERS ALL USERS

Designers are becoming more aware of the growing numbers of people prevented from making full use of buildings and transportation systems because of barriers imposed by inadequate design. This disadvantaged category is larger than generally realized, including not only those with obvious physical disability-the wheelchair-restricted or the blind-but the elderly and those temporarily encumbered with packages, suitcases or heavy clothing. Attention to some simple design elements described here can increase the ultimate use of a structure or system.

Fruin, JJ (Port Authority of New York and New Jersey) *ASCE Civil Engineering* Vol. 45 No. 3, Mar. 1975, pp 65-69

ACKNOWLEDGMENT: ASCE Civil Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

08 095212

TRAFFIC AND TECHNICAL ASPECTS AT LEVEL CROSSINGS. USE OF MODERN SAFETY SYSTEMS FOR PROTECTION AGAINST THE DANGER OF SLANTING COLLISIONS AND THEIR EFFECT ON ROAD TRAFFIC [Verkehr und Bahnebergangstechnik. Anwendung moderner Bahnebergangssicherung als Flankenschutz und deren Wirkung auf den Strassenverkehr]

Railway priority at level crossings necessitates the protection of both rail and road against the danger of slanting collisions. The author shows how the DB is endeavouring to solve the multiple problems that arise in this sphere, by using modern safety measures. Such devices as barriers, colour-light signals and audible warning signals are simply of an informative character. The installation of reciprocal interlocking between the barriers and the road signals on one hand, and the railway signals on the other, is necessary. The problem of controlling the danger zone remains to be solved. It is essential to re-examine the psychological influence of level crossing devices on road users as regards the recognition, perceptibility and assimilation of the information. [German]

Endmann, K *Eisenbahningenieur* Vol. 25 No. 8, Aug. 1974, pp 253-259, 14 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Dr Arthur Tetzlaff-Verlag Niddastasse 64, Frankfurt am Main, West Germany Repr. PC

08 095296

PROCEEDINGS. 1974 NATIONAL CONFERENCE ON RAILROAD-HIGHWAY CROSSING SAFETY

This transcript of the three-day conference covers many facets of the grade crossing problem; the objective of the sessions was "to demonstrate how each of the partners in grade crossing improvement programs is using or can best use new techniques and new funding in a cooperative effort to implement an effective grade crossing improvement program. Twelve papers, four panel discussion and opening addresses are included.

Conference held at U.S. Air Force Academy Interim Education Center, August 19-22, 1974.

Department of Transportation Aug. 1974, 92 pp, Figs., Tabs.

PURCHASE FROM: DOT Repr PC

DOTL RP

08 095378

REGULATIONS COVERING LEVEL CROSSING INSTALLATIONS [La reglementation de l'equipement des passages a niveau]

Analysis of the measures taken as a result of the ministerial decree dated 8 February 1973 concerning level crossing installations in France. They mainly relate to the definition of optimal equipment to be installed at railroad intersections. [French]

Jeanmasson, M *Informations Techn SNCF-Direction de l'Equipement* No. 13, June 1974, pp 33-39, 3 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Societe Nationale des Chemins de Fer Francais Paris, France Repr. PC

08 096545

WHAT PROGRESS FOR FEDERAL GRADE-CROSSING SAFETY PROGRAM?

While states got off to a slow start in obligating funds authorized by 1973 legislation, there are signs that the pace could pick up in what is turning out to be a long-range program. For the first time a situation has been created which permits new and modern grade crossing surfaces to be installed without any cost to the railroads. The first phase was an inventory of the 450,000 such crossings, information that is being put into an FRA computer file. Examples of the operation of the pertinent sections of the Highway Safety Act of 1973 in Illinois and Iowa are given. Supplementary information with this article includes descriptions of contemporary commercial grade crossing surfaces.

Railway Track and Structures Vol. 71 No. 5, May 1975, pp 27-31, 8 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

08 096615

RAILROAD-HIGHWAY GRADE CROSSING WARNING SYSTEMS

The selection of equipment components and the layout of a grade crossing warning installation should aim at attracting the attention of the motor vehicle operator and assist him in the exercise of his obligations. The object of this bulletin is to serve as a guide for those whose duties include promotion of safety at such crossings. The recommended practices contained in this bulletin are composite evaluations from sources in the railroad industry, Federal and state governments and manufacturers of grade crossing warning devices. These recommendations are intended to serve as guide lines only and are not to be taken or interpreted as absolute standards to be followed in all circumstances.

ANSI Standard No. D8.1, 1974, 32 pp

PURCHASE FROM: ESL Repr. PC, Microfilm

08 099354

STATE GRADE CROSSING PROGRAMS: A CASE STUDY

This report reviews the California Railroad-Highway Grade Crossing program, analyzing the factors influencing the reduction in grade crossing accidents. The report concludes that the greater than average success in grade crossing safety in California has resulted from the long standing financial support of the installation and maintenance of grade crossing warning devices, a strong, well managed Public Utilities Commission providing the analytical support for crossing improvement decisions, unusually strong safety efforts by the financially healthy railroads operating within the state, and an effective framework for city-county-state cooperative determination of grade crossing priorities. California ranks eighth overall in terms of active protection installed and first in the percentages of total crossings equipped with automatic gate installations. Areas for potential improvement and refinement of the California program are likewise discussed.

This program was sponsored by US DOT, Federal Railroad Administration's Office of Research and Development.

Kennedy, RG, III

Consad Research Corporation, (DOT-TSC-FRA-74-5) Final Rpt. FRA ORD&D-75-8, Sept. 1974, 66 pp, Figs., Tabs.

Contract DOT-TSC-34

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-244175/AS, DOTL NTIS

08 099360

FIELD EVALUATION OF LOCOMOTIVE CONSPICUITY LIGHTS

Flashing xenon strobe lamps were installed on locomotives in revenue service as a means of alerting motorists to the hazards they are approaching at a rail-highway grade crossing. Effectiveness of these lights in attracting motorists' attention was evaluated. The reactions of both motorists and locomotive crews to the use of strobe lights were also evaluated. Field observations, interviews, and experiments confirmed the attention-getting value of locomotive-mounted strobe lights used in revenue service to alert motorists and suggested operational procedures and device specifications that are the subject of a separate application guideline report. Experimentation and observation of the strobe lights under railroad operating conditions verified that these lights do not interfere with perception of trackside signals or with normal motorist and crew operations. The work reported in this document supports a technical recommendation favoring use of strobe lights on more extensive research tests in railroad operational service.

The project was sponsored by US DOT, Federal Railroad Administration's Office of Research and Development.

Devoe, DB Abernethy, C

Transportation Systems Center, (DOT-TSC-FRA-74-11) Final Rpt. FRA-OR&D-75-54, May 1975, 66 pp, Figs., Tabs.

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

08 099361

GUIDELINES FOR ENHANCEMENT OF VISUAL CONSPICUITY OF TRAINS AT GRADE CROSSINGS

This report summarizes a comprehensive study of potential means of reducing the probability of train-motor vehicle collisions at railroad-highway grade crossings through enhancement of the visual conspicuity of

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locomotives. Passive techniques are reviewed, and requirements and constraints upon active systems are described. Past research is reviewed, followed by derivation of functional specifications and discussion of practical operating considerations. Operational tests of devices deemed most appropriate to the application are described, with detailed recommendations. The preferred system consists of clear (white) xenon flash-tube beacons mounted on opposite sides of the locomotive cab roof, flashed alternately, used in conjunction with amber incandescent lamps outlining the locomotive.

This project was sponsored by US DOT, Federal Railroad Administration's Office of Research and Development.

Hopkins, JB Newfell, AT
Transportation Systems Center, (DOT-TSC-FRA-74-75) Final Rpt.
FRA-OR&D-75-71, May 1975, 56 pp, 17 Fig., 8 Ref.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

09 082922

DEVELOPMENT OF SCRATCH-AND SPALL-RESISTANT WINDSHIELDS

Studies were performed to evaluate possible ways of improving the primary weaknesses in existing Army helicopter windshields, namely, scratching and spalling. Three experimental windshield material configurations offering a potential solution were fabricated for test and evaluation. The spall problem was approached by using polycarbonate as a backup material and was incorporated into each design. The scratch problem was approached by employing either (1) a hard surface coating, (2) an acrylic cladding, or (3) a thin glass cladding to the polycarbonate backup material. Commercially available materials and abrasion-resistant coatings were evaluated utilizing a windshield wiper apparatus, while spall performance was studied by ballistic testing and high-speed photography of each of three test configurations. /NTIS/

Presented at Proceedings of Conference on Transparent Aircraft Enclosures, Las Vegas, Nev., 5-8 Feb. 1973. See also report dated June 73, AD-769 344.

Plumer, JR

Army Materials and Mechanics Research Center, (DA-1728005) Final Rpt. AMMRC-TR-74-19, Aug. 1974, 22 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AD/A-002513/OSL, DOTL NTIS

09 083034

VIBRATION PROBLEMS IN ENGINEERING

The new edition contains these changes; greater emphasis on transient vibrations and response spectra; introduction to the matrix format for both action and displacement equation of motion; comprehensive coverage of inertial gravitational and elasticity coupling, and the influence of viscous damping; completely new coverage of normal-mode responses to initial conditions, applied actions, and support motions; thorough coverage of iteration methods; and an appendix containing a series of computer programs which pertain to articles where numerical and matrix methods are utilized.

Timoshenko, S

Wiley (John) and Sons, Incorporated 1974, 521 pp

ACKNOWLEDGMENT: Automotive Engineering

PURCHASE FROM: Wiley (John) and Sons, Incorporated 605 Third Avenue, New York, New York, 10016 Orig. PC

09 083074

DECREASING THE COSTS IN HEAVY FABRICATION

With manual arc welding the cost per pound of deposit is the important factor. Cost per pound goes down as electrode diameter and welding amperage go up. With submerged arc welding, deposition rate was increased by 15% by decreasing specified wire diameter and using d.c. positive. Semiautomatic welding offers the advantages of higher duty cycles, high deposition, high current capacity.

Reynolds, DEH *Welding Design and Fabrication* Vol. 47 No. 10, Oct. 1974, pp 52-55

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 083915

CRACK-ARREST TECHNIQUES IN REINFORCED CONCRETE STRUCTURAL ELEMENTS—1. LABORATORY TESTS

Tests were conducted to develop improved methods of arresting or preventing undesired flexural cracking within the tensile zones of conventionally reinforced concrete beams. Specimens representing several potential crack-arrest techniques including fiber-reinforced concrete, concrete with wire mesh, and epoxy-resin concrete were tested under either short-or long-term static loading.

Cox, FB

Waterways Experiment Station Tech. Rpt. #C-74-7, Nov. 1974, 161 pp, 15 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 083916

INFLUENCE OF FIBER AGGREGATE INTERACTION ON SOME PROPERTIES OF STEEL FIBRE

Tests are reported in which the fiber-aggregate interaction is related to the properties of steel fiber concrete both in the fresh and hardened states. It is shown that compactibility, flexural and compressive strengths are reduced progressively by the presence of coarse aggregates. From the test results, a mix design for fiber concrete containing coarse aggregates to produce twice the flexural strength of the unreinforced matrix without bundling of fibers is presented.

Swamy, RN *Matériaux & Constructions/Materials & Structures* Vol. 7 No. 41, Sept. 1974, pp 307-314, 6 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 083931

FUNDAMENTALS OF FINITE ELEMENT TECHNIQUES FOR STRUCTURAL ENGINEERS

Using the formulations of matrix algebra, the mathematically powerful methods of finite elements are readily applicable to the analysis and solution of complex structural problems by computer methods. The book starts by summarizing the basic equations of linear elasticity and then develops the two fundamental variational principles of solid mechanics, the principles of virtual force. Chapter 2 treats the analysis of member systems and provides a link between the conventional matrix structural analysis approach and finite element methods. Chapters 3-7 contain a general development of the finite displacement method and its application to plane stress, three-dimensional bodies, plate bending and shell structures. The fundamentals of thin-shell theory are developed and current shell finite element models are discussed.

Brebba, CA Connor, JJ

Butterworth & Company, Limited 1973, 269 pp

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Butterworth & Company, Limited 88 Kingsway, London WE2B 6AB, England Repr. PC

09 083933

INTERACTIVE DESIGN AND DETAILING OF STRUCTURAL STEELWORK CONNECTIONS USING A COMPUTER

A technique for the automatic and interactive design of connections in structural steelwork using a computer with visual display facilities is described. The program can deal with inclined, oblique and eccentric beams with welded end plates and high-strength friction-grip bolts. A design example is given to illustrate the facilities provided. The discussion includes an economic assessment which indicates that the cost of using the technique is low.

Moore, MG Brotton, DM *Structural Engineer* Vol. 52 No. 4, Apr. 1974, pp 133-142

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

09 083937

LONGITUDINAL SHEAR CHARACTERISTICS OF UNIDIRECTIONAL CARBON FIBRE COMPOSITES

The theoretical dependence of the longitudinal shear characteristics of unidirectional carbon fibre reinforced resins (CFRP) is briefly reviewed. The Shear strength and modulus of various types of CFRP were measured experimentally by a torsion rod method. In particular the effect of fibre volume content and fibre type is considered. The test results are compared with theoretical predictions, and in view of the intrinsic variation in composite microstructures the correlation is considered to be reasonable.

Paton, W Lockhart, AH

National Engineering Laboratory No. 547, June 1973, 8 pp, 16 Fig.

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: National Engineering Laboratory East Kilbride, Glasgow, Scotland Repr. PC

09 083938

MATERIALS RESEARCH IN BRITISH RAILWAYS

Two particular engineering applications of composite materials have been described in some detail, namely the use of CFRP in lightweight axle units

and of CFRM in improved axle journal bearings. In addition the authors discuss problems with the selection of materials currently being encountered in the development of a new generation of secondary electric traction batteries. These examples have allowed the changing role of materials development in railway engineering to be outlined.

Referrn, BAW Waldron, GWJ *Metallurgist and Materials Technologist* July 1974, 6 pp

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: Metallurgist and Materials Technologist Repr. PC

09 084942
BENDING BEHAVIOR OF UNBONDED PRESTRESSED CONCRETE BEAMS

Unbonded prestressed concrete beams with the steel surface coated with asphalt or epoxy resin and conventional beams with grouting provided between prestress steel and concrete were submitted to static and dynamic bending tests. Through comparison of the test results with the theoretical calculations, phenomena in and safety of unbonded prestressed concrete beams have been revealed and confirmed, giving good prospects of their practical application.

Also available from ESL.

Miyamoto, Y Iwasaki, I *Railway Technical Research Institute Quart Rpt.* Vol. 15 No. 4, Dec. 1974, pp 177-183, 16 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

09 090547
THRESHOLD CRACK GROWTH IN A36 STEEL

Objectives of the study were to investigate the regions of high cycle and threshold fatigue crack propagation and to correlate the findings with observed results from tests of welded structural details. The crack propagation phase focused on cycling plate specimens at low ranges of stress to determine levels of stress for which no crack extension appeared. Results indicated a definite trend towards a threshold for fatigue crack propagation. Through a fracture mechanics analysis this threshold region of cyclic stress was described in terms of the range of the stress intensity factor for the plate specimens. The crack growth and threshold value were used to predict stress ranges which would not cause failure at the weld toe of cover plates fillet-welded to beam flanges. A mathematical model was used to relate the stress conditions existing at the weld toe to the stress applied on the detail. Using the threshold value of the stress intensity factor range found in the crack growth studies, a runout stress range was derived which agreed well with results of coverplated beam studies.

Report on High Cycle Fatigue of Welded Bridge Details. Prepared in cooperation with Federal Highway Administration, Washington, D.C.

Klingerman, DJ Fisher, JW
Lehigh University, Federal Highway Administration, Pennsylvania Department of Transportation, (PennDOT-72-3) Inrm Rpt. FEL-386.2, Sept. 1973, 61 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240625/4ST, DOTL NTIS

09 090624
FATIGUE DATA BANK AND DATA ANALYSIS INVESTIGATION

A library system has been developed for the acquisition, compilation and storage of information relating to the fatigue behavior of metal members and structures. Test data obtained from the various information sources are stored on both data sheets (for individual examination), and on standard computer punch cards. A computer program has been developed to sort the data into sets satisfying certain stipulated specimen types and loading conditions. A 'best-fit' S-N curve for each specified data set is then established using a least squares error of estimate and correlation coefficient of the regression line, and the lower tolerance limits for 99 percent survival at 50 percent and 95 percent confidence levels. The data and S-N curve are visually displayed using a CALCOMP plotter printout. Information obtained from an analysis of the data in the Fatigue Data Bank for several selected details indicates that the current AASHTO bridge design specification provisions, for these details, do not provide consistent corre-

lations nor properly model the fatigue behavior of the details as established by laboratory tests.

Report on Illinois Cooperative Highway Research Program Series 145.

Radziminski, JB Srinivasan, R Moore, D Thrasher, C Munse, WH
Illinois University, Urbana, Illinois Department of Transportation, (IHR-64) Inrm Rpt UILU-ENG-73-2025, June 1973, 162 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240261/8ST, DOTL NTIS

09 090730
AN EQUATION FOR FRACTURE ENERGY DETERMINATION BY DOUBLE-CANTILEVER CLEAVAGE

With the aid of elementary beam theory a Lagrangian equation of motion was developed to relate the crack velocity to cleavage energy in a double cantilevered single-crystal specimen when shear contributes significantly to the cleavage energy. For a constant cleavage energy the equation predicts that the square of crack length is proportional to time when the crack is long with respect to transverse specimen dimensions. For shorter cracks, crack length is proportional to time. (Author)

Availability: Pub. in Jnl. of Applied Physics, v45 n6 p2768-2769 Jun 74.

Hindman, DL Jones, JT Determan, WR
Iowa State University, Ames, Aerospace Research Laboratories, (AF-7420) Jour Artic Dec. 1973, 3 pp

Contract F33615-68-C-1034

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-006629/0ST, DOTL/NTIS

09 090736
DEVELOPMENT OF THE PROGRAM SPECCEL: A SPECIAL ELEMENT FOR ELASTO-PLASTIC CRACK TIP ANALYSIS
Theory is stated in terms of increments of displacement and stress, and of instantaneous or accumulated values of stress. The equilibrium equations, in the absence of body forces, are written, along with constitutive relations for plane strain. (Author)

Swedlow, JL
Carnegie Institute of Technology NASA-CR-140895, Dec. 1974, 32 pp

Contract NGR-39-087-053

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
N75-15073/0ST, DOTL/NTIS

09 090797
NATURAL FREQUENCIES OF VARIABLE THICKNESS BEAMS AND PLATES

Use of the perturbation method for approximating the fundamental frequencies and mode shapes of variable thickness, simply supported, square plates was expanded to include more specific problems such as higher order frequencies and mode shapes; the discretely stiffened beam and plate; and the simply supported, stepped plate. Perturbation theory is dependent upon representing the thickness of the plate as a continuous function with continuous first derivatives. This presents a problem in using the perturbation method for the discretely stiffened beam and plate, since the area of the stiffener is generally small in comparison to the overall area of the plate, and a reasonable approximation for the combined thickness is difficult to model mathematically as a continuous function. To satisfy these conditions a truncated Fourier series was used to approximate the thickness.

Geron, HJ
Air Force Institute of Technology MA Thesis GAE/MC/74-5, Dec. 1974, 48p

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-005282/9ST, DOTL NTIS

09 090804

A REVIEW OF SURFACE-CRACK FRACTURE TESTING

A brief historical review of surface-crack testing and analysis is given together with some examples of service failures due to surface cracks. The factors which complicate the analysis and interpretation of surface-crack fracture data are discussed. Current efforts to develop consensus recommendations for tensile testing of surface-crack specimens are summarized. (Author)

Conf-Presented at Mater. Eng. Ann. Meeting of the Am. Soc. For Metals, Detroit, 21-24 Oct. 1974.

Orange, TW

Lewis Research Center, (NASA-TM-X-71629) E-8163, 18p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

N75-13309/oST, DOTL NTIS

09 090838

AN APPLICATION OF FRACTURE MECHANICS TO STRUCTURAL ANALYSIS

Deflections of structural elements are frequently determined using simple engineering strength of materials approaches. However, when geometric discontinuities are present, such approaches may lead to excessive errors in the predicted deflection. The present paper suggests a simple technique for refining these deflection predictions using available fracture mechanics data. Use of such techniques leads to predictions which do not differ significantly from 'exact' solutions.

Bluhm, JI

Army Materials and Mechanics Research Center, (DA-1-T-161101-A-91-A) Final Rpt. AMMRC-TR-74-31, Nov. 1974, 10 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AD/A-003998/2ST, DOTL/NTIS

09 095220

A COMPARISON OF CHARPY V-NOTCH, DYNAMIC TEAR, AND PRECRACKED CHARPY IMPACT TRANSITION-TEMPERATURE CURVES FOR AAR GRADES OF CAST STEEL

Impact tests using Charpy V-notch, Dynamic Tear and Precracked Charpy samples were conducted on AAR-B, AAR-C (several compositions and heat treatments), and AAR-E cast grades of steel and on a high-strength, alloy cast steel. Graphical presentations of the transition-temperature data are given. Differences in the relative shapes of the curves and the locations of the NDT temperatures with respect to the transition temperatures are discussed. Fracture toughness, $K_{sub Id}$, values are also presented.

Contributed by the Rail Transportation Division of the ASME to be presented at the Joint Railroad Conference held jointly with IEEE, San Francisco, Calif., April 15-17, 1975.

Sharkey, RL (American Steel Foundries); Stone, DH (Association of American Railroads Technical Center)

American Society of Mechanical Engineers 75-RT-1, Apr. 1975, 7 pp, 11 Fig., 14 Ref.

ACKNOWLEDGMENT: ASME

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

09 095250

EFFECT OF MACHINE RIGIDITY AND LOAD APPLICATION RATE ON THE STRESS-STRAIN BEHAVIOR OF WELDED JOINTS OF HIGH-STRENGTH STEELS [Der Einfluss von Maschinensteifigkeit und Belastungsgeschwindigkeit auf das Spannungs-Dehnungsverhalten Geschweisster Verbindungen Hochfester Staehle]

An experimental program has been carried out with the aim to determine the effect of the testing machine for static tensile tests and the load application rate on the fracture behavior of welded high-strength steel. In addition to conventional universal hydraulic testing machine with "soft" characteristics, a servohydraulic and a thermally controlled testing machine with "hard" characteristics have been employed for this purpose. The latter machines made it possible to conduct control tensile tests which enabled the deformation behavior to be expressed as a function of the load application rate. [German]

Steffens, HD Knoesel, H *Maschinenschaden* Vol. 47 No. 3, 1974, pp 89-96, 14 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 095265

AUSTENITIC STAINLESS REACHES INTO NEW MARKET

The average annual growth rate for nickel stainless was 9 pct compared to less than 2 pct for the non-nickel grades. Reasons for increased specification include relative freedom from joining limitations by strict welding parameters, good formability, high corrosion resistance and high toughness and ductility (especially for cryogenic applications). Mechanical properties are listed in chart form.

Iron Age Vol. 214 No. 18, Oct. 1974, 3 pp

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

09 095266

STAINLESS STEELS, THEIR IDENTIFICATION, PROPERTIES, AND APPLICATIONS [Nichtrostende Staehle: Kennzeichnung, Eigenschaften und Verwendung]

In this review, the identification of the stainless and corrosion resistant steels according to their applications is discussed. The differences between these and related steels are explained. The basic metallurgical significance of the influence of the principal alloying elements on the general corrosion characteristics and structure of the ferritic and martensitic 13% and 17% chromium steels and the austenitic Cr-Ni and Cr-Ni-Mo(-Cu) steels is pointed out. The systematics of the DIN symbols in the context of chemical composition are explained. Heat treatments, mechanical properties, and applications are tabulated. [German]

Oppenheim, R (DEW Technische Berichte) *DEW Technische Berichte* Vol. 14 No. 1, Nov. 1974, pp 5-13

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 095275

TECHNIQUE FOR ENSURING SPOT WELDS IN A STANDARD WELDING RANGE

Features which influence spot weld quality are included. The main welding parameters to achieve quality control are welding current, welding time and electrode force. Methods for achieving required spot diameters, typical welding ranges and use of destructive testing are described.

Ganowski, FJ *Welding and Metal Fabrication* Vol. 42 No. 10, Nov. 1974, pp 372-378, 18 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 095298

ENGINEERING PROPERTIES OF FIBER-REINFORCED AND POLYMER-IMPREGNATED SHOTCRETE

Structural properties of steel-fiber-reinforced shotcrete and polymer-impregnated shotcrete, both plain and fiber-reinforced, were investigated by the Federal Bureau of Mines, Spokane Mining Research Center. The research center has found that flexural strengths can be increased by as much as 106 percent, and splitting-tensile strength by 50 percent, by introducing randomly oriented steel fibers. A slight decrease of compressive strength was found in the fiber-reinforced shotcrete. Polymer-impregnated shotcrete exhibited a threefold to fourfold increase in compressive and splitting-tensile strength. The techniques of preparing shotcrete with the dry process, using both fast-set agents and regulated-set cement, are described, along with the results of physical-property testing. Physical properties include compressive and splitting-tensile strengths, tangent and secant moduli, and stress-strain curves for plain shotcrete, fiber-reinforced shotcrete, and polymer-impregnated plain and fiber-reinforced shotcrete. Flexural strengths for plain and fiber-reinforced shotcrete are also reported. Steel-fiber shotcrete is the more promising of the new structural materials for ground support, and additional research is recommended.

This report is also available from NTIS, PB-240695, Repr. PC, \$3.75, Microfiche, \$2.25.

Poad, ME · Serbousek, MO Goris, J (Spokane Mining Research Center)
Bureau of Mines RI 8001, 1975, 25 pp, 21 Fig., 14 Tab., 6 Ref.

ACKNOWLEDGMENT: Bureau of Mines
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240695, DOTL NTIS

09 095618
ACOUSTIC EMISSION DETECTION OF FLAWS IN BUTT-WELDED PLATES

Acoustic emissions were monitored during mild flexural deformation of butt-welded steel plates after cooling of the welds. Measurement of the difference in the arrival times at two transducers was used to locate predominant sources. These were then compared with the location of known flaws. This study demonstrates the feasibility of employing acoustic emission monitoring as a method of evaluating the quality of welds. Requirements, which are appropriate to quality control on an assembly line, are discussed.

Hartman, WF (Johns Hopkins University, Baltimore) *Materials Evaluation* Vol. 32 No. 12, Dec. 1974, 4 pp, 4 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

09 095634
EFFECT OF SURFACE ROUGHNESS ON THE FATIGUE LIMIT OF STEELS (AT ZERO MEAN STRESS)

This Item provides data on the zero mean stress fatigue limit of steels having rough surfaces. There is a variety of methods in use for the description of surface roughness; however, the peak-to-valley height measure is the most pertinent to fatigue situations and is used throughout this Item. Other methods and conversion to peak-to-valley height are discussed.

ESDU Data Items N74027, Oct. 1974, 13 pp, 13 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 095635
DETERMINATION OF FRACTURE MECHANICS DATA IN THE ELASTIC PLASTIC RANGE OF MATERIALS [Ermittlung von Bruchmechanik-Kennwerten bei Elastischplastischem Werkstoffverhalten]

This article aims at analyzing the fracture of steel in the temperature range of transition from frangible to non-frangible behavior. Samples provided with artificially initiated cracks are used to study the dependence of fracture stress on the geometry of the cracks and on the samples investigated. Results are discussed. [German]

International Conference on Struct Mech in React Technol, 2nd, Div, Sess, Prepr Pap, Berlin, Germany. Sept 10-14 1973 V6A, Div G, SessG3, Paper 5.

Seidl, W (Telefunken, Germany)
Committee of the European Communities Sept. 1973, 9 pp, 8 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 095636
CALCULATION OF DYNAMIC FRACTURE TOUGHNESS FOR SMALL SECTIONS [Ermittlung Dynamischer Risszähigkeitswerte an Kleinen Querschnitten]

Ten carbon and low alloy steels with tensile strengths of 400 to 1140 N/sq mm were subjected to notch bar impact bending tests at 20 to 195 C. Specimens with DVM, ISO-V, and sharp notches were used. Energy values causing the first appearance of a crystalline spot and the dynamic fracture toughness KD were calculated from the results. The values obtained decreased in magnitude from DVM to ISO-V to sharp-notch specimens. With all specimens, KD values at low temperatures were approximately proportional to room temperature tensile strengths. [German]

Krisch, A (Max-Planck Inst fuer Eisenforsch, Germany) *Archiv Fuer Das Eisenhuettenwesen* Vol. 45 No. 12, Dec. 1974, pp 885-890

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 095637
EXPERIMENTAL STUDY OF THE INFLUENCE OF INCLUSIONS ON THE FATIGUE PROPERTIES OF STEEL

Thickness-direction specimens have been produced from a number of steel forgings differing mainly with respect to inclusion characteristics. After heat treatment specimens are fatigued and fracture surfaces are examined by means of scanning-electron microscopy in order to determine the site of fatigue-crack nucleation. Experimental observations are evaluated and discussed in the light of fracture mechanics.

Harkegard, GR (Royal Institute of Technology, Sweden) *Engineering Fracture Mechanics* Vol. 6 No. 4, Dec. 1974, pp 795-805, 12 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 095638
RESISTANCE WELDING PARAMETER PROFILE FOR SPOT WELDING ALUMINUM

As tip force is increased, there is a larger tolerance in the variation of the other welding parameters, i.e., current and weld duration where good weld quality is obtained. Longer weld current duration reduces the tendency to have cracks appearing in the sheet under the electrodes. There is a near linear correlation between welding current and shear strength which is independent of the number of weld cycles and tip force used.

Roest, CA (Reynolds Metals Company); Rager, DD *Welding Journal* Vol. 53 No. 12, Dec. 1974, pp 529-536, 3 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

09 095639
STRENGTH OF WELDED SUPPORT JOINTS IN METAL STRUCTURES OF OVERHEAD CRANES

It has been established that under the conditions of low-cycle loading, the development of fatigue damage in the regions of welded joints is determined by interaction of the stresses, produced by an applied load, along with the residual stresses that have a marked effect on the actual characteristics of the cycle. Under the conditions of a pulsed cycle from tensile stresses, caused by applied loading, the residual compressive stresses in the concentrator zone can be responsible for decreased strength under cyclic loading. Measures are proposed for increasing the strength of the support assemblies in crane girders under alternating load.

Sagalevich, VM Vershinskii, AV Prokhorov, VN *Welding Production* Vol. 21 No. 4, Apr. 1974, pp 50-54, 5 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 095640
EFFECT OF PRE-AND POST-HEATING ON WELD CRACKING OF LOW ALLOY STEELS

The results indicate that cold cracking cannot occur at the temperature above the critical point, which is 80deg C in the case of HT80 steel joint; the delayed cracking may occur at low temperatures; the activation energy determined by incubation time of delayed cracking is 11,000 cal/mol at the temperatures over-30deg C and 2300 cal/mol below-30deg C, the activation energy determined by the effect of postheating on the cracking is 13,000 cal/mol independently of steel grade, and the preheat temperature may be reduced by using postheating, but thermal stress cracking may occur under certain conditions under which blue brittleness or precipitation brittleness takes place.

Kume, R (Ishikawajima-Harima Heavy Industries Company, Ltd); Okabayashi, H Naiki, T *Japan Welding Society Transactions* Vol. 5 No. 2, Sept. 1974, pp 62-71, 20 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 095644
ALUMINUM IN TRANSPORT [L'aluminium dans les transports]
General article on the importance of the various types of light-metal alloys in the transport industry. Significant examples show the progress achieved in the preparation of these alloys and techniques for machining them, and

underline the advantages of employing them in the sphere of transport. In one of the chapters, the author refers to rail transport and the tendency towards the use of aluminium alloy sections for construction purposes. [French]

Gerard, A *Revue de l'Aluminium* No. 432, Sept. 1974, pp 461-474, 26 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

09 095875

LABORATORY INVESTIGATION OF RAILWAY PRESTRESSED CONCRETE BOX BEAMS

This report contains the description and analysis of laboratory investigation of the static and repeated load strength of nine full-size box beams cast with regular mineral aggregates.

Conducted under sponsorship of AREA Committee 8-Masonry.

Association of American Railroads Technical Center ER-53, Feb. 1965, 29 pp, 15 Fig., 1 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

09 096565

CONCRETE RESTORATION

This committee report discusses the continuing increase in utilization of concrete as a building material and its inevitable deterioration which magnifies the problem of restoration or maintenance. Discussed are topics such as remove-and-replace technique, preplaced aggregates, dry-pack method, pneumatically applied mortar, structural crack restoration, and the epoxy injection process. The techniques are presented in general terms as a possible guide to choosing methods to be considered for specific restoration projects.

Proceedings of the Seventy-Ninth Annual Convention of the American Railway Bridge & Building Association held at Chicago, Illinois, October 1-3, 1974.

American Railway Bridge & Building Association Oct. 1974, pp 67-77, 1 Phot.

PURCHASE FROM: American Railway Bridge & Building Association 18154 Harwood Avenue, Homewood, Illinois, 60430 Repr. PC

09 096569

CORROSION OF DECK PLATES AFTER 10 YEAR EXPOSURE

The plates which form the metal trough on ballast deck bridges are subjected to a severe corrosion environment created by the salt brine from refrigerator cars. A variety of metals and alloys is available for this use, but until the AAR began its investigation in 1958, no comparative data were available on the corrosion resistance of these metals and alloys for the intended use. A previous research report, ER-40, includes the data for a five year exposure period. The present report contains data from ten years of exposure and a future report will present data from 15 years of exposure. Test plates, 7 in by 10 in., were installed on the New Orleans Public Belt Railroad Huey Long bridge, New Orleans, Louisiana. At this location, only plates of stainless steel and aluminum, 6061-T6, indicated significant resistance to this brine environment. The aluminum, Alclad 2014-T6, plates were seriously foliated. The average weight loss of the specimens after ten years exposure (except stainless steel and aluminum) varied between 44.8 percent and 59.9 percent. The depth of pitting was severe and varied from 0.34 in to 0.55 in. The inspection of corrosion specimens of deck plate material shows that after 10 years exposure in a brine environment, most of the metal compositions have a high corrosion rate. Exceptions to this general conclusion are Aluminum 6061-T6 and 316 stainless steel. It is expected that results of inspections after the 15 years of exposure that was planned when the investigation was started, will show further deterioration of those metals and alloys that now exhibit poor corrosion resistance.

Conducted in collaboration with AREA Committee 15, Iron and Steel Structures.

Association of American Railroads Technical Center ER-83, Aug. 1968, 6 pp, 4 Fig., 3 Tab., 3 Phot.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

09 096591

APPLICATION OF EPOXY RESINS IN ELECTRICAL APPARATUS

Important physical and electrical characteristics of these diverse and highly useful insulating materials are summarized. Factors of chemical structure which influence the resulting resin properties are discussed. The great variety of properties which can be achieved through variations in this one class of resins is emphasized. A range of applications of these resins is mentioned and illustrated.

Dakin, TW *IEEE Transactions on Electric Insulation* Vol. E1-9 No. 4, Dec. 1974, pp 121-128, 14 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

09 096603

UNIVERSAL HEAVY-TYPE RAIL-PASS DESIGN

An attempt to introduce two new sections at the Nizhnii-Tagil Combine on the rail and structural mill is described; viz, heavy R-75 rails and OR-75 ramp rails in small roll-change batches between the normal R-65 rails. Due to the universal nature of the T-Shaped passes in the roughing stands it was found possible to do so to a large extent using the same rolls as used for the R-65 rails. A formula was deduced for calculating the width of the finishing pass which allows for the deformation of the section during subsequent cold straightening in the roller straightening machines. Roll-pass designs, reduction sequences, and methods of mounting the passes in the rolls are presented for rolling these R-75 and OR-75 rails.

Feigin, GD (Nizhnii-Tagil Comb, USSR); German, Im *Steels in the USSR* Vol. 4 No. 6, June 1974, pp 484-486

ACKNOWLEDGMENT: EI

PURCHASE FROM: Iron and Steel Institute 39 Victoria Street, London SW1, England Repr. PC

09 096606

PREDICTIONS OF CUMULATIVE FATIGUE DAMAGE USING CONDENSED LOAD HISTORIES

This paper presents predictions of fatigue crack initiation life for three distinctly different, irregular load histories, each applied to keyhole-notched compact tension specimens at several maximum load levels and using two different structural steels. Three computerized prediction methods (Landgraf, Wetzel, and a Nominal Stress Range approach) are used. All predictions are based on load histories condensed to 10% of their original number of reversals by the "Racetrack Method." This method, which is described in detail, selects the most damaging overall ranges in an irregular load history while preserving the sequence of the original loading. Predictions are compared with test data for the two dozen combinations of loading type and level and steel used. Comments are made on the relative merits of the different prediction methods.

Prepared for SAE meeting Feb 24-28, 1974.

Nelson, DV (Stanford University); Fuchs, HO *Society of Automotive Engineers-Preprints* N750045, Feb. 1974, 27 pp

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 096607

SAE CUMULATIVE FATIGUE DAMAGE TEST PROGRAM

Although not exhaustive, this test program has produced a set of fatigue data of sufficient generality that methods of fatigue life prediction (both crack initiation and propagation) and laboratory simulation can be reasonably evaluated. The test data also provides other insights: Generally, the stronger steel had the longer crack initiation life and crack propagation life at all load levels for all histories. The inverse slope of the variable amplitude life lines varied from -3.8 to -7.25. Compressive mean loads resulted in less steep slopes.

Prepared for SAE Meeting, Feb 24-28, 1975.

Tucker, Lee (Deere and Company); Bussa, S
Society of Automotive Engineers Preprint N750038, Feb. 1975, 51 pp

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 096613
FRACTURE TOUGHNESS OF WELDMENTS IN HIGH-STRENGTH STEELS

The fracture toughness of weldments increases when they are alloyed with up to 4% Ni and Cr, up to 2% Mn, and up to 1% Cu, Co, and W. Alloying with molybdenum lowers the fracture toughness. The difference in the effects of alloying elements on the fracture toughness of the weld seam and the base metal is due to their effects on the austenite grain size and the evenness of carbon distribution. Grain refining and large microheterogeneities increase the fracture toughness.

Laz'ko, VG (Century Sci-Res Institute of Ferrous Metall, USSR); Laz'ko, VE Ovsyannikov, BM *Metal Science and Heat Treatment* Vol. 16 No. 5-6, June 1974, pp 430-432, 5 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 096614
ENGINEERING AND ECONOMICAL ASPECTS OF THE USE OF WELDABLE STEELS WITH HIGH ELASTIC LIMIT [Aspects technico-economiques soulevés par l'utilisation des aciers soudables à haute limite d'élasticité]

The use of special weldable steels with high elastic limit is discussed from the point of view of dimensioning and designing the envisaged constructions as well as from the standpoint of their technological properties and maintenance and repair capability. Some suggestions are made with respect to optimum use of these steels and an outline is given of the recent trends in their application in building and bridge construction, in civil engineering, and in the construction of earthmoving and lifting equipment, storage tanks pressure vessels, ships, road vehicles, and railroad rolling stock. [French]

Herbiet, H (Cockerill, Belgium) *Revue de la Soudure; Lastijdschrift* Vol. 30 No. 3, 1974, pp 166-174

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 096652
FROM STATIC TO DYNAMIC MATERIALS IN DESIGN

Many of our traditional concepts about engineering materials are rapidly becoming obsolete and being replaced by fresh ways of looking at materials. The foundation upon which the modern field of materials is now building is the view that materials are structures, whose architecture can be planned to meet specific application needs. And from this basic principle has stemmed the new image of materials as dynamic substances designed to perform the functions of mechanical and electronic components, and that can be changed or improved in their service environment.

Clauser, HR *ASME Journal of Mechanical Engineering* Vol. 97 No. 5, May 1975, pp 20-26

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

09 096757
MEASUREMENT OF THE ELASTIC PROPERTIES OF GRANULAR MATERIALS USING A RESONANCE METHOD

The suitability of a simple resonance method of testing unbound granular materials as a method of characterising elastic properties relevant to transient pavement behaviour has been investigated. The elastic properties were found to be dependent on the loading history, the isotropic confining pressure, certain material characteristics and the deviator stress. The isotropic confining pressure could be varied in a range which was realistic for unbound granular pavement materials, and its magnitude appeared to be the major non-material factor affecting the elastic properties. Other non-material parameters likely to be important in influencing the behaviour of the material in the road could not be varied to a great extent however and it is evident that before drawing definite conclusions concerning the usefulness of the method it will be necessary to establish by some more powerful simulative technique the dependence of the elastic properties on some of these, in particular the deviator stress. /Author/TRRL/

Robinson, RG
Transport and Road Research Laboratory Series No. SR1, TRRL Rpt. 111 UC, 1974, 26 pp, 10 Fig., 3 Tab., 1 Phot., 4 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211765)

PURCHASE FROM: Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU, England Repr. PC

09 096971
BOND STRENGTH OF STEEL FIBRE REINFORCED CONCRETE

Test results are presented to show that the Anchorage bond strength of deformed bars is 40% higher in steel fibre concrete than in plain concrete. The fibres were most effective in controlling cracking and failure of the test specimens. It is suggested that a steel fibre tensile skin can substantially improve the stiffness and serviceability conditions of conventionally reinforced structural members. The experimental work consisted of several pull-out tests on 10mm, 12mm, 16mm, 20mm and 25mm diameter bars embedded in steel fibre and plain unreinforced concrete. All the reinforcing steel were hot-rolled, high-yield deformed bars with a characteristic strength of 410 n/mm² and were embedded either vertically or horizontally within the concrete. /TRRL/

Swamy, RN Al-Noori, K *Concrete* Vol. 8 No. 8, Aug. 1974, pp 36-37, 2 Fig., 2 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212024)

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

09 097247
A FRACTURE MECHANIC'S APPROACH TO THE PROBLEM OF FRICTION AND WEAR

It is proposed that the application of fracture mechanics to the study of wear processes is both feasible and fruitful. Its use is demonstrated in explaining the complicated wear behaviour in the Ti-6Al-4V system.

Moore, EM *Tribology* Vol. 7 No. 6, Dec. 1974, pp 242-244

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

09 097809
ON THE PROTECTIVE NATURE OF ATMOSPHERIC RUST ON LOW-ALLOY STEEL

The essential nature of protective rust films formed on low-alloy, weathering steels by atmospheric exposure has been clarified as to (1) the electrochemical behavior, (2) catalytic ability to form sulphate from SO₂ in the atmosphere, and (3) distribution of active corrosion sites on rusted steel surfaces. Autoradiographs show that active corrosion sites are less on a more corrosion resistant steel and decrease with exposure time. The more continuous nature of the rust coating on such a steel is also obvious from greater anodic polarization. Furthermore, a more resistant steel forms less sulphate in polluted atmospheres due to the favourable nature of the rust. /Author/TRRL/

Matsushima, I Veno, T *Corrosion Science* Vol. 11 1971, pp 129-140, 10 Fig., 4 Tab., 15 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211989)

PURCHASE FROM: ESL Repr. PC, Microfilm

09 098014
DIAGRAM FOR DETERMINING THE STRUCTURE OF THE HEAT EFFECTS ZONE IN CARBON AND LOW-ALLOY STEELS

A universal diagram has been proposed for approximate determination of the structure of the HAZ in the welding of carbon and low-alloy steels (without allowance for the influence of microalloying additions).

Lebedev, BD *Welding Production* Vol. 21 No. 7, July 1974, pp 91-93, 9 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

09 098015
METALLURGICAL PROBLEMS ASSOCIATED WITH WELDING OF STEELS [Problèmes métallurgiques associés au soudage des aciers]

Based on a temperature-time diagram, the metallurgical phenomena related to welding are chronologically described. The transformations and

the characteristics of the fusion zone and the heat-affected zone in steel welding are examined with the aid of transformation diagrams for continuous cooling. The defects resulting from the thermomechanical effects of welding—i.e., cold cracking and lamellar tearing—are discussed. [French]

Granjon, H *Soudage et Techniques Connexes* Vol. 29 No. 1-2, Jan. 1975, pp 5-15

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 098017

DETERMINATION OF MOMENT-OF-INERTIA BY EXPERIMENTAL METHODS

This paper discusses the principle of several available methods to experimentally find moments-of-inertia of parts for a variety of sizes and shapes. The methods are discussed briefly and one application for finding the moment-of-inertia of a snowmobile is explained in detail. The method has advantages in being capable of locating the center-of-gravity in three dimensions and finding the moment-of-inertia about one axis without moving the object with respect to platform. Acceptable accuracies are obtained without excessive expense or time.

Presented at the meeting held April 21-24, 1975.

Newhouse, TC (Wisconsin University, Milwaukee); Pavelic, V
American Society of Mechanical Engineers #75-DE-29, 1975, 7 p, 5
Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

09 098058

SOME OBSERVATION ON FATIGUE PHENOMENA IN A LARGE PLATE SPECIMEN OF SPRING STEEL AFTER SHOT-PEENING TREATMENT

To obtain the fundamental data for the nondestructive finding of fatigue damage in vehicle parts, the fatigue due to pulsating repeated bending in

a large plate of spring steel which had been shot-peened to increase its fatigue strength as a vehicle part, was investigated. It was clarified that there were two ways to find the fatigue damage: to observe the changing state of the surface residual stress and to detect the internal cracks non-destructively.

Murayama, S Kohara, M Iwamoto, M *Railway Technical Research Institute* Vol. 16 No. 1, Mar. 1975, pp 35-39, 6 Fig., 4 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute

PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

09 098063

STRENGTH AND TOUGHNESS IMPROVEMENT OF HIGH CARBON STEELS BY ISOTHERMAL TRANSFORMATION TREATMENT BELOW MS TEMPERATURE

Changes in some high-carbon steels were studied while being held isothermally at below their Ms point, about 200 C, following quenching from the austenitizing temperature. It was ascertained that isothermal transformation from austenite to bainite occurs and is completed in these ranges. Effects of the treatment on strength and toughness were found to be that high-hardness steels are markedly improved by this process, but strength and toughness vary considerably, not only with treatment but also with treatment time.

Iijima, K *Railway Technical Research Institute* Vol. 16 No. 1, Mar. 1975, pp 40-45, 8 Fig.

PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

10 052665

RAILWAY NOISE. DECISION CRITERIA, WORK SCHEDULE AND MEASURES TO BE TAKEN IN ORDER TO REDUCE THE NOISE AND VIBRATION ON OLDER RAILWAY VEHICLES

This report describes preparatory specifications relating to noise and vibration abatement measures for older vehicles and defines criteria of suitability for modification. A work schedule for carrying out such modifications is given. In addition, desirable noise levels to be achieved by vehicle modification and suitable noise abatement measures for older vehicles are outlined.

International Union of Railways CI37/RP 1/E, Apr. 1975, 20 pp, 1 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

10 083035

INTER-NOISE 73

The papers are grouped under the following headings: noise control in industry; machinery noise; noise control in buildings; community noise; surface transportation noise; aircraft noise; methods and instrumentation for noise measurements. Some specific topics included are; noise from compressors and pneumatic tools; mufflers for internal combustion engines; some aspects of ball bearing noise; sound insulation of gypsum walls; plumbing noise; noise from heating systems; insulation against traffic noise; noise around large open industrial plants; noise radiation from engine and drivetrains; tire-road interaction noise; noise aspects of supersonic transport; airport noise monitoring systems; computer aided system for environmental noise control; testing of sound level meters; and vehicle noise measurements.

This is the proceedings of the International Conference on Noise Control Engineering, held August 22-24, 1973, in Copenhagen.

Technical University of Denmark Paper 1973, 634 pp

ACKNOWLEDGMENT: Automotive Engineering
PURCHASE FROM: Technical University of Denmark Building 352, DK-2800 Lyngby, Denmark Repr. PC

10 083036

INTERNAL COMBUSTION ENGINES AND AIR POLLUTION

The revision of a standard text first issued in 1944, this book presents a fundamental account of the development of the science and engineering underlying the design of combustion engines and turbines. Considerable introductory material is included not only on the physics, chemistry, fluid flow, heat transfer, and thermodynamics involved, but also on those aspects of fuels, lubricants, instrumentation, combustion, and kinetics which are related to design and to air pollution control.

Obert, EF
Intext Educational Publishers 1973, 740 pp

ACKNOWLEDGMENT: Automotive Engineering
PURCHASE FROM: Intext Educational Publishers 257 Park Avenue, New York, New York, 10010 Orig. PC

10 083903

METHODS FOR DETERMINING PARTICULATE MASS AND SIZE PROPERTIES: LABORATORY AND FIELD MEASUREMENTS

Although no single particle size measuring device was found suitable in both the fine and ultrafine particle size regimes, the combination of impactors, optical counters, and diffusion batteries with condensation nuclei counters has been successfully used to measure particle size distributions and fractional efficiencies from 0.005 to 10 angstrom units in diameter.

McCain, JD Cushing, KM Smith, WB *Air Pollution Control Association, Journal of* Vol. 24 No. 12, Dec. 1974, pp 1172-76, 17 Ref

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

10 083904

RESPONSE OF COMMERCIAL CHEMILUMINESCENT NO-NO₂ ANALYSERS TO OTHER NITROGEN-CONTAINING COMPOUNDS

Commercial analyzers for nitrogen oxides using carbon or molybdenum converters were found to be nonspecific for determining NO₂. The instru-

ments not only measure NO₂, but also simultaneously respond nearly quantitatively to peroxyacetyl nitrate, and a variety of other organic nitrates and nitrites. They respond nonquantitatively to compounds such as nitroethane and nitric acid. The implications of these observations are discussed.

Winer, AM (California University, Riverside); Peters, JW Smith, JP Pitts, JN, Jr *Environmental Science and Technology* Vol. 8 No. 13, Dec. 1974, pp 1118-21, 12 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

10 083921

TRANSPORTATION OF IRON ORE: A PRACTICAL EXERCISE IN ENVIRONMENTAL CONTROL

At a very early stage in the planning of high speed iron-ore trains, British Rail and the British Steel Corporation concerned themselves with the possible environmental effects from iron ore "blow-off". The trials were run, the first, using a wind jet at the Royal Aircraft Establishment, Farnborough, indicated that problems could arise from certain ores. The second trial was run on the main line between Llanwern, near Newport, and Swindon, a distance of 50 miles, at full operating speed and this confirmed the earlier findings. Control measures were tried and successfully contained the "blow-off". Facilities for dust control designed with the experience gained from the trials have been incorporated at the appropriate loading sites.

Davies, GM *Annals of Occupational Hygiene* Vol. 17 No. 1, Aug. 1974, pp 41-48

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: Pergamon Press, Incorporated Maxwell House, Fairview Park, Elmsford, New York, 10523 Repr. PC

DOTL JC

10 090103

NOISE ASSESSMENT AND ABATEMENT IN RAPID TRANSIT SYSTEMS. REPORT ON THE MBTA PILOT STUDY

A methodology is described for assessing the noise climate and for selecting the combination of abatement techniques which reduces the existing noise to user specified levels for minimum cost. This methodology, developed in a pilot study of the Massachusetts Bay Transportation Authority (MBTA) rapid transit lines, takes into account the large number of inter-related acoustic and economic considerations present in rail transit systems. Noise sources include several types of wheel-rail noise, propulsion, power pick-up, auxiliary equipment and braking noise. Noise propagation paths include airborne and structure-borne components establishing both direct and reverberant sound fields in tunnels, stations, transit cars, and communities. In the pilot application to the MBTA, minimum-cost noise control options were determined for noise level goals in the range 75 to 90 dBA.

Kurzweil, LG Lotz, R Apgar, EG
Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA-74-13, Sept. 1974, 116p

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB 238113/5ST, DOTL NTIS

10 091175

CONSIDERATION OF ENVIRONMENTAL NOISE EFFECTS IN TRANSPORTATION PLANNING BY GOVERNMENTAL ENTITIES

The purpose of the paper is to explore the extent to which governmental entities have given consideration to environmental effects (primarily noise) in transportation systems planning. The planning function is discussed in terms of the analytical framework of anticipatory project assessment. Special aspects of two transportation modes are given attention: (1) The consideration of environmental effects in the development of the Interstate Highway System and automotive vehicles; and (2) the evolution of the regulatory structure relating to aircraft noise. The discussion is focused primarily at the Federal level with attention given to the National Environment Policy Act of 1969 and other relevant legislation including S 128 and S 138 of the Federal-Aid Highway Act of 1968, S 136(h) and 136(i) of

the Federal-Aid Highway Act of 1970, and S 611 of the Federal Aviation Act of 1958 (1968 amendment). It is noted that only in recent years has serious regulatory attention been given to the transportation noise problem. Some implications of the Noise Control Act of 1972 are suggested. The question of the social impact evaluation of environmental noise is also briefly considered.

Mayo, LH
George Washington University, National Aeronautics and Space Administration GWPS-OP-15, Dec. 1972, 59 pp

Grant NASA-NGL-09-010-030

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche
N75-72515/2ST, DOTL NTIS

10 091193

MEASUREMENTS OF RAILROAD NOISE-LINE OPERATIONS, YARD BOUNDARIES, AND RETARDERS

A field investigation of noise emission from railroad operations was conducted. The objectives of the study were the establishment of a data base on the noise levels associated with railroad operations, both line (trains in transit) and yard, and the development of measurement procedures that could be utilized in regulations applicable to the noise from rail carrier equipment and facilities. For trains in transit, measurements were made as a function of horizontal distance from the tracks, and as a function of microphone height. Train passby data are presented as the maximum A-weighted sound level observed during the passby and as Single Event Noise Exposure Levels. The directionality of retarder noise was also investigated. Measurements were made of the noise emitted in various directions during retarder operation.

Fath, JM Blomquist, DS. Heinen, JM Tarica, M
National Bureau of Standards, Environmental Protection Agency, (NBS-2130498) Final Rpt. NBSIR-74-488, Dec. 1974, 108 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche
COM-75-10088/3ST, DOTL NTIS

10 091405

PRELIMINARY FINDINGS SOUND. THE ENVIRONMENT PROJECT BART IMPACT PROGRAM

This report presents early aspects of a measurement and analysis program to assess the acoustic impact of the Bay Area Rapid Transit system (BART) on its surrounding environment. It covers findings relative to simultaneous recordings of sound levels taken on-board BART trains and at wayside positions adjacent to the BART tract. These early findings will be combined with measurements of adjacent community ambient sound levels to arrive at an overall assessment of BART acoustic impact on its surroundings.

Prepared in cooperation with Gruen Associates, Los Angeles, Calif., and De Leuw, Cather and Co., Inc., Washington, D.C.

Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development, Gruen Associates, Incorporated, De Leuw, Cather and Company Tech Memo MTC-TM-13-4-75, Mar. 1975, 46 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-241699/8ST, DOTL NTIS

10 095246

NOISE ENVIRONMENTAL IMPACT OF HIGH SPEED STEEL WHEEL VEHICLES

A review of scales used for rating environmental noise is presented. One scale, the day-night equivalent noise level, is discussed in detail. Noise levels from present steel-wheel, steel-rail trains are presented and extrapolated for higher speed operation. This information is combined to predict the region of noise impact near a high-speed rail right-of-way. A comparison is made with the region of noise impact near a limited access highway with the same passenger flow rate. It is shown that (1) the region of noise environmental impact for high-speed trains is almost identical to the region of impact for a limited access highway with no trucks, and (2) that the region of impact may be reduced dramatically by using wayside acoustical barriers.

Wittig, LE (Bolt, Beranek and Newman, Incorporated) *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 417-424, 14 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

10 095257

NOISE CONTROL VERSUS SHOCK AND VIBRATION ENGINEERING

A review is made of technical, legal, and managerial aspects of techniques of noise control and of shock and vibration engineering. The discussion of noise control includes the establishment of regulations, monitoring, and design to comply with regulations. In shock and vibration the discussion includes environmental specifications for reliability, environmental testing, and design methods to comply with test requirements.

Morrow, CT (Advanced Technology Center, Incorporated) *Acoustical Society of America, Journal of* Vol. 55 No. 4, Apr. 1974, pp 695-699, 27 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

10 095299

RAILWAY ENVIRONMENTAL PROBLEMS

This report of the participation of British Railways and its predecessors in curbing pollution covers the following areas: Atmospheric pollution; liquid pollution; solid pollution; and the environment of the railway staff. Primary attention is given to problems of an essentially chemical nature and the increasing attention paid to physical conditions such as heat, humidity, noise and radiation are not dealt with.

Railway Engineering Journal (Henley, ED) *Railway Engineering Journal* Vol. 4 No. 1, Jan. 1975, pp 4-15, 7 Fig., 5 Tab., 24 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

10 095376

EARTH VIBRATION CAUSED BY HEAVY TRAINS [Svagningsrorelser i jord]

During the last 20 years investigations have been made by the Geotechnical Department of the SJ about vibrations in the earth caused by blasting, pile driving and by heavy train traffic. During the last years the train loads have increased and also the speed of the trains. The oscillations appear mostly in areas with cohesive soils. The vibration wave form is often harmonic with low frequencies and high amplitudes. Within usual frequency ranges, 0.10 Hz, resonance phenomena appear in the earth as well as in buildings. These phenomena can affect the stability conditions and cause high additional stresses in constructions, and also become very disagreeable to people nearby. The influence depends upon the mass of the train, the distribution of power per axle, the characteristics of the superstructure and of the track as well as the speed of the trains. [Swedish]

Hannelius, L *Jarnvagstechnik* 1974, pp 28-33, 11 Fig., 5 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Jarnvagstechnik P.O. Box 265, S-10123 Stockholm, Sweden Repr. PC

10 095384

THE INFLUENCE OF RAILS ON TRAIN NOISE

Presents an evaluation of the dynamic interaction of steel wheels on steel rails and an estimation of the contribution of sound radiated by rails to total train noise levels. The interaction is modelled as a random process, for which dynamic forces at the wheel/rail interface are related to wheel and rail impedances and roughness wave number spectra.

Bender, EK Remington, PJ *Journal of Sound and Vibration* Vol. 37 No. 3, Dec. 1974, pp 321-334, 10 Fig., 7 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

10 096206

IMPULSE NOISE-A BRIEF REVIEW

This paper contains a brief review of the results of recent research into impulse noise and its effects. It sets out the important parameters and the

various methods of measurement to enable anyone familiar with the measurement of steady state noise also to measure impulse noise. The physical parameters necessary to describe an impulse noise are considered and their importance discussed. Methods and problems of the assessment of subjective loudness are considered including the use of the impulse sound level meter. The risk of hearing damage due to high levels of impulse noise is discussed and the conclusion reached that equivalent continuous noise level is a good measure of damage risk. Methods for calculating it are detailed. Equipment needed to measure impulse noise is also considered, including oscilloscopes, tape recorders, sound level meters and dosimeters. /Author/TRRL/

Solaini, AV
Transport and Road Research Laboratory TRRL Report 85 UC, 1974, 9 pp, 6 Fig., 11 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211789)

PURCHASE FROM: Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU, England Orig. PC

10 096560 ENVIRONMENTAL IMPACTS OF HIGH SPEED GROUND TRANSPORTATION SYSTEMS

The appearance of the ways of transportation and their vehicles can be controlled by following good design principles. The impacts on living patterns and land use resulting from intrusions of transport ways are not so easily mitigated or controlled. The impact of appearance of the way is immediate as a visual and aural event. The impact upon living patterns and land use is long range and not completely predictable. In the matter of the aesthetic impact of a transport system it is important to give full consideration to its scale in relation to human life and the terrain it traverses. In the matter of scale of transport ways, high speed ground systems can offer some relief from the overpowering breadth of automobile roadways. Ground level transport systems also offer a means of controlling movement and, in the hands of competent planners, a means of guiding development. High speed ground transportation will require new vehicles for movement of people and goods providing designers with opportunities for fresh concepts for containing and expediting this movement.

Montooth, C *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 459-464

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

10 096665 EIGHTH INTERNATIONAL CONGRESS ON ACOUSTICS, SYMPOSIUM ON NOISE IN TRANSPORTATION, UNIVERSITY OF SOUTHAMPTON, 22 & 23 JULY, 1974. SECTION 3: SUBJECTIVE AND PLANNING ASPECTS OF TRANSPORTATION NOISE

Among the papers presented in section 3 are the following: Human Reactions to Traffic Noise, Lamure, C; Subjective Evaluation of Transport Noise in Latin America, Fuchs, GL; Rating Procedures for Traffic Noise, Barducci, I; Subjective Assessment of Transportation Noise, Rice, CG; The Problem of Modelling Community Noise, Dickinson, PJ and Large JB; The Protection of Communities from traffic Noise, Scholes, WE; Developments in Urban Planning Against Noise, Vulkan, GH; Regulation of Transportation Noise in the United States, Cuadra, E, Sperry and Roper, WE. The number of the covering abstract of the symposium is IRRD Abstract No. 211187. /TRRL/

Lamure, C (Institut de Recherche des Transports); Fuchs, GL
Barducci, I Rice, CG Dickinson, PJ Large, JB Scholes, WE
Vulkan, GH Cuadra, E Sperry, WC Roper, WE
Institute of Sound and Vibration Research Conf Paper No Date, Figs.,
Tabs., Refs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211191S)

PURCHASE FROM: Institute of Sound and Vibration Research
Southampton University, Southampton, England Repr. PC

10 096666
EIGHTH INTERNATIONAL CONGRESS ON ACOUSTICS,
SYMPOSIUM ON NOISE IN TRANSPORTATION, UNIVERSITY
OF SOUTHAMPTON 22 & 23 JULY, 1974. SECTION 1: GENERAL
Among the papers included in section 1 are the following: Assessment of Community Noise, Eldred, KM; The Future Transportation Noise Environment in the UK, Richards, EJ; the Control of Noise from Surface Transport, Macmillan, RH; Motor Vehicle Noise Abatement Through Economic Incentives, Alexandre, A and Barde, JP. The number of the covering abstract of the symposium is IRRD Abstract No. 211187. /TRRL/

Eldred, KM (Bolt, Beranek and Newman, Incorporated); Richards, EJ (Loughborough University of Technology, England); Macmillan, RH Alexandre, A Barde, JP
Institute of Sound and Vibration Research Conf Paper No Date, Figs.,
Tabs., Photos., Refs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211188S)

PURCHASE FROM: Institute of Sound and Vibration Research
Southampton University, Southampton, England Repr. PC

10 096754 MEASUREMENT OF THE OPACITY OF DIESEL SMOKE [Messung Der Opazität Von Dieselrauch]

In EEC regulation no. 24, visual disturbance by diesel smoke was established as a determinative value of nuisance caused by diesel exhaust fumes. On the basis of this, the revised requirements for measuring procedure and measuring equipment led to a basic examination of the measuring procedure at the Battelle Institute and the development of equipment by the firm Robert Bosch GmbH. The measuring principle is based on the determination of the extinction of visible light during the passing through of a defined area. An assigned comparative measuring area enables measurement of the difference to be undertaken, which represents a direct measure of the absorption coefficients of the test medium given standardization and evaluation of signals. The structure, method of operation and possible applications of the equipment are described. The covering abstract for the conference is IRRD no. 208556. /TRRL/ [German, French/Dutch]

Dinkelacher, W *Internationale Tagung Ueber Die Strassenverkehrs*, Conf Paper Vol. A N2 Nov. 1973, 8 pp

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 301379)

PURCHASE FROM: Road Safety Study and Research Fund, Belgium 14 rue du Gouvernement Provisoire, 1000 Brussels, Belgium Repr. PC

10 096755 PRACTICAL EXPERIENCE WITH THE MEASUREMENT OF DIESEL SMOKE IN ACCORDANCE WITH EEC REGULATION 24 [Praktische Erfahrungen Bei Messung Von Dieselrauch Nach EG 24]

EEC directive 24 provides for the measurement of the density of smoke from diesel engines for road vehicles by means of opacity meters. Together with this, the light reduction caused by smoke is to be determined under fully laden waiting conditions and under free acceleration. The author reports on the introduction of this rule by a manufacturer of vehicle diesel engines who hitherto has only worked with filter equipment. Illustrations are given of conversion tables, comparative curves and calculation examples which permit a simple conversion of the blackening values to opacity units with a sufficient degree of accuracy. Possible errors and wrong evaluations are discussed. Indeed usually relation can be established between smoke density during waiting and under conditions of free acceleration, but certain basis for the drawing up of correlations cannot be found. Gas/dynamic, thermal, engine and measurement influences during non-stationary operation are the determining factors. Measurements made during driving operations under various conditions again show the need for standardized evaluation of smoke, and especially in the establishment of faults on the road. These measurements should also contribute if necessary to the supplementing of previously established limit values. The covering abstract for the conference is IRRD NO. 2008556. /TRRL/ [German, French/Dutch]

Dittrich, W *Internationale Tagung Ueber Die Strassenverkehrs Conf*
Paper Vol. A No. 21, Nov. 1973, 16 pp, 14 Fig.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD
301380)

PURCHASE FROM: Road Safety Study and Research Fund, Belgium 14
rue du Gouvernement PROVISIOIRE, 1000 Brussels, Belgium Repr. PC

10 097249

SMOKE AND TOXICITY HAZARDS OF PLASTICS IN FIRE

Among fatal and non-fatal casualties in fires in buildings, the annual proportion due to smoke and toxic gas has increased threefold over a period of seventeen years; over half the total fatalities in fires are now due to this cause. This paper briefly reviews the problem of smoke and toxic gases in fires and describes investigations aimed at determining whether the introduction of non-traditional materials, principally plastics, into buildings is likely to make a significant increase in the numbers of fire casualties overcome by gas or smoke. The investigations covered the pyrolysis of plastics under laboratory conditions, large-scale fire tests in which the generation and survival of significant toxic products were monitored, and measurements of the toxicity of fire gases. Results are given for rigid PVC used as wall linings and for flexible polyurethane foam burning in bulk. It is clear that large industrial fire loads of these materials can produce an unacceptable hazard, but further work is needed before conclusions can be reached for fire loads relevant to, for example, private dwellings.

Bowes, PC *Annals of Occupational Hygiene* Vol. 17 No. 2, Dec. 1974, pp
143-151

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Pergamon Press, Incorporated Maxwell House,
Fairview Park, Elmsford, New York, 10523 Repr. PC

DOTL JC

10 098013

TRANSPORTATION ECOLOGY MODEL-CONCEPTUAL DEVELOPMENTS

It has been clear for some time that no single transportation mode is the panacea of all metropolitan transportation problems. This paper puts forth a conceptual foundation for a general transportation ecology model (a model representing the functional environment of transportation systems). The empirical and theoretical considerations necessary for the foundations, as well as the expectations of the model concept, are explored.

Hansen, RC (Bell Laboratories); Kahne, S *IEEE Transactions on Systems Man and Cybernetics* No. 2, Vol. SMC-5, Mar. 1975, pp 157-166, 25 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr: PC, Microfilm

DOTL JC

11 072096

THE OVERGROUND-TRAFFIC-SYSTEM "AEROBUS"

The AEROBUS cableway is a new system which gives a smoother ride than old style cables. The cable curves upward slightly, leveling to horizontal when a cabin passes. Since movement is smoother, it can also be made faster, up to 50 mph. The cabins carry 100 passengers each. 6000 passengers can be carried per minute if sufficient cabins are available. The first major installation in Mannheim will do so, with 8 cabins going a 2 mile route at a cost of \$2.2 million.

Mueller (G) Maschinenbau No Date, 9 pp, Photos.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Mueller (G) Maschinenbau Zurich, Switzerland Repr. PC

DOTL TF 835.G47

11 072111

ON THE GO-URBAN IMMEDIATE CAPACITY TRANSIT SYSTEM PROGRAM

The legislature of Ontario, Canada is informed by the Minister of Transportation that the contract with the German company Krauss-Maffei for the Go-Urban Demonstration Program at C.N.E. has been terminated. The Ontario Transportation Development Corporation, OTDC, takes over existing research and development data. Ontario will have free access to the Krauss-Maffei test tracks and equipment in Munich. Ontario investment in a demonstration track can therefore be postponed. The future program will be Canadian directed. McDonnell Douglas will share cost and collaborate with ATDC. The new agreement between Ontario, OTDC and Krauss-Maffei is attached to the minister's statement.

Rhodes, J

Ministry of Transport, Canada Nov. 1974, 10 pp

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Ministry of Transport, Canada Tower C, Place de Ville, Ottawa, Ontario, Canada Repr. PC

DOTL HE4501.C34

11 072129

CURRENT TREND AND PROBLEMS CONCERNING NEW TRAFFIC SYSTEMS

In this report the author offers abstracts and his personal opinions of the various new transportation systems discussed in the ECMT conference, June 1973, Paris. As far as Japan is concerned the new transportation system must provide the following: elimination of harmful exhausts, low noise pollution, low energy consumption, safe, public needs, punctuality, low man power, comfort, economy, versatile construction, and attractive design. The method which advocates the division of Personal Rapid Transit and People Mover, and Johns Hopkins University's Fast Transit Link System and Collection and Distribution System may solve some of the traffic problems readily, but lack the long range solution the Japanese transportation authorities seek. The author finds the guideway system the most attractive system among those discussed at the conference. A brief review of available Japanese technology on the guideway system (the KCV, MAT, VONA and Palento-lai) is presented, and Momo-tai New Town, commercial area in Kobe, and Okinawa Oceanographic Fair site are possible areas for pilot programs. America is the leading researcher on the guideway system (PRT and TTI). Europe is concentrating their efforts on High Speed Surface Transit. TRANSRAPID, TRAKSURBAN, CAB-INENTAXI, H-BAHN, TREDIM, VAL, AEROTRAIN, ARAMIS, URBA systems are discussed. [Japanese]

This study was sponsored by the Japanese Ministry of Construction.

Japanese Road Association Jan. 1974, 21 pp, Figs.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Japanese Road Association 3-3-3, Kasumigaseki, Chiyoda-ku, Repr. PC Req. Price

11 082924

THE AERODYNAMICS OF VEHICLES IN FINITE LENGTH TUBES

The aerodynamics of vehicles traveling through tubes are significantly affected by the constraints of the tube wall and the relative size (blockage ratio) of the vehicle. Steady flow conditions are reached only after long travel times. In this report, the flow created by vehicle travel in a tube is analyzed using numerical integration of the unsteady flow equations.

Steady state conditions are rarely obtained for closed-end tubes up to several hundred miles in length. Solutions are presented for various blockage ratio vehicles with choked and unchoked flow conditions about them. Various tube lengths are also considered. The solution for a doubly infinite tube is found to be approaching the asymptotic long time solution.

Hammit, AG

TRW Transportation and Environmental Operations, Federal Railroad Administration Final Rpt. 96034-L014-0, Apr. 1974, 85 pp

Contract DOT-FR-30004

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236692/0SL, DOTL NTIS

11 082925

LIM RESEARCH VEHICLE REACTION RAIL CURRENT DISTRIBUTION TESTS

A linear induction motor (LIM) operates, in principle, in the same manner as a conventional rotating induction motor. But LIM performance is subject to degradation by so-called end effects, particularly at relatively high vehicle speeds (100 mph upwards). End effects are the phenomena caused by rapid generation of currents in the reaction rail at the entrance end of the LIM and their equally rapid decay at the exit end. Specific knowledge of dynamic current distribution and directional characteristics will materially aid the future design of improved LIMs. This report documents an investigation of current distribution in the LIM research vehicle (LIMRV) reaction rail at the U.S. Department of Transportation High-Speed Ground Test Center, Pueblo, Colorado.

See also PB-226283.

D'Sena, G McConville, JH

AiResearch Manufacturing Company, Federal Railroad Administration Intrm Rpt. 73-9431, Sept. 1973, 35 pp

Contract DOT-FR-30026

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-237768/7SL, DOTL NTIS

11 082997

CABTRACK: COMMUNICATIONS AND CONTROL INSTRUMENTATION FOR A ONE-FIFTH SCALE TEST TRACK

Cabtrack is a proposed high-density urban transport system in which four seat electrically powered vehicles run on a network of segregated tracks under automatic control. A principle of position-lag slot control is discussed whereby vehicles would operate in synchronism with each other on main tracks, but change to asynchronous operation after diverting into a station loop. A one-fifth scale model cabway was constructed to develop and test the methods of control. The communication and control instrumentation which was developed to enable up to 14 cabs to operate under the control of a small digital computer is described. The model cabway was successfully operated with 6 cabs of length 66 cm running at 2 m/s with headways of 54 cm (equivalent to a flow of 4000 cabs per hour on a track which is 70% occupied) thereby demonstrating a viable system of control which could be developed for use with various types of vehicle on segregated tracks. (Author)

Gibbs, EW Leedham, HC

Royal Aircraft Establishment, (BR39806) RAE-TR-73169, Mar. 1974, 45 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

N75-10867/0SL, DOTL NTIS

11 083069

LINEAR ELECTRIC MACHINES—A PERSONAL VIEW

The history of linear motors is a history of shape. Once having departed from the cylindrical geometry of rotating machines, a wider world of three-dimensional design become possible. Linear induction motors dominate the field of linear drives to the same extent as does the rotary induction machine in relation to more complicated adjustable-speed motors. It is therefore thought appropriate to devote only one section to linear motors other than induction. A fairly full treatment of electromagnetic levitation is also included together with a treatment of oscillating machines.

Perhaps the most important features are the division of electrical machines into two classes which are termed "magnetic" and "electromagnetic" and the "topological explosion" which is at present taking place in linear motor design. Some linear machines are already well established on a commercial basis but the vast bulk of recent inventions will remain to be exploited.

Laithwaite, ER *British Steelmaker* Vol. 63 No. 2, Feb. 1975, pp 250-290

ACKNOWLEDGMENT: British Steelmaker

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 083902

SPECIAL AERODYNAMIC PROBLEMS OF HIGH SPEED GROUND TRANSPORTATION SYSTEMS

The aerodynamic problems which are special to the development of high speed ground transportation systems are discussed. The aerodynamics of ground transportation vehicles has certain unique aspects not found in the aerodynamics of vehicles which operate away from the restraint of the ground plane. The aerodynamic problems of interest fall into three categories: external flow about a vehicle in the presence of a ground plane, life aerodynamics in the presence of a ground plane, and the aerodynamics of vehicles in tunnels.

Hammit, AG (Hammit (Andrew G) Association) *High Speed Ground Transportation Journal* Vol. 8 No. 2, June 1974, pp 93-100, 11 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 083918

INTRODUCTION TO THE LINEAR D.C. MOTOR

The linear dc motor is not well known. However, for certain applications, the linear dc motor compares very favorably with the more publicized linear induction motor. The difficulties in controlling the speed of conventional induction motors are well known, as is the ease with which the speed of conventional dc motors can be controlled. The heatsink qualities of the linear dc motor are excellent. With the moving field fixed armature system, the armature current flows for a short period of time through those armature conductors embraced by the brushes. The armature core acts as an excellent heatsink, and the heat produced is left behind on the track. For a given thrust, the watts/newton ratio of the linear dc motor is far superior to that of the linear induction type. The big disadvantage of the linear dc type is the usual need for a wound armature and brushes. For obvious reasons, it would not be considered as a rival to the linear induction motor for traction or operation over considerable distances.

Brough, JJ (BTH Company) *Electronics and Power* Vol. 20 No. 15, Sept. 1974, pp 628-632, 20 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

11 083924

CONTROL ASPECTS OF NEW FORMS OF GUIDED LAND TRANSPORT

A collection of 32 papers on subjects related to the control of novel vehicles, with particular reference to personal rapid transit and magnetically levitated vehicles. Topics include:—Longitudinal spacing and headway problems, Behavior at junctions and stations, Overall system design, Propulsion and Power Collection, Stability of fixed schedule operation, Control function distribution, and Track to vehicle communications. Several papers deal with magnetic levitation including magnet design, magnet controller design, air gap sensors and vertical stability. Papers on automatic road vehicles, and the place of new transport modes in the urban fabric are included.

Institution of Civil Engineers Conf. Pub. No. 117, Aug. 1974, 239 pp

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 084719

ACCEPTABILITY OF PERSONAL RAPID TRANSIT (P.R.T.) IN EXISTING RESIDENTIAL AREAS

Personal Rapid Transit (P.R.T.), with access points within walking distance from the home, is often put forward as the principal alternative

transport mode to the private car in urban areas. This paper examines the aesthetic, accessibility and constructional implications of developing such a system in existing residential areas and concludes that serious problems would be encountered along most existing residential roads which would seriously limit its extensive implementation.

Leake, GR (Leeds University, England) *International Journal of Environmental Studies* Vol. 6 No. 2/3, 1974, pp 137-152, 16 Fig., 3 Tab., 18 Ref.

ACKNOWLEDGMENT: International Journal of Environmental Studies

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC, DOTL RP

11 090174

PARAMETER OPTIMIZATION STUDIES OF MAGNETIC SUSPENSIONS FOR HIGH SPEED GROUND TRANSPORTATION

The study investigates efficient, cost-effective methods of high speed ground transportation for intercity travel. Previous aspects of the program have demonstrated the technical feasibility of two types of magnetic suspensions (the attractive-force, and the repulsive-force suspensions) for such applications, and have developed a baseline design for a TMLRV (tracked magnetically levitated research vehicle). The attractive force suspension considers the development of a mathematical model which predicts the magnetic behavior of the magnet-rail system for high speed, and a parameter optimization of the magnet. The repulsive-force suspension examines various track geometries to see if the amount of aluminum in the track could be reduced without loss of performance. Experimental studies have been carried out to support the analytical aspects of the program.

See also report dated Mar 74, PB-236 671.

Borcherts, RH Davis, LC Wan, CC Mohdulla, AU Reitz, JR Ford Motor Company, Federal Railroad Administration Final Rpt. Apr. 1974, 168 pp

Contract DOT-FR-10026

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238773/6ST, DOTL NTIS

11 090185

CABLE-STAYED GUIDEWAY. ANALYSES AND DYNAMIC MODEL TESTS

This report presents the results of scale model tests and parametric structural analyses which were performed in support of a conceptual investigation of cable-stayed guideways for suspended vehicle systems (SVS). The SVS concept would use high speed ground transportation (HSGT) vehicles suspended from an overhead guideway and which could achieve large cabin bank angles for high speed turns. This cabin bank mechanism allows the SVS to maintain a high speed, even when the guideway is collocated with an existing freeway or railroad with relatively tight turn radii. The possibility of collocating the SVS guideway is further improved by the use of cable-stayed guideways with spans of 200 feet or greater. This report describes the static and dynamic tests of a 1:24 scale model of a 250-foot span cable stayed guideway which was designed for a conceptual SVS.

Whitelaw, RL Szeless, AG Counts, J Garst, DA Virginia Polytechnic Institute & State University, Federal Railroad Administration Final Rpt. Apr. 1974, 239 pp

Contract DOT-FR-3004

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238915/3SY, DOTL NTIS

11 090189

SURVEY OF PRT VEHICLE MANAGEMENT ALGORITHMS

The document summarizes the results of a literature survey of state of the art vehicle management algorithms applicable to Personal Rapid Transit Systems (PRT). The surveyed vehicle management algorithms are organized into a set of five major component subcategories: network routing, merge control, empty vehicle management, station management, and blocked segment management. The classification scheme enables the comparison and description of algorithms in common terms. One intent of the survey was to form a data base for system designers and users. Another intent was to use the results of the survey to aid in designing a simulation model to evaluate and develop PRT vehicle management algorithms.

Priver, AS
 Transportation Systems Center, Urban Mass Transportation
 Administration Final Rpt. DOT-TSC-UMTA-74-10, Sept. 1974, 100
 pp

ACKNOWLEDGMENT: NTIS
 PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-238942/7ST, DOTL NTIS

**11 090331
 CRASHWORTHINESS FOR HIGH-CAPACITY PERSONAL RAPID
 TRANSIT VEHICLES**

The study is concerned with the design of crashworthy vehicles for high-capacity personal rapid transit (PRT) systems. PRT systems offer on-demand, non-stop service from origin to destination over an extensive network of exclusive guideways. Proposed high-capacity PRT systems operate at fractional second headways. The necessity for such short headway operation has resulted in concern for passenger safety in high-capacity PRT. The study is undertaken to establish guidelines for the design of PRT vehicles in which passengers would not be seriously injured even under the conditions of a worst case collision. It is established that even in the case of a collision with a fixed unyielding barrier, adequate passenger protection can be obtained using existing technology provided impact velocities do not exceed 30 to 40 m.p.h.

Garrard, WL Caudill, RJ Rushfeldt, TL
 Minnesota University, Minneapolis, Urban Mass Transportation
 Administration, (UMTA-MN-11-0037) Final Rpt. Oct. 1974, 127p

ACKNOWLEDGMENT: NTIS
 PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-239104/3ST, DOTL NTIS

**11 090447
 OPERATING POLICIES FOR PERSONAL RAPID TRANSIT**

The report describes and evaluates operating policies for Personalized Rapid Transit (PRT) systems and illustrates their implementation in a PRT vehicle autopilot. The vehicles frequency of passage and other considerations that contribute to the selection of such frequencies are the major topics of the report. Also studied are the various effects on system parameters and performance that follow the selection of an operating policy. The report examines 3 potential operating policies for PRT systems and defines the necessary limitations on headways resulting from design parameters and the effects of maneuvers. The operating policies considered are constant separation, constant K factor, and constant headway operation.

Morag, D
 Urban Mass Transportation Administration UMTA-RDD-8-74-2, May
 1974, 102 pp

ACKNOWLEDGMENT: NTIS
 PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-239825/3SL, DOTL NTIS

**11 090556
 OPERATIONAL POTENTIAL OF SUSPENDED VEHICLE
 SYSTEMS (SVS)**

Earlier high speed ground transportation (HSGT) studies have confirmed the feasibility of high speed suspended vehicle systems (SVS). This study determines the operating regimes within which the SVS offers potential advantages over other HSGT alternatives such as high speed rail (HSR) and tracked air cushion vehicle (TACV) systems. Each system type provides an equal level of transportation service for typical high speed applications, including 200 mile intercity and 40 mile airport access corridors. Various design options concerning guideway supporting structures for above, below and at-grade construction are examined considering costs and planning and community preferences for each basic land use category. Collocation with existing transportation corridors offers the potential of significantly reduced right-of-way costs and less negative impact on the surrounding community.

Walston, TC Graham, HR Dietrich, WH
 TRW Transportation and Environmental Operations, Federal Railroad
 Administration Final Rpt. 96034-L012-0, Apr. 1974, 193 pp

Contract DOT-FR-30004
 ACKNOWLEDGMENT: NTIS
 PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240653/6ST, DOTL NTIS

**11 090570
 SUSPENDED VEHICLE SYSTEMS (SVS). VOLUME 1, SYSTEM
 ENGINEERING STUDIES**

This report discusses generic high speed ground transportation (HSGT) vehicles which are suspended from an overhead guideway. The performance and cost are predicted for trainable revenue vehicles which would use the overhead monorail principle and operate in the 150 to 250 mph speed regime. These vehicles and the necessary elevated guideway structure comprise the suspended vehicle system (SVS), which is an alternative to overriding HSGT systems, such as the tracked air cushion vehicle (TACV) or high speed rail (HSR) systems. The unique feature of the SVS is the vehicle pendulous suspension used to achieve large cabin bank angles (up to 25 degrees) in order to achieve high speeds on curved guideway alignments. The results of system studies are described in which the vehicle and guideway concepts are developed to satisfy the performance and safety requirements.

See also Volume 2, PB-240 760.

Meisenholder, SG McGinnis, NF Graham, HR
 TRW Transportation and Environmental Operations, Federal Railroad
 Administration Final Rpt. 96034-L011-0-Vol-1, Apr. 1974, 207 pp

Contract DOT-FR-30004

ACKNOWLEDGMENT: NTIS
 PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240759/1ST, DOTL NTIS

**11 090571
 SUSPENDED VEHICLE SYSTEMS (SVS). VOLUME 2,
 SUPPORTING ANALYSES FOR SYSTEM ENGINEERING
 STUDIES**

This report describes supporting analyses for the investigation of generic high speed ground transportation (HSGT) vehicles which are suspended from an overhead guideway. Various problems are considered which apply to the design and operation of mass transportation vehicles which would use the overhead monorail principle for operation in the 150 to 250 mph speed regime. These vehicles and the necessary elevated guideway structure comprise the suspended vehicle system (SVS), which is an alternative to overriding HSGT systems, such as the tracked air cushion vehicle (TACV) or high speed rail (HSR) systems. The unique feature of the SVS is the vehicle pendulous suspension used to achieve large cabin bank angles (up to 25 degrees) in order to achieve high speeds on curved guideway alignments.

See also Volume 1, PB-240 759.

Meisenholder, SG
 TRW Transportation and Environmental Operations, Federal Railroad
 Administration Final Rpt. 96034-L011-0-V61-2, Apr. 1974, 215 pp

Contract DOT-FR-30004

ACKNOWLEDGMENT: NTIS
 PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240760/9ST, DOTL NTIS

**11 090904
 CABTRACK STUDIES. CAB LAYOUT AND GUIDANCE**

The principles which determine the mechanical layout of Cabtrack vehicles are described. General design requirements are stated and the potentialities of novel solutions are examined. These include vehicle support without the use of wheels; air cushions, magnetic repulsion and alternative vehicle/track configurations (suspended cabs, sidemounted cabs). The problem of switching closely spaced vehicles at junctions is shown to be a major criterion in assessing the practicability of these many possibilities. The more novel methods are shown to have considerable drawbacks, and, at these relatively low speeds, appear to have no overall advantages. Alternative layouts using relatively conventional ideas are described, and the results of preliminary dynamic studies on these designs are presented. (Author)

Eley, MK Joyce, BC Longrigg, JC Williams, JD
 Royal Aircraft Establishment RAE-TR-72047, May 1972, 121 pp

ACKNOWLEDGMENT: NTIS
 PURCHASE FROM: NTIS Repr. PC, Microfiche
N75-17231/2ST, DOTL NTIS

11 091066

SUPERCONDUCTING MAGNET SUSPENSIONS IN HIGH SPEED GROUND TRANSPORT

There are a number of magnetic suspensions of which superconducting suspensions are a subset. In these suspensions the movement of the vehicle is used to induce currents in a conducting track which then interacts with the magnets on the vehicle to produce a repulsive suspension force. This work provides a technical and economic definition of high speed ground transport systems using these suspensions. The full range of common superconducting suspensions and of propulsions are covered with designs produced for speeds ranging from 100 m/s (225 miles/hr) to 250 m/s (560 mile/hr). For operating cost evaluation, throughputs ranging from one to thirty million seats per annum, each way, are considered. Technical descriptions of the vehicles, their suspensions, propulsions and tracks are given in some detail and operating costs are presented for all the systems together with details of the breakdown of costs and the capital costs involved.

Alston, IA

Cranfield Center for Transport Studies CTS-5, Aug. 1973, 136 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239012/8ST, DOTL NTIS

11 091082

SOME APPLICATIONS OF CRYOGENICS TO HIGH SPEED GROUND TRANSPORTATION

The current status (December 1972) of worldwide research on high speed ground transportation techniques is reviewed. Particular attention is given to studies of magnetic levitation using superconducting magnets, including comparison with alternative magnetic techniques and with air suspension systems. Superconducting levitation appears to be a strong contender in the U.S. Department of Transportation hopes to select in the late 1970's the best of the possible levitation techniques for subsequent advanced development. Cryogenic engineering research needed in support of major development of a superconducting levitated system is identified.

Previously announced as COM-73-50439.

Arp, VD Clark, AF Flynn, TM

National Bureau of Standards, (NBS-2750101) Tech. Note NBS-TN-635, Feb. 1973, 29p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

COM-75-10177/4ST, DOTL NTIS

11 095210

FORCE ON CURRENT COILS MOVING OVER A CONDUCTING SHEET WITH APPLICATION TO MAGNETIC LEVITATION

The use of Fourier transformation techniques provides accurate integral equations for the forces exerted on d.c. polygonal coils moving above conductor plates. These equations are used to study the proposed high-speed magnetic levitation transport. A large amount of numerical data was analysed with a view to determining mutual dependence of the parameters of the system, such as speed, coil shape, coil arrangement, air gap, thickness of the track, conductivity, permeability. With regard to possible applications, the authors draw a comparison between the supra-conductor system (repulsion) and the ferromagnetic attraction system.

Lee, SW Menendez, RC *Institution of Electrical Engineers, Proceedings* May 1974, pp 567-586

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095239

SUBTERRANEAN GUIDEWAY RESPONSES TO LEVITATION VEHICLE LOADING

Tracked air cushion vehicles (TACV's) and magnetic levitation vehicles with speeds up to 300 mph are currently being developed by the U.S. Department of Transportation. The guideways for these levitation vehicles will consist of both above and below ground portions. In this study, the stresses induced by a typical TACV on alternative underground guideway and support systems are analyzed. The effects of the following system parameters on a concrete tunnel liner and the response of the surrounding

medium were calculated: the type of guideway base support (solid and strut); the stiffness of the surrounding medium (varying from a soft clay to a moderately hard rock) the load distribution (levitation and/or lateral loading); and the liner thickness. Results show that concrete liners can support the dynamic loads of typical levitation vehicles.

Clough, GW (Duke University); Wilson, JF *High Speed Ground Transportation Journal* Vol. 8 No. 1, 1974, pp 153-164, 16 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095240

MONORAIL RAILROADS AS MODERN RAPID TRANSIT SYSTEMS [Einschienebahnen als Moderne Nahverkehrsmittel]

The article reports on various kinds of monorails and their incorporation into rapid transit systems. Alweg railroads are described in detail, and technical particulars regarding the tracks and vehicles of seven realized monorails of this type are given in tables. New track developments in the US aiming at an improvement of the running and riding qualities are compared with previous designs implemented in Japan. [German]

Haubitz, G *Glaser's Annalen ZEV* Vol. 98 No. 11, Nov. 1974, pp 376-382, 15 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095243

DESIGN CONCEPTS FOR TRACKED AIR CUSHION VEHICLE GUIDEWAYS

The design of guideways as "roadways" for air cushion vehicle operation must draw heavily on the accumulated theoretical and practical experience from highway, airport and railroad design. However, this experience must be applied rationally and supplemented or replaced by new theory where it does not satisfy the physical realities of the new vehicle/guideway system. Four of the new conditions requiring rational solutions are considered. The controlling requirement of a successful guideway is ability to retain a very smooth surface satisfying a stringent surface variation tolerance for long wave lengths with some acceptable level of maintenance. The "footprint" or loaded area on the pavement is much larger than for highway or airport pavements, but exerts much lower pressures. Both local surface and long wavelength roughness impose unusually stringent requirements on pavement contractors. The close vertical profile tolerances necessitate greater consideration of potential volume change within the subgrade or foundation soils.

Rauhut, J McCullough, BF *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 375-382, 10 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095248

AIRTRAIN: AN AIRCRAFT TECHNOLOGY GROUND TRANSPORTATION SYSTEM

The AIRTRAIN is essentially an aircraft flying at near-ground level and guided by a double-rail overhead beam. At low speeds the rail provides support by means of a set of electrically powered wheels ("trucks") which are moved into position against the rail. Electric power is supplied from wayside stations to a conductor on the rail-beam. At speeds above about 80 mph the aerodynamic surfaces generate sufficient lift to make the craft airborne, turbofan engines provide propulsion, and the rail serves as a guide. In the flying mode, contact with the rail is through a pair of "air-bearings" which fit loosely around the rail and generate centering forces by means of air flowing radially inward the rail. The airbearing also houses proximity sensors which feed signals into a control system to actuate movable aerodynamic surfaces. Rail suspension is provided by a series of arched supports along the right-of-way, with the rail-beam having hinged connections for some flexibility of roll position, particularly in turns. The AIRTRAIN may be flown at heights of 30 to 40 feet above terrain surface or to clear existing traffic patterns, or the vehicle may be partially trenched to take advantage of ground effect to supplement the aerodynamic lift and reduce wind gusts.

Lehl, EL (Wichita State University, Kansas); Zumwalt, GW *High Speed Ground Transportation Journal* Vol. 8 No. 2, 6 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095249

SYSTEM ENERGY IN HIGH SPEED GROUND TRANSPORTATION

The power requirements of the tracked air cushion vehicle and the magnetically levitated vehicle are examined. To provide a quantitative measure and a rational basis for the comparison of energy cost of various systems, a nondimensional parameter, transport efficiency, is introduced. It is defined as the ratio of transport productivity to the corresponding power input of the transportation system. A distinct speed range is found within which the tracked air cushion vehicle would have higher transport efficiency than that of the vehicle system using vehicle-borne superconducting magnets and conducting roadbed. Within the speed range of 250 to 300 mph, the power consumption per unit transport productivity of the two high-speed ground transportation systems analyzed is of the same order of magnitude as that of subsonic jet aircraft cruising at approximately twice the speed. This indicates that there is an upper limit to the economical speed range of ground transportation systems operating in atmospheric pressure, beyond which the power consumption per unit transport productivity would likely be excessive.

Wong, JY (Carlton University, Canada) *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 307-320, 20 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095253

ENERGY DEMAND AND CONSUMPTION REQUIREMENTS FOR SOLID-STATE CONTROLLED LINEAR INDUCTION MOTOR PROPULSION SYSTEMS

The electrical energy demand and consumption requirements of the tracked levitated, linear induction motor propelled, vehicle are presented. Energy requirements for the various modes of acceleration, cruise, and deceleration are established. It is shown that the implementation of the various techniques of solid-state power control (power conditioning) has significant impact on the electrical energy requirements. The real and complex power requirements are presented for both the variable voltage/ fixed frequency and variable voltage/variable frequency power conditioning systems. It is concluded that the variable frequency controlled system with pulsewidth modulation is potentially the most energy-efficient system. Power conditioners of this type have not yet been built at the power levels required for a high speed ground transportation vehicle, because these systems require advanced technologies to make their size and weight effective.

Raposa, FL (Transportation Systems Center) *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 345-353, 6 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095259

DEFINING GUIDEWAY IRREGULARITY POWER SPECTRA IN TERMS OF CONSTRUCTION TOLERANCES AND CONSTRAINTS

In order to define the correlation between guideway power spectra and corresponding construction tolerances and constraints, a digital computer program for simulating the construction of several miles of guideway has been developed. The inputs to the program include statistical accuracies associated with achieving specified profile elevations in addition to constraints on allowable maximum and minimum profile deviations. Results for guideways with lengths up to 46.5 miles are presented. Of particular interest is the leveling-off characteristic of the long wavelength portion of the spectrum due to profile relative deviation constraints. These results provide insight into how various constraints on the profile elevation can influence the long wavelength irregularity characteristics which dramatically influence the ride quality of high-speed vehicles such as tracked air cushion vehicles.

Hullender, DA (Texas University, Arlington); Bartley, TM *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 355-368

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095262

RIDE QUALITY AND GUIDEWAY ROUGHNESS MEASUREMENTS OF THE TRANSPO '72 PRT SYSTEMS

An extensive series of performance and evaluation tests has been conducted on the four Personal Rapid Transit (PRT) systems demonstrated at the Dulles TRANSPO '72 transportation exposition. Included among these tests were the measurement of vehicle ride quality and of guideway irregularity. In the Ride Quality tests, a portable instrumentation system developed at the applied Physics Laboratory, the John Hopkins University, was used to measure the accelerations experienced by passengers aboard the four PRT systems while operating over a wide speed range and during various modes of operation. Volunteer subjects rode the systems and these ride juries provided ratings on ride quality, appearance, safety, and convenience. Guideway Roughness and Alignment tests were conducted to determine the characteristics of the vertical and horizontal running surfaces. These tests are briefly reviewed and a sample of the results is presented. The ride quality tests show that meaningful vehicle accelerations can be measured and that the data can be successfully processed for correlation with ride quality specifications and subjective judgments. It is shown that accelerations on the seat can be greater than those on the floor and that in some instances measured jerk values were higher than those considered to be acceptable.

Caywood, WC (Johns Hopkins University, Silver Spring); Rubinstein, N *High Speed Ground Transportation Journal* Vol. 8 No. 3, 1974, pp 213-225, 9 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095383

A NEW DEVELOPMENT PHASE FOR PIPE-LINES. SOLID MATERIALS MAY BE TRANSPORTED [Ny utvecklingsfas for rorledningar Fasta material transporterar]

To construct pipe-lines is capital-demanding, to construct railways is work-demanding. But when a pipe-line is constructed, the increase in costs for transport by pipe-line is about 1% year per transport unit, which can be compared with an increase of up to 5% in the case of railway transport. The pipe-line technique is at present developing towards transport of solid materials, like parcels, waste, ore. This transport is carried out by means of wagons within the tubes, "tube-expresses." [Swedish]

Brolin, A Skold, B *Teknisk Tidskrift* 1974, 3 pp, 9 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Berhl Haard Box 40058, 10342 Stockholm 40, Sweden Repr. PC

11 095401

CONTINUOUS AND NEVERSTOP TRANSPORT

Engineers have been intrigued by moving pavements and neverstop railways since the Victorian age. Although great ingenuity has been devoted to designing mechanisms for their success, only low-speed conveyors are used today. Recently, however, researchers have examined human reactions to conveyor travel. The author of this article considers what future these modes have when account is taken of human and mechanical constraints.

Gillie, R. *Institution of Municipal Engineers, Journal of* Vol. 21 No. 8, Sept. 1974, pp 57-62, 16 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095446

NEW TRANSPORTATION SYSTEMS

The papers in this Record report on an intermediate-capacity transit system, station and intersection for a personal rapid transit network, feasibility of an elevated STOL-port test facility, application and development of demand-actuated transportation system, and a moving walkway. Ontar-

io's Program for Intermediate Capacity Transit describes the Province's plan for building and testing a demonstration transit system of intermediate capacity in Toronto, the forerunner for revenue systems in major Ontario cities over the next decade. The paper on PRT networks describes an effort to develop geometric designs for high-capacity systems, stations and intersections with predictions of their performance under quasi-synchronous control at different design and operating conditions.

Transportation Research Record No. 522, 1974, 76 pp, Figs., Refs.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

11 095624

LINEAR INDUCTION MOTORS AS 'ELECTROMAGNETIC RIVERS'

Certain shapes of transverse flux motor can be self-supporting and guiding without a separate coil system. Because the motion is similar to that of a piece of wood floating and drifting in a river, the name 'magnetic river' was given to the device. The importance of this development can be considered at two levels. First, if the machine is used as the propulsion unit for a vehicle having a separate means of suspension, then no unwanted reaction forces are developed. The second and more far-reaching prospect is that the machine may, when developed from its present early form, be regarded as the whole suspension and guidance means of the vehicle.

Eastham, JF (Aberdeen University, Scotland); Laithwaite, ER
Electronics and Power Vol. 20 No. 22, Dec. 1974, p 1108

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

11 095642

PROBLEMS ASSOCIATED WITH FUTURE RAILROAD TRAFFIC AT HIGHEST SPEEDS FROM THE VIEW POINT OF THE ELECTRICAL ENGINEER [Probleme des Spurgebundenen Landverkehrs der Zukunft mit Hoechsten Geschwindigkeiten aus der Sicht des Elektrotechnikers]

Factors to be considered when planning a land traffic system in Europe with a traveling speed of 400 to 500 km/hr are discussed. Problems of maintaining safety in a wheel-rail system operating at such speeds are considered. The possibility of using suspension techniques is outlined. Two suspension techniques are compared; namely, suspension on an air cushion or on a magnetic cushion, using permanent magnets, electromagnets or electrodynamic means. [German]

Bopp, K *Elektrische Bahnen* Vol. 45 No. 10, Oct. 1974, pp 222-230

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095671

SIDE FORCE IN COIL-SHEET MAGNETIC LEVITATION SYSTEMS

A Fourier transform technique is used to evaluate the forces on planar polygonal dc current coils moving parallel with a conducting sheet as applied to the magnetic levitation of high-speed ground vehicles. In addition to the lift and drag forces usually discussed, a side force may exist if the current coils are asymmetric with respect to the direction of vehicle motion. For some geometrically symmetric coils, the side force may be viewed as a transverse drag which exponentially damps small lateral motion. For some other coils, instability may occur due to a perturbation in the lateral direction. With proper design, a significantly large side force (comparable to drag) may be generated and controlled by mechanical or electrical means. This side force can be used for lateral control purposes.

Menendez, RC Lee, SW *Institute of Electrical and Electronics Engrs Proc* Vol. 63 No. 5, May 1975; pp 768-776, 27 Ref.

ACKNOWLEDGMENT: Institute of Electrical and Electronics Engrs Proc

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 095701

CRYOGENIC MAGNETIC LEVITATION IS FEASIBLE FOR OUR INTERCITY TRAINS

Depending on the choice of propulsion method the idea could be economically viable, with speed and throughput determining the cost.

Beatson, C *Engineer* Vol. 240 No. 6201, Jan. 1975, pp 36-37

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Morgan-Grampian Limited 30 Calderwood Street, London SE18 6QH, England Repr. PC

DOTL JC

11 095721

ANALYSIS AND SIMULATION OF VEHICLE/GUIDEWAY INTERACTIONS WITH APPLICATION TO A TRACKED AIR CUSHION VEHICLE

Several analytical methods for investigating the problem of vehicle/guideway dynamic interactions are presented. These methods include several digital programs, each tailored to solve a particular aspect of the vehicle/guideway problem. Also included are computerized frequency domain methods for rapid estimation of system sensitivity to principal parameters and for use in selecting candidate guideway parameters. The major tool is the full scale vehicle/guideway dynamic interaction simulation, TRAVSIM, which includes coupled vehicle/guideway dynamics, independently generated guideway roughness profiles, and data processing for obtaining vehicle output data in the various ride quality formats. An example of the use of these methods to analyze the effects of guideway roughness and flexibility on a specific vehicle is illustrated. Roughness parameters are given in terms readily understandable to guideway contractors and include camber, pier settlement, pier survey error and surface finish. Results show that it is possible to vary roughness and cross section parameters and tolerances while achieving equivalent vehicle performance. Therefore, it seems possible to allow the guideway contractor to select the least costly set of tolerances to achieve the specified ride quality.

Sponsored by the Federal Railroad Administration.

Ravera, RJ Andéres, JR

Mitre Corporation, (MTR-6839) Tech. Rpt. FRA-ORD & D-75-38, Feb. 1975, 102 pp, Figs., 20 Ref., Apps.

Contract FR-30015

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-242014/AS, DOTL NTIS

11 096552

CONTROL SYSTEM CONCEPT FOR A PASSENGER CARRYING MAGLEV VEHICLE

In the past few years, considerable effort has gone into the development of trains with speeds approaching 500 kilometres per hour. One of the most promising approaches is the use of electromagnets to replace wheels, which have poor performance at high speeds. This paper describes the design of the control system for a passenger car with secondary suspension using boggy-type configurations of sideways and vertical electromagnets for suspension and guidance. The deterministic and stochastic properties of the guideway, combined with the requirements for passenger comfort, curve and grade following capability, and power consumption are used to determine the vehicle configuration and control system specifications. The control system layout for the vertical channel of such a vehicle is presented along with the expected system performance.

Gottzein, E Lange, B Ossenberg-Franzes, F *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 435-447

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 096555

LEVITATION, DRAG AND TRANSVERSE FORCES IN FINITE WIDTH SHEET GUIDEWAYS FOR REPULSIVE MAGNETIC LEVITATION

In the repulsive magnetic levitation of high-speed ground transport, the economic constraint placed on the reaction guideways to the superconducting magnets is that desirably they should be strip conductors of finite width. Theoretical studies, based on an experimentally verifiable formulation, show that the width of flat strip guideways should be wider than the flat rectangular superconducting magnet by about twice the suspension height so as not to suffer loss in lift force and deterioration in the lift-to-drag ratio. Unfortunately, lateral guidance must be provided against a large destabilizing force.

Ooi, B *High Speed Ground Transportation Journal* Vol. 19 No. 1, 1975, pp 369-373

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 096589
MASSIVE CONVEYOR SYSTEM SUPPLIES AEP'S GAVIN PLANT

Twenty-five hundred tons of coal per hour feed huge 2.6-million-kilowatt facility near Cheshire, Ohio, from two mines located 10 and 15 miles away, respectively. The 15 mile conveyor system consists of a five-mile unit connecting the company's two new deep mines and a 10-mile stretch to carry washed coal from both mines to the power plant. The inter-mine system comprises a pair of 2 1/2 mile conveyors while the 10-mile system employs two five-mile flights over rolling terrain. Conveyor design, belting and drives, as well as the equipment operation are described.

Viciana, JJ *Coal Mining and Processing* Vol. 12 No. 2, Feb. 1975, pp 34-37

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

11 096590
ON-BOARD CRYOGENIC SYSTEM FOR MAGNETIC LEVITATION OF TRAINS CRYOGENIC SYSTEM OF EET

An experimental car based on electrodynamic levitation with superconducting magnets has been developed and manufactured by AEG, BBC, Siemens and other partners, with Linde AG as the firm responsible for the on-board cryogenic system. This system has to cope with new conditions and cryogenic tasks. It can be characterized in principle by liquid helium heat exchanger units, compressors, transfer lines, rotatable, and movable couplings and junctions. All transfer lines and couplings consist of three coaxial ducts for three different streams. This paper reports on processes and components. A brief description of the first results for the whole system under simulation conditions is given.

Asztalos, St L (Werksgruppe TVT, Germany); Baldus, W Kneuer, R Stephen, A *Cryogenics* Vol. 15 No. 2, Feb. 1975, pp 52-56

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

11 096628
THE CATAMARAN AS A MAGNETIC LEVITATION VEHICLE
[Der Katamaran als magnetisches Schwebefahrzeug]

The article deals with the behaviour of a vehicle shaped like a catamaran in a magnetic levitation system with linear motors and a double guideway. The lateral stabilising force is 6.5 times higher with a catamaran than with a single-guideway vehicle. Acceleration on starting and deceleration on braking are modulated automatically according to the load. The effects of side loads are negligible. The author then explains the starting, braking and stopping of the vehicle and what occurs when the electricity supply is cut. He gives minima dimensions for a speed of 500 km/h and power consumption when the linear motors are fixed in the guideway and when they are fitted in the vehicle. In the latter case, the magnetic field supporting the vehicle produces a braking force which increases with speed. [German]

Hochhauser, P *Elektrotechnische Zeitschrift, Ausgabe B* Vol. 26 No. 16, July 1974, pp 412-413, 6 Fig., 5 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: VDE Verlag GmbH Bismarckstrasse 33, Berlin Charlottenbur, g, West Germany Repr. PC

11 096678
HOW BRITAIN CAN STAY FIVE YEARS AHEAD IN TRACKED HOVERCRAFT

This article gives an account of progress that has been made in the research and development of tracked hovercraft. The work carried out by the Tracked Hovercraft Company (THL) is discussed. Its aim is to investigate the economic and technical potential of a high speed ground transportation system using air cushion suspension and linear induction drive. THL found that the air cushion was viable but noisy, and failed to prove the worth of the system. The author also describes the work of a number

of organizations who continued the work under research contracts to the government, when THL's work ceased, and activities of other organizations including the Universities of Sussex and Warwick. The work covers both suspension systems (air cushion and magnetic) and linear motors. After discussing the possible future of the THL test track at Earith, the author concludes by referring to work being carried out overseas. Particular reference is made to the work of the U.S. Department of Transportation, the French Aerotrain, and a Canadian Minitram contract near Ontario. /TRRL/

McCallum, P *Engineering* Vol. 239 No. 6183, Sept. 1974, pp 48-50, 1 Fig., 2 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 400064S)
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 096682
OPPORTUNITIES IN AUTOMATED URBAN TRANSPORT

The report examines the use of two automated travel systems as solutions to the congestion at present experienced in urban areas. Existing technologies are assessed and desirable characteristics of new systems are described, such as good access, allowance for short trips, above ground and automated. It is argued that some new technology is necessary. The operational attributes and network structure of both systems-minitram and cabtrack are discussed in detail. The former provides for larger movements of people on a fixed network of stops and the latter serves more as a personalized demand-activated service. Visual intrusion is assessed by the use of photomontages, and possible sites for networks are evaluated in Westminster, Southampton and Sheffield. A more detailed description is given of spartaxi-a similar scheme to cabtrack, that is planned for Gothenburg. Concluding, the authors argue that the systems are fast, flexible and cheap. /TRRL/

Grant, BE Russell, WJ
Mathew, (R), Johnson-Marshall and Partners R&D Rpt. No Date, 46 pp, Figs., Photos.

ACKNOWLEDGMENT: Transport and Road Research Laboratory
PURCHASE FROM: Mathew, (R), Johnson-Marshall and Partners Welyn Garden City, Hertfordshire, England Repr. PC

11 097246
NEW INFORMATION ON RESISTANCE TO FORWARD MOTION AT VERY HIGH SPEED (RESEARCH WITH THE TGV.001)

Within the scope of SNCF studies, research and experiment for planning new very high speed lines, an important programme is included concerning the resistance to forward motion of fast trainsets; the results have enabled an approach to be made to the determination of performance and energy consumption. The author, who is an Ingenieur Principal Hors Classe at the SNCF Rolling Stock Department, explains the different stages of the programme with the TGV 001: discovered the components of aerodynamic drag; then by experiments with models in the long wind tunnel at St-Cyr, determined the aerodynamic efforts of trains comprising 2 to 10 vehicles; finally, compared the results of various series of measurements taken with a full-size train, with those obtained with models and deduce from them the drag of operational trainsets by employing geometrical dimensions. These very instructive results have shown in particular that the effects are much more appreciable on the train when standing than when on the move, that the shape of the front of the train is all important when entering a tunnel, and that the TGV 001 creates pressure which is about 1/3rd that recorded on commercial trains running at the same speed. [French]

Bernard, M *Revue Generale des Chemins de Fer* Vol. 93 Oct. 1974, pp 584-590

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 097250
SELECTION OF CANDIDATE GUIDEWAY PARAMETERS FOR HIGH SPEED TRACKED LEVITATED VEHICLES

Using well known analytical techniques, a method is presented for quickly estimating candidate guideway parameters for tracked levitated vehicle systems. These guideway parameters include stiffness, pier spacing and

roughness coefficient. Each parameter is selected so that the suspension system can adequately respond to guideway roughness and flexibility deflections while allowing vehicle compliance with an assumed ride quality standard. The method also assumes a well defined vehicle and suspension system. The assumptions implicit in the method make further analysis such as real-time nonlinear simulation necessary to assure continued acceptability of the chosen candidate parameters. An example of the method, using a previously analyzed attraction MAGLEV system, is presented.

Ravera, RJ Anderes, JR *High Speed Ground Transportation Journal* Vol. 8 No. 3, Sept. 1974, pp 17-31

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 097292

CONSUMER PREFERENCES FOR AUTOMATED PUBLIC TRANSPORTATION SYSTEMS

This paper investigates the attitudes of a cross section of residents of a metropolitan area toward 3 automated transportation systems. Respondents to a home interview survey evaluated their satisfaction with each system according to 12 attributes such as travel time, comfort, automatic control, and privacy of the vehicle. Respondents also evaluated their overall satisfaction for each system and projected their possible use of these systems. In the first phase of the analysis, the interrelations among the respondents' perceptions of the system attributes are examined. Five latent factors are determined through factor analysis to describe the attribute satisfaction ratings: level of service, comfort and privacy, degree of automatic control, out-of-pocket cost, and options and amenities. These factors are consistent for both work and shopping trips. In the second phase, reported overall satisfaction for work and shopping trips is explained in terms of the attributes through the use of linear additive models. Level of service is a significant descriptor of overall satisfaction for work trips; comfort and privacy and options and amenities are added descriptors for shopping travel. The final phase of the analysis uses a nonlinear estimation technique to explain the allocation of work and shopping trips by the respondent. This technique revealed, as did the linear additive model, that satisfaction with a mode is dependent on trip purpose.

Report prepared for the 53rd Annual Meeting of the Highway Research Board.

Costantino, DP Golob, TF (General Motors Research Laboratories); Stopher, PR (Northwestern University, Chicago) *Transportation Research Record* No. 527, 1974, pp 81-93, 2 Fig., 7 Tab., 29 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL JC

11 097323

SUPERCONDUCTING LEVITATED HIGH SPEED GROUND TRANSPORTATION IN JAPAN

An outline of the magnetic levitation project in Japan is given. Research has been concentrated on levitation system utilizing electromagnetic repulsive force between a normal metal track and on-board superconducting magnets. Development of levitation magnets together with other items basic for a levitation system is given.

Ohtsuka, T (Tohoku University); Kyotani, Y (Japanese National Railways) *IEEE Transactions on Magnetics* No. 2, Vol. MAG-11, Feb. 1975, pp 608-614, 23 Ref.

ACKNOWLEDGMENT: IEEE Transactions on Magnetics
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

11 097947

THE POTENTIAL OF HELICALLY RIBBED PIPES FOR SOLIDS TRANSPORT

Hydraulic data have been obtained for the transport of one type of uniformly graded sand in nominal 6-inch-diameter spirally ribbed ABS pipes with pitch-to-diameter ratios varying from 1.8 to 11 and also for a smooth pipe. The pitch-to-diameter ratio requiring the minimum specific energy consumption was found to be about 8 for this particular type of sand. Similarly, experiments were carried out with the same sand in a smooth 2-inch acrylic pipe and in 2-inch acrylic pipes with pitch-to-diameter ratios

of 4.8, 7.8 and 11. Again the pipe with the pitch-to-diameter ratio of 7.8 was found to be the most efficient hydraulically for transportation of the sand slurry. The possible application of ribbed pipes are discussed briefly. /Author/TRRL/

Schriek, W Smith, LG Haas, DB Husband, WHW (Saskatchewan Research Council) *Canadian Mining and Metallurgical Bulletin* Vol. 67 Oct. 1974, pp 84-91, 7 Fig., 3 Tab., 10 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211939)

PURCHASE FROM: ESL Repr. PC, Microfilm

11 098008

HIGH-SPEED TRANSPORTATION LEVITATED BY SUPERCONDUCTING MAGNET

Results of preliminary studies on superconducting magnet levitation in Japan are presented. The review presented gives a summary of the experimental studies performed to date by the Japanese National Railways. Additional experimental and theoretical work is being carried out simultaneously in both industry and universities. Plans have now been formulated to perform a field test of a levitated superconducting magnet vehicle at the speed of 500 km/hr on a 7-km track in 1975. Studies for designing the test vehicle are presently under way and it is expected that this test will open the way to final development and design of the actual train which has to be completed by around 1977.

Oshima, K (Tokyo University) *Advances in Cryogenic Engineering* Vol. 19 1974, pp 127-136

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

11 098009

AXIALLY STRESSED LIM REACTION RAIL SUBJECTED TO A MOVING LOAD

A recently developed high speed test track for the Linear Induction Motor (LIM) Vehicle at Pueblo, Colorado consists of a welded railroad track supplemented by a continuous reaction rail. The stability of the reaction rail due to axial compressive force and the effect of axial forces upon the critical velocity of a moving lateral load are studied. Included in the analysis are representations of the rail, both as an isotropic and orthotropic entity. The moving lateral load applied to the rail is assumed to be a concentrated force, acting first at the top of the reaction rail, and then at two arbitrary points.

Labra, JJ *International Journal of Solids and Structures* Vol. 10 No. 10, Oct. 1974, pp 1155-70, 12 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

11 098018

CALCULATION AND OPTIMIZATION OF THE MAGNETS FOR AN ELECTROMAGNETIC LEVITATION SYSTEM

The calculation of the static behavior of the magnets of an electromagnetic levitation system can be performed using a numerical field calculation method. The agreement of measured with calculated values is satisfactory. Besides the excitation losses of the magnets, there are also losses due to eddy currents in the rails. Some measurements, calculations, and important parameters for these eddy current effects are also discussed. The dynamic behavior of the magnet using different linear and nonlinear models is described.

Appun, P (Brown Boveri and Company, Limited); Ritter, GR *IEEE Transactions on Magnetics* No. 1, Vol. MAG-11, Jan. 1975, pp 39-44, 5 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

11 099174

COMPARISON OF TWO HSGT MAGNETIC SUSPENSION SYSTEMS (ATTRACTION)

Two alternate attraction magnetic suspension systems are compared on a magnetic performance basis as well as on their lift-to-weight (L/W) capabilities. On an equal current basis, the lower reluctance, flat track configuration has higher lift force and better L/W than the U shaped track configuration with its larger leakage flux. With equal magnetization (unequal

currents) and low guidance forces, the U shaped track has a higher L/W ratio, but both attraction systems suffer from low L/W when all elements of the suspension system are considered.

This report supplements NTIS PB238773 "Parameter Optimization Studies of Magnetic Suspensions for High Speed Ground Transportation" (Ford Motor Co.) April, 1974. Prepared for DOT, Federal Railroad Administration.

Borcherts, RH
Ford Motor Company Final Rpt. FRA-OR&D 75-75, Feb. 1975, 13 pp, 5 Fig., 11 Ref.

Contract DOT-FR-10026

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-244226/AS, DOTL NTIS

11 099181

TRACKED LEVITATED RESEARCH VEHICLE DYNAMICS SIMULATION PROGRAM, USER'S MANUAL ADDENDUM

A digital computer program was generated to evaluate the dynamic characteristics of the Tracked Levitated Research Vehicle. Additional programming and new input data requirements are described in this addendum that enable the reduction and plotting of vehicle test data stored on magnetic tape concurrently with simulated responses. The changes incorporate improved theory and algorithms and permit more comprehensive theoretical dynamic analyses to be performed. This manual is an addendum to the Tracked Air Cushion Research Vehicle-Dynamics Simulation Program User's Manual, Department of Transportation Report FRA-RT-73-19, October 1972, NTIS Accession No. PB 219 984/2.

This program was sponsored by Federal Railroad Administration's Office of Research and Development.

Zapotowski, B
Grumman Aerospace Corporation, (PMT-B4-R75-4) FRA-OR&D 75-78, Feb. 1975, 95 pp, Figs., Tabs., 1 Ref.

Contract DOT-FR-30041

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

11 099351

AUTOMATED GUIDEWAY TRANSIT

This assessment of Personal Rapid Transit and other forms of Automated Guideway Transportation has been prepared in response to a request from the U.S. Senate Committee on Appropriations. Its objectives: To provide the Committee with information on the current status and social and economic aspects of Automated Guideway Transit development; to assess the key problems associated with AGT as perceived by potential riders, the communities and the transit industry; to identify major policy issues and automated guideway transit program alternatives and to explore their implications. It is concluded that to date the Federal AGT R&D program has not produced the direct results which could be reasonably expected from an expenditure of \$95 million.

This report was prepared at the request of the Senate Committee on Appropriations, Transportation Subcommittee.

United States Congress June 1975, 399 pp, Tabs., Refs., 4 App.

PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

DOTL RP

12 082921

AN APPRAISAL OF THE PROBLEM OF THE HANDLING, TRANSPORTATION, AND DISPOSAL OF TOXIC AND OTHER HAZARDOUS MATERIALS

The report presents detailed narrative, tables, and graphs as follows: Hazardous materials classification; Types and quantities of hazardous materials; Accidents involving hazardous materials; Transportation environment; Disposal of hazardous materials; and references and contacts. Hazardous materials discussed are flammable materials, compressed gases, corrosive materials, explosives, oxidizers, poisons including chemical warfare agents and pesticides, infectious agents, radioactive materials, and Molten Materials.

Booz-Allen and Hamilton, Incorporated, Department of Transportation, Council on Environmental Quality Final Rpt. Jan. 1970, 180 pp

Contract DOT-OS-05-00033

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236599/7SL, DOTL NTIS

12 082923

CHRIS: A CONDENSED GUIDE TO CHEMICAL HAZARDS

The Chemical Hazards Response Information System (CHRIS) manual is an official publication of the U.S. Coast Guard and consists of the following four volumes: A condensed guide to chemical hazards; hazardous chemical data; hazard assessment handbook; response methods handbook. The manual provides timely information essential for proper decision-making by responsible Coast Guard personnel and others during emergencies involving the water transport of hazardous chemicals. It also provides certain basic nonemergency related information to support Coast Guard efforts to achieve improved levels of safety in the bulk shipment of hazardous chemicals. The four manuals contain chemical data, hazard-assessment methods and response guides.

United States Coast Guard CG-446-1, Jan. 1974, 459 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AD/A-002390/3SL, DOTL NTIS

12 083936

THE ROLE OF GOVERNMENT IN THE FIELD OF RAILWAY SAFETY AND THE WORK OF THE RAILWAY INSPECTORATE

The aim of this short paper is to explain the work of the Railway Inspectorate by looking at the role and responsibilities of Government in the field of railway safety, describing briefly how the present situation in Great Britain arose, and examining to what extent it meets the requirements of the present day.

McNaughton, IKA *Permanent Way Institution, Journal & Rpt of Proc* Vol. 92 No. 11, 1974, pp 36-39

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Derry and Sons, Limited Canal Street, Nottingham, England Repr. PC

DOTL JC

12 084920

SAFETY'S STRANGEST YEAR

As a result of increased publicity, railway safety was extremely criticized during 1974 despite the fewest fatalities among employees ever recorded. The year did show a large increase in derailments but better reporting and more business may have increased the number significantly. Trucking safety is as bad, or worse, than railways but they don't receive the same criticism or bad publicity. The article includes a five year chart (1969-1973) of train accidents for the railway industry.

Modern Railroads Vol. 30 No. 2, Feb. 1975, pp 54-57

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

12 090555

DEVELOPMENT OF PERFORMANCE ORIENTED SPECIFICATIONS FOR DRUMS AND PAILS USED FOR PACKAGING OF HAZARDOUS MATERIALS FOR TRANSPORTATION

A study was carried out to develop performance requirements and tests for drums and pails used to ship hazardous materials. The current require-

ments and tests were obtained by studying DOT regulations and other standards and specifications on drums and pails. Reports on the hazards of shipping and the tests used in the packaging industry were also studied. Hazard classifications, performance requirements and tests, and a container rating system were developed. The rationale behind the development is presented in the report. Test plans for Qualification and Periodic testing and detailed test procedures were prepared. Tests included were Leak, Distortion, Pressure-Proof, Repetitive Shock (Vibration), Wet Strength-Stacking, Drop, and Puncture Tests and a Temperature Cycle.

Fridinger, CE Vickers, CVJ Gott, JS

Naval Surface Weapons Center, Department of Transportation Final Rpt. Dec. 1974, 105 pp

Contract DOT-AS-20065

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240647/8ST, DOTL NTIS

12 090565

RAILROAD ACCIDENT REPORT. DERAILMENT OF AN AMTRACK TRAIN ON THE TRACKS OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY AT MELVERN, KANSAS, JULY 5, 1974

The report describes and analyzes a derailment of an Amtrak passenger train which occurred as the train was moving eastward at a speed of about 77 mph. The derailment occurred on a trailing point turnout which connected the southerly main track with a siding. The rear six cars turned over as they slid down a bank. Fifteen employees and 87 passengers were injured as a result of the accident. The National Transportation Safety Board determines that the probable cause of the accident was the broken closure rail of the turnout leading from the south main track to the siding. The insufficient strength of the track bolt and the apparent stressed condition of the nail contributed to the cause of the broken rail.

National Transportation Safety Board NTSB-RAR-75-1, Feb. 1975, 36 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240728/6ST, DOTL NTIS

12 090647

RAILROAD TANK CAR FIRE TEST: TEST NUMBER 7

A fire test was conducted on a one-fifth scale model pressurized railroad tank car on 7 February 1973. The tank car model had a thermal insulation of four inches (10.16 cm) of polyurethane encased in a 0.125 inch (0.318 cm) steel jacket. The model was loaded with propane and then engulfed in a JP-4 jet fuel fire.

Anderson, C Townsend, W Zook, J Wright, W Cowgill, G Ballistic Research Laboratory, Federal Railroad Administration Final Rpt. Dec. 1973, 154 pp

Contract DOT-AR-30026

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241145/2ST, DOTL/NTIS

12 090970

MINUTES OF THE EXPLOSIVES SAFETY SEMINAR (16TH), HELD AT THE DIPLOMAT HOTEL, HOLLYWOOD, FLORIDA ON 24-26 SEPTEMBER 1974. VOLUME II

The document presents discussions and papers reviewed at a seminar on hazards relative to handling, storing, and transporting explosive materials.

See also Volume I, AD-A007 557.

Department of Defense Explosives Safety Board Sept. 1974, 764 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-A007566/3ST, DOTL NTIS

12 090971

MINUTES OF THE EXPLOSIVES SAFETY SEMINAR (16TH), HELD AT THE DIPLOMAT HOTEL, HOLLYWOOD, FLORIDA ON 24-26 SEPTEMBER 1974. VOLUME I

The document presents discussions and papers reviewed at a seminar on hazards relative to handling, storing, and transporting explosive materials.

See also report dated 20 Sep 73, AD-775 660 and Volume 2, AD-A007 566.

Department of Defense Explosives Safety Board Sept. 1974, 780 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-A007557/2ST, DOTL NTIS

12 091178

HAZARDOUS MATERIALS TRANSPORTATION (A BIBLIOGRAPHY WITH ABSTRACTS)

The transportation of explosives, rocket propellants, chemical warfare agents, industrial chemicals, liquefied natural gas, chlorine, and other hazardous materials are covered in this bibliography which contains 126 abstracts. All means of transportation are described. Accidents, economics, and statistics are also included in these reports. See also Published Search, NTIS/PS-75/285, Hazardous Materials Waste Disposal. Radioactive wastes are excluded.

Smith, MF

National Technical Information Service Feb. 1975, 131 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

NTIS/PS-75/286/5ST, DOTL NTIS

12 091253

ANALYTICAL INVESTIGATION OF A GRADE-CROSSING ACCIDENT BETWEEN A RAILROAD TRAIN AND A SPENT REACTOR FUEL CASK

No Abstract.

Dennis, AW

Sandia Laboratories Jan. 1975, 59 pp

Contract AT(29-1)-789

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

SAND-74-0317, DOTL NTIS

12 091264

ATMX-600 RAILCAR SAFETY ANALYSIS REPORT FOR PACKAGING (SARP)

No Abstract.

Adcock, FE

Dow Chemical Company Oct. 1974, 37 pp

Contract AT(29-1)-1106

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

RFP-2244, DOTL NTIS

12 091279

EVALUATION OF COMPUTERIZED TECHNIQUES FOR PREDICTING CHEMICAL REACTIVITY AND STABILITY

The purpose of this research project was to evaluate and optimize existing computer programs based on classical thermodynamics in regard to their ability to predict chemical reactivity, stability, and cargo compatibility in ship-board situations where unusual combinations might exist. Numerous calculated thermodynamic and experimental parameters were evaluated for their ability to predict the stability (self-reactivity) and reactivity (with other chemicals) of chemical substances. Also, thermodynamic prediction of toxic combustion products was accomplished for 20 bulk-transported chemicals under varying conditions. It was concluded that the relationship between the parameters considered and chemical stability and reactivity is too obtuse for conventional statistical analysis. Subsequently, pattern recognition techniques were employed and 11 of the more promising parameters were evaluated. It was concluded that thermodynamic prediction of toxic combustion products offered greater utility in assessing the hazard of burning chemicals than present consensus rating systems (USCG(NAS-NRC) and NFPA), and a few experimental evaluations would be desirable to confirm the validity of the thermodynamic approach.

Alexander, CA Hoyland, JR Treweek, DM

Battelle Columbus Laboratories, United States Coast Guard Final Rpt. Apr. 1975, 74 pp

Contract DOT-CG-23223

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-A009561/2ST, DOTL NTIS

12 091295

RAILROAD TANK CAR FIRE TEST: TEST NO. 6

The Department of Transportation is conducting an extensive research program designed to develop methods to minimize personal injury and damage to property caused by fire from ruptured railroad tank cars filled with hazardous materials. The Ballistic Research Laboratories were requested by the Department of Transportation to conduct a series of field tests with scaled model and standard size railroad tank cars. The test described is one of the scaled model series which had no thermal protective coating, and where the relief valve was turned ninety degrees from the vertical.

Anderson, C Townsend, W Zook, J

Ballistic Research Laboratory, Federal Railroad Administration Final Rpt. Aug. 1973, 178 pp

Contract DOT-AR-30026

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241207/0ST, DOTL NTIS

12 091301

FRAGMENTATION AND METALLURGICAL ANALYSIS OF TANK CAR RAX 201

On 28 July 1973, the Ballistic Research Laboratories performed a full-scale fire test on a 33,000 gallon, DOT 112A340W non-insulated, pressure, rail tank car for the Federal Railroad Administration and Association of American Railroads. The car was filled with liquefied petroleum gas (LPG). After 24.5 minutes of exposure to the fire, the tank car ruptured. This report concerns the mapping of the fragments and metallurgical analysis of the ruptured car, along with an investigation of the cause and initial location of failure.

Anderson, C Norris, EB

Ballistic Research Laboratory, Federal Railroad Administration Final Rpt. Aug. 1974, 37 pp

Contract DOT-AR-30026

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-24125/2ST, DOTL NTIS

12 091318

THE EFFECTS OF A FIRE ENVIRONMENT ON A RAIL TANK CAR FILLED WITH LPG

A 127 kiloliter (33,600 gallon) railroad tank car was instrumented and filled with liquefied petroleum gas. A large JP-4 fuel pool fire then engulfed the tank car, and measurements of temperature, pressure, etc., were recorded as a function of time. After 24.5 minutes, the car failed catastrophically via stress-rupture. Mass flow rates and a discharge coefficient have been obtained for the relief valve. An analytical expression has been derived and then used to obtain the heat flux to the wetted surface of the tank car. The rupturing of the car is briefly discussed.

Anderson, C Townsend, W Zook, J Cowgill, G

Ballistic Research Laboratory, Federal Railroad Administration Final Rpt. Sept. 1974, 289 pp

Contract DOT-AR-30026

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241358/1ST, DOTL NTIS

12 091319

DEVELOPMENT OF A COMPUTER PROGRAM FOR MODELING THE HEAT EFFECTS ON A RAILROAD TANK CAR

A mathematical model has been programmed in FORTRAN IV that represents the response to a fire environment of a railroad tank car laden with a volatile, flammable fluid. Inputs to the program include total mass of lading per foot of tank length, tank length, number and flow area of relief valves, their opening and closing pressure, thickness and thermal conductivity of exterior insulation, and array of the thermodynamic properties of the lading, its initial condition, and heat transfer coefficient and fire temperature at various points on the tank. Output includes tank pressure, temperatures of the liquid and vapor, temperatures of the interior surface of the shell, mass of liquid remaining, and location of the liquid level.

These are printed for the end of every computing interval, thus indicating the history of each.

Study sponsored by the U.S. Department of Transportation, Federal Railroad Administration, Washington, D.C.

Graves, KW

Calspan Corporation, Federal Railroad Administration, (CALSPAN-YE-5176-D-1) Final Rpt. FRA-OR&D 75-33, Jan. 1973, 101 pp

Contract DOT-AR-20036

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-241365/6ST, DOTL NTIS

12 091406

COMPARISON OF THERMALLY COATED AND UNINSULATED, RAIL TANK CARS FILLED WITH LPG SUBJECTED TO A FIRE ENVIRONMENT

Two fire tests were conducted on 128 kiloliter, high pressure rail tank cars filled with liquefied petroleum gas. Both tank cars were exposed to an intense hydrocarbon fire after being outfitted with appropriate instrumentation. The instrumentation was monitored and its output recorded throughout the fire tests. To test the feasibility of insulating railroad tank cars to protect them from fire exposure, one of the cars was coated with a 0.318 cm thermal shield. A comparison of data conclusively shows that a thermal shield significantly alters the thermal response of a rail tank car in a fire environment.

Townsend, W. Anderson, C. Zook, J. Cowgill, G
Ballistic Research Laboratory, Federal Railroad Administration Final Rpt. Dec. 1974, 53p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-241702/0ST, DOTL NTIS

12 095649

DERAILMENT DETECTOR ON HAULED ROLLING STOCK USED BY THE MIFERMA COMPANY [Detecteur de deraillement sur le materiel remorque utilise par le chemin de fer de la Societe MIFERMA]

This equipment, fitted beneath the vehicle underframe or body, is connected directly to the main compressed-air brake pipe. Its feelers, suitably positioned near the wheelsets, detect unusual axle or body movement, they cause depression in the brake pipe and consequently an emergency application of the brakes. This detector can also be used on vehicles fitted with vacuum brakes. [French]

Vie du Rail Outremer No. 243, Oct. 1974, pp 24-25, 4 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Office Central des Chemins de Fer d'Outremer 38 rue la Bruyere, Paris 9e, France Repr. PC

12 095703

RAILROAD ACCIDENT REPORT-SOUTHERN PACIFIC TRANSPORTATION COMPANY FREIGHT TRAIN 2ND BSM MUNITIONS EXPLOSION, BENSON, ARIZONA, MAY 24, 1973

On May 24, 1973, Southern Pacific Transportation Company's freight train 2nd BSM 22, was approaching Benson, Arizona, when 1 of 12 munitions boxcars in the train's consist caught fire. The boxcars were loaded with 500-lb. MK 82 bombs. As the train stopped, the cargo exploded, and the explosions continued for several hours. The National Transportation Safety Board determines that the probable cause of the accident was the exposure of heat-sensitive bombs in Car 38 to a fire inside the car. The fire most likely originated from sparks off the brakeshoes which ignited the sodium nitrate impregnated floorboards.

This report contains Railroad Safety Recommendations R-75-8 through R-75-10.

National Transportation Safety Board, (1114C) NTSB-RAR-75-2, Feb. 1975, 40 pp, 9 Fig., Apps.

ACKNOWLEDGMENT: National Transportation Safety Board

PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-241580/0ST, DOTL NTIS

12 095870

RAILROAD TANK CAR FIRE TEST: TEST NO. 7

A fire test was conducted on a one-fifth scale model pressurized railroad tank car on 7 February 1973. The test, designated as Test Number 7, was conducted by the Ballistic Research Laboratories for the Federal Railroad Administration of the United States Department of Transportation at the White Sands Missile Range. The tank car model has a thermal insulation of four inches (10.16 cm) of polyurethane encased in a 0.125 inch (0.318 cm) steel jacket. The model was loaded with propane and then engulfed in a JP-4 jet fuel fire.

Anderson, C. Townsend, W. Zook, J. Wright, W. Cowgill, G
Department of the Army Final Rpt. FRA-OR&D 75-37, Dec. 1973

Contract DOT-AR-30026

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche
PB 241145/AS, DOTL NTIS

12 096595

THERMAL HAZARD FROM PROPANE FIREBALLS

Tank trucks and rail cars containing such hazardous materials as commercial propane are often involved in accidents wherein the tanks are ruptured and fires occur. In this study, a model for determining the thermal hazard associated with the resulting fireball is developed, and the results are compared with available test data. One way to minimize the fireball hazard is to distribute the propane in the proper size container for shipment and to space the containers so that ignition of one would not result in ignition of additional containers.

Hardee, HC (Sandia Laboratories) *Transportation Planning and Technology* Vol. 2 No. 2, 1973, pp 121-128, 13 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

12 096775

CONSPICUITY OF BEACONS FOR EMERGENCY VEHICLES

In a large field study red, orange, light blue and dark blue rotating and flashing beacons have been studied mainly from a peripheral conspicuity point of view. Some subjective evaluation has also been made. The results show that from a purely visual point of view the orange beacon is superior. The red beacon is inferior in nighttime conditions but good under bright daylight conditions which seem to be the worst from a safety point of view. The blue beacons are almost too good in nighttime conditions in the respect that they cause discomfort but they are poorly visible in bright daylight conditions. A light blue beacon improves visibility in daylight. Flashing light blue beacons are equally as conspicuous as rotating light blue beacons but cause more discomfort. /TRRL/

Rumar, K

Uppsala University R&D Rpt. Report 152, 1974, 44 pp, 4 Fig., 1 Tab., 11 Ref.

ACKNOWLEDGMENT: National Swedish Road & Traffic Research Institute (VTIN20019E), Transport and Road Research Laboratory (IRRD 212463)

PURCHASE FROM: Uppsala University P.O. Box 256, 75105 Uppsala, Sweden Repr. PC

12 097295

RAILROAD ACCIDENT REPORT: HAZARDOUS MATERIALS ACCIDENT IN THE RAILROAD YARD OF THE NORFOLK AND WESTERN RAILWAY AT DECATUR, ILLINOIS, JULY 19, 1974

GATX 41623 and four other tank cars loaded with isobutane gas were uncoupled at the west end of Decatur Yard by a switching crew and allowed to free roll eastward on yard track 11. The car impacted an empty boxcar, and its coupler overrode the tank car coupler and punctured the tank. Isobutane escaped and vaporized for 8 to 10 minutes before it exploded. The yard, surrounding residences, and commercial facilities were damaged extensively by fire and shock waves. Seven employees died from burns, and 33 employees were injured. Three hundred sixteen persons outside the rail yard were also injured as a result of the explosion. Property damage was estimated at \$18 million. The National Transportation Safety Board determines that the probable cause of the accident was the overspeed impact between the heavy cut of tank cars and the uncoupled light boxcar, which resulted from the release of the tank cars at a higher-

than-acceptable switching speed. The lack of written guidelines to assist the switchman in determining the proper switching speed contributed to the accident. The crew members' lack of understanding of the risks involved in switching hazardous materials also was a contributing factor. Recommendations were made regarding tank head shields and couplers, employee training, hazardous materials accident data reporting, and regulations to limit losses in hazardous materials accidents.

This report contains Railroad Safety Recommendations R-75-18 through R-75-22.

National Transportation Safety Board NTSB-RAR-75-4, Apr. 1975, 30 pp, Figs.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

12 098678

RAILROAD ACCIDENT REPORT: COLLISION OF PENN CENTRAL FREIGHT TRAIN OV-8 WITH AN OPEN DRAWBRIDGE, CLEVELAND, OHIO, MAY 8, 1974

On May 8, 1974, Penn Central freight train OV-8 collided with the counterweight of a lift-span drawbridge on the Cuyahoga River at Cleveland, Ohio. Shortly before the collision, the eastbound train had been traveling at 33 mph on a main track equipped with automatic block signals when the DB operator contacted the traincrew and advised them that the route was clear ahead. Then, the operator remembered that a boat had been awaiting passage and, without informing the traincrew, he opened the bridge. The train passed the red home signal of the DB interlocking without braking and struck the counterweight of the open bridge about 600 feet beyond the signal. The two crewmembers in the lead locomotive unit died as a result of crash injuries. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the locomotive crewmembers to obey a wayside signal indication to stop and the concurrent opening of the drawbridge by the DB operator after he had advised the oncoming traincrew by radio that the route was clear. Contributing to the accident was the absence of specific rules that either prohibited such a radio message or described the circumstances under which such a radio transmittal could be accepted as an operational control.

This report contains Safety Recommendations R-75-11 through R-75-15.

National Transportation Safety Board NTSB-RAR-75-3, Mar. 1975, 29 pp, Figs., 2 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC

DOTL NTIS

12 099185

SAFETY PRIORITIES IN RAIL RAPID TRANSIT. VOLUME 2-EXHIBITS

This report contains the exhibits of the Volume 1 report, a report which develops a program to identify what should be done to aid in assuring that rail rapid transit safety continues to produce the lowest number of fatalities of any of the major passenger transportation modes. Exhibits are: (1) Work Statement; (2) Project Implementation Plan; (3) Safety Advisory Board; (4 & 5) Safety Advisory Board Meeting Agendas and Minutes; (6) Safety Advisory Board Committee Meeting Minutes; (7) Montreal Fire Report; (8) Compilation of Safety Related Items; (9) Accident Source Items Final Listing; (10) TDC Monograph Series 500 "Transit Flammability Requirements" 500-3; (11) UITP-Combustibility of Material Used in the Construction of Modern Rolling Stock; (12) Work Statement on Non-metallic Materials; (13) Consultants Report on Fire Safety of Materials; (14) Engineering for Fire Safety of Rail Rapid Mass Transit Systems-SRI; (15) TDC Monograph Series 500 "Smokeless Cable" 500-2; (16) NASA Problem Statement No. 72-04-025 Smokeless Non-toxic Cable; (17) Fire Extinguishing System-8-74; (18) Work Statement -The Development of a Method and Equipment for Early Detection of Fire, etc; (19) a proposed Study of Accidents on Fixed Stairs in Rapid Transit Stations-E. Novell; (20) Proposed Work Statement "Design, Test and Acceptance Criteria for Transparencies; (21) Work Statement for the Production and Distribution of a Safety Film on Mass Transit; and 6 other exhibits with relevancy to the main report.

Sponsorship was by the Urban Mass Transportation Administration, DOT. See also Safety Priorities in Rail Rapid Transit. Volume 1-Report.

Connell, WM

Transit Development Corporation, Incorporated Final Rpt. UMTA-DC-06-0091-75-2, Mar. 1975, 280 pp

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: NTIS Repr. PC

PB-242954, DOTL NTIS

12 099186

SAFETY PRIORITIES IN RAIL RAPID TRANSIT. VOLUME 1-REPORT

Rail Rapid transit presently produces the lowest number of fatalities of any of the major passenger transportation modes. This report develops a program to identify what should be done to aid in assuring that rail rapid transit safety continues. All aspects of rail rapid transit safety are reviewed, hazards are identified, priorities established, and remedial actions recommended. Recommendations include: (1) an evaluation program for materials which utilizes new methods of computing and assessing risk in the areas of flammability, smoke and toxicity; (2) compilation and dissemination of procedures, techniques, and equipment used in the safe evacuation of rail rapid transit patrons; (3) an improvement study of fixed stairs in rail rapid transit facilities to determine whether significant reduction can be achieved in the number of patron falls; (4) a safety education plan to produce films for public education and use in primary schools; (5) work efforts in the development of fire detection and transit vehicle fire extinguishing equipment; (6) establishment of criteria for transparencies used for transit vehicles; (7) determination of hazards of power regeneration and the evolution of procedures to eliminate them; and (8) continuation and support of the Safety Advisory Board techniques for analyzing and assessing safety in rail rapid transit to help assure coordinated technical information input to transit safety development. A bibliography is furnished.

Sponsorship was by the Urban Mass Transportation Administration, DOT. See also Safety Priorities in Rail Rapid Transit. Volume 2-Exhibits.

Connell, WM

Transit Development Corporation, Incorporated Final Rpt. UMTA-DC-06-0091-75-1, Mar. 1975, 45 pp

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: NTIS Repr. PC

PB-242953, DOTL NTIS

12 099210

RAILROAD ACCIDENT REPORT: COLLISION OF ST. LOUIS-SAN FRANCISCO RAILWAY TRAINS 3210 AND 3211 MUSTANG, OKLAHOMA, SEPTEMBER 1, 1974

On September 1, 1974, at 1:44 to 1:46 p.m., the St. Louis-San Francisco Railway Company's eastbound freight train 3210 and westbound train 3211 collided head-on 1.7 miles west of Mustang, Oklahoma. The trains were scheduled to meet in Mustang. However, train 3211 passed Mustang ahead of schedule. As a result of the collision, 4 locomotive units were destroyed, 23 cars derailed, and hazardous materials caught fire in the wreckage. As a result of the fire, eight families were evacuated from their homes. A brakeman on train 3211 was killed, and the three other crewmembers of the train were injured seriously. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the crew of the 3211 to take preventive action after the train passed Mustang ahead of schedule. Contributing to the passing of the meeting point ahead of schedule were the engineer's and the conductor's erroneous assumptions based on radio transmissions from train 3210 that it was at a more distant point. The report contains recommendations addressed to the St. Louis-San Francisco Railway Company and the Federal Railroad Administration intended to prevent the recurrence of this type accident.

National Transportation Safety Board NTSB-RAR-75-6, May 1975, 23 pp

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

12 099353

PROPOSED QUALIFICATION REQUIREMENTS FOR SELECTED RAILROAD JOBS

This report proposes minimum, safety-related knowledge, performance and training requirements for the jobs of railroad engineer, conductor, brakeman and train dispatcher. Analyses performed were primarily based upon job and task analytic documentation already in existence, and were critically reviewed by government and civilian railroad specialists. Recommendations are also offered for the conduct of job training and for techniques to measure and evaluate job knowledge and performance.

This report was sponsored by US DOT, Federal Railroad Administration's Office of Research and Development.

Hale, A Jacobs, HH
Dunlap and Associates, Incorporated, (DOT-TSC-FRA-75-8) Final
Rpt. FRA-OR&D-75-44, May 1975, 130 pp, 1 Fig., Tabs., 3 App.

Contract DOT-TSC-736

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-244090/AS, DOTL NTIS

13 072070

ELECTRICAL EQUIPMENT OF THE REGIONAL EXPRESS

SERVICE (RER) [L'équipement électrique du réseau express régional]
Electrical equipment of the regional East-West line includes installations with high and low power and with the most modern electronic equipment. The line and the stations are supplied by tractive power (1500 V). The lighting and power equipment of the line and the stations are described, including special safety measures that guarantee the functioning of all equipment under all circumstances. The signalling system (train control and signalling itself) is described, especially the on-board train control. The centralized train control consists of a central control station with an automatic train control system (SCA) which is connected with vehicle detection and vehicle transponder systems on the line. The diverse telecommunication systems of the line are mentioned. [French]

Paris Regional Transport Authority Dec. 1971, 45 pp, Figs., Photos.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Paris Regional Transport Authority Paris, France Repr. PC

DOTL TF368.R45

13 083028

A NEW BRITISH LIGHT-WEIGHT SINGLE-ARM PANTOGRAPH

Light-weight vehicle-construction is the logical order of the day in the interests of reducing wear and tear, and energy consumption in particular. This light-weight pantograph discussed has been developed for the lighter urban and suburban systems but has a ready potential for conventional railway suburban lines and speeds above those for which it was originally designed.

Dixon, DL *Rail Engineering International* Vol. 4 No. 9, Nov. 1974, pp 425-428, Figs.

ACKNOWLEDGMENT: Rail Engineering International

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

13 083049

GREAT NORTHERN SUBURBAN ELECTRIFICATION. PART I: CIVIL ENGINEERING WORKS. PART II: FIXED EQUIPMENT

This two-part (Civil Engineering Works and Fixed Equipment) article discusses the planning and construction involved in the electrification of 115 route km of British Railways suburban line out of London's Kings Cross Station. Installation of catenary involved alterations to existing bridges and tunnels and construction of some completely new bridges. The fixed equipment is the means by which power is transmitted from the supply point to the train and consists of the power supply system and the catenary itself. Designs result from the experience gained during installation and operation of earlier BR electrifications.

Mann, FAW Cronin, JE Waldrum, JH *Railway Engineering Journal* Vol. 3 No. 6, Nov. 1974, pp 13-36, 30 Fig., 2 Tab., 3 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

13 084936

CONTROLLED INTERRUPTION METHOD FOR SHORT-CIRCUIT CURRENT IN DC SUBSTATION

In commuter sections, the capacity of substations must be increased to meet increasing traffic volumes; simultaneously the short-circuit current is higher. The result is that overcurrents are likely to surpass the ratings of high-speed circuit breakers. This article attempts to define the characteristics of short-circuit currents in a high-capacity substation and studies methods to suppress and interrupt heavy short-circuit currents by inserting reactors.

Available also from ESL.

Fujimura, T Suwabe, K Furusawa, J *Railway Technical Research Institute Quart Rpt.* Vol. 15 No. 4, Dec. 1974, pp 197-202, 12 Fig., 3 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute

PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

13 084944

ELECTRIFICATION: IS IT GOING TO HAPPEN?

The U.S. has long since relinquished the role it had as the innovator of railroad electrification; there has been nothing but shrinkage of American rail operations under catenary since 1938. The author examines the potential for a renewal of electrification in the U.S. and Canada, citing the increase in cost of diesel fuel, the decreasing relative cost of installing catenary, and the demand for handling more and higher-speed freight. It is concluded that government and the industry are confronted with a rare opportunity to simultaneously advance the productivity of the nation's rail system and the national interest. However, it is not possible to say if significant new electrification will take place.

Middleton, WD *Railway Age* Vol. 176 No. 5, Mar. 1975, 4 pp, 3 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

13 090769

CATHODIC PROTECTION (A BIBLIOGRAPHY WITH ABSTRACTS)

Cathodic protection of ships, moorings, nuclear reactors, underground pipes, underwater equipment, and steel reinforcement are presented in 125 abstracts. The research covers electrochemistry, electrode cleaning, method reliability and electron microscopy. See also the Published Searches, NTIS/PS-75/143, Sea Water Corrosion, and COM-74-10889, Marine Fouling.

Smith, MF

National Technical Information Service Report Jan. 1975, 130p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PS-75/241/0ST, DOTL NTIS

13 095254

RAPID CONTACT LINES OF THE SWISS RAILROAD SYSTEM [Schnellfahrleitungen der SBB]

The development and implementation of a new design of contact lines are described and results of trial runs are reported. Problems associated with load currents and permissible thermal levels are discussed. [German]

Merz, H (Technische Hochschule, Bern) *Bulletin de l'Association Suisse des Electriciens* Vol. 65 No. 16, Aug. 1974, pp 1191-96, 4 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

13 095281

ENVIRONMENTAL AND ENERGY IMPACTS OF COAL ENERGY TRANSSHIPMENT THROUGH RAILROAD ELECTRIFICATION

This paper describes the environmental and energy impacts of long distance coal energy transshipment by electrified railroads as compared to diesel powered unit trains, water slurry pipelines, direct transmission and coal gasification. Air pollution potential, water consumption requirements, noise pollution impacts and energy consumption requirements are developed for coal transshipment from Wyoming to Texas by alternative coal transshipment modes. Electrified railroads provide centralized air pollutant generation from single point sources minimal water consumption requirements, and allow use of domestically available coal and nuclear power as energy sources.

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Application Society for presentation at the 1975 Joint ASME/IEEE Railroad Conference, San Francisco, Cal., April 13-16, 1975.

Cooper, HBH, Jr (Texas University, Austin)

Institute of Electrical and Electronics Engineers Conf Paper C-75-351-2-IA, Feb. 1975, 11 pp, 5 Fig., 8 Tab., 41 Ref.

ACKNOWLEDGMENT: IEEE

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

13 095374

A NEW ELECTRIC POWER SUPPLY SYSTEM FOR ALTERNATING CURRENT LINES [Novaja sistema energosnabsenija dlja ucastkov peremennogo toka]

The Soviet Railways are presently preparing a project for equipping a new line fed by alternating current supply with a 2 x 25 kV electric power

supply system. The alternating current system now used on the electrified lines of the Soviet Union has nominal voltage of 25 kV for an average distance between sub-stations of 45-50 km. For the moment, this system does not affect line capacity. However, an increase of traffic in the future could have an effect both on voltage and on heating of catenary wires. The 2 x 25 kV system offers new possibilities for lines fed by alternating current. The essential characteristic of this system is that use is made of existing track and existing rolling stock which operates at a nominal voltage of 25 kV while electrical energy is sent to the motive power unit along 50 kV lines. The author explains the wiring diagram of the system described in the article. The calculations made by the Transelektroprojekt (Institute for projects for the electrification of transport modes) show that the distance between sub-stations can be increased to 100 km on the Soviet Railways. The 2 x 25 kV system does however have drawbacks. A special power supply wire with 25 kV insulation is necessary. A large number of line auto-transformers are required in traction sub-stations, etc. Therefore a certain number of problems remain to be solved before the 2 x 25 kV system can be applied. The solution will be found only when the first electrified line with the new system is put into operation. [Russian]

Borodulin, BM *Elektriceskaja i Teplovoznaja Tiage* Vol. 19 No. 9, 1974, pp 44-45, 1 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Ministerstvo Putei Soobshchenia SSSR Moscow, USSR Repr. PC

13 095405

RECTIFIER BRIDGES-A POWER SUPPLY SYSTEM CLEARLY SUITED FOR THE WORKING OF A NETWORK FOR THREE-PHASE PROPULSION TRACTIVE UNITS [Vierquadrantensteller-eine netzfreundliche Einspeisung fuer Triebfahrzeuge mit Drehstromantrieb]

A rectifier bridge supplied by a 16-2/3 Hz a.c. locomotive transformer has, when fully loaded, a 20% current wave, a 5% wave factor for the intermediate circuit voltage and a 0.98 power factor. Harmonics can easily be compensated for by using two rectifier-bridges which are coupled together in parallel on the side of the network via a secondary transformer coil and which act on a common intermediate circuit with phase lag. [German]

Kehrmann, H *Elektrische Bahnen* Vol. 45 No. 6, 1974, pp 135-141, 13 Fig., 12 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

13 095413

EXTINCTION OF ARCING IN CONTACT LINE SECTION INSULATORS [Lichtbogenloschung an Fahrleitungsstreckentrennern]

To extinguish an electric arc rapidly, it must be extended quickly, and at the same time, the thermoionisation must be eliminated by cooling and by deionising gas. This result may be achieved by horned circuit-breakers, and by lateral strips of synthetic material, which discharge a deionising gas when heated by the electric arc. By means of these devices, arcs can be extinguished efficiently up to 400 A. The arc current may be raised to 600 A by additional circuit-breaking electrodes. [German]

Bethge, W Heigl, H *Elektrische Bahnen* Vol. 45 No. 7, July 1974, pp 155-158, 8 Fig., 1 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

13 095627

TRANSFER OF THE TRANS-EUROP-EXPRESS TRAFFIC TO ELECTRIC TRACTION [Uebergang des Trans-Europ-Express-Verkehrs auf Elektrische Traktion]

A West European high-speed railroad system is described which started operation in 1957 using diesel engines. Seven countries participate in this system, namely, Luxembourg, West Germany, Italy, the Netherlands, Switzerland, Belgium and France. Since 1974 almost the entire operation has been electrified. [German]

Behmann, U (Bundesbahnoberrat, Germany) *Elektrische Bahnen* Vol. 45 No. 8, Aug. 1974, pp 187-190, 5 Ref.

ACKNOWLEDGMENT: EI PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

13 095628

PHENOMENON AND PALLIATIVES OF ICE ON CATENARIES

[Le givrage des catenaires. Le phenomene et ses palliatifs]

The author explains the meteorological phenomenon and its different effects (mechanical, electrical with direct and alternating current) and describes, for 500 V direct current electrification systems, the measures taken to prevent ice formation, to provide protection against its effects and eliminate the ice. Electronic equipment was tested to detect, locate and eliminate ice formation and give advance warning. [French]

Jaume, H (French National Railways) *Revue Generale des Chemins de Fer* Vol. 93 Nov. 1974, pp 678-683

ACKNOWLEDGMENT: EI PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

13 095648

ENERGY CONSEQUENCES OF TRAFFIC IRREGULARITIES

[Energeticke dusledky dopravnich nepravidelnosti]

By assessing the energy consumption with the example of a train running schedule, the author presents a method for calculating the high consumption of electrical energy as a result of traffic irregularities. The numerical data relating to such high consumption, in the case of several traffic irregularities, are assembled in the form of a table. [Czech]

Opava, J *Zeleznicni Doprava a Technika* Vol. 4 No. 2, 1974, 6 pp, 7 Fig., 4 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Zeleznicni Doprava a Technika Hybernska 5, Prague 1, Czechoslovakia Repr. PC

13 095669

TRACTION OVERHEAD

This article reviews electric railway overhead wire construction practices as used by street railways and by interurban lines. Although written for railfans, the article contains much excellent technical material on electric railway overhead wire practices, and is largely based on American Electric Railway Association material. Trolley wire, catenary, pole installation, backbone, and other types of construction are covered.

This article is contained in the book "Traction Guidebook for Model Railroads", edited by Mike Schafer, Kalmbach Books, 1974.

Clouser, WJ Kalmbach Books 1974, pp 67-76, 53 Fig.

PURCHASE FROM: Kalmbach Books 1027 North Seventh Street, Milwaukee, Wisconsin, 53233 Repr. PC

13 095690

TECHNICAL AND ECONOMIC ASPECTS OF ELECTRICAL TRACTION ON USSR RAILWAYS

The fuel problems have brought to the forefront in many countries the long-discussed diesel versus electric traction problem. This article, by an expert in this field, analyzes these matters from a generalized point of view pointing out the factors that are leading to overall electrification of railways in the USSR including those lines that now have diesel traction.

Rakov, V (Ministry of Railways, USSR) *Rail International* Vol. 6 No. 1, Jan. 1975, pp 41-45, 6 Fig., 1 Tab.

ACKNOWLEDGMENT: Rail International PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

13 095697

INCREASE OF THE LOAD CAPACITY OF COPPER CONTACT WIRES

Creep-rupture tests have demonstrated an increase of thermal load capacity for a new low silver-alloyed electrolytic copper contact wire and for a conventional one. Mathematical-statistical analyses show a significant influence of the parameters tensile stress, temperature and rainfall on an increase of strength of the low silver-alloyed contact wire. The effects determined are advantageous to shiftable mine bench contact lines in future open-cast lignite mines with a maximum transportation of coal in direct-current locomotive haulage. [German]

Szepek, B *DET Eisenbahntechnik* Vol. 22 No. 11, Nov. 1974, pp 490-493

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: VEB Verlag Technik Oranienburgerstrasse 13-14, 102 Berlin, East Germany Repr. PC

13 096539

CATENARY DESIGN FOR HIGH SPEEDS

Ten years ago it was quite reasonable to wonder whether principles giving satisfaction at 160 km/h remained valid for higher speeds, and whether current collection by the conventional pantograph-catenary system was still possible at very high speeds of about 300 km/h. On existing infrastructure, even with old contact lines, a speed of 200 km/h is possible, subject to applying to the catenary certain improvements defined in each specific case, especially the addition of an initial sag of the contact wire, and to damping the movements of the pantograph by suitable device. For high speeds of about 300 km/h the pantograph-catenary system remains suitable. The two-tier pantograph supplies a solution to the problem of sets required to be used both with catenaries at constant height and on lines with catenaries of considerable variation in height.

Boissonnade, P *Rail International* Vol. 6 No. 3, Mar. 1975, pp 205-217, 8 Fig.

ACKNOWLEDGMENT: Rail International

PURCHASE FROM: ESL Repr. PC, Microfilm

JC

13 097310

RAILROAD ELECTRIFICATION: A SYSTEM DESIGN PROJECT

The problems of railroad electrification, in terms of the various subsystems involved, are described. The determination of optimum train size, optimum locomotive configuration, contact wire voltages, problems of electrical clearances, power supply, signal system coordination, catenary design, communications interference and personnel safety are briefly treated. The interrelationship of the subsystems is emphasized.

This is a paper from the proceedings of the 11th Annual Railroad Engineering Conference held at Southern Colorado State College, Pueblo, Colorado, October 23-24, 1974. Other individual papers from this conference have been accessioned separately for RRIS. The following is a list of the RRIS numbers of these papers preceded by its section number as it is contained in the bulletin: 03 097308, 03 097309, 04, 097311, 03 097312, 03 097313, 04 097314, 03 097315, 03 097316, 03 097317, 03 097318, 03 097319. The entire proceedings 03 097307 has also been accessioned. All of these are contained in the Bulletin 7502.

Siemens, WH (International Engineering Company, Incorporated)
Federal Railroad Administration 1974, pp 101-107, 22 Fig.

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC

DOTL NTIS

13 097324

FIRE-RETARDANT CABLE SYSTEMS

The increasing use of nonmetallic cables in cable trays for industrial applications as recognized in the 1975 National Electrical Code, Article 340, mandates that these cables be suitable for this application and that the outer sheath be flame-retardant. The significance of various flame tests is discussed, and data obtained following procedure and modifications of IEEE Standard 383-1974, Section 2.5, are presented. It is evident that nonmetallic sheathed tray cables are available that will comply. Furthermore, when a flame-resistant jacket is applied over type ALS, MC, or AC armored assemblies, it results in an exceptionally rugged, corrosion, and flame-resistant nonpropagating construction.

McIlveen, EE (Okonite Company) *IEEE Transactions on Industry Applications* No. 3, Vol. IA-11, May 1975, pp 301-307, 2 Fig., 8 Tab., 11 Ref.

ACKNOWLEDGMENT: IEEE Transactions on Industry Applications

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

13 098007

STUDY OF TRANSIENT VOLTAGES ON TRANSIT SYSTEMS

Data on transient-voltage environment are needed for the specification and design of reliable transit-system electrical equipment, especially those containing semiconductor devices. Such data taken on the 600-volt dc propulsion systems of the Chicago Transit Authority (CTA) and the Long Island Rail Road (LIRR) are presented. Transient-voltage counters, supplemented by an automatic cathode ray oscilloscope, were used to monitor transient voltages in substations, wayside switching stations and transit cars. The 37.5-volt dc battery line was also monitored on board on transit car on the LIRR system. This program spanned a period of two and a half years. Theoretical analysis on the characteristics of transients caused by lighting and switching is also presented.

Presented at the IEEE Electromagn. Compat. Symp. Rec., San Francisco, Calif, July 16-18, 1974.

Chowdhuri, P

Institute of Electrical and Electronics Engineers 74CHO803-7 EMC, 1974, pp 68-75, 7 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

13 098060

MEASURING DEVICE FOR SLIDING SURFACE WIDTH OF TWO CONTACT WIRES

Inspection of trolley wire is of growing importance as electrification spreads on the Japanese National Railways. A measuring device for the sliding surface width of the contact wire, developed in 1971, has proved to have an accuracy of 0.1 mm at 210 kph. The device consists of a camera, mirrors, flood lights, servo mechanism and control panel. Results of tests with this system are given.

Ichikawa, M Yasumatsu, E Horiki, K *Railway Technical Research Institute* Vol. 16 No. 1, Mar. 1975, pp 46-47, 3 Fig., 2 Tab.

PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

13 098061

COLD PRESSURE WELDING OF COPPER TROLLEY WIRES

The optimum method for cold welding of copper trolley wires was experimentally determined, then the mechanical properties and the aging characteristic of the welded joint as well as the influence of impurities in copper on cold weldability were investigated. The practical device was developed from the results. Since 1970, many cold welded joints have been included for tests, as a step to wider application, in copper trolley wires on lines in the suburbs of Tokyo.

Nagase, T Hagiwara, K *Railway Technical Research Institute* Vol. 16 No. 1, Mar. 1975, pp 29-34, 14 Fig., 4 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute

PURCHASE FROM: Ken-yusha 1-45-6 Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

13 099194

ELECTRIFICATION: A STATUS REPORT

This paper was prepared to discuss the present status of railway electrification in North America. It discusses high-voltage commercial frequency electrification and considers the following: Why are North American railroads far behind others in conversion to electrified operation? What has created the rebirth of interest in U.S. railroads toward electrification? What are some disadvantages of electrified operation as compared to diesel-electric? What is meant by "modern electrification technology"? What railroads are considering electrification? Would utilities be able to supply sufficient power? What are the economics of electrification? Listed are changes in signal facilities to make them compatible with electrification.

Kendall, HC (General Railway Signal Company) *Railway Gazette International* Vol. 6 No. 6, June 1975, pp 8-15

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

15 095424

COMMUNITY IMPACT OF ABANDONMENT OF RAILROAD SERVICE

This study provides an overview and analysis of the problem of track abandonment, including its economic and social impact, and the development of a basic model relating rail abandonment to income and employment levels in affected communities. The study was developed from nationally available data using the county as the community structure.

Developed for use by USRA for planning purposes.

Public Interest Economics Center Final Rpt. USRA/R-009, Dec. 1974, 219 pp

Contract USRA-C-50010

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239030, DOTL NTIS

15 095435

ANALYSIS OF COMMUNITY IMPACTS RESULTING FROM THE LOSS OF RAIL SERVICE VOL. IV: SUPPLEMENTARY INFORMATION

Volume IV: Supplementary information in support of a study to estimate the community impact of the loss of railroad freight service. This study was done in response to Section 202(b)(5) of P.L. 93-236 which requires that USRA consider such "anticipated economic, social and environmental costs and benefits" of rail-line abandonment that may result from consolidation, relocation, pooling, and joint operation of facilities and equipment.

Prepared for use by USRA. See also Volumes 1, 2 & 3, RRIS Numbers 15 095438, 15 095437, 15 095436; RRIS Bulletin 7502.

Consad Research Corporation Final Rpt. USRA/R-012.3, Oct. 1974, 100 pp

Contract USRA-C-50013

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239037, DOTL NTIS

15 095436

ANALYSIS OF COMMUNITY IMPACTS RESULTING FROM THE LOSS OF RAIL SERVICES VOLUME III: MANUAL

Volume III: Manual for assessing the community impact of the loss of railroad freight service. This study was done in response to Section 202(b)(5) of P.L. 93-236 which requires that USRA consider such "anticipated economic, social and environmental costs and benefits" of rail-line abandonment that may result from consolidation, relocation, pooling, and joint operation of facilities and equipment.

Prepared for use by USRA. See also RRIS Volumes 1, 2 & 4, RRIS numbers 15 095438, 15 095437, 15 095435; RRIS Bulletin 7502.

Consad Research Corporation Final Rpt. USRA/R-012.2, Oct. 1974, 131 pp

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239036, DOTL NTIS

15 095437

ANALYSIS OF COMMUNITY IMPACTS RESULTING FROM LOSS OF RAIL SERVICE VOL. II; NINETEEN CASE STUDIES

Volume II: Nineteen case studies in support of a study to estimate the community impact of the loss of railroad freight service. This study was

done in response to Section 202(b)(5) of P.L. 93-236 which requires that USRA consider such "anticipated economic, social, and environmental costs and benefits" of rail-line abandonment that may result from consolidations, relocation, pooling, and joint operation of facilities and equipment.

Prepared for use by USRA. See also Volumes 1, 3, & 4, RRIS numbers 15 095438, 15 095436, 15 095435; RRIS Bulletin 7502.

Consad Research Corporation Final Rpt. USRA/R-012.1, Oct. 1974, 141 pp

Contract USRA-C-50013

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239035, DOTL NTIS

15 095438

ANALYSIS OF COMMUNITY IMPACTS RESULTING FROM LOSS OF RAIL SERVICE, VOL I: DOCUMENTATION

Volume I: Documentation. This four volume study describes a method for estimating the community impacts of the loss of railroad freight service. This study was done in direct response to Section 202(b)(5) of P.L. 93-236 which requires that USRA consider such "anticipated economic, social, and environmental costs and benefits" of rail-line abandonment that may result from consolidation, relocation, pooling and joint operation of facilities and equipment. The study documents methodology developed for estimating community impact and presents the results of applications of the methodology to twenty communities. Included in the study is a guidebook designed for state and community use in estimating impacts on potentially affected communities.

Prepared for use by USRA. See also Volumes 2, 3 & 4, RRIS numbers 15 095437, 15 095436, 15 095435, RRIS Bulletin 7502.

Consad Research Corporation Final Rpt. USRA/R-012, Oct. 1974, 116 pp

Contract USRA-C-50013

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239034, DOTL NTIS

15 097279

IMPACT OF SHINKANSEN ON LOCAL COMMUNITIES. THE CASE OF OKAYAMA CITY AND ITS PERIPHERIES

This is a study of the effect of the extension of the high-speed all-passenger New Tokaido line to and through Okayama, Japan's 17th largest city with a population of 480,000. The area is beyond the original New Tokaido line and was the terminus for an extension from 1972 to 1975. The general effects of the line are first discussed. In looking at the local community, three effects are studied. The "announcement effect" affects local land values. Then there is the effect of construction work on the local area. The third, and major, effect is the changes in living, and economic spheres, with new traffic flows shifting travel patterns. New time/distance patterns have affected virtually all segments of life.

Yamaoka, M (Japanese National Railways) *Rail International* Vol. 6 No. 4, Apr. 1975, pp 253-276, 8 Fig., 22 Tab.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 083922

ENERGY IN LAND TRANSPORTATION

This article hopes to bring a little clarity to the confused debate of the consumption of energy by land transportation vehicles. The author has chosen a common measurement unit for energy consumption: the gram equivalent of coal. He then notes the global consumption of the land transportation sector before going on to the consumption in comparable markets.

Dobias, G *Transports* No. 192, May 1974, pp 163-166

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: Transports Paris, France Repr. PC

16 083953

MINERAL RESOURCES AND THE ENVIRONMENT

This report looks at mineral resources and their availability, including coal and petroleum. The report recommends for the U.S. a policy of conservation in the use of petroleum. The report also considers copper resources. The report concludes that world reserves of petroleum and natural gas will be seriously depleted by the end of this century, which is about 25 years.

Prepared by the Committee on Mineral Resources and the Environment.

National Academy of Sciences ISBN 0-309-02343-2, 1975, 348 pp, Figs., Tabs., Refs., Apps.

PURCHASE FROM: National Academy of Sciences 2101 Constitution Avenue, NW, Washington, D.C., 20418 Orig. PC

DOTL RP

16 084910

ENERGY. THE NEW ERA

This book, prepared under the sponsorship of the Twentieth Century Fund, traces the forces which propelled the U.S.—and the world—to the energy brink in 1973-1974. The author outlines short-term and long-term responses to energy increasingly in shorter supply and higher in cost. The effect, he says, will force crucial decisions on the interlinked problems of the environment, inflation, politics, economic health and foreign affairs. Explored are the network of incentives and controls that must be initiated to ensure true energy conservation and all-out technological innovation in a democratic society. The author is confident the U.S. can meet this greatest test of our national intelligence and maturity.

Freeman, SD

Walker and Company 1974, 386 pp, Tabs.

PURCHASE FROM: Walker and Company 720 Fifth Avenue, New York, New York, 10019 Orig. PC

DOTL TJ163.3 F83

16 090101

A COMPARATIVE ANALYSIS OF THE ENERGY CONSUMPTION FOR SEVERAL URBAN PASSENGER GROUND TRANSPORTATION SYSTEMS

The energy consumption rates, or efficiency, of the urban passenger ground transportation modes are compared. In addition, the efficiency of new transit systems being developed including large-and small-vehicle PRT's and Dual Mode, are estimated. Various measures of actual and potential efficiency are used. On an average load basis, mass transit (transit bus and rapid rail) is from 2 to 3 times more efficient than the predominant personal modes (light truck and passenger car) and on a crush load basis, 4 times more efficient.

Lieb, JG

Mitre Corporation, Urban Mass Transportation Administration Final Rpt. MTR-6606, Feb. 1974, 95 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238041/8ST, DOTL NTIS

16 090173

ENERGY STATISTICS. A SUPPLEMENT TO THE SUMMARY OF NATIONAL TRANSPORTATION STATISTICS

This annual report is a compendium of selected time-series data describing the transportation, production, processing, and consumption of energy. The report is divided into three main sections. The first, entitled Energy Transport, contains such items as the revenues and expenses of oil pipeline

companies, number and capacities of U.S. tank ships, and the total crude oil transported in the U.S. by method of transportation. The second section, entitled Reserves, Production, and Refining, reveals the growth over time of the U.S. oil and natural gas reserves, refinery capacity, and yields. Trends in the demand for fuel and power are displayed in the third section, entitled Energy Consumption. Throughout this part, the transportation sector is emphasized. Included are the gasoline and oil costs of automobiles of different sizes, the consumption of petroleum by type of product, the electrical energy consumed by the local transit industry, and other important statistics describing the supply and demand for energy.

Gay, WF

Transportation Systems Center Final Rpt. DOT-TSC-OST-74-12, Aug. 1974, 140 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238767/8ST, DOTL NTIS

16 090976

FIVE YEAR PROGRAM PLANNING DOCUMENT FOR END USE ENERGY CONSERVATION, RESEARCH, DEVELOPMENT, AND DEMONSTRATION

Prepared by the Federal Energy Administration (FEA) with assistance from sixteen participating federal agencies, this Research, Development and Demonstration (RD and D) Program Planning Document represents the initial effort to organize the nation's resources into task forces under national government leadership. Report covers projects and funding needed for energy conservation studies in areas of transportation, industry, and building research.

Bauer, DC

Federal Energy Administration FEA/PD-226-D, June 1974, 259 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240406/9ST, DOTL NTIS

16 090996

U.S. ENERGY AND FUEL DEMAND TO 1985: A COMPOSITE PROJECTION BY USER WITHIN PETROLEUM ADMINISTRATION FOR DEFENSE (PAD) DISTRICTS

Demand projections are presented for the years 1975, 1980 and 1985. These are subdivided by Petroleum Administration Defense (PAD) district, major consuming group within each district and the specific fuel. Fuel projections are presented on both a BTU and a commercial unit basis. Projections are a composite of several recent studies including those of the National Petroleum Council, Federal Power Commission, Bureau of Mines and National Economic Research Associates, Inc. Analyses of and comparisons among these studies are presented along with the methodology for the present projection.

Rieber, M Halcrow, R

Illinois University, Urbana, National Science Foundation UIUC-CAC-DN-74-108R, May 74, 173 pp

Grant NSF-GI-35821

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239343/7ST, DOTL NTIS

16 091029

HYDROGEN AS A FUEL

A short summary is given of continuing efforts directed toward evaluating the performance and problems of hydrogen-fueled piston engines and gas turbines and toward investigating the potential and problems of hydride and cryogenic storage of hydrogen.

See also report dated 31 Aug 74, AD-787 484.

Cole, RB Hollenberg, JW Magee, RS McAlevy, RF, III Weil, KH Stevens Institute of Technology, Office of Naval Research, Advanced Research Projects Agency, (ARPA Order-2615) Tech Rpt. ME-TR-75001, Feb. 1975, 14 pp

Contract N00014-75-C-0220,

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AS/A-006984/9ST, DOTL NTIS

16 091057

PROCEEDINGS OF THE NSF/RANN CONFERENCE ON ENERGY CONSERVATION RESEARCH, HELD AT AIRLIE HOUSE, IN WARRENTON, VIRGINIA.

This report contains the proceedings of the Conference on Energy Conservation Research, held at Airlie House, Warrenton, Virginia, February 18-20, 1974. The Conference brought together NSF/RANN energy conservation research grantees and representatives of user federal agencies for an exploration of current energy conservation research. The major purposes of the Conference were to identify those research results that could have immediate application in achieving energy conservation, to assess research priorities in light of changing events and to identify potential areas for new research initiatives. Four major categories of research were discussed in workshops on (1) conservation in residential and commercial buildings; (2) conservation in the industrial sector; (3) conservation in the transportation field; and (4) cross-sector conservation studies.

Lyday, N

National Science Foundation, Urban Institute NSF/RA/N-74-187, Feb. 1974, 199 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239271/0ST, DOTL NTIS

16 091070

ENVIRONMENTAL IMPACTS, EFFICIENCY, AND COST OF ENERGY SUPPLY AND END USE. VOLUME 1

This report presents tabular, footnoted, and referenced data quantifying the broad range of energy-related environmental impacts on land, water, air, solid waste, and occupational health. Using the data bank, it is possible to aggregate the environmental impacts of a wide variety of fossil fuel 'trajectories' traced from the end use of a fuel to its extraction or vice versa. This makes it possible to estimate environmental impacts for any number of scenarios related to energy consumption patterns envisioned for the next 10 to 20 years. Thirty environmental impact tables are contained in this report. Twelve of these are devoted to coal supply, twelve to oil supply, one to natural gas supply, four to energy end uses, and one to the electric power plant activity of energy supply. Each entry in these tables is footnoted and referenced.

Prepared in cooperation with the Environmental Protection Agency, Washington, D.C.

Hittman Associates, Incorporated, National Science Foundation, California University, Los Angeles, Council on Environmental Quality Final Rpt. HIT-593, Nov. 1974, 383p

Contract EQC-308t

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238784/3ST, DOTL NTIS

16 091160

ENVIRONMENTAL CONSIDERATIONS IN FUTURE ENERGY GROWTH

The environmental factors associated with alternative fuel/energy cycles were analyzed to provide a basis for making explicit judgments regarding economics and environmental trade-offs. A compilation of effluent data was developed for those energy sources considered commercially viable in the 1975 to 1990 time period. A methodology was developed for organizing the compiled effluent data, for evaluating the combined effects of extraction, transportation, processing, and use of fuels to produce energy, and for ranking the fuel/energy systems environmentally. The data bank and computer program for the ranking procedure are extant. The computerized methodology enables an energy system evaluator to test preferred weighting factors readily.

Battelle Columbus Laboratories, Environmental Protection Agency, Battelle Memorial Institute/Pacific Northwest Labs Final Rpt. Apr. 1973, 619 pp

Contract EPA-68-01-0470

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239157/1ST, DOTL NTIS

16 095198

ENERGY REQUIREMENTS OF INLAND WATERWAY TRANSPORT AND FREIGHT TRAINS (COMPLETE TRAINLOADS) CARRYING HEAVY BULK GOODS [Der Energiebedarf von Binnenschiffen und Gueterzuegen (Ganzzuegen) beim Massenguttransport]

The results of a study, published in No. 4-5 1971 of this magazine, on the fuel consumption of inland waterway or rail transport carrying heavy bulk goods was seriously questioned by the Test Centre for inland waterway vessel construction. In reply to this criticism, the author compares here the figures for energy consumption for motor boats and diesel locomotives. From this comparison, it can be seen that, as far as energy is concerned, transporting heavy bulk goods by inland waterway is no cheaper than by rail. [German]

Breimeier, R. *Internationales Verkehrswesen* Vol. 26 No. 3, 1974, pp 104-107, 4 Tab., 8 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Dr. Arthur Tetzlaff Verlag Niddastrasse 64, Frankfurt am Main, West Germany Repr. PC

16 095206

INTERNATIONAL SYMPOSIUM ON THE EFFECTS OF ENERGY SHORTAGE ON TRANSPORTATION BALANCE

Thirty-five papers were presented at the Symposium held in May, 1974 at University Park, Pennsylvania, and 27 are contained in this Proceedings, covering such themes as urban planning and investment; urban transit today and tomorrow; long distance passenger modal split; long distance economics and business logistics; research and development, and new technology.

Transportation Research Vol. 8 No. 4/5, Oct. 1974, pp 245-501

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 095282

TRANSIT SYSTEM ENERGY REQUIREMENTS

The importance of energy conservation has been recognized by the engineering profession for some time, although this has been apparent to the general public only in recent months. As an alternative to the private automobile, the more extensive use of public transit is recognized as a conservation measure. This paper analyzes various transit systems as to energy required per Passenger-kilometer, based on average trip length, both on a theoretical basis and from operating statistics. An equivalent is developed for comparing energy from fuels and electrical power supplies.

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Application Society for presentation at the 1975 Joint ASME/IEEE Railroad Conference, San Francisco, Cal., April 13-16, 1975.

Sulkin, MA Holden, WHT (Daniel, Mann, Johnson, & Mendenhall) Institute of Electrical and Electronics Engineers Conf Paper C-75-353-8-IA, Mar. 1975, 7 pp, 1 Fig., 3 Tab., 9 Ref., 1 App.

ACKNOWLEDGMENT: IEEE

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

16 095442

INVESTIGATING THE OPTIMAL ECONOMIC SPEED FOR RAIL VEHICLES [Optimal-Wirtschaftliche Geschwindigkeit spurgebundener Fahrzeuge]

New railway lines for very high speeds are already under construction or planned in five countries of Europe alone. The UIC therefore decided to examine the question of the optimal economic speed. To do this at all, certain assumptions and simplifications had to be made in respect of the many factors and variables, such as the limitation to passenger traffic. Difficulties with regard to cost assessment also arose owing to insufficient experience. The procedures and results described here by the chairman of the working group should therefore not be regarded as universally valid, but rather as a useful first step in the right direction. [German]

Brettmann, E. *Eisenbahntechnische Rundschau* Jan. 1975, pp 26-34, 7 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

16 095650

STUDY ON THE CONSUMPTION OF ELECTRICAL ENERGY FOR RAILWAY TRACTION [Badania zużycia energii elektrycznej na cele trakcyjne]

The author presents the study carried out by the Institute of Transport of Warsaw Technical University. During 48 study sessions, an examination was made of the various technical and human factors affecting the consumption of electrical energy. The article stresses the importance of the human factors, remarking that the influence of train driving and traffic regulation on the consumption of traction energy is of considerable consequence. For example, it has been proved that with judicious train driving, it is possible to make a 10-15 percent saving on the relative consumption of electrical energy. [Polish]

Wasilewicz, W *Przegląd Kolejowy Elektrotechniczny* Vol. 21 No. 8, Aug. 1974, pp 23-26

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Wydawnictwa Komunikacji i Łączności
Kazimierzowska 52, Warsaw 12, Poland Repr. PC

16 095675

NO EASY ANSWERS IN THE SEARCH FOR FUEL ECONOMY

Rising prices for diesel fuel, coupled with occasional shortages in some countries, have stimulated a drive to cut down consumption. Improved operating methods, matching motive power more closely to the tonnage hauled through detailed train performance calculations, offer appreciable fuel savings, but speed reductions have been rejected. Better refueling equipment and disciplines can be expensive, but they offer bonuses in reduced pollution and fire risk.

Railway Gazette International Vol. 131 No. 2, Feb. 1975, pp 54-57, 2 Tab., 2 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

16 095865

ENERGY AND TRANSPORT IN AN ISLAND CONTINENT

Although Australia is almost self-sufficient in petroleum products, it is expected that internal prices will move towards long-run world prices. However, fuel price will only have a moderate effect on the competitive position of long distance road and rail haulage, despite the relatively high price elasticities. Shipping costs have been strongly influenced by a rise of several hundred per cent in the cost of bunkering fuel. This change lowers the optimum speed of ships, counteracting the effect of very high ship construction costs. Because the freight rate contributes a large proportion of the landed cost of a bulk commodity such as iron ore and because fuel contributes a relatively high proportion of bulk carrier costs, fuel price increases may tend to favour Australia as the nearest major supplier to Japan. Competition between coastal shipping and land transport is significant. Because percentage increases in bunker fuel price have been much greater than in locomotive diesel fuel, the energy shortage will tend to divert traffic from coastal shipping to rail, even though the latter is the more energy intensive mode. /Author/TRRL/

Taplin, JHE *Transportation Research* Vol. 8 No. 4/5, Oct. 1974, pp 259-265, 6 Tab., 13 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211643)

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 095866

AN ANALYSIS OF THE IMPACT OF THE ENERGY SHORTAGE ON BUSINESS LOGISTICS SYSTEMS, AND ITS IMPLICATION FOR FREIGHT TRANSPORT

The energy crisis will probably affect business logistics systems in the U.S. Economy in two ways: cost and service relationships between the various modes of freight transportation may change (as carriers seek to compensate for higher fuel prices and fuel shortages) or aggregate levels of production may change (either because of fuel and raw material shortages or reduced demand). As logistics decision makers seek to compensate for these changes, their transportation requirements may also shift. These shifts will not necessarily result in an improvement in energy utilization in the freight sector of the economy. Thus government policies may need to be developed to counteract the effect of such changes. This paper discusses

these potential shifts, with specific reference to rail-truck competition, and recommends some changes in government policies in light of these conclusions. /Author/TRRL/

Stenger, AJ *Transportation Research* Vol. 8 No. 4/5, Oct. 1974, pp 419-425, 2 Tab., 18 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211655)

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 096526

FUEL IN TRANSPORT

The types of fuel used to provide energy for transport are discussed and measures of the efficiency of fuel use of different modes of transport are presented. Probable trends in fuel costs are outlined and predictions made of the effects of different rates of increase on perceived motoring costs and public transport fares. Various uses of oil are then discussed. In conclusion, some implications for transport planning are discussed: the greater the fuel efficiency of public transport, the likelihood that the cost of electricity will rise less than that of oil, and the effect of large increases in the cost of fuel on modal split. /TRRL/

Harman, RG (Voorhees (Alan M) and Associates, Incorporated) *Traffic Engineering and Control* Vol. 15 No. 10/1, Feb. 1974, pp 477-499, 1 Fig., Tabs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211604)

PURCHASE FROM: ESL Repr. PC, Microfilm

16 096634

DIRECT AND INDIRECT ENERGY FOR COMMERCIAL AVIATION

In 1971, the United States commercial aviation used: -for airplane propulsion, 1,080 trillion B.t.u., i.e. 6.3% of the consumption for transport as a whole; -for indirect uses (refining, airplane manufacturing and maintenance, airport construction, food for passengers), 370 trillion B.t.u. This paper presents the sources of information, estimates their interpretation, and gives, in diagrams and tables for the period 1950-1971, specific consumptions per ton-mile and passenger-mile for different modes of transport, and examples of indirect energy use.

Hirst, E *Transportation Research* Vol. 8 No. 45, Oct. 1974, pp 427-432, 5 Tab., 11 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 096637

THE IMPACT OF PETROLEUM SHORTAGES ON INTER-CITY TRAVEL AND MODAL CHOICE

The author introduces briefly and discusses three different travel demand models based on the abstract mode for inter-city travel and modal choice: Monsod model, Young model and Crow and Longeot model. He verifies that they satisfy two reasonableness condition. He then estimates with these models, for 22 citypairs in the Northeast corridor, region of the United States, the transfer of traffic from private motorcar to coach, railway, plane, which would result from increase of 50% and 100% in petroleum prices and reductions in speed limit to 65 mph and 55 mph. These results are then submitted to control tests.

Crow, RT Savitt, J *Transportation Research* Vol. 8 No. 4-5, Oct. 1974, pp 383-397, 9 Tab., 13 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 096638

THE USE OF ENERGY FOR PERSONAL MOBILITY

The authors were requested to carry out a survey on transport energy consumption. Preliminary results of this survey which identifies the broad patterns of transport energy usage in Australia, are presented. These results are given in 9 tables.

Clark, N *Transportation Research* Vol. 8 No. 4-5, Oct. 1974, pp 399-402, 9 Tab., 4 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 096640

THE IMPLICATIONS OF RAILROAD ENERGY CONSERVATION FOR LOGISTICS SYSTEMS PLANNING IN THE UNITED STATES

The author contemplates the means to reduce energy consumption by railroads. There are various obstacles in this field, namely tariffs, railroad structures and regulations inherited from the railways historical development. The author examines these factors as well as other administrative measures and other incentives to rationalize the system as a whole; this would lead to the reduction of redundant services and useless competitiveness. New structures for fair intermodal competition, and improvement of shipper physical supply and distribution systems could reduce considerably energy consumed for transport purposes.

Boone, JW *Transportation Research* Vol. 8 No. 4-5, Oct. 1974, pp 415-418, 3 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 096643

A TIME TO CHOOSE: AMERICA'S ENERGY FUTURE

This book is a culmination of a 2-yr, \$4 million inquiry into the nation's energy crisis. Its authors—a team of economists, lawyers, writers, scientists, and engineers—were brought specially together by the Ford Foundation to identify the nation's energy policy choices. Their principal finding is that the U.S. can balance its energy budget, control pollution, and avoid reliance on insecure oil sources abroad by slowing its growth rate in energy consumption. In fact, our energy growth can be trimmed to about 2 percent a year or, in time, even to zero without adversely affecting the economy. Among the prime candidates for energy belt-tightening are the American automobile as well as homes, offices, and factories. Topics discussed are: the energy industry's political and economic clout, nuclear energy problems—including the breeder reactor—and coal strip mining, to name but a few. Specific actions are recommended.

Ballinger Publishing Company 1974, 511 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Ballinger Publishing Company 17 Dunster Street, Cambridge, Massachusetts, 02138 Orig. PC

16 097235

CLEAN ENERGY FROM COAL: A RESEARCH PROGRAM

This article tells how the U.S. government is putting together a research program to generate the technology that can allow the U.S. to make the best use of vast coal resources in an environmentally acceptable manner and in as short a time as possible. Under study are coal liquefaction, two types of coal gasification, and improved methods of direct combustion. Criteria for selecting alternate technologies and the critical problems and technical unknowns in each area are listed.

ASME Journal of Mechanical Engineering Vol. 97 No. 5, June 1975, pp 14-21, 12 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 097239

RAIL, TRUCK, OR SMALL CAR—WHICH IS THE ENERGY SAVER?

A multiregional, multi-industry forecasting model is designed to make long-run regional forecasts under reasonable assumptions and to evaluate impacts of alternative government decisions. Essentially, forecasts are first made assuming no exogenous changes in governmental spending; then forecasts are made with a set of predetermined changes. A comparison of the sets of forecasts shows the economic impact of the governmental decisions. One of the major advantages of this model over the typical impact model is that regional demand and supply are interrelated. Application of this model to energy use shows that energy conservation efforts should stress conversion to smaller autos rather than future modal switches from truck to rail.

Harris, CC, Jr Hille, SJ *Business Horizons* Vol. 17 No. 6, Dec. 1974, pp 57-64, 1 Fig., 6 Tab.

PURCHASE FROM: Indiana University, Bloomington Graduate School of Business, Bloomington, Indiana, 47401 Repr. PC

DOTL JC

16 097245

THE ENERGY QUESTION: AN INTERNATIONAL FAILURE OF POLICY. VOL. 1: THE WORLD

These papers view the energy question from the stance of the economist. All sources of energy are considered, as are the markets in major areas of the world. In addition, past policies are analyzed and future policies recommended. There are papers on the Soviet Union in world energy markets; petroleum and natural gas in sub-Saharan Africa; the Latin American Petroleum industry; energy consumption and environmental quality; and a world energy model. Volume 2 will be devoted to North America.

Toronto University Press 1974, 376 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Toronto University Press Toronto, Ontario M56 1A6, Canada Orig. PC

16 097300

U.S. ENERGY OUTLOOK: OIL AND GAS AVAILABILITY

This report by the Oil & Gas Supply Task Group of the National Petroleum Council's Committee on U.S. Energy Outlook is an extension of a 1972 summary report, U.S. Energy Outlook. Individual task group reports have been prepared to include methodology, data and computer program descriptions. This is one of ten such reports, reflecting the best judgement of experts from the energy industries. It is noted that many factors can alter the conclusions reached. The report discusses methods of analyzing supplies, oil operations, gas operations, economics of oil and gas, and foreign oil and gas studies.

National Petroleum Council 1973, 768 pp, Figs., Tabs., 3 App.

PURCHASE FROM: National Petroleum Council 1625 K Street, NW, Washington, D.C., 20006 Repr. PC

16 097799

INSTEAD OF CARS

The book deals with the future of transport and has two central themes: the need for revolutionising ideas on moving people and goods and the conclusion that there is no single panacea. The author examines a number of new technologies such as driverless vehicles, electronic guidance systems and moving pavements, and discusses ways in which they can be put to use and their limitations. New ways of using existing vehicles—trains, buses, taxis, bicycles and cars—are also considered, together with new concepts of town planning and life-style that could reduce the need to travel. /TRRL/ /TRRL/

Bendixson, T

Temple Smith (Maurice), Limited Textbook 1974, 256 pp, Figs., Tabs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211924)

PURCHASE FROM: Temple Smith (Maurice), Limited 37 Great Russell Street, London WC1B 3PP, England Repr. PC

16 097800

THE ENERGY COSTS OF ROAD AND RAIL FREIGHT TRANSPORT; U.K. 1968

This study is part of a project to evaluate the cost of the total energy required in fabrication, energy to make the fabrication machinery, energy to provide the materials used, and the energy involved in transporting the materials to the assembly point. The project is based on the statistical information available in the report on the census of production 1968. The principle behind the method of energy analysis was one of identifying the energy chargeable inputs of the road and rail freight transport industries and employing conversion factors already available from A primary investigation of the above census. The results of the analysis are presented under the following headings: industries' own road transport energy cost 1968; distributive and retail traders' own road transport energy costs 1968; professional road hauling transport energy costs 1968; British railway energy costs 1968; energy costs per ton-mile and passenger-mile for road and rail transport. /TRRL/

Mortimer, ND

Open University, England R&D Rpt. ERRG 004, Feb. 1974, 47 pp, 33 Tab., 20 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211943)

PURCHASE FROM: Open University, England Walton Hall, Walton, Bletchey Buc, kinghamshire, England Repr. PC

16 097801

IN PRAISE OF HYDROGEN

The feasibility of using hydrogen as a fuel in the internal combustion engine is examined. The author points out that fossil-based fuels used at present are both finite and diminishing rapidly, whilst hydrogen can be produced by the electrolysis of water using nuclear power. Hydrogen is reported to give a virtually pollutant-free exhaust, and with a calorific value 2.5 times that of petrol, also has big advantages in terms of energy content. The demonstration by the school of automotive studies at Cranfield of the practicability of converting the engine of an ordinary Hillman Imp to run on hydrogen fuel by using an elementary gas carburetor is reported, and details of the modification made to the engine are given. The author reports that the major problem inherent in this system is storage of the hydrogen. Existing gas bottles weigh 63kg of which less than 1/2 kg is hydrogen, and this is equivalent to only half a gallon of petrol. The possibility of using metal hydrides for storage of hydrogen is raised. /TRRL/

Greenslade, R *Design* No. 311, Nov. 1974, pp 56-57, 1 Fig., 1 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRR 212042)

PURCHASE FROM: Design Centre 28 Haymarket, London SW1Y 4SU, England Repr. PC

16 097995

FUTURE TRANSPORT-THE IMPORTANCE OF SAVING FUEL

The planning of transport for the next decade should be treated as part of complete design philosophy embracing not just transport. Ten years is too short a period over which to consider transport systems in isolation from other factors. In the short term environmental and energy supply considerations have an enormous influence on what should be done. Above all, it must be remembered that transport adds nothing directly to the quality of life and goods, but can add appreciably to their cost if ill-conceived. Clearly the direction that transport for the next decade should follow must involve the more efficient use of fuel to reduce costs and more careful selection of systems to improve the environment.

Symes-Schutzmann, R *Design Engineering* Sept. 1974, pp 16-19

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

16 098055

ENERGY FOR TRACTION

Transport is a key industry in the health of any nation and it is important that scarce and costly resources are used to the best advantage in advancing transport services by land, on the sea or in the air. Since oil supplies 97% of all transport energy it is vital that maximum efficiency must be achieved in use of energy in this sector in view of declining oil reserves. Fuel price escalation, the evolution of transport, consumption by various modes, and matching of mode to requirement are all discussed. The remaining quarter of the century must be concerned with conversion of transportation from oil power to electric operation based on non-fossil fuels. Some of the new energy sources are considered, but electrified railroads are seen as having a major role in any case.

Masefield, P *Railway Engineering Journal* Vol. 4 No. 2, Mar. 1975, pp 39-49, 7 Fig., 1 App.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 098683

INFLUENCE OF LUBRICATION AND LUBRICATING OILS ON WEAR CONDITIONS IN DIESEL ENGINE CYLINDERS

This second installment describes work by the Indian Ministry of Railways on ring and liner lubrication. Excessive scraper-ring efficiency and oil alkalinity are conducive to high wear rates in high-temperature zones. When fuels contain sulfur above 1 percent, wear is also accelerated. Other lubricating oil characteristics and engine coolant temperature are also important.

Syngal, SP Bhalla, P *Rail Engineering International* Vol. 5 No. 3, Apr. 1975, pp 110-115, 18 Fig., 27 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

16 099184

PER PASSENGER-MILE ENERGY CONSUMPTION AND COSTS FOR SUBURBAN COMMUTER SERVICE DIESEL TRAINS

Results presented in this report are based on data obtained from Chicago, Illinois' three diesel commuter railroads. Operations and equipment are described, particularly in terms of energy consumption and pollutant production. Service characteristics, such as average occupancy and average trip distance, and energy consumption results are presented and discussed. With energy efficiency measured in passenger-miles per Btu, it was found that trips by diesel commuter trains are 3.5 times more energy efficient than Chicago Central Area auto trips. The total trip from home to suburban station, then by train to a downtown terminal, is found to be 2.2 times more energy efficient than such auto trips. Pollutant production rates are presented for five pollutants: carbon monoxide, hydrocarbons, nitrogen oxides, particulates, and sulfur oxides. For every pollutant except sulfur oxides, trains were found to be less polluting per passenger-mile than autos. According to the author, per passenger-mile pollutant emissions from trains are, overall, less damaging by a factor of 5.5 than the per passenger-mile emissions from autos. The author feels that travel on these diesel commuter trains is less costly to society than auto travel (1972 suburban-based autos), whether one compares the train trip alone to an auto trip or the home-to-suburban-station-then-by-train-to-a-downtown-terminal trip to an auto trip. A summary, appendices and references are furnished.

This project was sponsored by the Urban Mass Transportation Administration, DOT.

Walbridge, EW
Illinois University, Chicago Circle, (3-47-22-59-3-90) UMTA-IL-11-0006-74-1, Aug. 1974, 62 pp

ACKNOWLEDGMENT: UMTA

PURCHASE FROM: NTIS Repr. PC

PB-242232, DOTL NTIS

17 052600

ORE COLLOQUIA. REPORT ON THE FOURTH ORE COLLOQUIUM "TECHNICAL COMPUTER PROGRAMS" MUNICH, MAY 28-30, 1974

This report contains summaries of 17 descriptions of computer programs for train running control and closely related topics. Each summary is accompanied by the associated program sheet.

Each summary is treated as a separate document in Section 17, RRIS Numbers 052611-052627, RRIS Bulletin 7502.

International Union of Railways AZ40/RP 6/E, Sept. 1974

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052612

PROGRAMMING PACKAGE FOR RAILWAY TRACTION SIMULATION

The general purpose programming package for simulation of single train operation is described. The train can be tracted by AC, DC, diesel or steam locomotive. Input data for the simulation package consist of parameters describing the locomotive, coach, rail, tractive and operating conditions, tractive and traffic constraints and traffic assignment. Output provides data on running time, speed, acceleration, tractive effort, power, tractive motor current, energy consumption, temperature rise and other data depending on running distance. The program is designed for use by different specialists and serves as a practical and theoretical tool for diverse activities in railway engineering as, train diagram preparation, energy planning, studies and analysis of traction effects and capabilities, traffic capacity investigation etc. Special users-training is not required because the package was designed having "man-computer comfort" in mind. Data related to locomotive and rails are automatically available from data files stored in the auxiliary storage of the computing system.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Vuskovic, M Lusicic, B
International Union of Railways Sept. 1974, 2 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052613

STORAGE AND RETRIEVAL SOFTWARE SUPPORT FOR RAILWAY TRACTIVE CALCULATIONS

Computer-based data bank for storage of rail and locomotive data and of automatic data support for different programs related to railway traction and other relevant railway engineering calculations is described. System consists of data files and of the supporting programs for file creation, maintenance and reporting. The present organization of the data bank is suited to the programs already realized and consists of two basic groups of files: files with parameters describing rail geometry, stations, switches, signalling and other relevant railway devices and files with parameters describing locomotives classified in four types: AC, DC, diesel-electric and steam locomotive type. Data bank has many users and suppliers with different aims and purposes and possesses different data sources. Therefore it is important to protect its reliability. Protective measures that have been incorporated, such as data annotation and introduction of special data bank evidention files, are also described.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Vuskovic, M Bakic, N Pihajlic, E
International Union of Railways Sept. 1974

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052616

COMPARISON OF DECISION ALGORITHMS FOR SOLVING INCOMPATIBLE TRAFFIC SITUATIONS BY MEANS OF SIMULATION

Train control decisions on the sequence of trains in cases of conflict in traffic are now being taken over by machine (e.g. process computers) from man (e.g. traffic controller). This means that considerations extend to

more complex decision algorithms, which for time reasons were unable to be used by man. These new decision making rules can in certain circumstances bring important advantages in traffic and train working. The choice of the most suitable decision algorithm is to be made from case to case according to predetermined criteria. Such comparison requires model testing and hence simulation on a large electronic computer. With this in mind the SBB has applied the "small junction" simulation model, which is written in Simula I for the Univac 1108, and conclusive results were obtained. The SBB is currently working on a second generation simulation model, which will make it possible to extend the comparison of decision algorithms to large junctions and is written in Simula 67 for processing on the CDC computer.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Stahli, S
International Union of Railways Sept. 1974, 4 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052617

THE IDENTIFICATION AND CORRECTION OF CONFLICTS IN TRAIN RUNNING CONTROL

An on-line decision making program run off on a process computer for space and time reasons cannot in all cases produce optimum decisions. The intention is to solve satisfactorily as high as possible a percentage of conflict situations encountered by the application of simple and manageable decision making rules. In the remaining decisions to be taken by the controller he is assisted by computer prepared decision aids in the form of tables and graphs. The program described here consists of several modules, the first of which relates to a route traffic control system intended to be further developed parallel to practical testing. The control process is initiated in cycles and when special events occur (e.g. track closure). After each start, the timetables are generally compiled in advance for all trains, covering almost the next half hour (block sections and occupation times). The controller is advised of all conflict situations and how they can be corrected. Decisions by the controller override computer decisions.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Schenk, O
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052618

COMPILATION OF WORKING TIMETABLES FOR TEMPORARY SINGLE-TRACK WORKING; WAYS OF CONTROLLING TRAIN RUNNING

The German Federal Railway has developed a program for determining the effect of temporary single-track working on the theoretical timetable for a double-track line. The program does not just fix the train sequence in the temporary single-track section by train classes, but also takes into account permissible train delays, for which allowance is made depending on the priority of the train. The article gives an account of the structure of the program and the method used to determine the train sequence in the section with temporary single-track working.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Roth, P
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052620

COMPUTERIZED MANAGEMENT OF LOCOMOTIVE DRIVERS ROSTERED RUNNING SCHEDULES

The establishment of locomotive drivers rostered running schedules is as a rule a laborious task since there are a large number of factors to be taken into account (train running schedules and directives concerning the em-

ployment of footplate staff). In order to obtain rostered running schedules with "idle-times" reduced to the minimum and in order to facilitate the establishment of these schedules in automating the work as far as possible, an attempt has been made to solve the problem with the help of an electronic data processing device. The "Istituto di Elaborazione dell'Informazione del CNR" (Institute for the Preparation of Information for the National Research Council), in collaboration with FS Specialists, has prepared a program in FORTRAN language, by means of which, in assigning a group of trains to a locomotive depot, the drivers' rostered running schedules can be fixed. By means of linear programming methods, rostered schedules composed of runs between two successive idle periods in the parent depot, and in which schedules the idle times are reduced to the minimum, are established. These rostered running schedules are successively allocated to the drivers in such a way as to obtain the optimum use of the footplate staff, while taking into account union rules.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Miliani, F Tacci, G
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052621

SIMULATION MODEL FOR THE STUDY OF TRAIN RUNNING

The author describes a simulation model applicable to the case of a line equipped with automatic block the "exit-from-line" of which gives multi-directional access. The model is constructed in modular form and is of the type with variable time increment (simulation in the form of separate distinct events). The model is well-suited for studying the stability of a train running schedule during peak hours, as a function of the signalling installation. It permits the sensitivity of the train schedules to different parameters to be determined: length of block sections, speed restriction zones, characteristics of the rolling stock, closure time of signal controlled from end of line. etc.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Martens, P
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052622

COMPUTER BASED TRAIN CONTROL SYSTEMS ON LONDON TRANSPORT

The paper describes both present computer controlled railway signalling on London Transport's Railways, and the proposed installation of a centralized computer control system for two deep tube lines. In addition to the control functions, the paper also briefly describes the information which will be available from the computer system, and the means of entering time table and crew schedule information into the computers.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Hadaway, HW
International Union of Railways Sept. 1974, 5 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052623

DETERMINATION OF THE HIGHEST-DENSITY RUNNING SCHEDULE ON AN ARBITRARY LINE TIME-SHARING PROGRAM

To be able to determine the theoretical validity of a given line equipment it is essential to be able to measure this validity in terms of operation i.e. in terms of running schedule flexibility. In this connection, the maximum number of trains which it is possible to run can be considered as a sufficiently valid and selective criterion for being applied a priori to a more complete and finer study. The simplicity of application, through the combined technique of Branch and Bound, makes it an ideal tool for determining the most advantageous running schedules on an arbitrary line.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Gatez, JL
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052624

TESTS IN CONNECTION WITH THE AUTOMATION OF THE EQUIPPING OF TRAINS WITH TRACTIVE UNITS—AUTOMATED MANAGEMENT OF A LOCOMOTIVE FLEET

The tests, prepared and executed at Marseille, were designed at ensuring, with the help of a computer, the optimum continuous allocation of a stock of more than 400 locomotives to all the trains running on the two Marseilles and Montpellier regions chosen for this purpose. The installed system was a man-machine system in which the data processing machine (C 11 10 070, connected to 18 terminal equipments) prepared, every two hours, the allocation charts (for the use of the depots and control offices), finalized and completed by the Regional Control Office team. Each chart covered an allocation period of 3 hours and supplied the allocation forecasts for a period of 11 hours after the 3 hours. This management system permits a better use of the traction means, but requires a very thorough and detailed study of the information collecting procedures and of the organization of the different branches concerned at various levels (depots, Central Control Office, Regional Control Office).

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Carenco, G
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052625

RAILWAY AREA SIMULATION: AN AID TO TRAIN CONTROL

The paper describes a computer-based model of a railway network developed by the BR R&D Division. This model was designed to permit the evaluation of advanced train control strategies without resorting to practical tests on the real railways. Comprehensive facilities are provided by the simulator to handle the many complex facets of railway operation. The simulator has been used by BR to study train control strategies. It has also been employed to evaluate train service plans and line capacities, particularly for services of high density which demand running at close headways.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Breen, RC Stewart, JM
International Union of Railways Sept. 1974, 2 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052626

A REAL-TIME COMPUTER SYSTEM TO AID TRAIN REGULATION AT GLASGOW CENTRAL STATION

The paper describes a real-time computer system to assist in the control of trains at a busy terminal station. It is scheduled to be installed in the Signalling Centre at Glasgow on the Scottish Region of British Railways in 1974. The computer system will process data on trains received from the Train Descriptor and signalling staff, in conjunction with the timetable data. Replatforming and scheduling algorithms can make recommendations, in real-time on changes to the timetable to avoid potential operating problems due to out-of-course running. Information on the planned working and computed recommendations are presented to the signalling staff on three video displays.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Annis, AJ Brook, GD
International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

17 052627

STUDIES IN CONNECTION WITH THE LAYOUT AND OPERATION OF FIXED INSTALLATIONS FOR WRONG-TRACK RUNNING

This report deals with the elaboration of new methods applicable to studies in connection with the layout of fixed installations for wrong-track running and the operation of lines equipped with such installations. Three models have been developed. The first is designed for analyzing a priori the best layout of fixed installations for wrong-track running and the influence of the parameters involved. It has permitted a number of general results to be obtained with regard to the number of fixed installations for wrong-track running, the number of trains to be run in 'groups', etc. The second model is devoted to the pre-planning of the train running diagram, when single-track working is required as a result, for example, of work planned in advance; this running diagram is designed to approximate as closely as possible the normal train running graph for double-track working. The object of the third model is to organize the train traffic in real time in such that the delay incurred by the trains is reduced to the minimum on a line where, as a result of an incident, a fixed installation for wrong-track running must be unexpectedly placed in service. The first model is a theoretical one where certain simplifying hypotheses have been used. The last two models take the case of the Channel Tunnel (1970 or 1971 hypotheses) by way of concrete example.

A summary contained in ORE report #AZ40/RP 6/E, RRIS #052600, Section 17, RRIS Bulletin 7502.

Auclair, JP

International Union of Railways Sept. 1974, 5 pp

ACKNOWLEDGMENT: UIC

PURCHASE FROM: UIC Repr. PC

DOTL RP

17 083046

MOPAC CONTROL SYSTEM SPEEDS INVENTORY AND MOVEMENT

The Transportation Control System project of the Missouri Pacific is now controlling car, train and terminal operations with computer-based techniques. Data on inventories and movements of cars on the entire system are maintained in the computer at MP's St. Louis headquarters. At the yard level, MP has developed a standardized Yard and Terminal Subsystem (YATS) which ties in with the overall TCS network. YATS has produced substantial improvement in yards, more than enough to offset the cost of computerizing car information and processing at the individual yard level. Some data is processed on minicomputer subsystems at individual yards.

Railway System Controls Vol. 5 No. 10, Dec. 1974, pp 16-18, 3 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

17 084723

FREIGHT TRANSPORTATION INFORMATION SYSTEMS AND THEIR IMPLICATIONS FOR R&D POLICY

The current use of computerized management information and control systems in intercity freight transportation are examined. Each of the four modes (railroad, motor carrier, maritime and air cargo industries) is investigated. In each case, computer information systems can help improve the operational efficiency of the mode and provide management (and regulators) with more accurate data for decision making. The intermodal data standard and exchange problem is also discussed. Appropriate recommendations for DOT research and development policy are made. These include development of a national railroad management system, development of terminal control systems for railroad yards and intermodal terminals, support to development of a maritime industry information system and increased effort in the area of data facilitation.

Troup, KF, III

Transportation Systems Center Final Rpt. DOT-TSC-OST-73-10, Mar. 1974, 78 pp, 7 Fig., Refs.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL HE18.5.A35

17 084911

COMPUTER SYSTEMS' IMPACT ON RAILWAYS

The author traces the extension of computer technology on British Railways from isolated pockets of premature enthusiasm to systemwide regular dependence on the machines and data they produce. Byproducts of the basic systems have prompted extensions of computerization to new areas. Computers continue to change the style of BR management and decision making. The computer gives the ability to plan, to allocate resources and to run trains with the efficiency needed to fulfill the Railways' mission in Britain's present and future transportation.

Bowick, DM (British Railways) *Chartered Institute of Transport Journal* Vol. 36 No. 8, Jan. 1975, pp 179-185

PURCHASE FROM: Chartered Institute of Transport 80 Portland Place, London W1N 4DP, England Repr. PC

17 095208

NETWORK ANALYSIS AND BAR CHART

The writer first shows how any project, however complicated, can be split up into a number of smaller units (WBS: Work Breakdown Structure). He refers to the well-known conventional project planning systems (PERT = Programme Evaluation and Review Technique; CPM = Critical Path Method), and discusses the advantages of the Bar Chart (GANTT Chart). He explains how it can be used: for the review of progress and control of activities; for resource allocation and load smoothening; for performance budgeting and estimation of funds. In particular, he shows how the times of concurrent activities may be adjusted to gain advantages either in time, or cost, or in planning resources (total float, free float, independent float) by the use of the Bar Chart.

Mukherjee, PK *Indian Railway Technical Bulletin* Vol. 30 No. 190, Aug. 1973, pp 121-127, 7 Fig., 1 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Research Design and Standards Organization Alambagh, Lucknow 5, India Repr. PC

DOTL JC

17 095394

DISCOMFORT GLARE AND DISTURBANCES FROM LIGHT REFLECTION IN AN OFFICE ENVIRONMENT WITH CRT DISPLAY TERMINALS [Kontrastblandning och reflexstorningar i Kontorslandskap med bildterminaler]

The authors studied the lighting of an office equipped with 17 CRT display terminals and analyzed complaints from the staff. Discomfort glare and reflections on the terminal screens were found to be the main causes of the complaints. Discomfort glare resulted from difference in luminance between the dark screen and other lit surfaces in the room. Reflections from windows and ceiling lighting appearing on the glossy screen were often found to have higher luminance values than the text on the screen. On the basis of these results, guiding principles are suggested for the design of lighting in similar workplaces. [Swedish]

Hultgren, G Knave, B *Work and Health, Scientific Series* No. 1, 1973, 16 pp, Figs., 1 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Work Safety Board Stockholm, Sweden Repr. PC

17 095396

IN SERVICE MODELS [Bedienungsmodelle]

Within the context of operations research, the service theory studies the systems used according to statistical rules. For simple cases, there are analytical solutions. But complicated cases can only be explained by simulation with suitable models. This book provides a good introduction to the mathematical processes which give full solutions and it also quotes several examples. For some models, FORTRAN programmes have been prepared. A certain number of detailed cases concern practical applications for industrial production and transport in undertakings and for these there is an examination of the importances of queuing times and time losses and the economic grounds for the optimum solutions chosen. [German]

Krampe, H Kubat, J Runge, W

Verlag der Wirtschaft 1974, 512 pp, Figs., Tabs.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Verlag der Wirtschaft Berlin, West Germany Repr. PC

17 095699

ENGINEERING DEPARTMENT EQUIPMENT: REFERENCE ISSUE

This issue covers drafting equipment, calculators, computers, reproduction equipment, measurement equipments (mechanical, electrical, fluid, and temperature), simulation equipment, and rented and used equipment.

Machine Design Vol. 46 No. 28, Nov. 1974, 134 pp

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 096536

THE PLANNING OF TRAIN SERVICES USING COMPUTER METHODS

The paper describes British Rail's Train Service Production System and the computer developments which are suitable for application to it. These aim to improve the planned economics of train service operation and, in addition, to reduce production timescales and cost. The activities of train specification, timing, pathing, scheduling and documentation are discussed in the context of medium and short term planning. Current British Rail developments are described with particular emphasis being given to the role of a data base in a total computer aided train service production system.

Holt, J (British Railways) *Rail International* Vol. 6 No. 3, Mar. 1975, pp 177-187, 4 Fig., 2 Tab., 3 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 096538

MANAGEMENT INFORMATION SYSTEMS FOR RAILWAYS

A railway company, like any other business, is a system: to be more precise, it is an open system. This means that it is very largely dependent on the environment in which it operates. A business can suffer from a lack of flexibility towards a changing environment. And it can perish by that also. And since the dynamic forces in society are more vigorous nowadays than ever before, it is quite relevant to consider the company as an open system, influenced by and in interaction with a turbulent world surrounding it. A railway company can be regarded as an open system, very largely dependent on the environment. To manage a railway system, planning and control information about the inner and outer environment of the company is required. This information should be presented to the manager in an attractive form, most of the time by making use of a special information system.

Tieleman, T *Rail International* No. 3, Mar. 1975, pp 155-172, 7 Fig., 1 Tab., 18 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 096547

TELE-INFORMATION TECHNIQUES FOR AN INTEGRATED DATA TRANSMISSION NETWORK OF THE EUROPEAN RAILWAYS

Particular importance must be attached to the continually progressing advance of automation. Railway operation calls for the processing of frequently recurring data which must be exchanged and processed within a short period of time. For this purpose, modern electronic data processing plants with their rapid and reliable processing methods provide an optimum solution for the continuing process of introducing cybernetics into railway operation. Within the framework of the ever closer European co-operation, the need for the co-ordination of all these systems into a single integrated international system has become more and more evident. The international network stems from the integration of the different national systems; this gives a brief description of their characteristics.

Tosi, E *Rail International* Vol. 6 No. 2, Feb. 1975, pp 127-132, 8 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 096624

MESSAGE PROCESSING BY COMPUTER [Die rechnergesteuerte Behandlung von Fernschreiben]

Tests carried out at Essen on message processing by computer aimed to speed up and rationalise the sending of messages, especially duty messages, in the shape of forms and multiple address blocks. It is planned that this process will be used later after it has been improved upon during further tests within the intergrated transport management system (I.T.S) and within the administration of the rest of telegraphic traffic which will continue to exist after the integrated transport management system has been introduced. [German]

Ruffler, D Kegel, O *Signal und Draht* Vol. 66 No. 9, 1974, pp 159-166, 9 Fig.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: Dr Arthur Tetzlaff - Verlag Niddastrasse 64, Frankfurt Am Main, West Germany Repr. PC

17 096630

PROBLEMS CONCERNING DIGITAL TRANSMISSION OF DATA IN THE OPERATING DEPARTMENTS OF THE GERMAN STATE RAILWAY [Einige Probleme der digitalen Informationsuebertragung beim Zugbetrieb bei der Deutschen Reichsbahn]

When dealing with important transport operations at national level, the transmission of information is of prime importance. The author discusses the following problems in relation to the organisation of train running: optimal use, the method of determining safe transmission and transmission speed. [German]

Meinung, L *Fernmeldetechnik* Vol. 14 No. 4, 1974, pp 126-128

ACKNOWLEDGMENT: UIC
PURCHASE FROM: VEB Verlag Technik 13-14 Oranienburger Strasse, Berlin 102, East Germany Repr. PC

17 096639

MANAGEMENT INFORMATION SYSTEMS ACCORDING TO THE MODULE PRINCIPLE [Management-Informationssysteme nach dem Bausteinprinzip]

To make forecasts about changes in the economy and management, a Management-Information-System (MIS) is required. The author deals with technical questions of information and data banks, their introduction and gradual adaptation. Since information requirements vary according to levels within the company, the MIS should be split up into at least two levels with corresponding data banks. The author also shows an MIS which involves organisation at several levels: from basic organization without data banks to the level of several data banks. But data banks are not enough—a method bank is also necessary. [German]

Schultheiss, R *Industrial Engineering* Vol. 4 No. 3, 1974, pp 175-184, 3 Fig., 15 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 096651

THE STATE-OF-THE-ART OF COMPUTER GRAPHICS APPLICATIONS IN STRUCTURAL ENGINEERING

This report provides a survey of the ways in which computer graphics are used in engineering practice, particularly in structural engineering. The Committee attempted not only to survey the uses to which computer graphics was being put, but also to critically evaluate the uses, and to give recommendations for desirable work. Not all of these goals were met, but each of these areas is discussed.

Logcher, RD *ASCE Journal of the Structural Division* Proc Paper Vol. 101 No. ST3, #11158, Mar. 1975, pp 459-504

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 096676

AN ASSESSMENT OF THE APPLICATION OF ON-LINE COMPUTERS TO CONTROL OF AN UNDERGROUND RAILWAY-A SIMULATION STUDY

This paper describes the method and summarizes the results of work within the operational research department of London Transport to assess

the benefits that on-line computer control of signals on the Northern and Victoria lines would bring to passengers. From a simulation study it was concluded that reduction in travel times, waiting times and overcrowding could be achieved by computer control. In the simulation, travel time from Modern to Kings Cross was reduced by 1 min and passenger waiting time at stations reduced by up to 11 sec. The improvement derives mainly from better integration of conflicting movements. The total benefit to passengers over the Northern line is estimated to be 64,000 p.a. In addition there is the possibility of an increased revenue to London Transport from generated traffic. /Author/TRRL/

Levene, SM Weston, JG London Transport (London Transport)
Transportation Research Vol. 8 No. 2, Apr. 1974, pp 123-135, 8 Fig., 3 Tab., 5 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 210872S)

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 097236

ENGINEERING CYBERNETICS

The various disciplines which together are generally referred to as cybernetics, including adaptation, learning, self-organization, self-repair, game playing by machines, pattern recognition, and artificial intelligence, have been generating interest for the past two decades. It is one purpose of this book to explore these concepts under one cover and present a framework wherein these topics can be united. Another purpose is to present some of the applications of cybernetics that have emerged thus far. Finally, the reader is provided with some of the background necessary to carry out further work in these areas. The book is organized into roughly three major sections: (1) Motivation, basic tools, and definitions; (2) specific system examples; and (3) neural models and pattern recognition. The prerequisites for using the book are switching theory, a reasonable background in probability or random signal theory, and some familiarity with computer programming.

This is a part of the Prentice-Hall Information and System Sciences Series.

Glorioso, RM
Prentice-Hall, Incorporated 1975, 259 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Prentice-Hall, Incorporated Route 9W, Englewood Cliffs, New Jersey, 07632 Orig. PC

17 097271

SOFTWARE TECHNIQUES FOR EVALUATING KARTRAK SYSTEM PERFORMANCE

To help determine exactly where improvements must be made in the Automatic Car Identification (ACI) system adopted by North American railroads, a program has been undertaken to measure system performance. This program categorizes various errors so that the user can determine if the required performance criteria are being met.

Railway System Controls Vol. 6 No. 2, Feb. 1975, 5 pp, 12 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 097282

SHINKANSEN TRAFFIC CONTROL AND MANAGEMENT SYSTEM-COMTRAC PHASE 2

Contributing significantly to operation of high-speed trains on the New Tokaido Line have been improved operations control systems such as Automatic Train Control and Centralized Traffic Control. To handle higher service levels COMTRAC (Computer Aided Traffic Control) was introduced to automate route control. In this paper there is an outline of the Shinkansen and a general survey of its train operations system with details of the Comtrac system. The function, hardware and software of COMTRAC are discussed. A future stage will be further sophistication of COMTRAC to achieve mechanization and computerization of operations management of the expansion of service as Shinkansen is extended throughout Japan.

Inada, N Hayashi, Y Hirota, Y (Japanese National Railways) *Rail International* Vol. 6 No. 4, Apr. 1975, pp 295-308, 25 Fig., 3 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

17 097996

TRAFFIC CONTROL AND TRANSPORTATION SYSTEMS

Proceeding of the symposium include 57 papers that point out the most recent advances in automation and control as applied to the various transport fields with emphasis on the systems aspect. The main topics dealt with are: urban as well as road and highway traffic control; bus control systems; urban transportation systems on segregated tracks; air and railway transportation systems. In all these fields, the emphasis is placed on the link between the more or less theoretical research and the practical applications. Sessions are also devoted to modeling and decision aids methods as well as to the methods proper to provide harmony between transport planning and social organization planning. Some papers are in French with English abstracts. Following is a partial list of titles and authors of the papers presented. Methodology and Programming Package for Railway Traction Simulation. By Marko Vuskovic and Branko Lusicic. Regulation des Circulations en Gare de Paris-Nord. (Traffic Control on the Paris Nord Railroad in France). By Marcel Aubert and Andre Lemaire. Real Time Systems for Train Scheduling. By Malcolm J. Savage and Royston P. Harrison. Integrated Transport Control on Railways: Reasons for, Results, and Aspects of Future Development Based on Experience with 'Cybernetic Island Hannover'. By Wilhelm Max Wumderlich. Block Automatique de Type Nouveau Fait de Pre-Metro une Solution Moderne au Probleme des Transports en Commum dans les Villes de Moyenne Importance. (Modern Automatic Block System and the Solution Chosen for the Brussels, Belgium Pre-Metro). By Marc Brichaux. Utilisation d'une Console de Visualisation Quadrichrome en Mode Conversationnel pour l'Etude de la Regulation d'un Reseau Ferre Urbain. (Simulation of Urban Railway Transport with Color Graphic Display in Conversational Mode). By Rene Quonten. 'Minitran' in Britain: Automatic Urban Transportation. By Henry W. Groves and Roy C. Baker. Mise en Oeuvre du Pilotage Automatique du Metro de Santiago du Chili. (Implementation of the Automatic Driving of Trains for the Metro of Santiago in Chile). By Michel Blanchard, Jacques Gillon, Jean Pierre Malon and Gabriel Marie. Optimization Aspects in Large Railway Systems. By Robert Genser. Contribution of Optimum Computer-Aided Control of Train Operation. By Horst Strobel, Peter Horn and Manfred Kosemund. Information Processing System of the Musashino Marshalling Yard. By Akira Sato, Akoo Shioya, Naotsugu Nozue and Akira Hachiga. Management and Planning of Sugar Cane Railway Transportation Using a CID-201-A Digital Computer. By Jose Luis Toledano Fernandez and Luis Orlando Suarez Arias. Study of Rolling Stock Rostering. By Yoshihisa Iida and Sumio Koga. Application of Reliability Theory and Control Theory to Automatic Transportation System. By Klaus Dieter Wiegand and Jochen Glimm. Evaluation des Criteres Techniques de Mouvement pour les Installation de la Commande Automatique de la Marche des Trains. (Evaluation of the Technical Criteria that Have Influence on the Train Operation When Automatic Train Control Equipment is Used). By Antonio Masiewicz and L.M. Ericsson.

Proceedings of the 2nd Intl. Symposium on Traffic Control and Transportation Systems, Monte Carlo, Monaco, Sept. 16-21, 1974.

North Holland Publishing Company 1974, 736 pp

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Elsevier Publishing Company, Incorporated 52 Vanderbilt Avenue, New York, New York, 10017 Repr. PC

17 098051

TRAIN II-ADVANCED COMPUTERIZED FREIGHT CAR CONTROL

TRAIN II, the evolutionary development of AAR's computerized car control system, gives the car service Division instant information on cars throughout their empty to load to empty cycles. The Division charts origins and destinations for car types and commodities for individual railroads and regionally. Loading trends can be combined with commodity classification inputs and the status of loads and empties on line and coming to a railroad to produce the true useability of that road's car inventory. The ability to identify regional concentrations of cars will make possible more precise car use directives. Forecasts of loadings, unloadings, inventories, net available cars by type and other data will be available to AAR and individual railroads. Even now new refinements are under study.

Van Slyke, WH (Association of American Railroads) *Traffic World* Vol. 162 No. 12, June 1975, pp 27-33, Photos.

PURCHASE FROM: Traffic Service Corporation 815 Washington Building, Washington, D.C., 20005 Repr. PC

DOTL JC

17 098052

COMPUTER TECHNOLOGY: A KEY TO IMPROVED PRODUCTIVITY IN TRANSPORTATION

The utilization of computers by different transport modes is discussed in this article. Control Data Corp. has a transportation industry management office to direct and coordinate its computer applications in this field. Described are CARRIER, a truck line computer network; QUICKTRANS, an application on an air cargo line; and FCAMS, a computerized system for shippers which facilitates planning of freight shipments and warehousing operations. One promising area for computer systems is identified as tracking of intermodal shipments.

Collymore, WA (Control Data Corporation) *Traffic World* Vol. 162 No. 12, June 1975, pp 35-37, 1 Phot.

PURCHASE FROM: Traffic Service Corporation 815 Washington Building, Washington, D.C., 20005 Repr. PC

DOTL JC

17 098758

CAR MILEAGE BY AAR CAR TYPE

The file name is CAR MOVEMENT RECORDS. Computer program. Objective: To provide accurate information on mileage of certain groups of cars for studies of derailments and other train malfunctions. Mileage is generated from the car movement records and is summarized by SRS algorithm, system cars versus foreign cars, loaded versus empty miles, and roller bearing versus plain bearing cars. The SRS algorithm consists of the four-character AAR car type, plus a two digit code indicating truck capacity in tens of tons, and a two character marketing code designating special characteristics of cars.

Crews, WL
Southern Railway System 1972

ACKNOWLEDGMENT: AREA (AREA 09-02-003)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

17 098759

ACTIVE CAR SAMPLE

Computer program: ACTIVE CAR SAMPLE MASTER FILE. The objective of this program is to provide estimates of car mileage on Southern Railway System for selected groups of cars. The mileage estimates may be any of the following characteristics or combination of characteristics which are obtained from the Umler File and added to the Active Car Master File (age range, AAR car type, truck tonnage capacity, SRS marketing code, cubic foot capacity, nominal capacity, tare weight, lining, outside length, side door width, clearance, bearing type, draft gear travel, truck center length, fittings, compartments, floor type). These mileage estimates are used in calculating failure rates for groups of cars. Examples include studies of (1) derailments by AAR car type and age range, (2) uncouplings by cut-lever type and car cushioning, and (3) broken knuckles and couplers by AAR car type and age range. The input data (consisting of car number and supplemental information obtained by inspection of the car such as air hose arrangements and/or cut-lever type) is collected at selected hump yards for a sample of cars going over the hump. The file is of unlimited length. This method of estimating car population approximates mileage more closely than would ownership figures since cars will be included in the sample in proportion to their movement. The program produces a microfiche listing of all data in the file by car initial and number. Other reports are generated by a general purpose picker program (RSVP) which has the capability to select certain records, to sort them in any order, and to print the selected records with summaries on any field.

Tharpe, MK, III
Southern Railway System Aug. 1974

ACKNOWLEDGMENT: AREA (AREA 09-02-004)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

17 098767

SIGNAL DEPARTMENT INVENTORY

Computer Program purely an inventory of fixed property-crossing protection, spring switches, and interlockers. Input-physical description of existing material. Output-listings as required. Program will be expanded to include capabilities of listing selected records only.

Velebit, M
Illinois Central Gulf Railroad 1974

ACKNOWLEDGMENT: AREA (AREA 10-04-001)
PURCHASE FROM: Illinois Central Gulf Railroad 233 North Michigan Avenue, Chicago, Illinois, 60601

17 098768

BRIDGE INVENTORY

The file name is BRIDG, FDDSM. The bridge inventory computer program generates selected lists of bridges which include state, county, branch line, mile post, range and bridge type. This program is primarily a management information system which includes bridge data, as well as updating programs. The program named FDDSM generates summary tables for bridges which include linear feet of bridge, track, number of bridge types within a certain region and other information data which may assist in determining cost of repairs, painting, etc. The input to BRIDG, and FDDSM consist of description of territory and bridge screening parameters (Optional).

Eimer, N
Penn Central Transportation Company 1973

ACKNOWLEDGMENT: AREA (AREA 10-04-002)
PURCHASE FROM: Penn Central Transportation Company 6 Penn Central Plaza, Philadelphia, Pennsylvania, 10104

17 098770

SLOW ORDER REPORT

The file name is SLOW 1. The computer program keeps all slow orders on file and lists them in various formats. The data base consists of location, mile post, condition of track, reason for slow order, and allowable speed for Passenger and Freight Trains. Also recorded is travel time lost and estimated date of slow order release. The reports are generated to give management an idea about the condition of the railroad and priority of repair.

Glickstein, DL
Penn Central Transportation Company 1970

ACKNOWLEDGMENT: AREA (AREA 10-05-002)
PURCHASE FROM: Penn Central Transportation Company 6 Penn Central Plaza, Philadelphia, Pennsylvania, 19104

17 098772

UNIVERSAL MACHINE LANGUAGE EQUIPMENT REGISTER PICKER PROGRAM

File name is UMLER FILE. Program allows selection of cars in the Umler file on the basis of ownership code, AAR car type, individual car numbers (maximum of 500 cars), a car series, or car initials. Output consists of the selected Umler file data with sorting options of car age, AAR car type, capacity, bearing type, draft gear, outside length, tare weight, truck center length, and car identification. Objective of the program is to classify cars in failure groups or in population samples by the various characteristics described in the Umler file for failure analysis.

McNeil, RG
Southern Railway System 1973

ACKNOWLEDGMENT: AREA (AREA 12-01-001)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW, Atlanta, Georgia, 30303

17 098773

DIESEL RECORDS SYSTEM

The file name is DIESEL RECORDS MASTER FILE. The objectives of this computer program are: 1. To aid in scheduling and verifying completion of locomotive maintenance items. 2. To aid in isolating problems with specific locomotives by providing a history of pertinent information for each unit. Output consists of a semi-monthly printout showing the following information for each unit due maintenance during the next fifteen days: 1. Maintenance items due to be performed including repetitive maintenance items which are done at fixed intervals and special upgrading or correction projects. 2. A history of traction motor failures on each unit by pedestal number. 3. An indication if the traction motor model is not one of the models which is recommended for use on the specific locomotive model. (Recommendation is based on reliability considerations). Other outputs include a current "cab card" and various inventory listings of

main components (traction motors, main generators, turbochargers, etc.). Feedback is provided when maintenance items are completed by having the person who did the work sign the computer report and then keytyping data from the report. A maintenance item will continue to appear on the report each month until it is reported completed. Input consists of: 1. Oil control lab data, in-service failures, and defects from the Locomotive In-service Failure/Defect Analysis Program. 2. Feedback data from the shops on each maintenance item or project completed. 3. Traction motor applications and removals from the diesel shops. 4. Tables of frequency of repetitive maintenance items. 5. Tables identifying which units are due for special projects.

Tritt, RF
Southern Railway System 1960

ACKNOWLEDGMENT: AREA (AREA 12-01-002)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW,
Atlanta, Georgia, 30303

17 098775

DIESEL UTILIZATION MILEAGE AND HOUR STATISTICS

This computer program produces a family of monthly reports giving mileage and distribution of time (service status) by locomotive model. Input consists of mileage and time data for each unit in locomotive service. This is obtained from the car movement history file. Locomotive model and model group is obtained from the diesel records master. Output consists of four reports. These are: 1. Report by model group and within model group by model giving number of units in service, average miles per month, average miles hour, distribution of hours in percent in the following categories, freight, passenger, switching, in-tow, in-shop, and idle. The report also shows the effective utilization for each model which is defined as the ratio of the average speed to the rated speed times percent hours in service. 2. A listing by unit of low-utilization units showing the bottom five percent of each model and giving the same information as in report 1. 3. A listing by unit for high-utilization units. 4. A summary by model group comparing principal statistics for "last month" versus previous month. Report also gives totals by passenger, freight, and switching service.

Southern Railway System 1970

ACKNOWLEDGMENT: AREA (AREA 12-01-004)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW,
Atlanta, Georgia, 30303

17 098776

LOCOMOTIVE IN-SERVICE FAILURES/DEFECT ANALYSIS

File name is LOCOMOTIVE FAILURE/DEFECT FILE, CAR MOVEMENT HISTORY FILE. Major objective of computer program is to isolate major causes of locomotive in-service failures. Input consists of: 1. Data on the results of a monthly spectrographic analysis of samples of the cooling water, crank case oil, and air compressor oil from each locomotive. 2. Data on in-service failures (motive power failures which result in either reducing the tonnage of a train or in a train delay.) 3. Diesel shop report on in-service failure giving cause, type to defect, data repaired, etc. 4. Reports of locomotive defects (conditions not causing failure). Monthly output reports include: 1. A raw data tabulation of each failure listing all

pertinents data and sorted by locomotive model and within model by cause of failure. 2. A summary of locomotive in-service failures by maintenance points, locomotive model, and failing component for both one month and three-month periods giving number of failures and failures per million miles. 3. Summary of locomotive defects by defective component and by the reporting Road Foremen of Engines. 4. A summary of in-service failures by operating division and by type of service (passenger, freight, or switching). 5. Identification of units which have had repetitive duplicate oil lab findings.

Smith, SH
Southern Railway System 1969

ACKNOWLEDGMENT: AREA (AREA 12-01-005)
PURCHASE FROM: Southern Railway System 99 Spring Street, SW,
Atlanta, Georgia, 30303

17 098780

UTILITY SUBROUTINE PACKAGE

Computer Program. Subroutine Package for alphanumeric work and file handling routines which are used by other program to provide common functions. For example, alphanumeric routines match item numbers against a data base. File handling routines are used to create, for maintenance and updating of two dimensional files, and permit access to a group of items randomly and to individual items within the group sequentially.

Velebit, M
Illinois Central Gulf Railroad 1974

ACKNOWLEDGMENT: AREA (AREA 14-01-001)
PURCHASE FROM: Illinois Central Gulf Railroad 233 North Michigan
Avenue, Chicago, Illinois, 60601

17 098882

RAIL CAR MANAGEMENT SYSTEM

Computer program designed to provide shippers' traffic departments with analyses that can reduce the expense and capital outlays involved in operation of freight car fleets. The system develops and maintains an extensive base of information on each car with respect to financial, location and maintenance records. Generated are the following reports: Out of Service, Excessive Idle Time, Overdue at Destination, Rail Equipment and Daily Activity. A capability of online updating and retrieval of most reports provides fast, accurate information to manage and account for rail car functions. Input includes Car Location Messages, Standard Point Location Codes or other corporate location designations and financial data such as mileage earnings, rentals, paid maintenance, inhouse maintenance, depreciation and any additional expenses on owned or leased cars. For this base, immediate inquiries can be made on specific cars, locations, and status. Design of the system recognizes the individual character of different fleets and allows tailoring to specific management requirements.

International Business Machines Corporation Nov. 1974

PURCHASE FROM: International Business Machines Corporation 1133
Westchester Avenue, Data Processing Division, White Plains, New
York, 10604 Repr. PC

18 083048

A CAPITAL EXPENDITURE MODEL FOR RAILROAD EQUIPMENT

This article was initiated as a result of private research undertaken in the area of the econometric cost of capital in the transportation sector of the U.S. economy. It is presented as an efficient and unbiased model of evaluating capital equipment investments by railroads utilizing a Capital Investment Computer Program (CICP). The basic model shows that total net return can be used effectively for the capital budgeting program and for indicating the order in which a set of proposals should be used to maximize return on investment. The model can be extended using Monte Carlo simulation to determine the nature of risk inherent in any investment plan. It should be possible to determine the right mix of proposals such that expected profits are maximized without an undue element of risk.

Lackman, CL (Rutgers University, New Brunswick) *Traffic Quarterly* Vol. 29 No. 1, Jan. 1975, pp 113-132, 2 Fig., 8 Tab.

PURCHASE FROM: Eno Foundation for Transportation, Incorporated P.O. Box 55, Saugatuck Station, Westport, Connecticut, 06880 Repr. PC
DOTL JC

18 083060

FOR RAILROADS, IT WAS A YEAR OF MIXED BLESSINGS

The highlights of industry development are listed in this overview article, which covers railroads in 1974. The review is accompanied by graphs and tables showing the U.S. railroads' financial and operating statistics for the period from 1964 through 1974. The text summarizes 1974 capital expenditures, service improvements, rates, management/labor relations, legislation, research and development, the Northeast, merger activity, safety, and passenger service.

Railway Age Jan. 1975, pp 64-75

PURCHASE FROM: XUM Repr. PC

DOTL JC

18 084720

THE VALUATION OF A RAILROAD RIGHT-OF-WAY FOR A RECREATION TRAIL

Valuation of a railroad right-of-way presents a problem in the two possible treatments of the land, each of which represents a separate market. One market is that of the numerous abutting owners who might be interested in adding to their existing holdings at reasonable prices, but urban and rural areas present separate problems. While that alternative assumes total abandonment of the use of the right-of-way the second possible use of it would be by public utilities, highway departments, communities or private firms. In addition to uses such as power lines, sewers, new roads, road widenings, gas lines, and rail lines to specific users, several conservation departments of states have purchased these tracts of land for nature and recreation trails.

Ball, WH *Right of Way* Oct. 1974, pp 60-62

PURCHASE FROM: American Right of Way Association 3727 West 6th Street, Suite 504, Los Angeles, California, 90020 Repr. PC

DOTL RP

18 084909

MERGER VALUATION OF NET LOSS RAILROADS

Unlike unregulated industries where firms with a continuing prospect of net loss cease operations and withdraw their capital from the industry, railroads that operate at a net loss or are bankrupt are forced by the Interstate Commerce Commission to continue running. This consumes their assets and when the equity capital is wiped out, the creditors are in effect subsidizing the operation. The problem of valuing such properties when they are merged as a solution to their negative cash flow situation, is examined in the light of the New Haven, Lehigh Valley and Rock Island. The author notes that many railroads would be worth more if they had fewer assets and that unless disinvestment practices are liberalized there can only be a series of failing railroads in the U.S.

Conant, M (California University, Berkeley) *ICC Practitioners' Journal* Vol. 42 No. 3, Mar. 1975, pp 281-298

PURCHASE FROM: Association of Interstate Commerce Comm Pract 1112 ICC Building, Washington, D.C., 20423 Repr. PC

DOTL JC

18 084918

WHAT PRICE MONEY

The low reputation of railways for investment possibilities makes it very expensive to borrow money. Equity financing is particularly difficult for railways. Much of the railway debt is made up of equipment trust certificates and bonds. Until the return on net investment reaches at least ten or twelve percent instead of the present four percent the railways will continue to have problems raising capital.

Modern Railroads Vol. 30 No. 2, Feb. 1975, pp 51-53

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

18 084926

LEVERAGE LEASING-OVER \$600 MILLION FINANCING IN 1974

Leverage leasing is a financial arrangement whereby the major portion of the purchase price of new equipment is supplied by long term lenders and the remainder is supplied by the lessor-owner. The article details the financial advantages of this method for railroads and provides an example.

Progressive Railroading Vol. 17 No. 12, Dec. 1974, p 29

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

18 090959

AN ECONOMIC OVERVIEW OF THE CONSOLIDATED RAIL CORPORATION

The study identifies the principal problems to be overcome by ConRail if it is to become a self-sustaining operation, and the opportunities to improve rail service and earnings. Included in the study are recommendations for achieving profitability. Portions of this document are not fully legible.

Reebie (Robert) and Associates, Incorporated, United States Railway Association Final Rpt. USRA/R-003, Aug. 1974, 75 pp

Contract USRA-50003

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239025/0ST, DOTL NTIS

18 091314

COST/BENEFIT ANALYSIS OF HEAD SHIELDS FOR 112A/114A SERIES TANK CARS

A cost/benefit analysis of head shields installed on new and existing 112A/114A series pressure tank cars was performed based on a redistribution of accident dollar losses. Head shields are designed to prevent puncture of a tank car head during an accident with resulting loss of lading and possibly extensive fire damage. The design of the head shields and data for the analysis were obtained from Railway Progress Institute (RPI)-Association of American Railroads (AAR) cooperative research program reports. The RPI/AAR considered accident data for the years 1965-1970 and assigned accident dollar losses during that period according to the tank element that failed. Supporting evidence is presented indicating that dollar losses are strongly related to puncture distribution for a more extensive set of data including all classes of tank cars.

Study sponsored by the U.S. Department of Transportation, Federal Railroad Administration, Washington, D.C.

Adams, DE Bullerdiek, WA Pattern, JS Vassalo, FA Calspan Corporation, Federal Railroad Administration, (CALSPAN-ZL-5226-D-1) Final Rpt. FRA-OR&D 75-34, Mar. 1974, 15 pp

Contract DOT-FR-20069

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241298/9ST, DOTL NTIS

18 095202

OPTIMUM ECONOMIC PERFORMANCE FOR A RAILWAY SYSTEM

Comprised of several short papers—The PTE point of view, by A.M. Munro; Selection of train performance characteristics for suburban railroads, by A. Hawes; London Transport Railway economics, by D.K. Ware and F.G. Ruddy; and Design considerations for rapid transit, by A.M. Lyall and N.W. Colling.

Paper presented to the Institution of Mechanical Engineers Railway Division, November 11, 1974.

Munro, AM

Institution of Mechanical Engineers Nov. 1974, 23 pp, 24 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

18 095286

SOME OBSERVATIONS REGARDING VALUE-OF-SERVICE PRICING IN TRANSPORTATION

The case for and against value-of-service pricing is discussed. While demand pricing is seen by some as resulting in subsidies to some commodities and resulting in misallocation of resources, cost-oriented rates involve cost allocations of prodigious complexity in the transport industries. Demand pricing is seen as one means of allocating fixed costs on a "value received" basis and assuring that the plant is used more efficiently. Value-of-service pricing makes possible service to marginal locations with rates representing an indirect subsidy. While commodity rates do not ignore a commodity's value, they are more cost-oriented than class rates. Additional research is needed in the area of traffic, volume and rates charged.

Davis, GM Combs, LJ (Arkansas University) *Transportation Journal* Vol. 14 No. 3, 1975, pp 49-58, 1 Fig., 2 Tab.

PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Orig. PC

DOTL JC

18 095287

PRICING DEVELOPMENTS IN TRANSPORTATION AND PUBLIC UTILITIES: COMMENT

The author observes that advocates of complete deregulation of transportation rates have based their case on an over-simplified application of price theory and have exaggerated the adverse effects of existing regulation and the benefits which would be derived from its elimination. He advocates a careful cost-benefit type of analysis to determine the balance between undertaking to change the nature and scope of existing regulation, or in switching to antitrust controls over ratemaking. Either approach would involve significant changes in Federal laws. It is noted that attempts to accomplish welfare objectives and subordinate economic efficiency should not be achieved through rate structures.

This paper was presented at a session of the American Economic Association, Transportation and Public Utilities Group. San Francisco, December 29, 1974.

Harbeson, RW (Illinois University, Urbana) *Transportation Journal* Vol. 14 No. 3, 1975, pp 42-48

PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Orig. PC

DOTL JC

18 095288

CRITICISM OF REGULATED FREIGHT TRANSPORT: DO ECONOMISTS' PERCEPTIONS CONFORM WITH INSTITUTIONAL REALITIES?

The author examines the proposed end of government regulation of transport and elimination of the exemption from antitrust laws involved in collective rate making, concluding that benefits to freight transport users and the general public would not be inevitable. Examined specifically is motor and rail freight service pricing. It is observed that freedom from rate restraints has the possibility for development of rate-cost relationship that are less than optimal. This, together with the relation between charges, carriers' financial condition and the quality of transport services on one hand and the economic performance of shippers and industries on

the other would indicate the need for a rational and socially responsible approach, rather than precipitous deregulation.

This paper was presented at a session of the American Economic Association meetings, Transportation and Public Utilities Group, San Francisco, California, December 29, 1974.

Spychalski, JC (Pennsylvania State University, University Park) *Transportation Journal* Vol. 14 No. 3, 1975, pp 5-17

PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Orig. PC

DOTL JC

18 095418

COMPETITION IN THE RAILROAD INDUSTRY: A POLICY STUDY PREPARED FOR THE USRA

This study analyzes the economics of railroad competition in the region and its relationship to freight transportation by trucks and barges. The contractor reviewed the existing literature on the economics of competition and prepared an analysis of the presumed benefits of competition. A seminar with shippers was conducted and an analysis of shippers' views on competition prepared. The contractor also evaluated the competitive effects of different possible ways of organizing rail service in the region.

Developed for use by USRA for system planning.

Simat, Heliessen and Eichner, Incorporated Final Rpt. USRA/R-019, Feb. 1975, 218 pp

Contract USRA-C-50019

ACKNOWLEDGMENT: United States Railway Association PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239436, DOTL NTIS

18 095419

FREIGHT TRANSPORTATION: FUTURE MODAL COMPETITIVENESS

This study examines rail, truck and barge transportation in the region in light of current and projected future programs of various government bodies and changing technology. The study reviews current and future programs government bodies have in progress and analyses the influence of these programs. Similarly, changes in technology were reviewed and an analysis made of the impact of these changes on productivity. After quantifying the effect of these changes, the contractor developed a cost model for alternative operating configurations. The contractor's study also includes a market share analysis and identification of opportunities for securing additional rail traffic through improved service.

For use by USRA system planning.

Reebie (Robert) and Associates, Incorporated Final Rpt. Oct. 1974, 15 pp

Contract USRA-C-50057

ACKNOWLEDGMENT: United States Railway Association PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239219, DOTL NTIS

18 095421

CRITERIA FOR LINE RETENTION

This study developed economic criteria for identifying the viability of line segments under analysis in USRA local routes planning. The study identified applicable costing techniques and developed supporting rationale for each criteria selected. Consideration was given by the contractor to approaches forecasting branch line revenues and revenue allocation criteria and alternative means of evaluating overhead traffic divertable to other rail lines if uneconomic lines were not retained.

Consad Research Corporation Final Rpt. USRA/R-015, Feb. 1975, 349 pp

Contract USRA-C-50001

ACKNOWLEDGMENT: United States Railway Association PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239041, DOTL NTIS

18 095423

AN INTERIM PRICING STRATEGY FOR CONRAIL

This study proposes a pricing philosophy for the Consolidated Rail Corpo-

ration. The study analyzes the merits for the various types of short term price increases in terms of general rate increases, commodity increases, terminal surcharges, and region surcharges. An estimate of the traffic diversion under each arrangement is presented and the net profit for each alternative calculated.

Prepared for USRA for system planning.

Reebie (Robert) and Associates, Incorporated USRA/R-013, Jan. 1975, 12 pp

Contract USRA-C-50083

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239040/9ST, DOTL NTIS

18 095425

INVENTORY AND ASSESSMENT PROJECT FOR RAIL SERVICES IN MIDWEST AND NORTHEAST REGION: SUMMARY COST ESTIMATE

Bechtel Incorporated and five associate contractors conducted a general inventory of the fixed plant of the railroads in reorganization. These contractors examined the general physical condition of the plant, identified the rehabilitation work necessary to bring the rail system to a specified condition, and estimated the costs for such rehabilitation. In addition, the accuracy of the existing railroad records was reviewed. The total inventory is serving as a basis for developing a rehabilitation work plan. Bechtel Inc. also served as the Technical Direction Contractor to coordinate the activities of the associate contractors and this document spells out the cost estimates, forms used, and approaches taken.

Developed for use by USRA for system planning.

Bechtel Corporation Final Rpt. USRA/R-018, Feb. 1975, 107 pp

Contract USRA-C-40002

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239288/4ST, DOTL NTIS

18 095428

AN ECONOMIC MODEL FOR THE RAILROAD INDUSTRY

Outlines an economic outlook for 1985 by examining fundamental factors determining economic growth for the U.S. including population, GNP, labor, wages, and other trends. Includes equations relative to the railroad industries' economic variables. Developed projections for future prices, costs, taxes, benefits, revenue, employment and others.

Developed for use by USRA for preliminary system plan.

Chase Econometric Associates, Incorporated Final Rpt. USRA/R-001, Dec. 1974, 132 pp

Contract USRA-C-50066

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239020, DOTL NTIS

18 095429

FORECAST OF TRAFFIC AND REVENUE 1974-1980, VOL. I

Analysis of freight traffic of eleven Class I railroads operating in the geographic region covered by the Regional Railroad Reorganization Act of 1973 and a forecast of freight traffic and revenues for these railroads from 1974-1980. Used two distinct and separate forecast methods. The first forecast is based on the premise that there will be no significant change in the condition of the physical plant used by the seven bankrupt railroads. The other forecast assumes significant structural change in the physical facilities.

Developed for use by USRA. See also Volume II, PB-239023; and Volume III, PB-239024, RRIS #18 095430 and #18 095431, RRIS Bulletin 7502.

Ferguson, A Jones, N

Temple, Barker & Sloane, Incorporated Final Rpt. USRA/R-002, Oct. 1974, 142 pp

Contract USRA-C-50000

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239022, DOTL NTIS

18 095430

FORECAST OF TRAFFIC AND REVENUE 1974-1980, VOL. II, APPENDICES

This volume contains commodity analyses of the major commodities in support of the Volume I forecasts. The analyses cover the derivation of national Class I railroad share of production and Eastern District railroad share of national railroad volume. This volume also contains data used in deriving the originated shares of the individual eleven lines, the received traffic of the five major lines, and forecast of each of eleven lines by major commodity. There is also a copy of the Shipper Survey Questionnaire used in obtaining information.

Developed for use by USRA. See also Volume I, PB-239022; and Volume III, PB-239024, RRIS #18 094429 and #18 095431, RRIS Bulletin 7502.

Ferguson, A Jones, N

Temple, Barker & Sloane, Incorporated Final Rpt. USRA/R-002.1, Oct. 1974, 252 pp

USRA-C-50000

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239023, DOTL NTIS

18 095431

FORECAST OF CONRAIL TRAFFIC AND REVENUES 1985 (VOLUME III)

This report extends the 1974-1980 forecasts that were accomplished in previous volumes to 1985. The three data items that were extended were: ConRail 1985 forecast of tons and revenues, ConRail 1980 and 1985 originating carloads and tons, and regional rail traffic-1985 carloads and tons. This report describes the approach used in the 1985 forecasts and summarizes its major findings, it presents the methodology, assumptions and derivation of the forecasts (for all major commodities with a separate derivation for coal).

Developed for use by USRA. See also Volume I, PB-239022; and Volume II, PB-239023. RRIS #18 095429 and #18 095430, RRIS Bulletin 7502.

Ferguson, A Jones, N

Temple, Barker & Sloane, Incorporated Final Rpt. USRA/R-002.2, Dec. 1974, 139 pp

Contract USRA-C-50000

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239024, DOTL NTIS

18 095433

APPRAISING THE VIABILITY OF CONRAIL—AN ECONOMIC AND OPERATING OVERVIEW

This study identifies the principal operating, marketing and investment problems to be overcome for ConRail to improve rail service and earnings. A financial planning model is used to project operating and financial results for ConRail under network assumptions and operating plans being tested. The study further describes a detailed approach to planning ConRail operations with a view toward achieving ConRail financial self-sufficiency as set for in Section 301 of the Act.

Developed for use by USRA. Financial statements should be viewed as preliminary and used accordingly.

Strong, Wishart and Associates, Incorporated Final Rpt. USRA/R-004, Aug. 1974, 146 pp

Contract USRA-C-50006

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239026, DOTL NTIS

18 095439

ECONOMIC STUDY OF ALTERNATIVE MODES FOR RAIL TRAFFIC AND THEIR COSTS

An economic study of alternative modes for rail traffic and their relative costs, including the social and environmental costs. This study summarizes the overview of the problem of diverting rail traffic to alternative modes. It discusses the prospects for substituting different modes and preserving

competition and provides a description of the principal factors affecting comparative costs of the several modes of transportation.

Prepared for USRA system planning.

Smith (Wilbur) and Associates Final Rpt. USRA/R-011, Jan. 1975, 267 pp

Contract USRA-C-50020

ACKNOWLEDGMENT: United States Railway Association

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239032, DOTL NTIS

18 096537

INTEGRATION OF THE TARIFF SYSTEM OF THE RAILWAYS IN RESPECT OF INTERNATIONAL FREIGHT TRAFFIC

The tariff system constitutes the recognized instrument of commercial policy. Since the latter is always conditioned by the socio-economic environment, it is advisable to identify straightaway this environment which, in this case, is that of the countries with a market economy in Western Europe, where transport is governed by competition and by the free choice exercised by the users. Between these countries, freight exchanges have developed considerably in recent years. The traffic entrusted to road has progressed significantly. This expansion has been stimulated by various factors, in particular the flexibility of its tariff system. Generally speaking, the railways have marked time; the reason for the stagnation of their traffic has been attributed, among other things, to insufficient collaboration at international level. In particular, the conventional tariff system has given rise to criticism because, in some quarters, it has proved to be poorly adapted to the present circumstances of the transport market. The best expedients will probably be those which are based on the concept of common railway interests, for it is a fact that constant consideration of individual interests is proving paralysing and inadequate. The most effective expedients will also be those devised in an atmosphere of reciprocal confidence justifying delegation of authority between railways.

De Haeck, F *Rail International* Vol. 6 No. 3, Mar. 1975, pp 173-175

ACKNOWLEDGMENT: Rail International

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

18 096562

RAILWAY TO THE ARCTIC. THE ECONOMIC EFFECTS OF AN ARCTIC RAILWAY

The purpose of this draft report is to present, in substantially more detail, the economic and developmental conclusions of the Summary Report, Railway to the Arctic, published by the Canadian Institute of Guided Ground Transport. It evaluates the economic impact of the decision to construct an intermodal rail/pipeline delivery system, with a daily throughput of 300,000 tons (2,000,000 barrels) of crude oil. There are three principal effects of the new railway on the rest of the economy. These occur during the construction and the operations phases, the latter directly through the railway and the former via secondary impacts on the region through which the line operates. Each of these has distinctive, though related, characteristics and are discussed in detail.

This report replaces chapters VI and VII of the Interim Report dated 1 November, 1971. Prepared with funds contributed by Transportation Development Agency of the Ministry of Transport.

Macdonald, JA Baldwin, JR Olley, RE (Saskatchewan University, Canada); Woods, RE (Canadian National Railways); Lake, RW Law, CE

Canadian Institute of Guided Ground Transport 72-5, Aug. 1972, 50 pp, 19 Tab.

ACKNOWLEDGMENT: CIGGT

PURCHASE FROM: CIGGT Repr. PC

DOTL RP

18 096696

INLAND FREIGHT TRANSPORTATION PRICING IN EASTERN SAUDI ARABIA

Eastern Saudi Arabia is a new economic region in the modern sense. It consists mainly of desert, the most important centre of population being the deep-water port of Dammam. Until 1946, when oil development began in earnest, there were very few trucks or passenger cars in the area. Since then, a rail link has been completed from Ridyadh to Dammam and

the number of vehicles has increased. Oil is transported using pipelines. Other commodities are mainly carried from the coast to the inland areas. Only Saudis are allowed to own and operate vehicles and the government owns the railway. The transport industry has three sections: small one-man own-account operators; large companies owning about twenty vehicles who work for the oil companies; rail. At Dammam a prospective shipper bargains with small operators when he has goods to move. Prices fluctuate sharply depending on the state of demand. Large companies have tariff lists where price is determined by commodity and distance. Rail prices depend on distance, commodity and quantity. In all cases, the tariffs for hauls from inland to the coast are much lower. The transportation system which has developed is quite efficient and the pricing structure is fair. /TRRL/

Farmer, RN *Journal of Industrial Economics* ANALYTIC pp 174-187

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211898)

PURCHASE FROM: Basil Blackwell & Mott Limited 108 Cowley Road, Oxford OX4 1JF, England Repr. PC

7501124

18 098075

FRAMEWORK FOR PREDICTING EXTERNAL IMPACTS OF RAILROAD ABANDONMENT

Railroad abandonment applications submitted to the I.C.C. for disposition have traditionally been supported by substantial evidence accumulated by the railroads' legal staffs. Individual users and communities faced with the loss of railroad service have lacked the organization and expertise to present effective counter arguments. In order to attain a more even balance between contending parties, abandonment proceedings should consider the impacts on shippers, consumer prices, industrial development, other transport modes, and the environment. In this report, issues in these areas are examined from the viewpoint of transport economics and technology, business logistics, and industrial location theory. The report presents recommendations concerning the organization of the analysis process. In particular, effective analysis requires coordination of all of the evidence, preferably by qualified personnel at the regional or state level who would develop expertise in this area.

This research was sponsored by Office of University Research, DOT.

Humphrey, TJ

Massachusetts Institute of Technology, (R74-55) Tech. Rpt. DOT-TST-75-78, Mar. 1975, 84 pp, 2 Tab., Refs.

Contract DOT-OS-40002

ACKNOWLEDGMENT: DOT

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

18 098761

LEASE OR BUY ANALYSIS

Computer Program. General lease or buy analysis which produces results in graphical format that allows the user to exercise his judgement on the future value of money and the residual value of ownership. Uses the present value discounting concept to compare alternative cash flows. Plots the difference in D.C.F. at various discount rates against a percentage of the total capital cost of the buy option.

Gillis, RB

Canadian Pacific 1968

ACKNOWLEDGMENT: AREA (AREA 10-01-001)

PURCHASE FROM: Canadian Pacific Windsor Station, Montreal, Quebec H3C 3E4, Canada

18 098762

RATE OF RETURN ON INVESTMENT

This computer program takes information concerning capital expenditures, annual savings, and estimated salvage and produces a rate of return on investment using continuous compounding.

Velebit, M

Illinois Central Gulf Railroad 1970

ACKNOWLEDGMENT: AREA (AREA 10-01-002)

PURCHASE FROM: Illinois Central Gulf Railroad 233 North Michigan Avenue, Chicago, Illinois, 60601

18 098763**BRIDGE REPAIR OR RENEWAL**

File name is REBE. Computer program to determine if a bridge should be repaired or renewed. It will also compare the economics of various new structures. The program has a library of life and annual maintenance costs of all usual railroad bridge types. The discounted cash flow method of analysis is used in determining the various alternatives. Input consists of punched cards containing bridge identification, as to whether the structure is new or is to be repaired, structure geometry, estimated A & B and IOE costs, salvage and depreciation, interest and income tax rates. Output provides costs of the structures over their lives for comparison by the user.

Stane, RA

Atchison, Topeka and Santa Fe Railway No Date

ACKNOWLEDGMENT: AREA (AREA 10-01-003)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

18 098764**CAPITAL INVESTMENT PROGRAM**

File name is ENBI. Program makes analysis of proposed expenditures which require authority on projects. Program makes capital expenditures analysis of selected projects. The analysis will show the expected profitability of the project and the break-even point, taking into consideration the effect of Federal Income taxes, depreciation, etc., as well as the value of money on a discounted cash flow basis.

Robinson, RE

Atchison, Topeka and Santa Fe Railway 1968

ACKNOWLEDGMENT: AREA (AREA 10-01-004)

PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

18 098765**ENGINEERING DEPARTMENT ESTIMATING SYSTEM**

This computer program produces estimated cost for bridges, rail relays, signal department AFE, GMA, and FHWA projects; and industry track construction. Input is item numbers and quantities corresponding to standard items in the data base, with provision for overrides. Data base information includes: item description, unit prices-labor and material, ICC account number, and program related codes. Output consists of item descriptions, unit prices, quantity, ICC account number, and extended price. In certain cases, costs are broken down between capital and operating expense and labor, material, and other for budgetary and scheduling purposes. Program is expandable to other types of estimates and desired outputs.

Velebit, M

Illinois Central Gulf Railroad 1970

ACKNOWLEDGMENT: AREA (AREA 10-02-001)

PURCHASE FROM: Illinois Central Gulf Railroad 233 North Michigan Avenue, Chicago, Illinois, 60601

20 083077

AGRICULTURAL PRODUCTION EFFICIENCY

Despite rising indexes of domestic agricultural "efficiency," a National Research Council committee studying aspects of the economics of U.S. agriculture and its scientific and technological base found no reason to believe that growth of either U.S. agricultural productivity or U.S. agricultural output generally is insured. This report by the NRC Board on Agricultural and Renewable Resources, offers a mixed appraisal of U.S. agricultural prospects.

This publication is a result of work done by the Committee on Agricultural Production Efficiency.

National Academy of Sciences, (ISBN 0-309-02310-6) 1975, 199 pp

PURCHASE FROM: National Academy of Sciences 2101 Constitution Avenue, NW, Washington, D.C., 20418 Repr. PC

20 083913

IMPACT OF THE RAILROAD INDUSTRY ON MINING

As a case-in-point of the impact of a modern, well organized transportation of coal by rail over long distances by means of unit trains on the economics of surface mining, the boom in the Wyoming's mining industry is described. Coal activity on the Union Pacific is currently centered around the once near ghost town of Hanna, Wy. The coal rush along Union Pacific Railroad lines in this area actually began taking on boom proportions in 1972 with the start up of a new strip mining operation, expansion of another mine and the addition of five new unit train operations. Today, the rich coal fields of Wyoming are being tapped to serve the electric utilities for boiler fuel hundreds of miles eastward from the nearby Continental Divide.

Graves, TB, Jr (Union Pacific Railroad) *Mining Congress Journal* Vol. 60 No. 11, Nov. 1974, pp 22-25

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

20 083951

COMMODITY FLOW ANALYSIS. CANADIAN CARLOAD ALL-RAIL TRAFFIC 1968-1972. REFERENCE PAPER NO. 1

The data in this Reference Paper was derived from the computer tape records of Canadian National Railways and CP Rail and presents 119 statistical tables, grouped in four sections, analyzing local (domestic, export and import) carload revenue traffic for the five years 1968-1972. Commodity groups are as follows: Statutory grain and grain products; products of agriculture; animal products; products of mines; products of forests; manufactures and miscellaneous; and piggyback, Plan I (movements of trailers of highway common carriers).

Canadian Transport Commission 1974, 119 Tab.

PURCHASE FROM: Information Canada 640 St. Catherine Street West, Montreal, Quebec, Canada Repr. PC

DOTL RP

20 083952

COMMODITY FLOW ANALYSIS. CANADIAN CARLOAD ALL-RAIL TRAFFIC 1973. REFERENCE PAPER NO 1.1

This Reference Paper is composed of 27 statistical tables, grouped into four sections, which analyze local (domestic, export and import) carload revenue traffic carried by Canadian National Railways and CP Rail for the year 1973. It is published as a supplement of Reference Paper No. 1 which analyzes the same traffic for the five years 1968-1972. Commodity groups are as follows: Statutory grain and grain products; products of agriculture; animals and animal products; products of mines; products of forests; manufactures and miscellaneous; and piggyback, Plan 1 (movements of trailers of highway commodity carriers).

Canadian Transport Commission 1974, 27 Tab.

PURCHASE FROM: Information Canada 640 St. Catherine Street West, Montreal, Quebec, Canada Repr. PC

TT31-4/1973, DOTL RP

20 084912

THE RAILCAR SITUATION AND GRAIN CARRYING CAPACITY

The extreme railcar shortage, that occurred during 1972-74 because of increased exports, has now eased. The car shortage problem has some-

times been blamed on an inadequate fleet, but there are strong indications that capacity may be improved as readily by increasing car size and improving car utilization as by increasing car numbers, at least for the grains. Because grain stocks, both privately held and Government owned, are down and storage facilities appear adequate, railcar shortages during 1975 are unlikely to strain the transportation system as occurred during 1972-74.

Hammond, JJ Reinsel, EI *Marketing and Transportation Situation* Feb. 1975, pp 15-19, Tabs.

ACKNOWLEDGMENT: Marketing and Transportation Situation

PURCHASE FROM: Department of Agriculture Economic Research Service, Washington, D.C., 20250

20 090678

COMMERCIAL NAVIGATION ON THE UPPER MISSISSIPPI: ECONOMIC AND ENVIRONMENTAL CHOICES

Policy choices facing Minnesota and the Upper Midwest regarding low cost water transportation and environmental values are reviewed. Development of the Upper Mississippi River for commercial navigation is briefly reviewed from an historical viewpoint. The economic role of the waterway is examined. The two court battles over operation, maintenance, and replacement of navigation development are placed in the context of policy choices facing Minnesota and the Upper Midwest.

Christianson, R

Minnesota University, Saint Paul, Office of Water Research and Technology, (OWRT-B-054-MINN) Feb. 1975, 8 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240452/3ST, DOTL/NTIS

20 090723

THE PERPLEXITIES OF THE U.S. MARINE TRANSPORTATION SYSTEM

This paper focuses upon the 'well-balanced' aspects of maritime activities. Emphasis is placed on the carriage of water-borne commerce and related supportive activities and industries. There appears to be enough evidence to support a contention that one examine as a nation the effect of sea-based commerce and industry on both the total economy and on the substance of the total economy. Certainly it has been the clear policy of the Administration to support and encourage such growth, but policy has been frustrated by factors which have not yet been brought into proper perspective. Although all the causes for the failure of the marine transportation system to flourish on a world scale are not yet fully understood, several factors are cited as contributory. The revitalization of the marine transportation system is imperative, especially when measured in terms of the benefits to be derived by meeting U.S. economic, political and military needs.

Included in *Marine Affairs Jnl.*, n2 p1-34 Sep 74.

Nelson, SB

Rhode Island University, National Oceanic and Atmospheric Administration Sept. 1974, 35 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

COM-75-10257-01/ST, DOTL/NTIS

20 090835

INDIRECT ECONOMIC EFFECT FROM GULF INTRACOASTAL WATERWAY COMMERCE IN TEXAS

The study evaluates the indirect economic effect of the Texas Gulf Intracoastal Waterway and its tributaries on Texas. Determination of indirect economic effects was based on an initial calculation of the Gulf Intracoastal Waterway's contribution to the five coastal SMSAs. The aggregate economic stimulus of both direct and indirect contributions from waterway activities consisting of tax, education, and manufacturing revenues, income, waterway maintenance and industrial construction expenditures came to \$3.9 billion, equivalent to 4.5 percent of the Texas State Product. This figure applies only to the waterway and does not describe the total impact of the entire coastal zone.

Phillips, C
Texas A&M University, National Oceanic and Atmospheric
Administration TAMU-SG-74-218, July 1974, 117 pp

Grant NOAA-04-3-158-18

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
COM-75-10065/1ST, DOTL/NTIS

20 090840
DISCRIMINANT ANALYSIS APPLIED TO COMMODITY
SHIPMENTS IN THE ARKANSAS RIVER AREA

The report contains a survey of shipments utilizing the McCellan Kerr Arkansas-Verdigris Waterway and competing modes during 1971. Data on annual shipment quantity, usage shipment quantity, handling cost, tariff on each shipment, and transit time for origin to destination were analyzed by discriminant analysis. A demand schedule for water way traffic is estimated, reflecting the influence of competing modes.

Prepared by Army Engineer Div. Southwestern, Dallas, Tex.

Institute for Water Resources, Army Engineer Division IWR-RR-74-
R2, Aug. 1974, 42 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-003838/0ST, DOTL/NTIS

20 090922
AN ANALYSIS OF CONSTRAINTS ON INCREASED COAL
PRODUCTION

This report identifies, describes, quantifies and ranks existing and potential constraints on the nation's ability to significantly increase coal production. The analysis is based on the Project Independence Blueprint 'Business as Usual,' 'Intermediate,' and 'Accelerated' production scenarios through the year 1985. Appropriate action is recommended to eliminate or reduce the impact of the identified constraints.

Bhutani, J Brice, A Elliott, J Ellis, D Jacobsen, W
Mitre Corporation, Department of the Interior Final Rpt. MTR-6830,
Jan. 1975, 485 pp

Contract DI-14-01-0001-1937

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-240613/0ST, DOTL NTIS

20 090995
ECONOMIC SYSTEM ANALYSIS OF COAL PRECONVERSION
TECHNOLOGY

On August 1, 1973, Fluor Utah, Inc., began performing a comprehensive economic system analysis of coal preconversion technology. The study, in two phases, intends to identify and define the physical, technical, social, economic, legal and environmental problems of producing 75,000 tons per day of coal from surface mines in the United States. Phase I is scheduled to last 24 months. Progress is reported in the collection of data on the geology of coal resources, mining equipment, processing equipment, socio-economic and physioeconomic factors, and financial statistics. In addition, efforts are outlined for the development of a mathematical model to simulate mining operations and project the cost of various alternative cases.

Prepared in cooperation with Bonner and Moore Associates, Inc., Houston, Tex. Paper copy also available from GPO as I63.10:99/INT 1.

Fluor Utah, Incorporated, Office of Coal Research, Booner and More
Associates, Incorporated Intrm Rpt. Jan. 1975, 288 pp

Contract DI-14-32-0001-1520

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-234383/3ST, DOTL NTIS

20 091407
INVENTORY OF FREIGHT TRANSPORTATION IN THE
SOUTHWEST/PART I: MAJOR USERS OF TRANSPORTATION
IN THE DALLAS-FORT WORTH AREA

The report presents an inventory of the existing facilities, services, and practices of major shippers and distributors in the Dallas-Fort Worth

area. Data presented for various manufacturing industries were analyzed in order to determine the market destinations for specific commodities and the mode of shipment selected by the shipper or distributor. Personal interviews with 41 major users of transportation (representing a cross-section of manufacturers and nonmanufacturers in the Dallas-Fort Worth area) revealed the existence of a complex and intricate distribution system. Included in the inventory is information on daily and seasonal fluctuations in volume, variation in fleet size, variation in warehouse capacity, and patterns of goods movement. The results of this study indicate a growing dependence on the use of motor carriers for freight movements, with nearly two-thirds of all establishments surveyed operating their own private carrier fleet.

See also Part 3, PB-239 820, and Part 2, PB-241 704.

Robinson, E
Texas University, Austin, Department of Transportation Res. Rpt.
RR-4, Dec. 1973, 84p

Contract DOT-OS-30093

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-2417-3/8ST, DOTL NTIS

20 091408
INVENTORY OF FREIGHT TRANSPORTATION IN THE
SOUTHWEST/PART II: MOTOR COMMON CARRIER SERVICE
IN THE DALLAS-FORT WORTH AREA

The report provides an inventory of existing motor common carrier freight transportation facilities, services, and practices in the twenty-four Texas and two Oklahoma counties surrounding and including Dallas and Fort Worth. For inventory purposes, common carriers have been divided into seven categories: general motor freight, agricultural and other ICC exempt commodities, refrigerated commodities, heavy haulers, bulk commodities, and vehicle haulers. Detailed information for each classification of common carrier includes the number of trucks, estimated number of firms represented, intercity loads, total loads, intercity haulage, and total haulage. The inventory also provides estimates for total volume of general freight, delivery time for truckload and LTL shipments, terminal capacities, load factors, seasonal fluctuations, and the pattern of motor common carrier freight movements.

See also Part 1, PB-241 703.

Adain, JB Wilson, JS
Texas University, Austin, Department of Transportation Res. Rpt.
RR-5, Dec. 1973, 92p

Contract DOT-OS-30093

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-24170/6ST, DOTL NTIS

20 095204
GEOGRAPHIC PERSPECTIVES ON THE FUTURE OF
AMERICAN RAILROADS

This publication reproduces the text of papers and exchanges of views presented to the annual meeting of the Association of American Geographers, held in Atlanta in April 1973, on the subject of Railroads. The following are the authors and titles: Mayer, Harold M.: The future of the American railroad network. Wallace, William H.: The future of railroad freight transportation in the United States. Matchett, Ronald L.: Implications of the British Freightliner for the future of the American railroads. Francavigua, Richard F. and Silberman, A. Jerome: The future of intercity rail passenger service in the United States.

Quastler (I.E.) Apr. 1973, 75 pp, 5 Fig., 8 Tab., 40 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Quastler (I.E.) Atlanta, Georgia Repr. PC

20 095205
PROGRESS REPORT ON TRANSPORT FORECASTING
PROGRAM

The Canadian Transport Ministry and Commission have instructed the Forecasting Team of the Economic and Econometric Research Departments to construct a forecasting model applicable for transport planning and regulating. The Team's aim is, therefore, to create a model not just for short and medium-term forecasts but also for analysing the influence of

the various factors behind the generation or distribution of transport. The model will be built by successive iteration of a three-stage process: inventory of the technical and institutional situation at the outset; collection of data and definition of the model; application of the model. The report is presented on completion of the first iteration. A first chapter runs over 6 families of model proposed to date and makes critical remarks on their resources, properties and application possibilities. The next three chapters give: the general outline of the rail transport forecasting model, and the outline of forecasts for transport by sea. There are appendices giving some more details on the sources of the statistical material used and its treatment.

A Forecasting Program-Working Paper.

Canadian Transport Commission July 1974, 133 pp, 68 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Canadian Transport Commission Systems Analysis Branch, 275 Slater Street, Ottawa K1A 0N9, Ontario, Canada Repr. PC

20 095386

A LOGICAL TRANSPORT SYSTEM. CONSIDERATIONS ON THE DB MARKETING AND PRICING POLICY FOR COMPLETE WAGONLOAD TRAFFIC [Systemgerechte Transporte. Gedanken zur Absatz-und Preispolitik der DB im Wagenladungsverkehr]

Complete wagonload traffic, which represents over 98% of DB freight carryings, should increase, according to estimates, by a further 50% by 1985, which means that sales, production, installations and rolling stock should be adapted to this objective. For the railway, regular and concentrated traffic is especially profitable, like for example block trains with shuttle-service operation, and traffic between private sidings. The DB service offers must be made consistent, through measures in the tariff sphere, faster transit times, and the development of traffic in privately-owned wagons. [German]

Kalb, H *Die Bundesbahn* Vol. 50 No. 8, Aug. 1974, pp 481-485

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzfohallee 33, 61 Darmstadt, West Germany Repr. PC

20 095389

MODAL SPLIT OF FREIGHT TRAFFIC FLOWS IN THE GFR IN 1985 [Modalsplit der Verflechtung des Gueterverkehrs in der Bundesrepublik Deutschland 1985]

The purpose of the exercise was to determine the modal split (rail, road and waterways) of estimated traffic for 1985. In the model used, the first step involved calculating the overall traffic volume over a route, followed by an estimation of the percentages for the three modes concerned. It was a matter of apportioning the forecast tonnage: by groups of goods; by traffic flows between 50 internal traffic zones and 13 foreign zones; by transport mode. In the results the authors analyse more particularly the reasons behind the relative drop (45-40% in 1985) in the DB share. [German]

This report is a digest of a report commissioned by the Federal Transport Ministry and completed in November 1971. The original report contains 2 volumes: 89 pages of text, 11 annexes and 72 tables.

Internationales Verkehrswesen Vol. 26 No. 4, Aug. 1974, pp 126-128, 1 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Dr Arthur Tetzlaff Verlag Niddastrasse 64, Frankfurt am Main, West Germany Repr. PC

20 095427

FREIGHT CAR PLANNING FOR CONRAIL, VOL II (APPENDICES A TO K)

This volume provides documentation on assumptions, data sources, calculations, and computer output relative to the first volume.

Developed for use by USRA. See also Vol. I, PB-239027, RRIS #20 095434, RRIS Bulletin 7502.

Strong, Wishart and Associates, Incorporated Final Rpt. USRA/R-007.1, Jan. 1975, 174 pp

Contract USRA-C-50054

ACKNOWLEDGMENT: United States Railway Association PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239028/4ST, DOTL NTIS

20 095434

FREIGHT CAR PLANNING FOR CONRAIL, VOLUME I (CONSOLIDATED RAIL CORPORATION)

This study examines methods of improving equipment utilization within various network configurations and estimates the magnitude and impact of the potential improvement. Included in the study is an examination of whether additional freight cars are needed and whether car repair or building capacity should be increased. The contractor defines alternative strategies for meeting car requirement needs and makes recommendations on effective options.

Developed for use by USRA. See also Volume II, PB-239028, RRIS #20 095427, RRIS Bulletin 7502.

Strong, Wishart and Associates, Incorporated Final Rpt. USRA/R-007, Jan. 1975, 101 pp

Contract USRA-C-50054

ACKNOWLEDGMENT: United States Railway Association PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239027/6ST, DOTL NTIS

20 096586

LOW SULFUR COAL SUPPLIES FOR ENVIRONMENTAL PURPOSES

Because of limited domestic supplies of other basic energy sources, coal production must be expanded. Reserves of low sulfur coal are large, even in the East, but many problems restrict their availability. The major problem is inadequate productive capacity in the East. Except for metallurgical coals, Eastern production historically has been principally of higher sulfur coals which now are environmentally restricted. Strong incentives must be provided for large capital investments to increase Eastern coal productive capacity. The quickest solutions would be increased low sulfur coal production in the East, supplemented by shipments of Western coals into the Midwest; the relaxation of environmental restrictions, where feasible; and acceleration in the development of technologies to permit the use of higher sulfur coals.

Prepared for the meeting of American Chemistry Society, New York, NY, Aug 29-30, 1972.

Hunter, TW (Bureau of Mines) *Advances in Chemistry Series* No. 127, 1973, pp 17-23

ACKNOWLEDGMENT: EI

PURCHASE FROM: American Chemical Society 1155 16th Street, NW, Washington, D.C., 20036 Repr. PC

20 096604

COMPUTATIONAL EXPERIENCE WITH A MULTICOMMODITY NETWORK FLOW ALGORITHM

This paper discusses the computational results achieved with an experimental implementation of an algorithm for solving the minimum cost multicommodity flow problem for directed graphs. As programmed, the method combines aspects of network flow, partition programming, working bases and the use of secondary constraints. Computationally, this approach is particularly attractive within the multicommodity framework. The experimental results reveal the efficiency of the algorithm as solution strategies and problem parameters are varied. A comparison is also made with the corresponding linear programming solutions.

NATO Conference on Appl of Optim Methods for Large-Scale Resource Allocation, Proc, Pap, Elsinore, Denver, July 5-9 1971.

Grigoriadis, MD (IBM); White, WW

Crane, Russak, and Company 1974, pp 205-226, 16 Ref.

PURCHASE FROM: Crane, Russak, and Company New York, New York, Repr. PC

20 096633

TRANSPORT AND HANDLING GOODS IN THE YEAR 2000 [Prospectives 2000 en matiere de transport et de manutention]

This article is divided into four parts. It deals firstly with predictions for imports and tonnage imported per category by rail, road, waterway and by pipe-line. The author then examines transport by inland waterway and containerisation, as well as the characteristics of the other transport modes: road, rail, long distance conveyance, pipe-line and integral track. He concludes with a comparison of the cost of these various modes of transport. [French]

Tischauer, M *Handling-Energy* 1974, 64 pp, 77 Fig.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: Handling-Energy Brussels, Belgium Repr. PC

20 096656

REPORT ON TRANSPORT DEMAND FORECASTING

PROGRAM: PHASE ONE

This cooperative program of the Canadian Transport Commission and the Ministry of Transport is developing a large-scale econometric model to be a basic tool for forecasting. In the transport field, where relatively little work of this type has been done, effort had to go beyond applications of known techniques. Already further refinements and improvements are anticipated for Phase Two. The state-of-the-art in econometric models for forecasting transport demands is reviewed. Then The Transport Demand Model, Stage I, was developed to have flexibility for appraising alternative policy mechanisms. The report considers 13 commodity groups, calculating transport demand and accommodating a group of independent variables. Appendices and data base are in a separate volume which has restricted information and is available only on special request.

A joint CTC-MOT project.

Canadian Transport Commission Working Paper 6, Jan. 1975, 300 pp, Figs., Tabs.

ACKNOWLEDGMENT: Canadian Transport Commission

PURCHASE FROM: Canadian Transport Commission Systems Analysis

Branch, 275 Slater Street, Ottawa K1A 0N9, Ontario, Canada Orig. PC

DOTL RP

20 096677

TECHNICAL DEVELOPMENTS IN GOODS TRANSPORT

This work deals in some detail with the various technical factors which affect goods movement under the headings: goods and unit loads, the infrastructure, means of transport, cargo handling equipment and the lay out of the places of transshipment. A particularly detailed description is given of the various types of load. The unicube system of cargo handling, where loads are measured in terms of a unit cube and cargo space and handling equipment allotted accordingly is explained. Transport is discussed from the point of view of changes of scale and specialization and developments in sea, air, rail, road, and inland water transport. The likely future developments in goods movements are examined. The main conclusions of the paper are that (1) man will be less involved in the physical labour of goods transport but more as a planner or an operations should be optimized as a complete system (3) this method will also be more efficient, and (4) data control is essential for goods movement. /TRRL/

International Cargo Handling Coordination Assn R&D Rpt. Apr. 1973, 107 pp, Figs., Tabs., Photos., 27 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 400081S)

PURCHASE FROM: International Cargo Handling Coordination Assn Trade News Ltd, Abford House, 15 Wilton Road, London SW1V 1LX, England Repr. PC

20 096695

CANALS: A TRANSPORT RESOURCE?

The future of the British waterways and in particular the case for the development of water transport for the movement of freight is examined. It is pointed out that whilst modern barges operating on continental canals require less fuel, cost less per tonne-km and have lower labour costs than most other forms of transport, they show no profit. For British waterways to become commercially competitive, considerable government investment in canal renovation and improvement is required as well as the establishment of new water transport systems. A brief review is given of systems developed for transporting a number of barges as a single unit over Sea and ocean links, in order to provide a form of transshipment with low handling costs. The author concludes that, without sufficient resources, water transport cannot rival rail and road transport, and canals are destined to remain largely underutilized. /TRRL/

McKee, W *Built Environment* Vol. 3 No. 11, Nov. 1974, pp 560-563, 2 Fig., 3 Tab., 4 Phot., 6 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212016)

PURCHASE FROM: Architecture and Planning Publications Limited P.O. Box 135, 4 Catherine Street, London WC2B 5JN, England Repr. PC

20 097237

COAL RESERVE BASE AND ANALYTICAL DATA

A computer tape giving a statistical breakdown of the Nation's coal reserve base is now available. The coal reserve base tape tabulates analyses of approximately 250,000 coal samples by State, county, coalbed, and preparation method (washed, partially washed, or "raw"), as well as by chemical and physical properties including sulfur, ash, and moisture content. According to the Bureau, the Nation's coal reserve base amounts to 437 billion tons. This is the amount that exists in measured and indicated deposits, identified with a high degree of certainty, that generally could be mined economically by conventional underground or surface techniques.

The coal reserve base computer tape is available for \$200.

Bureau of Mines

ACKNOWLEDGMENT: Bureau of Mines

PURCHASE FROM: Bureau of Mines Division of Finance, Building 20, Denver, Colorado, 80225

20 097304

THE COUNTRYSIDE COUNCIL'S STUDY OF COMMODITY TRANSPORTATION PROBLEMS IN SOUTHWESTERN MINNESOTA

The Countryside Council reports on a task force study sponsored by the M. W. Kellogg Foundation covering primarily grain transportation in a 19-country area which produces nearly 300 million bushels annually, principally corn and soy beans. The absence of heavy-duty highways and threatened railroad abandonments have been of concern. Conclusions: Support be given for increased funding for rural road networks; a moratorium on all railroad abandonments be enacted to allow for state and federal officials to study the branchline problem; support be given to a proposal to conduct a feasibility study of branch lines to determine which are needed to serve the economic requirements of the region.

All inquires should be made in care of the author.

Arzdorf, MA

Southwest Minnesota State College 1975, 49 pp, 5 Fig., 12 Tab., 2 App.

PURCHASE FROM: Southwest Minnesota State College Office of Community Development, Marshall, Minnesota, 56258 Repr. PC

DOTL RP

20 097325

GRAIN TRANSPORTATION IN MINNESOTA

This study describes the grain transportation system in Minnesota, identifying the characteristics and problems of the system. Factors examined include grain production and marketing, grain movement patterns, highway system, railroad system, water transportation, holding and transfer facilities, potential new methods of transporting grain, and comparison of modal characteristics. While traditional shipping patterns are beginning to change and rail line abandonments affect the situation, it is concluded that pipelines and conveyor belts can be of little near-term significance; and truck, rail and water will maintain their importance, having risen to their present position because of their adaptability to the movement of grain. It is noted that data on rate structures, costs and commodity movements are lacking.

Minnesota State Planning Agency Jan. 1975, 95 pp, 37 Fig., Refs.

PURCHASE FROM: Minnesota State Planning Agency 100 Capitol Square Building, 550 Cedar Street, St. Paul, Minnesota, 55101 Repr. PC

DOTL RP

20 097603

MOTOR CARRIERS' AND SHIPPERS' PERCEPTIONS OF THE CARRIER CHOICE DECISION

In almost every industry today increasing attention is given to the customer and his preferences and research is undertaken to determine the factors that influence consumer choice. But in the transportation industry, particularly the motor carrier industry, much less has been done in this regard. This study is based on the hypothesis that shipper and carrier have a different notion of what it is that constitutes a good service. In Oklahoma, a random sample of manufacturers, wholesalers and retailers were questioned along with all motor carriers who served the area. The respondents were asked to rate 28 factors commonly thought to be important in the carrier selection decision using a scale where 1 indicated one of the

most important factors down to 5, not important. The findings are summarized in a table. The mean scores for carriers and shippers were compared using a "T" test. Only a few statistically significant differences were found indicating that Oklahoma motor carriers are fairly well attuned to shippers' needs. /TRRL/

Evans, RE Southard, WR (Oklahoma University) *Logistics and Transportation Review* Vol. 10 No. 2, 1974, pp 145-147, 1 Tab.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212142)

PURCHASE FROM: British Columbia University, Canada Faculty of Commerce, Vancouver 8, British Columbia, Canada Repr. PC

20 098000

106TH ANNUAL REVIEW AND OUTLOOK FOR MINERAL COMMODITIES: 1974-1975

A broad review is presented of the worldwide situation and outlook for the production and marketing of the most important mineral commodities in 1974-1975. Articles written by different authors deal with situation regarding over 40 minerals. Numerous statistical tables showing output of particular products throughout the world and the movement of prices since 1910 accompany the articles packed with a multitude of facts.

Engineering and Mining Journal Vol. 176 No. 3, Mar. 1975, 92 pp

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

20 098020

CURRENT ACTIVITY AND FUTURE TRENDS IN CANADIAN MINERAL EXPLORATION

This technical note arises from a recent visit to Canada funded mainly by the Vernon Hobson Bequest. One of the objectives was to determine the philosophy underlying current mineral exploration programs and also to find out the extent to which new methods in applied geochemistry had entered into practice by the mining companies. Extensive discussions were held with exploration personnel in government, mining companies and consultancy organizations. One of the most important aspects of mineral exploration in Canada at the present time is the widening discrepancy between revenue received from metal production and the money spent on exploration programs. The writer believes that the 1970s will be seen as a period of consolidation in Canadian mineral exploration. The combination of financial uncertainty and the diminution of virgin terrain will lead to a decline in the amount of airborne geophysical work within Canada, and companies will concentrate on a reappraisal of anomalies which have been eliminated in the past and a reinvestigation of properties made attractive by rising metal prices.

Edwards, RP (Camborne School of Mines, England) *Institution of Mining & Metallurgy, Trans. Sect. B* Vol. 84 No. 819, Feb. 1975, pp B26-B27, 10 Ref.

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

20 098064

THE RESERVE BASE OF U.S. COALS BY SULPHUR CONTENT. 1. THE EASTERN STATES

The Bureau of Mines has compiled coal reserve data for the United States as of January 1, 1974, for bituminous and anthracite coalbeds 28 inches or more in thickness to a maximum depth of 1,000 feet and for lignite beds 60 inches thick or greater. These data were organized by State, county, coalbed, and rank, to evaluate the reserve by sulfur content, the reserve and analytical data from the Bureau of Mines energy data bank were synthesized using computer techniques. The reserve base in the Eastern States was determined to be 202.3 billion tons. Bituminous coal accounts for the greatest reserve base: 161.5 billion tons of deep minable coal and 32.5 billion tons of strip-minable coal. Virtually all of the anthracite reserve base, 7.3 billion tons, is minable by underground methods. All of the lignite, 1 billion tons, is strip minable. Subbituminous coal is not significant in the Eastern United States. About 14 percent of the bituminous coal reserve base, 26.5 billion tons, contains 1.0 percent or less sulfur. About 87 percent of the anthracite reserve base, 6.3 billion tons, is low-sulfur coal.

Thomson, D York, HF
Bureau of Mines 1975, 537 pp, 9 Fig.

ACKNOWLEDGMENT: Bureau of Mines
PURCHASE FROM: Bureau of Mines Publications Distribution Branch
4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213 Repr. PC

20 098085

THE OUTLOOK FOR TIMBER IN THE UNITED STATES

This report on the Nation's timber supply and demand situation and outlook relates primarily to the 500 million acres of commercial timberland in the United States that are suitable for production of timber crops. Implications of comparisons of prospective timber supplies and demands presented in this report are clear—demands for lumber, plywood, woodpulp and other products are increasing more rapidly than available supplies. This can only mean rising prices for timber and timber products. The analysis is as of 1970 and outlook under a number of economic and management alternatives if given. Statistical data cover area and condition of forest land, inventories of standing timber and timber growth and removals by state. Trends in forest resources, in utilization and in consumption of wood products are shown.

Department of Agriculture FRR-20, July 1974, 374 pp, Tabs., Apps.

PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

DOTL RP

20 099187

IMPACT OF CHANGING TECHNOLOGY ON THE DEMAND FOR METALLURGICAL COAL AND COKE PRODUCED IN THE UNITED STATES TO 1985

The Bureau of Mines sponsored a study of the impact of changing technology on the demand for metallurgical coal and coke to 1985. Individual technologies were analyzed to determine what effect each had on the demand for and the consequent consumption of metallurgical coal and coke in the steel industry. The domestic steel industry demand for metallurgical coal and coke for the production of hot metal will probably increase through 1985. Formcoke if implemented on a worldwide basis could begin to supplant the U.S. export market for metallurgical coal. The major technologies that have contributed to the decline in demand for metallurgical coke per ton of hot metal are (1) the increased usage coupled with higher iron content of agglomerates, (2) modification of blast furnace practices such as high top pressures and blast temperatures, and (3) increases in the injection of supplemental fuels. The projected demand for metallurgical coal and coke under current technology for 1985 are 190.4 and 76.0 million tons, respectively. With future technology implemented, the demand for metallurgical coal and coke will be 82.0 and 56.9 million tons, respectively. The projected domestic demand for metallurgical coke could further decrease by as much as 15 to 20 million tons by 1985 if formcoking proves technologically and economically feasible.

Mutschler, PH
Bureau of Mines June 1975, 26 pp, 5 Fig.

ACKNOWLEDGMENT: Bureau of Mines
PURCHASE FROM: Bureau of Mines Publications Distribution Branch
4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213 Repr. PC

20 099195

TRANSPORTATION PLANNING: A NEW LOOK AT THE ROLE OF RAILROAD FORECASTING

This paper analyzes some of the issues involved in forecasting and adapting to changing railroad markets. The process is complicated by the fact that approximately 70 Class I railroads are simultaneously competing while being mutually dependent. It is concluded that while increased sophistication will develop in planning and forecasting, the interdependent nature of the railroad system will, itself, place constraints on the success of individual forecasting activities. While the need for multi-level forecasting has been argued before, the exact formulation will ultimately depend on the industry's ability to respond to all issues facing it.

Peppers, LC (Union Pacific Railroad) *Transportation Journal* Vol. 14 No. 4, June 1975, pp 18-24

PURCHASE FROM: American Trucking Associations 1616 P Street, NW, Washington, D.C., 20036 Repr. PC

DOTL JC

21 052610

DISTRIBUTION OF THE TEMPERATURE IN ICE COOLED OR MECHANICALLY REFRIGERATED VEHICLES. COMPARISON OF AIR DISTRIBUTION SYSTEMS IN A 20' REFRIGERATED CONTAINER

The tests described in the present report were carried out in 1973 by Vienna Arsenal to compare the behaviour of different systems of air circulation, classic and horizontal. It was observed that these systems were usable but capable of perfection, and that the improvements to be made depend on the development of the packages forming the load.

International Union of Railways B127/RP 2/E, Oct. 1974, 15 pp, 10 Fig., 1 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

21 052642

PROGRESS IN RAIL TRANSPORT OF FULL-LOAD FREIGHT TRAFFIC, TAKING INTO ACCOUNT THE EXTENDED USE OF HIGH-CAPACITY CONTAINERS

Contents: Section I, Economic Aspects; Section II, Commercial Aspects and Tariffs; Section III, Operating Methods; Section IV, Terminal Installations; and Section V, Rolling Stock and Containers.

This is the proceedings of the 20th Session of the IRCA.

International Union of Railways 1971, 69 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

21 057255

REPORT ON RAIL AND MARINE INTERFACE AT THE PORT OF BALTIMORE

The report examines the elements of cost, time and distance involved in the interface of marine terminal operations with those of the rail carriers for the Baltimore port complex specifically as they relate to the U.S. operators. The purpose of the report was to analyze and evaluate the rail carrier/ocean carrier interchange of equipment and recommend actions to them which would contribute towards a more efficient and economical intermodal transport system and assist in further enhancing the competitiveness of the American merchant marine.

Maritime Administration MA-GEN-711-74048, Nov. 1973, 21p

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche, Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC
COM-74-50332/7, DOTL NTIS

21 072063

FUTURE OUTLOOK FOR COMBINED TRANSPORT IN THE FEDERAL REPUBLIC OF GERMANY: MARKET ANALYSES FOR CONTAINER AND FOR PIGGYBACK TRANSPORT [Die Zukunftsaussichten des Kombinierten Verkehrs in der Bundesrepublik Deutschland.]

This report is in two parts. Part 1 (Market analysis of container transport) is concerned with the prospects for inland container transport and how common carriers as well as the legislature can make it most attractive to firms shipping goods. It studies the potential market for containers, the prerequisites of containerization, the present situation (1970) and the future outlook. The market analysis proposes several measures for increasing the marketability of container transport. Part 2 (Market analysis of piggy-back transport) gives a quantification and delineation of the potential market of piggy-back transport. It states reasons for and against piggy-back transport and general and economic prerequisites. It studies the potential market, the management of piggy-back transport and its future in the Federal Republic. It also compares the three different types of piggy-back transport available. It recommends increased collaboration between public and private freight carriers in planning and managing combined transport in the Federal Republic of Germany. [German]

Ministry of Transport, West Germany No. 36, 1971, 71 pp, Tabs.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Ministry of Transport, West Germany Bonn, West Germany Repr. PC

DOTL HE 64.A36 no.36

21 072103

STOWING OF GOODS IN CONTAINERS AND ON FLATS

This handbook consists of a summary of the experience and practical applications acquired in various branches of the transportation sector. The stowing instructions summarized are very well detailed and include information on loading stress, packing material, securing loads on flats and in containers, and a section on the handling of dangerous goods. Illustrations are included.

Also available from the International Cargo Handling Coordination Association.

Swedish Transport Research Commission, International Cargo Handling Coordination Assn 1968, 72 pp, 40 Fig.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Swedish Transport Research Commission Grev Turegatan 12D, 11446 Stockholm, Sweden, Repr. PC

DOTL TA1215.R69

21 082919

INTERACTION BETWEEN VARIOUS TYPES OF TRANSPORTATION AND CONTAINER TRANSFER

Interaction in working operations of railroads, motor transport and river and sea navigation is discussed. Primary attention was directed toward the necessity for reloading cargo at points of interface between these transportation modes, and the role of containers in alleviating this problem. Several container terminals at various ports and major railway stations are described, including handling equipment, layout of working space, and operations. Attention in the USSR appears to be directed toward relieving the overloaded railroads through increased use of river communications and motor transport for short hauls. /NTIS/

Translation of the Russian Monograph "Vzaimodeistvie Raznykh Vidov Transporta i Konteinernye Perevozki".

Osipov, VT
Army Foreign Science and Technology Center FSTC-HT-23-0468-74, Mar. 1974, 120 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD/A-002647/6SL, DOTL NTIS

21 083047

FUNDAMENTALS OF RAILROAD HUMP YARD DESIGN

The purpose of this article is to examine fundamental considerations for the design of high-throughput hump yards. The concepts are a systematic set of interrelated system design considerations that are necessary to achieve a safely operating high-throughput yard. The design considerations evolve from the relationship between the velocity of cars at the hump crest and the velocity of cars in the switching area. On the basis of the velocity relationship, the design of the yard is divided into two basic areas—the front section and the back section. Objective of front section design is to create sufficient headway for switching and of the back a minimization of impact velocities on class tracks.

Wong, PJ (Stanford Research Institute) *Traffic Quarterly* Vol. 29 No. 1, Jan. 1975, pp 133-147, 4 Fig.

PURCHASE FROM: Eno Foundation for Transportation, Incorporated P.O. Box 55, Saugatuck Station, Westport, Connecticut, 06880 Repr. PC
DOTL JC

21 083068

CONTAINER CRANE WITH CANTILEVER ARMS FOR MANHEIM'S CONTAINER DEPOT

Steadily increasing traffic since Mannheim's container depot was opened in 1968 has made it necessary to add a second crane. The German Federal Railway's first cantilever-arm container crane went into operation there on May 15, 1974. The development of the Mannheim facility is described.

This publication is available in English, German, French and Spanish editions.

Loeffler, W *Eisenbahntechnische Rundschau* Vol. 23 No. 12, Dec. 1974, pp 521-524

PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

21 083914

GETTING WESTERN COAL TO EASTERN CANADA

This paper describes the newly unveiled port terminal at Thunder Bay on Lake Superior shore in NW Ontario which is part of a transportation system for Western Canadian coal, moved over a distance of 1,400 miles eastward. Coal is transported in unit trains that carry about 10,000 tons in about 100 steel gondolas. From Thunder Bay coal will be distributed by ships for an initial throughput of 3-million ton/yr.

Canadian Mining Journal Vol. 95 No. 11, Nov. 1974, pp 55-57

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

21 084724

HAMMOND RAIL RELOCATION PROPOSAL

This report, developed by the Railroad Relocation Committee and submitted to the mayor, is proposed to relieve traffic congestion in the Indiana city. The plan would relocate existing operations on a consolidated and greatly simplified track system to be used by all the railroads involved. The result would be elimination of many grade crossings and creation of no new ones. Existing lines of Penn Central would be supplemented with additional tracks to handle the trains of Chesapeake & Ohio, Louisville & Nashville, Erie Lackawanna and Norfolk & Western.

Railroad Relocation Committee Feb. 1973, 15 pp

PURCHASE FROM: Hammond Chamber of Commerce Hammond, Indiana, Repr. PC

DOTL HE1613.H2H27

21 084729

ECONOMIC BENEFITS OF IMPROVED SECURITY AT A RAILROAD PIGGYBACK YARD

This report documents a successful effort to control theft at the Erie Lackawanna Railway Croxton Yard, a railroad piggyback terminal, during the period October 1971 to May 1973. There was a dramatic reduction in actual dollar losses of 95%, with theft incidents reduced by 78%. As a result of shipper satisfaction with the improved security, the terminal had increased revenue by 24% over a six month period. For air, truck and maritime terminal facilities, it has been estimated that as much as 85% of theft losses go out the "front gates" during normal operating hours, in the possession of persons and in vehicles authorized to be on the facility premises for legitimate purposes. This report outlines the steps taken to overcome the piggyback related theft problems at the Croxton Yard.

This was prepared for the Department of Transportation, Office of Transportation Security, Washington, D.C. 20590.

Hartkorn, AW

American Multi-ler Corporation Aug. 1974, 41 pp, 6 Fig., 2 App

ACKNOWLEDGMENT: DOT

PURCHASE FROM: American Multi-ler Corporation Hershey, Pennsylvania, Repr. PC

DOTL HE199.9.S4A73

21 084730

COOPERATIVE APPROACH TO CARGO SECURITY IN THE TRUCKING INDUSTRY

This report is published by the Department of Transportation to assist the transportation industry in achieving more effective protection of cargo from theft and pilferage. Although this information will be of primary interest to motor carriers, the concept described may be adapted to other modes and other situations in the transportation industry. The participation of DOT in the project resulting in this report was prompted by interest in making use of the growing knowledge of the nature and extent of theft-related cargo losses. This project presented a natural opportunity to verify and expand on earlier study efforts which revealed such facts as: (1)

the total cost of cargo theft and pilferage exceeds \$1 billion a year with the trucking industry experiencing the largest percentage of that total; (2) that about 85 percent of stolen cargo goes out the "front gates" of transportation facilities during normal operating hours in the possession of persons and in vehicles authorized to be on facility premises for legitimate purposes; and (3) that the Northern New Jersey/New York metropolitan area is one of the worst in the nation in terms of reported cargo theft losses. Seven interstate motor carriers each having terminals in the same high loss area of Northern New Jersey engaged in this collective security program.

This report was prepared for the Department of Transportation, Office of Transportation Security.

Executive Services, Incorporated Final Rpt. Aug. 1973, 114 pp, Figs., Tabs.

ACKNOWLEDGMENT: DOT

PURCHASE FROM: Executive Services, Incorporated Edison, New Jersey, Repr. PC

DOTL HE199.9S7E93

21 084736

CONFERENCE ON TANK CONTAINERS

This is a report on the second of a series of conferences involving ship operators, shippers, equipment manufacturers and concerned government agencies to discuss the present and future of specialized containers. The goal of the Maritime Administration in sponsoring such sessions is to increase the use of containerization and similar intermodal shipping systems in U.S. foreign trade. Tank containers offer the prospects for more economical shipment of certain commodities—such as liquor and fruit juice concentrates, eliminating unnecessary packaging and reducing losses from from damage or pilferage. There has been relatively small use of such containers which made up less than one percent of the U.S. container inventory at the time of the conference.

Murphy, EL Heins, CP

Maritime Administration 1973, 83 pp, Figs., Tabs.

ACKNOWLEDGMENT: Federal Transport Ministry, West Germany

PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

DOTL TA1215.C55

21 084737

GUIDELINES FOR WRITING RAILROAD OPERATING RULES

This report constitutes an aid to persons or groups who must create or revise railroad operating rules. It provides guidance for avoiding confusion, ambiguity and misconceptions in the wording of rules. Content, style and organization are discussed, with illustrations of both desirable and undesirable practices taken from current codes of operating rules.

Devoe, DB Story, AW

Transportation Systems Center, (DOT/TSC/111) Tech Rpt. FRA-RT-74-1, July 1973, 25 pp

ACKNOWLEDGMENT: FRA

PURCHASE FROM: NTIS Repr. PC

DOTL NTIS, DOTL TF23-U68A3

21 084741

WORKING ON THE RAILROADS. ST. LOUIS RAILROAD CONSOLIDATION RELOCATION STUDY

In St. Louis there are 17 main line railroads, 24 main routes and 63 separate yards. In the context of regional planning, a study was undertaken to simplify rail operations, increase efficiency and release some railroad properties for other uses. Since the St. Louis Gateway is the second largest rail terminal in the U.S., the Federal Railroad Administration hopes that a solution for the area could serve as a prototype for similar problems elsewhere. The release of rail properties for other purposes might stimulate new community development patterns. In addition to accommodating present rail operations, any consolidation plan would have to accommodate future growth and this has required forecasts of railroad traffic generally and of what might be generated in the Gateway area.

Parsons, Brinckerhoff, Quade & Douglas Notes Sept. 1974, pp 12-21, Figs.

PURCHASE FROM: Parsons, Brinckerhoff, Quade and Douglas, Inc One Penn Plaza, 250 West 34th Street, New York, New York, 10001 Repr. PC

DOTL JC

21 084916

MORE IRON ORE FOR WORLD MARKETS

In a series of six articles, the process by which the Quebec North Shore and Labrador Railway increased its capacity by 100 percent in three years is described. The 365 mile railway was originally designed in the early 1950's to carry 20 million tons. In 1974 it carried 30 million tons and today has a capacity of 40 million tons. High standards of maintenance of track and equipment are important to achieve this goal. This railway is operated by CTC and linked by a microwave system. The extreme cold during the winter is a particular problem in maintaining the railway. Helicopters are used extensively to reach inaccessible points along the railway for signal maintenance and emergency track repairs.

Progressive Railroading Vol. 18 No. 2, Feb. 1975, 18 pp

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

21 084922

PRECISION HUMPING SMOOTHS CAR FLOW

The use of a new speed control system, called Pace Setter II, has several important advantages in hump yard operation. The control system is extremely accurate for speeds as low as 0.2 mph and will compensate for changes in the train's weight during humping. Thus, it is easy to train new engineers for humping operations and wear and tear is reduced and fuel saved on the locomotive.

Progressive Railroading Vol. 17 No. 12, Dec. 1974, p 39

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

21 084923

INTERMODALISM

Two articles on intermodal transportation discuss the market possibilities and problems of piggyback and container traffic. One article analyzes the service and competitive realities of the traffic with specific reference to the Southern Pacific Transportation Company. The problems of regaining traffic from truckers is examined. The second article describes terminal operations and problems.

Progressive Railroading Vol. 17 No. 11, Nov. 1974, 9 pp

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

21 084928

A STEEL STEAL

The development of the interstate highway system caused a major decline in the railroad steel traffic. By 1972 the traffic had declined by 50 percent even though rail rates were considerably below truck rates. A 1972 study by the Grand Trunk Western indicated that customers tried to minimize inventory on hand which required dependable delivery. Grand Trunk Western marketing department developed a truck-rail service that increased net revenue by over 50 percent.

Modern Railroads Vol. 30 No. 1, Jan. 1975, pp 66-67

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

21 084939

PLAN OF NEW CONTAINER HANDLING AT INTERMEDIATE STATION

JNR has developed a container transfer machine for loading and unloading containers at intermediate freight stations. JNR had been planning to load and unload the containers at the train dock with this automatic container transfer device. Consequently computer simulation was performed

to standardize the design of the facility and its layout in the station to assure practical utilization of the transfer unit.

Also available from ESL.

Kobayashi, M Ohnuma, T *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 4, Dec. 1974, pp 215-216, 4 Fig., 1 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute

PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

DOTL JC

21 090768

SHIPBORNE CONTAINERS AND CONTAINERIZATION (A BIBLIOGRAPHY WITH ABSTRACTS)

Shipborne container design and containerization utilization are investigated in these 100 Government-sponsored research reports.

Habercom, GEJ

National Technical Information Service Feb. 1975, 105p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PS075/28409ST, DOTL NTIS

21 090886

USRA YARD CLASSIFICATION PLANNING PROJECT. SUMMARY. MAXIMUM THROUGHPUT AND ASSOCIATED EXPENDITURES IN HIGH PRIORITY YARDS

The study analyzed selected yard operations, including handling of inbound/outbound trains, interchange and transfers, line planning procedures and operating and managerial controls. The contractor proposed the maximum throughput of road cars for each of several terminals and yards premised upon 'reasonable' upgrade and expansion of existing facilities.

Hines (RL) Associates, Incorporated, United States Railway Association Final Rpt. Jan. 1975, 44 pp

Contract USRA-50043

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239031/8ST, DOTL NTIS

21 090958

FREIGHT CAR PLANNING FOR CONRAIL. VOLUME I. CONSOLIDATED RAIL CORPORATION

The study includes an examination of whether additional freight cars are needed and whether car repair or building capacity should be increased. The contractor defines alternative strategies for meeting car requirement needs and makes recommendations on effective options.

See also Volume 2, PB-239 028.

Strong, Wishart and Associates, Incorporated, United States Railway Association Final Rpt. Jan. 1975, 108 pp

Contract USRA-50054

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239027/6ST, DOTL NTIS

21 091080

REPORT ON RAIL AND MARINE INTERFACE AT THE PORT OF NEW ORLEANS

This study was prepared to assist the Maritime Administration in finding which interface methods produce the most desired results in United States ports.

Maritime Administration Final Rpt. Sept. 1974, 40 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Microfiche, Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

COM-75-50167/6ST, DOTL NTIS

21 091081

THE MINIMAX TRANSPORTATION PROBLEM

This note demonstrates a simple solution method for the following single-commodity flow problem: Given a set of origins each with a known sup-

ply, and a set of destinations each with a known demand, find the minimum possible capacity for a vehicle which is to perform all the origin-to-destination transfers one at a time.

Published in *Transportation Science*, November, 1968. V2 N4, pp 383-387.

Goldman, AJ
National Bureau of Standards Nov. 1968, 5 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: Operations Research Society of America 428 East Preston Street, Baltimore, Maryland, 21202

21 095201

STUDY OF THE ECONOMIC INFLUENCE OF CONTAINERIZATION ON TRANSPORT OPERATIONS [Etude de l'influence économique de la conteneurisation sur l'exploitation des transports]

An account of the 21st Session of Round Table Discussions of the ECMT which was held in Paris on 1-2 February 1973. The report by Mr. Stewart Joy, Chief Economist of the British Railways Board, describes the historical background of the British Freightliner system and explains the problems raised by its creation in Great Britain. The report contains: the definition of the network covered by these services; the conditions governing profitability; the aim and the need for being linked to the National Freight Corporation, which holds 51 percent of its capital, and to the BRB (49 percent of its capital); extension of its activities to sea transport and service to ports; the influence of this type of traffic on transport by complete wagon loads. Mr S. Joy was instructed by the Secretary General of the ECMT to draw lessons from this experience with a view to setting up a container service in Western Europe. He examines the differences between the British example and the latter, as well as Intercontainer's advantages and drawbacks. In the second section, the author summarises the discussion and states the conclusions reached. Stress is laid on vulnerability to competition from conventional traffic by complete wagon loads, the difficulties resulting from the existence of independent Railways in continental Europe, the hesitation on the part of these Railways to envisage a really integrated service by complete trains of containers, the continued investment in marshalling yards, and the need for a new approach involving an analysis of the market by segments and in terms of quality as well as quantity. [French]

Joy, S

European Conference of Ministers of Transport 1974, 90 pp, 9 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: OECD Publications Center 1750 Pennsylvania Avenue, NW, R 1207, Washington, D.C., 20006 Repr. PC

21 095231

RAIL TRANSIT TIME REDUCED BY GREAT LAKE INTERMODAL SERVICE

A new rail car barge service was started in 1974 between Thunder Bay, Ontario and Superior, Wisconsin. The ship can carry twenty-six 50 foot railcars on five tracks and reduces travel time between the two ports from three days by rail to 14 hours. The ship is operated by Incan Marine, a subsidiary of Canadian Pacific and Incheape Company, Britain.

Canadian Transportation & Distribution Management Vol. 77 No. 11, Nov. 1974, pp 37

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Southam Business Publications Limited 1450 Don Mills Road, Don Mills, Ontario, Canada Repr. PC

DOTL JC

21 095256

HOW TO DESIGN AN UNDERGROUND RAIL HAULAGE SYSTEM

This article presents a guide to the numerous systems that are available today. Automatic control is stressed.

Scott, S (Asea Limited); Hedstrom, K *Canadian Mining Journal* Vol. 95 No. 11, Nov. 1974, pp 76-78

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

21 095397

RATIONALISATION OF THE FREIGHT TRAIN SERVICE-AN OBJECTIVE OF PRODUCTION PLANNING [Rationalisierung des Gueterzugdienstes-ein Aufgabe der Produktionsplanung]

During recent years, planning of the freight train service has played an essential role in the rationalization of the German Federal Railway. The continuous rise in costs has been offset to such an extent that it is possible to speak of a relative improvement in operating results. At the same time, the measures taken have also resulted in higher quality. Thanks to traffic forwarded in through trains, the actual number of freight trains operated has been reduced by 19% and, simultaneously, their commercial speed has increased by 32%. The proportion of single-section trains in through freight train traffic has risen from 49 to 78%. The number of locomotive shunting hours, which was 4.4 million in 1966, fell to 3.5 million in 1973. The DB recorded 30,800 gross tonne-kilometres per train-hour in 1973 against 25,200 in 1966. [German]

Seeger, F *Die Bundesbahn* Vol. 50 No. 7, July 1974, pp 413-416, 3 Fig., 2 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

21 095398

RAILROAD FREIGHT MOVEMENT. SOME NEW CONCEPTS AND CURRENT PLANS

The author observes that the question of the utility of classification yards and whether they can be eliminated, has already been raised, and yet the Railway Companies are still constantly building new yards and modernizing the old ones. He therefore proposes to examine what freight carrying systems will enable classification yards to be eliminated, and if this is not possible, how they can be operated so as to improve car utilization and speed of movement. Means of by-passing the yards are well known: TOFC-COFC, unit trains, minitrains and related systems, but the problem of single freight car consignments still exists, and the writer outlines a very brief study of direct forwarding methods. He then describes modern yard technology, especially the principles of computer control of car movement.

Paper presented at the Association's meeting in Tulsa, Oklahoma.

Sargent, GA *ASCE Journal of Transportation Engineering* Vol. 100 No. TE2, May 1974, pp 475-487, 1 Fig., 6 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

21 095422

CONRAIL BI-MODAL AND INTER-MODAL OPERATIONS. A STUDY AND PLAN

This study reviews the intermodal problems of today and defines prospects for the future. The study covers the historical development of intermodal operations and identifies economic and organization problems and opportunities. From these findings, the contractor developed short and long range alternative plans based upon recommended changes and adoption of certain operating concepts.

For use by USRA for system planning.

Reebie (Robert) and Associates, Incorporated USRA/R-014, Feb. 1975

Contract USRA-C-50034

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239038, DOTL NTIS

21 095426

ANALYSIS OF RAILROAD OPERATED FERRY AND LIGHTERAGE OPERATIONS

This study presents a preliminary analysis of the marine operations of the railroads in reorganization and examines alternative approaches to meeting the transportation needs of the shippers now served. The study concerns itself with three major operations: The Ann Arbor Railroad car ferry on Lake Michigan; the Penn Central carfloat from Cape Charles, Virginia to Norfolk, Virginia; and the Lehigh Valley and Penn Central

carfloat operations from New Jersey to Brooklyn. In addition, the contractor analyzed lighterage service in New York Harbor.

Developed for use by USRA for preliminary and final system plans.

Kearney (AT) and Company, Incorporated Prel. Rpt. USRA/R-008, Jan. 1975, 225 pp

Contract USRA-C-50025

ACKNOWLEDGMENT: United States Railway Association
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239029/2ST, DOTL NTIS

21 095672

TRUCK-RAIL INTERMODALISM—COMPETITOR OR COMPLIMENTOR

For two and one-half years the Federal Railroad Administration (FRA) has been engaged in a research project entitled the "National Intermodal Network Feasibility Study." FRA is charged with promotion of the private sector rail industry, providing input to Federal Transportation policy decisions, and regulation of the private sector rail industry in safety matters. There has been an alarming decline in rail market share over the past few years. This loss has been particularly acute in the area of manufactured goods, a market that is highly service sensitive. In its analysis of the Northeast rail crisis one thing that became clear to FRA analysts—a key element of the railroad revival would be large amounts of new revenue. The most promising source of new revenue appeared to be in the recapture of high yield merchandise traffic. The question was thus posed, "Is it feasible for the railroads to offer a rail-highway service that is both service and cost competitive utilizing the best features of both highways and railways?" The study, in cooperation with a liaison committee made up of railway intermodal officers, was divided into several areas.

DeBoer, DJ *Rail International* Vol. 6 No. 2, Feb. 1975, pp 89-92

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

21 095872

STUDY OF WEIGHING FREIGHT CARS—TWO DRAFT COUPLED IN MOTION ON THE WESTERN MARYLAND RAILROAD

This study was conducted for the purpose of obtaining data on coupled in motion weighing on the "Railweight" track scale on the Western Maryland Railroad at Baltimore, Maryland in November, 1964. The study was conducted in accordance with a design prepared by the Operations Research Section, Computer Sciences Department, IIT Research Institute in order to take full advantage of modern statistical procedures. The test train consisted of 19 cars and one buffer car. Four of the cars weighed approximately 50,000 lb; four, 100,000 lb; four 150,000 lb; four 200,000 lb; and three, 250,000 lb. Sixteen runs were made with coupled in motion weighing with a different sequence of cars for each run, pulling the cars over the scale. Four weighings of the 19 cars were made on a nearby single draft static scale and four on the Railweight scale with two draft static weighings. The significant findings were: (1) No effect was indicated of the position of the car in the train or the weight of the preceding car. (2) A bias of approximately 20 lb per 25,000 lb of succeeding car weight was indicated. (3) The statistical analysis indicated that approximately 95 percent of the weighings on the Railweight scale coupled in motion would have a deviation of less than 320 lb from the true car weight; for the single draft static scale, less than 160 lb. A graphical analysis confirmed these values in that 94 percent of the weighings on the Railweight scale coupled in motion were less or exceeded the 320 lb deviation by only about 10 lb. From the graphical analysis the single maximum deviation for the Railweight scale coupled in motion weighing was 580 lb and for the single draft static scale, 150 lb. (4) No relation was found between the amount of deviation and the car weight on either scale; i.e., the amount of deviation in pounds was as much on the 50,000 lb cars as on the 250,000 lb cars. (5) The average weighing time per car was reduced from 2 min, 13.5 sec on the single draft static scale to 9.4 sec on the Railweight coupled in motion scale. Additional savings in time in coupled in motion weighing would depend upon local circumstances and might include the time required to take cars to and from the scale for static weighing, bleeding the air before weighing and recoupling the air hose after weighing, per diem, etc. (6) In the first ten test runs before the weights were affected by rain, the total Railweight coupled in motion weight for the 19 test cars in a test run varied from a maximum of 2,750,720 lb to a minimum of 2,748,080 lb, a

difference of 2,640 lb. Increase in recorded weight related to the weight of the succeeding car. The significant conclusions from the study are given in the statistical analysis, pages A-5 and A-6, and need not be repeated here.

Conducted under sponsorship of AREA Committee 14-Yards and Terminals.

Association of American Railroads Technical Center ER-63, Sept. 1965, 21 pp, 2 Fig., 3 Tab., 2 App.

ACKNOWLEDGMENT: Association of American Railroads Technical Center

PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

21 096532

FASTER RERAILING OF RAILWAY STOCK BY DEVELOPMENT OF NEW VEHICLE TYPES [Beschleunigung des Aufgleisens von Eisenbahnfahrzeugen durch Entwicklung und Einsatz neuer Fahrzeuge]

Increasing rail traffic means more heavily-worked lines, and this in turn calls for new rerailing equipment and methods for faster clearing of the tracks after derailments and other mishaps. After a resume of existing procedures, the Author describes the various types of road and rail vehicles used for rerailing, and points out the advantages of two-way vehicles for this purpose. A rerailing vehicle developed at the Minden Experimental Station of the German Federal Railway, and now in service, is described. [German]

Blank, JP Mohle, J *Eisenbahntechnische Rundschau* Vol. 24 Mar. 1975, pp 93-100, 8 Phot., 5 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

21 096548

OPERATIONAL STRATEGIES FOR IMPROVING FREIGHT MOVEMENT

Road traffic has been steadily carving out an increasing share of the total freight traffic in several countries all over the world, and even in a developing country like India. This is despite the innumerable advantages of rail over road, considerations of better use of energy and resources, available land, better employment of man-power and social considerations. For Indian Railways which will be burdened with other increasing loads of commodities essential to life in the community (mostly bulk items, like coal, iron ore, foodgrains, fertilizers), with demand still in excess of transport, the problem of stabilising the position in the future years depends on the following two objectives: 1) A phenomenal increase in through-put; 2) Special quality of service for high-rated long distance carload traffic. Inputs by way of additional locomotives, cars, increased traffic and yard facilities cannot be effective unless supported by operating techniques. The various strategies in this regard are discussed in this paper, elaborating the problems in practical application. The author concludes that Indian Railways will have to rely largely on the strategy of long distance block trains. The author also discusses the various implications of speeds within the constraints of time and limited financial resources.

Jagannathan, R *Rail International* Vol. 6 No. 2, Feb. 1975, pp 105-127, Figs., Tabs.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

21 096550

INTEGRATED ROAD/RAIL SERVICES

Over the past eight years the author's company has been operating a road/rail integrated service with British Railways to obtain the best service and economic advantages present in such operation. It is noted that the service has been very successful from the standpoint of both economics and service. The nightly movement of 500 tons over a distance of 200 miles involves three men while it is estimated that an all-highway movement would require 35 men. The author stresses the importance of single-management control of the integrated operation.

Armitage, KJ (Runcorn Transport Services, Limited) *Chartered Institute of Transport, Journal* Vol. 36 No. 9, Mar. 1975, pp 224-227, 1 Tab.

PURCHASE FROM: Chartered Institute of Transport 80 Portland Place, London W1N 4DP, England Repr. PC

DOTL RP

21 096580

MOPAC GIVES A NEW FACE TO CTC

The Missouri Pacific's program for consolidation of its dispatching offices in district headquarters has been culminated with the centralization of the Eastern District's control of train operations in a new office in Little Rock. Four pushbutton-type CTC machines are located around a circular chief dispatcher's glass enclosure with space available for two additional CTC boards. A theater-type display of the territory controlled extends around the periphery of the room.

Railway System Controls Vol. 6 No. 4, Apr. 1975, pp 14-17, 4 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

21 096627

SOLID PIPE-LINE CONSERVES ENERGY

Survey of the various pipe-line transport systems for solids:-packaged materials (capsule);-liquefied materials (gas or liquid). As a comparison, the paper gives numerical data on this latest mode of transport and on competitive transport modes: rail, road, waterways, plane. Then it gives a detailed account of energy consumption for coal transport, in Arizona, over 273 miles, by pipe-line and by railway. In conclusion, the authors enumerate the advantages of this mode of transport, for environment and other purposes, which make it even more favourable.

Zandi, I Kyong Sup Kim *Transportation Research* Vol. 8 No. 45, Oct. 1974, pp 471-480, 9 Tab., 19 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

21 096631

STUDY OF THE TASKS, WORKING CONDITIONS AND REQUIREMENTS OF A CENTRALISED CONTROL POINT [Eine Untersuchung uber Aufgaben, Arbeitsbedingungen und Arbeitsanforderungen auf einer Fernsteuerzentrale]

From a central control point, two regulators govern a line 120 km long and 17 stations including train operations and locomotive allocation. Following an analysis of the tasks, working conditions and requirements at the control point's offices, taking into account recent results of work science, the author comes to certain conclusions about the construction and fitting of offices in such surroundings so that better conditions can be obtained in the future. [German]

Mrosek, U *Verkehrsmedizin und Ihre Grenzgebiete* Vol. 21 No. 8, 1974, pp 262-277, 10 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: Transpress VEB Verlag Fuer Verkehrswesen Franzoesische Strasse 13/14, Berlin W8, East Germany Repr. PC

21 096675

THE HISTORY OF THE CONTAINER [La storia del container]

The article traces the history of containers and in particular discusses their use in Italy and Europe. The resulting coordination of road and rail transport and the location of container terminals are discussed. An English translation of this article DOT library translation L6 (162 P) has been prepared. /TRRL/ [Italian]

Gazzetti, G *Autostrade* Vol. 15 No. 12, Dec. 1973, pp 21-27, 9 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 210884S)

PURCHASE FROM: Societa Autostrade Via Antonio Nibby 10, Rome, Italy Repr. PC

21 096697

BS 4228: 1967. SPECIFICATION FOR CORNER FITTINGS FOR FREIGHT CONTAINERS. METRIC UNITS

This standard specifies the dimensional requirements and service design

loadings for upper and lower corner fittings for freight containers A,B,C and D described in British standard 3951-freight containers. It also indicates certain non-mandatory features which allow the fittings to be developed into the forms of boxes, if desired. The standard does not specify materials of construction or their strength properties. /TRRL/

British Standard No. 4228, 1967, 15 pp, Figs., 2 Tab.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212251)

PURCHASE FROM: British Standards Institution 2 Park Street, London W1A 2BS, England Repr. PC

21 097240

THE MINIBRIDGE THAT MAKES THE ILA BOIL

The International Longshoreman's Assn. is opposing the new shipping concepts—minibrige and landbridge—that are shrinking its work force. Minibrige, which moves containerized cargo overland, bypassing traditional ports and the Panama Canal, is meeting increased resistance from dock workers. Steamship lines, railroads and shippers like minibrige since it serves to reduce some costs and speeds time of movement. The Longshoremen and Atlantic Ports have been opposing the minibrige, having taken their case to the Federal Maritime Commission. Final decision is not expected by FMC until 1976.

Business Week No. 2381, May 1975, pp 99-100

PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

DOTL JC

21 097305

A PROGRAM OF EXPERIMENTS INVOLVING CHANGES IN TERMINAL OPERATIONS-1974 PROGRESS REPORT

The railroad industry's Labor/Management Committee, which is comprised of the chief executives of railroads and labor organizations, has established a number of labor/management programs to work on specific problem areas. The St. Louis Terminal Project is one such activity. This report elaborates on the objectives, techniques and progress that has been made. A Task Force on Terminals was established by the Labor/Management Committee with the objective of increasing the reliability, speed and efficiency of car movements through a major existing railroad terminal without capital expenditures. This objective is being achieved through a series of experiments involving changes to terminal operations. Missouri Pacific St. Louis Terminal Division was selected as the laboratory for this experimentation. A Project Team was formed to head up the project. The Project Director and Associate Director were recruited from the ranks of management and labor. Early in the program it was realized that a formal analytical search should be undertaken to identify these changes in operations that will make the most appropriate experiments. To facilitate problem identification and the measurement of quantitative impact of experiments, a computerized car movement evaluation system was developed which is described in Appendix A of this report. Several experiments involving both labor agreements and operating practices have been completed which have significantly improved car movements within the terminal. As a result, negotiations between labor and management are now in progress for the purpose of revising these agreements and operating practices.

Inquires should be made to FRA, in care of D. M. Collins, Secretary, Task Force on Terminals. This report was sponsored by Railroad Labor Organizations, Missouri Pacific Railroad, Association of American Railroads and Federal Railroad Administration.

Federal Railroad Administration Feb. 1975, 159 pp, Figs., Tabs., 2 App.

Contract DOT-FR-4-3003

ACKNOWLEDGMENT: Missouri Pacific Railroad

PURCHASE FROM: FRA Repr. PC

DOTL RP

21 097943

CONTAINERISATION INTERNATIONAL YEARBOOK 1974

The publication contains a reference guide by country to the current state of containerisation and unit load transportation. Details are given of port facilities, inland terminals, rail transport, road vehicle regulations and na-

tional container organisations. A description is also given of deep-and short-sea operators, combined transport operations and international rail services. Other chapters deal with barge carriers, terminal handling developments and container handling equipment. /TRRL/

Ginney, RF Denton, L
National Magazine Company 1974, 303 pp, Figs., Tabs., Photos.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211981)

PURCHASE FROM: National Magazine Company 22 Armoury Way, London SW18, England Orig. PC

21 098053

A GLOBAL LOOK AT CONTAINERIZATION

Two million containers are forecast to be in service worldwide by 1979, up almost 70% from the ownership in 1975. There will be corresponding expansion in the inventories of chassis, container terminal equipment and containerships. The article deals primarily with the marine phase of containerization's growth. The author sees container leasing as of growing importance in this expansion.

Crowley, RM (Flexi-Van Corporation) *Traffic World* Vol. 162 No. 12, June 1975, pp 39-43, 3 Phot.

PURCHASE FROM: Traffic Service Corporation 815 Washington Building, Washington, D.C., 20005 Repr. PC

DOTL JC

21 098068

CONTAINER TRANSPORT, SEAPORTS AND THE GERMAN FEDERAL RAILWAY [Containerverkehr, Seehafen und Deutsche Bundesbahn]

The world's containership fleet at the beginning of 1974 totalled about 900 units with a capacity of nearly 450,000 TEU (20-ft). Containerization demands huge investments. Hapag-Lloyd, for example, spent almost 1,000 million DM for their containerships and associated equipment, while the German Federal Railway has invested about 500 million DM in terminals, staddle carriers, chassis and tractors. The great number of containers also demands completely new planning concepts for the layout of handling facilities, and large quay areas are required. Future problems in container traffic will be not so much technical but more related to information and organization. The Author seeks to review all these questions, with special reference to the ports of Bremen and Hamburg. [German]

Strieck, E *Eisenbahntechnische Rundschau* Vol. 24 May 1975, pp 164-172, 10 Fig., 6 Tab., 27 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

21 098070

FREQUENCY OF TRAIN STOPS AT PASSING POINTS AS MEASURE OF THE OPERATING QUALITY OF SINGLE-TRACK LINES [Die Haeufigkeit reiner Kreuzungshalte als Masstab der Betriebsqualitaet auf eingleisigen Strecken]

If only the mean minimum train frequency and the mean interval between trains necessary for smooth operation are taken to determine the capacity of single-track lines, very high line capacities can be calculated. But since the number of passing stops increases as the square of the number of trains, these can become so frequent that a clear diminution in operating quality would result. The Author therefore suggests a further criterion, which limits downward the distances between the passing stops, and in the article seeks to apply this criterion to the measurement of train intervals. [German]

Schwanhaeuser, W *Eisenbahntechnische Rundschau* Vol. 24 May 1975, pp 187-190, 2 Fig., 7 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

21 098084

DECADE OF DECISION-TERMINALS. REPORT OF TASK FORCE I TO THE LABOR AND MANAGEMENT COMMITTEE

In March 1970, the Labor and Management Committee accepted an offer

by the Secretary of Transportation for assistance in their efforts to resolve joint labor-management problems in the railroad industry. Before any significant projects could be undertaken, it was first necessary to identify the problems, especially those affecting service to shippers and the industry's ability to compete for a larger share at the transportation market. It was agreed that most of the problems occur at terminals, so Task Force I of the Labor and Management Committee was established with the following objectives: (1) To identify major terminal problems; and (2) To recommend solutions to these problems. After nine months of study, Task Force I reported its findings and recommendations to the Labor and Management Committee which are contained in this report. Eleven major problem areas affecting railroad terminal operations were identified. Task Force I recommended that a major program of pilot studies be organized and directed at improved terminal operations. They would deal in these three areas: (1) Improved information flow between terminals; (2) Improved terminal facilities; and (3) Study of changes in rules, rates and agreements on terminal operations. Each of these tasks should be made in a separate yard in order that there can be a comparison of the effects of changes in each of the elements on yard operations. As a result of the report by Task Force I to the Labor and Management Committee, Task Force I was reconstituted as the Task Force on Terminals for the purpose of setting up and managing pilot studies in the three problem areas.

This project was co-sponsored by Illinois Central Gulf Railroad in cooperation with FRA.

Collins, DW
Federal Railroad Administration Final Rpt. Apr. 1971, 35 pp, Apps.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: Association of American Railroads Technical Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

21 098086

RESEARCH BASE FOR DEVELOPMENT OF A NATIONAL CONTAINER POLICY. APPLICATION OF EVALUATION PROGRAM TO MINI-LANDBRIDGE SCENARIO

This Phase III report is the final phase of a program undertaken by the Canadian Transport Commission to provide a research base to assist with development of a national container policy for Canada. Phase I covered development of a potential for Canadian containerization. Phase II report consisted of three volumes on potential, a computer evaluation program and container usage in overseas transport. Phase III has applied the computer-based evaluation to the possibility of increasing mini-landbridge service, primarily in connection with overseas container trade. The results show that while overall systems dollar costs increase with overland routings, the same routings create the benefits of increasing employment in Canadian transport and reduce overall system transit time.

Wooster (Swan) Engineering Company, Limited Project 2285, May 1973, 117 pp, Figs., Apps.

PURCHASE FROM: Canadian Transport Commission Systems Analysis Branch, 275 Slater Street, Ottawa K1A 0N9, Ontario, Canada Repr. PC

DOTL RP

21 098711

YARD LIGHTING SYSTEMS

File name is ENMP, ENLX. Programs combine to determine light intensities of a system lighting a yard. ENMP develops "contours" from grids which could be for elevations as well as of equal light intensities and could, therefore, be used in land levelling, or borrow pit problems. Input describes the area to be lighted and grids peculiar to the lights in the system. Output is a matrix of light intensities over the yard.

Stane, RA
Atchison, Topeka and Santa Fe Railway No Date

ACKNOWLEDGMENT: AREA (AREA 06-01-001)
PURCHASE FROM: Atchison, Topeka and Santa Fe Railway 9th and Jackson Streets, Information Systems Department, Topeka, Kansas, 66628

21 099198

RAILROADS BUILD UP FOR COAL

Over the next couple of years, railways can expect a major increase in the amount of coal traffic they carry. Several railways are planning new unit

coal train operations and new equipment purchases in anticipation of the new traffic. The article outlines the proposals of several major railways and the development of new cars for the future coal traffic.

Progressive Railroading Vol. 18 No. 4, Apr. 1975, pp 36-42

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

21 099207

FLATBACK NEEDS A NEW POSTURE

After 15 years of annual increases in traffic, flatback loadings declined in the early 1970's. As a result, some railways, the Norfolk and Western in particular, have re-examined the market. Railways have not yet provided coordinated door-to-door service, the present service is still not as reliable as trucks for delivery schedules and the empty mileage of the service is intolerably high. The article examines possible ways of removing these disadvantages.

Modern Railroads Vol. 30 No. 4, Apr. 1975, pp 36-40

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

21 099359

ST. LOUIS STREAMINES TERMINAL OPERATIONS

This report on the progress of the St. Louis Terminal Project gives the status of the various experiments involved in the cooperative Missouri Pacific, AAR, FRA and labor union project. The 18 phases are the result of the project's aims of identifying barriers to terminal efficiency and service reliability; proposing changes in management and labor practices, government policies and regulations; and conducting on-line experiments to test the effectiveness of proposed solutions. New experiments will be developed and changes that produce beneficial results will be entered into labor negotiations. If no government regulation or formal agreement is involved, changes can be made without formal negotiation.

Progressive Railroading Vol. 18 No. 6, June 1975, pp 54-58

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

22 084728

CARGO SECURITY HANDBOOK FOR SHIPPERS AND RECEIVERS

Losses resulting from cargo theft and pilferage in the transportation system have been estimated to exceed \$1 billion annually. This well may be a conservative estimate. Losses of this magnitude constitute a major drain on the commerce of the United States. This handbook has been developed by a working group of the Interagency Committee on Transportation Security under the auspices of the Department of Transportation. Leadership was provided by the Department of Commerce and the U.S. Postal Service with support from the Department of Defense, General Services Administration, other Government agencies, the transportation associations, and concerned insurance groups. This handbook is issued to provide guidance and assistance to management in an effort to achieve maximum cargo security for shippers and receivers. This guidance and information are offered as suggestions and are not regulatory in nature.

Office of the Secretary of Transportation DOT P 5200.5, Sept. 1972, 33 pp, 3 App

ACKNOWLEDGMENT: DOT

PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

#5000-00059, DOTL HE 199.9.S44754

22 084734

PRACTICAL HANDBOOK OF INDUSTRIAL TRAFFIC MANAGEMENT

The fifth edition of this reference book, like its predecessors, is arranged for the practicing traffic man, for the businessman who must make decisions involving transportation and physical distribution and for the student interested in a career in transportation. The problems of economical and adequate distribution and transportation are all treated. The authors have made every effort to cover all the principal responsibilities and functions of industrial traffic management. Because rates and services are subject to frequent change, such information is discussed only in basic or general terms. There are chapters on government regulation and on the transportation of hazardous materials.

Colton, RC Ward, ES

Traffic Service Corporation 1973, 639 pp, Figs., 2 App

PURCHASE FROM: Traffic Service Corporation 815 Washington Building, Washington, D.C., 20005 Repr. PC

DOTL HF 5761.C66

22 090894

SOLVING SINGULARLY CONSTRAINED TRANSSHIPMENT PROBLEMS

This paper develops a primal simplex procedure to solve transshipment problems with an arbitrary additional constraint. The procedure incorporates efficient methods for pricing-out the basis, determining representations, and implementing the change of basis. These methods exploit the near triangularity of the basis in order to take full advantage of the computational schemes and list structures used in solving the pure transshipment problem. Also reported is the development of a computer code, I/O PNETS-I for solving large scale singularly constrained transshipment problems. This code has demonstrated its efficiency over a wide range of problems and has succeeded in solving a singularly constrained transshipment problem with 3000 nodes and 12,000 variables in less than 5 minutes on a CDC 6600. Additionally, a fast method for determining near optimal integer solutions is also developed. Computational results show that the near optimum integer solution value is usually within a half of one percent of the value of the optimum continuous solution value.

Glover, F Karney, D Klingman, D Russell, R
Texas University, Austin, Naval Personnel Research & Development
Laboratory, Office of Naval Research, Colorado University, Boulder,
Tulsa University CCS-212, Dec. 1974, 32 pp

Contract N00123-74-C-2275

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-A008358/4ST, DOTL NTIS

22 091031

STORAGE AND TRANSPORTATION OF CHEMICAL PRODUCTS

The book is an attempt to present the basic considerations for safety in planning and using storage facilities for acids, alkalis, flammable and combustible liquids, liquid gases, highly toxic liquids and neutral substances.

Edited trans. of mono. Khranenie i Transportirovanie Khimicheskikh

Produktov, n.p., 1973 p1-272.

Berezhkovskii, MI

Wright-Patterson Air Force Base FTD-HC-23-1721-74, Dec. 1974, 400 PP

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

AD/A-006729/8ST, DOTL

22 091320

REVIEW OF PROPOSED SPECIFICATIONS RELATING TO THE SHIPMENT OF ETHYLENE IN TANK CARS AT CRYOGENIC TEMPERATURES

The report reviews proposed specifications and shipper regulations for 113 series tank cars for transporting liquid ethylene at cryogenic temperatures. The study was limited in scope and was to be directed primarily at the holding time requirements necessary for safe shipment of the commodity. The insulation requirements based on a 30-day holding time capability with a design margin of 15 days are considered responsive to needs and are reasonable and practical within the current state of the art. A further definition of conditions for heat transfer calculations and measurement are suggested to assure consistent design and performance. Apparent deficiencies are noted in the proposed in-transit pressure rise specification; a candidate modification is described.

Vassalo, FA Adams, DE Bullerdiel, WA

Calspan Corporation, Federal Railroad Administration, (CALSPAN-ZL-5226-D-2) Final Rpt. Sept. 1974, 33 pp

Contract DOT-FR-20069

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241380/5ST, DOTL NTIS

22 095292

THE ROLE OF THE CORPORATE STAFF TRANSPORTATION GROUP IN MEDIUM AND LARGE DIVERSIFIED MANUFACTURING ORGANIZATIONS

The Corporate Staff Transportation Group is not unlike other corporate-level staff groups but differs from the Physical Distribution Department prevalent in many organizations in that PDD is traditionally charged with the additional responsibilities of warehousing, inventory control and production scheduling. The CSTG is not similar to the plant transportation department in many aspects in that it performs a staff and not a line function. Plant-level personnel perform the daily plant traffic management functions. CSTG monitors the entire corporate/transportation operation, frequently advising and counseling the plant transportation managers and helping them solve problems as they occur or can be expected to occur. It is also a research group.

This is an original paper submitted in partial fulfillment of the requirements for the Certificate of Membership in the American Society of Traffic and Transportation, Inc.

Arizzi, VJ (Ball Corporation) *Transportation Journal* Vol. 14 No. 2, 1974, pp 41-52, 5 Fig.

PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Orig. PC

DOTL JC

22 095293

A SURVEY OF CURRENT STATUS AND TRENDS IN TRANSPORTATION AND LOGISTICS EDUCATION

This article reports on an extensive survey of the enrollment status and trends in transportation and logistics education. While surveys and reports of expert opinion frequently appear, few provide definitive market information that might help guide the preparation of educational materials and the development of curricula. The survey covered current student enrollments, trends in transportation and logistics courses offered over the pre-

vious five years and the characteristics of institutions and departments offering these courses.

Ballou, RH (Case Western Reserve University); Piercy, JE (Kent State University) *Transportation Journal* Vol. 14 No. 2, 1974, pp 27-36, 2 Fig., 4 Tab.

PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Orig. PC

DOTL JC

22 095447

RAW MATERIALS TRANSPORTATION COSTS AND THEIR INFLUENCE ON THE USE OF WASTEPAPER AND SCRAP IRON AND STEEL

The grant study evaluates the importance of transportation charges for virgin and competing secondary materials in the investment decisions of the steel and papermaking industries. Volume II contains the background material and the supporting statistical data. (Modified author abstract)

See also Volume I, PB 229816, RRIS #095448, Section 22, RRIS Bulletin 7502.

Foran, JF Heenan, AT Schweikhardt, RG
Resource Planning Institute, (RI-73-1) Final Rpt. Vol. 2 EPA-670/2-74-024-b, Apr. 1974, 100 pp, Apps.

Contract EPA-R-801678

ACKNOWLEDGMENT: Resource Planning Institute
PURCHASE FROM: NTIS Repr. PC; Microfiche

PB 229 817/2GA, DOTL NTIS

22 095448

RAW MATERIALS TRANSPORTATION COSTS AND THEIR INFLUENCE ON THE USE OF WASTEPAPER AND SCRAP IRON AND STEEL

The grant study evaluates the importance of transportation charges for virgin and competing secondary materials in the investment decisions of the steel and papermaking industries. Three major modes of transport are considered-rail, motor carrier, and inland water barge. Transportation charges are evaluated with respect to revenues generated for carriers. Comparisons of differences in changes are made on both a direct and a chemical-equivalent empirical data on transportation rates, volume of shipments, and origin and destination for the selected materials. (Modified author abstract)

See also Volume 2 PB 229817, RRIS #095447, Section 22, RRIS Bulletin 7502.

Foran, JF Heenan, AT Schweikhardt, RG
Resource Planning Institute, (RI-73-1) Final Rpt. Vol. 1 EPA0670/2-74-024-a, Apr. 1974, 207 pp

Contract EPA-R-801678

ACKNOWLEDGMENT: Resource Planning Institute
PURCHASE FROM: NTIS Repr. PC; Microfiche

PB 229816/4GA

22 096588

EFFICIENT PNEUMATIC STOWAGE BY MEANS OF MOBILE PIPING SYSTEMS PROVIDED WITH LATERAL DISCHARGES [Leistungsfähiger Blasvergatz Durch Rueckbare Blasrohrleitungen mit Seitenaustreagen]

Paper describes the results of testing on industrial scale of a system that has been developed in West Germany. Its purpose was to match the output of the pneumatic stowing with the advance rate of the longwall face. It has been ascertained that a combination of a powerful pneumatic stowing machine with mobile pipes provided with lateral discharges could supply stowage materials' volumes corresponding to a daily production of between 2000 and 2500 tons of coal from seams up to 3.5 m thick. [German]

Voss, KH *Glueckauf* Vol. 111 No. 2, Jan. 1975, pp 63-66, 12 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

22 096667

CONFERENCE ON BULK SOLIDS IN TRANSIT

Papers presented at the conference were as follows: Belt Weighing in the Coal Industry, by Crosland, R; Continuous Weighing Equipment, by

Mitchell, JR; Belt Weighing by Gamma-ray Absorption, by Hold, AC; Practical Aspects of Load Cell Weighing Applications, by Chatters, KE; Instruments to Detect Conveyor Belt Slip, Belt Tracking and Belt Damage, by Green, PJ; A 1973 Survey of Bunker Level Indicators in the British Steel Corporation. By Wright, H; Sampling and Analysis-Sampling Equipment, by Jordison, F and Gray, R; Ash Monitors for "on Stream" Coal Analysis, by Cammack, P; On-Line Analysis of Bulk Solids, by Ridgeway, KG; Chute Blockage Detection, by Holden, H; On-Line Analysis of Moisture Content of Bulk Solids in Transit, by Dartnell, J. and Berry, PM; The Impact Flowmeter, by Nugent, CW; and Coal Weighing at Longannet Power Station, by Price, K and Snowden, EWL /TRRL/

Crosland, R Mitchell, JR Hold, AC Chatters, KE Green, PJ Wright, H Jordison, F Gray, R Cammack, P. Ridgeway, KG Holden, H Dartnell, J Berry, PM Nugent, CW Price, K Snowden, EWL

Institution of Mechanical Engineers Conf Paper 1974, 123 pp, Figs., Tabs., Photos., Refs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211077S)

PURCHASE FROM: Institution of Mechanical Engineers 1 Birdcage Walk, Westminster, London SW1H 9JJ, England Repr. PC

7403209

22 096681

UNIT LOADS: TOO MANY CONSTRAINTS?

The article is a report on a conference on "Packages, Pallets and Containers in International Trade" held by the Institute of Materials Handling in London in November 1973. Difficulties arise from poor packing, careless handling and stacking, cargo sweat, leaks, infestation and contamination of food by fumigants. Variable lengths, heights and strengths of the floors of road vehicles also pose problems whilst for many purposes special containers (e.g. with fully folding sides or refrigeration) are necessary. Economic constraints arise from loss of pallets, difficulties in using container space efficiently and inflexible freight rates. /TRRL/

Materials Handling International Vol. 61 No. 1, Jan. 1974, 3 pp, 1 Fig.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 400022S)

PURCHASE FROM: IPC Business Press Limited 33-39 Bowling Green Lane, London EC1P 1AH, England Repr. PC

22 097942

UNREGULATED ROAD HAULAGE: THE AUSTRALIAN EXPERIENCE

The article describes the background to and present organization of the road haulage industry in Australia. Specific reference is made to the markets for haulage between Melbourne and Sydney, and between those cities and their hinterlands which can be served by interstate operations. /TRRL/

Joy, S *Oxford Economic Papers* July 1964, pp 275-285

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211979)

PURCHASE FROM: Oxford University Press Press Road, Neasden, London NW10-0DD, England Orig. PC

22 097945

THE RELATIONSHIP BETWEEN FREIGHT TRANSPORT ORGANIZATION AND INDUSTRIAL LINKAGE IN BRITAIN

It is argued that studies of industrial linkages have given inadequate attention to the role of the transport industry in maintaining them. By focusing on the functional relationship between plants in the overall circle of production, the importance of transport reliability and other qualities of service factors is emphasized. A census of industrial traffic in the north-west midlands provides data to show how manufacturers' preferences for various modes of transport, based more on service quality than on cost, have spatial implications. A paradox appears in that the more valuable goods, which theoretically travel most widely, demand the transport qualities associated with private transport, which has a generally restricted field of movement. It is shown, however, that under conditions which allow for efficient utilization of vehicle capacity, private vehicles can maintain linkages over long distances competitively with professional transport. The regular flow of components to large engineering factories is one such case.

It is difficult to prove that the structure of the transport industry in itself directly influences the distribution of industry, or to define the spatial limits of viable daily journeys, but it is nevertheless clear that regulations such as those governing drivers' hours have important, if latent, spatial implications. /Author/TRRL/

Carlton University, Canada (Carlton University, Canada) *Institute of British Geographers, Transactions* No. 62, July 1974, pp 25-43, 11 Tab., 28 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211966)

PURCHASE FROM: Institute of British Geographers 1 Kensington Gore, London SW7 2AR, England Orig. PC

7412121

22 097950

CHOICE OF TRANSPORT SERVICE: AN INVENTORY THEORETIC APPROACH

For many reasons, it is rare, if not impossible, that one finds a supplier who fulfills his promise regarding delivery date on every shipment. The impact of this delivery lateness and uncertainty is that the consignee has to invest more in inventory operations than otherwise in order to maintain the same level of customer service. In most cases, the consignee would prefer an improved service from the shipper who would be compensated by either higher direct shipping costs or increased product price. The problem of transport choice now becomes an issue of balancing increased shipping costs against expected reduction in inventory costs. The purpose of this paper is to propose a computational method of transport selection

appropriate to this situation. The method used is an extension of an earlier model and both are described. The main difference between the models is in the estimate of the variability of demand. Four sets of parameters are examined in a test problem and it is found that the models indicate different choices of shipper in some cases. /TRRL/

Das, C (Saskatchewan University, Canada) *Logistics and Transportation Review* Vol. 10 No. 2, 1974, pp 181-187, 2 Tab., 7 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212081)

PURCHASE FROM: British Columbia University, Canada Faculty of Commerce, Vancouver 8, British Columbia, Canada Orig. PC

22 099199

CAPTIVE UTILIZATION

The National Railway Utilization Company has developed a high usage of a 735 car fleet by a system it calls "captive utilization". National Railway examines the shipping patterns of several companies that have product compatibility. A routing is then established among the companies that allows maximum utilization of the box cars. Presently, National Railway operates 20 captive utilization cycles and more are planned when equipment becomes available.

Progressive Railroading Vol. 18 No. 4, Apr. 1975, pp 33-34

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

23 052614

STUDY OF TRAIN RUNNING PROGRAM VARIANTS AND ECONOMIC REPERCUSSIONS

It is a case here of a programme written in GPSS (General Purpose Simulation System) which permits the economic consequences of a given operating policy to be numerically indicated. Starting from data concerning the passenger transport requirements, the program calculates the best railway solution (or "offer") satisfying train running and "occupation rate" requirements. For this purpose, it publishes running schedule indicator tables, calculates the stock required for this traffic, and indicates numerically in several economic tables the cost of the equipment and of the passengers carried. This program is intended to monitor a larger number of railway variants for passenger requirements, route times, types of stock, operating policies etc. It has been built for a research project C-3 Nord, which concerns the traffic between Paris-London-Brussels-Dunkirk-Valencia-Lille. It is rapidly adaptable to any work network. It comprises 3000 instructions written in GPSS 360, fed through a data processing machine 360 75 or 370, and requires a processing time of 2 min. per simulation day and a storage device occupation of 650,000 octal digits.

A summary contained in ORE report #AZ40/RP 6/E, RRIS 3052600, Section 17, RRIS Bulletin 7502.

Theysier, J

International Union of Railways Sept. 1974, 3 pp

ACKNOWLEDGMENT: UIC

PURCHASE FROM: UIC Repr. PC

DOTL RP

23 072093

AUTOMATIC FARE COLLECTION SYSTEM OF THE REGIONAL EXPRESS SERVICE (RER) (SUBURBAN PARIS RAPID RAIL) [Le système de peage automatique du réseau express régional]

Two parts of the regional East-West line (Boissy-Saint-Leger and Saint Germain) are using an automatic fare collection with magnetically coded tickets that were especially developed for a complex fare structure, using the latest methods of real time information processing. This report describes how rates are determined for single trip or multiple trip tickets and for long-term passes. It describes the principle of the automatic fare system: shape of tickets, how they are purchased, how users are checked in and out and how the automatic ticket vending machines are connected with the information system. The tickets, ticket vending machines, automatic monitors (turnstiles) and the information system computers are illustrated with figures and photos and are described. [French]

Paris Regional Transport Authority July 1972, 19 pp, 14 Fig.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Paris Regional Transport Authority Paris, France Repr. PC

DOTL TA1230.R45

23 082956

FOUNDATION FOR MASS TRANSIT PROGRAM DEVELOPMENT IN THE TAMPA BAY REGION MANAGEMENT REPORT

The Tampa Bay Regional Planning Council (TBRPC) has pursued a vigorous program of transportation planning for the Tampa Bay Region. Resulting from this effort has been the identification of the need for establishment of a public mass transit planning and operating authority to execute studies related to the eventual development and operation of a mass transit system in the Tampa Bay Region. The study was performed as part of the 'Coordinated Support Services Management Study' of the Tampa Bay Regional Planning Council for the Authority.

Prepared by Tampa Bay Regional Planning Council, St. Petersburg, Fla.

Research Group, Incorporated, Urban Mass Transportation Administration, Tampa Bay Regional Planning Council, (UMTA-FL-09-0010) Dec. 1973, 80 pp

ACKNOWLEDGMENT: NTIS (PB-238115/OSL)

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238115/OSL, DOTL NTIS

23 083037

TROUBLE IN MASS TRANSIT: WHY CAN'T THE PEOPLE WHO PUT A MAN ON THE MOON GET YOU DOWNTOWN?

While the primary subject of this article is the Bay Area Rapid Transit and its technological and political problems, other problems associated with advanced transit technology are also illustrated with the experiences of the Pittsburgh Skybus project and the Personal Rapid Transit installed at Morgantown, W.V. The report cites the success of more conventional rapid transit systems—Toronto Transit and the Lindenwold Line out of Philadelphia. The article concludes that BART experience does not argue against fixed-guideway transit and does not doom new transit technology. It does, however, list some recommendations to avoid future problems of this type.

Consumer Reports Mar. 1975, pp 190-195, 2 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

23 083063

THE ROTTERDAM METRO

In six years' operation, the Rotterdam Metro has fulfilled the expectations placed on it and assumed an importance in that urban area inversely proportional to its relatively short length. The original section has had a major role in alleviating traffic congestion on the two highway crossings of the Maas River and is being extended. Plans are progressing for a second rapid transit line across the city in another direction. Municipal authorities have consistently followed the master plan, implementing segments on schedule and within the cost limits established for each. This article describes the planning, construction and operation of the Netherland's first rapid transit line.

Union Internationale des Transports Publics, Revue Vol. 23 No. 4, 1974, pp 264-271

PURCHASE FROM: Union Internationale des Transports Publics Avenue de l'Uruguay 19, B-1050 Brussels, Belgium Repr. PC

23 083064

THE COLOGNE PRE-METRO

After it was decided that buses would be inadequate for major cross-city service, the Cologne government made two major decisions: (1) It would not finance a full-scale rapid transit subway system; (2) That since a segregated right-of-way was required, this should not be at street level and should be operated with the same vehicles as the streetcar system that remained in the other areas of the urban region. As this subway light-rail system has been built, it has always been designed so various sections should be complete without leaving unfinished structures even when funds were short. An additional constraint was that historic buildings were not to be endangered. The article describes the construction of the cut-and-cover subway and the erection of elevated segments using prefabricated components.

Dubbel, R (Koelner Verkehrs - Betriebe AG) Union Internationale des Transports Publics, Revue Vol. 23 No. 4, 1974, pp 284-288

PURCHASE FROM: Union International des Transports Publics Avenue de l'Uruguay 19, B-1050 Brussels, Belgium Repr. PC

23 083072

A STUDY OF AMTRAK'S EFFECTIVENESS

In Report 119 of the Transport Service Appraisal Division of the Canadian Transport Commission, the authors have looked at U.S. experience with a quasi-public passenger train operating agency with its possible implications for Canada where consideration is being given to new government machinery to promote effective management of surface passenger transportation. This report defines some of the issues and problems affecting Amtrak and its performance. There are six chapters tracing the decline of intercity rail travel in the U.S.; the creation of Amtrak and its organization; the Amtrak marketing program; Amtrak's continuing operating and financial problems; and Amtrak's implications for Canada.

Canadian Transport Commission #119, Nov. 1974, 193 pp, Figs., Tabs., Refs.

PURCHASE FROM: Canadian Transport Commission Transport Service Appraisal Division, 275 Slater Street, Ottawa K1A ON9, Ontario, Canada Repr. PC

DOTL RP

23 083078

THE REGIONAL IMPACTS OF NEAR-TERM TRANSPORTATION ALTERNATIVES: A CASE STUDY OF LOS ANGELES

This report attempts to provide a consistent and comprehensive comparison of several transportation system alternatives in terms of their impacts on the region and its people. The three main objectives of the study were to determine pollution emissions, evaluate the effectiveness of transportation management tactics, and developed feasible transportation strategies for implementation by 1977.

Mikolowsky, WT Gebman, JR Stanley, WL Burkholz, GM
Rand Corporation 1974, 127 pp

ACKNOWLEDGMENT: ASCE Civil Engineering
PURCHASE FROM: Rand Corporation 1700 Main Street, Santa Monica,
California, 90401 Repr. PC

23 083082

ATTITUDINAL AND SITUATIONAL VARIABLES INFLUENCING URBAN MODE CHOICE: SOME EMPIRICAL FINDINGS

A mode choice decision structure incorporating travel attitudes toward modes and situational constraints is investigated. The major hypothesis tested is that mode choice is determined primarily by situational constraints, such as auto ownership and income, secondly by the quality of alternative modes. The structure of the mode choice process is analyzed with respect to (1) applicability of certain criterion forms; (2) psychological weighting of modal attributes in the choice criterion; (3) strength of logit, probit, and discriminant functional forms; (4) the relative strength of socio-economic and attitudinal variables in predicting mode choice. An evaluation is made of 50 binary choice models fitted to a sample of 471 randomly drawn urban travelers. Results indicate that (1) the four choice criterion forms tested are all about equal in predictive strength; (2) psychological weighting has no effect on model strength, but does influence which modal attributes appear to determine choice; (3) the three functional forms tested are all about equal in strength; (4) situational factors account for 80-90% of variation explained by the models, attitudes toward modes 10-20% thus confirming the primary hypothesis. Implications of these results for mode choice modeling and transit planning are discussed.

Hartgen, DT (New York State Department of Transportation)
Transportation Vol. 3 No. 4, Dec. 1974, pp 377-392, 2 Fig., 4 Tab., Refs.

ACKNOWLEDGMENT: Transportation
PURCHASE FROM: Elsevier Scientific Publishing Company P.O. Box 211,
Amsterdam, Netherlands Repr. PC

DOTL JC

23 083084

URBAN TRANSPORTATION—ANOTHER ALTERNATIVE. A WORLD-WIDE SURVEY OF LIGHT RAIL TECHNOLOGY

Light Rail Transit is intermediate between bus transit and full subway rapid transit. Light Rail Transit has higher capacity and speed than bus, and lower capital cost than full subway rapid transit. This report surveys the use of Light Rail Transit around the world, compares Light Rail Transit to both bus transit and full subway rapid transit, and highlights the advantages of Light Rail Transit.

Taylor, SF
Heritage Foundation, Incorporated Book 1974, 55 pp, 6 Fig., 43 Ref.

PURCHASE FROM: Heritage Foundation, Incorporated 415 Second Street,
NE, Suite 308, Washington, D.C., 20002 Orig. PC

DOTL RP

23 083245

BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART II. VOLUME III. RESIDENTIAL QUALITY PRIOR TO THE OPENING OF BART

The report is an account of the efforts at empirical definition of the factors involved in residents' perception of environmental quality by means of verbal response indicators. It includes a discussion of the problem of environmental quality and the need for environmental indicators, and a detailed overview and summary of the BART residential impact study. Chapters include—developing dimensions of residential quality, discussion, future work on empirical dimensions, identifying the determinants of

residential quality, and future work to identify determinants and add indicators.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 2, Volume 2, PB-236 729, and BART-2, Part 2, Volume 4, PB-236 731.

Appleyard, D
California University, Berkeley, Metropolitan Transportation
Commission, Department of Transportation, Department of Housing
and Urban Development Final Rpt. June 1973, 139 pp

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236730/8ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236730/8ST, DOTL NTIS

23 083929

AN EVALUATION OF INTERMEDIATE-CAPACITY TRANSIT TECHNOLOGY

In recent times considerable effort has been made to develop and apply new or existing transit technology to provide capacity in the 6,000 to 20,000 persons per hour per direction range. Technologies in this range have been termed intermediate-capacity transit systems (ICTS) and include such systems as light rail transit, personal rapid transit, light guideway transit, etc. Typically these systems cost approximately one-third to one-half that of heavy rapid transit on a per-mile basis. The purpose of this paper is to provide a framework in which ICTS can be evaluated for a given city.

Finn, N Morrall, J *Traffic Engineering and Control* Vol. 15 No. 15,
July 1974, 6 pp

ACKNOWLEDGMENT: British Railways
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 084716

CORRELATIONS BETWEEN SHORT-HAUL AIR TRANSPORT AND HIGH-SPEED RAILROAD SYSTEM IN JAPAN

The author examines the 11 year operation of the Japanese Tokaido Line and its impact on air transport and concludes that the Shinkansen is a far more efficient railroad system than was originally expected, and because of this, its impact on air transport could become all the greater.

This a paper which was presented at the "International Air Transportation" conference held in San Francisco, March 24-26, 1975, which was sponsored by the Air Transport Division of the American Society of Civil Engineers. Co-sponsoring organizations included: Airport Operators Council International, Air Transport Association of America, American Association of Airport Executives, International Air Transport Association and the Federal Aviation Administration.

Itow, R (Japan Airlines)
American Society of Civil Engineers Proceeding pp 73-89, 2 Fig., 2
Tab.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

23 084717

SERVICE AND TRAFFIC CHARACTERISTICS OF AMTRAK

Nearly all intercity rail passenger service in the United States is now operated by the National Railroad Passenger Corporation, commonly known as Amtrak. An examination is made of the service characteristics of the Amtrak system using timetable information. Results show that whereas the Amtrak network is centered on Chicago, the majority of passenger trains operate in the Northeast Corridor between Boston and Washington. Traffic characteristics are examined using unpublished data supplied by Amtrak. A map prepared from this traffic information shows a strong concentration of rail passenger service in the Northeast but also indicates several east-west transcontinental routes with moderate levels of traffic. Factors determining the traffic characteristics of individual trains are detailed.

Presented at the Annual Meeting of the Association of American Geographers, Seattle, Washington, April 30, 1974.

Richards, CW
Richards (Curtis W) 1974, 7 pp, 2 Ref.

ACKNOWLEDGMENT: Richards (Curtis W)
PURCHASE FROM: Richards (Curtis W) University of Wisconsin-Parkside, Kenosha, Wisconsin, 53140 Repr. PC

DOTL RP

23 084735
REPRIEVE FOR THE IRON HORSE. THE AMTRAK EXPERIMENT-ITS PREDECESSORS AND PROSPECTS

This book covers the decline of passenger service on private railroads, its resurrection under Amtrak and some of the legal and economic consequences of the emergence of this quasi-public agency. The author concludes that the implicit tax which once had fallen on rail shippers for support of passenger services has been shifted to general revenues. The Amtrak Act was an important reflection of the growing consumer movement and an indication of the widespread belief in the intertional downgrading hypothesis concerning railroad service.

Thoms, WE *Communications* 1971, 136 pp, Photos, Refs.

PURCHASE FROM: Claitor's Publishing Division. 3165 South Acadian at Interstate 10, P.O. Box 239, Baton Rouge, Louisiana, 70821 Repr. PC
DOTL HE2791.N28T5

23 084739
SIMULATION OF A PASSENGER FLOW THROUGH A RAPID TRANSIT STATION

This report presents the development of a mathematical model to describe the flow of passengers through a rapid transit interchange. The model represents a key element in the development of a completely rational approach to the design of transportation interface facilities, and depicts the movement of pedestrians as sequential flows of people across individual station components. Stochastic elements of the model design include the magnitude and distribution of passenger demand, and the modal split of arrivals. The basic processing algorithm for passenger flow is deterministic. The model incorporates the use of empirically derived functions of pedestrian flow through specific station components. The model is developed to serve as an aid to the station designer by simulating the movement of passengers on a digital computer. Examples are provided to demonstrate the program's flexibility and its application to access mode analysis, transit scheduling, and the testing of alternative station layouts.

Popper, RJ Anderson, RB Hoel, LA
Carnegie-Mellon University. CMUTRI-TO-73-15, May 1973, 25 Fig., 7 Tab., 16 Ref.

ACKNOWLEDGMENT: Carnegie-Mellon University
PURCHASE FROM: NTIS
Repr. PC Req. PPrice, PB 225205/4RS, DOTL TA1225.P67

23 084919
A NEW GEORGIA PEACH

Construction of Atlanta's new 52.9 mile rapid transit system began in 1975. The first trains are expected to operate by 1978. The planners have tried to acquire the right-of-way with minimum conflict to the urban and suburban areas. The system will use state-of-the-art technology and will profit from the experiences and problems of BART.

Modern Railroads Vol. 30 No. 2, Feb. 1975, pp 60-62

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

23 084929
THE WAY IN L.A.

In November, 1974 Los Angeles voters rejected a tax to fund rapid transit system in the region. This forced the urban planners to redevelop the transit plans using existing right-of-ways and conventional equipment. It is now hoped that an integrated commuter system will be in operation in about two years that will use light rail vehicles and conventional railway coaches.

Modern Railroads Vol. 30 No. 1, Jan. 1974, pp 62-65

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

23 084943
TRANSIT: SEPTA SHOWS THE WAY

The Southeastern Pennsylvania Transportation Authority has acquired and has been integrating the various private and public mass transit facilities serving the Philadelphia metropolitan area. This article is essentially an interview with SEPTA Chairman J. C. McConnon with much additional information incorporated in the text and accompanying illustrations and boxes.

Ellsworth, KG *Railway Age* Vol. 176 No. 5, Mar. 1975, pp 40-42, 1 Fig., 1 Phot.

PURCHASE FROM: XUM Repr. PC

DOTL JC

23 090120
URBAN RAIL SUPPORTING TECHNOLOGY PROGRAM FISCAL YEAR 1973, YEAR END SUMMARY

The Urban Rail Supporting Technology Program, being conducted for the Department of Transportation Urban Mass Transportation Administration (UMTA) is described for the 1973 Fiscal Year period. Major areas covered include program management, technical support and application engineering, facilities development, test and evaluation and technology development. Specific technical discussion covers track geometry measurement, UMTA facilities development at the High Speed Ground Test Center at Pueblo, Colorado, rail car test and evaluation, especially of the State-of-the-Art-Car (SOAC) and of Boston's MBTA Green Line, instrumentation for data acquisition and processing, noise abatement methodology, and tunneling and crash-worthiness studies.

See also report dated Apr 73, PB-220 846.

Madigan, RJ
Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA-74-15, Oct. 1974, 63p

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB 238602/7ST, DOTL NTIS

23 090341
BART AND THE HANDICAPPED

A ten-year review of BART with regard to special facilities for the handicapped shows a gradual awareness of needs as citizen pressure has mounted. Special facilities for the visually and audibly disabled are not yet provided, and many elevators are awkwardly located for the physically handicapped. A study team in 1974 found many minor elevator operational problems, with an additional barrier for wheelchair users as the lack of level access to and egress from buses that transfer with BART. It is observed that new responsibility is now being taken to provide transportation for the handicapped and that BART has set a planning precedent.

Levine, R
Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development, California University, Berkeley MTC-WP-17-1-75, Nov. 1974, 67 pp

Contract DOT-OS-38176

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239211/6ST

23 090445
PLANNING MODE SELECTION AND ECONOMIC FEASIBILITY REPORT. CHARLOTTE-HENRIETTA TRANSIT CORRIDOR. VOLUME II. MODE SELECTION AND ECONOMIC FEASIBILITY

The document provides a comprehensive economic analysis of the three selected alternative rapid transit systems for the Charlotte-Henrietta Corridor. The results of this analysis indicate the economic feasibility of an optimal system and lend to the recommendation of a specific mode. Re-

quirements for implementing the most feasible rapid transit system in the Charlotte-Henrietta Corridor at the earliest possible time are identified.

See also Volume 1, PB-232 347 and Volume 2/app, PB-238 916. Prepared by Corddry, Carpenter, Dietz, and Zack, Rochester, N.Y.

Rochester-Gennessee Regional Trans Authority, Urban Mass Transportation Administration, New York State Department of Transportation, Corddry, Carpenter, Dietz, and Zack, (UMTA-NY-09-0006) Oct. 1974, 259 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239806/3SL, DOTL NTIS

23 090463

PUBLIC TRANSPORTATION FOR FLORIDA'S GOLD COAST. DADE, BROWARD, PALM BEACH, TRI-COUNTY, FLORIDA

The report is the culmination of a 4 year transit planning effort in which the entire Florida Gold Coast was viewed from a comprehensive regional perspective. In a series of 22 technical reports (described in the Appendix) the need, feasibility and detailed description of the following Florida Gold Coast transit improvements were documented. The regional perspective enabled the location of rapid transit to accommodate heavy travel demand across the Dade-Broward line. South Palm Beach/North Broward Co. local travel market was considered for dial-a-ride service. Transit from Palm Beach Co. to Broward and Dade is recommended by interfacing express buses with regional rapid transit.

Simpson and Curtin Incorporated, Urban Mass Transportation Administration SIMCUR-039-F, Sept. 1974, 45 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239861/8SL, DOTL NTIS

23 090537

ASSESSMENT OF THE IMPACTS OF THE AC TRANSIT STRIKE UPON BART

The Alameda-Contra Costa Transit District (AC Transit) and the Bay Area Rapid Transit District (BART) provide bus and rapid rail public transportation, respectively, on the east side of San Francisco Bay. On July 1, 1974, AC Transit employees began a strike that was to last 62 days. This study assesses the impacts of the strike on BART travel, on travel between the east side of the Bay and San Francisco, and on the travelers who normally used AC Transit.

Sponsored by Contract UMTA-CA-09-0042. Prepared in cooperation with Peat, Marwick, Mitchell and Co., Burlingame, Calif.

Cohn, SG Ellis, RH

Metropolitan Transportation Commission, Urban Mass Transportation Administration, Peat, Marwick, Mitchell and Company MTC-TM-11-3-75, Feb. 1975, 80 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240414/3ST, DOTL NTIS

23 090542

PHASE I-RESEARCH PLAN. INSTITUTIONS AND LIFE STYLES PROJECT. BART IMPACT PROGRAM

The report is a research plan outlining central institutions most likely to be affected by BART, most feasible for study, and most likely to produce findings of transferability to other settings for policy-related decisions. Second, selected aspects of various kinds of life-styles are reviewed and suggestions and hypotheses presented for further study of both institutions and life-styles (I and LS). The methodologies are designed to inter-connect from different angles in the study of the same problem, with a combination of ethnographic, observational, and survey research supplemented by document monitoring and analysis.

Prepared by Jefferson Associates, Inc., San Francisco, Calif.

Duster, T Fischer, C

Metropolitan Transportation Commission, Jefferson Associates, Incorporated, Department of Transportation, Department of Housing

and Urban Development, National Science Foundation PD-10-6-75, Jan. 1975, 50 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240467/1ST, DOTL NTIS

23 090874

ANNUAL REPORT 1974

The report includes such highlights of the year's accomplishments as groundbreaking in Maryland and receipt of first Metro rolling stock and 620 new Metrobuses. The year closed with 39 miles of route and 39 stations under construction, including 26 for which finish contracts had been awarded. About 4.6 miles and six stations of Metro service is scheduled to begin in early fall of 1975, with a total of 18 miles and 25 stations in service during the Bicentennial year. The price for building Metro has gone up from \$2.98 billion to \$4.45 billion, reflecting inflation, materials shortages, a major court decision, various delays, storms, strikes and other factors.

Washington Metropolitan Area Transit Authority WMTA-75/8, Dec. 1974, 26 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-240334/3ST, DOTL NTIS

23 091235

FINANCING URBAN TRANSPORTATION. PART 2. LOCAL STUDIES (A BIBLIOGRAPHY WITH ABSTRACTS)

Financing of urban transportation in local areas is presented in 95 abstracts. Although these studies might be of interest to many cities, they were originally prepared to study the financial planning of subways, bus lines, or dial-a-ride systems for a specific locality. The metropolitan areas covered include Washington, D.C., Atlanta, Milwaukee, San Francisco, Baltimore, Minneapolis, plus many other smaller communities.

Lehmann, EJ

National Technical Information Service Bibliog. Jan. 1975, 100 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

NTIS/PS-75/201/4ST, DOTL NTIS

23 091236

FINANCING URBAN TRANSPORTATION. PART 1. GENERAL STUDIES (A BIBLIOGRAPHY WITH ABSTRACTS)

Financing methods are presented to show ways in which local or regional areas can support urban transportation systems. The 65 abstracts include financing for bus lines, subways, and dial-a-ride systems. A few case studies concerning local cities are reported if they would be of general interest to other areas.

Lehmann, EJ

National Technical Information Service Bibliog. Jan. 1975, 70 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

NTIS/PS-75/200/6ST, DOTL NTIS

23 091305

INTEGRATION OF TRANSIT SYSTEMS

No Abstract.

A 4 Volume Set which includes PB-241270 thru PB-241273, and TRIS 091306 thru 091309.

Interplan Corporation May 1973, 872 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC

PB-241269-SET/ST, DOTL NTIS

23 091306

INTEGRATION OF TRANSIT SYSTEMS. VOLUME 1. CONCEPTS STATUS, AND CRITERIA

The institutional, operational and physical forms of transit integration and the intermodal and interagency approaches are defined and discussed. Current transit integration efforts are described. Standards for evaluating

existing transit systems are developed from a concept of an ideal system and typical deficiencies of U.S. systems and their causes are described. These standards are then used to evaluate and compare transit systems of London, Hamburg, and Paris with those of three U.S. urban areas. Criteria are presented for selecting demonstration projects. Also considered are benefits and costs involved in improving public transit through integration and related measures.

Paper copy also available in set of 4 reports as PB-241 269-SET, PC\$25.00.

Krzyczkowski, R Vuchic, V Remak, R
Interplan Corporation, Urban Mass Transportation Administration,
(UMTA-RI-06-0005) Vol. 1 7123-R, May 1973, 145 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241270/8ST, DOTL NTIS

**23 091307
INTEGRATION OF TRANSIT SYSTEMS. VOLUME II.
INTEGRATED EUROPEAN TRANSIT SYSTEMS**

This is the second of a three volume report designed to assess the potential for interagency and intermodel integration of transit systems in U.S. urban areas, drawing on an analysis of the successful experience of European systems. This volume describes in detail four major European transit systems (London, Hamburg, Paris, and Munich); gives brief descriptions of six others (Newcastle upon Tyne, Edinburgh, Stockholm, Gotenburg, Copenhagen, and Oslo); and summarizes and appraises the applicability to U.S. transit systems of techniques which have contributed to the success of these European systems.

Paper copy also available in set of 4 reports as PB-241 269-SET, PC\$25.00.

Krzyczkowski, R Vuchic, V Remak, R
Interplan Corporation, Urban Mass Transportation Administration,
(UMTA-RI-06-0005) Vol. 1 7123-R, May 1973, 322 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241271/6ST, DOTL NTIS

**23 091308
INTEGRATION OF TRANSIT SYSTEMS. VOLUME 3. TRANSIT
INTEGRATION IN U.S. URBAN AREAS**

This is the third of a three volume report designed to assess the potential for interagency and intermodel integration of transit systems in U.S. urban areas, drawing on an analysis of the successful experience of European systems. This volume deals with the application of techniques which have contributed to the success of European systems to three major U.S. cities: Philadelphia, San Francisco, and Seattle. This application of techniques was also tested in an archetypal smaller urban area, 'Middletown'.

Paper copy also available in set of 4 reports as PB-241 269-SET, PC\$25.00.

Krzyczkowski, R Vuchic, V Remak, R
Interplan Corporation, Urban Mass Transportation Administration,
(UMTA-RI-06-0005) Vol. 3 7123-R, June 1973, 332 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241272/4SY, DOTL NTIS

**23 091309
INTEGRATION OF TRANSIT SYSTEMS. VOLUME 4. SUMMARY**

This summary volume contains conclusions reached in the three main volumes of the report, 'Integration of Transit Systems.' The objective of the report is to assess the potential for interagency and intermodal integration of transit systems in U.S. urban areas, drawing on an analysis of the successful experience of European transit systems.

Paper copy also available in set of 4 reports as PB-241 269-SET, PC\$25.00.

Krzyczkowski, R Vuchic, V Remak, R
Interplan Corporation, Urban Mass Transportation Administration,
(UMTA-RI-06-0005) Vol. 4 7123-R, Oct. 1973, 73 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241273/2ST, DOTL NTIS

**23 091310
BART IMPACT PROGRAM: ENVIRONMENT PROJECT
PRELIMINARY FINDINGS-BARRIERS**

The construction of the BART system inevitably resulted in changes to patterns of vehicular and pedestrian movement. This preliminary analysis assesses the effect of BART facilities on the ease and hindrance of vehicular and pedestrian movement in areas adjacent to BART lines and stations. The assessment describes and quantifies the relationship between BART and other transportation facilities (freeways, railroads and arterials) acting as barriers. It also includes a description of the extent and locations where BART has created new barriers to pedestrian and vehicular movement patterns, and goes on to describe how BART has tried to mitigate barrier impact.

Prepared in cooperation with Gruen Associates, Los Angeles, Calif. and De Leuw, Cather and Co., San Francisco, Calif.

Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development, Gruen Associates, Incorporated, De Leuw, Cather and Company Tech. Memo MTC-TM-12-4-75, Mar. 1975, 45 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241287/2ST, DOTL NTIS

**23 095209
AN ASSESSMENT OF THE RESEARCH CARRIED OUT BY THE
USSR RESEARCH INSTITUTE FOR RAILWAY TRANSPORT
AND THE PRINCIPAL AIMS OF THE INSTITUTE [Itogi nauchnyh
issledovanij i osnovnye zadaci Instituta]**

The article takes stock of the problems examined in 1973 at the USSR Research Institute for Railway Transport. These problems concern practically all aspects of railway transport. The Institute has carried out studies which were a basis for the modernisation work begun of the Moscow-Leningrad line with a view to increasing train running speeds to 200 km/h. Tests are under way on the Baltic network and the ER 200 electric train set will be placed in regular service in the near future. The Institute also participated in the construction and successful testing of the first electric railcar in the world with 3000 kW engine and no collector. The electric railcars could have a rated output of 10-12,000 kW in the near future. In 1973 tests were carried out successfully on the automatic control of a trainset on a suburban line. Two of this type of trainset will be built during this year and eighty in 1975-1976. [Russian]

Vestnik Vniizt Vol. 33 No. 4, 1974, pp 1-6

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Vestnik Vniizt Moscow, USSR Repr. PC

**23 095238
OUT OF THE HIGHWAY STRAIT-JACKET**

New Jersey has the oldest state transportation office in the United States. The department subsidizes 483 route miles of rail operations and 20 bus companies. The state owns the cars but no track although this may soon change as all the passenger carrying railways are bankrupt. The Department of Transportation is restricted by budget constraints but hopes to buy track and preserve essential freight and passenger traffic.

Modern Railroads Vol. 30 No. 3, Mar. 1975, pp 56-60

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

**23 095241
TERMINAL EQUIPMENT FOR MARS-105 SEAT RESERVATION
SYSTEM**

The seat reservation system, MARS 105, for the Japanese National Railways is one of the largest on-time systems in Japan, and meets the demand for extremely high system availability. The terminal equipment consists of a terminal controller (with operational board) and a ticket printer. Integrated circuits (IC) are used for the controller to achieve compact construction, and the controller and operational board are combined into a desk. The operational board has three types of input devices-ten key (numeric keyboard switch), full key, and page-designed to input request infor-

mation such as the date of boarding and the name of train. It also has lamps to display input and answer message. The controller consists of IC logic circuits (and their power supply) for input control in the reading, storing, displaying, and editing of input information; control of transmission to and reception from the central unit; and of output control in answer messages checking and printing. The ticket printer is designed to print out answer messages obtained from the central unit. The ticket printer is composed of a 128-character impact printer (printing speed: 20 character/second) and a printing controller.

Hosono, H (Japanese National Railways); Fukami, M Sawada, G Otani, A Minami, T Kikuta, S *Hitachi Review* Vol. 23 No. 12, Dec. 1974, pp 447-451

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

23 095251
APPROACH TO THE EVALUATION OF CHANGES IN TRAVEL UNRELIABILITY: A "SAFETY MARGIN" HYPOTHESIS

Even where unreliability has been recognized as a significant component in the generalized cost of trip-making, few attempts have been made to quantify it in the evaluation of transport improvements. This neglect is perhaps explained by the difficulty of observing a suitable "trade-off" situation in which transport users can trade money directly or indirectly for improved reliability of their transport modes. This article investigates the characteristics of a possible trade-off which might be made by commuters—the allowance of extra time for traveling in order to avoid unpredictable lateness at destination. The form of the costs of a response to unreliability of this nature is considered within a more general framework of the allocation of time under uncertainty or risk conditions. Certain other approaches to the evaluation of travel unreliability are reviewed and a brief outline is given to a current research project which attempts to test the applicability of the "safety margin" in London commuters' timing of the trips that they take to work.

Knight, T (Department of the Environment, England) *Transportation* Vol. 3 No. 4, Dec. 1974, pp 393-408, 6 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 095252
SYSTEM OPTIMIZATION WITH DIFFERING DEMANDS FOR SERVICE

For a given objective function which can be used for a system serving a single demand point, this paper defines a technique by which that objective function can be used to define an aggregate objective function for optimizing a system which is required to serve several different demand points. The objective function is defined for conditions under which demand is inelastic and all costs incurred by a group of users representing a single demand point must be paid by that group of users. The second condition is the same as the first, but with elastic demand. For the third condition, the problem of cross-subsidization among various users of the system is considered. The demand is considered to be elastic. Examples of the use of the technique for a commuter railroad are presented. In the examples, the objective function is the user cost where the cost includes fare, travel time, and the cost of inconvenience due to lack of service frequency.

Eberle, WR (Purdue University) *High Speed Ground Transportation Journal* Vol. 9 No. 1, 1975, pp 407-416, 4 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 095260
IMPROVEMENTS OF RAPID TRANSIT SYSTEM GOODNESS

The goodness of a rapid transit system depends on such factors as headway, average commercial speed through the system, capacity per unit train and safety. Improvement of system goodness can be achieved by optimizing each of these parameters. As they are interdependent, their relationships have to be analyzed. One method of improving system good-

ness is to use a double arrival track at each station. This configuration allows capability for future expansion and provides excellent system flexibility under track outage conditions. Use of this track configuration in downtown areas with optimized train routing strategies can provide maximum utilization of physical facilities and rolling stock, and provide the public with more transportation per dollar of cost. This paper discusses the relationship of the above factors and the advantages of using double arrival tracks at stations.

Kalra, P (Bechtel Corporation); Oswald, R *High Speed Ground Transportation Journal* Vol. 8 No. 3, 1974, pp 185-193, 3 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 095261
POTENTIAL IMPACTS OF RAPID TRANSIT AND PUBLIC RESPONSES TO RAPID TRANSIT PLANS

An analysis is presented of potential impacts of rapid transit systems, and some ways in which such an analysis can aid in achieving widespread public support for the rapid transit system itself. The analysis of the rapid transit plan developed for the St. Louis region is analyzed and its potential impacts are specified. A comparison is made of these impacts with preferred system features and goals desired by the region's residents. This report is not only a case study of a rapid transit planning experience, but also a description of several innovative planning procedures, especially in the area of identifying potential coalitions among regional factions so that support for the proposed system could be increased.

Hinkle, JJ (Consad Research Corporation); Lowrey, RA Yedla, V *High Speed Ground Transportation Journal* Vol. 8 No. 1, 1974, pp 87-123, Refs.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 095295
TRANSPORTATION PLANNING FOR A NEW CITY IN A DEVELOPING COUNTRY

With rapid urbanization, planning and constructing new cities is, perhaps, equally common in the developing and the developed countries. The methods evolved for transportation planning (an important component of the urban planning process) for the developed countries would not, however, be directly applicable to the situation in the developing countries. A developing country has severe constraints; mainly relating to limited resources, the need to depend on and conserve indigenous resources, the paying capacity of the average citizen and the effect of the cost of transportation on the overall economy. An urban transportation plan for a new city near Bombay in India was evolved under such constraints. The article describes the criteria evolved for the transportation plan and describes the methodology of evolving a land use—transportation system for the new city. The factors which controlled the evolution of this plan have also been discussed.

Ajgaonkar, RB (City & Industrial Development Corp. of Maharashtra) *Transportation Planning and Technology* Vol. 2 No. 4, 1974, pp 263-270, 1 Fig., 3 Tab.

ACKNOWLEDGMENT: Transportation Planning and Technology
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 095381
RAILWAY SERVICES COVERING THE NEW TOWN OF EVRY [Desserte ferroviaire de la ville nouvelle d'Evry]

This detailed memorandum explains the stage reached in the infrastructure work for construction of the line from Grigny to Corbeil via Evry. Electrified with 1500 V direct current, this 10.7 km line, which is a diversion from the main Paris-Corbeil route, is designed to serve 14 localities through 4 stations. The report includes numerous statistical data on the geological studies covering the site, the constraints imposed by urbanization of the region served and various details relating to the civil engineering work and the buildings intended for passengers and operation of the line. [French]

Gambart, H *Informations Techn SNCF-Direction de l'Equipement* No. 13, June 1974, pp 3-18, 16 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Societe Nationale des Chemins de Fer Francais Paris, France Repr. PC

23 095391

DOES SHORT DISTANCE PASSENGER TRAFFIC REALLY ALWAYS HAVE TO BE LOSS-MAKING? [Ist Schienenpersonennahverkehr eigentlich nur defizitaer zu betreiben?]

Eighty-nine percent of one thousand million passengers on the DB travelled on short distance services and 550 million passengers travelled at reduced fares. The percentage by which expenditure is covered has risen to 104% for long distance traffic but only 27% for short distance traffic. The cost per passenger-kilometer for short distance passenger traffic corresponds to 270% of long distance passenger traffic. Because of the nature of short distance rail traffic demand, all major short distance traffic undertakings are loss-making. Reductions in expenditure by cutting reserve capacity for peak periods would be very small and increases in the average transport price to cover costs are impossible. It is essential, however, that graduated price increases should be envisaged especially for season tickets. All steps taken will help cut down the deficit but will never remove it entirely. [German]

Stertkamp, W *Die Bundesbahn* Vol. 50 No. 9, Sept. 1974, pp 553-556

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

23 095400

AUTOMATIC TICKET ISSUING MACHINES ON FRANKFURT/MAIN'S URBAN AND SUBURBAN RAIL NETWORK [Fahrausweisautomaten der S-Bahn Frankfurt/Main]

Automatic issuing machines print and sell tickets prepared in accordance with the spacing of fare scales and taking account of certain supplementary charges. In addition, they must comply with the requirements of the financial and commercial departments as well as the demands of economical maintenance. They are fitted with a device which warns the Control Office when change or the cardboard stock run out. The machines are equipped with a micro-computer and a central unit to cover all control and data processing functions. In order to enlarge the capacity of the system, it is possible to add storage registers for invariable data and miniprogrammes (read only memory), storage registers with aleatory access (random access memory), as well as registers for enlarging the system's input and output capacity. [German]

Kopp, H *Signal und Draht* Vol. 66 No. 6-7, June 1974, pp 123-132, 13 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Verlag Dr Author Tetzlaff Niddastrasse 64, Frankfurt Am Main, West Germany Repr. PC

23 095402

SIMULTANEOUS CALCULATION OF TRIP DISTRIBUTION AND MODE CHOICE [Simultaan berekenen van verplaatsingsdistributie en vervoerswijzekeuze]

This article describes a model for simultaneous calculation of trip distribution and mode choice. Compared with the model that deals with the various parts of the arithmetical process step by step (in sequential order) this model has the advantage that its explanatory variables are consistent. A second advantage of this model is that the trip distribution is a function of the use of vehicle, quantities that influence each other. Consequently a simultaneous calculation of trip distribution and mode choice is a better procedure to interpret transportation behavior than a calculation in sequential order. This will be elucidated in order to explain transportation behavior on car-free Sundays in the Netherlands in 1973. The influence of the susceptibility of the distribution function to the use of vehicle has been examined it has been established that a simultaneous calculation of trip distribution and mode choice is particularly of importance if alternative modes of transportation are applied as, for instance, is the case with studies on a regional and national level. So far the development of the model for simultaneous calculation has been hampered by the inability to estimate its coefficients. In the next article it will be ascertained how this estimate can be effected.

Hamerslag, R *Verkeerstechneek* No. 10, 1974, 5 pp

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Dutch Touring Club ANWB Wassenaarseweg 220, Box 2200, The Hague, Netherlands Repr. PC

23 095645

PASSENGER INFORMATION IN URBAN RAILWAYS [Fahrgastinformation Im S-Bahnbereich]

The existence of information facilities is a decisive factor in the attraction of mass transit systems. The author, using the example of the Munich urban railway, explains how passengers obtain information about the journey, fare, departure time and platform, special services provided, etc. Train arrival and any interesting item of information are given over the public address system. Other features quite useful to passengers are: network map on the train, adequate signposting in stations, indications regarding connection possibilities and the geographical position of the station in the town, etc. [German]

Claussnitzer, OH *Die Bundesbahn* Vol. 50 No. 8, Aug. 1974, pp 501-506, 13 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

23 095655

COACH CLEANING-A CONTRIBUTION TOWARDS IMPROVING THE DB'S SERVICE OFFER [Reinigung der Reisezugwagen-Ein Beitrag zur Verbesserung des Leistungsangebotes der DB]

The DB is using more and more modern coaches and spending large sums of money on coach cleaning and maintenance. The outsides of all coaches are cleaned once a week and the inside daily. Daily cleaning is done by wiping with a damp cloth, major cleaning is done monthly and there are other occasional cleanings. Luxury trains and trains which get very dirty in service always have a member of the cleaning staff on board. Keeping long-distance trains cleaned is particularly difficult.

Ruhland, R Hofmann, R *Die Bundesbahn* Vol. 50 No. 9, Sept. 1974, pp 571-574, 3 Fig., 2 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

23 095662

VENT AND STATION TEST (VST) FACILITY DESIGN

In view of the fact that virtually no quantitative information is available regarding the airflow properties of subway vent shafts and stations, DSI-AT has undertaken the study of these properties and the design and construction of a unique test facility to obtain this missing, yet crucial data. The VST facility will supply the information required to characterize the airflow properties in subway vent shafts, transition sections, and stations in terms of rational parameters. These experimentally determined parameters will serve both as critical experimental inputs for the theoretical computer analysis and to provide needed guidance for effective experimental work in DSI-AT's subway aerodynamic test (SAT) facility.

This report was prepared for U.S. DOT, Urban Mass Transportation Administration. See also RRIS Nos. 095663 through 095668, Section 23, RRIS Bulletin 7502.

Developmental Sciences, Incorporated Tech Rpt. UMTA-DC-MTD-7-71-11, Jan. 1971, 51 pp

ACKNOWLEDGMENT: Institute for Rapid Transit PURCHASE FROM: NTIS Repr. PC

PB-201881, DOTL NTIS, DOTL TF845.D38

23 095663

SUMMARY REPORT OF ACTIVITIES AND ACCOMPLISHMENTS OF PHASE I

The report describes the various task assignments that were undertaken by all participating contractors during the first year of the IRT project. It includes highlights of these activities and identifies the major accomplishments. A list of the total of 37 interim and milestone technical reports prepared during the year is included. Abstracts or a condensed digest of some of the more significant reports are contained in this report.

This report was prepared for the Institute for Rapid Transit, Washington, D.C. and sponsored by the Urban Mass Transportation Administration, U.S. DOT. See also RRIS Nos. 095662, 095664 through 095668, Section 23, RRIS Bulletin 7502.

Parsons, Brinckerhoff, Quade and Douglas, Inc Final Rpt. UMTA-DC-MTD-7-71-37, Oct. 1971

Contract DOT-UT-290

ACKNOWLEDGMENT: Institute for Rapid Transit
PURCHASE FROM: NTIS Repr. PC

PB-205259, DOTL NTIS, DOTL TF845.P284

23 095665

VEHICLES IN CONFINED SPACES (VICS 120) FACILITY DESIGN

This report describes the fabrication and assembly of the VICS-120 facility on site at JPL including erection of the plenum scaffold, installation of the 2-in. test section tube, preparation of the control room, instrumentation and initial shakedown of the facility.

This report was prepared for the Institute for Rapid Transit, Washington, D.C. and sponsored by the Urban Mass Transportation Administration, U.S. DOT. See also RRIS Nos. 095662 through 095664 and 095666 through 095668, Section 23, RRIS Bulletin 7502.

California Institute of Technology UMTA-DC-MTD-7-71-19, 1971, 70 PP

Contract UT-290

ACKNOWLEDGMENT: Institute for Rapid Transit
PURCHASE FROM: NTIS Repr. PC

PB-203776, DOTL NTIS, DOTL TF845.C26

23 095666

DEVELOPMENT OF BASIC MATHEMATICAL MODELS FOR SUBWAY ENVIRONMENTAL SIMULATION

This report describes preliminary theoretical investigations into the nature of air flow and heat flow in an underground rapid transit system. Calculations included in the report demonstrate that the air flow in a subway system may be regarded as incompressible, and based on these findings a mathematical model describing the unsteady air flow generated by a train operating in a single-track subway system has been developed. In addition to these air flow investigations, a mathematical model describing heat flow in a subway tunnel has been created. The theoretical development leading to these two mathematical models is presented and results from the corresponding preliminary computer programs are included. A detailed discussion is provided describing the objectives of the next portion of the investigation, which include expanding these two programs and integrating them with a train performance program and a soil heat-sink model.

This report was prepared for the Institute for Rapid Transit, Washington, D.C. and sponsored by the Urban Mass Transportation Administration, U.S. DOT. See also RRIS Nos. 095662 through 095665 and 095667 and 095668, Section 23, RRIS Bulletin 7502.

Parsons, Brinckerhoff, Quade and Douglas, Inc Intrm Rpt. UMTA-DC-MTD-7-71-5, Mar. 1971

ACKNOWLEDGMENT: Institute for Rapid Transit
PURCHASE FROM: NTIS Repr. PC

PB-201879, DOTL NTIS, DOTL TF845.P283

23 095667

APPLICATION OF SCALING DATA TO MODEL TESTS TO OBTAIN FULL-SCALE RESULTS

The purpose of this document is to consider at the beginning of the Subway Environmental Research Project, the methodology for relating the experimental scale modeling data to full-scale predictions. The similitude laws being developed at CIT/JPL are considered in terms of their application to the geometrically scaled experiments to be run at DSI/AT. A procedure for scaling the DSI/AT data at full-scale is discussed and examples are given.

This report was prepared for the Institute for Rapid Transit, Washington, D.C. and sponsored by the Urban Mass Transportation Administration, U.S. DOT. See also RRIS Nos. 095662 through 095666 and 095668, Section 23, RRIS Bulletin 7502.

Developmental Sciences, Incorporated UMTA-DC-7-71-10, Mar. 1971, 12 pp

Contract UT-290

ACKNOWLEDGMENT: Institute for Rapid Transit
PURCHASE FROM: NTIS Repr. PC

PB-201880, DOTL NTIS, DOTL TF845.D35

23 095668

SUBWAY AERODYNAMIC AND THERMODYNAMIC TESTS

The purpose of this report is to present, describe and interpret the test data generated in the SAT Facility (double track, rectangular cross section tunnel, smooth, with a solid dividing wall, 15% porosity curtain wall and open except for periodic columns). In particular aerodynamic data for 3 trains of blockage ratios varying between 0.35 and 0.75 is described for steady and unsteady runs. Comparison with the CalTech theoretical work is made.

This report was prepared for the Institute for Rapid Transit, Washington, D.C. and sponsored by the Urban Mass Transportation Administration, U.S. DOT. See also RRIS Nos. 095662 through 095667, Section 23, RRIS Bulletin 7502.

Developmental Sciences, Incorporated Tech. Rpt. UMTA-DC-06-0010-7217, Oct. 1972, 74 pp

Contract SC-72-200

ACKNOWLEDGMENT: Institute for Rapid Transit
PURCHASE FROM: NTIS Repr. PC

PB-220807, DOTL NTIS, DOTL TF845.D37

23 095722

COMPILATION OF TIME TABLES, OPERATING SCHEDULES AND DUTY ROSTERS BY HEURISTIC PROCESS WITH THE AID OF EDP

The objective of this development was relieving scheduling offices of a periodic, expensive manual process, simultaneously optimizing criteria by complete integration of all related transport and operating requirements and restrictions and of legal and collective wage agreement regulations. The goals were minimizing of deadheading of equipment, minimizing of the crew costs and other means of reducing operating expenses. The eventual goals will be graphical production of timetables and the optimization of connections between different routes.

Kregeloh, H Netzband, I Mojsilovic, M *Union Internationale des Transports Publics, Revue* Vol. 24 Jan. 1975, pp 81-86, 3 Fig., 3 Ref.

PURCHASE FROM: Union Internationale des Transports Publics Avenue de l'Uruguay 19, B-1050 Brussels, Belgium Repr. PC

23 095723

MARKETING OF HIGH SPEED GROUND TRANSPORT

This paper outlines the major problems and decisions that must be considered in developing a successful marketing program for a high speed ground transport system. Each of the major elements of an integrated transport marketing program is considered: product-policy; pricing structure and strategy; selection of marketing channels; and choice of promotional media. In addition, the paper examines some of the special problems encountered in conducting market research when the product under study involves transport services. Finally, the paper explores several of the problems and issues involved in attempting to develop an effective transport marketing program under government regulatory constraints.

Hooper, TJ Johnston, EE
Canadian Transport Commission #114, Jan. 1975, 27 pp, 1 Tab., 6 Ref.

ACKNOWLEDGMENT: Canadian Transport Commission
PURCHASE FROM: Canadian Transport Commission Systems Analysis Branch, 275 Slater Street, Ottawa K1A 0N9, Ontario, Canada Repr. PC
DOTL RP

23 095864

MODAL SPLIT CONSIDERATION ON LONG DISTANCE PASSENGER TRAFFIC: EFFECTS OF DIFFERENT RELATIVE INCREASE IN TRANSPORTATION COSTS, COVERED BY HIGHER ENERGY PRICES

The purpose of this paper is to develop a model explaining the relative

distribution of long distance passenger traffic mainly on railway and air transport. Further it is shown how increased prices of energy influence the relative distribution. Data from Norway are used to estimate coefficients in a model based on the logistic curve. Increase in energy prices are shown for railways, air and passenger cars. Theoretical calculations indicate in a certain case a 40 per cent increase in railway traffic due to increased fares, whereas traffic counts show 36 per cent. /Author/TRRL/

Slettemark, R *Transportation Research* Vol. 8 No. 4/5, Oct. 1974, pp 409-413, 3 Fig., 3 Tab., 2 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211654)

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 096544

VICTORY IN SIGHT ON THE INTER-CITY FRONT

Though hard-pressed by competition from air and the private car, a relentless drive to raise the quality of long-distance trains maintained a slow growth of business in the past 20 years, even though SNCF'S share of the intercity passenger market declined. From 1980 the Paris-Sud-Est scheme will revolutionize rail's competitive position over a large segment of the country leading to important savings of energy.

Hutter, R (French National Railways) *Railway Gazette International* Vol. 131 No. 4, Apr. 1975, pp 136-141, 2 Fig., 1 Tab.

PURCHASE FROM: XUM Repr. PC

DOTL JC

23 096554

REBIRTH OF THE STREETCAR

Like the old streetcar, newly designed light rail vehicles are capable of moving large numbers of people efficiently. The reappearance of this old transit idea in a new form is due to a combined Government and industry program. Both entities see the streetcar as one answer to the urban-transportation dilemma in our cities, caused by too few transit riders.

Aronson, RB, *Machine Design* Vol. 46 No. 29, Nov. 1974, pp 20-22

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 096561

REPORT TO CONGRESS. THE RAIL PASSENGER SERVICE ACT OF 1970.

This report was submitted to Congress pursuant to the Rail Passenger Service Act of 1970 that requires the Secretary of Transportation report on and evaluate the effectiveness of the Act in achieving and promoting intercity rail passenger service and on the effectiveness of Amtrak. Part I summarizes the material in the Report. Part II discusses scheduling, on-time performance, equipment acquisition, and reservations and fares in the light of Amtrak's precedents. Part III considers the orderly assumption by Amtrak of all its operations and the control exercised by its management along with potential benefits from mail transport and problems of track improvements. Part IV evaluates routes and services, present and future. Part V has legislative recommendations.

Department of Transportation Mar. 1973, 110 pp, Figs., Tabs.

PURCHASE FROM: DOT Repr. PC

HE 2705.E153 1973

23 096576

RAPID TRANSIT AND OFFICE DEVELOPMENT

The Lindewold rapid transit service has had a considerable impact upon the commercial office market in the Philadelphia region. The line is acting simultaneously to consolidate the Philadelphia central business district as a prime office location and to promote the development of new suburban office locations. All the implications of these developments will require further analysis. It is suggested that theoretical and empirical analyses of urban rapid transit impact might well be tested in the Philadelphia region and that a complete appraisal will require the passage of more time.

Gannon, CA Dear, MJ *Traffic Quarterly* Apr. 1975, pp 223-242, 2 Fig., 6 Tab.

PURCHASE FROM: ESL Repr. PC, Microfilm

23 096581

THE REVIEW AND EVALUATION OF THE ECONOMIC AND TECHNICAL RESULTS OF THE AUTOMATION OF METROPOLITAN RAILWAYS. EFFECTS OF THE ENERGY CRISIS ON THEIR OPERATION

After noting that automation is particularly suitable for operations of metropolitan railways, this report to the UITP 1975 International Congress summarizes the results of a survey of technical and economic results of automated train running and station operations. The objectives and evaluations of automation are listed, with the need for analyses based on multiple criteria being stressed. The potential for minimizing energy consumption through automatic train operation is also discussed.

Presented at the 41st International Congress, Nice, France, 1975. Also available in French and German.

Essig, P Berry, FT

International Union of Public Transport 1975, pp 3-11

PURCHASE FROM: International Union of Public Transport 19 Avenue de l'Uruguay, Brussels B-1050, Belgium Repr. PC

DOTL RP

23 096582

METHODS AND THEORETICAL BASES FOR THE TRAFFIC PLANNING OF RAPID TRANSIT LINES

This investigation, a report to the UITP 1975 International Congress, is intended to indicate the planning data and usual methods applied to rapid transit plans. A questionnaire was sent to UITP member administrations and transport experts in the U.S. and Germany supplied the data utilized. To the extent possible, the planning processes are compared to enable planners to exchange experiences. The degree to which technical and economic sciences can supply decision aids for rapid transit planning are examined. Based on present planning methods, the report recommends certain further developments for such methodology.

Presented at the 41st International Congress, Nice, France, 1975. Also available in French and German.

Robbins, RM Pampel, F

International Union of Public Transport 1975, pp 5-28, Tabs., Apps.

PURCHASE FROM: International Union of Public Transport 19 Avenue de l'Uruguay, Brussels B-1050, Belgium Repr. PC

DOTL RP

23 096583

INTERACTION BETWEEN PUBLIC TRANSPORT AND URBAN TRANSPORT

This report, prepared for the UITP 1975 International Congress, examines metropolitan transportation after first pointing out that the central city cannot be considered as a separate element. Public transport has to be a vital element in the implementation of planning. Conceding that there is a role for the automobile, it is concluded that further demands for urban mobility that accompany economic growth will have to be met primarily by public transport. Among the recommendations: Public surface transport must be given absolute priority; public underground transport must be provided or extended; land development must be planned to locate secondary centers of expansion close to the more developed and congested central zones. Finally separate fare systems and administrations must be abandoned.

Presented at the 41st International Congress, Nice, France, 1975. Also available in French and German.

Paschetto, A

International Union of Public Transport 1975, pp 5-57, Figs., Tabs., 24 Ref.

PURCHASE FROM: International Union of Public Transport 19 Avenue de l'Uruguay, Brussels B-1050, Belgium Repr. PC

DOTL RP

23 096602

WASHINGTON, D.C., METRO: AT WHAT REAL PRICE THE "BENEFITS"?

There is general public enthusiasm for a rapid rail transit system in Washington, DC, primarily because it would reduce surface congestion at rush hours. METRO, as it is now designed, may nevertheless prove to be a poor second choice to the automobile by suburban commuters for destinations

other than the CBD and, at the same time, fail to provide satisfactory service for the transit-dependent. If downtown employment projections (and consequently, planned patronage) are not realized, the "benefits" of METRO will in no way justify the costs of the inflexible fixed-track system.

Brooks, EG (Institute for Defense Analysis, Evaluation Div)
Transportation Planning and Technology Vol. 2 No. 2, 1973, pp 105-119, 45 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP, DOTL JC

23 096616

THE IMPORTANCE OF TRANSPORT AND THE CHARGE ON THE NETWORK WITH CONVENTIONAL AND PLANNED ORIGINAL SHORT DISTANCE TRANSPORT SYSTEMS. USE OF AN INTEGRATED OVERALL MODEL FOR TRAFFIC FOR DETERMINING THESE FACTORS [Verkehrswert und Netzbelastung bei konventionellen und projektierten individualisierten Nahverkehrssystemen. Einsatz integrierter Gesamtmodells fuer den Verkehr zu ihrer Bestimmung]

Transport planning by the Federal German Government is in favour of conventional public transport systems for short distance passenger traffic which do not give a good overland service. The service goes all along a given line. This is the reason why conventional public transport does not sufficiently attract car-drivers and so non-conventional systems are being developed. The author assesses transport modes taking into account of the technical and economic viewpoint and also questions about environmental protection. Using the methods described, it is possible to assess the interaction of the transport systems, the operating methods of the modes of transport, the distribution of demand in towns, the size and shape of towns, taken overall. [German]

Fischer, AH *Verkehr und Technik* Vol. 27 No. 8, Aug. 1974, pp 287-292, 7 Fig., 2 Tab., 3 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: Schmidt (Erich) Verlag Herforder Strasse 10, 4800 Bielefeld, West Germany Repr. PC

23 096669

TERMINAL ACCESS TIMES IN NORTH-WEST ENGLAND

An exercise was carried out on access times by rail and road links to mainline railway terminals in North-west England. The average rail journey time to London was calculated by two methods. Firstly, it was assumed that all trips were made via a single centre, and secondly, the region was divided into 4 or 8 zones, each with its own railhead. The conclusion was that using a single centre over-estimates the journey time, but the average time with a small number of centres tends to agree with the average times to the railheads. /Author/TRRL/

Walmsley, Da Cox, M
Transport and Road Research Laboratory Supp Rpt. #73 uc, 1974, 7 pp, 2 Fig., 3 Tab., 4 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211352S)

PURCHASE FROM: Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU, England Repr. PC

23 096679

A VIEW OF THE FUTURE FOR HIGH-SPEED GUIDED GROUND TRANSPORT

The author discusses the high speed train (HST) and advanced passenger train (APT) in relation to the present high speed strategy of British Rail. Details are given of recent improvements in inter-city services which include increased frequency of services, improvement of the quality of the ride, reliability and safety, and reduction in journey time. Two new approaches to reduced journey time, HST and APT, are described. HST is designed to provide 200km/h combined with good braking and passenger comfort and incorporates improved stability of guidance. Reference is made to guidance-hunting and the effect of worn wheel tread profile on the cone angle. APT has been designed to work on existing track at a target speed of 250km/h. Special reference is made to the problems of negotiating curves. A study is presented of possible future developments in

relation to need and the reward for matching the need and a number of alternative solutions is outlined. The discussion is illustrated with three possible guided ground transport systems which are designed to operate at speeds of up to 300km/h, 400km/h and above 400km/h respectively. Reference is made to the use of modern technology (such as paved concrete track), the need for further research (such as in the areas of magnetic suspension and alternative linear motors) and the possible need for evacuated tubes to replace track. /TRRL/

Newman, M *Society of Engineers, Journal of* Vol. 64 No. 4, Oct. 1973, pp 86-96, 4 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 400024S)

PURCHASE FROM: ESL Repr. PC, Microfilm

23 096680

STEEL ON STEEL FOR BRITISH RAIL

This report describes British Rail's advanced passenger train (APT). The success of the APT depends not on revolutionary power plant (it is powered by gas turbines) but on its suspension system. Modification of the ordinary railway wheel set facilitates high speed running even on existing track. Greater speeds can be achieved by modifications to the track which would also benefit normal services. Improved brakes mean that the APT will be compatible with existing signalling equipment. It is expected that the APT will eventually have to be succeeded by a completely new system as traffic is expected to increase to saturation point after its introduction. /TRRL/

Wilson, J *Nature* Vol. 248 No. 5448, Apr. 1974, p 465, 1 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 400023S)

PURCHASE FROM: Macmillan Journals Limited 4 Little Essex Street, London WC2R 3LF, England Repr. PC

23 097063

VALUE OF TIME IN INTER-CITY TRAVEL

The author discusses inter-city travel in Sweden and compares different modes of transport from distance and developmental points of view. He mentions six parameters of modal split inter-city travel, two of which he considers are growing in importance, viz. Availability and speed. The relation between speed and fares can in a competitive situation be illustrated by the parameter "price per hour saved." The modal split between air and rail traffic is shown to have a high correlation with this concept. An analysis has been performed on railway service in Sweden and on air services in intra European traffic, showing high elasticity in the market with respect to frequency of service in public means of transport. /TRRL/

Bjoerkman, B
Royal Institute of Technology, Sweden R&D Rpt. No. 37, 1973, 25 pp, 11 Fig., 3 Tab.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211696)

23 097234

MEASUREMENT OF URBAN TRAVEL DEMAND

This paper suggests approaches to advancing the behavioral theory of travel demand and discusses some currently unresolved empirical questions on the determinants of travel behavior. Urban travel demand is the result of aggregation over the urban population, each member of which is making individual travel decisions based on his personal needs and environment. Travel is not normally an end objective of the consumer but rather a concomitant of other activities such as work, shopping, and recreation. Thus, it is natural to analyze travel demand within the framework of the consumption activity—i.e., household production models. Selected results are presented from a pilot study of rapid transit demand forecasting in the San Francisco Bay Area.

McFadden, D *Journal of Public Economics* Vol. 3 No. 4, Nov. 1974, pp 303-328

PURCHASE FROM: North-Holland Publishing Company P.O. Box 211, Amsterdam, Netherlands Repr. PC

23 097278

THE IMPROVEMENT AND FUTURE DEVELOPMENT OF THE RAILWAYS. THE ROLE OF MARKETING IN THE CONTEXT OF MEDIUM TO LONG DISTANCE PASSENGER TRAFFIC IN EUROPE

As railroads of the European Economic Community move closer together, major decisions will have to be taken on marketing of passenger services. Since railways are not a monopoly, the customer must always be of paramount importance with service being provided for him and not for the convenience of the railway. Discussed in this report are significance of marketing, the competitive environment, the marketing approach versus the production approach, analysis of demand, activities for which railways are best suited, market segmentation, elements determining marketing success, and product development.

Woodruff, JGW (British Rail Headquarters) *Rail International* Vol. 6 No. 4, Apr. 1975, pp 233-245

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

23 097283

LEVEL-OF-SERVICE CONCEPT FOR EVALUATING PUBLIC TRANSPORT

A system of evaluating service variables common to all public transport modes is proposed so that an existing system may be managed or improved and a new system may be built on the basis of its ability to fulfill a desired level of service. The variables discussed are those directly perceived by the user regardless of mode: overall trip speed and en route delay and comfort factors associated with the vehicle including density, acceleration, jerk, temperature, air flow, and noise. Improving one or more of these measurable variables bears an associated cost and design requirement. Since better service is desirable in certain situations while average service is sufficient in others, levels of service A through F are adopted for each variable. In the proposed system, level of service is determined by the use of a weighted average of rankings assigned to individual factors. Within tolerable limits, 40 percent of the overall ranking should be based on speed and delay and 60 percent on comfort factors. When an individual comfort variable becomes intolerable, the entire ride is at service level F. Application of the procedure results in reasonable comparisons of both systems and individual trips within a system.

Prepared for the 53rd Annual Meeting of the Highway Research Board.

Botzow, H (Port Authority of New York and New Jersey) *Transportation Research Record* No. 519, 1974, pp 73-84, 5 Tab., 13 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

23 097284

APPLICATION OF GUIDELINES FOR IMPROVING TRANSIT SERVICE AND OPERATING EFFICIENCY

Considerable public funds are being allocated for transit operations, and a method is needed to ensure improved quality of transit service and increased efficiency of operations. Operating guidelines and standards developed in Pennsylvania specify elements of service, such as speed, reliability, capacity, and comfort, that must be provided under different conditions. Transit agencies are also required to improve public information, undertake marketing, and collect technical, operating, and financial data and submit them to the state transportation department on a regular basis. The department uses the data to evaluate operations of each agency and bases distribution of funds among the applicants on their compliance with the guidelines. The department also provides all applicants with professional assistance for improvement of operations.

Prepared for the 53rd Annual Meeting of the Highway Research Board.

Vuchic, V (Pennsylvania University, Philadelphia); Tennyson, EL Underwood, WC (Pennsylvania Department of Transportation) *Transportation Research Record* No. 519, 1974, pp 66-72, 1 Fig., 8 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

23 097285

SUBURBAN TRANSIT PLANNING AND FORECASTING

Problems and policy issues of particular concern to suburban transportation planners are identified, including dispersed trip-making, high income and automobile ownership, low densities, significant transit-dependent population, increasing peak-hour freeway congestion, growth policy issues, and short-term availability of less expensive or nonunion labor. Experience in Orange County, 4 areas of Los Angeles County, and Chicago suburbs is discussed. Unique suburban approaches in the planning process are identified, and forecasting problems are discussed. For forecasting implications, 3 high-quality suburban-to-CBD transit services are compared with the range of calibration values for the LARTS model in southern California. Variables compared include the system characteristics in the marginal utility mode-choice model, socioeconomic characteristics of trip-makers, attitudes of trip-makers, and resultant trip-making behavior. The last category focuses on transit's market share, which appears to be a more appropriate planning statistic than the percentage of all trips using transit, as called for in mode-choice models. Some uniquely suburban transit organizational and planning process issues are discussed.

Prepared for the 53rd Annual Meeting of the Highway Research Board.

Benson, DE (Smith (Wilbur) and Associates) *Transportation Research Record* No. 519, 1974, pp 36-45, 13 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

23 097286

PUBLIC TRANSPORTATION PLANNING ISSUES

This compilation of eight reports covers a number of issues of interest to planners, administrators and professionals in the field of public transportation. Topics include funding sources, determination of market sectors, operations and levels of service. Hedges advocates low-capital and non-capital alternatives. Anderson and Hoel present an analysis of latent demand at various service levels. Benson discusses suburban transport planning. Wilson et al discuss marketing aspects of transit. Mix and Dickey report on rural transport problems. Vuchic et al discuss Pennsylvania DOT's guidelines for local transit operations. Botzow describes a system of patron service variables, applicable to any mode.

Reports prepared for the 53rd Annual Meeting of the Highway Research Board.

Transportation Research Record No. 519, 1974

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

23 097288

TRAVEL DEMAND FORECASTING

The eight papers in this record reflect recent findings on the interactions between travel behavior assumptions and the resulting travel models and forecasts made with these assumptions. What emerges from these papers is that the forecasting models being used for the past 20 years have their implicit rules of behavior. These rules are not only those implied by the independent variables included and the coefficients estimated, but also those on the structure of the travel choices and choice alternatives over which the models should be applied. Lack of knowledge of a model's implied choice behavior may lead to grievous errors in applications. This can result in complicated models always being needed when confronted with high-capital transportation investment decisions.

Report prepared for the 53rd Annual Meeting of the Highway Research Board.

Transportation Research Record No. 526, 1974, 105 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

23 097289

TOWARD THE DEVELOPMENT OF MEASURES OF CONVENIENCE FOR TRAVEL MODES

This paper describes a research project aimed at investigating the effect on disaggregate, behavioral, modal-choice models of the inclusion of 2 alternative measures of convenience. The 2 measures investigated compare a proxy variable for convenience, which could be included in many existing models without further data collection, a scale index that was developed

from the use of psychological scaling techniques, which will require longer term development and additional data collection. Both measures correlated highly with travel mode choices, although data limitations prevented any actual model building with the scale index. The proxy variable for convenience was found to add significantly to the explanatory power of a modal-choice model and to improve substantially the specification of the model. This paper describes the data sets used to generate these results and discusses the analytical processes used to derive scale information from preference and attitude data. A survey of previous work in the topic area, which is also included, shows that this paper reports on one of the first successful attempts to incorporate a measure of convenience in an urban modal-choice model.

Report prepared for the 53rd Annual Meeting of the Highway Research Board.

Stopher, PR (Northwestern University, Chicago); Spear, BD Sucher, PO (Cornell University) *Transportation Research Record* No. 527, 1974, pp 16-32, 7 Fig., 4 Tab., 31 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL JC

23 097290

DISAGGREGATED BEHAVIORAL VIEWS OF TRANSPORTATION ATTRIBUTES

The assessment of attitudes toward various attributes of urban transport alternatives is of interest because of (a) the relation between personal behavior toward transport systems and the perceptions and preferences of individuals toward attributes of the alternatives, (b) the possibility of developing policy-sensitive prediction models, and (c) the compatibility of output from attitude research with ongoing disaggregate behavioral model development. The current investigation applies all individual-differences scaling model to a set of perceptual similarity judgments of an automated urban transportation system to find groups of respondents with a homogeneous viewpoint. The perceptions of 7 distinct groups of respondents were represented by Euclidean distance models. The points of view of the different groups could be identified both by the number of dimensions and the relative position of attributes for their corresponding spaces. Across the axes of the perceptual spaces for the 7 groups, 3 major classes of attributes could be defined: basic transport service, personal luxury service, and general amenities. Satisfactions with modes of a proposed urban transportation system could be predicted from the projections of the attributes on the axes of the spaces, and in addition the particular classes of attributes that differentially contributed to satisfaction with a given mode could be determined. Finally, the potential contribution of the technique for evaluating impact models was demonstrated by the investigator, which indicated those activity pattern and socioeconomic variables that were not uniformly distributed across the 7 homogeneous perceptual groups.

Report prepared for the 53rd Annual Meeting of the Highway Research Board.

Stopher, PR (General Motors Research Laboratories); Kehoe, JF (University of Southern California) *Transportation Research Record* No. 527, 1974, pp 1-15, 6 Fig., 4 Tab., 35 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL JC

23 097291

COMPARISON OF THE MODEL STRUCTURE AND PREDICTIVE POWER OF AGGREGATE AND DISAGGREGATE MODELS OF INTERCITY MODE CHOICE

This paper reports the construction of both disaggregate and aggregate models of intercity mode choice; data from the Edinburgh-Glasgow Area Modal-Split Study were used. The models are then compared in terms of their structure (i.e., the variables included) and their ability to predict modal split. The disaggregate models provide a better statistical explanation of mode-choice behavior. Moreover, the failure of the variable representing relative travel time to reach a satisfactory level of statistical significance in the aggregate models indicates that the alleged behavioral nature of aggregate models is not supported by the empirical evidence. In addition, the predictions of modal split derived from the aggregate models are inferior to those obtained from the disaggregate models. Several tests show that the errors associated with the aggregate models are several times as large as those associated with the disaggregate models. Disaggregate mod-

els have extremely desirable performance characteristics. It is, therefore, time to make serious effort to incorporate them into the transportation planning process.

Report prepared for the 53rd Annual Meeting of the Highway Research Board.

Watson, PL (Northwestern University, Chicago) *Transportation Research Record* No. 527, 1974, pp 59-65, 4 Tab., 10 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL JC

23 097293

TRAVEL PREFERENCE FOR FARE ALTERNATIVES AS A TRANSPORTATION PLANNING INPUT

This paper deals with the effect of fare policy and transit service plans on mode-choice behavior. These issues were studied in the context of coordinating a new rail rapid transit service in San Francisco with the existing surface bus system in order to maximize the overall service level. To aid the process of simulating the effects of various bus and rail service plans and joint fare structures under study, a disaggregate model of sub-modal-choice behavior was developed. The model was calibrated with data collected in a field survey of bus patrons. These data were used to estimate the relative influence of fare level and time savings on sub-modal-choice behavior and to forecast the probable extent of rail rapid transit usage by current bus riders. Although the specific questions posed in this study were geographically unique, the underlying technical and policy issues could be applied to other similar situations involving the introduction of a new transportation service or facility.

Report prepared for the 53rd Annual Meeting of the Highway Research Board.

Day, GS (Stanford University); Schmidt, JW (De Leuw, Cather and Company) *Transportation Research Record* No. 527, 1974, pp 45-58, 4 Fig., 14 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL JC

23 097294

TRAVEL BEHAVIOR ANALYSIS

This Record contains various concepts of behavioral analysis in relation to transportation needs and requirements. The eight reports are: Disaggregated Behavioral Views of Transportation Attributes; Toward the Development of Measures of Convenience for Travel Modes; A Bernoulli Model of Destination Choice; Traveler Preference for Fare Alternatives as a Transportation Planning Input; Comparison of the Model Structure and Predictive Power of Aggregate and Disaggregate Models of Intercity Mode Choice; Preliminary Analysis of Disaggregate Models of Intercity Mode Choice; Preliminary Analysis of Disaggregate Modeling in Route Diversion; Prediction with Disaggregate Models; The Aggregation Issue; Consumer Preferences for Automated Public Transportation Systems.

Reports prepared for the 53rd Annual Meeting of the Highway Research Board.

Transportation Research Record No. 527, 1974, 94 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL JC

23 097296

THIS IS LIGHT RAIL TRANSIT

This illustrated brochure was prepared for distribution at the National Conference on Light Rail Transit in Philadelphia. Its short illustrated sections discuss: What is Light Rail Transit, Guideway, The Vehicles, Stations, Operations, Cost, and Development. Light rail is proposed as a less expensive alternative to costly full-scale rapid transit, or as an intermediate stage to such transit.

This brochure has been compiled by the TRB Committee on Light Rail Transit for distribution at the National Conference on Light Rail Transit, Philadelphia, Pennsylvania, 23-25 June 1975.

Transportation Research Board June 1975, 16 pp, Photos.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

23 097298

PAYMENT BY PERFORMANCE IN RAIL PASSENGER TRANSPORTATION: AN INNOVATION IN AMTRAK'S OPERATIONS

Amtrak has recently arrived at a new contract with a number of its supplying railroads representing over 50 percent of its passenger service. The new contract represents a major regulatory innovation in which payments to the railroads are based on quality of service, according to a fixed schedule. Payments are dependent upon frequency of arrival on time, the total magnitude of delays, the cleanliness and functioning of cars and equipment, and improvements in schedules. The article discusses the features of arrangements in earlier contracts that served as inducements for deterioration in quality of passenger service and argues that the new contract offers hope for the first time in recent years of substantial improvements in the quality of passenger service.

Baumol, WJ *Bell Journal of Economics* Vol. 6 No. 1, Mar. 1975, pp 281-298, Tabs., 4 Ref.

ACKNOWLEDGMENT: Bell Journal of Economics and Management
PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

23 097302

CAR CITY TO PEOPLE CITY (OR TAMING THE TRUCK)

This report is essentially a non-technical study of how to resolve Manhattan Island's traffic problems and in doing so to return the island to the people. The use of Light Rail Transit is advocated by the report as being superior to buses and as giving more convenient neighborhood service than subways.

4R LIGHT RAIL TRANSIT SYSTEMS

Kneiling, JG
Kneiling (JG)

PURCHASE FROM: Kneiling (JG) P.O. Box 1128, Church Street Station, New York, New York, 10008 Repr. PC

DOTL RP

23 097501

BART-II PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART II, VOLUME III. RESIDENTIAL QUALITY PRIOR TO THE OPENING OF BART

The report is an account of the efforts as empirical definition of the factors involved in residents' perception of environmental quality by means of verbal response indicators. It includes a discussion of the problem of environmental quality and the need for environmental indicators, and a detailed overview and summary of the BART residential impact study. Chapters include-developing dimensions of residential quality, discussion, future work on empirical dimensions, identifying the determinants of residential quality, and future work to identify determinants and add indicators.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also Bart-2, Part 2, Volume 2, PB-236729, and Bart-2, Part 2, Volume 4, PB-236731.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 139 pp

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236730/2ST, DOTL NTIS

23 097607

TRANSPORT IN TOKYO

A detailed account is given of Tokyo's various transport problems and their causes. The supply of transport in the city is reported to be unable to handle the high level of demand. Increased road congestion in the city centre and the spread of congestion to the suburbs are ascribed to the poor layout of existing roads, to the low road ratio and to the lack of parking facilities. Congestion is considered to be a major cause of the decline in bus patronage. Rush hour trains are reported to be crowded to 2.5 times their normal capacity, despite improvements to the rail network. The rapid population growth, particularly in the suburbs of Tokyo, and the concentration of economic, academic and cultural functions in the city

centre, together with the dislocation between production and distribution facilities, are cited as the major causes of the tremendous increases in demand. Environmental problems are discussed in terms of accident rates, lack of pedestrian facilities, air pollution and noise levels. Transport policies in Tokyo are examined, and it is suggested that in the short-term the problem of curtailing or adjusting demand, possibly by shifting transport volumes from one system to another should be investigated. Ultimately it is suggested that a complete change in the structure of the city will be necessary to cope with the growing transport problems. /TRRL/

Wheel Extended Vol. 4 No. 1, 1974, pp 4-13, 5 Fig., 5 Phot.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212140)

23 097810

TIME SAVINGS IN TRANSPORT STUDIES

The author divided cost-benefit studies into two parts: statistical and speculative. The latter consists of the evaluation of time savings and it is argued that these vary greatly, according to the values used which are in any event arbitrary. This is illustrated using the M1 motorway and victoria line studies. Examining working time suggests that not all time saved is used for work, yet in other situations schedules are changed and new routes added for goods vehicles, and population and industry is re-arranged. A worked example demonstrates that there is a significant economic difference between many people saving a short time and few saving a long time. Regarding leisure, it is difficult to equate eating with journeys to work and with general leisure pursuits. Many factors which determine travel habits are ignored, it is suggested. These are, amount of time saved relative to total trip time, journey breaks, reliability, time-tabling, comfort and convenience. Thus road pricing is artificial: there is a criticism of the speed report because of the sensitivity of the results to changes in time saving valuations. Further, the rest of the population would have no say in investment in transport. Concluding, the author writes that such investment involves a political decision. Only when a level of traffic has been fixed, can road pricing be used. /TRRL/

Tipping, DG *Economic Journal* Vol. 78 Dec. 1968, pp 843-854, 1 Fig., 1 Tab., Refs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212164)

PURCHASE FROM: MacMillan Journals Limited 4 Little Essex Street, London WC2R 3LF, England Repr. PC

23 097831

THE 1968 TOKYO TRIP BEHAVIOUR SURVEY

The method and some results of this survey are presented. The survey was to provide data for a transportation study, and also to help deal with immediate problems. It emphasized land use-transportation interaction, besides simply surveying peoples movements. 803 zones within 50km of Tokyo were studied, including a population of 21 million in 1968. Household surveys (2% sample) collected demographic, economic and travel characteristics. Car ownership and availability, household income, and employment were some details included. 48 million trips per day were made by 20 million people. Breakdowns of trips by sex, age, origin-purpose, destination-purpose and destination-zone are presented. 65% of all downtown trips were work or on-the-job trips, although home was the longest single destination-purpose in the whole area (41%). Information on linked trips is given. Walking was in single most used mode (43% of linked trips), while only 15% was by automobile. The relationship between trip length (time) and mode is described, as is that between journey purpose and mode. Trip generation rates are given for five sectors, and for several times of day. The destination location for home-based trips is presented in a graph. /TRRL/

Nakagawa, S *Wheel Extended* Vol. 1 No. 2, 1971, pp 32-6, 7 Fig., 3 Tab.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212247)

23 097946

PLANNING FOR THE WORK JOURNEY. A GENERALISED EXPLANATION OF MODAL CHOICE

In response to increasing congestion, certain measures have had to be taken to improve the movement of traffic and people: this document de-

scribes attempts made at predicting the effects of these measures by giving a generalised explanation of model choice. There is a summary of work done by the unit in this field: this is broken into town-based models and global models. Following this is an outline of the transport model's structure and its applications. The latter examines the period of time for a planning decision distinguishing short, medium and long-term and discusses the different uses of modal split-inputs. Model applications consider policy options, the practical problems of influencing choice, prediction and feedback effects. Simple examples are given using data and using estimates of the variables. Conclusions are also presented. Journey time is evaluated. There is a technical description of the techniques used and a review is included of literature for city wide, zonal and individual models. Material on data and surveys covers survey statistics, the questionnaire and questionnaire design. Analytical techniques and pooled and global model development are discussed, and a large number of tables is added. /TRRL/

Roghrs, KG Townsend, GM Metcalf, AE
Royal Institute of Public Administration R&D Rpt. Report 67, Apr.
1970, 97 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD
211944)

PURCHASE FROM: Royal Institute of Public Administration Reading,
Berkshire, England Orig. PC

7409070

23 097949

AN END TO URBAN MOTORWAYS? A COMPARISON OF TRANSPORT PLANNING IN PARIS AND LONDON

The article compares the problems facing the transportation planners of London and Paris where some 13M trips are made daily, of which half are made by private car, 40% by public transport and the remainder by two-wheeled vehicles. Over a period an increase in private car usage in Paris of about 8% per annum has been accompanied by a reduction in the use of public transport attributable to declining bus patronage. Parisian planning authorities are required to work within the broad framework of the SCHEMA DIRECTEUR plan adopted in 1965 for the development of new towns on the perimeter of Paris with a network of urban motorways, high-speed metros and modernised commuter services. Details are tabulated of the public transport systems of Paris compared with that of London. Increases in fuel costs are lately seen to have resulted in a growing demand for public transport and a reduction in the use of private transport. With more public transport funds and subsidies now available the Parisian transport authority, RATP, is presently proceeding with measures to improve and to increase the usage of public transport. /TRRL/

Britton, FEK Greestein, D *Built Environment* Vol. 3 No. 10, Oct.
1974, pp 502-505, 1 Fig., 1 Tab., 4 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD
212015)

PURCHASE FROM: Architecture and Planning Publications Limited P.O.
Box 135, 4 Catherine Street, London WC2B 5JN, England Orig. PC

23 098004

BINARY STATION CHOICE MODELS FOR A RAIL RAPID TRANSIT LINE

Using two independent data sets, alternative binary station choice models were successfully calibrated and tested. The regression and probit models

are based on a two stage decision process: first the commuter selects his mode of travel, and then, given the use of rapid transit, he chooses a station. The station choice models focus on the second stage of the decision process.

Desfor, G (York University, Canada) *Transportation Research* Vol. 9
No. 1, Feb. 1975, pp 31-41

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

23 099205

THE BIAS IN TRANSIT PLANNING

It is difficult to compare the advantages and disadvantages of highway transit versus rail transit, quantitatively. Road and rail transit both have unique characteristics that make them best suited for certain purposes. Transportation is now recognized as a public service that reflects a wide range of needs. It is not valid to measure the cost of service against the direct benefit of the user. Historically, there has been a strong bias against rail transit.

Modern Railroads Vol. 30-No. 5, May 1975, pp 70-73

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South
Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

23 099206

A LOOK AT THE LIGHT SIDE

Light rail transit is a very popular concept in North America at the moment. Transit planners like light rail because it is not experimental like some rapid transit systems. It is also cheaper to install than a subway system. However, despite the great interest in light rail no new systems are being built in North America at the moment, although several are planned. The main development in light rail has been the new car design for replacing old equipment on the San Francisco and Boston systems. The article gives a brief summary of existing and proposed light rail systems in the United States and Canada.

Modern Railroads Vol. 30 No. 6, June 1975, pp 52-54

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South
Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

23 099208

PRT-SEARCH FOR A DEFINITION

Although there is still a large amount of controversy on the subject, "Personal Rapid Transit" appears to be a sound concept. Morgantown, West Virginia, and the Dallas-Fort Worth airport system, are presently the only operating prototypes; Morgantown is still experimental but Dallas-Fort Worth airport is now in revenue service. The article describes the other plans that are presently considered for PRT in North America.

Modern Railroads Vol. 30 No. 4, Apr. 1975, pp 42-44

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South
Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

24 083070

WESTERN RAILROAD MERGERS—THEN AND NOW

This paper reviews the structure of the railroads of the western United States and describes the merger and/or consolidation efforts and accomplishments over the years from 1920 through 1974. Many railroads have disappeared from the activity during the years, in some cases reappearing as parts of new systems under new names. The half-century of change, or non change, should be viewed as a preliminary to the reader's own prognostication for the western railroads.

Bush, WL (Weyerhaeuser Company) *ICC Practitioners' Journal* Vol. 42 No. 2, Jan. 1975, pp 138-163

PURCHASE FROM: Association of Interstate Commerce Comm Pract 1112 ICC Building, Washington, D.C., 20423 Repr. PC

DOTL JC

24 084930

THE STATE OF THE INDUSTRY

A special report describes the state of the railroad industry at the end of 1974. The report looks at all aspects of railroading including, finance, marketing, legislation, the problems of the Northeast, equipment, flatback operations, train services and operations, maintenance of way and transit operations.

Modern Railroads Vol. 29 No. 12, Dec. 1974, pp 51-82

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

24 084945

USRA'S MASTER PLAN: BIG, BOLD AND EXPENSIVE

The \$10 billion revamping of the Northeastern rail map and recommendations of the U.S. Railway Association for the 15,000-mile ConRail system are discussed. There would be \$7.3 billion for the rehabilitation and expansion of the car fleets and trackage of the eight bankrupts of the region and additional expenditures for converting the Northeast Corridor mainline to an exclusive high-speed passenger system. These are among the recommendations of the 820-page "Preliminary System Plan" of the USRA.

Miller, LS *Railway Age* Vol. 176 No. 5, Mar. 1975, 5 pp, 3 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

24 095224

ORGANIZATION OF A TRAINING CENTER FOR MAINTENANCE PERSONNEL

TABEC (Technical And Behavioral Education Center) was created in 1974 as a centralized training facility for Chicago Transit Authority maintenance personnel. The primary function at TABEC is to provide the training needed to enable maintenance personnel to efficiently and safely maintain all of CTA's equipment. Training includes both classroom and "on-the-job" instruction. This paper discusses the courses of job training that are handled at TABEC.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, San Francisco, California, April 15-17, 1975.

Bolech, J (Chicago Transit Authority)

American Society of Mechanical Engineers 75-RT-6, Apr. 1975, 4 pp

ACKNOWLEDGMENT: ASME

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL RP

24 095232

NEW TRAIN-DYNAMICS SIMULATOR

A new approach to train-dynamics simulators has been developed by the Freight Master Company. Unlike units that are mock-ups of a locomotive cab similar to aircraft simulators, the new system uses a mini-computer and cathode ray tube to generate real-life conditions. The system might be further developed to be placed in a locomotive cab to aid the engineer in running his train more effectively. The Train Dynamics Analyzer, as it is

called, uses a track profile and train consist data stored on magnetic tape. A locomotive control stand gives throttle action, braking, etc.

Progressive Railroading Vol. 18 No. 3, Mar. 1975, pp 39-40

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

24 095285

SOME POLICY IMPLICATIONS OF NORTHEASTERN RAILROAD

The author notes that the Northeastern railroad problem cannot be traced to any single predominant source but is the result of a multiplicity of interrelated influences. While some sources of weakness are peculiar to Northeastern railroads, to a large extent the troubles are an intensified version of problems encountered by all U.S. railroads. It is concluded that nothing short of drastic reforms can restore the financial health; that these measures will have adverse effects on shipper and carrier interests and that legislative efforts to restore viability to the railroads will severely test the ability of the political process to subordinate individual interests to the greater public good. Prospects, says the author, are not promising.

This paper was presented at the Third Annual J. Leo Cooke Memorial Seminar, sponsored by the Decatur, Illinois, Chapter of Delta Nu Alpha, April 27, 1974.

Harbeson, RW (Illinois University, Urbana) *Transportation Journal* Vol. 14 No. 1, 1974, pp 5-12

PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Orig. PC

DOTL JC

24 095289

EUROPEAN RAILWAYS: A STATISTICAL SURVEY

The author explains that he is merely comparing published statistics and that much more study is needed. The comparisons of the various nations can be somewhat of a guide in the making of policy recommendations. There are four main tables with the article: Railway networks related to population and geography; Passenger traffic; Freight traffic; and Indices of railway productivity.

Coles, OB *Modern Railways* Vol. 32 No. 317, Feb. 1975, pp 74-76, 4 Tab.

PURCHASE FROM: XUM Repr. PC

DOTL JC

24 096605

WEST GERMANY: THE PHOENIX RISES

Various features of the German Federal Railway (Deutsche Bundesbahn or "DB") are described. Of the 29,000 total route kilometers, some 9000 route kilometers (or 31 percent of the system) are electrified. The DB traction equipment consists of a mix of all-electric, diesel-hydraulic, relatively few diesel-electric, and steam locomotives. Details on the DB electric, diesel-hydraulics and diesel-electrics are given. The Intercity mainline railway service, S-Bahnen (rapid transit rail systems) operating from center city to nearby and/or outlying suburbs, U-Bahnen (subways), and tramways are discussed.

Friedlander, GD *IEEE Spectrum* Vol. 11 No. 4, Apr. 1974, pp 62-70

ACKNOWLEDGMENT: EI

PURCHASE FROM: ESL Repr. PC, Microfilm

24 096632

CONSTRUCTION OF BUILDINGS OVER RAILWAY INSTALLATIONS [Ueberbauung von Bahnanlagen]

To help builders in the task of constructing property above railway installations, the DB has published a planning guide which lists questions on the preliminary studies for projects, instructions for the form of contracts, types of contracts, calculation of payments and a series of prices. There is also an explanation of the notions of building techniques and railway techniques and some examples of how the guide can be used are given. [German]

Pohlmann, D Kaetzke, F *DBZ/Deutsche Bauzeitschrift* Vol. 22 No. 8, 1974, pp 1411-16, 26 Fig., 10 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: Bertelsmann Fachzeitschriften GmbH 161 Carl Bertelsmann Strasse, Guetersloh/Westfalen, West Germany Repr. PC

24 097244

NOW, THIS IS THE WAY TO RUN A RAILROAD

This is a report of the Florida East Coast Railway's operations and management techniques in the 12th year of its strike by operating unions. The 530-mile railroad has completely restructured its operations and rebuilt its physical plant. Freight trains are run strictly by timetable with two-man crews operating the entire length of the mainline between Jacksonville and Miami. Minimizing of operating labor costs and other techniques have enabled FEC to show a return on investment substantially higher than the U.S. average.

Business Week No. 2347, Sept. 1974, pp 66-67

PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

DOTL JC

24 097248

COMMERCIAL TRAINING OF SNCF MANAGEMENT STAFF

The author, who is an Ingenieur Principal at the SNCF Commercial Department, states that, with its new structure, his Department can apply a more flexible, more competitive and therefore more effective commercial policy. This means that commercial management staff must have appropriate and continued training. He goes on to say that, according to the duties of these commercial or transport staff, where they come from, internal promotion, outside recruitment, different methods are adopted to train them; he explains the procedure in each case to impart knowledge of tariffs and regulations, the actual commercial requirements and the necessity of retraining. [French]

Valeix, A *Revue Generale des Chemins de Fer* Vol. 93 Oct. 1974, pp 580-583

ACKNOWLEDGMENT: British Railways

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

24 097280

FREIGHT MARKET RESEARCH ON BRITISH RAILWAYS

Six points are discussed in this report on freight traffic research: Research and the present product; what directions should be taken for the future; what can be done to influence future customers; how can the market for future products be analyzed; assistance in planning for the future; further thoughts on research. It is concluded that while British Railways could aid in reducing the energy drain, it is doubtful that traffic diverted from highways could ever be financially attractive. Research might play a part in developing a complementary road/rail system where rail trunking would link with road distribution networks through break-bulk distribution points at the periphery of urban centers. The motivation for such study and the problems of financing any recommendations are large.

Blair-Black, M (British Railways) *Rail International* Vol. 6 No. 4, Apr. 1975, pp 277-282, 2 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

24 097303

AN ANALYSIS AND EVALUATION OF PAST EXPERIENCE IN RATIONALIZING RAILROAD NETWORKS

Railroad network rationalization constitutes a process of adjusting the size and configuration of the railroad plant and its utilization in conformity with current and prospective volumes of traffic to obtain optimum efficiency in costs and levels of service. This report reviews the nature and scope of prior efforts to rationalize rail networks, including the Transportation Act of 1920, the Emergency Transportation Act of 1933, abandonments, mergers, and rail-highway coordination. It has been found that, in most respects, these prior schemes have either failed entirely or have achieved less than their anticipated success. Numerous opportunities for improving industry performance have been hampered by interfirm rival-

ries, managerial insensitivity, employee organizations' opposition, and regulatory constraints imposed by statute or by directive. A recognition both of these restraining factors and of the potential benefits should advance the rationalization process in the future.

Sloss, J Humphrey, TJ Krutter, FN
Massachusetts Institute of Technology, (R74-54) Tech. Rpt. DOT-TST-75-77, Mar. 1975, 212 pp, 10 Fig., 17 Tab., 5 App.

Contract DOT-OS-40002

ACKNOWLEDGMENT: DOT

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

24 098680

KEEPING RAILROADS ON TRACK

This report represents a condensation of an earlier 329-page publication, *Improving Railroad Productivity*, by The Task Force on Railway Productivity, RRIS 054726. Described are actions that must be taken to rejuvenate the rail industry so that it may continue to serve the nation as an essential transporter of freight. Solutions discussed are containerization, abandonment of light-density lines, technological innovation, improved freight car utilization, changes in operating techniques, improved costing techniques, new marketing and planning methods, modernized regulation, and consolidations.

This report presents a condensation of an earlier, 329-page Publication, "Improving Railroad Productivity", by the Task Force on Railroad Productivity. Copies of the complete report can be obtained by writing to the Publications Department of the National Commission on Productivity and Work Quality.

National Commission on Productivity & Work Quality 1975, 28 pp

PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

#052-003-00079, DOTL RP

24 098681

PRIORITIES IN RAIL TECHNOLOGY

This study is an inquiry as to the existence of opportunities for improving factor productivity in the railroad industry with new technology. Despite dramatic innovations in rail hardware during the postwar period, the systems and procedures—no less a part of rail technology—are comparatively unsophisticated. Innovations recommended in this study strike at fundamental deficiencies and incongruities which exist in present-day rail technology. Many of the deficiencies in present technology are logical accommodations to the institutional environment in which railroads operate. It is only in concert with other reforms that the promise of recommended innovations can be realized. Authors are economists, not engineers, and the competition of innovations for inadequate funds is discussed.

Morton, AL Cafilisch, JS
Morton (AL) Sept. 1975, 151 pp

PURCHASE FROM: Morton (AL) Harvard Business School, Boston, Massachusetts, 02163 Repr. PC

DOTL RP

24 099196

THE EXPERIENCE WITH MUNICIPAL OPERATION OF RAILWAY LINES

With the prospect for abandonment of many light-traffic lines, acquisition and operation by local governments is of growing interest. This article examines three such lines: Belfast & Moosehead Lake (Maine), City of Prineville Railway (Oregon), and East Troy Railway (Wisconsin). All aspects of these short lines are examined. It is concluded that a municipality can operate a railroad effectively and efficiently; there are substantial economic development benefits from such a step; prevention of discontinuance of rail service can have long-range benefits for a community; political involvement does not result from municipal railroad operation.

Due, JF *Transportation Journal* Vol. 14 No. 4, June 1975, pp 5-17, 2 Tab.

PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Repr. PC

DOTL JC

24 099209

A BRIEF SURVEY OF RAILROADS OF SELECTED INDUSTRIAL COUNTRIES

In 1893, 1915, 1935 and presently with substantial segments of the U.S. railroad industry in bankruptcy, nationalization of the entire system has been urged. Deteriorating financial and physical condition of American railroads is contrasted with "well run" foreign railroads which are government owned and operated. To assist in a review of foreign railroads, Union Pacific has updated for the second time its survey of nationalized rail systems of selected industrial countries. This revision focuses on 1973, but provides relevant data on the four prior years to give perspective. Separate comparative data is included for UP, Penn Central Transportation, Amtrak, and U.S. Class I railroads collectively. While accounting differs, it appears nationalized systems compare unfavorably with privately owned systems.

Union Pacific Railroad Company June 1975, 102 pp, Tabs., Refs.

PURCHASE FROM: Union Pacific Railroad Company 345 Park Avenue, New York, New York, 10022 Repr. PC

DOTL RP

24 099357

RAILROAD RESEARCH: IDENTIFYING WITH TOMORROW

A revival of interest in rail transportation in Canada finds the Transportation Development Agency of the Ministry of Transport supporting numerous rail research programs; formation of a Railway Association of Canada/Transportation Development Agency Rail Advisory Committee has undertaken identification of major problem areas not now being studied and is fostering use of the total resources of the industry in solving these problems. Problems being studied are line capacity, cold-weather effects on locomotive operation, and a rail test facility. CN and other Canadian railroads and equipment suppliers have also been doing their own research in areas such as motive power, track/train dynamics, track and cybernetics.

Gratwick, J (Canadian National Railways) *Progressive Railroading* Vol. 18 No. 6, June 1975, pp 29-36

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

25 072079

STUDY ON TRANSPORT INFRASTRUCTURE INVESTMENTS IN SELECTED CORRIDORS IN THE FEDERAL REPUBLIC OF GERMANY [Untersuchung ueber Verkehrswege Investitionen in Ausgewahlten Korridoren der Bundesrepublik Deutschland]

The purpose of this study is to examine the economic profitability of selected transportation infrastructure investments. Costs and benefits with and without the investment are determined, using the year 1985 as a reference year. By that time, existing rail facilities in three corridors (Cologne-Frankfurt, Mannheim-Stuttgart, and Hannover Wurzburg) will be saturated. In each case, an additional rail line was a possibility. Safety, efficiency, and environmental effects are considered. Rail transportation is safer and faster than motor transportation. One of the rail links is clearly cost-beneficial, as is a possible highway extension in the same corridor which would eliminate bottlenecks. A second rail link and a possible deepening of the Rhine will be studied further. The other proposed projects do not appear profitable at this time. Volume III contains technical appendices. [German]

Ministry of Transport, West Germany A15-20.70.50-03, Oct. 1972, 153 pp, 47 Tab., 30 Ref.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Ministry of Transport, West Germany Bonn, West Germany Repr. PC

DOTL HE249.G478

25 072080

BASIC LINES OF DEVELOPMENT OF TRANSPORT POLICY IN THE FEDERAL REPUBLIC OF GERMANY [Entwicklungslinien der Verkehrspolitik in der Bundesrepublik Deutschland]

Passenger transport in Germany is characterized by the mobility given by the motor vehicle. For percent of goods movement is by motor vehicle, while thirty per cent is by rail. Ninety percent of passenger trips and six percent of all goods trips are less than 50 kilometers, so traffic is very dense. During the past 25 years, networks of rail and trunk roads have been developed. The mobility offered by the automobile has been marred by accidents, congestion, and environmental problems. Future transport policy is therefore aimed at increasing safety, efficiency, energy-and space-conservation, and consideration for the environment. Short-distance transport, including public transit in urban areas, will be of major concern. Road construction will concentrate on underdeveloped rural areas and elimination of trouble spots. Predicted rail bottlenecks will be eliminated with new lines in certain corridors. High-speed ground transportation is under study. This would be implemented only in conjunction with other Common Market countries. [German]

Glæssner, E

Ministry of Transport, West Germany July 1974, 22 pp

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Ministry of Transport, West Germany Bonn, West Germany Repr. PC

DOTL HE249.G64

25 072087

THE CHANNEL TUNNEL ECONOMIC AND FINANCIAL STUDIES

The Channel Tunnel is to open in 1980. This report summarizes in non-technical language the revenues and expenditures which will determine the financial feasibility of the tunnel. Models of passenger behavior were devised based on detailed surveys of origins and destinations of both British and Continental travelers, especially of holidaymakers, and the split between those who take cars along and those who do not. Freight surveys, by product and country, show 4.5 million tons as probably using the Tunnel in 1980. The tariffs set will have some effect on the levels of usage; tunnel tolls are expected to be 10 to 20 per cent lower than the ferry tolls. 5 to 8 per cent inflation was assumed. The studies indicate a profit for the tunnel, even with the lower growth rate for the GNP.

Note: The tunnel project was abandoned in January 1975.

Coopers and Lybrand Associates Limited, SETEC-Economie June 1973, 63 pp, Figs., Tabs.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Coopers and Lybrand Associates Limited London, England Repr. PC, SETEC-Economie Paris, France

DOTL TGB8765.C66

25 072088

CONSIDERATIONS CONCERNING A EUROPEAN NETWORK OF MAIN TRAFFIC ARTERIES

This paper presents the view of the German Federal Ministry of Transport on European traffic networks and their future development. The opinions expressed are to be considered as a basis for discussion rather than final proposals. Networks considered are railways, roads, particularly long-distance trunk roads designed for high speed travel, airports (for both intra- and extra-European travel), waterways and new technologies (air cushion and magnetic levitation vehicles). The integration of different networks and the division of traffic among them are extremely important. To predict the modal split, demand forecasts must be subdivided to indicate types of traffic and demand elasticities. Advanced wheel/rail technology, new tracked technologies, and aircraft developments are reviewed. Surface transportation systems are not likely to be profitable if for passenger traffic only. Careful forecasting and regional planning will be necessary for final transport development decisions on a European basis.

Ministry of Transport, West Germany May 1973, 23 pp, Figs.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Ministry of Transport, West Germany Bonn, West Germany Repr. PC

DOTL HE200.G47

25 072108

LAND TRANSPORTATION IN JAPAN: PLANNING FOR HIGH SPEEDS

This research report reviews 100 years of Japan's investment in public transportation: first, shipping and railways, recently road construction. Since 1955, the increasing demand for transportation of industrial goods led to rapid progress in road development. This report considers the impact of Japan's economic planning on land transportation. It describes the construction, use and economic effect of the New Tokaido Line, NTL, (1964): high-speed bullet trains connecting Tokyo-Nagoya and Osaka-Kobe. The Neishin and Tomei Expressways (1965 and 1969) complement the New Tokaido Line with which they form the backbone of the huge Tokaido megalopolis. Their construction, use and effects are demonstrated. Tables illustrate all aspects of the report.

United Nations Centre for Regional Development TD-3, 1974, 44 pp, 21 Tab.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: United Nations Centre for Regional Development Nagoya, Japan Repr. PC

DOTL HE277.M38

25 072116

HSB-A STUDY OF A HIGH SPEED TRANSPORT SYSTEM. SUMMARY: SYSTEM ANALYSIS AND CONCLUSIONS [HSB-Studie ueber ein Schnellverkehrssystem Kurzbericht: Systemanalyse und Ergebnisse]

This report contains the results of a study commissioned by the Federal Ministry of Transport to consider a potential rapid rail transit system for Germany. The system considered is to transport motor vehicles and goods as well as passengers. The existing transport systems are analyzed to provide a basis for a number of different model configurations of varying technologies, infra-structure, and possible levels of use. These models are then analyzed in terms of operational and national economy. The study determined that a rapid rail system would substantially improve transport relationships between sections of the Federal Republic of Germany, while relieving the load on the highways. The new system, if adopted, should be connected with the existing rail system although not operating on the same track. The greatest efficiency would be achieved by using separate trains for passengers and goods, but all trains must travel at the same speed. The study also indicates further research subjects in the field of transportation. [German]

Also available from NTIS, PB-230 458-T.

Ministry of Transport, West Germany 1969, 87 pp, Figs., Tabs.

ACKNOWLEDGMENT: TSC

PURCHASE FROM: Ministry of Transport, West Germany Bonn, West Germany Repr. PC

DOTL HE64.A36

25 083050

PRIVATE VERSUS SOCIAL DECISION-MARKING FOR RAILWAY ABANDONMENT

The proposed restructuring of the northeastern railroads, with the possibility of abandonment of substantial mileage of lines and proposals for abandonments in Iowa and elsewhere, warrants attention to the relevant factors that should determine policy with regard to abandonment. This article presents the various elements that enter into abandonment decisions by individual railroads, and the additional elements, largely reflecting externalities, that should influence decisions about abandonment by the national government and the communities served. Various alternatives to abandonment, including transfer to local shipper-owned firms and to local governments, which allow internalization of some of the benefits external to the present companies are reviewed, as well as subsidy policy.

Due, JF (Illinois University, Urbana); Sidhu, ND (Northeast Illinois University) *Quarterly Review of Economics and Business* Vol. 14 No. 4, 1974, 23-42

ACKNOWLEDGMENT: Quarterly Review of Economics and Business
PURCHASE FROM: Bureau of Economic and Business Research 408 David Kinley Hall, Urbana, Illinois, 61801 Repr. PC

25 083071

TRANSPORTATION REGULATION: ANOTHER DIMENSION

In transportation's private sector, resources are allocated by the market mechanism of pricing. Many transportation projects such as highways, airways and navigable waterways do contain substantial indirect consumption benefits and hence price cannot be used as the principal allocator. The primary purpose of this study is to explore the relationship between marginal social benefits/marginal social costs and domestic regulated transportation. Examined are: (1) concept of regulated monopoly; (2) functions of economic regulation; (3) The deficiencies associated with transport regulation; and (4) the concept of marginal social benefits/marginal social costs as related to transport firms.

Davis, GM (Arkansas University, Fayetteville); Sherwood, SC (Sherwood, CS) *ICC Practitioners' Journal* Vol. 42 No. 2, Jan. 1975, pp 164-174

PURCHASE FROM: Association of Interstate Commerce Comm Pract 1112 ICC Building, Washington, D.C., 20423 Repr. PC

DOTL JC

25 083079

LOS ANGELES PIONEERS EXCLUSIVE BUSWAY

The Southern California Rapid Transit District has constructed a grade-separated bus transit system extending 11 miles through the San Gabriel Valley corridor. This Busway has the potential for even greater passenger capacity since the lanes could be easily converted to rail rapid transit at a relatively minor cost as future patronage and environmental needs warrant. Southern Pacific right-of-way adjacent to a major freeway provided space for the Busway, and relocation and elevation of the railroad was a major part of the overall project. Five years of negotiations and cooperation between a multitude of agencies and government bodies preceded the construction.

Gallagher, R (Southern California Rapid Transit District) *ASCE Civil Engineering* Vol. 45 No. 1, Jan. 1975, pp 64-67, 3 Fig.

PURCHASE FROM: XUM Repr. PC

DOTL JC

25 083081

THE PUBLIC RESPONSE TO THE SECRETARY OF TRANSPORTATION RAIL SERVICES REPORT. VOLUME II-MID ATLANTIC STATES

This report condenses the material presented to congress entitled "Evaluation of the Secretary of Transportation's Rail Service Report". The Rail Services Planning Office is aimed at improving rail service through the restructuring of bankrupt railroads in the midwest and northeast.

Interstate Commerce Commission 1974, 174 pp

ACKNOWLEDGMENT: ASCE Civil Engineering
PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

25 083083

TRANSPORT PLANNING AND THE POLICY-MODELLING INTERFACE

Evidence of the inability of transport models to elucidate policy is cited and reasons for this weakness are then suggested. Attention is drawn to the fundamental changes in both opinion and policy currently taking place. There is less concern with accessibility per se and rather more concern with the provision of adequate or minimum accessibility for certain social groups. More emphasis is placed also on the environmental aspects of transportation. The implications of these changes are outlined. It is not at all clear that the need to adapt and up-date models is appreciated widely enough. Finally, it is considered whether fundamental changes in methodology may help to make transport models more responsive to policy needs.

Starkie, DNM (Reading University) *Transportation* Vol. 3 No. 4, Dec. 1974, pp 323-334, 1 Fig., Refs.

ACKNOWLEDGMENT: Transportation
PURCHASE FROM: Elsevier Scientific Publishing Company P.O. Box 211, Amsterdam, Netherlands Repr. PC

DOTL JC

25 083940

THE DILEMMA OF FREIGHT TRANSPORT REGULATION

This is a background paper prepared for a conference of experts at the Brookings Institution, together with a summary of the conference discussion. There are six studies of the facets of regulation of economic activity in this volume. Because of the divergence in view concerning the proper nature and extent of transport regulation, the Brookings Institution decided to undertake a study that would cover systematically the implications of maintaining the current regulatory policies or of adopting alternatives. Following the background on freight transportation policy, the author summarizes the conference discussions.

Friedlaender, AF
Brookings Institution 1969, 216 pp, 8 Fig., 18 Tab., 3 App.

PURCHASE FROM: Brookings Institution 1775 Massachusetts Avenue, NW, Washington, D.C., 20036 Repr. PC

DOTL RP

25 083941

TECHNOLOGICAL CHANGE IN REGULATED INDUSTRIES

This book examines technological change in the regulated industries, including electric power, communications, and air and surface transportation. One complete chapter is devoted to surface transportation. This chapter examines several specific cases, including the relationship of Rail Form A costs on the long piggyback flatcar, and the Big John Grain Rates case. The chapter also looks at mergers and at highway and inland waterway transportation.

This publication contains papers prepared for a conference of experts, with an introduction and summary.

Brookings Institution 1971, 238 pp, 4 Fig., 21 Tab.

PURCHASE FROM: Brookings Institution 1775 Massachusetts Avenue, NW, Washington, D.C., 20036 Repr. PC

DOTL HD2766.T33

25 084722

THE STATES AND RAILROAD REORGANIZATION

This article summarizes the role of the States, their concerns and their activities in response to the Regional Rail Reorganization Act of 1973. Based on an examination of that role and the first year's activities, it is believed the States are in favor of reorganization of the bankrupt railroads. A viable and accessible railroad system is viewed as necessary if the region is to attract or retain industry. Massive abandonment is not seen as necessary, although some abandonment would probably be desirable. If USRA proposed such large scale abandonment in the Final System Plan that Congress would reject the plan, the results would be undesirable from every perspective.

Black, WR (Indiana University, Bloomington) *State Government* No. 1, Jan. 1975, pp 37-42, 2 Tab.

PURCHASE FROM: Council of State Governments P.O. Box 11910, Lexington, Kentucky, 40511 Repr. PC

DOTL RP

25 084738

THE INTERMODAL PRICING BEHAVIOR EXPECTATIONS UNDER REDUCED REGULATION

It is concluded that competitive intermodal pricing practices under substantially lessened regulatory constraints are essentially devoid of ruinously competitive or predatory aspects. The entry-limit pricing of similar situations in the past might indicate otherwise, but now, says the author, pricing behavior can result in more efficient allocation and utilization of resources in the transport sector. He notes that the lack of historical models which incorporate advances available to economics in the past 15 years produced expectations of competitive pricing detrimental to some or all the competitors and consumers of transport services.

McCarney, BJ *ICC Practitioners' Journal* Vol. 41 No. 5, July 1974, pp 532-43, 2 Tab.

PURCHASE FROM: Association of Interstate Commerce Comm Pract 1112 ICC Building, Washington, D.C., 20423 Repr. PC

DOTL JC

25 084742

ICC BEHAVIOR ON RAIL ABANDONMENTS

Rail management is not free to determine whether it can cease operations over certain parts of its plant. Rather such management decisions are subject to the approval of a Federal regulatory agency, The Interstate Commerce Commission (ICC). The ICC, in turn, trades off the carrier's desires with those of the public who may be adversely affected by the proposed abandonment of service. The nature of the trade off made by the ICC is explored through a theoretical model of the Commission's behavior. This behavioral theory gives an a priori construct from which empirical tests of actual Commission abandonment decisions are conducted. A (0,1) grant-deny decision model is postulated and estimated as a linear probability model, as a discriminant model, and as a probit model. All independent variables have the correct signs. In addition, the models classify existing cases properly at the 95 percent level. The empirical model suggests that Commission decisions are ordered and follow a well defined pattern.

Allen, WB *ICC Practitioners' Journal* Vol. 41 No. 5, May 1974, pp 553-571, 1 Fig., 6 Tab., 16 Ref.

PURCHASE FROM: Association of Interstate Commerce Comm Pract 1112 ICC Building, Washington, D.C., 20423 Repr. PC

DOTL JC

25 084915

TECHNICAL EVALUATION OF THE RECOMMENDED 1995 TRANSPORTATION SYSTEM IN THE CHICAGO-GARY REGION

This report is confined to the functional evaluation of public transportation and highway modes. The procedure involves a standard methodology developed for the urban transportation planning process: A methodology consisting of a sequence of technical studies designed to simulate 1995 future travel over the proposed public transportation and highway networks. In the latter stages of this process, performance measures are defined and the functional characteristics of the proposed networks are described at the simulated levels of transportation demand.

Chicago Area Transportation Study June 1974, 125 pp, 32 Fig., 52 Tab.

ACKNOWLEDGMENT: Chicago Area Transportation Study
PURCHASE FROM: Chicago Area Transportation Study 300 West Adams Street, Chicago, Illinois, 60606 Repr. PC

DOTL RP

25 090438

TRANSPORTATION IMPACT STUDIES: A REVIEW WITH EMPHASIS ON RURAL AREAS

The studies reviewed were classified into four categories (these are not mutually exclusive) according to the following criteria: The nature of the transportation facility (i.e., highway, rail, etc.); the kind of area examined in the study (e.g., by-pass area, rural area, interchange area); the type of effect measured (changes in land use, land value, economic activity, etc.); the methodology employed in the analysis of impact.

Skorpa, L. Dodge, R. Walton, CM Huddleston, J
Texas University, Austin, Department of Transportation RR-2, Oct. 1974, 83 pp

Contract DOT-OS-30093

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239483/1SL, DOTL NTIS

25 090517

PROCEEDINGS OF THE GREATER SAINT LOUIS TRANSPORTATION SEMINAR (WITH EMPHASIS ON PASSENGER SYSTEMS) HELD AT STOUFFER'S RIVERFRONT INN, ST. LOUIS, MISSOURI ON 11-12 OCTOBER 1973

Southern Illinois University at Edwardsville, in cooperation with the University of Missouri at Columbia, held an intermodal, interdisciplinary transportation seminar. Local, regional, state, and national participants were selected. The general public was also involved. The purpose of the conference was: (1) To facilitate comprehensive transportation; (2) to involve the public with transportation needs and trends; and (3) to consolidate transportation and land use planning for the St. Louis region.

Sponsored in part by Missouri Univ., Columbia.

Southern Illinois University, Edwardsville, Department of Transportation, Missouri University, Columbia Final Rpt. May 1974, 161 pp

Contract DOT-OS-30117

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238424/6ST, DOTL NTIS

25 090658

URBAN RAIL SUPPORTING TECHNOLOGY PROGRAM FISCAL YEAR 1974. YEAR END SUMMARY

Major areas include program management, technical support and application engineering, facilities development, test and evaluation, and technology development. Specific technical discussion includes track measurement systems; UMTA facilities development at the DOT High Speed Ground Test Center, Pueblo, Colorado; rail car test and evaluation; instrumentation for data acquisition and processing; noise abatement technology; tunneling; and car crashworthiness studies.

See also PB-238 602.

Madigan, RJ

Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA-75-7, Mar. 1975, 94 pp

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr PC, Microfiche

PB-241239/3ST, DOTL/NTIS

25 091379

CONSUMER INVOLVEMENT IN RULEMAKING. REPORT OF A STUDY AND RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION FOR CONSUMER INVOLVEMENT IN RULEMAKING

The report covers a study within the Department of Transportation of rulemaking practices and procedures, consumer involvement in that process, workshop sessions held as part of the study, need for consumer involvement in rulemaking, the development of the consumer movement and the growth of consumer organizations. Also included are five recommendations to the Secretary of Transportation to increase consumer involvement in the DOT rulemaking process through increased use of the notice and comment procedure, use of advanced notice of proposed rule-making, and 45-day comment period for proposed rulemaking.

Department of Transportation Final Rpt. June 1974, 37p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241575/0ST, DOTL NTIS

25 091417

THE VOICE OF THE TRANSPORTATION CONSUMER. A REPORT TO THE SECRETARY OF TRANSPORTATION ON NATIONWIDE CONSUMER PUBLIC HEARINGS CONDUCTED BY THE OFFICE OF CONSUMER AFFAIRS, 1971-1974

The report includes an analysis of transportation concerns expressed by participants at 54 nationwide public hearings held from 1971-1974. Also included is a tabulation of responses to 1,280, 29-part questionnaires returned by hearing attendees. Subject areas include: Balanced transportation; transportation planning; transportation funding; citizen participation in transportation planning; elderly and handicapped; energy; environment; rural transportation; technology; automobile; aviation; bicycles; bus; highways; motorcycles; pedestrians; rail; rapid transit; trucks; water transportation.

Paper copy also available in set of 2 reports as PB-241 778-SET, PC\$19.00.

Department of Transportation Final Rpt. DOT/TES/OCA-75/2, Apr. 1975, 665p

ACKNOWLEDGMENT: NTIS

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-241765/7ST, DOTL NTIS

25 095199

ADVANTAGES AND DISADVANTAGES FOR THE COMMUNITY OF STATE INTERVENTION IN THE PRICING POLICY OF FREIGHT TRANSPORT COMPANIES [Avantages et inconvenients (au Niveau de la collectivité) des interventions de l'Etat dans la politique des prix des entreprises de transport de marchandises]

The report by Professor del Visco of Rome's Research Centre for Transport Systems is made up of 6 sections: I. A general study of the common characteristics of the various techniques and the way of applying price control policies. II. Price control policy where the railway has a monopoly. III. Price control policy in a system where transport is provided only by a large number of private companies for transport by road and by waterway. IV and V. The example of a competitive market with possibilities of choosing from among three solutions, rail, road or waterway and where the railways still however could have a monopoly. VI. Political considerations which take into account other than purely economic aims of states, including that of maximum support. The second part of the document contains a summary of the Round Table discussions on the advisability of state intervention in prices on the transport market, various forms of intervention and monitoring their effects, the definition of the respective roles of politicians and economists in forming a transport policy. [French]

An account of the 22nd Session of Round Table Discussions of the ECMT which was held in Paris on March 15-16, 1973.

del Visco

European Conference of Ministers of Transport 1974, 42 pp, 43 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: OECD Publications Center 1750 Pennsylvania Avenue, NW, R1207, Washington, D.C., 20006 Repr. PC

25 095200

OVERALL SWISS TRANSPORT CONCEPT AND CK-73 MASTER CONCEPT [Gesamtverkehrskonzeption und Leitbild CK-73]

The article explains the contents, method and timetable for work on the overall Swiss transport concept and describes the interplay with the country's regional planning schemes. [German & French]

Hidber, C *Raumplanung Schweiz* No. 3, 1974, pp 27-30, 2 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: *Raumplanung Schweiz* Berne, Switzerland Repr. PC

25 095203

MEMORANDUM CONCERNING CERTAIN LEGAL MATTERS IN CONNECTION WITH INTERNATIONAL REGULATIONS FOR COMBINED TRANSPORT [Note au sujet de certaines questions juridiques relatives a la réglementation internationale des transports combinés]

The OCTI was invited by the Secretariat of the UNCTAD (United Nations Conference on Trade and Development) to take part in the drafting of a Convention for Multi-modal International Transport. This document is the memorandum submitted by the OCTI to the UNCTAD in April

1974. For the Convention, the UNCTAD envisages: balanced international regulations where private law is concerned; technical and economic organisation of combined transport so that it in no way impinges on the economic, political and social interests of the countries where industry uses these transport chains. The OCTI document shows up the practical difficulties of any convention with the second of these two aims and deals with the various features covered by the first point; A) Types of organisation for international combined transport, transport organised by the dispatcher with separate contracts for each handler, ETC transport (by Combined Transport Contractors), through transport contracts signed with a group of carriers contributing to the transport chain; B) Scope of the proposed convention; C) Systems of responsibility to be considered in connection with the proposed convention; D) Principles of uniform responsibility. [French/German]

Bulletin des Transports Internat par Chemin de Fer Vol. 82 July 1974, pp 126-144

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: *Bulletin des Transports Internat par Chemin de Fer* Berne, Switzerland Repr. PC

25 095236

CONRAIL-HOW THE PLAN BREAKS DOWN.

These are four major features to the proposed CONRAIL organization; (1) The establishment of a 15,000 mile system and abandoning 6,200 miles of branch lines; (2) Giving parts of the Reading and Erie Lackawanna to the Chessie System and Norfolk & Western to operate; (3) Improving high speed rail passenger service in the Northeast Corridor; (4) Undertaking a \$5 billion, 14 year track and roadway rehabilitation program. The article contains a brief summary of each of these major points.

Progressive Railroading Vol. 18 No. 3, Mar. 1975, pp 11-12

ACKNOWLEDGMENT: CNR

PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

DOTL JC

25 095385

IMPORTANCE OF THE RAILWAY IN THE CONCEPT OF THE INTEGRATED TRANSPORT INFRASTRUCTURE PLAN FROM THE POLICY VIEWPOINT [Die verkehrspolitische Bedeutung der Eisenbahn im integrierten Verkehrswegeplan]

The author examines the objectives of the federal transport infrastructure plan. The latter facilitates cost-benefit analyses, in relation to the overall national economy, of alternatives for the construction of transport infrastructures. In the period 1976-1985, 120 thousand million DM are available for transport investment purposes on the following basis: 42 thousand million for the DB, 65 for federal motorway projects, and 105 for inland waterways. Furthermore, money will be provided for improving air safety, and for developing airports and terminals. [German]

Haar, E *Eisenbahntechnische Rundschau* Vol. 23 No. 7-8, Apr. 1974, pp 305-309

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

25 095387

SCIENTIFIC ASPECTS OF THE RAILWAY'S PLACE IN THE INTEGRATED FEDERAL TRANSPORT INFRASTRUCTURE PLAN [Die wissenschaftlichen Aspekte der Bedeutung der Eisenbahn im integrierten Bundesverkehrswegeplan]

After reviewing the railway's specific characteristics, the author concludes that the top speed of 300 km/h chosen for new high-speed lines is adequate in terms both of the geographical housing pattern and of the traffic requirements of individual countries, even in the longer term. The railway can be highly competitive in the field of passenger traffic, provided train speeds can be substantially increased. The author places special emphasis on the construction of new lines and yards, as envisaged in the context of the first phase of implementation of the federal transport infrastructure plan. [German]

Kracke, R *Eisenbahntechnische Rundschau* Vol. 23 No. 7-8, July 1974, pp 309-312

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

25 095388

THE MUNICH TRANSPORT COMMUNITY-CONTRADICTION BETWEEN ECONOMIC THEORY AND POLITICAL ACTION? INVENTORY OF THE TRIAL YEAR AFTER THE OLYMPIC GAMES [Der Muenchner Verkehrsband—ein Widerspruch zwischen oekonomischem Denken und politischem Handeln? Bilanz des nacholympischen Bewahrungsjahres]

The inventory for 1973 (after the 1972 Olympic Games) shows expenditure of 510 million DM against receipts of 212 million DM, hence the substantial deficit despite the increased traffic recorded during that year. Although some of the reasons behind this deficit do not originate with the community, one may well ask to what extent this massive tax burden is justified by social service obligations. Of course, there are tangible results, especially in terms of relief to road traffic and shorter travel times. Nevertheless, the community since 26 May 1974 has been reappraising the overall service pattern in order to better adapt it to requirements. [German]

Meyer, NL *Internationales Verkehrswesen* Vol. 26 No. 4, July 1974, pp 147-154, 3 Fig., 1 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Dr Arthur Tetzlaff Verlag Niddastrasse 64, Frankfurt am Main, West Germany Repr. PC

25 095390

COMMERCIAL COLLABORATION BETWEEN THE EUROPEAN RAILWAYS IN THE FREIGHT TRAFFIC SPHERE [Die kommerzielle Zusammenarbeit der europaischen Eisenbahnen auf dem Gebiet des Gueterverkehrs]

The substantial development of international trade exchange has not been matched by a corresponding increase in the international traffic of European Railways: as a matter of fact, the rail share of total traffic is going down. The author discusses commercial collaboration between European Railways in the freight marketing sphere: national obligations hinder the development of this collaboration and the development of standard international tariffs. Special agreements with customers should also be developed in respect of those international traffic flows where competition is very strong, taking into account the interest of participating railways, measured against the profitability of the overall traffic relation. The ultimate objective is the setting up of a European Railway Company. [German]

Eifler, FK *Die Bundesbahn* Vol. 50 No. 8, Aug. 1974, pp 486-488

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

25 095392

PROBLEMS OF THE GERMAN FEDERAL RAILWAY IN CONNECTION WITH THE INTEGRATED TRANSPORT-INFRASTRUCTURE PLAN [Probleme der Bundesbahn im integrierten Verkehrswegeplan]

Whereas investments for road constructions jumped from 0.5 thousand million in 1950 to 12.1 thousand million DM in 1972, the German Federal Railway during this same period found itself having to concentrate its investments almost exclusively on maintenance. The massive transfer of petrol taxes to other transport-policy projects means that the DB is now able to implement its concepts within the framework of the national transport infrastructure programme. The 1973/1974 federal budget already makes provision for the construction of new lines. The DB is confident of reducing its cost prices through rationalization of its administration, development of its network and assets, and definition of a new strategy for part-load traffic. [German]

Vaerst, W *Eisenbahntechnische Rundschau* Vol. 23 No. 7-8, July 1974, pp 302-305

ACKNOWLEDGMENT: International Railway Documentation, Selection of PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

DOTL JC

25 095416

PRELIMINARY SYSTEM PLAN, VOLUME II FOR RESTRUCTURED RAILROADS IN THE NORTHEAST AND MIDWEST REGION

This volume deals specifically with the railroad light density line issue and the potential impact upon shippers and communities in the Northeast and Midwest region. It also defines the method used to compare the costs of providing safe and efficient rail service with the actual revenues from existing or projected traffic over each branch line. Railroad marine operations were also discussed as well as the methods used to analyze car-ferry operations. The community impact of abandonment of railroad service and a line-by-line analysis and recommendation for inclusion of specific light density line segments in the Consolidated Rail System are discussed.

This document sponsored by the U.S. Congress, was written in response to the Regional Rail Reorganization Act of 1973. See also PB-239845, RRIS #25 095417, RRIS Bulletin 7502.

United States Railway Association Prel. Rpt. USRA/R-021.1, Feb. 1975, 497 pp

Contract Pub. Law 93-236

ACKNOWLEDGMENT: United States Railway Association PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239846/9ST, DOTL NTIS

25 095417

PRELIMINARY SYSTEM PLAN, VOL. I FOR RESTRUCTURING RAILROADS IN THE NORTHEAST AND MIDWEST REGION PURSUANT TO THE REGIONAL RAIL REORGANIZATION ACT OF 1973

This plan was the requirement of the Regional Rail Reorganization Act of 1973 which was passed in response to a threat to the Nation's transportation system posed by the bankruptcy of eight railroads in the Northeast and Midwest. This plan includes the preliminary reorganization of rail services and disposition of rail properties of the bankrupt railroads. It also includes information and statistics on facilities, equipment, marketing, manpower, environment, passenger service and finances.

Result of the Regional Rail Reorganization Act of 1973. Sponsored by U.S. Congress. See also PB-239846, RRIS #25 095416, RRIS Bulletin 7502.

United States Railway Association Prel. Rpt. USRA/R-021, Feb. 1975, 326 pp

Contract Pub. Law 93-236

ACKNOWLEDGMENT: United States Railway Association PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239845, DOTL NTIS

25 095420

CONTROLLED TRANSFER AS A RESTRUCTURING MECHANISM

A study to develop the economic, social and environmental consequences of reorganizing the railroads by controlled transfers of banking rail properties to solvent carriers either within or external to the Northeast region. The study explores the consequences of a controlled transfer reorganization compared to the proposal to establish a single Consolidated Rail Corporation. Included in this exploration are the legislative and regulatory changes necessary, the problem of timing and manner of bidding and condition of sale. The study concludes with recommendation on continuation of potential bankrupt rail properties and solvent carriers.

Economic and Science Planning, Incorporated Final Rpt. USRA/R-016, Jan. 1975, 175 pp

Contract USRA-C-50071

ACKNOWLEDGMENT: United States Railway Association PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239218, DOTL NTIS

25 096542

THE MYSTERY OF THE MISSING MILLIONS

Fluctuating investment and traffic forecasts created something akin to planning paralysis last year at British Rail headquarters, but Richard Hope finds that spending is still expected to rise sharply over the next five years despite much-publicized cuts. Behind the uncertainty, however, lies the barely concealed conflict between the Transport Minister and the BR Board over policy objectives which this year's total subsidy of nearly 500 million pounds probably will bring to a head.

Railway Gazette International Vol. 131 No. 4, Apr. 1975, pp 149-151, 2 Tab.

PURCHASE FROM: XUM Repr. PC

DOTL JC

25 096563

THE INTERSTATE RAIL SYSTEM

This paper proposes the development of an Interstate Rail System, similar in scope and function to the Interstate Highway System, consisting of selected segments of the existing railroad network. The paper describes the concept of the proposal and the problems that it is designed to solve. Possible methods of implementation of the proposal are described. The paper includes a methodology for the selection of Interstate Rail System routes and an example system consisting of 39,331 route miles.

Zlatkovich, CP

Texas University, Austin Apr. 1975, 23 pp

ACKNOWLEDGMENT: Texas University, Austin

PURCHASE FROM: Texas University, Austin Bureau of Business Research, Austin, Texas, 78712 Repr. PC

DOTL RP

25 096577

PROFESSOR RIPLEY REVISITED: A CURRENT ANALYSIS OF RAILROAD MERGERS

Professor William Z. Ripley was commissioned by the ICC in 1920 to prepare a plan for consolidating American railroads into a limited number of financially viable systems. Consolidations are examined in the light of the regulatory environment because its ramifications did much to produce the current situation. The advantages and disadvantages of merger are examined. The course of the merger movement since 1957 is discussed. Finally the authors express their opinions regarding the ICC'S overall merger policy—or lack of policy, and the prudence of authorizing any more rail mergers. The present merger picture is examined in the light of Professor Ripley's recommendations.

Johnson, JC Whiteside, TC *ICC Practitioners' Journal* Vol. 42 No. 4, Apr. 1975, pp 419-452, 2 Tab.

PURCHASE FROM: Association of Interstate Commerce Comm Pract 1112 ICC Building, Washington, D.C., 20423 Repr. PC

DOTL JC

25 096578

CONSOLIDATED RAIL CORPORATION: PHOENIX OR ALBATROSS

The Regional Rail Reorganization Act of 1973 is the Federal government's response to the continued inability of the nation's largest railroad, Penn Central, to accomplish a reorganization within the framework of the law. The alternative of liquidation for PC was unacceptable. The author proposes an essentially private enterprise solution to the PC problem. After identifying weak management, excessive size and below-cost freight rates as the sources of the trouble, it is suggested that PC property be divided and sold to new private managements organized in Rail Development Corporations. The two to four RDCs would require some assistance in financing equipment acquisitions and would need limited ratemaking freedom.

Rice, CM *ICC Practitioners' Journal* Vol. 42 No. 4, May 1975, pp 379-405, 3 Tab.

PURCHASE FROM: Association of Interstate Commerce Comm Pract 1112 ICC Building, Washington, D.C., 20423 Repr. PC

DOTL JC

25 096584

THE ROLE OF REGIONAL TRANSPORT TODAY AND IN THE NEAR FUTURE

This report divides its assignment into two categories: Public rail and road-passenger transport and rail freight services. Examined in this report to UITP 1975 International Congress are the following: Development of regional transport, traffic trends, employment and operating figures, financial situation and loss coverage, reasons for unsatisfactory financial situation, and measures to improve regional transport. The report concludes with sections on reconsideration of regional transport policies and the future of regional transport. The report stresses that it covers the near future, noting that financial difficulties require public agencies to underwrite not only operating losses but also to recognize the social function of such operations by supplying adequate funding for investment.

Presented at the 41st International Congress, Nice, France, 1975. Also available in French and German.

Schlagelbauer, V

International Union of Public Transport 1975, pp 3-25, Tabs., Photos., Refs.

PURCHASE FROM: International Union of Public Transport 19 Avenue de l'Uruguay, Brussels B-1050, Belgium Repr. PC

DOTL RP

25 096635

A RAILWAY TRUST FUND

The author examines resource consumption, energy in particular, for different modes of transport, studies their relative competitive positions and suggests means to promote a more efficient overall transport system. Resource consumption is analysed on the basis of Leontieff's input-output theory; the author shows the various consequences of transfer between modes of transport. Competitive positions are given in terms of commercial speed, average transport distance, revenues, circuitry, for each mode and according to the regulations applying to them in terms of development of speed, ancillary equipment, volume carried annually since 1925. In concluding, he recommends:—abandoning all subsidies on barges and trucks, direct or indirect;—adopting an even-handed regulation for all modes;—purchasing and maintenance by the State of railroad structures (right-of-way user rights should be adopted).

Hannon, B *Transportation Research* Vol. 8 No. 4-5, Oct. 1974, pp 363-372, 3 Tab., 28 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

25 096636

ECONOMIC CONDITIONS FOR HIGH-SPEED RAILWAYS**[Wirtschaftliche Voraussetzungen fuer Fernschnellbahnen]**

Work of a study group in the law and economic sciences faculty at Berne University. The economic conditions for a high-speed railway and their relationship with the general transport situation in several countries are investigated with the aid of concrete examples. The studies are especially directed to conditions on the Japanese National Railways (new Tokaido line). Brief reference is made to several projects for high-speed railways (Japan, United States, Federal Germany, France, Britain, Italy, Switzerland). [German]

Dueggelin, H

Working Seminar on Administration & Mgt. Science 1974, 38 pp, 5 Fig., 33 Tab., 32 Ref.

ACKNOWLEDGMENT: UIC

PURCHASE FROM: Working Seminar on Administration & Mgt. Science Berne University, Berne, Switzerland Repr. PC

25 096641

RATIONALISATION IN PUBLIC SERVICE [Rationalisierung im oeffentlichen Dienst]

The increase in public expenditure is the result of the rise in the proportion of staff costs. This is why an examination needs to be made into whether the extra services imposed by the public authorities are really necessary and whether the state should handle the distribution done to

date according to the normal forces of supply and demand. Following details of the reasons for the increase in the proportion of staff expenditure, the author suggests, to cut back this proportion, that the statute of employees in public services should be reviewed and steps be taken to rationalise administration (revision and improvement of the structures of the organisation of work and management methods). [German]

Genscher, HD *Management Heute* Vol. 2 No. 6, 1974, pp 10-11

ACKNOWLEDGMENT: UIC

PURCHASE FROM: Verlag fuer Wissenschaft, Wirtsch & Tech GmbH & Co Postfach 242, 3388 Bad Harzburg, West Germany Repr. PC

25 096658

IMPLEMENTATION OF THE REGIONAL RAIL REORGANIZATION ACT OF 1973

The Rail Services Planning Office of the Interstate Commerce Commission has a dual function to review and comment on the various stages of the planning process mandated under the Regional Rail Reorganization Act of 1973 and to provide for the protection of the public interest during the course of the rail restructuring. In carrying out its mandate from Congress to solicit, study and evaluate the views of all interested persons with respect to present and future rail services in the region, RSPO issued this summary of the status of the Northeast railroads and steps which had been taken under the Act through March 18, 1974.

Rail Services Planning Office Mar. 1974, 16 pp

ACKNOWLEDGMENT: Rail Services Planning Office

PURCHASE FROM: Rail Services Planning Office 1900 L Street, NW, Washington, D.C., 20036 Repr. PC

DOTL RP

25 096660

PRELIMINARY RESULTS FROM AN INTEGRATED TRANSPORTATION AND LAND USE MODELS PACKAGE

This paper describes the results, to date, of an effort to integrate a land use model with a transportation network model for the purpose of analyzing the inter-relationships of transportation facility development and land development. In the system which has been developed each model provides input to, and receives feedbacks from, each other model. To the author's knowledge, the effort described here represents the first successful attempt to develop and test an integrated model package involving these reciprocal relationships. The results obtained from preliminary runs of this package should be of considerable interest to both transportation planners and land use planners. With this integrated system it has been possible to observe the interrelationships, and in particular the feedbacks, between land use and levels of traffic on the networks. Preliminary results indicate that congested networks produce tendencies toward metropolitan centralization. Attempts to relieve congestion seem to produce metropolitan decentralization and increased travel which lead, in turn, to metropolitan sprawl and increased spread of congestion. /Author/TRRL/

Putman, SH (Pennsylvania University, Philadelphia) *Transportation* Vol. 3 No. 3, Oct. 1974, pp 193-223, 9 Fig., 5 Tab., 12 Ref.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211637)

PURCHASE FROM: Elsevier Scientific Publishing Company P.O. Box 211, Journal Division, Amsterdam, Netherlands Repr. PC

25 096672

TRANSPORTATION-PLANNING FOR THE FUTURE

The author discusses the effect of the reorganization of local government on transportation planning and makes special reference to the transport policy and programmes (TPP). It is pointed out that the single grant system enables all transportation elements to compete as equals for grant aid and that the local authorities are allowed greater independence. The discussion is illustrated with two figures: a simple flow chart illustrating the procedure required and a more detailed diagram showing the principal work areas of the transportation planning unit and the relationship of the unit to other bodies in each work area. An account is given of the work to be done which includes the development and testing of the transportation policies, the development of projects to implement these policies (involving feasibility studies and evaluation), the production of a project programme and monitoring. The advantages of integrating work areas are

stressed together with a subdivision on a geographical basis. Separate sections should deal with planning for urban and rural areas. In conclusion the management of transport-based sections are discussed and particular reference is made to the need for co-ordination, maximum delegation of responsibility, and sufficient flexibility of structure. /TRRL/

Cathcart, R *Surveyor - Public Authority Technology* Vol. 144 No. 4287, Aug. 1974, pp 31-33, 2 Fig.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 210994S)

PURCHASE FROM: IPC Building and Contract Journals, Limited 32 Southwark Bridge, London SE1, England Repr. PC

25 096756

TPPS-ROUND TWO COMING UP

The author discusses problems associated with the introduction of the new transport policies and programmes (TPP) system, the need for authorities to take a critical look at their own TPPs and the way in which they can do this. The main part of the article is concerned with the sort of approaches that authorities should be adopting, the question of evaluation and the involvement of other agencies. Details are given of a check list of items requiring consideration namely; an integrated approach to the problems facing the area as a whole; the preparation of a position statement for existing policies and programmes, the development of a base for the understanding of the transport problem; the production of a clear statement of the objectives in operational terms derived from an analysis of needs and the position statement; the need for flexibility of plan and for keeping options open particularly in the earlier years; a study of the part to be played by public transport including methods of overcoming constraints and making an analysis of the operation of services; and the encouragement of new approaches. Mention is made of the problems of evaluation particularly in relation to policy decisions, the effectiveness of policies and the need for a policy impact statement in all TPPs. After stating the need for the involvement of other agencies including British Rail, NCB and district councils, the author concludes with a brief reference to the future. /TRRL/

Eddison, T (Bristol University, England) *Surveyor - Public Authority Technology* Vol. 144 No. 4293, Sept. 1974, pp 29-31

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 211601)

PURCHASE FROM: IPC Building and Control Journals Limited Dorset House, Stamford Street, London SE1 9LU, England Repr. PC

25 096985

TRANSPORT ORGANIZATION IN A GREAT CITY. THE CASE OF LONDON

This study opens with an account of the growth of the transport infrastructure of London and of the institutions controlling the operation and development of that infrastructure. The present powers and roles of the main statutory bodies are discussed. There follows fifteen case studies concerning a wide variety of projects such as new underground lines, changes in the rail approaches from the south-east, bus priority schemes and the Heathrow link. These examine the formulation of schemes, their appraisal, problems encountered and action taken. This leads to a discussion of the problems of London's transport which contrasts the wishes and aspirations of the public with the choices open to decision-makers. A number of policy options are discussed ranging from the short-term, such as fixing fares, to the long-term where attention is paid to land-use planning. The performance of the present institutional arrangement is evaluated, illustrating the difficulties of decision-making and action, given the number of interested parties. Various changes are suggested such as grant alterations, the transfer of control of over trunk roads and British rail to the GLC and improved transport planning with greater public participation and more co-ordination in decision-making. /TRRL/

Collins, MF Pharoah, TM
London School of Economics and Political Science 1974, 660 pp; Figs., Tabs., Refs.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 212263)

PURCHASE FROM: London School of Economics and Political Science Houghton Street, Aldwych, London WC2A 2AE, England Repr. PC

25 097233

ALLOCATION OF INVESTMENT FUNDS BETWEEN ROAD AND RAIL

This paper is concerned with the development of a simple and straightforward rule designed to ease the problem facing a government agency that must allocate funds for investment in transportation projects to different sectors when these sectors use different methods of investment appraisal. If, for example, funds must be allocated between road and rail projects, and the former is evaluated using a surplus rate of return (cost saving plus user benefit) and the latter a financial rate of return, it is demonstrated that these rates of return for practical purposes may be made directly comparable for interurban transport projects by multiplying the financial rate of return by the factor 1.5. The problems arising in other situations (e.g., urban areas) and that must empirically surmounted are also elaborated.

Peaker, A

Foundation Periodical for Public Finance Vol. 29 No. 1, 1974, pp 49-55

PURCHASE FROM: Foundation Periodical for Public Finance
Duesternbrooker Weg-120, D-23 Kiel, West Germany Repr. PC

25 097281

NEW VERY HIGH SPEED RAILWAY LINES AS A FUNDAMENTAL FACTOR OF THE DEVELOPMENT OF THE MAIN ARTERIES OF THE EUROPEAN NETWORK

Of the 250,000 km of line in the European network, about 40,000 km have been identified as "European main arteries." To meet requirements of capacity and quality for handling expanding freight and passenger traffic, these lines are getting special attention with some of them already being upgraded for high speeds and heavy traffic. This report considers the economic value of very high speeds on these routes, the potential and problems involved in building new lines which would not accommodate conventional equipment, and specific consideration of such lines as French National Railways' Paris South East project and certain international routes.

Tessier, M (French National Railways) *Rail International* Vol. 6 No. 4, Apr. 1975, pp 283-294, 7 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

25 097287

NATIONAL REQUIREMENT FOR URBAN PUBLIC TRANSPORTATION FUNDS

The 1972 National Transportation Study was undertaken to assess the need and priorities for transportation capital funds for states and urban areas. This paper describes some of the results of that study with respect to urban public transportation. The results indicate that substantial funding is needed for urban public transportation in both the short and long term and that funding requirements vary widely between urban areas of different sizes and between urban areas of similar size. Capital funding requirements over time also vary. Major public transportation implementation programs peak in funding requirements midway in the programs. Operating costs as a proportion of total capital and operating costs are higher for existing public transportation systems than for new public transportation systems because existing systems are almost fully depreciated. Even with two-thirds federal funding for capital improvements, the state-local share of the 25-year cost to construct and operate urban public transportation systems is likely to be substantial.

Report prepared for the 53rd Annual Meeting of the Highway Research Board.

Weiner, E (Department of Transportation) *Transportation Research Record* No. 519, 1974, pp 1-9, 3 Fig., 8 Tab., 8 Ref.

PURCHASE FROM: TRB Publications Off Repr. PC

DOTL RP

25 098074

EIGHTH REPORT ON THE RAILROAD TECHNOLOGY PROGRAM

This annual report by the Secretary of Transportation serves as an information source for those having a technological interest in FRA's research, development and demonstration activities. It covers not only programs

funded by the High Speed Ground Transportation Act of 1965, but also related work performed under appropriations for advancing railroad technology and safety. Sections deal with improved freight service, safety, improved track structures, automated test inspection and test support services, passenger service, supporting technology and facilities, Railroad Research Information Service, advanced technology and High Speed Ground Test Center. The year covered is through September 30, 1974.

Federal Railroad Administration 1974, 87 pp, 66 Fig., 2 App.

PURCHASE FROM: NTIS Repr. PC, Microfiche

DOTL NTIS

25 098679

SOME LESSONS FROM TRANSPORT DEREGULATION IN CANADA

Two lessons drawn from the Canadian experience with transport deregulation are that the process does not necessarily solve the financial problems of the carriers, and it does not necessarily produce an economically optimal allocation of resources. The author observes that while arguments for a substantial degree of deregulation in the U.S. may still be compelling, there is no such thing as an economic panacea. The body of this report is development of the two points noted above.

Presented to the Transportation Research Forum, San Francisco, Calif, Oct. 10-12, 1974.

Heads, J

Canadian Transport Commission ESAB-75-1, Feb. 1975, 21 pp, 3 Fig., Refs.

PURCHASE FROM: Canadian Transport Commission Economic and Social Analysis Branch, Ottawa K1A 0N9, Ontario, Canada Repr. PC
DOTL RP

25 099183

TRANSIT POLICY AND OPERATIONS IN EUROPE AND CANADA

This article describes and compares city planning policies as related to transit planning and transit operations in Europe and Canada. While transit is the traditional travel mode in Europe, authorities there are now experiencing the general decline in ridership that accompanies increased car ownership, the case in North America. One reason for larger transit usage in Europe is the difference in attitudes of authorities responsible for mass transportation. In Europe there is willingness to experiment and innovate, even if it means attacking the privileges of the automobile driver, and whether or not the new measure will benefit the transit authority in monetary terms. Canadian and British systems have low costs because they pare down unprofitable services so as not to incur a deficit.

Morrall, J Finn, N *Traffic Quarterly* Vol. 29 No. 3, July 1975, pp 385-402, 6 Fig., 4 Tab.

PURCHASE FROM: Eno Foundation for Transportation, Incorporated
P.O. Box 55, Saugatuck Station, Westport, Connecticut, 06880 Repr. PC
DOTL JC

25 099356

CARGO LIABILITY STUDY—FINAL REPORT

This study was undertaken to broaden our understanding of today's cargo liability system in order that future domestic legislation and international conventions may better serve the needs of commerce. The study was carried out under the overall guidance of the Office of Facilitation and coordinated with concerned segments of the Federal government, private industry, and international organizations concerned with the movement of intermodal cargo.

This program was sponsored by US DOT.

Department of Transportation, (OST-TE5-50) YS-32004, June 1975, 195 pp

ACKNOWLEDGMENT: DOT

PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-244203, DOTL NTIS

25 099363

A TECHNICAL REPORT ON A MICHIGAN STATE RAILROAD PLAN

This report is one product of a continuing study of the railroad system of the State of Michigan for the purpose of developing a State Railroad Plan.

Federal Railroad Administration supported this planning, and a similar effort in Wisconsin, as pilot efforts at statewide railroad system planning, an activity for which there is no precedent. The chapters: Background on the railroad system of Michigan; Analyses made with a statewide perspective; Methodology and analysis of lines identified for possible service termination; Possible service and traffic changes on lines identified for possible termination; Discussion of alternative state railroad policies; Summary and suggestions for future railroad planning needs.

This report was prepared for the Railroad Planning Section, Bureau of Transportation Planning, Department of State Highways and Transportation, Lansing, Michigan 48904.

Consad Research Corporation Jan. 1975, 122 pp, 2 Fig., 15 Tab., 7 App.

PURCHASE FROM: Consad Research Corporation 121 North Highland Avenue, Pittsburgh, Pennsylvania, 15206 Repr. PC

26 052644

A SURVEY OF THE MOST IMPORTANT TESTING FACILITIES OF THE ORE ADMINISTRATIONS

The report gives a survey of the most important testing facilities available on individual ORE Administrations. The first part gives an outline of individual facilities classified according to Administrations. The second part is arranged according to test purposes.

International Union of Railways DT 35/E, Feb. 1975, 67 pp, Tabs., 7 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

DOTL RP

26 052650

RAILWAYS AND PUBLIC RELATIONS

The specific aspects of "Public Relations" in the railway sphere, their role and the means at their disposal are outlined.

International Union of Railways, BD DOC 32, Jan. 1974, 4 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

DOTL RP

26 052651

RAILWAY PUBLICITY OFFICES AND PUBLICITY AGENCIES

This leaflet contains the types of organization of the publicity office of the most widespread publicity undertakings and agencies in Europe, together with their relationship.

International Union of Railways, BD DOC 31, Jan. 1973, 11 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

DOTL RP

26 082955

DESIGN AND APPLICATIONS OF FLYWHEELS (A BIBLIOGRAPHY WITH ABSTRACTS)

The bibliography covers the design and applications of flywheels with the majority of the studies concerning vehicular propulsion systems and attitude control systems for spacecraft. The report cites 57 references.

Lehmann, EJ
National Technical Information Service Jan. 1975, 62 pp, 57 Ref.

ACKNOWLEDGMENT: NTIS (NTIS/PS-75/070/3SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

NTIS/PB-75/070/3SL, DOTL NTIS

26 083076

DIRECTORY OF FIRE RESEARCH IN THE UNITED STATES: 1971-1973

The Committee on Fire Research of the National Research Council is supported by several federal agencies and has as its mission "to advise, recommend, and identify areas of research and development needed for fire prevention and control and the alleviation of fire damage." This Directory has established itself as a general reference and resource for interchange of information for a diffuse and worldwide endeavor to understand the destructive action of fire. It reveals emerging frontiers of research in attempting to cover all fire research activities in the U.S. Included are the R&D efforts of the U.S. Department of Transportation involved in the Tank Car Safety Test and Research Project.

The work on this publication was done by the Committee on Fire Research, Division of Engineering.

National Academy of Sciences, (ISBN 0-309-02327-0) 1975, 361 pp

PURCHASE FROM: National Academy of Sciences 2101 Constitution Avenue, NW, Washington, D.C., 20418 Repr. PC

DOTL RP

26 090439

POLITICAL DECISION PROCESSES, TRANSPORTATION INVESTMENT AND CHANGES IN URBAN LAND USE: A SELECTIVE BIBLIOGRAPHY WITH PARTICULAR REFERENCE TO AIRPORTS AND HIGHWAYS

The purpose of the bibliography is to assist with the revision and extension of intra-urban location theory, so as to explain and predict how deci-

sionmaking by different persons and groups affects change in intra-urban land use. Special attention is paid to the generation and resolution of conflicts over urban land in the vicinity of new transportation facilities. In particular the bibliography focuses on new airports on rural-urban fringes and the conflicts generated between politicians, citizens' and business groups, and planners over land use in their vicinity. Existing literature is sparse on this topic.

Chipman, WD Wolfe, HP Burnett, P
Texas University, Austin, Department of Transportation RR-7, Mar. 1974, 88 pp

Contract DOT-OS-30093

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-239484/9SL, DOTL NTIS

26 090726

BIBLIOGRAPHY ON COLD REGIONS SCIENCE AND TECHNOLOGY, VOLUME XXVIII, PART 2

This is a companion issue to CRREL Report 12, Vol. XXVIII, Pt. 1. The latter contains the full bibliographic citations referred to in the author and subject indexes included in this issue. In the author index principal and joint personal and corporate authors are listed along with the title, date, pagination, and language of the document and the accession number. The subject index is composed of three basic elements: (1) terms taken from a controlled vocabulary based on the Thesaurus of Engineering and Scientific Terms (LEX-EJC), (2) free terms added as needed, (3) geographic names, generally entered under countries. The terms are listed in a single alphabetical arrangement, along with title (original, translated, abridged, expanded, or supplied), principal author, date, pagination, and language of pertinent documents, and their accession numbers.

See also Part 1, AD/A-007 092.

Cold Regions Research and Engineering Laboratory CRREL-12-28-2, July 1974, 349 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD/A-007105/0St, DOTL/NTIS

26 090848

REVIEW AND BIBLIOGRAPHY OF SECONDARY IMPACTS OF MAJOR INVESTMENTS: HIGHWAYS, MASS TRANSIT, INTERCEPTOR SEWERS

The report presents a bibliography of secondary impacts of public investments in four sections: A review organized according to type of investment (highways, mass transit, wastewater) and to type of effect (economic, social, land use), including a brief summary of modeling techniques which may be used to analyze and project impacts; a condensation of the findings of 50 major studies; an annotated bibliography of 300 relevant studies; and classification of the literature by impact, investment type, geographic area examined, type of study, and type of analytic technique used in assessing secondary impacts.

Environmental Impact Center, Incorporated, Council on Environmental Quality Final Rpt. June 1974, 282 pp

Contract EQC-317t

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche

PG-240827/6ST, DOTL NTIS

26 091079

DATA ACCESS DESCRIPTIONS: TRANSPORTATION STATISTICS AVAILABLE FROM THE BUREAU OF THE CENSUS

The report provides users of Census Bureau data with a comprehensive review of the publication program for the 1972 Census of Transportation and an overview of other statistics produced by the Transportation Division, Bureau of the Census. The three components of the 1972 Census of Transportation—the National Travel Survey, the Truck Inventory and Use Survey, and the Commodity Transportation Survey—are discussed separately. The following information is provided for each of the three transportation census surveys: Scope of the survey, users, historical background, definitions, sample limitations or design, description of printed reports, examples of table outlines, geographic areas covered by the pub-

lication program, public use computer tapes, record content of tapes, and availability of the survey results.

Paper copy available from Social and Economic Statistics Administration, Washington, D.C. 20233. \$5.50/year, (with Small-Area Data Notes), \$0.50/copy.

Jackson, EM
Bureau of the Census Report DAD-34, Feb. 1974, 30 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: Social and Economic Statistics Administration
Washington, D.C., Orig. PC

26 091241
STRIP MINING (A BIBLIOGRAPHY WITH ABSTRACTS)

All aspects of strip mining are covered in 101 abstracts. However, the major topics include land reclamation, environmental aspects and the satellite remote sensing of mines.

Lehmann, EJ
National Technical Information Service Bibliog. Jan. 1975, 106 pp,
101 Ref.

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
NTIS/PS-75/054/7ST, DOTL NTIS

26 091242
SNOW STUDIES (A BIBLIOGRAPHY WITH ABSTRACTS)

The bibliography covers research on snow cover, snowmelt, snowdrifts, snow removal, trafficability, snow rescue and survival, physical and mechanical properties, and remote sensing. This information is covered in 192 abstracts.

Brown, RJ
National Technical Information Service Bibliog. Jan. 1975, 198 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC, Microfiche
NTIS/PS-75/042/2ST, DOTL NTIS

26 095207
COMPUTER MICROFILM PRINTING [L'ordinateur imprime sur microfilm]

The author explains the technique of the C.O.M. (Computer Output Microfilm), which can be employed in public administrations, libraries or large undertakings, in order to "print" computer data on microfilm. A scanning device and reproduction of the film by automatic developing apparatus enables the desired documentary consultation to be effected. Thanks to miniaturisation and the computer working speed, numerous advantages may be mentioned: saving in space for the classification of documents, abolition of the multiple binding tasks, clearness, with easy and rapid consultation of information, reduction of staff and working costs. Taking banks as an example, the author shows that the C.O.M. can provide customers with a faster and better quality service. [French]

Bulletin Hebdomadaire de la Kredietbank No. 32, Aug. 1974, pp 285-288

ACKNOWLEDGMENT: International Railway Documentation, Selection of
PURCHASE FROM: Bulletin Hebdomadaire de la Kredietbank Brussels,
Belgium Repr. PC

26 097320
RAILROAD FREIGHT TRANSPORTATION. A BIBLIOGRAPHY WITH ABSTRACTS

The planning, forecasting, management, and development of railroad freight transportation are covered in 98 abstracts. Included are studies on freight car management and scheduling, energy consumption, intermodal competition, costs, and specific studies for various regions. See also Published Search, NTIS/PS-75/321, Railroad Management and Planning.

Adams, GH
National Technical Information Service Feb. 1975, 98 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC
NTIS/PS-75/322, DOTL NTIS, DOTL RP

26 097321
RAILROAD MANAGEMENT AND PLANNING. A BIBLIOGRAPHY WITH ABSTRACTS

Aspects of railroad management and planning are covered in these 139 abstracts of Federally-funded reports. The topics covered include forecasting, Government planning, regional planning, intermodal comparisons, commuter railroads, energy consumption, Northeast Corridor studies, demand, transportation models, and costs. Freight transportation is excluded in this bibliography but fully covered in the Published Search, NTIS/PS-75/322, Railroad Freight Transportation.

Adams, GH
National Technical Information Service Feb. 1975, 139 pp

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC
NTIS/PS-75, DOTL NTIS, DOTL RP

26 099188
URBAN RAIL SUPPORTING TECHNOLOGY PROGRAM FISCAL YEAR 1974 YEAR END SUMMARY

The Urban Rail Supporting Technology Program, managed by the DOT Transportation Systems Center for the Urban Mass Transportation Administration, is described for the 1974 fiscal year period. Major areas include program management, technical support and application engineering, facilities development, test and evaluation, and technology development. Specific technical discussion includes track measurement systems; UMTA facilities development at the DOT High Speed Ground Test Center, Pueblo, Colorado; rail car test and evaluation; instrumentation for data acquisition and processing; noise abatement technology; tunneling; and car crashworthiness studies.

Madigan, RJ
Transportation Systems Center, (DOT-TSC-UMTA-75-7) Final Rpt.
UMTA-MA-06-0025-75-9, Mar. 1975, 102 pp

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: NTIS PB-241239, DOTL NTIS

26 099189
RAILROAD RESEARCH BULLETIN

This publication contains 1,176 abstracts of journal articles and research reports selected by RRIS from current railroad literature and 235 summaries of ongoing research activities in the railroad field. This material 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 journal and report abstracts and one for ongoing project summaries. The book also contains subject term, author, and source indexes. It supplements the material contained in the four prior Railroad Research Bulletins which should be retained for a complete file of RRIS data.

The publication is available on a regular subscription basis from Railroad Research Information Service, Transportation Research Board, 2101 Constitution Avenue, N.W., Washington, D.C. 20418. Batch-mode computerized and manual file searches of specific subject areas are available directly from RRIS. Bulletin is published twice yearly, each edition containing accessions of the Railroad Research Information Service over a six-month period. Bulletins form a cumulative library reference. Previous editions bear following NTIS Accession Numbers: PB-220220, PB-226784, PB-233880, Pb-241042.

Transportation Research Board, (RRIS-7501) Bibliog. Vol. 2 No. 1,
FRA-OR&D 75-42, Mar. 1975, 272 pp

Contract DOT-OS-40022
ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Orig. PC, Microfiche
PB-242353/AS, DOTL NTIS

26 099204
TRANSIT DIRECTORY OF PRODUCTS AND SUPPLIERS

The 71 page directory lists transit products and the addresses of suppliers.
Modern Railroads Vol. 30 No. 5, May 1975, p 93

ACKNOWLEDGMENT: CNR
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South
Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

DOTL JC

Ongoing Research Summaries

00 036999

PRESERVATION IMPROVEMENT AND REPLACEMENT OF ELEVATED TRANSPORTATION STRUCTURE BY ENGINEERING-PLANNING

The contractor shall carry out studies to determine the behavior of elevated structures from two standpoints: Existing structures, which do not possess acceptable dynamic characteristics based on present day criteria, and new structures, which can be designed to ensure that the required dynamic characteristics are within acceptable limits. This research program shall analytically model structural systems consisting of the elevated structure itself, the foundation, and the surrounding soil. The analysis shall be sufficiently general so that the behavior of a wide variety of structural systems can be investigated. As an analytic program requires field measurements to ensure that the numerical results truly represent field conditions, a small field measurement program shall be included.

PERFORMING AGENCY: Illinois University, Chicago Circle
INVESTIGATOR: Silver, ML
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: McFarland, RK TST-48 (Tel 202-4269639)

Contract DOT-OS-30092
STATUS: Active NOTICE DATE: July 1975 START DATE: June 1973
COMPLETION DATE: Dec. 1975 TOTAL FUNDS: \$197,852

ACKNOWLEDGMENT: TRAIS

00 038648

DEVELOPMENT AND TESTING OF NEW TUNNEL SUPPORTS

The objective is to make the construction of transportation tunnels faster, safer and less costly. Improvement in the design and construction of the opening is approached in two ways: measurements are being made on tunnels in Washington, D.C. during and after construction to determine how ground movements are related to construction procedure and geology; and finite element analyses are performed that will allow the simulation of realistic ground conditions with time dependent behavior and the sequence of excavation and support. The analysis can be tested with the field measurements and used to predict behavior of tunnels with different ground conditions and excavation and support sequences. Tests are being performed and analysis techniques developed relevant to the structural behavior of cast-in-place and segmented concrete tunnel liners subjected to various simulated ground loadings. Part of the effort on cast-in-place liners concerns the structural behavior and material development for an extruded liner system. This liner would be placed directly behind the excavation and serve both primary and secondary support functions. It would use rapid-set cement concrete and fiber reinforcement.

REFERENCES:

Research to Improve Tunnel Support Systems Paul, S; Kesler, C; Gaybrd, E; Mohraz, B; Hendron, A.; University of Illinois at Urbana-Champaign, FRA-CRDD-74-51, June 1974, PB-235-762/AS
Concrete for Tunnel Liners; Behavior of Steel Reinforced Concrete Under Combined Loads, Herring, KS; Kesler, CE, University of Illinois at Urbana-Champaign, FRA-ORDD-75-7, Aug. 1974
Concrete for Tunnel Liners: Evaluation of Fiber Reinforced Quick Setting Cement Concrete, Halvorsen, GI; Kesler, CE, University of Illinois at Urbana-Champaign, FRA-ORDD-75-3, Aug. 1974
Tunnel Design Considerations: Analysis of Medium-Support

Interaction, Ghaboussi, J; Ranken, R, University of Illinois at Urbana-Champaign, FRA-ORDD-75-24, Nov. 1974

PERFORMING AGENCY: Illinois University, Board of Trustees
INVESTIGATOR: Peck, RB (Tel (217)333-3823) Paul, SL (Tel (217)333-3823) Ghaboussi, J (Tel (217)333-3823) Gaylord, E Gamble, WL Ghaboussi, J Paul, SL. Parker, HW Mahar, J
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Lucke, WN RA-41 (Tel 202-4260808)

Contract FR-30022 (CPFF)
STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Jan. 1973
COMPLETION DATE: Aug. 1973 TOTAL FUNDS: \$1,197,638

ACKNOWLEDGMENT: TRAIS TRAIS

00 045081

CASE HISTORIES OF URBAN RAPID TRANSIT TUNNEL AND STATION SYSTEMS IMPLEMENTATION

Objectives are to structure the processes within a modeling framework, to collect and analyze cost data within this framework, to identify and quantify safety and environmental considerations and constraints within the framework, to analyze contractual arrangements used in urban tunneling, to identify and describe the technologies and tools employed, and to formulate an analysis for determination of system sensitivities and optimization of the Rapid Transit tunneling process.

PERFORMING AGENCY: Bechtel Corporation
INVESTIGATOR: Kovatch, G
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Kovatch, G (Tel 617-4942756)

Contract DOT-TSC-601
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973
TOTAL FUNDS: \$229,330

ACKNOWLEDGMENT: TRAIS

00 045960

TUNNEL LINING

The contractor shall perform and report on the following: Task 1. The prior work of the Principal Investigator shall be specialized for the specific case of the tunnel lining of circular cross-section. Task 2. The prior work of the Principal Investigator shall be extended to include the case of the tunnel lining of horseshoe shaped cross section. Task 3. The system of a linkage of prefabricated structural elements forming a tunnel lining shall be studied. Task 4. An in-situ test of a tunnel structure under construction shall be conducted.

PERFORMING AGENCY: California State University, Sacramento
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: McFarland, RK (Tel 202-426-9638)

Contract DOT-OS-40016
STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: \$26,727

ACKNOWLEDGMENT: TRAIS

00 046488

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING

It is the purpose of this center to collect and organize all the research information currently available on earthquake engineering and related areas. This will provide the first opportunity to collect, and assess information from many different sources and at the same time be a single source for researchers in the field to obtain information from a comprehensive collection. This will be geared to meet the needs of both academic researchers and design engineers. The library will consist of reports (both published and unpublished), site visit records, data collected from various seismic regions, an abstracting service and potentially as a basis for a technical journal directed to the needs of earthquake engineers.

This grant is the third year support for GI-28098X. It is a companion to Grant GK-28349X to University of California at Berkeley.

PERFORMING AGENCY: California Institute of Technology, Division of Engineering and Applied Science/
INVESTIGATOR: Hudson, DE

SPONSORING AGENCY: National Science Foundation, Division of Advanced Technological Applications/, GI-28098X3

Grant GI-28098X

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1973
COMPLETION DATE: Mar. 1974

ACKNOWLEDGMENT: Science Information Exchange (GSE 3202 2)

00 047346

A MODEL FOR SYSTEMS ANALYSIS OF TUNNELING AND EXCAVATION

The purpose of this research is to develop a computer model of the tunneling-excavation process, using techniques of systems analysis. The model is intended to be as comprehensive and as realistic as is possible; toward this end, close liaison will be maintained with appropriate contractors, government agencies, equipment manufacturers and engineering organizations. The model will be used for the following purposes: 1) To conduct sensitivity analyses to identify needed improvements in the current state of the art and to assess the impact of such improvements, if they could be realized by research and development investment; 2) to evaluate specific current or proposed innovations in tunneling technology on a cost-benefit basis; 3) to provide a means for rational cost estimation of tunnel construction, including the use of probabilistic methods when advisable because of geologic, hydrologic, and other uncertain factors; and 5) to permit optimization of the total tunneling system according to selected criteria such as construction time, construction cost, total cost including the service provided by the facility, safety, minimum disruption of contiguous activities, etc. A comprehensive analysis considering social as well as technical and economic factors is sought.

PERFORMING AGENCY: Massachusetts Institute of Technology, Department of Civil Engineering

INVESTIGATOR: McGarry, FJ Moavenzadeh, F

SPONSORING AGENCY: National Science Foundation, Division of Advanced Technological Applications, GI-34029A1

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974
COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$137,500

ACKNOWLEDGMENT: Science Information Exchange (GSQ 219 2)

00 048898

MUCK UTILIZATION IN THE URBAN RAPID TRANSIT TUNNELING PROCESS

The objective of this contract is to assess the problem of muck handling in the urban transit tunneling process and the potential for alternative means of utilization of muck as it emanates from rapid transit tunneling projects. The assessment will be based on case histories of materials handling and muck utilization, possible uses of muck, interactions with site surveys of subsurface geologies, and potential for contingency planning in waste material handling and utilization.

PERFORMING AGENCY: Haley & Aldrich, Incorporated
SPONSORING AGENCY: Transportation Systems Center

Contract TSC-836 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1974
COMPLETION DATE: Feb. 1975 TOTAL FUNDS: \$96,240

ACKNOWLEDGMENT: TRAIS

00 048930

STUDY OF FEASIBILITY OF LOCATING UTILITIES IN TRANSPORTATION TUNNELS

The objective of this project is to accomplish the following items of work: Investigate the various types of utility lines, such as main trunk, feeder, & branch lines present in urban utility networks, & define the most probable sets that utility networks, and define the most probable sets that would be applicable for inclusion with a cut-and-cover transportation tunnel & to assess the relative technical and economic feasibility of the designs developed in Item 1. The institutional factors involved in determining the acceptance or rejection of the concept of providing for utilities in cut-and-cover transportation tunnels will be examined. A detailed analysis shall be made of the economic, technical and institutional factors involved with integrating utilities with a specific cut-and-cover tunnel.

PERFORMING AGENCY: IIT Research Institute

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel 617-494-2144)

Contract TSC-794 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: July 1975 TOTAL FUNDS: \$113,996

ACKNOWLEDGMENT: TRAIS

00 058302

IMPROVEMENT OF PROBLEM TRACK SUBSOIL BY THE LIME SLURRY PRESSURE INJECTION METHOD

The ability of the Lime Slurry Pressure Injection (LSPI) stabilization technique to improve in-place railroad subgrades shall be examined. This study shall be directed toward developing the information requisite for field utilization of the promising LSPI stabilization technique. Emphasis shall be placed on verifying the concepts and premises on which the technique has been founded including delineation of those track and soil conditions under which LSPI is most effective. The study shall incorporate an evaluation of the present and past field performance of this track design criteria. Concurrent studies with regard to economic effectiveness and environmental impact shall be conducted to help provide a better guideline for future utilization.

PERFORMING AGENCY: Arkansas University, Little Rock, Graduate Institute of Technology

INVESTIGATOR: Blacklock, JR (Tel 501-375-7247)

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: O'Sullivan, W (Tel 202-426-4377)

ACKNOWLEDGMENT: FRA

00 058332

PREFABRICATED STRUCTURAL MEMBERS FOR CUT-AND-COVER TUNNELS

Accomplishments will include: 1) Innovative concepts for highway tunnels to be built in urban areas by cut-and-cover methods using prefabricated structural members. 2) Design requirements and recommendations concerning steps necessary to cope with environmental constraints for construction of cut-and-cover tunnels in urban areas using prefabricated structural members. 3) A summary of the engineering characteristics of the most promising materials, including composites, for use in prefabricated structural members and in their assembly on the construction site.

PERFORMING AGENCY: Consulting Engineers Group Incorporated

INVESTIGATOR: Martin, LD

SPONSORING AGENCY: Federal Highway Administration, Department of Transportation

Contract DOT-FH-11-8594 (CPFF)

STATUS: Active NOTICE DATE: Apr. 1975 START DATE: Jan. 1975
COMPLETION DATE: Mar. 1976 TOTAL FUNDS: \$91,920

ACKNOWLEDGMENT: Federal Highway Administration (41-10-0025)

00 058353

HYDRAULIC TRANSPORTATION AND SOLIDS SEPARATION OF EVACUATED MATERIALS IN TUNNELS

Investigation of techniques and costs of hydraulic tunneling and transport of sand rock muck and in particular St. Peter Sandstone, which underlies much of the Minneapolis area. Investigations will be made of techniques for slurry/water separation by mechanical and/or chemical means. The

purpose is to greatly minimize or eliminate the need for large settling ponds and to meet environmental requirements where open loop systems are used.

PERFORMING AGENCY: Minnesota University, Department of Civil and Mineral Engineering
 INVESTIGATOR: Nelson, CR
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: McFarland, RK

Contract DOT-OS-40087 (CS)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Mar. 1974
 COMPLETION DATE: Mar. 1975 TOTAL FUNDS: \$70,602

ACKNOWLEDGMENT: TRAIS

00 058360

HYDRAULIC WATER JET ASSISTED TUNNEL BORING

The effectiveness of jet assisted tunneling will be assessed after laboratory testing. A boring machine will be designed and an economic evaluation made.

PERFORMING AGENCY: Colorado School of Mines
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

Contract OS-40102 (CS)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1974
 COMPLETION DATE: Apr. 1976 TOTAL FUNDS: \$100,000

ACKNOWLEDGMENT: Office of Systems Development and Technology

00 058433

PARTICIPATION IN OST/TST TUNNELING RESEARCH PROGRAM

No Abstract.

PERFORMING AGENCY: Federal Highway Administration
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: McFarland, RK TST-45 (Tel 202-4269638)

ID AS-50062
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1975
 TOTAL FUNDS: \$2,500

ACKNOWLEDGMENT: Office of Systems Development and Technology

00 058434

COST/BENEFIT ANALYSIS OF THE ELEMENTS OF THE DOT TUNNELING R AND D PROGRAM

No Abstract.

PERFORMING AGENCY: Federal Railroad Administration
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: McFarland, RK TST-45 (Tel 202-4269638)

ID AS-50063
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1975
 TOTAL FUNDS: \$35,000

ACKNOWLEDGMENT: Office of Systems Development and Technology

00 058435

REVIEW OF THE DEPARTMENT OF TRANSPORTATION TUNNELING RESEARCH AND DEVELOPMENT PROGRAM

No Abstract.

PERFORMING AGENCY: Federal Highway Administration, DOT
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: McFarland, RK TST-45 (Tel 202-4269638)

ID AS-50060
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1975
 TOTAL FUNDS: \$10,000

ACKNOWLEDGMENT: Office of Systems Development and Technology

00 058438

TESTING PROGRAM ON MUCK PREPARATION AND PNEUMATIC TRANSPORT

The pneumatic transport test facility shall be constructed, tested and evaluated in the following areas: 1. Muck Preparation Unit (a) Reliability of equipment (b) Wear and maintenance requirements of equipment (c) System capacity (d) Operating noise levels (e) Energy requirements and operating costs 2. Pneumatic Conveyance System (a) Reliability and flexibility of equipment (b) Wear and maintenance requirements (c) System capacity (d) Operating noise levels (e) Energy requirements and operating costs (f) Effect of moisture content on material handling (g) Extensibility of pneumatic system.

PERFORMING AGENCY: Colorado School of Mines
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: McFarland, RK TST-44 (Tel 202-4269638)

Contract OS-50100 (CS)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Mar. 1975
 COMPLETION DATE: Sept. 1975 TOTAL FUNDS: \$200,699

ACKNOWLEDGMENT: Office of Systems Development and Technology

00 058470

ASSESSMENT OF DISRUPTIVE EFFECTS ASSOCIATED WITH URBAN TRANSPORTATION TUNNEL CONSTRUCTION

Effects of constructing both bored and cut and cover tunnels will be considered. Effects from bored tunnels center on the impact of the construction of access shafts, underpinning, and cut and cover stations. The extent of the impact will depend on the spacing and the location of these relative to community services. Effects from cut and cover stations tend to follow a surface route within the urban area. Disruptive effects, therefore, may tend to be more concentrated in the former, but distributed in the latter. For each disruptive effect identified, identify and describe the currently used method(s) of measurement for determining a disruptive dollar value of that impact. Develop a preliminary approach to predicting and assessing the degree of each disruptive impact.

PERFORMING AGENCY: ABT Associates, Incorporated
 SPONSORING AGENCY: Transportation Systems Center, UM-504

Contract DOT-TSC-1018 (CPFF)
 STATUS: Active NOTICE DATE: June 1975 START DATE: May 1975
 COMPLETION DATE: Mar. 1976 TOTAL FUNDS: \$68,845

ACKNOWLEDGMENT: TRAIS (UM-504)

00 058496

TESTS OF CONCRETE TUNNEL LINER SEGMENT EDGE SEALANT

Tasks include: 1-Evaluate the effect of compressive stress levels of 300, 600, and 1200 lb in (sq.) on the sealant to determine if satisfactory fusion can be achieved and the tensile strength and extensibility of the fusion obtained. 2-Evaluate the deformation of the sealant at the various compressive stress levels and the effect of lateral flow of the sealant on this liner. 3-Determine the hydrostatic pressure resistance of the sealant, particularly the effectiveness of the sealant fusion at the junction of four liner segments.

PERFORMING AGENCY: Bureau of Reclamation, DOI
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: McFarland, RK TST-45 (Tel 202-4269638)

IA AS-50061
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1975
 COMPLETION DATE: May 1976 TOTAL FUNDS: \$8,000

ACKNOWLEDGMENT: TRAIS

00 071586

PROTECTIVE MATERIALS SYSTEMS FOR CORROSION AND DETERIORATION CONTROL AT NAVAL SHORE FACILITIES

To investigate protective coatings, their effectiveness, adhesion and other properties relevant to extending the useful life of Naval shore structures by 10 percent and, where applicable, reduce average annual maintenance costs by 20 percent. Experimentation on protective systems for metal, wood, or masonry employs laboratory research and exposure to sites in

three different marine atmospheric environments. Field investigation results permit determination of paint performance, failure and causes, in three years, under varying conditions applicable to structures at different geographical locations. Important performance factors, such as adhesion, water permeability, flexibility and extensibility are studied in the laboratory and correlated with field behavior. Laboratory experimentation will establish new techniques. Investigation of new materials developments and thin polymeric surface films on metal are directed toward improving performance and reducing initial and maintenance costs for the Navy.

PERFORMING AGENCY: Naval Civil Engineering Laboratory,
Department of the Navy
INVESTIGATOR: Alumbaugh, RL Crilly, JB
SPONSORING AGENCY: Naval Facilities Engineering Command,
DN544155

STATUS: Active NOTICE DATE: Oct. 1974 START DATE: July 1974
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (ZQN544155 3)

00 109559

ANALYSIS OF DEEP PILE FOUNDATIONS

The purpose of this project is to develop analytical (numerical) methods for determining stresses, deformations, and ultimate load-carrying capacities of axially loaded piles. No conventional methods are available that can handle the complexities encountered in the field. A finite element formulation and a computer program will be prepared. The numerical results will be compared with data from several field pile load tests. A finite element procedure incorporating an isoparametric element and non-linear behavior for soil and interfaces has been developed. A computer program based on the procedure has been prepared, and a number of test results for piles and different soils have been considered for comparisons. The first example considered was a pile load test at the site of Jonesville lock in Louisiana. Consolidated drained triaxial tests at various densities and confining pressures have been performed on the sand (from the site) to determine its stress-strain characteristics. Direct shear tests at various normal loads and densities have been performed to determine the stress-

displacement laws for interfaces. The preliminary analysis showed good correlation between the numerical solutions and the field data for the load-displacement curves. Investigations are in progress. An interim report is being prepared to describe the work accomplished. /SIE/

PERFORMING AGENCY: Waterways Experiment Station
INVESTIGATOR: Desai, CS
SPONSORING AGENCY: Department of Defense; Army Corps of Engineers, Department of the Army

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (ZTK 138 1)

00 115950

A COMPREHENSIVE PROGRAM ON ROCK PROPERTIES, TUNNELING AND EXCAVATION TECHNOLOGY AND NUCLEAR BLAST EFFECTS ON EARTH MEDIA

Third-year funding of continuation grant GI-34608x1 The goal is to establish a data center on properties of geological substances of interest to the geosciences in a manner useful for applications and research concerned with the use of underground space. The data center will be within the Thermophysical Properties Research Center. Data tables will be compiled, using published literature and reports, on thermal, mechanical, magnetic and electrical properties of geologic materials. Periodic data tables will also be produced on unconventional methods of tunneling and underground excavation technology as well as complete information on the methods, equipment, rates and costs for excavation of tunnels and underground openings. A minimal effort will be maintained in collecting data on blast effects on soils and rocks.

PERFORMING AGENCY: Purdue University, School of Civil Engineering
INVESTIGATOR: Judd, WR Touloukian, YS
SPONSORING AGENCY: National Science Foundation, Division of Advanced Technological Applications, GI-34608X2

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: May 1975 TOTAL FUNDS: \$89,000

ACKNOWLEDGMENT: Science Information Exchange (GSQ 213 2)

01 013867

CONSTRUCT TEST TRACK

Basic Agreement for design, construction, instrumentation, data collection & analysis, and maintenance of a test track. The purpose of the test track is to investigate methods of providing more stable railroad track for the higher train speeds and heavier car loadings.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel (202)426-4377)

Contract DOT-FR-90043 (BOA)

STATUS: Active NOTICE DATE: July 1975 START DATE: Apr. 1969
COMPLETION DATE: Sept. 1975 TOTAL FUNDS: \$847,200

ACKNOWLEDGMENT: FRA

01 019580

FIELD STUDIES OF TRACK SUPPORTED ON PRESTRESSED CONCRETE TIES: TESTS TO EVALUATE STRUCTURAL CAPACITY OF SLAB AND BEAM RAIL SUPPORT STRUCTURES
No Abstract.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway Company, S2 32 11.02.04.00 32
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel 202-4260855)

Contract FR-90043 (BOA)

STATUS: Active NOTICE DATE: Aug. 1975 TOTAL FUNDS: \$193,637

ACKNOWLEDGMENT: TRAIS

01 036737

TRACK COMPONENT AND TRACK RESPONSE INVESTIGATIONS

C&O Railway Company and the B&O Railroad Company will conduct a series of track component and track response investigations.

PERFORMING AGENCY: C&O and B&O Railway Companies
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel v(202)426-4377)

Contract FR-20015 (CS)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Aug. 1971
COMPLETION DATE: Aug. 1972 TOTAL FUNDS: \$37,368

ACKNOWLEDGMENT: TRAIS

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 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 initial portion of the Railroad Track Structures Research Program was to consist of the Four Tasks: Mathematical Modeling, Ballast and Subgrade Material Performance Tests, testing phase, and Track Research Laboratory Facility. Work continues only on Ballast and Subgrade Material Performance Tests.

PERFORMING AGENCY: Association of American Railroads
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel (202)426-4377)

Contract DOT-FR-30038

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1973
COMPLETION DATE: Sept. 1976 TOTAL FUNDS: \$447,218

ACKNOWLEDGMENT: FRA

01 038974

CONTINUOUS MEASUREMENT OF DYNAMIC COMPLIANCE CHARACTERISTICS OF RAILROAD TRACK.

The proposed contract is for the design, fabrication, demonstration and furnishing of equipment for the continuous measurement of dynamic compliance characteristics of railroad track.

PERFORMING AGENCY: Battelle Memorial Institute, Columbus Laboratorie

INVESTIGATOR: Prause, Robert H (Tel 614-2993151)
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Woll, TP RA-42

Contract FR-30051 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1973
COMPLETION DATE: June 1973 TOTAL FUNDS: \$332,110

ACKNOWLEDGMENT: TRAIS

01 045168

DEVELOP AND JUSTIFY METHODOLOGIES AND PROCEDURES FOR ANALYZING THE ECONOMIC COST OF RAILROAD ROADWAY

To develop and justify a set of methodologies and procedures for analyzing the economic costs of providing, maintaining and operating the railroad roadway and attendant structures under various geographic, physical, climatic, operating and traffic conditions for the purpose of developing a portion of the relevant economic costs for pricing purposes.

PERFORMING AGENCY: Tops On-Line Services Incorporated
INVESTIGATOR: Williams, JH (Tel 415-9892670)
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Pompomio, J (Tel 202-426-0771)

Contract DOT-FR-30028 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973
COMPLETION DATE: June 1975 TOTAL FUNDS: \$370,000

ACKNOWLEDGMENT: FRA

01 047342

EVALUATION OF THE TECHNOLOGICAL & ECONOMIC EFFECTS OF VARIOUS CONTINUOUS WELDED RAIL SECTIONS & OF SPECIAL METALLURGY RAIL

An analysis of comparative life and economics of various rail sections for continuous welded rail under modern traffic loadings is in process. The study has been expanded to include jointed rails of special metallurgies such as heat treated, flame hardened, and hi-silicon. Wear patterns from field test locations are taken, analyzed, and equivalent cost conditions determined.

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering
INVESTIGATOR: Hay, WW Butler, AB Martin, GC Franke, MW Schuch, PM Reinschmidt, AJ Mikkelson, MJ Lawrence, FV
SPONSORING AGENCY: Burlington Northern, Incorporated

STATUS: Active NOTICE DATE: July 1975 START DATE: Nov. 1973
COMPLETION DATE: UNKNOWN

ACKNOWLEDGMENT: Science Information Exchange (AI 733 2)

01 048894

KANSAS TEST TRACK

The Kansas Test Track constructed parallel to the Atchison, Topeka and Santa Fe Railway Company's main line between Aikman and Chelsea, Kansas, is a unique, eight-thousand foot long track structure test facility. Test period of six months has been concluded and data is now under review million gross tons of traffic per year.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway Company
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB RA-11 (Tel 202-4269644)

Contract FR-90043/13

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1974
COMPLETION DATE: Dec. 1974 TOTAL FUNDS: \$68,831

ACKNOWLEDGMENT: TRAIS

01 058276

RAILROAD DEFERRED PLANT MAINTENANCE

A computer program was prepared to determine the deferred maintenance in track material replacement for twenty-five (25) Class I railroads, totaling 236,000 miles of track, to measure the railroad industry's condition with respect to track material replacement. The estimate of "deferred

maintenance" was made by costing in 1974 dollars the installation of new track materials necessary to achieve a "normalized condition." "Normalized condition" was defined as the condition in which fifty percent (50%) of the usable life of track materials is remaining. The Railroad Annual Report Form A data used in the computer program was for the forty-year period from 1933 to 1972 inclusive.

PERFORMING AGENCY: Dyer (Thomas K), Incorporated
 INVESTIGATOR: Dyer, TK (Tel 617-862-2075)
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Edson, WD (Tel 202-426-0771)

Contract DOT-FR-4-5005
 STATUS: Complete NOTICE DATE: Feb. 1975 START DATE: Dec. 1973
 COMPLETION DATE: May 1974

ACKNOWLEDGMENT: FRA

01 058304

ANALYSIS OF THE STABILITY OF RAILROAD TRACK SUBJECTED TO STATIC AND DYNAMIC LOADS

The objective of this contract is to obtain information which will provide a rational basis for the design, construction and maintenance of railroad track of improved safety and economic efficiency by reducing the probability of catastrophic buckling. The activities of this contract will assist in determining the largest admissible geometric imperfections to prevent buckling of the track in the vertical plane and will initiate the analysis of horizontal buckling. A critical review of track stress analyses and field tests on track will provide a methodology for determining the characteristics of track performance under static and dynamic loads. In addition, a continuing review of foreign technical literature will provide for the incorporation of previous European and Soviet experience into ongoing and anticipated rail systems research activities and recommendations for inclusion of documents in the series of technical translations under preparation by FRA.

PERFORMING AGENCY: Princeton University, Department of Civil and Geological Engineering
 INVESTIGATOR: Kerr, AD (Tel 609-452-5424)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: Kish, A (Tel 202-426-4377)

Contract DOT-TSC-900
 STATUS: Active NOTICE DATE: July 1975 START DATE: Dec. 1974
 COMPLETION DATE: Dec. 1975 TOTAL FUNDS: \$82,555

ACKNOWLEDGMENT: FRA

01 058305

NONDESTRUCTIVE MEASUREMENT OF LONGITUDINAL RAIL STRESSES

The work under this contract has dual objectives. One is the study of the effect of applied stress on the propagation of ultrasonic pulses in high-carbon, railroad-quality rail steel. This shall be accomplished by an analysis of appropriate wave equations with the non-linear elastic constants included, plus experimental work to compare with the predicted results. The second objective shall be to initiate research utilizing ultrasonic pulses that will result in techniques adaptable to the in-situ measurement of longitudinal stresses in rail via a test car moving at standard operating speeds. Measurement of these stresses will enable operating railroads to locate highly stressed areas in rail.

PERFORMING AGENCY: Oklahoma University, School of Aerospace, Mechanical and Nuclear Engineering
 INVESTIGATOR: Engle, DM (Tel 405-325-7241)
 SPONSORING AGENCY: Department of Transportation
 RESPONSIBLE INDIVIDUAL: O'Sullivan, W (Tel 202-426-4377)

Contract DOT-OS-40091
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1974
 COMPLETION DATE: June 1976 TOTAL FUNDS: \$100,000

ACKNOWLEDGMENT: FRA

01 058306

STATE-OF-ART SURVEY: RAIL JOINING METHODS

Research and review existing, as well as potential, rail joining methods with the aim of weighing the strengths and weaknesses of each. Also areas

are to be identified where further research and development efforts could lead to cost and/or performance improvements in joining rails.

Research for this project was also performed by Metals and Ceramics Information Center of the Defense Supply Agency.

PERFORMING AGENCY: Department of Defense, Defense Supply Agency
 INVESTIGATOR: McNeill, JD (Tel 513-296-6310)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel (202)426-4377)

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1974
 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: \$43,390

ACKNOWLEDGMENT: FRA

01 058307

RAIL INSPECTION SYSTEMS ANALYSIS AND TECHNOLOGY ASSESSMENT

Study of economic and operational aspects of rail inspection systems and an assessment of the state-of-the-art rail inspection technology.

PERFORMING AGENCY: Battelle Columbus Laboratories
 INVESTIGATOR: Meacham, HC (Tel 614-299-3151)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

Contract DOT-TSC-979
 STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
 COMPLETION DATE: July 1976 TOTAL FUNDS: \$149,202

ACKNOWLEDGMENT: FRA

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: Cecon, H 611 (Tel 617-494-2711)

Contract TSC-995
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1975
 COMPLETION DATE: May 1976 TOTAL FUNDS: \$75,552

ACKNOWLEDGMENT: TRAIS (RR-519)

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. Task will utilize both field tests and tests performed on the rolling load track test facility currently being developed and constructed by AAR. Task will also include sensitivity studies of track parameters utilizing dynamic simulation models developed during Track Train Dynamics, Phase I.

PERFORMING AGENCY: Association of American Railroads Technical Center
 INVESTIGATOR: Martin, GC (Tel 312-225-9600 Ext 877)

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency
 RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975
 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

01 099366

TECHNOECONOMIC SURVEY OF METHODS FOR REFURBISHMENT OF WOOD CROSS TIES

The contractor will conduct a review of cross tie deterioration mechanisms and a survey of the number and severity of ties exhibiting such deterioration. He than will critically assess the technical and economic capability of existing polymeric or other processes to regurbish ties either in-situ, on-site or in batch plant operation. Processing requirements will be determined and techniques for fulfilling these requirements identified. Based on this, the feasibility of such processes, both technical and economic, will be determined. Specific recommendations for research and/or development will be identified.

PERFORMING AGENCY: Stanford Research Institute
 SPONSORING AGENCY: Federal Railroad Administration, Rail Safety Research Office, Improved Track Structures Div
 RESPONSIBLE INDIVIDUAL: McConnell, DP (Tel 617-494-2461)

Contract DOT-TSC-1044

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Aug. 1975
 COMPLETION DATE: Feb. 1976 TOTAL FUNDS: \$53,000

ACKNOWLEDGMENT: FRA

01 099368

ENGINEERING ANALYSIS OF STRESSES IN RAILS

This project will provide a description of rail stresses required to develop predictions of the probability of rail fracture, utilizing the best available representations of service loads and support conditions. It will also provide descriptions of the conditions of stress and strain occurring at the boundaries of typical rail flaws in the head, web, and rail end regions suitable for calculation of appropriate fracture related stress intensity factors. This will be done in two phases, with the first phase reviewing existing analyses and data on stresses in rails and then devising a method of analysis of rail stress. This will then be used to identify conditions of damaging stresses, to describe the build-up of residual stresses in the rail, and to describe the stress strain conditions in the vicinity of certain rail flaws. The second phase will review stresses in the rail joint region and study the load transfer from joints to rails to come up with an analysis of rail end stresses. Stress and strain conditions in the vicinity of certain rail end flaws will be developed for use in the fracture analysis techniques.

PERFORMING AGENCY: Battelle Memorial Institute
 SPONSORING AGENCY: Federal Railroad Administration, Rail Safety Research Office, Improved Track Structures Div
 RESPONSIBLE INDIVIDUAL: McConnell, D (Tel 617-494-2451)

Contract DOT-TSC-1038

STATUS: Obligated NOTICE DATE: Aug. 1975 START DATE: July 1975
 COMPLETION DATE: June 1977 TOTAL FUNDS: \$343,345

ACKNOWLEDGMENT: FRA

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, Rail Safety Research Office, Improved Track Structures Div
 RESPONSIBLE INDIVIDUAL: Cecon, H (Tel 617-494-2711)

In-House

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Mar. 1974

ACKNOWLEDGMENT: FRA

01 099370

SLEEVE EXPANSION OF BOLT HOLES

This project will determine by laboratory testing whether the sleeve expansion process is likely to be an effective means of reducing the bolt hole failure rate under railroad loading conditions. The laboratory studies will optimize the process parameters for a range of hole sizes in rail steel. Based on this work, a procedures manual will be prepared defining all critical engineering requirements including inspection details. Additionally, fatigue tests shall be made on both treated and untreated rail to permit the use of extreme-value statistical techniques to project the expected improvement in the field. There will also be devised a test plan for a preliminary field evaluation defining cost and time required to implement the plan.

PERFORMING AGENCY: Boeing Company
 SPONSORING AGENCY: Federal Railroad Administration, Rail Safety Research Office, Improved Track Structures Div
 RESPONSIBLE INDIVIDUAL: Steele, R (Tel 617-494-2476)

Contract DOT-TSC-1048

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1975
 COMPLETION DATE: Jan. 1976 TOTAL FUNDS: \$159,010

ACKNOWLEDGMENT: FRA

01 099371

RAIL INSPECTION SYSTEM ANALYSIS AND TECHNOLOGY SURVEY

This research program will attempt to define quantitatively those factors which limit the present speeds of inspection systems used to locate rail defects and to determine the overall costs associated with making improvements on rail flaw detection systems which would enable information on the location and type of rail defects to be obtained more quickly. A technological data base will be formed that will primarily consist of data and information concerning the conditions in which inspection systems must operate and the equipment (detecting and data processing) currently in use. This will then be used to assess the economic benefits versus inspection system trade offs. Based on this analysis, a selection and recommendation of rail inspection system will be made.

PERFORMING AGENCY: Battelle Memorial Institute
 SPONSORING AGENCY: Federal Railroad Administration, Rail Safety Research Office, Improved Track Structures Div
 RESPONSIBLE INDIVIDUAL: Cecon, H (Tel 617-494-2711)

Contract DOT-TSC-979

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Jan. 1975
 COMPLETION DATE: June 1976 TOTAL FUNDS: \$161,582

ACKNOWLEDGMENT: FRA

01 099372

PLAN FLAW OCCURRENCE STUDY

The intent of this study is to provide a sampling of that portion of U.S. railroad derailment occurrences which can be attributed to rail failure. This shall be done with a sufficient degree of specificity to assess the severity of different types of rail flaws as causes of derailments and to establish the relationship between defect occurrence frequency and the load environment, the track and rail characteristics, and the maintenance and inspection practices employed by the U.S. railroad industry. The sampling will include a review of appropriate FRA, NTSB, and AAR records as well as those of one or more railroads over the last five years. From this there will be developed a data base to which statistical correla-

tion procedures will be applied. This project will also calculate a derailment severity index for different types of flaws and track features, inspection, and operation. The whole project will hopefully serve as a necessary foundation for the reliability analysis of rail-in-service.

PERFORMING AGENCY: Midwest Research Institute
SPONSORING AGENCY: Federal Railroad Administration, Rail Safety Research Office, Improved Track Structures Div
RESPONSIBLE INDIVIDUAL: Steele, R (Tel 617-494-2476)

Contract DOT-TSC-1061
STATUS: Obligated NOTICE DATE: Aug. 1975 START DATE: June 1975 COMPLETION DATE: Mar. 1976 TOTAL FUNDS: \$54,197

ACKNOWLEDGMENT: FRA

01 099373
RAIL MATERIAL FAILURE PROPERTIES AND BEHAVIOR CHARACTERISTICS

This project will consist of two distinct but interrelated parts: one, an experimental investigation to develop pertinent failure-related mechanical properties and behavior characteristics of rail steels; the other, an effort to perfect a computational scheme which will accept as inputs the experimentally determined failure properties and behavior characteristics and permit valid engineering judgements to be made about the contributions of all significant variables to the failure process. In the former, the aim will be to determine crack initiation growth, and fracture related properties and behavior characteristics of rail steels including the effects of metallurgical factors and to also prepare a fractographic reference. In the computational scheme, the objective is to develop one that can be used to statistically predict rail material failure.

PERFORMING AGENCY: Battelle Memorial Institute
SPONSORING AGENCY:
RESPONSIBLE INDIVIDUAL: Steele, R (Tel 617-494-2476)

Contract DOT-TSC-1076
STATUS: Obligated NOTICE DATE: Aug. 1975 START DATE: July 1975 COMPLETION DATE: June 1977 TOTAL FUNDS: \$299,700

ACKNOWLEDGMENT: FRA

01 099374
ANALYSIS AND DESIGN REQUIREMENT FOR IMPROVED CROSS TIE TRACK SYSTEMS

In this project, the contractor will assemble and validate the required analysis, and techniques, and then use these techniques in assessing the track response to wheel/rail loads, the load transfer between and stresses within components, and the effect of tie/fastener characteristics on track response and performance. Additionally, concrete cross ties will be assessed in terms of performance and failure characteristics, current design specifications will be evaluated and the economic feasibility of concrete tie fastener systems will be studied. Consideration will also be given to the evaluation of the structural and performance potential of "synthetic" cross-ties made of material other than timber and concrete.

PERFORMING AGENCY: Battelle Memorial Institute
SPONSORING AGENCY: Federal Railroad Administration, Rail Safety Research Office, Improved Track Structures Div
RESPONSIBLE INDIVIDUAL: Kish, A (Tel 617-494-2442) McConnell, D

Contract DOT-TSC-1044
STATUS: Obligated NOTICE DATE: Aug. 1975 START DATE: July 1975 COMPLETION DATE: June 1977 TOTAL FUNDS: \$326,661

ACKNOWLEDGMENT: FRA

01 099376
ULTRASONIC SYNTHETIC APERTURE REAL-TIME IMAGING SYSTEM

This project will develop a multi-directional transducer detection system, data processor and imaging system which can overcome some of the fundamental problems and limitations of conventional rail inspection systems. The detection and characterization of defects based on images derived from processing of signals from multi-directional transducers is expected to reduce substantially the dependence upon echo amplitude as detection criterion thereby improving reliability of detection of defects with unfavorable orientations. An ultrasonic scanning system will be developed and built to record, store, and display image format data suitable

for synthetic aperture processing which is also compatible with current conventional systems such as that used on the TSC Rail Inspection Vehicle. Next the synthetic aperture image processing will be added, plus those elements of the system required for high speed operation, namely the conversion to correlation processing of pseudo-random coded signals, and the provision for defect detector processor which will limit visual evaluation of image data to those portions having known or suspected defects.

PERFORMING AGENCY: Electra-Physics, Incorporated
SPONSORING AGENCY: Federal Railroad Administration, Rail Safety Research Office, Improved Track Structures Div
RESPONSIBLE INDIVIDUAL: Ryan, RP (Tel 617-494-2711)

Contract DOT-TSC-1036
STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1975 COMPLETION DATE: Jan. 1976 TOTAL FUNDS: \$96,577

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: Martin, GC (Tel 312-225-9600)

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: Martin, GC (Tel 312-225-9600)

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: AAR

01 099395
IMPROVED TRACK STRUCTURES RESEARCH PROGRAM

The objectives of this program are to reduce the frequency of track-caused derailments, to provide more durable track systems and components, and to reduce lading damage attributable to rough track. In the course of

refining the FRA track safety standards, a rail flaw detection system has been acquired and evaluation of areas of possible improvement has begun. In refining the performance of track systems, the Kansas Test Track has been opened to traffic (see RRIS 01 013857); design has started on constructing a Facility for Accelerated Service Testing (FAST) at the Transportation Test Center at Pueblo, Colo.; development is proceeding on three test tracks at Pueblo. Work aimed at reducing track-caused lading damage is to begin in FY 76.

PERFORMING AGENCY: Federal Railroad Administration, Rail Safety Research Office

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

RESPONSIBLE INDIVIDUAL: Peterson, LA (Tel 202-426-2965)

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: FRA

01 099396

ACCOUSTICAL EMISSION MONITORING OF FIELD AND PLANT WELDS

Accoustical 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: Martin, GC (Tel 312-225-9600)

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: AAR

01 099415

THE PROTECTION OF TRACK SWITCHES FROM SNOW AND ICE FAILURE

Investigate methods of track switch protection from failure due to snow or

ice. Thermal, non-thermal and passive methods have been and are being evaluated. A pulse jet combustion heater for forced convection heating in remote areas has been developed. A cyclone combustion heater has been developed for areas with adequate power supplies. A non-thermal switch protection system based on a horizontal air curtain has been evaluated on a limited scale for three winters. More extensive evaluation is planned. Two switches have been designed and fabricated. One employs vertical lift point members while the second uses a horizontal traverse double rail head profile section. Both switches need only overcome shear loads and do not have compression loading of snow or ice. One switch has had limited field trials while the second is due for field installation in mid-1975.

PERFORMING AGENCY: National Research Council of Canada, Division of Mechanical Engineering

INVESTIGATOR: Ringer, TR (Tel 613-993-2439)

SPONSORING AGENCY: National Research Council of Canada, Associate Committee on Railway Problems

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: National Research Council of Canada

01 109019

DEFORMATIONS UNDER RAIL TRACK STRUCTURE AND SUPPORT

The study of the stresses and deformations under dynamic and static load systems in railway track structure and support is being undertaken. Initially, the geotechnical properties of ballast and sub-ballast are being studied. A 25 ft. length of full scale track is now being built for testing in the laboratories.

PERFORMING AGENCY: Queen's University, Canada, 2.22

INVESTIGATOR: Raymond, GP Batchelor, B Gaskin, PN Davies, JR Dalen, KB Svec, O

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1971
COMPLETION DATE: May 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 045823**TRACK TRAIN DYNAMICS RESEARCH PROGRAM, PHASE I**

The objective of this contract as part of the Track Train Dynamics Research Program is to develop a better understanding of the dynamic interrelationships between the moving train and the fixed guideway structure on which it operates. This understanding will result in the development of techniques for improved train handling and train make-up. Authoritative guidelines for train handling and train make-up will be established, providing better performance and thus increasing time reliability of rail freight transportation. A train handling plan or matrix, incorporating combinations of key parameters, will be prepared, and it then will be available for use by each railroad to suit its operations.

PERFORMING AGENCY: Association of American Railroads
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Peterson, LA (Tel 202-426-2965)

Contract DOT-FR-40011 (CR)
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1973
COMPLETION DATE: June 1975 TOTAL FUNDS: \$418,618

ACKNOWLEDGMENT: FRA

02 054696**DYNAMICS OF FREIGHT TRAINS**

A mathematical model has been developed for investigating the dynamic stability of cars in long freight trains and appears able to predict accurately the stability characteristics of a specific container car employed by Canadian National Railways for which dynamic stability data are available. Groups of up to sixteen cars were investigated, and the results indicate that the range of train velocities for which a long freight train will exhibit stable behavior can apparently be determined with satisfactory accuracy by consideration of individual cars free of coupling forces. The model includes the effects of creep and spin forces at the rail-wheel interface, and a consideration of spin forces was found to be important. It is possible to define an optimum value of lozenge stiffness for which the freight-car trucks would be stable as regards hunting for all speed of interest for freight trains.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 2.8
INVESTIGATOR: Kurtz, EF
SPONSORING AGENCY: Canadian National Railways; Ministry of Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

02 055812**FREIGHT CAR DYNAMICS RESEARCH PROGRAM**

The contractor shall address the following objectives in carrying out the program. 1. 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 this behavior. 2. Validate these models with data gathered by the AAR-RPI-FRA Train-Track Dynamics Program, and the SP Truck Research Program. 3. Utilize the models developed to examine current vehicle and track maintenance procedures and to suggest amendments to the procedures. 4. Utilize the models to suggest conceptual design improvement and modifications for current trucks and to suggest alternative truck designs.

PERFORMING AGENCY: Clemson University, Department of Engine
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

Contract OS-40018 (CS)
STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Jan. 1973
COMPLETION DATE: May 1975 TOTAL FUNDS: \$111,498

ACKNOWLEDGMENT: TRAIS

02 055835**ENGINEERING DATA ON RAIL SYSTEM DYNAMICS**

The efforts of the contractor are expected to result in: 1- A computer program to be operational on TSC equipment for predicting the forces and tracking errors of a slowly moving rail car negotiating curves and traveling over track with specified track irregularities and alignment vari-

ations. 2 -Analytical tools and computations subroutines routines for extension of linearized model response programs existing at TSC for predicting rail vehicle vibration and track forces in response to statistical and deterministic descriptions of track geometry and track irregularities to include the influence of significant rail system non-linearities. 3- definition of Test Requirements for validation of the analysis tools developed above for prediction of rail system dynamics.

PERFORMING AGENCY: Clemson University
SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-902
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1974
COMPLETION DATE: Aug. 1975 TOTAL FUNDS: \$56,000

ACKNOWLEDGMENT: TSC (PR# TMP-0193 & A)

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 the Canadian Transportation Development Agency 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: Sutliff, DR (Tel 312-225-9600)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Dancer, D (Tel (202)426-1227)

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1975
COMPLETION DATE: June 1978 TOTAL FUNDS: \$1,700,000

ACKNOWLEDGMENT: FRA

02 058260**ROLL DYNAMICS UNIT/VIBRATION TEST UNIT EQUIPMENT 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 at the Transportation Test Center, Pueblo, Colorado. The RDL will be used in research, development, testing, and other activities associated with railroad vehicle wheel/track interactions. The contractor is to provide equipment sections/service structures, hydraulic units and air bearing hardware to support the RDL.

PERFORMING AGENCY: Boeing Company, Boeing Aerospace Company
INVESTIGATOR: Carter, A (Tel 206-655-9381)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel 202-755-1877)

Contract DOT-FR-30068
STATUS: Active NOTICE DATE: July 1975 START DATE: June 1973
COMPLETION DATE: Nov. 1975 TOTAL FUNDS: \$5,400,000

ACKNOWLEDGMENT: FRA

02 058263**U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY SYSTEMS MANAGER**

The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Roll Dynamic Unit (RDU) and Vibration Test Unit (VTU) at the Transportation Test Center, Pueblo, Colorado. The RDL

will be used in research, development, testing and other activities associated with railroad vehicle wheel/track interactions. The contractor as systems manager is responsible to design, fabricate, install and checkout and acceptance test of a RDU and VTU A vertical shaker (Block I VTU) has been installed in the RDL in early 1975 and acceptance test and training for the vertical shaker is to be completed by August 1975.

PERFORMING AGENCY: Wyle Laboratories, Eastern Operations Colorado Springs Facility
 INVESTIGATOR: de Benedet, D (Tel 303-597-4500)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel 202-755-1877)

Contract DOT-FR-30045
 STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1973
 COMPLETION DATE: Mar. 1977 TOTAL FUNDS: \$6,785,000

ACKNOWLEDGMENT: FRA

02 058265

RAILROAD EQUIPMENT RIDE QUALITY ANALYSIS

This project will determine ride quality characteristics of various designs of railroad equipment trucks by means of computer simulation. Report under preparation.

PERFORMING AGENCY: Battelle Memorial Institute
 INVESTIGATOR: Meekum, H (Tel 614-299-3151)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: Gannett, CM (Tel 202-426-9655)

Contract DOT-FR-20077
 STATUS: Completed NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
 COMPLETION DATE: June 1975 TOTAL FUNDS: \$45,000

ACKNOWLEDGMENT: FRA

02 058294

TUNNELING LINE AND GRADE TOLERANCES IN CURRENT USE, AND THEIR RELATIONSHIP TO VEHICLE RIDE QUALITY No Abstract.

PERFORMING AGENCY: Federal Railroad Administration, DOT
 SPONSORING AGENCY: Office of Systems Development and Technology
 RESPONSIBLE INDIVIDUAL: McFarland, RK TST-45 (Tel 202-4269638)

ID AS-50029
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Jan. 1975
 TOTAL FUNDS: \$21,000

ACKNOWLEDGMENT: TRAIS

02 058303

FREIGHT CAR TRUCK DESIGN OPTIMIZATION

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 technical 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.

PERFORMING AGENCY: Southern Pacific Transportation Company
 INVESTIGATOR: Byrne, R (Tel 415-362-1212X-22547)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel 202-426-0855)

Contract DOT-FR-40023
 STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$1,325,255

ACKNOWLEDGMENT: FRA

02 058316

CONTINUED DEVELOPMENT AND APPLICATION OF THE DYNALIST COMPUTER PROGRAM

The DYNALIST computer program was originally developed by TRW for DOT to compute complex eigenvalues for stability analyses of linear dynamic systems of up to 500 degrees of freedom. The program was extended by J.H. Wiggins' Company for DOT/TSC to compute response to both sinusoidal and stochastic excitations using complex modal synthesis. The purpose of the project is to refine the program (DYNALIST II) to provide improved versatility and to significantly reduce the level of user effort and sophistication presently required.

PERFORMING AGENCY: Wiggins (JH) Company
 SPONSORING AGENCY: Transportation Systems Center, RR-515

Contract DOT-TSC-990 (CPFF)
 STATUS: Active NOTICE DATE: Apr. 1975 START DATE: Feb. 1975
 COMPLETION DATE: Nov. 1975 TOTAL FUNDS: \$25,594

ACKNOWLEDGMENT: TSC (RR-515)

02 058401

AERODYNAMICS ON SUBWAY TUNNEL DESIGN AND OPERATIONAL COSTS

Objectives are: (1) Define key design parameters that relate to aerodynamics and determine the operational costs of the design options. (2) Determine the operational costs associated with the operational design options, i.e., train length and scheduling. (3) Assess the impact of environmental constraints on operational costs and related to the aerodynamics of the system.

PERFORMING AGENCY: National Aeronautics and Space Administration
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: McFarland, RK TST-45 (Tel 202-4269638)

IA AS-50030
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Feb. 1975
 TOTAL FUNDS: \$23,600

ACKNOWLEDGMENT: Office of Systems Development and Technology

02 058465

WAYSIDE DERAILMENT INSPECTION REQUIREMENTS STUDY

The main objective is to establish the impact and causes of railroad derailments and derailment-related accidents, and to assess existing and possible new wayside inspection means for preventing or reducing the occurrence of these events. It is also the objective to produce an analysis and presentation of derailments and pertinent related matters organized in a manner to facilitate understanding, identification of common characteristics and ultimately, effective methods of correction. Finally, the effort seeks to establish a posture on future action with respect to wayside detection and prevention of derailments: what changes and improvements should be made, and what innovations can best effect improvement with respect to wayside detection and prevention of accidents.

PERFORMING AGENCY: Shaker Research Corporation
 SPONSORING AGENCY: Transportation Systems Center, RR-523

Contract DOT-TSC-1029 (CPFF)
 STATUS: Active NOTICE DATE: June 1975 START DATE: Apr. 1975
 COMPLETION DATE: June 1976 TOTAL FUNDS: \$47,139

ACKNOWLEDGMENT: TRAIS (RR-523)

02 058508

GUIDEWAY VEHICLE COST REDUCTION

The objective is to develop tradeoffs between transit vehicle suspension system sophistication and guideway/roadway smoothness while maintaining acceptable ride quality. These tradeoffs can be applied to reducing the costs of transportation system development and maintenance. A systems analysis approach shall be applied to a conventional urban bus and a conventional passenger railcar. The same unified approach shall be applied to each system, varying only the details of the particular model. Major emphasis shall be on vehicle modeling, railway/roadway and vehicle suspension feasibility determination. The deterministic ride quality work begun on a previous program shall be utilized and extended.

PERFORMING AGENCY: Arizona State University
 INVESTIGATOR: Hedrick, JK
 SPONSORING AGENCY: Office of Systems Development and Technology,
 Department of Transportation
 RESPONSIBLE INDIVIDUAL: Fearnside, JJ (Tel 202-4264347)

Contract DOT-OS-50107 (CS)
 STATUS: Active NOTICE DATE: July 1975 START DATE: June 1975
 COMPLETION DATE: June 1976 TOTAL FUNDS: \$66,000

ACKNOWLEDGMENT: TRAIS (PUR-50175)

02 080320
DIRECT RECORDING OF RAIL-WHEEL PARAMETERS
 A test rig is being subjected to lateral displacement to measure the vertical movement of the centre of worn wheelsets on worn track to determine the gravitational stiffness related ride and stability characteristics of rail cars.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport,
 2.23.73

INVESTIGATOR: Blader, FB
 SPONSORING AGENCY: Canadian National Railways; Canadian Pacific;
 Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1973
 COMPLETION DATE: Jan. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 080321
TRACK DYNAMICS DATA ACQUISITION SYSTEM
 The design, construction and testing of an instrumented system for high speed (32 KBITS) acquisition of data on computer formatted magnetic tape on motion of the track and roadbed subjected to train loads is being carried out to provide essential data for improved design of both track and rolling stock.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport,
 2.9

INVESTIGATOR: Corneil, ER
 SPONSORING AGENCY: Canadian National Railways; Ministry of
 Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974
 COMPLETION DATE: Apr. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 081789
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I
 This international program has as its objective the perfecting of the operating efficiency and safety of railroad equipment. The purpose of the ten-year program is to study the various stresses which affect rolling stock and track and the damage they cause; to establish performance specifications that would enable suppliers to manufacture the strongest, most efficient equipment possible. The emphasis in this phase has been toward developing corrective measures which could be quickly adopted by the railroads to correct problems in train phenomena with primary emphasis on employee education. The goal in this phase has been not only generation of new information, but the organization of approaches toward its effective utilization. Phase II (1975-1977) is directed at taking the load environment and train action forces in railroad operations, established in Phase I, and using these as the basis for performance specifications for equipment with increased dynamic stability. Phase III (1977-1982) is to see application of more advanced scientific principles to railroad track, equipment and operations to improve dynamic stability.

PERFORMING AGENCY: Association of American Railroads Technical
 Center

INVESTIGATOR: Lind, EF
 SPONSORING AGENCY: Association of American Railroads Technical
 Center; Federal Railroad Administration; Railway Progress Institute;
 Transportation Development Agency
 RESPONSIBLE INDIVIDUAL: Lind, EF (Tel 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1972
 COMPLETION DATE: 1975 TOTAL FUNDS: \$4,000,000

ACKNOWLEDGMENT: AAR

02 081790
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 2—DEVELOP QUANTITATIVE TRAIN HANDLING PROCEDURES

The final matrix has been developed on which computer runs will be based. The matrix gives a detailed description of each run and refers the run to specific sections of the AAR Publication, "Track Train Dynamics To Improve Freight Train Performance." This matrix suggest comparisons to be made between various runs by linking them for the purpose of procedural analysis. This will make possible better methods of train handling and will make evident any hazards of alternative handling techniques. The Train Performance Calculator (TPC) has been used to verify and correct the known grades to determine continuous speeds. As the task progresses, more computer simulations may be needed to add runs not described in the matrix; it may also be possible to delete others. A second activity of Task 11 is organization of representative data into a convenient and useful format to be used for further investigation of train make-up with respect track train dynamics.

PERFORMING AGENCY: Association of American Railroads Technical
 Center

INVESTIGATOR: Lind, EF
 SPONSORING AGENCY: Association of American Railroads Technical
 Center; Federal Railroad Administration; Railway Progress Institute;
 Transportation Development Agency
 RESPONSIBLE INDIVIDUAL: Lind, EF (Tel 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1972
 COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

02 081791
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 4—ENGINEMEN'S SENSITIVITY ANALYSIS AND TRAIN HANDLING AIDS

The short-term objectives of this task are the development of train handling aids which could display visually to the engineman the distribution of the mass in his train and give some indication of the force levels as they develop; the subsequent testing of prototype instrumentation; and ultimately a means of comparing different enginemen and evaluating train handling at various skill levels. Long-term, the objectives are to (1) evaluate the enginemen's sensitivity to forces in the train by measuring the forces and the operator's response; (2) consider increasing the enginemen's sensitivity to the dynamics of his train by training or otherwise; (3) compare the various skill groups attending to the differences in train behavior, speed and motion cues. Devices already developed include the Train Mass Distribution Graph, a chart which provides a simple visual representation of the loaded and empty cars in a train and relative weights of the cars, developed by Transportation Systems Center; A Power Consist Force Display, giving enginemen a display of draft and buff forces generated by a locomotive consist and developed by Electro-Motive Division; the Draft-Buff Indicator, developed by Transportation Systems Center to portray development of potential violent car shocks in trains; and a Single-Point Slack Telemetry System, refinement of which has been postponed. An Independent Brake Monitor has been designed to record use of locomotive brakes above a preselected speed. Field testing by several railroads of the instrumentation has been under way.

PERFORMING AGENCY: Association of American Railroads Technical
 Center

INVESTIGATOR: Lind, EF
 SPONSORING AGENCY: Association of American Railroads Technical
 Center; Federal Railroad Administration; Railway Progress Institute;
 Transportation Development Agency
 RESPONSIBLE INDIVIDUAL: Lind, EF (Tel 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1973
 COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

02 081793

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH
PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK
7—MATHEMATICAL MODELING**

Computer programs under this task are nearing completion with validation, documentation and parameter investigations remaining to be completed. Involved are the Simplified Train Action Model; Detailed Train Action Model; Detailed Simplified Train Action Model (Purdue University); Quasi-Static Lateral Train Stability Model (Electro-Motive Division); Detailed Lateral Train Stability Model; Detailed Vertical Train Stability Model (Pullman-Standard); Braking Model (Westinghouse Air Brake); Equipment Model—Locomotive (General Electric); Equipment Model—Vehicle; Truck Models (Electro-Motive Division); Lateral-to-Vertical Ratio Model; Vehicle Transfer Function; Lateral Track Stability Model (AAR); Curve Entry Model (Electro-Motive Division); Simulation of Cushioning Characteristics (Keystone Railway Equipment); and Pre- and Post-Processor (McDonnell Douglas Automation Co.).

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Lind, EF

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Lind, EF (Tel 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1972
COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

02 081794

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH
PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK
8—COMPONENT CHARACTERISTICS**

The Track Train Dynamic Analysis and Test Program is being performed on a contract funded by the Department of Transportation, administered by the National Aeronautics and Space Administration, Marshall Space Flight Center, and conducted by the Denver Division of Martin Marietta Corp. The work is a coordinated analytical and test program with the goal of developing experimentally, with analytical correlation, a definition of the dynamic properties of a truck/car system suitable for use in dynamic analysis of curving, hunting and response to track irregularities and to the interaction mechanisms which exist between the wheel and the rail. The result is expected to be a procedure for generation of analytical models of the car/truck system and procedures and techniques for future test efforts by which additional configurations can be evaluated experimentally.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Lind, EF

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Lind, EF (Tel 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1972
COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

02 081795

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH
PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK
9—INSTRUMENTATION AND TESTING**

Tests have been conducted on Southern Railway to determine draft gear, end-of-car cushioning and sliding-sill characteristics in support of Task 8. Tests have been made on Union Pacific Railroad by Battelle Memorial Institute to investigate the wide-gage phenomena, determining the effects of tonnage and seasonal changes. Field validation of several mathematical models has been under way at the Pueblo Test Center. Field validation of the Pullman-Standard Vertical Stability Model has been completed.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Lind, EF

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute;

Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Lind, EF (Tel 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1972
COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

02 081796

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH
PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II**

The objectives of this program are the development of recommended performance specifications and design guidelines for railroad freight cars, track structures, and their components and subsystems. Performance specifications are to coincide with the demands of the dynamic operating environment to which such systems are subjected. Details of methods and scope are included under specific task references.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Sutliff, DR (Tel 312-225-9600 X-1463) Hawthorne, KL (Tel 312-255-9600 X-1463) Martin, GC (Tel 312-225-9600 X-1463)

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 081799

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH
PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK
2—WHEEL/RAIL INTERACTIONS**

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.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR:

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 081803

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH
PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK
7—TEST MANAGEMENT**

Task objectives is to coordinate and conduct such tests as are necessary for the pursuit of Tasks 1-6 of Track Train Dynamics, Phase II. Task will provide clearinghouse function for data requests and will design and conduct appropriate laboratory and field tests.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Darien, H (Tel (312)225-9600 X-888)

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 081804

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH
PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK
9—ADVANCED ANALYTICAL TECHNIQUES**

Task objective is to assure that Track Train Dynamics-Phase II, Tasks 1-6 are equipped with the latest advances in applicable analytical techniques. Task will essentially be performed through contract efforts in such areas as stress analysis, fracture mechanics, and wear properties of ferrous materials.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Martin, GC (Tel 312-225-9600 Ext 877) Moyar, GJ (Tel 312-225-9600 Ext 877)

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975

COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 081805

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH
PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK
8—PROGRAM ANALYSIS**

The objective of this task is to assure economic justification of recommendations which result from research activities conducted in Tasks 1-6 of Phase II of the Track Train Dynamics Program. Task will include prior evaluation of research and implementation strategies to forecast potential economic benefits as an aid to priority determination. Areas selected for priority determination will be selected by program management. The principal technique for priority determination will be lifecycle costing based on data accumulated through existing industry channels supplemented by field surveys. Task will supply economic justification package for final recommendations based on industry status and forecasts and time of release.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL (Tel 312-225-9600 Ext 862)

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975

COMPLETION DATE: Dec. 1977

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. Along with testing these two plans on W/R loads, field measurements will also be used to determine loads and then the results will be compared. After modification and/or validation, the predictive techniques will be used to identify strategies for the reduction of W/R loads linked to track deterioration. This will help in providing a means for extrapolating W/R loads data to alternate track, vehicle and operating conditions and in identifying alternate strategies for the reduction of W/R loads by specified amounts in specified frequency ranges. The aim for the entire project is to provide a clear assessment of the data and analysis requirements for the characterization and reduction of W/R loads.

PERFORMING AGENCY: Battelle Memorial Institute

SPONSORING AGENCY: Federal Railroad Administration, Rail Safety Research Office, Improved Track Structures Div

RESPONSIBLE INDIVIDUAL: Kurzweil, L (Tel 617-494-2142)

Contract DOT-TSC-1051

STATUS: Obligated NOTICE DATE: Aug. 1975 START DATE: July 1975 COMPLETION DATE: Mar. 1977 TOTAL FUNDS: \$325,430

ACKNOWLEDGMENT: FRA

02 099380

**IMPROVED WHEEL AND RAIL PERFORMANCE VIA CONTROL
OF CONTACT STRESS**

A wheel-rail system should provide adequate traction and sufficient lateral guidance to prevent excessive flange contact and unstable dynamic modes of excess vibration and derailments. A general numerical method for analyzing contact stresses at conformational interfaces will be developed for conventional and new wheels and rails. Braking and acceleration will be considered in detail with the objective of greater safety.

PERFORMING AGENCY: Pennsylvania University, Philadelphia, Department of Mechanical Engineering and Applied Mechanics

INVESTIGATOR: Paul, B

SPONSORING AGENCY: Office of the Secretary of Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Gannett, CM

Contract DOT-OS-40093

STATUS: Active NOTICE DATE: Aug. 1975 TOTAL FUNDS: \$30,913

ACKNOWLEDGMENT: DOT

02 099385

RAIL DYNAMICS LABORATORY

The design of this test facility at the Transportation Test Center at Pueblo, Colo., has been completed and hardware deliveries are proceeding. The major subsystems in this facility will be: Vertical Shaker with Capability for vibrating one end of a railroad or transit vehicle (accepted July 1975); Vibration Test Unit with total vertical and lateral test capability for rail or transit vehicle (scheduled for 4th quarter of FY 1976); Roll dynamics Unit with roller units capable of forward speed simulation (scheduled for 1st quarter of FY 1977).

PERFORMING AGENCY: Federal Railroad Administration, Office of Freight Systems Research and Development

SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1971

COMPLETION DATE: 1977

ACKNOWLEDGMENT: FRA

02 099388

FREIGHT LOSS AND DAMAGE PROGRAM

This program is based on the evaluation of cost-effective means of damage control and a study of commodities to which various cost effective methods are applicable. It is planned to develop an industry approach to damage control by establishing coordinated programs to demonstrate and evaluate control procedures. The program will be directed toward the control of damage to lading and the economics of such control. Adequate background data is necessary to clearly define any damage problem. It is necessary in certain cases to define the fragility of the product and design laboratory tests to simulate the train environment and produce the same type of damage experienced in transit. Some areas of experimental research provide data on over-the-road shock and vibration and distribution of forces and accelerations in loaded cars under end impact conditions. In cooperation with the Railroad Truck Safety Research and Test Project, the environment during over-the-road operation of a 60-foot box car was determined by extensive instrumentation and recording equipment. Data on freight car vibration will serve as input to the Rail Dynamics Simulator at the Transportation Test Center at Pueblo, Colo. At the request of the National Freight Loss and Damage Prevention committee, and working with the Transportation Committee of the U.S. Brewers Association, a four-phase project has been undertaken to understand and alleviate the damage to beer in aluminum cans. AAR has also provided funds to the Illinois Institute of Technology for research on freight damage with objectives of establishing analytical methods of predicting vibration and shock and then to design cost-effective methods for control.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: AAR

02 099390

INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS. PHASE II. TASK 10—SPECIAL PROJECT, LOCOMOTIVES

The objective of this task is to review accident statistics relating to derailments due to, or related to, locomotives for the purpose of determining whether or not six-axle locomotives are more prone to derailment than four-axle locomotives. Should the data reveal correlation between truck types and accidents, existing and/or newly developed computer models of locomotive trucks will be utilized for developing strategies for alleviating the problems.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL (Tel 312-225-9600 X-862) Polk, E

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 099408

TRAIN/TRACK DYNAMICS PROGRAM (PHASE 2)

This is the second phase of a jointly sponsored program of theoretical and experimental research on train/track dynamics and related areas. The specific objectives of this phase of the work are: (a) Investigation of track wear including the effects of wheel and axle loadings, rail metallurgy and tribology. (b) Investigation of truck steering characteristics and methods of measurement of wheelset angle of attack. (c) Investigation of the applicability of laser equipment to the measure of vibrational and other characteristics of railway facilities including bridge structures.

PERFORMING AGENCY: Canadian Pacific

INVESTIGATOR: Bethune, AE (Tel 514-861-6811)

SPONSORING AGENCY: Canadian Pacific; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: McLaren, W (Tel 514-283-2880)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Mar. 1975
COMPLETION DATE: Feb. 1977

ACKNOWLEDGMENT: Transportation Development Agency

02 099409

TRAIN/TRACK DYNAMICS PROGRAM (PHASE 2)

The program is the second phase of a broad research and development program in Train/Track Dynamics and related subjects. Specific objectives of the second phase are: (a) Measurement of freight car truck ride characteristics and evaluation of overall truck performance. (b) Evaluation of curving performance of trucks of six-axle locomotives with lateral clearance. (c) Evaluation of track structures including concrete ties with conventional fasteners and design of improved track structures including improved rail metallurgy. (d) Instrumentation of wheel sets to measure wheel/rail forces. (e) Research on wheel/rail interaction during curve negotiation including the effects of wheel profile to reduce severe wheel and track wear in curves. (f) Development of train handling recorder for use in the development of simulators for engineman training. (g) Evaluation of operational ballast requirements. (h) Evaluation of the effectiveness of various rail tie-down systems.

PERFORMING AGENCY: Canadian National

INVESTIGATOR: Rennie, RP (Tel 514-877-4337)

SPONSORING AGENCY: Canadian National; Transportation Department Agency

RESPONSIBLE INDIVIDUAL: McLaren, W (Tel 514-283-2880)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Sept. 1974
COMPLETION DATE: Mar. 1976

ACKNOWLEDGMENT: Transportation Development Agency

02 099413

TO STUDY THE DYNAMIC BEHAVIOR OF RAILWAY CARS AND TRUCKS TO MINIMIZE WEAR AND LADING DAMAGE

Using over the road testing and hydraulic actuators or other perturbation to discover structural modes of vibrations, truck hunting characteristics,

curving phenomena, wear mechanisms, remedial techniques and to encourage new designs. To develop new instrumentation to measure wheel and rail forces, geometric properties of truck designs and wheel profiles, and the mathematical relations between these parameters.

PERFORMING AGENCY: National Research Council of Canada, Division of Mechanical Engineering

INVESTIGATOR: 613-993-2432

SPONSORING AGENCY: National Research Council of Canada, Associate Committee on Railway Problems

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: National Research Council of Canada

02 099431

RAILROAD TANK CAR SAFETY AND TEST PROJECT. PHASE 15- SWITCH YARD IMPACT TESTS

In 1972 and 1974 catastrophic switchyard accidents involved the striking of light empty freight cars by several heavy tank cars carrying liquefied flammable gas. The resulting head puncture of the leading loaded tank car by the coupler of the empty car released gas which flooded the yard without instant ignition. When the gas cloud finally reached a point of ignition, violent explosion ensued. Because of these accidents, a fullscale test program, supplemented by analytical studies is being undertaken. In the tests, single empty freight cars will be impacted by loaded tank cars, up to, and beyond, destructive speeds. The objectives are to assess the efficiency of the shelf coupler, the head shield, or both in combination, toward preventing punctures in this particular accident scenario. Analytical studies will be conducted to broaden the understanding of the phenomenon, particularly regarding the ranges of variables not easily studied in the tests alone. The program will be conducted cooperatively with the FRA.

See also RRIS 12A 081788 in Bulletin 7501.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1974
COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

02 099434

DEVELOPMENT OF A TRAIN HANDLING CONTROL MODEL FOR FREIGHT TRAIN LOCOMOTIVE ENGINEER PERFORMANCE

The objective of this effort is to reduce data taken in locomotive cabs on revenue freight runs to the form of a mathematical model of the train handling performance of a locomotive engineer. As a minimum, the following phases of freight train handling will be modeled: starting the train from rest, controlling the train through changes in grade, and stopping the train. The data records include settings of locomotive controls, speed, accelerations, motor load, brake system pressures, wheel slip, drawbar force, slack condition, drawbar angle, and main generator voltage. Also available are supervisor ratings of each engineer's performance on each recorded test run. The development of this model is expected to contribute to the understanding and improvement of selection, training, and evaluation of engineers and to support the development of improved locomotive operating controls and displays.

Funds for this project are administered by DOT/Transportation Systems Center, Cambridge, Mass.

PERFORMING AGENCY: Turpin Systems Company

INVESTIGATOR: Wichmann, T (Tel 213-998-1404)

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Ofsevit, D (Tel 617-494-2617)

Contract DOT-TSC-1037

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1975
COMPLETION DATE: Feb. 1976 TOTAL FUNDS: \$24,744

ACKNOWLEDGMENT: FRA

03 016867

DEMONSTRATE TWO TRAIN SETS OF DUAL-POWER GAS TURBINE ELECTRIC POWERED COMMUTER RAILROAD CARS

No Abstract.

PERFORMING AGENCY: New York State Metro Transit Authority
 INVESTIGATOR: Raskin, D (Tel 212-262-6900)
 SPONSORING AGENCY: Urban Mass Transportation Administration
 RESPONSIBLE INDIVIDUAL: Silien, JS (Tel 202-4260090)

Grant DOT-UT-613

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Dec. 1971
 COMPLETION DATE: Dec. 1976 TOTAL FUNDS: \$7,400,000

ACKNOWLEDGMENT: UMTA (NY-06-0005)

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. Long range goals: Development and demonstration of improved vehicles.

PERFORMING AGENCY: Boeing Company, Vertol Division
 INVESTIGATOR: Hervey, D (Tel 215-5223200)
 SPONSORING AGENCY: Urban Mass Transportation Administration
 RESPONSIBLE INDIVIDUAL: Silien, JS (Tel 202-4260090)

Contract CN-DOT-UT-10007

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1971
 COMPLETION DATE: June 1977 TOTAL FUNDS: \$22,000,000

ACKNOWLEDGMENT: UMTA (IT-06-0026)

03 036986

ADVANCED DESIGN TECHNIQUES FOR RAIL TRANSPORTATION VEHICLES

The contractor shall develop an analytical model suitable for simulating the structural action of typical rail transportation vehicle components with sufficiently high degrees of precision to permit realistic evaluation of their expected fatigue life. Emphasis shall be on estimation of stress levels near points of singularity such as cutouts, stiffeners and support attachments. This model shall be based on the results of recent research on the part of the contractor and others which indicates that a family of finite elements, exhibiting convergence with respect to increasing orders of approximation as well as with respect to progressively reduced element sizes, can be constructed utilizing a new formulation technique known as the constraint method.

PERFORMING AGENCY: Washington University, St Louis
 INVESTIGATOR: Szabo, B (Tel 314-863-0100 X-4123)
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Levine, D (Tel 202-426-1227)

Contract DOT-OS-30108

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1973
 COMPLETION DATE: June 1976 TOTAL FUNDS: \$84,400

ACKNOWLEDGMENT: Office of Systems Development and Technology

03 038060

FLAW DETECTION IN RAILWAY WHEELS USING ACOUSTIC SIGNATURES

Phase I involves testing for defect identification by continuous static excitation. Methods and equipment for finding defects shall be developed. Phase II shall use the methods and facilities developed in Phase I to study the acoustic signatures of a variety of railroad wheel designs, sizes and typical flaws.

PERFORMING AGENCY: Houston University, Department of Mechanical Engineering
 SPONSORING AGENCY: Transportation Systems Center, DOT-FR-30002
 RESPONSIBLE INDIVIDUAL: Bray, D RT-20 (Tel 202-4261227)

Contract TSC-729

STATUS: Active NOTICE DATE: Jan. 1975 START DATE: Oct. 1972
 TOTAL FUNDS: \$127,573

ACKNOWLEDGMENT: TRAIS (DOT-FR-30002)

03 038061

RAIL HAZARDOUS MATERIAL TANK CAR DESIGN STUDY

The objectives of the study are: (1) to provide the basis for defining practical and economical safety improvements which can be either retrofitted to in-service cars or incorporated into the design and manufacture of new tank cars, and (2) define the safety research gaps which must be remedied before a prototype tank car can be designed to optimal safety/economic considerations.

PERFORMING AGENCY: Calspan Corporation
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Dancer, D (Tel (202)426-1227)

Contract DOT-FR-20069 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: Oct. 1972
 COMPLETION DATE: Oct. 1975 TOTAL FUNDS: \$94,555

ACKNOWLEDGMENT: FRA

03 038826

PERFORM POST ACCEPTANCE TEST ON THE STATE-OF-THE-ART CAR (SOAC)

The Ground Systems Division of the Transportation Systems Center, which is acting as Systems Manager for the Rail Programs Branch of UMTA in certain research, development and demonstration areas, is funding this contract for the twofold purpose: to perform post acceptance engineering test on the State-of-the-Art Car and to expand and improve the General Vehicle Test Plan. Both of these objectives are in furtherance of the Urban Rail Supporting Technology Program and more specifically will: provide engineering data for the Advanced Concepts Train Programs, provide UMTA with an engineering baseline to judge future program progress, relate HSGTC track characteristics to those of 5 model areas, and provide an instrumentation package that can be used on railcar test programs, including the AC Train. SOAC undergoing extended tests on Lindenwold line.

PERFORMING AGENCY: Boeing Company, Vertol Division
 SPONSORING AGENCY: Transportation Systems Center
 RESPONSIBLE INDIVIDUAL: Neat, G 422 (Tel 617-4942290)

Contract TSC-580 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Feb. 1973
 COMPLETION DATE: May 1974 TOTAL FUNDS: \$657,395

ACKNOWLEDGMENT: TRAIS

03 038849

IMPROVE METROLINER TRUCKS

The objective of this contract is to design, fabricate, test, integrate and railcar test improved Metroliner trucks. Phase I and II. Prototype (4). Reports are under preparation.

Work on this project is continuing under a contract between AM-TRAK and LTV.

PERFORMING AGENCY: LTV Aerospace Corporation, Ground Transportation Division
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Gannett, CM (Tel 202-426-9665)

Contract DOT-FR-20049 (FFP)

STATUS: Completed NOTICE DATE: July 1975 START DATE: Mar. 1973
 COMPLETION DATE: June 1975 TOTAL FUNDS: \$3,784,869

ACKNOWLEDGMENT:

03 045009

STRUCTURAL STUDY OF HAZARDOUS MATERIAL TANK CARS

The objectives of this research can be accomplished in three phases. The first phase shall be concerned with a review and evaluation of present specifications under which tank cars are currently being built. A study of the forces which tank cars are normally subjected to in service conditions will be part of this study. The next two phases are inter-related with one being an experimental study of a scale model one fourth or one fifth of a 112A 340W type tank car and the other being a theoretical analysis of a full scale tank car of the type 112A 340W using realistic thermal loads obtained from fire tests and analysis of fire accidents.

PERFORMING AGENCY: Louisiana Polytechnic Institute, Division of Engineering Research
 INVESTIGATOR: Wilkinson, M
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Dancer, D (Tel (202)426-1227)

Contract DOT-FR-30056 (CR)
 STATUS: Active NOTICE DATE: July 1975 START DATE: May 1973
 COMPLETION DATE: Nov. 1975 TOTAL FUNDS: \$89,000

ACKNOWLEDGMENT: FRA

03 045693
FRACTURE RESISTANCE CHARACTERISTICS OF RAILROAD WHEELS

Tasks include: 1-Carry out plane strain crack toughness (K_{1c}) tests on specimens removed from the rim, plate, or hub locations of railroad wheels. 2-Evaluate fatigue crack propagation in railroad wheels and correlate fatigue crack growth rate with the range of the stress intensity factor. 3-Establish conventional tensile, hardness, and impact toughness mechanical properties of railroad wheels. 4- Present and analyze fracture toughness (K_{1c}) & fatigue test data and attempt determination of critical crack size that will cause wheel fracture for different stress levels.

REFERENCES:

FRACTURE RESISTANCE OF RAILROAD WHEELS Carter, CS; Caton, RG, Federal Railroad Administration, FRA-ORD&D-75-12, Sept. 1974

PERFORMING AGENCY: Boeing Company, Boeing Aerospace Company
 SPONSORING AGENCY: Transportation Systems Center
 RESPONSIBLE INDIVIDUAL: Valente, RE (Tel 617-4942146)

Contract DOT-TSC-617 (CPFF)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1973
 COMPLETION DATE: Jan. 1975 TOTAL FUNDS: \$61,380

ACKNOWLEDGMENT: TSC

03 045708
CRASHWORTHINESS OF URBAN RAIL CARS

The results of the project are to include: 1. Definition of crashworthiness criteria for Urban Rail Systems. 2. Assessment of the crashworthiness of existing Urban Rail Vehicles. 3. Identification, analysis and assessment of state-of-the-art of crash energy management devices that can be retrofitted to existing vehicle designs. 4. Design Tradeoff Studies of improved structural designs in terms of passenger safety risks, vehicle weight and cost. 5. Engineering standards for Rail Rapid Transit Vehicle Crashworthiness.

PERFORMING AGENCY: Calspan Corporation
 SPONSORING AGENCY: Urban Mass Transportation Administration, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Weinstock, H (Tel 617-4942038)

Contract DOT-TSC-681 (CPFF)
 STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Aug. 1973
 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: \$151,831

ACKNOWLEDGMENT: TRAIS

03 045874
PRODUCTION OF THE IMPROVED METROLINER TRUCKS

Task Order 3 is herewith assigned for engineering support on an as-required basis for the production of the improved Metroliner trucks. Support shall include but not be limited to engineering evaluation, monitoring of dynamic analysis, and/or truck manufacture and testing, review of transformer mount modifications, carbody modification and/or supporting design fabrication and related testing.

PERFORMING AGENCY: Budd Company, Systems Technology D
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Swerdlow, C RA-11 (Tel 202-4262970)

Contract FR-10035 (CPFF)
 STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1971
 TOTAL FUNDS: \$257,017

ACKNOWLEDGMENT: TRAIS

03 046502
RAILROAD WHEEL INVESTIGATION

An analytical elastic solution to determine the stresses developed in a railway car wheel when subjected to axisymmetric heating is being used to evaluate different geometric designs. The theory is being extended to include inelastic analysis which should permit the determination of residual stresses developed in the wheel. Hot spots developed in the wheel tread by brake action are also being examined to assist in better modeling of the temperature profile for the theoretical analysis.

PERFORMING AGENCY: Illinois University, Urbana, Department of Theoretical and Applied Mechanics
 INVESTIGATOR: Wetenkamp, HR
 SPONSORING AGENCY: Griffin Wheel Company

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
 COMPLETION DATE: Unknown

ACKNOWLEDGMENT: Science Information Exchange (JGF 25)

03 048945
STUDY OF CRITERIA AND TECHNOLOGY FOR THE DESIGN OF SHELF COUPLERS

The contractor shall develop, test, and validate a comprehensive mathematical model with two principal capabilities: 1. It shall be suitable for simulating train action during derailment situations that may result in tank head penetration by couplers. 2. The second model segment shall be designed to simulate the structural response of couplers to design loads.

PERFORMING AGENCY: Washington University, St Louis
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

Contract DOT-OS-40106
 STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1974
 COMPLETION DATE: June 1976 TOTAL FUNDS: \$420,000

ACKNOWLEDGMENT: Office of Systems Development and Technology

03 050338
ARTICULATED RAIL CAR TRUCK DEVELOPMENT

Develop a dramatically improved freight car truck. Obtain background information for applying basic design to (a) locomotives; (b) rapid-transit cars, and (c) passenger cars.

Design, build, and test 100 ton capacity freight car trucks based on earlier work with 1/8 size scale models and a continuing work with mathematical models (computer simulation).

Testing to 77 mph under light car with worn wheels indicates that basic design and principles are sound. Plans being made for further testing under load and in service.

REFERENCES:

AN EVALUATION OF RECENT DEVELOPMENTS IN RAIL CAR TRUCK DESIGN, List, HA, ASME #71-RR-1, Apr. 1971, RRIS #050340-No 7401

PERFORMING AGENCY: Railway Engineering Associates, Incorporated; Canadian National Railways
 SPONSORING AGENCY: Railway Engineering Associates, Incorporated; Canadian National Railways
 RESPONSIBLE INDIVIDUAL: List, HA

In-House

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1971
 COMPLETION DATE: Unknown

ACKNOWLEDGMENT: Railway Engineering Associates, Incorporated

03 051251
RAILCAR REFRIGERATION GENERATION DEMONSTRATION

Description: This program was initiated to develop a closed Brayton cycle gas turbine engine for mechanical refrigeration of railcars. A breadboard demonstrator was fabricated and operated. A set of components was delivered to Pacific Fruit Express and subjected to test on railways around the U.S. A specialized combustor and control system was also delivered to PFE.

PERFORMING AGENCY: AiResearch Manufacturing Company, Garrett Corporation
 INVESTIGATOR: - Daudet, H
 SPONSORING AGENCY: National Science Foundation, Division of National and International Programs

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AQ 945)

03 055604

A STRUCTURAL SURVEY OF CLASSES OF VEHICLES FOR CRASHWORTHINESS

It is the purpose of this contract to provide the technical data required for the evaluation and improvement of the crashworthiness of several classes of rail vehicles as required in the rail safety effort. This contract is also to provide preliminary technical data for planning of possible future crashworthiness tests efforts.

PERFORMING AGENCY: Boeing Company, Vertol Division
 SPONSORING AGENCY: Transportation Systems Center
 RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel 617-4942144)

Contract DOT-TSC-856 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
 COMPLETION DATE: May 1976 TOTAL FUNDS: \$239,139

ACKNOWLEDGMENT: TRAIS (PR# TME-0131)

03 055636

RAIL SAFETY/EQUIPMENT CRASHWORTHINESS

The Transportation Systems Center (TSC) is providing technical assistance to the Federal Railroad Administration (FRA) in a program directed at improving railroad safety and efficiency by providing a technological basis for improvement and possible regulation in rail vehicle crashworthiness, inspection of equipment, surveillance of equipment, and other areas. As part of this program TSC is conducting technical analyses of passenger railcar collisions, derailments, and other accidents, directed toward minimizing occupant injuries.

PERFORMING AGENCY: Boeing Company, Vertol Division
 SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-821

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
 COMPLETION DATE: Oct. 1975 TOTAL FUNDS: \$122,641

ACKNOWLEDGMENT: TSC (PR# TME-0117)

03 055774

DEVELOPMENT OF DATA TO IMPROVE DESIGN CRITERIA OF RAILROAD WHEELS

To measure the mechanical loads and thermal gradients due to tread braking on railroad wheels in actual service; to determine the major wheel stresses resulting from these loads and thermal effects; and to develop improved wheel service life criteria.

PERFORMING AGENCY: IIT Research Institute
 SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-855 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
 COMPLETION DATE: Feb. 1976 TOTAL FUNDS: \$151,977

ACKNOWLEDGMENT: TSC (PR# TME-0120)

03 058251

ASSESSMENT OF AUTOMATIC COUPLING SYSTEMS FOR RAILROAD FREIGHT CARS

The objective of this activity is identification, classification, and analysis of all significant concepts in rail freight car coupling systems which offer, through more-nearly automatic operation, a potential for an improvement in safety and overall operational costs compared to present couplers. Tasks include a literature survey, definition of operational characteristics of relevant concepts, preliminary engineering analysis and feasibility study of promising systems, preliminary estimation of life-cycle costs, and preparation of a recommended development plan.

PERFORMING AGENCY: Kearney (AT) and Company, Incorporated
 INVESTIGATOR: Nyquist, A (Tel (312)782-2868)
 SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: Hazel, M (Tel (617)494-2528)

Contract DOT-TSC-1087

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1975
 COMPLETION DATE: Dec. 1975 TOTAL FUNDS: \$92,296

ACKNOWLEDGMENT: FRA

03 058301

RESEARCH OF FREIGHT DAMAGE, WHEEL-RAIL FRICTION AND ENGINE NOISE

The freight damage task consists of three areas (1) identification and description of a freight car system for analysis to yield information for L&D problems faced by industry, (2) modelling of system, and (3) modelling of freight/packaging systems. The wheel-rail friction portion requires setup of a friction-creep test facility with improvements to equipment obtained from General Motors and performing tests to validate test results with previous tests. Engine noise investigations of structural vibration related noise radiation from the GM645E series engine are being performed.

Fifty percent funded by industry (AAR and GM-EMD).

PERFORMING AGENCY: Illinois Institute of Technology

INVESTIGATOR: Kumar, S

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: O'Sullivan, W (Tel 202-426-4377)

Contract DOT-OS-40103

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1974
 COMPLETION DATE: Mar. 1976 TOTAL FUNDS: \$120,000

ACKNOWLEDGMENT: FRA

03 058514

FATIGUE ANALYSIS OF PROTOTYPE TANK CAR HEAD SHIELD

Impact tests will be conducted utilizing an instrumented freight car truck for over-the-road tests. All tests are to be conducted with the head shield attached to the tank car in a manner such that there is a direct connection between the stub sill and shield support or there is sufficient damping to eliminate the vertical motions of the shield. The test plan shall give consideration to the following: (a) Specification of additional instrumentation requirements for both the additional impact tests and the over-the-road tests. (b) Delineation of test train operation variables, i.e., speed, length of run, track and terrain conditions, consist makeup, stop and start operation and off-site test requirements.

PERFORMING AGENCY: IIT Research Institute

SPONSORING AGENCY: Transportation Systems Center, RR-525

Contract DOT-TSC-1043 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1975
 COMPLETION DATE: Mar. 1976 TOTAL FUNDS: \$46,994

ACKNOWLEDGMENT: TRAIS (RR-525)

03 058553

WHEEL NON-DESTRUCTIVE TESTING
 No Abstract.

PERFORMING AGENCY: Houston University

SPONSORING AGENCY: Federal Railroad Administration

Contract FR-30002 NOTICE DATE: July 1975 TOTAL FUNDS: \$116,000

ACKNOWLEDGMENT: TRAIS

03 080330

TURBO TRAIN REVIEW

A study of the development, systems design and implementation of the United Aircraft Turbo Train is being undertaken to guide the implementation of future advanced technology systems.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 4.35.74

INVESTIGATOR: Buchan, PB

SPONSORING AGENCY: Canadian National Railways; Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1974
COMPLETION DATE: Apr. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

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. The 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)229-3405)

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Morella, NA (Tel 216-229-3400)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1972
COMPLETION DATE: Dec. 1975

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. The principal activity has been a continuation of tests employing electronic systems to measure the different types of stress to which truck components are subjected under all types or operating conditions. Plans call for completion of stress data gathering and analysis, as well as metallurgical studies on damaged components to determine what caused them to weaken or break. Initial bolster fatigue tests have been conducted at the American Steel Foundries laboratory with further testing to be planned in Fall 1975. IITRI has been performing analytical work on data from the road service environmental tests and on the relationship of these tests to the fatigue tests. Integration of the Truck Project into the Dynamics Program, Phase II, has also been approved.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

INVESTIGATOR: Evans, RA (Tel (312)-225-0600 X876)

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Evans, RA (Tel (312)-225-9600 X876)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1973
TOTAL FUNDS: \$100,000

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 be required for validation of mathematical models. Testing will be carried out under a variety of conditions to obtain load environmental data using a variety of cars with varying loads.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Martin, GC (Tel 312-225-9600 Ext 877) Korpics, F (Tel 312-225-9600 Ext 877)

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

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.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Przybylinski, P (Tel 312-225-9600 Ext 862)

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

03 081801

INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 5—COUPLERS, DRAFTGEAR, AND CUSHION UNITS

Task objectives are development of recommended performance and/or test specifications and design guidelines for railroad freight car couplers, draftgear, and cushion units. Task will build on current RPI-AAR Railroad Coupler Safety Research and Test Project and will utilize dynamic simulation computer models developed during Phase I of the Track Train Dynamics Program. Coupler effort will concentrate on stress and fatigue analysis. Draft gear and cushion unit efforts will be directed toward investigations of opportunities for improved train handling through optimized operating characteristics.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL (Tel 312-225-9600 Ext 866) Brown, TR (Tel 312-225-9600 Ext 866)

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

03 099382

WHEEL RESEARCH PROGRAM

It is the objective of this program to prevent the formation of cracks in various wheel locations which can occur because of various conditions and can ultimately result in catastrophic failure. The initial step was a full review of wheel failure statistics to isolate wheel contours generating the most frequent failures. The problem is to be alleviated by considering changes in wheel design and wheel material, with emphasis on design. Finite element analysis is conducted on each characteristic shape of wheel involving stress due to tread loading, lateral loading and to thermal inputs resulting from drag or emergency braking. Such analysis would be followed by service or dynamometer tests to verify results. The initial phase of this involved the 28-inch wheel and was a joint project with Trailer Train Co. It involved cracked wheel plates and shattered rims, and indicated some solutions which would be generally applicable. In addition to the loading problems, research is being conducted to define problems associated with overheated wheels. It was initially found that criteria for rejecting such wheels were overly restrictive. Non-destructive residual stress measurement techniques, such as the Barkhausen method, are being evaluated for detecting thermally damaged wheels. The thermal fatigue behavior of wheel steels is also being investigated. Detection of rim thermal cracks, utilizing ultrasonic techniques like those used in AAR's rail test program, are also proceeding.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: AAR

03 099407

LIGHT RAPID COMFORTABLE (LRC) PROTOTYPE EVALUATION

The overall objective of this Transportation Development Agency-supported program is to test and evaluate the prototype LRC (Light, Rapid, Comfortable) locomotive and coach are: Stage 1: To demonstrate the ability of the LRC to operate at conventional speeds on Canadian mainline track. Stage 2: To explore the full operating limits of the prototype LRC equipment under controlled conditions. Stage 3: To subject the prototype LRC equipment to daily revenue operation over an extended period. Stage 4: To demonstrate the ability of the LRC to operate in excess of conventional limits on Canadian mainline track (up to 120 MPH). Stages 1 and 2 are completed. Stage 1 was completed in conjunction with the Technical Research Department of Canadian National Railways which was responsible for establishing the permissible rail wheel dynamic parameters and acceptance criteria. Testing to satisfy these criteria was undertaken on CNR trackage. Stage 2 was completed using the facilities of U.S.-D.O.T.-F.R.A. highspeed ground test centre at Pueblo, Colorado. The LRC prototype covered 20,500 miles at Pueblo at an average speed of 96 MPH. Stage 3 is now being carried out. LRC equipment is operated on CN "Tempo" service for one daily trip between Toronto and Sarnia and 100,000 miles is target. Stage 4-Not yet addressed.

PERFORMING AGENCY: Worthington (MLW) Industries Limited

INVESTIGATOR: Heaney, C (Tel 514-255-3681)

SPONSORING AGENCY: Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Eggleton, P (Tel 514-283-4077)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1973
COMPLETION DATE: Mar. 1976

ACKNOWLEDGMENT: Transportation Development Agency

03 099414

THE STRENGTH TESTING OF RAILWAY CARS AND LADING SECURING ARRANGEMENTS TO A.A.R. AND MIL SPECIFICATION FOR INDUSTRY

Using impact ramp, squeeze frame, jacks and in-service observations associated with strain gauge and accelerometer instrumentation, to assist industry in their car construction and tie down design, and to suggest or develop alternative lading protection devices where necessary.

PERFORMING AGENCY: National Research Council of Canada, Division of Mechanical Engineering

INVESTIGATOR: Watson, WJ (Tel 613-993-2432)

SPONSORING AGENCY: National Research Council of Canada, Associate Committee on Railway Problems

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: National Research Council of Canada

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 and theoretical analyses are planned. The tests will comprise impact testing of several bottom outlet configurations. The objective is to assess present specifications and to improve, where practical, their requirements for safe breakaway designs of bottom fittings and attachments.

32 Z C M D C A

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1970
COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

03 099430

RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 14-STUB SILL TANK CAR BUCKLING

This phase concerns buckling which has occurred inboard of the stub still termination on certain designs of non-pressure stub sill cars in either compressive train action or yard impact situations. The problem has been limited to empty cars, indicating that for loaded cars the tensile stresses produced in the bottom fibers of the tank by the lading weight is sufficient to offset the otherwise critical compressive stresses. The primary objective is to determine quantitatively what design and test loads should be specified for such stub sill cars to assure that their resistance to buckling is at least as good as that of all other freight cars. A second objective is to develop data on the brittle lacquer or photostress techniques of experimental analysis, and on the electrical strain gage test procedures and interpretation methods, in order to improve specification requirements in these areas. This work, currently nearing completion, has involved static squeezing and dynamic impacting of nine stub sill cars of different designs, four of which have experienced various histories of buckling and five of which are of new improved design. Approximately 80 strain gage rosettes are employed on each car. Conclusions from this work will be made in report form to the AAR Car Construction and Tank Car Committees for their use in adopting specification changes, if deemed necessary.

See also RRIS 12A 081788 in Bulletin 7501.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1974
COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

03 099432

ADVANCED COUPLING CONCEPTS PROJECT

The objectives of the Advanced Coupling Concepts project are: 1) To determine areas in which safety and efficiency could be improved by changes in the coupling system. 2) To quantify value to be achieved by

such improvements. 3) To define functional requirements in the form of a specification to guide development of improved systems. The scope includes all functional elements essential to interfacing of railroad cars and locomotives including mechanical couplers, train lines, etc. An economic model is to be developed and data collected to evaluate new coupling concepts individually and as logically assembled systems.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Punwani, SK

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1974

ACKNOWLEDGMENT: AAR.

03 099435

LOCOMOTIVE CAB DESIGN DEVELOPMENTS

The objective of this effort is the development of a locomotive control compartment based on an evaluation of the operator's functional requirements and comprehensive human factors engineering studies. The contractor will develop specifications for the design, test, and evaluation of a locomotive cab which is in concert with all operational, human factors, safety, and occupant protection considerations. The cab design will incorporate the predictable technical and operational progress, as well as 10 to 15 year projections of train handling and control requirements. In Phase I of the contract, a number of potentially feasible conceptual alternative locomotive cab configurations were developed. The most suitable alternate will be selected on the basis of human factors, structural integrity, and cost trade-off studies now in progress. In Phase II, a detailed human factors design of the optimized locomotive cab will be accomplished, and a full scale mock-up fabricated. Operational feasibility will be determined in a limited series of performance tests utilizing the mock-up.

Funds for this project are administered by DOT/Transportation Systems Center, Cambridge, Mass.

PERFORMING AGENCY: Boeing Company, Vertol Division

INVESTIGATOR: Robinson, J (Tel 215-522-2477 X-3909)

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Jankovich, J (Tel 617-494-2129)

Contract DOT-TCS-913

STATUS: Active 750 NOTICE DATE: 198 START DATE: Oct. 1974

COMPLETION DATE: June 1976 TOTAL FUNDS: \$343,276

ACKNOWLEDGMENT: FRA

03 099439

HOT JOURNAL SENSOR AND LOCAL DERAILMENT DETECTOR

This multi-year program is aimed at reducing the number of train derailments. Active anti-derailment devices are needed by the railroad industry

which when intalled 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 intiate in-service demonstrations of the Hot Journal Sensor (HJS) and 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: Gratton, P

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D (Tel 202-426-1227)

IA AR54162

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: FRA

03 099634

HOPPER-BOTTOM BOXCAR FOR RAILROAD TRANSPORTATION

Investigate the feasibility of developing and using a convertible hopper-bottom boxcar for transportation of grain and soybeans in bulk and packaged freight as a means of helping to increase the utilization rates for railroad freight cars, thereby relieving the shortages of railroad equipment, increasing the efficiency of grain handling, and reducing transport costs.

Railroad car designs and building techniques for boxcars and covered hopper cars will be surveyed and the design specifications of the Association of American Railroads will be studied to assess the engineering feasibility of developing and building hopper-bottom boxcars. The current methods of shipping grain in box and covered hopper cars will be studied and grain and soybeans shippers and receivers and railroad operating officers will be surveyed to determine the operational feasibility of using hopper-bottom boxcars for transport of the products. If the results of the first two steps are positive, preliminary engineering designs for such equipment will be developed to enable the building of prototype cars for testing and evaluation.

PERFORMING AGENCY: Kearney Foundation

INVESTIGATOR: Macomber, FJ Breakiron, P

SPONSORING AGENCY: Department of Agriculture, 0701-15841-008-C

Contract 12-14-1001-406

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974

COMPLETION DATE: Mar. 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS-0041196)

04 007457

HEAVY DUTY MARINE GAS TURBINE DEVELOPMENT PROJECT

The project will undertake those development efforts and improvements necessary to "marinize" the industrial regenerative gas turbine to provide an economically and technically attractive propulsion machinery system for ships of the U.S. merchant marine; having lower acquisition and operating costs than existing forms of propulsion power generation.

The marinization of the industrial regenerative gas turbine will require research and development efforts to provide: (1) a demonstrated capability to efficiently and reliably burn Bunker "C" fuel, and (2) a self-contained (internal) capability to reverse direction of rotation.

As an economically competitive system all efforts will be concentrated on insuring that the developed system will offer: (1) increased ship reliability and availability (reduced maintenance), (2) improved operational manpower utilization, (3) improved energy utilization (reduced specific fuel consumption), and (4) increased shipyard productivity (reduced installation manhours).

REFERENCES:

HEAVY DUTY MARINE GAS TURBINE DEVELOPMENT PROJECT Critelli, FX; Kaplan, SM; Carvana, A, General Electric Company, Feb. 1974, MRIS #053938

PERFORMING AGENCY: General Electric Company, Gas Turbine Department

INVESTIGATOR: Kaplan, SM (Tel 518-3742211)

SPONSORING AGENCY: Maritime Administration, Department of Commerce, DDM-467

RESPONSIBLE INDIVIDUAL: Critelli, FX (Tel 207-9675425)

Contract 0-35510 (CS)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1970
COMPLETION DATE: June 1975 TOTAL FUNDS: \$8,025,000

ACKNOWLEDGMENT: Maritime Administration

04 036771

METRO IMPROVEMENT

Using the constraint method, the program is to develop an analytical model suitable for simulating the structural action of typical rail transportation vehicle components with sufficiently high degrees of precision to permit realistic evaluation of expected fatigue life. A computer program for analysis of peak stress values in stiffened plate and shell structures will be developed to facilitate the design and production of a safer, more economical transportation vehicle not using the trial-and-error method, to increase the knowledge and scope of the finite element method, and to better the flow of research information in the industry. The model will be able to evaluate alternative design decisions, incorporating advanced structural design techniques, on the basis of expected fatigue life for application in the railway car manufacturing industry.

PERFORMING AGENCY: General Electric Company

INVESTIGATOR: Szabo, BA

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Gannett, MC RA-43 (Tel 202-4269665)

Contract DOT-OS-30108

STATUS: Active NOTICE DATE: July 1975 START DATE: Apr. 1973
COMPLETION DATE: June 1976 TOTAL FUNDS: \$87,600

ACKNOWLEDGMENT: TRAIS

04 054561

ON BOARD ENERGY STORAGE FOR TRANSIT CAR POWER CONSUMPTION REDUCTION

Description: The design, development and testing of an electric propulsion system with an onboard energy storage unit for use on various subway and commuter 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. Third rail power supplies an average power flow which is low through a chopper for drag, mechanical and electrical losses. Performance by computer analysis indicates a potential energy savings of 30% and peak power reduction as high as 60% over a typical NYCTA track profile. Verification of performance compared to conventional cars will be accomplished by operation on the NYCTA subway lines.

PERFORMING AGENCY: Metropolitan Transportation Authority of New York

INVESTIGATOR: Nickel, E

SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1974
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (AR 182)

04 054697

MONITORING AND DIAGNOSTIC EQUIPMENT FOR MAINTENANCE OF DIESEL ELECTRIC LOCOMOTIVES

This project is aimed at various aspects of preventive and predictive maintenance of diesel-electric locomotives. The main concern is the effectiveness of modern testing equipment for performance monitoring and maintenance, which includes certain electronic analyzers for the testing of mechanical components, SEARCH (System Evaluation and Reliability Checker) for the testing of electrical components, and onboard data-logger systems for continuous performance evaluation of locomotives.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 3.11.72

INVESTIGATOR: Rawat, SK

SPONSORING AGENCY: Canadian National Railways; Ministry of Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

04 058269

DESIGN IMPROVEMENTS TO METROLINER PROPULSION AND AUXILIARY EQUIPMENT

Reduce the failure rate, out of service time and maintenance cost of Metroliner cars by design improvements to propulsion and auxiliary equipment. Assist in the testing of improvements to validate effectiveness.

PERFORMING AGENCY: Klauder (Louis T) and Associates

INVESTIGATOR: Watson, R (Tel 215-563-2570)

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

RESPONSIBLE INDIVIDUAL: Gannett, CM (Tel 202-426-9665)

STATUS: Completed NOTICE DATE: July 1975 COMPLETION DATE: June 1975 TOTAL FUNDS: \$90,800

ACKNOWLEDGMENT: FRA

04 058270

ELECTRICAL PROPULSION

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 (Tel 202-426-9564)

PPA-RR-05

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: FRA

04 058280

POWER AND PROPULSION SYSTEM TECHNICAL AND SCIENTIFIC SERVICES AND DATA

Task effort is to include: (1) energy charging analysis and charger station requirements for flywheel propulsion systems for various urban vehicles; (2) power conditioner surveys for the linear synchronous motor; (3) cost data and economic analysis of linear electric motor propulsion systems; (4) review of advanced propulsion, power, and train control approaches for improved freight operations; (5) updating of cost data of wayside power supply systems; (6) assess data gathered from transit authorities and vehicle manufacturers on the problems of electrically caused fires.

PERFORMING AGENCY: Alexander Kusco, Incorporated
 SPONSORING AGENCY: Transportation Systems Center

Contract TSC-965 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Feb. 1975
 COMPLETION DATE: Dec. 1975 TOTAL FUNDS: \$124,000

ACKNOWLEDGMENT: TRAIS

04 099377

FLYWHEEL ENERGY STORAGE UNIT FOR YARD SWITCH ENGINES--FEASIBILITY STUDY

The objective of this research is to determine the technical and economic feasibility of employing flywheel energy storage technology to yard switch engines as a potential means of reducing fuel consumption, noise levels, exhaust emissions and overall maintenance costs. This work will include the development of a "breadboard" installation for testing with a 1500 HP locomotive. A trailing car will be used to house the flywheel unit and the necessary control integration and traction motor modification will be made to a railroad-furnished switcher. Four different railroads will assist in conducting 90-day operational evaluations.

The contract to a performing organization has not yet been awarded.

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

RESPONSIBLE INDIVIDUAL: Cracker, W, Jr (Tel 202-426-0855)

STATUS: Proposed NOTICE DATE: Aug. 1975 START DATE: Feb. 1976 COMPLETION DATE: Jan. 1978

ACKNOWLEDGMENT: FRA

04 099404

A.C. MOTOR PROPULSION SYSTEM

The overall objective of this project is to demonstrate a solid state inverter A.C. motor propulsion system based on current source and power factor feedback control which is both simple and reliable. The more specific

objectives are as follows: 1. Identify the requirements for an optimum system based upon reliability, simplicity, cost, weight and efficiency considerations. 2. Develop circuit configurations and design procedure for solid state inverter A.C. squirrel cage motor systems applicable to transportation, e.g. street cars, transit cars, etc. 3. Construct the "optimum" inverter configuration applicable to a propulsion system for a transit application. Status-preliminary feasibility studies have been completed, the concept has been demonstrated on a 3HP motor and works presently under way to build a system for a 120 HP motor.

PERFORMING AGENCY: Toronto University, Office of Research Administration

INVESTIGATOR: Dewan (Tel 416-928-6262)

SPONSORING AGENCY: Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Audette, M (Tel 514-283-4073)

Contract DSS-OSU5-0034

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1975
 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Transportation Development Agency

04 099440

METROLINER AUXILIARY POWER

The objective is to examine the possibility of substituting solid-state inverters for the motor alternator sets that supply the auxiliary power system on self-propelled Metroliner cars.

PERFORMING AGENCY: Transportation Systems Center

INVESTIGATOR: Raposa, FL

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

RESPONSIBLE INDIVIDUAL: Gannett, CM (Tel 202-426-9655)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: July 1975
 COMPLETION DATE: July 1976

ACKNOWLEDGMENT: FRA

05 058254

STUDY OF ADVANCED FREIGHT CAR BRAKING SYSTEMS

This study of alternative freight car braking systems is to determine the degree to which any existing concepts represent practical improvements in conventional freight operations. This technology assessment is not limited to alternatives which have been considered for high speed passenger trains, but is to include all known alternatives. The specific tasks include: 1) Detailed delineation of the functional performance of the present air brake system, including consideration of available optional equipment; 2) establishment of detailed life-cycle cost information for the existing system; 3) identification of areas in which the present system could be improved; 4) identification of alternative braking techniques/concepts; 5) analysis of those alternatives; and 6) recommendation of a research and development plan.

PERFORMING AGENCY: Kearney (AT) and Company, Incorporated
 INVESTIGATOR: Eshelman, L (Tel (312)782-2868)

SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Hazel, M (Tel (617)494-2528)

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1975

COMPLETION DATE: Feb. 1976

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

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975

COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

06 048861

TES SPONSORED STUDY OF SAN FRANCISCO BART AUTOMATIC TRAIN CONTROL TO ASSURE PUBLIC SAFETY

A comprehensive review of standards, regulations, design criteria and specifications, and industry safety practices will be performed. This information will be compiled into a generalized set of functional requirements for ATC systems. These requirements in turn, will serve as the basis for a detailed functional description of the ATC system and subsystems. Specific system designs, such as BART, will be compared to these requirements and to the functional description to uncover areas of nonconformance and potential sources of compromise (degradation) in overall ATC system safety. Particular attention will be given to the definition of the role of the train attendant within a safe ATC system.

PERFORMING AGENCY: Office of Environment, Safety and Consumer Affairs, Department of Transportation

SPONSORING AGENCY: Urban Mass Transportation Administration; Office of Environment, Safety and Consumer Affairs, Department of Transportation; Transportation Systems Center, Department of Transportation

RESPONSIBLE INDIVIDUAL: Herringer, FC (Tel 202-426-4040)

ID DC-06-0092

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Oct. 1973
COMPLETION DATE: July 1974 TOTAL FUNDS: \$200,000

ACKNOWLEDGMENT: UMTA (DC-06-0092)

06 054694

TRAIN CONTROL SYSTEMS FOR UNSIGNALLED RAILWAY LINES

This is a feasibility study to examine the requirements for the control of trains along unsignalled rail lines with a view to developing a control system that can be incorporated simply and economically into present-day railroad procedures.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport

INVESTIGATOR: MacKay, NA

SPONSORING AGENCY: Canadian National Railways; Ministry of Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

06 054699

SURFACE WAVEGUIDES FOR GUIDED RADAR AND OBSTACLE DETECTION

Open-guiding electromagnetic structures, i.e. surface waveguides, are being studied, both theoretically and experimentally, with the aim of providing a means for the detection of obstacles in guided ground transportation. Initially, emphasis is being placed on the detection of landslides in mountainous areas on present railway systems. This can be called "Guided Radar", as the intention is to enable a train to be warned within the braking distance of the train. Only the electromagnetic field aspects are being studied in this project; the signal-processing is under separate and co-ordinated investigation, formerly by Dr. G.J.M. Aitken also of Queen's University, now also by Dr. J.C. Beal.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport

INVESTIGATOR: Beal, JC

SPONSORING AGENCY: Canadian National Railways; Ministry of Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

06 058255

STUDY OF DEGRADATION OF ACI LABELS BY DIRT

Spectrographic analysis of ACI labels, both clean and degraded by accumulation of dirt, etc., will be carried out with the aim of providing insight into preferred means of reducing the effect of this failure mode on ACI system performance.

PERFORMING AGENCY: Transportation Systems Center

INVESTIGATOR: Ingraio, H (Tel 617-494-2373)

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

RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel 202-426-0855)

PPA RR-516

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: FRA

06 080327

COMMUNICATIONS TECHNOLOGY SATELLITE COMMUNICATIONS SYSTEM

A study to investigate the feasibility of using a satellite communications link for railroad communication is underway. The Canadian Communication Technology Satellite will be used for this research.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, I.2.72

INVESTIGATOR: Mackay, NA

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific; Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1974
COMPLETION DATE: 1977

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

06 099410

THE DEVELOPMENT OF A TRAIN LOCATION IDENTIFICATION AND CONTROL SYSTEM

The objective of this study is the development of locomotive identification and control techniques for railway signalling applications. The work includes: (a) Definition of operational requirements. (b) Conduct of system design and preparation of technical specifications. (c) Specification, design, construction and factory tests of locomotive control unit, cab signalling unit, microwave site unit, computer interface unit, and test panel. (d) Provision of assistance in the installation of the above equipment on British Columbia Railway property and conduct of field test and debugging of system.

PERFORMING AGENCY: Glenayre Electronics Limited

INVESTIGATOR: Francis, JR (Tel 604-980-6041)

SPONSORING AGENCY: Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Rudback, NE (Tel 514-283-4077)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Feb. 1975
COMPLETION DATE: July 1976 TOTAL FUNDS: \$184,670

ACKNOWLEDGMENT: Transportation Development Agency

06 099422

MANNED/UNMANNED TRANSIT SYSTEMS STUDY

This project will compare and evaluate the technical capabilities and safety aspects of two types of transit systems—one with on-board human control, the other fully automated with no on-board human control. The principal factors to be studied will be: public acceptance; safety and security for the passengers; and the reliability, maintainability and life cycle costs and benefits for the system. The findings are intended for use by authorities faced with advertising or deciding on selection and development of new systems. The project was started in the Office of the Secretary of Transportation where it was known as "Automatic Train Control Study" and was transferred to UMTA in April 1974 for expansion and completion.

PERFORMING AGENCY: Transportation Systems Center, Department of Transportation

SPONSORING AGENCY: Urban Mass Transportation Administration, Department of Transportation

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1974
COMPLETION DATE: 1976 TOTAL FUNDS: \$70,000

ACKNOWLEDGMENT: UMTA

07 045271

PROVIDE PHYSIOLOGICAL TESTING

Provide physiological testing to include the Following: 1. Toxicity by inhalation. 2. Toxicity by ingestion. 3. Toxicity by skin absorption. 4. Skin Corrosion (distruction corrosion (destruction of living tissue on contact). This work has been completed but no overall report was prepared. Test results were reported as received. As time and workload permits, preparation of a summary report is contemplated and would be made available through NTIS.

PERFORMING AGENCY: U.S. Testing Company, Incorporated
 SPONSORING AGENCY: Office of Environment, Safty and Consumer Affaires, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Pitts, HB TAD-432 (Tel 202-4264311)

Contract OS-30077

STATUS: Active NOTICE DATE: July 1975 START DATE: Mar. 1973
 TOTAL FUNDS: \$13,550

ACKNOWLEDGMENT: TRAIS

07 049659

HUMAN FACTORS IN RAILROAD OPERATIONS

This continues a program of research and consultation on human factors in railroad safety in support of FRA regulatory responsibilities involving human performance. Current work includes measurement of air contaminants in the train crew environment, development and evaluation of train handling aids, studies of crew alertness, design of a locomotive cab based on functional requirements, and study of employee motivation.

Reports issued are available from National Technical Information Service, Springfield, Virginia 22161.

REFERENCES:

PROPOSED QUALIFICATION REQUIREMENTS FOR SELECTED RAILROAD JOBS, Hale, A; Jacobs, HH, Federal Railroad Administration, FRA-OR&D-75-44, May 1975

TASK ANALYSIS FOR THE JOBS OF FREIGHT TRAIN CONDUCTOR AND BRAKEMAN, Sanders, M; Jankovich, J, Federal Railroad Administration, FRA-OR&D-75-69, May 1975

HUMAN FACTORS IN RAILROAD OPERATIONS ACTIVITIES IN FISCAL YEAR 1973, Devoe, DB; Feehrer, CE; Hill, JH; Sussman, ED, Federal Railroad Administration, FRA-ORD&D-74-32, Feb. 1974

PERFORMING AGENCY: Transportation Systems Center
 INVESTIGATOR: Devoe, DV (Tel 617-4942368)
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Levine, D (Tel 202-426-1227)

Contract PPA-RR695 Task 3

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: July 1975
 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: FRA

07 054559

COMBINED EFFECTS OF NOISE, WORK AND HEAT ON HUMAN HEARING

In this project the temporary noise-induced hearing loss resulting from exposure to broad band noise while under conditions of heat stress is being examined. Under closely controlled laboratory conditons, twelve young, healthy, male subjects with normal hearing were exposed to different noise levels while under various climatic and workload conditions. Susceptibility to temporary threshold shifts is being evaluated using air conduction audiometric examinations administered both before exposure and two and thirty minutes after exposure.

PERFORMING AGENCY: Department of Health, Education and Welfare, Center for Disease Control
 INVESTIGATOR: Heins, A
 SPONSORING AGENCY: National Inst for Occupational Safety and Health, 438-210-05

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973
 COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AM 473 1)

07 054562

LABORATORY STUDIES OF NOISE-INDUCED HEARING LOSS

Studies will be conducted of temporary and permanent hearing losses in animals and temporary hearing loss in human subjects, in order to determine effects of impact noise, fluctuating noise levels, "quiet" rest periods, shortened exposures at high levels, intermittent noise, lengthened exposures, and noise spectrum. Work with rats will continue, and some primate work will be done. Laboratory facilities for noise exposure, hearing testing, and anatomical work will be expanded and improved.

PERFORMING AGENCY: Department of Health, Education and Welfare, Center for Disease Control
 INVESTIGATOR: Dunn, D
 SPONSORING AGENCY: National Inst for Occupational Safety and Health, 438-210-03

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973
 COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AS 510)

07 055638

DEVELOPMENT OF EXPERIMENTAL DESIGNS AND PSYCHOMETRIC TECHNIQUES FOR THE STUDY OF RIDE QUALITY

The objective of this contract is to design the experiments and psychometric scaling tools necessary for the objective measurement of ride quality. The ride quality measurements are intended to support the development and specification of accurate, statistically reliable ride quality criteria for current and proposed ground transportation vehicles. The specification of these quality parameters is intended to provide the transportation designer with information which can be used (in conjunction with guideway surface characteristics, vehicle dynamic characteristics, projected vehicle velocity profiles, and associated costs) to determine the relative cost effectiveness associated with the use of various suspension systems.

PERFORMING AGENCY: ENSCO, Incorporated
 SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-864 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
 COMPLETION DATE: May 1975 TOTAL FUNDS: \$59,127

ACKNOWLEDGMENT: TRAIS (PR# TI-0147)

07 058468

DEVELOPMENT OF A TRAIN HANDLING CONTROL MODEL FOR FREIGHT TRAIN LOCOMOTIVE ENGINEER PERFORMANCE

The development of this model will contribute to the understanding and improvement of selection, training, and evaluation of engineers, and will support the development of improved locomotive operating controls and displays. The model will depict at least the following phases or types of train handling: 1. starting the train from rest; 2. controlling the train through changes in grade; 3. stopping the train.

PERFORMING AGENCY: Turpin Systems Company
 SPONSORING AGENCY: Transportation Systems Center, Department of Transportation, RR-509

Contract DOT-TSC-1037 (CPFF)

STATUS: Active NOTICE DATE: June 1975 START DATE: May 1975
 COMPLETION DATE: Mar. 1976 TOTAL FUNDS: \$24,744

ACKNOWLEDGMENT: TRAIS (RR-509)

07 058479

INVESTIGATION OF METHODS FOR IMPROVING RAILROAD CREW VIGILANCE

The study will consist of two parts: (1) A pilot study to investigate the factors of expectancy or set as a determinant of human performance in a task similar to that of railway signal recognition. (2) An experimental study to test the operational principles forming the basis of currently used methods for maintaining alertness of railway crews.

PERFORMING AGENCY: Small Business Administration
 SPONSORING AGENCY: Transportation Systems Center, RR-509

IA TSC-1010

STATUS: Active NOTICE DATE: June 1975 START DATE: May 1975
 COMPLETION DATE: Jan. 1976 TOTAL FUNDS: \$40,000

ACKNOWLEDGMENT: TRAIS (RR-509)

07 058555**ANALYTICAL METHODS AND DESIGN IMPLICATIONS OF DETERMINISTIC RIDE QUALITY CRITERIA**

No Abstract.

PERFORMING AGENCY: Arizona State University
 SPONSORING AGENCY: Office of Systems Development and Technology,
 Department of Transportation

Contract OS-40101 (CS) NOTICE DATE: June 1975 START
 DATE: Jan. 1974 TOTAL FUNDS: \$20,000

ACKNOWLEDGMENT: TRAIS

07 080132**INVESTIGATION OF PILOT CONTROL CAPABILITY DURING VIBRATION**

Vibration and noise effects are insufficiently understood for general design criteria for advanced aircraft. The objective of this research is to provide the aircraft design community with pilot control performance criteria for mechanically stressed environments in terms that are readily understood and immediately useful. The contractor will collect pilot performance data in terms of control system figures of merit under noise, GZ, and random vibration. The ensemble of seat, display, control, operator and controlled element with the command input and mechanical disturbances have mathematically determinable relationships. Take measurements of errors, control activity and operator behavioral properties used to develop models which will have applicability, over operationally likely combinations of variables.

PERFORMING AGENCY: Systems Technology, Incorporated
 INVESTIGATOR: Jex, HR Allen, RW
 SPONSORING AGENCY: Department of the Air Force, 6570 Aerospace
 Medical Research, Laboratory BB, DF316510 F33615-73-C-4003

Contract

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
 COMPLETION DATE: June 1975 TOTAL FUNDS: \$8,945

ACKNOWLEDGMENT: Science Information Exchange (GQF316510 2)

07 099433**INVESTIGATION OF METHODS OF IMPROVING RAILROAD CREW VIGILANCE**

The objective of this effort is to conduct experimental studies of factors affecting the responses of railroad train crews to colored light signals. Two experiments will be performed in a locomotive cab mockup located at the U.S. Army Materials Research Agency in Watertown, Massachusetts. In the first experiment, the speed and accuracy of responses will be studied in situations where the subject is led to expect one signal and is unexpectedly presented with another, since false expectations are frequently involved in the causation of train accidents. In the second experiment, principles employed in current cab alerting techniques will be compared for effectiveness, including: two-man teams to detect signals, random versus regular alerting signals, and a constant warning time signal. The results of these experiments will be interpreted for implications for improvement in methods of maintaining alertness in locomotive cabs.

Funds for this project are administered by DOT/Transportation Systems Center, Cambridge, Mass.

PERFORMING AGENCY: Lawrence Johnson and Associates
 INVESTIGATOR: Jones, J (Tel 617-277-4200)
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Abernethy, C (Tel 617-494-2617)

Contract DOT-TSC-1010

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1975
 COMPLETION DATE: Oct. 1975 TOTAL FUNDS: \$40,000

ACKNOWLEDGMENT: FRA

08 025441

LOCOMOTIVE CRASH ATTENUATION DEVICE

The train-strikes-vehicle type accident accounts for about 75% of the 1,100 or more annual train-involved grade crossing fatalities. The chief victims of these accidents are passenger car occupants (85%), but infrequent train/bus collisions have been notable tragedies. The fatality producing mechanisms of these accidents—impact force, disintegration, penetration, and fire—can be reduced in severity by incorporating a cushioning device into the forward end of the train while other design features can lessen the tendency of the train to drag, penetrate, roll, or otherwise destroy the impacted vehicle. This task undertakes the analysis, development, fabrication and testing of a crash attenuation device for trains. The device must be effective for a major portion of fatality producing train-strikes-vehicle accidents and have the potential of being reasonably economical to manufacture and install. In addition, the device must be practical. Its use must be compatible with efficient railroad practice.

PERFORMING AGENCY: Transportation Systems Center
 INVESTIGATOR: Koplow, MD (Tel (617)494-2769)
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Levine, D (Tel 202-426-1227)

Contract PPA-RR-211 (CR)

STATUS: Completed NOTICE DATE: July 1975 START DATE: Feb. 1973 COMPLETION DATE: June 1975 TOTAL FUNDS: \$92,400

ACKNOWLEDGMENT: FRA

08 048500

CONTROLLED GRADE CROSSING IMPACT TESTS TO ESTABLISH BASELINE DATA ON TRAIN/AUTOMOBILE INTERACTIONS

It is the purpose of this procurement to establish the baseline data required for the evaluation of the effectiveness of planned locomotive attenuator devices.

PERFORMING AGENCY: Ultrasystems, Incorporated, Dynamic Science Division

SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-700 (CPFF)

STATUS: Active NOTICE DATE: July 1975 TOTAL FUNDS: \$158,553

ACKNOWLEDGMENT: TRAIS

08 049658

RAIL SAFETY/GRADE CROSSINGS PROTECTION

The program will consist of four major tasks: (1) Development of Application Guidelines for Train 'on board' conspicuity and impact attenuation devices. (2) Standardization of protection equipment will be emphasized including three related cost reduction objectives for production cost, maintenance cost and administrative cost. (3) Innovative System development will study new grade crossing protection concepts. (4) System Analysis will establish interadministration, state and railroad requirements for a data system to accommodate new FRA grade crossing inventory and other data.

PERFORMING AGENCY: Transportation Systems Center

INVESTIGATOR: Coulombre, RE (Tel 617-494-2449)

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D (Tel 202-426-1227)

PPA Contr. PPA-RR-X02

STATUS: Active NOTICE DATE: July 1975 START DATE: Sept. 1973

ACKNOWLEDGMENT: FRA

08 055561

INNOVATIVE RAILROAD-HIGHWAY GRADE CROSSING PROTECTION SYSTEM STUDY

The main objective of this effort is to synthesize and examine innovative concepts for an active grade crossing protection system that demonstrates application potential, effectiveness and significant cost reduction.

PERFORMING AGENCY: Cincinnati Electronics Corporation

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Votolato, AC (Tel 617-494-2190)

Contract DOT-TSC-841 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974 TOTAL FUNDS: \$38,718

ACKNOWLEDGMENT: TRAIS (PR# PTR-0001-GF)

08 055562

INNOVATIVE RAILROAD-HIGHWAY GRADE CROSSING PROTECTION SYSTEM STUDY

The intent of this study is to synthesize and analyze new and innovative techniques for the improvement of railroad-highway grade crossing safety.

PERFORMING AGENCY: Tracor Jitco, Incorporated

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Votolato, AC 832 (Tel 617-4942190)

Contract TSC-842 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974 TOTAL FUNDS: \$44,052

ACKNOWLEDGMENT: TRAIS

08 055566

STUDY STANDARDIZATION OF GRADE CROSSING PROTECTIVE SYSTEMS AND DEVICES

The purpose of this procurement is to study the economic and technical feasibility of modularization and standardization used to improve the effectiveness and reduce the costs of active grade crossing protection, and to develop the information and technology foundation from which guidelines can be generated governing all appropriate aspects of implementation of active grade crossing protection. The primary immediate goal is enhancement of the effectiveness and reduction of the costs of all aspects of active protection—hardware, installation, maintenance, engineering design, and administration.

PERFORMING AGENCY: Harmon Electronics, Division of Harmon I

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Kelleher, DJ 832 (Tel 617-4942144)

Contract TSC-869 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: \$54,201

ACKNOWLEDGMENT: TRAIS

08 055567

STUDY STANDARDIZATION OF GRADE CROSSING PROTECTIVE SYSTEMS AND DEVICES

The purpose of this procurement is to study the economic and technical feasibility of modularization and standardization used to improve the effectiveness and reduce the costs of active grade crossing protection, and to develop the information and technology foundation from which guidelines can be generated governing all appropriate aspects of implementation of active grade-crossing protection. The primary immediate goal is enhancement of the effectiveness and reduction of the costs of all aspects of active protection—hardware, installation, maintenance, engineering design, and administration.

PERFORMING AGENCY: Storch Engineers

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Votolato, AC 832 (Tel 617-4942190)

Contract TSC-870 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: \$70,944

ACKNOWLEDGMENT: TRAIS

08 058459

ON-BOARD LOCOMOTIVE/AUTO IMPACT TEST DEVICE

Develop a locomotive/auto impact test device to be evaluated in train-strikes-vehicle validation tests at the DOT High Speed Ground Test Site at Pueblo, Colorado. The development is part of TSC Grade Crossing Safety Research and Development sponsored by the Federal Railroad Administration, Office of RD&D, and is directed toward possible improvement in protection for automobile occupants during grade crossing accidents. The attenuator is also intended to decrease the possibility of train derailment due to automobile engine block entrapment under the locomotive.

PERFORMING AGENCY: Minicars, Incorporated

SPONSORING AGENCY: Transportation Systems Center, RR-502

Contract DOT-TSC-997 (CPFF)

STATUS: Active NOTICE DATE: June 1975 START DATE: Apr. 1975 COMPLETION DATE: Feb. 1976 TOTAL FUNDS: \$97,400

ACKNOWLEDGMENT: TRAIS (RR-502)

08 080333

HUMAN FACTORS IN COLLISIONS AT RAILWAY CROSSINGS

This study develops a behavioral analysis of automobile drivers at level crossings involving road and rail traffic, and will provide recommendations designed to reduce the incidence of level crossing accidents.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 7.5.74

INVESTIGATOR: Wilde, GJS

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific; Canadian Transport Commission; Queen's University, Canada

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1974

COMPLETION DATE: Apr. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

08 107636

RAILWAY ADVANCE WARNING SIGN

This project will produce and submit to the T&R committee a new diamond shape black and yellow sign indicating the road with the tracks at an angle, with a tab showing the number of tracks when their number is 2 and over, or any other alternatives. The study should cover 7 models: 90 degree angle and 60, 45 and 30 degree angles in rights and lefts. Full scale reflectorized signs, to be viewed by day or by night, should be submitted. The symbols to be used are somewhat similar to the ones shown on W-24R. /RTAC/

PERFORMING AGENCY: Roads and Transportation Association of Canada

INVESTIGATOR: Bourque, RJ

SPONSORING AGENCY: Roads and Transportation Association of Canada

STATUS: Active NOTICE DATE: July 1975 START DATE: 1968

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

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

INVESTIGATOR: Interrante, C (Tel 301-921-2997)

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

RESPONSIBLE INDIVIDUAL: Dancer, D (Tel (202)426-1227)

AR-40008

STATUS: Active NOTICE DATE: July 1975 START DATE: Sept. 1973
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: FRA

09 058484

WEAR AND FRACTURE CHARACTERISTICS OF CRITICAL COMPONENTS IN GROUND TRANSPORTATION SYSTEMS

Tasks include: 1-Determination of the properties of steels used in rails and rail couplings. 2-Modification and instrumentation of the existing roll-on-roll test facility in order to study wheel-on-rail wear and rolling contact fatigue. 3-Macrographic and micrographic wear studies on wheel-on-rail wear as a function of load, environment, speed and magnitude of tangential slip. 4-Perform metallurgical and wear analyses of at least 100 field samples of steels used in railroad wheels, rails, and rail couplings.

PERFORMING AGENCY: Syracuse University

INVESTIGATOR: Keller, DV

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Lauriente, M (Tel 202-4269364)

Contract DOT-OS-50124 (CS)

STATUS: Active NOTICE DATE: June 1975 START DATE: May 1975
COMPLETION DATE: May 1976 TOTAL FUNDS: \$73,142

ACKNOWLEDGMENT: TRAIS

09 080133

NAVY VEHICLE DESIGN AND CONSTRUCTION: COMPUTER AIDS FOR STRUCTURAL ANALYSIS AND DESIGN

The bulk of research in structures and structural mechanics is devoted to the mathematical modeling of complex physical systems and the development of mathematical procedures for manipulating such models. Research here is concerned with the computer-aided design environment, principally the representation and communication aspects of the design process, in order to make advances in structural analysis and optimization with advances in computer science. This study continues to explore new concepts and techniques to enhance the computer-aided analysis and design of structural systems, concentrating on those aspects which make the design environment more flexible, general, and economical. Specific projects to be studied deal with the representation of design information within a management information system, the decomposition of structural mechanics application programs into its constituent modules, and the development of a taxonomy to classify structural mechanics programs, with the eventual aim of combining existing modules into new program capabilities.

PERFORMING AGENCY: Carnegie-Mellon University, Department of Civil Engineering

INVESTIGATOR: Fenves, SJ

SPONSORING AGENCY: Office of Naval Research, DN223456 N00014-67-A-0314-001

Contract

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
COMPLETION DATE: June 1975 TOTAL FUNDS: \$20,000

ACKNOWLEDGMENT: Science Information Exchange (GQN223456 2)

09 104358

FIBER REINFORCED CONCRETE

Economical sophisticated mix designs involving different cementitious materials and properties are being developed for steel fiber reinforced concrete. Physical properties are being determined. A study of mixing, handling and placing procedures in construction size quantities is a part of the project as is continued observations of the completed field installations. Anchorage of the fibers to the matrix is being studied. /SIE/

PERFORMING AGENCY: United States Steel Corporation

INVESTIGATOR: Kesler, CE

SPONSORING AGENCY: Illinois University, Urbana

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: July 1972

ACKNOWLEDGMENT: Science Information Exchange (NIL 753 4)

09 104774

PROPERTIES AND PERFORMANCE OF CLEAR AND PIGMENTED COATINGS ON WOOD

An attempt is made to find which types of coatings have the best durability so that advice can be given to users and to determine which basic properties confer durability to assist in development of coatings with improved performance. Both natural and accelerated weathering are used in evaluation studies. Exterior exposures of clear finishes have been completed and a report prepared. Factory-coated sidings are being exposed in comparison with plastic materials. The results of the wood stabilization project are being assessed. Reports Issued: The Swelling of Wood in Polar Organic Solvents, H.E. Ashton, Wood Science, Vol. 6, No. 2, pp 159, 1973. Exterior Exposure Study of Stains and Clear Finishes, H.E. Ashton, Canadian Paint and Finishing, Vol. 48, 2, pp 12 (February 1974). Removal of Solvent From Swollen Wood, H.E. Ashton, Wood Science, Vol. 6, 4, pp 368 (April 1974).

PERFORMING AGENCY: National Research Council of Canada, Division of Building Research

INVESTIGATOR: Ashton, HE

SPONSORING AGENCY: National Research Council of Canada

STATUS: Active NOTICE DATE: July 1975 START DATE: 1954

ACKNOWLEDGMENT: National Research Council of Canada, Div Bldg Res

09 115951

CHEMICAL BASIS OF RESISTANCE OF WOODS TO MARINE BORER ATTACK

Naval wooden structures must be protected from marine borers. Improved borer control would afford substantial savings. A few tropical wood species are borer-resistant by reason of chemical properties; the objective is to determine the nature of the protectants in resistant species for synthesis and use as improved preservatives. The wood tissues are subjected to chemical separation techniques. Tissue extracts, chemical constituents of active extracts, and structurally related compounds are assayed for anti-borer and anti-fungal activity. The mode of action of active compounds on borer physiology is being sought.

PERFORMING AGENCY: Department of the Navy, Department of Defense

INVESTIGATOR: Bultman, JD

SPONSORING AGENCY: Department of the Navy, Department of Defense, DN320195

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (ZQN320195 1)

09 115952

INTERNATIONAL BIODETERIORATION PROGRAM

The use of present-day wood preserving treatments results in the introduction of some very toxic material into the marine environment. This project, the U.S. portion of an International Research Program, is to develop new, non-polluting natural and synthetic wood treatments that can be made available if the use of heavy metals and cresoste are prohibited to the Navy. 1. Test sites will be established in a variety of Marine environ-

ments, world-wide, and catalogue the endemic species of wood borers and wood-rot fungi, and determine where wood protection practices are required, and which will be most effective and economical. 2. Conduct screening tests of promising new wood treatments, and screen commercially available, naturally resistant woods contributed by member countries in this international program. 3. Attempts will be made to isolate the active constituents of resistant woods, and impregnate them into non-resistant, inexpensive timbers; thereby combining maximum durability and economy.

PERFORMING AGENCY: Department of the Navy, Department of Defense

INVESTIGATOR: Depalma, JR

SPONSORING AGENCY: Department of the Navy, Department of Defense, DN145005

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974

COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (ZQN145005 3)

10 045934

TRANSPORTATION NOISE ABATEMENT

U.S. Army Research Office, Durham, N.C. will provide engineering data on the performance of noise abatement techniques for rapid transit systems as outlined in the document entitled 'Work Statement—Transportation Noise Abatement'.

PERFORMING AGENCY: Army Research Office, Department of Defense

SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

RESPONSIBLE INDIVIDUAL: Skerber, S (Tel 617-494-2758)

IA DOT-RA-74-17

STATUS: Completed NOTICE DATE: July 1975 TOTAL

FUNDS: \$6,500

ACKNOWLEDGMENT: TRAIS

10 045983

RAPID TRANSIT NOISE ABATEMENT AND COST REQUIREMENTS

The purpose of this effort is to provide an engineering assessment and evaluation of the acoustic noise environment associated with the New York City Rail Transit System, and the determination of combinations of noise abatement techniques for reducing the existing noises environment to specific levels at minimum cost.

PERFORMING AGENCY: Polytechnic Institute of New York

SPONSORING AGENCY: Urban Mass Transportation Administration

Grant NY-11-0010

STATUS: Active NOTICE DATE: July 1975 START DATE: Nov. 1973

COMPLETION DATE: Dec. 1974 TOTAL FUNDS: \$70,000

ACKNOWLEDGMENT: UMTA (NY-11-0010)

10 048581

MAGNITUDE OF RAIL RAPID TRANSIT GENERATED NOISE ON THE CHICAGO TRANSIT AUTHORITY SYSTEM

The university will make an assessment and evaluation of the magnitude of rail rapid transit generated noise on the Chicago Transit Authority system. It will also study ways and means of abating such noise and the most cost effective techniques to use. This is one part of an overall UMTA program encompassing all cities with rail rapid transit. The Transportation Systems Center is providing technical direction on the program for UMTA. The effort will cover a 13 month period. Both track and station areas will be studied.

PERFORMING AGENCY: Illinois University, Chicago

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Hughes, PG (Tel 202-426-0080)

Grant IL-11-0007

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1974

COMPLETION DATE: Feb. 1975 TOTAL FUNDS: \$61,092

ACKNOWLEDGMENT: UMTA (IL-11-0007)

10 058462

ASSESSMENT OF RAILROAD LOCOMOTIVE NOISE

To date, most available data on railroad noise has been of the opportunity type with little emphasis on controlled parametric testing. The intent of this project is to determine under controlled locomotive operating conditions overall and major source component noise levels, the directivity and the propagation efficiency (level vs. distance) of locomotive noise, and the proper measuring techniques required to accurately assess overall and component noise levels from a typical locomotive.

PERFORMING AGENCY: Bolt, Beranek, and Newman, Incorporated

SPONSORING AGENCY: Transportation Systems Center, OS-507

Contract DOT-TSC-1016 (CPFF)

STATUS: Active NOTICE DATE: June 1975 START DATE: Apr. 1975

COMPLETION DATE: June 1976 TOTAL FUNDS: \$49,017

ACKNOWLEDGMENT: TRAIS (OS-507)

10 058621

RAILROAD RETARDER NOISE REDUCTION

A cooperative effort is planned between DOT (TSC), and the BN to collect, assess and disseminate information regarding the character of the noise environment associated with the operation of active retarders in railroad classification (hump) yards and also, to present in useful form information as how to reduce retarder noise locally and to surrounding communities by the use of noise barriers. Information will be obtained by a measurement, barrier construction and evaluation program to be conducted at the Northtown freight classification yard of the Burlington Northern Railroad, Fridley, Minnesota.

PERFORMING AGENCY: Burlington Northern, Incorporated

SPONSORING AGENCY: Transportation Systems Center, OS-507

Contract DOT-TSC-1035 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1975

COMPLETION DATE: May 1976 TOTAL FUNDS: \$69,150

ACKNOWLEDGMENT: TRAIS (OS-507)

10 071565

METHODS FOR ANALYSIS OF HYDROCARBONS IN MOBILE SOURCE EMISSIONS

Low levels of hydrocarbons expected in 1975-76 automobile exhaust present a problem for instruments and methods developed for higher present day levels. A comprehensive review and definition of hydrocarbon analysis and sample collection procedures is underway with a view toward defining interferences, linearity, and repeatability at the mandated exhaust concentrations.

PERFORMING AGENCY: Environmental Protection Agency, National Environmental Research Center

INVESTIGATOR: Sigsby, JE

SPONSORING AGENCY: Environmental Protection Agency, Office of Research and Development, 26 ACV 05 72P18333

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973

COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AO 18333 1)

10 071566

STUDY OF STRATEGY ALTERNATIVES FOR OXIDANT CONTROL IN THE LOS ANGELES AIR QUALITY REGION

Objectives: Assist EPA in screening strategy alternatives for oxidant controls in the Los Angeles Air Quality Region to facilitate selection of one of several strategies which are superior on the basis of cost and effectiveness. (2) Approach: A base line for emissions for both fixed and mobile sources will be defined for reference years 1975 and 1977. All currently implemented and mandated controlled devices will be included in computing the base line. The costs and effectiveness of various techniques for reducing the emission levels will be analyzed and compared. Techniques to be investigated will include additional stationary source control, additional mobile source emission control devices, public transportation alternatives to the private auto, and policy measures to reduce demand for private auto travel. Various optimum mixes of these tactics into promising strategies will be determined. These will include mixes optimized on cost and on various levels of effectiveness. Sensitivity of the evaluations of the strategies to differences in input data will be determined in an attempt to quantify the level of uncertainty of the evaluation. (3) Current Plan and/or Progress: The project has been staffed, and the data base is being assembled. Work has been initiated on modifications of existing analytical models for application to this project.

PERFORMING AGENCY: Rand Corporation

INVESTIGATOR: Goeller, B

SPONSORING AGENCY: Environmental Protection Agency, Office of Research and Development, 68-01-0475 72P20637

Contract

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973

COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AO 20637 1)

10 099381

RESEARCH ON URBAN TRANSPORT PLANNING METHODS AND ENVIRONMENTAL IMPACTS

The objective is to make the transportation planning methodology wider in scope in defining the costs and impacts of investments. Land use patterns are determined simultaneously with the transportation system and the ambient air quality is a function of the system's configuration, level of service, and modal distribution of demand. The planning techniques will be improved to include alterations to existing ambient air quality resulting from transportation network changes. The research will be conducted in three phases. The first will be a model for forecasting emissions. Emissions from stationary sources will be derived from patterns of land use and an inventory of point sources. Then a diffusion model to obtain macro level ambient air quality forecasts for zones will be developed. Both models will be calibrated for the Boston area which will be applicable to other urban areas. The final product will be a consistent planning model incorporating land use patterns as an endogenous variable, and predicting air quality.

PERFORMING AGENCY: Harvard University, Department of Economics

INVESTIGATOR: Ingram, GK

SPONSORING AGENCY: Office of the Secretary of Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Cooper, N

STATUS: Active NOTICE DATE: Aug. 1975 TOTAL FUNDS: \$123,588

ACKNOWLEDGMENT: DOT

10 099437

MEASUREMENT OF TOXIC SUBSTANCES IN TRAIN CREW ENVIRONMENTS

The objective of this effort is to obtain measurements of contaminants that may be present in the breathing environment of the crews of road-haul freight trains engaged in normal railroad operations. Data will be taken on at least five railroad routes to sample variations in air contaminants with respect to mode and location of operation. Measurements will be made of nitric oxide, nitrogen dioxide, carbon monoxide, total hydrocarbon, aldehydes, ozone and particulates. The measurements will be corre-

lated with salient features of engine performance, terrain and meteorological conditions. The results will be interpreted with respect to current air quality standards for implications for crew safety and wellbeing.

Funds for this project are administered by DOT/Transportation Systems Center, Cambridge, Mass.

PERFORMING AGENCY: Scott Environmental Technology, Incorporated

INVESTIGATOR: Souza, A (Tel 215-766-8861)

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Hobbs, J (Tel 617-494-2413)

Contract DOT-TSC-1071

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1975

COMPLETION DATE: Jan. 1975 TOTAL FUNDS: \$37,114

ACKNOWLEDGMENT: FRA

10 100807

ANALYSIS OF A NEW APPROACH FOR ENVIRONMENTAL POLICY EVALUATION

This project will study environmental policy issues related to six problem areas, in order to attempt the development of general methods for using pareto analysis as a means of evaluation the political feasibility of various decisions. These problems are: (1) control of urban air pollution-stationary sources; (2) control of air pollution-mobile sources; (3) environmental aspects of electric power plant siting; (4) residual management in land use planning; (5) control of urban fires; (6) urban solid waste management. /SIE/

PERFORMING AGENCY: Harvard University, School of Engineering and Applied Physical Research

INVESTIGATOR: Thomas, HA

SPONSORING AGENCY: National Science Foundation, Division of Engineering Systems and Research, GI-35117A #3

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974

COMPLETION DATE: July 1975 TOTAL FUNDS: \$303,100

ACKNOWLEDGMENT: Science Information Exchange (GSQ 331 2)

11 038789

TRACKED AIR CUSHION RESEARCH VEHICLE, PHASE V, TEST
The TACRV Phase V Test Operations Program will be implemented and conducted in the conformance with Grumman Report PMT-B4-R72-6 TACRV Phase V Test Operations Plan. Effort will be required at DOT's High Speed Ground Test Center and Grumman, Bethpage to satisfy the various activities associated with TACRV test operations. The TACRV Test Operations Program consists of the following tasks: Test Operations-HSGTC, Test Operations-Bethpage, Ingress/Egress System Design, Fabrication and Installation,

PERFORMING AGENCY: Grumman Aerospace Corporation
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Lampros, AF RA-41 (Tel 202-4269564)

Contract FR-30041 (CPFF)
STATUS: Active NOTICE DATE: July 1975 START DATE: Feb. 1973
COMPLETION DATE: June 1977 TOTAL FUNDS: \$2,806,716

ACKNOWLEDGMENT: TRAIS

11 048879

ANALYSIS OF UT NEEDS WITH PARTICULAR EMPHASIS ON PRT SYSTEMS

The primary objective of this effort is to develop and describe the most appropriate role for PRT systems within the overall U.S. transportation system with particular consideration given to the 1985 and 2000 time periods.

PERFORMING AGENCY: Johns Hopkins University, Baltimore
SPONSORING AGENCY: Urban Mass Transportation Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Herringer, FC (Tel 202-426-4040)

Grant DOT-MD-11-0001-00
STATUS: Active NOTICE DATE: July 1974 START DATE: Apr. 1974
COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$82,710

ACKNOWLEDGMENT: TRAIS (MD-11-0001-00)

11 048918

TRACKED MAGNETICALLY LEVITATED VEHICLE TECHNOLOGY PROGRAM

A conceptual design shall be made of the total suspension and associated guideway for an 80-passenger vehicle which will satisfy the vertical and lateral ride quality specifications of Appendix A at all speeds below 300 mph. The primary suspension shall consist of superconducting coils acting on conductors.

PERFORMING AGENCY: Ford Motor Company
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Wilson, WW (Tel 202-426-0872)

Contract DOT-FR-40024 (CPFF)
STATUS: Active NOTICE DATE: July 1975 START DATE: May 1974
COMPLETION DATE: July 1975 TOTAL FUNDS: \$2,133,866

ACKNOWLEDGMENT: FRA

11 048919

EXPERIMENTS IN GUIDEWAY LEVITATION VEHICLE INTERACTION DYNAMICS

The Contractor shall furnish all necessary qualified personnel, facilities, materials, and such other services required to construct and test experimental models of various guideways and vehicles. Primary attention will be on beam type guideways of multiple spans and the Tracked Levitated Research Vehicle (TLRV) and the Prototype Tracked Air Cushion Vehicle (PTACV). Results of the test will be analyzed using the latest computer techniques and will be compared where available to theoretical computations.

PERFORMING AGENCY: Duke University, School of Engineering
INVESTIGATOR: Wilson, JF (Tel (919)684-2434)
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: McCafferty, RMM (Tel (202)426-4377)

Contract DOT-FR-44098
STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
COMPLETION DATE: Nov. 1975 TOTAL FUNDS: \$35,000

ACKNOWLEDGMENT: FRA

11 055786

A STUDY OF PRT VEHICLE CRASHWORTHINESS

The purpose of this contract is to obtain the engineering data required to delineate the particular crashworthiness requirements for the PRT-3 vehicle.

PERFORMING AGENCY: Northeastern University
SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-750 (CR)
STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1974
COMPLETION DATE: June 1975 TOTAL FUNDS: \$24,836

ACKNOWLEDGMENT: TRAIS (PR # TMP-0199)

11 058271

NUMERICAL ANALYSIS METHOD FOR LINEAR INDUCTION MOTORS

The principal objective of this project is to develop an accurate mathematical model of the linear induction motor. Model is correlated with available test data and other available mathematical models. The model being developed is the most general and postulates realistic, 3-dimensional, finite-iron motors. Another important part of this inter-agency agreement is the application of the model to on-going hardware projects of interest to FRA.

PERFORMING AGENCY: Jet Propulsion Laboratory, California Institute of Technology
INVESTIGATOR: Elliott, DG (Tel 213-354-3486)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Guarino, M (Tel 202-426-9564)

DOT-AR-30006
STATUS: Active NOTICE DATE: July 1975 START DATE: Sept. 1972
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: FRA

11 058272

TESTING OF ADVANCED POWER CONDITIONING UNIT (PCU) AND LINEAR INDUCTION MOTOR (LIM) PRESENTLY INSTALLED IN THE TLRV (TRACKED LEVITATED RESEARCH VEHICLE)

Testing of an advanced PCU and LIM on available guideway and 8.25 kV wayside power at the Transportation Test Center (TTC). The PCU may be used with rotary squirrel-cage motors on conventional railroads, as well as for LIMs on non-conventional transportation systems. The PCU is more powerful than the electric drive of any existing locomotives, and features variable-voltage, variable-frequency, a high power-to-weight ratio, and a high-power-to-volume ratio. The advanced features of the PCU are made possible by the use of a synchronous condenser and water cooling system. The PCU and LIM will undergo shakedown and low-speed tests through June 1976.

PERFORMING AGENCY: AiResearch Manufacturing Company
INVESTIGATOR: Kalman, G (Tel 213-323-9500)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Guarino, M (Tel 202-426-9564)

Contract DOT-FR-40016
STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1974
COMPLETION DATE: June 1977

ACKNOWLEDGMENT: FRA

11 058273

EVALUATION OF ELECTRICAL PROPULSION BY MEANS OF IRON-CORED SYNCHRONOUSLY OPERATING LINEAR MOTORS

This project constitutes the initial research phase of synchronous linear motors for transportation. The motors considered are restricted to those having both the excitation and armature windings on the same structure, i.e., on board the vehicle. The primary objectives are to determine the feasibility of two types (the homopolar inductor and the claw-pole) for propulsion of railroad vehicles, and to establish a basis for further exploratory R&D on a test wheel. The aim is to develop an alternate to the

present linear induction motor, with the potential for higher efficiency and power factor, larger clearances with the reaction rail, and useful attraction and guidance forces to inhibit vehicle derailment.

PERFORMING AGENCY: Polytechnic Institute of New York
 INVESTIGATOR: Levi, E (Tel 212-643-4486)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Guarino, M (Tel 202-426-9564)
 STATUS: Active NOTICE DATE: July 1975 START DATE: Apr. 1973
 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: FRA

11 058274

TEST PROGRAM ON THE LINEAR INDUCTION MOTOR RESEARCH VEHICLE (LIMRV)

The primary objective of this test program is to obtain essential test data on linear induction motors and on truck/rail dynamics, as well as correlation of this data with theory and mathematical models. The LIMRV is considered an important testbed because of its unique instrumentation and speed range. The LIMRV has established a world speed record for steel-wheel on steel-rail vehicles of 411.5 km/h.

PERFORMING AGENCY: AiResearch Manufacturing Company
 INVESTIGATOR: D'Sena, G (Tel 213-323-9500)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: Guarino, M (Tel 202-426-9564)

Contract DOT-FR-40016
 STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1973
 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: FRA

11 058338

PERSONAL RAPID TRANSIT (PRT) TECHNOLOGY

Participate in technical review meetings and perform specific studies in areas including (1) Guideway Structures; (2) Site Related Studies; (3) Acoustic Noise; (4) Mechanical Structures; and (5) Architectural and Engineering Specifications.

PERFORMING AGENCY: Mitre Corporation
 SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-50016/4 (CPFF)
 STATUS: Active NOTICE DATE: Apr. 1975 START DATE: June 1974
 COMPLETION DATE: May 1975 TOTAL FUNDS: \$150,000

ACKNOWLEDGMENT: UMTA

11 058355

DEVELOP DESIGN PARAMETER CONSTRAINTS FOR ELEVATED PERSONAL RAPID TRANSIT (PRT) GUIDEWAYS

Performance measures to be considered are stability, acceleration, rate of change of acceleration, guideway roughness, and guideway deflection. The system parameters to be varied include dimensionless quantities representative of vehicle speed, guideway mass and stiffness, guideway camber, guideway boundary conditions and curvature, and vehicle suspension characteristics. Computations will be made to determine the acceptability of preliminary PRT vehicle concepts in terms of stability, passenger comfort and guideway roughness and flexibility.

PERFORMING AGENCY: California University, Los Angeles
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

Contract OS-40080 (CS)
 STATUS: Active NOTICE DATE: July 1975 START DATE: Apr. 1974
 COMPLETION DATE: May 1975 TOTAL FUNDS: \$92,506

ACKNOWLEDGMENT: Office of Systems Development and Technology

11 058375

MORGANTOWN PRT IMPACT EVALUATION

The study will consist of the pre-PRT stage prior to the revenue operation of the system and the post-PRT stage, after the system has been placed into revenue service, with the following objectives: 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 of the people in the community toward the system, e. to measure the impact of PRT upon: travel and traffic, the economy, the society, and the environment in the PRT corridor, f. to create a methodology for extrapolation of the results.

PERFORMING AGENCY: West Virginia University
 SPONSORING AGENCY: Transportation Systems Center, UM-505

Contract DOT-TSC-985
 STATUS: Active NOTICE DATE: June 1975 START DATE: Feb. 1975
 COMPLETION DATE: Mar. 1976 TOTAL FUNDS: \$110,097

ACKNOWLEDGMENT: TSC (UM-505)

11 058378

LONGITUDINAL CONTROL SYSTEM DESIGN SUMMARY

Provide a report documenting the Morgantown Phase IB LCS design effort. The report shall contain the following elements: a. General System Description—Provide a general description of the longitudinal control system elements and operation of the overall system. b. Phase IB Design Task Requirements—Describe the requirements on the system and the resulting design, analysis and development test program undertaken to meet these requirements. c. Analysis and Test Results—Describe the major analysis and test results obtained, emphasizing the major problem areas encountered and the solutions to these problems. d. Analytical Model—Provide a detailed description of the analytical model developed during the design effort.

PERFORMING AGENCY: Boeing Company, Aerospace Group
 SPONSORING AGENCY: Transportation Systems Center, UM-533
 RESPONSIBLE INDIVIDUAL: Van Meter, D

Contract DOT-TSC-994 (CPFF)
 STATUS: Active NOTICE DATE: July 1975 START DATE: Mar. 1975
 COMPLETION DATE: Nov. 1975 TOTAL FUNDS: \$10,344

ACKNOWLEDGMENT: TSC (UM-533)

11 058429

TESTING OF THE PROTOTYPE TRACKED AIR CUSHION VEHICLE AT THE TRANSPORTATION TEST CENTER

Perform the maximum number of specific tests feasible within the funding limitations of this contract. The contractor shall utilize his best efforts to decrease the number of tests required by eliminating incremental speed tests wherever it appears advisable to do so.

PERFORMING AGENCY: Rohr Corporation
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Mitchell, MB (Tel 202-426-0966)

Contract DOT-FR-54089 (CPFF)
 STATUS: Active NOTICE DATE: June 1975 START DATE: Feb. 1975
 COMPLETION DATE: Sept. 1975 TOTAL FUNDS: \$550,000

ACKNOWLEDGMENT: TRAIS (4089-4)

11 058512

RIDE QUALITY STUDIES ON GROUND-BASED TRANSPORTATION SYSTEMS

Objectives are: (1) To measure and record sufficient acceleration and vibration data to provide a description of the characteristic ride motions of the Dallas/Fort Worth (DFW) Airport AIRTRANS vehicles and to allow the development of mathematical models of the vehicles and the validation of these models; (2) To develop vehicle dynamics models for the AIRTRANS vehicle(s) and to study the effects of the steering arm and power collector motor inputs on the vehicles' dynamic behaviors; and (3) To identify the analysis techniques and to prepare the computer programs required for the correlation of the measured vehicle ride motions and the subjective responses of passengers.

PERFORMING AGENCY: Texas University
 INVESTIGATOR: Healey, AJ
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Sussman, ED

Contract DOT-OS-50126 (CS)
 STATUS: Active NOTICE DATE: July 1975 START DATE: June 1975
 COMPLETION DATE: June 1976 TOTAL FUNDS: \$40,000

ACKNOWLEDGMENT: TRAIS (PUR-50185)

11 058619

TECHNICAL STUDIES FOR HIGH PERFORMANCE PERSONAL RAPID TRANSIT (HPPRT) SYSTEM DEVELOPMENT PROGRAM
Studies will be performed in areas related to HPPRT system reliability, maintainability and availability requirements.

PERFORMING AGENCY: Smith (Frank C.) and Associates
SPONSORING AGENCY: Urban Mass Transportation Administration, TX-06-0016

RESPONSIBLE INDIVIDUAL: Hamm, J (Tel 202-4269264)

Contract TX-06-0016

STATUS: Active NOTICE DATE: July 1975 START DATE: Apr. 1975
COMPLETION DATE: Oct. 1975 TOTAL FUNDS: \$19,800

ACKNOWLEDGMENT: TRAIS (TX-06-0016)

11 099406**DYNAMICS OF TRACKED LEVITATED VEHICLE SUSPENSIONS**

The main objective is to undertake analytical and experimental research concerning the dynamics of suspensions applicable to two forms of tracked levitated guided ground transportation systems: A. Ferromagnetic Suspensions Research: (attractive)-1. Specific experimental magnet dimensions based on inputting estimated ICTS characteristics into existing analytical model. 2. Design of magnet, magnet test platform, inverter controllers and instrumentation. 3. Construction of test apparatus. 4. Debugging test apparatus and commissioning on UTIAS heave table. 5. Testing on heave table and analysis of results. 6. Documentation and reporting results. The final report of the above system is being prepared. B. Flexible-skirt TACV Suspension Research:-1. Static and dynamic testing of hinged-lip model. 2. Construction of large open-loop skirt models. 3. Static and dynamic testing of open-loop skirt models. 4. Completion of nonlinear analytical model and calibration using experimental test results. 5. Documentation and reporting results.

PERFORMING AGENCY: Toronto University
INVESTIGATOR: Slemon, G (Tel 416-928-3117) Sullivan, PA (Tel 416-667-7711)

SPONSORING AGENCY: Transportation Development Agency
RESPONSIBLE INDIVIDUAL: Eggleton, P (Tel 514-283-4077)

Contract MOT-99025

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: July 1974
COMPLETION DATE: Jan. 1975 TOTAL FUNDS: \$82,500

ACKNOWLEDGMENT: Transportation Development Agency

11 099412**LINEAR INDUCTION MOTOR COMPARATIVE ANALYSIS**

To carry out theoretical and experimental research into linear induction Motors (LIM's). The objectives are: 1) To review, understand, and quan-

tify the basic differences between the predictive models of a LIM developed by various researchers worldwide with particular emphasis on the influence of compensating windings to improve motor performance. 2) To study and quantify end effects for single and double sided LIM's. 3) To investigate and quantify through experimentation the effects of compensating windings with respect to energy consumption, efficiency and economic viability when used in a practical vehicle configuration. 4) To formulate a predictive analytical model based upon the world knowledge to date, and the experience gained during this work, and then verify the model experimentally.

PERFORMING AGENCY: Centre de Recherches des Transports, Montreal University

INVESTIGATOR: Mukhedkar, D (Tel 513-343-7575)

SPONSORING AGENCY: Transportation Development Agency
RESPONSIBLE INDIVIDUAL: Rudback, NE (Tel 514-283-4077)

Contract

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Dec. 1974
COMPLETION DATE: June 1976 TOTAL FUNDS: \$17,320

ACKNOWLEDGMENT: Transportation Development Agency

11 110862**MAGNETIC LEVITATION STUDY**

The study is concerned with non-contact suspension and propulsion for 300 mph interurban transportation. Magnetic levitation is produced by the repulsive interaction between superconducting magnets on a moving vehicle and the eddy currents induced in guideway mounted aluminum conductors. Propulsion is by a linear synchronous motor which also uses vehicle mounted superconducting magnets and energised guideway coils. A 25 ft diameter rotating wheel test facility has been built in Kingston to test full scale levitation and propulsion magnets. Vehicle characteristics and guideway configurations are being analysed. Theoretical and experimental studies of magnetic lift, drag and guidance forces and the linear synchronous motor are in progress. The Canadian study complements U.S. D.O.T. sponsored studies and there is also a technical information exchange agreement with Germany. /RATAOC/

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, TDA07

INVESTIGATOR: Atherton, DL Bennett, J Slemon, GR Robertson, SD Dawson, GE Burke, PE John, VI

SPONSORING AGENCY: Transportation Development Agency; National Research Council of Canada

STATUS: Active NOTICE DATE: July 1975 START DATE: Oct. 1971
COMPLETION DATE: Oct. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

12 045276

DEVELOP A TRANSPORTATION SAFETY PROGRAM COORDINATION INFORMATION CENTER REPORT

The system would include reporting by agencies, with the objective of allowing the Office of Safety Program Coordination to: 1. Summarize number and rates of fatalities, injuries, accidents, as well as hazards, risks and causes of accidents identified with each mode of transportation on a periodic basis. 2. Identify from DOT sources, catastrophies, severe accidents emerging hazards and risks on a quick response basis for coordinative purposes. 3. Focus on information regarding the progress made by each transportation mode's safety program toward hazard identification, accident cause perception, and action toward reduction of risks.

PERFORMING AGENCY: Planning Technology, Incorporated
SPONSORING AGENCY: Office of Environment, Safety and Urban Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Vargo, TH TAD-432 (Tel 202-4269745)

Contract OS-20216

STATUS: Active NOTICE DATE: July 1975 TOTAL FUNDS: \$49,984

ACKNOWLEDGMENT: Office of Environment, Safety and Urban Affairs

12 045986

JOB KNOWLEDGE REQUIREMENTS

The contractor shall supply the necessary facilities, services, materials and personnel to perform the work specified as follows: For the jobs of locomotive engineer, train dispatcher, front-end brakeman rear-end brakeman/flagman and conductor, prepare: Item 1. A statement of this minimum job knowledge requirements for the safe performance of duties. Item 2. A statement of the minimum job skill requirements for the safe performance of duties. Item 3. A statement of the minimum training requirements for the safe performance of duties Item 4. A proposed written test of the job knowledge required in Item 1. Item 5. Proposed proficiency checks as tests of the jobs skills required in Item 2.

REFERENCES:

Proposed Qualification Requirements for Selected Railroad Jobs, Hale, A; Jacobs, HH, National Technical Information Serv, Springfield, Va., 21161, FRA-OR&D-75-44, May 1975

PERFORMING AGENCY: Dunlap and Associates, Incorporated
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Votolato, AC 832 (Tel 617-4942190)

STATUS: Completed NOTICE DATE: July 1975 START DATE: Jan. 1971 COMPLETION DATE: May 1975 TOTAL FUNDS: \$51,594

ACKNOWLEDGMENT: TRAIS

12 048571

RAIL SAFETY/EQUIPMENT

This project seeks the improvement of railroad safety and efficiency by providing a technological basis for improvement and possible regulation in rail vehicle crashworthiness, inspection of equipment, surveillance of equipment, and other important areas.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Lavery, AL (Tel 617-4942040)
SPONSORING AGENCY: Federal Railroad Administration

PPA Contr. PPA-RR-X14

STATUS: Active NOTICE DATE: July 1975 START DATE: Sept. 1973 TOTAL FUNDS: \$1,093,500

ACKNOWLEDGMENT: FRA

12 048655

OBSERVATIONAL PROGRAMS

The U.S. Atomic Energy Commission shall perform or have performed observational programs for surveillance of radioactive materials in transportation.

PERFORMING AGENCY: Atomic Energy Commission, Division of Headquar
INVESTIGATOR: Barker, LI
SPONSORING AGENCY: Office of Environment, Safety and Consumer Affairs, Department of Transportation

RESPONSIBLE INDIVIDUAL: Grella, AW TES-22 (Tel 202-4262311)

IA AS-40035

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Feb. 1974 TOTAL FUNDS: \$30,000

ACKNOWLEDGMENT: TRAIS

12 048790

STUDY OF THE PHYSICAL PARAMETERS OF TRANSPORTATION ACCIDENTS

This study will involve a literature data search of the various information which now exists with regard to the physical forces and parameters involved in transportation accidents. The study will analyze this data and develop accident damage test criteria to represent those accident conditions.

PERFORMING AGENCY: Atomic Energy Commission
SPONSORING AGENCY: Office of Environment, Safety and Consumer Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Grella, AW TSA-22 (Tel 202-4262311)

IA AS-20071

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1972 TOTAL FUNDS: \$65,000

ACKNOWLEDGMENT: TRAIS

12 048905

FACTORS AFFECTING RAILROAD CREW VIGILANCE

The objective of this procurement was to conduct experimental studies of factors related to the maintenance of alertness in railroad train crews. Experiments were performed in a locomotive cab mockup located at the U. S. Army Materials Research Agency in Watertown, Massachusetts. Subjects were required to make manual responses to colored light signals infrequently presented during an otherwise uneventful run of several hours. Brain waves, muscle potentials, eye movements body movements, and reaction times were recorded and correlated with incidents of missed signals or wrong responses in a search for indices of loss of attention. Although the measures studied have been of value as criteria in previous laboratory studies, the results failed to reveal any physiological or behavioural indices of attention loss readily applicable to in-cab monitoring and alerting systems.

PERFORMING AGENCY: Johnson (Lawrence) and Associates
SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Votolato, AC (Tel 617-494-2190)

Contract DOT-TSC-817 (CPFF)

STATUS: Completed NOTICE DATE: July 1975 START DATE: June 1974 COMPLETION DATE: Mar. 1975 TOTAL FUNDS: \$21,477

ACKNOWLEDGMENT: TSC

12 048924

STUDY OF CURRENT STATUS OF TRANSPORTATION SAFETY RESEARCH AND DEVELOPMENT

The objective of this task is to determine the current status of transportation safety R&D by analyzing, reviewing, critiquing and/or performing pertinent studies in the field. Three study areas have been identified: analysis and critique of causal factor studies; analysis and critique of cost/benefit studies, and an investigation of the impacts of R&D innovations. The results of these determinations will be used as inputs to subsequent efforts aimed at maximizing the return on the safety R&D investment and to indicate avenues for future safety related R&D efforts.

PERFORMING AGENCY: Science Management Corporation
SPONSORING AGENCY: Transportation Systems Center

Contract TSC-860 (CPFF)

STATUS: Active 750 NOTICE DATE: 197 START DATE: June 1974 TOTAL FUNDS: \$35,260

ACKNOWLEDGMENT: TRAIS

12 048967

OPTIMIZATION OF AUDIBLE WARNING DEVICES

The objective of this contract is to maximize effectiveness and minimize annoyance of motor and railroad carrier emergency audible warning signals. The requirements for both urban and suburban areas will be investigated.

PERFORMING AGENCY: Society of Automotive Engineers
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel 617-494-2144)

Contract DOT-TSC-868

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974

COMPLETION DATE: June 1975 TOTAL FUNDS: \$99,000

ACKNOWLEDGMENT: TRAIS

12 048973

STUDY THE DYNAMICS OF TRAIN REAR-END COLLISION ACCIDENTS

It is the purpose of this contract to establish the preliminary baseline data, through the medium of controlled train impacts, required to study the dynamics of train rear end collision accidents.

PERFORMING AGENCY: Ultrasystems, Incorporated, Dynamic Science Divi

SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Kelleher, DJ 832 (Tel 617-4942144)

Contract TSC-840 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974

COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$520,679

ACKNOWLEDGMENT: TRAIS

12 050004

TRANSPORTATION OF WATERBORNE HAZARDOUS MATERIALS IN THE WEST GULF COASTAL REGIONS OF TEXAS: ECONOMIC CONSIDERATIONS OF THE RISK INVOLVED

To develop a systematic approach to the evaluation of the risk involved in transporting waterborne hazardous materials in the coastal region of Texas: (a) To determine the present and projected movement of hazardous materials on the waterways of the coastal region, by commodity classification and type of transportation equipment used in the movement. (b) To determine the historical accident experience (from 1960) of water transport bulk cargo vessels (barge and ship) by principal commodity carried on Texas coastal region waterways. (c) To estimate the amount of spill involved in each of the accidents identified. (d) To estimate the economic cost of these accidents to society. (e) To develop methodology for determining accident potential for selected waterways, specific sites (e.g. bridges and curves), type of vessel and type of commodities transported. The results of this study will be applicable to establishing safety standards for the transport of hazardous materials on Texas Coastal Waterways; providing shippers with estimates of risk involved in moving hazardous materials on the coastal waterways; establishing priorities for the allocation of funds for safety improvement in Texas coastal waterways; identifying cargos and vessels most subject to accidents; and establishing estimates of total cost of waterborne hazardous materials transportation accidents in Texas coastal waterways.

Related project: R/Eq-1.

PERFORMING AGENCY: Texas A&M University
INVESTIGATOR: Richards, HA Dresser, GB Bridges, GS
SPONSORING AGENCY: National Oceanic and Atmospheric Administration, Sea Grant Office, Department of Commerce, R/CRM-3

Grant 04-3-158-18

STATUS: Active NOTICE DATE: May 1975 COMPLETION DATE: June 1975 TOTAL FUNDS: \$20,475

ACKNOWLEDGMENT: National Oceanic and Atmospheric Administration

12 054567

RAILROAD TANK CAR SAFETY VALVE TEST PROGRAM

This program is being accomplished under the area of technology transfer in the AFRPL Rocket Propulsion Plan. This AFRPL conducted program will provide data required by the Federal Railroad Administration of the Department of Transportation in their job of seeking means to improve

railroad tank car safety in accidents. The object of this program is to determine the relief and flow characteristics of class DOT-112A tank car safety relief valves. The program consists of four basis phases. The first phase of effort in this program is the analysis phase, and will define the most appropriate way to measure the performance of the relief valves. The second phase is system build-up. The third phase is valve testing and the last phase is preparation of the final report. Under the analysis phase additional ways to accomplish steady state and blowdown tests of saturated and superheated propane will be evaluated. The instrumentation needed to obtain flow data will be investigated and an instrumentation list compiled for each approach. Each test approach will be analyzed for the capability to expand to test larger valves at a future date. Specific equipment and materials needed will be determined for each test approach. The third phase of the program will be to test the relief valves in water. GN2 and propane in accordance with approved procedures resulting from phase I. The first test to be run will be a proof test of the propane tank at one and one-half times the tank maximum working pressure of 500 psi. The nitrogen and water flow tests, to be run next, will check out the flow measurement capabilities of the system and provide flow data for the test values. These tests will also calibrate the epoxy flow nozzles used for flow measurement. Data from the nitrogen and water tests will be correlated with other data generated for these types of valves and will also serve as a baseline for comparison of known fluids with propane. The cracking and reseal pressures of the test valves will also be determined. The propane flow tests will then be conducted. These tests will be conducted with saturated vapor, as well as saturated liquid which will flash through the valves. Flow rates for the valves will be determined for various pressures from cracking pressure of approximately 280 psig to 475 psig. The final item to be accomplished in the program will be to write a final report.

PERFORMING AGENCY: Department of the Air Force, Rocket Propulsion Laboratory

INVESTIGATOR: Silver, R

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development, DF342540

RESPONSIBLE INDIVIDUAL: Dancer, D (Tel (202)426-1227)

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973

COMPLETION DATE: Dec. 1975

ACKNOWLEDGMENT: Science Information Exchange (ZQF342540 1)

12 055784

TOXICOLOGICAL AND SKIN CORROSION TESTS ON HAZARDOUS MATERIALS

Toxicological data are inadequate for classifying certain of the materials being transported. The work is to verify further the suitability of proposed transportation health hazards classification criteria and to permit classification of additional materials according to these proposed criteria.

PERFORMING AGENCY: Department of Air Force, Toxic Hazards Divisi

SPONSORING AGENCY: Office of Environment, Safety and Consumer Affairs, Department of Transportation

RESPONSIBLE INDIVIDUAL: Harton, EE TES-22 (Tel 202-4262311)

IA AS-40079

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1974

COMPLETION DATE: Sept. 1975 TOTAL FUNDS: \$54,880

ACKNOWLEDGMENT: Office of Environment, Safety and Consumer Affairs

12 058266

RAILROAD TANK CAR FIRE PROGRAM

The objectives of this task are to (1) perform laboratory scale fire tests to evaluate the effectiveness of coatings in providing fire protection for tank cars and (2) develop analytical models of pool and torch fires.

PERFORMING AGENCY: Ames Research Center, National Aeronautics and Space Administration

INVESTIGATOR: Mansfield, J (Tel 415-965-5991)

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

RESPONSIBLE INDIVIDUAL: Dancer, D (Tel (202)426-1227)

AR-30033

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1973

COMPLETION DATE: Dec. 1976

ACKNOWLEDGMENT: FRA

12 058268

HAZARDOUS MATERIAL RAILROAD TANK CAR TORCHING STUDY

The objectives of this task are to (a) construct a facility which would enable the flow structure and properties of a burning jet to be characterized and (b) design and conduct a series of torch tests to evaluate the ability of railroad tank cars to withstand the effects of torching with and without insulation.

PERFORMING AGENCY: Ballistic Research Laboratory

INVESTIGATOR: Townsend, W (Tel 301-272-3979)

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

RESPONSIBLE INDIVIDUAL: Dancer, D (Tel 202-426-1227)

Ar-44061

STATUS: Active NOTICE DATE: July 1975 START DATE: Feb. 1974

COMPLETION DATE: Sept. 1976

ACKNOWLEDGMENT: FRA

12 058482

A FIELD COMPARISON OF STANDARD EMERGENCY-VEHICLE SIGNALS WITH A SEQUENTIALLY-FIRED FLASH TUBE ARRAY

Determine experimentally the relative visibility and informational content in actual field environments of several of the more commonly used emergency vehicle warning and signal systems. The visibility of these systems shall be compared in a variety of atmospheric conditions including rain, fog, snow, and clear conditions during the day and at night. Research will be performed on a light signal system based on phi-effect perception between adjacent gas discharge flash tubes. The optimum coding of information by such a device shall be experimentally determined and the performance of the system compared in effectiveness with present standard signals.

PERFORMING AGENCY: South Dakota University

INVESTIGATOR: Berkhout, J

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: McGuire, CW (Tel 202-4264468)

Contract DOT-OS-50121 (CS)

STATUS: Active NOTICE DATE: June 1975 START DATE: June 1975

COMPLETION DATE: June 1976 TOTAL FUNDS: \$27,057

ACKNOWLEDGMENT: TRAIS

12 071567

CAUSAL FACTORS IN ACCIDENTS

Efforts to analyze industrial accidents for the purpose of defining primary and contributing causes, either psychological or non-psychological in nature, suffer a number of shortcomings. Routine accident investigations and reports acknowledge little more than the agent which was the source of injury and the extent of injury. If personal faults are noted, there is no indication as to what led to these human errors. This project intends, via contract, to develop a plan for more completely probing work accidents and "near misses" for better clarifying the human, machine, and environmental factors which singly or in combination were responsible for the real or near mishap. It further plans to employ this technique on a prospective basis in analyzing the basis for accidents or "near misses" involving certain high risk job operations (e.g., use of powered trucks in materials handling) or certain types of injuries (e.g.g, falls, burns). The project is expected to yield information bearing on (a) improved accident investigation and reporting procedures, (b) proportion of accidents or "near misses" due to primary human vs. machine vs. environmental causes and underlying considerations, and (c) suggestions for improved preventative measures in light of the causes so identified.

PERFORMING AGENCY: Department of Health, Education and Welfare, Center for Disease Control

INVESTIGATOR: Cohen, A Margolis, B Cohen, H

SPONSORING AGENCY: Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, 436-230-01; National Inst for Occupational Safety and Health

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973

COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AS 452)

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 14 Phases. Phase 08, Reduced Scale Model Studies and Phase 13, Head Shield Study are completed. The other phases, on which work is continuing, are the following: Phase 01—Accident Review; Phase 02—Accident Data Analysis; Phase 03—Material Study; Phase 04—Literature Review; Phase 05—Head Study; Phase 06—Safety Valve in Liquid Study; Phase 07—Safety Relief Devices; Phase 09—Design Study, Tanks and Attachments; Phase 10—Design Study, Car; Phase 11—Thermal Effects Studies; Phase 12—Vessel Failure Research; Phase 14—Stub Sill Car Buckling study. A new phase is being added—"Switchyard Impact Tests.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

INVESTIGATOR: Phillips, EA (Tel 312-225-9600 Ext 863)

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 312-225-9600 Ext 863)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1970

COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

12 099389

RAIL VEHICLE SAFETY RESEARCH PROGRAM

This program has as its objectives: (1) Increase the safety of hazardous material tank cars; (2) Decrease number and severity of accidents caused by vehicle component failures; (3) Decrease the number of accidents caused by human error; (4) Reduce the number and severity of grade crossing accidents; (5) Improve communication and control systems. Torch and relief valve test facilities have been completed and used for the on-going hazardous material tank car project. On-board automatic inspection and monitoring systems are being developed as a means of component failure prevention. Development of cab and train handling simulator as part of the human factors project began late in FY 75. Modularized grade crossing equipment has been developed under the grade crossing safety project, which started in early FY 75.

PERFORMING AGENCY: Federal Railroad Administration, Rail Safety Research Office

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

RESPONSIBLE INDIVIDUAL: Peterson, LA (Tel 202-426-2965)

STATUS: Active NOTICE DATE: Aug. 1975

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.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Labor Organizations

RESPONSIBLE INDIVIDUAL: Hawthorne, KL (Tel 312-225-9600)

STATUS: Active NOTICE DATE: Aug. 1975 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 includes assignment which can be justified currently for a design solution is from tank cars in these accidents, categorized by the realized by its application, assuming that the accident potential values of design solutions are determined. The philosophy has been to assume that the dollar expenditure 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. 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 by simply comparing the actual benefit values with the estimated costs of solutions.

See also RRIS 12A 081788 in Bulletin 7501.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1970
COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

12 099425

RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 11-THERMAL EFFECTS STUDY

The whole thermal question, including fire environment and thermally induced stresses, is being covered under this phase. The major activity has been a search for a practical heat shield material, such as an ablative, intumescent, or simply an insulative coating, that can be applied to the non-insulated 112A (114A) pressure tank cars, which are the cars most vulnerable to violent rupture from external heat. Many companies which produce fire protective coatings have submitted samples which were studied in a laboratory fire test apparatus which was designed for initial screening. Two of the most promising materials were selected for application to 1/5 scale model tank cars which were subjected to large enveloping fires. These tests were conducted at the White Sands Missile Range in cooperation with the FRA. The objectives were to confirm laboratory findings and theoretical analyses, to ascertain some of the properties of fires which were not yet will defined, and, finally, to prepare for subsequent full scale tests. This was followed by two fullscale fire tests, one with an uncoated and the other with a coated tank. A report on these fire tests is under preparation. Currently, the "torch" type fire is being studied. This is a highly convective fire involving local impingement as compared to the highly radiative all-enveloping fire used in the tests just described. These torch fire studies are being conducted by the FRA at its Pueblo, Colorado, Test Center. When these tests are complete it is planned to finalize a specification for use in qualifying candidate coating materials for actual application on tank cars. Such qualification will include performance requirements to be met in a redesigned (upgraded) laboratory fire test apparatus.

See also RRIS 12A 081788 and 12A 058266 in Bulletin 7501.

PERFORMING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration, Department of Transportation

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute; Federal Railroad Administration, Department of Transportation

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1970
COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

12 099427

RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 7-SAFETY RELIEF DEVICES-GENERAL

This Phase covers all currently used safety relief devices on all classes of tank cars. It has the general objective of seeking means, through design changes in these devices, for safer containment, or safer release, of hazardous products in accidents. Activity has not progressed beyond initial planning since, to date, there has not been sufficient evidence that either deficiencies exist or that design changes would lead to significant improvement. This Phase will be activated when and if, results from other studies (viz. Phases 01, 06, and 11) indicate such a need.

See also RRIS 12A 081788 in Bulletin 7501.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1970
COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

12 099428

RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 6-SAFETY VALUE 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 and 12A 054567 in Bulletin 7501.

PERFORMING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration, Department of Transportation

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute; Federal Railroad Administration, Department of Transportation

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1970
COMPLETION DATE: 1976

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 nearly complete covering the four year period 1971/1974. 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 in Bulletin 7501.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1970
COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

13 045012**PENN CENTRAL ELECTRIFICATION NEW YORK TUNNELS 25 KV VS. 12.5/25 KV**

The Contractor shall perform engineering services and furnish recommendations and appropriate reports by studying alternatives to the proposed re-electrification of the New Haven Region of the Penn Central Railroad and by studying the feasibility of employing 25kv overhead power supply between New Haven, Conn. and New York, N.Y., including the N.Y. Connecting RR.

PERFORMING AGENCY: Gibbs and Hill, Incorporated
SPONSORING AGENCY: Federal Railroad Administration, FRA-ONECD-75-51

Contract DOT-FR-30065 (CPFF)
STATUS: Completed NOTICE DATE: July 1975 START DATE: June 1973 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$28,780

ACKNOWLEDGMENT: FRA

13 054560**DEVELOPMENT OF NEW CORROSION PROTECTION DEVICES FOR SUBWAY EQUIPMENT**

Description: To research and develop new or improved corrosion protection devices for subway equipment installed in severely corrosive environments. Project will result in improved reliability and safety to public and operating personnel and will reduce maintenance costs.

PERFORMING AGENCY: Long Island Lighting Company
SPONSORING AGENCY: Long Island Lighting Company
RESPONSIBLE INDIVIDUAL: Driscoll, TJ

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973
COMPLETION DATE: Unknown

ACKNOWLEDGMENT: Science Information Exchange (AP 698)

13 058322**SUPPORT FOR TRANSPORTATION TEST CENTER TEST TRACK**

1) Prepare and issue a solicitation (Invitation for Bid) for construction of the temporary catenary system for the Urban Mass Transportation Administration (UMTA test track at the Transportation Test Center (TTC), in Pueblo, Colorado. 2) Award contract based upon Item 1. 3) Administer and monitor contract awarded.

PERFORMING AGENCY: Federal Railroad Administration
SPONSORING AGENCY: Transportation Systems Center

ID RA-75-26
STATUS: Active NOTICE DATE: Apr. 1975 START DATE: Feb. 1975
COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$85,000

ACKNOWLEDGMENT: TSC (617-0289)

13 058415**PROVIDE AC AND DC POWER TO THE UMTA TEST TRACK AND ANCILLARY FACILITIES AT THE TTC, PUEBLO**

AC service of 120/208 volts of approximately 150 KVA and DC power of 600-750 volts of approximately 500 KVA is required at the Transit Maintenance Building. A maximum of 4000 KW DC power shall be provided at the Track with capability of variable voltage from 600-750 volts DC.

PERFORMING AGENCY: Ground Transportation Development Center, Federal Railroad Administration
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

ID RA-75-28
STATUS: Active NOTICE DATE: June 1975 START DATE: Mar. 1975
COMPLETION DATE: July 1976 TOTAL FUNDS: \$100,000

ACKNOWLEDGMENT: TSC (612-0294)

13 099411**CANADIAN RAILWAY ELECTRIFICATION STUDY PHASE I- DEVELOPMENT OF STUDY PLAN**

OBJECTIVES: To bring into sharper focus the time frame in which it is expected that electrification of significant portions of Canadian railways is likely to occur, and to develop and describe a program of investigation, research, and development designed to permit a smooth transition to effective electrified operation at that time. SCOPE AND METHOD: Identify the factors upon which the Canadian decision to electrify is dependent, or which will influence that decision. Explore these factors in order to determine their effect on the timing and economics of conversion, and to identify gaps in technological, operational and managerial knowledge or skills necessary to achieve conversion satisfactorily. Develop programs of investigation, research and development to overcome the identified gaps in technological, operational and managerial knowledge or skills, and to enable smooth transition to electrified operation under Canadian conditions. Identify the cost items involved in electrification and recommend an approach for the methodology for costing the electrification stages. Establish general economic criteria for evaluation of the electrification decision. Identify alternative approaches to, and methods of, financing electrification. Develop and recommend a process for monitoring future trends of relevant characteristics of particular factors which will have a significant influence on the electrification decision. Consider and suggest appropriate areas for Canadian railway pilot electrification projects, both freight and passenger, which might be implemented as intermediate, experience gaining steps towards major conversions, and suggest the rationale and general planning for their implementation.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport
INVESTIGATOR: Corneil, ER (Tel 613-547-5777)
SPONSORING AGENCY: Transportation Development Agency
RESPONSIBLE INDIVIDUAL: Brenckmann, M (Tel 514-283-7846)

Contract 14 St. T8200-5-5507
STATUS: Active NOTICE DATE: Aug. 1975 START DATE: July 1975
COMPLETION DATE: June 1976 TOTAL FUNDS: \$117,000

ACKNOWLEDGMENT: Transportation Development Agency

15 045815

BART IMPACT PROGRAM

Under this task TSC will provide staff personnel and special consultants necessary to perform required management functions for the complex and comprehensive BART Impact Program. Management of the four basic types of tasks as specified by the basic ordering agreement will be provided. A summary of these tasks is as follows: (1) overall management (task #1) and data management (2) specific analysis efforts, (3) identifying particular impact areas (4) specialized efforts of 1 overall program objectives. objectives.

PERFORMING AGENCY: Metropolitan Transportation Commission
 SPONSORING AGENCY: Office of the Secretary of Transportation, Department of Transportation; Department of Housing and Urban Development
 RESPONSIBLE INDIVIDUAL: Bouchard, RJ S-8 (Tel 202-4260163)

Contract OS-30176/1

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1973

TOTAL FUNDS: \$54,419

ACKNOWLEDGMENT: TRAIS (PR# DOT-OS-30176)

15 045966

A METHOD FOR ASSESSING PRICING AND STRUCTURAL CHANGES ON TRANSPORT MODE USE

Development of a mechanism which is capable of examining a policy change, for example, a central business district parking surcharge, and of tracing out the effects of such a change, not only on the relative utilization of alternative modes, but also on the spatial distribution of travel from changes in modal usage. be based upon behavioral hypotheses of choice. The method includes the use of attitudinal surveys to establish the determinants of destination choice for nongrocery shopping trips. These trips will be the subject of the prototypical model construction which will be probabilistic in form.

PERFORMING AGENCY: Northwestern University, Department of Civil Engineering, 6078-414
 INVESTIGATOR: Stopher, PR Watson, PL Peterson, GL Blin, JM
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Weiner, E TPI-12 (Tel 202-4264168)

Contract OS-40001 (C)

STATUS: Active NOTICE DATE: July 1975 START DATE: Apr. 1974

COMPLETION DATE: Sept. 1975 TOTAL FUNDS: \$213,227

ACKNOWLEDGMENT: TRAIS (PR# DOT-OS-40001)

15 045967

RE-USE PLANNING OF TRANSPORTATION PROPERTY ABANDONMENTS

To develop an operational planning paradigm which coordinates considerations of re-use potential with the more immediate aspects of trans-

portation prospective abandonments of rail branch lines, secondary roads, and general aviation airports, in a manner which anticipates long-term trends in excess transportation plant and in the dearth of land resources. Abandonment study will stress systematic analysis of re-use potential and the integration of that analysis into existing institutional procedures for abandonment decisions. A multimodal perspective would be realized. embracing aviation airports. Principal techniques include substantive legal research, systems analysis of re-use demand and market areas, and prototype test applications in cooperation with state agencies in Iowa.

REFERENCES:

Proposed Abandoned Railroad Right-of-Way Re-Use Act Baldus, DC; Grow S, Oct. 1974

Railroad Abandonment: The Administrative Decision-Making Process, Mazziotti, DF; Meyer, M, June 1974

Railroad Abandonment and Re-Use Planning: Relationship with Statewide Transportation Planning and Citizen Participation, Mazziotti, DF; Meyer, M; Ducker, KJ, Aug. 1974

PERFORMING AGENCY: Iowa University

INVESTIGATOR: Ducker, KJ

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Nupp, BL TPI-22 (Tel 202-4264447)

Contract OS-40019 (CS)

STATUS: Active NOTICE DATE: July 1975 TOTAL FUNDS: \$69,388

ACKNOWLEDGMENT: TRAIS TRAIS

15 045971

TRANSPORTATION SYSTEMS FOR DECENTRALIZING METROPOLITAN REGIONS

The major objectives of this effort are to: a. Bring about better understanding of decentralizing metropolitan regions and their relation to the changing demands for and the conditions of various modes of transportation therein. b. To identify the actual and potential impacts of new technology upon transportation demand. c. To identify the major public policy questions, particularly for transportation and land-use planning processes, that are implicit in metropolitan regional transportation systems. d. To begin dialogue between university, local, state, regional and Federal professionals involved in urban problems.

PERFORMING AGENCY: Syracuse University

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: McCready, R TPI-60 (Tel 202-4260163)

Contract OS-30118 (C)

STATUS: Active NOTICE DATE: July 1975 TOTAL FUNDS: \$9,290

ACKNOWLEDGMENT: TRAIS

16 058256

MEASUREMENT OF RAIL TRANSPORTATION FUEL CONSUMPTION

This project has the objective of establishing accurate information concerning fuel consumption of railroad freight trains in a variety of operations. Primary emphasis will be on TOFC/COFC trains. Accurate basic data will be collected in cooperation with a number of railroads, for revenue-service trains, and analyzed to provide results of general applicability.

PERFORMING AGENCY: Transportation Systems Center
 INVESTIGATOR: Hopkins, J (Tel 617-494-2048)
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel 202-426-0855)

PPA RR-516

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975

ACKNOWLEDGMENT: FRA

16 058398

CATEGORIZATION & MEASUREMENT STANDARDS FOR TRUCK & BUS FUEL ECONOMY IMPROVEMENTS

DOT desires to gather information and consensus recommendations on measurement methods for commercial vehicle fuel economy and how those measures relate to vehicle productivity.

PERFORMING AGENCY: Society of Automotive Engineers
 SPONSORING AGENCY: Transportation Systems Center, OS-514

Contract DOT-TSC-1007 (CR)

STATUS: Active NOTICE DATE: June 1975 START DATE: Apr. 1975
COMPLETION DATE: Apr. 1976 TOTAL FUNDS: \$99,896

ACKNOWLEDGMENT: TSC (OS-514)

16 115949

ALTERNATE FUELS FOR THE REDUCTION OF AIR POLLUTION FROM MOBILE SOURCES

The major objective of this research is to investigate alternate fuels that current internal combustion engines could operate on with little or no modification, and that would be less harmful to the environment than the fuels now used. This investigation will consider all fuels whose use could provide a solution to the problem of air pollution from mobile sources, and would include, but not be limited to, natural gas (methane), propane, butane, ammonia, hydrazine, hydrogen peroxide, hydrogen and reformed gasoline. The end result of this research will be the selection of the two most promising alternate fuels whose use will lead to the reduction and possibly elimination of air pollution from mobile sources. These fuels will represent the immediate and long-range solutions to the pollution problem. Factors considered in the selection of the fuels include: 1) Its availability. 2) Its chemical and thermodynamic properties. 3) Implementation problems. 4) Safety considerations. 5) Environmental impact. 6) Economics. Finally, the fuels will be tested to determine their theoretical and actual performance when applied to current or slightly modified engines. The final report of this research will reflect all data collected and present the candidate alternate fuel whose immediate implementation will greatly reduce air pollution, and the fuel (not hydrocarbon based) that will be the fuel of the future.

PERFORMING AGENCY: Southern University A&M College, Baton Rouge, School of Engineering, Department of Mechanical Engineering

INVESTIGATOR: Watson, MM

SPONSORING AGENCY: Environmental Protection Agency, Office of Research and Development, 802667 72P21528

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974
COMPLETION DATE: 1975

ACKNOWLEDGMENT: Science Information Exchange (AO 21528)

17 045821

COMPUTER-BASED RAILROAD NETWORK MODEL

The objective of this project is the development of a computer based railroad network model which will be capable of facilitating the analyses of, and providing insights into the potential impacts of alternative public policies aimed at plant and/or corporate rationalization of the railroad industry. Outputs of primary interest will include rates of plant utilization, revenue generation, estimated costs and probable viability, all analyzed on a segment-by-segment basis.

PERFORMING AGENCY: International Business Machines Corporation

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Bouve, T (Tel 202-426-2920)

Contract DOT-FR-40012

STATUS: Active NOTICE DATE: July 1975 START DATE: Oct. 1973

COMPLETION DATE: Sept. 1975 TOTAL FUNDS: \$1,400,000

ACKNOWLEDGMENT: FRA

17 048781

INTEGRATE COMPUTER SYSTEM NETWORK (ICSN)

Contractor will furnish an Integrated Computer System Network (ICSN) which will be instrumental in providing the degree of simulation fidelity required for the variety of dynamic situations to be investigated within the Wheel/Rail Dynamic Laboratory.

PERFORMING AGENCY: Datacom, Incorporated

SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation

RESPONSIBLE INDIVIDUAL: Eckland, J (Tel 202-4261227)

Contract DOT-FR-40009

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1974

COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$1,651,282

ACKNOWLEDGMENT: FRA (PR # 74-02-1-2-3-4-5)

17 058277

INTERMODAL INFORMATION SYSTEM

Two management systems will be developed as part of The Intermodal Network Implementation Program. The operations system, known as the Terminal Control System (TCS), will provide for the day-to-day management of the intermodal terminals, including manpower assignment and distribution of flatcars and trailers. It will do so by computerizing many of the terminal functions, thereby providing timely operating reports as well as inquiry capability. The Management Information System (MIS) will aid in the planning and monitoring functions, matching costs with revenues to measure profitability across various business segments, such as trains, traffic lanes, sales territories, types of equipment, etc. These two systems will provide accurate and timely information to control costs, improve profitability, and assure service. Extensive use will be made of exception reporting to highlight problem areas requiring attention. Also, information will be assembled to facilitate advanced planning such as modeling.

The contract to a performing organization has not yet been awarded.

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Edson, WD (Tel 202-426-0771)

STATUS: Obligated NOTICE DATE: July 1975 START DATE: July

1975 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: FRA

17 080332

RAILWAY TERMINAL SIMULATION MODELING

A simulation model is being developed for a railway terminal under the control of Terminal Management Information Service (TMIS). It will be used to investigate methods in which TMIS can be used to improve terminal performance. Data will be used from the Vancouver Terminal of CP Rail.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5,30.74

INVESTIGATOR: MacDwen, GH

SPONSORING AGENCY: Canadian Pacific; Transportation Development Agency; Queen's University, Canada

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974

COMPLETION DATE: Apr. 1977

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

17 081792

INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 5—ESTABLISH MECHANISMS FOR REPORTING SYSTEM PROBLEMS RELATING TO TRACK TRAIN DYNAMICS

The objective of this task is to develop a perpetual system for collection of Track Train Dynamics data, including the selection of data analysis techniques, software and a mechanism for advising the industry of trends and significant occurrences. AAR and FRA have worked cooperatively toward development of train accident reporting short forms, and FRA issued a handbook entitled "FRA Guide To Incident Reports." Although reporting forms and instructions will probably undergo some revision, certain data elements are of particular interest to the Program, including route identification, milepost location, first car involved, causing car, number of locomotives, location of loads and empties, and similar data. AAR is now working to develop long forms for train accident reporting to provide more detailed information. FRA is now utilizing a computerized data management system for storage and retrieval of accident data with AAR having terminal access to this information.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Lind, EF

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transportation Development Agency

RESPONSIBLE INDIVIDUAL: Lind, EF (Tel 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: July 1975 START DATE: 1972

COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

17 099386

ACCIDENT INFORMATION SYSTEM

This activity has two phases: (1) Systems Development involving railroad accident information reporting systems, safety inspection reporting systems and grade crossing inventory; (2) Application for rationalizing data bases and report production and for making failure analyses.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Systems Analysis and Program Development

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: DeBoer, DJ (Tel 202-426-9682)

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: FRA

17 099399

FREIGHT CAR UTILIZATION RESEARCH PROGRAM. PHASE I. TASK 2—DEVELOPMENT OF CAR UTILIZATION DEFINITION AND MEASUREMENT

Develop a definition of freight car utilization consistent with railroad industry and program objectives. The definition should recognize the need for both physical and economic measures and for their appropriate interaction. Develop a set of utilization measures consistent with this definition, and the specifications for the data necessary to support these measures. Implement these measures in a demonstration project to assess to costs and benefits of the use of such a utilization measurement system in managing rail operations.

For further information on related studies see also RRIS 099398 Section 26A, 099400 17A, 099401 17A, 099402 24A, 099403 21A in Bulletin 7502.

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: Bryant, AH

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Leilich, GM (Tel 415-362-1212)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1975

COMPLETION DATE: Jan. 1977

ACKNOWLEDGMENT: AAR

17 099400

FREIGHT CAR UTILIZATION RESEARCH PROGRAM. PHASE I. TASK 3—CAR CYCLE ANALYSIS

Draw a statistically based sample, collect car movement data using car location messages (CLM) and other sources, and analyze the movements

of the sample cars to develop representative car cycle profiles for selected car type-commodity combinations. An industry task force will be appointed to assess the car cycle data. The objects of the task are to identify specific car utilization problems which will suggest corrective action by railroads and/or shippers, and to form a basis for recommendations for future car utilization program tasks.

For further information on related studies see also RRIS 099398 Section 26A, 099399 17A, 099401 17A, 099402 24A, 099403 21A Bulletin 7502.

PERFORMING AGENCY: Association of American Railroads
 INVESTIGATOR: West, JB
 SPONSORING AGENCY: Association of American Railroads
 RESPONSIBLE INDIVIDUAL: Leilich, GM (Tel 415-362-1212 X-21016)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1975
 COMPLETION DATE: Jan. 1977

ACKNOWLEDGMENT: AAR

17 099401

FREIGHT CAR UTILIZATION RESEARCH PROGRAM. PHASE I. TASK 4—RECOMMENDED FREIGHT CAR MANAGEMENT AND CONTROL SYSTEMS

An industry task force will be appointed to assist FRA in developing and formulating a research, development and demonstration program for railroad car management systems. Such a task force will include members knowledgeable in railroad computer systems, railroad operations, and the planning, control and evaluation aspects of freight car management. The FRA program will be an integral part of, and closely coordinated with, the car utilization program.

For further information on related studies see also RRIS 099398 Section 26A, 099399 17A, 099400 17A, 099402 24A, 099403 21A Bulletin 7502.

PERFORMING AGENCY: Association of American Railroads
 INVESTIGATOR: Jones, JL (Tel 404-688-0800 X-395)
 SPONSORING AGENCY: Leilich, GM

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1975
 COMPLETION DATE: Jan. 1977

ACKNOWLEDGMENT: AAR

17 099405

MECHANIZED INVENTORY CONTROL SYSTEM FOR FREIGHT CARS IN RAILWAY CLASSIFICATION YARD

To develop a mechanized inventory control system for a railway hump yard to improve supply of railroad cars to Canadian shippers and increase railway productivity. Objectives: 1. To develop an improved inventory control system for a railway terminal, using available technology including minicomputers, cathode ray tube (CRT) inquiry devices and automatic car identification (ACI) scanners. 2. To transfer the knowledge gained in the development of this system to other members of the railway industry. 3. To improve service in the Montreal yard. 4. To monitor implementation problems in the introduction of an automated information system in a rail terminal.

PERFORMING AGENCY: Canadian National Railways
 INVESTIGATOR: Hoisak, P (Tel 513-877-5430)
 SPONSORING AGENCY: Transportation Development Agency
 RESPONSIBLE INDIVIDUAL: Rudback, NE (Tel 514-283-4077)

Contract MOT-95668

STATUS: Completed NOTICE DATE: Aug. 1975 START DATE: Feb. 1972 COMPLETION DATE: Mar. 1975 TOTAL FUNDS: \$185,000

ACKNOWLEDGMENT: Transportation Development Agency

17 099419

FINANCIAL ACCOUNTING AND REPORTING ELEMENTS (FARE), TASK V

Under this phase of the FARE project, additional effort to develop management information systems, using the FARE data base will be undertaken. Requirements for improvement management information-handling

capabilities will be assessed, and concepts for a standardized, integrated management information system will be designed for sample operations. In addition a computer-oriented processing plan for FARE external reporting will be designed.

Funding for this project has been allocated as of January 1975 but the contract has not yet been awarded to a performing organization.

SPONSORING AGENCY: Urban Mass Transportation Administration,
 Department of Transportation

IT-06-0094

STATUS: Active NOTICE DATE: Aug. 1975 COMPLETION DATE: July 1976 TOTAL FUNDS: \$860,000

ACKNOWLEDGMENT: UMTA

17 099420

FINANCIAL ACCOUNTING AND REPORTING ELEMENTS (FARE), TASKS I-IV

Financial and statistical information reported by transit operators has proven to be unreliable or incompatible due to varying accounting practices and procedures. This project, conducted with the advice of appropriate transit officials, is an attempt to create a comparable reporting scheme and to provide transit operators and government at all levels with a basis for planning, decision-making and action. Under Phases I-IV of this project, a standard system of financial accounting and reporting elements with selected operating statistics was developed. Direct input to the project by the transit industry was provided through the Industry Control Board and other interested agencies. Under Phase V of the FARE project, additional effort to develop management information systems using the FARE data base will be undertaken.

Project FARE Task II and Task III Reports, Set of Four Volumes, PB-222-041

Task and Project Summary and Reporting Systems, Set of Five Volumes, PB-226-358

PERFORMING AGENCY: Andersen (Arthur) and Company
 SPONSORING AGENCY: Urban Mass Transportation Administration,
 Department of Transportation

IT-06-0034

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Aug. 1972
 COMPLETION DATE: July 1975 TOTAL FUNDS: \$1,185,000

ACKNOWLEDGMENT: UMTA

17 099438

CARGO DATA INTERCHANGE SYSTEM (CARDIS)

Develop the necessary standard codes and procedures to allow interchange of shipping information in machine readable form among the parties involved in domestic and international commerce: shippers, carriers, forwarders, banks, insurance companies, etc. Define industry and Government requirements, design and test a prototype system, present draft standards at domestic and international forums.

Cargo Data Interchange System-CARDIS-Data Elements, Functions, and Information Standardization, National Committee on International Trade Documentation, June 1975

Preliminary Functional Specification for a Prototype Electronic Data Interchange System, Transportation Data Coordinating Committee, July 1975

System Concept Study for a Cargo Data Interchange System (CARDIS), Computer Sciences Corporation-TSC-DOT, Apr. 1975

PERFORMING AGENCY:

INVESTIGATOR: Carley, J (Tel 202-293-5514) Hamely, E (Tel 212-687-6261) Ruthling, C (Tel 703-533-8877)

SPONSORING AGENCY: Office of Environment, Safety and Consumer Affairs, Department of Transportation

RESPONSIBLE INDIVIDUAL: Ronayne, M

Contract DOT-PS-50017

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1974
 COMPLETION DATE: 1980

ACKNOWLEDGMENT: DOT

18 045249**DEVELOP A STANDARD TRANSPORTATION COMMODITY DESCRIPTION AND CODING SYSTEM**

Tasks include: 1. Analyze the requirements for freight tariffs, statistical collection systems, Government controls, foreign and domestic requirements. 2. Review the and code from the following: 1) The Brussels Nomenclature whether each description meets the operational and other needs of the transportation community. 3. Select the paper products category as the initial to develop description criteria and catalog the descriptions covering the paper products category. 4. Select additional product categories based upon industry, Federal Government, and Customs Cooperation Council recommendations.

PERFORMING AGENCY: Transportation Data Coordinating Committee
 SPONSORING AGENCY: Office of Policy, Plans and International Affairs, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Vargo, TH TAD-432 (Tel 202-4269745)

Contract OS-10205

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1971
 COMPLETION DATE: Sept. 1973 TOTAL FUNDS: \$250,000

ACKNOWLEDGMENT: TRAIS

18 080324**THE RAILWAY FREIGHT RATE ISSUE**

The historical development of the railway freight rates in Canada is traced to provide the basis for explaining the complex roles played by freight rates and their evolution from an economic function to a sociological or political phenomenon. The inhibiting effects on the development of sound transportation and regional development policies are also analysed.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 433.74

INVESTIGATOR: Darling, H

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
 COMPLETION DATE: Dec. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

18 099595**DETERMINATION OF UNIT MAINTENANCE COSTS FOR INTERMODAL FLATCARS**

The objective of this project is to determine accurately the maintenance cost per mile of intermodal flatcars operating in dedicated service between city pairs. The method used is to operate six specially-identified cars between Chicago and New Orleans on the Illinois Central Gulf Railroad. All repairs will be tabulated through the AAR Data Exchange System, and the mileage for each car will be recorded on an axle-mounted odometer. Pre-test and post-test measurements of critical components will be made in order to project their useful life.

PERFORMING AGENCY: Trailer Train Company

INVESTIGATOR: Greenfield, LP (Tel 312-786-1200)

SPONSORING AGENCY: Trailer Train Company

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: July 1975
 COMPLETION DATE: July 1976

ACKNOWLEDGMENT: Trailer Train Company

20 045166

STUDY OF SHIPPER DEMAND CONCERNING EMPTY RAILROAD FREIGHT CARS NEEDED FOR MATERIAL AND COMMODITY LOADING

Create a functional design of the elements and processes (system architecture) necessary for a technically advanced system to collect and predict shipper requests (orders for freight cars to load). Such a system must be operationally suitable and economically justifiable for use by individual Class I railroads as part of their system-wide empty freight car distribution activity. These are related to current FRA project reports on Car Management Studies.

PERFORMING AGENCY: Association of American Railroads
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: West, JB (Tel 202-4261677)

Contract DOT-FR-30058 (CR)
 STATUS: Active NOTICE DATE: July 1975 START DATE: June 1973
 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: \$171,699

ACKNOWLEDGMENT: FRA

20 045810

A MULTIREGIONAL INPUT-OUTPUT STUDY OF U.S. COMMODITY FREIGHT SHIPMENTS

A multiregional input-output (MRIO) model provides a consistent framework within which reliable estimates of transportation requirements by industry and region, and all the many interactions between changes in the rest of the economy and transportation can be studied in considerable industrial and regional detail.

PERFORMING AGENCY: Massachusetts Institute of Technology
 INVESTIGATOR: Polenske, KR
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Harman, J TPI-12 (Tel 202-4264214)

Contract OS-30104 (C)
 STATUS: Active NOTICE DATE: July 1975 START DATE: May 1973
 COMPLETION DATE: May 1976 TOTAL FUNDS: \$384,999

ACKNOWLEDGMENT: TRAIS

20 048497

CONTAINERIZATION AND THE GREAT LAKES TRANSPORTATION SYSTEM

1. To update data previously collected on the effects of containerization on the Great Lakes area. 2. To present governmental policy recommendations for the shipping and port industries. State, Regional and Federal government policy making agencies will be provided this information to aid in developing rational policies toward the shipping and port industries. This information will also be useful to officials in the shipping and port industries in meeting the problems posed by expanding containerization.

A report published in 1967 using 1964 data by E. Schenker entitled, "Effects of Containerization on Great Lakes Ports" has been updated. The purpose of this updating was to determine whether the conclusions are still valid in accordance with present more recent data (1970) concerning the general cargo traffic in the Great Lakes ports; or, in other words, have the trends upon which the projections and recommendations were based continued through the years after the study was made?

Related projects are: PC-1, PC-5, PC-7.

PERFORMING AGENCY: Wisconsin University, Milwaukee, Center for Great Lakes Studies
 INVESTIGATOR: Schenker, E Brockel, H
 SPONSORING AGENCY: National Oceanic and Atmospheric Administration, Sea Grant Office Department of Commerce, 04-3-158-5 #1 R/PC-1

(11615)
 STATUS: Active NOTICE DATE: May 1975 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: National Oceanic and Atmospheric Administration Science Information Exchange (GBP 1704)

20 051254

EFFECT OF TRANSPORTATION RATES, FACILITIES, AND INSTITUTIONS UPON THE GRAIN MARKETING SYSTEM IN MONTANA

OBJECTIVE: Determine present railroad and truck rate structure for grain moving within and out of Montana; determine changes in railroad grain loadings and rates over past 40 years as compared with production; analyze movements of grain directly from farms and elevators, both by truck and railroad. Determine handling methods, rates, pricing, origin, destination and uses for grain handled by truck from farm and elevator points in Montana; determine effects of barge services on Columbia upon truck and rail transportation in Montana. Determine effects of trends in transportation methods and rates on grain-pricing methods and institutions in Montana, with special attention to different kinds of wheat and other grains. APPROACH: Will use secondary data and information obtainable from regulatory authorities. Also obtain data from carriers and farmers through use of questionnaires. Transportation models and location theory will be applied to data in analysis. PROGRESS: With respect to research in the transportation area in general, further reading of the literature has been done and working relationship with Gene Carroll, the State Department's transportation specialist, has been developed. Various research topics have been discussed, various current transportation problems have been attacked, and an investigation is underway to determine what the crucial problems are so an extension of the work already done can be accomplished.

PERFORMING AGENCY: Montana State University, Bozeman, Department of Agricultural Economics/
 INVESTIGATOR: McConnen, RJ St George, G
 SPONSORING AGENCY: Department of Agriculture, Montana Cooperative State Research Service/

STATUS: Active NOTICE DATE: July 1975 START DATE: Dec. 1965
 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (CRIS-0002036), Current Research Information System

20 051256

ECONOMIC EFFECT OF CHANGING RAILROAD SYSTEMS ON GRAIN HANDLING FIRMS

OBJECTIVE: Estimate the effect of railroad abandonment or reduced service on country elevator operations. Determine the needed adjustment in the grain industry resulting from railroad abandonment or reduced services. Evaluate alternative options open to country elevator operations in adjusting to these changes. Estimate the effect of these changes on the flow of grain shipments. APPROACH: Develop a model describing the grain transportation system in Iowa. Collect data for use in the model. Complete the analyses required to achieve the objectives. PROGRESS REPORT: Optimal transportation system solutions have been obtained for corn and soybeans shipped out of a 6-1/2 county area around Fort Dodge, Iowa. These solutions were based on a Stollsteimer type two stage, multiperiod transshipment plant-location model. Transportation alternatives studied included the traditional single-car system, 3-10-car shipments, 50-car, 80-car and 115-car trains, truck, truck-barge, rail-barge, containers and belt lines. Generally, the highest net revenue was obtained by using a subterminal system to assemble large quantities of grain into multiple-car shipments. The optimum number of subterminals varied depending on the rate structure and the amount of rail maintained in each analysis. The least cost location of grain production and transportation from 152 producing regions to 78 consuming regions were obtained for 10 alternative transportation cost structures and demands for grain projected for 1980. The least cost transportation mode—rail, water, truck, or combination of them—was used for each shipment. Three levels of barging costs and five different rail costs were used. Grain transportation will continue expanding and more exports are likely to flow through the Northwest ports. The production location for grain is not sensitive to transportation costs.

REFERENCES:
 An Economic Analysis of Alternative Grain Transportation Systems: A Case Study, Eaumel, CP; Drinka, TP; Lifferth, DR; Miller, JJ, National Technical Information Service, PB-224819

Interrelationships of Grain Transport. Prod and Demand: A Cost Analysis and Proj. of Grain Shipments in US for 1980, Fedeler, JA; Heady, EO; Koo, Wk, NTIS, Dept of Commerce

PERFORMING AGENCY: Iowa State University, Ames, Agricultural Experiment Station
 INVESTIGATOR: Baumel, CP Thompson, WH
 SPONSORING AGENCY: Department of Agriculture, Iowa Cooperative State Research Service

STATUS: Active NOTICE DATE: July 1975 START DATE: Dec. 1969
 COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (CRIS-0056040), Current Research Information System

20 051259**IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAIN AND FARM SUPPLY FIRMS**

OBJECTIVE: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties; Estimate demand for feed and fertilizer. Project alternate changes in grain transportation; Determine economic feasibility of alternative systems of grain movement from producers to destinations; Determine effect of changes listed on number, size, type and location of country elevators and on local employment and services; Determine consequences of projected transportation changes on distribution of feed and fertilizer; and Develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information, and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. PROGRESS: Optimal transportation system solutions have been obtained for corn and soybeans shipped out of a 1-1/2 county area around Fort Dodge, Iowa. These solutions were based on a Stollsteimer type two stage, multiperiod transshipment plant-location model. Transportation Alternatives Studies included the traditional single-car system, 3-10-car shipment, 50-car, 80-car and 115-car trains, truck, truck-barge, rail-barge, containers and belt lines. Generally, the highest net revenue was obtained by using a subterminal system to assemble large quantities of grain into multiple-car shipments. The optimum number of subterminals varied depending on the rate structure and the amount of rail maintained in each analysis.

PERFORMING AGENCY: Iowa State University, Ames, Agricultural Experiment Station
 INVESTIGATOR: Baumel, CP Thompson, WH Wisner, RN
 SPONSORING AGENCY: Department of Agriculture, Iowa Cooperative State Research Service

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS-0060521)

20 051260**IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAINS AND FARM SUPPLY FIRMS**

OBJECTIVE: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties. Estimate demand for feed and fertilizer. Project alternate changes in grain transportation. Determine economic feasibility of alternative systems of grain movement from producers to destinations. Determine effect of changes on number, size, type, and location of country elevators and on local employment and services. Determine consequences of projected transportation changes on distribution of feed and fertilizer, and develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information, and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. PROGRESS: Least-cost movement pattern for Kansas wheat has been estimated by computer model for 1971-72 and compared with market flows as determined by market survey. Estimates of fertilizer consumption by county for Kansas for 1975 and 1980 is nearing completion. Development of origin points and quantities and transport rate data is in progress to be used in a least-cost flow model.

PERFORMING AGENCY: Kansas State University, Agricultural Experiment Station, Department of Agri Eco
 INVESTIGATOR: Sorenson, LO Mccoy, JH
 SPONSORING AGENCY: Department of Agriculture, Kansas Cooperative State Research Service/

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Science Information Exchange (CRIS-0061435), Current Research Information System

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.

PERFORMING AGENCY: Alaska University, College
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

Contract DOT-OS-40008 (CS)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973
 COMPLETION DATE: Oct. 1976 TOTAL FUNDS: \$375,418

ACKNOWLEDGMENT: TRAIS (PR # PUR-2-30685)

20 058333**TRUCK BROKERS AND MOVEMENTS OF AGRICULTURALLY EXEMPT COMMODITIES**

Develop an understanding within DOT and USDA of the nationwide patterns and problems of truck movements of exempt agricultural commodities (particularly fresh fruits and vegetables). It is felt that a field survey of agricultural truck brokers will serve this objective well, since truck brokers are, perhaps, the one group in the exempt products distribution system which is in a position to have an understanding of the overall transport/marketing patterns in the agriculturally exempt commodities trade. In the course of meeting the study's main objective, detailed information also will be gathered on the truck brokers and the nature of the services they provide.

PERFORMING AGENCY: Department of Agriculture
 INVESTIGATOR: Hutchinson, TQ (Tel 202-447-6363)
 SPONSORING AGENCY: Office of Policy, Plans and International Affairs, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Canellos, GA TPI-34 (Tel 202-4264420)

IA AS-50042

STATUS: Active NOTICE DATE: July 1975 START DATE: Feb. 1975
 COMPLETION DATE: Dec. 1975 TOTAL FUNDS: \$30,000

ACKNOWLEDGMENT: TRAIS

20 058426**DOMESTIC AND INTERNATIONAL TRANSPORTATION OF U.S. FOREIGN TRADE: 1975**

Collect data relating to the U.S. interior movements of U.S. imports and exports, and in combination with available data on the international movements of these commodities, present a complete transportation picture of U.S. foreign trade. Phase I is investigatory and consists of research into sample and survey design and procedures and will identify the work to be accomplished and items to be provided which will form the work statement for the Phase II agreement.

PERFORMING AGENCY: Bureau of Census
 SPONSORING AGENCY: Office of Policy and International Affairs, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Murphy, RD TPI-12 (Tel 202-4262090)

IA AS-50059

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1975
 COMPLETION DATE: June 1975 TOTAL FUNDS: \$10,000

ACKNOWLEDGMENT: TRAIS

Freight Transport Demand Analysis

20A

20 058460

TRANSPORTATION OF ENERGY MATERIALS

Identify and quantify mode shipment characteristics and flows of energy materials primarily through the use of personal interviews with energy carriers and working knowledge of the modes of transportation and computer capabilities. Identify the mode shipment characteristics by region and final user of energy materials in the U.S.

PERFORMING AGENCY: Small Business Administration
SPONSORING AGENCY: Transportation Systems Center, OP-502

IA TSC-1000

STATUS: Active NOTICE DATE: June 1975 TOTAL FUNDS: \$29,994

ACKNOWLEDGMENT: TRAIS (OP-502)

20 058467

INTERCITY FREIGHT DEMAND FORECASTING

Emphasis will be placed on evaluating existing data sources and recommendations for new collection techniques needed to acquire better data necessary for more effective forecasts of commodity flows. The analysis of the structural form of the model and definition of the variables will be coordinated with ongoing modeling efforts at MIT. Alternative methods of data collection will be investigated including relative cost aspects.

PERFORMING AGENCY: Massachusetts Institute of Technology
SPONSORING AGENCY: Transportation Systems Center, OP-509

Contract DOT-TSC-1005 (CR)

STATUS: Active NOTICE DATE: June 1975 START DATE: Apr. 1975
COMPLETION DATE: July 1976 TOTAL FUNDS: \$37,736

ACKNOWLEDGMENT: TRAIS (OP-509)

20 058473

AUTOMOTIVE SCRAPPAGE AND RECYCLING INDUSTRY STUDY

This project will include a literature search of the industries associated with the recycling of automotive materials, the preparation of an overview of the automobile recycling industry, and the performance of in-depth studies on the aspects of the automobile recycling such as automobile shredding and the reclamation of rubber from the automobile.

PERFORMING AGENCY: Small Business Administration
INVESTIGATOR: Kaiser, R
SPONSORING AGENCY: Transportation Systems Center, OS-514

IA TSC-1028 (FFP)

STATUS: Active NOTICE DATE: June 1975 START DATE: May 1975
COMPLETION DATE: Apr. 1976 TOTAL FUNDS: \$49,988

ACKNOWLEDGMENT: TRAIS (OS-514)

20 058488

AN EXPERIMENT IN FREIGHT MODAL CHOICE: DELINEATING THE RAIL-TRUCK INTERFACE

Specific objectives are: 1-To identify the economic characteristics of freight traffic which is rail and truck competitive in more detail than has been practicable to date. 2-To identify the marketing strategies most likely to succeed in attracting freight traffic to the most socially desirable and efficient mode of rail or truck transportation in terms of governmental economic, energy, and environment policies; 3-To estimate the true magnitude of any misallocation of traffic between the rail and truck modes of transportation and what might be done to alleviate that misallocation.

PERFORMING AGENCY: Pennsylvania State University, University Park
INVESTIGATOR: Stenger, AJ
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Meck, JP TPI-12 (Tel 202-4264138)

Contract OS-50120 (CS)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: July 1975
COMPLETION DATE: June 1976 TOTAL FUNDS: \$42,266

ACKNOWLEDGMENT: TRAIS

20 058489

TRANSPORT OF SOLID COMMODITIES VIA PIPELINE

Objectives are: (1) to explore the feasibility and viability of the pipeline as an effective mode of transporting solid commodities over long distances, and (2) if the conclusion of that exploration is positive, to evaluate the issues surrounding the freight pipeline. The research shall focus on evaluation of the concept through a technical and market feasibility study. In specific terms, the study is expected to quantify, as much as possible, the traffic, social, economic, energy, legal, regulatory, institutional, political, and environmental impacts of freight pipeline within the context of a number of varied, but possible, scenarios.

PERFORMING AGENCY: Pennsylvania University, Philadelphia
INVESTIGATOR: Zandi, I
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Ryan, DC TST-13 (Tel 202-4264208)

Contract OS-50119 (CS)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1975
COMPLETION DATE: June 1976 TOTAL FUNDS: \$64,529

ACKNOWLEDGMENT: TRAIS

20 080313

DEMAND INFORMATION AND FORECASTING RESEARCH PROJECT

To develop functional specifications for an advanced demand information and forecasting system to support intra-railroad car distribution. The system will be sufficiently generalized that it could be adopted by most Class I rails on a voluntary basis. Phase I of the project, now completed and a report prepared, identified the requirements of the data system and the most promising forecasting technique. Sample data from several railroads collected and analyzed to provide information about the current environment and associated problems. In Phase II, the recommendations of Phase I will be implemented on a Class I railroad. This demonstration is expected to provide the framework for evaluating the technical feasibility, operational suitability and economic desirability of the systems for other carriers.

PERFORMING AGENCY: Association of American Railroads
INVESTIGATOR: Minger, WK (Tel 202-293-6256)
SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Braddock, C (Tel 6-2920)

Contract DOT-FR-30058

STATUS: Active NOTICE DATE: July 1975 START DATE: 1974
COMPLETION DATE: 1976

20 080328

CANADIAN FREIGHT TRANSPORTATION MODEL: PHASE III

This study develops a planning model for the Canadian Freight Transportation System to assist in evaluating the effects of long range transport policies on the performance of the rail freight transport network in Canada. Phase III consists of validation of the network model and development of modal selection models using the intermodal freight data base.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5.10

INVESTIGATOR: Fullerton, HV Peterson, ER Turner, RE
SPONSORING AGENCY: Transportation Development Agency; Queen's University, Canada

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1971
COMPLETION DATE: July 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 080334

DATA MANAGEMENT SYSTEM FOR TRANSPORTATION DATA BASE

An existing intermodal freight transport data base containing rail, ship and for-hire trucking data on a common origin/destination/commodity basis for all of Canada is now being adapted for more general use by researchers. This permits intermodal freight traffic analysis to a degree of detail never before possible.

Freight Transport Demand Analysis

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5.14.73

INVESTIGATOR: Graham, LJ

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport; Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: Oct. 1973
COMPLETION DATE: Sept. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 083440

AN ECONOMIC ANALYSIS OF PRESENT AND POTENTIAL TRADE BETWEEN ALASKA AND WASHINGTON

The project will identify present and future trade relationships between Alaska and Washington; identify characteristics of the distribution system; suggest innovations needed to improve the performance of the physical distribution system; and considering above, determine the composition of future trade. The investigation is designed to collect and analyze primary data of commodity movements; using the above information plus secondary data, project future trade flows; interview and analyze information on the physical distribution system from selected firms and government agencies involved in commerce between the two states. From these interviews, problem areas will be identified and analyzed and related to the effects on future trade composition.

See also RRIS 20A 099627.

PERFORMING AGENCY: Alaska University, College, Department of Agricultural Sciences

INVESTIGATOR: Thomas, WC

SPONSORING AGENCY: Department of Agriculture, ALK-274-5584

STATUS: Active NOTICE DATE: July 1975 START DATE: Oct. 1973
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0064860)

20 083479

IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAIN AND FARM SUPPLY FIRMS

OBJECTIVES: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties; estimate demand for feed and fertilizer. Project alternate changes in grain transportation; determine economic feasibility of alternative systems of grain movement from producers to destinations; determine effect of changes listed under C and D on number, size, type and location of country elevators and on local employment and services; determine consequences of projected transportation changes on distribution of feed and fertilizer; and develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. Iowa, Kansas and Nebraska will participate in objectives A, B, C, D, F, and G. Iowa and Nebraska will participate in objective E. Illinois will participate in objectives A, B, C, D, and E. PROGRESS REPORT: A case study of the impact of branch line abandonment has been completed and the results reported in a paper given before the annual meeting of the American Agricultural Economics Association. The study indicated that in the one area with access to water-truck combination for transport the impact of abandonment on agricultural marketing and production firms was very slight. Fertilizer firms appeared to be affected more than grain and feed firms. In a second area with no ready access to water transportation, abandonment reduced the rate of firm growth, retarded investment in facilities, and weakened the market for cash grain. Development of predictive models is continuing.

PERFORMING AGENCY: Illinois University, Urbana, Department of Agricultural Economics, ILL U-05-366

INVESTIGATOR: Hill, LD

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0064467)

20 083481

SYSTEM ANALYSIS OF THE ECONOMICS OF GRAIN MARKETING

The purposes of this project are to: determine the effects of changing farm programs on the efficiency of the marketing, utilization, and distribution of grain and soybeans and their products; determine the implication of farm programs for shipping patterns and quantities shipped to foreign markets; and investigate the operation of the marketing systems as they affect the economics of physical distribution and processing of grains. APPROACH: The grain marketing system will be approximated by a spatial equilibrium model determining the optimum size, type, and number of firms. Relationships between prices and market structure will be analyzed using daily prices from Illinois elevators. The appropriateness of test weight standards of corn for communicating quality preferences will be evaluated. US price-support programs, export subsidies, OCC credit sales and inter-grain price relationships will be examined. Programs and policies of major importing countries and measurement of the incidence of trade restrictions will be evaluated for US exports. Export potentials for US grains will be estimated. PROGRESS REPORT: Work was concentrated in two areas appraisal of Sino-American trade prospects and direction of European integration. The results suggest that the United States has a good chance of becoming an important supplier of wheat, cotton, vegetable oils, and perhaps tobacco and coarse grains to China. A new basis for trade may be created through direct U.S. investments, joint undertakings, and the extension of most-favored-nation treatment to Chinese goods. The European Community is in a state of crisis and is confronted with three possibilities at this juncture. Regress into a free trade area with no common agricultural and economic policies. Stand still and hold on to what it has achieved to date. Push ahead toward a federal economic and monetary union, with supranational institutions.

REFERENCES:

An Enlarged European Community and Agricultural Trade Policy Choices for Third Countries, Schmidt, SC, Journal of Agricultural Economics, Vol. 24, Vol. 1, pp 141-164, Jan. 1973

East-West Trade in Wheat: Present and Potential Schmidt, SC, Economic Planning, Vol. 9, No. 3-4, pp 3-24, May 1973

The Demand for On-Farm Heated-Air Grain Dryers Kau, P; Hill, LD, Illinois University, Dept of Agri Econ, Agri Expt Station, AERR 118, Jan. 1973

Test Weight as a Grading Factor for Shelled Corn Hall, G; Hill, LD, Illinois University, Dept of Agri Econ, Agri Expt Station, AERR 124, Sept. 1973

European Integration Where To? Schmidt, SC, Illinois Business Review, 31(10): 6-8, Nov. 1974

Test Weight Adjustment Based on Moisture Content and Mechanical Damage of Corn Kernels, Hall; Glenn; Hill, LD, American Society of Agricultural Engineers--Transactions, 17:3, pp 578-79, Feb. 1974

PERFORMING AGENCY: Illinois University, Urbana, Department of Agricultural Economics, ILLU-05-0315

INVESTIGATOR: Hill, LD Schmidt, SC Hieronymus, TA

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0060066)

20 083485

LOGISTICAL FACTORS INVOLVED IN DOMESTIC AND FOREIGN MARKETING OF IOWA'S GRAINS, LIVESTOCK AND MEATS

OBJECTIVES: The project is to continue the investigation of patterns of transportation to domestic and foreign markets as a result of the grain transportation crisis of 1972-73 and current agricultural policy, and analyze and recommend possible changes in transportation regulations affecting the movements of Iowa's grains, oilseeds, livestock and meats. APPROACH: Recommendations for legislative changes will be determined by results of research underway on U.S. Department of Transportation contracts and reports to be submitted in September 1973. PROGRESS REPORT: Research on U.S. Department of Transportation project. "An Economic Analysis of Alternative Grain Transportation Systems: A Case Study." Writing manuscript on Executive Summary for above project and

reviewing and editing Final Report Phase I of same. Arranged and attended series of research meetings on Livestock and Meat Transportation during October and November. Meetings with Task Force Groups on Iowa Railroad Problems. Initiated first phase of possible research project on container movements of grains from Iowa. Acted as coordinator of grain transportation research with College of Engineering research team working on D.O.T. Contract D.O.T.-OS 30106. "Integrated Analysis of Small Cities Intercity Transportation to Facilitate the Achievement of Regional Goals."

An Economic Analysis of Alternative Grain Transportation Systems: A Case Study, Department of Transportation, Exec. Summary, FRA-OE-73-4, Nov. 1973

PERFORMING AGENCY: Iowa State University, Ames, Department of Industrial Administration, IOW02003

INVESTIGATOR: Thompson, WH

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0064289)

20 083507

PLAN AND PROMOTE IMPROVED WHOLESALE FOOD MARKETING FACILITIES AND METHODS IN NEW ORLEANS, LOUISIANA

The objective of this project is to improve the wholesale food marketing facilities in New Orleans, Louisiana. The approach will include the following: Determine the number and types of food firms including their locations and tenure status, methods of receipts, volumes handled, selected costs of operations, and adequacy of present facilities in terms of efficiency, organization, and space use; Formulate plans for those firms needing new facilities and recommend the type of facility which will help reduce marketing costs; Evaluate acceptable sites in relation to proximity to center of distribution and consumption, accessibility to truck and rail transportation and convenience for buyers; Develop a master plan for the site and determine the total investment for land and facilities and management needs, and estimate the annual revenue required to operate the proposed facilities; and Compare selected costs in the present market with those in the proposed facilities. The progress report will include a plan for a new regional wholesale food distribution center for New Orleans was developed and presented to local officials and food wholesalers at a public meeting in New Orleans. It calls for the initial development of \$13.4 million worth of facilities on 92 acres of land to meet the immediate needs of 54 local food wholesalers. The center is designed to be expanded to more than twice its initial size to meet future needs. As much as \$1.5 million could be saved at the outset each year in the handling and distribution of all kinds of food products. A site for constructing the initial facility has been purchased by the city and plans are underway for its development. A report of the study is written and has been submitted for publication.

REFERENCES:

Central Refrigeration System for A Proposed Food Distribution Center in New Orleans, Louisiana, Taylor, EG, Agricultural Research Service, NE-26, Aug. 1973

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute, 1104-15863-016

INVESTIGATOR: Taylor, EG Brasfield, KH

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1973
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0040306)

20 083508

PLAN AND PROMOTE IMPROVED WHOLESALE FOOD MARKETING FACILITIES AND METHODS IN DALLAS, TEXAS

The objective of this project is to improve the wholesale food marketing facilities in Dallas, Texas. The approach will include the following: Determine the number and types of food firms including their locations and tenure status, methods of receipts, volumes handled, selected costs of operations, and adequacy of present facilities in terms of efficiency, organization, and space use; Formulate plans for those firms needing new facilities

and recommend the type of facility which will help reduce marketing costs; Evaluate acceptable sites in relation to proximity to center of distribution and consumption, accessibility to truck and rail transportation and convenience for buyers; and develop a master plan for the site and determine the total investment for land and facilities and management needs, and estimate the annual revenue required to operate the proposed facilities. The progress report will include plans for improved wholesale food facilities in Dallas Texas, have been completed for firms facing displacement by highway or other urban renewal plans. Twenty-eight firms handling over 399,000 tons of good products annually are included. Fifteen specialized buildings arranged on 58 acres of land will meet their needs in the initial development. Future development of a farmers' market and allied industries would add another 50 acres bringing the total land area needed to over 100 acres. The total cost for the new center would be about \$11.3 million. Highlights of the study were presented at a public meeting in Dallas in September 1973. Since that time, meetings have been held with food industry representatives in Dallas to discuss implementation of the study and recommendations is drafted and in the process of publication.

REFERENCES:

Central Refrigeration System for a Proposed Food Distribution Center in Dallas, Texas, Overheim, RK, Agricultural Research Service, NE-27, Aug. 1973

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute, 1104-15863-002

INVESTIGATOR: Overheim, RK Brasfield, KH

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1973
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0040307)

20 083525

A RATE-COST ANALYSIS OF NEBRASKA LIVESTOCK AND MEAT TRANSPORTATION WITH GRAIN SHIPMENT COMPARISONS

The objectives of this project are to: Determine geographic patterns of interstate shipments of Nebraska livestock and meat; Determine extent to which backhauls are available and economically significant to livestock and meat truckers; Measure costs of truck shipments of livestock and meat; Obtain truck and rail rates for livestock and meat shipments; Compare truck costs with truck and rail rates; and compare costs and rates for livestock and meat shipments with those for grain shipments. Costs of livestock and meat trucking services are being measured using measured using economic-engineering techniques. Cost data have been collected and partially analyzed. Resulting costs are being compared with rail and truck published rates for meat shipments. Preliminary results indicate rates correspond closely with costs if no costs are allocated to backhauls. Any backhaul revenue received by model firms constitutes pure profit. Livestock/meat transport cost differentials in combination with weight loss in processing make long distance shipment of meat more economical than that for live animals.

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, NEB-10-068

INVESTIGATOR: Anderson, DG

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973
COMPLETION DATE: July 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0063941)

20 083526

IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAIN AND FARM SUPPLY FIRMS

The objectives of this project are to: estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties; Estimate demand for feed and fertilizer: project alternate changes in grain transportation; Determine economic feasibility of alternative systems of grain movement from producers to destinations; Determine effect of changes on number, size, type and location of country elevators and on local employment and services; Determine consequences

of projected transportation changes on distribution of feed and fertilizer; and develop guidelines which individual firms can use in investment and transportation decisions. Data will be obtained through survey schedules, transportation rate information, and published reports, and models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations will be developed. A six-county area in south-central Nebraska is the focus of a case study of abandonment implications. Results will aid elevator operators and other grain shippers in investment and other management decisions. Results of an economic-engineering analysis of grain trucking costs are being edited for publication. Average per unit costs were found to be affected by truck size, average length of haul and annual volume. Operating costs, particularly the cost of fuel, were important factors. Results will be useful to shippers, truck owners and operators and regulatory authorities. Comparisons are being made between truck costs and published rail rates for grain shipments over various length of haul. Results will be of use to grain shippers in their choice of mode and will offer guidelines to feasibility of private truck carriage. There may also be implications for regulatory rate and service policies. Dr. J. R. Felton, has been analyzing the supply-demand aspects of rail grain shipments. Included in his findings is a proposed market allocation system for freight cars. The system would substitute market pressures for present authoritarian car allocation methods and would render car shortages impossible in an economic sense.

REFERENCES:

Interline Freight Car Movement and Owner Compensation Felton, JR, Nebraska Univ., Lincoln, Dept of Agricultural Economics, Staff Paper 1973-13, 19 pp, 1973

The Importance of Grain Transportation to the Farm Economy and the Railroad Industry, Felton, JR, Nebraska Univ., Lincoln, Dept of Agricultural Economics, Staff Paper 1973-14, 18 pp, 1973

Private and Public Influences on the Size and Allocation of the Freight Car Fleet, Felton, JR, Nebraska Univ., Lincoln, Dept of Agricultural Economics, Staff Paper 1973-16, 20 pp, 1973

Measurement of the Adequacy and Efficiency of the Freight Car Fleet, Felton, JR, Nebraska Univ., Lincoln, Dept of Agricultural Economics, Staff Paper 1973-18, 12 pp, 1973

Proposed Solutions to the Problem of Freight Car Supply Felton, JR, Nebraska Univ., Lincoln, Dept of Agricultural Economics, Staff Paper 1973-19, 15 pp, 1973

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, NEB-10-062

INVESTIGATOR: Anderson, D

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971 COMPLETION DATE: July 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0060519)

20 083533

SYSTEMS ANALYSIS OF THE ECONOMICS OF GRAIN MARKETING

The objectives are: (1) Determine the effects of changing farm programs on the efficiency of the Marketing, Utilization and Distribution of Grain and Soybeans and their products; (2) Study changes in price relationships as a consequence of differences in location and production resulting from farm programs; (3) Ascertain changes in the relative utilization of different grains in the feeding of livestock and other uses; (4) Determine the implications of farm programs for shipping patterns and quantities shipped to foreign market; (5) Investigate the operations of marketing systems as they affect: (a) The economics of physical distribution and processing of grains. (b) Managerial decision-making by grain marketing firms. Secondary data will be supplemented by station experimental data, farm records, previous studies and from agencies and individual firms involved in various phases of the grain industry. Time series data will be analyzed and related to the long and short run demand for grain. U.S. price support programs, export subsidies, C.C.C. sales and inter-grain price relationships will be analyzed. Programs and policies of importing countries will be analyzed from standpoint of their relationship to U.S. exports. A spatial equilibrium model determining the optimum size, type, and number of firms will be developed. Existing decision-making models will be adapted and improved or new ones will be developed through studying

operating parameters and external constraints of marketing firms. PROGRESS REPORT: Cost of alternative move-store activities for small grains from the field to a central market were estimated. Included in the analysis were farm trucks, semi-trailer trucks, single car, multiple car, and unit train rates, farm storage, and elevators of 100,000, 400,000, and 1,500,000 bushels storage capacity. Resultant budgets for alternative movements of grain from field to a central market were ranked from 1 to 58 by total cost and compared with the most commonly used system. These budgets ranged from 27.97 cents per bushel to 52.97 cents with the typical system estimated at 41.84 cents. Limitations on some least cost budgets and justifications for more costly budgets were given. A Master's thesis was completed on marketing strategies of a sample of central N.D. grain farmers. This study indicated that country elevators were the predominant grain sales outlet.

REFERENCES:

The Cost of Seed Processing Anderson, DE, NDSU, Agricultural Experiment Station, Nov. 1973

Grain Marketing Methods in the United States: Theory Assumptions and Approach, Anderson, DE, NDSU, Agricultural Experiment Station, AAEA-CAES-WAEA Conf Paper, Aug. 1973

A Budget Analysis of the Logistics System for North Dakota Small Grains, Jensen, RC, NDSU, Department of Agricultural Economics, Unpublished MS Thesis, May 1974

North Dakota Farmers Grain Marketing Strategies Bedker, GM, NDSU, Department of Agricultural Economics, Unpublished MS Thesis, Mar. 1974

North Dakota Farmers Grain Marketing Practices Bedker, GM; Anderson, DE, NDSU, Agricultural Experiment Station, North Dakota Farm Research, Oct. 1974

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics, ND01354

INVESTIGATOR: Anderson, DE

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0060238)

20 099625

SYSTEMS ANALYSIS OF THE ECONOMICS OF GRAIN MARKETING

Determine the effects of changing farm programs on the efficiency of Marketing, Utilization and Distribution of Grain and Soybeans and their products; Study changes in price relationships as a consequence of differences in location and production resulting from farm programs. Ascertain changes in the relative utilization of different grains in the feeding livestock and other uses. Determine the implications of farm programs for shipping patterns and quantities shipped to foreign markets.

Secondary data will be supplemented by station experimental data, farm records, previous studies and from agencies and individual firms involved in various phases of the grain industry. The grain marketing system will be approximated by a spatial equilibrium model determining the optimum size, type, and number of firms. Projections of grain production and consumption will be made. Time series data will be analyzed and related to the long and short run demand. U.S. price-support programs, export subsidies, C.C.C. sales and inter-grain price relationships will be analyzed. Programs and policies of importing countries and measurement of the incidence of trade restrictions will be evaluated for U.S. exports. Export potentials for U.S. grain will be estimated.

A survey was made of multiple rail car loading country elevators and sub-terminals in Southern Minnesota to determine how new multiple rail car export rates are influencing grain marketing patterns and the structure of the country elevator industry. The results were summarized and a manuscript prepared. In mid-1974, 19 elevators in Southern Minnesota were operating facilities capable of loading unit grain trains. Several were under construction and at least three more elevators with unit train capability will be built in 1975. These elevators were shipping sizeable quantities of corn and soybeans by rail to the Gulf and Duluth-Superior for export. Unit train grain shipments from country points to export ports have several advantages favoring their continued heavy use. One railroad has also announced its intentions to extend lower multiple-car rates on domestic shipments to terminal markets and processors. This will give an advantage to country shippers that can ship in large quantities.

REFERENCES:

Grain Transportation and Sub-Terminals Dahl, RP, Farmers Elevator Association of Minnesota, Minneapolis, Speech, Feb. 1974

PERFORMING AGENCY: Minnesota University, Saint Paul, Department of Agricultural and Applied Economics

INVESTIGATOR: Dahl, RP

SPONSORING AGENCY: Department of Agriculture, MIN-14-069

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0060487)

20 099627

AN ECONOMIC ANALYSIS OF PRESENT AND POTENTIAL TRADE BETWEEN ALASKA AND WASHINGTON

Identify present types and quantities of goods and methods of shipment by major commodity, and estimate future volume and commodity make-up of trade between Alaska and Washington; identify characteristics of distribution systems which are or may be critical impediments to present and future trade; develop and present technological, legislative, physical and institutional innovations as needed to improve performance of physical distribution systems and minimize impediments to trade; concomitant with above, examine specific, based on comparative advantage, probable commodity and form composition of such future trade.

A profile of the Alaska-Washington distribution system will be developed through primary surveys and secondary data; commodity data and demographic data will be used to predict increased Alaska commodity demands and required Washington trade expansions and their composition; operating characteristics of the distribution system will be examined for possible impediments to present and future trade; as "critical" impediments are identified potential innovations to improve the performance of the system will be analyzed.

An examination of barriers to trade between Alaska and Washington has been partially completed. Transportation firms, government agencies, and marketing personnel have provided needed data relative to current problems affecting pricing problems. Data collection from the U. S. Army Corps of Engineers was expanded to include Alaska Domestic coastwise water-borne commerce from sources other than Washington for 1966-1972. These data will be analyzed to identify, major Alaska ports for inbound and outbound commerce, major commodities involved in commerce, port and commodity profiles, and volume of commerce relative to economic activity in Alaska. An input-output model of Alaska has been constructed. The model will identify structural interrelationships and provide projections of Alaskan trade needs. On grant-related research, the elasticity of demand for agricultural transportation of cherries and apples has been identified using the "logit" model. Additionally, the stability of exempt carriers in providing transportation service has been investigated via a national survey.

REFERENCES:

Boom or Bust Economy -- Past History for Alaska? Logsdon, CL; Casavant, K; Thomas, W, AAEA Annual Meetings, College Station, Texas, Paper, Aug. 1974

Energy-Intensiveness in Agricultural Transportation as a Source of Energy Conservation, Casavant, K; Cornelius, J, Project independence Public Hearings, Federal Energy Adm., Sept. 1974

PERFORMING AGENCY: Washington State University, Department of Agricultural Economics

INVESTIGATOR: Casavant, KL Faris, JE Waananen, MV

SPONSORING AGENCY: Department of Agriculture, WNP00191

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Current Research Information System (CRIS 0064137)

20 099628

APPRAISAL OF CAPABILITY OF TRANSPORTATION SYSTEM TO MEET NEEDS OF AGRICULTURE AND RURAL AREAS

Appraise the effectiveness of the rural transportation system to meet incurred demand for services and the capacity of the transportation system to economically move inputs under a policy of full production. Quantify effects of sharply increased exports on farm product storage

and transportation facilities and identify long-run structural problems affecting the capability of the transportation system to serve rural areas.

Utilize secondary data sources and interview local, state and Federal officials to obtain an assessment of the capability of the transportation system to meet agriculture's need. Models and other appropriate analytical tools are basic to making systematic appraisal of the data upon which to draw conclusions.

An interim report was submitted to the Congress showing that extraordinary demands for grain and soybean transportation in 1973 were met. The hardships and costs of meeting the demands were discussed. Some of the long-run structural problems of the transportation industry were identified and data availability for analysis of the problems assessed. Held a workshop on rural transportation problems and assisted in planning and conducting four Extension Workshops concerning the activities generated by the Regional Rail Reorganization Act of 1973.

Transportation in Rural America: An Interim Report US Senate, Committee on Agriculture & For., Comm Print, Committee Print, 18 pp, Apr. 1974

PERFORMING AGENCY: Kansas State University

INVESTIGATOR: Schnake, LD

SPONSORING AGENCY: Department of Agriculture, NEA-14-126-20-01

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
COMPLETION DATE: July 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041789)

20 099633

MARKET DEVELOPMENT FOR HARD RED SPRING AND DURUM WHEAT

Determine historical market activity for Hard Red Spring and Durum wheat; identify and analyze barriers to development of alternative market outlets; and determine alternative remedies to implement market development programs.

Study trends of stocks of classes of wheat. Identify and project demand for total use of spring wheat. Analyze competitive relationships of competing wheat classes. Analyze export subsidy payment programs. Analyze impact of government programs on distribution of wheat into markets. Cost to volume efficiency study of segments of the transportation industry. Analyze transportation services and related institutional conditions. Determine optimum distribution patterns for spring wheat with varying transportation costs. Study effects of shifts in distribution patterns resulting from changes in market demand. Cross-relate results and to resolve remedies to market development problems.

Work was completed on two manuscripts dealing with a Comparative Analysis of U.S. and Canadian Wheat Grading Standards. Eased on this study, recommendations for several minor changes in the U.S. grading system were suggested. It was generally concluded the Canadian system more closely parallels the U.S. system since the modifications were made. Work on a study of the impact of freight rate changes on farm prices of grain was continued. Several regression procedures are being used to analyze the significance of the rate changes. A Master's thesis is being completed on this study. A Market News Service was initiated on a pilot project basis in August 1974. This service provides toll-free telephone market news to farmers on a tape code-a-phone system, with the news updated twice daily. A questionnaire is planned to users in early 1975 to measure the benefits of the service.

REFERENCES:

Comparative Analysis of U.S. and Canadian Wheat Grades Anderson, DE; Petry, TA, North Dak St Univ, Dept of Agr Econ., Ag Exp. Station, Agri Econo Report, N., Nov. 1974

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics

INVESTIGATOR: Anderson, DE

SPONSORING AGENCY: Department of Agriculture, ND03314

STATUS: Active NOTICE DATE: July 1975 START DATE: Sept. 1965
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Current Information Research System (CRIS 0007897)

20 099644

APPRAISAL OF THE CAPABILITY OF THE TRANSPORTATION SYSTEM TO MEET NEEDS OF AGRICULTURE AND RURAL AREA

Appraise the effectiveness of the rural transportation system to meet incurred demand for services and the capacity of the transportation system to economically move inputs under a policy of full production.

Quantify effects of sharply increased exports on farm product storage and transportation facilities and identify long-run structural problems affecting the capability of the transportation system to serve rural areas.

Utilize secondary data sources and interview local, state and Federal officials to obtain an assessment of the capability of the transportation system to meet agriculture's need. Models and other appropriate analytical tools are basic to making systematic appraisal of the data upon which to draw conclusions.

An interim report was submitted to the congress showing that extraordinary demands for grain and soybean transportation in 1973 were met. The hardships and costs of meeting the demands were discussed. Some of the long-run structural problems of the transportation industry were identified and data availability for analysis of the problems assessed. Held a workshop on rural transportation problems and assisted in planning and conducting four Extension Workshops concerning the activities generated by the Regional Rail Reorganization Act of 1973.

Transportation in Rural America; An Interim Report US Senate, Committee on Agriculture and For., Committee Print, 18 pp, Apr. 1974

PERFORMING AGENCY: Economic Research Service, Department of Transportation Economics

INVESTIGATOR: Reinsel, EI

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
COMPLETION DATE: July 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041661)

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, economics 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.

Short-run needs for transportation services by the grain and soybean industries in FY 1974 were estimated; the supply of services likely to be available was found to be adequate to meet needs. Surveys were conducted of livestock shippers, feed and fertilizer distributors to determine their transportation practices. Limited surveys of livestock truckers were conducted to determine size and time in business. Potential loss of rail service in the Midwest-Northeast in zones where agriculture, forestry and rural development activities are important were estimated to occur for less than 10 percent of the carloads of traffic originated and terminated in the selected zones. Surveys now underway to obtain information about the nature and severity of economic effects from the potential loss of service. The food transportation bill for 1973 was estimated to be \$6.1 billion, no change from 1972. Transportation rates were higher in 1973 than in 1972, a decline in the quantity of U.S. produced foods consumed by the domestic civilian population offset the rate increases. Conducted analyses on various transportation rate and service actions and proposals to assist policy makers in understanding and evaluating the effects of changes on agriculture and rural areas.

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 Cattleman's Ass, Jan. 1974

Changing Technology in Grain Transportation Hutchinson, TQ, International Com Quality Conference, Champaign, Illinois, Oct. 1973

Problems in Transporting Fiscal 1974 Grain and Soybean Exports, Umberger, DE; Hutchinson, TQ, Economic Research Service, For. Agri. Trade of U.S., pp 18-24

PERFORMING AGENCY: Washington State University

INVESTIGATOR: Casavant, KL

SPONSORING AGENCY: Department of Agriculture, NEA-14-125-53-01-X2

Contract 12-17-04-8-917-X

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974

COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041788)

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, economics 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.

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REFERENCES:

Grain and Soybean Transportation Problems in Fiscal 1974 Umberger, DE; Hutchinson, TQ, Economic Research Service, Marketing & Transportation Sit., MTS-191, pp 22-28, Nov. 1973

The Price of Agricultural Transportation Gerald, JO, Grain Transportation Forum, Bismarck, North Dakota, Mar. 1974

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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, Oct. 1973

PERFORMING AGENCY: Economic Research Service, Department of Transportation Economics

INVESTIGATOR: Gerald, JO Hutchinson, TQ

SPONSORING AGENCY: Department of Agriculture, NEA-14-125-11-00

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information System (CRIS
0041660)

20 099647
EVALUATION OF PUBLIC TRANSPORTATION POLICIES
AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economics of size and other factors about for-hire livestock truckers and trucking.

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REFERENCES:

- Grain and Soybean Transportation Problems in Fiscal 1974 Umberger, DE; Hutchinson, TQ, Economic Research Service, Marketing & Trans Sit., MTS-191, pp 22-28, Nov. 1973
- The Price of Agricultural Transportation Gerald, JO, Grain Transportation Forum, Bismarck, North Dakota, Mar. 1974
- Nature and Quality of Livestock Transportation Services Used by Shippers, Hffman, LA, Transportation Com Amer Nat'l Cattlemen's Ass, San Diego, Jan. 1974
- Changing Technology in Grain Transportation Hutchinson, TQ, International Corn Quality Conference, Champaign, Ill., 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: Illinois University, Urbana
INVESTIGATOR: Bunker, AR
SPONSORING AGENCY: Department of Agriculture, NEA-14-125-17-01

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information System (CRIS
0041787)

20 100248
A SIMULATION MODEL FOR ESTIMATING THE EFFECTS OF
RATIONALIZING THE GRAIN COLLECTION, HANDLING AND
DISTRIBUTION SYSTEM UPON THE PRAIRIE ECONOMY

The objective is to develop a framework in which rationalization of the grain transportation system in western Canada can be analyzed with respect to rural community effects. The system's approach will be employed at a regional level to assess the impact of railway branch-line abandonment and elevator closure upon the economy of prairie communities affected. Simulation and evaluation of some rationalization proposals in a specified bounded production region will occur to estimate the change in direct employment income to the region with total effect to be estimated by deriving a local multiplier. Tax revenue changes and changes in local infrastructure investment and maintenance—chiefly roads—will also be estimated.

PERFORMING AGENCY: Manitoba University, Canada
INVESTIGATOR: Magarrell, HK Tyrchniewicz, EW
SPONSORING AGENCY: Transportation Development Agency

STATUS: Active NOTICE DATE: July 1975 START DATE: Sept. 1973
COMPLETION DATE: Unknown

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 100430
ROLE OF AGRICULTURAL TRADE AND TRANSPORTATION IN
THE PROCESS OF ECONOMIC DEVELOPMENT

The objective is to develop a model which indicates interrelationships between sectors of a low income economy. This model will be useful in quantifying how export earnings and purchase imports are related to the growth of a low income economy; provide empirical evidence as to how instability in export earnings affects economic development; appraise the comparative advantages of less developed countries in the production of farm products and manufactured goods. An inquiry will be made into the linkages between farm-to-market roads, regional income, and the potential to produce an exportable surplus. Secondary information and primary data collected through field research in two or more low income countries will be used to quantify the above objectives. Field work is anticipated in at least one Asian and one Latin American Country. Reports Issued: "Economic analysis of ground water irrigation in Nueva Ecija, Philippines," C. A. Robertson, Ph.D. thesis, Cornell University, 274 pages, November 1972. "An economic evaluation of water control in the northern region of the Greater Chao Phay Project of Thailand", L. E. Small, Ph.D. thesis, Cornell University, 412 pages, June 1972. "An econometric analysis of the demand for animal protein in Iran", H. Saleh, Ph.D. thesis, Cornell University, 163.

PERFORMING AGENCY: Cornell University, Agricultural Economics,
NYC-121410
INVESTIGATOR: Sisler, DG Robinson, KL
SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Current Research Information System (GY 6434 4)

21 036356

NATIONAL CONTAINER NETWORK FEASIBILITY STUDY

Historical analysis of current TOFC-COFC service, container traffic flow identification container network operating costs, network service differential criteria, network route and node specifications, network line, terminal and facility analysis, network investment requirements, network service package and profitability, network organization and funding requirements, analysis of network benefits.

PERFORMING AGENCY: Reebie Associates, Incorporated
 SPONSORING AGENCY: Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: DeBoer, DJ (Tel 202-426-9682)

Contract CN-DOT-FR-20065 (CPFF)

STATUS: Completed NOTICE DATE: July 1975 START DATE: June 1972 TOTAL FUNDS: \$650,662

ACKNOWLEDGMENT: FRA

21 044568

YARD AND TERMINAL SUBSYSTEM (YATS)

YATS is a subsystem of Missouri Pacific's Transportation Control System (TCS) and is designed to increase the efficiency of railroad operations at major terminals. YATS will assist operations by maintaining a computerized car inventory, supporting local management information requirements, generating car classification work orders, relieving the clerical data entry burden, and providing a real-time, online data base for local operations analysis. YATS is being developed on a Digital Equipment Corporation (DEC) PDP-11 mini-computer in service at eight locations and scheduled for installation at ten more in 1975 and 1976.

PERFORMING AGENCY: Missouri Pacific Railroad
 INVESTIGATOR: Bryan, LM (Tel 314-6222075)
 SPONSORING AGENCY: Missouri Pacific Railroad
 RESPONSIBLE INDIVIDUAL: Sines, GS (Tel 314-622-2564)

In-House

STATUS: Completed NOTICE DATE: July 1975 START DATE: July 1971

ACKNOWLEDGMENT: Missouri Pacific Railroad

21 044569

CARS: CAR ACTIVITY REGULARIZING SCHEDULER

The purpose of the CARS model is to simulate the over-the-road portion of the Missouri Pacific's on-line car scheduling system and to evaluate the data used to drive this on-line system. A pilot program which simulates car scheduling over a portion of the Missouri Pacific network is operational. Current and future efforts are directed towards insuring compatibility of the model with the on-line system and expanding the model's data base to include the entire Missouri Pacific system. The CARS model is made up of three major subprograms—the Preprocessor, the Simulator and the Post processor. The Preprocessor accepts train schedules and blocking policy as input and builds the scheduling files required by the Simulator. The Simulator runs the network for a specified period of time. It accepts car-dependent records as input and schedules these cars to the through and local train required to move them to their respective destinations. Statistics from the Simulator are bled off for analysis by the Postprocessor. The Postprocessor measures the efficiency of the scheduling data base by generating reports on yard and train performance and on transit time reliability.

REFERENCES:

Railroad Car Scheduling System Incorporating Car Scheduling
 Yoakum, RL; Beaumont, LH, Missouri Pacific Railroad, Jan. 1972

PERFORMING AGENCY: Missouri Pacific Railroad
 INVESTIGATOR: Fuller, JH (Tel 314-6222566) Keller, DC (Tel 314-6222566)
 SPONSORING AGENCY: Missouri Pacific Railroad
 RESPONSIBLE INDIVIDUAL: Sines, GS (Tel (314)622-2564)

In-House

STATUS: Inactive NOTICE DATE: July 1975 START DATE: Jan. 1971

ACKNOWLEDGMENT: Missouri Pacific Railroad

21 045142

INSTALLATION OF A RAIL TERMINAL MANAGEMENT SYSTEM (RTMS)

The Railway Terminal Management System and Intermodal Terminal Management Systems are developmental systems. This installation represents the first full-yard implementation and encompasses the use of automatic car identification scanners, wheel directional sensors, mini-computers and other related equipment at Deramus Yard, Shreveport, Louisiana and will permit a real-time inventory of the terminal to be maintained. As cars enter the yard a switch list preparation is automatically prepared and when trains are dispatched, an accurate consist list is immediately available. The Railway Terminal Management System and Intermodal Terminal Management Systems are expected to be beneficial, both to the railroad in the form of increased efficiency and to the general shipping public in reduced delays and improved service.

PERFORMING AGENCY: Kansas City Southern Railway; Louisiana and Arkansas Railway

SPONSORING AGENCY: Federal Railroad Administration; Leventh Street
 RESPONSIBLE INDIVIDUAL: Wacker, WF, Jr

Contract DOT-FR-30047

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973
 COMPLETION DATE: July 1976 TOTAL FUNDS: \$400,000

ACKNOWLEDGMENT: FRA

21 048495

AN EXAMINATION OF THE EFFECTS OF CHANGES IN RAIL TECHNOLOGY UPON GREAT LAKES BULK SHIPPING ACTIVITY

Objectives: To investigate the economic and technical aspects of unit train systems as they relate to Great Lakes shipping activities, with particular emphasis on the development of break-even and threshold points for unit train operations to gain some insight into their overall impact on the future of the Great Lakes shipping system. How information will be applied: Information and knowledge gained from this study would be highly useful in the development of policy and plans for the management of Great Lakes shipping. If, for example, unit trains have a potentially wide application, this would have serious implications upon the planning of new facilities for bulk movements on the lakes. Since such investments would be quite large, such information would be highly essential for proper decision making. Accomplishments during past twelve months: 1. A computer program has been developed to determine costs for bulk shipping on the Great Lakes. Another computer program has been developed to determine costs for unit trains in the Great Lakes region. The models were used to provide a quantitative comparison between two transportation modes under varying conditions. Models show bulk ships tend to dominate unit train movement of goods in and around the Great Lakes region. New and larger unloading ships have strong potential for domination in the future. 2. Two graduate theses have resulted from this work. 3. A paper will be presented at the Operations Research Society of America meeting to be held in Puerto Rico in October 1974.

PERFORMING AGENCY: Wisconsin University, Milwaukee, School of Engineering, Systems Design

INVESTIGATOR: Beimborn, EA Garvey, WA

SPONSORING AGENCY: National Oceanic and Atmospheric Administration, Sea Grant Office, Department of Commerce, 04-3-158-5 #1

STATUS: Active NOTICE DATE: Jan. 1975 START DATE: July 1974
 COMPLETION DATE: June 1975 TOTAL FUNDS: \$8,986

ACKNOWLEDGMENT: Science Information Exchange (GBP 1698)

21 048498

CHANGING TECHNOLOGY AND THE SEAWAY

1. To define the problems facing the Great Lakes area as a result of changing technology, such as: a dramatic increase in size of merchant vessels; containerization; automation in cargo handling; development of new super-ports; and the creation of precise navigation systems. 2. To estimate the benefits from these changes in technology. States, Regional and National Planning Agencies must have this information so that the best policy decisions regarding the Seaway can be made. The effects of changing technology pose serious problems for the Seaway and the results will aid in developing innovations, new investments and significant departures from current practices and methods of operation.

Phase I of the study has been completed and the results were presented at the 8th Conference of the International Association of Ports and Harbors in Amsterdam in May 1973 and at the Marine Technology Society Conference in Washington in September 1973. Phase II of the study will apply the results of Phase I to the Great Lakes Region.

Related projects are: PC-2, PC-3, PC-5, PC-7.

PERFORMING AGENCY: Wisconsin University, Milwaukee, Center for Great Lakes Studies
 INVESTIGATOR: Schenker, E Brockel, H
 SPONSORING AGENCY: National Oceanic and Atmospheric Administration, Sea Grant Office, Department of Commerce, 04-3-158-5 #1 R/PC-2

Grant 04-3-158-5

STATUS: Active NOTICE DATE: July 1975 COMPLETION DATE: June 1975 TOTAL FUNDS: \$9,561

ACKNOWLEDGMENT: National Oceanic and Atmospheric Administration Science Information Exchange (GBP 1703)

21 048795

CONTAINERIZATION IMPACT STUDY

This agreement is to provide funding for new OST(TPI) portion of a containerization impact study to be conducted by the Federal Highway Administration.

PERFORMING AGENCY: Federal Highway Administration, DOT
 SPONSORING AGENCY: Office of Policy and International Affairs, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Stanley, RL HGS-11 (Tel 202-4260724)

ID AS-30063

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Apr. 1973 TOTAL FUNDS: \$30,000

ACKNOWLEDGMENT: Office of Policy and International Affairs

21 054698

IMPROVEMENT IN COUPLING-UP PERFORMANCE IN AUTOMATIC MARSHALLING YARDS

In classification yards of the North American pattern, the free-running cars do not always couple as intended: stalls and overspeed impacts cause \$10 million annual avoidable damage to freight and cars in Canada, and \$100 million annually in the U.S.A. A "Monte Carlo" simulation has been constructed using the IBM 360/50 which is extremely realistic in its simulated assembly of trains. Using it, better methods of constructing and instrumenting the yard are shown to be possible, realizing a 75% reduction in the damage figures.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 3.7.74

INVESTIGATOR: Kerr, CN
 SPONSORING AGENCY: Canadian National Railways; Ministry of Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: July 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

21 054702

CANADIAN FREIGHT TRANSPORT MODEL

The aim of this research is to model the flow of commodity freight in Canada, in order to assist industry and government planners in evaluating future changes to the transport system. The rail transport mode is emphasized, but the effects of competition by other modes are included. An optimizing network flow model of the mainline operation of a railroad is developed. This model predicts the optimal routing of traffic and the congestion at each yard and over each track section in the system. Congestion-dependent expressions are included for time delays in the yards and over-the-road. The time-optimal assignment pattern for railcar flow is then obtained for a given set of origin-destination demands for railcar movement, using a new assignment algorithm. The mainline Canadian rail networks of both CN and CP are modelled. Historical railcar tracing data are summarized and compared with model predictions. A model of modal choice by shippers is also developed in order to obtain modal splits of commodity forecasts. Relative usage of various modes is represented as a function of both modal and shipment characteristics, and the relationships

are tested statistically. To provide the necessary empirical data, an extensive data base has been collected incorporating historical commodity freight data on volume, cost, time and location of rail, ship and for-hire truck movements in Canada. Common codes for commodity grouping are developed to integrate the diverse modal schemes currently used, and the data are transformed to a common regional basis.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5.10

INVESTIGATOR: Fullerton, HV Turner, RE Peterson, ER
 SPONSORING AGENCY: Canadian National Railways; Ministry of Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1971 COMPLETION DATE: Apr. 1974

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

21 058252

ANALYSIS OF CLASSIFICATION YARD TECHNOLOGY

This study comprises a survey and assessment of the state-of-the-art in rail freight car classification yard technology. Separate tasks include establishment of a detailed description of the hardware, costs, performance characteristics, and operational practices of existing yards; formulation of general yard-network interaction concepts; collection of detailed background information concerning the yard population in the United States, categorized by type, technology, and function; estimation of the demands likely to be placed upon the nation's network of freight car terminals during the foreseeable future, and an assessment and prioritization of those areas of terminal operations which warrant further technological research or development.

PERFORMING AGENCY: Stanford Research Institute

INVESTIGATOR: Siddiquee, W (Tel 415-326-6200)

SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Office of Research and Development
 RESPONSIBLE INDIVIDUAL: Abbott, R (Tel 617-494-2250)

Contract DOT-TSC-968

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975 COMPLETION DATE: Nov. 1975 TOTAL FUNDS: \$87,781

ACKNOWLEDGMENT: FRA

21 058278

TRUCK/RAIL INTERMODAL OPERATIONS: AN OPTION FOR THE FUTURE?

Case Study made of advantages, if any, of a T.O.F.C. intermodal service in the Los Angeles-Portland corridor, utilizing latest available equipment and operating techniques—without massive capital outlays on rail roadbed and terminals—in terms of: (1) economic geography; (2) topography; (3) traffic flows, existing and projected; (4) costs and service capabilities; (5) shipper modal preferences; and (6) need and demand for highways. Estimates of modal diversion prepared and submitted to sample shippers, carriers, and labor representatives for comment and critiques.

Task A (Preliminary) Traffic Divertability May 1974

Task B (Preliminary) Impact on Carriers and Shippers Mar. 1975

PERFORMING AGENCY: Reebie (Robert) and Associates, Incorporated

INVESTIGATOR: Ainsworth, D (Tel 203-661-8661)

SPONSORING AGENCY: Federal Highway Administration, Department of Transportation; Federal Railroad Administration
 RESPONSIBLE INDIVIDUAL: Sonnenberg, AT (Tel (202)426-0570)
 Keale, MJ (Tel (202)661-8661)

Contract DOT-FH-11-8158 (CPFF)

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1973 COMPLETION DATE: Sept. 1975 TOTAL FUNDS: \$175,420

ACKNOWLEDGMENT: FRA

21 058279

SYSTEMS ENGINEERING FOR INTERMODAL SYSTEMS

The objective of the systems engineering effort in connection with intermodal systems is to define and analyze the great number of variables that affect the design, layout and equipment for use in a rail-highway intermodal system. The areas to be investigated include the functions required of gateway and intermediate terminals (light density as well as heavy density service in each type of terminal), the equipment needed to operate an

efficient system such as rolling stock, handling equipment and propulsion and the control processes necessary to optimize utilization of plant. It is anticipated that test and evaluation of the design concepts selected will be conducted in cooperation with the railroad industry and local and state governments on a cost sharing basis.

The contract to a performing organization has not yet been awarded.

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

RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel (202)426-0855)

STATUS: Proposed NOTICE DATE: July 1975 START DATE: May 1976 COMPLETION DATE: Apr. 1979

ACKNOWLEDGMENT: FRA

21 058439

ANALYSIS OF R&D FREIGHT PLAN

Review a R&D planning freight scenario prepared by the Office of R&D Plans and resources and assess the reasonableness of the specific goals and time frames referenced therein and identify barriers that could hamper implementation of desired improvements. Catalog and quantify the nominal (or range) time lag the applicable barrier imposed on the delivery of freight innovations. These may be extracted from the literature or hypothesized by the application of ex poste deductive reasoning. Suggest methods whereby the barriers can be mitigated or eliminated. As an exposition of the ideas presented, develop a step-by-step action plan that the Department of Transportation would follow to assure efficient delivery of a specific, major freight innovation.

PERFORMING AGENCY: Gellman Research Associates, Incorporated

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Green, LP TST-20

Contract PS-50304

STATUS: Completed NOTICE DATE: July 1975 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1975 TOTAL FUNDS: \$3,546

ACKNOWLEDGMENT: Office of Systems Development and Technology

21 058461

INVESTIGATION OF THE AERODYNAMIC DRAG OF CONTAINERS AND TRAILERS ON FLATCARS

Obtain a detailed formulation of an experimental program which will determine the aerodynamic drag of various methods of transporting containerized freight on railroad flatcars. This program shall include testing of trailers on flatcars (TOFC), containers on flatcars (COFC) and proposed techniques for reduction of drag through streamlining, drag through streamlining.

PERFORMING AGENCY: Andrew G. Hammitt Associates

INVESTIGATOR: Hammitt, AG (Tel 213-541-1328)

SPONSORING AGENCY: Transportation Systems Center, 612-0278-AT

RESPONSIBLE INDIVIDUAL: Barrows, T 612 (Tel 617-494-2451)

Contract TSC-1002 (FFP)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Mar. 1975 COMPLETION DATE: Nov. 1975 TOTAL FUNDS: \$99,000

ACKNOWLEDGMENT: TRAIS (612-0278-AT)

21 097348

ST. LOUIS TERMINAL PROJECT

The railroad industry's Labor/Management Committee, which is comprised of the chief executives of railroads and labor organizations, established a number of labor/management programs to work on specific problem areas. The St. Louis Terminal Project is one such activity. A Task Force on Terminals was established by the Labor/Management Committee with the objective of increasing 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 and 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. Missouri Pacific's St. Louis Terminal division was selected as the laboratory for this experimentation. A Project Team was formed to head up the project. The Project

Director and Assoc. Director were recruited from the ranks of management and labor. The St. Louis Terminal Project consists of the following activities: 1) identification of potential changes, 2) implementation of experiments, and 3) method to measure the quantitative impacts of experiments, a computerized car movement evaluation system was developed. This system and the underlying approach can be used by any railroad. This project is unusual in the labor and management are working together to implement significant changes in railroad terminal operations which will hopefully lead to improved service, more and better jobs. The lessons learned from this project should have wide application throughout the industry.

PERFORMING AGENCY: Task Force on Terminals of the Labor/Mgt Committee

INVESTIGATOR: Dyer, VG (Tel (314) 622-2750) Zamarioni, FJ

SPONSORING AGENCY: Railroad Labor Organizations; Association of American Railroads; Federal Railroad Administration; Missouri Pacific Railroad

RESPONSIBLE INDIVIDUAL: Collins, DW (Tel (216) 228-9400 X-32)

Contract EB-400-0-ARR-849

STATUS: Active NOTICE DATE: June 1975 START DATE: Oct. 1973 COMPLETION DATE: Dec. 1975 TOTAL FUNDS: \$596,213

ACKNOWLEDGMENT: FRA

21 099384

IMPROVED RAIL FREIGHT SERVICE PROGRAM

With the objective of improving rail freight service the following projects are being conducted or are being considered: Rail Terminal Management Program on Kansas City Southern (Partial Operation); Classification Yard Technology Analysis (Stanford Research Institute); Freight Truck Design Optimization (Southern Pacific Transportation Co.); Track Train Dynamics Program (Association of American Railroads et al); Advanced Component Development which will involve couplers, brakes, etc.; Fly-wheel Yard Locomotive Development (project being developed).

PERFORMING AGENCY: Federal Railroad Administration, Office of Freight Systems Research and Development

SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: FRA

21 099387

FREIGHT CAR MANAGEMENT PROGRAM

This program presently involves four phases: (1) Systems Operations including service reliability studies, data interface standards and car cycle sampling; (2) Operating Practices as involved with Car Service rules, per diem rates and car distribution procedures; (3) Information Technology developing Car Assignment Model and Demand Forecast Model; (4) Operating Systems with the Line Operations phase involving Grand Trunk Western and Missouri Pacific and the Yard Operations phase involving the Kansas City Southern at Shreveport, La., and the Chicago Railroad Terminal Information System.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Systems Analysis and Program Development

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: DeBoer, DJ (Tel 202-426-9682)

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: FRA

21 099397

FREIGHT CAR UTILIZATION RESEARCH PROGRAM—PHASE I

Since an increase in car utilization would effectively increase the car supply, a research and action program directed at improving utilization has been undertaken. A significant improvement probably can be achieved without revolutionary changes on the part of shippers, railroads and government agencies. A quantitative assessment of the potential for improvement can be made when an adequate data base on car cycles is available. Analysis of these car cycles from load to load would reveal the fraction of time a car spends being loaded, being moved by railroads and being unloaded. Car utilization is expressed in terms of a wide variety of indices. None is wholly satisfactory for evaluation of all aspects of utilization and

none in common use permits analysis of the economic effectiveness of use of the car fleet. A \$12 million program, extending through 1980, is projected. The first phase, a two-year program, includes: Analysis of current practices and problems; (2) Development of car utilization measurement standards; (3) Collection of data for a more complete car cycle analysis; (4) Recommendation of projects for FRA consideration; (5) Analysis of the impact of AAR and ICC rules, directives and orders on car utilization; (6) Study of freight car time reliability. Each of these projects is expected to identify specific opportunities for improvement in car utilization.

PERFORMING AGENCY: Association of American Railroads
 SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute; Federal Railroad Administration; Interstate Commerce Commission; Railway Labor Organizations; Transportation Association of America
 RESPONSIBLE INDIVIDUAL: Leilich, GM (Tel 202-293-5018)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1974
 COMPLETION DATE: Jan. 1977 TOTAL FUNDS: \$2,365,000

ACKNOWLEDGMENT: AAR

21 099403

FREIGHT CAR UTILIZATION RESEARCH PROGRAM. PHASE I. TASK 6—RELIABILITY STUDIES

Design and conduct a series of experiments, coordinated with Task 3, which will permit statistically sound evaluations of alternatives to improve rail service reliability and the effects these alternatives have on equipment utilization.

For further information on related studies see also RRIS 099398 Section 26A, 099399 17A, 099400 17A, 099401 17A, 099402 24A Bulletin 7502.

PERFORMING AGENCY: Association of American Railroads
 INVESTIGATOR: Yarbrough, HF (Tel 404-688-0800)
 SPONSORING AGENCY: Association of American Railroads
 RESPONSIBLE INDIVIDUAL: Leilich, GM (Tel 202-293-5018)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1975
 COMPLETION DATE: Jan. 1977

ACKNOWLEDGMENT: AAR

21 099630

CONTAINERIZED TRANSPORT AND STORAGE SYSTEMS FOR GRAINS AND SOYBEANS

Determine feasibility of combining short term storage and transportation by some form of containerization so as to facilitate use of vehicles not now used for transport of grain and soybeans.

Both on-farm and off-farm handling and storage methods, equipment, and facilities for grains and soybeans will be surveyed to determine the adaptability of the functions to some form of containerized storage and transport. Various types of rail and highway vehicles not now used for grain and soybean transport will be studied to determine if they might be adapted to hauling grains and soybeans on return movement through grain areas. The engineering and operational feasibility of these potential innovations will be assessed and appropriate recommendations developed.

PERFORMING AGENCY: Kearney Foundation
 INVESTIGATOR: Breakiron, PL Guilfooy, RF, Jr Macomber, FS
 SPONSORING AGENCY: Department of Agriculture, 0701-15842-009-C

Contract 12-14-1001-406

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
 COMPLETION DATE: Mar. 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041197)

21 107252

IMPROVING TRAILER VANS AND CONTAINERS FOR TRANSPORT OF PERISHABLE FOODS

The objectives include the following: Develop design criteria and specifications necessary for improving environmental control systems in transport vehicles and develop, test, and evaluate such improvements. The approach include the following: Standard testing methods for rating performance of loaded refrigerated trailers and van containers will be developed. Development of this method and its related empirical data will provide a basis for realistic design and performance specifications for such vehicles and as a yardstick for evaluating improved refrigerated vehicles

and modifications of conventional equipment. Shipping experiments will be made to develop additional performance data and data on cost of fuel, servicing, and maintenance to determine operating and ownership cost of improved equipment. The progress report include the following: The prototype van container has been utilized to transport celery, citrus, cantaloupe, and lettuce domestically; one mixed load of cabbage, poly-bagged carrots, celery, and lettuce was shipped in it to Korea. All outturns were judged excellent by the receivers; temperatures were optimum and uniform, and boxes sustained less damage. Field tests of the prototype will be concluded after an export shipment of corn or radishes during the second or third quarter of FY 1975. It is undergoing fumigation capability tests at this time. The first draft of the project report can then be completed. Reports Issued: Improving the Transport of Perishables Through Better Equipment and Methods, P.L. Breakiron, 24th Int. Conf. on Handling Perishable Agr. Commodities, Purdue Univ., March 1971. Long-Haul Transportation of Frozens, Frozen Food Age, W. F. Goddard, Jr., Distribution Zero Issue, Vol. 19 No. 12, July 1971. Refrigeration Systems and Loading Patterns for Refrigerated Trailers and Van Containers, W.F. Goddard, Jr., Paper, Conference on Delivering Quality Perishables, University of Florida, January 1972. Air Distribution—The Common Denominator, W.F. Goddard, Jr., Journal American Society of Heating, Refrigerating, and Air Conditioning Engineers, January 1972. New Developments in Perishable Commodity Movement, W.F. Goddard, Jr., Paper, Cargo Systems Science Conference, April 1972. The Floor—A Common Denominator for Refrigerated Transport Problems, International Institute of Refrigeration, Meeting of Commission D-2 Land Transport, Wageningen, The Netherlands (1974), Goddard, W.F., Jr., pp 22-26.

PERFORMING AGENCY: Agricultural Research Service, Transportation Facilities Division, 7606-15840-001

INVESTIGATOR: Goddard, WF

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1971
 COMPLETION DATE: Jan. 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0022041)

21 107295

UTILIZATION AND IMPROVEMENT OF VEHICLES FOR TRANSPORT OF GRAIN

The objectives are to improve the utilization of present transport equipment for grain and to develop new transport concepts, in order to hold down transport costs and reduce loss and damage to grain in transit. The approach will be to study present equipment, methods, and techniques for the transport and physical distribution of grain, evaluate each phase of distribution on the basis of cost and performance, and develop concepts for changes in equipment and methods with a view toward: better utilization of present equipment; development of improved transport equipment and techniques; faster loading and unloading of vehicles; reducing overall physical distribution time; reducing the number of times the product is handled and transferred; evaluating and testing new ideas. The Progress Report will include: Exploratory work was continued to determine if it might be feasible to increase the utilization of railroad boxcars through heavier loading of cars. Data were obtained on 2,000 box car loads of wheat and corn handled at Chicago, Minneapolis, and Kansas City. That data indicated that boxcars have an average load limit of about 65 tons, and that the average weight of grain loaded into the cars is about 60 tons. Although it would appear that cars could, on the average, be loaded with 5 more tons of grain, it was found not feasible to do so. There are four factors which, in combination, prevent heavier loading. They are: Variation in load limits of cars; variation in grain weight; grain door height (some open space above door must be allowed through which to insert the loading spout); and, some space must be allowed between the top of the load of grain and the car roof so that a man has room to maneuver to insert a grain probe.

PERFORMING AGENCY: Agricultural Research Service, Transportation Facilities Division, 1104-15841-006

INVESTIGATOR: Guilfooy, RF, Jr

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1972
 COMPLETION DATE: June 1977

ACKNOWLEDGMENT: Current Research Information System (CRIS 0022877)

22 052066

FREEZING PROBLEMS DURING RAIL TRANSPORTATION

Study to determine methods processes or equipment to eliminate or minimize delays in discharging granular bulk materials (coal ore, etc.) from rail cars under freezing conditions.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, Queen's University

INVESTIGATOR: Colijn, H

SPONSORING AGENCY: Canadian National Railways; Ministry of Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: Aug. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

22 054568

IMPROVING TRAILER VANS AND CONTAINERS FOR TRANSPORT OF PERISHABLE FOODS

OBJECTIVE: Develop design criteria and specifications necessary for improving environmental control systems in transport vehicles and develop, test, and evaluate such improvements. APPROACH: Standard testing methods for rating performance of loaded refrigerated trailers and van containers will be developed. Development of this method and its related empirical data will provide a basis for realistic design and performance specifications for such vehicles and as a yardstick for evaluating improved refrigerated vehicles and modifications of conventional equipment. Shipping experiments will be made to develop additional performance data and data on cost of fuel, servicing, and maintenance to determine operating and ownership cost of improved equipment. Progress: The prototype van container has been utilized to transport celery, citrus, cantaloupe, and lettuce domestically; one mixed load of cabbage, poly-bagged carrots, celery, and lettuce was shipped in it to Korea. All outturns were judged excellent by the receivers; temperatures were optimum and uniform, and boxes sustained less damage. Field tests of the prototype will be concluded after an export shipment of corn or radishes during the second or third quarter of FY 1975. It is undergoing fumigation capability tests at this time. The first draft of the project report can then be completed.

REFERENCES:

The floor -- A common denominator for refrigerated transport problems., Goddard, WF, Jr, Intl Inst Refrig Meet Comm D-2 Land Transp, Wageningen, Neth, 22-26 pp, 1974

PERFORMING AGENCY: Department of Agriculture, Horticultural Research Laboratory

INVESTIGATOR: Breakiron, P (Tel 303-344-2815)

SPONSORING AGENCY: Department of Agriculture, Agricultural Research Service

ID

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1971 COMPLETION DATE: Jan. 1975

ACKNOWLEDGMENT: Science Information Exchange (CRIS-00220411), Current Research Information System

22 058248

DEVELOPMENT OF PERFORMANCE-ORIENTED CONTAINER STANDARDS FOR PACKAGING OF HAZARDOUS MATERIALS—CARBOYS AND BAGS

Perform theoretical analyses, and conduct selective experimentations and laboratory investigations with the objective of developing accurate, reproducible, reasonably concise, performance-based tests and requirements for carboys and bags (and inside containers and linings, where comparable). Each performance test is to assess one or more environmental characteristics being simulated.

PERFORMING AGENCY: Naval Ordnance Laboratory, DOD,USN

SPONSORING AGENCY: Office of Environment, Safty and Consumer Affaires, Department of Transportation

RESPONSIBLE INDIVIDUAL: Gigliotti, ME TES-221 (Tel 202-4262311)

IA AS-50032

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1975 COMPLETION DATE: Jan. 1976 TOTAL FUNDS: \$90,000

ACKNOWLEDGMENT: TRAIS

22 071572

IMPROVED TRANSPORT EQUIPMENT AND TECHNIQUES FOR OVERSEAS SHIPMENTS OF FRUITS AND VEGETABLES

OBJECTIVE: Find more efficient, less costly ways of transporting fresh fruits and vegetables to overseas markets. APPROACH: Make paired test shipments by usual break-bulk method and in container vans. Measure transport, damage, refrigeration, insurance, documentation and handling costs. Develop and test improved load patterns, transport refrigeration and handling equipment and techniques. Obtain data on labor, material and capital inputs by time and cost studies for the land-sea-land movement of the products. Similar work also done at Orlando, Florida (See Work Units TF 4-220 and 4-220A). The only difference between this project and TF 4-220A is the emphasis placed on special commodities. (See items 62 through 66). Progress: A cooperative export program was agreed upon by several citrus producer/shippers in South Texas early in the citrus marketing season. It was agreed that shipments would be made during the months of January through March. This time period is more representative of fruit maturity. A freeze occurred on the morning of December 21, 1973, causing considerable damage. After the freeze, less fruit was being sold on the fresh market. The fuel crises caused shipments to be delayed enroute to market and, as a consequence, citrus shippers were reluctant to cooperate with us in making experimental shipments.

PERFORMING AGENCY: Department of Agriculture, Transportation & Facil. Div., Transportation Research Br

INVESTIGATOR: Camp, TH

SPONSORING AGENCY: Agricultural Research Service, Transportation Facilities Division

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971 COMPLETION DATE: July 1974

ACKNOWLEDGMENT: Science Information Exchange (CRIS-0022083), Current Research Information System

22 080322

THERMAL CONDUCTIVITY MEASUREMENTS OF MOIST BULK MINERAL CONCENTRATES UNDER FREEZING CONDITIONS

An experiment to determine the thermal conductivity characteristics of various moist bulk mineral concentrates under freezing conditions is underway. The parameters determined will be used in the mathematical model of the freezing process now being developed under this program. (See Oosthuisen, Colijn)

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 3.25.74

INVESTIGATOR: Paterson, J

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific; Noranda Research; Queen's University, Canada

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1973 COMPLETION DATE: Apr. 1976

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

22 080323

DEVELOPMENT OF A MATHEMATICAL MODEL OF FREEZING AND THAWING IN A RAILCAR

This study will develop a 3-dimensional heat transfer model of a railcar containing a moist granular material. Its objective is to permit rapid simulation studies of the movement of specific commodities under various freezing weather conditions to determine the extent and character of the freezing process. It is part of the overall freezing research program. (See Colijn, Paterson).

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 3.24.73

INVESTIGATOR: Oousthuizen, PH

SPONSORING AGENCY: Canadian National Railways; Noranda Research; Queen's University, Canada; Canadian Pacific

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

22 083444

PREDICTED EFFECTS OF SELECTED POLICY AND TECHNOLOGY CHANGES ON THE GRAIN MARKETING SYSTEM

In this project, the present grain marketing system will be compared with a simulated least cost system to identify and determine areas of inefficiency in the present grain marketing structure. Alternative government policies and technological developments that affect grain marketing will be selected and will be evaluated by using the spatial equilibrium models to assess the impact of changes on grain marketing system in the South. Progress Report: Arkansas utilization of manufactured feed is estimated to increase from 4.6 million tons in 1970 to 6.2 million tons in 1980. Approximately 900 thousand tons of this increase will be fed in Northwest Arkansas. Southwest Arkansas will need an estimated 428 thousand tons more than in 1970. The other two areas will need an increase of less than 200 thousand tons each. Northeast Arkansas would need 11 new feed mills to process the quantity of feed, if the optimum 78 thousand tons annual capacity plant was built. Southwest Arkansas would need 5 or 6 new mills of this capacity. With the trend toward increase in the percentage of feed being processed in the area of utilization and with 73% of the present feed mills producing less than 10,000 tons annually, the expansion in formula feed production may come from smaller mills. Procurement and distribution cash must be considered along with milling costs in determining the optimum size mill.

REFERENCES:

Trends in Livestock Production-Predicted Effects of Selected Policy & Technology Changes on the Grain Marketing System, Morrison, WR, Ohio Agricultural Research and Development Center, SM-42, Regional Res. Rept. #1, Apr. 1973

PERFORMING AGENCY: Arkansas University, Fayetteville, Department of Agricultural Economics and Rural Sociology

INVESTIGATOR: Morrison, WR

SPONSORING AGENCY: Department of Agriculture, ARK00730

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1970
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0057175)

22 083483

SYSTEM ANALYSIS OF THE ECONOMICS OF GRAIN MARKETING

The purposes of this project are to: determine effects of changing farm program on efficiency of Marketing, Utilization and Distribution of Grain and Soybeans and their products; study changes in price relationships as a consequence of differences in location and production resulting from farm programs; ascertain changes in relative utilization of different grains in feeding of livestock and other uses; determine implications of farm programs for shipping patterns and quantities shipped to foreign markets; investigate operations of marketing systems as they affect both vertical and horizontal integration in marketing of grains. Approach: Secondary data will be supplemented by experimental data, farm records, previous studies, and from agencies and individual firms involved in various phases of the grain industry. Projections of production and consumption will be made. Major importing countries and instance of trade restrictions will be evaluated. U.S. price support programs, export subsidies, C.C.C. credit sales and inter-grain price relationships will be examined. Analysis will be made of emerging systems in terms of forces and incentives affecting closer vertical and horizontal interrelations, decision-making, and potential adjustments likely to be faced by firms in different segments of the industry. Progress Report: A study of grain marketing patterns by Indiana farmers was carried forward, and a survey of truck shipments of grain by Indiana country elevators for the 1973-74 marketing year was initiated. A third study dealing with vertical coordination in cooperative grain marketing systems was completed and the results incorporated in a Ph.D. thesis. This study focused on evolving patterns of forward transfer within the cooperative system, with special emphasis on reasons for the loss of grain from the system between local cooperatives and their affiliated regionals. Possibilities for improved performance by regional cooperatives might include consolidation into larger organizations, diversification into processing and exporting grain, and general emphasis on flexibility and innovation in merchandising and procurement.

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: Farris, PL

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0060205)

22 083490

SYSTEMS ANALYSIS OF WHEAT QUALITY

The purpose of the project is to discover and apply modern scientific management techniques to the wheat industry sector of the American economy for the twofold purpose of providing an improved basis for government policy decisions and increasing the efficiency of the performance of the individual firm serving agriculture to the end that costs of marketing wheat as a food and feed can be reduced. Specifically, this research is to develop a mathematical model of the wheat supply-marketing-demand complex to indicate the nature and extent of the major economic activities, measure the influence of change within the sector and determine how best to use the computer in practical application of the model as developed. Approach: Build econometric model of wheat industry in order to derive normative solutions with which to compare real world practices. Progress Report: This research analyzes the efficiency of the transfer of wheat and wheat products to the ultimate consumer. Mathematical models for several subsystems are currently in different stages of development. The subsystem to minimize freight costs is operational and has been successfully integrated for actual use to solve real-world problems. One large scale project has been completed in which the impact of a proposed change in the cost of shipping wheat was evaluated. Synthesis of costs for milling of wheat into flour for three sizes of flour mills have been developed to be incorporated into the general marketing systems model.

REFERENCES:

Computerization of Wheat Mixes Niernberger, FF; Phillips, DP, Cereal Science Today, Amer. Assoc. of Cereal Chemists, Vol. 17, p 194, July 1972

Factors in Wheat Purchasing by Flour Mills. Proceedings of Wheat Marketing Field Day for Kansas Wheat Producers, Niernberger, FF, Kansas Agricultural Experiment Station, 1973

Wheat Mix Make-up Procedures Niernberger, FF; Ward, AB, Cereal Science Today, Amer. Assoc. of Cereal Chemists, Vol. 18, pp 125, Aug. 1973

Blending Wheat to Meet Product Specifications Niernberger, FF, Association of Operative Millers Technical Bulletin, pp 3395-3400, Sept. 1973

Trends in Wheat Economics. Proceedings of Wheat Marketing Field Day for Kansas Wheat Producers, Schruben, LW, Kansas Agricultural Experiment Station, 1974

Wheat Market Watchers Guide Schruben, LW, Kansas Agricultural Experiment Station, 1973

The Economics of Wheat to Flour. Proceedings of Wheat Marketing Field Day for Kansas Wheat Producers, Niernberger, FF, Kansas Agricultural Experiment Station, 1974

Evaluation of Wheat Tempering and Blending Models of Hard Winter Wheats Under Experimental Conditions, Posner, E; Ward, AB; Niernberger, FF, Association of Operative Millers Technical Bulletin, pp 3425-3438, Jan. 1974

PERFORMING AGENCY: Kansas State University, Food and Feed Grain Institute, KAN-05-017

INVESTIGATOR: Schruben, LW

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Dec. 1967
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0056748)

22 083494

AN ECONOMIC ANALYSIS OF SPATIAL AND TEMPORAL PRICE DIFFERENTIALS FOR GRAINS (OTHER THAN RICE) IN LOUISIANA

The purpose of the project is to determine existing prices for grains (other than rice), including terms of trade, at selected locations in the state, compare prices at these locations over a period of time, determine transfer costs for grains between various locations in the state, and classify operations at these locations as to type of business done. Monthly price data, including terms of trade to which the prices refer, on soybeans, corn, and grain sorghum will be obtained from selected firms including feed mills, country elevators, small river elevators, and export terminals in the state. The firms also will be surveyed for information relative to classifying them into type of operation and relative to transportation costs. From these data, price maps will be constructed for different types of operations in the market and for selected months. The maps will be compared with transportation costs, intensity of competition, and other factors in order to explain temporal and spatial price differences for grain in the state. Progress Report: Preparation of a manuscript on the amount of feed grains produced, imported, consumed and exported from Louisiana was underway. A broad summary of the manuscript was published as noted below and it is expected that the larger manuscript will be ready for publication by the middle of 1975. The larger manuscript contains details on the kind and amount of feed grains consumed, the amounts of each consumed by each class of livestock, more specific geographic areas in which the consumption is taking place and projections of these factors to the year 1980. The data will be useful to those planning new grain handling facilities in the state and those being supplied to SM-42 for a regional analysis of policies and technological developments affecting the grain marketing system of the South. Also the data are being analyzed, in a transportation type model, to indicate the optimum number, kind, location and capacity of grain handling facilities for Louisiana in the future at the projected and alternative levels of consumption, deficits and the like.

REFERENCES:

Commercial Bulk Grain Handling Firms in Louisiana Traylor, HD; Hodson, RC, La. State Univ. Baton Rouge, Agricultural Experiment Station, AEA Information Series No 31, June 1973

The Futures Market--A Partial Substitute for Unavailable Storage Capacity, Traylor, HD; Lemoine, RV, Louisiana Rural Economist, Vol. 35, No. 2, May 1973

Futures Market Serves as Storage Substitute Traylor, HD; Lemoine, RV, Delta Farm Press, Vol. 30, No. 25, June 1973

Louisiana's \$75 Million Feed Grain Deficit Increases at the Rate of \$3 Million Annually, Owens, MT; Traylor, HD, La. State Univ. Baton Rouge, Dept Agri Econ & Agri Business, Louisiana Rural Economist, V2, May 1975

An Analysis of Futures Trading as an Approach to Overcoming Unavailable Grain Storage Capacity at Harvest, Traylor, DH; Coolf, WF, Northeast La. State Univ, Monroe, Academy of La. Economists, Proceedings, Oct. 1974

PERFORMING AGENCY: Louisiana State University, Baton Rouge, Department of Agricultural Economics and Agribusiness, LAB01599

INVESTIGATOR: Traylor, HD

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1972 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0062488)

22 083502

DEVELOPMENT OF IMPROVED ALTERNATIVE PHYSICAL DISTRIBUTION SYSTEMS FOR CITRUS FRUITS

The objective of this project is to analyze existing physical distribution systems and develop and evaluate alternative less costly systems for marketing citrus. Research into the structure of harvesting systems presently used in the Texas citrus industry was conducted. A manuscript comparing the costs of the three principal harvesting systems is being prepared. A manuscript is being edited prior to publication that compares the costs of five shipping systems for citrus in highway trailers. These systems include nonunitized methods using forklifts and conveyors and unitized methods using pallets, slipsheets and pallet bins. Of the methods studied, the unitized system using slipsheets proved to be the least expensive.

REFERENCES:

Citrus Shipping Costs Articles Anthony, JP; Mongelli, RC, United Fresh Fruit and Vegetable Association 1974 Yearbook, Mar. 1974

PERFORMING AGENCY: Agricultural Research Service, Transportation Facilities Division, 1104-15842-002

INVESTIGATOR: Anthony, JP

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1970 COMPLETION DATE: Aug. 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0021630)

22 083503

SIMPLIFICATION AND STANDARDIZATION OF SHIPPING CONTAINERS FOR AGRICULTURAL PRODUCTS

The objective of this project is to reduce the cost of marketing agricultural products by simplifying and standardizing the dimensional sizes of shipping containers. A 118 page report, "Standardization of Shipping Containers for Fresh Fruits and Vegetables," was printed and distributed to the fruit and vegetable and packaging industries. Four base dimensional size shipping containers and one base size pallet were recommended for industry adoption. Ways and means of getting industry adoption and use of these standard size containers were discussed in conferences with the United Fresh Fruit and Vegetable Association's Palletization and Productivity Committee, the National Commission on Productivity, the National Bureau of Standards, and the Office of Policy Development, Department of Commerce. Two meetings of the American National Standards Institute MH 10 Packaging Dimensions Committee were attended to develop recommended plan view unit load dimensions and transport-package size dimensions for thermal and non-thermal transport vehicles. Data were collected on 11 palletized shipments of fresh produce.

REFERENCES:

Standardization of Shipping Containers for Fresh Fruits and Vegetables, Stokes, DR; Woodley, GW, MRR 991, 118 pp, Mar. 1974

Palletization: Progress and Goals Stokes, DR, The Packer, pp 3C-6C, Dec. 1973

Transport Package Sizes for ANSI MH 10.1, Unit Load Sizes Stokes, DR, American National Standards Institute, 53 pp, Aug. 1973

PERFORMING AGENCY: Agricultural Research Service, Transportation Facilities Division, 1104-15841-003

INVESTIGATOR: Stokes, DR

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 COMPLETION DATE: Nov. 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0021705)

22 083505

IMPROVED TRANSPORTATION AND PACKAGING SYSTEMS FOR EDIBLE BEANS AND PEAS SHIPPED OVERSEAS

The objective of this project is to improve the efficiency of transporting and handling edible dry beans and peas shipped to overseas markets by improving packaging, handling, and transporting systems. Dry edible beans had experienced losses in export shipments due to an inhospitable transport environment in conventional break-bulk shipments. This research proved the physical feasibility of shipping beans in multiwall paper bags, in bulk, and in van containers. Detailed cost analysis showed that potential savings from containerized bulk shipments range from \$200,000 over burlap bags to \$300,000 over paper bags per annum on the shipments to the United Kingdom alone. Total potential savings for all export shipments of dried beans, peas, and seeds would exceed \$1 million annually with bulk shipment in containers. This research was the prime factor in the Michigan bean industry's shift to containerized bulk shipping.

REFERENCES:

A Cost Comparison of Four Container Systems to Export Dry Edible Beans to the United Kingdom, Anthony, JP, Jr, ARS-NE-31, Dec. 1973

A Comparison of Burlap and Paper Bags in Exporting Dry Edible Beans by Van Containers, Anthony, JP, Jr; Hinds, RH, Jr; Goddard, WF, Jr, ARS-NE-10, Apr. 1973

PERFORMING AGENCY: Agricultural Research Service, Transportation Facilities Division, TF4-226

INVESTIGATOR: Anthony, JP

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1972

COMPLETION DATE: Aug. 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0022998)

22 083506

DETERMINE COSTS FOR DIFFERENT SYSTEMS FOR MARKETING POTATOES FROM THE GROWER TO THE RETAIL STORE

Objectives: Develop the least cost system(s) for handling, distribution, storing, processing and packaging potatoes by improving the efficiency for each function in the marketing systems. Approach: Establish the cooperation of growers, packers, processors, wholesalers, retailers and transportation firms to participate in the study. Run test shipments from the producing areas to the retail store level. Make industrial engineering studies, economic analyses and cost evaluation comparisons to determine the optimum system(s) for marketing potatoes. It will be necessary to enlist the aid of Federal and State agriculture extension personnel, land grant colleges, potato associations and the knowledge of other laboratories within the Agricultural Marketing Research Institute. Progress Report: Research was conducted and completed on two systems of harvesting and transporting California potatoes from field to packing shed. The harvesting system employing a truck and trailer combination, had total costs that were 18 percent lower than the system that used only the truck. Preliminary research was conducted on handling Long Island, Maine, and Florida potatoes. Research on packing shed operations in California and Florida is continuing to identify and measure packing costs. Unitized and palletized shipping of potatoes is being investigated.

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute, 1104-15842-001

INVESTIGATOR: Volz, MD Anthony, JP Bouma, JC

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: May 1973

COMPLETION DATE: May 1978

ACKNOWLEDGMENT: Current Research Information System (CRIS 0040246)

22 083511

IMPROVED SYSTEMS FOR SHIPPING AND HANDLING GROCERIES FROM MANUFACTURER TO WHOLESALE WAREHOUSE

The objective of this project is to measure the cost for less-than-truckload (LTL) shipments of groceries from manufacturer to wholesaler and determine the feasibility of reduced cost with a regional warehouse to store products of several manufacturers and ship full truckloads of grocery products from several manufacturers. Basic information relative to volume of groceries shipped from manufacturer to wholesaler by less than truckload, truckload, and rail car is being obtained. Research advantages and disadvantages of various unitload handling systems from supplier to distribution warehouse and to determine the feasibility of shipping smaller unitloads such as 40 inch by 32 inch. The need for this research is great because the industry pallet exchange program is not working satisfactorily.

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute, 1104-15864-001

INVESTIGATOR: Bouma, JC

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Nov. 1973

COMPLETION DATE: Nov. 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0040668)

22 083516

CONTROL OF DAMAGE AND LOSS IN DISTRIBUTION

The objectives of this project are to find characteristics of commodities and items which are damaged in distribution, determine environment factors causing damage, to propose methods of damage reduction, and to

develop an economics of distribution loss control. The approach will be as follows: 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 packages including resource use and the ecological impact; Using information assembled in case by case approach, establish generalities relating to damage control; and Develop sub-projects to explore specific problems in the areas of cushion properties, distribution environment, item fragility and system evaluation procedures. Progress Report: Damage boundary technique applied to container survival. Conducting testing audit of the specification properties of corrugated fiber board. Conducting compression and dynamic performance tests for plastic container board. Developing material tests and specifications for this board. Utilized plastic container board as a shipping container for Michigan celery. Report issued.

PERFORMING AGENCY: Michigan State University, East Lansing, Department of Packaging, MICL 03108

INVESTIGATOR: Goff, JW

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1971

ACKNOWLEDGMENT: Current Information Research System (CRIS 0060632)

22 083527

SYSTEMS ANALYSIS OF THE ECONOMICS OF GRAIN MARKETING

The objective of this project is to investigate the operations of marketing systems as they affect the economics of physical distribution and processing of grains. Managerial decision-making by grain marketing firms will also be investigated. A spatial equilibrium model of the grain marketing system will be developed to determine the optimum size, type and number of firms. Parametric programming will be used to simulate various conditions of supply, demand, technology and transportation rates and the effects on the market structure will be traced within the model. The project will examine existing managerial decision-making models for grain marketing firms and adopt or create new models. Operating parameters and external constraints of marketing firms will be analyzed. Data will be obtained from private and public agencies including EDP companies and trade associations. Management Systems-A financial planning system for diversified grain marketing and farm supply firms was developed and tested. The system includes a monthly and an annual budgeting process, a monthly and an annual cash flow analysis based upon budgeted expectations, and instructions for completing and using the budgets and the cash flow analysis. This system is designed to aid the manager and owners in planning and controlling the financial well being of the business. It deals specifically with sales volume, price policy, expense control, credit policy, capital requirements, and repayment ability. Physical systems-A Nebraska grain producers survey has been completed. It measured harvesting methods and on-farm drying and storage capacity. A survey of 30 country elevators was also completed. This survey determined physical capacities and transfer of ownership patterns and will be used as input to a regional analysis.

REFERENCES:

Grain Drying and Storage Systems Lytle, PW; Kniep, MD, Nebraska Quarterly, Vol. XX, No. 3, Sept. 1973

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, NEB-10-061

INVESTIGATOR: Turner, M Lytle, PW

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971

COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0060246)

22 083541

PREDICTED EFFECTS OF SELECTED POLICY AND TECHNOLOGY CHANGES ON THE GRAIN MARKETING SYSTEM

The objectives are to: (1) Identify marketing facilities and flows of grain; (2) Identify and explain spatial and temporal price differentials for grain;

(3) Identify current inefficiencies with regard to capacity and location in the grain marketing system (by comparing current structure with simulated least cost structure); (4) Evaluate the impact of changes in government policies and in technology on the grain marketing system. Ohio will participate in the work of the regional committee and will coordinate research efforts on the basis of sub-committee responsibility. If possible, an effort will be made to publish research results both on a state and regional basis. The 1973 SM-42 work schedule was subdivided into three parts: (1) the organization and content of the Southern Regional Grain Marketing Conference, (2) the development of related publications, and (3) the revision and testing of the required models. Progress Report: The analysis of the data on regional grain price differences in Ohio was completed and a publication written, now in the process of printing. The results show the price advantages to farmers in Ohio if they market their grain based on these market relationships. A second publication was prepared in cooperation with Purdue University which presented statistical evidence on the changing grain marketing structure in Ohio, Indiana, and Illinois, serving the south and evaluates the implication of these changes on net returns to the midwest farmer and the feeder in the south. This publication is ready for printing. Work is continuing on the interregional, regional and interstate grain marketing, storage, drying and transportation model which will be used by all states in the region. Model adjustments and trial runs are constantly being made by some of the states in the region. When completely developed, the model will serve as a tool to solve minimal cost problems resulting from market structure changes so that farmers, country elevators and processors, transporters can minimize their marketing cost. The dynamics of this model will incorporate the effects of such market structural changes as rail abandonment, unit train shipments, and increased export demand, and changing government policy affecting the grain market. The benefits of the reduction of marketing costs will mean higher grain prices for the farmer.

REFERENCES:

- SM-42 - Predicted Effects of Selected Policy and Technology Changes on the Grain Marketing System, Sharp, JW, Ohio Agricultural Research and Development Center, Regional Res. Rept. 1, Apr. 1973
 Seasonal Corn Price Differentials in the Cincinnati and Toledo Markets, Sharp, JW; Baldwin, WD, OARDC Research Circular, N203
 Estimating a Theoretical Contract Curve Between Vertical Stages in the Illinois Grain Industry, Baldwin, ED; Hill, LD, American Journal of Agricultural Economics, Feb. 1975

PERFORMING AGENCY: Ohio State University, Departments of Agricultural Economics and Rural Sociology, OHO00403
 INVESTIGATOR: Sharp, J
 SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Mar. 1971
 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0059154)

22 083542**VERTICAL COORDINATION POTENTIAL IN COOPERATIVE GRAIN MARKETING SYSTEMS**

The objective is to describe those existing marketing patterns and coordinating arrangements in the marketing of grain from producers through country elevators to selected regional grain cooperatives, and investigate those possibilities that would enable regional grain cooperatives to increase producer returns through closer vertical coordination within grain marketing systems will also be investigated. Research efforts will be organized into three parts. Personal interviews with management personnel of regional grain cooperatives in Oklahoma and Kansas will be made to determine grain marketing patterns and coordinating arrangements between local cooperative elevators and regional grain cooperatives, as well as among regional grain cooperatives. Appropriate sampling procedure will be used to select local cooperative elevators whose management personnel will be interviewed concerning coordinating of arrangements between the managers of local cooperatives and producers, relative to procurement, storage, transportation, hedging and merchandising of grain to determine grain marketing patterns and coordinating between producers and local cooperative elevators. A survey of grain producers in Oklahoma and Kansas will be made and questions will be asked dealing with the attitudes, preferences, and flexibility of grain producers in adapting to potentially new marketing arrangements to determine grain marketing patterns and coordinating arrangements between producers and local co-

operative elevators. Progress Report: A personal interview questionnaire to determine vertical coordination practices performances and potentials at the local grain cooperative level was constructed. The questionnaire has been approved by the Farmer Cooperative Service, and OMB. A stratified random sample of 67 local cooperative elevators in Oklahoma and Texas was drawn and a completed questionnaire has been obtained from the manager of each local cooperative in the sample. The questionnaire answers have been checked for errors and consistency, and coded on computer cards for analysis. Tabular and regression analyses of the data are in progress.

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01559
 INVESTIGATOR: Hummer, PD Oehrtman, RL
 SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Oct. 1973
 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0064641)

22 083543**SYSTEM ANALYSIS OF THE ECONOMICS OF GRAIN MARKETING**

The objective is to investigate the operations of marketing systems as they affect: (1) The economics of physical distribution and processing of grains; (2) managerial decision-making by grain marketing firms. A spatial equilibrium model of the grain marketing system will be developed to determine the optimum size, type and number of firms. Parametric programming will be used to simulate various conditions of supply, demand, technology and transportation rates and the effects on the market structure managerial decision-making models for grain marketing firms and adopt or create new models. Operating parameters and external constraints of marketing firms will be analyzed. Data will be obtained from private and public agencies including EDP companies and trade associations. Data on storage capacities of existing grain facilities was compiled and used as a basis for selecting alternative plant sizes to be considered in the model. Areal delineations were made and production and consumption estimates were obtained corresponding to these areas. Direct and published sources were used to obtain truck and rail transportation rates. Selected elevators in each size group were surveyed to obtain operating cost data and information concerning operating revenues and annual storage and handling volumes. Annual expense budgets were developed for each size group to determine operating cost per unit of grain. A spatial equilibrium model of the subject area's grain marketing system is being constructed. The spatial equilibrium model is constructed so that the parameters in the model can be changed to depict alternative conditions of supply, demand and technology and thus permit their effects on the system to be analyzed. The introductory, theory and methodology sections of the research report have been written. /CRIS/

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01521
 INVESTIGATOR: Oehrtman, RL
 SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
 COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS-0060577)

22 083556**THE FEASIBILITY OF DEVELOPING ADDITIONAL BEEF PROCESSING FACILITIES IN SOUTH DAKOTA**

The objective of this research is to determine the feasibility of developing additional beef processing facilities in South Dakota. Associated objectives include: Estimate costs of kill and chill plants; estimate costs of breaking facilities; estimate transportation rates; simulate the coordinated development of beef production with beef processing and transportation systems in South Dakota. The method used will be a systems analysis approach based on a transportation model. Data for the model will be derived by cost feasibility analysis of beef processing plants. Transportation rates will be obtained by regression analysis of rates provided by the railroads, P.U.C. and the trucking industry.

PERFORMING AGENCY: South Dakota State University, Department of Economics

INVESTIGATOR: Rudel, RK

SPONSORING AGENCY: Department of Agriculture, SD00656

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973

COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0063916)

22 099379

FREIGHT RATE STRUCTURE STUDY

A viable transportation system is essential for growth in a market-oriented industrialized economy. The project is a combined research, demonstration, and seminar program to incorporate modern distribution management principles in the freight rate structure to encourage Utah's agricultural development. Data on the availability, quality, and costs of services combined with the market opportunities for selected commodities and industries in Utah will be analyzed of a definitive set of rate and service proposals by a consortium of producers, distributors, and carriers. Alternative institutional arrangements for the coordination of information concerning the transportation market is being explored to assure the maximum operating efficiency with realistic costing and pricing of the distribution system. The freight rate structures of rail and motor carriers will be examined and criteria for marketing, cost, and management will be developed.

PERFORMING AGENCY: Utah State University, Department of Economics

INVESTIGATOR: Taylor, MH

SPONSORING AGENCY: Office of the Secretary of Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Nupp, BL

Contract DOT-OS-30116

STATUS: Active NOTICE DATE: Aug. 1975 TOTAL FUNDS: \$96,750

ACKNOWLEDGMENT: DOT

22 099623

FUTURE ECONOMIC ADJUSTMENTS IN THE MARKETING OF SELECTED NORTHEAST FRUITS AND VEGETABLES

Determine the economic impact of changes in consumption and buying patterns for apples, potatoes and tomatoes in fresh and/or processed form in the Northeast on: cost, margins, and price making practices at each transfer point in the marketing channels. Producer decisions concerning alternative markets.

Conduct a mail survey to evaluate the usefulness of market information currently available to potato growers. Analyze the nature and extent of the impact of potato market information upon the price making mechanism. Review the basic objectives for and alleged advantages and disadvantages of trading in Maine potato futures, and investigate the alternatives for improving flow patterns of nonregulated trucks for Maine, and the Boston and the New York market areas. Identify shortages in supply (trucks available for loading) and the causes, investigate means of alleviating shortage in supply to specific areas. Analyze capabilities of existing potato storage and marketing facilities, and relate to projected changes in market channels.

Analysis of truck shipment data concerning availability of trucks from origins to destinations, and seasonality of movements of Maine potatoes showed 25,000 to 31,000 truckloads of potatoes per season shipped from Maine in past 4 marketing seasons. About 1/2 of shipments were in March, April, and May each year. About 1/3 of shipments went to New England points and 2/5 to New York, New Jersey, and Penn. Truck shortages reported 45 and 35% of time in past 2 seasons. Truck vs rail freight rates compared. Recent and proposed changes prompt reevaluation. Analysis of Maine tablestock potato shipments described marketing characteristics for the 1966-1972 Crop years. Deadheading problem for specific carrier was analyzed. A 30% response obtained to mail survey of number and capacity of potato storage facilities. Follow-up questionnaire drifted. Regression analysis indicated information on potato production, wholesale market unloads, and storage stocks of frozen french fries was nearly wholly reflected in Maine cash and futures potato prices. Differences between monthly estimates and the revised annual figures were calculated for both acreage planted and production of potatoes in the Fall states. Performance of the estimates improved over the 1950-1943 study period.

REFERENCES:

An Analysis of the Impact of Market Information Upon Maine Potato Prices, Green, RC, Maine University, Department of Agr. & Resources Economics, Masters Thesis, June 1974

Marketing Characteristics in Shipments of Maine Tablestock Potatoes, Johnston, EF; Pelsue, NH, Jr, Maine University, Maine Experiment Station, Mis. Rpt. No 163, Sept. 1974

POTATOES: Planting and Production Estimates, Research in the Life Sciences, Pelsua, NH, Jr, Maine University, Life Sciences & Agr. Experiment Station, V22 N4, Nov. 1974

PERFORMING AGENCY: Maine University, Department of Agricultural and Resource Economics

INVESTIGATOR: Johnston, EF Pelsue, HN, Jr

SPONSORING AGENCY: Department of Agriculture, ME00293

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1973

COMPLETION DATE: June 1977

ACKNOWLEDGMENT: Current Research Information System (CRIS 0064637)

22 099624

IMPROVING TRANSPORT AND HANDLING OF CONCENTRATED FORAGE PRODUCTS TO OVERSEAS MARKETS

Develop and evaluate improved methods and equipment for transporting and handling overseas shipments of concentrated forage products.

Evaluate present forms and methods of concentrating forage products, and handling, storing, transporting and using the products. Determine how these steps interface and the effect of such interfacing. Develop improved equipment and techniques or modifications of present technology. Evaluate improvements in commercial shipping experiments to overseas markets. Determine comparative handling and transport efficiencies in terms of physical performance and costs. Recommend best equipment and methods and develop guidelines for their use.

Evaluation of grass seed residue industry current practices indicate: Major manufacturing problem is difficulty in achieving a proper density of 25 lbs. per cu. ft. or less; moisture level below 10 percent; and flat rate charges per container (\$200 per 20 foot and \$300 per 40 foot van) resulting in high transport cost because of low density of current product shipped. Technical problems such as the drying process for cubes, densification and recompressing of bales have not been solved as yet. Availability of containers—steamship lines will allocate their containers to highest paying cargo—is also a current problem.

PERFORMING AGENCY: Agricultural Research Service, Western Region Oregon-Washington Area

INVESTIGATOR: Fountain, JB

SPONSORING AGENCY: Department of Agriculture, 5805-15880-001

STATUS: Active NOTICE DATE: July 1975 START DATE: Nov. 1973

COMPLETION DATE: Nov. 1978

ACKNOWLEDGMENT: Current Research Information System (CRIS 0040669)

22 099626

SYSTEMS ANALYSIS OF THE ECONOMICS OF GRAIN MARKETING

Determine effects of changing farm programs on efficiency of Marketing, Utilization and Distribution of Grain and Soybeans and their products: Study changes in price relationships as a consequence of differences in location and production resulting from farm programs. Ascertain changes in relative utilization of different grains in feeding of livestock and other uses. Determine implications of farm programs for shipping patterns and quantities shipped to foreign markets.

Secondary data will be supplemented by station experimental data, farm records, previous studies and from agencies and individual firms involved in various phases of the grain industry. Grain marketing system will be approximated by a spatial equilibrium model determining the optimum size, type, and number of firms. Projections of grain production and consumption will be made. Time series data will be analyzed and related to the long and short run demand. U.S. price-support programs, export subsidies, C.C.C. sales and inter-grain price relationships will be analyzed. Programs and policies of importing countries and measurement of incidence of trade restrictions will be evaluated for U.S. exports.

The regional project has concentrated on a survey of country elevators and Wisconsin did not participate because a similar survey was conducted in Wisconsin under another project which duplicated the interests of the regional project. The investigator attended the meetings of the Technical Committee of NC-104. The April meeting included a seminar with the Kansas City Board of Trade and the October meeting included a seminar with the staff members of the Continental Grain Company. The investigator will continue to meet with NC-104 technical committee.

PERFORMING AGENCY: Wisconsin University, Madison, Department of Agricultural Economics

INVESTIGATOR: Peterson, G

SPONSORING AGENCY: Department of Agriculture, WIS01819

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1971
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System

22 099629

ORGANIZATION AND MANAGEMENT OF FARM SUPPLY FIRMS

Identify and evaluate the potential impact on firms of changes in structure and operating methods of farm supply industries. Develop and test management practices and procedures for farm supply industry firms.

The existing market structure for Missouri farm supply industries will be determined. Expected changes in industry structure will be identified. The potential impact of structural change on industry firms will be examined. As new products or practices are introduced, their potential impact on the operations of individual firms will be studied. Operations research and simulation techniques will be adopted to the types of managerial problems faced by agribusiness firm managers. Areas of work which will receive attention include local distribution, inventory control, and management planning.

Computer analysis has been completed on a study of the market structure of fertilizer retailing in Missouri. Basic information on feed enterprises has been assembled for a financial simulation model for farm supply firms. The model will allow evaluation of changing conditions upon elevator operations. The model will assist managers in long range planning. A contributing project designed to evaluate fertilizer inventory policy for farm supply firms has been designed to evaluate fertilizer inventory policy for farm supply firms has been developed. Preliminary data has been gathered. The model to be developed will assist managers in optimizing inventory. A survey of approximately 80 country elevators to determine storage, capacity, handling facilities, transportation facilities and grain receipts by months was completed for a 16 county area in N.W. Missouri. This will be useful as background information on the grain industry as well as input data for a location-transshipment model to be used as a basis for transportation decisions in the area. A survey and analysis of farm to market grain transport, methods and costs has been completed. The analysis will be useful in making cost-reducing and energy-conserving decisions in the handling and marketing of grain. A statement on agricultural transportation needs and problems has been provided to the Missouri Department of Agriculture and the State Transportation Policy Council for use in transportation policy and planning studies at state level.

REFERENCES:

Transportation Change and Missouri's Agribusiness Future Moser, DE, Missouri University, Columbia, Extension Division, Agri-Business Newsletter, Mar. 1974

Transportation Problems and Policy Concerns of Agriculture Moser, DE, Missouri University, Columbia, Extension Division, Agri-Business Newsletter, Nov. 1974

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics

INVESTIGATOR: Devino, GT Moser, D

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Jan. 1972

ACKNOWLEDGMENT: Current Research Information System (CRIS 0061002)

22 099631

PACKAGING, TRANSPORT, AND STORAGE EFFECTS ON CONDITION AND DISTRIBUTION OF FRESH BEEF

Determine the effectiveness and costs of different types of treatments, packaging, handling, and transportation environments on maintenance of quality, shelf-life, and consumer acceptability of fresh beef.

Studies designed to evaluate the effects of three types of refrigerated transport trailers—(1) standard, (2) vacuumized, and (3) controlled atmosphere—will be conducted to determine the operation costs and effects on condition for beef quarters and other wholesale beef cuts. Studies on packaging of boxed wholesale and institutional-type beef cuts prepared under different packaging systems and employing different types of films will be conducted to evaluate their effects on condition during storage and transport. Appropriate retail cuts will be prepared from the boxed wholesale beef cuts to study and determine the shelf-life of the retail cuts.

PERFORMING AGENCY: Texas A&M University, Agricultural Experiment Station

INVESTIGATOR: Carpenter, ZL Hoke, K

SPONSORING AGENCY: Department of Agriculture, 1090-15842-010-A

Contract 12-14-1001-407

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041163)

22 099632

UTILIZED HANDLING OF GROCERIES FROM SUPPLIER TO DISTRIBUTION WAREHOUSE

Measure costs and determine relative advantages of five unitload handling systems from supplier to distribution warehouse and determine feasibility of shipping unitloads smaller than the 48-by 40-inch currently in use.

Establish by time study the standard time for loading and unloading rail cars and trailers for five classes of product by five methods. Measure the cost of unitizing, platform cost, cost for load security, vehicle cube utilization, and damage. At the destination, determine cost for breaking down and repalletizing to smaller unitloads, cost and return from disposing of dunnage and unitload platform, and cost for maintaining pallets under the pallet exchange program. Determine feasibility, simulated cost, and benefits with use of smaller unitload shipping methods.

PERFORMING AGENCY: Shaffer (PF) Company

INVESTIGATOR: Bouma, JC

SPONSORING AGENCY: Department of Agriculture, 1090-15864-006C

Contract 12-14-1001-421

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041266)

22 099635

POTENTIAL FOR EXPANDING GRAIN STORAGE IN NEW ENGLAND AND ACHIEVING FREIGHT RATE REDUCTIONS

The problem is high transportation rates on feed grains into New England as compared to the Southeast. Present rates are clearly discriminatory. In the absence of discriminatory rates, minimum transportation costs cannot be achieved without a "reorganization" of the feed industry. Water-rail alternatives will be considered.

Obtain present storage capacity and unloading facilities. Determine number of grain consuming animal units for 80, 85, and 1990. Determine minimum number of days of available feed. Compare costs of storage in Mid-West and New England. Compare transportation of the present with costs after storage capacity is increased.

It has been shown that the corn markets in the mid-west are part of a single-priced market structure and that weekly prices in Cincinnati and Toledo, move together. R^2 over 0.95 were obtained when correlating weekly prices in the two markets. Freight rates on corn from country elevators to river crossings on southern movement is 70-80 percent of the rate from country elevators to terminal markets supplying corn to New England. Efforts are currently underway to ascertain the economic feasibility of modernizing and reorganizing the feed storage and milling industries of New England to take advantage of unit train tariff rates established for shipments of raw grain. A data list of feed mills and grain storage facilities has been compiled which identifies the current structure of industry in New England. These firms have been surveyed to obtain data on their feed grain receiving and storage capacities, milling capacities and retail and wholesale marketing parameters. Progress also has been made in developing economy of scale schedules for feed grain storage

centers. Synthesized schedules have been developed showing the various per unit costs attached to changes in the size of elevator storage areas. Also estimates on the investment requirements to expand feed grain storage facilities have been synthesized.

REFERENCES:

Verified Statement Before Interstate Commerce Commission Seaver, SK, Interstate Commerce Commission

PERFORMING AGENCY: Connecticut University, Storrs, Department of Agricultural Economics

INVESTIGATOR: Seaver, SK Farrish, ROP Hanekamp, WJ

SPONSORING AGENCY: Department of Agriculture, CONS00452

STATUS: Active NOTICE DATE: July 1975 START DATE: Feb. 1974

COMPLETION DATE: June 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0064907)

22 099636

ECONOMICS OF CONSUMPTION, DISTRIBUTION, AND PRODUCTION OF SECONDARY MANUFACTURED WOOD PRODUCTS

Improve the efficiency of performance of the markets for secondary manufactured wood products in Eastern United States in satisfying the needs of society and using available resources effectively.

The major research will be concerned with the pallet, furniture, and flooring industries. Studies will seek to determine the optimum raw material mix. Industrial trends and consumer preferences will be studied. Wooden pallet standards will be developed. Studies will be made to develop a model for optimizing the flow of pallets to meet the demands for shipment, handling and storage of product. This will include evaluation of a pallet exchange pool. Other studies will be concerned with developing alternatives to the labor intensive nature of the production of many wood products.

A body of fundamental physical and economic relationships has been established from the study of the performance of wooden pallets in pallet exchange programs. For the first time, it is possible to differentiate between different degrees of quality in pallets. Quality standards and specifications have now been written to produce pallets that will reduce the average cost per use 80 percent as compared with normal warehouse pallets. The U.S. Postal Service has adopted these standards and introduced an \$8 million palletized mail program. National Pallet Leasing Systems, Inc. in contract with Sears, has also adopted these standards and have instituted a pilot pallet exchange program with their suppliers. As the program is expanded, it will ultimately include about 3000 of Sears suppliers. The nucleus of what could become a National Pallet Exchange program is now in operation.

REFERENCES:

Required Pallet Research: Economic Aspects Opportunities for Virginia's Pallet, Industry, Proceedings, Wallin, WB, VPI & State University, 121, pp 32-38, 73

The Performance of Wooden Pallets in Pallet Exchange Programs, Sardo, WH, Jr; Wallin, WB

Quality Distribution of Pallet Parts From Low-Grade Lumber Large, HR; Frost, RE, USDA Forest Service Research, Paper NE-266, 6pp, illus, 1974

Factors Influencing the Selection of State Office Furniture Anderson, RB, USDA Forest Service Research, Paper NE-266, 6 pp, illus., 1973

Factors Affecting the Use of Hardwood Flooring in Urban Rehabilitation, Nevel, RL, Jr, USDA Forest Service Research, Paper NE-273, 7 pp, illus., 1973

PERFORMING AGENCY: Northeastern Forest Experiment Station

INVESTIGATOR: Martens, DG

SPONSORING AGENCY: Department of Agriculture, NE-4304

STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1967

COMPLETION DATE: May 1978

ACKNOWLEDGMENT: Current Research Information System (CRIS 0023183)

22 099637

IMPROVED PACKAGING OF AGRICULTURAL PRODUCTS

Reduce product damage, develop and evaluate new materials or ways of using substitute packaging materials for those in short supply that will

reduce the cost of packaging, handling, and transport of perishable agricultural products.

In cooperation with package and container manufacturers develop new containers, packages, or packaging materials such as air cushion bags and plastic corrugated boxes. Test the physical performance of such materials in protecting the packaged product in the laboratory, commercial packing plants, and through distribution systems. Gather data on cost of materials, packing, handling, storage, transport, and distribution and data on the suitability of the new containers, packages, or packaging materials for meeting the requirements of the marketing system and consumers of the product. Compare the cost of using the new packages, containers, or packaging materials and the efficiency with which they can be packed, shipped, and handled on pallets or in some other type of unit load with conventional forms of packaging in current use.

In cooperation with package materials manufacturers, new air cushion pads—film bags inflated with air—were developed and tested in the laboratory and under field conditions for immobilizing and cushioning bulk and tray packs of apples. Apples packed in pulpboard and polystyrene shipping trays and overwrapped with shrink film were test shipped by the Yakima, Washington Packaging laboratory and evaluated by the AMRI, TPRL package researchers. Newly developed corrugated high density polyethylene shipping containers were also tested for the shipment of celery and cut flowers. The design of the corrugated polyethylene containers in being modified to provide more ventilation and protection to the product. Analysis of data collected on the evaluation of 3-pound size consumer trays for McIntosh apples was completed.

REFERENCES:

Economic Aspects of Prepackaging Stokes, DR, OECD, Paris France, Doc No. DAA 1066, Mar. 1974

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory

INVESTIGATOR: Stokes, DR

SPONSORING AGENCY: Department of Agriculture, 1104-15841-001

STATUS: Active NOTICE DATE: July 1975 START DATE: Oct. 1968

COMPLETION DATE: May 1977

ACKNOWLEDGMENT: Current Research Information System (CRIS 0020042)

22 099638

EVALUATE SYSTEMS FOR HANDLING AND TRANSPORTING FROZEN FOOD FROM PROCESSING PLANT TO WHOLESALE

Determine and evaluate various systems for handling and transporting frozen food from processing plant to wholesaler and to develop methods for improving the efficiency for the total system.

This project will be conducted in cooperation with the American Frozen Food Institute which will assist in establishing industry contacts and evaluating research findings. Project leadership will be provided by the Market Operations Research Laboratory. The objectives will be approached by detailed studies of the layout, methods, equipment, and labor required in processor warehouses on frozen foods from storage through loading of transport vehicles; at public or regional frozen food warehouse on receiving, storing, and loading, and at wholesale warehouse on receiving and storing frozen foods. Evaluations will be made of various systems for handling and transporting frozen food from the processing plant to wholesale warehouses and if possible, develop systems that will reduce the cost. Labor, equipment, methods and handling costs at the various facilities for different systems will be analyzed and evaluated.

Studies were initiated to determine the most economical systems for handling and transporting frozen foods from processing plant to wholesalers, including direct shipments and through regional and public warehouse. Preliminary studies were made in four processing plants in New Jersey, Maryland, and Virginia to try to determine the magnitude and complexity of frozen food products, handling, and marketing characteristics, and to determine what aspects of the frozen food industry would be studied first. Plans were made to analyze the major marketing systems from processing plant to wholesaler with emphasis on obtaining labor, equipment, and material inputs and costs on the distribution systems studied. Research was completed at two public refrigeration warehouses and at a corporate chain warehouse. Research has been initiated on handling methods and loading costs, both manual and unitized, in four processing plants in Florida.

PERFORMING AGENCY: Agricultural Marketing Research Institute,
Market Operations Research Laboratory
INVESTIGATOR: Mongelli, RC
SPONSORING AGENCY: Department of Agriculture, 1104-15864-004
STATUS: Active NOTICE DATE: July 1975 START DATE: May 1974
COMPLETION DATE: May 1979

ACKNOWLEDGMENT: Current Research Information System (CRIS
0041067)

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.

PERFORMING AGENCY: Agricultural Marketing Research Institute,
Market Operations Research Laboratory
INVESTIGATOR: Goulston, CL
SPONSORING AGENCY: Department of Agriculture, 1104-15864-005
STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1974
COMPLETION DATE: Aug. 1977

ACKNOWLEDGMENT: Current Research Information System (CRIS
0041735)

22 099640

MAINTENANING AND IMPROVING QUALITY AND MARKET LIFE CALIFORNIA-ARIZONA CITRUS IN FOREIGN MARKETS

Determine the effects of transit temperatures and relative humidities, postharvest fungicidal treatments, and handling, packaging, palletizing and containerization on arrival condition and appearance, quality, and market life of California-Arizona citrus in foreign markets.

Ship citrus fruit, or hold in simulated transit conditions, after treating with individual or combinations of fungicides. Determine fungicide concentrations necessary to control storage decays and fruit spoilage. Determine fungicide residues on or in fruit at time of treatment and upon arrival in Europe or Japan. Develop and improve analytical methods for fungicides now used or expected to be used, as needed. Compare palletized and hand stacked shipments in mechanical and iced rail cars and containers for fruit cool-down rates, uniformity of fruit temperature control, and fruit injury and carton deterioration due to cargo shifting during loading, unloading and in transit.

Oranges treated with high and low thiabendazole (TBZ) levels were run through a Sunkist Grower's Inc. citrus products pilot plant. TBZ residues were measured on whole fruit, wet pulp, juice, molasses, oil, and dry citrus pulp cattle feed. TBZ stability was determined by analyzing the cattle feed every two weeks for 12 weeks. Data is being used in establishing a U.S. 10 ppm TBZ tolerance on fresh citrus. Industry-USDA cooperative shipping tests showed warm citrus sent to eastern US markets in mechanically refrigerated rail cars was poorly cooled, especially in the "B" end of cars. Hand-stacked chimney-vented loads cooled better than solid, palletized loads. Receivers increasingly prefer palletized shipments. Two tests, a simulated shipping test and an actual shipment, indicate feasibility of shipping field-run nontreated oranges in bulk bins via refrigerated ship van containers to foreign countries. Chief advantages appear to be reduction in cost (fruit shipping carton cost is avoided and fruit is cleaned, graded and packed in foreign countries), and avoidance of pesticide and food additive legal restrictions in some countries. A thin-layer chromatographic method is being developed to measure behomyl residues on citrus. The station was moved from Pomona to the UCR campus, Riverside during the year. Research progress was somewhat restricted because of the transfer.

PERFORMING AGENCY: Agricultural Research Service, Market Quality
Laboratory
INVESTIGATOR: Hauck, LG Norman, SM
SPONSORING AGENCY: Department of Agriculture, 5210-15880-001

STATUS: Active NOTICE DATE: July 1975 START DATE: Mar. 1974
COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: Current Research Information System (CRIS
0041023)

22 099641

MAINTAINING QUALITY IN EXPORTED TEXAS FRUITS AND VEGETABLES

Determine the most effective methods for protecting, fruits and vegetables exported to foreign markets.

Explore packaging and unitization systems as they relate to citrus fruit quality during overseas shipment and movement throughout foreign market channels. Factors including temperature, relative humidity, and atmospheric composition will be monitored during accompaniment of shipments. Stacking patterns will be tested to determine the most effective utilization of the ship's ventilation system. Based on the above relationships, recommendations will be made with respect to minimizing losses and maintaining quality of exported fruits and vegetables.

PERFORMING AGENCY: Agricultural Research Service, Nematology
Research Laboratory
INVESTIGATOR: McDonald, RE
SPONSORING AGENCY: Department of Agriculture, 7202-15880-002

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
COMPLETION DATE: July 1977

ACKNOWLEDGMENT: Current Research Information System (CRIS
0041394)

22 099642

MARKETING MARGINS AND COST COMPONENTS IN THE OIL CROPS INDUSTRY

Determine price spreads and cost components in producing transporting, storing, and manufacturing oil crops and major products; and relate changes in structure, technology, and practices to changes in prices, margins and costs.

Determine farm-to-retail price spreads from secondary data and develop cost components from special studies and surveys, using economic-engineering data and budget analyses. Develop costs for producing, storing, transporting and manufacturing oil crops and major products with initial attention being given to costs of manufacturing margarine, cooking and salad oil, and crushing soybeans.

Initiated work in cooperation with Virginia Polytechnic Institute and State University to provide cost component data for the manufacture of cooking oil, salad oil, and margarine. Advised the VPI group on a number of industry contracts and furnished them with considerable reference material to avoid duplication of effort. Collection of cost component data for the solvent extraction of soybeans is in progress.

PERFORMING AGENCY: Economic Research Service
INVESTIGATOR: Doty, HO
SPONSORING AGENCY: Department of Agriculture, CE-07-062-11-00

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974
COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information System (CRIS
0041588)

22 099643

ORGANIZATION AND EFFICIENCY OF THE PRODUCTION AND MARKETING SECTOR FOR OIL CROPS

Develop a structural schematic for producing, storing, processing, and distributing products in the oil crops industry. Analyze the competitive position of the oil crops industry with competing commodities and with the same commodities from competing countries. Evaluate the impacts of changes in economic, technical, and regulatory factors on the organization and efficiency of the oil crops industry.

Determine the present economic structure of the oil crops industry and quantify the product flow through the various marketing channels as background to the development of the oil crops research program. Evalu-

ate marketing patterns, regional competition, stock management and storage and transportation problems. Develop a spatial-temporal model for soybeans to analyze the impacts on industry organization and efficiency of changes in supply, demand, cost and institutional factors.

Developed and published a model to analyze the spatial-temporal flow of soybeans and corn. The model uses separable programming as the solution algorithm. Prepared an unpublished report "Optimal Solutions Involving Cross-Product Relationships Through Separable Programming". This report outlines the problems associated with including cross-product coefficients in a programming model and shows how they can be overcome.

REFERENCES:

Storage Utilization in a Deficit Region Boutwell, A; Kenyon, E, Southern Journal of Agricultural Economics, V5, N1, pp 233-237, July 1973

Grain Storage in the Deficit South Atlantic Region Kenyon, E; Boutwell, A, VPI and State University, Research Division, Bull N90, 69 pp, May 1974

PERFORMING AGENCY: Economic Research Service

INVESTIGATOR: Boutwell, WA

SPONSORING AGENCY: Department of Agriculture, CE-07-064-11-00

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974

COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041590)

22 099648

IMPROVED TRANSPORT EQUIPMENT AND TECHNIQUES FOR OVERSEAS SHIPMENTS OF CITRUS FRUITS AND VEGETABLES

Improve packaging, palletization, and transport to reduce overseas marketing costs of fresh fruits and vegetables.

Develop better shipping containers, palletization methods, transport modes, and handling procedures for exporting fresh fruits and vegetables. Emphasis on developing less expensive cartons for "in register" stacking patterns that can be palletized to permit greater air circulation for product maintenance. Data on carton and product condition, air circulation, product temperatures, atmospheres, trade reaction, cost of materials, packing, palletizing, handling and transport costs will be obtained at the time when experimental shipments are made.

PERFORMING AGENCY: Agricultural Research Service, Market Quality Research Laboratory

INVESTIGATOR: Camp, TH

SPONSORING AGENCY: Department of Agriculture, 7302-15880-001

STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1974

COMPLETION DATE: Feb. 1976

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041734)

22 099649

UTILIZED AND PALLETIZED LOADING TECHNIQUES FOR CITRUS FRUITS

Find ways to utilize containers of citrus to reduce handling and transport costs and product damage.

Develop and test stacking patterns for various size containers in palletless units and transport vehicles. Make shipping tests by piggyback trailer to measure unit and load stability, container and product damage, air-flow and cooling rates. Obtain data on material, equipment and labor inputs by time and cost studies. Determine feasibility of palletless unitizing. Research has been completed-final report giving results to be published during next fiscal year.

PERFORMING AGENCY: Agricultural Research Service, Market Quality Research Laboratory

INVESTIGATOR: Camp, TH

SPONSORING AGENCY: Department of Agriculture, 7302-15870-003

STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1974

COMPLETION DATE: Aug. 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0041736)

22 100431

STANDARDIZATION OF SHIPPING CONTAINERS FOR MEAT AND MEAT PRODUCTS

The objective is to improve the efficiency of marketing meats by determining requirements for standardizing shipping containers for meat and meat products. Presently used shipping containers will be surveyed and problem areas associated with the performance of containers during transport and handling will be identified. A first draft manuscript entitled, "Shipping Containers Used for Fresh Beef and Pork", presenting the data collected on the dimensions of shipping containers used for fresh beef, has been completed and is being reviewed prior to being submitted for review and publication. Data were collected at four chainstore distribution warehouses on shipping containers used for meats and meat products and to identify specific problem areas associated with packaging, handling, and distribution of meats. A multiplicity of container types and sizes were found to be used. Much of the container damage observed appeared to be a result of the many sizes of containers that prevented the use of proper stacking methods. Many of the various sizes of shipping containers could not be handled efficiently on the 48-by 40-inch pallet used in the warehouses. Potential container sizes were developed which could be substituted for the numerous container sizes used.

REFERENCES:

PROLIFERATION OF CONTAINERS INCREASES DAMAGE LOSSES James, GM; Ashby, BH, National Provisioner, Sept. 1973

PERFORMING AGENCY: Agricultural Research Service, Transportation Facilities Division, 1104-15841-002

INVESTIGATOR: Ashby, BH James, GM

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1975 START DATE: Mar. 1970

COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Current Research Information System (CRIS 0021141)

22 111280

FOOD PRESERVATION SYSTEMS

The objective of the project is to improve present systems and develop new systems for the preservation of food including cereal grains, cereal products, oilseeds, fresh vegetables and fruit. The transporting, storing and processing of foods as they move from the farmers' field to the consumers' table is to be considered as a complex interrelated system. The two computer simulation programs already developed to predict temperatures in unaerated and aerated grain bins will be combined. Then this program will be developed to simulate the complete grain preservation beginning with the standing crop in the field and ending with the delivery of the grain at a foreign country.

PERFORMING AGENCY: Manitoba University, Canada

INVESTIGATOR: Muir, WE

SPONSORING AGENCY: National Research Council of Canada

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Sept. 1973

COMPLETION DATE: Oct. 1978

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

23 048860

TRANSIT MARKETING PROGRAM

This contract is for a transit marketing program. The project will involve: market research to determine rider motivation, transit service planning, consideration of fares and scheduling, testing promotional methods at selected demonstration sites, and production of a transit marketing manual.

PERFORMING AGENCY: Grey Advertising, Incorporated
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Lee, D (Tel 202-4269157)

Contract DOT-UT-40021

STATUS: Active NOTICE DATE: July 1975 START DATE: Feb. 1974
COMPLETION DATE: Aug. 1975 TOTAL FUNDS: \$465,790

ACKNOWLEDGMENT: TRAIS (IT-06-0078)

23 048880

A STUDY OF TRANSIT FARE POLICIES AND THEIR IMPLICATIONS

The project will develop information on transit fares and fare structures that can: (1) identify promising techniques, (2) assess impacts, (3) instruct public policy regarding transit pricing, and (4) guide management decision-making by transit properties with regard to fare policies.

PERFORMING AGENCY: Office of Transportation Planning Analysis,
Department of Transportation
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Doyle, JE (Tel 202-4269745)

IA DOT-AT-40016

STATUS: Active NOTICE DATE: July 1975 START DATE: Apr. 1974
TOTAL FUNDS: \$25,000

ACKNOWLEDGMENT: TRAIS (IT-06-0095)

23 048959

CONFERENCE ON THE ADAPTIVE USE OF RAILROAD STATIONS

The objectives of the symposium are: (1) the establishment of guidelines for the adaptive use of railroad stations; (2) determining whether and what additional Federal, state, or municipal legislation or authority would provide incentives to make adaptive use of stations more attractive to the state, the municipality, the private developer and the local or regional transportation or transit authority; and (3) the establishment of a clearing-house of information on questions relating to the adaptive use of such railroad stations.

The film "STATIONS", 28 minutes, 16 mm, is available on loan from DOT, RM 9424, Tel: (202)426-4298. Film may be purchased from Roger Hagen Associates, 1019 Belmont Place, Seattle, Washington 98102. 28 min Version, \$300.00; rent, \$40. 63 min version, \$600.00; rent \$100.

Reusing Railroad Stations Scheduled for FY 76 Educational Facilities Laboratories, New York, New York, Volume I and II, Vol I, \$4.00

PERFORMING AGENCY: National Endowment for the Arts
INVESTIGATOR: Freeland, J
SPONSORING AGENCY: Office of Environment, Safety and Urban Affairs,
Department of Transportation
RESPONSIBLE INDIVIDUAL: Davis, RD TES-1 (Tel 202-4264474)

IA AS-40066

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: May 1974
TOTAL FUNDS: \$2,000

ACKNOWLEDGMENT: Office of Environment, Safety and Urban Affairs

23 058185

EVALUATE THE MBTA'S PREPAID TRANSIT PASS PROGRAM

On March 1, 1974, the Massachusetts Bay Transportation Authority inaugurated a new marketing program. It involves selling passes for transit riding in cooperation with downtown employers, and using the mechanism of payroll deduction to pay for the passes. The initial participant was the Boston-based John Hancock Mutual Life Insurance Company. Of the 7000 employees at the Boston Office, 1000 have signed up for the program. Other employers participating in the program include the Commonwealth of Massachusetts, the City of Boston, and the Transportation Systems Center. Many additional employers have already expressed interest in the program, and this number will surely grow as the Prepaid Pass receives greater publicity.

PERFORMING AGENCY: Massachusetts Bay Transportation Authority
INVESTIGATOR: Kelly, JC
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: McConahey, SG UTM-1 (Tel 202-4269157)

Grant MA-06-0059

STATUS: Active NOTICE DATE: Apr. 1975 START DATE: Oct. 1974
COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$80,000

ACKNOWLEDGMENT: UMTA

23 058246

OPERATIONS AND MAINTENANCE SUPPORT FOR URBAN RAIL SUPPORTING TECHNOLOGY AT DOT/TRANSPORTATION TEST CENTER

No Abstract.

PERFORMING AGENCY: Ground Transportation Development Center,
Federal Railroad Administration
SPONSORING AGENCY: Transportation Systems Center

ID RA-75-22

STATUS: Active NOTICE DATE: June 1975 START DATE: July 1974
COMPLETION DATE: June 1975 TOTAL FUNDS: \$43,844

ACKNOWLEDGMENT: TSC (420-0121)

23 058344

DECLINE IN USE OF MASS TRANSPORTATION

Objective is to determine the effect of the decline in the availability of mass transportation on the ability of urban residents in selected neighborhoods to travel into and out of the city to reach work. Specific objectives are: 1) To determine the characteristics of those who are affected by a decline in mass transit. 2) To assess the numbers who have been affected. 3) To determine the cost to society in terms of those affected. 4) To see what role fear has played in the development and continuation of the problem.

PERFORMING AGENCY: Chicago State University
SPONSORING AGENCY: Office of Systems Development and Technology,
Department of Transportation

Contract OS-40082 (FP)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Sept. 1974
COMPLETION DATE: May 1975 TOTAL FUNDS: \$21,353

ACKNOWLEDGMENT: Office of Systems Development and Technology

23 058345

MANUAL ON CONSUMER MOTIVATION AND PARTICIPATION IN PLANNING AND USE OF TRANSPORTATION SERVICES

1. A search of the behavioral science literature will be conducted for relevant principles that can be applied to transportation needs. Transportation successes and failures will be explored for valuable principles concerning user behavior and motivation. 2. Transportation strategies will be developed, evaluated, and refined according to scientific and social criteria.

PERFORMING AGENCY: George Washington University
SPONSORING AGENCY: Office of Systems Development and Technology,
Department of Transportation
RESPONSIBLE INDIVIDUAL: Williams, W TST-60

Contract OS-40083 (CS)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Feb. 1974
COMPLETION DATE: Feb. 1976 TOTAL FUNDS: \$52,746

ACKNOWLEDGMENT: Office of Systems Development and Technology

23 058349

OPTIMAL INTERNAL ORGANIZATION FOR NEW AND EXISTING URBAN PASSENGER TRANSPORTATION ENTERPRISE

Tasks include: 1. Define and quantify the dimensions of the concepts of organization, technology and socio-economic environment so that they can be related to transportation. 2. Identify suitable research hypothesis relating technological and environmental factors to organizational structure and behavior. 3. Conduct sample field surveys to obtain data on passenger transit organizations suitable to the testing of hypotheses and the formulation of findings and conclusions concerning optimal internal organizations for new and existing urban passenger transportation enterprises.

PERFORMING AGENCY: California University, Berkeley
 SPONSORING AGENCY: Office of Systems Development and Technology,
 Department of Transportation

Contract OS-40079 (CS)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Mar. 1974
 COMPLETION DATE: Mar. 1976 TOTAL FUNDS: \$95,793

ACKNOWLEDGMENT: Office of Systems Development and Technology

**23 058350
 MODAL CHOICE AND DEMAND FOR URBAN
 TRANSPORTATION**

Gather data and create data files adequate for use in the statistical analysis under Phase II. In Phase II, computer data analyses will be performed for the econometric part of the study. Phase III will develop and document policy analysis.

PERFORMING AGENCY: Brown University
 INVESTIGATOR: Chinitz, B
 SPONSORING AGENCY: Office of Systems Development and Technology,
 Department of Transportation

Contract OS-40078 (CS)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Feb. 1974
 COMPLETION DATE: Mar. 1975 TOTAL FUNDS: \$24,000

ACKNOWLEDGMENT: Office of Systems Development and Technology

**23 058364
 REESTABLISHING RAIL SERVICE IN CONJUNCTION WITH
 NEW FEEDER SYSTEMS**

A passenger demand model for line-haul service will be specified. Analysis and comparison of alternatives will include; 1) description and coding of alternative networks including assignment of capacities and speed for each line, and 2) tracing minimum path trees using standard techniques. A catalog of institutional and legal constraints will include 1) labor agreements, 2) ownership of rail rights-of-way, and 3) regulatory rules. A range of feasible alternative distribution systems will place the alternatives in parametric form. The alternatives will include, 1) fixed-route bus, 2) jitney, 3) subscriptions bus, 4) dial-a-ride, and 5) park-and-ride.

PERFORMING AGENCY: Princeton University, Department of Civil Engineering
 INVESTIGATOR: Lion, PM
 SPONSORING AGENCY: Office of Systems Development and Technology,
 Department of Transportation
 RESPONSIBLE INDIVIDUAL: Weil, RW

Contract DOT-OS-40095 (CS)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Mar. 1974
 COMPLETION DATE: Mar. 1977 TOTAL FUNDS: \$140,235

ACKNOWLEDGMENT: TRAIS

**23 058370
 DEVELOP A METHOD FOR PLANNING OF TRANSPORTATION
 SYSTEM IMPROVEMENTS IN A HIGH ACCESSIBILITY URBAN
 CORRIDOR**

The method is to be designed to fill a void in current transportation planning procedures between the regional planning and project planning levels. It will enable the consideration of travel demands and needs for a financially sound system, environmental and social impacts, and energy requirements. It will consist of a computerized model and a strategy for use in a manner well-suited to participation by citizens and political leaders as well as planners and engineers.

PERFORMING AGENCY: Pennsylvania University, Philadelphia
 SPONSORING AGENCY: Office of Systems Development and Technology,
 Department of Transportation

Contract OS-40092 (CS)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: July 1974
 COMPLETION DATE: July 1975 TOTAL FUNDS: \$69,928

ACKNOWLEDGMENT: Office of Systems Development and Technology

**23 058388
 INTERCITY TRANSPORTATION NETWORK ANALYSIS
 PROGRAM**
 No Abstract.

PERFORMING AGENCY: Federal Railroad Administration
 SPONSORING AGENCY: Office of Systems Development and Technology,
 Department of Transportation
 RESPONSIBLE INDIVIDUAL: Veloña, W

ID AS-50052
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Feb. 1975
 TOTAL FUNDS: \$2,500

ACKNOWLEDGMENT: Office of Systems Development and Technology

**23 058389
 PHOTOGRAPHIC SURVEY OF DEVELOPMENT AND
 ACTIVITIES IN THE VICINITY OF BART STATIONS**
 Develop a photographic inventory of information on the nature of development and activities in the vicinity of selected BART stations.

PERFORMING AGENCY: Metropolitan Transportation Commission
 SPONSORING AGENCY: Office of the Secretary of Transportation,
 Department of Transportation
 RESPONSIBLE INDIVIDUAL: Bouchard, R S-8 (Tel 202-4264144)

Contract OS-30176/17
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Mar. 1975
 COMPLETION DATE: Aug. 1975 TOTAL FUNDS: \$11,460

ACKNOWLEDGMENT: TRAIS

**23 058390
 URBAN TRAVEL DEMAND ELASTICITIES STUDY**
 Specify and estimate a behavioral travel demand model capable of determining the effects of policy instruments related to pricing, service, and the availability of limited resources, such as parking space and fuel on numbers of urban person trips by mode, purpose and zone. The model will be capable of being easily transformed so as to be applicable to aggregated urban data and to determining the effects of the above policy instruments on lengths of urban person trips. The specific modes will include: 1) Auto 2) Transit and taxi. The purposes will include, but not be limited to: 1) Home-work round trips, 2) Other home-based round trips, 3) Non home-based trips.

PERFORMING AGENCY: Charles River Associates, Incorporated
 SPONSORING AGENCY: Transportation Systems Center, OS-443

Contract DOT-TSC-964 (CPFF)
 STATUS: Active NOTICE DATE: June 1975 START DATE: Feb. 1975
 COMPLETION DATE: Dec. 1975 TOTAL FUNDS: \$59,690

ACKNOWLEDGMENT: TRAIS (OS-443)

**23 058431
 TECHNOLOGY FORECAST AND ASSESSMENT OF INTERCITY
 TRANSPORTATION ALTERNATIVES**
 The study includes a technology survey and forecast for both air and ground modes through the years 2000/2025, estimates of transportation demand based on various socio-economic scenarios, and analysis of the impacts of the transportation alternatives. The purpose of the study is to identify promising areas for transportation research.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company
 SPONSORING AGENCY: Office of Systems Development and Technology,
 Department of Transportation; Ames Research Center, National Aeronautics and Space Administration
 RESPONSIBLE INDIVIDUAL: Fearnside, JJ TST-13 (Tel 202-4264347)

IA AS-50053
 STATUS: Active NOTICE DATE: July 1975 START DATE: Mar. 1975
 TOTAL FUNDS: \$421,000

ACKNOWLEDGMENT: Office of Systems Development and Technology

**23 058440
 DEVELOP AN AGGREGATE MODEL OF URBANIZED AREA
 TRAVEL BEHAVIOR**
 Tasks include: Develop criteria for choosing between alternative models developed, establish methods and procedures for aggregating data, pro-

duce a disaggregate forecasting model for testing purposes, produce an aggregate forecasting model for testing purpose, review TRANS model requirements, establish criteria for validating aggregate forecasting procedures, and revise both models based on the results of testing and sensitivity analyses.

PERFORMING AGENCY: Massachusetts Institute of Technology
SPONSORING AGENCY: Office of Policy and International Affairs,
Department of Transportation

Contract DOT-OS-50001 (CR)
STATUS: Active NOTICE DATE: June 1975 START DATE: Feb. 1975
COMPLETION DATE: Oct. 1976 TOTAL FUNDS: \$99,871

ACKNOWLEDGMENT: Office of Policy and International Affairs

23 058544

DEVELOPMENT OF A DISAGGREGATE BEHAVIORAL DEMAND MODEL

Special emphasis will be placed on variables which are likely to result in variations in the demand for urban transportation services either in total or among modes, and which are likely to be affected by the response to impending issues, such as air quality strategies, energy shortage, urban congestion or land use policy. Subcases under these broad categories shall include such considerations as auto control strategies (i.e. parking changes, road tolls), variations in fuel costs (including taxations and/or price increases), and improvements in public transportation development. Extension of the model to include carpooling will receive special attention.

PERFORMING AGENCY: Charles River Associates, Incorporated
SPONSORING AGENCY: Office of Policy and International Affairs,
Department of Transportation

Contract OS-50161 (CPFF)
STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1975
COMPLETION DATE: June 1977 TOTAL FUNDS: \$78,586

ACKNOWLEDGMENT: TRAIS

23 058557

PHILA-LINDENWOLD RAIL TRANSIT LINE LAND USE IMPACT STUDY

No Abstract.

PERFORMING AGENCY: Pennsylvania State University, University Park
SPONSORING AGENCY: Office of Systems Development and Technology,
Department of Transportation

Contract OS-10043 NOTICE DATE: Aug. 1975 TOTAL
FUNDS: \$52,000

ACKNOWLEDGMENT: TRAIS

23 058624

STUDY OF SUBWAY STATION DESIGN AND CONSTRUCTION

The objective is to develop a set of recommended subway station designs for specific urban conditions in order to provide guidelines for more economical subway station construction. The recommended designs will be based on case studies of experience in underground urban rapid transit systems in the United States and in foreign countries. At the conclusion of the study a workshop will be conducted for transit planners, engineers, contractors and operators with the intent of disseminating the information gathered in this study to the tunneling community.

PERFORMING AGENCY: De Leuw, Cather and Company
SPONSORING AGENCY: Transportation Systems Center, UM-504

Contract DOT-TSC-1027 (CPFF)
STATUS: Active NOTICE DATE: July 1975 START DATE: June 1975
COMPLETION DATE: Aug. 1976 TOTAL FUNDS: \$223,838

ACKNOWLEDGMENT: TRAIS (UM-504)

23 099391

IMPROVED PASSENGER SERVICE PROGRAM

Provide near and long-term technology to permit maximum effective use of the rail passenger systems. Provide technological data and advice to the Secretary of Transportation for use in his responsibility in connection with Amtrak. Provide support to Amtrak in developing new rail passenger

equipment. Provide direct R&D support to Northeast Corridor Project. Formal coordination with Amtrak is being developed. Components on which R&D efforts are directed: Suspension support and guidance; signal, control and communications; braking/adhesion; energy management; propulsion; creature comforts; improved passenger train.

PERFORMING AGENCY: Federal Railroad Administration, Office of
Passenger Systems Research and Development
SPONSORING AGENCY: Federal Railroad Administration, Office of
Research and Development
RESPONSIBLE INDIVIDUAL: Mitchell, MB (Tel 202-426-0966)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1966

ACKNOWLEDGMENT: FRA

23 099416

STUDY OF TRANSIT FARE POLICIES AND IMPLICATIONS

This project will develop information on transit fares and fare structures that can (1) identify promising techniques for increasing ridership, (2) assess effects of fare policies on operations, (3) instruct public policy regarding transit pricing, and (4) guide management decision-making by transit properties with regard to fare policies. Attention will be given to existing pricing policies in urban transit, alternative fare structures and packaging techniques, (including the extent of no-fare transit operations), the potential for fare modification as a marketing tool, the effects of alternative fare and service packages on transit ridership and revenue (i.e., the price elasticity of transit demand), the institutional constraints affecting fare and service change, the implications for public policy, and the need for further research. In addition to a final report covering all data, analysis, methodology, findings and recommendations, a Transit Pricing Manual will be prepared for transit operators and other interested public agencies responsible for transit operations.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company
SPONSORING AGENCY: Urban Mass Transportation Administration

Contract IT-06-0095

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Sept. 1974
COMPLETION DATE: June 1976 TOTAL FUNDS: \$120,000

ACKNOWLEDGMENT: UMTA

23 099417

TRANSIT USER INFORMATION AIDS AND DISSEMINATION TECHNIQUES

Alternative mechanisms for the dissemination of transit user information will be identified and evaluated. User information embraces the communication of transit routes, schedules, fare structures, transfer policies, vehicle destinations, stop locations and other requisite information for transit accessibility. Various existing user information aids will be inventoried and evaluated, including maps and schedules, on-vehicle destination markings, stop location signs, telephone information systems and other innovative techniques. Dissemination policies and methods will also be addressed. Promising techniques will be synthesized, and a detailed transit information handbook for transit operators will be prepared.

PERFORMING AGENCY: Ilium Octopus
SPONSORING AGENCY: Urban Mass Transportation Administration

Contract IT-06-0098

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1974
TOTAL FUNDS: \$75,000

ACKNOWLEDGMENT: UMTA

23 099418

MARKETING FUNCTIONS IN TRANSIT MANAGEMENT ORGANIZATION STRUCTURES

The proposed study will inventory and evaluate alternative management organization structures and decision processes with regard to transit marketing. Generic marketing functions will be identified and described (e.g., market research, community relations, information dissemination, service planning, customer services, promotional activities, etc.) within representative transit management organizations. The decision processes for actual marketing activities will also be examined. Alternative organization structures will be evaluated.

PERFORMING AGENCY: Lesko Associates
 SPONSORING AGENCY: Urban Mass Transportation Administration,
 Department of Transportation

IT-06-0099
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1974
 TOTAL FUNDS: \$75,000

ACKNOWLEDGMENT: UMTA

23 099421
ENVIRONMENTAL CONTROL IN UNDERGROUND RAPID
TRANSIT SYSTEMS

This project was developed to fill a gap in subway environmental design. Since the first subway systems were built, "guesstimation" has been the principal ingredient of subway environmental criteria, analysis and control. Ventilation and station air conditioning represent 8 to 10 percent of the total cost of underground construction. Not only is there uncertainty in the size, configuration and spacing of vent shafts, but there are also many unknowns about the interaction between vent shafts and other elements of the total underground environmental system such as air flow, heat dissipation, and requirements for station air conditioning. This project has produced a Subway Environmental Simulation (SES) computer program which has been partially validated by full scale tests. An engineering handbook in two volumes has been produced. Volume I is entitled Subway Environmental Design Handbook: Principles and Applications. Volume II is a users' and a programmers' manual for the SES computer program. The fourth phase of the project, approved in June 1974, completes validation of the SES program, tests a new concept of removing heat from the stations and revises and updates Volume I of the Handbook.

A total of 42 technical reports have been issued, starting in May 1971. All are available from the National Technical Information Service.

PERFORMING AGENCY: Transit Development Corporation, Incorporated
 SPONSORING AGENCY: Urban Mass Transportation Administration,
 Department of Transportation

Contract DC-06-0010
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1970
 COMPLETION DATE: Jan. 1976 TOTAL FUNDS: \$4,023,064

ACKNOWLEDGMENT: UMTA

23 115953
APPLICATIONS OF MATHEMATICS TO TRANSPORTATION
STUDIES

This is a continuation of research previously supported under GP 24617. G. Newell will continue his work on the application of mathematics to transportation system analysis. Specific topics include: 1. Optimization in public transportation systems (route location, station spacing, zoning, scheduling, and control). 2. Transportation planning (continuum approximations on networks, queueing in networks, optimal scheduling and location of facilities). 3. Queueing theory and stochastic properties of traffic.

PERFORMING AGENCY: California University, Berkeley, School of Engineering

INVESTIGATOR: Newell, GF

SPONSORING AGENCY: National Science Foundation, Division of Mathematics and Physical Science, MPS72-05068 A02

STATUS: Active NOTICE DATE: July 1975 START DATE: Aug. 1974
 COMPLETION DATE: July 1975 TOTAL FUNDS: \$25,000

ACKNOWLEDGMENT: Science Information Exchange (GSP 5015 6)

24 045989

RAIL NETWORK AND MODEL FOR ANALYSIS AND EVALUATION OF ALTERNATIVE RAIL SYSTEMS WITHIN THE CONTINENTAL UNITED STATES

Conduct a detailed examination of the feasibility of extending and expanding data and operational programs for the computation of short line mileage to produce a rail network and model for analysis and evaluation of alternative rail systems within the continental United States.

PERFORMING AGENCY: National Bureau of Standards, Department of Commerce

INVESTIGATOR: Skillington, GE

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Ostrosky, D (Tel 617-494-2190)

IA DOT-RA-74-15

STATUS: Active NOTICE DATE: July 1975 TOTAL FUNDS: \$10,000

ACKNOWLEDGMENT: TSC

24 048949

IMPACTS OF PROPOSED RAIL NETWORKS

The Contractor shall develop a set of Methodologies for estimating and evaluating impacts of Proposed Rail Network changes, helping ease redundancies and misallocation of resources affecting the cost and performance of the railroads. Models will be developed, calibrated, and validated to provide a framework in which the impacts of alternative means or rationalization can be evaluated. The railroad industry, the users, labor, and other competing modes are affected by the process. The politico-socio-economic effects of different programs will be evaluated to provide a basis for the models. A review of regulatory agencies and laws will be performed. The end product will be the development and documentation of methodologies to predict quantitative and qualitative impacts within the framework of a railroad network model.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Sussman, JM

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Pitts, HB TAD-481 (Tel 2)

Contract DOT-OS-40002

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Oct. 1973

TOTAL FUNDS: \$180,000

ACKNOWLEDGMENT: TRAIS

24 050711

ILLINOIS CENTRAL NETWORK ANALYSIS

Railroad transportation operations are characterized by having a large number of variables with extensive interactions between variables and, in most cases, analytical techniques such as linear programming, queuing theory, game theory, etc., do not provide realistic solutions. A network simulation model will be applied to aid railroad management in determining the effects of changing facilities, operating policies, and traffic load on the performance of a railroad, thereby improving the overall system performance.

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering

INVESTIGATOR: Hay, WW Reinschmidt, AJ Kim, SJ

SPONSORING AGENCY: Illinois Central Gulf Railroad

STATUS: Completed NOTICE DATE: July 1975 START DATE: July 1973 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (AI 753 3)

24 055781

RAIL FACILITIES DATA

The Office of Preparedness shall update rail facilities data for use in the rail network analysis.

This project was done in cooperation with Government Services Organization, Federal Preparedness Agency.

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: Roggeveen, V (Tel (415)328-8338)

SPONSORING AGENCY: Office of Policy, Plans and International Affairs, Department of Transportation; Office of the Secretary of Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Leavens, D TPI-12 (Tel (202)343-6213)

IA AS-40071

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: June 1974

TOTAL FUNDS: \$5,000

ACKNOWLEDGMENT: TRAIS

24 058236

ENGINEERING AND SCIENTIFIC MANPOWER AVAILABLE FOR THE TRANSPORTATION INDUSTRY

Prepare a report delineating the recent, present and near-future supply of new graduates in the physical sciences and engineering, and particularly in civil engineering; examine the available demand information; outline the several alternative possibilities for increasing the available supply of technological manpower and/or augmenting it from the present workforce; and make recommendations for a further comprehensive study of the manpower supply/demand situation within the programs of the Department of Transportation.

PERFORMING AGENCY: Scientific Manpower Commission

INVESTIGATOR: Vetter, BM (Tel 202-2236995)

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation, PS-50287

RESPONSIBLE INDIVIDUAL: Money, LJ TST-45

Contract PS-50287

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Dec. 1974

COMPLETION DATE: Jan. 1975 TOTAL FUNDS: \$2,499

ACKNOWLEDGMENT: Office of Systems Development and Technology (PS-50287)

24 058509

STUDY OF UNIONS, MANAGEMENT RIGHTS, AND THE PUBLIC INTEREST IN MASS TRANSIT

This research proposes to determine the extent of collective bargaining, its effect, the variables relating to public interest that are common to most negotiations, and the adequacy of transit management to effect stable, reliable, efficient, and economical transit service. Through a better understanding of union-management relations, the research will assist the transit management in reaching settlements without interruptions of service and provide economically realistic settlements for management and the public.

PERFORMING AGENCY: University of North Florida

INVESTIGATOR: Smith, JA

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Forrester, MW (Tel 202-4262888)

Contract DOT-OS-50116 (CS)

STATUS: Active NOTICE DATE: July 1975 START DATE: June 1975

COMPLETION DATE: June 1976 TOTAL FUNDS: \$59,857

ACKNOWLEDGMENT: TRAIS (PUR-50046)

24 099402

FREIGHT CAR UTILIZATION RESEARCH PROGRAM. PHASE I. TASK 5—IMPACT OF AAR AND ICC RULES, DIRECTIVES AND ORDERS ON CAR UTILIZATION

Continue the evaluation of activity currently supporting the Clearinghouse experiment. This evaluation will include utilization comparisons of Railbox with comparable railroad-owned car groups. Assist in revising the Clearinghouse ground rules to improve the efficiency of the Clearinghouse alternative to Car Service Rules 1 and 2. Attempt to set up demonstrations to evaluate alternatives to industry rules and practices in the areas of per diem, demurrage and car service rules and orders.

For further information on related studies see also RRIS 099398 Section 26A, 099399 17A, 099400 17A, 099401 17A, 099403 21A Bulletin 7502.

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: Metz, HW (Tel 312-435-7327)

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Leilich, GM (Tel 202-293-5018)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1975

COMPLETION DATE: Jan. 1977

ACKNOWLEDGMENT: AAR

25 045962

PUBLIC INVESTMENT IN TRANSIT FACILITIES

To evaluate the desirability/feasibility/impact of a value capture policy across areas: 1) The Law, 2) Community enhancement, and 3) Financing. The techniques to be used rely primarily on application and evaluation of case study corridors in Houston which represent prototypical situations. Each corridor will provide a situation for the development of comprehensive strategies (legal, social, financial, physical) based upon the value capture policy. These strategies will then be evaluated. General guidance material developed and integration to evaluate the policy's overall potentials.

PERFORMING AGENCY: Rice University, Center for Community Design and Research
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Nupp, BL TPI-22 (Tel 202-4264447)

Contract OS-40007 (C)
STATUS: Active NOTICE DATE: July 1975 TOTAL FUNDS: \$150,000

ACKNOWLEDGMENT: TRAIS

25 048920

STATE RAIL PLANNING METHODOLOGY

The proposal is designed to build upon the current efforts and experience of two states to develop a framework for state rail planning which can be used by other states on their own initiative, and specifically in response to the planning requirements of the Regional Rail Reorganization Act of 1973 and the Transportation Improvement Act, upon enactment.

PERFORMING AGENCY: Wisconsin Department of Transportation
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Sperty, JP

Contract DOT-FR-40025
STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$90,000

ACKNOWLEDGMENT: FRA

25 048938

URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES

The function of an effective national R&D policy in transportation is to indicate how federal resources available for R&D should be distributed between and across modes. This judgment must be based on established needs and evidence of promise in both new and existing technologies, with the final decision criterion being which options for expenditure will best assure continued transportation service and maximum national benefit.

PERFORMING AGENCY: National Science Foundation
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Linhares, A (Tel 202-426-4208)

IA DOT-AS-40063
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974
COMPLETION DATE: May 1975 TOTAL FUNDS: \$25,000

ACKNOWLEDGMENT: TRAIS

25 048978

AN EXPERIMENTAL REGIONAL TRANSPORTATION INFORMATION DIFFUSION UNIT

The contractor shall undertake experiments and conduct exploration to determine (1) the information needs of the transportation research, development, planning and administration communities in the Chicago Metropolitan Area, (2) the feasibility of a university-based information diffusion unit to act as an instrument for the dissemination of federally developed technologies to state and local transportation institutions, and (3) the impacts of the formal dissemination programs and systems upon the use of new transportation technologies. The method will be to establish an experimental information diffusion unit to provide three types of services: consultation by faculty specialists in transportation, on-line and off-line access to the evolving elements of TRISNET, and a system of delivery of documents and data required by the information users in the execution of their functions.

REFERENCES:

First Report on DOT Information Diffusion Study Rath, GJ, May 1974

R-TRIS Chicago: First Quarterly Report Libman, A; Jacobson, B; Rath, GJ; Roy, M; Schofer, J; Silva, J, July 1974

R-TRIS Chicago: Second Quarterly Report Libman, A; Jacobson, B; Rath, GJ; Roy, M; Schofer, J; Silva, J, Oct. 1974

PERFORMING AGENCY: Northwestern University, Transportation Center
INVESTIGATOR: Rath, GJ Schofer, JL
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Hoshovsky, AG TST-25.1

Contract OS-40090 (CS)
STATUS: Active NOTICE DATE: July 1975 START DATE: Apr. 1974
COMPLETION DATE: Apr. 1975 TOTAL FUNDS: \$69,706

ACKNOWLEDGMENT: TRAIS TRAIS (PR# PUR-1-40057)

25 054707

CONSTITUTIONAL AND GOVERNMENT ASPECTS OF TRANSPORTATION POLICY

A brief examination from secondary sources of the historical, economic, political and legal influences which have governed the development of a transportation policy in Canada and examination of the intergovernmental aspects involved in any revision or development of it in the future.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport
INVESTIGATOR: Burns, RM
SPONSORING AGENCY: Canadian National Railways; Ministry of Transport, Canada; Queen's University, Canada

STATUS: Active NOTICE DATE: July 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

25 058293

TRANSPORTATION INVESTMENT REQUIREMENTS AND GROWTH PATTERNS IN MICHIGAN

Since the State government of Michigan is formulating land use policies, an evaluation of the differential transportation costs associated with each of the growth patterns would show the way to effect savings to produce a balance in the Michigan transportation budget. Specifically, a model for use in Statewide planning will be produced. It will simulate the relationships between population growth and interzonal transportation costs for the state, and in addition, the social and environmental impacts will be evaluated. The technique developed for the State of Michigan will be useful for the development of transportation

PERFORMING AGENCY: Michigan State University, Department of Civil Engineering
INVESTIGATOR: Taylor, WC
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Williams, W TST-60

Contract OS-50044 (CS)
STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Jan. 1975
COMPLETION DATE: Feb. 1976 TOTAL FUNDS: \$31,297

ACKNOWLEDGMENT: TRAIS

25 058351

ANALYSIS OF A STATE-WIDE INTEGRATED TRANSPORTATION SYSTEM

Tasks include: 1) Analysis of current status and changing character of transportation modes in Mississippi. 2) Analysis of population characteristics and availability of population to transportation modes. 3) Examine the relationship between the transportation system and views of users and nonusers. 4) Analyse the flow of commodities within and through the state. 5) Analyze present transportation planning processes and develop procedures for implementing new planning processes.

PERFORMING AGENCY: University of Southern Mississippi, Southern Mississippi University
 INVESTIGATOR: Peterson, JR (Tel ter)
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Macrae, NK

Contract DOT-OS-40089 (CS)
 STATUS: Active NOTICE DATE: Aug. 1975 START DATE: Jan. 1974
 COMPLETION DATE: Jan. 1977 TOTAL FUNDS: \$177,915

ACKNOWLEDGMENT: TRAIS

25 058363

RESEARCH ON TRANSPORTATION CONNECTIVITY

A summary of institutional solutions to transportation systems integration will be prepared. A working symposium on the technological state-of-the-art of integrated multi-modal transportation terminals. A theoretical mission flow study and analysis will be initiated to identify the major concepts of connectivity to determine the need in some depth, and to identify the major connectivity activities necessary for a DOT program in connectivity RD and D.

PERFORMING AGENCY: Tennessee University
 INVESTIGATOR: Sleeper, RS
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation; Space Institute

Contract OS-40105 (C)
 STATUS: Active NOTICE DATE: July 1975 START DATE: May 1974
 TOTAL FUNDS: \$25,000

ACKNOWLEDGMENT: Office of Systems Development and Technology

25 058490

TRANSPORTATION ENERGY CONSUMPTION AND URBAN FORM RELATIONSHIP

Specific objectives are: a. Develop an analytical tool capable of assessing the relationship between urban land form and energy consumed to satisfy travel requirements. b. Establish the validity of the analytical tool. c. Utilizing the analytical tool, examine the relationship between urban land form and energy consumption for a number of abstracted existing land use patterns as well as a number of proposed or hypothetical land use patterns. d. Identify the policy options that may be realistically implemented to affect land use and the transportation system. e. Explore the impacts of implementing the different policy options and identify their effect on energy consumption.

PERFORMING AGENCY: Northwestern University, Evanston
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Goodman, KM TPI-12

Contract OS-50118 (CS)
 STATUS: Active NOTICE DATE: July 1975 START DATE: June 1975
 COMPLETION DATE: July 1976 TOTAL FUNDS: \$42,000

ACKNOWLEDGMENT: TRAIS

25 058494

IMPACTS OF THE SAN FRANCISCO BAY AREA RAPID TRANSIT SYSTEM

The Public Policy Project will analyze the observed influence of the BART system on policies of Bay Area, State and Federal governmental units. The influence may be due to costs and resulting bonds and taxes, or it may be due to transportation service changes that affected policies related to transportation facility development, land use and zoning, growth and provision of services, and finance. The reasons why the observed policy impacts occur will be examined, and approaches to improve the effects in future situations will be proposed. The Public Policy Project will also derive indications of the cause for policy changes and the results of change or no change from each of the other projects and may in turn direct their work by identifying changes which should be explained.

PERFORMING AGENCY: Metropolitan Transportation Commission
 SPONSORING AGENCY: Office of the Secretary of Transportation, Department of Transportation; Urban Mass Transportation Administration
 RESPONSIBLE INDIVIDUAL: Bouchard, R S-8 (Tel 202-4263957)

Contract OS-30176/201
 STATUS: Active NOTICE DATE: July 1975 START DATE: June 1974
 COMPLETION DATE: June 1975 TOTAL FUNDS: \$231,000

ACKNOWLEDGMENT: TRAIS

25 058507

DEVELOPING LOCAL STRATEGIES AS ALTERNATIVES TO ABANDONMENT OF LIGHT DENSITY RAILROAD LINES

By identifying, compiling and stressing innovative procedures which local interests may take either to preserve their rail service or to facilitate transition to a new form of transportation service, this research aims to assist in ameliorating potential deleterious impacts of rail abandonment. The objective is to develop a handbook to assist shippers, local and state governmental units, and planners when their rail service is scheduled for abandonment.

PERFORMING AGENCY: Tennessee University
 INVESTIGATOR: Patton, EP
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
 RESPONSIBLE INDIVIDUAL: Lewis, B (Tel 202-4262890)

Contract DOT-OS-50125 (CS)
 STATUS: Active NOTICE DATE: July 1975 START DATE: June 1975
 COMPLETION DATE: Sept. 1976 TOTAL FUNDS: \$85,420

ACKNOWLEDGMENT: TRAIS (PUR-50164)

25 058556

STUDY THE APPLICATION OF CURRENT TRANSPORTATION SYSTEMS & TECHNICAL KNOWLEDGE TO METROPOLITAN REGIONS

No Abstract.

PERFORMING AGENCY: Michigan University
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

Contract DOT-OS-10018 (FFP) NOTICE DATE: June 1975 TOTAL FUNDS: \$43,000

ACKNOWLEDGMENT: TRAIS

25 080326

A SIMULATION MODEL FOR NORTHERN TRANSPORTATION PLANNING

A computer simulation model is being constructed to enable transport planners to evaluate alternative transport investments required to meet the freight transport needs of a northern region over a specific time horizon.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 4.11.71

INVESTIGATOR: MacDonald, JA
 SPONSORING AGENCY: Canadian National Railways; Canadian Pacific; Transportation Development Agency; Queen's University, Canada

STATUS: Inactive NOTICE DATE: July 1975 START DATE: Nov. 1972

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

25 099364

INTEGRATED ANALYSIS OF SMALL CITIES INTERCITY TRANSPORTATION TO FACILITATE THE ACHIEVEMENT OF REGIONAL GOALS

The goal is to determine the conditions that should be obtained by planning, regulations, policies, and programs to help the small cities-those with less than 50,000 population-attract and attain economic growth by enhancing their environments, especially in regard to transportation. There will be intrastate, interregional, and intercity analysis of the ability of the cities to provide gainful employment, health services, and welfare services in both the local cities and the larger ones. Access by transportation is the vital link. The nine non-SMSA cities that are centers for the state planning region are being studied in depth. Both personal and freight transport and their demands are considered with each region analyzed with respect to

present and future growth patterns. Recommendations in three forms have been made: 1) mode modification transcending regional development, 2) general system improvements and innovation, and 3) those associated with regional typological structure and integrated goal analysis.

PERFORMING AGENCY: Iowa State University, Department of Civil Engineering

INVESTIGATOR: Carstens, RL

SPONSORING AGENCY: Office of the Secretary of Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Meck, JP

Contract DOT-OS-30106

STATUS: Active NOTICE DATE: Aug. 1975 TOTAL FUNDS: \$294,644

ACKNOWLEDGMENT: DOT

25 099365

VALUE CAPTURE POLICY RESEARCH-THE ECONOMIC, LEGAL, AND COMMUNITY DESIGN IMPLICATIONS OF CAPTURING LAND VALUE EXCALATION RESULTING FROM PUBLIC INVESTMENT IN TRANSIT FACILITIES

Land values are usually greatly increased by the installation of urban transportation facilities. It has suggested that Value Capture Policy be

utilized whereby more land than is needed immediately for the facilities to be purchased at market price. Selling and leasing of the surrounding land can be done eventually to provide a form of financing and to provide a positive control over the areas development. This research and seminar program is to explore the legal implementation, community enhancement, and economic feasibility aspects of capturing land value. Existing constraints, problems, and possibilities will be analyzed and described utilizing the Houston Transit Action Program. Alternative strategies for implementation will be developed with an evaluation of the feasibility of the program and the specification of guidelines. Seminars will provide input from public officials, transportation professionals, and civic leaders.

PERFORMING AGENCY: Rice University, School of Architecture

INVESTIGATOR: Sharpe, CP

SPONSORING AGENCY: Office of the Secretary of Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Nupp, BL

Contract DOT-OS-40007

STATUS: Active NOTICE DATE: Aug. 1975 TOTAL FUNDS: \$150,000

ACKNOWLEDGMENT: DOT

26 058298

RAIL TECHNOLOGY REVIEW

Bibliography shall contain an index based on the RRIS thesaurus, descriptive English language abstracts and the necessary bibliographic information required for input along with copies of selected documents and translations of important works in the foreign literature.

PERFORMING AGENCY: Defense Electronics Supply Center, Department of Defense

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Steele, R (Tel 617-4942476)

IA RA-75-19

STATUS: Active NOTICE DATE: July 1975 START DATE: Feb. 1975

COMPLETION DATE: Aug. 1975 TOTAL FUNDS: \$200,000

ACKNOWLEDGMENT: TSC (611-0186)

26 058329

DEVELOPMENT AND OPERATION OF 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, F (Tel. 202-389-6611)

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

RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel. 202-426-0855)

Contract DOT-OS-40022/10

STATUS: Active NOTICE DATE: July 1975 START DATE: July 1974

COMPLETION DATE: Sept. 1976 TOTAL FUNDS: \$499,500

ACKNOWLEDGMENT: FRA

26 058380

RAILROAD WAGE AND EMPLOYEE STATISTICS RECEIVED BY THE FEDERAL RAILROAD ADMINISTRATION

Describe specific data available and the methods used by railroads in reporting. Verify data accuracy. Specific data items to be inventoried are: (1) Interstate Commerce Commission Annual Wage Statistics of each Class I railroad in the United States for the years 1969-1973 for 128 Employee Occupational Classifications (Form ICC-A-300). (2) Railroad Retirement Board: a) Wage Study Tape—1973-Current Payroll Information b) Wage Study (Xeroxed)—1969-1973 Retained Payroll Data c) Wage History Tapes—1969-1973-Retirement Records. The Interstate Commerce Commission's Form A-300 and the Railroad Retirement Board's Wage Study and Wage History Tapes are to be thoroughly reviewed for informational quality.

PERFORMING AGENCY: Whitten (Herbert O) and Associates

INVESTIGATOR: Whitten, HO

SPONSORING AGENCY: Federal Railroad Administration

Contract DOT-FR-55097 (FFP)

STATUS: Active NOTICE DATE: July 1975 START DATE: Mar. 1975

COMPLETION DATE: June 1975 TOTAL FUNDS: \$9,991

ACKNOWLEDGMENT: TRAIS (5097)

26 099398

FREIGHT CAR UTILIZATION RESEARCH PROGRAM. PHASE I. TASK 1—ANALYSIS OF CURRENT PRACTICES AND PROBLEMS

Identify, analyze and document car utilization problems and the various approaches to these problems that have been undertaken. This identifica-

tion and documentation will include a limited literature search, an extensive survey of the industry and shippers, the compilation of a manual of practices and the dissemination of that manual to the industry.

For further information on related studies see also RRIS 099399 Section 17A, 099400 17A, 099401 17A, 099402 24A, 099403 21A in Bulletin 7502.

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: Steele, RN (Tel 703-981-5284)

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Leilich, GM (Tel 202-293-5018)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1975

COMPLETION DATE: Jan. 1976

ACKNOWLEDGMENT: AAR

26 099423

TRANSPORTATION RESEARCH INFORMATION AND TECHNOLOGY SHARING

Activities of the Transportation Research Board of the National Academy of Sciences are supported under this continuing program to provide the services and resources for improved information dissemination and technology transfer. Under this project, general support is provided for the Transportation Research Information Service which maintains a data bank of abstract and bibliographic information relating to various aspects of transportation research. The project also supports various technology sharing forums, including seminars, conferences and workshops on various specific research topic.

Information services and a variety of regular publications relating to transit research are available from the Transportation Research Information Service.

PERFORMING AGENCY: Transportation Research Board, National Research Council

SPONSORING AGENCY: Urban Mass Transportation Administration, Department of Transportation

STATUS: Active NOTICE DATE: Aug. 1975 TOTAL FUNDS: \$100,000

ACKNOWLEDGMENT: UMTA

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 in Bulletin 7501.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel 321-225-9600 X-863)

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1970

COMPLETION DATE: 1976

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 of the addresses for those publications that are not listed on pages vii and viii. 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 reference numbers should be checked. Some organizations have more than one office, and again there will be more than one listing of reference numbers of possible interest. Each summary of ongoing research is indicated not only by the *A* in the reference number but also by having the entire number appear in italics.

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