

Highway Safety Literature

... A Bi-Monthly Abstract Journal

HSL No. 72-4 February 25, 1972

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THIS ISSUE CONTAINS:

HS-010 504 - HS-010 572

HS-800 604

U.S. Department of Transportation / National Highway Traffic Safety Administration

An Announcement of
HIGHWAY SAFETY LITERATURE
... A Bi-Monthly Abstract Journal

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INTRODUCTION

Publications such as journal articles, proceedings, and research reports announced in *Highway Safety Literature* include some of the most recent additions to the collection of the NHTSA Scientific & Technical Information Service. Subject areas covered include all phases of highway, motor vehicle, and traffic safety, especially those encompassed by the National Traffic and Motor Vehicle Safety Act of 1966 and the Highway Safety Act of 1966.

Individual issues of *HSL* are numbered according to the year and the issue number within that year; thus, 71 designates the year and 1, 2, 3, etc. the individual issues. To aid the user in locating citations by the HS-number, the cover bears the inclusive entry number for each issue.

Entries in *HSL* are arranged according to the NHTSA Subject Category List shown in the Table of Contents. The list is a two-level arrangement consisting of five major subject fields subdivided into 59 subject groups. Documents related directly to the National Highway Traffic Safety Administration

(NHTSA) are announced in a separate section headed NHTSA DOCUMENTS and are numbered in five distinct series: NHTSA Accident Investigation Reports (HS-600 000 series), NHTSA Compliance Test Reports (HS-610 000 series), NHTSA Contractors Reports (HS-800 000 series), NHTSA Staff Speeches, Papers, etc. (HS-810 000 series), and NHTSA Imprints (HS-820 000 series). For NHTSA DOCUMENTS in series HS-600 000 and HS-610 000, individual full case reports are available for inspection at the National Highway Traffic Safety Administration. HS-800 000 series and HS-800 000 series are available for purchase from NTIS or GPO (see page ii). Although announced together in a separate section, these documents are also assigned specific subject categories for machine retrieval.

A document which contains a number of separate articles is announced as a complete volume in the subject category most applicable to it as a whole. Entries for the individual articles appear in their most specific subject category.

SAMPLE ENTRIES

Subject Category Array

NHSB Accession no..... HS-800 218 Fld. 5/21; 5/9

Title of document..... AN INVESTIGATION OF USED CAR SAFETY STANDARDS--SAFETY INDEX: FINAL REPORT. VOL. 6 - APPENDICES G-L

Personal author(s)..... by E. N. Wells; J. P. Fitzmaurice; C. E. Guilliams; S. R. Kalin; P. D. Williams

Corporate author..... Operations Research, Inc.

Collation

Publication date..... 1969 150p
Contract FH-11-6921
Report no. ORI-TR-553-Vol-6; PB-190 523

Abstract..... Appendices G-L to this study of used car safety standards include: indenture model diagrams for classes I-IV motor trucks; degradation, wear, and failure

HS-004 497 Fld. 5/19

AUTO THEFT--THE PROBLEM AND THE CHALLENGE

by Thomas A. Williams, Sr.

Journal citation . . . Published in *FBI Law Enforcement Bulletin* v37 n12 p15-7 (Dec 1968)

Gives figures on the extent of the auto theft problem and comments on anti-theft devices available now or in the planning stage.

Search terms: Theft; Theft protection; Stolen cars

TABLE OF CONTENTS

NOTE: () Numbers in parentheses following certain subject groups indicate the Highway Safety Program Standards (No. 1, and up) and/or Federal Mot. Vehicle Safety Standards (No. 101 and up) which may apply to these groups.

INTRODUCTION AND SAMPLE ENTRIES	Inside Front Cover
AVAILABILITY OF DOCUMENTS	ii

NHTSA SUBJECT FIELDS AND GROUPS

1/0	ACCIDENTS	1
	/1 Emergency Services (11, 15-16)	
	/2 Injuries	
	/3 Investigation (10, 14-15)	
	/4 Locations (9, 14)	
	/5 Statistical data	
2/0	HIGHWAY SAFETY	5
	/1 Breakaway Structures	
	/2 Communications	
	/3 Debris Hazard Control and Cleanup (15-16)	
	/4 Design and Construction (12, 14)	
	/5 Lighting (14)	
	/6 Maintenance (12)	
	/7 Meteorological Conditions	
	/8 Police Traffic Services (15)	
	/9 Traffic Control (13-14)	
	/10 Traffic Courts (7)	
	/11 Traffic Records (10)	
3/0	HUMAN FACTORS	7
	/1 Alcohol (8, 14)	
	/2 Anthropomorphic Data	
	/3 Cyclists	
	/4 Driver Behavior	
	/5 Driver Education (4, 14)	
	/6 Driver Licensing (5, 10, 14)	
	/7 Drugs Other Than Alcohol	
	/8 Environmental Effects	
	/9 Impaired Drivers	
	/10 Passengers	
	/11 Pedestrians (14-15)	
	/12 Vision	

4/0	OTHER SAFETY-RELATED AREAS	10
	/1 Codes and Laws (6)	
	/2 Community Support (17)	
	/3 Cost Effectiveness	
	/4 Governmental Aspects	
	/5 Information Technology	
	/6 Insurance	
	/7 Mathematical Sciences	
	/8 Transportation Systems	

5/0	VEHICLE SAFETY	12
------------	-----------------------------	-----------

* All Federal Motor Vehicle Safety Standards apply to passenger vehicles. An asterisk before a subject group indicates additional types of vehicles to which the indicated standards may apply.

/1	Brake Systems (102, 105-6, 116)	
*/2	Buses, School Buses, and Multipurpose Passenger Vehicles (102-4, 106-8, 111-3, 116, 205-6, 209, 211)	
*/3	Cycles (3, 108, 112, 116, 205)	
/4	Design (14; 101-2, 105, 107, 201)	
/5	Door Systems (201, 206)	
/6	Fuel Systems (101, 301)	
/7	Glazing Materials (205)	
/8	Hood Latch Systems (113)	
/9	Inspection (1)	
/10	Lighting Systems (101, 105, 108, 112)	
/11	Maintenance and Repairs	
/12	Manufacturers, Distributors, and Dealers	
/13	Mirrors and Mountings (107, 111)	
/14	Occupant Protection (15; 201-4, 207-10)	
/15	Propulsion Systems	
/16	Registration (2, 10)	
/17	Safety Defect Control	
/18	Steering Control System (101, 107, 203-4)	
/19	Theft Protection (114-5)	
*/20	Trucks and Trailers (102-4, 107-8, 112-3, 116, 205-6, 209)	
/21	Used Vehicles	
/22	Wheel Systems (109-10, 211)	
/23	Windshield-Related Systems (101, 103-4, 107, 205, 212)	

NHTSA DOCUMENTS	18
EXECUTIVE SUMMARIES	19

NOTE: Material published in Highway Safety Literature (HSL) is intended for the information and assistance of the motor vehicle and highway safety community. While brand names, equipment model names and identification, and companies may be mentioned from time to time, this data is included as an information service. Inclusion of this information in the HSL should not, under any circumstances, be construed as an endorsement or an approval of any particular product, course, or equipment by the U. S. Department of Transportation, National Highway Traffic Safety Administration.

Harry A. Feinberg
Managing Editor

Articles and reports whose citations and abstracts appear in HSL are acquired from many sources, such as periodicals, journals, NHTSA Contractors' reports and NHTSA staff speeches, and other reports. Those reports other than NHTSA Contractors' reports and NHTSA generated reports and speeches (see introduction) are assigned a lower consecutive accession (HS-) number.

Department of Transportation personnel may borrow copies of publications announced in HSL from the NHTSA Technical Reference Division. Non-DOT Personnel, in the Washington, D.C. area, may borrow copies of publications for a 24-hour period only. Telephone (202) 426-2768. Government personnel in the Washington, D.C. area, use government ID phone 118-62768.

The names of the journals cited in HSL appear in italic type preceded by the word "Published in." The journal containing the article cited may be borrowed from most research and public libraries. Non-DOT personnel outside the Washington area should contact their company or agency libraries for assistance.

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The more common availability sources are identified by symbols which are explained in the next column:

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GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Give corporate author, title, personal author, and report number. Prepayment is required by GPO coupon (NTIS coupons are not acceptable), check or money order (made payable to the Superintendent of Documents).

HRB: Highway Research Board, National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C. 20418.

NHTSA: National Highway Traffic Safety Administration, General Services Division, Washington, D.C. 20591 (Telephone (202) 426-0874), Give HS-No.

SAE: Society of Automotive Engineers, Dept. HSL, 2 Pennsylvania Plaza, New York, N.Y. 10001. Order by SAE report numbers. Prices given are list; discounts are available to SAE members and sometimes to libraries and U.S. Government Agencies. Prepayment is required; orders received without payment are subject to a \$1 handling charge.

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1/0 ACCIDENTS

HS-010 504 Fld. 1/0; 2/0; 5/0

PROCEEDINGS OF THE 14TH ANNUAL CONFERENCE OF THE AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE, 19-20 NOVEMBER 1970

Michigan Univ. Hwy. Safety Res. Inst.

1971 255p refs

Includes HS-010 505, 507-512, 514, 518, 521, 527-528, 531, 535-536, 545, 564-565 and 569

Papers are presented on: soft-tissue windshield injuries; traumatic arthritis; dashboard injuries of the larynx; soft-tissue injuries of the cervical spine; pulmonary complications from trauma; blunt abdominal trauma; localized impact effect on the skull and patella; lap belt restraint effects on pregnant car crash victims; concept comparisons in restraint protection; the human ear and air bag noise; snowmobile accidents; bicycle accidents; booby trapped highways; training emergency medical technicians; a New York State system of emergency health services; identifying the problem-drinking driver; risk among alcoholic drivers; a university and police program for high school seniors; and effects of vehicle design changes.

Search terms: Windshield caused injuries; Arthritis; Dashboard caused injuries; Pulmonary arrest; Abdominal injuries; Head impact tolerances; Knee impact tolerances; Seat belt caused injuries; Restraint system effectiveness; Snowmobile accidents; Highway design; Alcoholism; Ambulance personnel training; Emergency medical services; High school drivers; Highway safety programs; Neck injuries; Noise tolerances; Bicycle accidents; Drinking drivers; Vehicle design

1/1 Emergency Services

HS-010 505 Fld. 1/1

TRAINING EMERGENCY MEDICAL TECHNICIANS

by Charles F. Frey; William C. Grabb

Michigan Univ.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p175-81

7 refs

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

Emergency medical service at its best is a complex system of integrated components. These component parts include well trained rescue workers. Historically, ambulance workers have not been well trained. The 70-hour training program for rescue workers in Washtenaw County constitutes an interim program, an intermediate step between the advanced Red Cross first aid course, and a truly professional one- to two-year community college hospital-based program.

Search terms: Emergency medical services; Ambulance personnel training; First aid; Heart lung resuscitation; Medical emergencies; Michigan; Curricula; State action

HS-010 506 Fld. 1/1

TRAUMA AND THE GENERAL PRACTITIONER (ABRIDGED)

by Kenneth C. Easton

Published in *Proceedings of the Royal Society of Medicine* v63 p1321-3 (Dec 1970)

4 refs

Unless medical care is available at the site of accidents and in transit, some

lives are lost that could have been saved and some injuries are aggravated. The state of road emergency care in Great Britain is briefly reviewed and "The Road Accident After Care" scheme of the North Riding of Yorkshire is proposed as an example of what should and can be achieved to provide excellent emergency care.

Search terms: Emergency medical services; First aid; Physicians and highway safety; Great Britain

HS-010 507 Fld. 1/1; 4/2

ESTABLISHING A SYSTEM OF EMERGENCY HEALTH SERVICES IN NEW YORK STATE

by Caldwell B. Esselstyn

New York State Dept. of Health

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p183-93

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

The New York State Department of Health is developing a statewide system of emergency health services which includes medical defense, accident prevention and injury control, investigating physical requirements for driver licensing, administration of ambulance regulations, training of ambulance attendants, designing a statewide system of emergency health communications, research, and the establishment of 30 area emergency medical care committees with full-time staff. Although ultimately dependent on hospital emergency department cooperation and performance, the emergency health services system is largely a universe composed of agencies and organizations outside of the hospital, such as community colleges, city and village police, fire departments, Red Cross, local government, the Interdepartmental Traffic Safety Committee, the State Medical Society and others.

1/1 Emergency Service (Cont'd.)

HS-010 507 (Cont'd.)

Search terms: Emergency medical services; Emergency services; Emergency training; First aid; Ambulance licensing; Ambulance personnel training; Communication systems; Community support; State government; New York (State); Driver physical fitness; State action

1/2 Injuries

HS-010 508 Flid. 1/2

TRAUMATIC ARTHRITIS—A MEDICAL AND LEGAL DILEMMA

by John D. States

Rochester Univ.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p21-8

10 refs

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970

Traumatic arthritis is a progressive degenerative process which occurs in joints injured by trauma and which causes pain, swelling, stiffness, and instability. Diagnosis is usually delayed because the clinically detectable manifestations do not appear for a year or more following injury. Fusion or prosthetic joint replacement are often the only definitive means of care and some disability always remains. Legal adjudication is difficult because of the long delay in the appearance of objective symptoms, and the severity and permanence of disability which follows the onset of traumatic arthritis. The pathology, pathogenesis, and etiology of 46 cases are discussed and some illustrative studies presented.

Search terms: Safety design; Arthri-

tis; Hip injuries; Knee injuries; Shoulder injuries; Legal factors; Joints (anatomy); Medical case reports; Injury research

HS-010 509 Flid. 1/2

DASHBOARD INJURIES OF THE LARYNX

by Nels R. Olson

Michigan Univ.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p29-46

5 refs

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

A protruding "hood" or "shelf" has been used in dashboard design in all major makes of American automobiles at various times since 1964. This structure has usually been provided with padding sufficient to protect the facial and cranial skeletons from severe injury. The larynx is more easily injured, however, and is often significantly injured when struck against a protruding edge, even though the edge is padded. In this paper, the case reports of twelve persons injured this way are briefly summarized. The mechanism of injury is explicitly detailed. Photographs of the patients and their vehicles are included. This type of injury is easily prevented either by the use of restraints or by changing the configuration of the dashboard.

Search terms: Dashboard caused injuries; Injury prevention; Passenger injuries; Larynx injuries; Neck injuries; Injuries by vehicle make; Restraint system usage; Injuries by vehicle age; Tracheotomy; Crush injuries; Instrument panel caused injuries; Instrument panel padding; Instrument panel design; Photographs; Injury research; Injury case reports

HS-010 510 Flid. 1/2

DETECTION OF SOFT-TISSUE INJURIES OF THE CERVICAL SPINE

by C. L. Nelson

Cleveland Clinic Foundation

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p47-62

23 refs

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

Soft tissue flexion-extension injuries of the cervical spine continue to pose a diagnostic and therapeutic problem for the physician. It has been proposed and found that some patients have soft tissue injuries of the cervical spine that will respond to surgical fusion. The problem has been the inability to diagnose the abnormality and the level of abnormality. This study represents a group of patients who were evaluated by the use of cineradiography and some of their operative findings. Abnormalities of the cervical spine noted after flexion and extension injuries, and the soft tissue determination of cervical movement are discussed.

Search terms: Neck injuries; Rear end collisions; Cervical spine; Ligaments; Surgery; Diagnosis; Cadavers in testing; Injury research; Whiplash injuries; Medical treatment; Radiography; Spinal flexion

HS-010 511 Flid. 1/2

PULMONARY COMPLICATIONS FROM TRAUMA

by David L. Beckman

Michigan Univ. Hwy. Safety Res. Inst.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the*

American Association for Automotive Medicine, 1970 p63-6

11 refs
Grant PH5-GM-16912

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

Previous clinical studies have shown that pulmonary complications may attend mechanical trauma, including injuries resulting from car crashes involving the head, thorax, and the extremities. Autopsy reports of car crash victims in some cases show gross pulmonary hemorrhage and edema. An investigation was carried out using squirrel monkeys and rhesus monkeys to determine the type and extent of any immediate pulmonary changes following exposure to experimental mechanical head injury, and to consider the causal factors involved. Results of an analysis of clinical and laboratory data suggest that direct pulmonary complications in addition to any possible airway obstruction occur immediately following trauma in car crash victims and may result in increased mortality rates. These pulmonary effects are attributed primarily to an alteration in lung surface tension forces mediated by the sympathetics.

Search terms: Heart lung resuscitation; Head injuries; Hemorrhage; Edema; Lungs; Monkeys; Airway maintenance; Medical treatment; Sympathetic nervous system

HS-010 512 Fld. 1/2

EFFECT OF LOCALIZED IMPACT ON THE HUMAN SKULL AND PATELLA

by John W. Melvin; Peter M. Fuller

Michigan Univ. Hwy. Safety Res. Inst.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p77-96

2 refs

Sponsored by Ford Motor Co. Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

The results of recent dynamic load measurements on the human skull and patella bone, conducted with less-than-one-square-inch penetrators, are discussed in relation to previously reported skull impact data from larger contact areas. The impacts were performed on embalmed bone at 0, 10, and 20 mph. The results of the impacts performed on patellas in the laboratory are correlated with accident reports from case histories of patella fractures.

Search terms: Dynamic loads; Impact tests; Head impact tolerances; Knee impact tolerances; Test equipment; Cadavers in testing; Skull fractures; Penetration tests; Bone physical properties; Bone mechanical properties; Patella fractures; Low speed impact tests

HS-010 513 Fld. 1/2

THE ANATOMICAL LOCALIZATION OF BRAIN INJURIES SUSTAINED IN TRAFFIC ACCIDENTS

by Aleksander Dubrzyski; Stefan Raszeja

Published in *Journal of Forensic Medicine* v17 n3 p99-102 (Jul-Sep 1970)

5 refs

In 40 out of 56 cases of fatal head injuries due to road accidents, injury of the brain occurred. The extent of damage to the brain in pedestrians is significantly greater than in drivers and passengers. The discrepancy between the neurological symptoms in relation to the changes observed during autopsies indicates that prognosis should be made cautiously in case of head injuries arising from road accidents, especially in early stages of treatment when no neurological symptoms are observed. The study is based on autopsies of accident victims in Poland.

Search terms: Head injuries; Brain

injuries; Autopsies; Neurologic manifestations; Pedestrian injuries; Injury severity; Pedestrian fatalities; Driver fatalities; Passenger fatalities; Poland

HS-010 514 Fld. 1/2; 1/1

TRAFFIC DEATHS DUE TO BLUNT ABDOMINAL TRAUMA

by Susan P. Baker; Harold R. Gertner, Jr.; Robert B. Rutherford; Werner U. Spitz

Johns Hopkins Univ.; Maryland Office of the Chief Medical Examiner

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p67-75

Sponsored by Insurance Inst. for Hwy. Safety and the Maryland Medical Legal Foundation. Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

Hospital records and post-mortem findings were reviewed for 33 traffic deaths in which the primary injuries were intra-abdominal. Only one case died before reaching the hospital. Half of these lives might have been salvaged by prompt and proper diagnosis and treatment. The investigation suggested a need to improve several aspects of hospital care of trauma patients. In particular, over one-third of the cases in this series demonstrated a need for more aggressive resuscitation of patients in hypovolemic shock. Nearly half of all cases involved either failure to operate or excessive delay in surgery, despite symptoms of abdominal injury. The importance of evaluating the results of medical care of the injured is emphasized by the unusual distribution of these deaths among various hospitals. The study points to the importance of seeing that severely injured patients reach appropriately trained physicians.

Search terms: Abdominal injuries; Medical treatment; Fatality causes; Resuscitation; Shock (pathology); Diagnosis; Surgery

HS-010 515 Flid. 1/2; 1/3; 3/9

AGE EFFECTS AND AUTOPSY EVIDENCE OF DISEASE IN FATALLY INJURED DRIVERS

by Susan P. Baker; Werner U. Spitz

Published in *Journal of the American Medical Association* v214 n6 p1079-88 (9 Nov 1970)

12 refs

A preliminary report of this study was read before the Third International Congress on Medical and Related Aspects of Motor Vehicle Accidents, New York, 30 May 1969.

A total of 328 drivers who died as the result of highway crashes was investigated, using autopsy records and police reports. There was no correlation between driver responsibility for the crash and autopsy evidence of disease or physical disability. Arteriosclerotic heart disease was found with similar frequency in drivers at fault and drivers not at fault. Several findings indicated that a decreased ability to survive crashes caused older persons to be greatly over-represented among fatally injured drivers. The proportion of drivers who were 60 years of age or older was five times as high among those killed as among drivers who survived multivehicle crashes. Delayed death was more common among older drivers and was associated with less serious injuries than in younger drivers. Blood alcohol levels are also discussed.

Search terms: Autopsies; Accident responsibility; Driver physical fitness; Heart diseases; Fatalities by age; Blood alcohol levels; Aged drivers; Age factor in accidents; Accident survival time; Driver age; Driver fatalities; Accident factors; Drinking drivers

HS-010 516 Flid. 1/2; 3/2

EFFECTS OF AMBIENT PRESSURE ON TOLERANCE OF MAMMALS TO AIR BLAST

by Edward G. Damon; Charles S. Gaylor; John T. Yelverton; Donald R. Richmond; I. Gerald Bowen; Robert K. Jones; Clayton S. White

Published in *Aerospace Medicine* v39 n10 p1039-47 (Oct 1968)

20 refs

Contract DA-49-146-XZ-372

Dogs, goats, rats, and guinea pigs were exposed against the end plate closing the expansion chamber of a shock tube to air blast at ambient pressures (P_1) ranging from 5 to 42 psia. As previously found with mice, animal blast tolerance, expressed at delta P_{50} -one-hour reflected overpressures, rose progressively as the experimental ambient pressure was increased. When expressed as the ratio, delta P_{50}/P_1 , the median lethal dose tended to fall at the higher ambient pressures. A set of equations relating air blast tolerance to the ambient pressure at exposure was derived for five species of mammals, and by use of these and other results a similar equation was obtained for predicting the effects of ambient pressure on human tolerance to air blast.

Search terms: Animal experiments; Goats; Dogs; Guinea pigs; Rats; Blast injuries; Lung injuries; Pressure waves; Air pressure; Injury research; Mathematical models; Animal impact tolerances; Pressure time histories; Probit analysis; Equations

HS-010 517 Flid. 1/2; 4/2

THE SEMANTICS OF SAFETY. AN EVALUATION OF SOME LANGUAGE USED IN PRESS COVERAGE OF AVIATION AND AUTOMOBILE FATALITIES

by John DeMott

Northwestern Univ.

1966 17p

Differences are believed to exist in the press coverage of aviation and automo-

bile fatalities. Twelve metropolitan newspapers were selected for the month of June 1966, and all news stories in 360 issues involving either aviation or automobile fatalities were analyzed. It is concluded that the press should re-examine its coverage of aviation and automobile fatalities to guard against providing unintentional support to public apathy towards today's increasing deaths on the nation's streets and highways.

Search terms: Semantics; Mass media; Public opinion; Attitudes; Aircraft accidents; Automobile accidents; Fatalities; Psychological factors; Accident reporting

HS-010 518 Flid. 1/2; 5/7

THE CHANGING CHARACTER AND MANAGEMENT OF SOFT-TISSUE WINDSHIELD INJURIES

by Richard C. Schultz

Illinois Univ.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine* 1970 p1-19

6 refs

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

The pattern of soft tissue facial injuries resulting from automobile windshields has changed with recent changes in windshield construction. Whereas formerly large avulsion flaps and avulsion injuries resulted and plastic surgeons were commonly asked to perform the repair, the current forms of injuries consist of numerous small lacerations and triangular avulsion flaps, and being less dramatic in appearance, they often receive only cursory medical attention. The final appearance of these latter forms of injury are often quite disappointing. Small triangular avulsion flaps contract, and the patient is left with a pebbly, scarred forehead as a final

result. Though not all treatment problems relative to the newer forms of windshield injuries have been resolved, the author attempts to define the surgical problems and recommends approaches to treatment which minimize subsequent facial disfigurement.

Search terms: Windshield caused injuries; Windshield penetration; Facial injuries; Impact caused lacerations; Injuries by vehicle age; Laminated glass caused injuries; Medical treatment; Surgery; Glass fracture behavior; Injury research

1/3 Investigation

HS-010 519 1/3

MOTOR VEHICLE SAFETY: THE VECTORS

by J. Wadsworth

National Res. Council of Canada

1966 10p

Report no. NRC-TN-6

A study of over-all fatal motor vehicle accidents, using only the irrefutable statistics of quantity, time of occurrence, and traffic volume, establishes the driver as the prime accident vector. The other, inanimate components of the automobile transportation system are definitely of lower rank. Alcohol most certainly is the impediment in the 2:30 a.m. peak. Safety cars may confer immunity to the accident disease only if they are passively safe, not dependent on people.

Search terms: Epidemiology; Accident causes; Driver intoxication; Safety cars; Drinking drivers; Driver error caused accidents; Traffic volume; Time of accidents; Time of day; Vehicle mileage; Accident rates; Accident factors

HS-010 520 Fld. 1/3; 5/20

A DETERMINATION OF THE RELATIVE COLLISION INVOLVEMENT OF TRUCKS AND OTHER VEHICLES

by Donald D. van der Zwaag

Published in *HIT LAB Reports* p1-5 (Jul 1971)

Three separate measures of exposure to crashes were used to study collision data from the Ohio Turnpike for the period January 1966 through June 1970. The measures — induced exposure, vehicle miles, and an interaction model — yielded different results, and the assumptions underlying these measures were examined. The author concluded that caution should be exercised to ensure that the appropriate measure is applied. The exposure measurement has not been perfected and therefore, one may not conclude that one method of measurement is better than another for all circumstances. Trucks appear to be over-involved in rear end and sideswipe collisions on the Ohio Turnpike for the period studied.

Search terms: Accident risks; Accident rates; Truck accidents; Vehicle mileage; Statistical analysis; Accident types; Ohio; Rear end collisions; Overtaking; Side impact collisions; Mathematical models

2/0 HIGHWAY SAFETY

2/4 Design and Construction

HS-010 521 Fld. 2/4; 1/4

BOBBY TRAPPED HIGHWAYS IN THE BECKONING COUNTRY [A BOOK REVIEW]

by Julian A. Waller; Lawrence S. Harris
Vermont Univ.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the*

American Association for Automotive Medicine, 1970 p167-74

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

Over the past 20 years between one-third and one-half of Vermont's highway fatalities have involved unnecessary collision with death-dealing roadside obstacles. This paper describes a project to document this unnecessary slaughter and to bring it to the attention of state legislators, town selectmen, and the news media. This type of project can be carried out inexpensively and effectively by practicing physicians who are in a unique position to document the full extent of human losses attributable to improper energy transfer involving roadside hazards.

Search terms: Highway design; Highway safety; Vermont; Roadside hazards; Accident location; Highway planning; Physicians and highway safety

HS-010 522 Fld. 2/4; 1/4

FREEWAY MEDIANS

Illinois Div. of Highways

1969 16p

Report no. Accident-Study-101

Based on previous studies of median-encroachment accidents and accidents near median crossovers, attacks on the problems are suggested. Unessential crossovers should be eliminated. Those remaining should be unsigned and depressed below shoulders but with adequate sight distance, not located near speed-change tapers or structures, and located only where interchange spacing is greater than five miles. Problems of median encroachment and glare require imaginative, new cross-section designs, removal or protection of obstacles, glare screening, energy-absorbing barriers for narrow medians, trees with small trunks, and median width as great as possible.

Search terms: Freeway planning;

1/2 Injuries (Cont'd.)**HS-010 522 (Cont'd.)**

Median barriers; Median crossovers; Median encroachments; Accident location; Roadside hazards; Highway design; Accident prevention

2/5 Lighting**HS-010 523 Fld. 2/5; 5/10****LIGHTED HIGHWAYS CAN REDUCE ACCIDENTS**

by Jim O'Hara

Published in *Municipal South* v16 p6-8 (Oct 1969)

Speeding has become a habit carried over from day time to night time, rain, and fog. Methods of improving visibility were discussed at a lighting symposium held at the University of California, Berkeley. Additional highway lighting would increase the amount of light on the pavement and reduce glare. Some suggested improvements are: lower the angle of light beam, mount the lamps higher, introduce quality lamps and institute high-luminance tail lights and directional signal lights. Other studies have shown that unlighted highways are a particular threat to drivers over forty.

Search terms: Reduced visibility; Glare; Vision age changes; Highway lighting; High level lighting; Lamp mounting height; Taillamps; Night visibility; International factors

2/7 Meteorological Conditions**HS-010 524 Fld. 2/7; 5/20****WILL IT RUN AT 70 BELOW? A PROGRESS REPORT ON ARCTIC WINTER OPERATION OF AUTOMOTIVE EQUIPMENT**

by J. A. Miller; H. R. Porter; J. D. Lewis

Chevron Res. Co.; Standard Oil Co. (Calif.)

1971 16p 5 refs
Report no. SAE-710717

Presented at the National Farm, Construction, and Industrial Machinery Meeting, Milwaukee, 13-16 Sep 1971.

This paper describes special winterization aids and petroleum products that have been developed to make possible the operation of automotive machinery, on an emergency basis, at temperatures as low as -70°F. A package of five basic petroleum products appropriate for use on the North Slope of Alaska has served there successfully for several years at temperatures consistently in the -40°F range. The products may be blended to obtain additional properties. The motor gasoline and diesel fuels developed for this package are discussed, along with the pour point and viscosity properties of Arctic winter lubricants - motor oils, ATF and torque fluids, hydraulic oils, gear oils, and greases.

Search terms: Low temperature; Cold weather starting; Off the road vehicles; Construction vehicles; Freezing; Greases; Lubricants; Lubricating oils; Fuels; Transmission fluids; Vehicle maintenance; Alaska; Viscosity; Winterization; Hydraulic fluids

AVAILABILITY: SAE

2/9 Traffic Control**HS-010 525 Fld. 2/9****AN ANALYSIS OF DRIVER PREFERENCES FOR ALTERNATIVE VISUAL INFORMATION DISPLAYS**

by Kenneth W. Heathington; Richard D. Worrall; Gerald C. Hoff

Published in *Highway Research Record* n303 p1-16 (1970)

9 refs

Sponsored by Committee on Freeway Operations and presented at the 49th Annual HRB Meeting.

Traffic information descriptors have been evaluated as to how desirable they are to drivers residing in the Chicago metropolitan area. Several descriptors were evaluated for each of three levels of congestion: heavy, moderate and none. These descriptors are messages about the conditions on a freeway and are displayed by electronic signs. For the level of heavy congestion, information about an accident having occurred and causing heavy congestion was the descriptor most preferred. The speed descriptor ranked second for the level of heavy congestion and first for the other two levels of congestion. The two remaining descriptors (excluding the accident descriptor) were scaled fairly high, but were less desirable than the speed descriptor. The two quantitative descriptors, delay and travel time, had relatively low scale values and were simply not desired by the respondents.

Search terms: Electronic devices; Driver aid systems; Highway communication; Opinion polls; Driver characteristics; Chi square test; Traffic research; Chicago; Traffic information signs; Changeable message signs

HS-010 526 Fld. 2/9; 4/7**CASE STUDY IN THE APPLICATION OF A TRAFFIC NETWORK SIMULATION MODEL**

by Frank C. Barnes; Frederick A. Wagner, Jr.

Voorhees (Alan M.) and Associates, Inc.

1968 17p 4 refs

Presented at the 34th national meeting of the Operations Research Society of America, Philadelphia, Nov 1968.

A digital computer simulation model of traffic operation and control on urban street systems was utilized to investigate the effectiveness of several traffic engineering alternatives in a hypothetical nine-intersection 3 x 3 grid network. The four alternatives considered were: the existing conditions, prohibition of left

turns on the major arterial streets, parking prohibition and left-turn channelization on the major arterial streets, and grade separation at the intersection of the two major arterial streets. Use of simulation statistics for economic analysis of traffic alternatives is discussed.

Search terms: Computerized simulation; Traffic capacity; Traffic congestion; Traffic engineering; Waiting time; Traffic models; Arterial traffic volume; Parking prohibitions; Simulation models; Speed patterns; Urban intersections; Left turns; Economic analysis; Digital computers; Traffic signal timing; Traffic simulation; Channelized intersections; Travel time costs; Simulation models

3/0 HUMAN FACTORS

3/1 Alcohol

HS-010 527 Fld. 3/1

DEVELOPMENT OF A QUESTIONNAIRE TO IDENTIFY THE PROBLEM-DRINKING DRIVER

by Rudolf G. Mortimer; Jerold S. Lower

Michigan Univ. Hwy. Safety Res. Inst.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine* 1970 p195-205

12 refs
Contract FH-11-6555

Supported in part by Automobile Manufacturers Assoc. Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

Since alcoholism is implicated as a causal factor in a large proportion of traffic deaths, it is important to develop tools for detecting the alcoholic driver. Because of the large population to be screened, a simple, self-administering, objective questionnaire is the most promising approach. Four hundred fifty-two items were chosen from several psychological

tests which had shown promise in detection of alcoholics. These were administered to hospitalized alcoholics and to a control group of non-professional workers. Although additional work remains to be done, this technique appears to offer considerable promise of being able to detect a large proportion of the alcoholics in the driving population, thus opening the way for application of countermeasures.

Search terms: Drinking drivers; Alcoholism; Driver intoxication; Chi square tests; Questionnaires; Driver psychological tests; Driver personality; Driver sex; Problem drivers

HS-010 528 Fld. 3/1

DIFFERENTIAL RISK AMONG ALCOHOLIC DRIVERS

by Melvin L. Selzer; Marion Chapman

Michigan Univ.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p207-13

10 refs

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

The Michigan Alcoholism Screening Test (MAST) was developed to meet the need for a consistent, structured, easily quantified interview questionnaire for the detection of alcoholism. The effectiveness of the MAST was demonstrated in a previous study in which five groups of drivers were administered the MAST and the results validated by a record search in the courts, social service agencies, and medical facilities. The MAST data were analyzed to determine whether the MAST could be used to detect high risk driving as well as problem drinking and it was found that evidence of problem drinking is insufficient to predict high risk driving. A high risk driving questionnaire which can be rapidly administered and easily scored will have to be

developed to complement the MAST.

Search terms: Driver psychological tests; Questionnaires; Drinking drivers; High risk drivers; Alcoholism; Accident repeater drivers; Michigan Alcoholism Screening Test; Driver records

HS-010 529 Fld. 3/1

ALCOHOL BREATH TESTS: GROSS ERRORS IN CURRENT METHODS OF MEASURING ALVEOLAR GAS CONCENTRATIONS

by N. Herbert Spector

Published in *Science* v172 n3978 p57-9 (2 Apr 1971)

4 refs

Transitory contact of ethanol with the mucous membranes of the mouth or nasal passages is sufficient to drastically alter measurements of concentrations of ethanol in so-called "alveolar" gas for more than 20 minutes. When true concentrations of blood alcohol were at or close to zero, readings of greater than 0.4 gram/100 ml. were obtained on the Breathalyzer. Repeated mouth washing and gargling with water, changes in the nature of the solvent, and stomach loading each had only a slight effect in diminishing these errors.

Search terms: Alcohol breath tests; Alcohol blood tests; Blood alcohol levels; Alcohol effects; Driver intoxication; Breathalyzers; Accuracy

HS-010 530 Fld. 3/1; 4/2

TRAFFIC ACCIDENTS INVOLVING ALCOHOL IN THE U. S. A.: SECOND-STAGE ASPECTS OF A SOCIAL PROBLEM

by Selden D. Bacon

Published in *Quarterly Journal of Studies on Alcohol* n4 p11-33 (May 1968)

3/1 Alcohol (Cont'd.)**HS-010 530 (Cont'd.)**

6 refs

Social problems tend to emerge in two stages. The initiating events (traffic deaths, injuries, and damage related to alcohol) are held to be painful, improper, and controllable. Secondly, attempts at control (laws, education, law enforcement, and public information programs) are held to be ineffective or causes of further problems. Attempts even to describe the first stage are hampered by conflict, misinformation, ignorance, and emotionality related to the second stage. Common misinterpretations are cited and difficulties in gaining adequate information are described. Recent social changes suggest that alcohol problems are now more susceptible to attack.

Search terms: Sociological factors; Public opinion; Accident causes; Drinking drivers; Alcohol laws; Alcoholism; Social drinking; Accident prevention; Driver intoxication; Psychological factors

3/3 Cyclists**HS-010 531 Fld. 3/3; 5/3****AN INVESTIGATION OF RIDER, BICYCLE, AND ENVIRONMENTAL VARIABLES IN URBAN BICYCLE COLLISIONS**

by E. Brezina; M. Kramer

Ontario Dept. of Transport (Canada)

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p139-65

5 refs

Presented at the annual conference, Assoc. Adv. 10-29 Nov 1970.

school year 1969-70 was undertaken to identify the occurrence and contribution to risk of selected rider, bicycle, and environmental factors. The collision-involved bicyclist was found to be largely unguided by the conventional abstract rules of roadway placement and priority; responding only to immediate and obvious traffic conflicts. Collisions occurred most frequently in rush hour traffic flows; a high proportion were related to environmental deficiencies such as severe obstructions to view, substantial grades, and darkness or rain conditions. A large number of young riders experienced excess risk when riding bicycles too large for them. Among the 8 to 10 year old bicyclists, a five fold increase in risk was found for those who could not reach their pedals comfortably when seated.

Search terms: Bicycle accidents; Bicycle rider age; Bicycle rider behavior; Bicycle handling; Vehicle bicycle collisions; Time of day; Accident studies; Age factor in accidents; Accident risks; Toronto; Males; Accident factors; Bicycle characteristics; Trip length; Bicycle brakes; Bicycle safety

3/4 Driver Behavior**HS-010 532 Fld. 3/4****THE SLEEPY DRIVER: A TEST TO MEASURE ABILITY TO MAINTAIN ALERTNESS**

by Robert E. Yoss

Published in *Mayo Clinic Proceedings* v44 p769-83 (Nov 1969)

11 refs

Grant PHS-NB-2003

Presented in part at the meeting of the American Association of Automotive Medicine, Oct 1969.

The ability to maintain alertness while

especially prone to this problem is measuring changes in pupillary size and behavior. This method makes it possible to detect decreased wakefulness in an environment similar to that of driving an automobile. Selected case histories of "sleepy drivers" with dangerous driving records are presented along with their test results. They are compared to "alert" control subjects.

Search terms: Narcolepsy; Pupil responses; Attention; Driver tests; Driver physical fitness; Driver behavior; Driver licensing; Driver fatigue; Case reports

HS-010 533 Fld. 3/4**MOTIVATIONAL FACTORS IN CRASHES AND VIOLATIONS OF YOUNG DRIVERS**

by Donald C. Pelz; Stanley H. Schuman
Michigan Univ.

1971 31p 2 refs

Presented in part, at a meeting of the American Public Health Assoc., Minneapolis, 13 Oct 1971.

With a probability sample of 3,000 drivers, it was previously reported that crashes and violations-plus-warnings for young men rose to a maximum at age 18 or 19 and then declined. Among several dozen indexes constructed from interview data, similar curvilinear patterns in relation to age of young men were found for such factors as getting engaged or breaking an engagement, changing jobs, driving confidence such as rejection of seat belts, use of driving to blow off steam after arguments, and time-involvement with cars. Many of these measures also related to occurrence of crashes and especially violations. Other measures such as hostility indexes showed a decrease with age, while drinking and smoking steadily increased, and each of these also related to driving

adulthood may help to explain the elevated hazard at this age.

Search terms: Driver marital status; Alcohol usage; Young adult drivers; Traffic law violators; Motivation research; Anxiety; Accident rates; Driver personality; Age factors in driving; Statistical analysis; Drinking drivers; Seat belt usage; Male drivers; Psychological factors; Risk taking; Adolescent drivers; Driver records; Problem drivers; Aggression; Smoking

3/5 Driver Education

HS-010 534 *Flid.* 3/5

GOOD DRIVERS ARE WORTH THE EFFORT

by Robert E. Howell

Published in *Commercial Car Journal* v117 n1 p89-92 (Mar 1969)

The Pennsylvania Motor Truck Association's school near Harrisburg is dedicated to turning out skilled drivers. From initial interview to the time of graduation the truck driver must have a good attitude and the incentive to be a careful, courteous driver. The Pennsylvania school has adequate facilities and a few curricula to assure the turnout of safe drivers.

Search terms: Truck drivers; Fleet driver training; Behind the wheel instruction; Classroom driver instruction; Curricula; Pennsylvania; Truck driver performance

HS-010 535 *Flid.* 3/5; 3/4

A UNIVERSITY- AND POLICE-SPONSORED SPRING FIELD TRIAL TO REACH HIGH SCHOOL SENIORS IN MICHIGAN

by S. H. Schuman; D. C. Pelz; T. L. McDole; J. Amthor

Michigan Univ.; Michigan State Police

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p215-28

5 refs

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

A field trial to reach young drivers in a sample of southeastern Michigan high schools was conducted with the support of the Highway Safety Research Institute and the encouragement of the Michigan Association of Secondary School Principals, utilizing these three programs: small group discussions with "trigger films," a program of individual driving-development letters with positive recognition for good driving, and a series of large group senior assemblies with high impact safety messages from state and local police. The trial was timed to reach the drivers just before the perennial spring "epidemic" of young driver crashes. The considerations of population size, content of the programs, difficulties, feasibility and high acceptance of one of the programs are presented in detail. Results await analysis of ongoing data collection from the young driver files.

Search terms: High school drivers; Highway safety programs; Age factor in driving; Fatality rates; Program evaluation; Driver motivation; Police cooperation with other agencies; Michigan; Adolescent drivers; Driver education; Driver behavior; Young adult drivers; Driver sex

3/8 Environmental Effects

HS-010 536 *Flid.* 3/8; 5/14

THE HUMAN EAR IN AN AIR BAG NOISE ENVIRONS

by Charles W. Nixon

Aerospace Medical Res. Lab. (6570th)

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the*

American Association for Automotive Medicine, 1970 p121-34

11 refs

Prepared in cooperation with NHSB. Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

Personal restraint systems employing the principle of rapidly expanding air bags show promise of providing greater protection of occupants during motor vehicle impact than any other system or technique currently in use. On inflation, these systems generate an intense acoustic impulse which may or may not constitute a potential hazard to the auditory systems of the vehicle occupants. This study evaluated this potential acoustic hazard on 91 volunteer subjects. Results indicate that the impulsive noise is very loud; however, the probability of irreversible harm to the auditory systems of vehicle occupants may be considered to be extremely small.

Search terms: Auditory perception; Auditory threshold; Acoustic measurement; Noise tolerances; Impulse noise; Noise exposure; Air bag restraint systems; Hearing tests; Males; Females

3/9 Impaired Drivers

HS-010 537 *Flid.* 3/9

PROBLEMS IN EMPLOYMENT OF DIABETICS IN TRANSPORT JOBS

by A. M. Emará

Published in *Journal of the Egyptian Medical Association* v52 p677-88 (1969)

22 refs

A survey of 100 diabetics working in an Egyptian transport organization is reported. This study includes information about the types of diabetics, their jobs, any accident which occurred at these jobs, the severity of the accident, and the cause of the accident. The classes which were studied

3/9 Impaired Drivers (Cont'd.)

HS-010 537 (Cont'd.)

are: juvenile diabetics, obese diabetics, diabetes and employment, and diabetes and car driving. The results show that the main causes of sick absenteeism in diabetics are its complications rather than the diabetes itself. Therefore, one should not suppose that diabetics are a greater risk to employ with respect to the amount of work they do than any other class of employee.

Search terms: Diabetic drivers; Diabetes mellitus; Driver physical fitness; Medical factors; Disability evaluation; Medical factor caused accidents; Insulin; Injuries by accident type; Occupation; United Arab Republic; Accident causes

HS-010 538 *Fld. 3/9; 1/5*

A RECORD ANALYSIS OF WASHINGTON DRIVERS WITH LICENSE RESTRICTIONS FOR HEART DISEASE

by Alfred Crancer, Jr.; Peggy Ann O'Neill

Published in *Northwest Medicine* v69 p409-16 (Jun 1970)

3 refs

The purpose of this study was to determine if there are drivers with specific heart diseases, masked by the overall heart disease group, that have significantly higher accident, violation, or accident and violation rates than those of a comparable non-restricted population. It was found that the arteriosclerotic and hypertensive disease groups each have significantly higher accident rates than that of their matched groups. Drivers on a six-month reexamination cycle had a significantly greater proportion of accidents than expected. This indicates that they are a group of problem drivers in themselves, regardless of the specific

disease for which they are restricted. The study also included comparisons between drivers who used pacemaker devices and comparable heart disease and non-restricted drivers. The results showed that the users of pacemakers do not appear to be a problem driver group.

Search terms: Pacemaker (cardiac); Heart diseases; Accident rates; Hypertension; Traffic law violations; Driver license restrictions; Medical factors; Fatalities; Injuries; Accident statistics; Driver physical fitness; Washington; Problem drivers; Arteriosclerosis; Rheumatic heart disease; Driver records

HS-010 539 *Fld. 3/9; 3/6*

EPILEPSY AND DRIVING: SOME OF THE PROBLEMS

by Maurice J. Parsonage

Published in *Nursing Times* v66 n18 p555-6 (30 Apr 1970)

1 ref

It has long been generally accepted that any person currently liable to epileptic seizures of any type should not be permitted to drive any kind of powered vehicle on the highway. The law in Great Britain is not very clear, however, on how long an epileptic should be free from attacks before he could be regarded as safe to drive. Some clarification and relaxation of that law are needed in order to reduce the temptation to evade the regulations, minimize unnecessary hardships, and encourage epileptics to have a responsible attitude towards the laws.

Search terms: Handicapped drivers; Disability evaluation; Driver physical fitness; Epilepsy; Driver license laws; Great Britain

3/12 Vision

HS-010 540 *Fld. 3/12; 3/4; 2/4*

DRIVER DISTRACTION AS RELATED TO PHYSICAL DEVELOPMENT ABUTTING URBAN STREETS: AN EMPIRICAL INQUIRY INTO THE DESIGN OF THE MOTORIST'S VISUAL ENVIRONMENT

by Leslie S. Pollock

Published in *Exchange Bibliography* n58 p1-4 (Jul 1968)

52 refs

This summary and bibliography are given for a study of the distractive impact of buildings surrounding the road. Based upon analysis of selected arterial streets in Chicago and accidents of non-resident drivers in front, rear, and fixed object collisions not at intersections, conclusions were: the structure of the driver's visual field has a direct impact upon accident causation; the present setback restrictions relating to urban arterial streets bear little relationship to the motorist's visual requirements; and areas containing contiguous buildings with minimal setback variance and distance encourage distractive accidents.

Search terms: Accident location; Environmental factors; Building setbacks; Chicago; Urban accidents; Visual fields; Arterial streets; Driver residence; Psychological factors; Attention lapses; Accident causes; Field of view

4/0 OTHER SAFETY-RELATED AREAS

4/4 Governmental Aspects

HS-010 541 *Fld. 4/4; 1/3*

RESEARCH, THERE IS A PAY-OFF! [A PANEL]

by John A. Edwards; John D. States

National Hwy. Traf. Safety Administration; National Motor Vehicle Safety Advisory Council

Published in HS-010 546, *Partnership in Safety Conference*, 1971 p5-14

The research program of the National Highway Traffic Safety Administration includes priority studies on alcohol safety, crash survivability, and experimental safety vehicles. Some other programs are: driver-vehicle interactions, seatbelt usage, brakes, tires, handling, passive restraints, vehicle structure, and vehicles-in-use. Crashworthiness developments are now oriented toward protection at higher speeds. Multidisciplinary teams throughout the country study accidents in depth to help guide preventive efforts.

Search terms: Safety research; Automobile safety standards; Highway safety programs; Crashworthiness; Safety cars; Accident analysis; Accident investigation; Multidisciplinary teams; Alcohol usage deterrents; Accident survivability

4/5 Information Technology

HS-010 542 *Fld. 4/5; 5/17*

CONSUMER ASPECTS OF VEHICLE SAFETY

by Robert J. McEwen; Walker Sandbach; Edward J. Speno

National Motor Vehicle Safety Advisory Council

Published in HS-010 546, *Partnership in Safety Conference*, 1971 p71-8

New-car safety performance data must be published by automobile manufacturers. Department of Transportation consumer-information programs include advisory bulletins and recall campaigns which concern safety defects. Information about defects from individuals, fleet operators, consumer organizations, and state officials is needed in return. Accident and injury rates are related to

the make of automobile in terms of the chances for survival of a crash in that car make.

Search terms: Consumer information regulation; Automotive industry; Automobile recall campaigns; Automobile safety standards; Vehicle safety; Accidents by vehicle make; Injuries by vehicle make

4/6 Insurance

HS-010 543 *Fld. 4/6; 1/2*

ECONOMIC CONSEQUENCES OF AUTOMOBILE ACCIDENT INJURIES

by Edward C. Bryant

Westat Research, Inc.

[1970] 13p

Economic losses associated with serious injuries and fatalities in traffic accidents were estimated from sampled police accident reports and court cases in the contiguous United States in 1967. Average economic loss for the seriously injured (one and one-half to two and one-half years after the accident) was \$4,200; about 45% was wage loss, 38% medical costs, and 12% property damage. Total societal losses in future earnings were \$13,600 per victim. Economic loss in fatality cases averaged \$2,300 exclusive of lost earnings. The extent to which these losses were compensated by insurance and recovery under the tort system is discussed.

Search terms: Accident costs; Damage costs; Injury costs; Life value; Medical factors; Torts; Earning capacity; Accident compensation; Injury compensation; Insurance; Fatalities

HS-010 544 *Fld. 4/6; 4/1*

REPORT AND RECOMMENDATIONS OF THE SPECIAL COMMITTEE ON AUTOMOBILE ACCIDENT REPARATIONS

American Coll. of Trial Lawyers

1971 25p 37 refs

A study of the present system of auto accident reparations and of proposals for its change was made. Criticisms of the existing system are evaluated, and 12 recommendations are made for improving the existing system.

Search terms: Insurance laws; Insurance claims; Insurance fraud; Torts; Insurance costs; Liability insurance; No fault insurance plan; Negligence; Injury compensation; Accident compensation; Legal costs; Uninsured motorist funds; Fault

4/7 Mathematical Sciences

HS-010 545 *Fld. 4/7; 5/4; 5/14*

MEASURING THE EFFECTS OF CHANGES IN VEHICLE DESIGN WITH MASS ACCIDENT DATA

by James O'Day; Jay S. Creswell, Jr.

Michigan Univ. Hwy. Safety Res. Inst.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p229-50

Presented at the annual conference. Ann Arbor, 19-20 Nov 1970.

There seems to be no doubt of the efficacy of the several interior protection modifications of the modern American car. Their usefulness can be demonstrated in analysis, in simulations, and in clinical accident investigations. Ultimately, however, there should be indication of their value in the mass accident statistics. While these totals are greatly affected by factors such as increasing traffic volume, certain sub-sets of the accident data should be more sensitive to the vehicle improvements. This paper presents a model which relates specific improvements to specific accident events in order to measure the effectiveness of vehicle modifications. The data base for this study is a set of some 15,000 Michigan fatal accidents

4/7 Mathematical Sciences (Cont'd.)

HS-010 545 (Cont'd.)

which occurred over the past six years. A flexible analysis system permits this data to be sorted with respect to accident type, car model year, and many other factors. This paper presents the results of such an analysis.

Search terms: Vehicle design; Occupant protection; Accident statistics; Mathematic models; Injury prevention; Injury rates; Injuries by vehicle age; Fatality rates; Energy absorbing steering columns; Restraint system usage; Injury severity; Michigan; Equations

5/0 VEHICLE SAFETY

HS-010 546 Fld. 5/0

PARTNERSHIP IN SAFETY CONFERENCE

National Motor Vehicle Safety Advisory Council

1971 92p

Includes HS-010 541; 542, 547-548, 554, 556, 570, and 572

The Advisory Council functions as a liaison between the Department of Transportation, the states, and the public in coordinating the establishment of standards. The Council's primary concern is with vehicle standards. At this first Partnership in Safety Conference, the principal topics were the federal highway safety research program, future safe car design, state and federal roles in vehicle safety standards, industrial and governmental problems of safety standards, defective vehicles on the road, tire safety, and consumer protection. Conference were federal, state, and local government representatives, legislators, academic and industrial researchers con-

Vehicle Safety Act of 1966; Federal state relationships; Accident research; Vehicle safety standards; Vehicle maintenance; Vehicle design; Safety standards; Conferences; Defective vehicles; Safety cars; Occupant protection; Tire standards; Consumer protection

HS-010 547 Fld. 5/0

STATE/FEDERAL ROLES IN VEHICLE SAFETY STANDARDS [A PANEL]

by Ralph T. Millet; Sol M. Edidin

National Motor Vehicle Safety Advisory Council

Published in HS-010 546, *Partnership in Safety Conference*, 1971 p27-40

The Motor Vehicle Safety Act provided for new-vehicle safety standards issued by the National Highway Traffic Safety Administration. Standards numbered in the 100 series concern normal operating equipment, those in the 200 series concern crash phase equipment, such as occupant protection and seatbelts, and those in the 300 series involve post-crash factors such as fuel system, flammability and escape. There are conflicts between federal and state automobile standards. A more cooperative effort on the national level is needed.

Search terms: Federal state relationships; State laws; Federal laws; National Traffic and Motor Vehicle Safety Act of 1966; Automobile safety standards; Crashworthiness; Pre-crash phase; Crash phase; Postcrash phase; Stopping distance

HS-010 548 Fld. 5/0; 4/0; 2/0

SOLVING THE NATIONAL

Ford Motor Co.

Published in HS-010 546, *Partnership in Safety Conference*, 1971 p41-52

Federal and state governments and the auto industry are mutually dedicated to reduction of deaths and injuries on our highways. Federal regulation was essential to force safety products into the market despite competition. State responsibilities involve vehicle inspection, driver licensing and law enforcement, and roads and their design. The industry must produce new safety equipment but often time is too short and cost too high under the new standards.

Search terms: Federal state relationships; Automobile safety standards; Safety design; Drivers; Automotive industry; Safety device costs; Vehicle safety; Highway design; Safety standards compliance

5/1 Brake Systems

HS-010 549 Fld. 5/1

POSSIBLE ALTERNATIVES TO ASBESTOS AS A FRICTION MATERIAL

by D. Hatch

Published in *Annals of Occupational Hygiene* v13 p25-9 (Jan 1970)

Presented at Conference on Exposure to Asbestos during Brake and Clutch Maintenance, Brentwood, England, Mar 1969

Asbestos in friction linings is used because it neither burns nor loses its strength below 500°C. Dust counts during brake cleaning by compressed air-jet indicate that the wear products from friction material are probably no more dangerous to health than many other dirty dusts. In drum brake linings of

asbestos have to be tightly controlled and a substitute material required, possible replacements are glass fibres, steel wool, mineral wool, carbon fibres and sintered metals and cermets. Advantages for these materials are given.

Search terms: Friction materials; Brake materials; Air pollution measurement; Asbestos; Health hazards; Brake pads; Dust tests; Disc brakes; Clutches

HS-010 550 Flid. 5/1

TESTING MACHINES FOR SCALE VEHICLE BRAKE INSTALLATIONS

by A. J. Wilson; W. G. Belford; G. T. Bowsher

Published in *Engineer* v225 p317-23 (23 Feb 1968)

This work is concerned with a new effort to develop a test rig for the evaluation of friction materials, which would be capable of accurately defining the friction/temperature/speed/load characteristics of the material under test. The test rig simulates a vehicle braking system on an exact scale basis with sufficient accuracy to be comparable with vehicle assessment itself, and provides a high level of test repeatability. Test techniques have been developed in which the friction materials intended for drum brakes, tractor plate brakes, and railway brakes can be successfully evaluated. Control equipment has been extended to enable the rig to be "driven" as a vehicle, to simulate brake usage under general road running conditions.

Search terms: Friction tests; Friction materials; Test equipment; Brake fade; Brake design; Brake lining tests; Brake materials; Performance tests; Brake temperature; Laboratory tests; Brake tests; Brake thermal factors; Brake torque; Dynamometers; Materials tests; Wear tests; Disc brakes; Drum brakes

HS-010 551 Flid. 5/1; 5/11

AUTOCARE, THE FUNCTION AND FITTING OF A BRAKE SERVO

Anonymous

Published in *Autocar* v134 n3928 p42-4 (8 Jul 1971)

Power, or servo-assisted, brake kits are available, and the author fitted one to his car (a 1964 Mercedes), which had effective but heavy drum brakes. Reduction of braking effort was moderate, greatly reducing fatigue without the danger of too-sensitive brakes.

Search terms: Brake boosters; Pedal force; Power brakes; Servomechanisms; Brake pedals; Driver fatigue

HS-010 552 Flid. 5/1

TECHNIQUES FOR DETERMINING THE THERMAL CHARACTERISTICS OF BRAKE DRUMS AND DISCS

by Frank H. Highley

General Motors Corp.

1971 10p 2 refs
Report no. SAE-710589

Presented at SAE mid-year meeting, Montreal, Canada, 7-11 Jun 1971.

Heat storage, heat dissipation, and cooling coefficients are defined; and equations, based on theory and practice, are developed with which values of the coefficients can be determined. Vehicle tests required are described. Use of the coefficients in predicting drum or disc temperatures is demonstrated, using coefficient values obtained in vehicle tests. Use of the cooling coefficient for simulating brake cooling on a brake dynamometer is demonstrated.

Search terms: Brake temperature; Brake thermal factors; Brake performance; Brake tests; Equations; Brake

discs; Brake drums; Heat storage; Mathematical analysis; Brake fade; Dynamometers

AVAILABILITY: SAE

HS-010 553 Flid. 5/1; 5/20

COMMERCIAL VEHICLE BRAKES

Truck Trailer Manufacturers Assoc.

1969 115p

A panel discussion presented at Truck Trailer Manufacturers Association 28th annual convention, Miami, 28 Apr 1969.

Proposals for commercial vehicle brake safety standards were discussed by representatives of operators and manufacturers of tractors and trailers, foundation brakes, brake system components, and brake linings. A draft proposal on new vehicle braking performance was evaluated for technical soundness, practicality of performance levels, and effective industry compliance. Pertinent SAE recommended practices are included.

Search terms: Truck brakes; Brake performance; Brake tests; Brake standards; Commercial vehicles; Manufacturing standards; Truck safety standards; Trucking industry; Truck trailers; Brake system design

5/4 Design

HS-010 554 Flid. 5/4

THE CAR OF THE FUTURE—HOW SAFE WILL IT BE? [A PANEL]

by Vincent L. Tofany; Edward J. Speno

New York State Dept. of Motor Vehicles; National Motor Vehicle Safety Advisory Council

Published in HS-010 546, *Partnership in Safety Conference*, 1971 p15-26

5/4 Design (Cont'd.)**HS-010 554 (Cont'd.)**

Passengers in future safety vehicles may be able to survive crashes at 60 to 80 mph. Front and rear bumpers could eliminate damage in collisions at less than 10 mph and contribute to safety at higher speeds; padding will protect passengers at a 20 mph impact. Other innovations might be full rear view through a periscope, escape panels, and restraint against all crash modes. The entire concept of vehicle safety embraces pedestrian safety, nonmotion safety, accident avoidance, crash injury reduction, and post-crash factors.

Search terms: Vehicle safety; Vehicle design; Safety programs; Pedestrian safety; Automobile safety standards; Safety cars; Crashworthiness; Occupant protection; Bumper design; Accident survivability

HS-010 555 Fid. 5/4**OILS AND FLUIDS FOR HYDRAULICS**

by A. S. Morrow

Shell Oil Co.

1971 7p
Report no. SAE-710721

Presented at the National Farm, Construction and Industrial Machinery Meeting, Milwaukee, 13-16 Sep 1971.

The methods of refining and treating petroleum fractions and the selection of appropriate additives and inhibitors to obtain a satisfactory oil for hydraulic applications are reviewed. The various physical and chemical properties of these oils and their significance in hydraulic systems are also presented. In addition, a short resume and state-of-the-art of fire-resistant fluids is given. One of the most important requirements for oils and fire resistant fluids is to maintain an acceptance level of cleanliness.

Search terms: Physical properties; Lubricating oils; Hydraulic fluids; Refining; Lubricant additives; Fire resistant materials; Chemical properties; Compression; Hydraulic equipment; Temperature

AVAILABILITY: SAE

HS-010 556 Fid. 5/4; 4/4**SOLVING THE NATIONAL HIGHWAY SAFETY PROBLEM**

by Douglas Toms

National Hwy. Traf. Safety Administration

Published in HS-010 546, *Partnership in Safety Conference*, 1971 p79-86

The federal government, in the guiding role, shares responsibility for safety standards with the states and the automobile manufacturers. Emphasis in the federal program has shifted from accident prevention to concern with crash survivability as more cost-effective in reducing injuries and fatalities. Experimental safety car designs point toward safety advances in all cars. Various agencies of the state government should become involved with the rule-making process in the total area of the vehicle-in-use.

Search terms: Vehicle safety; Vehicle maintenance; Defective vehicles; Crashworthiness; Safety cars; Accident survivability; Automotive industry; Federal state relationships; Experimental vehicles; Safety devices; Automobile safety standards; Injury prevention

HS-010 557 Fid. 5/4; 5/10**ELECTRONIC SPEED INDICATOR FOR VEHICLES**

by G. N. Patchett

Published in *Electronic Engineering* v40 n488 p540-2 (Oct 1968)

1 ref

Includes summaries in French and German.

A signal light reflects in the windshield to remind the driver when he exceeds a preset speed of 30, 40, 50, or 70 mph, corresponding to four standard British speed limits. The driver selects the speed by switch; light brightness is controlled automatically for day or night. Circuit design is described for the system, which uses a magnetic speed pickup on the transmission.

Search terms: Speed indicators; Electronic devices in vehicles; Solid state devices; Inattention devices; Automatic warning systems; Great Britain

HS-010 558 Fid. 5/4; 5/20**DESIGN AND DEVELOPMENT OF THE TRANSMISSION SYSTEM FOR THE ALLIS-CHALMERS HD-41 CRAWLER TRACTOR**

by Robert W. Meyer; Wendell E. Richmond

Twin Disc Clutch Co., Inc.

1971 13p 3 refs
Report no. SAE-710725

Presented at the National Farm, Construction and Industrial Machinery Meeting, Milwaukee, 13-16 Sep 1971.

Design features and development of the power transmission system consisting of the hydraulic torque converter, driver shaft, powershift transmission, and integrated hydraulic system are discussed in this paper. The hydraulic control system relating to the dump valve transmission clutches and the forward-reverse inhibit system designed for full throttle shifts without thermal failure is of particular importance.

Search terms: Automatic transmission design; Hydraulic torque converters; Hydraulic design factors; Tractors; Power trains; Drivelines; Transmission tests; Vehicle performance;

Hydraulic equipment; Driveshafts; Shift lever sequence

AVAILABILITY: SAE

5/6 Fuel Systems

HS-010 559 Fld. 5/6

THE HETEROGENEOUS DECOMPOSITION OF NITRIC OXIDE ON SUPPORTED CATALYSTS

by M. Shelef; K. Otto; H. Gandhi

Published in *Atmospheric Environment* v3 p107-22 (1969)

23 refs

Heterogeneous decomposition rates of nitric oxide in the temperature range from 300 to 800°C are determined for a series of supported catalysts containing platinum, or the oxides of copper, chromium, and cobalt. The experiments have been carried out in a conventional integral flow reactor, and complete analyses of the gas compositions obtained by a mass spectrometer. Kinetic parameters such as activation energy and reaction order are given. A comparison is made with published data for similar catalysts, and reasons for disagreement are considered. It is concluded in view of the presently available catalysts that the practical application of catalyzed decomposition is not promising for the removal of NO from automobile exhaust.

Search terms: Nitric oxide; Catalysts; Exhaust emission control; Reaction kinetics; Mass spectrometry; Gas analysis; High temperature; Mathematical analysis; Decomposition; Platinum; Copper oxides; Chromium oxides; Cobalt oxides; Reactors

HS-010 560 Fld. 5/6

NO LEAD, LESS RVP COMING IN GASOLINE?

Anonymous

Published in *Canadian Chemical Process*ing v53 p47-50 (Mar 1969)

The cost of eliminating pollution-causing power units may force sacrifices in the fuel economy and may put manufacturers of lead additives out of business. The sources of pollutants which must be controlled are: exhaust emissions, the crankcase vent tube, the fuel tank, and the carburetor. Some problems connected with pollution reduction are the rising cost of fuel and drivability problems for a portion of the public.

Search terms: Vehicle air pollution; Air pollution emission factors; Petroleum industry; Refineries; Fuel economy; Lead free gasoline; Exhaust emission control; Fuel costs; Crankcase emission control; Fuel tank emission control; Carburetor emission control; Vapor pressure; Exhaust emissions; Driveability

HS-010 561 Fld. 5/6

UTILITY WIELD FIELD FLEET OF GAS/GAS CARS

by Nat Wood

Published in *Machine Design* v41 n4 p31-3 (20 Feb 1969)

After a year's testing with four vehicles, two California gas utility companies are planning to adopt dual-fuel systems for fleet use. Cars and trucks will use compressed or liquidified natural gas for city driving, gasoline for long trips. Conversion cost of \$300 will be cut to \$200 in quantity, and tests showed much lower emissions with fuel costs nearly cut in half. Emissions, while using natural gas, were reduced drastically; CO to about 0.14%, HC to about 120ppm, and NO_x to 550ppm or less.

Search terms: Exhaust emission control; Vehicle air pollution; Natural gas vehicles; Compressed natural gas; Liquidified natural gas; Fuel costs; Fuel systems; Dual fuel vehicles; Engine modification; Engine performance

5/11 Maintenance and Repairs

HS-010 562 Fld. 5/11; 5/1

REMOVING DUSTS FROM BRAKE ASSEMBLIES DURING VEHICLE SERVICING — ALTERNATIVE CLEANING METHODS

by G. L. Lee

Published in *Annals of Occupational Hygiene* v13 p33-6 (Jan 1970)

2 refs

Presented at Conference on Exposure to Asbestos during Brake and Clutch Maintenance, Brentwood, England, Mar 1969.

Vacuum cleaning provides a useful contribution towards obtaining satisfactory dust control when brake assemblies are cleaned. The design of the cleaner chosen prevents discharge of particles back into the environment and the collection in a paper bag enables suitable disposal methods to be adopted.

Search terms: Environmental factors; Brake maintenance; Dust control; Cleaning; Dust collection

HS-010 563 Fld. 5/11; 5/1

EXPOSURE TO ASBESTOS DURING BRAKE MAINTENANCE

by D. E. Hickish; K. L. Knight

Published in *Annals of Occupational Hygiene* v13 p17-21 (Jan 1970)

3 refs

Presented at Conference on Exposure to Asbestos during Brake and Clutch Maintenance, Brentwood, England, Mar 1969.

The procedure for the blowing out of brake shoes and drums is the subject of this study. Air sampling was carried out

5/11 Maintenance and Repairs (Cont'd.)

HS-010 563 (Cont'd.)

using membrane filters in two locations near the car being tested. Static samples were also taken in three locations near brake maintenance areas for trucks; and personal samples were obtained from two men engaged on truck maintenance. Exposure to asbestos during brake maintenance is not as severe as was anticipated; however, the development of cleaning procedures which would reduce air contamination is desirable.

Search terms: Brake maintenance; Asbestos; Air sampling; Air filters; Air pollutant exposure tolerances; Cleaning; Mechanics (personnel); Health hazards research; Truck maintenance; Dust

5/14 Occupant Protection

HS-010 564 Fid. 5/14; 1/2

THE EFFECT OF LAP BELT RESTRAINT ON PREGNANT VICTIMS OF AUTOMOBILE COLLISIONS

by Warren M. Crosby; J. Paul Costiloe

Oklahoma Univ.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association of Automotive Medicine*, 1970 p97-110

18 refs

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

A prospective study was made of 441 pregnant victims of automobile accidents, in which 69 wore lap belts and 372 were unrestrained. There was no significant increase in either maternal or fetal mortality associated with lap belt restraint. The absence of maternal or fetal protection is discussed; the advantage of lap belt restraint in nonpregnant occupants appears to be nullified in

pregnancy by the uterine compression produced by the snubbing action of the lap belt. It is concluded that there are no disadvantages of lap-belt restraint for pregnant travellers, and that the prevention of ejection provides a clear indication for its use. The lap belt should be secured low across the bony pelvis, not over the mid- or upper-fundus. When available, the lap belt and shoulder harness combination is recommended.

Search terms: Fetal death; Seat belt usage; Uterine injuries; Seat belt caused injuries; Pregnancy; Abortion; Abdominal injuries; Injuries by seat occupation; Ejection caused injuries; Injury statistics; Seat belt positioning; Fatality causes; Injuries by accident type

HS-010 565 Fid. 5/14; 5/4

COMPARISONS OF CONCEPTS IN AUTOMOBILE OCCUPANT RESTRAINT PROTECTION

by D. H. Robbins; A. W. Henke

Michigan Univ. Hwy. Safety Res. Inst.

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p111-20

12 refs

Contract FH-11-6962

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

This paper compares various concepts in occupant restraint protection such as inflating restraint systems and various belt arrangements. The source of information is a large body of impact sled test data which has been gathered at the Highway Safety Research Institute within the past year. It will be demonstrated that the level of effectiveness possible with an inflating restraint system is significantly greater than that with various belt systems based on the level of protection offered and on the rate of usage. The index of protection or injury

criterion which has been used in this work will be discussed and compared with other recent developments in the area of human tolerance.

Search terms: Restraint system effectiveness; Injury severity index; Air bag restraint systems; Seat belts; Shoulder harnesses; Energy absorbing systems; Injury prevention; Impact sleds; Deceleration tolerances; Impact forces; Impact tests; Occupant protection

HS-010 566 Fid. 5/14; 5/4; 1/2

CONFERENCE ON ROAD SAFETY 1968

Anonymous

Published in *Technical Aspects of Road Safety* v36 p2.19-2.37 (Dec 1968)

Summaries are given of the principal papers of the conference, which concerned three major subjects: Biomechanics—safety windshields and windshield injuries, safety belts, the New York state safety car, injury reduction by safety devices, bus and tractor safety, and helmet design; technical inspection of vehicles — organization, procedures, financing, factory defects, prototype tests, noise, exhaust emissions, brake repairs after severe damage, and inspector training; and automobile experts — may examine badly damaged vehicles, ascertain mechanical causes of accidents, and help resolve conflicts of interest.

Search terms: Conferences; Biomechanics; Occupant protection; Vehicle safety; Vehicle inspection; Injury prevention; International factors; Windshield caused injuries; Seat belts; Accident causes; Restraint system effectiveness; Exhaust emissions; Inspector training; Defects; Vehicle noise; Safety cars; Deformation; Damage

5/15 Propulsion Systems

HS-010 567 Fld. 5/15

FLYWHEEL FEASIBILITY STUDY AND DEMONSTRATION. FINAL REPORT

by R. R. Gilbert; J. R. Harvey; G. E. Heuer; L. J. Lawson

Lockheed Missiles and Space Corp.

1971 165p 18 refs
Grant EHS-70-104
Report no. LMSC-D007915; PB-200 143

The purposes of this study are: to determine the feasibility of the flywheel as a means of low-emission propulsion for urban vehicles and to demonstrate and evaluate full-scale flywheels for hybrid applications. A flywheel/heat engine hybrid drive may be a feasible means of emission reduction for passenger cars, buses, and vans. Pure flywheel drive is suited for limited-range vehicles such as city buses, since recharge would be necessary about every ten miles, but a bus with flywheel and spark-ignition engine would reduce both emissions and operating costs. Flywheel tests showed safe energy density could be at least 12 watt-hours per pound. Development and testing of prototypes is recommended. A flywheel/hybrid family car might be available by 1975, with emissions below the Clean Air Act standards.

Search terms: Energy storage systems; Propulsion systems; Flywheels; Exhaust emission control; Commuting automobiles; Experimental vehicles; Transmissions; Engine design; Materials tests; Mathematical models; Stress analysis; Power densities; Failure stress; Engine performance; Clean Air Act of 1970; Kinetic energy; Emission standards; Feasibility studies; Hybrid buses; Spark ignition engines; Hybrid Automobiles; Urban transportation; Horsepower; Torque

AVAILABILITY: NTIS

5/18 Steering Control System

HS-010 568 Fld. 5/18

DESIGN SERIES — VEHICLE RIDE. 3. SUSPENSION SYSTEMS FOR SPECIAL DUTY

by Gilbert Grace

Published in *Automotive Design Engineering* v7 p34-8 (Jan 1968)

Suspension systems used on most vehicles today are largely unchanged from those of 60 years ago. In that time our understanding of the suspension problem has improved and now many alternatives to the basic system are available. This article discusses the characteristics of linear and non-linear suspension systems with reference to some particular, currently available, items of equipment.

Search terms: Suspension systems; Air suspension systems; Springs; Spring damping; Vehicle riding qualities; Linear systems; Nonlinear systems; Heavy duty vehicles

5/20 Trucks and Trailers

HS-010 569 Fld. 5/20; 1/2

SNOWMOBILE ACCIDENTS IN ONTARIO

by W. R. Ghent

Queen's Univ. (Canada)

Published in HS-010 504, *Proceedings of the 14th Annual Conference of the American Association for Automotive Medicine*, 1970 p135-8

Presented at the annual conference, Ann Arbor, 19-20 Nov 1970.

The small personalized snowmobile of the 1970's had a modest beginning in two areas of North America in 1959. In this year Armand Bombardier in Quebec and Carl Eleason in Wisconsin each produced about 200 machines for sale. The concept grew, and by 1970 some

1,500,000 machines have been produced and sold. This new form of transport and sport has brought injury to more than a few drivers and passengers. The purpose of the paper is to review 400 injury producing snowmobile accidents from Ontario in the winter of 1969-70. These include two of the 14 deaths recorded in Ontario from the same cause in the same period. The mechanism and type of injury are discussed. Six safety rules are suggested which include snowmobile driver training and safe methods of operation.

Search terms: Snowmobile accidents; Snowmobile caused injuries; Injuries by age; Injuries by body area; Injury rates; Ontario

5/21 Used Vehicles

HS-010 570 Fld. 5/21; 5/9; 5/4

THE "UNSAFE" VEHICLES IN USE—THEY'RE ARE YOURS!

by William A. Raftery

Published in HS-010 546, *Partnership in Safety Conference* 1971 p53-64

Many of the hundred million vehicles on the road have defects that can contribute to accidents. Inspection of all vehicles improves their mechanical condition and seems to reduce accident rates, but many states lack inspection programs due to inconvenience to the public. Some recommendations are: better state-operated inspection stations, new-car and frequent used-car inspections, vehicle design for inspection, mechanic training programs, and future system standards for acceptable performance of each vehicle component.

Search terms: Accident prevention; Federal state relationships; Automobile defects; Vehicle inspection; Inspection effectiveness; Accident causes; Mechanic training; Defective vehicles; Vehicle safety standards; Used automobiles; Automobile maintenance; Vehicle design

5/22 Wheel SystemsHS-010 571 *Fld. 5/22***OIL-EXTENDED NATURAL RUBBER IN WINTER TYRE TREADS**Natural Rubber Prod. Res. Assoc., Inc.
(England)1968 22p 9 refs
Report no. TB-15/68

This bulletin describes laboratory and road tests with passenger cars on icy surfaces, comparing the skid performance of winter tire treads made from oil-extended natural rubber with that of treads from oil-extended styrene/butadiene rubber. The tests involved skidding on icy road surfaces having temperatures ranging from 0 degrees C (melting ice) down to -6 degrees C (packed ice). Under all conditions, the oil-extended natural rubber treads had superior skidding resistance. Better traction in standard, winter, and suttled winter tires and superior wear at cooler temperatures are cited as advantages of these tires. Rubber formulations are given.

Search terms: Laboratory tests; Road tests; Icy road conditions; Wet road conditions; Tire materials; Tire skid resistance; Studded tires; Snow tires; Synthetic rubber; Tire traction; Tire wear; Tire tests; Tire performance

HS-010 572 *Fld. 5/22; 4/1***TIRE SAFETY**

by James W. Hall

National Motor Vehicle Safety Advisory Council

Published in HS-010 546, *Partnership in Safety Conference*, 1971 p65-70

Under Federal safety acts, tire safety performance standards were effective in January 1968 and have since been improved. The complexity of uniform tire quality grading has delayed its implementation, although manufacturer

identification and recall will soon be operational. The states should periodically inspect tires, make the sale and highway use of rejected tires illegal, check air pressure gauges, and identify slippery road sections by correcting them or posting warning signs.

Search terms: Accident prevention; Defective tires; Tire inspection; Tire regulations; Tire safety; Tire standards; Tire wear; Tire road conditions

NHTSA DOCUMENTS**NHTSA Contractors Reports**HS-800 545 *Fld. 3/5; 5/2; 3/4***THE SELECTION AND TRAINING OF SCHOOL BUS DRIVERS. FINAL REPORT**

by A. James McKnight; Carolyn M. McClelland; Mary E. Berry

Human Resources Res. Organization

1971 250p 110 refs
Contract FH-11-7339
Report no. HunRRO-TR-71-3

Report for Aug 1969 - Feb 1971.

Recommended driver selection requirements include personal history, physical examination, written tests, driving test, and an attitude measure. Training objectives cover all aspects of bus operation, specified at three levels to fit the resources of individual school districts. The selection requirements and training objectives are based on analysis of: literature relating individuals' characteristics to safe driving, bus operator's tasks, characteristics of high- and low-rated operators, opinions of pupil transportation authorities, and observations and interviews of school bus operators.

Search terms: School bus drivers; Driver tests; Driver attitude measurement; Driver characteristics; Driver education; Driver physical fitness; Driving task analysis; Reviews; Driver

physical examinations; Driver personality; Psychological factors; Driver performance; Driver psychological tests; Questionnaires

AVAILABILITY: GPO \$2.00 (See Executive Summary, Page 19)

HS-800 604 *Fld. 3/1***PROCEEDINGS OF MANAGEMENT WORKSHOP FOR ALCOHOL SAFETY ACTION PROJECT LEADERS, WARRENTON, VIRGINIA, JUNE 13-18, 1971**

National Hwy. Traf. Safety Administration; Human Resources Res. Organization

1971 210p
Contract DOT-HS-003-1-003

The National Highway Traffic Safety Administration's alcohol countermeasures program is described. Aspects included are: chemical testing; identification of problem drinkers; community demonstration programs on drinking driver re-education; public education; legislative programs; state and community programs; Alcohol Safety Action Projects; law enforcement; treatment and rehabilitation of alcoholics; driver licensing; program evaluation.

Search terms: Driver identification; Alcoholism; Community support; Federal aid; Program evaluation; Alcohol laws; Law enforcement; Alcohol chemical tests; Problem drivers; Driver licensing; Drinking drivers; Alcohol education; Alcohol usage deterrents; Alcohol Safety Action Projects; Demonstration projects; Driver rehabilitation; Conference programs; Management

AVAILABILITY: NTIS as PB-204638



executive summary

SYNOPSIS OF A RECENTLY RELEASED NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION RESEARCH REPORT

THE SELECTION AND TRAINING OF SCHOOL BUS DRIVERS

The purpose for which this contract was awarded was to initiate a study intended to assist the states and their school districts in employing drivers capable of operating school buses safely and efficiently. The objective of the study was to establish a set of selection requirements and training objectives that would enable pupil transportation administrators to assure, within the resources available, that newly employed drivers have the required qualifications.

NHTSA Contract FH-11-7339
Human Resources Research
Organization (HumRRO)
300 North Washington Street
Alexandria, Virginia 22314

Award Amount: \$82,289.00
Period of contractual performance:
June 26, 1969 to February 26, 1971

DOT/HS-800 545

General Remarks

The record of safety achieved by operators of school buses across the country is, on the whole, a commendable one. It compares favorably with that of commercial bus drivers and far surpasses the safety record of automobile drivers. Yet, because of the type of passenger the school bus carries, public concern is aroused whenever an accident occurs. The problem of school bus safety is complicated by the generally unfavorable hours and pay available to drivers, and the consequent difficulties involved in attracting suitable numbers of qualified applicants. Under present conditions, recruitment programs cannot be highly selective but must concentrate on weeding out candidates that may represent high risk. A burden is also placed on training to see that the best possible use is made of the limited personnel that are available.

Approach

The development of selection requirements and training objectives necessitated an accurate identification of the qualifications required of school bus operators. The qualifications, for the purposes of the study, were defined as knowledges, skills, habits, attitudes, and

physical characteristics. Three approaches were taken to the identification of driver qualifications: (a) a survey of research literature dealing with the relation of driver characteristics to various indices of performance (115 references in the report); (b) a detailed analysis of the school bus operator's tasks; and (c) a survey of the opinions of school bus drivers, supervisors, and other pupil transportation authorities as to requisite driver qualifications.

The various sources provided hypotheses as to the qualifications underlying safe and effective school bus operation. The relationship of these qualifications to performance was tested in two ways:

The rated performance of experienced drivers was compared with their qualifications at the time of employment. This comparison was confined to personal information for which pre-employment qualifications could be determined after the fact.

Newly employed drivers were administered pre- and post training knowledge tests, a road test, and measures of attitudes toward safety and the work situation. Scores were compared with rated performance for the first 16 weeks and the job.

In addition to the identification of driver qualifications, a survey was made of school bus operator selection and training procedures in order to determine both the needs and the resources that characterize individual school districts. This information was believed to be important to the establishment of realistic requirements. A survey of state pupil transportation selection and training standards was also conducted at the request of the study sponsor.

MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Findings

- o A comparison of the characteristics of experienced drivers with their performance as rated by supervisors showed that the better drivers had the following characteristics:
 - Over 30 years of age
 - At least three years of school bus driving experience
 - Married
 - Small family
 - No pre-school children
 - Between 8 and 12 years of formal education
- o The knowledge and performance tests showed significant differences between newly employed and experienced drivers, while the knowledge tests correlated significantly with the rated performance of the newly employed drivers. The attitude measures showed the results in the expected direction; however, they lacked statistical significance.
- o The results of the surveys of driver tasks, school bus operations, selection procedures, and training procedures, as well as the results of the survey of state selection and training standards, are summarized in the body of the report and described in detail in the Appendices.

Conclusions and Recommendations

- o From the results of the literature survey and the comparison of driver characteristics with rated performance, it was concluded that a school bus driver selection program should be established in each pupil transportation organization that would assess, at a minimum, the following characteristics:
 - *Background Characteristics.* The applicant's age,

sex, experience, education, family characteristics, outside employment, work record, court or police record, and driving record should be examined for clues as to the qualifications of the applicant. Since these background factors do not directly influence driving behavior but merely reflect the influence of more fundamental causes, they should serve only to alert the pupil transportation administrator to possible problem areas into which he should conduct further investigation. Only the driving record is of sufficient direct relevance to the job to warrant being made a basis of selection in and of itself. The applicant's financial record should not be examined or used as a basis of employment.

- *Psychological Characteristics.* The candidate's knowledge at the time of his application and following any school bus driver training may be assessed through the tests developed within the project. The tests should be used primarily to assist the administrator in judging whether the candidate is adequately prepared and to help identify specific deficiencies to be overcome. The road performance test may be administered following instruction to help determine whether the driver is capable of operating a school bus safely and efficiently. Neither the knowledge nor the performance test should be used as a means of predicting future performance levels.
 - Attitudes are extremely important to vehicle operation and to other aspects of the school bus driver's job. The administrator should attempt to identify work-related attitudes through interviews with the candidate, conversations with others such as previous employers, and through observation of his performance during training.

The two attitude measures developed within the study may assist the administrator but should not be used by themselves as a basis for selection.

- Personality characteristics, like attitudes, are extremely important in determining the candidate's suitability for the job and should be assessed through interviews, references, and observation. But available standard personality tests lack sufficient validity to be employed for selection purposes. ,

- *Physical Characteristics.* A complete examination should be required of every new driver when he is hired and periodic re-examinations required of older drivers. The physical examination should include tests of vision and hearing, as well as tests for communicable diseases and physical conditions that could affect the ability to drive safely, including diabetes, epilepsy, cardiovascular disorders, Meniere's Syndrome, severe arthritis, hyperthyroidism, and acute hyper- or hypo-parathyroidism.

- Applicants taking prescribed drugs should furnish a certificate from the prescribing physician that the drugs will not interfere with the ability to drive when taken individually or in combination with one another. Any indication of illegal drug use or excessive use of alcohol should be a basis for rejection of the applicant.

- o Each newly employed driver should receive a program of training to include 6-12 hours of instruction devoted to the following topics: pupil transportation system and driver duties, school bus operating procedures, general traffic and school bus laws and regulations, responsibilities to pupils, preventive maintenance, administrative requirements, emergency and accident-related procedures.

- o Moderate-sized and large pupil transportation systems having the resources to provide additional training should be prepared to provide 14 to 25 hours of instruction covering additional topics such as public relations, defensive driving, handling of emergencies (e.g., skids, brake loss, blowouts, and impending collisions), pupil evacuation and first aid, fire control, and special assignments such as field trips or procedures for dealing with handicapped students. Districts unable to include all of

the topics mentioned during initial instructions should attempt to do so through periodic improvement training.

- None of the individual subjects recommended in the "Selection Program—Training Objectives" Chapter 6 of the report, is more critical for large school districts than for small ones. All of the subjects are important to effective school bus operation. The three levels of "Training Objectives" are merely for recognition of the differences that exist among school districts in the length of the training program they can sustain. The establishment of the three level hierarchy is not intended to discourage smaller districts from conducting a comprehensive training, but, rather, to guide them in applying their limited resources to be of greatest benefit. It is hoped that higher-level objectives that could not be included within the initial training in a particular school district would become part of a later in-service advance training.

-o-

The Contract Technical Manager has certified that the contractor's work has been satisfactorily completed and that all contractual obligations have been met.

The contents of the report and of this report summary reflect the views of the Human Resources Research Organization which is responsible for the facts and the accuracy of the data presented. The contents of either do not necessarily reflect the official views or policy of the Department of Transportation, National Highway Traffic Safety Administration. The report does not constitute a standard, specification or regulation.

Availability: GPO; order by title and stock no. 5003-0043; price \$2.00.

U.S. DEPARTMENT OF TRANSPORTATION NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

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