

## Restraint Development May Outpace Rulemaking

The Department of Transportation's new passive restraint proposals, which would take effect no earlier than the 1977 model year, may already have been outpaced by the passenger protection performance levels of some existing passive air bag and belt systems.

Passive restraint developmental work currently being carried out in the public and private sectors indicates that, for example, manufacturers would have no technological difficulty at all in meeting the proposed standard's requirement that passive protection be provided to all front seat occupants in 30 mile per hour frontal and angular and 20 mile per hour lateral barrier crash tests. (See *Status Report*, Vol. 9, No. 6, March 26, 1974.) Nor, it appears, would they have much difficulty meeting tougher requirements. Simultaneously with publishing its proposal (FMVSS 208) last month, DOT issued an "advance notice" seeking reaction to the idea of a future standard, projected for no earlier than the 1981 model year, that may require 45 or 50 mile per hour passive protection for occupants. The thrust and output of passive systems development to date suggest that such a standard already is within the state of the art.

The leading indicators of progress in passive restraint systems development — indicators that suggest faster movement on the technological front than the standards-making front — fall into the two general categories of "small car" and "standard-sized car":

### SMALL CAR OCCUPANT PROTECTION

Even though sub compact cars "present the most difficult case for satisfactory performance of a passive restraint system," a DOT contractor has demonstrated that a vehicle as small as the 1972 Ford Pinto, equipped with off-the-shelf air bags, can "consistently satisfy the requirements of FMVSS 208" as now proposed.

In a report submitted to DOT in December, 1973, (DOT-HS-801-003), Agbajian Associates described the results of a test series that it ran for DOT with 1972 Pintos equipped with air bag systems developed by Olin Corp. and Rocket Research Corp. The cars were crashed front-into-barrier at 30 and 35 miles per hour; ten crashes were run with air bag-equipped Pintos.

### *Inside*

- Lowered Drinking Age Brings Increased Deaths . . . Page 3
- Injury Severity Scoring System Developed . . . Page 4
- Data Debunk Crash Prediction Theories . . . Page 6
- 1974 Imports Tested In Low Speed Crashes . . . Page 8

“Test data gathered in this project indicate that, given development of an inflatable occupant restraint system for a particular model of production vehicle and attendant modification of that vehicle, it should be possible to consistently satisfy the requirements of FMVSS 208 with a fully passive inflatable occupant restraint system,” Agbabian told DOT.

It also said that compliance with DOT’s proposed standard with passive restraint systems in current vehicle structures of sub compacts “is feasible.”

“No significant structural modifications to passenger compartment framework, cowl or instrument panel are apparently required, even in the potentially difficult sub compact vehicle, for adequate passenger compartment integrity in 30 mile per hour flat barrier impacts.”

Agbabian said its crash test results “show that the Pinto structure is very effective in controlling passenger compartment volume up to 30 miles per hour flat barrier impact severity.” The “upper limit” of acceptable passenger compartment integrity for the 1972 Pinto, it added, was somewhere at or above 35 miles per hour; “It was determined that deformation of the passenger compartment was not a significant problem in impacts up to 35 miles per hour.”

Another DOT contractor, Minicars, Inc., is midway through a federally-funded project (DOT-HS-113-3-742) whose goal is to develop passive passenger restraint systems enabling occupant survival, under FMVSS 208, at front-into-barrier speeds of 50 miles per hour and 30 degree oblique crash speeds up to 40 miles per hour. In this project also, the 1972 Pinto is being used as the test vehicle.

Meanwhile, in the words of a senior Japanese automotive engineer, that country’s small car manufacturers for some time have been “pouring efforts” into studies aimed at providing “protection of the driver at the 80 kilometer per hour [50 mile per hour] head-on collision.” Recently both Toyota Motor Co. and Nissan Motor Co. delivered experimental safety vehicle models to the U.S. government for extensive crash testing; the results, which probably will be announced at the International Research Safety Vehicle Conference to be held in London in June, will disclose whether the efforts have paid off.

At last year’s conference, held in Tokyo, Nissan said that when its then-developed experimental small car was “caused to collide with a large-sized vehicle of 1,800 kg [4,000 pounds] at a relative speed of about 90 km/h [56 miles per hour], both cars sustained nearly the same degree of crush, and it was ensured that the occupant safety was also secured during collisions.” It added that it also had developed an alternative – a belt system that “requires a pre-load device and a retractable steering column unit for occupant protection in collision at speeds as high as 80 km/h.”

## STANDARD-SIZE CAR OCCUPANT PROTECTION

Impressive evidence as to the proposed 1977-model standard’s feasibility is being provided by air bag equipped vehicles already in operation across the United States, both in test fleets and individual ownership. (See *Status Report*, Vol. 9, No. 4, Feb. 21, 1974.)

In addition, work sponsored by DOT is providing additional support both for the proposed standard and for DOT’s idea of a future standard geared to the somewhat higher – 45-50 mile per hour – crash range:

- Rocket Research has completed a study to “provide protection to normally seated occupants and minimize injury to out-of-position occupants,” according to the National Highway Safety Administration’s internal newsletter, *Weekly Bulletin*, dated March 15, 1974. “To date,” it reported, “a six-year-old surrogate leaning flush against the bag (to simulate an out-of-position child) has been subjected to sled tests of up to 30 miles per hour; all readings satisfied the established injury criteria. Problems

currently encountered with the 50th percentile surrogate” – an adult size test dummy – “in sled tests at 50 miles per hour are considered solvable by the contractor.”

- DOT has tested, with human volunteers, a passive “advanced belt restraint system” developed by Takata-Kojyo Co., Ltd. The “dynamic human volunteer test runs” were at 22.5 and 25 miles per hour, DOT said; “the volunteer has sustained no injuries and will probably volunteer to ride again at 27.5 miles per hour. These runs are the highest injury-free tests ever attained by human volunteers restrained by automotive type lap and shoulder belts.”

- Under still another DOT contract (DOT-HS-053-2-280), Calspan Corp. has developed a system that combines air bags and “collapsible” energy-managing dashboards. As described by Calspan in a “final report” published last month, the energy-managing “collapsible panel section of the restraint system provides adequate protection for all occupant sizes larger than 50 pounds at impact speeds up to at least 20 miles per hour without the necessity of deploying the air bag.

“The restraint system performance is generally satisfactory in restraining a 95th percentile male in a 45 mile per hour frontal impact. Somewhat better performance was achieved in protecting a 50 pound child (6 year old) and a 50th percentile male at speeds of 40 and 50 miles per hour, respectively.”

## **Lowered Drinking Age Brings Increased Highway Deaths**

State laws reducing legal minimum drinking ages to 18 years of age represent “social policy that carries a price in increased fatal motor vehicle collisions,” a research report recently completed by the Insurance Institute for Highway Safety has demonstrated.

Between September, 1970 and September, 1973, the legal minimum drinking age was lowered to 18 years of age in at least 24 states. Other states are considering such measures.

The IIHS study compares fatal crash involvement of drivers under 21 in Michigan, Ontario and Wisconsin – where the legal drinking age was dropped from 21 to 18 in either 1971 or 1972 – with fatal crash involvement of similar drivers in Indiana, Illinois and Minnesota – where the legal drinking age was 21.

The researchers estimated that for each 100,000 of their numbers in the population, 15-20 year-olds were involved in 2.6 to 3.3 more fatal crashes in the first year after the legal drinking age was lowered than would have been expected from prior experience.

“The estimated number of 15-20 year-olds involved in fatal crashes, in the year after the legal minimum drinking age was reduced, that would not have been involved had the law not changed, was approximately 19 in Michigan, 26 in Ontario and 13 in Wisconsin,” the researchers said.

In studying the effects of lowering the legal drinking age, the researchers found “a significant increase in involvement in fatal crashes of drivers under 21 in areas that changed the law, particularly in nighttime and single vehicle crashes where alcohol is most often involved.”

Only one state – Wisconsin – had “adequate data on blood alcohol concentration in fatally injured drivers.” In those data the researchers found that “almost half (48 per cent) of the 15-17 year-olds and

nearly three-fourths of the 18-20 year-old drivers killed in nighttime (6:00 p.m.-5:59 a.m.) crashes before the law changed had blood alcohol concentrations of 0.05 per cent by weight or above compared to approximately one in five of those in each age group killed in daytime crashes." Overall, "blood alcohol concentrations of 0.05 per cent by weight or above were found in 60 per cent of 15-17 year-old drivers and 80 per cent of 18-20 year-old drivers in single vehicle crashes compared to 24 per cent and 36 per cent respectively in those in multiple vehicle crashes." These data were used to illustrate alcohol involvement in single vehicle and nighttime crashes among young drivers.

The researchers also concluded that, "Although there may have been some crossing of borders from states where persons under 21 could not purchase alcoholic beverages legally, the fatal crash involvement of persons under 21 in border areas of change and nonchange areas was not significantly greater than involvement in interior areas of the states studied."

Although fatal crashes involving youthful drivers did increase in areas that lowered the legal drinking age, the researchers found that the increase was not as great as others have previously reported.

They noted that in 1972 and 1973, "considerable publicity was devoted to highway losses in states that had recently lowered the legal minimum drinking age. For example, the legislation was said to have produced increases of 54 per cent in Michigan and over 100 per cent in Massachusetts in the number of 18-20 year-old drivers in fatal crashes, reported by the police to have been drinking, during the period in which the lowered drinking age had been in effect, compared to the equivalent period of the prior year." Based on their study, the researchers suggested that "the law change affected the perception and/or reporting of alcohol involvement by the police more than it affected the fatal crash rate."

Prepublication copies of the study, entitled, *The Legal Minimum Drinking Age and Fatal Motor Vehicle Crashes*, are available from "Minimum Drinking Age," Insurance Institute for Highway Safety, Watergate Six Hundred, Washington, D.C. 20037.

## **Injury Severity Scoring System Developed**

Four public health researchers have developed and tested a new system for assessing cumulative severity of multiple injuries, such as those sustained in highway crashes.

Their "Injury Severity Score" will enable, for the first time, precise evaluation of the efficiency of medical care of multiple, as well as single, injury cases. It also will be useful for more accurate paramedical evaluation, such as by emergency medical personnel, of crash and other injury severity.

The new method "makes possible a valid numerical description of the overall severity of injury in persons who have sustained injury to more than one area of the body," the researchers said. They added, "The ability to compare groups of patients classified by overall injury severity makes possible better evaluation" of emergency room and hospital methods of treatment.

The research was conducted by Susan P. Baker, M.P.H., of the Johns Hopkins School of Hygiene and Public Health, Brian O'Neill and William Haddon, Jr., M.D., of the Insurance Institute for Highway Safety and William B. Long, M.D., of the Maryland Institute for Emergency Medicine, University of Maryland, Baltimore. The study was sponsored by IIHS and the Maryland Medical-Legal Foundation.

The study points out that there are two basic research approaches in evaluating emergency and subsequent care. The first is to compare only persons with similar injuries. This approach is often not feasible because the numbers of injuries of exactly similar type and severity are often too small to support statistically sound conclusions.

The second approach is to compare persons "whose injuries, although not necessarily the same anatomically, are of the same severity." Comparing patients on this basis requires the use of a scale such as the widely used Abbreviated Injury Scale (AIS), which was developed to provide a method for rating and comparing injuries incurred in automotive crashes. The AIS, however, pertains only to individual injuries.

The present study was undertaken because there was no scale for describing multiply injured patients, "even though most deaths following automotive crashes involve injury to more than one part of the body."

## INJURY RECORDS STUDIED

The first part of the study examined the records of more than two thousand motor vehicle occupants, pedestrians and other road users whose injuries resulted in hospitalization or caused death. Injuries were categorized according to the AIS with the aim of determining how closely AIS ratings on injury severity correlate with subsequent mortality figures. The first 5 codes of the AIS scale were used, from grade 1 for least, to grade 5 for most severe.

The results showed that "the percentage of patients who died increased with the AIS grade of the most severe injury, as did the proportion of deaths that were dead on arrival." Death rates, however, varied for patients in the same AIS severity group according to the existence and severity of a second injury elsewhere.

For example, the study showed that only 6 per cent of persons with a grade 4 injury died if they had no other injury or only a grade 1 injury. Sixty per cent of persons with a grade 4 injury, however, died if they had a second grade 4 injury. Similarly, for persons whose most severe injury was grade 5, "death rates ranged from 22 per cent to 100 per cent, depending upon the degree of injury in the second most severely injured area.

These results pointed to the need to develop an index for injury severity that would reflect "variations in mortality associated with the number of body areas involved and the severity of trauma in each." Simply adding the AIS scores for the various body areas was not a solution because, for example, the "death rate for persons with two injuries of grades 4 and 3 was not comparable to that of persons with two injuries of grades 5 and 2" although in both cases the sum was 7.

## INJURIES SCORED

The researchers discovered that "*squaring* the AIS grades for the most severe injury in each body area before adding them together" provided a valid adjustment for multiple injuries. "When the AIS grades for each of the two most severely injured areas were squared and the two results added together, it was found that death rates were usually similar for comparable totals," they said. For example, for persons whose two most severely injured areas were graded 5 and 0 and for those graded 4 and 3 (sum of squares = 25 in both cases), death rates were almost identical.

The new Injury Severity Score was defined as "*the sum of the squares of the highest AIS grade in each of the three most severely injured areas.*" Including the three most severely injured body areas improved the correlation with death rates; including the fourth area had no appreciable effect.

The researchers also showed that there was a marked relationship between age and mortality. Death rates were higher for persons in the 50-69 year age group than for younger persons and increased substantially for those age 70 and over. This difference was particularly noticeable for deaths from *less* severe injuries.

The researchers suggest that the new Injury Severity Score may provide an important means of evaluating emergency care systems. The score could be added to data kept for research purposes and to hospital charts. It would make possible comparisons of the quality of the emergency and subsequent medical care received by groups of variously injured patients in different institutions and time periods where comparison was previously impossible when multiple severe injuries were involved.

"The Injury Severity Score: A Method for Describing Patients with Multiple Injuries and Evaluating Emergency Care" was published in *The Journal of Trauma*, March, 1974, Vol. 14, No. 3. Copies are available by writing "Injury Severity Score," the Insurance Institute for Highway Safety, Watergate Six Hundred, Washington, D.C. 20037.

## **N.C. Data Debunk Crash Prediction Theories**

Researchers at the University of North Carolina using newly available data have shown that driver control programs aimed at a small number of "bad" drivers cannot produce significant reductions in highway losses because it is impossible to predict with accuracy which drivers should be included in the programs.

"Despite the appeal in searching for a relatively few drivers whom we might erroneously assume are causing a large part of our problem, we must continue the systematic programs" aimed at the environment, the vehicle and the "normal but fallible driver," the researchers say.

The study was conducted by B. J. Campbell and Donald Levine of the University of North Carolina's Highway Safety Research Center. It is based in part upon research into crash and violation records of over two million North Carolina drivers for each of four years from 1966 to 1970. (See *Status Report*, Vol. 8, No. 16, Aug. 13, 1973).

The idea that some persons have an unchangeable personality characteristic that predisposes them to injury has been common for many years. The study points out that it is an attractive theory because "society can harshly restrict such a group, but not the larger 'normal' group." Treating a small number of drivers is not only more feasible than reaching a large number but also appears less expensive than changing highway and vehicle design, the study says.

For more than 20 years scientists have repeatedly demonstrated that data from study of drivers and their motor vehicle records do not yield satisfactory evidence to support the theory, especially as the explanation for any substantial proportion of highway losses. Nevertheless, it has remained widely prevalent.

Campbell and Levine describe first what they call the "percentage fallacy." It is illustrated by statements, such as "two per cent of drivers account for 50 per cent of fatal crashes," which imply that "we can identify the two per cent, and then potentially prevent 50 per cent" of future crashes. This implication is mistaken for several reasons, the study shows.

### **PAST RECORDS POOR PREDICTOR**

Firstly, the statement is made about a previous year's experience and there is no basis for the belief that the *same* two per cent of drivers will be involved in the next year's crashes, since, among other reasons, some of these drivers will have been killed in these crashes. Secondly, when the percentages are expressed as

numbers the statement reads, "2,000,000 drivers cause 29,000 fatal crashes." The study points out that it may seem promising to use intensive measures on "two per cent" of drivers but it is "more formidable" to have to control two million drivers.

The North Carolina data show that during a two-year period, all reported crashes were accounted for by 11 per cent of drivers. During a subsequent two-year period, however, these drivers were involved in only 19 per cent of all reported crashes. A large percentage of them were not involved in any crash in that second period. Even the drastic step of removing all of them from the road would not have affected 81 per cent of the crashes in the second two years.

The study asserts that, if a driver remedial program is to be effective, it is essential to be able to predict accurately which drivers will be involved in crashes and should, therefore, attend the program. It would be a waste of resources, the study says, to give the program to "false positives," the drivers who are predicted to have a crash but do not. More importantly, it continues, the program would not succeed if there were a large number of "false negatives," drivers predicted not to have a crash who do have one.

When Campbell and Levine classified the North Carolina drivers in their study, they found that it would be impossible to identify accurately the drivers who should be given a remedial program. During one two-year period, 32,583 drivers, or 1.3 per cent of the state's drivers, had two or more crashes. During the next two-year period, however, only 9,184 of these same drivers were involved in a crash.

During the first two-year period, 2,195,261 drivers were either not involved in a crash or involved in only one crash. The report notes that such drivers would not be classified as likely to have crashes under any scheme identifying "bad" drivers. Yet 283,580 of these drivers were involved in crashes during the following two-year period. These "false negatives accounted for 96.8 per cent of all drivers who *did* have accidents" in that time period, the study shows.

"Massive misclassifications such as just shown will occur when using those predictors on large, diverse driver populations," the researchers concluded.

Since prediction based on actual figures proved unsuccessful, the researchers examined the correlations between crashes in the two time periods that would be necessary to reduce false positives and negatives to an extent that would be consistent with practical programs. The correlation would have to be seven times greater than that found in the data on North Carolina drivers. The researchers concluded that there was little basis for expecting prediction to reach this level.

The study concludes that programs aimed at the driver should be designed to help the "normal but fallible driver," for example, by improving the signs and markings to aid a driver through a complicated interchange. This approach will be more successful, the study says, than "trying to identify and change long-term antecedent characteristics such as driver personality, temperament, attitude and so forth."

Alcohol, the study notes, is a "significant exception" to the theory and risk of involvement in a crash may be increased up to twenty fold with very high blood alcohol levels.

*Accident Proneness and Driver License Programs*, by B. J. Campbell and D. Levine, was presented at Plenary Session 3, First International Conference on Driver Behavior, Oct. 8-12, 1973, Zurich, Switzerland.

Copies are available by writing to: Lyn White, Publications Manager, Highway Safety Research Center, University of North Carolina, Chapel Hill, North Carolina 27514.

## Crash Test Results On 1974 Imports Reported

Although imported 1974 cars are somewhat less damage-prone than last year's models, they still suffer "needless, costly damage" in low speed crashes, especially when sides and corners are involved, according to testimony given to the Senate Committee on Commerce today.

William Haddon, Jr., M.D., president of the Washington-based Insurance Institute for Highway Safety, told the committee during motor vehicle safety oversight hearings that low speed crash test results of representative 1974 imports "are encouraging in their indications that somewhat less damage-prone designs have been adopted by some foreign-car manufacturers, but not so encouraging in their indications that much needless, costly damage still is being designed into, in particular, the corners and sides of the tested models."

Haddon pointed out that "DOT has no authority to protect consumers with standards directed at minimizing the damageability of sides and the consequent economic penalties of side impacts – including the forced purchase of untold millions of replacement parts. DOT is empowered under the Motor Vehicle Information and Cost Savings Act of 1972 to set such a standard for 'bumper' performance in crashes at low speeds – speeds that DOT has appropriately defined as 20 miles per hour and below. But so far, it has issued only a proposed standard, which is limited to five mile per hour front and rear barrier impacts."

In its tests of the 1974 imports, IIHS crashed six models. The Volkswagen Superbeetle, Volvo 142, Toyota Corolla, Opel Manta and Datsun 610 were tested in front-to-rear, front-to-side and barrier crashes. Those five models, and the Mazda RX-2, were corner-crash tested. In 1973 the Datsun 510 and Opel 1900 were tested. Since these were not offered in 1974, the Datsun 610 and the Opel Manta were tested.

Haddon told the committee that:

- "With one discouraging exception – the Toyota Corolla – the representative makes of imported cars that we tested both for the 1974 and the 1973 model years showed, for the current models, reduced vulnerability to damage in their impacts of 5 miles per hour front-into-barrier. Moreover, all five of the current models showed reduced damageability in their impacts of 5 miles per hour rear-into-barrier. The Datsun was so designed that it experienced no damage whatsoever in either test, and the Opel – whose 1973 model was a poor performer in similar tests – experienced no damage at all in the rear-into-barrier test and only a small amount in the front.

- "Results were mixed for the same five 1974-model foreign cars in their 10 mile per hour front-into-barrier tests. None of this year's models was as damageable as the 1973 Opel, which registered \$590 in damage compared with \$222 in damage with the 1974 version. But, none was as damage resistant as the 1973 Volvo, which experienced only \$63 in damage as compared with the substantially higher figure of \$236 for the 1974 model.

- "With only one exception – the Opel, which showed substantial improvement from last year – the 1974 models were more vulnerable to damage in the 15 mile per hour front-into-barrier crashes than the 1973 models.

- "The five tested 1974 imports showed, on balance, more damage resistance in the 10 mile per hour front-to-rear intervehicular tests. (GM's Opel experienced not one cent worth of damage in this test, a record that has not been provided by any model, domestic or imported, tested by us to date despite the fact that it has for years been technologically easy to accomplish.)

“But the five also showed increased damageability, virtually across the board, especially in their sides and front corners – routinely struck locations on the car, for which damage-resistant design should be the rule.”

Copies of the testimony are available by writing to “1974 Imports,” Insurance Institute for Highway Safety, Watergate Six Hundred, Washington, D.C. 20037.

**INSURANCE INSTITUTE FOR HIGHWAY SAFETY  
1974 MODEL LOW SPEED BARRIER CRASH TEST RESULTS  
IMPORTED SERIES**

	5 MPH FRONT INTO BARRIER	5 MPH REAR INTO BARRIER	10 MPH FRONT INTO BARRIER	15 MPH FRONT INTO BARRIER
VW SUPERBEETLE	\$ 5.30	\$ 24.90	\$391.45	\$828.50
VOLVO 142	15.56	31.14	235.92	924.10
TOYOTA COROLLA	99.66	81.73	404.52	986.95
OPEL MANTA	13.20	0.00	221.65	816.30
DATSUN 610	0.00	0.00	232.40	949.65
AVERAGE	\$ 26.74	\$ 27.55	\$297.19	\$901.10

**INSURANCE INSTITUTE FOR HIGHWAY SAFETY  
1974 MODEL LOW SPEED CAR-TO-CAR CRASH TEST RESULTS  
IMPORTED SERIES**

	10 MPH FRONT-TO-REAR			10 MPH FRONT-TO-SIDE		
	FRONT DAMAGE	REAR DAMAGE	TOTAL DAMAGE	FRONT DAMAGE	SIDE DAMAGE	TOTAL DAMAGE
VW SUPERBEETLE	\$208.15	\$126.70	\$334.85	\$124.65	\$386.70	\$511.35
VOLVO 142	37.32	46.43	83.75	6.04	462.78	468.82
TOYOTA COROLLA	114.27	227.47	341.74	78.29	412.34	490.63
OPEL MANTA	0.00	0.00	0.00	47.90	545.50	593.40
DATSUN 610	280.63	19.00	299.63	207.51	294.27	501.78
AVERAGE	128.07	\$ 83.92	\$211.99	\$ 92.88	\$420.32	\$513.20

**INSURANCE INSTITUTE FOR HIGHWAY SAFETY  
1974 MODEL LOW SPEED CAR-TO-CAR CRASH TEST RESULTS  
IMPORTED SERIES**

	10 MPH FRONT-TO-FRONT-CORNER			10 MPH FRONT-TO-REAR-CORNER		
	FRONT DAMAGE	CORNER DAMAGE	TOTAL DAMAGE	FRONT DAMAGE	CORNER DAMAGE	TOTAL DAMAGE
VW SUPERBEETLE	\$ 42.55	\$173.55	\$216.10	\$121.40	\$343.93	\$465.33
VOLVO 142	3.56	286.00	289.56	67.25	128.36	195.61
TOYOTA COROLLA	124.77	278.50	403.27	180.96	182.25	363.21
OPEL MANTA	0.00	182.15	182.15	91.55	372.70	464.25
DATSUN 610	296.54	365.34	661.88	442.83	153.22	596.05
MAZDA RX-2	31.90	276.11	308.01	41.56	352.38	393.94
<b>AVERAGE</b>	<b>\$ 83.22</b>	<b>\$260.28</b>	<b>\$343.50</b>	<b>\$157.76</b>	<b>\$255.47</b>	<b>\$413.07</b>

### ***Brinegar Rejects Underride Protection Plea***

Transportation Secretary Claude Brinegar has told his auto safety advisory council that fatalities from cars underriding larger trucks will have to quadruple before underride protection will be considered cost-beneficial by his department.

The National Motor Vehicle Safety Advisory Council – established by the Congress to advise DOT on auto safety matters – had recommended that the department reconsider its 1971 decision to scrap plans that would have required that trucks be designed to minimize underride hazards when cars hit them from behind. The council had estimated that 224 fatalities are caused each year by vehicle underride.

The council urged Brinegar to take a new look at the problem because of “increased braking effectiveness of new heavy duty trucks and the increasing density of small cars on the highways.”

Brinegar responded that neither of those developments is expected to increase underride fatalities.

DOT's Bureau of Motor Carrier Safety, in a report of 1970 crashes involving large vehicles, shows that 125 car occupants were killed and 1,754 were injured. BMCS officials have told *Status Report* that figures in its reports represent only about 10 per cent of the country's truck population. “Only the tip of the iceberg,” one official said.

Recently a safety official for the International Brotherhood of Teamsters told a Senate committee hearing that “one of the greatest dangers of interstate highways is rear-end accidents caused by slow moving trucks.”

## NTSB Warns On Heat Use In Truck Repairs

The National Transportation Safety Board has warned that the careless use of heat in vehicle maintenance can, in some cases, reduce strength and contribute to failure of vehicle components.

In a report on two separate tractor-trailer crashes, one of them fatal to the driver, the board found that both crashes resulted from failure of the tractor-tandem suspension equalizer beam after a "serious safety problem" in maintenance. NTSB discovered that heat from cutting torches had produced cavities, creating stress raisers that caused the equalizer beam to fail. The board said:

"It is important to emphasize that the circumstances associated with these two accidents must be considered only as examples of what can happen as a result of unorthodox maintenance and repair practices."

"The important lesson to be learned by these accidents is that the improper use of cutting torches created stress raisers which adversely affected the strength characteristics of the equalizer beam."

"Furthermore, it should also be noted that the indiscriminate application of heat to any heat-treated vehicle component, whether by cutting torch, by welding or by heating in an oven, can reduce strength characteristics or can cause the component to fail, even without the occurrence of cavities."

The board said it had no reason to believe that the suspensions involved in the two accidents were inadequate components, until they were exposed to damage by cutting torches. Nevertheless, it urged the Federal Highway Administration to inform the motor carrier industry to:

- eliminate the use of cutting torches in the removal of equalizer beam bushings;
- follow manufacturers' instructions to use appropriate mechanical devices to remove and install all bushings and bearings;
- check past maintenance records to replace any components subjected to a cutting torch.

### **Clarification**

The Center for Auto Safety has expressed concern that a recent *Status Report* story could lead to misunderstanding of its position on restraining children in automobiles.

In a letter to *Status Report*, center staff member Art Delibert emphasized, "The center has never advised against the use of adult belts for children, except in the context of urging the use of properly-designed infant and child restraints."

The center's statement on belt use by small children, as reported in *Status Report*, Vol. 9, No. 5, March 5, 1974, was made in conjunction with a petition urging NHTSA to encourage mandatory child restraints. An earlier story on the center's petition appeared in *Status Report*, Vol. 8, No. 23, Dec. 20, 1973.

the highway  
loss reduction

## STATUS REPORT

Ralph W. Hoar, Jr., Editor

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