SOME HARD DATA RELATIVE TO HIGHWAY LOSSES
IN DAMAGED PEOPLE AND PROPERTY
AND
CHANGES THAT MIGHT RESULT FROM THE ENERGY SHORTAGE

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Washington, D.C. 20037
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INTRODUCTION

Several measures that have been proposed or suggested to conserve energy could affect highway losses in damaged people and property. A number of people and organizations have suggested that these measures will result in substantial reductions in such losses. However, since both the long and short term prospects with respect to energy supplies, and in particular gasoline and truck fuels, are still very uncertain as are many other aspects of the situation, it is not now possible to predict with accuracy what the effects of the energy shortage will be on each of the various categories of highway losses, or even the direction in which each will move.

The purpose of this document is to present known facts and results concerning several especially well documented aspects of the situation that are changing and that might change, but not to speculate on the overall effect.

ASPECTS THAT ARE CHANGING

Vehicle Size

The proportion of small (subcompact, compact and import) cars in the population of all vehicles has been increasing for several years. In 1969, approximately 20 per cent of the new passenger cars registered were small cars, and in 1973 this proportion will have increased to approximately 40 per cent. Sales reports for the first months of the 1974 model year suggest that this trend is being accelerated by the energy shortage. Furthermore, since small cars generally have lower gasoline consumption rates than larger cars, it is probable that families with more than one car will tend to use the smaller of their cars for a greater proportion of their driving than in the past. Therefore, the energy shortage should result in relative increases in small car mileage.

Research studies have shown that the occupants of smaller cars, once they become involved in crashes tend to sustain more severe injuries than the occupants of bigger cars.

A 1968 New York State study¹ based on more than 400,000 vehicles in reported crashes found a “strong association” between “the weight of a car and the per cent of accidents in which there was a fatality or serious injury in that type of car.” Results of this study showed a large exponential increase in the per cent of serious or fatal injuries with decreasing vehicle weight. This relationship is illustrated in Figure 1. (IIHS Status Report, Vol. 5, No. 6, April 2, 1970. See attached story)

¹1968 New York state study, prepared for the Department of Transportation. (Submission for the Record by U.S. Department of Transportation to U.S. Subcommittee on Antitrust and Monopoly, March 10, 1970.)
FIGURE 1
PERCENT OF ACCIDENT-INVOLVED VEHICLES IN WHICH
THE MOST SERIOUS INJURY WAS FATAL OR SERIOUS

SOURCE: ADAPTED FROM NEW YORK STATE STUDY CONDUCTED FOR
DOT. PRESENTED IN "KEY ISSUES IN HIGHWAY LOSS
A 1970 study by the University of North Carolina concluded that occupants of "larger cars...show generally less injury than average," while occupants of "smaller cars...show generally more than average injury." Figure 2 illustrates these results. Although the study demonstrated a general relationship between vehicle size and severity of injury, it also showed that there were considerable variations between individual vehicle series. Figure 3 illustrates this variance. (*Status Report*, Vol. 5, No. 6, April 2, 1970)

More recently a University of Michigan study showed that "once involved in an accident, the chance of injury...increases at the rate of about 2.5% for each decrease of 100 pounds in vehicle weight." (*Status Report*, Vol. 8, No. 22, November 27, 1973)

Some of the reasons for the inverse relationship between vehicle size and injury severity can be demonstrated using the basic laws of physics. The approximate relationship between velocity change, stopping distance and deceleration was presented in a 1971 paper by Haddon. This relationship is shown in Figure 4. This figure shows that for any given velocity change, the g forces experienced by a properly packaged occupant substantially increase as the stopping distance decreases.

These reasons and also, where involved, the mass differentials in intervehicular crashes – as opposed to those only involving a single vehicle – place the occupants of smaller vehicles at a great disadvantage once crashes are initiated. The intervehicular aspect of this was demonstrated by filmed IIHS tests in 1971. In which six separate pairs of vehicles, in each case one large and one small car produced by the same manufacturer, were crashed head-on at about 45 mph. In each case the passenger compartment of the smaller car was demolished, while that of the larger remained intact and virtually unchanged. (*Status Report*, Vol. 6, No. 21, November 16, 1971)

In addition to the studies showing increasing injury severity with decreasing car size, Highway Loss Data Institute (HLDI) results from collision coverage insurance data indicate that overall average loss payments per claim tend to decrease slightly with increasing vehicle size for the 1972, but not the 1973, models. Figure 5a illustrates these.


FIGURE 2
SERIOUS DRIVER INJURIES
IN CRASHES OF VARIOUS MAKES AND MODELS

1966  BIG OLDSMOBILE
1967  BIG BUICK
1968  BIG PONTIAC
1969  STD. PONTIAC
1966  STD. OLDSMOBILE
1967  SMALL OLDSMOBILE
1962  STD. OLDSMOBILE
1967  SMALL OLDSMOBILE
1962  STD. OLDSMOBILE
1967  SMALL OLDSMOBILE
1968  STD. CHEVROLET
1969  CHEVELLE
1966  STD. CHEVROLET
1965  STD. FORD
1964  STD. CHEVROLET

FEWER INJURIES THAN AVERAGE

1962  FAIRLANE
1963  FAIRLANE
1961  CORVAIR
1962  CHEVY II
1964  VALIANT
1964  SMALL DODGE
1968  VALIANT
1965  VALIANT
1965  CHEVY II
1960  CORVAIR
1962  CORVAIR

MORE INJURIES THAN AVERAGE

ALL  VW (BUS)

INJURY INDEX

FIGURE 3
SERIOUS AND FATAL DRIVER INJURIES IN CRASHES
OF VARIOUS 1967 MODEL YEAR CARS

<table>
<thead>
<tr>
<th>CAR</th>
<th>WEIGHT (LBS)</th>
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</thead>
<tbody>
<tr>
<td>BUICK ELECTRA</td>
<td>4404</td>
</tr>
<tr>
<td>PONTIAC BONNEVILLE</td>
<td>4309</td>
</tr>
<tr>
<td>OLDSMOBILE 88</td>
<td>4146</td>
</tr>
<tr>
<td>PONTIAC CATALINA</td>
<td>4024</td>
</tr>
<tr>
<td>BUICK LESABRE</td>
<td>4001</td>
</tr>
<tr>
<td>PONTIAC GTO</td>
<td>3993</td>
</tr>
<tr>
<td>PONTIAC TEMPEST</td>
<td>3477</td>
</tr>
<tr>
<td>OLDSMOBILE F-85</td>
<td>3365</td>
</tr>
<tr>
<td>CHEVROLET II</td>
<td>3240</td>
</tr>
<tr>
<td>BUICK SPECIAL</td>
<td>3203</td>
</tr>
<tr>
<td>PLYMOUTH BELVEDERE</td>
<td>3169</td>
</tr>
<tr>
<td>FORD FAIRLANE</td>
<td>3112</td>
</tr>
<tr>
<td>DODGE DART</td>
<td>3030</td>
</tr>
<tr>
<td>CHEVY II</td>
<td>2770</td>
</tr>
<tr>
<td>FORD FALCON</td>
<td>2677</td>
</tr>
</tbody>
</table>

INJURY INDEX

FIGURE 4
A FIRST APPROXIMATION OF THE RELATIONSHIP BETWEEN
VELOCITY CHANGE, G's AND OCCURRENCE OF INJURY FOR SEATED,
PROPERLY PACKAGED ADULTS DECELERATING FORWARD

SOURCE: ADAPTED FROM WILLIAM HADDON, J. M.D., "A LOGICAL FRAMEWORK FOR
CATEGORYING HIGHWAY SAFETY PHENOMENA AND ACTIVITY," THE
FIGURE 5
LOSS PAYMENT SUMMARY BY MARKET CLASS — 1973 AND 1972 MODELS —
COLLISION COVERAGES

a. AVERAGE LOSS PAYMENT PER CLAIM

b. CLAIM FREQUENCY PER 100 INSURED VEHICLE YEARS

relationships. In addition to the general relationship there is, however, considerable variation between individual vehicle series. (Status Report, Vol. 8, No. 18, October 5, 1973)

Studies have also shown that small cars tend to be more frequently involved in crashes than larger cars. The previously mentioned study from the University of Michigan showed that "small cars... are overrepresented in single vehicle accidents," without being underrepresented in car-to-car crashes. (Status Report, Vol. 8, No. 22, November 27, 1973)

HLIDI results also show that, in general, small cars have higher collision coverage claim frequencies than big cars. Figure 5b illustrates this relationship. (It is noted that for each of the major market classes the average loss payment per insured vehicle year was slightly lower for 1973 than 1972 models.) In addition to the general relationship, however, the HLIDI results also show that there is considerable variation between the claim frequencies for individual vehicles series. (Status Report, Vol. 8, No. 18, October 5, 1973)

A survey of unrepaired automobile crash damage conducted by State Farm and the Insurance Institute for Highway Safety (IIHS) showed that the percentage of passenger cars that each year sustained crash damage that was left unrepaired was higher for small cars than for large cars. Figure 6. (Status Report, Vol. 8, No. 17, September 10, 1973)

Thus, there is considerable evidence that, if all other aspects of the situation were unchanging, the decreasing size of the cars in the vehicle population would tend to generate more severe and more frequent losses.

Vehicle Speed

A number of states have recently reduced speed limits to either 50 mph or 55 mph and other states are expected to follow suit. Reductions in speed limits may vary in their results depending on amounts and nature of enforcement.

Speed is a central factor in increasing chances of death and severe injury in crashes which do occur. Four separate research studies cited by the Department of Transportation in a 1969 report concluded that the ratio of fatalities to injuries increases substantially as crash speeds increase. Applied to national highway fatality figures for 1967, one of these studies indicates that 12,100 deaths were associated with crashes above 60 miles per hour — and that 6,800 of these would have been prevented had the crashes occurred at speeds below 60 mph. That would have equaled 13 per cent of the total highway deaths of 1967. (Status Report, Vol. 5, No. 22, December 15, 1970)


FIGURE 6
ESTIMATED PERCENTAGES OF PASSENGER CARS
THAT EACH YEAR SUSTAINED CRASH DAMAGE THAT
WAS LEFT UNREPAIRED

SOURCE: ADAPTED FROM "A SURVEY OF UNREPAIRED AUTOMOBILE CRASH
Speed is a factor also in postcrash aggravation to the extent that higher speeds heighten the possibility of fire following a crash, contribute to greater severity of wreckage, and increase difficulty, time, and hazard of extricating injured occupants. The precise nature and degree of speed's role in postcrash complications, however, is at present quantitatively unknown.

As in the case of vehicle size, the basic laws of physics provide some of the reasons for the relationship between speed and crash severity. Figure 4 shows that reductions in crash velocities result in lower deceleration forces on properly packaged occupants.

In testimony8 before the Senate Subcommittee on Antitrust and Monopoly in October 1969, Dr. William Haddon, Jr., presented crash test results and property damage insurance claim closure results which showed that most of the claims and claim closure dollars paid for damage to private automobiles resulted from individual losses that were smaller than the damage incurred in ten-mile-per-hour barrier crashes, Figures 7a and b, and Figures 8a and b. These results suggested that the overwhelming bulk of both the dollar losses and claims made under property damage coverage was for damage resulting from low speed crashes. Subsequent analysis of collision coverage claim data showed that the same situation obtains and the conclusion results.9 Therefore, it seems unlikely that average claim sizes and claim frequencies will change substantially as a result of reducing travel speeds to levels still far above the low speeds involved in the overwhelming bulk of the crashes.

Therefore, if all other aspects were unchanged, it is likely that reduced speeds would result in fewer deaths and injuries but little appreciable change in crash frequencies. (See above, pages 1 to 8 for comments concerning the contrary influence of vehicle size.)

It should be noted that decreased travel speeds result in increased travel times; for example, a 300 mile journey at 60 mph takes five hours, but the same journey at 50 mph takes six hours — a 20 per cent increase in "time exposure" with no reductions in miles driven or in exposure to the fixed environmental hazards along the way. This increased "time exposure" will increase traffic density. The effect of this increase in "time exposure" on losses is not known.

8Testimony of William Haddon, Jr., M.D., President, Insurance Institute for Highway Safety, Before the Senate Subcommittee on Antitrust and Monopoly, October 6, 1969.

FIGURE 7
PROPERTY DAMAGE CLAIM CLOSURES

(a) PRIVATE PASSENGER AUTOMOBILES
LESS THAN ONE YEAR OLD

1969 MODEL CRASH TEST DAMAGE RANGES

1. $134-$306 5 MPH FRONT
2. $134-$352 5 MPH REAR
3. $485-$814 10 MPH FRONT

PERCENT OF TOTAL CLAIMS

DOLLAR SIZE OF LOSS

(b) PRIVATE PASSENGER AUTOMOBILES
OF ALL AGES COMBINED

1969 MODEL CRASH TEST DAMAGE RANGES

1. $134-$306 5 MPH FRONT
2. $134-$352 5 MPH REAR
3. $485-$814 10 MPH FRONT

PERCENT OF TOTAL CLAIMS

DOLLAR SIZE OF LOSS

SOURCE: ADAPTED FROM TESTIMONY OF WILLIAM HADDON, JR., M.D., PRESIDENT,
INSURANCE INSTITUTE FOR HIGHWAY SAFETY BEFORE THE SENATE
SUBCOMMITTEE ON ANTITRUST AND MONOPOLY, OCTOBER, 1969.
FIGURE 8
PROPERTY DAMAGE CLAIM CLOSURES

(a) PRIVATE PASSENGER AUTOMOBILES
LESS THAN ONE YEAR OLD

1969 MODEL CRASH TEST DAMAGE RANGES
1. $134-$305 5 MPH FRONT
2. $134-$352 5 MPH REAR
3. $485-$814 10 MPH FRONT

(b) PRIVATE PASSENGER AUTOMOBILES
OF ALL AGES COMBINED

1969 MODEL CRASH TEST DAMAGE RANGES
1. $134-$305 5 MPH FRONT
2. $134-$352 5 MPH REAR
3. $485-$814 10 MPH FRONT

ASPECTS THAT MAY CHANGE

Passenger Car Mileage

Passenger car mileage may decrease. It is likely that substantial decreases in vehicle mileage would result in some reduction in highway losses. It is not possible, at this time, however, to scientifically predict what, if any, these reductions would be. It is not known, for example, what sorts of mileage (e.g., relatively low risk freeway or toll road travel versus other travel) would be reduced. Also there is no simple relationship between vehicle mileage and highway losses; for example, for a number of years the annual death rate per 100,000,000 miles has been declining despite dramatic increases in vehicle mileage.

It is important to note, however, the reduced energy supplies do not automatically imply that there will be reductions in the miles traveled. For example, a Department of Transportation Study found that a 3,990 pound car would use approximately nine gallons of gasoline traveling 100 miles at 70 mph whereas a 2,050 pound vehicle would use less than four gallons of gasoline traveling the same distance at 50 mph - a 60 per cent decrease in fuel consumption. In other words, a smaller car traveling at lower speeds could consume substantially smaller quantities of gasoline than a larger car at higher speeds on the same journey. In addition, as noted previously, the fuel saving involved in the case of the smaller car might, in turn, be used in such a way as to result in an increase in overall miles driven.

Vehicle Occupancy Rates

Vehicle occupancy rates may increase. Increased occupancy rates would mean that the chances of injury in a given crash are increased. In addition, it is probable that increased occupancy rates in small cars adversely affect the braking and handling characteristics to a much greater extent than increased occupancy rates in larger cars. Therefore, the combination of small cars and higher occupancy rates could tend to increase crash frequencies.

Different Speed Limits for Trucks and Cars

As an energy saving measure, President Nixon has proposed a 50 mph speed limit for automobiles and a 55 mph limit for trucks, trailers and buses. If implemented, this could increase highway losses, because of the substantial gap between the braking abilities of passenger cars and larger vehicles. In a 1971 paper Dr. William Haddon, Jr., pointed out


that the "actual braking performance of heavy trucks is commonly two to three times worse
than that of passenger cars." Even when cars were commonly traveling faster than trucks —
a situation tending to reduce the results and implications of the difference in braking
abilities — the inadequate braking performance of trucks has been responsible for serious
losses. For example, Haddon cited a November 1969 crash (documented by the National
Transportation Safety Board) on the New Jersey Turnpike in which "one after another huge
track was unable to stop in a short enough distance and plowed into the vehicles and people
ahead." If trucks are traveling faster than passenger cars the already major discrepancies in
braking performance become even more pronounced and under these circumstances, more
crashes of this tragic type can be expected. (Status Report, Vol. 6, No. 1, January 18, 1971)

Motorcycle and Bicycle Usage

Motorcycle and bicycle usage may increase. This would probably accelerate the present
trend of sharply increasing losses being generated by these modes of transport.

Supplemental Gasoline Containers

The use of supplemental gasoline containers may increase. This could lead to in-
creases in vehicle and other fire losses. Several serious incidents of this nature have already
been reported by the press.

Age of Vehicle Population

The average age of the vehicles in use may increase if people disproportionately use
older vehicles because of their better gasoline consumption. The Ford Motor Company\(^\text{12}\) has prepared figures showing that a typical 1965 standard size sedan in normal driving
would produce 15 miles per gallon whereas a comparable 1973 model, which weighed
considerably more, had a larger engine and also had emission controls, would produce only
12 miles per gallon.

The effect of a change in the average age of vehicles in use is uncertain, although
many of the older vehicles would not be designed and constructed to satisfy the more recent
federal motor vehicle safety standards.

Restrictions on Young Drivers

It is possible that the amount of non-essential driving done by young drivers may be
reduced. For example, some high schools have already proposed that student parking lots be
closed to students' cars. And in the event of severe gasoline shortages, more essential family

auto use needs would presumably take priority over non-essential driving by youthful family members.

Since young drivers in general have a very high involvement rate in crashes of all types it is possible that substantial reductions in the amount of driving by youthful operators would result in lower crash rates.

**Restraint Usage**

Restraint usage in 1974 model vehicles may increase. Very informal preliminary indications are that the interlock and inertial reel harnesses are being worn at a somewhat higher rate than restraint systems in earlier model year cars.

**Street Lighting**

Street lighting and external building lights may be reduced. This could lead to an increase in nighttime urban crashes, especially those involving pedestrians and bicycles.

**The Economy**

Gross National Product and Industrial Index of Production may go down in 1974. There is a strong correlation between total annual motor vehicle deaths and the Industrial Index of Production, and, separately, the GNP. The reasons for this correlation are not understood but it appears to be independent of most of the vehicle-related measures that contribute to both of the economy indicators. A slowdown or recession in the economy in 1974 may, therefore, be accompanied by a reduction in motor vehicle deaths. Whether this correlation would hold under highly usual circumstances is, however, unknown.

**MEASURING CHANGES**

Several possible indicators could be used to measure some of the effects of the energy shortage on highway losses. However, at the present time, no single indicator or data source would be able to provide a definitive measure of the effects of the energy shortage.

It is important to note that simple before-and-after comparisons can be very misleading. For example, Campbell and Ross in a 1968 study\(^{13}\) of the widely publicized “Connecticut Crackdown on Speeding” showed after a very detailed analysis that there was

"no unequivocal proof" that fatality reductions were due to the crackdown. Nonetheless, the governor of the state had earlier claimed success on the basis of simple before-and-after comparison. Ideally, results obtained after a change in presumably relevant factors should be compared with a series of corresponding results from several prior years, lest mistakes in judgment result from reliance on analysis of short-term fluctuations.

A further complicating factor in assessing the effects of the energy shortage is the possibility of the so-called "Hawthorne effect." It has been known since the classic studies of workers in the Hawthorne plant of Western Electric in the 1920's that people often change their behavior or claimed behavior in the desired direction as a result of being studied rather than as a result of the changed conditions. Such changes, however, are usually only temporary. Therefore, caution is necessary before interpreting any early changes in losses, if such occur, as being indicative of real trends due to the energy shortage.

Holiday Death Totals

The number of motor vehicle deaths occurring in any holiday period are usually available very soon after the holiday.

Reductions in deaths occurring during the 1973 Thanksgiving holiday compared with the same holiday in 1972 have already been widely quoted in the press as an indication that the energy shortage has already begun to reduce motor vehicle deaths. Such conclusions are premature.

Figure 9 shows the Thanksgiving holiday deaths for the last six years. It is clear from this figure that, with the exception of 1972, there has been a consistent downward trend in these deaths and it appears that 1972, rather than 1973, was the unusual year since the deaths were higher in 1972 than would have been predicted on the basis of the figures of previous years. Furthermore, the reported 1973 total appears to be on the declining trend line established by the data for the prior years, except for 1972.

Holiday fatality figures are also complicated because holidays are, by definition, not typical of other periods. It is probable, therefore, that their amounts and types of driving are also not typical. This is likely to be particularly true for the Thanksgiving holiday.

Turnpike Statistics

Various turnpike authorities publish statistics concerning crashes that occur on the turnpikes, and these are usually available soon after the calendar period in question. These statistics suffer from a similar deficiency as the holiday fatality figures; that is, they reflect the losses resulting from very special types of driving, and therefore cannot be generalized.
FIGURE 9
THANKSGIVING HOLIDAY MOTOR VEHICLE DEATHS*

*MOTOR VEHICLE DEATHS

YEAR


*IMMEDIATE DEATHS, THOSE OCCURRING BY MIDNIGHT ON THE LAST DAY OF THE HOLIDAY PERIOD.

1973 DATA, PUBLIC INFORMATION DEPARTMENT, NATIONAL SAFETY COUNCIL
National Safety Council Statistics

The National Safety Council's monthly publication, Traffic Safety, publishes monthly national fatality statistics. There is usually a three-month delay in these figures. e.g., December fatality figures usually appear in the March issue.

Highway Loss Data Institute Results

Collision coverage insurance losses can be produced by HLDI by market class and by month. Such analyses would indicate whether changes had occurred in average loss payment amounts or claim frequencies. There is a delay of approximately two months after the end of a given month of interest before sufficient percentages of claim reports have been received. It would be necessary, in addition, to look at several months experience before any sound, even tentative, conclusions concerning new trends could be reached.

SUMMARY

The extent and duration of the energy shortage is not yet predictable, although there is apparently no doubt that there will continue to be at least short term shortages of gasoline and truck fuels. In view of uncertain short term prospects and the many aspects of the situation that are changing, it is not possible at this time to predict with any confidence what the short term effects, even as to direction, will be on each of the various categories of highway losses.

In the longer term, even assuming some relaxation of the fuel shortages, it seems probable that the trend toward smaller cars which began before the present energy shortage will continue. Despite the considerable research evidence that improved occupant protection measures become even more important as cars get smaller, the bulk of the proposed federal motor vehicle safety standards in this area were postponed last year by the National Highway Traffic Safety Administration (Status Report, Vol. 7, No. 22, November 27, 1972). Without dramatic decreases in vehicle fragility and increases in restraint usage or other improved occupant protection measures (especially including airbags), the trend towards smaller cars will result in long term increases in both damaged people and property.
CRASH-RELATED LOSS DATA GIVEN TO SENATE

Large, heavy cars are substantially safer for occupants in crashes than small, light ones -- and for all sizes, federally-required equipment in newer models is paying off to the benefit of crash occupants.

That was the import of data presented at recent hearings of the Senate Antitrust and Monopoly Subcommittee by Dr. B. J. Campbell, director of the University of North Carolina Highway Safety Research Center. Campbell's findings were reinforced by a Department of Transportation report to the subcommittee on preliminary results of a DOT-funded study by New York State of injuries associated with crashes of 31 makes of cars covering the model years 1965-1968. The study began in mid-1968.

Dr. Campbell said data such as his would help potential car buyers to "assess the risk and weigh it with the alternative values" before purchasing a particular vehicle.

"It should be of more than passing interest to drivers to know that in the event of a crash their chance of a serious or fatal injury is associated with the car they are driving," Campbell observed, "and that depending on their choice, the 'odds' could be reduced 50 per cent or increased 100 per cent."

Using an injury severity index of 100 as the average frequency of driver injury for all cars in his study, which was based on crash reports for 276,697 cars, Campbell found there were 13 models with driver injury rates lower than average:

<table>
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<th>Year</th>
<th>Make</th>
<th>Index</th>
<th>Sample Size</th>
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<tbody>
<tr>
<td>1960</td>
<td>Standard Ford</td>
<td>84</td>
<td>1813</td>
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<td>1962</td>
<td>Big Pontiac</td>
<td>60</td>
<td>318</td>
</tr>
<tr>
<td>1962</td>
<td>Standard Oldsmobile</td>
<td>52</td>
<td>569</td>
</tr>
<tr>
<td>1964</td>
<td>Standard Chevrolet</td>
<td>88</td>
<td>2961</td>
</tr>
<tr>
<td>1966</td>
<td>Big Oldsmobile</td>
<td>420</td>
<td>102</td>
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<tr>
<td>1966</td>
<td>Standard Oldsmobile</td>
<td>51</td>
<td>207</td>
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<tr>
<td>1966</td>
<td>Standard Chevrolet</td>
<td>83</td>
<td>1355</td>
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The Insurance Institute for Highway Safety is an independent, nonprofit, scientific and educational organization. It is dedicated to reducing the losses—deaths, injuries and property damage—resulting from crashes on the nation's highways. The Institute is supported by the American Insurance Associations, the National Association of Automobile Mutual Insurance Companies and the National Association of Independent Insurers, which represent companies writing most of the nation's automobile insurance.
<table>
<thead>
<tr>
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<td>1967</td>
<td>Big Buick</td>
<td>&lt;50</td>
<td>138</td>
</tr>
<tr>
<td>1967</td>
<td>Small Oldsmobile</td>
<td>54</td>
<td>237</td>
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<tr>
<td>1968</td>
<td>Big Pontiac</td>
<td>&lt;50</td>
<td>115</td>
</tr>
<tr>
<td>1968</td>
<td>Standard Pontiac</td>
<td>&lt;50</td>
<td>188</td>
</tr>
<tr>
<td>1968</td>
<td>Standard Chevrolet</td>
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<td>789</td>
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<tr>
<td>1968</td>
<td>Chevelle</td>
<td>77</td>
<td>664</td>
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Thirteen cars with a higher than average injury index were:

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<th>Sample Size</th>
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<td>1990</td>
<td>Corvair</td>
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<td>365</td>
</tr>
<tr>
<td>1991</td>
<td>Corvair</td>
<td>147</td>
<td>505</td>
</tr>
<tr>
<td>1992</td>
<td>Corvair</td>
<td>197</td>
<td>181</td>
</tr>
<tr>
<td>1992</td>
<td>Chevy II</td>
<td>152</td>
<td>543</td>
</tr>
<tr>
<td>1992</td>
<td>Fairlane</td>
<td>131</td>
<td>585</td>
</tr>
<tr>
<td>1993</td>
<td>Fairlane</td>
<td>139</td>
<td>782</td>
</tr>
<tr>
<td>1994</td>
<td>Valiant</td>
<td>154</td>
<td>345</td>
</tr>
<tr>
<td>1994</td>
<td>Small Dodge</td>
<td>158</td>
<td>200</td>
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<tr>
<td>1995</td>
<td>Chevy II</td>
<td>180</td>
<td>179</td>
</tr>
<tr>
<td>1995</td>
<td>Valiant</td>
<td>167</td>
<td>217</td>
</tr>
<tr>
<td>1996</td>
<td>Valiant</td>
<td>160</td>
<td>143</td>
</tr>
<tr>
<td>Combined</td>
<td>VW Type II (Bus)</td>
<td>215</td>
<td>195</td>
</tr>
<tr>
<td>Combined</td>
<td>VW Type I (Regular)</td>
<td>141</td>
<td>4286</td>
</tr>
</tbody>
</table>

Campbell said that for all cars covered in his study, "Later model cars (which have more crash safety features) show up better than earlier model cars." Significantly lower levels of serious injury, he indicated, were associated with the newer models than the old. He also stressed that his data were not directed at questions of crash frequency by make, model, age or size of the studied cars.

The New York State findings submitted by DOT to the subcommittee showed that "the light cars generally experienced a higher percentage of severe accidents (non-collision or rollover) and generally had a higher percentage of drivers under 30," according to the federal agency. DOT said it wanted further analyses to determine "the degree to which the higher percentage occurrence of severe injuries in light cars was due to their weight and . . . due to a driving population which gets into more severe accidents."

The report included this table from the New York State study:

<table>
<thead>
<tr>
<th>Crash-Involved Size Group</th>
<th>Average Weight, lbs</th>
<th>Per Cent Occurrence of Serious or Fatal Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Domestic &quot;luxury&quot; regular</td>
<td>4,800</td>
<td>3.1</td>
</tr>
<tr>
<td>2. Domestic &quot;intermediate&quot;</td>
<td>3,700</td>
<td>4.0</td>
</tr>
<tr>
<td>3. Domestic &quot;economy&quot; regular</td>
<td>3,400</td>
<td>5.2</td>
</tr>
<tr>
<td>4. Domestic compact</td>
<td>2,800</td>
<td>6.4</td>
</tr>
<tr>
<td>5. Foreign compact</td>
<td>1,900</td>
<td>9.6</td>
</tr>
<tr>
<td>Combined</td>
<td></td>
<td>5.5</td>
</tr>
</tbody>
</table>
Small Car Hazards Reported

The current increase in small car sales "will lead to a greater number of injuries," including fatal and crippling injuries, a University of Michigan research group has warned.

The group based its conclusion on an extensive analysis of crash injury data from national and local crash investigation files. Its analysis showed, it said, that the following rule should be applied to new cars in crashes:

"... once involved in an accident, the chance of injury in this car increases at the rate of about 2.5 per cent for each decrease of 100 pounds in vehicle weight."

The analysis also indicated that smaller cars are involved in single vehicle crashes at a significantly higher rate than larger cars, and in other crashes at about the same rate as larger cars.

The warning and the rule were contained in a report (HIT Lab Reports, Vol. 3, No. 9) written by James O'Day, D. Henry Golomb and Peter Cooley of the University's Highway Safety Research Institute (HSRI).

Their conclusions underscore similar, earlier research findings, including those reported by the New York State Department of Motor Vehicles and the Insurance Institute for Highway Safety, that occupants of compact and smaller size cars are substantially more vulnerable to death and serious injury in crashes than occupants of sedan and larger size cars. (See Status Report, Vol. 6, No. 21, Nov. 16, 1971.)

The HSRI report stressed that the higher levels of crash injury associated with small cars is not a result of more occupants in such cars. In fact, it found that the "average number of occupants in small cars is slightly lower than in large cars," rather than higher.

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  By Safety Center . . . Page 5
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  . . . Page 5
- Grate Hazards Cited By Center
  For Auto Safety . . . Page 6
- U.S. Sues I.H. On Defective
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- Congress Gets DOT Safety
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The Insurance Institute for Highway Safety is an independent, nonprofit, scientific and educational organization. It is dedicated to reducing the losses—deaths, injuries and property damage—resulting from crashes on the nation's highways. The Institute is supported by the American Insurance Association, the National Association of Automobile Mutual Insurance Companies, the National Association of Independent Insurers and several individual insurance companies.
It also found "little difference in the use of restraints by the large and small groups defined in this study. One must conclude that the increase in injuries is most probably a result of car weight and protection offered by interior size, rather than from these other factors."

As to the widespread notion that smaller cars are involved less frequently in crashes than larger ones, the HSRI report noted that in single vehicle crashes covered by the study, smaller cars were "over-represented," possibly "because of their drivers; or perhaps because of stability, handling, or control characteristics; or because of a combination of the two."

The report also suggested that an auto population solely of smaller cars, when compared with an identical size auto population solely of larger cars, would produce both more crashes, and more injuries per crash. There would be "about 50 more injury accidents per 10,000 reported accidents" for the smaller car population and the number of injuries would be "somewhat higher," it found.

For its definition of "small cars," the study used a conservative grouping that included "essentially all mini-cars, nearly all of the compacts, and the lighter half of the intermediates. The large car group includes the remaining half of the intermediates, and all full-size vehicles." The data were based on crash files primarily for the 1968-1970 period. "Later accident data will be available in the near future," the report said. "With such data the relative safety of the American 2000-2500 pound vehicle can be more accurately assessed."
Tests Show Small-Car Dangers

Occupants of so-called "economy cars" face dangers in crashes that are "far greater" than those faced by occupants of larger-size cars, according to filmed results of an exploratory crash test program made public today by the Insurance Institute for Highway Safety.

Dr. William Haddon, Jr., president of the Institute, said in a statement accompanying release of the test results that the discrepancy between crash protection afforded by smaller cars and that offered by larger, family sedan-type cars is a "tragically widespread" kind of intervehicular incompatibility that "should be of particular concern to society because of the sizable human damage it is producing."

The test series consisted of six two-car head-on crashes, with each car traveling at speeds between 40 and 50 miles per hour — speeds much lower than those allowed and often driven on newer highways today. Each test involved the crash of a small car with a sedan-size car. Seven of the cars were 1972 models; the other five were 1971's, four of which were not instrumented with dummies. Both cars in each crash test were made or marketed by the same company — General Motors, Ford Motor Company, Chrysler or American Motors.

Haddon termed the tests "particularly timely" since "domestic manufacturers, in an effort to compete with the sales of small imported cars, have vigorously entered the field of small car production and marketing . . . ."

(Cont'd. on page 2)
"The public is being heavily exposed to advertising information extolling the purchase-price and operating economies claimed for these cars, but it is not being given vital information about their distinct safety hazards," Haddon noted. He cited estimates that small car sales will represent 50 per cent of all new car sales before 1980.

"As the share of these small cars in the total vehicle population continues to expand on U.S. highways, they can be expected to become involved in a commensurately increasing share of collisions, including collisions with such larger cars as the traditional family sedan," he said.

The relative lack of crashworthiness of smaller cars in their collisions with larger ones must be viewed, Haddon said, in the context of a "modern day highway environment that mixes large, intermediate and small vehicles at speeds comparable to and often considerably higher than those in the 40 to 50 mile per hour tests" conducted by the Institute.

(In Brief)

How The Tests Were Run

Each test in the medium-speed crash test program involved a head-on crash of a small-size car and a sedan-size car, each traveling between 40 and 50 miles per hour, with a speed differential never larger than four miles per hour in any given test. The test cars were "driven" into each other by test drivers using remote control drive units in nearby "command" cars. In the initial tests — of 1971 Chevrolets and 1971 Ford's — the cars were not equipped with dummies; anthropometric dummies were installed in the outboard front seating position of each of the cars in all other tests. Following are the models tested, their weights and their speeds:

<table>
<thead>
<tr>
<th>SMALL CARS</th>
<th>WEIGHT LBS</th>
<th>MPH</th>
<th>MODEL</th>
<th>WEIGHT LBS</th>
<th>MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971 Cheverolet Vega</td>
<td>2,300</td>
<td>63.0</td>
<td>1971 Cheverolet Impala</td>
<td>4,107</td>
<td>45.8</td>
</tr>
<tr>
<td>1971 Ford Pinto</td>
<td>2,100</td>
<td>66.5</td>
<td>1971 Ford Galaxie</td>
<td>4,375</td>
<td>45.0</td>
</tr>
<tr>
<td>1972 Chevrolet Vega</td>
<td>2,500</td>
<td>67.0</td>
<td>1972 Chevrolet Impala</td>
<td>4,362</td>
<td>45.4</td>
</tr>
<tr>
<td>1972 Ford Pinto</td>
<td>2,300</td>
<td>68.5</td>
<td>1972 Ford Galaxie</td>
<td>4,114</td>
<td>44.7</td>
</tr>
<tr>
<td>1972 Dodge Colt</td>
<td>2,363</td>
<td>67.4</td>
<td>1972 Plymouth Prowl</td>
<td>4,206</td>
<td>45.4</td>
</tr>
<tr>
<td>1972 American鳥cmlin</td>
<td>2,000</td>
<td>63.4</td>
<td>1972 American Ambassador</td>
<td>3,914</td>
<td>44.7</td>
</tr>
</tbody>
</table>

*All weights are curb weights as advertised, with the weights of remote control drive units between 50 and 100 pounds each added for all cars, and the weight of dummy-side (35 pounds each) also added for all 1972 cars and the 1971 Dodge Colt.
OCCUPANT PACKAGE

Roof caved in; right door latch broke, door opened; windshield tore loose, fell into passenger compartment onto dummy; rear window popped out.

COMPARTMENT INTERIOR

Lap and shoulder belts broke; non-adjustable head restraint would not position fully behind dummy's head.

TEST DUMMY

Head impacted roof, sun visor, windshield, dashboard; lacerations on forehead, right side of face, nose, left hand, right thigh; glass splinters in face; legs pinned under dashboard. Abrasions on right forearm; lacerations on right palm.

OTHER

Battery smashed; fuel tank ruptured, leaked.

Battery smashed.

(contr'd. from page 2)

The problem would not be solved simply by removing larger vehicles from the highway, he said. The 'vulnerability of small-car passenger compartments and the amounts of exposure to hazard they permit their occupants . . . cannot be explained away by the size and weight of larger vehicles. We believe, rather, that the relative lack of crashworthiness of small cars is substantially inherent in their design — in the amounts and kinds of spaces and structures they use to shield, or not to shield, their occupants from injury and death,' he said.

(contr'd. on page 4)
SMALLER CAR 1972 American Gremlin

LARGER CAR 1972 American Ambassador

COMPARTMENT INTERIOR

Shoulder belt latch broke; nonadjustable head restraint would not fully position behind dummy's head.

Shoulder belt anchor tore out of roof; adjustable head restraint would not fully position behind dummy's head.

TEST DUMMY

Head impacted roof, sun visor, windshield, dashboard; face severely lacerated; legs pinned under dashboard.

Head impacted sun visor, dashboard.

OTHER

Battery smashed.

Battery smashed.

(cont'd. from page 3)

Haddon noted that 'smaller cars increasingly common on today's highways are characterized by sizes, weights and designs that are much less adequate even than currently produced larger cars in terms of:

- "Provision of sufficient energy-absorbing structure, external to the passenger compartment itself, to guarantee maximum attenuation of crash forces by means of adequately planned compression or crushing."

- "Maintenance of the integrity of the passenger compartment itself — the package within which the human cargo is located."

- "Protection of the passenger compartment from intrusion by outside objects, such as hoods."

- "Provision of sufficient space within the passenger compartment to keep belted occupants from impacting damaging structure — roof pillars and beams, for example — and also to allow enough spatial depth for padding and other passive restraints."

(cont'd. on page 5)
SMALLER CAR
1972 Chevrolet Vega

LARGER CAR
1972 Chevrolet Impala

COMPARTMENT INTERIOR
Nonadjustable head restraint would not position fully behind dummy's head.

Adjustable head restraint would not position fully behind dummy's head.

TEST DUMMY
Head impacted windshield, dashboard; dummy beheaded; legs pinned under dashboard; glass splinters in face; chin, forehead lacerated; arm cut; battery acid on shirt.

Head impacted dashboard, heel of right hand lacerated.

OTHER
Battery smashed, acid entered passenger compartment.

Battery smashed.

The Institute's test results are consistent with findings in a New York state study, carried out in 1968 for the U.S. Department of Transportation, that compared injuries from crashes of 420,000 various-size automobiles. The study found a "strong association" between "the weight of a car and the per cent of accidents in which there was a fatality or serious injury in that type of car."

A preliminary report to the Department of Transportation on the New York state study included the following table:

<table>
<thead>
<tr>
<th>Crash-Involved Size Group</th>
<th>Average Weight</th>
<th>Per Cent Occurrence of Serious or Fatal Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Domestic &quot;luxury&quot; regular</td>
<td>4,800</td>
<td>3.1</td>
</tr>
<tr>
<td>2. Domestic &quot;intermediate&quot;</td>
<td>3,700</td>
<td>4.0</td>
</tr>
<tr>
<td>3. Domestic &quot;economy&quot; regular</td>
<td>5,400</td>
<td>5.2</td>
</tr>
<tr>
<td>4. Domestic compact</td>
<td>2,800</td>
<td>6.4</td>
</tr>
<tr>
<td>5. Foreign compact</td>
<td>1,900</td>
<td>9.5</td>
</tr>
<tr>
<td>Combined</td>
<td></td>
<td>5.5</td>
</tr>
</tbody>
</table>

(Cont’d. on page 8)
SMALLER CAR
1971 Dodge Colt

LARGER CAR
1972 Plymouth Fury

OCCUPANT PACKAGE

Windshield partially tore loose, draped into passenger compartment.

COMPARTMENT INTERIOR

Lap belt buckle unlatched; shoulder harness strap broke; adjustable head restraint would not position fully behind dummy's head, flew out of car in crash.

Shoulder harness strap broke; adjustable head restraint would not position fully behind dummy's head, pushed into "down" position in crash.

TEST DUMMY

Head impacted sun visor, header, windshield; head lacerated; glass splinters in face; legs jammed under dashboard, broke at hip joint.

Head impacté dashboard.

OTHER

Battery smashed.

Battery smashed.

(continues from page 5)

In describing the Institute's medium-speed crash test series Haddon pointed out that, although "the tests were not meant to show whether or not a car's safety components were in compliance with the (federal motor vehicle safety) standards," they "may well indicate where standards require toughening."

The film and Haddon's statement identified, for example, head restraints that could not be positioned fully behind the test dummy's head, one head restraint that flew out of the car in a crash, shoulder and lap belts and latches that broke or otherwise failed, three windshields that fell into the passenger compartments of

(continues on page 7)
their small cars, and one windshield - that of the 1971 Chevrolet Vega - that was penetrated by the car's hood "like a horizontal meat cleaver."

Data and films from the crash tests have been supplied to the National Highway Traffic Safety Administration, National Transportation Safety Board, Federal Trade Commission and the manufacturers of the vehicles tested.

***

'Meat Axe Effect'

Test Shows Need For Rule

The National Highway Traffic Safety Administration will find in the outcome of the crash test of the 1971 Chevrolet Vega and Chevrolet Impala strong support for moving forward with its plan, now in the Advance Notice of Proposed Rulemaking stage (Docket No. 69-17), to set a standard prohibiting penetration of automobile windshields by their hoods in crashes.

As in this crash, hood penetration of windshields in guillotine fashion exacerbated in small cars, which give the front-seat occupants less room between their heads and the windshield. A person riding in the crash-tested 1971 Vega would have been impacted transversely by the hood edge.

Since November 1969, the NHTSA has kept its advance notice docket open. Both foreign and domestic auto manufacturers' submissions to the docket indicate that the auto industry supports adoption of such a standard. The next step - issuance by NHTSA of a Notice of Proposed Rulemaking - has not yet been taken.

Meanwhile, the agency's accident investigation division has submitted a report of an analysis of 718 serious, real-world crashes looked at by NHTSA multi-disciplinary accident investigation teams. In 487 of these, damage was sustained by the fronts of vehicles.

From this sample the investigation division discovered that in 33 of the crashes the rear edge of the hood penetrated the windshield - 4.6 per cent of all the crashes and 7.1 per cent of those with frontal damage. It also found that 44 of the 48 occupants in those cars involved with hood penetration of the windshield were front-seat occupants - that is, those most exposed to the lethal meat-axe effect.
Test Report Available

Single copies of the report detailing the Institute's medium-speed crash test program may be obtained by writing, "Medium Speed Tests," Communications Department, Insurance Institute for Highway Safety, Watergate 600, Washington, D.C. 20037.

Inquiries as to availability and cost of the crash test film should be addressed to "Test Films," Insurance Institute for Highway Safety, at the above address.
1973 Models: Claims Less Frequent, Higher

A new report released by the Highway Loss Data Institute indicates that in general 1973 model cars are producing fewer collision claims but higher payments per claim than their 1972 model counterparts.

"These results," the report said, "are consistent with evidence suggesting that certain 1973 model bumpers, while reducing the amount of damage resulting from very low speed crashes to amounts less than the collision coverage deductible, also possibly either maintain or augment the cost to repair the damage produced by crashes at somewhat more rapid speeds."

The 1973 model cars were the first to be covered by the National Highway Traffic Safety Administration's standard 215 which requires only that bumpers prevent damage to safety related components and only in very low speed crashes – five miles per hour front-into-barrier and 2.5 miles per hour rear-into-barrier.

The report, which draws on insurance collision coverage data from six companies, compared series of 1973 models with 1972 models as to their claim frequency per 100 insured vehicle years, their average loss payments per claim, and their average loss payments per insured vehicle year. Both the 1973 and 1972 model year data were obtained from the same period – September 1972 through July 1973 – from the same six insurance companies.

"In six of the seven market classes with results for both 1973 and 1972 models, the claim frequencies were lower for the 1973 models than the corresponding 1972 models. The percentage reductions ranged from -4% for sub compact and expensive specialty models to -9% for the full size and luxury models. Specialty models showed no change in results between the two model years.

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- Charts Detail 1973-1972 Model Comparisons... Pages 3 & 4
- Race Drivers' Highway Records: Not Good... Page 5
- Auto Makers Protest NHTSA Fuel System Amendment... Page 7
- NHTSA Goes After VW's 'Thing'... Page 8
- NHTSA May Seek Delay Of Consumer Info Deadline... Page 8
- Steering Defect Found in Cadillacs, GM Balks at Recall... Page 10
- NHTSA Issues Limited Used-Vehicle Standards... Page 11

The Insurance Institute for Highway Safety is an independent, nonprofit, scientific and educational organization. It is dedicated to reducing the losses—deaths, injuries and property damage—resulting from crashes on the nation's highways. The Institute is supported by the American Insurance Association, the National Association of Automobile Mutual Insurance Companies, the National Association of Independent Insurers and several individual insurance companies.
In six of the seven market classes, the average loss payment per claim was higher for the 1973 models than for the corresponding 1972 models. The percentage increase ranged from 4% for the compact models to 7% for the full size models. In the luxury models there was a 2% decrease in the average loss payment.

The average loss payments per insured vehicle year were lower for the 1973 models than the corresponding 1972 models in five of the seven market classes. The percentage decreases ranged from -2% for sub compact and full size models to -12% for luxury models. Expensive specialty models showed no change between the two model years, and specialty models showed a 3% increase.

Among the seven market classes with results from both model years, the average loss payment per insured vehicle for the 1973 models ranged from $40 for the full size models to $75 for the specialty models. The corresponding 1972 model results ranged from $41 for the full size models to $73 for the specialty models. The claim frequencies for the 1973 models ranged from 8.4 for the full size models to 14.4 for the specialty models. The corresponding 1972 model results ranged from 9.2 for the full size models to 14.4 for the specialty models. The average loss payments for the 1973 models ranged from $468 for the compacts to $576 for the expensive specialty models. The corresponding 1972 model results ranged from $449 for the full size models to $528 for the luxury models.

The summary results presented in the tables on pages three and four have been standardized to adjust for different mixes of operator ages and deductibles among the vehicle series. The full report includes extensively detailed information for combinations of operator age groups and deductibles.

(Continued on page 4)

Status Report  
October 5, 1973
<table>
<thead>
<tr>
<th>MARKET CLASS, MAKE/SERIES</th>
<th>TOTAL EXPOSURE (INSURED VEHICLE YEARS)</th>
<th>AVERAGE LOSS PAYMENT PER INSURED VEHICLE YEAR</th>
<th>CLAIM FREQUENCY PER 100 INSURED VEHICLE YEARS</th>
<th>AVERAGE LOSS PAYMENT PER CLAIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Series</td>
<td>777,911</td>
<td>288,890</td>
<td>$50</td>
<td>$49</td>
</tr>
<tr>
<td>Sub Compact</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ford Pinto S/W</td>
<td>7,679</td>
<td>8,254</td>
<td>55</td>
<td>48</td>
</tr>
<tr>
<td>Volkswagen Beetle</td>
<td>29,485</td>
<td>12,098</td>
<td>49</td>
<td>49</td>
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<tr>
<td>Ford Pinto</td>
<td>35,058</td>
<td>9,002</td>
<td>65</td>
<td>60</td>
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<tr>
<td>AMC Gremlin</td>
<td>8,520</td>
<td>4,107</td>
<td>71</td>
<td>65</td>
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<tr>
<td>Chevrolet Vega</td>
<td>26,056</td>
<td>10,677</td>
<td>53</td>
<td>67</td>
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<tr>
<td>Compact</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Dodge Dart Swinger</td>
<td>12,214</td>
<td>3,541</td>
<td>41</td>
<td>30</td>
</tr>
<tr>
<td>Plymouth Valiant Duster</td>
<td>19,261</td>
<td>6,748</td>
<td>60</td>
<td>45</td>
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<tr>
<td>Chevrolet Nova</td>
<td>30,701</td>
<td>11,626</td>
<td>43</td>
<td>46</td>
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<tr>
<td>AMC® Hornet</td>
<td>4,024</td>
<td>2,665</td>
<td>55</td>
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<tr>
<td>Ford Maverick-2 Dr.</td>
<td>23,069</td>
<td>5,217</td>
<td>50</td>
<td>61</td>
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<tr>
<td>Intermediate</td>
<td></td>
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<tr>
<td>Brick Century-2 Dr.*</td>
<td>10,780</td>
<td>5,566</td>
<td>46</td>
<td>39</td>
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<tr>
<td>Chevrolet Monte Carlo</td>
<td>17,595</td>
<td>8,750</td>
<td>57</td>
<td>47</td>
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<tr>
<td>Chevrolet Chevelle-2 Dr.</td>
<td>21,394</td>
<td>5,583</td>
<td>54</td>
<td>47</td>
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<tr>
<td>Ford Torino-2 Dr.</td>
<td>20,364</td>
<td>5,783</td>
<td>57</td>
<td>51</td>
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<tr>
<td>Oldsmobile Cutlass-2 Dr.</td>
<td>20,180</td>
<td>9,140</td>
<td>55</td>
<td>55</td>
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<tr>
<td>Full Size</td>
<td></td>
<td></td>
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<tr>
<td>Pontiac Catalina</td>
<td>17,823</td>
<td>6,229</td>
<td>34</td>
<td>33</td>
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<tr>
<td>Chevrolet Caprice</td>
<td>13,733</td>
<td>6,282</td>
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<td>34</td>
</tr>
<tr>
<td>Chevrolet Impala</td>
<td>43,918</td>
<td>8,221</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Oldsmobile Delta 88</td>
<td>19,128</td>
<td>6,604</td>
<td>35</td>
<td>41</td>
</tr>
<tr>
<td>Ford LTD</td>
<td>31,565</td>
<td>11,976</td>
<td>47</td>
<td>51</td>
</tr>
</tbody>
</table>

*Corresponds to 1972 Skylark-2 door models.
The following chart graphically shows the comparative results by market class:

<table>
<thead>
<tr>
<th>MARKET CLASS</th>
<th>CLAIM FREQUENCY PER 100 INSURED VEHICLE YEARS</th>
<th>AVERAGE LOSS PAYMENT PER CLAIM</th>
<th>AVERAGE LOSS PAYMENT PER INSURED VEHICLE YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Series</td>
<td>10.7</td>
<td>10.1</td>
<td>-6</td>
</tr>
<tr>
<td>Sub Compact</td>
<td>12.1</td>
<td>11.6</td>
<td>-4</td>
</tr>
<tr>
<td>Compact</td>
<td>10.5</td>
<td>9.9</td>
<td>-6</td>
</tr>
<tr>
<td>Intermediate</td>
<td>10.8</td>
<td>10.0</td>
<td>-7</td>
</tr>
<tr>
<td>Full Size</td>
<td>9.2</td>
<td>8.4</td>
<td>-9</td>
</tr>
<tr>
<td>Luxury</td>
<td>11.1</td>
<td>10.1</td>
<td>-9</td>
</tr>
<tr>
<td>Specialty</td>
<td>14.4</td>
<td>14.4</td>
<td>0</td>
</tr>
<tr>
<td>Expensive Specialty</td>
<td>12.9</td>
<td>12.4</td>
<td>-4</td>
</tr>
<tr>
<td>Sports</td>
<td>15.1</td>
<td>(insufficient data)</td>
<td>(insufficient data)</td>
</tr>
</tbody>
</table>

The HLFI report is the organization's second. (See Status Report, Vol. 8, No. 12, June 15, 1973.) It was based on more than 100,000 collision coverage claims and on collision coverages involving more than 280,000 insured vehicle years of exposure for passenger cars of the 1973 model year and more than 770,000 vehicle years of exposure for those of the 1972 model year. In the future, HLFI plans to publish loss results during the first year of availability of the involved vehicles, to include additional makes, and to base the results on larger volumes of data from additional companies.

HLFI (pronounced "hildy") was formed in December, 1972, as an outgrowth of a special data project initiated earlier by the Insurance Institute for Highway Safety. (See States Report, Vol. 8, No. 1, Jan. 3, 1973.) It is a nonprofit organization that gathers, processes and provides the public with insurance data concerned with human and economic losses resulting from highway crashes.

The membership of the board represents the eight insurance companies – Allstate Insurance Co., The Hartford Insurance Group, The Home Insurance Co., Kemper Insurance Group, Liberty Mutual Insurance Co., Nationwide Mutual Insurance Co., State Farm Mutual Automobile Insurance Co. and The Travelers Insurance Co. – that are supplying data to HLFI. The financial support for HLFI is provided by the eight companies and by the Insurance Institute for Highway Safety, which in turn is supported by most automobile insurers either directly or through their trade associations. The new report is based on collision coverages – that is, insurance that covers damage to the insured vehicle itself – supplied by six of the companies: Allstate, The Home, Kemper, Liberty, Nationwide and State Farm.

The full report, entitled Automobile Insurance Losses, Collision Coverages, Initial Results for 1973 Models Comparison with 1972 Models, (Research Report R73-1, September 1973) is available in single copies by writing to "R73-1," Highway Loss Data Institute, Watergate 600, Washington, D.C. 20037. It includes detailed discussion of the data analysis employed in the study.

Status Report

October 5, 1973
Widespread Unrepaired Damage Found

Each year nearly one out of every five recent-model cars is left with unrepaired scars of a run-of-the-mill crash, a new study released by the Insurance Institute for Highway Safety has revealed.

Analyzing the results of primarily suburban parking lot surveys in 13 major U.S. metropolitan areas, the study concludes that the commonness of unrepaired damage to recent-year automobiles "strongly" indicates that minor damage producing crashes are "not rare events that only deviant drivers experience, but in fact are very common events experienced by a majority of the vehicles and their drivers."

Since such unrepaired damage "may result from crashes that are not reported to the public agencies or insurers, any evaluation of the real-world effectiveness of vehicle designs intended to reduce low speed crash damage must take into account this type of damage," in addition to damage that is reported and repaired following the crash, the study stresses.

Results of the study were presented by Brian O'Neill, an IIHS research staff member, at a National Highway Traffic Safety Administration public hearing in Washington, D.C. At the hearing NHTSA officials heard comments from industry and the public on NHTSA's effort to develop a standard that would eliminate damage to automobiles in low speed crashes. Such a standard is required by the Motor Vehicle Information and Cost Savings Act of 1972.

The surveys under, age the study were conducted in parking lots in the metropolitan areas of Atlanta, Chicago, Cleveland, Dallas, Denver, Detroit, Minneapolis-St. Paul, St. Louis and Washington, D.C. Vehicles of the 1968 through 1972 model years -- vehicles that is, manufactured prior to the effective date of federal safety standards affecting bumper designs -- were examined, and their unrepaired damage appraised. Damage judged not to be the result of a collision was excluded.

Highlights of the study included the following:

- **Damage by Market Class**: The estimated percentage of cars that each year sustained crash damage that was left unrepaired was highest among smaller cars and lowest among luxury and expensive specialty cars. By market class, the figures were: subcompacts, 30 per cent; compacts, 23 per cent; intermediate, 18 per cent; full size, 18 per cent; luxury, 13 per cent; specialty and sports, 20 per cent; expensive specialty, 13 per cent; and station wagons, 21 per cent.

  "The extent to which they [the variations between classes] may reflect differences in crash frequencies, variations in the designed-in delicateness of the vehicles themselves, and/or variations in owner maintenance practices is unknown," the study says.

- **Damage by Age**: The older the car, the higher were both the frequency and dollar values of its unrepaired damage. The observed percentages of cars with unrepaired crash damage were 15 per cent for 1972 models, 28 per cent for 1971 models, 42 per cent for 1970 models, 52 per cent for 1969 models and 58 per cent for 1968 models. The average estimated cost per damaged car to fix the damage was $74 for 1972 models, $75 for 1971 models, $81 for 1970 models, $105 for 1969 models, and $115 for 1968 models.

(Cont'd on page 8)
Corner Damage Predominate

An analysis of unrepaired damage survey data from two major metropolitan areas has found a high involvement of automobile corners and rear ends in such damage — high enough to "strongly suggest that, despite the claims of auto manufacturers and others to the contrary, these areas of the car are very vulnerable to damage and also very frequently involved in damage producing crashes."


The analysis, discussed in the study reused by IHHS, used data from the surveys in the Washington, D.C. and Atlanta areas. It finds that in both front and rear end unrepaired damage, corner damage substantially outweighed front and rear center damage, and that rear end damage of all kinds outweighed front end damage of all kinds.

"These results show that the rear ends of the automobiles were, in general, more frequently damaged than the front ends. Between 34 per cent and 41 per cent of the damaged locations were on front ends compared with between 43 per cent and 49 per cent on rear ends. Comparing front centers and rear centers alone, the frequency of rear end damage was again higher than front end damage; front center damage ranged from 10 per cent to 14 per cent and rear center damage from 17 per cent to 26 per cent.

"Corner damage was very common for all model years; between 52 per cent and 54 per cent of the damage locations were on the corners of the vehicles."

A breakdown of the results by model year follows:

DISTRIBUTION OF UNREPAIRED CRASH DAMAGE BY LOCATION OF DAMAGE ON THE VEHICLE BY MODEL YEAR — ATLANTA AND WASHINGTON, D.C. METROPOLITAN AREAS
June — October 1972

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Front, Center</td>
<td>11%</td>
<td>11%</td>
<td>12%</td>
<td>10%</td>
<td>14%</td>
</tr>
<tr>
<td>Corner, Front</td>
<td>24%</td>
<td>23%</td>
<td>24%</td>
<td>24%</td>
<td>27%</td>
</tr>
<tr>
<td>ALL FRONT</td>
<td>35%</td>
<td>34%</td>
<td>36%</td>
<td>34%</td>
<td>41%</td>
</tr>
<tr>
<td>Rear, Center</td>
<td>18%</td>
<td>18%</td>
<td>20%</td>
<td>18%</td>
<td>17%</td>
</tr>
<tr>
<td>Corner, Rear</td>
<td>28%</td>
<td>29%</td>
<td>29%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>ALL REAR</td>
<td>46%</td>
<td>47%</td>
<td>49%</td>
<td>46%</td>
<td>43%</td>
</tr>
<tr>
<td>ALL CORNERS</td>
<td>54%</td>
<td>52%</td>
<td>53%</td>
<td>52%</td>
<td>53%</td>
</tr>
<tr>
<td>ALL SIDES</td>
<td>19%</td>
<td>19%</td>
<td>14%</td>
<td>18%</td>
<td>16%</td>
</tr>
</tbody>
</table>

Status Report
September 10, 1973
These declines in damage values and frequencies for newer cars "should not be misinterpreted as an indication that the more recent model year automobiles are less costly to repair than earlier model year automobiles," the study warns. It says the decline is because "there will be an increasing percentage of older cars involved in more than one crash in which the damage is subsequently unrepaired; therefore, the amount and hence the dollar value of unrepaired crash damage as well as its frequency should increase with the age of the vehicle."

- **Damage by Metropolitan Area**: The estimated percentages of cars that each year sustained crash damage left unrepaired ranged from a low of 10 per cent in the Cleveland and St. Louis areas to a high of 40 per cent in the Washington, D.C. area, with the following between: Dallas, 14 per cent; Minneapolis-St. Paul, 15 per cent; Detroit, 18 per cent; Atlanta, 19 per cent; Chicago, 24 per cent; and Denver, 36 per cent.

"The precise reasons for these wide variations between metropolitan areas are not known," the study notes, adding that a similar survey conducted in 1970 by Ford Motor Co. "also indicated wide variations between metropolitan areas in the percentages of vehicles observed with unrepaired crash damage."

The study says that "subsequent reports in the series will compare the real world frequencies and amounts of unrepaired crash damage to 1973 and later model year vehicles with the experience of earlier models." Such data, it notes, "provide one of the important measures for evaluating the extent to which vehicle manufacturers are reducing the designed-in susceptibility of their vehicles to damage in low speed (0 to 20 miles per hour) collisions."

The study's authors were James Casassa, II, of the research department of State Farm Mutual Automobile Insurance Co., Brian O'Neill, of the IIHS research staff, and Irwin Miller and Sandra Stone, of Arthur D. Little, Inc. Surveys on which the study is based were conducted by State Farm, IIHS, Arthur D. Little, Inc., and the Independent Automotive Damage Appraisers Association, during June-October, 1972.

Copies of the study are available by writing "Unrepaired Damage," Insurance Institute for Highway Safety, Watergate 600, Washington, D.C. 20037.

Status Report

September 10, 1973
NHBS IGNORES ITS OWN STUDY IN SPEED CONTROL PLAN

The National Highway Safety Bureau has proposed that speed limits be built into highway vehicles — but at a ceiling higher than the bureau’s own experts earlier recommended as an absolute maximum.

Starting Oct. 1, 1972, the bureau’s three-part proposal would:

1) Set 95 miles per hour as the speed ceiling that must be built into all new vehicles — cars, trucks, buses, multi-purpose vehicles and motorcycles;

2) Set 85 miles per hour as the highest speed that could be shown on a vehicle’s speedometer;

3) Require that as a vehicle entered the 81-85 mile per hour speed range its horn would sound and warning lights flash until the speed dropped below that point.

In announcing the proposal, the bureau suggested that building speed limits into cars could mean less expensive vehicles, because it “may result in substantial reduction in the cost of manufacturing vehicle power plants.”

The bureau cited in its announcement a Cornell Aeronautical Research Laboratory study showing that at speeds over 80 miles per hour, 509 of 2,948 “unbelted exposed persons” or 17.3 per cent, were killed. However, it offered no evidence to suggest how its proposed masking of speedometers above 85 miles per hour, or the sounding of horns and blinking of warning lights in the 81-85 miles per hour range, would reduce crash losses.
A forerunner of the new proposal was the bureau's 1967 "advance notice" of intent to publish a speed control standard for new vehicles. Response to the notice was almost entirely from auto manufacturers and muscle car proponents — and was almost entirely in opposition. This contrasted with the results of a CBS television poll, conducted the same year, showing that 52 per cent of 1,081 surveyed drivers would favor built-in speed-limiting devices.

Evidence that 95 miles per hour would be excessively high for such limits was contained in a little-publicized NHTSA report released in early 1969 and entitled, "Maximum Safe Speed for Motor Vehicles." (Copies are available on request, for $1, by writing the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.) That report, not referred to in the new bureau proposal, pointed out that:

- No maximum posted speed limit in the United States exceeds 80 miles per hour. (Two states, it reports, have no posted limits.)
- Based on an examination of crash data in one surveyed state, "fatalities might be reduced in the order of 13 per cent if the speed maximum were set as low as 60 miles per hour," and with a 70 mile per hour maximum, an "eight per cent (fatalities cut) might be achievable" — but for crash speeds above 80 miles per hour, available data are "inadequate for the purpose of quantifying hazard-casualty-speed relationships." (The report noted that an eight per cent reduction in fatalities for the nation because of a 70 mile per hour speed maximum would mean 4,000 lives per year.)
- Even for a "fully restrained occupant who has been packaged to provide large areal distribution and controlled acceleration rates of the crash forces up to a peak of about 40 G's" — such as with an effective air bag system — the "maximum crash speed that can be tolerated without exceeding the human injury threshold . . . (is) about 85 miles per hour." (G forces experienced by an occupant in a 95 mile per hour crash would be 25 per cent greater than in an otherwise identical crash at 85 miles per hour.)
- The "majority of foreign cars" — but "only two domestic models" — surveyed in the report had maximum speed capabilities lower than 90 miles per hour.

A major contributor to the 1969 report was Col. John Stapp, a bureau official reknowned for his research in high-speed crash survivability.

A vehicle speed performance ceiling above 90 miles per hour, Stapp said in the report, would be "a gratuitous promotional extravagance and a total waste for the law abiding consumer." Stapp urged — and the report concluded by recommending — that the bureau adopt a standards-making strategy "to control (speed) at 90 miles per hour as a beginning and work down as public acceptance grows and more evidence is gathered to show the additional payoff at lower maximum speeds."

Comments on the proposal (docket 1-19) may be sent to: Docket Section, National Highway Safety Bureau, Room 4223, 400 Seventh Street, S.W., Washington, D.C. 20591. Closing date for comments is Feb. 26, 1971.
SAFETY COUNTERMEASURES URGED FOR TRUCKS, BUSES

The former director of the National Highway Safety Bureau has urged attention to five countermeasures which, he said, have been neglected in efforts to reduce highway losses due to truck and bus crashes.

In a paper delivered this month in Detroit, Michigan, to the Automotive Engineering Congress of the Society of Automotive Engineers, Dr. William Haddon, Jr., president of the Insurance Institute for Highway Safety, said he had picked the five as "especially noteworthy" because "each (is) comprised of a situation contributing prominently to such losses and, correspondingly, of the analogous countermeasures . . . (and) because each is being either largely ignored or, at best, inadequately handled both in the private and public sectors."

1. Heavy trucks and buses are incapable of braking to a stop in the same distance as automobiles, he said, even though it is "a logical, necessary performance requirement for all vehicles" that they have the same braking ability. "Actual braking performance of heavy trucks is commonly two to three times worse than that of passenger cars," Haddon said. He cited a "multivehicular holocaust" Nov. 29, 1969, on the New Jersey Turnpike
in which "one after another huge truck was unable to stop in a short enough distance and plowed into the vehicles and people ahead." There is no adequate federal standard for truck braking rates, he noted.

2. "... For trucks, most roads in effect have no guardrails," he said. Since this is "a situation not likely to improve rapidly, I believe that we can expect increased numbers of ... disasters in which so-called guardrails fail properly to retain impacting vehicles, especially trucks."

3. Another situation which, he said, "pleads for energetic correction" is the failure to design trucks so that "hazardous cargoes do not spill in crashes at the maximum operating speeds for which the vehicles involved are designed." Haddon said absence of such crash design contributes "greatly to highway losses, and this, too, I believe, will continue for some time to worsen."

4. Concerning buses, he said that "the failure to prevent most, if not virtually all injuries of any severity to crashing bus passengers must be attributed to inadequacies in ... design," particularly since bus dimensions, their maximum speeds and the available technology and hardware could be applied to proper packaging of bus occupants.

5. A California study, he said, has indicated that "alcohol use by drivers of lighter trucks appears to be a very major problem . . . . Strong countermeasure development and implementation and evaluation directed at this light truck operation part of the overall alcohol and highway safety problem, each supported by thoroughly competent research, are long overdue, and nowhere substantially present,"
NHTSA Plans Extensive Vehicle Rule Delays

In an "update" of its "Program Plan for Motor Vehicle Safety Standards," the National Highway Traffic Safety Administration has quietly postponed projected effective dates for more than 25 new safety standards, amendments to existing safety standards and regulations by a combined total of more than 30 years.

The agency eased a revised schedule of its projected rulemaking activity into a public docket file with no official signature, official letter of transmittal or annotation as to where the document originated. Although the file is open to public inspection, it is seldom reviewed by other than motor vehicle industry representatives.

Virtually the only major rule to escape the widespread postponements is NHTSA's passive restraint rule. That rule is currently under court review because of auto maker dissatisfaction with its requirements. (See Status Report, Vol. 7, No. 5, March 13, 1972.)

NHTSA issued its first "program plan" in August, 1970. A revised plan was issued two months later. A third revision was published and circulated in October, 1971. The October, 1971, version of NHTSA's projected rulemaking activity said that the publication is intended as a "guideline and working document."

It said that the schedules in the plan "represent the best estimates" of NHTSA's timetable, and cautions that those plans "are subject to change at any time."

The current revision in the plan, which reflects across-the-board delays, is dated Nov. 1, 1972. According to an official stamp on the document, it was placed in the public file Nov. 8, 1972.

A Nov. 6, 1972, story in Automotive News, by Helen Kahn, a veteran Washington and Detroit reporter, had said that the automobile rulemaking "atmosphere in Washington is expected to be considerably more relaxed" during the next four years.

In addition to the blanket postponements, NHTSA has altogether dropped plans to upgrade its exterior protection standard (FMVSS 215). The standard is now aimed at

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The Insurance Institute for Highway Safety is an independent, nonprofit, scientific and educational organization. It is dedicated to reducing the losses—deaths, injuries and property damage—resulting from crashes on the nation's highways. The Institute is supported by the American Insurance Association, the National Association of Automobile Mutual Insurance Companies, the National Association of Independent Insurers and several individual insurance companies.
protecting a limited number of “safety related” items from damage during low speed crashes. In its October, 1971, “program plan,” the agency said it expected to extend “the scope of the no-damage requirements to any subsystem of the vehicle that (when damaged) may adversely affect the vehicle’s safe operation.” The new revision gives no schedule for issuing property damage standards mandated by the “Motor Vehicle Information and Cost Savings Act.” (See Status Report, Vol. 7, No. 19, Oct. 16, 1972.) However, a safety administration official told Status Report that the agency “is working on that now.”

The most noteworthy safety standard postponements include:

- A four year delay (Sept. 1, 1976, to Sept. 1, 1980) in the effective date of a new standard that would be aimed at protection of pedestrians and cyclists when they are hit by a motor vehicle. The planned rule is directed at improving vehicle exteriors in order to “reduce injury levels to pedestrians and cyclists during initial vehicle impacts and if possible . . . control his trajectory to reduce the severity of secondary impacts,” NHTSA said in its October, 1971, “program plan.”

- A delay of almost two years (Jan. 1, 1973, to Sept. 1, 1974) on an amendment to the consumer information regulation on vehicle stopping distance that would give consumers information on wet pavement stopping performance.

- A delay of almost two years (Sept. 1, 1972, to May 1, 1974) on a new consumer information regulation that would “provide the consumer with qualitative information to assist him in making an informed choice when purchasing tires.” (See Status Report, Vol. 6, No. 18, Oct. 4, 1971.)

In the National Traffic and Motor Vehicle Safety Act of 1966, the Congress mandated that NHTSA issue a uniform quality grading system for motor vehicle tires. The law called for that standard to be issued before 1969.

- A two year delay (Sept. 1, 1973, to Sept. 1, 1975) in a new standard that would seek “to deter and limit excessive speeds” by limiting the maximum attainable speed of a vehicle and by using visible and audible warnings as a vehicle approaches that speed. (See Status Report, Vol. 5, No. 22, Dec. 15, 1970.)

- A two year delay (Sept. 1, 1975, to Sept. 1, 1977) in “major revisions and additions to the present requirements for defrosting, defogging, wiping and washing systems” (FMVSS 103 and 104).

- A two year delay (Sept. 1, 1975, to Sept. 1, 1977) in a new standard to require “installation of spray protectors where existing vehicle structure permits spray produced by the vehicle’s wheels to impair the visibility of following traffic.”


- A one year delay (Sept. 1, 1976, to Sept. 1, 1977) is also anticipated for improvements in indirect visibility (mirrors) on passenger cars (FMVSS 111).

- A one year delay (Sept. 1, 1973, to Sept. 1, 1974) in the effective date of a new standard to “specify requirements for passenger seats in buses.” The new rule is supposed to carry requirements for “strengthened seats and seat anchorages, seat back protection and increased seat back height.”

- A one year delay (Sept. 1, 1973, to Sept. 1, 1974) in an amendment that would combine “seat and head restraint performance requirements and upgrade(s) these performance requirements.”

- A one year delay (Aug. 15, 1973, to Sept. 1, 1974) for passenger cars and a four year delay (Sept. 1, 1977) for forward control vehicles (such as vans) on an amendment to upgrade protection for drivers against impacts with steering assemblies.
Projected amendments to other existing standards that have been postponed include: Occupant Protection in Interior Impact (FMVSS 201), Child Restraint Systems (FMVSS 213), Windshield Mounting (FMVSS 212), Steering Control Rearward Displacement (FMVSS 204), Motor Vehicle Brake Fluid (FMVSS 116), Brake Hoses and Brake Hose Assemblies (FMVSS 106), Retreaded Tires (for vehicles other than passenger cars) (FMVSS 117), New Pneumatic Tires for Passenger Cars (FMVSS 109) and New Lighting Systems (FMVSS 108).

Other projected or postponed new standards for which planned effective dates have been postponed include: Windshield Zone Intrusion, (for vehicles other than passenger cars), Gaseous Fuel System Equipment for Motor Vehicles, Motorcycle Rider Protection Systems, Motorcycle Headgear, Tires, Rims and Wheels (for vehicles other than passenger cars), Direct Fields of View and Passenger Car Tire Traction.