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DESIGNING FOR AUTO SAFETY

By

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Thank you, it's nice to be back and to have the opportunity to bring you up-to-date on what's new in the field of auto safety; especially in the area of design, since all vehicle manufacturers must translate our Federal Motor Vehicle Safety Standards into designs that meet the safety performance requirements.

First, I'd like to show you some figures and discuss how our activity has been reflected to these safety statistics. Much has happened in the field of motor vehicle safety since I spoke to you on May 1, 1968. Later we'll explore what's in store for the next two or three years in the motor vehicle and highway safety field.

Figure 1 shows the traffic situation today. From 1961 through 1966 the average increase in fatalities was 6.8% per year. However, since the expanded Federal Safety Program got under way, this trend has dropped to 0.95%--in spite of a 6% increase in vehicle registrations and drivers and a 4% per year jump in total miles driven. These fatality figures represent a startling drop when you consider that only about 1/3 of all the cars on the road today have the new safety features.

Our early projections indicated that the number of crash victims should start to decline around 1972 or 1973. However, last year, 1970, we had 2% fewer deaths than in 1969 (56,400 vs 55,300). We believe the tide has begun to turn. Additionally, recently tabulated data shows a decline in severity of injury, as reflected in the number of days lost through reduced activity and hospitalization because of motor vehicle crashes. The rate rose sharply until 1966. For example, in 1967, an average of 34 days was lost due to restricted activity while in 1969, this average was down to about 25 days.

Evidence that later model cars are safer is shown in a study, made by the Highway Safety Research Center, University of North Carolina, of injuries to drivers in 270,000 vehicles involved in accidents in North Carolina from 1966 to 1968. Results suggest that for every 100 serious and fatal driver injuries in 1968 models, 130 would have occurred in a similar array of crashes had 1966 models been involved. The Director of the HSRC states that, "as more and more of the newer cars, with more safety devices, come onto the highways, there will be a more pronounced safety factor to work against the upward pressures from more cars, more miles and higher speeds."

Figure 2, our systems approach, which I described to you 3 years ago, has begun to pay off. Let's take a look at one of the old system description slides. By using a systems approach to prevent or lessen the end results of deaths, injury and property damage, we must either.

1. Prevent the occurrence of crashes: - Precrash
2. Increase survivability in crashes that do occur: - Crash
3. Provide prompt medical attention to injured people and other postcrash salvage measures: - Postcrash.

The systems approach (Figure 3) on the time base precrash, crash and postcrash, is interfaced with the system elements of the driver, the vehicle and the environment. Of these three systems, action on the vehicle system will effect the greatest and quickest pay off. Design modification will reduce the national emergency proportions of highway deaths, injuries and crashes. In working to make these design changes, we deal with a small number of American and foreign vehicle manufacturers to effect the safety changes.

Vehicle design is the most direct and most positive means for man to affect system safety in the shortest time. We (MVP) can do many things with vehicle design to keep the driver out of trouble and make sure that he does not pay with his life for his first mistake.

Our enviable highway network contains millions of miles of roadway under local, State and Federal jurisdiction. The Federal Highway Administration and Traffic Safety Programs, a part of D.O.T., are concerned with the vehicle environment or roadway. They direct their system effort to safer roadways by improving traffic capacity, sight distances, speed, lighting; removing roadside hazards and accident-producing obstacles, controlling safer traffic flow through better signs, signals and computer control systems. The time frame for this systems approach, as you know, is longer than the vehicle approach.

Altering or changing the third system, the driver, is also a long term approach. With some 111 million licensed drivers, most

good, some bad, operating 111 million vehicles over 3.7 million miles of roads in 51 separate jurisdictions, you can readily see that the education, training, licensing, and record keeping of vehicle drivers could not have a fast payoff. The basic responsibilities for safe operation of highway traffic and for control of drivers remains with the States.

Last month in Detroit, a high speed crash on the Edsel Ford Expressway (Figure 4) illustrates the simultaneous contribution of all three systems to a deadly crash:

1. The Driver
2. The Vehicle
3. The Environment.

While our systems approach is basically unchanged, the organization which implements the system has changed in structure and size.

Since I was last here in 1968, (Figures 5, 6, 7, 8, 9, & 10) the National Highway Safety Bureau has come of age and is now a full fledged Administration - the National Highway Traffic Safety Administration. This Administration is organized as shown with Motor Vehicle Programs being responsible for the development and issuance of safety standards. Here we see the organization of Motor Vehicle Programs and the three Offices assigned to preparing standards. Operating Systems, Crashworthiness and Vehicles in Use. In the two other Offices shown - Defects Review is concerned with investigating and following up on problems affecting the operation of vehicles in use by the motoring public - such as the Ford lower control arm problem and the G.M. three-piece truck wheel which affected a great number of truck campers. The Other Office - Compliance - is responsible for insuring the compliance of new vehicles and vehicle equipment with the requirements of all safety standards in effect today.

As more and more standards and amendments are issued (Figure 11 & 12) they begin to affect many of the same components and subsystems of a vehicle. It soon became all too apparent that we had to supplement the systems approach in our thinking and subsequent issuance of rulemaking actions. To this end (Figure 13) we now have an Engineering Systems group - a staff function to the Associate Administrator - to insure that all of our standards are properly interfaced with others that affect a common component.

Also (Figure 14) equally important, we now provide for the timely introduction of our standards with effective dates that complement the product cycle operation of the vehicle manufacturers. Also, we now carefully analyze the safety benefits of each new rule as to cost and pay off in terms of reductions in deaths, injuries and accidents. These new approaches insure that new standards will be reasonable, appropriate and practicable.

When I spoke to you in 1968, we had issued 23 standards. These original standards were based, to a large extent, on existing SAE and other existing voluntary standards and various government requirements for vehicle safety. They did not specify, in many cases, the requirement for safety in quantifying terms. We have since addressed ourselves to these deficiencies. For example, Safety Standard No. 104 required a windshield washer and wiper. This has now been upgraded through amendments to specify exact requirements for how much of the windshield must be washed and wiped. The same is true for Safety Standard No. 103 - Windshield Defrosting and Defogging. Since 1968, the original 23 standards have grown to 34 standards, 5 regulations, and 79 amendments. I want to point out that in many cases amending an existing standard is as complicated, if not more so, as issuing a new standard. For example, we recently amended Safety Standard No. 208. This was initially entitled, "Seat Belts." The amended version has been renamed, "Occupant Crash Protection Systems" and now specifies among other things the requirements for passive systems to protect the driver and occupants from injury in the event of a crash. A tremendous effort was required to promulgate this amendment.

The systems approach here points up the validity of our emphasis on the vehicle rather than the driver to achieve a reduction in highway fatalities. We have required seat belts in passenger cars since 1968, but we can't make people use them.

The National Safety Council claims that if all available belts were always worn, between 8,000 and 10,000 lives could be saved every year. We also know that seat belts saved 2,000 to 3,000 lives last year; even though only 35 percent of the cars in this country have them.

People say they get "all bunched up" and get in the way. Well, the best way to keep them from being bunched up is to fasten them around your waist! And then they say, "But that's uncomfortable--it restricts me" and to that, I can only say that seat belts are not as uncomfortable as a cast on the leg, and they don't restrict you half as much as a hospital bed does.

However, the trouble is, figures indicate that no more than 30 percent of the public uses its lap belts and only a paltry 4 percent uses the shoulder harness. So it is quite evident that we need a method which does not depend upon any action that must be taken by the driver or his passengers. So we are going all out for a passive restraint system. The leading type of these is called the "Air Bag." I've seen them work and I'm convinced that they can do the job.

I would be the first one to concede that improving the car alone will not end all road fatalities. We are dealing with a complex system of man, machine, and highway. We have to hit all three hard in a coordinated attack if we are going to start saving those 55,000 lives being thrown away every year (as revealed by the latest compilation of figures we have at D.O.T.). In addition to a better machine, we need to complete our Interstate system because for every 5 miles built, we save one life per year--on a continuing basis.

In fact, since the Interstate highway program began, we have saved over 35,000 lives because the Interstate system is that much safer for motorists. Another thing we are going to do is continue to improve the older primary and secondary roads.

But perhaps the major improvements during the 70's are going to be in the area of driver qualifications. Let me give you a profile of a typical accident.

The Profile: The wee hours of a Saturday morning in December are apt to be the most dangerous time of the year for driving...

Death is most apt to occur at that time on an undivided two-lane highway in a suburban area...

The weather will be clear and the victim will probably be a 21-year old male driver alone in a sports car...

The likelihood is that he will run off the road and crash into a tree or utility pole...

He will die, usually instantly, of head and chest injuries...

Tests will show that he had an alcoholic level of .15 of one-percent in his blood--more than half again the Federal government's standard for intoxication.

These are not guesses--these facts come from the results of a $1.2 million Department of Transportation grant to the Commonwealth of Massachusetts to computerize accident data.

The Massachusetts study shows that more than two-thirds of all auto deaths were triggered by alcohol. (We have been using, nationally, the figure of "more than half." The startling Massachusetts figures show that we may have underestimated.)

We estimate that the use of alcohol by drivers and pedestrians causes at least 25,000 deaths and 800,000 injuries each year. The sickening aspect of this tragedy is that so much of the loss of life, limb and property is suffered by people who are completely innocent.

However, public myth has always held that you can't really do very much about the drunken driver. Well, the time has come--in fact, it's overdue--for us to demolish this defeatist attitude. But it will take more than a simple Breathalyzer test.

We have just set up an Office of Alcohol Countermeasures to direct our top-priority campaign in this area. The job of this Office will be to identify the chronic drinker before he becomes a statistic in the morgue--or kills an innocent victim. The alcoholic, contrary to legend, does have an identity. He is on somebody's book, either as a patient, a bad employment risk, or troublemaker or a poor insurance risk. Most heavy drinkers are already known to family counselors, welfare agencies, local traffic courts and their long-suffering neighbors.

So, whenever a man is convicted for drunk driving, his entire background should be investigaged before he is sentenced. The judge should determine whether the offender has ever been arrested before for drunkenness--on or off the highway. Then he can confront him with two options--either get treatment and dry out, or stop driving. Period. No leniency, no excuses, no extenuating circumstances. The tough approach has paid off in

countries as diverse as Sweden and Great Britain.

Much of this talk has concerned new vehicles and new equipment and, if this were our only approach, it would take 11 years of introducing standards on new vehicles to get complete coverage of the vehicle population. To determine the scope and limitations of vehicle-in-use candidate standards, detailed fault logic was used to identify vehicle safety critical systems. This effort is reflected in the Booz-Allen Hamilton Report No. FH-11-7316.

The hazard analysis technique used in aerospace was used during the development of the dual fuel project by General Services Administration with Department of Transportation assistance. This technique was also applied to passive restraint system to a limited degree.

Before closing, I'd like to say a few words about our experimental car project (Figure 15)

The National Traffic and Motor Vehicle Safety Act of 1966 provides that the Secretary of Transportation shall conduct research, development, testing and training on experimental motor cars and equipment.

We have awarded three contracts totaling nearly 8 million dollars for construction of an experimental vehicle. (Figures 16, 17 & 18) A.M.F., Fairchield Hiller and G.M. (their bid was $1.00) have contracts for the production of a 5 passenger, 4-door sedan weighing about 4,000 pounds with a wheelbase of about 120 inches. These low emission vehicles will have three different designs with accident avoidance and crash injury reduction objectives in mind.

We are requiring that the integrity of the passenger compartment should be insured in barrier crashes up to 50 mph, that the compartment should also remain intact in rollovers at 70 mph. These all-new vehicles will enable us to set improved future safety standards for all automobiles offered for sale in this country. One contractor will build and test a total of 14 of these cars by the end of 1972, after a run-off between prototypes.

These mobile laboratories will help provide effective and realistic answers to the problem of cutting the highway death toll.

Three years ago, we were on a rising curve of highway deaths and crashes (Figure 1). By systematically applying our research and knowledge, we have turned the curve downward. With our safety standards, improved restraint systems, alcohol programs, proposed used car programs and our experimental safety cars, we think we can bring all the elements of the safety equation into balance.

We believe we can drive highway fatalities down by 40% by the year 1980. When I say we, I mean all of us - you, the individual driver, the manufacturers, the equipment suppliers, the State regulatory agencies, and the insurance companies.

We will all be driving for the greatest possession of all. We'll be driving for our life.

CRASH SEQUENCE CLASSIFICATION 2

PHASE	SEQUENCE	OBJECTIVE	ILLUSTRATIVE PROBLEMS
PRE-CRASH	1. SELECTION & DEVELOPMENT 2. OPERATING	PREVENTION	● DRUNKEN DRIVING ● ROAD MAINTENANCE ● MECHANICAL & MEDICAL FACTORS
CRASH	1. FIRST COLLISION 2. SECOND COLLISION	AMELIORATION	● CRASH DESIGN: VEHICLE AND HIGHWAY ● SAFETY HELMETS
POST CRASH	1. SIGNAL GENERATION 2. SIGNAL RECIPT 3. RESPONSE-DISPATCH-ARRIVAL 4. LEAVE ACCIDENT SCENE 5. ARRIVAL AT MEDICAL FACILITY	SALVAGE, HUMAN AND PROPERTY	● RAPIDITY & QUALITY OF RESPONSE ● EXTRACTION FROM VEHICLE ● REMOVAL OF DEBRIS ● " ACCIDENT " AND SURVIAL ANALYSIS

FIGURE 2

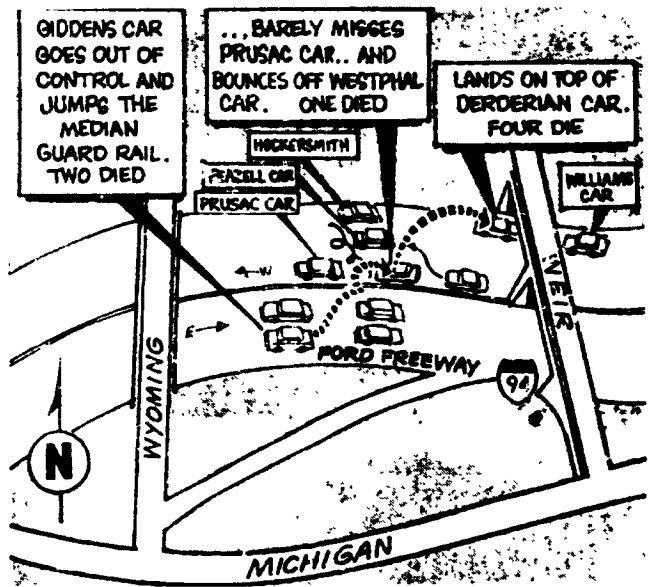


FIGURE 3

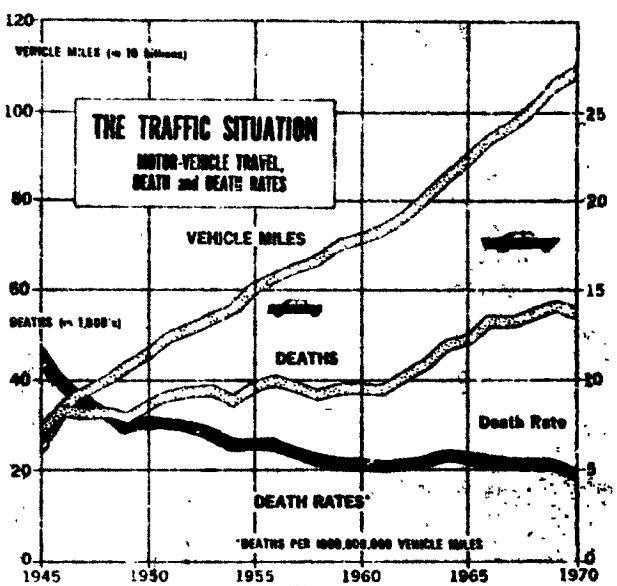
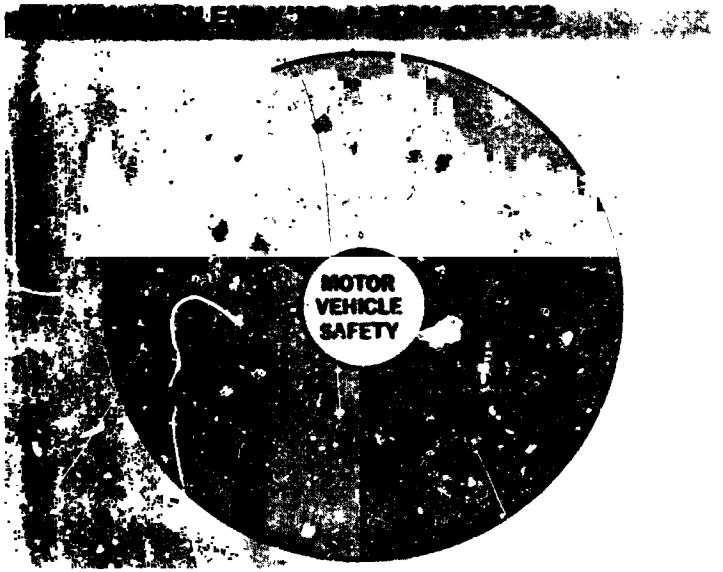


FIGURE 1

FIGURE 4



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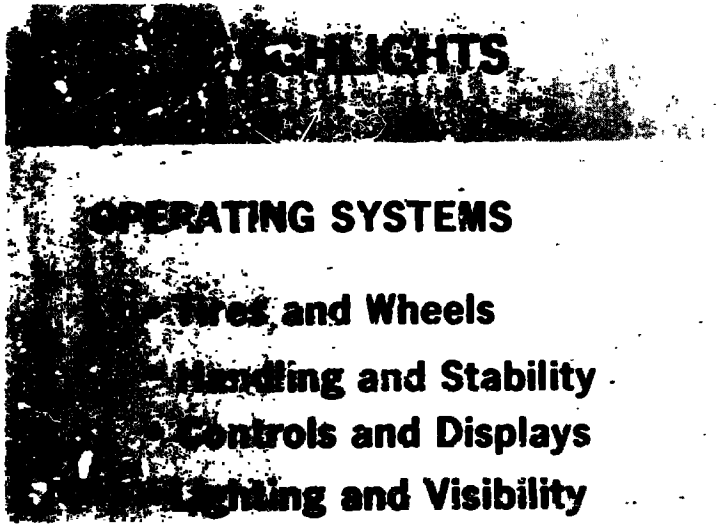


FIGURE 8

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA)

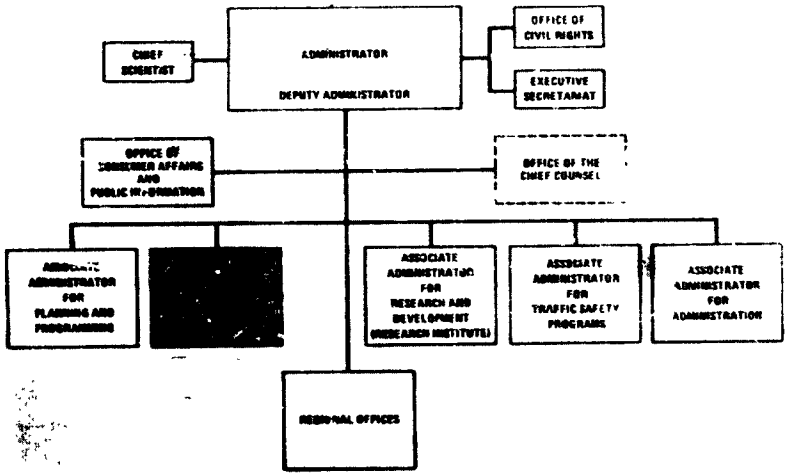


FIGURE 5

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
MOTOR VEHICLE PROGRAMS (MVP)

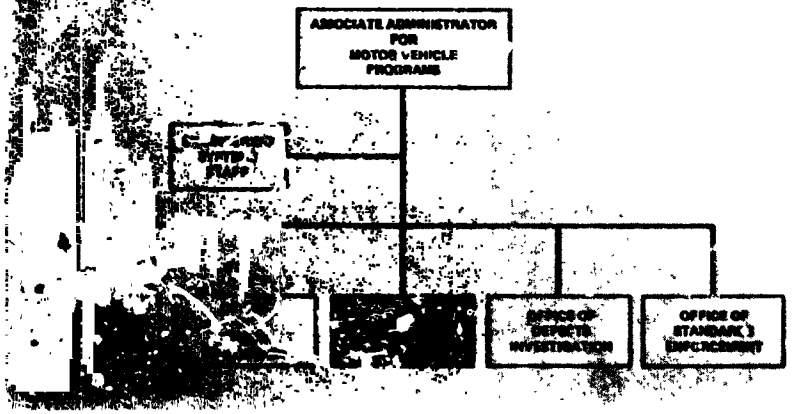


FIGURE 6

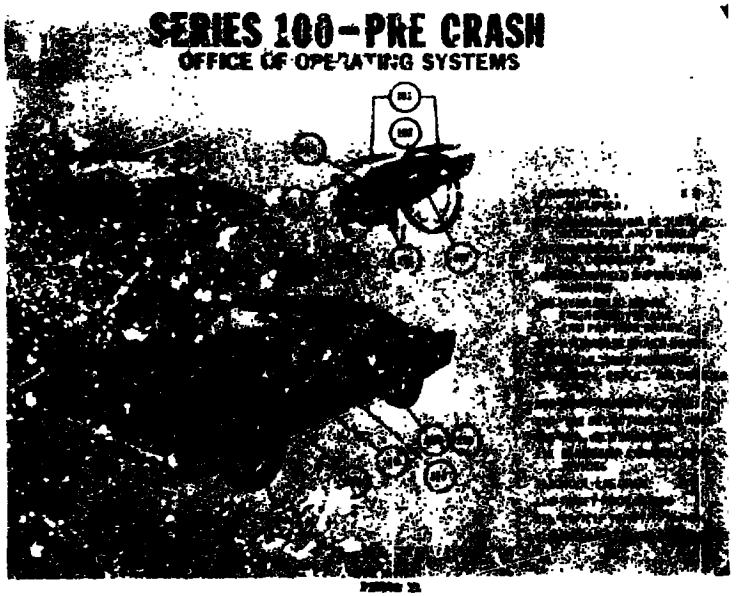
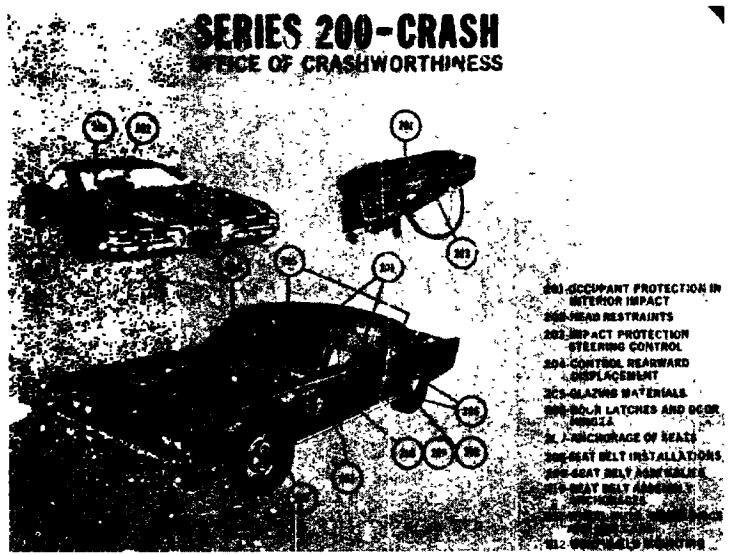


FIGURE 11



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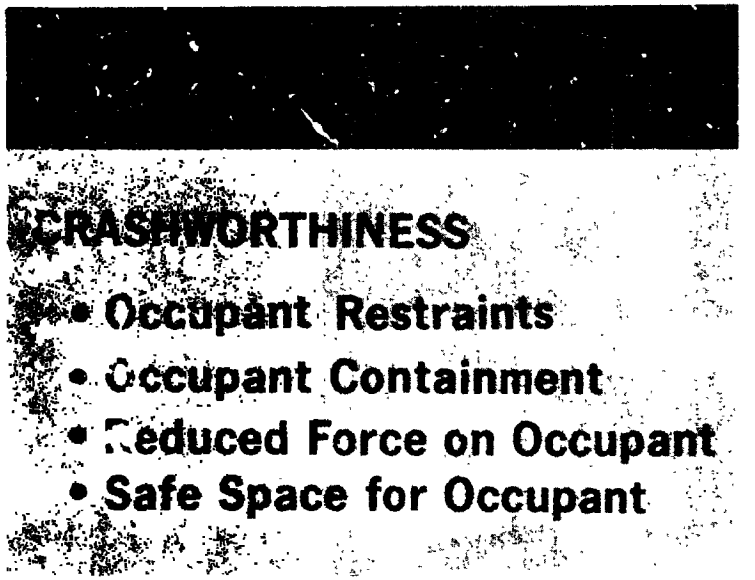

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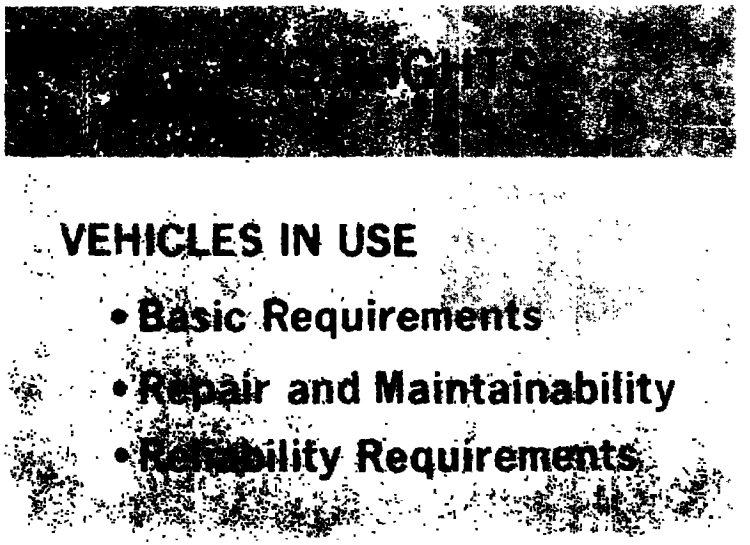

FIGURE 10

FIGURE 15

FIGURE 13

FIGURE 14

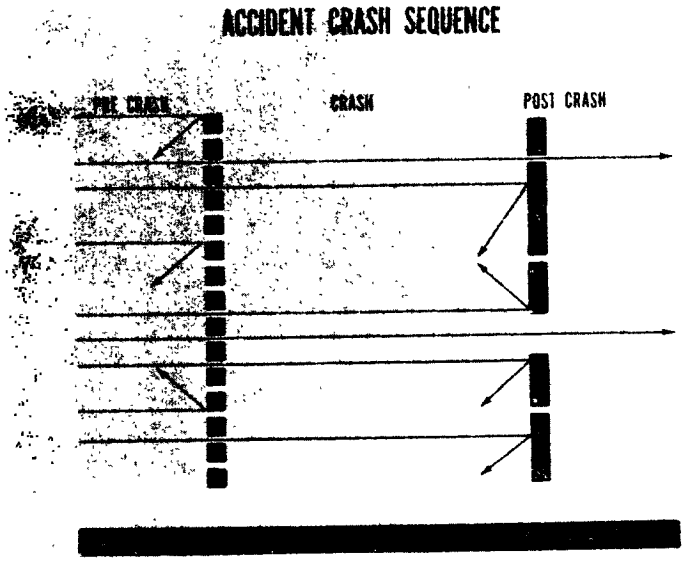

FIGURE 16