FEDERAL HIGHWAY ADMINISTRATION
NATIONAL HIGHWAY SAFETY BUREAU
WASHINGTON, D.C. 20591

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THE NEW NATIONAL HIGHWAY SAFETY PROGRAM

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National Highway Safety Bureau

Remarks Prepared for Delivery Before
IGOA National Convention
Penn-Sheraton Hotel - Pittsburgh, Pennsylvania
July 1, 1967

I sincerely appreciate this opportunity to be here with you today to discuss the new national effort in highway safety. I would like to talk about what we are doing and why we are doing it.

The "what" is in the program of action that we have started.

The "why" is in the upwards of 50,000 Americans continue to be killed each year on our highways, and hundreds of thousands are injured, and property is damaged to the extent of billions of dollars.

But a bold approach has been taken:

-- by President Johnson in calling for legislation to curb what he described as ". . . a raging epidemic of highway death which has killed more of our youth than all other diseases combined. . ."

-- by the Congress in enacting the most far reaching safety legislation in history.

Now, to follow up on the bold approach of the President and the Congress -----. We have an action program that seeks to achieve short range results in fatality and injury reductions, wherever immediate gains are possible, while laying the groundwork for more long range solutions.

But it is a realistic program as well in recognizing that within the limits of present knowledge there is no single magical solution to the problem of motor vehicle accidents, and the resulting losses of life and limb. There are no short cut substitutes, unfortunately, for systematic balanced effort.

Legislation

Two laws comprise the enabling legislation for the national traffic safety program. First, the National Traffic and Motor Vehicle Safety Act of 1966 and second, the Highway Safety Act of 1966.

The National Traffic and Motor Vehicle Safety Act deals with motor vehicle safety standards and authorizes the formation in the Department of Commerce of the National Traffic Safety Agency with the provision that the Agency would become a part of the Department of Transportation at such time as the Department of Transportation came into being.

The Highway Safety Act on the other hand is concerned with the Federal-aid grant program to the States and local communities for carrying out effective State and community highway safety programs. This Act in turn authorizes the creation of the National Highway Safety Agency also in the Department of Commerce until such time as the Department of Transportation came into being.

With the creation of the Department of Transportation the two agencies became bureaus. By Executive Order issued several weeks ago, the President directed that the two bureaus be operated as a single unit, the National Highway Safety Bureau, in the Federal Highway Administration.

Unified Safety Program

The overall orientation of the single unified safety program is a balanced approach to all phases of the problem leading to ultimate control that is the reduction of death injuries and property damage due to highway accidents. We regard the approach in three phases.

-- The first phase deals with those activities related to the prevention of accidents or accident avoidance.

-- The second phase deals with those factors related to reducing the injury potential to occupants of vehicles in the crash minimization of the so-called second collision.

-- Phase three deals with the measures designed to improve the salvage or to increase the likelihood of accident victims' later full recovery.

As I stated before, the National Traffic and Motor Vehicle Safety Act directs the establishment of performance standards for motor vehicles and motor vehicle equipment. We can categorize the various standards in these three phases. In the accident avoidance phase is the performance of the brakes and steering systems.

The purpose of seat belts is to reduce injury in the crashes that do occur; their performance therefore exemplifies a phase two requirement.

Prevention of fuel tank rupture falls in the category of post crash measures or phase three.

We can similarly describe activities in the State highway safety programs within this three phase framework: driver education is an accident avoidance, or phase one activity; motorcyclist crash helmets prevent injury after an accident occurs and hence a program dealing with their use is in phase two; finally, the vast array of activities relating to emergency medical care in transport of the injured exemplify a phase three program.

Program Functions

The primary functions under the National Traffic and Motor Vehicle Safety Act are promulgation and enforcement of motor vehicle safety

performance standards, surveillance of safety related manufacturing defects, research and development.

Under Title II of the Act the Bureau is concerned with tire safety standards, including labeling and other identification to indicate the composition of materials used in the ply of the tire, the actual number of plies in the tire, and the recital that the tire conforms to the Federal safety standards.

Under Title III the Bureau is authorized to make complete investigation and study of the need for a research facility to conduct such research in developing and testing in traffic safety as the Secretary deems appropriate and necessary to carry out these provisions.

Under Title IV the Bureau is authorized to proceed with the National Driver Register whereby the Secretary shall establish and maintain a register identifying each individual reported to him by a State or political subdivision temporarily withdrawing an individual's license or privilege to operate a motor vehicle.

The primary functions under the Highway Safety Act on the other hand deal with a Federal-aid grant program to States and local communities in which at least 40 percent of all of the funds proportioned to a State must be utilized in local programs, except under certain conditions under which the Secretary may waive this provision. These funds are matching funds on essentially a 50-50 basis.

The law further provides for research and development activities, for demonstration projects, and for manpower activities which we categorize in three groups:

-- Safety technicians or specialists such as motor vehicle inspectors, driver licensing examiners, motor vehicle inspectors, ambulance operators, and other technicians for these safety activities;

-- Secondly, safety program management personnel;

-- Finally, safety research personnel.

Program Funds

Table 1 shows the general magnitude of the funds authorized by the legislation for fiscal year 1967, fiscal year 1968, and fiscal year 1969 by major categories. Also it shows the funds appropriated in fiscal year 1967 and the funds requested in fiscal year 1968. It should be noted that in the grant program to States the authorization covers 3 years, the purpose being to require the Secretary to report back to Congress prior to the end of the fiscal year 1969.

We might say parenthetically here that under the provisions of the law 75 percent of the funds authorized for the grants to States must be apportioned to the States on the basis of population. The remaining 25 percent may be apportioned under an appropriate formula at the discretion of the Secretary. The requirements of the law are that at the

end of 3 years the Secretary reports to the Congress on a non-discretionary formula for apportioning the Federal aid for highway safety.

In passing, I might point out that preliminary reports from the States strongly indicate that needs far exceed present authorizations. Congress recognized that this would be the case, but prudently called for a systematic build-up to appropriate levels of activity, especially after needs became more clearly defined.

Organization of the Bureau

Perhaps a quick look at the organization of the Bureau is in order.

The Bureau is organized in three major line units, along with the Office of the Director. The Motor Vehicle Safety Performance Service deals with the establishment of motor vehicle performance standards including the development of the engineering and materials in support of standards, the process and evaluating compliance by the manufacturers with these standards and the defects notification program.

The second major sub-bureau is the Highway Safety Program Service which is concerned with the development of performance standards for the various State highway safety programs assisting the States to implement these programs, evaluating the performance of the various program areas, and compliance with the standards as issued by the Secretary.

Both of the Services have the responsibility of identifying the research, test, development demonstration projects, manpower requirements specific to the conduct of their programs. These requirements are then met by the National Traffic Safety Institute, the third major unit of the Bureau. Stated otherwise, to a very real degree the National Traffic Safety Institute is a service unit that implements the research needs of the Motor Vehicle Safety Performance Service and the Highway Safety Program Service units.

Advisory Groups

The law also provides two major national advisory groups. First, the National Motor Vehicle Safety Advisory Council appointed by the Secretary, relates to the standard setting process of the Motor Vehicle Safety Performance Service. The second advisory group, the National Highway Safety Advisory Committee, is appointed by the President and under the law is authorized to review the safety performance standards for State highway safety programs, and make recommendations on the content of these various programs. The Committee met for the first time on April 25 and later in June to consider the draft of program standards which the Secretary announced last week.

The Committee is comprised of 29 members and the Chairman is the Secretary of Transportation.

The Council is comprised of 13 members and the members have been appointed for some time. They have met a number of times. The Chairman is Dr. Thomas Malone, Vice President of the Travelers Insurance Companies. It is presently organized into a number of sub-committees on such subjects as: research, relations with industry, problems with foreign industry and others.

The Motor Vehicle Safety Performance Service

The most important single activity of the Service has been the issuance, as required by law, of the initial Federal Motor Vehicle Safety Performance Standards on January 31, 1967. A total of 23 proposals were published around the first of December 1966, of these 20 initial standards were published during the month of January with 3 of the proposals specifically dealing with tires.

In addition to the standards as issued on the 31st of January, there are 10 pending additional actions relating to the 23 proposals and the 20 initial standards as issued. Of these 10 pending actions, 4 involve proposals for amendments to the existing standards or additional provisions in the existing standards and 6 are Advanced Notice of Proposed Rule Making.

The standards as issued are categorized according to the three phases of the accident problem as I previously described. Table 2 shows the 100

series or the accident avoidance group. Table 3 lists the 200 series group or the group of standards that relate to crash injuries reduction and also shows the single standard that is proposed as relating to the third phase of the crash -- this is the 301 series dealing with fuel tank and fuel tank filler pumps, and fuel tank connections.

One of the provisions of the law is that manufacturers report to the Secretary all safety related defects that are discovered. The law further requires that manufacturers notify the original owner that there is a defect in the vehicle that he purchased and he must also notify the dealer along with the appropriate remedial measures. From the period September 9, 1966, through April 30, 1967, the Bureau received notification from manufacturers of over 1,100,000 vehicles potentially having safety related defects. Of these approximately 89,000 were foreign vehicles and a little over 1,000,000 were produced domestically; 22 manufacturers reported defects, 34 makes and 99 models were involved; the number of recall campaigns were 101.

A general distribution of the parts of the vehicle and associated equipment involved in the defects notices is shown in Table 4.

Upwards of 55 percent relate to the brake system, steering system, and steering and the throttle linkage. Consequently, our plans are to

concentrate major efforts on these three aspects of the vehicles both in setting additional vehicle performance standards under the Traffic Safety Act and in implementation of used car safety programs via motor vehicle inspection in the States under the Highway Safety Act.

State and Community Highway Safety Programs

Generally, the standards development process that we follow starts with the draft proceeding through the series of review by States and other interested parties followed by a final draft which then is to be reviewed by the National Highway Safety Advisory Committee and finally to reconcile the use of the Committee with the policies, a standard is finally issued. A detailed report on the entire standard setting process has been prepared, and, as required by the law, is being submitted to the Congress shortly.

Table 5 lists the standards announced by Secretary Boyd last week. They represent, we believe, an important start. But we are also looking to moving ahead. As results of demonstration projects became available, as results of research became available, and, most important, as actual experience of the States and local government which will be implementing the programs comes into clear focus, we shall be prepared to issue totally new standards or to modify those that have already been published. As I said at the start, this is an action program, and we will make changes wherever and whenever they are indicated.

The National Traffic Safety Institute

The National Traffic Safety Institute brings the research test and development activities of the two services into one organizational unit producing economies associated with prevention of duplication in that in the safety field there are many research projects that have substantial outputs to both the highway safety program activities on the one hand and the motor vehicle safety standards on the other.

An example would be the motor vehicles inspection program which would be carried out under the Highway Safety Programs Service through the States and the standard setting process that would be carried out in the Motor Vehicle Safety Performance Service. Research projects such as controlled collisions, field investigation of accidents, field studies on the involvement of drivers in accidents would be of major importance to both the Highway Safety Program Service and Motor Vehicle Safety Performance Service. For this reason, among others, we felt that all of our research, test, development activities should be one organizational unit.

The National Traffic Safety Institute is organized into three primary working units. The National Traffic Safety Data Center will be responsible for all of the data related to the highway safety program and traffic safety program, mathematical analysis of all of the data, the computer systems, and the information and transmission links.

The National Traffic Safety Documentation Center will deal with all forms of safety documentation including audio-visual training aids that might be used in elementary schools; other films might be used in medical schools for training doctors in traumatic medicine.

The National Traffic Safety Research Center will be the unit responsible for carrying out all of the research, test and development activity of the Bureau. The center will operate research laboratories and test facilities that we expect to have located in several places in the country. However, the precise nature of the research facilities will be determined after detailed studies on facility requirements and existing available facilities have been completed.

The research, test, and development program that we recently funded will be in excess of $7 million during the current fiscal year. Depending upon appropriations, we anticipate that it will be substantially increased in the next fiscal year. The overall approach of the Bureau centers on an immediate, hard-hitting attack to provide the urgently needed answers now. This will be followed by work on the gaps of knowledge to begin to broaden our base of understanding of accident and injury causes.

Some of the procurements that are of direct interest to this group: (1) used car safety; (2) safety compliance procedures; (3) a major program in excess of one and a half million dollars now being conducted by the National Bureau of Standards for the Bureau on tires, brakes and seat

belts, and (4) another procurement deals with the entire range of automotive industrial engineering problems related to lead time production tooling.

Motor vehicle inspection is an activity of primary concern to this group and in this regard we are studying the cost and feasibility of automated diagnostic equipment. We feel much more has to be known about the motor vehicle inspection process, in particular the use of advanced electronic instrumentation techniques to guard against under-inspection of vehicles which would allow dangerous vehicles to be operated on the highways, and on the other hand, over-inspection of vehicles which will result in inordinately high costs to the consumer.

As I mentioned earlier, upwards of 50 percent of all defects relate to brakes and steering. Consequently, our work in automated diagnostics will deal very heavily with these aspects of motor vehicle performance.

In passing, I might mention that the entire process of motor vehicle inspection represents one of the primary links between the National Highway Safety Act and the National Traffic and Motor Vehicle Safety Act. We recognize that manufacturers in their recall campaigns cannot obtain full compliance, that is, they cannot get all of the customers whom they notify to return their cars to dealers for corrective action. As a result, we believe the motor vehicle inspection programs that will be conducted by the States will provide the means for accomplishing this. The used

car safety aspects of the National Traffic and Motor Vehicle Safety Act thus will have to be implemented by the motor vehicle inspection procedures of the States under the provisions of the National Highway Safety Act. Thus, you gentlemen are interested in both the Traffic and the Highway Safety Act.

The Role of IGOA

This brings me to the aspects of the new national safety effort that I believe you, the Independent Garage Owners of America, are most directly concerned with. These deal with the interrelated problems of motor vehicle inspection under the Highway Safety Act and the used car safety study under the Motor Vehicle Safety Act.

With regard to motor vehicle inspection, Secretary Boyd last week announced that this would be one of a total of 13 different areas of activity that the States would be expected to implement under the provisions of the National Highway Safety Act. I shall not read the standard at this time, but I would like to quote several significant portions.

> "Each State shall have a program for periodic inspection of all registered vehicles or other experimental, pilot, or demonstration program approved by the Secretary, to reduce the number of vehicles with existing or potential conditions which cause or contribute to accidents or increase the severity of accidents which do occur, and shall require the owner to correct such conditions."

The standard does not specifically state that the inspection shall be conducted by State inspection stations or by private garages. This is in keeping with the overall philosophy of the standards of being performance standards which indicate what is to be accomplished but not the method of accomplishing it. However, it is clear that regardless of who performs the motor vehicle inspection, the garage owners, such as yourself, will clearly have to attune their practices to the requirements implicit in the inspection procedures.

With regard to used car safety, to quote the law:

> "In order to assure a continuing and effective national traffic safety program, it is the policy of Congress to encourage and strengthen the enforcement of State inspection of used motor vehicles. Therefore to that end the Secretary shall conduct a thorough study and investigation to determine the adequacy of motor vehicle safety standards and motor vehicle inspection requirements and procedures applicable to used motor vehicles in each State, and the effect of programs authorized by this title upon such standards, requirements, and procedures for used motor vehicles, and report to Congress as soon as practicable but not later than one year after the date of enactment of this title, the results of such study, and recommendations for such additional legislation as he deems necessary to carry out the purposes of this Act."

We have started the used car safety study called for by the law, and after very extensive bidding competition, have selected the firm of Operations Research, Inc., of Silver Spring, Maryland, for the award. As the work progresses, we shall be developing the used car safety standards called for in the law, which I quote again:

> "As soon as practicable after the submission of such report, but no later than one year from the date of submission of such report, the Secretary, after consultation with the Council and such interested public and private agencies and groups as he deems advisable, shall establish uniform Federal motor vehicle safety standards applicable to all used motor vehicles. Such standards shall be expressed in terms of motor vehicle safety performance . . . ."

Gentlemen, our new car safety standards evolved only after extensive discussions with industry and all other interested groups. In developing the used car safety standards we intend to achieve a similar dialogue with groups such as yours that have a direct interest and experience in used car safety. The law specifically directs that, to repeat the quotation I just stated, "the Secretary shall establish uniform Federal motor vehicle safety standards applicable to all used motor vehicles after consultation with such interested public and private agencies and groups as he deems advisable . . ."

Thus, we look forward to receiving your suggestions and comments on any used car standards that we propose for adoption. I am sure that these will be in a constructive vein with due recognition of the undesirable extremes of standards that force the motorist to "over-maintain" his vehicle in contrast to standards that force him to "under-maintain". In the motor vehicle inspection context this means we wish to guard against over inspection that forces a motorist to spend more money on his vehicle than is required, but we similarly wish to prevent under inspection that allows a dangerous vehicle to be operated on the highways.

Concluding Remarks

I would conclude with several observations.

The provision of Federal safety standards for automobiles is landmark legislation, the need for which has been apparent for many years.

But the Federal responsibility for safety in transportation has been exercised for many years. Federal standards for the safety of ships at sea long antedate the Civil War. By the Year 1907, the Interstate Commerce Commission was requiring that pullman cars be constructed of steel rather than of wood. Aviation safety regulations were first authorized in the Air Commerce Act of 1926, a year in which domestic airlines carried a total of less than 6,000 passengers.

Yet, with the exception of a handful of State regulations and the Federal seat belt and brake fluid laws, the automobile sold generally in interstate commerce, prior to issuance of our initial standards in January, was subject only to the standards produced by the committees of the Society of Automotive Engineers. These SAE standards are the product of a committee consensus, subject to a single manufacturer's veto, while affording no consumer or user representation: Compliance is voluntary. There exist no procedures to compel their adoption, monitor their use, or evaluate their effectiveness.

We do not question the fact that cars today include, on overall balance, much safer design concepts than ever before. But the overwhelming

evidence is that the promotion of motor vehicle safety through voluntary standards has not produced a degree of safety anywhere near levels that are well within our present technology. In other words, many of our most recent major scientific breakthroughs remain to be incorporated in vehicle design for greater safety.

More important, perhaps, the individual in the marketplace, upon whom the free marked economy normally relies to choose the superior among competing products, is incapable of evaluating the comparative safety of competing model cars and replacement parts. The public which has become increasingly interested in safety still has no means of satisfying that interest. Both industry and Government share the responsibility for supplying adequate consumer information of automobile safety.

It is to the credit of the automotive industry that industry leaders have come to recognize the gravity of the problem and have joined in support of a law establishing binding Federal vehicle safety standards.

A situation similar to that affecting automobile and parts manufacturers when the Bureau started working on new car standards now confronts you. The form and substance of used car safety standards will be to you what new car standards are to manufacturers. We urge and look forward to your early participation in our development of used car safety standards.

It is so much easier and better to obtain facts before standards are issued, rather than to change them later.

It is to your best interests, as one of the key groups responsible for providing the automotive maintenance and repair services that will enable motor vehicles to meet any used car safety standards that we develop, to contribute to the development of the standards. I might make an even stronger statement to the effect that it is your responsibility and duty; it is your unavoidable role in the massive all out attack called for by the President on the traffic accident problem.

We now look to the newly enacted law as the focal point of the framework for a cooperative partnership between the Federal Government, the States, and industry in arresting the senseless carnage on our highways.

We expect no overnight miracles.

But in initiating this reasoned, systematic approach, we know that substantial progress will be made.

Attachments - Tables 1 - 5

BUDGET

	FY 1967 AUTH.	APPROP.	FY 1968 AUTH.	REQ.	FY 1969 AUTH.
	(THOUSANDS OF DOLLARS)				
NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966					
MOTOR VEHICLE SAFETY STANDARDS	11,000	4,000	17,000	11,750	23,000
TIRE SAFETY	2,900	1,000	1,450	1,150	1,450
ACCIDENT RESEARCH TEST FACILITY (STUDY)	3,000	700	–	1,700	–
NATIONAL DRIVER REGISTER	–	–	–	1,555	–
HIGHWAY SAFETY ACT OF 1966					
HIGHWAY SAFETY PROGRAMS (GRANTS TO STATES/ COMMUNITES)	67,000	10,000	100,000	100,000	100,000
HIGHWAY SAFETY RESEARCH AND DEVELOPMENT	10,000	4,300	20,000	15,300	25,000

TABLE 1

INITIAL MOTOR VEHICLE SAFETY STANDARDS

100 SERIES -- ACCIDENT AVOIDANCE GROUP

STANDARD NO.	
101	CONTROL LOCATION AND IDENTIFICATION
102	TRANSMISSION SHIFT LEVER SEQUENCE, STARTER INTERLOCK, AND TRANSMISSION BRAKING EFFECT
103	WINDSHIELD DEFROSTING AND DEFOGGING
104	WINDSHIELD WIPING AND WASHING SYSTEMS
105	HYDRAULIC BRAKE, EMERGENCY BRAKE AND PARKING BRAKE SYSTEMS
106	HYDRAULIC BRAKE HOSES
107	REFLECTING SURFACES
108	LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT
109	NEW PNEUMATIC TIRES
110	TIRE SELECTION AND RIMS
111	REAR-VIEW MIRRORS

TABLE 2

INITIAL MOTOR VEHICLE SAFETY STANDARDS

200 SERIES -- CRASH INJURY REDUCTION GROUP

STANDARD NO.

201 OCCUPANT PROTECTION IN INTERIOR IMPACT

202 HEAD RESTRAINTS (HEADRESTS)

203 IMPACT PROTECTION FOR THE DRIVER FROM THE STEERING CONTROL SYSTEM

204 STEERING CONTROL REARWARD DISPLACEMENT

205 GLAZING MATERIALS

206 DOOR LATCHES AND DOOR HINGES SYSTEMS

207 ANCHORAGE OF SEATS

208 SEAT BELT INSTALLATIONS

209 SEAT BELT ASSEMBLIES

210 SEAT BELT ASSEMBLY ANCHORAGES

211 WHEEL NUTS, WHEEL DISCS, AND HUB CAPS

300 SERIES -- POST-CRASH PROTECTION

301 FUEL TANKS, FUEL TANK FILLER PIPES, AND FUEL TANK CONNECTIONS

TABLE 3

MANUFACTURER SAFETY DEFECT REPORTS BY VEHICLE SYSTEMS INVOLVED
SEPTEMBER 9, 1966 THROUGH APRIL 30, 1967

VEHICLES INVOLVED IN RECALL CAMPAIGNS

1,137,530

BRAKE SYSTEM 34%	GEAR SHIFT MECH. 2%	WIRING 1%
STEERING SYSTEM 19%	DRAG LINKAGE 2%	FUEL TANK 1%
THROTTLE LINKAGE 14%	CARBURETOR 2%	STARTING BATT. CABLE 1%
WHEELS 7%	ACCELERATOR 2%	TIE ROD 1%
FRAME (WELDS) 4%	TIRES 2%	HEAT EXCHANGER 1%
DOOR LATCHES 4%	WINDSHIELD WIPER 2%	AXLE BEARING 1%

*SOME MANUFACTURERS DID NOT SUBMIT THE POTENTIAL NUMBER OF DEFECTIVE VEHICLES IN THEIR REPORTS.

TABLE 4

STANDARDS FOR
STATE HIGHWAY SAFETY PROGRAMS

RIVER LICENSING

OTOR VEHICLE REGISTRATION

)ENTIFICATION AND SURVEILLANCE
F ACCIDENT LOCATIONS

RAFFIC RECORDS

RAFFIC COURTS

ERIODIC MOTOR VEHICLE INSPECTION

MOTORCYCLE SAFETY

- ALCOHOL IN RELATION TO HIGHWAY SAFETY
- CODES AND LAWS
- TRAFFIC CONTROL DEVICES
- EMERGENCY MEDICAL SERVICES
- HIGHWAY DESIGN, CONSTRUCTION AND MAINTENANCE
- DRIVER EDUCATION (STATUTORY REQUIREMENT)

TABLE 5

MAN -- KEY TO ACCIDENT CONTROL

Robert Brenner
Deputy Director
National Highway Safety Bureau

sion of Commercial Vehicle, School Transportation
and Transit Sections
967 National Safety Congress and Exposition
National Safety Council
LaSalle Hotel - Chicago, Illinois
October 26, 1967

ciate the opportunity to be here with you today to discuss

ng idea . . . "man, the key to accident control".

accident is a "people" problem, because people are

red as a result of accidents.

us never forget that this is the problem of ultimate concern.

nson highlighted this in calling for legislation to curb what

as ". . . a raging epidemic of highway death which has

f our youth than all other diseases combined . . . "

people problem, because people are behind the wheels of

hat go out of control, that fail to avoid pedestrians, that

vehicles, that run off the road.

have the well-known multiplicity of programs aimed at

e performance of the man behind-the-wheel: driver

ver attitudes, driver skills, driver licensing, driver

d driver rehabilitation and training.

people problem, because people, in my own profession of

design the vehicles that later become involved in crashes

and produce death and injury.

One could hardly question the fact that cars and tires today include on overall balance much safer design concepts than ever before. But the overwhelming evidence is that this has not been enough. Much more can be done, must be done and will be done within our present technology, and as soon as new technology is proved.

It is as well a people problem, because people such as you in the organized safety movement direct their careers and skills toward bringing the problem under control.

It is a people problem, because people make the decision as to whether or not they will fasten their safety belts when they get into their cars.

It is a people problem, because people decide whether they will have "another drink for the road" before they head for home in the wee hours of the morning.

It is a people problem, because people decide whether they will have sympathy for the plight of the drunken driver, who has struck some child in a crosswalk, or will hold him in the same contempt in which they hold the embezzler, the thief, or the arsonist.

It is a people problem, because people who own fleets of vehicles decide on the levels of maintenance and where they might save a dollar. People decide whether or not to try to get by on near bald tires, or

with their brakes out of adjustment, or to have drivers stay behind the wheel for long periods of time.

It is a people problem, because people will oppose or favor motor vehicle inspection that seeks to identify vehicles that are not being properly maintained.

What is the reaction of your neighbor when a motor vehicle inspector tells him to repair that unsafe brake? What would your reactions be?

And I could go on.

Indeed the title of the talk is most appropriate -- Man is the key to accident control. And we can discuss this central role of man from these or many other aspects.

I describe these several dimensions of people in the accident problem to emphasize a point of view that must be stated and restated.

There is no single magical solution to the problem of motor vehicle accidents and the resulting losses of life and limb.

There is no 'silver bullet", no panaceas, no short-cut sub stitues, unfortunately, for systematic balanced effort that seeks to achieve short-range results in fatality and injury reduction, wherever immediate gains are possible, but still lays the groundwork for more long-range solutions.

Presently I shall describe the major aspects of the national safety effort started under the provisions of the landmark legislation. But, in the same sense that is a realistic program in not seeking some single magical solution, so is it realistic in recognizing that the broad-gauged, well-balanced effort now under way will not produce the substantial progress called for by the President and the Congress without the full participation by all sectors of our society.

- by you, as citizens and voters to whom the Congress responded by passing the landmark safety legislation almost unanimously.

- by you, as parents who have the grim reminder of the toll traffic accidents have been having on our youth.

- by you, as drivers who have the responsibility of proper handling of your vehicles, of courteous observance of the rules of the road, and of maintaining your vehicle in reasonably safe working order.

- by you, as an important part of our Nation's transportation industry, and professionals in the safety movement as well.

Legislation

Let me here review briefly the two laws that comprise the enabling legislation. First, the National Traffic and Motor Vehicle Safety Act of 1966 which deals with motor safety performance standards for motor vehicles and motor vehicle equipment; second, the Highway Safety Act of 1966 which provides for a Federal-aid grant program to the States and local communities for carrying out effective State and community highway safety programs.

The overall orientation of the single unified safety program is a balanced approach to all phases of the problem leading to ultimate reductions in deaths, injuries and property damage due to highway accidents. We regard the approach in three phases.

-- The first phase deals with those activities related to the prevention of accidents or accident avoidance.

-- The second phase deals with those factors related to reducing the injury potential to occupants of vehicles in the crash minimization of the so-called second collision.

-- Phase three deals with the measures designed to improve the salvage or to increase the likelihood of accident victims' later full recovery.

As I stated before, the National Traffic and Motor Vehicle Safety Act directs the establishment of performance standards for motor vehicles and motor vehicle equipment. We can categorize the various standards in these three phases. In the accident avoidance phase is the performance of the brakes and steering systems. Tire safety obviously is in this category.

The purpose of seat belts is to reduce injury in the crashes that do occur; their performance therefore exemplifies a phase two requirement.

Prevention of fuel tank rupture falls in the category of post crash measures or phase three.

We can similarly describe activities in the State highway safety programs within this three phase framework: motor vehicle inspection is an accident avoidance program, or phase one activity; motorcyclist crash helmets prevent injury after an accident occurs and hence a program dealing with their use is in phase two; finally, the vast array of activities relating to emergency medical care in transport of the injured exemplify a phase three program.

I would point out that man is a key element in all three phases of the problem described in this manner.

In phase one, the accident avoidance phase, questions of driver skills or attitudes are certainly relevant.

In phase two, the injury minimization phase, there is the question of whether or not the driver chose to fasten the seat belt. Or was the motorcyclist wearing a helmet when thrown upon impact.

In phase three, did people know how to extricate a victim from a wreck without increasing the severity of injuries and reducing the chances of later full recovery.

But I would point out that the vehicle is also involved in all three phases, so is the highway. So is the community--man collectively. The vehicle and the highway as well as man the individual and man collectively as a community relate to these three phases of the problem.

Program Structure

Within this three-phase characterization of the accident problem, we have the overall program planning structure of the Bureau. In it, our work is organized in five programs relating to the two enabling laws and operational plans for implementing them.

1.0 Improve safety performance standards of motor vehicles and motor vehicle equipment,

2.0 Assure proper safety quality of vehicles in use,

3.0 Assist States and local governments in expanding and improving their highway safety programs,

4.0 Improve the process of highway accident investigation, vehicle damage and injury assessment, and information analysis,

5.0 Provide program support and facilities.

Program 1.0

The first program covers our effort to achieve substantial reductions in traffic accident losses due to the inherent design, construction or performance of motor vehicles and motor vehicle equipment. The program is organized in three major categories:

1. Development of new and revised Federal motor vehicle safety performance standards,

2. Surveillance of standards compliance and defects corrections,

3. Development and testing of experimental vehicles.

In this regard, 20 initial standards published last January are to become effective this January. In addition, Secretary Boyd announced two weeks ago proposals for comments on 47 additional areas for new and revised Federal safety standards.

Program 2.0

The second program relates to the used car safety problem. In it we seek to reduce traffic losses that result from failures to assure proper safety quality of vehicles in use on public thoroughfares.

We consider this program to be of primary importance for several reasons, two of the most important being:

. degradation of safety qualities of the vehicle after continued use is to be expected -- with or without proper maintenance,

- the cost burden to the owner of the vehicle is highly sensitive to maintenance requirements implicit in used car safety standards and associated inspection standards.

Furthermore, this program is the major link between our activities authorized under the two laws. For example, the development of used car safety standards will be accomplished by the same groups of engineers developing new car standards under the provisions of the National Traffic and Motor Vehicle Safety Act.

However, the compliance aspects of used car safety standards undoubtedly must be handled via the motor vehicle inspection activities of the States under the provisions of the National Highway Safety Act.

Program 3.0

The third program pertains to the Bureau's assisting each State and its political subdivisions to expand and upgrade comprehensive statewide highway safety activities.

It comprises the direct Federal grant-in-aid and technical assistance to the States, backed up with research, development, training and education, demonstration and other activities that will improve safety program content and provide more substantive bases for resources allocation among the competing categories of highway safety activities.

Our analysis of this program structure leads us to the following primary conclusions:

1. Preliminary needs studies conducted by the States indicate that program costs will far exceed present authorization levels. New authorizations will be required.

2. Much better program investment criteria are needed for near-term decisions on form and substance of highway safety program activities at Federal, State and local levels. The need is especially acute in light of present indications that resources will not be adequate in the foreseeable future.

3. The scope and depth of backup materials and technical assistance to States and local governments in their conduct of highway safety programs must be broadened. There is much less uncertainty as to what constitutes proper standards for these programs as on methods of implementation and procedures for evaluating comparative payoff.

4. A systematic program of highway safety demonstration projects should be developed in various types of local government jurisdictions to assist them in obtaining actual working experience in proper implementation of new highway safety techniques at local levels.

5. In view of the magnitudes of highway safety program cost indications from preliminary surveys, studies initiated should be in cooperation with other agencies and Departments on ways and means of "piggy-backing" highway safety on to other Federal, State and local programs with minimal, if any, increase in the expenditures required for the primary missions of the other agencies.

Program 4.0

The fourth program describes the closely correlated activities of accident investigation, vehicle damage and injury assessment and, finally, accident and injury analysis. It is fundamental to the entire effort, and will provide better means of evaluating the payoff among competing countermeasure programs. This is a need of paramount importance for all safety program decision-making at national, State and local levels of government, by industry and by the individual citizen.

Program 5.0

Our fifth program covers various Bureau activities that are in general support of the other four programs of the Bureau. The most significant one from the standpoint of this meeting deals with our liaison programs which are of central importance to our successfully carrying out our mandate.

Something in excess of 1,000 citizen and professional organizations that collectively might be referred to as "the organized safety movement" have been working entirely or substantially in highway safety for many years prior to passage of the safety legislation. More often than not, this has been on threadbare budgets with funds provided by limited private contributions.

We want to enhance our relationships with these groups, our purpose being to draw upon their skill and experience. This is directly in keeping with our frequently stated philosophy of seeing that the jobs get done in the best possible fashion; it is in keeping with my earlier statement that we realistically recognize that the success of the program depends upon full participation by all sectors of our society. Some of these organizations are already working on Bureau contracts that relate to their unique expertise. And we plan to expand this participation in a systematic, programmed fashion.

But I would not want to leave the impression that this is limited to volunteer citizen groups such as the National Safety Council, or associations of government bodies such as the National Association of County Officials, both of which are working on contracts now. We are actively calling upon the technical and scientific community as well.

Another important support activity in this fifth program relates to the development and validation of a better cost/effectiveness data for the entire complex of motor vehicle and highway safety programs and the various categories and subcategories within each. Our position on this is quite simply stated:

There are no precedents to the new National Motor Vehicle and Highway Safety effort. Thus, the program structures and related resources allocations among the various activities are based largely on subjective judgments, supplemented by limited objective data.

We fully recognize that much better methods for decision-making and resources allocation among competing areas of motor vehicle safety improvements are urgently needed. For example, should more resources be directed toward improvements in better accident avoidance braking or better injury-minimizing structural crashworthiness.

We are well aware of the fact that State and local governments are confronted with highway safety program needs whose cost far exceed available funds, even with a substantially expanded Federal aid support.

We therefore recognize that major efforts must be directed toward developing more precise methods for resources allocation among competing program areas--for example, driver education vs. motor vehicle inspection--or on competing techniques within a given functional program area.

As an example, no one today can provide precise and objective data in the driver education area as to how much money should be devoted to more behind-the-wheel instruction rather than improved classroom procedures.

Nor are there precise data on how much should be spent on vehicle maintenance for safety. We obviously are concerned with guarding against permitting dangerously undermaintained vehicles to be operated on public thoroughfares. But the other side of the coin is concern against requiring over-maintenance at inordinately high cost to the vehicle owner.

Clearly, we must move ahead in implementing these and other aspects of safety programs, albeit without as much objective, comparative cost/benefit information as we would like to have.

Clearly, we must make decisions, albeit on the basis of incomplete evidence or, to state it positively, on the basis of the best available evidence. Parenthetically, I might add, this is not substantially different than any decision-making in the public or private sector. Rarely, if ever, does the decision-maker have all of the evidence he would like to have. Yet decisions--and good ones--are still made.

But this does not, and must not preclude driving toward better data and facts. And while time does not permit full descriptions here,

I can report that the Bureau has undertaken a major effort directed toward better information and understanding of safety program cost/effectiveness and payoff technologies.

Conclusion

Now, in conclusion, may I pose several questions.

Granted, that everyone agrees that the motor vehicle accident is a continuing national tragedy urgently in need of being brought under control.

Granted that effective countermeasures programs can be devised, proved, and implemented.

Granted that all sectors can participate within the full range of individual and group skills.

Is so, can there ever be unanimous support by all sectors and individuals for all proven countermeasures?

Can a motor vehicle performance standard that costs a manufacturer some increment of profit or some consumer an increment in the price he pays for the product, be fully accepted?

Or, can a State or local highway safety program that must make demands upon an already overburdened tax base be fully appreciated.

Or, to bring the problem down to the most personal plane, can the individual citizen who is a social drinker--not an alcoholic--fully support

implied consent legislation, stiff penalties for drunk driving and other countermeasures aimed at this critical aspect of the problem?

I am sure that all of us can pose many more questions of this nature with regard to our continuing national tragedy of death and injury on the highway.

Will you agree with me that the answers to all are implicit in the title of my talk

Man -- the Key to accident control?

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
NATIONAL HIGHWAY SAFETY BUREAU
WASHINGTON, D.C. 20591

THE EVALUATION OF COMPLIANCE WITH FEDERAL MOTOR VEHICLE SAFETY STANDARDS

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American Society for Quality Control
Workshop Seminar
Dearborn, (Detroit) Michigan
November 3, 1967

I. INTRODUCTION

Purpose

The purpose of my talk today is to describe some aspects of the overall approach of the National Highway Safety Bureau to assure compliance by manufacturers of motor vehicles and motor vehicle equipment with:

1. Applicable Federal motor vehicle safety performance standards issued under the provisions of the National Traffic and Motor Vehicle Safety Act of 1966, and

2. Other provisions of this law relating to defects notification and corrective recall campaigns.

I shall describe some of the major Bureau-manufacturer relationships throughout the entire spectrum of meeting both compliance requirements. The presentation is largely qualitative since there has not as yet been substantial operating experience in the early stages of getting the programs started.

Certain quantitative data, however, are available and are presented for purposes of demonstrating the magnitude of the compliance surveillance tasks confronting the Bureau and the broad policy decisions that must be made at this time.

Requirements

The law (Sec. 108(a), 80 Stat. 722) directs that no manufacturer shall:

. . . sell or offer for sale any motor vehicle or item of motor vehicle equipment that is not in conformity with applicable Federal motor vehicle safety standards,

. . . fail or refuse access to or copying of records, or fail or refuse to permit copy or inspection,

. . . fail to issue a certificate that that vehicle or equipment (be manufactured for sale, etc.) conforms to all applicable Federal motor vehicle safety performance standards,

. . . fail to furnish notification of any defect he judges to be safety related or fail to furnish notices or bulletins on any defect.

In effect, the law requires each manufacturer:

. . . with regard to certification

1. to certify that his product meets all applicable Federal motor vehicle safety standards,

2. to provide or make available to the Bureau any relevant information and test data in support of his certification of compliance.

. . . with regard to defects control

3. to notify the Secretary of any safety related defect that he (the manufacturer) discovers, whether or not covered by a Federal safety standard, and the corrective action he has instituted,

4. to notify the Secretary of all defects that are the subject of recall campaigns regardless of whether or not he (the manufacturer) judges them to be safety related.

Arising out of these four basic requirements that the law places upon motor vehicle and motor vehicle equipment manufacturers are the compliance surveillance or, more simply stated, the enforcement responsibilities of the Bureau in implementing the law. Briefly, the Bureau must:

. . . with regard to the manufacturer's certification	1. Verify that the manufacturer has provided a certification that his product meets all applicable Federal safety standards.
	2. Check (i.e., validate) the correctness of the certification and the supporting information and data provided by the manufacturer.
	3. Examine actual performance of products in use to ascertain if consumer experience with the product matches performance advanced in certification data of the manufacturer.
. . . with regard to manufacturers' defects control programs	4. Evaluate the technical sufficiency of manufacturers' corrective actions in announced safety related defects recall campaigns.
	5. Evaluate the quality of implementation by dealers and garages of the remedial measures prescribed by manufacturers.
	6. Measure the extent to which "campaigned" vehicles are being checked and corrected if found to be faulty. This relates to (a) whether owners when informed of a possible safety related defect in their vehicle are bringing them in to dealers for checking, and (b) what the dealer does when a potentially defective vehicle is brought in for check.
	7. Evaluate the manufacturer's judgment that some reported defect is <u>not</u> safety related and hence need not be subject to the safety defects recall provisions.
. . . with regard to motor vehicle equipment sold in the repair and "aftermarket"	8. Evaluate the manufacturer's certification and defects control programs for motor vehicle equipment on tires, brake hoses, brake linings, brake master cylinders and other safety related items in the so-called "aftermarket" of the automotive industry. This includes the vast rebuilt parts industry.

. . . with regard to compliance programs for incomplete vehicles	9. Evaluate nonoverlapping compliance responsibilities of component manufacturers in relation to responsibility of the final manufacturer.

II. SOME OF THE MAGNITUDES OF THE COMPLIANCE PROBLEM

Under the provisions of the National Traffic and Motor Vehicle Safety Act, there are two areas of compliance activity dealing respectively with motor vehicle standards and defects recall campaigns. The compliance responsibilities of the manufacturer and derivative responsibilities of the Bureau to maintain reasonable levels of surveillance over manufacturer compliance activities are:

With regard to Motor Vehicle Standards

(1) The responsibility to design and manufacture cars so that they meet the motor vehicle standards, and the responsibility to certify that they do so, rests with the vehicle manufacturers.

(2) The responsibility to provide assurance to the public and Congress that the finished product does in fact comply, rests with the Bureau.

With regard to Defects Recall Campaigns

(1) The responsibility to identify safety related defects in their products and to correct them through appropriate recall campaigns rests with the manufacturer.

(2) The responsibility to provide assurance to the public that appropriate corrective action is taken rests with the Bureau. The Bureau has the further responsibility to call to manufacturers' attention any safety related defects that they have failed to detect, report, and correct.

The magnitudes of potential areas of noncompliance are extremely large in every dimension of both standards compliance and defects control. The salient issues with regard to the magnitudes are:

Technical Audit Requirements for Standards Compliance

The initial 20 Federal safety standards that become effective January 1, 1968, generate 281 corroborative tests of which 119 pertain to passenger cars.

When new and revised standards are issued, for which 47 proposals have been announced, the number of tests probably will approach 1000.

Test Cost and Facilities Requirements

The necessary tests vary widely in complexity, facilities for their accomplishment, and costs. They range from simple visual inspection to complex (and very costly) destructive test procedures.

The estimated costs for conducting a single, complete set of tests (both low and high cost items) required for a passenger car range upwards of $45,000; the costs will be much higher for trucks, buses and multipurpose passenger cars.

The facilities required for conducting the tests also are of varying complexity and costs. A related issue is the highly variable time required to complete a single test.

Universe of Vehicles, Manufacturers and Plants

Upwards of 500 different make-model combinations of passenger cars are introduced onto the domestic market every year. Each is subject to the 119 test items, although the actual number of tests would be less than the cross products since manufacturers use the same parts in several different models for several successive years. However, even with appropriate adjustments for these factors, the number of combinations is still extremely large.

A number of factors further compound and complicate the problem. There are 47 domestic passenger car plant locations, 53 truck producing plants, 6 for buses. Noncompliance situations could develop at one plant location but not at others manufacturing the same final product.

In the truck building industry, although there are only 12 major domestic manufacturers of truck chassis, something in excess of 3000 truck body manufacturers purchase the chassis and complete the vehicle. Responsibility for certification that vehicles comply with applicable Federal safety standards rests with the final manufacturer. Thus, the Bureau must deal with the 3000 truck body manufacturers (as well as the 12 truck chassis producers).

The law requires safety performance standards for motor vehicle equipment as well as motor vehicles per se. This generates what probably is the most difficult aspect of the compliance surveillance problem of the Bureau, namely the estimated 30,000 parts suppliers, the rebuilt parts industry, plus 10,000 tire retreaders and other elements of the vast so-called automotive aftermarket.

Defects Recalls

In the 11 months after enactment of the law, the Bureau received notices from manufacturers of safety related defects involving 1,970,890 vehicles, in 105 separate recall campaigns, involving 13 domestic and 11 foreign producers. The safety related defect problem thus is very widespread.

However, three highly important recall campaigns were triggered by the Bureau, not the manufacturer, and these needs came to light in the process of review by Bureau staff of letters from the public. Although the number of recall campaigns initiated by manufacturers has a substantial random element, the most unpredictable aspect of defects compliance control will be triggered by individual citizens.

Let me briefly demonstrate the magnitude of the defects workload:

FIGURE 1

From the period September 9, 1966 until April 30, 1967, we received notifications on safety defect possibilities on 1,137,000 vehicles, of which 88,000 were foreign made and 1,048,000 were domestic. A total of 22 manufacturers reported; 34 makes covering 98 models were involved. In all, there were 101 recall campaigns. Eighty-one different people checked our defects log, demonstrating that we have made this information readily available as a matter of public record.

FIGURE 2

This shows the monthly distribution of defect recalls. The cumulative total as of the end of August is about 1,500,000 vehicles. It now is in excess of 4,000,000.

FIGURE 3

The classification of defects shows that over half relate to steering and brakes. This is one reason why, in our used car safety work, we shall concentrate on these features.

FIGURE 4

These data provide some indication of the workload magnitude associated with our compliance program on the defects. Now, let me return briefly to our standards work to highlight the magnitude of the compliance workload in that area of our program. Then, I shall describe briefly how we are approaching both compliance tasks in a coordinated unified manner.

Referring only to passenger cars, we see that we are dealing with 48 makers, 497 models, 47 plant locations, about 43,000 dealers. The annual production volume is about 10 million.

For trucks, 12 manufacturers and 3,000 body manufacturers
Tire Retreaders -- 10,000
Parts Suppliers -- 30,000

III. COMPLIANCE DECISION LOGIC

The need for a detailed systematic analysis of all facets of the compliance problem is patently obvious from the most cursory examination

of sizings of the two Bureau responsibilities. Moreover, pat statements to the effect that some form of clever statistical sampling will handle the problem are virtually idle. The problems are of far greater complexity than could ever begin to be resolved simply by statistical methods.

With this in mind, the Bureau has undertaken a program of identifying the total decision logic underlying the development of its compliance program. The need is to develop such a program within the framework of a total system concept that utilizes capabilities and skills throughout all levels of government and the private sector. For it is unmistakably clear that resources beyond those of the Bureau will be required to make the compliance program effective. For example, much of the standards and defects compliance work under provisions of the National Traffic and Motor Vehicle Safety Act will have to be "piggy-backed" onto the State motor vehicle inspection program under the provisions of the Highway Safety Act.

It is equally clear that the two compliance tasks (i.e., with regard to Federal motor vehicle safety standards and to manufacturer defect recall campaigns) must be approached in a coordinated, unified program.

The four figures presented here constitute a basic framework within which the concept of total systems planning for compliance can be developed.

FIGURE 5

Decision Flow Logic, Certification-Verification

FIGURE 6

Decision Flow Logic, Certification-Validation

FIGURE 7

Decision Flow Logic, Compliance Control Phase (Validation)

FIGURE 8

Decision Flow Logic, Defect Control Phase

Before discussing these in detail, may I emphasize that, although these are the basis of our present thinking, they should be considered only as an initial approximation.

The figures illustrate, in general sequence flow, the basic inputs of an information or action type that force the decisions throughout the system. A coding system has been used that will facilitate easy cross referencing of the various system elements that comprise the total system.

Essentially, the two charts titled "Certification-Verification" and "Certification-Validation" can be considered as "first level." The chart titled "Compliance Control Phase" is considered as "second level" as it deals with the expansion (or explosion) of a system element denoted on a "first level" chart. In this particular case, "Compliance Control Phase" is one of the elements appearing on the "Certification-Validation" chart. It is, for ease of cross reference, so identified in its titular heading, using the elemental code symbol as assigned on the "first level" chart to which it is related. Similarly, if an element from a "second level" chart is taken and expanded, the resulting chart would be a "third level" definition. This process of exploding system elements can be followed to any level necessary for adequate detailing of the total system requirements.

FIGURE 5

Decision Flow Logic, Certification - Verification

The manufacturer, as obliged by law, certifies that the motor vehicle or motor vehicle equipment conforms to all applicable Federal motor vehicle safety standards. In the case of a motor vehicle, such certification shall be in the form of a label or tag permanently affixed to such motor vehicle. In the case of an item of motor vehicle equipment, such certification may be in the form of a label or tag on such item, or on the outside of a container in which such item is delivered.

The first question then is, "Does the Bureau verify that certification has taken place?" The chart indicates a "yes" decision and then graphically portrays the type of input actions required before the Bureau can be satisfied that the physical evidence of certification, labels or tags, has been provided.

Bureau action could include a "dealer/distributor sampling program" whereby Bureau inspectors would ascertain, by physical on-site inspection, that the proper evidence of certification does, in fact, exist.

The Bureau could further verify certification by periodic audits of the manufacturers' own records and reports.

Using the "exception rule," the Bureau would pursue only those cases where certification had not taken place and could enter into legal action as required.

Other action by the States and other government agencies would also contribute to the verification process.

States monitor vehicle registration: It could be established that proof of certification be a prerequisite for vehicle registration.

Audit for certification by State/local police: A routine check could be made of any vehicle involved in a traffic accident, or stopped for a traffic violation, to ensure that proof of certification was affixed to the vehicle.

Customs inspection: In the case of imports, proof of certification could be verified at the port of entry.

State inspection program: Proof of certification could be verified as a routine part of State inspection programs.

Again, using the "exception rule," only cases of non-certification would be reported to the Bureau by the other participating agencies. They would then enter the same "legal action as required" loop as those cases discovered in the Bureau's own program.

As indicated on the chart, all vehicles and equipment after satisfactory verification of certification then become involved in the "Certification-Validation" process.

FIGURE 6

Decision Flow Logic, Certification - Validation

After the manufacturer's certification, the first question on the chart is "Does the Bureau validate the certification?" A "yes" answer is indicated. This being the case, a series of inputs are illustrated that must be pursued and evaluated if the Bureau is to be satisfied that the vehicle or equipment is in compliance with the Federal standards covered by the certification.

Bureau action includes the audit of manufacturers' records and reports, and sampling of the market place by the Bureau's testing program. This can include, but is not limited to, design data, quality control procedures and reports, manufacturers' own test reports, and the results of the Bureau's own testing program through the full spectrum of its application.

If non-compliance (failure to meet Federal standards) is discovered, the process enters the "Compliance Control Phase."

State action relative to validation revolves around the "State inspection program." The State notifies the Bureau in cases of non-compliance and such cases then enter the "Compliance Control Phase" loop.

A third entry into this loop is provided by the manufacturer who notifies the Bureau of a non-compliance situation discovered in production. He simultaneously notifies the dealer and the owner alerting them to the corrective action situation that will follow.

The chart also illustrates the possibility of automatic validation where a manufacturer notifies the Bureau that his design, as previously validated, is unchanged.

FIGURE 7
Decision Flow Logic, Compliance Control Phase (Validation)

The chart clearly defines sources of prime input to the compliance control phase of the overall compliance program.

Accident investigations: These, of course, could be from a number of independent sources; i.e., the Bureau itself, State/local police, insurance companies, and private investigations.

Letters of complaint: Letters as received by the Bureau from dissatisfied owners and users.

Bureau testing program: Cases of non-compliance discovered during the Bureau's own testing program.

State inspection program: Cases of non-compliance discovered during the States' routine testing programs.

Other Government agencies: Primarily from experience of vehicle performance, etc., of vehicles used in Government service.

Manufacturers' records and reports: As specified earlier, this can include, but is not limited to, design data, quality control procedures and reports, and manufacturers' own test reports.

Manufacturer reports non-compliance: Notification to the Bureau that a non-compliance situation has been discovered in production.

The latter item is a special case. The manufacturer, in reporting the non-compliance will also have initiated what he considers to be the appropriate corrective action. This corrective action will be evaluated by the Bureau as part of a "compliance review." The review will enable the Bureau to satisfy itself as to the adequacy, or otherwise, of the corrective action taken by the manufacturer to re-establish his compliance status. A "yes" answer to the question, "Is there compliance?" following the compliance review would result in a "stop" (no further action required) situation.

A "no" answer to the same question would result in a review of the corrective action taken, with the manufacturer. The review (including legal action as required) could result in agreement on the corrective action as originally taken by the manufacturer, or alternatively, on a modified form of corrective action. In the former case, a "yes" answer to the "Is corrective action agreed?" question would result in a "stop" situation. In the latter case, a "yes" answer to the same question would lead to further action by the Bureau, and the manufacturer, relative to the implementation of the modified corrective action agreed upon.

The other input sources previously indicated are followed by the question, "Is there non-compliance?" If the answer is "no" then the vehicle or equipment is in compliance and the certification is validated. If the answer is "yes" then the Bureau notifies the manufacturer and the public. The manufacturer is afforded an opportunity to appeal the Bureau findings. If he chooses not to appeal, or his appeal is unsuccessful, the manufacturer initiates his corrective action and recall campaign. This, in turn, leads into the compliance review loop as previously discussed relative to "Manufacturer reports non-compliance." Also involved is the evaluation of the recall campaign, itself, by the Bureau.

At the time the initial question, "Is there non-compliance?" is asked, and answered in the affirmative, a subsequent question is immediately generated. "Is the non-compliance related to a previous Bureau action?" A "no" answer to this question would close out this particular loop immediately. A "yes" answer would lead to a review and evaluation of the previous Bureau action. This particular loop (question-answer-action) is internal to the Bureau's own operation providing a quality control feature on previous decisions and actions taken. Entry into this loop is also made when a manufacturer reports a non-compliance situation.

FIGURE 8

Decision Flow Logic, Defect Control Phase

This chart is a graphic illustration of the defect control phase. It is basically the same chart as that used for the compliance control phase, with minor modifications and additions. The modifications and additions extend the coverage beyond compliance (control of standard related defects) to include all safety related defects not covered by standards.

The sources of prime input remain the same with one modification, and one addition. Both of these situations relate to a change in input from the manufacturer.

Where the manufacturer previously reported a "non-compliance," he now reports a "safety related defect." The Bureau then asks the question, "Is the defect covered by a standard?" If the answer is "yes," there would be no further action shown on this chart beyond indicating that the defect would enter the compliance control phase. If the answer is "no," then it would follow through the additional loop, as provided here to channel all pertinent information relative to "safety related defects not covered by standards" into the "standards development program." Defects in this category also follow through the corrective action loop as previously described relative to the compliance control phase. This particular loop is again illustrated on the "defect control phase" chart.

The other input sources include, in addition to the ones previously described relative to the "compliance control phase," provision for "manufacturer reported defect." These input sources are followed by a question, "Is defect covered by a standard?" If the answer is "yes," there would be no further action shown on this chart beyond indicating that the defect would enter the compliance control phase. If the answer is "no," this would lead to a second question, "Is defect safety related?" If the answer to this question is "no," no further action is taken. If the answer is "yes," the defect would enter an action loop similar to that already described for the "compliance control phase." As with all cases of non-compliance and safety related defects, it would also be subjected to the same Bureau internal quality control feature to determine if the defect was related to a previous Bureau decision or action.

OVERVIEW

Each of the decision and subsequent action processes can be further expanded into second and third level decision logic phases in a similar way as used in expanding the compliance control phase shown in Figure 7 into 15 decision flow logic portrayed in Figure 8.

The next step in the analytical formulation is to identify the information items that must flow from one decision point to the next. The following step is to establish the quantity of information in the network. Finally, the appropriate sampling can be derived. The sensitive parts of the decision logic network as well as quality of information flow are of major importance in this determination.

CONCLUSION

As I stated earlier, the compliance problems are of far greater complexity than could ever begin to be resolved simply by statistical methods.

Conventional quality control techniques and sampling methods will, of course, be used.

But I believe that wholly new techniques will have to be developed and applied. Possibly, the needed mathematical methods do not as yet exist for quantifying the decision flow logic that I have demonstrated.

However, we are approaching the problem systematically so that the Government and manufacturers alike can best meet their respective responsibility for the overall good of the society.

NUMBER OF MANUFACTURERS REPORTING DEFECTS	NUMBER OF MAKES INVOLVED	NUMBER OF MODELS INVOLVED	NUMBER OF MANUFACTURER RECALL CAMPAIGNS	NUMBER OF VISITORS THAT CHECKED THE "DEFECT NOTIFICATION ACCESSION LOG"
22	34	99	161*	81

FIGURE 1

DOMESTIC
FOREIGN
VEHICLES RECALLED
400,000
300,000
200,000
100,000
0
SEPT
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
1967
6,757
17,439
2,935
42,533
2,883
3,037
0
341
0
12,033
294
14,085
0
11,019
143,629
193,103
81,321
88,034
222,760

FIGURE 2

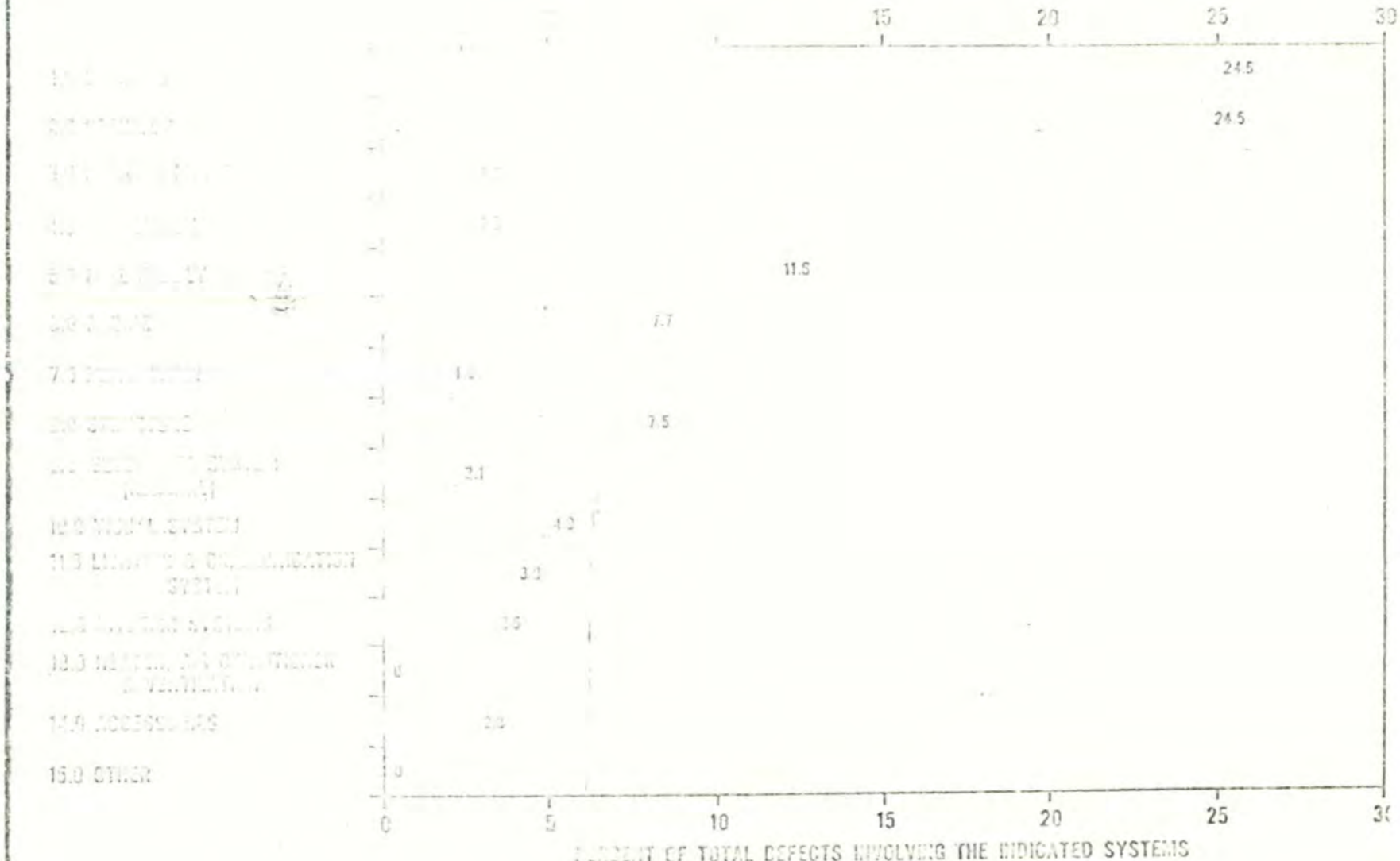

FIGURE 3

PASSENGER CARS

1966

	DOMESTIC	FOREIGN	TOTAL
Manufacturers	15	33	48
Models	380	117	497
Plant Locations	47	-	
Dealers	28,912	14,280	43,192
Production	8,600,000	900,000	9,500,000

TRUCKS

Chassis Manufacturers	Truck Body Manufacturers
12	3,000 (approx.)

Tire Retreaders

10,000 (approx.)

Parts Suppliers

30,000 (approx.)

FIGURE 4

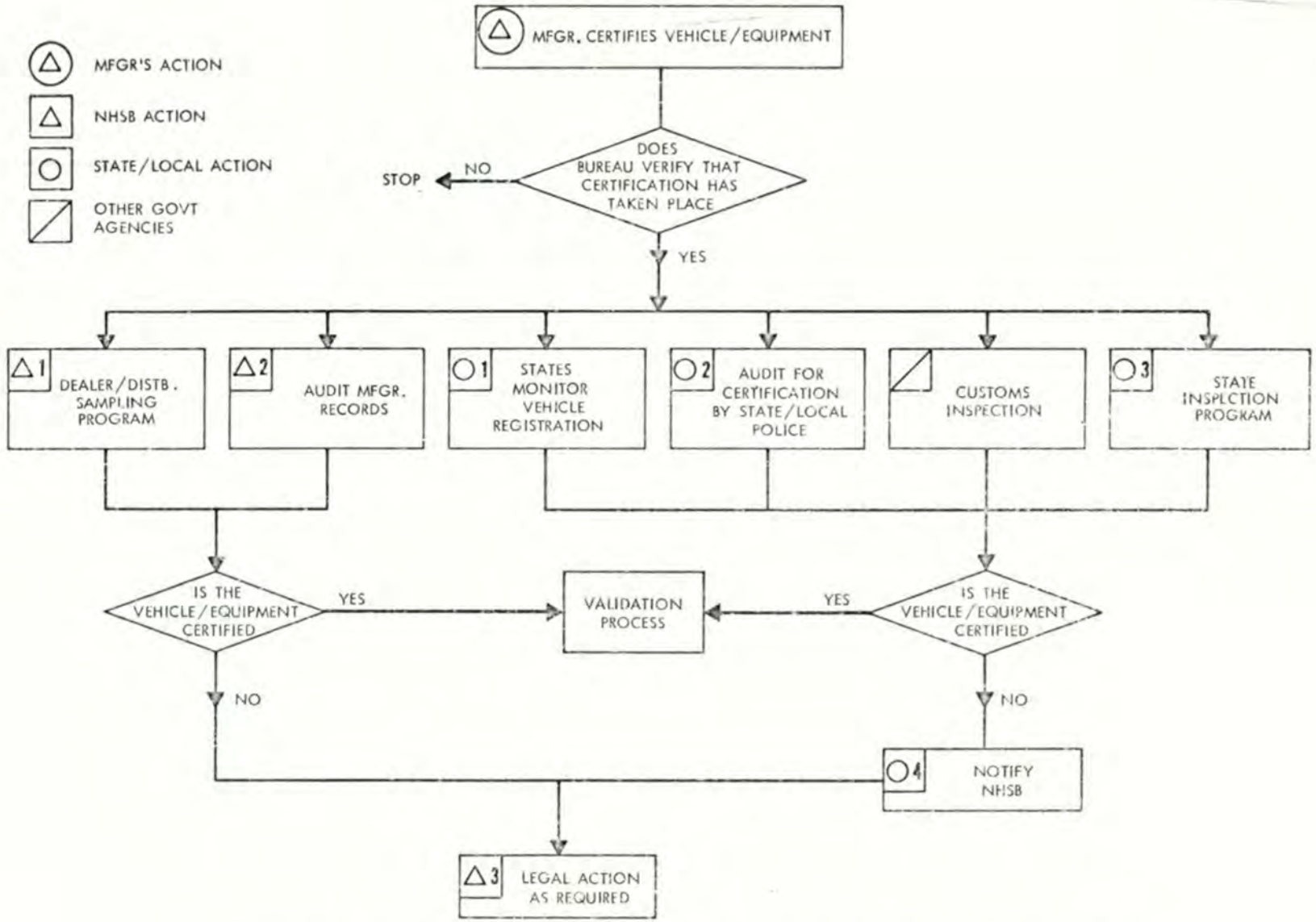

Figure 5 Decision Flow Logic CERTIFICATION-VERIFICATION

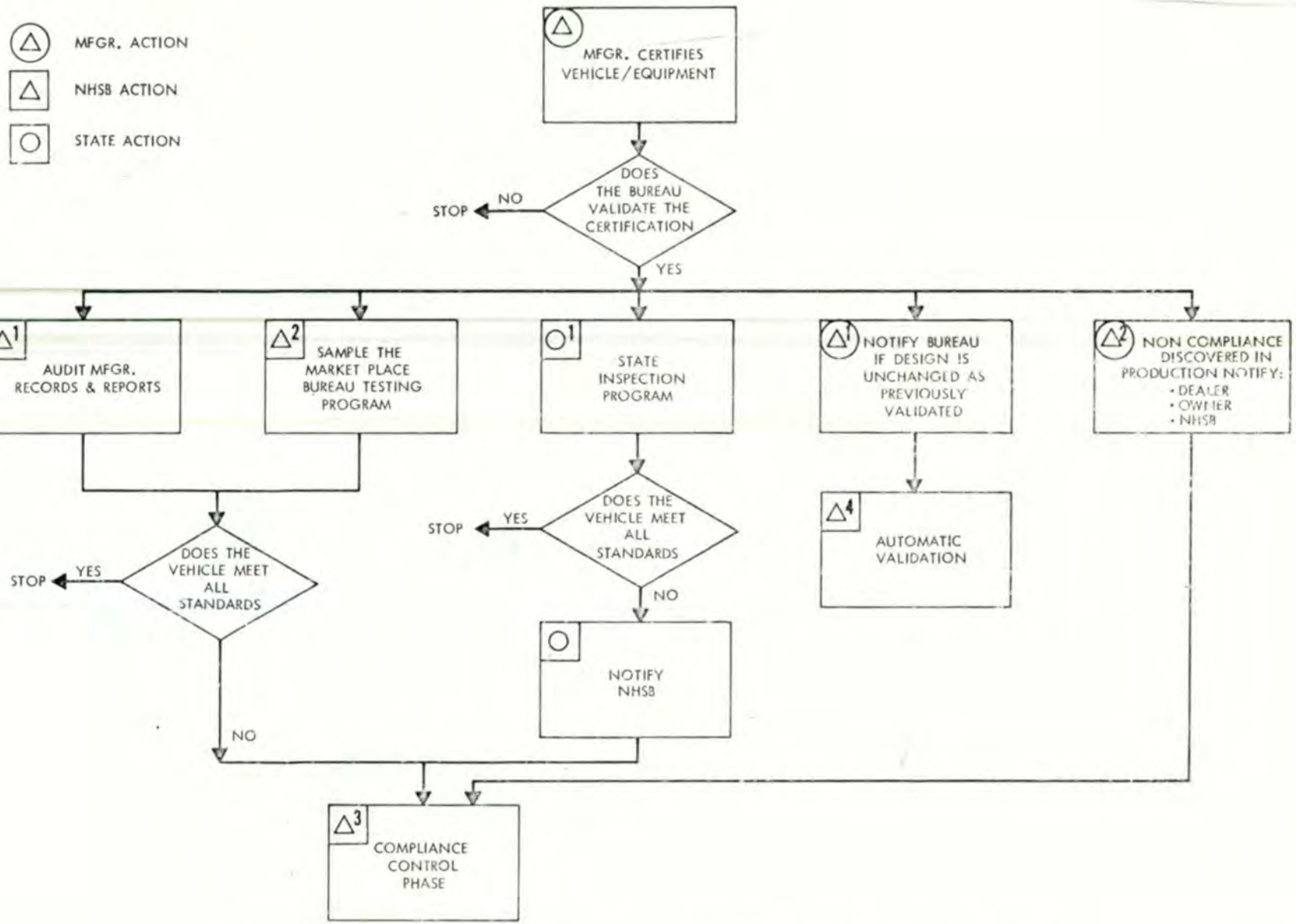

Figure 6 Decision Flow Logic CERTIFICATION-VALIDATION

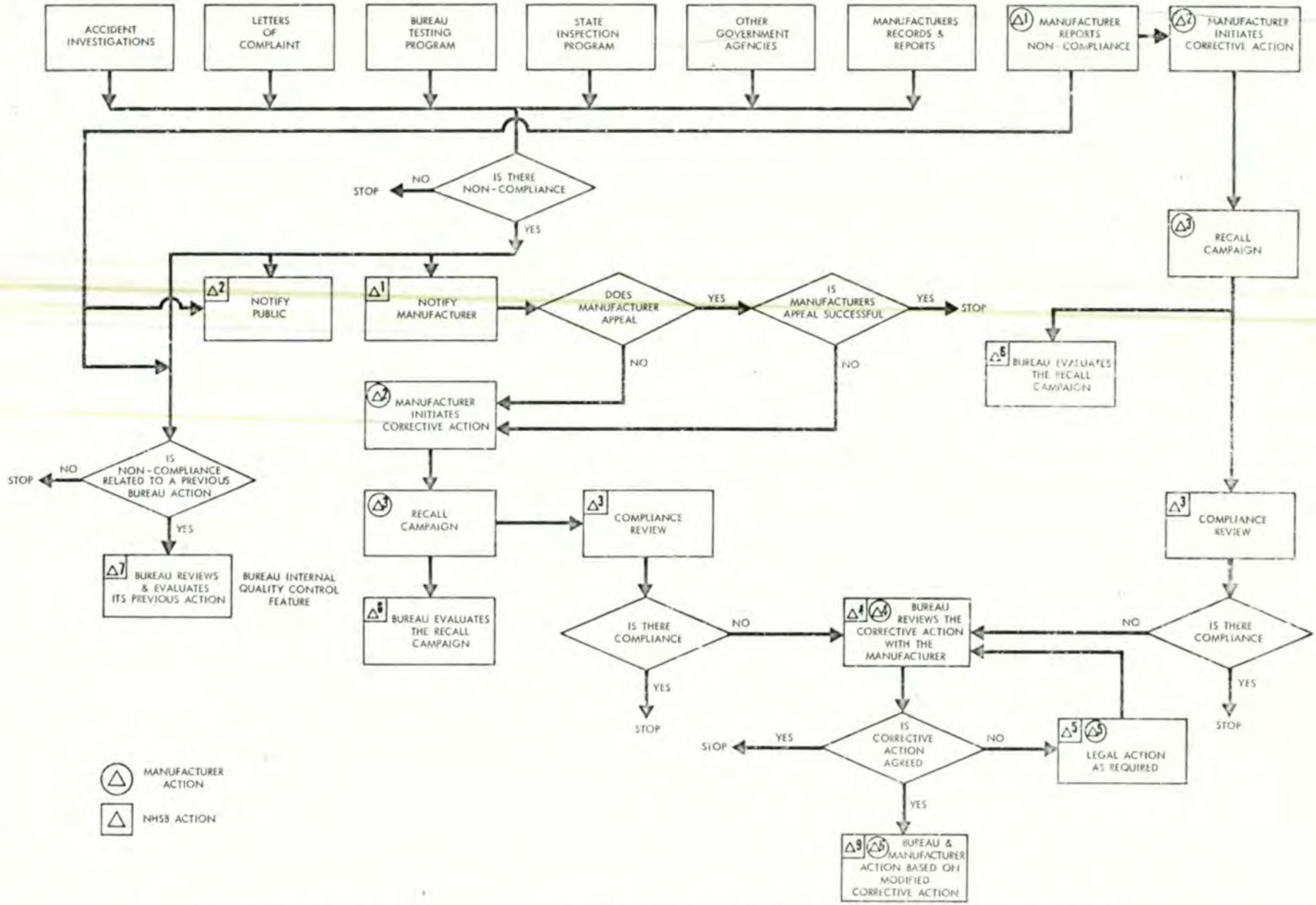

Figure 7 Decision Flow Logic COMPLIANCE CONTROL PHASE (Validation △3

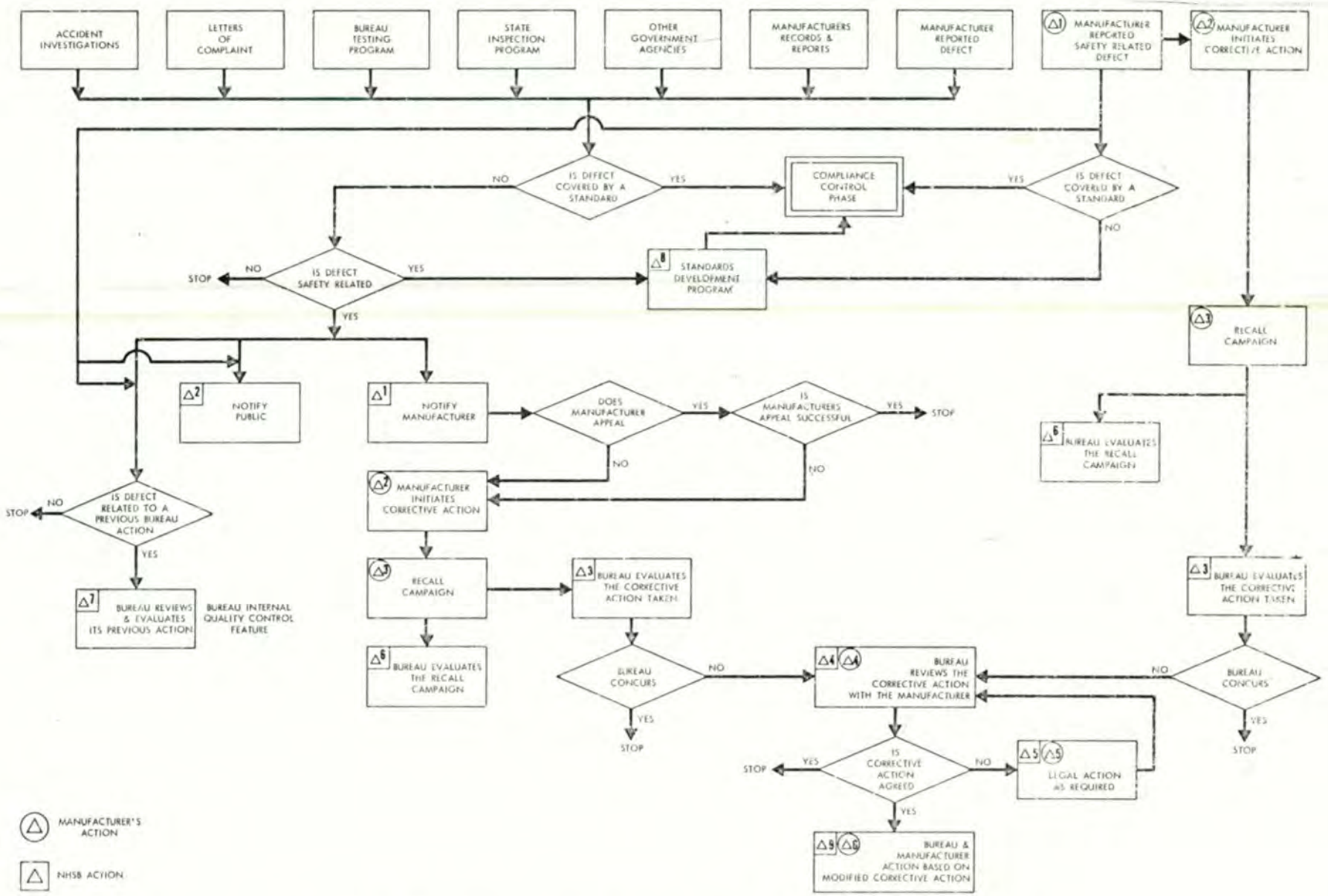

Figure 8 Decision Flow Logic DEFECT CONTROL PHASE

U.S. DEPARTMENT OF TRANSPORTATION
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STATISTICAL VIEWS OF TRANSPORTATION SAFETY

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Presented at
Annual Meeting of the
American Association for the Advancement of Science
New York City, New York -- December 30, 1967

Introduction

A discussion of the statistics of transportation safety is better entitled "the statistics of transportation crashes" because, for all practical purposes, safety per se is not measurable; "nonsafety" or the crash, on the other hand, is measurable. I use the word "crash" rather than "accident" for reasons due to Haddon*.

My remarks today are, therefore, directed toward the crash information system comprised of:

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* Haddon, William, Jr., "The Changing Approach to the Epidemiology, Prevention, and Amelioration of Trauma: The Transition to Approaches Etiologically Rather Than Descriptively Based", Paper Presented at the 95th Annual Meeting of the American Public Health Association, Program on Epidemiology of Traffic Accidents, October 26, 1967, Miami Beach, Florida.

- on-the-scene investigation of the single crash event.
- reconstruction and recording by investigating officers of the facts of the crash.
- encoding of selected items of information for later aggregation for rate computations and other statistical analyses.

The thesis I advance is that, with relatively few exceptions, our present nationwide crash information systems fall far short of yielding data with the reliability required for dealing with the problem. And when the most far-reaching highway safety legislation in history was called for by President Johnson and enacted by the Congress last year, the nation was caught short without anything approaching the kind of information system merited by the urgent request of the President, the unanimous action of the Congress and by an almost unprecedented public interest in arresting the senseless carnage on our highways.

The Dependence on Heuristic Arguments

For example, the introduction of the energy absorbing steering shaft assembly in motor vehicles to meet one of the new Federal safety standards is already demonstrably saving lives. Preliminary evidence borders on the spectacular: reductions in driver fatalities of the order

of 80% appear possible. Translated into reductions in nationwide traffic death tolls, this means that if all motor vehicles used today were equipped with these types of steering shafts, instead of 53,000 annual traffic deaths, there could be less than 40,000, a saving of 13,000 lives each year, or 260 each week, 38 each day.

However, we now can only offer heuristic arguments of this nature, but no statistical proof. Although little more in the way of proof could be expected so soon after introduction of the new advance, even after sufficient time elapses, our nationwide crash information systems in their present form still cannot yield the data needed to demonstrate with statistical reliability that the new steering shafts are saving lives.

Possibly the most important need that these systems presently cannot meet relates to the assessment of countermeasure payoffs, of the overall magnitudes of the national investment that will be required to bring the problem of highway deaths and injuries under control, or the point of diminishing returns in such investments. All ostensibly important program elements share the common goal of reducing traffic deaths and injuries, but almost no valid statistical data are available or can be obtained to aid in assessing their respective values in relation to their costs. When reductions in traffic deaths and injuries do occur, the data provided by present systems do not enable us to partial out the reduction that can be ascribed to driver education, that to motor vehicle inspection, or those to other operating program elements.

The deficiency in our crash information systems for research purposes is equally great. The highway safety field has always been severely handicapped by a dearth of scientifically sound, objective basis for program content. Many widely accepted practices can only be justified now on little more than subjective judgment, and in the absence of objective cost/effectiveness information, many high payoff activities probably are being underfunded, if not ignored entirely, while low payoff programs are being implemented. Stated otherwise, much of the program guesswork that is unavoidable today tracks directly to the fact that highway safety has not until now had anything approaching proper levels of research attention.

Now, as greatly increased research support is forthcoming, our nation finds itself without a crash information system capable of providing very much of the data of a caliber needed for sound research for reasons that I now shall describe.

Validity of Information on the Individual Crash

First, there is a high likelihood that information on the individual crash is not complete or correct. Clearly, all subsequent aggregations of information become suspect if the information on the single event is suspect. Moreover, the issue transcends safety per se because information on the single event may be used:

- in judging whether to issue a criminal complaint against an allegedly offending motorist, or
- in subsequent civil litigation in which heavy punitive damages are sought, or
- in judging driver's license revocation which could compromise the capability of earning a livelihood, or
- in increasing insurance rates.

Whether the citizen goes to jail, pays a heavy fine, has his license revoked, has his insurance cancelled or rates raised -- individually or collectively -- these possible personal consequences of the motor vehicle crash can be strongly influenced by the information resulting from its investigation, and can have profound effects on the personal life of the involved parties.

It is my belief that by and large the investigation procedures followed throughout the nation do not provide adequate information for safety planning; nor do they fully protect the rights of innocent individuals or fully contribute to proper punitive actions of motorists at fault. Our present procedures start with an almost incredible mixture of police actions on the scene of the crash that at once seek to aid injured motorists, keep traffic moving, interrogate witnesses, measure skid marks, remove wrecked vehicles and other debris, take notes and finally reconstruct the details into some semblance of a report.

We later require the investigating officer to act as the principal prosecution witness of the State in subsequent criminal or civil litigation. After an investigating officer, in his first few experiences at court testimony, has been made to look foolish by opposing counsel, or has been reprimanded several times by a judge for offering unfactual opinions, he will begin to adjust his later investigations and reports accordingly. He becomes court wise and learns what to say and what not to say; words that will aid prosecution or harm it, legal traps to be avoided, or statements that might cause his impeachment as an export or at least reflect upon his professional judgment. This, I submit, tends to force him to withhold his best expert opinions on the facts of the case, encouraging instead a sort of bland, neutral, and not particularly illuminating but highly sanitized report that has little in its favor other than it can stand up to court tests.

And this is the building block upon which the nation is to build a meaningful program of countermeasures, to plan resource allocations and to conduct sound research!

Crash investigation procedures have become so highly oriented around anticipated litigation that they do not provide some of the most basic information for the many countermeasure programs that can produce improvements much more quickly than punitive legal actions.

For example, I know of no published statistical correlations between degradation of vehicle brake performance and crash occurrence. Nor are such correlations presently achievable because, to the best of my knowledge, no one as yet is systematically assessing the condition of the brakes of vehicles in crashes, nor comparing them with their counterparts not involved in crashes. We thus are not in any position to justify with crash statistics the obvious need for proper braking performance.

While I do not suggest eliminating the prosecution or litigation orientations, I do believe that major revisions are necessary if the system is to begin to provide substantive information required for other facets of comprehensive countermeasure programs apart from litigation.

Expanded procedures are required for detailed follow-up investigations away from the scene: more information on the personal history of the drivers -- how they received driver training, behavioral and medical histories, clinical records of barbiturates and other drugs in use. More information is needed on the condition of the vehicle; when it was inspected last before the crash; what was its mechanical condition at the time of the crash. But above all, new methods must be developed and implemented to improve the validity of the information being collected on the single event.

The Validity of Aggregations of Crash Data and Rate Analyses

Apart from the validity and completeness of the basic information on the single event, there are substantial problems in combining information from a multiplicity of crashes, and making valid interpretations of the results.

The problem has been studied by a number of authors, but I would like to summarize some of the relevant findings in an earlier paper by myself and two colleagues.*

All uses of aggregate crash information for operational decision-making of one form or another pose this same problem of detecting a stable pattern of crash or crash consequence conditions out of wide fluctuations of relevant statistical data, and to do so at sufficiently low levels of aggregation commensurate with corrective action.

Specifically, present statistical interpretations of these aggregations, make a fundamental mistake in focusing on what I refer to as low alpha-high beta error types of analyses which are appropriate for hypothesis testing in most classical research but not for crash research or operational countermeasure applications. On the other hand, high alpha-low beta procedures which are not too attractive for classical research

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* Brenner, R., Fisher, G. R., and Mosher, W. W., Jr., "Statistical Analysis of Accident Data as a Basis for Planning Selective Enforcement" Report No. 66-49, Institute of Transportation and Traffic Engineering, Department of Engineering, University of California, Los Angeles, June 1966.

purposes, can provide extremely valuable and useful information for most crash and crash consequence countermeasure programs.

The principle, which is developed fully in the earlier work, is that statistical treatments of aggregations of crash data should be geared toward tolerating more false indications of a dangerous change in the death or injury potential of the transportation system in order to reduce the likelihood of failing to detect a real change. In other words, we should choose to err statistically in the direction of "over-safety" rather than "under-safety".

A New Viewpoint on Exposure

The discussion to this point has treated only the statistical interpretation of aggregation of raw accident experience data, and has not considered the statistical interpretation of accident rates in which raw accident experience is divided by some normative measure of exposure. The overall logic is the same, but some new problems are introduced.

This general question of exposure treatments in crash statistical methods is a topic that has been discussed and studied extensively and exhaustively for many years, without yielding a measure that cannot be validly criticized on some account. Without deprecating the importance of developing better exposure data, I nonetheless propose that in our

primary analyses we not contaminate rigorously collected crash data with less reliable exposure data.

In this regard, a new theoretical orientation for crash information treatments would be based on raw totals of the crash events, with limited operation on these data with any form of exposure information such as mileage. Exposure information would, however, be examined as possible explanations of the measured fluctuations in the raw crash and derivative injury and other information totals.

Several factors described in the full paper support this logic. First, the mathematical theory is clearly developed for treating raw event data, but not for treating rates having exposure as a random variable. Second, manipulating relatively exact raw event totals with less exact, if not totally spurious, exposure data can readily confound interpretations without producing any reliable new insights.

Finally, it appears that most operational countermeasures ultimately reduce to responses to raw crash totals being experienced anyway. Consider the example of a given enforcement beat on which the numbers of crashes are high. Even if the accompanying traffic volumes are also high so that a low rate based on vehicle mileage results, substantial manpower would nonetheless be allocated to that beat. This is to say that high counts of crashes and losses will produce operational action regardless of whether or not exposure manipulations yield statistically low rates.

This leads to the challenging proposition that the "causation process" for crashes and crash consequences is the totality of all exposures. Thus the losses that occur should be considered as measuring the multi-dimensional quantity and quality of this exposure hyper-space. The amount of drunkenness and other personal characteristics in the set of drivers using a particular roadway and an inventory of weather conditions that set of drivers encounters are as much a part of that roadway's exposure measure, as is the traffic count.

A high loss experience becomes an indication of something amiss in the antecedent exposure hyper-space; a statistically significant change in losses is an indication of change in some aspect of the exposure hyper-space. Control of the problem starts with isolating where the exposure change is occurring and directing operational action there. One may even argue that all operational actions can be considered to be directed toward influencing or changing some aspect of the exposure hyper-space.

The implications of this proposition are more far-reaching than may be immediately apparent. It leads to replacing as the primary statistical usage for operational purposes the present rate-based statistics with urambiguous crash data unmodified by any exposure treatment. It precludes deliberately or inadvertently overlooking

inherently dangerous environments as a result of operating on loss data with sound or unsound exposure data, but identifies crash loss experience, clearly and unambiguously. Considered judgments as to how these losses relate to the antecedent exposure hyper-space become the primary goal of subsequent analytical processes. Any correlations between the losses and the exposure hyper-space would strongly dictate appropriate operational countermeasures. However, failure to isolate such correlations nonetheless would not prevent proper recognition of loss magnitudes as such and any changing patterns in these magnitudes.

In past scientific history, many phenomena have been observed well before acceptable theories were developed to explain the phenomena. This is somewhat analogous to the situation here. Regardless of whether or not some exposure argument reduces a high loss experience to a low rate, operational personnel will act on the high loss information. The proposed system thus in effect is reflecting the highly rational, realistic practices currently in use by pragmatic operational personnel who cannot wait for research to produce totally unambiguous findings.

Accident Information as Measures of Transportation System Effectiveness

This proposition that statistical procedures be developed around raw loss totals leads directly into my last topic today, namely, crash loss information as measures of transportation system effectiveness.

I would preface my remarks, however, by pointing out that while crashes and derivative information must always be of central importance in planning safety programs and resource allocation, they do not comprise all of the criteria for transportation system performance evaluations. Some obvious other measures of system effectiveness are cost, quality of service, speed and efficiency of movement, amenity and convenience; and there are diseconomies in addition to crashes that are to be minimized such as degradation in quality of the air, increased noise levels and other undesirable environmental effects produced by transportation systems.

I submit that it is rarely possible to relate any one of these measures to another without a major element of subjective opinion and moral or social conscience pronouncements that are matters of personal prerogative. The basis for assigning dollar value to a life lost in a crash are no more objective than dollar assignments to the inconvenience of having to wait an inordinate amount of time on a corner for a bus, or being backed up in a traffic jam extending for miles, or to the consequences of the poor in a community not having adequate transportation to get to job markets, or to the nation as a whole not having an international transportation capability to compete favorably in world markets.

Yet, although we cannot fully relate the measures of effectiveness of these various facets of transportation to each other, we nonetheless

must allocate resources among them. As disdainful as it might sound, improvement of safety must compete for its share of the budget dollar with the improvement of other facets of transportation, which in turn must compete with the promotion of other social purposes, such as housing, education, uplifting of the disadvantaged, and others.

As I stated at the start of my talk, our present information for crashes and crash consequences are not, for practical purposes, geared for this type of analysis, although I would hasten to add that our methods for assessing cost/effectiveness of other facets of transportation system performance or other social purposes such as urban planning are not very much better. But we must develop major new programs of statistical analysis addressed specifically to identifying cost/effectiveness of all aspects of highway safety as well as other programs of social purpose.

It is my opinion that to make substantial progress in safety cost/effectiveness demonstrations we shall have to reorient our countermeasure studies away from the conventional man, vehicle, highway split to a new three-phase categorization* in which:

- The first phase deals with those activities related to the prevention of crashes.
- The second with those factors related to reducing the severity of injuries to occupants of vehicles that crash.

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* Haddon, W., Jr., "A Note Concerning Accident Theory and Research with Special Reference to Motor Vehicle Accidents," Annals of the New York Academy of Sciences, 107:635-646, 1963.

. The third with post-crash measures designed to improve the crash victims' chances of later full recovery.

The sought-for end result of the sequence of activities is substantial reductions in traffic deaths and injuries. And we do not care how the result is achieved -- by phase one prevention of crashes, by phase two lessening of injury severities in crashes, or by phase three post-crash salvage of injured persons. But while the ultimate measure of effectiveness must focus on the reductions of traffic deaths and injuries, we need an array of intermediate measures specific to each of the three phases and composites of the phase-specific measures. Permit me to cite several illustrative possibilities.

Phase 1, in dealing with the circumstances leading up to the occurrence of the crash is measurable by the number of crashes; the severity of the injuries that are suffered is secondary.

Phase 2, on the other hand, subsumes that the crash has occurred and is measured by the severity of the injuries suffered thereby. We might, thus, have a measure of the form hospital bed days of drivers involved in head-on collisions. We might further evaluate differences in this measure for various make-model combinations of vehicles. As an aside, our task of establishing performance values for the energy absorbing steering shaft would have been materially facilitated had measures of this nature been known.

Phase 3, subsuming both that the crash has occurred and that an occupant has suffered an injury of given severity, might have as one of its measures the average time to get medical attention to the scene of an accident.

These are but a few examples of this three-phase orientation of measures of safety program effectiveness. Many other both simple and complex variations are possible from which a new statistical methodology can evolve, I believe much more powerful new tools for safety program analysis than heretofore have been available.

Conclusion

In conclusion, I would reiterate that the purpose of transportation systems is to provide for the movement of men and material for the functioning of the socio-economic complex of modern civilization. Safety per se is not a purpose, but an attribute that we want the transportation system to have. Nonsafety, that is the crash, is a cost we pay in the course of transportation system performance. We pay other costs as well.

We have been reducing this crash cost burden upon transportation system performance; but I believe that much more can be done. In fact, the scientific community and the entire nation are committed to doing so. The challenge is to prove that the investment in improving safety can stand on its own merits and compete favorably with investments in other improvements in transportation system performance.

The need for strong, quantitative methods in safety has never been greater. Nor has the promise ever been greater that quantitative methods can lead to reducing the magnitude of the deaths and injuries in the national tragedy on our highways today --

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