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*Superseded by NCHRP Rept 79*  
**Development of Improved Methods for  
Reduction of Traffic Accidents**

*A staff (NCHRP) digest of the essential findings from the final report on NCHRP Project 17-1, "Development of Improved Methods for Reduction of Traffic Accidents," prepared by John W. Garrett and Kenneth J. Tharr, Cornell Aeronautical Laboratory*



THE PROBLEM AND ITS SOLUTION

The problem of highway accidents is a multi-dimensional one involving a system comprised of man, machine, and environment, and all of the complex interrelationships that are possible between these variables. The objective of this research was to determine and describe improved methods for collecting, storing, and analyzing accident information so that the accident facts derived therefrom can be used by public officials to develop programs that are likely to prevent accidents.

Previous suggestions for the improvement of accident information systems may be described as representing a piecemeal approach wherein system components are improved individually to correct what are regarded as weaknesses in the system. Unfortunately, in too many instances neither the requirements nor the capabilities of the total accident system are considered.

This research shows the shortcomings of commonly used accident record systems and presents ways to improve these systems. A multi-level concept of accident investigation is proposed which involves the basic reporting of all accidents, limited investigation of a selected sample of accidents, and intensive investigation of a limited number of accidents. Studies of accident report forms and methods of locating accidents in the field were included in the research, together with recommended methods for improvement.

As an aid to the practicing engineer, the research included several demonstration studies that illustrate typical accident information that can be extracted by using the recommended procedures and methods. Examples include tire failure versus vehicle speed, frequency of accidents as a function of time since inspection, fatal accident rate by sex, accident involvement according to vehicle manufacturer, and relationships between vehicle exposure and accidents.

## FINDINGS

The shortcomings of presently used accident information systems as listed herein are not particularly new. The value of this research is that the problems, previously delineated mostly through subjective judgment, are now well-documented, and there is no longer any doubt that these problems truly exist. Through the use of the proposed multi-level concept of accident investigation, it is believed that many of the problems listed as findings can now be eliminated.

1. The total state information system, and specifically pertinent non-accident data files concerning the highway, the vehicle, and the driver, are not being brought to bear on the accident problem in an effective manner.

2. The current accident record system does not meet the requirement of providing data for measurement of the magnitude of the accident problem, determination of countermeasures to the problem, or the measurement of the effectiveness of attempted countermeasures.

3. Routine accident summaries prepared by most states are simple tabulations of accident report items (time of occurrence, severity, rural-urban, etc.) and generally are not informative. Consequently, they are of little use for devising accident reduction measures. Statistical analysis and interpretation, and even simple cross-tabulations, could enhance the usefulness of the data, but are rarely employed.

4. Several different agencies are often involved in the collection, processing, and maintenance of accident records. Cooperation between agencies is at a low level and the lack of coordination reduces the efficiency of the system so that processing and transmission of data are impeded. Additional safeguards such as improved report forms and computer consistency edits to prevent or correct errors are needed.

5. Accidents are reported by the police, by the driver/owner, or both. The vast majority are completed by the most biased reporter - the driver. The typical report contains some useful data but, due to biases and inaccuracies, must be used with caution.

6. Accident records involve analysis of a large volume of data. Special studies particularly require competent analytical personnel. The use of statistical personnel in this field is relatively recent and not widespread.

7. On the basis of current data volume and research requirements, it is concluded that a sampling of accident data is sufficient for most research purposes.

8. Useful research data can be obtained by the police if proper training and equipment are provided and appropriate checks to insure accuracy are taken.

9. Few programs of continuing education are available for the practicing engineer. Highway safety research information is not available to engineers at various operating levels.

10. Because of the nationwide scope of the highway accident problem, it is concluded that data collected should be sufficiently compatible to permit meaningful and complete summarization of basic accident data throughout the country.

## APPLICATIONS

The multi-level accident investigation system developed in this research is practical and will permit highway departments to determine reliable accident information that can be used for the justification and programming of highway safety expenditures and, for the first time, have a tool for the accurate measurement of the effectiveness of accident prevention programs such as traffic engineering improvements, law enforcement, vehicle safety standards, vehicle inspection, and driver education. Implementation of the system can be accomplished with minimum difficulty for several noteworthy reasons. Most importantly, the research investigators have had considerable experience in working with practicing state highway personnel, and this fact is reflected by research results consisting of principles expressed so as to permit immediate use in practice; that is, they do not require translation before reaching the practicing engineer, nor do they require combination with other research results in order to be usable. These assets are further strengthened by the fact that the soundness of the principles has been validated through demonstration studies, thereby enabling the practicing engineer to better estimate the probability of success if applied to practice.