IDENTIFICATION OF

DRIVER LICENSING RESEARCH REQUIREMENTS

Elizabeth F. Gilbert

Patricia F. Waller

Livia K. Li

The University of North Carolina
Highway Safety Research Center

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16. Abstract

This project organizes state driver licensing activities into a total system and identifies the research needs which have the greatest potential for crash and injury reduction. The relevant literature was reviewed and summarized and the AAMVA Committee on the Model Driver Services Standard was consulted. Visits were made to four states to observe and discuss their programs. A model driver licensing system was developed and research needs identified. The system emphasizes reducing multiple licenses/records.

Research needs are first ranked by priority. High priority needs are categorized into those that promise crash or injury reduction, those that address fundamental issues that must be resolved to develop better programs, and those that would improve administration and records. Although there are critical research needs in driver licensing that could lead to significant improvements in the driver-vehicle-highway system, only one high priority need promises immediate benefits, that is, that of requiring young beginning drivers to use available restraint systems as a condition of licensure. Other needs promise gains in knowledge that can be used to develop more effective programs, e.g., identify human performance parameters that differentiate between novice and experienced drivers.

It is recommended that consideration be given to combining licensing with other state functions to achieve more effectively goals of mutual interest. Because the driver licensing program is the only state program that has the potential for maintaining personal contact with the majority of the adult population on a routine basis, greater exploration should be made of its potential for providing additional services to the public.

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Technical Summary

This project represents an effort to organize the multitude of state driver licensing activities into a total system and identify the associated research needs which have the greatest potential for crash and injury reduction.

A review of the literature on driver licensing and post licensing control was conducted. The American Association of Motor Vehicle Administrators (AAMVA) Committee on the Model Driver Services Standard was consulted twice to review the project's goals and progress. In addition, visits were made to California, Iowa, North Dakota, and Tennessee to observe and discuss licensing procedures with licensing personnel. Information from all these efforts was used in developing the model driver licensing program and identifying research needs.

The model driver licensing system consists of a prelicensing and permit or license issuance system, a renewal issuance system, an out-of-state transfer issuance system and a driver licensing records support system. The model is designed to provide an efficient means of administering driver licensing while at the same time reducing the probability of multiple or fraudulent licenses.

Throughout the system there is an emphasis on security of the license based in large part upon verification of applicant identity. In addition, there is emphasis on adequate assessment of the applicant's ability to drive. In this regard the model defines currently acceptable minimum and optimum standards for vision, knowledge and skills testing for original, renewal and out-of-state transfer applicants. When these standards have been met, a tamper-proof license should be issued.

A comprehensive driver records system is an essential support system for the model to provide timely driver information to those persons who are responsible for making decisions about driver licensure. At a minimum, the records support system should include a hard copy or a microfiche of the application form, driver history brief file, restriction subfile, crash subfile, driver improvement subfile, medical subfile and a hard copy of the medical file.

Research needs identified are first ranked by priority and then described separately in the report. The high priority needs are further categorized into research needs that promise accident reduction potential, research needs that address fundamental issues which must be resolved in order to develop more effective programs, and research needs that concern improvements in licensing

administration and records. Second and third priority needs are grouped by their topic areas such as driver records, medical concerns, driver identification and so forth. Although there are critical research needs in driver licensing that could lead to significant improvements in the entire driver-vehicle-highway system, only one high priority need promises immediate benefits in terms of injury reduction. This research would address the requirement that young beginning drivers use available restraint systems as a condition of licensure. Other research needs, however, promise significant gains in knowledge that can be used to develop more effective programs in licensing. Examples of such research needs include establishing vision testing criteria by license type and class, establishing procedures for routine screening of medical conditions shown to be related to driving, and identifying human performance parameters that differentiate between novice and experienced drivers.

It is also recommended that the driver licensing program be viewed in relation to other state government programs and that consideration be given as to where it could be combined with other state functions in order to achieve more effectively goals of mutual interest. Many states have combined their licensing programs with organ donor programs, and at least one state has combined driver licensing and voter registration. The driver licensing program could also include routine screening for certain types of health conditions that have been shown to be related to driving performance and for which there are simple, inexpensive, and innocuous screening procedures available. One example of such a condition is hypertension. Another possibility for coordinating state efforts is in the area of literacy. Driver licensing programs could be used as an incentive to encourage the acquisition of literacy skills. These possibilities are discussed further in the report.

Because the driver licensing program is the only state program that has the potential for maintaining personal contact with the majority of the adult population on a routine basis, greater exploration should be made of its potential for providing additional services to the public.

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INTRODUCTION

The driver licensing program is the only state program that has the potential to reach all licensed drivers. It has the responsibility for establishing initial qualification of license applicants and for ensuring within reasonable limits that an acceptable level of functioning is maintained by drivers in order for them to continue to hold licenses. When a driver appears to be having undue difficulty, the driver improvement section of the licensing authority responds with varying levels of intervention. However, driver licensing programs have not begun to realize their potential for influencing the licensed population.

Historically, licensing programs developed largely as a response to a recognized need to identify drivers and establish some minimal requirements for vehicle operation. However, it is probably fair to say that for the most part driver licensing programs have not had the benefit of careful consideration as to how the various components function to achieve a comprehensive system of influencing driver behavior to encourage safe performance. Licensing programs are hard pressed to meet the daily demands placed upon them, some established by law and others by administrative policy. The growing specter of administrative liability has placed constraints upon licensing authorities that may inhibit their willingness to attempt new and different approaches to driver monitoring and control. Changes in well-established procedures will almost certainly require evidence of their effectiveness.

This project represents an effort to organize the licensing area into a total system and identify the associated research needs on the basis of their potential payoff in accident loss reduction. In the course of the project it became evident that there are research needs that do not relate directly to accident loss reduction but which are crucial nonetheless. These include research needs addressing fundamental questions that hold no immediate promise of crash reduction but may eventually lead to far more effective programs than may currently be designed, and research needs to improve the administration and records systems in driver licensing. There are additional needs that promise little or no crash reduction but which are important nonetheless. These needs concern the licensing of the medically and physically handicapped, the elderly, and any other special populations that may not ordinarily be able to qualify for

licensure. Because the function of licensing programs is viewed as including a responsibility to enable as many people to drive as may do so in a reasonably safe manner, these research needs are also addressed.

The project calls for a review of the literature in driver licensing and post licensing control, the development of a model driver licensing system that is still representative of what might exist within a state, and the identification of the future research requirements in this area. The American Association of Motor Vehicle Administrators (AAMVA) Committee on the Model Driver Services Standard was contacted early in the project, and midway through the project a meeting was held with them to review the progress to date. In addition, personal visits were made to four states, California, Iowa, North Dakota, and Tennessee. Discussions with the licensing personnel and observations of licensing procedures in these states were especially helpful in developing the model and identifying research needs.

Research needs are presented first in terms of priority. The most pressing needs are further categorized into those needs that promise accident reduction potential, those that address fundamental issues that must be resolved in order to develop more effective programs, and those that concern licensing administration and records. Additional research needs are grouped according to priority but presented by area of need, e.g., driver records, vision testing, driver improvement.

It should be noted that very few research needs are given high priority, and only one promises immediate significant payoff, namely, the requirement that young beginning drivers use available restraint systems. However, it is believed that the other high priority research needs will build a foundation upon which far more effective programs can be established. Furthermore some of the fundamental research needs will have significance far beyond licensing programs, although they can be justified in terms of their potential payoff in licensing alone.

In addressing research needs, we have taken a far broader view of the licensing function than has traditionally been the case. This has been done while recognizing the growing constraints upon state budgets and programs and the growing concern about government interference. However, it is felt that the driver licensing program can offer far greater services to the public generally and can achieve far more benefits for the tax dollar invested if a more

comprehensive view is taken of the licensing function and how it may logically be coordinated with other citizen needs and goals. The manner in which some of these questions is pursued is of the utmost importance. User groups, including licensing administrators and representatives of affected drivers, should be involved early on in plans for pursuing some of the proposed activities. No matter how worthy a goal may be, programs cannot be forced upon unwilling licensing personnel and drivers. The value of a cooperative approach cannot be overemphasized.

It is recommended that all such efforts should be carefully developed on the soundest information possible and field tested under limited circumstances with careful evaluation procedures applied. Only on the basis of promising findings should there be an attempt to expand the programs.

REVIEW OF THE LITERATURE

The review of the literature is not intended to be exhaustive. Rather, it is an attempt to highlight the major kinds of studies that are relevant to the topic under discussion. The topics covered include four major areas, namely, (1) general considerations, covering driver records systems, some of the medical aspects of licensing, the question of administrative liability, and the qualifications of the driver license examiner; (2) pre-licensing procedures, including driver identification and the various tests administered; (3) the issuance of the learner's permit or the license itself, including some of the administrative procedures used in permit, original, out-of-state transfer, and renewal licensure; and, finally, (4) post-licensing procedures, including driver improvement, the monitoring of public records, suspended or revoked licenses, limited licensure, administrative adjudication, and habitual offender statutes.

General Considerations

There are several areas of concern that underlie the entire licensing program. These include the driver records, which are the backbone of any adequate licensing system; medical aspects of licensure, which concern the overall policies and guidelines for licensing drivers known to have certain medical conditions; the question of administrative liability that increasingly stresses the importance of license administrators establishing and following reasonable procedures in the licensing process; and, finally, the driver license examiner and his qualifications and responsibilities.

Driver licensing records. An effective driver licensing system is ultimately dependent upon the adequacy of the records system that supports it. Virtually every decision that is made about licensing is or should be related to the records. Issuance of an original permit or original license requires a careful check of the records to insure that the person does not already hold a permit or license either within state or elsewhere, and renewal licensure requires checking to make sure that the person is entitled to such licensure on the basis of his record. In addition to the needs of a single state, the increasing mobility of the driver population has led to a growing need for better interstate coordination of driver records.

Jones and Moser (1970) have provided a thorough analysis of what should be included in a driver licensing file. They point out that applicant or driver identification is important for four different purposes. The first type of

identification is termed applicant-record. It is needed to determine if the applicant has other records that would disqualify him for licensure. For example, if an applicant has had his license revoked in another state, it is important for the licensing authority to collect enough information from the applicant to query the National Driver Register (described below) and find out about the revocation. Likewise a state should secure enough information to enable checking its own driver history files. The kinds of information that would be helpful for these purposes include full name, date of birth (month, day, year), social security number, and applicant sex and height.

The second purpose of identification concerns linking the driver to the driver license. This type of information is especially important in law enforcement where the identity of the driver usually must be established during the relatively brief time period in which the driver is stopped. Recommended identifiers for this purpose include a color photograph, sex, eye color, and height.

The third type of identification concerns linking records both within an organization and between organizations. For automated search within an organization, the authors recommend that any identifier may be used just so long as it uniquely identifies a driver and may be used in automated search. For interorganizational search they recommend the use of the social security number and name (including surname, first name, and middle name).

Finally, it is important to have identifying information that makes it possible to link the identity of a person with his identity on the records. This type of identification is called person-to-person and is needed when the license itself is not available. For example, it would be needed when a person appears for a duplicate license because his original one has been lost or stolen or when determination must be made that the person who took the license examinations is the same one to whom license is being issued. (In some states portions of the license examination may be taken at different times and even at different stations.) For this type of identification the authors recommend obtaining the applicant's full name, social security number, sex, eye color, and height.

Jones and Moser do not include date of birth as an identifier for the last three purposes, but it appears that it would be worthwile to add it. They also consider what sort of medical information should appear on the driver license records, the possible sources of such information, and sample medical questions for the license application.

As indicated earlier, the National Driver Register (NDR) is designed to assist states in making decisions about licensing applicants. The NDR is a file maintained in Washington, D.C. consisting of information provided by the states on drivers whose licenses have been suspended or revoked. While input to the NDR is made by most states, few of them routinely check the file prior to issuing a learner's permit or a license. The reason for the reluctance to make use of the NDR information is that most states have over-the-counter issuance of license, and obtaining information from the NDR may take a week or more. As a result, even though the NDR contains information on suspended and revoked drivers, at the present time the information is not likely to be used in the way it was intended. Participation by the states is voluntary, and until and unless major changes are made in the turnaround time involved in obtaining information from it, the NDR is unlikely to fulfill its promise. A report by the General Accounting Office (Eschwege, 1978) points out some of these problems but also underscores the potential value of the NDR.

It should be noted that a recently completed report on the NDR (Blatch, Riviere, Nocerino, and McGuire, 1979) makes recommendations that would lead to major changes in its capabilities and thus make its use much more attractive to the states.

Even if the NDR were completely operative, there would remain major problems with driver license records. These problems stem from the lack of coordination and cooperation among states in reporting to each other and recording the information thus reported. Not only do many states fail to report to the home state about infractions committed in their state by out-of-state drivers, but also, even when such information is reported, many states receiving the information fail to make a note of it on their driver records. Recent budget squeezes in the states have exacerbated this problem. Yet states must recognize that the effectiveness of their driver license programs is no better than the records systems that support them. The decisions made at every step of licensure must be based on sound and complete information that is readily retrievable in usable form. No matter how good the licensing examinations may be, no matter how fine the examiner corps may be, no matter how excellent a medical advisory board a state may have, without an adequate records system the licensing program cannot realize its potential.

Physical and medical conditions. It has been estimated that about 15 percent of the driving population in this country has a physical or medical

condition that might impair the ability to drive safely. It is further estimated that about 15 to 25 percent of serious crashes are attributable at least in part to physical and medical (P & M) conditions that are not related to alcohol (Waller, 1967b, 1968, 1973). Because it has long been assumed that at least some medical conditions may affect driving, and because some states have laws concerning certain medical conditions, e.g., epilepsy, alcoholism, there have been a large number of studies conducted in this area. A recent review of the literature on P & M conditions was conducted by Janke, Peck, and Dreyer (1978) as part of California's evaluation of their policy affecting P & M drivers. The literature on mental conditions, alcoholism, drug use, physical conditions (cardiovascular disease, diabetes, and aging), and lapse of consciousness (epilepsy, narcolepsy, and general neurological disorders) was reviewed and individually summarized in their report. Brainin, Naughton, and Breedlove (1977) have also prepared a literature review in this area.

Based on studies reviewed by Janke et al., it appears that P & M drivers have higher accident rates than drivers in the general population with no known P & M conditions (Davis and Wehling, 1972; Waller, 1965; Waller and Goo, 1969; West, 1963). According to a recent study conducted in Wisconsin (Fuchs, 1978), the rates are even higher for drivers with epilepsy (especially for men). Diabetics have the next highest rates which are still worse than the general population. The crash rates for drivers with cardiovascular and cerebrovascular conditions (except for middle aged men with strokes) are not that different from the overall population rates. Similar non-significant findings for cardiovascular conditions have also been reported by Baker and Spitz (1970) and Crancer and McMurray (1968). Although sudden illness is of some concern, it was found to play a minor role in traffic accidents. When such crashes did occur, they were usually related to cardiovascular diseases. The literature on mental conditions (Buttiglieri et al., 1969; Crancer and Quiring, 1969) suggests that following hospital discharge, drivers with functional mental disturbances tend to have more violations than control drivers, but not necessarily more crashes.

In spite of their higher accident rates on a per mile basis, evidence indicates that aging drivers have very little impact on the total accident picture because they drive slower, drive fewer miles, and drive in less demanding situations (Planek, 1972). However, when problems of aging are compounded by medical disabilities, safety becomes a concern. In a study conducted by Waller (1967a), it was found that elderly drivers (over 60 years of

age) with cardiovascular problems and senility symptoms had significantly more accidents and violations than middle aged drivers living in the same community. Elderly drivers who had senile symptoms but no cardiovascular problems had significantly more accidents than the middle aged drivers. However, elderly drivers with cardiovascular problems and problem-free elderly drivers were not significantly different from their middle aged counterparts. The Waller study points to the importance of not treating the elderly as a homogeneous group.

Several problems exist in attempting to draw conclusions from these early studies. First, drivers known by licensing agencies as having P & M conditions often come to the attention of the licensing agency because of their accidents or violations. Therefore their conditions may, on the whole, be more severe than are those of all P & M drivers. Second, most studies in the literature did not employ vigorous experimental design, and comparisons are seldom made with a control group matched to the P & M drivers on the basis of age, sex, and estimated annual mileage. Finally, there is no single set of criteria for defining all P & M conditions, and therefore the reported results are not readily replicable or even comparable.

To more accurately determine the accident rates of P & M drivers, a pilot study was performed by the California Department of Motor Vehicles in 1976 (reported in Janke et al., 1978). Three year pre- and post-hearing accident records of five categories of P & M drivers (drugs, alcohol, lapse of consciousness, mental, and physical conditions) were compared to accident records for a random sample of California drivers. The age and sex distributions of the control group were adjusted for each P & M group prior to the accident rate comparisons to remove the effects of age and sex on accident rates. Except for the alcohol group, mileages of the P & M groups were reported to be below those of the control group.

The findings from this pilot study indicated that accident rates preceding the hearing for P & M groups were higher than the crash rates for the control group, implying that P & M groups (especially alcohol and drug groups) are at higher accident risk. Following hearing, accident rates decreased for the P & M groups, but their rates were still higher than the rates of the control groups.

The pilot study was later replicated on an expanded P & M population. Drivers with P & M conditions who had received no department action or who had been reinstated from revocation were added to the previous drivers identified through P & M hearing. In addition, a group was added that could be

characterized by lack of skill, mostly elderly drivers. The findings are essentially the same as those from the pilot study. All P & M groups have higher accident rates preceding the hearing than the crash rates for the control group, especially in fatal and injury accidents and in single vehicle accidents striking fixed objects. Drivers in the alcohol and lack of skill groups show much higher rates, followed by drivers in the drugs, physical, lapse of consciousness, and mental categories. After hearing, accident rates of P & M groups decreased but were still higher than those of the control groups. Greater reductions were observed for the alcohol and the lack of skill groups and those P & M drivers whose privileges were suspended or revoked after the hearing. However, since randomization was not used in the study to assign drivers to no action or suspension, it is possible that regression to the mean could have accounted for the observed accident reduction for the P & M drivers in the post-treatment period.

In another part of the Janke, Peck and Dreyer study, an evaluation was made of the effectiveness and the costs of the Department's actions on drivers judged to be at higher accident risk because of their P & M conditions. Drivers with a lapse of consciousness, physical, or mental condition who had been given an order for probation with periodic medical report from the driver's doctor as a result of their most recent P & M hearing, were randomly assigned to one of three experimental groups. These included (1) informal probation in which no periodic medical report was required; (2) probation requiring medical report from the driver's physician at regular intervals; and (3) minimal treatment, i.e., sending a letter with some information on the risk involved in driving with a disability. Subsequent accident records of the three groups revealed no significant differences, but the cost for the probation program with periodic medical report was substantially higher than that of the probation with no medical report or the minimal treatment program.

On the basis of the above efforts, Janke et al. arrived at the following conclusions. First, accident rates of P & M drivers are substantially higher than those of the general driving population and some of the increased accident risk is related to the P & M conditions. Second, despite the higher accident risk, the number of accidents caused by P & M conditions is small compared to the number caused by negligent drivers or by repeated alcohol offenders. Third, there seems to be some improvement in a driver's subsequent record as a result of a departmental hearing. However, since programs aimed at the P & M driver

group are generally more expensive than programs aimed at other driver groups with higher accident risks than the P & M drivers, it is probably not cost beneficial to single out the P & M drivers for suspension or revocation actions. Furthermore, as a group, P & M drivers are generally more responsive to departmental control actions than are negligent operators. Therefore drastic suspension or revocation measures are not indicated for this group.

For some P & M drivers, and especially those with an uncontrolled disorder such as frequent seizure, some form of license control may be necessary. In such cases, less aversive options should be exercised, particularly for P & M drivers with clean records, without sacrificing the safety of the general driving public. Instead of license suspension or revocation, P & M drivers could be given a probationary or a restricted license. Such options are not costly to administer (especially the probation without the medical report requirement), and if enforced properly, pose no traffic safety disadvantage while at the same time permitting the P & M drivers to meet their mobility needs.

Presently, the manner in which P & M drivers are identified for control actions is not entirely satisfactory. As a result not all P & M drivers are being identified systematically. They are usually made known to the licensing agency through driver's self report, report by relatives, or police report in the case of a P & M driver incurring an infraction. More formal mechanisms of identifying P & M drivers should be considered. Several such mechanisms have been shown to be useful according to the study conducted by Brainin, Naughton and Breedlove (1977). The first method requires that the physician report to the licensing agency any patient suspected of being an unsafe driver. The reporting guidelines could be established by the State Medical Advisory Board or by the American Medical Association. Second, hospital and public health departments could report potentially unsafe P & M drivers. An example of guidelines to evaluate drivers with medical problems is provided by Brainin, Breedlove and Naughton (1977). Also risk-increasing and moderating factors are provided with guidelines to aid in evaluating an individual's limitation. Third, police, who in performing their normal duties frequently come into contact with drivers who are involved in crashes or violations that may be caused by P & M conditions, could systematically report such drivers to the DMV. Finally, a hotline could be set up in the licensing agency to encourage citizens to notify the agency about potentially unsafe P & M drivers.

Such reporting to DMV would not imply automatic revocation of driving privileges but rather would call to the licensing authorities' attention the possible need to evaluate the driver further. It should be noted that citizen reporting carries with it some potential problems. Before any action can be taken against a reported driver, in many states the driver has the right to know who reported him and on what basis. The possibility of such divulgence is likely to reduce considerably the number of such private citizens' reports. Without such divulgence, the reporting system could become a mechanism for unfair harassment of drivers.

Ultimately the success of any program for P & M drivers depends upon the cooperation of many groups, including licensing authorities, educational groups, enforcement personnel, the judiciary, medical interests, and private citizens. Because the evidence indicates that P & M conditions do not contribute heavily to the total crash picture, any countermeasures must be relatively inexpensive and must ensure that the driver's rights are not infringed upon in the process.

Administrative liability. Administrative liability refers to the responsibility of administrators acting in their official capacity (in this case the licensing of drivers), that is, the liability inherent in the performance of the job. The literature concerning administrative liability is sparse. Reese (1971) mentions the problem several times in, Power, Policy, People: A Study of Driver Licensing Administration. In discussing testing of driver license applicants, for instance, he points out that tests "imply the predictive validity of the test administered. . . (and) suggest as well, that all applicants are treated alike" (p. 65). Thus, in the opinion of one legal expert in the driver licensing area, a state and its administrators may one day be challenged in court to show the "predictive validity" of the licensing tests -- vision, knowledge, signs and performance. The tests of vision and of highway signs and symbols are probably the easiest to defend as predictive, although it may be extremely difficult to defend a certain minimum standard as being the dividing line.

Hricko (1976) examined potential liability in the licensing of alcoholics. The Uniform Vehicle Code (Section 6-103(b) 3 and 4) (National Committee on Uniform Traffic Laws and Ordinances, 1976) specifies that an habitual user of alcohol shall not be issued a license, and most states have similar laws. In defining an habitual user of alcohol, there may be a problem. Records of police departments and motor vehicle departments showing repeated alcohol-related

convictions could be considered as indication of habitual use. However, Hricko contends that most motor vehicle administrators do not check their own records for habitual users of alcohol, nor do they go further to examine records of alcoholism clinics or mental institutions.

If an individual who is a known habitual user of alcohol is licensed and if such a licensed person then is in a serious motor vehicle accident and is at fault by virtue of his alcohol use, Hricko is of the opinion that the injured party could bring action against the state and the administrator.

Hricko describes one case in which the motor vehicle administrator did not suspend the vehicle registration in a situation requiring such action. The vehicle was then involved in an accident, and the injured party argued that the motor vehicle administrator should not have permitted the vehicle to be driven. The decision of the court was that this was a sovereign situation, that "neglect in performance created no civil liability to individuals" (p. 80).

He describes another case, however, involving a driver convicted of driving while under the influence of alcohol who was enrolled in a rehabilitation program which permitted him to retain his license. The driver had very recently been at fault in an accident, which should have disqualified him from entrance to the program, but the information was not yet available in the field office. Soon after, he was at fault in a fatal accident which occurred when he was again under the influence of alcohol. The state was sued for having permitted the individual to drive. The State District Court of Claims held that the state had been negligent and that the negligence was a proximate cause of the fatal accident. An appeal to the State Supreme Court, however, reversed the finding and directed that the case be dismissed (Hennessee, 1978). The State Supreme Court found that the state's agents were not negligent (and that the doctrine of sovereign immunity had not been waived).

Hricko (1976) is of the opinion that litigation against motor vehicle administrators is increasing. Although at the time of writing, several cases had been decided in favor of the states concerned, most are being appealed. The defenses which have been used by the motor vehicle administrators in these cases have been "sovereign immunity, nonliability for discretionary action and lack of proximate cause" (Hricko, 1976, p. 87). Hricko points out that the records of the motor vehicle department should be consulted, as should the records of "other state departments and applicable federal and local sources of data" (p.

87). Hricko believes that motor vehicle administrators should set up procedures to ensure that appropriate records are consulted.

Hricko (1979) has pointed out that licenses are being issued to individuals whose driver histories contain information that should have kept them from being licensed. Whereas in his earlier paper (1976), Hricko emphasized that states often did not check their own records to determine if an individual should not be licensed, here he emphasizes the need to make use of the National Driver Register (NDR). The NDR can be useful in identifying drivers whose licenses have been suspended or revoked in other states. Most states do not make full use of the NDR, and the reasons for non-use vary. In one state with license-issuing offices that have on-line communication with the state records system, use of the NDR might cause a two-week delay in the (otherwise) over-the-counter issue. Another state cites the cost of use of the NDR as being a deterrent. Yet another state feels that the identifying information on an individual is not sure enough to guarantee the identity.

All of these states have state laws prohibiting licensure of individuals under suspension or revocation. Therefore, in failing to use a mechanism set up specifically to provide information on suspensions and revocations, namely, the NDR, these states act contrary to their own laws. Hricko argues that it is possible that states not making use of the NDR may be found liable in the case of a driver licensed by that state who had been under suspension or revocation in another state at the time of licensing. The numbers of drivers who may be so licensed in the four states of California, Florida, Massachusetts, and New York (who do not routinely search the NDR, according to Hricko) may be 50,000 to 75,000 annually.

It should be noted that not all authorities agree with Hricko as to the potential threat posed by administrative liability. They cite the fact that in no instance to date has a state been found liable upon appeal. It remains for the courts to resolve how significant an issue administrative liability may become.

The driver license examiner. No matter how well designed and developed a driver licensing system may be, ultimately it is no better than the individual examiner who administers it in the local examination station. The attitude and demeanor of the driver license examiner can do much to influence the public, either engendering positive supportive attitudes toward state licensing programs or eliciting resentment and anger toward the system. The importance of the

examiner's role cannot be overemphasized, yet there is very little information about this most important component of the licensing program.

A compilation of information on state and provincial practices (Tritsch and Kumbar, 1977) shows that of the 61 jurisdictions responding, 46 indicated that a merit system or civil service system was used in the selection of examiners. Of the 15 jurisdictions with no civil service/merit system, a variety of application procedures may be followed, for example, appointment by an official or transfer from the State Highway Patrol. Minimum age, where specified, ranges from 18 through 25. Minimal educational qualifications range from an eighth grade education to an undergraduate degree, although most require only that the examiner have a high school diploma. Waller et al. (1978) discuss some of the implications of having license examiners with no more than a high school education:

> "A high school diploma can characterize persons representing a wide range of ability and commitment. The economic health of a state will to some extent affect the attractiveness of the driver examiner position and hence the quality of applicants available for selection. Because of variations in quality of educational systems and economic conditions, it is probably fair to assume that there is variation among the states in the overall quality of the driver license examiner corps. The fact that most states require little or no specialized training beyond high school means that there are very real constraints resulting from the characteristics of the examiners. To a very considerable extent these limitations can be modified by good training programs, both initial and on-the-job. Again, other constraints will dictate the extent to which such training programs are possible.
>
> It is worthwhile to consider what it means to have a driver license examiner corps that for the most part has not gone beyond high school. The driver license examiner must deal with essentially every segment of the adult population including the best educated, the most cantankerous, the physically and mentally ill, the poorly educated in need of special consideration, persons whose race, sex and ethnicity differ from those of the examiner, etc. There may be no other position in state government that requires the versatility in dealing with human nature that is demanded of the driver license examiner. Not only must he be capable of dealing with such a range of applicants, but also he usually has to do so with an audience composed of a variety of other applicants. Recognizing that there are many individual exceptions, it is probably fair to say that most examiners will not be prepared to deal with every type of applicant with whom he is confronted. Realistically we cannot expect the driver license examiner to be an expert in human relations (even though some of them, especially with experience, become amazingly adept in this most difficult area), nor can we expect him to have the knowledge and skill of a trial lawyer (although examiners are

> usually informed of the changes in traffic law, and some become remarkably knowledgeable of its intricacies). It should also be recognized that in this, as in other fields, not every examiner can be expected to be delighted at the opportunity to put in extra time and effort to meet the demands of crowded offices at closing time."

Over one-third of the jurisdictions included in the Tritsch and Kumbar report indicated that examiners were given no initial training, although almost half of these indicated the use of some on-the-job training. When pre-assignment training was given, it ranged from ten hours to over 20 weeks. In 36 of the jurisdictions, examiners are given special training in the conduct of performance tests for the handicapped. Most jurisdictions require that the examiner hold a valid operator's license to administer road tests for licensure to drive a passenger car. Although about half the states have some form of classified licensing, not all require that the examiner be qualified in the operation of other vehicle types in order to administer the related road tests (motorcycle - 9, bus/truck - 11, tractor-trailer - 8). It is well to remember that these data were reported in 1977 and may not be entirely accurate currently.

What qualifications are necessary in order to be able to give the different tests required, i.e., vision, knowledge, understanding of signs, and performance? The American Association of Motor Vehicle Administrators (1967) suggests such basic standards as high school education and proof of citizenship. The AAMVA points out that the examiner should not attempt to be an expert in vision testing (which implies diagnostic skills) but should be skilled in vision screening, which merely indicates whether an applicant has met certain vision standards under certain conditions. No specific comments regarding special examiner qualifications for particular needs are mentioned by the AAMVA. It thus appears that a reasonable degree of intelligence, combined with the ability to work with people, are the major prerequisites for a driver license examiner.

Several course guides for training license examiners are available (for example, Malany et al., 1971), which give a skeletal description of the examiner's job. The interpretation of the material depends largely on the course instructor and the governing principles of the jurisdiction concerned.

The fact that there is very little information concerning qualifications of a driver license examiner suggests that the driver license examiner position has not been given the attention that its importance merits.

Pre-Licensing Procedures

Pre-licensing procedures ordinarily bring to mind the various tests that are administered routinely in all states for original licensure. Usually these include vision, signs, knowledge, and performance testing. However, in addition to these testing procedures, the verification of the driver's identity is of utmost importance and is probably given far less attention in most states than is warranted. Hence the following sections describe driver identification in some detail as well as the various types of tests administered in the licensing process.

Driver identification. There has been little research on making the driver's license a sure and secure document for the identification of an individual. Since the driver's license is by far the most frequently used form of identification in the United States today, it behooves the issuers of the license to examine the identity of the applicant carefully before providing a license. Once a license has been issued in any state, it becomes relatively simple for the individual to obtain other licenses and to retain at least one license in some state (Reid, 1977).

The magnitude of the problem of false identification is not known. In one study of 40,000 licenses, 2.3 percent were found to be fraudulent (Latchaw, 1978). Applying the same rate to the estimated 138 million drivers in the U.S. results in over three million possibly fraudulent licenses. A major study on the criminal use of false identification (U.S. Department of Justice, 1976) provides information on techniques and recommendations for action. Without conscious intent, state driver licensing departments may be contributing to the problem of fraudulent identification.

In recognition of the potential role that licensing authorities could play in establishing and maintaining secure identification, NHTSA and AAMVA have recently prepared a document entitled, "Driver License Applicant Identification and Licensing System Security" (NHTSA, 1979a). The crux of the situation, so far as state licensing authorities are concerned, seems to be the verification that the applicant is, in fact, the individual his documents declare him to be. This positive identification of an applicant must occur first at the time of original licensure where the responsibility falls primarily on the examiner in the field office.

Evaluation of identification documents. Suggestions have been made to help the examiner recognize fraudulent identification (NHTSA, 1978).

Consistency is a major clue. Are the documents consistent among themselves and with the person presenting them? All the documents should give the same date and place of birth and agree with the apparent age of the individual. The NHTSA document describes three types of false identification; a) counterfeit, which is manufactured with little reference to any actual person; b) altered identification, which begins with a valid document and makes changes to suit either a different individual or a specific need of the original individual; and c) an imposture, which may be a valid document but belonging to another individual.

Some of the clues which may indicate fraudulent papers include: a) All documents equally new (allowing, of course, for honest loss by fire, and so on); b) Papers which are evenly dirty across the entire surface; c) Plastic coating unscratched; d) Printing errors (including spelling errors); e) The name of the state typed and not printed; f) Birth certificate number not incorporating the year of birth; g) Impression seals not clear and appropriate; h) Social security number beginning with one of the unissued series (e.g., 600, 800; and 900); i) Photographs on different documents identical; and j) Different documents typed on same machine.

Documents which are presented in support of identity are not all equally valid as identification. Some documents are more acceptable proofs of secure identification than others, as indicated by the following lists published by NHTSA (1979a):

More Acceptable

Birth certificate
Driver license with photograph
U.S. passport
Naturalization certificate
Military discharge papers
Military ID
Home mortgage or lease papers
Transcripts of school records
Non-resident alien registration
State-issued photo ID
Federal agency employee ID
Police pistol permit with photo and fingerprint

Less Acceptable

Voter registration ID
Vehicle registration
Student ID

Selective service card
Employee ID with photo and signature
Baptismal certificate

Reducing the probability of counterfeiting. Documents can be prepared in such a way as to reduce the ease with which they can be counterfeited, hence facilitating the detection of fraud. This issue has been investigated by business interests (e.g., Alan, 1977) and government (e.g., Latchaw, 1978; NHTSA, 1979a), as well as others (Reid, 1977).

Alan (1977) recommends that the identification card (in this case the driver license) bear a color photograph taken with the face turned slightly so as to face over the observer's shoulder, that is, a three-quarter face photograph. In this way, more information is provided on head shape and details of the ear. Alan also describes a method of placing a fingerprint on a grid in such a way that the grid coordinates are used to describe two or three locations on the fingerprint where a noticeable feature may appear. These grid coordinates are coded onto the card so that when its validity is later checked, the coordinates may be located and the fingerprint examined accordingly. Alan also recommends including a signature, a logo printed in two shades of the same color on the license and lamination of the license in plastic.

The birth certificate is usually considered one of the most reliable identification documents and is the basis upon which other documents are issued. Therefore it is important to make the issuance of birth certificates as secure as possible. According to Reid (1977), birth certificates are among the most frequently used documents for securing false identification papers. The Department of Justice (1976) recommends tightening security of the birth certificate, including linking death records back to birth records.

The Department of Justice report also lists suggestions specific to the driver license, including the following:

a) The driver license should be legally recognized as the primary personal identification.

b) Federal guidelines for minimum standards for identification of applicants for identity cards or driver licenses should be established.

c) Voluntary state compliance with federal guidelines should be encouraged.

d) A plan for improvement in the security of state identification cards should be developed.

e) Federal legislation should be passed to prohibit counterfeiting any state identity card in any state and prohibit the use of the mails for application for an identity card.

Furthermore, in order to reduce the issuance of fraudulent licenses, the following recommendations are included:

a) The applicant for an original license should be required to provide several documents in evidence of identity. (Refer to the list of more and less acceptable documents given above.)

b) The applicant should appear in person.

c) Temporary licenses should not be issued unless in an extreme emergency.

d) School groups should apply as a group for permits or licenses.

e) Addresses should be verified wherever possible.

Latchaw (1978) summarizes the research needs in this area, including the need for more effective techniques for establishing driver identity, driver records and vital statistics that are valid and complete as well as responsive, and improved federal-state coordination.

Verification of the identity of the license applicant is important, but it is unlikely that extensive efforts are warranted in most situations. For example, young beginning drivers applying for a learner's permit can frequently be processed without extensive background checking, although it is at this point that careful records should be made of relevant identity information. Routine renewal of license for drivers who have not experienced driver problems can probably be handled without extensive investigation. However, interstate transfer of license and licensure of certain classes of drivers, e.g., operators of heavy trucks, warrant additional effort. The investment of time and effort at this stage will frequently avoid the need for further effort at a later stage. It should also be noted that there is some question as to whether over-the-counter issuance of license is compatible with security of driver identification. From the standpoint of defining a model driver license system, it is clear that ideally permits and licenses would be issued centrally except where all stations are on-line and identification can be readily established in the field office. However, it is also recognized that realistically these are questions that are frequently decided more on the basis of political considerations than licensing needs.

Driver testing - vision. At the present time all states require vision testing for an original permit or an original license, including out-of-state transfer, but only a little over half require it upon renewal (FHWA, 1978). Reporting in 1977, Shinar found that all states, including the District of Columbia, tested for static visual acuity at original licensure. The American Optometric Association (1977) reported that 46 states had a standard of 20/40 (binocular vision) for the static acuity test, although the range for all states was from 20/40 to 20/70. In addition, 42 states tested color vision, 31 tested depth perception, and only 20 tested peripheral vision. At renewal, 31 states tested static acuity, 27 tested color vision, 18 tested depth perception, and nine tested the extent of the visual fields (Shinar, 1977).

Although one intuitively feels that better vision should be positively correlated with better driving, in fact, this relationship is difficult to demonstrate. In the state of Washington, Crancer and O'Neall (1969) investigated the visual characteristics of 285 drivers between 50 and 70 years of age. The drivers were divided into two groups, those with good records (no violation or accident in the previous five and a half years) and those with either two or more accidents and two or more violations in the previous 24 months or with two or more accidents in the previous 12 months. Those individuals who appeared at a certain field office in a two-month period and who met the criteria of the study were required to take several vision tests, including static visual acuity (eight tests), night vision (three tests), visual fields (ten tests), and dynamic visual acuity (four tests). Drivers with poor records showed better vision in nine of 25 tests, and these nine tests were those examining static visual acuity, dynamic visual acuity, diplopia, glare vision, and static screen acuity. Drivers with clean records showed better vision in tests of depth perception, vertical and horizontal phorias, night vision, glare recovery, and visual fields. The drivers with the poorer records thus showed significantly better vision in the tests for visual acuity. Richards (1972) suggests that better visual acuity may give one a sense of competence or superiority which, in turn, may lead to accidents.

Burg (1964, 1968, 1971) developed tests measuring a variety of visual skills and administered them to drivers. Although he found no significant relationships between driving record and a variety of static visual measures, he did find positive relationships with dynamic visual acuity. The federal government sponsored further research in this area, and in 1971 Henderson, Burg, and Brazelton reported on a new vision tester that integrated the most promising vision tests they could develop that appeared to show a relationship to driving.

Further reports related the findings to drivers of trucks and buses (Henderson and Burg, 1973) and provided additional evidence of the potential of the integrated vision tester (Henderson and Burg, 1974).

The prototype integrated vision tester was further refined by Williams and Graf (1975) and is currently being field tested in New York. Because the tests ordinarily used in routine eye exams conducted by eye specialists do not show strong relationships to driving performance, the integrated vision tester required the development of new measures that must be validated. However, this research undertaking represents the most significant progress to date in the field of vision testing for driver licensure.

Shinar, Mayer, and Treat (1975) and Shinar (1977), working with a modification of the integrated vision tester, found correlations between some of the vision tests and crashes. Static visual acuity at low illuminations and dynamic visual acuity showed the most significant relationships to crashes, but the actual correlations were low. Poor performance on tests of static acuity under low illumination appear to be related to nighttime crashes. Central angular movement also showed a relationship to crash data. There was evidence that the relationship between vision and crash experience is strongest for the younger (below age 25) and older (over age 54) drivers. Shinar recommends that further work be performed to identify those specific tests of greatest use for specific driver age groups and that only these tests be used. He also suggests that perhaps testing should be administered only to certain driver groups, such as problem drivers, drivers failing the standard vision test, elderly drivers, accident or violation repeaters, and/or beginning drivers. He further recommends elimination of routine re-exmination of vision until the age of 50.

There is some evidence that color vision is not extremely important in driving, particularly since the standardization of traffic light positions and the slight change in the composition of the green light (including more blue) and the red light (including more yellow), so that they are more distinguishable by persons with the more common types of color deficiencies (Milkie, 1974). Only for the commercial driver has it been suggested that color vision might be necessary.

There is some controversy regarding the role and importance of depth perception in drivers. Monocular drivers use clues such as size and overlapping outlines to obtain depth information. At a distance the monocular driver is at little disadvantage, although the precise distance at which the advantage of binocularity disappears is not agreed upon. Milkie (1974) suggests that this

distance is about 75 feet, while Miller & Dimling (1969), based on a review of the available literature, believe that binocularity may give an advantage up to 1000 yards.

Although there is some evidence that restricted visual fields may be associated with a higher proportion of side collisions, but not total collisions (Council and Allen, 1974), only 20 states test the extent of visual field. Cole (1979) updated and expanded the analyses reported by Council and Allen and again found that drivers with restricted peripheral vision (visual field $\leq$ 140°) did not have significantly worse records than drivers with visual fields of 160° or more. However, the drivers with restricted vision did have more daytime crashes, crashes at driveways, and crashes in which the impact was at an angle or a sideswipe. Interestingly, the drivers with restricted visual fields reported lower annual mileages than drivers with normal peripheral vision, suggesting that there may be some self-restriction operating.

Milkie (1974) notes that the field of attention narrows as speed increases, so that, for example, at 60 mph the area of concentration is approximately 40°. Although Milkie does not relate his findings to the driver with limited peripheral vision, it appears that his data may have relevance for licensing requirements.

There is growing interest in glare resistance and glare recovery and their importance to driving. Crancer and O'Neall (1969) suggest that the measurement of vision under glare and glare recovery may be useful in licensing. Burg (1971), Williams and Graf (1975), and Shinar (1977) have examined vision in the presence of glare and how it relates to driving. Wolbarsht (1975) examined glare sensitivity and driving and pointed out that particles within the eyes scatter light and lead to increased glare sensitivity. Huculak (1978) examined discomfort glare and disability glare and their relationship to the detection of hazardous objects in night driving. Although vision in the presence of glare has been shown to be related to driving performance, Allen (1970) considers the question of glare resistance an academic one, since dirty or scarred windshields are so common that they are likely to affect even the most glare-resistant drivers. (This problem is probably exacerbated with the increased use of self-service gas pumps and the evidence that drivers are not replacing their automobiles as frequently as previously.)

There is clear evidence that vision changes with increasing age. Of particular interest is a recent study by Sivak, Olson, and Pastalan (1979) which examined older drivers (age 62 through 74 years), all of whom had passed the standard vision test for driving and who were then matched with young drivers

(age 18 through 24) on tests of high luminance far acuity. All had normal color vision. It was found that the ability to read roadway signs at night was lower for the older drivers, who needed to be closer to a sign in order to be sure of its meaning. The distance at which the older drivers read the sign was 65 to 77 percent of the distance for the younger drivers. The authors note that the results could also be attributed to a greater reluctance on the part of the older drivers to commit themselves.

Although there is growing evidence that certain types of vision, such as dynamic visual acuity and vision in the presence of glare, are related to driving performance, the findings have not been incorporated into state licensing programs. Should new vision testing equipment be developed and adopted by the states, there remains the question of what options will be available to drivers who fail to pass the new tests. Of course corrective lenses help improve static acuity, but they do not assist dynamic weaknesses. There is some evidence that drivers with somewhat restricted peripheral vision may be taught behavioral patterns that modify performance (Mourant and Rockwell, 1972; Hennessy and Newton, 1977). Although Mourant and Rockwell showed that the search and scan patterns of novice drivers can be altered by feedback, there was no attempt to relate the results to subsequent driving record. It should also be noted that although the subjects trained by Hennessy and Newton showed improvement in recognizing a vehicle silhouette in the peripheral field, when the test and control groups were tested on the highway, both showed improvement and were not significantly different from each other. Thus there is no evidence that the training transfers into actual on-the-road situations.

It is clear that the information on visual skills and driving exceeds what is being utilized in current state licensing practices. Although relationships between measures of certain visual skills and driving performance may not be high, the fact that they are in the right direction and have been found in a variety of studies suggests that they should be incorporated into license examination programs.

Driver testing - signs. It is generally agreed that applicants should be tested on their knowledge of traffic signs. Tritsch and Kumbar (1977) show that almost without exception states administer such tests, often as an integral part of the knowledge or vision test.

Most studies in this area concern the design, visibility, or understandability of the sign and not the validity of the sign test itself.

Dewar and Swanson (1972) reviewed earlier work on sign recognition and concluded that the evidence comparing symbol signs, word signs, and mixed signs

was inconclusive. Some work suggested that symbols alone were most easily understood, yet other studies indicated the symbols associated with words were better. The authors recommend further research on general principles underlying signing, e.g., is the positive sign better than the negative one? Further recommendations include basic research concerning the information processing of unfamiliar symbols and research on standard symbols and their alternatives.

Pollock and McDole (1974) developed an item bank for use in constructing knowledge tests for applicants. Approximately 250 questions deal with signs, symbols, and markings. All questions presented had been tested on at least one group of individuals, and some questions had been tested on as many as three groups. Information is included on test-retest correlations, verbal ability correlations, and distributions of responses.

Carpenter (1976) used some of the Pollock and McDole items in a California study which, among other things, related the test items (both sign-related and other) to the driving record and biographical variables. The strongest relationships to driving record were found for the biographical variables. Compared to other questions, those concerning signs showed weaker (although significant) correlations with both accidents and convictions. Furthermore, these relationships were both positive and negative, that is, for some items a correct answer was related to a good driving record while for others, a correct answer was related to a poor record.

An understanding of laws and safe driving practices provides a driver with a framework on which to develop good driving behavior. Signs, however, provide information that is essential for safe driving. In order to obey a stop, one-way, or exit sign, the driver must understand and act upon the sign. The signs must be clear and unambiguous. Signs, symbols and markings are worthy of as much research effort as other types of knowledge test items.

Driver testing - knowledge. Knowledge tests are required of applicants for original permit or original licensure in all states, and at least a dozen states require such testing at renewal. Almost all states require a knowledge test for out-of-state transfers, reflecting the fact that the written test incorporates questions about the motor vehicle laws of that state (FHWA, 1978). Many states also include questions concerning safe driving practices, as well as an understanding of signs.

The purpose of a knowledge test is twofold. First, the test attempts to insure that those who become licensed drivers have a knowledge of the rules of the road of their state. In this case, the immediate goal is to delay licensure of those who have not reached a certain standard of knowledge of motor vehicle

laws. The laws, of course, are designed to make the use of the highway more orderly and therefore safer. Second, many states incorporate safe driving principles into the test, suggesting that at least one immediate purpose of the test is to promote safety on the highways. Thus an improvement in driver performance appears to be the ultimate goal of a written exam.

With the widespread acceptance of knowledge tests as part of the license examination, it may be expected that there would be clear-cut relationships between an individual's score on the test and subsequent driving record. However, studies in this area differ.

Conley and Smiley (1976) examined the four-year records of over 22,000 drivers and compared errors on the knowledge test with types of violation. Only a few significant relationships were found. Similarly, Wallace and Crancer (1969) studied the four-year records of 235 drivers and found no relationships between scores on the written test and accumulated violation points based on record. Wallace and Crancer also attempted to identify good and poor drivers by the answers to certain test questions. Of 40 questions considered, only ten showed any significant relationship with driving record. However, half of these showed a positive relationship while the other half showed a negative one.

Harrington and Ratz (1978) considered the effectiveness of a written test of law taken at home. A control group was given the usual test at the examination station. Additional groups had the written test waived if there were no crashes or convictions on record for the three years prior to renewal. Two additional groups were selected that had a crash or a conviction in the previous three years. One of these groups took the at-home law test, while the other was given the standard written test at the examination station. There were approximately 15,000 persons in each of the several groups. There were no significant differences among the groups and their respective controls on the basis of subsequent record.

A study by Waller, Hall and Padgett (1977) examined the impact of a North Carolina law waiving knowledge testing for renewal applicants having no convictions for the four years prior to renewal. The waiver of knowledge testing for such applicants showed no significant differences in subsequent driving record.

Other studies have showed more promising results for knowledge testing. Dreyer (1976) examined the subequent one-year record of individuals taking the California written test. Of 8905 drivers, 87 percent were located on the driver file. (Those failing any of the licensing tests did not of course receive licensure.) Test scores were related to total crashes, at-fault crashes, fatal

and injury crashes, and total convictions for original, renewal, and out-of-state applicants. In eight of the twelve categories, better knowledge test scores were significantly related to better subsequent records.

Carpenter (1976) compared two types of knowledge tests, one the standard California written test, and the other composed of questions from the knowledge test item pool developed by Pollock and McDole at the Highway Safety Research Institute (1974). Both tests were related to the prior six-year driving record. Strong relationships were found between both tests and biographical variables. Furthermore, the California test showed relationships between test errors and accidents and convictions in the appropriate direction, that is, more test errors were associated with more crashes and convictions. The other test, however, showed relationships in both directions.

In two other studies, Carpenter (1978a, 1978b) examined the relationships between driving records and scores on the written test. Knowledge of safe driving practices was included in both studies, and in both instances there was an indication that better test scores were associated with better driving records. However, the associations were not significant. In one of the studies (1978a), one subgroup that had taken a test with the safe driving component showed slightly more collisions than the comparison group that took a test based solely on knowledge of law.

Creech and Grandy (1974) analyzed the relationships between knowledge tests and accident and violation history for renewal applicants in North Carolina. Five different test forms were developed according to psychometric principles, and data were collected from all renewal applicants in the state during one week. Demographic and other information was also obtained (age, sex, race, educational level, mileage, age of car driven). Test performance was related to records for the previous four years of driving to determine relationships between test scores and driver history. It was found that there was a significant relationship between good test scores and good records, that is, lower test scores were associated with both more crashes and more violations. With reported mileage taken into consideration, it was found that applicants scoring below the median had 62 percent more crashes than those scoring at or above the median. However, the relationship was not adequate for use in predicting individual driver records, as pointed out by the authors.

The knowledge test poses special problems for the applicant who does not read well enough to take a written test. Apparently all jurisdictions make

some provision for an oral and/or pictorial test for these individuals (Tritsch and Kumbar, 1977). McMichael and Waller (1973) reported that for over 4600 tests given to North Carolina driver license applicants, there were more failures when the oral exam was used. This relationship held when type of license (original or renewal) and area of examination station (urban or rural) were controlled for. The higher failure rate may be related to a higher difficulty level for the oral test and/or a lower ability level of oral exam applicants. On the basis of this work, a new pictorial oral examination was constructed for functionally illiterate applicants in North Carolina (Waller, Hall, Lowery and Nathan, 1976). Every item in the new test was related to driver record and retained only if it showed a significant relationship in the appropriate direction.

In California, Jones (1976) reported an even higher failure rate (51 percent) on the oral exam than that reported earlier for North Carolina (44 percent). For written test applicants, the comparable failure rates were 12 percent for California and 33 percent for North Carolina. Jones investigated different modes of item presentation, e.g., movies, film strips, and picture books, in an attempt to develop a test that was fair for both the functionally illiterate applicants who spoke English and the applicants who spoke only a foreign language. No difference was found among the modes when tested on 152 illiterate and 167 literate individuals, hence a black and white picture book was ultimately chosen. It is recommended that the test be used for both illiterate and literate applicants, since many who are able to read do so with great difficulty (20 percent below third grade level).

According to Reese (1971), the use of tests implies that they are effective in predicting performance. He adds that licensing authorities may one day be required to demonstrate the predictive validity of the tests they use. However, given the operational necessity that tests be brief, it is difficult to obtain more than a minimum of information about an applicant's ability. It should be noted that when tests are carefully constructed according to psychometric principles, the opportunity to obtain a relationship between test performance and driver record is increased (Creech and Grandy, 1974). However, even such well-constructed tests cannot be expected to provide good prediction for individual applicants.

It should be noted, however, that, as with other portions of the driver license examination, only those applicants who pass the test may be licensed.

Consequently the range of performance for licensed drivers is severely restricted, thus seriously limiting the opportunity to discover relationships between test performance and subsequent driving. Because convictions and, to a greater extent, crashes are relatively rare events, the opportunity to discover relationships to test performance is even further restricted. It should also be noted that knowledge of the law and of safe driving practices is no guarantee that the knowledge will be used. On the other hand, if the driver is ignorant of such information, he can scarcely make use of it. It may be that a minimum level of knowledge is necessary but not sufficient for adequate driving performance.

It is not unreasonable to expect drivers to demonstrate minimal knowledge of a state's traffic laws and/or what are considered safe driving practices. It should be borne in mind that the United States has the best traffic safety record of any modern industrialized nation in the world and that, just as crashes are multi-caused, there is reason to believe that our superior traffic safety record is also multi-caused. To the extent that this is the case, it becomes increasingly difficult to demonstrate a strong relationship between any one portion of our traffic safety system and the ultimate criterion, namely, traffic crashes.

Most driver knowledge tests in existence today do not meet the minimal criteria for sound test construction. The fact that, in the one instance in which test items were carefully constructed according to established criteria, a significant relationship was found in the desired direction is supportive of sound knowledge examinations as part of the driver license program.

Driver testing - skills. All states require that an applicant demonstrate ability to drive before an original license is issued, and in some states such testing is required by statute. Such a requirement certainly appears justified, yet it is very difficult to show a direct relationship between proficiency on the performance test and subsequent crash and/or violation experience.

Road performance tests have been addressed at some length by Waller, Li, Hall and Stutts (1978). They point out that the road test may be used as a screening device, a diagnostic tool, or an educational instrument. Although a performance test can determine whether a driver can operate a vehicle, the quality of driving performance is a function of many factors. Whether a

driver uses the skills he demonstrates on the performance test may be dependent upon variables beyond the control of a licensing agency.

Several studies have failed to find a significant relationship between performance on a road test and subsequent driving record. With applicants for original license in California, Ratz (1978b) found no significant relationship between performance test scores and crashes on the driver record in the six months subsequent to testing. In an earlier study, Dreyer (1976) had failed to find a clear-cut relationship between road test scores and driving record. Of 12 driver groups defined by type of application (original, renewal, out-of-state transfer), convictions, and crashes (total, at-fault, injury plus fatal), only one showed a significant relationship (total convictions for renewal applicants). Wallace and Crancer (1969) also found no significant relationship between road test scores and subsequent four-year driving record. Waller and Goo (1968) did report a significant relationship between drivng record and road test scores, that is, applicants with the lowest passing scores on the road test had higher mean individual crash rates than applicants with higher scores. No significant differences were found for violations. McRae (1968), using weighted values for the various road test maneuvers, found significant differences between groups of poor and good drivers (as defined by driver record). Even so, there was considerable overlap between the two groups.

It may not be productive to seek crash prediction from road test performance. Most crashes involve drivers whose records are reasonably good, and the crash-involved population tends to shift from year to year. Hence, efforts to improve overall driving performance should probably occur prior to crash involvement.

Jones (1978a) used intermediate criteria based on performance and perception tests to evaluate driver training curriculum. The performance test appeared promising, although its reliability was low based on a retest two weeks later. Subsequently, Jones (1978b) demonstrated that retesting after a 30-minute interval resulted in higher reliability, suggesting that in the two-week interval used previously the drivers had actually changed. Jones concludes that if performance varies greatly because of mood, stress, general health condition, and so forth, it may be impossible to predict crashes from a performance test. Only if driver variation is slight is such prediction feasible. Subsequently Jones found less variability in the performance of

experienced drivers, suggesting that prediction would be more feasible for this group.

Several studies have shown relationships between the road test and driving record that are in the opposite direction from what would be expected, that is, good performance on the road test was found to be associated with poor driver record. Waller, Hall, and Padgett (1977) evaluated the impact of a waiver of performance testing (as well as knowledge testing) for certain North Carolina drivers. Renewal applicants who had no violations during the four years prior to license renewal and who appeared to be in good physical and mental health were not required to take either knowledge or performance tests. The subsequent records of these drivers showed no significant effect of test waiver, with the exception of younger drivers, who showed some detrimental effects. Drivers with especially poor records were required to take both knowledge and performance tests. Evaluation of their subsequent records showed no beneficial effect, but rather a significant deterioration in their records when compared to drivers with similar histories who had not been required to take the performance test (those who renewed shortly before the test waiver law was enacted).

These findings were consistent with those reported by Harrington (1973), who considered out-of-state applicants transferring licensure to California. The schedule for whether road tests were administered was such that there was no apparent bias in which applicants received them. A total of 15,012 applicants were given a road test, whereas 23,647 applicants had the test waived. When the data were analyzed by age and sex groups, it was found that females in the middle age group (30-49 years) who had taken the road test had significantly more crashes and significantly more fatal and injury crashes when compared to females of the same age group who did not take the test. The differences for the other groups, although not significant, were in the same direction with the exception of the youngest age groups.

In another study Ratz (1978a) examined the effects of a traffic safety film with a long written test emphasizing safe driving or a drive test used in combination with a counseling session for renewal applicants with poor previous records. He found that those applicants who took the road test had a significant increase in fatal or injury accidents. Studies such as these raise serious questions about the effect of the performance test.

More thorough road testing has been suggested in studies conducted in New Jersey (New Jersey Motor Vehicle Study Commission, 1975) and Pennsylvania (Olsen et al., 1969), whereas Cameron and Macdonald (1973) in Australia recommend that road testing be evaluated. Waller, Li, Hall and Stutts (1978) urge that short-term research in road performance testing focus on the development of a road test based on the best information currently available, that road test routes be studied, that information on current state practices be compiled, that road tests as a motivating factor be examined, and that the role of road tests in the licensing of operators of heavy trucks and motorcycles be considered. Over the long term, the authors recommend, first and foremost, the identification of those human performance parameters that differentiate between novice and experienced drivers with good records. The clear definition of these parameters would enable the development of licensing procedures based on measurement of those behaviors known to be related to satisfactory driving performance. Once these parameters are identified, investigation should also be made to determine how amenable they are to training, and driver programs developed accordingly. Furthermore the parameters should be applied to the licensed population to determine the actual capabilities of drivers. This information would then provide a basis for intelligent planning in highway design and vehicle design.

Chapman et al. (1969) emphasize that improvement in driver licensing programs in general is a problem of social change which requires feedback of information to administrators, researchers, and the general population.

Wiener (1974) points out that because courts are considering the driver license more in the nature of a right than a privilege, any test used predictively must be legally defensible if it is to be used as a basis for denial of license. Addressing the legal aspects of driver licensing, Reese (1971) states that the use of tests implies that they have predictive value. If used properly, tests also ensure that all applicants are treated alike. Therefore, although the usefulness of the tests may be in question, from a legal standpoint they are desirable in that they are conducive to administrative fairness. The road performance test may be difficult to support on the basis of research but easy to defend legally, or, as Reese puts it, "accepted as good law even though it is poor science" (1971, p. 70).

Although performance tests may be legally desirable, at some future date the court may require evidence that they are, in fact, reasonable predictors

of performance. However, it may have been a mistake to look to performance tests for prediction. Investigators are dubious about the ability of the tests to predict subsequent driving experience (e.g., Uhlaner and Drucker, 1965). Perhaps it would be more realistic to view satisfactory performance on a road test as a criterion that must be achieved for licensure but which cannot predict future performance since that is the function of many other uncontrolled variables.

License Issuance: Learner's Permit, Original License, Out-of-State Transfer, and Renewal License

All states require the personal appearance of applicants for an original license and presumably for an original permit as well, that is, for the first time a person ever receives a driver permit or license. Ordinarily this occurs in the middle or late teens, and frequently acquisition of a permit or license requires evidence of completion of an approved driver education course. Federal standards for original driver license require personal appearance and the administration of tests covering vision, signs, knowledge, and performance.

California considered the possibility of omitting performance testing for selected graduates of a driver education course, namely, those identified by their instructors as being in the top ten percent of the class in behind-the-wheel performance (Harrington, 1970). Evaluation of the effectiveness of such a procedure led to its rejection, however. It was found that only 85 percent of these selected students passed the tests at the licensing station. At the present time it appears that original licensure should include all the tests mentioned above.

Out-of-state transfer of licensure ordinarily requires vision, signs, and knowledge testing, with performance testing administered at the discretion of the examiner. In most instances performance testing is waived. An evaluation of routine performance testing for these applicants again led to rejection of the procedure (Harrington, 1973). At the present time it appears that evaluation of out-of-state transfers should include vision, signs, and knowledge testing but not performance testing, unless there appears to be a special need for it.

Routine renewal testing appears to offer the greatest opportunity for variation with a view toward greater efficiency for both the licensing agency and the applicant. In North Carolina a careful evaluation of routine knowledge testing for renewal applicants with no convictions for the previous four years failed to show any detrimental effects of waiving such testing for applicants over age 25 (Waller, Hall, and Padgett, 1977). In the same study, performance

testing for renewal licensure of drivers with especially poor records showed no beneficial effects. Similar findings were subsequently reported in California (Ratz, 1978b).

Texas examined the use of home completion of knowledge tests for renewal licensure (Fruchter, 1970). A total of 7,000 renewal applicants were sent a renewal card and a driver handbook. In addition, conditions were varied systematically as indicated below.

1. Applicants not receiving an at-home completion test were divided into those who were told to expect to take a closed- or open-book test at the station and those given no warning of an in-station test.

2. For applicants receiving an at-home completion test, instructions varied as follows:

   a. whether or not they were told to expect an additional test at the station and if told to expect a test, whether it would be the same as or different from the one they took at home;

   b. whether they were encouraged to get help in completing the at-home test or given no such instructions.

3. In addition, some applicants receiving an at-home test were told to expect a short version of the test at the station.

Generally, it was found that the most advantageous condition was the full length take-home test sent with the warning that there would be an additional test at the station and followed by a short version of the test administered by the examiner. This condition led to mastery of the material while at the same time keeping in-station time to a minimum (and hence maintaining lower personnel costs as well as avoiding overcrowding of limited space).

Although knowledge testing has not been found to be crucial for renewal licensure, the application of the findings from the Texas study to original licensure could reduce expenses and increase efficiency. For example, if a lengthy take-home test were provided along with instructions that a perfect or near-perfect score would be required on the shorter test administered at the station, it is likely that applicants would study the material. Adequate testing of the applicant's mastery of the information would not lead to overcrowding of offices. Furthermore, the Texas study found that the combination of the take-home test along with the warning of an in-station test

led to higher test scores, particularly for those groups traditionally considered to be disadvantaged (non-white and lower educational level). Hence, the procedures appear worthy of further investigation.

It should be noted that California has also examined the feasibility of at-home drivers license law testing for renewal applicants with clean records for the previous three years (Harrington and Ratz, 1978). Although they found no differences between drivers taking the at-home test and those taking the tests at the examination station, the use of the at-home test was not considered cost-effective because some groups appeared to show an increase in collisions.

California also studied the effects of "rewarding" drivers with no collisions or convictions for the previous 12 months by sending them a letter extending their license for a year. They were also told if their records remained clean for the subsequent 12 months they would receive another extension. Evaluation of the impact of this procedure found that there were no significant effects on convictions, but the "rewarded" drivers had a significant increase in collisions.

Another part of this study offered an incentive to drivers with one or more entries on their records for the previous year. These drivers were told they would be given a one-year extension on their license if they kept their records clean for the subsequent 12 months. Again there was no effect found on convictions, but these drivers had significantly fewer subsequent collisions.

A number of states have acquired the capability for automated knowledge testing in at least some of their driver license stations. The state of Washington was one of the first to do so and to evaluate applicants' performance (Paulsrude, 1970). Based on a relatively small sample (N = 262), it was found that the failure rate on the automated test was 48 percent, compared to only 20 percent for the traditional written test. At least some of this high failure rate was attributed to the fact that most of the applicants did not expect to be tested in this manner. Younger drivers did considerably better than older ones, with barely a fifth of those over 40 passing the test. Those who failed and were retested later on the same equipment but with different items generally improved their scores and passed on the second attempt. The author identified certain specific problems with the test items that were subsequently corrected but concludes that the testing approach is an effective one.

It should be noted that the administration of a test by automated means as opposed to paper and pencil is probably less important than the quality of the

test items. Unfortunately relatively little attention has been paid to the latter, while considerable investment has been made in the equipment portion of the system. Assuming, however, that items are approximately equivalent in quality, there may still be reasons for considering automated presentation of the test. The most frequently alleged advantages are efficiency of administration (one examiner can monitor a larger number of applicants simultaneously), automated scoring, immediate feedback of correct responses (consequently enhancing learning), potential for random compilation of items so that applicants are not receiving the same test and thus cannot memorize a particular test form, and reduced opportunity for unauthorized assistance from other applicants. The fact that the automated presentation usually includes a color photograph of a traffic situation is also cited as an advantage, although paper and pencil tests can usually adequately depict most situations in graphic form. It should also be noted that automated testing may pose problems for the itinerant license examiner who must carry his equipment from one station to another throughout the work week.

Colorado investigated the possibility of using a mobile driver license testing unit to cover the testing needs in rural areas (Russell, 1970). A special mobile van was modified to incorporate automated testing facilities, including knowledge testing, vision testing, fingerprinting, photo processing, plus the necessary space and equipment to support the testing operation. The demonstration project was considered a success. The mobile testing unit was well received by the public and was sufficient to meet the demands for testing in the rural areas. Furthermore, it was felt that the automated knowledge test was superior because it provided immediate feedback on the correctness of responses. In addition, the mobile van provided uniformity in both testing and facilities throughout the various testing areas. It was also felt that the mobile van was a more efficient means of testing. Although some problems were encountered, these were resolved and recommendations were made concerning future possibilities for improvement. Thus the mobile van for driver testing appears to have promise for meeting the needs of rural communities.

The findings from the studies on modification of the licensing procedures, particularly modifications in the renewal process, raise exciting possibilities for integrating licensing procedures with driver improvement programs. Traditionally driver improvement programs have concentrated on the "problem driver." However, it has become increasingly clear that most crashes involve

drivers who would not have been identified as problems. Hence, meaningful driver improvement must encompass the overall driving population, and the driver licensing program is the only one that reaches each of these drivers individually.

Post-Licensing Procedures

Once the driver is licensed and entered into the records system, the licensing authority has a legal responsibility to monitor that driver's performance and intervene should circumstances warrant it. The various kinds of driver improvement measures reported in the literature are discussed. It has been recommended that licensing administrators monitor publicly available records such as commitments to and releases from institutions for the treatment of mental illness and/or alcoholism. Of course, license administrators have a clear responsibility for monitoring their own records on driver performance and instituting driver improvement procedures when appropriate. In addition, there is a review of the information available on the effectiveness of suspending or revoking driver license, the use of limited licensure for drivers whose licenses have been suspended, the use of administrative adjudication of minor traffic offenses in place of processing them through the court system, and finally, the effectiveness of state habitual offender statutes.

Driver improvement. Driver improvement most often refers to those programs which are designed to help drivers who have experienced violations or crashes. Driver improvement may also take on broader meaning, namely, all of those aspects of post-licensing control of a driver, including the monitoring of suspended or revoked drivers, the use of limited licenses, the examination of public records to identify individuals who may be at an elevated risk of crash, administrative hearings, and administrative adjudication.

The studies reported here include review articles, general studies of driver improvement, studies of specific driver improvement programs, and reports with recommendations.

Review articles. There are several extensive reviews of the literature on driver improvement, notably Kaestner (1968), Goldstein (1973), and McGuire et al. (1975). Goldstein's comments are based not only on the authors' original analyses but also on additional analyses which he performed on the data presented. Goldstein warned against relying on results that do not consider regression to the mean, that is, the tendency for extremes to move toward the mean value in subsequent intervals perhaps showing an "improvement" of 70 to 85

percent. While such great changes are undoubtedly encouraging, in order to distinguish what proportion may be attributed to the specific treatment, careful controls must be established. If it is intended that multiple tests of significance be made, Goldstein urges that more than one control group be selected. If this is not done, any abnormality which may exist in a single control group may affect the resulting comparisons. Griffin, Powers and Mullen (1975), addressing regression to the mean, note that driver improvement programs (and highway improvement programs as well) are areas in which the problem has been particularly acute. They note, "All before-after evaluations are highly suspect, logically" (page 36).

McGuire et al. (1975) comment on the reviews by Kaestner and by Goldstein, indicating the great value of Goldstein's review but citing disagreements with some of his interpretations. For example, McGuire et al. conclude that individualized programs may not be more promising than group methods. They also feel that at least certain studies were conducted carefully and thoroughly enough to be valid, whereas Goldstein felt that no study was sufficiently rigorous. They provide a useful table summarizing 24 studies, including author and date; significant differences between treatment and control groups (accidents, convictions, both); time studied after treatment; and treatment type (including numbers in the different groups). They report about 25 percent of the treatments analyzed showed some significant effect on subsequent crashes for certain subgroups. Even more (36 percent) showed a significant effect on subsequent convictions, again for certain subgroups. Together, the reviews by Goldstein and McGuire et al. provide a valuable survey of the driver improvement area. The present review will concentrate on studies not covered in these two reviews.

General studies of driver improvement. Several of the reports reviewed consider background data for driver improvement actions or for the design of a driver improvement system. Waller and Li (1975) and Waller and Padgett (1975) examined North Carolina driver improvement clinic participants and found them to be different from the general population of drivers in several respects. Clinic participants included more younger drivers (especially under 25), more males, more non-whites, and were more often separated or divorced, were more often in semi-skilled or unskilled occupations, and reported higher mileages than the average. The rather extensive driving reported appeared to be

one of the factors leading to attendance at the clinic, as did inexperience and driving while under stress.

Miller and Dimling (1969) point out that it is not rewarding to seek out a small number of accident-prone drivers so as to remove them from the highway to promote highway safety. Ferriera (1970) found that about six percent of drivers accounted for about 50 percent of crash involvements in a two-year period. Although the six percent are definitely overrepresented in crashes, the phenomenon is time-sensitive in that in the next two-year period the same six percent will account for only a very small fraction of the total crashes. As a result, if all crash-involved drivers were removed from the road, there would be very little effect on the total crash experience during the subsequent time-period. Similar findings have been reported by Forbes (1939); McGuire (1970); Peck, McBride, and Coppin (1971); and Stewart and Campbell (1972).

Studies of specific driver improvement programs. Evaluations of driver improvement programs show conflicting results. Some indicate no reduction in crashes or convictions following the driver improvement treatment, whereas others show some improvement in the subsequent measures.

It has been suggested that the most productive approach to driver improvement may be to increase the level of performance of the general population of drivers. Anderson (1977) studied the effects on subsequent crash and conviction data of different types of informational material mailed to a large number of California drivers. Seven traffic safety booklets were produced falling into three categories, namely, general information on hazards and ways to minimize them, information on human factors involved in safe driving, and information on signs and street markings. The booklets were mailed to over 50,000 drivers while a control group of over 20,000 drivers received an innocuous change of address contact from the Department of Motor Vehicles. An additional control group of over 20,000 drivers experienced no contact from the Department. On the basis of the subsequent six-month crash and conviction records, no significant differences were found among the groups. On the basis of this study, it appears that an attempt to reach the general driving population with driver improvement information does not result in a detectable change in subsequent driving record.

A recent study by Salzberg, Paulsrude and McMurray (1979), available in draft form, examined the effectiveness of Washington's "narrative driving" program. The narrative driving program teaches the driver to ask himself

questions about his driving environment as he drives and to attempt to answer the questions as the environment unfolds. The technique is designed to counter inattention and preoccupation which are seen as reasons for crashes especially among more experienced drivers. Two groups were drawn from a register of probation and suspension drivers and a list of collision and violation drivers. The study group (N = 397) received the narrative driving program, while the control group was sent information from the Department of Ecology. Non-deliverable letters provided names which were removed from the study.

Measures examined to determine effectiveness were, (1) the proportions of drivers who had one or more violations or crashes in the year following the program, (2) the change in overall violation and collision rate from the year before to the year following treatment, (3) the violation and collision means for drivers experiencing infractions, and (4) the mean time to first collision or violation. The results showed significant reductions in the proportions of older drivers having either collisions or violations. Drivers from the probation and suspension list showed improvement only with respect to violations. Thus it appears that the narrative driving program may possibly benefit at least certain subgroups of drivers.

A study by House and Waller (1976) examines certain driver improvement actions in North Carolina in 1967. Comparisons were made between individuals who met with a hearing officer and attended a clinic and ones who failed to do so. The authors emphasize the inherent weaknesses and biases in the study, such as regression to the mean and non-random assignment. The differences between the groups were slight. For certain subgroups the clinic attendees had fewer subsequent citations, while, for other subgroups, those who failed to attend clinics had better records. Two different types of clinic curriculum were evaluated, one developed over the years by the Department of Motor Vehicles and emphasizing attitudinal change, and the other, the National Safety Council Defensive Driving Course. Differences between the two kinds of curriculum were slight, although males showed slightly better records with the traditional program and females with the Defensive Driving Course.

Salzberg and Klingberg (1977) examined the effectiveness of three versions of the Defensive Driving Course. One version was associated with significantly improved citation and crash records, while another version showed some improvement in subsequent citation record. The authors emphasized problems with

the interpretation of the results because of non-random assignment to groups and sample bias.

Knighton (1976) evaluated the effect of a defensive driving course for violators in Utah. The 500 drivers attending the course had experienced 1102 convictions the year prior to attendance. In the two years following the course, the drivers experienced only 401 convictions. In the seven years following the course, only 17 of the 500 drivers were involved in any other driver improvement action. However, the study does not include a control group, so it may be assumed that most if not all of the effect identified can be attributed to regression to the mean.

The most promising driver improvement program appears to be the Group Educational Meeting (GEM) administered by California as the department's first in-person contact with the driver. Preliminary evaluations have shown that drivers who participated in the GEM program have a significantly lower accident rate (but not conviction) than drivers in the control group (Marsh, 1971). Because of the differential effectiveness of the GEM program on accidents and convictions, another effort was recently undertaken by California in order to improve the GEM program (Marsh, 1978). The original GEM program was compared with three modified versions of GEM and two non-classroom programmed learning techniques. It was found that the GEM's accident rate was significantly lower than that of the control group during the first six months. None of the modified GEM programs was superior to the original GEM in reducing accidents or convictions during the first six months. Furthermore, all programs except one of the non-classroom programs (with homework and without incentive) were effective in reducing subsequent convictions. Consequently, the original GEM program was retained as the intermediate driver improvement program between the warning letter program and the individual hearing program in California.

Recommendations. Several reports include recommendations for driver improvement programs. Chipman and Morgan (1975) examined age, sex, license class, previous accidents, and points (based on convictions) to determine which factors best predicted future collisions. The points proved to be the best predictor. This finding suggests that points may be the best basis for selecting candidates for driver improvement measures.

Waller (1974) recommends that driver improvement measures should be based on the reasons for a particular driver's problems. Since some drivers do poorly because of lack of sufficient skill, perhaps applicants who barely pass the

performance test for licensure should be retested. Other poor drivers may be skilled, but lack sufficient experience. These drivers should be studied to determine the types of driving errors they make and then trained specifically to meet these deficiencies. Waller also recommends reducing the penalties for driving while intoxicated so as to increase the likelihood of conviction. He also recommends that there be a required statement regarding alcohol involvement on all citations for whatever reason.

Edwards and Ellis (1976), working with eight groups of drivers who had been through a driver improvement program in Texas, devised an equation to predict the reduction in crashes and violations in the year following driver improvement training. They found that the specific rehabilitation and training program did appear to be associated with improvement in the subsequent year's record for certain subgroups of drivers. It is not clear, however, how either the equation or the study as a whole deals with the phenomenon of regression to the mean.

Peck (1976) points out that it is not realistic to anticipate high correlations and large treatment effects of driver improvement programs. He stresses the importance of experimental replication, random assignment, studies of effectiveness routinely produced by computer, great statistical power, and cost-benefit analyses. He notes that driving is a complex function and that crashes are not a direct measure of behavior. Probably more often than not a particularly unsafe driving act does not result in a crash so that unsafe driving is reinforced. Furthermore there are times when good driving may result in a crash.

Kadell and Peck (1979) examine the relative costs of four driver improvement programs (warning letter, GEM, individual hearing and probation violator hearing) in California in relation to their effectiveness in reducing crashes. They found that the GEM was the most cost beneficial program, especially after adjusting for the follow up treatment effects. To illustrate, marginal program cost for the GEM is $14.91 as compared to $.83 for the warning letter program, $43.34 for the individual hearing and $56.23 for the probation violator hearing. However, the GEM program saved almost as many accidents per 1000 programs as the individual hearing program (17.12 as compared to 18.77). In contrast, the warning letter and probation violator hearing programs saved only 1.24 and 9.16 accidents per 1000 programs respectively. Thus, the GEM appears to be the most promising approach to improving the performance of the near-problem drivers.

Monitoring of public records. Certain persons are considered such poor driving risks that they should not be licensed. The Uniform Vehicle Code (Section 6-103 (b) 3 & 4; National Committee on Uniform Traffic Laws and Ordinances, 1976) specifies, for example, that an habitual user of alcohol should not be issued a license to drive. Many states have laws to that effect. Hricko (1976) contends, however, that most driver licensing authorities do not routinely consult their own records to determine if an individual has had repeated convictions for driving while under the influence of alcohol (DUI). Yet repeated DUI's are considered one of the indications of a problem drinker (U.S. Department of Transportation, 1968). In those states where a statute prohibits licensure of habitual users of alcohol, if licensing administrators do not check their own records before issuing license, Hricko believes that they are not in compliance with their own state laws. Therefore they could be held liable if license is issued to someone with repeated DUI convictions. State licensing agencies are even less likely to check other public records, such as those from state institutions for the treatment of alcoholism or mental illness.

In a later paper, Hricko (1979) points out that licensing authorities frequently do not routinely check the National Driver Register (NDR) to determine whether a person applying for a license in their state may already be under suspension or revocation in another state. According to Hricko, in failing to check the NDR in such instances, the administrator may be liable since he is not using a system specifically established to prevent the licensing of persons with suspended or revoked licenses.

Jones and Moser (1970) found that most state licensing authorities do not routinely obtain information from medical institutions, even though it is not usually considered an invasion of an individual's privacy and in most states such checking is considered legal. Out of 36 states responding to questions, four reported that they routinely check information from acute general hospitals, 11 checked with psychiatric hospitals, eight with institutions for mentally retarded, 12 with institutions for the blind, five with rehabilitation centers or institutions for alcoholics, and five with institutions for epileptics.

Lacey, Stewart and Council (1979) identified certain driver groups who are at high risk of having an alcohol-related crash. Among others, persons who were recently divorced and persons who were recently released from prison fall into the high risk groups. Divorce records and records of prison release are public

information, and routine monitoring of such records could help identify persons in need of special attention. It would probably not be wise for the driver licensing agency to contact these people, but perhaps some special advice could be routinely provided by persons already having contact with these individuals, e.g., divorce lawyers, court personnel, or prison personnel.

Clearly the use of public records for the identification of drivers in need of special consideration raises the specter of "Big Brother," and any activities in this area must be handled with discretion. Legal and ethical questions must be resolved regarding the access to and use of information in various records systems. The role of state and federal laws concerning privacy, privileged relationships, and freedom of information need greater clarification in regard to driver licensing and the responsibilities of licensing administrators.

License suspension or revocation. Suspension is the temporary removal of the driving right/privilege, and revocation is the permanent lifting of the permission to drive. Although these are the exact meanings, the words are often used interchangeably even in state statutes. Suspension usually refers to a relatively brief period after which the driver license is revalidated. A revocation, however, may be for a period of several years, although usually not a permanent prohibition on driving. Often a person, seeking reinstatement as a driver after revocation, begins anew in the licensing system, going through all the testing and acquiring a new driver license number.

In a study by Kaestner and Speight (1974), evaluating the effectiveness of suspension in reducing subsequent violations or accidents, drivers eligible for discretionary suspension were either not suspended, suspended, sent a letter of last warning, a choice of a probationary license instead of suspension or a choice of taking the Defensive Driving Course (DDC) instead of suspension. The results indicated that the probationary license and the DDC were more effective than suspension, in that a higher proportion of drivers drove one full year without a moving violation or a chargeable accident. It therefore appears that suspension is not as effective a countermeasure as the probationary license and DDC.

The only instance in which suspension appears to have any safety benefit is for drivers convicted of multiple Driving-Under-the-Influence (DUI) offenses (Hagen et al., 1978). There, license suspension was compared with participation in an alcohol abuse treatment program and multiple DUI offenders who received a suspension sentence had at least 30 percent fewer convictions or accidents than

drivers who had not received the mandatory suspension or revocation sentence. However, for the majority of drivers under suspension, suspension does not seem to be a very effective traffic safety countermeasure. This could probably be attributed to the fact that suspension was frequently not enforced and therefore not observed by these drivers.

It is known that many individuals drive even while their license is suspended or revoked, although the extent of the problem cannot really be known. Usually detection of such driving is discovered only if the driver is stopped for a subsequent violation or crash. The estimates of the number of persons with suspended or revoked licenses who nevertheless drive range up to 80 percent (New York Department of Motor Vehicles, 1975). Kerrick (1974) has estimated that at least ten million unlicensed drivers are on the road on any given day. He includes in this estimate not only those under suspension or revocation but also those with expired licenses and those who cannot qualify for a license. Coppin and Van Oldenbeek (1965) have reported that in California approximately one-third of suspended drivers are subsequently detected through a crash or violation citation, while for revoked drivers the proportion is approximately two-thirds. Based on spot checks over a six-month period, Michigan estimated that 60,000 drivers were using the highways without a valid license. This is approximately 1-1/2 percent of the total number of licensed drivers in Michigan. Again, this figure includes not only those with suspended or revoked licenses but also those with expired licenses or no licenses (Hricko, 1970). In 1968, Montana arrested approximately 1-1/2 percent of their driver population for driving without a valid license or while under suspension or revocation (Hricko, 1970). It is believed that persons whose license has been suspended or revoked may be overrepresented in serious and fatal crashes, but because such drivers may carry additional licenses from states where their driving privilege has not been suspended, it is difficult to determine the extent of such a problem. A recent study on suspended and revoked drivers has estimated that such drivers are involved in four to 14 percent of all fatal crashes (NHTSA, 1979b).

Suspension and revocation may be imposed as a punitive measure but is also used as an attempt to protect others. Mandatory suspension for conviction of a felony involving the use of a motor vehicle may be imposed for the larger public good even though the driving per se may have been satisfactory. In other instances, suspension or revocation is imposed because the driver is considered dangerous to others on the road. The determination that a driver poses a hazard is not easy, although some sort of a point system is often used.

Once an individual's license is suspended or revoked, most states attempt to recover the actual document from the driver. The licensing authority may send a mailed request for the return of the license. If this approach fails, a police officer may be sent to collect the license. In some instances the court recovers the license at the time of conviction, and in at least one state the license is taken by the arresting officer who issues a temporary driving permit in its place. The permit is valid until the scheduled court appearance. Failure to appear leaves the person without legal permission to drive.

McGuire and Peck (1976) have pointed out that suspension and revocation are unique sanctions in that they depend upon the cooperation of the erring driver. The problem of effective enforcement of license suspension and revocation is one that has not been solved. It is partially for this reason that alternative measures are being sought. The limited license, addressed more fully in the following section, is one such alternative.

Limited licenses. A limited license may have different names, e.g., hardship license, occupational license, limited permit, restricted permit, or conditional driver's license (English, 1977). English describes four conceptual approaches to limited licenses that differ in the reasons given for issuing the license. First is the hardship approach which requires that the applicant show that loss of license would result in undue hardship. Usually such a license also carries restrictions. Second is the restricted approach which does not require demonstration of hardship but assumes that it would result and therefore allows only a limited license with suitable restrictions. Third is the professional driver approach which automatically gives special consideration to persons who have high exposure because they drive professionally. Finally is the rehabilitative approach which allows driving to occur only if the person complies with certain conditions, e.g., completing a driver improvement course. The Uniform Vehicle Code does not endorse hardship or limited licenses *per se* but does incorporate a rehabilitative licensing concept.

The limited license concept has come about because of reservations about the effectiveness of license suspension and revocation. The major source of dissatisfaction is the evidence that many drivers whose licenses are suspended or revoked continue to drive, perhaps as many as 80 percent (New York Department of Motor Vehicles, 1975; Coppin and Van Oldenbeek, 1965). Since the suspended driver who drives is usually discovered only when involved in a crash or violation, these are only estimates of the number caught driving during suspension.

Kaestner and Speight (1974) studied 505 Oregon drivers who had been convicted of driving while under suspension. (This study is also discussed in the section on License Suspension or Revocation.) The authors found that the effectiveness of suspension was less with each succeeding suspension, as indicated by the shorter interval to the next charge of driving while suspended. Of course this finding probably reflects a selection process rather than a diminishing effect of license suspension. Drivers for whom suspension is not effective are probably less affected by any driver improvement measures, whether they be warning letters, special interviews or courses, or license suspension or revocation. Such drivers are therefore more likely to be detected through subsequent driving violations while under license suspension. It may also be that suspended drivers are kept under closer surveillance by local enforcement personnel and hence more subject to subsequent apprehension.

The Kaestner and Speight report also describes a separate study in which questionnaires were sent to 250 drivers whose licenses had recently been reinstated following suspension. All questionnaire recipients were guaranteed that their responses would be considered confidential. Based on a single mailing, the response rate was about 44 percent. Of those responding, 52 percent admitted driving during their suspension. Furthermore, almost half of these reported driving 21 or more times during their 30-day suspension. It is reasonable to assume that these reports are probably on the conservative side. It should also be noted, however, that drivers tended to report exercising greater caution while driving under suspension.

A second reason for seeking alternatives to suspension is the belief that courts, and especially juries, are reluctant to impose such a severe penalty because of the hardship that may result. If a charge carries with it mandatory suspension upon conviction, the charge may be reduced through plea bargaining or, if not reduced, the defendant may be acquitted. At one time North Carolina law imposed mandatory one-year license suspension upon first conviction of driving under the influence of alcohol (DUI). Subsequently the law was amended to allow the court to issue a limited license for convicted defendants. An evaluation of the change (Johns and Pascarella, 1971) found that it led to an increase in convictions for DUI and a decrease in reduced charges, e.g., changing DUI to reckless driving. Comparing drivers adjudicated under the old system with those processed subsequent to the law's implementation, it was found that the limited license drivers had more convictions and crashes than drivers

whose licenses had been suspended. However, when limited license drivers were compared with the general population, they had fewer total violations (4.6 per 100 limited license drivers versus 12.9 per 100 for the general population). It should be noted, however, that the limited license group had more subsequent DUI convictions. The number of crashes for the two groups was almost identical, namely, 7.8 per 100 limited license drivers and 7.5 per 100 general population drivers.

A third source of dissatisfaction with suspension is that it is strictly a punitive approach. It leaves no real incentive for improvement in driving performance (English, 1977). The evidence indicates that many suspended drivers continue to drive without a license, thus placing them out of the control of the licensing authorities. Kaestner (1974) has supplied the analogy of the industrial worker who has had several accidents and asked if that worker is required to stay home 30, 60, or 90 days, thus precluding the possibility of his practicing or relearning the skill required, can it really be expected that he will return to the job better able to perform than previously? Yet this is precisely the approach we are taking with our suspension programs.

Such major concerns with suspension as a driver improvement measure have led to growing support for the concept of a limited license.

A particularly interesting study that compares the effectiveness of suspension with that of a limited license is reported in Kaestner and Speight (1974). Drivers due for suspension were assigned to one of five different groups, each receiving a different treatment. One of the treatments was license suspension according to the usual procedures. Another group was given the option of applying for a limited license and even allowed to specify the extent of the limitations, i.e., define the days and times driving would be allowed. Thus one group of drivers had their licenses suspended for a 30-day period while the other group was allowed to drive during the 30-day period but within the constraints of the limited license. This latter group was told, however, that if they failed to maintain a clean record during the subsequent year, the suspension would go into effect. Compared to the suspended drivers, the limited license group was found to have significantly better records during the one-year period following the restricted or suspended period. It should be noted that Kaestner emphasizes the importance of maintaining the possibility of suspension as a sanction to encourage drivers to maintain clean records. It is his belief

that without the possibility of such a sanction, the limited license would have little or no effect.

Arguments have also been made against the concept of the limited license. First it is pointed out that suspension is indeed intended to be a hardship. If it were not, there would be no incentive to drive safely so as to avoid suspension. This position asserts that a major purpose of suspension is a punitive one. A second argument for suspension and against the limited license is that the major purpose is to remove the unsafe driver from the road. The limited license allows him to continue to drive, thus circumventing the intent of suspension and endangering others. In this regard, Baker and Robertson (1975) report that the threat of loss of job if driving privilege is lost is more imagined than real. They questioned drivers as to how they would get to work if they broke a leg and found that most of them reported realistic alternatives to driving themselves. A third argument against the limited license is that the restrictions on it are unenforceable. Of course the same thing may be said about license suspension itself. Furthermore, Kaestner and Speight (1974) found that when drivers specified their own restrictions and when there was no effort to enforce them, the limited license still appeared superior to suspension itself.

At least three-fourths of the states have some form of the limited license for at least some groups of drivers (English, 1977). By and large the effectiveness of these programs is not known. In North Carolina, it was found that drivers on limited licenses had somewhat more crashes and violations than comparable drivers subjected to license suspension. However, the limited license drivers had no more violations or crashes than the general driving population (although they did have more DUI convictions). In Oregon, drivers allowed to operate under a limited license, with restrictions they themselves had specified, were found to have significantly better subsequent records than comparable drivers whose licenses were suspended. Thus it appears that at least under some circumstances the limited license is a more effective driver improvement measure than suspension. Furthermore the limited license is a low cost countermeasure in contrast to some other driver improvement measures, e.g., personal interviews and driver improvement schools.

Adjudication of traffic violations. Traditionally the adjudication of traffic offenses has been handled through the court system. Recently, however, some attention has been given to the possibility of alternative approaches. The

reasons for considering change are several. First, because traffic offenses are such frequent events, in some areas they are contributing to serious increases in the court caseload with corresponding increases in court operating costs. Understandably, the courts have given priority to what are considered more serious crimes such as robbery and assault. As a result, court processing of traffic violations has often been delayed. Second, except for certain types of violations, such as repeated driving under the influence of alcohol, traffic violations are usually viewed as minor offenses (Klein and Waller, 1970), or, as Ross (1960) has so aptly put it, "folk crimes." If a person is convicted of speeding, he is not viewed as a criminal. In fact, in our society at one time or another almost every member of the driving population experiences a traffic violation. Consequently many believe that such offenses should not be treated in the same way as serious criminal offenses. Third, the majority of traffic violators do not wish to contest their cases in court, and such cases might better be handled administratively rather than judicially (Institute for Research in Public Safety, 1972).

Administrative adjudication, in its various forms, has been proposed as an alternative to the judicial method of handling the majority of traffic violations (Brandt, 1973; University of Denver College of Law, 1975). By using parajudicials (lawyers) or nonjudicials (administrative hearings officers) and by conducting adjudication in an administrative setting, the time now spent by judges and by the courts could be better redirected to the more serious types of violations, such as those involving the possibility of incarceration. The parajudicials or the administrative hearings officers are also better able to give more time and personal attention to the driving problems of the traffic offenders than judges could ordinarily afford. When adjudication is conducted in an administrative setting, there may be less tendency to treat the offender as a criminal. Finally, the efficiency of handling traffic violations should be improved with the administrative adjudication approach since traffic cases become the primary responsibility of the agency in charge of adjudicating the traffic violations. This efficiency should lead to prompter recording of convictions on the driver's record and hence instigate driver improvement measures in a more timely fashion.

The major reservations concerning administrative adjudication pertain to the legal rights of the violator and to the implication administrative adjudication has for traffic safety. On the question of legality, the same type

of legal protection granted to the violator now could also be made available to the violator under a system of administrative adjudication. Defendants would still have the protection of due process, and the rights of hearings or appeals could still be granted if so desired.

To address the traffic safety benefits of the administrative adjudication system, two studies were undertaken, one in Seattle and one in Rhode Island (NHTSA, 1977). Both studies conducted their adjudication within an administrative setting, the difference being that parajudicials (magistrates) were employed in the Seattle study and nonjudicials were used in the Rhode Island study.

In the Seattle study (Morehead and Wood, 1976) traffic offenders were assigned to one of three possible adjudicative actions: forefeiture of bail, magistrate's hearing and court hearing. It was found that drivers adjudicated under the informal magistrate hearing portion of the process exhibited longer delays between adjudication and their subsequent violations or accidents than drivers processed through the formal court hearings.

The Rhode Island study (Moretti and Ulmer, 1978) also compared the three different approaches to adjudication. First time offenders could pay fine by mail with no personal appearance required. Repeated offenders were identified and required to attend an administrative or a court hearing with records made available at the time sanction was imposed. With the administrative hearing, it was found that the time between violation and sanction was much reduced, a desirable condition if sanction is to function as an effective deterrent to further infractions and if driver improvement action is to be administered at an early stage. The application of sanction was also more consistent with the administrative adjudication approach. The respective operating costs for the three approaches were $2.78 for summons by mail, $16.82 for the administrative hearing and $19.56 for the court hearing.

Two other variants of the administrative adjudication system have been implemented in California and in New York. These two systems differ from all others in that adjudication is not handled by any department within the state, but rather by a separate board in California (Novi, n.d.) and by a merged entity for traffic offense adjudication and driver licensing functions in New York (Halper and McDonnell, n.d.).

Based on a review of the adjudication process in 12 metropolitan areas (Arthur Young and Company, 1974), a model system for adjudicating traffic

offenses was developed to offer the maximum in highway safety benefits and case processing efficiency and, at the same time, satisfy all essential legal requirements. The model developed represents a simplification of procedures currently utilized by the judicial or parajudicial approaches and incorporates several elements from New York's administrative adjudication system. The important changes in the model include:

a. A review of motorists' driving records to determine appropriate sanctions for violators and identification of persistent violators prior to entering plea;

b. Self arraignment which could be handled by mail if the motorist so wishes;

c. Plea advice/evaluation sessions given to motorists who are undecided on the plea or to those wishing to present mitigating evidence;

d. More highway safety oriented sanctions.

The report recommends that the model adjudication process be carried out administratively, because using judges or parajudicials within the process model would increase the operating costs of the system. Less consistent sanctioning would also occur, especially with the judicial approach because of judicial discretion in setting penalties. Another disadvantage of using the judicial approach relates to the less accurate and less efficient transfer of information between the courts and driver licensing agency.

Based on the evaluations of administrative adjudication available to date, it appears that the procedure may have advantages at least for some jurisdictions. First, administrative adjudication appears to be more efficient, that is, it takes less time to process a case. This greater efficiency leads to more rapid entry of convictions upon a driver's record and thus enables the instigation of driver improvement measures at an earlier date when they are likely to have greater effect. Second, it appears that the operating costs are less than when traffic cases are processed through the court system. Third, administrative adjudication appears to result in more equitable sanctions, that is, persons convicted of the same offense are more likely to be treated in a similar fashion. Fourth, the procedure may have benefits for the traffic violator in that he is not treated as a criminal in the administrative setting. In addition, he is likely to be given more personal attention by persons more knowledgeable about traffic safety. Furthermore, at no time does the driver lose his right to counsel or the right to appeal his case.

Thus it appears that administrative adjudication has the potential for offering greater efficiency, savings, and equity while protecting individual rights and possibly enhancing safety benefits.

Habitual offender statutes. Since the usual suspension or revocation of a driver license does not seem to be effective, attempts have been made to rehabilitate drivers with multiple infractions by suspending or revoking their driving privileges for a longer period of time. The authority for imposing this type of driver control action is granted through the states' passage of Habitual Offender (HO) statutes. Although the specific HO statutes vary from state to state, generally, the HO statute authorizes states to revoke licenses of drivers who had committed a small number of major violations (such as DUI, driving while suspended or motor vehicle related felony) or a large number of minor violations within a given time period. Under the HO statute, driving privileges may be revoked for as much as ten years, and the penalty for violating the HO revocation is more severe. For example, in Oregon, conviction for driving while under HO revocation carries with it a 30-day mandatory jail sentence.

Evaluation of the HO statutes have been conducted in both North Carolina and in Oregon and have yielded different results.

In the North Carolina study (Li and Waller, 1976), it was found that courts varied in their prosecution of HO cases. Some courts pursued them vigorously, while in other courts the information was filed away and the prosecutor maintained that they "might get around to them after (they had) handled the murders, rapes, assaults, and armed robberies." Comparison of cases referred to the two types of court actions showed essentially no differences in subsequent records, that is, cases that had been processed by the courts did not appear to differ from cases that were "pending" (eligible for HO revocation but with no attempt at adjudication). Because of the failure to show any effect whatsoever of the HO procedure and because many people felt that other state laws provided an ample basis for prosecuting these drivers, the North Carolina HO statute was repealed.

In contrast, an evaluation of the Oregon HO statute (Kaestner and Hawes, 1977) found that revoked drivers had better subsequent driving records than drivers whose cases were pending. The authors suggest that the differences in the findings from the two states may be in part a function of the differences in their respective HO statutes. The North Carolina HO statute defined the HO as a driver convicted of three major violations or 12 moving violations within a

seven year period while the Oregon HO statute applies to drivers convicted of three major violations or 20 minor moving violations within a five year period. The revocation period is also different. In Oregon the driving privilege is revoked for ten years while in North Carolina it may be restored after five years of clean record. From the above comparison, it appears that the HO statute in Oregon is more stringent than the North Carolina one.

In the same study, Kaestner and Hawes (1977), found that a warning letter sent to drivers who had two major violations or 19 minor moving violations (that is, one violation short of a HO revocation) was effective in that drivers who received such a warning letter had significantly longer delay times before incurring the subsequent violation which moved them to the HO status. Thus, it appears that some measures directed at the habitual offenders are producing the desired effect.

REPORT ON INTERVIEWS AND FIELD OBSERVATIONS OF FOUR STATES

Every state produces driver handbooks, examiners' manuals, and summaries of procedures used in fulfilling their licensing responsibilities. Although considerable information can be gleaned from studying these documents, there is no substitute for first hand observation of the licensing process combined with the opportunity to question those responsible for the program. As part of this project, on-site visits were made to four states, namely, California, Iowa, North Dakota, and Tennessee. These states were selected because they represented a diversity of populations to be served and considerable variation in their approaches to the licensing process.

Prior to the visits, a questionnaire was sent to the person responsible for driver licensing in each of the states. The questionnaire showed the topics that would be addressed and allowed the recipients to arrange for discussions with other licensing personnel when appropriate. During the visits the questionnaire served as a guide to the discussion, although many additional issues surfaced. The questionnaire, with summarized answers, appears as the Appendix.

Whenever possible, operation of the examining station and administration of skills tests were observed.

The general observations and conclusions on the state visits are summarized in the following sections.

Driver Identification

Acceptable documents for identification of an individual in the states visited were, in general, those considered as "more acceptable" by NHTSA (1979a). From the list of more acceptable, however, no state indicated that they used home mortgage or lease papers, non-resident alien registration, federal employee card, or pistol permit. Evidences of identity which were used and do not appear on either the more acceptable or less acceptable list are; training certificate, affidavit of personal knowledge, insurance papers, Bible records, "managers discretion" and, for renewals, license renewal notice. No special information, other than that placed on the license itself, was collected at the time of original application to be used for verifying identity at times of renewal or other subsequent contact. One state, however, obtains from nearly all applicants a thumbprint which may be used to protect the person's identity. If, for example, an individual's license is stolen and another uses it to cash

checks and build up a bad credit rating, the thumbprint can be used to clear the bona fide licensee. It has been used also in cases of disaster for the identification of victims. Provision of the print is voluntary, but most see it as a protection of their own identity. This state also maintains a black and white copy of the license photograph on file which is checked before central issuance of a duplicate license.

Three of the four states issued a photo I.D. to non-drivers, and in each case the issuing agency was the Department of Motor Vehicles.

Classified Licenses

Only two of the states indicate that they have a classified license system. One of the others has what might be considered an informal classification of licenses in that operation of a motorcycle or heavy duty vehicle requires a special endorsement based on a performance test in that vehicle type.

Learner's Permits

Learner's permits, although given various names, were found in all four states, and all required vision and knowledge testing.

Testing - Original Application

In most instances, an individual could walk in unannounced to apply for a license. In one state an appointment was needed for all applicants. This appeared to be a function of the fact that stations were open only at certain times and that applicants might have to travel some distance to reach the station. In another state, appointments were needed for motorcycle license applicants. Three states gave the written test first and one state gave the vision test first. No state gave a separate test of signs and symbols but incorporated this into one of the other tests.

Driver Testing - Vision

Three states required that their vision standards be met by both eyes together and by each eye individually. One state required that the standards be met either by both eyes together or by one eye. All states recommend 20/40 vision as the basic standard, although there were many conditions in which the standard could be different, usually less severe. This often took the form of permission to drive with vision no better than 20/50 or even 20/70, if there were a statement from a vision specialist that this was the best possible corrected vision that the individual could achieve.

One state tested for color discrimination and depth perception, but we were unable to determine what use was made of the information. Another state required their "special chauffeurs" to be able to discriminate color.

Vision testers in use were Keystone, Titmus, Bausch and Lomb Orthorater, and the Snellen chart. The state using the Snellen chart had it positioned so that an applicant at the counter talking with the clerk who was filling out the form merely looked up to read the chart. If the applicant had any difficulty, he stepped to one side where an Orthorater provided more controlled vision measurement.

No state indicated that illiterates experienced difficulty with the vision test, and the vision testers used were considered quite satisfactory.

Driver Testing - Knowledge

All states provided a multiple choice test, and in one state presentation was automated. In the latter case, 20 questions were automatically selected at random from a pool of 80. When an answer was selected, the machine indicated whether it was correct. If incorrect, the correct answer was shown, giving an opportunity for learning.

All tests incorporated questions on laws and safe driving principles, and two of the states asked questions about signs and symbols.

The number of questions on a test ranged from 15 to 36. One state used different length tests for different license classes. The number of equivalent forms of the test ranged from one (a motorcycle test) to five. In the case of the automated presentation, the opportunity for different item combinations was almost limitless. The passing grade was 80 percent for three states and 76 percent for one state. No state imposed a time limit for taking the test.

Only two states provided information concerning the reading level of the test. One state's tests had a reading level of eighth grade. Another state provided a test with a reading level of fourth to sixth grade for the applicant for passenger car license. For other license classes this state's tests were at eighth grade level.

All states had pictorial-oral tests for illiterates. This test was uniformly offered to applicants for passenger car license. Only one state gave the oral test to truck applicants, and two states gave it to motorcycle or bus applicants. With the illiterate applicant, one state also used a test of words and phrases commonly used in the driving environment. It was noted that in one

state the oral test was not available the day we visited but we failed to ascertain how long this had been the case.

Two of the states made no provision for foreign language applicants, but it is not known whether this poses a problem. One of the other states had written tests already available in Spanish, Lao, Vietnamese and Korean and would give an oral test through an interpreter in any other language. One state provided written tests in seven languages, namely, Spanish, Portuguese, Tagalog, Japanese, Chinese, Korean and Vietnamese.

One state required that an individual pay even if the test is failed, but there is no limit placed on the number of times a person may take the test. Three states made no charge for a failure, but two of these allow only three tries in a given period. In two of the states the number of failures show on a person's record. All states permit an applicant who fails to try again the next day although they are usually advised to wait a little longer.

Driver Testing - Skills

In almost every instance the performance test is an in-traffic road test. It is only in motorcycle testing that off-road testing occurs, with one state giving the test entirely off-road, one state giving off- and on-road testing and one state giving the test off-road unless the license is solely for a motorcycle (and not an endorsement on another license). In that case the motorcycle test is both on-road and off-road. One state will accept a certificate of experience in lieu of a road test for certain license classes.

Three of the states give the road test in the type of vehicle appropriate to the license, but in the other state it would be possible to drive an articulated truck after passing the road test in a small car. No state makes use of a simulator in license examination.

Every state has the possibility of automatic failure on a road test for a generally agreed upon variety of reasons, such as becoming involved in a crash. After an automatic failure, however, the applicant usually drives back to the station. The examiner may offer to do so or the car may be parked and both walk back to the station. In past years the examiner more often drove back, but the legal environment and the popularity of lawsuits mitigates against such actions today.

Every state has standard road test routes, and the road test usually lasts 10 to 20 minutes. For trucks and buses it may require 30 to 45 minutes and for a motorcycle test as little as five. Those who fail may try again the following

day in three states. One state requires that at least two weeks elapse before the next attempt.

License Renewal and Renewal Testing

Three states require an individual to appear in person for renewal of license (with some exceptions, such as residents in military service). One state permits all renewals to be processed by mail. In the three states requiring personal appearance, the tests required are mandated by law, although the examiner may add tests at his discretion.

The renewal interval varies from two to four years. In one state the renewal interval may be shorter than the normal period for those "limited term" licenses given for medical reasons.

Tests of knowledge, vision, and signs are always given in one state at renewal and a performance test may be given. Knowledge, vision, signs and performance tests may be given in the other two states depending chiefly upon examiner judgment or a variety of reasons. States found it difficult to estimate the percentage of renewal applicants taking a performance test.

Out-of-State Transfers

In all states, out-of-state individuals are required to be tested on knowledge, vision and understanding of signs. The transfer may be given a skills test as well.

Public Records

Only one state examines records from medical institutions and does so only occasionally. However, that state is required by law to examine routinely the Department of Health reports.

The Driver License Examiner

The four states showed great variation in the examiner's position. Two used State Police or Highway Patrol as examiners. These were uniformed, but only one state required the examiner-supervisor to wear sidearms. One of the other two states had uniformed examiners and the fourth state permitted street clothes, only requiring a name tag as a distinctive feature.

Qualifications for the position ranged in minimum age from 18 to 21 and in education from high school equivalent to two years of college. Other requirements were specific to certain states such as a minimum height of 5'4". Interestingly, only two said that the examiner must be a licensed driver. It is supposed that this requirement actually holds true in all states. The examiner is selected by some sort of civil service or merit system in all states.

All states give on-the-job training to examiners and three of the states give a month or a month and a half of pre-assignment training. All states give (or will soon give) in-service training.

No state requires that examiners be licensed to drive the type of vehicle in which the performance test is given, although one has truck driver training and another a voluntary motorcycle school.

The number of full-time examiners ranges from 36 to 427 in the three states with full-time personnel. One state which uses members of the Highway Patrol as part-time examiners has 110. These figures have meaning chiefly in relation to the population of licensed drivers in the state. All states had clerical personnel assisting the examiner, so the proportion of the examiner's time spent in clerical duties was probably no higher than 30 percent. Clerical personnel give some of the tests in three states, relieving the pressure on the examiner.

Non-Typical Licenses

Licenses may have a variety of restrictions or conditions placed upon them. One state has over 50 different types of restrictions. All states had restrictions for corrective lenses and locality and three states for certain highway types as well. These restrictions were usually imposed by the examiner.

Medical Aspects

Only one of the four states has a medical board, composed of five physicians, the chief examiner, and the director of the driver licensing division. This group meets as needed, and considers the individual's case without requiring the individual to appear in person.

Driver Improvement

Three states have a formal or informal point system for violators and three states have the information on their driver improvement system available to the public. No state has specific rewards for good driving, nor is any training offered to nonviolators except in one state. Warning letters, group or individual meetings are said to be a part of the system in two states. The two other states give an individual credit for attendance at various driver improvement meetings. Two states warn the driver when the point of suspension has almost been reached.

No state (apparently) has adjudication of minor traffic offenses outside of the court system although all states have hearing officers.

License Suspension and Revocation

Licenses which are suspended or revoked may be handed in at the hearing (three states) or mailed in (three states). In one state the Highway Patrol officer may hold the driver's license and give a temporary permit valid only until the date of the hearing. This is one state's method of trying to curb driving while under suspension. Other states issue a warning on the suspension order or rely on good records and active enforcement. No state was willing to hazard a guess as to the number who actually do drive while under suspension or revocation, although it was thought that a large percentage did so.

Records System

There was general agreement that certain items should appear on the driver license (name, address, date of birth, license number, expiry date, restrictions, weight, signature, and license type). There was no general agreement as to the use of the full name or the name as commonly used, mailing or residence address, or whether the social security number should be used as the driver license number. Three states had a (color) photograph and gave the driver's height. Beyond this there was little agreement as to what should appear on the face of the license.

Tamper-proof aspects included plastic lamination, overlapping of features onto the photograph, and tamper-proof paper, each used by two states.

Those states which did not use the social security number as the driver license number had central control with sequential numbering. The computerized files could always be entered by the driver license number and usually by the driver's name as well.

Records kept as hard copy or in photo-reduced form are usually the original application form and the medical records. Two states have a standard purge date for recorded infractions, one using three years and the other ten.

Entry onto the record of court action is said to take from seven days to three months in three states. In only one state is the vehicle type in which an accident or violation occurred available in the records.

Three states exchange information with at least some other state outside of any compact agreement. All of the states used the National Driver Register although in one case the manner of use is not clear. Two states use the National Driver Register to check on out-of-state transfers, and one state uses it to check out-of-state transfers aged 18-25 only. The three states obtain

information weekly; two submit information weekly and one submits on a monthly basis. One uses the National Driver Register to check on all license applicants.

There was no consensus on how to prevent multiple licensing, although checking with previous states, use of the National Driver Register, pick-up of old license, and a signed statement by the applicant were mentioned. No state was able to estimate the number of individuals with fraudulent licenses.

Only one state had had a problem involving administrative liability.

By far the most valuable aspect of the on-site visits was the possibility of seeing the actual operation of the driver licensing offices, thus gaining an understanding of the constraints involved in actual operation and of what may be feasible in a real-world situation.

MODEL DRIVER LICENSING SYSTEM

The model driver licensing system is divided into three major sections, namely, the pre-licensing system and license issuance, renewal issuance and out-of-state transfer issuance. Each of these sections is diagrammatically represented by a type of flow chart. The records system of the model driver licensing system is shown diagrammatically, indicating the relationship of the component parts of the records system.

Throughout the description of the model, the optimal and the minimal recommendations are provided where applicable.

Pre-Licensing System and Permit or License Issuance

1. The system begins with the applicant seeking licensure and claiming no previous out-of-state licensure. (Numbers at the beginning of paragraphs are keyed to numbers on the flow chart diagrams shown in Figures 1 through 3.) If the individual is applying for a learner's permit and is a minor, the responsible adult who will sign the parent certification form should accompany the applicant.

The applicant first provides evidence of identity, a birth certificate and two other documents. NHTSA (1979a) has identified more and less acceptable documents as follows:

More acceptable:

Birth Certificate
Driver License with Photograph
Passport
Naturalization Certificate
Military Discharge Papers
Military ID
Home Mortgage or Lease Papers
Transcripts of School Records
Non-resident Alien Registration
State-issued Photo ID
Federal Agency Employee ID
Police Pistol Permit with Photo and Fingerprint

Less acceptable:

Voter Registration ID
Vehicle Registration
Selective Service Card
Student ID
Employee ID with Photo and Signature
Baptismal Certificate

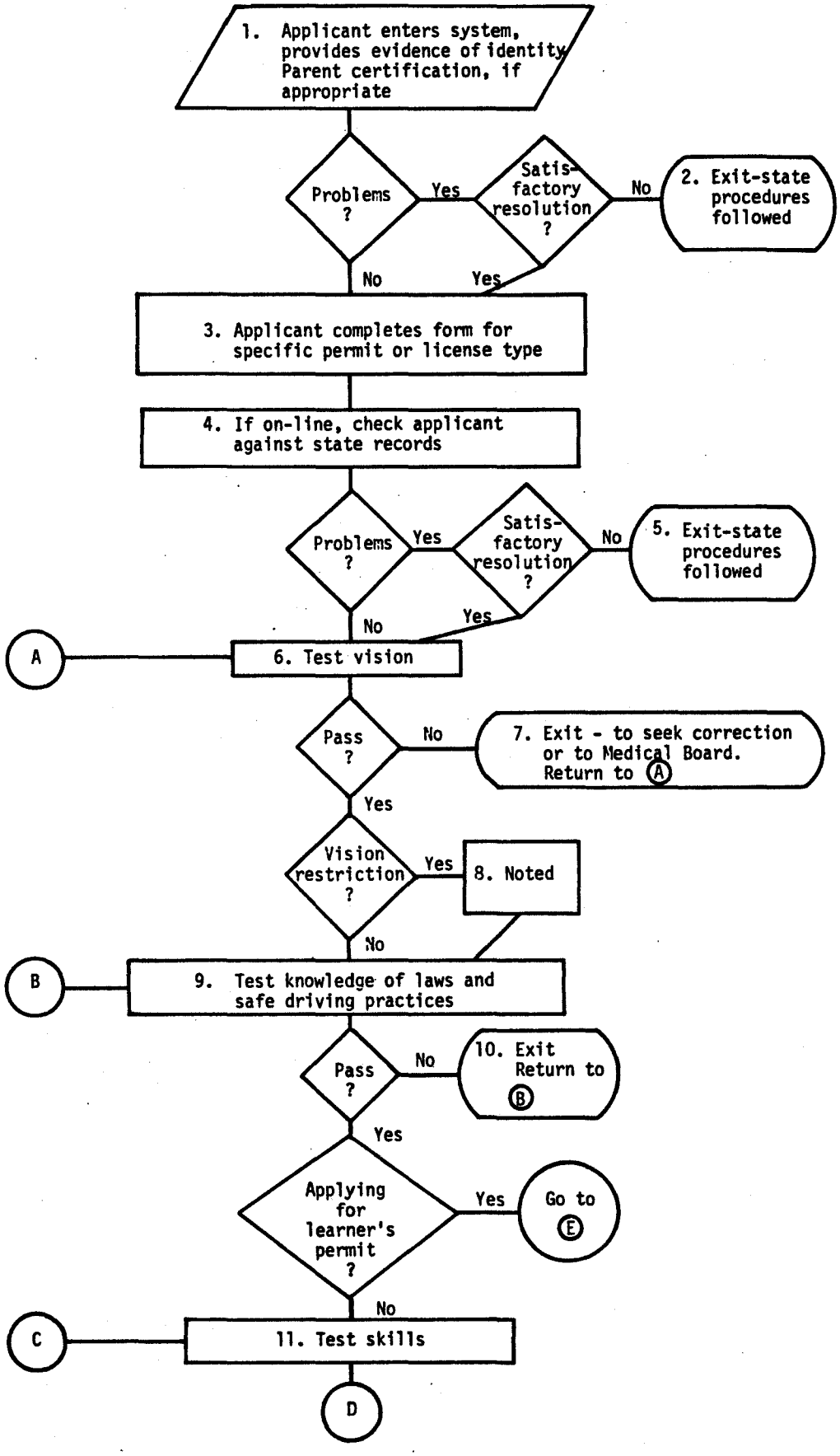

Figure 1. Pre-licensing system and permit or license issuance
(Continued on following page).

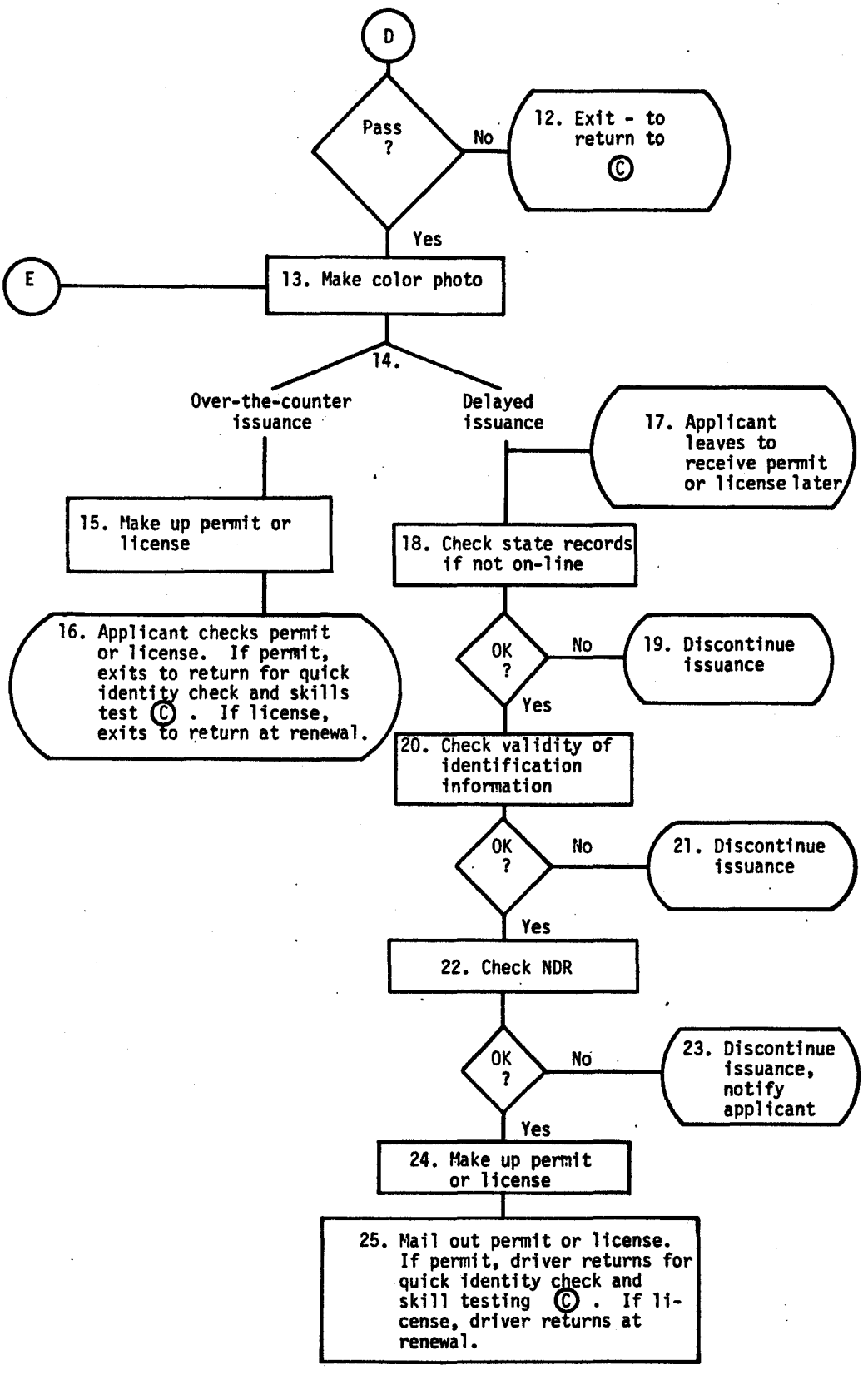

Figure 1. Pre-licensing system and permit or license issuance (Concluded).

MINIMAL REQUIREMENTS: Birth certificate and one other document

OPTIMAL REQUIREMENTS: Birth certificate and two other documents

2. The driver license examiner inspects the documents, looking first of all for consistency. Do all documents show the same date of birth, and is this consistent with the apparent age of the individual presenting the documents? The examiner should bear in mind the guidelines published by NHTSA (1978) for recognizing fraudulent identification. Clues which may indicate fraudulent documents include:

a) All documents equally new (allowing, of course, for honest loss by fire, and so on),

b) Papers which are evenly dirty across the entire surface,

c) Plastic coating unscratched,

d) Printing errors (including spelling errors),

e) The name of the state typed and not printed,

f) Birth certificate number not incorporating the year of birth,

g) Impression seals not clear and appropriate,

h) Social security number beginning with one of the unissued series (e.g., 600, 800, and 900),

i) Photographs on different documents identical, and

j) Different documents typed on the same machine.

If the examiner is in doubt about the authenticity of the documents or whether the individual presenting the documents is the one to whom they belong, then he may wish to question the applicant. If the examiner is still unsure, then he should follow the procedures set up in that state for handling such cases.

3. If the documents appear to be in order, the applicant fills out the application form, providing biographical data, information which will be used later in the quick check of identity, answers to questions concerning medical and physical conditions and a variety of other information.

The OPTIMAL APPLICATION FORM is given as Table 1.

MINIMAL REQUIREMENTS are shown on the table by asterisks.

The applicant's full name, including previous name if married, is requested. In addition, any other names ever used should be given. Provision is thus made for any name change and the possibility of both men and women changing their names upon marriage. The applicant's present mailing address and residence, if different, are required for future contact with the individual. The individual's social security number is required to serve as a secondary identifier. The examiner should verify that the number is a valid one, i.e., does not belong to a series never issued. The class of permit or license for which the individual is applying should also be a part of the form, as well as any endorsements sought, e.g., motorcycle, school bus. Date, place of birth, race and sex are used in verification of identity, both initially and subsequently. Height and weight are required for later use in identification, especially if added to the driver license. The same holds true for eye color, although a color photograph on the license may suffice. Questions concerning medical and physical conditions are required in order to determine whether medical evaluation is necessary. Information concerning the applicant's school, the mother's full name, and place where she grew up are collected for future verification of identity. The form includes a statement signed by the applicant concerning the penalties for providing false information. A thumbprint is also placed on the form. The thumbprint is requested of California applicants on a voluntary basis, with almost total compliance. The print is collected to protect the applicant's license in cases of impersonation, but is also used for identification of disaster victims. Although it is possible to put information concerning a print on computer files, California merely retains it on the application form for reference if needed. It was estimated that the thumbprint cost the state five cents each (Nishite, 1977). Finally, if the applicant is a minor, the application includes the parent's signature certifying the accuracy of the information and the parental permission for permit or license issuance. Special information from out-of-state transfers is described more fully on the section dealing with this applicant group.

Since a portion of the application form filled out by the applicant includes information for a future quick check of identity, the concept of the quick-check will be described at this point.

Table 1. Application form for learner's permit, original license, or out-of-state transfer.

* Name in full (first, middle, last, validated from acceptable documents. If married, include name previous to marriage.)

Any other names ever used

* Date of application

* Present mailing address

* Present residence address (if different from above)

* Social security number (secondary identifier) - Determine if number appears valid

* Class of permit or license applying for

* Endorsement(s) applied for, e.g.. motorcycle, school bus

* Date of birth (month, day, and year)

* Place of birth

* Race and Sex

* Height

* Weight

* Eye color

* Any medical or physical conditions which may affect driving (Specific medical questions)

Name of high school (or elementary school)

Year of last attendance at that school

Location of that school

Mother's first and family names and place where she grew up

* False information statement

* Signature

Thumbprint

* Parent certification (if applicant is a minor)

** State(s) of previous licensure and license number(s)

** Previous mailing address

Estimated mileage driven previous year (out-of-state transfer only)

* Examiner number

* Examination station number

* Minimal requirements

** Additional minimal requirements for out-of-state transfer

When a driver wishes to renew a license or to transact any business with the licensing agency subsequent to initial licensing, there should be no need for a rigorous identity check (this has been done at the time of original licensing). The special information collected and stored earlier can be used to verify that the renewal applicant is the same person receiving earlier licensure. Information can be checked by computer or telephone at the field office and requested of the renewal applicant. This procedure merely insures that the person appearing the second time is probably the one who appeared earlier. It does not prevent all fraudulent identifications but it should reduce their likelihood while making the examiner's task only minimally more difficult.

4, 5. At this point if a state has on-line capabilities in its field offices a check against the state records is made. If there is information on the record that the applicant should not receive a permit or license, then the examiner proceeds according to state law. If there is no adverse information on record, the licensing process proceeds.

6, 7. Next, vision testing is administered. If the individual fails to meet the established standards, the examiner will recommend that he see a vision specialist and may provide a form to be completed by the specialist. The individual may be fitted with corrective lenses to meet the standards, or, if that is not possible, permitted to drive with certain license restrictions. In severe cases, the individual may ask or be asked to be considered by the state's medical advisory board.

If and when the individual returns to the examiner's office, his identity is verified through the quick check procedure and he proceeds for re-testing of vision at point A.

8. If the applicant requires corrective lenses or other vision-related restriction, notation is made on his license or permit.

9. Knowledge of highway signs or symbols may be included in the vision test or the knowledge test. In any event, the knowledge test should include questions on motor vehicle law and safe driving practices.

10. If the applicant fails this test, he leaves the office to study the driver's manual and other relevant materials. He may return at a later date (although no sooner than state law allows), proceed through a quick check of identity, and reenter the system at the knowledge test at point B.

11. Upon passing the knowledge test, if the individual has applied for a learner's permit, he proceeds to step 13, point E, where a photograph is taken.

When he returns for the skill test, he undergoes a quick check of identity, takes the performance test(s), point C, and proceeds as indicated for a license.

If the individual is applying for a regular license of any class and not a learner's permit, he will take the road test immediately after passing the knowledge test. (In some instances, however, an appointment may be needed for the skill test.)

12. If the applicant fails to pass the road test, he should not be allowed to try again for at least two weeks, unless there are compelling reasons for waiving this requirement.

In every case, when a person fails at one point he returns to that point in the system and need not repeat portions successfully completed. When a person returns, the quick check is used to verify identity.

13. Once the vision, signs, knowledge and skills tests are passed, the applicant has his photograph taken. The photograph should be in color and taken as though the applicant were looking past the photographer's shoulder, i.e., three-quarter face rather than full face. The three-quarter face photograph will provide information concerning the shape of the back of the head and details of the ear which a full-face photograph cannot. Additionally a state may wish to identify certain groups by different colored backgrounds, a distinctive color for minors, for example. Height could easily be incorporated into the photograph by having a scale at the side. The scale need not be detailed to the inch, but perhaps have markings every six inches or different bands of color six inches wide. If any sort of a scale is used, the applicant must stand while being photographed.

OPTIMAL REQUIREMENTS: a color photograph, three-quarter face, with color-coded background and height scale

MINIMAL REQUIREMENTS: a color photograph, full face

14. At this point license issuance will be either over-the-counter or delayed issuance (from a central office, possibly following further identity checking).

The use of fraudulent identification poses a problem of unknown magnitude. The driver's license, now one of the most commonly used forms of personal identification, should be made as secure as possible.

Identification for an original permit or license is most important, since once a permit or license is acquired it is relatively easy to use it to acquire others. It is important, then, to try to verify documents presented in support of identity at the time of issuance of the original permit or license. This may involve, as indicated in the figure, a period of time to check on document validity.

Taking the necessary time for verification of identity is strongly recommended. However, it may not always be possible. The problem of fraudulent identification is probably the least severe for original applicants when first reaching the minimum age for permit or licensure. These individuals will usually be in their teens, local residents, perhaps with driver education training at a local school, and known to the local school authorities. Such individuals could be issued the permit or license on the same visit as that on which they passed the required tests. Verification procedures, if desired, could be as simple as one or two phone calls, e.g., to the local school.

A state may decide that if a person applying for an original license or learner's permit is less than 20 years old, the license may be issued over-the-counter. Of course, the examiner should be able to exercise discretion, so that if he has doubts a longer check of identity could be made. The learner's permit should be handled like a license with the same standards of identification applying. The permit should include a color photograph, an assigned number that is part of the regular licensing system and entrance on the driver license system records.

15. The license is made up in the field office. The photograph is included, and the driver license number is made up according to the state algorithm. Any appropriate restrictions such as corrective lenses, are entered. Biographical data are added and the license covered over with a tamper-proof coating.

OPTIMAL INFORMATION ON THE DRIVER LICENSE is given in Table 2.

MINIMAL DRIVER LICENSE INFORMATION is indicated on Table 2 by an asterisk (*)

16. When the individual receives the permit or license, he is requested to check it for errors before leaving. He does not return until renewal time or earlier if necessary to update the name or address.

Table 2. The learner's permit or driver license

*Name in full (first, middle, and last)
*Mailing address
*Residence address
*Date of birth (month, day, year)
*Race and sex
*Permit or license number
*Social security number
*Permit or license expiry date
*Restrictions
 Height
 Weight
 Eye color
*Photograph in color
*Permit or license class
*Endorsements, e.g., motorcycle, school bus
*Signature
*Organ donor (if yes)

*Minimal requirements

17. If the applicant for original license (or permit) is 20 years of age or older, the procedure follows the longer check of identity. The applicant leaves the field office and is told (depending on state policy) that his license will be mailed to him when completed or that he must return at a certain date to pick up the license. Advantages to mailing the license are the convenience both to the individual and to the field office as well as confirmation that the address given is valid. The disadvantage to mailing is the possibility of loss. Advantages to personal appearance to pick up the license lie in the greater certainty that the individual who took all the tests and was photographed is the one who is receiving the license. Disadvantages to personal appearance are the extra time and effort required by the applicant and extra work in the field office.

18, 19. If the state records have not been consulted because the field office was not on-line, this is the point at which they should be checked to see if the individual already has a license or is under suspension or revocation or should not be licensed for some other reason.

20, 21. If the record check is clear, then the validity of the identity documents should be checked by verifying certain facts which had been noted earlier. If evidence of fraud is seen, the individual will be dealt with according to state law.

22, 23. The National Driver Register is checked to see if the individual is presently under suspension or revocation in another state. Depending on the volume of activity in the state driver licensing agency, all individuals 20 years and older may be checked or only those in a given age range, 20-30 years for example. If a "hit" is made, then the individual is notified and not licensed at this time.

24. If all appears to be in order, the permit or license is made up. See Table 2 for the contents of the permit or driver license.

25. The permit or license is mailed to the applicant, who returns to the field office at renewal time or to provide an update on name or address.

If the state requests that the individual pick up the permit or license in person, then the applicant returns at the prearranged time, undergoes a quick check of identity, and receives the license.

OPTIMAL AND MINIMAL REQUIREMENTS:	under 20 years: over-the-counter issuance. 20 years and over: long check of identity, license mailed to driver

Renewal Issuance

26, 27. Ninety days prior to the time that an individual's license is due to be renewed, the state checks its own files to determine if the driver is eligible for renewal. If the license has been suspended, the renewal application is not sent out.

28, 29. If the state's records are clear and indicate no reason why a license should not be renewed, then the National Driver Register is checked. If the National Driver Register shows a suspension or revocation in another state, no renewal notice is generated.

30. If the applicant's record shows no barrier to continued licensure, then the renewal notice is generated by computer and mailed to the driver.

31, 32, 33, 34. The applicant appears in person with his renewal notice at

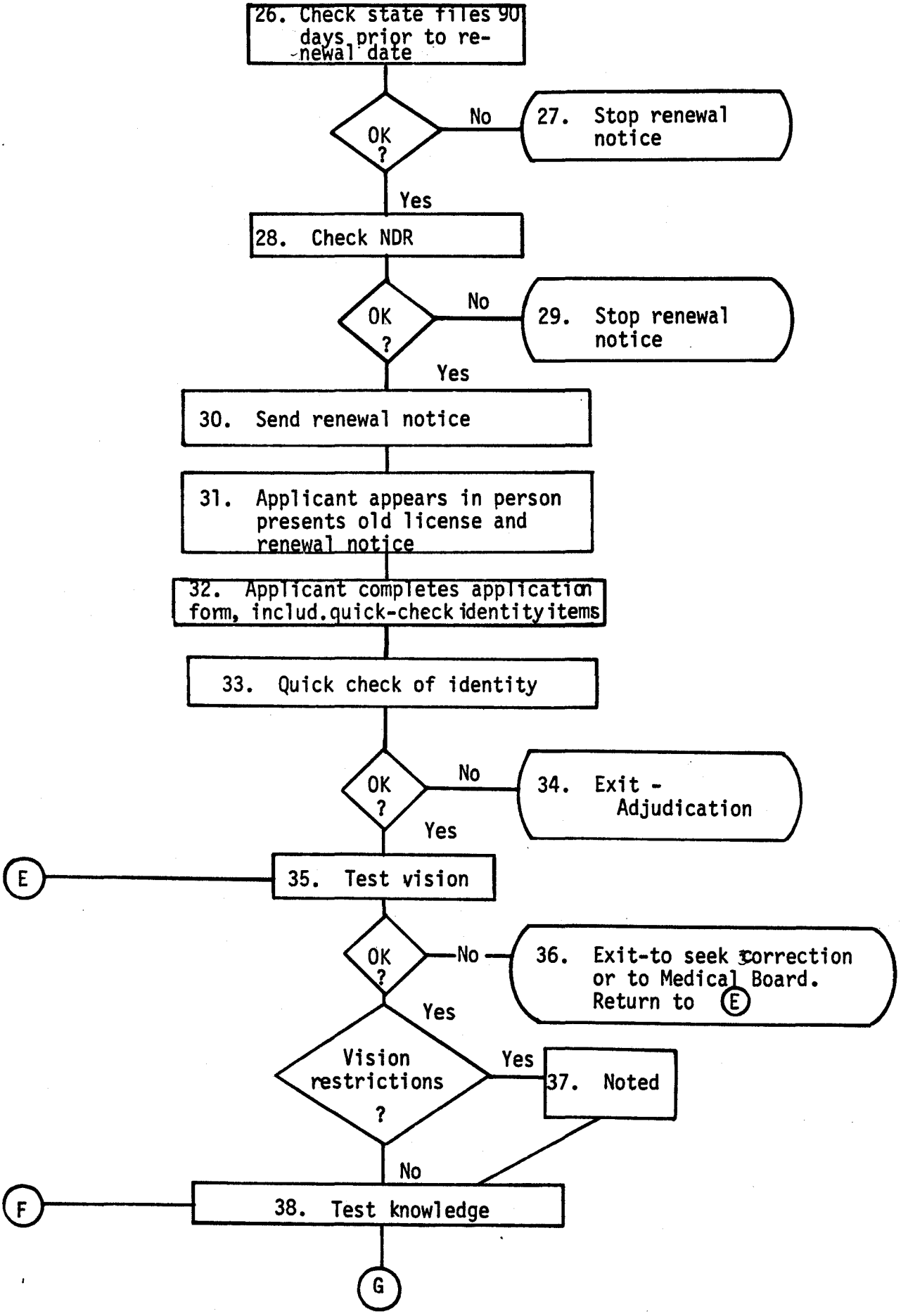

Figure 2. Renewal issuance including portion of out-of-state transfer (continued on following page).

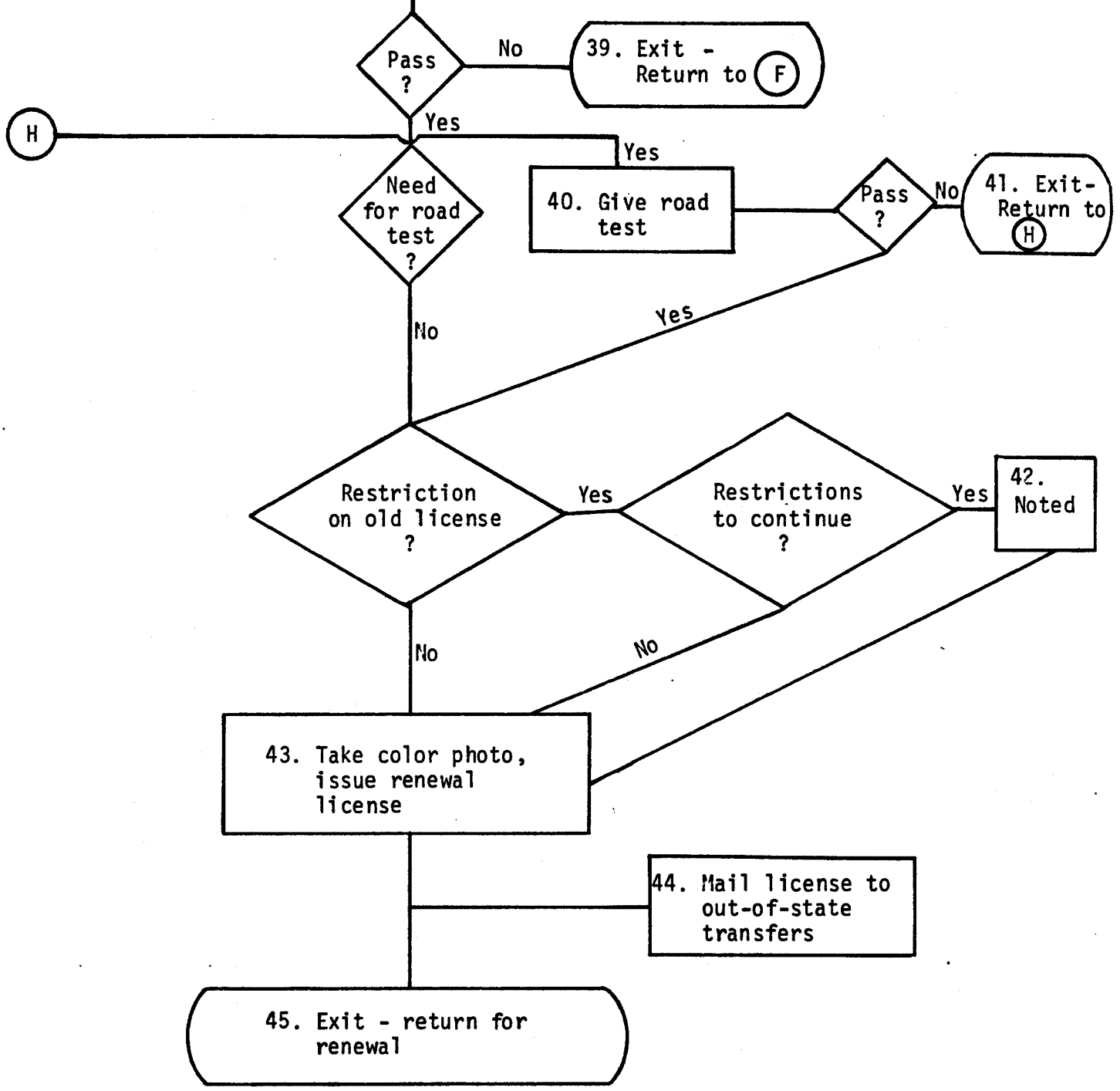

Figure 2. Renewal issuance including portion of out-of-state transfer (concluded).

the examining station and fills out the renewal application form (Table 3). The examiner uses the old license, the renewal notice, and the quick check of identity to verify that the individual is who he claims to be.

35, 36, 37. The vision test is given to all renewal applicants. If corrective lenses are required, this need will be noted for later restriction on the license.

38, 39. Administer the knowledge test, in part as a means of transmitting information about changes in laws or signs and in part to counteract misinformation. However, it should be noted that the use of routine knowledge testing for renewal has not been shown to be related to crash reduction.

40, 41. Under most circumstances, a demonstration of skill (road test) will not be needed. It should always be a possibility, however, and the examiner should have the option of requiring that an applicant take a road test.

42. The restrictions indicated on the old license are reviewed, and a decision is made based on the recent tests and other information as to whether the restrictions must continue.

43, 44, 45. A three-quarter face color photograph is taken and a license made up. The examiner issues the license to the applicant in exchange for the old one, which is subsequently destroyed. The in-state renewal driver checks the license and leaves. He will return again at renewal or to update certain aspects of the license. In the case of the out-of-state transfer (see the following section), the license is mailed out after further checking, e.g., with state of previous licensure.

OPTIMAL REQUIREMENTS:	Check state files
	Check NDR
	Send out renewal notice
	Test vision
	Test knowledge
	Road test (Discretionary)
	Three-quarter face color photograph
MINIMAL REQUIREMENTS:	Applicant appears without a renewal notice
	Test vision
	Knowledge test (Discretionary)
	Road test (Discretionary)
	Color photograph

Table 3. Application form - renewal.

*Name in full (first, middle, last)
*Present address
Height
Weight
*Social security number
*Date of birth (month, day, year)
Mother's full name and where she grew up
High school (or elementary school) attended
Year of last attendance at that school
*What type of license is applied for
*Any changes in medical or physical conditions since last licensing
*Signature
Thumbprint
Estimated mileage driven previous year

*Minimal requirements

Out-of-State Transfer Issuance

The driver moving into a state is handled in some ways like an original license applicant and in some ways like a renewal applicant. The out-of-state transfer is, in fact, obtaining an original license in the state concerned.

46. The applicant appears and surrenders his out-of-state license and presents at least one other document of identity, preferably a birth certificate.

47. The application form is the same as that used at original licensing, see Table 1.

48. The examiner, using the guidelines listed earlier, examines the documents for their authenticity and compares the documents with the individual for consistency. If the out-of-state license includes a photograph and signature, these also are compared.

49, 50. The applicant is checked against the state records for possible suspension or revocation in that state even though the license was held elsewhere. Depending upon the results of the search, the licensing process ends or continues.

51, 52. For transfers from another state, the National Driver Register should be checked. Eventually, the National Driver Register should be on

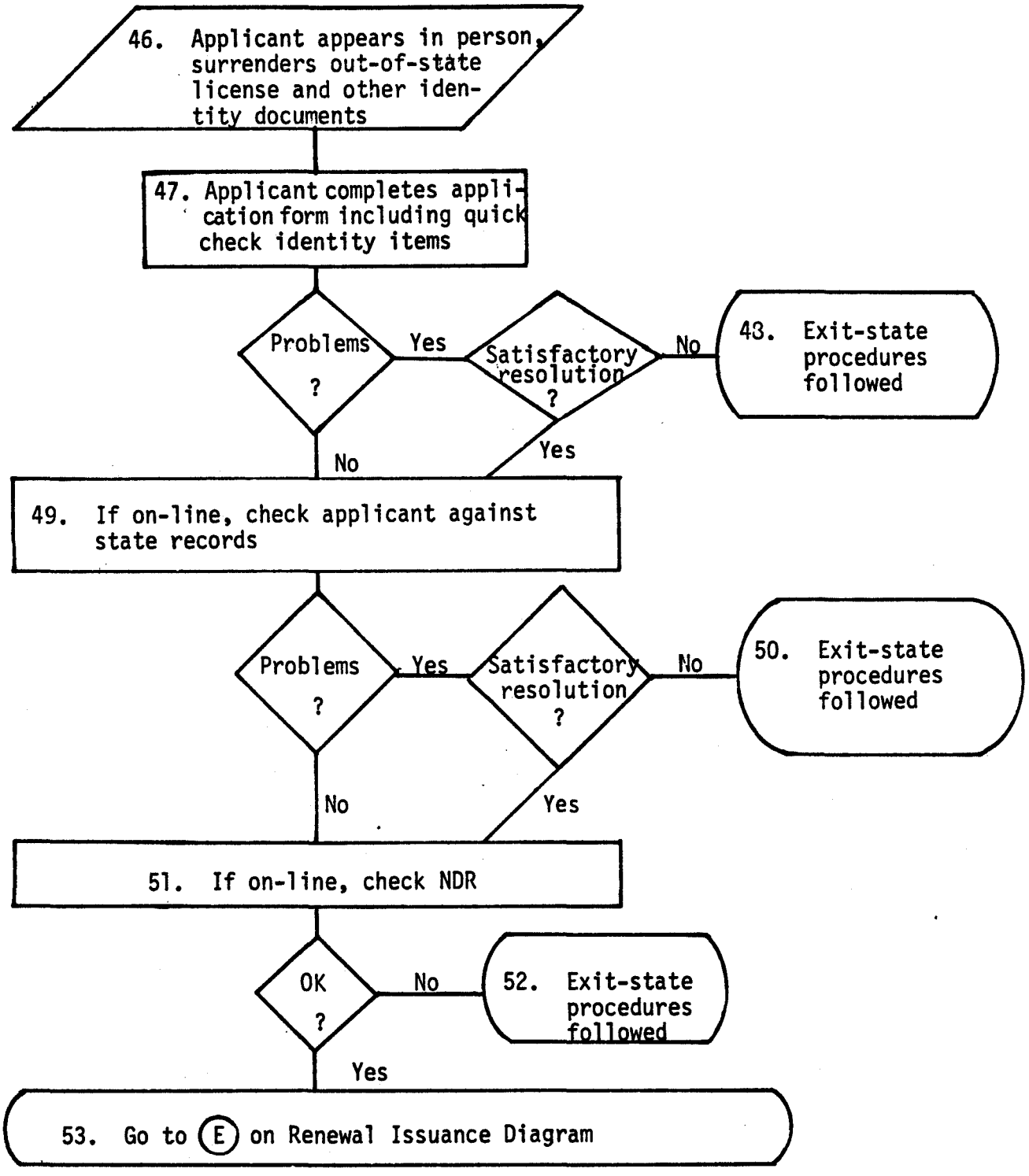

Figure 3. Out-of-state transfer - license issuance.

line with each state's driver licensing headquarters, and field officers will communicate their needs to the main state office which in turn will transmit a request for information to the NDR. Until the NDR has a quick response capability the use of the NDR will require delayed issuance.

53. The transfer applicant then follows the same pattern as does the renewal applicant, namely, vision tests, knowledge tests, possibly a skills test, and a color photograph (preferably three-quarter face). At this point, however, the transfer applicant leaves the field office. The license is made up, noting any necessary restrictions, and the response from the NDR is awaited. When the NDR report indicates "no hit," that is, the individual is not known to be under suspension or revocation in another state, then the license is mailed to the individual. In the interim, the individual is able to drive using a cash receipt as a ten-day license. If a "hit" occurs on the NDR, the license is simply not mailed. The out-of-state license should be returned to the state of previous license along with a request for a transcript of the driver's record.

OPTIMAL REQUIREMENTS:	Out-of-state license surrendered
	Birth certificate and other document
	Check NDR
	Vision test
	Knowledge test
	Road test (Discretionary)
	Three-quarter face color photograph, color-coded background, height scale
	Mail license
MINIMAL REQUIREMENTS:	Out-of-state license surrendered
	Check NDR
	Vision test
	Knowledge test
	Road test (Discretionary)
	Color photograph
	Issue license

The model driver licensing system attempts to provide an efficient means of administering driver licensing while reducing the probability of multiple or fraudulent licenses.

In the pre-licensing system, especially at time of first licensing, the emphasis on security is strongest. If careful verification of identity is required for initial licensing, subsequent renewals can focus primarily on whether the person and the driver license match.

For any license issuance (permit, original, renewal, transfer), as soon as identification is established, the emphasis shifts to the question of the applicant's fitness to drive.

Minimum standards for vision, knowledge, and skills must be met. Once the applicant's qualifications are established, a license is provided that includes information that is of use to the driver, the licensing agency, and law enforcement, and is made as tamper-proof as possible.

Should the driver incur violations, they may be handled through administrative adjudication within the licensing agency or through the court system. If a conviction results, there may be points assessed against the driver's record with no further action; there may be some driver improvement action, e.g., an advisory or warning letter or meeting with a Driver Improvement Analyst; there may be a suspension or revocation with or without a limited license issued. The court sometimes issues the limited license, making it difficult for the licensing authority to conduct effective monitoring of their licensing program. Ideally only the licensing agency should control license issuance, including limited licenses, but it is unlikely that the power to issue limited licenses will be entirely removed from the judicial branch. Eventually most drivers have their licenses reinstated.

Post-licensing control procedures are addressed briefly following the discussion of the driver licensing records system.

Driver Licensing Records System

A complete and readily accessible records system is essential for an effective driver licensing system.

Ordinarily the records system begins with information provided at the time of initial licensing. (In some instances a driver may already be on the records system by virtue of a conviction while licensed in a foreign state.) The application form itself is maintained in hard copy or microfiche, but most of the driver record is computerized. The core of the driver records is the brief file, which includes identifying information, current status of the license including the presence of any restrictions, and whether there are certain subfiles available. Through this brief driver record any of several subfiles

may be accessed. An identification subfile should be available on all drivers and include additional information that can be used for purposes of quick check of identity. A research subfile should also be present for all drivers and include any special information that is routinely collected for research purposes, e.g., estimated annual mileage, test scores. It should be noted that unless the information requires regular collection, it is recommended that it be obtained through special data collection efforts. Driver files often include millions of records so that storage space is always at a premium. Other subfiles will not necessarily be present for all drivers. They include the restrictions subfile, the crash subfile, the driver improvement subfile, the alcohol/drug subfile, and medical information. The medical subfile provides a computerized summary of medical information and actions taken, but a hard copy file is also maintained, including all medical reports and other related information. Figure 4 illustrates the components of the system.

Application form. Input at the time of application comes from three sources, namely the applicant, any supporting identification documents, and the driver license examiner. Table 4 summarizes the information obtained from each source.

Information from the applicant was described in the description of the pre-licensing process. Information from the documents is stored primarily for purposes of resolving any future questions of identification. The examiner provides information on any obvious medical or physical problems, the results of the licensing tests, possibly a black and white copy of the photograph appearing on the license, the license number, parental certification in the case of a minor applicant, and any special information to be used for research purposes. The application form is retained in hard copy or on microfiche or microfilm.

Driver history brief file. This brief file is the core of the driver records system. It is the portion of the record that is accessed first and through which all of the subfiles or trailers may be accessed. It includes information that can be used for the quick check of identity, including name, address, driver license number, social security number, date of birth, race, sex, expiration date of license, restrictions on license if any, and license type (e.g., permit, renewal) and class (e.g., motorcycle, heavy truck). It will also indicate the presence or absence of a crash subfile, a violation conviction subfile, or a driver improvement file. In addition there will be a code for

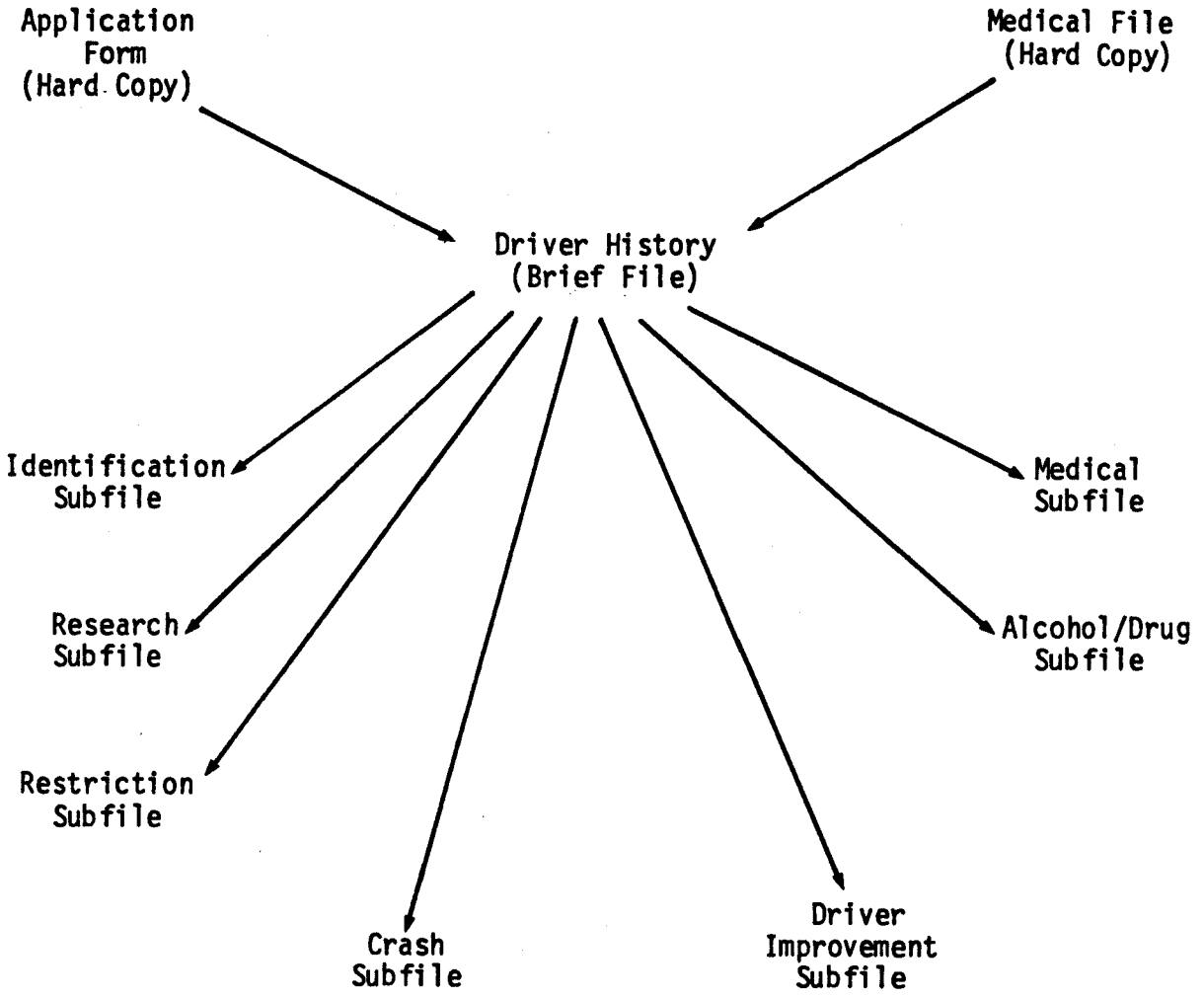

Figure 4 . Driver Licensing Records System.

Table 4. Information included on application form.

Input from the Applicant

* Name in full (first, middle, last. If married, include name previous to marriage.)
  Any other names ever used
* Present mailing address
* Present residence address (if different from above)
* Social security number (secondary identifier) - Determine if number appears valid
* Class of permit or license applying for
* Endorsement(s) applied for, e.g., motorcycle, school bus
* Date of birth (month, day, and year)
* Place of birth
* Race and Sex
* Height
* Weight
* Eye color
* Any medical or physical conditions which may affect driving
  (Specific medical questions)
  Name of high school (or elementary school)
  Year of last attendance at that school
  Location of that school
  Mother's first and family names and place where she grew up
* False information statement
* Signature
  Thumbprint
* Parent certification (if applicant is a minor)
* State(s) of previous licensure and license number(s) (out-of-state transfers)
* Previous mailing address (out-of-state transfers)
  Estimated mileage driven previous year (out-of-state transfer and renewal)

Input from Documents

* Full name
* Date of birth
* Place of birth
  Mother's first and family names

Input from Examiner

* Medical and physical condition as judged by examiner
* Test results (vision, signs, knowledge, skills)
  Photograph
* Driver license number
  Responsible adult (if applicant is a minor)
  Questions for research:
  Pre-licensing experience (driver ed, moped, etc.)
  Estimated annual mileage

* Minimal requirements

whether license issuance should be stopped for any of a variety of reasons. Although investigation of the total record would indicate that licensure is stopped, including the information here insures that even a review of the brief file will communicate this important message.

The brief file will also include a code for presence or absence of a medical subfile, but this information will not be revealed except through a special access code. Medical subfiles, and even the presence or absence of such files, are ordinarily considered confidential. With current proposals for developing the NDR into a switching center whereby states will be put in direct contact with each other, safeguards to maintain the confidentiality of medical records, including their presence or absence, become even more important.

Presumably all drivers will have an identification subfile and a research subfile, if this information is included. Whether a restriction subfile is present will be indicated by the summary information on restrictions. The crash subfile, the violation subfile and the driver improvement subfile will appear only if applicable. The medical subfile, of course, will appear only in those special cases where there are medical questions. Table 5 lists the contents of the brief history file.

In summary, the driver history brief file is a compilation of information identifying the driver, his license characteristics, and the presence or absence of certain trailers or subfiles. This brief version of the record enables retrieval of a maximum amount of information in minimal search time.

Identification subfile. Information on this trailer is primarily for use in a quick check of identity. Table 6 lists proposed contents, including place of birth, school attended and possibly location, mother's first and family names, and place where she grew up. It may be that the type of information collected and stored could vary from person to person, e.g., with father's name and place of upbringing given rather than the mother's. A special code should indicate which type of information is stored so that the examiner conducting the quick check of identity will know which questions to ask.

Research subfile. This subfile will include any special information that is routinely collected primarily for research purposes. It should not include information to meet short term needs, i.e., information that can be obtained through special data collection procedures for a limited period of time. Possible elements to be included would be reported estimated annual mileage, type of test administered (whether knowledge or road test was given), form of

Table 5. Driver history - brief file.

File Contents

* Name (first, middle, last)
* Address, mailing
  Address, residence
* Permit or license number
* Social security number
* Date of birth (month, day, year)
* Race and sex
* Permit or license expiry date
* Restriction(s)
* Permit or license class (including endorsements)
* Code for
    Crash(es) (yes/no)
    Convictions (yes/no)
    Driver improvement measures (yes/no)
    Stop issue
*Special access code for
    Medical information (current, previous, or none)

* Minimal requirements

Table 6. Identification subfile.

File Contents
Place of birth
School attended, date and location
Mother's first and family name and place where she grew up

knowledge test given (oral or written, foreign language), scores on tests administered, type of driver training received, etc. Because any addition to a driver file may involve millions of records, information collected on a routine basis should be kept to a minimum. Most research needs can be met through special data collection procedures and do not require the type of system described here. Table 7 lists possible contents of this subfile.

Restrictions subfile. Table 8 lists the information included on the restrictions subfile. By far the most common restriction is corrective lenses. Other restrictions include limitations on time or place of driving (e.g., daylight on highways with posted speed $\leq$ 45 mph) or speed of driving. Driving may also be restricted to the use of special equipment either for the vehicle, e.g., hand controls, or the driver, e.g., prostheses, or both.

Crash subfile. Table 9 lists the contents of this subfile. They include the date of each crash, the crash severity (property damage only, injury, fatality), the crash report number that should enable ready access to the crash file (and hence to crash-related information), and the type of associated violations of which the driver was convicted, if any. All crashes should be recorded regardless of whether there is a conviction. Ideally the vehicle type in which the crash was experienced would also be recorded. This information would facilitate evaluation of hardship licensing and classified licensing programs.

Driver improvement subfile. Table 10 lists the contents of this subfile. It has two major types of information, namely, convictions and driver improvement actions. For each conviction there is information on the date the violation occurred, the violation type and associated points assigned, whether the- violation was crash related, the citation number, the date of conviction, and the court of conviction. The citation number should be included to enable linkage to the original citation which should provide data on original charge (which may be different from the conviction), vehicle type in which violation occurred, time of day, day of week and highway type.

The driver improvement action information will include any driver improvement measures taken, e.g., advisory letters, conferences with the driver improvement analyst, or assignment to special schools or clinics held under the auspices of the licensing authority or the courts.

Alcohol/Drug subfile. This subfile includes information on all alcohol/drug related offenses. Although some information on such offenses will also occur in the driver improvement subfile and may be alluded to in the medical subfile, it is included in a special subfile to enable compilation of infobmation that is not ordinarily stored and to provide for research in this important area. It could be argued that from a research standpoint it would be desirable to have

Table 7. Research subfile.

File Contents
Estimated annual mileage
Type of license test(s) taken and scores
Type of driver training
Form of knowledge test (oral, written, foreign language)

Table 8. Restrictions subfile.

File Contents

* Corrective lenses
* Speed, permitted hours, permitted locality
* Equipment (e.g., hand controls)
* Other restrictions

* Minimal requirements

Table 9. Crash subfile.

File Contents

* Date of crash
* Accident severity (property damage only, injury, fatality)
* Report number

  Associated violation (conviction) type, if any

  Vehicle type operated at time of crash

* Minimal requirements

Table 10. Driver improvement subfile.

File Contents

* Convictions
  * Date of violation
  * Violation type and associated points
    Whether crash related
  * Citation number
  * Date of conviction
  * Court of conviction

* Driver Improvement Actions
  * Advisory letters
  * Type and date
  * Meetings with driver improvement analyst
  * Type and date
  * Assignment to driver improvement school
  * Date
  * Assignment to other rehabilitative program
  * Type and date
  * Suspension/Revocation
  * Duration

* Minimal requirements

information on all arrests regardless of violation type and of subsequent disposition. However, there may be insurmountable legal obstacles to compiling this type of information. In the case of alcohol/drug arrests, however, there may be justification for such a subfile. It can be seen from Table 11 that the file would include the results of tests administered so that a low blood alcohol concentration (bac) could indicate that an arrest may have been made in error, or at least that the apparent impaired driving performance was not attributable to alcohol. Unlike speed measures, the measure of bac is ordinarily conducted by someone other than the arresting officer. There is no such independent measure available for non-alcohol related arrests so that it is not possible to make a judgment as to the validity of the charge. In any event, the contents of this subfile should be available for research purposes only and not for use in any decisions made about an individual driver. It is hoped that the systematic analyses of the contents of this file in conjunction with other traffic records files should lead to improvements in the overall administration of programs for drinking drivers.

Medical subfile. This subfile includes information on referrals for medical evaluation with corresponding dates, receipt of medical reports with corresponding dates, any actions taken, reexaminations scheduled, and purge dates if applicable. Table 12 lists proposed contents.

Medical file--hard copy. It is necessary that the entire medical reports on a driver be retained, and it is usually simpler to do this by maintaining a medical file in hard copy. The type and amount of information compiled will vary so greatly that it will not lend itself readily to automated storage. Hence the hard copy medical file will include the necessary identifying information (name, date of birth, address, race, sex, driver license number, social security number, restrictions, license class, license expiry date). In addition, the file should include information from the driver's entire record whenever decisions are being made from a medical standpoint. Since the vast majority of drivers will not have special medical information compiled on them, the usual constraints of storage space are not applicable here. Table 13 lists possible contents.

Table 11. Alcohol/drug subfile.

File Contents

Arresting charge with date

Test(s) administered
  Reason for failure to test

Test results

Adjudicated charge with date

Disposition
  Nol pros
  Aquittal
  Conviction - Type and date

Subsequent actions
  Fine - Amount
  Jail sentence - Duration
  License suspension/revocation
    Duration
    Limited license
  Suspended sentence - Duration
  Rehabilitation action

Table 12. Medical subfile.

File Contents

* Date(s) of referral(s) for medical evaluation
* Date(s) of medical reports received and source
  (Physician, Medical Board)
* Medical condition(s)
* Action(s) taken
  (Restrictions)
* Re-examination interval
* Purge file date (after x years, as advised by the Medical Board)

* Minimal requirements

In summary, files that are essential to an effective driver licensing (MINIMAL REQUIREMENTS) include:

Application Form (hard copy or microfiche)
Restriction Subfile
Crash Subfile
Driver Improvement Subfile
Medical Subfile
Medical File (hard copy)

Files that are recommended in addition (OPTIMAL REQUIREMENTS) include:

Identification Subfile
Research Subfile
Alcohol/Drug Subfile

The recommended components of the system are shown in Figure 4 followed by the contents of each component in Tables 5 through 13.

The effective operation of a driver licensing system requires the maintenance of information from a variety of sources updated in a timely fashion. Furthermore the information must be readily accessible by those persons responsible for making decisions about the driver's licensure. Without a comprehensive records system that meets the criteria of currency and accessibility the driver licensing program cannot achieve optimal effectiveness.

Post-Licensing Control

McGuire et al. (1975) have conducted an excellent review of post-licensing control measures and have developed detailed models of the various portions of the system. Therefore, the reader is referred to that work and only a brief treatment of post-licensing control is given here.

Post-licensing control consists of a variety of measures, including driver improvement programs, programs for drivers with alcohol-related convictions, monitoring of public records that may have relevance to ability to drive, monitoring the driving activity of drivers under license suspension or revocation, the possible use of habitual offender statutes, and the use of administrative adjudication. Each is addressed more fully below.

Driver improvement measures. Aside from routine renewal licensure procedures, by far the most frequently implemented post-licensing control measures are the driver improvement programs. Briefly, these measures fall into three major steps. Whether any of these steps is implemented depends upon a review of the driver record.

Table 13. Medical file (hard copy)

File Contents

* Name
* Date of birth
* Address
* Race and sex
* Permit or license number
* Social security number
* Restrictions
* Permit or license class
* Permit or license expiry date
* Driver license examiner's report
* Physician(s) report(s)
* Medical Advisory Board report(s)

* Minimal requirements

Review of the record should occur routinely whenever a conviction is entered on a driver's history and/or whenever the driver is due for re-evaluation for license renewal or because of some other concerns about his driving. Generally, aside from license renewal, the most frequent reason for record review is notice of a conviction for a violation.

Technically the purpose of driver licensing and driver improvement programs is to reduce traffic crashes. However it is difficult to use crashes as a basis for instituting driving improvement measures. Too often the defense can be made that the driver in question was not culpable. In contrast, if convictions are used, the driver has "had his day in court" and the licensing authority is not put in the position of passing judgment. Hence, from a practical standpoint convictions are a more defensible measure on which to base driver improvement programs.

There is another good reason for using convictions rather than crashes. It has been shown in a number of studies that violations are a better predictor of future crashes than are crashes themselves (Campbell, 1958; Stewart & Campbell, 1972). Thus the states are on firmer ground than they may realize in using convictions for assigning drivers to driver improvement programs.

Although most drivers at one time or another will be convicted of at least a minor moving violation, e.g., speeding, failing to yield, the evidence indicates that drivers who have recently experienced a conviction have a higher probability of crash involvement in the subsequent year or two. Because so many drivers do experience a single conviction on an otherwise "clean" record, any corrective measures aimed at this group must of necessity be relatively low cost. Particularly in the case of young drivers, the first conviction may be grounds for initiating the first step in the driver improvement process.

Advisory letters or warning letters have been shown to be a low cost and effective means of improving driver performance. They may be instituted for a variety of reasons and may vary in form accordingly. They should be considered as a first step in dealing with drivers who have experienced infractions but who do not appear to be seriously derelict in their driving performance.

Most drivers will not progress beyond this first level at which a warning letter is sent. However, some drivers will continue to compile convictions on their records, and when this occurs something beyond a letter is needed. Although there has been considerable research conducted on driver improvement, there is very little evidence of effective programs for drivers who reach this second stage. An exception is the California Group Educational Meeting (GEM)

program which appears to be cost-effective for these drivers, even more cost-effective than warning letters. Therefore, based on the information available, the GEM or some variation of it is recommended as the improvement measure of choice for this intermediate stage driver who might be considered a near-problem driver. However, there is room for considerable additional investigation in this area.

If the driver continues to accumulate convictions, the licensing authority has no choice but to take more drastic measures. Before license is suspended or revoked, it is recommended that consideration be given to alternative approaches. The innovative research of Kaestner and Speight (1974) suggests that if a driver at this stage is given a choice of attending a driver improvement clinic or accepting a limited license subject to restrictions he himself specifies, he is more likely to achieve a clean driving record for the subsequent 12 months than if his license is suspended. However, it is considered essential that the driver understand license suspension will be instituted if the record does not remain clean. Kaestner and Hawes (1977) found that drivers who were one conviction short of habitual offender (HO) status had better subsequent records if they received a warning letter informing them of their status than if no such letter was received. Thus it appears that there may be ways to deal effectively even with a driver who has reached such a serious level of performance deterioration.

Generally, then, it is recommended that driver improvement consist of three major steps. The first, namely, the advisory letter, is instituted upon early evidence of driving problems. The second consists of a one-session group meeting, the GEM, as developed in California and is instituted when the driver reaches what may be called near-problem driver status. Finally, the driver who persists in violation-type behavior may be given some alternative to suspension with the understanding that suspension will be instituted should he incur any further convictions. Finally, of course, a fourth level may be reached when license suspension or revocation is necessary. However, it may be questioned whether such license suspension may actually be considered a driver improvement measure. It may be more accurate to describe it as a driver control measure.

Programs for drivers with alcohol-related convictions. There is no good evidence that driver improvement programs specially tailored for the problem drinker driver are effective. Although there is some evidence that alcohol rehabilitation programs may benefit the social drinker who has been convicted of

his first DUI, these programs do not hold promise for the more seriously impaired driver. Licensing authorities have the responsibility for efforts to prevent such drivers from driving while impaired but not for attempts to treat the drinking problem itself. Evidence from California indicates that license suspension is the most effective driver control measure for drivers convicted of a second DUI offense.

Monitoring public records. There is evidence that information available in public records will contribute to the identification of drivers who are at higher than average risk of experiencing crashes and, in some cases, of experiencing alcohol-related crashes (Lacey, Stewart, and Council, 1979). Of particular importance may be information on releases from institutions for the treatment of alcoholism and/or mental illness, persons who have recently been divorced, and persons who have just been released from prison. It appears worthwhile for persons in these categories to be informed of their elevated risk and counseled as to what steps they may take to reduce it. However, it is questionable whether the licensing authority should be the agency to initiate such contact. Although there are unresolved questions of administrative liability (see section on Unsolved Problems), from a strictly licensing standpoint it would be advisable to have effective programs instituted whereby divorce lawyers, prison officials, and officials of institutions for the treatment of alcoholism and/or mental illness routinely counsel the drivers in question with no involvement on the part of the licensing authority.

Licensing authorities should be monitoring their own drivers' records, including information received from other states. In addition, they should be making routine use of the NDR in licensing decisions.

Monitoring driving activity of drivers under license suspension or revocation. Although it is well documented that significant proportions of drivers under license suspension or revocation continue to drive, studies generally indicate that suspension or revocation does appear to be associated with reduced driving and fewer infractions than if these same drivers are not suspended. In smaller communities it may be possible to alert local enforcement personnel of drivers currently under license suspension so that surveillance may be enhanced. However, in larger communities it is unlikely that effective surveillance could be maintained. Because this is an area where the evidence has been most discouraging and because NHTSA is about to fund a study in this area, it would be premature to make any recommendations.

Limited licenses. Limited licenses appear to have potential as a post-licensing control mechanism. Furthermore, their existence increases the probability of conviction, since courts are reluctant to impose penalties that appear to present serious hardship. The use of the limited license is endorsed when it is combined with requirements placed on the driver, e.g., attending a driver improvement school or maintaining a clean record for a specified period of time subsequent to license reinstatement. It is important that further sanctions be invoked should the driver fail to abide by the requirements. There is a need for greater investigation of the optimal use of this approach.

Habitual offender statutes. Careful evaluation of habitual offender (HO) statutes raises questions as to their effectiveness in achieving their presumed goal of decreasing crashes and violations. Evidence from Kaestner's work in Oregon does suggest, however, that HO statutes can be used effectively in combination with a warning letter sent when the driver is just one infraction short of HO status. Further investigation of this approach is warranted. However, in light of the reluctance to prosecute these statutes (many prosecutors feel their time should be devoted to cases of assault, burglary, and other serious offenses and therefore fail to prosecute HO cases), their use is not recommended at this time.

Administrative adjudication. Because there is a need for careful evaluation of the advantages and disadvantages of administrative adjudication, it is not included in the post-licensing control system at this time. However, should its effectiveness be demonstrated, it should of course be reconsidered.

UNSOLVED PROBLEMS

In addressing the research requirements or unsolved problems, an attempt has been made to classify the needs according to their importance. Those given the highest priority are described first. The work statement of this project calls for identifying licensing research needs with a special emphasis on those that promise accident reduction potential. In conducting this project, it became clear that there are several major areas into which research needs fall, only one of which promises accident reduction within a reasonable time frame. A second area addresses more fundamental issues that may at some future time lead to crash reduction, while a third concerns support systems.

1. Licensing Research Needs that Have Accident Reduction Potential. It was found that relatively few of the identified needs clearly fall into this area. There are a number of research areas described that should have accident reduction potential, but it is not possible at this time to say for sure what that potential may be. For the top priority proposals both types of needs are described under this category.

2. Fundamental Research That Does Not Promise Immediate Benefits but Which Potentially Could Lead to Improvements in Licensing. Improvements might be in accident reduction potential, administrative and/or records efficiency and effectiveness, or enabling more persons to drive.

3. Licensing Research Needs That Concern Improvements in Licensing Administration and Records. The research needs described under this category do not in and of themselves promise any reduction in crashes or injuries. Nevertheless, valid and complete records are essential to any effort to evaluate the accident reduction potential of licensing programs. Hence, without improvement in this area, the questions of concern in the first category cannot be answered adequately.

The top priority research needs are described within the three categories. It is obvious that these groupings are to some extent arbitrary, and there are instances where a proposed research undertaking could be placed in any of two or even three categories. In addition to classifying these top priority research needs, there has been an attempt within categories to list the proposals in order of priority. Again this ordering should not be considered inflexible in that there is room for disagreement as to which proposal should take precedence.

Following the discussion of the top priority research needs, the next most important group of research needs are described. These are not presented according to the above listed categories but rather are discussed within topic area, e.g., driver records, knowledge testing, driver improvement. Finally, research needs in the third priority group are listed.

A. High Priority Needs

1. Licensing research needs that have accident reduction potential. Within this category the first proposal clearly has the greatest and most immediate accident reduction potential. The other proposals hold promise for crash reduction, but in some instances the realization of that potential will be further removed.

a. Required belt usage by young beginning drivers. Encourage programs, legislative or otherwise, that would require the young beginning driver to use available restraint systems. Consider also the possibility of extending the belt usage requirement to all front seat passengers or all occupants of a vehicle operated by a young beginning driver.

This proposal offers the greatest potential for injury reduction of any of the proposed research projects. The effectiveness of safety belt usage has been well documented and needs no further elaboration here. The evidence is also very clear that beginning drivers have a disproportionately high crash rate. It has also been reported that belt usage of crash-involved young drivers is even lower than that of other drivers in crashes (Council, 1976).

Hence, these drivers constitute a prime target group for efforts to increase safety belt usage.

The possibility of legislation to influence their belt usage is particularly attractive for several reasons, including the following:

(1) Society has traditionally felt a greater obligation to its children and youth, especially in terms of legislation. The existence of child labor laws and the requirement that children receive at least a minimal education are examples of such concern. More recently the widespread repeal of motorcycle helmet laws has often been combined with a requirement that the helmet still be used by riders under age 18. Many states already have what are called provisional licensee laws that place the young beginning driver in a special category so far as license monitoring and control are concerned. Hence there is legal precedent for dealing differentially with this driver group.

(2) The high crash rate experienced by this group, as mentioned above, indicates a special need for protection. Increased belt usage by these drivers should have greater benefits than is true for any other driver group.

(3) The required use of safety belts during the initial stages of driver skill acquisition may increase the probability of developing the "safety belt habit" and the continued use of belts thereafter.

(4) These drivers represent a group in which society has invested considerable time and money but a group that has not yet had the opportunity to make significant contributions in return. Lives saved and injuries reduced among these young drivers should lead to greater return to society than would be true for older drivers generally.

(5) There is reason to believe that support for requiring belt usage by these drivers could be elicited from a wide variety of sources. First, parents are likely to feel more secure if their youngsters are protected in this way. Should the requirement be extended to other vehicle occupants as well, parents will be reducing their potential liability arising from injuries to these other occupants if their young driver is involved in a crash. Because belt usage should lead to reduced injury and consequent litigation, there should be a reduced demand placed on the court system. Insurance interests should support such a move because of their special concern about reducing injury. Young people below age 18 do not vote and hence do not pose a significant threat to legislators considering such legislation. Furthermore, young people are usually willing to abide by any reasonable requirement in order to get their licenses to drive.

NHTSA could encourage this proposal in two major ways.

(1) Prepare Materials. There is a need for readily usable off-the-shelf materials that could be used by both state legislators and support groups. These materials would take two major forms:

(a) Brochures, pamphlets, posters. Prepare brochures, pamphlets, etc. that would clearly spell out the size of the problem and the anticipated benefits. These materials would be based on the best information currently available both from national data banks and from whatever state and/or other data banks may be available.

(b) How-to-do-it materials. These materials would spell out in detail the steps to be taken by potential interest groups to compile the necessary information and data applicable to the specific state in question. These "how-to materials" would address at least the points outlined in Waller, Li, Campbell and Herman (1977 pp. 9-6 - 9-7) on the steps to be pursued by the state prior to and following the passage of such legislation. These include, among other points, addressing the existing state laws covering licensure of these drivers and the necessary modifications, collection of state data on current belt usage both on road and in crashes to determine anticipated benefits, determination of sanctions to be proposed, organization and coordination of support efforts, and production of necessary materials. Pre-legislation efforts should also address the question of medical, rehabilitation, and other related costs incurred because of unnecessary injury. Special emphasis may be given to any current concern about health cost containment.

(2) Once the state has passed the necessary legislation, NHTSA should carefully evaluate the impact of the law. This will of course necessitate the collection and use of pre-implementation data as well as post-implementation data and the collection and

analyses of appropriate comparison data from other driver groups as well. This evaluation should be conducted quite independently of the efforts to promote the legislation in order to avoid possible "contamination" of the evaluation process.

Ideally this evaluation would also address the potential benefits had the legislation extended beyond the age group in question.

b. Vision needs by license class. Establish vision functions and corresponding standards for different classes of licensure. While for most drivers, vision standards for licensure may not be of paramount importance, it may be that for certain license classes an upgrading and expansion of vision testing would be cost-effective. In the first place, drivers of special vehicles, such as heavy trucks or emergency vehicles, can be required to meet more stringent standards than drivers in general because of the greater potential hazard to others posed by the operation of their vehicles. Furthermore, because drivers of heavy duty trucks must often continue to drive under less than optimal conditions, e.g., nighttime or bad weather, and are thus overrepresented in crashes occurring at such times, it is reasonable to explore whether such visual functions as glare resistance or glare recovery may be of greater import for this group. Likewise, it may be that a function like peripheral vision would be of particular importance for the motorcyclist, who is especially vulnerable to hazards approaching from all directions and is apparently not highly visible to other vehicle operators. Although it may prove to be the case that extensive vision testing is not advisable for all drivers, for certain license classes the visual needs may be somewhat different and the usefulness of special testing greater.

c. Screening for medical conditions. There is some information that indicates that certain medical conditions are associated with poorer driving performance. While there is a need for better information in this regard, it may still be feasible to check license applicants for some of these conditions at the time of initial licensure or renewal. The licensing agency has always had the responsibility for ensuring that drivers are physically and mentally fit to drive, and the proposed screening would follow the traditional pattern that has been used for vision screening. It would of course be limited to health conditions that could be detected through the use of innocuous low cost

procedures that can be administered by a licensing examiner or some other office personnel. A possible candidate for such screening would be hypertension which has been shown to be related to crashes and is a condition that is known to be widespread, particularly in segments of the population that, as a group, are less likely to seek routine medical care. Furthermore, in most instances the condition can be controlled through relatively simple inexpensive treatment. Because a person is unlikely to be aware of having this condition until it has done some damage, it is especially important that preventive measures be taken.

In such a program, the driver examiner would merely screen and refer: all health decisions would be made by health professionals. It has been reported recently that screening programs are not considered so important as they once were because an awareness of having a condition is not enough to ensure that a treatment regimen will be observed. However, in some parts of the country it is believed that many persons with conditions such as hypertension are not aware of having the condition and of course cannot do anything about it until it is detected. Furthermore, because the driver license is considered so important in our society, tying the successful treatment of a condition to retaining the license may encourage greater observance of a prescribed treatment. Such an approach to health conditions related to driver performance would be no different from that already observed in the area of vision. If the driver, for whatever reasons, does not or is not able to get his vision functions within acceptable limits, he is denied license. Such denial is for his own protection as well as that of other highway users. However, it is hypothesized that many more drivers will be able to drive longer and under healthier circumstances, if a reasonable screening program is developed in cooperation with the state agency responsible for health.

This proposal is elaborated in greater detail in Waller (1978).

d. Coordination of licensing with activities of other state and private interests to combat driving problems that transcend driving per se. It is becoming increasingly obvious that there may be some circumstances that are associated with poorer driving which may stem from conditions well beyond the influence of the licensing authorities. Perhaps alcohol is the most obvious illustration, and indeed state licensing authorities have recognized this problem as one that requires the assistance and involvement of other agencies. While the effectiveness of some of the programs enacted may remain doubtful,

nevertheless the attempt to deal with the drinking driver exemplifies the type of approach proposed here.

Waller (1967c) has reported that drivers who have especially poor records are also more likely to be known to public agencies concerned with crime, family problems, financial problems, and so forth. In 1949 Tillman and Hobbs concluded that, "a man drives as he lives."

This is not to suggest that we should "get the problem driver off the road" so that the highways will be safe for the rest of us. There is strong evidence that indicates the majority of crashes involve drivers that would not be identified in such record monitoring. Nevertheless there is room for exploration of how the driver licensing program might be used to enhance the overall functioning level of drivers and whether an improved level of functioning might be expected to be reflected in their driving.

One such example is the relationship between literacy and driving. Waller and Hall (1979) have examined the records of drivers who took the oral version of the license examination (a fairly valid measure of functional illiteracy) and compared them with matched controls who took the written test. Oral exam drivers have more violations on their records, a not surprising finding in that other evidence indicates persons of lower socioeconomic status are more likely to be convicted once a given offense occurs. However these drivers also had more crashes on their records. a finding that is less likely to be acccounted for by their disadvantaged condition. It should also be noted that the oral exam drivers had their crashes in older vehicles and were more likely to have vehicle defects reported.

Licensing programs could be used to encourage the acquisition of skills. A state could announce that after a certain period of time, e.g., three to five years, all applicants for a learner's permit or initial license under the age of 25 would be required to take the written version of the test. In the meantime it would be necessary to develop excellent remedial reading programs aimed at these drivers. Unprecedented cooperation and coordination among state and private agencies and interest groups would be required to reach the young people and conduct the necessary teaching and tutoring. Young people could read about cars or driving or whatever they were interested in--the important goal would be to get them reading. Many of these young people have already been lost to existing programs, that is, they have dropped out of school without acquiring minimal reading skills. However, the one goal they all seek

is acquisition of the driver license. The question to be addressed is whether it is possible to capitalize on the motivation to drive in order to encourage the acquisition of literacy skills. If the result were simply that more applicants were denied license, then the program would not be a success.

Of course the acquisition of literacy skills should accomplish far more than simply better driving records. It should lead to more productive citizens that are not only contributing but also no longer requiring extensive social services in other areas. The proposal is elaborated further in Waller and Hall (1979).

It should also be noted that there may be areas where driver licensing programs could provide greater services to the public that would not necessarily be related to driving. For example, in some states drivers can register and title their vehicles at the licensing stations. In Michigan they can register to vote in any examination station. Because the license station is the primary and often sole contact between state government and the citizen, it has unique potential for delivering other services, e.g., screening for medical conditions. In a time of growing concern about government costs, it may be that the coordination of different state agency functions could better achieve the goals of each agency and at a reduced overall investment.

e. Programs for the near-problem driver. Programs dealing with drivers who have become "set" in their problem driving behavior have not been shown to be particiularly cost-beneficial. However, lower cost programs aimed at the broader group of drivers who have shown some difficulty but have not yet advanced to a serious level, have been shown to be effective at least in some instances, e.g., advisory letters in California and Oregon. Because most crash-involved drivers do not have exceedingly poor records, it would appear that to have any major effect on crashes generally it is important to reach a large portion of the driving population.

An examination is needed of state practices regarding drivers with only a few violations. A review of the available information from the literature and from states that have any information on their programs should be used to identify those approaches that seem to offer the greatest promise for the costs involved. It is then necessary to devise specific approaches that may be field-tested (not a demonstration project) and subjected to careful evaluation. While it is not anticipated that the approaches would show dramatic results,

even relatively small effects could be beneficial when applied to the large number of drivers involved.

2. Licensing research needs that are fundamental but do not promise any immediate benefits. There are some fairly basic research needs that must be met before it will be possible to achieve other improvements in our licensing program. Hence, even though these proposals are described separately from those in the first category, in at least some instances their potential for crash reduction far exceeds that of any of the earlier proposals. However, in order to realize the benefits, it is essential that efforts be initiated to address the fundamental issues.

a. Identification of human performance parameters that differentiate between novice and experienced drivers. It is well known that experienced drivers as a group perform more safely than novice drivers. However, very little is known about the manner in which these two groups differ. While it is true that driver education programs exist in abundance to assist the novice driver in initial skill acquisition, it is also true that the basic research needed to equip the driver education instructor with effective tools has never been performed. This fundamental research is needed for effective licensing programs, effective driver training programs, and effective highway and vehicle design. However, because such fundamental inquiry does not offer immediate payoff, it has not been seriously addressed.

A discussion of how to proceed on this proposal is included in a previous NHTSA-sponsored report on driver performance tests (Waller, Li, Hall, and Stutts, 1978). It should be strongly emphasized that the type of inquiry proposed here is based on empirical studies of fundamental skills, e.g., perceptual skills, decision making processes, measures of performance variability.

While it is true that NHTSA has sponsored projects whose titles imply that these questions have been addressed, in point of fact the resuting reports are based on what might more accurately be labeled "an expert opinion poll." Expert opinion is a reasonable starting point. It is an unacceptable ending point. In contrast, the type of empirical investigation advocated here is that used by Alfred Binet when he went into the classrooms in Paris in 1904 to determine a way to differentiate between children who could benefit from the existing educational programs and those who could not. Binet did not assemble a group of teachers and have them judge what skills seven-year-old children

could perform that could not be performed by six-year-olds, and how critical they were. Rather, Binet tested children and determined for himself what kinds of questions could be answered accurately by seven-year-olds but not six-year-olds. The resulting test developed by Binet is still considered the most useful instrument in existence today for measuring the intelligence of young children. It is past time to make use of at least as sophisticated methodology as was employed by Binet in 1904.

It should be noted that the work that has been done in this field is as much as could be expected given the level of support provided by NHTSA. It is also recognized that NHTSA has difficulty justifying support of research that does not promise fairly short-term benefits. However, until and unless some of these fundamental questions are addressed, major expenditures on developmental and demonstration programs are premature. It will take longer and may initially cost more to address the questions in the manner proposed. However, it is anticipated that total funding will not need to be increased. What is needed is a different allocation of funding with more investment in the initial discovery phase to insure sound information on which to develop programs. Over the long run the information can be used to develop far more effective licensing, training, and vehicle and highway design programs than any that may currently be developed.

b. Development of knowledge and performance tests based on sound psychometric principles. There is a decade worth of advances that can be made on the basis of available techniques. For example, virtually no states employ standard psychometric techniques in the development of their written and road tests. NHTSA field staff have not pushed this, and the standard does not require it. NHTSA has sponsored the development of tests that do not meet the minimal criteria for sound test construction. For example, in multiple choice tests for use with an adult population a minimum of four choices should be given. Fewer choices increase the probabilty of getting an answer correct by chance. A true-false question has a 50 percent chance of being answered correctly even if the answer is not known. For a three-choice item there is a one in three possibility of guessing the correct answer, and for four choices the probability decreases to 25 percent. Five choices reduce it further to 20 percent, and six choices to about 17 percent. However, it is difficult to devise good five-choice items and extremely difficult to develop six-choice ones. Therefore four-choice questions balance the problem of developing good test items with the problem of guessing correctly.

A second requirement of test items is that the distractors (wrong answers) must be selected a certain proportion of the time. If, in a four-choice item, one of the distractors is never or rarely selected, in effect the item is a three-choice one. Likewise, if only two choices are ever selected, the item is psychometrically equivalent to a true-false item, with a 50 percent chance of guessing correctly. These are only some of the considerations that must be addressed in test construction but which have not been handled adequately in previous NHTSA-sponsored projects. Longer term gains can never be realized until at the least the obvious step is taken of using test instruments of known and defensible psychometric characteristics.

Guidelines are also needed as to what topics should be covered in knowledge and performance tests and to what extent.

c. Development of a reliable medical impairment scale. One of the difficulties in research concerning medical conditions and driver performance has been the lack of validated medical criteria for determining the degree of impairment associated with the medical conditions commonly believed to affect driving performance. There is a fundamental need for a reliable medical impairment scale developed according to established procedures to be used as a research tool in identifying possible relationships between medical conditions and driving. Because there currently exists no reliable measuring instrument, it is not possible to develop sound information in this area.

Once a reliable scale is established and any relationships between degrees of medical impairment and driving have been defined, it will be necessary to identify the types of restrictions that can realistically be imposed and develop criteria for their use. An attempt should also be made to determine for which conditions, if any, a restricted or limited license may be issued without periodic medical reports.

d. The role of preclinical disease in crashes. This is an area where very little is known, and for fairly obvious reasons it would not be easy to develop a sound body of information. Nevertheless, it is believed that this area is worth pursuing, first, to determine whether there are relationships that are sufficient to justify further concern, and second, to explore possible countermeasures that could be incorporated into the licensing program or elsewhere. Hypertension is one example of a condition that is likely to go undetected for extended periods of time (and hence be considered "preclinical") unless there is routine medical surveillance. Waller (1968) has reported increased crash rates for drivers who subsequently developed heart disease. There may be other conditions that during the preclinical stage are associated

with increased driving risk. Exploration of this area could have potential payoff for both licensing programs and health maintenance programs.

3. Licensing research needs that concern improvements in licensing administration and records. These proposals for the most part will not lead directly to any crash reduction. However, by virtue of their implementation it will be possible to conduct far more valid evaluations of other programs designed to reduce crashes. Furthermore these activities will make it possible to identify problem needs and devise additional countermeasures that could not be developed without the proposed improvements.

a. Clarification of communication between the judicial system and the licensing agency. At the present time the judicial system (including all adjudicative components, i.e., courts, judges, prosecutors, and any administrative adjudicative programs) is to a large extent outside the established lines of communication among agencies monitoring drivers. For the most part the enforcement system communicates fairly well with licensing authorities, even though it is recognized that some communities are chronically derelict in this regard. However, for excellent reasons the court system has been established as an independent entity that does not answer to other state agencies. Nevertheless for effective license monitoring it is essential that licensing agencies receive timely feedback on court convictions for traffic offenses. Court practices vary widely in this regard. It has been reported that some municipal courts do not report license suspensions until after the suspension period has elapsed. Other courts report convictions differentially depending on who the driver is. McGuire et al. (1975) have recognized the problem, although there are no clear guidelines as to how to resolve it. Clearly if licensing and driver improvement programs are to be based on traffic records, a careful examination must be made of how the court system coordinates with the licensing agency.

A careful investigation should be conducted of current practices to determine whether there are any routine procedures that could ensure that the driver licensing agency is informed of adjudicative actions. This investigation should be more than a survey of state practices; it should include some in-depth examination of what actually happens as opposed to stated policies. Once it is known what the current practices are, one or more model communication systems should be developed.

b. Court practices concerning the under-age traffic offender. A special problem is posed by the under-age offender. In many states these young people fall under the jurisdiction of the juvenile court system whose records are not public. Consequently the state licensing authority is not informed of the disposition of arrests for traffic violations. There is a need for information on present state practices concerning the under-age traffic offender with the development of recommendations and guidelines in this area. Ideally minors should be dealt with the same as adults regarding traffic violations.

c. Administration of driver license permits. In some states the holder of a driver permit is not issued a regular driver license number and placed on the driver license file. As a result it is not possible to determine how many people are driving on permits. Even more important, it is not possible to find out who the permit holders are. If a permit holder is involved in a crash that is reported to the licensing authority, the driver is entered on the file with the crash information. As a result, it is possible to study failures but not the successes. It is simply not possible to get good information about the driving performance of this group. Because we know that the young driver is inexperienced and hence more likely to make errors resulting in crashes, it is essential to get as much information as possible about this early learning period which ordinarily requires the presence of a licensed adult. Better information about this driver group would be useful in developing more effective licensing procedures for easing the young driver into the driving population more gradually. Information is needed on current state practices as well as recommendations for how best to administer the licensing permit.

d. Form and record life of driver records. Every state is inundated with traffic records, and as driver programs are subjected to closer scrutiny the need for more and better records increases. Recommendations are needed concerning the minimal requirements for driver records. Which records must be kept in hard copy, which may be retained on microfiche, and which are most suitably stored in computer files? What is an acceptable record life for each type of information? State practices should be examined and a model system developed.

e. Acceptable identification for license type and license class. To ensure the security of the driver license, close attention must be given to driver identification both at initial and renewal licensure. Recommendations are needed as to what may be considered acceptable evidence of identity for the learner's permit, original license, renewal license, and out-of-state

transfers. Guidelines are needed as to how the identification should be checked and how it should be stored. An important question is how the information should be retrieved for verification at time of renewal.

In addition, recommendations are needed as to whether identification requirements should vary with different license class. For example, should identity requirements be more stringent for license to drive a tractor trailer? Should a license to operate a moped only (not an endorsement on an operator's license) be issued under the same guidelines as those used for establishing identity to drive a passenger car? If identity requirements are less strict, what insurance is there that a moped license will not become a "breeder" document (and be used as evidence of identity for acquiring other documents)?

f. Procedures for rapid identity check after initial permit or initial licensure. Procedures are needed for a simple quick check of identity after issuance of initial permit or license. For example, should certain information be obtained at original licensure, stored in the file, and checked at renewal? Such information might include the name of the applicant's elementary school or the place his mother grew up. Because individual circumstances will vary so greatly, it is not necessary that the same type of information be obtained from every applicant. It may be that there may be as many as five possible types of information requested, only one of which would be stored, depending on which type of information the applicant is best able to provide. No effort would be made to check the veracity of the information originally supplied. However, upon renewal application the information can be used to assure that the applicant is the same person who was previously licensed. Thus the information would be used to protect the applicant from fraudulent use of his identity.

g. Quick response capability of licensing stations. Closely tied to the question of identification is the capability of examination stations to communicate rapidly with the central records system. There is a need to determine the status of states in this regard, since the extent to which quick response capability exists will determine the kinds of guidelines that are developed for establishing driver identity and for recommending over-the-counter versus central issuance of license (see below).

h. Over-the-counter versus delayed issuance of driver license. Closely related to the questions of driver identification and the quick response capability of licensing stations is the question of over-the-counter

versus delayed issuance of license. At the present time the states vary in their practices, although there may be a trend toward over-the-counter issuance. Immediate license issuance creates problems where there is no capability for direct communication with central records and thus no opportunity to check some of the identification information. When licenses are issued centrally, the checking results in some instances of fraudulent identification, and license issuance can be stopped. A recent study in Virginia (cited in NHTSA, 1979a) focused on young drivers seeking duplicate licenses. When they were told that they would have to produce better identification information and should return the next day, a significant portion never returned. It is not currently known to what extent licenses are issued under fraudulent identifications, although many of the procedures used are well known to licensing authorities.

On the other hand delayed license issuance creates its own set of problems, and these go well beyond whatever inconvenience might be created for the applicant. Frequently temporary permits are issued, to be used until the identity can be checked and a permanent license sent. However, the use of temporary permits means that more licenses are in circulation, and the temporary permit frequently includes no identity safeguards.

Of course it is not necessary that the same practices apply to all license types and license classes. Young drivers obtaining their first license probably do not require close checking of identity. Routine renewal licensure for persons with clean or relatively clean records likewise probably does not pose serious problems. However, out-of-state transfers and operators of heavy duty vehicles may be instances in which close scrutiny is warranted. Recommendations and procedures are needed for license issuance by license type and license class.

i. Guidelines for identifying and licensing certain high risk drivers. Guidelines are needed for administrators in dealing with drivers who have been identified as falling into certain high risk groups, e.g., drivers who have been institutionalized for treatment of alcoholism or other conditions that may adversely affect driving performance. Administrators need to know to what extent they have a legal responsibility for monitoring public records and what steps they should take if a driver is identified as falling into a special high risk group. Also, at what point will the administrator be perceived by the public as invading the privacy of individuals? On the one hand, society is demanding greater protection from government interference and hence less inquiry into records not directly related to driving. On the other hand, society is holding government increasingly liable for the decisions it makes, and there are

growing expectations that government should protect the public from the irresponsible driver. In such a climate, administrators are expected to exercise the wisdom of Solomon while processing literally millions of drivers each year. Some kind of guidelines are needed until many of the issues are ultimately resolved in the courts.

B. Second Priority Needs

This group of research recommendations includes those areas second in priority to the ones just previously discussed. There has been no attempt here to categorize according to immediate crash potential, support system or fundamental issues. Within this group of recommendations, all of which are second priority, the areas will be considered by the portion of the driver licensing system concerned.

1. Driver records.

a. Application guidelines. Guidelines should be provided concerning details of the application forms for the original, renewal, and out-of-state transfer drivers licenses. It is necessary to consider in detail what questions should be asked on application forms, what biographical details are needed for all future identification use, for example, in a records system and in law enforcement. What questions should be asked concerning medical and physical conditions? How often should the information on these application forms be updated, and how long should the information be kept and in what form?

b. Records' check. Guidelines are needed to insure first, that a state driver licensing agency routinely examine its own appropriate records and secondly, to determine what types of medical institutions might provide information needed by licensing agencies and to design procedures for obtaining this information within the constraints of the privacy laws, freedom of information laws, and the privileged relationship between physician and patient.

Many if not most states make it illegal for a drivers license to be issued to an habitual user of alcohol, and all states have knowledge of individuals who have had repeated convictions for driving while intoxicated. Not all states have a procedure for routine checking of their own records to prevent license issuance to such individuals. Many states do not have standard procedures for checking whether an applicant has been or is a patient in an alcoholism center or center for the mentally ill or other institutions providing treatment for conditions known to be associated with poorer driving.

Hricko (1976, 1979) contends that driver licensing administrators may be held liable for not routinely checking records. Since licensing administrators

are already burdened with responsibility, a clarification of the legal considerations and the development of acceptable guidelines would be useful to driver license programs.

c. Evaluation procedures. Develop guidelines for the routine evaluation of procedures in the driver licensing system. Basic information is needed on cost-effectiveness of all aspects of the driver licensing system. For example, not only should the numbers of individuals involved in a certain program be known, but the cost per person and, if possible, the rate of success should be established. If evaluations of these sorts are produced routinely, then comparative cost-effective studies may be developed. Guidelines are needed as to those program activities that should be subject to routine evaluation, for example, among driver improvement programs, warning letters, group meetings, and so on; and among standard procedures, application forms, test papers, manuals; in short, very nearly every aspect of the system. Recommendations are also needed concerning the timing of the evaluations. Should certain activities be evaluated every six months, every year, every two years? Unless a routine evaluation procedure is established, the system is unlikely to operate efficiently.

2. Medical concerns.

a. Physician guidelines for prescribing medications. Establish guidelines for physicians in prescribing therapeutic drugs to include recommendations to patients concerning their driving. Special attention should be given to the individual variation in drug response. Emphasis should also be placed on the importance of such information whether the medication is for short term or long term use.

b. Relationships between alcohol usage and medical conditions. Determine the role of alcohol involvement by drivers known to have medical conditions which are non-alcohol related.

Analyses of driver medical files in North Carolina indicate that individuals with medical conditions that are not alcohol-related are overrepresented in the alcohol-related violations. This association needs to be explored in order to clarify the role of alcohol in the driving performance of persons identified as having medical conditions that are not alcohol-related.

3. Driver identification.

Tamper-proof driver license. Design a driver license which will be not only very difficult to alter or counterfeit, but also relatively simple to make. In attempting to design a model driver license, the aspects of present

licenses which are most often altered or counterfeited should be investigated. In what way can licenses be changed so that they are less easy to alter? Not only should the license be relatively simple to make, but also it should be designed so that forgery is readily detectable.

Model I.D. cards have been designed (Alan, 1977) but they may be too complicated for driver licensing use. Rather than have each state study the question independently, it would be advisable to sponsor one larger study which could benefit all.

4. Renewal license issuance.

a. Guidelines for renewal intervals. Recommend renewal intervals for the driver license. In order to ease the burden upon the driver licensing examiner station, it may pay to consider variable renewal intervals through the life of a driver. For example, should renewals be more frequent for young and elderly drivers and less frequent for those drivers in between? In youth, driving performance is changing rapidly; in the middle years (after 40) vision may be changing; in later years, medical conditions and other changes may affect driving. The years from about 25 through 40 are typically fairly stable and may require less frequent renewal, particularly if driving records are clear.

b. Personal appearance for renewal. Closely related to the above concern is the development of guidelines concerning personal appearance at renewal issuance. Should personal appearance be invariably required or should certain age groups be permitted to renew by mail? If an individual has a good driving record, should renewal by mail be standard? Should residents temporarily out of state, for example, those in military service or those who are students, be able to renew by mail? If the interval between renewals is long, should by-mail renewals take place in the interval?

In the general attempt to tighten up the identification aspects of licensing, the requirement of renewal only by personal appearance needs attention. Several states allow renewal by mail for those in military service, for example. Should this be handled in alternative ways (extension of present license perhaps)? It appears that altering standard renewal might be one method of alleviating the burden on the driver licensing system.

5. Driver testing - vision.

a. Depth perception and glare resistance. What is the significance of depth perception and decreased glare resistance to driving performance, particularly among certain groups of drivers, for example, those who drive heavy duty vehicles? There is general disagreement in the literature as to the distance at which the advantage of binocularity disappears, 75 feet or 1,000

yards. It is possible that this varies with speed. If the advantage of binocular vision is essentially eliminated beyond a short distance, then perhaps there is no justification for different standards for binocular and monocular drivers.

Decreased glare resistance may be of particular importance to certain groups of drivers, for example, those of heavy duty vehicles who may have little opportunity to choose their own time and conditions of driving. Better information on the relationship of decreased glare resistance to driving performance would enable more intelligent licensing qualifications and license restrictions.

b. Windshield scarring and glare vision. Study the importance of windshield scarring on glare vision. Does the average dirty or scarred windshield cause so much glare that our concerns for glare vision are of very little importance? If scarred or dirty windshields are extremely important in glare, what countermeasures would be necessary in order to improve the average windshield situation?

Allen (1970) has suggested that there is little point in studying glare vision because of the number of tiny scratches, scars, pits or simple dirt on nearly every windshield. Before much concern is expanded over the importance of glare resistance and recovery with means of testing and recommendations for dealing with certain subgroups, it is important to know the impact of glare vision in the actual driving situation through the average windshield.

c. Vision tests by driver age. Recommend the visual characteristics to be tested by age of driver. Recommend also the interval at which such testing should occur. There is evidence that the visual characteristics of importance to driving vary with age, for example, static acuity changes very little in the early middle years, although it may change until the early 20's and after the age of 50. Is there therefore a reason for testing static acuity in the middle years? Should one also consider adding tests, such as those dealing with glare, for the older drivers? Can a relationship between glare-related vision and crash experience be demonstrated?

Vision tests require considerable time for administration. It may be more cost-effective to test selectively for certain minimal abilities which may be particularly important at certain ages.

6. Driver testing - knowledge.

Utility of take-home test. Examine the utility of take home tests to be used in a knowledge testing program combined with a briefer test at the examining station. Such a practice could ensure a basic minimal knowledge of laws and safe driving practices while minimizing the workload at examining

stations. If the take-home test is combined with a briefer test at the examining station and if these questions given at the station are derived from the longer test, a higher score or even a perfect score could be required at the station. How suitable are these tests for different license types (original, renewal, or transfer)? What is the advantage or disadvantage of combining take-home tests with briefer tests given at the examining stations?

7. The driver licensing examiner.

Examiner qualifications by license class. Develop recommendations concerning the qualifications of driver licensing examiners by license class with particular emphasis on driving skills. What are current state policies on this?

If a driver license examiner cannot drive the test vehicle, is it possible for the examiner to give a good test? Is it legal for an examiner not licensed to drive that type of vehicle to accompany a permit holder at examination time? Should legal guidelines make it clear that the examiner need not be so licensed? Should the examiner hold the appropriate type of license, and, if so, in the case of license to drive a heavy duty vehicle, is the examiner likely to move on to more lucrative employment?

8. Monitoring of records.

Guidelines for monitoring public records. Develop guidelines for the use of public records to determine high-risk groups. Examine the feasibility of routine advice or counseling for such high-risk groups, for example, those recently divorced or recently released from prison.

Certain groups of people are found to be at high risk of accident when undergoing certain experiences, divorce, for example. Can accident rates for such groups be lowered by innocuous measures such as brief counseling or provision of information? What agency should provide this and at what time? How should such high-risk individuals be identified?

9. License suspension and revocation.

a. Driving by individuals under suspension or revocation. Determine whether drivers in certain categories, such as those driving heavy trucks, are more likely to drive while under suspension or revocation. Since drivers of heavy duty vehicles frequently drive in many states, depend on driving for their livelihood, and may carry more than one license, it has been hypothesized that a greater proportion of such drivers are driving while under suspension. Before any remedial measures are developed, it must be determined whether and to what

extent driving while under suspension is more prevalent among drivers of heavy duty vehicles.

b. Coordination of courts and licensing agency in license suspension. Develop guidelines for coordinating activities of the adjudicating body and the driver licensing authorities concerning license suspension and revocation. When does the suspension or revocation take effect in different states? Does it take effect when the license is turned in or when the sanction is applied?

In different states, even among the four visited on this project, suspension takes effect at different times; at the time of sentencing or at the time the license is turned in. It was found that in one state where suspension takes effect at sanctioning that, at least in some cases, the adjudicating body held the suspension information until a few days before or even after the expiry date of the suspension. Thus, a six month suspension might not come to the attention of the driver licensing agency until the suspension period had passed. (See the related recommendation concerning clarification of communication between the judicial system and the licensing agency under High Priority Needs.)

10. Administrative adjudication.

Impact of administrative adjudication on highway safety. Information is needed on the impact, if any, of administrative adjudication on subsequent driving performance. Two studies (Morehead and Wood, 1976; Moretti and Ulmer, 1978) examined the effect of administrative adjudication on highway safety. Other studies of administrative adjudication speak of the advantages of reduced court backlog, shorter intervals between violations and sanctions, and consistency of sanctions. If administrative adjudication leads to more efficient processing of violations, it could enable more rapid identification of near-problem drivers and possibly increase the effectiveness of intervention programs. However, this effect remains to be demonstrated.

11. Driver improvement programs.

a. Driver improvement measures used by fleet operators. Examine the rehabilitation procedures used by fleet operators for their drivers who begin to acquire poor driving records.

No information was found in the literature on methods used by fleet operators who developed poor records. Since fleet operators deal with the problem drivers from a different perspective from that of a state driver licensing agency, it may be useful to examine fleet rehabilitation procedures.

b. Identification of susceptibility to fatigue. Investigate the possibility of developing reliable measurements of individual susceptibility to

fatigue. Because fatigue appears to be a major problem among drivers of heavy duty vehicles, the identification of drivers more or less susceptible to fatigue could assist in the licensing and selection for this driver class.

c. Provision of information on relevant community resources. Provide guidelines to assist hearing officers or other driver improvement personnel in providing information about local community resources that may be of more assistance than any of the traditional driver improvement programs. For those drivers whose driving difficulty stems from non-driving sources, e.g., marital problems or financial difficulties, such an approach may be beneficial. This proposal is elaborated further in Waller (1978).

C. Third Priority Needs

As in the case of the second priority needs, the following proposals are presented according to the area of the driver licensing system into which they fall.

1. Legal aspects and administrative adjudication.

a. Information for use in adjudication. Recommend appropriate and desirable input for an adjudicating officer to have on hand at the time of sanctioning. In some states the traffic records system and other public records may not be readily available, even though technically they may be consulted. There is a need to determine the extent to which supplementary information from the driving record and possibly other sources is currently used in the various states and the manner of use. Any variations in record life as a function of infraction type should also be ascertained, e.g., alcohol related convictions may be retained in records for a longer time period than speeding convictions. Certain types of information, e.g., medical records, may be inappropriate for use in the sanctioning process.

b. Effect of type of adjudication available on citations issued. Determine whether the type of adjudication available in a state affects the type of citation issued. There is a suggestion in the literature that when some citations are processed through a parajudicial system, officers may tend to issue citations for infractions that will fall under the judicial system because of the latter's greater flexibility. If this should prove to be the case, then the purpose of the parajudical processing of citations is being undermined. Investigation should be made of whether the existence of administrative adjudication, with its presumably greater consistency of consequences, modifies the types of citations issued.

2. Driver record.

a. Adoption of ANSI-D20 Records System Guidelines. Determine the extent of adoption by the states of the ANSI-D20 model traffic records system, any obstacles to its adoption, and recommendations for resolving identified problems. The ANSI-D20 model traffic records system was developed with the help of a wide spectrum of traffic safety experts. It would be useful to know the extent to which this system has been adopted or adapted by the states and any reasons for failure to make use of the recommended system. Since greater uniformity of traffic records data would enhance evaluation of licensing programs, as well as other highway safety programs, the identification of any obstacles to adoption of this model system is necessary for developing effective implementation recommendations.

b. Record updating. Develop guidelines for updating driver records. There are some records that require essentially daily updating, while others may be updated at longer intervals. Recommendations are needed as to which records fall into which category and what are acceptable time lags for different types of driver record entries.

c. Record accessibility. Recommendations should be developed concerning how accessible records should be, to whom they should be made available, and how they should be accessed. At the present time there is considerable variation among the states as to how access to records may be accomplished, if at all. In many states records are, by law, publicly available to any party, while in at least one state they may be obtained only by the driver himself or by a legitimate state agency. Furthermore states vary in the portions and the lengths of the record supplied. There are also variations in how a request for record must be submitted even to the point of specifying the size and weight of the paper on which the request is made. Any party that must access driver records routinely, e.g., trucking companies, is required to follow unnecessarily complicated procedures in submitting requests to certain states. Guidelines on record accessibility, including to whom records should be made accessible and the method of access, would simplify the requirements placed on both those parties seeking information and the state agencies providing it.

3. Medical and physical aspects.

a. Identification of special problems of older drivers. Investigate the possibility of identifying specific factors, such as vision problems or retarded information processing, that may contribute to the poor driving performance of the elderly and identify possible remedial measures. Since the

elderly are becoming a larger proportion of the driving population, any measures that can be taken to improve their performance and enable their continued driving would have significant benefits to society as a whole. Very little is known about the basic components of driving generally, but even less is known about the driving problems of the elderly. While the removal of older drivers from the driving population may achieve some small gain in highway safety, any possible benefits should be balanced against the social costs that may be incurred through the loss of independence by this segment of the population. This proposal is an example of a research need that may lead to an increase in crashes but one that may still be justified in terms of the larger purpose of a licensing program and the overall goals of the greater society.

b. Financial limitations and denial of license. Investigate whether some individuals cannot obtain licensure because of limited financial resources. Both Waller (1967b) and Gurgold and Harden (1978) have suggested that certain individuals may not be able to drive because of financial reasons, e.g., the lack of resources to obtain corrective lenses, necessary prostheses, or specially equipped vehicles. While social services provide such aid, it is the belief of the above authors that there may still be unmet needs in this area. This proposal is another that would fall into the category of research that may lead to an increase in crashes by virtue of increased exposure.

c. Physician reporting of driving-related medical conditions. Recommendations are needed concerning the feasibility of physician reporting of driving-related medical conditions. Some states encourage or require such reporting. Inquiries should be made as to how effective these systems are, including the degree of compliance, any effects on the physician-patient relationship, and any legal concerns. Guidelines, including legal requirements, should be developed for the optimal system for communication between the physician and the licensing authority so as to protect the interests of the patient, the physician, and the public.

d. Self reporting of medical conditions. Determine the effectiveness of self reporting of medical conditions in response to standard questions on driver license applications, including the rate of reported medical conditions for different driver groups. Do different ways of asking for information lead to better reporting? What differences, if any, are there between applicants reporting a medical condition and individuals with the same condition who do not report it? How may this information be used to define better questions for

driver license applications? Does the routine seeking of this information make any difference? If so, a model procedure for requesting the information would be useful to licensing programs.

e. Guidelines for provision of medical expertise to licensing authority. Develop guidelines for making medical expertise available to a driver licensing program. Consider the type of specialties that should be represented and the additional qualifications in training that these individuals should have. States vary greatly in how they obtain their medical input. Some have medical advisory boards that meet regularly or when necessary. Individuals may or may not appear personally before these boards. Other states have boards that operate by mail. Still other states have no formal arrangement for obtaining medical input to their licensing program. At the present time the state of the art is such that it is difficult to devise clear-cut guidelines for physicians evaluating drivers. However, once a reliable and valid medical impairment scale is developed and related to driving, it may be possible to equip physicians with better information. Until such time, interim guidelines on how best to proceed would be useful.

f. Guidelines for imposition of medical restrictions. Develop recommendations for the imposition of medical restrictions, including the agency or agencies that should impose the restrictions. If the court imposes these restrictions, what should be the role, if any, of medical input to the decision-making process?

g. Drivers with handicaps of varying duration. Examine the driving records of handicapped individuals who have had their limitations for a long period of time and compare with records of individuals who have recently acquired the same handicap. If it is found that there are differences in the records for the long term versus the short term handicapped individuals, it may be possible to simplify the licensing procedures for one of these groups. (This recommendation is from the work of Negri (1978) who worked with severely handicapped drivers in New York.)

h. Handicapped drivers and mode of learning. Determine how handicapped drivers have acquired their driving skill and whether the mode of learning is associated with subsequent performance. Coppin and Peck (1964) suggested that the method by which handicapped drivers learn to drive might be reflected in their subsequent driving performance. If this assumption should prove valid,

driver licensing authorities may recommend or prescribe the type of training handicapped individuals should undergo before licensure.

4. License issuance - renewal.

Renewal period by license type and license class. Develop guidelines for the optimal renewal period for each license type and each license class, taking into account any established variations in driver performance as a function of age, vision, driver history, or other factors. It may be worthwhile to consider renewing licensure of young drivers more frequently because their performance is changing rapidly or of older drivers because of the greater probability of debilitating medical conditions. Likewise drivers of heavy duty vehicles or emergency vehicles may warrant more frequent evaluation by virtue of their special driving tasks. Drivers whose records indicate no problem and who by virtue of age or other considerations do not fall into a group of special concern may be renewed less frequently. If the income from examination receipts is a consideration, renewal by mail could probably be achieved. Whether such considerations have any merit should be determined and recommendations made for licensing programs.

5. The beginning driver.

Communication between driver licensing and driver education programs. Determine the extent to which communication currently occurs between driver licensing and driver education programs and develop a model system for such communication that appears useful. Driver education programs could benefit from systematic feedback on the performance of their graduates on licensing examination. In turn, driver licensing programs could perhaps develop more effective procedures if they were in closer communication with their local driver education programs and hence more knowledgeable of the goals and practices of driver education.

6. Driver testing - vision.

a. Driver license restrictions regarding vision. Develop recommendations for driving restrictions related to identified visual defects that are appropriate to the type of vision deficiency identified. Determine how enforceable such restrictions may be and the extent to which they are likely to be observed by the driver.

b. Self restriction by visually deficient drivers. Determine the extent to which drivers with specific vision deficiencies restrict their own driving and whether any such restriction is realistic in terms of the type of

vision deficiencies experienced. Cole (1979) has reported that persons with limited peripheral vision report lower annual mileages than drivers with normal visual fields. Whether the type of driving engaged in is likewise restricted is unknown. Better information on such restriction and whether the self-imposed restriction occurs independently of a driver's specific knowledge of a deficiency would be useful. For example, if it were found that drivers limit their driving to those situations for which their vision is adequate, it would not be necessary to develop extensive vision testing programs in licensing.

c. Recommendations for remedial measures for vision limitations. Determine the extent to which remedial measures can be taken when established vision standards are not met. Driver licensing agencies currently refer applicants to professional help for vision problems. However, little is known about the extent to which certain visual deficiencies may be alleviated through special training and whether any improvements are transferred to the actual driving task. To the extent that specific remedial measures could be identified for vision deficiencies, e.g., limited peripheral vision or faulty scanning behavior, driver licensing authorities could recommend such training for license applicants shown to be deficient in these areas.

d. Relationship of speed to visual field. Persons with normal vision experience a reduction in visual field as speed increases. It has been recommended that peripheral vision be included in vision testing for licensure. However if visual field is reduced essentially to tunnel vision for normal drivers moving at moderate speeds, it may be that in many driving situations peripheral vision is of less importance than has been suspected. Such information would be of value before major efforts are expended to include peripheral vision in routine vision testing.

7. Driver testing - knowledge.

a. Guidelines for knowledge testing of the functionally illiterate. Develop guidelines for administering the knowledge test to illiterate applicants. Make recommendations as to which license classes such testing should be available for, e.g., should literacy be a requirement for operation of a heavy truck? Recommendations should also include how the tests should be administered. It should be noted that many states presently employ orally administered open-ended questions with functionally illiterate applicants. It has long been known that questions requiring that an answer be constructed "from scratch" are far more difficult than questions that merely require recognition

of a correct response from among several possibilities (multiple choice questions). Hence even if the same body of knowledge is being covered, the use of open-ended questions with illiterate applicants and multiple choice questions with literate ones in effect reqires a higher level of verbal skill from the illiterate driver. It is unlikely that most licensing authorities are aware of the indefensible discrepancy inherent in such a practice.

b. Guidelines for knowledge testing of applicants who do not speak English. Develop guidelines for the knowledge testing of applicants who do not read or write the English language. Make recommendations as to whether usage of the English language should be a prerequisite for any license type or class. The influx of residents speaking foreign languages has led to an increase in the variety and quantity of testing materials in foreign languages. However most countries require a knowledge in their language for driver licensure. There is a need for scrutiny of the licensing of foreign-language applicants and recommendations for licensing procedures and/or for training programs should it be determined that the lack of facility with the English language poses a significant highway safety problem.

8. Driver testing - signs.

Recommendations for signs and symbols testing. Develop recommendations as to which elements are of importance in testing for knowledge of signs and symbols. Determine whether it is sufficient that the appplicant be knowledgeable as to the meanings communicated through the shape and color of the sign or whether it is essential that the meaning of the specific wording of the sign also be understood. For many signs, e.g., stop signs or railroad crossings, the specific meaning is communicated by the color and/or shape. However, for caution and regulatory signs specific meaning may vary while size and shape remain constant. Better information on the important aspects of signing so far as safe driving performance is concerned will be useful for driver testing practices.

9. The driver license examiner.

Guidelines for examiner qualification and training. Conduct an in-depth survey concerning present qualification and training for driver license examiners in the various states and develop recommendations for qualification and training. The survey of states should include information on recruitment, the requirements for qualification, the amount of training given both prior to and after job placement, and the extent of turnover compared with other state

positions. Jurisdictions with low turnover should be examined more closely to identify any possible reasons for the greater stability of the examiner corps.

10. License suspension and revocation.

Alternatives to suspension and revocation. Determine present practices regarding alternatives to driver license suspension and revocation which appear to have merit. Because suspension or revocation depends primarily upon observance by the driver in question, and because there is evidence that these drivers do not abide by the sanctions imposed, it would be useful to develop more effective procedures for dealing with drivers subject to suspension or revocation. Work conducted in Oregon (Kaestner and Speight, 1974) shows that certain alternatives may be more effective, but a broader study is needed with recommendations that can be used by a state licensing authority.

11. Limited license

Guidelines for limited license. Develop guidelines for the imposition of a limited license. Determine the driver types for whom a limited license appears most effective and make recommendations as to the types of limitations that are most appropriate for each driver type. Include recommendations as to how the limited license should be imposed, i.e., what agency should determine the limits and administer their observance. If the limited license is imposed by the court, recommend safeguards to assure some degree of equity in imposition.

12. Administrative adjudication

Survey of current practices. Survey current state practices in adjudication of minor traffic offenses outside the traditional court system and identify practices that appear to have particular merit. Determine the training and qualifications required of existing adjudicative officers and develop guidelines in this area (see NHTSA, 1977). Determine obstacles to the smooth implementation and operation of administrative adjudication.

SUMMARY AND CONCLUSIONS

This project addressed the question of what a model driver licensing program should include and what research is needed to resolve remaining questions. A review of the literature was conducted covering driver licensing and post licensing control. Contact was made with the AAMVA Ad Hoc Committee on the Model Driver Services Standard and a mid-project meeting was held with them. A model licensing system was developed identifying minimal and optimal components, and, finally, research needs were identified.

High priority research needs were categorized according to those that have accident loss reduction potential, those that examine fundamental issues that must be resolved in order to develop more effective programs in the state, and those that address support systems (administrative and records systems). Although there are a number of critical research needs in driver licensing, only one promises immediate benefits in terms of crash reduction. Others, however, promise significant gains in knowledge that can be used to develop far more effective programs in licensing and elsewhere. Other research needs presented are grouped according to level of priority.

The highest priority research needs include the following:

1. Require use of available restraint systems by young beginning drivers. This is the only research need identified that promises immediate, significant accident loss reduction.

2. Establish vision testing needs by license type and class.

3. Establish procedures for routine screening of medical conditions shown to be related to driving performance.

4. Coordinate licensing with activities of other state and private interests to combat driving problems that transcend driving per se.

5. Develop programs for the near-problem driver.

6. Identify human performance parameters that differentiate between novice and experienced drivers and determine their amenability to training.

7. Develop knowledge and performance tests based on sound psychometric principles.

8. Develop a reliable medical impairment scale.

9. Determine the role of pre-clinical disease in crashes.

10. Establish procedures and recommendations for communication between the judicial and licensing systems.

11. Develop recommendations and guidelines for dealing with the records of the under-age traffic offender.

12. Establish recommendations for administering the driver license permit.

13. Develop recommendations for the form and record life of different kinds of driver records.

14. Determine acceptable identification for license type and license class.

15. Establish procedures for rapid identity check after initial licensure.

16. Determine the extent of quick response capability of licensing stations throughout the states.

17. Delineate the advantages and disadvantages of over-the-counter vs delayed issuance of driver license and make recommendations for each license type and license class.

Each of these needs is described more fully in the text.

Waller (1978) has suggested that the driver license program could be used as an opportunity to provide other state services to the public. An example of this concept is the driver licensing-organ donor program now operational nationwide. Although organ donations have nothing to do with driver licensure, there is recognition that the driver license is the most widely accepted form of identification and that tying the organ donor program to this document should facilitate the acquisition of healthy organs for transplant. Another example is in the state of Michigan where voter registration services have been combined with driver licensing. Waller suggests consideration of routine screening for health conditions that can be shown to be related to driver performance and that can be screened for in a relatively innocuous inexpensive manner. The condition elaborated on in the report is hypertension.

Because the driver license program is the only state program that personally reaches the majority of the adult population on a routine basis, greater exploration should be made of its potential for providing additional services. At some future time our driver license stations could become citizen service centers.

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APPENDIX

Driver Licensing System Questionnaire

The questionnaire shown on the following pages was sent to the states of California, Iowa, North Dakota, and Tennessee and was used as a guide to discussions during the subsequent visits to these states. The information is summarized on the questionnaire, using the following abbreviations:

C - California

I - Iowa

N - North Dakota

T - Tennessee

4 - All four states

Although the results are based on the information provided by the states, the authors must assume responsibility for any errors.

Driver Licensing System Questionnaire

I. Driver Identification

1. Which of the following are accepted as evidence of identity at the time of licensing? Please check as many as apply and indicate any which are recommended or preferred.

	Learners Permit	Original	Renewal	Duplicate	Out-of State Transfer
Birth certificate	4	4			
Passport	C,I	C,I			
Transcript of school records	C,I	C,I			
Federal employee card					
Military discharge papers	C	C			
Military ID	C	C			
Home mortgage or lease papers					
Non-Resident alien registration					
State-issued photo ID	C,I	C,I			
Pistol permit					
Social security card					
Old driver license	C	C			
License renewal notice	C	C			
License from another state					
Valid	C,I	C,I			
Expired less than ___ months	I	I			
Other (please specify) (see list at lower right)					I, T N (1 yr.)

2. Is there information not on the driver's license but perhaps in a central office which is used as an identity check (for example, mother's first and family names)?

C,I,N ___ Yes
___ No

1. Other

Driver ed. certificate	C
Training certificate	C
Manager's discretion	C
Affidavit, personal knowledge	T
Insurance papers	I
Baptismal records	I
Bible records	I

II. Classified Licenses

3. Does your state have a classified license system?

C,N Yes
I,T No If NO, please go to Question 7.

4. What classes of license are there? Please check as many as applicable or supply separate listing.

___ Moped
___ Motorcycle
___ Passenger cars
___ Taxicabs
___ School bus
___ Bus, other than school bus
___ Ambulance
___ Trucks less than 18,000 lbs GVW
___ Trucks over 18,000 lbs GVW
___ Trucks over _____ lbs GVW
___ Two-axle trucks
___ Trucks with more than 2 axles
___ _____

See following page for answers to questions 4 and 5.

5. Approximately what percentage of the total number of licensed drivers are in each of the license classes? Please add the percentage to the list above or to your own listing.

6. How long has this classified license system been in effect?

C. approx. 19
I. 1968-1977 (different classes)
N. 1968

III. Learner's Permit

7a. Is there a learner's permit?

4 Yes
___ No If NO, please go to Question 9.

7b. For a learner's permit, which tests are included?

4 Knowledge
4 Vision
3 Signs/Symbols
___ Performance

II. Classified Licenses

4 and 5. License classes. Percentage of the total number of licensed drivers in each class given in parentheses.

California

Cl. 4 - motorcycle
Cl. 3 - basic operator (94%)
Cl. 2 - bus (2%)
Cl. 1 - truck (4%)

Iowa

Instruction permit (1.4%)
School license
Moped
Operator (87.2%)
Chauffeur/Instruction permit
  under 5 ton
  straight truck
  articulated
Motorcycle

North Dakota

Cl. 4 - motorcycle
Cl. 3 - basic operator (92.9%)
Cl. 2 - any vehicle not towing more than 6000 GVW (2%)
Cl. 1 - any vehicle (4.6%)

Tennessee

Operator
Regular chauffeur
Special chauffeur
Learner's permit
Motor-driven cycle
Motorcycle
Limited License

LICENSE CLASSES

All Classes				

IV. Original Licensing, Testing of Applicants

8. Does a person need an appointment to take a driver license exam? (Please circle "yes" or "no" for each class.)
   All classes: Yes - N No - C,I,T

Yes No	Yes No	Yes No	Yes No	Yes No

Motorcycle - yes (I)

9. In what order are the knowledge, vision, signs, and performance (road) tests given? Please number the following list.

	C,I,N	T					
Knowledge	1	2					
Vision	2	1					
Signs							
Performance (road test)	3	3					

10. Knowledge of signs is tested (at the time of original licensing) in what manner? Please check all applicable statements.

A separate test					
Questions in the written test	4				
Illustrations in the vision test	C,N				
Demonstration during road test	N				
Other					

11. The vision standards are to be met by (check whatever is applicable)

Both eyes together	C,N,T				
Each eye individually	C,N,T				
Other (Please describe) Iowa, Standards for both eyes or for one eye onl					

12. What are the static acuity vision standards for licensed operators? Please fill in the chart below or provide the information separately.

	LICENSE CLASSES VISUAL ACUITY MEASUREMENT				
	ALL CLASSES				
HAVING TWO EYES					
Not visually restricted	All states, basically 20/40 Tenn. 20/30, with up to 20/70 accepted				
Restricted to wearing corrective lenses					
Other restrictions (Please specify)					
Failure					
HAVING ONLY ONE EYE					
Not visually restricted	Basically 20/40				
Restricted to wearing corrective lenses					
Other restrictions (Please specify)					
Failure					

13. Are other vision tests given to driver license applicants? Please check if used and give Pass/Fail standards.

Peripheral vision					
Dynamic acuity					
Glare resistance					
Glare recovery					
Other (Please specify) N - color, depth T - color (for special chauffeur)					

14. What type of vision test machine is used? Please check all that apply.

C Bausch and Lomb Orthorater (secondary)

N,T Keystone

I Titmus

C Snellen Chart (primary)

___ Other (Please specify)

15. This vision test machine has been in use for approximately how long?

I 1954, N 1969, T 1977

16. Have illiterate applicants been able to handle the vision test with this machine?

4 Yes, in general. T described a few problems.

___ No

17. Have you any comments to make on the vision test machine (few problems, uniformly satisfactory, considering a change, and so on)?

4- generally satisfactory

18. What type of knowledge test is given? Please check all applicable.

	ALL CLASSES	LICENSE CLASSES			
Multiple choice	4				
True and false					
Matching					
Short answer					
Essay questions					
Problem situations					
Items presented by automatic equipment (Please describe)	T				
Other					

	ALL CLASSES	LICENSE CLASSES: operator	motorcycle operator	bus	truck	
19. The written test includes what subjects? Please check all applicable.						
Laws	4					
Safe driving principles	4					
Signs and symbols	C,T					
Other (Please describe)						
Driving situations	I					
20. How many equivalent forms of the test are there?	T random from 80	C 5 I 3 N 4	C 3 I 2 N 1	C 3	C 3 I 2	N,Cl.2-1 N,Cl.4-1
21. How many questions are there on the test?	T 20	C 36 I 35	C 20 I 20	C 15	C 15 I 20	
22. What is the passing grade or percentage for a written test?	C 80 I 80 N 76 T 80					
23. Is there a time limit when taking the test? (Please circle "yes" or "no" for each class.)	Yes 4- No	Yes No	Yes No	Yes No	Yes No	
If yes, what is the time limit (in minutes)						
24. What is the reading level of the test? (What Grade Level)?	C 8 N, Cl N other 8	3-4-6	grade			
25. Is there provision for illiterates? (Please circle "yes" or "no" for each class.)	Yes No	Yes No	Yes No	Yes No	Yes No	
If YES, what type of test is given?						
Oral	I	C,N,T	C	C		
Pictorial		T				
Other (Please describe)		C	C	C		

		LICENSE CLASSES			
	ALL CLASSES	operator	motor-cycle operator	bus	truck
26. Is there provision for the test to be given in other languages? (Please circle "yes" or "no" for each class.)	Yes No N,T no	Yes No C,I yes	Yes No	Yes No	Yes No

If YES, how is this done?

Oral, through a translator. (What languages are possible?)	I, any				
Written (What languages are possible?)	C *	I-Spanish Lao Vietnamese Korean			
27. How soon after a failure on the written test may a person try again?	4 - next day				

*Spanish Portuguese Tagalog Japanese Chinese Korean Vietnamese

28. Does a person pay a charge if they fail to pass the test?

T Yes

C,I,N No

29. Is there a limit to the number of times a person may take the test?

____ Yes C (3x per application) N (3x per 6 months)

____ No I,T (N, for an applicant changing class)

30. Does a person's record show how many times he has failed, if any?

C,N Yes

I,T No

31. Where is the test of performance given?

Off the road			N,I		
On the road	T	C,N		N	N
Both on and off road			C,I*		
Other Certificate of experience			C	C	

* If license for motorcycl only, then of and on road both (Iowa).

32. Are the performance tests given in the vehicle type appropriate for the type of license applied for?

C,I,N Yes
T No

	LICENSE CLASSES				
	ALL CLASSES				
33. Are there certain acts on the part of the applicant which lead to automatic failure? (Please circle "yes" or "no" for each class.)	4- Yes No	Yes No	Yes No	Yes No	Yes No

If YES, what acts give an automatic failure? Please check all applicable.

Dangerous or reckless driving	4				
Committing a traffic violation	4				
Becoming involved in an accident	4				
Failing to obey examiner's instructions	C - "repeatedly" I - "after warning" N,T				
Other (Please describe)					
Stalling in dangerous situation - C					
Driving onto sidewalk - C					
Causing immediate danger - C					
Refusal to perform - I					
Number of points off - N					

34. Does the examiner drive the vehicle back after a mid-test failure? (Please circle "yes" or "no" for each class.)	Yes 4-No	Yes No	Yes No	Yes No	Yes No
	C - though the examiner may offer to do so T - only if dangerous, and with permission				

34a. During the road test:

The driver license examiner uses safety restraint - C,N
The applicant uses safety restraint - N

		LICENSE CLASSES					
		ALL CLASSES	operator	motor-cycle operator	bus	truck	heavy truck
35.	Is a driving simulator used (Please circle "yes" or "no" for each class.)	Yes 4- No	Yes No	Yes No	Yes No	Yes No	
36.	If the performance test is given (at least in part) on the road, are standard routes used? (Please circle "yes" or "no" for each class.)	4- Yes No alternate routes	Yes No C,N	Yes No	Yes No	Yes No	
37.	Approximately how long does the performance test usually take (in minutes)?	I 15-20 T 10	C 15 N 20	C 5 N 10	C 30	C 30 N 30	N 45
38.	If the individual fails the performance test, how long must he wait before attempting to pass again?	C 2 wks I,N,T	next day				

39. When an individual comes in to renew a license, how does the examiner know what tests (vision, signs, knowledge, performance) to give the individual? (Please check all which apply.)

Tennessee has mail renewal

Mandated by law	C,I,N					
Tests indicated on renewal form	N					
Examiner calls up central computer from remote terminal						
Examiner's judgement	C,I					
Other (Please describe)						

40. For how many years is a license valid before it must be renewed?	C,N 4 T 2					

I 2 or 4 as indicated:

Permit - 2
Moped - 2
Operator aged less than 18 or over 65 - 2
Operator 18-65 years - 4
Chauffeur - either 2 or 4 (choice) unless over 65, 2

	LICENSE CLASSES				
	ALL CLASSES				

41. Is the renewal period ever for shorter or longer intervals?

C Yes
I,N,T No

If YES, please place the appropriate year information in the applicable space.

For the youngest drivers					
For the oldest drivers (over ____ years old)					
Problem drivers					
For medical reasons	C "limited term license"				
Other (Please describe)					

42. What tests are always given at renewal? Please check all which apply.

Knowledge	C				
Vision	C,I				
Signs/symbols	C				
Performance					

43. What tests are sometimes given at renewal?

Knowledge	I,N				
Vision	I,N				
Signs/symbols	I,N				
Performance	C,I,N				

44. If tests are sometimes given, what determines if the test is used? (Please check all which apply.)

Past record of accidents	N				
Past record of convictions	N				
Age	N				
Examiner's judgement	C,I				
Requirement of the medical board	N				
Other (Please describe) Limited term requirement	C				
License expired	I				

	LICENSE CLASSES				
	ALL CLASSES				

45. Is the individual required to appear in person for license renewal?

C,I,N Yes
T No

46. Approximately what percentage of renewal applicants are given a performance test?	N very	few			

47. What tests are usually given when a person transfers from another state where they hold a valid license?

Knowledge	4				
Vision	4				
Signs/symbols	4				
Performance					

V. Public Records

48. Are any public records checked in order to identify individuals who perhaps should not drive?

C Yes
I,N,T No

If NO, please go to Question 52.

49. Which records are consulted? (Please check all that apply.)

C "occasionally" (all listed)

General hospital					
Mental hospital					
Alcoholism treatment institution					
Drug treatment center					
Court records					
Other (Please describe) Department of Health reports					

50. What action is taken if the name of an applicant appears on one of the records consulted?

C - investigate subject's condition

51. How is the checking of records accomplished?

___ Hospitals, clinics, courts, and so on supply the DMV with reports routinely

C DMV requests specific information from hospitals, clinics, courts

C Other (Please describe) Routine Department of Health reports (mandated)

VI. Driver License Examiner

52. What state agency is responsible for the examination of driver license applicants?

N,T State police/highway patrol

C,I DMV driver licensing section

___ Other (Please describe)

53. What are the qualifications for the position of driver license examiner?

Age ____ Years I 18, N 18, T 21

Education ____ I H Sch., N 2 yrs. college, T H Sch. or equiv.

Other C,T licensed driver — N member of Highway Patrol
C vision test
T ability to type, at least 5'4"

54. How much training is the examiner given before assignment?

C 4 wks.
I 4-6 wks.
N 1 mo.
T none

55. Does the examiner receive on-the-job training?

C,I,N,T Yes
___ No

56. Is the examiner required to be qualified to drive the type of vehicle in which the performance test is given?

___ Yes
4 No

N Highway Patrol members trained in truck driving
I valid license not needed, but must be familiar
T 2-day voluntary motorcycle school

57. Does an examiner receive in-service training?

C,I,N Yes
T No (will start fall '79)

If YES, how much in-service training each year I 1-2 wks
N 40 hrs.

58. How many examiners are there in your state?

Full time C-427 I - 36 & 6 superv. T - 42 & 8 superv.

Part time C-11 N - 110

59. What percentage of an examiner's time is clerical work and how much is testing applicants?

Percentage clerical I-20 N-30

Percentage testing applicants C "chiefly"

60. Do the examiners in the field offices give all of the tests, or are some of the tests given by clerical personnel?

T Examiner gives all tests

C,I,N Clerical personnel give some tests

61. How is a new examiner selected?

C,N,T Civil service

I,N Merit system

___ Open competition

___ Appointment (by whom?) _____

___ Other (Please explain)

62. Does the examiner have police powers?

N Yes
C,I,T No

63. Is the examiner required to wear a uniform?

I,N,T Yes
C No

64. Does the examiner wear side arms?

___ Yes
4 No

VII. Non-typical Licenses

65. In addition to the usual unrestricted license, what types of restrictions may be applied to licenses? Please check all which may be used.

4 Corrective lenses

I Lower speed limits

C,I,N Certain highway types (for example, no interstate highway driving)

T Weekdays

C,N To/from work or school ("occupational license")

4 Specific locality: (for example, hometown only, farm use only)

___ Other (Please describe)

___ C has over 50 different types of restrictions

___

66. What authority issues these non-typical licenses? (Driver licensing examiner, court, administrative hearing officer, medical board, other)

___ Corrective lenses

___ Lower speed limits

___ Certain highway types

___ Weekdays

___ To/from work or school

___ Specific locality

___ Other

chiefly by the examiner, sometimes by someone higher up in driver licensing (e.g., driver improvement analyst)

VIII. Medical Aspects

67. Does your state have some sort of a Medical Board?

I Yes

C,N,T No

If NO, please go to Question 76.

68. The Medical Board has how many members? I 5

69. The Medical Board is composed of what type of individuals?

Physicians' Specialities:

I Orthopedics

I General practice

I Ophthalmology

I Neurology

I Cardio-pulmonary

Other

DMV personnel (what position/title) chief examiner and director

Other (Please describe) _____

70. How often does the Medical Board meet?

I As needed
___ Weekly
___ Monthly
T Other Requests medical advice by mail

71. How does an individual come to the attention of the Medical Board?

T Driver license examiner
___ Private physician
T Family and friends
T Because of accidents or violations
I Other Chiefly through Driver Licensing system

72. When the Medical board considers a person, does the individual appear before the Board in person?

___ Yes
I No

73. Who makes the final decision regarding an individual's driving?

___ The Medical Board
I The Motor Vehicle Administrator
___ Other

74. How does an individual leave the medical system?

___ Medical record kept active for driving life
___ Medical file closed and purged after a period of time specified by the Medical Board
___ File purged a certain number of years following the latest medical entry (How many years) _____
___ Other (Please explain)

75. Are Medical Board policy guidelines published so that the public may be aware of them?

I Yes (some)
___ No

IX. Driver Improvement System

76. Does your state have a point system?

C,N Yes (T unofficially)
I No

In either case, we would be interested in the details of the system used.

77. Is the driver improvement system (or point system) written out and available to the public?

C,I,N Yes
T No

78. How does an individual enter the driver improvement system?

C,I,T Accident
C,I,N Violation
C,I Court action
C,I Other (Please explain) Referral

79. Does the driver improvement system reward improved driving on the part of an individual in the system?

___ Yes
C,I,N,T No

If YES,

___ By reducing a penalty
___ By extending a time of privilege
___ Other incentives (Please describe)

80. Is any training offered special sub-groups of NON-violators?

___ Yes
C,I,N No

If YES,

___ Elderly drivers
___ Novice drivers
___ The general public (for, example, advanced skills courses)
___ Other (describe)

81. What types of programs are there in the driver improvement system?

C,I Warning letters
C,I Group meetings
C,I Individual meetings
___ Clinics (Please describe types)

Other
I - one "no action" control group

82. Does an individual in the driver improvement system receive credit for attending meetings, clincs, courses, and so on?

N,T Yes
I No

83. Is there any special warning or training offered before reaching the point of suspension or revocation?

C,T Yes
I,N No

84. Does your state have a system of administrative hearings?

C,I,N Yes (Note: There may be a problem of definition here.)
T No

85. If your state holds administrative hearings, what training does the hearing officer have? _____ _____

86. If an individual driver's license is suspended or revoked how is this license turned in?

C,I,T Handed in at the court or hearing

C,I,N Mailed in

___ Collected by police officer

___ Other (Please describe.)

87. What measures attempt to prevent those with suspended licenses from driving? C - warning statement on suspension order N - good records and active enforcement T - Trooper may lift license

88. How many individuals in your state do you think continue to drive while under suspension/revocation?
C - many I - 50% N - ? (convictions for driving while suspended in 1978 were approximately 10% of the suspensions) T - most

X. Records System

89. What items are to be found on the driver's license. Check all which apply.

C,I,N Name in full

T___ Name as commonly used (perhaps using middle initial)

C,N,T Residence address

C,I Mailing address

4 Date of birth

C,T License number

I,N Social Security number

4 Expiry date of the license

4 Restrictions

4 Weight

C,T Eye color

___ Black and white photograph

C,I,N Color photograph

4 Signature of driver

I,N,T Validation signature

4 License type

___ Other (Please specify)
(see list at right)

C,I,T, Height
C Endorsements
C Office preparing applicatic
C Typist's initials
I,T Sex
T Issue date
T Race
T Hair color
T Organ donor

90. In an attempt to reduce the possibility of tampering with a drivers license, what techniques are used?

I,N Sealed in plastic

C,I Overlapping of seal, signature or other onto photograph

N,T Tamper-proof paper

___ Other (Please describe)

91. What system is used to give a unique license number?

C,T Sequential numbering with central control

I,N Social security number used as the license number

___ Social security number used as a part of the license number

___ Coded number (for example, Soundex)

What type of code is used? _____

___ Other (Please describe) _____

92. In the organization of the central driver licensing records, access is by means of what?

I,N,T Driver's name

4 Driver license number

___ Other (Please explain)

93. Record access is by what means?

___ By hand

4 By computer

If record access is manual, please go to Question 95.

94. If records are on computer files and accessible by computer, the computer access mode is:

___ Sequential

___ Direct Poor question

___ Other

95. What records are always preserved as hard copy or in a photo-reduced form?

C,I,N Medical reports

C,I,N Original application form

C Fraudulent information statement

I Other (Please describe)

96. Is there a standard record life, that is, are records purged after a certain period of time?

C,I,N Yes
___ No

If YES, does this vary depending on the record?

I Yes
C,N No

If NO, what is the length of time a record is kept?

_____ years C - 10 yrs. N - 3 yrs.

97. How long a time usually elapses between the court action (or administrative hearing) and the entry on the record?

I - 15 days N - 7-10 days T - 2-3 months

98. In the record of a violation, is the vehicle type in which the violation occurred recorded?

C,I Yes (T indirectly through tags)
N No

99. In the record of accidents, is the vehicle type in which the accident occurred recorded?

C,I Yes (T indirectly through tags)
N No

100. Is the state a member of the Non-Resident Violator Compact?

C Yes
I,N,T No

101. Does the state exchange record information with other states outside of any formal compact agreement.

C,I,N Yes
___ No

If YES, please explain.

102. Does the state use the National Driver Register?

4 Yes
___ No

If NO, skip to Question 106.

103. The National Driver Register is used to:

I,N Check on out-of-state transfers C - only 18-25 yrs.
C,I,N Submit information on suspensions and revocations
___ Other (Describe)

104. How often is the National Driver Register used?

To obtain information C,I,N (weekly) (C - 15,000/week)
To submit information I,N weekly C monthly tape

XI. Miscellany

105. Is the National Driver Register used in other ways? Please describe.
I all license applications are checked

106. What methods are used to try to prevent multiple licensing?

N Check with previous state of residence

N Check with NDR

Other (Specify) C certified statement of applicant
I out-of-state license picked up

107. Have you any idea of the extent of fraudulent licensing in the state? If so, would you estimate the number of individuals involved or the number of fraudulent licenses concerned? _____

108. Does the state have a non-driver photograph-identity card?

C,I,N Yes
T No

If YES, what agency issues the card? Department of Motor Vehicles (or equivalent)

109. Has the state had problems concerning administrative liability?

I Yes
N,T No

If YES, around whom or what did the problems center?

___ The driver license examiner

___ Problem of multiple licenses

___ Other (Please specify)