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Abstract

This project was initiated at the request of the Department of Motor Vehicles as a response to House Joint Resolution 378 (1989). The resolution requested an evaluation of research studies on ignition interlocks and a determination of possible benefits to the Commonwealth of Virginia from using this technology to control drunken driving.

A survey of other states found that since the first law was enacted in California in 1986, another 15 states have passed some form of legislation dealing with the installation of ignition interlock devices. These laws primarily target recidivists, persons younger than 21, and offenders with a very high BAC. Sanctions are applied at the discretion of the court as a supplemental condition of probation or license restriction. These state statutes also deal with BAC threshold levels, tampering with the devices, insurance, and liability limits.

A number of legal and economic issues that must be considered if Virginia initiates an ignition interlock program are discussed in the report. These issues include the authority of the state, equal access for indigents, tort liability, operational costs, administrative costs, and costs to defendants.

Product information from manufacturers and the results of laboratory studies indicate that the devices currently on the market would fulfill the needs of an interlock program. The operational characteristics, reliability, and accuracy of these devices are sufficient for use by defendants convicted of drunken driving.

Although a number of states have passed legislation and have established ignition interlock programs, very little is known about the actual operations of these programs because they have not been in existence very long. Some preliminary data suggests that the programs might have had a positive impact on safety, but no definitive result is currently available because a thorough evaluation has yet to be completed for even one program.

It is recommended that Virginia delay legislative action until the results of mandated ongoing evaluations in other states are completed.

MOTOR VEHICLE IGNITION INTERLOCKS:

In-Vehicle Devices That Monitor Alcohol Levels of Motor Vehicle Operators

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A report prepared by the Virginia Transportation Research Council under the sponsorship of the Transportation Safety Administration of the Department of Motor Vehicles

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EXECUTIVE SUMMARY

House Joint Resolution 378 (1989 Session) requested that the Department of Motor Vehicles evaluate research studies on motor vehicle ignition interlocks, determine the possible benefits to the Commonwealth of using interlock technology, and prepare a report of its findings and recommendations. Ignition interlock units are in-vehicle alcohol sensing devices that compare the blood alcohol content (BAC) of a vehicle operator with a preset limit. The test is performed by the driver blowing into the mouthpiece of the interlock unit so that a deep-lung air sample can be obtained. A BAC lower than the limit allows the driver to start the vehicle, but a BAC greater than the limit prevents the car from being started.

Legislation permitting the installation of ignition interlock devices on vehicles belonging to persons who have been convicted of driving under the influence (DUI) of alcohol has only recently been introduced in other states. The first such law was enacted in California in 1986. Since then, 16 states have passed some form of legislation dealing with the installation of ignition interlock devices. The legislation in California, and in most other states, was passed in an effort to reduce the recidivism rate of selected drinking drivers under the assumption that the interlock device would prevent the driver from operating a vehicle while under the influence of alcohol. The laws and resulting interlock programs primarily target recidivists, persons younger than 21 years of age, and offenders with a very high BAC. Some programs resulting from this legislation are fully operational, whereas others are in varying stages of implementation. Many states with recent legislation have yet to establish the guidelines necessary to implement their programs.

Although the criteria for mandating ignition interlock devices varies, the sanction is usually applied at the discretion of the court as a supplemental condition of probation or restricted licensing; it is not applied as an alternative to existing restrictions. The implementation of any interlock program is dependent upon its acceptance by the judiciary and its willingness to require installations. Although such programs have been accepted in some jurisdictions, judges in other jurisdictions have declined to order vehicle interlocks without additional documentation of their effectiveness in reducing drunken driving.

The two ignition interlock devices now on the market measure BAC with a seemingly high degree of accuracy and consistency, although no interlock unit is fail-safe. A third device has been developed, and although not currently marketed, also accurately and consistently measures BAC. Motivated individuals who have some knowledge of the system can circumvent the devices. In addition, some persons simply

choose to operate another motor vehicle. Known circumvention techniques include (1) using bogus air samples stored in balloons, (2) using filtration devices to remove alcohol from the breath, (3) having a sober third party perform the test, and (4) leaving the car idling while drinking.

In an attempt to guard against circumvention and to detect increasing BAC, some models require the driver to provide a second breath sample several minutes after the car has been started. These retesting procedures might be required while on heavily traveled roadways or in areas with high crime rates, each of which might place the driver and passengers at significant risk. Also, to guard against circumvention, none of the models provides an override feature to deactivate the device; therefore, in an emergency, the vehicle would remain inoperable.

Thus far, the studies evaluating the effectiveness of interlock devices are limited in scope and of such short duration that they do not provide conclusive results. More definitive findings should be forthcoming as field testing continues and as the various interlock programs evolve. Several studies evaluating the effectiveness of ignition interlock programs are currently being carried out. For instance, a final report is due to be completed by California officials and published in December 1989. A similar study of New York's law is scheduled to be completed in 1992.

The preliminary data that are available indicate that the costs of obtaining an interlock unit should not create an economic hardship for the offender. Five states have implemented funding programs to allow indigent offenders to participate when they would otherwise be excluded because of the costs. Provisions for equal access to indigent offenders should satisfy any challenges made on the grounds of providing equal access to the law.

Three states have enacted statutes to place limits on their liability, three others forbid both civil and criminal suits, and six others have mandatory insurance provisions. Virginia's sovereign immunity doctrine appears to restrict the state's exposure to any tort liability that may arise out of the court-ordered use of interlock devices.

Because most of the data necessary to determine the effectiveness of motor vehicle interlock programs were either preliminary or unavailable at the time this report was prepared, it is recommended that legislative action concerning the use of ignition interlock devices in Virginia be postponed until the final report from California can be obtained and analyzed. This report should provide a more comprehensive evaluation of the effectiveness of interlocks under field conditions than is currently available.

Should the General Assembly pass legislation authorizing the use of ignition interlocks in Virginia, a pilot project of limited scope should be carried out in conjunction with a carefully designed evaluation plan. This evaluation should include a determination of the size of the at-risk population to be affected, the cost of operating the program in Virginia, operational problems, and the impact the program would have on DUI recidivism rates.

MOTOR VEHICLE IGNITION INTERLOCKS:

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INTRODUCTION

The problem of alcohol-impaired drivers has plagued American society since the beginning of the age of motor vehicle travel. Other than the frequent debates on taxation and spending, few issues have consumed as much time in the legislative assemblies of the states as how to minimize and control the abusive use of alcohol on the highways that has resulted in hundreds of deaths and injuries and large economic losses each year.

In a country where the rights of the individual are protected and where a long tradition of limited governance is respected, it is difficult to find statutory remedies that can arrest the problem and reduce the risks associated with alcohol-impaired driving to tolerable levels. Harsh penalties often seem to result in low levels of enforcement. Less stringent penalties seem to bring the arrest levels up but do not appear to strike fear in the hearts of offenders. For many persons, suspension or revocation of the operator's license merely results in unlicensed drivers on the highways.

Previous studies of drunken drivers have established that those who abuse alcohol are involved in a disproportionately higher number of motor vehicle crashes than are other drivers. Because drunken driving results in high social and economic costs in terms of fatalities and serious injury, educational and legislative efforts have been initiated to persuade or require these motorists not to drive after consuming alcoholic beverages. In addition, judicial and administrative efforts also have been directed toward the drunken driver. In the past decade, Virginia has modified its statutes concerning driving under the influence (DUI) of alcohol in an effort to combat the problem drinking driver.

Specific steps that have targeted drunken drivers include (1) alcohol education classes, (2) restricted driving/licensing, (3) license suspension and revocation, and (4) incarceration. In spite of these efforts, drunken driving remains a serious social, economic, and highway safety problem. Technological advances, however, have produced a novel method of preventing the operation of a motor vehicle by an operator whose blood alcohol content (BAC) exceeds a prescribed limit: ignition interlock devices. During the 1989 Session of the Virginia General Assembly, HJR 378 was passed. It mandated that a study of ignition interlock technology be conducted by the Department of Motor Vehicles (see Appendix A for the full text of the resolution).

The concept of an ignition interlock device to prevent a motor vehicle from being started by a driver who had been drinking dates from the early 1970s. Research carried out by General Motors on the Phystester and on compensatory tracking tasks was deemed to have merit. However, this early laboratory research concluded that although discrimination at a specific BAC was possible, at a low BAC both the false positive and the false negative failure rates were unacceptably high. This was considered insufficient evidence to show its effectiveness in preventing alcohol-impaired driving. However, since these early studies, technological advances have contributed to the refinement of in-vehicle alcohol sensing devices, which is the type of device discussed in this report.

Ignition interlock devices require a driver to provide an alveolar (deep lung) breath sample by blowing into the mouthpiece of a hand-held unit for four to six seconds. The vehicle may be started only if the driver's BAC is lower than the preset limit programmed into the interlock device. The ignition system of the vehicle will be rendered inoperable if the BAC of the driver is greater than the preset limit. The units are compact; they are easily installed; and they are easily removed without permanantly damaging the vehicle.

Interlock Programs in Other States

Interlock programs initiated to date have been directed toward drivers convicted of DUI and focus primarily on recidivists, persons younger than 21 years of age, and offenders with a high BAC level. As of July 1989, 16 states had passed legislation concerning the installation of ignition interlock devices for DUI offenders. These states are Alaska, California, Idaho, Indiana, Iowa, Kansas, Maryland, Michigan, Nevada, North Dakota, New York, Ohio, Oregon, Tennessee, Texas, and Washington. Some of these states have fully operational programs; others are promulgating rules and regulations to govern the administration of their statutes. Two states have mandated studies to evaluate the effectiveness of their interlock legislation, and several others have

carried out small-scale, interim evaluations. California plans to publish its final report in December 1989. New York, which recently approved interlock legislation, requires its study to be completed in 1992. Additional reports will be forthcoming from other states and private organizations as state programs mature and more accurate evaluations can be made of the effect interlocks have on DUI offenders.

All states with interlock legislation use the devices to supplement probation and/or restricted licensing. As with probation, the devices are installed at the discretion of the court. Many judges have been reluctant to require offenders to install interlock units until the effectiveness of the devices under field conditions can be more firmly established. The implementation of successful interlock programs will ultimately depend on the level of confidence the courts have that the devices will perform as designed.

PURPOSE

The purpose of this study is to evaluate research studies of in-vehicle ignition interlock systems, to estimate the feasibility of implementing an interlock program in Virginia, and to determine the possible benefits of interlock technology to the Commonwealth. This study does not attempt to advance the field of technology; it assumes that the Commonwealth will work within present technological limitations.

METHODOLOGY

This project was carried out in several phases. First, a review of the literature was conducted to obtain background for the various issues under investigation. Second, a comparative review of the statutes, rules, and regulations of the states that had passed interlock legislation was conducted. Third, a review was conducted of the technology of ignition interlocks, the testing of interlock devices, and their installation requirements. Fourth, a number of legal issues related to the use of in-vehicle ignition interlock devices were considered; these included the authority of the state, equal access, and tort liability. Finally, the cost of using these devices to both the defendant and the state was reviewed.

Officials from state motor vehicle departments, state police departments, and the office of the Governor's Highway Safety Representa-

tive were contacted to obtain information regarding the status of current and proposed legislation for their respective state. The relationships between the different state agencies usually required contacting a number of persons in order to answer the questions listed in Appendix B. These groups were requested to furnish copies of their state's certification standards applicable to the interlock device and its installation and use.

Vendors were contacted, and they provided technical information regarding the specifications, installation, and operation of interlock devices. In addition, information on the technical aspects of interlock devices was obtained from publications of the National Highway Traffic Safety Administration (NHTSA) and from the states that had approved the use of these devices.

RESULTS

The results of this investigation are discussed in three sections: (1) a comparative review of state statutes and programs, (2) an examination of current interlock technology and standards for certification, and (3) a discussion of the legal and economic issues related to the implemention of an interlock program in Virginia.

Comparative Review of State Statutes and Programs

As previously stated, 16 states have passed some form of legislation permitting the use of ignition interlock devices as an option in sentencing for alcohol-related offenses. In addition, Massachusetts has a bill awaiting senate action. The majority of these states are presently developing rules and regulations for certifying the devices and administering the programs. They differ on the issues to be addressed in the enabling act and those to be governed by administrative rules and regulations. The substantive information pertaining to each state's ignition interlock program is summarized in the table in Appendix C. Some of the data are incomplete since final specifications have not been approved in all states.

Nearly all of the states authorize the installation of interlock devices--at the discretion of the court--for both first and repeat DUI convictions. Texas, which does not include first offenders in its program, is considering an amendment to allow the use of interlocks for first offenders. These states also require the offender to submit proof of an interlock installation to the proper authorities within 30 to 90 days of conviction. The Department of Motor Vehicles is then notified,

and a restricted license is issued with a notation stating that the individual may operate only vehicles in which an ignition interlock device has been installed.

Ignition interlocks are generally used in conjunction with the more traditional conditions of probation for DUI offenders, such as driving only during certain hours or to and from certain locations. Iowa allows offenders to drive only to and from their place of employment or during the course of their employment, provided it is not for more than 6 days per week or longer than 12 hours per day. New York requires mandatory license revocation for 6 to 12 months prior to permitting an offender to drive with an interlock device. The New York postrevocation license is valid only for driving to and from work, school, court, or the doctor and for one additional 3-hour period on a nonwork day. State statutes typically defer to the discretion of the court to determine the length of time an interlock device is to be installed. Although some states require a 6-month minimum, others call for 1- and 5-year maximums for first and multiple offenders, respectively.

The offender generally pays the costs associated with using the device, including the purchase/lease price, installation, and service. Several states mandate that a fund be created to provide equal access for indigent offenders. A concern over the expense of the device prompted some states to allow the DUI fines to be reduced by an amount equal to the costs of the interlock unit. Although this cost issue is not specifically addressed by some jurisdictions, judges may use their discretion to impose reduced fines to offset a portion of the costs.

Any interlock device installed must meet the certification standards of the respective state, which are usually promulgated through administrative rulemaking. The present BAC thresholds for the operation of interlock devices in the different states range from 0.02 percent to 0.05 percent, with some states leaving the level to the court's discretion.

Offenders are generally permitted to drive a company vehicle during working hours without having an interlock device installed. The employer must be notified by the offender of the DUI conviction, and the offender must keep a record of the notification in the vehicle that is being operated. This exception does not apply if the offender owns an interest in the business.

Most of the states require that the installation and servicing of interlock devices be carried out by specially approved and regulated centers. The states also require that installation and service be performed away from the customer area by persons who have not been convicted of a DUI offense in the previous 5 years. Scheduled service appointments are necessary to maintain accurate calibration of the unit, monitor the use of the device through the electronic data log, and detect

any evidence of physical tampering. Service requirements range from as often as every 60 days to as long as once a year. Some jurisdictions have found 3 months to be an acceptable balance between the expense and inconvenience imposed upon the offender and adequate monitoring of the offender's actions. Although regulation might set parameters for servicing an interlock unit, the courts have the option to establish other requirements based on its determination of the severity of the offense or on the characteristics of the defendant.

Eight states do not address insurance coverage for the vendor of interlock devices, four require only that it be adequate, and two mandate coverage of $1 million per occurence and $3 million maximum. Kansas, Maryland, and Texas specifically forbid both criminal and civil suits against the state arising from injuries related to the use of ignition interlock devices. Several jurisdictions require the vendor to indemnify the state for any costs incurred from interlock litigation. In addition, three states have statutes that place limits on their liability when an ignition interlock device has been mandated.

Six states specifically require interlock units to have a warning label stating that it is a misdemeanor to assist in circumventing or tampering with the interlock unit. The assistance or tampering must usually be performed with intent or knowledge, though not in all jurisdictions. Knowingly or intentionally lending, renting, or leasing a vehicle to a person with a restricted interlock license may also be punished as a misdemeanor.

Program Effectiveness

A number of preliminary studies in other states have analyzed the ignition interlock program data available. These interim studies often have very little data on the effectiveness of interlocks in preventing drunken driving, but they do contain administrative evaluations and recommendations for improved program operations. For instance, an interim study of program operations in four pilot counties in California includes proposals for a minimum one-year installation period, certain changes in administrative procedures for more efficient operation, and a one-year extension of the evaluation to provide more conclusive results concerning the effectiveness of the program (EMT Group, 1988). The results of the extended evaluation will be available in December 1989.

The state of Oregon conducted a pilot ignition interlock program in 11 counties. Persons wanting a hardship license had to have a device installed on their vehicle. The offenders in the pilot program were compared to a "control" group of offenders issued a hardship license in other counties not requiring an interlock device. The study stated that "not enough information is available to draw conclusions about the traffic safety benefits of the ignition interlock pilot program" (p. 1).

The interlock program in Calvert County, Maryland, was evaluated by the University of Maryland from January through September 1988 (Baker, 1989). It was found that multiple offenders were positive in their assessment of the benefits derived from the use of interlocks, but first-time offenders showed hostility toward being required to use the device. The study concluded that "multiple offenders may be the best target population for interlock programs at this time" (p. 6). The short evaluation period and small sample size prevented a useful comparison of recidivism rates between the control group and an experimental group.

The University of Colorado, in conjunction with Guardian Technologies, is currently conducting a study to evaluate the success of the ignition interlock program in Hamilton County, Ohio (Morse and Elliot, 1989). A September 1989 report on the short-term results indicate that recidivism rates for the control group were over three times greater than that of the experimental group during the first 26 months (9.0 percent vs. 2.5 percent), although the small sample size and the short observation period "increase the difficulty of detecting evidence of significant DUI recidivism differences" (p. 2). The report also stated that nearly 93 percent of the users reported some difficulty in starting their car on a regular basis. In addition, 10.3 percent of the users reported attempts to circumvent the device, with nearly one fourth of these stating that they left the vehicle idling so as to avoid a test.

Carlisle, Pennsylvania, is currently administering an interlock program that has been in effect for the last 18 months. The offender's license is suspended for only 1 month with the agreement that he or she must accept an interlock as a condition of probation instead of a 6-month suspension when an interlock device is not used. According to one official, 250 units were installed, and only two rearrests have occurred. This compares with a recidivism rate of about 22 percent without the device. It should be noted, however, that persons not given the option of shortened probation may be different in a number of ways from persons given that option, such as in their previous driving record and in the severity of their drinking problem.

In summary, although there is considerable information describing the intent of state ignition interlock programs and their preliminary operational phases, there are no definitive data concerning the impact of the program. Thus, no conclusions concerning the ability of interlock programs to deter drinking and driving can be drawn at this time.

Ignition Interlock Technology and Certification Standards

There are two basic questions related to the implementation of ignition interlock programs. First, is the ignition interlock technology sophisticated enough to produce devices that perform their function

reliably? Second, is enough known about the actual field performance of the devices to set standards for their production and use? This section of the report discusses these issues.

Ignition Interlock Technology

The Autosense Corporation and Guardian Technologies Incorporated currently manufacture and sell ignition interlock devices in the United States. Breath Test USA anticipates marketing a device developed in Australia beginning in September 1989. The Autosense unit is being used in California, and the Guardian unit is being used in California, Oregon, Maryland, and Ohio.

Each of the devices requires the driver to take a breath test to determine his or her BAC. An alveolar (deep lung) breath sample is needed to obtain the greatest accuracy. The driver blows into the hand-held portion of the unit for four to six seconds in order to gain an adequate sample. A low BAC, compared with the preset limit, allows the driver to start the vehicle. A BAC greater than the limit activates the ignition interlock function, thereby preventing the vehicle from being started.

Some devices require the driver to use an identification code to initiate the test. The purpose of offender identification is to prevent an unauthorized person from starting the vehicle. Research and development efforts may allow voice analysis to be used in conjunction with breath samples as a means of identification on some devices in the future. This could reduce the possibility of another party performing a test for an impaired offender. Each unit also displays a warning sticker stating that it is illegal for an individual to assist an offender in starting an interlock-equipped vehicle.

Retesting is used as a means of monitoring increasing BAC. A driver's BAC may rise above the preset limit after the initial test if the test is performed immediately after the consumption of alcohol but prior to its absorption into the bloodstream. A retesting feature requires the driver to perform a second test at a set time after passing the initial test. Depending on the manufacturer, the driver may retest while driving or may be required to park the vehicle and turn off the ignition. If the second test reveals a higher BAC level, the driver must perform subsequent tests at regular intervals until the BAC decreases, assuming the BAC never exceeds the preset limit. Exceeding the preset limit during retesting activates the vehicle's headlights, signal lights, 4-way flashers, and/or horn until the vehicle is parked and the engine is turned off. Two of the units discussed in this report use the re-testing feature. The Breath Test USA unit requires a mandatory retest, but retesting is an option on the Guardian unit. In using the Breath

Test unit, the retest can be performed while the vehicle is in motion, but Guardian requires that the vehicle be parked with the engine off to perform the retest.

This retesting feature presents problems to the driver and other motorists. Motor vehicle operation, especially in heavily populated urban centers, requires a driver's total concentration to drive safely. Safety problems would almost certainly arise if a driver's concentration was distracted in heavy traffic while performing the retest while the vehicle was in motion. In addition, if drivers are unable to locate a safe retest location in a timely manner, they may be forced to perform an unsafe maneuver to exit the flow of traffic.

Installation and removal of the interlock device are usually performed at dealer service centers, although some vendors anticipate licensing local dealers to service devices in designated areas. Installation and removal times range from one to five hours. Wiring and electrical connections are sealed to aid in the prevention and detection of tampering. Little, if any, permanent modification to the vehicle is required for installation. Training and instruction in the use of the device are conducted at the service center at the time of installation. Twenty-four-hour customer telephone service is provided to assist offenders in need of additional instructions or emergency service. Service contracts are available for units that are purchased, and service costs for leased units are included in the monthly payment.

Innovative offenders have developed a number of circumvention techniques. Alcohol-free breath samples have been stored in containers such as mylar balloons or plastic bags. The samples are then used when an offender is unable to pass the test legitimately. Water, cigarette filters, industrial filtering material, and other fibers have been used to filter the alcohol out of the breath sample before it enters the interlock unit. Bypassing the ignition or "push-starting" the vehicle may also circumvent the device, but such attempts are recorded on an electronic data log and are revealed during servicing. Offenders have been known to leave the vehicle idling while they drink, thereby eliminating the need to be tested before driving. A person may also choose to violate probation and simply drive another vehicle without an interlock unit.

Pressure, humidity, and temperature sensors are used in an effort to prevent circumvention. Acceptable limits have been calculated to correspond to average human ranges, and the vehicle cannot be started when the breath sample is outside these parameters. Advances in technology should continue to make it more difficult to circumvent the units. None of the devices currently has the capability to detect a vehicle idling for an extended period, although development is underway.

Although the characteristics mentioned above are common to current units, each manufacturer has several unique features and specifications. The following sections of this report present information on ignition interlock units manufacturered or distributed by the three companies that either currently have units available or anticipate the marketing of a device in the near future.

Breath Test USA

The Breath Test USA unit accepts only those breath samples within a temperature range of 32 to 36 degrees celsius. The device also requires that a sample register within a predetermined pressure curve as monitored by a microprocessor. These features are designed to prevent circumvention by alternate breath samples. Breath Test USA claims calibration accuracy to be maintained over a temperature range of -20 to +70 degrees celsius inside the vehicle.

The unit requires the driver to perform a second test 8 minutes after the initial test. The driver is notified of the test requirement by an audible beep. The test may be performed while the vehicle is moving. If the second test indicates a greater BAC than the first test, the driver is required to retest every 8 minutes until his or her BAC decreases, providing it always remains below the threshold limit. A failure on the intial test renders the vehicle inoperable, and another test cannot be performed for 2 minutes. A failure of any subsequent test results in any combination of the following programmable options: indicator lights continuously flash, headlights continuously flash, and/or the horn continuously sounds. An antistall feature permits the vehicle to be restarted within 1 minute without additional testing provided that the test has been passed.

A calibration check is required by the manufacturer after 750 tests. The device alerts the driver on the 700th test and counts down from 50 to 0. The device will assume the test failure condition if it is not serviced before the 750th test is conducted. Breath Test USA will train existing commercial automotive centers to service, install, and recalibrate interlock devices in an effort to provide convenient service. Breath Test USA offers two models: one with and one without an electronic data log. The data stored in the logs can be printed out during scheduled servicing and are available for use by the courts if so required as a condition of installation and use of the device.

Autosense Corporation

The driver initiates a test on the Autosense device by entering a personal identification number (PIN). A transducer monitors the breath

sample for humidity, pressure, and temperature. The results are compared with preset tolerances to protect against bogus air samples. The driver's BAC is displayed digitally, and the vehicle may be started if the test is passed. The device does not require the driver to retest a second time, nor does it require a minimum waiting period before retesting after failing a test. The unit is designed to provide accurate readings between -40 and +85 degrees celsius.

The test data recorded in the electronic log include date, time, BAC, pass/fail results, engine on/off, and test taken/bypassed. Autosense recommends that the device be recalibrated a minimum of every four to six months. A hard copy of the information in the electronic data log can be printed out during service appointments, which are scheduled at three-month intervals, for use by the courts if required. There is no internal calendar to notify offenders of upcoming service dates, nor does the unit activate ignition interlock after a scheduled service appointment is missed. The service center mails reminders of scheduled appointments and reports noncompliance to the courts.

Guardian Technologies

The use of the Guardian unit requires the driver to conduct two separate and distinct tests in order to start and drive the vehicle. It is first necessary to sign-on. Once signed-on, the operator must take and pass the test for BAC threshold. The driver uses a coded sequence of expelled breaths and pauses to sign-on. This feature is designed to prevent unauthorized persons from assisting impaired offenders. The difficulty level of the coded sign-on is set by the vendor. A 15-minute waiting period is required prior to retesting if the driver fails to sign-on in three attempts. In conjunction with the breath code, the device monitors the pressure of the breath to deter use of bogus breath samples.

After signing-on, the driver must take the test for BAC. A multilight display informs the driver whether or not the test was passed. The driver also must wait 15 minutes to retest if the BAC test is failed three times. After passing the initial test, the vehicle may be restarted within 1 minute if stalling occurs, and no retesting is required during this period.

An optional feature requires retesting 40 minutes after the initial test to determine if there has been an increase in the driver's BAC. The second test cannot be performed while the engine is running, thus requiring the driver to stop the vehicle within 5 minutes prior to performing the retest. The horn will sound continuously if the second test is not performed within the 5-minute period.

An optional electronic data log monitors and records up to 4,000 events such as pass or fail. This optional feature records BAC, date, time, engine on/off, pass/warn/fail, power interrupt, and types of failed or aborted attempts (i.e., sign-on or BAC test). Tampering and circumvention attempts also are noted by date.

Guardian recommends that the device be serviced every 60 days, and 10 days prior to the service due date, an LED display alerts the driver of the upcoming service. An audible tone is activated 7 days before service is due. The device will render the vehicle inoperable the day after the service date if the unit has not been serviced. The internal clock is programmable from 1 to 254 days.

Certification Standards and Field Test Results

There are currently no national or international standards for ignition interlock devices. Each state that authorizes the use of ignition interlocks requires that the units meet approved certification standards. Many states have not yet promulgated their rules or regulations for the certification of interlock devices because of the recent passage of their enabling legislation. A copy of typical performance criteria and testing procedures is contained in Appendix C. Certification testing is normally conducted at the vendor's expense by an independent laboratory because highly specialized and expensive equipment is needed to conduct the test procedures. For example, Alberta, Canada, reported that 12 to 14 days of testing at a cost of approximately $16,000 are required to meet their certification standards.

The certification standards that have been established take into consideration the unique characteristics and requirements of the individual state. The severity of Michigan's winters and Texas' summers necessitates that interlock devices function accurately over an extreme range of temperatures. States such as Washington, which has both coastal and mountainous terrain, require interlock units to maintain correct calibration over a wide spectrum of elevations.

Certification specifications that test for both accuracy and ease of circumvention were the focus of an NHTSA-funded report entitled "Further Laboratory Testing of In-Vehicle Alcohol Testing Devices" (Frank, 1988). The Autosense and Guardian units were among those tested. The report concluded that the limited size and scope of this testing project makes it "inappropriate to generalize" the "results to all current and future units," although the devices tested consistently identified high and low BAC in users who properly followed the operating instructions (p. 17).

As interest in the use of ignition interlocks as a drunken-driving countermeasure increased, NHTSA sponsored research and published a report

that discussed the development of the devices, the current level of technology, and the status of legislation (Crompton, 1988). The report included a discussion of psychomotor testing (tests of driver coordination), alcohol sensor technology, and test results. The feature/function section concerned the technological and operational aspects of the Autosense and Guardian units. At the time the NHTSA report was published, only California, Michigan, Oregon, and Texas had legislation in place. The report concluded that although ignition interlocks were technically feasible, there were insufficient data to determine their effectiveness as a drunken-driving countermeasure.

Commercially available motor vehicle interlock units were also evaluated for accuracy and ease of circumvention in a second NHTSA-sponsored laboratory test (Frank, 1988). The devices consistently registered an accurate BAC for persons properly following testing instructions. The circumvention techniques included bogus breath samples and filtered breath samples. Balloons and plastic bags were used to provide bogus breath samples, and water and commercially available absorbent material were used as filtering materials. Simple procedures were designed to heat the bogus air samples in order to circumvent temperature sensing devices. The author stated that "even with special features designed to prevent circumvention, it can be concluded that a motivated individual, with preplanning and some knowledge, can fool the devices tested" (p. 18). Thus, the devices were rated as being accurate, although they could be circumvented.

Although the results of the laboratory tests may be limited because of the small sample sizes and narrow scope of the studies, the accuracy of the units in determining threshold BAC is probably sufficient for use by defendants convicted of drunken driving. Additional testing is needed to evaluate the performance of the devices under actual field conditions.

Legal and Economic Feasibility

Once the operational characteristics, reliability, and validity of currently available interlock devices are established, the next issue to consider is the feasibility of their use in Virginia. The issue can be expressed by way of two questions: (1) Is the use of interlock devices as a sanction legal? and (2) Is such a sanction economically practical?

Legal Issues

The primary legal issues relevant to the implementation of ignition interlock legislation are (1) whether the Commonwealth has the authority to impose such legislation, (2) whether there is equal access by indigent offenders, and (3) whether the Commonwealth would be exposed to tort liability for damages resulting from their use.

Authority

Legislation providing for the use of ignition interlock devices would be based on the Commonwealth's police power. Police power is a state's ability to protect the health, safety, welfare, and morals of its citizens. Berman v. Parker, 348 U.S. 26 (1954). Legislation based on the police power is valid unless it is unrelated to a legitimate state interest or unreasonably restricts liberty and privacy. "Courts have long recognized highway safety as an important state interest, and this interest has justified measures designed to remove drunken or otherwise unfit drivers from highways" (Ruschmann et al., 1979, p. 9). The use of interlock devices is related to highway safety because the devices are designed to keep drunken drivers off the highways.

Probation conditions restricting drinking and driving behavior are considered reasonable restrictions of a traffic offender's liberty, and the use of mechanical devices to enforce those conditions likewise has been considered a reasonable restriction of liberty and privacy (Id. at pp. 13-14).

Equal Access

Interlock devices are costlier than simple revocations or restrictions of licenses. If drivers must pay the added costs, some drivers may be excluded from the program because of their inability to pay. If that occurs, the program might be challenged as a violation of the equal protection guarantee of the Fourteenth Amendment to the U.S. Constitution.

The application of the equal protection guarantee to distinctions made on the basis of wealth is not clear. Some states have taken the view that equal access programs must be provided for offenders who are unable to pay. California, Idaho, New York, and Oregon have established funds to make payments for indigents. One source of money for the funds is a portion of the fines assessed for DUI offenses.

In other states, the view is expressed that offenders must meet the requirements of their probation. It is argued that interlock devices are a voluntary condition of probation that is easily afforded by all persons. Vendor lease charges of $35 to $65 per month are viewed as being within the means of all offenders. In addition, interlock devices are not the only alternative to outright license revocation. Courts may choose from other alternatives, including restrictions unsupervised by mechanical devices, driver-improvement classes, and alcohol-treatment sessions (Ruschmann, 1979, pp. 18-19).

Tort Liability

In 1982, the Virginia Tort Claims Act relaxed the Commonwealth's hold on sovereign immunity, a doctrine that in certain situations prevents claims against the Commonwealth except where the Commonwealth gives its permission. The Act, in § 8.01-195.3, provides that the Commonwealth shall be liable for up to $75,000 for damages caused by negligent or wrongful acts or omissions of any employee of the Commonwealth while acting within the scope of his or her employment. However, individual employees retained whatever sovereign immunity they had prior to the Act. Furthermore, the Act provides that the Commonwealth retains sovereign immunity for claims based on acts or omissions of the General Assembly or of any employee executing a lawful order of any court.

There are two scenarios where tort liability and the sovereign immunity doctrine come into play. One is where a claimant sues the Commonwealth for damages caused by a person driving while under a probation involving an ignition interlock device. The claimant would argue that the Commonwealth should not have allowed that person to drive at all. The Commonwealth would argue that sovereign immunity applies because the General Assembly mandated the use of the devices in the first place and also because installation of a specific device requires a court order. If the state should lose the case, the most the claimant could win would be $75,000.

The other scenario is where a claimant sues an individual employee of the Commonwealth. The Commonwealth and the employee would argue that sovereign immunity applies because the Tort Claims Act did not affect the individual immunity of Commonwealth employees. If the state should not prevail, there would be no limit on the amount the claimant could win. Furthermore, the Commonwealth could be required to pay any damage award because of the state's self-insurance policy.

Sovereign immunity is a doctrine that has been limited by the Virginia courts. However, the Commonwealth, in a suit where it is named as defendant rather than an employee, could argue that the courts' limitations are superseded by the language of the Tort Claims Act, which provides that "the Commonwealth shall be liable for claims for money only . . . on account of damage . . . caused by negligent or wrongful act or omission of any employee [emphasis added]." Then the Act specifically excludes certain types of cases from its coverage. It is unclear whether the Act means to bar those types of claims absolutely or merely to push them into an area where the courts will determine whether or not sovereign immunity bars them.

If the courts must view a case against the Commonwealth through the scope of sovereign immunity, they will apply the doctrine in the same

fashion that they would apply it in a case against an individual employee of the Commonwealth. The Virginia courts have developed a four-factor test for determining whether sovereign immunity bars a suit. The presence of any of the factors increases the likelihood that sovereign immunity will bar a particular suit. A suit is most likely to be barred if all four of the following factors are present:

1. the use of an employee's independent judgment

2. governmental rather than proprietary function

3. extensive state interest and involvement

4. extensive supervision by the state over the performance of the employee's job.

The Commonwealth could prepare for the event that a claimant made it through the labyrinth and was granted a damage award by establishing an insurance plan like those provided for in the Code of Virginia at § 2.1-526.8. The Code at § 2.1-526.11 provides that adoption of such a plan would not affect the Commonwealth's sovereign immunity.

The Commonwealth could prevent the loss associated with damage awards and settlements by requiring vendors of interlock devices to indemnify the Commonwealth for all money paid to claimants as a result of litigation concerning the devices. The indemnification provisions would be contained in the contracts of sale.

The Commonwealth could deter suits against it by requiring vendors of the devices to carry product liability insurance. If claimants know that the vendors are financially responsible, they may be less likely to pursue recovery of damages from the Commonwealth. The Commonwealth could check the vendors' insurance coverage prior to entering the contracts of sale.

Finally, some states have avoided all these problems by inserting provisions into the enabling statutes that prohibit civil or criminal litigation against them in connection with ignition interlock devices. The Commonwealth could insert such provisions into the enabling legislation or into the Virginia Tort Claims Act.

Economic Considerations

Implementation of an ignition interlock program in Virginia would require an outlay of funds, as does any administrative or judicial approach to a major traffic safety problem. Although exact figures are impossible to predict, the discussion below identifies some areas where

costs to the Commonwealth would be expected to occur and points out some areas where data are available and others where it will not be available until a program is operational. Ignition interlock programs are a response to a severe problem, the drinking driver, and these individuals already extract a considerable toll from the Commonwealth in terms of lives and dollars. Virginia is currently committed to substantial expenditures for the arrest, prosecution, sanction, and/or treatment of such offenders. An ignition interlock program would utilize many of these same resources, particularly personnel, already committed to the drunken driving problem, so economies of operation may be possible.

One of the problems in predicting the cost of an ignition interlock program to Virginia is the fact that such programs can take a variety of forms: mandatory or discretionary with the court, targeted at particular classes of offenders, or used for all drivers convicted of DUI. Regardless of the specifics of an ignition interlock program, the costs involved can be considered under three main areas: operational, administrative, and the cost to the defendant.

Operational Costs

If interlock devices are ordered by the court as a condition of the sentence for DUI, the costs to the state of operating such a program should be minimal. In all likelihood, no new facilities, equipment, or personnel would be required. The training required of police and court officials would be minor compared, for example, to that necessary as a result of the recent DUID law change. Once state officials are aware of and familiar with the technology, the program could be initiated with few start-up costs being incurred.

Predicting the cost of an interlock program is difficult without an idea of the number of offenders likely to be ordered to use the device. The General Assembly must determine which classes of offenders will be required to use interlock devices; for example, any of the following might be included: very young drivers who have been convicted of drunken driving, repeat offenders, or offenders with BACs greater than 0.15. However, if the courts are given discretion as to when to require use of the devices, such figures would only establish the maximum number of possible users per year; they would not provide an estimate of the actual number of users per year. Initially, judges and legislators might want to keep the number of users low, but this would be impractable for two reasons. First, data on program effectiveness would be very difficult to collect if only a small number of devices were installed statewide. Secondly, it would be difficult for the installation/service centers to exist (and for the state to monitor them) without a sufficient volume of business to justify their costs of operation.

Because offenders ordered to use an ignition interlock would either purchase or lease the device from private vendors, direct involvement by the state in distributing them would not be required. The main activities of the state would be to monitor the service centers to ensure that installation and maintenance are properly performed, that the data are accurately collected and reported, and that service and repairs are promptly performed. Such oversight and monitoring functions are similar to those currently in existence for commercial scales and vehicle inspection stations. It entails periodic on-site investigations of the equipment, personnel, and procedures used in the installation and service centers. It is possible that DMV, VSP, or another state agency could handle this function without additional personnel. Whether additional personnel would be needed would depend on both the number of authorized installation centers and the frequency of inspection mandated by the General Assembly. In California, the Bureau of Automotive Repair was assigned responsibility for oversight of the centers installing interlock devices. That agency determined that the installation procedures were not so complex as to require specialized licensing and has concentrated instead on developing operational standards for the devices and a procedure for handling complaints about installation and service (EMT Group, 1988). If interlock devices are approved for use in Virginia, the state could follow the lead of other states in developing installation, service, and operational criteria, thereby significantly reducing state costs.

Administrative Costs

The largest impact, in terms of workload, of an ignition interlock program would be administrative, but the actual administrative cost would probably be low. Recordkeeping procedures for persons on probation are already in place. The adding of information about interlocks should amount to no more than adding a new form (or additions to existing ones) and some training of the court clerks and probation officials who maintain the records. Similarly, if the General Assembly requires a notation on the operators' licenses, then, since procedures and forms for making such notations are presently in place, they would require only minimal modification and little or no additional cost to implement.

One additional cost the Commonwealth may desire to undertake is a public information campaign that would explain not only the purpose of the devices but also the penalties for tampering with them or assisting in their circumvention. Since the state regularly produces public information and education campaigns, particularly in the area of drunken driving, this would require only a rechanneling of funds and not any new outlay.

Costs to Defendents

In today's market, ignition interlock devices can be leased for $35 to $65 per month or purchased for $395 to $800, depending on the manufacturer and optional features. The data in Appendix D summarize the cost factors from three different manufacturers. Because drunken drivers come from all sectors of society, it is possible that some offenders would be unable to afford an interlock device if one was required by the courts. If this is perceived to be a significant problem, the state has at least three options: leave the question of cost to the discretion of the courts, create a fund to provide the devices for the indigent, or leave the problem for the indigent offenders to solve. Each of these options is discussed below.

Judicial discretion. In some states with interlock programs, the judge is allowed to reduce the amount of the fine by the projected cost of the device, so the total cost to the offender is the same whether or not an interlock is required. In Virginia, the courts already have authority to suspend fines, and this authority could be applied to the ignition interlock program. Also, when assigning an offender to the VASAP, the court can waive the fee upon a showing of indigency. A similar showing could be used in the case of the interlock program. The state would then pick up the cost from a fund as described below.

Direct subsidies. Some states, such as Michigan, provide for the lease of ignition interlocks directly to those unable to afford them. Virginia also could follow this approach, although it might not to be popular if funded from general revenues. However, a fund created from increased fines for DUI might be more acceptable to all groups. Groups such as MADD, which have lobbied for years for harsher penalties for all DUI convictions, would probably support higher fines and court costs. If ignition interlock devices are shown to be truly effective in reducing the number of drunken drivers on the road, other innovative ways to make them available at a reduced cost should be explored.

Laissez-faire approach. There is the argument that anyone who can afford to operate a car can afford the $35 per month for a court-ordered interlock device. The hardship caused in these cases is no more severe than that of an offender whose license has been revoked or suspended and must use public transportation or make other transportation arrangements. It is possible that some offenders would claim indigency in the hope of being given license restrictions rather than being required to use an ignition interlock. The primary issue is whether or not it is worth the administrative cost to the state to distinguish those truly indigent from those fraudulently claiming to be so.

The installation of an ignition interlock device might qualify a DUI offender for a reduction in insurance costs. Three companies currently

offer reduced premiums when an ignition interlock device has been installed, although only one, the Moore Group, is currently licensed to do business in Virginia. The Moore Group offers a 5 to 10 percent discount on the liability and physical damage portion of a policy, applicable only to the vehicle in which the device is installed. To qualify for the reduction, the installation must be authorized by the court as a condition of probation, and a copy of the installation certificate must be filed with the insurance carrier. Because the insurance rates charged to persons convicted of DUI are significantly higher than those charged to safer drivers, the 5 to 10 percent savings can partially offset the cost of the device.

If the decision is made to require all defendants to bear the cost of the devices (or to leave cost issues to the discretion of the court), one cost the Commonwealth should anticipate is defaults in payments to the vendor. It would hardly be appropriate for the vendor to repossess the device for failure to pay, the typical remedy for creditors. The state would need to provide some guarantee of payment to the manufacturers in these situations. Perhaps a fund created from increased fines would be appropriate.

Need for Further Study

Once the details of an ignition interlock program in Virginia are decided upon, it will be possible to collect accurate data to estimate program costs. Examples of data needs include the number of convictions per year in the group(s) targeted, the median income of offenders, and the number of VASAP referrals qualifying as indigents. Knowing the costs incurred by other states in implementing and running their programs could also be useful, particularly those from California, whose evaluation report is due this year.

The most conservative step for Virginia to take is to authorize a pilot program on the use of interlock devices. Sample areas could be selected from the different geographic regions of the state. Other states have inaugurated their programs with pilot projects, and this is the method by which Virginia instituted its VASAP program. A one-to-two-year pilot project could give reliable estimates of the costs involved and provide data on the effectiveness of ignition interlock devices.

CONCLUSIONS AND RECOMMENDATIONS

Although product information from manufacturers indicates that the devices on the market would fulfill the needs of an interlock program,

little is known about their use in actual programs. NHTSA studies indicate that performance is good for high and low BAC, but additional testing needs to be conducted to ensure that reliable devices are available for use.

A number of states have passed legislation and established in-vehicle ignition interlock programs as a sanction for drunken driving. Very little is known about the operations of these programs, since not all states have begun implementation. Those states with pilot or ongoing programs appear to be in the "fine tuning" stage.

Although some preliminary data on effectiveness suggest a positive impact, no definitive statement can be made at this time concerning whether the programs deter drunken driving because no thorough evaluation has been completed.

No significant legal impediments exist that would prevent Virginia from establishing an ignition interlock program. However, little case law exists in this area as yet.

The economic impact on individual users does not appear excessive. However, costs to the state may be significant.

It is recommended that any legislative action concerning ignition interlock devices be postponed until the final report from California can be analyzed. This report should allow a more comprehensive evaluation of the effectiveness of interlocks under field conditions.

In addition, a study should be conducted to determine the scope and impact of implementing an interlock program. The number of offenders sentenced and placed into an interlock program will determine the costs of such an operation in Virginia. An impact analysis will greatly assist in evaluating the feasibility of the program.

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REFERENCES

Baker, E. A. 1989. The Calvert County study: A program evaluation of DWI probationers use of an in-car alcohol breath analyzer ignition interlock system. Ph.D. diss., University of Maryland, College Park.

Crompton, R. F. 1988. Potential for application of ignition interlock devices to prohibit operation of motor vehicles by intoxicated individuals. NHTSA Report No. DOT HS807281. Washington, DC: National Highway Traffic Safety Administration.

Department of the Solicitor General. No date. Impaired driving program briefing paper. Alberta, Canada.

England, R. E. 1988. Ignition interlock: Curbing drunk drivers with modern technology. Boston: Massachusetts Legislative Research Bureau.

Evaluation, Management, and Training Group, Inc. 1988. Evaluation of the California ignition interlock pilot program for DUI offenders (Farr-Davis Driver Safety Act of 1986): Interim report. Sacramento, CA: Evaluation, Management, and Training Group, Inc.

Frank, J. F. 1988. Further laboratory testing of in-vehicle alcohol test devices. NHTSA Report No. DOT HS807333. Washington, DC: National Highway Traffic Safety Administration.

Jones, B. and Wood N. 1989. Traffic safety impact of the 1988 ignition interlock pilot program. Salem, OR: Motor Vehicles Division.

Morse, B. J., and Elliott, D. S. 1989. Hamilton County interlock evaluation study: Interim report on survival estimates for DUI. University of Colorado, Boulder.

Morse, B. J., and Elliott, D. S. 1989. Hamilton County drinking and driving study interlock evaluation: Two year findings. University of Colorado, Boulder.

Ruschmann, P. A.; Carroll, H. O.; Greyson, M.; and Joscelyn, K. B. 1979. Analysis of the potential legal constraints on the use of mechanical devices to monitor driving restrictions. NHTSA Report No. DOT-HS-805523. Washington, DC: National Highway Traffic Safety Administration.

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APPENDIX A

LD9196548

HOUSE JOINT RESOLUTION NO. 378

AMENDMENT IN THE NATURE OF A SUBSTITUTE

(Proposed by the House Committee on Rules
on February 4, 1989)

(Patron Prior to Substitute--Delegate Plum)

Requesting the Department of Motor Vehicles to study ignition interlock technology.

WHEREAS, the 1988 Session of the General Assembly created a commission to study ignition interlock technology; and

WHEREAS, alcoholism and drinking while driving continue to be major problems for the nation and for the Commonwealth of Virginia; and

WHEREAS, alcohol was involved in over forty-four percent of Virginia's 1986 fatal automobile crashes; and

WHEREAS, alcohol-related crashes remain the leading cause of death for Americans under age thirty-five and the nation's number one health and safety problem; and

WHEREAS, the Commonwealth of Virginia has addressed this problem with educational programs and stiffer fines and sentences; and

WHEREAS, the development of new technology through an ignition interlock system will prevent the use of an automobile by a person who is intoxicated and, therefore, could save the lives of hundreds of Virginians; and

WHEREAS, the Commission Studying Ignition Interlock Technology found that field studies are currently being conducted on ignition interlock devices in California and several other states, which results are scheduled to be released in 1989; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Department of Motor Vehicles is requested to evaluate the results of the studies currently underway, the potential benefits to the Commonwealth of ignition interlock technology, and submit final recommendations to the General Assembly by January 1990 as provided in the procedures of the Division of Legislative Automated Systems for processing legislative documents.

Official Use By Clerks	
Agreed to By The House of Delegates	**Agreed to By The Senate**
without amendment ☐	without amendment ☐
with amendment ☐	with amendment ☐
substitute ☐	substitute ☐
substitute w/amdt ☐	substitute w/amdt ☐
Date: _____	Date: _____
Clerk of the House of Delegates	Clerk of the Senate

APPENDIX B

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QUESTIONS RELATED TO THE REGULATION OF EACH STATE'S IGNITION INTERLOCK PROGRAM

1. May the court require interlocks for first, second, and/or subsequent offenders?

2. Is the offender required to pay the costs associated with the installation of the device?

3. What, if any, provisions have been enacted to provide equal access to indigent offenders?

4. Is the court allowed, by statute, to reduce fines normally associated with DUI offenses by the amount the offender must pay for the interlock device?

5. What is the present BAC limit on the device?

6. What is the minimum frequency allowed between servicing and recalibration of the unit?

7. What, if any, special provisions have been made for offenders required to drive employer vehicles?

8. Does DMV receive notification of the driving restriction?

9. Is any notation of the restriction made on the operators license?

10. Is it an offense for a third party to assist in circumventing the unit?

11. Is it an offense to rent, lease, or loan a noninterlock vehicle to a person restricted to driving with an interlock?

12. What is the minimum amount of liability insurance required for the vendor?

13. Is the State's liability specifically restricted or limited by statute?

APPENDIX C

SUMMARY OF STATE'S
REGULATION OF IGNITION INTERLOCK PROGRAMS

	AK	CA	ID	IN	IA	KA	MD	MI	NV	NY	ND	OH	OR	TN	TX	WA
APPLICABLE FOR 1ST DUI	-	Y	Y	Y	Y	Y	Y	Y	Y	Y[3]	*	Y	Y	Y	N	Y
2ND DUI	-	Y	Y	N	Y	Y	Y	Y	Y	Y[3]	*	Y	Y	Y	Y	Y
RESTRICTION NOTED ON LICENSE	-	N	Y	Y	Y*	-	Y	Y	Y	Y	*	Y	Y	Y	-	Y
NOTICE TO DMV	-	Y	Y	Y	Y	-	Y	Y	Y	Y	*	Y	Y	Y	Y	-
STATE'S LIABILITY RESTRICTED BY STATUTE	-	N	N	N	N	Y	Y	N	N	N	N	N	N	N	Y	N
VENDOR INSURANCE REQUIRED	-	1MIL BOND	1MIL 3MIL[4]	*	*	*	Y	*	*	Y	*	Y	Y	*	*	1MIL 3MIL[4]
INDIGENT FUND	-	Y	Y	*	*	*	*	*	*	Y	*	-	Y	*	*	*
REDUCED FINES[1]	-	Y	N	*	*	Y	N	N	*	*	*	-	-	*	*	*
BAC LIMIT	-	.03	SET BY CT	.02	.04	SET BY CT	.02	.02	.05	.02	*	-	-	.02 TO .05	-	SET BY CT
REQUIRED ON WORK VEHICLE[2]	-	N	*	N	Y	-	N	*	N	N	*	N	N	N	N	Y
SERVICE FREQUENCY (Months)	-	12	4	*	2	-	6	2	3	2	*	3	-	6	6	3

SUMMARY OF STATE'S
REGULATION OF IGNITION INTERLOCK PROGRAMS

	AK	CA	ID	IN	IA	KA	MD	MI	NV	NY	ND	OH	OR	TN	TX	WA
SEPERATE OFFENSE FOR:																
WHEN OFFENDER REQUESTS ASSISTANCE	-	Y	Y	Y	Y	Y	Y	*	*	Y	*	Y	Y	Y	*	*
WHEN A THIRD PARTY PROVIDES ASSISTANCE	-	Y	Y	Y	Y	Y	Y	*	*	Y	*	Y	Y	Y	Y	Y
TO RENT OR LOAN A VEHICLE TO AN OFFENDER	-	Y	*	Y	Y	*	Y	*	*	Y	*	Y	Y	Y	*	*

* Not specifically addressed by statute, rules, or regulations at this time.
\- No response received.
1. Fines may be reduced to offset the cost of the interlock unit at the discretion of the court.
2. States not requiring interlock units on work vehicles usually require the following conditions to be met: employer must have notice of restriction, proof of such notice must be in the vehicle, the offender may not own an interest in the business.
3. New York anticipates interlock restrictions to be required primarily for multiple offenders.
4. $1 million per occurrance, $3 million maximum.

APPENDIX D

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SUMMARY OF
IGNITION INTERLOCK COST FACTORS

Autosense Corporation

Lease: $35.00/month
Purchase: $390.00
Installation: $65.00
Service contract*: $200 year 1
$100 year 2
$100 year 3

Breath Test USA, Incorporated**

Lease: $40/month (w/o data log)
$65/month (w/ data log)
Purchase: $700 (w/o data log)
$800 (w/ data log)
Installation: $50
Service contract*: $25 per service

Guardian Technologies, Incorporated

Lease: $40/month (months 1-12)
$30/month (months 12-24)
$25/month (months 25+)
Purchase: N/A
Installation: $50
Service contract: N/A

* Service Contracts are required only for purchases. Monthly lease payments include service costs.

** Prices quoted are preliminary and will be finalized at time of product introduction.

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APPENDIX E

SAMPLE PERFORMANCE CRITERIA AND TESTING PROCEDURES

Title 11
DEPARTMENT OF TRANSPORTATION

Subtitle 13 MOTOR VEHICLE ADMINISTRATION — VEHICLE EQUIPMENT

11.13.10 Ignition Interlock Systems

Authority: Transportation Article, §27-107 and 27-108, Annotated Code of Maryland

Notice of Emergency Action
[89-044-E]

The Joint Committee on Administrative, Executive, and Legislative Review has granted emergency status to new Regulations .01 — .18 under a new chapter, **COMAR 11.13.10 Ignition Interlock Systems.**

Emergency status began: January 31, 1989.
Emergency status expires: May 31, 1989.

.01 Scope.

The purpose of this chapter is to establish regulations for the certification, installation, repair, and removal of ignition interlock systems in accordance with Transportation Article, §27-108, Annotated Code of Maryland. The Administration shall establish standards for the calibration and maintenance of ignition interlock devices, but the calibration and maintenance of each individual device are the responsibility of the manufacturer of that device. If the Administration approves a device, the Administration shall notify the manufacturer in writing of that fact. This written notice of approval is admissible in any civil or criminal proceeding in this State. The Administration may not be held liable in any civil or criminal proceeding arising out of the use of a device approved under this chapter.

.02 Definitions.

A. The following terms have the meanings indicated.

B. Terms Defined.

(1) "Administration" means the Motor Vehicle Administration.

(2) "Alcohol" means the generic class of organic compounds known as alcohols and, specifically, the chemical compound ethyl alcohol. For the purpose of ignition interlock devices, there is no requirement expressed or implied that the device be specific for ethyl alcohol.

(3) "Alcohol concentration" (BAC) means the amount of alcohol in a person's blood or breath determined by chemical analysis, which shall be measured by grams of alcohol per:

(a) 100 milliliters of blood; or

(b) 210 liters of breath.

(4) "Alveolar air" (also called "deep lung air") means an air sample which is the last portion of a prolonged, uninterrupted exhalation and which gives a quantitative measurement of alcohol concentration from which blood alcohol concentration can be determined. The alveoli are the smallest air passages in the lungs, surrounded by capillary blood vessels and through which an interchange of gases occurs during respiration. Alcohol in the blood is eliminated from the lungs via the alveoli.

(5) "BAC" in this chapter means either breath alcohol concentration or blood alcohol concentration.

(6) "Bogus" means air samples which are not human breath samples and may include but are not limited to compressed air, hot air dryers, balloons filled with air (human breath or other air sources), manual air pumps, etc.

(7) "Device" means an ignition interlock device.

(8) "Filtering agents" means materials that can be used in an attempt to remove alcohol from the human breath sample. Filters include but are not limited to silica gel, Drierite, cat litter, cigarette filters, water filters, cotton, etc.

(9) "Ignition interlock device" means a device that connects a motor vehicle's ignition system to a breath analyzer that measures a driver's alcohol concentration and prevents a motor vehicle ignition from starting, if a driver's alcohol concentration exceeds the calibrated setting on the device.

(10) "Interlock" means the mechanism by which a motor vehicle is prevented from starting when the test result of a person's breath alcohol analysis exceeds a preset BAC level.

(11) "Manufacturer" means any person engaged in the manufacturing or assembling of ignition interlock devices.

(12) "Purge" means a mechanism by which a device cleanses or removes a previous breath test sample from the device and specifically removes residual alcohol.

(13) "Restart" means the condition in which a test is successfully completed and the vehicle is started, and then at some point the engine stops for any reason (including stalling). A restart is the ability to start the engine again without giving another test.

(14) "Security" means the protection and safeguards incorporated into ignition interlock devices to ensure proper performance and to ensure against failure caused either by inherent defects or human tampering which causes the device not to perate as designated.

(15) "Simulator" means a device in which air is equilibrated with a water/alcohol solution of known alcohol content at a known temperature. The water/alcohol solution can be made to simulate any breath alcohol concentration. The simulator becomes a known breath/alcohol reference standard by which any alcohol testing equipment can be calibrated and verified.

.03 Manufacturer's Application.

A. A manufacturer of an ignition interlock device shall apply for certification on a form or in a format prescribed by the Administration and shall certify that the ignition interlock devices:

(1) Do not impede the safe operation of the vehicle;

(2) Minimize opportunities to be bypassed;

(3) Work accurately and reliably in unsupervised environments;

(4) Minimize inconvenience to a sober user; and

(5) Sold or leased, of the same make and model for which application for certification is sought, meet the requirements for certification set forth in the specifications of the devices.

B. An application for certification shall include, in addition to other information which the Administration may require:

(1) The name and address of the manufacturer;

(2) The name and model number of the device;

(3) A detailed description of the device including instructions for its installation and operation;

(4) Technical specifications descriptive of the device's accuracy, security, data collection and recording, tamper detection, and environmental features;

(5) A description of the manufacturer's present or planned provisions for distribution of the device in Maryland including all locations in the State where the device may be purchased, installed, serviced, repaired, calibrated, inspected, and monitored;

(6) A certificate from an insurance company licensed in Maryland evidencing that the manufacturer holds product liability insurance as required in Regulation .05; and

(7) A sample warning label, to be affixed to each device, which shall be in compliance with Transportation Article, §27-108, Annotated Code of Maryland.

.04 Guidelines.

A. Correlation.

(1) The ignition interlock device shall correlate with an alcohol concentration of 0.02 percent BAC with the accuracy set forth in §C

(2) A correlation coefficient of 0.95 is considered reliable. 95 times out of 100, the ignition interlock device shall respond to, detect, and interlock when a person has an alcohol concentration of 0.02 percent BAC.

B. Reliability.

(1) Device user complaints shall be reported as required in Regulation .14.

(2) Complaints shall be serviced as follows:

(a) Customer error in operation or misuse shall be corrected with additional instructions;

(b) Device problems due to component failures shall be corrected through exchange of appropriate package.

C. Accuracy.

(1) Breath test devices shall use breath specimens which are alveolar air samples ("deep lung air") in accordance with established forensic alcohol standards.

(2) The calibrated setting shall be at .020 percent BAC. The device shall have an accuracy of 95 percent and shall detect and interlock when the air sample provided to it contains alcohol at or above the calibrated setting.

(3) The ignition interlock device shall be calibrated for proper use and accuracy semi-annually, or more frequently as the circumstances may require.

D. Security.

(1) A simulator, considered the best substitute for human breath samples, shall be employed for testing purposes as determined by Regulation .13.

(2) The manufacturer shall take all reasonable steps necessary to prevent tampering or circumvention of the device. These steps shall include:

(a) Physical and electronic security provisions to prevent or record evidence of cheating;

(b) Special locks, seals, installation procedures, or other methods that record attempts to circumvent security provisions; and

(c) Checks for evidence of tampering when the device is serviced, repaired, or monitored, and more frequently if necessary as specified in the terms of certification by the Administration, or as requested by the courts or Division of Parole and Probation.

E. Environmental Features. The device shall operate reliably over the range of motor vehicle environments or motor vehicle manufacturing standards. The device shall:

(1) Be resistant to shock and vibration as normally found in a motor vehicle environment;

(2) Operate accurately over a temperature range of −20 degrees celsius to +70 degrees celsius; and

(3) Operate accurately with an altitude range of 0 to 2,500 feet (sea level to 2,500 feet above sea level).

F. Mandatory Operational Features.

(1) The device shall be designed to permit a restart (grace period) of a vehicle's ignition within 60 seconds after the ignition has been shut off, without requiring a further test.

(2) The device shall automatically purge residual alcohol before allowing subsequent tests.

(3) Each device shall be provided with a supply of disposable mouthpieces with saliva traps. The manufacturer shall ensure the availability of additional mouthpieces.

(4) The device shall be required to be stowed out of the way before starting the motor vehicle.

.05 Product Liability.

A. The manufacturer of the device shall carry product liability insurance with minimum liability limits of 1 million dollars per occurrence, with 3 million dollars aggregate total. The liability covered shall include defects in product design and materials as well as in the work of manufacturing, calibration, installation, and removal of devices. The proof of insurance shall include a statement from the insurance company that 30 days

notice will be given to the Administration before cancellation of the insurance.

B. The manufacturer shall provide to the Administration a statement that the manufacturer shall be totally responsible for product liability and shall indemnify the following from any liability resulting from the device or its installation or use:

(1) The State of Maryland, including all of its units and all State personnel as defined in State Government Article, §12-101;

(2) The court that ordered installation of the device; and

(3) The testing laboratory that has verified that the device meets the Administration's standards and requirements.

.06 Warranty.

The manufacturer shall provide a warranty of performance to ensure responsibility for support for service within 48 hours after notification of complaint. This support shall be effective for the duration of the probationary period under which the device is required to be installed in the vehicle.

.07 Warning Label.

The manufacturer shall affix to each device a warning label containing the following language: "A person tampering with, circumventing, or otherwise misusing this Ignition Interlock System is guilty of a misdemeanor, and, on conviction, is subject to a fine or imprisonment or both."

.08 Installation Standards.

A. The manufacturer of the device shall be responsible for ensuring proper installation procedures to include, but not limited to, the following:

(1) Devices shall be installed within a building fully equipped for adequate installation.

(2) Customers or other unauthorized persons may not be allowed to watch the installation of the device.

(3) Adequate security measures shall be taken to prevent unauthorized persons from accessing secured materials (tamper seals, installation instructions, etc.).

(4) Each manufacturer shall develop detailed and written instructions for installation of its device in accordance with the guidelines adopted by the Administration.

(5) The installer shall screen the vehicles for acceptable mechanical and electrical conditions, in accordance with the manufacturer's instructions.

(6) Conditions that would interfere with the function of the device (for example, low battery or alternator voltage, stalling frequent enough to require additional breath tests, etc.) shall be corrected to an acceptable level.

(7) Installations shall be made in a workmanlike manner in accordance with accepted trade standards, and according to the instructions provided by the manufacturer.

(8) After a device is installed, the vehicle and device shall be checked to see that the installation was performed properly and that it does not interfere with the normal operation of the vehicle after it has been started.

(9) Each installation shall include all of the tamper resistant features required by the manufacturer and the Administration.

B. The manufacturer shall be responsible for ensuring physical anti-tamper securities which include, but which are not limited to, the following:

(1) A unique and easily identifiable wire, covering, or sheathing over all wires used to install the device, which are not inside a secured enclosure.

(2) A unique and easily identifiable covering, seal, epoxy, or resin at all exposed electrical connections for the device.

(3) Connections to the vehicle which shall be under the dash or in an inconspicuous area of the vehicle.

(4) A unique and easily identifiable tamper seal, epoxy, or resin at all openings (except the breath and exhaust ports) of the hand-held unit, control, and support units.

(5) Depending on the level of electronic anti-tampering security of a device, additional anti-tamper measures that could be taken such as the use of a special mark, seal, paint, epoxy, resin, or other material to mark points likely to be accessed when attempting to bypass or tamper with the device (for example, battery post terminals, wire to starter solenoid, wire to ignition, dash screws).

C. The manufacturer shall be responsible for ensuring electronic anti-tampering securities which include, but which are not limited to, the following:

(1) The device shall detect when the vehicle has been started without a breath test being passed, and shall either display the tamper or record it, or both, in a way that the information can be retrieved at a later date.

(2) The device shall retain its tamper detection capabilities when disconnected from the vehicle's power supply, or record that it was disconnected. Devices that lose their memory of tamper events when disconnected from a power source shall have an indicator or interrupt device.

(3) If required by the appropriate court or probation office, the device shall continuously record the time and date for each of the following vehicle and device operations:

(a) Breath test fail;

(b) Breath test pass; and

(c) Alcohol level of breath test.

(4) When a device detects a condition that would be considered tampering, the device shall activate an indicator or interrupt device.

.09 Periodic Inspections.

A. At the time of device installation, the device shall be checked to make sure that it is functioning properly and accurately. Self-diagnostic features shall also be checked.

B. Tamper inspections shall be conducted at any time that the device is given routine inspection, maintenance, or repair. Tamper inspections shall include the following:

(1) Inspect all external wiring insulation, connections, and sheathing for the device and where the device connects to the vehicle. Document and photograph any perforations, cuts, or other evidences of possible tampering.

(2) Record or document any electronic indications of tampering.

(3) Inspect all tamper seals for breaks, tears, or other evidence of tampering. Document and photograph any evidence of tampering.

(4) Check device for proper operation to ensure tamper detection capabilities.

(5) After all evidence of tampering has been recorded, photographed, and reported to the appropriate law enforcement agencies, restore the system and its tamper seals, etc. to their original condition to prevent further abuse.

C. The Administration or its designees shall have the right to inspect installation and service of the devices.

.10 User Orientation and Support.

A. The vehicle operator shall be provided:

(1) Written instructions on how to clean and care for the device;

(2) Written instructions on what type of vehicle malfunctions or repairs may affect the device, and what to do when such repairs are necessary;

(3) Written notice about how the device may be affected by high altitudes; and

(4) Written and hands-on training on how to use the device after it is installed in the user's vehicle. This shall include all persons who are authorized to use the vehicle that has had a device installed.

B. The manufacturer shall provide an emergency 24-hour phone number that a user may contact to receive assistance. Assistance may include technical information, tow service, or road service. Emergency assistance related to the failure of a device shall be provided within 2 hours for vehicles located in or near an area with an installation or repair facility. The device shall be made functional within 48 hours from when the call for assistance is made.

.11 Personnel Requirements.

The manufacturer shall be responsible for device installation, user training, service, and maintenance. The following apply:

A. Installers shall have the training and skills necessary to install, troubleshoot, and check for proper operation of the device, and to screen the vehicle for acceptable conditions.

B. Personnel who install, calibrate, perform tamper inspections, or perform reporting duties, or all of these, may not have been convicted of a crime substantially related to the qualifications, functions, and duties related to the installation and inspection of the devices. This may include, but is not limited to, persons:

(1) Convicted of any alcohol or drug related offense within the last 3 years;

(2) Convicted of more than one alcohol or drug related offense overall;

(3) Convicted of probation violation;

(4) Convicted of perjury; or

(5) Who have had a license or registration revoked, suspended or denied for a violation or violations of motor vehicle safety equipment laws.

C. Persons who can show acceptable evidence of rehabilitation may be considered for the positions in §B.

.12 Facility Requirements.

Each facility where interlock devices are installed shall:

A. Be in an enclosed building with a separate waiting area for customers.

B. Have records maintained for 5 years.

C. Have and use the required tools, test equipment, and manuals needed to screen vehicles for acceptable mechanical and electrical conditions to install devices. These include, but are not limited to, the following:

(1) Tools necessary to ensure electrical connections are made in a workmanlike manner in accordance with accepted trade standards (for example, properly soldered or mechanically crimped with high quality connectors);

(2) Heat gun if heat shrink tubing or heat set labels are used;

(3) Volt/ohmmeter;

(4) Test light;

(5) Battery testing equipment and servicing tools (for example, load tester, terminal cleaning tools, battery filler, etc.); and

(6) Electrical wiring diagrams or reference guide, or both, for electrical systems on import and domestic vehicles, 20 years old or less, necessary for the installation and operation of the device.

.13 Testing Procedure for Certification.

A. Overview.

(1) Testing shall be performed by an entity approved by the Administration for the purpose of establishing the accuracy and reliability of candidate breath test ignition interlock devices.

(2) Testing shall be accomplished by using two devices to be certified and by performing not less than 20 tests using simulators containing alcohol solutions of known concentrations.

(3) These test procedures are for breath alcohol testing devices only.

B. Equipment List. Equipment shall consist of the following:

(1) A simulator, which is a constant-temperature, water/alcohol instrument for the purpose of delivering a standard air/alcohol vapor mixture at a temperature corresponding to human breath.

(2) An air compressor which forces dry, filtered air through the simulator, delivering an air/alcohol vapor of known concentration.

(3) An environmental chamber which is capable of a temperature range from −20 degrees celsius to +70 degrees celsius with access ports to enable testing of devices at various temperature levels.

C. Use of Equipment — Simulators.

(1) The simulator shall be checked for cleanliness and dryness.

(2) The simulator shall be in good working order. To ensure this:

(a) Check motor, heater and thermometer, fill glass jar with 500 ml distilled water and securely screw on lid with motor and controller.

(b) Plug into 110V line, and after approximately 30 minutes check temperature, which shall be 34 degrees celsius plus or minus 0.2 degrees. Make sure mercury column in thermometer is intact. Check to make sure the stirrer is stirring smoothly.

(c) Block outlet with thumb and blow into inlet. There should be great resistance and the simulator should be leak proof.

(d) Unplug, empty, and allow to dry thoroughly before using, then:

(i) Place 500 ml of alcohol reference solution into the clean, dry jar and screw on the lid with motor and controller.

(ii) Attach short piece (1.0 inch) of Tygon or FDA vinyl tubing to the outlet and affix with a spit-trap mouthpiece. Attach a longer piece (8 inches) of tubing to the inlet.

(iii) Label each simulator with BAC value and date filled. A label for marking down each test shall be affixed.

(e) The solution in the simulator may be used for up to 25 tests, but the solution shall be discarded after 25 tests.

D. Use of Equipment — Air Compressor.

(1) Air from compressor shall be filtered (to remove oil and particulate) and dried (to remove water).

(2) Pressure and flow regulator shall deliver air to simulator at the rate specified by device manufacturer.

(3) If necessary, all simulator testing may be conducted by a technician using a live breath sample.

E. Use of Equipment — Environmental Chamber. Environmental chambers shall have the:

(1) Capacity to have units placed inside chamber to run tests; and

(2) Ability to maintain temperature during tests at −20 degrees celsius, 0 degrees celsius, room temperature, +70 degrees celsius. Tests at 20 — 25 degrees celsius tests may be run at room temperature outside the chamber.

F. Preparation of Standard Alcohol Reference Solutions.

(1) Stock Solution. Measure 77.0 ml absolute ethanol (at 25 degrees celsius), using various size pipets and 10 ml buret, into a 1 liter volumetric flask and dilute to the mark with distilled water.

(2) Stock solution storage. Store in a well-stopped flask labeled "Stock Solution" and "Contains 60.5 g/L ethanol (77.0 ml)". The date prepared and initials of preparer shall be on the flask.

(3) Standard reference solutions. Prepare from stock solution by pipeting the requisite amount of the stock solution into a 1 liter volumetric flask and diluting to the mark as given below. Thoroughly mix by capping the flask securely and inverting several times. The following apply:

(a) For 0.010 percent BAC dilute 1.0 ml stock solution to 500 ml.

(b) For 0.020 percent BAC dilute 2.0 ml stock solution to 500 ml.

(c) For 0.030 percent BAC dilute 3.0 ml stock solution to 500 ml.

(4) Concentration determination. Determine the exact concentration of the standard reference solution as for secondary alcohol standard solution in an approved method of forensic alcohol analysis. In addition, each standard reference solution shall be tested using a suitable analytical procedure approved by the State.

(5) Standard reference solution storage. The standard reference solution shall be stored in a glass bottle with a tight fitting ground glass stopper or a teflon coated screw cap.

(6) Label the container with solution number, solution concentration in BAC, date prepared, and the initials of the preparer.

(7) The manufacturer may request aliquot samples of solutions for independent testing.

G. Test Procedures.

(1) Set up simulator with standard alcohol solutions equivalent o 0.010 percent BAC, 0.020 percent BAC, and 0.030 percent BAC. Allow each solution to reach 34 degrees celsius plus or minus 0.2 degrees celsius.

(2) Test Setup.

(a) Sample test devices may not be modified, changed or altered by testing agency.

(b) Use short tubing (1 inch) from simulator to spit-trap mouthpiece leading to breath sampling inlet of the interlock device.

(c) Access breath test device according to manufacturer's instructions.

(d) In order to maintain accurate measurements, use new mouthpiece/tubing after each sequence of tests or when moisture is noticed in the trap.

(e) Wait 3 to 5 minutes between each test to avoid overloading sensors.

(f) Record numerical readout or Pass/Fail signal, or both, on chart for each test result.

(3) Test temperatures at −20, 0, +20 to +25 (room temperature) and +70 degrees celsius.

(4) Test Alcohol Solutions. It is recommended that 0.010 percent BAC, 0.020 percent BAC, and 0.030 percent BAC standard alcohol reference solution values be generated by human breath through a simulator as noted above.

(5) Accuracy Tests with Alcohol Reference Solutions. Run 20 tests of each device at each temperature and at each concentration of alcohol solutions. The required results shall start at least 19 of 20 tests for 0.010 percent BAC and may not start at least 19 of 20 tests for 0.020 percent BAC.

(6) Repeatability Test with Alcohol Reference Solutions. Run 20 tests of each device at 0.020 percent BAC at room temperature, repeat in 48 hours and repeat after the following vibration of 10 G's RMS per square root of Hz of white noise band limited to 5 — 40 Hz. The required results for each segment may not start at least 19 of 20 tests.

(7) Altitude Tests. Run 10 tests of each device at 0.010 percent BAC and at 0.020 percent BAC at sea level and 2,500 feet. The required results shall start at least 17 of 20 tests for 0.010 percent BAC and shall not start at least 19 of 20 tests for 0.020 percent BAC.

(8) Live Subject Tests. Any tests done in simulated conditions shall be verified with human subjects in a manner which proves in live subjects that the calibration works.

(9) Bogus Breath and Filter Tests. Select three sources for testing to determine that the devices successfully resist circumvention, and require premeditation to circumvent.

(10) Restart Tests. Ten tests of each device permit restart without breath source within 1 minute after a successful start.

(11) Purge Tests. Run 10 tests of each device to determine that the system will automatically purge residual alcohol before allowing subsequent tests.

(12) Other Test Procedures.

(a) Time between tests shall be consistent with manufacturer's specifications and accepted testing practice.

(b) If a device fails a test, the test segment shall be repeated once. If the device fails a second time, the manufacturer shall be notified.

(c) A detailed test report shall be submitted, including test logs and discussions of any problems encountered.

H. Sample Filtering Agents for Bogus Breath Testing.

(1) Absorbents can be commercial cat litter, silica gel 30/60 each, Drierite 8 mesh, molecular sieve "Union Carbide 13×1/16-inch pellets". The absorbents shall be used as follows:

(a) Use tubing or rigid paper that does not crush easily, such as Thin Wall, with an interior diameter of 11/16-inch, and a length of 2⅝-inches;

(b) Fill tubing approximately 50 percent with absorbent;

(c) Place wad of cotton in each end; and

(d) Place rubber stopper with center hole in one end, with tubing/mouthpiece in hole in rubber stopper.

(e) A separate tubing shall be used for each test. Do not repeat tests of various tubing composition for ethanol-absorbance (copper, glass, tygon).

(2) Tube with Cotton.

(a) Use paper tubing with an interior diameter of ¾ inch, and a length of 4 inches.

(b) Fill approximately 50 percent of tubing with cotton and insert rubber stopper. Run one test with dry cotton and one test with cotton moistened with water.

(3) Water Filter.

(a) Use a 300 ml container (that is, a beaker); and

(b) Fill with approximately 100 ml hot tap water.

(4) Plastic Bag.

(a) Use a 1.2 liter Mylar gas sampling bag (any plastic is acceptable), approximately 8" × 8"; and

(b) Secure the opening around mouthpiece or over opening directly into unit.

(5) Balloons.

(a) Use medium-size standard toy balloon; and

(b) Place balloon over mouthpiece or stretch over opening of unit.

(6) Cigarette Filters.

(a) Use whole cigarette (one per test), such as ulfiltered Pall Mall and filtered Carlton, Lark, Winston.

(b) Filtered cigarettes shall be 3 5/16 inches in length including 1-inch filter.

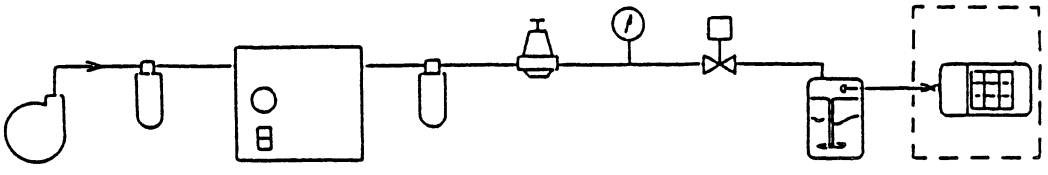
(7) Hair Dryers.

(a) Use 12v and 110v dryers, adding paper tubing taped to nozzle to reduce the diameter to 1/4 inch.

(b) Affix tubing to mouthpiece.

(8) Vacuum. Use a 12v suction vacuum only and hook vacuum to vent portion of unit.

I. Diagram of Test Setup.



[1] Air compressor: Air source for tests
[2] Filter: to remove particles from air source
[3] Drier: to remove water from air source
[4] Filter: to remove oil from air source
[5] Pressure regulator: to adjust air pressure to simulator
[6] Pressure gauge: maintain air pressure at 1.75 psi — 2.5 psi (flow rate of 25 — 45 scf/h)
[7] On-off switch: to turn air supply on and off
[8] Simulator: contains alcohol/water solution to deliver air sample on known alcohol content
[9] Environmental chamber: into which device is placed for temperature tests

J. Results of Tests. As a prerequisite to certification, the manufacturer shall submit a notarized letter or affidavit, or both, from an approved testing laboratory certifying that the device by model or class, or both, meets or exceeds all requirements set forth in this regulation. This affidavit shall also include:

(1) Name and location of the testing laboratory;

(2) Address and phone number of the testing laboratory;

(3) Description of the tests performed;

(4) Copies of the data and results of the testing procedures; and

(5) Names and qualifications of the individuals performing the tests.

.14 Reports Required by Manufacturer.

A. The manufacturer shall provide to the Administration:

(1) Annually, a certified statement that the manufacturing of the model or type of device originally certified has not been modified or altered in any way to require laboratory retesting.

(2) Annually, a summary of all complaints received and corrective action taken by the manufacturer for each model or type of certified device. These reports shall be categorized by:

(a) Customer error of operation;

(b) Faulty automotive equipment other than the device;

(c) Apparent misuse or attempts to circumvent the device causing damage; and

(d) Device failure due to material defect, design defect, workmanship errors in construction, installation, or calibration.

(3) Semi-annually, a report that the ignition interlock devices were checked for proper use and accuracy, detailing any necessary adjustments.

(4) Any other available information upon request.

B. The manufacturer shall provide the appropriate office of the Division of Parole and Probation the following:

(1) Proof of the installation of the system.

(2) Reports of the results of the monitoring, which shall be performed at least every 60 days, or more frequently as the circumstances may require. The reports may be in the form of an electronic log of the driver's experience with the system.

(3) Within 7 days of discovery, reports of any apparent misuse of the device, tampering, circumventing, or attempts to disconnect, or any other pertinent information.

(4) Any other available information upon request.

.15 Fees For Certification.

Approved testing laboratories may have fees associated with their work in the testing of the device and shall be paid directly by the manufacturer. All other costs of obtaining certification of an ignition interlock device shall be paid by the manufacturer of the device to the Administration.

.16 Removal of the Device.

A. When notified in writing by the originating court, the manufacturer shall remove the device and return the vehicle to normal operating condition. All severed wires shall be permanently reconnected and insulated with heat shrink tubing or its equivalent.

B. Whenever a device is removed for repair and cannot immediately be reinstalled, a substitute device shall be used. A purchaser or lessee's vehicle may not be driven without a required device.

C. Before removal of a device, the manufacturer shall notify the originating court except under the following conditions:

(1) Completion of sentence, or other terms of a court order; or

(2) Immediate device repair needs.

.17 Revocation of Approval of Ignition Interlock Devices.

A. The Administration may revoke approval of a device, and remove it from the list of acceptable devices, upon any of the following grounds:

(1) Evidence of repeated device failures due to gross defects in design, materials, or workmanship during manufacture;

(2) Termination of manufacturer's liability insurance;

(3) Notification that the manufacturer is no longer in business;

(4) Voluntary request of the manufacturer to remove a device from the acceptable list;

(5) Any findings that the manufacturer is not in compliance with the provisions of this chapter or Transportation Article, §27-108, Annotated Code of Maryland; or

(6) Any other reasonable cause to believe the device was inaccurately represented to meet the performance standards.

B. The effective date of revocation shall be 15 days after notification is sent to the manufacturer via certified mail, except in cases where the Administration determines immediate revocation is necessary for the safety and welfare of the public.

C. Manufacturers may request a review of revocation. This request shall be submitted to the Administration, in writing, within 15 days of the revocation.

D. Upon revocation or voluntary surrender of an approval, a manufacturer shall be responsible for removal of all like devices from customers' vehicles.

E. A manufacturer shall be responsible for any costs connected with removal of its revoked devices from customers' vehicles and the installation of new devices from the Administration's list of approved devices.

.18 ***Exemption.***

Until such time as manufacturers have the opportunity to certify the ignition interlock devices in accordance with this chapter, but not later than 120 days after the effective date of this chapter, all court systems using an uncertified ignition interlock device as a condition of probation are exempt from the provisions of this chapter.

W. MARSHALL RICKERT
Administrator
Motor Vehicle Administration
