

2. Collier, D. W. (1994). *Second Generation Interlocks Lead to Improved Program Efficiencies* (1993). TRB ID No.: CF076. Chicago, Illinois. Paper presented at the 73rd Annual Meeting, Transportation Research Board, January 9-13, 1994.
3. EMT Group, I. (1990). *Evaluation of the California ignition interlock pilot program for DUI offenders (Farr-Davis Driver Safety Act of 1986)*. Sacramento: The EMT Group, Inc. Prepared for The California Dept. of Alcohol and Drug Programs and The California Office of Traffic Safety.
4. Elliott, D. S. & Morse, B. J. (1993). *In-Vehicle Test Devices as a Deterrent to DUI*. NIAAA Final Report, January 1993, pp 18-21.
5. Jones, B. (1993). *The Effectiveness of Oregon's Ignition Interlock Program*. Proceedings of the 12th International Conference on Alcohol, Drugs and Traffic Safety — ICADTS - T'92, Cologne, Hotel Maritim, 1992, September 28 Koln, Germany. TUV Academie: Rhienland.
6. Klein, T. (1989). *Changes in alcohol-involved fatal crashes associated with tougher state alcohol legislation*. Washington, DC: National Highway Traffic Safety Administration.
- 999). Washington, DC: NHTSA.
7. Marques, P. R. & Voas, R. B. (1993). *Setting Performance Priorities for Breath Alcohol Ignition Interlock Devices*. Landover, MD. *J. Traffic Medicine*, 21 (3), 127-132.
8. Marques, P.R. & Voas, R.B. (1994) *Case-managed alcohol interlock programs: A bridge between the criminal and health systems*. Under Review.
9. McKnight, A. J., & Voas, R. B. (1991). *The effect of license suspension upon DWI recidivism*. *Alcohol, Drugs, and Driving*, Vol. 7, No.1, p.43-54.
10. Rodgers, A. Effect of Minnesota's license plate impoundment law on recidivism of multiple DWI violators, *Alcohol, Drugs, and Driving*, Vol. 10, p. 127-134.
11. Ross, H.L. (1976). *The neutralization of severe penalties: Some traffic law studies*. *Law and Society Review*, 10(3), 403-413.
12. Ross, H.L. (1982). *Detering the drinking driver: legal policy and social control*. D.C. Health (Ed.) Lexington, MA: Lexington Books.
13. Sadler, D. D., & Perrine, M. W. (1984). *An evaluation of the California drunk driving countermeasure system: Volume 2 The long-term traffic safety impact of a pilot alcohol abuse treatment as an alternative to license suspensions*. Sacramento, CA: California Department of Motor Vehicles.
14. Stewart, K. & Ellingstadt (1988). *Rehabilitation Countermeasures for Drinking Drivers*. In *Surgeon General's Workshop on Drunk Driving*; Background Papers, HHS, Washington, D.C.
15. Stewart, K. & Voas, R. B. (1993). *Plan for Evaluating the State of Ohio's Vehicle Immobilization Law*. Bethesda, MD. TRB ID No.: CF075. Paper presented at the 73rd Annual Meeting, Transportation Research Board, January 9-13, 1994.
16. Voas, R. B. (1992). Final Report on NHTSA Contract No. DTNH22-89-4-07026 *Assessment of Impoundment and Forfeiture Laws for Drivers Convicted of DWI*. Washington, D.C.: National Highway Traffic Safety Administration.
17. Voas, R. B., & Marques, P. R. (1991, December 23). Final Report on NHTSA Contract No. DTNH22-89-C-07009 *Alcohol Ignition Interlock Service Support*. Landover, MD: National Public Services Research Institute.
18. Voas, R. B., & Tippetts, A. S. (1994A). *Unlicensed Driving by DUIs - A Major Safety Problem?* TRB ID No.: CR077. Landover, MD. Paper presented at the 73rd Annual Meeting, Transportation Research Board, January 9-13, 1994.
19. Voas, R. B., & Tippetts, A. S. (1994B). *Assessment of Impoundment and Forfeiture Laws for Drivers Convicted of DWI: Phase II Report*, Washington D.C., National Highway Safety Administration, August 1994, 32pp.

APPENDIX C10

A BRIEF HISTORY OF THE USE OF IN-VEHICLE DEVICES FOR PREVENTING ALCOHOL-IMPAIRED DRIVING

Anthony C. Stein, Ph.D.
Safety Research Associates, Inc.

Other papers in this series have discussed vehicle sanctions which, in some manner, separate the driver from his or her vehicle. There is an alternative to this action when it is determined that the convicted drunk driver should be allowed to retain either limited or unrestricted vehicle use. There are situations where arguments can be made that allowing the convicted drunk driver to retain use of his or her vehicle has less impact on society than vehicle seizure. Also, there are cases where seizure or impoundment of a vehicle only keeps the driver from the targeted vehicle, but where vehicle alternates are available.

One thing is certain, however, we do not want to allow the convicted drunk driver to operate a motor vehicle when (s)he is drunk.

There are alternatives to seizure or impoundment which allow the driver to drive, but which prevent impaired vehicle operation. These systems are installed in the individual's vehicle; and, depending on the device, determine the presence

of alcohol in the driver or measure the operators "fitness for duty." The basic idea behind these devices is that the driver must pass a test before each drive.

There are two issues which must be decided to determine what type of system will be installed -- or in a broader context, what type of system will be recommended for large scale implementation.

The first issue is concerned with the type of test to be administered. There are two methodologies currently available. The first uses a sensitive breath testing device to determine the presence of alcohol on the drivers breath; the second uses a psychomotor test to determine the operators performance level, and determines if an individualized performance criteria has been met.

The second issue deals with what happens to the vehicle if the test is not passed. Again, there are two possibilities: the first method prevents the car from starting unless the test is passed; the second activates some form of alarm system which will alert other drivers on the road if the vehicle is driven. Figure 1 is a matrix of the various possibilities.

The purpose of this paper is to give a historical perspective of the use of in-vehicle devices to prevent drunk driving trips, and to discuss the research which has been conducted using these devices.

Snyder (1984) provides a comprehensive background of the NHTSA experience with in-vehicle devices. In the late 60's and early 70's NHTSA asked manufacturers to submit devices or testing to determine their suitability for implementation as an in-vehicle testing device. After testing 10 of the 12 first generation devices submitted, they came to the conclusion that none could be used "as is."

	TEST TYPE	
	Breath Test	Performance Test
SYSTEM TYPE		

Figure 1.--In-vehicle Device Matrix

Four devices were retained from what was described as "second generation" testing during the mid 70's. The NHTSA

testing found three of the four devices offered better performance than those first tested and that pass/fail criteria and test strategies could be developed for these devices. They also concluded that two of the devices could provide the required alcohol detection without penalizing the sober driver.

At this time NHTSA reached other significant conclusions which dictated the type of test they would attempt to develop and the type of system to be used. Their determination that breath testing devices were subject to test taker compromise, and that an interlock which disabled the vehicle could lead to potential liability implications resulted in the decision to pursue a performance based system which used alarms.

NHTSA then contracted with Systems Technology, Inc. (STI) to develop and test a Drunk Driving Warning System (DDWS). This research required taking an existing test, the Critical Tracking Task (see Jex, et al, 1967) and developing alcohol sensitivity curves, training regimes, and tamper-proof hardware. From the sensitivity curves and training data an impairment detection strategy was developed (IDS) which had the dual purpose of maximizing detection of the alcohol impaired driver while minimizing the likelihood of failing an unimpaired driver.

The resulting test device and strategy (described in Stein and Allen, 1986) resulted in a system which required a driver to take a performance based test each time (s)he entered the car. Various methods were incorporated to make sure the person taking the test was the person driving. When the vehicle ignition was turned on as series of alarms were activated. These alarms consisted of the 4-way emergency flashers operating all the time, and the horn honking once a second if the vehicle was driven over 10 mph. To deactivate the alarms the driver was required to pass the test. If the test were failed, the driver needed to wait 10 minutes before retaking it.

Field tests were conducted to assess the feasibility of this type of system. A total of 20 convicted second offense drunk drivers were participants in the study. The purpose of the study was to determine implementation feasibility through the court system, acceptability of the system by the user and other interested parties, and the effectiveness of the system in reducing implied drunk driving trips. A laboratory experiment was also conducted to determine the sensitivity of the IDS.

The field tests proved successful. The involved courts found the system effective and found no barriers to implementation as a sentencing tool. The subjects, their families and other interested parties universally praised the system as being beneficial; and, while test failure was a rare

event³ there were only two cases when subjects drove with the alarms activated (<1 percent of implied drunk failures). In one case the subject had not been drinking but a passenger's behavior caused the system to think the driver was attempting to allow someone else to take the test in his place; and in the other case the driving action did not occur until over 4 hours after the first failure, and the vehicle was driven to a new parking place around the corner to prevent it being towed from a rush hour no-parking location.

The laboratory tests showed discriminability which equalled the statistical projections. The IDS had been set to detect 80 percent of the individuals at a BAC of 0.15 percent and to fail no more than 2.5 percent of the unimpaired subjects.

With no further government funding for system improvements or large scale testing, the idea of vehicle based detection systems languished for many years. In the late 80's the idea of vehicle based systems resurfaced. This came about for two reasons. First, low-cost, accurate and portable breath testing devices became a reality; and second, testing operator impairment to determine "fitness-for-duty" was considered as an alternative to mandatory urine testing by some individuals.

At the same time STI was studying the effectiveness of the DDWS, the Canadians were looking at the effectiveness of another performance testing device (Noy, 1986). This research found that the Tracometer was at least as effective as the test used in the DDWS (the CTT), and could be incorporated in an in-vehicle system.

The advent of low-cost breath testing devices and a major change in the public perception of the acceptability of drunk driving resulted in "Breath Alcohol Ignition Interlock Devices" (BAIID) becoming an acceptable methodology. This change in policy appears to be both product driven and a result of citizen groups, such as MADD, lobbying all involved parties to incorporate BAIIDs as a sentencing tool. This pressure has resulted in state legislation which allows BAIID's to be used both as a sentencing tool, or to be administratively required by the DMV.

NHTSA's response to this pressure was the development of a model specification/guideline for BAIID's which can be easily adopted by states in their legislation (Federal Register, 1991). Research has been conducted to determine the acceptability and perceived potential usefulness of BAIIDs (Linell, 1991). In general, the response to BAIIDs has been positive, with the majority of respondents providing positive

comments, and with the systems' preventing drivers with positive alcohol levels from driving. The same drawbacks were observed as with the DDWS (e.g., cost, no proven effect, ability to bypass, etc.).

More recently the idea of using some form of performance based fitness-for-duty testing device as a means of detecting impaired driving, or as an alternative to workplace urine testing has been proposed.

Development and evaluation of a Truck Operator Proficiency System (TOPS) was conducted in the late 80's and early 90's (Stein, et al. 1990). This system uses a performance based test to determine operator impairment, and has been conducted in the workplace with a device based on the same test with excellent results (Miller, 1993). It is appealing to contemplate the use of the same test device both in the workplace and in a vehicle.

This brief historical perspective should provide the background to answer the following questions in the workshop:

- Should in-vehicle devices be considered as an alternative to prevent the persistent drinking driver from operating a motor vehicle?
- Should such a device measure the presence of alcohol, or should it measure impairment?
- In either case, how should the pass/fail criteria be determined?
- If the test is failed, should the vehicle's ignition be disabled, or should a warning system concept be employed?

REFERENCES

1. Federal Register (1991). Model specifications for breath alcohol ignition interlock devices (BAIIDs), Federal Register, 56 (79), April 24, 1991 (56 FR 18857).
2. Jex, H.R.; McDonnell, J.D. and Phatak, A.V. A "critical" tracking task for man-machine research related to the operator's effective delay time. Part I: Theory and experiments with a first-order divergent controlled element. Washington, DC: National Aeronautics and Space Administration.
3. Linell, R.H. and Mook, S.J. (1991). Ignition interlock devices: An assessment of their applicability to reduce DUI. Washington, DC: AAA Foundation for Traffic Safety.
4. Noy, Y.I. (1986) A comparative evaluation of the tracometer and the critical tracking task as tests of alcohol intoxication. Downsview, Ontario, Canada: Defense and Civil Institute of Environmental Medicine.

³Interviews with subjects' indicated they usually didn't attempt the test when they knew they were impaired.

5. Snyder, M.B. (1984) The drunk driving warning system - status review. Washington, DC: Transportation Research Board.

6. Stein, A.C.; Parseghian, Z. and Allen, R.W. (1990) The development of a low-cost portable system for the detection of truck driver fatigue. In E. Petrucelli (ed.) Proceedings of the 34th Annual Conference of the AAAM. Des Plaines, IL: Association for the Advancement of Automotive Medicine.

7. Stein, A.C. and Allen R.W. (1986). The use of in-vehicle detectors to reduce impaired driving trips. In D.C. Viano (Ed.) Alcohol, Accidents, and Injuries. Warrendale, PA: Society of Automotive Engineers, P-173.

APPENDIX C11

EVALUATING ALTERNATIVE SANCTIONS FOR MULTIPLE-OFFENDER DWIS-A DESCRIPTION OF SOME PRIOR AND CURRENT RESEARCH

Ralph K. Jones

John H. Lacey

Mid-America Research

James M. Byrne, Ph.D.

University of Massachusetts at Lowell

In this paper, we describe some current research we are conducting to evaluate some alternative sanctions to jail that are being used for multiple-offender DWIs.

BACKGROUND

For many years, the *legal approach* to controlling alcohol-crash risk was essentially the only approach of any significance. Then, it was devoted almost entirely to the applying the theory of legal deterrence. Now, the legal approach also includes the regulation of the availability of alcohol (Jones and Lacey, 1989). A major component of the Traffic Law System that attempts to deter drunk driving and other unsafe driving behaviors proscribed by law is what we have called elsewhere the Traffic Case Disposition System. *The Traffic Case Disposition System is composed of the judicial agencies and administrative agencies that determine the guilt or innocence of accused drunk drivers and impose legally authorized sanctions as punishment on those found guilty.*

Traditionally, these sanctions have been in the form of a fine, incarceration, or a suspension (or revocation) of the driver license. When a law permits a convicted drunk driver to be incarcerated (even for a short time), adjudication and sanctioning must be performed by a judicial agency as a criminal proceeding, and the law violation is called a crime.

Since every State has laws authorizing (and in some cases mandating) incarceration, all DWI cases covered by these laws are heard by a judicial agency. However, licensing sanctions are often imposed by a non-judicial (administrative) agency. Administrative proceedings are generally more efficient for "processing" accused drunk drivers, since they do not have to provide the full protection required in a criminal proceeding.

For many years, judges have experimented with *alternative sanctions* for drunk driving. Most commonly, these involved referral of drivers to treatment and education, and such referrals have now become "legitimized" by statutes in many States. The process of diagnosing, referring, treating, and supervising DWIs (or accused DWIs if parts of the process are performed prior to conviction) is performed by a number of Traffic Law System and Public Health System agencies. Following Filkins (1969), we have used the term *Health / Legal System* to describe the collection of agencies that participate together in this process (Jones, Joscelyn, and McNair, 1979).

Other alternative or non-traditional sanctions that have been tried for DWI (and also legitimized in some instances) include community service in lieu of or in addition to jail, impoundment or forfeiture of vehicles or license plates, victim restitution, visits to a hospital emergency room that treats traffic accident victims, and using license plates that identify the vehicle owner as a DWI, among others. Often, these sanctions have been used in combination with traditional sanctions, a practice that makes their evaluation more difficult.

More recently, alternatives to incarceration have received considerable attention as a sanction because of the lack of jail space for holding offenders and also with the inappropriateness of incarceration for many kinds offenses. Much interest is being given to a class of such alternatives called intermediate sanctions (Morris and Tonry, 1990), and the U.S. Department of Justice has been studying such alternatives for a wide range of offenses under its intermediate sanctions program (U.S. Department of Justice, 1990). The term "intermediate sanctions" is used to describe the range of post-adjudication sanctions (note that pre-trial diversion is not included) to fill the gap between traditional probation and traditional jail or prison sentences. In their recent review of the evaluation literature on intermediate sanctions, Byrne and Pattavina (1992) provided brief descriptions of several of the sanctions along with their conclusions about the effectiveness of the sanctions, viz.:

- Intensive Supervision Probation - Intensive supervision probation (ISP) provides probation agencies with the ability to work more intensively with select probationers.