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**National Highway
Traffic Safety
Administration**

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September 1986

Workshop on In-Vehicle Alcohol Test Devices

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16. Abstract <p>On September 17, 1986, a one-day workshop, sponsored by the National Highway Traffic Safety Administration was held at the Department of Transportation in Washington D.C. The purpose was to bring interested persons together, including manufacturers, legislators, researchers, safety-related program personnel, and the public to consider the state of the art of in-car alcohol test devices and to identify relevant issues regarding their development and application.</p> <p>The workshop consisted of six sequential sessions on the following topics:</p> <ol style="list-style-type: none"> 1. Status of Performance Type In-Car Testers 2. Status of Breath Testing In-Car Devices 3. Manufacturer's Issues 4. User Issues 5. Research Issues <p>This document is intended to provide information regarding the topics covered, attendees, new information and viewpoints raised, as well as sources for further information.</p>					
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PREFACE

On September 17, 1986, a one-day workshop, sponsored by the National Highway Traffic Safety Administration was held at the Department of Transportation in Washington D.C. The purpose was to bring interested persons together, including manufacturers, legislators, researchers, safety-related program personnel, and the public to consider the state of the art of in-car alcohol test devices and to identify relevant issues regarding their development and application.

Over sixty people from outside of the Federal government attended. A wide range of interests, perspectives and knowledge was represented.

This document is intended to provide information regarding the topics covered, attendees, new information and viewpoints raised, as well as sources for further information. Arrangements were not made to publish detailed proceedings; however, authors of invited presentations did prepare written versions. Requests for single copies of individual papers of particular interest may be sent to the Office of Driver and Pedestrian Research (NRD-40), 400 7th Street S.W., Washington, DC 20590 or to the author.

HISTORICAL BACKGROUND

The idea that a car could be designed to "automatically" prevent or deter drunk driving is a notion that has many desirable features in principle. Research and development related to practical application of this concept has gone on since the late 1960's. The basic approach is to require a driver to pass an in-vehicle test related to alcohol impairment before starting the vehicle. A test failure is linked to some action to deter driving ... preventing the ignition system from working or activating a warning system that alerts the driver and others to the danger.

In the early seventies, laboratory and analytical studies were conducted on breath and performance test devices. "It appeared that breath test devices were too susceptible to circumvention or cheating to be practical. There seemed to be a number of ways a sample of air, that did not come from the driver at the time of the test, could be delivered to the testing device. A practical way to combat such circumvention or cheating was not identified. R&D on an in-vehicle breath test was suspended." (1)

Laboratory testing of performance devices indicated promise for discriminating between impaired and non-impaired persons, but suggested that further improvements would be needed for application with the general public.

In the late 1970's a field test was initiated using a Drunk Driving Warning System (DDWS) that used a performance test called the Critical Tracking Task (CTT). The system was tested with convicted drunk drivers. Test failure on the CTT resulted in alarms (horn honking and parking lights flashing) being activated and information being recorded of the test results (e.g., test score, record of when alarms activated).

Findings from this field test conducted in Los Angeles, California suggested that 1) it is feasible to use a DDWS as a sentencing sanction and, 2) people are highly unlikely to drive a DDWS-equipped vehicle when the alarms are activated. The CTT's ability to identify those who should not drive did not appear to be high enough to avoid the problem of intoxicated drivers retaking the test a few times until they passed.

Further information about this time period is available in a paper summarizing the work conducted during the 1970s and early 1980s. (1)

In the eighties, as national attention was focussed on the drunk-driving problem, there was increased interest and activity with respect to in-vehicle breath test devices. New devices were developed by the private sector, NHTSA did some limited testing of some, and inquiries and suggestions about possible application of these devices increased. The time seemed right to bring interested parties together to review the state of the art and consider relevant issues regarding possible application.

(1) Snyder, M. B. The Drunk Driving Warning System-Status Review. Presented at the 63rd Annual Meeting of the Transportation Research Board, January 18, 1984. Copies of this paper may be obtained from the Office of Driver and Pedestrian Research, National Highway Traffic Safety Administration, Washington, DC 20590.

WORKSHOP ORGANIZATION AND TOPICS

Persons who had expressed interest in the area were contacted directly and a notice of the workshop was published in the Federal Register (June 23, 1986). The workshop was open to the public. It consisted of six sequential sessions on the following topics:

1. Status of Performance Type In-Car Testers: Recent developments and the state of the art in devices that require the driver to take a performance test (e.g., turn steering wheel to align a pointer), discussed in relation to practical applications.
2. Status of Breath Testing In-Car Devices: A number of alcohol breath testing devices have been tested by the Department. What can and can't they do?
3. Manufacturer's Issues: A number of private organizations have taken steps to promote or market test devices. Consideration of the state of the art in terms of questions, problems and issues faced by both breath test devices and automotive manufacturers.
4. User Issues: Test devices have already been used and are being used on a limited basis by the judicial system. Other applications concern use of these devices by owners of fleets and by the general public. Discussion of the issues, problems, and requirements from the perspective of these groups.
5. Research Issues: Two basic types of devices (breath testing and performance based devices) have been examined experimentally in two contexts (ignition interlock and driver warning system). Is there a need for further research and, if so, what kinds? "

A copy of the Final Agenda including speakers and their affiliations and the topics they discussed is attached (see Appendix A).

Each session consisted of one or more 5-10 minute presentations followed by a question and answer period. Papers from invited presenters were distributed at the meeting. Appendix B provides a listing of the papers that were distributed along with their authors and addresses. Interested parties should contact the author directly to secure a copy of a presentation.

DISCUSSION OVERVIEW

The discussions covered a range of topics, some in finer detail than others. This section presents information and viewpoints presented which can be briefly summarized and are relevant to an understanding of the state of the art.

PERFORMANCE TESTS

- o The majority of activity is now taking place with breath test devices rather than performance test devices. Only limited laboratory and field research has been conducted on performance test based systems during the past few years. (one study each in the U.S., Canada, and Australia).
- o The most promising performance devices tested to date require extensive individualized training by users, e.g., convicted drunk drivers, so that a pass-fail cutoff score can be set. This means other family members who drive would have to be trained to pass the test. Additionally, most of the devices tested to date have not been demonstrated to be very accurate at low (.05 % BAC) or moderate (.08% BAC) BAC levels.
- o Data were presented at the Workshop that indicated the Tracometer was superior to the CTT in detecting drivers whose BAC levels were at the legal limit in Canada (.08% BAC) and in the US (BAC levels between .10 and .12). With the Tracometer, the subject is required to turn a steering wheel to move a pointer to one of five small circles that are illuminated in a random sequence. Performance is measured in terms of speed and accuracy. While further work is being considered in Canada on the Tracometer, no further work on either device was identified in the U.S.
- o There was sentiment by the workshop participants for continued development of performance test devices primarily because they are sensitive to a variety of drugs rather than to alcohol alone.

BREATH TEST DEVICES

- o A number of manufacturers of breath test devices have recently introduced (or plan to introduce) their devices into the marketplace. Presentations in the Workshop discussed the following devices: the Guardian Interlock (Guardian Interlock Corp, Denver, CO); AutoSense (AutoSense Corp., Hayward, CA); the Lion Analytics VBM (Lion Analytics Pty Ltd., New South Wales, Australia); Safety Interlock (Safety Interlock, Inc., Carmel, CA); and, Lincoln Co-Driver (Lincoln Research Corporation, Ltd., Auckland, New Zealand).
- o Data were presented about two prototype alcohol breath-testing devices that were tested by NHTSA. The devices tested under laboratory conditions were the Soberlyzer and the Alcohol Breath Ignition Controller (ABIC). Although the devices were generally accurate at low BAC levels, they both could be fooled into allowing the test to be passed by using substitute air samples or breath samples that had the alcohol filtered out. One of these device manufacturers attended the workshop and said the results of the NHTSA testing led to subsequent changes in their device.

- o Information was presented suggesting that alcohol breath testing devices using fuel cells may be more accurate and reliable than those breath testing devices using metal oxide semiconductor (MOS) sensors. Research continues on the development of better MOS sensors that may improve the accuracy and reliability of breath test devices using that technology. Some of the problems influencing the accuracy and reliability of these alcohol sensors (e.g., sensitivity to a variety of substances in addition to alcohol, calibration drift over time) as well as potential solutions were discussed..

OPERATIONAL APPLICATIONS

- o Legislative Initiatives--A bill (Farr-Davis Driver Safety Act of 1986) was recently signed into law in California. It permits judges in four counties to require those convicted of driving under the influence to install the devices in their vehicles. It also calls for a multiyear evaluation of devices that are certified for use in the four counties.
- o Currently, the only application is in the judicial system with persons found guilty of DWI. Workshop participants indicated that within the past year, breath test interlock devices (i.e., Guardian Interlocks) have been installed on the cars of more than 60 convicted drunk drivers in Denver, Colorado and Calvert County, Maryland. Separate evaluation efforts are planned for the California, Denver and Maryland activities.
- o Future applications were seen by the participants as more extensive use by the judicial system, and use by fleet owners. Market data by one U.S. device manufacturer and GM's experience in New Zealand (where the Co-Driver was offered as an after market option) suggest that the general public would not be interested in these kinds of devices in the near term.
- o A participant from an insurance company felt that in order for a customer to possibly get a reduction in premiums, the device would have to reduce the occurrence of drunk driving. It was recommended by a number of participants that the in-vehicle sanction should not be used in lieu of other sanctions but in addition to them.

CIRCUMVENTION OR CHEATING

Many of the participants felt that progress has been made in reducing the possibility of cheating by a driver or a companion. No information was presented, however, on how effective their proposed solutions may be in reducing the occurrence of this problem in real world use.

Some of the proposed solutions were as follows:

- o The California law provides for penalties for those who take the test for the convicted drunk driver or provide him with another vehicle, as well as for the driver who tries to get around taking or defeating the test.

- o A device manufacturer discussed an approach that would require the test taker to provide a pattern of deep and shallow breaths into a breathing tube that would have to match a standard. (The idea is that a companion would have less success in matching due to less practice.)
- o Off-road data were presented suggesting that a divided attention task could be used to identify when a driver or companion was taking the alcohol breath test. A divided attention task would require a person to do two things at the same time while in the driver's seat. For example, it might require a person sitting in the driver's seat to tap a button with his foot within seconds of the time he provides a breath sample for the ignition interlock device. The presenter suggested that such a task could only be completed by the driver, thereby reducing the chances of circumvention and cheating.
- o Another device manufacturer stated that his device could thwart companions by requiring additional breath tests after the vehicle was started and on the road.

LIABILITY, CERTIFICATION, EVALUATION

- o Product Liability: Information was presented on the difficulty that some device manufacturers had in obtaining product liability insurance; another felt that a product liability lawsuit successfully brought against one manufacturer could have disastrous effects on the industry.
- o Device Certification: It was felt by some that there is a need to develop uniform standards that these kinds of devices would have to meet. The question was raised also as to who would set standards.
- o Evaluation of Devices: Many workshop participants wanted studies to be conducted to determine whether these devices work. Some stressed that the devices had to be accurate and reliable; other stressed that they had to reduce the rate of recidivism or impact deaths or injuries. NHTSA may support testing and evaluation with respect to ongoing activities or new developments.

APPENDIX A: AGENDA

APPENDIX B: PAPERS & AUTHORS

APPENDIX C: ATTENDEES

WORKSHOP ON IN-VEHICLE ALCOHOL TEST DEVICES
SPONSORED BY THE NATIONAL HIGHWAY
TRAFFIC SAFETY ADMINISTRATION
400 SEVENTH STREET S.W.
WASHINGTON, D.C. 20590
ROOMS 10234 - 10238
SEPTEMBER 17, 1986

<u>TOPIC</u>	<u>PRESENTER</u>
INTRODUCTION & PURPOSE (9:00 AM - 9:25AM)	
WELCOMING REMARKS	MR. MICHAEL M. FINKELSTEIN ASSOCIATE ADMINISTRATOR FOR RESEARCH AND DEVELOPMENT NHTSA
HISTORICAL PERSPECTIVE; WORKSHOP OBJECTIVES & ORGANIZATION	DR. MONROE B. SNYDER, CHIEF PROBLEM-BEHAVIOR RESEARCH DIVISION, NHTSA*
SESSION 1: IN-VEHICLE PERFORMANCE TEST DEVICES (9:25 AM - 10:00 AM)	
RECENT CANADIAN RESEARCH ON PERFORMANCE-BASED DEVICES	DR. BRIAN GRANT, TRANSPORT CANADA
FLOOR DISCUSSION	
SESSION 2: IN-VEHICLE BREATH TESTING DEVICES (10:00 AM - 11:00 AM)	
DOT IN-VEHICLE ALCOHOL TEST RESULTS	DR. JAMES F. FRANK PROBLEM-BEHAVIOR RESEARCH DIVISION, NHTSA
TIN OXIDE GAS SENSORS RESEARCH	DR. SELDEN B. CRARY, GENERAL MOTORS RESEARCH LABORATORIES
ANTI-CIRCUMVENTION	MR. TIMOTHY J. MALONEY, S.O.B.E.R. RESEARCH, INC.
FLOOR DISCUSSION	
BREAK	

*MODERATOR FOR ALL WORKSHOP SESSIONS

SESSION 3: DEVICE MANUFACTURER'S ISSUES (11:00 AM - 12:20 PM)

AUTOSENSE	MS. PATRICIA ZAJAC
GUARDIAN INTERLOCK	DR. DONALD COLLIER
LINCOLN CO-DRIVER	MR. ANTHONY J. YANEK (GENERAL MOTORS)
LION ANALYTIC	DR. ROBERT J. BREAKSPERE
SAFETY INTERLOCK	DR. RONALD GARREN
FLOOR DISCUSSION	

LUNCH 12:20 PM - 1:30 PM

SESSION 4: USER ISSUES (1:30 PM - 3:10 PM)

JUDICIAL ISSUES	JUDGE G. TOM THOMPSON (RET)
LEGISLATIVE ISSUES	SENATOR HERSCHEL ROSENTHAL, CALIFORNIA STATE SENATE

PANEL OF DISCUSSANTS

MR. ROGER VANCE, STATE FARM INSURANCE CO.
MR. ANTHONY J. YANEK, GENERAL MOTORS
MR. DONALD E. SCHAET, MADD
DR. GEORGE F. GITLITZ, RID
JUDGE LAWRENCE LAMSON, MARYLAND JUDICIARY

FLOOR DISCUSSION

SESSION 5: RESEARCH ISSUES (3:10 PM - 4:10 PM)

THOUGHTS ON RESEARCH ISSUES	DR. BRIAN GRANT
FLOOR DISCUSSION	
CONCLUDING REMARKS	DR. MONROE B. SNYDER

APPENDIX B

<u>TITLE</u>	<u>AUTHOR</u>
1. The General Motors of New Zealand Co-Driver - A Breath Test/Ignition Interlock Device	Mr. Anthony Yanik Automotive Safety Engineering Environmental Activities Staff General Motors Corporation General Motors Technical Center 30400 Mound Road Warren, MI 48090-9015
2. The Guardian Interlock Responsible Driver Program	Donald W. Collier, Ph.D. Lecturer and Consultant Strategic and Innovation Management Suite 1008 307 North Michigan Avenue Chicago, IL 60601
3. Recent Advances and Future Prospects for Tin-Oxide Gas Sensors	Selden B. Crary, Ph.D. GM Research Laboratories Electronics Department Warren, MI 48090
4. Paper dealing with California's legislation concerning the use of ignition interlock devices	Ronald Garren, M.D. President, Safety Interlock, Inc. P.O. Box 221818 Carmel, CA 93922
5. Development of the Lion Analytics VBM Breath Alcohol Activated Interlock	Dr. Robert J. Breakspere Lion Analytics P.O. Box 440 Castle Hill, NSW 2154 Australia
6. Research Issues Related to Evaluations of an Impairment Warning Device Used as a Sentencing Alternative	Brian A. Grant, Ph.D. Research Psychologist Traffic Safety Standards & Research Transport Canada Ottawa, Ontario K1A 0N5 Canada
7. Manufacturers Issues	Ms. Patricia Zajac (VP-Marketing) Autosense 3496 Breakwater Court Hayward, CA 94545

8. Paper dealing with legislator's perspective on drunk driver warning systems
9. Development of the Tracometer as an In-Vehicle Impairment Warning Device
10. Paper dealing with judge's perspective of in-vehicle alcohol testing devices

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The Honorable Judge G. Tom Thompson
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APPENDIX C

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MR. WAYNE JOHNSON
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GM RESEARCH LABS

DR. MAX SAFDY
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ARAPAHOE COUNTY COURT
COLO. STATE JUDICIAL DEPT.

JUDGE G. TOM THOMPSON, (RET.)
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COMPTON, CA

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CALIFORNIA STATE SENATE

MRS. PAT ROSENTHAL

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