tact for the coordinators, referring them to the most appropriate source of assistance for whatever problems they encounter. He is also to protect the coordinators' interests at the state level and to make their continuing needs known to relevant state agencies.

SUMMARY

In summary, this study identified a number of problem areas in the current local programs.

1. Weak interagency linkages with police and magistrates, which hampered program operations, were pinpointed.
2. PI&E activities were taking place, although they were limited by the lack of relevant training and experience among the coordinators and the lack of work time during which PI&E could be performed.
3. There was need for a state-level staff member to act as a liaison between state agencies and local programs.
4. Networking among the independent local programs needed to be strengthened.

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Abridgment

The Drunk Driving Warning System: Status Review

MONROE B. SNYDER

ABSTRACT

An overview and highlights from a review of the status of work on in-vehicle devices that has led to the development and test of the drunk driving warning system are presented.

An overview and highlights from a review of the status of work on in-vehicle devices that has led to the development and test of the drunk driving warning system (DDWS) are presented. The idea of a car that would deter drunk drivers is intriguing. Various approaches have been proposed, and some aspects have been the subject of research studies during the past decade.

BACKGROUND STUDIES

In October 1970, NHTSA issued a prospectus entitled "Some Considerations Related to the Development of an Alcohol Safety Interlock System (ASIS)." Its purpose was to acquaint commercial and academic organizations with the U.S. Department of Transportation's (DOT) interest in ASIS devices to deter or prevent drunk drivers from operating their cars, and to ensure that all possible ASIS techniques would be considered. Twenty-five organizations responded to the prospectus. Their responses were analyzed in conjunction with a general survey of the literature on various kinds of performance degradation induced by alcohol. A number of performance test devices underwent laboratory testing to determine the percentage of "prevented starts" that could be expected at various levels of blood alcohol content (BAC). The results of the studies indicated that none of the devices tested was acceptable for application at that time. At about the same time, General Motors reached a similar conclusion.

Development of an on-board breath measurement vehicle-control device took place during 1972 and 1973. At the same time, initial evaluation of four additional performance-testing devices took place. The major conclusion of this second-generation program was that three of the instruments offered better performance than the devices tested during the 1972 program. By using the scoring procedures highlighted in the report, false positives were minimized (i.e., there were few cases of a sober person failing). However, although many legally intoxicated persons were detected, a noticeable number were not. A review of the various test devices and systems from the standpoint of circumvention was undertaken about this time.

In 1976 some significant conclusions and decisions were reached.

1. It appeared that breath test devices for vehicle control were too susceptible to circumvention or cheating to be practical. There appeared to be a number of ways that a sample of air, which 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. Research and development (R&D) on an in-vehicle breath test ASIS was suspended. [Recently, as part of the DOT small business innovation research (SBIR) program, a small feasibility study was initiated regarding the development of a sensing device that, when installed near the driver's seat, would continuously monitor the alcohol content emitted from the driver's breath.]
2. It appeared that an interlock approach presented disadvantages associated with the disabling of a car, particularly when the driver might not be intoxicated. These include prevention of emergency use, danger to other traffic, and public acceptability. R&D on the ASIS (i.e., interlock) concept was

stopped. The approach was shifted to use of a warning system as opposed to a disabling interlock when the test was not taken or passed. The concept of a DDWS for use with convicted drunk drivers was to be the subject of future R&D.

3. It was decided to conduct a field test that focused on the operational feasibility of the DDWS concept.

4. The critical tracking test (CTT) device was selected for use in the DDWS to be fabricated for field testing because it was among the top performers with respect to discrimination and did not require additional engineering development in order to integrate it into a vehicle system. CTT discrimination rates would be maximized by the use of individually set pass scores in the field test.

5. Work on the divided attention test (DAT), and on other test devices that might offer better discrimination than the CTT, was put on hold until field test results could be evaluated.

About the same time that preparations were being made for a field test in the United States, cooperative studies were undertaken with foreign governments, which provided additional laboratory data on performance devices.

CALIFORNIA FIELD TEST

In 1976 and 1977, 11 DDWSs were fabricated for field testing by using the CTT as the impairment test component. The DDWS constructed is a vehicle-mounted system that requires the driver to pass a brief test using the steering wheel before the car can be driven in a normal manner. The test must be passed in order to deactivate alarms consisting of the emergency flasher system and the horn. Because DDWS is a warning system and does not prevent the vehicle from running, the car can be driven without passing the test. However, if the test is not passed, the emergency flashers operate, and if the car is then driven at speeds greater than 10 mph, the horn honks at 1-sec intervals. If the test is failed, the driver must wait 10 min before retesting is permitted.

The current DDWS consists of two major components. The first is a CTT display unit, which is located adjacent to the vehicle steering wheel. The second component is an electronics module located in the trunk, which scores the test performance, activates the alarms if appropriate, and records necessary data. A cassette recorder keeps a permanent time-based record of items such as test scores, ignition on or off, and alarms activated (i.e., speed greater than 10 mph).

Various countermeasures have been incorporated into the DDWS to prevent cheating. These include sealing components and cables to prevent or reveal physical tampering, and requiring retesting if the driver leaves the driver's seat after passing the test.

The DDWS was used with drivers who have a history of repeated drunk driving offenses and who were under court supervision. Their driver's licenses were restricted to use of the DDWS-equipped vehicle. Probationary conditions required regular check-ins to collect cassette-recorded data and to verify driver compliance.

STATE-OF-THE-ART SUMMARY

1. There are many ways in which an in-vehicle drunk driving deterrence system might be applied. Different applications have different requirements that may be best met by different approaches. For only one approach is there a significant amount of data: a performance test DDWS with individually based scores used under court supervision.

2. Field test data suggest that it is feasible to use a DDWS as an alternative sentencing sanction and that people are highly unlikely to drive a DDWS vehicle when the alarms are activated.

3. Available laboratory data suggest (a) that some performance tests can identify highly intoxicated persons (0.15 percent BAC); (b) that the ability of the CTT to identify those who should not drive does not appear high enough to avoid the problem of intoxicated drivers retaking the test a few times until they pass; (c) that at least one performance test, the divided attention test (DAT-2), which uses individualized scoring as part of a DDWS, would warn against practically any trips at or greater than 0.10 percent BAC, with little delay for trips with no prior alcohol intake; and (d) that the same test may have potential for application with large segments of the population without individualized scoring; however, norms would have to be developed based on much more extensive performance testing.

4. Performance-test-based systems appear to be relatively resistant to substitute test takers; further refinements could be made in this area. Although the DDWS cannot prevent someone from driving a substitute vehicle, it does appear to reduce the likelihood this will be done to a level less than that for license suspension or vehicle impoundment.

5. Off-the-shelf, low-cost equipment that is effective and easy to install does not now exist. There do not appear to be any technical reasons that redesign and improvement of present equipment could not reach that goal for a performance-test-based system.

6. Breath-test-based vehicle-control systems could be made available for some applications involving drivers who are not likely to try very hard to beat the system. However, testing is needed to determine the extent to which new systems have been made resistant to cheating, and further development may still be needed for breath testers to achieve this goal.

The full paper (from which this abridgment was taken) treats differing design approaches for differing applications and identifies major issues that must be considered. A future report will apply the conclusions of this paper to the delineation of options for future work in the area.

[Note: Those interested in a more comprehensive consideration of the data and issues as well as a complete bibliography are referred to the full paper from which this abridgment was drawn. A limited number of copies are available from the Office of Driver and Pedestrian Research (NRD-40), National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590.]

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