Vehicle Immobilization Technologies (VITs)

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Since September 11, 2001, the U.S. Department of Transportation's FMCSA has been actively investigating methods to improve safety and security, as well as efficiency, in the trucking industry. To achieve these goals, FMCSA conducted various tests and evaluations of security technologies, including the 2004 Hazardous Materials Safety and Security Technology Operational Test, the Expanded Satellite Tracking and the Untethered Trailer Tracking and Control Security projects. As a result of these studies, it was determined that additional technologies, including panic buttons, driver identification and vehicle disabling could be deployed to obtain additional security benefits. In 2005, the House of Representatives Conference Report 108-792 stated that further testing of technologies, including vehicle disabling was necessary. FMCSA funded this project to support the Congressional need called out in the aforementioned report, and builds on the experience and lessons learned from previous field operational tests. The primary objective of this project was to develop "Best Practices" associated with the use of VITs in support of hazmat transportation, and commercial vehicle safety and security. A secondary objective was to develop a Concept of Operations for law enforcement based on project experiences.

Definitions

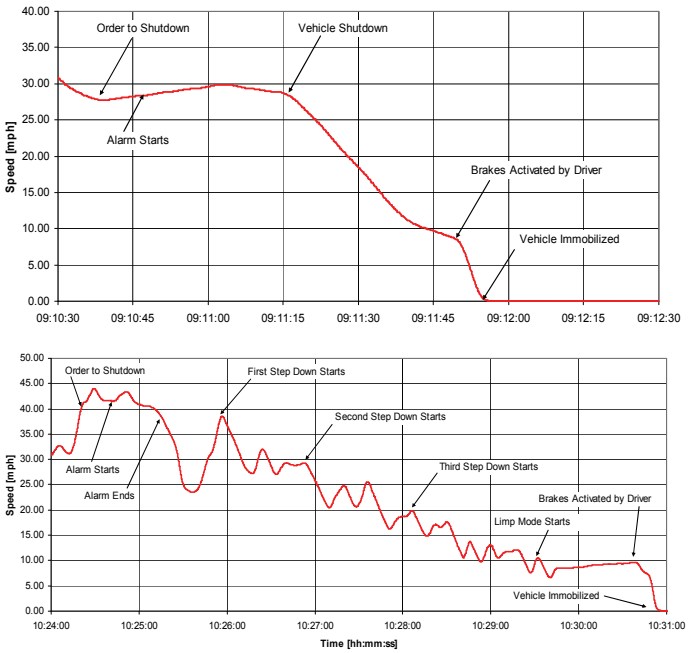
VITs are classified into two main categories: (1) Vehicle Disabling Technologies (VDTs), which are technologies that impede restarting a vehicle; and (2) Vehicle Shutdown Technologies (VSTs), which are technologies that cause a moving vehicle to lose power and come to a stop. At the core of any VIT system there is an electronic vehicle immobilization device (eVID) mounted somewhere in the engine compartment of the equipped vehicle as well as GPS device. The eVID can be actuated remotely (through satellite or cellular communication lines) and/or locally to impair the performance of the vehicle (through, for example, an acceleration control, a throttle reduction, or a power reduction mechanism) up to a complete engine shutdown.

VST tests at Lauren Proving Grounds, South Carolina.

Technology Demonstration Tests

Nine companies participated in the VIT demonstration tests that were conducted at the Laurens Proving Grounds (a test-track facility in South Carolina) on February 27, 2007. All the participating companies demonstrated their driver authentication technologies, remote disablement by driver, and

remote disablement by dispatcher/law enforcement. In addition, two companies demonstrated vehicle disablement/shutdown due to a loss of signal. During the vehicle shutdown demonstration, speed profiles were collected for the different technologies demonstrated. The graphs on the right show two such speed profiles: one for a technology that causes a complete engine shutdown when the eVID is activated and the other one for a technology that uses an acceleration control system that permits reduction of the vehicle speed without engine shutdown (i.e., all the mechanical functions of the vehicle are maintained and available to the driver, except the ability to accelerate beyond a certain speed threshold that is constantly being decreased during the shutdown process).



Speed profiles for engine shutdown and acceleration control technologies.

Study Findings

Conclusions from this study suggest that VITs are currently being used by early adopters in the trucking industry for the security of high-value goods and for the protection of drivers against theft and hijacking. Driver Authentication Technologies were shown to be the first and most important line of defense to improve security and are being deployed rapidly. The study also showed that while VITs can greatly increase security of any trucking operations and would certainly decrease the number of cargo thefts, the technology is not infallible. The communication component of VIT systems is its weakest link. For example, vehicle shutdown due to loss of signal cannot be implemented because it would create too many undesired shutdown events. Therefore, anyone with knowledge of the system can cut the communication link and continue driving the truck. There are, however, anti-hijack technologies that trigger the eVID locally if someone opens the door to the cab and the device is not deactivated. If the driver is abducted and kept in the cab, this could also be defeated by forcing the driver to re-enable the truck.

In terms of best practices, several items were clearly shown to be key elements of an effective system to improve security, including prioritization of security related messages from wireless communications systems, and smart VITs that can act in accordance with surrounding conditions. The study also found that there was a strong consensus among stakeholders that remote disablement by dispatcher/ law enforcement should always work in conjunction with remote disablement by driver. That is, discussions with law enforcement personnel indicated that it would be very difficult and impractical for law enforcement to remotely shutdown a vehicle without coordination with the dispatcher or some other party in possession of all the necessary information and control capabilities to trigger such an event.

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