



The Automotive “Black Box”

Before deciding on automotive accident fault be sure to consider the possibility of the electronic witness present in most General Motors and select Ford and Isuzu cars. Since 1994, GM vehicles have been equipped with a Sensing and Diagnostic Module (SDM) acting like a “Black Box” responsible for recording Crash Data and controlling air bag deployment. Valuable vehicle data and switch conditions are stored for the critical seconds before and following a crash event on the air bag module’s EEPROM.

There are two types of SDM recorded events (air bag Non-Deployment and Deployment). A Non-Deployment event is significant enough to “wake up” or trigger the sensing algorithm but not severe enough to deploy or fire any air bags. The module records Pre-Crash and Post-Crash data. The SDM can eraseably store information for one Non-Deployment Event. The Non-Deployment data can be overwritten by an event that has a greater SDM recorded velocity change (Delta-V) or will be cleared by the SDM after the ignition has been cycled 250 times (about 60 days of normal driving).

The second type of SDM recorded crash event is an air bag Deployment Event. The module also maintains Pre-Crash and Post-Crash data. The SDM can permanently store up to two different Deployment Events, if they occur within five seconds of one another. The first deployment event will be stored in the deployment file (this would have been the event that deployed the air bag) and the second Deployment Event will be stored in the Near Deployment file. Deployment events cannot be overwritten or cleared from the SDM, thus once the SDM has deployed the air bag, the SDM must be replaced.

Depending on the specific vehicle any or all of the following information is available:

- Vehicle speed (5 seconds before impact)
- Brake status (5 seconds before impact)
- State of driver's seat belt switch (On/Off)
- Passenger's air bag enabled or disabled state
- Time from vehicle impact to air bag deployment
- Maximum ΔV for non-deployment event
- Time from vehicle impact to time of maximum ΔV
- Engine speed (5 seconds before impact)
- Throttle position (5 seconds before impact)
- SIR Warning Lamp status (On/Off)
- Ignition cycle count at event time
- Ignition cycle count at investigation
- ΔV vs. time for frontal air bag deployment event
- Time between non-deploy and deploy event

The SDM may be accessed and read by the Vetronix Crash Data Retrieval system. If the vehicle's electrical system is operational, data can be read by connecting to the vehicle's Data Link Connector (DLC). The DLC is located underneath the dash by the steering column, and is used by technicians to communicate with the vehicle's on-board computer. If the vehicle's electrical system is not operational, then SDM data can be read by connecting directly to the air bag module whether in or out of the vehicle through interface cables and an external power supply.

The Crash Data stored in the SDM is utilized for many purposes by:

- Accident Reconstructionists
- Automobile Manufacturers
- NTSB (National Transportation Safety Board)
- Law Enforcement
- Vehicle Fleet Managers
- NHTSA (National Highway Traffic Safety Administration)
- Insurance Adjusters
- Others

The readable Sensing & Diagnostic Module (SDM), “Black Box,” could yield vital information regarding Pre-crash, Crash, and Non-Deployment events. Florida Forensic Engineering, Inc. owns and employs the Vetronix Crash Data Retrieval system to obtain this valuable data for vehicle accident analysis.

Elliot L. Stern, PhD, PE
Florida Forensic Engineering, Inc
www.FlaForEng.com
813.868.FFEI (3334)

