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# ❖ RDA NEWS ❖

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## DATA RECORDERS BUILT INTO GM VEHICLES

**M**ost motorists, attorneys, and insurance claims personnel are not aware that General Motors Corporation (GM) has been equipping some of their automobiles and light trucks with crash data recorders since 1974. The National Transportation Safety Board has recommended that the National Highway Traffic Safety Administration (NHTSA) and automobile manufacturers cooperate to collect information on automobile crashes using instrumentation that senses and records crash events. The primary objective was to obtain crash data that could be used to improve vehicle and roadway safety. These on-board collision sensing and data collection systems record airbag status and accident severity for impacts that result in airbag deployment. In addition, many of these systems also record pre-crash data, including vehicle speed, engine RPM, throttle position, and brake switch on/off position. Similar systems have in the past been, and are presently being, installed in Ford and Chrysler vehicles, as well as those of other manufacturers.

In 1974, GM introduced the first regular production driver/passenger airbag systems as an optional feature on certain of its vehicles. The deployment of the airbag(s) in a crash is triggered by the longitudinal deceleration of the vehicle during an impact. Electromechanical g-level (deceleration) sensors, a diagnostic circuit that monitored the readiness of the airbag controls and a light on the instrument panel to warn of airbag system malfunctions were incorporated into the design of these early systems. In 1990, a more complex system called *DERM* (Diagnostic and Energy Reserve Module) was introduced that recorded time from impact to deployment of the airbag and recorded diagnostic codes for the system.

Beginning in 1994, a new system commonly called *SDM* (Sensing and Diagnostic Module) was introduced. *SDM* included a solid state accelerometer and a computer algorithm that also computed and stored the change in longitudinal velocity (DeltaV) that occurred during near-deployment and deployment events.

This system has been upgraded on certain 1999 and later model GM vehicles to include certain data prior to the collision. In particular, the speed of the vehicle, braking status, engine speed, and throttle position for 5 seconds prior to impact are recorded.

## RECONSTRUCTION OF TRAFFIC ACCIDENTS

**T**he 1994 and 1999 *SDM* systems that have been installed in GM vehicles provide information that can greatly facilitate reconstruction of an accident. Analysis to reconstruct the speeds of vehicles involved in traffic accidents often involves determining the

DeltaV experienced in a collision. This determination is usually based upon calculations that relate the crush damage experienced by the vehicles and their crush stiffnesses (as determined in NHTSA crash tests) to the change in speed of each vehicle. Such an analysis provides both the longitudinal and lateral DeltaV's for the two vehicles. Once the DeltaV's have been determined, the impact speeds of the vehicles can be obtained for each vehicle from the energy lost in traveling from the point-of-impact to its rest position.

For the 1994 SDM system, the computer can store information concerning longitudinal DeltaV and a time-history of the DeltaV for frontal airbag deployment. For the 1999 version of the SDM system, the on-board computer will also store engine speed, brake status, throttle position, and vehicle speed for the 5 seconds prior to impact. Thus, interrogation of SDM computers can be used to establish longitudinal DeltaV's in frontal impacts, to corroborate the accuracy of other reconstruction analytical methods, and to determine impact and pre-impact speed directly (in the case of the most sophisticated SDM systems).

## **RETRIEVING DATA FROM SDM SYSTEMS OF CRASHED VEHICLES**

**T**he retrieval of the data stored in an SDM system requires the use of special equipment and software. Vetronix Corporation was selected by GM to develop software and interface cables to allow data to be downloaded to common laptop computers for 1996 and later model GM vehicles equipped with SDM systems. These Crash Data Retrieval (CDR) systems connect to a diagnostic port for the airbag system on the crashed vehicle and can be powered by the vehicles electrical system or an external power source.

Romualdi, Davidson & Associates, Inc. is now retrieving and using CDR data as an element of accident recon-struction analyses (when appropriate and feasible). At present, software and hardware are available to retrieve data from GM vehicles only. However, it is expected that similar cables and software will be available for Ford vehicles by the end of 2001 and in the near future for Chrysler vehicles as well.

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