

# CRASH TALK

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## Event Data Recorder Technology: 2007 "Black Box" Update

By **D. PATRICK RYAN, P.Eng.**

### Current Implementation

EDR (Event Data Recorder) functionality in modern passenger vehicles is implemented not as a stand-alone device (although such devices are available in the aftermarket), but rather as added features within existing electronic control modules. The module which incorporates this functionality is typically the ACM (Airbag Control Module), although some vehicles store information in the PCM (Powertrain Control Module). What information is stored varies from manufacturer to manufacturer and from module to module.

Crash data recording by General Motors modules began with the DERM (Diagnostic Energy Reserve Module) and, slightly later, the SDM (Sensing and Diagnostic Module). The DERM could record the status of the air bag warning lamp and the time from "wakeup" to deployment, while the SDM could additionally record the status of the driver's seat belt and, perhaps most importantly, the change in velocity (DV, or "delta-V"). Major revisions of the SDM began with model year ("MY") 1999 vehicles. Rather than being limited to data gleaned largely from internal sensors, these SDM's gathered data from other networked vehicle systems. Data such as throttle application, engine RPM's, brake application, and speed could be buffered and stored by the SDM following a collision event, at nominal one second intervals for the five seconds prior to the event.

Even greater amounts of data are monitored and stored in vehicles using a higher-speed data communications bus,

known as Controller Area Network (CAN-BUS). Data carried by this in-car computer network includes communications from a wide array of vehicular systems, allowing the SDM to record such diverse items as the selected transmission range, whether or not traction control was active, whether the "Service Engine Soon" light was illuminated, outside air temperature, whether any doors were open, whether cruise control was engaged, and an expanded 5-second pre-crash list including (but not limited to) the steering wheel angle, the yaw rate, and whether the ABS or Vehicle Dynamics Control was active.

Ford coverage is not as extensive as GM, and includes only a relatively few models back to MY2001. In addition, the data from the various Ford Restraint Control Modules (RCM's) tends to be sparse. Although Ford RCM's store no pre-crash data, they do provide a record of the change

in velocity at a higher data frequency than GM SDM's. Currently, some Ford vehicles (generally, those equipped with Electronic Throttle Control) can store extensive pre-crash speed data: 25 seconds worth (more in some cases) of speed, brake, throttle, and RPM's. Instead of this data being stored in the RCM, however, it is logged in the PCM. As of the time of writing of this article, this data is not accessible via the Vetronix CDR™ system, but

such accessibility is anticipated in the near future.

### What's Next?

In the very near future we expect the initial rollout of Chrysler support for the CDR system. Details regarding the type of data that will be available from Chrysler vehicles have not yet been made publicly available. However, it is understood that support will extend back approximately four years for some models.

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SDM download, Pontiac Grand Am

## Event Data Recorder Technology

More tellingly, we understand that coverage will be limited to passenger vehicles and light trucks using high-speed (CAN-BUS) communications. This suggests that the data will be similar to that available in the latest GM SDM's. Details for an "unnamed Asian manufacturer" are similarly sketchy.

In the slightly longer term, a regulatory change in the United States promises to have significant consequences. The National Highway Traffic Safety Administration (NHTSA) has implemented a new Rule within Chapter 49 of the Code of Federal Regulations, known as 49 CFR Part 563. This rule promises to have far-reaching effects, since it will impose a large degree of standardization and greatly extend the amount of coverage. Most, if not all, North American manufacturers will likely be required to comply with the terms of the Rule.

The types of data elements required by the Rule, and the appearance of these elements, is strongly reminiscent of the recent GM SDM's. Most important, perhaps, is the requirement that the manufacturer must make a download tool commercially available within ninety days of the first vehicle sale. As it stands, the Rule will apparently, for all intents and purposes, make EDR functionality standard and accessible once it takes effect.




Typical GM "Black Box"

Subject to appeal by a consortium of manufacturers, the Rule will take effect in September of 2010, for model year 2011 vehicles. However, since most manufacturers stagger the rollouts of new model designs, compliance with the Rule will most likely start to become widespread with MY2009 vehicles.

### Closing Thoughts

One consideration that will not disappear any time soon is the fact that EDR technology can be subject to many limitations, including problems with the representation of collision severity, vehicle speed, and, ultimately, collision survivability. These problems manifest for a variety of reasons, including system design limitations and the particular behaviour of the vehicle on (or off) the roadway in any given event.

For the most part, even when they manifest, the exceptions and limitations of the technology do not necessarily invalidate the entire dataset of a download, and may often be overcome. However, the fact that such exceptions *may* exist means one can have confidence in the downloaded data only in the context of a "situationally complete" analysis. Rather than replacing the need for traditional forms of analysis, EDR data builds upon those methods. The greatest strength of EDR technology is that it will add significantly to the amounts and types of data available to the collision investigator, thereby improving the scope and accuracy of collision reconstructions. 

*This piece is excerpted and summarized from an article originally published in "The Barrister" magazine. Reprints of the complete article may be obtained by contacting the author or from our web site at <http://www.grahamryan.com>.*

## Recalls



**2004 Nissan Titans on some crew cabs the rear center seat belt may malfunction and lock in the retracted position, rendering the seat belt unusable after one use.**

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[www.grahamryan.com](http://www.grahamryan.com)

### EDMONTON

#201, 17823 - 106 Avenue  
Edmonton, AB T5S 2H1  
Tel (780) 425-1150  
Fax (780) 425-1555

### CALGARY

3512 - 114 Avenue SE  
Calgary, AB T2Z 3V6  
Tel (403) 290-1150  
Fax (403) 290-0659

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Calgary  
will be located at:**

**#34, 11410 - 27 St. SE  
Calgary, AB T2Z 3R6**

**Telephone and Fax numbers  
will be the same**