

Automotive Event Data Recorders appeared originally in the March 2011 issue of *Public Risk*.

By Peter R. Thom and Ryan L. Devine



Public Risk Management Essentials

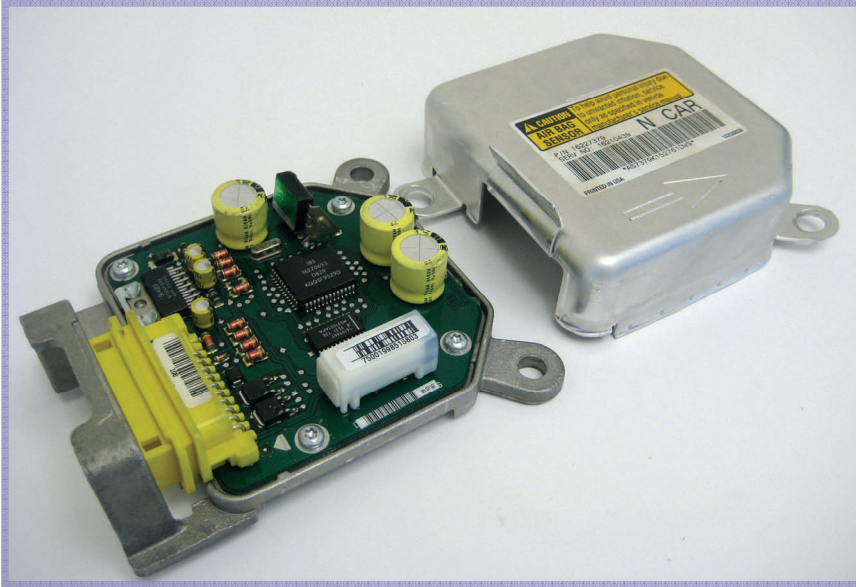
# Automotive Event Data Recorders

## Is this an article about yet another acronym?

Yes, you do have another set of initials to decipher, but the mysterious EDR could well become a useful tool if you manage a vehicle fleet for your municipality or public entity. EDR is short for “event data recorder,” and in most vehicles it is embedded in the airbag safety system. The National Highway Transportation Safety Administration (NHTSA) estimates 64% of model year 2005 vehicles were equipped with EDRs, and that figure has grown in recent years.

In the early days of airbag development, embedded data recorders helped automakers gather information to measure airbag safety system performance. As manufacturers refined EDR functionality, other parties, like transportation researchers, regulators, insurance companies, and attorneys started to see the modules as sources of real-world accident data. So significant is the potential impact of EDR technology on vehicular accident investigations that, in 2006, the NHTSA issued a rule requiring all automakers that install EDRs to notify buyers if their airbag safety systems contain data recorders and to comply with data collection and reporting standards by model year 2012. While the agency has not made airbag EDRs mandatory, it will consider requiring them if they do not become standard equipment.

Before the 2006 rule, automakers considered their EDRs to be proprietary and very few shared the technology that would download the crash data stored on the modules. That certainly was true of Toyota until early last year, when a flood of unintended acceleration complaints by newer-model Toyota and Lexus owners overwhelmed the manufacturer. Since then, an internal policy change has signaled the automaker’s willingness to facilitate data downloads.



## EDR Data Sets Include:

- Vehicle speed
- Engine speed
- Brake status
- Throttle position
- Seatbelt status
- Ignition cycles
- Delta V's (velocity changes)
- Passenger airbag status
- Time from impact to airbag deployment

## EDR and Fleet Vehicles

When you survey your fleet the chances are good that almost all the recently manufactured vehicles will have some data-recording capability. The latest cars and trucks are replete with microprocessors, especially in performance-enhancing features like electronic stability control and antilock brakes. However, the most pertinent EDRs to fleets are the ones found in airbag safety systems because they are designed to collect, store, and report accident data to a NHTSA-regulated standard. Even if these other modules retain useful information for crash investigators—a distant possibility, at best—the data usually is wiped with each ignition cycle (turning the vehicle on/off), plus the modules remain outside the scope of current federal laws.

Now that you are aware of EDR as a potential resource for accident data, it is crucial to become familiar with its operation. The more you know about EDR and crash data retrieval, the better prepared you will be to work with your insurer and legal representative should the need arise. What is more, your ability to respond to your constituency as a public risk manager will be enhanced as well.

## EDR Basics

The mission of an EDR airbag safety system module is simple: passively monitor specific operational readings until a sudden velocity change like a rapid acceleration or deceleration triggers activation. At that

point, the EDR will wake up and save the data it has been sampling in the seconds prior to the event. Then it will record the subsequent changes in vehicle speed that describe the behavior of the vehicle during a collision—engineers use the term *crash pulse*. If the accident results in airbag deployment, the data will be saved indefinitely, but if the crash is less severe, the data may be erased if another sudden deceleration occurs or if the vehicle goes through another 250 ignition cycles. Not every speed burst or sudden braking will signal an accident, but an event of sufficient magnitude to awaken the system will be documented until erased or overwritten.

What are the steps to initiate data retrieval following an accident? As the risk manager for the public entity that owns the affected vehicle you are probably the appropriate official to authorize a data download by an agent chosen by your insurance carrier, a law enforcement official trained in crash data retrieval (CDR), or other involved parties. There are issues associated with EDR data ownership that have been addressed by state legislatures, but the laws enacted are typically directed to private ownership rather than to public fleets. There is a remote possibility that you may face questions from union representatives of the driver involved in the accident, if pertinent, but EDR usage is becoming so commonplace and is so far below the level of scrutiny delivered by in-vehicle surveillance, that it rarely triggers argument.

Even if a vehicle has an EDR, there is no guarantee that the data downloaded from the module following an airbag deployment will be accurate or complete. The technology is still developing, plus current automotive EDRs are not as resilient or reliable as their aviation counterparts, which can withstand concussion, conflagration and submersion. At present, there is no commonality in data collected, sample rate, recording period, communications protocol, or module connectors. Remember standardization is the goal of the NHTSA rule, but even as the new models are compliant, that still leaves 250 million or more vehicles on U.S. roads whose EDRs are unaffected by federal oversight.

Consequently, the data retrieved from an EDR download is best used as an adjunct to a thorough accident investigation and not as stand-alone testimony. The data may refute or corroborate witness statements, but when the issues in question are gray rather than black and white, it is crucial that the evidence be as indisputable as possible. The analysis and interpretation of the data is best left to skilled automotive engineers who are aware of the technology's limitations and schooled in broader analytics.

## Data Retrieval Essentials

A proprietary cable is the means for retrieving data from an EDR module. For now there is only one commercially available system and it is used primarily for vehicles manufactured by the Big Three U.S. automakers. Access to other automaker modules must be initiated through the manufacturer, although they will have to facilitate CDR access via a commercially available system by 2012.

Data extraction from an EDR is not for the hobbyist, as tampering with airbag sensors or attempting to remove the module can imperil airbag operation and related safety systems, nullify warranties, and abrogate NHTSA safety standards. Airbags are explosive devices that are dangerous to untrained personnel who may inadvertently trigger deployment. Automotive engineers understand the different components in these systems and are careful when accessing the

EDR to avoid or minimize problems like data loss or evidence spoliation. They will also document both the retrieval process and the chain-of-custody.

The easiest approach to a download is to link to the Standard OBD-II Diagnostic Link Connector (the portal for emissions-control data) located under the dashboard with a CDR interface (a proprietary cable). If the vehicle's electric system or diagnostic connector has been compromised, then the data can be downloaded directly from the airbag module by using a proprietary cable. The last alternative is to remove the airbag restraint module for later extraction under laboratory conditions. Whatever means used, the data retrieved will then be formatted into a series of reports with software that can interpret the data.

**Data extraction from an EDR is not for the hobbyist, as tampering with airbag sensors or attempting to remove the module can imperil airbag operation and related safety systems, nullify warranties, and abrogate NHTSA safety standards.**

Ultimately, it is not realistic to assume EDRs will deliver insights to every crash because not all vehicles have accessible modules and, even if the automobile has one, there are accident circumstances where the data cannot deliver useful insight. For example, the data will not explain the cause of a tire failure if a blowout causes a vehicle to veer off the road before crashing. Then there is the instance of a phantom vehicle where a swerving car causes another one to careen off a roadway—the EDR will not deliver useful data because there was no vehicle contact to fire the airbags. The crash data is most useful in accidents where the airbags deploy and driver behavior is in dispute. These are commonly efforts to determine vehicle speed and seatbelt use when traditional accident reconstruction practices like scene and vehicle inspections and momentum analysis are incomplete or inconclusive.



Public safety vehicles like this sheriff's cruiser frequently have event recording capabilities beyond EDR including cabin microphones and dashboard video.

## Legal and Judicial Ramifications

Issues associated with consent, data ownership, and privacy can cloud EDR usage and overshadow the operational challenges the module faces as its utilization spreads. Thirteen states responded initially to a media debate about automotive black boxes by enacting protective legislation starting in 2003. While a number of other states have laws pending, the pace to address EDR privacy concerns through legislation has slackened in part because the more common computer trespass laws criminalizing unauthorized access may be applicable to EDR data recovery as well.

More relevant to public entity risk managers is the flipside of the data ownership question: what happens to ownership rights when an insurance company takes salvage title? Arkansas, North Dakota, New Hampshire, Oregon, and Virginia laws state that EDR data ownership does not pass to an insurer due to ownership succession while the remaining ones leave the issue open to debate. The effect of this is broader than simple title transference, especially for insurance companies that have a duty to investigate all claims. On the one hand, downloading the data from an accident could result in penalties for privacy violation, and on the other, failing to download the data could be seen as a failure to defend the interests of an insured—albeit an individual, corporation or public entity. The safest course may well be removing and

retaining the EDR module to preserve the evidence in anticipation of future need.

Judicial proceedings to date are supportive of EDR evidence. In fact, Frye and Daubert hearings to assess admissibility have been supportive of the module's crash data in every instance. For criminal proceedings, the information gleaned from a download has been used primarily to prosecute drivers who were driving recklessly before fatal collisions. In contrast, the civil cases primarily concern airbag malfunction or vehicle defects, like an alleged sticking gas pedal. In the few cases where the court has ruled against admitting EDR data, it determined that the recorded event was not relevant to the matters at issue.

## EDR's Future in Accident Investigations

Current-generation EDR modules represent a growing trend in automotive design and manufacture to harness the power of microprocessors in order to revolutionize vehicle performance and safety. Beyond perfecting the driving experience, these data-gathering modules are providing useful evidence in accident investigations. At least for now EDR usage remains scattered, but it will certainly expand and develop as the technology's access and reporting are standardized across all makes and models.

**Peter R. Thom** is President of Peter R. Thom and Associates Inc., a national firm of consulting automotive engineers. **Ryan L. Devine** is a managing engineer at the company. They can be reached at (800) 874-1664; [www.prtassoc.com](http://www.prtassoc.com).