DISPELLING MYTHS ABOUT AIR BAGS

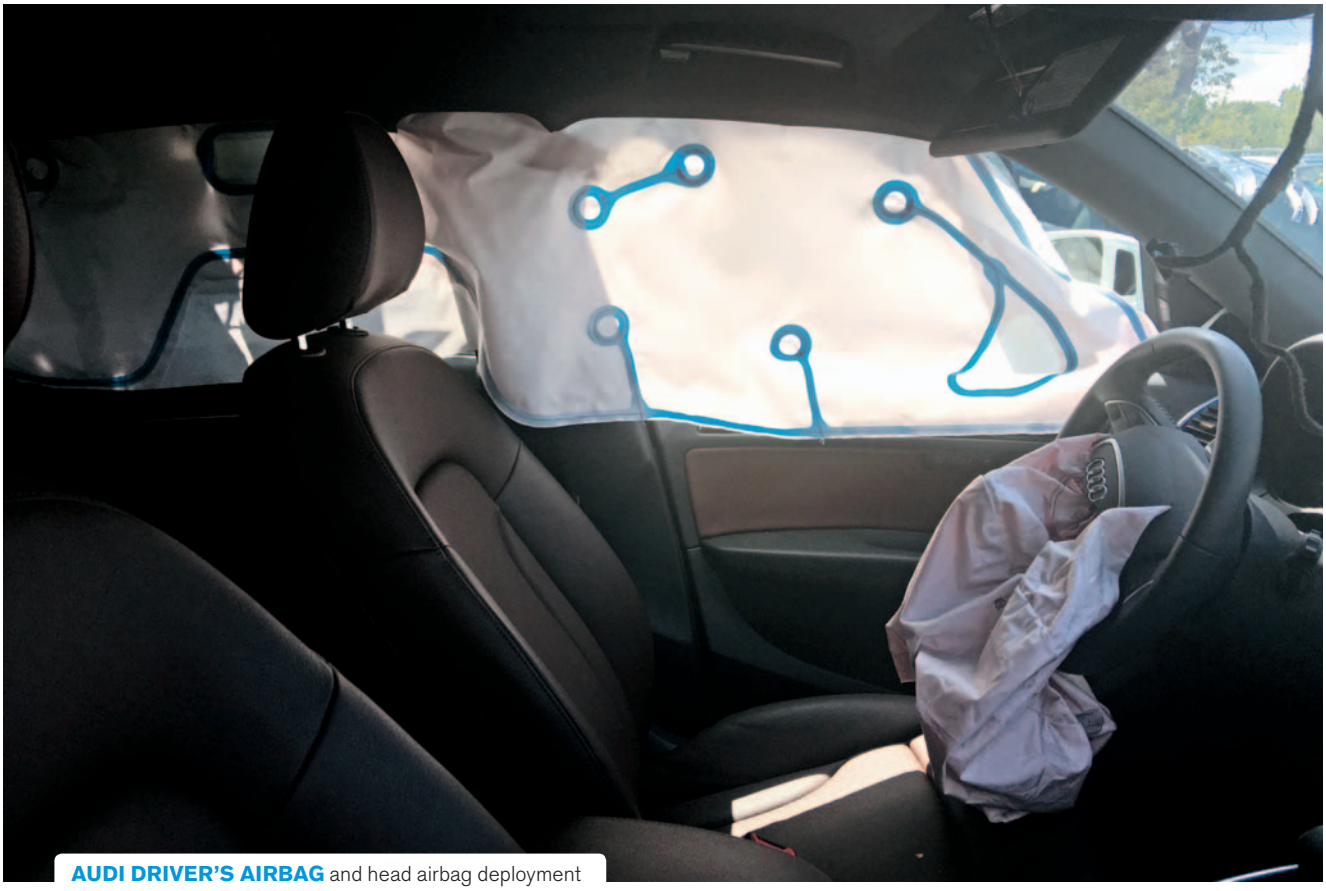
A LITTLE FACT AND FICTION ABOUT THE 'BLACK BOXES' ON TODAY'S VEHICLES

LARRY MONTANEZ III // Technical Advisor

Jeff Lange, PE *contributed to this article.*

Big brother is watching! Is our privacy is at risk? Who owns the rights to the information stored in the vehicle? These are good comments and questions, but we are not politicians, lawmakers or judges who can address them.

But what we can answer — or should we say dispel — are the myths about "black boxes." We have all heard the term "black box" recorder, and we usually associated the term with airplanes, more specifically airplane crashes. Officially, that black box is known as a flight data recorder (FDR), and contrary to its name, it is in fact not black but coated in a heat resistant bright orange paint to make it highly visible after a collision event. The device collects information from the plane and records all incoming and outgoing communications from the time of taxiing, during the flight and up to the actual crash. This allows aviation authorities to determine what happened during that flight or,



AUDI DRIVER'S AIRBAG and head airbag deployment

PHOTOS: LARRY MONTANEZ

more importantly, what went wrong during an in-air mishap.

Similar devices have been utilized by vehicle engineers during crash testing for about two decades and serve a similar purpose. They record what was happening to the vehicle during the crash test, or more specifically it records the vehicle speed, airbag deployment, airbag deployment speed, seat belt usage, gear, occupant position, crash dummy sustained injuries and almost anything else the engineers need to study. These devices eventually went from testing modules, generally accelerometers, to in-vehicle equipment.

Vehicle-based electronic data recorders (EDRs) are designed to give automakers feedback on how and when airbags deploy, in order to improve the technology, make vehicles safer and essentially lessen occupant injuries in real life crash events. EDR data were instrumental, for example, in development of the dual-stage or "smart" airbag systems installed in today's vehicles. Smart systems determine which component deploys, if any, based on the severity of a collision, vehicle speed, vehicle deceleration, longitudinal and lateral deceleration, occupant position, occupant weight and seat belt usage. These smart airbag systems help reduce the number of airbag-related injuries and deaths to adults and children.

EDR data can be used to track manufacturing defects and issue recalls. For example, the data provided by EDRs proved to be critical data during the federal investigation into the unintended-acceleration controversy that affected primarily Toyota vehicles. NASA found only one case that could be attributed to Wide Open Throttle (WOT).

BMW DEPLOYED head airbag and driver's air bag

In almost every case, black box technology EDRs have had an overall positive effect on automotive safety and may become

become mandatory on all new vehicles sold in the U.S. Vehicles now equipped with EDRs already have mandated guidelines on recording under the Federal Motor Vehicle Safety Standards (starting in September 2012 for the 2013 model year as per FMVSS Title 49 CFR Part 563). But as with any government regulation/rule/law, not everyone is in favor of EDRs in vehicles.

Not surprisingly, some consumer and privacy advocates point out that they aren't only used to improve safety, but also help automakers cover their, well, you know what. This, in fact, might be true. The data provided by the EDRs may show evidence to prove the supposed airbag malfunctions or sudden unintended acceleration cannot be supported and the root cause was an improper repair or operator error. What is wrong with the truth?

I have read articles by those who worry that EDRs can and will be used to track drivers' every movement — wherever, whenever. They have mentioned the issues with the federal and state governments being able to track where, when and how fast you are going 24/7, every day of the year.

Over the past few years, some criminals have been caught by big brother watching technology. Many of those criminals were caught by surveillance cameras or by EZ Pass. Yes, some criminals stole a car and used the vehicle's EZ Pass to pay for tolls. Can I tell you right now today that EDRs will not become a big brother device? No, but we feel it will not happen, as there are laws against spying on U.S. citizens. We know what you are thinking: What about Progressive's Snapshot or OnSTAR service, that keeps an eye on you? Yes, it does and it is the owner's choice to install the device or pay for the service. But EDRs do not record the same information that the Snapshot device or OnStar service does.

BMW DEPLOYED head airbag

There is a lot of apprehension about mandating that every car have an EDR black box device. The idea behind mandating black box data recorders is to gather information that can help investigators determine the causes of accidents and lead to safer vehicles. But privacy advocates say government regulators and automakers are spreading an intrusive technology without first putting in place policies to prevent misuse of the information collected. Data collected by the recorders is increasingly showing up in lawsuits, criminal cases and high-profile accidents. For example, Massachusetts Lt. Gov. Timothy Murray initially said that he wasn't speeding and that he was wearing his seat belt when he crashed a government-owned car last year. But the Ford Crown Victoria's data recorder told a different story: It showed the car was traveling more than 100 mph and Murray wasn't belted in. In 2007, then-New Jersey Gov. Jon Corzine was seriously injured in the crash of an SUV driven by a state trooper. Corzine was a passenger. The SUV's recorder showed the vehicle was traveling 91 mph on a parkway where the speed limit was 65 mph, and Corzine didn't have his seat belt on.

The recording and sharing of personal information has become a touchy topic in our increasingly connected world. Let's look at some of the issues and separate fact from fiction.

1. EDRs are required on all cars.

Fiction. As mentioned above, not yet, but almost all of the OEMs are in compliance with Title 49 CFR Part 563. For OEMs that claim they do not use EDR black box technology, there is a proposed Senate rule pending that would require EDRs in all vehicles. The new law, if passed, would take out the option and require all car manufacturers to install EDRs.

2. Automakers have to declare the presence of an EDR.

Fact. Since 2006, NHTSA has stipulated that automakers that include the device in a vehicle have to disclose to consumers that an EDR is on board. The information generally is found in the owner's manual, which nobody reads, but it is there. NHTSA also mandated that vehicles manufactured after Sept. 1, 2011, that include EDR devices must record data in a standardized format.

3. An EDR constantly records your driving habits.

Fiction. Unlike a FRD, an EDR just records certain information about the vehicle operation (see page 59 for a general list) and that information is recorded only for a maximum of few seconds. An automotive EDR captures information only if the vehicle senses and detects a crash is

or may be evident. This "trigger" — referred to as algorithm wake up or algorithm enable (for GM cars) — is set off when the airbag control module detects enough force (deceleration) to trigger it. This trigger can be set off by different events, such as in a collision or from significant impact after a hard jolt (i.e. pothole impacted at a rapid speed).

The algorithm that sets off the capturing of EDR data can be triggered without deploying an airbag. On the EDR report of data there is generally a line that states "Events Recovered" and next to that it will state either Deployment Event or Non-deployment Event. Deployment events, obviously deployed an airbag component, such as an airbag, seat belt pretensioner or some combination. A non-deployment event records the same information a deployment event would but there was no airbag system component deployment.

4. Black boxes can assist in insurance fraud investigations.

Fact and fiction. This also would depend on if the EDR recorded a non-deployment event. This can be as simple as a parked and unoccupied collision event vs was the vehicle moving to a multiple vehicle incident and who could have caused the event.

But what can EDRs actually record? Here is a general list of what the current EDRs record and eventually they will be required to record the same information, although they may record more than what is required.

- Change in forward crash speed
- Maximum change in forward crash speed
- Time from beginning of crash at which the maximum change in forward crash speed occurs
- Speed vehicle was traveling
- Percentage of engine throttle, percentage full (how far the accelerator pedal was pressed)
- Whether or not brake was applied
- Ignition cycle (number of power cycles applied to the EDR) at the time of the crash
- Ignition cycle (number of power cycles applied to the EDR) when the EDR data were downloaded
- Whether or not driver was using safety belt
- Whether or not frontal airbag warning lamp was on
- Driver frontal airbag deployment: time to deploy for a single stage airbag, or time to first stage deployment for a multi-stage airbag
- Right front passenger frontal airbag deployment: time to deploy for a single stage airbag, or time to first stage deployment for a multistage airbag
- Number of crash events

- Time between first two crash events, if applicable
- Whether or not EDR completed recording
- And some newer European Models record time and date information.

Currently on the first page of each EDR data report there is a section titled "Data Limitations." This section explains how to read the data and interpret it. Generally, when a vehicle is involved in a collision event and is equipped with an EDR, if the "Jerk" (change in rate of acceleration) is enough to wake the system up or if airbags deploy, inputs from the vehicle's crash sensor(s) send information to the airbag control module (that is where the EDR is located) and the EDR will generally record 200 milliseconds to 5 seconds pre-crash data and 300 milliseconds to 10 seconds of post crash data depending on the OEM.

Other airbag system information

After any collision event, the vehicle needs to be scanned for any malfunctions and/or stored codes. Additionally, check with the OEM repair information on what checks and inspections must be performed after a collision. Scanning the vehicle systems will allow you to better determine what system is or is not functioning and determine the repair options. After the vehicle repairs are completed, the vehicle should be brought to the dealer for wheel alignment (many vehicles require OEM proprietary software) due to steering and suspension component replacement, and/or structural misalignment and because almost every OEM requires the Occupant Weight System or Classification to be recalibrated.

Never use junk yard salvaged airbag components. There is no scientific way to prove an airbag module will deploy or will function as designed. Yes, visual and electronic tests can be performed, but none can confirm proper operation. All the liability rests on the collision repair facility owner, and the employees including the technician who installed the airbag system components.

We hope this article has helped the industry to understand the importance of "Black Box" technology, the facts and the fiction and airbag system components. If you are interested in learning more about EDRs and/or becoming a certified technician feel free to send us an email.

LARRY MONTANEZ is co-owner of P&L Consultants, which works with collision shops on estimating, production and proper repair procedures. He is also a certified technician for multiple OEM collision repair programs.
info@PnLEstimology.com