EDR Technology in Support Of a Crash Reconstruction

What is an EDR and what does it mean to you?
Criminal Justice Track
Lifesavers 2008
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DOT HS 810 950

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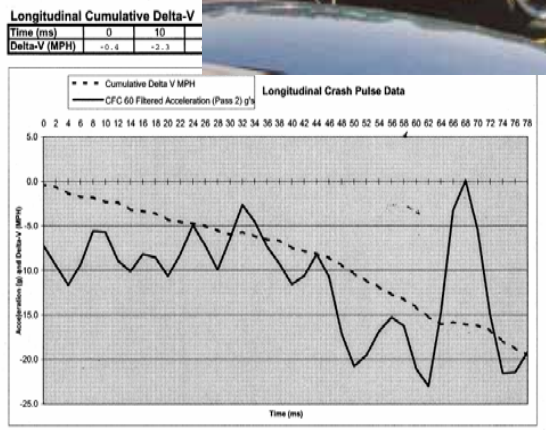
National Highway Traffic Safety Administration

Discussion Topics

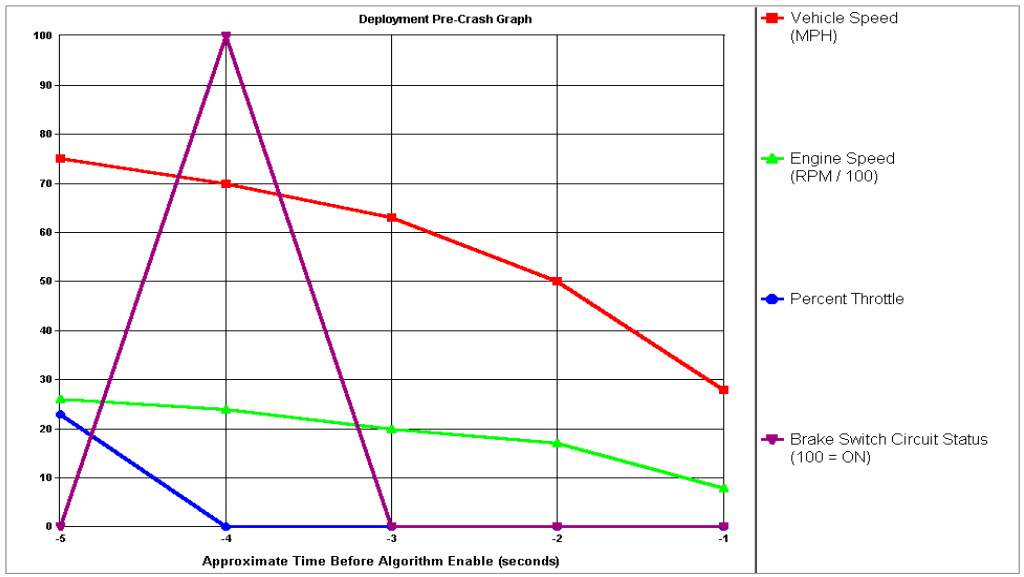
- What is an event data recorder
  - What constitutes data recording
- NHTSA & EDR data
- Public access to EDR data
- What we have learned
- Summary



Aviation "Black Boxes" or Flight Data Recorders (FDR)

Estimate of EDRs in the U.S. fleet

- **Light Fleet** **200,000,000 vehicles**
- **Estimated** **30,000,000 equipped vehicles**
- **Estimated** **15% of current fleet**
- **New Models** **65-90% equipped**



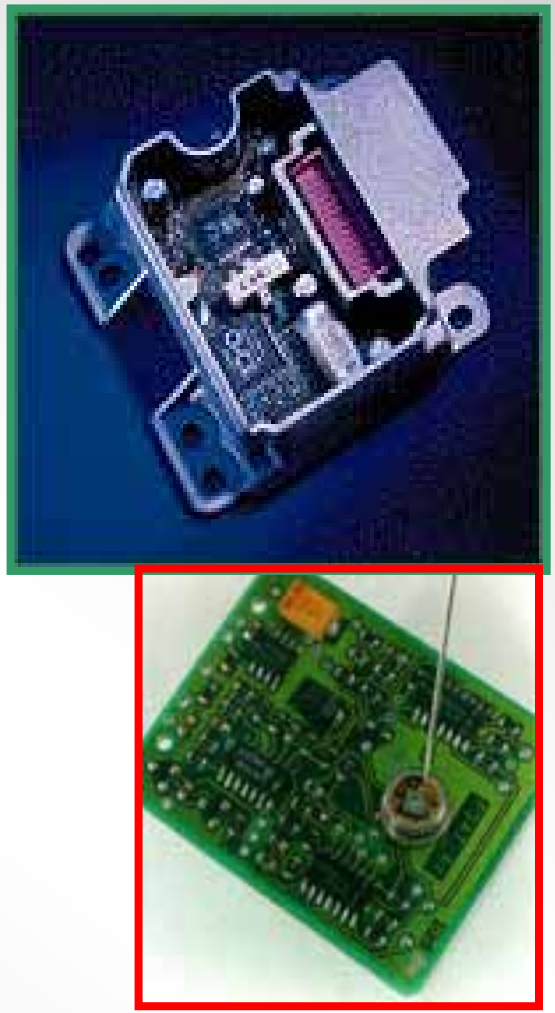
Event Data Recorders (EDR)

Primary Purpose:	Secondary Purpose:
Deployment of Air Bag	Record/Playback Crash Data

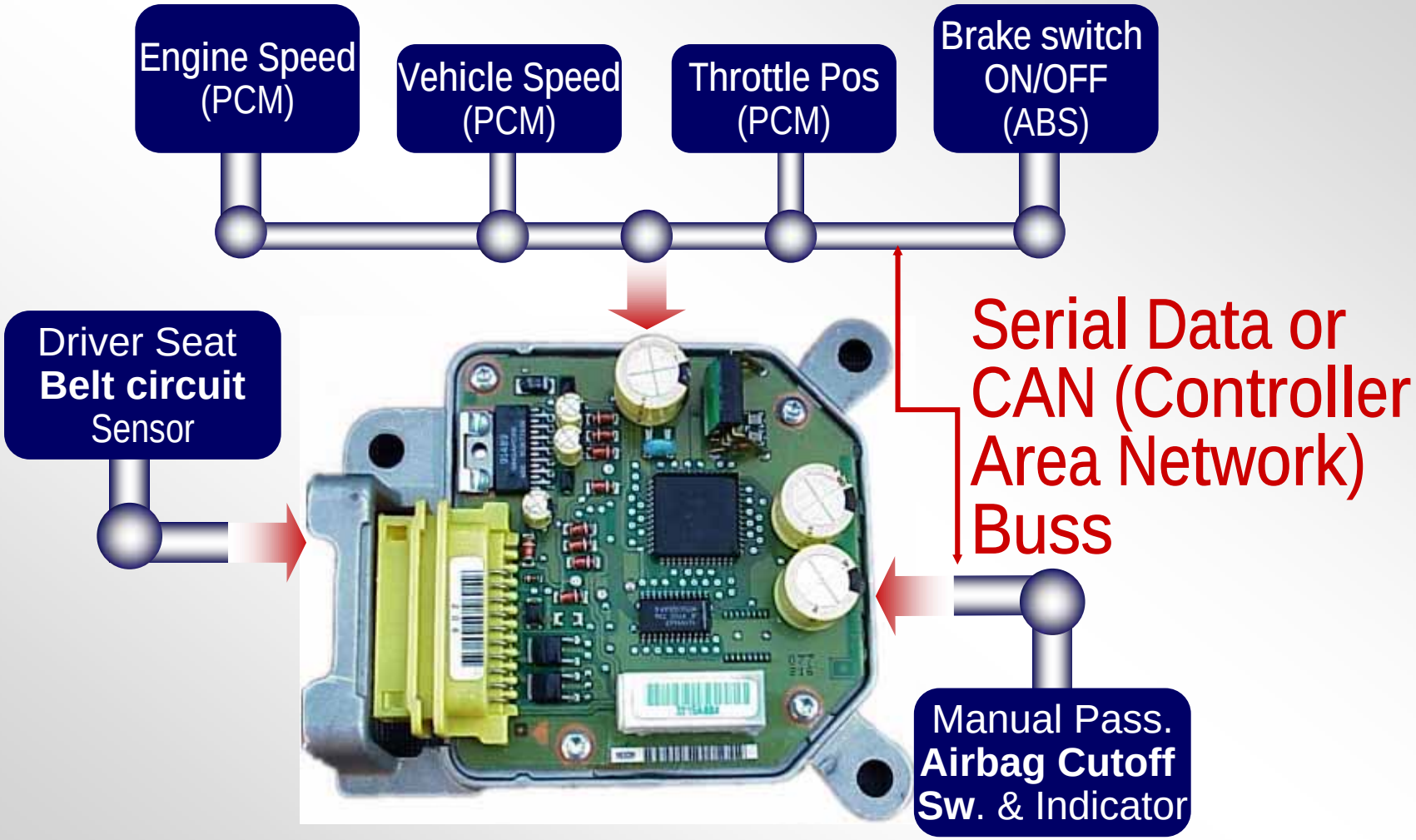
Current Technology

- *Air Bag Control Module*
  (aka SDM, RCM, PCM, ECU, etc.)
  - *Accelerometer*
  - *Microprocessor*
  - ♦ *Bosch, Takada, Delphi*

- *Satellite Sensors*
  - *Diagnostic functions*
  - *Central acceleration detection*
  - *Side crash detection*
  - *System deployment*



SDM Simplified



NHTSA & EDRs

- *We have been collecting EDR data since the 1990s*
- *Over 6,000 downloads to date*
- *Final rule issued early this year*
- *Does not mandate EDRs in vehicles*
- *However, if there is an EDR*
  - *It must capture uniform data in a uniform format*
  - *Standardized notification statement in vehicle's owner's manual*
    - *Inform consumer of presence of EDR in vehicle*
    - *Identify the purpose of the EDR*
    - *Identify the type of data collected by the EDR*
  - *There must be a commercially available tool to access the data*

NHTSA & EDRs

- **New EDR rule takes effect with 2012 model year vehicles**
- **If EDR equipped, required items:**

- *Delta V long*
- *Max delta V long*
- *Time, max delta V*
- *Speed, vehicle indicated*
- *Engine throttle %*
- *Service brake on /off*
- *Ignition cycle, crash*
- *Ignition cycle, download*
- *Safety belt status, driver*
- *Frontal air bag warning lamp on/off*
- *Frontal air bag time to deploy – driver air bag*
- *Frontal air bag time to deploy – passenger air bag*
- *Multi-event – number of events*
- *Time from event 1 to 2*
- *Complete file recorded yes/no*

NHTSA & EDRs

- ***Additional items are required if recorded <u>some</u> include:***

- *Lateral acceleration*
- *Max delta V*
- *Engine rpm*
- *Vehicle roll angle*
- *ABS activity*
- *Stability control on/off*
- *Safety belt status front passenger*
- *Frontal air bag supresssion switch status RF passenger*
- *Side air bag time to deploy – driver*
- *Side air bag time to deploy – passenger*
- *Side curtain/air tube deployment driver side*
- *Side curtain/air tube deployment pass. side*
- *Pretensioner deployment (driver and passenger)*
- *Etc.*

NHTSA & EDRs

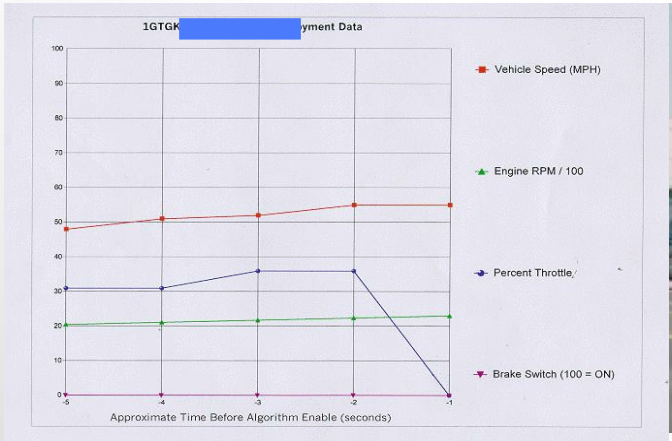
- ***Currently three supported manufacturers***
  - ***General Motors***
  - ***Ford***
  - ***Chrysler***
- ***Varying level of downloaded data currently available***
- ***Additional support for the Ford Power Control Module***
  - ***Some vehicles contain "minutes" of looped data – which can be overwritten!***

Public Access to EDR data

- ***January '08 – Vetronix is now owned by Bosch***
- ***Software is by subscription (1 to 3 years)***
- ***Hardware/cables are purchased separately***
- ***Hoping for three releases per year***

Public Access to EDR data

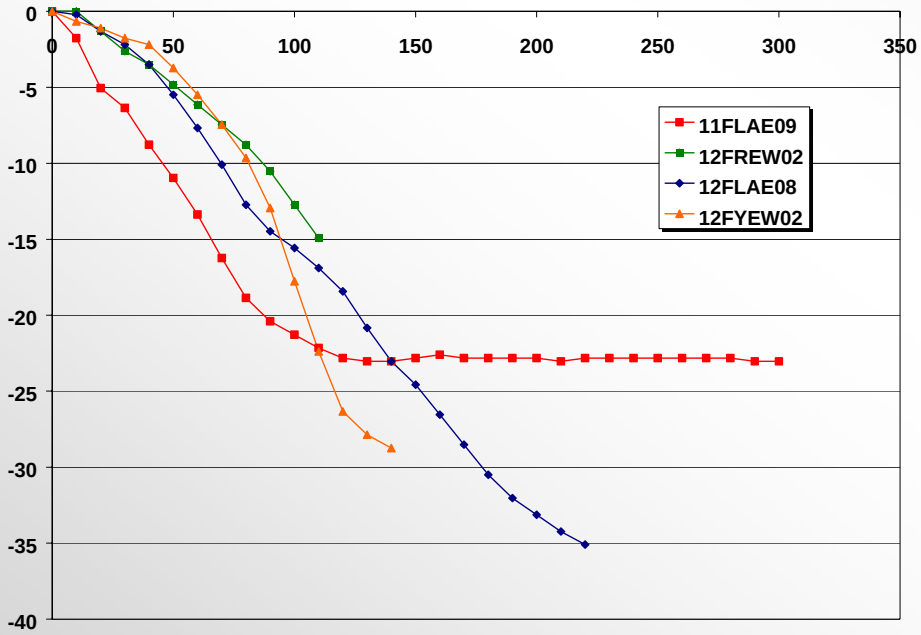
- **We can only read a limited number of vehicles**
  - **Bosch Crash Data Retrieval System**
  - **Version 3.0 Software**
    - **Most General Motors 1994 and newer**
    - **Some Ford and Mercury 2001 and newer**
    - **Chrysler 2004-2008**
    - **And others Isuzu Hombre 2000 - 2002 and Ascender 2003**



EDR Program at NHTSA
What We Have Learned

- **Some EDR output data may be lost or questionable.**
  - **Due to power loss and sensor problems.**
- **Supports a complete crash reconstruction.**
  - **Crash pulse, time to deployment, restraint usage, etc.**
- **WinSmash vs. OEM EDR delta-Vs are comparable**
- **Improves data quality.**
  - **Used for validation of data.**
  - **Improves completeness of data**

Longer Recording Times Needed



Offset Crashes Longer Than 150 ms

- *Typical offset crash: 250+ milliseconds*
- *EDR (pre-2000): 300 milliseconds*
- *EDR (post-2000): 150 milliseconds*

Effects of Power Limitations on Event Recording

2G1WF55E7Y91	System Status At Deployment
SIR Warning Lamp Status	OFF
Driver's Belt	UNBUCKLED
Passenger Front-Air Bag	ON
Ignition Cycles At Deployment	1596

Seconds Before
-5
-4
-3
-2
-1

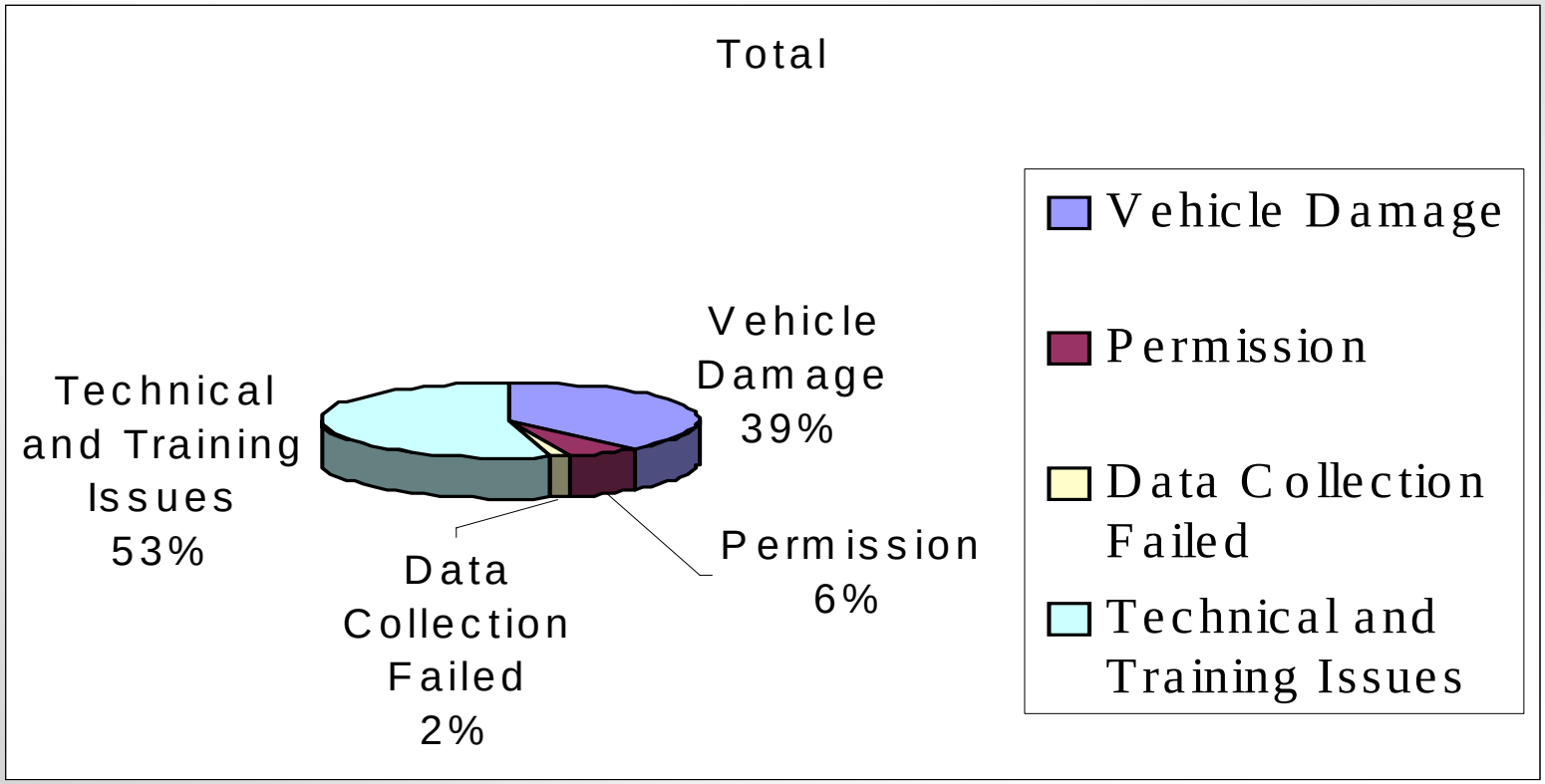
Milliseconds Aft
Velocity Change

Time Between D

NHTSA's Data Collection Experience With Unsuccessful EDR Downloads

NASS reasons EDRs could not be downloaded

***Based on 2003-2005 data collection years**



Summary

- **All OEMs that sell a 2012 vehicle equipped with an EDR**
  - **Inform consumer of presence of EDR in vehicle**
    - **Identify the purpose of the EDR**
    - **Identify the type of data collected by the EDR**
  - **Must capture the data in a uniform format**
    - **There must be a tool available to access the data**
- **Current OEM EDR data does NOT replace a crash reconstruction!**

Questions?