Automotive Black Box Technology
• Only provider of OEM event data recorder or “black box” data harvesting network (in 37 states) and desktop evaluations for claims professionals

• Customers include 16 auto insurers which sell nearly 20% of the auto insurance policies in the U.S.

• Policy: permission is obtained from the owner of the vehicle at the time of the accident before data is extracted
Vehicle Data Recorder Applications

- **Aftermarket**
  - Trip Logging Devices
  - Passive GPS Tracking Devices
  - Non-OEM Crash Data Recording Devices
  - Telematics

- **OEM**
  - Telematics with real-time GPS Tracking (OnStar, ATX)
    - Communications
    - Vehicle maintenance and diagnostics
    - Travel services
    - Safety services
    - Accident and highway safety analysis
  - Airbag Control Modules (SDMs, RCMs)
Timeline of Historical EDR Events

1950
- Flight Data Recorders Introduced

1960
- Cockpit Voice Recorders Introduced
- NHTSA Launches Auto EDR Research

1970
- Railroad Applications Introduced

1980
- '90-GM DERM
- '94-GM SDM
- '97-Ford RCM

1990
- '96-OnStar Launched
- '92-Jerome Brown v GM
- '98-1st Progressive Pay as You Drive (PAYD) Pilot
- NHTSA EDR Working Group Launched
- '99-GM Advanced SDM
- Vetronix CDR Launched
- '00-CDR Launched
- Harris v GMC

2000
- '02-Bachman v GMC

2005
- '04-2nd Progressive PAYD Pilot
  - GMAC PAYD Pilot
  - CA Data Ownership Legislation
  - NHTSA Proposed Rulemaking
- '05-CDR Expansion
- '04-2nd Progressive PAYD Pilot

EDR Available to Auto Insurance Industry for Claim Investigations
What are OEM EDRs?

OEM Event Data Recorder (EDR) devices control deployment of occupant protection systems

- SDM (Sensing and Diagnostic Module - GM and Isuzu)
- RCM (Restraint Control Module - Ford)
EDRs – Primary Purposes

The Event Data Recorder has 3 purposes:

1. Measure collision severity
2. Make decisions about airbag deployment
3. Record the event data for future reference
Data Harvesting – How....

Points of Connection:
• OBDII Port (DLC)
• Direct to EDR
  – In vehicle
  – Out of vehicle
## System Status at Deployment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIR Warning Lamp Status</td>
<td>OFF</td>
</tr>
<tr>
<td>Driver's Belt Switch Circuit Status</td>
<td>UNBUCKLED</td>
</tr>
<tr>
<td>Passenger Front Air Bag Suppression Switch Circuit Status</td>
<td>ON</td>
</tr>
<tr>
<td>Ignition Cycles at Deployment</td>
<td>187</td>
</tr>
<tr>
<td>Ignition Cycles at Investigation</td>
<td>213</td>
</tr>
<tr>
<td>Time From Algorithm Enable to Deployment Command Criteria Met (msec)</td>
<td>18.75</td>
</tr>
<tr>
<td>Time From Algorithm Enable to Pretensioner Deployment Command Criteria Met (msec)</td>
<td>18.75</td>
</tr>
<tr>
<td>Time From Near Deployment to Deployment (msec)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

## Recorded Velocity Change (MPH)

<table>
<thead>
<tr>
<th>Time (milliseconds)</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
<th>130</th>
<th>140</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorded Velocity Change (MPH)</td>
<td>-1.54</td>
<td>-3.07</td>
<td>-3.51</td>
<td>-5.27</td>
<td>-7.68</td>
<td>-10.09</td>
<td>-12.29</td>
<td>-16.24</td>
<td>-21.50</td>
<td>-27.66</td>
<td>-32.69</td>
<td>-39.93</td>
<td>-42.78</td>
<td>-43.44</td>
<td>-44.32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time (milliseconds)</th>
<th>160</th>
<th>170</th>
<th>180</th>
<th>190</th>
<th>200</th>
<th>210</th>
<th>220</th>
<th>230</th>
<th>240</th>
<th>250</th>
<th>260</th>
<th>270</th>
<th>280</th>
<th>290</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorded Velocity Change (MPH)</td>
<td>-44.98</td>
<td>-45.42</td>
<td>-46.07</td>
<td>-46.95</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
<td>-47.17</td>
</tr>
</tbody>
</table>

## PRE-CRASH DATA

<table>
<thead>
<tr>
<th>Seconds Before AE</th>
<th>Vehicle Speed (MPH)</th>
<th>Engine Speed (RPM)</th>
<th>Percent Throttle</th>
<th>Brake Switch Circuit Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>57</td>
<td>4032</td>
<td>100</td>
<td>OFF</td>
</tr>
<tr>
<td>-4</td>
<td>65</td>
<td>4160</td>
<td>70</td>
<td>OFF</td>
</tr>
<tr>
<td>-3</td>
<td>62</td>
<td>2304</td>
<td>2</td>
<td>ON</td>
</tr>
<tr>
<td>-2</td>
<td>55</td>
<td>1088</td>
<td>2</td>
<td>ON</td>
</tr>
<tr>
<td>-1</td>
<td>47</td>
<td>896</td>
<td>2</td>
<td>ON</td>
</tr>
</tbody>
</table>
Overview of Data Rules - GM

- **When data is available**
  - Airbag deployment – permanently written into EDR Memory
  - Non-deployment – temporarily written into EDR Memory
  - Non-deployment – represents the most severe event if multiple events
  - One to three collision events may be stored, depending on module

- **When no data is available**
  - Vehicle was not operational
  - There was no impact resulting in frontal decelerations
  - Impact was too minor to wake up sensors
  - Non-deployment – temporary storage period has been exceeded

- **No date and time stamp available**
Harvestable Black Box Data
Ford

- Longitudinal (generally) change in velocity for approximately 80 milliseconds
- Driver and passenger airbag deployment
- Driver and passenger (front seat) seat belt status (buckled vs. unbuckled)
- Driver and passenger pretensioner performance
- Driver seat track position
Overview of Data Rules - Ford

- Crash data is only available
- Airbag deployment – data permanently stored
- Non-deployment events – data temporarily stored
- Lateral impact information available for Sable and Taurus models
Potential Telematic Data Elements

- Airbag deployment
- Crash pulse (\(\Delta V\))
- Pre-impact braking
- Pre-impact speed
- Pre-impact engine RPM
- Pre-impact throttle position
- Gear selection
- Seat belt usage
- Seat tensioning restraint activation
- Occupant weight sensor data
- Head rest position
- Airbag disabler (on/off)
- VIN
- Date and approximate time of collision
- Mileage
- Vehicle location
- Pre-impact travel direction
- Headlights (on/off)
- Headlight dim and high beam switches (on/off)
- Turn signal status (on/off)
- Tire pressure sensor data
- Traction control sensor data
- Vehicle stability sensor data
- Other?
Nearly 25% of all private passenger vehicles have harvestable “black box” data
- GMs dating to ’94,
- Saturns dating to ’95 and
- Isuzus dating to 2001
- Fords dating to 2001

*NY Times* reports more manufacturers to participate – Chrysler and Toyota

*Without* new manufactures reported by *NY Times*, percentage will expand approximately 4% per year

NHTSA’s proposed rulemaking, effective Oct., 2008 will further expand coverage

*Availability varies by region*
Regional EDR Data Availability

Legend
- 24%+ Vehicles
- 20 - 23% Vehicles
- 17 - 19% Vehicles
- 14 - 16% Vehicles
- Insufficient Data

* Denotes availability levels below specified range

Estimates for 2005

Over 655,000 private passenger auto policies and accidents sampled for OEM EDR data availability in ‘03
<table>
<thead>
<tr>
<th>Type of Claim</th>
<th>Required EDR Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low/minimal impact claims, frontal impact by insured</td>
<td>All Types</td>
</tr>
<tr>
<td>Intersection accidents</td>
<td>Pre-Crash Data</td>
</tr>
<tr>
<td>Claims involving the potential issue of speeding</td>
<td>Pre-Crash Data</td>
</tr>
<tr>
<td>Accidents involving 3 or more vehicles where the claimant is the middle vehicle</td>
<td>Pre-Crash Data</td>
</tr>
<tr>
<td>Hit and run (phantom vehicle) claims</td>
<td>Will Vary</td>
</tr>
<tr>
<td>Claims involving allegation of mechanical failure (brakes, cruise control, etc)</td>
<td>Pre-Crash Data</td>
</tr>
<tr>
<td>Airbag system replacement</td>
<td>All Types</td>
</tr>
<tr>
<td>Date of coverage vs accident questions</td>
<td>Will Vary</td>
</tr>
<tr>
<td>Serious injury cases – seat belt defense</td>
<td>Will Vary</td>
</tr>
</tbody>
</table>
Insurance Questions & Process

- **Who owns the data?**
  - Vehicle owner at the time of the accident (*prevalent practice*)
  - Ownership transferred to subsequent owner (salvage of entire vehicle or replaced components)
  - Driver of the vehicle at the time of the accident (significant implications to commercial applications)
  - Vehicle rentals or leases

- **Should permission be obtained from the data owner before the extraction of data?**
  - Authorization form for 1st and 3rd party (*prevalent practice*)
  - Policy language
  - Exceptions when fraud suspected

- **Is an insurer potentially liable if it does not obtain the data as it defends its insured?**
Model Legislation - AAM

- Requires disclosure of EDR existence in owner’s manual
- Defines vehicle owner as a person:
  - Possessing legal title, and
  - Entitled to possession of the vehicle as a purchase under a security agreement, or
  - Entitled to possession of the vehicle as a lessee provided lease is over 3 months
- Defines an EDR (includes recording steering performance and ACN)
- Defines conditions in which EDR data can be downloaded
  - Owner
  - Owner or owner’s agent or legal representative consents
  - Court order
  - For purposes of improving safety provided identity of the owner and driver not disclosed and last 4 digits of VIN deleted
  - Retrieved by a dealer or an auto technician to service or repair the motor vehicle
  - ACN
- If applicable, disclosure in subscription services agreement
Proposed Rulemaking by NHTSA

- For light vehicles equipped with EDRs (estimated to be in 65-90% of 2004 model years)
  - Require the EDRs to record a minimum set of specified elements
    - Vehicle speed (-8 to 0 seconds)
    - Engine RPM (-8 to 0 seconds)
    - Engine throttle % (-8 to 0 seconds)
    - Braking (-8 to 0 seconds)
    - Driver belt usage (-1 second)
    - Longitudinal acceleration ($\Delta V$) – Crash Data
  - Standardize the data format
  - Require that the EDRs function during and after front, side and rear vehicle crashes
  - Require vehicle manufacturers to:
    - Make publicly available information that would enable crash investigators to retrieve data from the EDR
    - Include a brief standardized statement in the owner’s manual indicating that the vehicle is equipped with an EDR

- Proposed effective date of September 01, 2008
Authoritative white paper – “Legal Issues Surrounding the Implementation and Use of Event Data Recorders” by Michael Edmund O’Neill – Assoc. Professor, George Mason University School of Law

- Fifth Amendment does not necessarily apply
- Fourth Amendment only applies relative to owners expectations to privacy
  - Fourth Amendment rights not as strong in a mobile vehicle
  - Fourth Amendment exceptions remain applicable
- Federal rules of discovery, evidence spoliation and admissibility apply
• **Harris v. GMC (2000)** - found that EDR data should be evaluated under the *Daubert* criteria that governs the qualification and admission of scientific testimony.

• **Bachman v. GM (2002)** – After extensive review of evidence found data scientifically reliable. Suggested expert testimony may not be necessary.

• **State New York v. Christmann (Jan. 2004)** – Citing Bachman, found general acceptance in the scientific community. No need for expert witness.


• **Matos v. State Florida (March 2005)** – citing Bachman, held EDR scientifically reliable and not “new or novel” science.
Personal Observations

- Data available today from EDRs is evidence - not an invasion of privacy
  - Forensic analysis can recreate similar information, but with less precision
  - Forensic analysis has been traditionally used, and consistently admitted into evidence, to address the previously-noted claim questions
  - EDR data increases precision and reduces cost
  - Eye witness accounts are not consistently reliable substitutes
- Obtaining permission to extract the data neutralizes invasion of privacy arguments
- Data is objective and therefore favors no particular party
  - Data tampering to introduce bias is not practically achievable using reasonable safeguards
  - Newton’s laws give insight to vehicles without available EDR information
- While not perfect, the AAM model is practical and works
  - Vehicle owner as owner of data is consistent with other protocols
  - Model could benefit from definition of the timing of collision relative to data ownership
  - Permission from vehicle owner or court order to obtain data is reasonably balanced in the context of insurance “duties” (1st and 3rd party)
Thank You

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