Vehicle Black Boxes and Infotainment Systems

AAJ Motor Vehicle Collision, Highway and Premises Liability Section/
Bus Litigation Group
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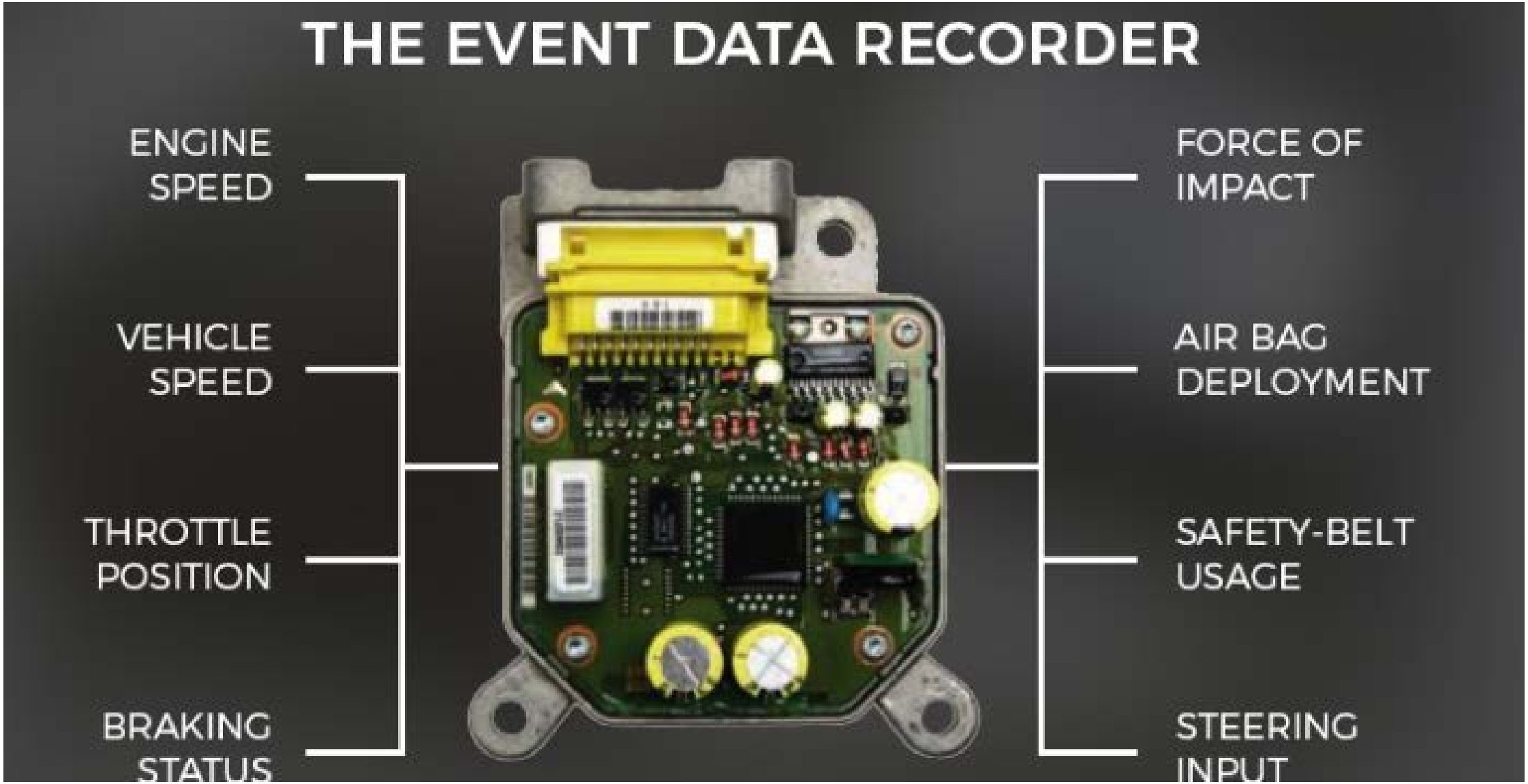
What’s In the Box?

THE EVENT DATA RECORDER



Federal Rules re Data Recorders (2006) 49 CFR Part 573

- Minimum standard for pre-crash data to be collected:
  - 5 seconds pre-crash
  - Required data:
    - speed, belt status, airbag warning light, engine throttle, brake use, change in velocity (delta-v) and airbag deployment times
  - Additional standards for 30 other types of data
  - Data required to survive 30 mph barrier crash
  - Manufacturers not required to make data public

Federal Driver Privacy Act of 2015

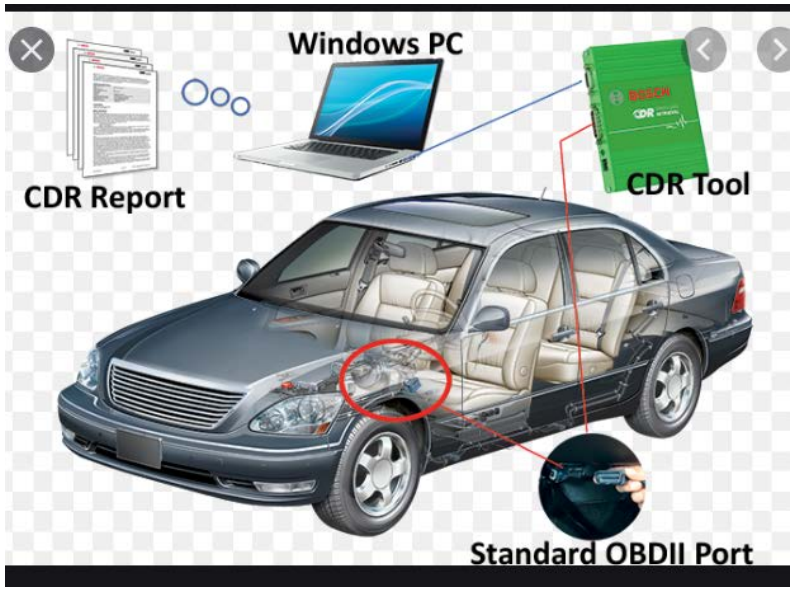
Owner or lessor of vehicle is the owner of the data recorded

To access data, investigator needs:

- Permission of owner or lessee or court order
- Conduct an investigation authorized by federal law
- Demonstrate necessary to facilitate medical care in response to accident, or
- Conduct traffic safety research

Retreiving the Data

- Requires power and cable to connect to OBDII port in vehicle
- Type of cable connection depends on vehicle



Limitations on the Data Collected

Not all EDRs are identical

Download process may not be impartial

Data retrieved not necessarily infallible

Not All EDRs are Identical

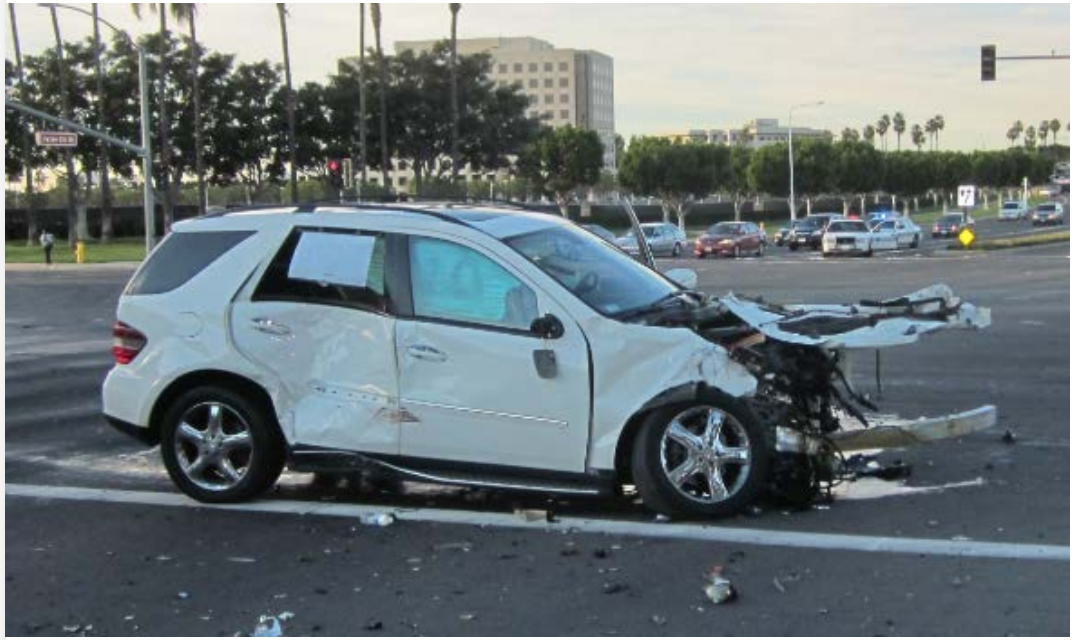
- Type and amount of data
- Timing of data collection
- Reliability of data recorded
- Amount of space to store data
- Stored data susceptible to being corrupted, erased or overwritten

Download Process Can Corrupt Data

- Power source
  - Vehicle power
  - External power
- Type of connector used to download
- Location of port used to download

Reliability of Data Retrieved?

- Recorded data is only a 5 second “snapshot”
  - What happened before data recorded?
  - Correlate to physical evidence?
- Commercial download tools do NOT establish reliability of data
- Tools can only retrieve data specified by manufacturer
- Most fault codes are not read or translated by commercial download tools
- Source of data may be affected by modifications to vehicle
  - Speed determined by wheel and transmission sensors
  - Changes to wheel size or transmission work requires recalibration of sensors
- More than one event?
- Loss of power during crash?



Example of EDR Crash Data Report - Investigation of side airbag non-deployment

BOSCH

CDR CRASH DATA RETRIEVAL

IMPORTANT NOTICE: Robert Bosch LLC and the manufacturers whose vehicles are accessible using the CDR System urge end users to use the latest production release of the Crash Data Retrieval system software when viewing, printing or exporting any retrieved data from within the CDR program. Using the latest version of the CDR software is the best way to ensure that retrieved data has been translated using the most current information provided by the manufacturers of the vehicles supported by this product.

CDR File Information

User Entered VIN	1J4RR6GG8BC687713
User	John Hinger
Case Number	Tenove
EDR Data Imaging Date	12/18/2015
Crash Date	01/28/2013
Filename	1J4RR6GG8BC687713_ACM.CDRX
Saved on	Friday, December 18 2015 at 14:24:17
Collected with CDR version	Crash Data Retrieval Tool 16.3
Reported with CDR version	Crash Data Retrieval Tool 16.3
EDR Device Type	Airbag Control Module
Event(s) recovered	Most Recent Event 1st Prior Event

Comments

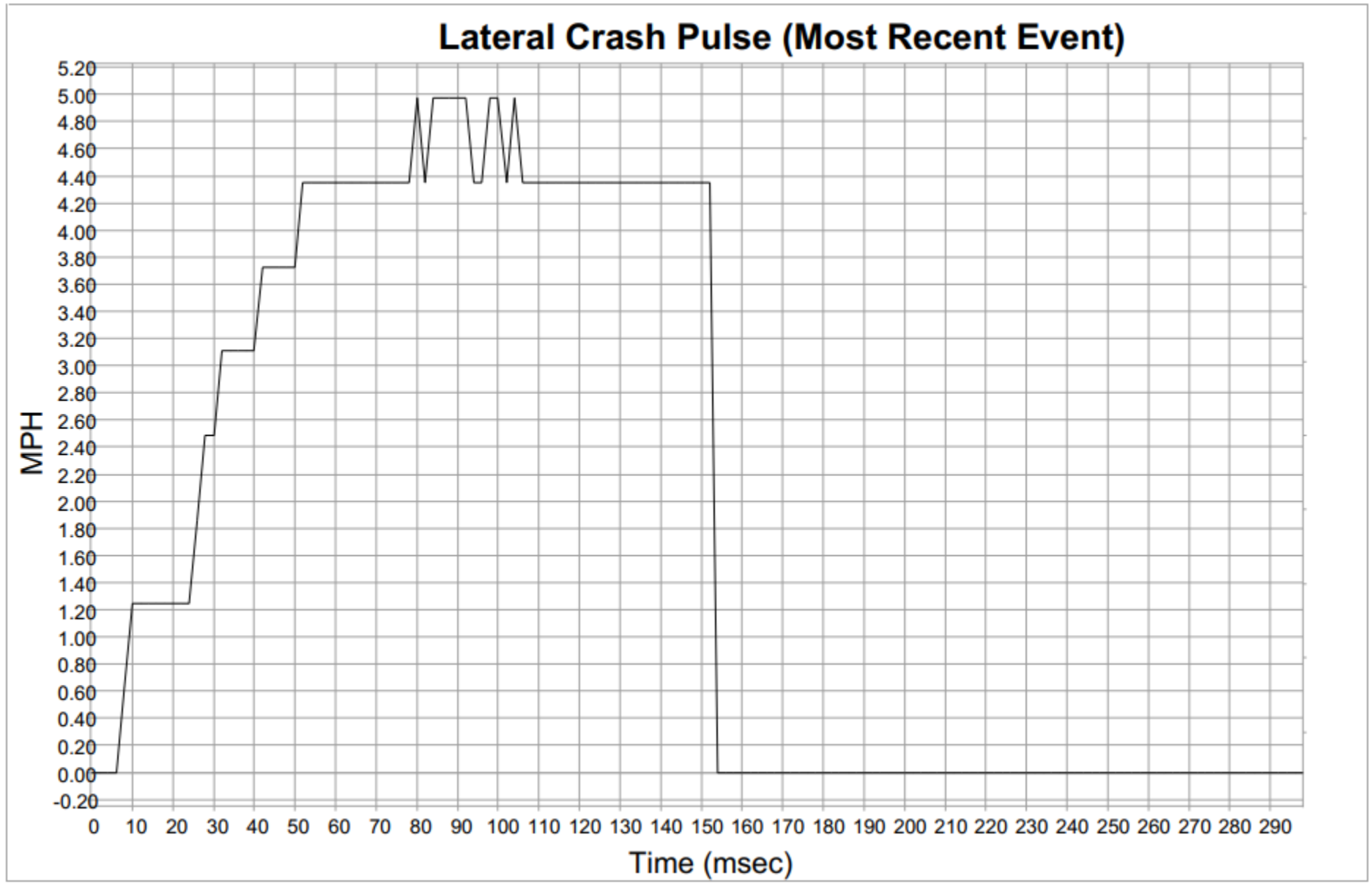
No comments entered.

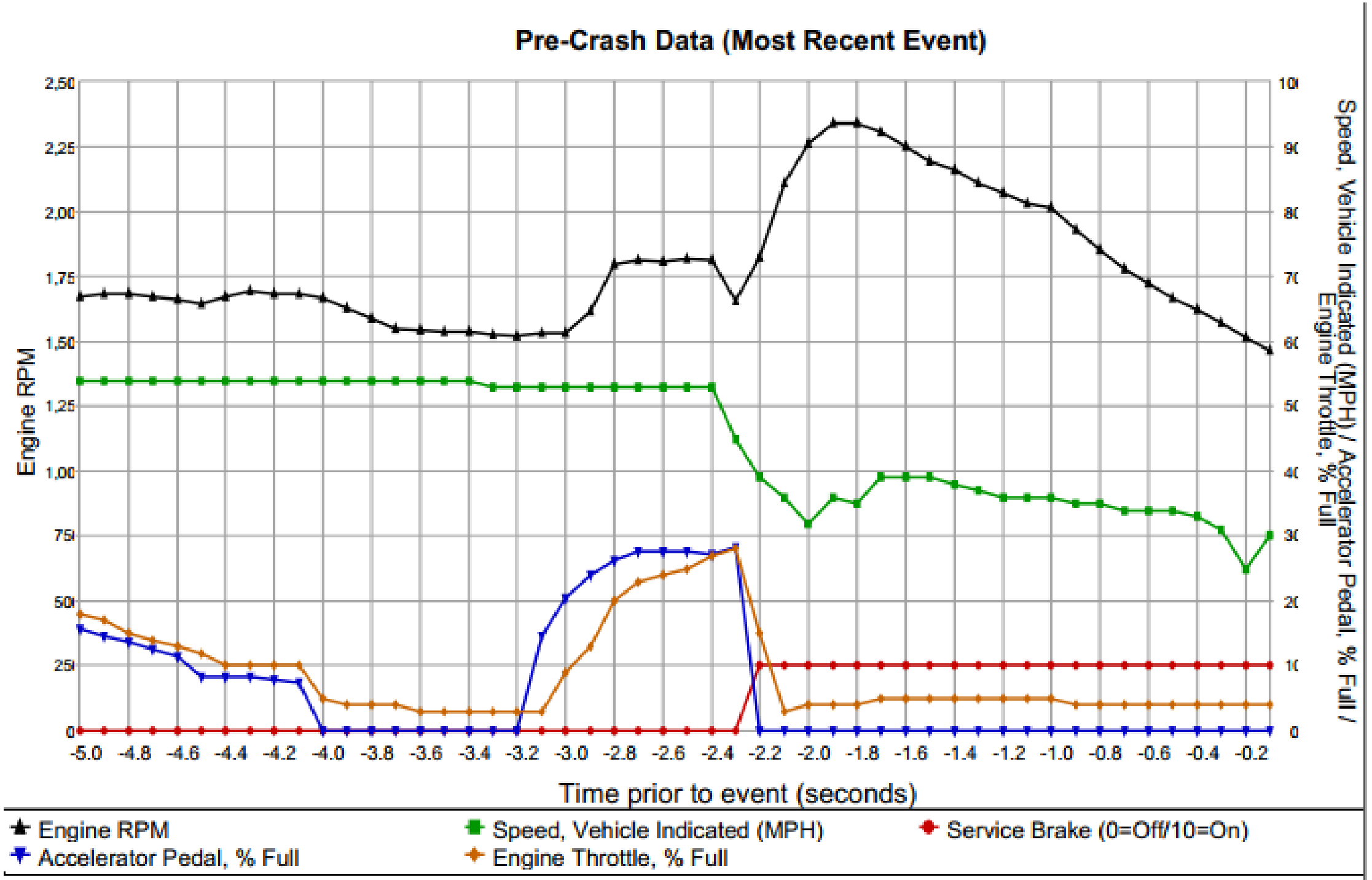
BOSCH

CDR

System Status at Event (Most Recent Event)

Event Recorder Status	Complete
Event Record Status - Delta-V, Longitudinal	Complete
Event Record Status - Delta-V, Lateral	Complete
Event Record Status - Angular rate	Complete
Event Number	3
Total Number of Events Recorded	3
Time from Event 1 to 2 (sec)	2
Odometer Recorded at Event (miles [km])	23815 [38326]
Operation System Time at Event (min)	50259
Ignition Cycles, Crash	4219
VIN Recorded at Event (last 8 characters)	BC687713
Vehicle System Voltage Recorded at Event (V)	14.4
Operation Via Energy Reserve Only	No
Safety Belt Switch Configured, Driver (if equipped)	Yes
Safety Belt Status, Driver (if equipped)	Buckled
Safety Belt Switch Fault, Driver (if equipped)	No
Safety Belt Switch Configured, Passenger (if equipped)	Yes
Safety Belt Status, Passenger (if equipped)	Unbuckled
Safety Belt Switch Fault, Passenger (if equipped)	No
Seat Track Position Sensor, Driver (if equipped)	Not Configured
Seat Track Position Sensor, Passenger (if equipped)	Not Configured
Airbag Warning Lamp "On" at Event	Off
Airbag Warning Lamp "On" Time Before Event (min)	0


Lateral Crash Pulse (Most Recent Event)
MPH
5.20
5.00
4.80
4.60
4.40
4.20
4.00
3.80
3.60
3.40
3.20
3.00
2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-0.20
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290
Time (msec)

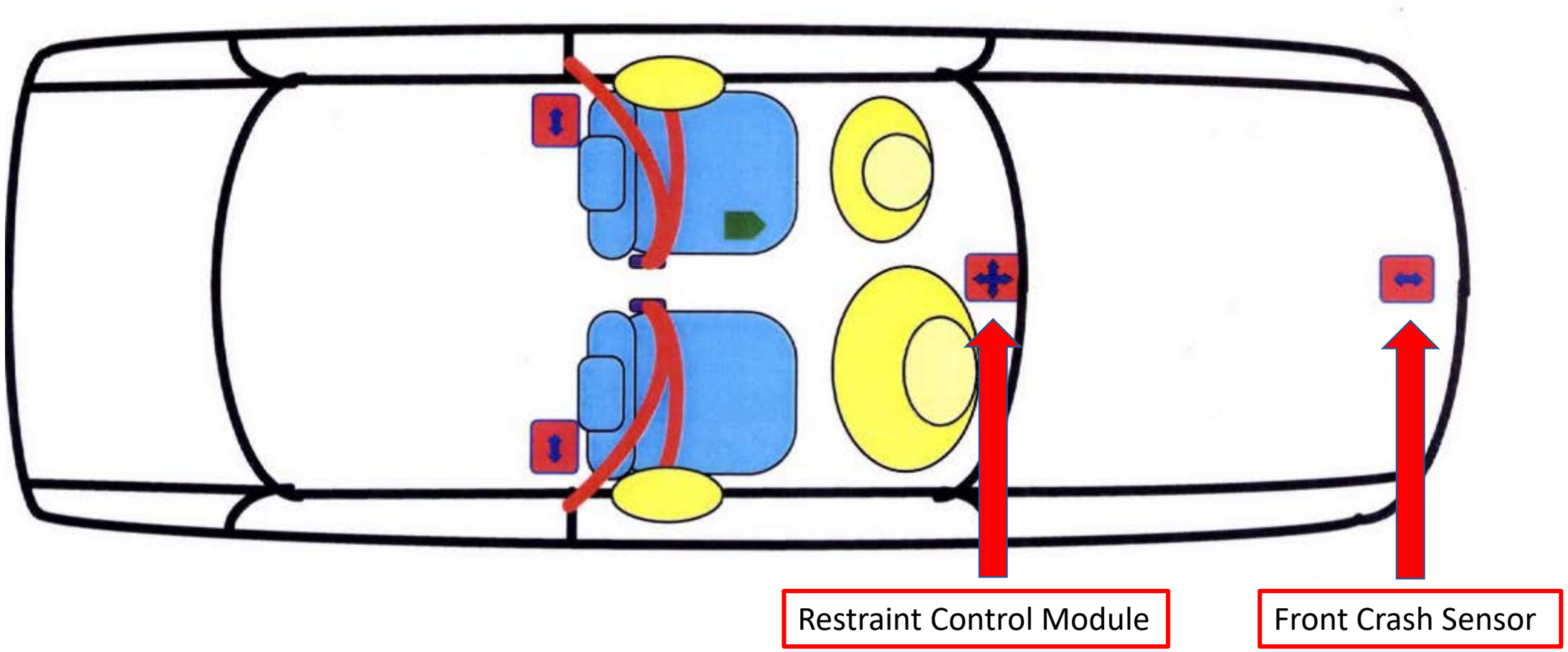

Pre-Crash Data (Most Recent Event)
Engine RPM
2,50
2,25
2,00
1,75
1,50
1,25
1,00
75
50
25
0
Speed, Vehicle Indicated (MPH) / Accelerator Pedal, % Full / Engine Throttle, % Full
-5.0 -4.8 -4.6 -4.4 -4.2 -4.0 -3.8 -3.6 -3.4 -3.2 -3.0 -2.8 -2.6 -2.4 -2.2 -2.0 -1.8 -1.6 -1.4 -1.2 -1.0 -0.8 -0.6 -0.4 -0.2
Time prior to event (seconds)
Engine RPM
Speed, Vehicle Indicated (MPH)
Service Brake (0=Off/10=On)
Accelerator Pedal, % Full
Engine Throttle, % Full

Investigation of Front Airbag Non-Deployment

- Crash Sensor Malfunction
- Crash Sensor Locations

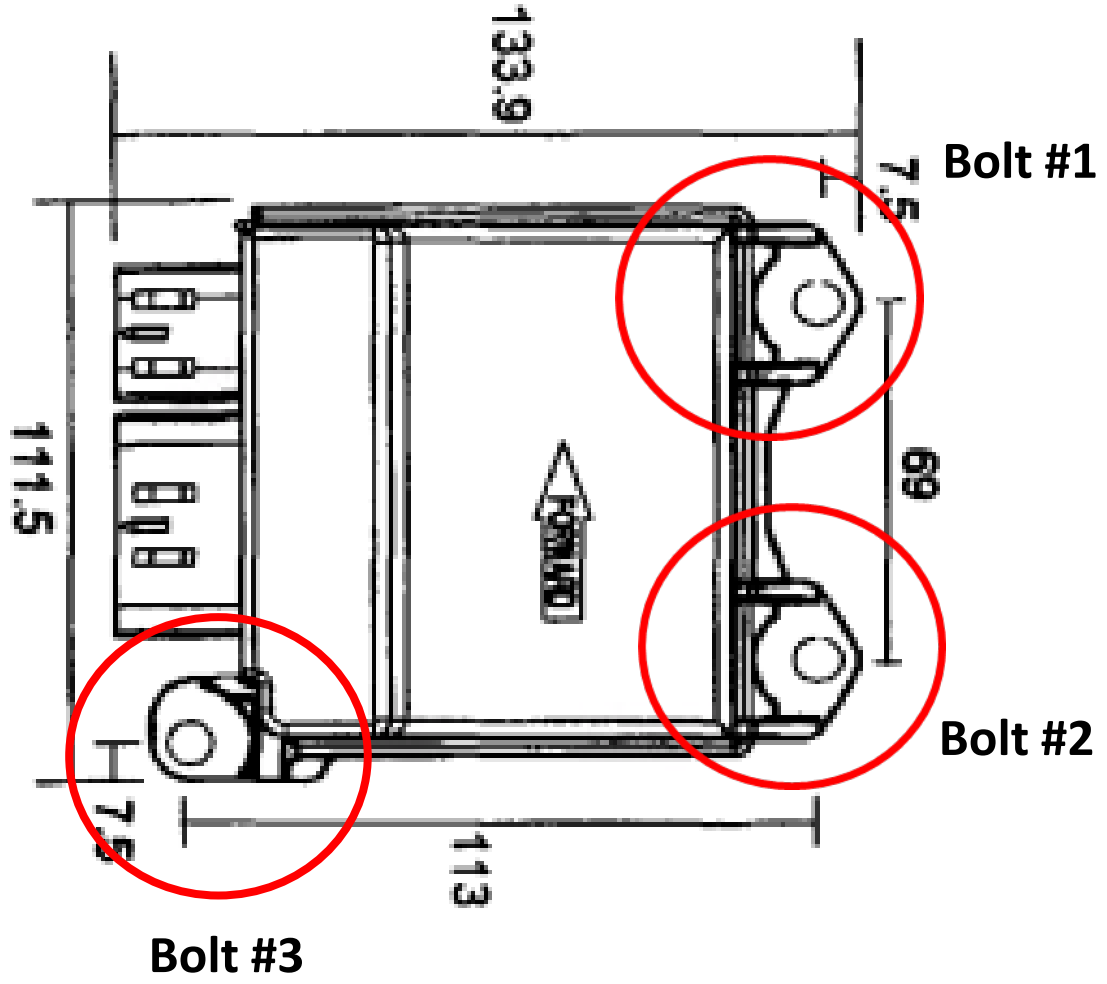
Example Crash Sensor Malfunction: Investigation of front airbag non-deployment

2003 MY Ford Taurus

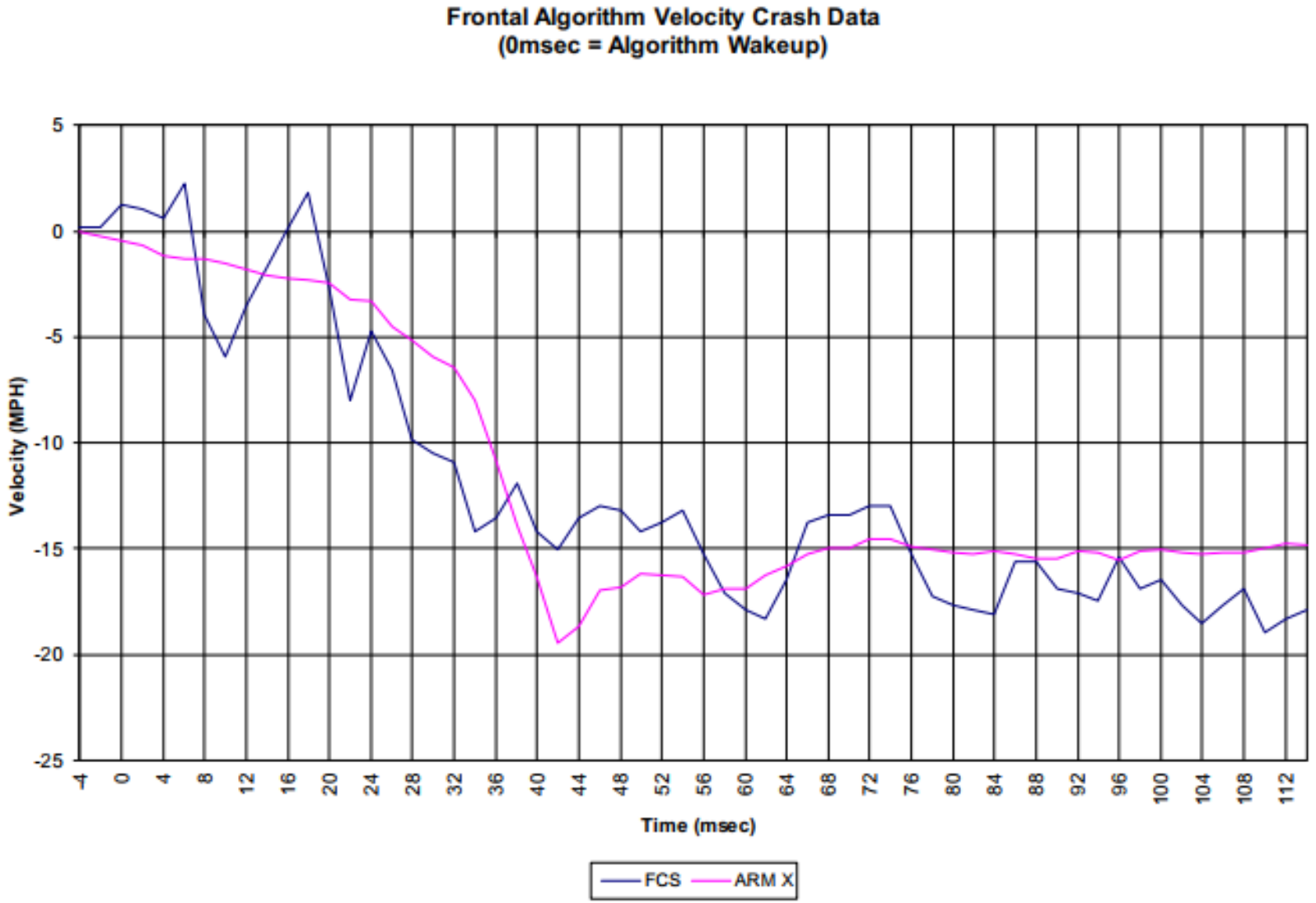


2003 MY Ford Taurus Restraint Control Module

- Installed on passenger side of center console
- Three bolts required to secure the module
- In Fitzgerald vehicle:
  - Bolt #1 is missing
    (never installed)
  - Bolt #2 Torque = 5.9 (lb – ft)
  - Bolt #3 Torque = 14.6 (lb – ft)



H202 03 Taurus Fitzgerald v Ford
Acceleration and Delta Velocity Charts Continued



Evolution of Deployment Threshold

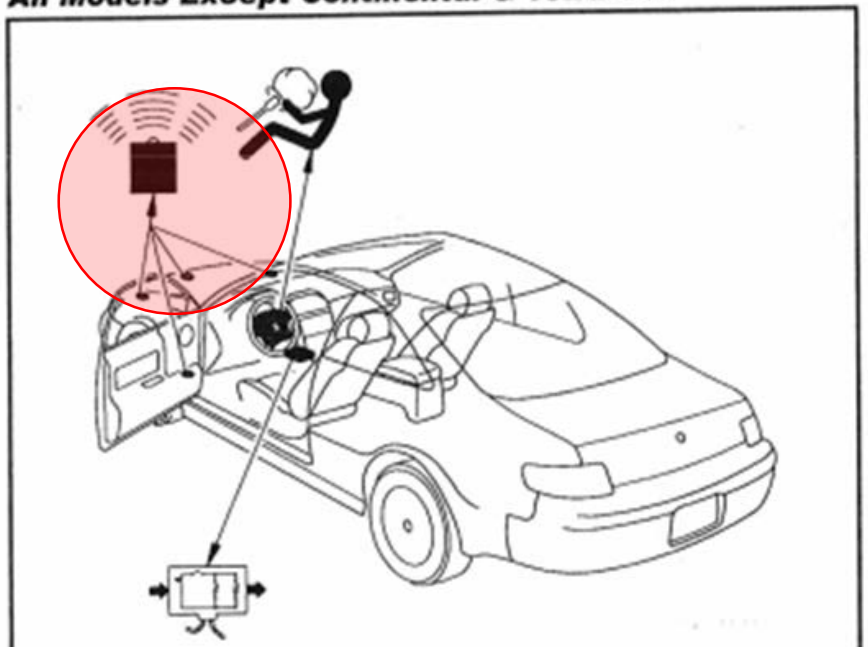
- 2000 MY to 2002 MY
  - Belted Occupant
  - Frontal
  - Gray zone: 14 – 22 mph
  - May or may not fire airbag

- 2003 MY
  - Belted Occupant
  - Angular Crash
  - No Fire: under 22 mph
  - Gray Zone: 22 – 31 mph

Evolution of Front Sensor Locations

90-2

All Models Except Continental & Town Car

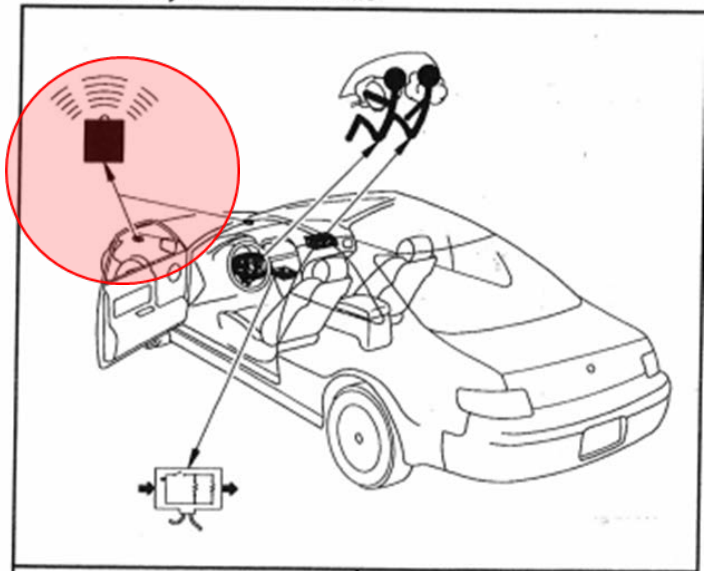


Component	Location
Control module	Under center console
Driver air bag module	On steering wheel

1990 Model: 3 sensors

97-3

Continental, Sable & Taurus

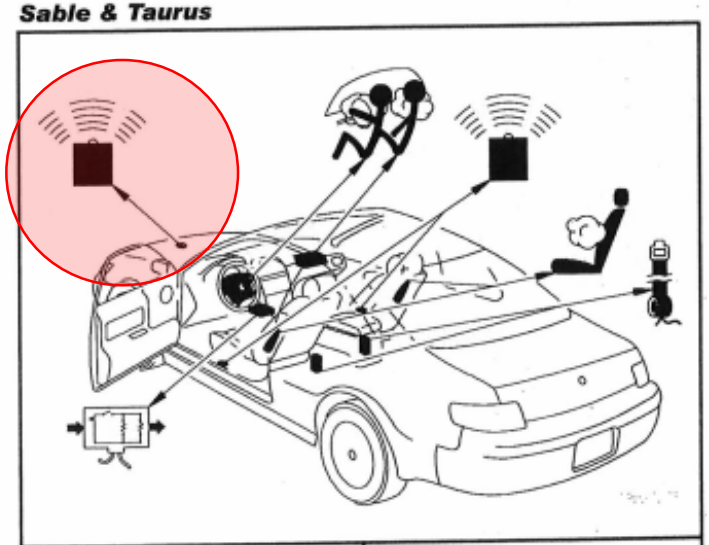


Component	Location
Control module	Center of instrument panel
Driver air bag module	On steering wheel
Impact sensors	Driver & passenger-side radiator support
Passenger air bag module	Passenger-side instrument panel

1997 Model: 2 sensors

Evolution of Front Sensor Locations

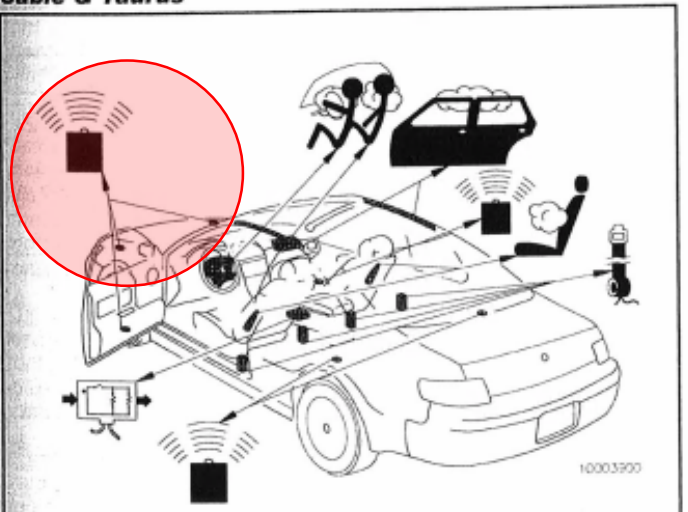
00-13
Sable & Taurus



Component	Location
Control module	Under center instrument panel
Driver air bag module	On steering wheel
Front impact sensor	Behind center grille
Passenger air bag module	Passenger-side instrument panel
Seat belt pretensioners	Driver & passenger front seat belt buckles
Side impact air bag modules	Driver & passenger-side front seat outer seat backs
Side impact air bag sensors	Under driver & passenger-side front seats

2003 Model: 1 sensor

08-14
Sable & Taurus



Component	Location
Control module	Under center of instrument panel
Driver air bag module	On steering wheel
Front impact sensors	Driver & passenger-side radiator support, inboard of headlight assemblies
Passenger air bag module	Passenger-side instrument panel
Seat belt pretensioners	Driver & passenger lower B-pillars

2008 Model: 2 sensors

Infotainment Systems

What does your car know about you?

Data Available: Cell Phones

- If you connect phone to car system:
  - Who and when you called
  - Who and when you texted
  - Photos
  - Media files

GPS Tracking Log

- Where did you go?
- What time where you there?
- What route did you take?

Driver Habits