

CL 10514171-2574

July 12, 2013

JUL 17 2013

Department of Transportation
NHSTA
ODI
1200 New Jersey Avenue SE
West Building
Washington, DC

To Whom It May Concern:

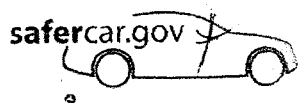
Enclosed is a copy of ODI complaint number 10514171 along with an Event Data Recorder – Reference Document prepared by Bosch at the request of the Toyota Motor Company. Please contact me if the report contains information regarding the crash, specifically, if the report indicates sudden acceleration.

Respectfully,

[Redacted Signature]

Clarksville, MD [Redacted]

ET
72213
SMD



Thank you for your Vehicle Safety Complaint

Your Complaint Information has been successfully submitted.

Your Confirmation Number (ODI Number) is: 10514171.

Your Complaint will be available within 72 hours at <http://www-odi.nhtsa.dot.gov/complaints/>.

An acknowledgement was sent to [REDACTED]

1. Vehicle Information

Vehicle Identification Number (VIN): JTDKB20UX77 [REDACTED]

Make / Model / Year: TOYOTA PRIUS 2007

2. Incident Information

Approximate Incident Date: 05/17/2013

Vehicle mileage at time of incident: 125,000

Vehicle speed at time of incident: (mph)

Affected Parts: Body, Lighting, Unknown or Other

Fire: No

Crash: Yes

Injury or Fatality: No

Tell us what happened:

At approximately 11:20 AM, I was waiting to have my car washed at a drive through car wash. A Chevrolet pickup truck had completed being washed and was stopped at the exit. The green light came on at the start of the car wash for me to proceed. I moved forward when suddenly the car lurched forward at what seemed to be top speed. I jammed my foot of the brake pedal and held it down but the car continued speeding. I eased the car into the left side wall of the car wash to slow down the momentum, but to no avail. I crashed into the back of the truck. The hood of the Prius went under the truck rear bumper. The air bags did not deploy. The Prius has been declared at total loss.

3. Personal Information

Name: [REDACTED]

Email: [REDACTED]

Daytime Phone: [REDACTED]

Evening Phone: [REDACTED]

Address1: [REDACTED]

Address2: [REDACTED]

City, State, Zip: Clarksville, MD [REDACTED]

1200 New Jersey Avenue, SE, West Building Washington DC 20590 USA 1.888.327.4236 TTY 1.800.424.9153

Event Data Recorder - Reference Document

An Event Data Recorder (EDR) is a part of the Supplemental Restraint System (SRS) ECU that records data for some types of collision events for future safety research or analysis. The EDR will record data when the vehicle experiences a rapid change in speed that exceeds a specified threshold. The threshold to start recording is above changes in speeds that are considered normal driving use. For example, stopping hard with the brakes would not cause a recording, but hitting a curb may. EDRs were installed on Toyota/Lexus/Scion vehicles because they have the capability to serve several purposes, such as assisting in vehicle development, quality control and/or safety research. An EDR is also helpful in determining the circumstances that caused an airbag to be deployed or not deployed.

EDR Generations

Starting with the 2001 Lexus LS400, EDRs were incorporated into to all Toyota, Lexus and Scion vehicles by 2007. SRS ECUs with EDRs were typically installed at full model change years, which generally occur every 4 to 6 years, depending on the model. The chart below outlines the three generations of EDRs installed on Toyota, Lexus, and Scion vehicles and what each EDR generation is capable of recording.

01MY	02MY	03MY	04MY	05MY	06MY
Gen 1		Gen 2		Gen 3	
EDR		★		★	
Frontal		Frontal Roll Over		Current EDR	
				Frontal Rollover Side Impact Multiple Events	

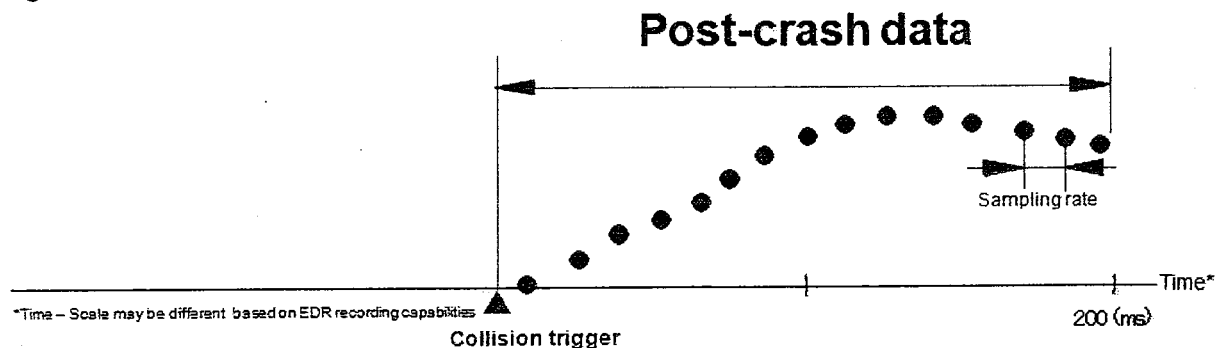
Note: MY stands for model year

Post-Crash & Pre-Crash data

Post-Crash Data - All vehicles equipped with an EDR will record post-crash data

If an impact occurs that has exceeded the rapid change in speed threshold, the EDR system will begin to record data for varying lengths of time depending on the parameters it is capable of recording. Figure 1 shows a collision 'trigger' and the data sampling rate recorded in the EDR.

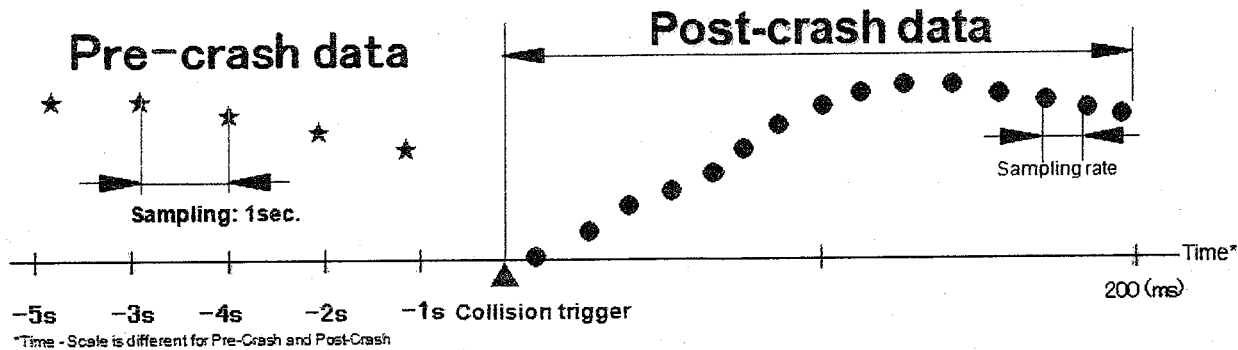
Figure 1



Pre-Crash Data - Not all models have an EDR capable of recording pre-crash data

As explained in the Post-crash section, the EDR System begins recording data when an impact exceeds the rapid change in speed threshold. On certain models, the EDR will also record about 5 seconds of data that took place before the impact. Figure 2 shows the sampling rate of Pre-Crash data is different than Post-Crash data.

Figure 2



Post Crash & Pre-Crash Applicability Chart

The chart below provides EDR capability of each model and the corresponding calendar year (CY) it was built. Vehicles and the corresponding year that have a yellow bar are equipped with EDR that have the ability to record post-crash data only. Vehicles and the corresponding year that have a red bar, are equipped with EDRs capable of pre & post-crash data recording.

		Post-crash data only Pre- & Post-crash data										
	Model Name	2000CY	2001CY	2002CY	2003CY	2004CY	2005CY	2006CY	2007CY	2008CY	2009CY	2010CY
Lexus	LS											
	LS HV											
	GS											
	GS HV											
	SC											
	ES											
	LX											
	GX											
	RX											
	RX HV											
	IS											
	IS-F											
	IS-C											
	HS											
CT												
Toyota	LFA											
	Avalon											
	Camry											
	Camry Solara											
	Corolla											
	Echo											
	4Runner											
	Land Cruiser											
	RAV4											
	Sienna											
	Prius											
	Highlander											
	Highlander HV											
	Tacoma											
	Tundra											
	SEQUOIA											
	Yaris											
	Yaris Sedan											
	FJ Cruiser											
	Venza											
SCION	Matrix											
	tC											
	xA											
	xB											

EDR - Frequently Asked Questions

What is an EDR? An Event Data Recorder (EDR) is part of the Supplemental Restraint System (SRS) ECU that records data for some types of collision events for future safety research or analysis. An event is a change in vehicle speed that is more than typical of everyday use. For example, stopping hard with the brakes would not cause a recording, but hitting a curb may cause the EDR to record an event.

Are EDRs required in cars? They are currently not required.

Is the EDR a black box? No, the EDR is not a black box like on an airplane. It does not record sounds or conversations and does not have the capacity like an airplane blackbox. The EDR is simply part of the Supplemental Restraint System (SRS) ECU that only records certain vehicle data for a short period of time before or during a collision.

What causes the EDR to record? The EDR starts to record when the vehicle experiences a rapid change in speed (like acceleration or deceleration) that exceeds a specified threshold higher than normal use. Hard braking will not cause an EDR to record, because that may be considered normal use. Impacting a curb hard may cause a recording as the vehicle body may change speed much quicker than normal use.

Why were EDRs installed in Toyota/Lexus/Scion vehicles? EDRs have the capability to serve several purposes, such as assisting in vehicle development, quality control or safety research. Airbag deployment occurs very rapidly and it may be difficult to determine exactly what occurred during a collision. Although indirect methods may be used to determine airbag deployment circumstances, an EDR is a more direct method to understand airbag deployment circumstances.

Do all EDRs record the same information? No. Due to different vehicle designs and changes in equipment, the information recorded varies by model and model year.

Were there other recording systems before EDR in Toyota vehicles? Yes, some vehicles in the past had some impact recording capabilities, but these were not considered reliable for field use. There is no current capability to read these predecessors to EDRs.

How accurate is the EDR data? The accuracy of the data from the EDR depends on the collision and the EDR capabilities. Government studies of Toyota EDRs indicate that Toyotas EDRs have similar capabilities to other vehicle manufacturers.

What has Toyota done to validate its EDRs and EDR tools? Toyota has been analyzing data from vehicles since they were first introduced to ensure the reliability of the EDR technology. Toyota performs imaging of our own vehicles as part of crash testing. Toyota also performs EDR imaging from U.S. Government crash testing and investigations, and when requested, in law enforcement investigations.

How does the EDR record information? During a collision, the EDR calculates the delta V based on accelerometer data every 10 milliseconds and puts it into the permanent memory. During the intervals, other data is also placed into memory. If all the data is not transferred into the permanent memory, a writing flag is put on the report. If all data is successfully transferred, the report states 'Finished writing'. In some very severe impacts, electrical connections or internal EDR components may be damaged, resulting in incomplete data transfer to the permanent memory.

How long is an event stored in the EDR? If the airbags are deployed in a collision, the EDR data is locked and cannot be erased or overwritten. If the airbags have not been deployed in previous EDR events, an event that causes the vehicle to experience a rapid change in speed (example: hitting a curb) that exceeds a specified threshold will overwrite previous EDR events.

Why is a signed consent form required before performing imaging? Various states have privacy regulations that require consent before performing an EDR image.

How is EDR data retrieved and does the retrieval process affect/change the data contained in the EDR? Depending on the vehicle's condition, data can be imaged in one of two ways. The EDR tool is either connected through the vehicle's DLC port, or the EDR is removed from the vehicle and the EDR tool is connected directly to the SRS ECU. Neither method alters or erases EDR data during the process. In some rare circumstances such as water immersions- the EDR data may not be able to be imaged.

What will I receive after the EDR image process has taken place on my vehicle? After the imaging has been completed, the EDR report and other reference documents will be provided.

What is the difference between vehicle speed and delta V? Vehicle speed is how fast the vehicle moves relative to the ground - usually in miles per hour. It is understood that vehicle speed is the straight line speed of the entire vehicle. Delta V is the change in vehicle speed over milliseconds and is usually discussed as longitudinal, lateral or total delta V.

Is there more than one deltaV? In some EDR reports there are longitudinal and lateral delta V data.

Why can't the EDR tool operator just tell the customer what the report says? Crashes can be very complex events. The EDR report is just one piece of information and without knowing other critical crash information, the EDR data could be misinterpreted with the context for the overall crash.

Can the EDR tell me the date and time of collision? No, the EDR does not have a time stamp function.

- The recording trigger judgment threshold value differs depending on the collision type (i.e., frontal crash, rear crash, side crash, or rollover event).
- Some of the data recorded by the airbag ECU is transmitted to the airbag ECU from various vehicle control modules by the vehicle's Controller Area Network (CAN).
- In some cases, the airbag ECU part number printed on the ECU label may not match the airbag ECU part number that the CDR tool reports. The part number retrieved by the CDR tool should be considered as the official ECU part number.
- The sampling interval of "Roll Angle" and "Lateral Acceleration" is 8 [ms] or 128 [ms]. A field indicating the sampling interval is not provided. The graph scaling can assist with determining the sample rate. The time zero is indicated by count (0).
- "Prior Event" is the event that occurred before the "1st Prior Event" that reached the greatest MAX Delta-V. Therefore, "Prior Event" is not always the prior event of "1st Prior Event".

Data Element Sign Convention:

The following table provides an explanation of the sign notation for data elements that may be included in this CDR report.

Data Element Name	Positive Sign Notation Indicates
Max. Longitudinal Delta-V	Forward
Longitudinal Delta-V	Forward
Roll Angle Peak	Clockwise Rotation
Roll Angle	Clockwise Rotation
Lateral Acceleration, Airbag ECU Sensor *	Right to Left

* For sensing a rollover

Data Definitions:

- The "ON" setting for the "Freeze Signal" indicates a state in which the non-volatile memory can not be overwritten or deleted by the airbag ECU. After "Freeze Signal" has been turned ON, subsequent events will not be recorded.
- "Recording Status" indicates a state in which all recorded event data has been written into the non-volatile memory, or a state in which this process was interrupted and not fully written into the non-volatile memory. If "Recording Status" is "Incomplete", recorded event data may not be valid.
- "Time to Deployment Command" indicates the time between recording trigger establishment and the determination of airbag deployment. This value may differ from the actual time it takes for the airbag to fully deploy.
- Even if an airbag/pretensioner did not deploy due to the "front passenger airbag disable switch and/or "RSCA Disable Switch" in the ON position or other disabling criteria are met, the "Time to deployment command" data element for that airbag/pretensioner may still be recorded.
- "Engine RPM" indicates the number of engine revolutions, not the number of motor revolutions. The recorded value has an upper limit of 6,000 rpm. Resolution is 400 rpm and the value is rounded down and recorded. For example, if the actual engine speed is 799 rpm, the recorded value will be 400 rpm.
- The upper limit for the recorded "Vehicle Speed" value is 126 km/h (78.3mph). Resolution is 2km/h (1.2mph) and the value is rounded down and recorded. The accuracy of the "Vehicle Speed" value can be affected by various factors. These include, but not limited, to the following.
 - Significant changes in the tire's rolling radius
 - Wheel lock and wheel slip
- The "Accelerator Rate" value is recorded as a voltage or level. In the case of voltage, the voltage increases as the driver depresses the accelerator. In case of the level, the following three levels are recorded.
 - FULL / MIDDLE / OFF
- "Accelerator Rate" may be recorded as "OFF" even if the accelerator pedal is depressed lightly. In addition, "FULL" may be recorded when the accelerator pedal is depressed strongly but not fully.
- The "Drive" setting for the "Shift Position" value indicates the shift position state is other than "R,"(Reverse), "N" (Neutral), or "P" (Park).
- Depending on the type of occupant sensor installed in the vehicle, one of the following three recording formats for "Occupancy Status, Passenger" will be utilized.
 - Occupied / Not Occupied
 - Adult / Child / Not Occupied
 - AM50 / AF05 / Child / Not Occupied
- Resolution of the "Air Bag Warning Lamp ON Time Since DTC was Set" is 15 minutes, and the value is rounded down and recorded.
- "Longitudinal Delta-V" indicates the change in forward speed after establishment of the recording trigger. This does not refer to vehicle speed, and it does not include the change in speed during the period from the start of the actual collision to establishment of the recording trigger.
- "Roll Angle peak" may not always match the peak value within the "Roll Angle" sampling points due to differences in data calculation method.
- For "Lateral Delta-V", the sensor location (B-pillar, front door, C-pillar, and slide door) shows the outline of a typical sensor position. Sensory location can be confirmed using the repair manual.
- "TRG Count" indicates the number of frontal/rear recording triggers that have been established. The calculated value does not include the number of times side or rollover recording triggers have been established. The sequence in which each frontal/rear event occurred can be verified from the "TRG Count". The lesser the "TRG Count" value, the older the data. The upper limit for the recorded value is 255 times. When more than one event reaches the upper limit, the actual "TRG Count" may be greater than what is displayed for that event.

- Resolution of the "Time from Pre-Crash to TRG" is 100 [ms], and the value is rounded down and recorded.
- For "Time from Previous TRG", the recording trigger of side crash and rollover is not considered. The upper limit for the recorded value is 5000 [ms] or 5100 [ms] depending on the ECU part number. Resolution is 20 [ms] and the value is rounded down and recorded. When it's displayed as 5100ms, the actual "Time from Previous TRG" may be longer than what is displayed for that event

05002 ToyotaDENSO r016

System Status at Time of Retrieval

ECU Part Number	89170-47070
ECU Generation	02EDR
Recording Status, All Pages	Complete
Diagnostic Trouble Codes Exist	No
Total Number of Front/Rear Crash Events	3
Freeze Signal	OFF

Front/Rear Event Record Summary at Retrieval

Events Recorded	TRG Count	Crash Type	Time (msec)	Event & Crash Pulse Data Recording Status
Most Recent Frontal/Rear Event	4	Front/Rear Crash	0	Complete (Front/Rear Page 0)
1st Prior Frontal/Rear Event	3	Front/Rear Crash	-840	Complete (Front/Rear Page 2)
Prior Frontal/Rear Event	2	Front/Rear Crash	-1000	Complete (Front/Rear Page 1)

System Status at Front Airbag Deployment

Time to Deployment Command, Front Airbag, Driver (msec)	Not Commanded
Time to Deployment Command, Front Airbag, Passenger (msec)	Not Commanded
Event Severity Status, Driver	N/A
Event Severity Status, Passenger	N/A

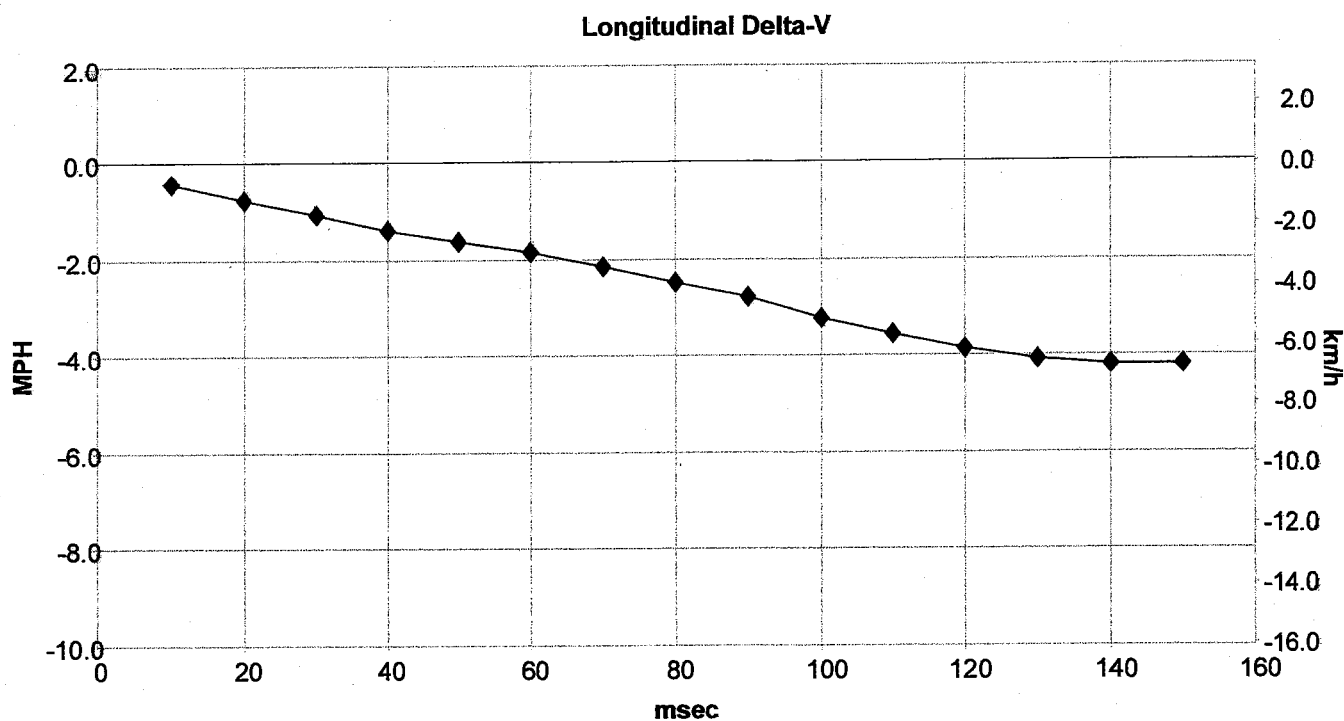
System Status at Event (Most Recent Frontal/Rear Event, TRG 4)

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	4
Time From Previous TRG (msec)	840
Buckle Switch, Driver	Unbuckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

Longitudinal Crash Pulse (Most Recent Frontal/Rear Event, TRG 4 - table 1 of 2)

Max Longitudinal Delta-V (MPH [km/h])

-4.2 [-6.7]



Longitudinal Crash Pulse (Most Recent Frontal/Rear Event, TRG 4 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.4 [-0.7]
20	-0.8 [-1.2]
30	-1.1 [-1.7]
40	-1.4 [-2.2]
50	-1.6 [-2.6]
60	-1.8 [-2.9]
70	-2.1 [-3.4]
80	-2.5 [-4.0]
90	-2.8 [-4.5]
100	-3.2 [-5.2]
110	-3.5 [-5.7]
120	-3.9 [-6.2]
130	-4.1 [-6.6]
140	-4.2 [-6.7]
150	-4.2 [-6.7]

DTCs Present at Start of Event (Most Recent Frontal/Rear Event, TRG 4)

Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

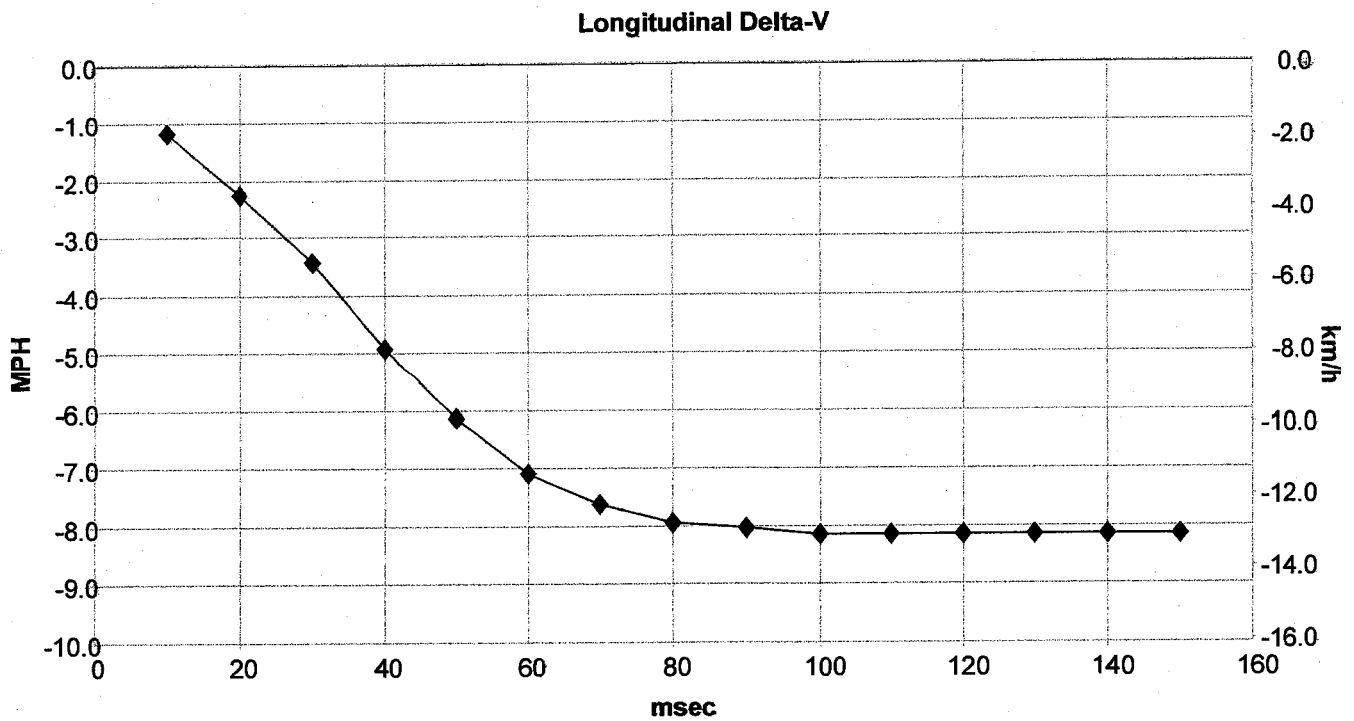
System Status at Event (1st Prior Frontal/Rear Event, TRG 3)

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	3
Time From Previous TRG (msec)	160
Buckle Switch, Driver	Unbuckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

Longitudinal Crash Pulse (1st Prior Frontal/Rear Event, TRG 3 - table 1 of 2)

Max Longitudinal Delta-V (MPH [km/h])

-8.1 [-13.1]



Longitudinal Crash Pulse (1st Prior Frontal/Rear Event, TRG 3 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-1.2 [-1.9]
20	-2.2 [-3.6]
30	-3.4 [-5.5]
40	-4.9 [-7.9]
50	-6.1 [-9.8]
60	-7.1 [-11.4]
70	-7.6 [-12.2]
80	-7.9 [-12.8]
90	-8.0 [-12.9]
100	-8.1 [-13.1]
110	-8.1 [-13.1]
120	-8.1 [-13.1]
130	-8.1 [-13.1]
140	-8.1 [-13.1]
150	-8.1 [-13.1]

DTCs Present at Start of Event (1st Prior Frontal/Rear Event, TRG 3)

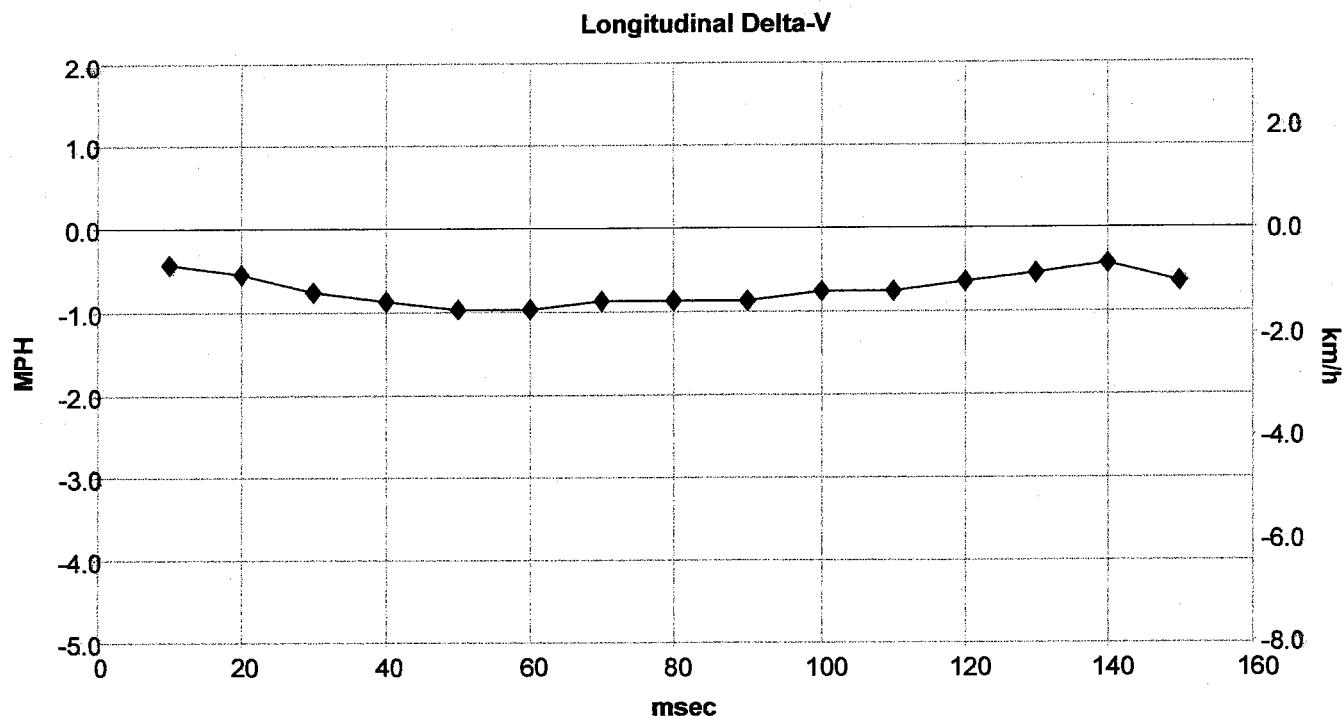
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

System Status at Event (Prior Frontal/Rear Event, TRG 2)

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	2
Time From Previous TRG (msec)	5000 or greater
Buckle Switch, Driver	Unbuckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

Longitudinal Crash Pulse (Prior Frontal/Rear Event, TRG 2 - table 1 of 2)

Max Longitudinal Delta-V (MPH [km/h])	-1.0 [-1.6]
---------------------------------------	-------------



Longitudinal Crash Pulse (Prior Frontal/Rear Event, TRG 2 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.4 [-0.7]
20	-0.5 [-0.9]
30	-0.8 [-1.2]
40	-0.9 [-1.4]
50	-1.0 [-1.6]
60	-1.0 [-1.6]
70	-0.9 [-1.4]
80	-0.9 [-1.4]
90	-0.9 [-1.4]
100	-0.8 [-1.2]
110	-0.8 [-1.2]
120	-0.6 [-1.0]
130	-0.5 [-0.9]
140	-0.4 [-0.7]
150	-0.6 [-1.0]

DTCs Present at Start of Event (Prior Frontal/Rear Event, TRG 2)

Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

Hexadecimal Data

Data that the vehicle manufacturer has specified for data retrieval is shown in the hexadecimal data section of the CDR report. The hexadecimal data section of the CDR report may contain data that is not translated by the CDR program. The control module contains additional data that is not retrievable by the CDR system.

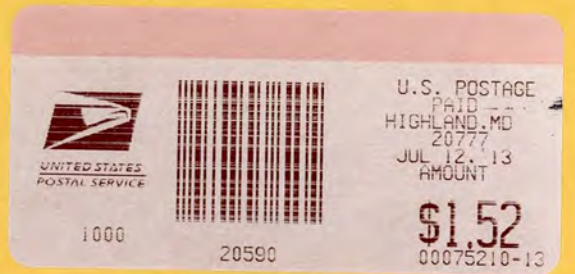
PIDs	PID	Data
	00	BC 00 00 01
	01	00
	03	34 37 30 37 30 34 37 30 34 30 34 37 30 34 30 34 37 30 32 30 34 37 30 33 30 30 30 30 46 42 30 30 30 46 42
	04	02 02 01 01
	05	02
	06	00
	20	80 00 00 01
	21	00 01
	40	00 00 00 01
	60	00 00 00 01
	80	00 00 00 01
	A0	00 00 00 01
	C0	00 00 00 01
	E0	C0 10 00 00
	E1	01 01
	E2	00 5B 1F 11 00
	EC	FF

EEPROM	Address	Data (-- = data not imaged from ECU) (** = no response from ECU)
	0	-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
	10	-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
	20	-- -- -- -- -- -- -- -- -- -- -- -- -- -- 00 00
	30	00 00 FF FF 00 80 00 00 00 00 00 00 00 00 FF FF
	40	99 04 54 03 00 03 00 03 00 02 00 02 00 03 00 03
	50	00 03 00 04 00 03 00 03 00 02 00 01 00 00 00 02
	60	00 2A 00 04 00 00 00 00 00 00 00 00 00 00 00 00
	70	00 00 00 00 00 00 00 00 99 04 54 01 00 02 00 01
	80	00 01 00 00 00 FF 00 00 00 00 00 FF 00 00 00 FF
	90	00 FF 00 FF 00 02 00 00 00 FA 00 02 00 00 00 00
	A0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	B0	99 0B 54 0A 00 0B 00 0E 00 0B 00 09 00 05 00 03
	C0	00 01 00 01 00 00 00 00 00 00 00 00 00 00 04
	D0	00 08 00 03 00 00 00 00 00 00 00 00 00 00 00
	E0	00 00 00 00 00 00 00 00

Disclaimer of Liability

The users of the CDR product and reviewers of the CDR reports and exported data shall ensure that data and information supplied is applicable to the vehicle, vehicle's system(s) and the vehicle ECU. Robert Bosch LLC and all its directors, officers, employees and members shall not be liable for damages arising out of or related to incorrect, incomplete or misinterpreted software and/or data. Robert Bosch LLC expressly excludes all liability for incidental, consequential, special or punitive damages arising from or related to the CDR data, CDR software or use thereof.

Clarksville, MD



Department of Transportation
NHSTA
ODI
1200 New Jersey Ave, SE
West Building
Washington Dc. 20590