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**National Highway
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Special Crash Investigations On-Site Guardrail End Terminal Investigation Vehicle: 2016 Volkswagen Jetta Location: California Crash Date: February 2018

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16. Abstract This single-vehicle crash occurred during the afternoon on an interstate highway in California in February 2018. The Volkswagen Jetta was being driven eastbound by an unbelted 22-year-old male. The front right seat was occupied by a belted 25-year-old male. The Volkswagen traveled off the right edge of the roadway and struck the X-Lite end terminal of the guardrail with its front plane. Several rail panels were displaced as the guardrail telescoped. At some point the guardrail overrode the vehicle and penetrated the vehicle's windshield while exiting through the backlight. The vehicle came to rest off the right edge of the roadway on the field side of the guardrail. The driver sustained fatal head injuries and was pronounced deceased at the scene. The front right passenger sustained "A" injuries (suspected serious injury) and was hospitalized for two days.			
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**Special Crash Investigations (SCI)
On-Site Guardrail End Terminal Investigation
Case Number: DS18005
Vehicle: 2016 Volkswagen Jetta
Location: California
Crash Date: February 2018**

BACKGROUND

This report documents the on-site guardrail end terminal investigation of an X-Lite guardrail end terminal struck by a 2016 Volkswagen Jetta and the fatal injuries sustained by the driver (**Figure 1**). The investigation was intended to determine what role the guardrail may have played in causing injuries to the driver. This crash was initiated in response to a notification from a local transportation representative. The Federal Highway Administration (FHWA) reviewed the



Figure 1. 2016 Volkswagen Jetta, final rest, looking east (California Department of Transportation image).

notification and associated images and determined that the guardrail qualified for investigation. The Special Crash Investigation (SCI) group of the National Highway Traffic Safety Administration assigned the case to the SCI team in February 2018. The scene and vehicle inspections took place in February 2018. Representatives from the California Department of Transportation setup a lane closure for the scene inspection. Police and tow personnel were present during the vehicle inspection. The vehicle was supported by the Bosch Crash Data Retrieval (CDR) system and the vehicle's event data recorder (EDR) was imaged during the inspection.

This single-vehicle crash occurred during the afternoon on an interstate highway in California in February 2018. The Volkswagen Jetta was being driven eastbound by an unbelted 22-year-old male. The front right seat was occupied by a belted 25-year-old male. The Volkswagen traveled off the right edge of the roadway and struck the X-Lite end terminal of the guardrail with its front plane. Several rail panels were displaced as the guardrail telescoped. At some point the guardrail overrode the vehicle and penetrated the vehicle's windshield while exiting through the backlight. The vehicle came to rest to the right of the roadway on the field side of the guardrail. The driver sustained fatal head injuries and was pronounced deceased at the scene. The front right passenger sustained "A" injuries (suspected serious injury) and was hospitalized for two days.

SUMMARY

Crash Site

The crash site was the eastbound lanes of a two-lane divided interstate highway in a rural area of California (**Figure 2**). The asphalt roadway was straight and had a positive 1 percent grade. The travel lanes were separated by dashed white lines. The roadway was bordered on the right by a white fog line, asphalt shoulder with rumble strip, asphalt curb, and metal W-beam guardrail. It was bordered on the left by a yellow fog line, asphalt shoulder, and metal W-beam guardrail. The roadway was dry and it was daylight at the time of the crash. The posted speed limit was 112 km/h (70 mph). The weather at the nearest report station was 12 degrees C (55 degrees F), 59 percent humidity, clear visibility and the wind direction was southwest at 29.6 km/h (18.4 mph). A crash diagram is attached at the end of this technical report.



Figure 2. Eastbound approach.

Pre-Crash

The Volkswagen was traveling eastbound in the first lane from the right at an EDR-reported speed of 121 km/h (75 mph) at -5.0 seconds prior to algorithm enable (AE). The service brake was off and the accelerator pedal was at 46 percent. The vehicle speed and engine RPM increased slightly and the service brakes remained off during the next 5 seconds. The vehicle traveled 169 m (555 ft) during this time. For unknown reasons, the vehicle crossed over the white fog line and traveled off the right edge of the roadway.

Crash

As the vehicle departed the shoulder on the right, the front plane struck the X-Lite barrier end terminal (**Figure 3**). The WinSMASH program calculated a barrier equivalent speed (BES) of 31 km/h (19.2 mph). The EDR reported a maximum longitudinal delta-V of -31.0 km/h (-19.2 mph) and a maximum lateral delta-V of -5.0 km/h (-3.1 mph). The driver's and



Figure 3. X-Lite barrier end terminal.

passenger's frontal air bags and both inflatable curtain (IC) air bags deployed and both seat belt pretensioners actuated during this impact. The guardrail penetrated the vehicle, entering through the windshield and exiting through the backlight. The vehicle came to rest facing northeast while still impaled on the guardrail near post 11.

Post-Crash

The driver was fatally injured and declared deceased on scene. The front right occupant was able to exit the vehicle on his own but was seriously injured. He was transported by ambulance to a local trauma center for treatment and was hospitalized for two days. The vehicle was towed from the scene after portions of the guardrail were cut away.

GUARDRAIL DAMAGE

The guardrail end terminal in this crash was a Lindsay X-Lite tangent redirective gating guardrail terminal. It uses a fixed impact head on a W-beam rail section. During an end impact, the W-beam rails “telescope” back and energy is dissipated by friction. Special shear bolts are used at the W-beam splices to facilitate the telescoping action. When hit directly on the end, the vehicle pushes the first rail panel and the slider panel over the second rail panel (telescoping). The head measured 60 cm x 35 cm (24.0 x 14.0 in). It was designed with a ground strut between posts 1 and 2. A cable is attached to the slider bracket which is bolted to the second rail element. The first 9 steel posts measured 15 x 10 cm (6.0 x 4.0 in). The next 6 measured 15 x 15 cm (6.0 x 6.0 in). The posts were spaced approximately 190 cm (75.0 in) apart. The bolt slots for post 1 (leading) and post 2 (trailing) were aligned correctly. The guardrail height was 78 cm (31.0 in). During the crash, panels 1, 2, and 3 telescoped together and panel 4 penetrated the vehicle (**Figure 4**). Eleven posts were damaged and deformed as the vehicle overrode them. They were deformed in an easterly direction. The measured distance from the top of the posts to the ground was as follows:

- 1: 5 cm (1.9 in)
- 2: 2 cm (0.8 in)
- 3: 2 cm (0.8 in)

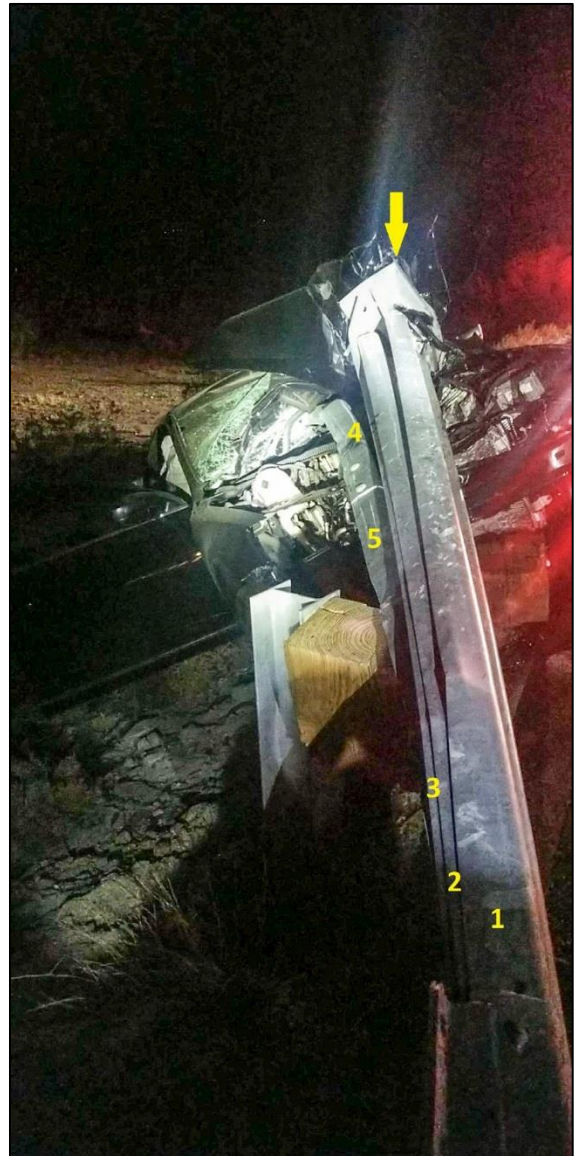


Figure 4. Struck terminal end, looking southwest (California Department of Transportation photo). Arrow shows end terminal position.

- 4: 4 cm (1.5 in)
- 5: 3 cm (1.3 in)
- 6: 5 cm (1.9 in)
- 7: 5 cm (1.9 in)
- 8: 11 cm (4.3 in)
- 9: 13 cm (5.1 in)
- 10: 13 cm (5.1 in)
- 11: 24 cm (9.4 in)

The total length of rail damaged was approximately 19.2 m (63.0 ft).

2016 VOLKSWAGEN JETTA

Description

The 2016 Volkswagen Jetta was a 4-door sedan that was identified by the Vehicle Identification Number 3VW267AJ3GMxxxxxx. The vehicle was configured with a 1.4-liter, 4-cylinder, gasoline engine, a 6-speed automatic transmission, front-wheel drive, and 4-wheel ABS. The vehicle manufacturer's recommended tire size was P195/65R15 with a cold pressure of 248 kPa (36 psi). The vehicle was equipped with Yokohama YK580 P205/55R16 tires for the front, a Dunlop SL 55A tire of the same size for the left rear, and a Goodyear tire of the same size for the right rear. The specific tire information was as follows:

Position	Measured Tread Depth	Restricted	Damage
LF	3 mm (4/32 in)	No	None
LR	4 mm (5/32 in)	No	None
RR	3 mm (4/32 in)	No	None
RF	5 mm (6/32 in)	No	None

The Volkswagen was configured with seating for five occupants. The front row was equipped with bucket seats with adjustable head restraints. Both front seats were adjusted to the middle track position. The second row was equipped with a bench seat with folding backs with adjustable head restraints.

Exterior Damage

The Volkswagen sustained moderate front plane damage from the impact with the guardrail end terminal and the penetration of the passenger compartment (**Figure 5**). The direct damage began 26 cm (10.2 in) to the right of the left bumper corner and extended 50 cm (19.6 in) to the right. The Field L extended from bumper corner to bumper corner. Thirteen measurements were taken at bumper backing bar level by the Nikon Total Station, after adjusting for freespace, and the Faro Blitz program computed crush measurement in six increments as follows: $C_1 = 2$ cm (0.8 in), $C_2 = 15$ cm (5.9 in), $C_3 = 41$ cm (16.1 in), $C_4 = 30$ cm (11.8 in), $C_5 = 11$ cm (4.3 in), $C_6 = 6$ cm

(2.3 in). The occupant compartment area was damaged by the hood after being displaced rearward by the end terminal and by being fully penetrated by one of the guardrail panels (**Figure 6**). The calculated principal direction of force, using the EDR longitudinal and lateral components, was 10 degrees. The collision deformation classification (CDC) was 12FYAW9.

Event Data Recorder

The Volkswagen was equipped with an airbag control module (ACM) that had EDR capability to store deployment and non-deployment events. This ACM was capable of recording up to six events. Each record contains 5 seconds of pre-crash data and at least 300 ms of post-crash data. The oldest non-deployment event will be overwritten first. The pre-crash data includes engine RPM, vehicle speed, accelerator pedal percentage, and service brake activation.

The data from the Volkswagen's EDR was imaged using the Bosch Crash Data Retrieval Tool version 17.6.1 using the DLC method and reported using version 19.0. Five events were recovered, three from ignition cycle 4,605, one from ignition cycle 2,474, and one from ignition cycle 395. The first three events were related to this crash.

The first event (Record 3) resulted from the impact with the guardrail end terminal and was a deployment event. The maximum longitudinal delta-V was -34.0 km/h (-21.1 mph). The maximum lateral delta-V was -4.0 km/h (-2.5 mph). The calculated principal direction of force was 10 degrees. The Bosch CDR report is included at the end of this report and the EDR-reported data not discussed elsewhere in this report was summarized as follows.

The pre-crash data at impact was as follows:

Engine RPM:	2240
Vehicle Speed:	124 km/h (77 mph)
Accelerator Pedal (percent):	46
Service Brake Activation:	Off



Figure 5. Frontal damage, 2016 Volkswagen Jetta.



Figure 6. 2016 Volkswagen Jetta, guardrail panel intrusion. Arrow indicates guardrail exiting vehicle through backlight.

The second event (Record 2) occurred 870 ms after the first. The maximum longitudinal delta-V was -38.0 km/h (-23.6 mph). The maximum lateral delta-V was -15.0 km/h (-9.3 mph). The calculated principal direction of force was 20 degrees.

The third event (Record 1) occurred 447 ms after the second. The maximum longitudinal delta-V was 8.0 km/h (5.0 mph). The maximum lateral delta-V was -6.0 km/h (-3.7 mph). The calculated principal direction of force was 140 degrees.

These latter two events likely occurred as the guardrail telescoped and was displaced with the vehicle rotating counterclockwise.

Interior Damage

The Volkswagen sustained major interior damage from intrusion and occupant contacts (**Figure 7**). The damage included the windshield and backlight. The steering wheel was deformed due to occupant loading.



Figure 7. 2016 Volkswagen Jetta, interior damage.

Manual Restraint Systems

The front row was equipped with driver and front right passenger lap and shoulder seat belts. The driver's belt was equipped with continuous loop belt webbing, a sliding latch plate, an emergency locking retractor (ELR), and an adjustable upper anchor that was adjusted to the full down position.

The front right passenger's seat belt was equipped the same as the driver's, but had a switchable ELR/automatic locking retractor (ALR). The front seat positions were equipped with retractor-mounted seat belt pretensioners that actuated at 222 ms. The driver's belt was locked in the stowed position. The front right passenger's belt was locked in the used position. The EDR reported that the driver's seat belt was "Not Belted" and the front passenger seat belt was "Belted." The second row was equipped with lap and shoulder seat belts for the three second-row seat positions.

Supplemental Restraint Systems

The Volkswagen's supplemental restraint systems included a air bag control module, driver's and passenger's frontal air bags, seat-mounted front row side air bags, and front and second row side impact IC air bags.

Both stages of the driver's frontal air bag deployed from the steering wheel hub during the impact with the guardrail end terminal. Both stages of the passenger's frontal air bag deployed from the top of the instrument panel during the same impact. The left seat-mounted side air bag and left IC air bag also deployed during this impact.

The driver's frontal air bag was cut and removed during the removal of the driver. The passenger's frontal air bag measured 40 x 50 cm (15.7 x 19.6 in). The IC air bags measured 193 cm (75.8 in) in length and 50 cm (19.6 in) in height. They were attached to the A- and C-

pillars by 18 cm (7.0 in) and 20 cm (7.8 in) tethers, respectively. They were undamaged and unremarkable.

NHTSA Recalls and Investigations

There were no recalls or investigations associated with this vehicle. The recall database was last queried in June 2019.

2016 VOLKSWAGEN JETTA OCCUPANTS

Driver Demographics

Age/Sex: 22 years/male
 Height: 183 cm (72 in)
 Weight: 101 kg (223 lbs)
 Eyewear: Unknown
 Seat type: Bucket
 Seat track position: Middle
 Manual restraint usage: Lap and shoulder seat belt not used
 Usage source: Vehicle inspection, EDR report
 Air bags: Frontal and IC air bag deployed
 Alcohol/drug data: Unknown
 Egress from vehicle: Occupant fatal before removal
 Transport from scene: None
 Type of medical treatment: None, fatal

Driver Injuries

Injury No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Brainstem transection, complete at the lower medulla	140218.6	Guardrail	Certain
2	Brain lacerations, avulsed cerebral cortex	140692.5	Guardrail	Certain
3	Brain contusions, frontal and temporal lobes with fragmentation of the right frontal temporal lobes	140626.5	Guardrail	Certain

Injury No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
4	Comminuted skull fractures, open fracture of right frontal and temporal bones, comminuted fractures of anterior and middle cranial fossae, fracture through sphenoid bone and fractures along the ethmoid plate	150406.4	Guardrail	Certain
5 6 7 8	Comminuted fractures of nasal bone, zygomatic, maxilla, and mandible	251000.1 251814.2 250800.2 250610.2	Guardrail	Certain
9	Bilateral and right temporal subgaleal hemorrhages	110402.1	Guardrail	Certain
10	Subarachnoid hemorrhage, cerebral hemispheres and base of brain	140693.2	Guardrail	Certain
11	Laceration, 10 cm (3.9 in), extends from medial left upper eyelid to right temporal scalp	210604.2	Guardrail	Certain
12	Laceration, 1.9 cm (4.8 in), base of right ear to posterior right temporal scalp	210600.1	Guardrail	Certain
13	Laceration, lateral right upper lip and corner of mouth	210600.1	Driver air bag	Possible
14	Abrasion, base of chin	210202.1	Driver air bag	Probable

Injury No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
15	Abrasion, lateral right neck	310202.1	Driver air bag	Probable
16 17	Abrasion, linear, 17.7 x 3.8 cm (7 x 1.5 in), left upper chest to right pectoral chest (laceration along the left lateral margin)	410202.1 410600.1	Steering wheel rim	Probable
18	Petechial hemorrhages, left supraclavicular fossa	710402.1	Driver air bag	Probable
19	Abrasions, lateral right neck over medial right clavicle and onto right upper chest	410202.1	Guardrail	Possible
20	Obliquely oriented, linear, abrasions inferior right chest	410202.1	Steering wheel rim	Probable
21	Abrasions, lateral left abdomen and inferolateral right abdomen	510202.1	Steering wheel rim	Probable
22	Laceration, superior right shoulder	710600.1	Guardrail	Possible
23	Abrasions, dorsal right upper arm, dorsal forearm, dorsal surface of right hand	710202.1	Guardrail	Probable
24	Abrasions, left hand and forearm	710202.1	Instrument panel	Possible

Injury No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
25	Contusion, 10.1 x 5.0 cm (4 x 2 in), anteriomedial right thigh	810402.1	Steering wheel rim	Probable
	Postmortem chemical burns	Not Codeable		

Source: Autopsy Report

Driver Kinematics

The driver of the Volkswagen was seated in an unknown posture and was not belted. His activity prior to the crash is not known. At impact with the guardrail the driver was displaced forward and contacted the deployed frontal air bag and loaded the steering wheel rim. The lower rim was deformed forward 5 cm (1.9 in). The driver was struck by the intruding guardrail panel. He came to rest in the vehicle.

Front Row Right Passenger Demographics

Age/Sex: 25 years/male
 Height: Unknown
 Weight: Unknown
 Eyewear: Unknown
 Seat type: Bucket
 Seat track position: Middle
 Manual restraint usage: Lap and shoulder belt used
 Usage source: Vehicle inspection and EDR report
 Air bags: Frontal and IC air bag deployed
 Egress from vehicle: Exited under own power
 Transport from scene: Transported by ambulance
 Type of medical treatment: Hospitalized for two days

Front Row Right Passenger Injuries

Injury No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Laceration, left occipital scalp	110602.1	Guardrail	Certain
2	Laceration, right index finger	710600.1	Unknown	Unknown

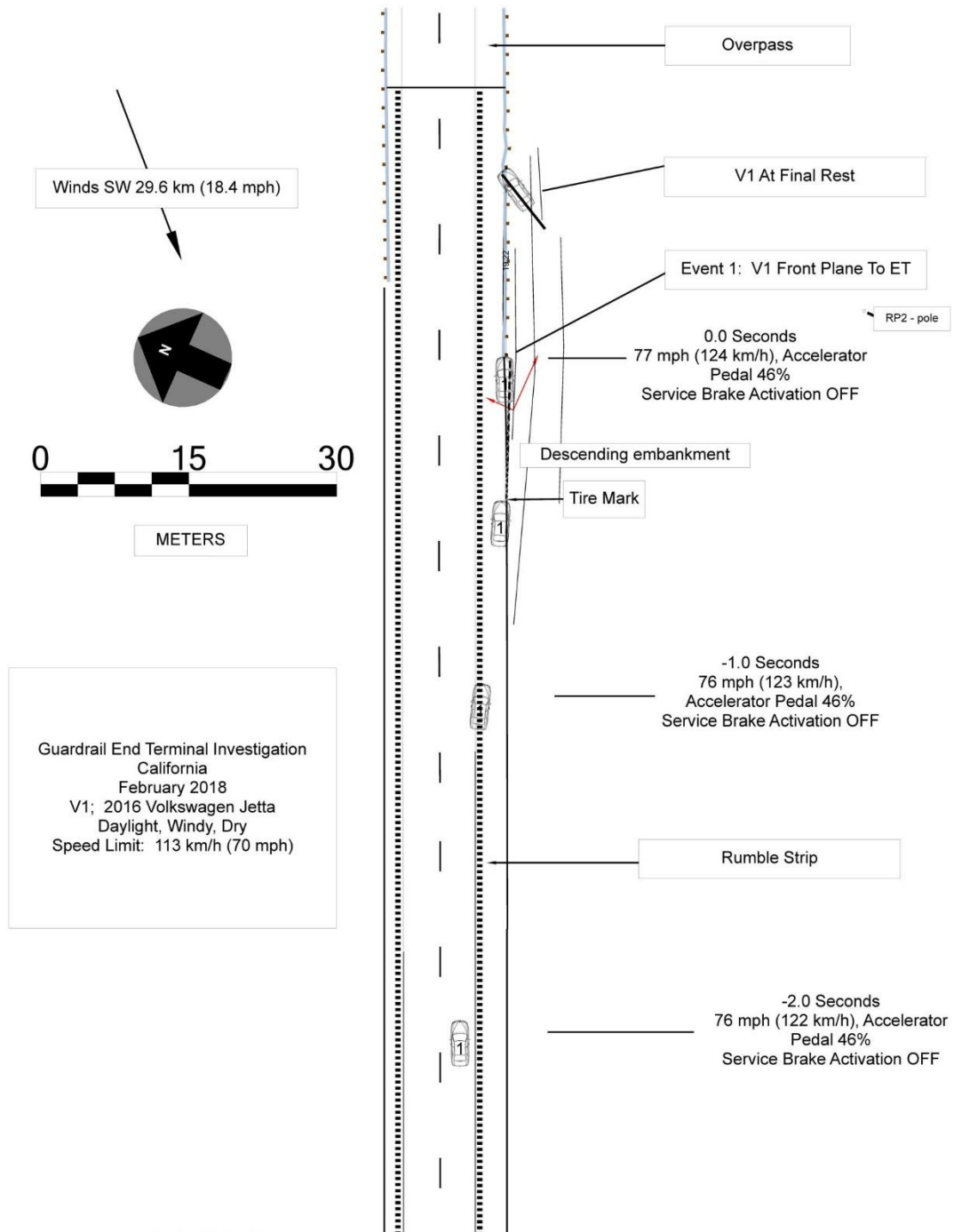
Injury No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
3 4	Abrasion, bilateral knees	810202.1 810202.1	Right instrument panel	Probable
5	Ecchymosis, left thigh	810402.1	Center console	Possible

Source: Emergency Room, Radiology

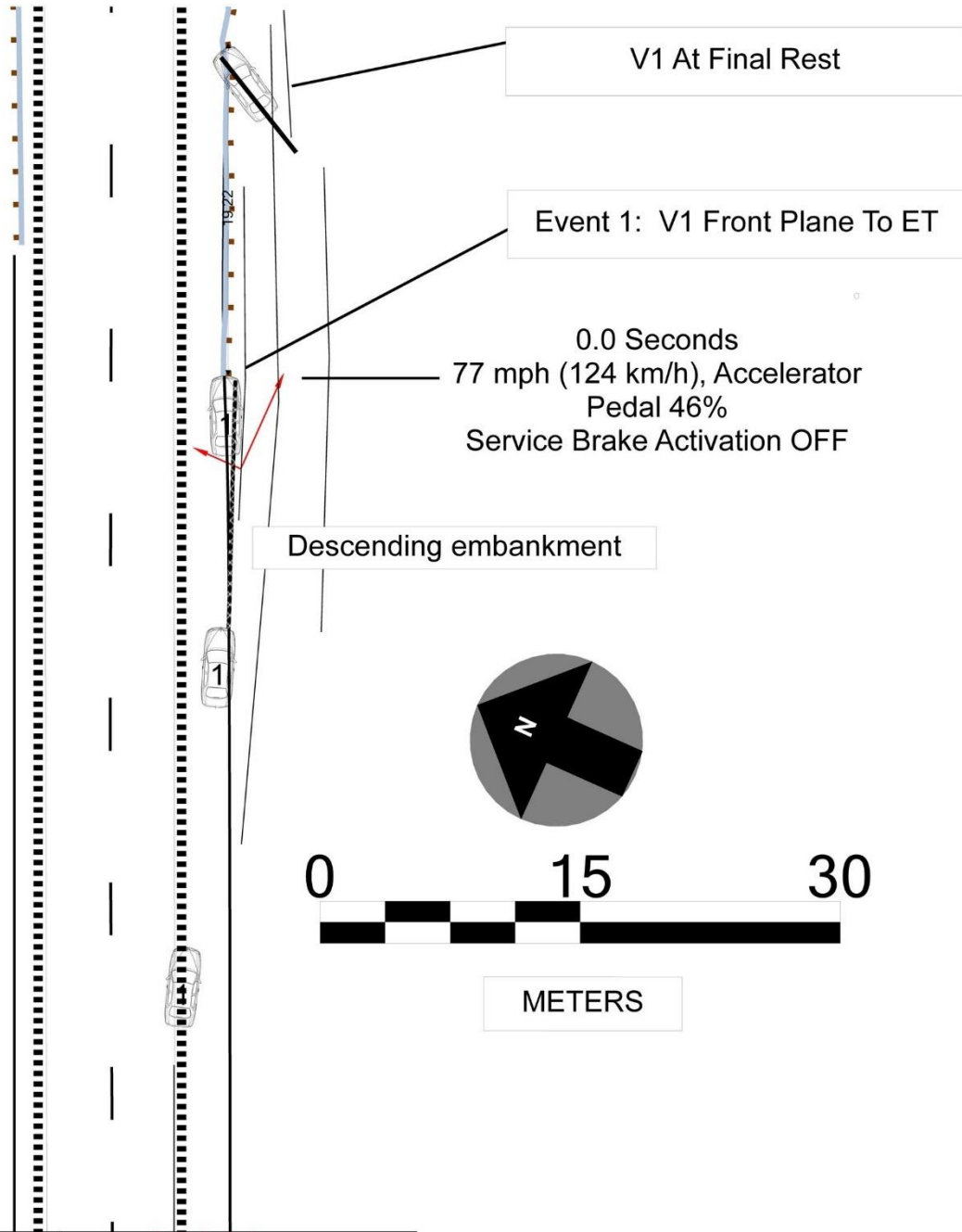
Front Row Right Passenger Kinematics

The front row right passenger was asleep just prior to the crash and was belted. He woke as he heard a sound that he recognized the vehicle traveling over the shoulder rumble strip. He heard a loud noise and then felt the impact. At impact with the guardrail he was displaced forward and loaded the lap and shoulder seat belt. The driver partially came to rest on top of this occupant. He checked but was unable locate the driver's pulse. He opened the passenger door and exited the vehicle where he was met by one of the witnesses. He sustained a head laceration and was transported by ambulance to a local trauma center where he was hospitalized for two days.

CRASH DIAGRAMS



	
Case Number:	DS18005



 <p>DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA</p>	 <p>NHTSA www.nhtsa.gov</p>
<p>Case Number:</p>	<p>DS18005</p>

APPENDIX A: FHWA Data Forms

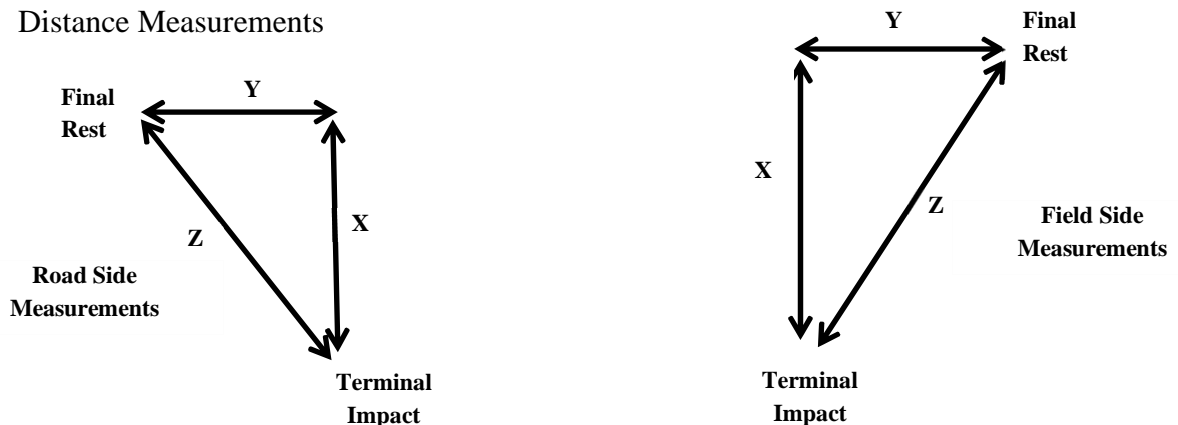
Case No.: DS18005

PREPOPULATED DATA (BY OTHERS)			
Date of Crash	February 2018	TIME OF CRASH (MILITARY)	Afternoon
Case Number	DS18005	State	CA
Traffic Route	8	Direction (Southbound = SB)	EB
Ambient Conditions (at time of crash)			
Temperature (°F)	55	Lighting	Daylight
Atmospheric	Clear		

SCENE INFORMATION	
Type of area where crash occurred	<input type="checkbox"/> Urban <input checked="" type="checkbox"/> Rural <input type="checkbox"/> Suburban
Terminal on a horizontal curve?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Curve/LT <input type="checkbox"/> Curve/RT
Estimated or Reconstructed Speed at Impact (MPH)	77
Est. distance (straight line) from terminal impact to COM final rest position (ft.)	Z = 63 ft
Est. distance (longitudinal) along guardrail from terminal impact to COM final resting location (ft.)	X = 62 ft
Est. distance (normal) from either 1. the white paint line; or 2. roadway/shoulder/pavement edge to COM rest position (ft.)	Y = 3 ft
Super elevation	<input type="checkbox"/> +2% <input type="checkbox"/> -2% <input checked="" type="checkbox"/> NONE or FLAT
Curve Radius (ft.)	N/A

KEY:

- COM - Center of Mass of Vehicle
- Distance Measurements



Case No.: DS18005

ON-SCENE INFORMATION										
End Treatment Type	<input type="checkbox"/> Extruder	<input type="checkbox"/> ET2000	<input type="checkbox"/> ET-PLUS 4in	<input type="checkbox"/> ET-PLUS 5in	<input type="checkbox"/> SKT	<input type="checkbox"/> FLEAT	<input type="checkbox"/> SOFT STOP			
	<input checked="" type="checkbox"/> Telescope	<input checked="" type="checkbox"/> X-LITE	<input type="checkbox"/> X-TENSION							
Curb?	<input type="checkbox"/> No	<input type="checkbox"/> AASHTO Type A		<input type="checkbox"/> AASHTO Type B		<input type="checkbox"/> AASHTO Type C		<input type="checkbox"/> AASHTO Type D		<input type="checkbox"/> AASHTO Type E
	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> AASHTO Type F		<input type="checkbox"/> AASHTO Type G		<input type="checkbox"/> AASHTO Type H				
Curb Height: 2- 3.5 in.										

GUARDRAIL INSTALLATION									
Post No.	Post		Offset Block		PRE-Existing Damage		Offset to Post or Post Hole (ft.)		Spacing to Next Post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
1	Steel	6 x 4	None	NA	No	NA	10.0	0.9	0
2	Steel	6 x 4	None	NA	No	NA	10.0	0.9	6ft-1in

Case No.: DS18005

GUARDRAIL INSTALLATION									
Post No.	Post		Offset Block		PRE-Existing Damage		Offset to Post or Post Hole (ft.)		Spacing to Next Post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
3	Steel	6 x 4	Unknown	Unk	No	NA	10.0	0.9	6ft-2in
4	Steel	6 x 4	Unknown	Unk	No	NA	10.0	0.9	6ft-2in
5	Steel	6 x 4	Unknown	Unk	No	NA	10.5	1.4	6ft-2in
6	Steel	6 x 4	Unknown	Unk	No	NA	10.8	1.3	6ft-3in
7	Steel	6 x 4	Unknown	Unk	No	NA	10.4	1.2	6ft-9in
8	Steel	6 x 4	Unknown	Unk	No	NA	10.4	1.0	6ft-8in

Case No.: DS18005

GUARDRAIL INSTALLATION									
Post No.	Post		Offset Block		PRE-Existing Damage		Offset to Post or Post Hole (ft.)		Spacing to Next Post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
9	Steel	6 x 4	Unknown	Unk	No	NA	10.3	1.0	6ft-3in
10	Steel	6 x 6	Composite	7.5 x 4	No	NA	10.5	1.2	6ft-2in
11	Steel	6 x 6	Wood	8 x 11	No	NA	10.5	1.2	6ft-4in
12	Steel	6 x 6	Wood	Unk	No	NA	10.4	1.5	6ft-3in

Additional Comments:

Case No.: DS18005

EXTRUDER			
Feeder Channel Width at impact head	<input type="checkbox"/> 4 inches <input type="checkbox"/> 5 inches <input type="checkbox"/> Other _____		
Guide Chute Exit Height (in.)			
Connection of feeder channels to head damaged?	<input type="checkbox"/> No <input type="checkbox"/> Yes	Are Welds Broken?	<input type="checkbox"/> No <input type="checkbox"/> Yes
Anchor Cable Present?	<input type="checkbox"/> No <input type="checkbox"/> Yes	Connected?	<input type="checkbox"/> No <input type="checkbox"/> Yes
Rail Extrusion?	<input type="checkbox"/> No <input type="checkbox"/> Yes	Length (ft. in.)	
Rail Extrusion Direction	<input type="checkbox"/> Traffic Side <input type="checkbox"/> Field Side		
Total Length of Rail Damaged (ft.) [total length would include extruded rail plus damaged rail downstream from head.]			

TELESCOPE			
Rail Displacement	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	Length:	No of Panels Displaced <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6

ALL-SYSTEM PERFORMANCE	
Railkinks Downstream of Head?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes No. of Kinks in Rail:
Was there intrusion into the Occupant Compartment by foreign object (guardrail)?	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes
Did vehicle impact other objects after impact with terminal?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
Object Contacted	

ALL-SYSTEM PERFORMANCE ENVIRONMENT			
SIDESLOPE	50 ft in advance of Post 1	At Post 1	50 ft Past Post 1
Percent - %	5	6	5
Adjacent Lane Width (ft)	11.9		
Lane Type (NAS EDS Variable: Sur. Type)	Asphalt		
Shoulder Type	Asphalt		
Shoulder Width (ft)	9.3		
Guardrail Height (in)	30.5		

Case No.: DS18005

VEHICLE INFORMATION	
Vehicle Type (NHTSA Input)	2016 Volkswagen Jetta
Vehicle Identification Number (VIN)	3VW267AJ3GMxxxxxx
Vehicle Mass (NASS var.: yeh.wgt)	1174 kg (2588 lbs)
Vehicle orientation upon impact	<input checked="" type="checkbox"/> Case Type 1 <input type="checkbox"/> Case Type 2 <input type="checkbox"/> Case Type 3 <input type="checkbox"/> Case Type 4 <input type="checkbox"/> Case Type 5 <input type="checkbox"/> Case Type 6 <input type="checkbox"/> Case Type 7 <input type="checkbox"/> Case Type 8 <input type="checkbox"/> Other
If 'Other', describe	
Collision Deformation Classification	12FYAW9
Delta-V	21.1 mph
Occupant Compartment Penetration of rail	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes Describe: complete, windshield to backlight
Quarter Turns (NASS EDS variable: Rollover)	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17+
Object Precipitating Rollover, (NASS EDS variable: Rollobj)	NA
Rollover Type, Terhune Scale, (NASS EDS variable: rolintyp)	NA

**APPENDIX B: Event Data Recorder (EDR) Report
2016 Volkswagen Jetta¹**

¹ The EDR report in this technical report was imaged using the current version of the Bosch CDR software at the time of the vehicle inspection. The CDR report in the associated Crash Viewer application may differ relative to this report.

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	3VW267AJ3GM*****
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	201850S3DS18005_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.6.1
Imaged with Software Licensed to (Company Name)	Company Name information was removed when this file was saved without VIN sequence number
Reported with CDR version	Crash Data Retrieval Tool 19.0
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Record 1 (CRC Check Failed - Saved Without VIN Sequence Number), Record 2 (CRC Check Failed - Saved Without VIN Sequence Number), Record 3 (CRC Check Failed - Saved Without VIN Sequence Number), Record 4 (CRC Check Failed - Saved Without VIN Sequence Number), Record 5 (CRC Check Failed - Saved Without VIN Sequence Number)

Comments

No comments entered.

Data Limitations

AIRBAG CONTROL MODULE (ACM) DATA LIMITATIONS:

General Information:

These limitations are intended to assist you in reading the event data that has been imaged from the vehicle's Airbag Control Module (ACM). They are not intended to provide specific information regarding the interpretation of this data. Event data should be examined in conjunction with other available physical evidence from the vehicle and scene.

Note: The ACM's current DTC status will be altered if the ACM is powered-up without the vehicle periphery connected. This situation might occur when the CDR tool is connected directly to the ACM (e.g. for bench top imaging). It will not affect the stored EDR data, but may result in additional DTCs within the ACM.

Note: During bench top imaging, make sure the ACM is not moved, tilted or turned over while connected to and powered by the CDR Interface Module. Also, after a CDR imaging process, wait one minute after power is removed from the ACM before attempting to move the module. Not following these general ACM guidelines for bench top imaging could cause new events to be recorded in the ACM.

Recorded Crash Events:

This ACM is capable of recording up to 6 events of front, side, rear or rollover within its memory. Each record contains 5 seconds of pre-crash data and at least 300ms of post-crash data. Deployment events are locked into memory and cannot be overwritten. Non-deployment events can be overwritten by subsequent deployment or non-deployment events. The oldest non-deployment event will be overwritten first. Some ACMs stop over-writing of older non-deployment events by more recent non-deployment events after a certain number of events (more than 1000). Under these conditions, the storage of deployment events is still available. The event counter is incremented for each event and stored within the data record.

Deployment events are recorded, when a non-reversible restraint system was commanded to deploy. Recording of non-deployment events requires a minimum delta-V of 8km/h within a 150ms period in either longitudinal or lateral direction. Reversible restraint systems (e.g. active headrests) that have been commanded to deploy also trigger recording of a non-deployment event. Time Zero of an event is determined by the ACM's algorithms based on the acceleration and/or pressure sensors or a deployment command. Post-crash data (e.g. deployment time of restraint systems) is reported relative to Time Zero.

The ACM supports recording of multiple events. In case of a rapid sequence of events (e.g. a combined frontal and side event), the ACM will record the data within a common EDR entry (a so-called parallel event). In this case, the post-crash data is reported relative to Time Zero of the initial event. If the initial event has already ended and another event happens within a time period of 5s from Time Zero of the initial

event, the ACM will record a multi-event consisting of two or more separate EDR entries.

If power to the ACM was lost during an event, all or part of the event data record may not have been recorded.

Data:

The reported data elements may vary by vehicle model, model year or vehicle configuration. Part of the pre-crash data has been transmitted to the ACM by various vehicle control modules via the vehicle's communication network.

Time-continuous pre-crash data is recorded at two samples per second for 5 seconds before Time Zero. The main data elements are:

- Speed Vehicle Indicated: is reported as displayed by the vehicle's instrument cluster. The vehicle speed is evaluated as an average of wheel speeds and transmitted via the vehicle communication network to the ACM. Its data accuracy may be affected by various factors, such as significant changes in tire size from the factory settings, wheel lock-up or slip.
- Accelerator Pedal: is the ratio of the accelerator pedal's position compared to the fully depressed position (in percent). The pedal position sensor is wired to the Engine Control Module.
- Service Brake Activation: is the status of the brake pedal switch. The switch is wired to the Engine Control Module.
- Engine RPM (Combustion Engine): as reported by the Engine Control Module.
- Steering Input: as reported by the wheel angle sensor.
- ABS Activity: as reported by the Electronic Stability Control Module.
- Stability Control: as reported by the Electronic Stability Control Module.

The pre-crash status is recorded 1 second before Time Zero. The main data elements are:

- Safety Belt Status: as evaluated by the belt-switches that are wired to the ACM.
- Seat Track Position Switch: as evaluated by the seat track position sensors that are wired to the ACM.
- Airbag Warning Lamp, Status: as commanded by the ACM.
- Occupant Size Classification, Front Passenger: as reported by the occupant classification system.
- Frontal Airbag Disable Indicator Status: as commanded by the ACM.

Pre-crash and post-crash data are recorded asynchronously. The data element "Time from Last Speed Data Sample (Pre-crash) to Time Zero" indicates the time delay between the most recent pre-crash data sample and Time Zero (0 to 500ms).

Post-crash data is recorded after Time Zero up to 300ms. The Vehicle Roll Angle may be recorded for 5 seconds post-crash. The main data elements are:

- Event Type: indicates the event type depending on the algorithm that triggered the recording criteria first (deployment or Delta-V threshold).
- Multi-Event, Number of Events: determines the chronological order of records being part of a multi-event.
- Time from Previous / Initial Event to Current Event: indicates the time difference between records of multi-events.
- Delta-V Longitudinal / Lateral: are recorded every 10ms from Time Zero to 250ms. Delta-V reflects the change in velocity that the ACM experienced during the recorded time period. It does not necessarily correlate with vehicle traveling speed.
- Longitudinal / Lateral / Normal Acceleration: are recorded every 10ms from Time Zero to 250ms (if supported by the ACM). The reported range of acceleration may vary between ACM models.
- Clipping Time, Longitudinal / Lateral Acceleration Sensor: depending on the severity of the event, the measuring range of the longitudinal or lateral accelerometers may be exceeded. The data elements "Clipping Time, Longitudinal / Lateral Acceleration Sensor" indicate the time within an event when the measurement first exceeded the design range of the sensor. As a result, subsequent Delta-V values may be underestimated.
- Vehicle Roll Angle: is recorded every 100ms from 1 second before and up to 5 seconds after Time Zero. Due to mechanical limitations of the roll rate sensor, high accelerations, which can occur during front, side or rear crashes, can disturb the oscillating angular rate sensing element. This results in the roll rate data being temporarily invalid for a short period of time (at or shortly after Time Zero).
- Time to Deployment: indicates the time at which the ACM commanded the deployment of the associated restraint system.
- Disposal: indicates whether the ACM commanded the disposal of the propellant from the associated restraint system. "No Disposal" indicates that the restraint system was commanded to deploy for occupant restraint purposes.
- Date and Time at Event: is reported as the date and time of the vehicle's clock at the time of an event. Since the vehicle clock may be adjusted manually, the reported values may not reflect the actual date and time of a given event. As with the other data elements reported herein, these parameters should be examined in conjunction with other available physical evidence from the vehicle and scene.
- Complete File Recorded: indicates if the event data has been completely recorded to the ACM's memory or if the recording process has been interrupted before completion.

The status "Data not Available" is reported if the ACM was unable to store the data element (e.g. due to missing communication). "Invalid Data" is reported if the ACM was unable to store valid data for the data element (e.g. range exceeded, communication failure, sensor failure).

Data Sign Convention:

Data Element Name	Positive Sign Notation Indicates
Longitudinal Acceleration	Forward
Delta-V, Longitudinal	Forward
Maximum Delta-V, Longitudinal	Forward
Lateral Acceleration	Left to Right
Delta-V, Lateral	Left to Right

Maximum Delta-V, Lateral	Left to Right
Normal Acceleration	Downward
Vehicle Roll Angle	Left to Right Rotation
Steering Input	Left Turn

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.

12001_VWGDefault_r002

System Status at Event (Record 1, Most Recent)

Event Counter at Event (Counts)	5
Multi-Event, Number of Events	3. Event
Time from Initial Event to Current Event (msec)	1,317.0
Time from Previous Event to Current Event (msec)	447.0
Vehicle Mileage (km)	49,270
Operating Time (min)	66,017
Ignition Cycle at Event (Cycles)	4,605
Ignition Cycle at Download (Cycles)	4,611
Maximum Delta-V, Longitudinal (MPH [km/h])	5.0 [8]
Time, Maximum Delta-V, Longitudinal (msec)	300.0
Clipping Time, Longitudinal Acceleration Sensor (msec)	Clipping Not Reached
Maximum Delta-V, Lateral (MPH [km/h])	-3.7 [-6]
Time, Maximum Delta-V, Lateral (msec)	300.0
Clipping Time, Lateral Acceleration Sensor (msec)	Clipping Not Reached
Time, Maximum Delta-V, Resultant (msec)	300.0
Time from Last Speed Data Sample (Preocrash) to Time Zero (msec)	192
Vehicle Identification Number (VIN)	*****
Supply Voltage (Before Event) (V)	0.0
Complete File Recorded	Completed Successfully

Deployment Command Data (Record 1, Most Recent)

Pretensioner, Time to 1st Stage Deployment, Driver (msec)	Not Deployed
Belt-Load Limiter, Time to Deployment, Driver (msec)	Not Deployed
Frontal Airbag, Time to 1st Stage Deployment, Driver (msec)	Not Deployed
Side Airbag, Time to Deployment 1st Stage, Driver (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Driver Side (msec)	Not Deployed
Pretensioner, Time to 1st Stage Deployment, Front Passenger (msec)	Not Deployed
Belt-Load Limiter, Time to Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, Time to 1st Stage Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, Time to 2nd Stage Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, 2nd Stage Disposal, Front Passenger	Not Deployed
Side Airbag, Time to Deployment 1st Stage, Front Passenger (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Passenger Side (msec)	Not Deployed

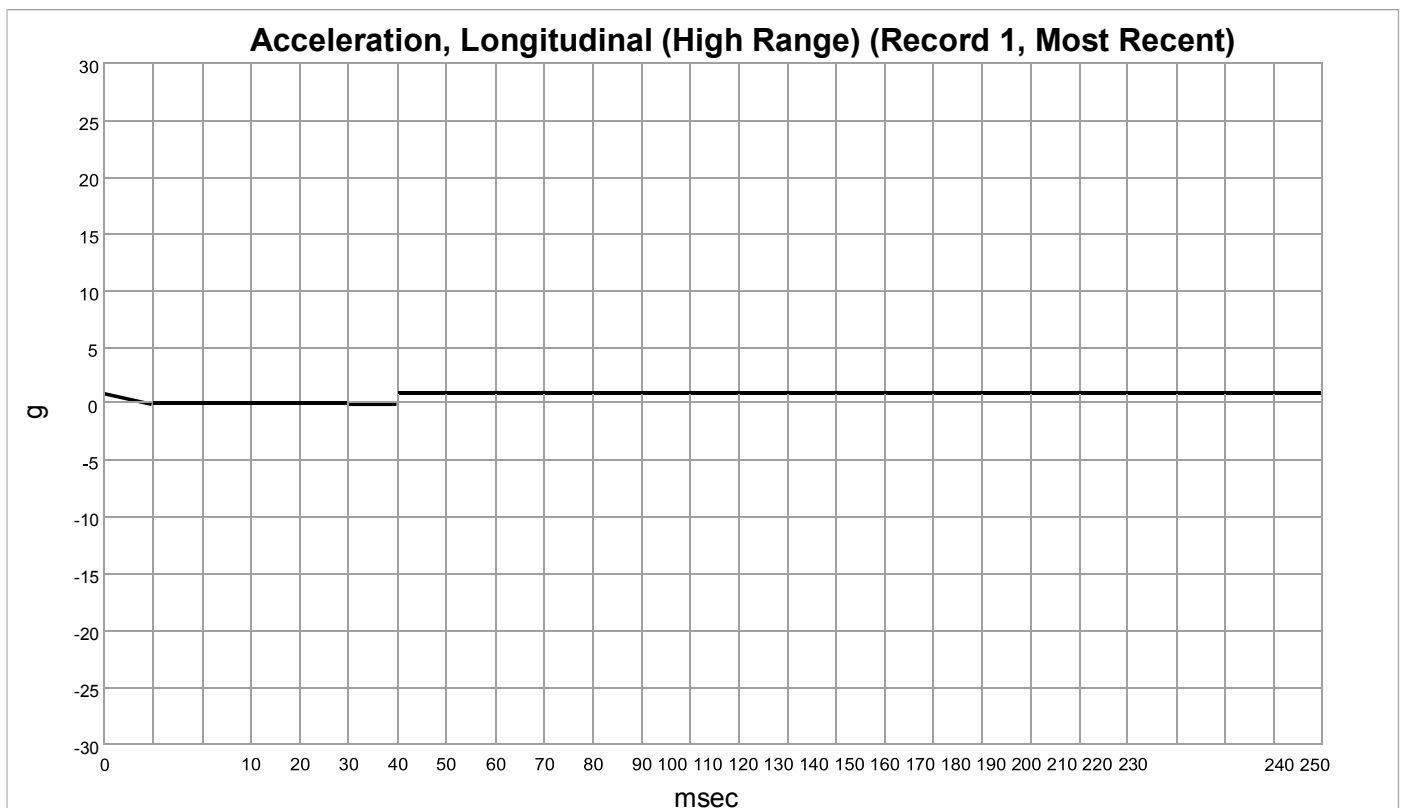
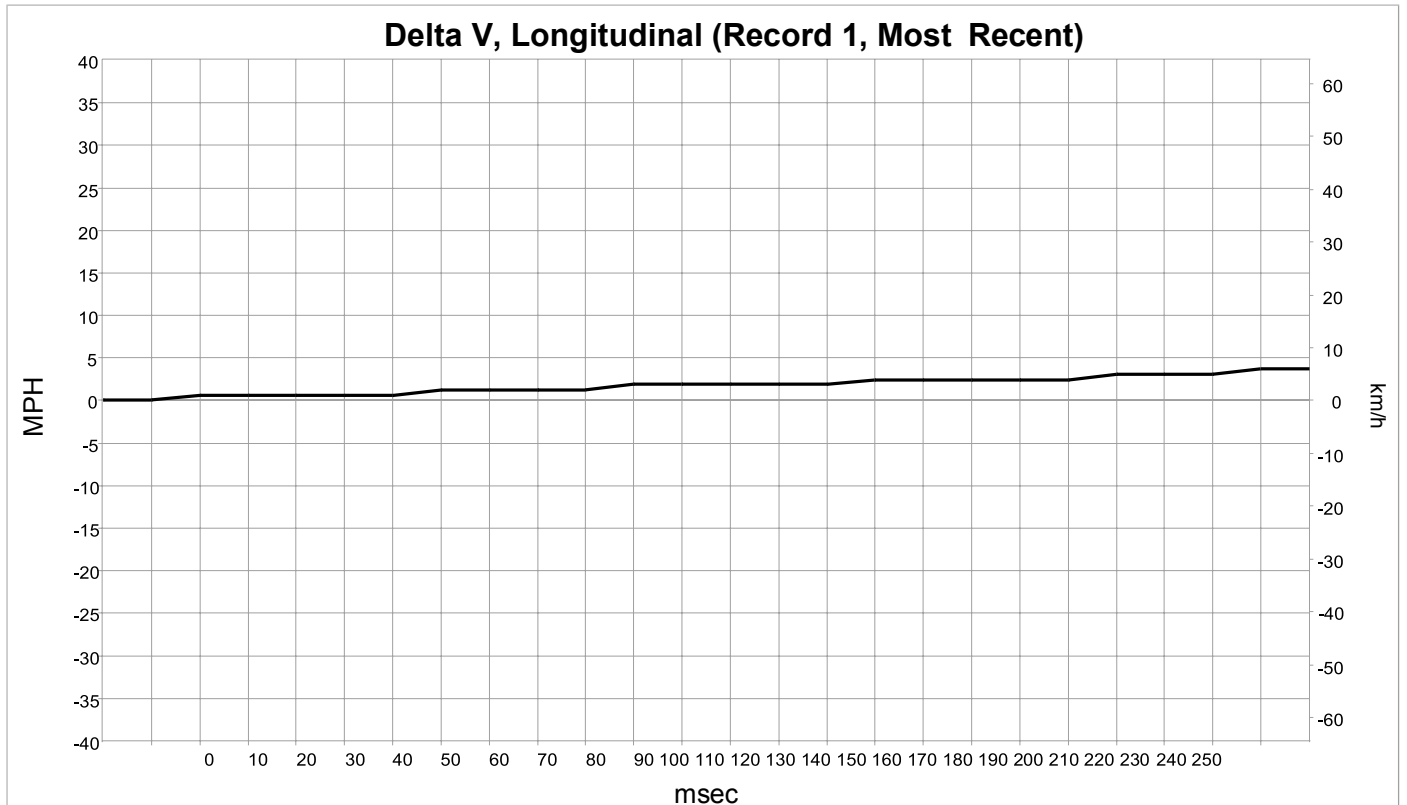
Pre-Crash Data -1 Sec (Record 1, Most Recent)

Safety Belt Status, Driver	Not Belted
Seat Track Position Switch Status, Driver	Rear
Safety Belt Status, Front Passenger	Belted
Seat Track Position Switch Status, Front Passenger	Rear
Occupant Size Classification, Front Passenger	Not Empty
Frontal Airbag Disable Indicator Status, Passenger	Off
Airbag Warning Lamp, Status	On

Pre-Crash Data -5 to 0 sec (Record 1, Most Recent)

Time (sec)	Engine RPM (Combustion Engine) (RPM)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal (%)	Service Brake Activation
-5.0	2176	75 [121]	46	Off
-4.5	2176	76 [122]	46	Off
-4.0	2176	76 [122]	46	Off
-3.5	2176	76 [122]	46	Off
-3.0	2240	76 [122]	46	Off
-2.5	2240	76 [123]	46	Off
-2.0	2240	76 [123]	46	Off
-1.5	2240	77 [124]	46	Off
-1.0	2048	70 [113]	100	On
-0.5	1728	0 [0]	Invalid Data	Invalid Data
0.0	1728	0 [0]	Invalid Data	Invalid Data

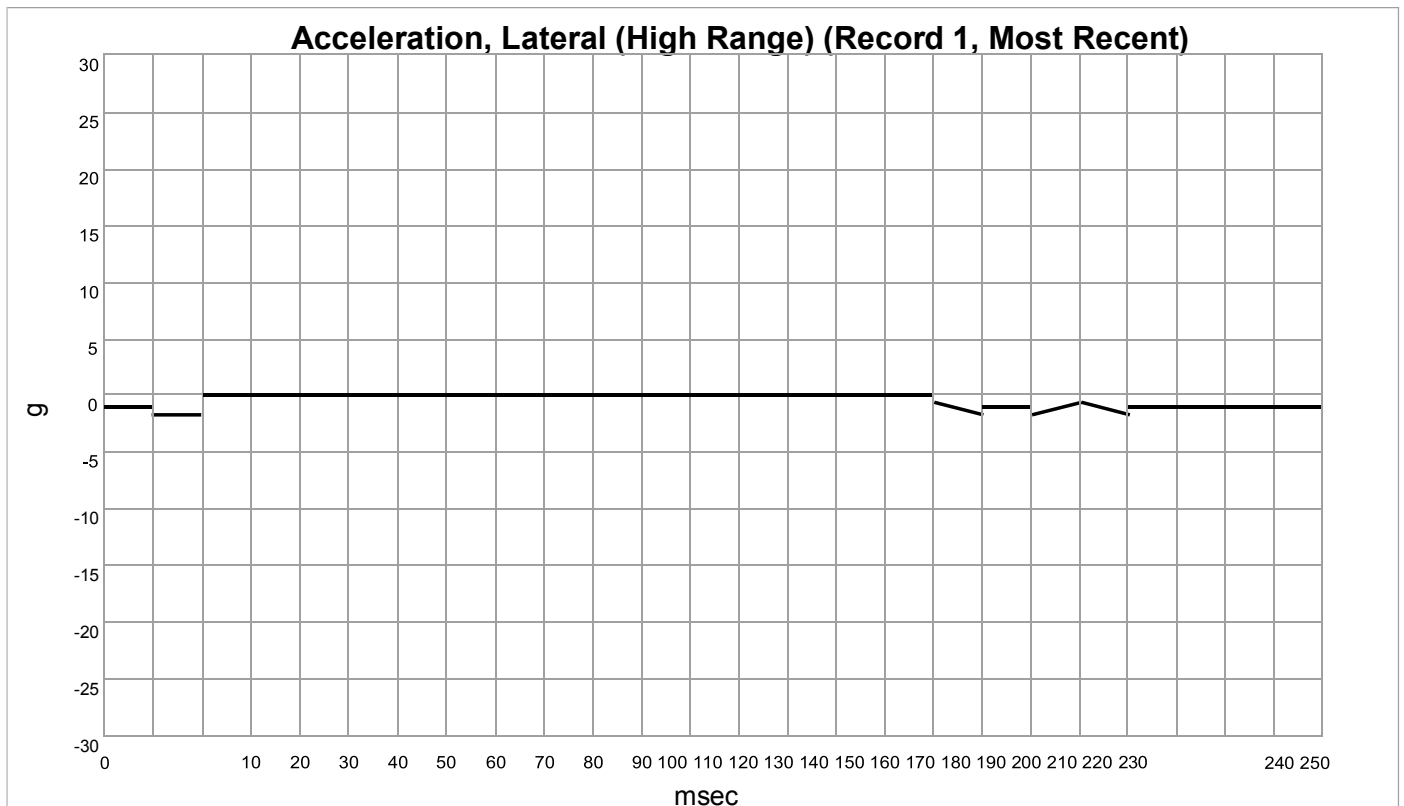
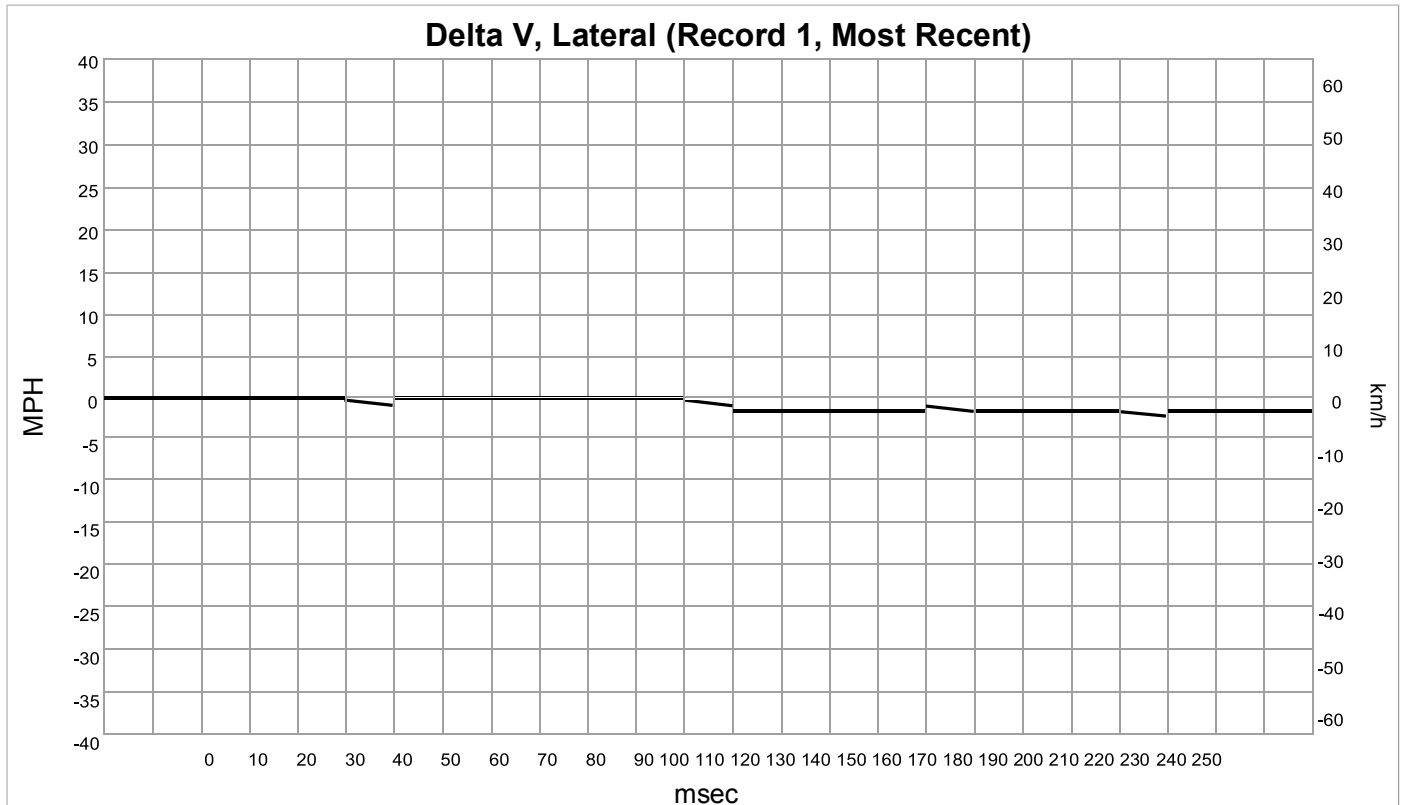
Longitudinal Crash Pulse (Record 1, Most Recent)



Longitudinal Crash Pulse (Record 1, Most Recent)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])	Longitudinal Acceleration High Range (g)
0	0.0 [0]	0.60
10	0.0 [0]	0.47
20	0.6 [1]	0.38
30	0.6 [1]	0.42
40	0.6 [1]	0.47
50	0.6 [1]	0.49
60	0.6 [1]	0.50
70	1.2 [2]	0.55
80	1.2 [2]	0.59
90	1.2 [2]	0.64
100	1.2 [2]	0.67
110	1.9 [3]	0.66
120	1.9 [3]	0.60
130	1.9 [3]	0.55
140	1.9 [3]	0.57
150	1.9 [3]	0.57
160	2.5 [4]	0.57
170	2.5 [4]	0.53
180	2.5 [4]	0.53
190	2.5 [4]	0.54
200	2.5 [4]	0.57
210	3.1 [5]	0.60
220	3.1 [5]	0.64
230	3.1 [5]	0.68
240	3.7 [6]	0.74
250	3.7 [6]	0.80

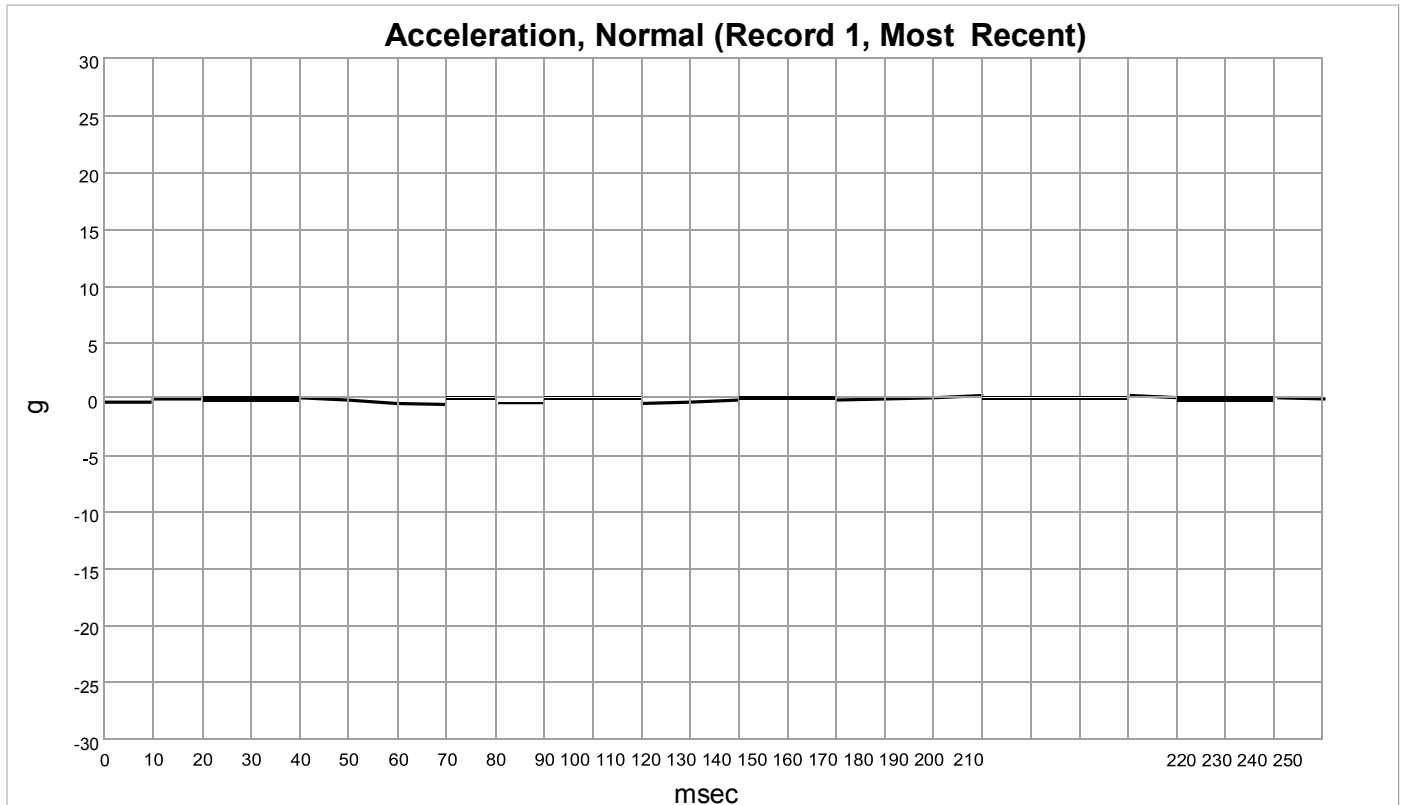
Lateral Crash Pulse (Record 1, Most Recent)



Lateral Crash Pulse (Record 1, Most Recent)

Time (msec)	Delta-V, Lateral (MPH [km/h])	Lateral Acceleration High Range (g)
0	0.0 [0]	-0.67
10	0.0 [0]	-0.61
20	0.0 [0]	-0.37
30	0.0 [0]	-0.20
40	0.0 [0]	-0.11
50	0.0 [0]	-0.16
60	-0.6 [-1]	-0.38
70	-0.6 [-1]	-0.42
80	-0.6 [-1]	-0.33
90	-0.6 [-1]	-0.39
100	-0.6 [-1]	-0.36
110	-0.6 [-1]	-0.28
120	-0.6 [-1]	-0.25
130	-1.2 [-2]	-0.36
140	-1.2 [-2]	-0.35
150	-1.2 [-2]	-0.36
160	-1.2 [-2]	-0.38
170	-1.2 [-2]	-0.46
180	-1.9 [-3]	-0.57
190	-1.9 [-3]	-0.50
200	-1.9 [-3]	-0.40
210	-1.9 [-3]	-0.56
220	-2.5 [-4]	-0.71
230	-2.5 [-4]	-0.78
240	-2.5 [-4]	-0.74
250	-2.5 [-4]	-0.71

Normal Acceleration (Record 1, Most Recent)



Time (msec)	Normal Acceleration (g)
0	-0.1
10	0.1
20	0.2
30	0.2
40	0.2
50	0.0
60	-0.2
70	-0.3
80	-0.3
90	-0.2
100	-0.2
110	-0.2
120	-0.1
130	0.0
140	0.0
150	0.0
160	0.1
170	0.2
180	0.4
190	0.4
200	0.4
210	0.4
220	0.2
230	0.2
240	0.2

Time (msec)	Normal Acceleration (g)
250	0.1

System Status at Event (Record 2)

Event Counter at Event (Counts)	4
Multi-Event, Number of Events	2. Event
Time from Initial Event to Current Event (msec)	870.0
Time from Previous Event to Current Event (msec)	870.0
Vehicle Mileage (km)	49,270
Operating Time (min)	66,017
Ignition Cycle at Event (Cycles)	4,605
Ignition Cycle at Download (Cycles)	4,611
Maximum Delta-V, Longitudinal (MPH [km/h])	-23.6 [-38]
Time, Maximum Delta-V, Longitudinal (msec)	300.0
Clipping Time, Longitudinal Acceleration Sensor (msec)	Clipping Not Reached
Maximum Delta-V, Lateral (MPH [km/h])	-9.3 [-15]
Time, Maximum Delta-V, Lateral (msec)	300.0
Clipping Time, Lateral Acceleration Sensor (msec)	Clipping Not Reached
Time, Maximum Delta-V, Resultant (msec)	300.0
Time from Last Speed Data Sample (Preocrash) to Time Zero (msec)	246
Vehicle Identification Number (VIN)	*****
Supply Voltage (Before Event) (V)	0.0
Complete File Recorded	Completed Successfully

Deployment Command Data (Record 2)

Pretensioner, Time to 1st Stage Deployment, Driver (msec)	Not Deployed
Belt-Load Limiter, Time to Deployment, Driver (msec)	Not Deployed
Frontal Airbag, Time to 1st Stage Deployment, Driver (msec)	Not Deployed
Side Airbag, Time to Deployment 1st Stage, Driver (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Driver Side (msec)	Not Deployed
Pretensioner, Time to 1st Stage Deployment, Front Passenger (msec)	Not Deployed
Belt-Load Limiter, Time to Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, Time to 1st Stage Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, Time to 2nd Stage Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, 2nd Stage Disposal, Front Passenger	Not Deployed
Side Airbag, Time to Deployment 1st Stage, Front Passenger (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Passenger Side (msec)	Not Deployed

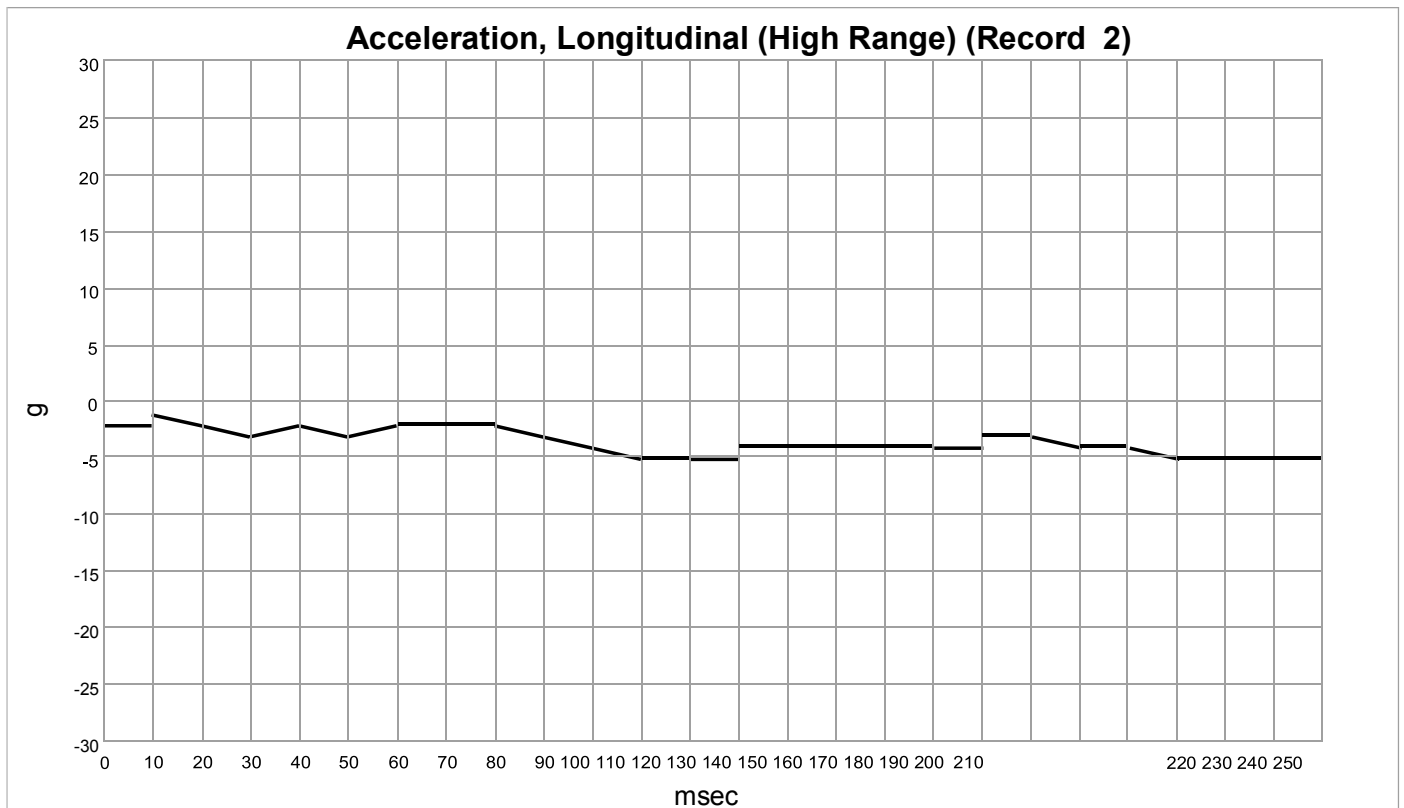
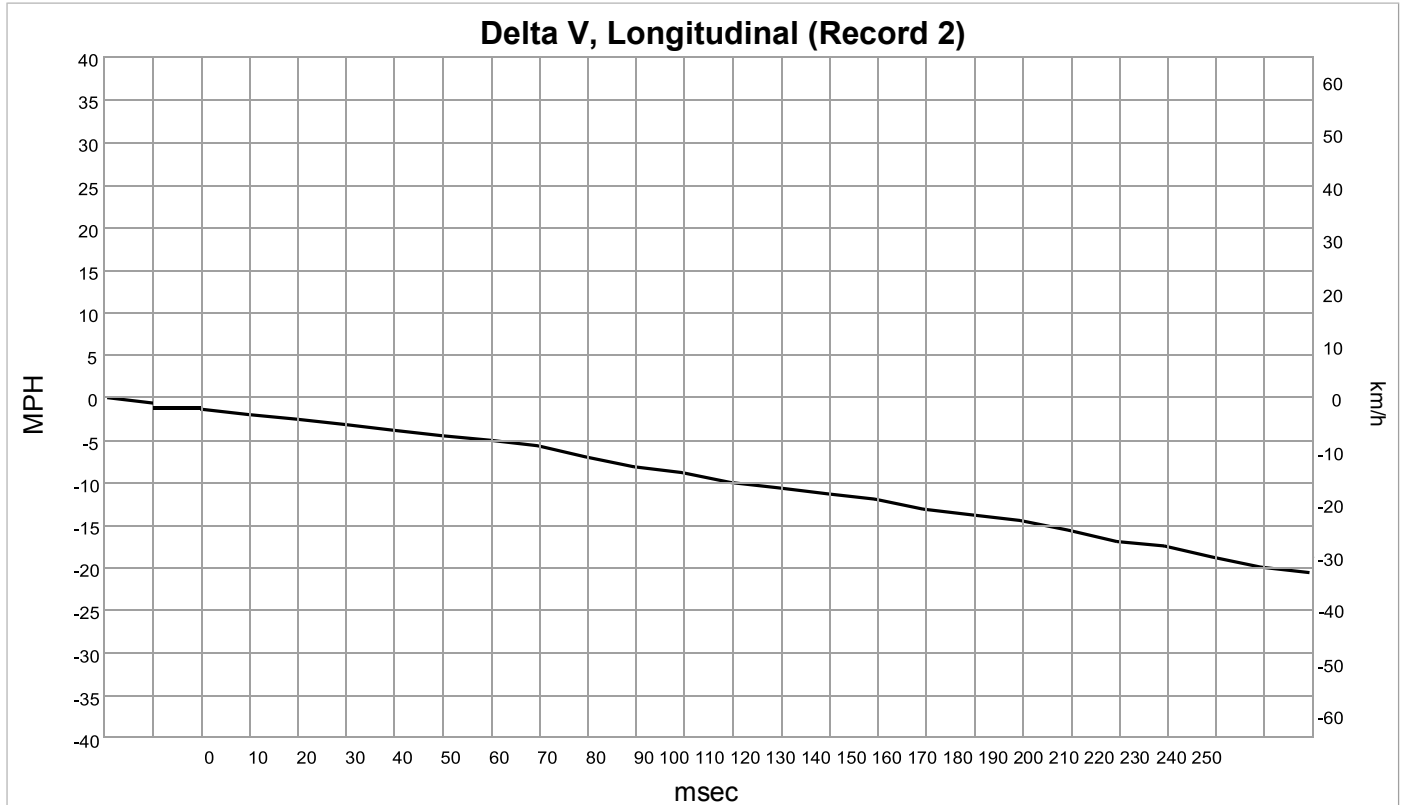
Pre-Crash Data -1 Sec (Record 2)

Safety Belt Status, Driver	Not Belted
Seat Track Position Switch Status, Driver	Rear
Safety Belt Status, Front Passenger	Belted
Seat Track Position Switch Status, Front Passenger	Rear
Occupant Size Classification, Front Passenger	Not Empty
Frontal Airbag Disable Indicator Status, Passenger	Off
Airbag Warning Lamp, Status	On

Pre-Crash Data -5 to 0 sec (Record 2)

Time (sec)	Engine RPM (Combustion Engine) (RPM)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal (%)	Service Brake Activation
-5.0	2176	75 [121]	45	Off
-4.5	2176	75 [121]	46	Off
-4.0	2176	76 [122]	46	Off
-3.5	2176	76 [122]	46	Off
-3.0	2176	76 [122]	46	Off
-2.5	2240	76 [122]	46	Off
-2.0	2240	76 [123]	46	Off
-1.5	2240	76 [123]	46	Off
-1.0	2240	77 [124]	46	Off
-0.5	2048	70 [113]	100	On
0.0	1728	0 [0]	Invalid Data	Invalid Data

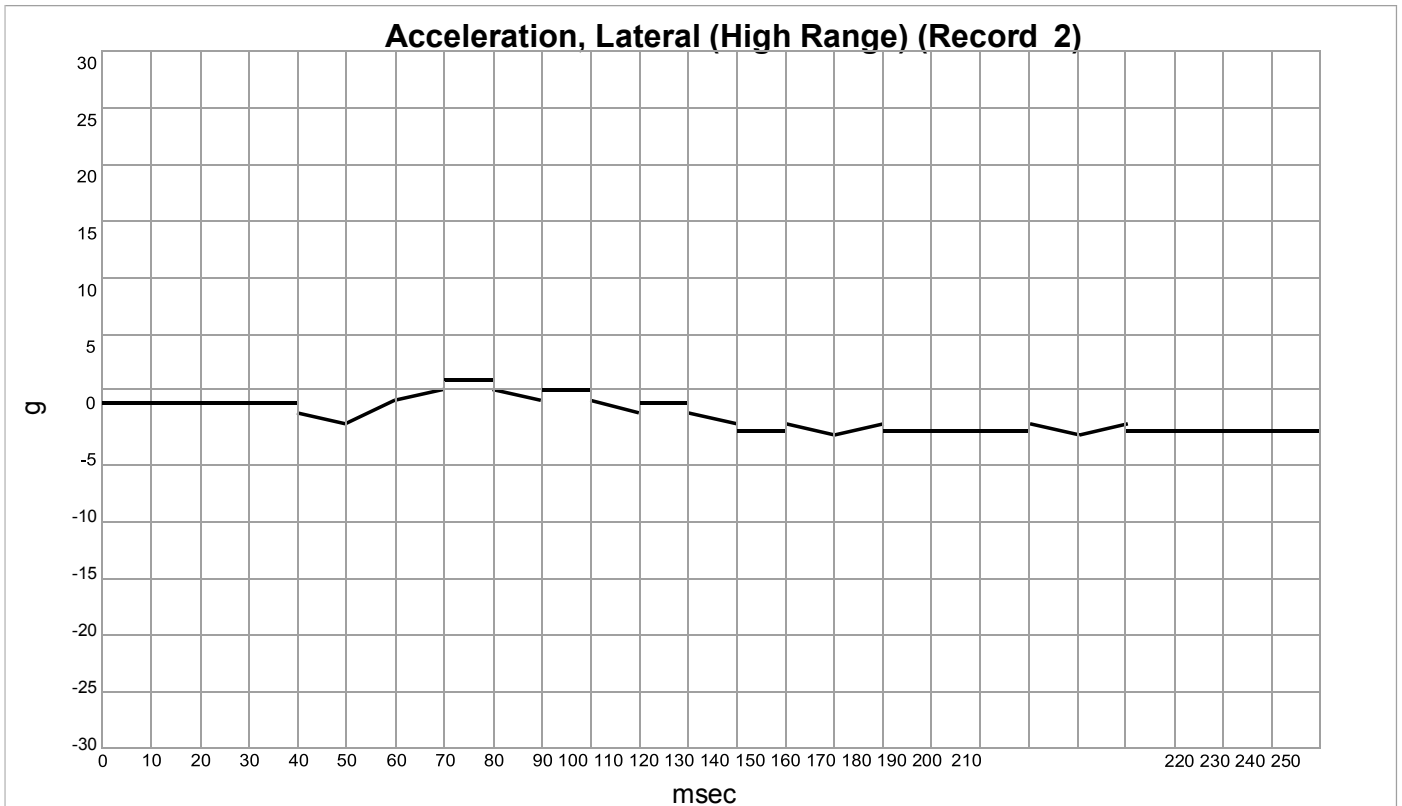
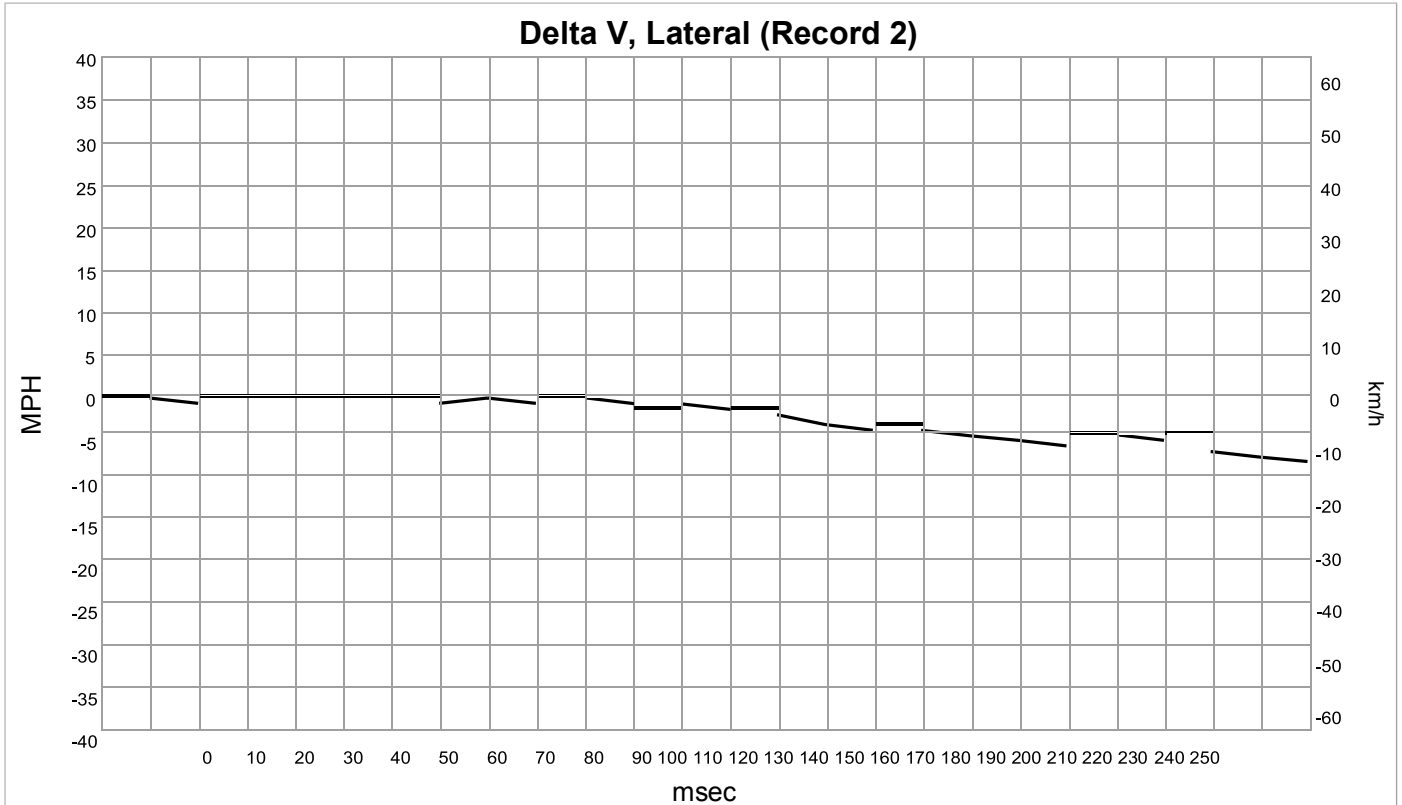
Longitudinal Crash Pulse (Record 2)



Longitudinal Crash Pulse (Record 2)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])	Longitudinal Acceleration High Range (g)
0	-0.6 [-1]	-1.55
10	-1.2 [-2]	-1.13
20	-1.2 [-2]	-1.71
30	-1.9 [-3]	-2.83
40	-2.5 [-4]	-2.45
50	-3.1 [-5]	-2.57
60	-3.7 [-6]	-2.32
70	-4.3 [-7]	-1.91
80	-5.0 [-8]	-2.46
90	-5.6 [-9]	-2.64
100	-6.8 [-11]	-4.22
110	-8.1 [-13]	-5.42
120	-8.7 [-14]	-4.64
130	-9.9 [-16]	-3.83
140	-10.6 [-17]	-3.96
150	-11.2 [-18]	-3.98
160	-11.8 [-19]	-3.60
170	-13.0 [-21]	-3.76
180	-13.7 [-22]	-3.08
190	-14.3 [-23]	-3.36
200	-15.5 [-25]	-3.71
210	-16.8 [-27]	-4.22
220	-17.4 [-28]	-4.52
230	-18.6 [-30]	-4.76
240	-19.9 [-32]	-4.82
250	-20.5 [-33]	-4.79

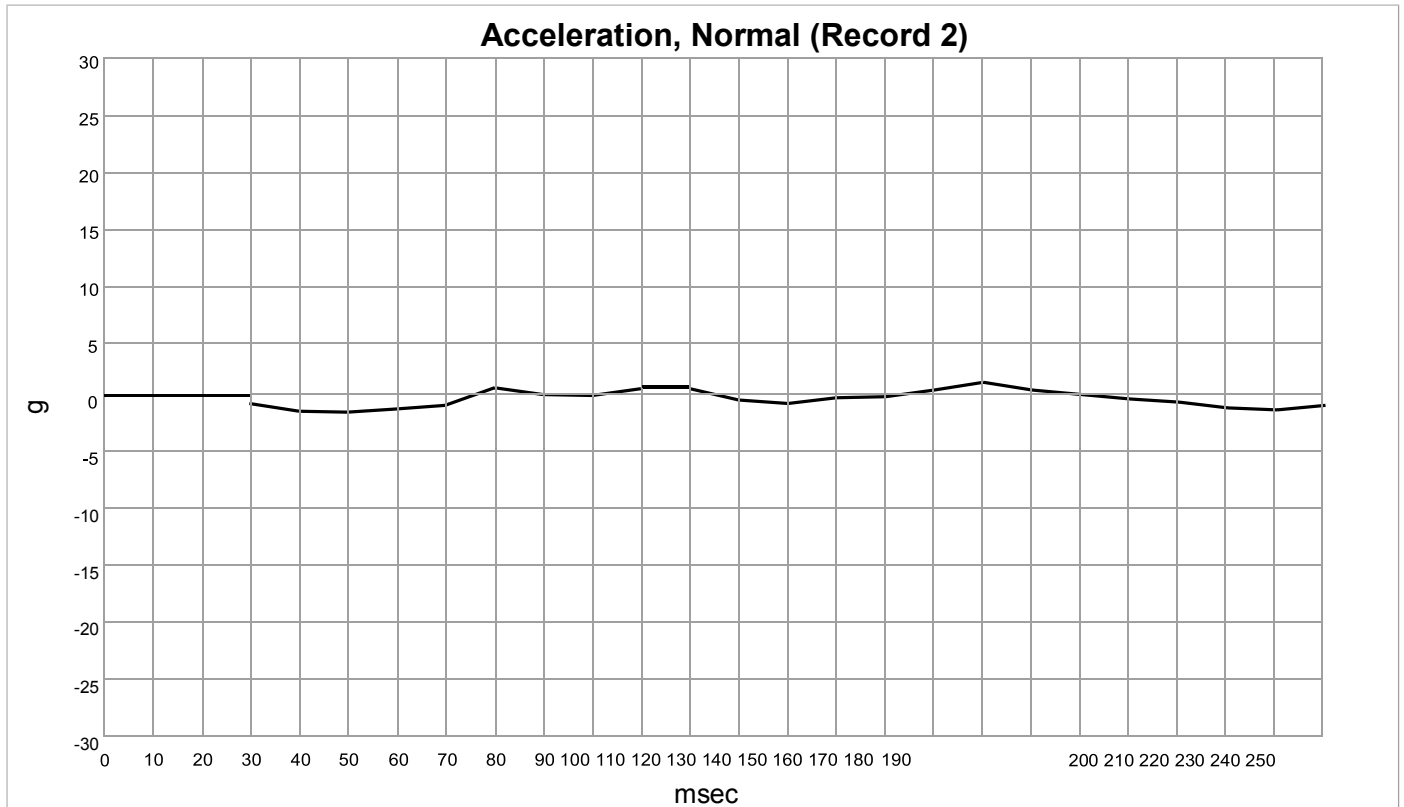
Lateral Crash Pulse (Record 2)



Lateral Crash Pulse (Record 2)

Time (msec)	Delta-V, Lateral (MPH [km/h])	Lateral Acceleration High Range (g)
0	0.0 [0]	-0.78
10	0.0 [0]	-0.69
20	-0.6 [-1]	-1.09
30	-0.6 [-1]	-0.76
40	-0.6 [-1]	-0.59
50	-0.6 [-1]	-1.87
60	-0.6 [-1]	0.25
70	-0.6 [-1]	0.53
80	0.0 [0]	0.55
90	-0.6 [-1]	0.12
100	-0.6 [-1]	-0.27
110	-1.2 [-2]	-1.29
120	-1.2 [-2]	-0.85
130	-1.9 [-3]	-1.50
140	-1.9 [-3]	-1.74
150	-3.1 [-5]	-2.56
160	-3.7 [-6]	-2.25
170	-3.7 [-6]	-2.10
180	-4.3 [-7]	-1.92
190	-5.0 [-8]	-2.37
200	-5.6 [-9]	-2.67
210	-5.6 [-9]	-2.12
220	-6.2 [-10]	-1.89
230	-6.2 [-10]	-1.82
240	-6.8 [-11]	-1.92
250	-7.5 [-12]	-1.81

Normal Acceleration (Record 2)



Time (msec)	Normal Acceleration (g)
0	-0.2
10	-0.2
20	-0.2
30	-0.2
40	-0.9
50	-1.0
60	-0.7
70	-0.4
80	1.1
90	0.5
100	0.4
110	1.0
120	1.0
130	0.0
140	-0.2
150	0.2
160	0.3
170	0.9
180	1.6
190	0.9
200	0.5
210	0.1
220	-0.1
230	-0.6
240	-0.8

Time (msec)	Normal Acceleration (g)
250	-0.4

System Status at Event (Record 3)

Event Counter at Event (Counts)	3
Multi-Event, Number of Events	1. Event
Time from Initial Event to Current Event (msec)	0.0
Time from Previous Event to Current Event (msec)	0.0
Vehicle Mileage (km)	49,270
Operating Time (min)	66,017
Ignition Cycle at Event (Cycles)	4,605
Ignition Cycle at Download (Cycles)	4,611
Maximum Delta-V, Longitudinal (MPH [km/h])	-21.1 [-34]
Time, Maximum Delta-V, Longitudinal (msec)	300.0
Clipping Time, Longitudinal Acceleration Sensor (msec)	Clipping Not Reached
Maximum Delta-V, Lateral (MPH [km/h])	-2.5 [-4]
Time, Maximum Delta-V, Lateral (msec)	290.0
Clipping Time, Lateral Acceleration Sensor (msec)	Clipping Not Reached
Time, Maximum Delta-V, Resultant (msec)	300.0
Time from Last Speed Data Sample (Preocrash) to Time Zero (msec)	378
Vehicle Identification Number (VIN)	*****
Supply Voltage (Before Event) (V)	14.2
Complete File Recorded	Completed Successfully

Deployment Command Data (Record 3)

Pretensioner, Time to 1st Stage Deployment, Driver (msec)	22
Belt-Load Limiter, Time to Deployment, Driver (msec)	222
Frontal Airbag, Time to 1st Stage Deployment, Driver (msec)	22
Side Airbag, Time to Deployment 1st Stage, Driver (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Driver Side (msec)	22
Pretensioner, Time to 1st Stage Deployment, Front Passenger (msec)	22
Belt-Load Limiter, Time to Deployment, Front Passenger (msec)	222
Frontal Airbag, Time to 1st Stage Deployment, Front Passenger (msec)	22
Frontal Airbag, Time to 2nd Stage Deployment, Front Passenger (msec)	27
Frontal Airbag, 2nd Stage Disposal, Front Passenger	No Disposal
Side Airbag, Time to Deployment 1st Stage, Front Passenger (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Passenger Side (msec)	22

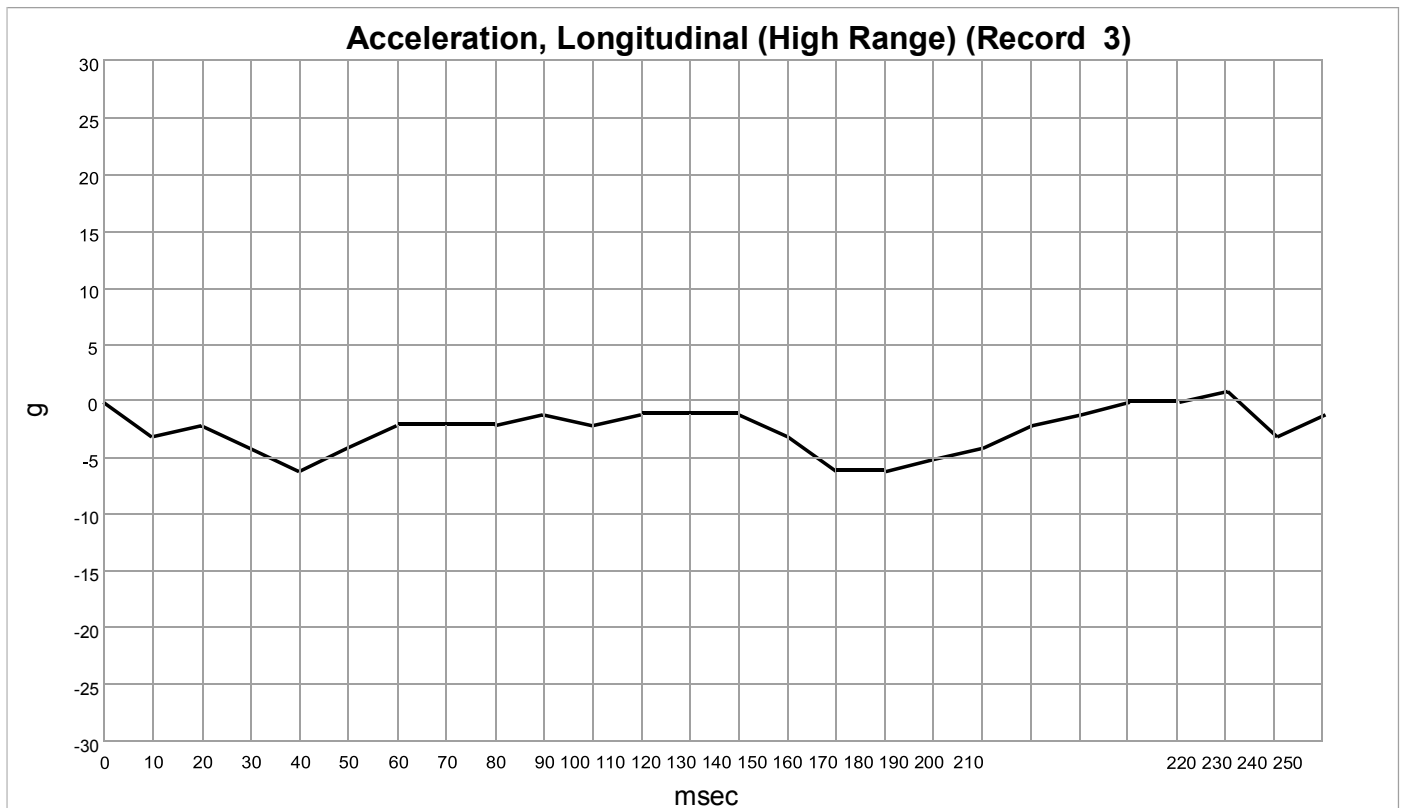
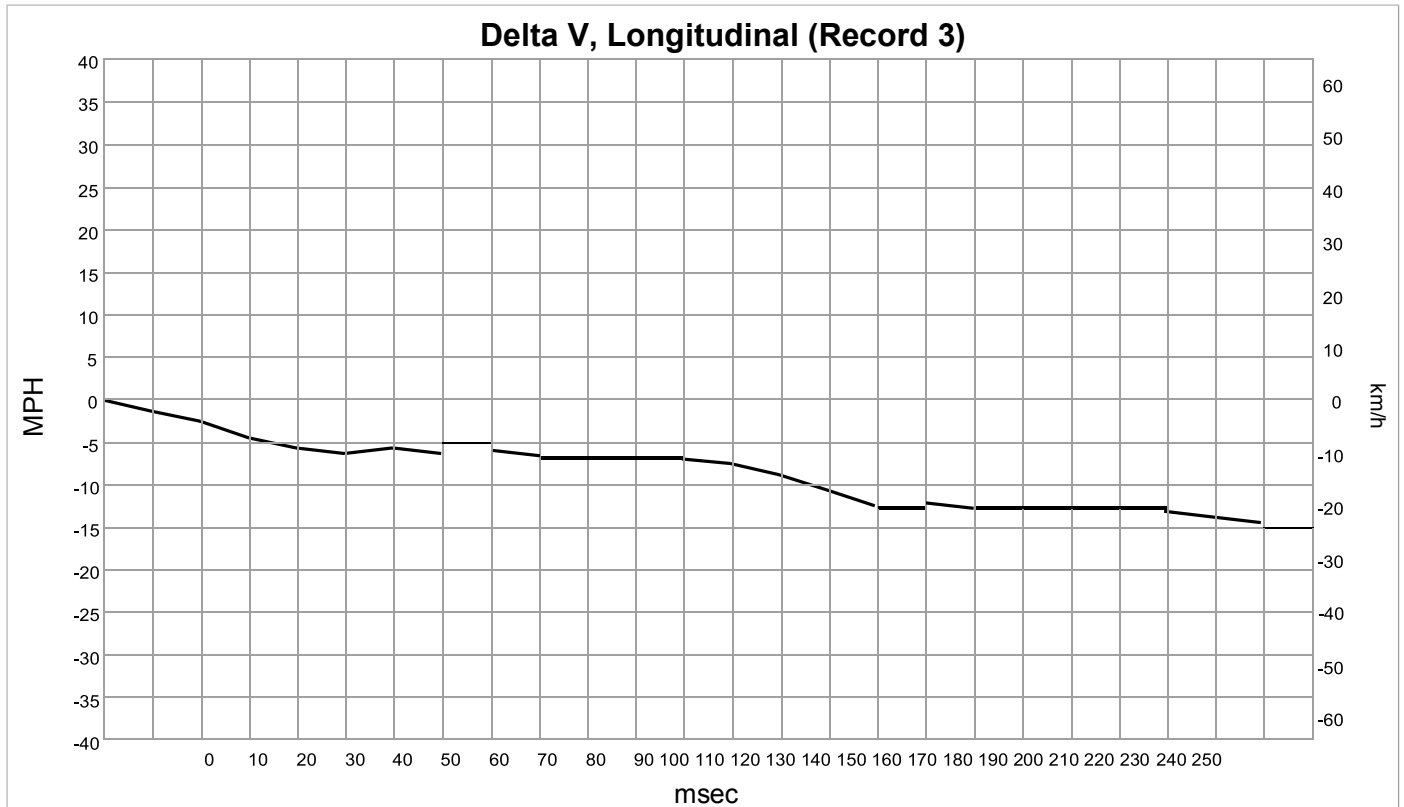
Pre-Crash Data -1 Sec (Record 3)

Safety Belt Status, Driver	Not Belted
Seat Track Position Switch Status, Driver	Rear
Safety Belt Status, Front Passenger	Belted
Seat Track Position Switch Status, Front Passenger	Rear
Occupant Size Classification, Front Passenger	Not Empty
Frontal Airbag Disable Indicator Status, Passenger	Off
Airbag Warning Lamp, Status	Off

Pre-Crash Data -5 to 0 sec (Record 3)

Time (sec)	Engine RPM (Combustion Engine) (RPM)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal (%)	Service Brake Activation
-5.0	2176	75 [121]	43	Off
-4.5	2176	75 [121]	44	Off
-4.0	2176	75 [121]	45	Off
-3.5	2176	75 [121]	46	Off
-3.0	2176	76 [122]	46	Off
-2.5	2176	76 [122]	46	Off
-2.0	2176	76 [122]	46	Off
-1.5	2240	76 [122]	46	Off
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0.0	2240	77 [124]	46	Off

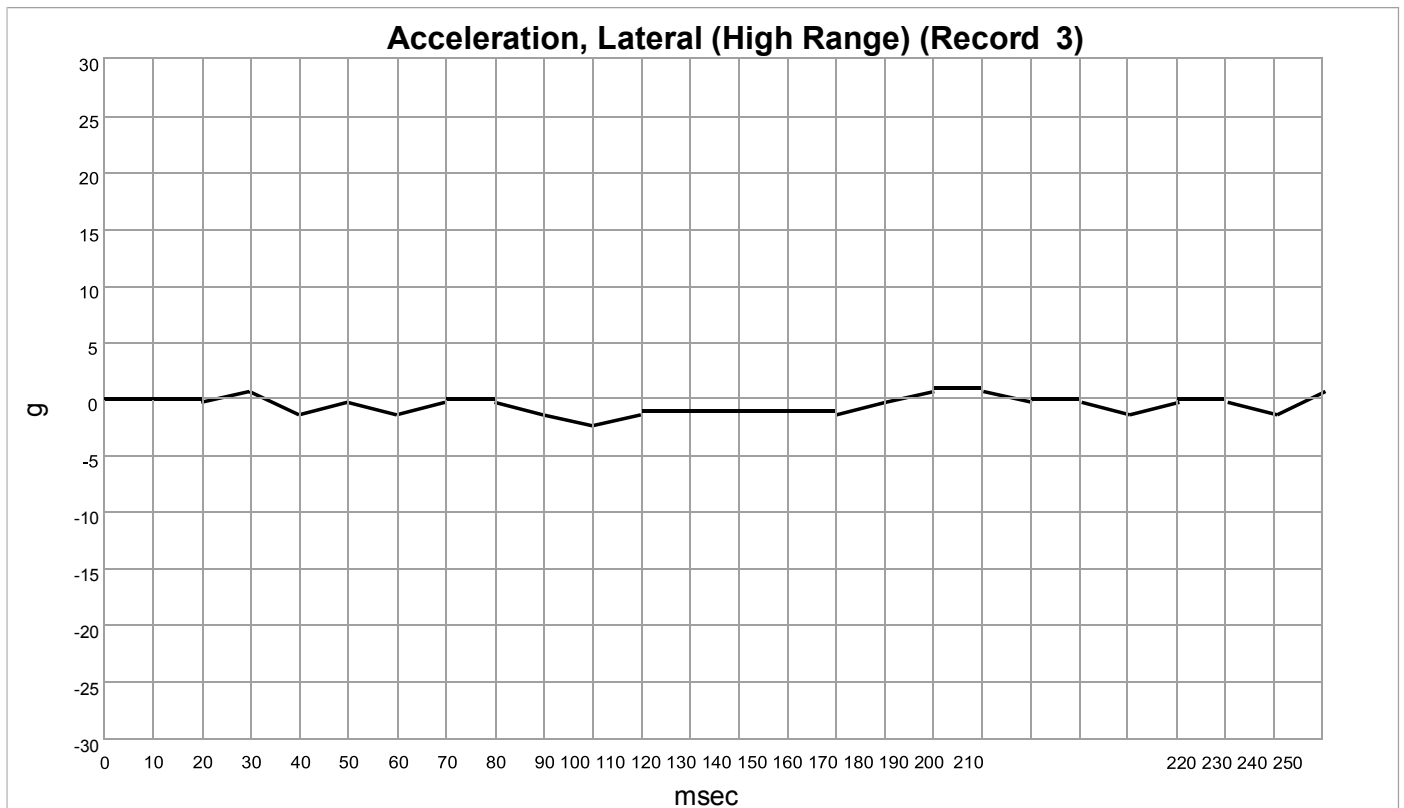
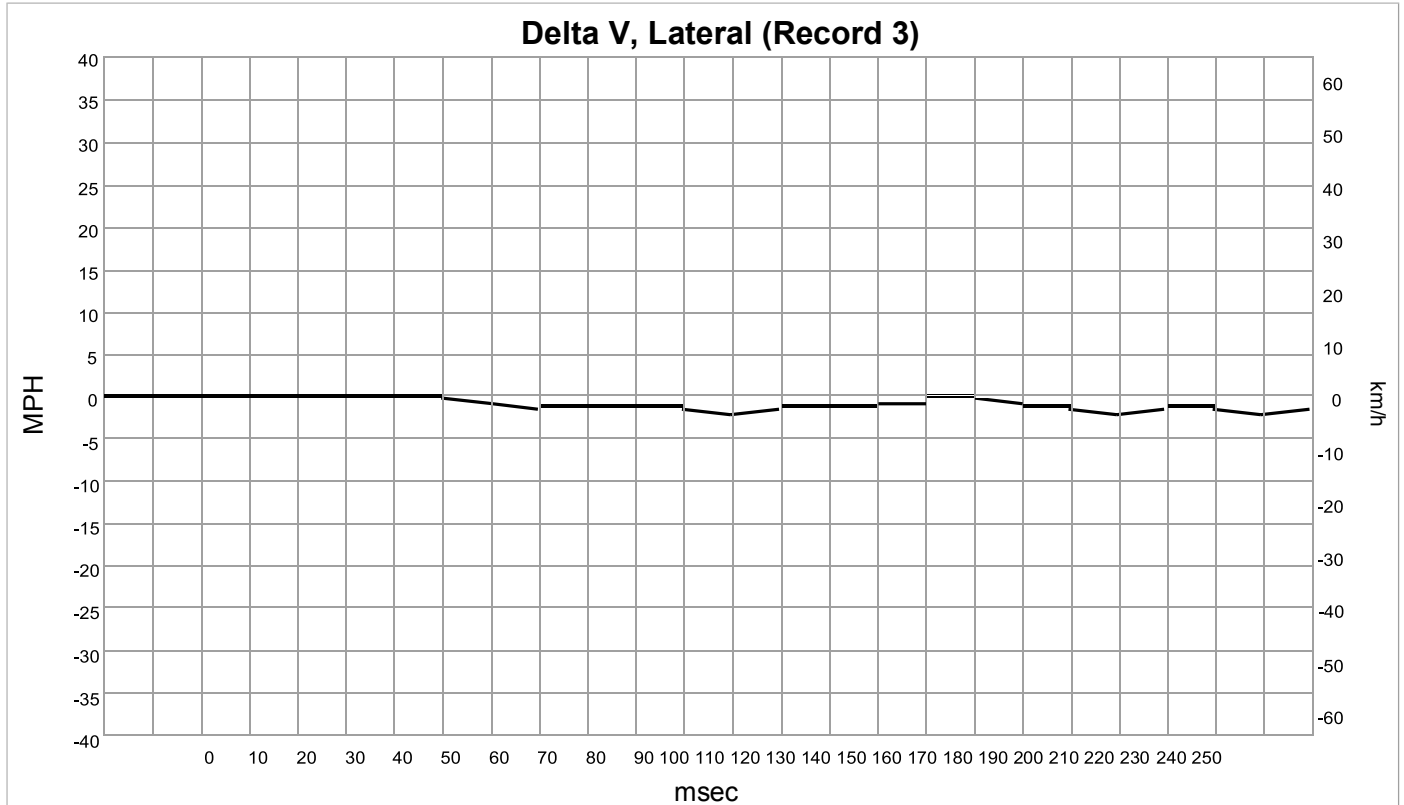
Longitudinal Crash Pulse (Record 3)



Longitudinal Crash Pulse (Record 3)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])	Longitudinal Acceleration High Range (g)
0	0.0 [0]	0.00
10	-1.2 [-2]	-2.90
20	-2.5 [-4]	-2.24
30	-4.3 [-7]	-4.42
40	-5.6 [-9]	-6.35
50	-6.2 [-10]	-4.48
60	-5.6 [-9]	-2.46
70	-6.2 [-10]	-1.90
80	-6.2 [-10]	-1.59
90	-6.8 [-11]	-1.39
100	-6.8 [-11]	-1.54
110	-6.8 [-11]	-0.79
120	-6.8 [-11]	-0.61
130	-7.5 [-12]	-0.95
140	-8.7 [-14]	-3.12
150	-10.6 [-17]	-5.64
160	-12.4 [-20]	-6.44
170	-12.4 [-20]	-4.82
180	-13.0 [-21]	-3.67
190	-13.0 [-21]	-2.39
200	-13.0 [-21]	-0.92
210	-13.0 [-21]	-0.06
220	-13.0 [-21]	-0.02
230	-13.7 [-22]	0.52
240	-14.3 [-23]	-3.37
250	-14.3 [-23]	-1.47

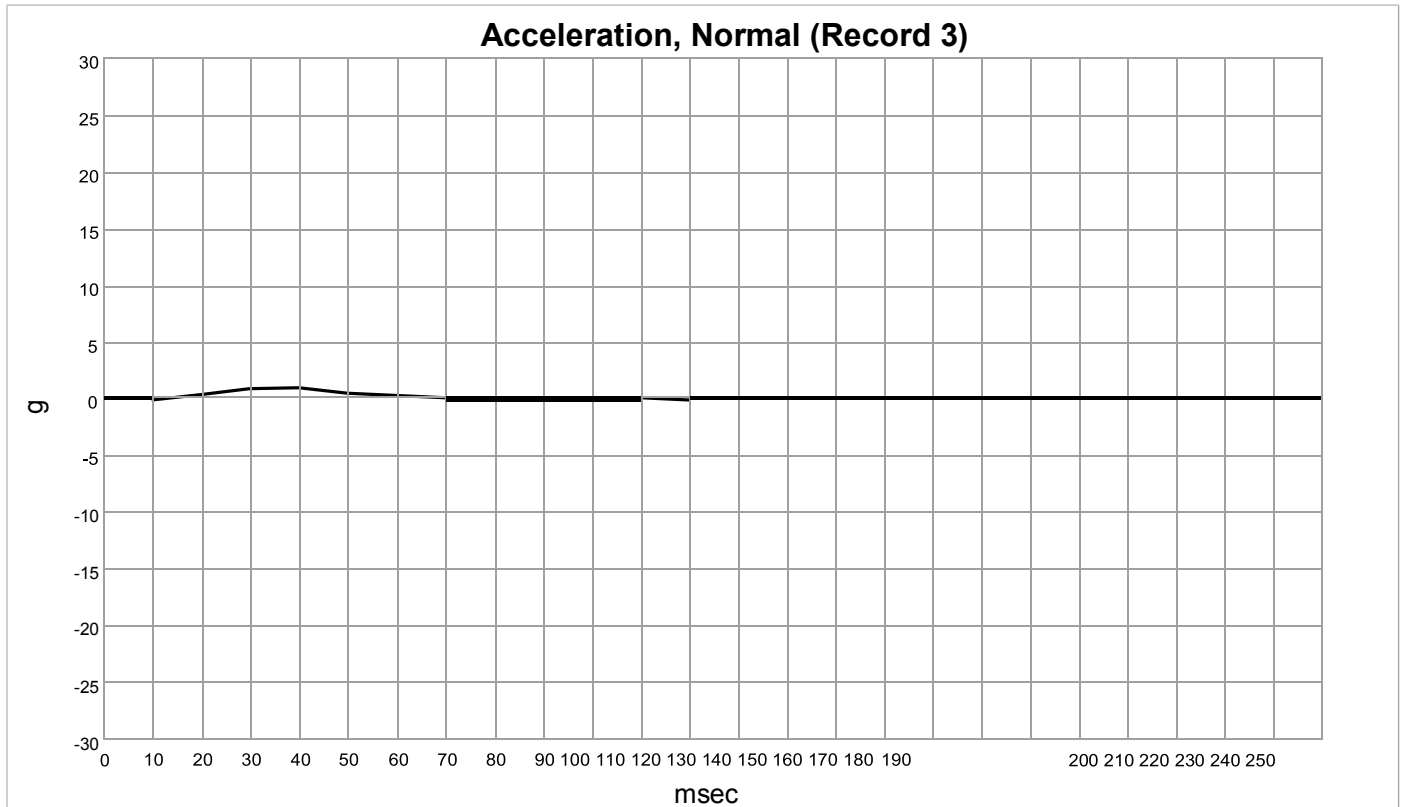
Lateral Crash Pulse (Record 3)



Lateral Crash Pulse (Record 3)

Time (msec)	Delta-V, Lateral (MPH [km/h])	Lateral Acceleration High Range (g)
0	0.0 [0]	0.25
10	0.0 [0]	0.00
20	0.0 [0]	0.35
30	0.0 [0]	0.69
40	0.0 [0]	-0.95
50	0.0 [0]	0.01
60	0.0 [0]	-0.53
70	0.0 [0]	0.02
80	-0.6 [-1]	-0.04
90	-1.2 [-2]	-1.15
100	-1.2 [-2]	-1.76
110	-1.2 [-2]	-0.92
120	-1.2 [-2]	-0.51
130	-1.9 [-3]	-0.70
140	-1.2 [-2]	-1.27
150	-1.2 [-2]	-0.98
160	-1.2 [-2]	0.33
170	-0.6 [-1]	1.35
180	-0.6 [-1]	0.55
190	-1.2 [-2]	0.44
200	-1.2 [-2]	-0.08
210	-1.9 [-3]	-0.87
220	-1.2 [-2]	0.21
230	-1.2 [-2]	0.10
240	-1.9 [-3]	-0.59
250	-1.2 [-2]	0.62

Normal Acceleration (Record 3)



Time (msec)	Normal Acceleration (g)
0	0.0
10	0.0
20	0.5
30	1.0
40	1.1
50	0.6
60	0.4
70	0.2
80	0.2
90	0.2
100	0.2
110	0.2
120	0.0
130	0.0
140	0.0
150	0.0
160	0.0
170	0.0
180	0.0
190	0.0
200	0.0
210	0.0
220	0.0
230	0.0
240	0.0

Time (msec)	Normal Acceleration (g)
250	0.0

System Status at Event (Record 4)

Event Counter at Event (Counts)	2
Multi-Event, Number of Events	1. Event
Time from Initial Event to Current Event (msec)	0.0
Time from Previous Event to Current Event (msec)	0.0
Vehicle Mileage (km)	28,470
Operating Time (min)	39,942
Ignition Cycle at Event (Cycles)	2,474
Ignition Cycle at Download (Cycles)	4,611
Maximum Delta-V, Longitudinal (MPH [km/h])	-7.5 [-12]
Time, Maximum Delta-V, Longitudinal (msec)	280.0
Clipping Time, Longitudinal Acceleration Sensor (msec)	Clipping Not Reached
Maximum Delta-V, Lateral (MPH [km/h])	1.2 [2]
Time, Maximum Delta-V, Lateral (msec)	32.5
Clipping Time, Lateral Acceleration Sensor (msec)	Clipping Not Reached
Time, Maximum Delta-V, Resultant (msec)	280.0
Time from Last Speed Data Sample (Preocrash) to Time Zero (msec)	407
Vehicle Identification Number (VIN)	*****
Supply Voltage (Before Event) (V)	14.2
Complete File Recorded	Completed Successfully

Deployment Command Data (Record 4)

Pretensioner, Time to 1st Stage Deployment, Driver (msec)	Not Deployed
Belt-Load Limiter, Time to Deployment, Driver (msec)	Not Deployed
Frontal Airbag, Time to 1st Stage Deployment, Driver (msec)	Not Deployed
Side Airbag, Time to Deployment 1st Stage, Driver (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Driver Side (msec)	Not Deployed
Pretensioner, Time to 1st Stage Deployment, Front Passenger (msec)	Not Deployed
Belt-Load Limiter, Time to Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, Time to 1st Stage Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, Time to 2nd Stage Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, 2nd Stage Disposal, Front Passenger	Not Deployed
Side Airbag, Time to Deployment 1st Stage, Front Passenger (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Passenger Side (msec)	Not Deployed

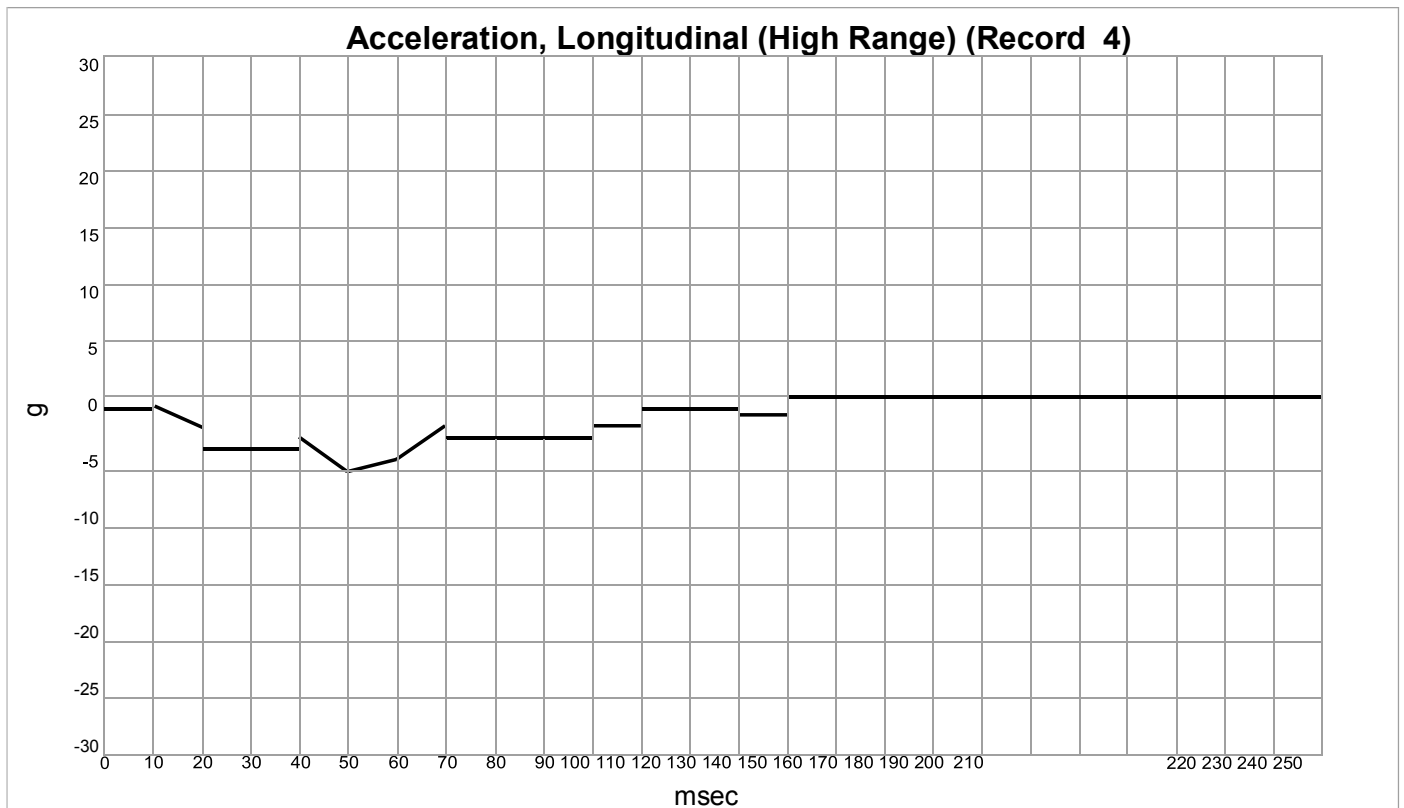
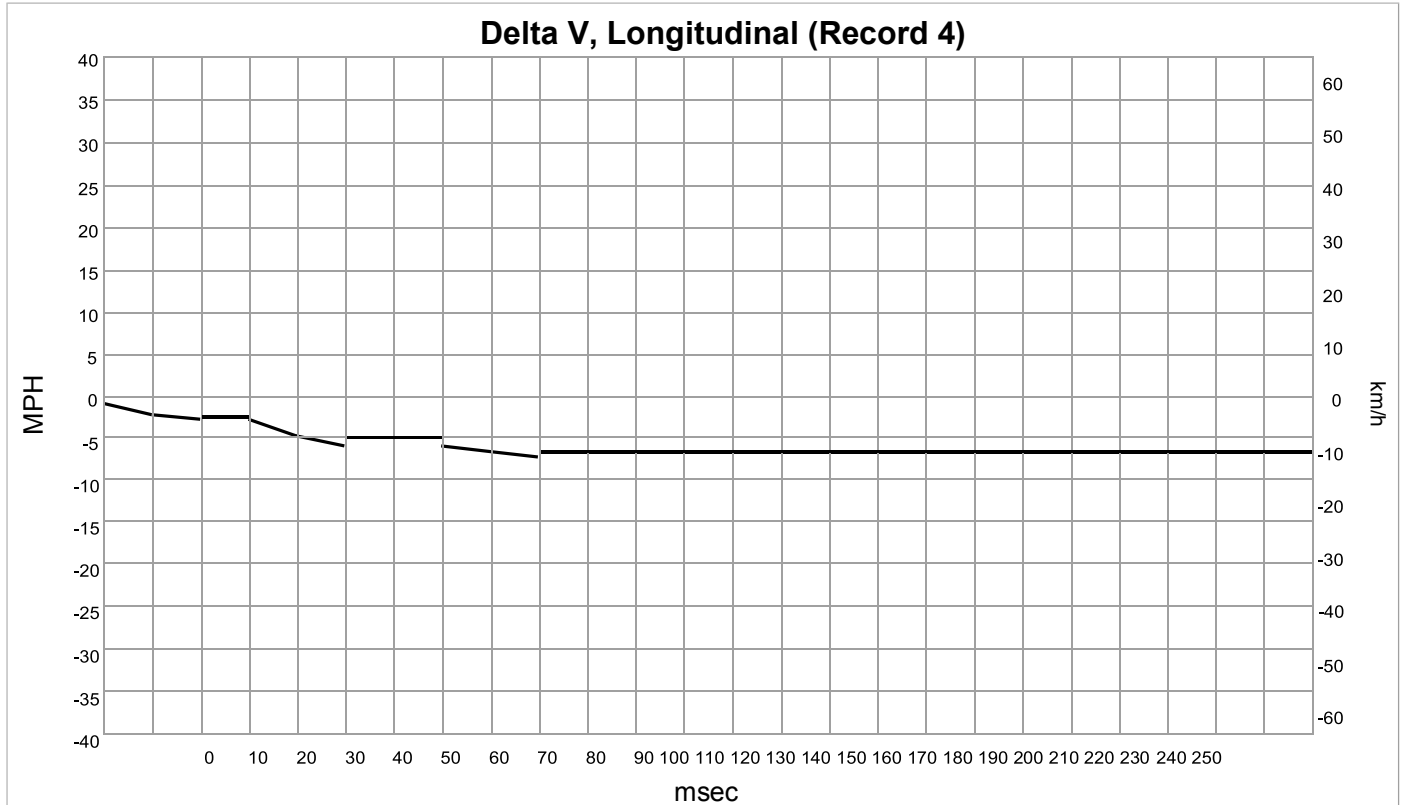
Pre-Crash Data -1 Sec (Record 4)

Safety Belt Status, Driver	Not Belted
Seat Track Position Switch Status, Driver	Rear
Safety Belt Status, Front Passenger	Not Belted
Seat Track Position Switch Status, Front Passenger	Rear
Occupant Size Classification, Front Passenger	Empty
Frontal Airbag Disable Indicator Status, Passenger	On
Airbag Warning Lamp, Status	Off

Pre-Crash Data -5 to 0 sec (Record 4)

Time (sec)	Engine RPM (Combustion Engine) (RPM)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal (%)	Service Brake Activation
-5.0	2368	40 [65]	44	Off
-4.5	2048	42 [67]	44	Off
-4.0	2112	42 [68]	43	Off
-3.5	2112	43 [70]	42	Off
-3.0	2176	45 [72]	41	Off
-2.5	1728	45 [73]	39	Off
-2.0	1600	45 [73]	0	Off
-1.5	1472	45 [73]	10	Off
-1.0	1280	45 [73]	19	Off
-0.5	1408	45 [73]	22	Off
0.0	1280	43 [70]	0	On

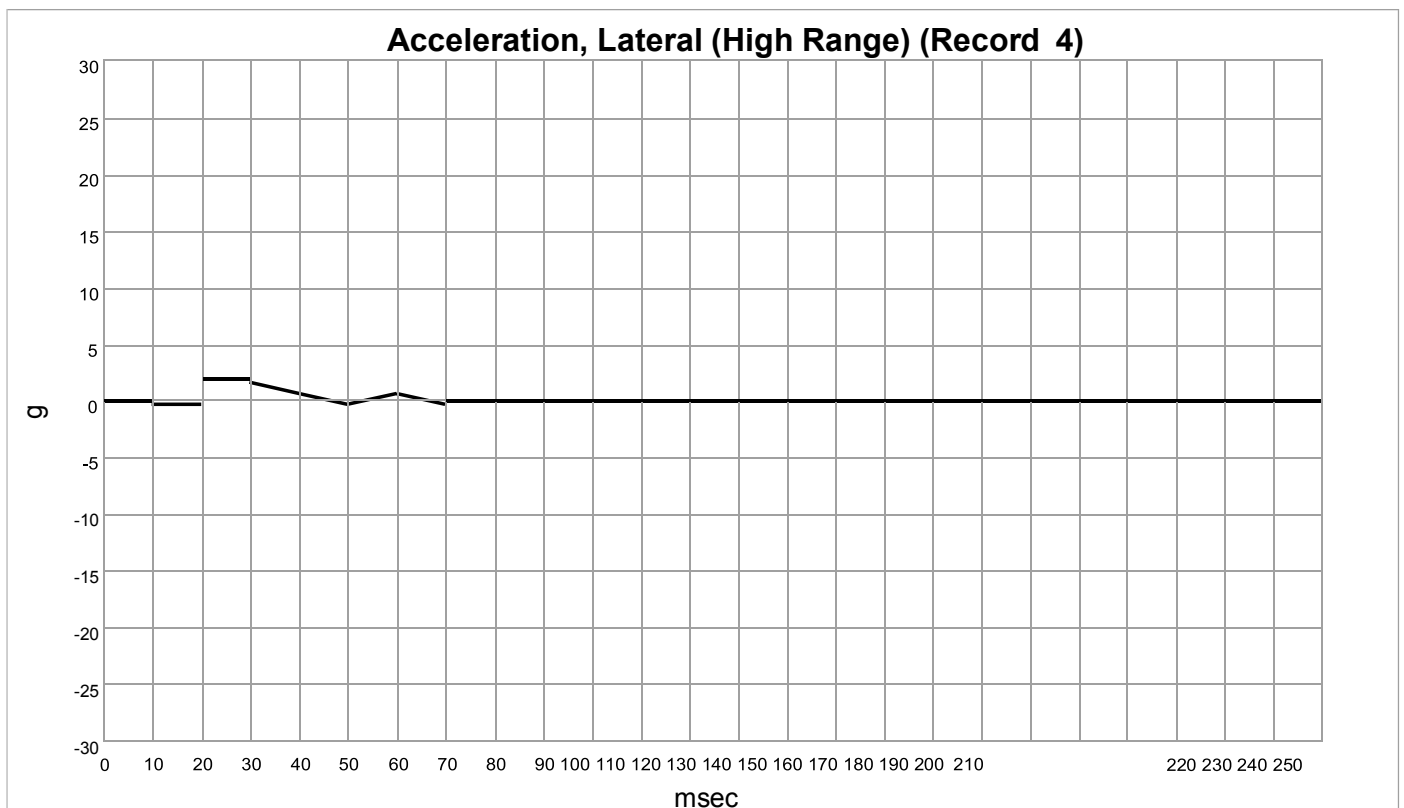
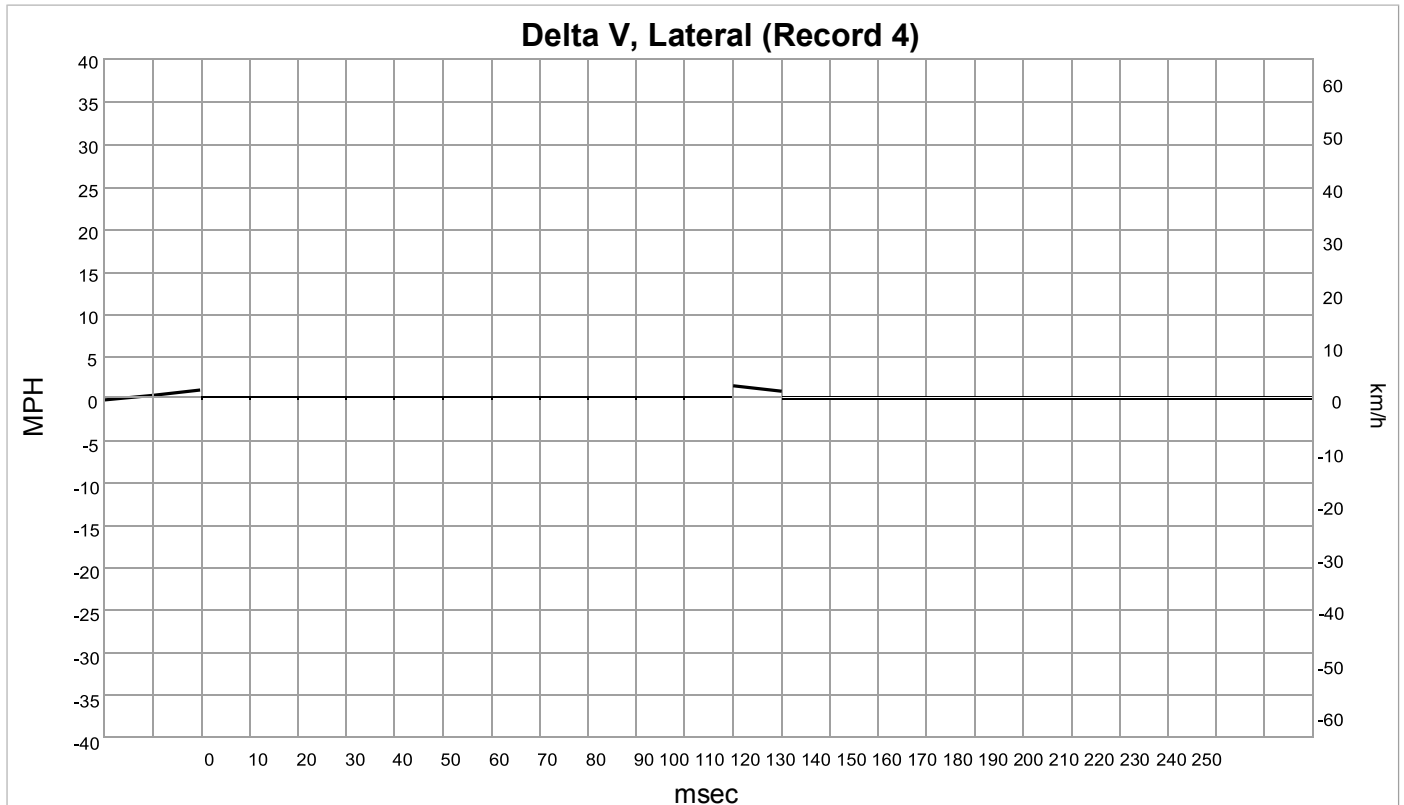
Longitudinal Crash Pulse (Record 4)



Longitudinal Crash Pulse (Record 4)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])	Longitudinal Acceleration High Range (g)
0	-0.6 [-1]	-0.69
10	-1.9 [-3]	-1.35
20	-2.5 [-4]	-3.00
30	-2.5 [-4]	-2.85
40	-4.3 [-7]	-3.10
50	-5.6 [-9]	-5.55
60	-5.6 [-9]	-4.68
70	-5.6 [-9]	-2.30
80	-6.2 [-10]	-2.40
90	-6.8 [-11]	-2.02
100	-6.8 [-11]	-1.52
110	-6.8 [-11]	-1.04
120	-6.8 [-11]	-0.88
130	-6.8 [-11]	-0.51
140	-6.8 [-11]	-0.28
150	-6.8 [-11]	-0.01
160	-6.8 [-11]	0.00
170	-6.8 [-11]	-0.32
180	-6.8 [-11]	-0.37
190	-6.8 [-11]	-0.30
200	-6.8 [-11]	-0.25
210	-6.8 [-11]	-0.25
220	-6.8 [-11]	-0.27
230	-6.8 [-11]	-0.27
240	-6.8 [-11]	-0.16
250	-6.8 [-11]	-0.07

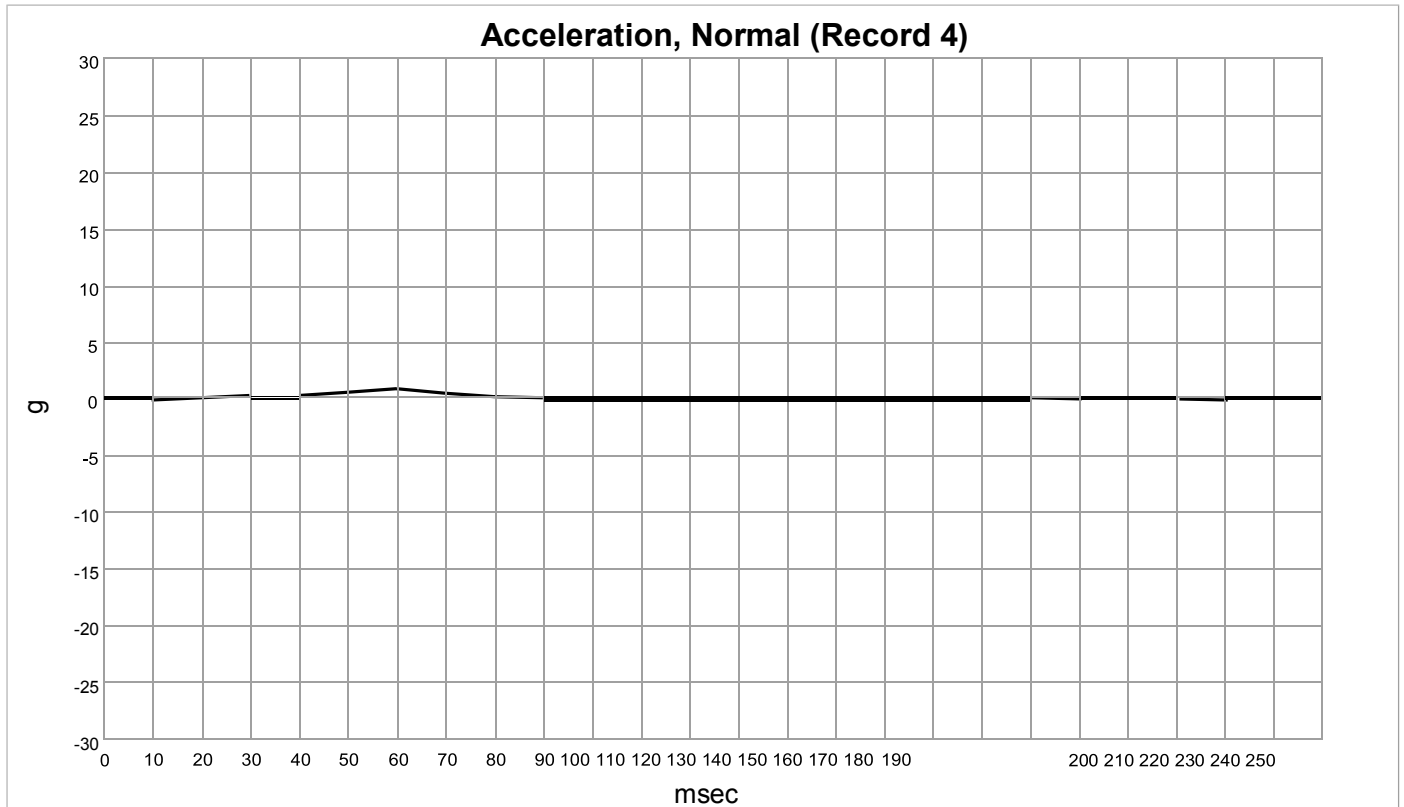
Lateral Crash Pulse (Record 4)



Lateral Crash Pulse (Record 4)

Time (msec)	Delta-V, Lateral (MPH [km/h])	Lateral Acceleration High Range (g)
0	0.0 [0]	0.07
10	0.6 [1]	0.41
20	1.2 [2]	1.76
30	1.2 [2]	1.92
40	1.2 [2]	1.16
50	1.2 [2]	-0.23
60	1.2 [2]	0.50
70	1.2 [2]	0.43
80	1.2 [2]	0.28
90	1.2 [2]	-0.32
100	1.2 [2]	0.14
110	1.2 [2]	0.30
120	1.2 [2]	-0.23
130	1.2 [2]	0.04
140	0.6 [1]	-0.25
150	0.6 [1]	-0.30
160	0.6 [1]	-0.35
170	0.6 [1]	-0.21
180	0.6 [1]	-0.22
190	0.6 [1]	-0.25
200	0.6 [1]	-0.43
210	0.6 [1]	-0.32
220	0.6 [1]	-0.06
230	0.6 [1]	-0.04
240	0.6 [1]	-0.12
250	0.6 [1]	-0.21

Normal Acceleration (Record 4)



Time (msec)	Normal Acceleration (g)
0	0.0
10	0.0
20	0.2
30	0.4
40	0.4
50	0.7
60	1.0
70	0.6
80	0.3
90	0.2
100	0.2
110	0.2
120	0.2
130	0.2
140	0.2
150	0.2
160	0.2
170	0.2
180	0.2
190	0.2
200	0.1
210	0.1
220	0.1
230	0.0
240	0.0

Time (msec)	Normal Acceleration (g)
250	0.0

System Status at Event (Record 5)

Event Counter at Event (Counts)	1
Multi-Event, Number of Events	1. Event
Time from Initial Event to Current Event (msec)	0.0
Time from Previous Event to Current Event (msec)	0.0
Vehicle Mileage (km)	3,680
Operating Time (min)	5,128
Ignition Cycle at Event (Cycles)	395
Ignition Cycle at Download (Cycles)	4,611
Maximum Delta-V, Longitudinal (MPH [km/h])	11.2 [18]
Time, Maximum Delta-V, Longitudinal (msec)	97.5
Clipping Time, Longitudinal Acceleration Sensor (msec)	Clipping Not Reached
Maximum Delta-V, Lateral (MPH [km/h])	-1.2 [-2]
Time, Maximum Delta-V, Lateral (msec)	55.0
Clipping Time, Lateral Acceleration Sensor (msec)	Clipping Not Reached
Time, Maximum Delta-V, Resultant (msec)	97.5
Time from Last Speed Data Sample (Preocrash) to Time Zero (msec)	329
Vehicle Identification Number (VIN)	*****
Supply Voltage (Before Event) (V)	14.5
Complete File Recorded	Completed Successfully

Deployment Command Data (Record 5)

Pretensioner, Time to 1st Stage Deployment, Driver (msec)	Not Deployed
Belt-Load Limiter, Time to Deployment, Driver (msec)	Not Deployed
Frontal Airbag, Time to 1st Stage Deployment, Driver (msec)	Not Deployed
Side Airbag, Time to Deployment 1st Stage, Driver (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Driver Side (msec)	Not Deployed
Pretensioner, Time to 1st Stage Deployment, Front Passenger (msec)	Not Deployed
Belt-Load Limiter, Time to Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, Time to 1st Stage Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, Time to 2nd Stage Deployment, Front Passenger (msec)	Not Deployed
Frontal Airbag, 2nd Stage Disposal, Front Passenger	Not Deployed
Side Airbag, Time to Deployment 1st Stage, Front Passenger (msec)	Not Deployed
Side Curtain/Tube Airbag, Time to Deployment, Passenger Side (msec)	Not Deployed

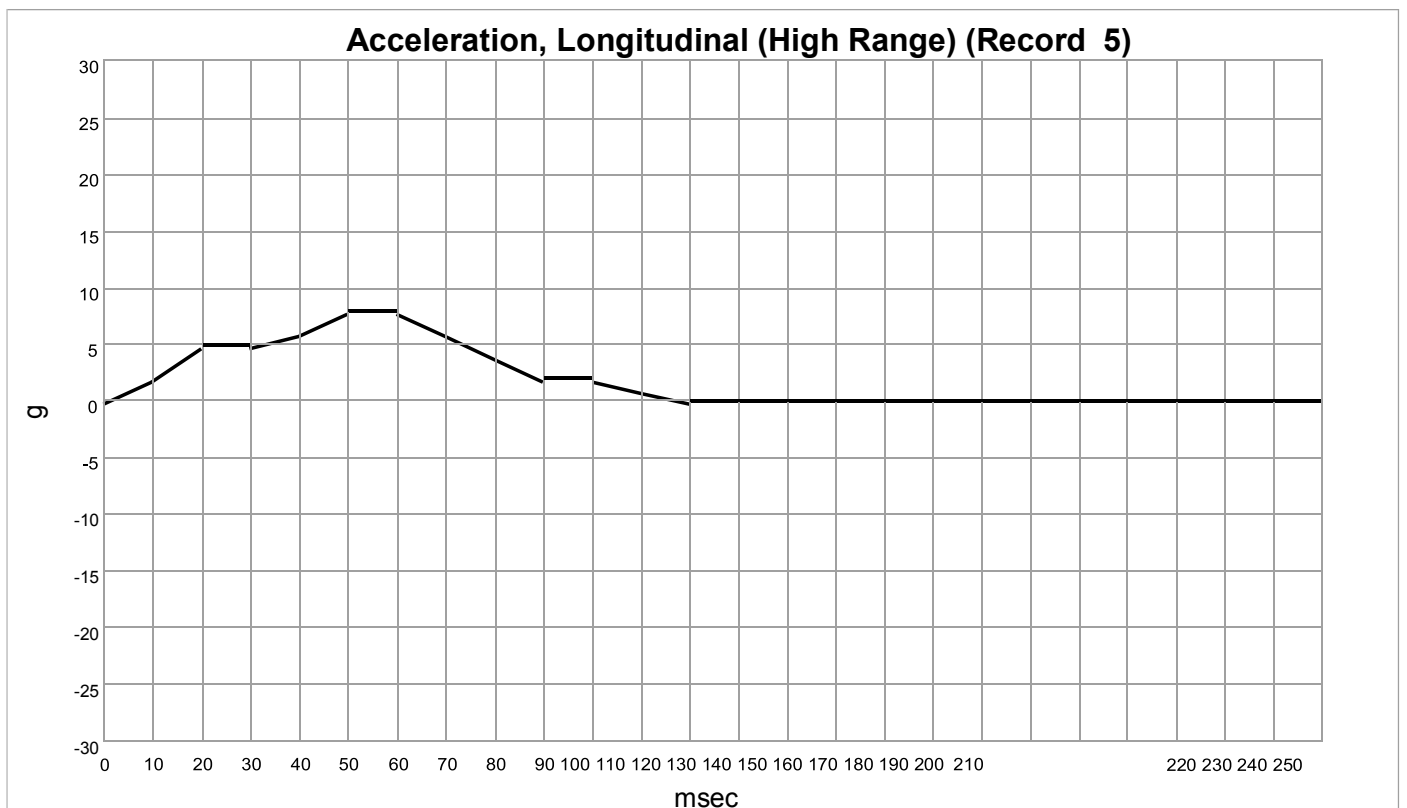
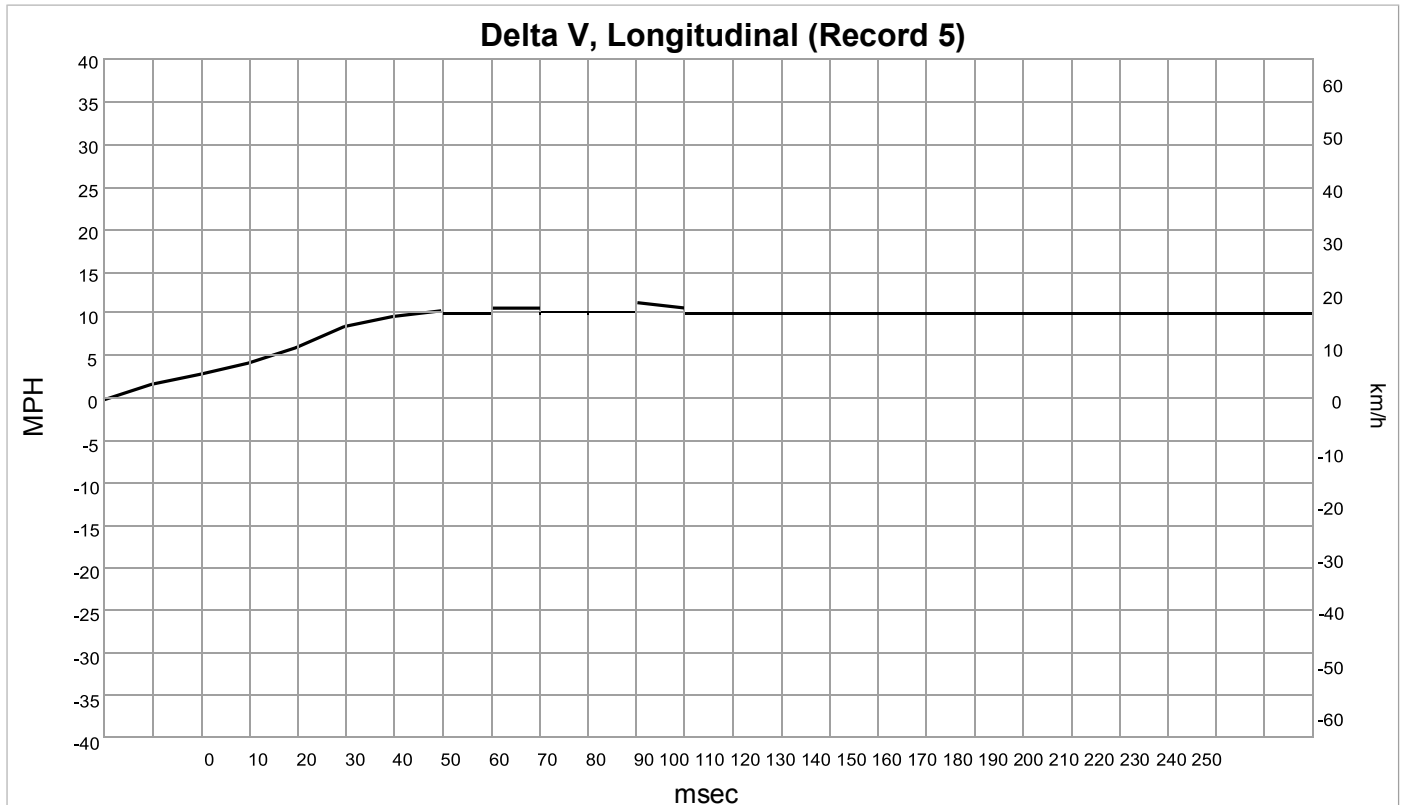
Pre-Crash Data -1 Sec (Record 5)

Safety Belt Status, Driver	Belted
Seat Track Position Switch Status, Driver	Rear
Safety Belt Status, Front Passenger	Not Belted
Seat Track Position Switch Status, Front Passenger	Rear
Occupant Size Classification, Front Passenger	Empty
Frontal Airbag Disable Indicator Status, Passenger	On
Airbag Warning Lamp, Status	Off

Pre-Crash Data -5 to 0 sec (Record 5)

Time (sec)	Engine RPM (Combustion Engine) (RPM)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal (%)	Service Brake Activation
-5.0	1984	9 [14]	41	Off
-4.5	2176	11 [17]	43	Off
-4.0	2304	12 [19]	46	Off
-3.5	1856	12 [20]	44	Off
-3.0	1280	13 [21]	0	Off
-2.5	1088	12 [19]	0	On
-2.0	896	9 [15]	0	On
-1.5	832	7 [11]	0	On
-1.0	832	5 [8]	0	On
-0.5	768	2 [4]	0	On
0.0	832	1 [1]	0	On

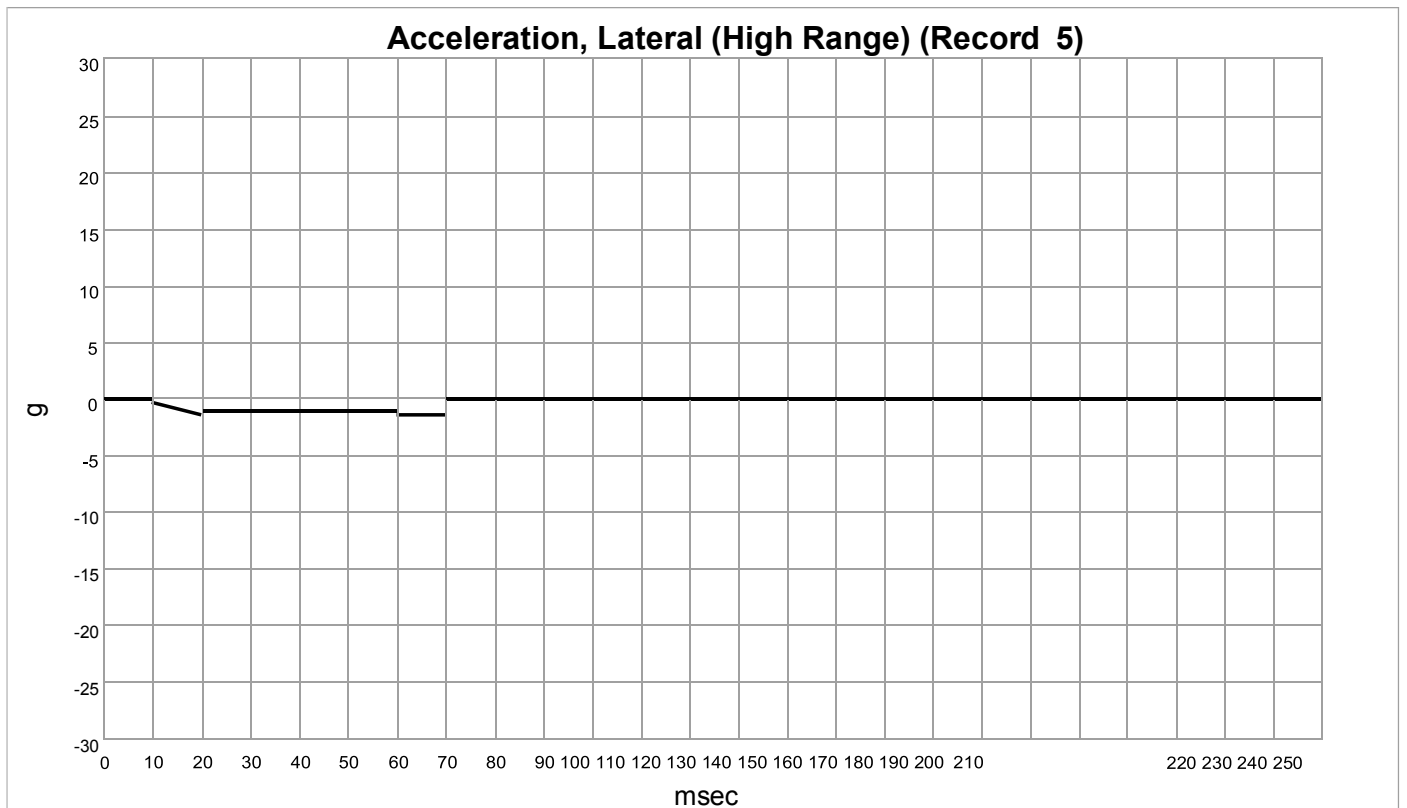
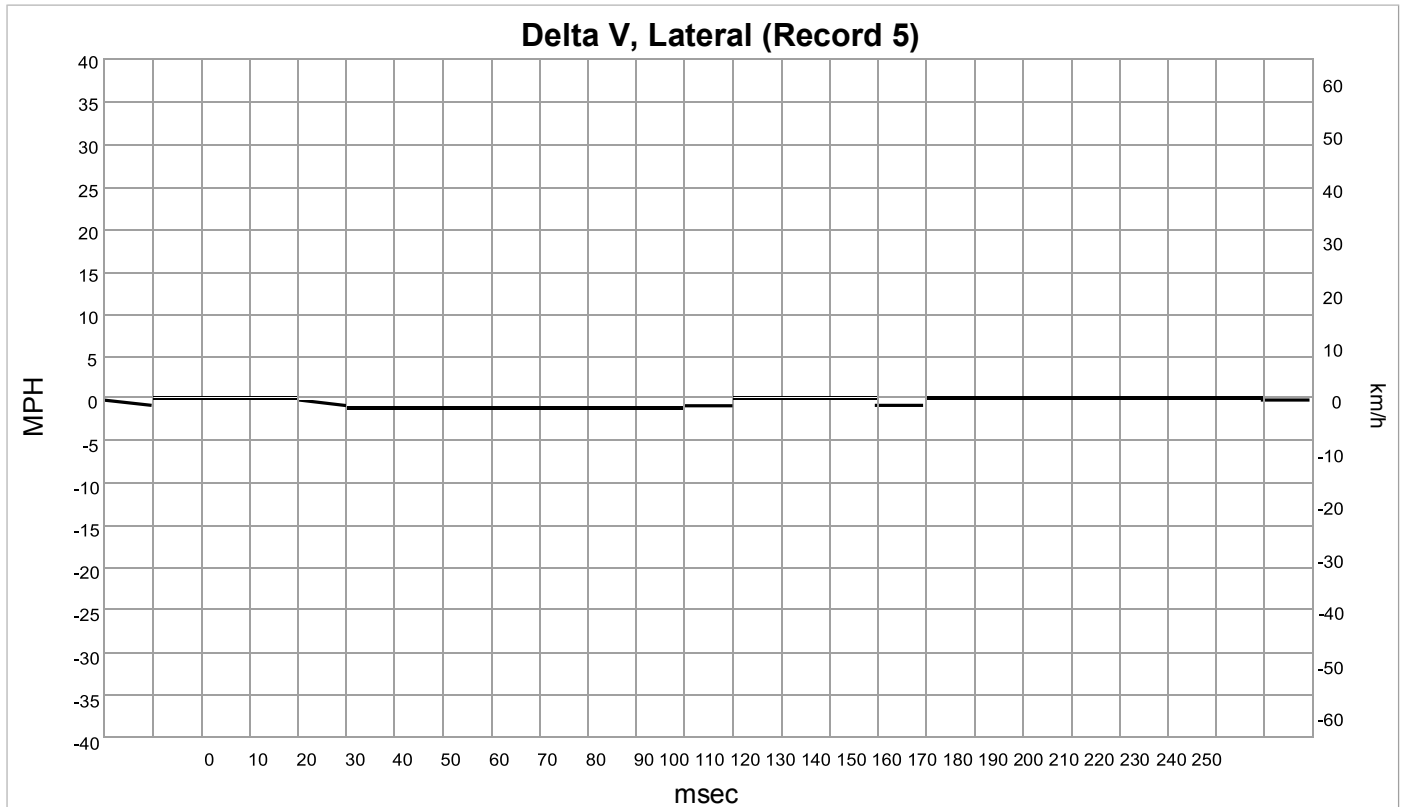
Longitudinal Crash Pulse (Record 5)



Longitudinal Crash Pulse (Record 5)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])	Longitudinal Acceleration High Range (g)
0	0.0 [0]	0.01
10	1.9 [3]	2.38
20	3.1 [5]	4.90
30	4.3 [7]	4.64
40	6.2 [10]	5.66
50	8.7 [14]	8.42
60	9.9 [16]	8.40
70	10.6 [17]	6.39
80	10.6 [17]	3.81
90	11.2 [18]	2.31
100	11.2 [18]	1.75
110	11.2 [18]	0.93
120	10.6 [17]	0.17
130	10.6 [17]	-0.04
140	10.6 [17]	-0.21
150	10.6 [17]	-0.07
160	10.6 [17]	0.00
170	10.6 [17]	0.02
180	10.6 [17]	-0.05
190	10.6 [17]	-0.07
200	10.6 [17]	-0.01
210	10.6 [17]	0.01
220	10.6 [17]	0.10
230	10.6 [17]	0.10
240	10.6 [17]	0.05
250	10.6 [17]	0.05

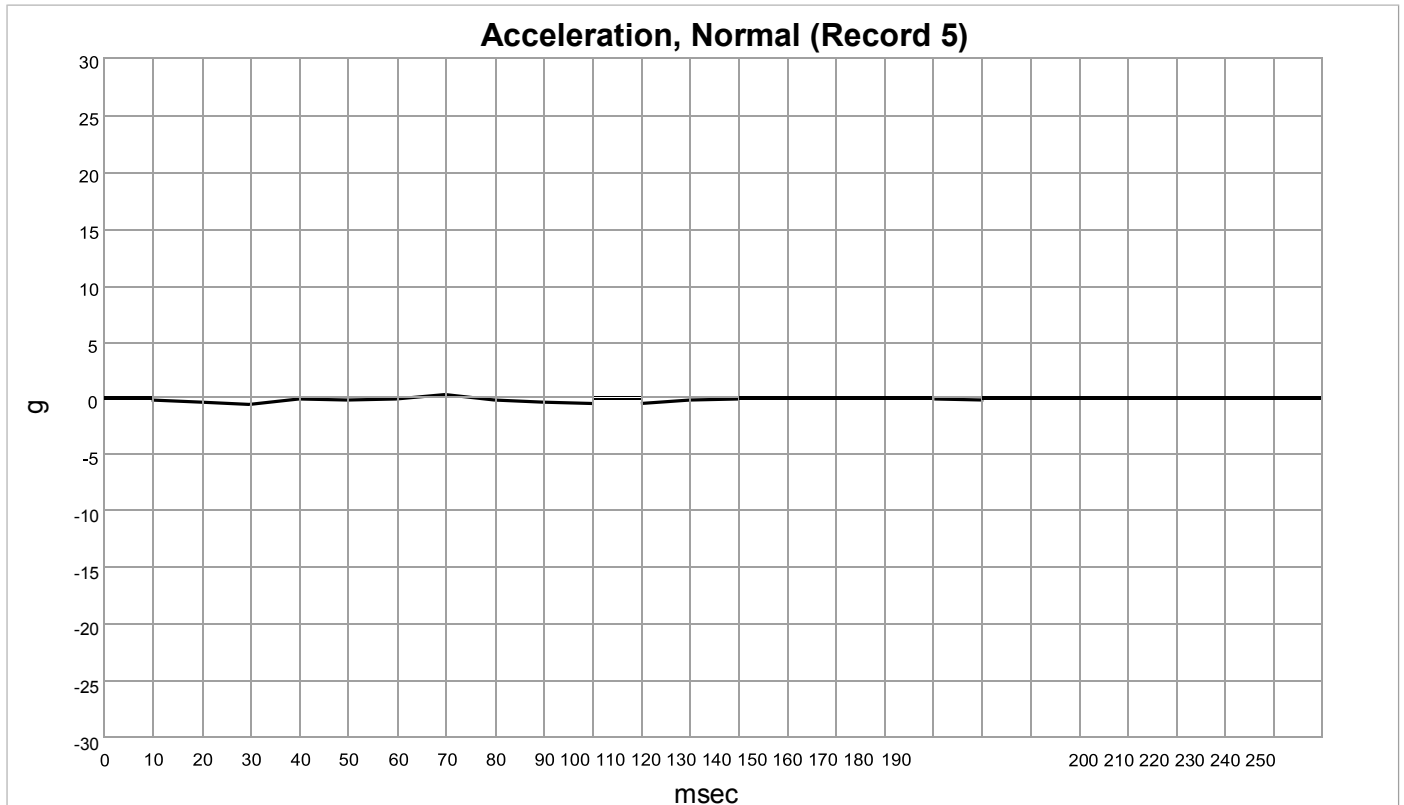
Lateral Crash Pulse (Record 5)



Lateral Crash Pulse (Record 5)

Time (msec)	Delta-V, Lateral (MPH [km/h])	Lateral Acceleration High Range (g)
0	0.0 [0]	0.01
10	-0.6 [-1]	-0.46
20	-0.6 [-1]	-1.01
30	-0.6 [-1]	-1.23
40	-0.6 [-1]	-0.68
50	-1.2 [-2]	-0.78
60	-1.2 [-2]	-1.07
70	-1.2 [-2]	-0.28
80	-1.2 [-2]	-0.16
90	-1.2 [-2]	0.07
100	-1.2 [-2]	0.00
110	-1.2 [-2]	0.06
120	-1.2 [-2]	0.10
130	-0.6 [-1]	0.14
140	-0.6 [-1]	0.34
150	-0.6 [-1]	0.46
160	-0.6 [-1]	0.49
170	0.0 [0]	0.49
180	0.0 [0]	0.42
190	0.0 [0]	0.42
200	0.0 [0]	0.39
210	0.0 [0]	0.39
220	0.0 [0]	0.39
230	0.0 [0]	0.39
240	0.0 [0]	0.35
250	0.6 [1]	0.35

Normal Acceleration (Record 5)



Time (msec)	Normal Acceleration (g)
0	0.0
10	0.0
20	-0.1
30	-0.3
40	0.1
50	0.0
60	0.1
70	0.5
80	0.0
90	-0.1
100	-0.2
110	-0.2
120	0.0
130	0.1
140	0.1
150	0.1
160	0.1
170	0.1
180	0.0
190	0.0
200	0.0
210	0.0
220	0.0
230	0.0
240	0.0

Time (msec)	Normal Acceleration (g)
250	0.0

Hexadecimal Data

```
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FA11 02 00 04
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7F F4 7F EF 7F D9 7F D5 7F DE 7F D8 7F DB 7F E3
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7F D7 7F C7 7F B8 7F B1 7F B5 7F B8 00 17 64 01
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3F 03 F2 01 01 E1 03 F3 FF FF FF FF FF FF FF FF
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03 FE 75 52 55 7F
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FA15 00 05 00 04 00 00 00 05 00 0D 00 06 00 07 00 07
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**National Highway
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