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# **Special Crash Investigations Child Restraint System Crash Investigation Vehicle: 2015 Toyota Camry Location: Colorado Date: May 2017**

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15. Supplementary Notes <p>This report documents the on-site investigation of the child restraint systems (CRSs) used by the second row child occupants in a 2015 Toyota Camry involved in a head-on crash with a loaded 2001 Freightliner tractor-trailer.</p> <p>Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicles or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.</p>			
16. Abstract <p>This two-vehicle crash occurred in May 2017 on a two-lane State highway in Colorado. The 2015 Toyota Camry was being driven southbound by a belted 27-year-old female. The second row left seat was occupied by a 9-month-old female who was restrained in a rear-facing CRS. The second row right seat was occupied by a 4-year-old female who was restrained in a forward-facing CRS. The Freightliner was being driven northbound by a belted 54-year-old male. The Toyota drove into the northbound lane and the vehicles struck head-on. The Toyota rotated clockwise and remained engaged with the Freightliner as it was displaced to the north. The driver of the Toyota was fatally injured. The 4-year-old sustained "A" (Evident - Incapacitating) injuries. The 9-month-old sustained "B" (Evident - Non incapacitating) injuries. Both vehicles were towed due to damage.</p>			
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**Special Crash Investigations**  
**On-Site Child Restraint System Investigation**  
**Case Number: DS17018**  
**Vehicle: 2015 Toyota Camry**  
**Location: Colorado**  
**Crash Date: May 2017**

**BACKGROUND**

This report documents the on-site investigation of the child restraint system (CRS) used by the second row child occupants in a 2015 Toyota Camry involved in a head-on crash with a loaded 2001 Freightliner tractor-trailer (**Figure 1**). This crash was identified by Dynamic Science, Inc., from an online news article in September 2017. The Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration instructed the investigators to pursue the crash. The police report and on-scene photos were obtained. SCI contacted the vehicle owner and several involved attorneys. Permission to inspect the CRSs and vehicle was obtained in November 2017 and the case was assigned on the same day. The inspections were completed in December 2017. The vehicle was supported by the Bosch Crash Data Retrieval (CDR) system. The event data recorder (EDR) was removed by police investigators and placed into evidence. SCI obtained a PDF copy of the imaged data from the police.



**Figure 1.** 2015 Toyota Camry at final rest, looking south (police photo).

This two-vehicle crash occurred during the morning in May 2017 on a two-lane State highway in Colorado. The 2015 Toyota Camry was being driven southbound by a belted 27-year-old female. The second row left seat was occupied by a 9-month-old female who was restrained in a rear-facing CRS. The second row right seat was occupied by a 4-year-old female who was unconventionally restrained in a forward-facing CRS. The Freightliner was being driven northbound by a belted 54-year-old male. The Toyota traveled into the northbound lane and the vehicles struck head-on. The Toyota rotated clockwise and remained engaged with the Freightliner as it was displaced to the north. The driver of the Toyota was fatally injured. The 4-year-old sustained “A” (Evident - Incapacitating) injuries. The 9-month-old sustained “B” (Evident - Non incapacitating) injuries. The driver of the Freightliner complained of pain. Both vehicles were towed due to damage.

**SUMMARY**

***Crash Site***

The crash site was under construction at the time of the crash. This was initially a divided roadway. The southbound travel lanes had been closed and the northbound lanes had been restriped for north and southbound travel. The asphalt roadway was straight and level. The travel

lanes were divided by solid double-yellow lines and orange centerline markers. The speed limit was 72 km/h (45 mph). The weather at the nearest reporting station was 13 degrees C° (57 degrees F°), 45 percent humidity, 14 km (9 miles) visibility, cloudy skies, with winds out of the north at 24 km/h (15 mph) with gusts up to 37 km/h (23.0 mph). A Crash Diagram is attached at the end of this technical report.

### ***Pre-Crash***

The Toyota was traveling southbound at an EDR-reported of 67 km/h (41.6 mph) at 4.75 seconds before impact. Based on EDR report data for accelerator pedal and engine throttle percentages, it would appear that the vehicle was in cruise control. The driver of the Toyota was under the influence of multiple drugs, including amphetamines, oxycodone, and oxymorphone. The Toyota may have been drifting to the right. At 2.25 seconds prior to impact, the vehicle had slowed to 65 km/h (40 mph) and the driver steered to the left while entering the northbound travel lane. At 0.75 seconds prior to impact, the vehicle had slowed to 62 km/h (38 mph) and the driver steered sharply to the right. The Freightliner was traveling northbound (**Figure 2**) at a police-reported speed of 48 km/h (30 mph). The driver of the Freightliner saw the Toyota enter his travel lane. He began braking and steering to the left.



**Figure 2.** Northbound approach for Freightliner (police photo).

### ***Crash***

At impact, the Toyota was traveling 55 km/h (34 mph) and was being steered sharply to the right. There were no indications of braking. The front plane of the Freightliner struck the front plane of the Toyota. The EDR reported a maximum longitudinal delta-V of -107.0 km/h (- 66.5 mph) at 182 ms. The driver's frontal air bag, driver's side air bag, driver's knee air bag, passenger's side air bag, second row seat-mounted side air bags, and both inflatable curtain (IC) air bags deployed during this impact. Both front row seat belt pretensioners also actuated at this time. Both vehicles remained engaged as the Freightliner continued traveling northbound, pushing the Toyota with it. The Toyota struck two centerline markers (Events 2 and 3) as it was displaced rearward to the north.



**Figure 3.** Vehicles at final rest, looking east (police photo).

### ***Post-Crash***

The Freightliner and Toyota continued northbound for 58 m (191 ft) before coming to rest on the centerline. The Toyota had rotated clockwise and was facing west at final rest (**Figure 3**). The driver of the Toyota was trapped in her vehicle. She was not responsive and was declared deceased on scene. The 9-month-old sustained "B" (Evident - Non incapacitating)

injuries and was transported from the scene for treatment. The 4-year-old sustained “A” (Evident - Incapacitating) injuries and was transported from the scene for treatment. The driver of the Freightliner complained of pain and was transported from the scene for treatment. Both vehicles were towed due to damage.

**2015 TOYOTA CAMRY SE**

***Description***

The Toyota was a 5-passenger, 4-door sedan. The vehicle was identified by the Vehicle Identification Number (VIN) 4T1BF1FK5FUxxxxxx. The vehicle was equipped with a 2.5-liter 4-cylinder gasoline engine, a 6-speed automatic transmission, and front wheel drive. The vehicle manufacturer’s recommended tire size was P205/65R16 with a cold tire pressure of 241 kPa (35 psi). The vehicle was equipped with Bridgestone Turanza P215/55R17 tires. The specific tire information was as follows:

<b>Position</b>	<b>Measured Pressure</b>	<b>Measured Tread Depth</b>	<b>Restricted</b>	<b>Damage</b>
LF	Tire Flat	3 mm (4/32 in)	Yes	Debeaded
LR	268 kPa (39 psi)	3 mm (4/32 in)	No	None
RR	275 kPa (40 psi)	2 mm (3/32 in)	No	None
RF	275 kPa (40 psi)	2 mm (3/32 in)	Yes	None

The Toyota was configured with seating for five occupants. The front row was equipped with leather covered bucket seats with adjustable head restraints. The second row was equipped with a bench seat and integral head restraints at each seat position.

***Exterior Damage***

The Toyota sustained severe frontal damage from the impact with the front plane of the Freightliner (**Figure 4**). The Field L extended from bumper corner to bumper corner. Fourteen measurements were taken at the backing bar level by the Nikon Total Station and the Faro Blitz program computed crush measurement in six increments as follows: C<sub>1</sub> = 69 cm (24.8 in), C<sub>2</sub> = 73 cm (28.7 in), C<sub>3</sub> = 75 cm (29.5 in), C<sub>4</sub> = 66 cm (25.9 in), C<sub>5</sub> = 57 cm (22.4 in), C<sub>6</sub> = 37 cm (14.5 in). The vehicle sustained substantial above bumper override crush. Crush at the radiator support was measured as follows: C<sub>1</sub> = 156 cm (61.4 in), C<sub>2</sub> = 153 cm (60.2 in), C<sub>3</sub> = 142 cm (55.9 in), C<sub>4</sub> = 141 cm (55.5 in), C<sub>5</sub> = 141 cm (55.5 in), C<sub>6</sub> = 127 cm (50.0 in). The averaged crush was as follows: C<sub>1</sub> = 113 cm (44.4 in), C<sub>2</sub> = 113 cm (44.4 in), C<sub>3</sub> = 109 cm (42.9 in), C<sub>4</sub> = 104 cm (40.9 in), C<sub>5</sub> = 99 cm (38.9 in), C<sub>6</sub> = 82 cm (32.2 in). The Collision Deformation Classification was 12FDEW6. The calculated Principal Direction of Force was 353 degrees. Damage from the center line markers could not be located.

**Event Data Recorder**

The Toyota was equipped with an air bag control module that had EDR capability to store deployment and non-deployment events. Both types of events can contain pre-crash and crash data. For the pre-crash data there is a 5-second buffer that records vehicle speed, accelerator pedal position, percentage of engine throttle, engine rpm, motor rpm, service brake, brake oil pressure, longitudinal acceleration, yaw rate, steering input, shift position, cruise control status, and driver mode. The control module was removed by police investigators and placed into evidence. SCI obtained a PDF copy of the imaged data from the police.



**Figure 4.** 2015 Toyota Camry, frontal damage.

Four events were recovered, one of which was a deployment event. It appears that all four events were generated during this crash. The 3<sup>rd</sup> Prior Event was a potential rollover event that was likely triggered by a sharp evasive steering maneuver. The 2<sup>nd</sup> Prior Event was the deployment event that resulted from the impact with the front plane of the Freightliner. The 1<sup>st</sup> Prior and Most Recent Event occurred while the Toyota was being displaced rearward while still engaged with the Freightliner.

The recording status for the deployment event was complete and was linked to pre-crash page 1. The maximum longitudinal delta-V was -107.0 km/h (-66.5 mph) at 182 ms. The maximum lateral acceleration from the frontal/rear crash floor sensor was -113.0 m/s/s at 70 ms. The calculated cumulative lateral delta-V was 13.8 km/h (8.6 mph). The driver’s front air bag, both side air bags, and both IC air bags deployed at 1 ms. Both second row seat back air bags also deployed in this crash. The driver and passenger seat belt pretensioners actuated at 1 ms.

The Bosch CDR report is included as Appendix A at the end of this report. The pre-crash data was as follows:

Time (sec)	-4.75	-4.25	-3.75	-3.25	-2.75	-2.25	-1.75	-1.25	-0.75	-0.25	0 (TRG)
Vehicle Speed (MPH (km/h))	41.6 (67)	41.6 (67)	41 (66)	41 (66)	41 (66)	40.4 (65)	39.8 (64)	39.8 (64)	38.5 (62)	34.8 (56)	34.2 (55)
Accelerator Pedal %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.5
Percentage of Engine Throttle %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
Engine RPM	1,100	1,100	1,300	1,300	1,300	1,300	1,300	1,300	1,000	800	1,100

<b>Service Brake ON/OFF</b>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
<b>Brake Oil Pressure (Mpa)</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.05
<b>Longitudinal Acceleration, VSC Sensor (m/sec^2)</b>	-0.287	-0.502	-0.359	-0.287	-0.431	-0.574	-0.502	-0.287	-1.723	-2.25	-2.297
<b>Yaw Rate (deg/sec)</b>	1.46	-0.49	-0.49	0.00	0.49	15.62	11.22	1.46	-30.74	-23.91	-21.96
<b>Steering Input (degrees)</b>	3.0	-1.5	-1.5	0.0	7.5	61.5	21.0	10.5	-202.5	-318.0	-301.5
<b>Shift Position</b>	D	D	D	D	D	D	D	D	D	D	D
<b>Cruise Control Status</b>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
<b>Drive Mode, PWR</b>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
<b>Drive Mode, ECO</b>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
<b>Drive Mode, Sport</b>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
<b>Drive Mode, Snow</b>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
<b>Drive Mode, EV</b>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

The cruise control status was reported as “Off.” However, the accelerator pedal percentage and engine throttle percentage were reported as 0.0 until -0.25 seconds before impact, suggesting that the cruise control was likely actuated.

### ***Interior Damage***

The Toyota sustained severe damage from vehicle intrusions and extrication efforts. All the doors and the front row right seat were removed during the extrication of the driver. There was longitudinal intrusion of the windshield header, instrument panel, steering wheel, toe pan, A- pillar, and the vehicle’s hood into the front row (**Figure 5**). The driver’s seat was deformed rearward and intruded into the second row left seat position.

### ***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. The front row seat belt retractor pretensioners actuated during the impact with the Freightliner. The driver’s seat belt was cut at 72



**Figure 5.** 2015 Toyota Camry, front row intrusion.

cm (28.3 in) above the floor anchor during the driver extrication. The latch remained inserted in the receiver (**Figure 6**), indicating that the belt was in use at the time of crash. The front right seat belt was cut at 106 cm (41.7 in) above the floor anchor, presumably to assist in removing the seat.

The second row seat belts were equipped with continuous loop belt webbing, sliding latch plates, switchable ELR/automatic locking retractors (ALRs), and non-adjustable upper anchors. The second row left seat belt was used to secure a CRS in combination with the CRS lower tethers. The second row right seat belt was used to secure a CRS. The belt was cut at 114 cm (44.8 in) above the floor anchor to remove the CRS.

### ***Supplemental Restraint Systems***

The Toyota was equipped with dual-stage frontal air bags for the driver and front right passengers positions, seat back mounted side air bags for the front and second row outboard seat positions, IC air bags for the front and second row outboard seat positions, and a driver's knee air bag. As a result of the frontal impact with Freightliner all the air bags with the exception of the passenger frontal air bag deployed.

The driver's frontal and knee air bags were entrapped due to passenger compartment intrusion. The driver's and front right passenger seat-mounted side air bags deployed from their respective seat backs. The air bags measured 64 cm (25.1 in) in height and 29 cm (11.4 in) in width. The second row outboard seat side air bags deployed from the seat back (**Figure 7**). The air bag measured 53 cm (20.8 in) in height and 20 cm (7.8 in) in width. Both the left and right IC air bags deployed during the crash. The air bags measured 177 cm (69.6 in) in length, 54 cm (21.2 in) in height, and had an 8 cm (3.1 in) tether at the leading end.

### ***Child Restraint System (CRS)***

#### ***Safety 1st Grow and Go 3-in-1 CRS***

The Toyota was configured with Lower Anchors and Tethers for Children (LATCH) in the second row. The outboard seat positions were equipped with lower anchors. Top tethers were available in every second row seat position. LATCH was used in this crash for this CRS.



**Figure 6.** 2015 Toyota Camry, driver's seat belt latch.



**Figure 7.** 2015 Toyota Camry, second row left seat-back mounted side air bag.

The Safety 1st Grow and Go 3-in-1 CRS was installed rear-facing in the second row left position using the lower anchors and the vehicle's lap and shoulder belt. On-scene police images show the CRS secured in its position in the Toyota (**Figure 8**). The user's manual indicated that the lower anchors should not be used in combination with the vehicle lap or lap and shoulder belt; therefore, the CRS was installed unconventionally.

The model number was CC138-DWU and the date of manufacture was December 19, 2016. The Grow and Go was configured with a 5-point harness system with a buckle and retainer clip and two level harness slots. The seat was designed to be used with or without the internal harness. The occupant parameters for using the seat rear-facing with the harness are as follows:

- Weight: 2.3-18 kg (5-40 lbs)
- Height: 48-101.6 cm (19-40 in)

It is not known if the 9-month-old child in this seat position met the occupant parameters. Examination of the vehicle's seat belt during the SCI inspection indicated the belt retractor and buckle functionality was normal. The internal harness was examined and it revealed loading and twisting (**Figure 9**). The buckle and latch functioned with some difficulty. The CRS shell was deformed as it was compressed between the driver's seat back and the second row seat (**Figure 10**).



**Figure 8.** 2015 Toyota Camry, Safety 1st Grow and Go CRS (police photo).



**Figure 9.** 2015 Toyota Camry, Safety 1st Grow and Go CRS.



**Figure 10.** 2015 Toyota Camry, Safety 1st Grow and Go CRS.

***Safety 1st Alpha Omega Elite CRS***

The Safety 1st Alpha Omega Elite CRS was an all-in-one seat. Given the occupants’ age, it was likely installed forward-facing in the second row right position. The CRS was not available for inspection. The vehicle lap and shoulder seat belt and upper tether appear to have been used to anchor the seat. Both were cut during extrication. The model number and date of manufacture is unknown. The seat is designed for children weighing between 2.2-15.8 (5-35 lbs) when rear-facing. It was being used by a 4-year-old whose weight is not known. The police reported that the CRS was unconventionally used. Based on the occupant injuries and kinematics, it appears that the child was likely seated in the CRS but was not using the CRS internal harness.

**2015 TOYOTA CAMRY OCCUPANTS**

***Driver Demographics***

Age/Sex: 27 years/female  
Height: 160 cm (63 in)  
Weight: 65 kg (144 lbs)  
Eyewear: None  
Seat type: Bucket  
Seat track position: Unknown  
Manual restraint usage: Lap and shoulder belt used  
Usage source: Vehicle inspection  
Air bags: Driver’s frontal, seat-mounted side, knee, and IC air bags deployed  
Alcohol/drug data: Tested positive for phenylpropanolamine, amphetamine, oxycodone, oxymorphone, THC  
Egress from vehicle: Mechanically restrained  
Transport from scene: NA  
Type of medical treatment: None, declared deceased on scene

***Driver Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Large hinge-type basilar skull fracture through both sides of posterior fossa	150206.4	Tandem IPC Hood Windshield	Certain Probable
2	Subdural hemorrhage	140410.3	Tandem IPC Hood Windshield	Probable Probable
3	Liver lacerations, 15.2 cm (6 in) in length, 7.6 cm (3 in) deep	541824.3	Tandem IPC Driver air bag Steering wheel rim	Probable
4	Spleen lacerations	544220.2	Steering wheel rim	Probable

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
5	Fracture, right humerus	751100.2	Unknown	Unknown
6	Compound fracture, right femur	853271.3	Lower left IP	Probable
7	Fracture, left femur	853221.3	Lower left IP	Probable
8	Right knee contusion	810402.1	Lower left IP	Certain
9 10	Contusion, abrasion right shin	810402.1 810202.1	Lower left IP	Probable
11 12	Left upper thigh, contusion and abrasion	810402.1 810202.1	Steering wheel rim	Probable
13	Contusions, right wrist and back of right hand	710402.1	Upper left IP	Possible
14	Abrasions, right elbow forearm, right wrist, back of right hand	710202.1	Unknown	Unknown
15	Dicing lacerations, left upper arm, back of left wrist, back of hand	710600.1	Windshield	Possible
16	Abrasion, right upper thigh	810202.1	Steering wheel rim	Probable
17	Abrasion, left knee and shin	810202.1	Lower left IP	Probable
18	Lacerations, left shin	810600.1	Lower left IP	Probable
19	Abrasions, nose, left cheek	210202.1	Windshield	Possible
20	Abrasion, 6.3 cm (2.5 in), left upper neck	310202.1	Shoulder portion of belt restraint	Probable
21	Abrasion, right side of neck	310202.1	Unknown	Unknown
22	Contusion, middle of sternum	410402.1	Steering wheel hub	Probable
23	3 x 2 in dicing injury, left upper breast and left shoulder	410202.1	Windshield	Possible
24	Abrasion, right lower chest	410202.1	Steering wheel rim	Possible

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
25	Abrasion, 3.8 cm (1.5 in) right abdomen	510202.1	Lap portion of belt restraint	Possible
26	Abrasion, 10.1 x 2.5 cm (4 x 1 in), top of left shoulder	710202.1	Shoulder portion of belt restraint	Probable

*Source: Autopsy report.*

### ***Driver Kinematics***

The 27-year-old female was restrained by the manual lap and shoulder belt and was seated in an unknown posture. She may have been asleep or unconscious at some point as the vehicle traveled into the off to the right side of the roadway. She was under the influence of drugs, according to the autopsy report. Just prior to the crash, she actively steered the vehicle to the left to return to her lane and then to the right after traveling into the opposing lane of travel. At impact, the frontal air bag deployed and the driver's seat belt pretensioner actuated. The driver responded to the 12 o'clock direction of force with a forward trajectory. She loaded the steering wheel and contacted the intruding frontal components. She was entrapped in the vehicle due to the intrusion and was declared deceased at the scene.

### ***Second Row Left Passenger Demographics***

Age/Sex: 9 months/female  
Height: Unknown  
Weight: Unknown  
Eyewear: None  
Seat type: Split bench with folding back  
Seat track position: NA  
Manual restraint usage: Lap and shoulder belt used to secure CRS  
Usage source: Police photos  
Air bags: Seat-mounted side air bag and IC air bag, deployed  
Alcohol/drug data: NA  
Egress from vehicle: Extricated by passersby through side window  
Transport from scene: Ambulance  
Type of medical treatment: Transported to hospital, examined/treated then transferred to children's trauma center

***Second Row Left Passenger Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Subdural hematoma over anterior lateral left frontal convexity extending over anterior left temporal convexity	140650.3	CRS shell	Certain
2	Acute avulsion fracture, right proximal femur (right proximal femoral metaphysis)	853111.3	Seat back	Probable
3	Subarachnoid hemorrhage, left frontoparietal convexity	140693.2	CRS shell	Certain
4 5	Bilateral shoulder abrasions	710202.1 710202.1	CRS webbing	Certain
6	Puncture wound, left hip	816010.1	Unknown	Unknown

*Source: Radiology report, emergency room records.*

***Second Row Left Passenger Kinematics***

The 9-month-old female child was secured in a rear-facing CRS. At impact with the Freightliner, she was displaced forward and struck the CRS shell with her head. She was displaced rearward as the driver’s seat was forced rearward due to intrusion/compression and contacted the second row seat back with her right leg.

***Second Row Right Passenger Demographics***

Age/Sex: 4 years/female  
 Height: Unknown  
 Weight: Unknown  
 Eyewear: Unknown  
 Seat type: Split bench with folding back  
 Seat track position: NA  
 Manual restraint usage: Unknown  
 Usage source: Vehicle inspection, medical notes  
 Air bags: Seat back mounted side air bag and IC air bag, deployed  
 Alcohol/drug data: NA  
 Egress from vehicle: Extricated by passersby through side window  
 Transport from scene: Ambulance  
 Type of medical treatment: Transported, treated, then transferred to child trauma facility

***Second Row Right Passenger Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Comminuted fracture, left distal femoral metadiaphysis butterfly	853331.3	Center console Right seat back	Probable Possible
2	Transverse fracture, distal third aspect of left femur	853221.3	Center console Right seat back	Probable Possible
3	Distal radial metaphyseal buckle fracture, left	752311.2	Center console	Probable
4	Subtle ulnar buckle fracture left	753200.2	Center console	Probable
5 6 7	Bilateral pulmonary contusion with pneumothorax	441410.3  442202.2 (L)  442202.2 (R)	Right seat back (Alternative center console)  Center Console (Alternative right seat back)  Right seat back (Alternative center console)	Probable Possible  Probable Possible  Probable Possible
8	Liver laceration, grade II without open wound into cavity	541820.2	Right seat back	Probable
9	Spleen laceration	544220.2	Right seat back	Probable
10	Laceration, left shoulder	710600.1	Center console	Probable

*Source: ED report, radiology reports.*

***Second Row Right Passenger Kinematics***

This occupant was likely seated in the forward-facing CRS. It does not appear that the child seat harness was in use. At impact with the Freightliner, the 4-year-old female was displaced forward and to the left. She struck the back of the front row center console and the back of the front right seat. The center console was scuffed and the top cover displaced. This occupant was located on the floor behind the front row by passersby and first responders. She was transported by ambulance to a local hospital where she was treated and assessed. She was then transported to a child trauma center where she was hospitalized for an unknown number of days.

## 2001 FREIGHTLINER ST120 TRACTOR 2007 VANTAGE DUMP TRAILER

### *Description*

The 2001 Freightliner ST120 CBE tractor was identified by the VIN 1FUJA3CGX1Lxxxxxx. The Freightliner was configured with three axles and rear-wheel drive, a Detroit Series 60 12.7-liter, 6-cylinder, diesel engine, and a GVW of 14,968 kg (33,000 lbs). The Freightliner was pulling a 2007 Vantage dump trailer that was loaded at the time of the crash.

### *Exterior Damage*

The Freightliner sustained moderate front plane damage during the impact with the Toyota (**Figures 11-12**). The estimated Truck Deformation Classification (TDC) was 12FDEW1. The vehicle was towed from the scene due to damage.

### *Occupants*

The restrained 54-year-old male driver of the Freightliner complained of pain. He was transported by ambulance to a local hospital for treatment.

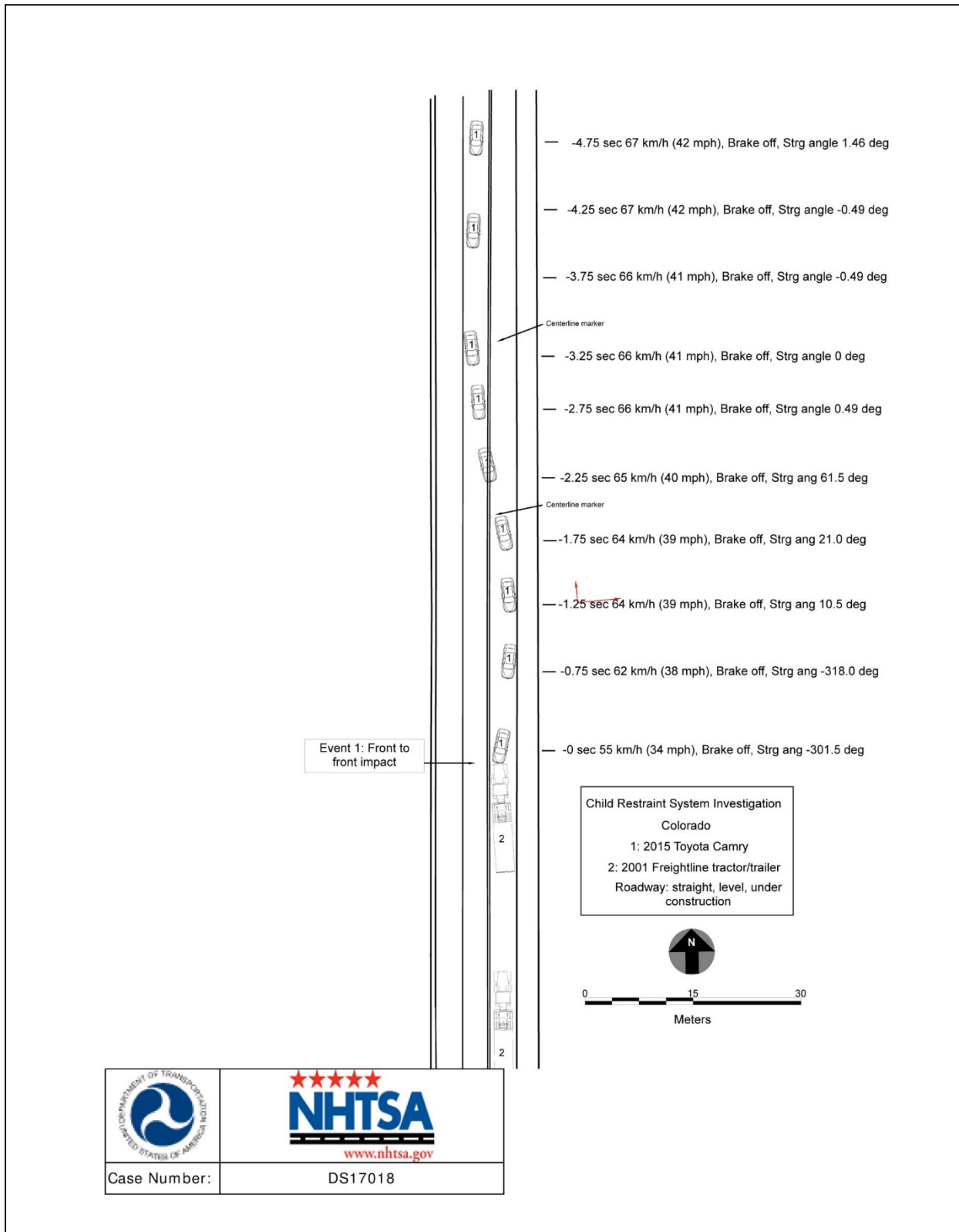


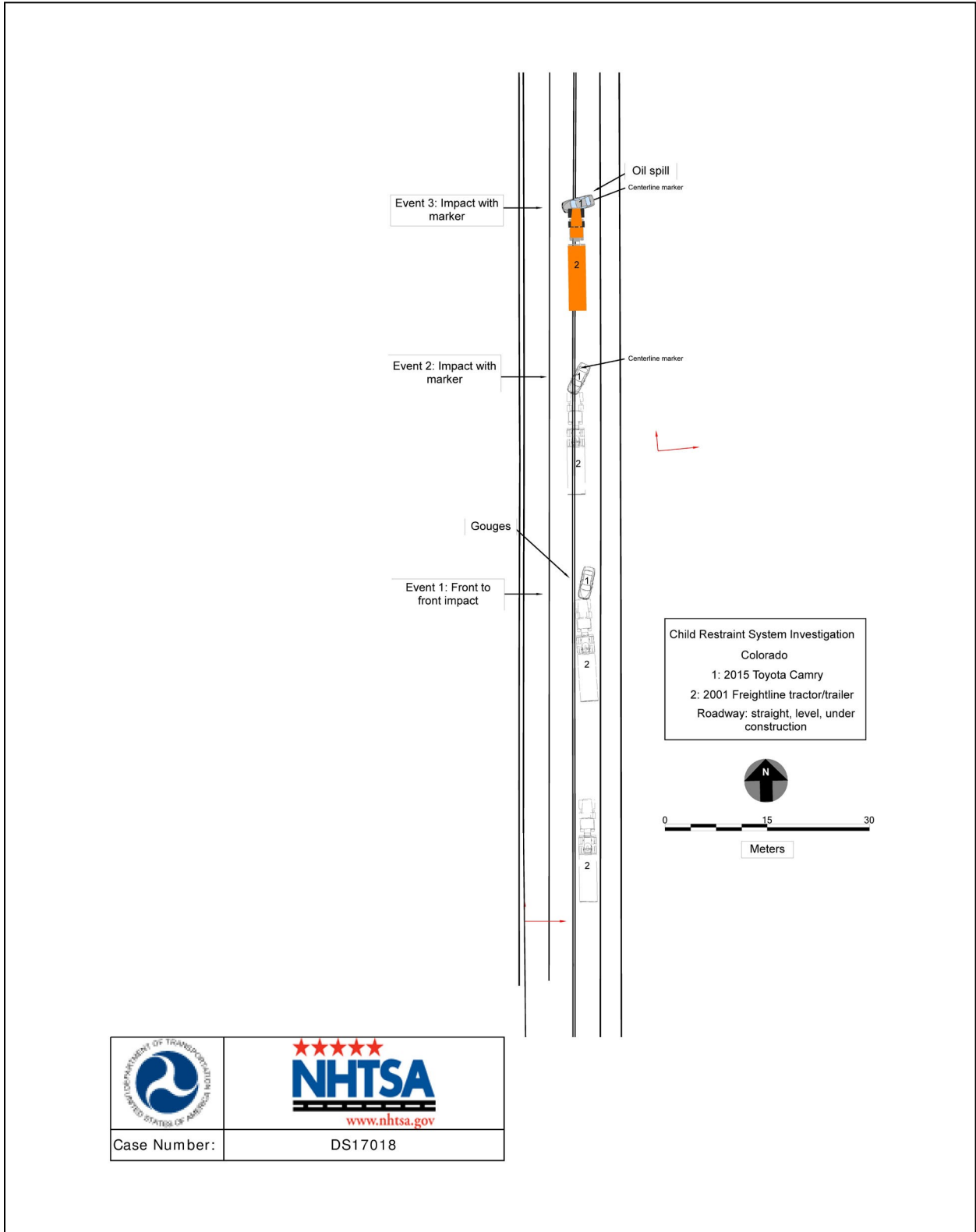
**Figure 11.** 2001 Freightliner ST120 tractor (police photo).



**Figure 12.** 2001 Freightliner ST120 tractor (police photo).

# CRASH DIAGRAMS





 <p>DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA</p>	 <p><b>NHTSA</b> www.nhtsa.gov</p>
<p>Case Number:</p>	<p>DS17018</p>

**APPENDIX A: Event Data Recorder Report  
2015 Toyota Camry<sup>1</sup>**

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<sup>1</sup> The EDR report contained in this technical report was imaged by the investigating police department. Only a PDF copy of the EDR report was provided by the police and the hexadecimal data contained in the report has been deleted due to potential personal identifiable information contained in the EDR report (i.e. vehicle identification number, etc).



**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/Frame Number	
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.3
Imaged with Software Licensed to (Company Name)	
Reported with CDR version	Crash Data Retrieval Tool 17.3
Reported with Software Licensed to (Company Name)	
EDR Device Type	Airbag Control Module
Event(s) recovered	Front/Rear (1), Side (2), Rollover (2)

### Comments

Direct-to-module in vehicle.  
Vehicle located at xxx Towing,xxx  
Vehicle equipped with tires sized P215/55R17 front and rear. For Trooper xxx.

### Data Limitations

#### CDR Record Information:

- Due to limitations of the data recorded by the airbag ECU, such as the resolution, data range, sampling interval, time period of the recording, and the items recorded, the information provided by this data may not be sufficient to capture the entire crash.
- Pre-Crash data is recorded in discrete intervals. Due to different refresh rates within the vehicle's electronics, the data recorded may not be synchronous to each other.
- Airbag ECU data should be used in conjunction with other physical evidence obtained from the vehicle and the surrounding circumstances.
- If any of the front passenger seat airbags, side airbags, or Curtain Shield Airbags have deployed, data will not be overwritten or deleted by the airbag ECU following that event. If none of the airbags have deployed, the data of that event may be overwritten by a following event even if other airbags (pretensioner, rear seat airbag, etc.) have deployed.
- If power supply to the airbag ECU is lost during an event, all or part of the data may not be recorded.
- "Diagnostic Trouble Codes" are information about faults when a recording trigger is established. Various diagnostic trouble codes could be set and recorded due to component or system damage during an accident.
- The airbag ECU records only diagnostic information related to the airbag system. It does not record diagnostic information related to other vehicle systems.
- The TaSCAN, Global Tech Stream, or Intelligent Tester II devices (or any other Toyota genuine diagnostic tool) can be used to obtain detailed information on the diagnostic trouble codes from the airbag system, as well as diagnostic information from other systems. However, in some cases, the diagnostic trouble codes of the airbag system recorded by the airbag ECU when the event occurred may not match the diagnostic trouble codes read out when the diagnostic tool is used.

#### General Information:

- The data recording specifications of Toyota's airbag ECUs are divided into the following categories. The specifications for 12EDR or later are designed to be compatible with NHTSA's 49CFR Part 563 rule.
  - 00EDR / 02EDR / 04EDR / 06EDR / 10EDR / 12EDR / 13EDR / 15EDR / 17EDR
- The airbag ECU records data for all or some of the following accident types: frontal crash, rear crash, side crash, and rollover events. Depending on the installed airbag ECU, data for side crash and/or rollover events may not be recorded.
- This airbag ECU records record pre-crash data and post-crash data.
  - If a single event occurs independently, the data for that event is recorded on a one-to-one basis.
  - If multiple events occur successively (within a period of approximately 500ms), the establishment of the recording trigger for the first event is defined as the "pre-crash recording trigger". Pre-crash data for the first event and post-crash data for each successive event is then recorded.
- The airbag ECU has two recording pages (memory maps) to store pre-crash data. Additionally, to store post-crash data, the airbag ECU has two recording pages for each accident type: two pages for frontal and rear crash, two pages for a side crash, and two pages for rollover event.
- The data recorded by the airbag ECU includes correlating information between each previously occurring event (i.e., information that clarifies the collision event sequence. This correlation information consists of the following items.
  - Time from Previous Pre-Crash TRG
  - Linked Pre-Crash Page
  - Time from Pre-Crash TRG
  - TRG Count

- Previous Crash Type
- In frontal and rear collision events, the first point where a longitudinal cumulative delta-V of over 0.8 km/h (0.5 mph) is reached is regarded as time zero for the recorded data. In side impact collision and rollover events, the point in time at which the recording trigger is established is regarded as time zero for the recorded data.
- 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.
- In frontal and rear collision events, the record time varies depending on the period during which a longitudinal cumulative delta-V of over 0.8 km/h (0.5 mph) is reached, and time series data is recorded for up to 250 ms. The record time described above is indicated as "Length of Delta-V: Delta-V, Longitudinal" outside the record time is indicated by area shaded in the table, and not indicated in the graph.

**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
Maximum Delta-V, Longitudinal	Forward
Delta-V, Longitudinal	Forward
Lateral Acceleration for Frontal/Rear Crash, Floor Sensor	Left to Right
Lateral Acceleration, Side Satellite Sensor 1	Left to Right
Lateral Acceleration, Side Satellite Sensor 2	Left to Right
Lateral Acceleration, Side Satellite Sensor 3	Left to Right
Lateral Acceleration, Side Satellite Sensor 4	Left to Right
Lateral Acceleration for Side Crash, Floor Sensor	Left to Right
Roll Angle Peak	Clockwise Rotation
Roll Angle at the Time of TRG	Clockwise Rotation
Roll Rate	Clockwise Rotation
Lateral Acceleration for Rollover, Floor Sensor	Left to Right
Longitudinal Acceleration, VSC Sensor	Forward
Yaw Rate	Left Turn
Steering Input	Left Turn

**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.
  - If the "Occupant Size Classification, Front Passenger" displays "Child" or "Not Occupied", "Side Air Bag Deployment, Time to Deploy" and "Pre-tensioner Deployment, Time to Fire" may indicate a time even if deployment did not occur on the following part no's: 89170-07280, 35400, 35410, 35470, 42660, 0R120, 0R080, 0R081, 0R150.
  - "Engine RPM" indicates the number of engine revolutions, not the number of motor revolutions. The recorded value has an upper limit of 12,600 rpm. Resolution is 100 rpm and the value is rounded down and recorded. For example, if the actual engine speed is 799 rpm, the recorded value will be 700 rpm.
  - If the electric vehicle is using a calculated/virtual engine RPM for drivetrain control, "Engine RPM" may be recorded, but should not be used during data analysis.
  - The upper limit for the recorded "Vehicle Speed" value is 200 km/h (125mph). Resolution is 1km/h (0.6mph) 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
  - "Accelerator Pedal" has two recording specifications. Both the recorded value increases as the driver depresses the accelerator.
    - Percentage of accelerator pedal depressed (recorded as 0-100(%)).
    - Output voltage of accelerator pedal module (recorded as 0-5(V)).
  - If M/T transmission vehicle of some limited model, "Shift Position" may display "Drive" regardless of the actual shift position.
  - Depending on the type of occupant sensor installed in the vehicle, one of the following three recording formats for "Occupant Size Classification, Front Passenger" will be utilized.
    - Occupied / Not Occupied
    - AM50 / AF05 / Child / Not Occupied
    - AM50 / AF05 / Child or Not Occupied
  - "Cruise Control Status" indicates whether the cruise control system is actuated or not. OFF indicates that the cruise control system is not actuated, but can also indicate that the vehicle is not equipped with the system.
  - "Air Bag Warning Lamp, On/Off", "Ignition Cycle, Crash", "Seat Track Position Switch, Foremost, Status, Driver", "Occupant Size Classification, Front Passenger", "Safety Belt Status, Driver", "Safety Belt Status, Front Passenger", "Frontal Air Bag Suppression Switch Status, Front Passenger", and "RSCA Disable Switch" indicate the state approximately 1 second before time zero. They may not always indicate the state at the moment of collision.
  - The upper and lower limits for the recorded value of "Motor RPM" is 17,500 rpm and -7,500 rpm respectively. Resolution is 100 rpm and the value is rounded down and recorded.
  - "Brake Oil Pressure" has an upper limit of 12.14 Mpa. In the case of the vehicle that has not VSC system, "0 Mpa" or "Invalid" may be displayed.
  - "Longitudinal Acceleration, VSC Sensor" has upper and lower limits for the recorded value of 8.973 m/s<sup>2</sup> and -8.973 m/s<sup>2</sup> respectively. This

- acceleration sensor does not sense collisions
- "Sequential Shift Range" displaying "Undetermined" indicates the shift range is undetermined or was not being used
- Some vehicles will not be equipped with all "Drive Mode" types indicated in the "Drive Mode" table. If some or all drive modes are not applicable to vehicle, "OFF" or "Invalid" may be displayed. The item in the "Drive Mode" table may not match the name of switch or indicator that equipped the vehicle.
- The upper and lower limits for the recorded value of "Steering Input" is 375 deg and -375 deg respectively. Resolution is 1.5 deg and the value is rounded down and recorded.
- Resolution of the "Air Bag Warning Lamp ON Time Since DTC was Set" is 15 minutes, and the value is rounded down and recorded.
- "Delta-V, Longitudinal" indicates the change in forward speed after time zero. 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 time zero.
- "Location of Side Satellite Sensor" shows the outline of a typical sensor position. Sensory location can be confirmed using the repair manual.
- "Time from Previous Pre-Crash TRG" indicates the time between the establishment of an event's pre-crash recording trigger to the establishment of a more recent event's pre-crash recording trigger. The upper limit for the recorded value is 16,381 milliseconds. In the event of establishment of the first pre-crash recording trigger after the ignition is switched ON, the upper limit value(max value) is recorded.
- "TRG Count" indicates a calculated value of the number of times recording triggers have been established for all crash types. The sequence in which each event occurred can be verified from the "TRG Count". The smaller the "TRG Count" value, the older the data. The upper limit for the recorded value is 65,533 times. When more than one event reaches the upper limit, the actual "TRG Count" may be greater than what is displayed for that event.
- "Linked Pre-Crash Page" is used to link "paged" pre-crash data with "paged" post-crash data. When old pre-crash data is overwritten by new pre-crash data, the "Linked Pre-Crash Page" value may record a page number that is not actually linked.
- Resolution of the "Time from Pre-Crash to TRG" is 50 [ms], and the value is rounded up and recorded.
- "Roll Angle at the Time of TRG" and "Roll Angle Peak" do not represent the actual roll angle of the vehicle. These values are used internally by the airbag ECU for sensing a rollover.

05013\_ToyotaS00std\_r026

**System Status at Time of Retrieval**

ECU Part Number	89170-06720
EDR Generation	13EDR
Complete File Recorded	No
Freeze Signal	ON
Freeze Signal Factor	Front Airbag Deployment
Diagnostic Trouble Codes Exist	No
Ignition Cycle Download (times)	5169
Multi-event, number of events (times)	N/A
Time from event 1 to 2 (s)	N/A
Time from Previous Pre Crash TRG (msec)	16381 or greater
Latest Pre-Crash Page	1
Contains Unlinked Pre-Crash Data	Yes

**Event Record Summary at Retrieval**

Events Recorded	TRG Count	Crash Type	Time (msec)	Pre-Crash & DTC Data Recording Status	Event & Crash Pulse Data Recording Status
Most Recent Event	9	Side Crash	0	Complete (Page 1)	Complete (Side Page 1)
1st Prior Event	7	Side Crash	N/A	N/A	Complete (Side Page 0)
2nd Prior Event	6	Front/Rear Crash	N/A	N/A	Complete (Front/Rear Page 0)
3rd Prior Event	5	Rollover	N/A	N/A	Complete (Rollover Page 0)
TRG Invalid #1	N/A	Rollover	N/A	N/A	Incomplete (Rollover Page 1)

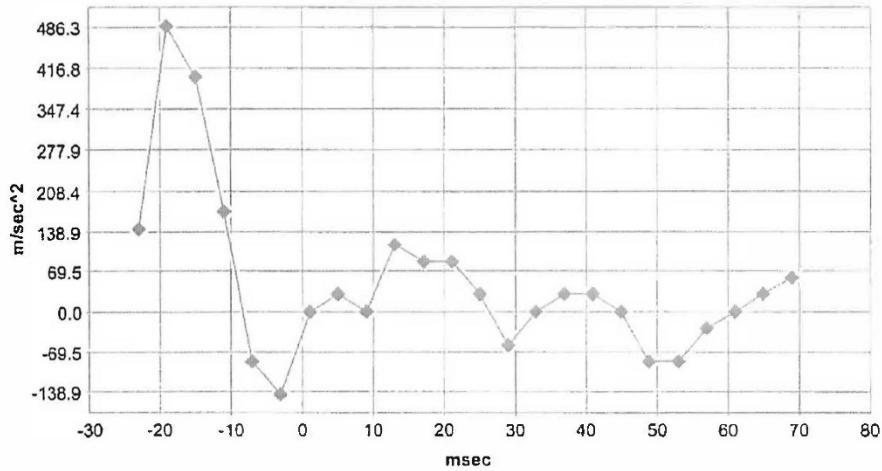
**System Status at Event (Most Recent Event, TRG 9)**

Recording Status, Side Crash Info.	Complete
Crash Type	Side Crash
TRG Count (Times)	9
Previous Crash Type	Roll over
Time from Pre-Crash TRG (msec)	99
Linked Pre-Crash Page	1
Side Airbag Deployment, Time to Deploy (If Equipped) (msec)	No
Side Curtain Airbag Deployment, Time to Deploy (If Equipped) (msec)	No
Pretensioner Deployment, Time to Fire (msec)	No
Rear Window Airbag Deployment, Time to Deploy (msec)	SNA

**Lateral Crash Pulse (Most Recent Event, TRG 9 - table 1 of 2)**

Recording Status, Time Series Data	Complete
Recorded Side	Left Side
Time from TRG to Next Sample (msec)	1
Location of Side Satellite Sensor 1	Front Door
Location of Side Satellite Sensor 2	B-Pillar
Location of Side Satellite Sensor 3	Not Equipped
Location of Side Satellite Sensor 4	C-Pillar
Location of Floor Sensor	Airbag ECU
Clipping Time of Lateral Acceleration, Side Satellite Sensor 1 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 2 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 3 (msec)	SNA
Clipping Time of Lateral Acceleration, Side Satellite Sensor 4 (msec)	No
Clipping Time of Lateral Acceleration, Floor Sensor (msec)	No

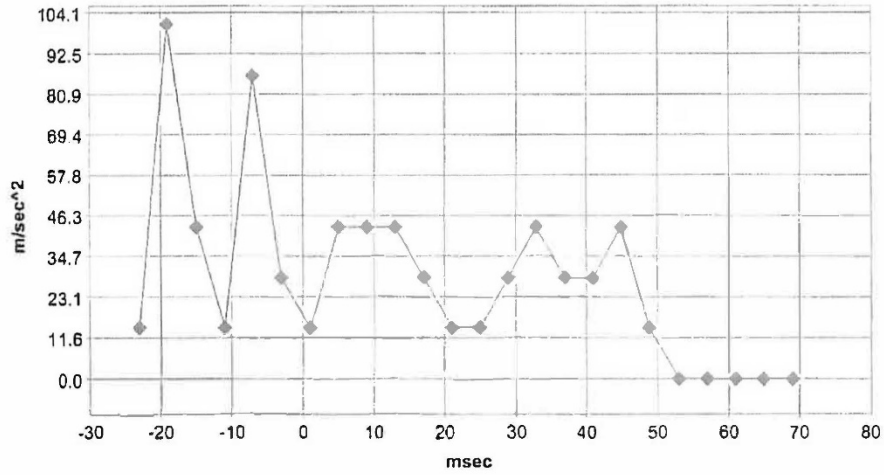
Side Satellite Sensor 1



Deployment Time Marker Key

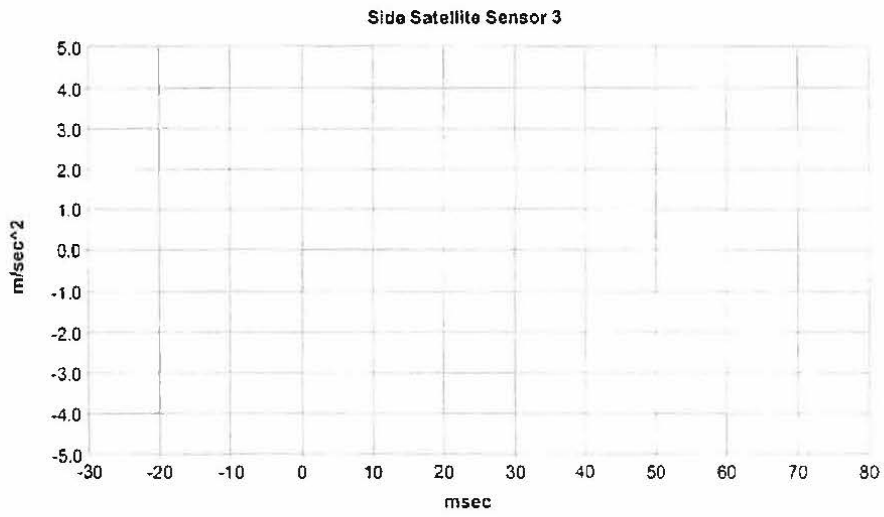
1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Tense

Side Satellite Sensor 2



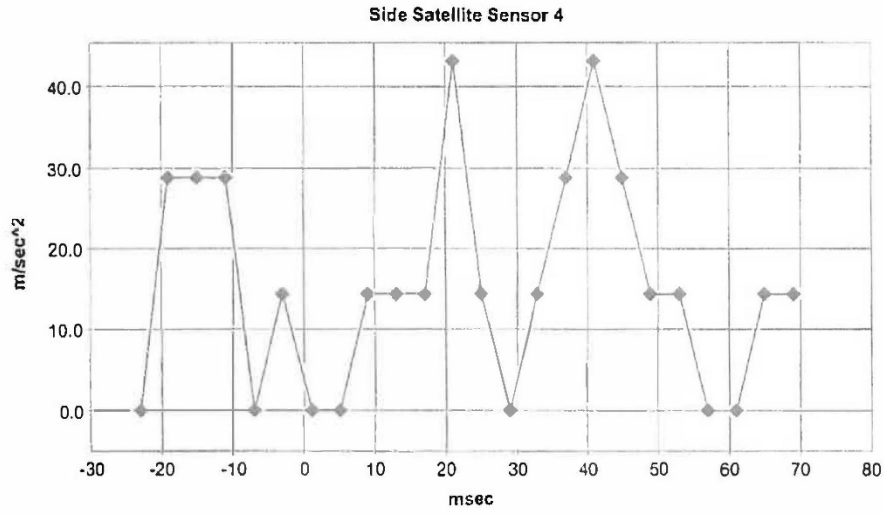
Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time

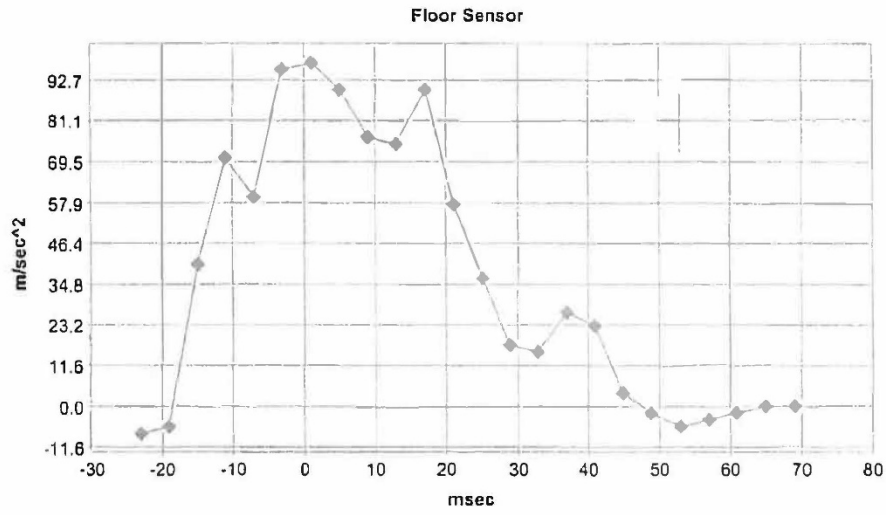


Deployment Time Marker Key

1	Side Curtain Airbag
---	---------------------



Deployment Time Marker Key  
1 Side Curtain Airbag



Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time
4	Side Curtain Airbag

**Lateral Crash Pulse (Most Recent Event, TRG 9 - table 2 of 2)**

Time (msec)	Lateral Acceleration, Side Satellite Sensor 1 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 2 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 3 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 4 (m/sec^2)	Lateral Acceleration for Side Crash, Floor Sensor (m/sec^2)
-23	143.5	14.4	SNA	0.0	-7.7
-19	288.0	100.6	SNA	28.7	-5.7
-15	401.9	43.1	SNA	28.7	40.2
-11	172.2	14.4	SNA	28.7	70.9
-7	-86.1	86.2	SNA	0.0	59.4
-3	-143.5	28.7	SNA	14.4	95.8
1	0.0	14.4	SNA	0.0	97.7
5	28.7	43.1	SNA	0.0	90.0
9	0.0	43.1	SNA	14.4	76.6
13	114.8	43.1	SNA	14.4	74.7
17	86.1	28.7	SNA	14.4	90.0
21	86.1	14.4	SNA	43.1	57.5
25	28.7	14.4	SNA	14.4	38.4
29	-57.4	28.7	SNA	0.0	17.2
33	0.0	43.1	SNA	14.4	15.3
37	28.7	28.7	SNA	28.7	26.8
41	28.7	28.7	SNA	43.1	23.0
45	0.0	43.1	SNA	28.7	3.8
49	-86.1	14.4	SNA	14.4	-1.9
53	-86.1	0.0	SNA	14.4	-5.7
57	-28.7	0.0	SNA	0.0	-3.8
61	0.0	0.0	SNA	0.0	-1.9
65	28.7	0.0	SNA	14.4	0.0
69	57.4	0.0	SNA	14.4	0.0



**DTCs Present at Time of Event (Most Recent Event, TRG 9)**

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

**Pre-Crash Data, 1 Sample (Most Recent Event, TRG 9)**

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	250
TRG Count when Pre-crash TRG was Established (times)	6
Safety Belt Status, Driver	ON
Safety Belt Status, Front Passenger	OFF
Occupant Size Classification, Front Passenger	Child or Not Occupied
Frontal Airbag Suppression Switch Status, Front Passenger	SNA
RSCA Disable Switch	SNA
Seat Track Position Switch, Foremost, Status, Driver	SNA
Airbag Warning Lamp, On/Off	OFF
Ignition Cycle, Crash (times)	5168

**Pre-Crash Data, -5 to 0 seconds (Most Recent Event, TRG 9)**

Time (sec)	-4.75	-4.25	-3.75	-3.25	-2.75	-2.25	-1.75	-1.25	-0.75	-0.25	0 (TRG)
Vehicle Speed (MPH (km/h))	41.6 [67]	41.6 [67]	41 [66]	41 [66]	41 [66]	40.4 [65]	39.8 [64]	39.8 [64]	39.5 [62]	34.8 [56]	34.2 [55]
Accelerator Pedal, % Full (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.5
Percentage of Engine Throttle (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
Engine RPM (RPM)	1,100	1,100	1,300	1,300	1,300	1,300	1,300	1,300	1,000	800	1,100
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Brake Oil Pressure (Mpa)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Longitudinal Acceleration, VSC Sensor (m/sec <sup>2</sup> )	-0.287	-0.502	-0.359	-0.287	-0.431	-0.574	-0.502	-0.287	-1.723	-2.225	-2.297
Yaw Rate (deg/sec)	1.46	-0.49	-0.49	0.00	0.49	15.62	11.22	1.46	-30.74	-23.91	-21.96
Steering Input (degrees)	3.0	-1.5	-1.5	0.0	7.5	61.5	21.0	10.5	-202.5	-318.0	-301.5
Shift Position	D	D	D	D	D	D	D	D	D	D	D
Sequential Shift Range	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined
Cruise Control Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, PWR	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, ECO	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Sport	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Snow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, EV	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid



Fuel Injection Quantity (mm <sup>3</sup> /St)	invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
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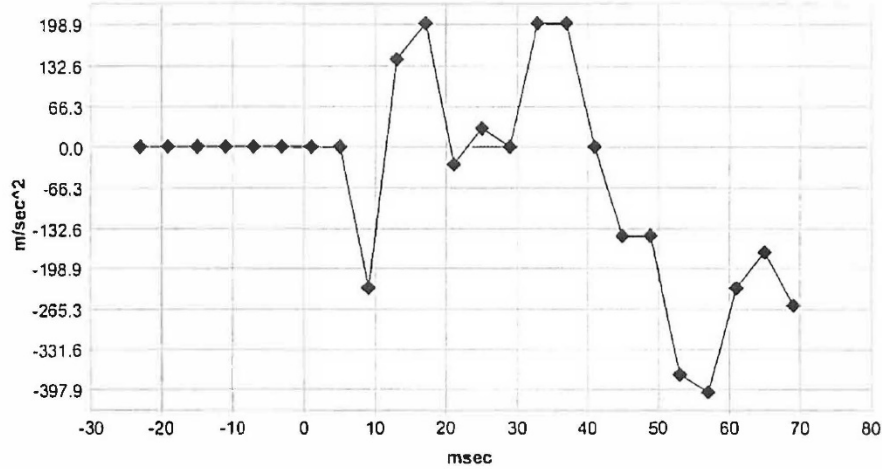
**System Status at Event (1st Prior Event, TRG 7)**

Recording Status, Side Crash Info.	Complete
Crash Type	Side Crash
TRG Count (times)	7
Previous Crash Type	Front/Rear Crash
Time from Pre-Crash TRG (msec)	3
Linked Pre-Crash Page	1
Side Airbag Deployment, Time to Deploy (If Equipped) (msec)	No
Side Curtain Airbag Deployment, Time to Deploy (If Equipped) (msec)	No
Pretensioner Deployment, Time to Fire (msec)	No
Rear Window Airbag Deployment, Time to Deploy (msec)	SNA

**Lateral Crash Pulse (1st Prior Event, TRG 7 - table 1 of 2)**

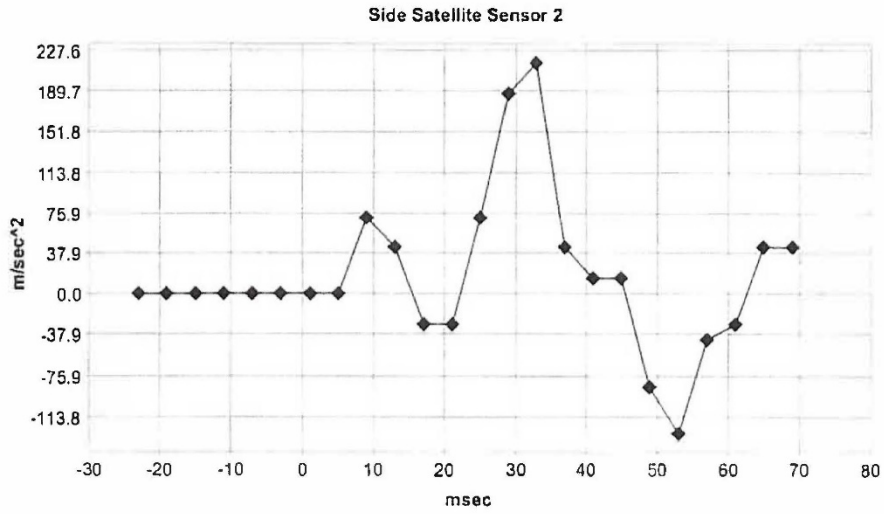
Recording Status, Time Series Data	Complete
Recorded Side	Left Side
Time from TRG to Next Sample (msec)	1
Location of Side Satellite Sensor 1	Front Door
Location of Side Satellite Sensor 2	B-Pillar
Location of Side Satellite Sensor 3	Not Equipped
Location of Side Satellite Sensor 4	C-Pillar
Location of Floor Sensor	Airbag ECU
Clipping Time of Lateral Acceleration, Side Satellite Sensor 1 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 2 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 3 (msec)	SNA
Clipping Time of Lateral Acceleration, Side Satellite Sensor 4 (msec)	No
Clipping Time of Lateral Acceleration, Floor Sensor (msec)	20.5

**Side Satellite Sensor 1**



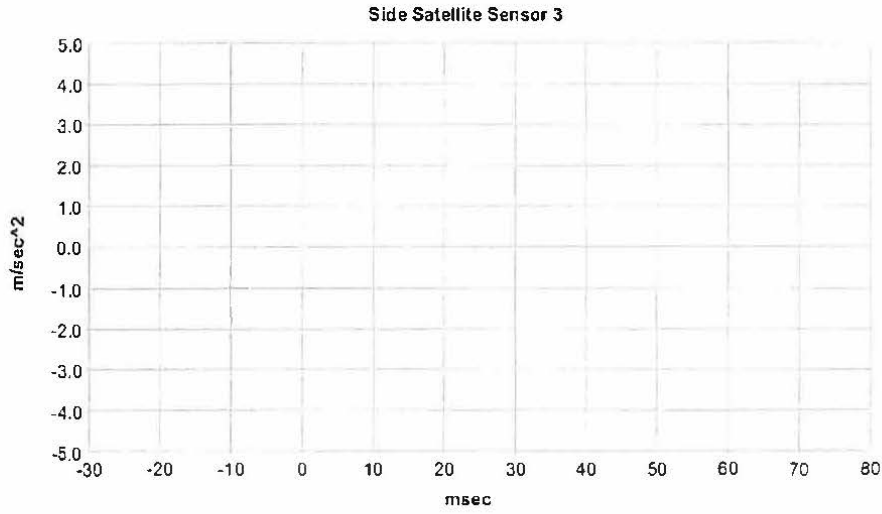
**Deployment Time Marker Key**

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time



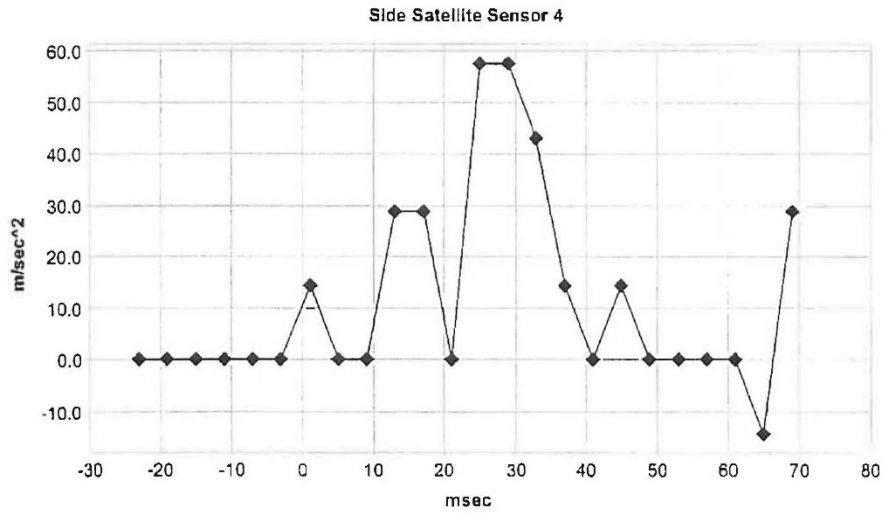
**Deployment Time Marker Key**

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time

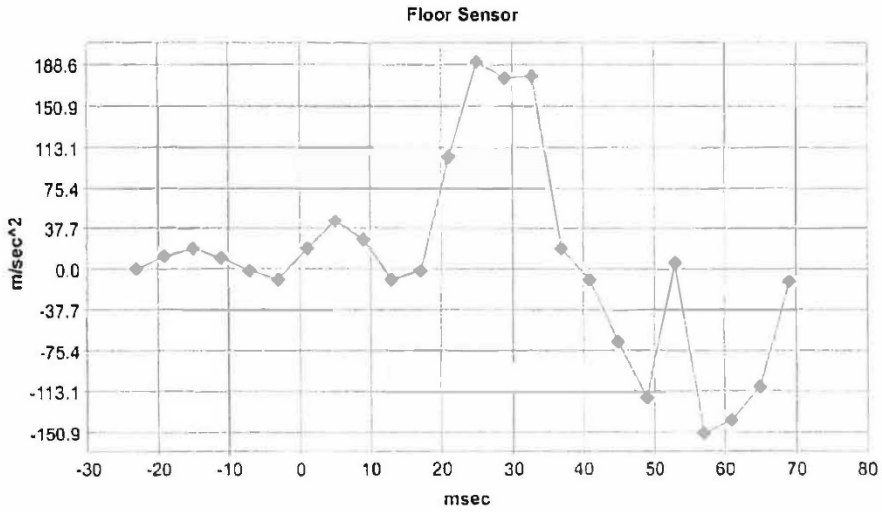


Deployment Time Marker Key

1	Side Curtain Airbag
---	---------------------



Deployment Time Marker Key  
1 Side Curtain Airbag



Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time
4	Side Curtain Airbag

**Lateral Crash Pulse (1st Prior Event, TRG 7 - table 2 of 2)**

Time (msec)	Lateral Acceleration, Side Satellite Sensor 1 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 2 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 3 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 4 (m/sec^2)	Lateral Acceleration for Side Crash, Floor Sensor (m/sec^2)
-23	0.0	0.0	SNA	0.0	0.0
-19	0.0	0.0	SNA	0.0	11.5
-15	0.0	0.0	SNA	0.0	19.2
-11	0.0	0.0	SNA	0.0	9.6
-7	0.0	0.0	SNA	0.0	-1.9
-3	0.0	0.0	SNA	0.0	-9.6
1	0.0	0.0	SNA	14.4	19.2
5	0.0	0.0	SNA	0.0	44.1
9	-229.7	71.9	SNA	0.0	26.8
13	143.5	43.1	SNA	28.7	-9.6
17	201.0	-28.7	SNA	28.7	-1.9
21	-28.7	-28.7	SNA	0.0	103.4
25	28.7	71.9	SNA	57.5	191.5
29	0.0	186.8	SNA	57.5	176.2
33	201.0	215.6	SNA	43.1	178.1
37	201.0	43.1	SNA	14.4	19.2
41	0.0	14.4	SNA	0.0	-9.6
45	-143.5	14.4	SNA	14.4	-67.0
49	-143.5	-86.2	SNA	0.0	-118.8
53	-373.2	-129.3	SNA	0.0	5.7
57	-401.9	-43.1	SNA	0.0	-151.3
61	-229.7	-28.7	SNA	0.0	-139.8
65	-172.2	43.1	SNA	-14.4	-109.2
69	-258.4	43.1	SNA	28.7	-11.5

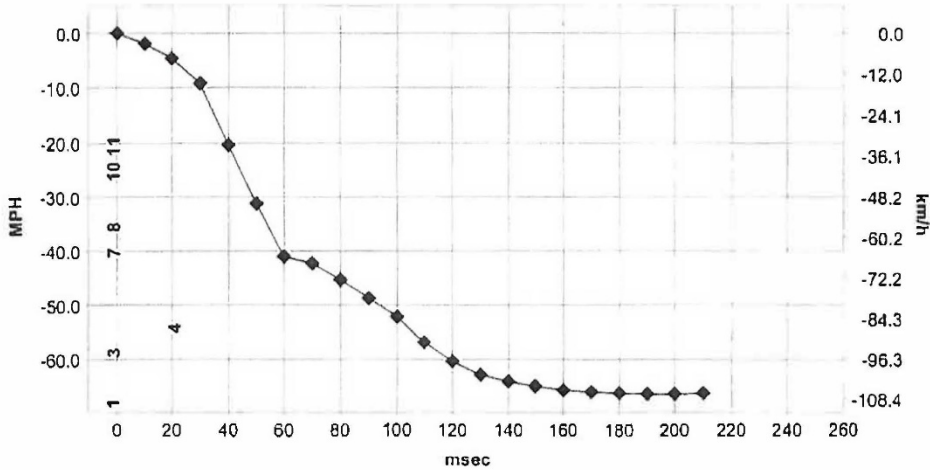
**System Status at Event (2nd Prior Event, TRG 6)**

Recording Status, Front/Rear Crash Info.	Complete
Crash Type	Front/Rear Crash
TRG Count (Times)	6
Previous Crash Type	No Event
Time from Pre-Crash TRG (msec)	0
Linked Pre-Crash Page	1
Frontal Airbag Deployment, Time to 1st Stage Deployment, Driver (msec)	1
Frontal Airbag Deployment, Time to 1st Stage Deployment, Front Passenger (msec)	No
Pretensioner Deployment, Time to Fire, Driver (msec)	1
Pretensioner Deployment, Time to Fire, Front Passenger (msec)	1
Frontal Airbag Deployment, Time to 2nd Stage, Driver (msec)	23
Frontal Airbag Deployment, Time to 2nd Stage, Front Passenger (msec)	N/A
Active Head Restraint, Time to Deploy, Driver (msec)	SNA
Active Head Restraint, Time to Deploy, Front Passenger (msec)	SNA
Side Curtain Airbag Deployment, Time to Deploy, Driver (msec)	1
Side Curtain Airbag Deployment, Time to Deploy, Passenger (msec)	1
Side Airbag Deployment, Time to Deploy, Driver (msec)	1
Side Airbag Deployment, Time to Deploy, Passenger (msec)	1
Rear Window Airbag Deployment, Time to Deploy (msec)	SNA

**Longitudinal/Lateral Crash Pulse (2nd Prior Event, TRG 6 - table 1 of 2)**

Recording Status, Time Series Data	Complete
Time from Time Zero to TRG (msec)	1.5
Length of Delta-V (msec)	210
Max. Longitudinal Delta-V (MPH [km/h])	-65.5 [-107.0]
Time, Maximum Delta-V, Longitudinal (msec)	182.0
Power Supply Status at Max. Delta-V	OFF
Clipping Time of Longitudinal Delta-V (msec)	No
Clipping Time of Lateral Acceleration, Floor Sensor (msec)	25.0

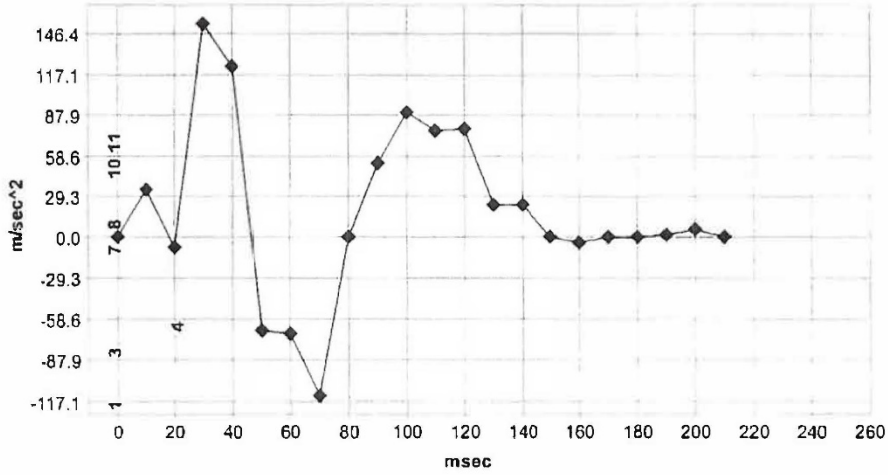
**Longitudinal Delta-V**



**Deployment Time Marker Key**

1	Driver Airbag Deployment Time
2	Passenger Airbag Deployment Time
3	Driver/Passenger Pretensioner
4	Driver 2nd Stage Airbag Deployment Time
5	Passenger 2nd Stage Airbag Deployment
6	Driver/Passenger AHR
7	Driver CSA
8	Passenger CSA
9	Rear Window Airbag Deployment Time
10	Driver SAB
11	Passenger SAB

Lateral Acceleration for frontal/rear crash, Floor Sensor



Deployment Time Marker Key

1	Driver Airbag Deployment Time
2	Passenger Airbag Deployment Time
3	Driver/Passenger Pretensioner
4	Driver 2nd Stage Airbag Deployment Time
5	Passenger 2nd Stage Airbag Deployment
6	Driver/Passenger AHR
7	Driver CSA
8	Passenger CSA
9	Rear Window Airbag Deployment Time
10	Driver SAB
11	Passenger SAB

**Longitudinal/Lateral Crash Pulse (2nd Prior Event, TRG 6 - table 2 of 2)**

Time (msec)	Longitudinal Delta-V (MPH [km/h])	Lateral Acceleration for Frontal/Rear Crash, Floor Sensor (m/sec^2)	Power Supply Status
0	0.0 [0.0]	0.0	ON
10	-1.9 [-3.0]	34.5	ON
20	-4.6 [-7.4]	-7.7	OFF
30	-9.3 [-14.9]	153.2	OFF
40	-20.4 [-32.8]	122.8	OFF
50	-31.2 [-50.2]	-67.0	OFF
60	-41.0 [-65.9]	-69.0	OFF
70	-42.3 [-68.1]	-113.0	OFF
80	-45.2 [-72.8]	0.0	OFF
90	-48.7 [-78.3]	53.6	OFF
100	-52.1 [-83.8]	90.0	OFF
110	-56.9 [-91.6]	76.6	OFF
120	-60.3 [-97.1]	78.5	OFF
130	-62.9 [-101.2]	23.0	OFF
140	-64.1 [-103.2]	23.0	OFF
150	-65.0 [-104.5]	0.0	OFF
160	-65.8 [-105.9]	-3.8	OFF
170	-66.2 [-106.5]	0.0	OFF
180	-66.3 [-106.7]	0.0	OFF
190	-66.5 [-107.0]	1.9	OFF
200	-66.5 [-107.0]	5.7	OFF
210	-66.3 [-106.7]	0.0	OFF
220	0.0 [0.0]	0.0	ON
230	0.0 [0.0]	0.0	ON
240	0.0 [0.0]	0.0	ON
250	0.0 [0.0]	0.0	ON

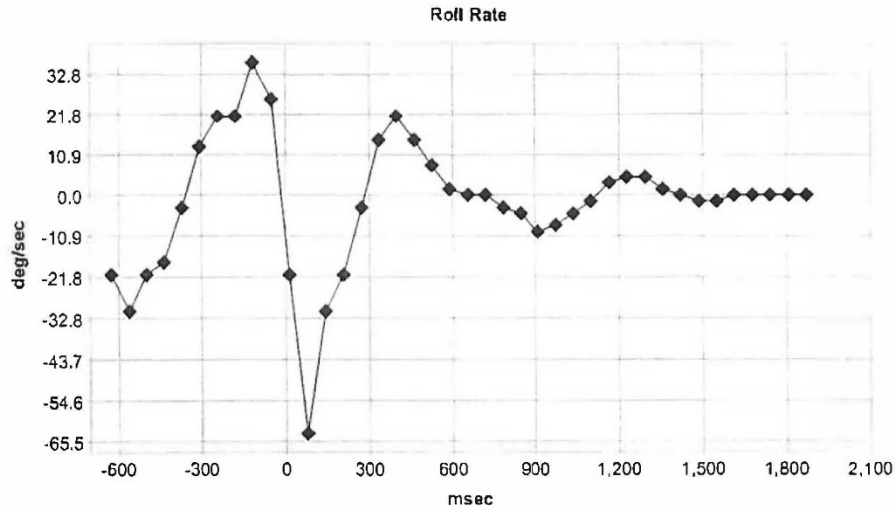


### System Status at Event (3rd Prior Event, TRG 5)

Recording Status, Rollover Crash Info.	Complete
Crash Type	Rollover
TRG Count (Times)	5
Previous Crash Type	No Event
Time from Pre-Crash TRG (msec)	0
Linked Pre-Crash Page	0
Side Curtain Airbag Deployment, Time to Deploy (msec)	No
Pretensioner Deployment, Time to Fire, Driver (msec)	No
Pretensioner Deployment, Time to Fire, Front Passenger (msec)	No

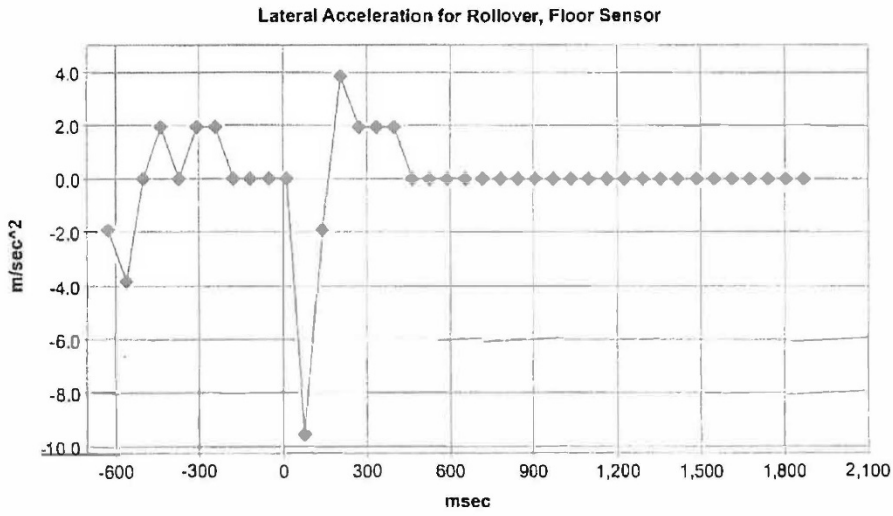
**Rollover Crash Pulse (3rd Prior Event, TRG 5 - table 1 of 2)**

Recording Status: Time Series Data	Complete
Time from TRG to Next Sample (msec)	14
Roll Angle Peak (degrees)	4.5
Roll Angle at the Time of TRG (degrees)	3.7



**Deployment Time Marker Key**

1	Driver/Passenger CSA
2	Driver/Passenger Pretensioner



Deployment Time Marker Key

1	Driver/Passenger CSA
2	Driver/Passenger Pretensioner

**Rollover Crash Pulse (3rd Prior Event, TRG 5 - table 2 of 2)**

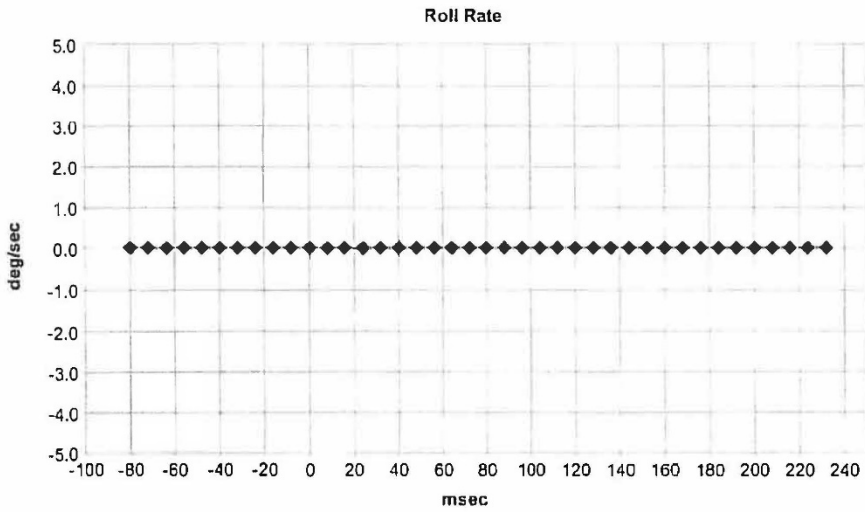
Time (msec)	Roll Rate (deg/sec)	Lateral Acceleration for Rollover, Floor Sensor (m/sec^2)
-626	-21.2	-1.9
-562	-30.9	-3.8
-498	-21.2	0.0
-434	-17.8	1.9
-370	-3.3	0.0
-306	13.0	1.9
-242	21.2	1.9
-178	21.2	0.0
-114	35.8	0.0
-50	26.1	0.0
14	-21.2	0.0
78	-63.5	-9.6
142	-30.9	-1.9
206	-21.2	3.8
270	-3.3	1.9
334	14.7	1.9
398	21.2	1.9
462	14.7	0.0
526	8.1	0.0
590	1.6	0.0
654	0.0	0.0
718	0.0	0.0
782	-3.3	0.0
846	-4.9	0.0
910	-9.8	0.0
974	-8.1	0.0
1038	-4.9	0.0
1102	-1.6	0.0
1166	3.3	0.0
1230	4.9	0.0
1294	4.9	0.0
1358	1.6	0.0
1422	0.0	0.0
1485	-1.6	0.0
1550	-1.6	0.0
1614	0.0	0.0
1678	0.0	0.0
1742	0.0	0.0
1806	0.0	0.0
1870	0.0	0.0

**System Status at Event (TRG Invalid #1)**

Recording Status, Rollover Crash Info.	Incomplete
Crash Type	Rollover
TRG Count (times)	Invalid
Previous Crash Type	Front/Rear Crash
Time from Pre-Crash TRG (msec)	0
Linked Pre-Crash Page	0
Side Curtain Airbag Deployment, Time to Deploy (msec)	N/A
Pretensioner Deployment, Time to Fire, Driver (msec)	N/A
Pretensioner Deployment, Time to Fire, Front Passenger (msec)	N/A

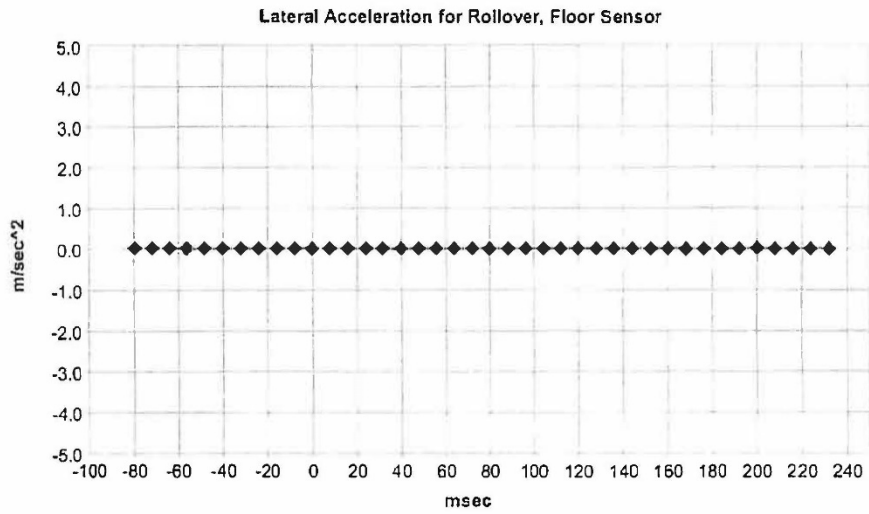
**Rollover Crash Pulse (TRG Invalid #1 - table 1 of 2)**

Recording Status, Time Series Data	Incomplete
Time from TRG to Next Sample (msec)	0
Roll Angle Peak (degrees)	0.0
Roll Angle at the Time of TRG (degrees)	0.0



**Deployment Time Marker Key**

1	Driver/Passenger CSA
2	Driver/Passenger Pretensioner



**Deployment Time Marker Key**

1	Driver/Passenger CSA
2	Driver/Passenger Pretensioner



Rollover Crash Pulse (TRG Invalid #1 - table 2 of 2)

Time (msec)	Roll Rate (deg/sec)	Lateral Acceleration for Rollover, Floor Sensor (m/sec^2)
-80	0.0	0.0
-72	0.0	0.0
-64	0.0	0.0
-56	0.0	0.0
-48	0.0	0.0
-40	0.0	0.0
-32	0.0	0.0
-24	0.0	0.0
-16	0.0	0.0
-8	0.0	0.0
0	0.0	0.0
8	0.0	0.0
16	0.0	0.0
24	0.0	0.0
32	0.0	0.0
40	0.0	0.0
48	0.0	0.0
56	0.0	0.0
64	0.0	0.0
72	0.0	0.0
80	0.0	0.0
88	0.0	0.0
96	0.0	0.0
104	0.0	0.0
112	0.0	0.0
120	0.0	0.0
128	0.0	0.0
136	0.0	0.0
144	0.0	0.0
152	0.0	0.0
160	0.0	0.0
168	0.0	0.0
176	0.0	0.0
184	0.0	0.0
192	0.0	0.0
200	0.0	0.0
208	0.0	0.0
216	0.0	0.0
224	0.0	0.0
232	0.0	0.0

**DTCs Present at Time of Event (Unlinked, Page 0)**

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

**Pre-Crash Data, 1 Sample (Unlinked, Page 0)**

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	300
TRG Count when Pre-crash TRG was Established (times)	5
Safety Belt Status, Driver	ON
Safety Belt Status, Front Passenger	OFF
Occupant Size Classification, Front Passenger	Child or Not Occupied
Frontal Airbag Suppression Switch Status, Front Passenger	SNA
RSCA Disable Switch	SNA
Seat Track Position Switch, Foremost, Status, Driver	SNA
Airbag Warning Lamp, On/Off	OFF
Ignition Cycle, Crash (times)	5128

**Pre-Crash Data, -5 to 0 seconds (Unlinked, Page 0)**

Time (sec)	-4.8	-4.3	-3.8	-3.3	-2.8	-2.3	-1.8	-1.3	-0.8	-0.3	0 (TRG)
Vehicle Speed (MPH) (km/h)	6.8 [11]	6.8 [11]	7.5 [12]	7.5 [12]	8.1 [13]	8.1 [13]	8.7 [14]	8.7 [14]	8.7 [14]	8.7 [14]	8.1 [13]
Accelerator Pedal, % Full (%)	9.5	9.5	9.5	14.0	12.5	14.5	0.0	14.0	12.0	0.0	0.0
Percentage of Engine Throttle (%)	2.0	2.5	2.0	3.0	3.0	4.5	0.0	4.5	3.0	0.0	0.0
Engine RPM (RPM)	1,200	1,200	1,300	1,300	1,400	1,500	1,400	1,500	1,600	1,500	1,400
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Brake Oil Pressure (Mpa)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Longitudinal Acceleration, VSC Sensor (m/sec <sup>2</sup> )	0.215	0.359	0.359	-0.144	-0.144	0.718	0.000	0.574	0.933	1.507	-3.733
Yaw Rate (deg/sec)	-1.95	-3.80	-5.86	-6.83	-0.98	0.49	8.34	5.86	1.95	-0.49	-8.30
Steering Input (degrees)	-27.0	-51.0	-73.5	-75.0	-22.5	21.0	72.0	66.0	34.5	-7.5	-39.0
Shift Position	D	D	D	D	D	D	D	D	D	D	D
Sequential Shift Range	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined
Cruise Control Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, PWR	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, ECO	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Sport	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Snow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, EV	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid



Fuel Injection Quantity (mm3/str)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
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Hexidecimal data deleted

DOT HS 812 825  
October 2019



U.S. Department  
of Transportation  
**National Highway  
Traffic Safety  
Administration**

