INDIANA UNIVERSITY

TRANSPORTATION RESEARCH CENTER

ON-SITE AMBULANCE CRASH INVESTIGATION

CASE NUMBER - IN14035
LOCATION - TEXAS
VEHICLE - 2010 FORD ECONOLINE E-350 TYPE II AMBULANCE
CRASH DATE - June 2014

Contract Number: DTNH22-12-C-00270

Prepared for:

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

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16. *Abstract*

The focus of this on-site investigation was the crash of a 2010 Ford Econoline E350 Type II ambulance, the sources of the injuries to the occupants, and the displacement of the patient cot from the rail clamp and antler bracket during the crash. This crash occurred at a three-leg intersection of a multi-lane, divided state highway that traversed in a northeast and southwesterly direction and a multi-lane, divided street that traversed northwest and southeast. The ambulance was equipped with a Type II patient compartment and was equipped with driver and passenger frontal air bags. The ambulance was occupied by a belted 29-year-old male driver and an unbelted 46-year-old female paramedic. The paramedic was in the patient compartment attending to a 72-year-old female patient who was restrained on a Stryker EMS Model 6092 EZ-PRO patient cot. The patient was being transported to a hospital for dialysis treatment and the ambulance was operating without emergency lights or siren activated. The right plane of the ambulance was impacted by the front plane of a 2009 Toyota Prius (event 1). The ambulance rotated clockwise and the right corner of the back plane was impacted by the front plane of a 2005 Chevrolet Tahoe (event 2). The ambulance continued to rotate clockwise and its right plane was sideswiped by the right plane of the Chevrolet (event 3). The driver of the ambulance was not injured, according to the police report. The paramedic sustained police reported "C" (possible) injuries and was transported by ambulance to a hospital. The patient sustained a police reported "K" (fatal) injury. She was transported to a level four trauma center, then transferred to a level one trauma center, where she expired approximately five hours post crash. The Toyota was a front wheel drive, four-door sedan, that was occupied by an unbelted 59-year-old female driver. She sustained police reported "A" (incapacitating) injuries and was transported by ambulance to a hospital. The Chevrolet was a four-door, sport utility vehicle that was occupied by a restrained 46-year-old male driver, a restrained 44-year-old female front right occupant, and a 10-year-old, male second row right occupant. None of the Chevrolet's occupants were injured during the crash.

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CASE NUMBER - IN14035

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CRASH DATE - June 2014

BACKGROUND

The focus of this on-site investigation was the crash of a 2010 Ford Econoline E350 Type II ambulance (**Figure 1**), the sources of the injuries to the occupants, and the displacement of the patient cot from the rail clamp and antler bracket during the crash. This investigation was initiated by the National Highway Traffic Safety Administration (NHTSA) on June 17, 2014 through NHTSA's Emergency Medical Services (EMS) Division. This investigation was assigned on July 7, 2013, once an inspection by research and legal parties could be coordinated by the vehicle owner. The crash involved the ambulance, a 2009 Toyota Prius, and a 2005 Chevrolet Tahoe. The crash occurred in June 2014, at 1050 hours in Texas, and was investigated by a local police agency. The ambulance was inspected on July 17, 2014. The Toyota and the crash scene were inspected on July 18, 2014. A partial interview with the owner of the ambulance service was conducted on July 17, 2014. It was not possible to conduct an interview with the driver of the ambulance nor a complete interview with the ambulance service owner due to litigation related to this crash.

Figure 1: 2010 Ford Econoline Type II Ambulance

This crash occurred at a three-leg intersection of a multi-lane, divided state highway that traversed in a northeast and southwesterly direction and a multi-lane, divided street that traversed northwest and southeast. The ambulance was equipped with a Type II patient compartment and was equipped with driver and passenger frontal air bags. The ambulance was occupied by a belted 29-year-old male driver and an unbelted 46-year-old female paramedic. The paramedic was in the patient compartment attending to a 72-year-old female patient who was restrained on a Stryker EMS Model 6092 EZ-PRO patient cot. The patient was being transported to a hospital for dialysis treatment and the ambulance was operating without emergency lights or siren activated. The right plane of the ambulance was impacted by the front plane of the Toyota (event 1). The ambulance rotated clockwise and the right corner of the back plane was impacted by the front plane of the Chevrolet (event 2). The ambulance continued to rotate clockwise and its right plane was sideswiped by the right plane of the Chevrolet (event 3). The driver of the ambulance was not injured. The paramedic sustained police reported "C" (possible) injuries and was transported by ambulance to a hospital. The patient sustained police reported "K" (fatal) injuries and was transported to a level four trauma center, and then transferred to a level one trauma center, where she expired approximately five hours post crash. The Toyota was a front wheel drive, four-door sedan, that was occupied by an unbelted

59-year-old female driver. She sustained police reported "A" (incapacitating) injuries and was transported by ambulance to a hospital. The Chevrolet was a four-door, sport utility vehicle that was occupied by a restrained 46-year-old male driver, a restrained 44-year-old female front right occupant, and a 10-year-old, male second row right occupant. None of the Chevrolet's occupants were injured during the crash. All vehicles were towed from the crash scene due to damage.

Ambulance Service, Personnel, Driver Training: The ambulance service provided only non-emergency medical transport service to a 1,036 square kilometer (400 square miles) area with a population density of 3,393 people/square mile. The ambulance service had a fleet of six ambulances and was a privately owned operation. All drivers and personnel were paid staff. The ambulance service screened the records of their drivers and provided them with a three-day in-house ambulance driver training program. No re-certifications were required for their drivers and there was no defensive driving program required. The driver had previous experience as a fire fighter in the U.S. Army and had been hired by the ambulance service less than one month prior to the crash. He was not issued any citations for this crash.

The driver of the ambulance was a full time employee for the ambulance service, who's EMS certification was current. Their question was did he have an EMS certification. Think you should made a second sentence and simply say "The driver was a certified The paramedic was also a full time employee of the ambulance service for approximately one year. The driver and paramedic both had a set work schedule and worked 8 am to 5 pm shifts. Both worked the day previous to the crash.

CRASH SUMMARY

Crash Site: This crash occurred during daytime hours within the three-leg intersection of a multi-lane, divided state highway and a multi-lane, divided street. The weather conditions were clear with 16.1 kilometers (10 miles) visibility, southerly winds at 21 km/h (18.5 mph), temperature of 29.4° C (85° F), and dew point of 22.2° C (72° F), according to local weather reports. All vehicles were traveling on a divided state highway that traversed in a northeast/southwest direction. The ambulance's and Chevrolet's roadway had three through lanes and two designated left turn lanes. The ambulance's left turn lane was 6.7 m (22.1 ft) wide and the Chevrolet's left turn lane was 3.6 m (11.9 ft) wide. The roadway markings consisted of solid white edge lines and a solid white center line. The Toyota's roadway had three through lanes and a designated right turn lane, each approximately 3.5 m (11.6 ft) wide. The roadway markings consisted of broken white lane lines, a solid yellow left edge line, and a solid white right edge line. The intersection was controlled by three-phase traffic signals. The roadway surface for all vehicles was dry, level bituminous, and the speed limit was 97 km/h (60 mph). The Crash Diagram is on included on page 14 of this report.

Pre-Crash: The ambulance was making a non-emergency transport of a patient to a hospital for dialysis treatment and the ambulance was operating without emergency lights or siren activated. The ambulance and Chevrolet were stopped at the intersection in the first and second left turn lanes (**Figures 2** and **3**), respectively with the Chevrolet behind at least one non-contact vehicle. Both drivers intended to proceed northwest, through the intersection. The Toyota was traveling southwest in the left through lane (**Figure 4**) and the driver intended to proceed straight through the intersection.

Figure 2: Initial position of Ford and northwest travel path

Figure 3: Initial position of Chevrolet and travel path

The drivers of the ambulance, Chevrolet, and non-contact vehicle were accelerating after the traffic light turned green. They proceeded through the intersection as the Toyota entered the intersection. There was no EDR-reported pre-crash braking by the ambulance and it is unknown if either vehicle's driver attempted any avoidance maneuvers prior to the crash. The ambulance's pre-crash data, including vehicle speed, percent accelerator pedal, and service brake status reported by the Event Data Recorder (EDR) are presented below. The Toyota's EDR report did not record pre-crash data.

Figure 4: Toyota travel path

Time	-5 Sec	-4 Sec	-3 Sec	-2 Sec	-1 Sec	0 Sec
Vehicle Speed Km/h (mph)	0.0 (0.0)	3.0 (1.9)	9.0 (5.6)	15.0 (9.3)	19.0 (11.8)	22.0 (13.7)
Accelerator Pedal Position (percent)	0	16	21	22	23	23
Service Brake on/off	On	Off	Off	Off	Off	Off
Engine RPM	500	1,100	1,300	1,600	1,800	1,500

Crash: The right plane of the ambulance was impacted by the front plane of the Toyota (event 1). The force direction was within the 1 o'clock sector to the ambulance. No air bags deployed. The Damage algorithm of the WinSMASH program calculated the total Delta V for the ambulance as 9 km/h (5.6 mph). The longitudinal and lateral velocity changes were -8 km/h (-5 mph) and -5 km/h (-3.1 mph), respectively. The ambulance's EDR reported the maximum longitudinal and lateral velocity changes as -11.22 km/h (-6.97 mph) and -6.87 km/h (-4.27 mph), respectively. The Damage algorithm of the WinSMASH program calculated the total Delta V for the Toyota as 30 km/h (18.6 mph). The longitudinal and lateral velocity changes were -19 km/h (-11.9 mph) and 23 km/h (14.3 mph), respectively. The WinSMASH results appeared reasonable for the ambulance and Toyota based on the crush damage to each vehicle. The Toyota's EDR reported the maximum longitudinal Delta V as -65.5 km/h (-40.7 mph). The ambulance rotated approximately 50 degrees clockwise and the right corner of the back plane was impacted by the front right corner of the Chevrolet (event 2). The force direction on the ambulance was within the 5 o'clock sector, and the CDC Only algorithm of the WinSMASH program calculated the total Delta V as 7 km/h (4.3 mph). The longitudinal and lateral velocity changes were 7 km/h (4.3 mph) and -2 km/h (-1.2 mph), respectively. WinSMASH calculated the total Delta V for the Chevrolet as 12 Km/h (7.5 mph). The longitudinal and lateral velocity changes were -11 km/h (6.8 mph) and -4 km/h (2.5 mph), respectively. The results should be considered borderline for both vehicles since they are based on CDC only. The ambulance continued to rotate clockwise an additional 110 degrees and the Chevrolet rotated slightly counterclockwise. The right rear corner of the ambulance then sideswiped the right plane of the Chevrolet (event 3). The patient cot became displaced from the antler clamp and rail clamp during the crash . The ambulance came to final rest just to the west of a traffic island on the northwest leg of the intersection, heading east. The Toyota rotated clockwise approximately 110 degrees after impact and came to final rest in its travel lane within the intersection, heading northwest. The Chevrolet came to final rest with its front wheels on the traffic island at the northwest leg of the intersection, heading west.

Post-Crash: The police were notified of the crash at 1053 hours and arrived on scene at 1100 hours. Emergency medical and rescue services also responded. The owner of the ambulance service reported during the SCI interview that the patient was found on the floor of the patient compartment, with the cot on top of her, and the paramedic on top of the cot. It is unknown if the patient came out of the cot's restraint straps. The driver of the ambulance was not injured nor transported. The paramedic sustained police reported "C" (possible) injuries and was transported by ambulance to a hospital. The patient sustained critical injuries and was transported by ambulance to a level four trauma center, then transferred to a level one trauma center where she expired approximately five hours post crash. The driver of the Toyota sustained police reported "A" (incapacitating) injuries was transported by ambulance to a hospital. The driver and two occupants of the Chevrolet were neither injured nor transported for medical treatment.

2010 FORD ECONOLINE E-350 TYPE II AMBULANCE

DESCRIPTION

The ambulance was a rear-wheel drive, E-350 RV cutaway (VIN: 1FDSS3ES0ADxxxxxx) manufactured in June 2010. The Type II ambulance patient compartment was manufactured in August 2010 by American Emergency Vehicles (AEV). The vehicle was equipped with a 6.8-liter

V-10 engine, five-speed automatic transmission, four-wheel anti-lock brakes with electronic brake force distribution, and traction control. The ambulance was also equipped with driver and front right passenger multi stage air bag inflators, front seat belt pretensioners, and an EDR. The tilt steering column was adjusted to the full down position. The patient compartment was configured with two right side entry doors, double rear doors for patient loading, and multiple storage cabinets along the front and left side. An M-class oxygen cylinder was located in a storage compartment at the right rear corner of the patient compartment. The cylinder had been removed prior to inspection. There were no issues with the oxygen cylinder, according to the ambulance service owner. The windshield glazing was AS1 laminated. The left front and right front glazing were AS2 tempered. The right side glazing panels and two backlight glazing panels were AS2 tempered with after market tinting. All of the glazing was either closed or fixed prior to the crash. The specified wheelbase was 351 cm (138 in).

The vehicle manufacturer's recommended tire size was LT245/75R16 for the front and rear tires. The vehicle was equipped with Savero HT2 GT Radial tires of the recommended size. The recommended cold tire pressure for the front and rear tires was 414 kPa (60 psi) and 552 kPa (80 psi), respectively for all tires. The right rear tire sustained a cut sidewall during the crash. The remaining tires were in good condition.

The front row was equipped with cloth covered, bucket seats and integral head restraints. The driver's seat back was reclined 20 degrees aft of vertical and the seat track was at the rear-most position. The patient compartment was configured with a vinyl covered, rear-facing, pedestal seat located behind the driver and a two occupant, vinyl covered, bench seat was located along the right side of patient compartment.

EXTERIOR DAMAGE

Exterior Damage, Event 1: The ambulance sustained right plane damage during the impact with the Toyota. The right rear doors, side panel, and rear wheel were directly damaged **(Figure 1)**. The direct damage began 143 cm (56.3 in) rear of the right front axle and extended 235 cm (92.5 in) rearward. The Field L was 260 cm (102.4 in). The crush measurements were taken at the sill level and maximum residual crush was 30 cm (11.8 in) occurring at 26 cm (10.2 in) forward of C_3. The crush values were: C_1 = 8 (3.1 in), C_2 = 6 cm (2.4 in), C_3 = 23 cm (9.1 in), C_4 = 29 cm (11.4 in), C_5 = 17 cm (6.7 in), C_6 = 7 cm (2.8 in). The sill height was 30 cm (11.8 in) and the height of the maximum crush was 40 cm (15.7 in). The Door/Sill Differential was 0. The vehicle's left side wheelbase was extended 4 cm (1.6 in) and the right side wheelbase was extended 19 cm (7.5 in).

Damage Classification, Event 1: The Collision Deformation Classification (CDC) for the impact with the Toyota was 01RPEW3 (30 degrees). The Damage algorithm of the WinSMASH program calculated the total Delta V as 9 km/h (5.6 mph). The longitudinal and lateral velocity changes were -8 km/h (-5 mph) and -5 km/h (-3.1 mph), respectively. These results appeared reasonable, based on the damage to the ambulance.

Exterior Damage, Event 2: The ambulance sustained back and right plane damage (**Figure 5**) during the impact with the Chevrolet. The back bumper and right rear side panel were directly damaged. There was no crush to the back bumper and no C-measurements were taken.

Figure 5: Right rear damage to ambulance

Damage Classification, Event 2: The CDC for the impact with the Chevrolet was 05BRAW2 (160 degrees). The CDC Only algorithm of the WinSMASH program calculated the total Delta V as 7 km/h (4.3 mph). The longitudinal and lateral velocity changes were 7 km/h (4.3 mph) and -2 km/h (-1.2 mph), respectively. The results should be considered borderline since they are based on CDC only.

Exterior Damage, Event 3: The ambulance sustained sideswipe damage to the right rear corner during impact with the Chevrolet. The direct damage to the ambulance could not be discerned since there was overlapping damage from event 2; however, the on-scene photos of the Chevrolet showed blue and red paint transfer on the Chevrolet's right plane, which was consistent with a sideswipe impact with the right rear corner of the ambulance (**Figure 5**).

Damage Classification, Event 3: The CDC for the impact with the Chevrolet was 12RBAS2 (0 degrees. The WinSMASH program was not used for this impact since sideswipes are out of scope for the program.

EVENT DATA RECORDER

The ambulance's EDR was imaged with version 15.0 of the Bosh Crash Data Retrieval software via connection to the Diagnostic Link Connector (DLC). Power to image the data was provided by an external battery. The data were reported using version 16.1.1 The EDR reported one unlocked event and no faults were recorded. The frontal air bag warning lamp was reported as "Off." The safety belt status for the driver and front right passenger were both reported as "Buckled," though there was not a front right passenger seated at the time of the crash. The driver's seat track position switch was reported as "Forward," thought the seat track was at the rear most position at the time of inspection. The maximum longitudinal and lateral Delta Vs was reported as -11.22 km/h (-6.97 mph) and -6.87 km/h (-4.27 mph). The time from Algorithm Enable (AE) to maximum longitudinal and lateral Delta V was 120 and 69 msec, respectively. The pre-crash data were presented in the pre-crash section of this report on page 3. The EDR report is attached at the end of this report as Attachment A.

Front Row: Inspection of the front row revealed no intrusions or occupant contacts. Both doors were undamaged and the windshield was cracked but in place. The remaining window glazing was undamaged.

Patient Compartment: Inspection of the of the patient compartment revealed moderate damage from three intrusions. The right side doors, window frames, and the vertical shelf support intruded laterally 22 cm (8.7 in), 10 cm (3.9 in), and 15 cm (5.9 in), respectively. The M class oxygen cylinder located in the right rear cabinet was undamaged and remained secured within the cabinet during the crash, according to the ambulance service owner. The cylinder was removed prior to inspection. Both right side entry doors were jammed shut. There was no damage to either of the right side glazing, but the left backlight glazing was disintegrated. This probably occurred during the rescue effort.

MANUAL RESTRAINT SYSTEMS

The front row was equipped with driver and front right passenger lap and shoulder safety belts. The driver's upper anchor was located in the full down position. Both safety belts were equipped with pretensioners, neither of which actuated during the crash.

The ambulance's EDR reported the driver's safety belt status as "Buckled." No load marks were found on the driver's safety belt assembly.

The patient compartment's rear facing seat was equipped with a lap and shoulder belt. There was no passenger in this seat.

The patient compartment's right side bench seat was equipped with one four-point harness that was secured to the right side wall at the middle position. Investigation of this safety belt revealed little evidence of historical usage and no load marks. The paramedic was not using this safety belt, according to the ambulance service's owner.

SUPPLEMENTAL RESTRAINT SYSTEMS

The ambulance was equipped with frontal air bags for the front row seating positions. Neither frontal air bag deployed during the crash since the crash sensing algorithm determined insufficient severity to command a deployment.

Figure 6: Stryker Medical Model 6092 EZ-Pro R4 ambulance cot

PATIENT COT

The cot that was used to transport the patient was a Stryker EMS Model 6092 EZ-PRO (**Figure 6**), serial number 04024xxxx. It was an H-frame design, and could carry a maximum of 295 kg (650 lbs). It was 211 cm (83 in) long and 58 cm (23 in) wide and had a height range of 30 cm (12 in) to 94

cm (37 in). The back rest could be adjusted from 0-73 degrees. The cot was equipped with torso, thigh, and lower leg restraints, all of which were tied to the frame of the cot. No shoulder straps were used to secure the patient. It is unknown if the ambulance service outfits their cots with shoulder straps. The torso and thigh restraints were manufactured by Morrison Medical Products, and the product number was #12000R. The manufacturer's tag on the lower leg restraint was illegible.

Figure 7: Antler bracket, assembled/bolted to floor by investigator

The cot was secured by the antler bracket and rail clamp (**Figures 7** and **8**). The antler bracket secured the head of the cot by restraining the undercarriage, using the wheel frames as anchor points. The rail clamp located at the back left of the patient compartment secured the cot to the floor. There were no manufacturer's labels or serial numbers on the rail clamp nor antler clamp. The patient was supine on the cot and was secured by the restraints at the chest and hip locations. The lower leg restraints were not in use since both of the patient's legs had been amputated above the knee. The recline angle of the back rest could not be determined. The ambulance service owner stated that the patient was found by emergency responders on the floor of the patient compartment, underneath the cot and the paramedic. It is unknown if the patient came out of the restraints during the crash.

Figure 8: Rail clamp

Figure 9: Back right door indentation from back of rail clamp

The SCI inspection of the cot, antler bracket, and rail clamp focused on determining how the cot released from the rail clamp during the crash. There were no abnormalities to the antler bracket, the two anchor bolts, or the floor brackets. The bolts showed historical wear marks, primarily on the first seven threads, suggesting both bolts were not completely tightened against the floor bracket. The bolts held the antler bracket firmly when reassembled and fastened to the floor. The rail clamp was in working order when the cot was placed in the patient compartment and secured during the SCI inspection. The cot was shaken vigorously and the rail clamp held the cot in place. The rail clamp locking mechanism could be released by exerting light pressure on the back end of the rail clamp, pushing it forward. One pronounced and one light impression (**Figure 9**) of the end of the rail clamp was present in the vinyl of the back door

panel, indicating there had been contact between the end of the rail clamp and the door. The door was slammed a number of times during inspection and while there was minor contact between the door and the end of the rail clamp, the cot remained secured to the rail clamp. Inspection of the cot revealed its left adjustable side rail was broken off during the crash (**Figure 10**), the vertical attachment bar (which was held by the rail clamp) was slightly bent (**Figure 11**), and there were scuffs on the left side frame rail. The inspection findings of the rail clamp and the cot's vertical attachment bar suggested that crash forces during the back plane impact with the Chevrolet allowed the end of the rail clamp to contact the back door with sufficient force to create a pronounced impression of the end of the rail clamp in the vinyl and release of the cot from the rail clamp. The rail scuffs on the left rail of the cot indicated that it was then displaced to the right and contacted the right bench support.

Figure 10: Broken left adjustable side rail

Figure 11: Vertical attachment bar (to rail clamp)

DRIVER DEMOGRAPHICS

Age/Sex:	29 years/male
Height:	170 cm (67 in)
Weight:	89 kg (197 lb)
Eyewear:	Unknown
Seat Type:	Bucket seat
Seat Track Position:	Unknown
Manual Restraint Usage:	Lap and shoulder belt
Usage Source:	EDR
Air Bags	Frontal, non-deployed
Alcohol/Drug Involvement:	Police reported none
Egress from Vehicle:	Left front door
Transport from Scene:	None
Medical Treatment:	Unknown

DRIVER INJURIES

No injury information was obtained since there was no interview with the driver.

DRIVER KINEMATICS

The driver was restrained by the lap and shoulder safety belt at Model Minimum Uniform Crash Criteria (MMUCC) guideline seating position 1. The right plane impact with the Toyota displaced the driver forward and to the right within the safety belt, opposite the 1 o'clock direction of force. The rear impact with the Chevrolet displaced the driver backward and to the right, into the seat back. He did not sustain any police reported injuries and was not transported. It is unknown if the driver sought treatment later.

PARAMEDIC DEMOGRAPHICS

Age/Sex:	46 years/female
Height:	160 cm (63 in)
Weight:	86 kg (190 lb)
Eyewear:	Unknown
Seat Type:	Inward-facing bench seat on right side of patient compartment
Seat Track Position:	Fixed
Manual Restraint Usage:	None
Usage Source:	Vehicle inspection/Ambulance owner interview
Air Bags	None available
Alcohol/Drug Involvement:	None reported
Egress from Vehicle:	Unknown
Transport from Scene:	Ambulance
Medical Treatment:	Unknown

No injury information was obtained since there was no interview with this occupant.

PARAMEDIC KINEMATICS

The paramedic was unrestrained and located in MMUCC position 9, the middle position on the inward-facing bench seat on the right side of the patient compartment. She was leaning forward, tending to the patient on the cot and was in the process of standing up when the impact with the Toyota occurred, according to the ambulance service owner. The impact with the Toyota displaced the paramedic forward and to the right, opposite the one o'clock direction of force, and she contacted the right side wall of the patient compartment. The impact with the Chevrolet displaced her backward and to the right, opposite the five o'clock direction of force. She came to final rest on top of the cot, which had been turned upside-down during the crash sequence. She sustained police reported "C" (possible) injuries and was transported by ambulance to a hospital. Her treatment status is unknown and her medical records were not obtained.

PATIENT DEMOGRAPHICS

Age/Sex:	72 years/Female
Height:	Unknown
Weight:	74 kg (163 lbs)
Eyewear:	Unknown
Seat Type:	Ambulance cot
Seat Track Position:	N/A
Restraint Usage:	Secured by chest and hip restraints
Manual Usage Source:	Ambulance service owner interview
Air Bags	None available
Alcohol/Drug Involvement:	None reported
Egress from Vehicle:	Removed by emergency responders
Transport from Scene:	Ambulance
Medical Treatment:	Expired approximately five hours post crash

PATIENT INJURIES

Injury Number	Injury	AIS 2005/08	Injury Source	Confi-dence Level
1	Fracture, minimally displaced, through left greater trochanter, not further specified	853151.3,2	Floor	Possible
2	Fracture, non-displaced, through left femoral neck, not further specified	853161.3,2	Floor	Possible
3	Fracture, non-displaced, of superior pubic symphysis	856151.2,4	Floor	Possible

Source: ***Hospitalization Records***

The patient was located in MMUCC position 5. She was supine on the cot and secured by the chest and hip restraints. The leg restraints were not used since the patient's legs were amputated above the knees. The cot was secured by the antler bracket and rail clamp. The right plane impact displaced the patient forward and to the right, opposite of the 1 o'clock direction of force and she loaded the cot's chest and hip restraints. The impact to the back of the ambulance resulted in release of the cot from the rail clamp and the cot turned over. The patient sustained fractures of the left greater trochanter, the left femoral neck, and the superior pubic symphysis from her contact with the floor. She came to final rest face down on the floor, with the cot on top of her, and the paramedic on top of the cot. It is unknown if she remained within the restraints. The patient was transported by ambulance to a hospital where she expired approximately five hours post crash.

2009 TOYOTA PRIUS

DESCRIPTION

The Toyota was a front wheel drive, five-passenger, four-door hatchback (VIN: JTDKB20U793xxxxxx), equipped with a 1.5-liter I-4 engine and a continuously variable-speed automatic transmission. The Toyota was also equipped with 4-wheel anti-lock brakes with electronic brake force distribution, brake assist, traction control and an EDR.

EXTERIOR DAMAGE

Exterior Damage: The Toyota sustained front plane damage during the impact with the ambulance. The front bumper, bumper fascia, grille, hood, right head lamp/turn signal assembly, and right fender were directly damaged (**Figure 12**). The direct damage extended 158 cm (62.2 in) across the entire front plane. The Field L was 106 cm (41.7 in). The crush measurements were taken at the front bumper bar and the maximum residual crush was 39 cm (15.4 in) occurring 12 cm (4.7 in) to the right of C_1. The crush values were: C_1 = 19 (7.4 in), C_2 = 29 cm (11.4 in), C_3 = 27 cm (10.6 in), C_4 = 20 cm (7.9 in), C_5 = 13 cm (6.7 in), C_6 = 3 cm (1.2 in). The vehicle's left side wheelbase was extended 1 cm (0.4 in), while the right side wheelbase was reduced 5 cm (2 in).

Figure 12: 2009 Toyota Prius

Damage Classification: The CDC for the impact with the Toyota was 10FDEW2 (310 degrees). The Damage algorithm of the WinSMASH program calculated the total Delta V as 30 km/h (18.6 mph). The longitudinal and lateral velocity changes were -19 km/h (-11.8 mph) and 23 km/h (14.3 mph). The results are borderline due to underride nature of the impact.

The Toyota's EDR was imaged using version 15.0 of the Bosch Crash Data Retrieval software via connection to the Airbag Control Module (ACM). The data were reported using version 16.1.1. The EDR reported three "Frontal/Rear" events and no diagnostic trouble codes were reported. The "Freeze Signal" (i.e., recorded data cannot be overwritten or deleted by any subsequent events) was reported as "On" and the recording was "Complete" for the three events. The time between the most recent and first prior event was reported as "5000 msec or greater." This indicated that the first and second prior events were unrelated to this crash. The EDR reported the maximum longitudinal Delta V as -65.5 km/h (-40.7 mph) at 150 msec after AE. The driver's buckle switch was reported as "Unbuckled" and the seat position was reported as "Rearward."

OCCUPANT DATA

The driver of the Toyota (59-year-old female) was not restrained by the lap-and-shoulder safety belt. She sustained a police reported "A" (incapacitating) injury and was transported by ambulance to a hospital. Her injury and treatment status are not known.

2005 CHEVROLET TAHOE

DESCRIPTION

The Chevrolet was a four wheel drive, six-passenger, four-door sport utility Vehicle (VIN: 1GNEK13T95Rxxxxxx), equipped with a 5.3 liter V-8 engine and a four-speed automatic transmission.

EXTERIOR DAMAGE

Exterior Damage, event 2: The Chevrolet sustained front plane damage from the impact with the ambulance. The front bumper, bumper fascia, right head lame/turn signal assembly, left turn signal assembly, grille, hood, and right fender were directly damaged.

Damage Classification, event 2: The Chevrolet was not inspected. The CDC for the impact with the ambulance was 01FREW1 (20 degrees) based on the police photographs of the crash scene (**Figure 13**). The CDC Only algorithm of the WinSMASH program calculated the total Delta V as 12 km/h (7.5 mph). The longitudinal and lateral velocity changes were-11 km/h (-6.8 mph) and -4 km/h (-2.5 mph). The results are borderline since they are based on CDC only.

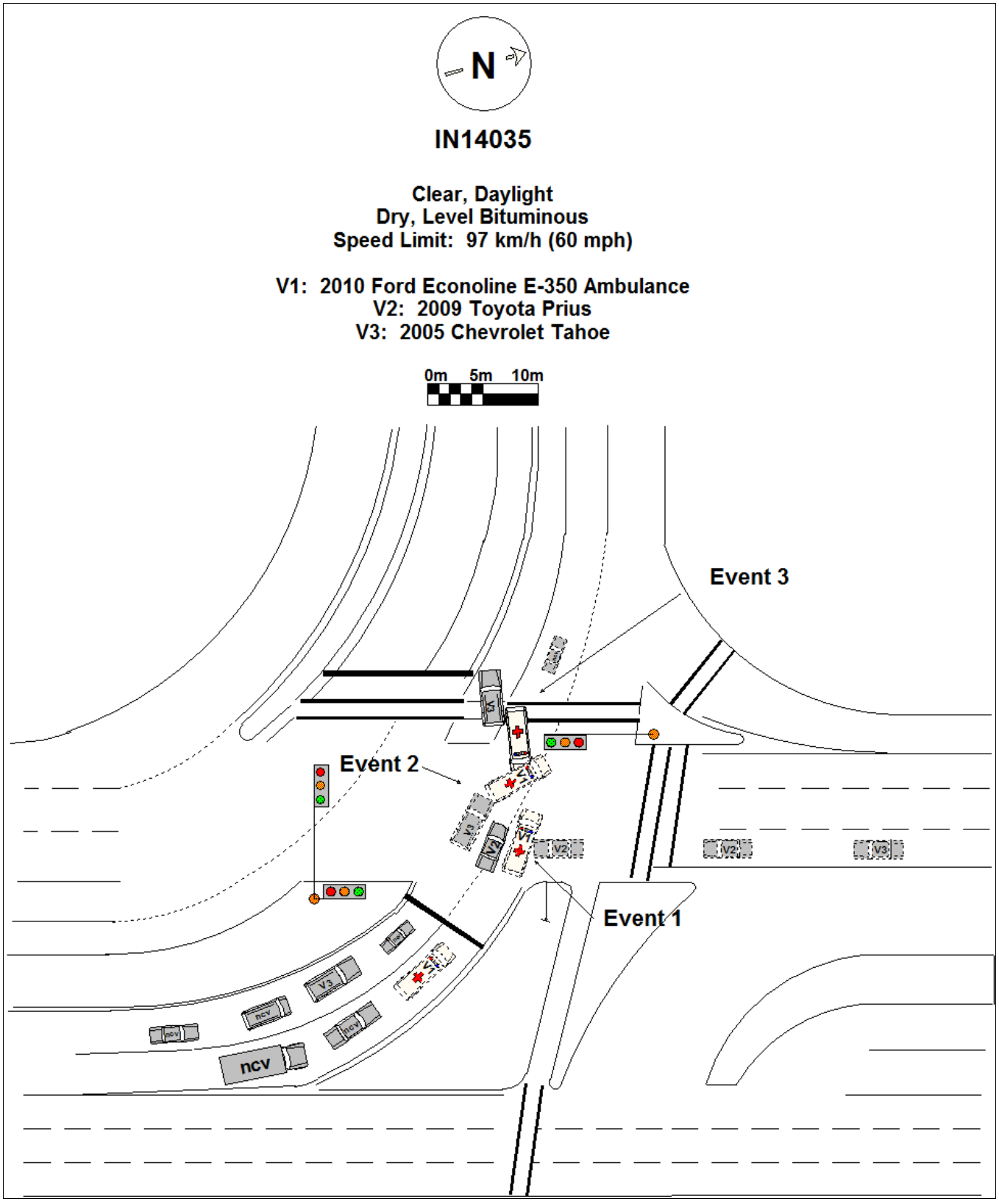
Figure 13: 2005 Chevrolet Tahoe

Exterior Damage, event 3: The Chevrolet sustained right plane damage from the sideswipe impact with the ambulance. The right doors were directly damaged.

Damage Classification, event 3: The CDC for the second impact with the ambulance was 12RPES1 (0 degrees), based on police photographs of the crash scene. The WinSMASH program was not used for this impact since sideswipes are out of scope for the program.

OCCUPANT DATA

The driver (46-year-old male), front right passenger (44-year-old female), and second row right passenger (10-year-old male) of the Chevrolet were reported by police as restrained by their lap and shoulder safety belts. None of the occupants sustained any police reported injuries and none were transported.


N
IN14035
Clear, Daylight
Dry, Level Bituminous
Speed Limit: 97 km/h (60 mph)
V1: 2010 Ford Econoline E-350 Ambulance
V2: 2009 Toyota Prius
V3: 2005 Chevrolet Tahoe
0m 5m 10m
Event 3
Event 2
Event 1
ncv

Attachment A
Event Data Recorder (EDR) Report
2010 Ford E350 Type II Ambulance

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	1FDSS3ES0AD******
User	
Case Number	
EDR Data Imaging Date	07/17/2014
Crash Date	
Filename	IN14035_V1_ACM.CDRX
Saved on	Thursday, July 17 2014 at 14:37:20
Collected with CDR version	Crash Data Retrieval Tool 12.3
Reported with CDR version	Crash Data Retrieval Tool 16.1.1
EDR Device Type	Airbag Control Module
ACM Adapter Detected During Download	No
Event(s) recovered	unlocked event

Comments

No comments entered.

The retrieval of this data has been authorized by the vehicle's owner, or other legal authority such as a court order or search warrant, as indicated by the CDR tool user on Thursday, July 17 2014 at 14:37:20.

Data Limitations

Restraints Control Module Recorded Crash Events:
Deployment Events cannot be overwritten or cleared from the Restraints Control Module (RCM). Once the RCM has deployed any airbag device, the RCM must be replaced. The data from events which did not qualify as deployable events can be overwritten by subsequent events. The RCM can store up to two deployment events.

Airbag Module Data Limitations:

- Restraints Control Module Recorded Vehicle Forward Velocity Change reflects the change in forward velocity that the sensing system experienced from the point of algorithm wake up. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately five seconds prior to algorithm wake up. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle forward velocity change.
- Event Recording Complete will indicate if data from the recorded event has been fully written to the RCM memory or if it has been interrupted and not fully written.
- If power to the Airbag Module is lost during a crash event, all or part of the crash record may not be recorded.
- For 2011 Ford Mustangs, the Steering Wheel Angle parameter indicates the change in steering wheel angle from the previously recorded sample value and does not represent the actual steering wheel position.

Airbag Module Data Sources:

- Event recorded data are collected either INTERNALLY or EXTERNALLY to the RCM.

  - INTERNAL DATA is measured, calculated, and stored internally, sensors external to the RCM include the following:
    > The Driver and Passenger Belt Switch Circuits are wired directly to the RCM.
    > The Driver's Seat Track Position Switch Circuit is wired directly to the RCM.
    > The Side Impact Sensors (if equipped) are located on the side of vehicle and are wired directly to the RCM.
    > The Occupant Classification Sensor is located in the front passenger seat and transmits data directly to the RCM on high-speed CAN bus.
    > Front Impact Sensors (right and left) are located at the front of vehicle and are wire directly to the RCM.

  - EXTERNAL DATA recorded by the RCM are data collected from the vehicle communication network from various sources such as Powertrain Control Module, Brake Module, etc.

02007_RCM-RC6_r002

System Status at Time of Retrieval

VIN as programmed into RCM at factory	1FDSS3ES0AD******
Current VIN from PCM	1FDSS3ES0AD******
Ignition cycle, download (first record)	5,919
Ignition cycle, download (second record)	N/A
Restraints Control Module Part Number	AC24-14B321-BA
Restraints Control Module Serial Number	3114751200000000
Restraints Control Module Software Part Number (Version)	9E53-14C028-AB
Left/Center Frontal Restraints Sensor Serial Number	12AE743D
Left Side Restraint Sensor 1 Serial Number	00000000
Left Side Restraint Sensor 2 Serial Number	00000000
Right Frontal Restraints Sensor Serial Number	00000000
Right Side Restraint Sensor 1 Serial Number	00000000
Right Side Restraints Sensor 2 Serial Number	00000000

System Status at Event (First Record)

Recording Status	Unlocked Record
Complete file recorded (yes,no)	Yes
Multi-event, number of events (1,2)	1
Time from event 1 to 2 (msec)	N/A
Lifetime Operating Timer at event time zero (seconds)	21,851,835
Key-on Timer at event time zero (seconds)	9,720
Vehicle voltage at time zero (Volts)	13.689
Energy Reserve Mode entered during event (Y/N)	No

Faults Present at Start of Event (First Record)

No Faults Recorded

Deployment Data (First Record)

Maximum delta-V, longitudinal (MPH [km/h])	-6.97 [-11.22]
Time, maximum delta-V longitudinal (msec)	120
Maximum delta-V, lateral (MPH [km/h])	-4.27 [-6.87]
Time, maximum delta-V lateral (msec)	69

Pre-Crash Data -1 sec (First Record)

Ignition cycle, crash	5,909
Frontal air bag warning lamp, on/off	Off
Occupant size classification, front passenger (Child size Yes/No [Hex value])	No [$04]
Frontal air bag suppression switch status, front passenger	Not Active
Safety belt status, driver	Driver Buckled
Seat track position switch, foremost, status, driver	Forward
Safety belt status, front passenger	Passenger Buckled
Brake Telltale	Off
ABS Telltale	Off
Stability Control Telltale	Off
Speed Control Telltale	Off
Powertrain Wrench Telltale	Off
Powertrain Malfunction Indicator Lamp (MIL)Telltale	Off

Pre-Crash Data -5 to 0 sec [2 samples/sec] (First Record)

Times (sec)	Speed vehicle indicated MPH [km/h]	Accelerator pedal, % full	Service brake, on/off	Engine rpm	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
- 5.0	0.0 [0.0]	0	On	500	non-engaged	non-engaged	non-engaged	non-engaged
- 4.5	0.0 [0.0]	12	Off	700	non-engaged	non-engaged	non-engaged	non-engaged
- 4.0	1.9 [3.0]	16	Off	1,100	non-engaged	non-engaged	non-engaged	non-engaged
- 3.5	3.7 [6.0]	17	Off	1,200	non-engaged	non-engaged	non-engaged	non-engaged
- 3.0	5.6 [9.0]	21	Off	1,300	non-engaged	non-engaged	non-engaged	non-engaged
- 2.5	7.5 [12.0]	21	Off	1,400	non-engaged	non-engaged	non-engaged	non-engaged
- 2.0	9.3 [15.0]	22	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
- 1.5	10.6 [17.0]	23	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
- 1.0	11.8 [19.0]	23	Off	1,800	non-engaged	non-engaged	non-engaged	non-engaged
- 0.5	12.4 [20.0]	23	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
0.0	13.7 [22.0]	23	Off	1,500	non-engaged	non-engaged	non-engaged	non-engaged

Pre-Crash Data -5 to 0 sec [10 samples/sec] (First Record)

Times (sec)	Steering Wheel Angle (degrees)
- 5.0	Invalid
- 4.9	Invalid
- 4.8	Invalid
- 4.7	Invalid
- 4.6	Invalid
- 4.5	Invalid
- 4.4	Invalid
- 4.3	Invalid
- 4.2	Invalid
- 4.1	Invalid
- 4.0	Invalid
- 3.9	Invalid
- 3.8	Invalid
- 3.7	Invalid
- 3.6	Invalid
- 3.5	Invalid
- 3.4	Invalid
- 3.3	Invalid
- 3.2	Invalid
- 3.1	Invalid
- 3.0	Invalid
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- 2.8	Invalid
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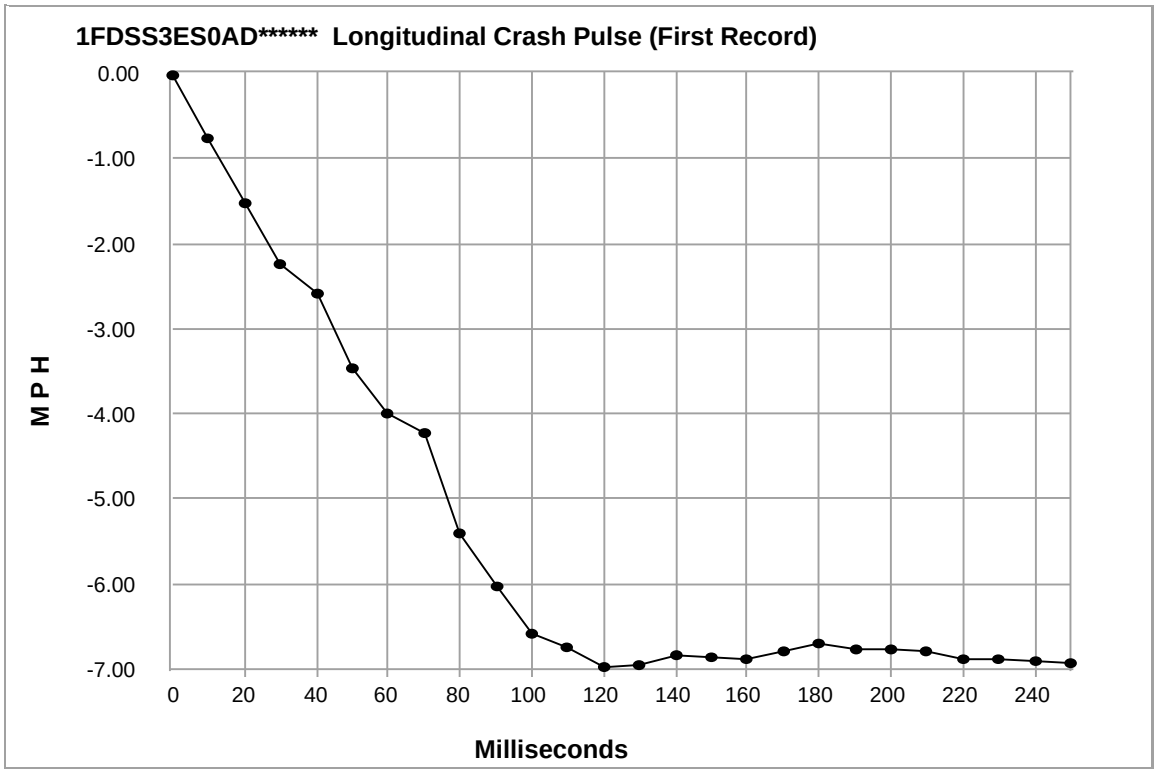
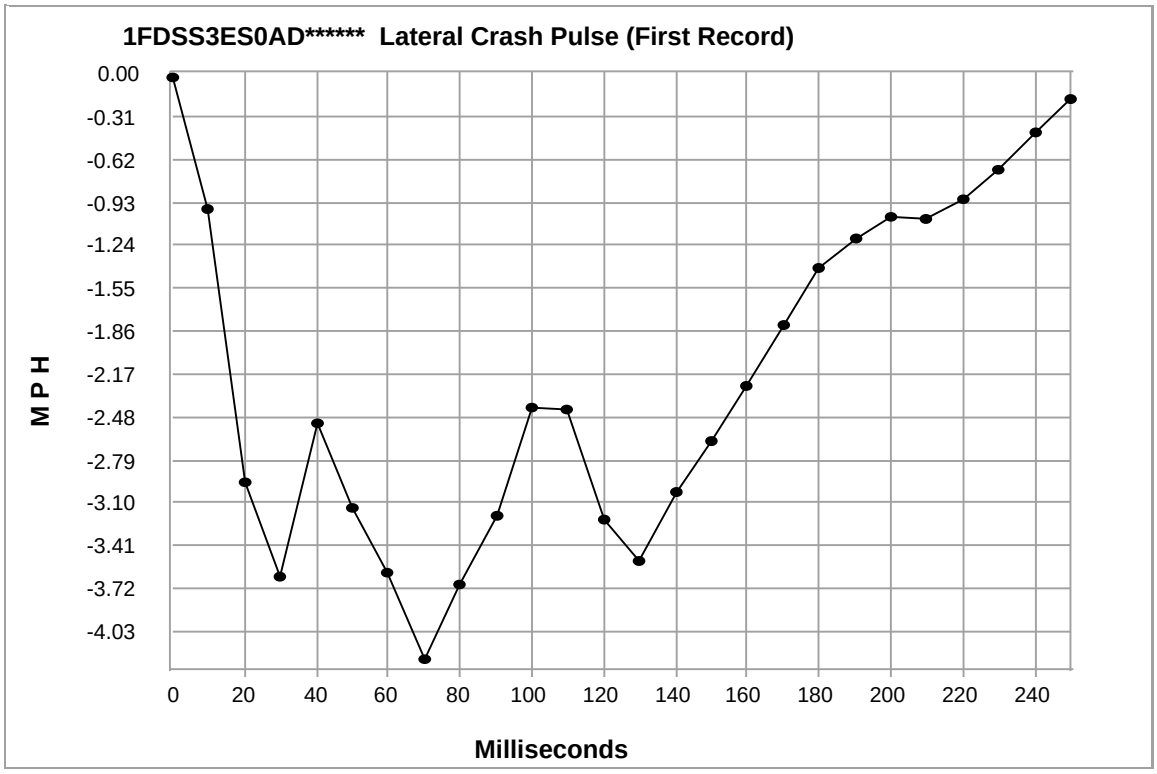
- 2.3	Invalid
- 2.2	Invalid
- 2.1	Invalid
- 2.0	Invalid
- 1.9	Invalid
- 1.8	Invalid
- 1.7	Invalid
- 1.6	Invalid
- 1.5	Invalid
- 1.4	Invalid
- 1.3	Invalid
- 1.2	Invalid
- 1.1	Invalid
- 1.0	Invalid
- 0.9	Invalid
- 0.8	Invalid
- 0.7	Invalid
- 0.6	Invalid
- 0.5	Invalid
- 0.4	Invalid
- 0.3	Invalid
- 0.2	Invalid
- 0.1	Invalid
0.0	Invalid



Longitudinal Crash Pulse (First Record)

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
0	-0.03	-0.04
10	-0.75	-1.21
20	-1.52	-2.45
30	-2.24	-3.61
40	-2.59	-4.17
50	-3.47	-5.58
60	-3.99	-6.42
70	-4.22	-6.79
80	-5.41	-8.70
90	-6.04	-9.72
100	-6.58	-10.59
110	-6.75	-10.86
120	-6.97	-11.22
130	-6.95	-11.18
140	-6.84	-11.01
150	-6.87	-11.06
160	-6.88	-11.08
170	-6.78	-10.91
180	-6.70	-10.78
190	-6.77	-10.90
200	-6.76	-10.88
210	-6.80	-10.94
220	-6.89	-11.08
230	-6.90	-11.10
240	-6.92	-11.13
250	-6.92	-11.14



Lateral Crash Pulse (First Record)

Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
0	-0.03	-0.05
10	-0.98	-1.58
20	-2.95	-4.75
30	-3.64	-5.85
40	-2.52	-4.06
50	-3.14	-5.05
60	-3.60	-5.80
70	-4.22	-6.80
80	-3.68	-5.93
90	-3.20	-5.15
100	-2.41	-3.87
110	-2.43	-3.91
120	-3.22	-5.18
130	-3.53	-5.67
140	-3.02	-4.86
150	-2.66	-4.27
160	-2.26	-3.63
170	-1.82	-2.93
180	-1.40	-2.25
190	-1.19	-1.91
200	-1.03	-1.66
210	-1.05	-1.68
220	-0.91	-1.46
230	-0.69	-1.11
240	-0.43	-0.69
250	-0.18	-0.29

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.

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41 43 32 34 2D 31 34 42 33 32 31 2D 42 41 00 00 00 00 00 00 00 00 00 00

33 31 31 34 37 35 31 32 30 30 30 30 30 30 30 30

39 45 35 33 2D 31 34 43 30 32 38 2D 41 42 00 00 00 00 00 00 00 00 00 00

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Event Record 1

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Event Record 2

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Disclaimer of Liability

Attachment A
Event Data Recorder (EDR) Report
2009 Toyota Prius

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	JTDKB20U793******
User	
Case Number	
EDR Data Imaging Date	07/18/2014
Crash Date	
Filename	IN14035_V2_ACM.CDRX
Saved on	Friday, July 18 2014 at 10:35:49
Collected with CDR version	Crash Data Retrieval Tool 12.3
Reported with CDR version	Crash Data Retrieval Tool 16.1.1
EDR Device Type	Airbag Control Module
Event(s) recovered	Front/Rear (3)

Comments

No comments entered.

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 the airbags did not deploy or the pretensioners did not operate during an event that meets a specified recording threshold, it is called a Non-Deployment Event. Data from a Non-Deployment Event can be overwritten by a succeeding event that meets the specified recording threshold. If the airbag(s) deploy or the pretensioners are operated, it is called a Deployment Event. Deployment Event data cannot be overwritten or deleted by the airbag ECU following that event.
- 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 TechStream, 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 seven 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
- 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.
- The airbag ECU records post-crash data and may record pre-crash data in the event of a frontal/rear crash. In addition, it may record post-crash data in the event of a side crash or rollover.
- The airbag ECU has the following recording pages (memory maps) for each accident type to store event data: three pages for frontal or rear crash, one page for a side crash (if airbag ECU is applicable) , and one page for rollover events. (if airbag ECU is applicable)
- The data recorded by the airbag ECU in the event of a frontal/rear crash includes information that indicates the sequence and interval of each previously-occurring frontal/rear crash event.
  - Time from Previous TRG
  - TRG Count
- The point in time at which the recording trigger is established is regarded as time zero for the recorded data. For the time indicated in "Lateral Delta-V", "Roll Angle" or "Lateral Acceleration", the first sampling point after the recording trigger establishment is regarded as time zero. The time zero of the data and the recording trigger establishment do not always occur simultaneously.
- The recording trigger judgment threshold value differs depending on the collision type (i.e., frontal crash, rear crash, side crash, or

rollover event).

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

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

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

* For sensing a rollover

Data Definitions:
1)

- The "ON" setting for the "Freeze Signal" indicates a state in which the non-volatile memory can not be overwritten or deleted by the airbag ECU. After "Freeze Signal" has been turned ON, subsequent events will not be recorded.
- "Recording Status" indicates a state in which all recorded event data has been written into the non-volatile memory, or a state in which this process was interrupted and not fully written into the non-volatile memory. If "Recording Status" is "Incomplete", recorded event data may not be valid.
- "Time to Deployment Command" indicates the time between recording trigger establishment and the determination of airbag deployment. This value may differ from the actual time it takes for the airbag to fully deploy.
- Even if an airbag/pretensioner did not deploy due to the "front passenger airbag disable switch and/or "RSCA Disable Switch" in the ON position or other disabling criteria are met, the "Time to deployment command" data element for that airbag/pretensioner may still be recorded.
- "Engine RPM" indicates the number of engine revolutions, not the number of motor revolutions. The recorded value has an upper limit of 6,000 rpm. Resolution is 400 rpm and the value is rounded down and recorded. For example, if the actual engine speed is 799 rpm, the recorded value will be 400 rpm.
- The upper limit for the recorded "Vehicle Speed" value is 126 km/h (78.3mph). Resolution is 2km/h (1.2mph) and the value is rounded down and recorded. The accuracy of the "Vehicle Speed" value can be affected by various factors. These include, but not limited, to the following.
  - Significant changes in the tire's rolling radius
  - Wheel lock and wheel slip
- The "Accelerator Rate" value is recorded as a voltage or level. In the case of voltage, the voltage increases as the driver depresses the accelerator. In case of the level, the following three levels are recorded.
  - FULL / MIDDLE / OFF
- "Accelerator Rate" may be recorded as "OFF" even if the accelerator pedal is depressed lightly. In addition, "FULL" may be recorded when the accelerator pedal is depressed strongly but not fully.
- The "Drive" setting for the "Shift Position" value indicates the shift position state is other than "R,"(Reverse), "N" (Neutral), or "P" (Park). It also includes communication disruption. Regardless of an actual shift position, "Drive" is always set for M/T vehicles because the shift position signal is not available.
- Depending on the type of occupant sensor installed in the vehicle, one of the following three recording formats for "Occupancy Status, Passenger" will be utilized.
  - Occupied / Not Occupied
  - Adult / Child / Not Occupied
  - AM50 / AF05 / Child / Not Occupied
- Resolution of the "Air Bag Warning Lamp ON Time Since DTC was Set" is 15 minutes, and the value is rounded down and recorded.
- "Longitudinal Delta-V" indicates the change in forward speed after establishment of the recording trigger. This does not refer to vehicle speed, and it does not include the change in speed during the period from the start of the actual collision to establishment of the recording trigger.
- "Roll Angle peak" may not always match the peak value within the "Roll Angle" sampling points due to differences in data calculation method.
- For "Lateral Delta-V", the sensor location (B-pillar, front door, C-pillar, and slide door) shows the outline of a typical sensor position. Sensory location can be confirmed using the repair manual.
- "TRG Count" indicates the number of frontal/rear recording triggers that have been established. The calculated value does not include the number of times side or rollover recording triggers have been established. The sequence in which each frontal/rear event occurred can be verified from the "TRG Count". The lesser the "TRG Count" value, the older the data. The upper limit for the recorded value is 255 times. When more than one event reaches the upper limit, the actual "TRG Count" may be greater than what is displayed for that event.
- Resolution of the "Time from Pre-Crash to TRG" is 100 [ms], and the value is rounded down and recorded.
- For "Time from Previous TRG", the recording trigger of side crash and rollover is not considered. The upper limit for the recorded value

is 5000 [ms] or 5100 [ms] depending on the ECU part number. Resolu tion is 20 [ms] and the value is rounded down and recorded. When it's displayed as 5100ms, the actual "Time from Previous TRG " may be longer than what is displayed for that event.

- If 2 or more frontal/rear events occur successively within a perio d of 5000ms (or 5120ms for ECUs with 1.024 data sampling intervals), the actual sample time before the trigger is not displayed for sub sequent events. The sample time before trigger will only be displ ayed for the first event of the successive events. For subsequent even ts (i.e second event or later events), the pre-crash "Time (sec)" data is replaced by integers -5 through -1 and the heading "Time (sec)" is replaced with "Sample Count". T he time between "Sample Count" integers (-5 through -1) cannot be determined. The time between the last integer and TR G cannot be determined.
- "Pre-Crash Data Status" indicates data communication status of the vehi cle. If communication disruption or other failure is occur, "Invalid" is set. Moreover, "Invalid" is set for some M/T vehicles because the shift position signal is not transmitted for them eve n if the other data is valid.

05002_ToyotaDENSO_r024

System Status at Time of Retrieval

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

Front/Rear Event Record Summary at Retrieval

Events Recorded	TRG Count	Crash Type	Time (msec)	Event & Crash Pulse Data Recording Status
Most Recent Frontal/Rear Event	6	Front/Rear Crash	0	Complete (Front/Rear Page 1)
1st Prior Frontal/Rear	5	Front/Rear Crash	-5000 or greater	Complete (Front/Rear Page 0)
Prior Frontal/Rear Event	3	Front/Rear Crash	N/A	Complete (Front/Rear Page 2)

System Status at Front Airbag Deployment

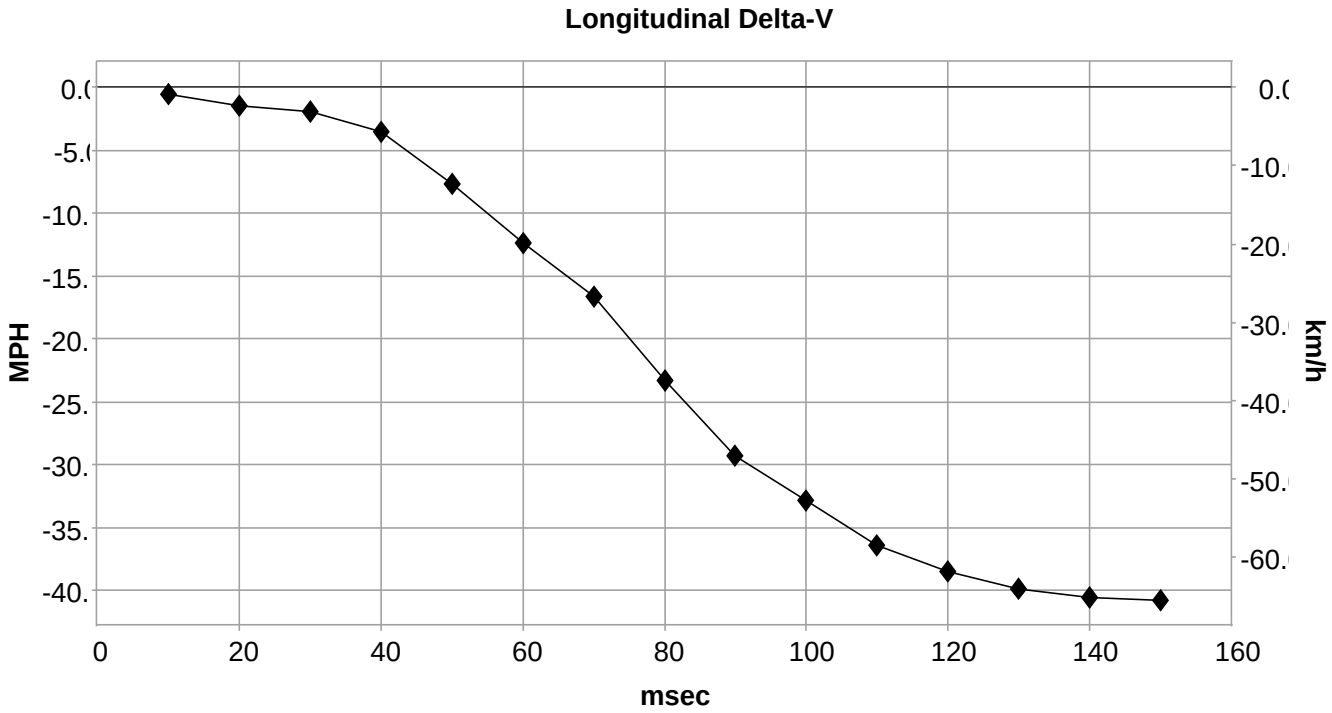
Time to Deployment Command, Front Airbag, Driver (msec)	38
Time to Deployment Command, Front Airbag, Passenger (msec)	38
Event Severity Status, Driver	Level 3
Event Severity Status, Passenger	N/A

System Status at Event (Most Recent Frontal/Rear Event, TRG 6)

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	6
Time From Previous TRG (msec)	5000 or greater
Buckle Switch, Driver	Unbuckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

Longitudinal Crash Pulse (Most Recent Frontal/Rear Event, TRG 6 - table 1 of 2)

Max Longitudinal Delta-V (MPH [km/h])	-40.7 [-65.5]



Longitudinal Crash Pulse (Most Recent Frontal/Rear Event, TRG 6 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.5 [-0.9]
20	-1.5 [-2.4]
30	-1.9 [-3.1]
40	-3.5 [-5.7]
50	-7.7 [-12.4]
60	-12.3 [-19.8]
70	-16.6 [-26.7]
80	-23.2 [-37.4]
90	-29.2 [-47.1]
100	-32.9 [-52.9]
110	-36.4 [-58.6]
120	-38.5 [-61.9]
130	-39.8 [-64.1]
140	-40.5 [-65.2]
150	-40.7 [-65.5]

DTCs Present at Start of Event (Most Recent Frontal/Rear Event, TRG 6)

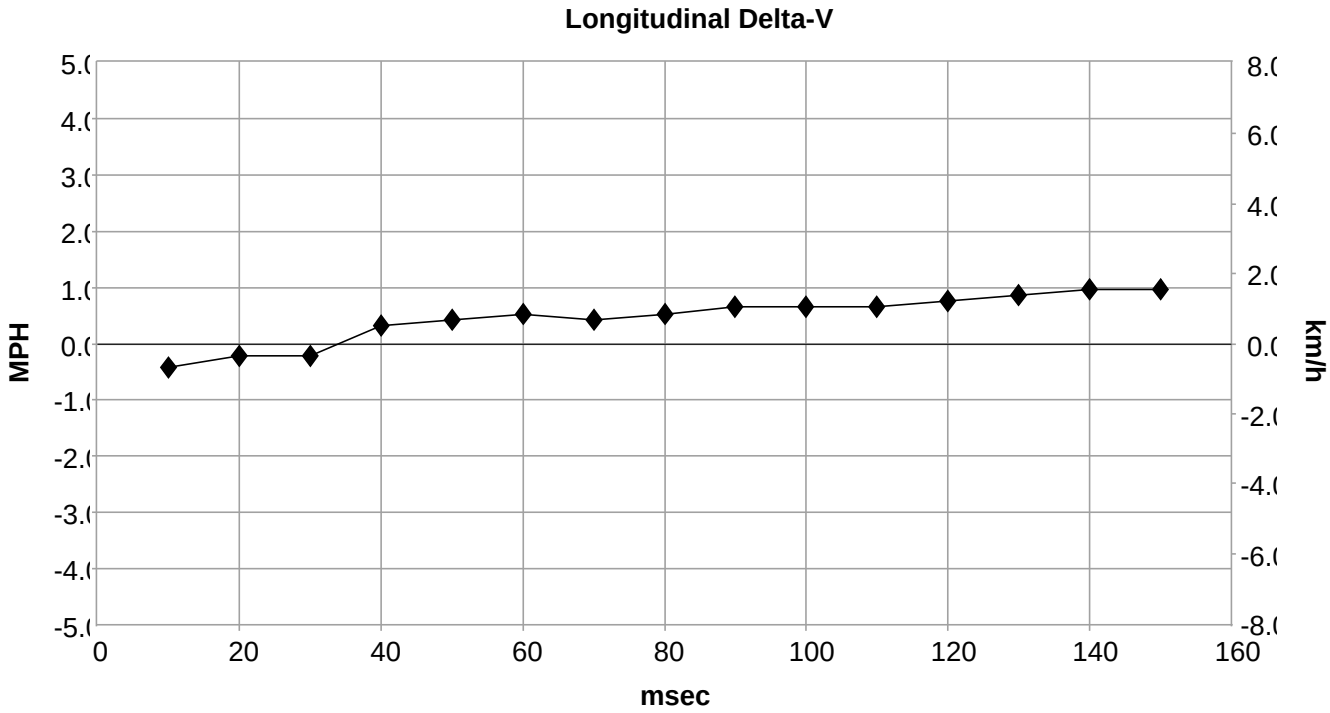
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

System Status at Event (1st Prior Frontal/Rear Event, TRG 5)

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	5
Time From Previous TRG (msec)	300
Buckle Switch, Driver	Unbuckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

Longitudinal Crash Pulse (1st Prior Frontal/Rear Event, TRG 5 - table 1 of 2)

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



Longitudinal Crash Pulse (1st Prior Frontal/Rear Event, TRG 5 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.4 [-0.7]
20	-0.2 [-0.3]
30	-0.2 [-0.3]
40	0.3 [0.5]
50	0.4 [0.7]
60	0.5 [0.9]
70	0.4 [0.7]
80	0.5 [0.9]
90	0.6 [1.0]
100	0.6 [1.0]
110	0.6 [1.0]
120	0.8 [1.2]
130	0.9 [1.4]
140	1.0 [1.6]
150	1.0 [1.6]

DTCs Present at Start of Event (1st Prior Frontal/Rear Event, TRG 5)

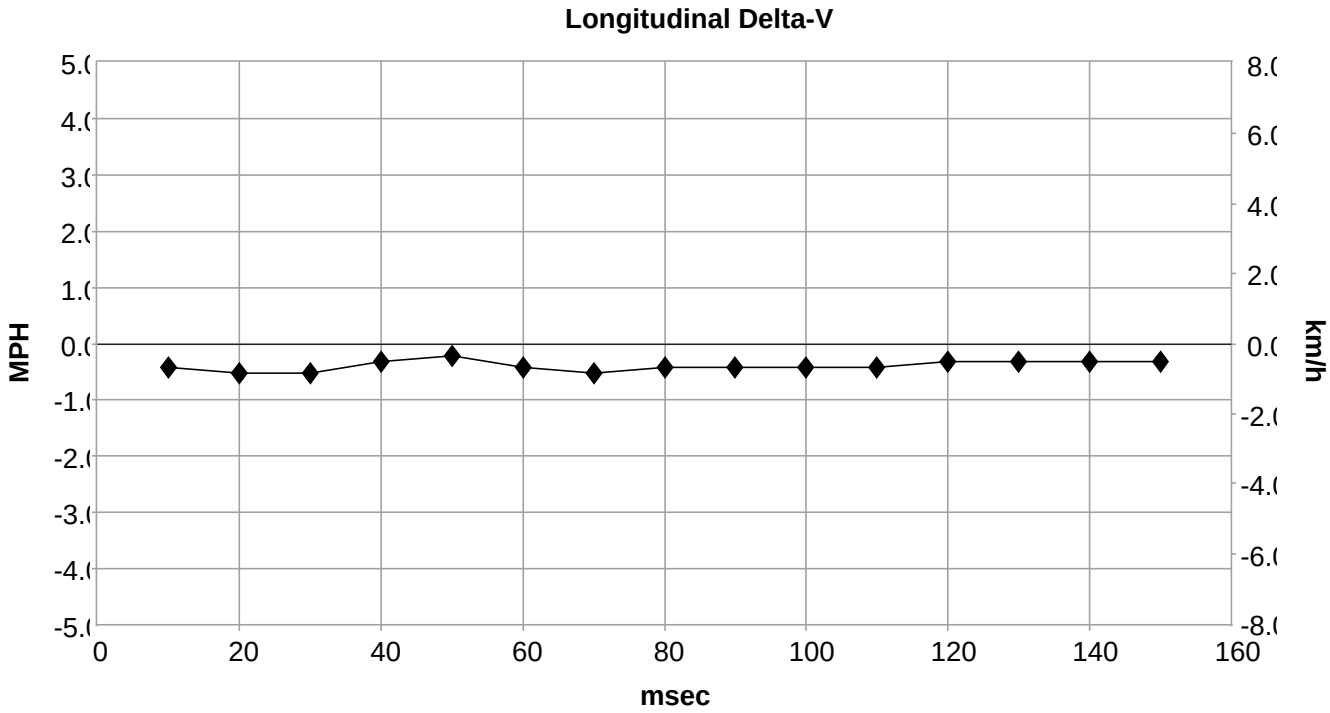
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

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

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	3
Time From Previous TRG (msec)	220
Buckle Switch, Driver	Buckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

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

Max Longitudinal Delta-V (MPH [km/h])	-0.5 [-0.9]



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

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.4 [-0.7]
20	-0.5 [-0.9]
30	-0.5 [-0.9]
40	-0.3 [-0.5]
50	-0.2 [-0.3]
60	-0.4 [-0.7]
70	-0.5 [-0.9]
80	-0.4 [-0.7]
90	-0.4 [-0.7]
100	-0.4 [-0.7]
110	-0.4 [-0.7]
120	-0.3 [-0.5]
130	-0.3 [-0.5]
140	-0.3 [-0.5]
150	-0.3 [-0.5]

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

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

* "Invalid" may be set for M/T vehicle

Hexadecimal Data

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

PIDs

PID	Data
00	BC 00 00 01
01	00
03	34 37 30 37 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30
04	FF FF FF FF
05	02
06	02
20	80 00 00 01
21	00 01
40	00 00 00 01
60	00 00 00 01
80	00 00 00 01
A0	00 00 00 01
C0	00 00 00 01
E0	C0 10 00 00
E1	15 15
E2	00 5B 1F 11 00
EC	FF

EEPROM

Address	Data (-- = data not imaged from ECU) (** = no response from ECU)
0	-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
10	-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20	-- -- -- -- -- -- -- -- -- -- -- -- -- -- 00 00
30	00 00 FF FF 00 80 00 00 A5 00 00 02 4D 03 FF FF
40	99 04 54 FE 00 00 00 FB 00 FF 00 FF 00 01 00 FF
50	00 FF 00 00 00 00 00 FF 00 FF 00 FF 00 00 00 FF
60	00 0F 00 05 00 00 00 00 00 00 00 00 00 00 00 00
70	00 00 00 00 00 00 00 00 99 05 54 09 00 04 00 0F
80	00 27 00 2B 00 28 00 3E 00 38 00 22 00 21 00 13
90	00 0D 00 06 00 02 00 17 00 FA 00 06 00 00 00 00
A0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
B0	A9 04 54 01 00 00 00 FE 00 FF 00 02 00 01 00 FF
C0	00 00 00 00 00 00 00 FF 00 00 00 00 00 00 00 00
D0	00 0B 00 03 00 00 00 00 00 00 00 00 00 00 00 00
E0	00 00 00 00 00 00 00 00

Disclaimer of Liability

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