INDIANA UNIVERSITY

TRANSPORTATION RESEARCH CENTER

School of Public and Environmental Affairs

ON-SITE AMBULANCE CRASH INVESTIGATION

CASE NUMBER - IN13025
LOCATION - WISCONSIN
VEHICLE - 2009 E450 TYPE III AMBULANCE
CRASH DATE - July, 2013

Contract Number: DTNH22-12-C-00270

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
National Center for Statistics and Analysis
Washington, D.C. 20590-0003

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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.

Technical Report Documentation Page

1. *Report No.* IN13025	2. *Government Accession No.*	3. *Recipient's Catalog No.*	
4. *Title and Subtitle* On-Site Ambulance Crash Investigation Vehicle - 2009 Ford E450 Type III Ambulance Location - Wisconsin		5. *Report Date:* May, 2014 6. *Performing Organization Code*	
7. *Author(s)* Special Crash Investigations Team #2		8. *Performing Organization Report No.*	
9. *Performing Organization Name and Address* Transportation Research Center Indiana University 501 South Madison Street, Suite 105 Bloomington, Indiana 47403-2452		10. *Work Unit No. (TRAIS)* 11. *Contract or Grant No.* DTNH22-12-C-00270	
12. *Sponsoring Agency Name and Address* U.S. Department of Transportation (NVS-411) National Highway Traffic Safety Administration National Center for Statistics and Analysis Washington, D.C. 20590-0003		13. *Type of Report and Period Covered* Technical Report Crash Date: July 2013 14. *Sponsoring Agency Code*	
15. *Supplementary Notes* On-site ambulance crash investigation involving a 2009 Ford E450 Type III Ambulance.			

16. *Abstract*

This on-site investigation focused on a 2009 Ford E450 Type III ambulance and the sources of the fatal injuries sustained by a restrained pediatrician who was seated in the patient compartment in the rear position of the left inward facing bench seat. This crash occurred on the roadside of a three lane state highway. The ambulance was equipped with a Type III patient compartment and frontal air bags. The ambulance was equipped as a neonatal intensive care unit and operated from a regional hospital. The unit transferred 60 - 80 infants per year from various parts of the state to the regional hospital for specialized care. The ambulance was traveling to a town located approximately 166 kilometers (103 miles) from the hospital to transfer an infant to the hospital for surgery. The ambulance had been enroute approximately one hour when the crash occurred. It was operating without emergency lights or siren. A restrained 62-year-old male driver, restrained 32-year-old male pediatrician, restrained 36-year-old nurse practitioner, restrained 43-year-old female respiratory therapist, and restrained 62-year-old registered nurse occupied the patient compartment. The pediatrician was a neonatal care specialist who was receiving specialized training after completing his residency program. The vehicle was traversing a left curve when it departed the right side of the roadway and impacted a culvert. The vehicle then rolled over, left side leading, one quarter turn. The pediatrician sustained police-reported fatal injuries. He was airlifted to a trauma center where he was hospitalized and pronounced deceased 33 hours and 13 minutes following the crash. The nurse practitioner and respiratory therapist both sustained police-reported "B" (non-incapacitating) injuries and were transported by ambulance to a hospital and trauma center, respectively. The registered nurse sustained "A" (incapacitating) injuries and was transported by ambulance to a trauma center. The driver sustained "C" (possible) injuries and was not transported. The ambulance was towed from the crash scene due to damage.

17. *Key Words* Rollover Ambulance Crash	Motor Vehicle Traffic Crash Fatal Injury Severity	18. *Distribution Statement* General Public	
19 *Security Classif. (of this report)* Unclassified	20. *Security Classif. (of this page)* Unclassified	21. *No. of Pages* 19	22. *Price*

Form DOT 1700.7 (8-72) Reproduction of completed page authorized

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VEHICLE - 2009 FORD E450 TYPE III AMBULANCE
CRASH DATE - July 2013

BACKGROUND

This on-site investigation focused on a 2009 Ford E450 Type III ambulance and the sources of the fatal injuries sustained by a restrained pediatrician who was seated in the patient compartment in the rear position of the left inward facing bench seat. This crash investigation was initiated by the National Highway Traffic Safety Administration (NHTSA) on July 15, 2013 through NHTSA's Emergency Medical Services (EMS) Division. The investigation was assigned on July 15, 2013. This single vehicle crash occurred in July, 2013, at 1235 hours in Wisconsin and was investigated by a local police agency. The ambulance and crash scene were inspected on July 31, 2013. Some information was obtained from the driver via email on August 1, 2013. He stated he could provide no other information until approved by his attorney. A hospital official was interviewed on August 2, 2013. An interview was conducted with one of the occupants of the patient compartment on August 11, 2013. A telephone call was received by an attorney representing the hospital and driver on August 12, 2013. He stated that no further cooperation would be possible due to potential legal action against the driver. An interview was conducted with a second occupant in the patient compartment on August 21, 2013 when the occupant called the SCI investigator in response to SCI informational materials that were left at her residence during the field investigation on July 31, 2013.

Figure 1: The damaged 2009 Ford E450 Type III ambulance

This crash occurred on the roadside of a three lane state highway. The ambulance was equipped with a Type III patient compartment and frontal air bags. The ambulance operated from a regional hospital and was used solely as a neonatal intensive care unit. The ambulance transferred 60 - 80 infants per year from various parts of the state to the regional hospital for specialized care. The ambulance was traveling to a town located approximately 166 kilometers (103 miles) from the hospital when this crash occurred. The purpose of the trip was to transfer an infant to the hospital for surgery. The ambulance had been traveling approximately one hour when the crash occurred. It was operating without emergency lights or siren. A restrained 62-year-old male driver, restrained 32-year-old male pediatrician, restrained 36-year-old nurse practitioner, restrained 43-year-old female respiratory therapist, and restrained 62-year-old registered nurse occupied the patient compartment. The pediatrician was a neonatal care specialist who was undergoing specialized training after completing his residency program. The ambulance was traversing a slight left curve

when it departed the right side of the roadway and impacted a culvert. The vehicle then rolled over, left side leading, one quarter turn. The pediatrician sustained police-reported fatal injuries. He was airlifted from the crash scene to a trauma center where he was hospitalized and pronounced deceased 33 hours and 13 minutes following the crash. The nurse practitioner and respiratory therapist both sustained police-reported "B" (non-incapacitating) injuries and were transported by ambulance to a hospital and trauma center, respectively. The registered nurse sustained "A" (incapacitating) injuries and was transported by ambulance to a trauma center. The driver sustained "C" (possible) injuries and was not transported. The police crash report stated that the driver's blood test was negative for the presence of alcohol. The driver was also given a blood test for the presence of drugs; however, no test results were available. The ambulance was towed from the crash scene due to damage.

CRASH SUMMARY

Crash Site: This crash occurred during daytime hours and clear weather conditions on a curved, three lane, bituminous state highway. The roadway traversed in a north-south direction and had one through lane in each direction and a northbound passing lane for a three-leg intersection that was located south of the crash site. The passing lane was 3.7 m (12.1 ft) wide and tapered into the northbound lane 17.5 m (57.4 ft) south of the crash site. The northbound lane was 4.4 m (14.4 ft) wide and the passing lane narrowed to approximately 1.4 m (4.6 ft) wide in the area where the ambulance departed the east side of the roadway. The south bound lane was 3.5 m (11.5 ft) wide. The roadway was bordered by a 3.1 m (10.1 ft) wide gravel shoulder on the east side of the roadway and a 3.7 m (12.1 ft) wide bituminous and gravel shoulder on the west side of the roadway. A 1.3 m (4.3 ft) deep ditch, a culvert, and a driveway intersection were located on the east side of the roadway where the crash occurred. A curve warning sign and 72 km/h (45 mph) speed advisory sign were located approximately 0.3 kilometer (0.2 mile) south of the curve. Six curve warning signs were located in the curve on the east side of the roadway. The roadway pavement markings consisted of solid white edge lines, broken white passing lane line, and double yellow center lines. The roadway grade on the ambulance's approach to the crash site was positive 6%. The speed limit was 89 km/h (55 mph). The Crash Diagram is included on page 19 of this report.

Pre-Crash: The driver of the ambulance was traveling north in the through lane negotiating the slight left curve (**Figure 2**) when the vehicle departed the east side of the roadway. The driver told police that the right front wheel went onto the gravel shoulder and he tried to steer back to the left, but crossed the shoulder into the ditch. He stated he did not apply the brakes and provided no statement to police as to why the vehicle departed the roadway. The pre-crash data reported by the vehicle's Event Data Recorder (EDR) are presented in the following table.

Figure 2: Northbound approach of the ambulance to east roadside departure

Time (sec)	Speed km/h (mph)	Acceler-ator pedal %	Service Brake	Engine rpm	ABS activity	Stability Control	Traction control via brakes	Traction control via engine
-5.0	91.0 (56.5)	31	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-4.5	91.0 (56.5)	28	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-4.0	91.0 (56.5)	22	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-3.5	91.0 (56.5)	21	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-3.0	91.0 (56.5)	24	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-2.5	91.0 (56.5)	29	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-2.0	91.0 (56.5)	30	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-1.5	91.0 (56.5)	30	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-1.0	90.0 (55.9)	31	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
-0.5	90.0 (55.9)	10	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
0.0	88.0 (54.7)	58	Off	2,100	non-engaged	non-engaged	non-engaged	non-engaged

Crash: The ambulance departed the right shoulder and the top of the front right corner of the patient compartment impacted a curve warning sign (**Figure 3**, event one). The ambulance traveled 16 m (53.5 ft) down a 15% grade into a ditch and the front plane and front undercarriage (**Figure 4**) impacted a culvert located at a residential driveway (**Figure 5**). The force direction on the ambulance was within the 12 o'clock sector and the impact deployed stage one of both frontal air bags. The vehicle's EDR reported the maximum longitudinal and lateral Delta Vs for this impact as -33.08 km/h (-20.55 mph) and -10.19 km/h (-6.33 mph), respectively. The ambulance traveled 11 m (36 ft)

Figure 3: Northbound approach of the ambulance to impact with the curve warning sign and culvert

across the driveway as it rotated clockwise 90 degrees following the culvert impact and then rolled over, left side leading, one quarter turn. The distance traversed during the rollover was approximately 4 m (13 ft). The ambulance came to final rest on its left plane heading southeast (**Figure 5**).

Figure 4: Damage to the front plane and front undercarriage from the impact with the culvert

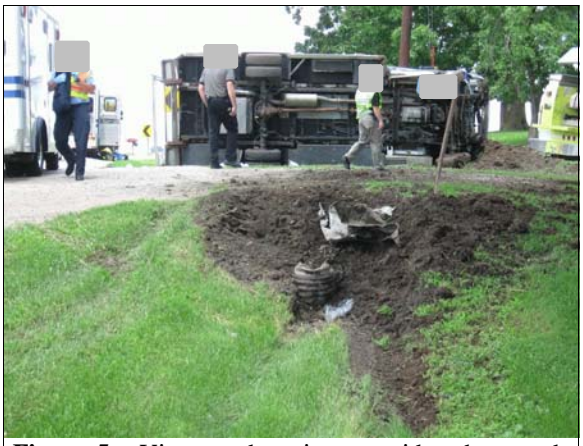

Figure 5: View north to impact with culvert and final rest of the ambulance

Post-Crash: The police were notified of the crash at 1236 hours and arrived on scene at 1243 hours. Emergency medical personnel, including air ambulance and rescue service also responded to the crash scene. The driver and registered nurse exited the vehicle through the patient loading doors prior to police arrival. The nurse then laid down on the ground near the ambulance. The respiratory therapist and nurse practitioner stayed in the patient compartment and tended to the critically injured pediatrician until emergency medical responders arrived. Emergency medical responders removed the pediatrician from the patient compartment through the rear patient loading doors and airlifted him to a trauma center where he was hospitalized and pronounced deceased 33 hours and 13 minutes following the crash. The nurse practitioner and respiratory therapist both sustained police-reported "B" (non-incapacitating) injuries and were transported by ambulance to a hospital and trauma center, respectively. The registered nurse sustained "A" (incapacitating) injuries and was transported by ambulance to a trauma center. The driver sustained "C" (Possible) injuries and was not transported. The ambulance was towed from the crash scene due to damage.

2009 FORD E450 TYPE III AMBULANCE

DESCRIPTION

The Ford was a rear-wheel drive, 2-passenger, 2-door, E450 cutaway (VIN: 1FDXE45P99Dxxxxxx) manufactured in March 2009 and equipped with Ford's ambulance preparation package. The ambulance was manufactured by the Horton Emergency Vehicle Company in March 2009. The vehicle was equipped with a 6.0-liter, V-8 diesel engine, five-speed automatic transmission, four-wheel anti-lock brakes, frontal air bags, an EDR, and a tilt steering column, which was adjusted to the full-up position. The patient compartment was configured with a right side entry door, double rear doors for patient loading, and multiple storage cabinets on the both sides and front. Two spare Class E oxygen cylinders and two spare Class E medical air cylinders were located in the storage cabinet directly behind the driver. Two Class M oxygen

cylinders designated primary and secondary, were located in the left rear exterior storage cabinet. A single Class M medical air cylinder was located in the exterior front storage cabinet. The ambulance was also equipped with a Stryker Model 6390 Power Load cot fastener system and Stryker Power Pro IT powered incubator transport unit. The powered incubator unit had been removed from the ambulance prior to the SCI inspection. The windshield glazing was AS1 laminated. The left front and right front glazing were AS2 tempered. The glazing in the patient entry door, right side patient compartment, and rear patient loading doors was covered with an opaque material and no AS label could be discerned. The glazing for all non-fixed windows were closed at the time of the crash. The specified wheelbase was 401 cm (158 in).

The vehicle manufacturer's recommended tire size was LT225/75R16 for the front and rear tires. The vehicle was equipped with tires of the recommended size. The recommended cold tire pressure was 515 kPa (75 psi) for the front tires and 550 kPa (80 psi) for the rear tires. All the tires were in good condition prior to the crash. The ambulance's tire data are presented in the table below.

Position	*Measured Pressure*	*Measured Tread Depth*	*Restricted*	*Damage*
LF	Flat (Flat)	10 mm (13/32 in)	No	None
LR Outside	538 kPa (78 psi)	7 mm (9/32 in)	No	None
LR Inside	538 kPa (78 psi)	8 mm (10/32 in)	No	None
RR Inside	676 kPa (98 psi)	10 mm (12/32 in)	No	None
RR Outside	Flat (Flat)	9 mm (11/32 in)	No	None
RF	Flat (Flat)	10 mm (13/32 in)	No	None

The front row was equipped with cloth covered, box-mounted seats and integral head restraints. The driver's seat track was in the rear-most position at the SCI vehicle inspection and the seat back was in the upright position. The seat track had probably been moved following the crash when the Air Bag Control Module (ACM), which was located under the seat, was disconnected and removed by police. It was also subsequently placed back under the seat by police. The vehicle's EDR reported the driver's seat track position switch status as "Forward." The patient compartment was configured with a vinyl covered, rear-facing, box-mounted seat located behind the driver. A two-passenger, inward-facing, vinyl covered bench seat was located along the right and left sides of patient compartment.

EXTERIOR DAMAGE

Exterior Damage Event 1: The ambulance sustained minor direct damage to the top of the front right corner of the patient compartment from impact with the curve warning sign. The direct

damage consisted of a single vertical scratch.

Damage Classification, Event 1: The Truck Deformation Classification (TDC) was 12FRBSA. The severity of the damage was minor.

Figure 6: Induced damage to the roof, left roof side rail, and A-pillar

Exterior Damage, Event 2: The ambulance sustained damage to the full width of the front plane from the impact with the culvert. The direct damage resided on the bottom of the bumper and extended onto the undercarriage. Heavy deposits of dirt were embedded in the front axle, wheels, and undercarriage. The cab of the vehicle was displaced vertically, which bent the frame and buckled the roof, roof side rails, and A-pillars (**Figure 6**). The direct damage began at the front right bumper corner and extended 177 cm (69.7 in) across the bottom of the bumper. Crush measurements were taken on the front bumper, but there was no residual crush.

Damage Classification, Event 2: The TDC was 12FDLW1 (10 degrees). The vehicle's EDR reported the maximum longitudinal and lateral velocity changes as -33.08 km/h (-20.55 mph) and -10.19 km/h (-6.33 mph), respectively

Exterior Damage, Event 3: The ambulance sustained damage to the left plane during the rollover. The damage consisted of dirt deposits in the left front wheel, broken left rear view mirror, and dirt deposits on the side of the patient compartment at the front and rear extending from the roof side rail to the bottom of the patient compartment. There was no lateral or vertical crush to the patient compartment or cab of the ambulance.

Damage Classification, Event 3: The TDC was 00LDAO1. The severity of the damage was minor.

EVENT DATA RECORDER

The Ford's EDR was imaged with version 11.0 of the Bosch Crash Data Retrieval software and reported with version 12.3. The EDR was imaged via direct connection to the ACM, which was found disconnected and under under the driver's seat. The EDR reported a "Locked frontal event." The event recording was complete and no fault codes were reported. The air bag warning lamp was reported as "Off" and the driver's safety belt status was reported as "Driver Buckled." The front right passenger's safety belt status was also reported as "Passenger Buckled." There was no front right passenger in the vehicle at the time of the crash and the belt was unbuckled at the SCI vehicle inspection. It is not known why the safety belt status was reported as buckled. The EDR reported a stage one deployment of both frontal air bags, and the time to deployment was reported as 30.5 msec following Algorithm Enable (AE). The maximum longitudinal and lateral Delta Vs reported on the "Deployment Data" record were -33.08 km/h (-20.55 mph) and -10.19 km/h (-6.33 mph), respectively. The time to the maximum longitudinal and lateral Delta Vs were reported as 172 msec. The pre-crash data were presented in the pre-crash section of this report on page three. The EDR report is included at the end of this report as attachment A.

Front Row: The interior of the cab sustained minor damage from air bag deployments and intrusion. The passenger compartment sustained five intrusions, and the most severe intrusions in the driver's space involved the A-pillar and roof. The A-pillar intruded longitudinally 5 cm (2 in) and the roof intruded vertically 4 cm (1.6 in). The driver's knees contacted and scuffed the lower left instrument panel. A scuff mark was present on the back of the sun visor, which was in the down position, from possible contact by the driver's head. There was no deformation of the steering wheel. The front doors had been opened following the crash and would not close. The windshield glazing was cracked from impact forces, and the remaining glazing was undamaged.

Figure 7: Police photo of the Stryker Power Pro IT powered incubator unit

Patient Compartment: There was no intrusion to the patient compartment and no damage to the interior components other than a broken plexiglass door on the top left storage cabinet. There were at least two unsecured objects in the patient compartment: A laptop computer that was in use by the rear-facing box-mount seat passenger and a small cooler bag located on the EMT work area on the right side of the patient compartment. A transport case and small box of medical supplies was secured in the storage cabinet on the right side of the patient compartment. The police photographs showed that the Stryker Power Pro IT powered incubator unit remained secured to the Stryker Power Load cot fastener system (**Figure 7**). It was reported during the SCI interview with the rear-facing box mount seat passenger that two pumps on the end of the incubator unit facing this passenger came off during the crash. The extent of their displacement could not be determined.

A scuff mark was located on the padding of the storage cabinet located immediately forward of the right inward-facing bench seat from contact by the torso of the front passenger of this seat. Hair was also adhering to the bottom front surface of the storage cabinet immediately above the previously described contact. Extensive blood transfers from the pediatrician were located on the left inward-facing bench seat and on the side of the patient compartment behind the seat. No other discernable evidence of occupant contact was found.

MANUAL RESTRAINT SYSTEMS

The front row was equipped with driver and front right passenger lap and shoulder safety belts. Neither safety belt was equipped with a pretensioner.

The driver was restrained by the lap and shoulder safety belt. Inspection of the safety belt assembly revealed a slight cupped impression in the belt webbing located 92 cm (36.2 in) from the floor anchor, but no other load marks. The vehicle's EDR reported the status of the driver's safety belt as "Driver Buckled."

Figure 8: The safety belt assembly for the pediatrician, who was seated in the rear position of the left inward-facing bench seat

The rear facing box-mounted seat in the patient compartment was equipped with a lap safety belt. The inward-facing bench seat on each side of the patient compartment was equipped with two lap safety belts.

The pediatrician, who was seated in the rear position of the left inward-facing bench seat, was restrained by the lap belt. Inspection of the safety belt assembly revealed that the retractor and buckle brackets were bent inward and toward the front of the ambulance (**Figure 8**), and the forward edge of the plastic belt guide on the retractor was fractured. Inspection of the safety belt assemblies for the three remaining occupants in the patient compartment was inconclusive for use or non-use. The occupant who was seated in the rear position of the right inward-facing bench seat stated during the SCI interview that all the occupants in the patient compartment were restrained at the time of the crash. Injuries sustained by the two occupants seated on the right inward-facing bench seat were consistent with lap belt usage. The occupant seated in the rear-facing box-mounted seat sustained only minor injuries, suggesting she was probably restrained as well.

Figure 9: Stitching on the left side of the driver's frontal air bag

SUPPLEMENTAL RESTRAINT SYSTEMS

The ambulance was equipped with dual stage frontal air bags. The driver air bag deployed. The driver's air bag was constructed with stitching that was designed to separate. An area of stitching approximately 5 cm (2 in) long at the top left of the air bag did not separate (**Figure 9**). The front right passenger's air bag was equipped with an instrument panel-mounted On/Off switch. The switch was in the "On" position and the air bag deployed during the crash.

DRIVER DEMOGRAPHICS

Age/Sex:	62 years/Male
Height:	168 cm (66 in)
Weight:	91 kg (200 lbs)
Eyewear:	Unknown
Seat Type:	Box-mounted seat
Seat Track Position:	Unknown since seat was probably moved when ACM was disconnected and removed by police
Manual Restraint Usage:	Lap and shoulder belt
Usage Source:	Vehicle inspection, EDR
Air Bags	Frontal, deployed
Alcohol/Drug Involvement:	Alcohol, none; Drugs, unknown
Egress from Vehicle:	Exited without assistance through patient loading doors
Transport from Scene:	Not transported
Medical Treatment:	None

DRIVER INJURIES

The driver sustained police-reported "C" (possible) injuries but was not treated.

DRIVER KINEMATICS

The driver was restrained by the lap and shoulder safety belt and was displaced forward, slightly to the right, and down into the seat when the front plane and undercarriage impacted the culvert. He loaded the safety belt and the deployed frontal air bag. He was redirected to the left when the vehicle rotated clockwise and rolled over, one quarter turn, onto its left side. The driver exited the vehicle through the patient loading doors. He was not transported to a treatment facility.

REAR-FACING BOX-MOUNT SEAT PASSENGER DEMOGRAPHICS

Age/Sex:	36 years/Female
Height:	173 cm (68 in)
Weight:	82 kg (180 lbs)
Eyewear:	No
Seat Type:	Box-mount
Seat Track Position:	Fixed
Manual Restraint Usage:	Lap safety belt
Usage Source:	SCI interview other occupant
Air Bags	None available
Alcohol/Drug Involvement:	None
Egress from Vehicle:	Exited without assistance through patient loading doors
Transport from Scene:	Ambulance
Medical Treatment:	Treated in hospital emergency room and released

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Abrasions, multiple, unknown location, not further specified (possibly left chin)	910200.1,9	Other interior loose object[1]	Probable
2	Contusions, multiple, unknown location, not further specified (possibly right breast/rib area)	910400.1,9	Other interior loose object[1]	Probable
3	Abrasion left mid-calf area with tenderness, not further specified	810202.1,2	Support on which rear-facing seat is mounted	Probable

Sources: Emergency Room Records, EMS treatment Record, and Interviewee Data–Other Occupant. Injury Numbers 1 and 2 came from ***Interviewee Data****. Injury Number 3 came from* ***Emergency Room Records****.*

REAR-FACING BOX-MOUNT SEAT PASSENGER KINEMATICS

The rear-facing box-mount passenger (a nurse practitioner) was restrained by the lap safety belt and seated in an upright position. She had a laptop computer on her lap that she was using at the time of the crash. The front plane impact with the culvert displaced the passenger toward the front of the patient compartment and slightly to the right into the seat back. The back of her left lower leg contacted the box on which the seat was mounted causing an abrasion. She rebounded and was redirect to the left side of the patient compartment when the vehicle rotated clockwise and rolled over, left side leading, onto its left plane. She was contacted by one or both of the unsecured objects (laptop computer and small cooler bag on EMT work area to her right) during the crash sustaining multiple abrasions and contusion. The passenger exited her seat position and began tending to the critically injured pediatrician, who was seated in the rear position of the left inward facing bench seat. She tended to the pediatrician until emergency medical responders arrived and then exited the vehicle through the patient loading doors. The passenger was transported by ambulance to a hospital where she was treated in the emergency room and released.

[1] There were at least two objects that were set in motion during the crash, including a laptop computer in use by the rear facing box-mount seat passenger and a small cooler bag located on the EMT work area on the right side of the patient compartment.

Age/Sex:	43 years/Female
Height:	160 cm (63 in)
Weight:	61 kg (135 lbs)
Eyewear:	Unknown
Seat Type:	Bench, inward-facing
Seat Track Position:	Fixed
Manual Restraint Usage:	Lap safety belt
Usage Source:	SCI interview with rear passenger of same seat and injury data
Air Bags	None available
Alcohol/Drug Involvement:	None
Egress from Vehicle:	Exited without assistance through patient loading doors
Transport from Scene:	Ambulance
Medical Treatment:	Treated in hospital emergency room and released

RIGHT INWARD-FACING BENCH SEAT, FRONT PASSENGER INJURIES

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Dislocation (grade 2 spondylolisthesis) L_5-S_1 with bilateral spondylolysis[2]	650604.2,8	Lap portion of safety belt system	Probable
2	Fractured anterior right 4th rib with chest wall tenderness just lateral to right breast	450201.1,1	Other interior object: side of storage cabinet attached to seat	Probable
3	Dislocation (loosened) lower right side teeth, not further specified	251402.1,8	Other interior object: wall-mounted storage cabinet, on right side of passenger	Probable
4	Contusion (bruising) right lower abdomen, not further specified	510402.1,1	Lap portion of safety belt system	Probable
5	Abrasion, superficial, over right lower quadrant of abdomen and right iliac crest	510202.1,1	Lap portion of safety belt system	Probable

Sources: Emergency Room Records, EMS treatment Record, and Interviewee Data–Other Occupant. Injury Numbers 1 and 3 through 5 came from ***Emergency Room Records****. Injury Number 2 came from a combination of* ***Emergency Room Records*** *and* ***Interviewee Data****.*

[2] The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:
ankylosis (ang"ka-lo/sis): immobility and consolidation of a joint due to disease, injury, or surgical procedure.
spondylolisthesis (spon"da-lo-lis-the/sis): forward displacement (olisthy) of one vertebra over another, usually of the fifth lumbar over the body of the sacrum, or of the fourth lumbar over the fifth, usually due to a developmental defect in the pars interarticularis.
spondylosis (spon"da-lo/sis): 1. ankylosis of a vertebral joint. 2. degenerative spinal changes due to osteoarthritis.

The front passenger (a respiratory therapist) in the right inward-facing bench seat was restrained by the lap safety belt and seated in an upright position. The impact with the culvert displaced the her toward the front and right of the patient compartment. The right side of her torso contacted the side of the storage cabinet that was attached to the seat causing a fracture of the right 4th rib. Her head contacted the cabinet located immediately above the storage cabinet causing a dislocation of the lower right teeth. She also loaded the lap belt causing a contusion and an abrasion to the right lower abdomen. The passenger was redirected toward the left side of the patient compartment within her safety belt as the vehicle rolled over, left side leading, onto its left plane and she loaded the lap belt causing a dislocation of L_5-S_1. She was suspended by the safety belt following the crash but was able to release the belt. She then tended to the critically injured pediatrician until emergency medical responders arrived. The passenger then exited the vehicle through the patient loading doors. She was transported by ambulance to a trauma center where she was treated in the emergency room and released.

LEFT INWARD-FACING BENCH SEAT, REAR PASSENGER DEMOGRAPHICS

Age/Sex:	32 years/Male
Height:	180 cm (71 in)
Weight:	70 kg (154 lbs)
Eyewear:	Unknown
Seat Type:	Bench, inward-facing
Seat Track Position:	Fixed
Restraint Usage:	Lap safety belt
Manual Usage Source:	Vehicle inspection
Air Bags	None available
Alcohol/Drug Involvement:	None
Egress from Vehicle:	Removed by emergency responders through patient loading doors
Transport from Scene:	Air lifted to trauma center
Medical Treatment:	Hospitalized, then pronounced deceased 33 hours and 13 minutes post-crash

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1 2	Edema, cerebral, diffuse, bilateral hemispheres, left greater than right, with loss of white-gray differentiation on left and almost complete effacement of left lateral ventricle[3]	140672.4,2 140670.3,1	Other interior object: edge of left side EMT work table	Certain
3	Hemorrhage, intraventricular, within 4th ventricle and occipital horn of left lateral ventricle; became extensive involving all cerebrospinal fluid spaces	140677.4.0	Other interior object: edge of left side EMT work table	Certain
4 5	Hemorrhage, subarachnoid, about the sella turcica, prepontine cistern, and become extensive, not further specified	140695.3,1 140695.3,2	Other interior object: edge of left side EMT work table	Certain
6	Hemorrhage, epidural, right temporal lobe, 14 by 55 mm (0.55 x 2.2 in) in anterior-posterior dimension with bone fragment with-in hemorrhage	140636.5,1	Other interior object: edge of left side EMT work table	Probable
7	Hemorrhage, epidural, stable, left frontal lobe near left orbital roof fracture with mass effect that subsequently developed	140630.3,2	Other interior object: edge of left side EMT work table	Certain
8 9	Infarct left hemisphere and inferior right frontal lobe, not further specified	140676.3,2 140676.3,1	Other interior object: edge of left side EMT work table	Probable

[3] There was subfalcine herniation, initially 4 mm (0.16 in) toward the left but became 15 mm (0.6 in) toward the right
The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:
falcial (fal′shal): pertaining to a falx.
falx (falks) pl. ***fal′ces***: a sickle-shaped organ or structure; used as a general term in anatomical nomenclature to designate such a structure.
f. ce′rebri, f. of cerebrum: the sickle-shaped fold of dura mater that extends downward in the longitudinal cerebral fissure and separates the two cerebral hemispheres.
herniation (her"ne-a′shen): the abnormal protrusion of an organ or other body structure through a defect or natural opening in a covering, membrane, muscle, or bone.
cingulate h: *subfalcial h.*
subfalcial h.: a shift of the cingulate gyrus to below the falx cerebri (i.e., see falcial above); called also *cingulate herniation*.

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
10	Fracture, longitudinal, non-displaced, unstable, through right superior posterior margin of squamous portion of temporal bone at junction with petrous bone, extending to right middle ear with hemotympanium; a bone fragment is within the associated epidural hemorrhage[4] cited above	150402.2,1	Other interior object: edge of left side EMT work table	Probable
11	Fracture, oblique, vertically oriented, left temporal bone, extending to left middle ear with overlying emphysema and hemotympanium	150402.2,2	Other interior object: edge of left side EMT work table	Probable
12	Fractures basilar: including bilateral temporal bones extending to sella turcica and extending to left clivus[5]; left orbital roof (left anterior cranial fossa) extending posteriorly to pterygoid plates of left sphenoid sinus, to right sphenoid sinus, and onto clivus, not further specified	150206.4,8	Other interior object: edge of left side EMT work table	Certain
13 14	Fracture left orbit including superior, lateral, and inferior walls and inferior orbital rim with overlying hematoma	251205.2,2 210402.1,2	Other interior object: edge of left side EMT work table	Certain
15	Fracture left maxillary sinus including lateral and medial walls with posterior extension	250800.2,2	Other interior object: edge of left side EMT work table	Certain
16	Fracture, comminuted, left zygomatic arch, not further specified	251814.2,2	Other interior object: edge of left side EMT work table	Certain
17	Fracture, comminuted, left mandible, not further specified	250610.2,2	Other interior object: edge of left side EMT work table	Certain
18	Fracture left aveolar ridge, not further specified	250200.2,8	Other interior object: edge of left side EMT work table	Certain
19	Fracture, small, anterior and left lateral nasal bones, not further specified	251000.1,4	Other interior object: edge of left side EMT work table	Certain

[4] Treated with right lateral craniectomy with removal of large portion of right side of skull and insertion intracranial pressure monitor (ICP).

[5] The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:
clival (kli′vl): pertaining to the clivus.
clivus (kli′vas) [L. "slope"]: a bony surface in the posterior cranial fossa, sloping superiorly from the foramen magnum to the dorsum sellae, the inferior part being formed by a portion of the basilar part of the occipital bone *c. ossis occipitalis*) and the superior part by a surface of the body of the sphenoid bone *c. ossis sphenoidalis*).

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
20	Dislocation (displaced), slightly, right temporomandibular joint, anteriorly	251604.2,1	Other interior object: edge of left side EMT work table	Probable
21	Laceration left internal cartoid artery with extravasation in sphenoid sinus with uncontrollable bleeding from nose, nasopharynx, and right ear; left eye proptosis and chemosis[6]	121002.5,2	Other interior object: edge of left side EMT work table	Certain
22	Wound with active hemorrhage into left maxillary sinus from distal inter-nal maxillary artery[7]	220204.3,2	Other interior object: edge of left side EMT work table	Certain
23	Pneumothorax, moderate, left apical, not further specified	442202.2,2	Other interior object: vertically oriented rearward side of left EMT work table	Probable
24	Abrasions about face, not further specified	210202.1,0	Other interior object: edge of left side EMT work table	Probable
25	Laceration, 3 cm (1.2 in), deep, left lower mandibular area requiring surgical repair	210602.1,8	Other interior object: edge of left side EMT work table	Certain
26	Laceration (puncture), superficial, left lateral neck, not further specified	310602.1,2	Other interior object: edge of left side EMT work table	Probable

*Sources: Emergency Room Records, Hospitalization Records, EMS treatment Record, Interviewee Data–Two Other Occupants. Injury Number 20 came only from **Emergency Room Records**, Injury Numbers 8, 9, 22, and 24 came only from **Hospitalization Records**. and Injury Numbers 3 through 7, 11, 23, and 25 came from a combination of **Emergency Room** and **Hospitalization Records**. Injury Numbers 17 through 19 came from a combination of **Interviewee Data** and **Emergency Room Records**. Injury Number 21 came from a combination of **Interview Data** and **Hospitalization Records**. Injury Number 26 came from a combination of **EMS treatment Record**, **Emergency Room** and **Hospitalization Records**. Injury Numbers 1, 2, 10, and 12 through 16 came from a combination of **Interviewee Data**, **Emergency Room** and **Hospitalization Records**.*

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[6] The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:
chemosis (ke-mo´sis): excessive edema of the ocular conjunctiva.
***exophthalmos (ek"sof-thal´mos)* [ex-+Gr opthalmos eye]**: abnormal protrusion of the eyeball. Spelled also *exophthalmus*; called also *exorbitism* and *proptosis*.
exsanguination (ek-sang"wi-na´shen): extensive loss of blood due to internal or external hemorrhage.
***fistula (fis´tu-la)* [L. "pipe"]**: an abnormal passage or communication, usually between two internal organs, or leading from an organ to the surface of the body. Such passages may also be created surgically for arteriovenous access or experimentally to obtain body secretions for physiologic study.
carotid-cavernous fistula, carotid?cavernous sinus fistula: a fistula between an injured internal carotid artery and the cavernous sinus; the adjacent orbital veins may swell and press against various ocular nerves, causing visual symptoms.
proptosis (prop-to´sis): *exophthalmos*.
There was a bilateral traumatic cavernous cartoid fistula with left worse than right.

[7] According to the surgeon who performed craniectomy, greater than one liter of blood was lost because there was active exsanguination and it was impossible to obtain an accurate reading.

The rear passenger (a pediatrician) of the left inward-facing bench seat was restrained by the lap safety belt and seated in an upright position. The frontal impact with the culvert displaced the passenger toward the front of the patient compartment and slightly to the right. The passenger loaded the safety belt and the left side of his head and face contacted the edge of the EMT work table located on the left side of the patient compartment immediately to the passenger's left (**Figure 10**). He sustained cerebral edema, intraventricular hemorrhage, subarachnoid hemorrhage, epidural hemorrhage, multiple skull fractures, multiple facial fractures, dislocation of the right temporomandibular joint, laceration of the left internal cartoid artery, and facial abrasions/lacerations. The passenger also sustained a left pneumothorax from contacting the vertical surface of the EMT work table. The passenger was redirected to the left when the vehicle rolled over, left side leading, onto its left plane coming to rest on the side of the patient compartment behind his seat position. Emergency responders removed the passenger from the patient compartment through the rear patient loading doors and transported him by air to a trauma center where he was admitted. He was pronounced deceased 33 hours and 13 minutes following the crash according to his medical records.

Figure 10: The rear passenger in the left inward-facing bench seat contacted his head and face on the edge of the EMT work table (arrow) during the frontal impact

RIGHT INWARD-FACING BENCH SEAT, REAR PASSENGER DEMOGRAPHICS

Age/Sex:	62 years/Female
Height:	157 cm (62 in)
Weight:	73 cm (160 lbs)
Eyewear:	None
Seat Type:	Bench, inward-facing
Seat Track Position:	Fixed
Restraint Usage:	Lap safety belt
Manual Usage Source:	SCI interview with this occupant and injury data
Air Bags	None available
Alcohol/Drug Involvement:	None
Egress from Vehicle:	Exited without assistance through the rear patient loading doors
Transport from Scene:	Ambulance
Medical Treatment:	Treated in hospital emergency room then transferred to a trauma center

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Laceration[8] right scalp near vertex (top), not more accurately specified	110602.1,1	Interior object: powered incubator unit[9]	Probable
2	Fracture, Chance-type[10], T_9, inferior endplate with extends into posterior elements and through bilateral lamina and through base of spinous process with anterior subluxation (anterolisthesis), 8 mm (0.3 in) with associated narrowing of central spinal canal but neurologically intact	650417.2,7	Lap portion of safety belt system	Probable
3	Injury (disruption) of the T_9-T_{10} intervertebral disc, not further specified	650499.2,7	Lap portion of safety belt system	Probable
4	Pneumothorax, small, anteromedial right lung base and along medial margin of right lung	442202.2,1	Lap portion of safety belt system	Possible
5	Abrasions from lap belt, flank to flank, not further specified	510202.1,8	Lap portion of safety belt system	Certain
6	Contusions both hips, not further specified	510402.1,3	Lap portion of safety belt system	Certain
7	Contusion (bruising) right elbow, not further specified	710402.1,1	Interior object: powered incubator unit[9]	Probable
8	Abrasion, superficial, right elbow, not further specified	710202.1,1	Interior object: powered incubator unit[9]	Probable
9	Contusions bilateral (both) arms, involving upper arm and forearm	710402.1,3	Interior object: powered incubator unit[9]	Probable

Sources: Emergency Room Records, Hospitalization Records, EMS treatment Record, Interviewee Data–Same Person. Injury Numbers 3 and 8 came only from ***Emergency Room Records****. Injury Number 7 came only from* ***Hospitalization Records****. Injury Numbers 6, and 9 came only from* ***Interviewee Data****. Injury Numbers 1 and 5 came from a combination of* ***EMS Treatment****,* ***Emergency Room****, and*

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[8] Estimates of the size of the laceration vary from 1 cm (0.4 in) to 4 cm (1.6 in), depending on the medical.

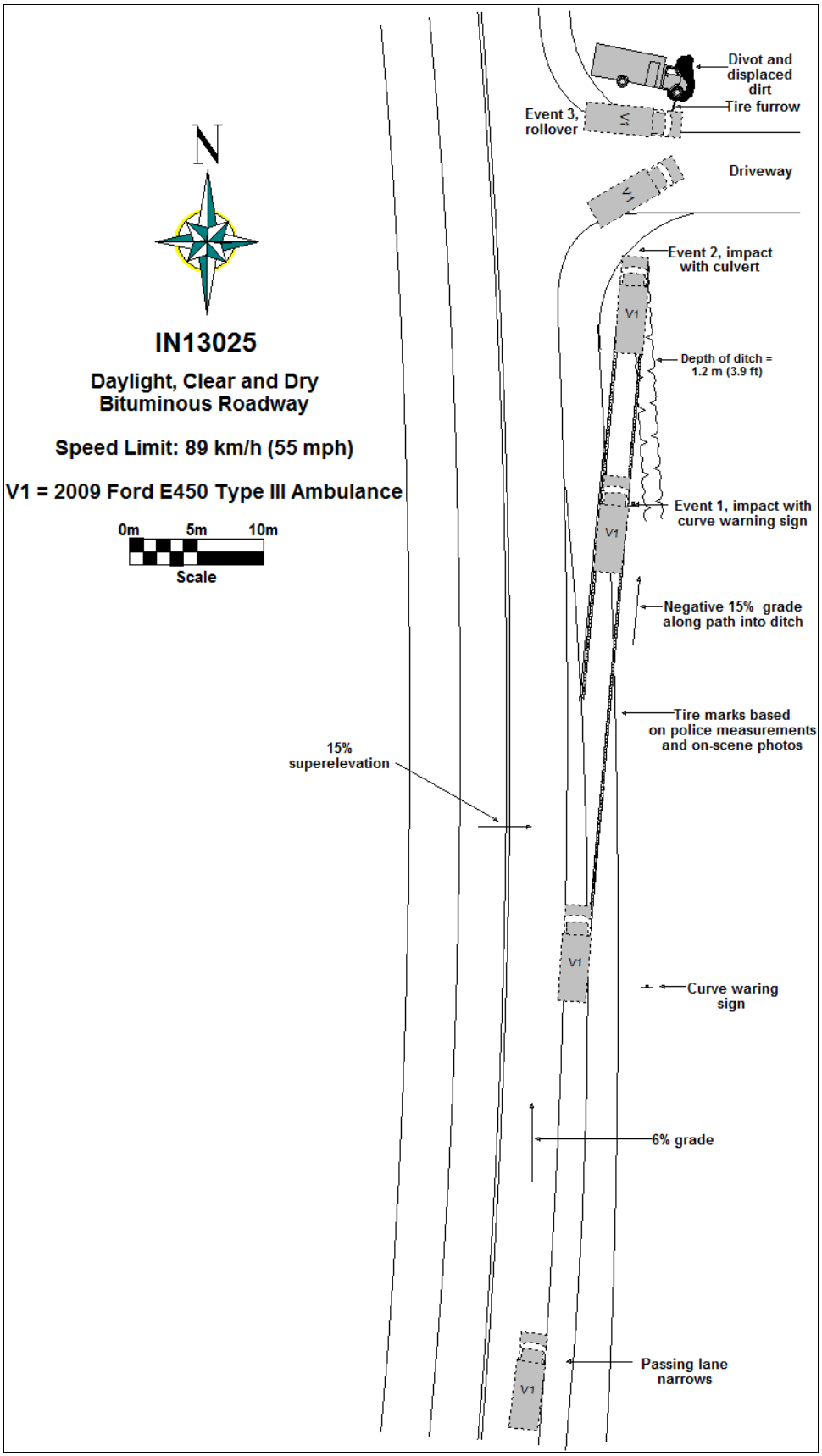
[9] The neonatal unit was positioned right in front of her in the back of the ambulance.

[10] The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:
anterolisthesis (antr-o-lis′the-sis) [antero- + Gr. olisthanein to slip]: ***spondylolisthesis***; cf. *retrospondylolisthesis*.
fracture (frak′cher): 1. the breaking of a part, especially a bone. 2. a break or rupture in a bone.
Chance f.: horizontal splitting of the neural arch and body of a vertebra, usually in the lumbar region, caused by a flexion-distraction force; called also *seat belt f.*
spondylolisthesis (spon"da-lo-lis-the′sis): forward displacement (olisthy) of one vertebra over another, usually of the fifth lumbar over the body of the sacrum, or of the fourth lumbar over the fifth, usually due to a developmental defect in the pars interarticularis.
traumatic spondylolisthesis: that due to acute fracture of the facets, pedicle, or lamina, rather than of the pars interarticularis.
This lesion was also referred to some medical as a three column vertebral body fracture involving the inferior endplate and the articulating facets. This lesion was treated with a T_7-T_{12} posterior fusion with pedicle screws and rods, and a TLSO (thora-columbar sacral orthosis brace) was required to address the fracture and support the spine.

Hospitalization Records. *Injury Numbers 2 and 4 came from a combination of* ***Emergency Room***, ***Hospitalization Records***, *and* ***Interviewee Data***.

RIGHT INWARD-FACING BENCH SEAT, REAR PASSENGER KINEMATICS

The rear passenger (a registered nurse) of the right inward-facing bench seat was restrained by the lap safety belt. She stated during the SCI interview that she was seated upright with her back against the seat back and the lap belt was snug across her hips. The impact with the culvert displaced her toward the front and right side of the patient compartment. She was then redirected toward the left side of the patient compartment as the vehicle rolled over, left side leading, onto it left plane. She contacted the powered incubator unit causing a laceration to the right scalp on the top of her head, an abrasion to the right elbow, and contusions on both arms. Loading the lap belt caused contusions and abrasions across both hips and fractures of T_9 and T_{10}. She stated that following the crash, she was suspended by the safety belt and couldn't release it until she braced her foot on the incubator transport unit. She briefly tended to the pediatrician with the other occupants, then exited the vehicle through the rear patient loading doors with some assistance and laid down on the ground near the ambulance until emergency responders arrived. She was then transported by ambulance to a hospital and treated in the emergency room, then transferred to a trauma center and hospitalized for 13 days.


N
IN13025
Daylight, Clear and Dry
Bituminous Roadway
Speed Limit: 89 km/h (55 mph)
V1 = 2009 Ford E450 Type III Ambulance
0m 5m 10m
Scale
Divot and displaced dirt
Tire furrow
Event 3, rollover
V1
Driveway
Event 2, impact with culvert
Depth of ditch = 1.2 m (3.9 ft)
Event 1, impact with curve warning sign
Negative 15% grade along path into ditch
Tire marks based on police measurements and on-scene photos
15% superelevation
Curve waring sign
6% grade
Passing lane narrows

Attachment A
Event Data Recorder (EDR) Report
2009 Ford E450 Type III 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	1FDXE45P99D******
User	
Case Number	
EDR Data Imaging Date	07/31/2013
Crash Date	
Filename	IN13025_V1_ACM.CDRX
Saved on	Wednesday, July 31 2013 at 11:57:32
Collected with CDR version	Crash Data Retrieval Tool 11.0
Reported with CDR version	Crash Data Retrieval Tool 12.3
EDR Device Type	Airbag Control Module
ACM Adapter Detected During Download	Yes
Event(s) recovered	locked frontal 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 Wednesday, July 31 2013 at 11:57:32.

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	1FDXE45P99D******
Current VIN from PCM	1FDXE45P99D******
Ignition cycle, download (first record)	2,683
Ignition cycle, download (second record)	N/A
Restraints Control Module Part Number	9C24-14B321-BJ
Restraints Control Module Serial Number	7009797200000000
Restraints Control Module Software Part Number (Version)	9L34-14C028-AN
Left/Center Frontal Restraints Sensor Serial Number	0C044A1D
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	Locked 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)	3,060,585
Key-on Timer at event time zero (seconds)	5,620
Vehicle voltage at time zero (Volts)	13.527
Energy Reserve Mode entered during event (Y/N)	No

Faults Present at Start of Event (First Record)

No Faults Recorded

Deployment Data (First Record)

Frontal airbag deployment, time to first stage deployment, driver (msec)	30.5
Pretensioner (buckle) deployment, time to fire, driver (msec)	30.5
Frontal airbag deployment, time to first stage deployment, front passenger (msec)	30.5
Pretensioner (buckle) deployment, time to fire, right front passenger (msec)	30.5
Maximum delta-V, longitudinal (MPH [km/h])	-20.55 [-33.08]
Time, maximum delta-V longitudinal (msec)	172
Maximum delta-V, lateral (MPH [km/h])	-6.33 [-10.19]
Time, maximum delta-V lateral (msec)	172
Left or center front, satellite Sensor discriminating deployment	Yes
Left or center, front satellite Sensor safing	Yes
Right, front satellite sensor discriminating deployment	Yes
RCM, front sensor discriminating deployment	Yes
RCM, front sensor safing	Yes

Pre-Crash Data -1 sec (First Record)

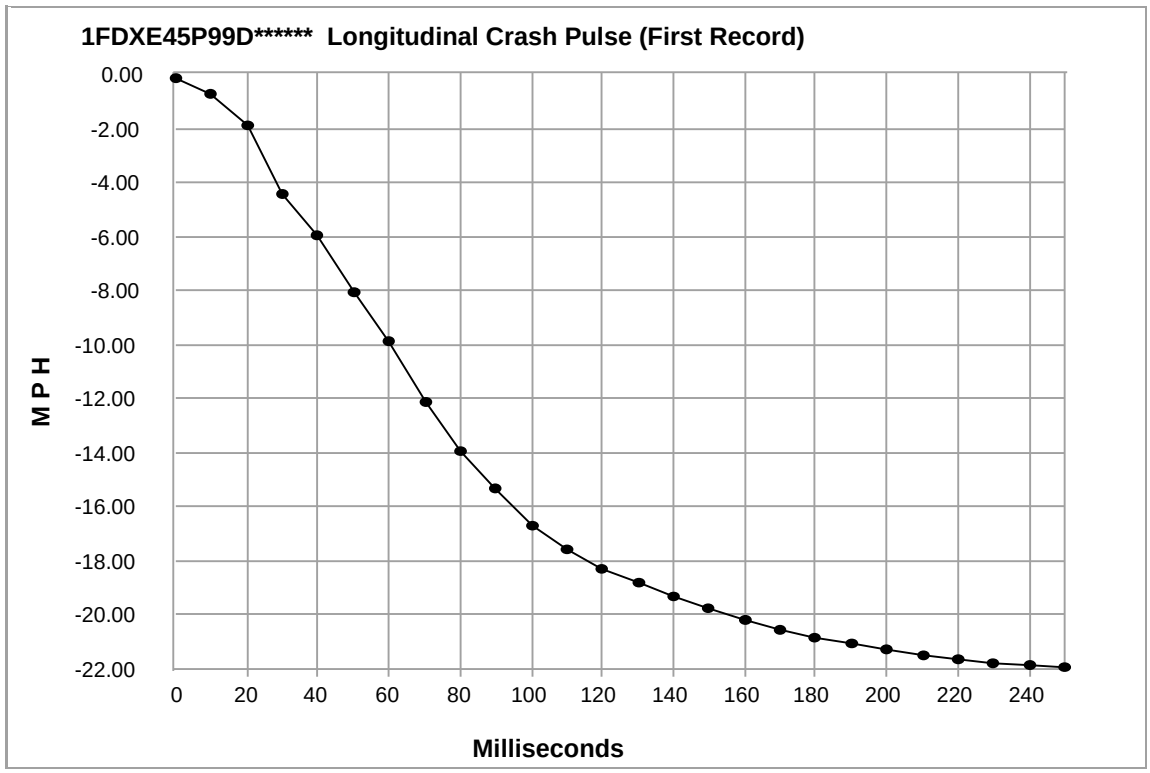
Ignition cycle, crash	2,682
Frontal air bag warning lamp, on/off	Off
Occupant size classification, front passenger (Child size Yes/No [Hex value])	No [$04]
Frontal air bag suppression switch status, front passenger	Not Active
Safety belt status, driver	Driver Buckled
Seat track position switch, foremost, 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	56.5 [91.0]	31	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 4.5	56.5 [91.0]	28	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 4.0	56.5 [91.0]	22	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 3.5	56.5 [91.0]	21	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 3.0	56.5 [91.0]	24	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 2.5	56.5 [91.0]	29	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 2.0	56.5 [91.0]	30	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 1.5	56.5 [91.0]	30	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 1.0	55.9 [90.0]	31	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
- 0.5	55.9 [90.0]	10	Off	1,900	non-engaged	non-engaged	non-engaged	non-engaged
0.0	54.7 [88.0]	58	Off	2,100	non-engaged	non-engaged	non-engaged	non-engaged

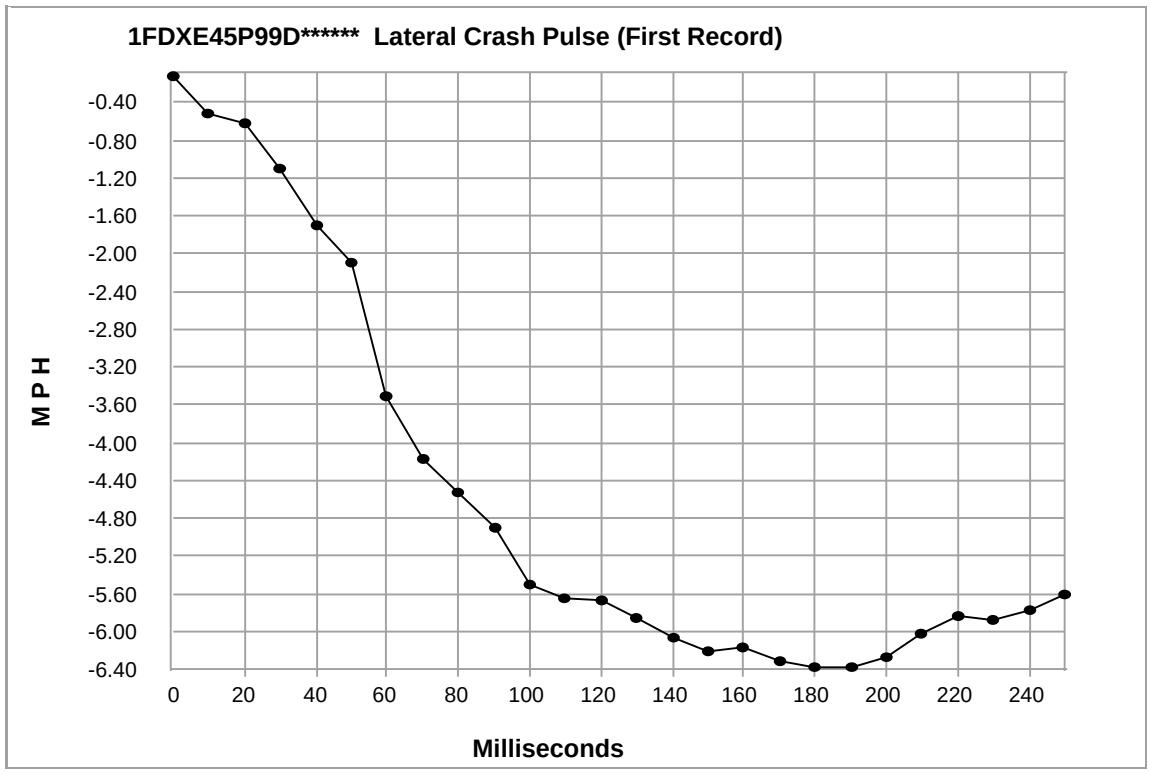
Pre-Crash Data -5 to 0 sec [10 samples/sec] (First Record)

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
- 2.9	Invalid
- 2.8	Invalid
- 2.7	Invalid
- 2.6	Invalid
- 2.5	Invalid
- 2.4	Invalid
- 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	-0.12	-0.20
10	-0.74	-1.19
20	-1.86	-2.99
30	-4.40	-7.08
40	-5.96	-9.58
50	-8.08	-13.01
60	-9.90	-15.93
70	-12.12	-19.50
80	-13.93	-22.41
90	-15.31	-24.63
100	-16.72	-26.92
110	-17.54	-28.23
120	-18.29	-29.43
130	-18.78	-30.22
140	-19.33	-31.11
150	-19.75	-31.79
160	-20.22	-32.53
170	-20.52	-33.02
180	-20.80	-33.48
190	-21.04	-33.85
200	-21.27	-34.24
210	-21.48	-34.57
220	-21.61	-34.77
230	-21.76	-35.02
240	-21.86	-35.18
250	-21.95	-35.33



Lateral Crash Pulse (First Record)

Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
0	-0.12	-0.19
10	-0.51	-0.82
20	-0.62	-1.00
30	-1.11	-1.78
40	-1.70	-2.74
50	-2.10	-3.37
60	-3.51	-5.64
70	-4.18	-6.73
80	-4.53	-7.28
90	-4.89	-7.88
100	-5.51	-8.88
110	-5.64	-9.08
120	-5.68	-9.13
130	-5.86	-9.43
140	-6.07	-9.77
150	-6.20	-9.99
160	-6.18	-9.94
170	-6.31	-10.16
180	-6.38	-10.26
190	-6.38	-10.27
200	-6.27	-10.09
210	-6.02	-9.69
220	-5.84	-9.40
230	-5.87	-9.45
240	-5.78	-9.30
250	-5.60	-9.02

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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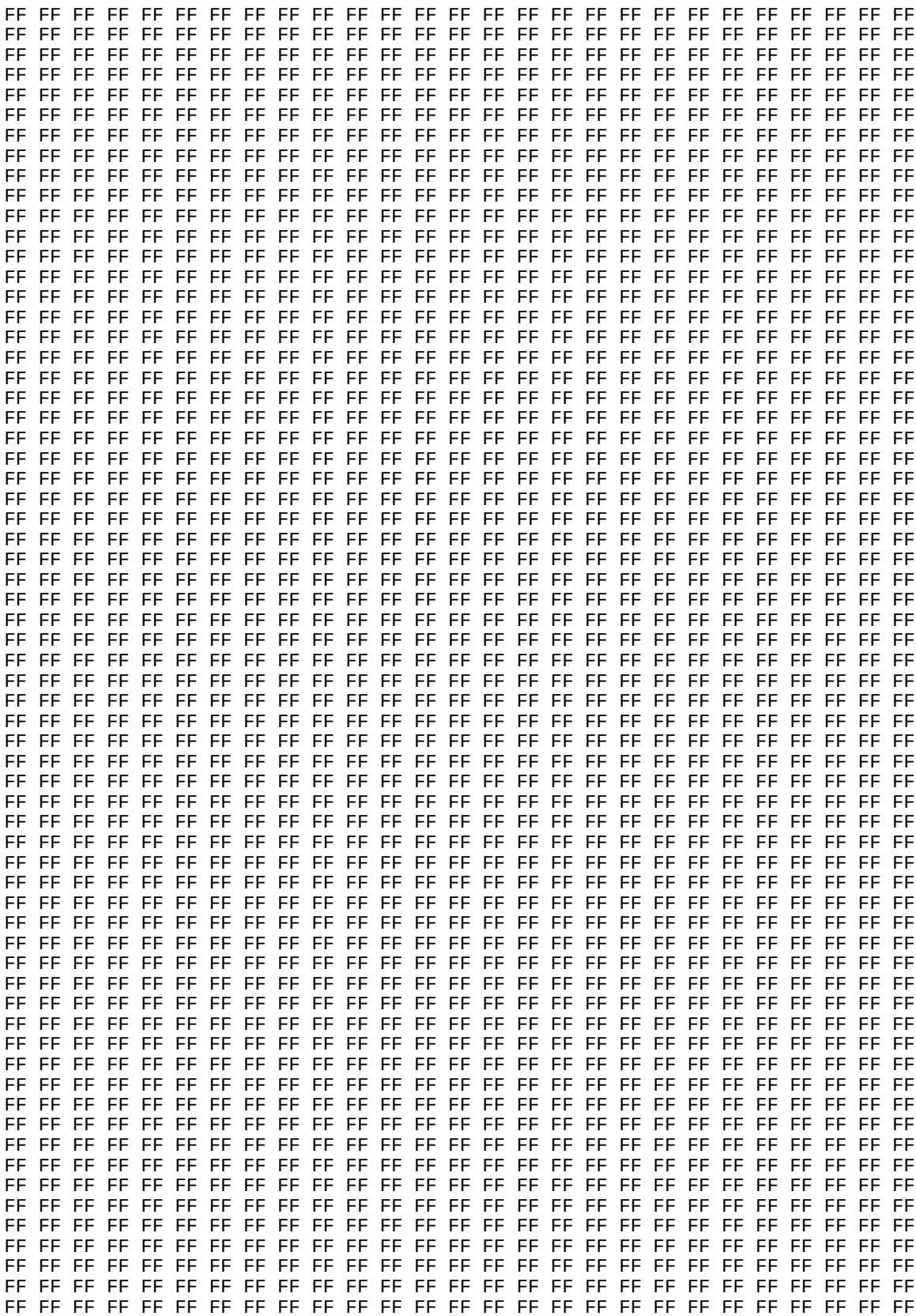

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Event Record 2

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