On-Site Rollover Investigation
Dynamic Science, Inc. (DSI), Case Number DS09021
2007 Ford Expedition XLT
Arizona
February 2009

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

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.	2. Government Accession No.	3. Recipient Catalog No.
DS09021		

4. Title and Subtitle	5. Report Date
On-Site Rollover Investigation	March 9, 2010
	6. Performing Organization Report No.

7. Author(s)	8. Performing Organization Report No.
Dynamic Science, Inc.	

9. Performing Organization name and Address	10. Work Unit No. (TRAIS)
Dynamic Science, Inc. 299 West Cerritos Avenue Anaheim, CA 92805	11. Contract or Grant no. DTNH22-07-00045

12. Sponsoring Agency Name and Address	13. Type of report and period Covered [Report Month, Year]
U.S. Dept. of Transportation (NVS-411) National Highway Traffic Safety Administration 1200 New Jersey Ave, SE Washington, DC 20590	14. Sponsoring Agency Code

15. Supplemental Notes

16. Abstract

This on-site rollover investigation focused on the dynamics of a 2007 Ford Expedition XLT sport utility vehicle that was involved in a single-vehicle rollover crash. The Ford was a modified police vehicle being driven by a 32-year-old on-duty male police officer. The crash occurred in February 2009 in Arizona and the crash site was a two-lane undivided north/south roadway. The Ford was traveling northbound and the vehicle's right side tires departed the roadway on the right side. The driver overcorrected to the left and the vehicle then departed the roadway on the left side. After the vehicle traveled a short distance off-road, it initiated a right side leading trip rollover. The vehicle rolled seven quarter-turns and came to final rest on its left side and off the roadway. During the crash, the left and right IC air bags deployed and the driver's safety belt pretensioner actuated. The driver was transported to a hospital with non-incapacitating injuries. The vehicle was towed due to damage and was later declared a total loss by the county's Risk Management Department.

17. Key Words	18. Distribution Statement		
Rollover, air bag, injury			
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No of pages	22. Price

Form DOT F 1700.7 (8_72) Reproduction of this form and completed page is authorized

Dynamic Science, Inc.
Crash Investigation
Case Number: DS09021

TABLE OF CONTENTS

Background

This on-site rollover investigation focused on the dynamics of a 2007 Ford Expedition XLT sport utility vehicle that was involved in a single-vehicle rollover crash (**Figure 1**). The Ford was a modified police vehicle being driven by a 32-year-old on-duty male police officer. The crash occurred in February 2009 in Arizona and the crash site was a two-lane undivided north/south roadway. The Ford was traveling northbound and the vehicle's right side tires departed the roadway on the right side. The driver overcorrected to the left and the vehicle then departed the roadway on the left side. After the vehicle traveled a short distance off-road, it initiated a right side leading trip rollover. The vehicle rolled seven quarter-turns and came to final rest on its left side approximately 50.0 m (164.0 ft) from the roadway edge.

Figure 1. Subject vehicle, 2007 Ford Expedition XLT

The Ford was a Certified Advanced 208-Compliant (CAC) vehicle and was equipped with advanced dual stage frontal air bags, combination side impact/rollover inflatable curtain (IC) air bags, seat-mounted side air bags, and safety belt buckle pretensioners for the front row. The frontal air bags were certified by the manufacturer to be compliant with the advanced air bag requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. During the crash, the left and right IC air bags deployed and the driver's safety belt pretensioner actuated.

The driver was transported to a hospital with non-incapacitating injuries. The vehicle was towed due to damage and was later declared a total loss by the county's Risk Management Department.

This on-site rollover investigation was initiated by the National Highway Traffic Safety Administration (NHTSA) during a review of General Estimates System (GES) police reports. On March 20, 2009, DSI was forwarded the police report with instructions to locate the subject vehicle and obtain cooperation. DSI located the subject vehicle and obtained permission from the county to inspect the vehicle. The case was assigned on April 24, 2009 and the vehicle inspection was completed on April 27, 2009. The Ford's Event Data Recorder (EDR) was supported by the Bosch Crash Data Retrieval (CDR) software and crash data from the vehicle's Powertrain Control Module (PCM) was imaged during the vehicle inspection. A truncated version of the Bosch report with the hexadecimal data removed is included in Attachment 2 of this report.

Summary

Crash Site

The crash site was a two-lane north/south roadway that was maintained by the county (**Figure 2**). The roadway surface was of asphalt composition; the lanes were separated by a dashed yellow line and bordered by solid white fog lines. The northbound roadway alignment was a left curve that comprised a radius of 769.4 m (2,524.3 ft) and the profile was level. Each travel lane measured 3.2 m (10.8 ft) in width. Outboard of the travel lanes were gravel shoulders measuring 6.4 m (21.0 ft) on the east side and 4.9 m (16.0 ft) on the west side. Beyond the gravel shoulders was uneven ground that consisted primarily of sand and low-lying vegetation.

Figure 2. Crash site, northbound approach showing skid marks

The crash occurred at 1740 hours. At the time of the crash conditions were daylight without streetlight illumination, the weather was clear and the roadway was dry. The posted speed limit for the roadway was 72 km/h (45 mph).

Pre-Crash

The Ford was traveling northbound at a PCM-reported speed of 127.3 km/h (79.1 mph) at 24.4 seconds before the impact. Prior to the crash site the roadway alignment changed from straight to a left curve. At 56.4 m (185.0 ft) north of the beginning of the left curve, the Ford departed the roadway on the right side and deposited a tire furrow on the gravel shoulder that measured 61.0 m (200.0 ft) in length. The tire furrow curved left and ended at the paved right edge of the northbound lane. The vehicle returned to the roadway, crossed both travel lanes while it initiated a counterclockwise rotation, and then departed the roadway on the left side. While traversing the roadway from right to left, the vehicle's right side tires deposited two yaw marks indicating a counterclockwise yaw. The right front tire deposited a yaw mark measuring 33.4 m (109.6 ft) in length and the right rear tire deposited a yaw mark measuring 32.6 m (107.0 ft) in length. The yaw marks began at the right roadway edge and ended at the left roadway edge.

After the vehicle departed the roadway on the left side, it continued to travel off-road in a counterclockwise yaw. The vehicle's right front tire deposited a furrow in the gravel shoulder and ground indicating the direction and distance of travel. The furrow measured 34.8 m (114.1 ft) in length and its end point marked the vehicle's trip point. At the trip point, the Ford had rotated approximately 130 degrees counterclockwise and its heading angle was 90 degrees from its direction of travel.

Crash

The vehicle's right side tires engaged the ground and the opposing lateral forces were sufficient to initiate a right side leading trip rollover. The vehicle rolled about its longitudinal axis for seven quarter-turns and came to final rest on its left side and facing southwest. The location of final rest revealed a debris field and fluid spills. Based on scene evidence, the roll distance was estimated to be 18.0 m (59.0 ft). The vehicle's travel distance from the roadway departure to final rest measured 52.0 m (171.0 ft). The profile of the ground between the roadway departure and the area of final rest measured an average downhill slope of negative 3 percent.

Post-Crash

When the vehicle came to rest the restrained driver was resting primarily on the front row left side door and window. The driver attempted to use the vehicle's on-board police radio to call for assistance but the radio did not function. The driver then used a hand-held radio device and called for assistance. On-scene responders arrived in approximately five minutes and assisted the driver. Additional officers who arrived on-scene used police batons to fracture and hole the windshield sufficiently to allow the driver to exit the vehicle through the opening. They then placed blankets into the vehicle to create an exit route for the driver, due to the broken glass and other sharp components. The driver unbuckled his safety belt and with assistance exited the vehicle through the windshield opening.

The driver received first aid treatment at the scene and was then transported by ground ambulance to a local border patrol station. From there he was air transported by helicopter to a hospital located approximately 166 km (103 mi) from the crash site. The driver was admitted to the emergency department at 1927 hours, 107 minutes post-crash. The driver's Glasgow Coma Score was 15 and he sustained minor injuries including a right hip contusion, minor lacerations to the left forearm, and bilateral hand abrasions. He was discharged at 2130 hours, approximately two hours after admission. The driver missed one day from work due to his injuries and did not seek follow-up treatment.

The Ford was towed due to damage and was later declared a total loss by county Risk Management Department.

Vehicle Data - 2007 Ford Expedition XLT

The 2007 Ford Expedition XLT was identified by the Vehicle Identification Number (VIN): 1FMFU16587Lxxxxxx. The vehicle's date of manufacture was October 2007. The vehicle was equipped with a 5.4-liter, 8-cylinder engine, automatic transmission, 4-wheel drive, variable power steering, and a tilt steering wheel.

The Ford's braking system consisted of 4-wheel power disc brakes with a standard anti-lock brakes (ABS), Electronic Stability Control (ESC), and AdvanceTrac Traction Control with Roll Stability Control (RSC). The fuel system included a single nonmetallic fuel tank.

The vehicle manufacturer's recommended tire size was P265/70R17 and the recommended cold tire

pressure was 241 kPa (35 psi) for the front and the rear. The vehicle was equipped with Bridgestone Dueler A/T LT265/70R17 tires that had a maximum tire pressure rating of 552 kPa (80 psi). The tires were manufactured in April 2007. The vehicle was equipped with a tire pressure monitoring system. The specific tire information was as follows:

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	Unknown	3 mm (4/32 in)	No	Sidewall cut
LR	386 kPa (56 psi)	2 mm (3/32 in)	No	None
RR	Tire flat	9 mm (11/32 in)	No	De-beaded
RF	248 kPa (36 psi)	4 mm (5/32 in)	No	None

The Ford's interior was configured with seating for five occupants. The front row seating consisted of outboard bucket seats with adjustable head restraints and the second row seating consisted of a 40/20/40 split bench seat with folding backs and adjustable head restraints.

The Ford was a modified police vehicle and was equipped with aftermarket components and equipment that were specific to police usage. At the time of the vehicle inspection most of the police equipment had been removed. During the interview the driver described the after-market equipment in the vehicle at the time of the crash as follows: a shotgun and rack, mobile data laptop computer, radio/scanner, spike strips, wench and controller, traffic cones, steel partition screen and emergency spotlight. The driver estimated the total weight of the interior equipment to be approximately 45.0 kg (100.0 lb). The equipment that remained in place after salvage activity included the following: a steel Ramsey grille guard attached to front end frame, steel partition screen, and hand-controlled spotlight located at the left A-pillar. The spotlight handle was in place and the lamp had been fractured and displaced during the rollover.

Vehicle Damage - 2007 Ford Expedition XLT

Exterior Damage

The Ford sustained direct and induced damage to the front end, the top, and the left and right sides during the rollover. The hood was displaced from the vehicle. The left front axle and suspension were fractured and the rim and tire were displaced from the vehicle. The rim and tire were positioned with their outboard side on the ground and were being used to prop up the left front of the vehicle. The left side view mirror was fractured and missing.

The direct damage to the right side began at the right rear bumper corner, extended forward 519.0 cm (204.3 in), and ended at the right front bumper corner. The vertical aspect of the direct damage began at the sill, extended upward 151.0 cm (49.5 in), and ended at the roof side rail. Direct damage to the left side began at the left rear bumper corner, extended forward 503.0 cm (153.3 in), and ended at the left front bumper corner. The vertical aspect of the direct damage began at the sill, extended upward 145.0 cm (44.2 in), and ended at the top of the second row door frame.

The direct damage to the top began at the leading edge of the hood, extended rearward 292.0 cm (115.0 in), and ended on the roof, 30.0 cm (11.8 in) aft of the B-pillar. Direct damage to the hood was distributed laterally across its width and measured 159.0 cm (62.6 in).

Figure 3. Maximum vertical crush measurement, left windshield header

Direct damage to the roof was distributed laterally from roof side rail to rood side rail and measured 130.0 cm (51.2 in) in width. The maximum lateral crush to the greenhouse area was located 170.0 cm (66.9 in) aft of the front axle on the left roof side rail at the A-pillar, and measured 4.0 cm (1.6 in). The maximum vertical crush was located at the windshield header, 132.0 cm (52.0 in) forward of the rear axle and 18.0 cm (7.1 in) inboard of the left roof side rail, and measured 7.0 cm (2.8 in) (**Figure 3**). The CDC for the rollover impact was 00TDYO2.

Interior Damage

The Ford sustained minor interior damage as a result of intrusions, occupant loading, contacts, post-crash extrication efforts and salvage facility activity. The front row left side door was jammed shut. The windshield was out of place and holed due to extrication activity; the front row left and right side glass, third row right side glass, and backlight were disintegrated due to impact forces. The rear view mirror was displaced from the windshield. The center console had been removed and the first row seats had been unbolted from the floor post-crash. The front left seat cushion exhibited a tear in the cover that resulted from occupant loading. The passenger compartment sustained vertical and lateral intrusions to the front and second rows.

Manual Restraints

The Fords's front row seating was equipped with 3-point manual lap and shoulder safety belts with sliding latch plates, adjustable D-ring anchorage assemblies, and buckle pretensioners. The driver's safety belt had an Emergency Locking Retractor (ELR) and the passenger's safety belt had a switchable ELR/Automatic Locking Retractor (ALR).

The driver's safety belt D-ring anchorage was set to the full-down position. The latch plate exhibited scratches indicating historical usage, and evidence of occupant loading in the form of scuffs on the inside of the slot where the belt webbing was routed (**Figure 4**). The safety belt D-ring was polished metal and did not reveal evidence of occupant loading. The safety belt webbing was cut into three sections. The lower section was found to be spooled on the safety belt retractor, which was visible due to the displaced B-pillar trim. The lower section of belt webbing measured 121.0 cm (47.6 in) in length and exhibited no damage or evidence of occupant loading. The middle section of belt webbing had been used to tie the left front window frame to the left B-pillar. The webbing measured 140.0 cm (55.1 in) and revealed no damage or loading evidence. The third section of belt webbing

was attached to the lower anchorage and measured 56.0 cm (22.1 in) in length and exhibited no damage or loading evidence.

The driver's safety belt buckle pretensioner had actuated during the rollover. The buckle stalk measured 17.0 cm (6.7 in) in length and retracted 3.0 cm (1.2 in) during actuation. Based on the vehicle inspection, the driver's kinematics, and his injuries, it was determined that the driver was using the manual lap and shoulder belt at the time of the crash.

Figure 4. The driver's safety belt latch plate showing loading evidence

The front row right passenger safety belt anchorage was set to the full-down position. The latch plate was scratched indicating historical usage. The second row seats were equipped with 3-point manual lap and shoulder belts. The outboard belts were equipped with non-adjustable anchorages that were located on the C-pillars and the center position safety belt retractor was integrated into the seat back. The three retractors were switchable ELR/ALR. The left safety belt latch plate was scratched indicating historical usage and the center and right position latch plates were smooth indicating no historical usage.

Supplemental Restraint System

The Ford's Supplemental Restraint System (SRS) included an air bag control module, driver and passenger frontal air bags, seat-mounted side air bags, left and right IC air bags, and seat belt pretensioners for the front row. The vehicle was part of a police department fleet and based on the interview it was not determined whether the air bags were original to the vehicle or if they had been serviced.

The Ford's frontal air bags were advanced dual-stage designed to deploy according to impact severity. The driver's air bag module was located in the steering wheel hub and the passenger's air bag module was in the middle instrument panel. The driver's frontal air bag did not deploy due to insufficient longitudinal deceleration during the crash. The passenger seat was unoccupied and due to the weight recognition function of the SRS the deployment of the front row passenger air bag was suppressed. The seat-mounted side air bags did not deploy due to the absence of side impacts to the vehicle.

The left and right IC air bags deployed during the rollover from the left and right roof side rails. The IC air bags extended longitudinally from the first row to the cargo area and measured 276.0 cm (108.7 in) in length. They extended vertically from the roof side rail to the bottom of the side window and measured 53.0 cm (20.9 in) in height. The leading edge was connected to the A-pillar with a 6.0 cm (2.4 in) tether and the trailing edge was connected to the roof side rail with a 26.0 cm (10.2 in) tether. The IC air bags were constructed without vent ports.

A section of the left IC air bag was rolled and stowed behind the C-pillar interior trim (**Figure 5**) and attempts to free the air bag from its stowed position were unsuccessful. It was not determined whether the air bag did not completely deploy or if the air bag was stowed behind the component during post-crash activities. The stowed section of the IC air bag measured 40.0 cm (15.7 in) in length. The section of the air bag aft of the stowed section measured 60.0 cm (23.6 in) in length and its area of coverage was reduced due to the section behind the trim. At the rearward tether the air bag hung normally in its post-inflated state; however, the bottom aspect of the bag was rolled and hung diagonally. This resulted in a reduction of approximately 30 percent in the air bag's coverage of the left third row window. The section of air bag forward of the stowed section measured 176.0 cm (69.3 in) in length and its area of coverage was reduced due to the section behind the trim. Forward of the B-pillar, the air bag hung normally in its post-inflated state; however, at the second row window the bottom aspect of the bag was rolled and hung diagonally. This resulted in a reduction of approximately 25 percent in the IC air bag's coverage of the second row window.

Figure 5. Left IC air bag, second row view

Figure 6. Damage to left IC air bag

The outboard panel of the left IC air bag exhibited a V-shaped tear that was located 20.0 cm (7.9 in) forward of the C-pillar and measured 4.0 x 5.0 cm (1.6 x 2.0 in) in size (**Figure 6**). The forward external tether was cut or torn, probably during post-crash salvage activity. At 4.0 cm (1.6 in) section of tether was attached to the A-pillar and 4.0 cm (1.6 in) section was attached to the air bag. The inboard panel of the left IC air bag exhibited vinyl striations and was otherwise unremarkable.

The right IC air bag deployed from the roof side rail over the front, second and third rows. A section of the IC air bag was cut away at the forward aspect during extrication efforts or salvage activity. The cut section measured 37.0 cm (14.6 in) in length and 52.0 cm (20.5 in) in width and was located within the area of the first row left side glass and the B-pillar; it was missing and not inspected. The inboard panel of the air bag exhibited vinyl striations and the outboard panel showed dirt deposits where the air bag contacted the ground during the rollover. The air bag was otherwise unremarkable and no evidence of occupant loading was present.

Powertrain Control Module

The vehicle's Powertrain Control Module (PCM) was imaged during the vehicle inspection through the Data Link Connector (DLC). The PCM image reported 24.6 seconds of pre-crash data that was

calculated in increments of 0.2 seconds of relative time. When the driver's safety belt pretensioner actuated and the IC air bags deployed, the Restraint Control Module (RCM) sent a Restraints Deployment Signal (RDS) flag to the PCM via the Vehicle Data Bus. The moment of impact or deployment was determined by the signal changing from "NOT RECEIVED" to "RECEIVED".

The Bosch PCM Data Report is included in Attachment 2 of this report. The following information is a summary of the data obtained from the PCM imaging results. All times are relative to the moment the RDS flag was sent to the PCM.

- Vehicle speed was 127.3 km/h (79.1 mph) at -24.4 seconds and 38.1 km/h (23.7 mph) at 0 seconds.
- Accelerator Pedal % Full was 23 at -24.6 seconds and 0 at -4.2 seconds.
- Brake Switch changed from "OFF" to "ON" at -3.4 seconds.
- Brake Stability Control Deactivation changed from "OFF" to "ON" at -3.4 seconds.
- ABS changed from "INACTIVE" to "ACTIVE" at -2.4 seconds.
- Traction Control remained in "NOT ACTIVE" mode throughout the event.
- Stability Control remained in "NOT ACTIVE" mode throughout the event.

Rollover

The Ford had a Static Stability Factor (SSF) of 1.18. The SSF of a vehicle is an at-rest calculation of its rollover resistance, which is based on its track width and center of gravity. The vehicle had a rollover resistance rating of 4 out of 5 stars and had a 19% chance of rollover.[1] The vehicle was configured with the following equipment that could potentially increase its rollover resistance: 4-wheel drive, 4-wheel Assisted Braking System (ABS), 4-wheel anti-lock disc brakes, tire pressure monitoring system, Electronic Stability Control (ESC) and Traction Control. Additionally, it was equipped with Roll Stability Control (RSC) technology, which utilizes gyroscopes to detect when a vehicle is cornering too sharply or maneuvering in such a way as to induce a trip rollover. The RSC system applies braking to the wheels on the outside of the turn, which then induces understeer and improves stability. The ESC functions when the tires lose traction and then spin by momentarily decreasing engine power to help regain tire traction.

Prior to the rollover the vehicle was traveling on the right gravel shoulder at a PCM-reported speed of 127.1 km/h (79.0 mph). The vehicle then reentered the roadway and initiated a counterclockwise rotation. Upon reentering the roadway, the driver braked; based on the PCM report, the vehicle's RSC and ABS activated in response to the braking action and the relatively tight radius of the right turn. Based on the resulting yaw mark deposited by the vehicle's tires, the turn radius for the

[1] www.safercar.org

outboard tires was 109.0 m (358.8 ft). The RSC responded to the vehicle's counterclockwise rotation as well as the turning radius. The ABS and anti-lock braking technology activated in response to the vehicle's reduction in effective braking during the rotation and yaw.

Figure 7. View showing travel path from roadway departure to trip point

The vehicle then traveled across both lanes and departed the roadway on the left side, skidding from the paved roadway to the gravel shoulder and then across sand in rapid succession (**Figure 7**). The vehicle then traveled off-road for approximately 34.8 m (114.1 ft) and the vehicle's right front tire deposited a furrow in the gravel shoulder and the ground that indicated the direction and distance of travel. Based on the point at which the furrow ended, the Ford had rotated approximately 130 degrees counterclockwise and its heading angle was 90 degrees from its direction of travel.

The driver's steering and braking input was ineffective due to the lateral movement and loss of traction; the brake assist technology was ineffective due to the orientation of the vehicle relative to its direction of travel. Adding further to the lack of stability was the tires' tendency to plow into the loose ground.

The vehicle's right side tires engaged the ground and the opposing lateral forces upon the vehicle were sufficient to initiate a right side leading trip rollover. At the trip point, the vehicle was traveling at a PCM reported speed of 38 km/h (24 mph). The first and second quarter turns resulted in minor interior and exterior damage to the vehicle. The third quarter turn resulted in significant damage to the vehicles left side, including the displacement of the left front wheel and the disintegration of the first row left side window glazing. The vehicle rolled about its longitudinal axis for seven quarter turns, then came to final rest on its left side and facing southwest. Based on scene evidence, the roll distance was estimated to be 18.0 m (59.0 ft).

Occupant Demographics

	Driver
Age/Sex:	32 years / Male
Height:	180 cm (71 in)
Weight:	95 kg (209 lb)
Seat Type:	Bucket with adjustable head restraint
Seat Track Position:	Between forward and middle
Manual Restraint Usage:	Lap and shoulder belt used
Restraint Usage Source:	Vehicle inspection
Air Bag:	Frontal air bag, not deployed; seat-mounted side air bag, not deployed; IC air bag, deployed
Eyewear:	Contact lenses
Alcohol/Drug Involvement:	None
Type of Medical Treatment	Transported, treated, and released

Occupant Kinematics

Driver

The 32-year-old male driver was seated in an upright posture and was restrained by the vehicle's 3-point manual lap and shoulder safety belt. He stated during the interview he was wearing his safety belt snug at the hips and shoulder. His seat track position was set between middle- and full-forward. The driver was actively steering his vehicle with his left hand and his right hand was operating a mobile data laptop computer located near the center instrument panel. His right foot was on the accelerator and his left foot was on the floor. The driver was wearing prescription contact lenses. He stated during the interview that the sun was low on the horizon, resulting in glare on the roadway. Based on the interview, the driver was viewing the mobile data computer at the time of the right roadside departure and was probably distracted.

The driver was wearing the following police-related gear: equipment belt with firearm, ammunition magazine, and holster, two sets of hand cuffs, pepper spray canister, tazer, police baton, hand-held radio device, and a bulletproof vest. The driver estimated the total weight of the equipment to be approximately 18.1 km (40.0 lb).

The vehicle departed the roadway on the right side, and in an effort to return the vehicle to the roadway, the driver steered left. The vehicle returned to the roadway and initiated a counterclockwise rotation, then departed the roadway on the left side. As the vehicle rotated and initiated a yaw, the driver remained in place in his seat, his left hand was on the steering wheel, and he removed his right

foot from the accelerator pedal and applied the brakes. The vehicle departed the roadway on the left side, crossed a gravel shoulder, and then traveled over descending and uneven ground that consisted primarily of sand and shrubbery. The transition from gravel to ground had minor effect on the driver's posture, but did result in slower vehicle speed due to the loose nature of the sand.

At the trip point, the left and right IC air bags deployed and the driver's safety belt pretensioner actuated. The driver was displaced to the right in response to the direction of the roll. He was wearing his firearm on his right hip and his right hip loaded the center console, displacing the console and resulting in a hip contusion. The driver loaded the safety belt; the plastic coating on the safety belt latch plate revealed scuff marks. Additionally, he loaded the seat cushion, resulting in a tear on its right aspect that measured 2.0 x 3.0 cm (0.8 x 1.2 in). He raised his arms and hands to protect his face and head during the rollover and he sustained bilateral hand abrasions and left forearm lacerations due to flying glass. He stated during the interview that he contacted the steering wheel with his chest and due to the presence of his bulletproof vest he was not injured by the contact. The steering wheel revealed a group of small scuffs totaling 3.0 cm (1.2 in) in length in the right quadrant where the contact occurred. The driver came to rest against the left side door panel and window.

The roof above the driver's seated position intruded 10.0 cm (3.9 in) at its maximal vertical deformity but did not exhibit evidence of loading by the driver. Throughout the rollover, the driver remained restrained by his safety belt and stayed in his seated position. His extremities were displaced left, right and forward during the seven quarter turns of the rollover sequence. The driver's head did not contact any components resulting in loss of consciousness or other head injury. Contact and loading evidence was greater on the driver's right side than on his left side, in response to the initial direction of the rollover.

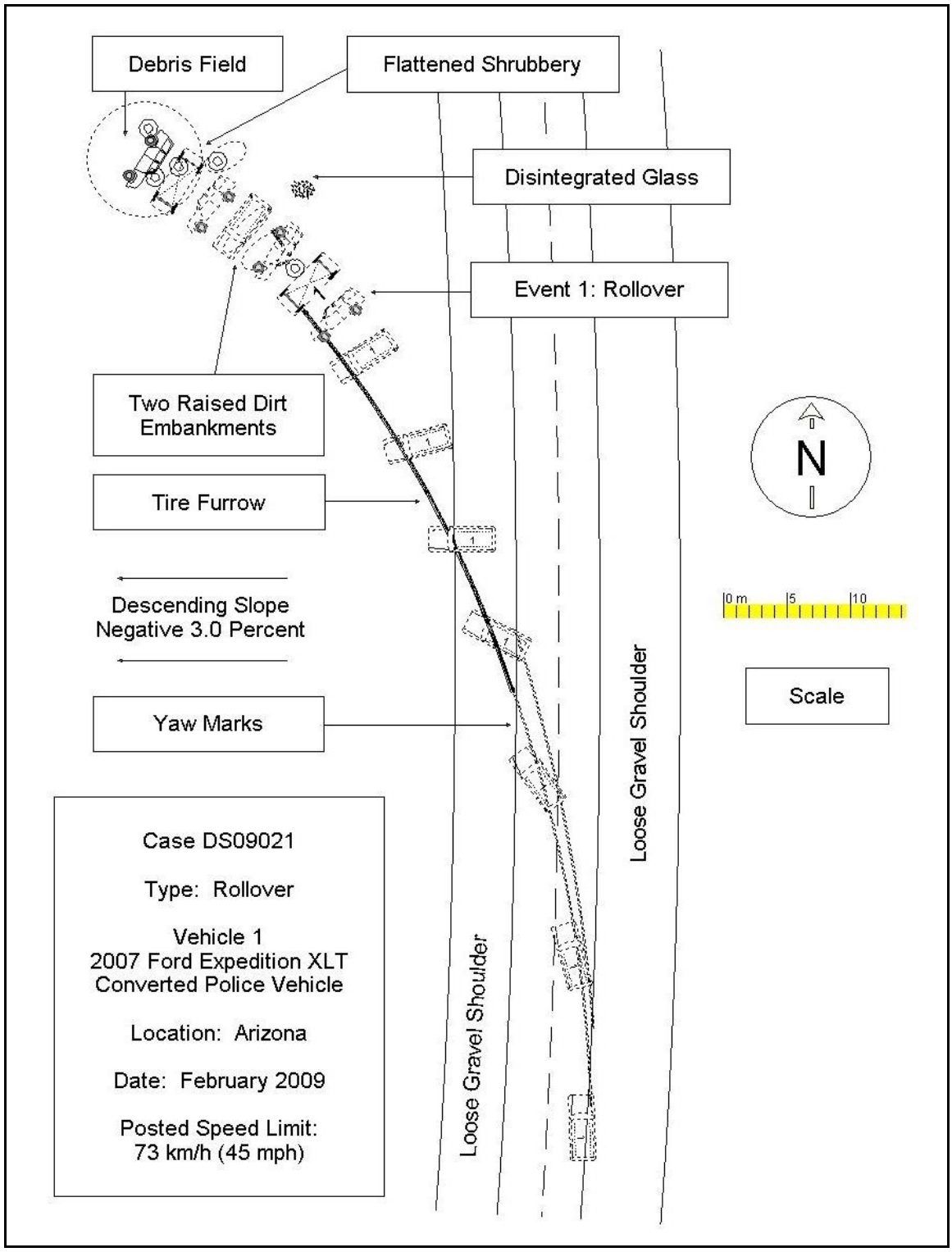
Occupant Injuries

Driver

The injury data was obtained from the driver's medical records and the interview.

Injury	OIC Code	Injury Mechanism	Confidence Level
Contusion, right hip	890402.1,1	Center console	Certain
Lacerations, minor, left forearm	790602.1,2	Flying glass	Certain
Abrasions, bilateral hands	790202.1,3	Flying glass	Probable

Attachment 1. Scene Diagram



Attachment 2. Bosch PCM EDR Crash Data Report

CDR File Information

User Entered VIN	1FMFU16587L******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	09021 WO SEQUENCE NO.CDR
Saved on	Tuesday, April 28 2009 at 08:44:07 AM
Collected with CDR version	Crash Data Retrieval Tool 3.1.1
Reported with CDR version	Crash Data Retrieval Tool 3.3
EDR Device Type	powertrain control module
Restraint Deployment Signal Received	Yes

IMPORTANT NOTICE: Robert Bosch LLC recommends that the latest production release of Crash Data Retrieval software be utilized when viewing, printing or exporting any retrieved data from within the CDR program. This ensures that the retrieved data has been translated using the most recent information including but not limited to that which was provided by the manufacturers of the vehicles supported in this product.

Module Information

The retrieval of this data has been authorized by the vehicle's owner, or other legal authority such as a subpoena or search warrant, as indicated by the CDR tool user on Tuesday, April 28 2009 at 08:44:07 AM .

FORD POWERTRAIN CONTROL MODULE EVENT DATA INTERPRETATION GUIDE

1. This document is intended to assist you in reading the data that has been retrieved from a Powertrain Control Module ("PCM") contained in a Ford vehicle. This document is further intended to provide general guidelines and is not intended to provide information regarding the interpretation of a specific read-out.

2. The data points in the “PCM EDR Data” tables shown in this report occur every 0.2 seconds of time. It should be pointed out that “Relative Time (calc.)” in these tables is calculated based on the 0.2 second time interval and is displayed relative to the receipt of a Restraint Deployment Signal from the RCM. The “Relative Time (calc.)” Information is not data which is retrieved from the PCM but is calculated based on the above information.

3. In the event that one of the vehicle's restraint devices (e.g., the vehicle's airbag or pretensioner) have deployed as a result of a collision, the Restraint Control Module or RCM will send a Restraints Deployment Signal (RDS) to the PCM via the vehicle data bus or through a direct wired connection. If the PCM receives an RDS, it will lock the data. It should be pointed out that the RCM and Vehicle Data Bus both require power for tenths of a second after the collision in order to send a signal or flag to the PCM.

4. If no RDS flag has been received from the RCM and there is still power to the PCM, the PCM data will not lock and the circular buffer will continuously overwrite itself when the vehicle’s ignition is in the run position. In this event, data contained in the PCM that was relevant to the collision may be lost. However, if power was lost as a result of the collision, or the ignition key was turned off shortly after the event, there may still be data relating to the collision in the PCM.

5. Finding the data relating to the moment of impact:

a.) With regard to the PCM EDR Data tables where a Restraint Deployment Signal is received, the data is displayed in ordered of the “Relative Time (calc.)” parameter beginning with the oldest recorded frame of data.

The moment of impact can be found by reviewing the data contained in the RDS column. Specifically, the data samples recorded with an RDS flag equal to “Received” in the PCM EDR Data tables signify points recorded after the PCM received the RDS signal from the RCM. If the PCM has received an RDS flag, the moment of impact is typically set at the RDS = “Not Received” in the PCM EDR Data tables reading that immediately precedes a reading of RDS = “Received”. The last RDS = “Received” data point signifies the last data point recorded in the event.

b.) With regard to the PCM EDR Data tables where a Restraint Deployment Signal is not received, the data is displayed in order of the “Buffer Address” parameter data beginning with the lowest address value. The PCM buffer is circular and the data point of first address listed in the PCM EDR Data tables does not necessarily signify the beginning of the PCM recording. The start and stop time of the PCM recording could be in the middle of the Table.

The moment of impact usually correlates with a discontinuity of the data listed in the table. If a single, significant discontinuity in the data is found, the data point immediately preceding the discontinuity is likely to be the last data point recorded. This point usually signifies impact time zero. If there is no single significant discontinuity, the data must be examined in detail to determine the largest discontinuity in the largest number of data elements. If no single largest discontinuity can be determined, it may not be possible to determine the moment of impact.

6. The PCM Data Tables further show a column labeled as the “Key on Timer – 63.75 Max (sec)” or PUTMR. The PUTMR shows the length

of time that the PCM was functioning for the most recent key cycle. The timer ascends to a maximum value of 63.75 seconds. If the data was not locked by an RDS flag and the ignition key was turned off and on again, the PCM will begin to write new data starting at the beginning of the data table. While it is not common, there are instances where the first portion of the data table has subsequent-key-on, post-crash data; while the latter portion of the data table has data from the key cycle in which the crash occurred. In other rare cases, an event has occurred in less than 25 seconds after key on and older data from prior key cycles has been left in the latter part of the buffer. Review the Key on Timer – 63.75 Max (sec) (PUTMR) data for discontinuities to determine if this has occurred.

7. Data displayed in the Key on Timer – 63.75 Max (sec) column has a resolution of 0.25 seconds and rounds actual data to the nearest 0.25 seconds. The data points occur every 0.2 seconds.

Actual time	Key on Timer display
0.0	0.0
0.2	0.25
0.4	0.50
0.6	0.50
0.8	0.75
1.0	1.00

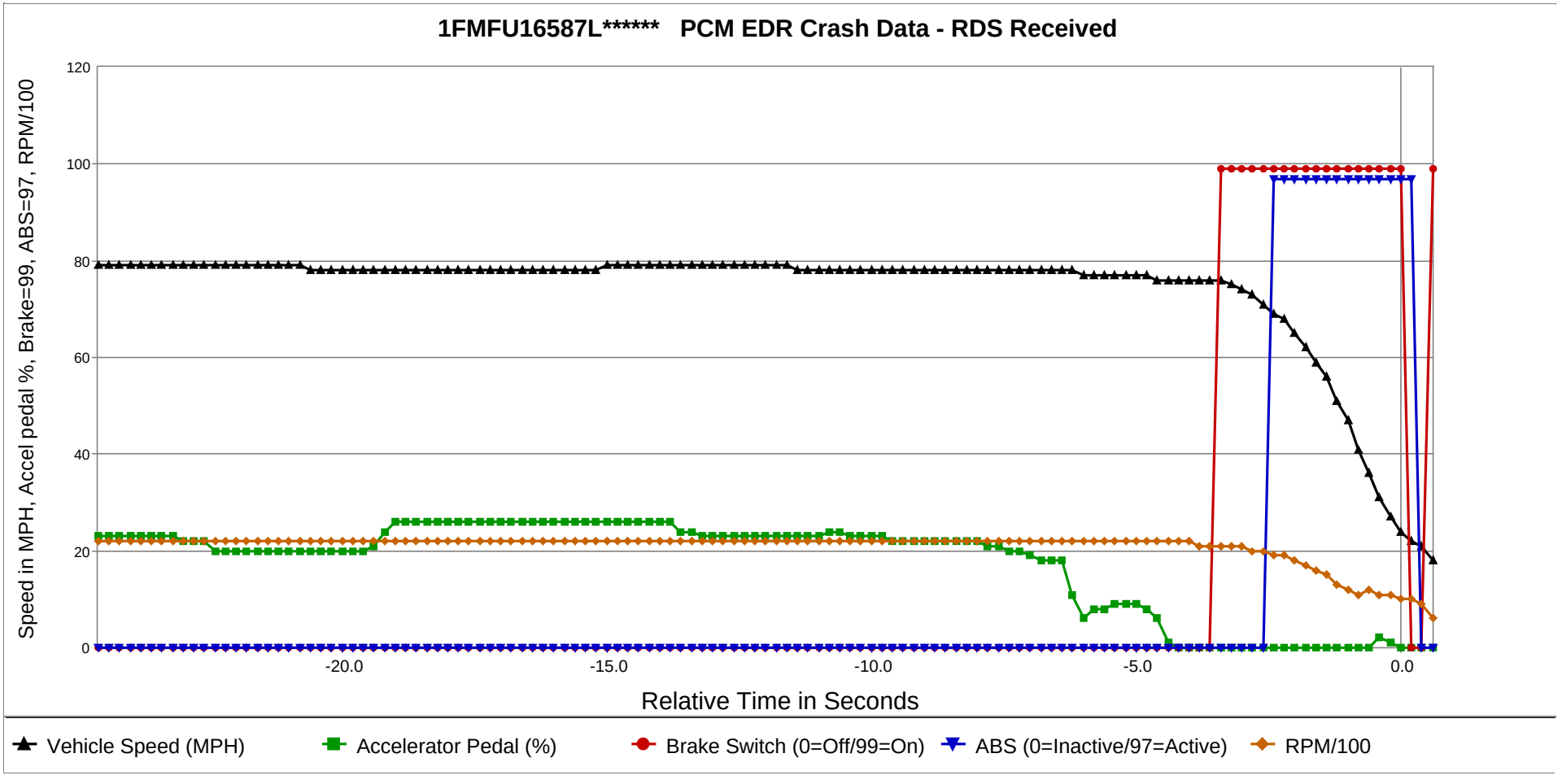
8. Recorded Vehicle Speed is proportional to transmission output shaft speed and accuracy can be affected if the vehicle has had the tire size or inflation pressure or the final drive axle ratio changed from the factory build specifications.

PCM Data Source:
• All PCM recorded data is fed directly from sensors to the PCM where raw signals are processed, and stored internally, except for the following parameters which are transmitted via the vehicle's communication network:

- Stability Control
- Traction Control
- ABS
- Restraint Deployment Signal

PCM Module Information

Vehicle Identification Number (from PCM)	1FMFU16587L******
PCM File Name (calibration level)	IKBJ2J6.HEX*
PCM Part Number	7L1A-12A650-AGB


1FMFU16587L****** PCM EDR Crash Data - RDS Received
Speed in MPH, Accel pedal %, Brake=99, ABS=97, RPM/100
120
100
80
60
40
20
0
-20.0
-15.0
-10.0
-5.0
0.0
Relative Time in Seconds
Vehicle Speed (MPH)
Accelerator Pedal (%)
Brake Switch (0=Off/99=On)
ABS (0=Inactive/97=Active)
RPM/100

PCM EDR Data (1)

Buffer Address (Hex)	Relative Time (calc.) (Seconds)	Restraint Deployment Signal (Received / Not Received)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal % Full (%)	Engine Throttle % Full (%)	Brake Switch (On / Off)	Brake SC De-ac (On / Off)	ABS (Active / Inactive)	Transmission - Neutral (Neutral / Not Neutral)
EA0002C0	-24.6	Not Received	79 [127.1]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA0002D0	-24.4	Not Received	79.1 [127.3]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA0002E0	-24.2	Not Received	79 [127.1]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA0002F0	-24.0	Not Received	79 [127.1]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000300	-23.8	Not Received	79 [127.1]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000310	-23.6	Not Received	79 [127.1]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000320	-23.4	Not Received	79 [127.1]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000330	-23.2	Not Received	79 [127.1]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000340	-23.0	Not Received	79 [127.1]	22	18	OFF	OFF	Not Active	Not Neutral
EA000350	-22.8	Not Received	78.9 [127]	22	18	OFF	OFF	Not Active	Not Neutral
EA000360	-22.6	Not Received	78.9 [127]	21.5	17.5	OFF	OFF	Not Active	Not Neutral
EA000370	-22.4	Not Received	78.9 [127]	20	16.5	OFF	OFF	Not Active	Not Neutral
EA000380	-22.2	Not Received	78.8 [126.8]	19.5	16	OFF	OFF	Not Active	Not Neutral
EA000390	-22.0	Not Received	78.8 [126.8]	19.5	16	OFF	OFF	Not Active	Not Neutral
EA0003A0	-21.8	Not Received	78.8 [126.8]	19.5	16	OFF	OFF	Not Active	Not Neutral
EA0003B0	-21.6	Not Received	78.8 [126.8]	19.5	16	OFF	OFF	Not Active	Not Neutral
EA0003C0	-21.4	Not Received	78.7 [126.6]	19.5	16	OFF	OFF	Not Active	Not Neutral
EA0003D0	-21.2	Not Received	78.6 [126.5]	19.5	16	OFF	OFF	Not Active	Not Neutral
EA0003E0	-21.0	Not Received	78.6 [126.5]	19.5	16	OFF	OFF	Not Active	Not Neutral
EA0003F0	-20.8	Not Received	78.5 [126.3]	20	16	OFF	OFF	Not Active	Not Neutral
EA000400	-20.6	Not Received	78.5 [126.3]	19.5	16	OFF	OFF	Not Active	Not Neutral
EA000410	-20.4	Not Received	78.4 [126.1]	20	16	OFF	OFF	Not Active	Not Neutral
EA000420	-20.2	Not Received	78.4 [126.1]	20	16	OFF	OFF	Not Active	Not Neutral
EA000430	-20.0	Not Received	78.4 [126.1]	20	16	OFF	OFF	Not Active	Not Neutral
EA000440	-19.8	Not Received	78.3 [126]	20.5	16.5	OFF	OFF	Not Active	Not Neutral
EA000450	-19.6	Not Received	78.3 [126]	20.5	16.5	OFF	OFF	Not Active	Not Neutral
EA000460	-19.4	Not Received	78.2 [125.8]	21	17	OFF	OFF	Not Active	Not Neutral
EA000470	-19.2	Not Received	78.1 [125.7]	24	19	OFF	OFF	Not Active	Not Neutral
EA000480	-19.0	Not Received	78.1 [125.7]	26	22	OFF	OFF	Not Active	Not Neutral
EA000490	-18.8	Not Received	78.2 [125.8]	26	20.5	OFF	OFF	Not Active	Not Neutral
EA0004A0	-18.6	Not Received	78.2 [125.8]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA0004B0	-18.4	Not Received	78.2 [125.8]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA0004C0	-18.2	Not Received	78.2 [125.8]	26.5	19.5	OFF	OFF	Not Active	Not Neutral
EA0004D0	-18.0	Not Received	78.2 [125.8]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA0004E0	-17.8	Not Received	78.2 [125.8]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA0004F0	-17.6	Not Received	78.2 [125.8]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA000500	-17.4	Not Received	78.3 [126]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA000510	-17.2	Not Received	78.3 [126]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA000520	-17.0	Not Received	78.3 [126]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA000530	-16.8	Not Received	78.3 [126]	26	20	OFF	OFF	Not Active	Not Neutral
EA000540	-16.6	Not Received	78.3 [126]	26	19.5	OFF	OFF	Not Active	Not Neutral
EA000550	-16.4	Not Received	78.4 [126.1]	26	20	OFF	OFF	Not Active	Not Neutral
EA000560	-16.2	Not Received	78.4 [126.1]	26	20.5	OFF	OFF	Not Active	Not Neutral
EA000570	-16.0	Not Received	78.4 [126.1]	26	21	OFF	OFF	Not Active	Not Neutral
EA000580	-15.8	Not Received	78.4 [126.1]	26	21	OFF	OFF	Not Active	Not Neutral
EA000590	-15.6	Not Received	78.4 [126.1]	26	21	OFF	OFF	Not Active	Not Neutral
EA0005A0	-15.4	Not Received	78.4 [126.1]	26	21	OFF	OFF	Not Active	Not Neutral
EA0005B0	-15.2	Not Received	78.5 [126.3]	26	21	OFF	OFF	Not Active	Not Neutral
EA0005C0	-15.0	Not Received	78.5 [126.3]	26	21	OFF	OFF	Not Active	Not Neutral
EA0005D0	-14.8	Not Received	78.6 [126.5]	26	21	OFF	OFF	Not Active	Not Neutral
EA0005E0	-14.6	Not Received	78.6 [126.5]	26	21	OFF	OFF	Not Active	Not Neutral
EA0005F0	-14.4	Not Received	78.6 [126.5]	26	20.5	OFF	OFF	Not Active	Not Neutral
EA000600	-14.2	Not Received	78.6 [126.5]	26	20.5	OFF	OFF	Not Active	Not Neutral
EA000610	-14.0	Not Received	78.6 [126.5]	25.5	20	OFF	OFF	Not Active	Not Neutral
EA000620	-13.8	Not Received	78.7 [126.6]	25.5	20	OFF	OFF	Not Active	Not Neutral
EA000630	-13.6	Not Received	78.7 [126.6]	24.5	19	OFF	OFF	Not Active	Not Neutral
EA000640	-13.4	Not Received	78.7 [126.6]	23.5	18	OFF	OFF	Not Active	Not Neutral
EA000650	-13.2	Not Received	78.7 [126.6]	23	18	OFF	OFF	Not Active	Not Neutral
EA000660	-13.0	Not Received	78.6 [126.5]	23	18	OFF	OFF	Not Active	Not Neutral
EA000670	-12.8	Not Received	78.6 [126.5]	23	19	OFF	OFF	Not Active	Not Neutral
EA000680	-12.6	Not Received	78.6 [126.5]	23	19.5	OFF	OFF	Not Active	Not Neutral
EA000690	-12.4	Not Received	78.6 [126.5]	23	19	OFF	OFF	Not Active	Not Neutral
EA0006A0	-12.2	Not Received	78.6 [126.5]	23	18.5	OFF	OFF	Not Active	Not Neutral

Buffer Address (Hex)	Relative Time (calc.) (Seconds)	Restraint Deployment Signal (Received / Not Received)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal % Full (%)	Engine Throttle % Full (%)	Brake Switch (On / Off)	Brake SC De-ac (On / Off)	ABS (Active / Inactive)	Transmission - Neutral (Neutral / Not Neutral)
EA0006B0	-12.0	Not Received	78.6 [126.5]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA0006C0	-11.8	Not Received	78.5 [126.3]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA0006D0	-11.6	Not Received	78.5 [126.3]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA0006E0	-11.4	Not Received	78.5 [126.3]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA0006F0	-11.2	Not Received	78.5 [126.3]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000700	-11.0	Not Received	78.4 [126.1]	23	19	OFF	OFF	Not Active	Not Neutral
EA000710	-10.8	Not Received	78.4 [126.1]	23.5	19	OFF	OFF	Not Active	Not Neutral
EA000720	-10.6	Not Received	78.3 [126]	23.5	18.5	OFF	OFF	Not Active	Not Neutral
EA000730	-10.4	Not Received	78.3 [126]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000740	-10.2	Not Received	78.3 [126]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000750	-10.0	Not Received	78.2 [125.8]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000760	-9.8	Not Received	78.2 [125.8]	23	18.5	OFF	OFF	Not Active	Not Neutral
EA000770	-9.6	Not Received	78.2 [125.8]	22.5	18.5	OFF	OFF	Not Active	Not Neutral
EA000780	-9.4	Not Received	78.2 [125.8]	22.5	18	OFF	OFF	Not Active	Not Neutral
EA000790	-9.2	Not Received	78.1 [125.7]	22	18	OFF	OFF	Not Active	Not Neutral
EA0007A0	-9.0	Not Received	78.1 [125.7]	22	18	OFF	OFF	Not Active	Not Neutral
EA0007B0	-8.8	Not Received	78.1 [125.7]	22	18	OFF	OFF	Not Active	Not Neutral
EA0007C0	-8.6	Not Received	78 [125.5]	21.5	18	OFF	OFF	Not Active	Not Neutral
EA0007D0	-8.4	Not Received	78 [125.5]	21.5	18	OFF	OFF	Not Active	Not Neutral
EA0007E0	-8.2	Not Received	77.9 [125.3]	21.5	18	OFF	OFF	Not Active	Not Neutral
EA0007F0	-8.0	Not Received	77.9 [125.3]	21.5	17.5	OFF	OFF	Not Active	Not Neutral
EA000010	-7.8	Not Received	77.9 [125.3]	21	17.5	OFF	OFF	Not Active	Not Neutral
EA000020	-7.6	Not Received	77.8 [125.2]	21	17	OFF	OFF	Not Active	Not Neutral
EA000030	-7.4	Not Received	77.8 [125.2]	20.5	17	OFF	OFF	Not Active	Not Neutral
EA000040	-7.2	Not Received	77.8 [125.2]	20.5	16.5	OFF	OFF	Not Active	Not Neutral
EA000050	-7.0	Not Received	77.8 [125.2]	19	16	OFF	OFF	Not Active	Not Neutral
EA000060	-6.8	Not Received	77.7 [125]	17.5	14.5	OFF	OFF	Not Active	Not Neutral
EA000070	-6.6	Not Received	77.6 [124.9]	17.5	14.5	OFF	OFF	Not Active	Not Neutral
EA000080	-6.4	Not Received	77.6 [124.9]	17.5	14.5	OFF	OFF	Not Active	Not Neutral
EA000090	-6.2	Not Received	77.5 [124.7]	11	11.5	OFF	OFF	Not Active	Not Neutral
EA0000A0	-6.0	Not Received	77.4 [124.5]	6.5	9.5	OFF	OFF	Not Active	Not Neutral
EA0000B0	-5.8	Not Received	77.3 [124.4]	8	8	OFF	OFF	Not Active	Not Neutral
EA0000C0	-5.6	Not Received	77.1 [124.1]	8.5	8	OFF	OFF	Not Active	Not Neutral
EA0000D0	-5.4	Not Received	76.9 [123.7]	9	8.5	OFF	OFF	Not Active	Not Neutral
EA0000E0	-5.2	Not Received	76.8 [123.6]	9	9	OFF	OFF	Not Active	Not Neutral
EA0000F0	-5.0	Not Received	76.7 [123.4]	9	9	OFF	OFF	Not Active	Not Neutral
EA000100	-4.8	Not Received	76.6 [123.2]	8	9	OFF	OFF	Not Active	Not Neutral
EA000110	-4.6	Not Received	76.5 [123.1]	6	8	OFF	OFF	Not Active	Not Neutral
EA000120	-4.4	Not Received	76.3 [122.8]	1	8	OFF	OFF	Not Active	Not Neutral
EA000130	-4.2	Not Received	76.1 [122.4]	0	7.5	OFF	OFF	Not Active	Not Neutral
EA000140	-4.0	Not Received	76 [122.3]	0	8	OFF	OFF	Not Active	Not Neutral
EA000150	-3.8	Not Received	75.8 [122]	0	8	OFF	OFF	Not Active	Not Neutral
EA000160	-3.6	Not Received	75.6 [121.6]	0	8	OFF	OFF	Not Active	Not Neutral
EA000170	-3.4	Not Received	75.8 [122]	0	7.5	ON	ON	Not Active	Not Neutral
EA000180	-3.2	Not Received	75.1 [120.8]	0	6.5	ON	ON	Not Active	Not Neutral
EA000190	-3.0	Not Received	74.1 [119.2]	0	6.5	ON	ON	Not Active	Not Neutral
EA0001A0	-2.8	Not Received	72.7 [117]	0	7	ON	ON	Not Active	Not Neutral
EA0001B0	-2.6	Not Received	70.9 [114.1]	0	6.5	ON	ON	Not Active	Not Neutral
EA0001C0	-2.4	Not Received	69.4 [111.7]	0	6.5	ON	ON	Active	Not Neutral
EA0001D0	-2.2	Not Received	67.6 [108.8]	0	6.5	ON	ON	Active	Not Neutral
EA0001E0	-2.0	Not Received	64.9 [104.4]	0	6	ON	ON	Active	Not Neutral
EA0001F0	-1.8	Not Received	62.4 [100.4]	0	6	ON	ON	Active	Not Neutral
EA000200	-1.6	Not Received	59.2 [95.3]	0	5.5	ON	ON	Active	Not Neutral
EA000210	-1.4	Not Received	56.4 [90.7]	0	5.5	ON	ON	Active	Not Neutral
EA000220	-1.2	Not Received	51.4 [82.7]	0	5	ON	ON	Active	Not Neutral
EA000230	-1.0	Not Received	46.5 [74.8]	0	4.5	ON	ON	Active	Not Neutral
EA000240	-0.8	Not Received	40.8 [65.6]	0	4	ON	ON	Active	Not Neutral
EA000250	-0.6	Not Received	35.9 [57.8]	0	4	ON	ON	Active	Not Neutral
EA000260	-0.4	Not Received	31.2 [50.2]	1.5	4	ON	ON	Active	Not Neutral
EA000270	-0.2	Not Received	27.3 [43.9]	1	4	ON	ON	Active	Not Neutral
EA000280	0.0	Not Received	23.7 [38.1]	0	4	ON	ON	Active	Not Neutral
EA000290	0.2	Received	22.3 [35.9]	0	3.5	OFF	OFF	Active	Not Neutral
EA0002A0	0.4	Received	21.4 [34.4]	.5	3.5	OFF	OFF	Not Active	Not Neutral
EA0002B0	0.6	Received	17.6 [28.3]	0	4	ON	ON	Not Active	Not Neutral

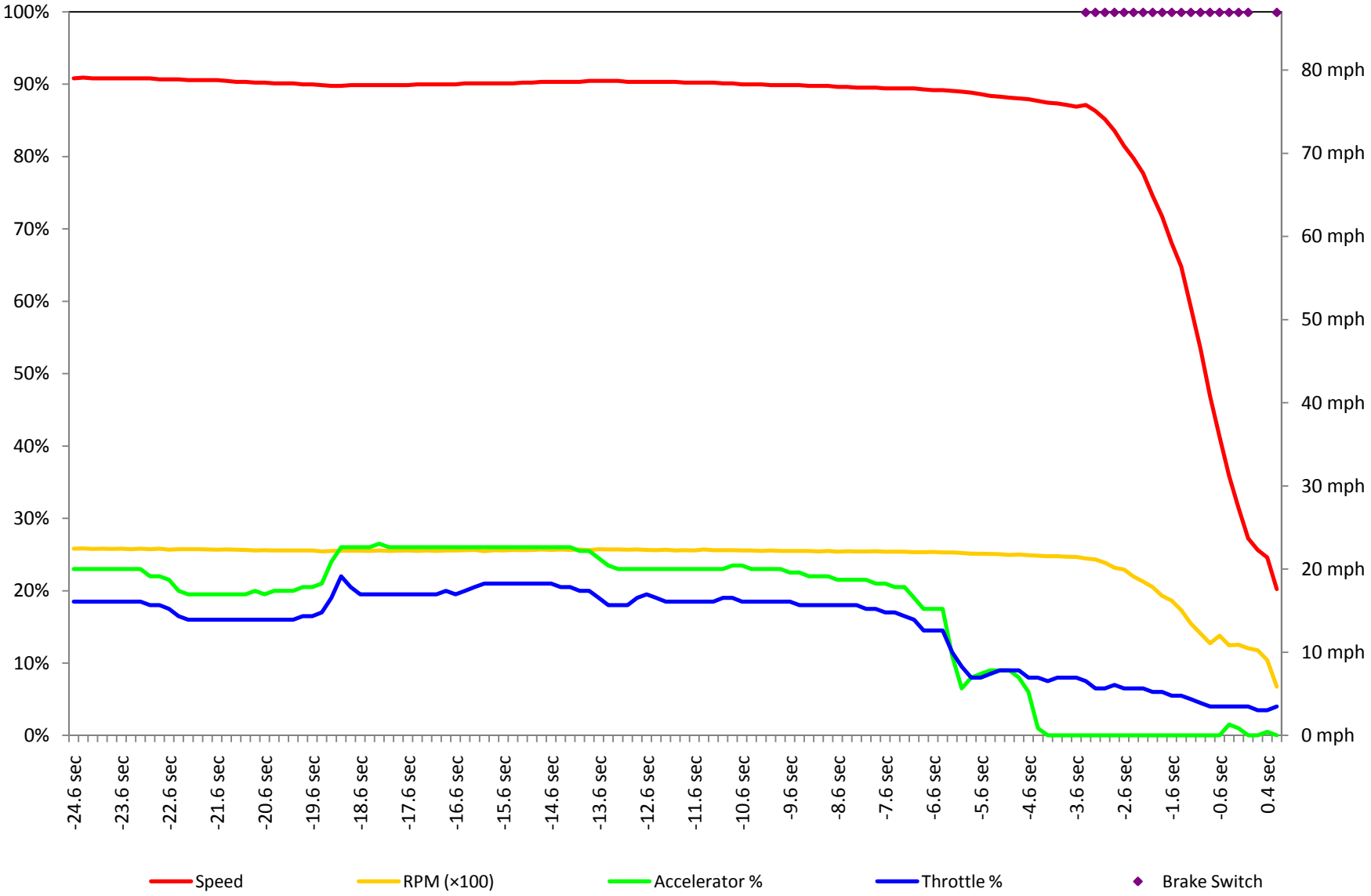
PCM EDR Data (2)

Buffer Address (Hex)	Relative Time (calc.) (Seconds)	Transmission - Reverse (Reverse / Not Reverse)	Speed Control (On / Off)	Engine RPM (RPM)	Driveline Torque Commanded (N-m)	Driveline Torque Actual (N-m)	Traction Control (Active / Inactive)	Stability Control (Active / Inactive)	Key On Timer 63.75 Max (sec) (Seconds)
EA0002C0	-24.6	Not Reverse	OFF	2244.75	169	119	Not Active	Not Active	63.75
EA0002D0	-24.4	Not Reverse	OFF	2248	170	117	Not Active	Not Active	63.75
EA0002E0	-24.2	Not Reverse	OFF	2243.25	163	115	Not Active	Not Active	63.75
EA0002F0	-24.0	Not Reverse	OFF	2247	166	113	Not Active	Not Active	63.75
EA000300	-23.8	Not Reverse	OFF	2243.25	165	114	Not Active	Not Active	63.75
EA000310	-23.6	Not Reverse	OFF	2245	170	114	Not Active	Not Active	63.75
EA000320	-23.4	Not Reverse	OFF	2238.25	168	115	Not Active	Not Active	63.75
EA000330	-23.2	Not Reverse	OFF	2246.5	169	114	Not Active	Not Active	63.75
EA000340	-23.0	Not Reverse	OFF	2240.25	164	113	Not Active	Not Active	63.75
EA000350	-22.8	Not Reverse	OFF	2245.75	163	111	Not Active	Not Active	63.75
EA000360	-22.6	Not Reverse	OFF	2233.75	158	108	Not Active	Not Active	63.75
EA000370	-22.4	Not Reverse	OFF	2241	151	101	Not Active	Not Active	63.75
EA000380	-22.2	Not Reverse	OFF	2239.75	144	97	Not Active	Not Active	63.75
EA000390	-22.0	Not Reverse	OFF	2239.25	139	94	Not Active	Not Active	63.75
EA0003A0	-21.8	Not Reverse	OFF	2238	139	93	Not Active	Not Active	63.75
EA0003B0	-21.6	Not Reverse	OFF	2234.75	139	93	Not Active	Not Active	63.75
EA0003C0	-21.4	Not Reverse	OFF	2235.25	140	93	Not Active	Not Active	63.75
EA0003D0	-21.2	Not Reverse	OFF	2234	136	93	Not Active	Not Active	63.75
EA0003E0	-21.0	Not Reverse	OFF	2230	140	94	Not Active	Not Active	63.75
EA0003F0	-20.8	Not Reverse	OFF	2225.75	137	94	Not Active	Not Active	63.75
EA000400	-20.6	Not Reverse	OFF	2227.75	138	94	Not Active	Not Active	63.75
EA000410	-20.4	Not Reverse	OFF	2226	136	94	Not Active	Not Active	63.75
EA000420	-20.2	Not Reverse	OFF	2226	138	95	Not Active	Not Active	63.75
EA000430	-20.0	Not Reverse	OFF	2224	138	95	Not Active	Not Active	63.75
EA000440	-19.8	Not Reverse	OFF	2224	139	97	Not Active	Not Active	63.75
EA000450	-19.6	Not Reverse	OFF	2223.75	143	98	Not Active	Not Active	63.75
EA000460	-19.4	Not Reverse	OFF	2213.5	143	99	Not Active	Not Active	63.75
EA000470	-19.2	Not Reverse	OFF	2217.75	156	106	Not Active	Not Active	63.75
EA000480	-19.0	Not Reverse	OFF	2222.5	187	128	Not Active	Not Active	63.75
EA000490	-18.8	Not Reverse	OFF	2220.75	212	146	Not Active	Not Active	63.75
EA0004A0	-18.6	Not Reverse	OFF	2220.75	213	145	Not Active	Not Active	63.75
EA0004B0	-18.4	Not Reverse	OFF	2217.75	208	144	Not Active	Not Active	63.75
EA0004C0	-18.2	Not Reverse	OFF	2225.75	212	145	Not Active	Not Active	63.75
EA0004D0	-18.0	Not Reverse	OFF	2217.75	210	146	Not Active	Not Active	63.75
EA0004E0	-17.8	Not Reverse	OFF	2222	209	146	Not Active	Not Active	63.75
EA0004F0	-17.6	Not Reverse	OFF	2225	210	146	Not Active	Not Active	63.75
EA000500	-17.4	Not Reverse	OFF	2219.5	206	145	Not Active	Not Active	63.75
EA000510	-17.2	Not Reverse	OFF	2224.75	211	144	Not Active	Not Active	63.75
EA000520	-17.0	Not Reverse	OFF	2219.75	211	145	Not Active	Not Active	63.75
EA000530	-16.8	Not Reverse	OFF	2224.5	212	144	Not Active	Not Active	63.75
EA000540	-16.6	Not Reverse	OFF	2225.75	214	144	Not Active	Not Active	63.75
EA000550	-16.4	Not Reverse	OFF	2226.75	207	142	Not Active	Not Active	63.75
EA000560	-16.2	Not Reverse	OFF	2229.75	200	135	Not Active	Not Active	63.75
EA000570	-16.0	Not Reverse	OFF	2214	206	140	Not Active	Not Active	63.75
EA000580	-15.8	Not Reverse	OFF	2227.5	207	141	Not Active	Not Active	63.75
EA000590	-15.6	Not Reverse	OFF	2225.5	205	142	Not Active	Not Active	63.75
EA0005A0	-15.4	Not Reverse	OFF	2229.75	208	144	Not Active	Not Active	63.75
EA0005B0	-15.2	Not Reverse	OFF	2226.75	207	144	Not Active	Not Active	63.75
EA0005C0	-15.0	Not Reverse	OFF	2231.25	206	145	Not Active	Not Active	63.75
EA0005D0	-14.8	Not Reverse	OFF	2236.25	209	145	Not Active	Not Active	63.75
EA0005E0	-14.6	Not Reverse	OFF	2230	205	145	Not Active	Not Active	63.75
EA0005F0	-14.4	Not Reverse	OFF	2236	209	144	Not Active	Not Active	63.75
EA000600	-14.2	Not Reverse	OFF	2230.75	207	143	Not Active	Not Active	63.75
EA000610	-14.0	Not Reverse	OFF	2236.25	208	141	Not Active	Not Active	63.75
EA000620	-13.8	Not Reverse	OFF	2227.75	207	141	Not Active	Not Active	63.75
EA000630	-13.6	Not Reverse	OFF	2240.25	199	135	Not Active	Not Active	63.75
EA000640	-13.4	Not Reverse	OFF	2235.25	187	127	Not Active	Not Active	63.75
EA000650	-13.2	Not Reverse	OFF	2236.75	177	119	Not Active	Not Active	63.75
EA000660	-13.0	Not Reverse	OFF	2233.25	164	110	Not Active	Not Active	63.75
EA000670	-12.8	Not Reverse	OFF	2236.25	163	112	Not Active	Not Active	63.75
EA000680	-12.6	Not Reverse	OFF	2230.25	172	115	Not Active	Not Active	63.75
EA000690	-12.4	Not Reverse	OFF	2228	168	115	Not Active	Not Active	63.75
EA0006A0	-12.2	Not Reverse	OFF	2233.25	166	113	Not Active	Not Active	63.75

Buffer Address (Hex)	Relative Time (calc.) (Seconds)	Transmission - Reverse (Reverse / Not Reverse)	Speed Control (On / Off)	Engine RPM (RPM)	Driveline Torque Commanded (N-m)	Driveline Torque Actual (N-m)	Traction Control (Active / Inactive)	Stability Control (Active / Inactive)	Key On Timer 63.75 Max (sec) (Seconds)
EA0006B0	-12.0	Not Reverse	OFF	2224	162	113	Not Active	Not Active	63.75
EA0006C0	-11.8	Not Reverse	OFF	2227.75	164	113	Not Active	Not Active	63.75
EA0006D0	-11.6	Not Reverse	OFF	2224.75	165	113	Not Active	Not Active	63.75
EA0006E0	-11.4	Not Reverse	OFF	2235.75	164	113	Not Active	Not Active	63.75
EA0006F0	-11.2	Not Reverse	OFF	2227.75	165	114	Not Active	Not Active	63.75
EA000700	-11.0	Not Reverse	OFF	2226.75	165	116	Not Active	Not Active	63.75
EA000710	-10.8	Not Reverse	OFF	2227	171	116	Not Active	Not Active	63.75
EA000720	-10.6	Not Reverse	OFF	2223.75	169	117	Not Active	Not Active	63.75
EA000730	-10.4	Not Reverse	OFF	2226	172	118	Not Active	Not Active	63.75
EA000740	-10.2	Not Reverse	OFF	2218.75	169	116	Not Active	Not Active	63.75
EA000750	-10.0	Not Reverse	OFF	2225.5	169	116	Not Active	Not Active	63.75
EA000760	-9.8	Not Reverse	OFF	2218.75	168	114	Not Active	Not Active	63.75
EA000770	-9.6	Not Reverse	OFF	2217.25	165	113	Not Active	Not Active	63.75
EA000780	-9.4	Not Reverse	OFF	2219.25	162	111	Not Active	Not Active	63.75
EA000790	-9.2	Not Reverse	OFF	2219.5	158	110	Not Active	Not Active	63.75
EA0007A0	-9.0	Not Reverse	OFF	2213.25	157	108	Not Active	Not Active	63.75
EA0007B0	-8.8	Not Reverse	OFF	2219.75	157	107	Not Active	Not Active	63.75
EA0007C0	-8.6	Not Reverse	OFF	2210	154	107	Not Active	Not Active	63.75
EA0007D0	-8.4	Not Reverse	OFF	2214.25	155	106	Not Active	Not Active	63.75
EA0007E0	-8.2	Not Reverse	OFF	2212.25	155	106	Not Active	Not Active	63.75
EA0007F0	-8.0	Not Reverse	OFF	2212.5	154	106	Not Active	Not Active	63.75
EA000010	-7.8	Not Reverse	OFF	2216.75	161	109	Not Active	Not Active	63.75
EA000020	-7.6	Not Reverse	OFF	2210.25	157	106	Not Active	Not Active	63.75
EA000030	-7.4	Not Reverse	OFF	2208.75	151	103	Not Active	Not Active	63.75
EA000040	-7.2	Not Reverse	OFF	2209.75	150	102	Not Active	Not Active	63.75
EA000050	-7.0	Not Reverse	OFF	2202.5	141	99	Not Active	Not Active	63.75
EA000060	-6.8	Not Reverse	OFF	2204.75	130	89	Not Active	Not Active	63.75
EA000070	-6.6	Not Reverse	OFF	2205.75	127	87	Not Active	Not Active	63.75
EA000080	-6.4	Not Reverse	OFF	2200	128	88	Not Active	Not Active	63.75
EA000090	-6.2	Not Reverse	OFF	2199.25	126	86	Not Active	Not Active	63.75
EA0000A0	-6.0	Not Reverse	OFF	2194.75	81	56	Not Active	Not Active	63.75
EA0000B0	-5.8	Not Reverse	OFF	2186.5	56	39	Not Active	Not Active	63.75
EA0000C0	-5.6	Not Reverse	OFF	2186.5	46	30	Not Active	Not Active	63.75
EA0000D0	-5.4	Not Reverse	OFF	2182.25	39	25	Not Active	Not Active	63.75
EA0000E0	-5.2	Not Reverse	OFF	2178.75	40	27	Not Active	Not Active	63.75
EA0000F0	-5.0	Not Reverse	OFF	2171	42	28	Not Active	Not Active	63.75
EA000100	-4.8	Not Reverse	OFF	2177	41	27	Not Active	Not Active	63.75
EA000110	-4.6	Not Reverse	OFF	2166.5	36	23	Not Active	Not Active	63.75
EA000120	-4.4	Not Reverse	OFF	2159.75	23	16	Not Active	Not Active	63.75
EA000130	-4.2	Not Reverse	OFF	2155	22	14	Not Active	Not Active	63.75
EA000140	-4.0	Not Reverse	OFF	2154.75	17	11	Not Active	Not Active	63.75
EA000150	-3.8	Not Reverse	OFF	2148.25	21	11	Not Active	Not Active	63.75
EA000160	-3.6	Not Reverse	OFF	2147	17	10	Not Active	Not Active	63.75
EA000170	-3.4	Not Reverse	OFF	2128.5	17	9	Not Active	Not Active	63.75
EA000180	-3.2	Not Reverse	OFF	2115.5	1	0	Not Active	Not Active	63.75
EA000190	-3.0	Not Reverse	OFF	2075.25	-6	-6	Not Active	Not Active	63.75
EA0001A0	-2.8	Not Reverse	OFF	2015.75	-8	-10	Not Active	Not Active	63.75
EA0001B0	-2.6	Not Reverse	OFF	1996.75	-8	-9	Not Active	Not Active	63.75
EA0001C0	-2.4	Not Reverse	OFF	1909.5	-18	-15	Not Active	Not Active	63.75
EA0001D0	-2.2	Not Reverse	OFF	1851.25	-15	-15	Not Active	Not Active	63.75
EA0001E0	-2.0	Not Reverse	OFF	1782.75	-5	-8	Not Active	Not Active	63.75
EA0001F0	-1.8	Not Reverse	OFF	1678	0	-6	Not Active	Not Active	63.75
EA000200	-1.6	Not Reverse	OFF	1621.75	-2	-6	Not Active	Not Active	63.75
EA000210	-1.4	Not Reverse	OFF	1506	-1	-7	Not Active	Not Active	63.75
EA000220	-1.2	Not Reverse	OFF	1343	1	-6	Not Active	Not Active	63.75
EA000230	-1.0	Not Reverse	OFF	1225.75	0	-5	Not Active	Not Active	63.75
EA000240	-0.8	Not Reverse	OFF	1107.5	3	-5	Not Active	Not Active	63.75
EA000250	-0.6	Not Reverse	OFF	1199.5	-10	-12	Not Active	Not Active	63.75
EA000260	-0.4	Not Reverse	OFF	1083.25	-7	-11	Not Active	Not Active	63.75
EA000270	-0.2	Not Reverse	OFF	1089.5	-7	-10	Not Active	Not Active	63.75
EA000280	0.0	Not Reverse	OFF	1049.5	-11	-13	Not Active	Not Active	63.75
EA000290	0.2	Not Reverse	OFF	1025.5	-14	-15	Not Active	Not Active	63.75
EA0002A0	0.4	Not Reverse	OFF	907.75	-16	-26	Not Active	Not Active	63.75
EA0002B0	0.6	Not Reverse	OFF	586	-22	-44	Not Active	Not Active	63.75

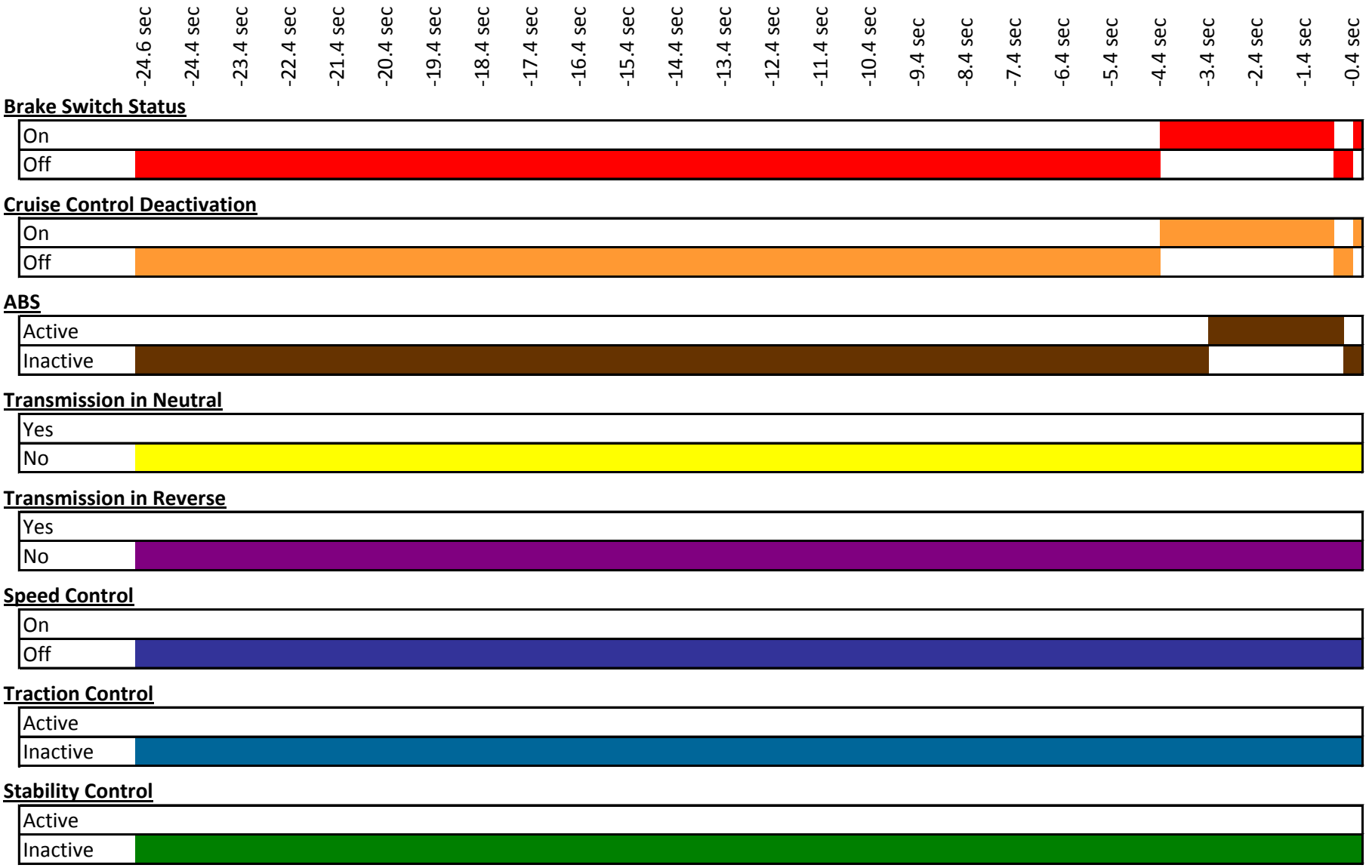
Collected with CDR version: Crash Data Retrieval Tool 3.1.1
Reported with CDR version: Crash Data Retrieval Tool 3.3

User:
Case Number:



Maximum Recorded Speed: **79.1 mph at -24.4 sec**

On/Yes equals 100%



Collected with CDR version: Crash Data Retrieval Tool 3.1.1
Reported with CDR version: Crash Data Retrieval Tool 3.3