



U.S. Department  
of Transportation

**National Highway  
Traffic Safety  
Administration**



DOT HS 813 593

July 2024

**Special Crash Investigations:  
Remote Move-Over-Law Crash  
Investigation;  
Vehicle: 2015 Ford F-150;  
Location: Washington State;  
Crash Date: June 2021**

*This page is intentionally left blank.*

## DISCLAIMER

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Suggested APA Format Citation:

Dynamic Science, Inc. (2024, July). *Special Crash Investigations: Remote move-over-law crash investigation; Vehicle: 2015 Ford F-150; Location: Washington State; Crash Date: June 2021* (Report No. DOT HS 813 593). National Highway Traffic Safety Administration.

*This page is intentionally left blank.*

## Technical Report Documentation Page

<b>1. Report No.</b> DOT HS 813 593	<b>2. Government Accession No.</b>	<b>3. Recipient's Catalog No.</b>	
<b>4. Title and Subtitle</b> Special Crash Investigations: Remote Move-Over-Law Crash Investigation; Vehicle: 2015 Ford F-150; Location: Washington State; Crash Date: June 2021		<b>5. Report Date</b> July 2024	
		<b>6. Performing Organization Code</b>	
<b>7. Author</b> Dynamic Science, Inc.		<b>8. Performing Organization Report No.</b>	
<b>9. Performing Organization Name and Address</b> Dynamic Science, Inc. 26141 Marguerite Parkway, Suite C Mission Viejo, CA 92692		<b>10. Work Unit No. (TRAIS)</b>	
		<b>11. Contract or Grant No.</b> 693JJ918C000012	
<b>12. Sponsoring Agency Name and Address</b> National Highway Traffic Safety Administration 1200 New Jersey Avenue SE Washington, DC 20590		<b>13. Type of Report and Period Covered</b> Technical Report June 2021	
		<b>14. Sponsoring Agency Code</b>	
<b>15. Supplementary Notes</b>  Each crash represents a unique sequence of events and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicles or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.			
<b>16. Abstract</b>  This report documents a Special Crash Investigations (SCI) remote investigation of a Move-Over-Law incident where a 2015 Ford F-150 police vehicle was struck by a 2005 Ford F-350. A 2015 Freightliner Cascadia tractor pulling a Pratt trailer chassis with a container unit was also involved. The 54-year-old male police officer had finished inspecting the Freightliner and returned to his vehicle on the highway shoulder. The unbelted 40-year-old male driver of the F-350 was driving southbound in a stolen vehicle. The Ford F-350 ran off the road onto the right shoulder until it struck the back of the Ford F-150, which was displaced forward, striking the back of the Pratt trailer. The police officer was extricated by emergency personnel. He sustained police-reported "A" (disabling) injuries and was transported by helicopter to a local trauma center. The driver of the Ford F-350 was extricated by the police and placed under arrest for driving under the influence. He sustained police-reported "B" (non-disabling) injuries and was transported by helicopter to a local trauma center. The driver of the Freightliner was not injured.			
<b>17. Key Words</b>  Move-Over-Law		<b>18. Distribution Statement</b>  This document is available to the public from the DOT, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, <a href="https://crashstats.nhtsa.dot.gov">https://crashstats.nhtsa.dot.gov</a> .	
<b>19. Security Classif. (of this report)</b> Unclassified	<b>20. Security Classif. (of this page)</b> Unclassified	<b>21. No. of Pages</b> 46	<b>22. Price</b>

*This page is intentionally left blank.*

# Table of Contents

<b>Background .....</b>	<b>1</b>
<b>Summary.....</b>	<b>5</b>
Crash Site.....	5
Pre-Crash.....	5
Crash.....	6
Post-Crash.....	6
Move-Over-Law Discussion.....	6
<b>2015 Ford F-150 .....</b>	<b>9</b>
Description.....	9
Emergency Lighting Discussion.....	9
Exterior Damage .....	9
NHTSA Recalls and Investigations .....	10
Manual Restraint Systems.....	11
Supplemental Restraint Systems.....	11
<b>2015 Ford F-150 Occupant.....</b>	<b>13</b>
Driver Demographics.....	13
Driver Injuries.....	13
Driver Kinematics.....	14
<b>2005 Ford F-350 .....</b>	<b>15</b>
Description.....	15
NHTSA Recalls and Investigations .....	15
<b>2005 Ford F-350 Occupant.....</b>	<b>17</b>
Driver Demographics.....	17
Striking Vehicle Driver.....	17
Driver Kinematics.....	18
Driver Injuries.....	18
<b>2015 Freightliner Cascadia Tractor .....</b>	<b>19</b>
Description.....	19
Driver Data.....	20
<b>Crash Diagram .....</b>	<b>21</b>
<b>Appendix: Event Data Recorder Report 2015 Ford F-150 .....</b>	<b>22</b>

**Special Crash Investigations  
Remote Move-Over-Law Crash Investigation  
Case Number: DS21010  
Vehicle: 2015 Ford F-150  
Location: Washington State  
Crash Date: June 2021**

## **Background**

This report documents the remote investigation of a crash selected by the Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration to be included in its Move-Over-Law investigations. The investigation used data obtained from local authorities including the police report, on-scene police photos, and other sources. The source material documented the facts of the case and reconstructed the causal factors of the crash relative to Washington State’s Move-Over-Law. Revised code Washington RCW.46.61.212, “Approaching Emergency Zones,” is typically referred to as the Move-Over Law. It requires that any vehicle approaching an emergency or work zone to proceed with due caution, and if safe, move over or change lanes. If changing lanes is not possible, drivers should reduce their speed to 10 miles under the posted speed limit. This investigation was initiated by SCI in response to a notification sent by the SCI team containing an online news release. The SCI team obtained the police report and on-scene police photos in October 2021. The case was assigned to Dynamic Science, Inc., in October 2021.



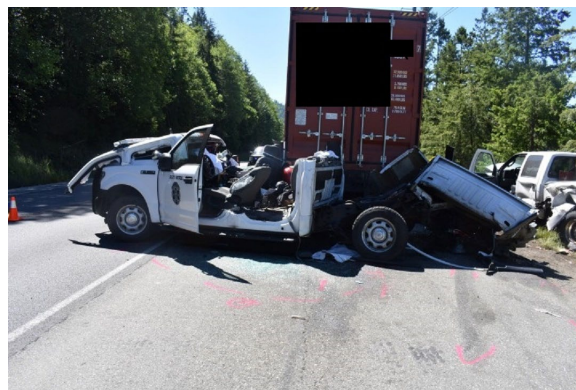
*Figure 1. The struck subject vehicle, 2015 Ford F-150 police vehicle, looking north (police photo)*



*Figure 2. Striking vehicle, 2005 Ford F-350, looking north (police photo)*

The struck subject vehicle was a 2015 Ford F-150 police vehicle (Figure 1) and the striking vehicle was a 2005 Ford F-350 (Figure 2). The other involved vehicle was a 2015 Freightliner Cascadia tractor pulling a Pratt trailer chassis with a container unit. The crash site was the shoulder adjacent to the southbound lane of a two-lane undivided State highway. The crash conditions were daylight, dry, and clear visibility in Washington State. The posted speed limit was 89 km/h (55 mph).

Prior to the crash, the police officer had finished inspecting the Freightliner and its trailer on the right shoulder and returned to his vehicle. The fully-marked police vehicle had emergency lights that were activated. It was parked at an approximate -10 to 15° angle behind the Freightliner. The law enforcement officer was seated in his vehicle and unbelted. He was completing paperwork and was about to exit the vehicle to re-contact the 37-year-old male driver of the Freightliner, who was seated inside the cab of his vehicle. The unbelted 40-year-old male driver of the F-350 was driving southbound. The driver had stolen the vehicle shortly before this crash and was fleeing from police. The Ford F-350 passed several other vehicles at high speed. The Ford F-350 exited the travel lane to the right and entered the shoulder. The F-350 traveled straight until it struck the back plane of the Ford F-150. The Ford F-150 was displaced forward and left (to approximately -75°) and struck the back plane of the Pratt trailer with its right plane (Figure 3).



*Figure 3. Pratt trailer, 2015 Ford F-150 police vehicle, looking south*

The Ford F-150 came to rest in contact with the trailer. The Ford F-350 came to rest off the right shoulder slightly south of the trailer. The police officer was extricated by emergency personnel. He sustained police-reported "A" (disabling) injuries that included scapula and rib fractures, a lung contusion, and a scalp hematoma. He was transported by helicopter to a local trauma center. The driver of the Ford F-350 was extricated by the police and placed under arrest for driving under the influence. He sustained police reported "B" (non-disabling) injuries and was transported by helicopter to a local trauma center. The driver of the Freightliner was not injured. Both Fords were towed from the scene and placed on a police hold. The Freightliner was driven from the scene.

The event data recorder (EDR) for the Ford F-150 was imaged by police by back-powering the restraint control module (RCM) with 12-volt power applied to the RCM fuse. One locked side event was recovered. The report showed that the vehicle transmission was in "Park" at the time of the crash. SCI obtained a PDF version of the report that is included as an appendix to this report.

*This page is intentionally left blank.*

## Summary

### Crash Site

The crash site was the shoulder adjacent to the southbound lane of a two-lane north/south undivided State highway (Figure 4). The roadway measurements were obtained from satellite imagery and are approximate. The 3.6 m (12 ft) wide travel lanes were separated by a dashed-painted yellow line with a center rumble strip. The roadway was bordered on the right edge by a solid white painted fog lane, a 5.3 m (18 ft) wide asphalt shoulder (pull out), a gravel shoulder, and an area of level grass/dirt. The roadway was bordered on the left edge by a solid white painted fog line, an asphalt shoulder, a dirt shoulder, and a tree line. The weather at the nearest reporting station was 21 °C (71 °F), 57 percent humidity, and winds out of the north-northeast at 14 km/h (9 mph). Conditions were daylight, dry, and clear visibility. The posted speed limit for this straight, well-traveled, asphalt roadway was 89 km/h (55 mph).



*Figure 4. Southbound approach (police photo)*

### Pre-Crash

Earlier in the morning, the 40-year-old male driver of the Ford F-350 was at a gas station, according to police reports. He was visible on a gas station security camera spraying gasoline on the ground and then igniting it next to a van. He then entered/stole the Ford F-350 that was parked adjacent to the fuel pump island and fled the scene, traveling southbound. Several minutes later the Washington State Patrol also began traveling southbound to overtake the Ford F-350.

Prior to the crash, the police officer had finished inspecting the Freightliner and its trailer on the right shoulder and returned to his vehicle. The fully-marked police vehicle was equipped with emergency lights that were activated. It was parked diagonally behind the Freightliner. The officer was seated in his vehicle and unbelted. He was completing paperwork and was about to exit the vehicle to re-contact the 37-year-old driver of the Freightliner, who was seated inside the cab of his vehicle. The driver of the Freightliner was placed out-of-service until properly licensed. The vehicle was placed out-of-service until repairs were made.

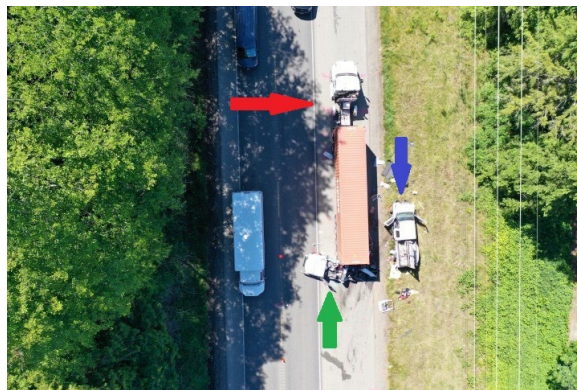
The Ford F-350 continued traveling southbound at high speed prior to this crash. The Ford F-350 exited the travel lane to the right and entered the wide shoulder.

## Crash

The F-350 traveled straight until it struck the back plane of the Ford F-150 (Event 1). The EDR report reported a maximum longitudinal delta V of 50.6 km/h (31.4 mph). The inflatable curtain (IC) and seat-mounted side air bags deployed. The Ford F-150 was displaced forward and left, beginning a counterclockwise rotation. The left plane of the Ford F-150 struck the back corner of the Ford F-350, displacing the bed (Event 2). The Ford F-150 then struck the back plane of the Pratt trailer with its right plane (Event 3).

## Post-Crash

The Ford F-150 came to rest in contact with the trailer (Figure 5). The Ford F-350 came to rest right of the shoulder and parallel to the trailer. The police officer in the Ford F-150 was extricated by emergency personnel. He sustained police-reported “A” (disabling) injuries that included scapula and rib fractures, a lung contusion, and a scalp hematoma. He was transported by helicopter to a local trauma center where he was hospitalized for 2 days. The driver of the Ford F-350 was extricated by the police and placed under arrest for driving under the influence. He sustained police-reported “B” (non-disabling) injuries and was transported by helicopter to a local trauma center. The driver of the Freightliner was not injured. Both Fords were towed from the scene and placed on a police hold. The Freightliner was driven from the scene.



*Figure 5. Final rest positions (police image), Up = south, 2015 Ford F-150 (green), 2005 Ford F-350 (blue), 2015 Freightliner tractor/trailer (red)*

## Move-Over-Law Discussion

Revised code Washington RCW.46.61.212, “Approaching Emergency Zones,” is typically referred to as the Move-Over Law for the State of Washington. The text of the law is as follows.

Emergency or work zones—Approaching—Penalty—Violation.

(1) An emergency or work zone is defined as the adjacent lanes of the roadway two hundred feet before and after:

(a) A stationary authorized emergency vehicle that is making use of audible and/or visual signals meeting the requirements of RCW 46.37.190;

(b) A tow truck that is making use of visual red lights meeting the requirements of RCW 46.37.196;

(c) Other vehicles providing roadside assistance that are making use of warning lights with three hundred sixty degree visibility;

(d) A police vehicle properly and lawfully displaying a flashing, blinking, or alternating emergency light or lights; or

(e) A stationary or slow moving highway construction vehicle, highway maintenance vehicle, solid waste vehicle, or utility service vehicle making use of flashing lights that meet the requirements of RCW 46.37.300 or warning lights with three hundred sixty degree visibility.

(2) The driver of any motor vehicle, upon approaching an emergency or work zone, shall:

(a) On a highway having four or more lanes, at least two of which are intended for traffic proceeding in the same direction as the approaching vehicle, proceed with caution and, if the opportunity exists, with due regard for safety and traffic conditions, yield the right-of-way by making a lane change or moving away from the lane or shoulder occupied by an emergency or work zone vehicle identified in subsection (1) of this section;

(b) On a highway having less than four lanes, proceed with caution, reduce the speed of the vehicle, and, if the opportunity exists, with due regard for safety and traffic conditions, and under the rules of this chapter, yield the right-of-way by passing to the left at a safe distance and simultaneously yield the right-of-way to all vehicles traveling in the proper direction upon the highway; or

(c) If changing lanes or moving away would be unsafe, proceed with due caution and reduce the speed of the vehicle to at least ten miles per hour below the posted speed limit.

(3) A person may not drive a vehicle in an emergency or work zone at a speed greater than the posted speed limit or greater than what is permitted under subsection (2)(c) of this section.

(4) A person found to be in violation of this section, or any infraction relating to speed restrictions in an emergency or work zone, must be assessed a monetary penalty equal to twice the penalty assessed under RCW 46.63.110. This penalty may not be waived, reduced, or suspended.

(5) A person who drives a vehicle in an emergency or work zone in such a manner as to endanger or be likely to endanger any emergency or work zone worker or property is guilty of reckless endangerment of emergency or work zone workers. A violation of this subsection is a gross misdemeanor punishable under chapter 9A.20 RCW.

(6) The department shall suspend for sixty days the driver's license, permit to drive, or nonresident driving privilege of a person convicted of reckless endangerment of emergency or work zone workers.

It is unknown if the driver of the Ford F-350 was familiar with the law and the actions required of drivers in such circumstances. It is unclear why the driver moved from the travel lane to the pullout lane. A toxicology report for the driver's blood showed .027 mgL of methamphetamine. It was recommended that the driver be charged with vehicular assault and driving under the influence.

*This page is intentionally left blank.*

## 2015 Ford F-150

### Description

The struck vehicle was a 2015 Ford F-150 4-door SuperCrew pickup configured as a police vehicle. It was identified by the Vehicle Identification Number (VIN) 1FTFW1CF3FKxxxxxx. The vehicle had a 5.0-liter, 8-cylinder gasoline engine, 6-speed automatic transmission, a 1.98 m (6.5 ft) bed, 4-wheel ABS, and rear-wheel-drive. It was equipped with 4 doors and seating for 5.

### Emergency Lighting Discussion

The Ford F-150 had a roof-mounted LED light bar (Figure 6), 4-way amber flashers, and standard head lamps and tail lamps. The driver had the emergency light activated as he was completing the inspection of the semi-truck and trailer. The vehicle's interior console emergency light switch was found all the way to the right (Figure 7), indicating the lights were at a Level 3, which is a combination of flashing blue, amber, and red lights. Witnesses confirmed that the light bar was activated.



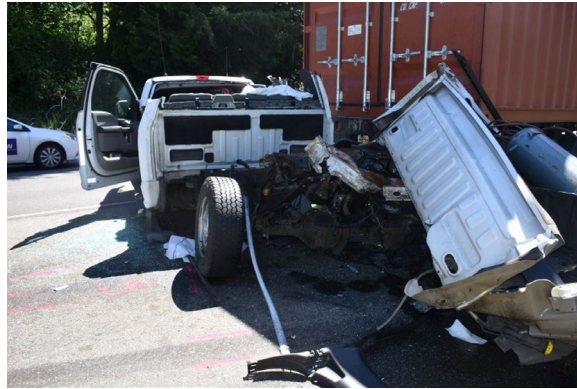
*Figure 6. 2015 Ford F-150, light bar (police photo)*



*Figure 7. 2015 Ford F-150, interior light switch (police photo)*

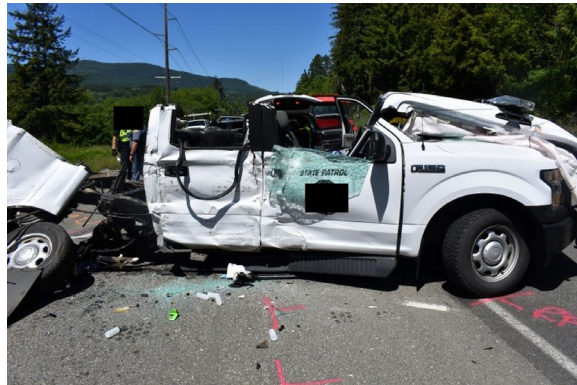
### Exterior Damage

The Ford F-150 sustained severe damage to the back plane from impacts with the Ford F-350. During the initial back-to-front impact, the F-150 was displaced forward into a counterclockwise rotation. The calculated principal direction of force from the EDR data for this impact was 183°. During rotation, the left plane of the F-350 appeared to snag the bed of the F-150 and displaced the bed from the vehicle chassis (Figure 8). Complete collision deformation classifications (CDCs) could not be generated because the damage to the rear plane from the two impacts could not be separated. The estimated CDC was 06BDEW99.



*Figure 8. 2015 Ford F-150, rear plane/bed damage (police photo)*

After rotating counterclockwise, the right plane of the F-150 struck the back plane of the Pratt trailer (Figure 9). The direct damage began forward of the B-pillar and extended rearward into the bed. The damage extended vertically from the frame to above the sill. The CDC was 03RZAW3.



*Figure 9. 2015 Ford F-150, right plane damage (police photo)*

Post-crash, the cab roof was cut off to render aid to the driver.

### **NHTSA Recalls and Investigations**

Searches in January 2022 and March 2024 using the Ford F-150's VIN revealed no unrepaired recalls.

### **Event Data Recorder**

The Ford F-150 had a restraints control module with EDR capabilities. The EDR could record one or two events, each containing 5 seconds of pre-crash data and at least 300 ms of post-crash data. The pre-crash data includes vehicle speed, accelerator pedal percentage, service brake, engine RPM, accelerations, stability control yaw rate, stability control roll rate, and steering wheel angle. The vehicle was parked with the engine running at the time of the crash. The EDR reported the driver's seat belt status as "unbuckled." The EDR data was obtained from the

investigating police agency as a PDF file. The EDR was imaged by the police through the DLC (after being back powered) using Bosch Crash Data Retrieval Tool version 21.1.1. A single event was recovered for ignition cycle 3,926. The event occurred during the initial rear plane impact with the front plane of Ford F-350. The maximum longitudinal delta V was 50.67 km/h (31.48 mph) at 145 milliseconds (ms). The maximum lateral delta-V was 7.92 km/h (4.92 mph) at 120 ms. The principal direction of force as calculated using EDR data was 194°. The left and right front-row seat belt pretensioners actuated at 571.5 and 576.5 ms. Both seat-mounted side impact air bags deployed at 571.5 ms. Both IC air bags deployed at 571.5 ms. The air bag deployments and seat belt pretensioner actuations would be considered late deployments and were probably related to the side impact to the trailer.

### **Interior Damage**

The Ford F-150 sustained moderate interior damage from the impact with the trailer, air bag deployments, and post-crash extrication efforts. There was intrusion to the right front door, right B-pillar, and right rear door. The right front seat was displaced clockwise and the right laminated windows were fractured and displaced. The cab roof was cut off by fire personnel during extrication.

### **Manual Restraint Systems**

The front row had driver and front passenger lap and shoulder seat belts. The driver's belt was equipped with continuous loop belt webbing, a sliding latch plate, an emergency locking retractor (ELR), and an adjustable upper anchor in an unknown position. The EDR reported that the driver seat belt status was "unbuckled." The EDR indicated the Seat Belt Status as "buckled" for the right front seat belt, but on-scene images show the belt jammed against the B pillar. The front-row seat belts had retractor pretensioners that both actuated.

### **Supplemental Restraint Systems**

The Ford F-150 had dual-stage driver and passenger frontal air bags, outboard seat-mounted side-impact air bags for the front rows, and IC air bags for the front and second rows. Both IC and seat-mounted side impact air bags deployed and the seat belt pretensioners actuated as a result of the impact with Ford F-350. The IC air bags were cut during extrication efforts.

*This page is intentionally left blank.*

## 2015 Ford F-150 Occupant

### Driver Demographics

Age/sex: 54 years/male  
 Height: 183 cm (72 in)  
 Weight: 107 kg (235 lb)  
 Eyewear: Unknown  
 Seat type: Bucket  
 Seat track position: Unknown  
 Manual restraint usage: Lap and shoulder seat belt not used  
 Usage source: EDR/police vehicle inspection  
 Air bags: Driver's frontal, seat-mounted side impact, and IC air bag available; driver's seat-mounted side impact and IC air bags deployed.  
 Alcohol/drug data: Not tested  
 Egress from vehicle: Extricated by emergency personnel  
 Transport from scene: Helicopter  
 Type of medical treatment: Hospitalized for 2 days

### Driver Injuries

Injury No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Contusion, right upper lobe of lung	441406.2	This occupant's seat back	Certain
2	Comminuted fracture, right scapula	750900.2	This occupant's seat back	Certain
3	Comminuted fracture, left scapula	750900.2	This occupant's seat back	Certain
4	Fracture, right rib 7, left rib 12	450202.2	This occupant's seat back	Certain
5	Scalp hematoma	110402.1	This occupant's seat back	Probable
6	Fracture, left extra-articular first metacarpal (thumb) base	752000.2	Unknown	Unknown
7	Laceration, right eyebrow	210600.1	Unknown	Unknown

Source: Emergency room records, discharge summary, and follow-up visit reports

## **Driver Kinematics**

The 54-year-old police officer was seated in an unknown posture and was unbelted. He was completing paperwork associated with a roadside truck inspection on a truck tractor and trailer. At impact with the F-350, he was displaced rearward into the driver's seat back, deforming the seat rearward. As the Ford F-150 was displaced forward and into a counterclockwise direction, he remained in place as the vehicle rotated around him and he contacted the left door. At impact with the trailer, he was displaced to the right. He came to rest between the front seats with his head on the rear passenger seat. He was extricated by emergency personnel after the cab roof was removed and was transported to a local trauma center by helicopter.

## 2005 Ford F-350

### Description

The 2005 Ford F-350 Lariat pickup was identified by the VIN 1FTWW33P05Exxxxxx. The manufacture date was unknown. The F-350 was a 4-door crew cab pickup with a gross vehicle weight rating of 5,080 kg (11,200 lbs), 4-wheel drive, a 209 cm (6.8 ft) bed, and seating for five. Standard equipment included a 6.0-liter, 8-cylinder diesel engine, 5-speed automatic transmission, a 2.0 m (6.8 ft) bed, and 4-wheel disc brakes with ABS).

### Exterior Damage

The Ford F-350 sustained moderate damage to the front plane from the impact of the back plane of the F-150 (Figure 10). The damage extended from bumper corner to bumper corner. The hood, grille, and front fenders were deformed. The truck deformation classification (TDC) for this impact was 12FDEW2. The vehicle sustained moderate damage to the left plane as the left plane engaged the bed of the F-150 (Figure 11). The damage began forward of the B-pillar and extended rearward past the rear tire. The forward edge of the bed was snagged and the sheet metal on the side of the bed was torn rearward. The TDC was 11LZEW3.

The passenger side window was broken out by first responders to aid the driver.



*Figure 10. Front plane damage, 2005 Ford F-350 (police photo)*



*Figure 11. Left plane damage, 2005 Ford F-350 (police photo)*

### NHTSA Recalls and Investigations

Searches in January 2022 and March 2024 using the Ford F-350's VIN revealed no unrepaired recalls for this vehicle.

*This page is intentionally left blank.*

## 2005 Ford F-350 Occupant

### Driver Demographics

Age/sex: 40 years/male  
 Height: 168 cm (66 in)  
 Weight: 70 kg (155 lbs.)  
 Eyewear: Unknown  
 Seat type: Split-bench with separate back cushions  
 Seat track position: Unknown  
 Manual restraint usage: Lap and shoulder belt not used  
 Usage source: Police report  
 Air bags: Frontal air bag available; frontal air bag deployed  
 Alcohol/drug data: Methamphetamine (.027 mg/L),  
 negative for alcohol  
 Egress from vehicle: Removed by police  
 Transport from scene: Helicopter  
 Type of medical treatment: Treated and released

### Striking Vehicle Driver

(Move-Over data, obtained from police report)

Police injury severity:	B (non-disabling)
Speeding-related:	No
Condition (impairment) at the time of crash:	Under the influence of drugs
Police reported alcohol presence:	Tested positive for methamphetamine, negative for alcohol
Alcohol test:	Blood draw
Alcohol test result:	Negative
Police reported other drug presence:	Methamphetamine (.027 mg/L)
Method of drug determination by police:	Blood draw
Other drug test result:	Not reported
Physical/mental conditions:	None noted
Driver fatigue:	Not reported
Driver's distraction/inattention to driving:	Not reported
Driver's distractions:	None
Driver illness:	No illness
Driver's license type/status:	Suspended
GDL status:	NA
Violations charged:	Vehicular assault
Striking vehicle driver sight line to the struck firstresponder vehicle clear:	Yes

Police injury severity:	B (non-disabling)
Striking vehicle driver sight line to the struck firstresponder vehicle obscured:	No
Driver notes:	None

### Driver Kinematics

The driver was an unbelted 40-year-old male. His seat belt status was determined by the police who noted that the seat belt was locked in the stowed position by the belt pretensioner. The driver and passenger frontal air bags deployed during the crash. He was extricated by the police and placed under arrest for driving under the influence (tested positive for methamphetamine, and negative for alcohol). He sustained police-reported “B” (non-disabling) injuries that consisted of facial lacerations and was transported by helicopter to a local trauma center for treatment.

### Driver Injuries

Injury No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Facial lacerations	210600.1	Unknown	Unknown

Source: Police report

## 2015 Freightliner Cascadia Tractor

### Description

The 2015 Freightliner Cascadia tractor was identified by police using the VIN 1FUNGED63FLxxxxxx. The Freightliner was a conventional cab behind-engine truck tractor with a 6-cylinder, 14.8-liter, diesel engine and an 8 x 4 drivetrain configuration (two sets of steering axles at the front and two sets of drive axles at the rear). It was pulling a 2014 Pratt chassis trailer that had 4 axles and was loaded with a shipping container.



*Figure 12. 2015 Freightliner Cascadia tractor/2014 Pratt chassis trailer (police photo)*

### Exterior Damage

The Freightliner was not damaged (Figure 12). The Pratt trailer sustained minor damage from the impact with the right plane of the Ford F-150 (Figure 13). The TDC for this impact is 06BDEWA.

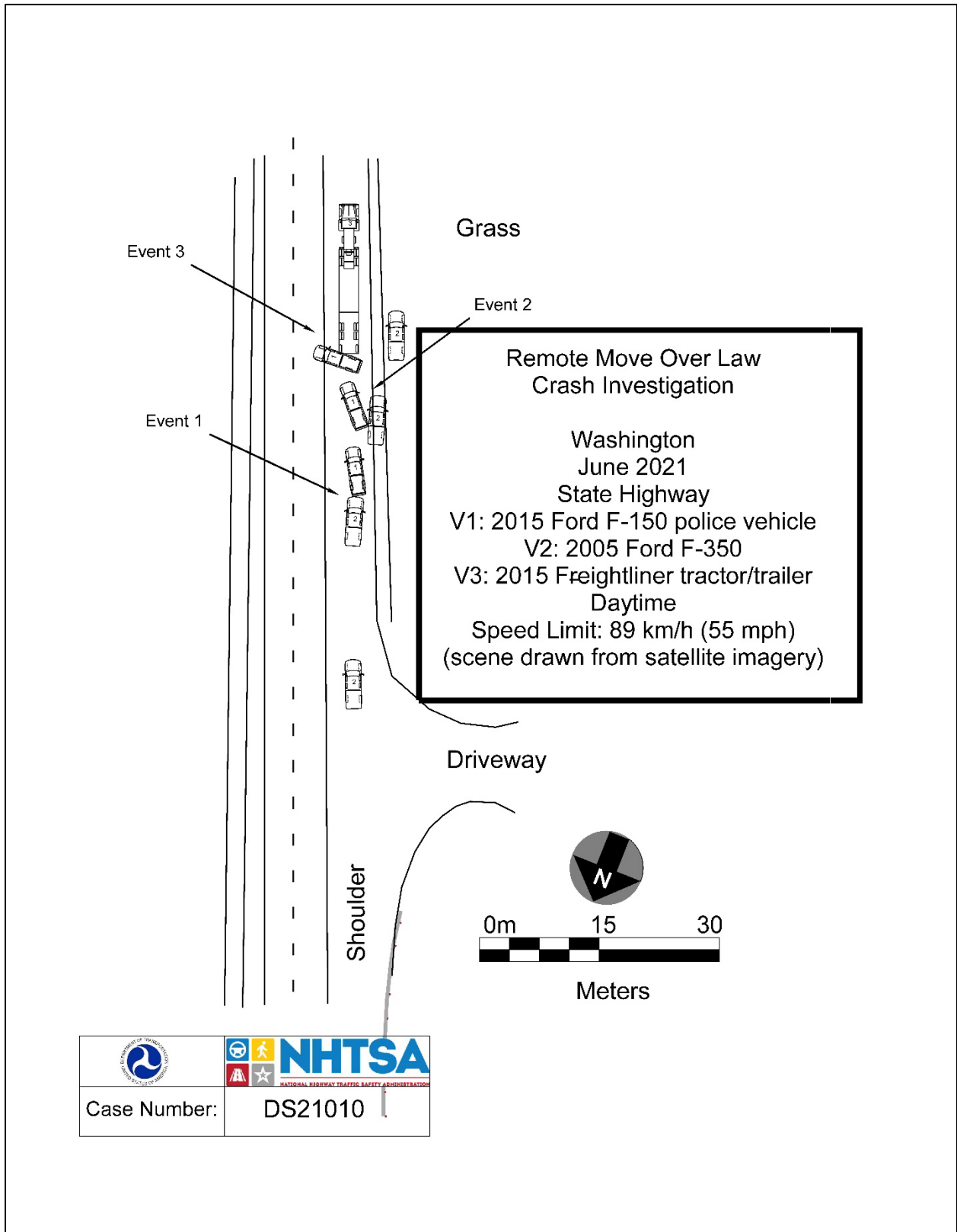


*Figure 13. Rear plane damage, 2014 Pratt chassis trailer and container (police photo)*

**Driver Data**

The driver was a belted 37-year-old male who was not injured.

# Crash Diagram



## Appendix: Event Data Recorder Report 2015 Ford F-150<sup>1</sup>

---

<sup>1</sup>The Bosch CDR Report contained in this technical report was imaged by the investigating police department. Only a PDF copy of the Bosch CDR Report was provided by the police. Hexadecimal data has been deleted due to potential personal identifiable information.

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	1FTFW1CF3FK [REDACTED]
User	[REDACTED]
Case Number	21-009981
EDR Data Imaging Date	08/02/2021
Crash Date	[REDACTED]
Filename	1FTFW1CF3FK [REDACTED].ACM.CDRX
Saved on	Monday, August 2 2021 at 16:20:06
Imaged with CDR version	Crash Data Retrieval Tool 21.1.1
Imaged with Software Licensed to (Company Name)	[REDACTED]
Reported with CDR version	Crash Data Retrieval Tool 21.1.1
Reported with Software Licensed to (Company Name)	[REDACTED]
EDR Device Type	Airbag Control Module
ACM Adapter Detected During Download	Yes
Event(s) recovered	locked side event Fuel cutoff level 1

### Comments

[REDACTED]

other notes:

[REDACTED]

### Data Limitations

Data Imaging  
1FTFW1CF3FK [REDACTED]

**CAUTION:** When imaging data directly from the RCM on a bench top, make sure the RCM is placed on a flat surface without any movement (static) while connected to and powered by the CDR interface. Not following the above guideline for bench top imaging could risk inducing new events to be recorded in the RCM and possibly overwriting a Non airbag deployment.

Note that the RCM Adapter Detected during Download parameter equal to "Yes" indicates that the EDR data was collected directly from the RCM. When equal to "No", it indicates that the EDR data was collected through the OBD II from the vehicle.

**Restraints Control Module (RCM) Recorded Crash Event(s):**

The RCM can store up to two crash events. Event types are categorized as follow:

1. Non deployment trigger event is an event in which EDR recording trigger threshold is met or exceeded (minimum of 5 mph (8kph) Accumulated Delta Velocity within 150ms interval), but no device(s) have deployed. The data from such event can be overwritten by subsequent events.
2. Airbag deployment event is an event in which frontal, side or curtain airbags have deployed. Note that such event cannot be overwritten or cleared from the Restraints Control Module (RCM). Once the RCM has deployed any airbag device(s), the RCM must be replaced.
3. Some RCM may also categorize Non airbag deployment event. This type is an event in which non airbag devices such as pretensioners, knee bolster etc... have deployed. Note that such event can be overwritten given a subsequent "deployment" event.

"Time zero" or Event Beginning of any event (First Record or Second Record) is defined as the first Algorithm wake up during that event. So all the Pre-Crash, At Event, Delta V Data, deployment times etc... are relative to "Time zero".

It is possible that conditions in a crash may result in an incomplete event data record.

## **EDR Data Elements Overview/Interpretation in CDR Report:**

### **Under CDR File Information Section**

- Event(s) recovered indicates if an event was detected and recorded by RCM. If no event is detected, it will indicate "none". If a trigger or non airbag deployment event is detected, it will indicate "unlocked event". If an airbag deployment is detected, it will indicate "locked frontal event", or "locked side event", or "locked rollover event".

### **Under System Status at Event Section**

- Complete file recorded indicates if data from the recorded event has been fully written to the RCM memory.
- If the RCM detected a peripheral crash sensor was lost during an event, the crash sensor would be identified as well as the time it was lost during that event relative to Time zero. If no loss of a peripheral crash sensor, nothing would be displayed. Note in some vehicles, loss of a peripheral crash sensor may lead to the loss of another peripheral crash sensor due to shared communication.

### **Under Deployment Data Section**

- If the RCM commanded a deployment during an event, the deployment device(s) would be identified as well as the time the RCM commanded its deployment relative to Time zero. If no device was commanded to deploy by the RCM, nothing (no deployment device(s)) would be displayed.

### **Under Pre-Crash Data -5 to 0 sec**

- Steering Wheel Angle if Applicable: positive value indicates left turn, and negative value would indicate right turn.
- Stability Control Lateral Acceleration if Applicable: Lateral Acceleration (Y-direction) is the acceleration along the lateral axis of the vehicle, reported as positive when accelerating to the left.
- Stability Control Longitudinal Acceleration if Applicable: Longitudinal Acceleration (X-direction) is the acceleration along the longitudinal axis of the vehicle, reported as positive when accelerating in a forward direction.
- Stability Control Yaw Rate if Applicable: The Yaw Axis is the vertical axis of the vehicle, generally perpendicular to the plane of the road. A positive Yaw Rate is counter-clockwise when observing the vehicle from above.
- Stability Control Roll Rate if Applicable: The Roll Axis is the longitudinal axis of the vehicle, generally aligned with the primary axis of motion of the vehicle. A positive Roll Rate is counter-clockwise when observing the vehicle from the front.

### **Under Longitudinal Crash Pulse**

- Delta-V, longitudinal: SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from Time zero. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V.

### **Under Lateral Crash Pulse**

- Delta-V, lateral: SAE J211 sign convention, Positive value generally indicates a driver side crash and negative value generally indicates a passenger side crash.

### **Under Rollover Sensor Data (if Applicable)**

- Vehicle roll angle if applicable: The Roll Axis is the longitudinal axis of the vehicle, generally aligned with the primary axis of motion of the vehicle. A positive Roll Angle is counter-clockwise when observing the vehicle from the front.

### **Data Sources:**

The Restraints Control Module (RCM) contains all recorded data on any event. Data collected from the RCM comes from multiple sources:

1. Internal to the RCM such as internal sensors for delta Velocity data, rollover angle data if applicable, etc... which are measured, calculated and stored internally.
2. External to the RCM but with a direct connection such as buckle switches, peripheral crash sensors, seat track switch(s) etc... which are measured, calculated and stored internally.
3. External Modules to the RCM such as Powertrain Control Module, Brake Control Module, etc... These modules communicate to the RCM via Vehicle Communication Network. The RCM stores the received data internally.

02013\_RCM-RC7P\_r001

### System Status at Time of Retrieval

VIN As Programmed into RCM at Factory	1FTFW1CF3FK [REDACTED]
Current VIN (From PCM)	1FTFW1CF3FK [REDACTED]
Ignition Cycle, Download (First Record)	3.927
Ignition Cycle, Download (Second Record)	N/A
Restraints Control Module Part Number	FL3T-14B321-BA
Restraints Control Module Serial Number	7023586100000000
Restraints Control Module Software Part Number (Version)	FL3T-14C028-AA
Driver Side/Center Frontal Restraints Sensor Serial Number	00A7193B
Driver, Row 1, Side Restraint Sensor 1 Serial Number	000000B7
Driver, Row 2, Side Restraint Sensor 2 Serial Number	00AD18B9
Passenger Frontal Restraints Sensor Serial Number	00A519EA
Passenger, Row 1, Side Restraint Sensor 1 Serial Number	000000F4
Passenger, Row 2, Side Restraint Sensor 2 Serial Number	00A519EA
Steering Wheel Location	Left Hand Drive

**System Status at Event (First Record)**

Complete File Recorded (Yes,No)	Yes
Multi-Event, Number of Events	1
Time From Event 1 to 2 (msec)	0
Lifetime Operating Timer at Event Time Zero (sec)	18,816,545
Key-On Timer at Event Time Zero (sec)	4,880
Vehicle Voltage at Time Zero (V)	14.4
Energy Reserve Mode Entered During Event (Yes, No)	No
Time Yaw Rate Lost (msec)	708.5

**Faults Present at Start of Event (First Record)**

No Faults Recorded

### Deployment Data (First Record)

Pretensioner (Retractor) Deployment, Time to Fire, Right Front Passenger (msec)	571.5
Side Airbag Deployment, Time to Deploy, Driver (msec)	571.5
Side Airbag Deployment, Time to Deploy, Right Front Passenger (msec)	571.5
Side Airbag/Curtain Airbag Deployment, Time to Deploy, Driver Side (msec)	571.5
Side Airbag/Curtain Airbag Deployment, Time to Deploy, Passenger Right Side (msec)	571.5
Pretensioner (Anchor) Deployment, Time to Fire, Right Front Passenger (msec)	576.5
Maximum Delta-V, Longitudinal (MPH [km/h])	31.48 [50.67]
Time, Maximum Delta-V Longitudinal (msec)	145.0
Driver, side sensor 1 (1st row), Safing Deployment	Yes
Driver, side sensor 2 (2nd row), Discriminating Deployment	Yes
Driver, side sensor 2 (2nd row), Safing Deployment	Yes
Passenger, side sensor 1 (1st row), Discriminating Deployment	Yes
Passenger, side sensor 1 (1st row), Safing Deployment	Yes
Passenger, side sensor 2 (2nd row), Safing Deployment	Yes
RCM, side Driver (lateral), Safing Deployment	Yes
RCM, side Passenger (lateral), Safing Deployment	Yes

**Pre-Crash Data -1 sec (First Record)**

Ignition cycle, Crash	3,926
Frontal Air Bag Warning Lamp, On/Off	Off
Safety Belt Status, Driver	Unbuckled
Seat Track Position Switch, Foremost, Status, Driver	Not Forward
Seat Track Position Switch, Foremost, Status, Front Passenger	Not Forward
Safety Belt Status, Front Passenger	Buckled
Brake Telltale	Off
ABS Telltale	Off
ESC/TC Telltale	Off
ESC/TC Off Telltale	Default Mode
Powertrain Wrench Telltale	Off
Powertrain Malfunction Indicator Lamp (MIL) Telltale	Off
Global Real Time (seconds)	192,630,024.7

**Pre-Crash Data -5 to 0 sec [2 samples/sec] (First Record) - Table 1 of 2**

<b>Time (sec)</b>	<b>Speed, Vehicle Indicated (MPH [km/h])</b>	<b>Speed, Vehicle Indicated, Quality Factor</b>	<b>Accelerator Pedal, % Full</b>	<b>Accelerator Pedal, % Full, Quality Factor</b>	<b>Service Brake, On/Off</b>	<b>Service brake, Quality Factor</b>	<b>Engine RPM</b>	<b>ABS Activity (Engaged, Non-Engaged)</b>
- 5.0	0.0 [0]	OK	0.0	OK	Off	OK	598	Non-engaged
- 4.5	0.0 [0]	OK	0.0	OK	Off	OK	600	Non-engaged
- 4.0	0.0 [0]	OK	0.0	OK	Off	OK	600	Non-engaged
- 3.5	0.0 [0]	OK	0.0	OK	Off	OK	588	Non-engaged
- 3.0	0.0 [0]	OK	0.0	OK	Off	OK	594	Non-engaged
- 2.5	0.0 [0]	OK	0.0	OK	Off	OK	594	Non-engaged
- 2.0	0.0 [0]	OK	0.0	OK	Off	OK	602	Non-engaged
- 1.5	0.0 [0]	OK	0.0	OK	Off	OK	604	Non-engaged
- 1.0	0.0 [0]	OK	0.0	OK	Off	OK	596	Non-engaged
- 0.5	0.0 [0]	OK	0.0	OK	Off	OK	602	Non-engaged
0.0	0.0 [0]	OK	0.0	OK	Off	OK	596	Non-engaged

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

<b>Time (sec)</b>	<b>Brake Powertrain Torque Request 1</b>	<b>Brake Powertrain Torque Request 2</b>	<b>Traction Control via Brakes</b>	<b>Wheel Torque (N-m)</b>	<b>Speed Control Status</b>	<b>Driver Gear Selection (Auto Trans)</b>	<b>Occupant Size Classification, Front Passenger (Child size Yes/No [Hex value])</b>
- 5.0	No	No	No	-4	Denied	Park	Yes [\$02]
- 4.5	No	No	No	-4	Denied	Park	Yes [\$02]
- 4.0	No	No	No	-4	Denied	Park	Yes [\$02]
- 3.5	No	No	No	-4	Denied	Park	Yes [\$02]
- 3.0	No	No	No	-4	Denied	Park	Yes [\$02]
- 2.5	No	No	No	-4	Denied	Park	Yes [\$02]
- 2.0	No	No	No	-4	Denied	Park	Yes [\$02]
- 1.5	No	No	No	-4	Denied	Park	Yes [\$02]
- 1.0	No	No	No	-4	Denied	Park	Yes [\$02]
- 0.5	No	No	No	-4	Denied	Park	Yes [\$02]
0.0	No	No	No	-4	Denied	Park	Yes [\$02]

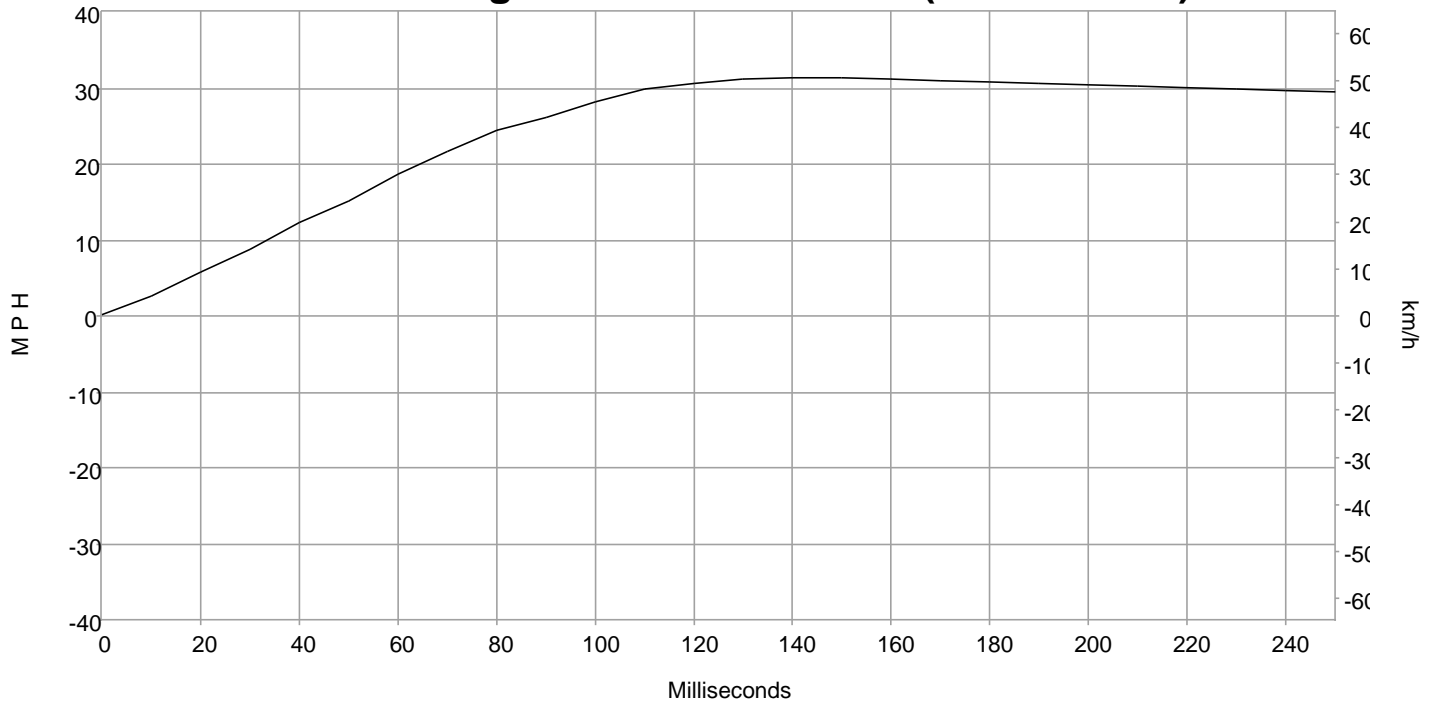
**Pre-Crash Data -5 to 0 sec [10 samples/sec] (First Record)**

Time (sec)	Stability Control Lateral Acceleration (g)	Stability Control Longitudinal Acceleration (g)	Stability Control Yaw Rate (deg/sec)	Stability Control Roll Rate (deg/sec)	Steering Wheel Angle (deg)
- 5.0	0.01	0.00	-0.06	0.07	347.9
- 4.9	0.00	0.00	-0.17	0.07	347.9
- 4.8	0.01	0.00	-0.06	0.11	347.9
- 4.7	0.01	0.00	-0.10	0.03	347.9
- 4.6	0.01	0.00	-0.17	0.11	347.9
- 4.5	0.00	0.00	-0.15	0.07	347.9
- 4.4	0.01	0.00	-0.03	0.07	347.9
- 4.3	0.01	0.00	-0.10	0.11	347.9
- 4.2	0.01	0.00	-0.06	0.07	347.9
- 4.1	0.01	0.00	-0.15	0.07	347.9
- 4.0	0.01	0.00	-0.13	0.07	347.9
- 3.9	0.01	0.00	-0.10	0.15	347.9
- 3.8	0.01	0.00	-0.08	0.07	347.9
- 3.7	0.01	0.00	-0.10	0.07	347.9
- 3.6	0.01	0.00	-0.10	0.03	347.9
- 3.5	0.01	0.00	-0.10	0.07	347.9
- 3.4	0.01	0.00	-0.08	0.11	347.9
- 3.3	0.01	0.00	-0.08	0.11	347.9
- 3.2	0.01	0.00	-0.10	0.19	347.9
- 3.1	0.01	0.00	-0.13	0.15	347.9
- 3.0	0.01	0.00	-0.10	0.07	347.9
- 2.9	0.01	0.00	-0.13	0.07	347.9
- 2.8	0.01	0.00	-0.10	0.07	347.9
- 2.7	0.01	0.00	-0.13	0.07	347.9
- 2.6	0.01	0.00	-0.08	-0.03	347.9
- 2.5	0.01	0.00	-0.10	0.15	347.9
- 2.4	0.01	0.00	-0.06	0.07	347.9
- 2.3	0.01	0.00	-0.15	0.07	347.9
- 2.2	0.01	0.00	-0.13	0.07	347.9
- 2.1	0.01	0.00	-0.17	0.07	347.9
- 2.0	0.01	0.00	-0.10	0.11	347.9
- 1.9	0.01	0.00	-0.06	0.07	347.9
- 1.8	0.01	0.00	-0.15	0.07	347.9
- 1.7	0.01	0.00	-0.08	0.07	347.9
- 1.6	0.01	0.00	-0.08	0.07	347.9
- 1.5	0.01	0.00	-0.08	0.07	347.9
- 1.4	0.01	0.00	-0.13	0.07	347.9
- 1.3	0.01	0.00	-0.08	0.07	347.9
- 1.2	0.01	0.00	-0.08	0.11	347.9
- 1.1	0.01	0.00	-0.15	0.03	347.9
- 1.0	0.01	0.00	-0.17	0.19	347.9
- 0.9	0.01	0.00	-0.17	0.07	347.9
- 0.8	0.01	0.00	-0.08	0.07	347.9
- 0.7	0.01	0.00	-0.10	0.03	347.9
- 0.6	0.01	0.00	-0.13	0.07	347.9
- 0.5	0.01	0.00	-0.10	0.07	347.9
- 0.4	0.01	0.00	-0.06	0.15	347.9
- 0.3	0.01	0.00	-0.13	0.00	347.9
- 0.2	0.01	0.00	-0.15	-0.07	347.9
- 0.1	0.01	0.00	-0.13	0.11	347.9
0.0	-0.01	0.08	-0.13	-0.03	347.9

**Post-Crash Data 0 to 5 sec [4 samples/sec] (First Record)**

<b>Time (sec)</b>	<b>Impact Event Feedback Status</b>
0.00	Normal
0.25	EventInProgress
0.50	EventInProgress
0.75	EventInProgress
1.00	EventInProgress
1.25	EventInProgress
1.50	EventInProgress
1.75	EventInProgress
2.00	EventInProgress
2.25	EventInProgress
2.50	EventInProgress
2.75	EventInProgress
3.00	EventInProgress
3.25	EventInProgress
3.50	EventInProgress
3.75	EventInProgress
4.00	EventInProgress
4.25	EventInProgress
4.50	EventInProgress
4.75	EventInProgress
5.00	EventInProgress

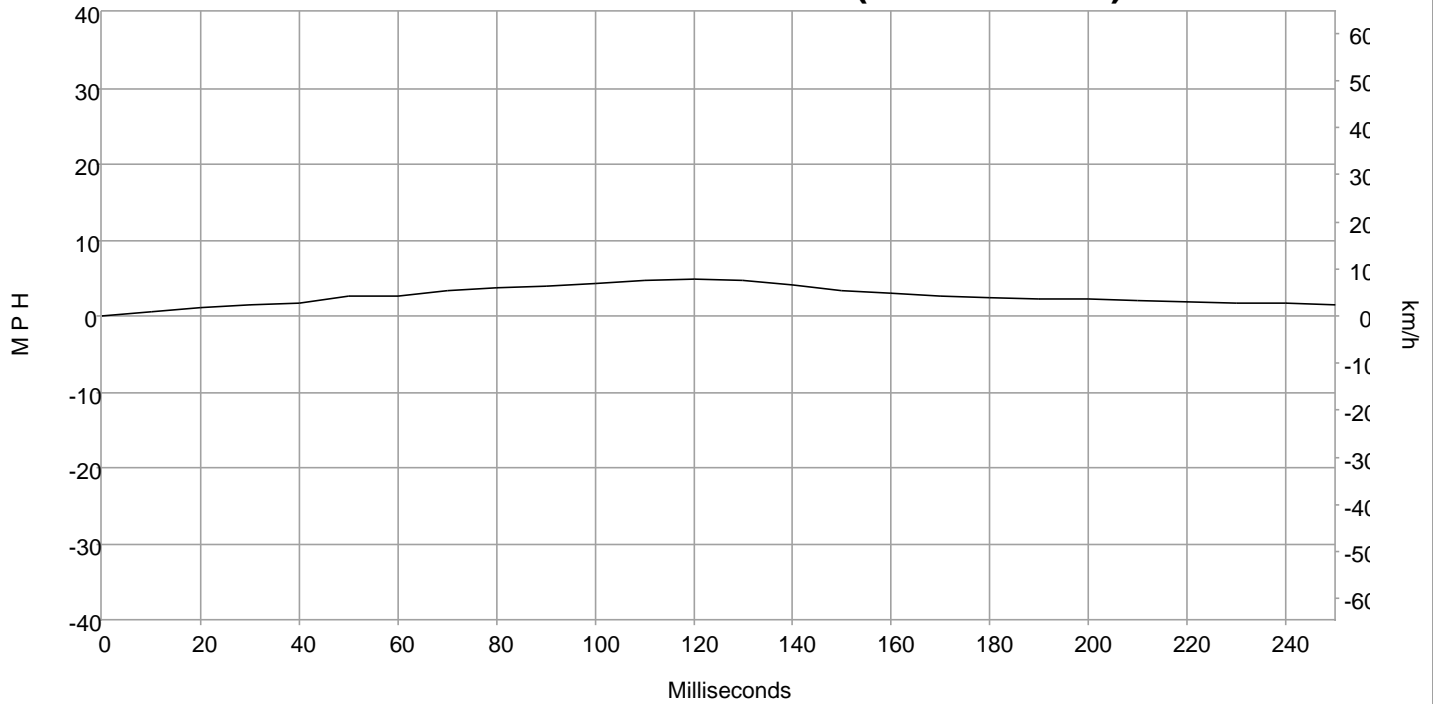
### Longitudinal Crash Pulse (First Record)



### Longitudinal Crash Pulse (First Record)

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
0	0.23	0.37
10	2.65	4.27
20	5.77	9.29
30	8.82	14.19
40	12.30	19.80
50	15.17	24.41
60	18.70	30.09
70	21.71	34.94
80	24.46	39.36
90	26.12	42.03
100	28.17	45.34
110	29.82	47.99
120	30.71	49.42
130	31.21	50.22
140	31.44	50.59
150	31.41	50.55
160	31.20	50.21
170	31.06	49.99
180	30.83	49.61
190	30.70	49.40
200	30.42	48.96
210	30.22	48.64
220	30.12	48.47
230	29.86	48.06
240	29.66	47.74
250	29.46	47.41

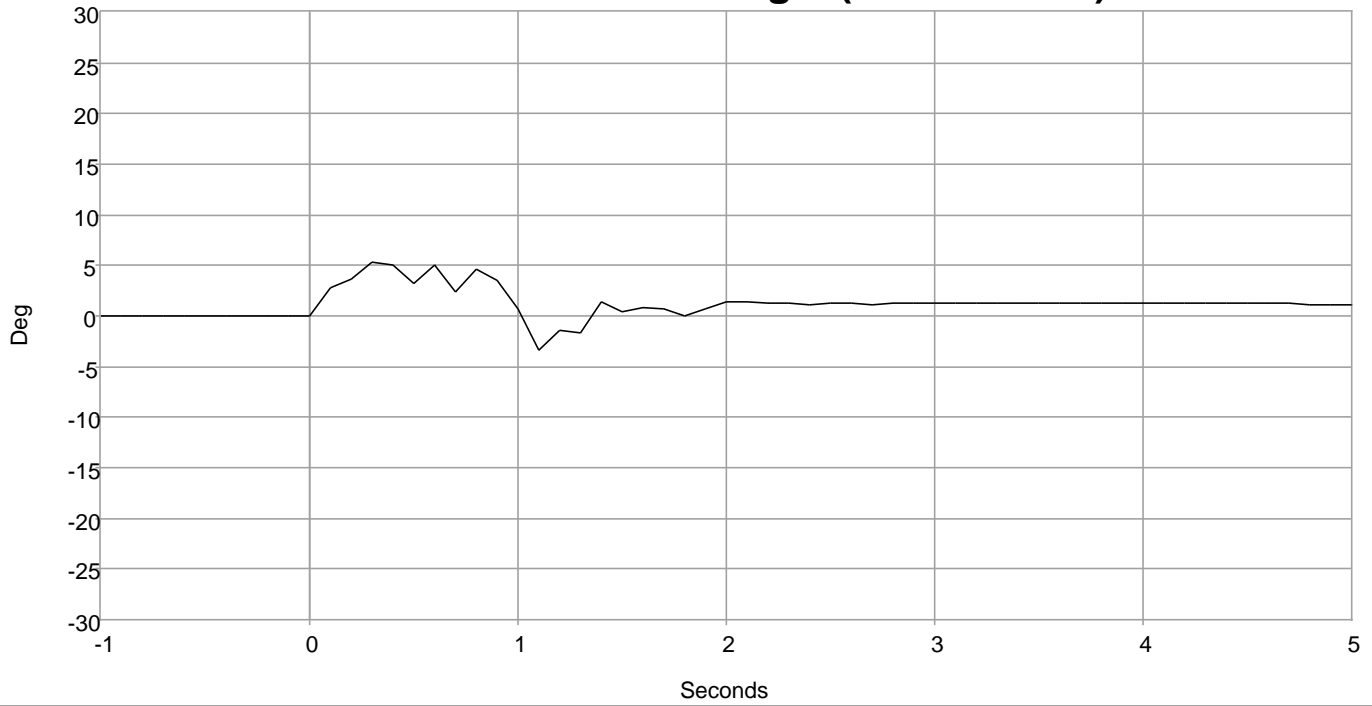
### Lateral Crash Pulse (First Record)



### Lateral Crash Pulse (First Record)

Time (msec)	Delta-V, Lateral (MPH)	Delta-V, Lateral (km/h)
0	0.04	0.07
10	0.50	0.80
20	1.06	1.70
30	1.45	2.34
40	1.69	2.72
50	2.60	4.19
60	2.66	4.28
70	3.33	5.36
80	3.79	6.10
90	4.00	6.43
100	4.35	7.00
110	4.72	7.60
120	4.92	7.92
130	4.59	7.38
140	4.13	6.65
150	3.45	5.56
160	3.04	4.90
170	2.68	4.31
180	2.40	3.86
190	2.22	3.58
200	2.19	3.53
210	2.08	3.34
220	1.91	3.07
230	1.71	2.75
240	1.60	2.57
250	1.53	2.46

### Vehicle Roll Angle (First Record)



### Vehicle Roll Angle (First Record)

Time (sec)	Vehicle Roll Angle (deg)
-1.0	0.02
-0.9	0.02
-0.8	0.02
-0.7	0.02
-0.6	0.02
-0.5	0.02
-0.4	0.02
-0.3	0.02
-0.2	0.02
-0.1	0.02
0.0	0.00
0.1	2.77
0.2	3.59
0.3	5.28
0.4	5.05
0.5	3.29
0.6	5.11
0.7	2.40
0.8	4.57
0.9	3.51
1.0	0.74

Time (sec)	Vehicle Roll Angle (deg)
1.1	-3.35
1.2	-1.42
1.3	-1.66
1.4	1.39
1.5	0.45
1.6	0.86
1.7	0.77
1.8	0.07
1.9	0.77
2.0	1.43
2.1	1.34
2.2	1.25
2.3	1.28
2.4	1.12
2.5	1.23
2.6	1.28
2.7	1.17
2.8	1.20
2.9	1.21
3.0	1.21
3.1	1.21

Time (sec)	Vehicle Roll Angle (deg)
3.2	1.20
3.3	1.20
3.4	1.20
3.5	1.20
3.6	1.20
3.7	1.20
3.8	1.20
3.9	1.20
4.0	1.20
4.1	1.20
4.2	1.20
4.3	1.20
4.4	1.20
4.5	1.20
4.6	1.20
4.7	1.20
4.8	1.19
4.9	1.19
5.0	1.19

## Disclaimer of Liability

The users of the CDR product and reviewers of the CDR reports and exported data shall ensure that data and information supplied is applicable to the vehicle, vehicle's system(s) and the vehicle ECU. Robert Bosch LLC and all its directors, officers, employees and members shall not be liable for damages arising out of or related to incorrect, incomplete or misinterpreted software and/or data. Robert Bosch LLC expressly excludes all liability for incidental, consequential, special or punitive damages arising from or related to the CDR data, CDR software or use thereof.

DOT HS 813 593  
July 2024



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



16303-070224-v3a