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Special Crash Investigations: Reported Air Bag Non-Deployment Crash Investigation; Vehicle: 2018 Ford F-150; Location: West Virginia; Crash Date: September 2019

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15. Supplementary Notes

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 submitted.

16. Abstract

This report documents the reported non-deployment of the air bag systems in a 2018 Ford F-150 involved in a reported offset frontal crash with a 1991 Chevrolet Prism. The vehicle owner notified NHTSA of the crash, reporting that while traveling approximately 72-80 km/h (45-50 mph), the Ford was struck by an oncoming vehicle. The driver reported that none of the Ford air bag systems deployed and stated the seat belt systems did not restrain the front occupants and did not lock. At the time of the crash the Ford was driven by a 51-year-old female with an 18-year-old female front-right passenger. The owner stated that both occupants were belted at the time of the crash. The driver further stated that she sustained neck injuries, a lumbar strain, and a cervical strain; however, she was not medically evaluated at the scene or transported, and she did not seek medical care after the crash. The front-right passenger was not injured. Police documentation of the crash was not provided with the crash notification. The police report, crash site, and Chevrolet could not be located with the limited information provided by the owner. After evaluation of the available documentation, the SCI team ultimately concluded that the crash type was more indicative of a front-to-rear crash and was of insufficient magnitude to produce or warrant supplemental restraint device actuation/deployment. No anomaly of the Ford or its manual/supplemental restraint systems was indicated.

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Special Crash Investigations
Reported Air Bag Non-Deployment Crash Investigation
Office of Defects Investigation
Case Number: CR19033
Vehicle: 2018 Ford F-150
Location: West Virginia
Crash Date: September 2019

Background

This report documents the reported non-deployment of the air bag systems in a 2018 Ford F-150 (Figure 1) involved in a reported offset frontal crash with a 1991 Chevrolet Prism. The vehicle owner notified the National Highway Traffic Safety Administration of the crash. She reported that while traveling approximately 72-80 km/h (45-50 mph), the Ford was struck by an oncoming vehicle. During her interview, she later reported a vehicle pulled out in front of her and the impact configuration was front-to-rear. The driver further reported that none of the Ford air bag systems deployed in the crash, and stated that the seat belt systems did not restrain the front occupants and did not lock. At the time of the crash the Ford was driven by a 51-year-old female with an 18-year-old female front-right passenger. The owner stated that both occupants were belted at the time of the crash. The driver further stated that she sustained neck injuries, a lumbar strain, and a cervical strain; however, she was not medically evaluated at the scene or transported, and she did not seek medical care after the crash. The front-right passenger was not injured. Police documentation of the crash was not provided with the crash notification. The police report, crash site, and Chevrolet could not be located with the limited information provided by the owner.

Figure 1. Right-front oblique view of the damaged 2018 Ford F-150 (owner provided image)

The Ford owner reported the crash to NHTSA; the notification was forwarded to the Special Crash Investigations (SCI) group and assigned for investigation in October 2019. The SCI team located the vehicle at an auto body repair facility, where it was fully repaired and pending return to its owner. Twenty-six images of the damaged vehicle and an itemized repair order were given

to the SCI investigator by the repair facility. The vehicle owner provided images of the damaged vehicle and scheduled to meet with a member of the SCI team to allow an inspection of the repaired vehicle and an attempt to image the event data recorder (EDR) data from the Ford restraints control module (RCM). The owner was unsure of the exact location of the crash, and despite contacting numerous police agencies, the SCI team was unable to find a police crash report (PCR) documenting the crash. After evaluation of the available documentation, the SCI team ultimately concluded that the crash type was more indicative of a front-to-rear crash and was likely of insufficient magnitude to produce or warrant air bag deployment. No anomaly of the Ford or its manual/supplemental restraint systems was indicated.

Summary

Crash Site

The crash reportedly occurred during the afternoon in early September 2019. The driver described the roadway as an undivided 5-lane roadway with two northbound lanes, two southbound lanes, and one center turn lane. The driver was not familiar with the area and could not provide the exact location of the crash. Despite the availability of details concerning the specific date and time of the crash, the SCI team was unable to locate any documentation or PCR of the crash, even after contacting all law enforcement agencies with jurisdiction over or near the general area in which the driver reported that the crash occurred. Therefore, the specific location of the crash remains unknown, no documentation of the crash site could be conducted, and no crash diagram could be constructed.

Crash Sequence

Due to the lack of official documentation of the crash and a lack of information concerning the other involved vehicle, the specific circumstances of the crash remain unknown. The driver stated to the SCI investigator that the Ford was traveling in the left lane of the roadway (travel direction unknown). She saw the Chevrolet on the side of the road and observed it pull out into traffic from the right, encroaching into her intended travel path. The driver of the Ford stated that she applied the brakes and steered the Ford left. The front plane, right aspect of the Ford struck the Chevrolet (configuration unknown), and the Ford came to a controlled stop in the center turn lane. The driver of the Ford was unable to provide any further details concerning the crash, its configuration, or the post-crash movement of the Ford. None of the occupants of the Ford or Chevrolet received medical evaluation or transport from the crash scene.

2018 Ford F-150

Description

The 2018 Ford F-150 (Figure 2) was inspected after its repair and return to the owner. It was identified by the VIN 1FTEW1E56JKxxxxxx. It was a 4-door, 4-wheel-drive pickup truck manufactured in November 2017 and equipped with a 5.0-liter, V-8 gasoline engine linked to a 6-speed automatic transmission. The vehicle had power-assisted front and rear ventilated antilock disc brakes. The Ford's electronic odometer reading at the repair facility following the crash was 99,156 km (61,613 mi). The vehicle manufacturer's recommended tire size was P265/70R17, with recommended cold tire pressures of 240 kPa (35 PSI) front and rear. The gross vehicle weight rating was 3,175 kg (7,000 lb), distributed as gross axle weight ratings of 1,531 kg (3,375 lb) front and 1,724 kg (3,800 lb) rear. At the time of the crash, the Ford had Goodyear Wrangler tires of the recommended size at all four axle positions. All tires had adequate tread depths of 5 mm (6/32 in) or greater. None of the tires were damaged relative to the crash.

Figure 2. Left-front oblique view of the 2018 Ford F-150 after its repair

The Ford's interior had seating for up to six occupants. The front row consisted of outboard power-adjustable bucket seats with a center bench seat, while the second row consisted of a three-passenger bench seat. All seats were cloth-surfaced and equipped with adjustable head restraints. According to the owner of the Ford, the driver seat was adjusted between forward and middle track position with the seatback upright at the time of the crash, while the front-right passenger seat was adjusted to a track position between middle and rear with the seatback slightly reclined. Safety equipment consisted of 3-point lap and shoulder seat belt systems for all six seating positions, with retractor pretensioners for both front row outboard positions. Additional supplemental restraint was provided by dual-stage frontal, seat-mounted side impact, and roof side-rail-mounted inflatable curtain (IC) air bags.

Vehicle History

A commercially available vehicle history report was obtained for this specific 2018 Ford F-150. It reported the Ford had a previous owner who had purchased it new in December 2017 and owned the vehicle for 11 months. During that time the Ford was driven 36,567 km (22,722 mi)

and only required routine maintenance/service. It was then sold in November 2018 to the current owner. Over the current owner's 10-month ownership, the Ford was driven more than 62,603 km (38,900 mi). It only received routine maintenance and service during that time. There were no records of crashes, repair, or service beyond routine maintenance over its entire life leading up to the date of the crash.

NHTSA Recalls and Investigations

A VIN query of the NHTSA recall database www.NHTSA.gov/recalls at the time of the 2019 investigation and again in July 2022 found no unrepaired recalls for this vehicle.

Exterior Damage

The Ford was completely repaired prior to SCI case assignment. However, 26 images of the damaged vehicle were provided to the SCI team by the repair facility, which documented the minor severity damage to the Ford and its post-crash condition prior to its repair. A front image (Figure 3) showed minor front end direct damage that appeared to begin near the vehicle's centerline and extended to the right-front bumper corner. There was minor crush and deflection of the bumper beam, and based on a visual review of the images appeared to be less than 10 cm (4 in) in magnitude.

The trim was displaced from the top of the bumper beam, and the right headlight assembly was cracked. The grille appeared to be depressed less than 2 cm (1 in). A small outward deflection of the right-front fender was visible immediately below the headlight. Red paint transfer was visible on the lower aspect of the headlight (Figure 4) and on the polymer bumper trim. Based on the images of the Ford, the SCI investigator assigned a collision deformation classification to the Ford of 01FZEW1. A complete WinSMASH calculation could not be computed due to the lack of damage measurements and unknown crash configuration. The WinSMASH barrier equivalent speed based on the estimated damage was 14 km/h (9 mph).

Figure 3. View of the Ford's front-plane damage pattern (repair facility provided image)

Figure 4. Close-up view of the Ford's front-plane damage pattern (repair facility provided image)

Event Data Recorder

The Ford had a restraint control module (RCM) mounted to the center tunnel beneath the center instrument panel. The RCM monitored and measured vehicle acceleration in multiple axes, and had event data recorder capabilities to record data for longitudinal, lateral, and rollover crash pulses. The Ford was fully repaired at the time of the SCI case assignment, and a complete repair order was obtained from the repair facility. The repair order did *not* include replacement of the RCM. Therefore, if any crash data were recorded, the possibility remained for the SCI team to image the Ford EDR data following its complete repair. A member of the SCI team met the owner of the Ford days after she had picked up the vehicle from the repair facility. He made numerous attempts to image data from the Ford RCM, but was unsuccessful and kept receiving a communications error that indicated that the CDR system software was unable to communicate with the RCM.

Interior Damage

Images of the Ford provided by the owner and repair facility showed that there was no interior damage associated with the crash. There also was no damage or occupant contact to any of the vehicle glazing.

Manual Restraint Systems

The Ford had 3-point lap and shoulder seat belt systems for all six seating positions. The driver system incorporated an emergency locking retractor (ELR) with retractor pretensioner, while the front-right passenger belt system was equipped with an ELR/automatic locking retractor (ALR). Both these belt systems consisted of continuous loop webbing with a lightweight locking latch plate and an adjustable D-ring. Repair facility images (Figures 5 and 6) showed both the driver and front passenger belt systems extended from the retractors and lying loosely on the respective seats in a used position.

The repair order indicated that both the driver and front passenger belt systems, including the webbing, latch plate, and retractor, were replaced following the crash. The belt buckles were *not* replaced. It appeared to the SCI investigator that both front retractor pretensioners had actuated

as a result of the crash. In the images below, the webbing is extended from the retractor in the worn (used) position, which is the typical evidence of an actuated pretensioner.

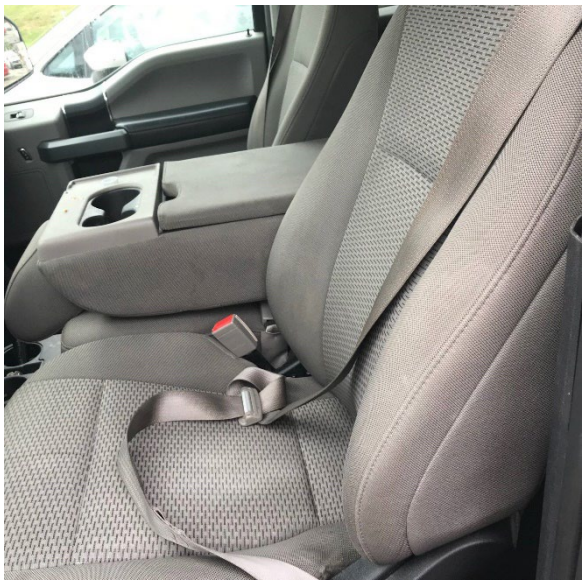

Figure 5. View of the driver seat belt system (repair facility image)

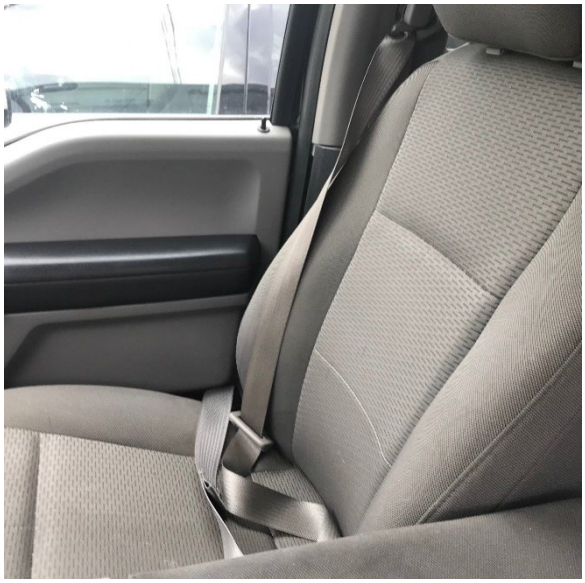

Figure 6. Passenger seat belt system (repair facility image

Supplemental Restraint Systems

The Ford was equipped with multiple inflatable supplemental restraint systems, including a certified advanced 208-compliant frontal air bag system, front seat-mounted side-impact air bags, and IC air bags. The CAC system incorporated front seat track position sensors, front seat belt buckle switch sensors, occupant classification/presence (weight) sensors, front seat belt

retractor pretensioners, and dual-stage driver and passenger frontal air bags. The driver frontal air bag was concealed in the hub of the steering wheel, while the passenger frontal air bag was mounted in the right instrument panel.

The front seat-mounted side impact air bags were concealed in the outboard aspect of the front seatbacks and provided protection for lateral crash events. The IC air bags were mounted along the roof side rails and were designed to deploy downward to provide protection along the full-height of the side glazing for lateral and rollover crash event types (dual-sensing). None of the Ford's inflatable supplemental restraint systems were deployed in relation to the crash under investigation.

Air Bag Non-Deployment Discussion

The Ford owner/driver had reported this crash to NHTSA and stated the Ford supplemental restraint devices did not deploy in the crash. She further reported that the seat belt systems in the front row did not restrain the occupants and spooled out during the crash.

During interview she reported to the SCI investigator that the Ford had been under repair for more than 4 weeks. She said she perceived that her insurance company was not being responsive to her needs and concerns, which had prompted her to report the crash to NHTSA in hopes that it would somehow expedite the repair of her vehicle or elevate the claim to replacement. However, the vehicle was already fully repaired prior to SCI case assignment. The repair facility provided a complete repair order that detailed the components replaced and labor required to repair the damaged vehicle. After reviewing the repair order, the SCI investigator noted that none of the Ford's inflatable supplemental restraint devices required replacement, as none had deployed. However, both front seat belt systems, consisting of the retractor, belt webbing, and latch plate had been replaced as part of the repair. Images of the damaged vehicle showed both front seat belt systems locked in used positions, with their webbing extended and resting on the front row seats. Based on a visual interpretation of the images, both front seat belt retractor pretensioners had actuated as a result of the crash. Thus, the SCI investigator concluded that the Ford had experienced a pretensioner actuation-only event in this crash.

During the SCI inspection of the repaired vehicle, attempts were made to image EDR data from the Ford's RCM. The SCI team was ultimately unsuccessful, after experiencing communication issues in which the CDR software was unable to communicate with the RCM.

After reviewing the images of the damaged vehicle, the SCI investigator concluded that inflatable supplemental device deployment would not be expected in minor severity crashes that produce damage patterns similar to that of the Ford. Further, the actuation of the Ford's retractor pretensioners indicated that the RCM detected the crash event and functionally responded. There was no evidence to support the owner/driver's claim that seat belt systems did not restrain the occupants. In fact, the seat belt systems appeared to have functioned as intended, successfully preventing the occupants from being displaced from position or contacting interior components in the crash. The positioning of the belt systems post-crash, with the webbing locked in an extended position, is exactly how belt systems used by occupants in similar crashes appear after their retractor pretensioners actuate. The SCI team was unable to find any evidence to support the Ford owner/driver's allegations of air bag non-deployment or seat belt system non-

performance. There was no evidence observed to support an anomaly of the Ford manual or supplemental restraint systems.

2018 Ford F-150 Occupant Data

Driver Demographics

Age/sex:	51 years/female
Height:	Unknown (refused to provide)
Weight:	Unknown (refused to provide)
Eyewear:	None
Seat type:	Forward-facing bucket seat with adjustable head restraint
Seat track position:	Between forward and middle
Manual restraint usage:	3-point lap and shoulder seat belt
Usage source:	Driver interview
Air bags:	Frontal, seat-mounted side impact, and IC air bags available; None deployed
Alcohol/drug involvement:	None
Egress from vehicle:	Exited without assistance
Transport from scene:	None
Type of medical treatment:	None

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
-	No medically-diagnosed injuries	N/A	N/A	N/A

Source: driver interview

Driver Kinematics

The Ford's 51-year-old female driver was in the driver seat, with the seat adjusted to a position between forward and middle and the seatback upright. She used the available 3-point lap and shoulder seat belt for manual restraint. Her restraint usage and seat positioning were described by her during SCI interview.

The driver reported that she saw the Chevrolet as it entered the roadway and encroached into her travel path. She initiated avoidance braking and left steering, but was unable to avoid impact. The Ford struck the Chevrolet (configuration unknown), which induced forces on the Ford from the 1 o'clock sector. The Ford driver initiated a forward and slightly right trajectory in response to the crash forces, but the seat belt restricted her forward movement. The retractor pretensioner actuated, which removed much of the slack in the system and further prevented the driver from being displaced about the interior of the Ford during the crash.

The driver brought the Ford to a controlled stop in the center turn lane of the roadway. She then unbuckled the safety belt system and exited the vehicle without assistance. The driver reported that she sustained neck injuries, a lumbar strain, and a cervical strain; however, she stated that she was not medically evaluated at the scene or transported, and she did not seek medical care at any time after the crash.

Front-Right Passenger Demographics

Age/sex:	18 years/female
Height:	Unknown (refused to provide)
Weight:	Unknown (refused to provide)
Eyewear:	Prescription contacts
Seat type:	Forward-facing bucket seat with adjustable head restraint
Seat track position:	Between middle and rear
Manual restraint usage:	3-point lap and shoulder seat belt
Usage source:	Driver interview
Air bags:	Frontal, seat-mounted side impact, and IC air bags available; None deployed
Alcohol/drug involvement:	None
Egress from vehicle:	Exited without assistance
Transport from scene:	None
Type of medical treatment:	None

Front-Right Passenger Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
-	No medically-diagnosed injuries	N/A	N/A	N/A

Source: driver interview

Front-Right Passenger Kinematics

The 18-year-old female front-right passenger was in the front-right seat, with the seat adjusted to a position between middle and rear with the seatback slightly reclined. She used the available 3-point lap and shoulder seat belt of manual restraint. Her restraint usage and seat positioning were described by the driver during SCI interview.

At impact with the Chevrolet (configuration unknown), the passenger initiated a forward and slightly right trajectory in response to the 1 o'clock sector crash forces. Her seat belt restricted her forward movement, and much of the slack in the system as used was removed by the retractor pretensioner upon its actuation. This prevented her from being displaced about the interior of the Ford during the crash.

As the Ford came to a controlled final rest in the median turn lane of the roadway, she unbuckled the safety belt and exited the vehicle without assistance. She denied injury at the crash scene, refused medical evaluation/transport, and did not seek medical care at any time after the crash.

1991 Chevrolet Prism

Description

The other vehicle in this crash was described as a 1991 Chevrolet Prism, according to the owner/driver of the Ford. However, no official documentation of the crash could be located, and the owner/driver of the Ford was unable to provide any further details concerning the Chevrolet. Specifics of the Chevrolet, its damage, and its outcome remain unknown.

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