



U.S. Department  
of Transportation

**National Highway  
Traffic Safety  
Administration**



---

DOT HS 813 418

March 2023

**Special Crash Investigations:  
On-Site Move-Over-Law Crash  
Investigation;  
Vehicle: 2016 Dodge Challenger;  
Location: Texas;  
Crash Date: December 2020**

## 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 are mentioned, it is only 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:

Crash Research & Analysis, Inc. (2023, March). *Special Crash Investigations: On-site move-over-law crash investigation; Vehicle: 2016 Dodge Challenger; Location: Texas; Crash Date: December 2020* (Report No. DOT HS 813 418). National Highway Traffic Safety Administration.

## Technical Report Documentation Page

<b>1. Report No.</b> DOT HS 813 418	<b>2. Government Accession No.</b>	<b>3. Recipient's Catalog No.</b>	
<b>4. Title and Subtitle</b> Special Crash Investigations: On-Site Move-Over-Law Crash Investigation; Vehicle: 2016 Dodge Challenger; Location: Texas; Crash Date: December 2020		<b>5. Report Date</b> March 2023	
		<b>6. Performing Organization Code</b>	
<b>7. Author</b> Crash Research & Analysis, Inc.		<b>8. Performing Organization Report No.</b> CR20039	
<b>9. Performing Organization Name and Address</b> Crash Research & Analysis, Inc. PO Box 302 Elma, NY 14059		<b>10. Work Unit No. (TRAIS)</b>	
		<b>11. Contract or Grant No.</b> 693JJ919C00004	
<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	
		<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 submitted.			
<b>16. Abstract</b>  This report documents an on-site "Move-Over-Law" crash investigation involving a 30-year-old male firefighter/first responder (struck non-occupant) who was struck by a 2016 Dodge Challenger driven by an unbelted 23-year-old female. The non-occupant was on the roadway working with other first responders to clear a multi-vehicle crash that occurred earlier. He sustained police-reported "A" (incapacitating) injuries, was transported by ambulance, and hospitalized. The initial crash and the subject crash occurred at night on a four-lane, divided State highway. Seven police vehicles, three fire trucks, a fire department ambulance, and several tow trucks responded and were in the process of clearing the previous crash scene. All vehicles had their full complement of emergency lights engaged and were providing visibility and protection for the emergency workers. Six police vehicles and three fire department vehicles were positioned at the east end of the crash scene, blocking traffic from proceeding further west, and the westbound traffic was re-routed onto the service and toll roads. One fire truck and a police unit were positioned in the right lane at the far west end of the crash scene. The Dodge was a 2-door coupe and was occupied by just the driver. The Dodge was traveling east in the westbound lanes, which was the wrong direction. The Dodge struck the firefighter, who was in the far left lane, and the Dodge continued east until forced to stop by police. The Dodge driver was not injured and was arrested by police.			
<b>17. Key Words</b>  move over, first responder, pedestrian, conspicuity		<b>18. Distribution Statement</b>  This document is available to the public from the National Highway Traffic Safety Administration, National Center for Statistics and Analysis, <a href="http://crashstats.nhtsa.dot.gov">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> 48	<b>22. Price</b>

# Table of Contents

<b>Background .....</b>	<b>1</b>
<b>Legal Statutes Governing Vehicle Movements Around Emergency Vehicles and Driver Responsibility .....</b>	<b>3</b>
<b>Summary.....</b>	<b>4</b>
Crash Site.....	4
Pre-Crash.....	4
Crash.....	5
Post-Crash.....	6
<b>Conspicuity and Emergency/Warning Lighting of Police Vehicles .....</b>	<b>7</b>
2020 Ford F-150 .....	7
2019 Chevrolet Tahoe.....	8
<b>Conspicuity and Emergency/Warning Lighting of Fire Department Vehicles.....</b>	<b>10</b>
2019 Pierce Engine Unit.....	10
Fire Department Dodge Ambulance.....	11
Pierce Ladder Truck.....	12
Pierce Engine Unit “Blocker” .....	13
<b>2016 Dodge Challenger.....</b>	<b>16</b>
Description.....	16
Exterior Damage .....	16
Event Data Recorder.....	16
Occupant Data.....	17
<b>Non-Occupant Data .....</b>	<b>18</b>
Non-Occupant Demographics.....	18
Non-Occupant Injuries.....	18
Non-Occupant Kinematics.....	19
<b>Crash Diagram .....</b>	<b>21</b>
<b>Crash Diagram (Impact Area).....</b>	<b>22</b>
<b>Crash Diagram (Dodge Final Rest/Blockers Area).....</b>	<b>23</b>
<b>Appendix A: 2016 Dodge Charger Event Data Recorder Report .....</b>	<b>A-1</b>

**Special Crash Investigations**  
**On-Site Move-Over-Law Crash Investigation**  
**Case Number: CR20039**  
**Vehicle: 2016 Dodge Challenger**  
**Location: Texas**  
**Crash Date: December 2020**

## **Background**

This report documents an on-site “Move-Over-Law” crash investigation involving a 30-year-old male firefighter/first responder (non-occupant) who was struck by a 2016 Dodge Challenger (Figure 1) driven by an unbelted 23-year-old female. The non-occupant was on the roadway working with other first responders to clear a multi-vehicle crash that occurred earlier that evening. He sustained police-reported “A” (incapacitating) injuries, was transported by ambulance, and hospitalized.



*Figure 1. 2016 Dodge Challenger*

The crash occurred in December 2020. The National Highway Traffic Safety Administration’s Enforcement and Justice Services Division identified the crash and assigned it to the Special Crash Investigations (SCI) team at Crash Research and Analysis, Inc., in December 2020. The fire and police personnel were contacted in December 2020 and inspections of the police and fire department vehicles were completed in January 2021. Some of the police and fire personnel who were at the incident site were interviewed in January 2021. Scene documentation was also completed in January 2021.

The initial crash occurred at night in the westbound lanes of a four-lane, divided State highway. Seven police vehicles (one Ford F-150 and six Chevrolet Tahoes), three fire trucks, a fire department ambulance, and an unknown number of tow trucks responded and were in the process of clearing the previous crash. All vehicles had their full complement of emergency lights engaged and were providing visibility and protection for the emergency workers. Six police vehicles and three fire department vehicles were positioned at the east end of the crash scene, blocking traffic from proceeding further west, and the westbound traffic was re-routed onto the service and toll roads. One fire truck and a police unit were positioned in the right lane at the far west end of the crash scene. The Dodge was a 2-door coupe and was occupied by just

the driver. The Dodge was traveling east in the westbound lanes, which was the wrong way. The Dodge struck the firefighter, who was in the far left lane, then the Dodge continued east until forced to stop by police. The Dodge driver was not injured and was arrested by police.

The SCI on-site investigation consisted of exterior inspections of the emergency lighting equipment of the police and fire department vehicles. Exemplary police units were inspected because the vehicles at the incident scene were on patrol at the time of the SCI inspection. All fire department units that were at the incident site were available for inspection. The Dodge's exterior was inspected for damage and the vehicle's event data recorder (EDR) was imaged during the SCI inspection. The crash site was photographed and mapped by a Nikon total station.

## **Legal Statutes Governing Vehicle Movements Around Emergency Vehicles and Driver Responsibility**

Texas' traditional Move-Over Law gave right-of-way to emergency and utility vehicles and was enhanced in September 2013. The enhancement required motorists to move one lane away from any law enforcement or other emergency vehicles on the side of the roadway and reduce speed to 32 km/h (20 mph) below the posted speed limit.

## Summary

### Crash Site

This incident occurred at night in the westbound lanes of the lighted State highway (Figure 2). The environmental conditions were clear skies, winds from the northwest at 19.3 km/h (12 mph), and a temperature of 10.6 °C (51 °F) according to local weather reports. The roadway traversed in an east-west direction and there were three through lanes in each direction, separated by a concrete traffic barrier and an express/toll lane in each direction. Each of the westbound lanes was approximately 3.6 m (12 ft) wide with roadway markings consisting of dashed white lane lines, solid white and yellow median lines, and solid white edge lines. The roadway was dry bituminous with a 0.75 m (2.5 ft) shoulder on the south and a 3.2 m (10.5 ft) shoulder on the north. The posted speed limit was 113 km/h (70 mph). A crash diagram is included at the end of this report.



Figure 2. Satellite view of incident scene. Note: Image does not include express lanes.  
(Image source: Google Maps ©2022 Maxar Technologies)

### Pre-Crash

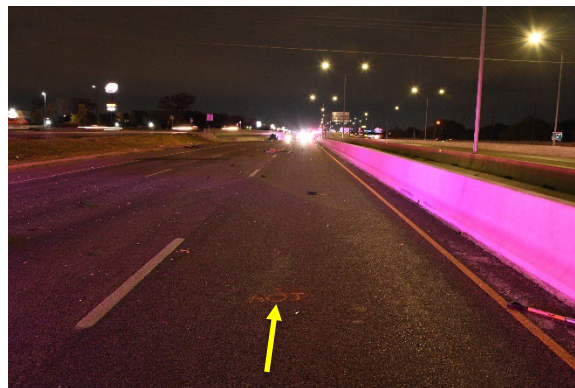
Prior to the subject incident, a crash occurred in the westbound lanes of the roadway. Five vehicles were involved in the crash that was spread out over approximately 158 m (520 ft) and local police, fire, and rescue personnel responded. The fire department placed a retired engine unit at the far east end of the crash scene. This vehicle was one of the designated “blocker” vehicles used at crash scenes by the fire department and was parked across the three lanes, angled southwest/northeast. A ladder truck was also parked in the same diagonal fashion across the roadway, west of the blocker. Six police units were parked west of the ladder truck, covering all lanes. In the area of these police vehicles, one of the crashed vehicles was parked on the north shoulder and an ambulance was parked nearby, in the right lane, facing east. At the far west end of the crash scene, approximately 150 m (492 ft) west of the ambulance, three of the vehicles from the previous crash were parked on the north shoulder along with a tow truck. A police vehicle and fire department engine unit were also parked in the right lane, both facing west. Personnel from both fire and police departments were providing illumination and protection as a tow service was clearing the crash scene.

The Dodge approached the crash scene from the west and was traveling east in the westbound lanes, which was the wrong way. The investigating officer reported during the SCI interview that the driver was impaired and her blood alcohol concentration was reported as .23 g/dL.

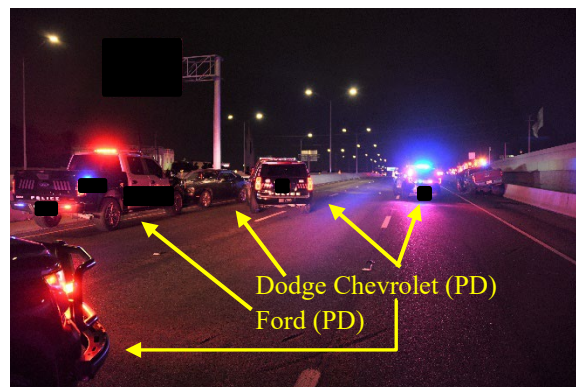
## Crash

During the SCI interview, one of the on-scene firefighters reported that he was walking east with the struck non-occupant, with their backs to the west. Another firefighter nearby noticed the eastbound Dodge traveling the wrong way toward his colleagues and yelled at them, warning them of the oncoming vehicle. Both firefighters turned to their right; however, neither could take evasive action. The firefighter was struck by the front of the Dodge (Figure 3), wrapped onto the left side of the hood, and was projected forward approximately 31 meters (102 ft). He came to final rest in the center lane. The other firefighter was not struck.

The Dodge continued forward in the left lane for approximately 158 m (520 ft). At the east end of the previous crash scene, police vehicles were spread across all lanes. The Dodge driver attempted to travel in between (Figure 4) one of the police department's Chevrolets and the concrete median barrier. One of the officers behind the line of police vehicles moved his vehicle (Ford) into this gap, blocking the Dodge's path. The Dodge came to a stop facing east and the driver was apprehended by police.



*Figure 3. East view on WB lanes, police on-scene image of area of impact (AOI)*



*Figure 4. West view, the Dodge at final rest, blocked by police vehicles*

## **Post-Crash**

The struck firefighter sustained police reported “A” (incapacitating) injuries, was transported to a trauma center, and hospitalized. No one else was reported as injured.

## Conspicuity and Emergency/Warning Lighting of Police Vehicles

### 2020 Ford F-150

This was the only Ford police vehicle at the scene. It was also the only police or fire department vehicle that moved during the incident sequence. An officer moved this vehicle from the left lane to the shoulder, blocking the Dodge's movement eastward (see scene diagram at the end of this report). The Ford's front and back sections were painted black and the center section was light gray (Figure 5). The city name and "POLICE" were emblazoned across the doors in black and white, respectively, and "POLICE" was displayed across the front of the hood and on the tailgate in a tan color. All lettering was applied with reflective decals.



*Figure 5. Color scheme on police Ford F-150*



*Figure 6. Police F-150 with top bar and side push bar lights illuminated*

Emergency LED lighting manufactured by Whelen was present on all sides of the vehicle (Figure 6). The light bar across the roof featured blue LEDs on the right side and red LEDs on the left. All LEDs for each half alternately flashed with the other half at a slow pace. The lighting scheme was the same for the front and back of the light bar. The push bar on the front plane had a horizontal array of eight small LEDs mounted at the bumper level. Each of these lights was either red, blue, or white and they would flash in four different symmetrical patterns. A small rectangular LED was mounted on each side of the uprights of the push bar and each LED would flash red and blue. The only other lighting on the side planes was a single small LED on the upper back corner of the truck bed that flashed red and blue.

The back plane of the vehicle (Figure 7) featured reflective diagonal decals on each outboard aspect of the tail gate and “POLICE” lettered in the center of the lower tailgate, just above the bumper, also with reflective decals. Warning lighting consisted of the aforementioned light bar on the roof and two narrow LEDs mounted horizontally on the back bumper on each side of the license plate. Each LED would flash half blue and half red and each half would switch colors. The two modules were not in sync with each other.



*Figure 7. Back plane of the F-150*

### **2019 Chevrolet Tahoe**

There were six Chevrolet Tahoe police vehicles at the scene. One was positioned at the far west end of the scene and the other five were at the east end. All were parked facing west, with their front plane lights facing the eastbound Dodge. The top plane was equipped with an LED light bar manufactured by Federal Signal. The right and left halves were illuminated with red and blue flashing LEDs. The center of the light bar jutted forward to form a triangular shape (Figure 8). This portion featured three blue and three red lights that were illuminated from the center in sequence, outward, then back to the center. This gave the illusion of lights shooting out to the sides and back again. The remainder of the LEDs were manufactured by Whelen. The push bar mounted on the front plane was equipped with eight small LEDs (Figure 9), arranged horizontally, that flashed red, blue, and white in four different patterns. The headlamps remained steadily illuminated but the high-beam lights would flash on and off quickly as did a thin light strip between the headlamp and the high-beam globes.



*Figure 8. Exemplar roof light equipment of exemplar Chevrolet*



*Figure 9. Exemplar police Chevrolet, top and front warning lighting*

On the side planes, there was an LED on the sill under each door. Each half of the LED would flash red and the other side blue and the colors would switch. There were also two thin LEDs at the bottom of the C-pillar, aligned horizontally. One flashed red, then the other flashed blue. The colors remained constant on their respective sides of the vehicle.

## Conspicuity and Emergency/Warning Lighting of Fire Department Vehicles

### 2019 Pierce Engine Unit

The fire department's Pierce engine unit was dispatched to the initial crash scene and was parked in the right lane, facing west, at the west end of the initial crash scene, an unknown distance east of one of the police vehicles. Emergency/warning lighting on the top and front planes (Figure 10) included the light bar atop the cab which featured six red LEDs on each side of the Opticon (a device that communicates with stop lights at intersections). For an unknown reason, the third and fifth LEDs on each side did not flash. Large, white LED non-flashing flood lights were mounted diagonally at both front roof corners. Three small red non-flashing LEDs were mounted horizontally at the windshield header and one more on the outboard side of each of the flood lights. There were two horizontally mounted LEDs on either side of the grille. Only the outside LEDs flashed white. The headlights, immediately below the LEDs, remained on.



*Figure 10. Front of the engine unit with arrows indicating flashing lights (some top bar lights are obscured by flood lights)*

The side planes (Figure 11) were equipped with a flashing red LED at the front bumper level and turn lights on the front corners which remained continuously on. One small LED was mounted on the roof side rail directly below the top light bar that remained continuously illuminated. Blue and red LEDs were mounted at the upper level at the center and rear aspects of the truck, respectively. Red flashing LEDs were mounted above the pump controls at the center of the truck and above the back wheels. There were small red lights mounted forward of the rear wheel well and at the upper back corner. These two lights remained continuously on. Small red flashing LEDs were mounted at the sill level aft of the pump controls and aft of the back wheel well. There were also two flood light mounted on the side planes that could be illuminated if necessary.

The back plane (Figure 12) was painted with red and yellow diagonal striping. All stripes emerged from the outboard edge and angled toward the centerline. Each outboard aspect of the back plane was equipped with a small light at the upper corner that remained continuously on and immediately below was an LED that flashed red. At the mid-level, flashing blue and red LEDs were mounted to the left and right sides, respectively, of the equipment door. Red brake

lights, also along the outboard edge, remained continuously on. Above the equipment door, three horizontally mounted red lights remained continuously on and mounted directly above was a horizontal array of eight small LEDs, alternating red and blue was mounted above the three lights at the top center. These flashed all one color, then the other in unison. In addition were several small white work lights.



*Figure 11. Right side of the engine unit*



*Figure 12. Back of the engine unit*

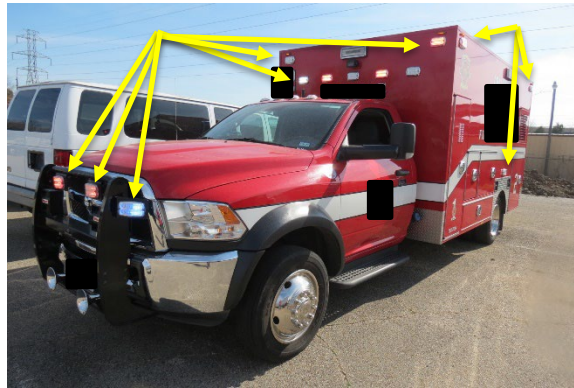
### **Fire Department Dodge Ambulance**

The fire department also dispatched a late model Dodge Ram, Type I ambulance to the initial crash scene. It was parked facing east, at the east end of the crash scene in the right lane, in the general area where the Dodge Challenger stopped. All emergency/warning lights were manufactured by Whelen. The front plane included five LEDs (Figure 13), mounted horizontally on the front of the patient compartment. There was one blue, two red, and two white flashing lights in this array. There were also single LEDs in the upper corner of each side of the patient compartment that flashed red and a smaller light above each, also flashing red. Five red lights were mounted across the roof of the cab. These lights would be illuminated only in darkness and if the vehicle's transmission was in Park.

A push bar was mounted to the front of the ambulance and was equipped with two flashing LEDs which were mounted to the underside of the top bar. Each LED had half red and half white lights that alternately flashed. An additional LED was mounted to the outside of each upright of the push bar. These LEDs were half blue and half red and alternately flashed. The sides of the ambulance patient compartment featured an LED that flashed red only at each upper corner with

a smaller flashing light above it. There was also an LED that flashed half red and half white above the rear wheels.

The back plane of the ambulance (Figure 14) featured an LED at each upper corner as well as mid-level on both sides of the doors. The upper LEDs flashed red only and the mid-level LEDs flashed half blue and half red. Brake lights were mounted to each outboard aspect, just above the bumper and below the upper corner LEDs. A white light was mounted above each door and would only illuminate when the doors were opened.



*Figure 13. Front and side plane lighting on the ambulance*



*Figure 14. Back plane of the ambulance*

### **Pierce Ladder Truck**

The fire department had one of its large Pierce ladder trucks (Figure 15) called a “blocker” dispatched to the initial crash scene. It was used to block the roadway, and to protect working emergency personnel. It was situated an unknown distance west of the blocker and was also parked at a diagonal, facing southwest. Ten small, red LEDs were mounted to the front side of the bucket and one LED was mounted to the lower front corner on each side. There were two red flashing lights, mounted horizontally, on either side of the grille and the low beam headlights remained continuously illuminated. Light bars were mounted on either side of the ladder on the cab roof. Each of the light bars had four red flashing LEDs, including one facing each side.



Figure 15. Left oblique view of the ladder truck

Each side of the ladder truck featured a blinking light on the side of the front bumper and a small flashing light at the top of the A-pillar. Three LEDs were mounted along each side of the truck as well as a small red LED between the wheel wells and a flood light at the top of the center section. The back plane of the ladder truck featured three red flashing lights, including a red flashing dome light at the top, and two other red flashing lights mounted at each outboard aspect (Figure 16). The turn signal light remained on continuously. There were three red lights mounted horizontally just above the rear equipment door. Immediately above those lights, a series of six red lights were mounted horizontally at the top center and these could be illuminated in different patterns, indicating the proper direction for following traffic. A red and white diagonal “A-shaped” pattern was painted on the rear equipment door of the truck.



Figure 16. Back of the ladder truck

### Pierce Engine Unit “Blocker”

The fire department used retired fire trucks as “blockers,” which were parked at a diagonal across a roadway, blocking traffic that would be flowing toward the crash zone to be cleared. The blocker used in this incident (Figure 17) was a retired Pierce engine unit that was parked on the east end of the crash scene, facing southwest. All lighting on this vehicle was of incandescent bulbs unless otherwise indicated. The roof of the cab was equipped with a light bar manufactured by Public Safety Equipment. It was comprised of four red bulbs on the right and four blue bulbs on the left. Each bulb remained illuminated and a mirror circled around each bulb. The front of the cab featured two lights on either side of the grille, arranged horizontally. Each inboard light flashed white and the outboard light flashed red, each in a non-synchronous pattern.



*Figure 17. Front of the blocker engine unit*

The right and left planes of the blocker were identical. There were red and white lights on the sides of the front bumper. The white lights remained on continuously and the red lights would periodically flash. Over each front wheel were LEDs (Figure 18), half flashing white and the other half red in no uniform pattern. LEDs were also mounted over the back wheels, constantly flashing red. A retrofitted “arrow board” was attached to the upper rear of each side of the truck (Figure 19). The board featured a 127 cm (50.0 in) horizontal light band and arrows at either end of the horizontal band which measured 38 cm (15.0 in) in height. All lighting was made of individual LED light packs, each 13 cm (5.1 in) in length. The arrow board could be illuminated and timed such that only the right or left or both arrows would flash, depending on which direction traffic was to be directed.



*Figure 18. Front and left planes of the blocker unit*



*Figure 19. "Blocker" engine unit, left arrow board*

The back of the truck (Figure 20) featured red rotating mirror dome lights on each top corner. The arrow board was placed at the upper center and below it, LED units were mounted to the back bulkhead of the truck. The upper pair was mounted in horizontal fashion and would flash blue in an irregular, asynchronous manner. Below each of these lights were another set of LEDs that were mounted vertically. These flashed back and forth in red. Each outboard aspect of the back plane also had brake (red), turn (red), and reverse (white) lights that were continuously illuminated.



*Figure 20. Back of the blocker truck*

## 2016 Dodge Challenger

### Description

The Dodge was a rear-wheel-drive, 5-passenger, 2-door coupe with the vehicle identification number (VIN) 2C3CDZAG9GHxxxxxx. The vehicle was manufactured in November 2015 and was equipped with a 3.6-liter, 6-cylinder engine, an 8-speed automatic transmission, and a 295 cm (116.1) in wheelbase. The Dodge's curb weight was 1,785 kg (3,927 lb) and had a gross vehicle weight rating (GVWR) of 2,246 kg (4,950 lb). The Dodge was equipped with 4-wheel antilock braking, emergency braking preparation, emergency braking assist, stability control, and traction control. The manufacturer's recommended tire size was P235/55R18 and the vehicle was equipped with Arroyo Eco Pro H/T tires on the front wheels and Cooper Adventurer Tour tires on the back wheels, all of the recommended size. All tires had a minimum of 3 mm (4/32 in) of tread and were in good condition at the time of inspection.

### Exterior Damage

The Dodge sustained damage to the front plane during the impact with the non-occupant. There was direct damage to the bumper fascia, upper and lower grilles, left head lamp assembly, and hood (See Figure 1 above). The direct damage started 24 cm (9.4 in) right of the left front bumper corner and extended 39 cm (15.4 in) to the right. There was no crush damage to the bumper but the non-occupant wrapped onto the hood (Figure 21). The contact to the hood extended approximately 70 cm (28 in) rearward and was 18 cm (7.1 in) wide. The maximum longitudinal crush to the front of the hood was approximately 5 cm (2 in), occurring 53 cm (22.0 in) left of the centerline. The collision deformation classification (CDC) for this impact was 12FYEN1. Scratching and dents were noted on the left side plane, but this damage occurred as police officers forced the vehicle to a stop and apprehended the driver.



*Figure 21. On-scene police image of the left side hood damage from impact with non-occupant*

### Event Data Recorder

The Dodge's EDR was imaged with version 19.5.1 of the Bosch Crash Data Retrieval software and reported with version 21.5.1 at the end of this report as an Appendix. The electronic CDR file was provided by the investigating officer. The EDR reported no events and no data was recorded.

## **Occupant Data**

The Dodge's driver was an unbelted 23-year female according to the police crash report. After the incident, police forced her to stop the vehicle and she was apprehended and placed under arrest. The investigating officer indicated during the SCI interview that the driver's blood alcohol concentration was measured at .23 g/dL. She did not sustain any police-reported injury and was not medically treated.

## Non-Occupant Data

### Non-Occupant Demographics

Age/sex: 30 years/male  
 Height: 183 cm (72 in)  
 Weight: 82 kg (180 lb)  
 Eyewear: Unknown  
 Alcohol/drug involvement: Not tested  
 Transport from scene: Ambulance to level 1 trauma center  
 Medical treatment: Hospitalized for 4 days

### Non-Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Contusional hemorrhages in right frontal, left frontal, and right occipital lobes	140620.3	Isolated IPC Other Vehicle or Object - Ground	Certain
2	Trace left parietal subdural hemorrhage over left convexity	140651.3	Isolated IPC Other Vehicle or Object - Ground	Certain
3	A few scattered foci of punctate subarachnoid hemorrhage in left frontal lobe with LOC > 30 min.	140694.2	Isolated IPC Other Vehicle or Object - Ground	Certain
4	Tiny right pneumothorax	442202.2	Isolated IPC Exterior of Other Motor Vehicle - Hood	Probable
5	Small pneumomediastinum	442209.2	Isolated IPC Exterior of Other Motor Vehicle - Hood	Probable
6	Retroperitoneal hematoma in right anterior pararenal space which partially compresses the IVC	543800.2	Isolated IPC Exterior of Other Motor Vehicle - Hood	Probable
7	1 cm laceration to back of head	110602.1	Isolated Other Vehicle or Object - Ground	Certain
8	Large hematoma to back of head	110402.1	Isolated Other Vehicle or Object - Ground	Certain
9	Right parietal scalp hematoma	110402.1	Isolated Other Vehicle or Object - Ground	Certain
10	6 cm left forehead laceration	210602.1	Isolated Other Vehicle or Object - Ground	Certain

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
11	Ecchymosis to left periorbital area	210402.1	Isolated Other Vehicle or Object - Ground	Certain
12	Abrasion to chin	210202.1	Isolated Other Vehicle or Object - Ground	Certain
13	Intramuscular hematoma in right internal oblique abdominal muscle	510402.1	Isolated Exterior of Other Motor Vehicle - Hood	Probable
14	Left T1 transverse process fracture	650420.1	Isolated Exterior of Other Motor Vehicle - Hood	Probable
15	0.5 cm left thigh laceration	810602.1	Isolated Exterior of Other Motor Vehicle – Hood edge and/or trim	Certain
16	Superficial right hip abrasion	810202.1	Isolated Exterior of Other Motor Vehicle – Hood edge and/or trim	Certain

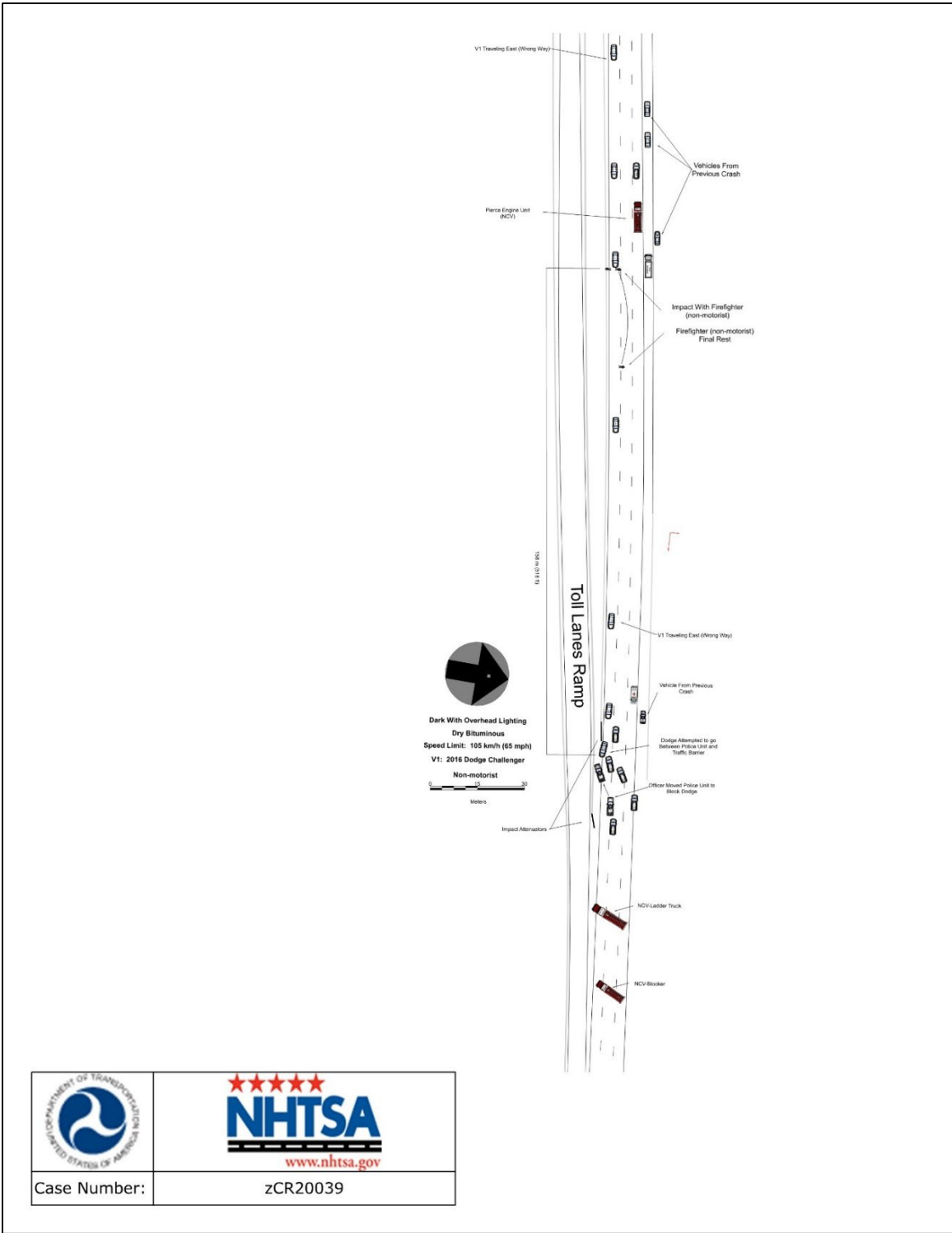
Source: hospital records

### Non-Occupant Kinematics

The non-occupant was walking on the roadway, working with other first responders to clear a multi-vehicle crash that occurred earlier that evening. He was not wearing a helmet but was wearing the other firefighter turnout gear with reflective stripes. Another firefighter was walking with him. Both were walking east, with their backs to the west. Another firefighter nearby noticed the eastbound Dodge traveling the wrong way toward his colleagues and yelled at them, warning them of the oncoming vehicle. Both firefighters turned to their right; however, neither could take evasive action. The non-occupant was struck by the front of the Dodge. With his right side exposed to the front plane of the Dodge, the front bumper contacted the lower legs of the non-occupant. The composite header panel struck his thighs and right hip, causing a laceration of the left thigh and an abrasion to the right hip. As the non-occupant was accelerated up to the speed of the Dodge, he wrapped onto the left side of the hood and was carried by the vehicle. His acceleration and contact with the hood resulted in a transverse process fracture of L1 and an abdominal intramuscular hematoma. Additionally, he sustained a right pneumothorax, a retroperitoneal hematoma, and a small pneumomediastinum. As the Dodge began to decelerate, the non-occupant separated from the vehicle and was thrown onto the road surface where he tumbled/rolled prior to coming to rest approximately 31 meters (102 ft) east of the point of impact. His contact with the pavement resulted in brain contusions and hemorrhages, lacerations and contusions of the scalp and forehead, and an abrasion to the chin. It should be noted that although the non-occupant wrapped onto the hood of the Dodge, he did not contact the windshield or the structures surrounding the windshield. He came to final rest in the center lane.

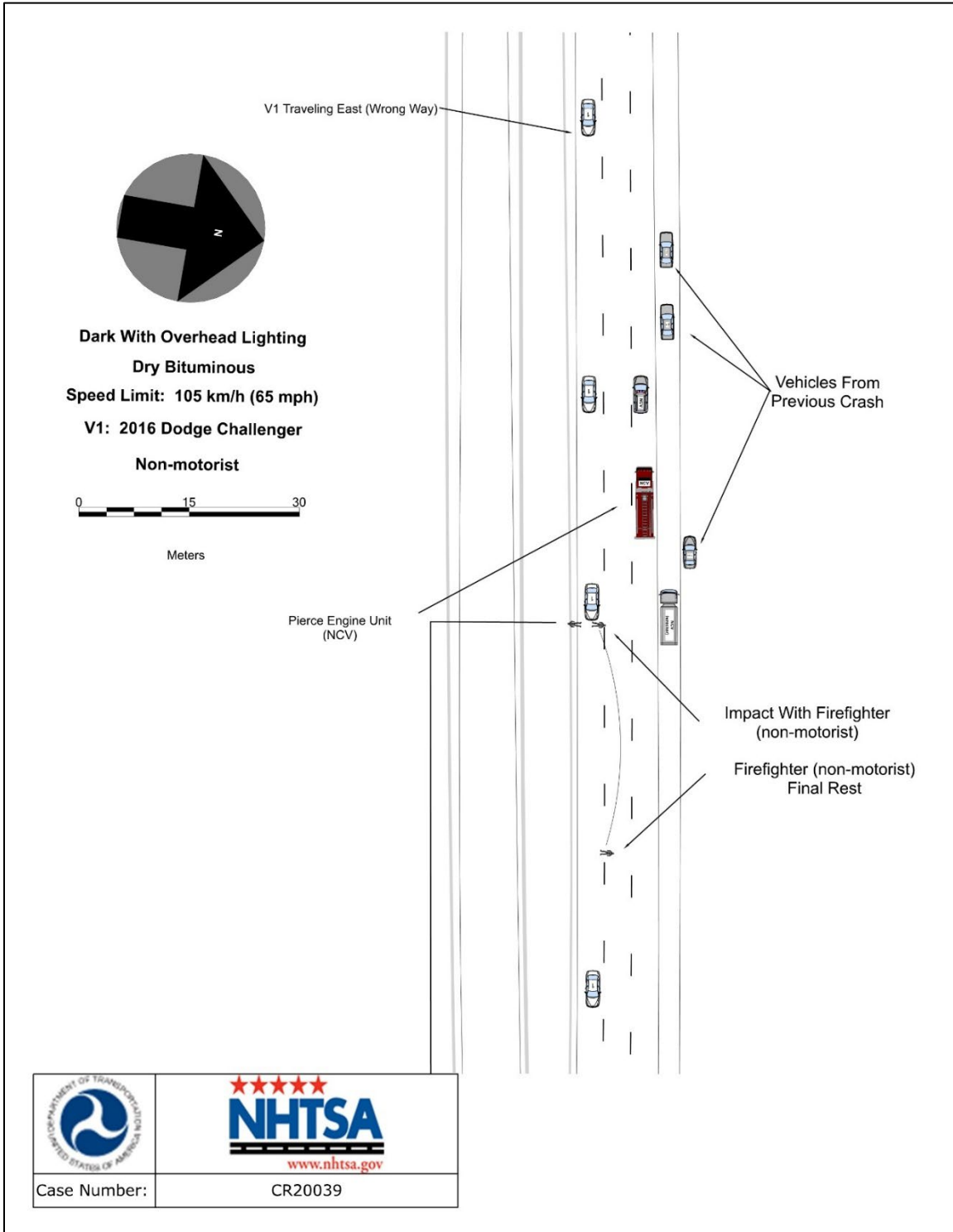
The non-occupant was transported by ambulance to a level 1 trauma center where he was admitted for treatment of his injuries. He was discharged home to his parents' care following 4 days of hospitalization. He was to attend neuro day rehab for his traumatic brain injury but had not yet started as of 3 weeks post-crash.

# Crash Diagram

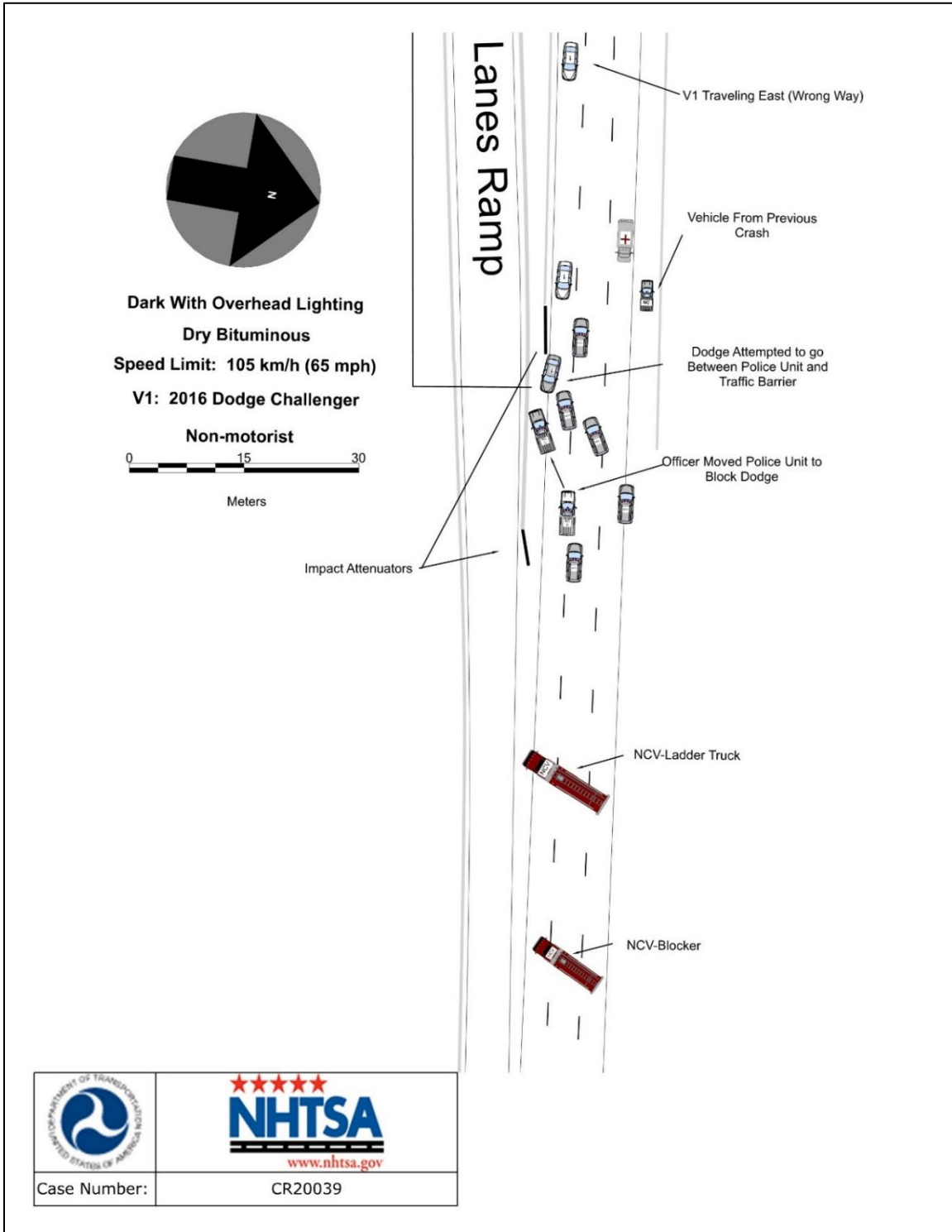


	 <p>www.nhtsa.gov</p>
<p>Case Number:</p>	<p>zCR20039</p>

# Crash Diagram (Impact Area)



# Crash Diagram (Dodge Final Rest/Blockers Area)



## **Appendix A: 2016 Dodge Charger Event Data Recorder Report<sup>1</sup>**

---

<sup>1</sup> The EDR report contained in this technical report was imaged using the current version of the Bosch CDR software at the time of the vehicle inspection by the corresponding law enforcement agency. The CDR report contained in the associated Crash Viewer application may differ relative to this report.

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	2C3CDZAG9GH*****
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	DODGE EDR.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 19.5.1
Imaged with Software Licensed to (Company Name)	Company Name information was removed when this file was saved without VIN sequence number
Reported with CDR version	Crash Data Retrieval Tool 21.5.1
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	None

## Comments

No comments entered.

## Data Limitations

### AIRBAG CONTROL MODULE (ACM) DATA LIMITATIONS:

#### GENERAL INFORMATION:

CAUTION: During direct-to-module imaging where the Airbag Control Module (ACM) is disconnected and removed from a vehicle, make sure the ACM is not moved, tilted or turned over while connected to and powered by the CDR Interface Module (with appropriate adaptors in place, where required). Also, after a CDR imaging process, wait 2 minutes after power is removed from the ACM before attempting to move the module. Not following these general ACM guidelines for direct-to-module imaging may cause new events to be recorded in the ACM.

- For additional definitions, please refer to the CDR Help File Glossary.
- As the VIN may be used to determine the configuration of the restraint system, it is imperative that the correct VIN be entered into the CDR Tool during the imaging process.
- If a DLC adapter has to be used with the CDR Tool, the "Read VIN from Vehicle" feature in the CDR Tool will not work. The VIN will have to be manually entered.
- If a 2021 or later MY Dodge Durango was imaged with a CDR Tool version 19.4 or older, the ACM will need to be reimaged as not all the peripheral sensor data will have been retrieved.
- The 2019 MY RAM 1500 may take up to 30 minutes to retrieve the EDR data. The ignition will time out within 20 minutes so the vehicle flashers must be turned on within 20 minutes to keep the ignition and communication bus active.
- Lateral Delta V will not be displayed for the 2013 MY Jeep Compass and Patriot.
- Ignition Cycle, download/crash
  - For RAMs and Dodge Vipers, there are 2 internal ignition counters in the ACM. It is possible for the ignition cycles at download to be different than the ignition cycles at event due to the 2 different counters.
  - Note that the ignition cycle count in an ACM may differ from the ignition cycle count in a Pedestrian Protection Module (PPM) in the same vehicle due to the fact that the ACM has an energy reserve while the PPM does not.

The following table provides an explanation of the sign notation for data elements that may be included in this CDR report. All directional references to sign notation are from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

Data Element Name	Positive Sign Notation Indicates
Delta-V, Longitudinal	Forward
Maximum Delta-V, Longitudinal	Forward
Delta-V, Lateral	Left to Right
Maximum Delta-V, Lateral	Left to Right
Angular Rate	Clockwise rotation around the longitudinal axis
Peripheral Sensors, X and Y	Outside to Inside

Pressure Sensors	Compression of air
Internal Y Acceleration	Left to Right
Low-g Z Acceleration	Downward
Steering Input	Steering wheel turned counter clockwise
Yaw Rate	Counter clockwise rotation

**CDR FILE INFORMATION:**

- An event will be stored when the delta V is approximately 5 mph (8 km/h) or greater within a 150 ms interval.
- For non-NAFTA ACMs that control pedestrian protection devices, a non-deployment event will be stored when the pedestrian protection devices are activated.
- A non-deployment event may be stored with activation of the Active Head Restraints. See AHR explanation under System Configuration at Retrieval/Event section.
- A deployment event may be stored in a 2019 MY+ Ram 3500 as the result of a rear impact, even though the Ram 3500 does not deploy any restraint system devices in a rear impact.

Event(s) Recovered definitions:

- None - There are no stored events in the ACM
- Not Retrievable - Event Data may be stored in the ACM but is not retrievable by the CDR Tool.
- Most Recent Event - Data of the most recent event is displayed in the report
- 1st Prior Event - Two events are stored in the ACM, Data displayed is of the first prior event.
- 2nd Prior Event - Three events are stored in the ACM, Data displayed is of the second prior event.
- For 2013 and 2014 MY Dodge Journey and Fiat Freemont:
  - Event Record 1 - Data from an event is stored in the ACM (not necessarily in chronological order)
  - Event Record 2 - Data from another event is stored in the ACM (not necessarily in chronological order)
- For TRW modules:
  - If there is a side impact, two EDR events may be stored for the one side impact event. The second event may be recorded due to the Lateral Delta V exceeding 5 mph (8 km/h) within a 150 ms interval after the side deployment occurred.
- For some Fiat vehicles:
  - Two EDR events may be stored for one impact event. The second event may be recorded due to the deployment of the frontal airbag, 3<sup>rd</sup> stage passenger.
- During an event, if power to the ACM is lost, all or part of the event data record may not be recorded. An indication may be observed in the recorded data under this condition: The restraint data is recorded first and then the vehicle data.
  - "None" may be displayed in the "Event(s) Recovered" section of the report indicating no pre-crash vehicle data.
  - An event may be displayed in the "Event(s) Recovered" section of the report and "Interrupted" will be displayed for Pre-Crash Recorder Status.
- For the 2021MY Jeep Grand Cherokee L, an event may be displayed in the "Event(s) Recovered" section of the report as "End of Line Test event - See Data Limitations". This event is an End of Line test event from the module manufacturing process which will be included in the count for the total number of events, but no data will be displayed in the CDR Report.

**SYSTEM STATUS AT RETRIEVAL:**

- Original VIN - The VIN is captured by the ACM and then recorded as the Original VIN after 10 consecutive ignition cycles of capturing the same number. Once it has been recorded, this number cannot be changed.

**SYSTEM CONFIGURATION AT RETRIEVAL/EVENT:**

- The System Configuration data tables indicate the components that the ACM for a particular vehicle monitors and/or controls.
- Active Head Restraint (AHR) - This refers to some active head restraint systems that are electronically controlled by the ACM. AHRs may activate but not store an EDR Record if the delta V does not exceed the minimum delta V threshold. It is possible that the AHRs may activate after the EDR record has been stored and written, based on achieving the minimum delta V. This condition will result in an EDR but no record of the AHR activation in the CDR report. Activation of only the AHRs, if stored, will be a non-deployment event.

**SYSTEM STATUS AT EVENT:**

- Frontal Airbag Warning Lamp - In Veoneer modules, the airbag warning lamp may indicate ON at the time of a most recent event without any DTCs present if a deployment event has already occurred in the same ignition cycle. The ABWL will come on due to the deployment but, as there are still algorithms processing data, the actual faults will not be qualified yet and will not show up as DTCs.
- Number, Total Events - Cumulative number of events that the ACM has recorded, including those non-deployment events that have been overwritten by a subsequent event.
  - For the 2021MY Jeep Grand Cherokee L, the module will contain one, two, or three End of Line test events from the module

- manufacturing process which will be included in the count for the total number of events. However, the data from these End of Line test events will not be displayed in the CDR Report.
- Occupant Size Classification, Outboard Front Passenger - "Child" status may be used to indicate anything weighing less than a 5<sup>th</sup> percentile female adult crash dummy, including an empty seat; "Not Child" indicates anything weighing the same as or more than a 5<sup>th</sup> percentile female adult crash dummy. "SNA" indicates undetermined;
    - For some non-North American applications, "Empty" indicates an empty seat;
  - Odometer at Event - Vehicle odometer at the time of the event
    - For 2014-2016 MY Fiat 500L, the odometer value in miles may be shown in the brackets, labeled as kilometers. If this is the case, the non-bracketed value is not valid.
  - Operation via Energy Reserve Only - "Yes" indicates that the ACM had lost power at or before T0 and was only operating on energy reserve at T0.
  - Safety Belt Status, Outboard Front Passenger - For vehicles sold outside of North America which do not contain a buckle switch for the outboard front passenger, the safety belt status, outboard front passenger will default to "not buckled/unbuckled".
  - System Voltage at Event, ACM - Voltage at the ACM as measured by the ACM. This voltage may be approximately 0.7V (one diode drop) below the bused voltage.
  - System Voltage at Event, Bused - Voltage of the vehicle system, communicated on the communication bus to other electronic modules in the vehicle.
  - Temperature, Outside - Ambient Air Temperature.
  - Time, Airbag Warning Lamp On - This is a cumulative time. It indicates the total amount of time that the ACM has requested the Airbag Warning Lamp be turned on.
    - This time does not include the warning lamp bulb check time, which occurs at every ignition cycle
    - For 2013 MY Minivans and new 2017+ MY Jeep Compass, this time is only cumulative for the past 10 ignition cycles.
  - Time from event 1 to 2 -
    - If only one event is stored, either a value of 0 or >5 may be displayed for this data element.
    - For the 2018+ MY Promaster and 2019+ MY RAM 1500, a value of 0 may be displayed for the first event or for events >5 seconds apart.
    - If multiple events exist in the EDR, the time from event 1 to event 2 is defined as:
      - For Bosch and TRW modules, the time from the prior recorded event (even if it has been overwritten) to the current recorded event.
      - For Continental modules, the time from the prior existing recorded event (as long as it is still displayed in the CDR report) to the current recorded event. If the prior event in a multi-event condition is overwritten by a subsequent event, the multi-event status will no longer be displayed.
      - For the 2019+ MY RAM 1500, the time from event 1 to 2 may utilize a non-stored event as event 1. In this case, the total number of events and multi-event data elements will not include the non-stored event in the number of events. However, the time from event 1 to 2 will be shown as time from that non-stored event.
  - Time, Operation System Time - This is a cumulative lifetime timer for the ACM. It indicates the total amount of time the ACM has been powered up.
    - For 2019 and later MY RAMs, this time is only cumulative for the current ignition cycle.
  - Tire Pressure Indicator Lamp at Event- "On" indicates a tire with low pressure or a fault in the tire pressure monitoring system at the time of the event. The TPM module DTC's should be read and recorded for final system interpretation. "Flashing" indicates a recent fault in the tire pressure monitoring system.
  - Tire Pressure at Event, LF, RF, RR - See "Tire Information" under Pre-Crash Data section for details.
  - VIN at Event, Last 8 Digits- Last 8 digits of the VIN of the vehicle at the time the ACM records the event.

#### **DEPLOYMENT COMMAND DATA:**

- A "Yes" for a particular item indicates that the ACM commanded the deployment /activation of the associated device.
- The phrase "Exceeded Storage Range" for a particular time to deploy indicates that the deployment time is equal to or greater than the 255 milliseconds that can be stored.
- If a device is not deployed, the "time to deploy" for that device will N/A.
- A time to deploy value of 0 is valid and indicates that the deployment of the device triggered the EDR t0.
- In vehicles with Bosch and Veoneer ACMs, once a device has been deployed in an ignition cycle, it is possible that the ACM will not attempt to re-deploy any already deployed device during subsequent events in that same ignition cycle.

#### **DTCs PRESENT AT START OF EVENT:**

- If any DTCs (diagnostic trouble codes) are present in the ACM at the start of the event, these will be listed in this section. A dealership service manual can be used to decode the DTCs.
  - DTCs Present at Start of Event are not present in the Alfa Romeo Giulia, Fiat 500X, and the Jeep Renegade.
- For the 2021 MY+ Jeep Grand Cherokee L, the DTCs will not be updated for the subsequent events within the same ignition cycle.

#### **SENSOR DATA:**

- The design range for the angular rate data is:
  - +/- 240 deg/sec for Bosch ACMs unless specifically called out below
  - +/- 300 deg/sec for TRW ACMs, the 2019 MY RAM 1500, and the 2018+ MY Dodge Journey

- +/- 290 deg/sec for 2008+ MY minivans and 2009-2017 MY Dodge Journey
- +/- 340 deg/sec for 2017+ MY Chrysler Pacifica and new 2017+ MY Jeep Compass
- - 416.67 deg/sec to +413.41 deg/sec for 2014+ MY Jeep Cherokee
- +/- 300 deg/sec for vehicles with Veoneer ACMs
- For vehicles that store peripheral sensor data, t0 for the peripheral sensors is the same as the t0 for the delta V.
- Internal y acceleration is stored prior to t0 so the internal y acceleration data will usually be zero unless the rollover sensing algorithm has triggered storage of the EDR event.
- The words "Sensor Design Range Exceeded" and a vertical line will be displayed on the Longitudinal and Lateral Delta-V graphs the first time the applicable sensor range is exceeded.
- For the 2010-2012 MY Chrysler Town and Country, Dodge Caravan, Dodge Grand Caravan, and Dodge Journey and the 2010-2011 MY Grand Voyager, the angular rate will only be displayed if it is non-zero.

#### PRE-CRASH DATA:

- The recorded Event may contain Pre-Crash data. Pre-Crash data from the various electronic control modules in the vehicle is transmitted to the Airbag Control Module via the vehicle's communication bus.
- In the Pre-Crash Data graph, data transmitted at a rate other than 0.1 seconds will be shown as dots for each available data point. Only data transmitted at a rate of 0.1 seconds will have the dots connected by a line.
- (if equip.) - If a parameter name is followed by the words (if equip.), then the parameter is only valid for vehicles equipped with the associated parameter/vehicle system.
- The MIL (Malfunction Indicator Lamp) Status for the various recorded systems indicates the requested state of the applicable malfunction indicator lamp at the time that the data was captured. Note: Some fault codes could be stored due to component/system damage from the accident. The appropriate diagnostic tool should be used to read any stored Diagnostic Trouble Codes (DTC's) in the various electronic modules (ACM, PCM, ABS, TCM, etc., where applicable) for use in interpretation of some vehicle specific recorded data.
- ABS Activity - "Yes" indicates an active ABS event in which the ABS is actively controlling the brakes.
- ABS MIL- This indicates the ABS fault indicator lamp status. It will only be "On" when there is a fault in the ABS system. The Electronic brake module DTC's should be read and recorded for final system interpretation.
- Accelerator Pedal, % Full - This indicates the actual position of the accelerator pedal. It will be "SNA" if the vehicle is in the power free mode which limits acceleration.
- Accelerator Pedal (Derived), % Full - This indicates the calculated value of the accelerator pedal for battery electric vehicles only.
- Accelerator Pedal/Engine Throttle, % Full - This indicates the actual position of the accelerator pedal unless the cruise control is engaged. If the cruise control is engaged, this indicates the actual position of the engine throttle blade.
- Brake Pedal Position - This indicates the percentage of brake pedal depression by the driver.
- Brake Torque - This indicates the calculated amount of brake torque the system is producing at the wheels.
- Brake Torque Driver - This indicates the calculated amount of brake torque that the driver is requesting.
- Braking System, Maximum Braking -- "Yes" indicates that ABS is active on all 4 wheels at the same time.
- Cruise Control:
  - Note that the following two Cruise Control data elements are only valid for vehicles not equipped with Adaptive Cruise Control (ACC). For vehicles equipped with ACC, the ACC data elements are used for both regular Cruise Control and ACC.
  - Cruise Control System/Lamp Status -"On" indicates that the Cruise Control system is turned on.
  - Cruise Control Status - "Off" indicates that all cruise control functionality is disabled; "NCC\_On" indicates that the Normal Cruise Control system is turned on; "NCC\_Engaged" indicates that the Normal Cruise Control is actively controlling vehicle speed; "ACC\_On" indicates that ACC is turned on; "ACC\_Engaged" indicates that the ACC is actively controlling vehicle speed.
  - Cruise Control Engaged Status/Active - "Engaged"/"Yes" indicates the Cruise Control system is actively controlling vehicle speed. "Not Engaged"/"No" indicates the system is NOT controlling vehicle speed.
  - Cruise Control Override - "Active" indicates that the driver has overridden the set speed. "Not Active" indicates that the cruise control is either not turned on or is not being overridden.
  - Adaptive Cruise Control (ACC) Status (if equip.)- "Off" indicates that all cruise control functionality is disabled; "NCC\_On" indicates that the Normal Cruise Control system is turned on; "NCC\_Set" indicates the Normal Cruise Control is actively controlling vehicle speed; "ACC\_On" indicates that ACC is turned on; "ACC\_Set" indicates that the ACC is actively controlling vehicle speed. If the value is SNA for all time stamps, then the vehicle is not equipped with ACC.
  - Set Speed (if equip.)- This indicates the desired speed in mph that was input by the driver for the cruise control system.
  - ACC Faulted - "Yes" indicates that the ACC system will not function and the ACC warning lamp is lit; "No" indicates that the ACC system is functional and the ACC warning lamp is off;
  - For new 2017+MY Jeep Compass, cruise control data elements are only available for vehicles NOT equipped with ACC.
- Drive Mode - This indicates the driver selected mode of operation (e.g. normal, sport, track, ...)
- Electronic Brake/Stability Control information:
  - Stability Control - This is the status of the ESC symbol - "car with squiggly lines" indicator lamp. "On" indicates that the ESC system is functional. "Off" indicates that the ESC system was turned off either by the driver or due to a fault or thermal mode shutdown. "Engaged" indicates an active ESC/TCS event. "Partial Off" indicates that engine management has been turned off but brake traction control is still functional.
    - For the Jeep Renegade, if the Stability Control is "Off", the ESC Button Status is "Disabled", and the vehicle speed exceeds 40 mph, the stability control system will operate in a reduced functionality mode with traction control turned off ("partial off" mode) even though the user disabled it. For all other conditions, when the Stability Control is "Off", the stability control system will be off.
  - ESC Button Status - This indicates the driver selected mode for the ESC system. "Disabled" indicates that the driver pressed the ESC button to disable engine management. "Enabled" is the default state for the ESC system.
    - SRT and some Fiat products have the ability to fully disable the ESC system if the ESC button has been pressed and held for a specific amount of time. Additional system analysis is required.

- ESP Feature is Completely Disabled - This indicates that the stability control system has turned off engine management, traction control, and stability control.
- ESC/ESP MIL - This indicates the ESC/ESP fault indication lamp status. It will only be "On" when there is a fault or thermal mode shutdown in the ESC/ESP system. The ESC/ESP module DTC's should be read and recorded for final system interpretation.
- Brake Intervention by ESP - "Yes" indicates that the stability control system has engaged the brakes.
- Engine Torque Applied - "No" indicates no engine torque output was applied (as in Park/Neutral for Automatic transmissions or clutch depressed on manual or during an ESP/Traction Control event). If "Yes", then engine torque output was applied.
- Traction Control Active - "Yes" indicates that the traction control system is actively controlling the vehicle's wheels.
- Electronic Park Brake (EPB):
  - Park Brake Engaged - "Yes" indicates that the park brake is applied.
  - EPB MIL - "On" indicates that there is a fault in the Electronic Park Brake System.
- Engine RPM - For the RAM ProMaster City, the minimum resolution for Engine RPM is 32 rpm.
- Engine Throttle, % Full - This indicates the actual position of the Engine Throttle blade. This data element is not supported by vehicles with diesel engines. Thus a value of "SNA" will be displayed if the vehicle has a diesel engine.
- ETC Lamp - Lamp "ON" indicates there is an active Electronic Throttle DTC.
- ETC Lamp Flashing - "Yes" indicates that the ETC is in the limp-in mode.
- Forward Collision Warning (FCW) (if equip.):
  - Object of Interest Distance - If the FCW system is acting on the object, this indicates the actual forward distance to the main object being tracked by the FCW system. "No Object" indicates that the FCW system is not currently acting on an object. If the value is SNA for all time stamps, then the vehicle is not equipped with FCW.
  - FCW System Operating State - "Off" indicates that the FCW system is off and the FCW Warning Lamp will be "On"; "On" indicates that the FCW system is on with the audible and visual warnings enabled.
  - FCW System Status - "Off" indicates that the FCW system is off and the FCW Warning Lamp will be "On". "On-warning" indicates that the FCW system is on but active braking is disabled. In an FCW event, the driver will only receive FCW audible and visual warnings. "On-full" indicates that the FCW system is fully on with active braking enabled as well as the audible and visual warnings enabled. SNA indicates that the vehicle is not equipped with FCW.
  - FCW Braking Enabled - "Yes" indicates that the FCW system has active braking enabled; "No" indicates that the FCW system does not have active braking enabled.
- Gear Position/Current Gear - For all vehicles except the RAM ProMaster City, this indicates the current transmission gear.  
For the RAM ProMaster City, this indicates the status of the gear shift lever.
- Estimate Regenerative Braking Axle Torque - (HEV only) This indicates the calculated braking torque applied by the HEV system to the drive axles in Nm.
- Driver Intended Axle Torque - (HEV only) This indicates the calculated value of torque in Nm being applied to the drive axles based on accelerator pedal position.
- Trans torque request - (HEV only) "Yes" indicates that the transmission controller has requested a torque reduction when shifting from one gear to another.
- Static Axle Torque - (HEV only) This indicates the torque in Nm at the axle when the speed of the axle is constant.
- HEV Battery Pack Contactor State - (HEV only) "Closed" indicates that the HEV battery pack is connected to the vehicle's electrical system. "Open" indicates that the HEV battery pack is disconnected from the vehicle's electrical system. "Pre-Charging" indicates that the inverter internal capacitor is charging. "Pre-Charge Failed" indicates that the attempt to charge an internal capacitor failed. "Pre-Charge Inhibited" indicates that an attempt to charge an internal capacitor was not made.
- HEV Lamp Request - (HEV only) This indicates the HEV indicator lamp status. It will only be "On" when there is a fault in the HEV system. The vehicle DTC's should be read and recorded for final system interpretation.
- Master Cylinder Pressure - This indicates the brake pressure applied to the brakes through the brake pedal.
- PCM MIL - This indicates the PCM fault indicator lamp status. It will only be "On" when there is a fault in the PCM. "Flashing" indicates misfire detection. The Powertrain Control Module DTC's should be read and recorded for final system interpretation.
- Pre-Crash Recorder Complete - Due to the interruption of data recording in one section, this data element may display "Interrupted" for all sections when some data sections are actually complete.
  - For the 2014 MY Jeep Grand Cherokee and Dodge Durango, if recording of angular rate data is interrupted, the entire EDR record will display "Interrupted" even though the rest of the data may be complete.
- PRND/PRNDL/PRNDS Status - This indicates the status of the Shifter Position.
- Raw Manifold Pressure - This indicates engine load in kPa.
- Reverse Gear - For manual transmission vehicles only, "Yes" indicates the transmission is in the reverse gear.
- Service Brake - "On" indicates that the brake pedal is physically depressed. Braking from the ABS or FCW systems will not be reported in this data element.
- Shift Selector Position - This indicates the status of the gear shift selector.
- Speed, Vehicle Indicated - This indicates the average of the wheel speeds of the drive wheels.
  - The reporting resolution for Speed, Vehicle Indicated is 1 km/h.
  - To display this data element in mph, the CDR Tool converts the km/h to mph and reports a rounded value in mph.
  - The accuracy of the recorded Speed, Vehicle Indicated may be affected by a significant change of the tire size for the drive wheels or the final drive axle ratio of the transmission from the factory build specifications, wheel lockup, wheel slip, or wheel spin.
  - On some vehicles capable of speeds in excess of 255km/h (about 158mph), the actual vehicle speed may have exceeded the reporting range. It is always prudent to check the reported wheel speeds and other parameters to confirm the Speed, Vehicle Indicated value(s).
- Tire Information:
  - XX where LF = Left Front Tire, RF = Right Front Tire, LR = Left Rear Tire, and RR = Right Rear Tire.
  - Tire X Location - This indicates the location of the tire pressure sensor data being displayed for that time stamp. Default is used to indicate that the location of the tire pressure sensor is unknown or there is no tire pressure sensor in that wheel. Vehicles with Base Tire Pressure Monitoring systems will display SNA for both Tire Locations as these vehicles do not send actual pressure values across the communication bus.

- Tire X Pressure/Tire Pressure Status, XX -This indicates the actual pressure status of the Tire Location defined in the previous column (Tire X Location) or by the values for XX. Possible values are Significantly Under Inflated (TPM lamp will be on), LOW/Under/Under Inflated, NORMAL, HIGH/Over/Over Inflated, or SNA for this parameter. Vehicles with Base Tire Pressure Monitoring systems may display NORMAL even though these vehicles do not send actual pressure values across the communication bus.
- Tire X Pressure/Tire Pressure Value, XX (psi) - This indicates the actual tire pressure value of the Tire Location defined in the previous column (Tire X Location) or by the values for XX. Vehicles with Base Tire Pressure Monitoring systems will display N/A for this parameter as these vehicles do not send actual pressure values across the communication bus.
- For the following vehicles, the tire location, if displayed, may not be accurate if the tires have been rotated:
  - 2013 MY Ram
  - 2013-2017 MY Jeep Patriot
  - 2013-2014 MY Chrysler 200
  - 2013-2017 MY Jeep Compass
  - 2013-2016 MY Dodge Dart
- For the 2013 MY Ram, if the values for tire pressure status and the tire pressure are SNA, the EDR does not store tire pressure monitoring data.
- Tire pressure is not stored in the EDR for the following vehicles:
  - 2014-2018 MY RAM 1500
  - 2014+ MY RAM (all but 1500)
  - 2013+ MY Jeep Wrangler
  - 2013 MY Jeep Grand Cherokee
  - 2013 MY Dodge Durango
  - 2013-2014 MY Dodge Challenger
  - 2013-2016 MY Chrysler Town and Country
  - 2013+ MY Dodge Grand Caravan
  - 2015+ MY Fiat 500
- Wheel Speed, XX - This indicates the speed value of a particular tire as denoted by XX.
- Tire Pressure Monitor Indicator Lamp/Faults - "On" indicates a tire with low pressure or a fault in the tire pressure monitoring system. The TPM module DTC's should be read and recorded for final system interpretation. "Flashing" indicates a recent fault in the tire pressure monitoring system.
- "T0" ("Time zero" where '0' is seen as subscript) is defined as "beginning of the crash event". T0 is the time at which the ACM algorithm is activated, a specific Delta-V is exceeded, or a non-reversible restraint device is deployed. T0 may be defined differently for front, side, rear and roll-over events.
  - If multiple algorithm decisions (i.e.: frontal, side, rear and/or rollover) are made before the first recorded event ends, all of those events are part of the same event record and "T0" is defined as the "T0" from the first recorded event.
  - In the Pre-Crash data tables, the relative time marker "-0.1s" or "-0.25s" respectively represents the last set of data captured in the buffer prior to "T0."
- Torque Information:
  - Axle Torque - This indicates the E-Motor Torque multiplied by the gear ratio for battery electric vehicles only.
  - E-Motor Torque - This indicates the calculated torque from the output shaft of the electric motor in battery electric vehicles only.
- Traction Control Intervention Active - "Active" indicates wheel slippage was occurring during vehicle acceleration.

#### APPLICATION INFORMATION:

- Alfa Romeo Giulia, Alfa Romeo Stelvio, Fiat 500L, Fiat 500X, and Jeep Renegade are only CDR supported in the United States, Canada, and Saudi Arabia markets.
- Fiat 500/500e is only CDR supported in the United States, Canada, Mexico, and Brazil markets.

03002\_Chrysler\_r046

### System Status at Retrieval

Original VIN	2C3CDZAG9GH*****
Ignition Cycle, Download	7423
ACM Part Number	68297881AA
ECU Serial Number	T52MD288501485
ACM Supplier	Bosch
ECU Supply Voltage at Time of Retrieval	11.8

### System Configuration at Retrieval

Configured for Driver Frontal Airbag	Yes
Configured for Driver Knee Airbag	No
Configured for Driver Buckle Pretensioner	Yes
Configured for Driver Retractor Pretensioner	Yes
Configured for Driver Seat Seatbelt Switch	Yes
Configured for Driver Seat Track Position Switch	Yes
Configured for Left Side Curtain Airbag	Yes
Configured for Left Side Seat Airbag	Yes
Configured for Passenger Frontal Airbag	Yes
Configured for Passenger Buckle Pretensioner	Yes
Configured for Passenger Retractor Pretensioner	Yes
Configured for Passenger Seat Seatbelt Switch	Yes
Configured for Passenger Seat Track Position Switch	No
Configured for Right Side Curtain Airbag	Yes
Configured for Right Side Seat Airbag	Yes
Configured for Rollover Sensing	Yes

## Hexadecimal Data

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

62 F1 00 00 40 07 03

62 F1 32 36 38 32 39 37 38 38 31 41 41

62 F1 8C 54 35 32 4D 44 32 38 38 35 30 31 34 38 35

62 F1 54 00 03

62 F1 90 32 43 33 43 44 5A 41 47 39 47 48 2A 2A 2A 2A 2A

62 F1 A0 32 43 33 43 44 5A 41 47 39 47 48 2A 2A 2A 2A 2A

62 A0 02 01 01 03 00 03 00 45 01 00 00 00 00

62 A0 04 05 00 02 08 00 00 00 00

62 A0 05 0B 0B 03 00 40 FF 00 FB 1F 00 03 06 00

62 A0 0D 75 27 12 EF 66 00 00 FF 2C 00 10 02 12 00 10 00 10 3F 01 47 39 47 48 31 33 30 00 00  
00 00 00 00 02 2A 2A 2A 2A 2A 2A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

62 A0 0E 00 E2 FF FF FF FF FF FF 00 00 01 94 01 93 FF FF 00 00 00 00 1C FF 00 00 00 00 00 00  
00 00

62 02 B6 00 00

62 02 B1 FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF FF

62 02 B2 FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF  
FF FF

71 01 03 35 00 00 00 00 00 00

71 01 03 01 01 00 FF 00  
00  
00 00





















## **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 813 418  
March 2023



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



15782-022823-v2