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Special Crash Investigations On-Site Rollaway Crash Investigation Vehicle: 2014 RAM 1500 Location: Texas Crash Date: August 2018

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This report documents the on-site investigation of a rollaway crash involving a 2014 Ram 1500. The vehicle was unoccupied and there were no injuries.

Each crash represents a unique sequence of events and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.

16. Abstract

This single-vehicle crash occurred in August 2018 in the morning on a park road near a parking lot for a boat ramp in Texas. There were initially two people in the vehicle. The Ram was equipped with an automatic transmission controlled using a rotary electronic gear selector located on the instrument panel. The vehicle was driven through/over a pipe rail. The driver indicated that he stopped the vehicle and placed the vehicle in Park with the engine running. Both occupants exited the vehicle in order to close the gate. After closing the gate, both occupants saw the vehicle begin moving forward. They estimated that 40 to 60 seconds passed before the vehicle began moving. The vehicle traveled down an embankment and rolled across a parking lot before striking a pipe rail. The vehicle went over the rail, down an embankment, and came to rest on a pile of rocks. This vehicle was involved in a similar incident 11 days earlier. That incident occurred during the evening. The driver (different from most recent incident) reported that he stopped the vehicle and placed it in Park with the engine running. He exited the vehicle to secure a gate. The vehicle began rolling forward and struck a delineation post with the driver's door. The vehicle was driven from the scene and a report of the incidentwas generated. Based on the available evidence it would appear that the driver did not place the vehicle in Park prior to exiting the vehicle and the vehicle was likely in Drive during the most recent crash.

17. Key Words	18. Distribution Statement
rollaway, crash, unoccupied, no injuries.	Document is available to the public from the National Technical Information Service, www.ntis.gov.

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Table of Contents

Special Crash Investigations (SCI)
On-Site Office of Defects Investigation
Rollaway Crash Investigation
Case Number: DS18024
Vehicle: 2014 Ram 1500
Location: Texas
Crash Date: August 2018

BACKGROUND

This report documents the on-site investigation of a rollaway crash involving a 2014 Ram 1500 (**Figure 1**). The vehicle was unoccupied and there were no injuries. This investigation was initiated by the Office of Defects Investigation (ODI) after being notified by the General Services Administration (GSA). The Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration assigned the case to Dynamic Science, Inc., in September 2018. The vehicle and scene inspections were completed in September 2018. A representative of Fiat Chrysler Automobiles N. V. (FCA) was present during the vehicle inspection. The Ram was supported by the Bosch Crash Data Retrieval (CDR) system and the vehicle's event data recorder (EDR) was imaged during the inspection.

Figure 1. 2014 Ram 1500 ST.

This single-vehicle crash occurred in August 2018 in the morning on a park road near a parking lot for a boat ramp in Texas. There were initially two people in the vehicle. The Ram was equipped with an automatic transmission controlled by a rotary electronic gear selector located on the instrument panel. The vehicle was driven through/over a pipe rail. The driver indicated that he stopped the vehicle and placed the vehicle in Park with the engine running. Both occupants exited the vehicle in order to close the gate. After closing the gate, both occupants saw the vehicle begin moving forward. They estimated that 40 to 60 seconds passed before the vehicle began moving. The vehicle traveled down an embankment and rolled across a parking lot before striking a pipe rail. The vehicle went over the rail, down an embankment, and came to rest on a pile of rocks. The vehicle was initially towed to an FCA dealership and then moved to a government compound.

This vehicle was involved in a similar incident 11 days earlier. That incident occurred at night. The driver (different from most recent incident) reported that he stopped the vehicle and placed it in Park with the engine running. He exited the vehicle to secure a gate. The vehicle began rolling forward and struck a delineation post with the driver's door. The vehicle was driven from the scene and a report of the incident was generated. This earlier incident is discussed at the end of this report in **Appendix A**.

Based on the available evidence it would appear that the driver did not place the vehicle in Park prior to exiting the vehicle and the vehicle was likely in Drive during the most recent crash.

SUMMARY

Crash Site

The crash site was the road and parking lot adjacent to a boat ramp in a public park. The asphalt roadway was oriented southwest/northeast and measured 5.8 m (19.0 ft) in width. A metal pipe gate was located at the west roadway entrance. The grade at this location was +2.6 percent. Adjacent to the roadway was a descending embankment that measured 7.5 m (24.6 ft) from top to bottom. The grade at the midpoint of the embankment was -18 percent. The total drop from the top of the embankment to the bottom was approximately 1.8 m (5.9 ft). An asphalt parking lot was located at the base of the embankment and measured 28.2 m (92.5 ft) from northwest to southeast. The entire perimeter of the roadway and parking lot was separated from the park by a metal guardrail. The height of the rail was 58 cm (22.8 in) and was constructed of 8 cm (3.0 in) metal pipe. There were concrete parking bumpers located on the parking lot at the base of the embankment and along the southeast edge. Southeast of the parking lot was a descending area covered by large rocks and vegetation.

Figure 2. Approximate parked position, looking southeast.

The weather at the nearest reporting station was 16.6° C (62° F), 100 percent humidity, fair conditions, and the winds were out of the north- northwest at 24 km/h (15 mph). It was daylight at the time of the crash. A crash diagram is included at the end of this technical report.

Pre-Crash

This single-vehicle crash occurred in August 2018 in the morning on a park road near a parkinglot for a boat ramp in Texas. There were initially two occupants in the vehicle. The two occupants were employees of the park and had been checking electric submersible pump lines in the park. After checking the last pump line, the Ram was driven through the open pipe rail gate into the boat dock area and then stopped on the other side of the gate. The driver indicated that he placed the running vehicle into Park (**Figure 2**). It is not known how familiar the driver was with this particular vehicle and its gear shifting procedures. The driver and front right passenger

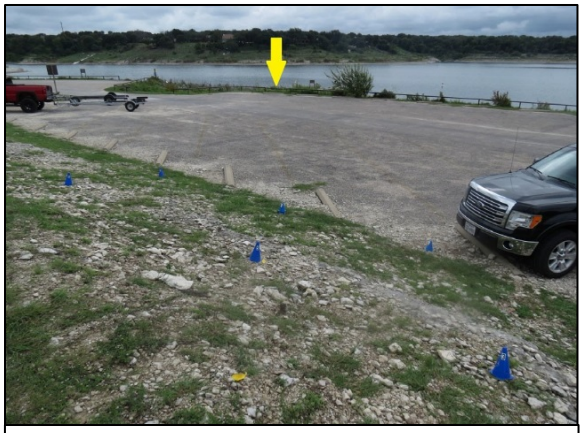


Figure 3. Path down embankment, looking southeast. Struck rail marked with yellow arrow.

exited the vehicle to close the gate. It has been reported that the gate was old and takes two people to close it. After approximately 45 to 60 seconds, both employees reported that they saw the vehicle begin moving. The vehicle moved along the positive grade road for a short distance and then began traveling down the embankment (**Figure 3**). The Ram traveled down the embankment and then traveled approximately 25 m (82 ft) across the parking lot.

Crash

At the end of the parking lot, the Ram struck the pipe rail (**Figure 4**) with its front plane (Event 1). The barrier algorithm of the WinSMASH program calculated a barrier equivalent speed (BES) of 14 km/h (9 mph). The vehicle went over the rail and down a rock-covered embankment while sustaining undercarriage damage (Event 2).

Figure 4. Impact with pipe rail, looking southeast.

Post-Crash

The Ram came to rest at an angle on a pile of rocks (**Figure 5**). The engine was still running. The driver opened the driver's door and reported that he looked at the gear shift knob and it showed the vehicle to still be in Park (**Figure 6**). The vehicle sustained undercarriage damage and the transmission could not be taken out of Park. The vehicle was towed from the scene to a Dodge dealership. According to the repair order, the transmission pan was damaged and needed to be replaced. The vehicle underwent a multi-point inspection in accordance with the vehicle's maintenance interval. The powertrain control module was reprogrammed/updated to satisfy NHTSA safety recall 18V- 332/U61 (see NHTSA Recalls and Investigations section of this report for additional details). Additional diagnostics were performed and there were no transmission-related issues identified.

Figure 5. Final rest, looking northwest (park agency photo).

2014 RAM 1500 ST

Description

The 2014 Ram 1500 ST was a 4-door crew cab short-bed pickup. The vehicle was a fleet vehicle owned by the GSA. The Ram was identified by the vehicle identification number

1C6RR6KG5ESxxxxxx and manufactured in May 2014. The vehicle mileage at the time of the vehicle inspection was 94,872 km (58,951 miles); the mileage at the time of the crash was 93,575 km (58,145 miles). The vehicle was equipped with a 3.6-liter, 6-cylinder, flex fuel engine coupled to an 8-speed automatic transmission, rear-wheel drive, ABS, driveline traction control, and after-market grille guard. The vehicle manufacturer's recommended tire size was P265/70R17 with a cold pressure of 276 kPa (40 psi). The vehicle was equipped with BF Goodrich Advantage tires of the recommended size. The Ram was configured with seating for six occupants. The front row was configured with a cloth 40/20/40 bench seat and the second row was configured with a cloth 40/20/40 split bench seat.

Figure 6. 2014 Ram 1500, controls at final rest (agency photo).

Transmission/Ignition Operation

The transmission is controlled by a rotary electronic gear selector located on the instrument panel (**Figure 7**). The transmission gear range (PRND) is displayed both above the gear selector and in the electronic vehicle information center (EVIC). To select a gear range, rotate the gear selector. Press the brake pedal to shift the transmission out of Park, or to shift from Neutral into Drive or Reverse, when the vehicle is stopped or moving at low speeds. To shift past multiple gear ranges at once (such as Park to Drive), rotate the gear selector to the appropriate detent. Select Drive range for normal driving. This vehicle is equipped with a brake transmission shift interlock system (BTSI) that holds the transmission gear selector in Park unless the brakes are applied. To shift the transmission out of Park, the ignition switch must be turned to the On/Run position (engine running, for vehicles with 8-speed transmission) and the brake pedal must be pressed.

Figure 7. Ignition/transmission selection, 2014 Ram 1500.

The vehicle was taken on a test drive by the FCA representative, accompanied by the SCI investigator. The following items were assessed.

- Brake interlock operated as expected.
- Parking brake functioned correctly.
- Service brakes functioned correctly.
- Selector knob values (PRND) matched the IP display.
- Vehicle placed in Drive with slow idle and the vehicle moved ahead slowly.

- All gears functioned as expected.
- The ignition switch/key fit was very loose. This was due to use and possibly the additional items on the key ring. The key had to be maneuvered during the efforts to image the EDR in order to obtain the data.

Based on the available scene and vehicle data it would appear that the driver exited the vehicle with the vehicle still in Drive. The vehicle would not have moved immediately since it was on a positive grade. After a short period of time the idle speed possibly changed as the engine was put under a load possibly by the AC system and the vehicle began moving forward.

NHTSA Recalls and Investigations

The vehicle was not subject to NHTSA Recall Number 14V161000 since it was a 4x2 vehicle. The defect summary indicated the transmission case may have been improperly machined which can result in the Park pawl not properly engaging when the transmission is in the Park position. If the Park pawl does not properly engage, the vehicle may rollaway. There were no other related recalls based on the VIN.

The vehicle was, however, subject to NHTSA safety recall 18V-332/U61. This 2014 Ram 1500 pickup was in the fourth-generation vehicle family. The recall issue was described as follows: In the instance of a short in the vehicle causing the CAN-C bus to stop communicating while the cruise control is active and the vehicle speed is below the set speed such that the cruise control system is requesting positive torque at the exact moment of the short, it is possible for a positive torque request to be locked on the PCM which may result in either the vehicle maintaining its current speed or possibly accelerating. If the driver does not shift to neutral or apply the brakes to stop the vehicle this condition can cause a vehicle crash without warning. The repair involved reprogramming the powertrain control module, which occurred during the post-crash repair of this vehicle.

The vehicle was subject to FCA service campaign U07 that launched in November 2018 and has since been completed on this vehicle. U07 installs an AutoPark shift functionality. AutoPark is a securement strategy that places the vehicle in Park if the driver attempts to exit the vehicle before placing the rotary gear shift selector in the Park position.

Figure 8. Front plane damage, 2014 Ram 1500.

Exterior Damage

The Ram sustained minor surface damage to the grille guard (**Figure 8**) from the impact with the pipe rail. The direct damage was presumed to be across the vertical surfaces of the grille guard based on the height of the struck object. This measured 104 cm (40.9 in). There was an area of scraping located at the bottom of the right

vertical surface that may have occurred as the vehicle traveled past the pipe rail. Sixteen measurements were taken at the bumper level along the grille guard by the Nikon Total Station and the Faro Blitz program computed crush measurement in six increments as follows: $C_1 = 0$ cm, $C_2 = 0$ cm, $C_3 = 0$ cm, $C_4 = 0$ cm, $C_5 = 4$ cm (1.5 in), $C_6 = 0$ cm. The collision deformation classification (CDC) was 12FDLW1.

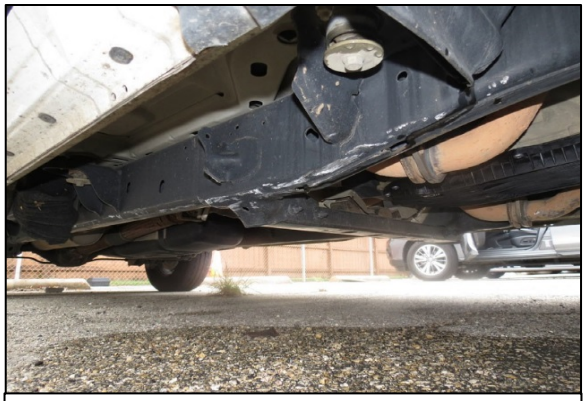


Figure 9. Undercarriage damage (right frame rail), 2014 Ram 1500.

The vehicle sustained minor damage to the undercarriage (**Figures 9-10**) from impacts to the rocky surface beyond the pipe rail. The CDC was 00UDDW2.

Event Data Recorder (EDR)

The Ram was equipped with an air bag supplemental restraint system that had EDR capability to store deployment and non-deployment events. Both types of events can contain pre-crash and crash data.

The data from the Ram's EDR was imaged using the Bosch Crash Data Retrieval Tool version 17.7.2 through the diagnostic link connector (DLC) by the SCI investigator and reported using version 18.0.2. The vehicle initially had power on hand but did need to be jumped later in the inspection. No events were generated during this crash. The Bosch CDR report is included at the end of this report.

Figure 10. Undercarriage damage (right sill), 2014 Ram 1500.

Interior Damage

There was no interior damage.

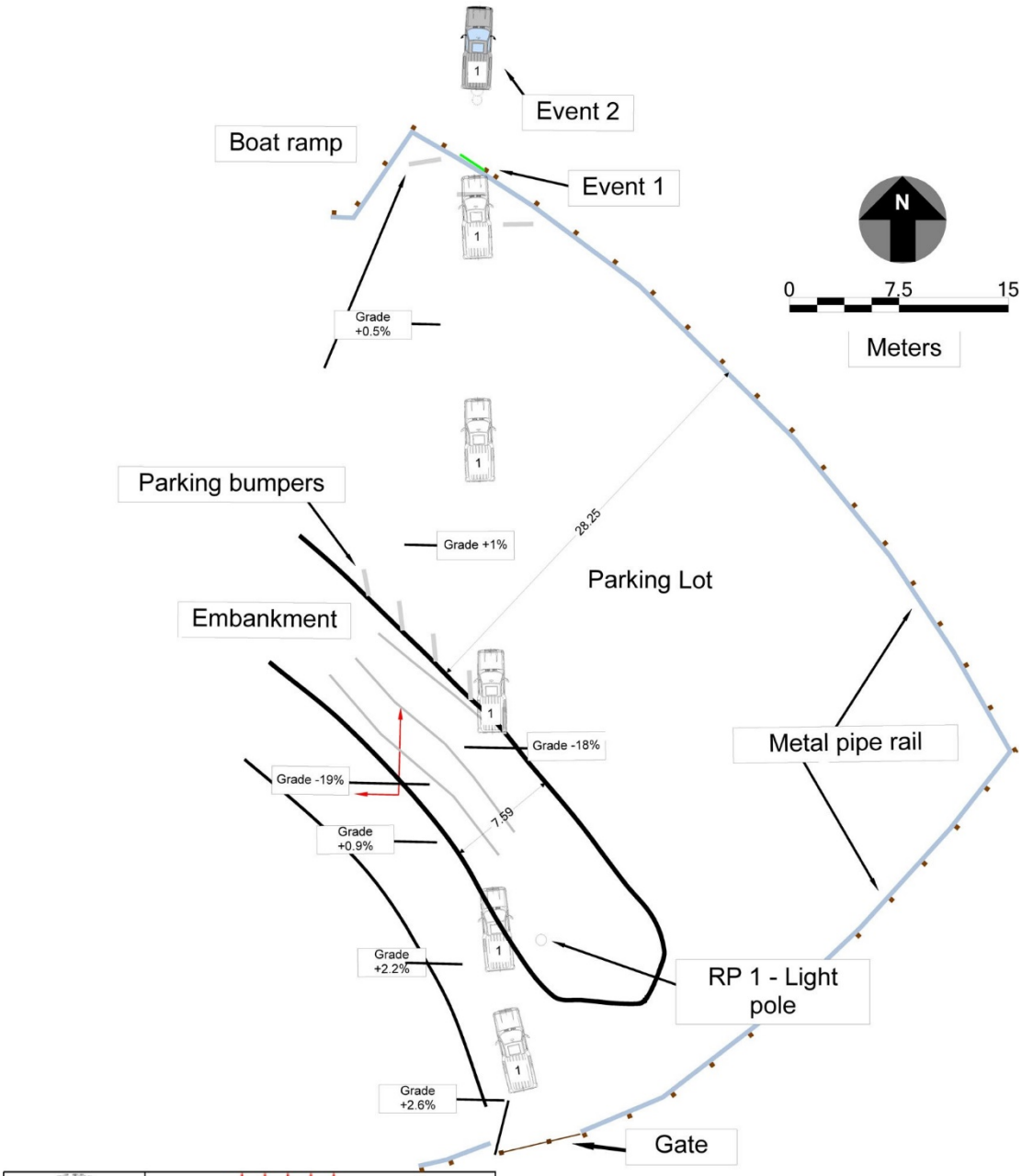
Manual Restraint Systems

The front row was equipped with driver and front right passenger lap and shoulder seat belts. The middle seat position was equipped with a lap belt. The vehicle was unoccupied.

Supplemental Restraint Systems

The Ram's supplemental restraint systems included an air bag electronic control unit, driver's and passenger's frontal air bags, seat-mounted side impact air bags for the front row, and front and second row combination side impact/rollover inflatable curtain air bags. There were no air bag deployments during this crash.

CRASH DIAGRAM



	NHTSA www.nhtsa.gov
Case Number:	DS18024

APPENDIX A: First Incident

This vehicle was involved in a similar incident 11 days earlier. That incident occurred at nighttime. The crash scene was the entrance to a parking area in a State park (**Figure 12**). The through road was configured north/south and the entrance was configured east/west. The entrance was secured by two gates. There were series of 15 x 15 cm (5.9 x 5.9 in) wooden posts located along the east side of the roadway and along the south side of the entrance. It has been reported that there was a negative 8 percent grade in this general location. A crash diagram is located on the following page.

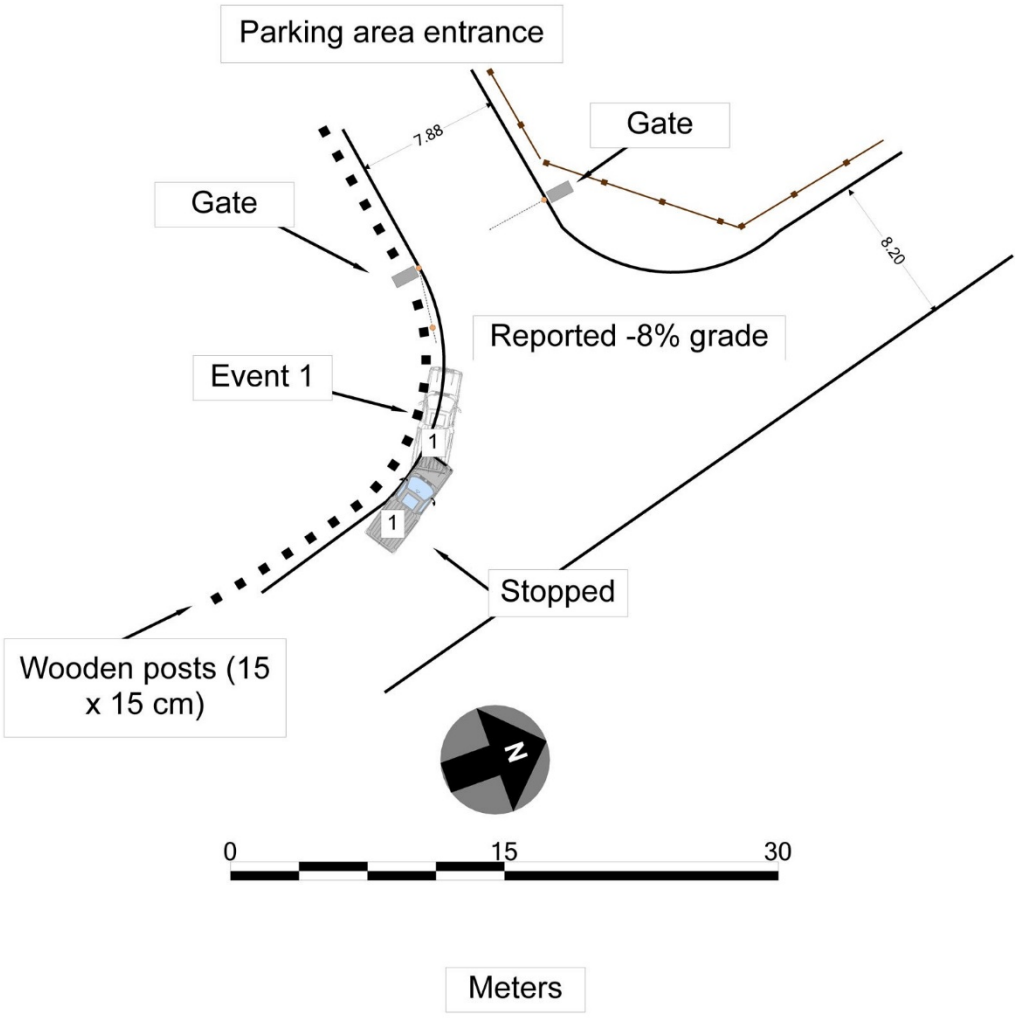
Figure 12. Area of incident, looking west (on-line image).

The driver of the Ram reported that he stopped the vehicle and placed it in Park with the engine running. This was a different driver than the driver involved in the second incident. He exited the vehicle to secure the gates. He first secured the exit gate (on left) and then crossed the road to secure the entrance gate (on right). At this time he observed the vehicle start rolling forward. It struck one of the wooden posts with its left side (**Figure 13**) and came to rest in that area. The direct damage was located 95 cm (37.4 in) aft of front axle and measured 53 cm (20.8 in). The CDC was 12LPES1. The driver entered the vehicle on the passenger side to make sure the vehicle was turned off and the vehicle placed in Park. The vehicle was then driven from the scene and a report of the incident was generated.

Figure 13. 2014 Ram 1500, left side damage.

Crash Diagram for First Incident

Previous Incident



Case Number:	DS18024

APPENDIX B: Event Data Recorder Report (EDR)
2014 Ram 1500[1]

[1] 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. 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	1C6RR6KG5ES******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	18024_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.7.2
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 18.0.2
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.
- For Fiat vehicles, the "Read VIN from Vehicle" feature in the CDR Tool will not work. The VIN will have to be manually entered.
- 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.

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, 3rd 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.

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:

- 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.
- Occupant Size Classification, Outboard Front Passenger - "Child" status may be used to indicate anything weighing less than a 5th percentile female adult crash dummy, including an empty seat; "Not Child" indicates anything weighing the same as or more than a 5th percentile female adult crash dummy.
- Odometer at Event - Vehicle odometer at the time of the event
- 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.
- System Voltage at Event, ACM - Voltage at the ACM as measured by the ACM.
- System Voltage at Event, Bussed - 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.
- 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 display 0, SNA, N/A or 255.
- In vehicles with Bosch 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.

SENSOR DATA:

- The design range for the angular rate data is:
    - +/- 240 deg/sec for Bosch ACMs
    - +/- 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
- 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.

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.
- (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.
- 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 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.
    - 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.
    - ACC Speed Set (if equip.)- This indicates the desired speed in mph that was input by the driver for the ACC system. If the value is SNA for all time stamps, then the vehicle is not equipped with ACC.
    - 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;
- 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 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 - This indicates the actual forward distance to the main object being tracked by the FCW system. "FCW present but not tracking" indicates that the FCW system is not currently tracking 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 fully on with active braking as well as 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-braking" indicates that the FCW system is on with active braking enabled but there will no FCW audible or visual warnings in an FCW event. "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 as well as the audible and visual warnings enabled. SNA indicates that the vehicle is not equipped with FCW.
- Gear Position - This indicates the current transmission gear.
- 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.
- Speed, Vehicle Indicated - This indicates the average of the drive wheels. The accuracy of the recorded Speed, Vehicle Indicated will be affected if the vehicle had the tire size or the final drive axle ratio changed from the factory build specifications. 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 LOW, NORMAL, HIGH, 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 (in revolutions per minute) of a particular tire as denoted by XX.

- Tire Pressure Monitor Indicator Lamp/Faults - "On" indicates a fault in the tire pressure monitoring system. The TPM module DTC's should be read and recorded for final system interpretation.
- "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:

- Jeep Renegade and Alfa Romeo Giulia are only CDR supported in the NAFTA market.

03002_Chrysler_ r038

System Status at Retrieval

Original VIN	1C6RR6KG5ES******
Ignition Cycle, Download	5731
ACM Part Number	68401982AA
ECU Serial Number	T52MD106402840
ACM Supplier	Bosch
ECU Supply Voltage at Time of Retrieval	14.6

System Configuration at Retrieval

Configured for Driver Frontal Airbag	Yes
Configured for Passenger Airbag	Yes
Configured for Driver Retractor Pretensioner	Yes
Configured for Passenger Retractor Pretensioner	Yes
Configured for Left Side Curtain Airbag	Yes
Configured for Right Side Curtain Airbag	Yes
Configured for Front Left Seat Airbags	Yes
Configured for Front Right Seat Airbag	Yes
Configured for Safety Belt Status, Driver	Yes
Configured for Safety Belt Status, Outboard Front Passenger	Yes
Configured for Seat Track Position Switch, Foremost, Status, Driver	No
Configured for Seat Track Position Switch, Foremost, Status, Outboard Front Passenger	No
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.

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October 2019

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of Transportation

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Administration**

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