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

16. Abstract

This report documents the on-site investigation of an air bag non-deployment crash involving a 2014 Toyota Avalon. This three-vehicle crash occurred in the morning in January 2019 in Kansas. Conditions were daylight, clear, and dry. The crash site was a 4-lane, undivided, urban roadway. The Toyota was driven southbound by a 53-year-old female. The Toyota was following a 2015 Lexus GX460 SUV driven by a belted 56-year-old male. A 2015 Chevrolet Cruze driven by a 62-year-old female was traveling northbound. The Lexus stopped in preparation for a left turn and was struck in the back plane by the front plane of the Toyota. The Toyota's air bags did not deploy, and the pretensioner did not actuate. The Lexus was displaced into the oncoming northbound lane and struck the Chevrolet. The driver of the Toyota sustained incapacitating injuries and was transported by ambulance to a trauma center, where she was hospitalized for six days. The drivers of the Lexus and Chevrolet were not injured. The Toyota was towed from the scene due to damage. The other vehicles were not towed. The crash severity and vehicle crash configuration suggest that the driver's frontal air bag should have deployed in this crash.

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Special Crash Investigations
Air Bag Non-Deployment Crash Investigation
Office of Defects Investigation
Case Number: DS19011
Vehicle: 2014 Toyota Avalon
Location: Kansas
Crash Date: January 2019

BACKGROUND

This report documents the on-site investigation of an air bag non-deployment crash involving a 2014 Toyota Avalon (**Figure 1**). The frontal air bags did not deploy. This investigation was initiated by NHTSA's Office of Defects Investigation. Special Crash Investigations (SCI) assigned the case to Dynamic Science, Inc., in May 2019. The Toyota was located at an auction lot, and the SCI team obtained permission to inspect the vehicle. The inspection was completed in May 2019. The Toyota had previously been inspected by NHTSA's Vehicle Research and Test Center (VRTC) staff. The Toyota was supported by the Bosch Crash Data Retrieval (CDR) system, and the vehicles's ACU was imaged during their inspection. No events were recorded by the Bosch tool. The vehicle's ACU was removed and was in the custody of the VRTC. The vehicle was being inspected in connection with ODI investigation EA19-001.

Figure 1. The 2014 Toyota Avalon.

This three-vehicle crash occurred in the morning in January 2019 in Kansas. Conditions were daylight, clear, and dry. The crash site was a 4-lane, undivided, urban roadway. The Toyota was being driven southbound by a 53-year-old female. The Toyota was following a 2015 Lexus GX460 SUV driven by a belted 56-year-old male. A 2015 Chevrolet Cruze driven by a 62-year-old female was traveling northbound. The Lexus stopped to turn left and was struck in the back plane by the front plane of the Toyota. The Toyota's air bags did not deploy and the pretensioners did not actuate. The Lexus was displaced into the oncoming northbound lane and struck the Chevrolet. The driver of the Toyota sustained "A" (disabled/incapacitating) injuries and was transported by ambulance to a local hospital, where she was hospitalized for six days. The drivers of the Lexus and Chevrolet were not injured. The Toyota was towed from the scene due to damage. The other vehicles were operable and not towed. The crash severity and vehicle crash configuration suggest that the driver's frontal air bag should have deployed in this crash.

SUMMARY

Crash Site

The crash site was a 4-lane, undivided, urban roadway approaching a three-leg intersection. The asphalt roadway was straight and level. There were two northbound and two southbound travel

lanes separated by a painted double yellow centerline. The roadway was bordered by white painted fog lines and asphalt shoulders. There was a driveway on the right side of the roadway and undivided urban roadway on the left. There were no traffic controls for the northbound and southbound traffic. The speed limit was 64 km/h (40 mph) in all directions. The weather at the nearest reporting station was -8 degrees C (16 degrees F), 81 percent humidity, clear visibility, and the winds were out of the south southeast at 11 km/h (7 mph). A crash diagram is attached at the end of this technical report.

Pre-Crash

The Toyota was being driven southbound by a 53-year-old female at a driver-reported speed of 56 to 64 km/h (35 to 40 mph). The vehicle was in the second lane from the right (**Figure 2**) and was traveling behind a 2015 Lexus GX460 sport utility vehicle (SUV) driven by a 56-year-old male. The Lexus had stopped at the intersection in preparation for a left turn. A 2015 Chevrolet Cruze driven by a 62-year-old female was traveling northbound in the second lane from the right.

Figure 2. Southbound approach.

Crash

The front plane of the Toyota struck the rear plane of the Lexus (Event 1). The "missing vehicle" algorithm of the WinSMASH program calculated a total delta V of 25 km/h (16 mph) for the Toyota. The longitudinal and lateral components were -25 km/h (-16 mph) and 0 km/h, respectively. The results fit the model but appear low. The WinSMASH program calculated a total delta V of 17 km/h (11 mph) for the Lexus. The longitudinal and lateral components were 17 km/h (11 mph) and 3 km/h (3 mph), respectively. The Lexus was displaced into the oncoming northbound lane, and the front plane of the Lexus struck the left plane of the Chevrolet (Event 2).

Post-Crash

The driver of the Toyota was seriously injured. She was first assessed by law enforcement who noted that she did not respond appropriately. She was extricated by EMS and transported by ambulance to a local trauma center. She was admitted and was hospitalized for six days. The remaining drivers were not injured. All of the vehicles came to rest on the roadway. The Toyota was towed from the scene due to damage. The other vehicles were operable and not towed.

2014 TOYOTA AVALON

Description

The Toyota was a 4-door sedan identified by the Vehicle Identification Number (VIN) 4T1BK1EB0EUxxxxxx with a manufacture date of October 2014. The vehicle was equipped with a 3.5-liter, 6-cylinder, gasoline engine; an automatic transmission; and front-wheel drive. The vehicle manufacturer's recommended tire size was P215/55R17 with a cold pressure of 228 kPa (33 psi). The vehicle was equipped with Firestone FR710 of the recommended size on the front and Michelin tires of the recommended size on the rear. The specific tire information was as follows:

Position	Measured Tread Depth	Restricted	Damage
LF	7 mm (9/32 in)	Yes	Debeaded
LR	4 mm (5/32 in)	No	None
RR	4 mm (5/32 in)	No	None
RF	7 mm (9/32 in)	No	None

The Toyota was configured with seating for five occupants. The front row was equipped with bucket seats with adjustable head restraints. The second row was equipped with a 60/40 split bench with folding backs.

Vehicle History

The Toyota was a leased vehicle from 2014 to 2017. It was purchased used by the driver in this crash in 2017. A Carfax report was obtained, and it did not contain any reports of any previous crashes. The driver reported that she had not been involved in any crashes or had any safety-related mechanical repairs. The first owner was located in Iowa. The current owner (driver) was located in Kansas and indicated that the vehicle had remained in that area throughout her ownership.

Exterior Damage

The Toyota sustained moderate front plane damage from the impact to the rear plane of the Lexus (**Figure 3**). The direct damage began at the left front bumper corner and extended 31 cm (12.2 in) to the right. The Field L extended from bumper corner to bumper corner. Thirteen measurements were taken at bumper backing bar level by the Nikon Total Station and the Faro Blitz program computed crush measurement in six increments as follows: C_1 = 10 cm (3.9 in), C_2 = 22 cm (8.6 in), C_3 = 18 cm (7.0 in), C_4 = 13 cm (5.1 in), C_5 = 6 cm (2.3 in), and C_6 = 1 cm (0.4 in). The maximum crush was located 23 cm (9.0 in) from the left front bumper corner. The direct damage extended 84 cm (33.0 in) down the left plane. The Collision Deformation Classification (CDC) was 12FLEE3.

Figure 3. Frontal damage, the 2014 Toyota Avalon.

Event Data Recorder

The Toyota was equipped with an air bag supplemental restraint system that had EDR capability to store deployment and non-deployment events. The vehicle's ACU was removed by VRTC during its inspection and was in their custody. The data, which was from the Toyota's EDR, was imaged using the Bosch Crash Data Retrieval Tool version 18.0 by going directly to the ACU

and reported using version 19.5. No events were recovered by the Bosch tool. Possible reasons are discussed later in this report. The EDR report is included in this report as **Appendix A**.

NHTSA Recalls and Investigations

There were no recalls associated with the VIN for this vehicle. The most recent query to the recall database was in June 2020. This vehicle was associated with ODI investigation EA19-001.

Interior Damage

The Toyota sustained minor interior damage as a result of this crash. There was slight longitudinal intrusion at the base of the left A-pillar. The windshield was fractured from hood contact. There was no other glazing damage. There were scuff occupant contacts to the left lower instrument panel and make-up contacts to the steering wheel hub (**Figure 4**). All the doors remained closed and operational.

Figure 4. Steering wheel hub/lower instrument panel contacts, the 2014 Toyota Avalon.

Manual Restraint Systems

The front row was equipped with driver and front right passenger lap and shoulder seat belts. The driver's belt was equipped with continuous loop belt webbing, a sliding latch plate, an emergency locking retractor (ELR), and an adjustable upper anchor that was adjusted to the full-down position. The front right passenger's seat belt was equipped the same as the driver's, but had a switchable ELR/Automatic Locking Retractor (ALR). Both seat belts were equipped with retractor pretensioners that did not actuate. The driver's seat belt exhibited loading evidence and a blood drip pattern that indicated that the seat belt was in use.

Figure 5. Left frontal air bag sensor, the 2014 Toyota Avalon.

Supplemental Restraint Systems

The Toyota was equipped with 10 air bags for supplemental restraint: dual-stage frontal air bags for the driver and front right passenger positions; front row seat-mounted side air bags; front row knee air bags; second row seat-mounted side air bags; and side-impact inflatable curtain (IC) air bags for the front and second row seats. There were no air bag deployments. The vehicle was configured with an air bag sensor assembly, front impact sensors, side-impact sensors (front doors), and side-impact sensors (front and rear). The dual front impact sensors were located on the vehicle body above the backing bar on the frame rails. The left sensor wiring was damaged during the crash (**Figure 5**).

Air Bag Non-Deployment Discussion

The driver's frontal air bags did not deploy and the pretensioner did not actuate. The owner's manual indicated that the frontal air bags would deploy in impacts that exceed the set threshold level. The threshold level was reported to be the level of force corresponding to an approximately 20 to 30 km/h (12 to 18 mph) collision with a fixed wall that does not move or deform. This threshold might be higher in the case of underride collisions or impacts against deformable objects and vehicles. In this crash, the WinSMASH algorithm calculated a total delta V of 25 km/h (16 mph). The crash severity and vehicle crash configuration suggest that the driver's frontal air bag should have deployed in this crash. The damage was outside of the left frame rail, possibly causing a longer delta T and a late deployment. Regardless, a non-deployment event should have been recorded.

ODI opened an engineering analysis (EA19-001) in April 2019. The subject was air bag ACU electrical overstress. The issue was that an internal component of the ACU that monitors signals from crash signals may fail that may disable the ACU and cause a non-deployment of needed air bags. It has been reported that the disablement occurs in certain types of frontal crashes. A condition known as electrical overstress may affect the internal components of the ACU. It is not known if this was the issue in this crash.

2014 TOYOTA AVALON OCCUPANT

Driver Demographics

Age/sex:	53 years/female
Height:	170 cm (67 in)
Weight:	54 kg (119 lbs)
Eyewear:	Sunglasses
Seat type:	Bucket
Seat track position:	Between middle and full rearward
Manual restraint usage:	Lap and shoulder used
Usage source:	Vehicle inspection, interview
Air bags:	Frontal, side-impact, and IC air bags not deployed
Alcohol/drug data:	None
Egress from vehicle:	Extricated by EMS
Transport from scene:	Ambulance
Type of medical treatment:	Transported to Level 1 trauma center, hospitalized for 6 days

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Left pulmonary contusion	441402.3	Shoulder portion of seat belt	Certain
2	Left orbit fracture	251200.2	Steering wheel hub	Certain

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
3	Maxilla fracture, right side	250800.2	Steering wheel hub	Certain
4	Fracture, L4	650616.2	Seat belt Seat cushion	Probable Possible
5	Nasal fracture	251099.1	Steering wheel hub	Certain
6	Fracture, single left rib (upper left), rib 4	450200.1	Shoulder portion of seat belt	Probable
7	Large hematoma, right lower leg	810402.1	Lower instrument panel	Certain
8	Lip laceration	210600.1	Steering wheel hub	Certain
9	Contusion, right side of face, superior to right eye	210402.1	Steering wheel hub	Certain
10	Right knee abrasions	810202.1	Left instrument panel	Certain

Source: ER report, EMS, radiology, and interview.

Driver Kinematics

The 53-year-old female driver was seated in an upright position. She was wearing the manual lap and shoulder seat belt. She indicated that the shoulder portion was in the proper position. The seat was adjusted to between the middle and rearmost track position. Both hands were on the steering wheel, and her right foot was on the accelerator. She was unclear if she was distracted. She saw the Lexus just prior to impact. She braked and steered to the right. At impact, she was displaced forward. Her right lower leg contacted the lower instrument panel. She loaded the seat belt and sustained a fractured rib. She slipped past the shoulder portion of the seat belt and contacted the steering wheel hub with her face, causing the multiple facial fractures. She was extricated by EMS and transported by ambulance to a local trauma center. She was admitted and was hospitalized for six days.

2015 LEXUS GX460

Description

The 2015 Lexus GX460 was a 5-door SUV. The vehicle was identified by the VIN JTJJM7FX9F5xxxxxx. The vehicle was equipped with an 8-cylinder, 4.6-liter, gasoline engine and 4-wheel drive.

Exterior Damage
The Lexus sustained moderate rear plane damage from the impact with the front of the Toyota. The vehicle may have sustained minor frontal damage from the impact with the left plane of the Chevrolet. The vehicle was not towed from the scene and was presumed to be operable.

Occupant Data
The 56-year-old male driver was belted and was not injured or transported.

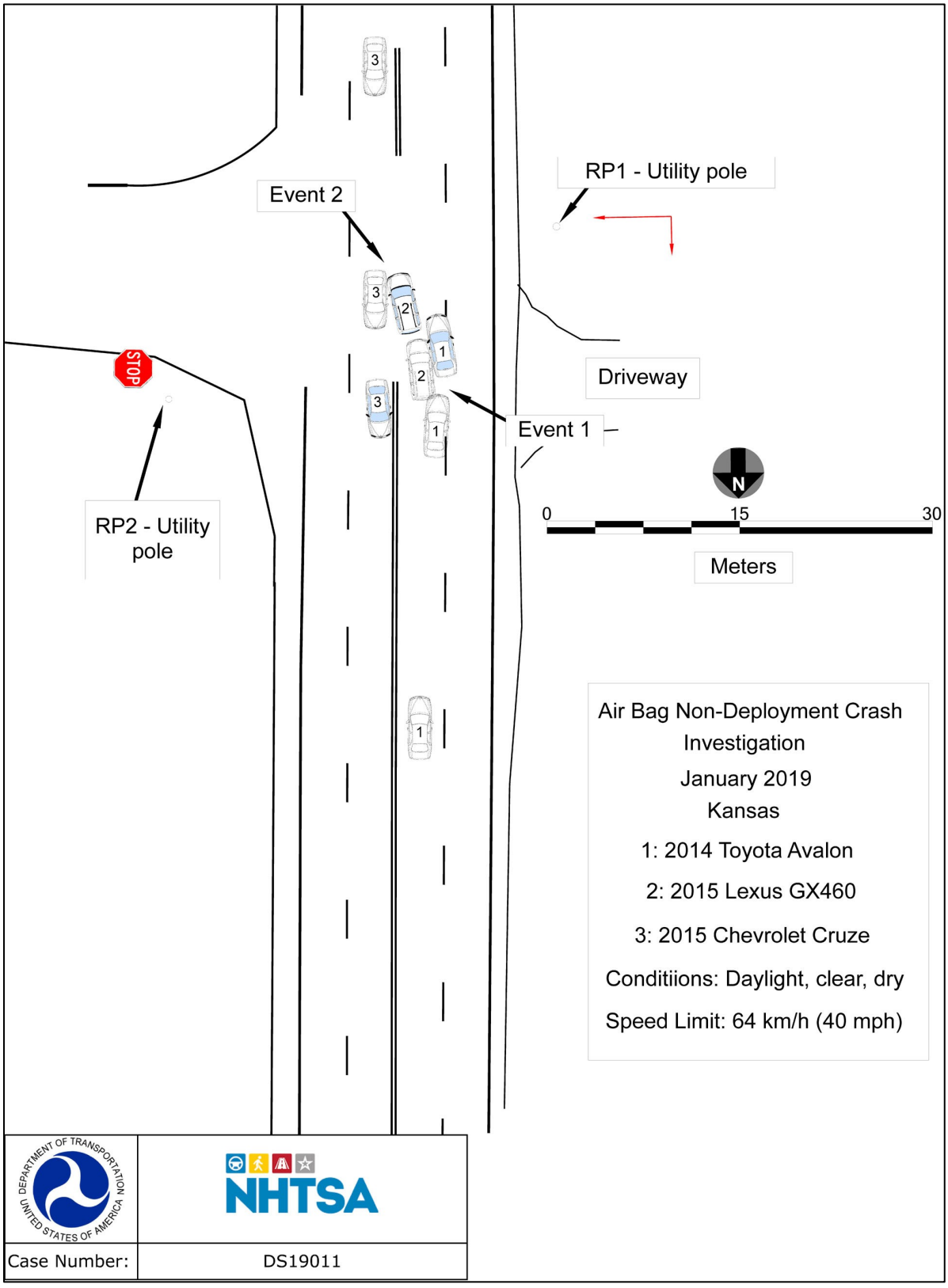
2015 CHEVROLET CRUZE

Description
The 2015 Chevrolet Cruze was a 4-door sedan identified by the VIN 1G1PC5SB3F7xxxxxx. The vehicle was equipped with a 1.4-liter, 4-cylinder, gasoline engine coupled to an automatic transmission and front-wheel drive.

Exterior Damage
The Chevrolet sustained minor damage to the left plane from the impact with the Lexus. The vehicle was not towed from the scene and was presumed to be operable.

Occupant Data
The 62-year-old female driver did not sustain any injuries and was not transported. It is not known if she was belted or not.

CRASH DIAGRAM



APPENDIX A: 2014 Toyota Avalon Event Data Recorder (EDR) Report[1]

[1] The event data recorder (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 View 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/Frame Number	4T1BK1EB0EU******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	DS19011_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 18.0
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 19.5
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	None

Comments

No comments entered.

Data Limitations

CDR Record Information:

- Due to limitations of the data recorded by the airbag ECU, such as the resolution, data range, sampling interval, time period of the recording, and the items recorded, the information provided by this data may not be sufficient to capture the entire crash.
- Pre-Crash data is recorded in discrete intervals. Due to different refresh rates within the vehicle's electronics, the data recorded may not be synchronous to each other.
- Airbag ECU data should be used in conjunction with other physical evidence obtained from the vehicle and the surrounding circumstances.
- If any of the front passenger seat airbags, side airbags, or Curtain Shield Airbags have deployed, data will not be overwritten or deleted by the airbag ECU following that event. If none of the airbags have deployed, the data of that event may be overwritten by a following event even if other airbags (pretensioner, rear seat airbag, etc.) have deployed.
- If power supply to the airbag ECU is lost during an event, all or part of the data may not be recorded.
- "Diagnostic Trouble Codes" are information about faults when a recording trigger is established. Various diagnostic trouble codes could be set and recorded due to component or system damage during an accident.
- The airbag ECU records only diagnostic information related to the airbag system. It does not record diagnostic information related to other vehicle systems.
- The TaSCAN, Global Tech Stream, or Intelligent Tester II devices (or any other Toyota genuine diagnostic tool) can be used to obtain detailed information on the diagnostic trouble codes from the airbag system, as well as diagnostic information from other systems. However, in some cases, the diagnostic trouble codes of the airbag system recorded by the airbag ECU when the event occurred may not match the diagnostic trouble codes read out when the diagnostic tool is used.

General Information:

- The data recording specifications of Toyota's airbag ECUs are divided into the following categories. The specifications for 12EDR or later are designed to be compatible with NHTSA's 49CFR Part 563 rule.
  - 00EDR / 02EDR / 04EDR / 06EDR / 10EDR / 12EDR / 13EDR / 15EDR / 17EDR / 19EDR
- The airbag ECU records data for all or some of the following accident types: frontal crash, rear crash , side crash, and rollover events. Depending on the installed airbag ECU, data for side crash and/or rollover events may not be recorded.
- This airbag ECU records record pre-crash data and post-crash data.
  - If a single event occurs independently, the data for that event is recorded on a one-to-one basis.
  - If multiple events occur successively (within a period of approximately 500ms), the establishment of the recording trigger for the first event is defined as the "pre-crash recording trigger". Pre-crash data for the first event and post-crash data for each successive event is then recorded.
- The airbag ECU has two recording pages (memory maps) to store pre-crash data. Additionally, to store post-crash data, the airbag ECU has two recording pages for each accident type: two pages for frontal and rear crash, two pages for a side crash, and two pages for rollover event.
- The data recorded by the airbag ECU includes correlating information between each previously occurring event (i.e., information that

clarifies the collision event sequence. This correlation information consists of the following items.
- Time from Previous Pre-Crash TRG
- Linked Pre-Crash Page
- Time from Pre-Crash TRG
- TRG Count
- Previous Crash Type

- In frontal and rear collision events, the first point where a longitudinal cumulative delta-V of over 0.8 km/h (0.5 mph) is reached is regarded as time zero for the recorded data. In side impact collision and rollover events, the point in time at which the recording trigger is established is regarded as time zero for the recorded data.
- The recording trigger judgment threshold value differs depending on the collision type (i.e., frontal crash, rear crash, side crash, or rollover event).
- Some of the data recorded by the airbag ECU is transmitted to the airbag ECU from various vehicle control modules by the vehicle's Controller Area Network (CAN).
- In some cases, the airbag ECU part number printed on the ECU label may not match the airbag ECU part number that the CDR tool reports. The part number retrieved by the CDR tool should be considered as the official ECU part number.
- In frontal and rear collision events, the record time varies depending on the period during which a longitudinal cumulative delta-V of over 0.8 km/h (0.5 mph) is reached, and time series data is recorded for up to 250 ms. The record time described above is indicated as "Length of Delta-V". "Delta-V, Longitudinal" outside the record time is indicated by area shaded in the table, and not indicated in the graph.

Data Element Sign Convention:
The following table provides an explanation of the sign notation for data elements that may be included in this CDR report.

Data Element Name	Positive Sign Notation Indicates
Maximum Delta-V, Longitudinal	Forward
Delta-V, Longitudinal	Forward
Lateral Acceleration for Frontal/Rear Crash, Floor Sensor	Left to Right
Lateral Acceleration, Side Satellite Sensor 1	Left to Right
Lateral Acceleration, Side Satellite Sensor 2	Left to Right
Lateral Acceleration, Side Satellite Sensor 3	Left to Right
Lateral Acceleration, Side Satellite Sensor 4	Left to Right
Lateral Acceleration for Side Crash, Floor Sensor	Left to Right
Roll Angle Peak	Clockwise Rotation
Roll Angle at the Time of TRG	Clockwise Rotation
Roll Rate	Clockwise Rotation
Lateral Acceleration for Rollover, Floor Sensor	Left to Right
Longitudinal Acceleration , VSC Sensor	Forward
Yaw Rate	Left Turn
Steering Input	Left Turn

Data Definitions:

- The "ON" setting for the "Freeze Signal" indicates a state in which the non-volatile memory can not be overwritten or deleted by the airbag ECU. After "Freeze Signal" has been turned ON, subsequent events will not be recorded.
- "Recording Status" indicates a state in which all recorded event data has been written into the non-volatile memory, or a state in which this process was interrupted and not fully written into the non-volatile memory. If "Recording Status" is "Incomplete", recorded event data may not be valid.
- If the "Occupant Size Classification, Front Passenger" displays "Child" or "Not Occupied", "Side Air Bag Deployment, Time to Deploy" and "Pretensioner Deployment, Time to Fire" may indicate a time even if deployment did not occur on the for following part no's:
  - 89170-07280, 35400, 35410, 35470, 42660, 0R120, 0R080, 0R081, 0R150
- "Engine RPM" indicates the number of engine revolutions, not the number of motor revolutions. The recorded value has an upper limit of 12,800 rpm. Resolution is 100 rpm and the value is rounded down and recorded. For example, if the actual engine speed is 799 rpm, the recorded value will be 700 rpm.
- If the electric vehicle is using a calculated/virtual engine RPM for drivetrain control, "Engine RPM" may be recorded, but should not be used during data analysis.
- The upper limit for the recorded "Vehicle Speed" value is 200 km/h (125mph). Resolution is 1km/h (0.6mph) and the value is rounded down and recorded. The accuracy of the "Vehicle Speed" value can be affected by various factors. These include, but not limited, to the following.
  - Significant changes in the tire's rolling radius
  - Wheel lock and wheel slip
- "Accelerator Pedal" has two recording specifications. Both the recorded value increases as the driver depresses the accelerator.
  - Percentage of accelerator pedal depressed (recorded as 0-100(%)).
  - Output voltage of accelerator pedal module (recorded as 0-5(V)).
- If M/T transmission vehicle of some limited model, "Shift Position" may display "Drive" regardless of the actual shift position.
- Depending on the type of occupant sensor installed in the vehicle, one of the following three recording formats for "Occupant Size Classification, Front Passenger" will be utilized.
  - Occupied / Not Occupied
  - AM50 / AF05 / Child / Not Occupied
  - AM50 / AF05 / Child or Not Occupied

- "Cruise Control Status" indicates whether the cruise control system is actuated or not. OFF indicates that the cruise control system is not actuated, but can also indicates that the vehicle is not equipped with the system.
- "Air Bag Warning Lamp, On/Off", "Ignition Cycle, Crash", "Seat Track Position Switch, Foremost, Status, Driver", "Occupant Size Classification, Front Passenger", "Safety Belt Status, Driver", "Safety Belt Status, Front Passenger", "Frontal Air Bag Suppression Switch Status, Front Passenger", and "RSCA Disable Switch" indicate the state approximately 1 second before time zero. They may not always indicate the state at the moment of collision.
- The upper and lower limits for the recorded value of "Motor RPM" is 17,500 rpm and -7,500 rpm respectively. Resolution is 100 rpm and the value is rounded down and recorded.
- "Brake Oil Pressure" has an upper limit of 12.14 Mpa. In the case of the vehicle that has not VSC system, "0 Mpa" or "Invalid" may be displayed.
- "Longitudinal Acceleration , VSC Sensor" has upper and lower limits for the recorded value of 8.973 m/s^2 and -8.973 m/s^2 respectively. This acceleration sensor does not sense collisions.
- "Sequential Shift Range" displaying "Undetermined" indicates the shift range is undetermined or was not being used.
- Some vehicles will not be equipped with all "Drive Mode" types indicated in the "Drive Mode" table. If some or all drive modes are not applicable to vehicle, "OFF" or "Invalid" may be displayed. The item in the "Drive Mode" table may not match the name of switch or indicator that equipped the vehicle.
- The upper and lower limits for the recorded value of "Steering Input" is 375 deg and -375 deg respectively. Resolution is 1.5 deg and the value is rounded down and recorded.
- Resolution of the "Air Bag Warning Lamp ON Time Since DTC was Set" is 15 minutes, and the value is rounded down and recorded.
- "Delta-V, Longitudinal" indicates the change in forward speed after time zero. This does not refer to vehicle speed, and it does not include the change in speed during the period from the start of the actual collision to establishment of the time zero.
- "Location of Side Satellite Sensor" shows the outline of a typical sensor position. Sensory location can be confirmed using the repair manual.
- "Time from Previous Pre-Crash TRG" indicates the time between the establishment of an event's pre-crash recording trigger to the establishment of a more recent event's pre-crash recording trigger. The upper limit for the recorded value is 16,381 milliseconds. In the event of establishment of the first pre-crash recording trigger after the ignition is switched ON, the upper limit value(max value) is recorded.
- "TRG Count" indicates a calculated value of the number of times recording triggers have been established for all crash types. The sequence in which each event occurred can be verified from the "TRG Count". The smaller the "TRG Count" value, the older the data. The upper limit for the recorded value is 65,533 times. When more than one event reaches the upper limit, the actual "TRG Count" may be greater than what is displayed for that event.
- "Linked Pre-Crash Page" is used to link 'paged" pre-crash data with 'paged" post-crash data. When old pre-crash data is overwritten by new pre-crash data, the "Linked Pre-Crash Page" value may record a page number that is not actually linked.
- Resolution of the "Time from Pre-Crash to TRG" is 50 [ms], and the value is rounded up and recorded.
- "Roll Angle at the Time of TRG" and "Roll Angle Peak" do not represent the actual roll angle of the vehicle. These values are used internally by the airbag ECU for sensing a rollover.

05013_ToyotaS00std_r028

System Status at Time of Retrieval

ECU Part Number	89170-07290
EDR Generation	13EDR
Complete File Recorded	No
Freeze Signal	OFF
Freeze Signal Factor	None
Diagnostic Trouble Codes Exist	No
Ignition Cycle ,Download (times)	6990
Multi-event, number of events (times)	N/A
Time from event 1 to 2 (s)	N/A
Time from Previous Pre Crash TRG (msec)	16381 or greater
Latest Pre-Crash Page	0
Contains Unlinked Pre-Crash Data	Yes

Event Record Summary at Retrieval

Events Recorded	TRG Count	Crash Type	Time (msec)	Pre-Crash & DTC Data Recording Status	Event & Crash Pulse Data Recording Status
None	N/A	N/A	N/A	N/A	N/A

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.

PIDs	PID	Data
	00	BC 60 00 01
	01	00
	03	30 37 32 39 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30
	04	FF FF FF
	05	01
	06	00
	0A	01
	0B	00
	20	80 00 00 01
	21	04 9F
	40	C0 00 E0 01
	41	54 57
	42	47 42 13 24 02
	51	FF
	52	F9
	53	00
	60	FF FF F0 01
	61	04 05 C8 00 B2 40 28 00 02 7E 02 7E 01 40 01 40 03 1D 03 1D 00 00 00 00 1F 40 29 B1 85 5F C0 00 12 C0 19 00
	62	00 00 3F FD 1B 4E 00 00 00 00
	63	AA 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	64	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	65	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	66	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	67	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	68	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	69	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	6A	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	6B	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	6C	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	6D	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	6E	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	6F	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	70	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

71	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
72	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
73	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
74	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
80	00	00	00	01																		
A0	0C	00	1F	81																		
A5	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00											
A6	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00											
B4	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00																		
B5	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00																		
B6	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00																
B7	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00																
B8	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
B9	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	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.

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**National Highway
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Administration**

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