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Special Crash Investigations: Alleged Inadvertent Air Bag Deployment Investigation; Vehicle: 2010 Nissan Versa; Location: California; Crash Date: July 2017

DISCLAIMER

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15. Supplementary Notes

Each crash represents a unique sequence of events, and generalized conclusions cannot be made concerning the crashworthiness performance of the involved 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 report documents the investigation of an alleged inadvertent deployment of the driver's front air bag in a 2010 Nissan Versa, its crash, and the injuries sustained by the driver resulting from the deployment and crash. The case was initiated by the Office of Defects Investigations (ODI) in response to a driver notification stating that the Nissan was traveling at approximately 64 km/h (40 mph) when without warning or impact, the driver's frontal air bag deployed inadvertently. The alleged deployment was followed by a crash where the vehicle's front plane struck a tree. The driver sustained moderate severity injuries requiring hospitalization. The vehicle sustained severe exterior damage to the front end and was towed due to damage. The SCI investigation found no evidence supporting the alleged inadvertent air bag deployment. The evidence suggested the vehicle departed the roadway for unknown reasons and struck a tree causing the deployment of the driver's frontal air bag as well as other air bags.

17. Key Words	18. Distribution Statement
inadvertent, deployment, air bag, injury	Document is available to the public from the National Technical Information Service, www.ntis.gov.

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Special Crash Investigations
Alleged Inadvertent Air Bag Deployment Investigation
Office of Defects Investigation
Case Number: DS17014
Vehicle: 2010 Nissan Versa
Location: California
Crash Date: July 2017

BACKGROUND

This report documents the investigation of an alleged inadvertent deployment of the driver's frontal air bag (**Figure 1**) in a 2010 Nissan Versa (**Figure 2**), its crash, and the injuries sustained by the driver resulting from the deployment and crash. This on-site investigation was intended to determine the air bag deployment parameters, occupant restraint usage, occupant kinematics and injury sources.

Figure 1. Deployed driver's frontal air bag, 2010 Nissan Versa.

Figure 2. Front plane damage, 2010 Nissan Versa.

The case was initiated by the Office of Defects Investigations (ODI) in response to a driver notification. The driver notification stated that the Nissan was traveling at approximately 64 km/h (40 mph) when without warning or impact the driver's frontal air bag deployed inadvertently. The alleged deployment was followed by a crash where the vehicle's front plane struck a tree. The driver sustained moderate severity injuries requiring hospitalization. The vehicle manufacturer was made aware of the incident and initiated its own incident investigation including a vehicle inspection. SCI obtained a copy of their report which did not support or refute the allegations.

The Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration assigned the case to Dynamic Science, Inc in September 2017 and the field inspections were completed in October 2017.

The SCI investigation found no evidence supporting the alleged inadvertent air bag deployment. That determination was based on event data recorder (EDR) data, the vehicle inspection, driver statements, medical records, the police report, a vehicle history report, and service records, and information obtained from the vehicle manufacturer's incident investigation. The vehicle

manufacturer had inspected the vehicle prior to SCI and it imaged the EDR using its proprietary tool and software. SCI obtained a copy of the EDR report in PDF format. The complete EDR report is included in this report as **Appendix A**.

An open recall (NHTSA Recall Number: 17V-449/Manufacturer Recall Number: PM685) was issued in July 2017, several days after the crash involving this vehicle. The recall summary stated: "Continued exposure to areas with high levels of absolute humidity may cause the front passenger air bag inflator housing to rupture and deploy abnormally." The recall safety risk stated: "If the driver air bag inflator ruptures, it may result in metal fragments striking the vehicle occupants causing serious injury or death." The investigation determined the driver's air bag deployed in a normal manner as a result of a frontal impact with a tree. The inflator remained intact and the air bag was not damaged.

This single-vehicle crash occurred during the afternoon in California in July 2017. The Nissan was being driven northbound by a belted 85-year-old female at an EDR-reported speed of 64 km/h (40 mph) at T-5 seconds to algorithm enable (AE). The driver sustained multiple incapacitating injuries and was transported. The vehicle sustained severe exterior damage to the front plane and was towed due to damage.

SUMMARY

Crash Site

The crash site was the northbound lanes of a divided north/south asphalt surface street in California (**Figure 3**). The roadway configuration was initially two northbound lanes separated by a dashed white painted stripe. This section of roadway curved right at a radius of 400 m (1,312 ft). The curved section was followed by a straight section heading due north and the lanes expanded from two to five. From right to left, the configuration was a right turn lane, bike lane, two through lanes and two left turn lanes. The slope in the pre-crash section of roadway measured positive 1 percent. The right turn lane measured 3.3 m (10.8 ft) wide and was bordered by a raised concrete curb measuring 16 cm (6.3 in) high, a paved concrete sidewalk measuring 1.7 m (5.6 ft) wide on the right and a solid white painted stripe on the left. Mature trees lined the right roadside. The posted speed limit was 80 km/h (50 mph). Conditions were daylight, clear and dry. A crash diagram is included at the end of this report.

Figure 3. Crash site, pre-crash approach looking north.

Pre-Crash

The Nissan was traveling northbound in the first lane from the right at an EDR-reported speed of 64 km/h (40 mph) at T-4 seconds to AE. The brake pedal was "Off." Vehicle speed remained constant until T-1 seconds when it dropped to 61 km/h (38 mph). At T-0 the brake pedal was "On" and vehicle speed was not reported. SCI interviewed the driver who stated she was familiar

with the area and was intending to turn right at the next intersection. She stated she was attentive and not distracted. Traffic was light and no unusual conditions existed. The vehicle's cruise control was not activated. The driver stated she believed the frontal air bag deployed inadvertently. Her first thought was to depart the roadway, which she did on the right edge. The driver was interviewed by police who reported she was traveling northbound and fell asleep. She was unable to recall events immediately preceding the collision; however, she stated she has fallen asleep while driving her vehicle in the past. These statements regarding sleep appear to conflict with later statements regarding the alleged inadvertent deployment. A witness traveling southbound stated to police he observed the Nissan traveling northbound suddenly veer to its right and travel off the roadway. Pre-crash data obtained from the EDR report used to calculate distance traveled is presented in the following table.

Time	Vehicle Speed		Distance Traveled			
			Incremental		Cumulative	
-sec	km/h	mph	m	ft	m	ft
7	66	41	NA	NA	NA	NA
6	64	40	8.9	29.3	8.9	29.3
5	64	40	8.9	29.3	17.9	58.6
4	64	40	8.9	29.3	26.8	87.9
3	64	40	8.9	29.3	35.7	117.2
2	64	40	8.9	29.3	44.7	146.5
1	61	38	8.5	27.9	53.2	174.4
0	NA	NA	NA	NA	NA	NA

The vehicle's EDR-reported pre-crash driver input status at Time 0.0 seconds is stated in the table below.

Time -1 second	Service Brake Activation	Engine RPM	Engine Throttle (%)	Speed, Vehicle Indicated (mph [km/h])
At Event	OFF	1,834	1	38 (61)

Crash

The Nissan departed the roadway on the right edge, traveled over the raised curb and across the paved sidewalk and its front plane struck a tree in a head-on configuration. The departure angle was calculated at approximately 10 degrees using the location of two marks on the curb deposited by the vehicle's right-side tires and the location of the struck tree. Distance traveled from roadway departure to impact was 10 m (33 ft). The Nissan initiated a post-impact, clockwise rotation of 60 degrees and came to rest against the tree and facing northeast. The tree measured 43 cm (17.0 in) in diameter. Damage caused by the impact measured to 90 cm (35.0 in) above ground on the trunk (**Figure 4**). This damage included displacement of bark but no fracturing or movement of the tree was documented.

Three air bags deployed in the Nissan including the driver's frontal, the front right seat-mounted and the right inflatable curtain (IC) air bag. A statement from the vehicle manufacturer indicated

its analysis determined that the air bags deployed as a direct result of the frontal collision, as was evident in the EDR data, as large accelerations were recorded in 100 ms of T-0 for the frontal air bag deployment system. The EDR report indicated no past diagnostic trouble codes (DTCs) were present. Nine DTCs were present following the crash. All the codes were crash-related and cited deployed air bags, actuated pretensioners, collision detection, and crash zone sensors as the involved systems.

Figure 4. Point of impact, looking north.

The EDR data suggests these DTC codes were activated as a result of the crash and subsequent safety systems deployments.

The barrier algorithm of the WinSMASH program calculated a longitudinal delta V of -71 km/h (-44 mph). The results seem reasonable given the EDR-reported vehicle speed. The EDR reported a maximum frontal delta V of 61 km/h (38 mph) at 110 ms and a maximum lateral delta V of -5 km/h (-3 mph) at 70 ms. The calculated principle direction of force (PDOF) was rounded to 0 degrees. The WinSMASH results are borderline.

Post-Crash

Following the crash, local fire department emergency medical service (EMS) responders were notified 2 minutes after the crash and arrived 5 minutes later. The driver was disoriented and they removed her from the vehicle through the open left front door and prepared her for transport. No extrication was required. The driver's EMS report indicated at 19 minutes post-crash the driver had a Glasgow coma score of 15. She did not have a full recall of the event. At 28 minutes post-crash the driver reported a loss of consciousness that was noted in the medical records but not specifically defined or medically substantiated. She complained of pain to the chest and left knee, and exhibited minor visible injuries. She was transported by ambulance and transferred to a helicopter which transported her to a hospital in another city.

2010 NISSAN VERSA

Description

The 2010 Nissan Versa was a 5-door hatchback identified by the Vehicle Identification Number 3N1BC1CP1ALxxxxxx. The vehicle was manufactured in September 2009 and the owner-estimated mileage was 37,000 km (23,000 mi). This vehicle was equipped with a 1.8- liter, 4-cylinder, gasoline engine, front-wheel drive, ABS brakes, and cruise control. The vehicle manufacturer recommended 195/55R16 tires for the front and rear. The Nissan was equipped with Continental ContiProContact of the recommended size on the front and rear manufactured in 2014 and 2015.

The Nissan was configured with two rows of seating for five occupants. The front row was equipped with bucket seats with adjustable head restraints. According to the driver, the seat cushion was adjusted to the middle track position and the seat back was slightly reclined. The

head restraint was in the full-down position. The vehicle was equipped with tilt steering wheel functionality set to the middle position.

Exterior Damage

The Nissan sustained severe damage to the front plane damage caused by the impact with the tree (**Figure 5**). The front bumper fascia was displaced from the vehicle and the backing bar was used to measure direct damage and crush. The direct damage began at the front right bumper corner and extended 57 cm (22.5 in) to the left. The Field L extended from bumper corner to bumper corner and measured 107 cm (42.1 in). Thirteen measurements were taken at bumper level by the Nikon Total Station and the Faro Blitz program computed crush measurement in six increments as follows: C_1 = 0 cm, C_2 = 25 cm (9.8 in), C_3 = 51 cm (20.1 in), C_4 = 78 cm (30.7 in), C_5 = 77 cm (30.3 in), and C_6 = 64 cm (25.2 in). The calculated PDOF was rounded to 0 degrees. Both frame rails were shifted 15 cm (5.9 in) to the right. The collision deformation classification for the Chevrolet in Event 1was 12FZEW5.

Figure 5. Front plane damage, 2010 Nissan Versa.

The Nissan sustained additional front plane damage including displacement of the grille and right headlamp assembly. It sustained top plane damage including crumpling of the hood and right plane damage including crumpling of the right front fender and restriction of the right front tire. The engine and transmission were shifted rearward. The vehicle sustained undercarriage damage including the underbody and suspension. The damage was located on the right aspect between the front and rear axles. The fuel tank was not damaged. Direct damage to the undercarriage began 18 cm (7.1 in) aft of the right front wheel well extending longitudinally 80 cm rearward; it began 22 cm (8.7 in) left of the right sill extending laterally 30 cm (11.8 in) to the left. The direct damage consisted primarily of bent sheet metal, scuffs and scrape marks.

The undercarriage panel bulged vertically downward in an area just aft of the right front tire in a maximum measurement of 10 cm (3.9 in). The vehicle was moved several times to different locations in the salvage lot which possibly caused some of the damage to the undercarriage.

Event Data Recorder

The Nissan's EDR was removed and imaged by the manufacturer using their proprietary tool and software following the crash. SCI obtained a PDF copy of the EDR report included in this report as an appendix. The vehicle manufacturer's investigation concluded the air bags deployed as a result of the crash as evidence by the EDR-reported velocity changes and times relative to the deployment time.

Although not inclusive of all the data recorded during the event, the information captured by the EDR is summarized as follows:

- One deployment event was captured, which was associated with the front plane impact with the tree.

- Seven seconds of pre-crash data was captured in 1-second intervals including vehicle speed, engine revolutions (rpm), throttle pedal position, brake pedal switch state, and buckle switch state for driver and front passenger.

- Systems data for DTCs indicated none existed prior to the crash.

- Nine DTCs were present following the crash. All were crash-related and cited deployed air bags, actuated pretensioners, collision detection, and crash zone sensors as the involved systems.

- There were 300 ms of post-crash data captured in 10 ms intervals including frontal delta V, lateral delta V, frontal G and lateral G. Maximum frontal delta V was 61 km/h (38 mph) at 110 ms; maximum lateral delta V was 5 km/h (3 mph) at 70 ms.

Interior Damage

The Nissan's interior sustained minor damage resulting from impact forces, air bag deployments, and occupant contacts. The windshield was fractured and the right front door was shifted rearward. Three air bags deployed and one seat belt pretensioner actuated. Occupant contacts were documented on the driver seat belt. The front row was reduced by longitudinal intrusion documented at the following locations: right toe pan (11 cm [4.3 in]), right instrument panel (IP) (11 cm [4.3 in]), center console (10 cm [3.9 in]), middle IP (5 cm [2.0 in]) and left IP (5 cm [2.0 in]).

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, emergency locking retractor (ELR), and an adjustable D-ring in the full-up position. The front row belts were configured with retractor-mounted seat belt pretensioners. The EDR indicated the driver's seat belt was "On" at the time of the crash. The seat belt latch plate exhibited scuff marks and impressions on the plastic caused by the webbing and the webbing exhibited scuff marks and stretch marks caused by the D-ring. Those damage patterns were indicative of usage and driver loading at impact. The belt webbing was folded and overlapped itself where it passed through the latch plate preventing the latch plate to slide freely on the belt.

The EDR did not specifically document a pretensioner actuation. During the inspection, the retractor functioned normally and was not locked in place. The latch plate and buckle were examined and they engaged and disengaged in a normal manner. The owner's manual did not include parameters for pretensioner actuation or describe how the retractor might behave following actuation. It merely stated the pretensioner activates in conjunction with the front air bag system. The investigation found inconclusive evidence as to whether the driver's seat belt pretensioner actuated during the crash. The front right passenger seat belt was configured similarly to the driver's with the addition of a switchable ELR/automatic locking retractor (ALR). This belt was found in the stowed position against the B-pillar and the retractor

pretensioner was found in the actuated and locked position.

Supplemental Restraint Systems

The Nissan's supplemental restraint systems (SRSs) included an air bag control module, driver's and passenger's advanced frontal air bags, front row seat-mounted side impact air bags, and front and second row side impact IC air bags. The owner of the vehicle stated the air bags were original and had never been serviced. A vehicle history report indicated the vehicle had undergone routine maintenance at a manufacturer dealership and no air bags had been serviced since its purchase date. The vehicle had not been involved in any prior crashes and there had been no prior air bag deployments. In this crash, the driver's frontal, the right seat-mounted side and right IC air bags deployed at impact with the tree. The impact was to the frontal plane with a 12 o'clock PDOF with direct contact damage located right of the horizontal center line on the front plane and induced damage extending down the right plane ending at the right B-pillar.

The vehicle owner's manual stated the front air bags were designed to deploy in higher severity collisions, or in other types of collisions that are similar to higher severity frontal impacts. The advanced air bag system had dual stage inflators. It monitors information from the crash zone sensor, the air bag control unit (ACU), seat belt buckle sensors, occupant classification sensor (pressure sensor), and passenger seat belt tension sensor. Inflation operation is based on the severity of a collision and seat belt usage of the driver. Based on information from the sensors, only one front air bag may inflate in a crash, depending on crash severity and whether the front occupant was belted or unbelted.

The driver's frontal air bag deployed from the steering wheel hub. The air bag measured 56 cm (22.0 in) in diameter and was configured with two vent ports and two tethers. The cover flaps opened at their tear points and neither the air bag or cover flaps were damaged. The driver notification stated this air bag deployed inadvertently without warning or impact. The vehicle manufacturer initiated an investigation including an imaging of the EDR data and a vehicle inspection. The vehicle manufacturer concluded their analysis determined that the air bag deployed as a direct result of the frontal collision, as was evident in the EDR data, as large accelerations were recorded within 100 ms of T-0 for the frontal air bag deployment system. The Nissan was subject to an NHTSA recall for the air bag system in which a potential existed for inflator rupture. During the inspection, the inflator canister for the deployed frontal air bag was examined and photographed and it exhibited no such damage. The recall is examined further in the NHTSA Recalls and Investigations discussion of this report.

According to the vehicle owner's manual, the seat-mounted side impact air bags and IC air bags are configured to deploy only on the side of the vehicle that is struck. The right seat-mounted air bag deployed from the outer aspect of the front right passenger's seat back. It measured 40 cm (15.7 in) in length and 20 cm (7.9 in) wide. This air bag revealed no evidence of contact or damage.

The right IC air bag deployed from the roof side rails above the front and second rows. It measured 160 cm (63.3 in) wide, 45 cm (17.7 in) in length and was configured with a tether measuring 35 cm (13.8 in) in length at its forward aspect. This air bag revealed no evidence of contact or damage.

NHTSA Recalls and Investigations

A VIN search last queried in July 2019 on safercar.gov[1] revealed one open recall for the Nissan. In summary, the recall states that continued exposure to areas with high levels of absolute humidity may cause the driver's frontal air bag inflator housing to rupture and deploy abnormally. The safety risk concluded if the driver's frontal air bag inflator ruptures, it may result in metal fragments striking the vehicle occupant causing serious injury or death. The remedy called for replacement of the driver's frontal air bag inflator with a new one manufactured by a different supplier. The vehicle owner indicated no recall notices were sent to her regarding the air bag. The driver notification reporting this crash indicated at the time of the crash the driver was not aware of the recall. The investigation determined the recall date was several days after the crash date which is consistent with the absence of a recall notice being sent to the driver. The recall is documented in the table below.

NHTSA Recall Number	Manufacturer Recall Number	Recall Date	Status
17V-449	PM685	July 17, 2017	Incomplete

Alleged Inadvertent Air Bag Deployment Discussion

The driver notification alleged an inadvertent deployment without warning or impact of the driver's front air bag. Following inspection of the vehicle, crash scene, EDR report, and manufacturer's investigative report, the investigation found no evidence an inadvertent air bag deployment occurred. The evidence suggested the likely cause for the deployment of the driver's frontal air bag, as well as other air bags in the vehicle, was the impact with the tree. It appeared to have deployed normally without damage to the air bag, cover flaps, or inflator. The EDR report indicated no prior or current DTCs existed relating to safety systems. The vehicle manufacturer's investigation concluded the air bags deployed as a result of the crash as evidence by the EDR-reported velocity changes and times relative to the deployment time. An open recall for the vehicle's frontal air bags had no apparent bearing on the crash or air bag deployments. According to the police report, following the crash the driver stated to police she had fallen asleep prior to the crash and that she had a history of falling asleep while driving. She stated later during EMS treatment she had no recollection of the crash.

2010 NISSAN VERSA OCCUPANT

Driver Demographics

Age/sex:	85 years/female
Height:	163 cm (64 in)
Weight:	73 kg (160 lb)
Eyewear:	Eyeglasses
Seat type:	Bucket
Seat track position:	Middle
Manual restraint usage:	Lap and shoulder seat belt
Usage source:	Vehicle inspection, EDR report

[1] NHTSA has discontinued safercar.gov but the information can be found at nhtsa.gov/recalls.

Air bags:	Frontal air bag deployed; seat-mounted side impact and IC air bags did not deploy
Alcohol/drug data:	None; tested in ER
Egress from vehicle:	Removed from vehicle while unconscious or not oriented to surroundings
Transport from scene:	Ambulance to helicopter to hospital
Type of medical treatment:	Admitted for 6 days, then underwent follow-up treatment

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Brief loss of consciousness NFS	161002.2	Frontal air bag	Probable
2	Fracture, comminuted, left patella	854500.2	Lower left IP	Probable
3	Tear (partial), anterior cruciate ligaments, left leg	840501.2	Lower left IP	Probable
4	Fracture, anterior, rib R4	450201.1	Seat belt webbing	Probable
5	Contusion with abrasion, right knee	810402.1	Lower left IP	Probable
6	Closed head injury	100099.9	Frontal air bag	Probable

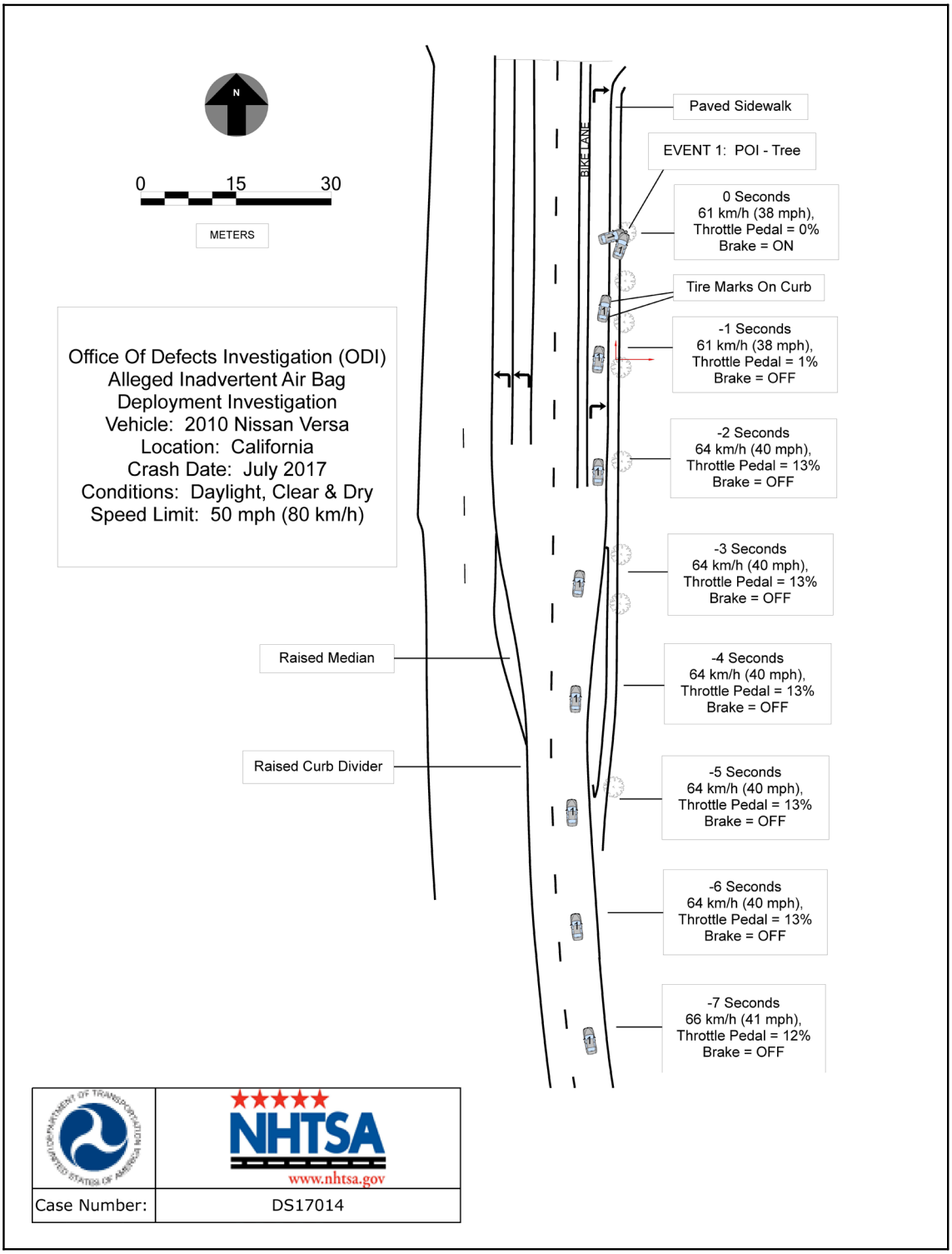
Source: EMS and Medical Records.

Driver Kinematics

The belted 85-year-old female driver was seated in an upright posture and operating the Nissan at moderate and constant speed. She indicated both hands were on the steering wheel and her right foot was on the accelerator. The investigation found sufficient evidence to conclude the driver likely fell asleep and the vehicle departed the roadway on the right edge. It traveled over a raised curb and across a paved sidewalk before striking a mature tree with its front end. The driver was displaced slightly upward when the tires contacted the curb and was held in her seated position by the seat belt. At impact with the tree, the driver's seat belt ELR engaged and the frontal air bag deployed. The driver was displaced severely forward, loading the shoulder portion of webbing with her shoulder and chest. Her face, head, and torso probably loaded the deployed air bag although no physical contact evidence was documented on the bag. The patient's medical record noted a probable closed head injury with a loss of consciousness and altered level of consciousness. She sustained a fracture to the anterior right rib R4. The driver's left knee struck the lower left instrument panel causing a fracture to the left patella and a contusion with abrasion to the knee, with additional partial tears to the cruciate ligaments of the left leg. The vehicle rotated approximately 60 degrees clockwise with its front plane in contact with the tree. The tree did not yield and the Nissan came to rest on the roadside and facing northeast.

Following the crash, the driver was either unconscious or disoriented. Emergency responders arrived 7 minutes after the crash and removed the driver from the vehicle through the open front left door. No extrication was needed. She was transported for a short distance by ambulance to a helicopter and flown to a hospital in another city, where she arrived in the ED 64 minutes after the crash. She was admitted for 6 days then discharged with continued aftercare treatment for the purpose of physical therapy and rehabilitation.

CRASH DIAGRAM



APPENDIX A:
Event Data Recorder (EDR) Report 2010 Nissan Versa[2]

[2] EDR report was provided by the manufacturer in PDF format.

SYSTEM ENGINE
DATE 09/01/2017 00:52:34
P/# 23710-ZW88C

SELF-DIAG RESULTS

DTC RESULTS	TIME
TCS/CIRC [P1212]	0
NATS MALFUNCTION [P1614]	0
INT/V TIM V/CIR-B1 [P0075]	0
CAN COMM CIRCUIT [U1001]	0
APP SEN 1/CIRC [P2122]	0
APP SENSOR [P2138]	0
VEH SPD SEN/CIR AT [P0720]	1t

SYSTEM IPDM E/R
DATE 09/01/2017 00:53:11

SELF-DIAG RESULTS

DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SYSTEM BCM
DATE 09/01/2017 00:53:37
P/# 284B2-ZW80C

SELF-DIAG RESULTS

DTC RESULTS	TIME
LOW PRESSURE FL [C1704]	PAST
LOW PRESSURE FR [C1705]	PAST
LOW PRESSURE RL [C1707]	PAST

SYSTEM METER
DATE 09/01/2017 00:54:01

SELF-DIAG RESULTS

DTC RESULTS	TIME
CAN COMM CIRCUIT [U1000]	0

SYSTEM INTELLIGENT KEY
DATE 09/01/2017 00:54:19
P/# 285E2-

SELF-DIAG RESULTS

DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING REQUIRED.	

SYSTEM TRANSMISSION
DATE 09/01/2017 00:54:45
P/# 31036-ZW80A

SELF-DIAG RESULTS

DTC RESULTS	TIME
ENGINE SPEED SIG [P0725]	PAST
VEH SPD SEN/CIR AT [P0720]	PAST
CAN COMM CIRCUIT [U1000]	0
ESTM VEH SPD SIG [P1722]	CRNT
ELEC TH CONTROL [P1726]	PAST

SYSTEM AIR BAG
DATE 09/01/2017 00:04:26
PROG No. 3000

RECORDED DATA READOUT

f:00	r:01
a0:D1	a1:D2
a2:31	a3:51
a4:56	a5:36
a6:83	a7:91
a8:23	a9:00
aa:00	ab:00
ac:00	ad:00
ae:00	af:00
A1:00	A2:00
A3:00	A4:00
A5:00	B1:00
B2:00	B3:00
B4:00	B5:00
C1:00	C2:00
C3:00	C4:00
C5:00	D1:00
D2:00	D3:00
D4:00	D5:00

E1:00	E2:00
E3:00	E4:00
E5:00	F1:00
F2:00	G:00
U:0C	I1:CC
J1:21	K1:00
L1:12	M1:07
I2:08	J2:21
K2:01	L2:08
M2:07	IR:24
JR:24	KR:19
LR:01	MR:FF
IL:FF	JL:FF
KL:1A	LL:12
ML:FF	R:81
S1:A5	S2:0A
S3:0A	S4:0C
S5:0C	S6:21
S7:31	S8:5A
W:00	O1:00
O2:00	O3:00
O4:00	O5:00
O6:00	O7:00
O8:00	O9:00
OA:00	OB:00
OC:00	OD:00
P:F6AA	

SYSTEM AIR BAG
DATE 09/01/2017 00:02:33
PROG No. 3000

SELF-DIAG [CURRENT]

DTC RESULTS

FRONTAL COLLISION
DETECTION
[B1209]
SIDE COLLISION
DETECTION
[B1210]
DRIVER AIRBAG MODULE
[OPEN]
[B1049]
PRE-TEN FRONT RH
[OPEN]
[B1081]
PRE-TEN FRONT LH
[OPEN]
[B1086]
DRIVER AIRBAG MODULE
[OPEN]
[B1054]
SIDE MODULE RH
[GND-SHORT]
[B1131]
CURTAIN MODULE RH
[OPEN]
[B1145]
CRASH ZONE SEN
[COMM FAIL]
[B1035]

SYSTEM AIR BAG
DATE 09/01/2017 00:03:07
PROG No. 3000

SELF-DIAG [PAST]

DTC RESULTS

NO DTC IS DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SYSTEM AIR BAG
DATE 09/01/2017 00:03:37
PROG No. 3000

TROUBLE DIAG RECORD

DTC RESULTS

NO DTC IS DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SYSTEM AIR BAG
DATE 09/01/2017 00:09:59
PROG No. 3000

LATERAL DELTA-V

TIME	DATA
-100ms	FF
-90ms	FF
-80ms	FF
-70ms	FF
-60ms	FF
-50ms	FF
-40ms	FF
-30ms	FF
-20ms	FF
-10ms	FF
0ms	FF
10ms	FF
20ms	FF
30ms	FF
40ms	1mph
50ms	0mph
60ms	-2mph
70ms	-3mph
80ms	-2mph
90ms	-1mph
100ms	-1mph
110ms	-1mph
120ms	-1mph
130ms	-1mph
140ms	-1mph
150ms	-1mph
160ms	-1mph
170ms	-1mph
180ms	FF
190ms	FF
200ms	FF
210ms	FF
220ms	FF
230ms	FF
240ms	FF
250ms	FF
260ms	FF
270ms	FF
280ms	FF
290ms	FF
300ms	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:09:00
PROG No. 3000

FRONTAL DELTA-V

TIME	DATA
-100ms	FF
-90ms	FF
-80ms	FF
-70ms	FF
-60ms	FF
-50ms	FF
-40ms	FF
-30ms	FF
-20ms	FF
-10ms	FF
0ms	0mph
10ms	1mph
20ms	3mph
30ms	5mph
40ms	9mph
50ms	13mph
60ms	18mph
70ms	24mph
80ms	29mph
90ms	34mph
100ms	37mph
110ms	38mph
120ms	38mph
130ms	0mph
140ms	0mph
150ms	0mph
160ms	0mph
170ms	0mph
180ms	FF
190ms	FF
200ms	FF
210ms	FF
220ms	FF
230ms	FF
240ms	FF
250ms	FF
260ms	FF
270ms	FF
280ms	FF
290ms	FF
300ms	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:06:21
PROG No. 3000

FRONTAL DELTA-V

TIME	DATA
-100ms	FF
-90ms	FF
-80ms	FF
-70ms	FF
-60ms	FF
-50ms	FF
-40ms	FF
-30ms	FF
-20ms	FF
-10ms	FF
0ms	0mph
10ms	1mph
20ms	3mph
30ms	5mph
40ms	9mph
50ms	13mph
60ms	18mph
70ms	24mph
80ms	29mph
90ms	34mph
100ms	37mph
110ms	38mph
120ms	38mph
130ms	0mph
140ms	0mph
150ms	0mph
160ms	0mph
170ms	0mph
180ms	FF
190ms	FF
200ms	FF
210ms	FF
220ms	FF
230ms	FF
240ms	FF
250ms	FF
260ms	FF
270ms	FF
280ms	FF
290ms	FF
300ms	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:12:24
PROG No. 3000

VEHICLE SPEED

TIME	DATA
-7s	41mph
-6s	40mph
-5s	40mph
-4s	40mph
-3s	40mph
-2s	40mph
-1s	38mph
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:12:45
PROG No. 3000

ENGINE REVOLUTION

TIME	DATA
-7s	1384rpm
-6s	1387rpm
-5s	1384rpm
-4s	1378rpm
-3s	1381rpm
-2s	1369rpm
-1s	1834rpm
0s	FE
1s	FE
2s	FE
3s	FE
4s	FE
5s	FE
6s	FE

SYSTEM AIR BAG
DATE 09/01/2017 00:13:06
PROG No. 3000

THROTTLE PEDAL POSITION

TIME	DATA
-7s	12%
-6s	13%
-5s	13%
-4s	13%
-3s	13%
-2s	13%
-1s	1%
0s	FE
1s	FE
2s	FE
3s	FE
4s	FE
5s	FE
6s	FE

SYSTEM AIR BAG
DATE 09/01/2017 00:11:24
PROG No. 3000

LATERAL G

TIME	DATA
-100ms	0.00G
-90ms	0.00G
-80ms	0.00G
-70ms	0.00G
-60ms	0.00G
-50ms	0.00G
-40ms	0.00G
-30ms	0.00G
-20ms	0.00G
-10ms	-0.29G
0ms	0.29G
10ms	0.00G
20ms	-8.20G
30ms	-4.39G
40ms	16.41G
50ms	12.01G
60ms	-10.84G
70ms	-1.76G
80ms	14.94G
90ms	6.15G
100ms	-1.76G
110ms	0.00G
120ms	-0.88G
130ms	-0.88G
140ms	0.00G
150ms	1.17G
160ms	-0.29G
170ms	0.00G
180ms	0.29G
190ms	1.46G
200ms	0.29G
210ms	0.29G
220ms	0.29G
230ms	1.17G
240ms	1.76G
250ms	0.00G
260ms	0.59G
270ms	0.00G
280ms	0.29G
290ms	0.59G
300ms	0.59G

SYSTEM AIR BAG
DATE 09/01/2017 00:10:42
PROG No. 3000

FRONTAL G

TIME	DATA
-100ms	-0.49G
-90ms	-0.49G
-80ms	-0.49G
-70ms	-0.49G
-60ms	-0.49G
-50ms	0.00G
-40ms	-0.49G
-30ms	-0.49G
-20ms	-0.49G
-10ms	-0.49G
0ms	3.91G
10ms	6.84G
20ms	6.84G
30ms	20.51G
40ms	24.41G
50ms	22.95G
60ms	31.25G
70ms	28.81G
80ms	18.07G
90ms	21.48G
100ms	7.81G
110ms	2.93G
120ms	-0.98G
130ms	-3.42G
140ms	-2.44G
150ms	-2.93G
160ms	-2.93G
170ms	-1.95G
180ms	-1.46G
190ms	-2.44G
200ms	-1.95G
210ms	-2.93G
220ms	-2.44G
230ms	-1.46G
240ms	-2.44G
250ms	-1.95G
260ms	-1.46G
270ms	-1.46G
280ms	-1.95G
290ms	-1.95G
300ms	-1.95G

SYSTEM AIR BAG
DATE 09/01/2017 00:15:29
PROG No. 3000

DIAGMUXON STATE

TIME	DATA
-7s	OFF
-6s	OFF
-5s	OFF
-4s	OFF
-3s	OFF
-2s	OFF
-1s	OFF
0s	ON
1s	ON
2s	OFF
3s	OFF
4s	OFF
5s	OFF
6s	OFF

SYSTEM AIR BAG
DATE 09/01/2017 00:17:40
PROG No. 3000

MAX.FRONTAL G&TIME

FRONTAL	TIME
37.60G	76.0ms
LATERAL	
2.05G	
VERTICAL	
FF	

SYSTEM AIR BAG
DATE 09/01/2017 00:17:56
PROG No. 3000

MAX.LATERAL G&TIME

FRONTAL	TIME
22.46G	33.0ms
LATERAL	
-35.74G	
VERTICAL	
FF	

SYSTEM AIR BAG
DATE 09/01/2017 00:14:35
PROG No. 3000

BACKLE SW STATE[AS]

TIME	DATA
-7s	OFF
-6s	OFF
-5s	OFF
-4s	OFF
-3s	OFF
-2s	OFF
-1s	OFF

SYSTEM AIR BAG
DATE 09/01/2017 00:14:51
PROG No. 3000

ROLL ANGLE

TIME	DATA
-7s	FF
-6s	FF
-5s	FF
-4s	FF
-3s	FF
-2s	FF
-1s	FF
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:15:10
PROG No. 3000

ROLL RATE

TIME	DATA
-7s	FF
-6s	FF
-5s	FF
-4s	FF
-3s	FF
-2s	FF
-1s	FF
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:13:27
PROG No. 3000

STEERING ANGLE

TIME	DATA
-7s	FF
-6s	FF
-5s	FF
-4s	FF
-3s	FF
-2s	FF
-1s	FF
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:13:46
PROG No. 3000

BRAKE PEDAL SW STATE

TIME	DATA
-7s	OFF
-6s	OFF
-5s	OFF
-4s	OFF
-3s	OFF
-2s	OFF
-1s	OFF
0s	ON
1s	ON
2s	ON
3s	ON
4s	ON
5s	ON
6s	ON

SYSTEM AIR BAG
DATE 09/01/2017 00:14:14
PROG No. 3000

BACKLE SW STATE[DR]

TIME	DATA
-7s	ON
-6s	ON
-5s	ON
-4s	ON
-3s	ON
-2s	ON
-1s	ON

SYSTEM AIR BAG
DATE 09/01/2017 00:22:03
PROG No. 3000

LATERAL DELTA-V

TIME	DATA
-100ms	FF
-90ms	FF
-80ms	FF
-70ms	FF
-60ms	FF
-50ms	FF
-40ms	FF
-30ms	FF
-20ms	FF
-10ms	FF
0ms	FF
10ms	FF
20ms	FF
30ms	FF
40ms	1mph
50ms	0mph
60ms	-2mph
70ms	-3mph
80ms	-2mph
90ms	-1mph
100ms	-1mph
110ms	-1mph
120ms	-1mph
130ms	-1mph
140ms	-1mph
150ms	-1mph
160ms	-1mph
170ms	-1mph
180ms	FF
190ms	FF
200ms	FF
210ms	FF
220ms	FF
230ms	FF
240ms	FF
250ms	FF
260ms	FF
270ms	FF
280ms	FF
290ms	FF
300ms	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:19:52
PROG No. 3000

CAN ABNORMALITY

STATE
NORMAL

SYSTEM AIR BAG
DATE 09/01/2017 00:21:16
PROG No. 3000

FRONTAL DELTA-V

TIME	DATA
-100ms	FF
-90ms	FF
-80ms	FF
-70ms	FF
-60ms	FF
-50ms	FF
-40ms	FF
-30ms	FF
-20ms	FF
-10ms	FF
0ms	0mph
10ms	1mph
20ms	3mph
30ms	5mph
40ms	9mph
50ms	13mph
60ms	18mph
70ms	24mph
80ms	29mph
90ms	34mph
100ms	37mph
110ms	38mph
120ms	38mph
130ms	0mph
140ms	0mph
150ms	0mph
160ms	0mph
170ms	0mph
180ms	FF
190ms	FF
200ms	FF
210ms	FF
220ms	FF
230ms	FF
240ms	FF
250ms	FF
260ms	FF
270ms	FF
280ms	FF
290ms	FF
300ms	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:18:12
PROG No. 3000

IGN CYCLE

	CYCLE
Event	FE
Download	FE

SYSTEM AIR BAG
DATE 09/01/2017 00:18:28
PROG No. 3000

OPERATION TIME

	TIME
Event	FE
Download	FE

SYSTEM AIR BAG
DATE 09/01/2017 00:18:55
PROG No. 3000

D/L COUNT AFTER EVENT

STATE
1count

SYSTEM AIR BAG
DATE 09/01/2017 00:19:18
PROG No. 3000

EDR RECORDING COMPLETE

	STATE
Priority 1	SUCCESS
Priority 2	SUCCESS
Priority 3	SUCCESS
Priority 4	SUCCESS

SYSTEM AIR BAG
DATE 09/01/2017 00:19:36
PROG No. 3000

GAP TIME FOR EDR

	TIME
High Freq	3.0ms
Low Freq	380ms

SYSTEM AIR BAG
DATE 09/01/2017 00:27:03
PROG No. 3000

GAP TIME FOR EDR

	TIME
High Freq	3.0ms
Low Freq	380ms

SYSTEM AIR BAG
DATE 09/01/2017 00:27:22
PROG No. 3000

CAN ABNORMALITY

STATE
NORMAL

SYSTEM AIR BAG
DATE 09/01/2017 00:27:46
PROG No. 3000

VEHICLE SPEED

TIME	DATA
-7s	41mph
-6s	40mph
-5s	40mph
-4s	40mph
-3s	40mph
-2s	40mph
-1s	38mph
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:28:04
PROG No. 3000

ENGINE REVOLUTION

TIME	DATA
-7s	1384rpm
-6s	1387rpm
-5s	1384rpm
-4s	1378rpm
-3s	1381rpm
-2s	1369rpm
-1s	1834rpm
0s	FE
1s	FE
2s	FE
3s	FE
4s	FE
5s	FE
6s	FE

SYSTEM AIR BAG
DATE 09/01/2017 00:26:04
PROG No. 3000

MAX.LATERAL G&TIME

FRONTAL	TIME
22.46G	33.0ms
LATERAL	
-35.74G	
VERTICAL	
FF	

SYSTEM AIR BAG
DATE 09/01/2017 00:26:19
PROG No. 3000

IGN CYCLE

	CYCLE
Event	FE
Download	FE

SYSTEM AIR BAG
DATE 09/01/2017 00:26:30
PROG No. 3000

OPERATION TIME

	TIME
Event	FE
Download	FE

SYSTEM AIR BAG
DATE 09/01/2017 00:26:40
PROG No. 3000

D/L COUNT AFTER EVENT

STATE
1count

SYSTEM AIR BAG
DATE 09/01/2017 00:26:50
PROG No. 3000

EDR RECORDING COMPLETE

	STATE
Priority 1	SUCCESS
Priority 2	SUCCESS
Priority 3	SUCCESS
Priority 4	SUCCESS

SYSTEM AIR BAG
DATE 09/01/2017 00:23:09
PROG No. 3000

VEHICLE SPEED

TIME	DATA
-7s	41mph
-6s	40mph
-5s	40mph
-4s	40mph
-3s	40mph
-2s	40mph
-1s	38mph
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:25:19
PROG No. 3000

MAX.FRONTAL G&TIME

FRONTAL	TIME
37.60G	76.0ms
LATERAL	
2.05G	
VERTICAL	
FF	

SYSTEM AIR BAG
DATE 09/01/2017 00:29:59
PROG No. 3000

ROLL RATE	
TIME	DATA
-7s	FF
-6s	FF
-5s	FF
-4s	FF
-3s	FF
-2s	FF
-1s	FF
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:30:16
PROG No. 3000

DIAGMUXON STATE	
TIME	DATA
-7s	OFF
-6s	OFF
-5s	OFF
-4s	OFF
-3s	OFF
-2s	OFF
-1s	OFF
0s	ON
1s	ON
2s	OFF
3s	OFF
4s	OFF
5s	OFF
6s	OFF

SYSTEM AIR BAG
DATE 09/01/2017 00:29:15
PROG No. 3000

BACKLE SW STATE[DR]	
TIME	DATA
-7s	ON
-6s	ON
-5s	ON
-4s	ON
-3s	ON
-2s	ON
-1s	ON

SYSTEM AIR BAG
DATE 09/01/2017 00:29:29
PROG No. 3000

BACKLE SW STATE[AS]	
TIME	DATA
-7s	OFF
-6s	OFF
-5s	OFF
-4s	OFF
-3s	OFF
-2s	OFF
-1s	OFF

SYSTEM AIR BAG
DATE 09/01/2017 00:29:43
PROG No. 3000

ROLL ANGLE	
TIME	DATA
-7s	FF
-6s	FF
-5s	FF
-4s	FF
-3s	FF
-2s	FF
-1s	FF
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:28:21
PROG No. 3000

THROTTLE PEDAL POSITION	
TIME	DATA
-7s	12%
-6s	13%
-5s	13%
-4s	13%
-3s	13%
-2s	13%
-1s	1%
0s	FE
1s	FE
2s	FE
3s	FE
4s	FE
5s	FE
6s	FE

SYSTEM AIR BAG
DATE 09/01/2017 00:28:37
PROG No. 3000

STEERING ANGLE	
TIME	DATA
-7s	FF
-6s	FF
-5s	FF
-4s	FF
-3s	FF
-2s	FF
-1s	FF
0s	FF
1s	FF
2s	FF
3s	FF
4s	FF
5s	FF
6s	FF

SYSTEM AIR BAG
DATE 09/01/2017 00:28:58
PROG No. 3000

BRAKE PEDAL SW STATE	
TIME	DATA
-7s	OFF
-6s	OFF
-5s	OFF
-4s	OFF
-3s	OFF
-2s	OFF
-1s	OFF
0s	ON
1s	ON
2s	ON
3s	ON
4s	ON
5s	ON
6s	ON

DOT HS 812 868
May 2020

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

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