TRANSPORTATION SCIENCES
CRASH DATA RESEARCH CENTER

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REMOTE ADVANCED 208-COMPLIANT VEHICLE INVESTIGATION
SCI TECHNICAL SUMMARY REPORT

NASS/SCI COMBO CASE NO. 02-12-150E

VEHICLE – 2003 CHEVROLET SUBURBAN

LOCATION - STATE OF MICHIGAN

CRASH DATE – NOVEMBER 2002

Contract No. DTNH22-01-C-17002

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D.C. 20590

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

TECHNICAL REPORT STANDARD TITLE PAGE

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16. Abstract This remote investigation focused on the performance of the Advanced 208-Compliant frontal safety system present in a 2003 Chevrolet Suburban. The Suburban was involved in an intersection collision with a 1997 1500 Series Chevrolet pickup truck. Both vehicles were equipped with Event Data Recorders (EDR). The Suburban attempted to make a left turn across the path of the pickup truck and was struck on the right front aspect. The Suburban rotated in a rapid counterclockwise (CCW) direction which resulted in a subsequent sideslap. The frontal air bag system in the 1997 Chevrolet pickup truck deployed as a result of the crash, however, neither the side impact air bag system nor the frontal air bag system deployed in the 2003 Chevrolet Suburban. A 67-year-old male driver was restrained by the integrated manual 3-point lap and shoulder belt. At impact, he initiated a lateral trajectory to the right and loaded the manual restraint. He sustained a self-reported knee contusion and finger sprains but was not transported to a medical facility. The 53-year-old female front right passenger of the Suburban was unrestrained and was ejected through the right front window. She sustained a right fifth distal metacarpal fracture, a right hand contusion and abrasion, and a right lower leg abrasion from loading against the interior surface of the right front door. She sustained a positive loss of consciousness, a nose abrasion, a forehead laceration, left hand contusions and abrasions, left first finger laceration, and a left thigh contusion and abrasion from contact with the ground. She was transported by ambulance to a regional trauma center where she was treated and released.			
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LOCATION - STATE OF MICHIGAN
CRASH DATE - NOVEMBER 2002

BACKGROUND

This remote investigation focused on the performance of the Advanced 208-Compliant frontal safety system present in a 2003 Chevrolet Suburban. The Suburban was involved in an intersection collision with a 1997 1500 Series Chevrolet pickup truck. Both vehicles were equipped with Event Data Recorders (EDR). The Suburban attempted to make a left turn across the path of the pickup truck and was struck on the right front aspect. The Suburban sustained moderate right front damage **(Figure 1)** and rotated in a rapid counterclockwise (CCW) direction, which resulted in a subsequent sideslap. The frontal air bag system in the 1997 Chevrolet pickup truck deployed as a result of the crash, however, neither the side impact air bag system nor the frontal air bag system deployed in the 2003 Chevrolet Suburban. A 67-year-old male driver was restrained by the integrated manual 3-point lap and shoulder belt. At impact, he initiated a lateral trajectory to the right and loaded the manual restraint. He sustained a self-reported knee contusion and finger sprains but was not transported to a medical facility. The 53-year-old female front right passenger of the Suburban was unrestrained and was ejected through the right front window. She sustained a right fifth distal metacarpal fracture, a right hand contusion and abrasion, and a right lower leg abrasion from loading against the interior surface of the right front door. She sustained a positive loss of consciousness, a nose abrasion, a forehead laceration, left hand contusions and abrasions, left first finger laceration, and a left thigh contusion and abrasion from contact with the ground. She was transported by ambulance to a regional trauma center where she was treated and released.

Figure 1. Damaged 2003 Chevrolet Suburban

This crash was identified by the National Automotive Sampling System (NASS) PSU 12 during the weekly sampling of Police Accident Reports (PARs). This crash was selected as CDS Case No. 02-12-150E. The NASS PSU performed the vehicle inspection, EDR download, and scene inspection. Due to the Advanced 208-Compliant frontal safety system in the 2003 Chevrolet Suburban, NHTSA assigned the tasks of case review and report preparation to the Veridian SCI team.

SUMMARY

Crash Site

This two-vehicle crash occurred during the daylight hours of November 2002. At the time of the crash it was raining and the concrete roadway surface was wet. The north/south roadway was configured with two travel lanes in each direction that were separated by a center left turn lane

and bordered by concrete curbs. The roadside environment consisted of commercial properties. A concrete driveway was present on the east roadside at the entrance to a service station. A four-leg intersection was present approximately 20 m (66') south of the point of impact. Traffic flow through the intersection was controlled by three-phase traffic signals. The posted speed limit for the north/south roadway was 72 km/h (45 mph).

Figure 2. Southbound approach for the Suburban prior to initiating the left turn

Pre-Crash

The 67-year-old male driver of the 2003 Chevrolet Suburban was traveling southbound on the four-lane roadway and traveled onto the center left-turn lane in anticipation of making a left turn into a service station driveway **(Figure 2)**. He stated that he had stopped the vehicle in the center left-turn lane and was waiting for a northbound traffic to clear. The 1997 Chevrolet pickup truck was traveling northbound on the outboard lane of the roadway and had cleared the intersection south of the Suburban's position **(Figure 3)**. Based on the pre-crash data from the Suburban's EDR, the driver had slowed to 6 km/h (4 mph) in the center turn lane three seconds prior to the impact, and initiated the left turn **(Figure 4)**. The EDR data indicated an increased throttle input and full disengagement of the brake switch. The driver of the Suburban did not detect the approaching pickup truck as he initiated the left turn.

Figure 3. Northbound approach for the Chevrolet pickup truck

Crash

The front aspect of the Chevrolet pickup truck impacted the right front aspect of the 2003 Chevrolet Suburban. Impact resulted in the frontal air bag deployment in the pickup truck and moderate damage to both vehicles. The unrestrained front right occupant of the Suburban was ejected through the right front window as a result of the impact. The damage algorithm of the WinSMASH program computed a total delta-V of 22 km/h (14 mph) for the Suburban and a total delta-V of 24 km/h (15 mph) for the Chevrolet pickup truck. The longitudinal and lateral components for the Suburban were -11 km/h (-7 mph) and -19 km/h (-12 mph), respectively. The longitudinal and lateral components for the Chevrolet pickup truck were -23 km/h (-14 mph) and 8 km/h (5 mph), respectively. The EDR recorded a longitudinal velocity change of -19.26 km/h (-11.97 mph) for the Suburban and -30.72 km/h (-19.09 mph) for the pickup truck. The Suburban rotated in a

Figure 4. Suburban's path of travel after initiating the left turn

rapid CCW direction, which caused the right rear aspect of the Suburban to sideslap the left rear aspect of the pickup truck. The WinSMASH-computed delta-V for the sideslap impact was 6 km/h (4 mph) for the Suburban and 7 km/h (4 mph) for the pickup truck. The Suburban continued to rotate CCW and came to rest facing north in the center of the northbound lanes. Although the Suburban was equipped with the OnStar system, it was not reported if the driver subscribed to the service, or if the system activated as a result of the crash. The pickup truck was redirected slightly CW and departed the right roadside in a tracking mode. The vehicle ramped the curb, impacted a small tree on the roadside, and came to rest facing north on the roadside.

Although the vehicle inspection confirmed that there was no air bag deployment in the 2003 Chevrolet Suburban, the EDR in the Suburban recorded a Deployment event and a Non-Deployment event for this crash. According to the Suburban's EDR output, a deployment was commanded for the first stage of the frontal air bags at 17.5 milliseconds after Algorithm Enable (AE). In addition, the five seconds of pre-crash data is identical for both the Deployment event and the Non-Deployment Event, which suggested that the time duration between the events was minimal.

Post-Crash

The 67-year-old male driver of the Chevrolet Suburban exited the vehicle under his own power and was not transported. The 53-year-old female front right passenger was found on the roadway approximately 3 m (10') south of the Suburban's final rest position. She was transported by ambulance to a regional trauma center where she was treated for her injuries and released. The 17-year-old male driver of the Chevrolet pickup truck exited the vehicle under his own power. He sustained a police-reported possible injury and did not receive medical treatment.

VEHICLE DATA – 2003 Chevrolet Suburban

The 2003 Chevrolet Suburban was identified by the Vehicle Identification Number (VIN): 1GNFK16Z33R (production sequence omitted). At the time of the vehicle inspection the odometer read 2,884 km (1,792 miles). The Suburban was a four-door 1500 Series (1/2 ton) sport utility vehicle (SUV) that was equipped with a 5.3 liter, V-8 engine, Autotrack 4x4 system, four-wheel anti-lock brakes with dynamic rear proportioning, integrated safety belts, front right passenger sensing system, power steering, a tilt steering wheel, remote keyless entry, and OnStar. The Suburban was equipped with Goodyear Wrangler RT/S P265/70R17 tires. The vehicle manufacturer recommended tire pressure was 207 kPa (30 PSI). The specific tire data is summarized as follows:

Tire	Measured Pressure	Tread Depth	Restricted	Damage
LF	262 kPa (38 PSI)	11 mm (14/32")	No	None
LR	234 kPa (34 PSI)	11 mm (14/32")	No	None
RF	0 kPa	11 mm (14/32")	Yes	Sidewall punctured
RR	269 kPa (39 PSI)	11 mm (14/32")	No	None

The 2003 Chevrolet Suburban was configured with bucket seats with adjustable head restraints for both front seat positions. The front left seat was found between the mid and rear track position and the front right seat was located in the mid-track position at the time of the vehicle inspection. The second and third rows were configured with bench seats with 60/40 split folding backs. The outboard positions on the bench seats were configured with adjustable head restraints and the center positions with integral head restraints.

VEHICLE DAMAGE

Exterior Damage – *2003 Chevrolet Suburban*

The 2003 Chevrolet Suburban sustained moderate damage to the right front aspect as a result of the impact with the Chevrolet pickup truck **(Figure 5)**. The direct contact damage began 45 cm (18") forward of the right front axle and extended 98 cm (39") rearward along the right front fender. The combined direct and induced damage began 45 cm (18") forward of the right front axle and extended 222 cm (87") rearward along the right side plane. The right front fender was abraded and crushed laterally from direct contact. The rear edge of the fender was pulled forward as a result of the lateral displacement of the front aspect of the fender. The hood was displaced laterally and buckled rearward. The right front corner of the bumper was crushed laterally and longitudinally and the right aspect of the front bumper fascia was fractured and partially separated. The entire front bumper fascia was displaced laterally. The right headlamp assembly was fractured and the grille and front trim were separated. The right front tire was punctured on the top aspect of the sidewall as a result of engagement with the front bumper corner. The Collision Deformation Classification (CDC) for the initial impact with the Chevrolet pickup truck was 02-RFEW-3. Six crush measurements, illustrated in **Figure 6,** were documented at the mid-door level and were as follows: C1 = 0 cm, C2 = 0 cm, C3 = 0 cm, C4 = 6 cm (2"), C5 = 38 cm (15"), C6 = 28 cm (11").

Figure 5. Right side view of damaged Suburban

Figure 6. View of right front crush measurements

The Chevrolet Suburban sustained minor damage as a result of the secondary sideslap impact with the Chevrolet pickup truck **(Figure 7)**. The direct damage began 18 cm (7") aft of the right rear axle and extended rearward 108 cm (43"). The right rear wheel sustained direct contact abrasions. The lower rear aspect of the right rear quarter panel adjacent to the bumper corner was abraded and crushed laterally aft of the wheel

Figure 7. Close-up of right rear sideslap damage

opening. Direct contact deformation extended vertically to the belt line. The bottom aspect of the right rear taillight was fractured. The CDC for the sideslap event was 03-RBAW-2. Six crush measurements were documented at the lower door level and were as follows: C1 = 4 cm (2”), C2 = 12 cm (5”), C3 = 19 cm (7”), C4 = 8 cm (3”), C5 = 0 cm, C6 = 0 cm.

Interior Damage – *2003 Chevrolet Suburban*

The interior damage to the 2003 Chevrolet Suburban was minor and attributed to occupant contact. The right front window glazing was disintegrated. It could not be determined if the front right window glazing fractured as a result of impact forces or occupant contact. The loading to the interior aspect of the right front door resulted in fractures to the interior door panel **(Figure 8)**. The fractures were located fore and aft of the door release handle below the forward aspect of the arm rest. A rubber transfer from possible contact with the front right passenger’s shoe was present on the rear aspect of the interior door surface near the belt line. A 3 cm (1”) scuff was present on the right roof side rail.

Figure 8. View of occupant contact to the interior right front door

Exterior Damage – *1997 Chevrolet 1500 Series Pickup Truck*

The 1997 Chevrolet 1500 series pickup truck sustained moderate frontal damage as a result of the impact with the Chevrolet Suburban. The direct damage began at the front left bumper corner and extended 140 cm (55”) laterally across the frontal plane **(Figure 9)**. The combined direct and induced damage measured 166 cm (65”) across the entire frontal plane. The bumper was crushed rearward on the left side and displaced forward on the right corner. The grille was fractured and the left headlamp was separated. The left front fender was crushed rearward and buckled. The aft aspect of the left front fender overlapped the leading edge of the left front door. The hood was buckled rearward and displaced rearward, which resulted in a fracture of the windshield on the lower left aspect. The frontal crush displaced the left front wheel rearward, which resulted in a reduction of the left wheelbase by 3 cm (1”). A large cut was present on the tread of the left front tire from the impact. The tire was deflated and debeaded as a result of the crash. Six crush measurements were documented along the front bumper of the pickup truck and were as follows: C1 = 35 cm (14”), C2 = 30 cm (12”), C3 = 43 cm (17”), C4 = 34 cm (13”), C5 = 4 cm (2”), C6 = 0 cm. The CDC for the frontal impact with the Suburban was 11-FDEW-2.

Figure 9. View of frontal damage to the Chevrolet pickup truck

The Chevrolet pickup truck sustained minor left side damage as a result of the secondary sideslap event **(Figure 10)**. The direct damage on the left aspect of the pickup box began 70 cm (28”) forward of the rear axle and extended rearward 118 cm (46”). The combined direct and induced damage began at the rear bumper corner and extended forward 218 cm (86”). Direct contact abrasions were present above the left rear wheel from contact with the Suburban. Six crush measurements were documented along the left side plane at the mid-door level and were as follows: C1 = 0 cm, C2 = 0 cm, C3 = 15 cm (6”), C4 = 22 cm (9”), C5 = 6 cm (2”), C6 = 2 cm (1”). The CDC for the sideslap impact was 09-LBEW-2.

Figure 10. Left rear damage from the sideslap event

The Chevrolet pickup truck also sustained additional minor frontal damage as a result of a secondary frontal impact with a small tree on the roadside. The tree measured less than 10 cm (4”) in diameter. Bark and small branch fragments were present on the right aspect of the frontal plane and on the upper right aspect of the right front fender. The damage that resulted from the tree impact was masked by the initial frontal impact. The CDC for the tree impact was 12-FL99 with an SCI revised extent zone of 1.

MANUAL RESTRAINT SYSTEMS – 2003 Chevrolet Suburban

The 2003 Chevrolet Suburban was equipped with integrated continuous loop manual 3-point lap and shoulder belts with sliding latch plates for both front seat positions. The driver’s safety belt was configured with an Emergency Locking Retractor (ELR) and the front right safety belt was configured with a switchable ELR/Automatic Locking Retractor (ALR). The driver’s safety belt webbing was deformed as a result of loading against the latch plate **(Figure 11)**. The plastic trim cover on the top left aspect of the driver’s seat back was separated as a result of the driver loading the manual restraint.

Figure 11. View of deformed driver's safety belt webbing

The front right safety belt system was equipped with a webbing tension sensor designed to detect the presence of a child safety seat (CSS) based on the tension of the safety belt webbing.

The second row bench seat was equipped with continuous loop manual 3-point lap and shoulder belts with sliding latch plates for each position. Each safety belt for the second row bench seat was configured with a switchable/ALR retractor. The outboard second row restraints were configured with OEM positioning devices that were mounted on the interior C-pillars. Tether anchors were present on the lower rear aspect of the seat cushions below the seat backs, and four

Lower Anchors and Tethers for Children (LATCH) anchors were present on the left and center seating positions.

The third row bench seat was equipped with integrated continuous loop manual 3-point lap and shoulder belts with sliding latch plates for the outboard positions. Both outboard safety belts were configured with switchable/ALR retractors. The center position was equipped with a lap belt with a locking latch plate. The third row bench seat was not equipped with LATCH anchors.

ADVANCED 208-COMPLIANT SAFETY SYSTEM – 2003 Chevrolet Suburban

Frontal Air Bag System

The 2003 Chevrolet Suburban was equipped with dual-stage frontal air bags for the driver and front right passenger positions. The air bags did not deploy as a result of the crash. The driver's air bag was housed in the center of the steering wheel and the front right passenger's air bag was housed in a mid-mount module on the right instrument panel.

Occupant Weight Sensor

The front right passenger's air bag was equipped with a passenger sensing system that automatically suppresses the air bag based on an occupant's weight. A bladder system in the seat cushion was designed to detect the weight of an occupant and suppress the front right passenger's air bag if the system detected a low occupant weight, such as a child or out-of-position occupant. An illuminated indicator labeled "passenger air bag" was present on the lower aspect of the rear view mirror, which monitored the air bag's status as "on" or "off."

Seat Track Position Sensor

Both front seating positions were equipped with seat track positioning sensors. Floor-mounted steel bars were present adjacent to the inboard seat tracks. Inverted horseshoe-shaped sensors were mounted to the underside of the seat cushions, which moved fore and aft along the steel bars with fore and aft movement of the seats **(Figure 12)**. In the event of a crash, the position of the horseshoe-shaped sensor relative to the steel bar would provide inputs to determine the deployment stages of the frontal air bags and/or suppression, in addition to inputs from the weight sensor and safety belt buckle sensors.

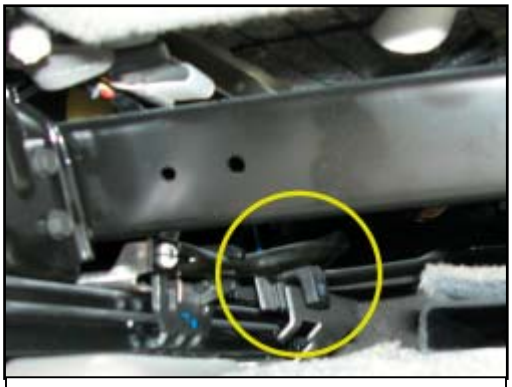


Figure 12. View from the rear aspect of the front right seat of an exemplar vehicle, showing the horseshoe-shaped seat track position sensor

Side Impact Air Bag System

The 2003 Chevrolet Suburban was equipped with side impact air bags for both front seat positions. The air bags were located in the outboard aspects of the front seat backs and were configured with vinyl module cover flaps. The side impact air bags did not deploy in the crash.

OCCUPANT DEMOGRAPHICS – 2003 Chevrolet Suburban

Driver

Age/Sex:	67-year-old male
Height:	173 cm (68”)
Weight:	86 kg (190 lb)
Seat Track Position:	Mid to rear-track
Manual Restraint Use:	Manual 3-point lap and shoulder belt
Usage Source:	Vehicle inspection, EDR summary
Eyewear:	Prescription eyeglasses
Type of Medical Treatment:	Sustained self-reported minor injuries and was not transported

Driver Injuries

Injury	Injury Severity (AIS 90/Update 98)	Injury Mechanism
Left 1st and 2nd finger sprain	Minor (750402.1,2)	Steering wheel
Left knee contusion	Minor (890402.1,2)	Knee bolster

Injury source: Interview

Driver Kinematics

The 67-year-old male driver of the 2003 Chevrolet Suburban was seated in an upright posture and restrained by the integrated manual 3-point lap and shoulder belt. At impact with the Chevrolet pickup truck, he initiated a lateral trajectory to the right and loaded the manual restraint. The loading to the shoulder belt resulted in the displacement of the plastic trim cover on the forward aspect of the integrated shoulder belt guide that was located on the upper outboard aspect of the driver’s seat back. His left hand struck the steering wheel which resulted in a left 1st and 2nd finger sprain. His left knee struck the knee bolter and caused a left knee contusion. He was redirected as the Suburban rotated counterclockwise (CCW) and was redirected laterally to the right during the secondary sideslap. The use of the safety belt prevented additional movement in the vehicle. He came to rest in the driver’s seat and exited the vehicle under his own power. Although he reported minor injuries during the interview, he did not receive medical treatment after the crash.

Front Right Passenger

Age/Sex:	53-year-old female
Height:	165 cm (65”)
Weight:	90 kg (199 lb)
Seat Track Position:	Mid-track
Manual Restraint Use:	Unrestrained
Usage Source:	Vehicle inspection, ejection
Eyewear:	None
Type of Medical Treatment:	Transported by ambulance to a regional trauma center and treated and released

Front Right Passenger Injuries

Injury	Injury Severity (AIS 90/Update 98)	Injury Mechanism
Positive loss of consciousness, length unknown	Moderate (160406.2,9)	Ground
Right fifth distal metacarpal fracture; comminuted, impacted, angulated	Moderate (752002.2,1)	Right side interior hardware/arm rest
Nose abrasion	Minor (290202.1,4)	Ground
2.5 cm (1.0”) left forehead laceration (significant amount of gravel and debris within wound)	Minor (290602.1,7)	Ground
Right wrist/hand contusion	Minor (790402.1,1)	Right side interior hardware/arm rest
Left hand contusions	Minor (790402.1,2)	Ground
Right hand abrasions	Minor (790202.1,1)	Right side interior hardware/arm rest
Left hand abrasions	Minor (790202.1,2)	Ground
Left first finger 1.5 cm (0.6”) transverse laceration	Minor (790602.1,2)	Ground
Right knee/lower leg abrasion	Minor (890202.1,1)	Right side interior hardware/arm rest
Left thigh abrasion	Minor (890202.1,2)	Ground
Left thigh contusion	Minor (890402.1,2)	Ground

Injury source: Emergency Room Records

Front Right Passenger Kinematics

The driver of the Suburban stated that the 53-year-old female front right passenger had removed the safety belt and was out-of-position at the time of the crash. She was rotated CCW and reaching between the front seat backs for an object in the second row seat area. At the time of the initial right front impact, she was in the process of returning to a forward upright posture. The driver stated that the front right passenger was in the process of reaching for the safety belt at the time of the impact. At impact, the front right passenger initiated a lateral trajectory and loaded the interior aspect of the right front door. It could not be determined if the front right window glazing fractured as a result of impact forces or occupant contact. The loading to the door interior resulted in fractures to the interior door panel near the release lever. The front right passenger sustained a comminuted, impacted, angulated right fifth distal metacarpal fracture, a right wrist/hand contusion, a right hand abrasion, and a right knee/lower leg abrasion as a result of contact with the interior door arm rest and hardware. As the vehicles engaged and the Suburban rotated in a CCW direction, the front right passenger was fully ejected through the right front window opening. She came to rest on the roadway and sustained a positive loss of consciousness, a nose abrasion, a 2.5 cm (1.0”) left forehead laceration, left hand contusions and abrasions, a left first finger 1.5 cm (0.6”) transverse laceration, and a left thigh abrasion and

contusion as a result of the ground contact. The driver stated that the front right passenger was unconscious for approximately two minutes after the crash. The front right passenger was transported by ambulance to a regional trauma center where she was treated and released.

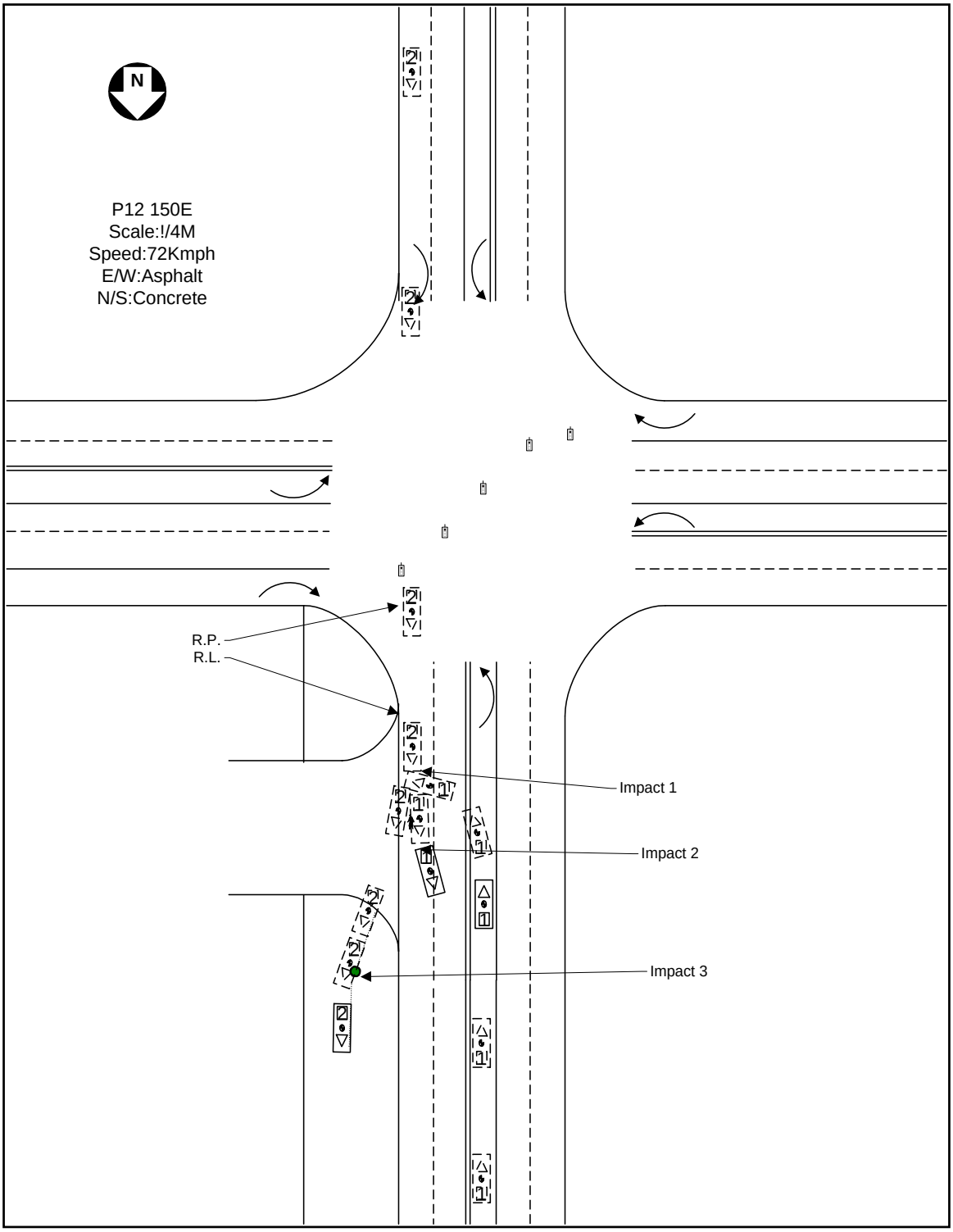


Figure 13: Nass scene schematic

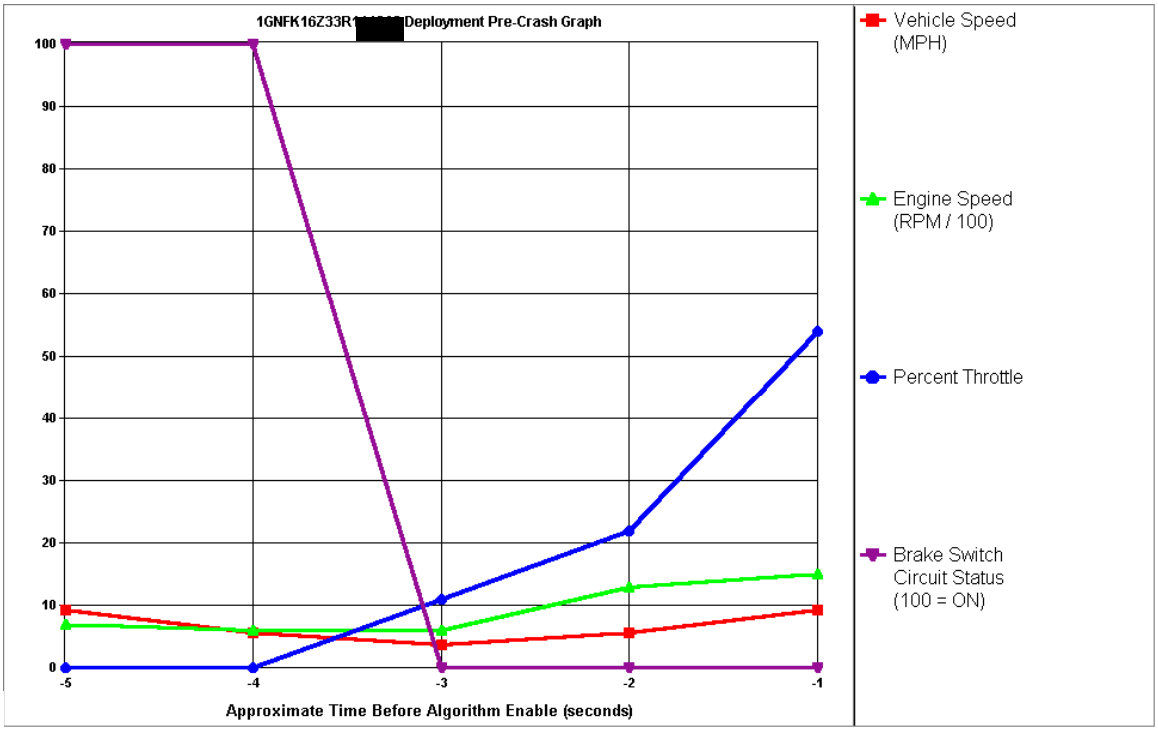
APPENDIX A: 2003 CHEVROLET SUBURBAN EDR SUMMARY

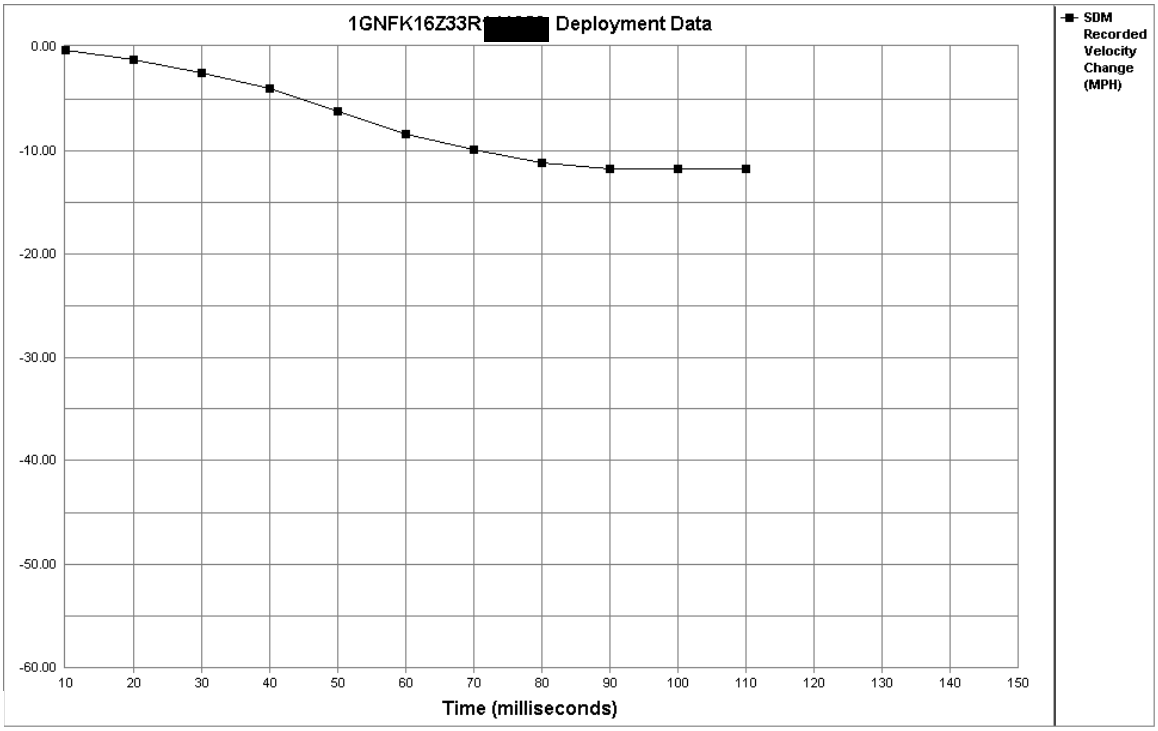
Deployment Event

1GNFK16Z33[redacted] System Status At Deployment	
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Ignition Cycles At Deployment	192
Ignition Cycles At Investigation	193
Maximum SDM Recorded Velocity Change (MPH)	-11.97
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	155
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	17.5
Driver Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	N/A
Passenger First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	17.5
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	N/A
Time Between Non-Deployment And Deployment Events (sec)	N/A
Frontal Deployment Level Event Counter	1
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.31	-1.24	-2.48	-4.03	-6.20	-8.37	-9.92	-11.16	-11.78	-11.78	-11.78	N/A	N/A	N/A	N/A

PRE-CRASH DATA				
Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	9	704	0	ON
-4	6	576	0	ON
-3	4	640	11	OFF
-2	6	1344	22	OFF
-1	9	1472	54	OFF



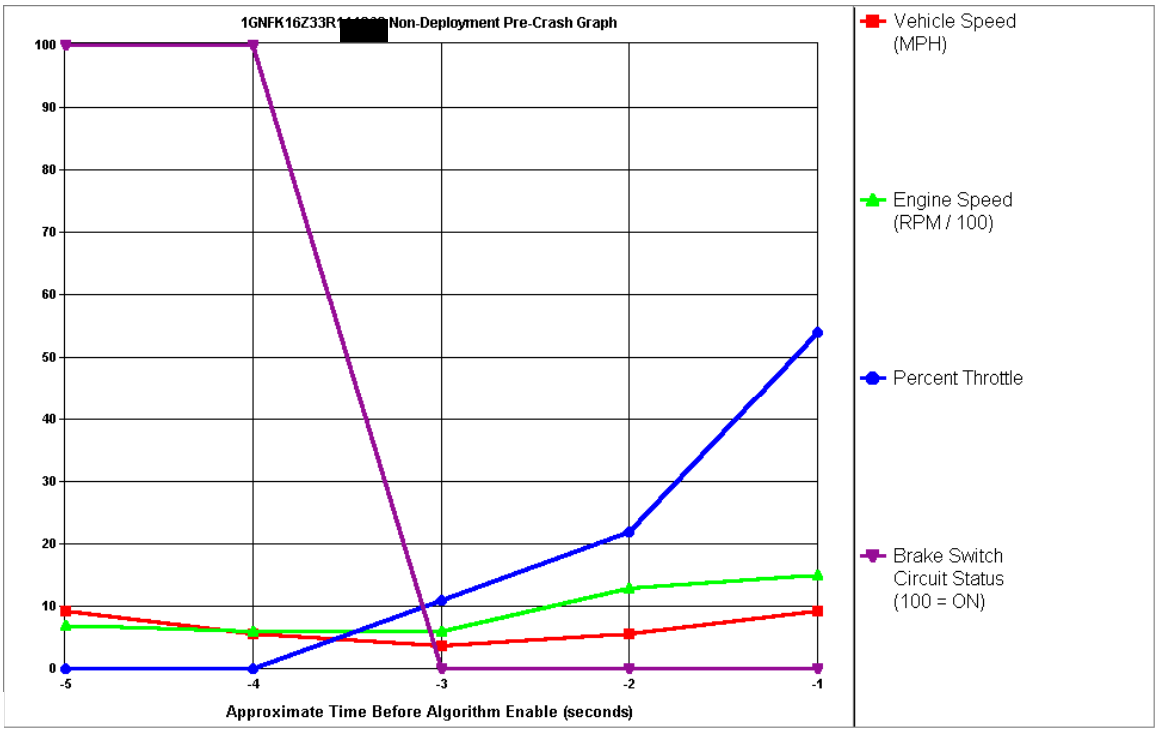


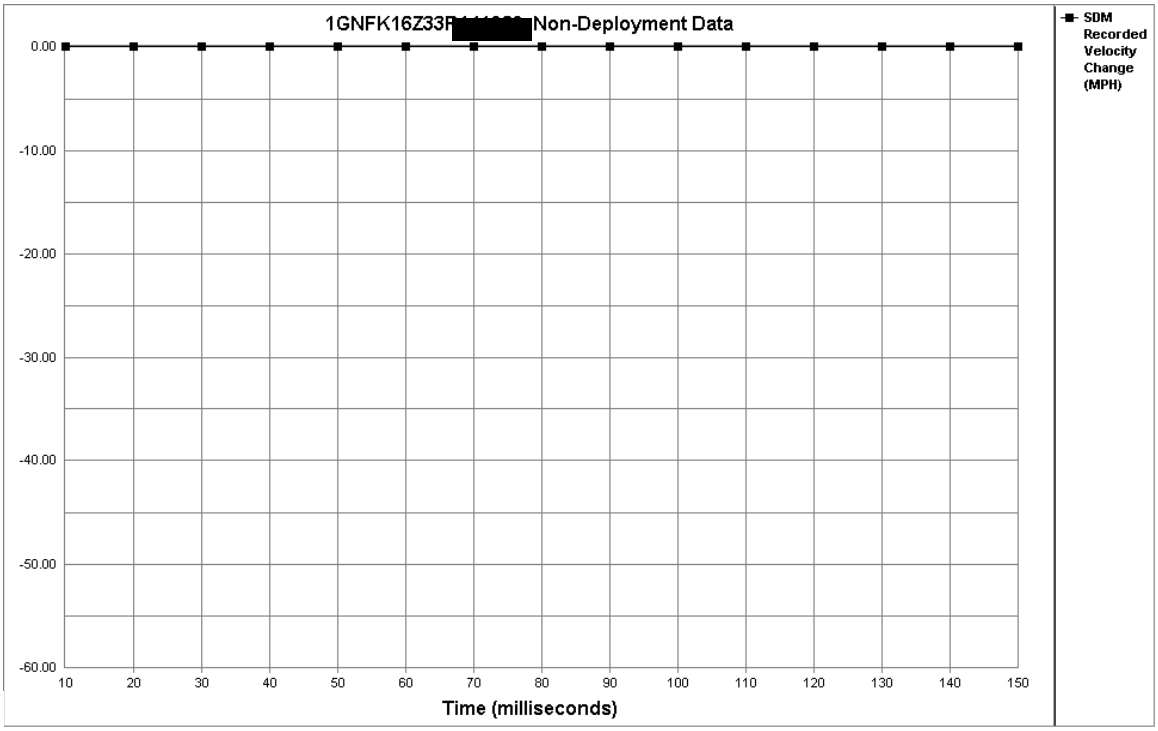
Non-Deployment Event

1GNFK16Z33R[redacted] System Status At Non-Deployment	
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Ignition Cycles At Non-Deployment	192
Ignition Cycles At Investigation	193
Maximum SDM Recorded Velocity Change (MPH)	0.00
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	167.5
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PRE-CRASH DATA				
Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	9	704	0	ON
-4	6	576	0	ON
-3	4	640	11	OFF
-2	6	1344	22	OFF
-1	9	1472	54	OFF


1GNFK16Z33R[redacted]Non-Deployment Pre-Crash Graph
100
90
80
70
60
50
40
30
20
10
0
-5
-4
-3
-2
-1
Approximate Time Before Algorithm Enable (seconds)
Vehicle Speed (MPH)
Engine Speed (RPM / 100)
Percent Throttle
Brake Switch Circuit Status (100 = ON)

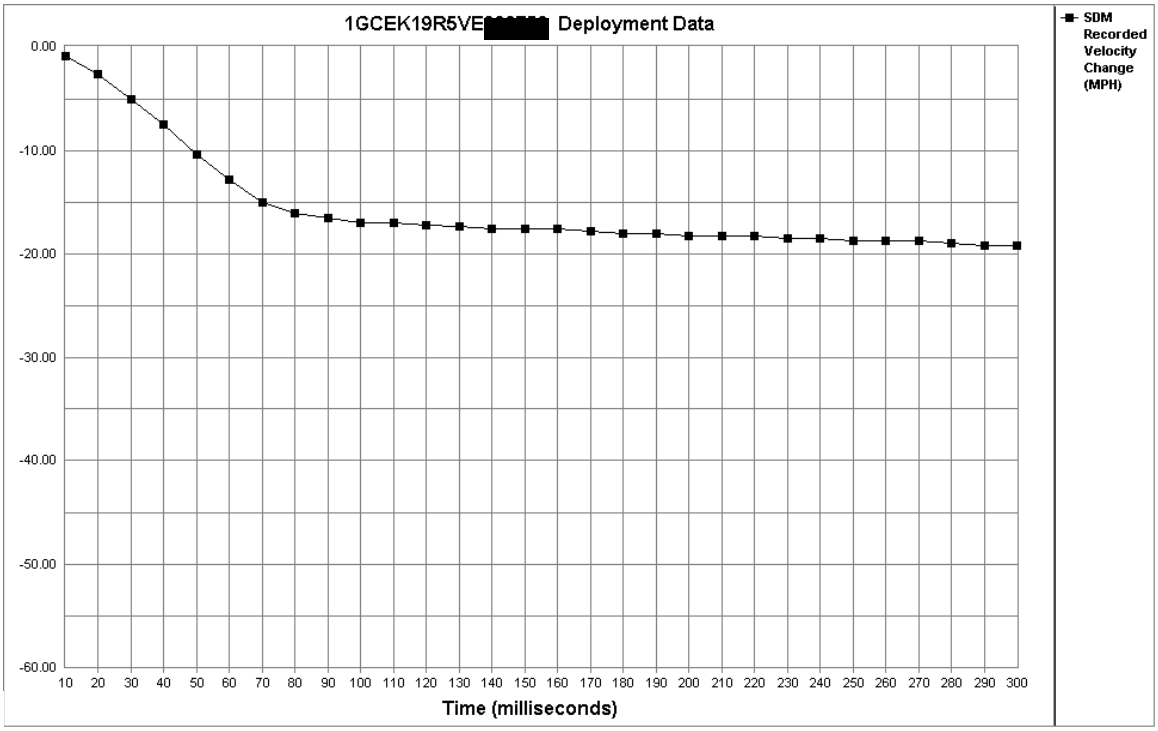

1GNFK16Z33R[redacted]Non-Deployment Data
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
-60.00
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Time (milliseconds)
SDM Recorded Velocity Change (MPH)

APPENDIX B: 1997 CHEVROLET 1500-SERIES PICKUP TRUCK EDR SUMMARY

Deployment Event

1GCEK19R5VE[redacted] System Status At Deployment	
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Passenger Front Air Bag Suppression Switch Circuit Status	Air Bag Not Suppressed
Ignition Cycles At Deployment	10158
Ignition Cycles At Investigation	10160
Time From Algorithm Enable To Deployment Command (msec)	15
Time Between Non-Deployment And Deployment Events (sec)	N/A

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.88	-2.63	-5.05	-7.46	-10.31	-12.73	-14.92	-16.02	-16.46	-16.89	-16.89	-17.11	-17.33	-17.55	-17.55
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Recorded Velocity Change (MPH)	-17.55	-17.77	-17.99	-17.99	-18.21	-18.21	-18.21	-18.43	-18.43	-18.65	-18.65	-18.65	-18.87	-19.09	-19.09



Non-Deployment Event

1GCEK19R5VE[redacted] System Status At Non-Deployment	
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Passenger Front Air Bag Suppression Switch Circuit Status	Air Bag Not Suppressed
Ignition Cycles At Non-Deployment	10158
Ignition Cycles At Investigation	10160
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	3.75
Maximum SDM Recorded Velocity Change (MPH)	-0.22
A Deployment was Commanded Prior to this Event	Yes

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00