

REPORT NUMBER: T8001-MGA-2008-002

**VEHICLE TO DEFORMABLE BARRIER CRASH TESTS
IN SUPPORT OF NHTSA OFFSET FRONTAL PROGRAM**

**LEFT 40% OFFSET DEFORMABLE BARRIER IMPACT
R94 BARRIER**

TEST DATE: JANUARY 31, 2008

ORDER NUMBER: DTRTV-T8001

2008 CHEVROLET AVEO LS 4-DOOR (R80173)

**PREPARED BY:
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**FINAL REPORT SUBMITTED:
AUGUST 22, 2008**

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION / RITA
VOLPE NATIONAL TRANSPORTATION SYSTEM CENTER
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Technical Report Documentation Page

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16. Abstract A 40% frontal offset barrier impact was conducted on a 2008 Chevrolet Aveo LS 4-Door, NHTSA No. R80173, at MGA Research Corporation on January 31, 2008. This test was conducted in accordance with Volpe Order No. DTRTV-T8001 for the evaluation of vehicle and occupant responses. The impact velocity was 56.0 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum static crush was 591 mm located to the left of the vehicle's centerline. The driver's 15 millisecond Head Injury Criteria (HIC) was 458. The driver's chest maximum resultant acceleration with three milliseconds minimum duration was 32.0 g. The driver's maximum chest deflection was -16 millimeters. The driver's left and right femur maximum axial compressive forces were -5052 N and -1343 N, respectively. The right front passenger's 15 millisecond Head Injury Criteria (HIC) was 96. The right front passenger's chest maximum resultant acceleration with three milliseconds minimum duration was 22.6 g. The right front passenger's maximum chest deflection was -13 millimeters. The right front passenger's left and right femur maximum axial compressive forces were -3627 N and -1076 N, respectively. The left rear passenger's 15 millisecond Head Injury Criteria (HIC) was 276. The left rear passenger's chest maximum resultant acceleration with three milliseconds minimum duration was 37.5 g.			
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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE

This 56.0 km/h (target speed) Left 40% Offset Deformable Barrier test was conducted for the Volpe National Transportation Systems Center (VNTSC) / RITA by MGA Research Corporation.

The purpose of this testing was to evaluate and compare vehicle and occupant responses during 40% frontal offset vehicle to deformable barrier crash tests. For this test, the subject vehicle was a 2008 Chevrolet Aveo LS 4-door with two (2) 50th percentile dummies in the front seating positions and one 10-year-old dummy in the left rear seating position. The deformable barrier used for this test was the R94 barrier.

TEST PROCEDURE

This test was conducted in accordance with VNTSC's instructions for a 40% offset vehicle to deformable barrier crash test. Data was obtained relative to FMVSS 208, "Occupant Crash Protection" performance, FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," performance.

The test vehicle, a 2008 Chevrolet Aveo LS 4-door, was instrumented with twelve (12) accelerometers to measure longitudinal axis accelerations, four (4) accelerometers to measure lateral axis accelerations, and six (6) accelerometers to measure vertical axis accelerations. The driver and passenger's primary and secondary airbag signals were monitored with inductive pickups. The vehicle impacted a 40% left offset deformable barrier. The vehicle's specified impact velocity range was 55.2 to 56.8 km/h.

The test vehicle contained two (2) Part 572E 50th percentile adult male Hybrid III anthropomorphic test devices (dummies) with Thor-Lx legs in the driver and right front passenger positions. A Hybrid III 10-Year-Old dummy was placed in the left rear seating position. The 50th percentile dummies were positioned in the front outboard designated seating positions according to a procedure provided by the COTR. The seating procedure is included as Appendix D. The driver dummy was restrained with a 3-point seat belt and a front airbag. The right front passenger dummy was restrained with a 3-point seat belt and a front airbag. The left rear passenger dummy was in the Graco Highback Turbobooster child seat and restrained with the Type II seat belt.

Each Hybrid III 50th dummy was instrumented with an array of twelve (12) accelerometers in the head, and six (6) accelerometers in the chest, oriented to measure longitudinal, lateral, and vertical accelerations. Each dummy was also instrumented with 6-channel upper and lower neck moment and force load cells, left and right femur load cells to measure axial forces, a chest deflection potentiometer, and knee displacement potentiometers. Each dummy was equipped with Thor-Lx legs, which included upper and lower tibia load cells to measure forces and moments, longitudinal and lateral tibia accelerometers, three (3) foot accelerometers on each foot to measure accelerations in three (3) axes and three (3) rotary potentiometers at each ankle to measure foot rotations about three (3) axes.

SECTION 1 (CONTINUED)
PURPOSE AND TEST PROCEDURE

TEST PROCEDURE (CONTINUED)

The Hybrid III 10-Year-Old child dummy was instrumented with tri-axial accelerometers in the head, chest, and pelvis oriented to measure longitudinal, lateral, and vertical accelerations. The dummy was also instrumented with 6-channel upper and lower neck moment and force load cells, left and right shoulder load cells, upper and lower sternum X accelerometers, upper and lower spine X accelerometers, 6-channel lumbar moment and force load cells, right/left upper and right/left lower axis load cells.

The vehicle impacted a deformable barrier instrumented with 90 load cells to measure longitudinal forces.

The 313 data channels were digitally sampled and recorded at 10,000 samples per second and processed per SAE J211 March 1995.

The crash event was recorded by one (1) real-time panning motion picture camera and seventeen (17) high-speed digital motion picture cameras. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera.

The left 40% offset deformable barrier crash test summary data and all occupant, camera, vehicle, and deformable barrier face measurements are presented in Section 2.0. Appendix A contains the still photographs. Appendix B contains the dummy, vehicle, and barrier data plots. Appendix C contains the dummy verification data. Appendix D contains customer provided seating procedure. Appendix E contains the barrier certification. Appendix F contains an INSIA report that was the basis for the Structural Measurements presented in Data Sheet 10 (page 30) of this report.

SECTION 2

LEFT 40% OFFSET DEFORMABLE BARRIER IMPACT SUMMARY

This 56.0 km/h (target speed) left 40% offset deformable barrier crash test was conducted by MGA Research Corporation on January 31, 2008.

The test vehicle, a 2008 Chevrolet Aveo LS 4-Door, NHTSA Number R80173, was equipped with a 1.6 L, 4-cylinder lateral engine, manual transmission with overdrive, power steering, power brakes, and front airbags. The vehicle's test weight was 1433.3 kg. The vehicle's impact speed was 56.0 km/h. The vehicle sustained 591 mm of static crush during the impact.

The occupant injury assessment values are summarized on the following page.

TEST NOTES

There was no valid data collected for:

- Left Rear Seat Crossmember X after 200 msec.

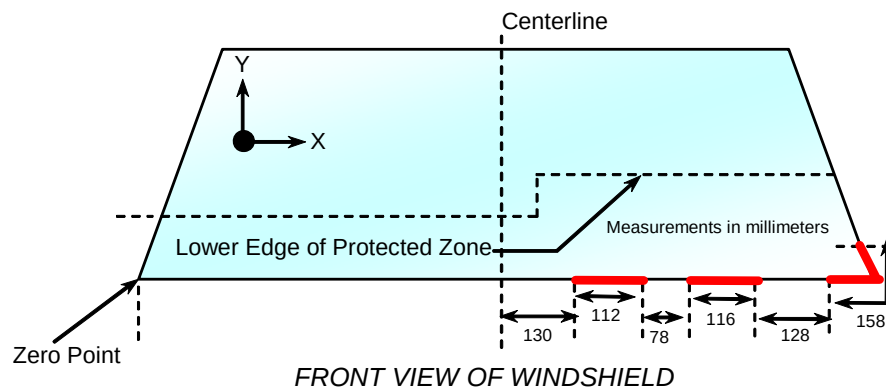
- Vehicle CG X after 90 msec.

- Left Brake Caliper after 100 msec.

The onboard passenger camera did not run.

The As Tested Weight was greater than the calculated test weight to accommodate the onboard equipment without removal of major components.

CMM Reference: Rear Bumper Top @ Center
 +X Forward
 +Y Left
 +Z Up



There was 90.4 percent windshield retention and no intrusion into the protected zone of the windshield during the event.

SECTION 2 (CONTINUED)
LEFT 40% OFFSET DEFORMABLE BARRIER IMPACT SUMMARY

OCCUPANT INJURY ASSESSMENT VALUES

Injury Criteria		Limit	Driver	Right Front Passenger
HIC 36		1000	458	201
	T1 (msec)		253.9	104.1
	T2 (msec)		256.5	140.1
HIC 15		700	458	96
	T1 (msec)		253.9	116.9
	T2 (msec)		256.5	131.9
Upper Neck Tension (N)		4170	906	1056
Upper Neck Compression (N)		4000	-827	-74
Neck Injury (NIJ) N_{te}		1.0	0.4	0.2
Neck Injury (NIJ) N_{tf}		1.0	0.2	0.2
Neck Injury (NIJ) N_{ce}		1.0	0.4	0.0
Neck Injury (NIJ) N_{cf}		1.0	0.1	0.1
Clip (g)		60	32	23
Chest Displacement (mm)		63	16	13
Left Femur (N)		9,040	-5052	-3627
Right Femur (N)		9,040	-1343	-1076
Left Upper Tibia Index		0.91	0.36	0.39
Right Upper Tibia Index		0.91	0.47	0.31
Left Lower Tibia Index		0.91	0.31	0.40
Right Lower Tibia Index		0.91	0.59	0.38
Left Upper Tibia Force (N)		-5600	-771	-1955
Right Upper Tibia Force (N)		-5600	-1966	-1238
Left Lower Tibia Force (N)		-5200	-1424	-2321
Right Lower Tibia Force (N)		-5200	-3243	-1535
Left Inversion (degrees)		-35	-3.9	-0.9
Left Eversion (degrees)		35	28.5	17.2
Left Plantarflexion (degrees)			-17.3	-26.7
Left Dorsiflexion (degrees)		35	21.3	N/A
Left External Rotation (degrees)			-3.7	-7.0
Left Internal Rotation (degrees)			7.0	N/A
Right Inversion (degrees)		35	N/A	3.7
Right Eversion (degrees)		-35	-23.4	-28.4
Right Plantarflexion (degrees)			-21.5	-15.3
Right Dorsiflexion (degrees)		35	12.9	N/A
Right External Rotation (degrees)			3.5	3.8
Right Internal Rotation (degrees)			-8.2	-6.4
Left Knee Shear (mm)		-15	-0.8	-0.7
Right Knee Shear (mm)		-15	-1.6	0.0

SECTION 2 (CONTINUED)
LEFT 40% OFFSET DEFORMABLE BARRIER IMPACT SUMMARY

OCCUPANT INJURY ASSESSMENT VALUES (CONTINUED)

Injury Criteria		Left Rear Passenger
HIC 36		502
	T1 (msec)	90.3
	T2 (msec)	126.3
HIC 15		276
	T1 (msec)	101.2
	T2 (msec)	116.2
Upper Neck Tension (N)		1721
Upper Neck Compression (N)		-1543
Clip (g)		37

DATA SHEET 1
CRASH VEHICLE SUMMARY

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Description	Value
Test Time	11:14 a.m.
Temperature	21°C
Vehicle Year/ Make / Model / Body Style	2008 Chevrolet Aveo LS 4-Door
Vehicle Test Weight	1433.3 kg
Vehicle / Barrier Impact Angle	0°
Vehicle / Barrier Impact Accuracy	2 mm up / 5 mm right
Impact Velocity	56.0 km/h
Maximum Static Crush	591 mm to the left of the vehicle's C/L
Deformable Barrier	R94
Number of Data Channels	313
Number of Real-Time Cameras	1
Number of High-Speed Cameras	17

Dummies	Driver	Right Front Passenger	Left Rear Passenger
Type/Serial No.	HIII / 202	HIII / 206	HIII 10YO / D001
Type Lower Legs	Thor-Lx	Thor-Lx	
Serial Numbers of Legs	37R / 36L	45R / 46L	
Restraint System	3-Point Seatbelt Front Airbag	3-Point Seatbelt Front Airbag	Type II Belts Graco Highback Turbobooster

DATA SHEET 2**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

TEST VEHICLE INFORMATION

Manufacturer	Chevrolet
Model	Aveo
Body Style	4-Door Sedan
NHTSA No.	R80173
VIN	KL1TD56698B001262
Color	Cosmic Silver
Delivery Date	11/29/2007
Odometer Reading (mile)	43
Dealer	Boucher Chevrolet
Transmission	Manual
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	1.6
Engine Placement	Lateral
Automatic Door Lock (ADL)	No
Owners Manual Details Instructions on Disabling ADLs	N/A
Bucket Seats	Yes

TEST VEHICLE OPTIONS

Front Airbag	Yes
Driver Side Curtain Airbag	No
Driver Side Torso Airbag	Yes
Rear Passenger Side Curtain Airbag	No
Rear Passenger Side Torso Airbag	No
Force Limiter	Yes
Pretensioner	Yes
Power Steering	Yes
Power Door Locks	No
Tilt Wheel	Yes
Air Conditioning	Yes
Anti-lock Brakes	No
Traction Control	No
All Wheel Drive	No
Power Seats	No

DATA FROM CERTIFICATION LABEL

Manufactured By	GM Daewoo Auto & Technology Company
Date of Manufacture	05/07

GVWR (kg)	1568
GAWR Front (kg)	838
GAWR Rear (kg)	802

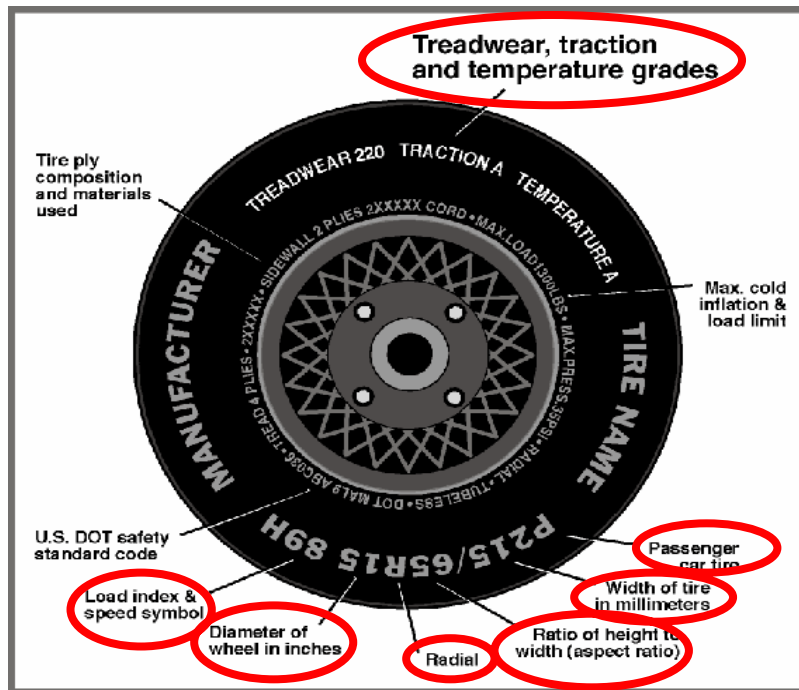
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				390
Cargo Wt. (RCLW) (kg)				50

DATA SHEET 2 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	210	210
Recommended Tire Size	P185/60R14	P185/60R14
Tire Size on Vehicle	P185/60R14	P185/60R14
Tire Manufacturer	Hankook	Hankook
Tire Name	Optimo H420	Optimo H420
Tire Type	Passenger	Passenger
Tire Width (mm)	185	185
Ratio of Height to Width (aspect ratio)	60	60
Radial	R	R
Wheel Diameter	14	14
Load Index & Speed Symbol	82H	82H
Treadwear	420	420
Traction Grade	A	A
Temperature Grade	A	A

DATA SHEET 2 (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	347.9	228.6		384.7	333.8	
Right	kg	346.1	229.1		378.7	336.1	
Ratio	%	60.3	39.7		53.3	46.7	
Totals	kg	694.0	457.7	1151.7	763.4	669.9	1433.3

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1151.7
Weight of 2 P572E ATDs & 1 10-Year-Old	kg	191.4
Rated Cargo/Luggage Weight (RCLW)	kg	50
Calculated Vehicle Target Weight (TVTW)	kg	1393.1

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	631	636	639	639	986
As Tested	mm	624	625	569	570	1159
Post Test	mm	647	598	553	595	

Vehicle Wheelbase (mm): 2480

Weight of Ballast secured in cargo area (kg): 0

Vehicle Components Removed: Plastic wheel covers, spare tire, jack & tools, trunk carpet, right tail light, four side windows, trunk interior, rear half of exhaust, left front and right front door panels, right rear door panel, and right rear speaker.

Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET 2 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

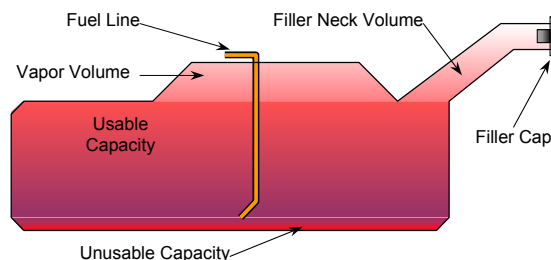
Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	44.7
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	41.1 to 42.0
Actual Amount of Solvent used	41.3
1/3 of Usable Capacity	14.9

The test vehicle is equipped with an electric fuel pump. The fuel pump will operate for about 3 seconds when the ignition switch is on to provide proper fuel rail pressure.



VEHICLE FUEL TANK ASSEMBLY

BELT LENGTH DATA

Measurement Description	Units	Driver	Right Front Passenger
Shoulder belt length as measured on ATD	mm	860	890
Lap belt length as measured on ATD	mm	785	805
Remainder of belt on reel	mm	1700	1575
Total belt length for continuous webbing systems	mm	3345	3270

SEAT TRACK INFORMATION

Description	Driver	Right Front Passenger	Left Rear Passenger
Seat Track Shift (mm)	0	0	0
Seat Back Failure	None	None	None

DATA SHEET 3
POST IMPACT DATA

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

DOOR OPENING AND GLAZING DAMAGE

Description	Left Side	Right Side
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Glazing Damage	The windshield cracked.	

DUMMY CONTACT POINTS

Description	Driver	Right Front Passenger	Left Rear Passenger
Head Contact	Airbag, B-Pillar	Airbag, headrest	C-Pillar
Chest Contact	Airbag	Airbag	None
Abdomen Contact	None	None	None
Left Knee Contact	Knee bolster	Glovebox	Knees and feet to driver seatback
Right Knee Contact	Knee bolster	Glovebox	Knees and feet to driver seatback

LEFT REAR (P4) CRS POST-TEST INSPECTION

Location	Damage	Remarks
Cracks on CRS	None	
Fabric Tears on CRS	None	
Vehicle Seat Structure	None	
Vehicle Seat Fabric Tears	None	
Child Dummy	None	10-Year-Old

DATA SHEET 4

TEST VEHICLE INFORMATION

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door NHTSA No.: R80173
Test Program: Left 40% Offset Deformable Barrier Test Date: 1/31/2008

NORMAL DESIGN RIDING POSITION

Driver seat back angle: 13.9° at headrest post
Right Front Passenger seat back angle: 13.8° at headrest post
Left Rear Passenger seat back angle: Fixed

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Left Front Seat	19 detents	4 th detent (1 st as 0)
Right Front Seat	19 detents	11 th detent (1 st as 0)
Left Rear Seat	Fixed	Fixed

ADJUSTABLE D-RING POSITION

The driver and passenger D-rings were set at the 2nd position with the uppermost defined as 0.

STEERING COLUMN POSITION

	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1		64.5
Geometric center position No. 2		67.0
Uppermost position No. 3		69.5

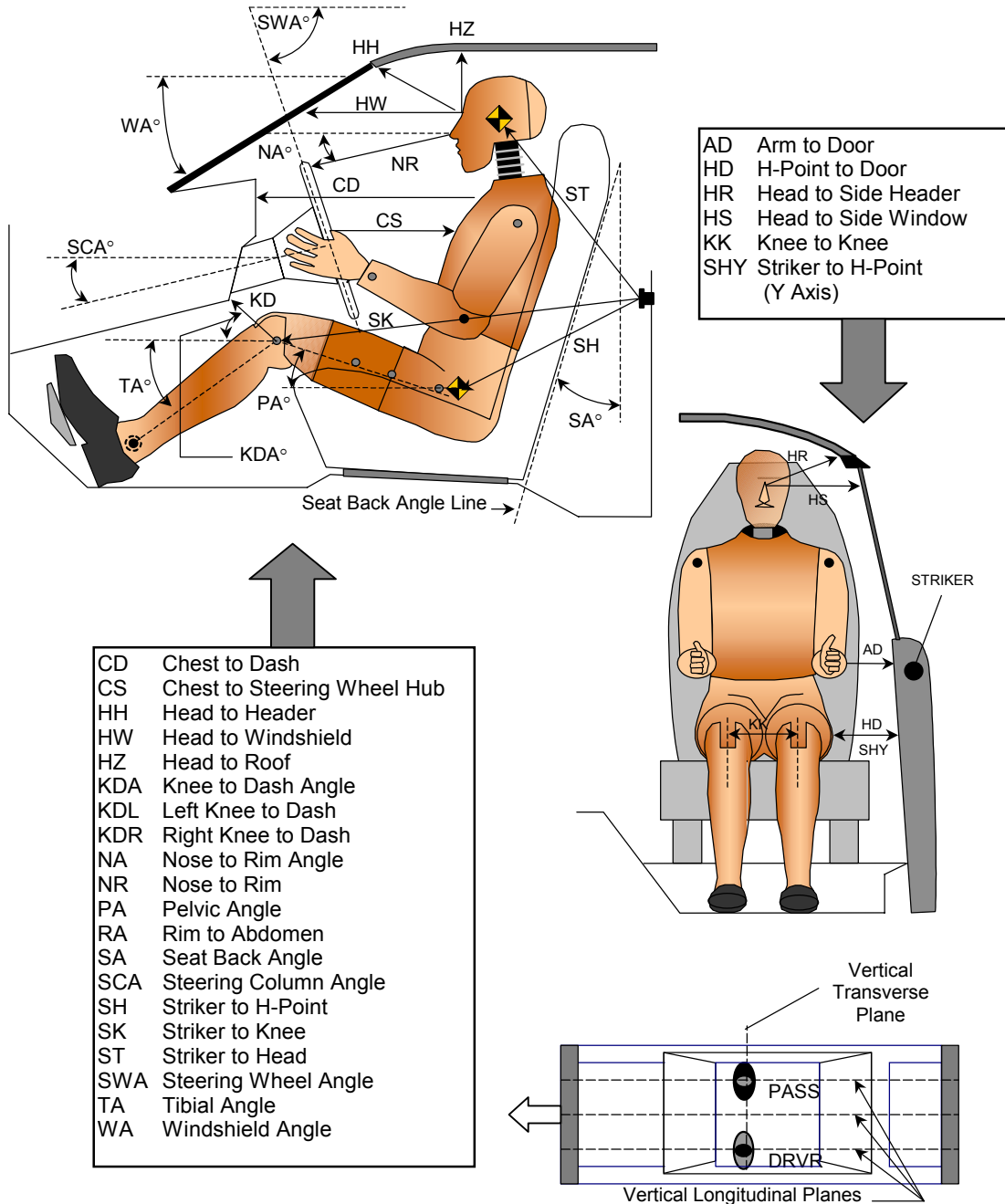
DATA SHEET 5

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET 5 (CONTINUED)
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Right Front Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		27.7		
SWA	Steering Wheel Angle		67.0		
SCA	Steering Column Angle		24.7		
SA	Seat Back Angle (headrest post)		13.9		13.8
HZ	Head to Roof (Z)	205	90	183	90
HH	Head to Header	434	18.1	355	17.1
HW	Head to Windshield	756	0	661	0
HR	Head to Side Header (Y)	225		228	
NR	Nose to Rim	494	7.9		
CD	Chest to Dash	644		536	
CS	Chest to Steering Hub	421	2.9		
RA	Rim to Abdomen	288	0		
KDL	Left Knee to Dash	211	18.5	126	
KDR	Right Knee to Dash	178		134	31.7
PA	Pelvic Angle		23.6		24.5
TA	Tibia Angle		42.9		48.1
KK	Knee to Knee (Y)	321		258	
SAN	Striker to Ankle	858		935	
SK	Striker to Knee	526		614	
ST	Striker to Head	538		541	
SH	Striker to H-Point	183		246	
SHY	Striker to H-Point (Y)	233		223	
HS	Head to Side Window	314		307	
HD	H-Point to Door (Y)	220		210	
AD	Arm to Door (Y)	145		136	
AA	Ankle to Ankle	297		214	

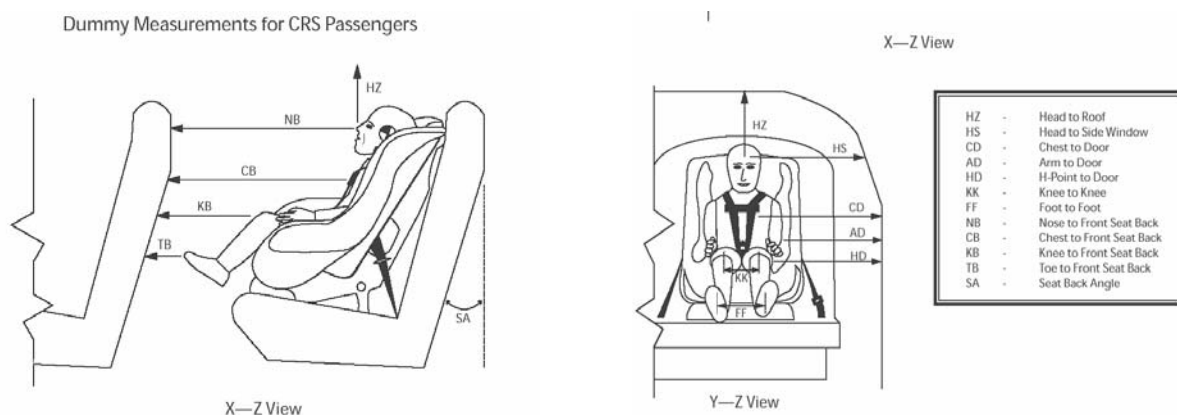
DATA SHEET 5 (CONTINUED)
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Child Restraint System (Position 4)	Graco Highback Turbobooster (Forward Facing)
Dummy Type / Serial Number	Hybrid III 10-Year-Old / D001

Dummy Measurements for CRS Passengers



Measurement	Pre-Test (mm)	Post-Test (mm)
	P4 CRS	P4 CRS
SA (deg)	Fixed	Fixed
HS	281	404
CD	340	385
AD	164	200
HD	221	185
HZ	215	251
NB	431	484
CB	410	456
KK	136	119
FF	148	60
KB - LEFT	152	127
KB - RIGHT	148	213
TB - LEFT	0	47
TB - RIGHT	0	0
Seat Top to Door	103	73
Seat Bottom to Door	120	126

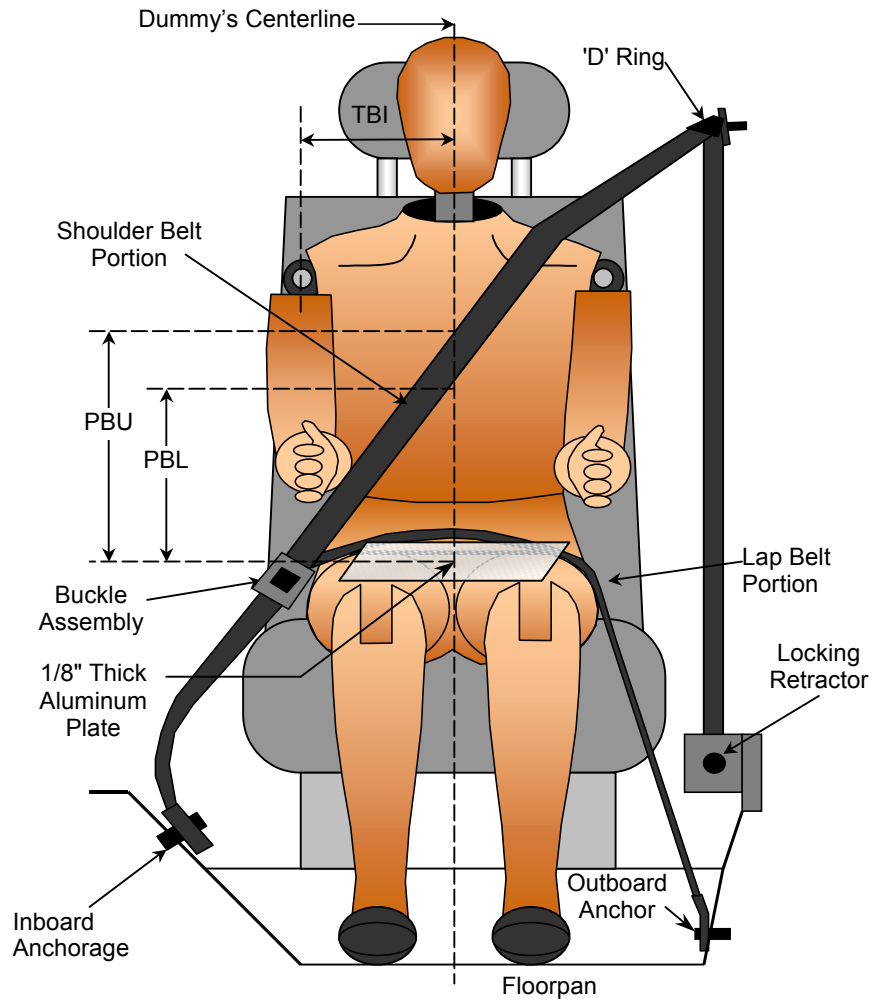
All dimensions in mm (unless noted)
 P4 – 2nd Row Left Rear Passenger (Forward Facing)

DATA SHEET 5 (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	360	360
PBL - Top surface of reference to belt lower edge	mm	285	285

DATA SHEET 5 (CONTINUED)
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

	Driver			Right Front Passenger			Left Rear Passenger		
	X	Y	Z	X	Y	Z	X	Y	Z
Head CG	2052	-405	-607	2123	403	-604	1276	-404	-604
Striker	2050	-731	-69	2048	734	-68	1081	-714	-266
Left Knee	2575	-504	-46	2663	188	-41	1669	-422	-153
Right Knee	2588	-251	-51	2662	471	-52			
Tip of Nose	2164	-328	-561	2236	330	-576			
H-Point	2183	-498	56	2269	511	39	1404	-447	-90
Left Ankle	2891	-537	240	2963	329	236			
Right Ankle	2895	-229	236	2968	496	235			
Left Heel	2880	-515	367	2961	295	363			
Right Heel	2878	-195	367	2971	470	371			
Right Toe	3115	-186	143	3164	438	131			
Left Toe	3118	-504	145						
Seat Back									
Left Shoulder Bolt							1237	-429	-405
Right Shoulder Bolt							1241	-227	-408

DATA SHEET 6

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Accelerometer Location	Measurements (mm)		
	X	Y	Z
Left Rear Seat Crossmember X	1743	-329	328
Left Rear Seat Crossmember Y			
Right Rear Seat Crossmember X	1743	334	334
Right Rear Seat Crossmember Y			
Vehicle Center of Gravity X	2344	0	412
Vehicle Center of Gravity Y			
Vehicle Center of Gravity Z			
Top of Engine Block X	3536	19	865
Bottom of Engine Block X	3609	93	257
Left Disc Brake Caliper X	3591	-665	212
Right Disc Brake Caliper X	3591	665	212
Instrument Panel X	3741	0	1008
Left Side Driver Mid Seat Track X	2085	-577	332
Accelerator Pedal X (at midfoot)	3079	-193	403
Accelerator Pedal Y (at midfoot)			
Accelerator Pedal Z (at midfoot)			
Brake Pedal X (at midfoot)	3241	-284	454
Brake Pedal Y (at midfoot)			
Brake Pedal Z (at midfoot)			
Footrest X	3111	-594	395
Footrest Y			
Footrest Z			

Reference is on the following page.

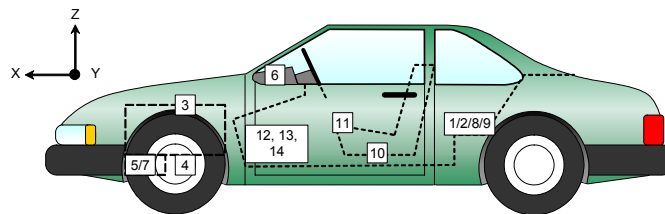
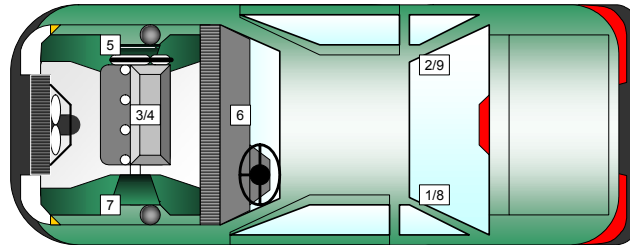
DATA SHEET 6 (CONTINUED)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

Reference Points: X - Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ up)



DATA SHEET 6 (CONTINUED)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Location Number	Description	Maximum Values (g's)			
		Positive	Time, ms	Negative	Time, ms
1	Left Rear Seat Cross Member X	(1)	(1)	-28.7	81.6
2	Right Rear Seat Cross Member X	3.2	199.5	-25.8	53.6
3	Top of Engine Block X	12.2	49.0	-41.5	81.6
4	Bottom of Engine Block X	12.9	54.9	-36.9	36.3
5	Disc Brake Caliper @ Right Side X	16.4	58.6	-35.8	111.1
6	Instrument Panel X	24.4	38.1	-48.4	47.0
7	Disc Brake Caliper @ Left Side X	(2)	(2)	-124.8	48.3
8	Left Rear Seat Cross Member Y	9.8	53.5	-4.2	211.7
9	Right Rear Seat Cross Member Y	12.2	53.0	-4.1	211.9
10	Left Side Driver Mid Seat Track X	4.5	193.9	-26.2	54.2
11	Vehicle Center of Gravity X	(3)	(3)	(3)	(3)
	Vehicle Center of Gravity Y	12.4	52.0	-3.1	96.9
	Vehicle Center of Gravity Z	13.0	53.0	-7.1	23.1
	Vehicle Center of Gravity Resultant	(3)	(3)		
12	Accel Pedal Heel Location X	41.0	87.3	-69.9	92.5
	Accel Pedal Heel Location Y	126.1	87.1	-94.4	82.5
	Accel Pedal Heel Location Z	107.1	87.1	-73.8	81.9
	Accel Pedal Heel Location Resultant	170.3	87.1		
13	Brake Pedal Heel Location X	5.3	19.1	-36.0	91.5
	Brake Pedal Heel Location Y	14.1	53.0	-9.2	96.4
	Brake Pedal Heel Location Z	8.1	72.6	-17.2	51.6
	Brake Pedal Heel Location Resultant	36.7	91.5		
14	Outside Footrest X	2.9	211.3	-33.4	78.4
	Outside Footrest Y	16.1	52.7	-8.3	15.1
	Outside Footrest Z	15.2	42.1	-6.6	105.5
	Outside Footrest Resultant	34.9	78.4		

(1) No valid data after approximately 200 msec.

(2) No valid data after approximately 90 msec.

(3) No valid data after approximately 100 msec.

DATA SHEET 7
DUMMY INJURY CRITERIA VALUES

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

Description	Unit	Maximum Value							
		Driver				Right Front Passenger			
		Positive	Time, ms	Negative	Time, ms	Positive	Time, ms	Negative	Time, ms
Head X	G	148.1	255.1	-55.9	117.5	2.5	284.9	-27.0	127.5
Head Y	G	18.3	118.0	-18.1	255.3	8.6	137.6	-2.3	42.6
Head Z	G	52.8	255.2	-3.0	266.1	25.5	110.6	-1.2	32.5
Head Resultant	G	157.7	255.1			34.2	123.0		
Head (FT) Y	G	23.8	117.7	-13.4	254.7	11.3	101.2	-1.2	217.8
Head (FT) Z	G	105.3	255.1	-6.7	283.8	28.4	111.2	-2.1	167.2
Head (LT) X	G	152.2	255.1	-53.3	117.4	2.8	298.7	-26.6	122.9
Head (LT) Z	G	61.0	255.2	-3.3	266.1	27.4	118.1	-1.3	32.8
Head (TP) X	G	223.4	255.1	-61.8	117.4	4.2	288.8	-40.8	124.0
Head (TP) Y	G	16.4	139.3	-31.1	255.0	10.0	133.2	-7.0	120.0
Head Redundant X	G	148.8	255.0	-57.6	117.5	2.5	288.5	-27.3	128.5
Head Redundant Y	G	17.2	117.8	-17.9	255.2	7.9	137.6	-2.5	120.5
Head Redundant Z	G	52.5	255.2	-2.8	265.9	27.4	111.2	-1.4	32.9
Head Resultant Redundant	G	158.0	255.1			35.5	117.5		
Upper Neck Fx	N	567.2	124.9	-475.1	255.3	82.1	295.6	-448.7	111.7
Upper Neck Fy	N	468.2	116.9	-47.2	235.6	235.1	139.8	-77.1	204.7
Upper Neck Fz	N	906.3	116.7	-826.6	256.2	1055.6	110.7	-74.0	29.0
Upper Neck F Resultant	N	1086.5	116.8			1144.4	110.7		
Upper Neck Mx	N-m	21.1	156.0	-36.3	117.1	15.0	126.7	-8.7	199.1
Upper Neck My	N-m	42.1	110.9	-59.6	262.7	15.9	189.9	-14.9	141.2
Upper Neck Mz	N-m	8.3	100.1	-13.4	131.1	2.9	196.1	-14.1	141.5
Upper Neck M Resultant	N-m	59.9	262.6			21.1	142.1		
Lower Neck Fx	N	414.7	112.2	-274.3	150.5	216.6	293.3	-982.0	109.6
Lower Neck Fy	N	351.2	154.2	-577.9	125.3	78.1	276.2	-338.7	105.2
Lower Neck Fz	N	1204.3	109.7	-603.6	256.3	1455.3	117.2	-49.5	31.9
Lower Neck F Resultant	N	1283.6	109.7			1753.1	110.2		
Lower Neck Mx	N-m	86.2	157.5	-18.3	238.4	35.2	137.7	-27.6	207.8
Lower Neck My	N-m	58.8	165.2	-75.8	241.4	83.5	157.8	-47.7	275.4
Lower Neck Mz	N-m	11.4	61.1	-16.0	124.3	5.8	204.6	-27.4	151.2
Lower Neck M Resultant	N-m	103.2	158.9			90.4	153.4		
Chest X	G	4.3	300.0	-31.0	116.0	0.4	213.4	-22.5	106.7
Chest Y	G	16.3	126.6	-1.7	60.8	5.8	77.4	-4.1	108.0
Chest Z	G	13.9	118.5	-4.9	145.9	10.8	121.1	-6.0	82.0
Chest Resultant	G	34.5	116.0			23.1	106.7		
Chest Redundant X	G	4.2	299.8	-30.8	116.0	0.3	204.4	-22.2	106.8
Chest Redundant Y	G	16.0	126.6	-2.2	59.4	5.9	84.0	-3.8	107.9
Chest Redundant Z	G	13.3	118.4	-4.9	147.6	10.5	122.8	-6.0	79.2
Chest Resultant Redundant	G	34.3	115.9			22.7	106.8		
Chest Displacement	mm			-15.8	123.1			-13.1	134.9

DATA SHEET 7 (CONTINUED)
DUMMY INJURY CRITERIA VALUES

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

Description	Unit	Maximum Value							
		Driver				Right Front Passenger			
		Positive	Time, ms	Negative	Time, ms	Positive	Time, ms	Negative	Time, ms
Pelvis X	G	2.8	148.1	-50.0	95.1	2.9	168.5	-29.9	73.8
Pelvis Y	G	10.4	95.1	-3.1	38.7	6.3	66.2	-4.9	123.4
Pelvis Z	G	3.0	256.4	-19.3	105.1	1.3	139.8	-15.4	87.7
Pelvis Resultant	G	53.5	95.1			32.1	82.7		
Right Femur	N	693.5	75.9	-1342.7	105.3	530.7	65.7	-1075.7	112.4
Left Femur	N	791.3	77.9	-5052.2	103.2	297.5	40.2	-3627.1	111.4
Right Knee Shear	mm	0.8	87.3	-1.6	111.2	1.0	120.1	0.0	33.6
Left Knee Shear	mm	0.7	98.3	-0.8	115.4	0.3	44.3	-0.7	112.0
Right Upper Tibia Fx	N	384.4	89.7	-159.9	109.1	228.6	72.6	-29.6	203.2
Right Upper Tibia Fy	N	78.2	96.5	-209.6	67.2	59.1	158.8	-237.9	76.3
Right Upper Tibia Fz	N	347.3	79.7	-1965.7	97.9	46.3	215.3	-1238.2	107.4
Right Upper Tibia F Resultant	N	1965.9	97.9			1244.0	107.4		
Right Upper Tibia Mx	N-m	47.6	127.2	-8.9	93.2	16.2	50.1	-39.5	80.2
Right Upper Tibia My	N-m	41.9	106.8	-60.9	90.8	13.1	170.2	-49.0	78.1
Right Lower Tibia Fx	N	48.2	232.1	-599.4	90.3	84.9	222.0	-310.6	76.7
Right Lower Tibia Fy	N	199.0	92.8	-126.1	127.8	155.8	77.3	-61.4	48.0
Right Lower Tibia Fz	N	354.7	279.2	-3243.4	96.9	81.8	206.4	-1535.1	114.4
Right Lower Tibia F Resultant	N	3258.1	96.9			1542.8	114.4		
Right Lower Tibia Mx	N-m	31.6	128.2	-14.6	91.5	5.0	43.6	-45.0	82.0
Right Lower Tibia My	N-m	26.1	104.2	-65.6	89.2	4.7	154.5	-34.5	76.7
Right Tibia Mid Shaft X	G	4.4	139.9	-72.2	89.7	2.1	159.0	-25.8	78.6
Right Tibia Mid Shaft Y	G	41.3	78.1	-23.6	78.9	15.0	75.5	-5.2	104.8
Rt Dorsi/Plantar Flexion	Deg	12.9	107.6	-21.5	297.6	-6.5	108.6	-15.3	15.4
Rt Inversion/Eversion	Deg	-1.3	0.0	-23.4	65.9	3.7	242.8	-28.4	127.0
Rt Internal/External	Deg	3.5	104.8	-8.2	200.2	3.8	98.1	-6.4	200.3
Right Foot X – Front	G	23.0	77.3	-123.8	78.1	2.2	188.5	-26.3	82.2
Right Foot Y – Front	G	74.1	86.3	-23.1	78.2	18.4	88.1	-3.9	38.0
Right Foot Z – Front	G	78.8	78.4	-98.8	77.4	2.8	18.9	-16.0	90.9
Right Foot - Front Resultant	G	125.8	78.1			29.2	88.5		
Left Upper Tibia Fx	N	220.0	94.5	-209.1	112.9	283.5	61.9	-26.5	156.6
Left Upper Tibia Fy	N	70.6	113.6	-143.1	90.1	76.4	89.2	-206.5	63.2
Left Upper Tibia Fz	N	89.8	98.3	-770.5	39.7	106.6	39.3	-1954.5	86.9
Left Upper Tibia F Resultant	N	771.6	39.7			1956.3	86.9		
Left Upper Tibia Mx	N-m	29.8	128.7	-16.6	298.0	17.8	129.1	-17.7	72.8
Left Upper Tibia My	N-m	22.3	140.8	-70.6	94.2	17.3	137.1	-52.9	80.8
Left Lower Tibia Fx	N	36.3	209.5	-721.7	94.7	92.9	137.4	-347.2	62.0
Left Lower Tibia Fy	N	153.7	90.5	-45.7	202.4	172.7	63.0	-69.2	198.9
Left Lower Tibia Fz	N	44.0	230.6	-1424.2	92.7	75.6	200.3	-2320.5	85.5
Left Lower Tibia F Resultant	N	1580.1	92.7			2332.4	85.5		

DATA SHEET 7 (CONTINUED)
DUMMY INJURY CRITERIA VALUES

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

		Maximum Value							
		Driver				Right Front Passenger			
Description	Unit	Positive	Time, ms	Negative	Time, ms	Positive	Time, ms	Negative	Time, ms
Left Lower Tibia Mx	N-m	28.5	134.5	-8.3	85.4	4.6	138.1	-11.8	68.8
Left Lower Tibia My	N-m	9.7	139.7	-36.5	95.2	7.0	299.8	-38.5	62.5
Left Tibia Mid Shaft X	G	4.9	35.2	-45.8	94.6	3.0	138.0	-30.6	62.3
Left Tibia Mid Shaft Y	G	11.5	90.2	-3.5	113.7	14.5	63.6	-4.6	88.7
Lt Dorsi/Plantar Flexion	Deg	21.3	100.4	-17.3	37.0	-12.2	300.0	-26.7	44.2
Lt Inversion/Eversion	Deg	28.5	136.4	-3.9	254.7	17.2	143.2	-0.9	0.0
Lt Internal/External	Deg	7.0	161.8	-3.7	270.9	-0.9	299.8	-7.0	168.2
Left Foot X – Front	G	3.3	300.0	-29.9	87.7	7.9	44.1	-34.7	65.3
Left Foot Y – Front	G	5.0	70.0	-9.9	103.3	12.7	68.0	-9.7	97.4
Left Foot Z – Front	G	2.8	18.5	-29.8	93.4	3.8	26.7	-26.8	84.8
Left Foot – Front Resultant	G	36.8	88.0			36.1	65.3		
Lap Belt Load	N	5637.9	91.3			3639.1	75.8		
Shoulder Belt Load	N	3864.0	114.5			3775.7	109.3		

		Maximum Value			
		Left Rear Passenger			
Description	Unit	Positive	Time, ms	Negative	Time, ms
Head X	G	31.5	256.3	-33.6	136.2
Head Y	G	2.1	263.6	-7.1	132.8
Head Z	G	48.9	111.0	-1.4	235.3
Head Resultant	G	53.8	111.0		
Upper Neck Fx	N	482.4	256.8	-777.0	134.4
Upper Neck Fy	N	72.7	199.2	-203.4	131.3
Upper Neck Fz	N	1721.1	105.1	-1543.3	262.4
Upper Neck F Resultant	N	1865.4	110.8		
Upper Neck Mx	N-m	15.3	262.2	-7.8	119.6
Upper Neck My	N-m	29.1	260.6	-20.2	95.4
Upper Neck Mz	N-m	5.7	138.1	-3.1	98.4
Upper Neck M Resultant	N-m	32.5	260.9		
Lower Neck Fx	N	109.4	237.0	-1677.1	110.8
Lower Neck Fy	N	64.4	213.9	-567.7	111.7
Lower Neck Fz	N	1339.7	95.1	-1476.4	262.6
Lower Neck F Resultant	N	2040.5	104.9		
Lower Neck Mx	N-m	15.8	203.3	-56.1	126.2
Lower Neck My	N-m	180.5	134.3	-16.3	244.6
Lower Neck Mz	N-m	8.4	152.3	-10.7	115.6
Lower Neck M Resultant	N-m	187.1	134.2		

DATA SHEET 7 (CONTINUED)
DUMMY INJURY CRITERIA VALUES

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

Description	Unit	Maximum Value			
		Left Rear Passenger			
		Positive	Time, ms	Negative	Time, ms
Right Shoulder Fx	N	141.1	117.7	-30.5	200.6
Right Shoulder Fz	N	143.8	116.8	-51.3	265.7
Left Shoulder Fx	N	73.0	209.5	-2434.0	108.3
Left Shoulder Fz	N	1280.5	108.7	-31.4	266.5
Chest X	G	5.2	277.5	-37.1	103.8
Chest Y	G	9.9	106.3	-3.0	112.7
Chest Z	G	13.4	255.9	-13.5	144.3
Chest Resultant	G	37.9	104.0		
Chest Displacement	mm			-25.9	111.4
Upper Sternum X	G	13.2	75.5	-63.2	89.6
Lower Sternum X	G	6.7	85.8	-54.0	90.6
Upper Spine X	G	6.8	277.4	-36.8	104.0
Lower Spine X	G	2.6	266.7	-39.0	95.8
Lumbar Fx	N	1387.1	145.1	-211.3	92.8
Lumbar Fy	N	48.6	272.2	-469.9	95.8
Lumbar Fz	N	580.4	191.2	-388.5	52.3
Lumbar F Resultant	N	1391.0	145.1		
Lumbar Mx	N-m	2.8	244.5	-80.2	98.5
Lumbar My	N-m	18.9	299.0	-22.6	258.0
Lumbar Mz	N-m	16.8	117.5	-3.3	268.8
Lumbar M Resultant	N-m	82.5	98.5		
Pelvis X	G	6.6	155.3	-35.2	97.7
Pelvis Y	G	112.2	122.8	-8.3	73.5
Pelvis Z	G	10.5	256.8	-24.6	110.8
Pelvis Resultant	G	38.8	99.2		
Right Upper Asis Fx	N	189.6	100.8	-190.1	131.7
Right Lower Asis Fx	N	430.9	118.6	-30.6	262.8
Left Upper Asis Fx	N	77.1	93.6	-82.4	150.2
Left Lower Asis Fx	N	292.2	92.0	-6.6	262.2
Shoulder Belt Load	N	5289.6	104.6		
Lap Belt Load	N	3113.6	94.2		

DATA SHEET 8

SUMMARY OF FMVSS 212/ 219 (PARTIAL) DATA

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Windshield Mounting Details:

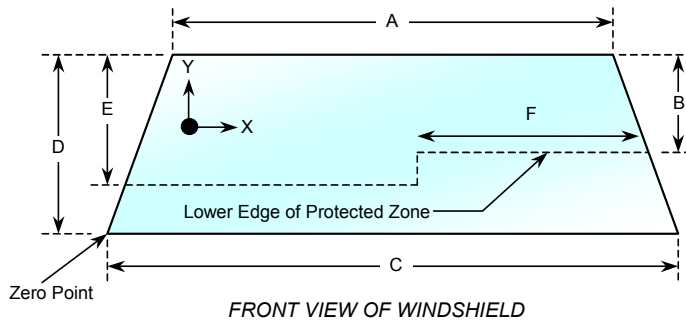
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles, which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2013	1627	80.8
Right Side	2013	2013	100
Total	4026	3640	90.4



Item	Units	Value
A	mm	1098
B	mm	558
C	mm	1338
D	mm	795
E	mm	540
F	mm	453

AREA OF PROTECTED ZONE FAILURES - NONE

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

DATA SHEET 9

FMVSS 301 FUEL SYSTEM INTEGRITY DATA

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

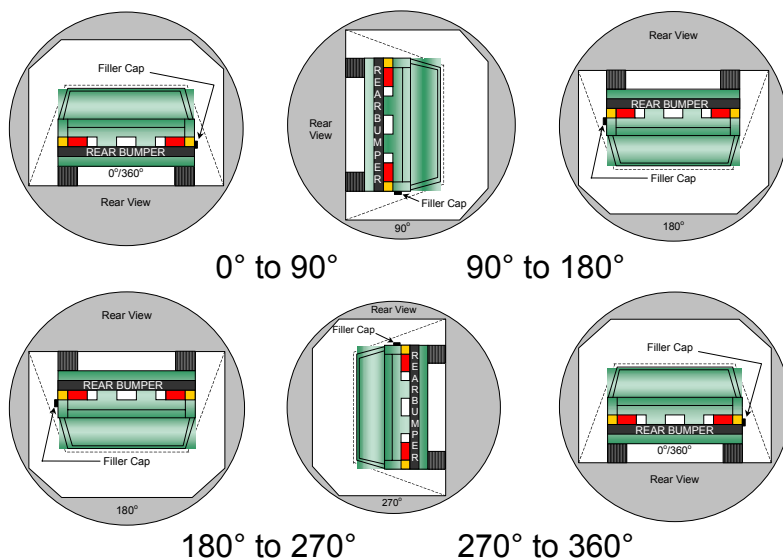
Temperature at Time of Impact: 21° C Test Time: 11:14 am

Stoddard Solvent Spillage Measurements

- A. From impact until vehicle motion ceases: 0 oz.
 (Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0 oz.
 (Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0 oz.
 (Maximum Allowable = 1 oz. /minute)
- D. Spillage: None

FMVSS 301 STATIC ROLLOVER DATA

NOT PERFORMED



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage locations:

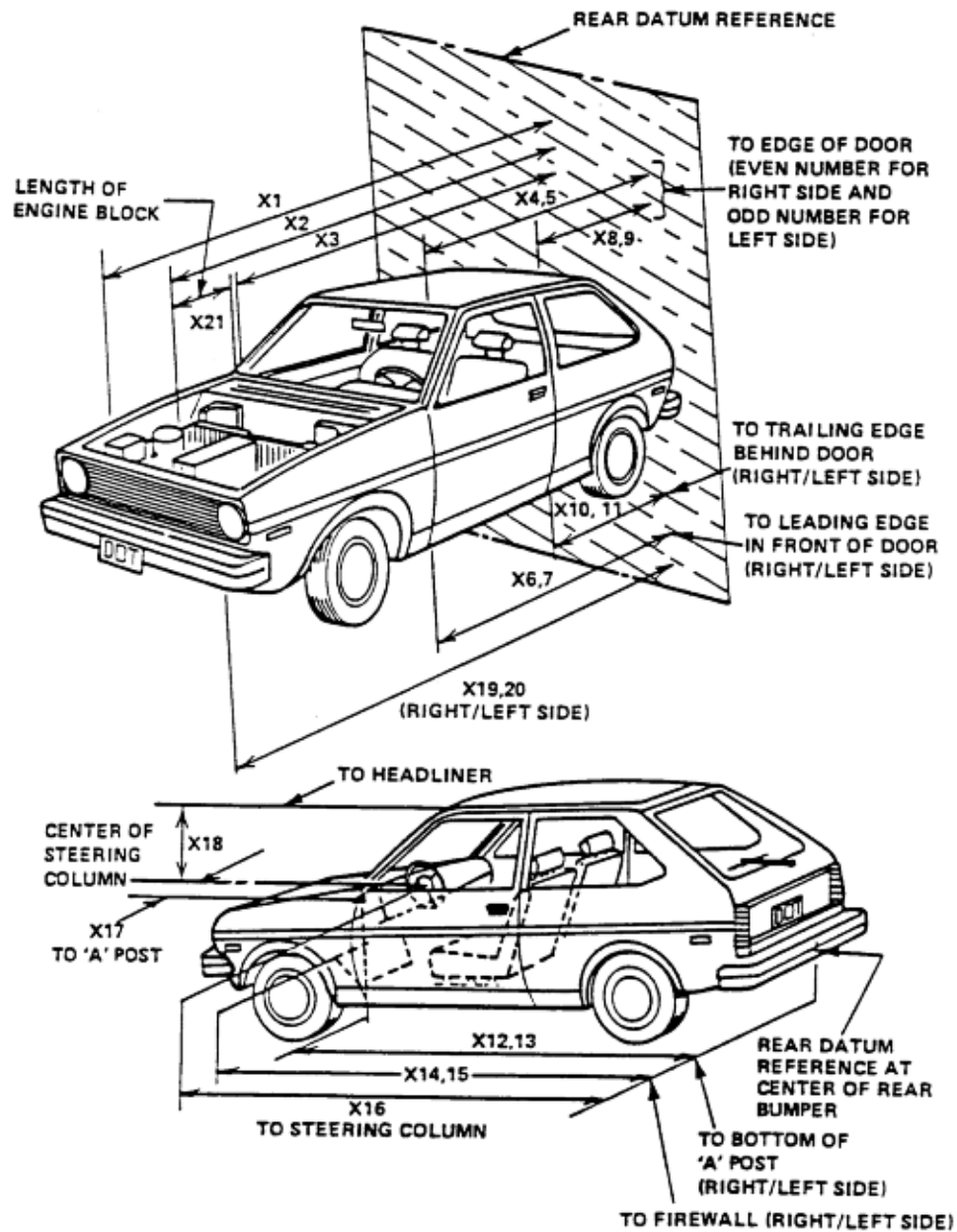
Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	N/A		
90° to 180°	N/A		
180° to 270°	N/A		
270° to 360°	N/A		

DATA SHEET 10

TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008



DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

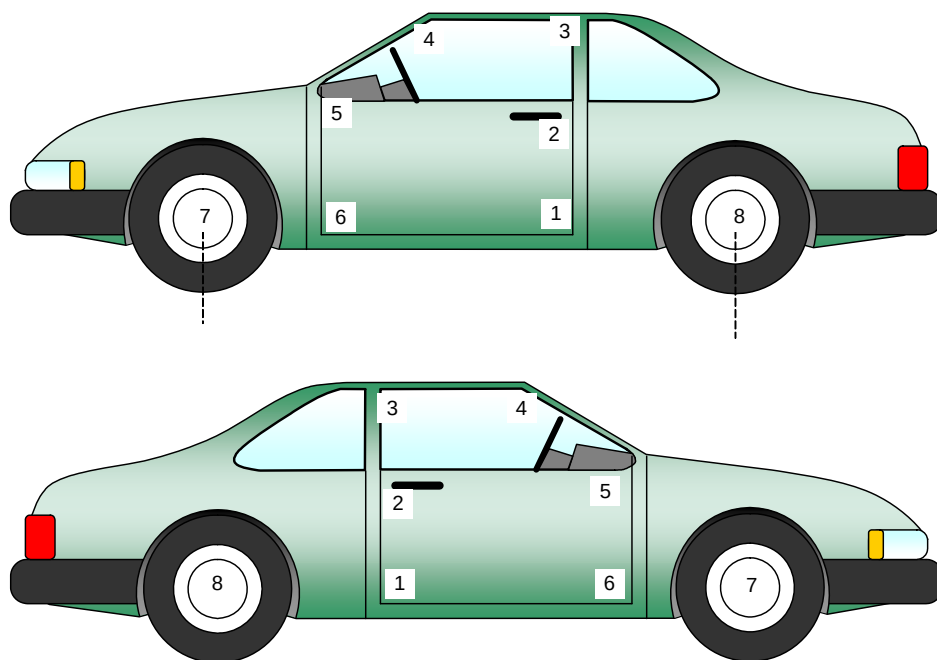
NHTSA No.: R80173
Test Date: 1/31/2008

No.	Measurement Description	Pre-Test (mm)	Post-Test (mm)	Difference (mm)
1	Total length of vehicle at centerline	4280	3869	411
2	RSOV to front of engine	3807	3633	174
3	RSOV to firewall centerline	3419	3339	80
4	RSOV to leading edge of right door	3034	3042	-8
5	RSOV to leading edge of left door	3031	2982	49
6	RSOV to lower leading edge of right door	2999	2984	15
7	RSOV to lower leading edge of left door	2999	2962	37
8	RSOV to upper leading edge of right door	1921	1932	-11
9	RSOV to upper leading edge of left door	1913	1899	14
10	RSOV to lower trailing edge of right door	1969	1948	21
11	RSOV to lower trailing edge of left door	1962	1926	36
12	RSOV to bottom of right 'A' pillar	3001	2985	16
13	RSOV to bottom of left 'A' pillar	3000	2960	40
14	RSOV to firewall on right side	3380	3398	-18
15	RSOV to firewall on left side	3372	3242	130
16	RSOV to steering column	2585	2519	66
17	Center of steering column to left 'A' pillar	360	432	-72
18	Center of steering column to headlining	403	483	-80
19	RSOV to right side of front bumper	4160	4140	20
20	RSOV to left side of front bumper	4162	3571	591
21	Length of engine block	229	229	0
RD	RSOV to right side of dash panel	2748	2738	10
CD	RSOV to center of dash panel	2740	2710	30
LD	RSOV to left side of dash panel	2737	2692	45

DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008



LEFT FRONT

Point Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2174	-703	232	2145	-722	281	-29	19	-49
2	1990	-696	-375	1981	-695	-332	-9	-1	-43
3	1911	-548	-765	1920	-533	-719	9	-15	-46
4	2507	-590	-687	2507	-579	-770	0	-11	83
5	3000	-680	-355	2929	-692	-346	-71	12	-9
6	2909	-707	270	2875	-709	290	-34	2	-20
7	3475	-791	348	3295	-822	290	-180	31	58
8	995	-788	353	971	-778	397	-24	-10	-44

RIGHT FRONT

Point Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2172	708	236	2169	701	243	-3	7	-7
2	1987	702	-371	1986	698	-367	-1	4	-4
3	1908	556	-765	1909	555	-760	1	1	-5
4	2516	601	-682	2516	598	-678	0	3	-4
5	2991	688	-371	2991	678	-363	0	10	-8
6	2905	712	272	2901	697	280	-4	15	-8
7	3472	799	351	3529	758	358	57	41	-7
8	993	786	363	994	796	408	1	-10	-45

DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

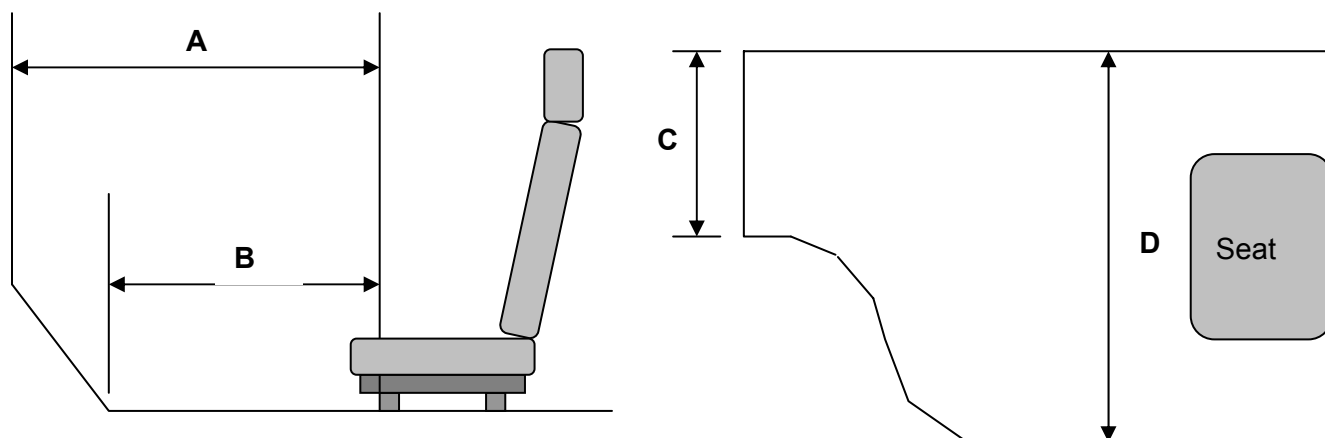
NHTSA No.: R80173
 Test Date: 1/31/2008

	Elements	Pre-Test (mm)
1	Total Length	4280
2	Total Width	1691
3	Bumper Top Height	542
4	Bumper Bottom Height	430
5	Longitudinal Member Top Height	534
6	Distance between Longitudinal Members	884
7	Longitudinal Member Width	76
8	Engine Top Height	801
9	Engine Bottom Height	206
10	Engine and gearbox width	794
11	Front bumper-engine distance	311
12	Front shock absorber fixing height	856
13	Bonnet leading edge height	770
14	Front shock absorber fixing width	1106
15	Front bumper – front axle distance	729
16	Front axle – a pillar distance	389
17	A-pillar – B-pillar distance	1101
18	B-Pillar – rear axle distance	992
19	B-pillar – C-pillar distance	604
20	Roof sill bottom height	1316
21	Roof sill top height	1464
22	Floor sill bottom height	198
23	Floor sill top height	349

DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008



DRIVER

Measurements	Pre-Test (mm)	Post-Test (mm)	Difference (mm)
A	734	658	76
B	542	528	14
C	387	310	77
D	536	533	3

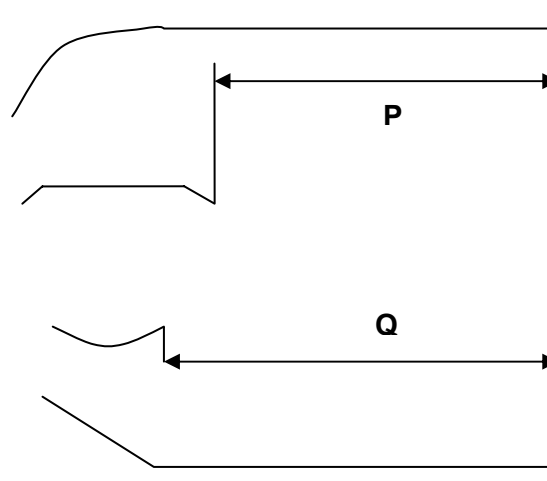
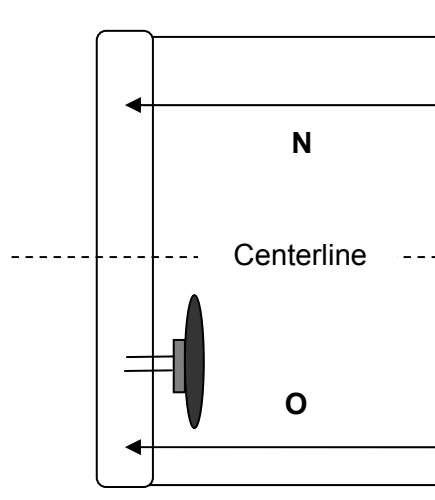
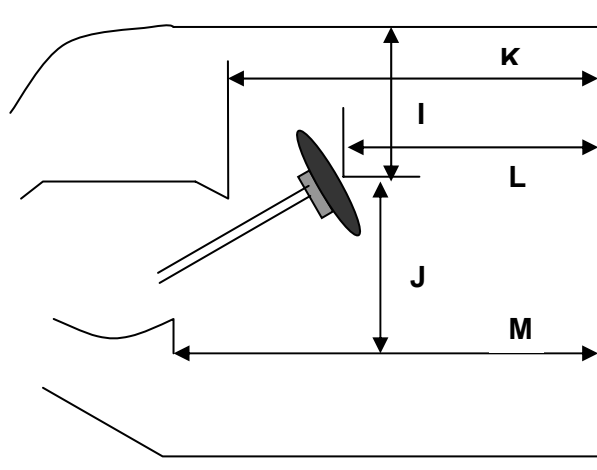
LEFT FRONT PASSENGER

Measurements	Pre-Test (mm)	Post-Test (mm)	Difference (mm)
A	727	717	10
B	556	539	17
C	401	396	5
D	535	526	9

DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008



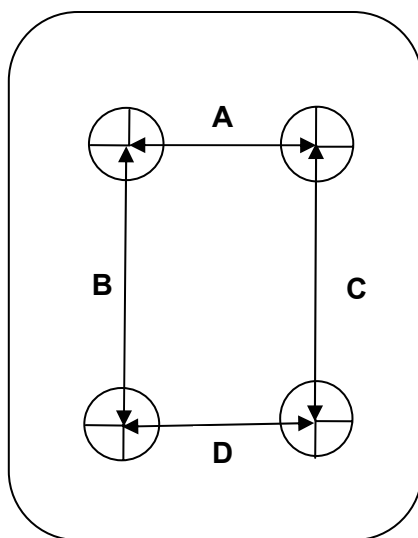
Measurements	Pre-Test (mm)	Post-Test (mm)	Difference (mm)
I	402	479	-77
J	702	721	-19
K	1490	1404	86
L	1255	1165	90
M	1443	1367	76
N	1918	1893	25
O	1926	1840	86
P= K (PASS)	1544	1520	24
Q= M (PASS)	1423	1398	25

Measurements from C-Pillar Belt Anchorage

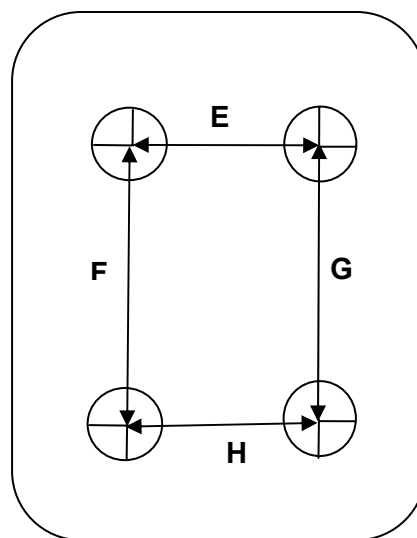
DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008



Driver



Passenger

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test (mm)	Post-Test (mm)	Difference (mm)
A	329	334	-5
B	308	306	2
C	316	323	-7
D	326	336	-10
E	327	335	-8
F	322	322	0
G	310	310	0
H	345	338	7

DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

	Points	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
		X	Y	Z	X	Y	Z	X	Y	Z
Lower Bumper Beam	1	4104	-622	184	3510	-593	185	-594	-29	-1
	2	4207	-371	187	3684	-387	197	-523	16	-10
	3	4226	-118	188	3808	-199	178	-418	81	10
	4	4224	128	192	3954	-2	176	-270	130	16
	5	4203	384	191	4093	213	176	-110	171	15
	6	4098	636	189	4163	477	167	65	159	22
Upper Bumper Beam	1	4104	-622	79	3533	-611	74	-571	11	5
	2	4207	-371	81	3717	-415	67	-490	44	14
	3	4228	-118	84	3806	-198	60	-422	80	24
	4	4227	132	85	3964	-5	65	-263	137	20
	5	4205	383	85	4103	208	69	-102	175	16
	6	4099	635	85	4173	471	63	74	164	22
Upper Radiator Support	1	3827	-655	-205	3604	-620	-274	-223	-35	69
	2	4086	-374	-145	3642	-353	-126	-444	-21	-19
	3	4113	-119	-138	3761	-143	-119	-352	24	-19
	4	4112	131	-136	3909	57	-144	-203	74	8
	5	4082	391	-143	4017	293	-168	-65	98	25
	6	3822	668	-201	3817	615	-207	-5	53	6
Front of Hood	1	3885	-656	-216	3666	-699	-295	-219	43	79
	2	4182	-674	-105	3688	-385	-55	-494	-289	-50
	3	4144	-119	-178	3776	-163	-149	-368	44	-29
	4	4144	121	-177	3923	24	-169	-221	97	-8
	5	4184	382	-102	4101	238	-140	-83	144	38
	6	3887	667	-212	3882	574	-275	-5	93	63

Reference Photos on the Following Page

DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008



Lower Bumper Beam / Upper Bumper Beam / Front of Hood



Upper Radiator Support

DATA SHEET 10 (CONTINUED) **TEST VEHICLE MEASUREMENTS**

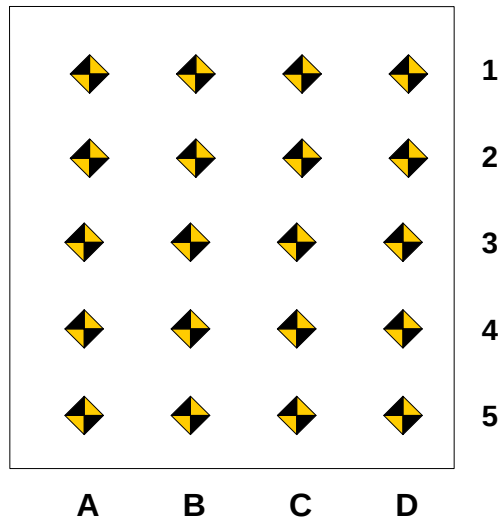
Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3, 4, and 5 are located on the most level portion of the floor pan.

Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.



DRIVER'S SIDE TOE PAN FLOOR BOARD

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	3138	-557	276	3066	-557	274	-72	0	2
B1	3165	-431	276	3087	-438	264	-78	7	12
C1	3185	-308	276	3130	-320	277	-55	12	-1
D1	3191	-181	277	3137	-199	276	-54	18	1
A2	3116	-558	333	3065	-564	335	-51	6	-2
B2	3107	-432	331	3053	-440	336	-54	8	-5
C2	3113	-309	332	3076	-319	349	-37	10	-17
D2	3122	-180	330	3082	-192	341	-40	12	-11
A3	3033	-557	383	3002	-567	400	-31	10	-17
B3	3033	-433	387	3005	-443	412	-28	10	-25
C3	3034	-308	386	3008	-316	415	-26	8	-29
D3	3032	-180	387	3008	-188	412	-24	8	-25
A4	2931	-558	383	2903	-566	417	-28	8	-34
B4	2931	-432	387	2905	-441	420	-26	9	-33
C4	2932	-304	388	2907	-312	414	-25	8	-26
D4	2930	-180	387	2907	-187	412	-23	7	-25
A5	2831	-558	386	2804	-566	424	-27	8	-38
B5	2833	-429	388	2808	-437	434	-25	8	-46
C5	2831	-306	389	2807	-315	427	-24	9	-38
D5	2831	-181	389	2808	-189	415	-23	8	-26
Brake Pedal	3023	-280	209	2961	-297	209	-62	17	0
IP Left	2750	-474	-163	2688	-469	-154	-62	-5	-9
IP Right	2725	-176	-147	2684	-173	-133	-41	-3	-14
Steering Column	2581	-325	-326	2520	-322	-312	-61	-3	-14
Front Outboard Bolt	2498	-563	281	2470	-575	335	-28	12	-54

DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Driver's Side Toe Pan Floor Board
Additional Measurements

Points	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
1	3054	-628	67	2964	-646	73	-90	18	-6
2	3096	-605	71	2998	-613	75	-98	8	-4
3	3127	-567	79	3016	-567	81	-111	0	-2
4	3156	-525	86	3032	-519	85	-124	-6	1
5	3183	-485	92	3048	-472	89	-135	-13	3
6	3212	-444	98	3072	-426	91	-140	-18	7
7	3241	-403	103	3104	-389	91	-137	-14	12
8	3051	-630	125	2961	-644	131	-90	14	-6
9	3092	-608	132	2996	-613	136	-96	5	-4
10	3124	-572	142	3017	-569	143	-107	-3	-1
11	3151	-532	153	3035	-523	153	-116	-9	0
12	3179	-492	165	3055	-478	160	-124	-14	5
13	3206	-453	174	3080	-435	166	-126	-18	8
14	3234	-412	185	3114	-398	172	-120	-14	13
15	3110	-606	220	3028	-608	225	-82	2	-5
16	3153	-528	225	3056	-522	225	-97	-6	0
17	3262	-315	87	3153	-314	72	-109	-1	15
18	3261	-218	81	3177	-225	66	-84	7	15
19	3248	-311	222	3168	-326	208	-80	15	14
20	3235	-184	226	3173	-203	216	-62	19	10
21	3100	-405	120	2975	-374	94	-125	-31	26
22	3040	-413	188	2908	-363	156	-132	-50	32
23	3007	-413	225	2871	-353	189	-136	-60	36
24	3092	-247	132	3028	-264	131	-64	17	1
25	3040	-282	188	2977	-299	187	-63	17	1
26	3014	-282	231	2951	-300	231	-63	18	0
27	3172	-129	171	3114	-141	168	-58	12	3
28	3100	-167	191	3040	-171	196	-60	4	-5
29	3043	-167	249	2990	-169	259	-53	2	-10
30	3139	-501	310	3084	-504	303	-55	3	7
31	3141	-371	305	3082	-377	306	-59	6	-1
32	3149	-243	299	3101	-254	304	-48	11	-5
33	3071	-488	358	3035	-498	369	-36	10	-11
34	3069	-370	360	3036	-378	383	-33	8	-23
35	3073	-248	357	3042	-256	379	-31	8	-22
36	2982	-497	379	2953	-506	410	-29	9	-31
37	2978	-367	380	2952	-375	416	-26	8	-36
38	2978	-244	380	2952	-253	405	-26	9	-25
39	2876	-494	376	2848	-502	414	-28	8	-38
40	2879	-367	379	2854	-375	423	-25	8	-44

DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Driver's Side Toe Pan Floor Board
Additional Measurements (Continued)

Points	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
41	2878	-243	380	2854	-250	408	-24	7	-28
42	2730	-557	386	2702	-566	426	-28	9	-40
43	2729	-432	391	2703	-440	438	-26	8	-47
44	2727	-305	389	2703	-312	429	-24	7	-40
45	2728	-180	386	2705	-188	415	-23	8	-29
46	2628	-556	385	2600	-565	431	-28	9	-46
47	2628	-432	388	2604	-440	431	-24	8	-43
48	2626	-306	389	2602	-312	428	-24	6	-39
49	2629	-180	385	2606	-187	417	-23	7	-32
50	2527	-558	370	2499	-564	415	-28	6	-45
51	2526	-431	370	2502	-438	412	-24	7	-42
52	2527	-306	372	2504	-313	407	-23	7	-35
53	2526	-181	371	2503	-189	398	-23	8	-27
54	3077	-118	339	3053	-126	366	-24	8	-27
55	2982	-117	344	2960	-125	369	-22	8	-25
56	2887	-120	341	2863	-128	367	-24	8	-26
57	2793	-119	344	2770	-127	371	-23	8	-27
58	2698	-118	342	2676	-135	366	-22	17	-24
59	2603	-117	337	2580	-128	362	-23	11	-25
60	3075	-642	330	3038	-659	338	-37	17	-8
61	2978	-641	332	2948	-646	349	-30	5	-17
62	2885	-641	334	2854	-645	354	-31	4	-20
63	2788	-641	331	2758	-645	357	-30	4	-26
64	2693	-641	333	2661	-647	364	-32	6	-31
65	2597	-641	329	2566	-647	368	-31	6	-39



DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

Driver's Side Toe Pan Floor Board



DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

Driver's Side Toe Pan Floor Board



DATA SHEET 10 (CONTINUED)
TEST VEHICLE MEASUREMENTS

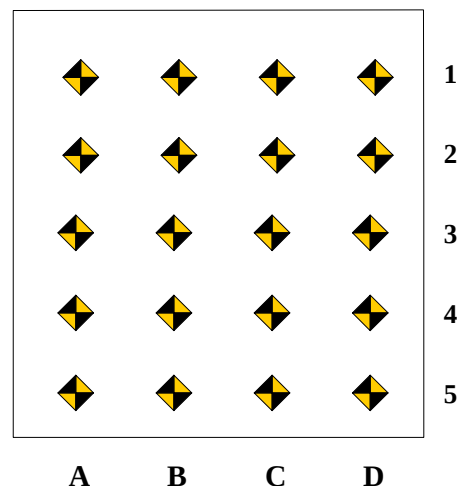
Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3, 4, and 5 are located on the most level portion of the floor pan.

Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.



PASSENGER'S SIDE TOE PAN FLOOR BOARD

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	3188	183	276	3169	162	282	-19	21	-6
B1	3180	306	278	3166	287	284	-14	19	-6
C1	3169	431	278	3158	411	284	-11	20	-6
D1	3140	558	277	3133	538	284	-7	20	-7
A2	3117	180	332	3101	162	340	-16	18	-8
B2	3110	305	332	3097	287	342	-13	18	-10
C2	3105	432	330	3095	413	339	-10	19	-9
D2	3116	560	333	3108	541	340	-8	19	-7
A3	3016	182	386	3003	165	399	-13	17	-13
B3	3027	310	385	3016	294	397	-11	16	-12
C3	3029	431	385	3020	414	395	-9	17	-10
D3	3037	555	383	3030	538	392	-7	17	-9
A4	2936	177	384	2923	163	401	-13	14	-17
B4	2934	304	386	2924	289	400	-10	15	-14
C4	2931	432	385	2923	416	397	-8	16	-12
D4	2930	560	384	2925	544	394	-5	16	-10
A5	2833	180	386	2820	168	407	-13	12	-21
B5	2833	304	387	2823	291	403	-10	13	-16
C5	2832	430	386	2824	415	398	-8	15	-12
D5	2830	558	386	2825	544	396	-5	14	-10
Front Outboard Bolt	2724	185	-145	2702	188	-133	-22	-3	-12
IP Left	2749	484	-158	2742	486	-148	-7	-2	-10
IP Right	2496	566	282	2490	556	291	-6	10	-9

DATA SHEET 11
PHOTOGRAPHIC DATA

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

No.	Camera View	Location (mm) *			Lens (mm)	Angle (deg)	Shutter (µs)	Speed (fps)
		X	Y	Z				
1	Left Front Half	625	-5060	1075	24	2.9	500	1000
2	Left Closeup	1040	-6610	1485	35	3.0	100	1000
3	Left SWC Bottom	350	-6320	800	50	1.0	100	1000
4	Left Angle 1	4251	-5460	1420	25	2.2	150	1000
5	Left Angle 2	5960	-5090	2030	50	8.3	100	1000
6	Left Overall	1710	-7325	1145	19	2.3	700	1000
7	Right Front Half	365	5420	1080	24	3.5	325	1000
8	Right Closeup	1230	5950	1640	35	3.5	300	1000
9	Right Angle 1	3940	5555	1615	25	2.1	325	1000
10	Right Angle 2	5830	4990	2050	50	7.7	250	1000
11	Windshield	-2285	0	2770	12.5	37.9	275	1000
12	Overhead Closeup	-360	-250	4440	50	90.0	200	1000
13	Overhead Overall	490	0	4630	14	90.0	600	1000
14	Pit Front	5	0	-3150	24	90.0	375	1000
15	Pit Rear	2165	0	-3150	24	90.0	700	1000
16	Onboard Passenger **				8	21.6	1000	1000
17	Onboard Driver Footwell				6.5	5.2	1000	1000
18	Real-Time Camera				13			24

*COORDINATES:

+X = forward of impact plane
+Y = right of monorail centerline
+Z = above ground level

** Camera did not run.

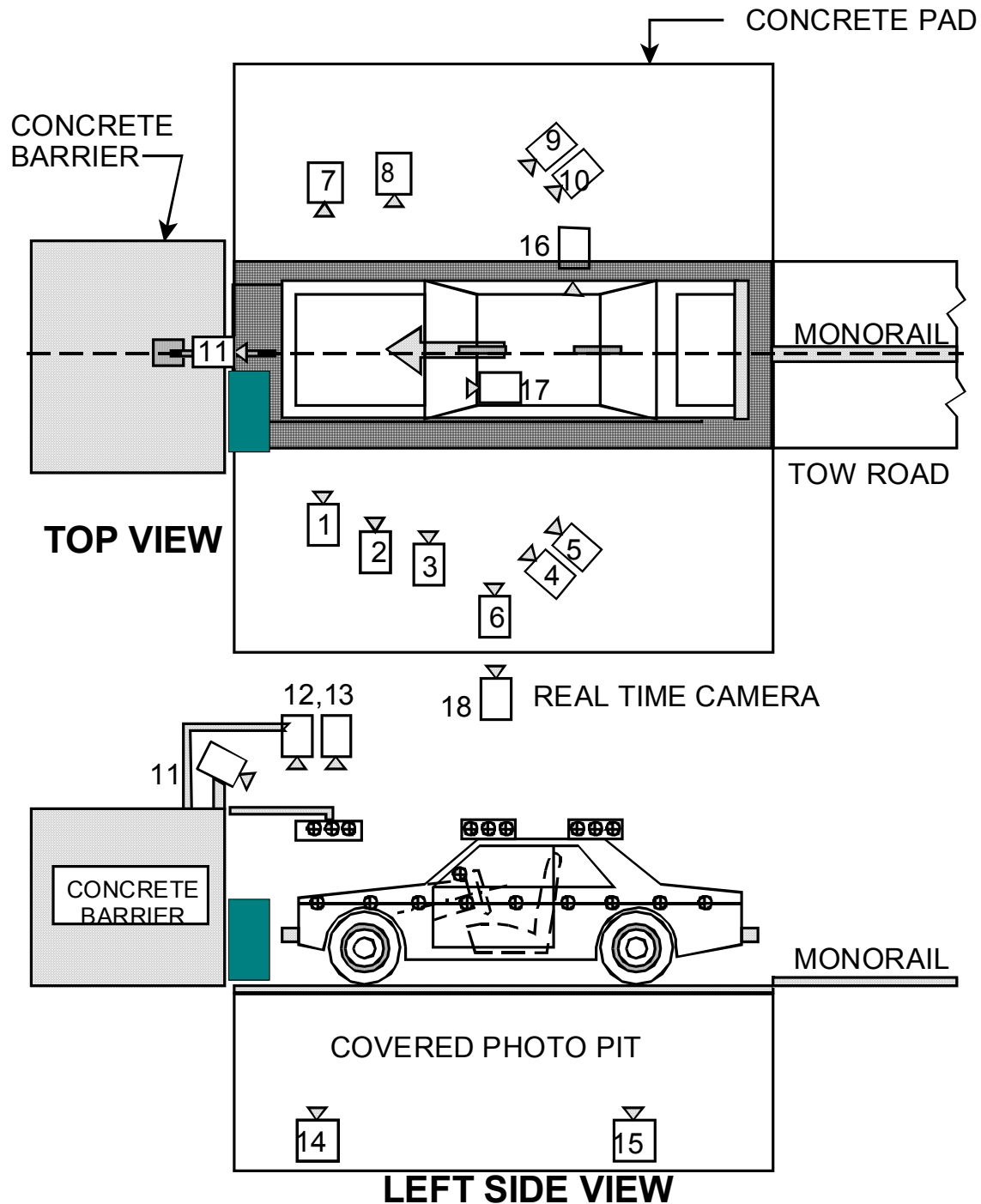
DATA SHEET 11 (CONTINUED)

PHOTOGRAPHIC DATA

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET 12

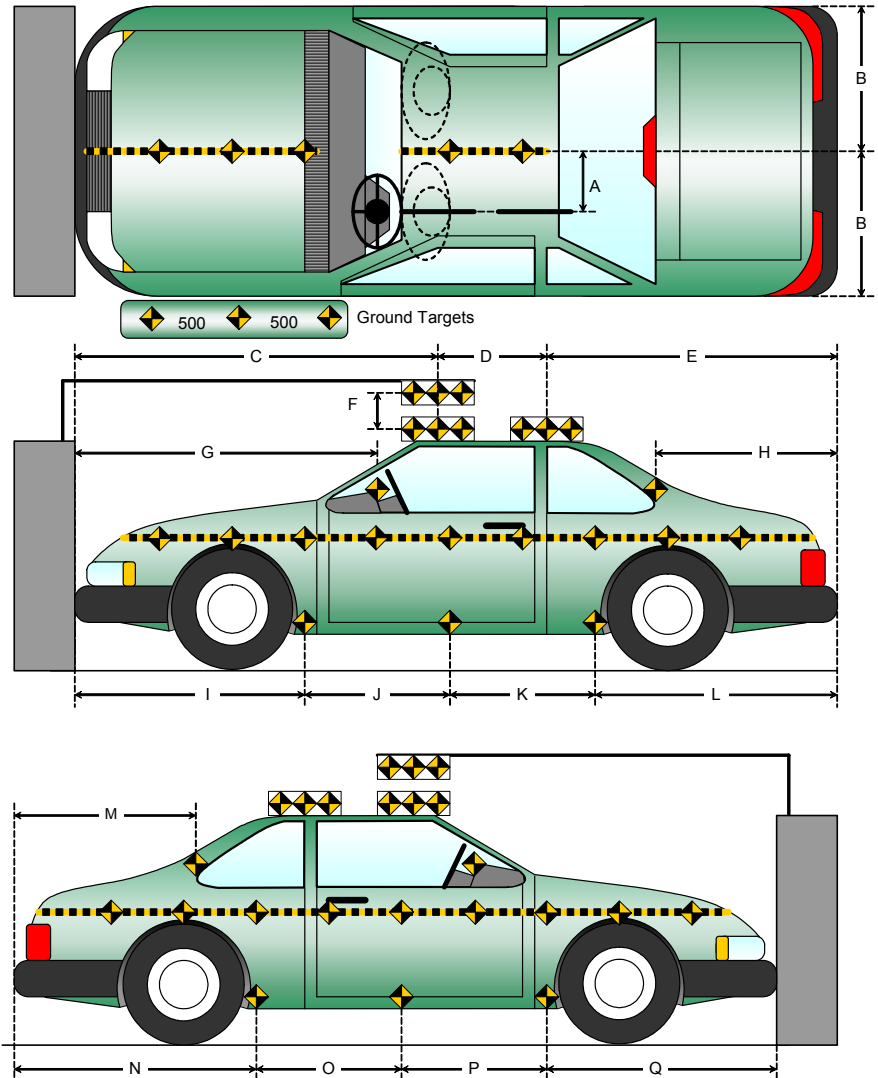
VEHICLE REFERENCE PHOTO TARGET LOCATIONS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

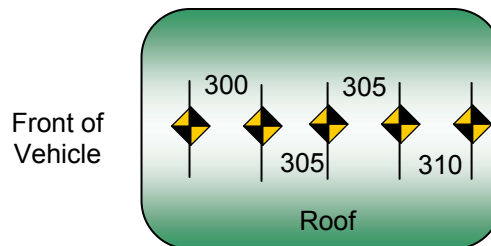
NHTSA No.: R80173
 Test Date: 1/31/2008

Measurement from roof to overhead cameras: 3035 mm

Item	Value
A	360
B	846
C	2265
D	610
E	1405
F	
G	
H	849
I	1223
J	852
K	851
L	1354
M	864
N	1357
O	850
P	850
Q	1223



Measurement of roof targets:



DATA SHEET 13
DATA SHEET 13
POST TEST AIR BAG DATA

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

Air Bag Data	Driver	Right Front Passenger
Number of Vent Holes	2	2
Size of Vent Holes	40 mm diameter	50 mm diameter
Shape of Vent Holes	Round	Rectangle
Total Vent Area	2513 mm ²	3927 mm ²
Length of Deflated Airbag (if square)		650 mm
Width of Deflated Airbag (if square)		485 mm
Diameter of Deflated Airbag (if round)	660 mm	
Is Airbag Tethered?	Yes	Yes
Length of Tethers	240 mm	440 mm
		410 mm

Driver Airbag Part Numbers: 96654846704260122
 AS7FV1D5E
 608837F2H017

Passenger Airbag Part Numbers: 96654871704240150
 BS7HL1HWK
 6088256XH045

DATA SHEET 14

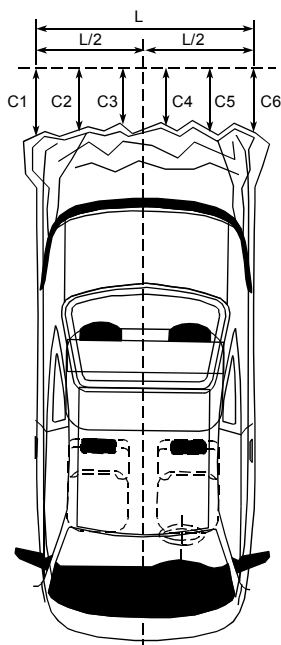
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

CRUSH DEPTH DIMENSIONS

No.	Measurement Description	Pre-Test (mm)	Post-Test (mm)	Difference (mm)
C1	Crush zone 1 at left side	4162	3571	591
C2	Crush zone 2 at left side	4237	3696	541
C3	Crush zone 3 at left side	4275	3756	519
C4	Crush zone 4 at right side	4275	3985	290
C5	Crush zone 5 at right side	4236	4084	152
C6	Crush zone 6 at right side	4160	4140	20
L	C1 TO C6	1170	1161	9

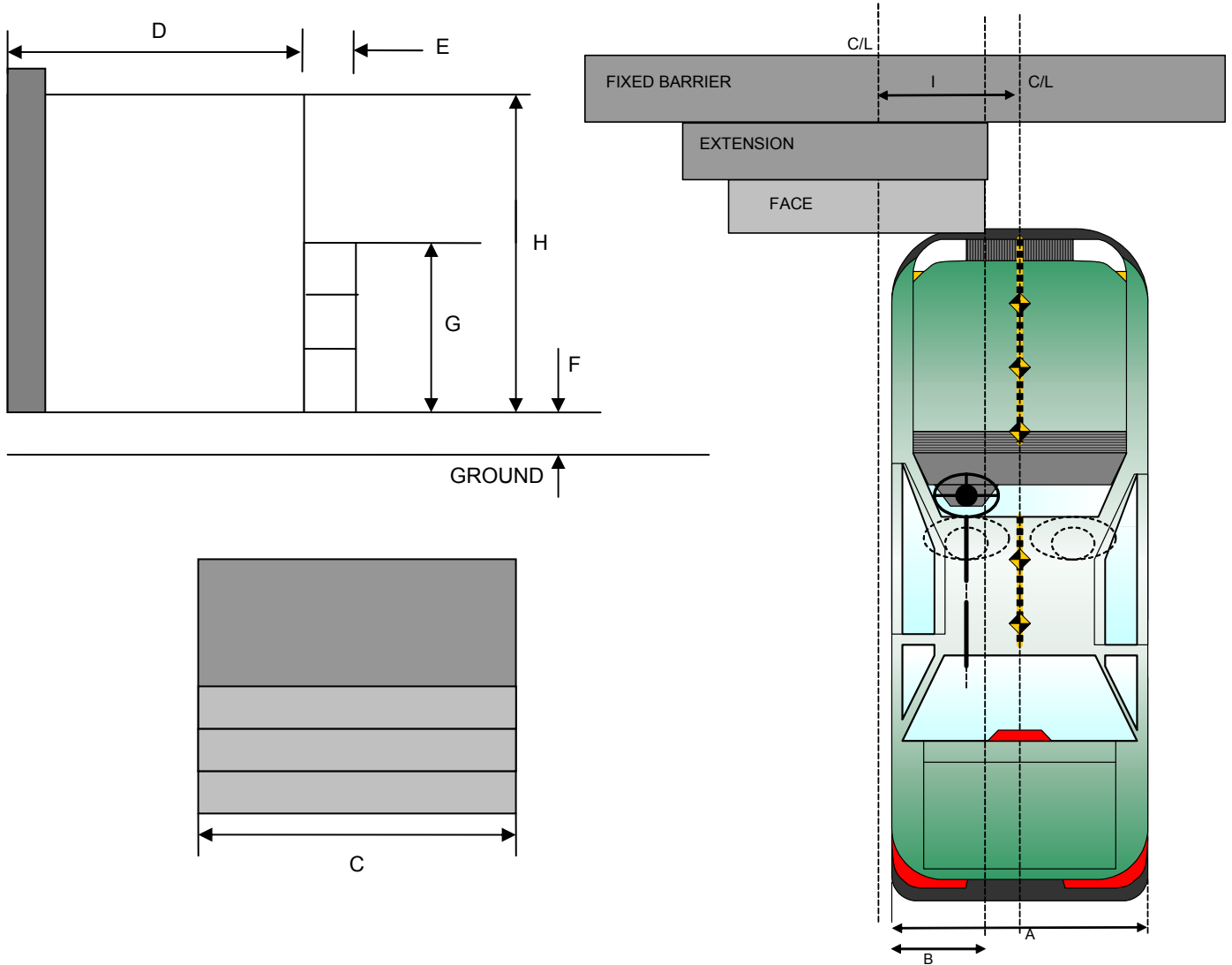


DATA SHEET 15

OFFSET BARRIER AND VEHICLE ORIENTATION

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008



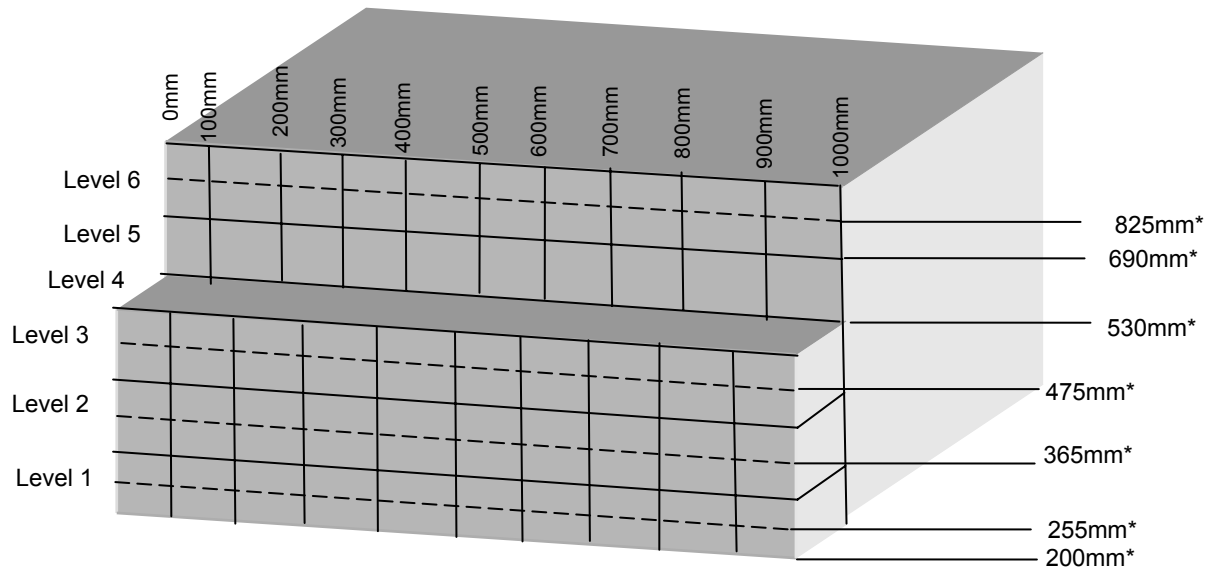
Location	Description	Measurement (mm)
A	Total Vehicle Width	1691
B	40% Overlap Distance	169
C	Deformable Face Width	1000
D	Single Stage Honeycomb Depth	450
E	Bumper Element Depth	90
F	Lower Edge Height From Ground	199
G	Bumper Element Height	330
H	Deformable Barrier Honeycomb Height	650
I	Offset Distance	669

DATA SHEET 16

DEFORMABLE BARRIER HONEYCOMB CRUSH

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008



*Measurement to Ground

	Points (mm)	Pre-Test (mm)	Post-Test (mm)	Difference (mm)
255 mm	0	539	537	2
	100	539	494	45
	200	539	450	89
	300	539	410	129
	400	539	380	159
	500	539	354	185
	600	539	322	217
	700	539	280	259
	800	539	235	304
	900	539	189	350
	1000	539	134	405
365 mm	0	540	579	-39
	100	540	512	28
	200	539	447	92
	300	539	379	160
	400	539	373	166
	500	539	345	194
	600	539	302	237
	700	539	248	291
	800	539	196	343
	900	540	149	391
	1000	540	91	449

DATA SHEET 16 (CONTINUED)
DEFORMABLE BARRIER HONEYCOMB CRUSH

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
 Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
 Test Date: 1/31/2008

	Points (mm)	Pre-Test (mm)	Post-Test (mm)	Difference (mm)
475 mm	0	540	613	-73
	100	540	538	2
	200	540	463	77
	300	540	396	144
	400	540	370	170
	500	540	321	219
	600	540	262	278
	700	540	200	340
	800	540	150	390
	900	540	99	441
	1000	540	42	498
530 mm	0	451	465	-14
	100	450	443	7
	200	450	408	42
	300	450	356	94
	400	450	310	140
	500	450	264	186
	600	450	201	249
	700	450	126	324
	800	450	78	372
	900	451	55	396
	1000	450	35	415
690 mm	0	451	487	-36
	100	451	465	-14
	200	451	442	9
	300	451	413	38
	400	451	370	81
	500	451	293	158
	600	451	225	226
	700	451	178	273
	800	451	139	312
	900	451	120	331
	1000	451	64	387
825 mm	0	452	504	-52
	100	452	480	-28
	200	452	443	9
	300	452	385	67
	400	452	339	113
	500	452	274	178
	600	452	236	216
	700	452	203	249
	800	451	172	279
	900	451	142	309
	1000	451	102	349

DATA SHEET 17

DEFORMABLE BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2008 Chevrolet Aveo LS 4-Door
Test Program: Left 40% Offset Deformable Barrier

NHTSA No.: R80173
Test Date: 1/31/2008

Row One

1	11	21	31	41	51	61	71	81
2	12	22	32	42	52	62	72	82
3	13	23	33	43	53	63	73	83
4	14	24	34	44	54	64	74	84
5	15	25	35	45	55	65	75	85
6	16	26	36	46	56	66	76	86
7	17	27	37	47	57	67	77	87
8	18	28	38	48	58	68	78	88
9	19	29	39	49	59	69	79	89
Row Ten	10	20	30	40	50	60	70	90

Track C/L

90 Load Cells
10 Rows
9 Columns

Front View

Load Cells measure 123 mm square and have a 1.5 mm gap.
Distance from LCB to ground measures 125 mm

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PHOTOGRAPHS

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Manufacturer's Label



Tire Placard



Left Front $\frac{3}{4}$ View, As Received



Right Rear $\frac{3}{4}$ View, As Received



Pre-Test Front View



Post-Test Front View



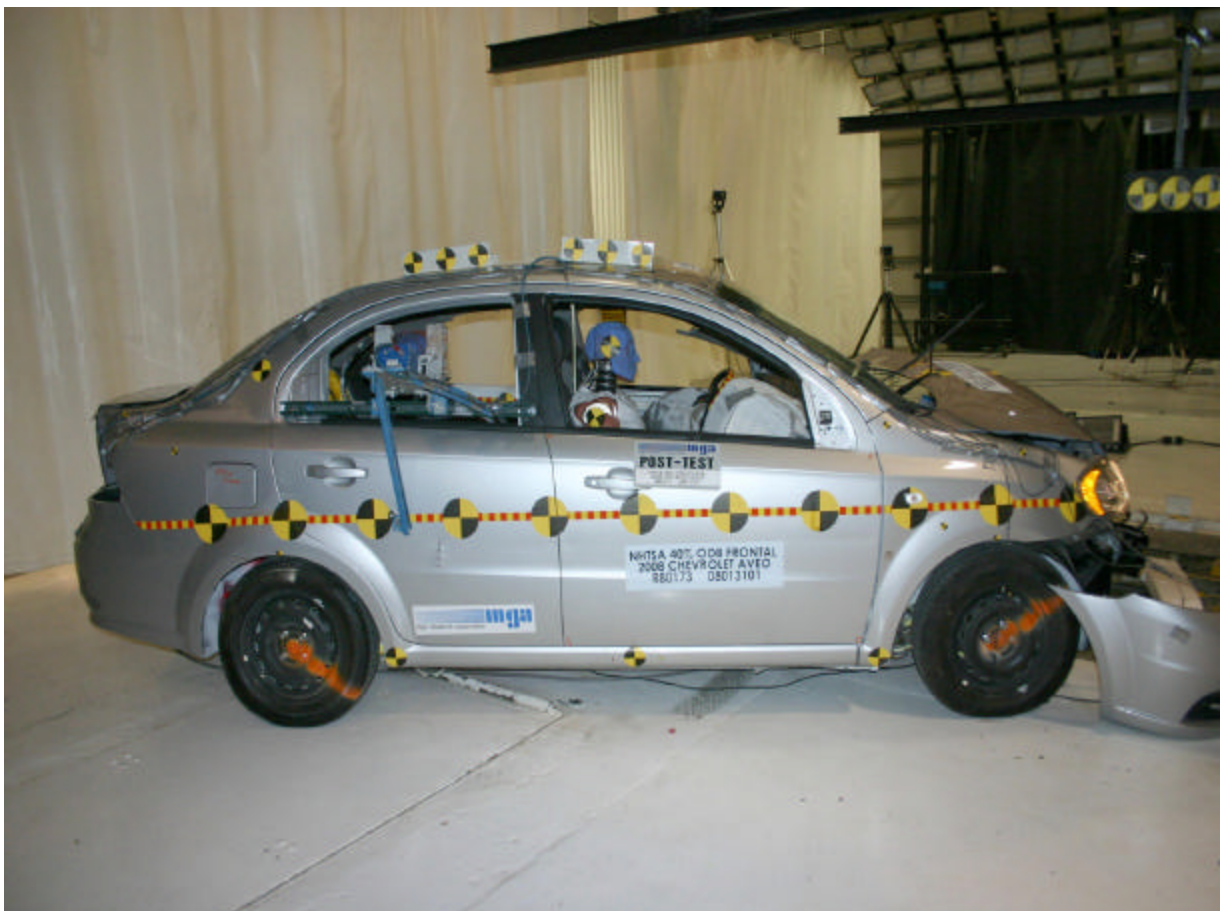
Pre-Test Left Side View



Post-Test Left Side View



Pre-Test Right Side View



Post-Test Right Side View

Pre-Test Right Front $\frac{3}{4}$ View

Post-Test Right Front $\frac{3}{4}$ View



Pre-Test Left Front $\frac{3}{4}$ View



Post-Test Left Front $\frac{3}{4}$ View



Pre-Test Left Rear $\frac{3}{4}$ View



Post-Test Left Rear $\frac{3}{4}$ View



Pre-Test Left Side $\frac{3}{4}$ View of Doors



Post-Test Left Side $\frac{3}{4}$ View of Doors After Impact



Pre-Test Right Side $\frac{3}{4}$ View of Doors



Post-Test Right Side $\frac{3}{4}$ View of Doors After Impact



Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



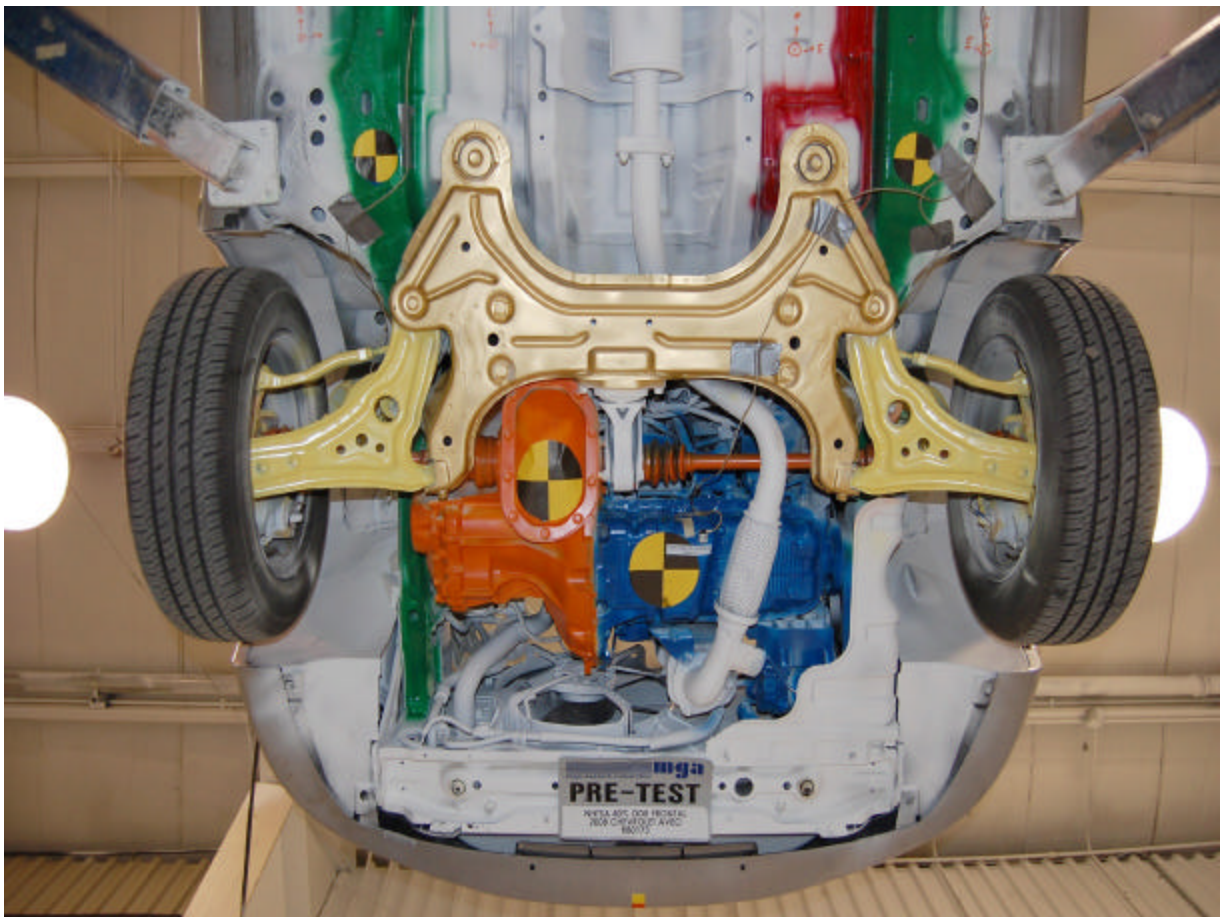
Post-Test Engine Compartment View



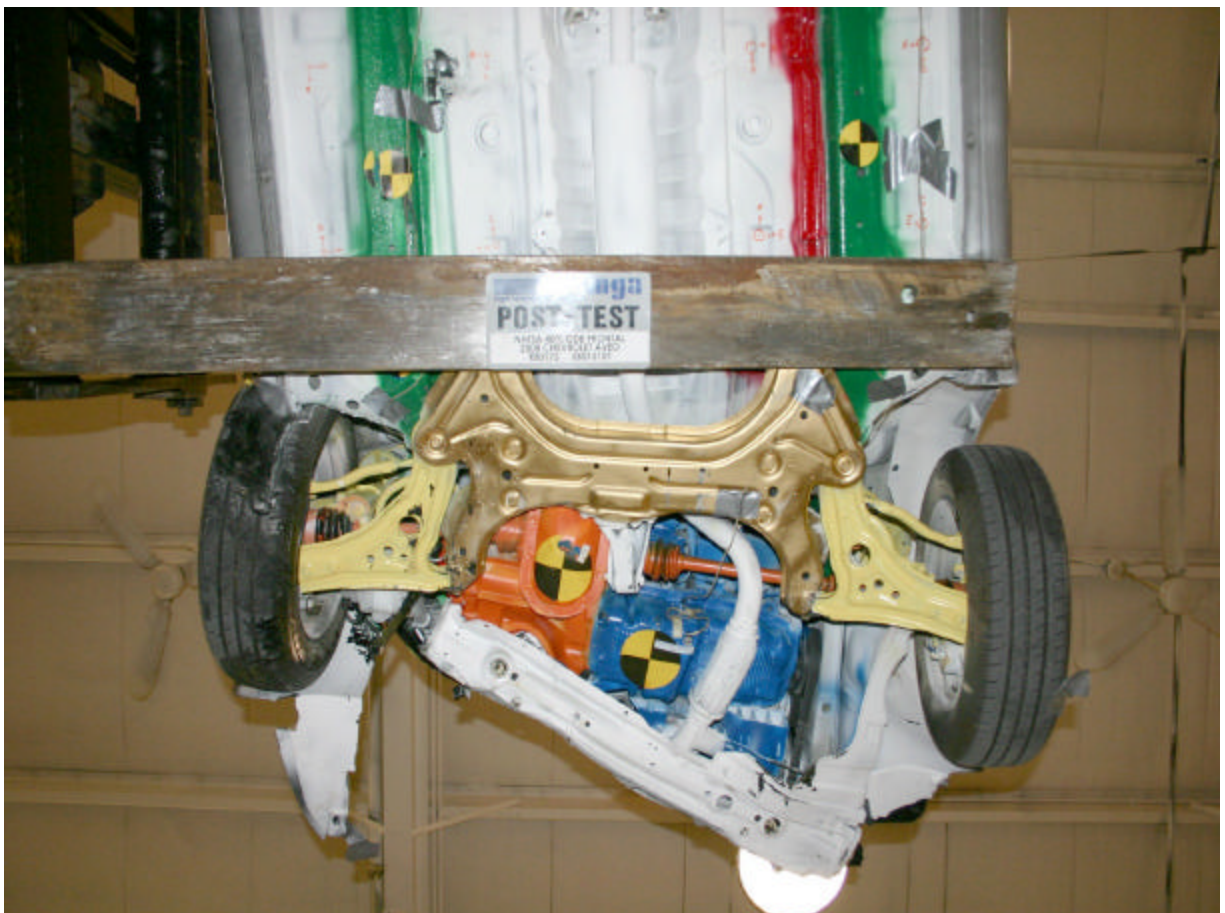
Pre-Test Fuel Cap View



Post-Test Fuel Cap View



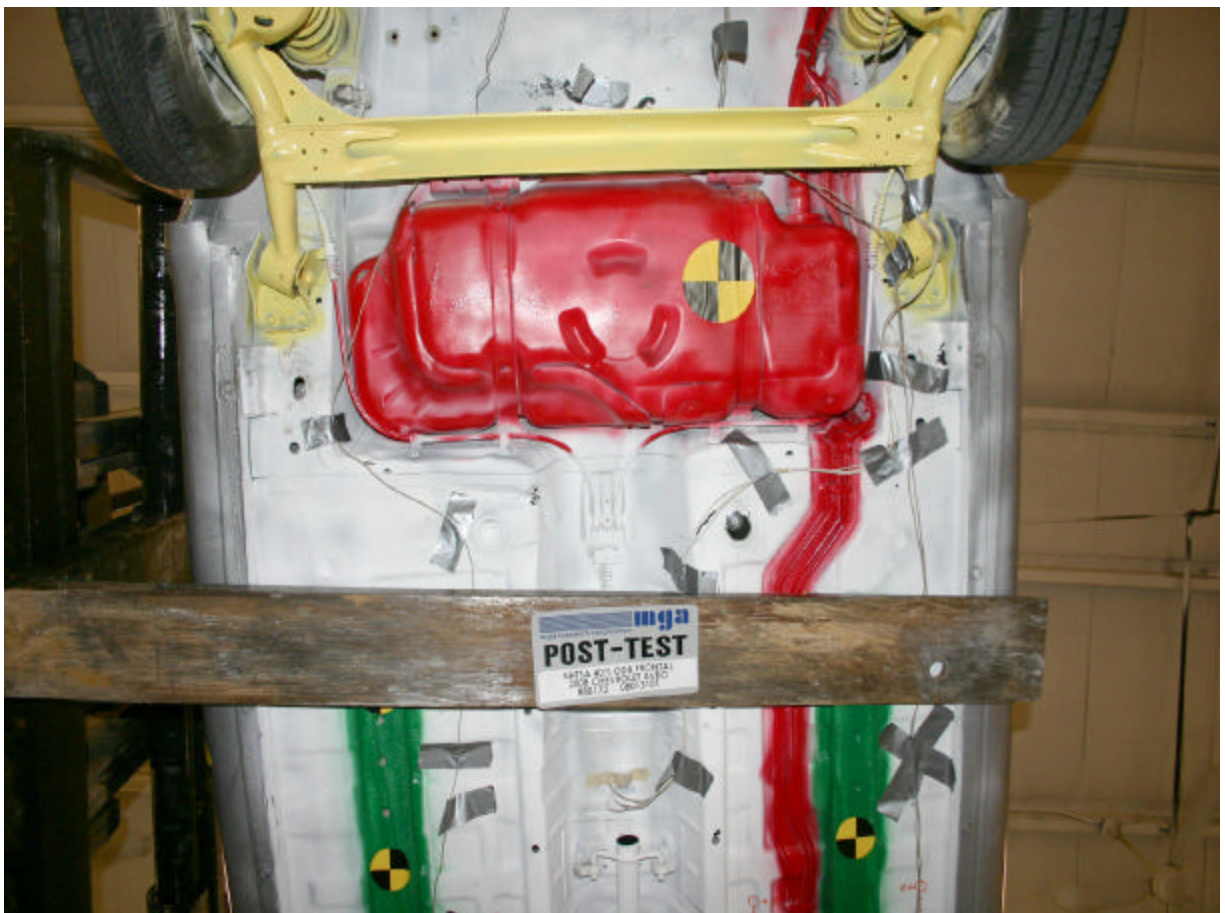
Pre-Test Front Underbody View



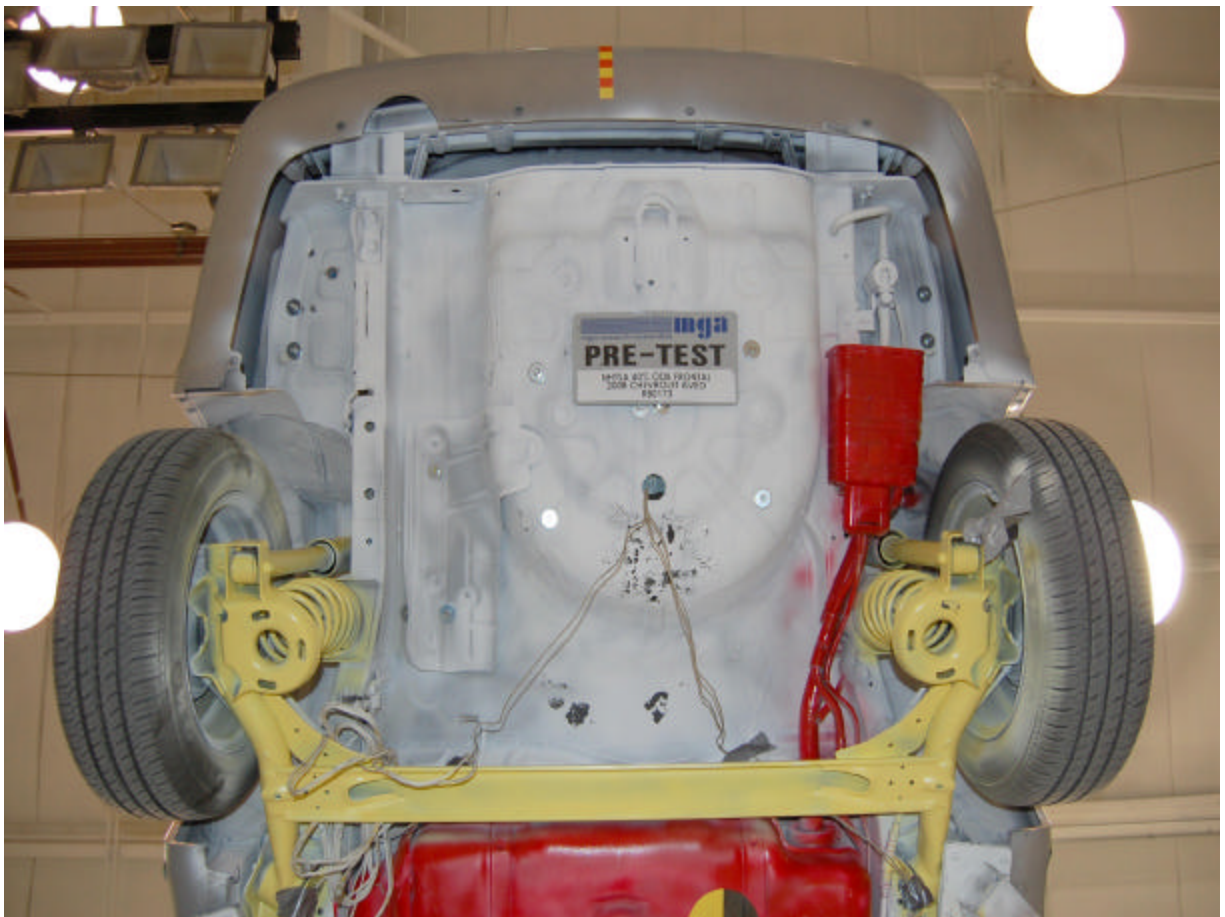
Post-Test Front Underbody View



Pre-Test Mid Underbody View



Post-Test Mid Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Driver Dummy Front View (Head Position)



Post-Test Driver Dummy Front View (Head Position)



Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy (Door Open)



Post-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy Abdomen View Close-Up



Post-Test Driver Dummy Abdomen View Close-Up



Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet



Pre-Test Driver Dummy Foot/Leg Close-Up



Post-Test Driver Dummy Foot/Leg Close-Up



Pre-Test Driver Side Knee Bolster



Post-Test Driver Side Knee Bolster



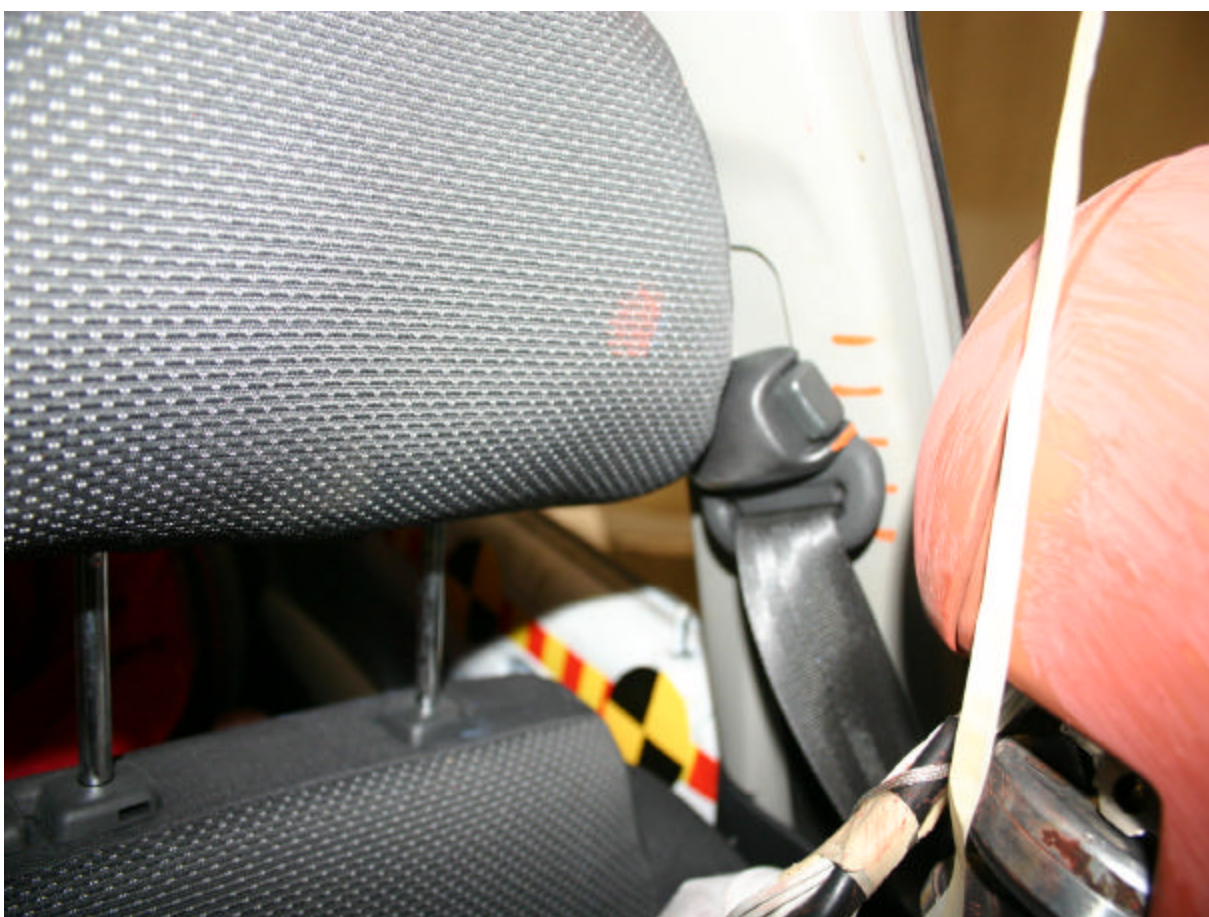
Pre-Test Driver Side Floor Pan



Post-Test Driver Side Floor Pan



Post-Test Driver Dummy Head Contact (B-pillar)



Post-Test Driver Dummy Head Contact (headrest)



Post-Test Driver Dummy Knee Contact



Post-Test Driver Dummy Airbag Contact



Pre-Test Passenger Dummy Front View (Head Position)



Post-Test Passenger Dummy Front View (Head Position)



Pre-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Door Open)



Pre-Test Passenger Dummy Feet



Post-Test Passenger Dummy Feet



Pre-Test Passenger Dummy Foot/Leg Close-Up



Post-Test Passenger Dummy Foot/Leg Close-Up



Pre-Test Passenger Side Glove Box



Post-Test Passenger Side Glove Box



Pre-Test Passenger Side Floor Pan



Post-Test Passenger Side Floor Pan



Post-Test Passenger Dummy Head Contact (headrest)



Post-Test Passenger Dummy Knee Contact



Post-Test Passenger Dummy Airbag Contact



Pre-Test Left Rear Passenger Dummy (Through Window)



Post-Test Left Rear Passenger Dummy (Through Window)



Pre-Test Left Rear Passenger Dummy (Door Open)



Post-Test Left Rear Passenger Dummy (Door Open)



Pre-Test Left Rear Passenger Dummy Leg Position View



Post-Test Left Rear Passenger Dummy Leg Position View



Pre-Test Left Rear Passenger Dummy Feet Position View



Post-Test Left Rear Passenger Dummy Feet Position View



Pre-Test Left Rear Passenger Dummy Right Side View



Post-Test Left Rear Passenger Dummy Right Side View



Post-Test Left Rear Passenger Dummy Head Contact View



Post-Test Left Rear Passenger Dummy Foot Contact View 1



Post-Test Left Rear Passenger Dummy Foot Contact View 2



Pre-Test Offset Deformable Barrier Front View



Post-Test Offset Deformable Barrier Front View



Pre-Test Offset Deformable Barrier Left Side View



Post-Test Offset Deformable Barrier Left Side View



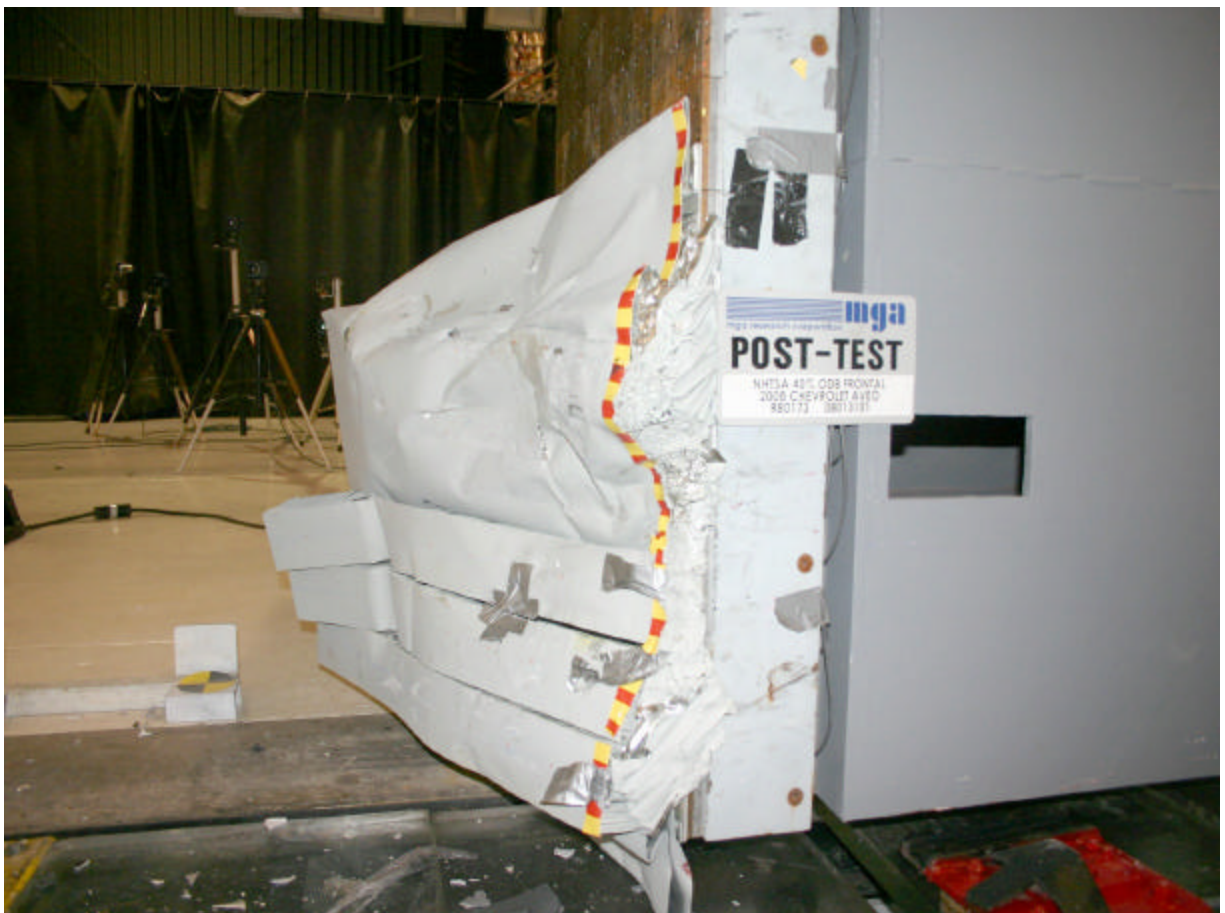
Pre-Test Offset Deformable Barrier Left Side $\frac{3}{4}$ View



Post-Test Offset Deformable Barrier Left Side $\frac{3}{4}$ View



Pre-Test Offset Deformable Barrier Right Side View



Post-Test Offset Deformable Barrier Right Side View



Pre-Test Offset Deformable Barrier Right Side $\frac{3}{4}$ View



Post-Test Offset Deformable Barrier Right Side $\frac{3}{4}$ View



Pre-Test Offset Deformable Barrier Overhead View



Post-Test Offset Deformable Barrier Overhead View



Vehicle Impact



Pre-Test Left Side A Pillar (Frontal View)



Post-Test Left Side A Pillar (Frontal View)



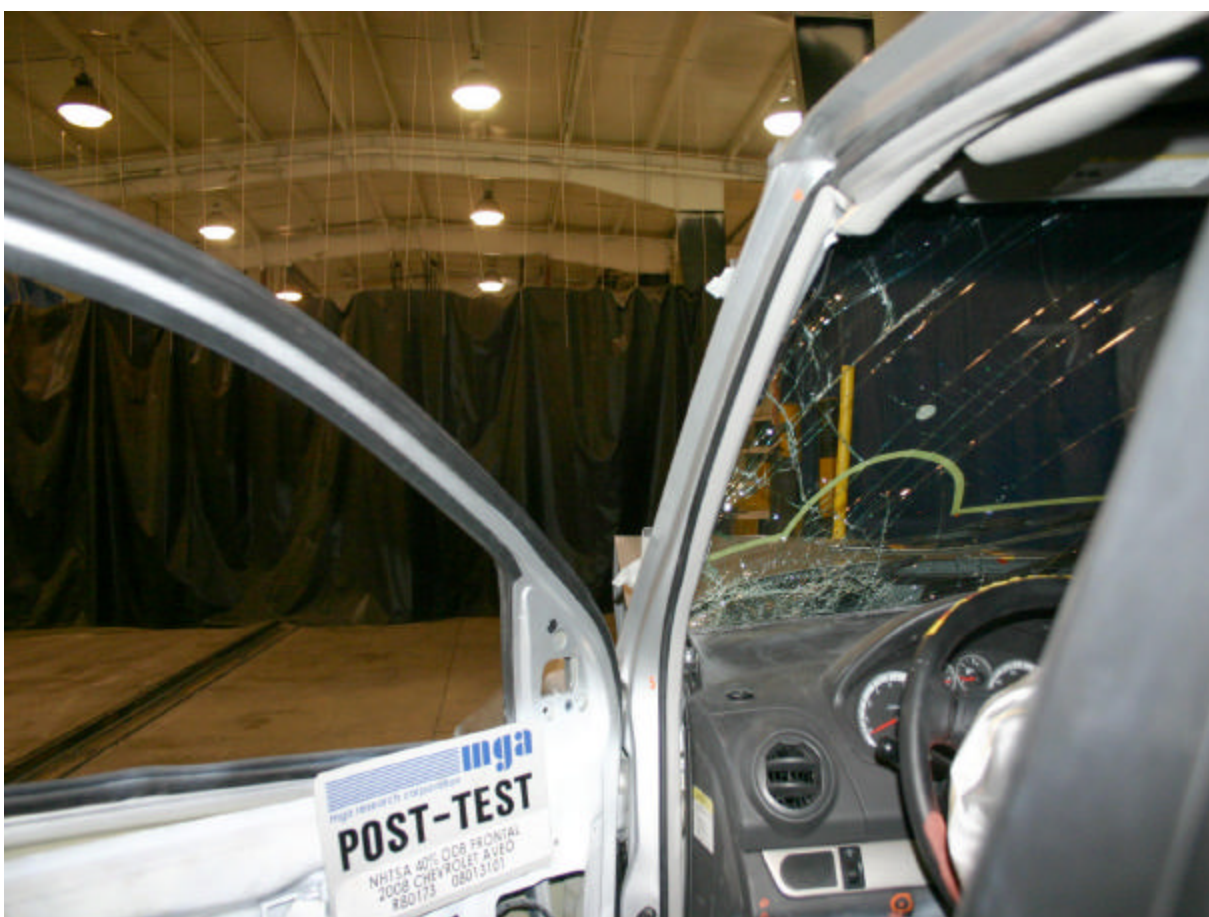
Pre-Test Left Side A Pillar (¾ Frontal View)



Post-Test Left Side A Pillar (¾ Frontal View)



Pre-Test Left Side A Pillar



Post-Test Left Side A Pillar



Pre-Test Left Side B Pillar (Side View)



Post-Test Left Side B Pillar (Side View)



Pre-Test Left Side B Pillar



Post-Test Left Side B Pillar



Pre-Test Left Side C Pillar



Post-Test Left Side C Pillar



Pre-Test Left Side Sill Front Half View



Post-Test Left Side Sill Front Half View



Pre-Test Left Side Sill Rear Half View



Post-Test Left Side Sill Rear Half View



Pre-Test Right Side A Pillar



Post-Test Right Side A Pillar



Pre-Test Right Side B Pillar



Post-Test Right Side B Pillar



Pre-Test Right Side C Pillar



Post-Test Right Side C Pillar



Pre-Test Right Side Sill Front Half View



Post-Test Right Side Sill Front Half View



Pre-Test Right Side Sill Rear Half View



Post-Test Right Side Sill Rear Half View



Pre-Test Left Side Rocker View 1



Post-Test Left Side Rocker View 1



Pre-Test Left Side Rocker View 2



Post-Test Left Side Rocker View 2



Pre-Test Left Front Wheel Well



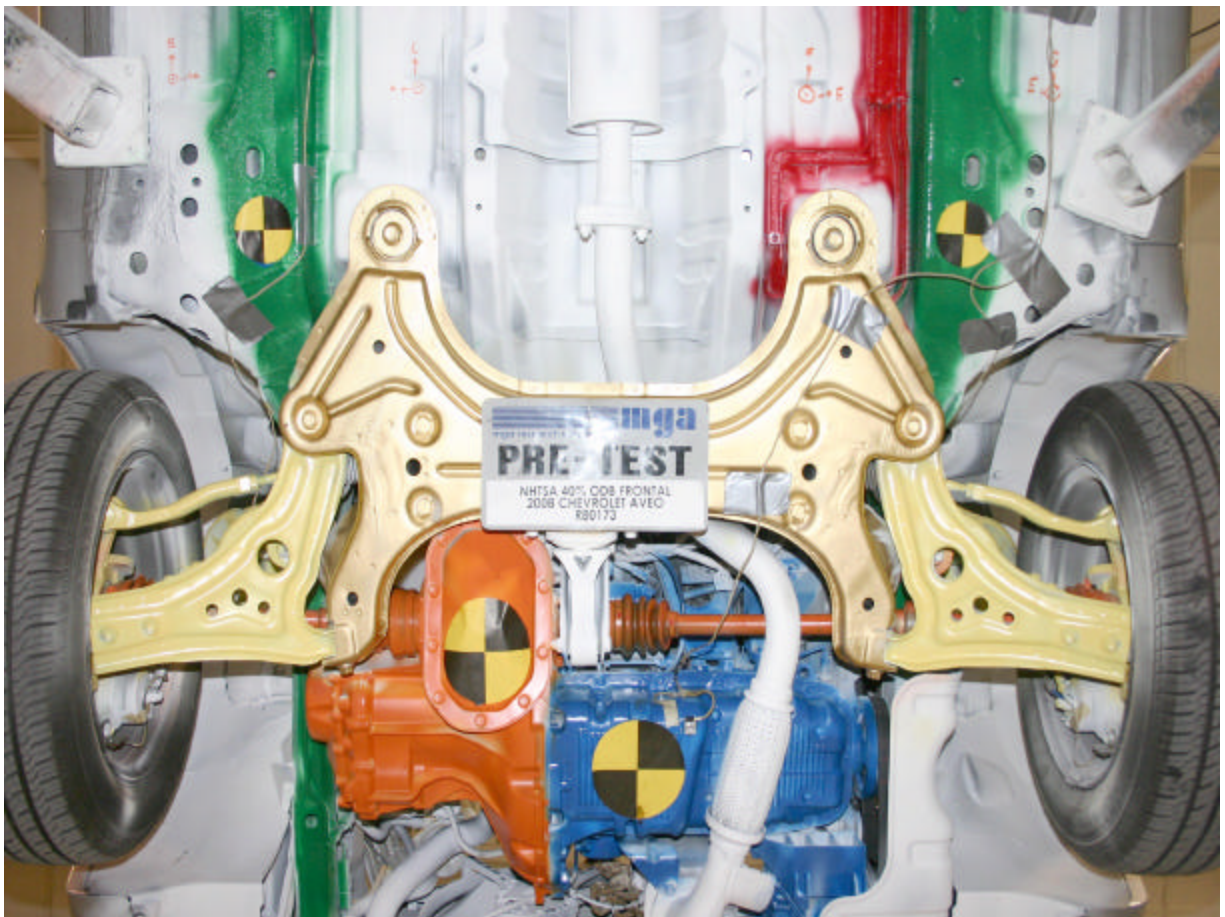
Post-Test Left Front Wheel Well



Pre-Test Left Front Shotgun



Post-Test Left Front Shotgun



Pre-Test Steering Rack View



Post-Test Steering Rack View



Pre-Test Steering Rack ¾ Left Side View



Post-Test Steering Rack ¾ Left Side View



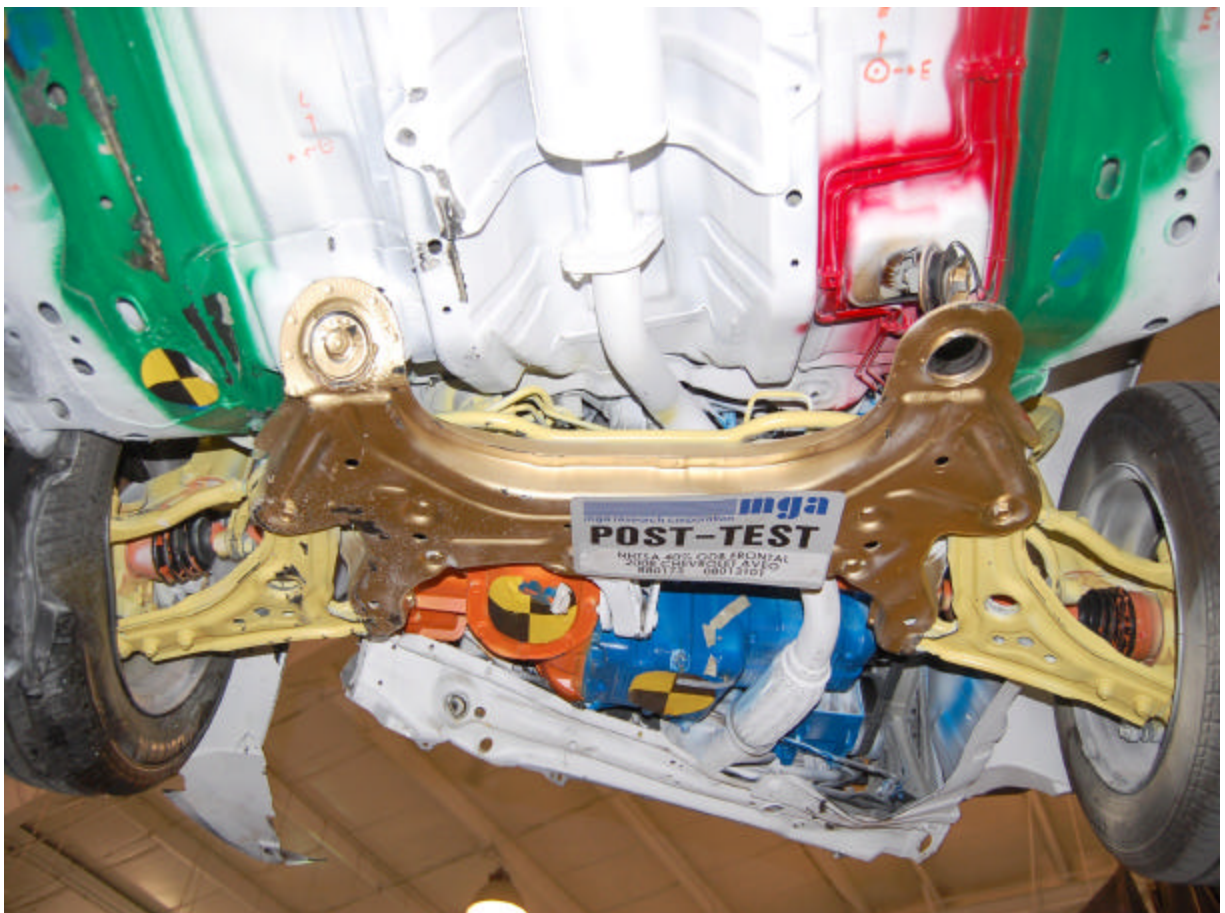
Pre-Test Steering Rack ¾ Right Side View



Post-Test Steering Rack ¾ Right Side View



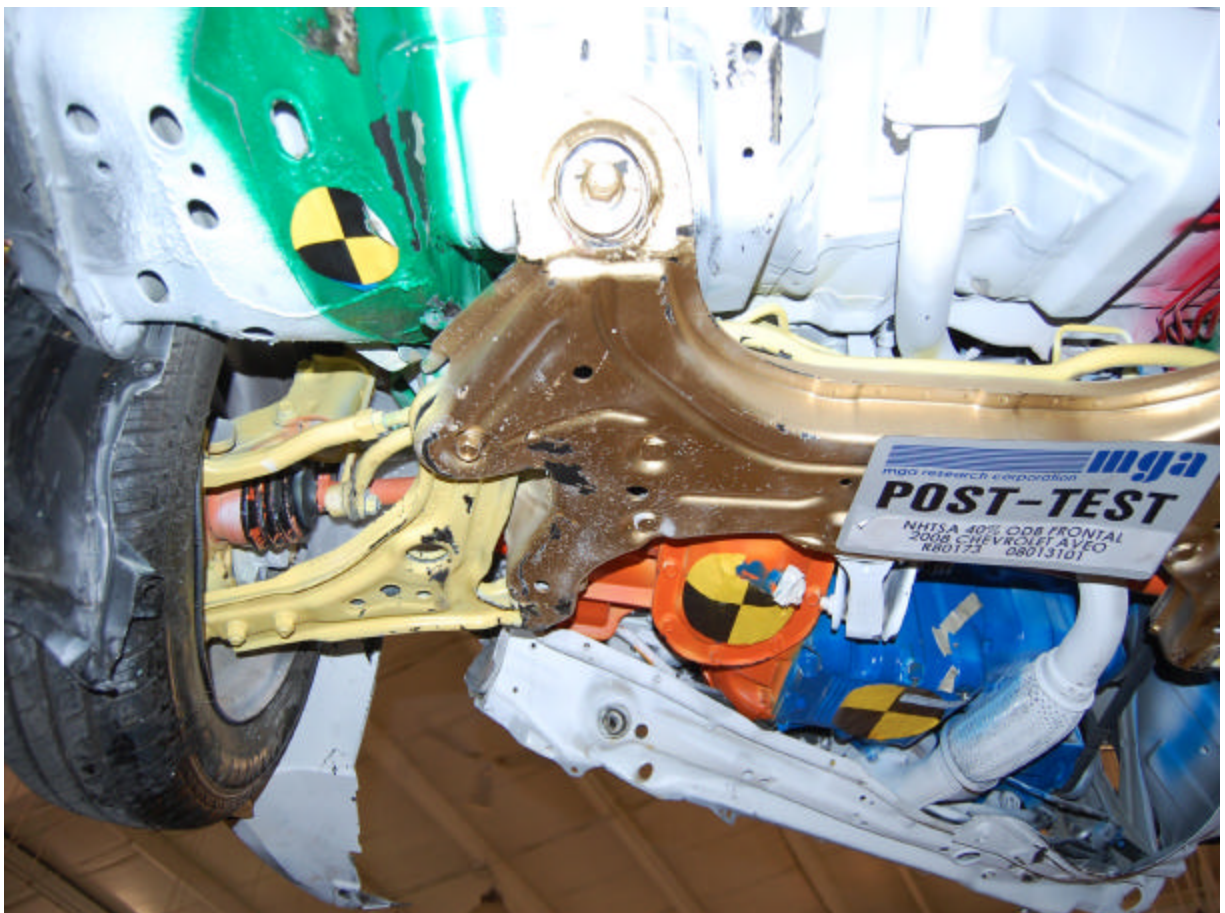
Pre-Test Sway Bar View



Post-Test Sway Bar View



Pre-Test Sway Bar Left Side View



Post-Test Sway Bar Left Side View



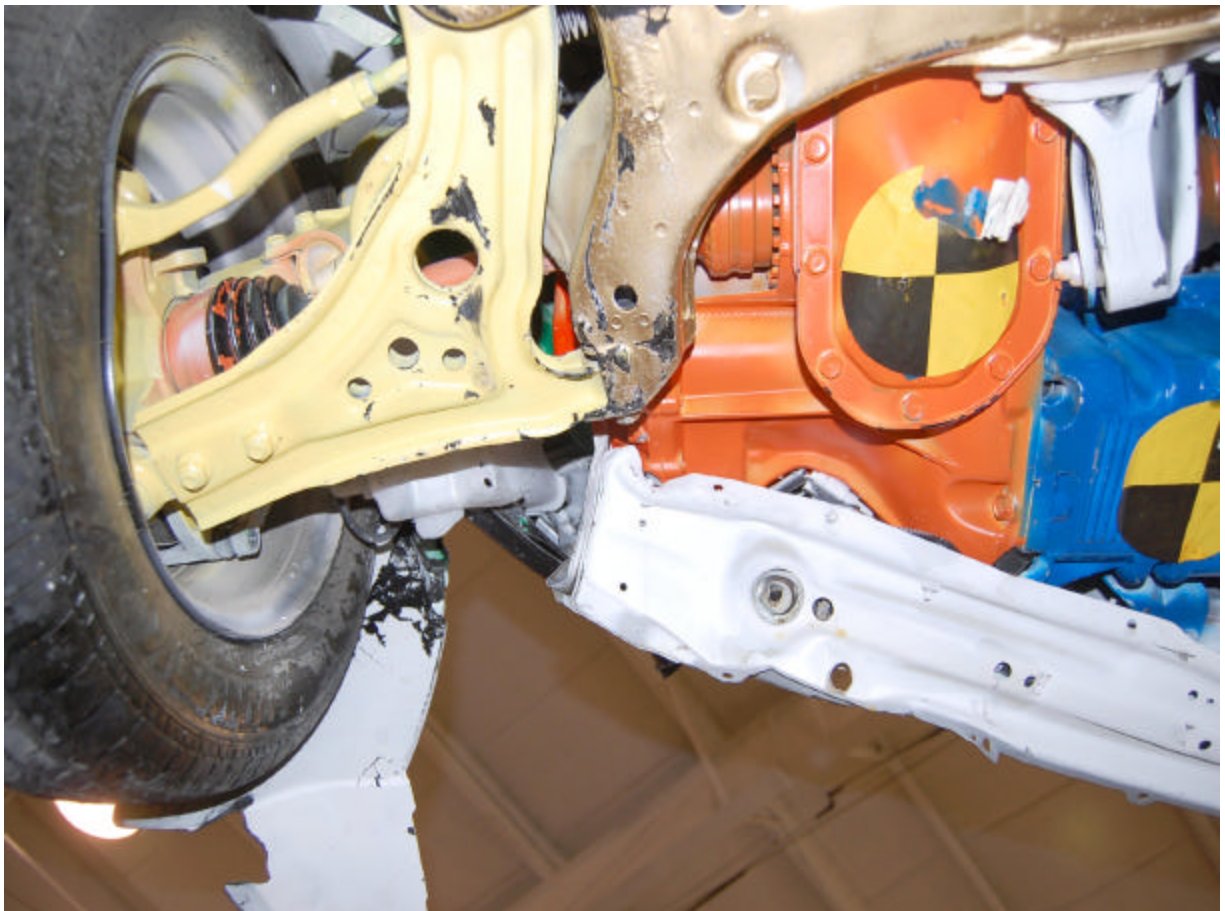
Pre-Test Sway Bar Right Side View



Post-Test Sway Bar Right Side View



Pre-Test Bumper to Rail Attachment View



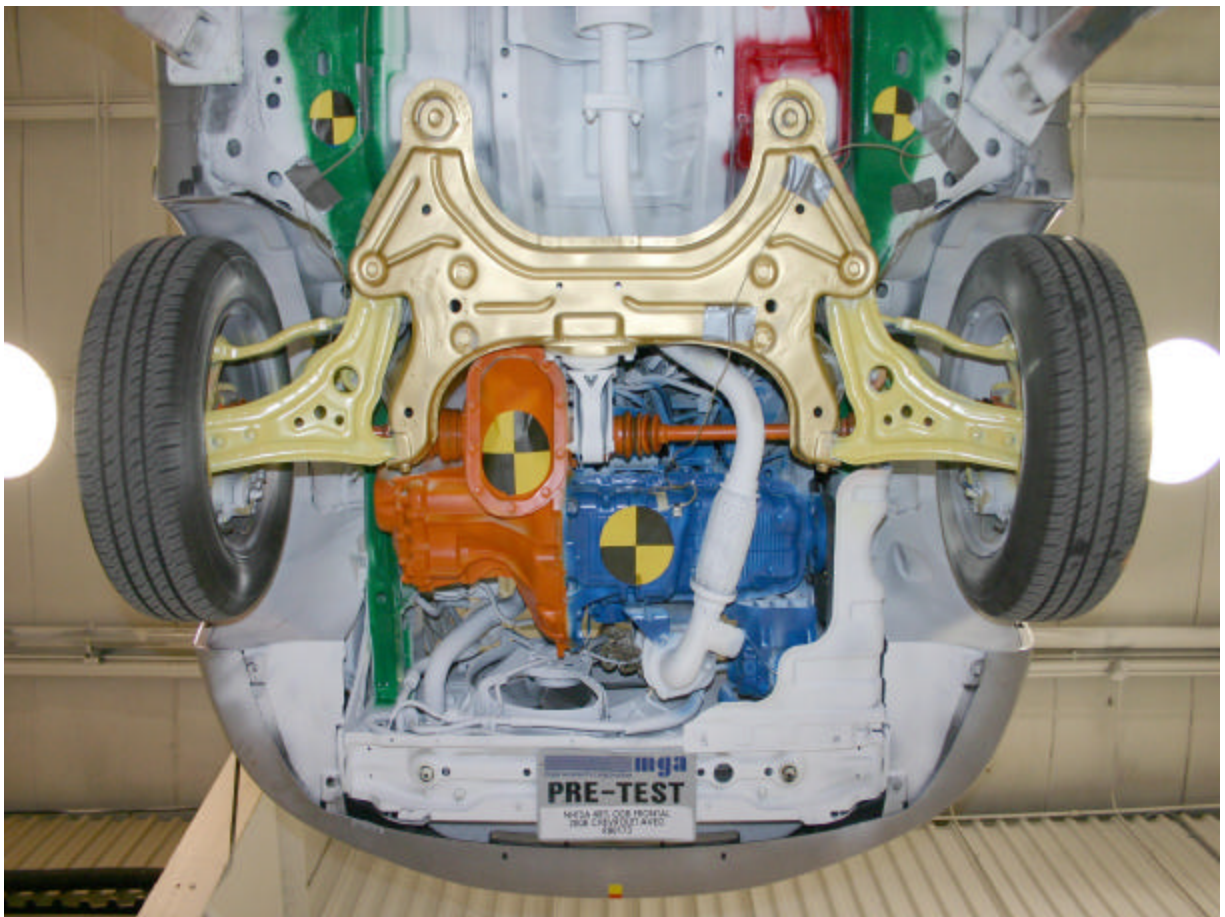
Post-Test Bumper to Rail Attachment View



Pre-Test Bumper to Rail Attachment $\frac{3}{4}$ View



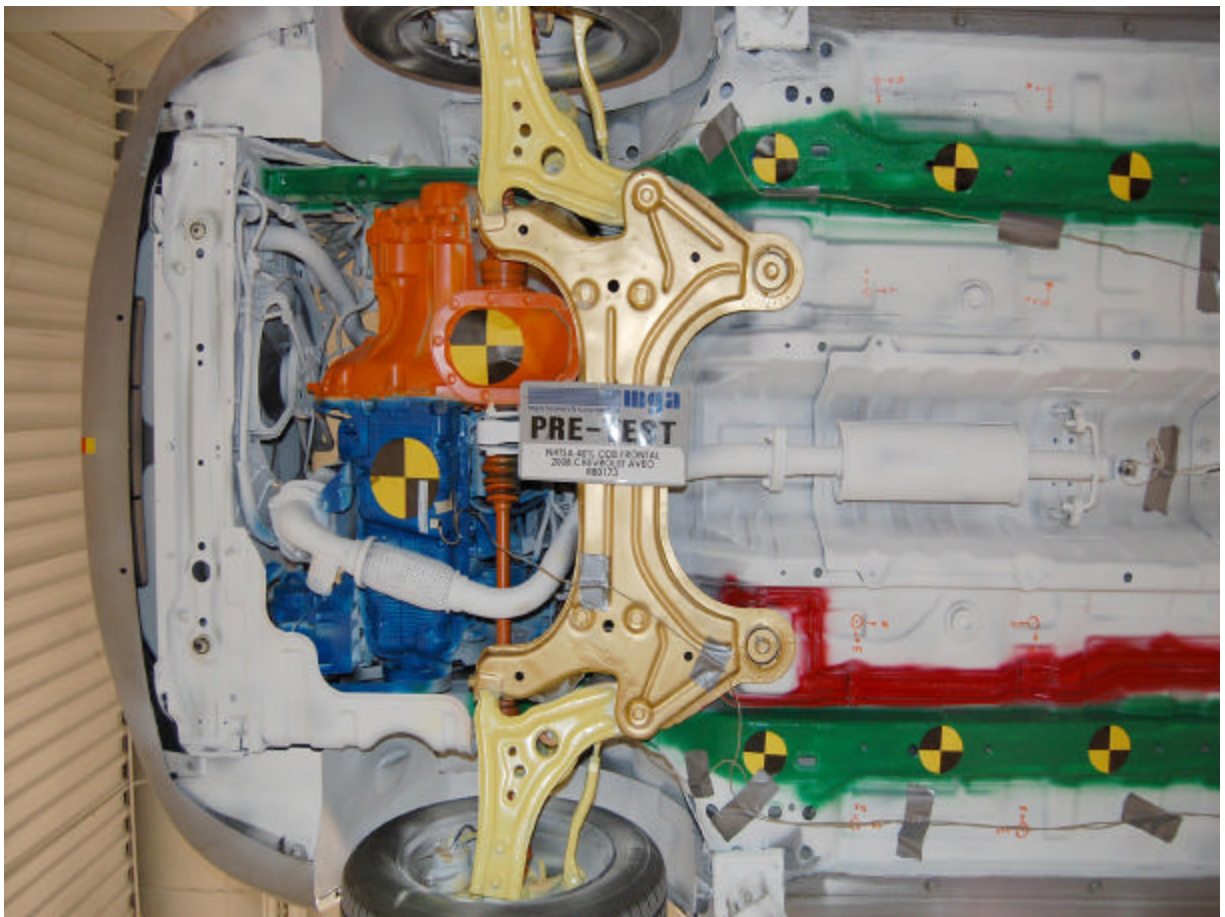
Post-Test Bumper to Rail Attachment $\frac{3}{4}$ View



Pre-Test Front Underbody



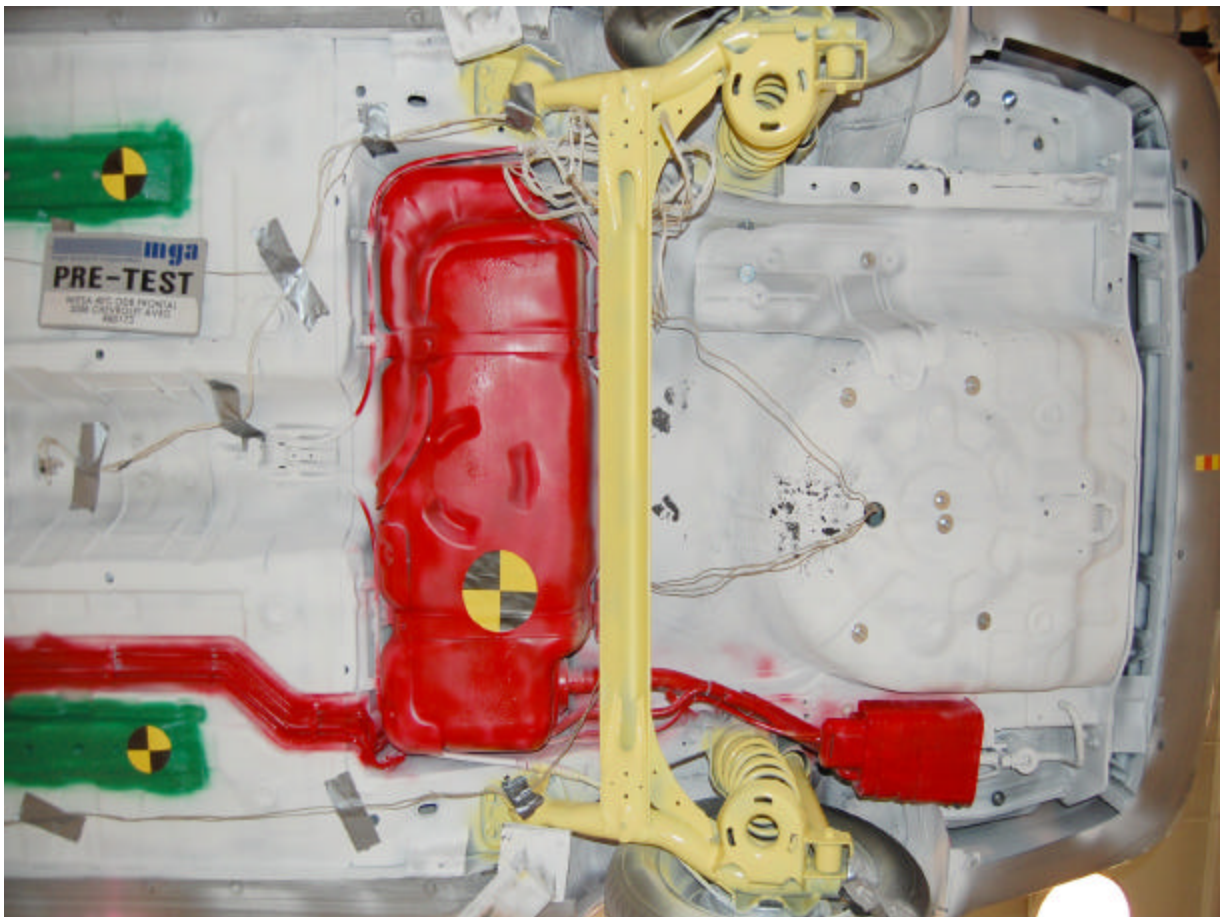
Post-Test Front Underbody



Pre-Test Front Underbody Perpendicular View



Post-Test Front Underbody Perpendicular View



Pre-Test Rear Underbody Perpendicular View



Post-Test Rear Underbody Perpendicular View



Pre-Test Left Front Wheel Contact View



Post-Test Left Front Wheel Contact View



Pre-Test Left Front Wheel Contact Close Up View



Post-Test Left Front Wheel Contact Close Up View



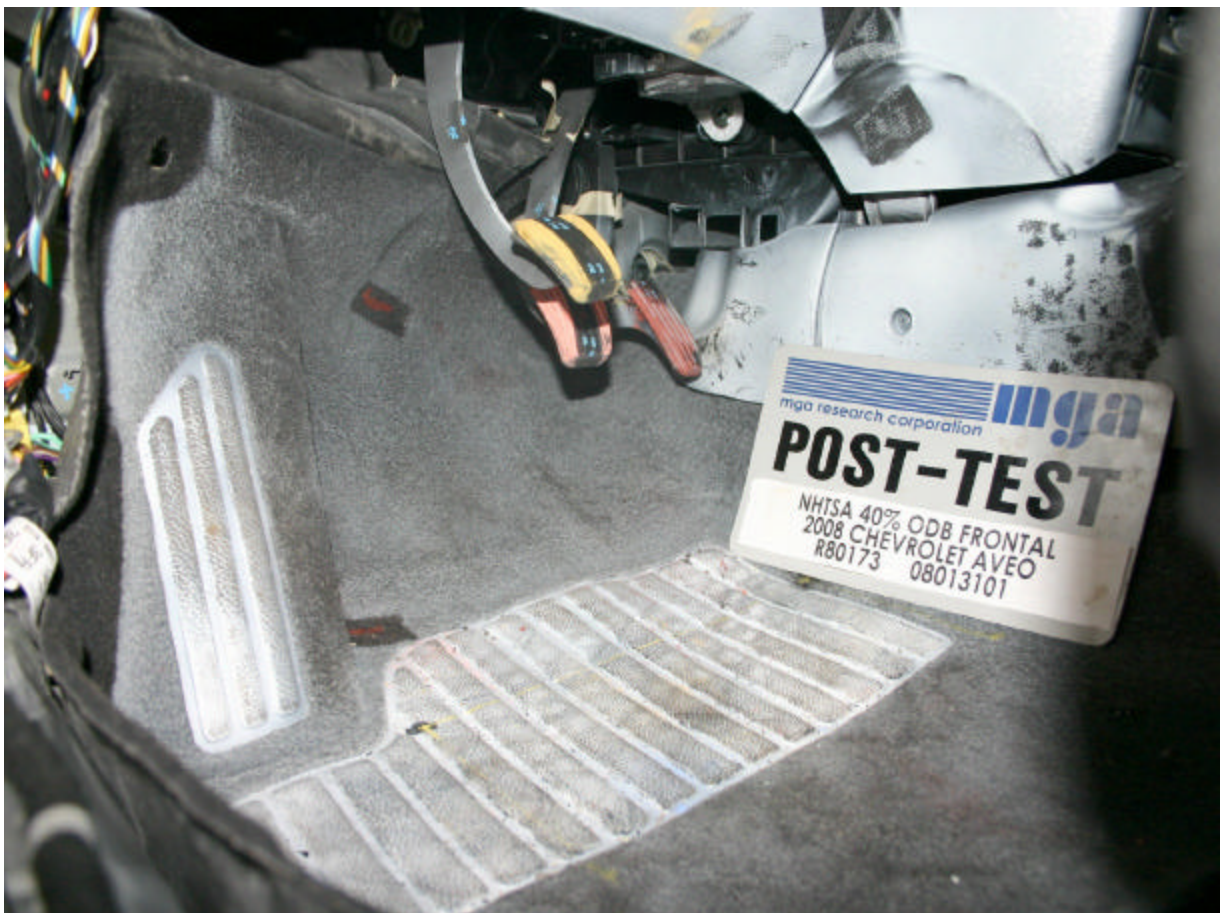
Pre-Test Over Toe pan/ Floor pan Left of Seat, Seat Cushion Height



Post-Test Over Toe pan/ Floor pan Left of Seat, Seat Cushion Height



Pre-Test Over Toepan/ Floorpan Left of Seat, Sill Height



Post-Test Over Toepan/ Floorpan Left of Seat, Sill Height



Pre-Test Over Toeplan/ Floorpan Center of Seat, Seat Cushion Height



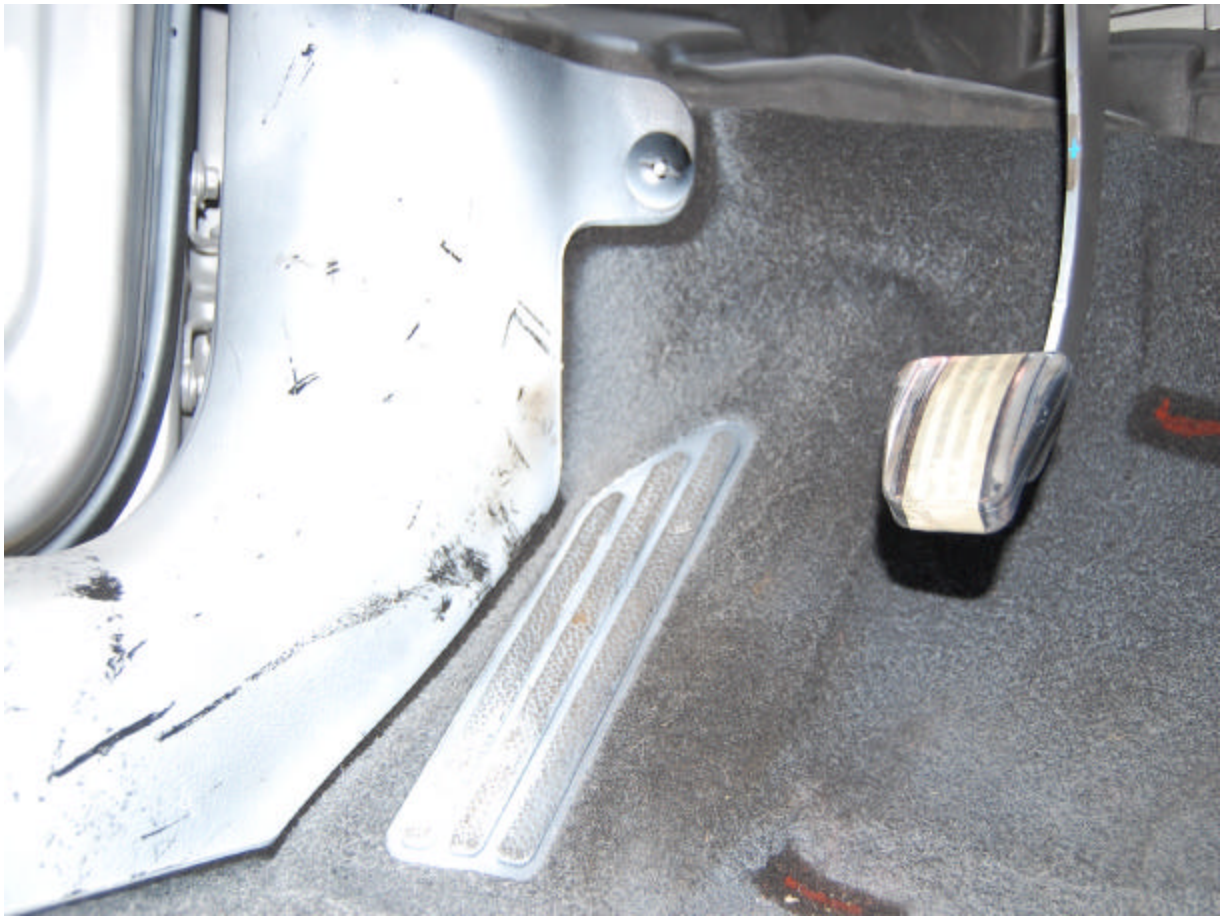
Post-Test Over Toeplan/ Floorpan Center of Seat, Seat Cushion Height



Pre-Test Over ToePan/ Floorpan Right of Seat, Seat Cushion Height



Post-Test Over ToePan/ Floorpan Right of Seat, Seat Cushion Height



Pre-Test Footrest Seat Cushion Height



Post-Test Footrest Seat Cushion Height



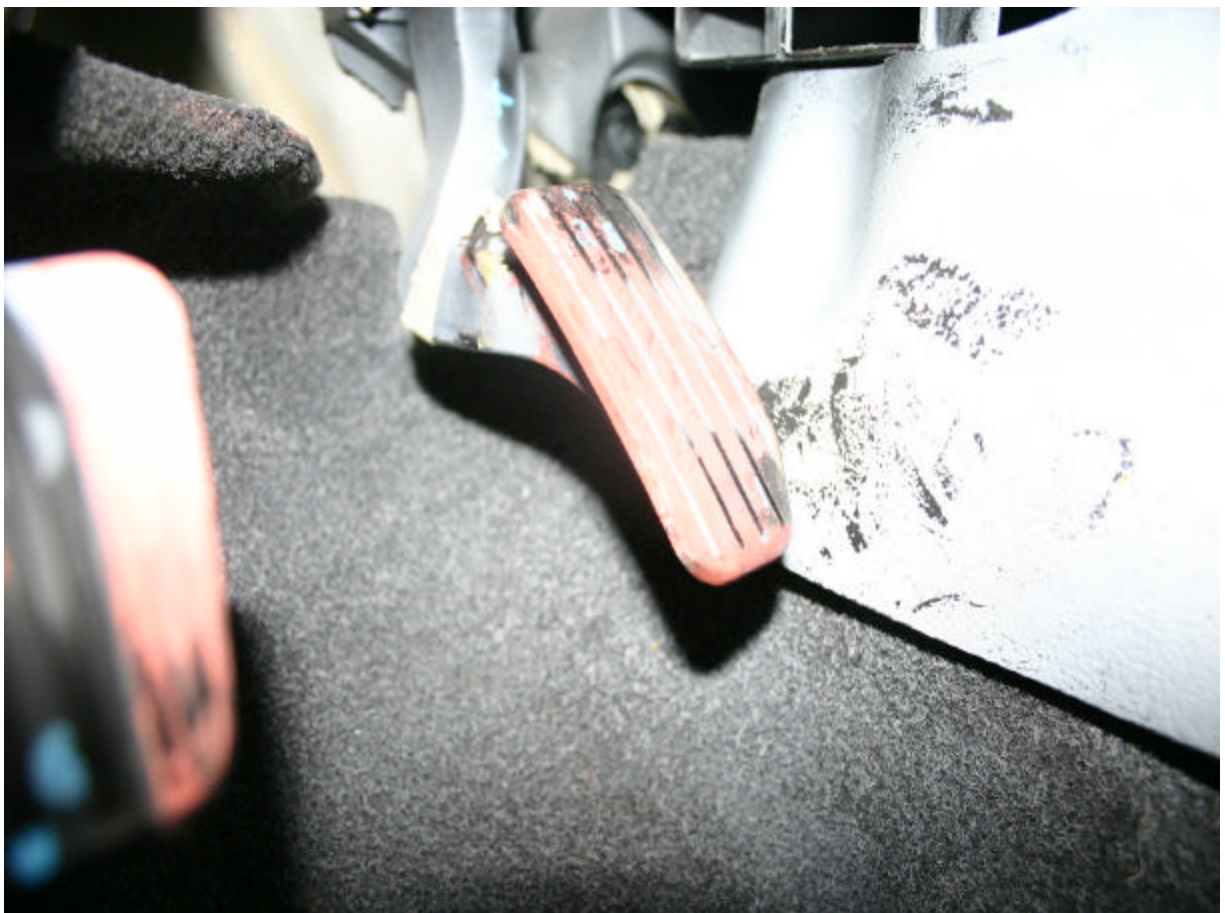
Pre-Test Footrest Seat Sill Height



Post-Test Footrest Seat Sill Height



Pre-Test Accelerometer Pedal Close Up



Post-Test Accelerometer Pedal Close Up



Pre-Test Accelerometer Pedal Left Side View



Post-Test Accelerometer Pedal Left Side View



Pre-Test Right Side Floorplan, Right of Seat, Seat Cushion Height



Post-Test Right Side Floorplan, Right of Seat, Seat Cushion Height



Pre-Test Right Side Floorplan, Right of Seat, Sill Cushion Height



Post-Test Right Side Floorplan, Right of Seat, Sill Cushion Height



Pre-Test Right Side Floorplan, Center of Seat, Seat Cushion Height



Post-Test Right Side Floorplan, Center of Seat, Seat Cushion Height



Post-Test Windshield Damage



Post-Test Left Side A-Pillar Close Up View



Post-Test Left Side A-Pillar Close Up $\frac{3}{4}$ View



Pre-Test Front View of CRS



Post-Test Front View of CRS



Pre-Test Rear View of CRS



Post-Test Rear View of CRS



Pre-Test Left Side View of CRS



Post-Test Left Side View of CRS



Pre-Test Right Side View of CRS



Post-Test Right Side View of CRS



Post-Test Left Rear Passenger Head Contact



Post-Test Left Rear Passenger Head Contact $\frac{3}{4}$ View

APPENDIX B

DUMMY, VEHICLE AND BARRIER DATA PLOTS

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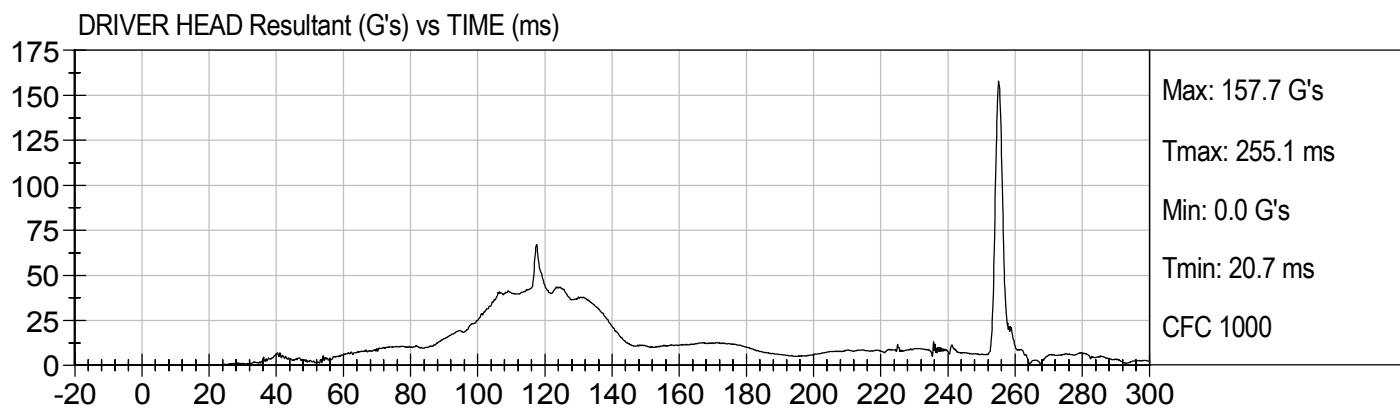
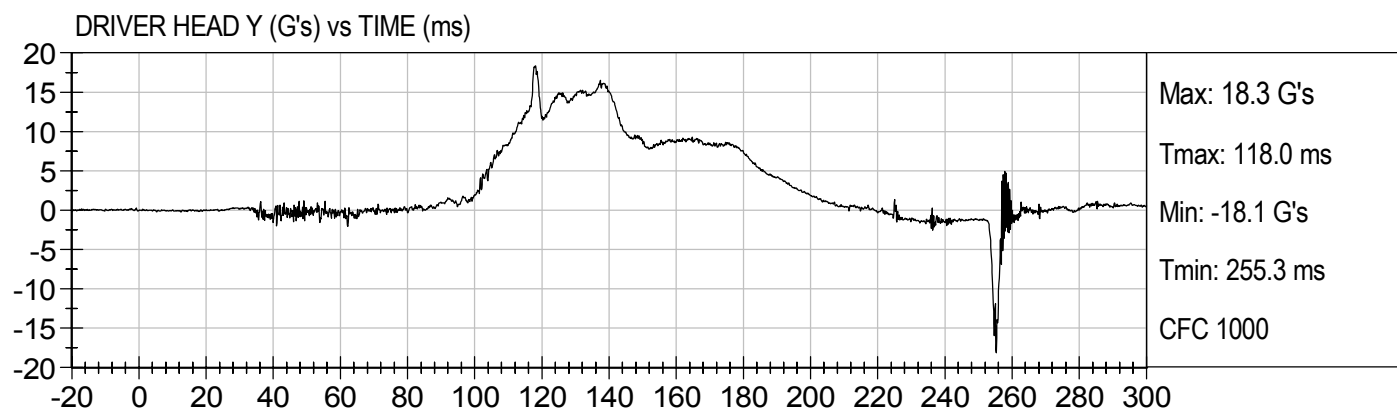
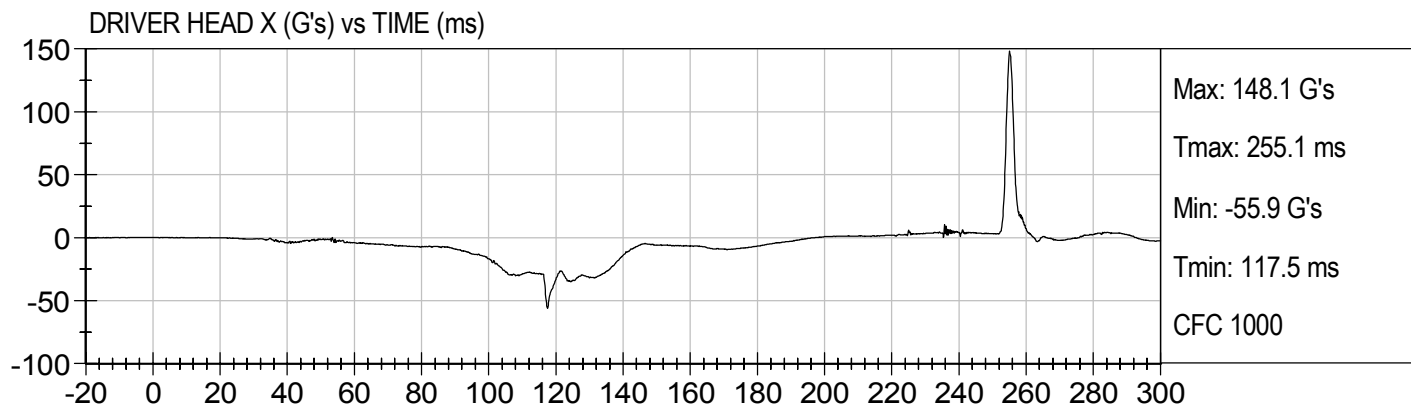
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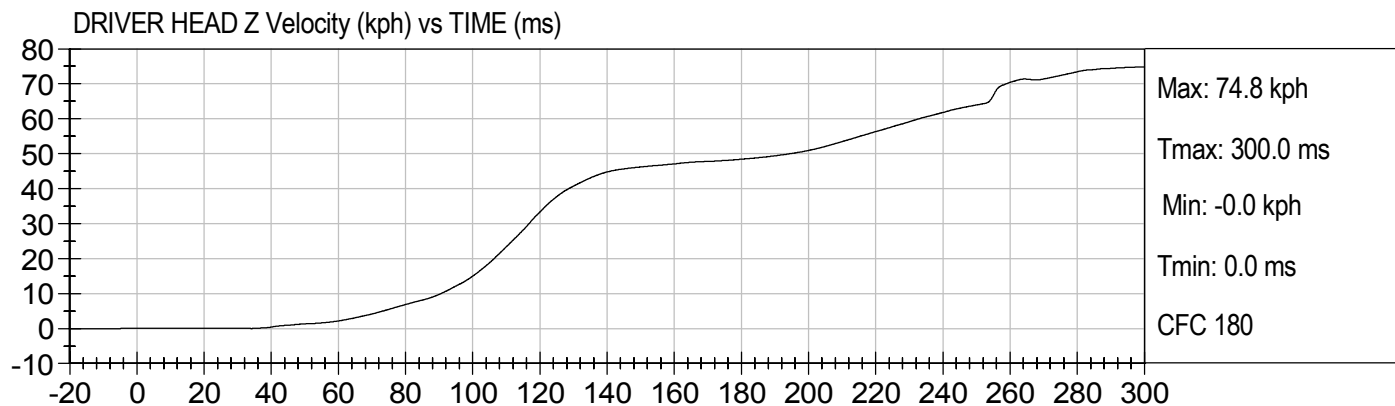
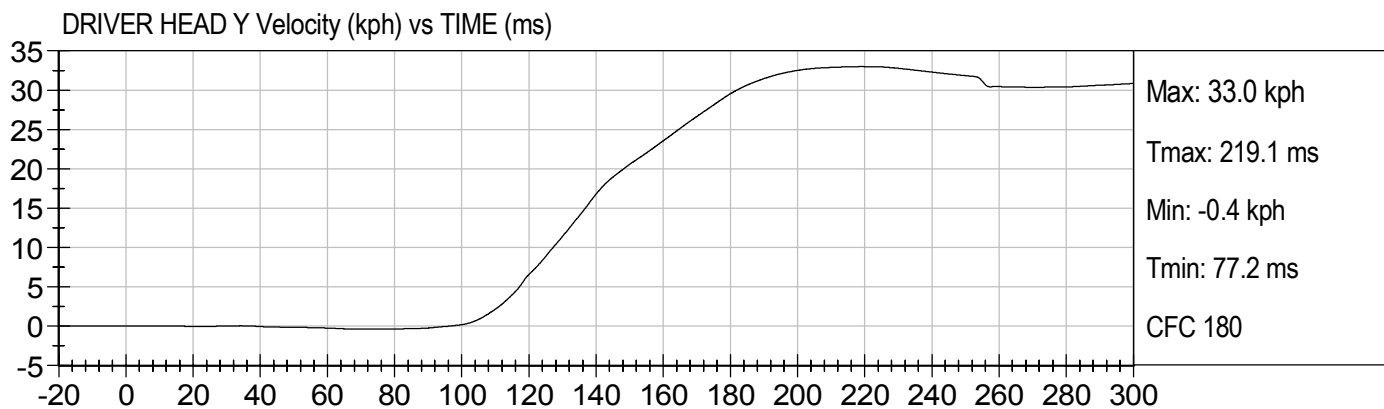
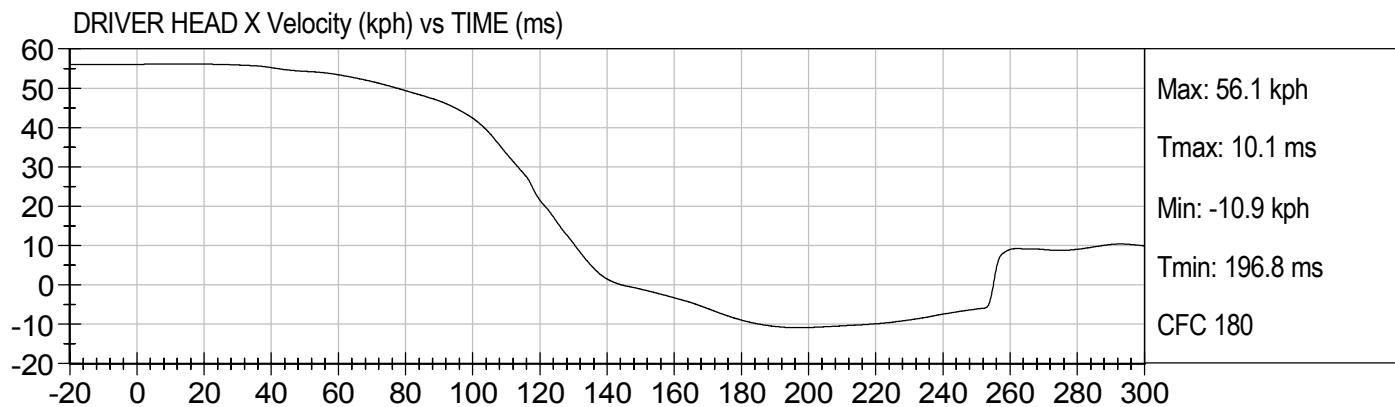
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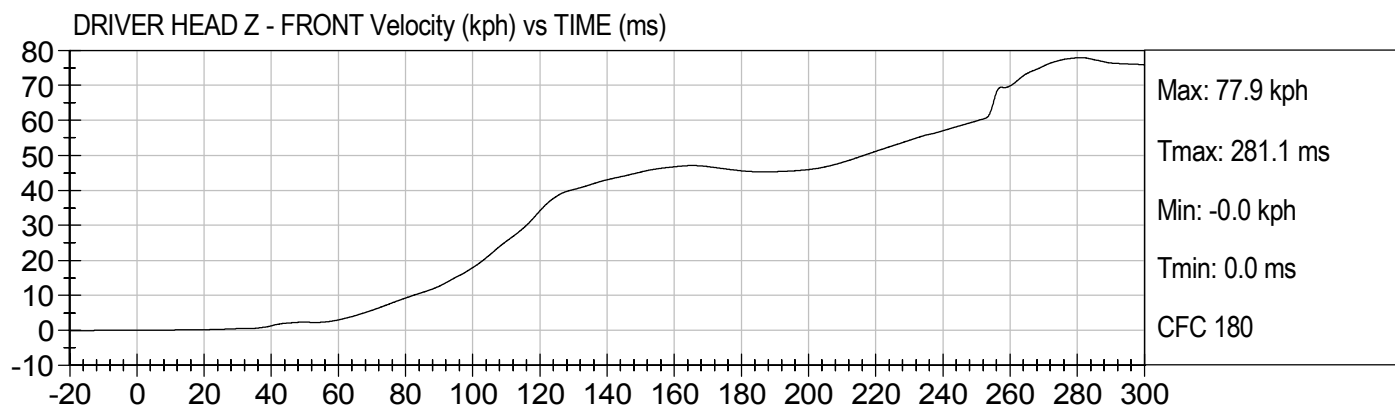
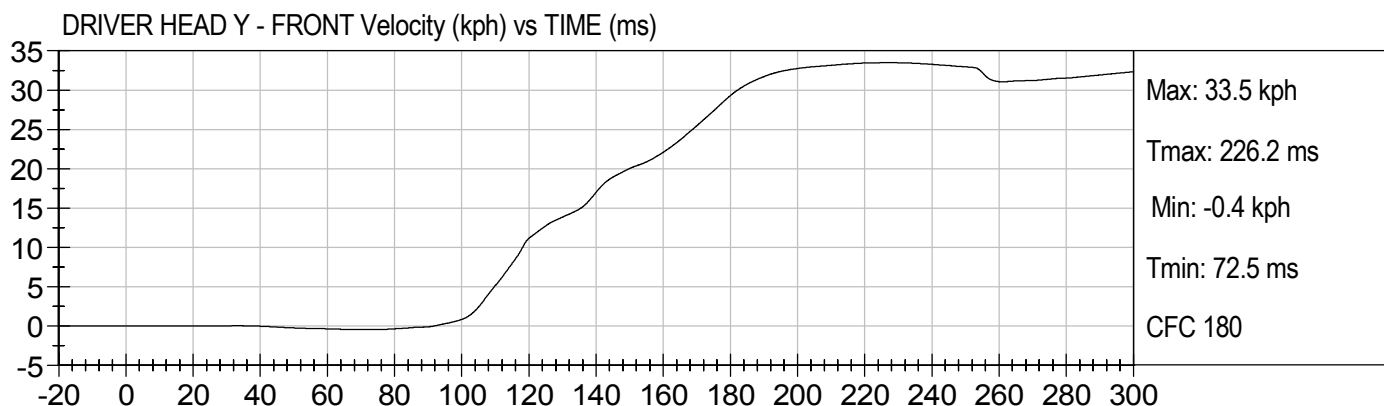
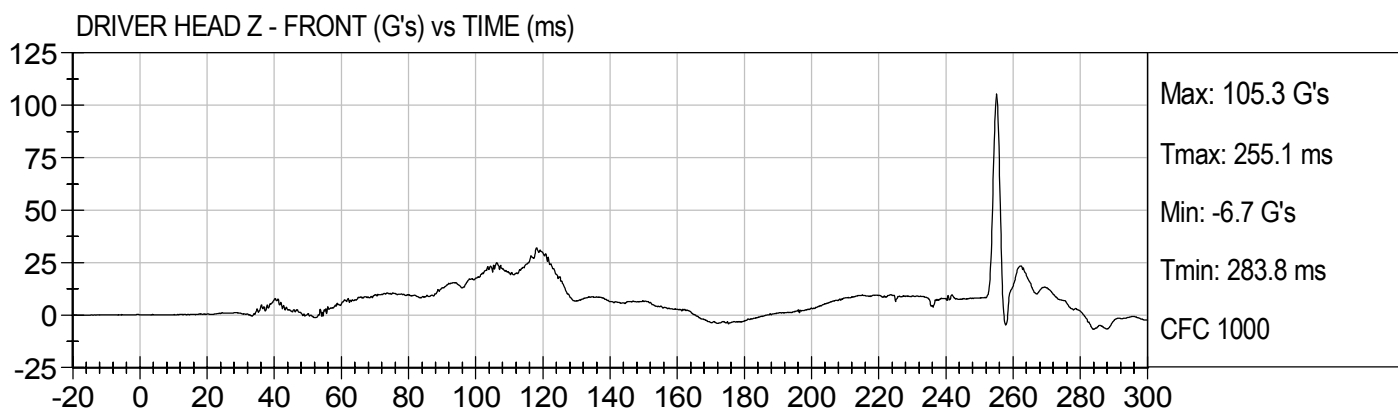
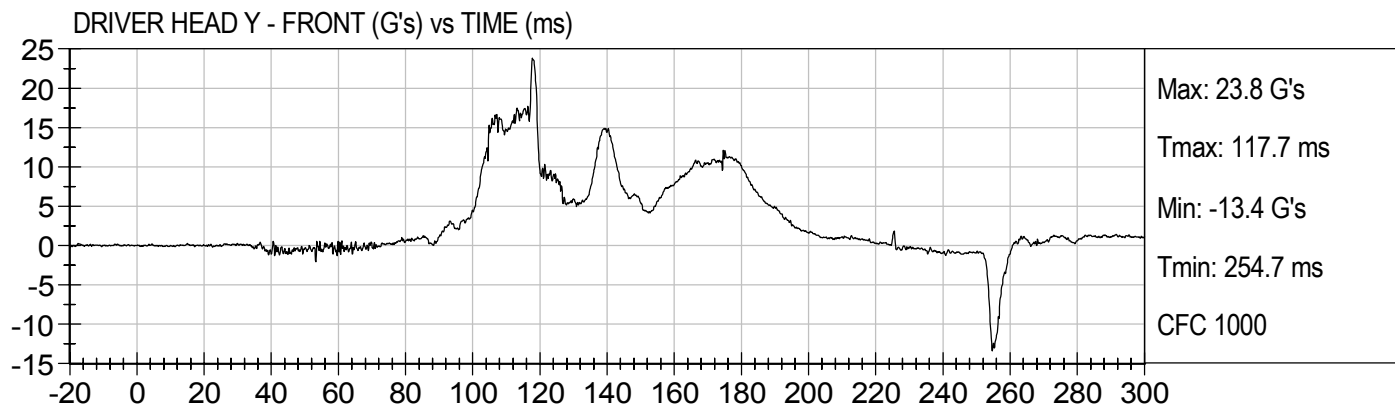






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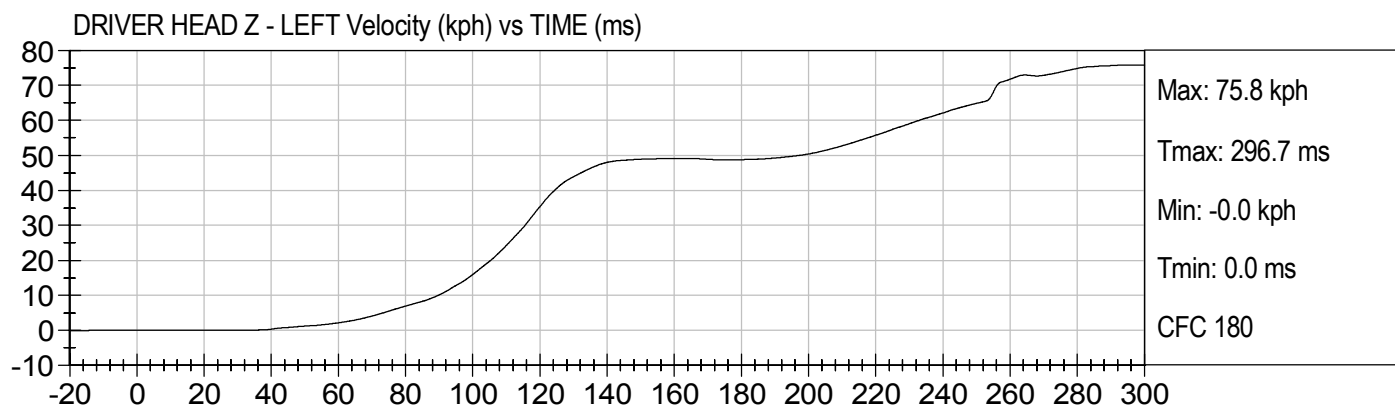
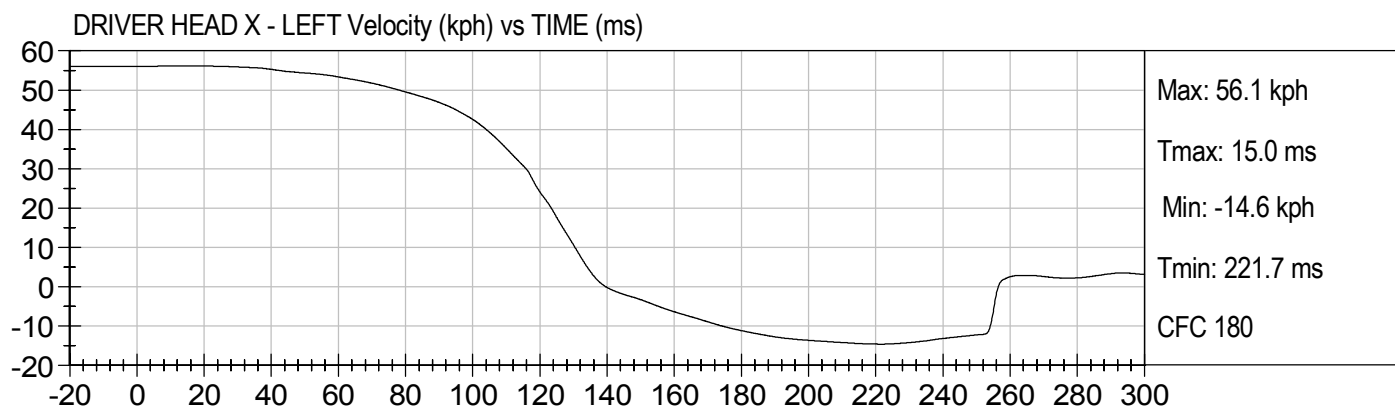
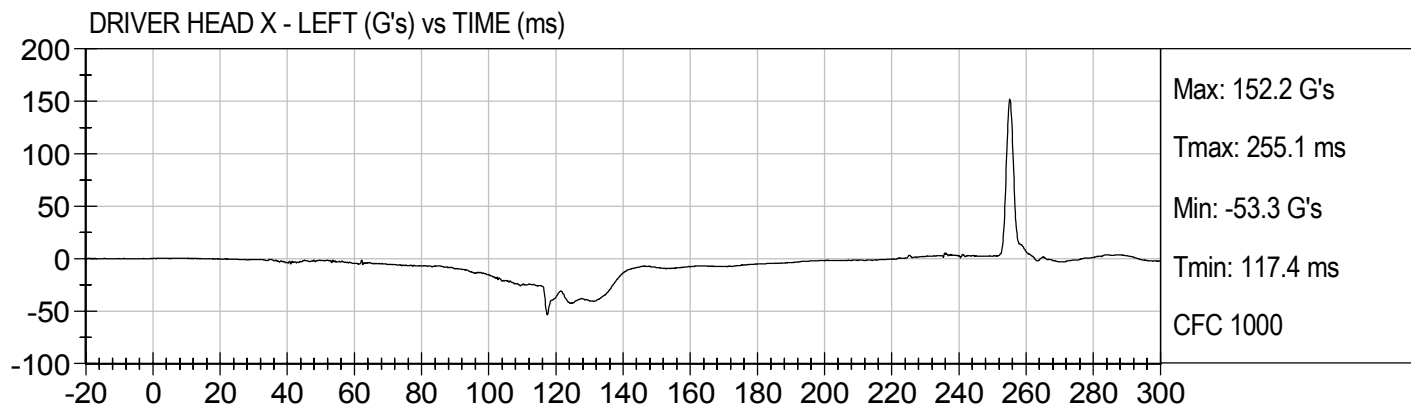
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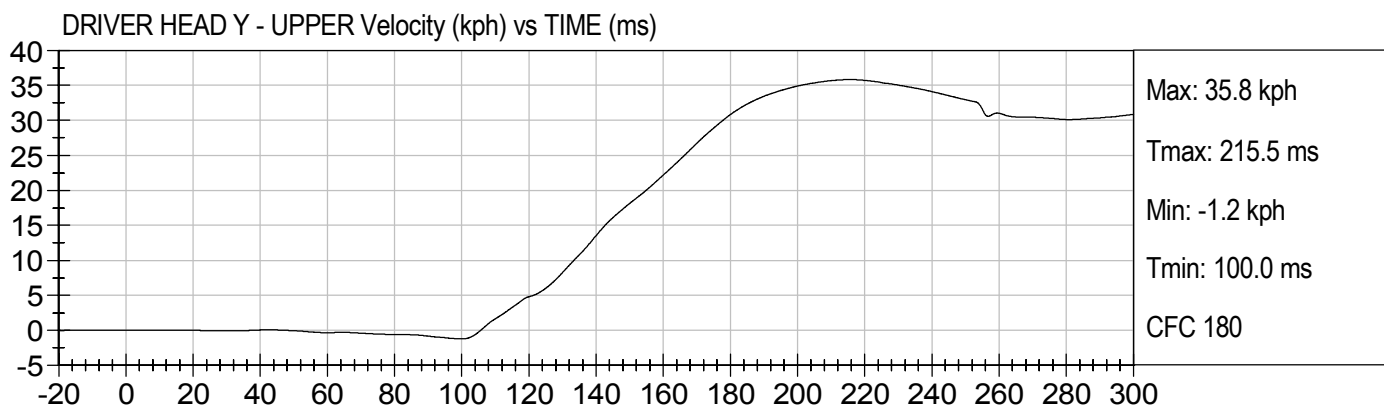
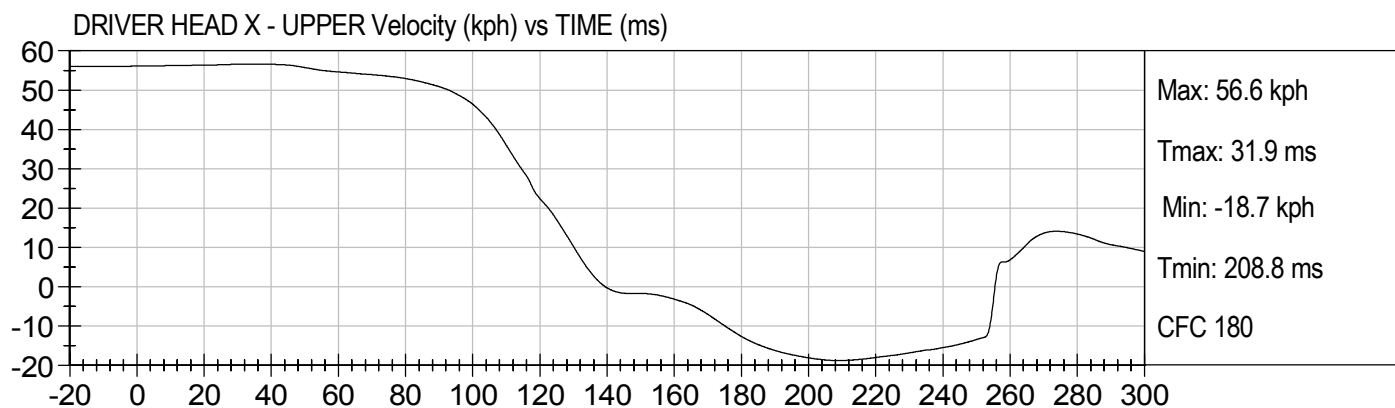
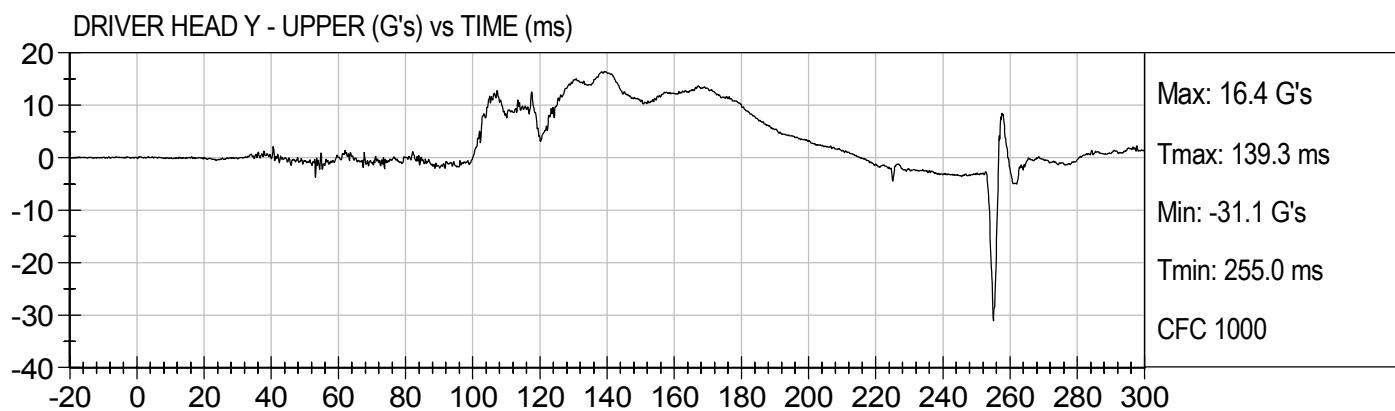
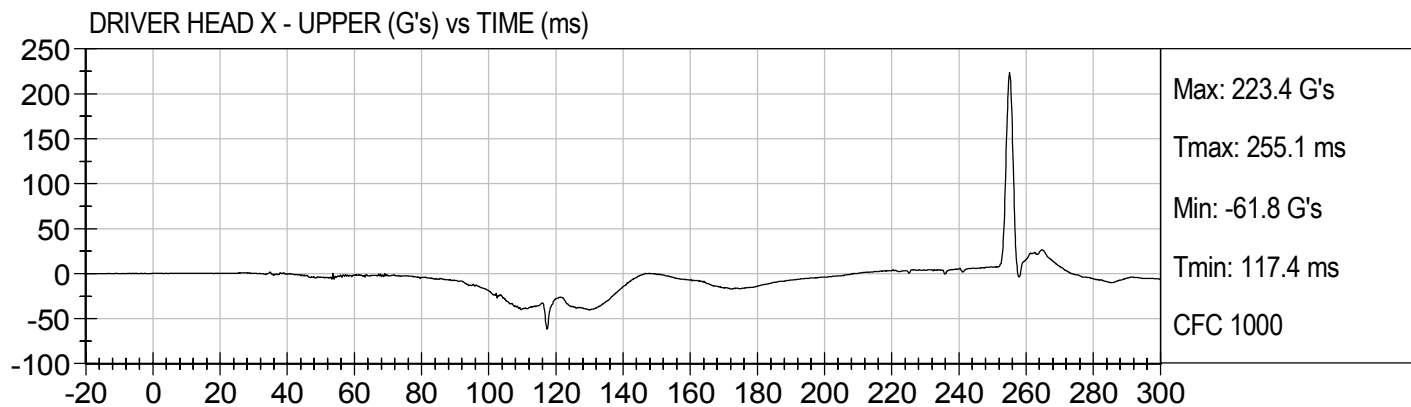




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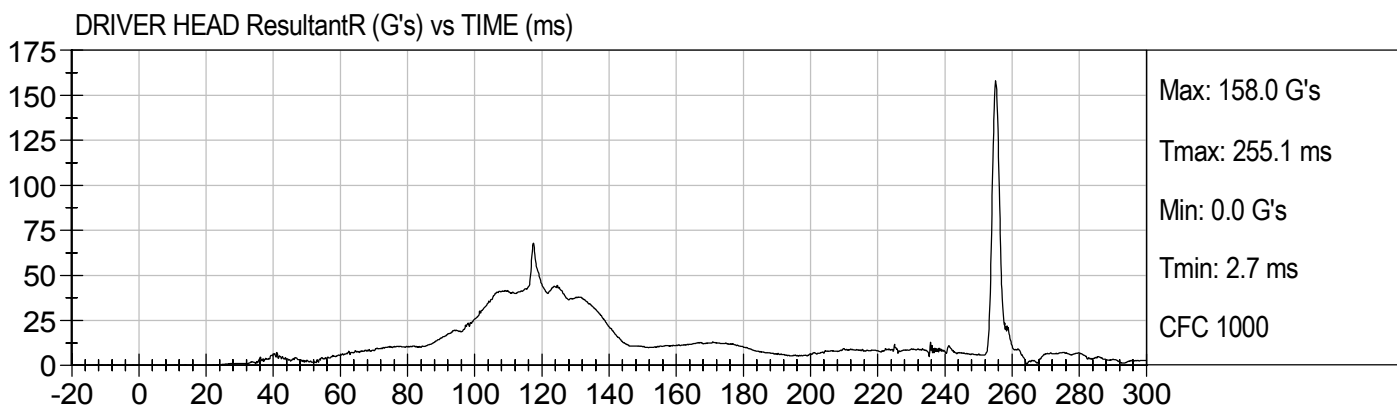
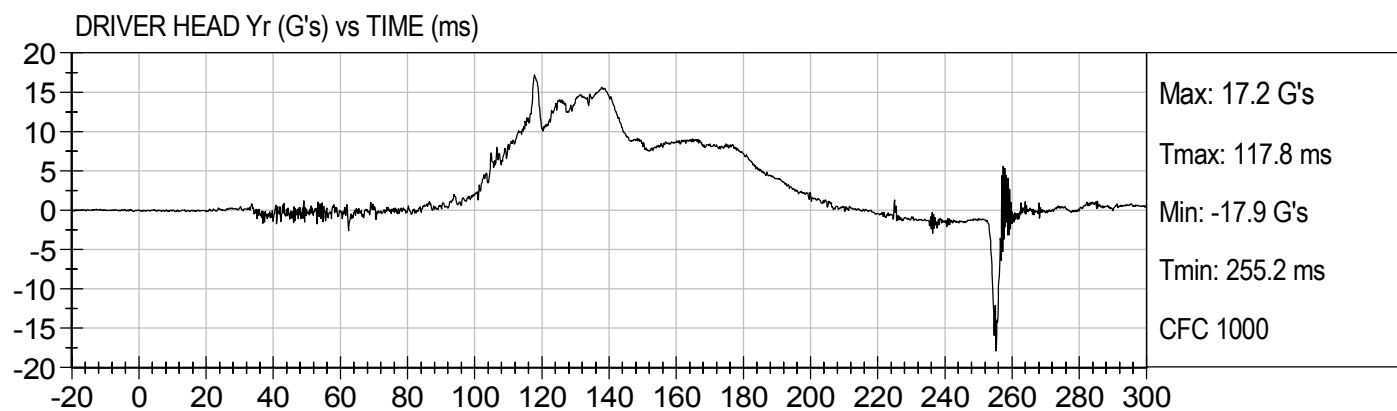
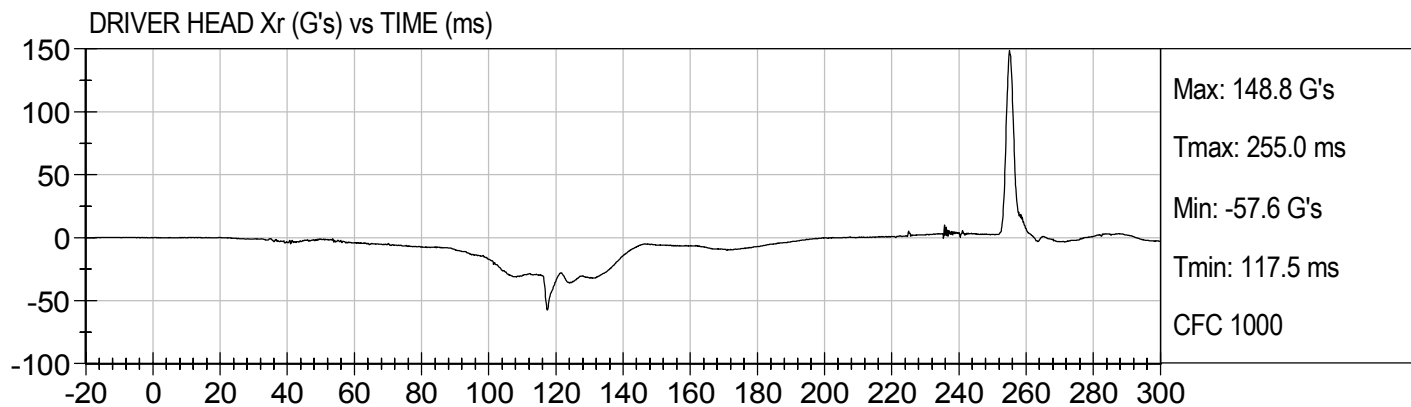


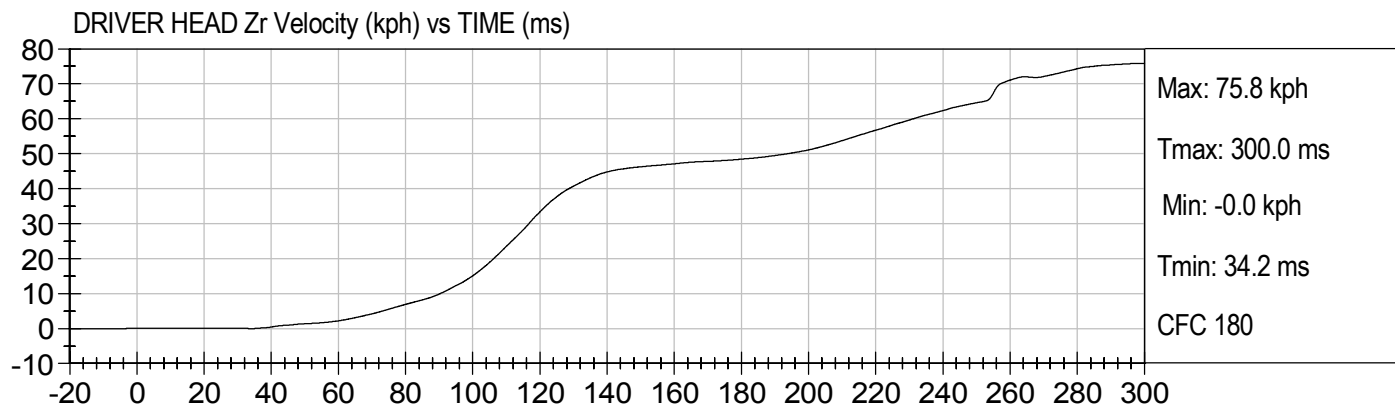
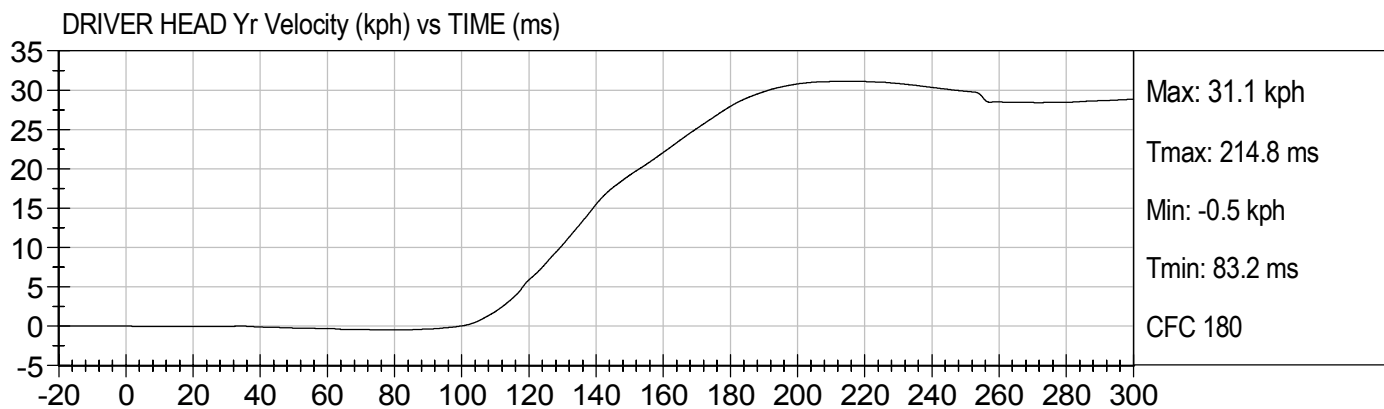
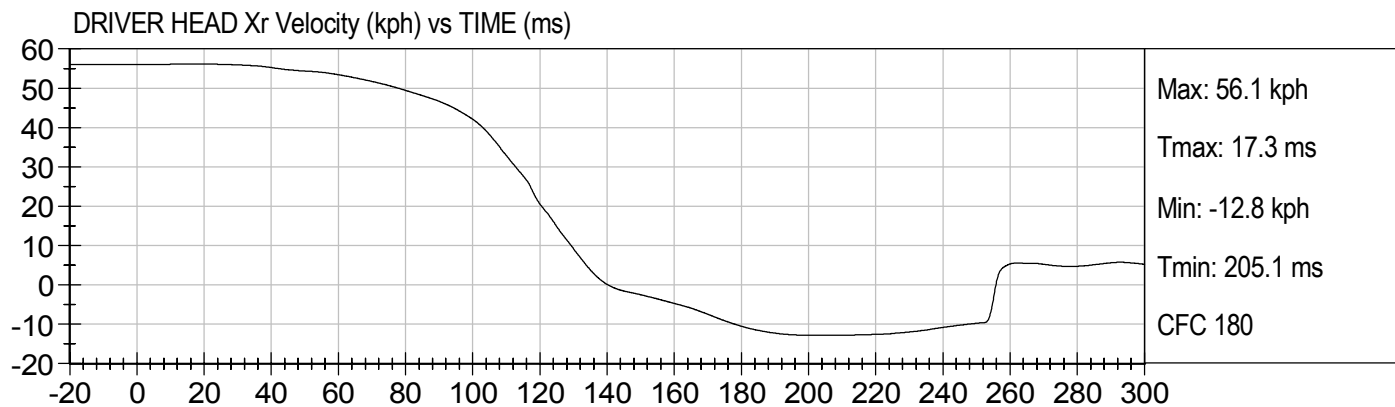




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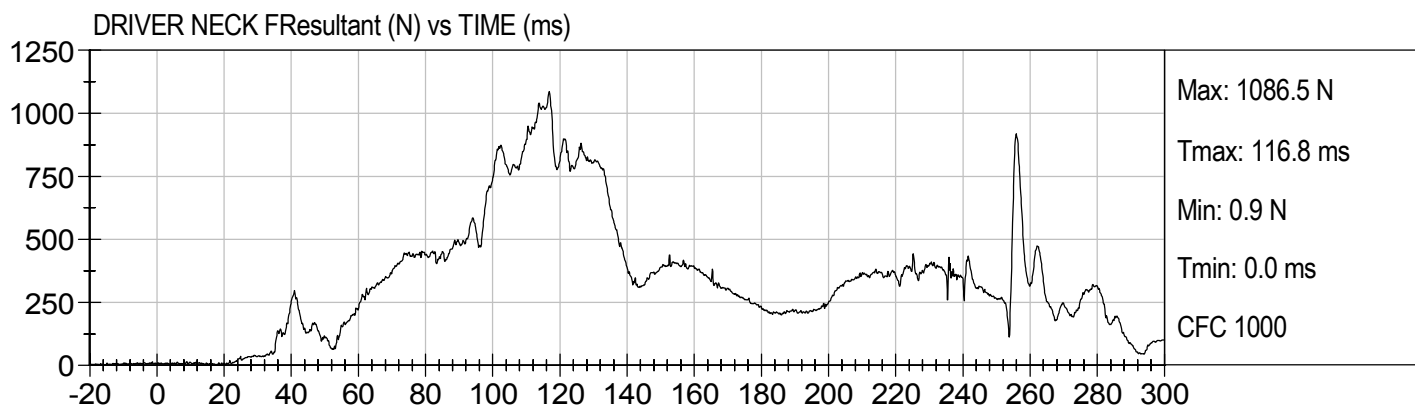
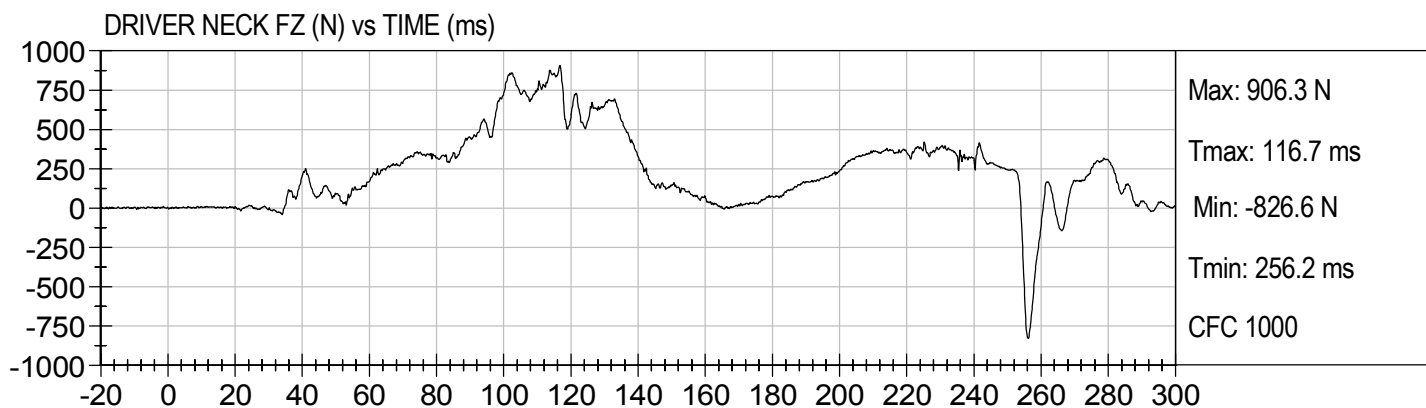
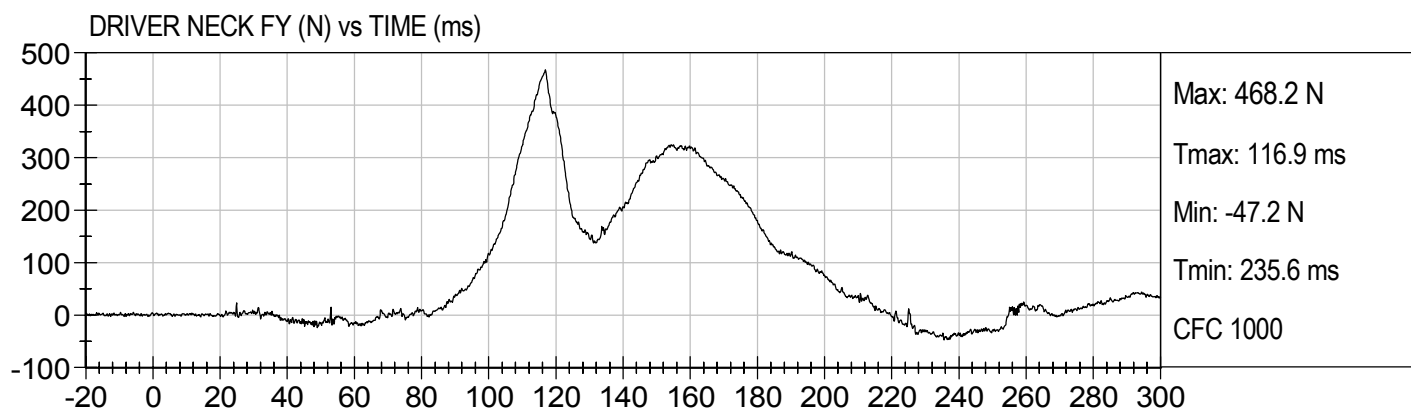
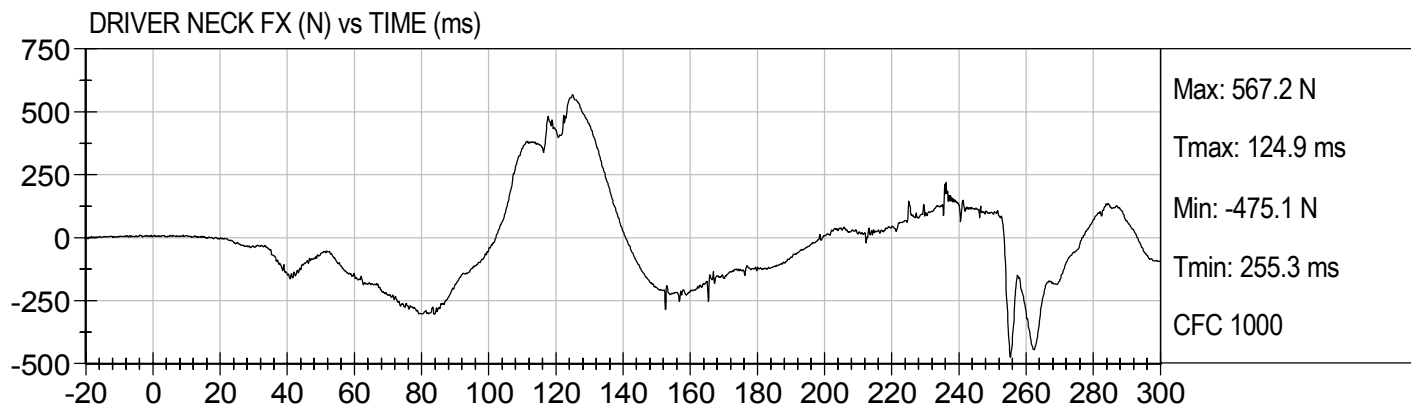






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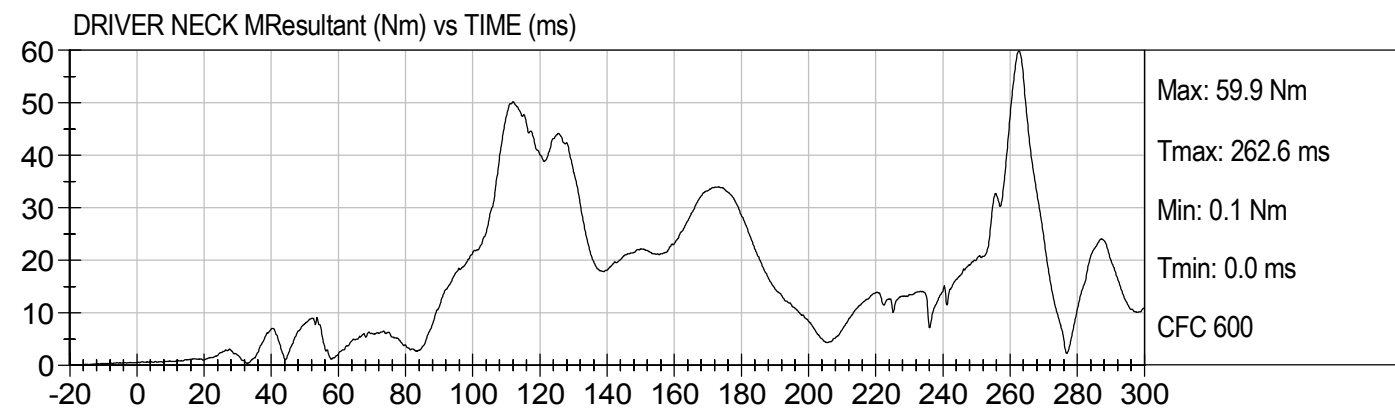
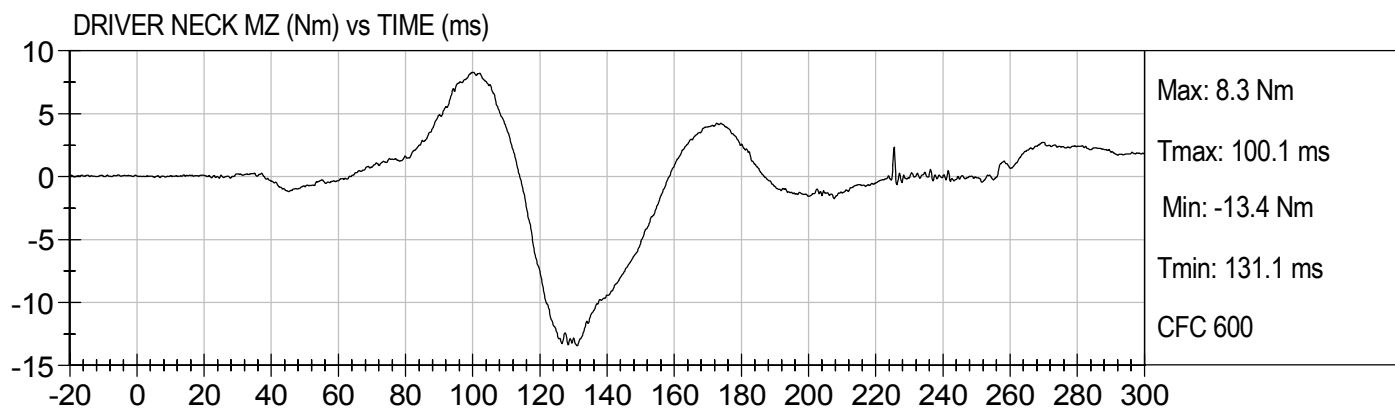
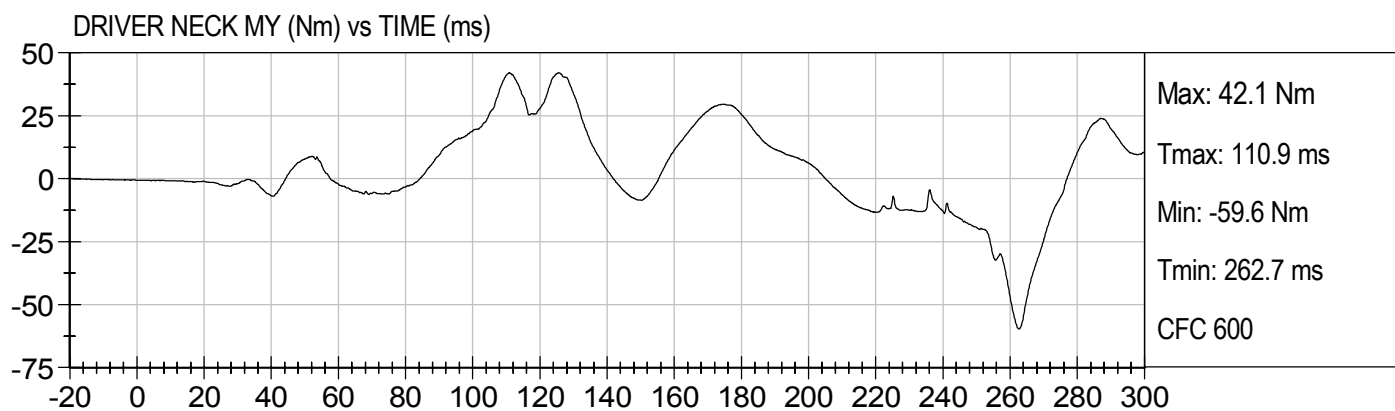
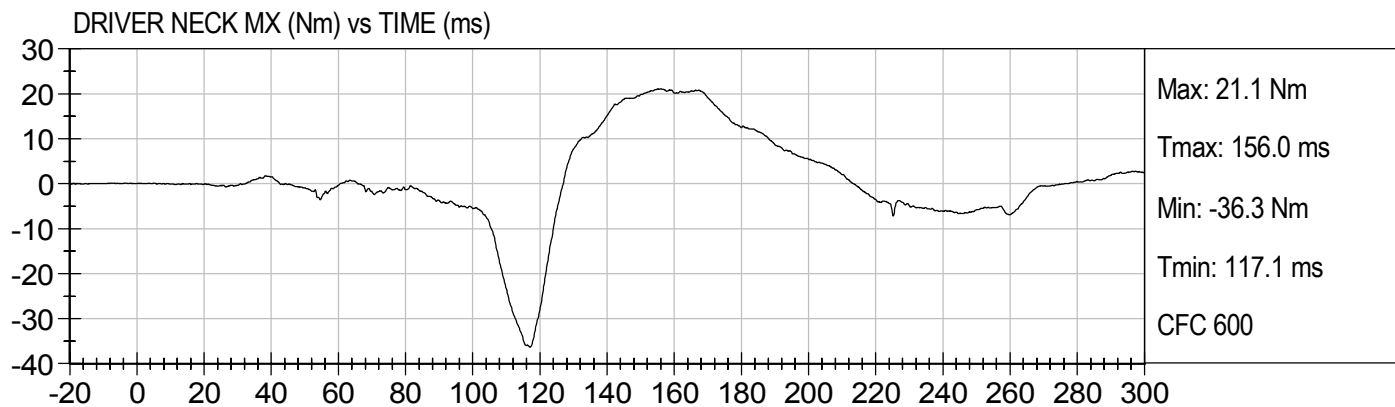
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

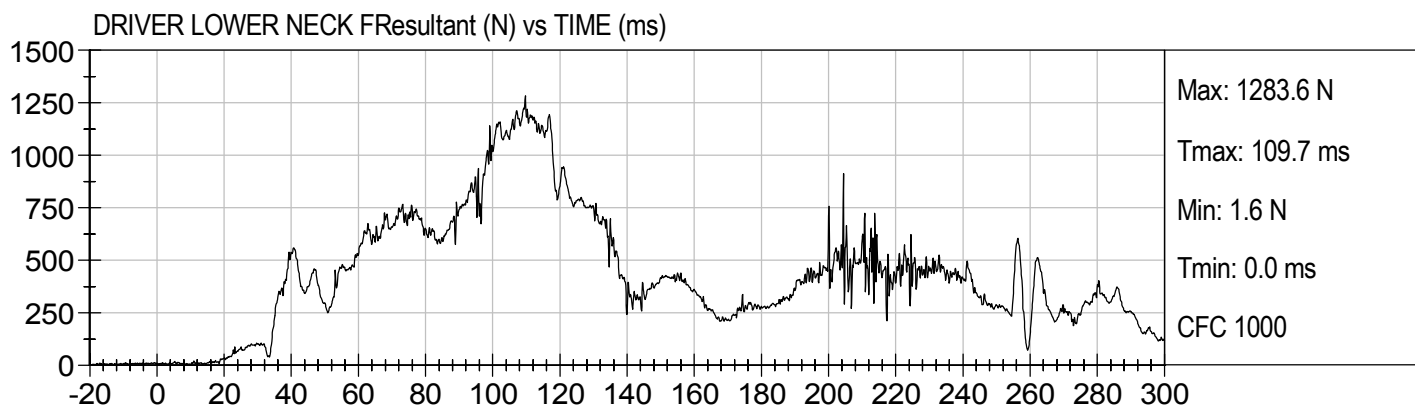
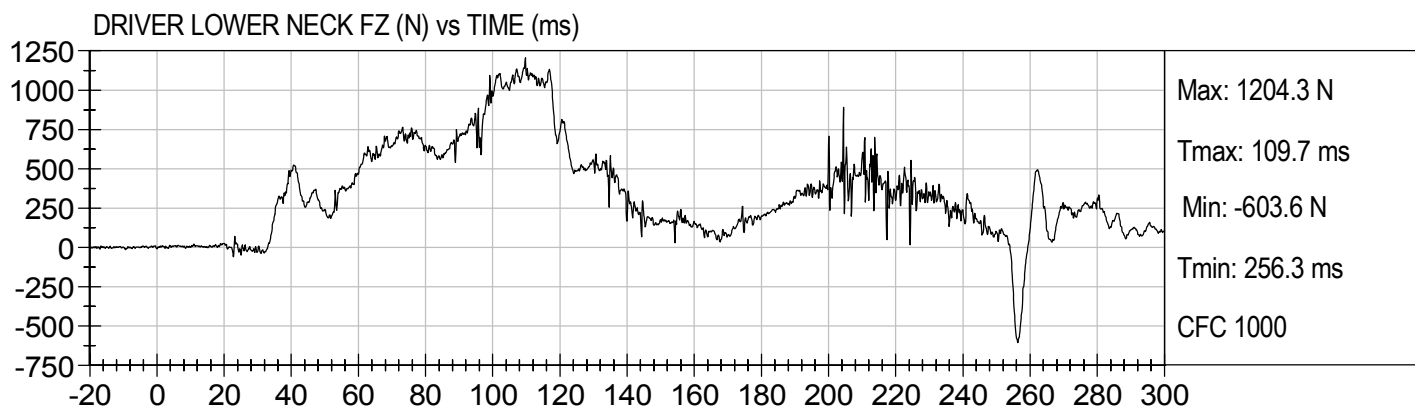
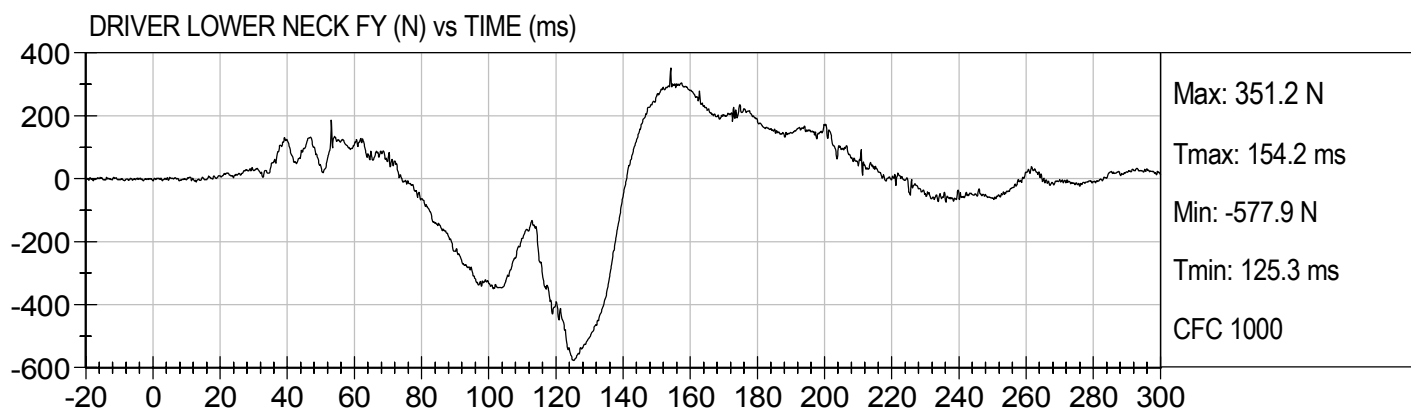
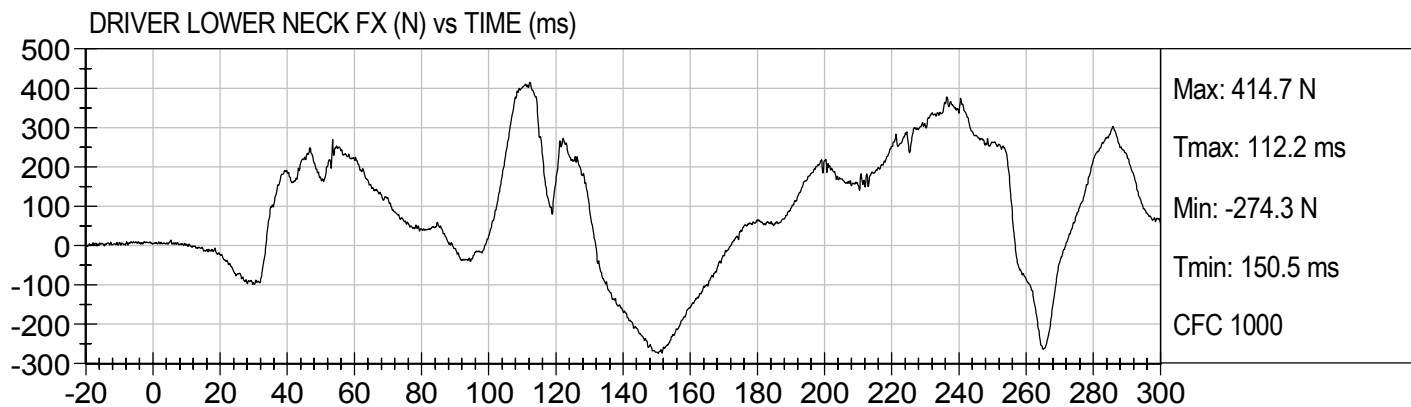
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

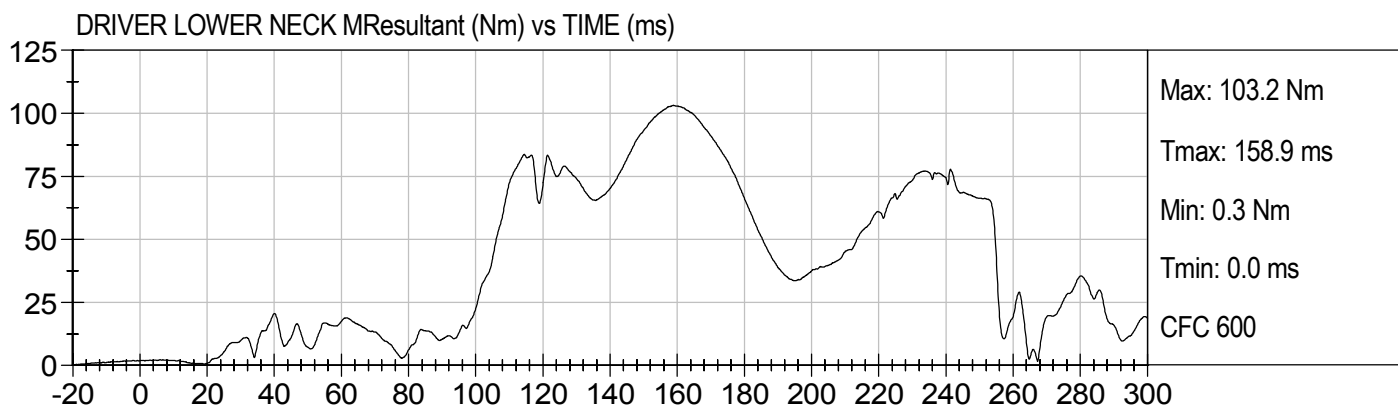
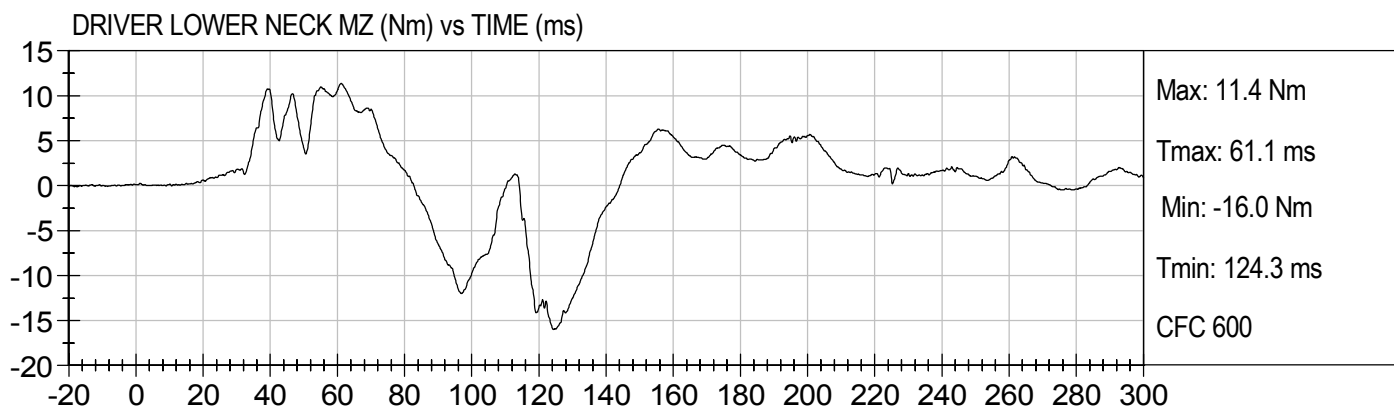
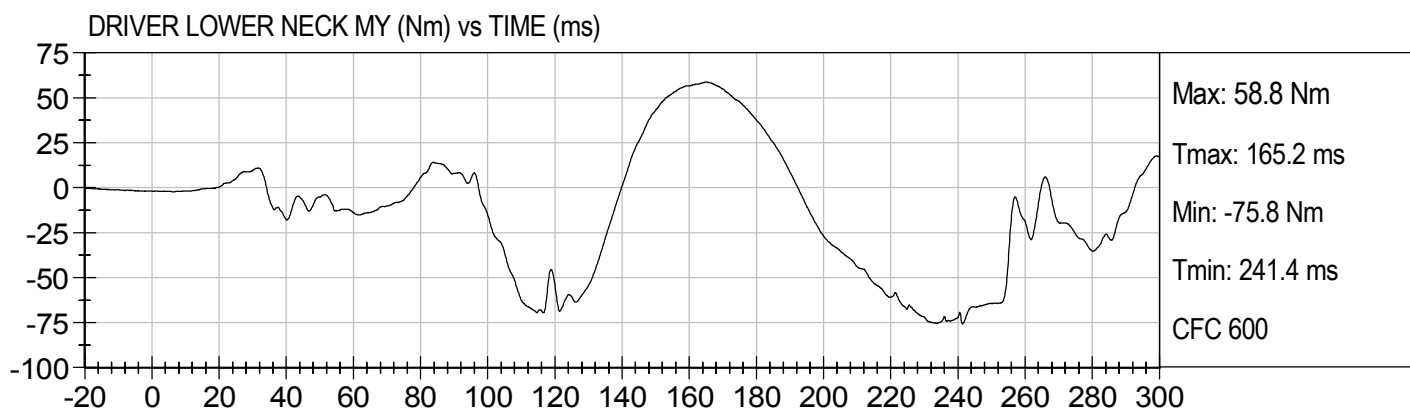
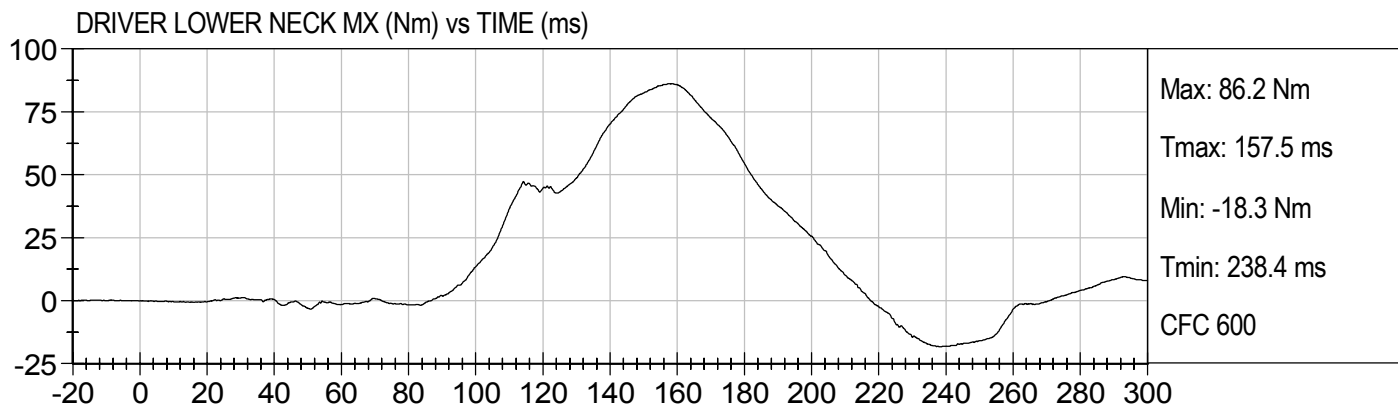




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

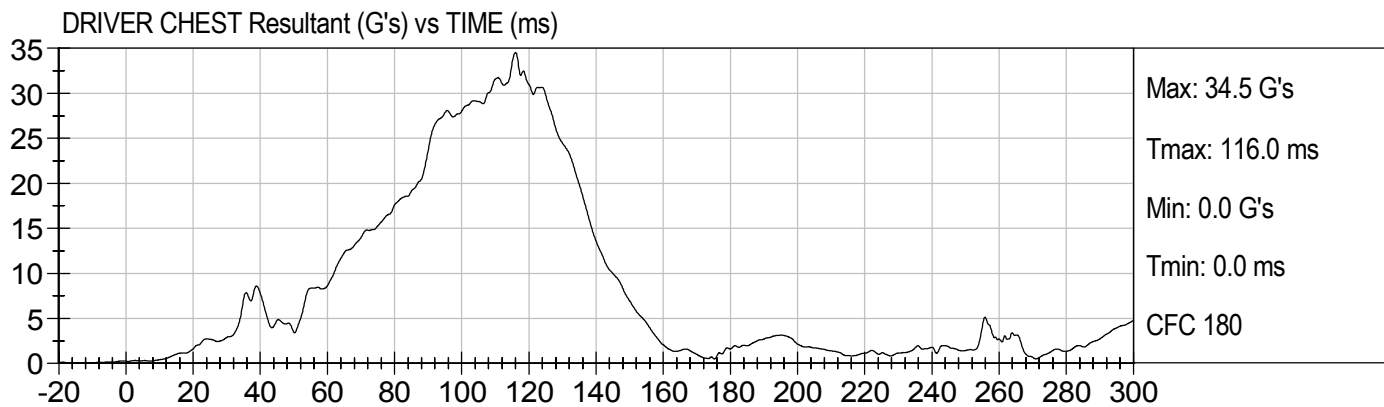
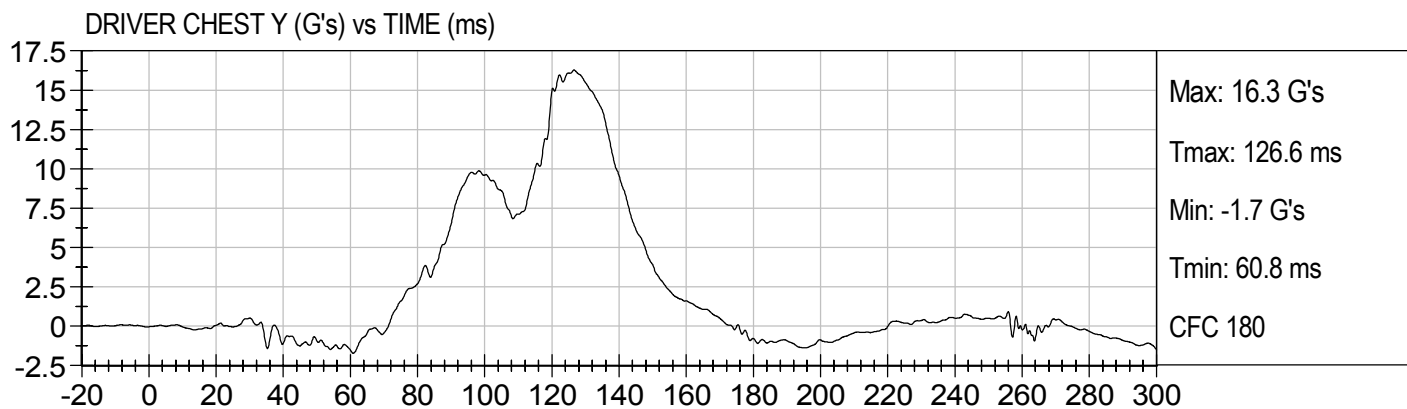
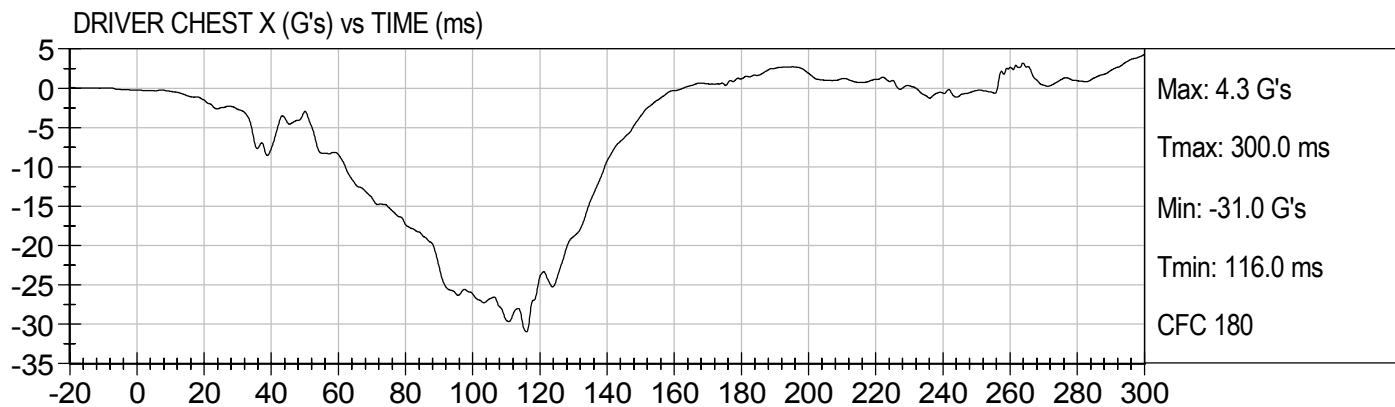


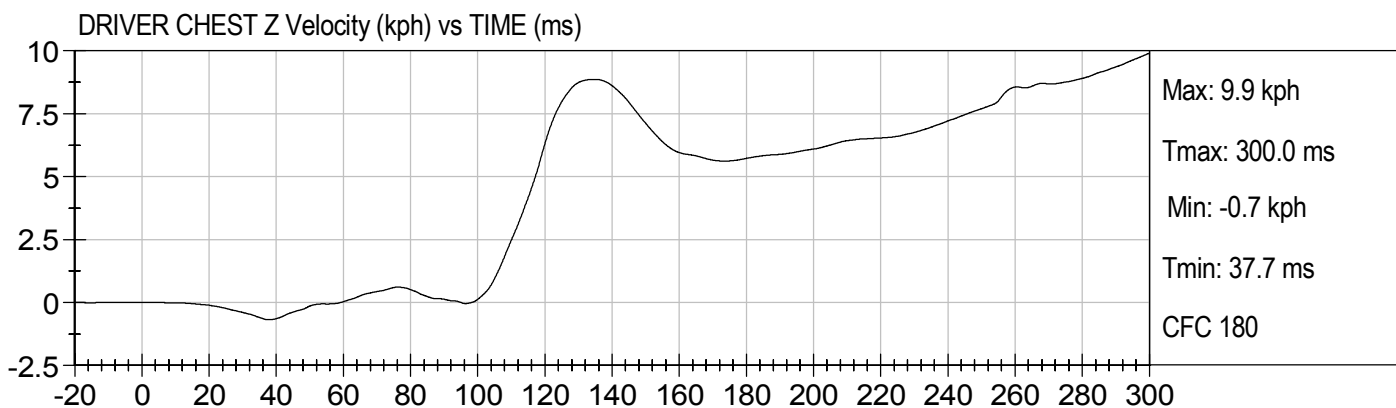
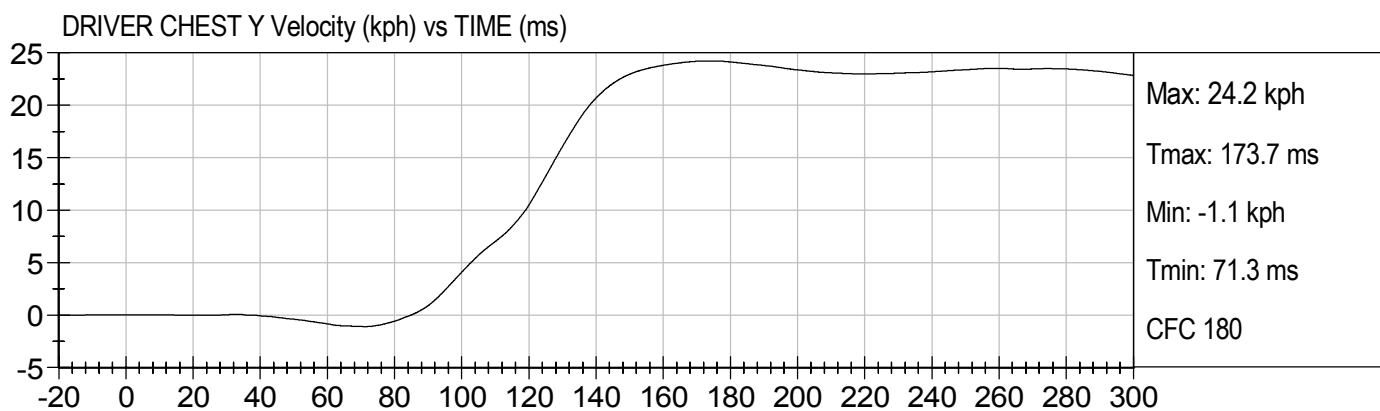
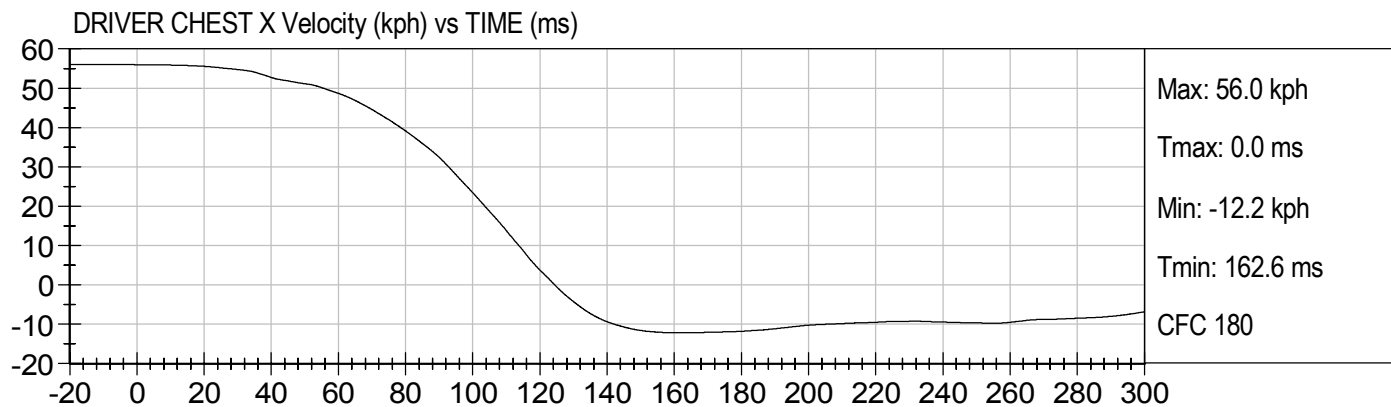




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

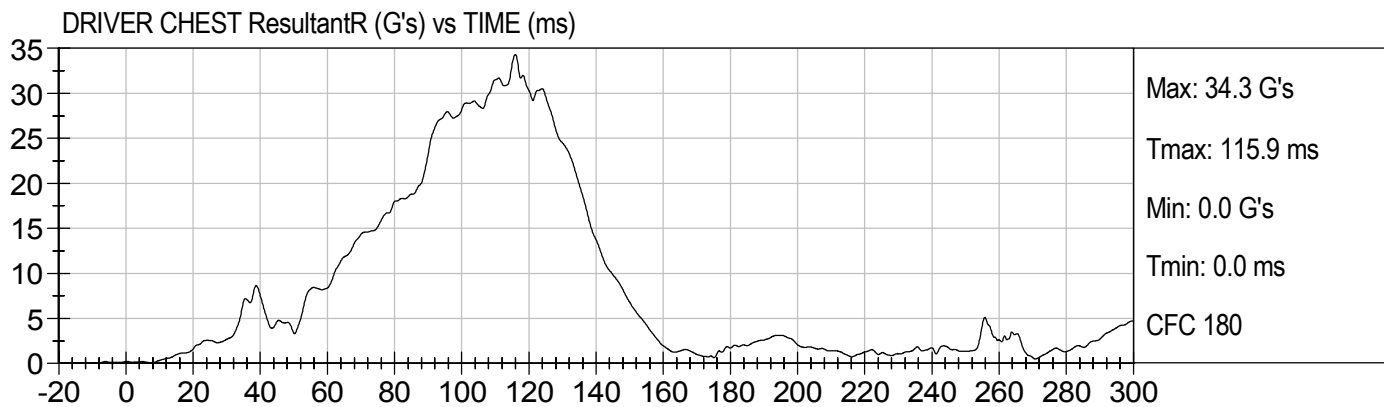
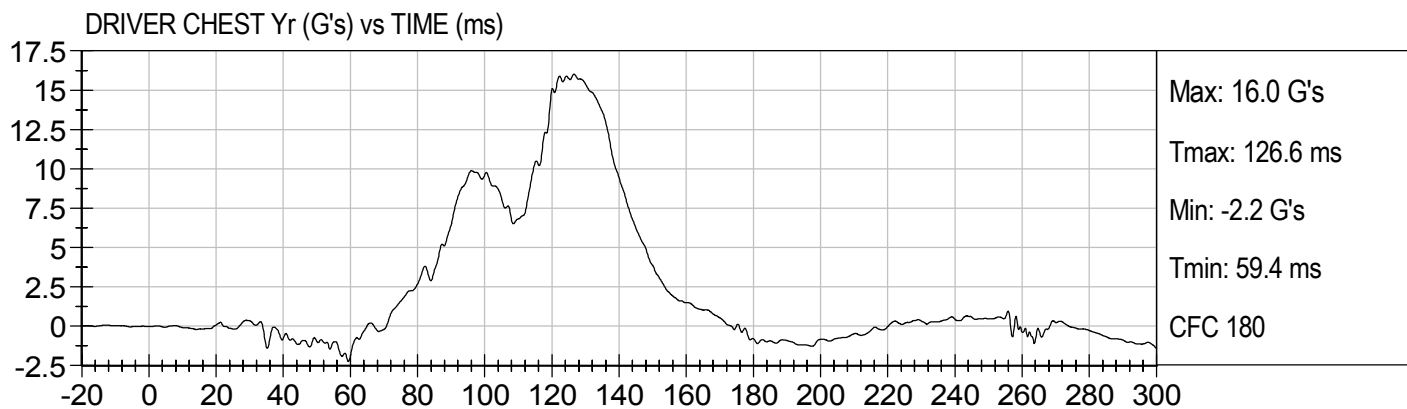
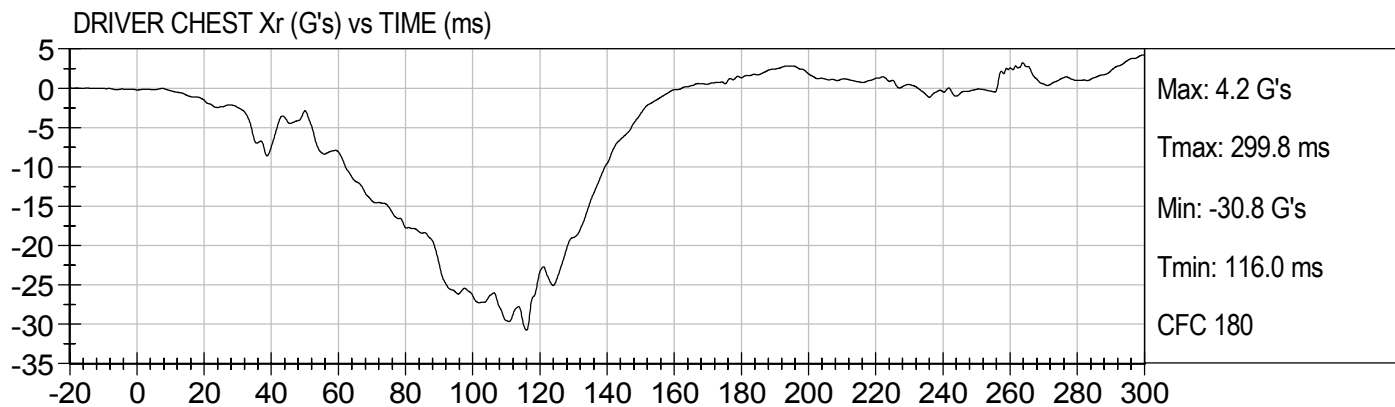






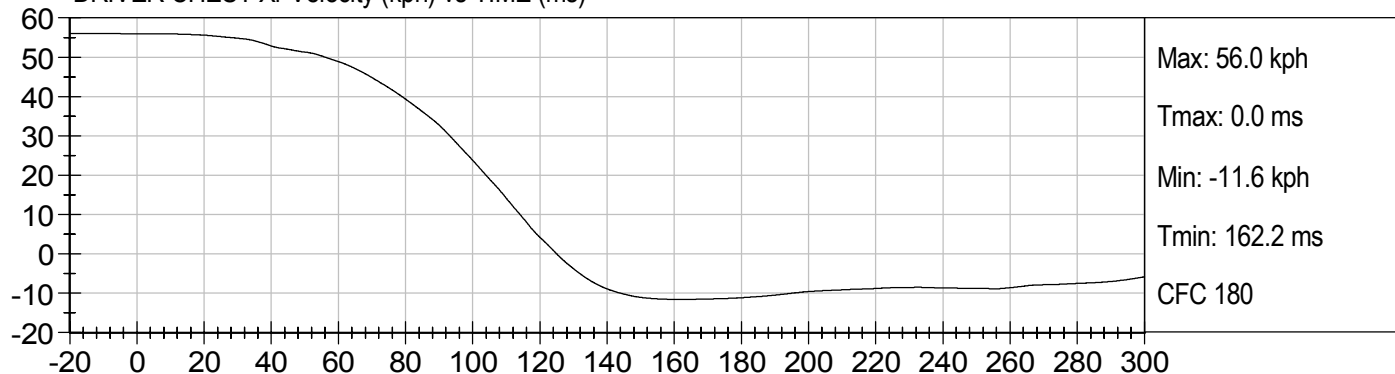
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

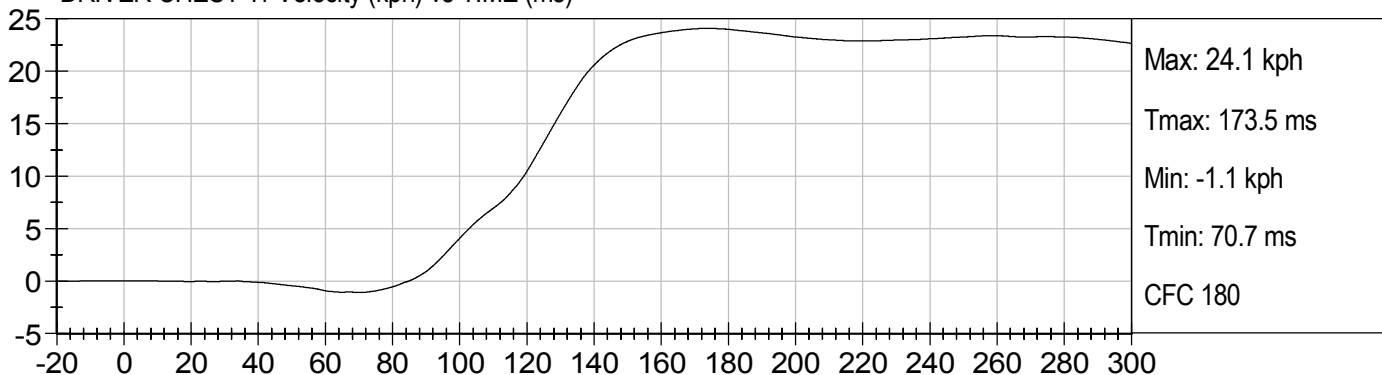




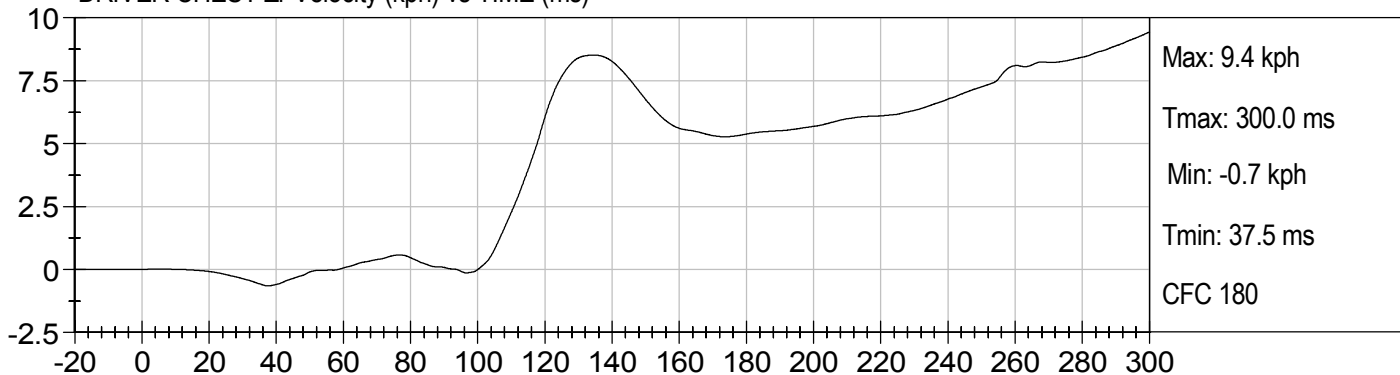
DRIVER CHEST Xr Velocity (kph) vs TIME (ms)



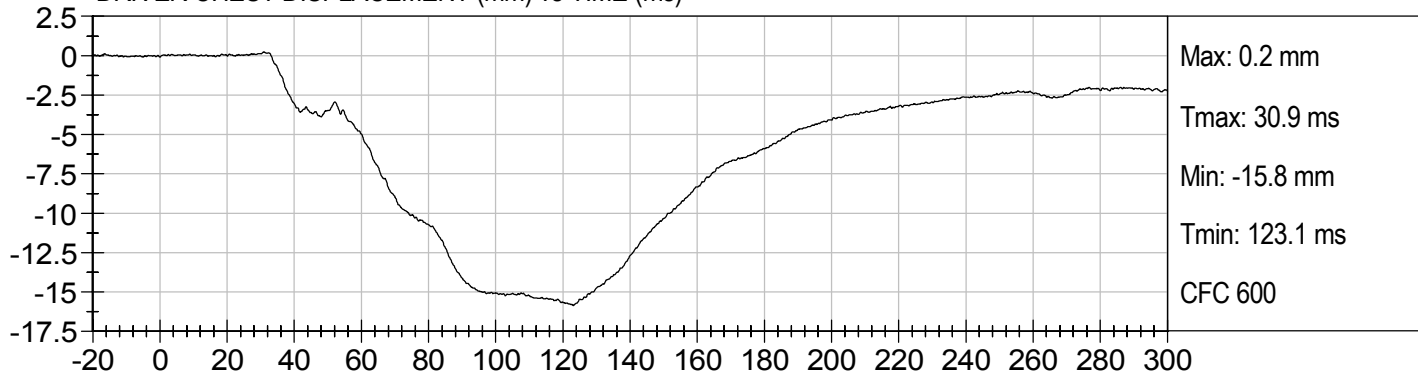
DRIVER CHEST Yr Velocity (kph) vs TIME (ms)



DRIVER CHEST Zr Velocity (kph) vs TIME (ms)



DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)

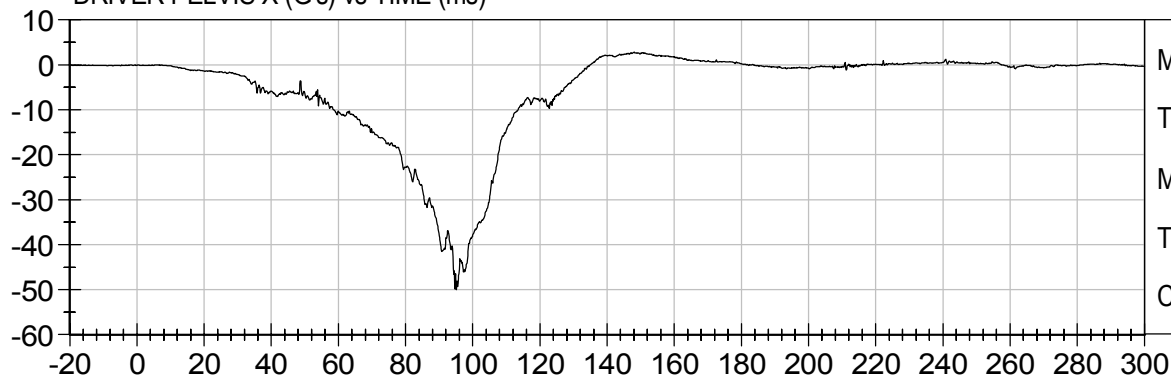




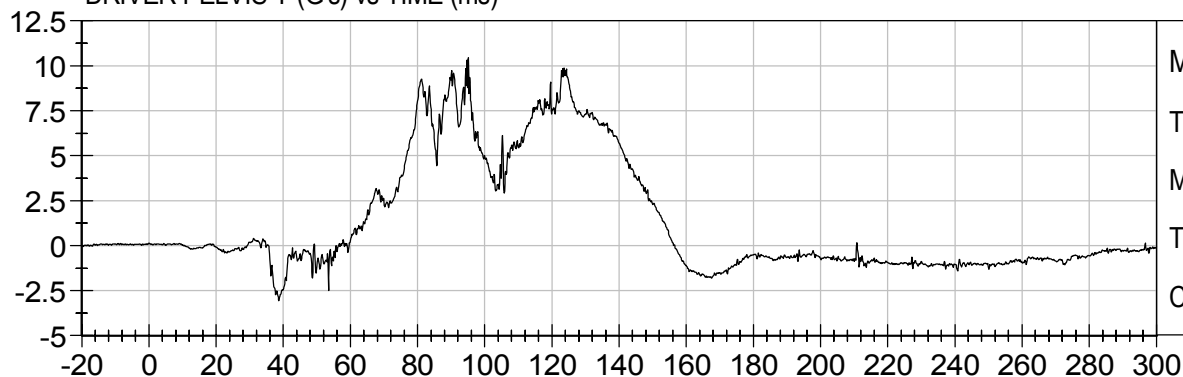
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

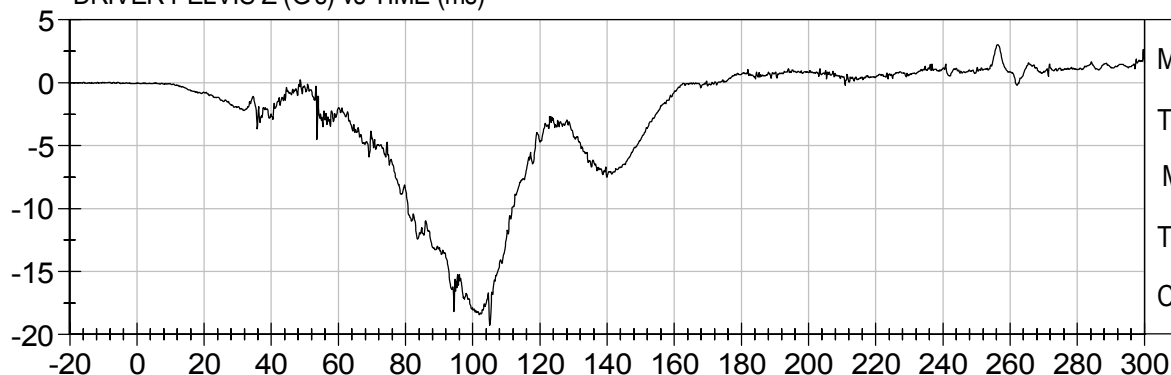
DRIVER PELVIS X (G's) vs TIME (ms)



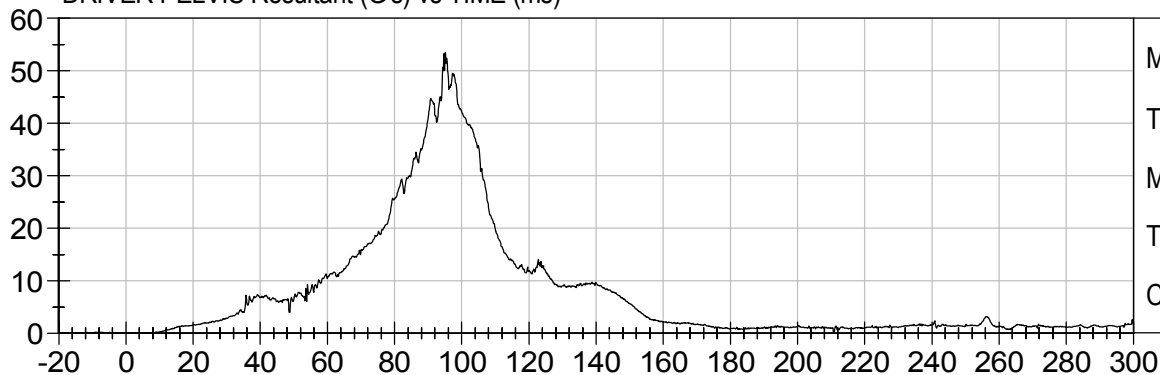
DRIVER PELVIS Y (G's) vs TIME (ms)

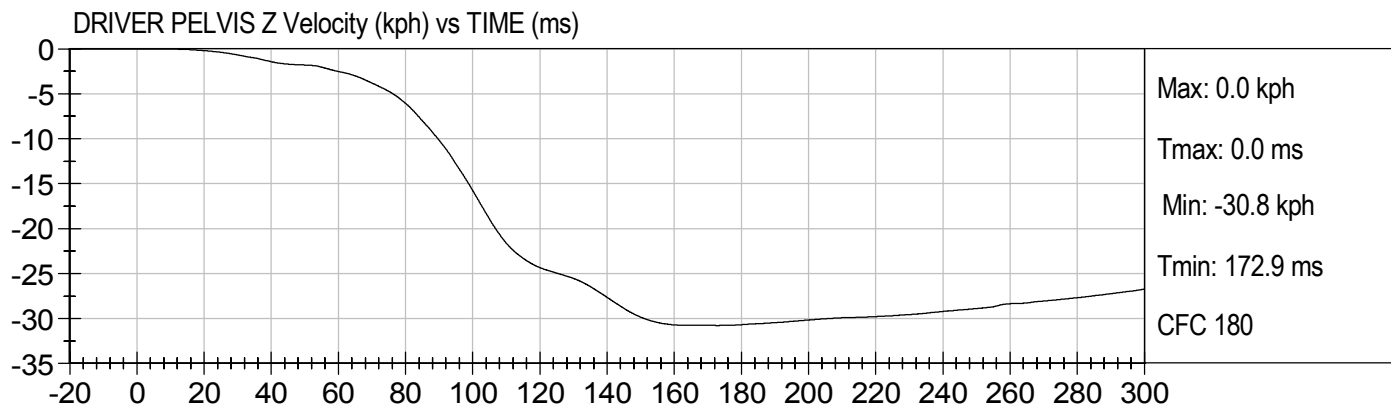
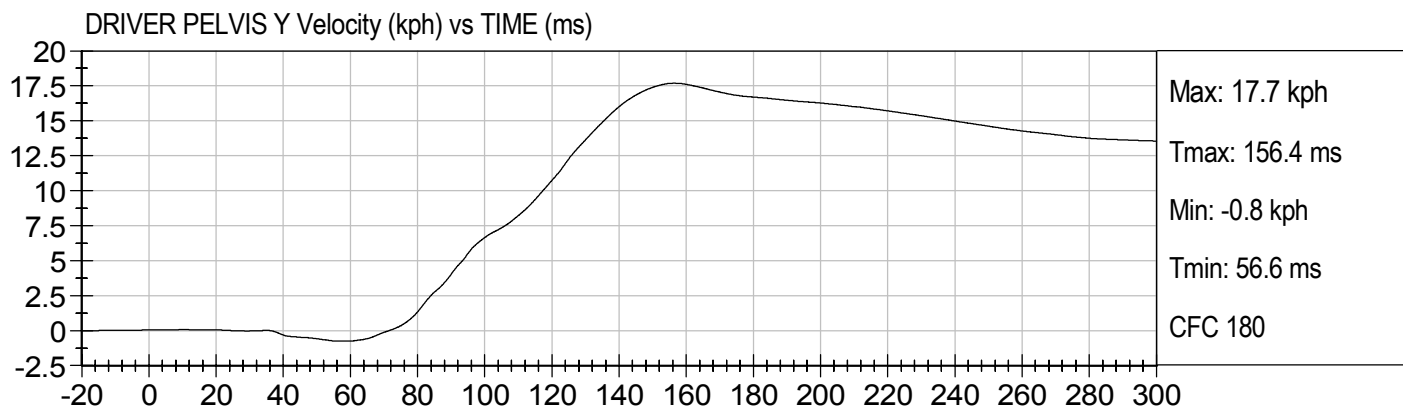
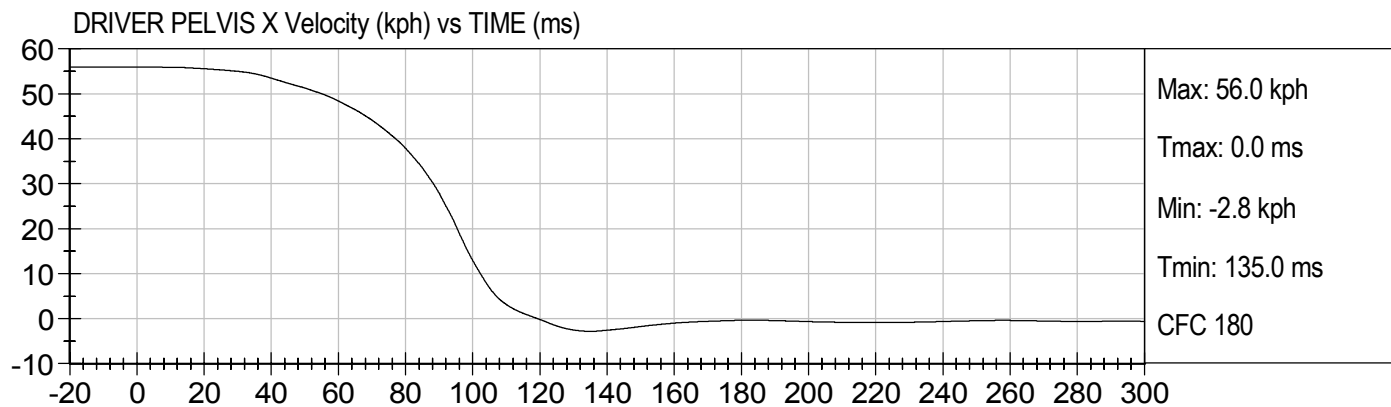


DRIVER PELVIS Z (G's) vs TIME (ms)



DRIVER PELVIS Resultant (G's) vs TIME (ms)

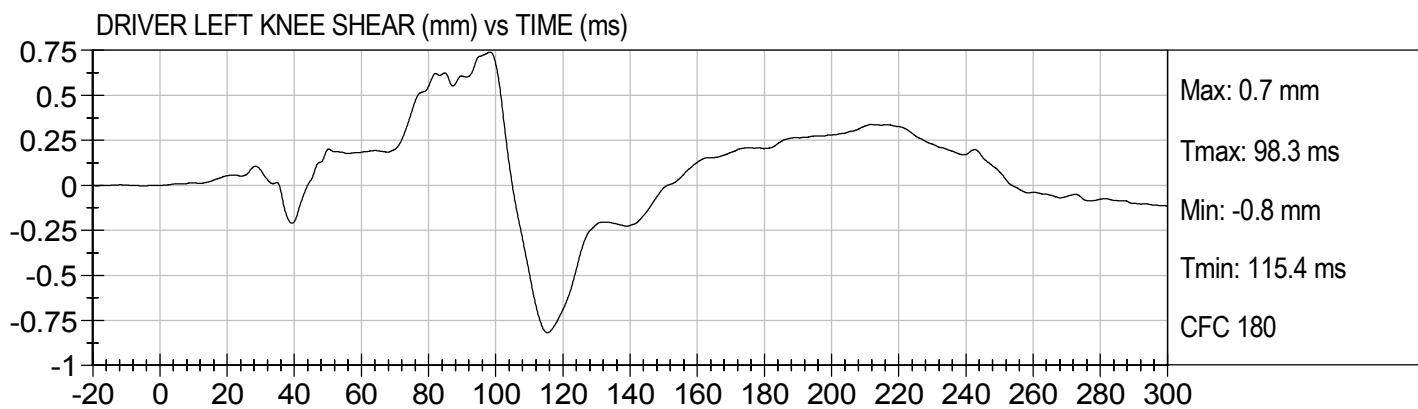
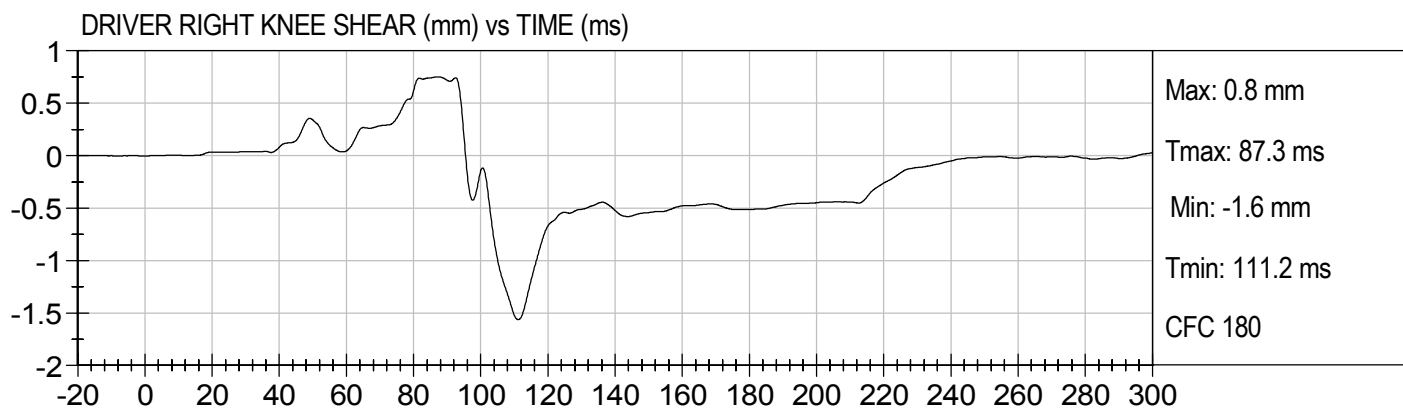
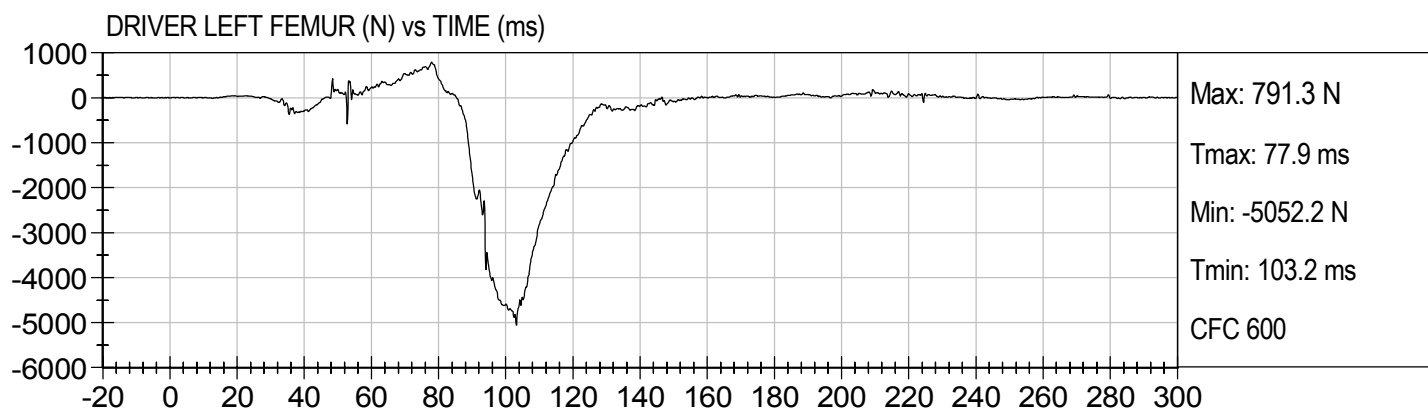
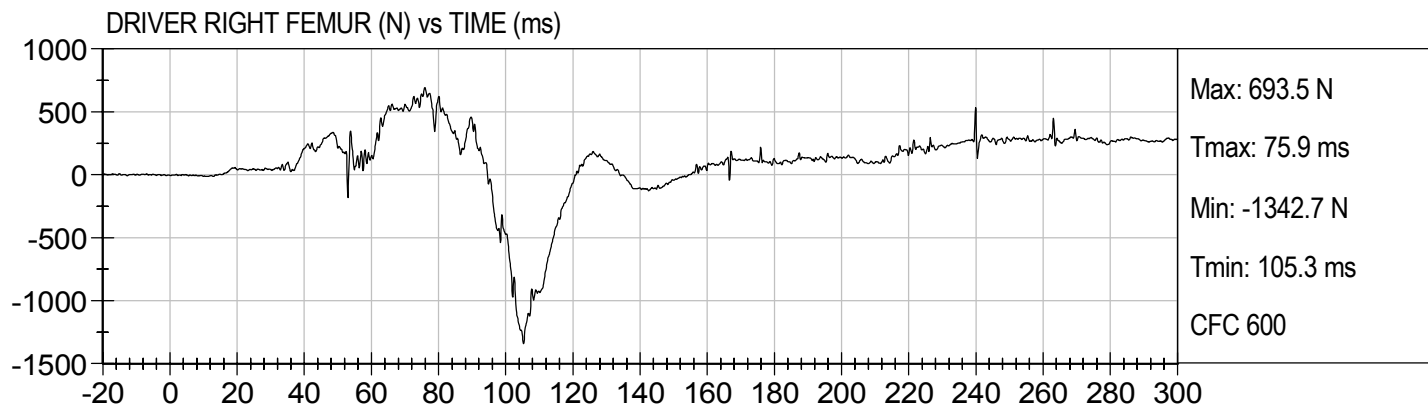






NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

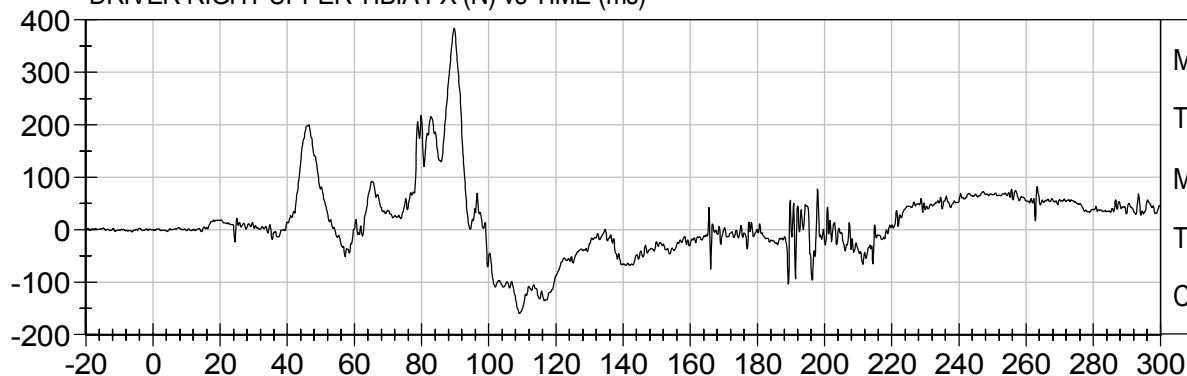




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

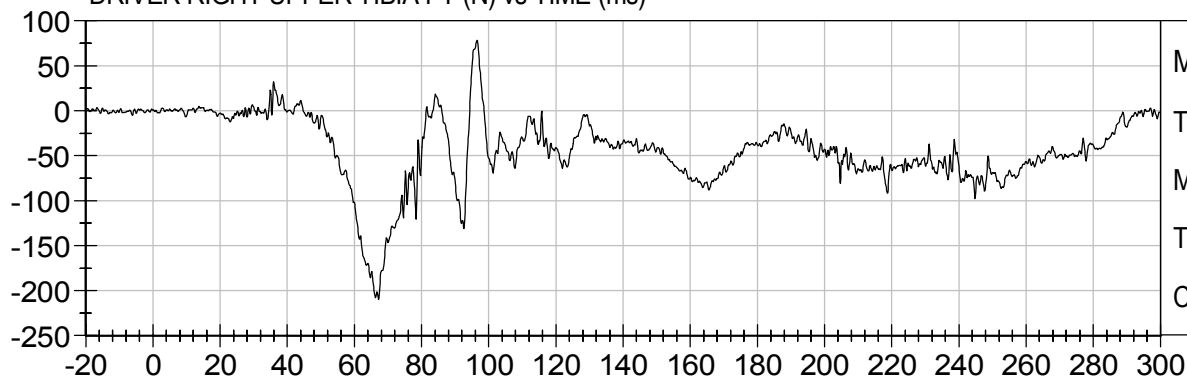
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

DRIVER RIGHT UPPER TIBIA FX (N) vs TIME (ms)



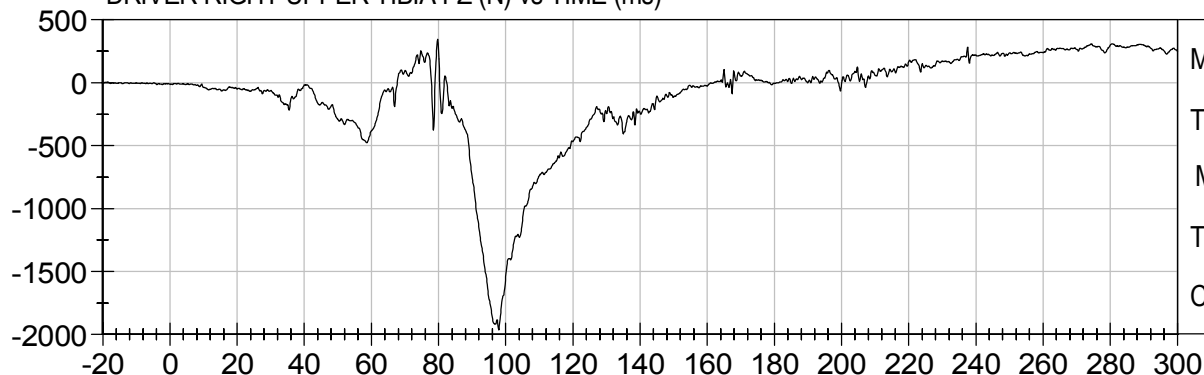
Max: 384.4 N
Tmax: 89.7 ms
Min: -159.9 N
Tmin: 109.1 ms
CFC 600

DRIVER RIGHT UPPER TIBIA FY (N) vs TIME (ms)



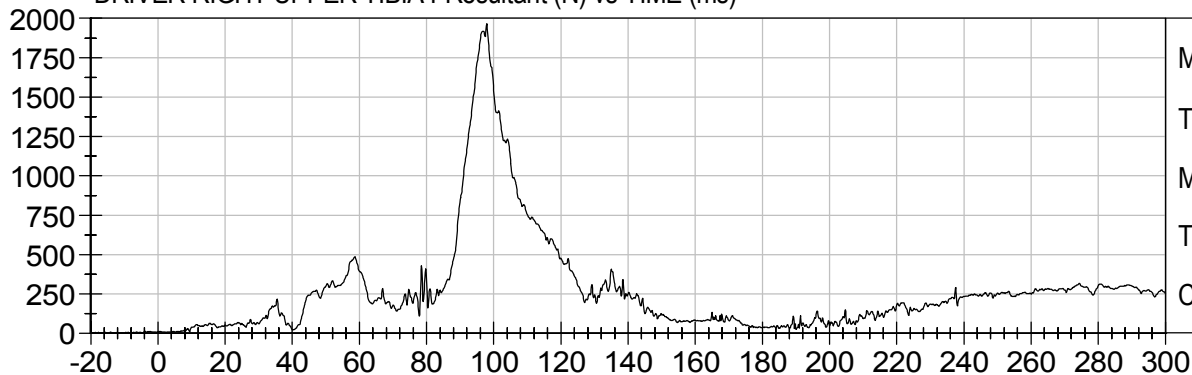
Max: 78.2 N
Tmax: 96.5 ms
Min: -209.6 N
Tmin: 67.2 ms
CFC 600

DRIVER RIGHT UPPER TIBIA FZ (N) vs TIME (ms)



Max: 347.3 N
Tmax: 79.7 ms
Min: -1965.7 N
Tmin: 97.9 ms
CFC 600

DRIVER RIGHT UPPER TIBIA FResultant (N) vs TIME (ms)

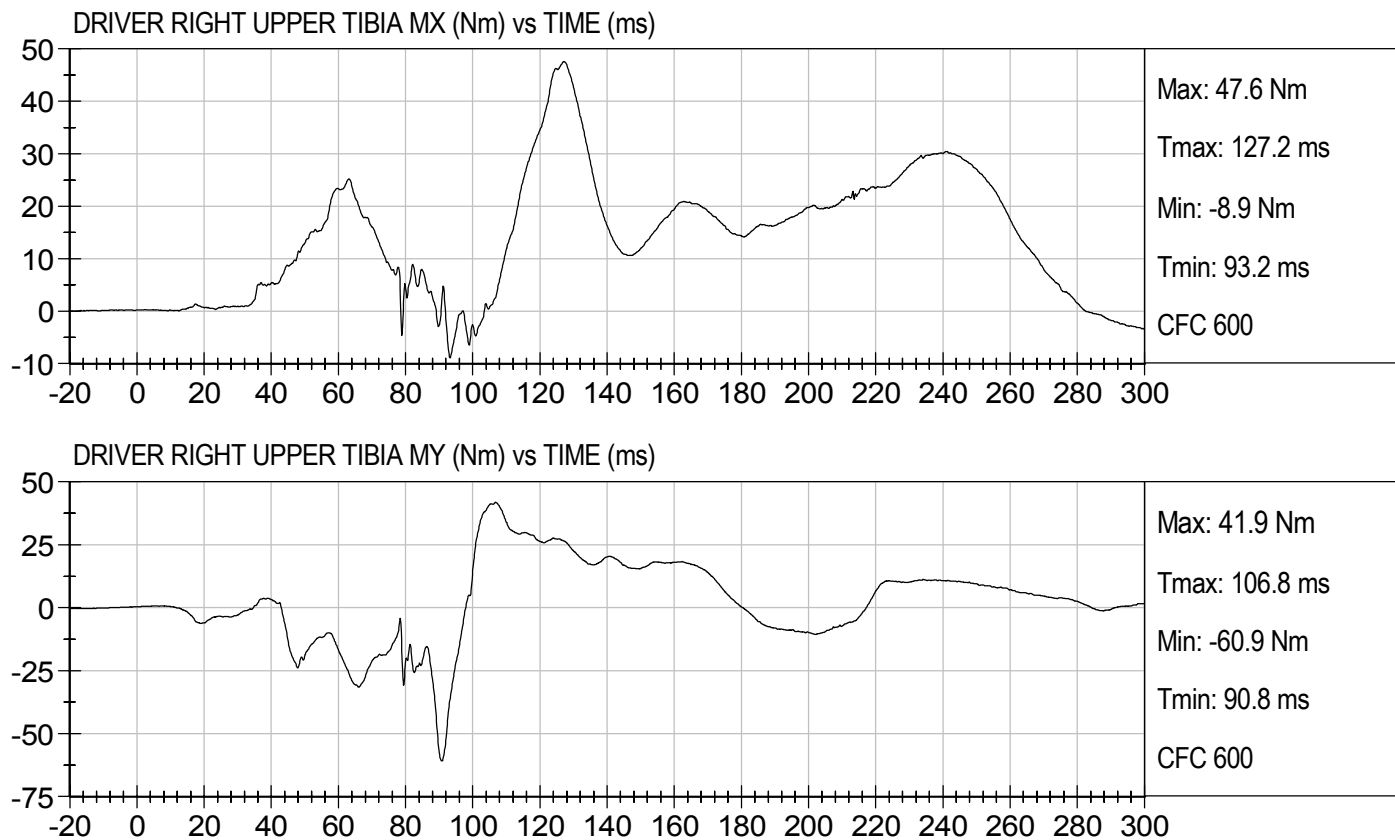


Max: 1965.9 N
Tmax: 97.9 ms
Min: 0.8 N
Tmin: 0.0 ms
CFC 600



NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

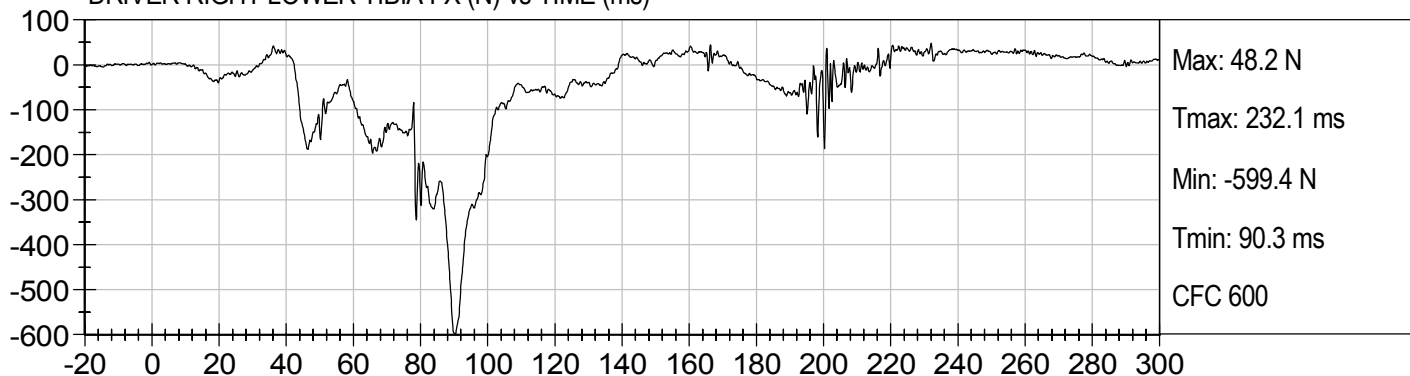




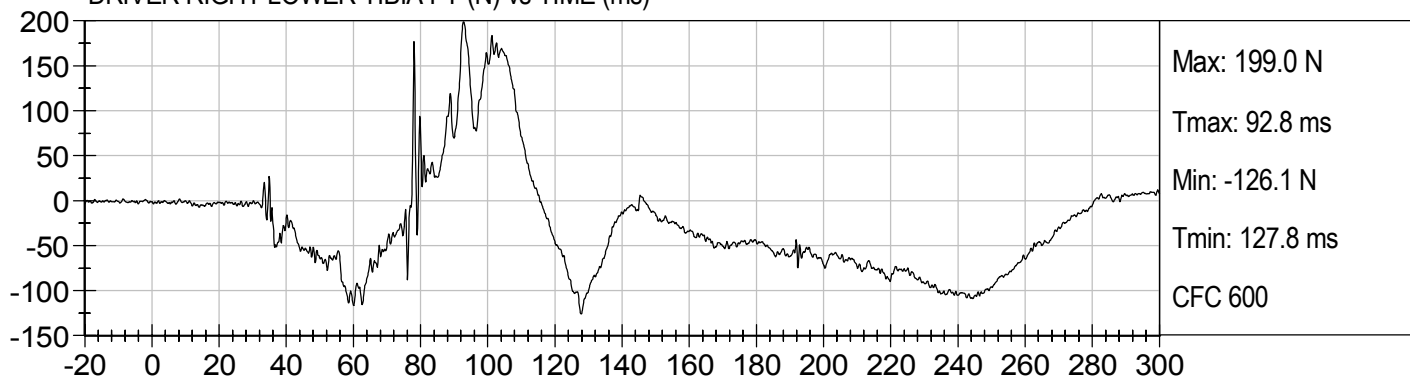
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

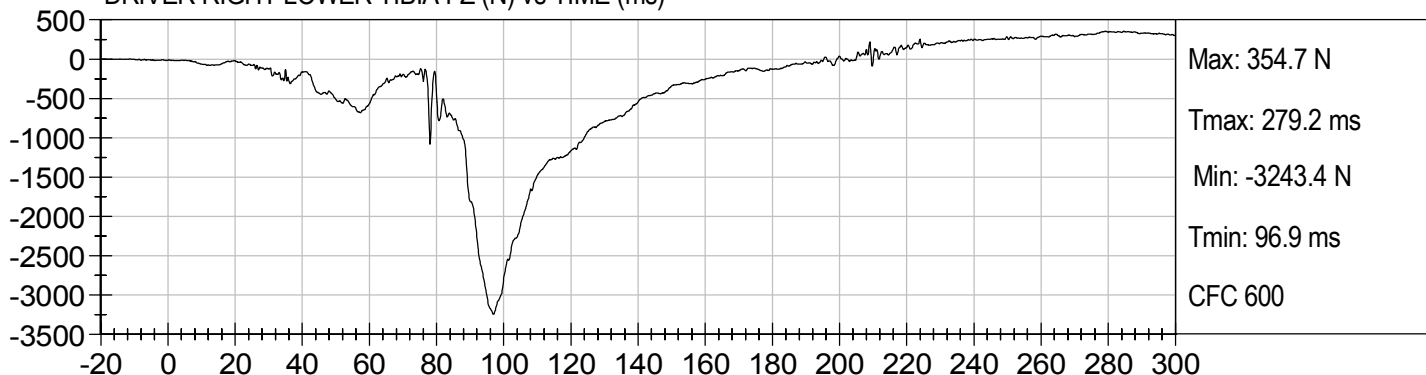
DRIVER RIGHT LOWER TIBIA FX (N) vs TIME (ms)



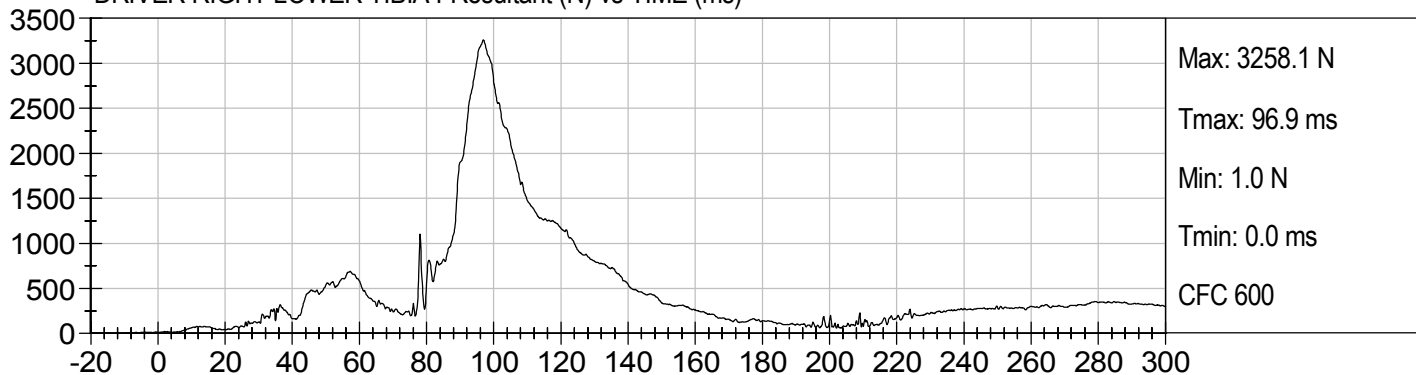
DRIVER RIGHT LOWER TIBIA FY (N) vs TIME (ms)



DRIVER RIGHT LOWER TIBIA FZ (N) vs TIME (ms)



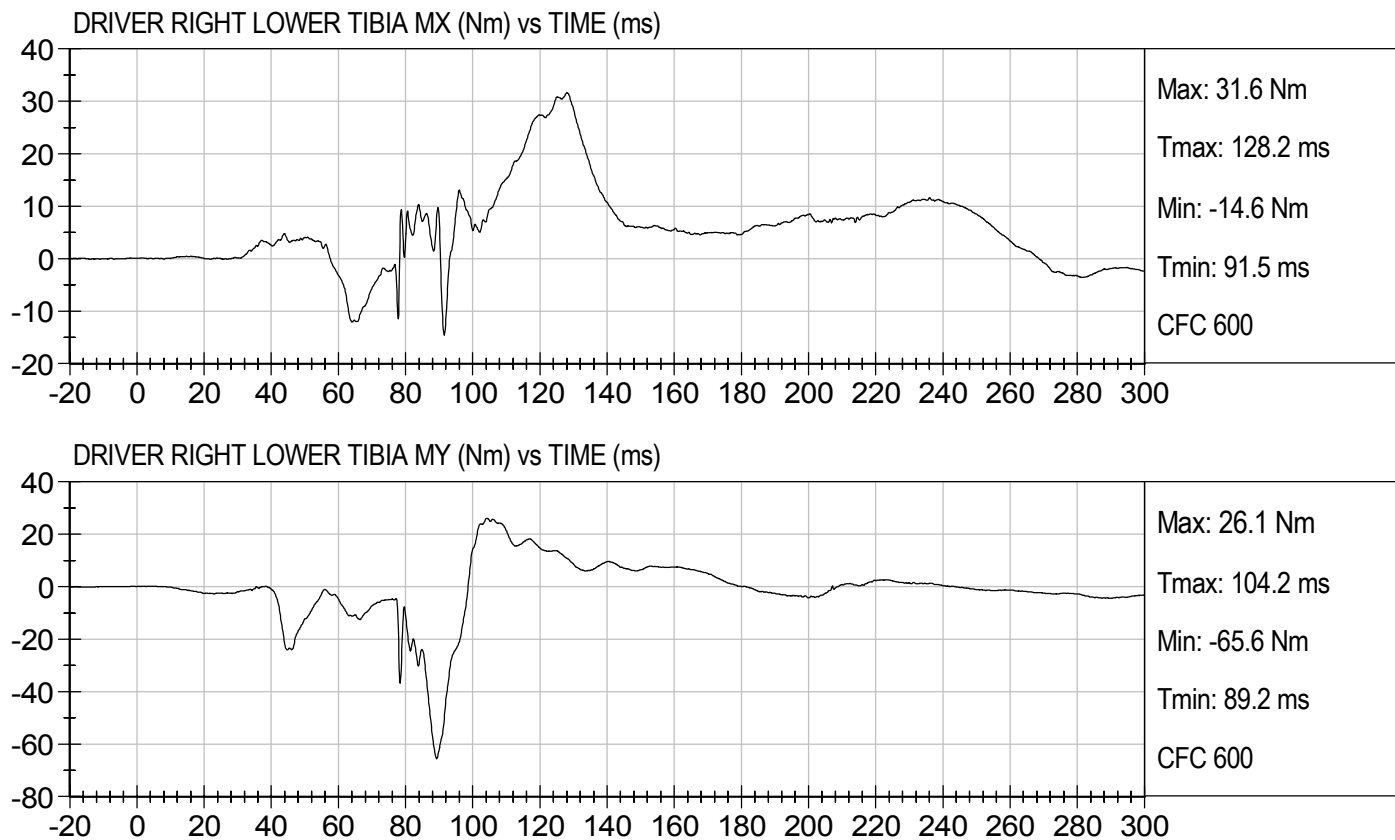
DRIVER RIGHT LOWER TIBIA FResultant (N) vs TIME (ms)

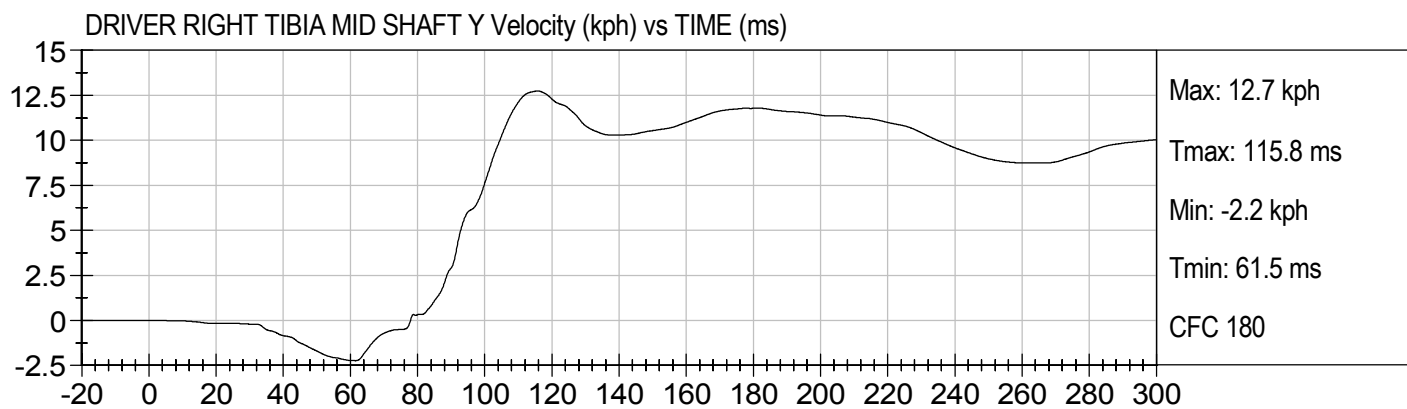
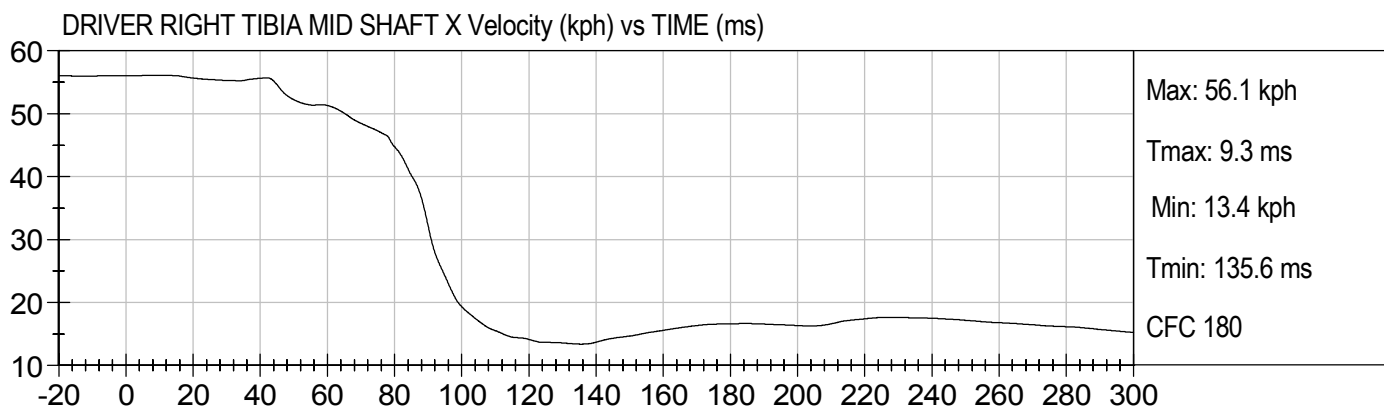
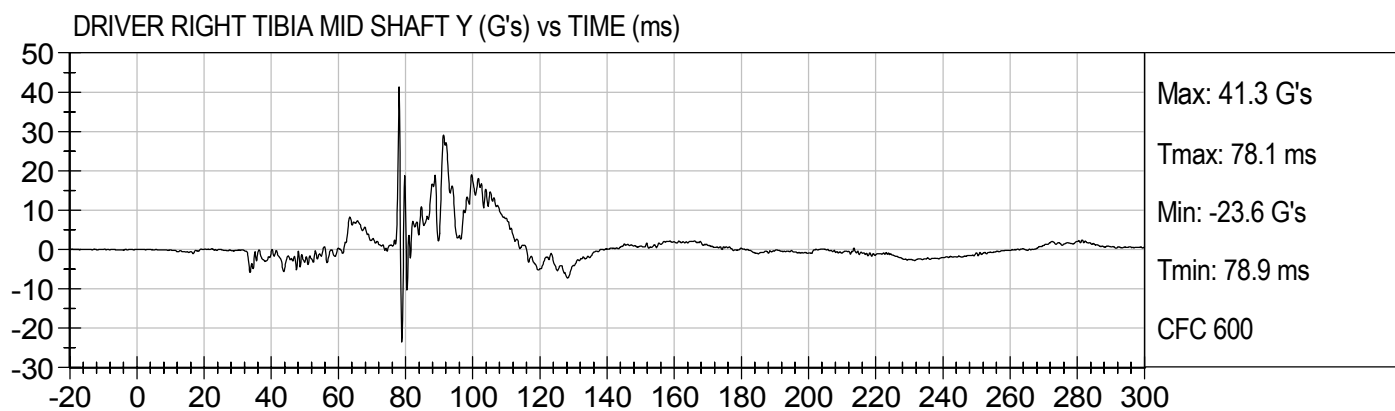
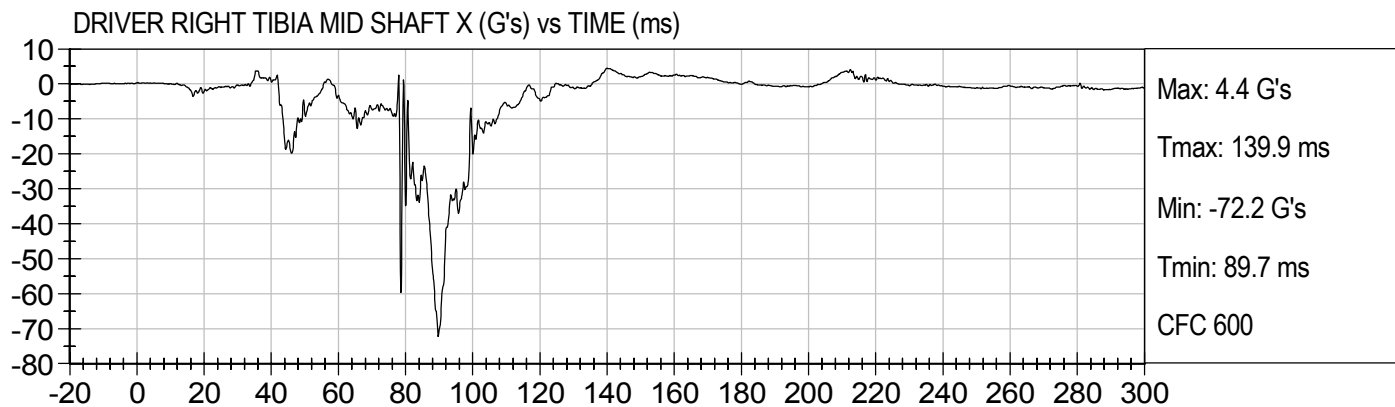


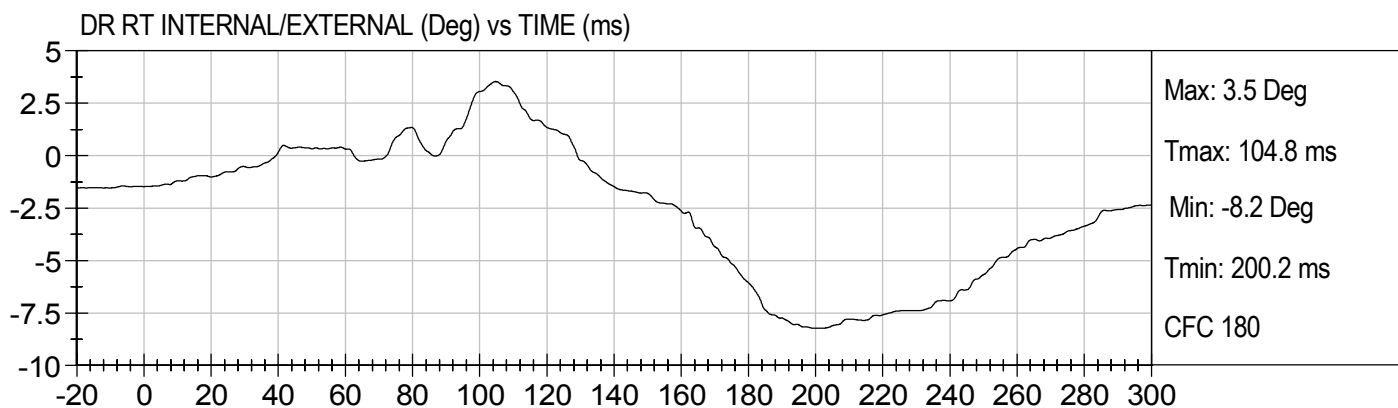
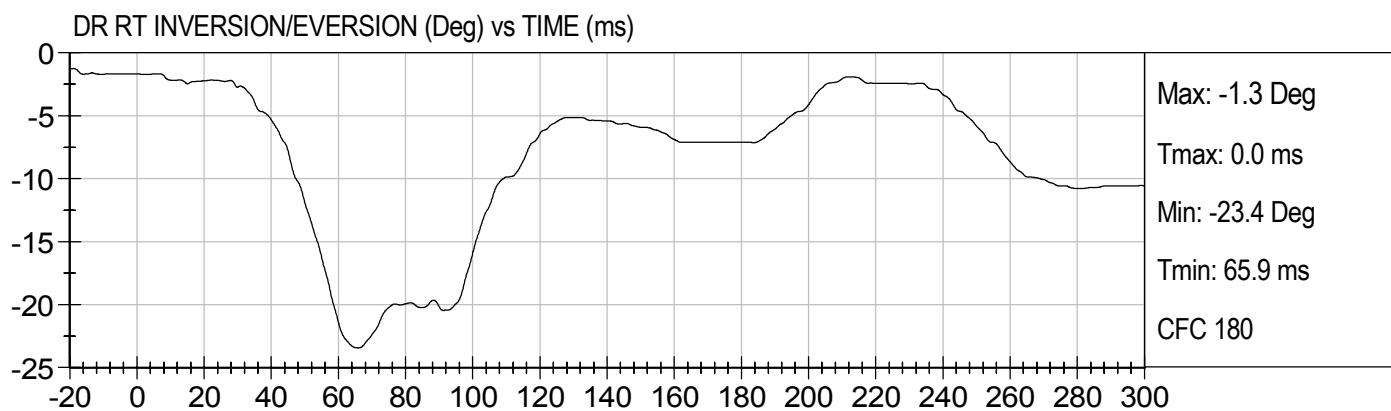
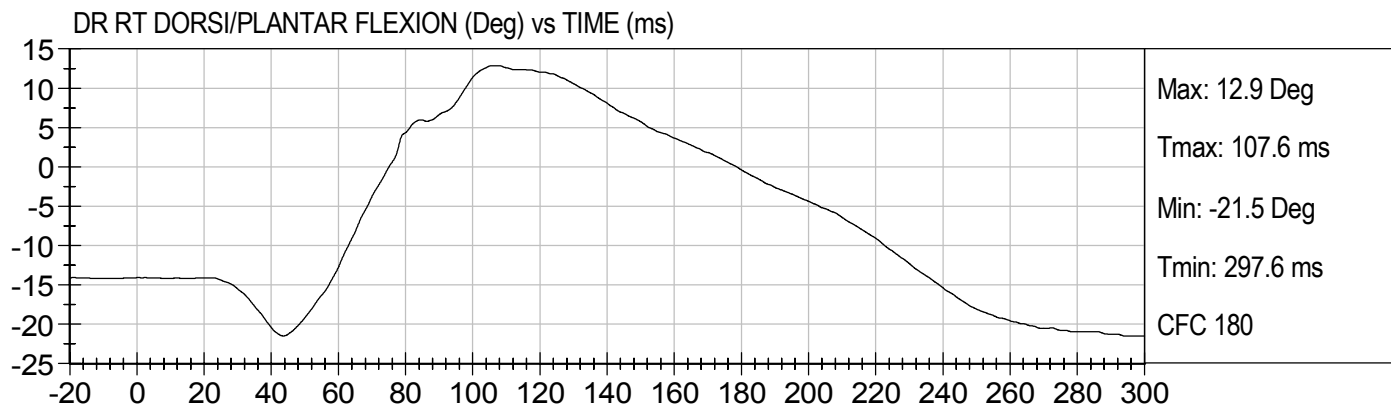


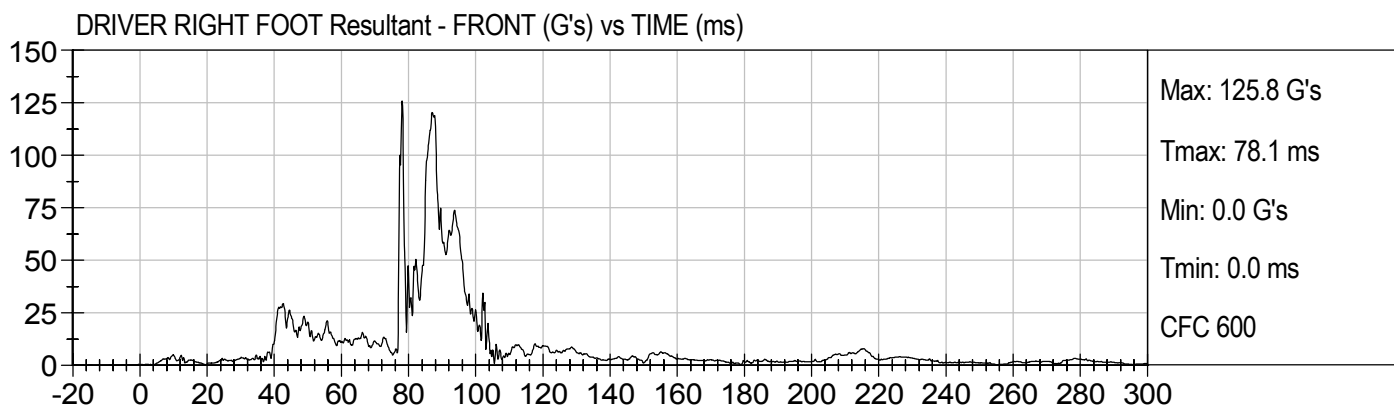
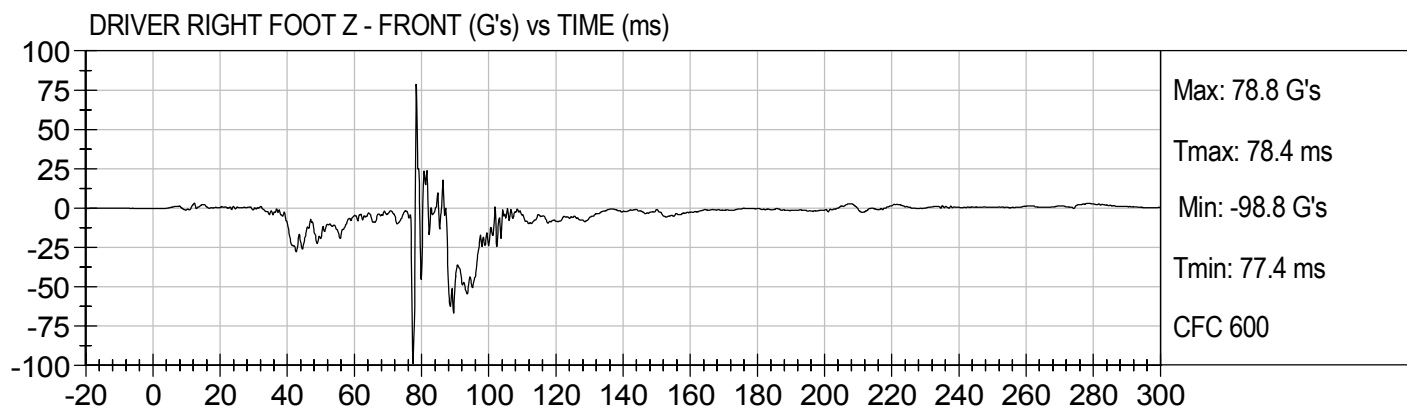
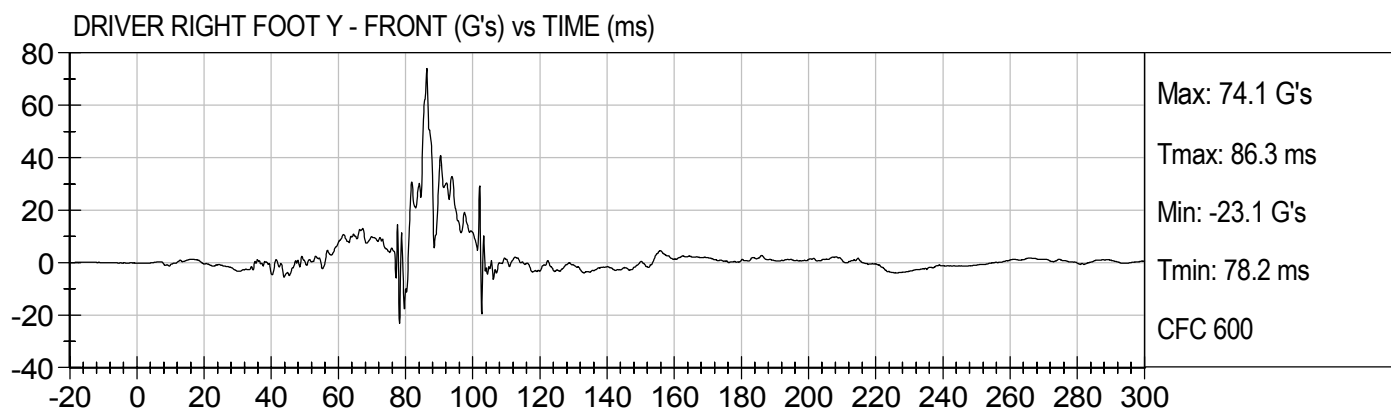
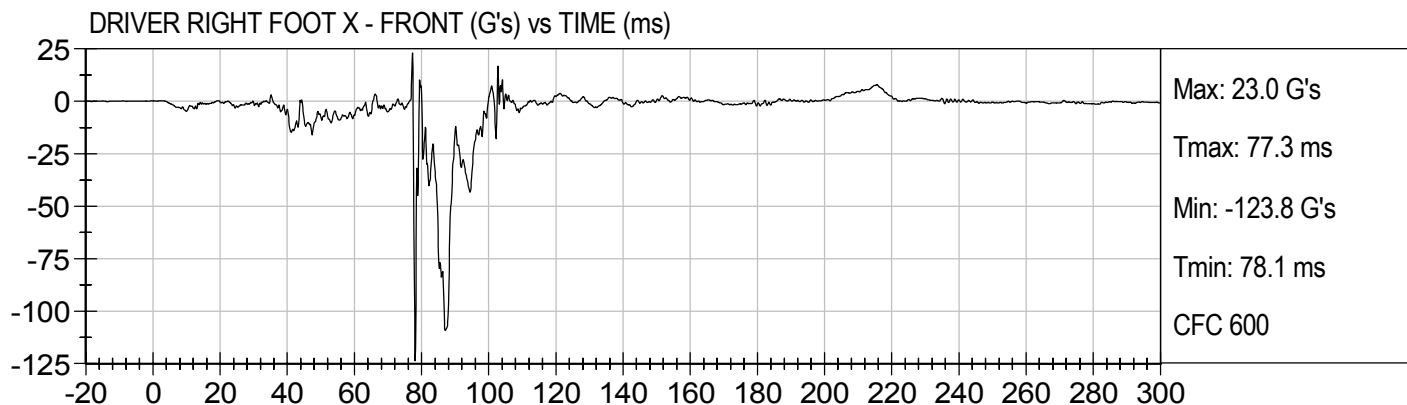
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)



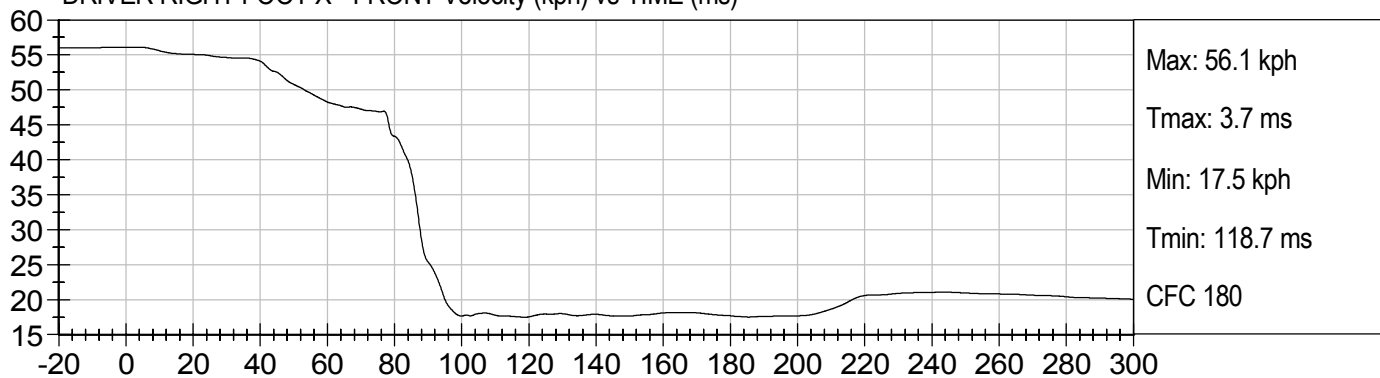




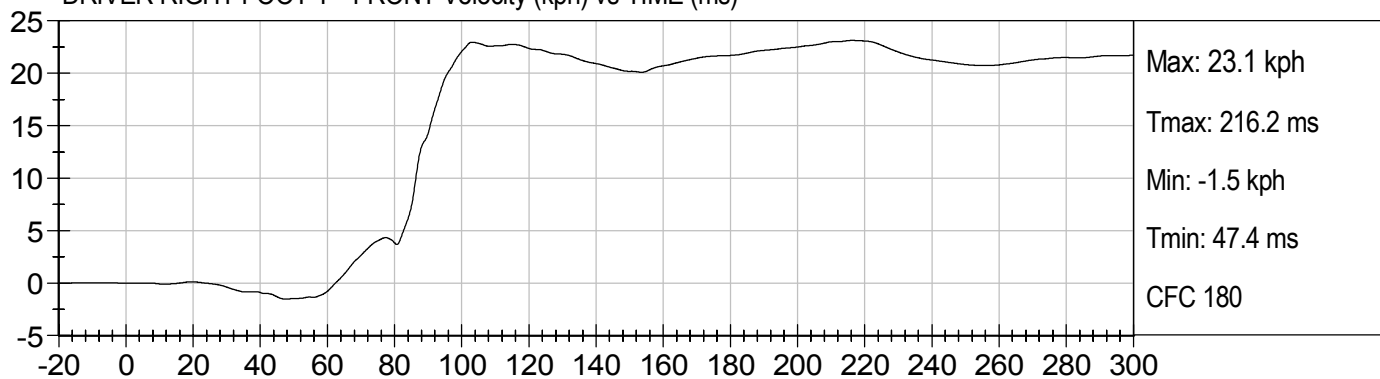




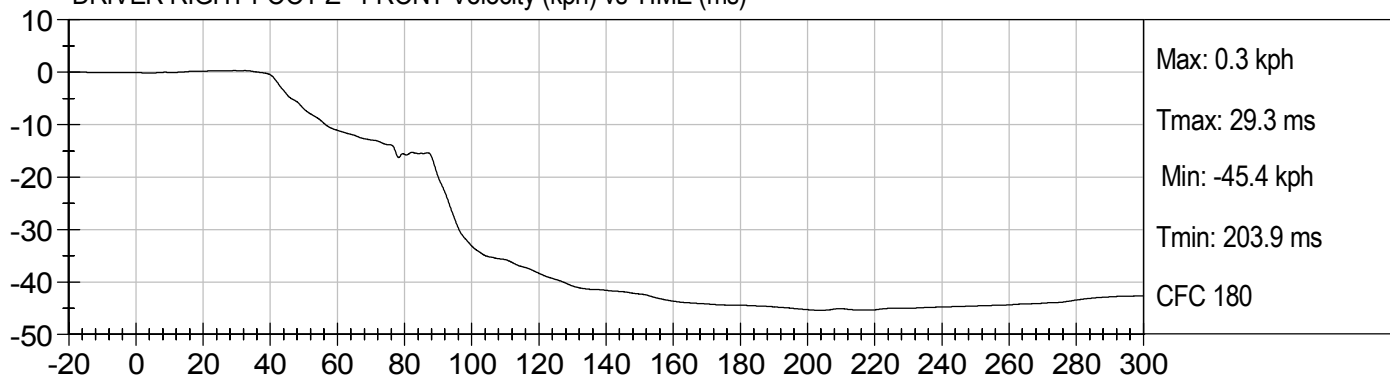
DRIVER RIGHT FOOT X - FRONT Velocity (kph) vs TIME (ms)

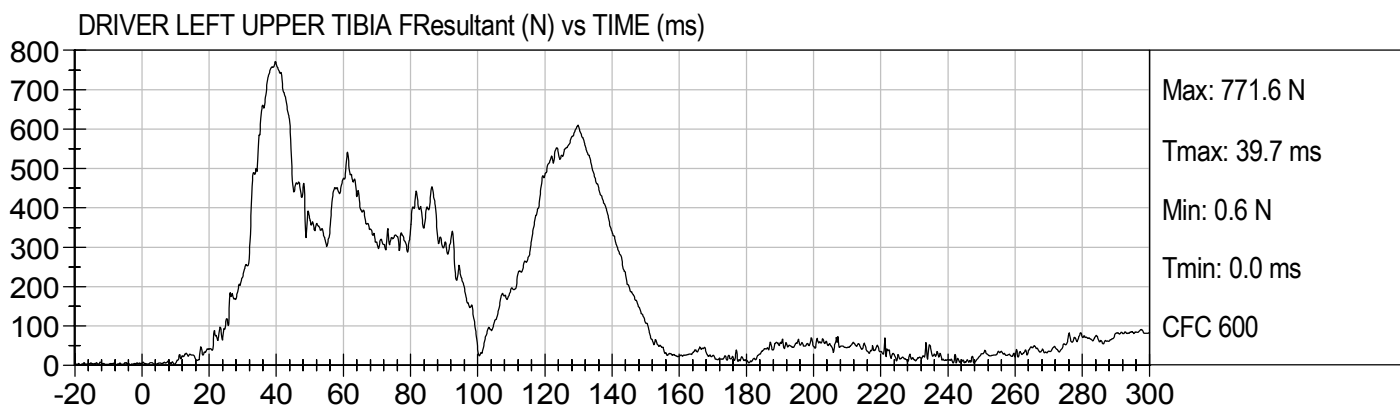
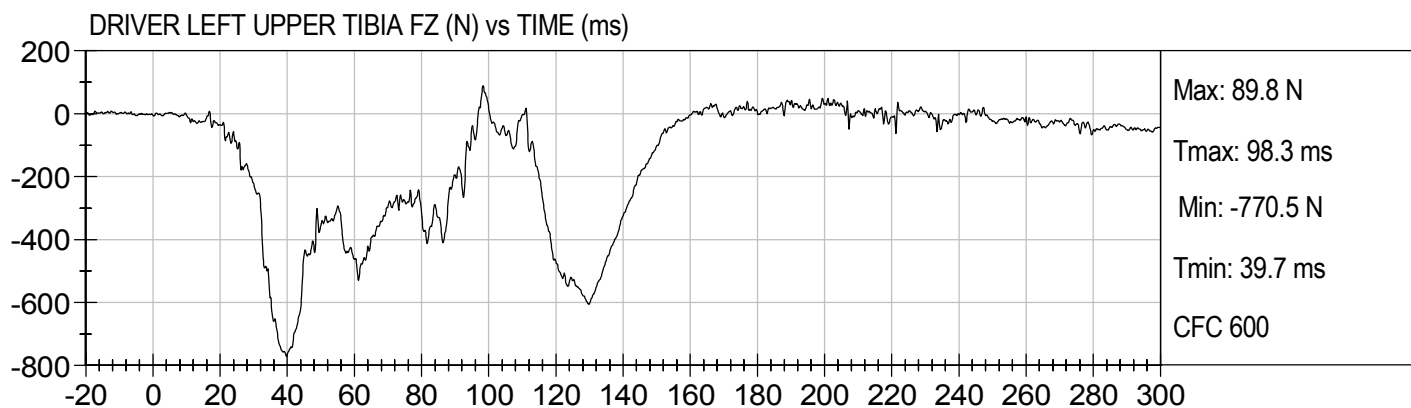
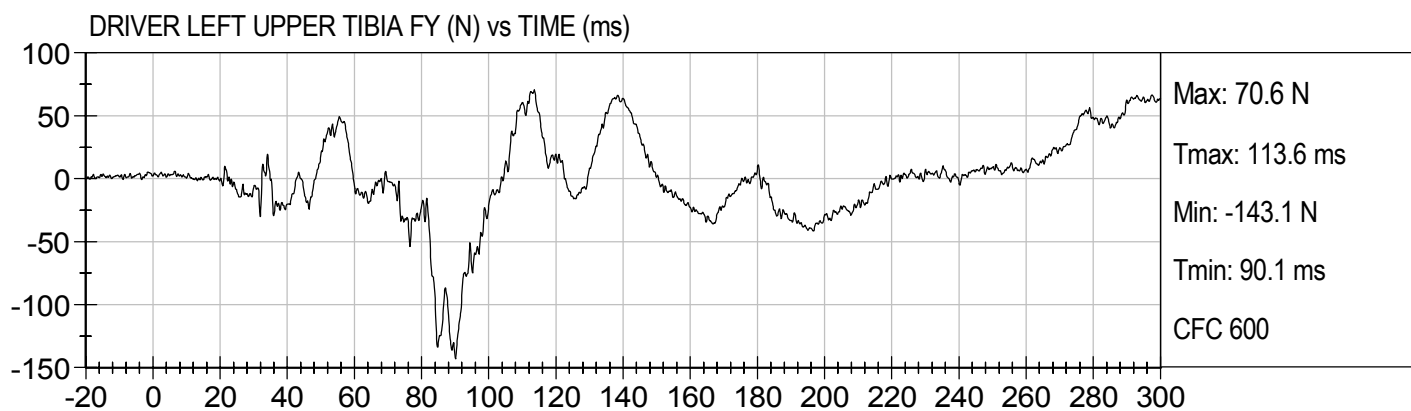
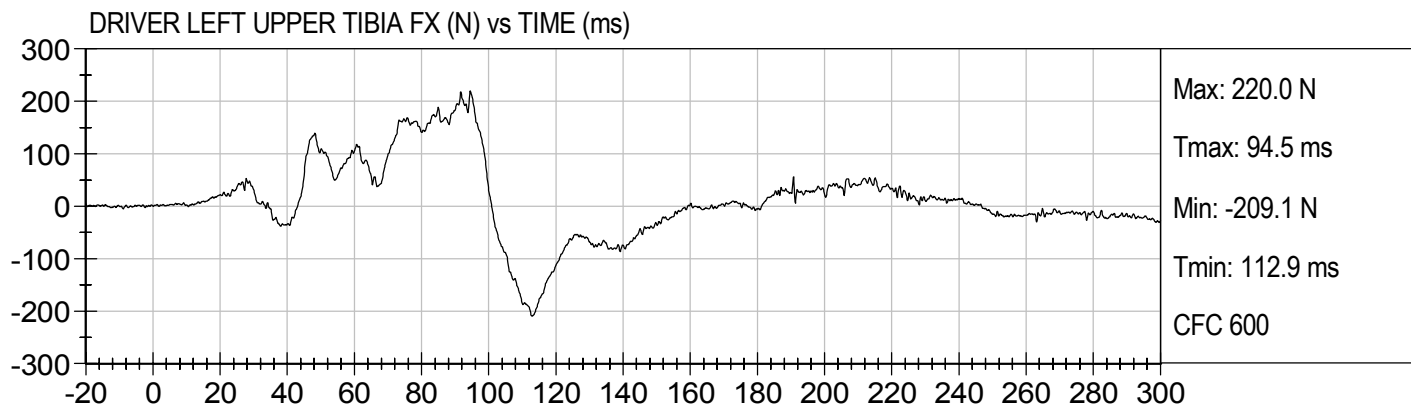


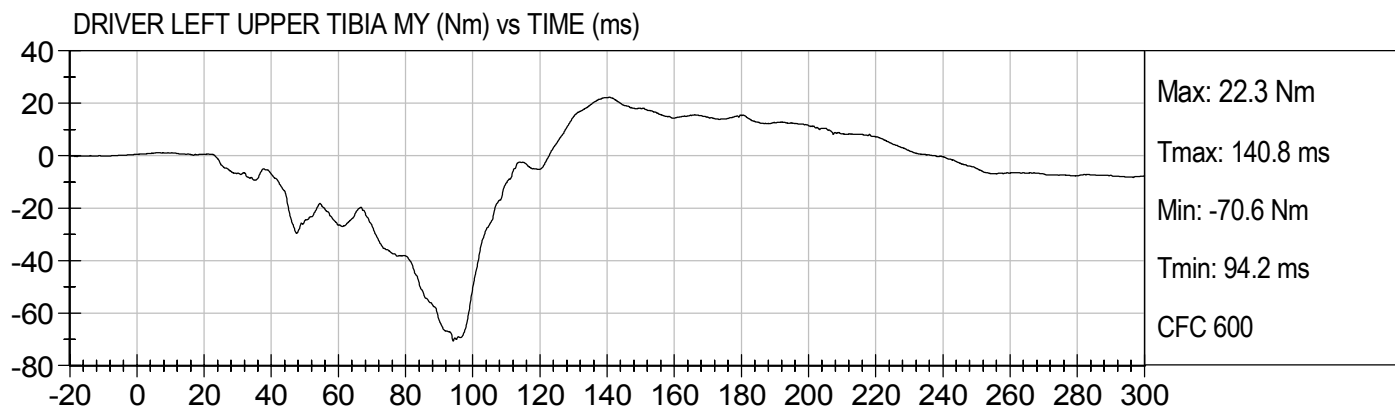
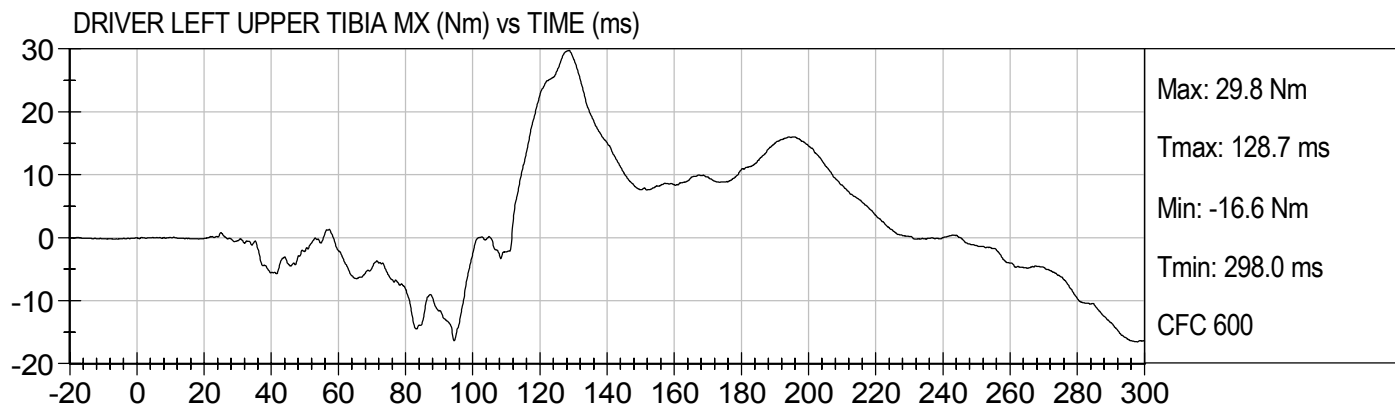
DRIVER RIGHT FOOT Y - FRONT Velocity (kph) vs TIME (ms)



DRIVER RIGHT FOOT Z - FRONT Velocity (kph) vs TIME (ms)

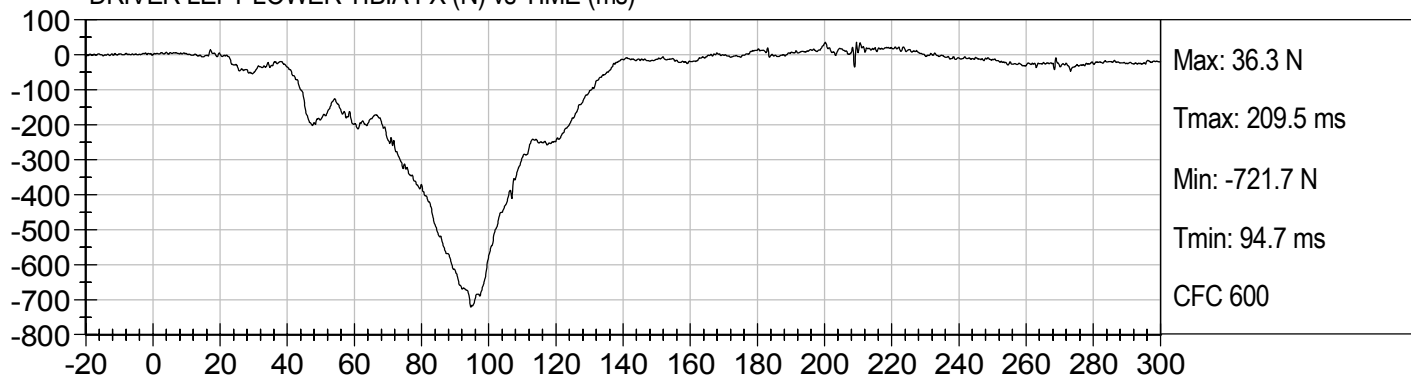




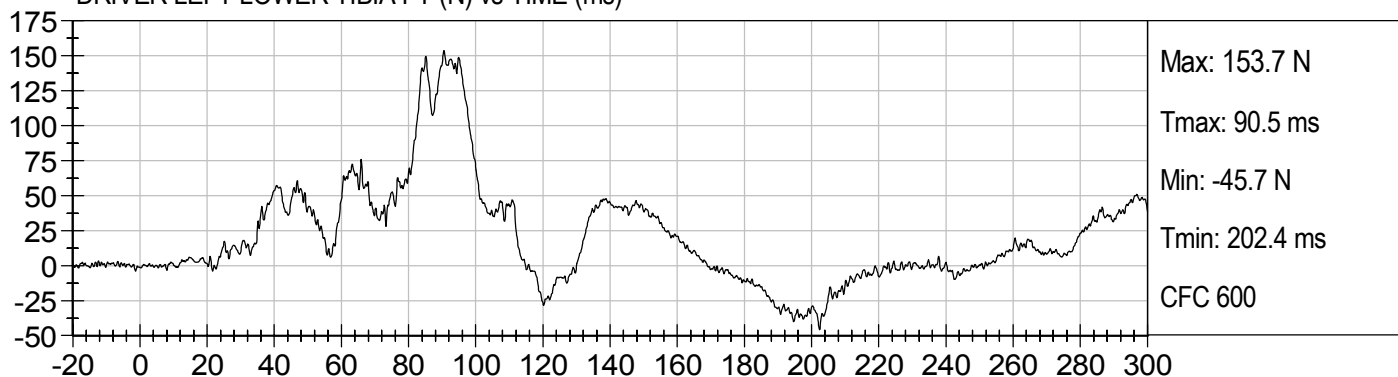




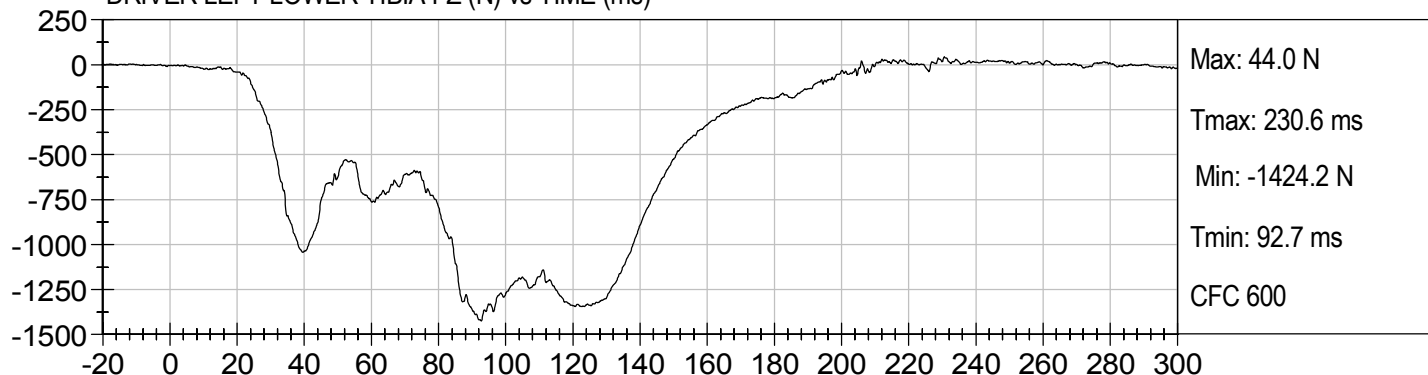
DRIVER LEFT LOWER TIBIA FX (N) vs TIME (ms)



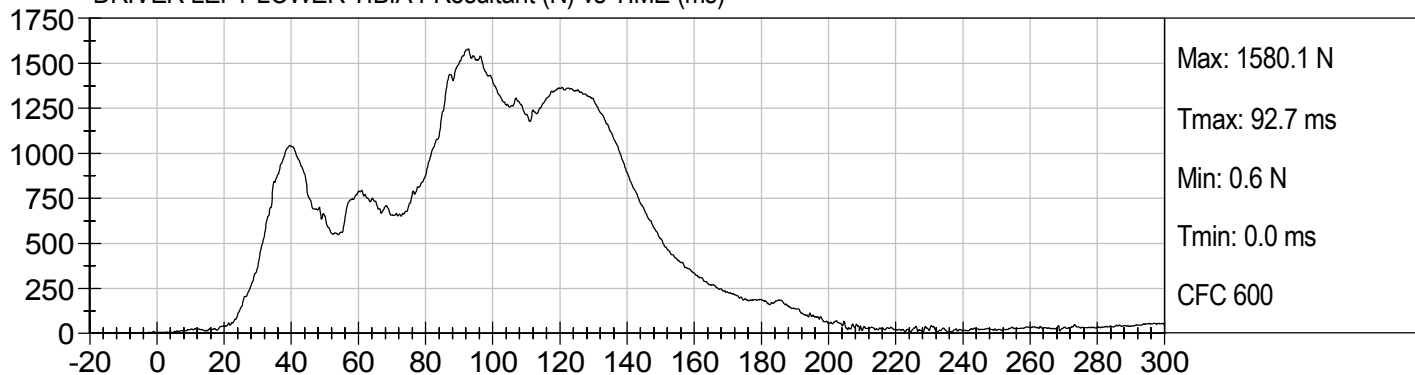
DRIVER LEFT LOWER TIBIA FY (N) vs TIME (ms)

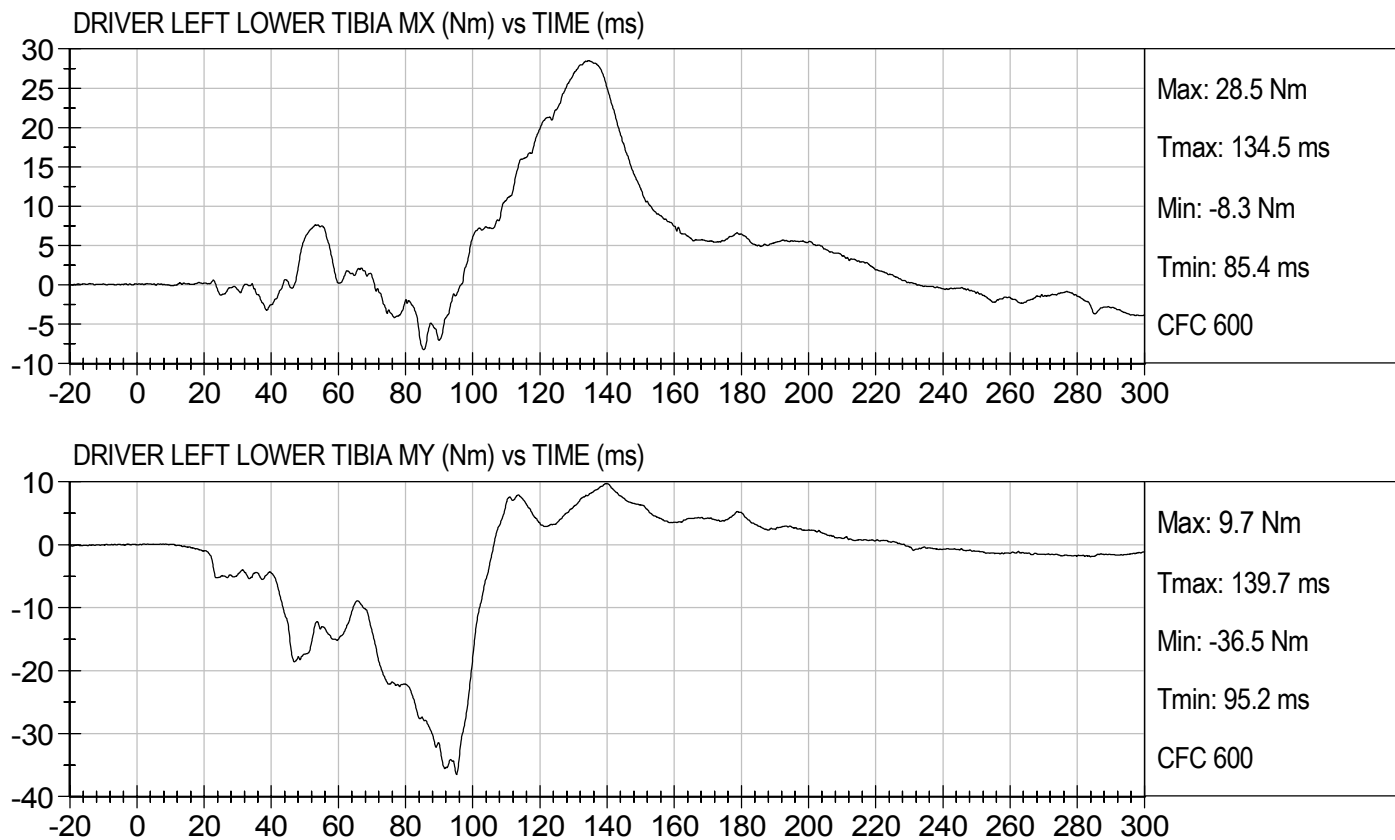


DRIVER LEFT LOWER TIBIA FZ (N) vs TIME (ms)



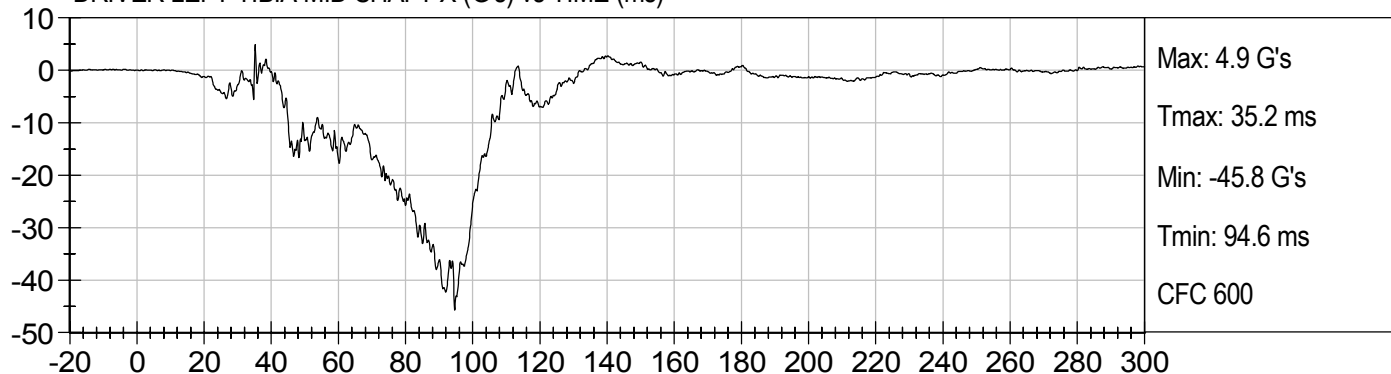
DRIVER LEFT LOWER TIBIA FResultant (N) vs TIME (ms)



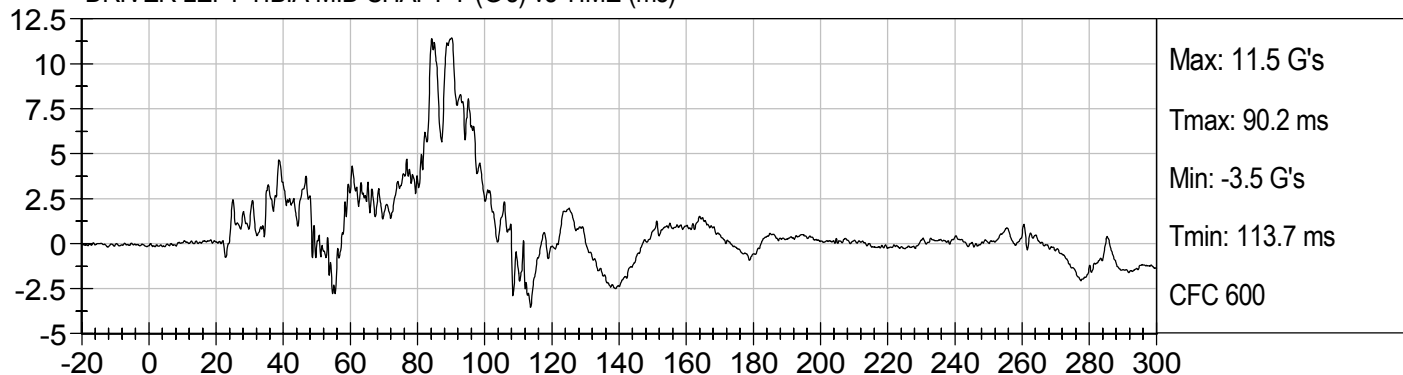




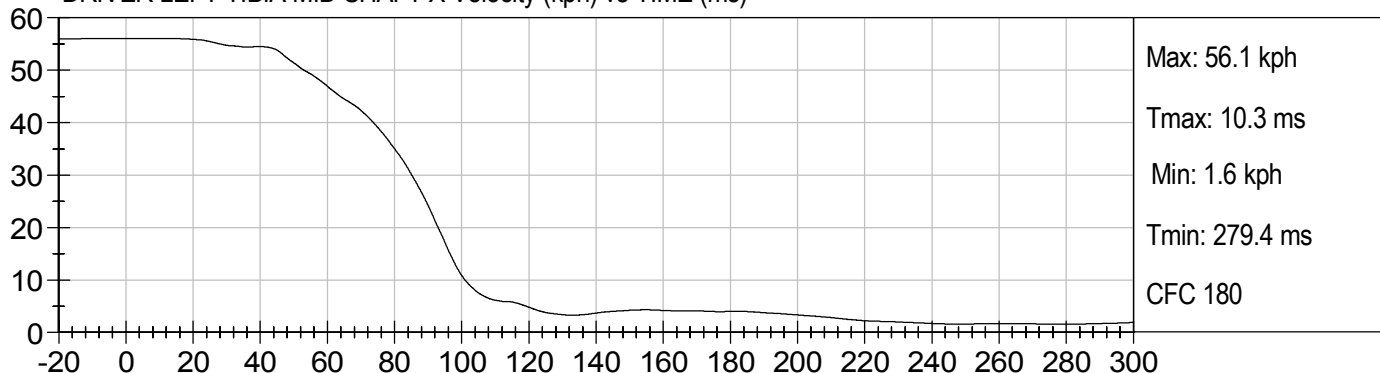
DRIVER LEFT TIBIA MID SHAFT X (G's) vs TIME (ms)



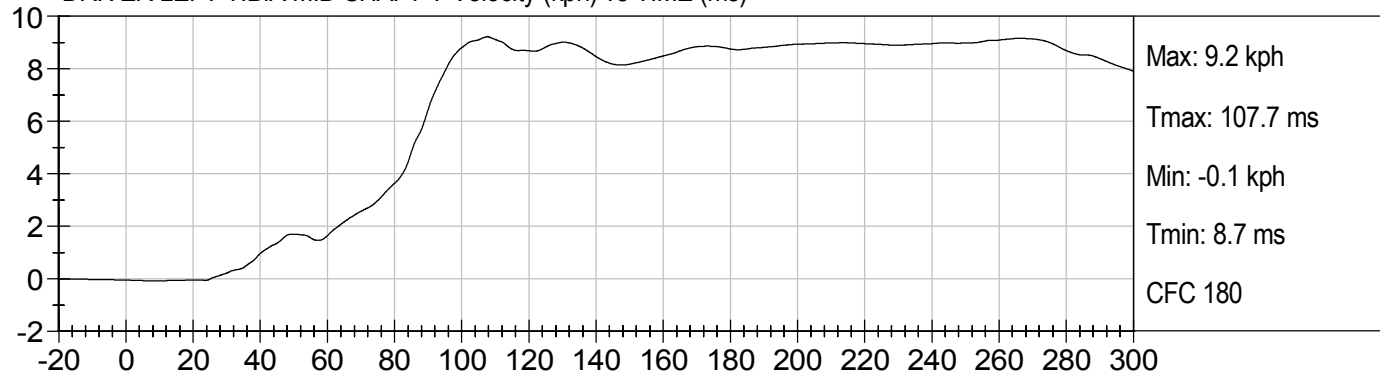
DRIVER LEFT TIBIA MID SHAFT Y (G's) vs TIME (ms)

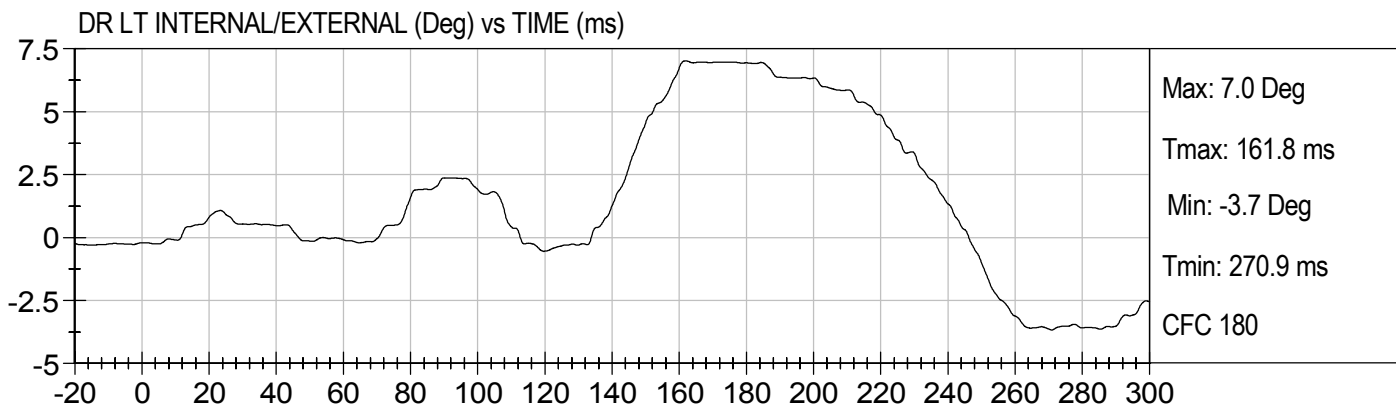
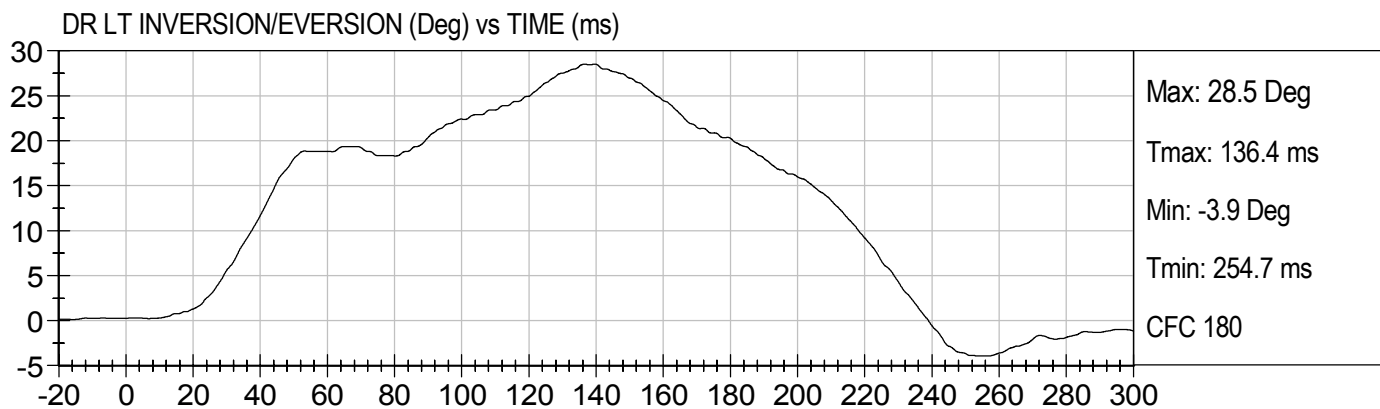
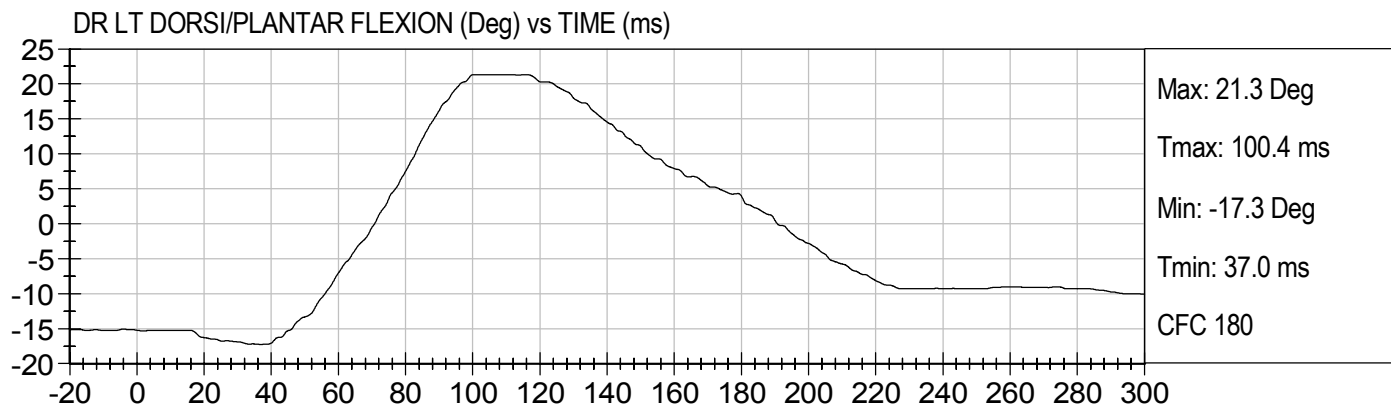


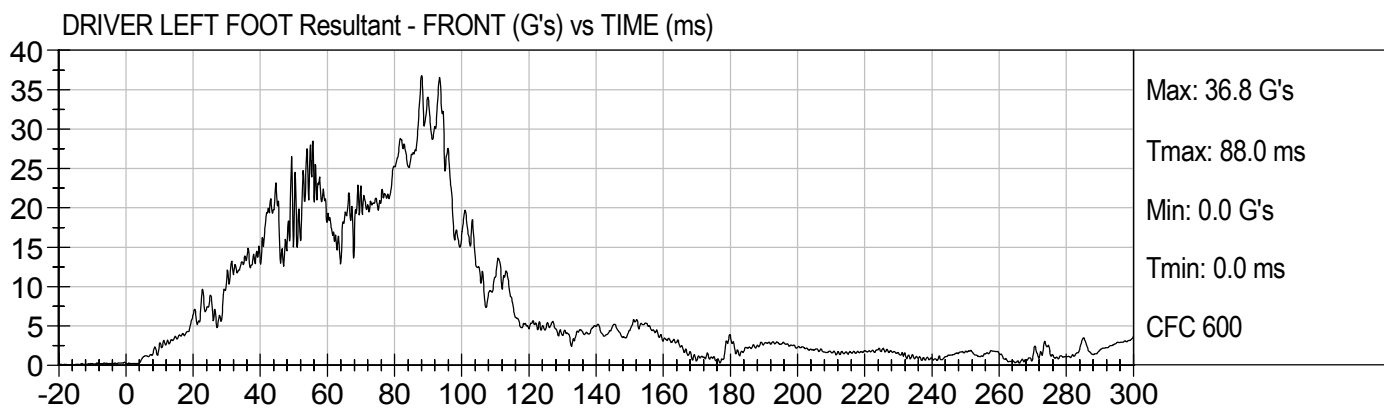
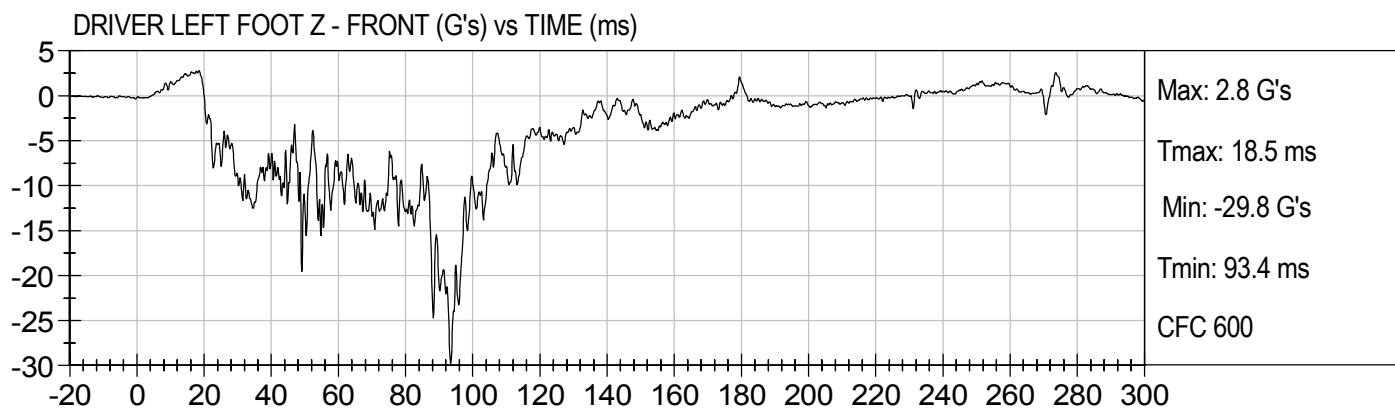
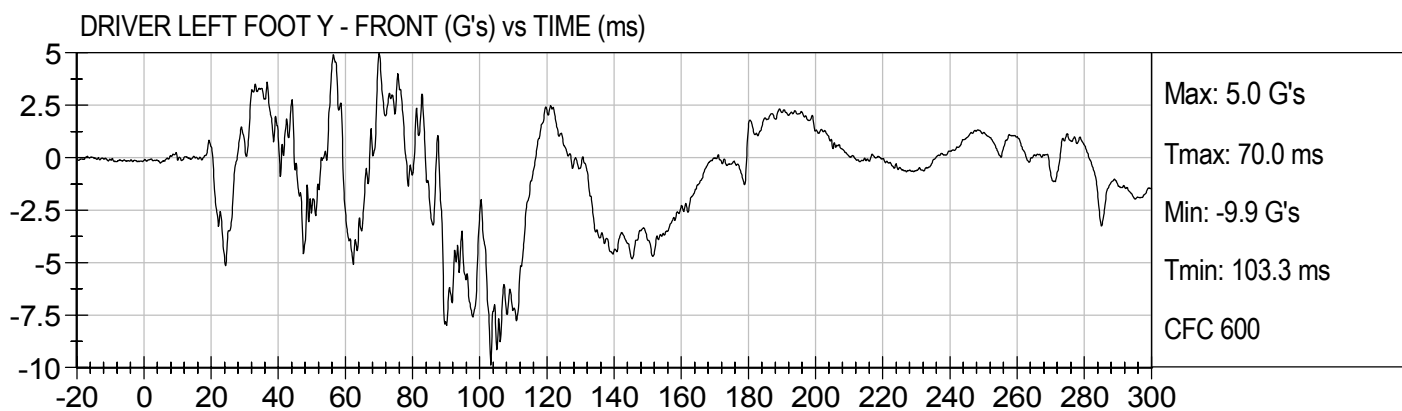
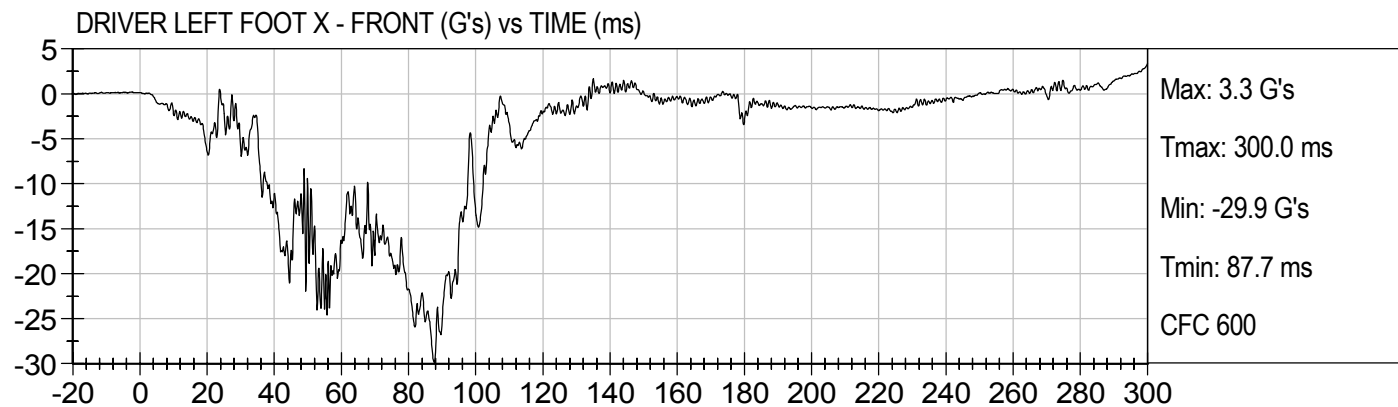
DRIVER LEFT TIBIA MID SHAFT X Velocity (kph) vs TIME (ms)



DRIVER LEFT TIBIA MID SHAFT Y Velocity (kph) vs TIME (ms)

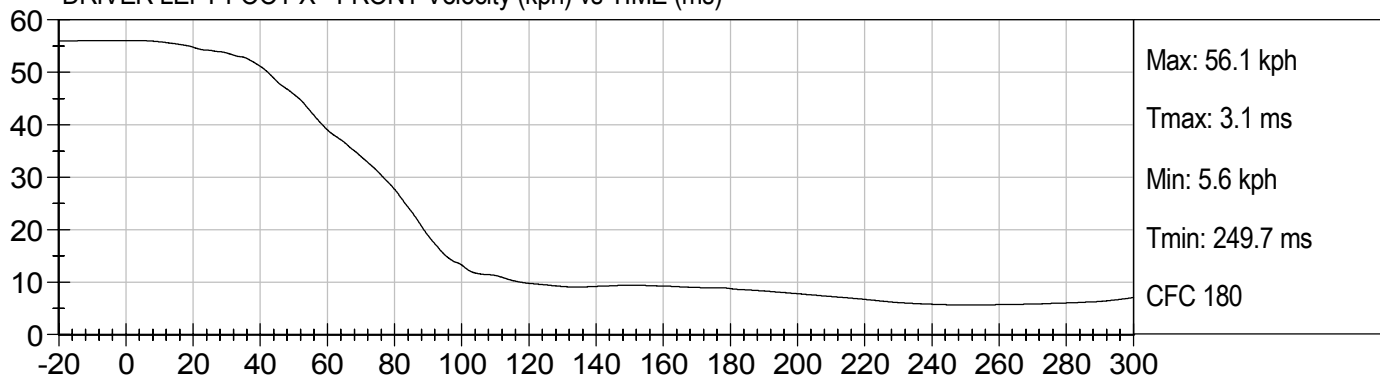




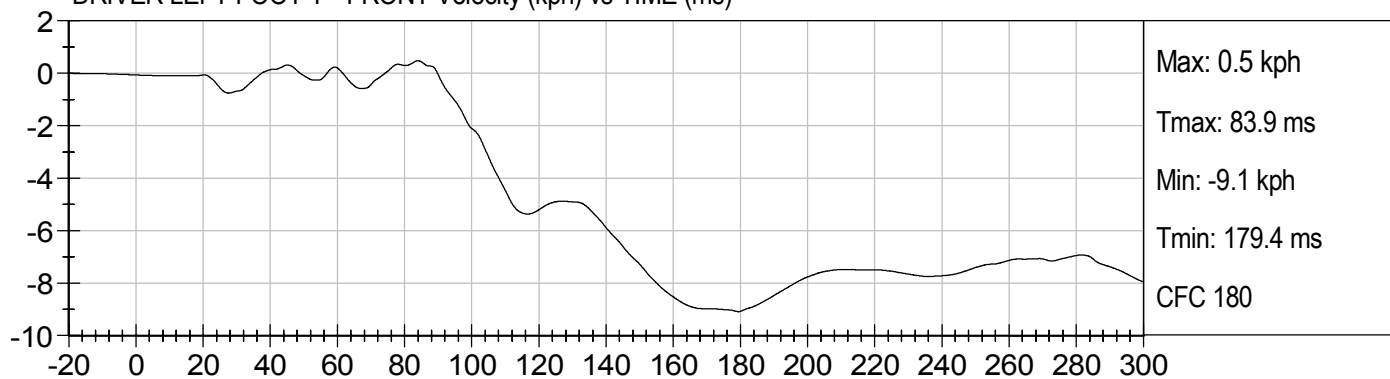




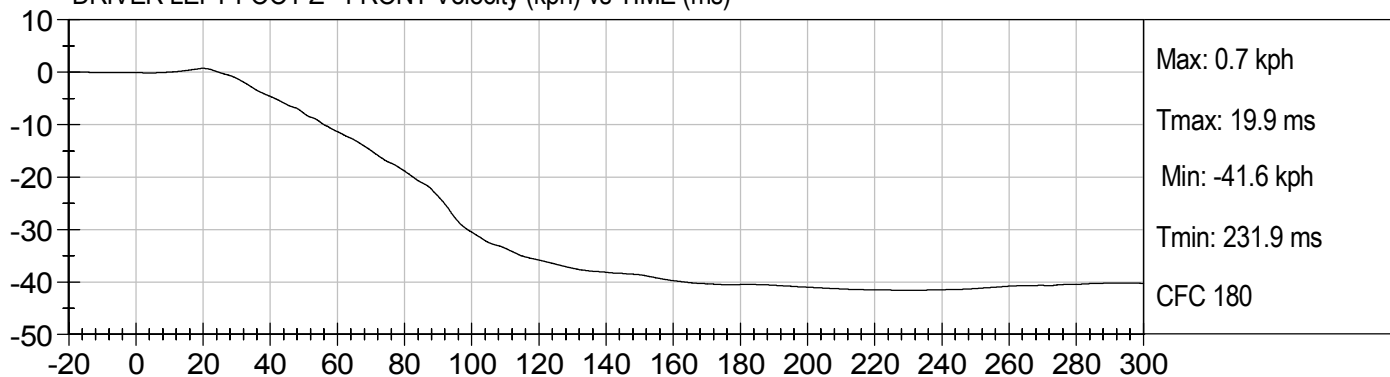
DRIVER LEFT FOOT X - FRONT Velocity (kph) vs TIME (ms)



DRIVER LEFT FOOT Y - FRONT Velocity (kph) vs TIME (ms)



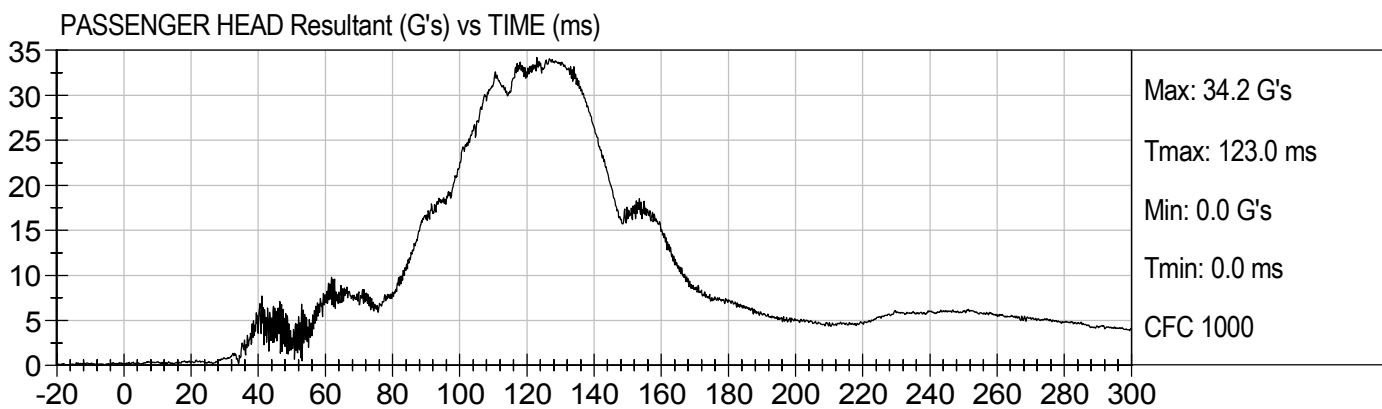
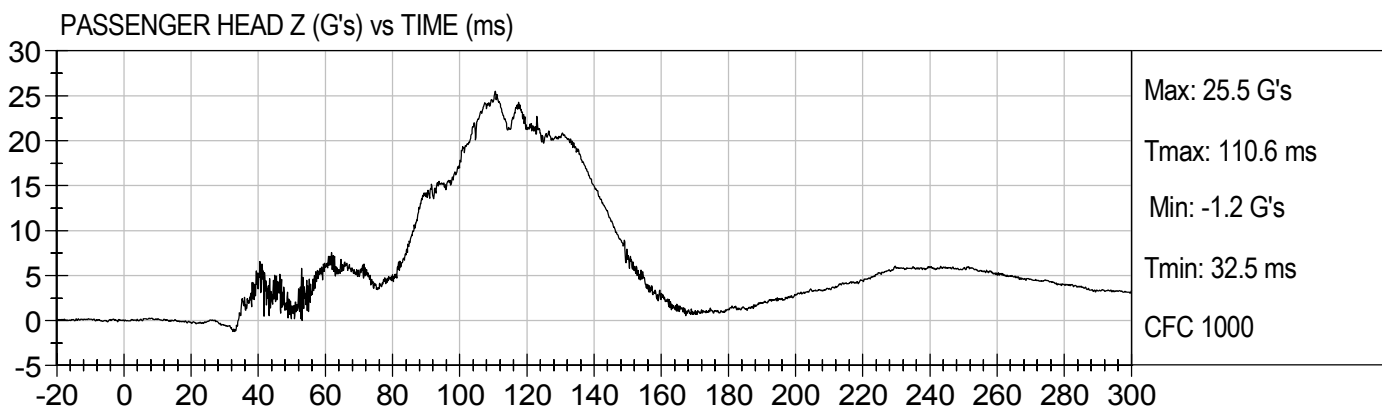
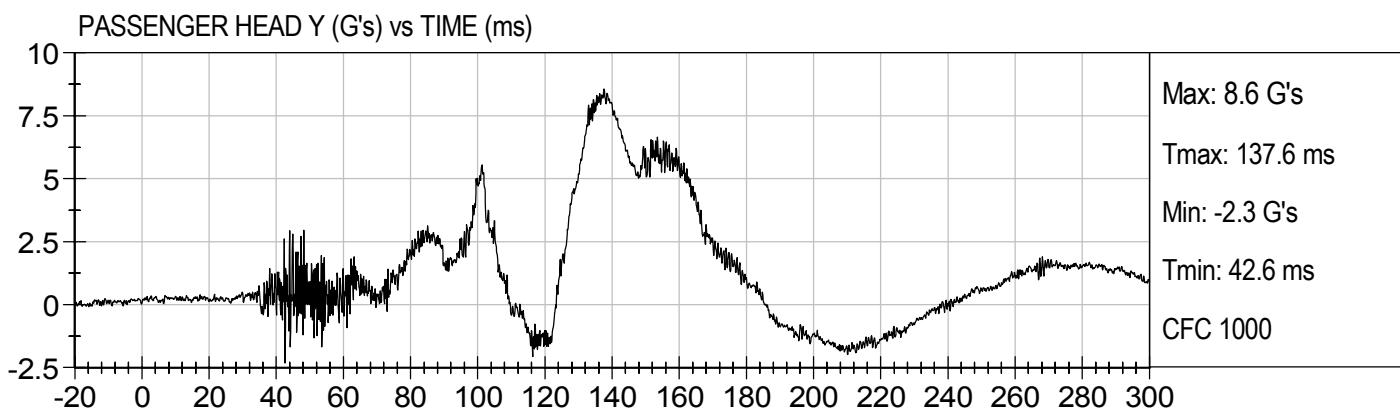
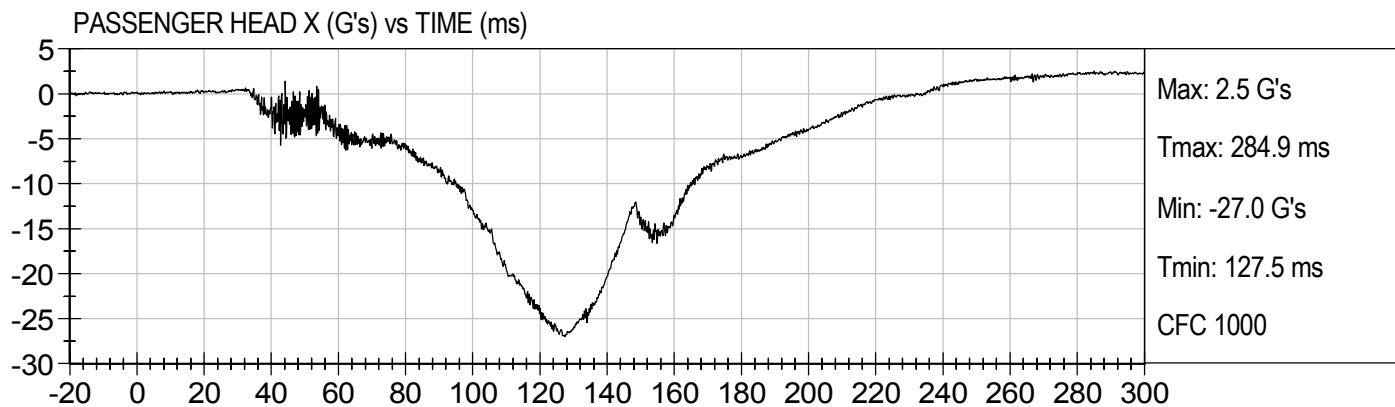
DRIVER LEFT FOOT Z - FRONT Velocity (kph) vs TIME (ms)

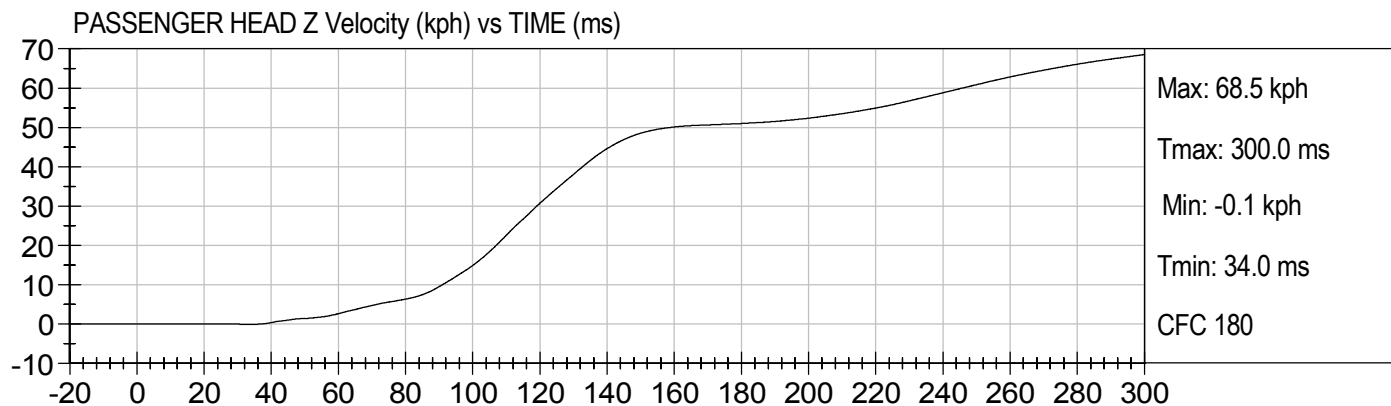
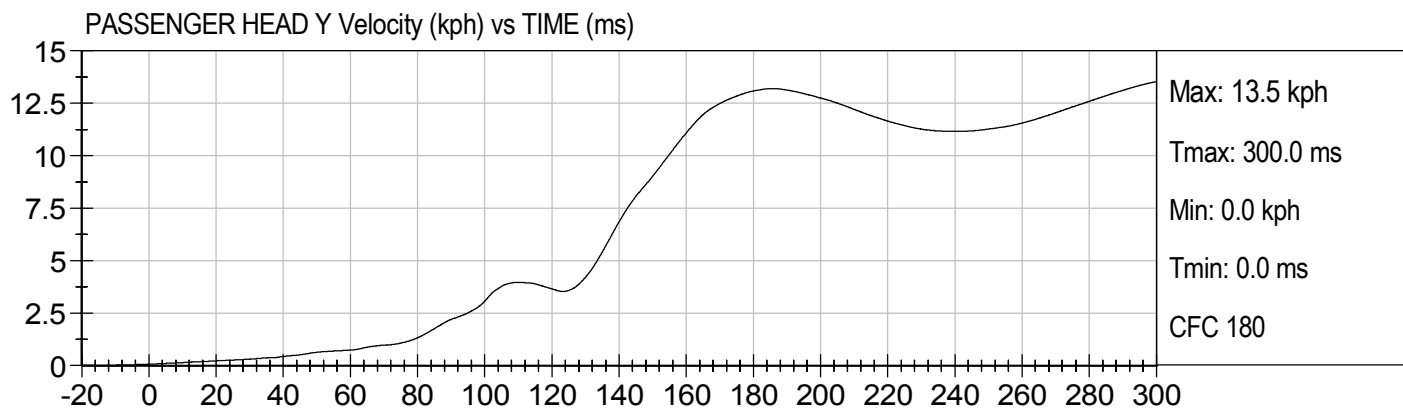
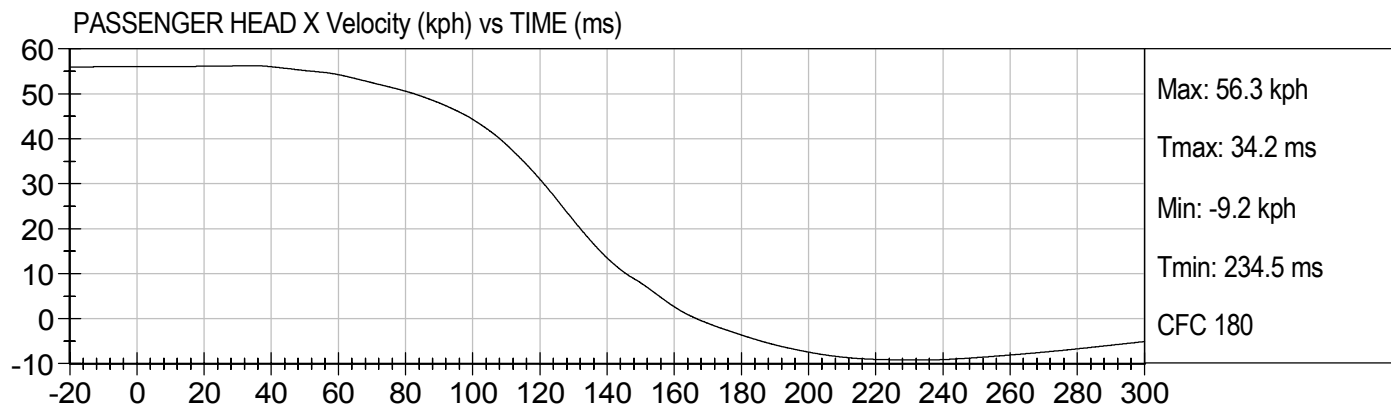




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

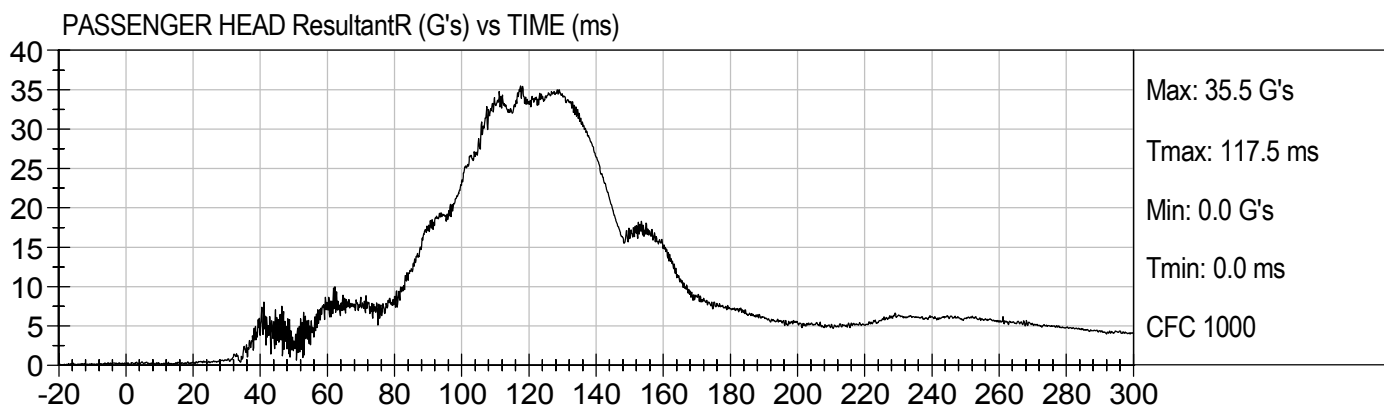
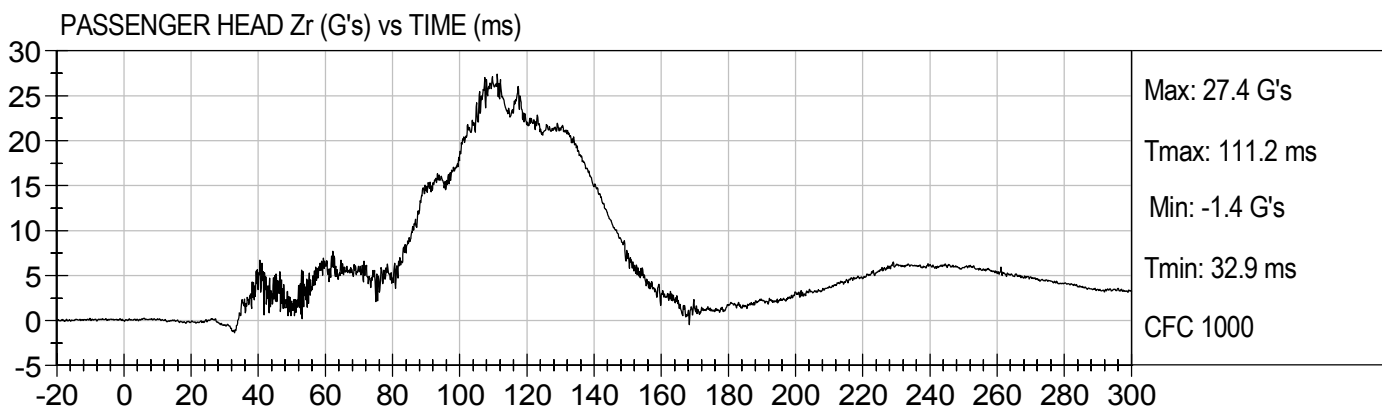
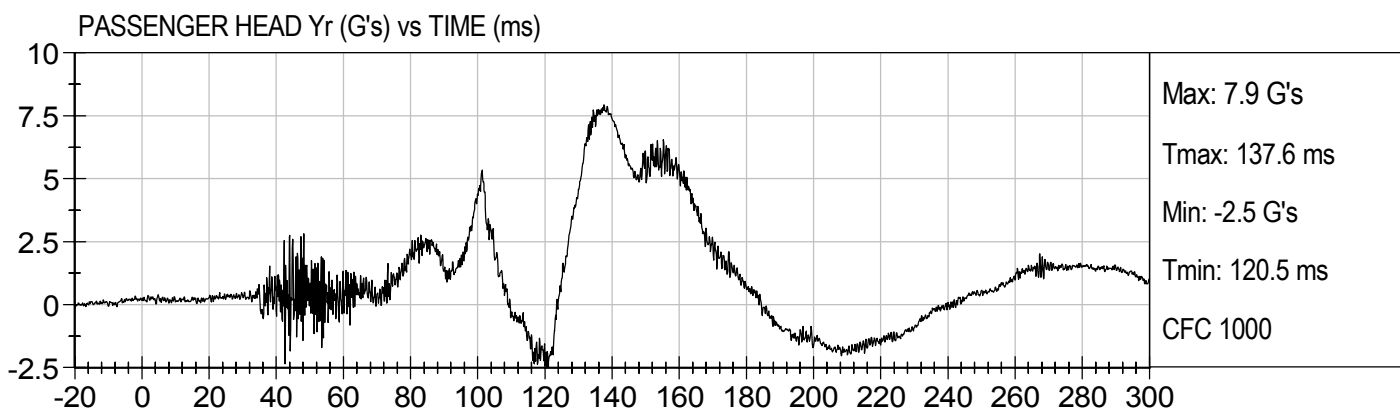
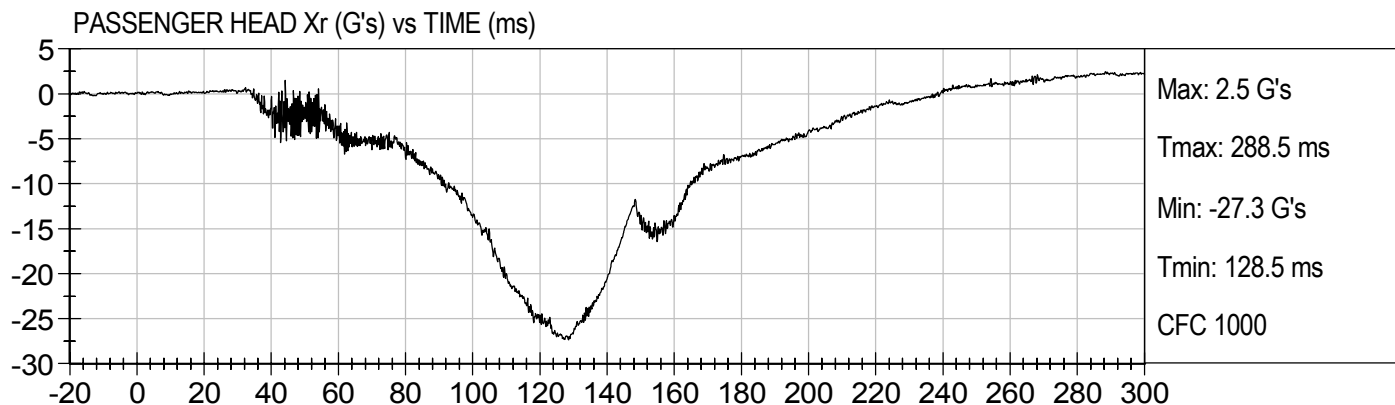


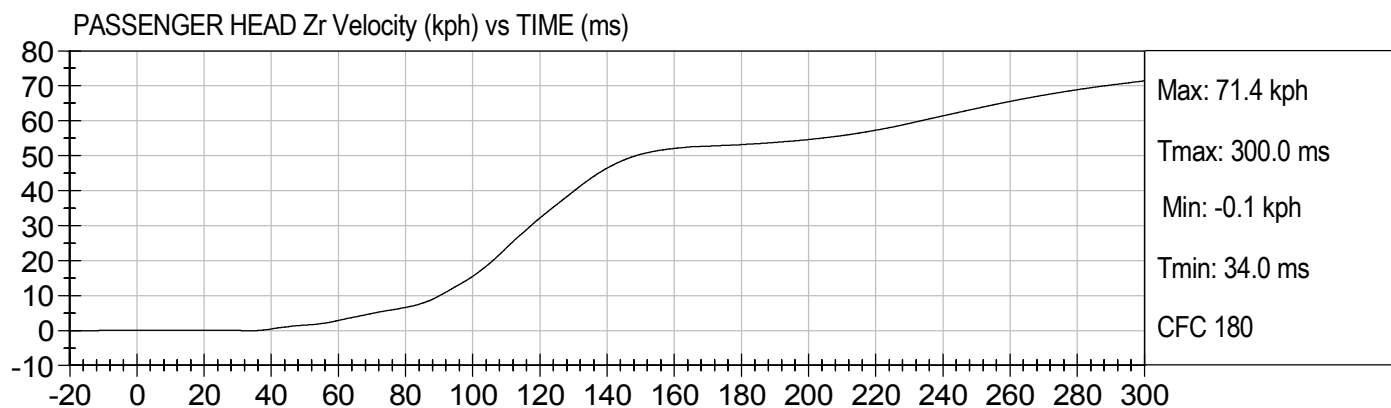
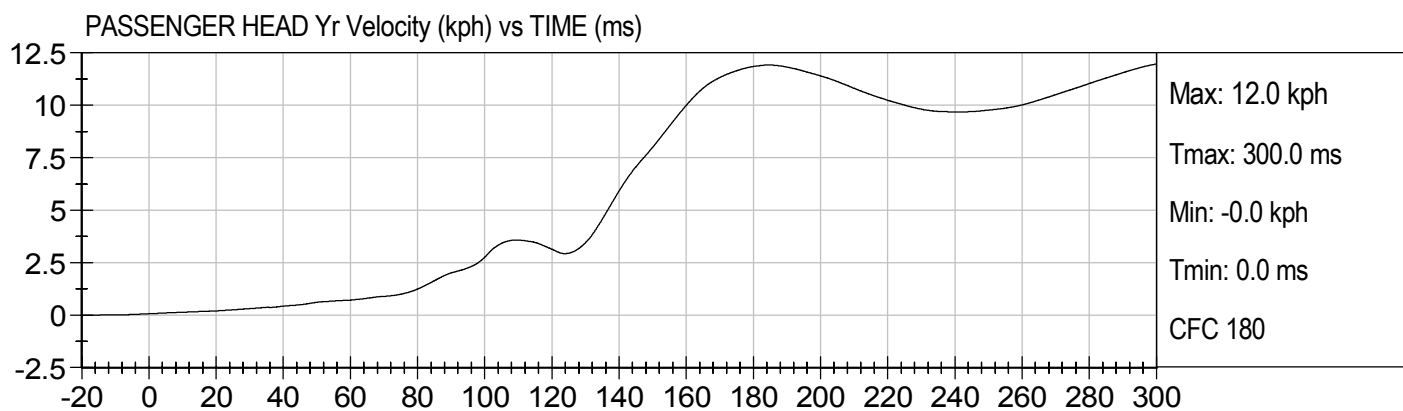
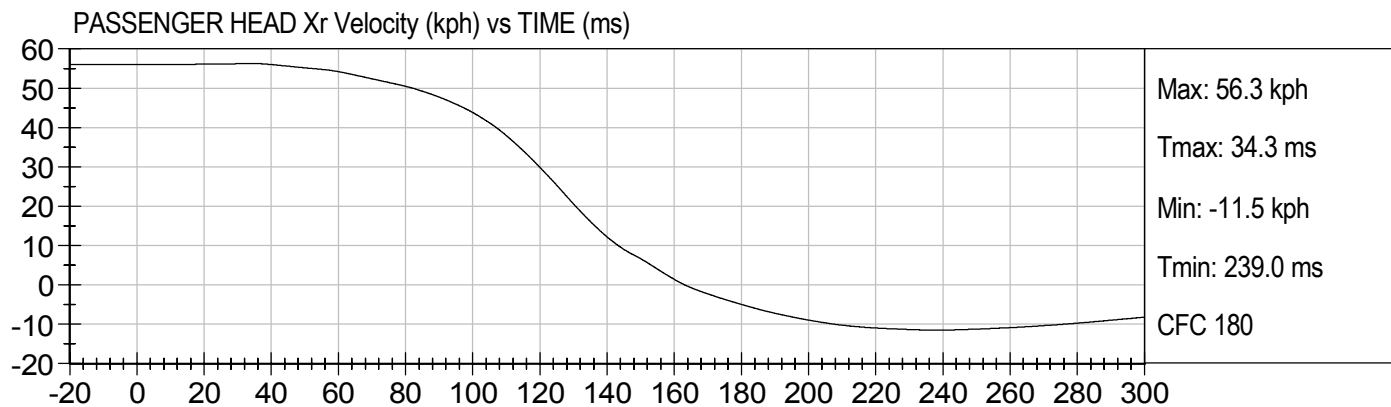




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

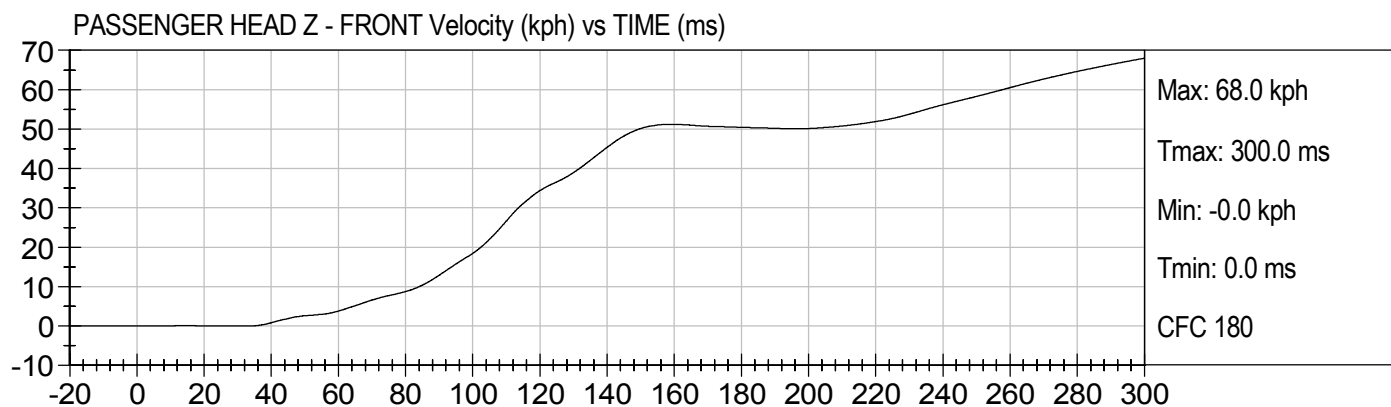
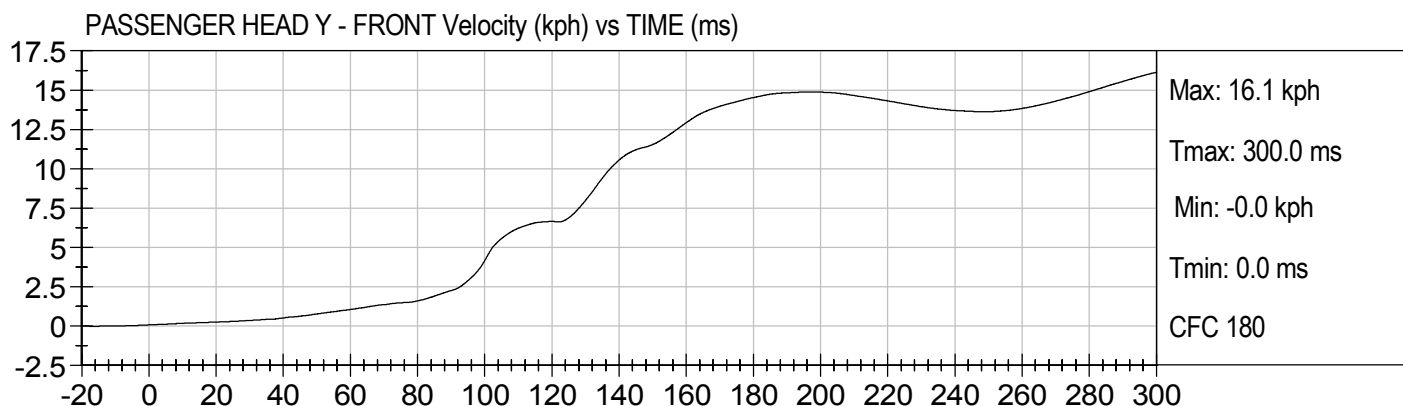
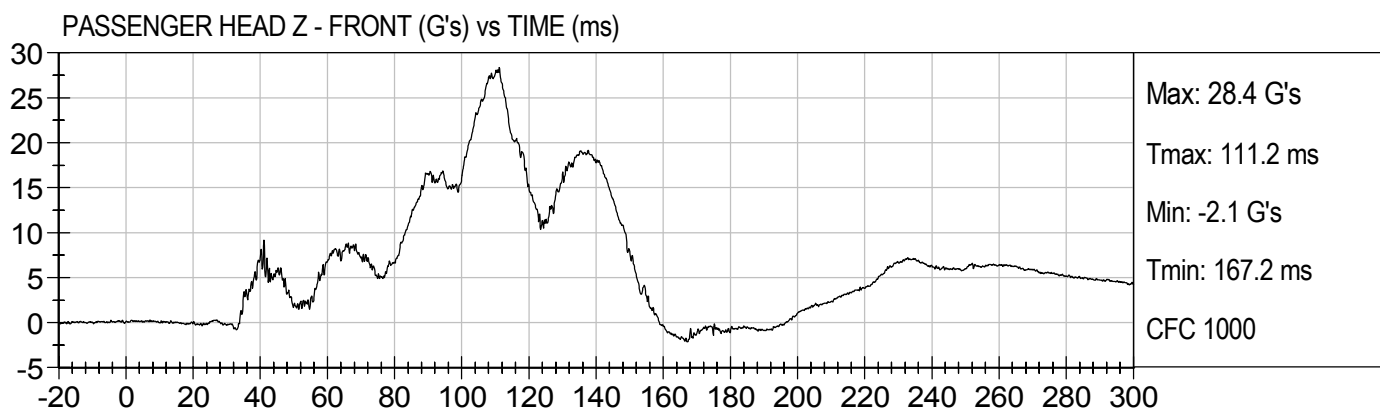
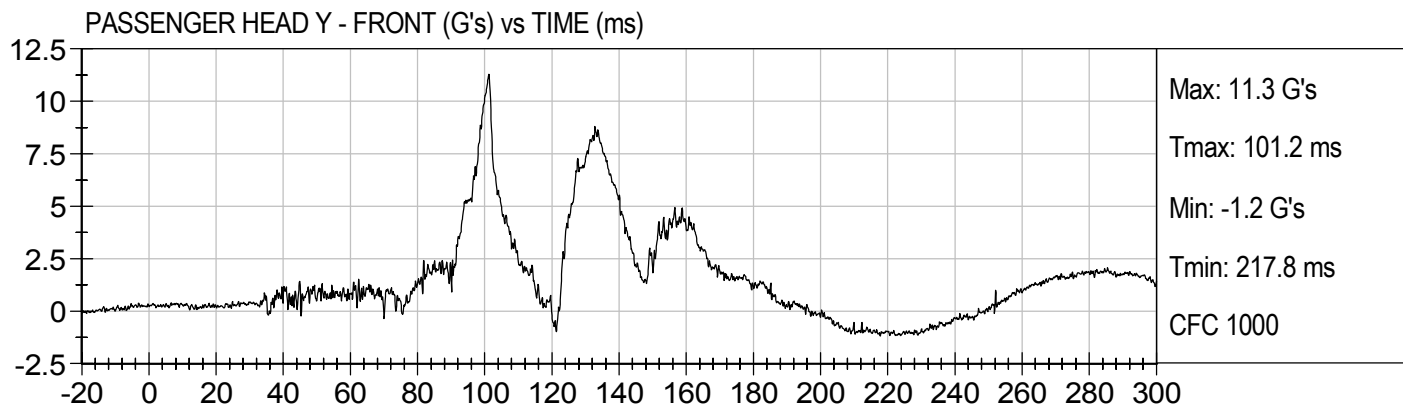






NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

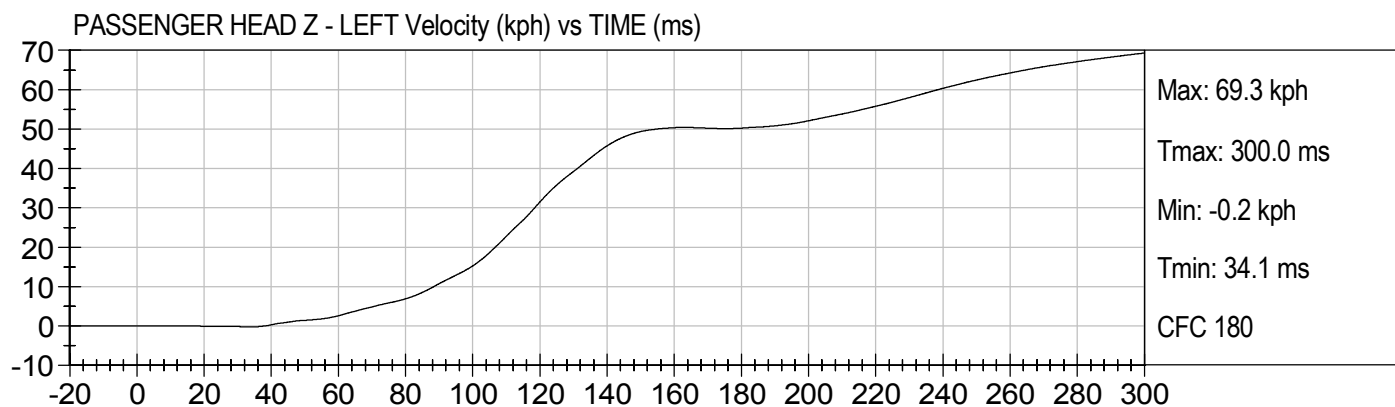
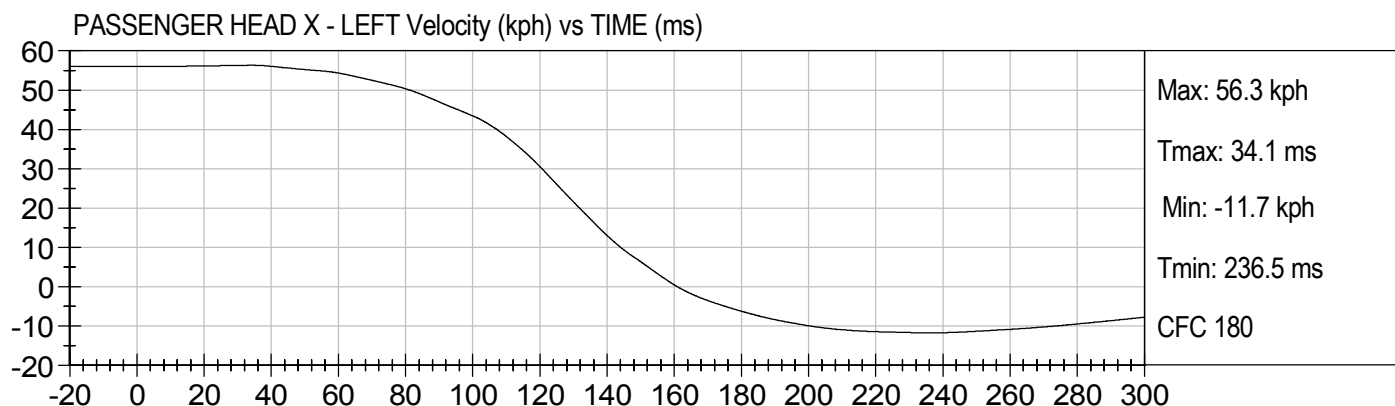
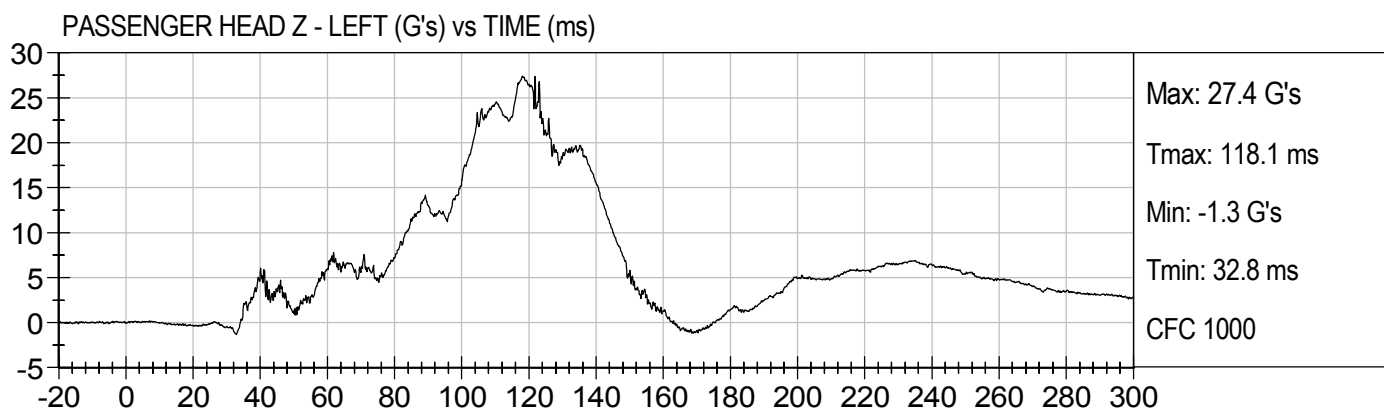
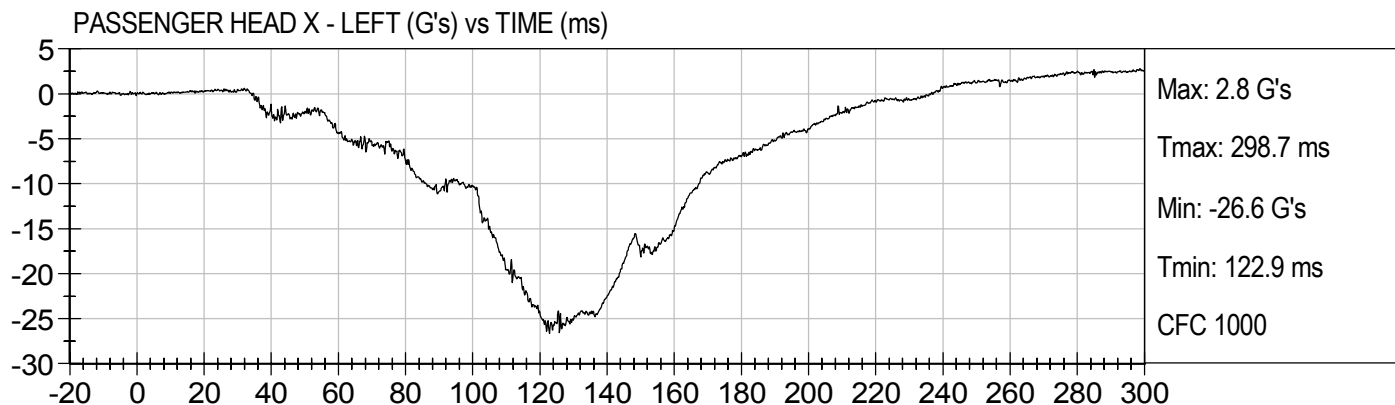
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

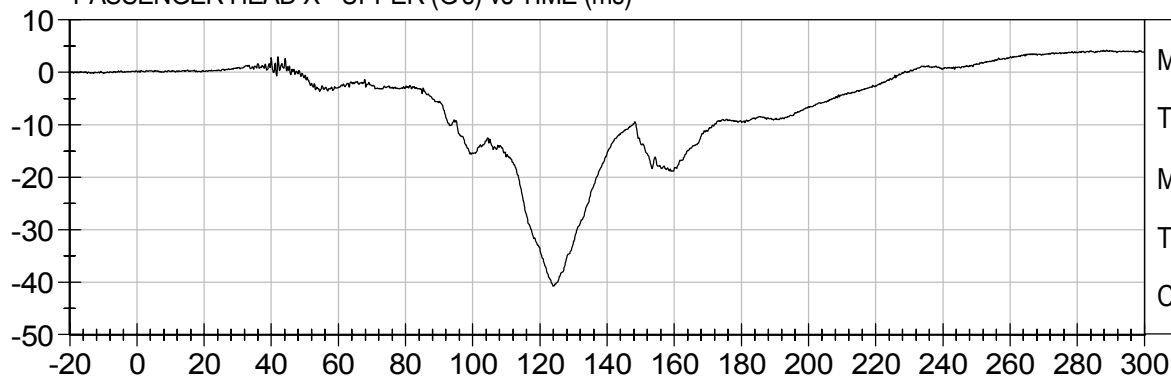




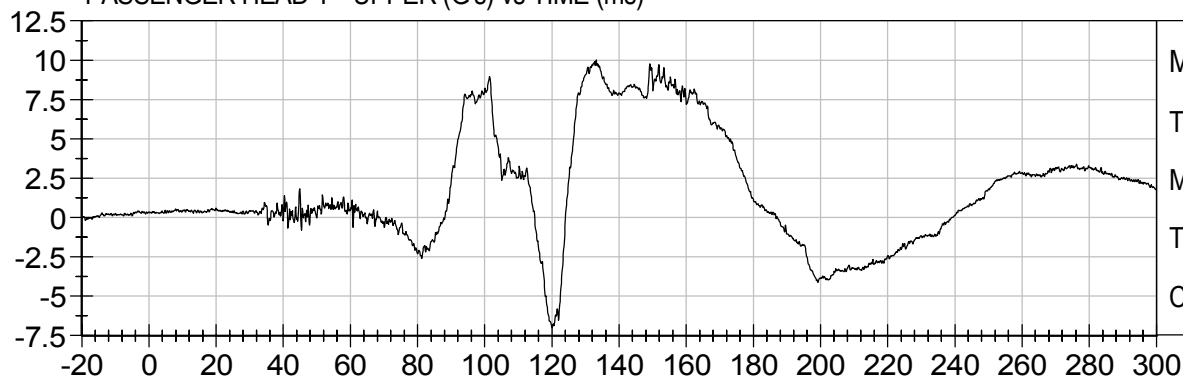
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

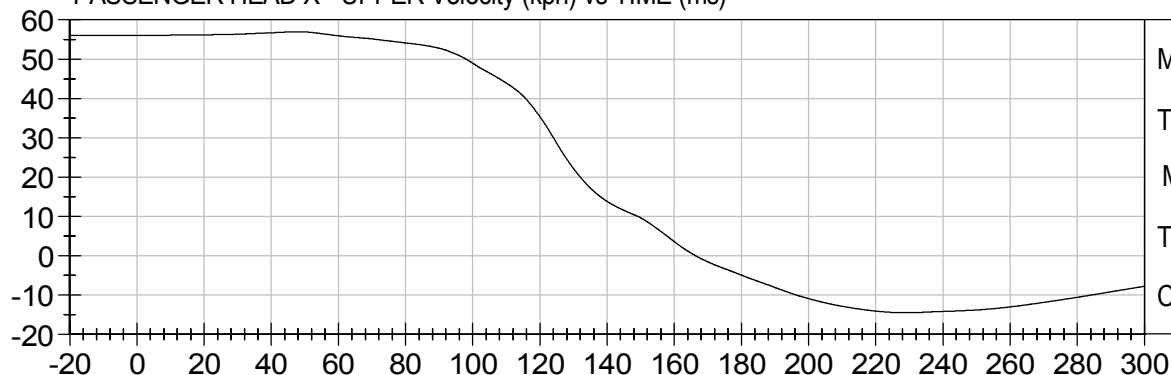
PASSENGER HEAD X - UPPER (G's) vs TIME (ms)



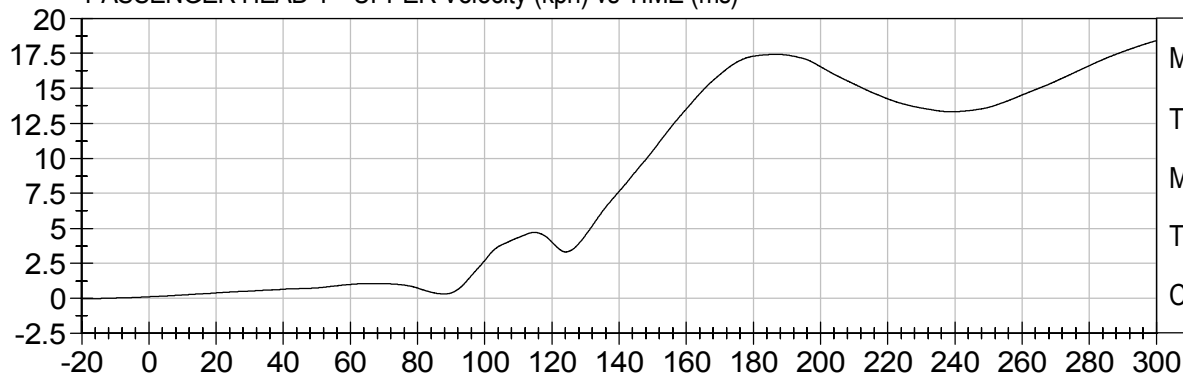
PASSENGER HEAD Y - UPPER (G's) vs TIME (ms)



PASSENGER HEAD X - UPPER Velocity (kph) vs TIME (ms)



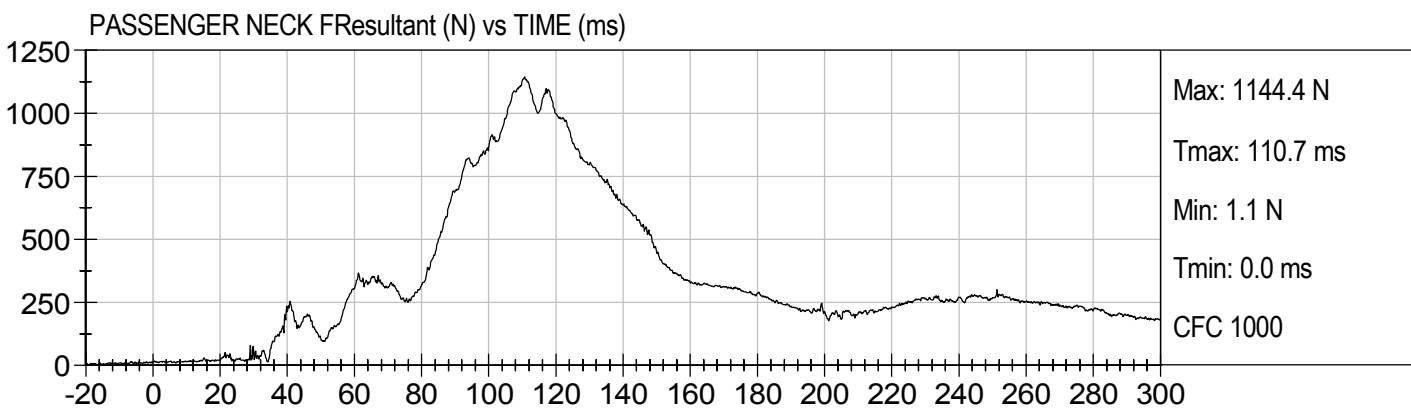
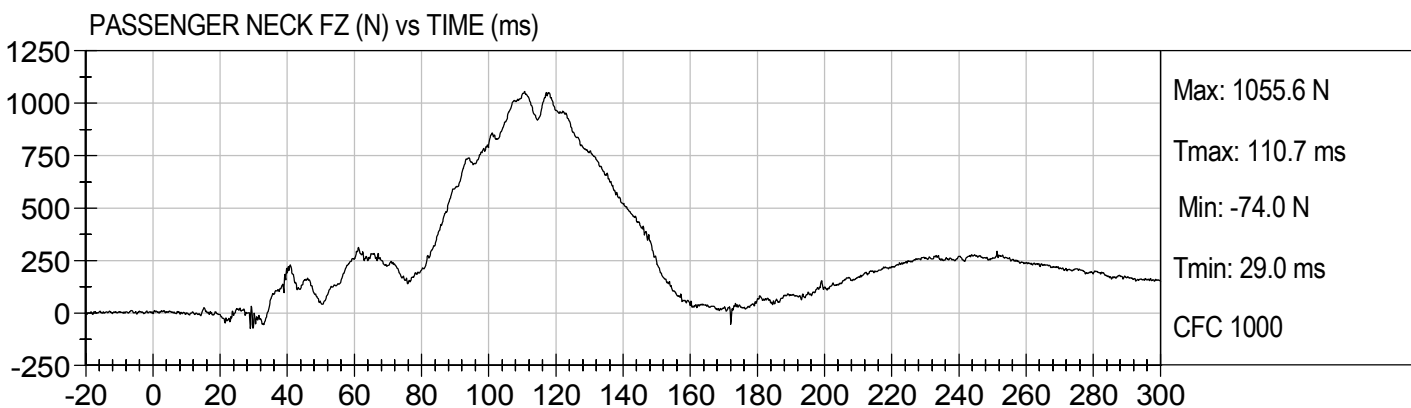
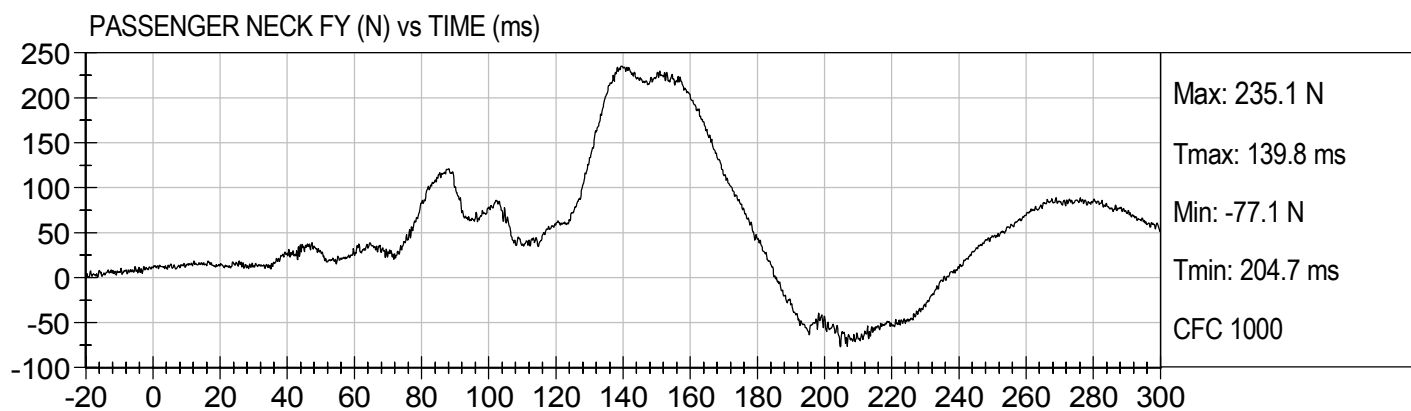
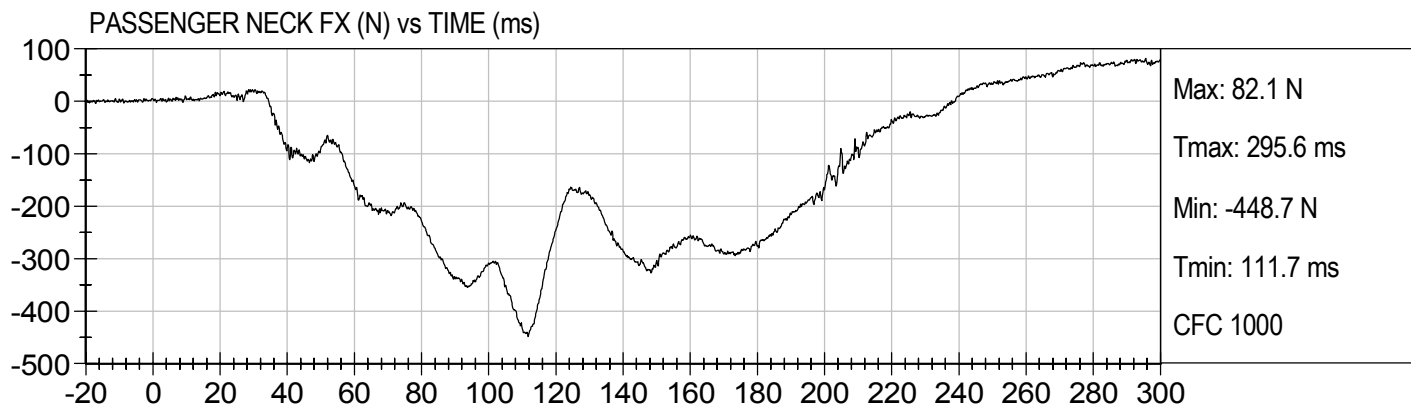
PASSENGER HEAD Y - UPPER Velocity (kph) vs TIME (ms)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

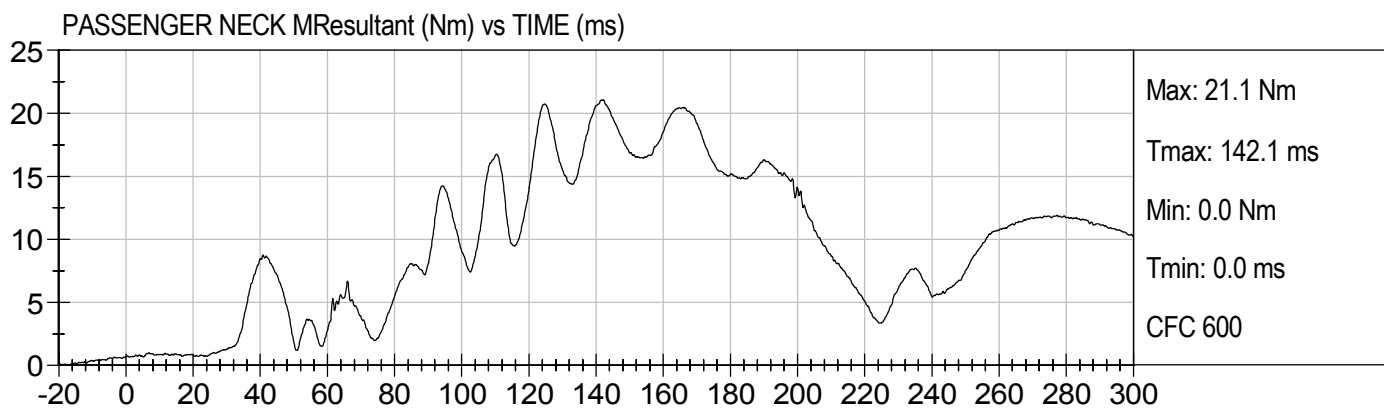
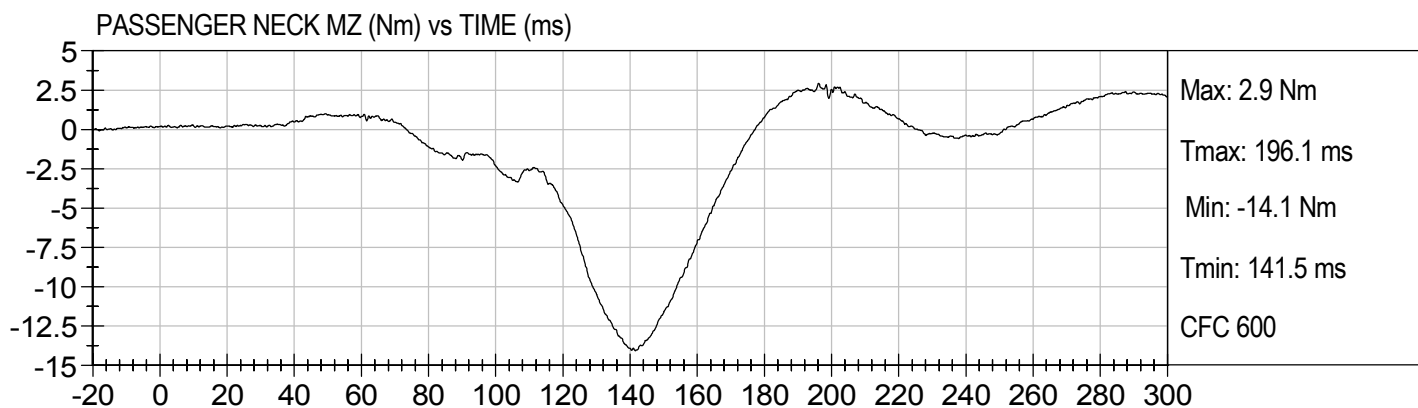
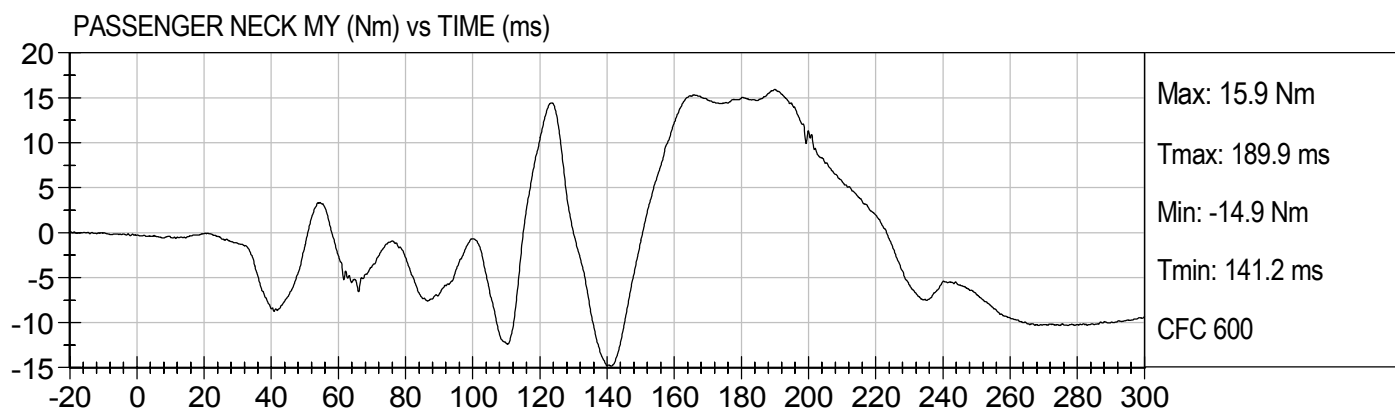
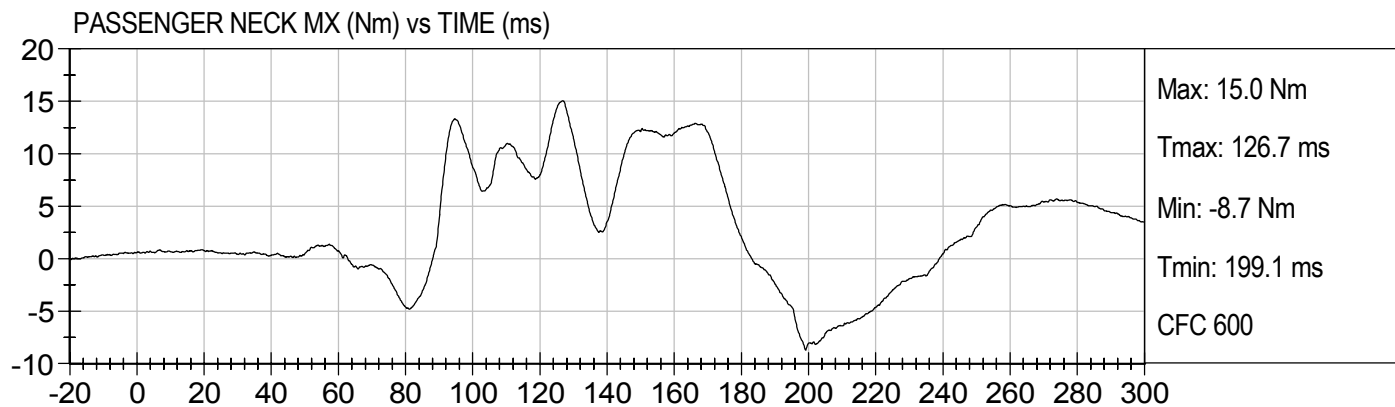
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

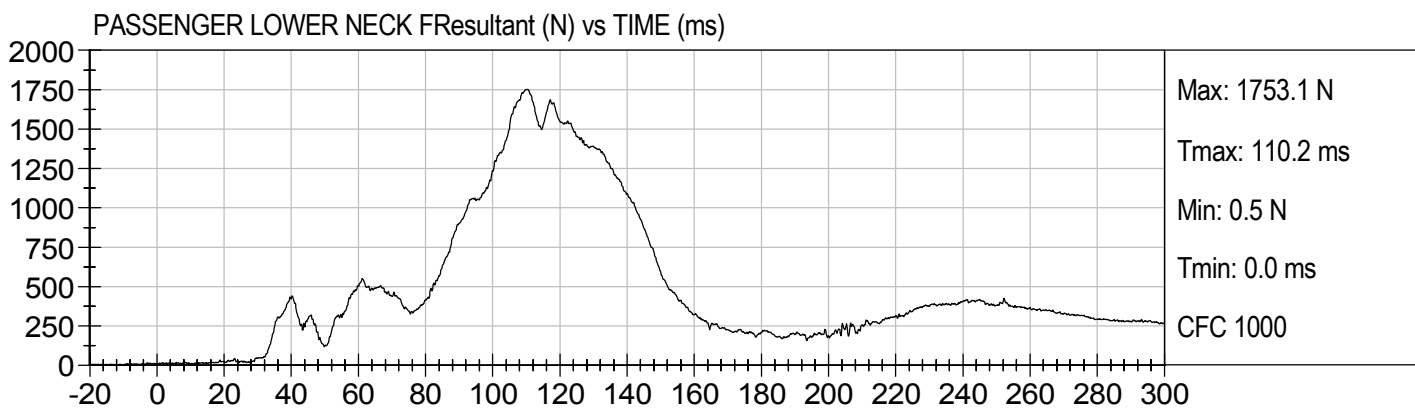
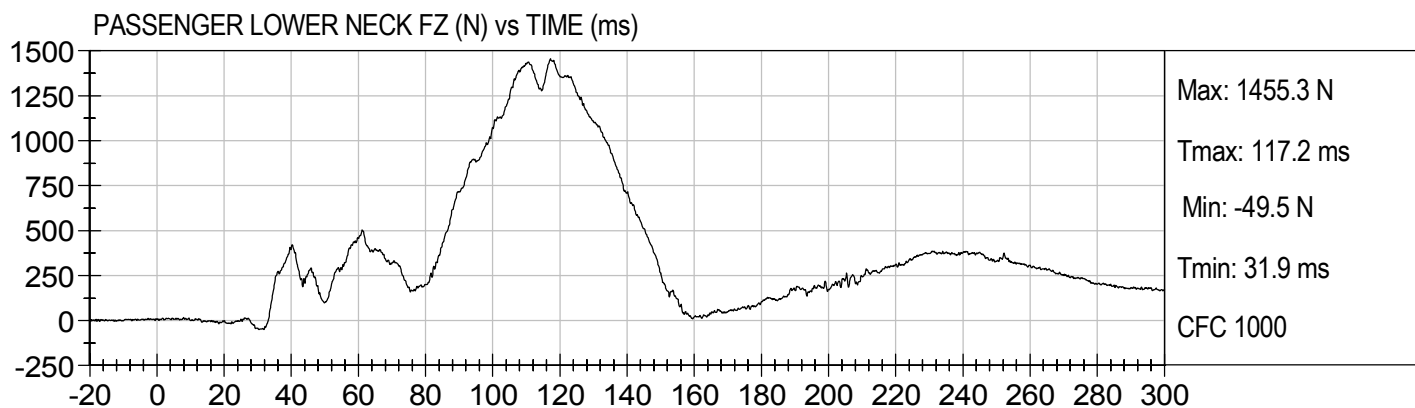
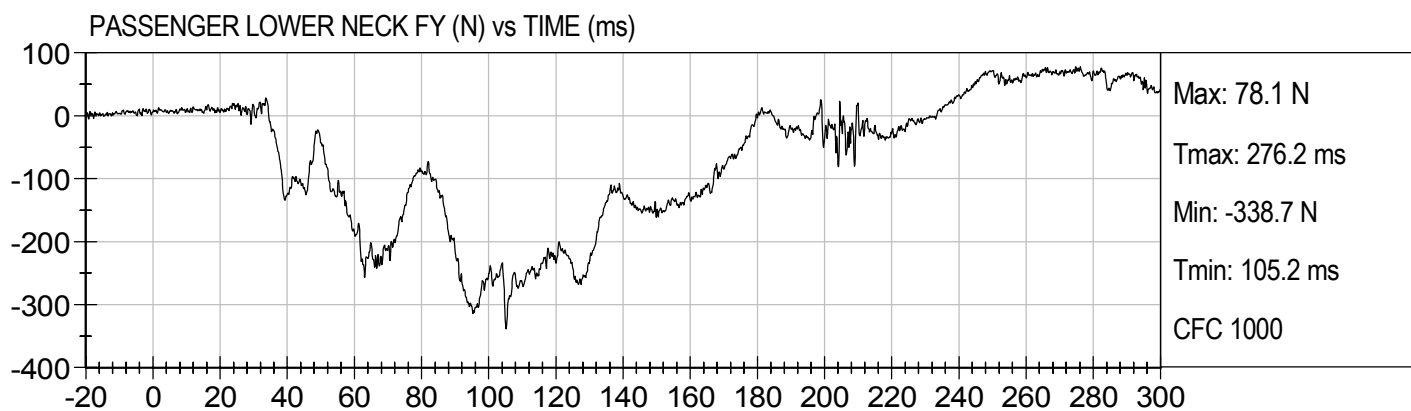
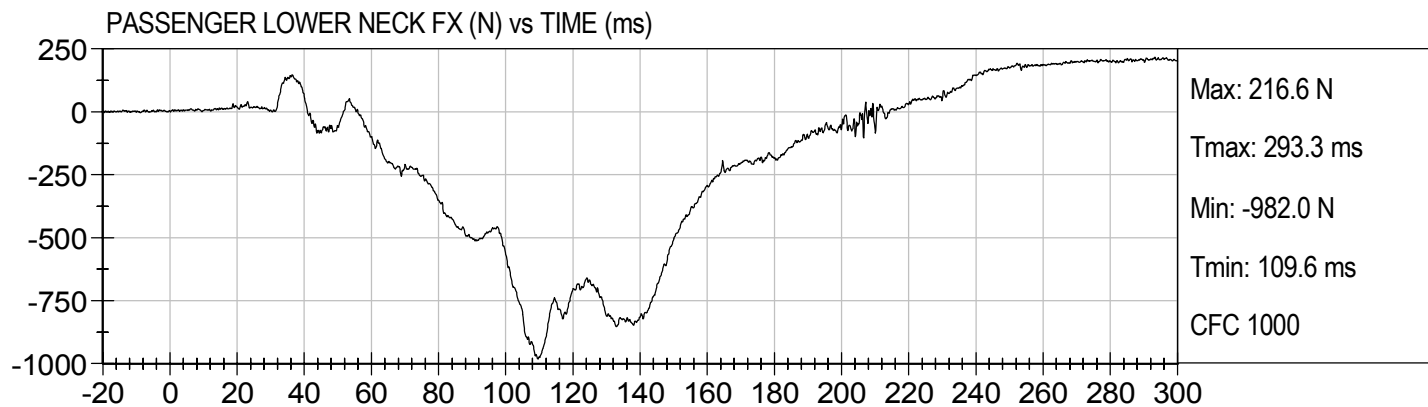
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

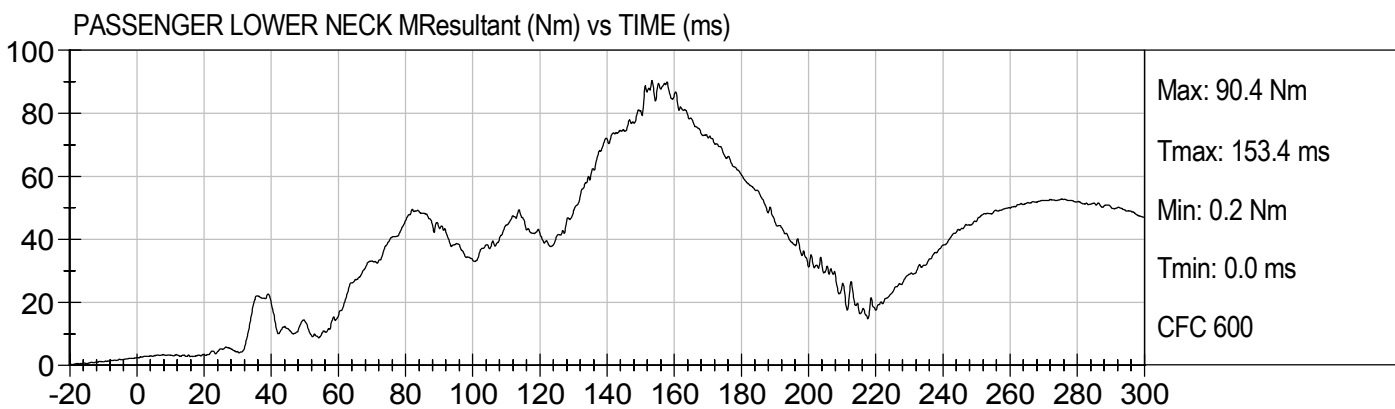
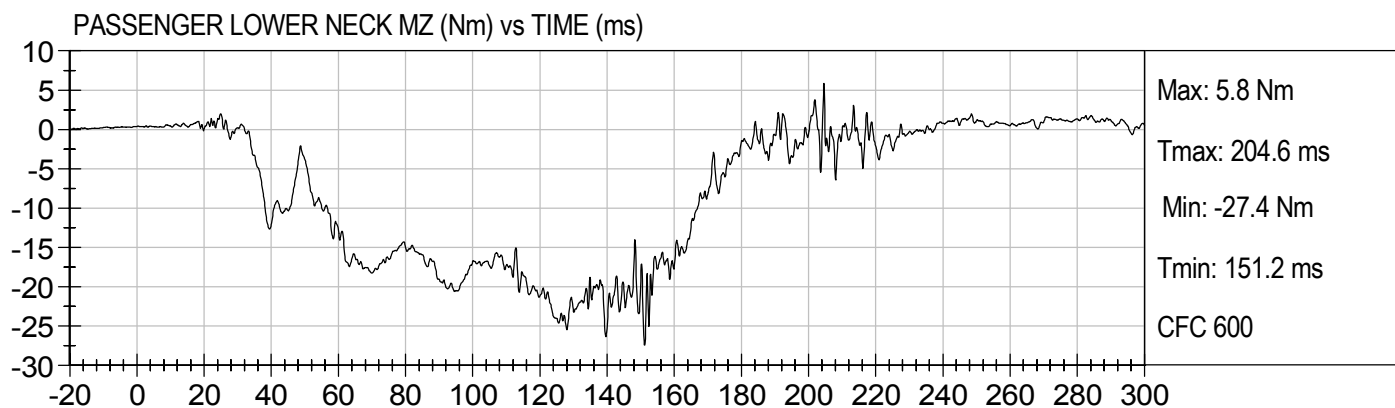
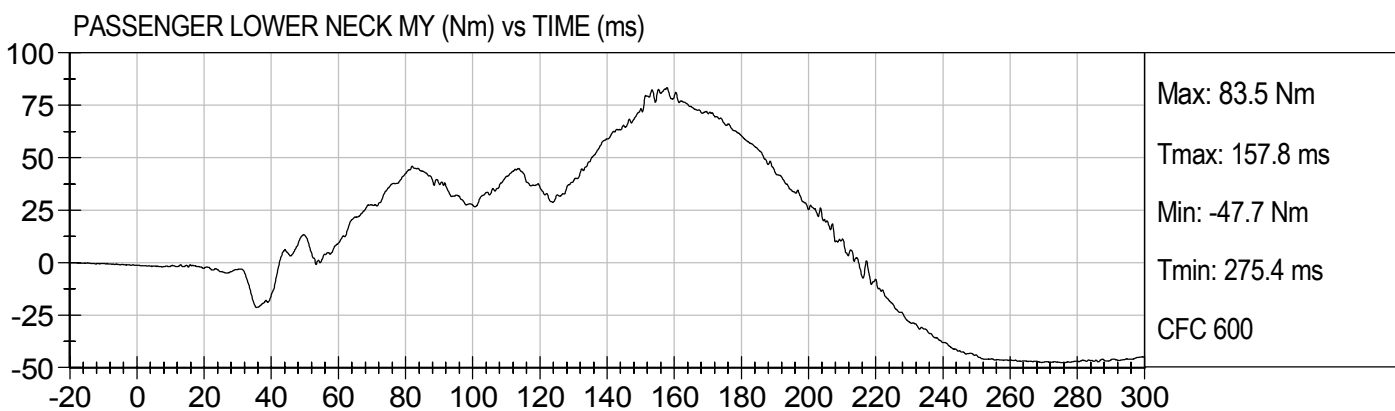
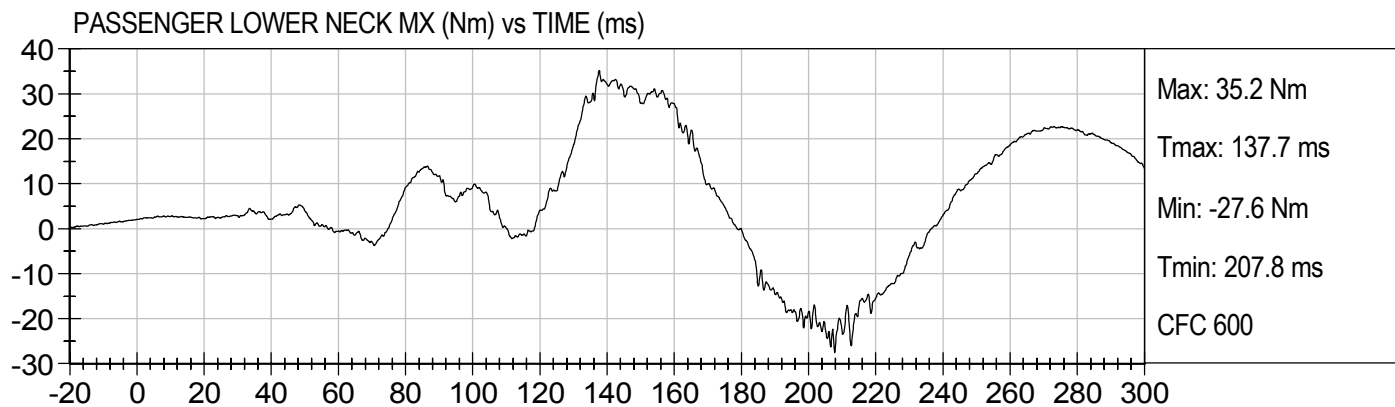
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

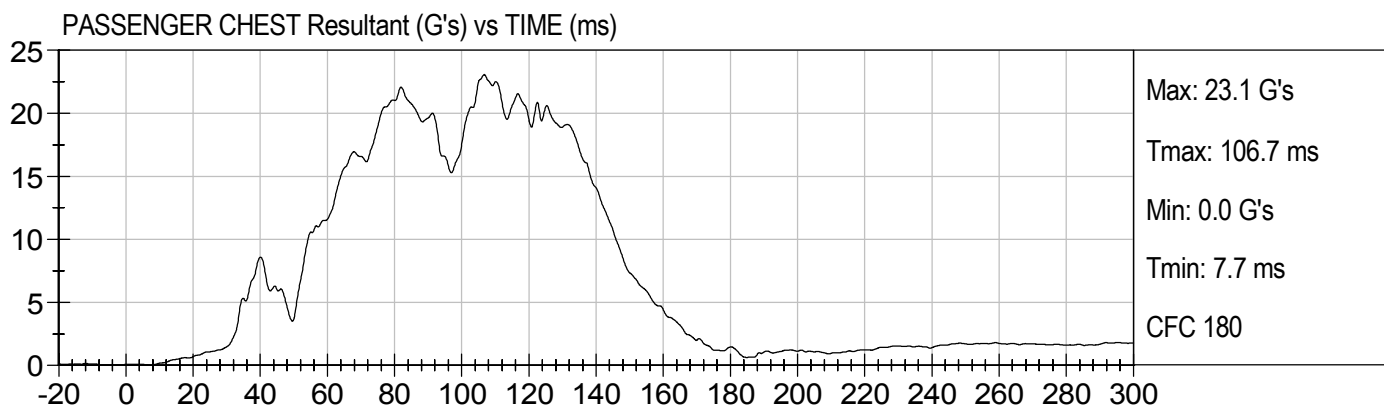
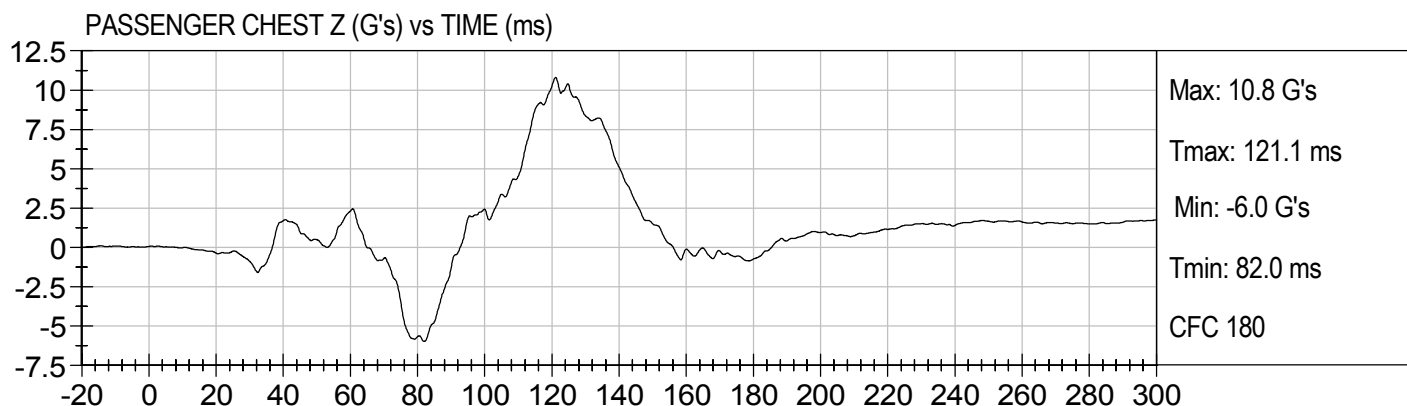
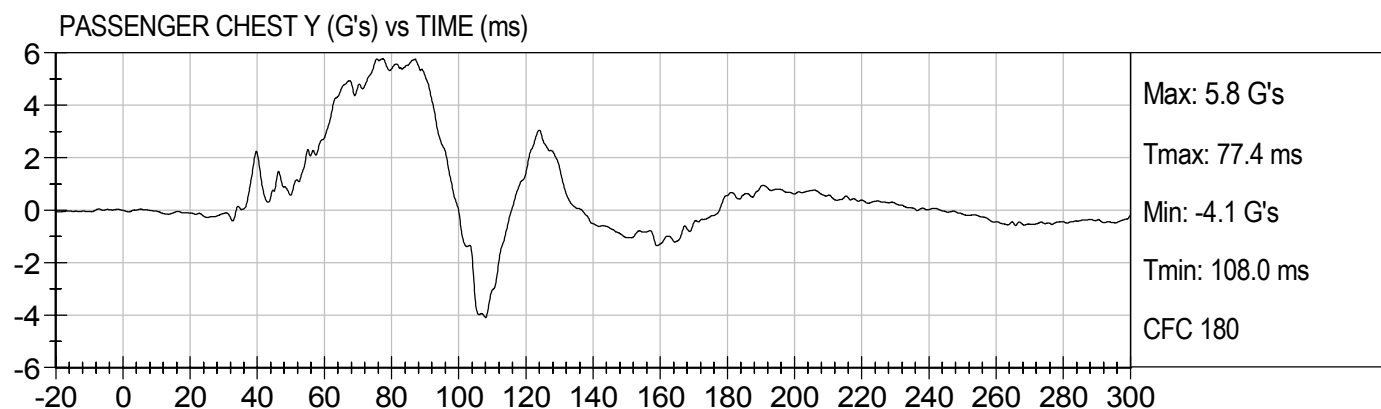
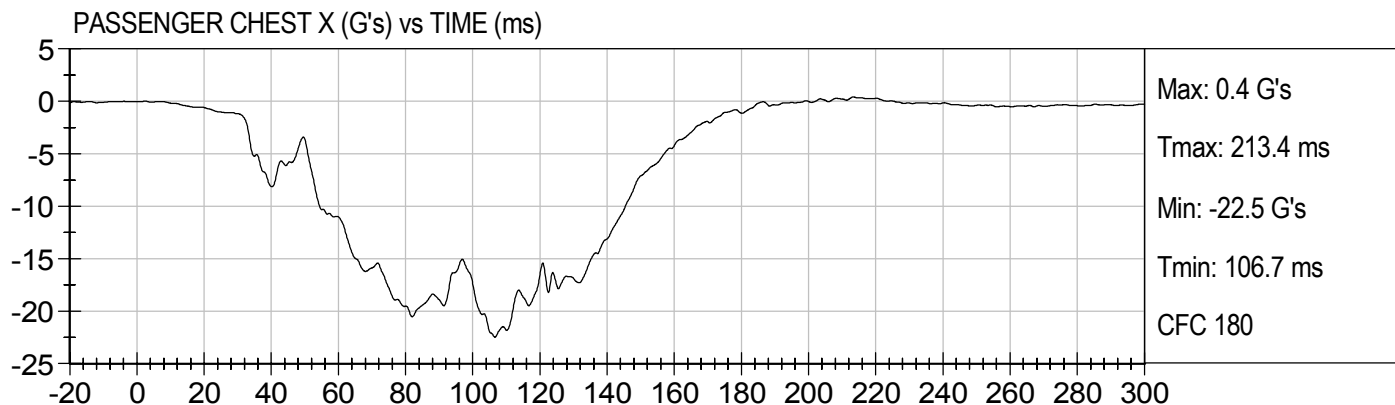
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

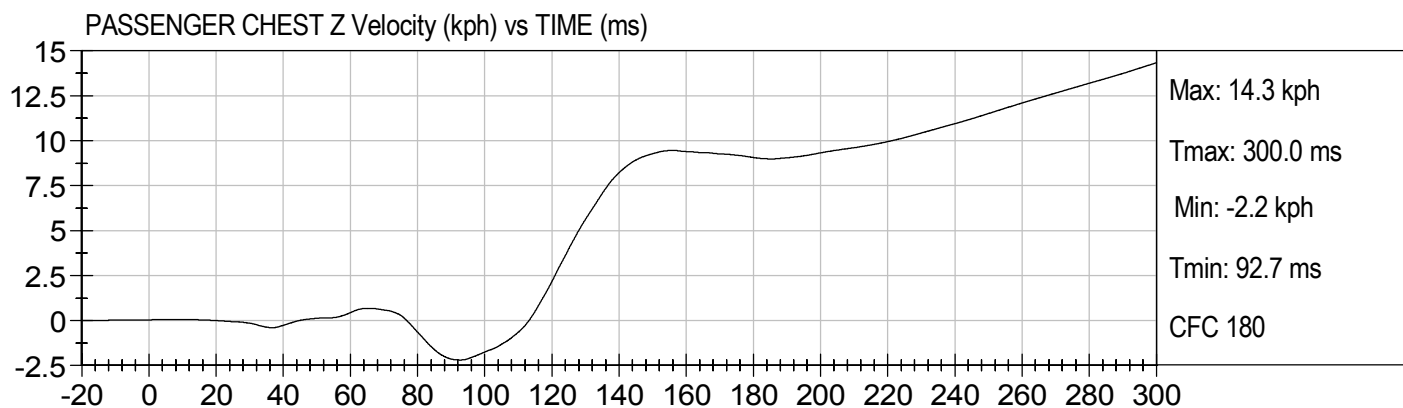
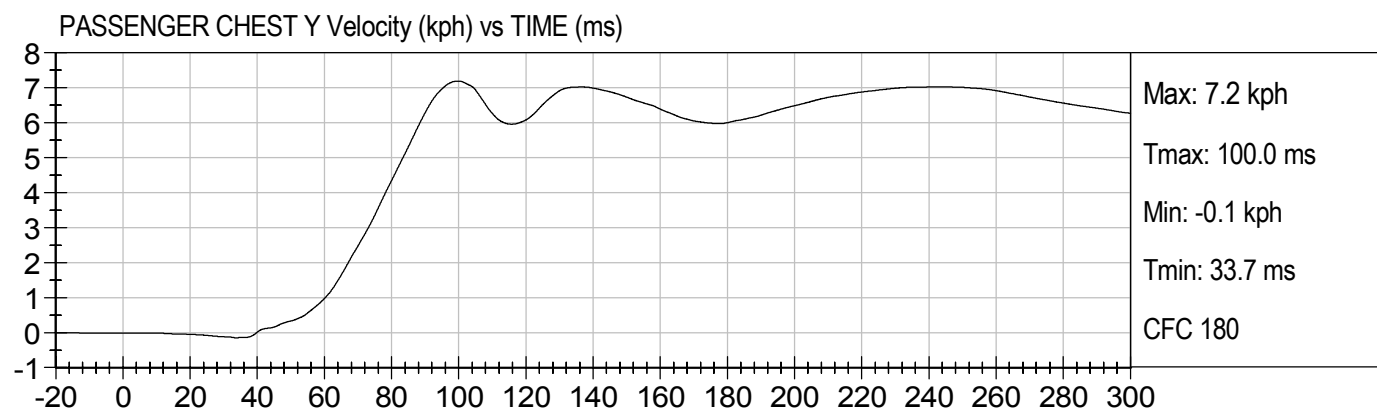
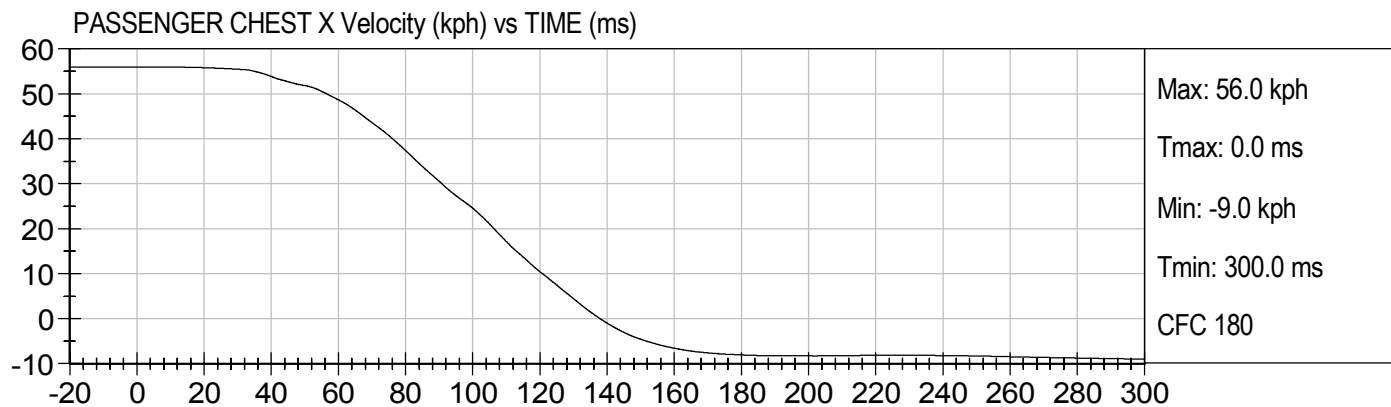




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

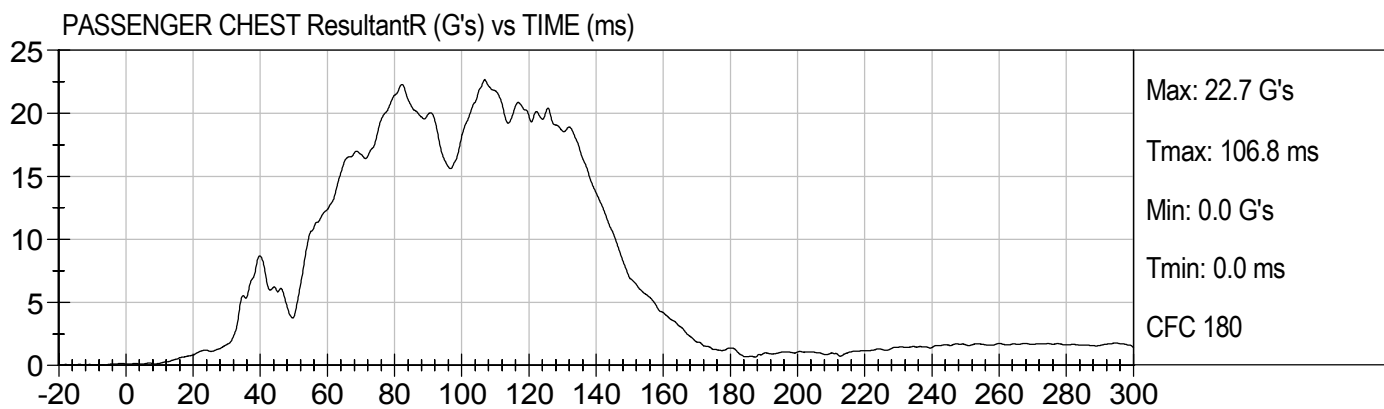
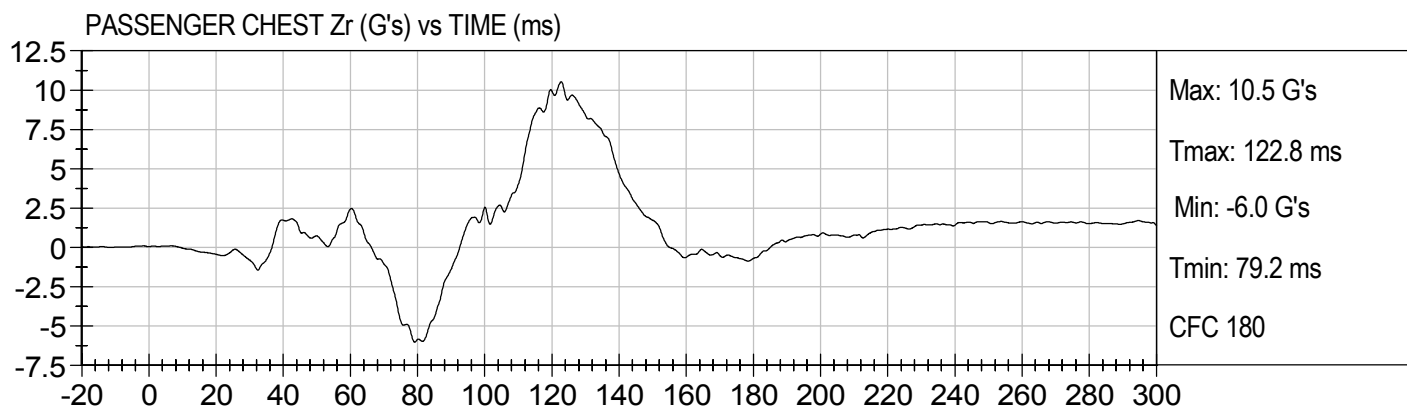
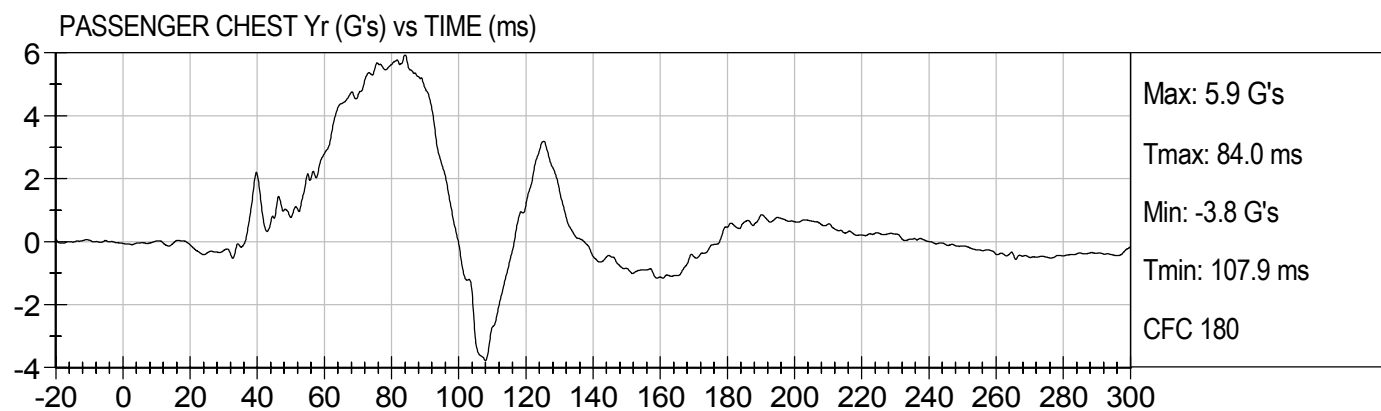
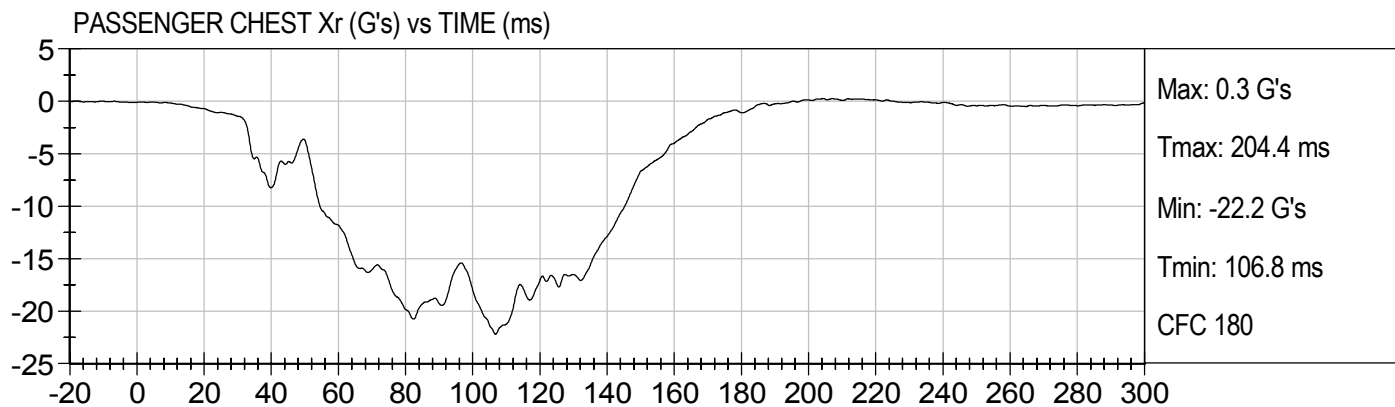


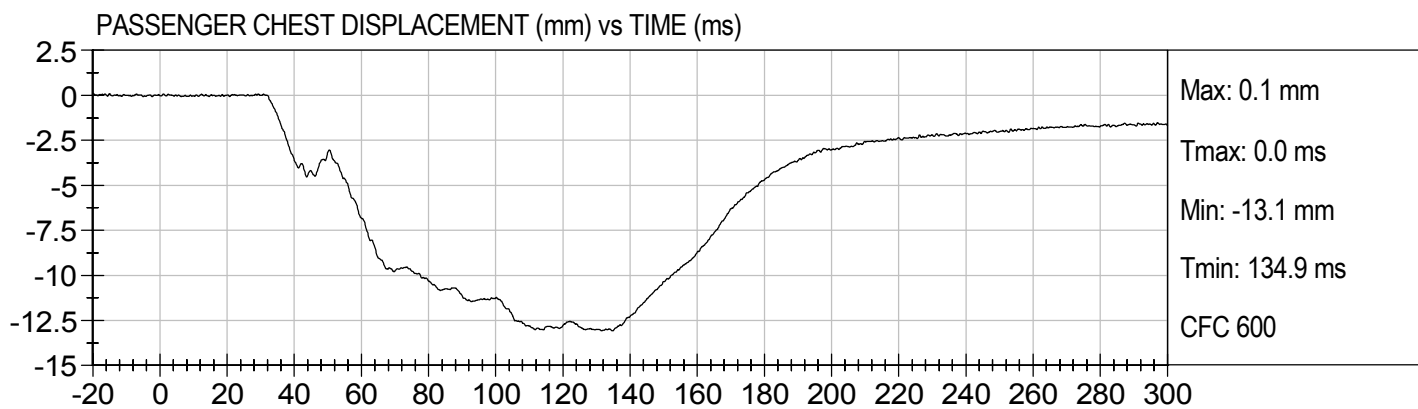
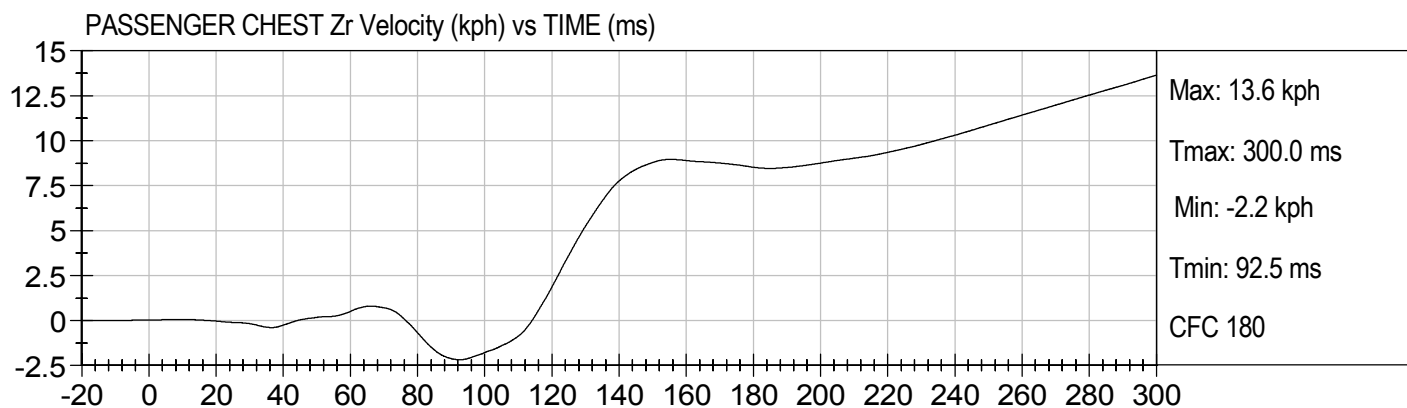
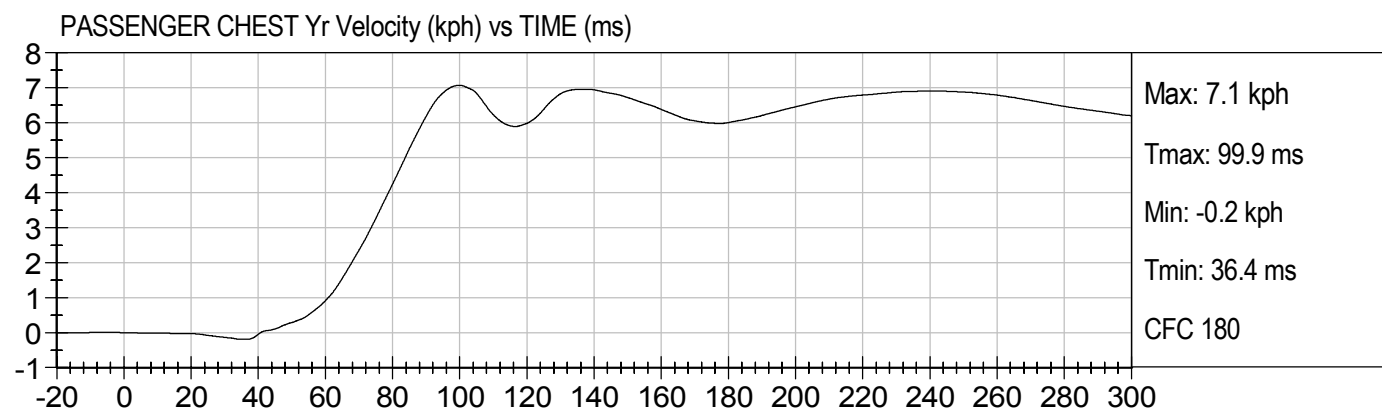
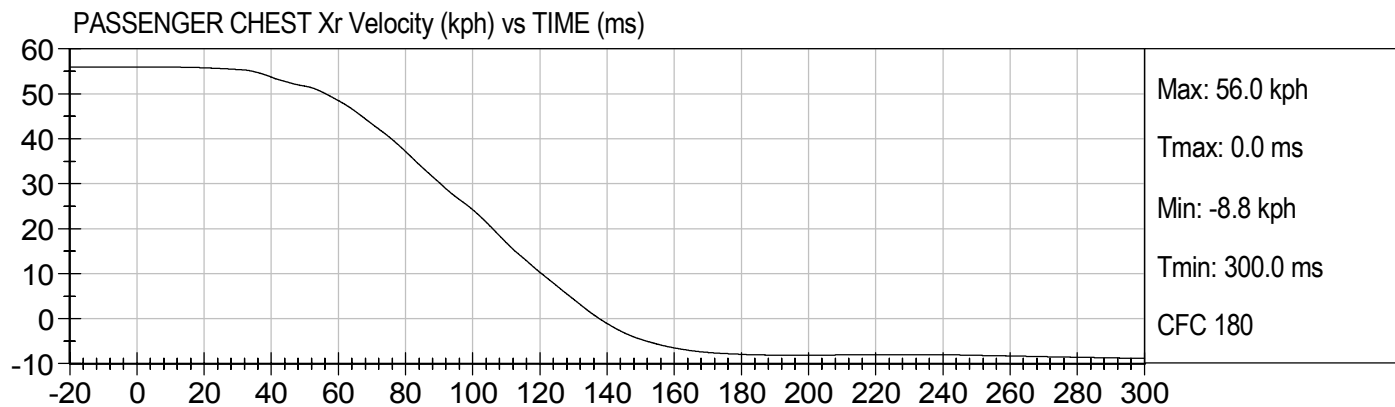




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)



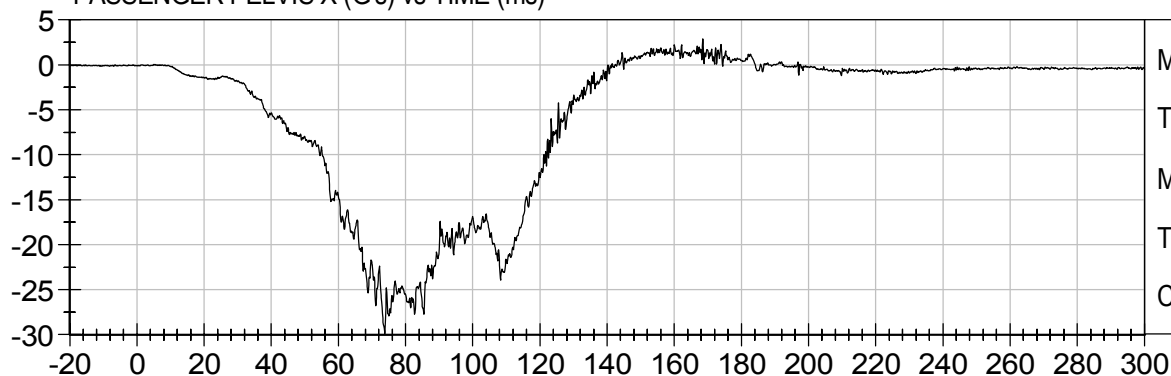




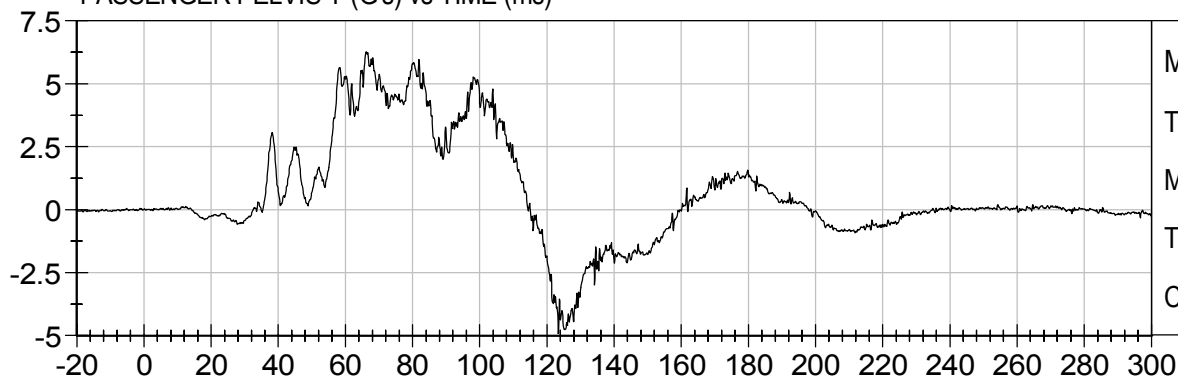
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

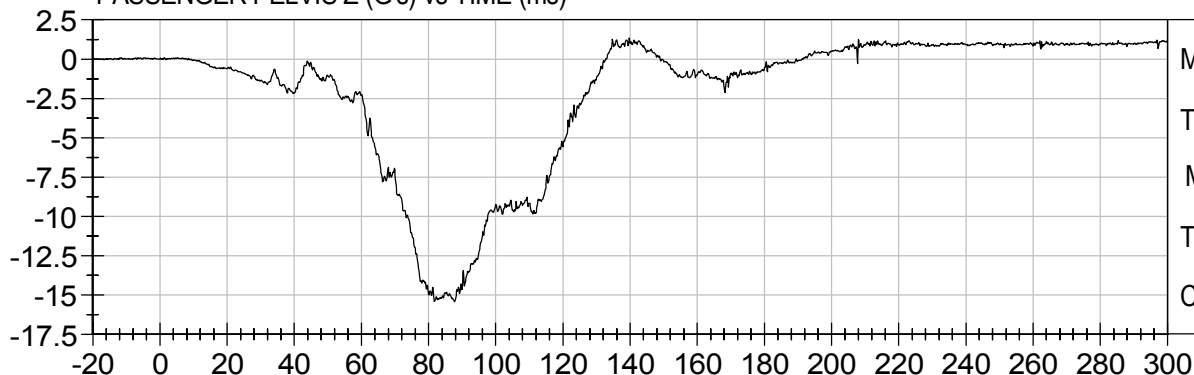
PASSENGER PELVIS X (G's) vs TIME (ms)



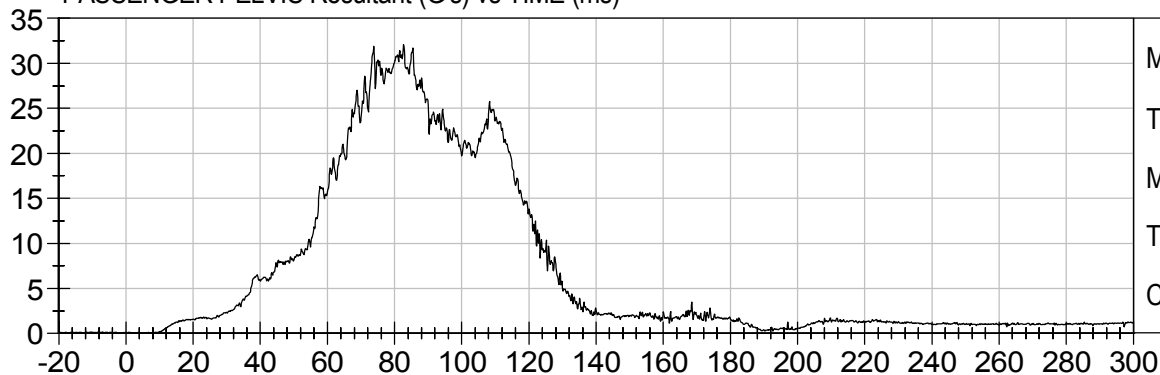
PASSENGER PELVIS Y (G's) vs TIME (ms)

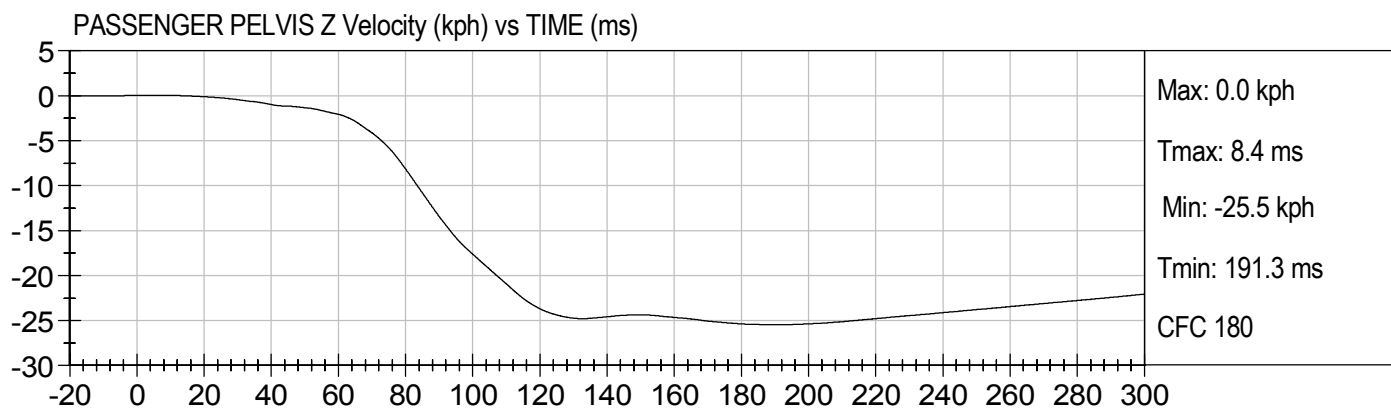
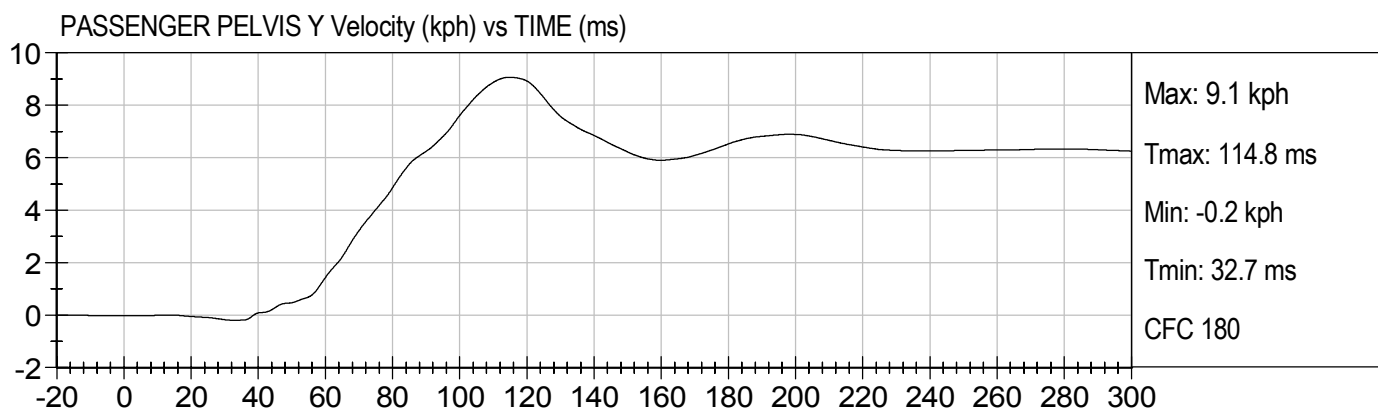
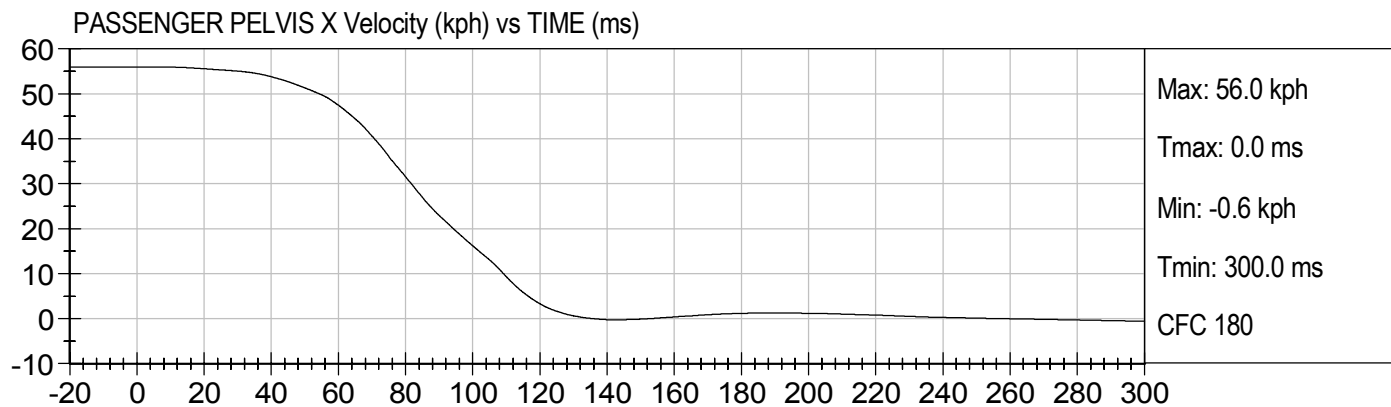


PASSENGER PELVIS Z (G's) vs TIME (ms)



PASSENGER PELVIS Resultant (G's) vs TIME (ms)

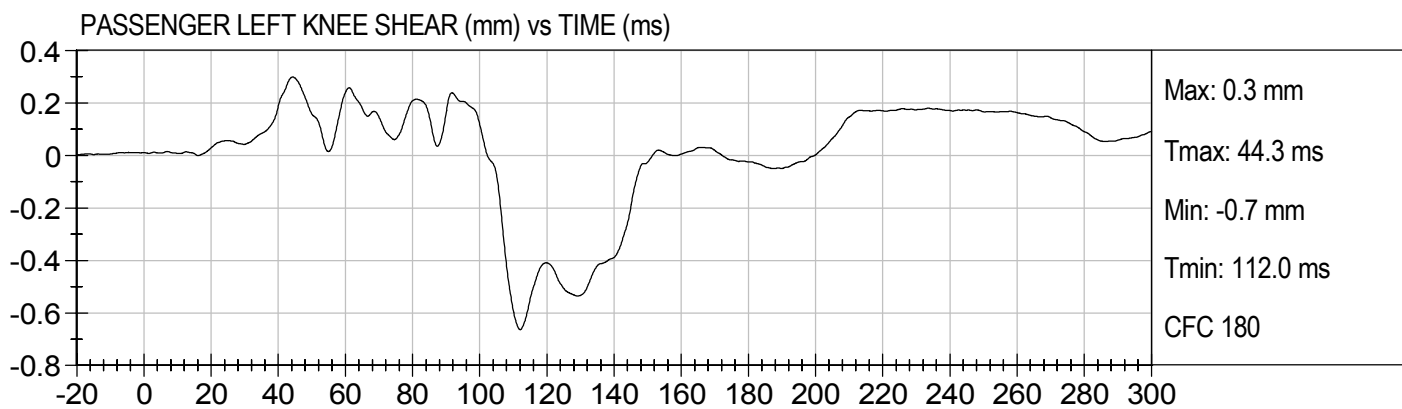
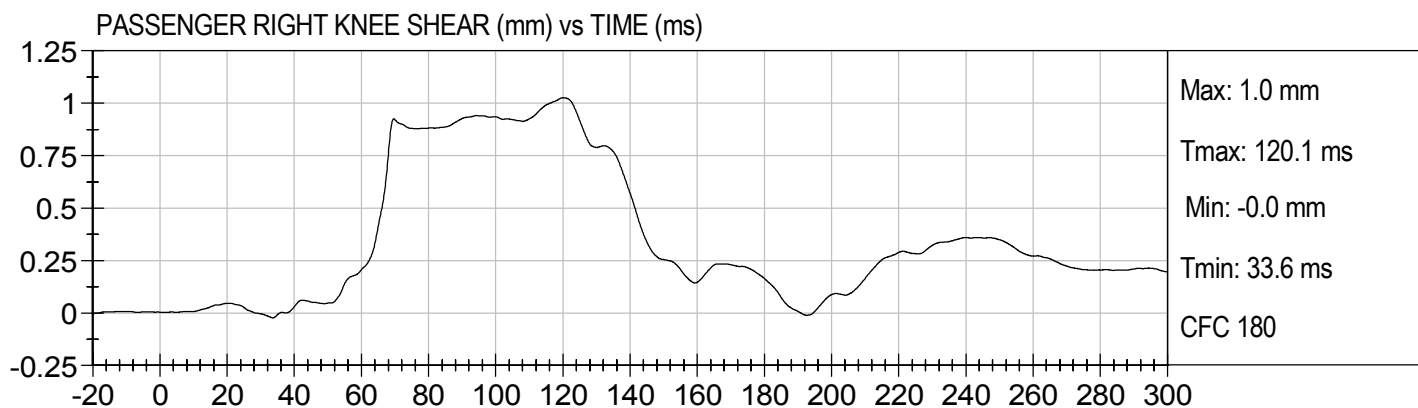
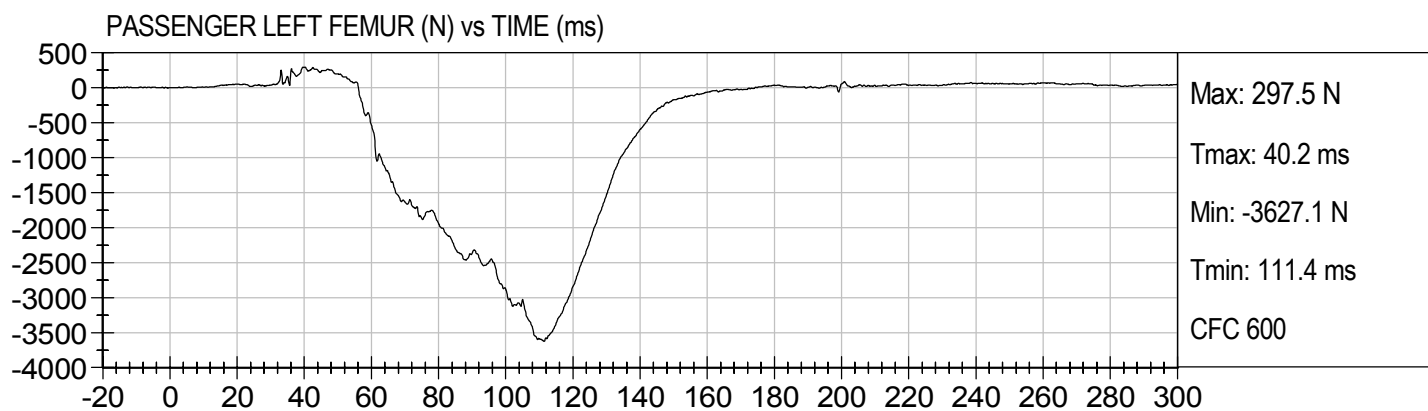
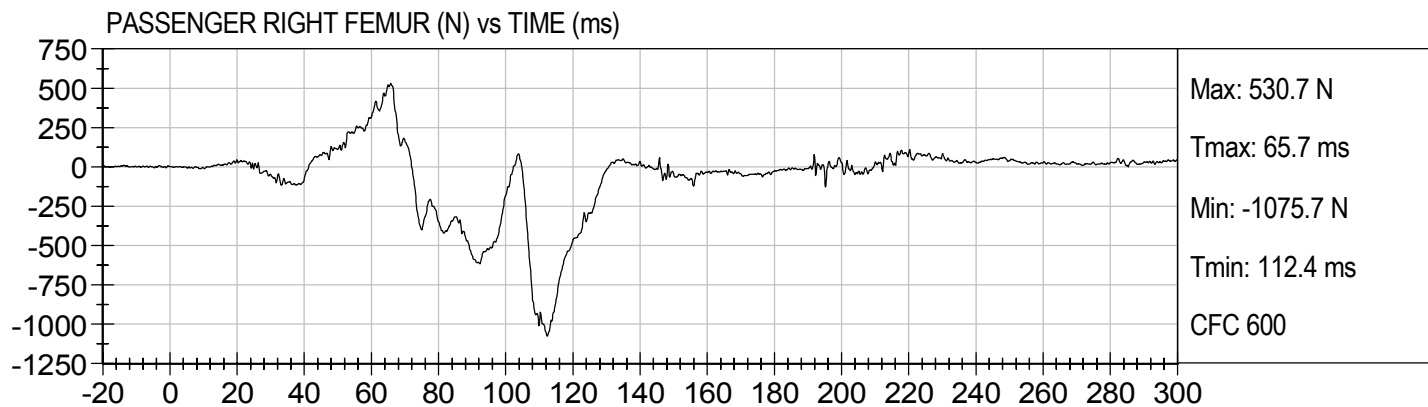






NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

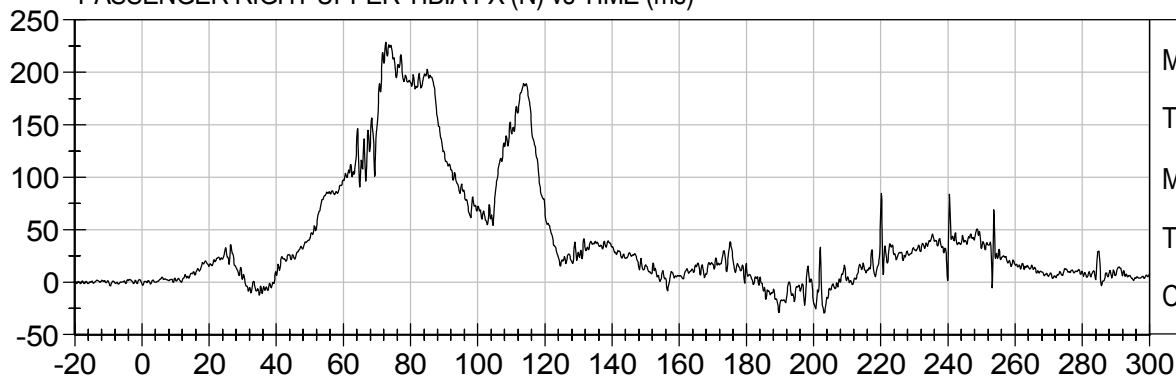




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

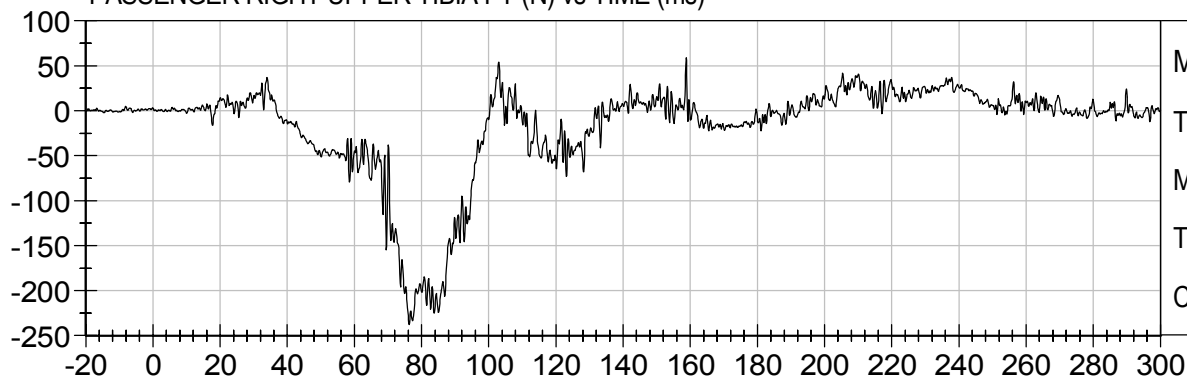
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

PASSENGER RIGHT UPPER TIBIA FX (N) vs TIME (ms)



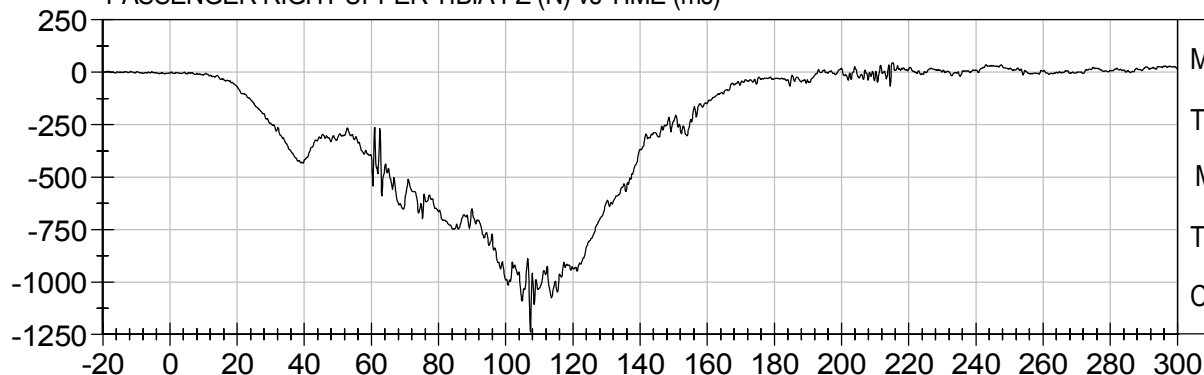
Max: 228.6 N
Tmax: 72.6 ms
Min: -29.6 N
Tmin: 203.2 ms
CFC 600

PASSENGER RIGHT UPPER TIBIA FY (N) vs TIME (ms)



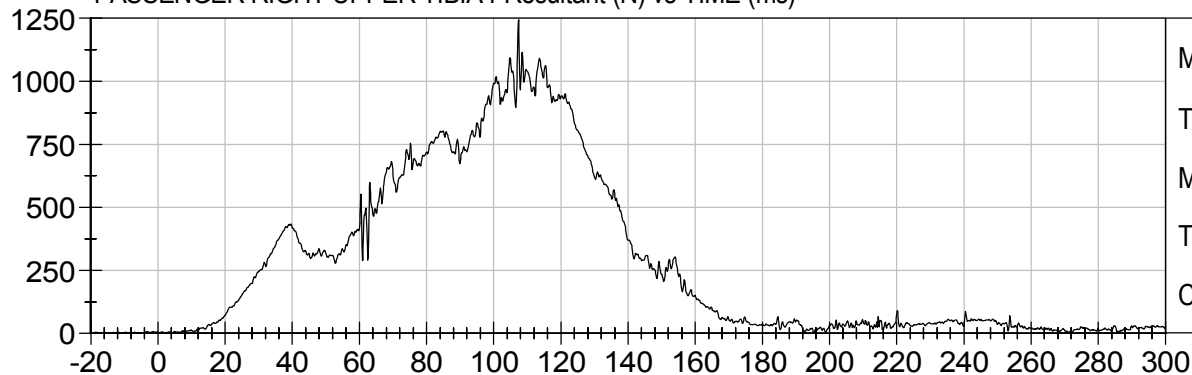
Max: 59.1 N
Tmax: 158.8 ms
Min: -237.9 N
Tmin: 76.3 ms
CFC 600

PASSENGER RIGHT UPPER TIBIA FZ (N) vs TIME (ms)

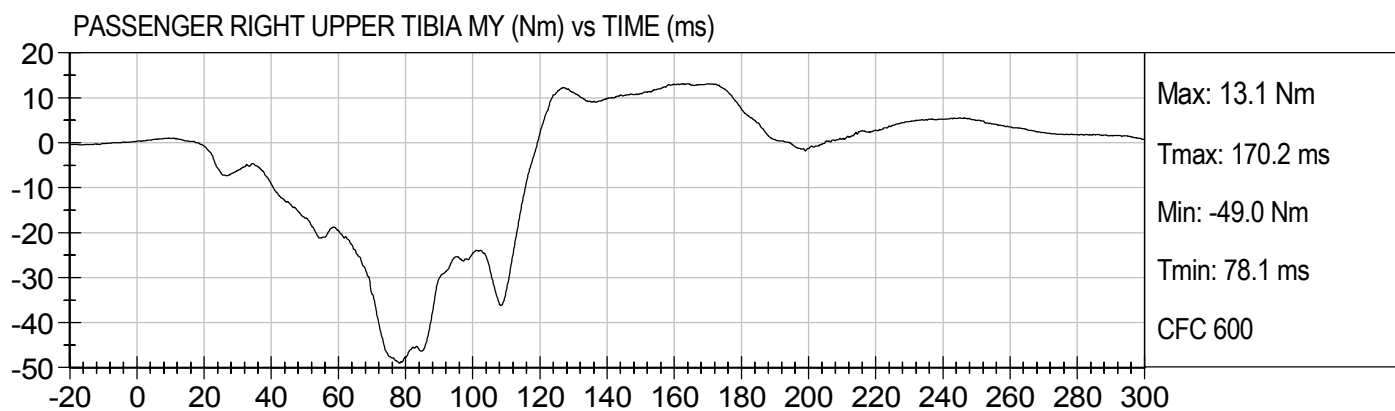
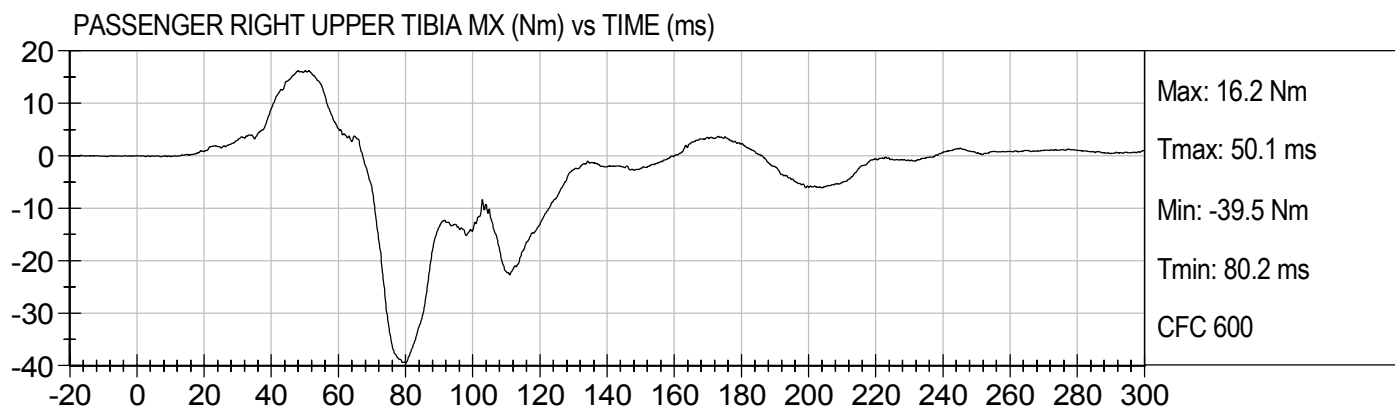


Max: 46.3 N
Tmax: 215.3 ms
Min: -1238.2 N
Tmin: 107.4 ms
CFC 600

PASSENGER RIGHT UPPER TIBIA FResultant (N) vs TIME (ms)



Max: 1244.0 N
Tmax: 107.4 ms
Min: 0.2 N
Tmin: 0.0 ms
CFC 600

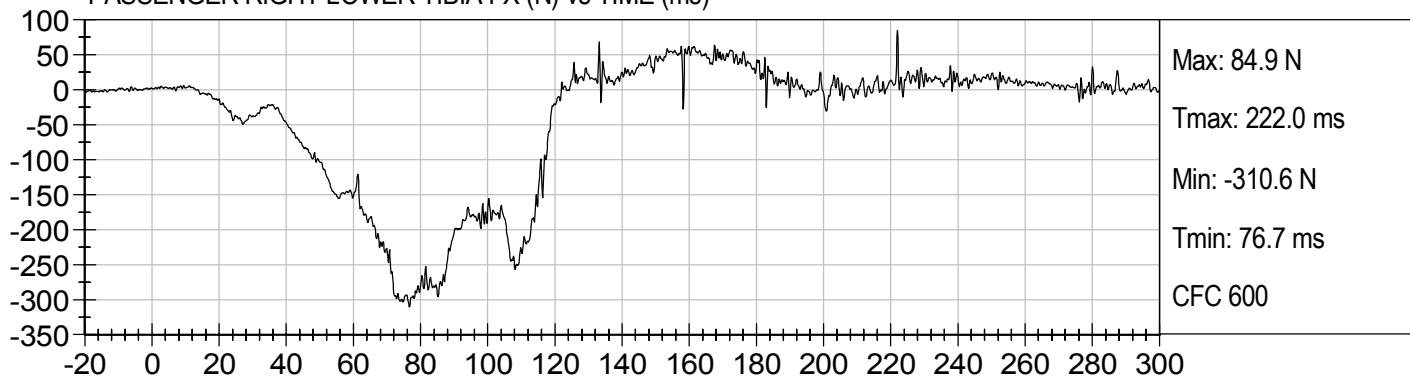




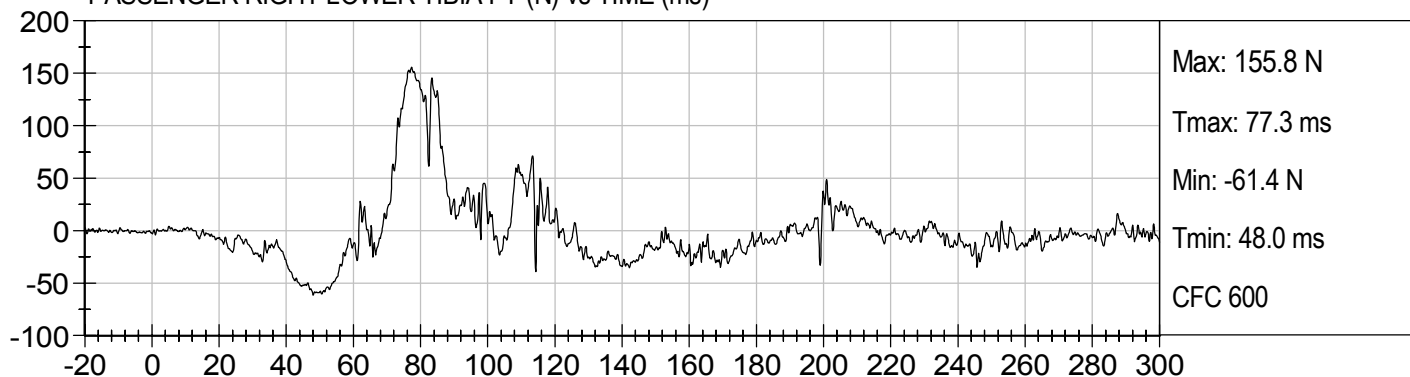
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

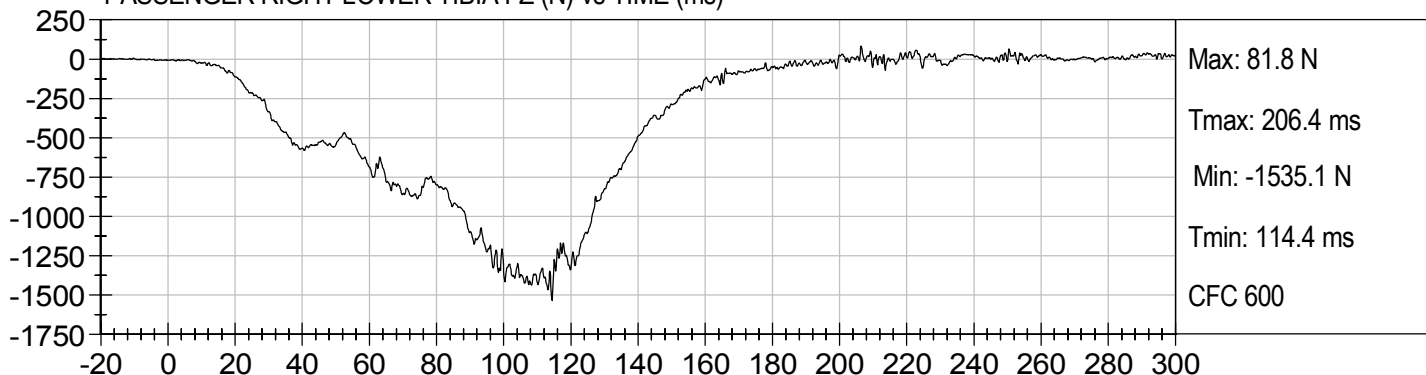
PASSENGER RIGHT LOWER TIBIA FX (N) vs TIME (ms)



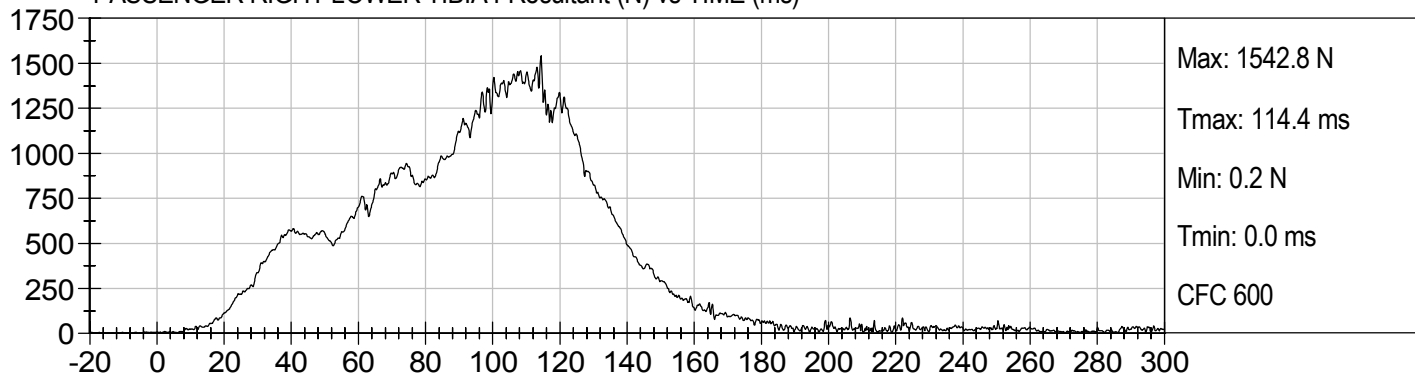
PASSENGER RIGHT LOWER TIBIA FY (N) vs TIME (ms)

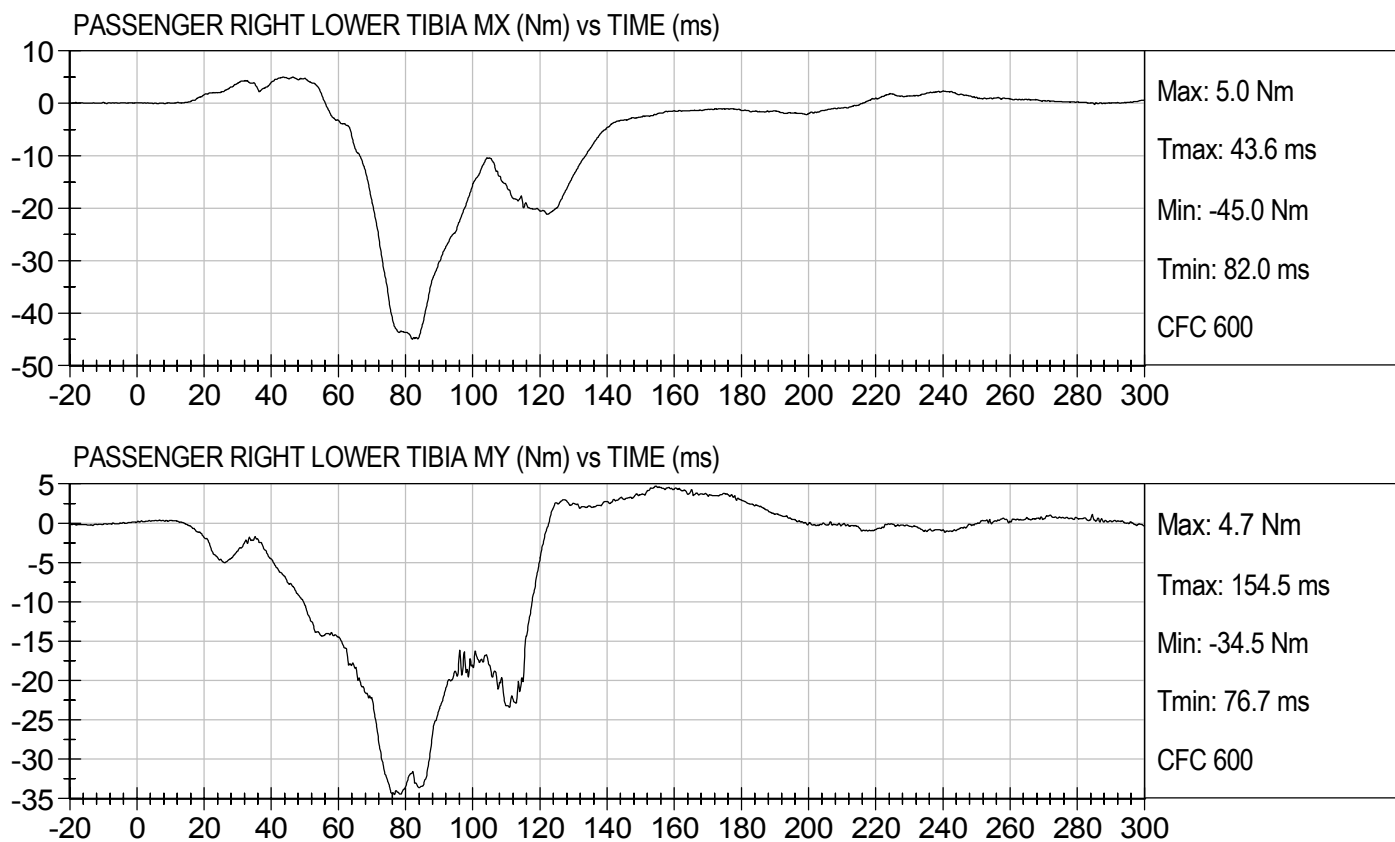


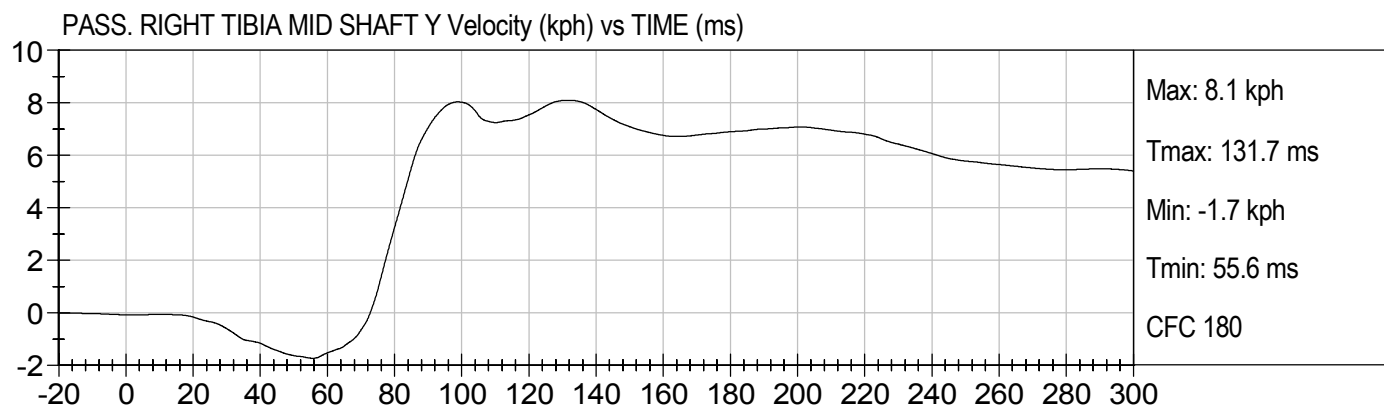
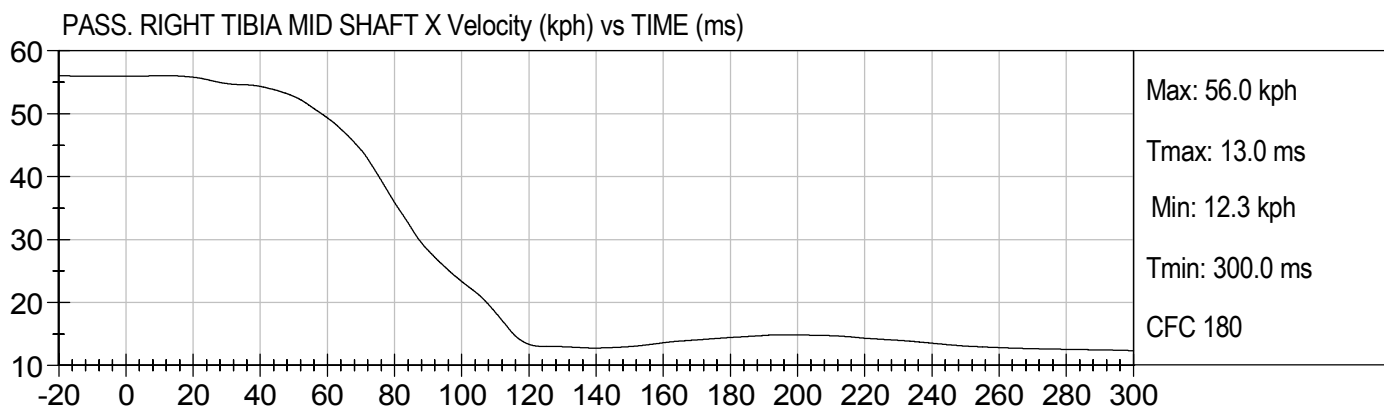
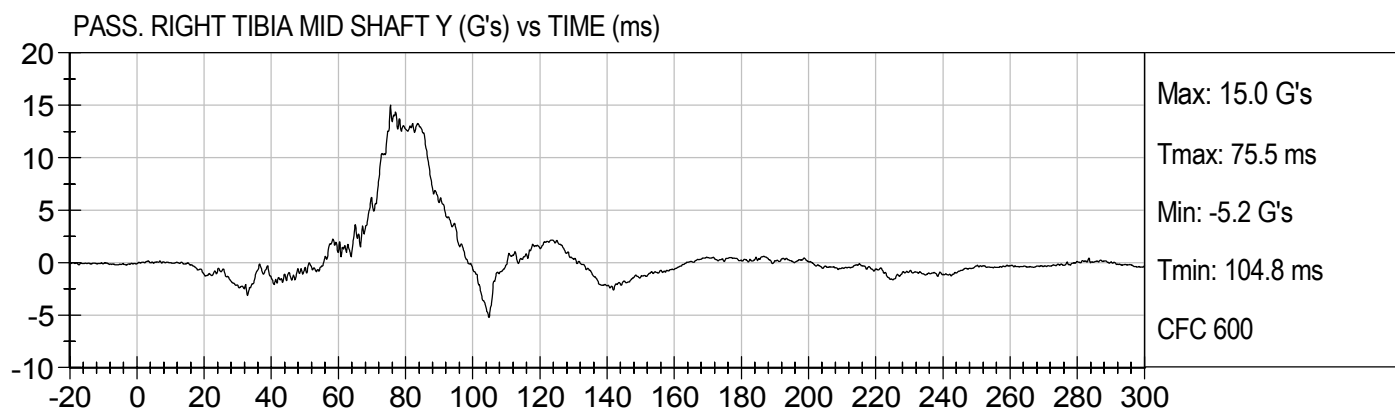
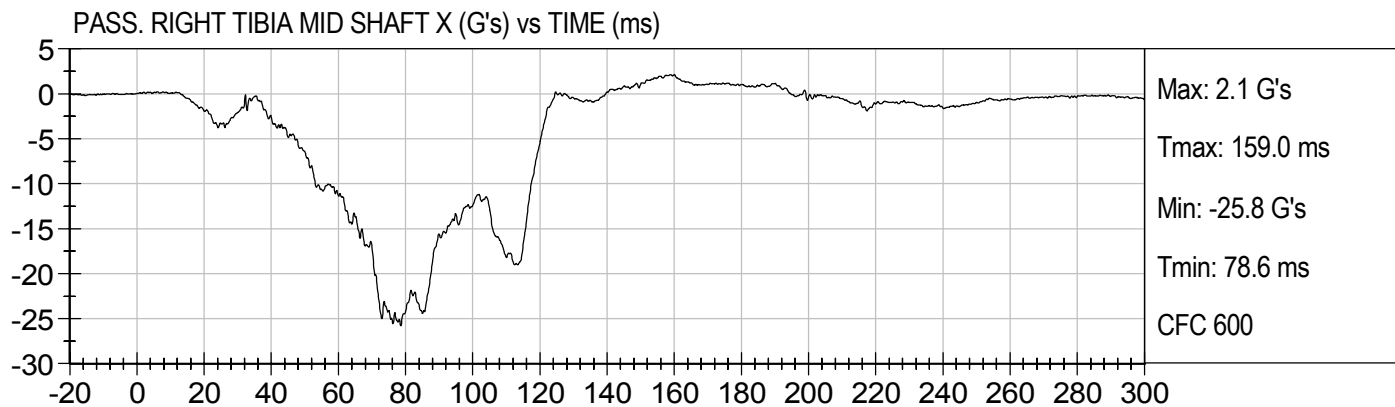
PASSENGER RIGHT LOWER TIBIA FZ (N) vs TIME (ms)

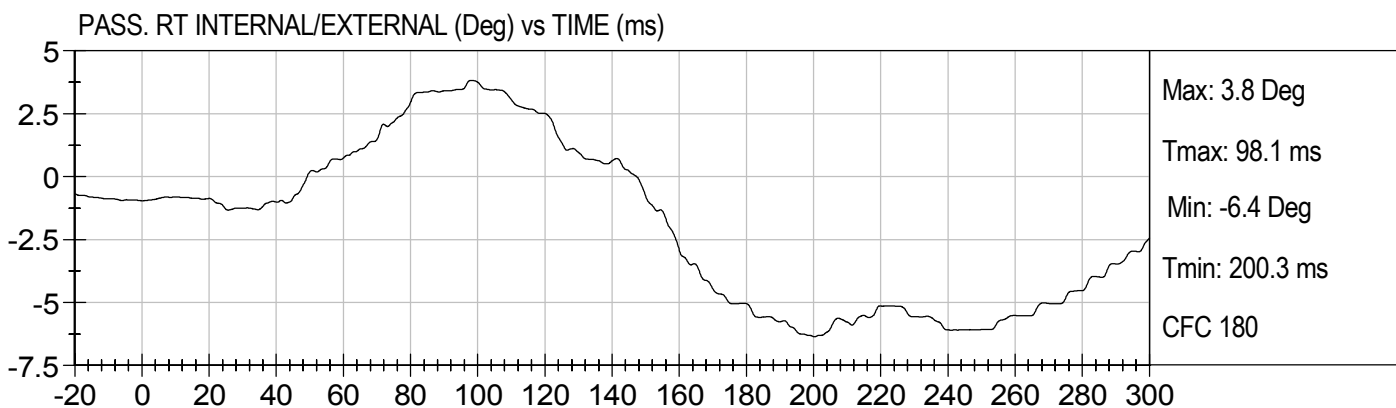
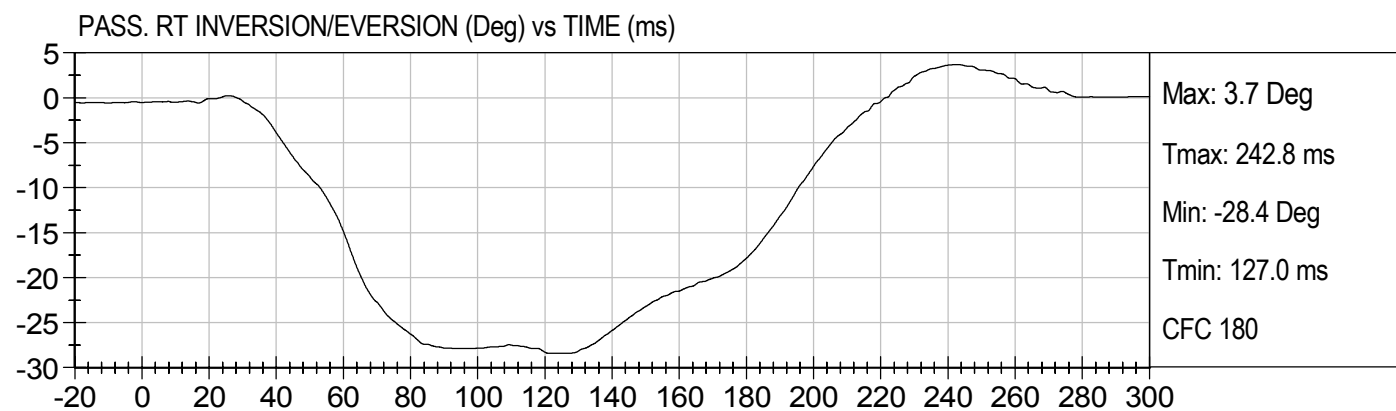
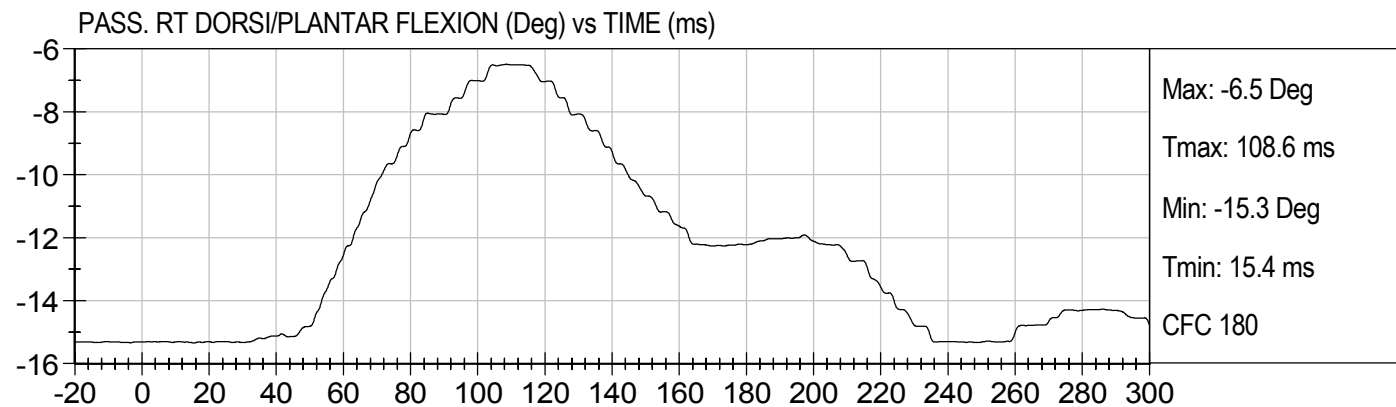


PASSENGER RIGHT LOWER TIBIA FResultant (N) vs TIME (ms)







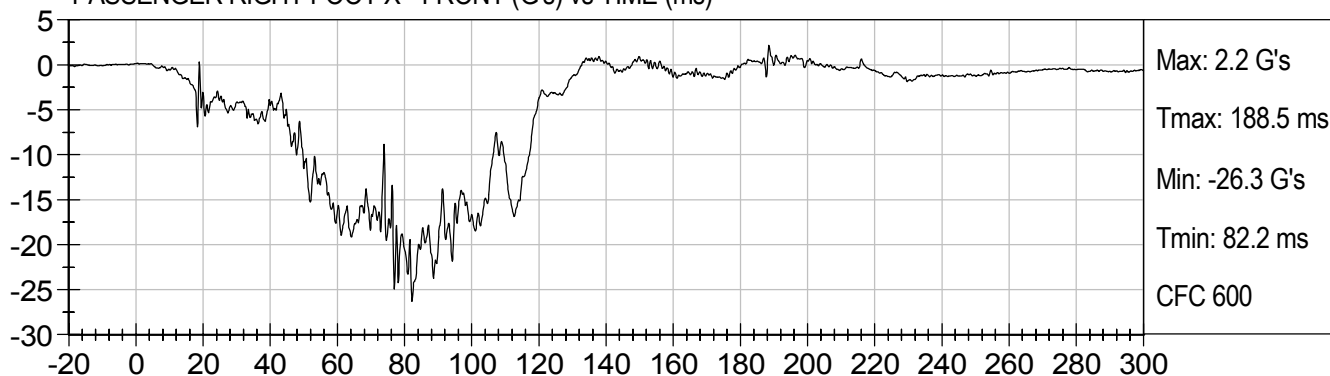




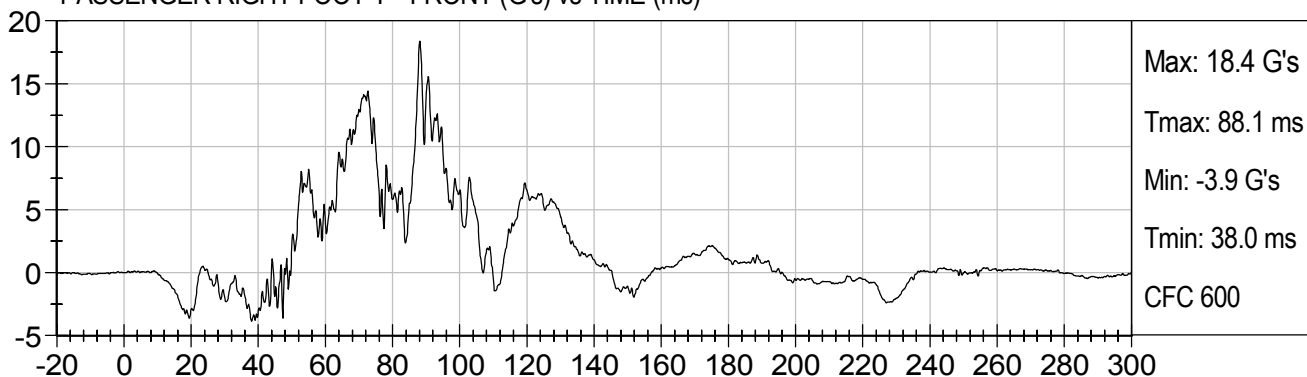
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

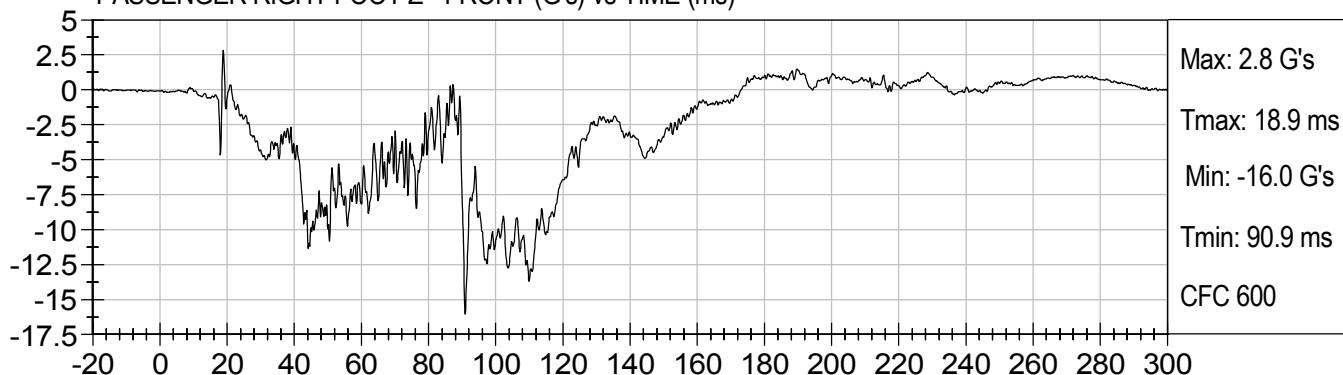
PASSENGER RIGHT FOOT X - FRONT (G's) vs TIME (ms)



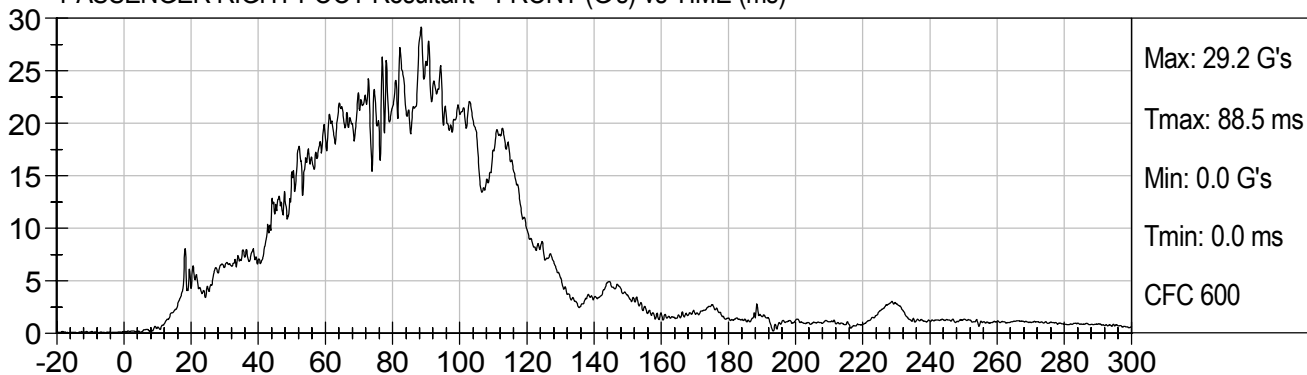
PASSENGER RIGHT FOOT Y - FRONT (G's) vs TIME (ms)



PASSENGER RIGHT FOOT Z - FRONT (G's) vs TIME (ms)

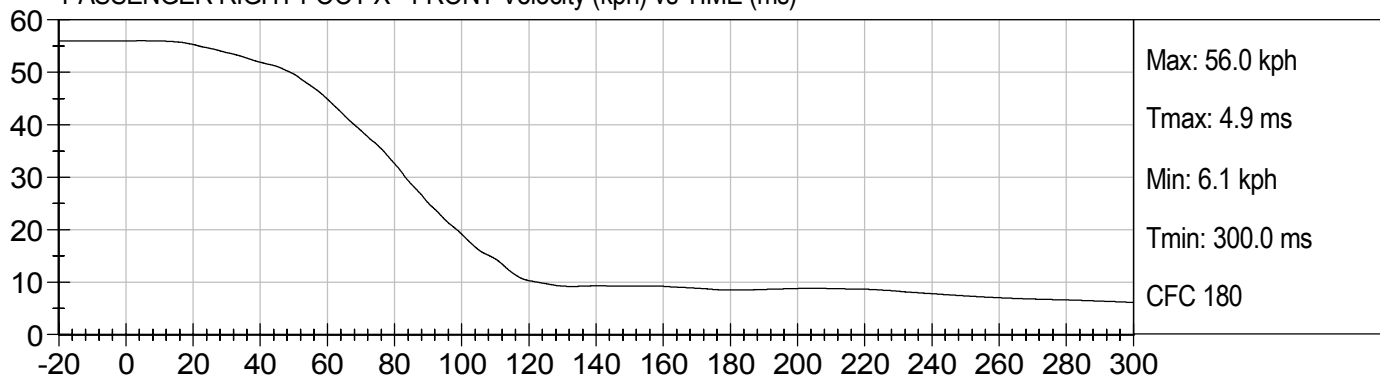


PASSENGER RIGHT FOOT Resultant - FRONT (G's) vs TIME (ms)

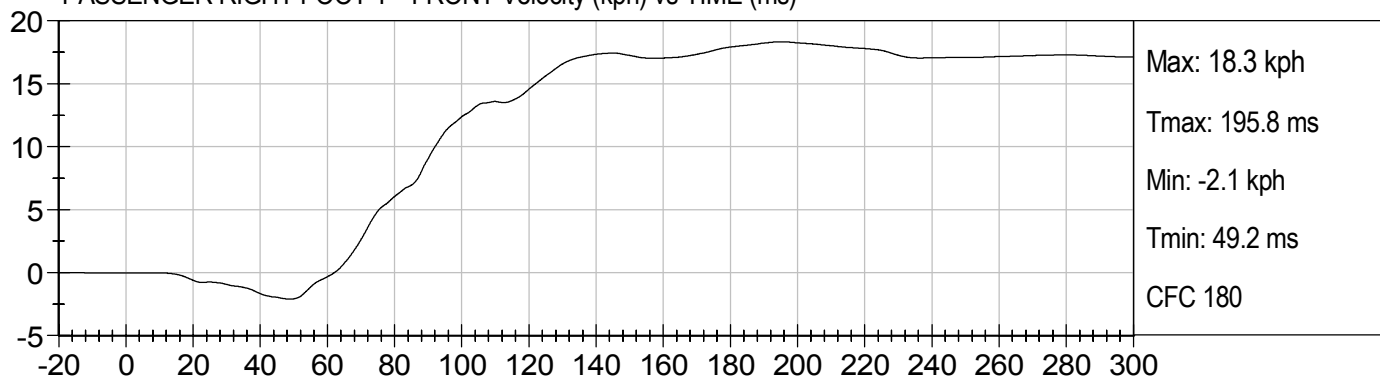




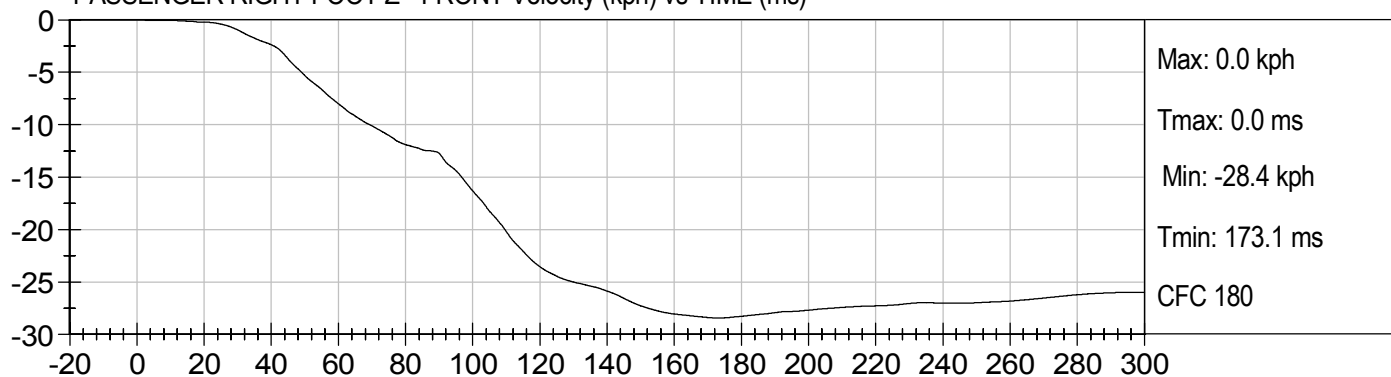
PASSENGER RIGHT FOOT X - FRONT Velocity (kph) vs TIME (ms)



PASSENGER RIGHT FOOT Y - FRONT Velocity (kph) vs TIME (ms)



PASSENGER RIGHT FOOT Z - FRONT Velocity (kph) vs TIME (ms)

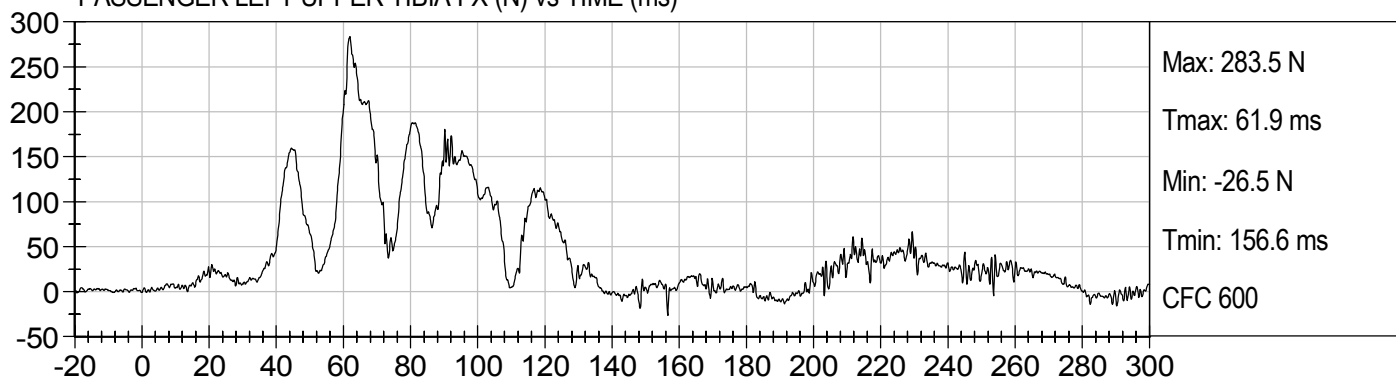




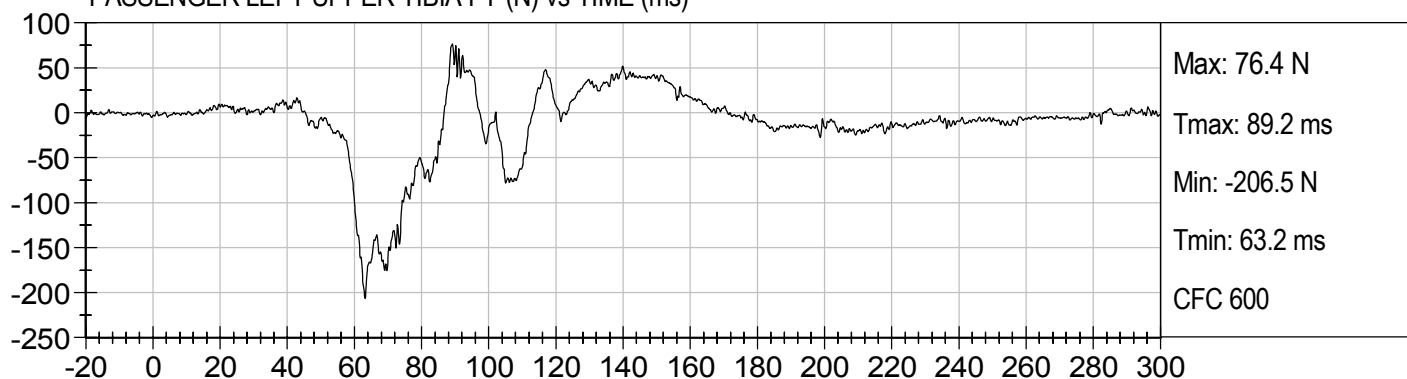
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

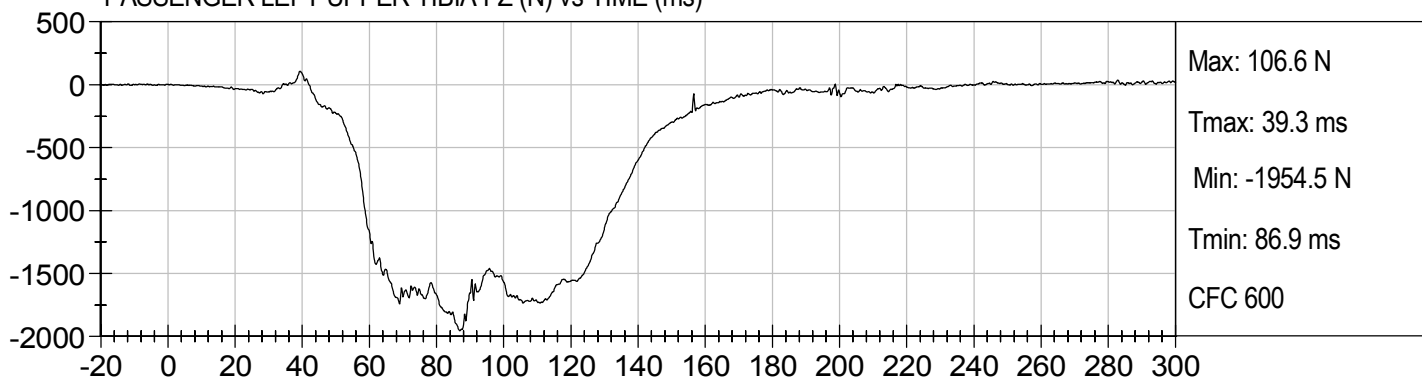
PASSENGER LEFT UPPER TIBIA FX (N) vs TIME (ms)



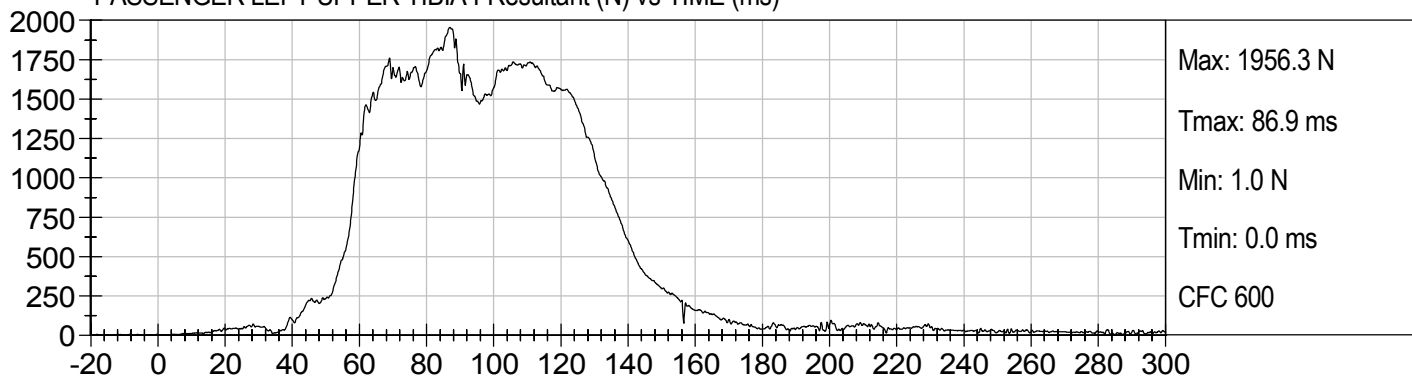
PASSENGER LEFT UPPER TIBIA FY (N) vs TIME (ms)



PASSENGER LEFT UPPER TIBIA FZ (N) vs TIME (ms)



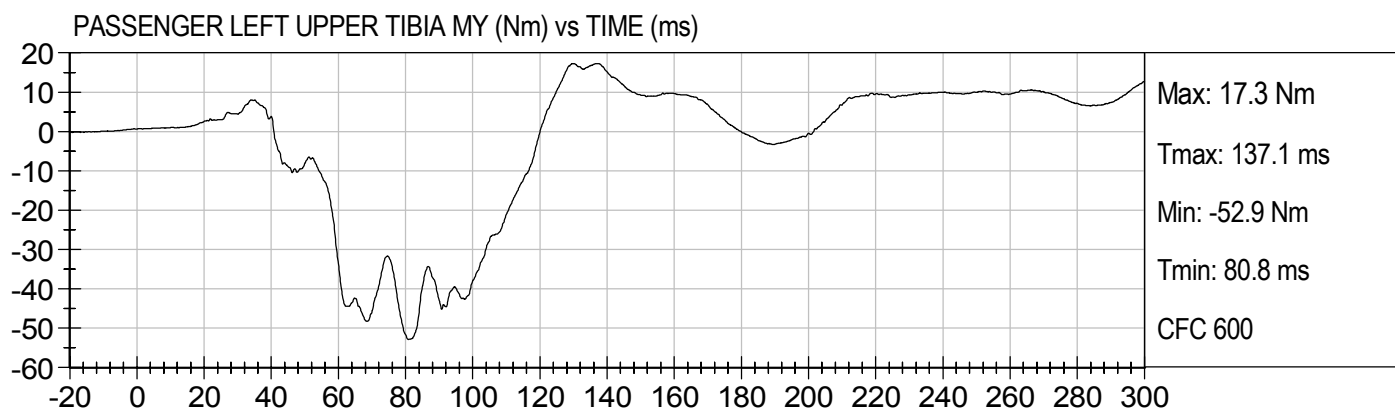
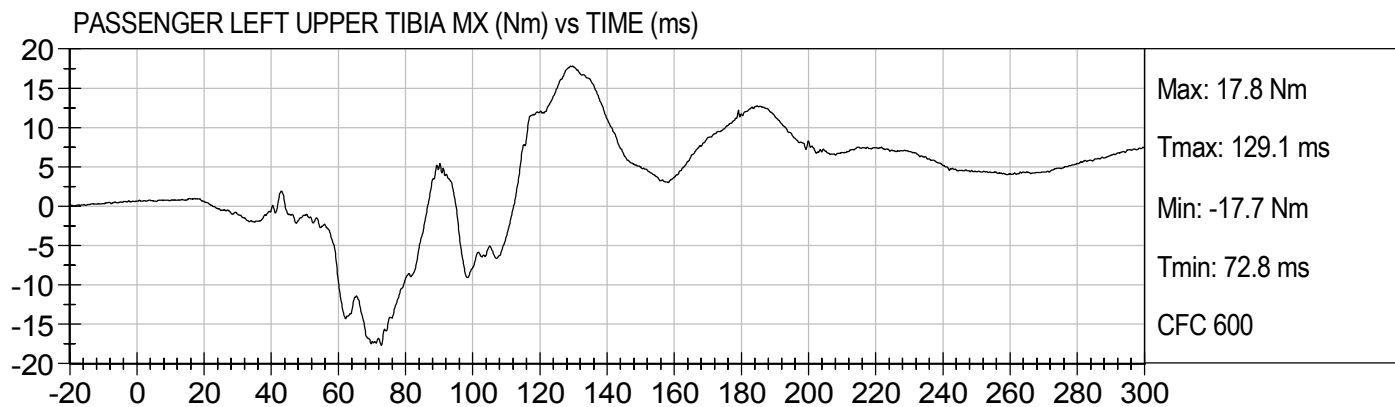
PASSENGER LEFT UPPER TIBIA FResultant (N) vs TIME (ms)

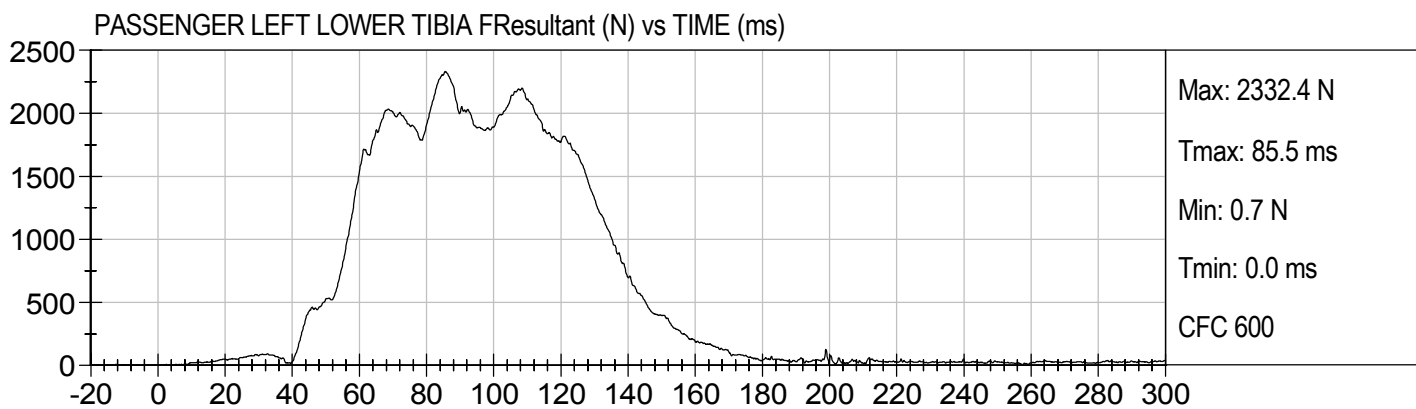
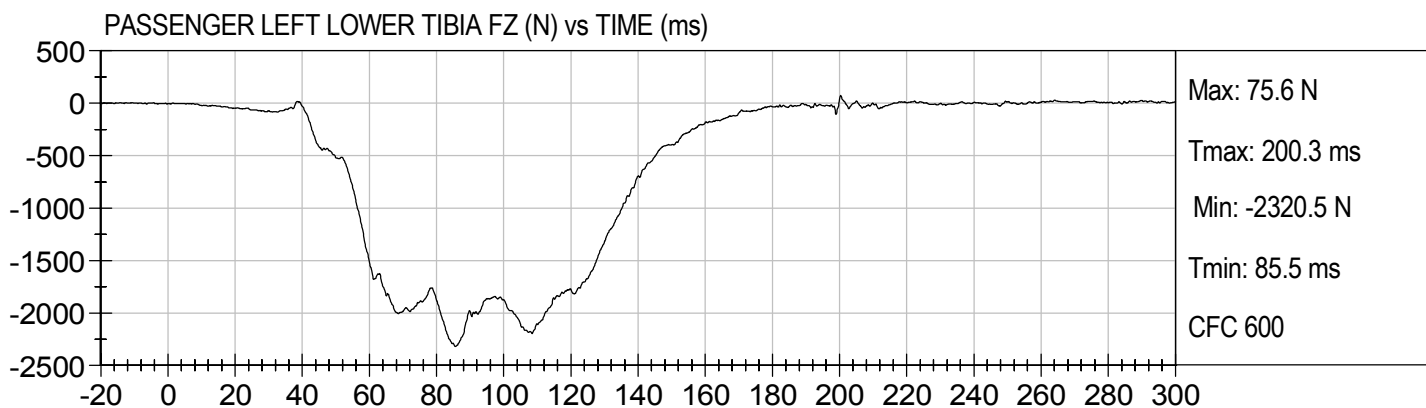
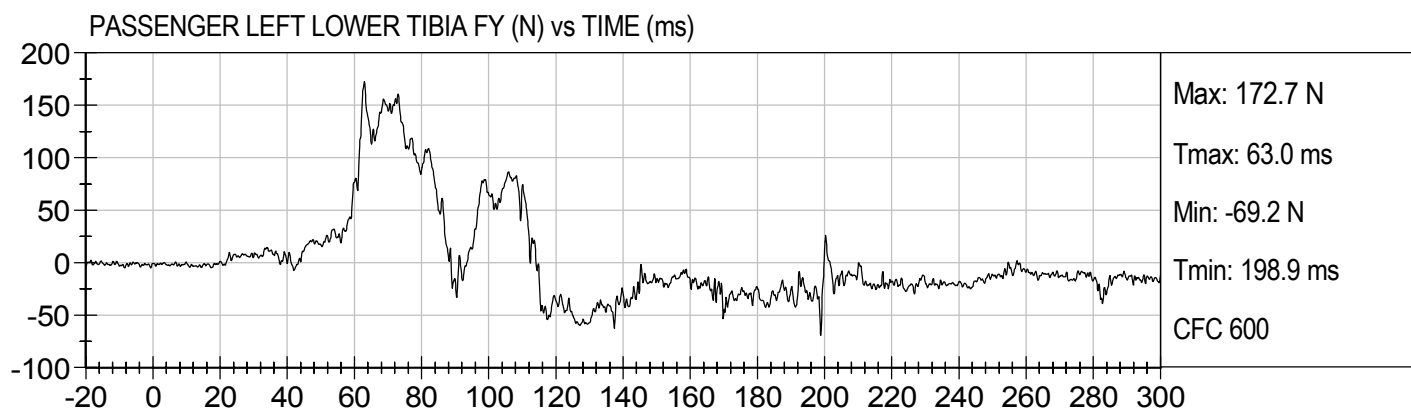
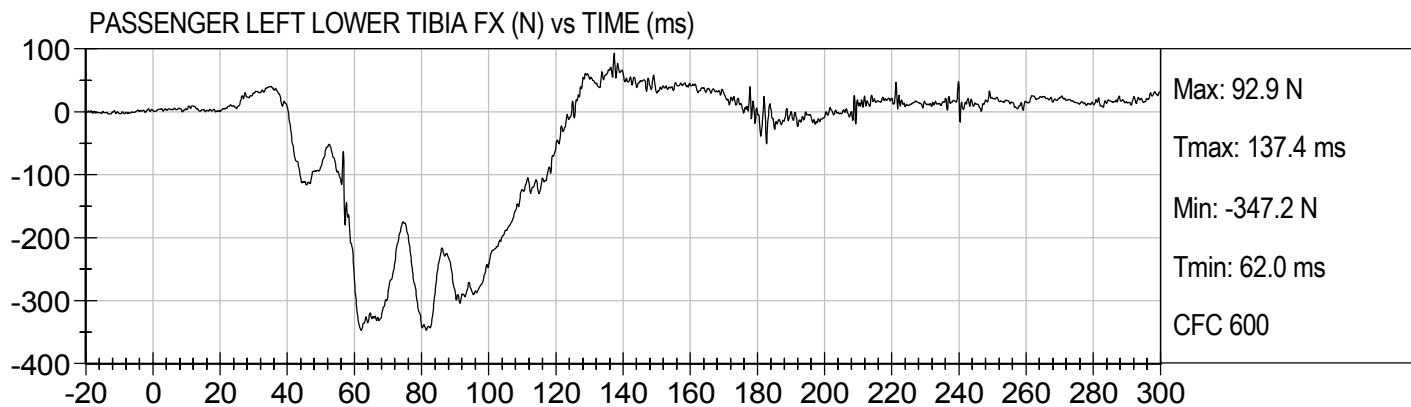




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

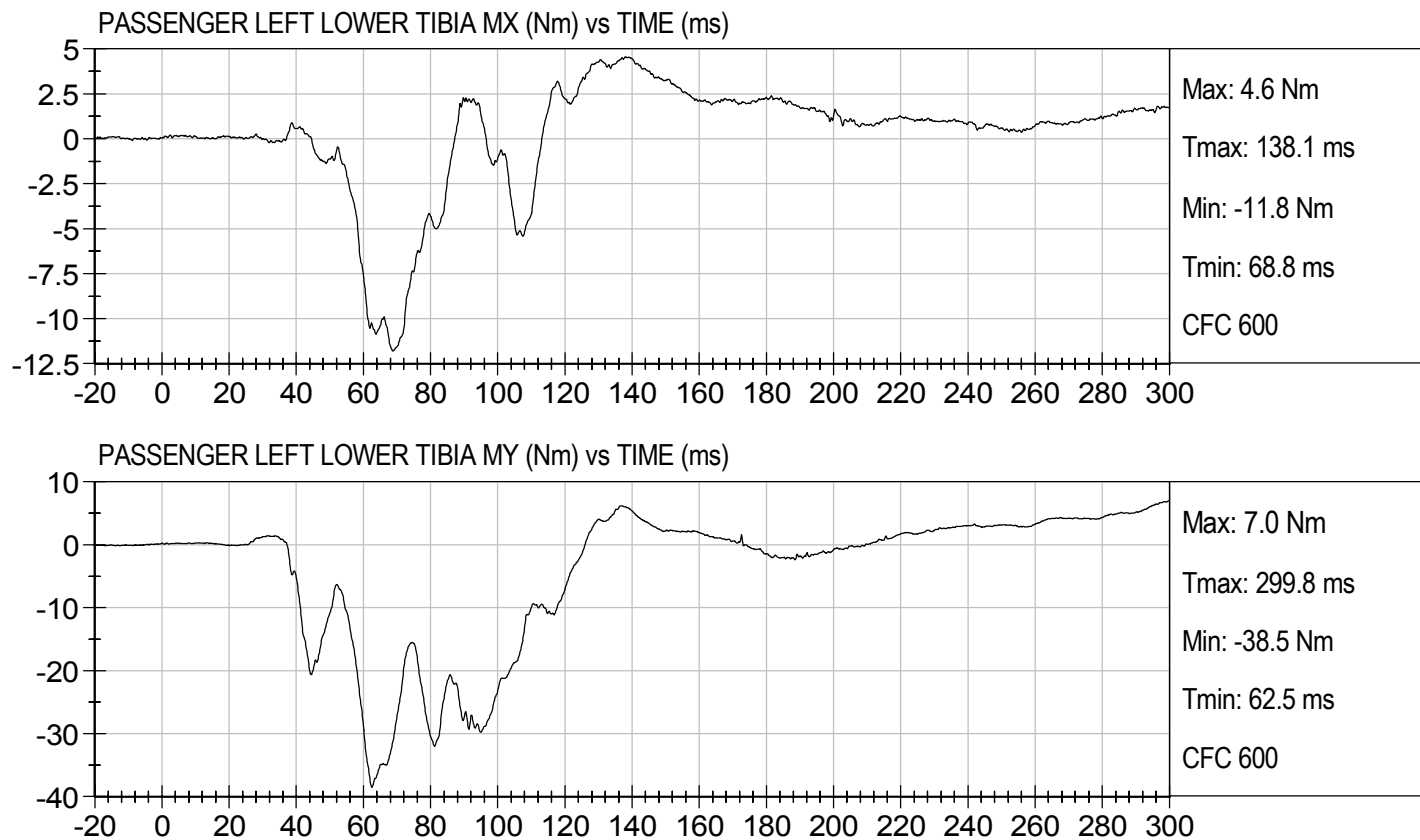


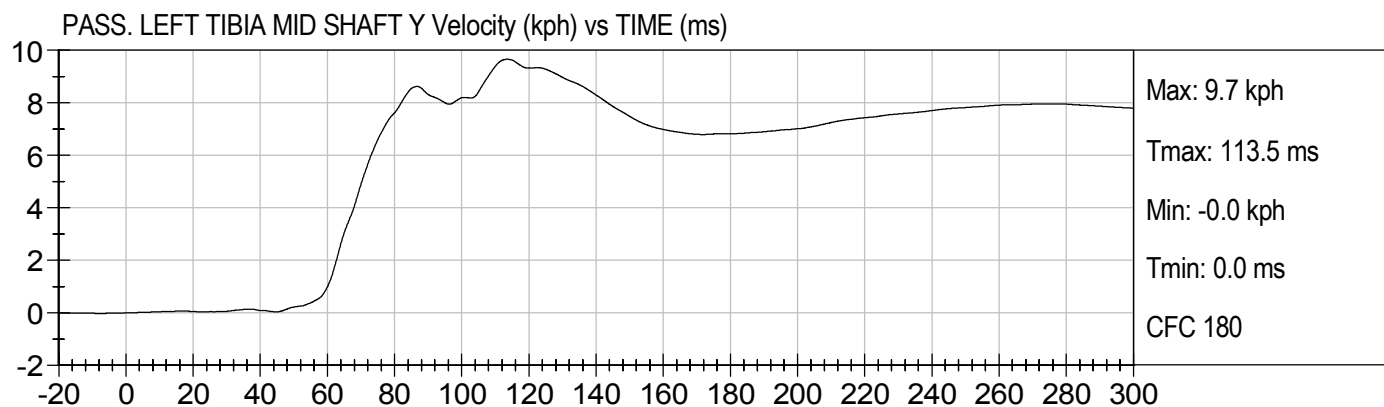
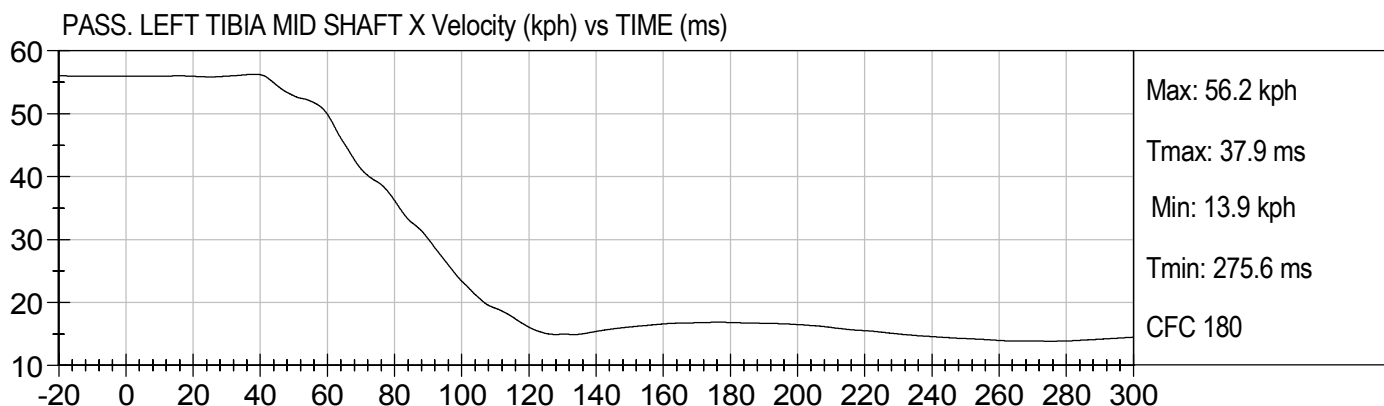
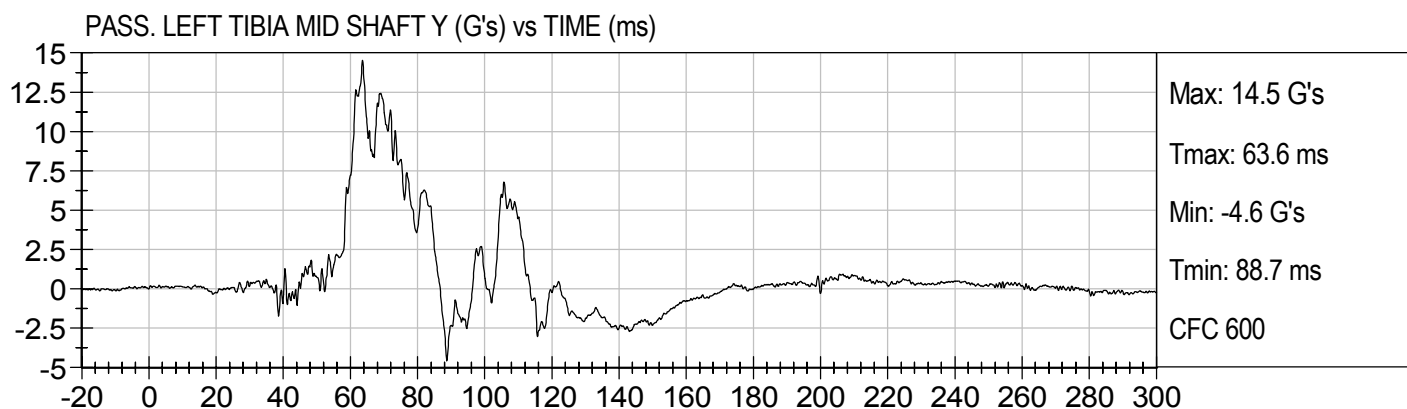
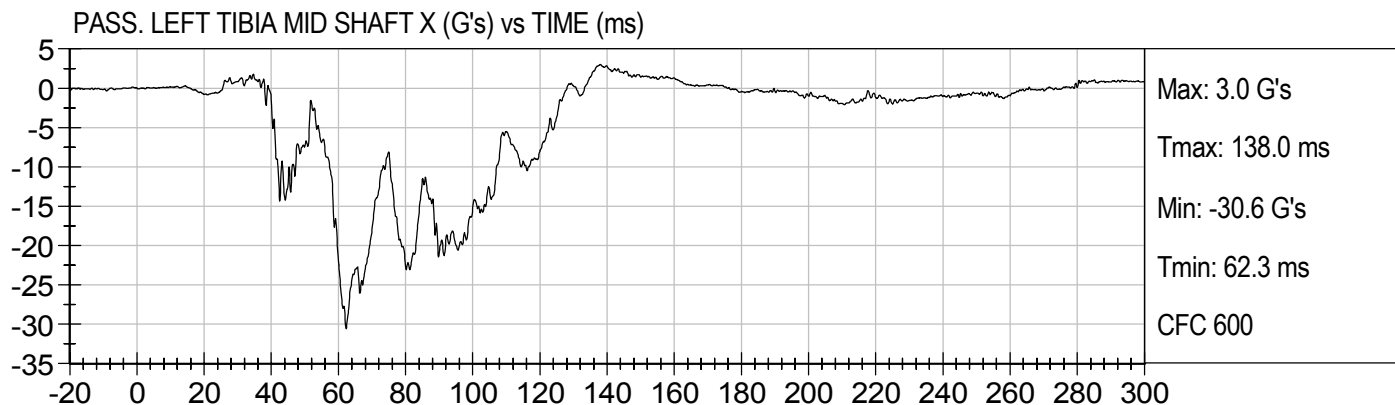


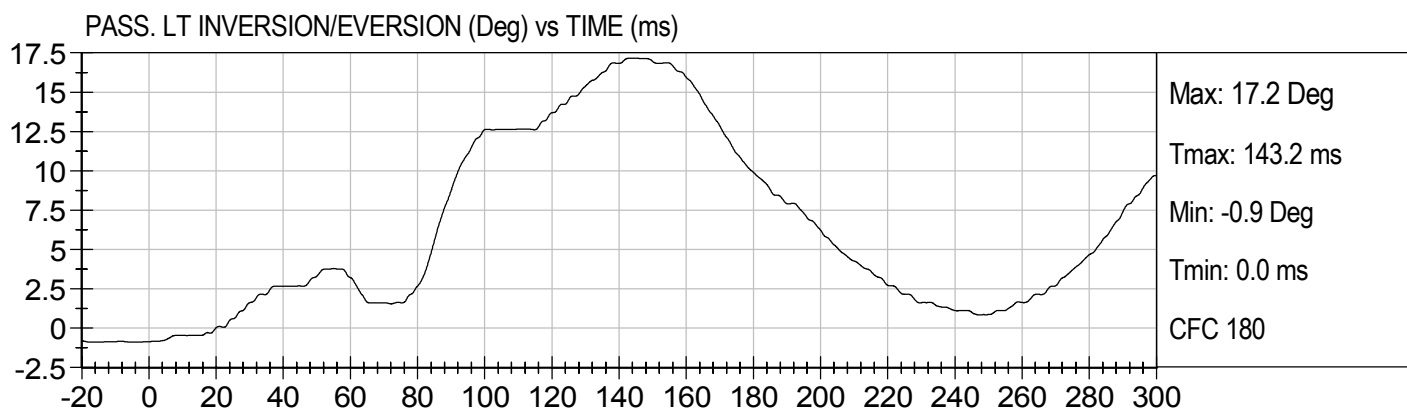
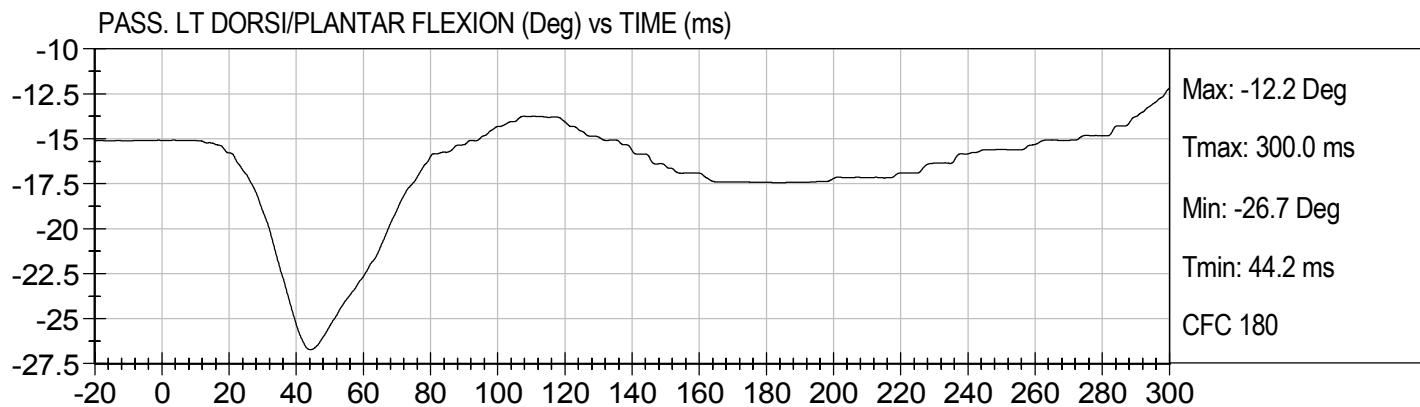


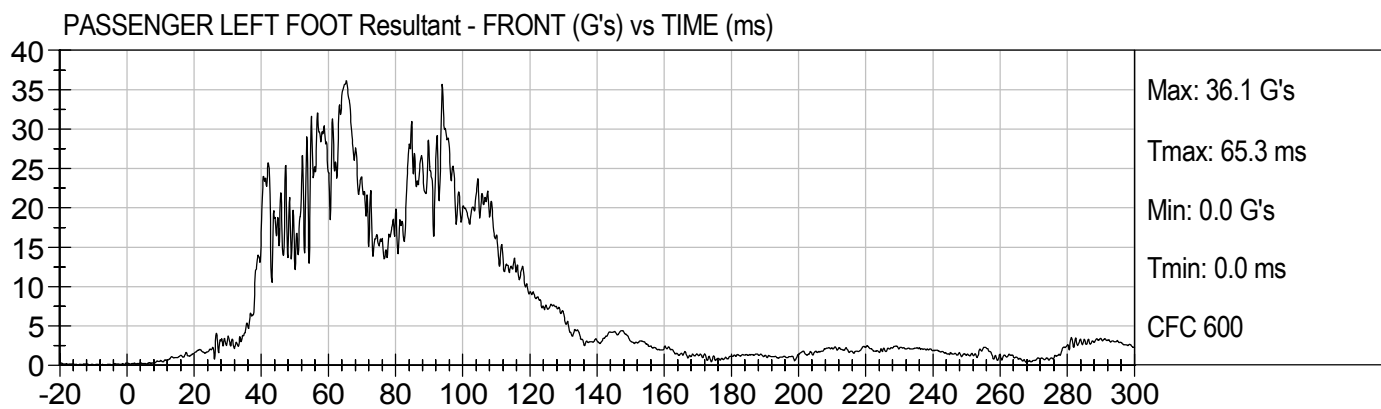
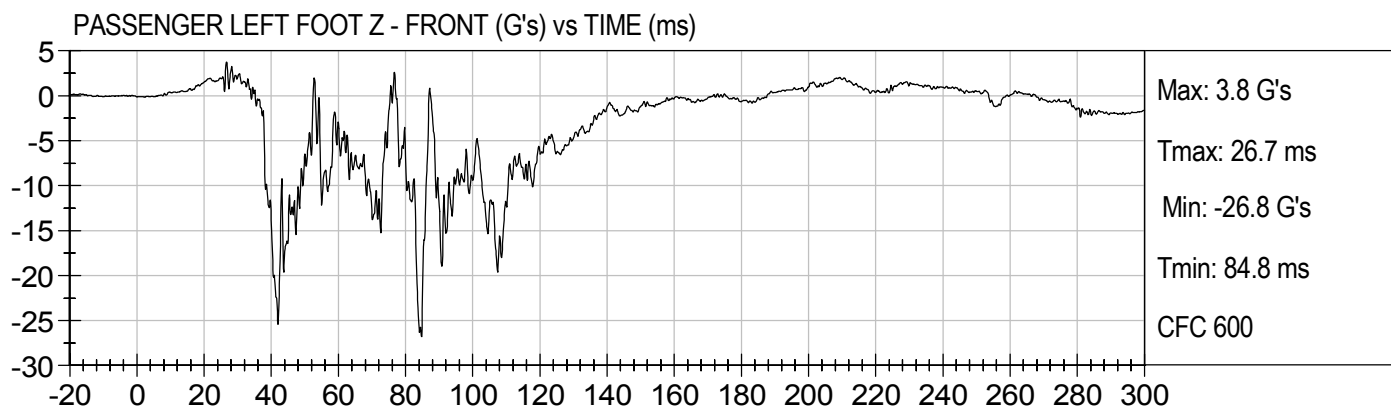
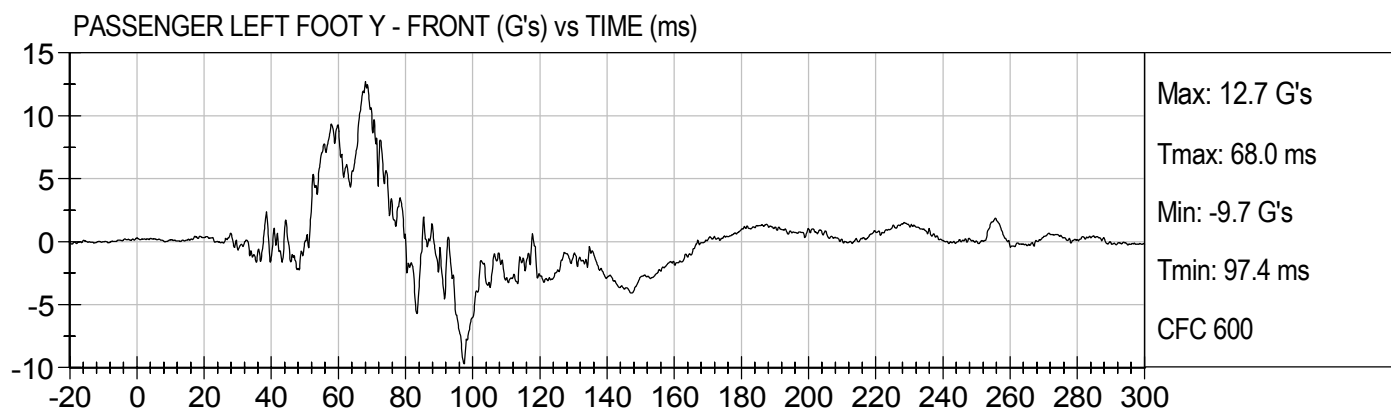
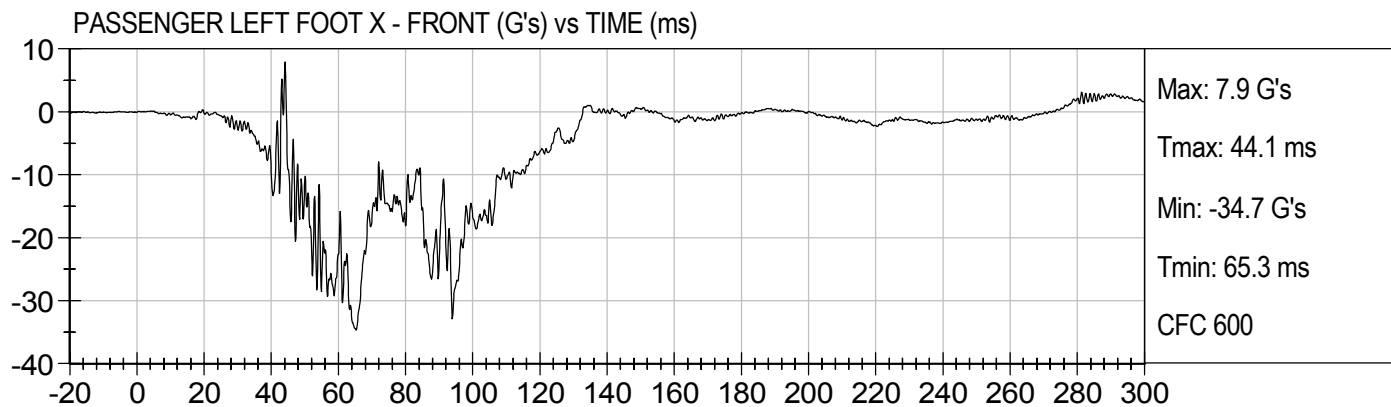
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)



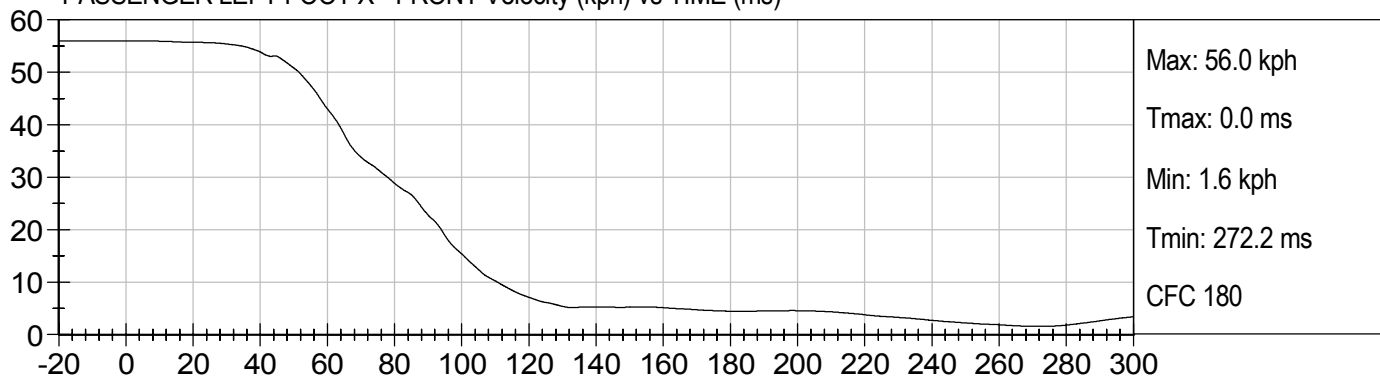




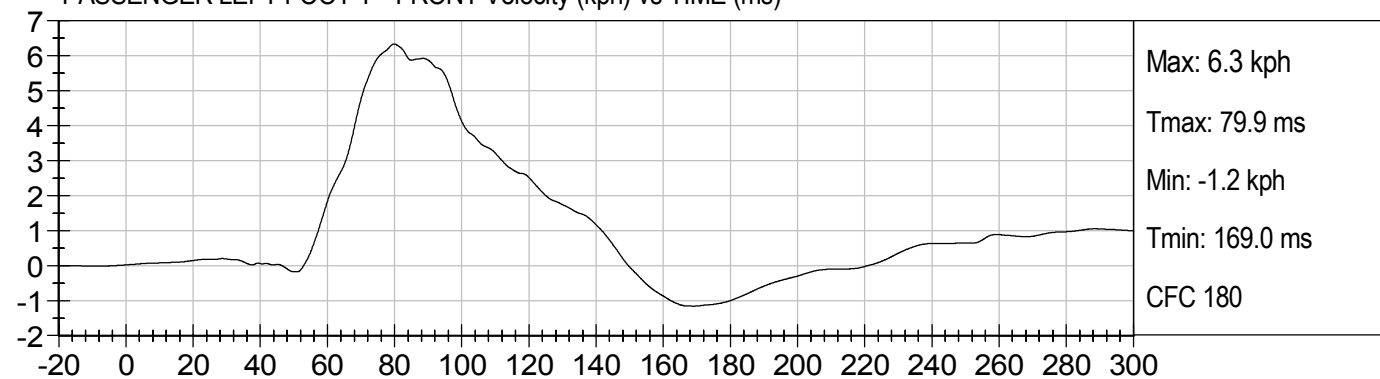




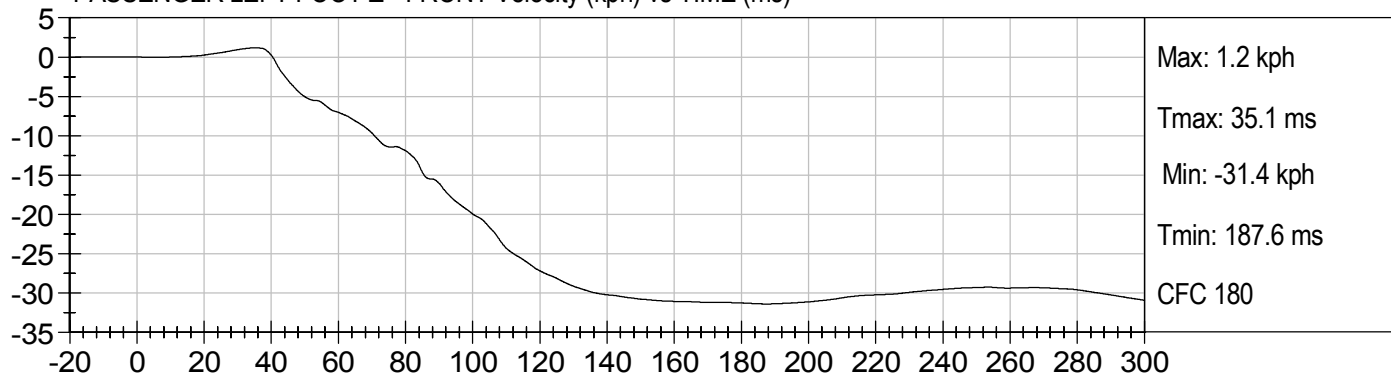
PASSENGER LEFT FOOT X - FRONT Velocity (kph) vs TIME (ms)



PASSENGER LEFT FOOT Y - FRONT Velocity (kph) vs TIME (ms)



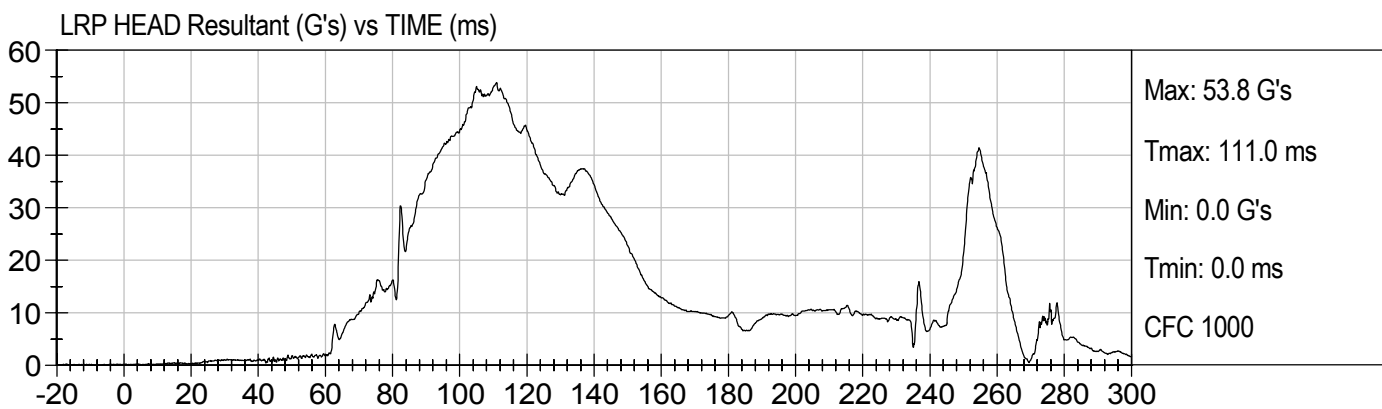
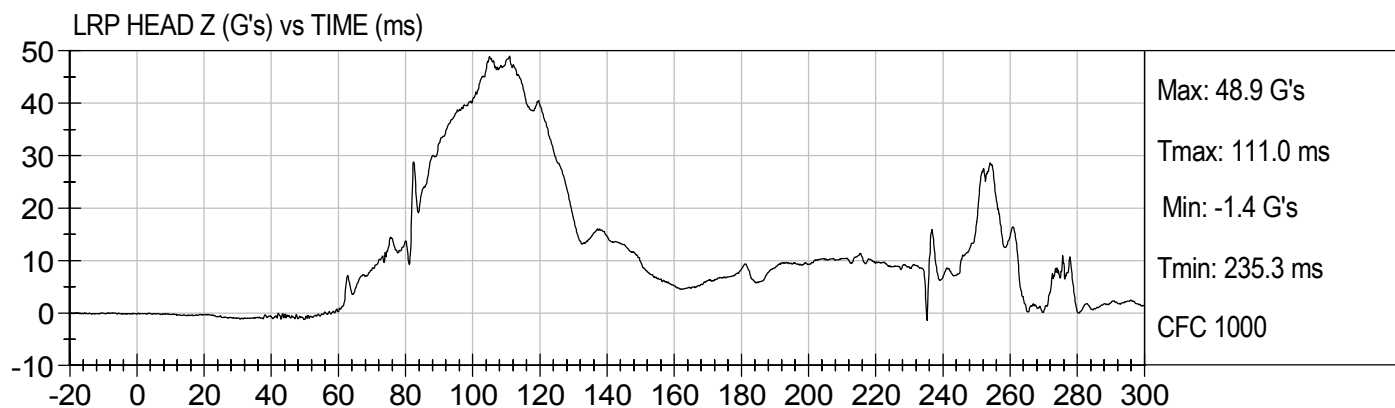
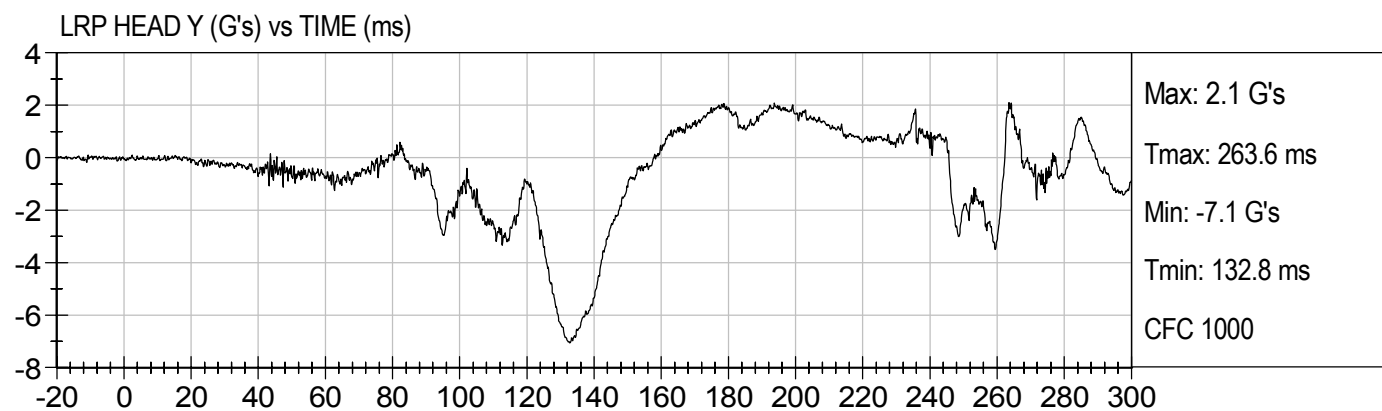
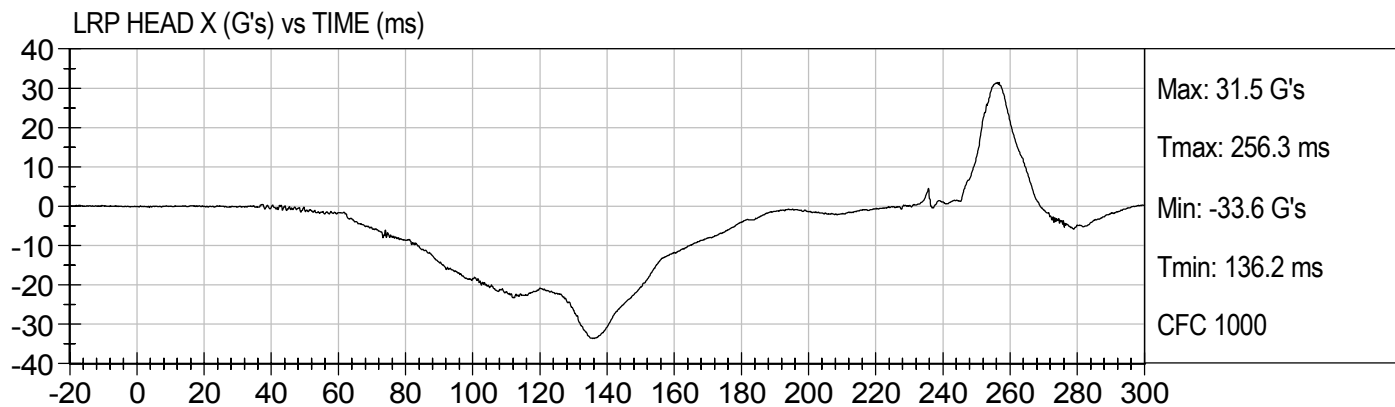
PASSENGER LEFT FOOT Z - FRONT Velocity (kph) vs TIME (ms)

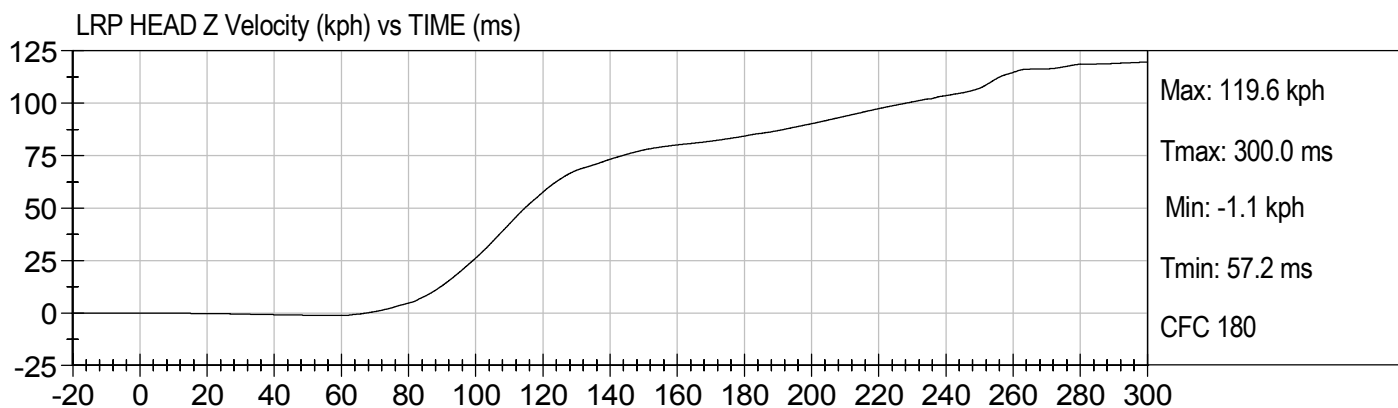
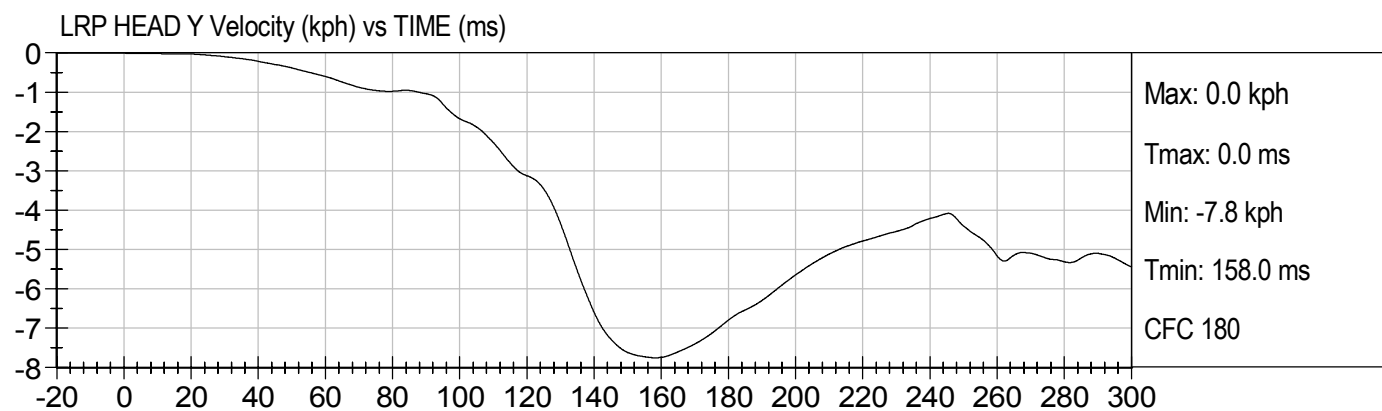
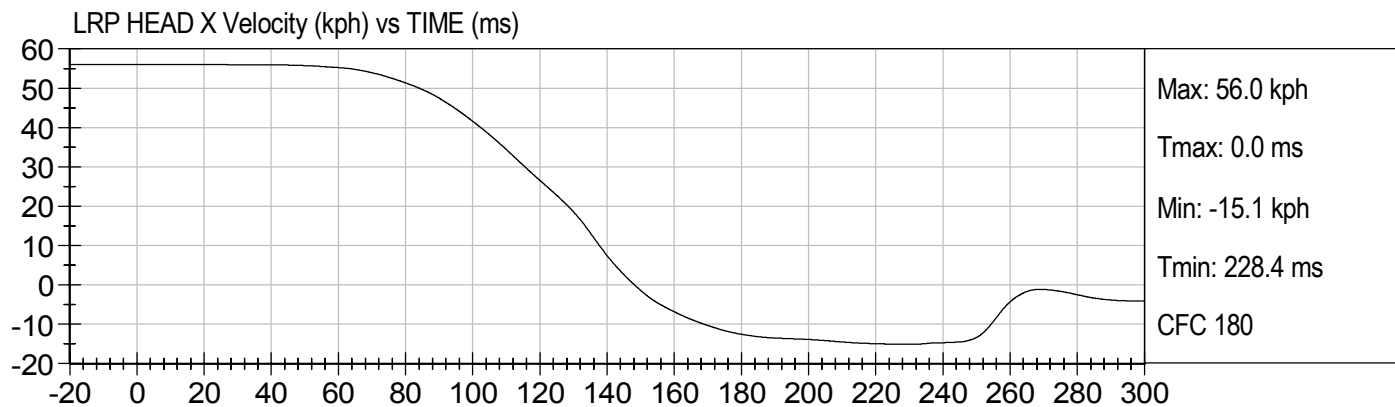




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

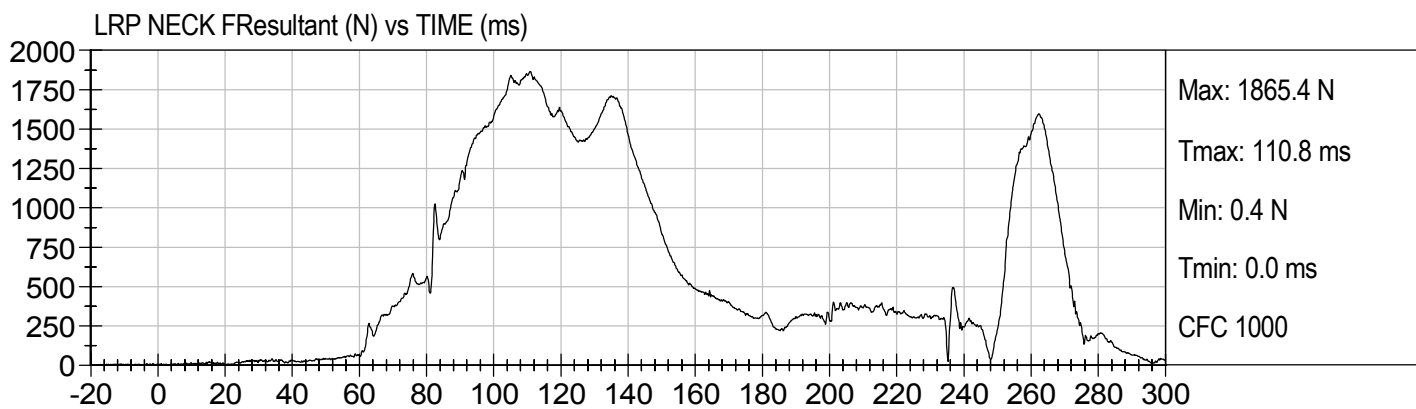
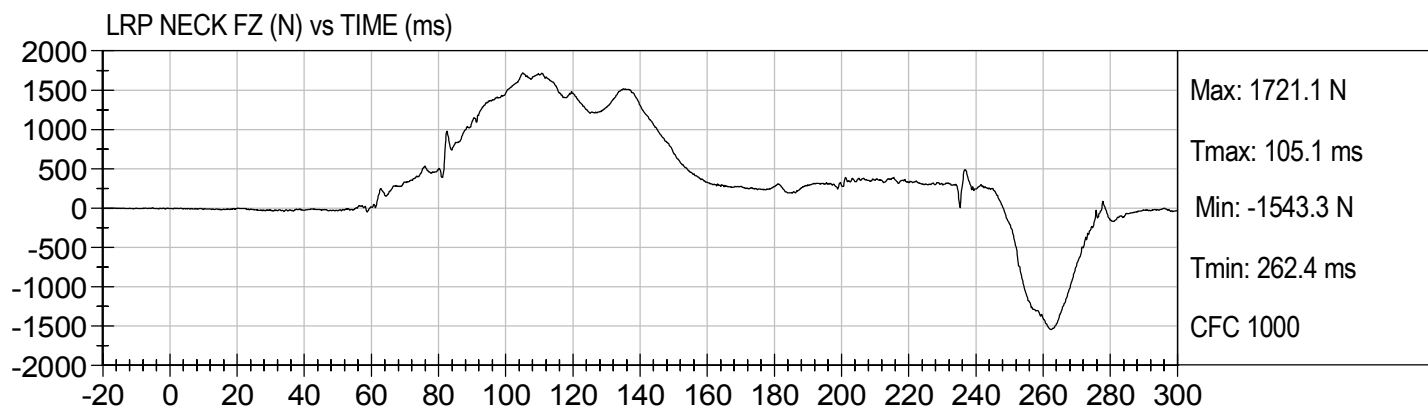
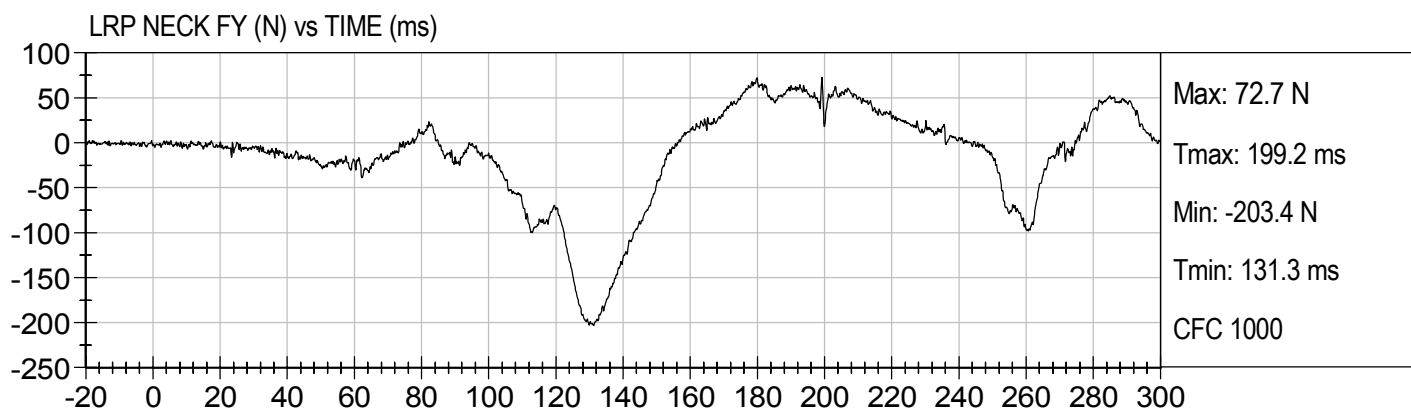
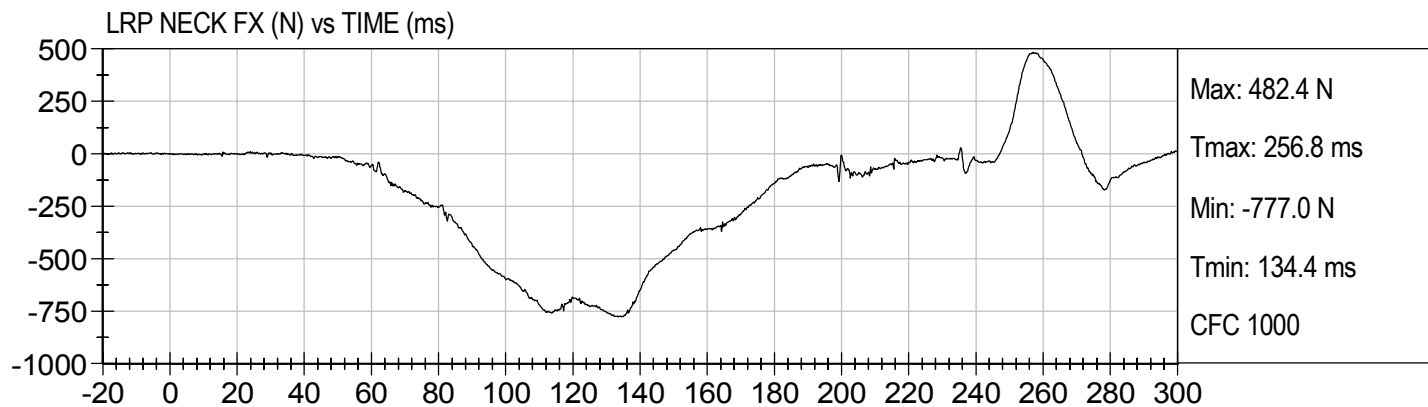






NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

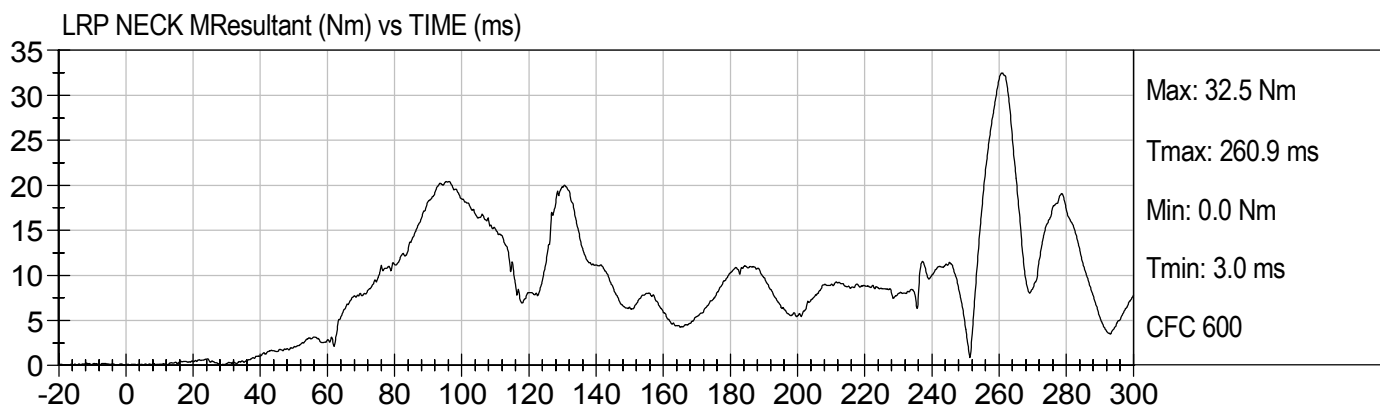
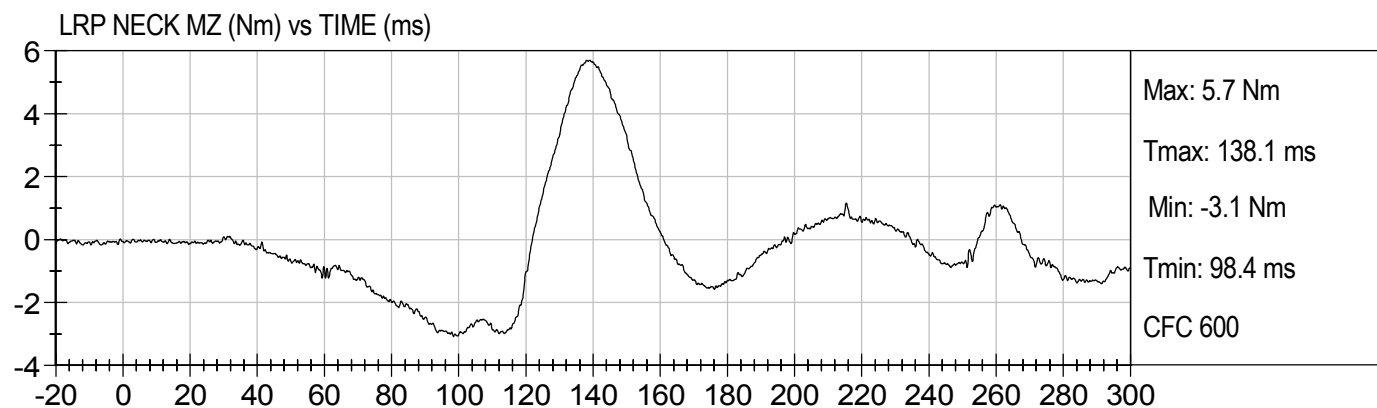
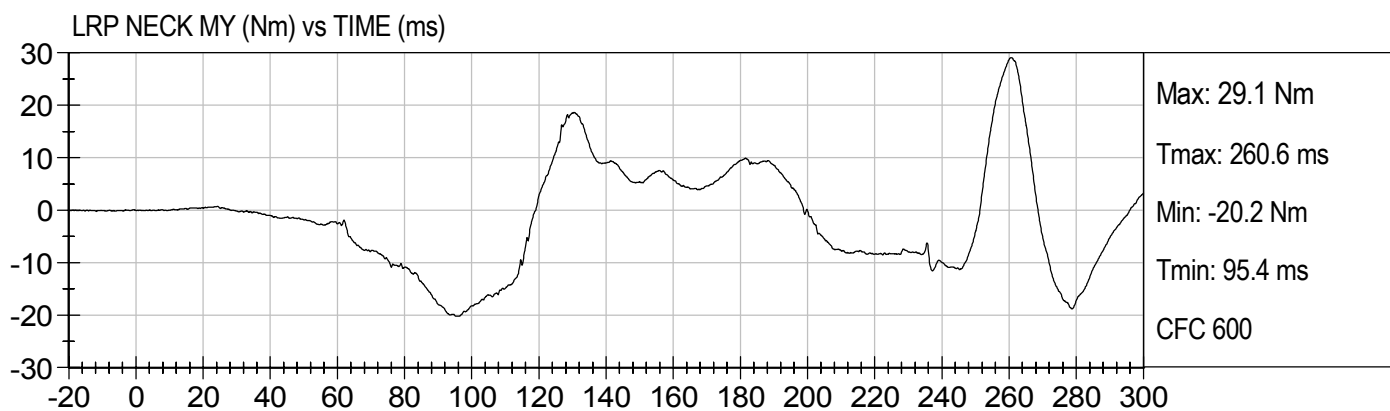
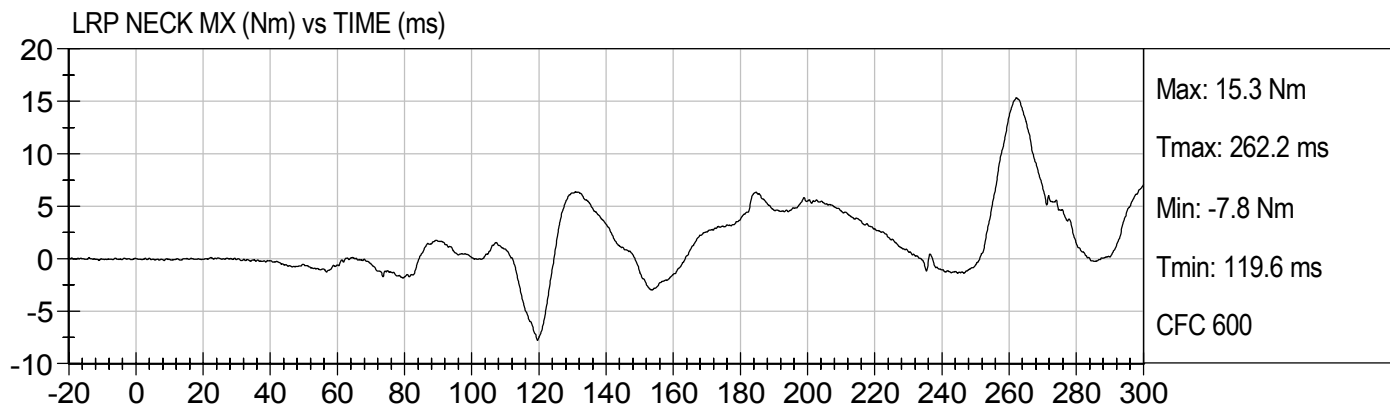
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

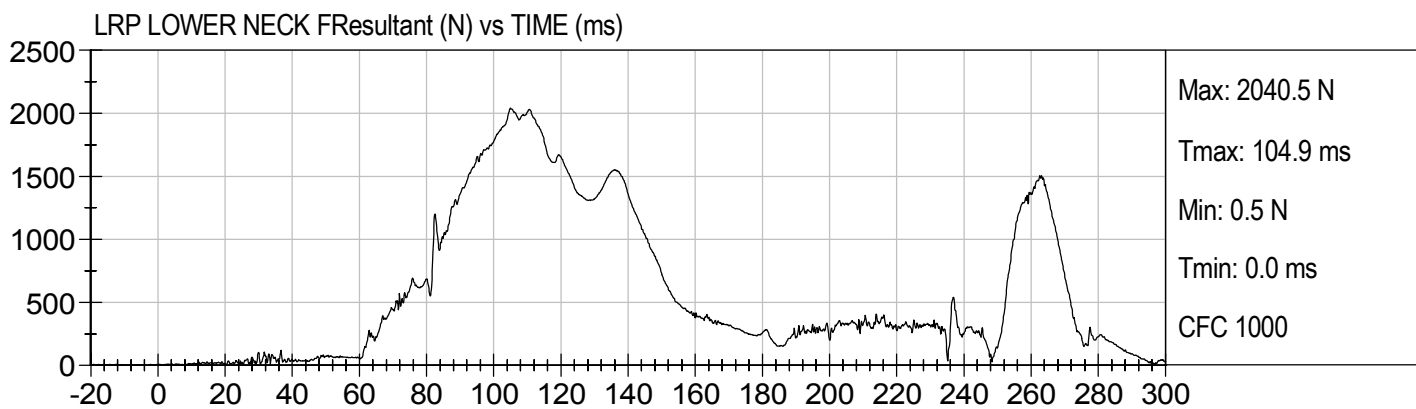
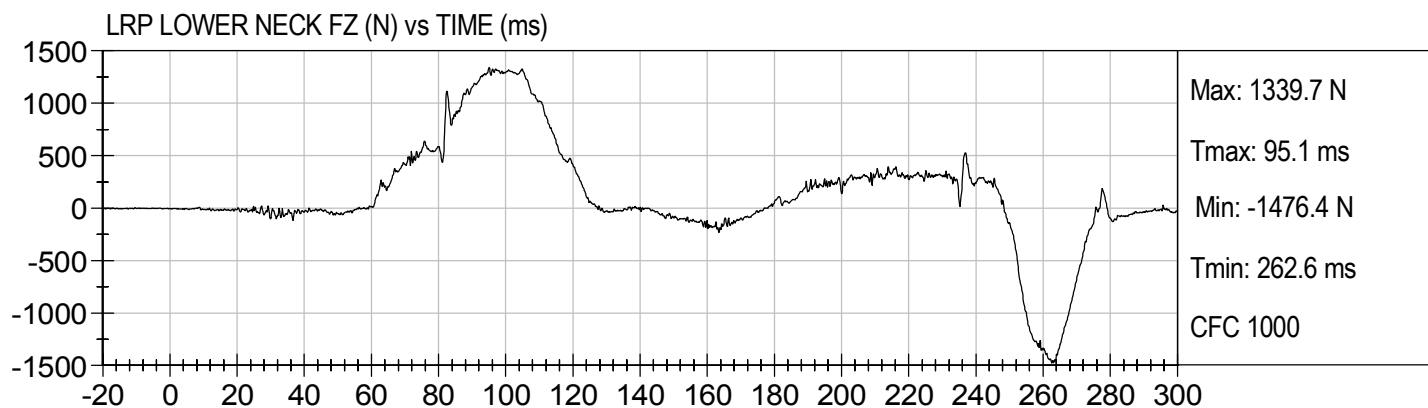
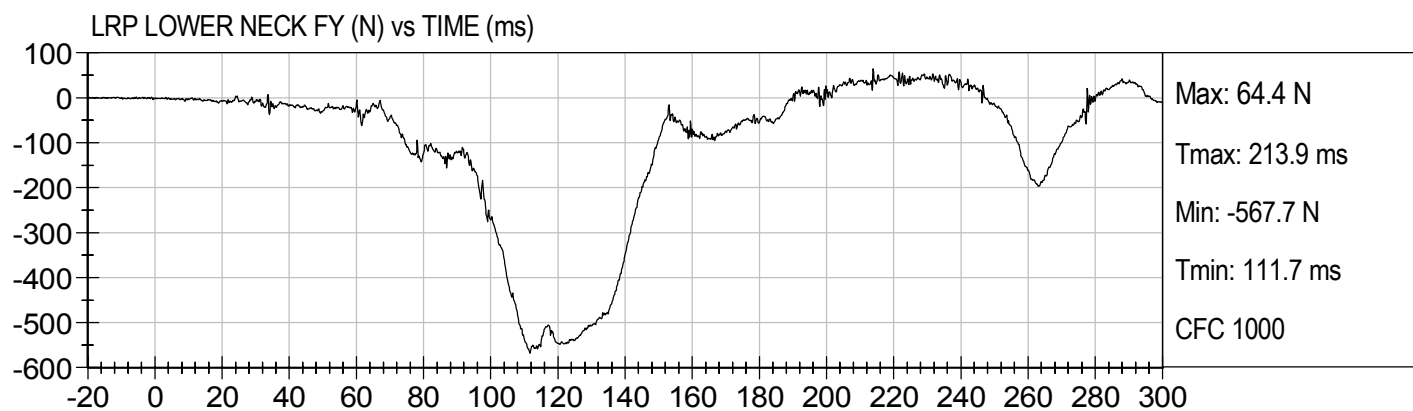
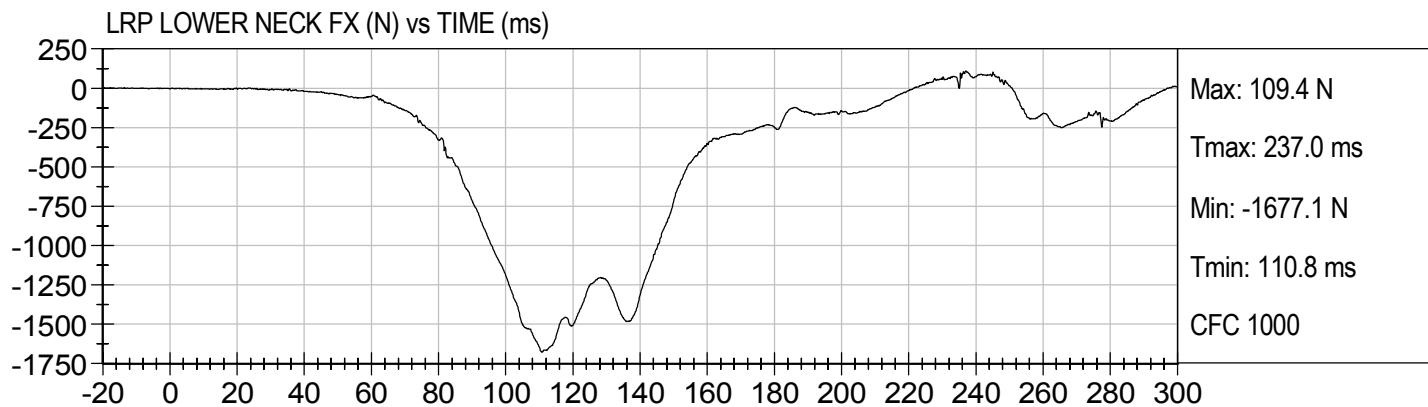
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

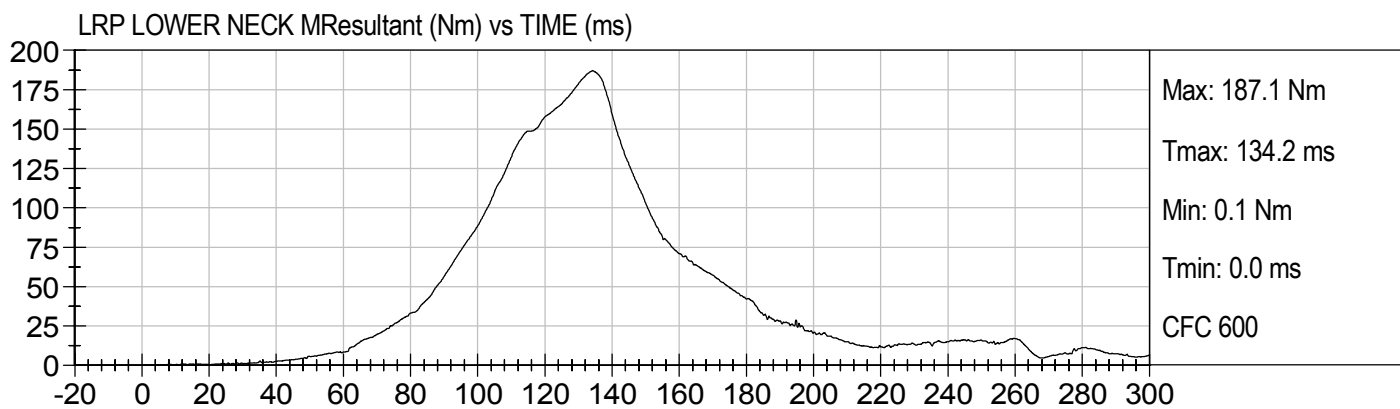
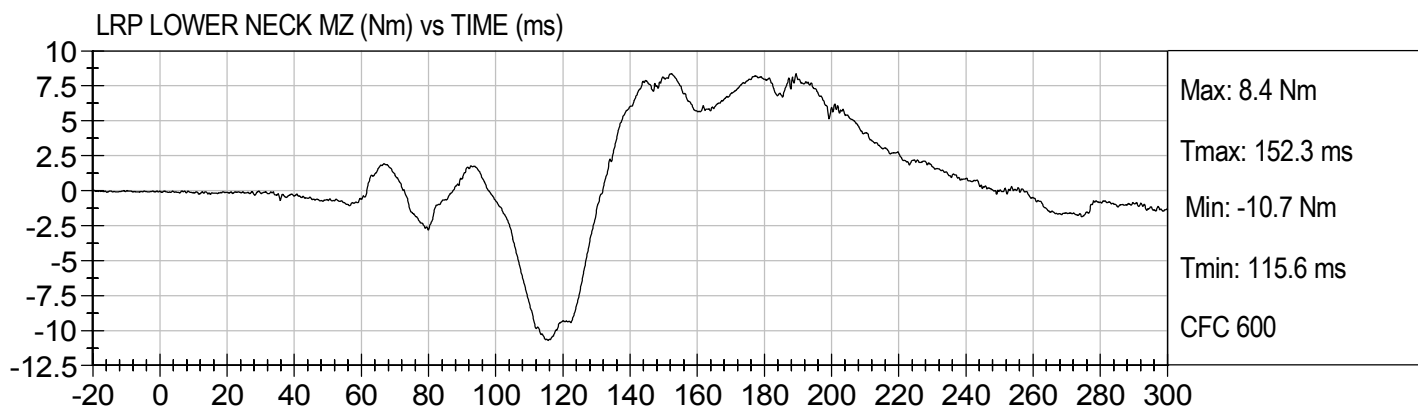
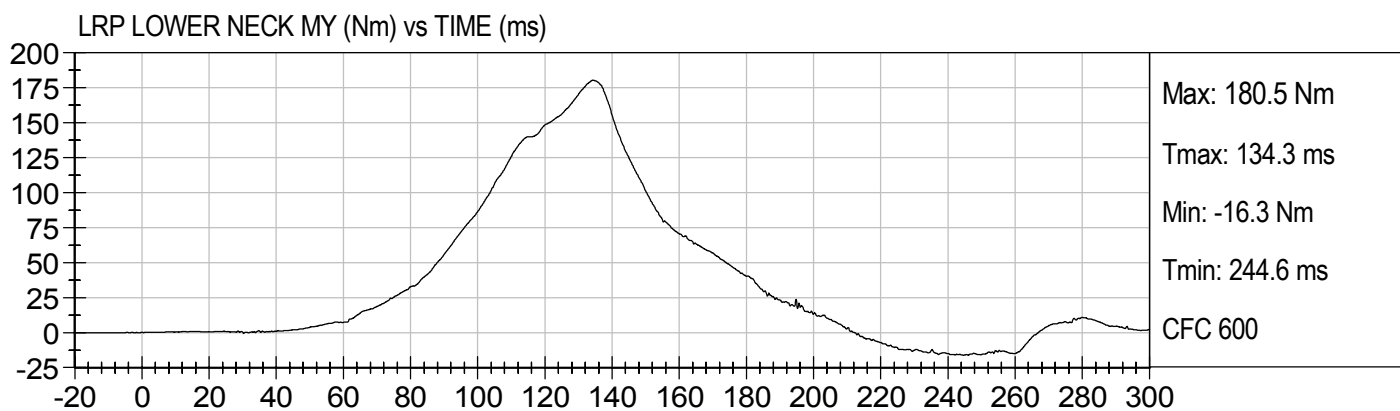
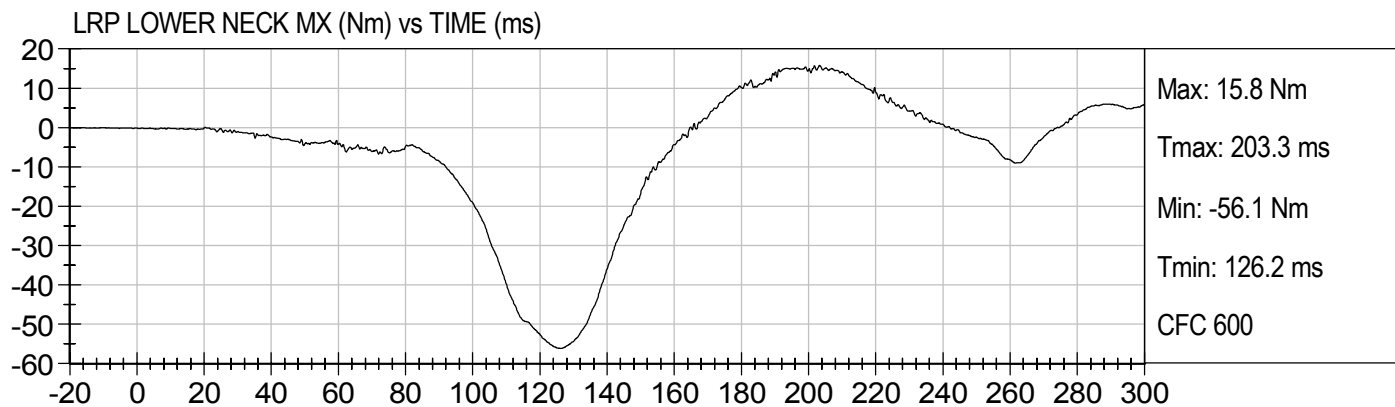




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)



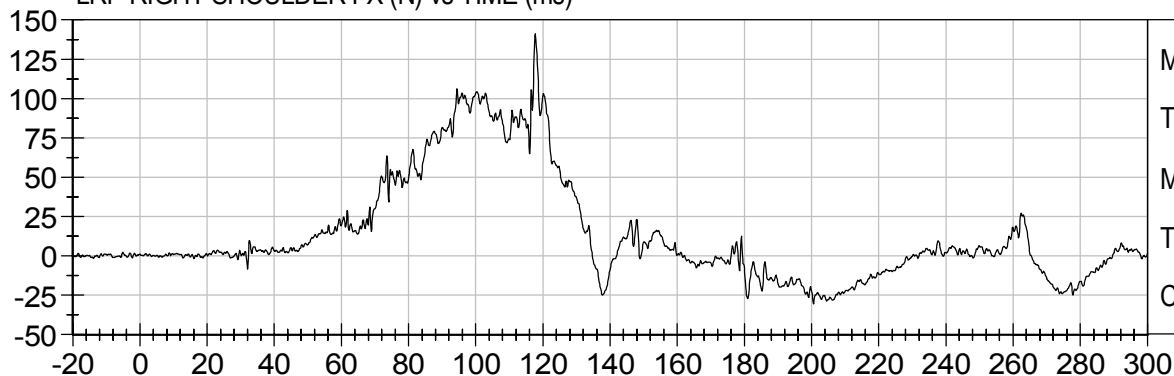




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

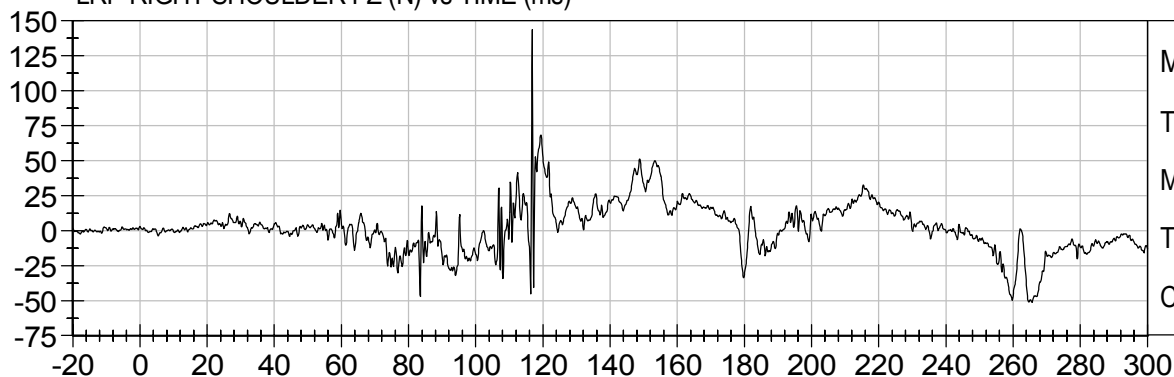
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

LRP RIGHT SHOULDER FX (N) vs TIME (ms)



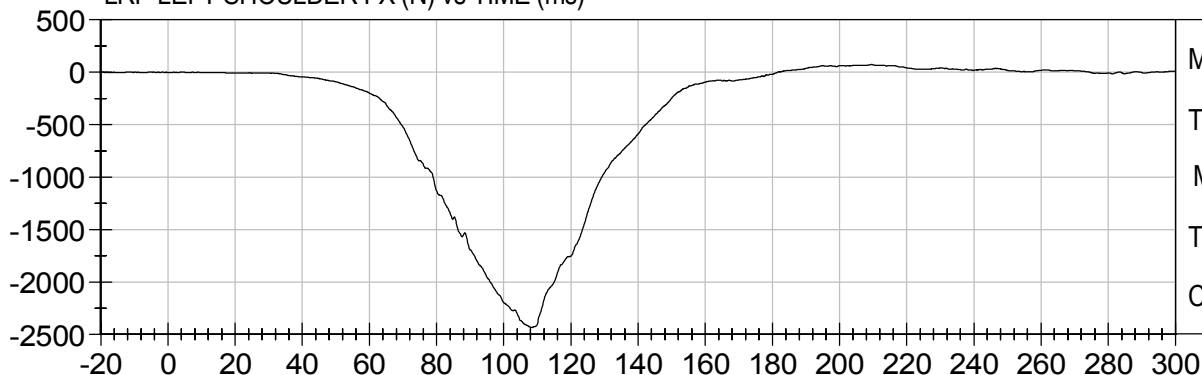
Max: 141.1 N
Tmax: 117.7 ms
Min: -30.5 N
Tmin: 200.6 ms
CFC 600

LRP RIGHT SHOULDER FZ (N) vs TIME (ms)



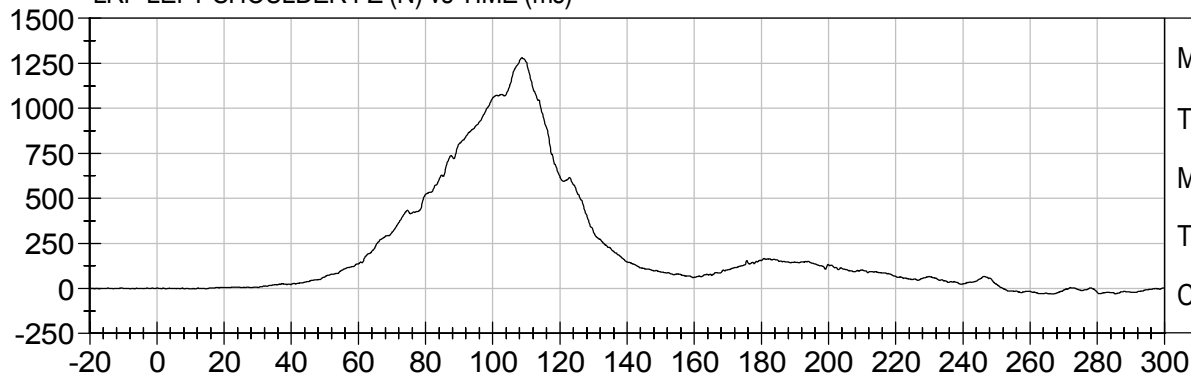
Max: 143.8 N
Tmax: 116.8 ms
Min: -51.3 N
Tmin: 265.7 ms
CFC 600

LRP LEFT SHOULDER FX (N) vs TIME (ms)



Max: 73.0 N
Tmax: 209.5 ms
Min: -2434.0 N
Tmin: 108.3 ms
CFC 600

LRP LEFT SHOULDER FZ (N) vs TIME (ms)

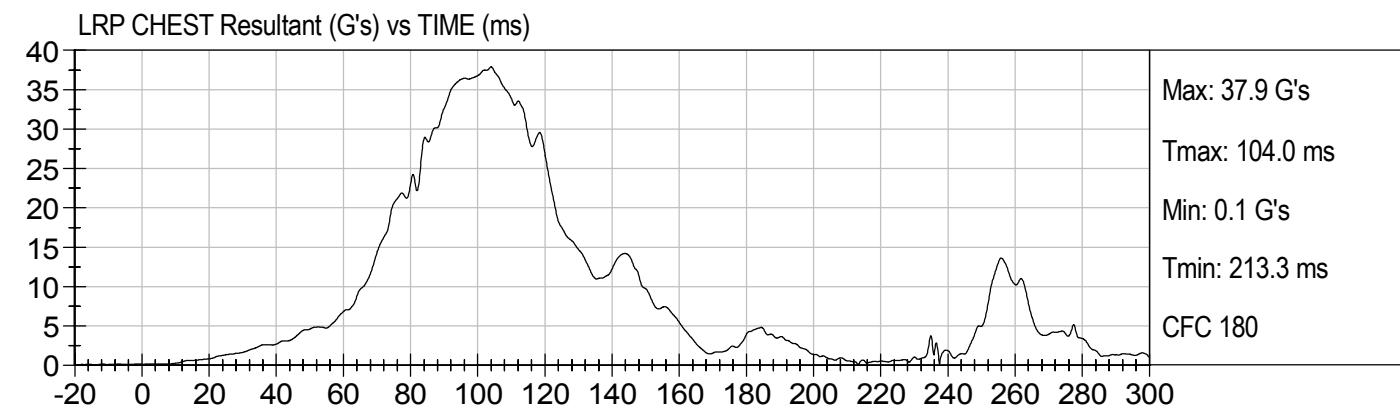
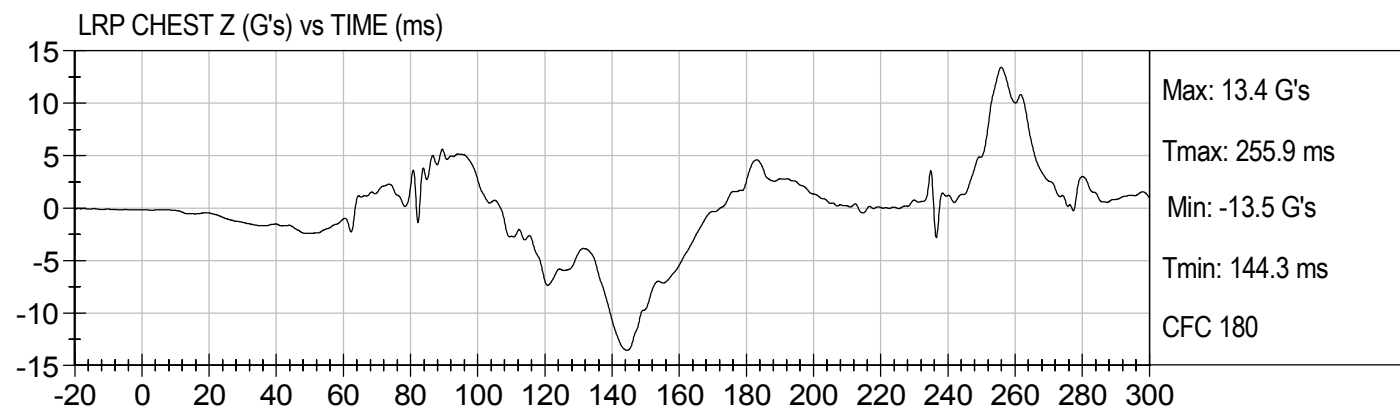
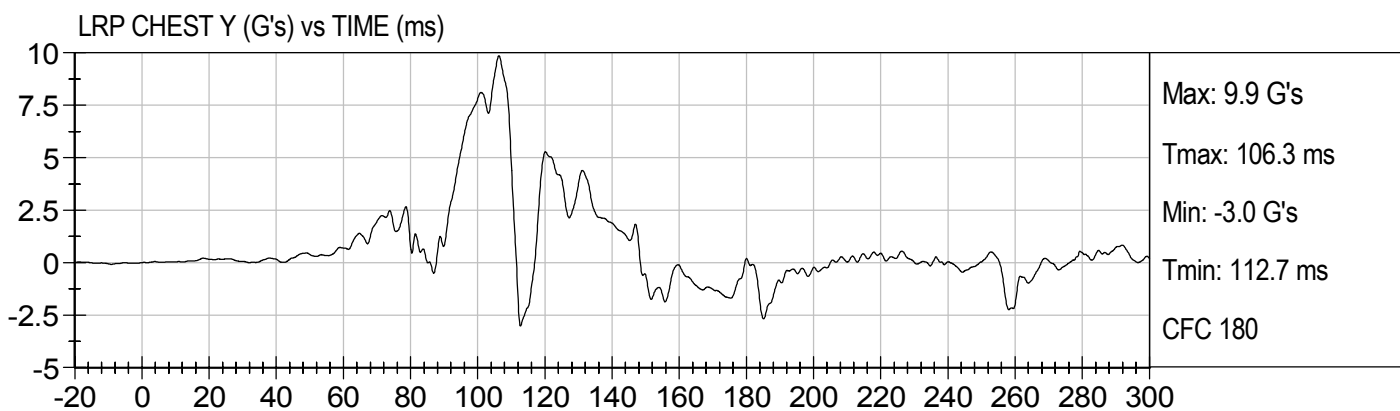
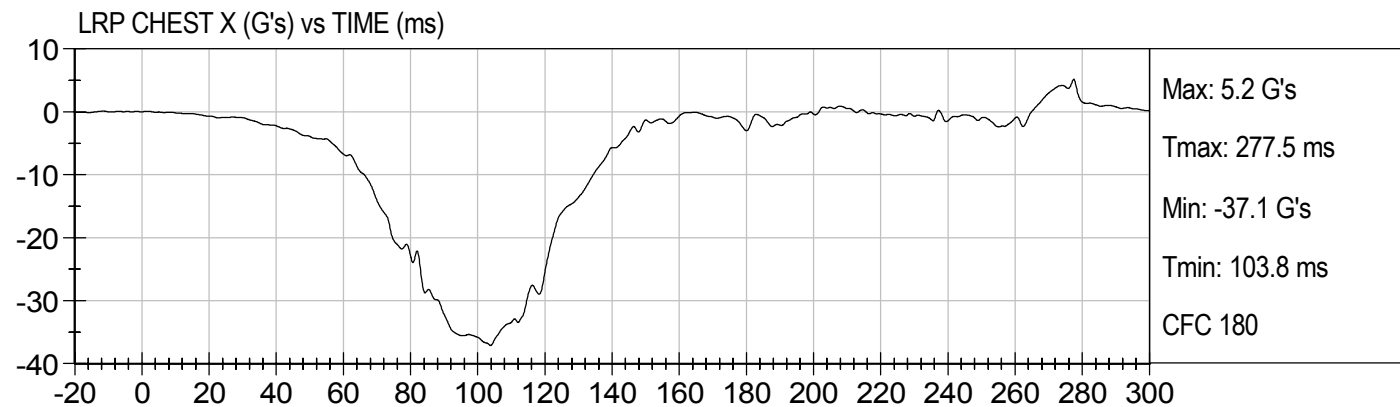


Max: 1280.5 N
Tmax: 108.7 ms
Min: -31.4 N
Tmin: 266.5 ms
CFC 600



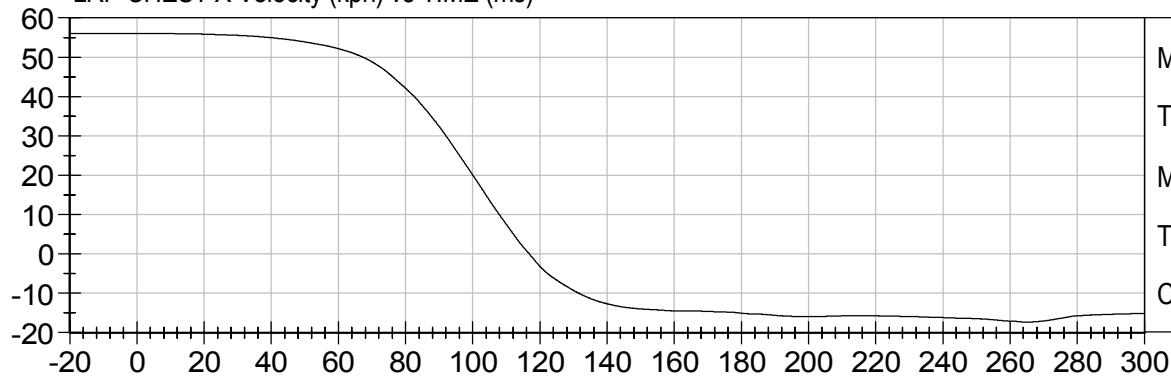
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

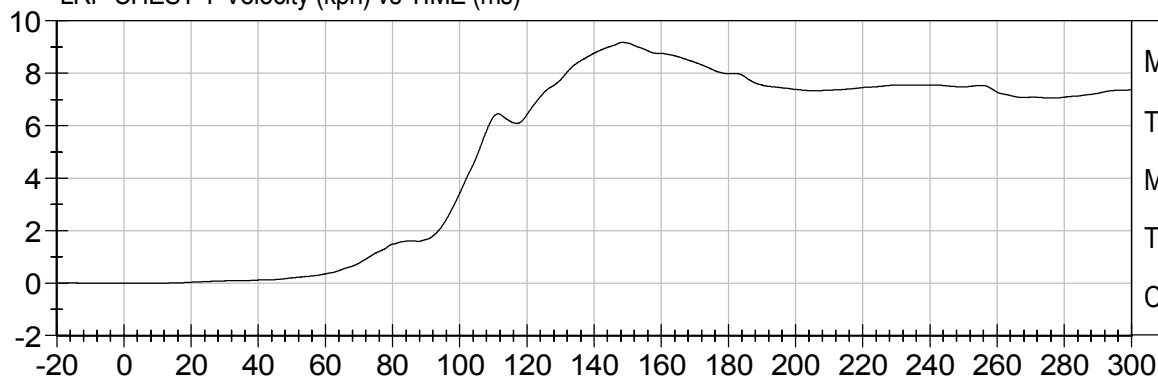




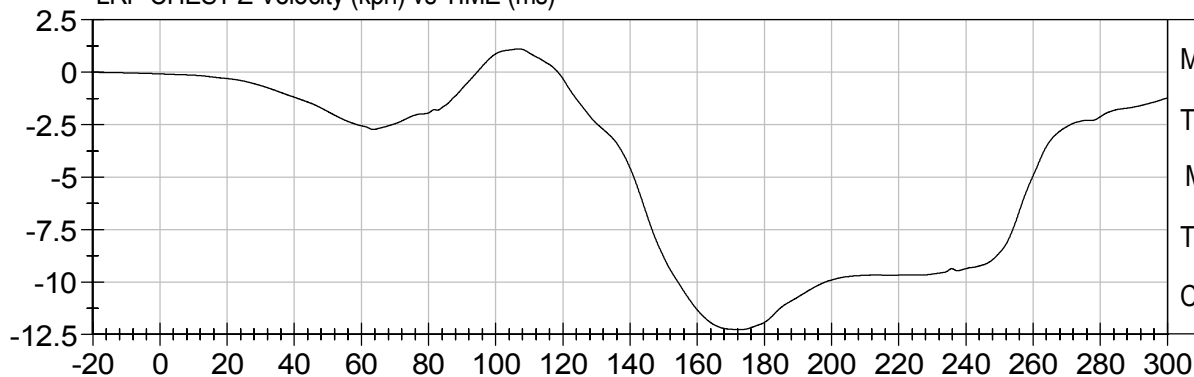
LRP CHEST X Velocity (kph) vs TIME (ms)



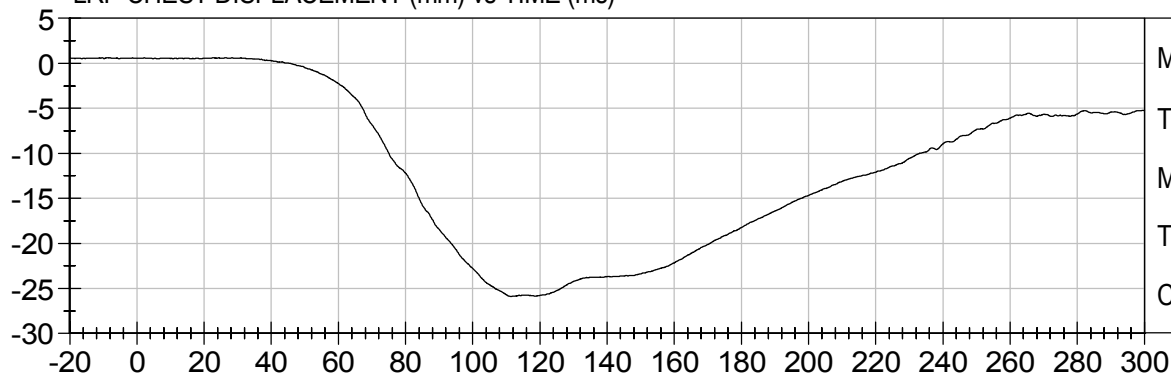
LRP CHEST Y Velocity (kph) vs TIME (ms)



LRP CHEST Z Velocity (kph) vs TIME (ms)



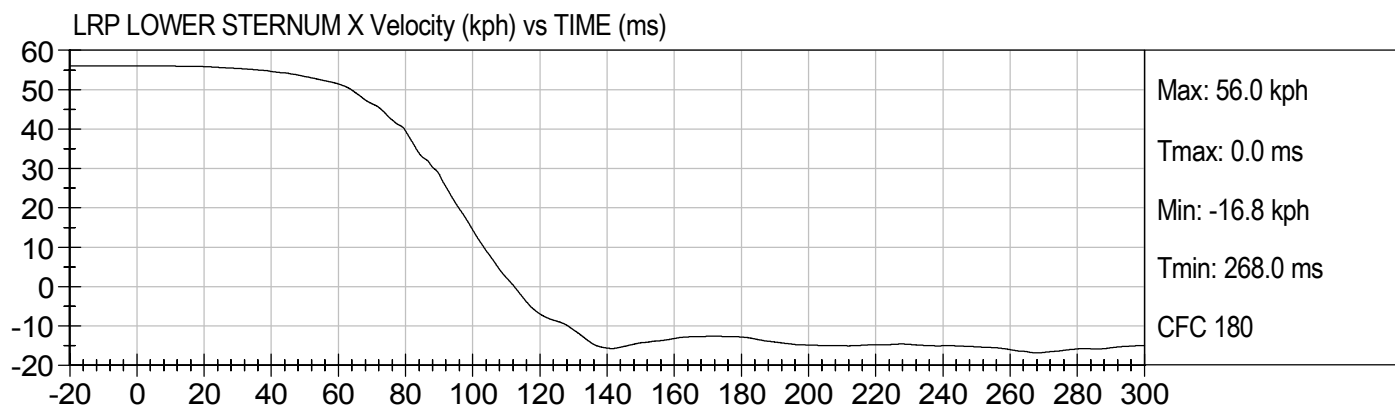
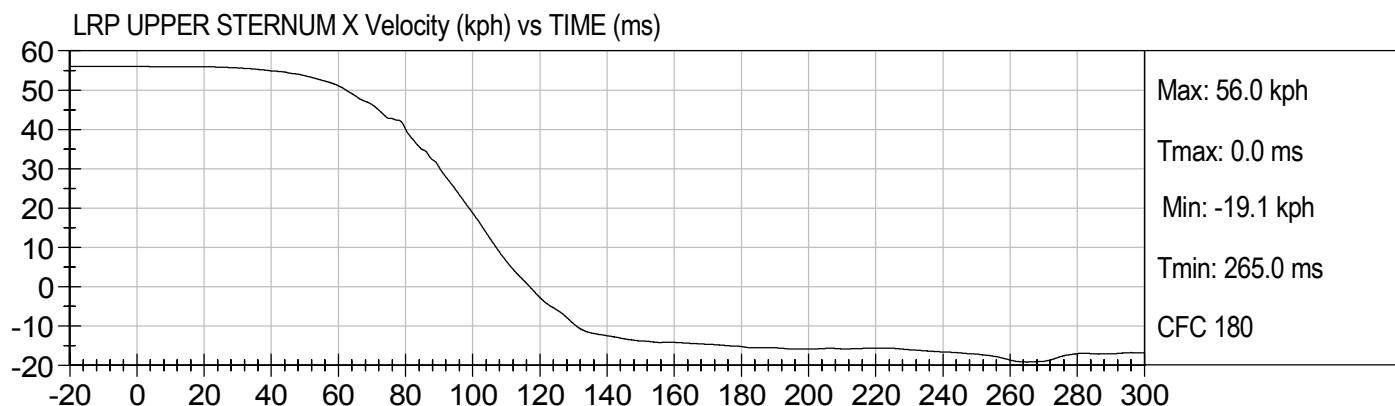
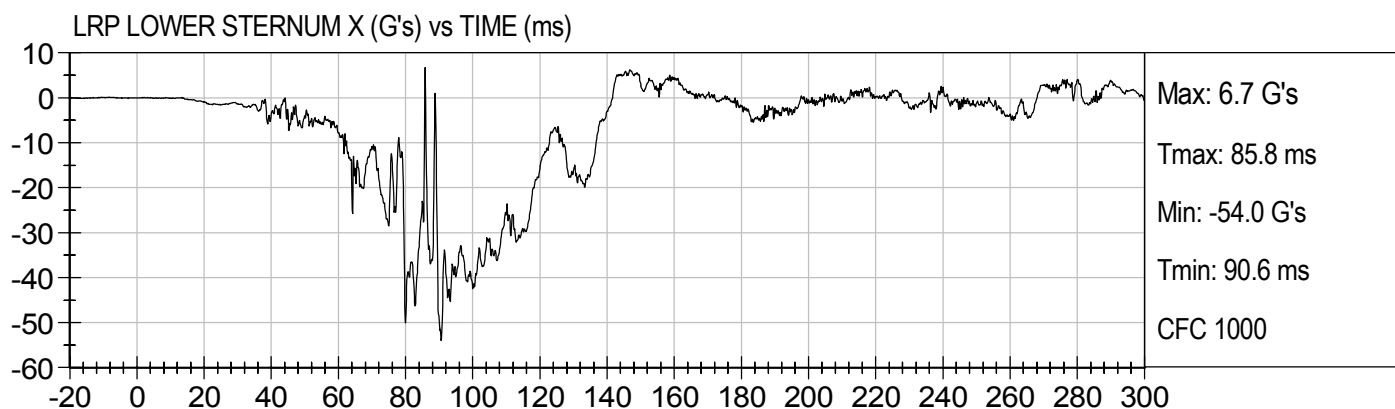
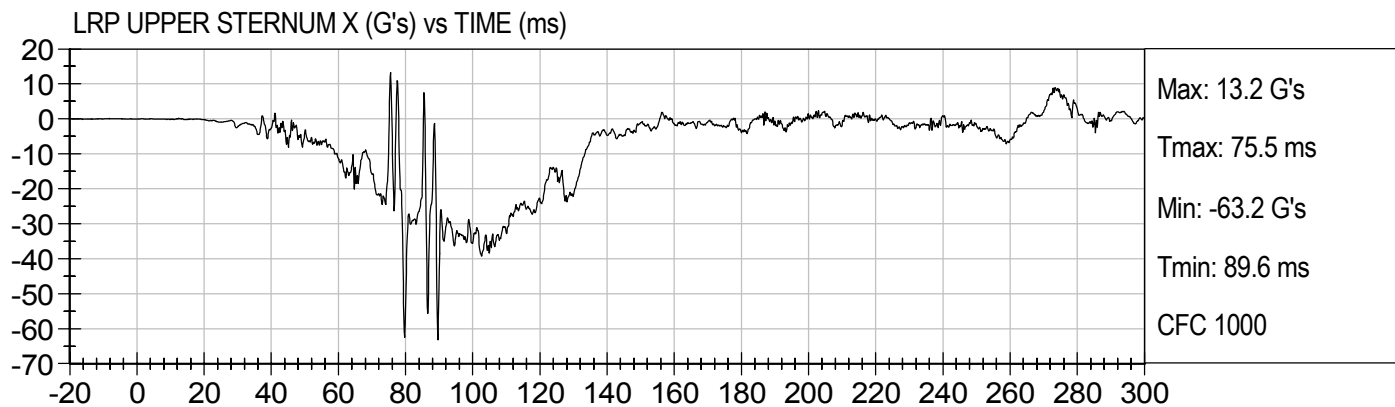
LRP CHEST DISPLACEMENT (mm) vs TIME (ms)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

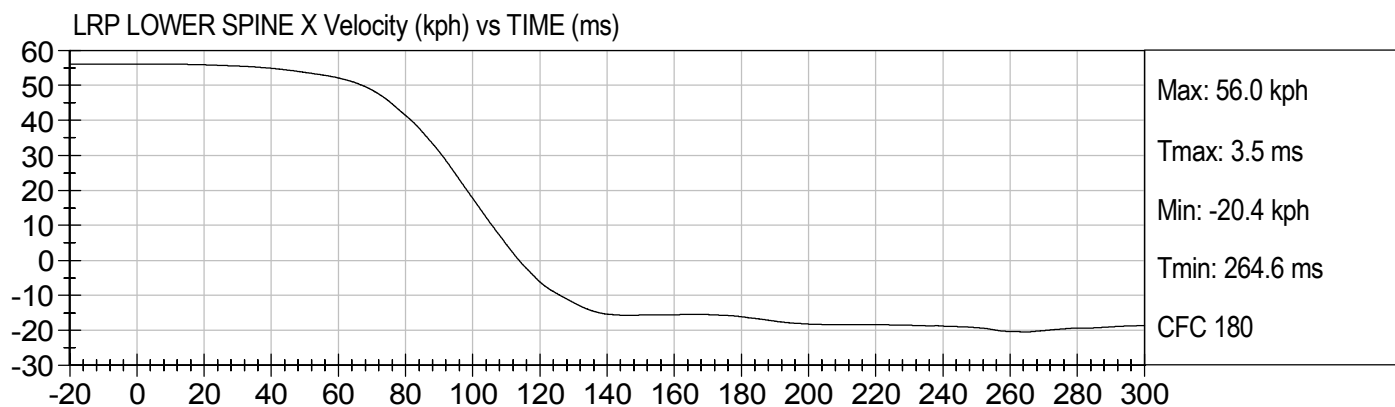
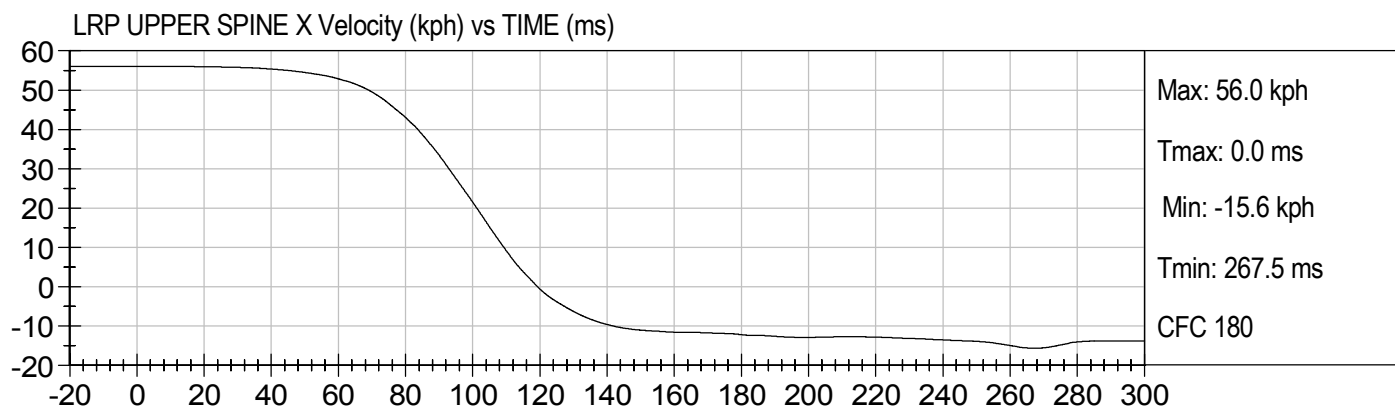
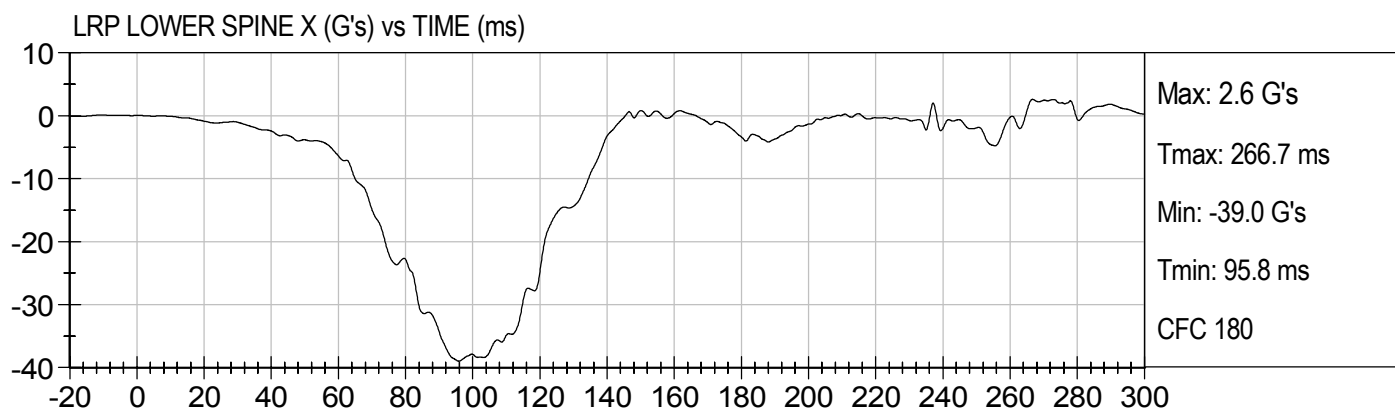
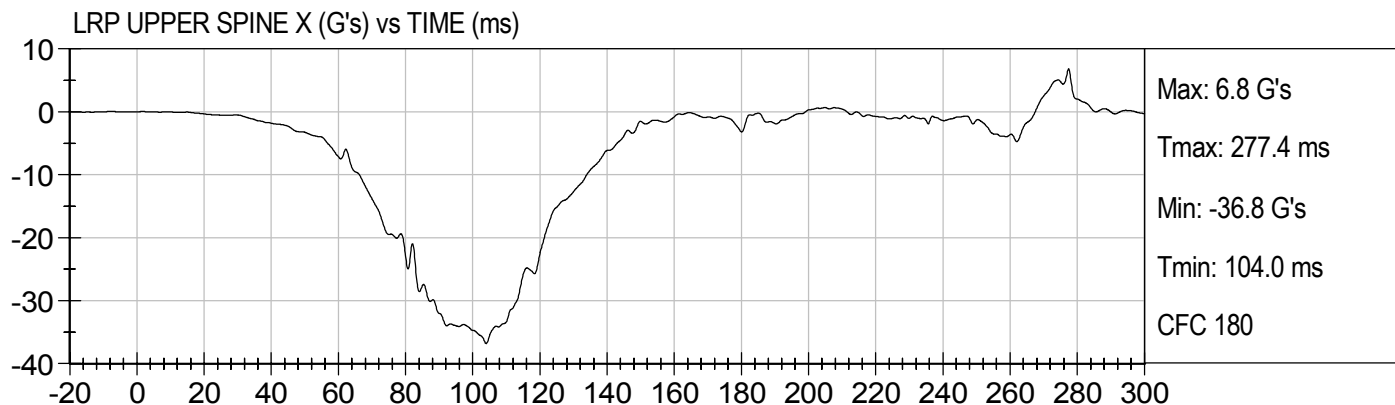
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)





NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

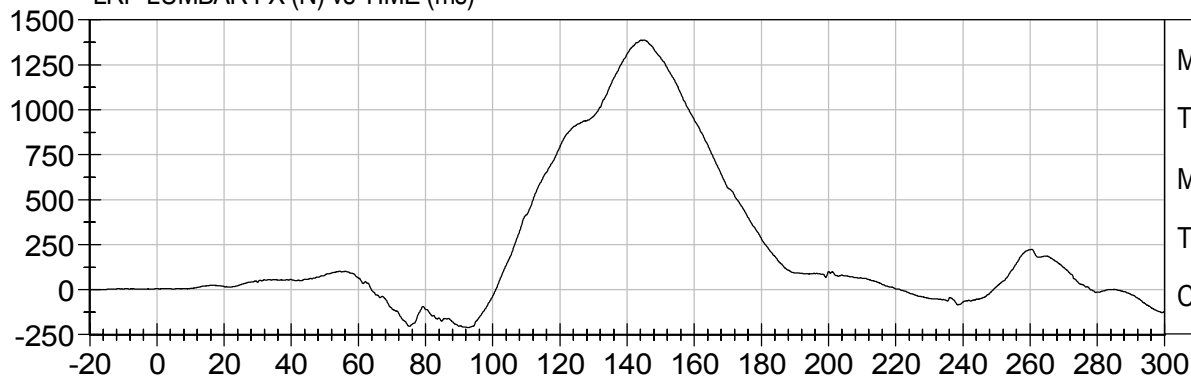




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

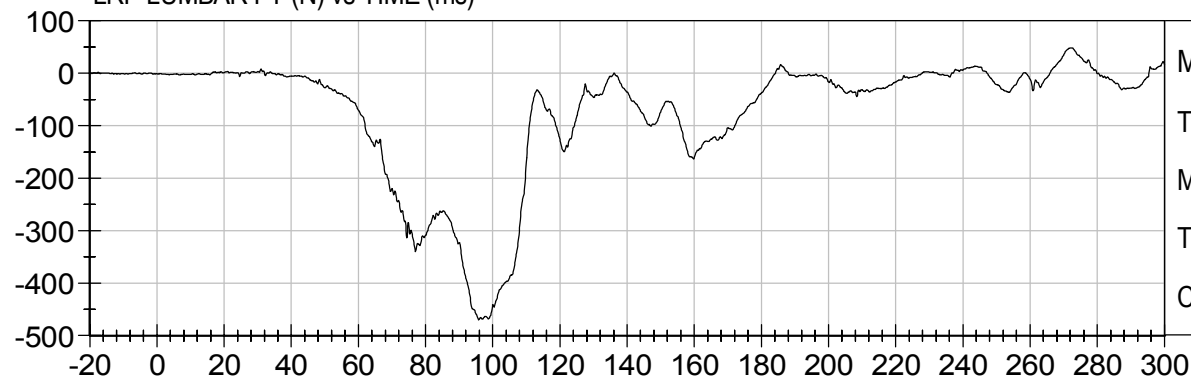
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

LRP LUMBAR FX (N) vs TIME (ms)



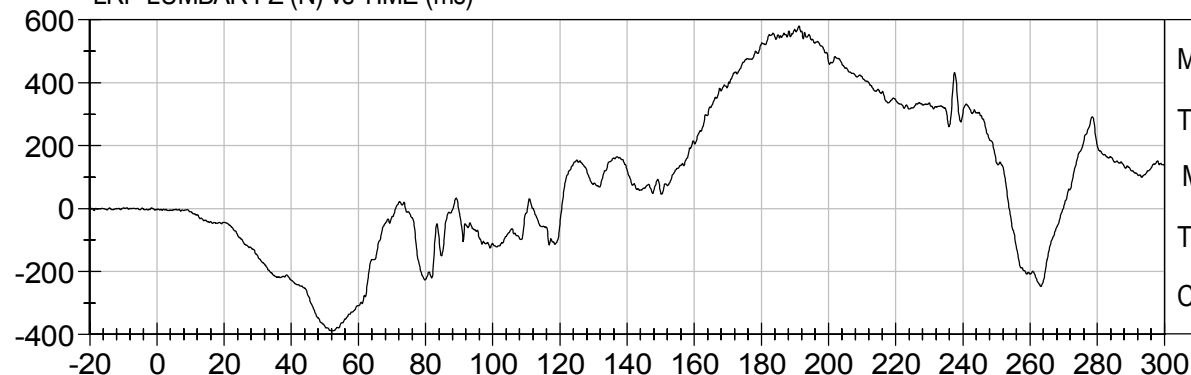
Max: 1387.1 N
Tmax: 145.1 ms
Min: -211.3 N
Tmin: 92.8 ms
CFC 600

LRP LUMBAR FY (N) vs TIME (ms)



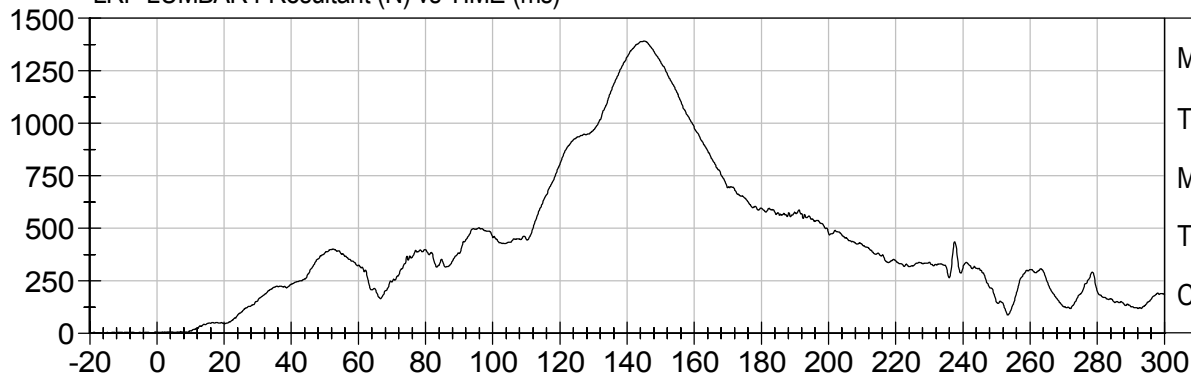
Max: 48.6 N
Tmax: 272.2 ms
Min: -469.9 N
Tmin: 95.8 ms
CFC 600

LRP LUMBAR FZ (N) vs TIME (ms)



Max: 580.4 N
Tmax: 191.2 ms
Min: -388.5 N
Tmin: 52.3 ms
CFC 600

LRP LUMBAR FResultant (N) vs TIME (ms)

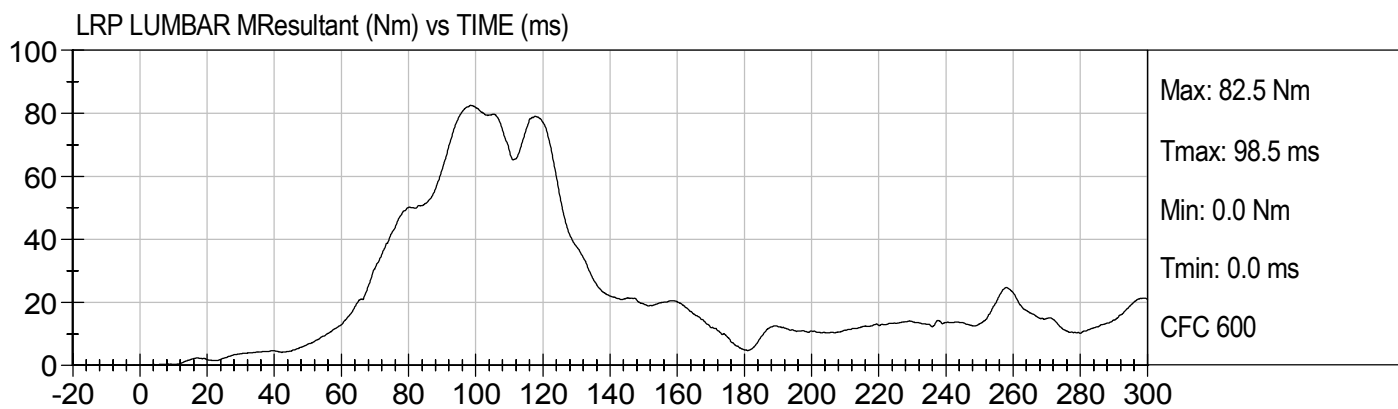
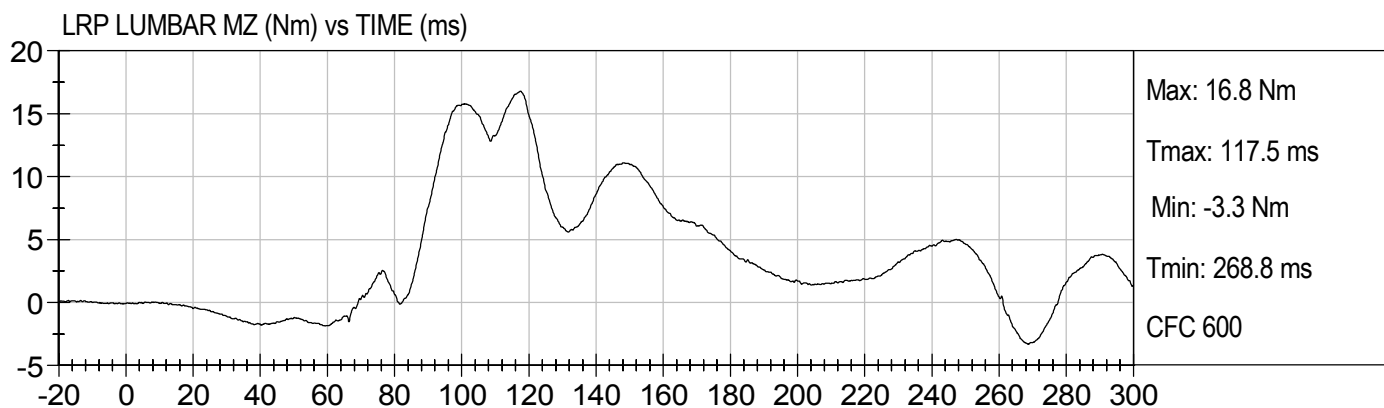
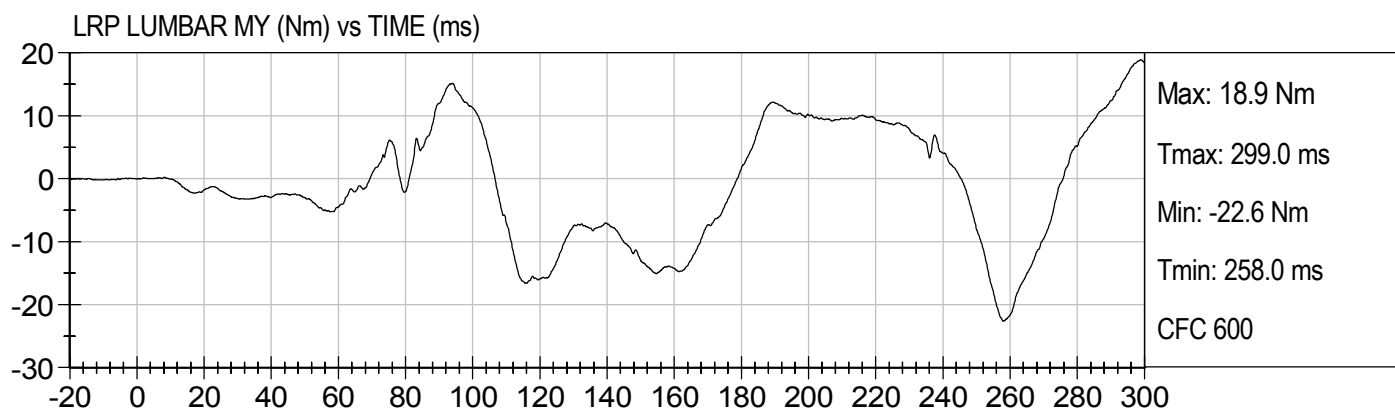
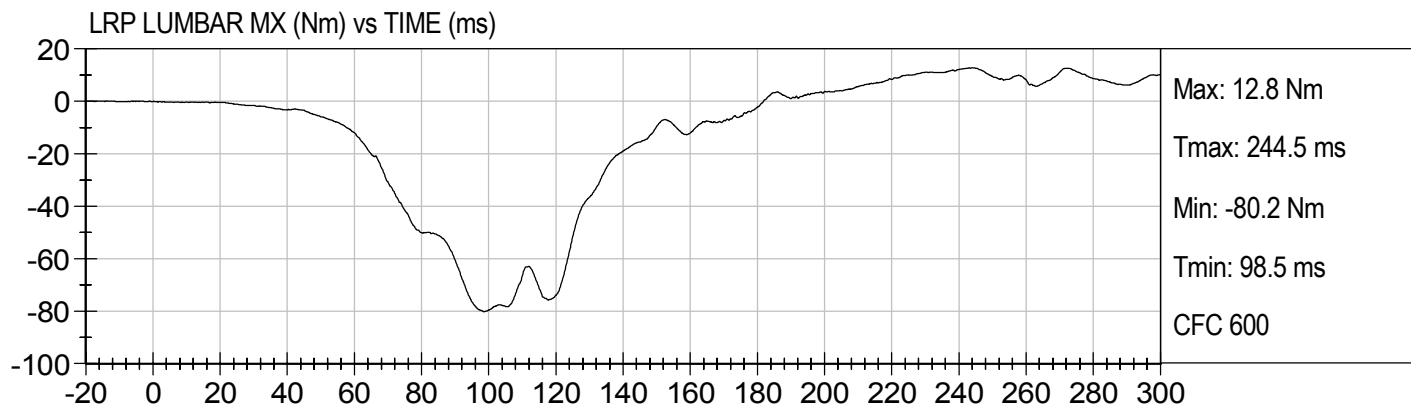


Max: 1391.0 N
Tmax: 145.1 ms
Min: 0.3 N
Tmin: 0.0 ms
CFC 600



NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

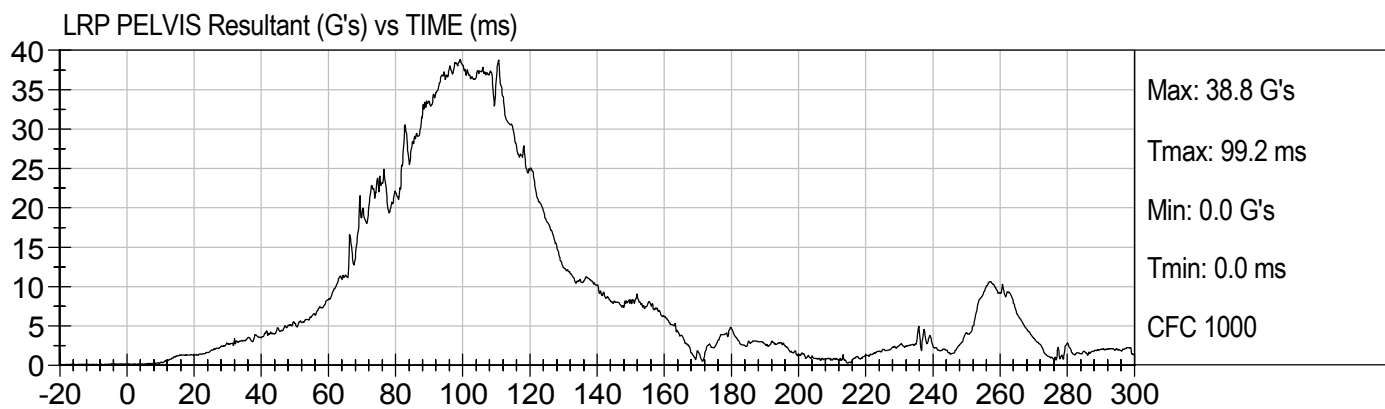
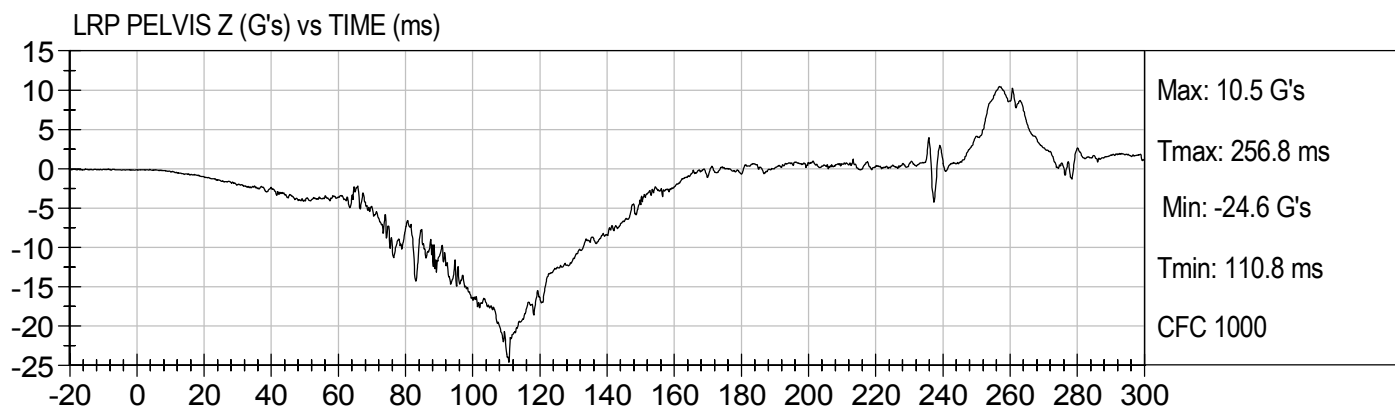
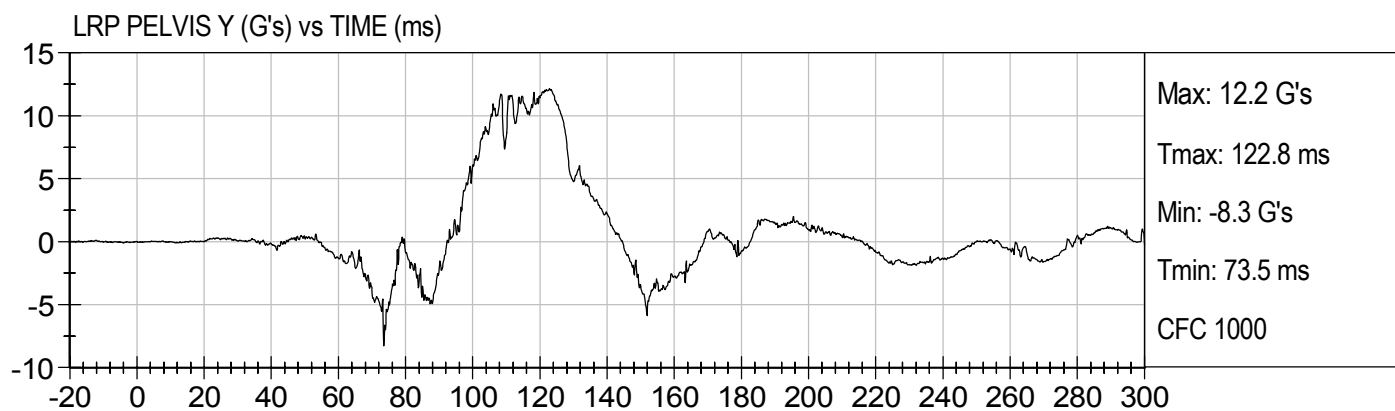
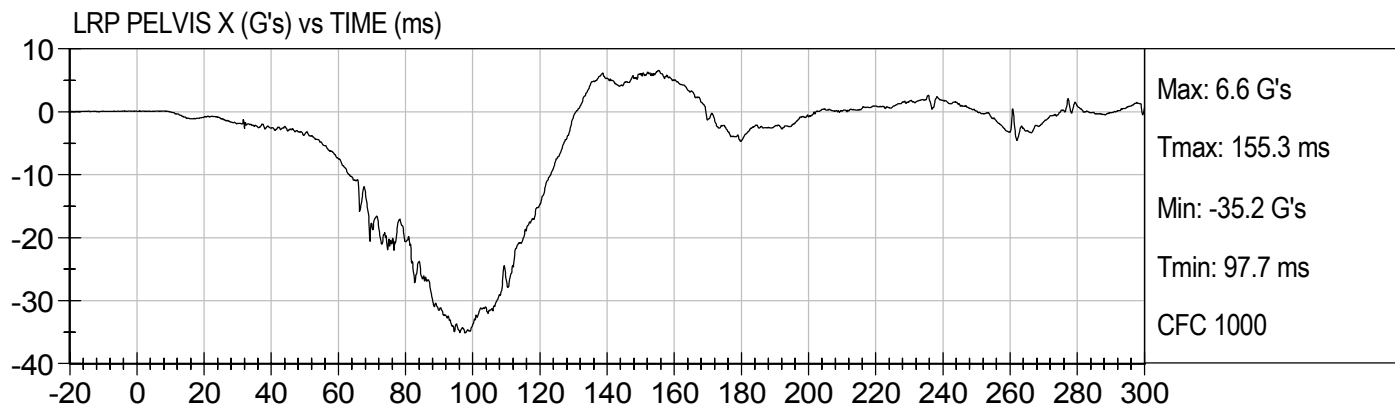
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

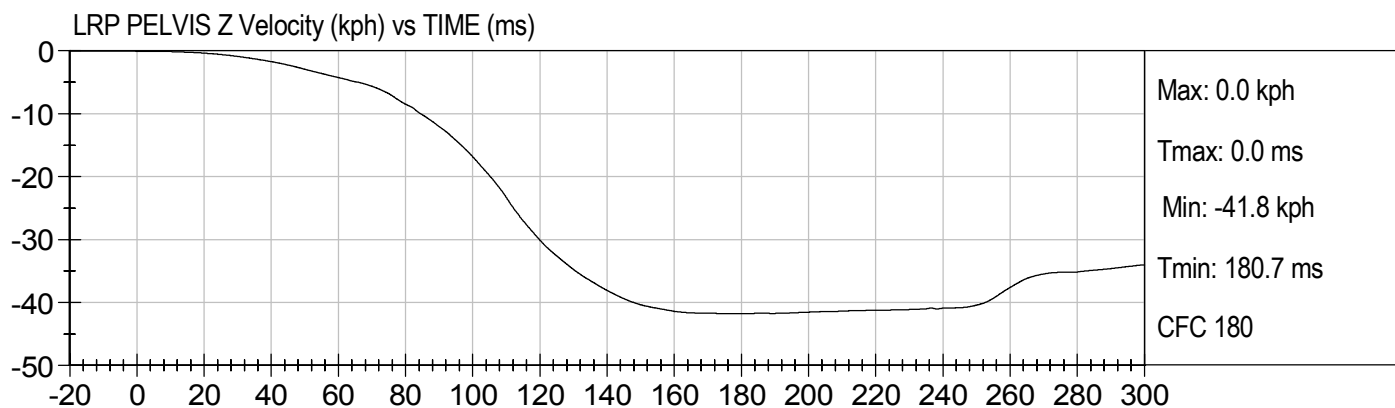
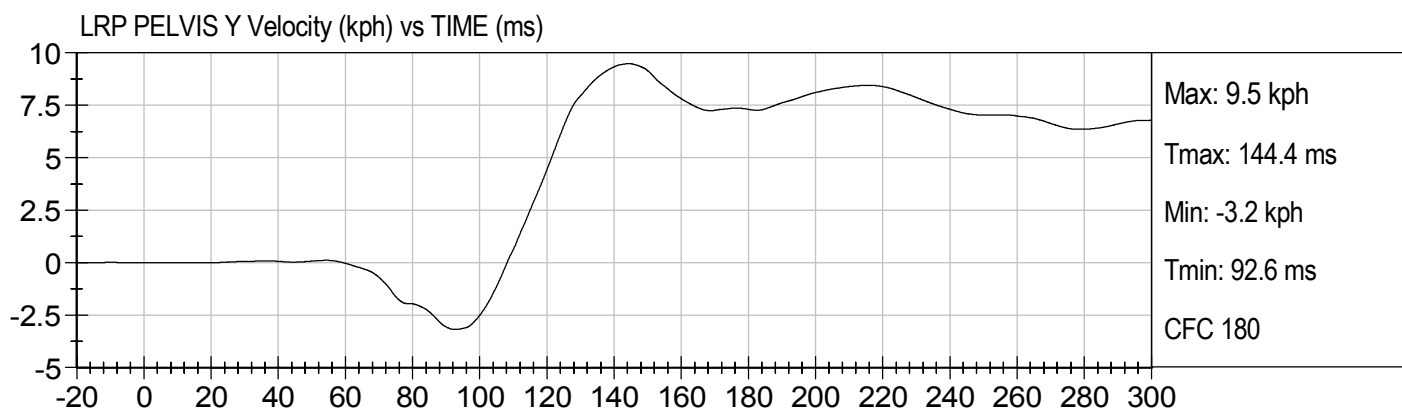
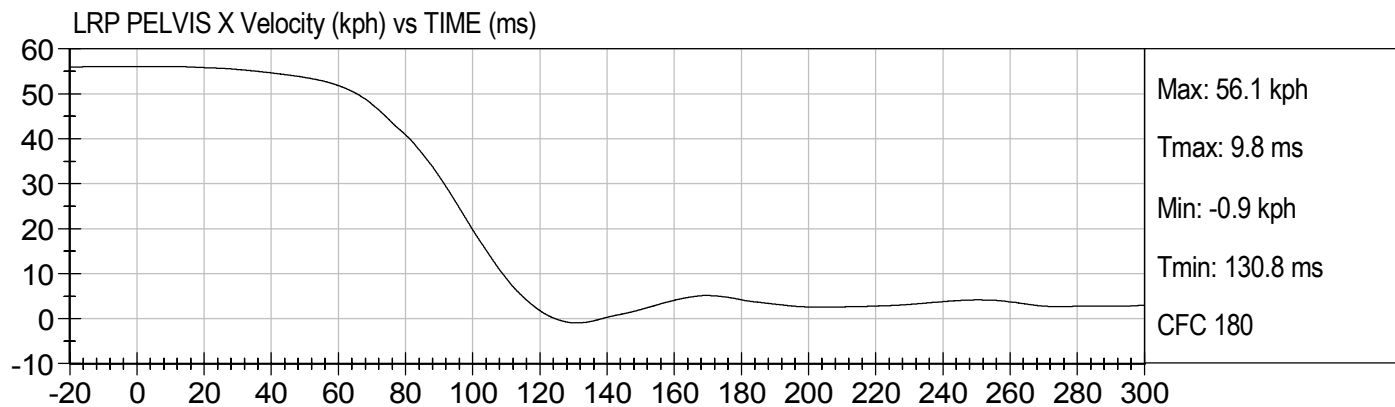


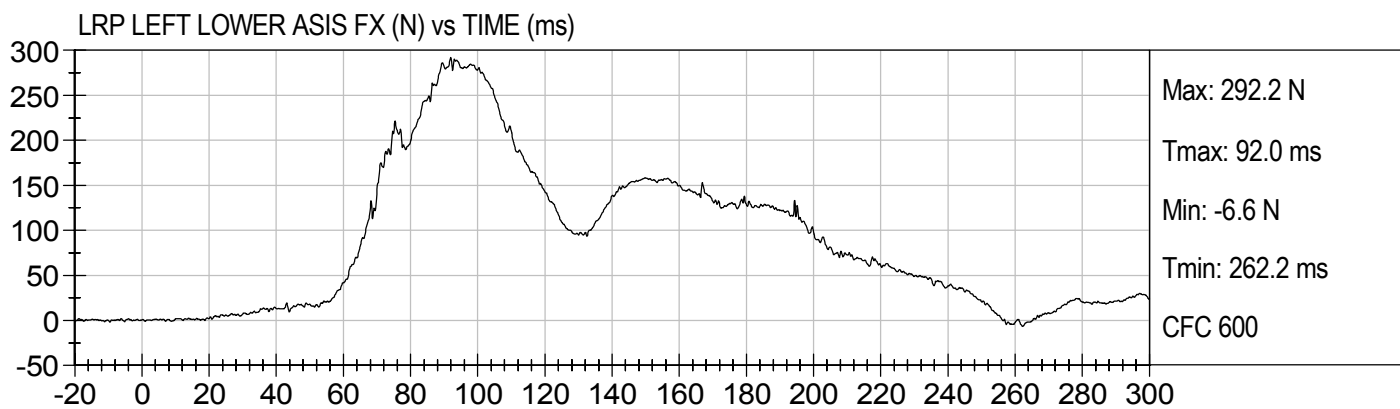
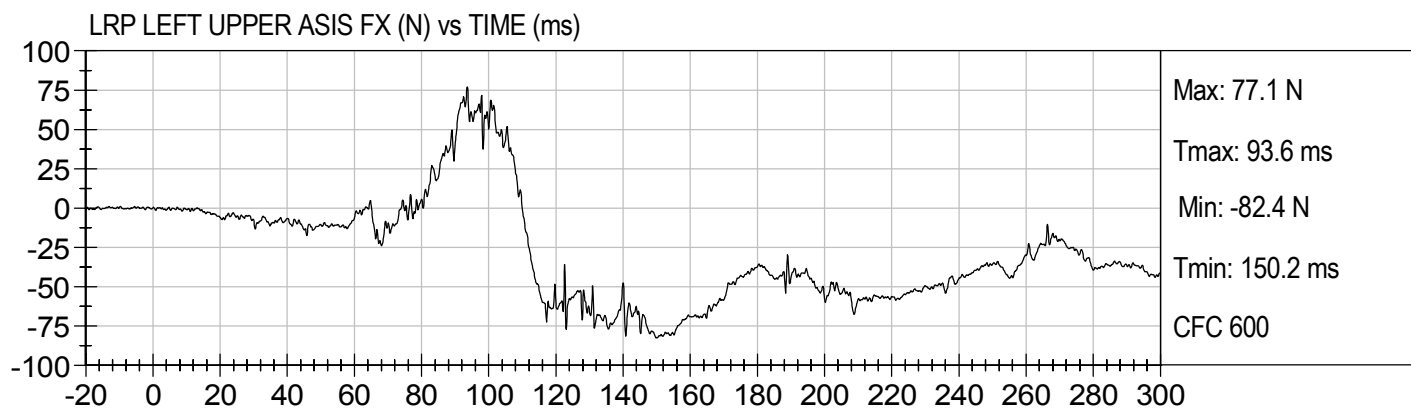
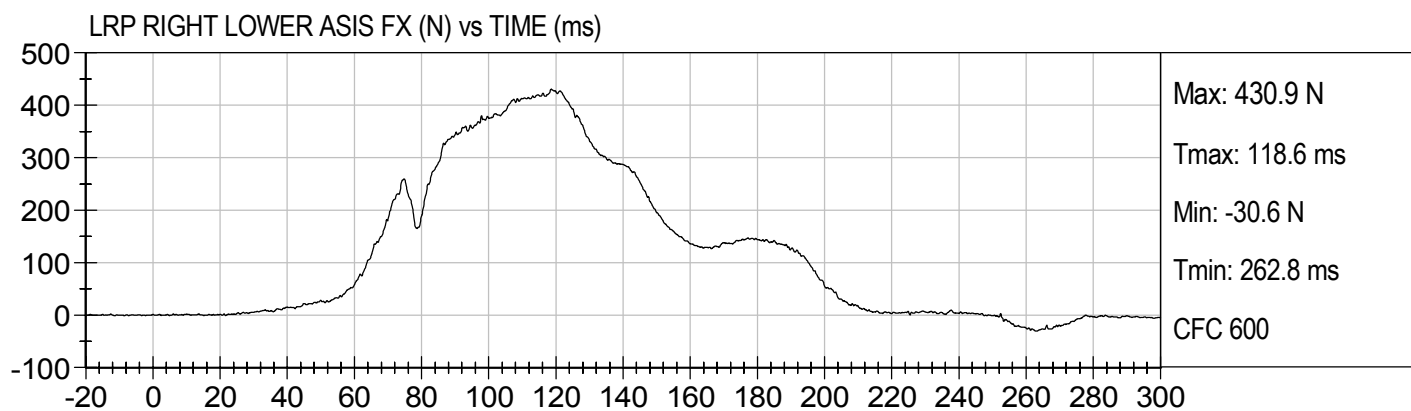
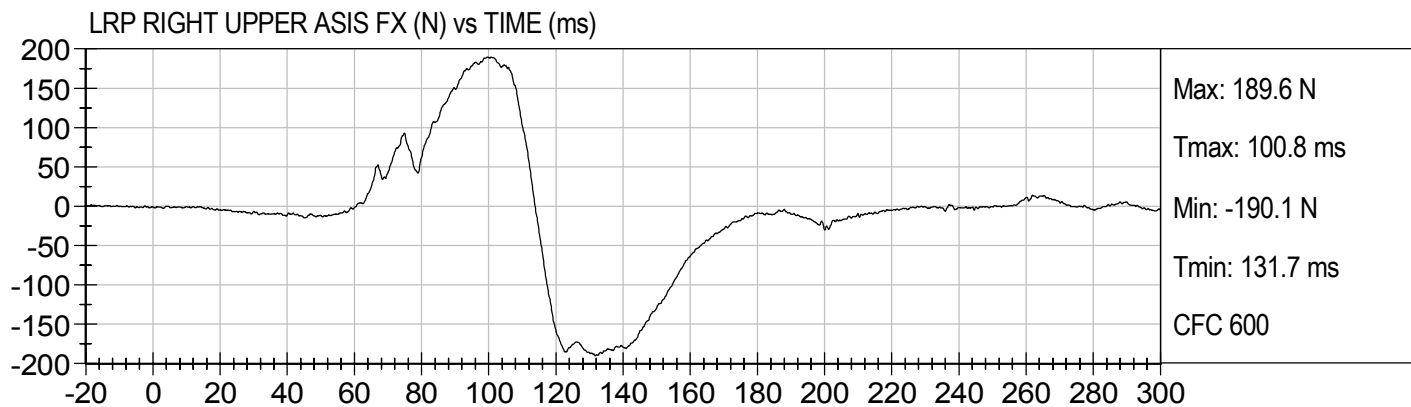


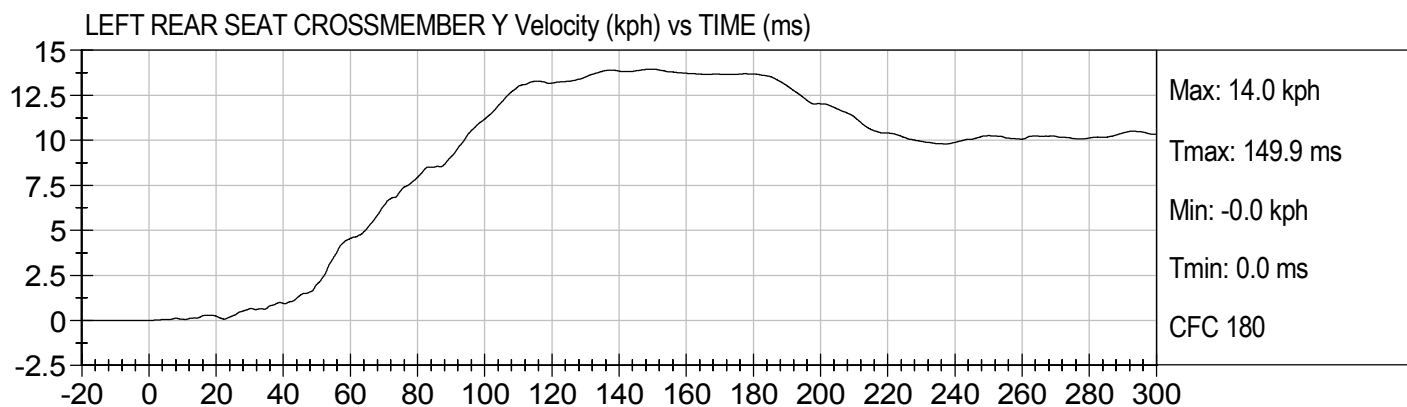
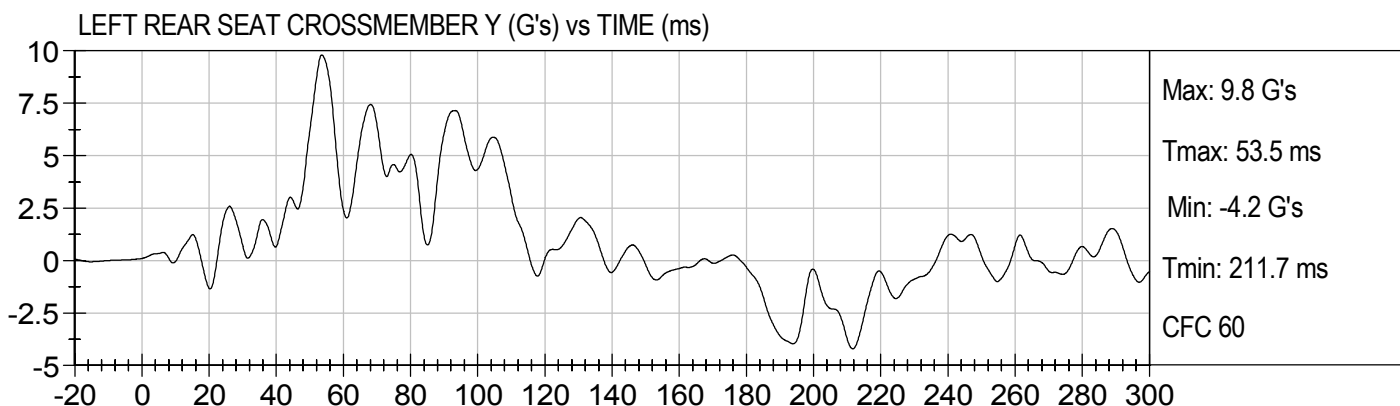
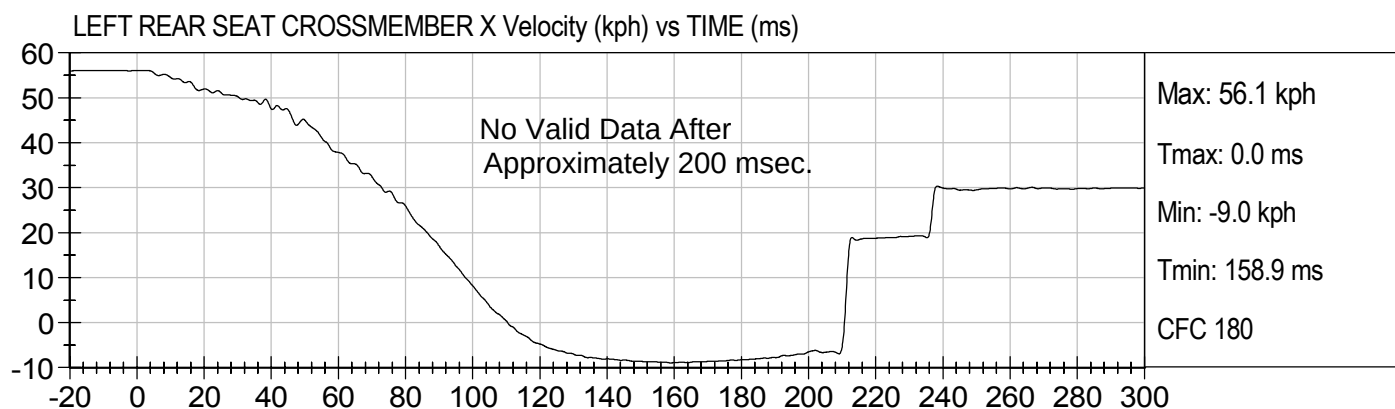
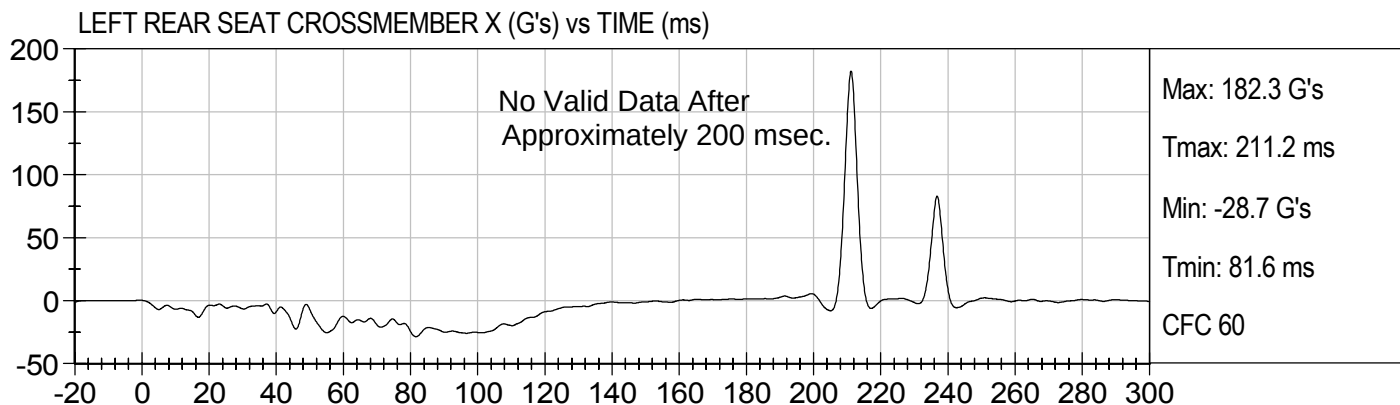
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

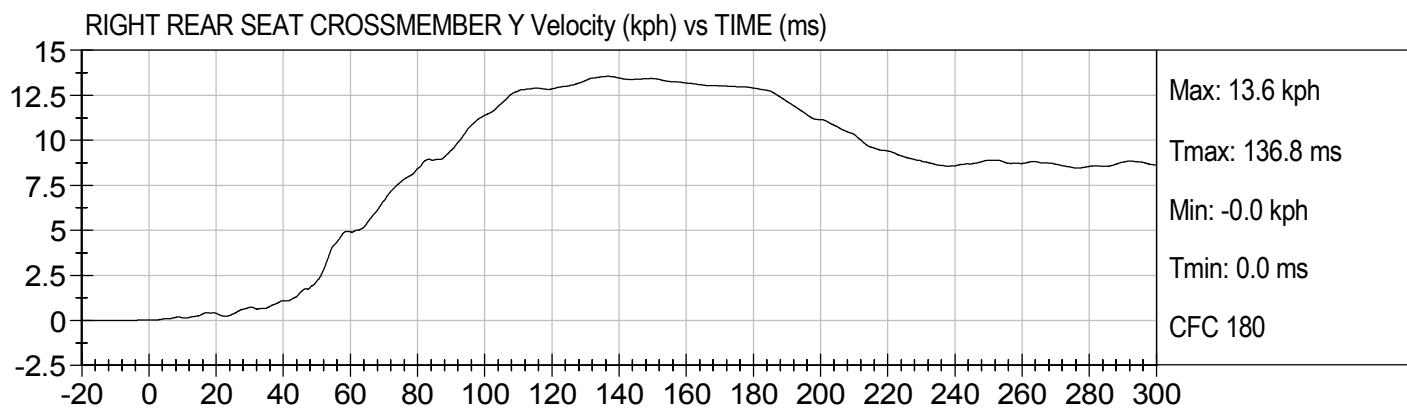
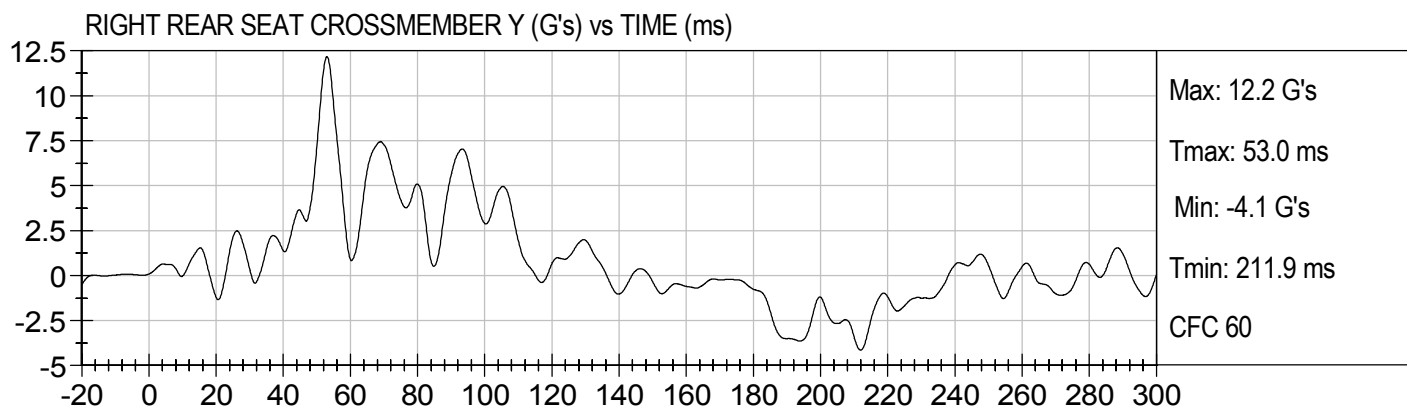
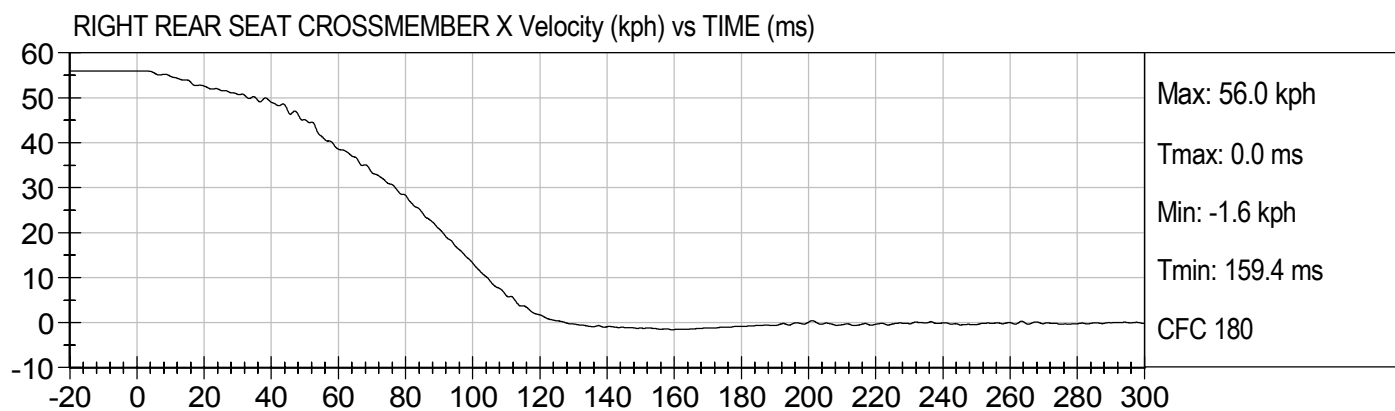
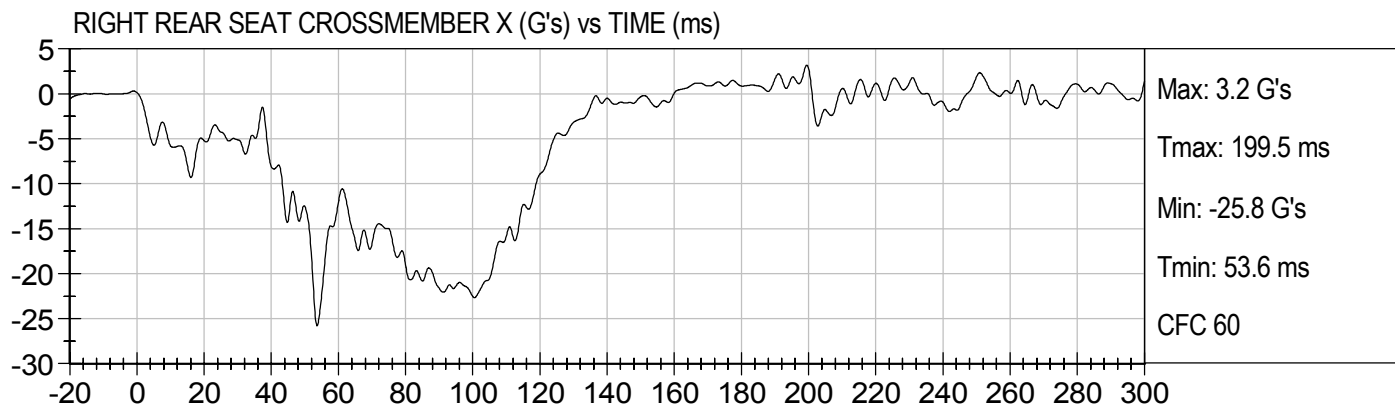
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

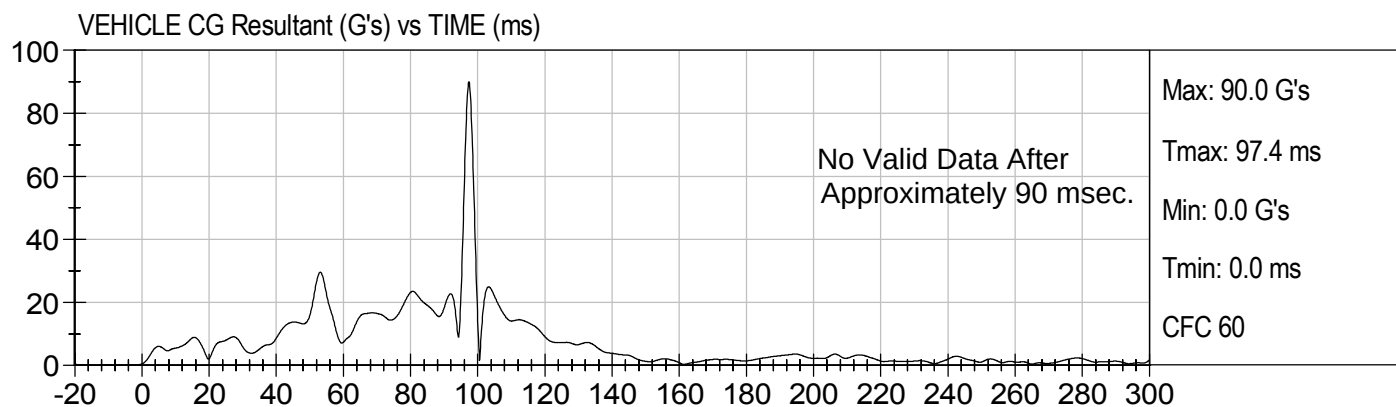
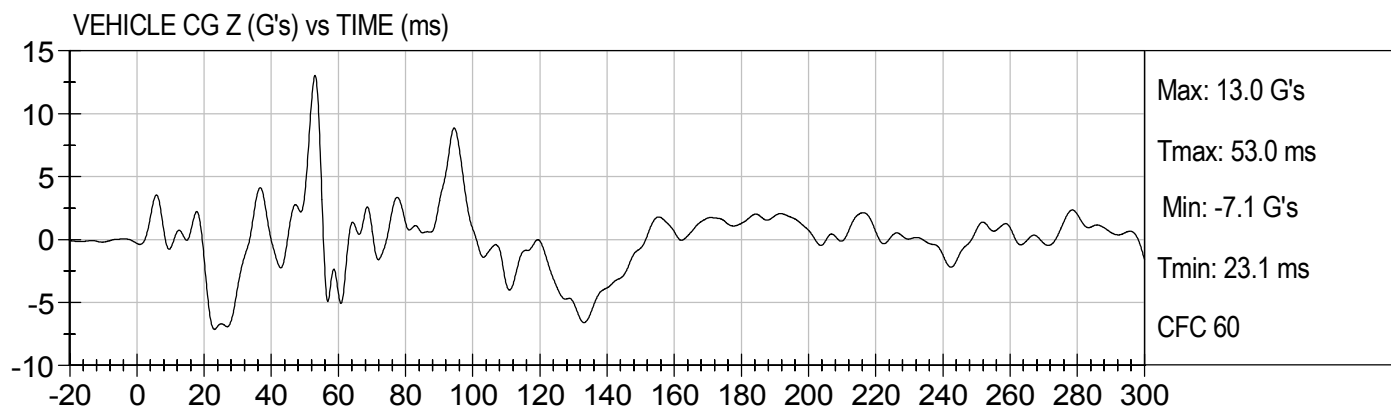
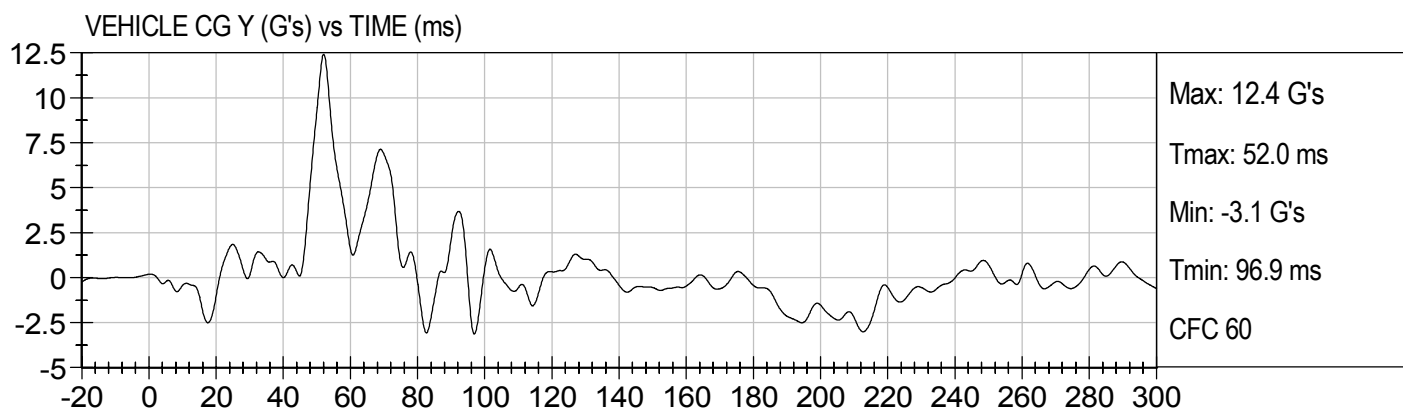
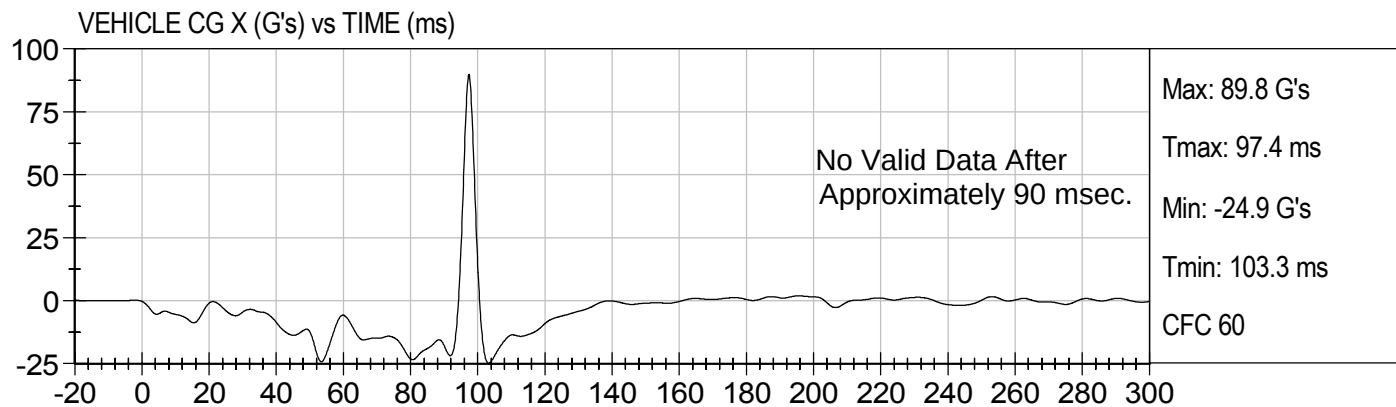


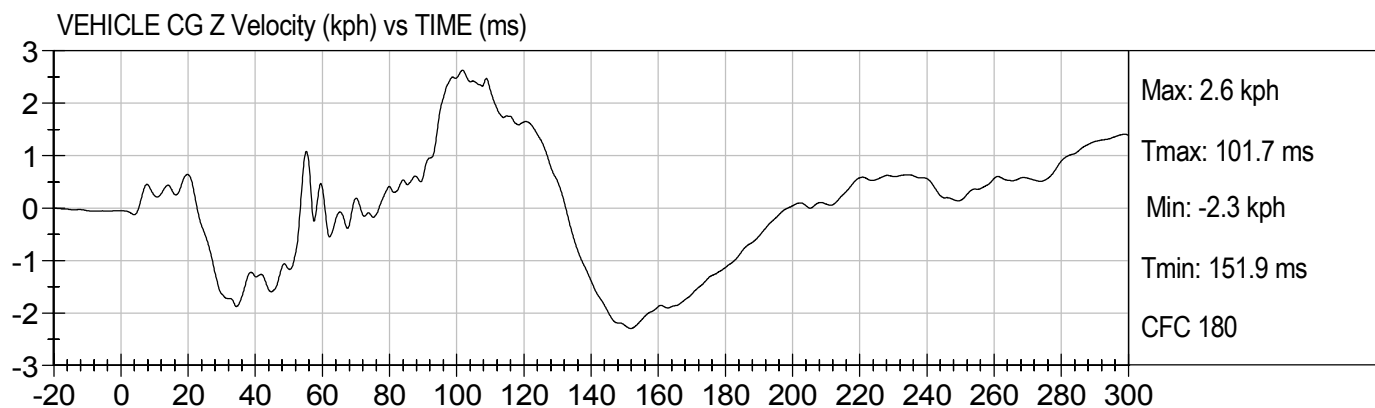
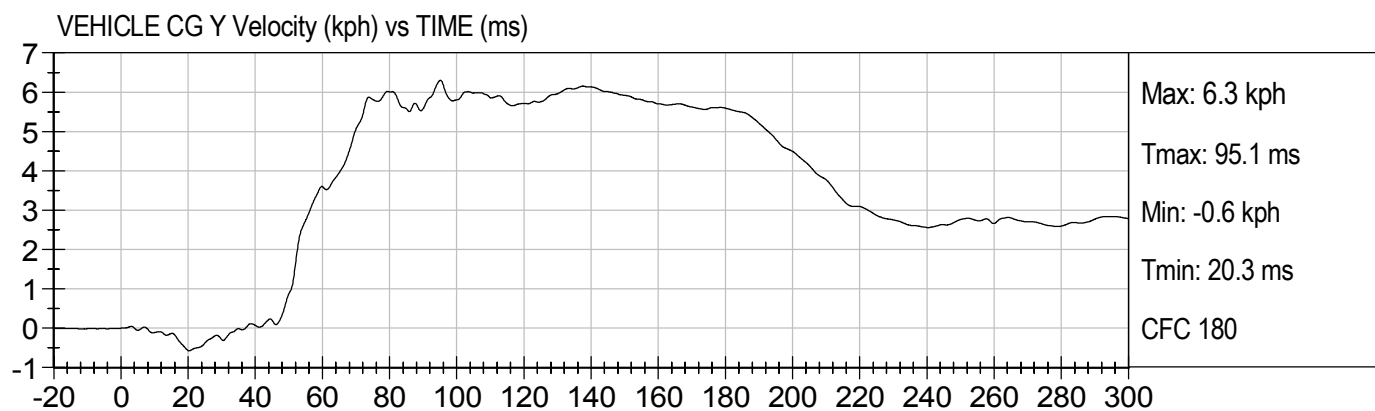
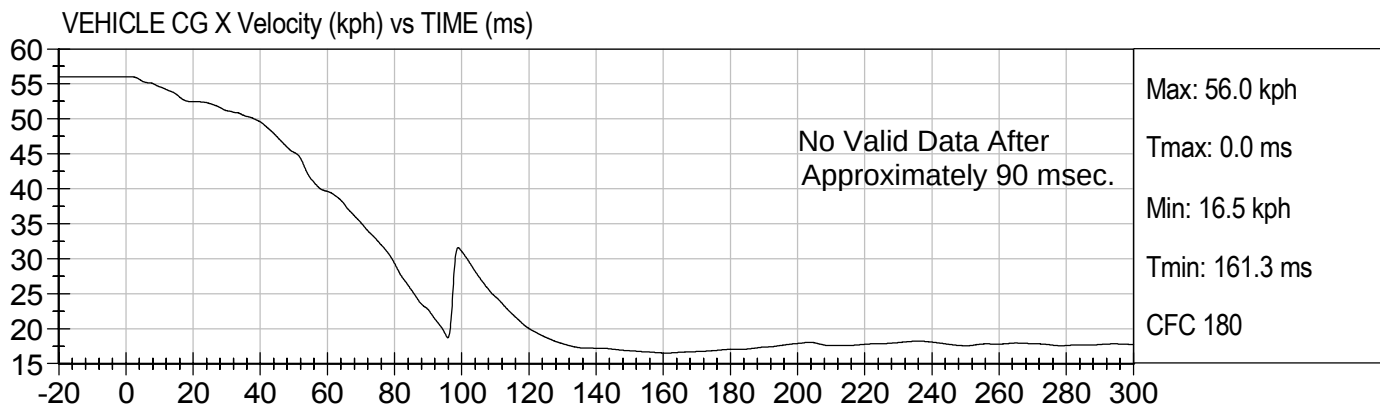


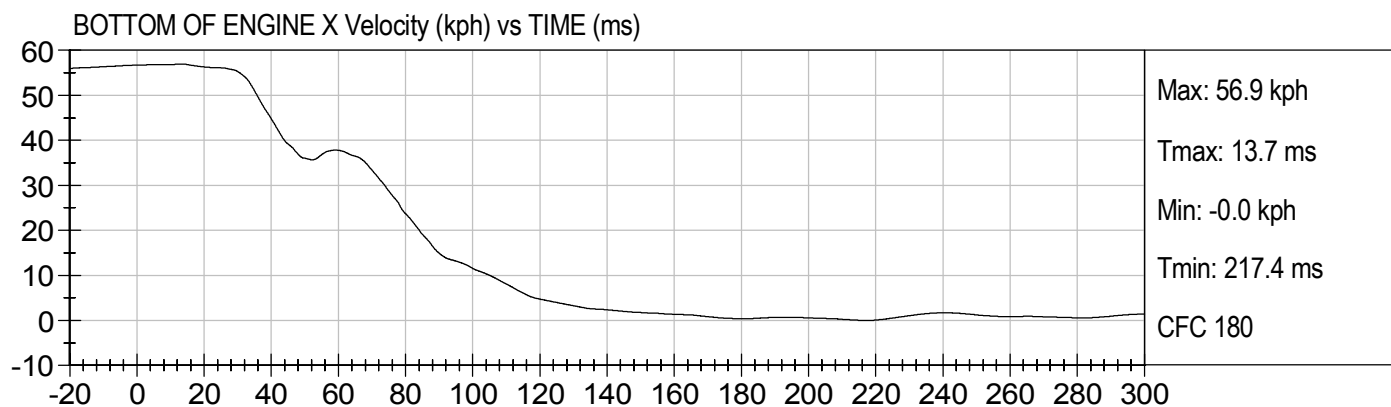
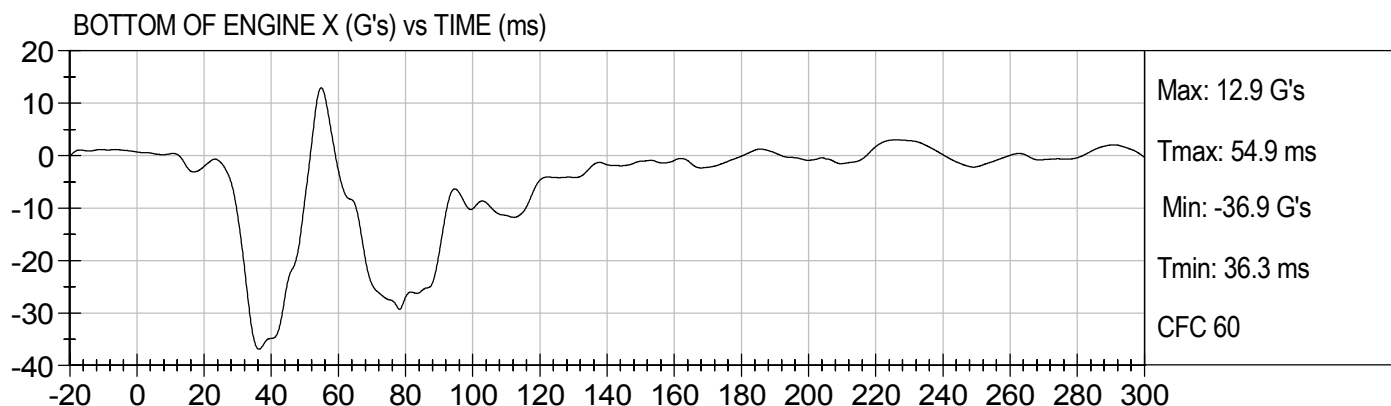
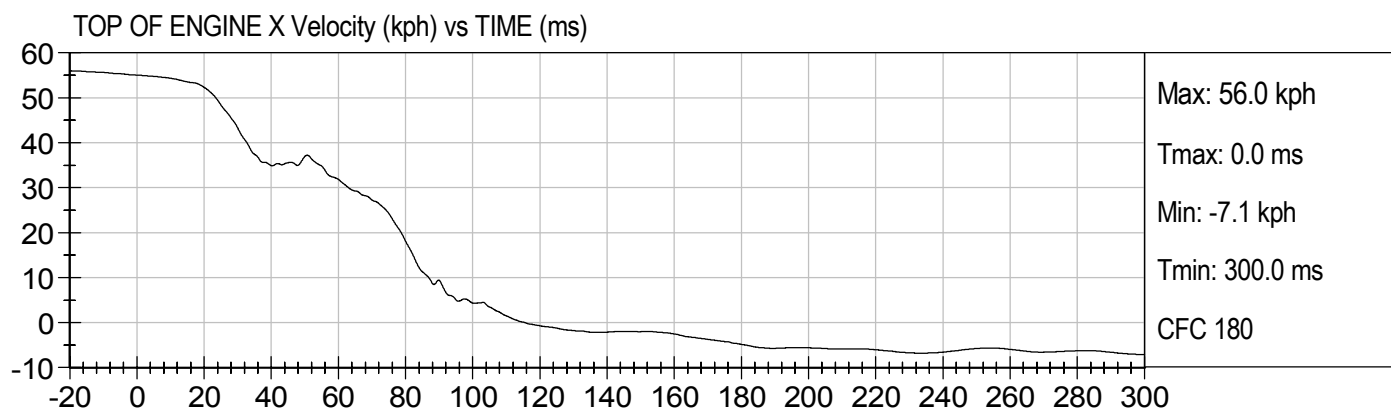
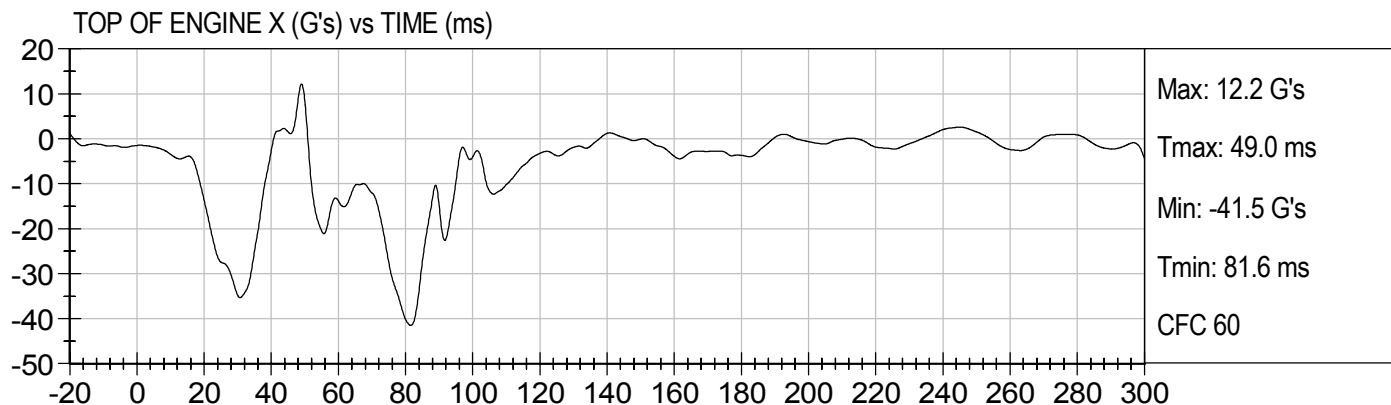






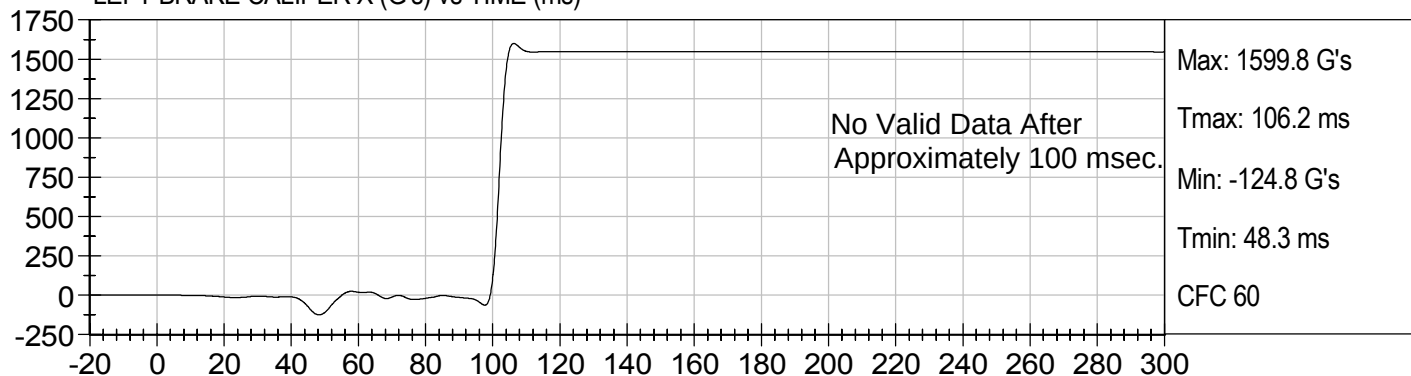




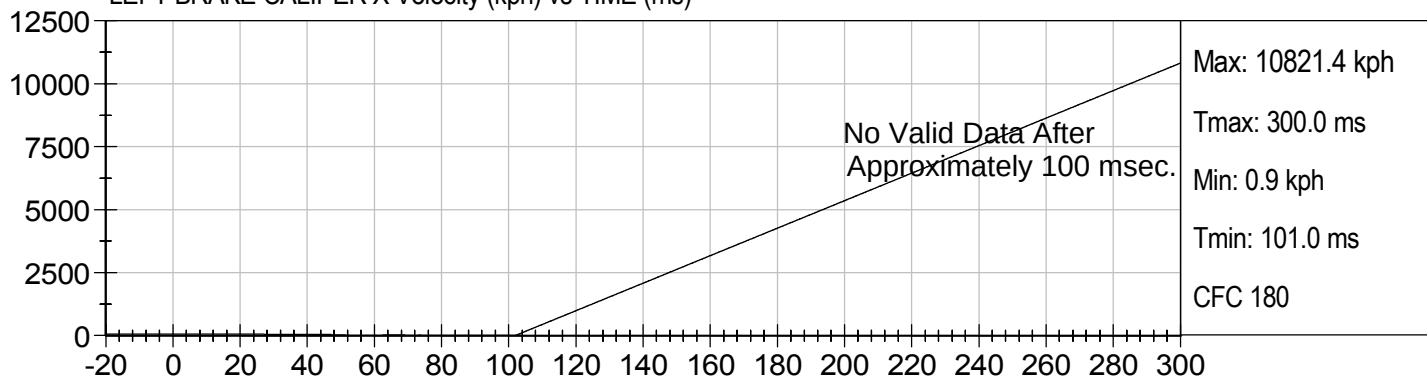




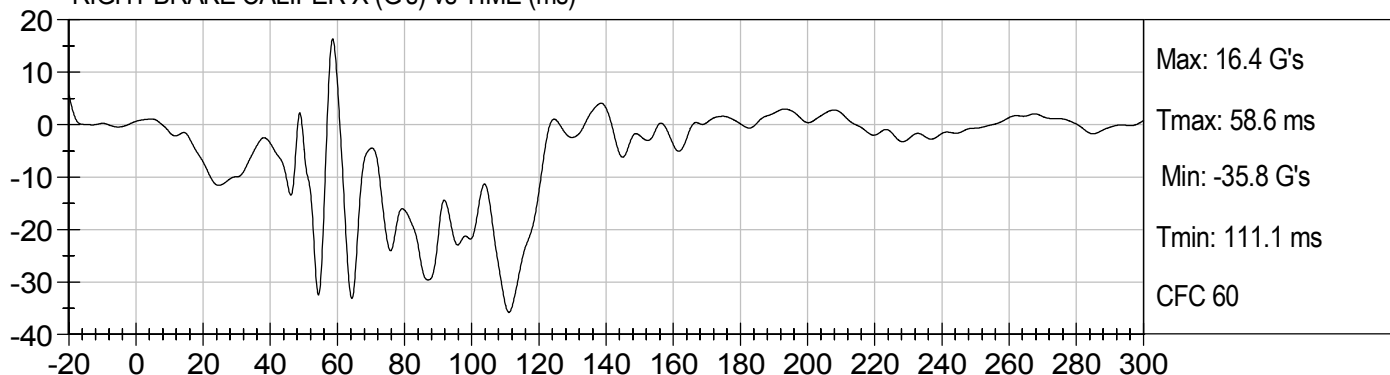
LEFT BRAKE CALIPER X (G's) vs TIME (ms)



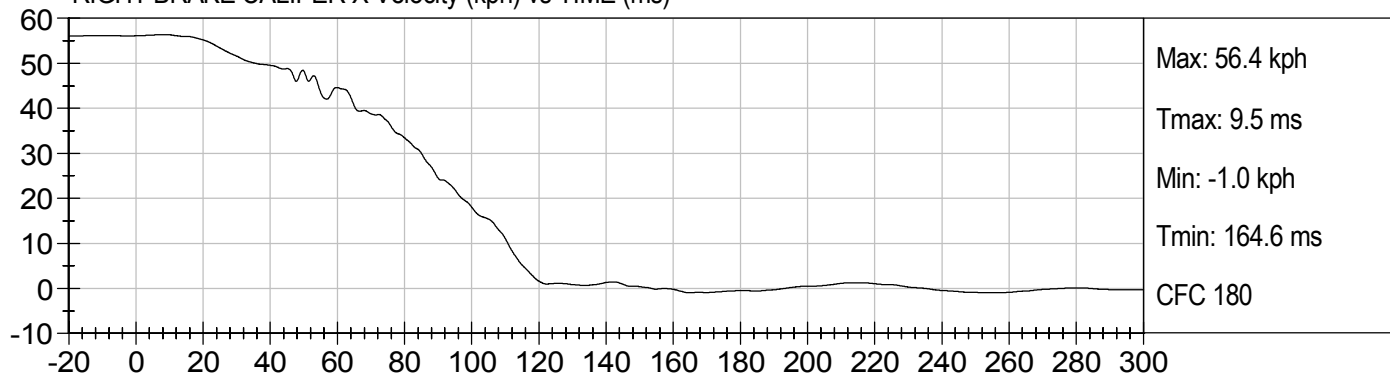
LEFT BRAKE CALIPER X Velocity (kph) vs TIME (ms)

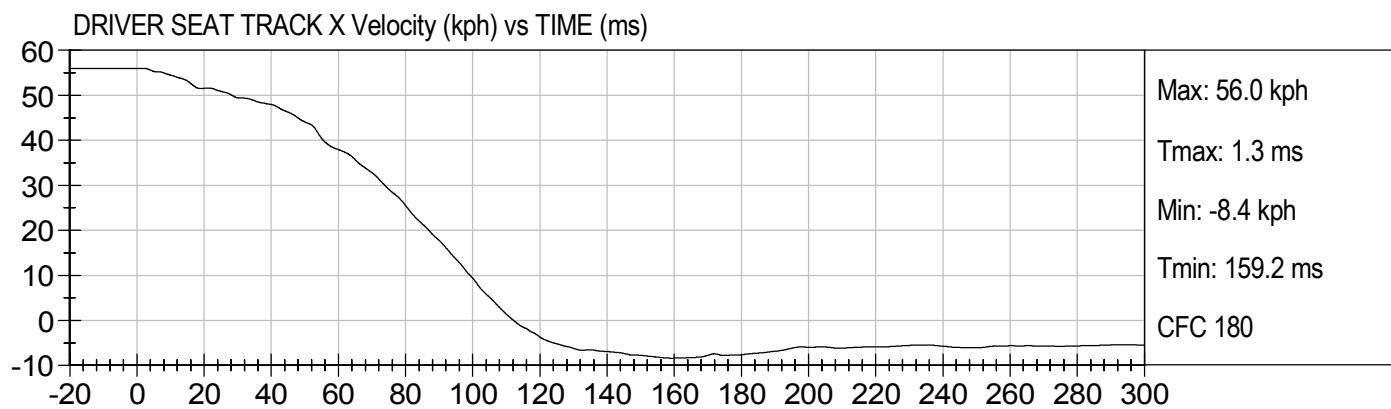
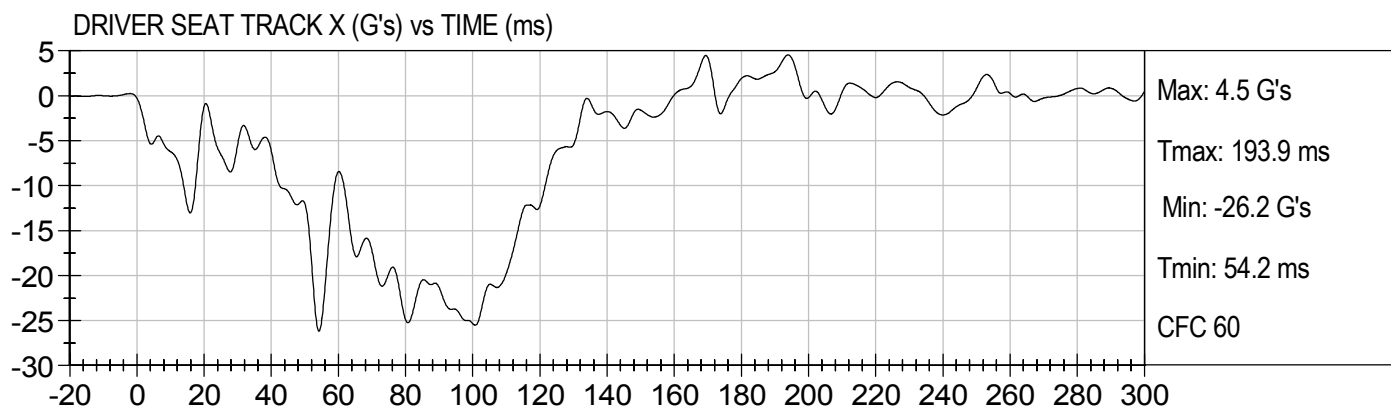
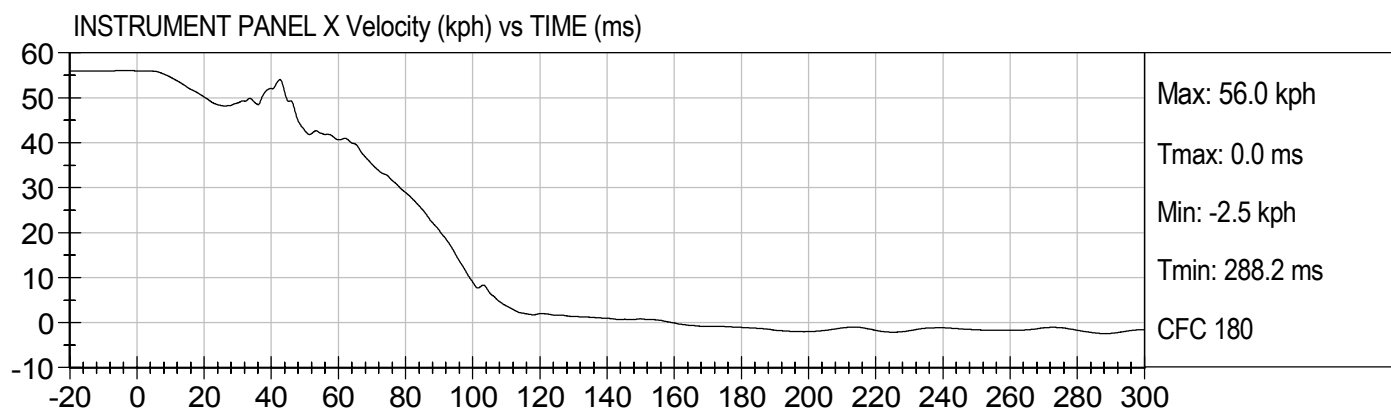
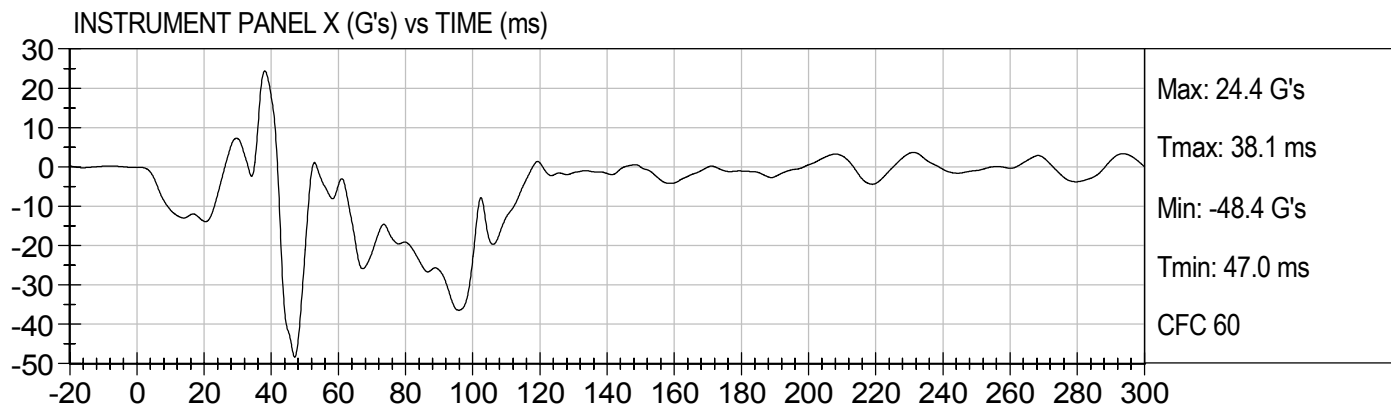


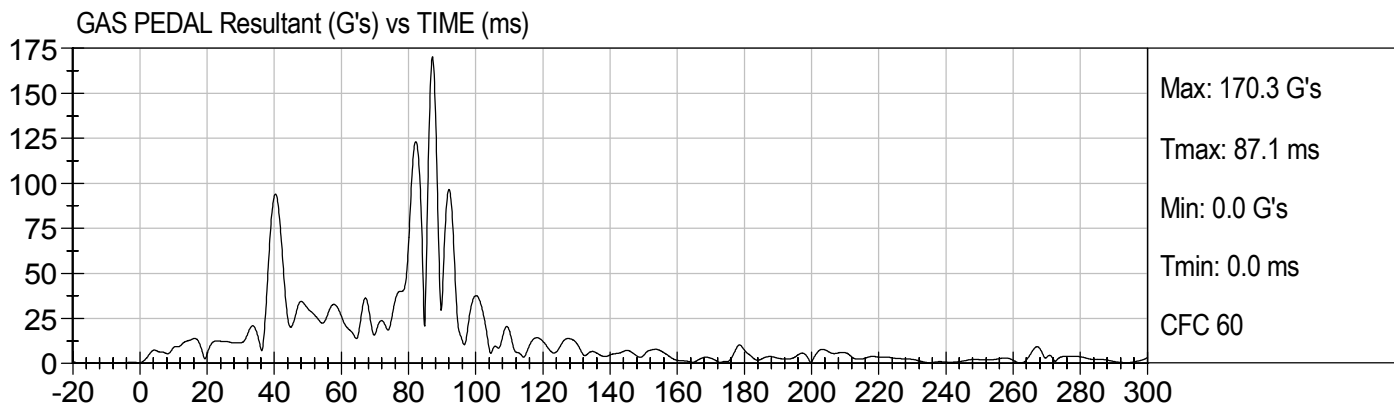
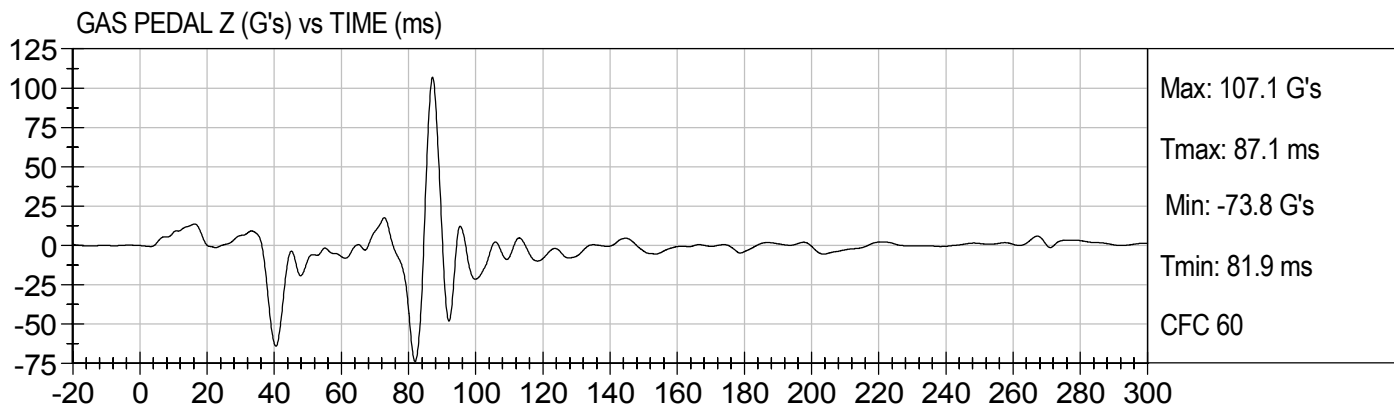
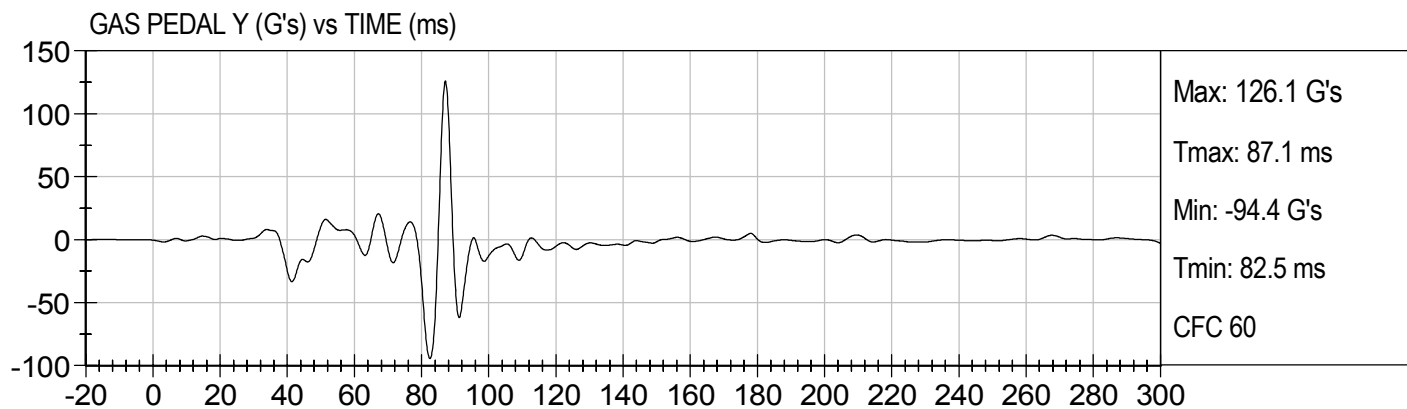
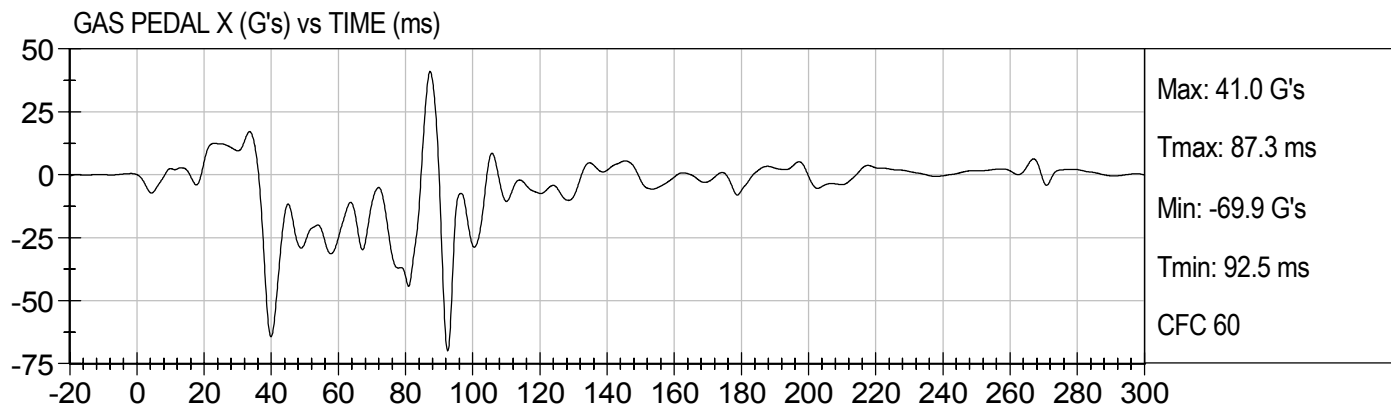
RIGHT BRAKE CALIPER X (G's) vs TIME (ms)



RIGHT BRAKE CALIPER X Velocity (kph) vs TIME (ms)

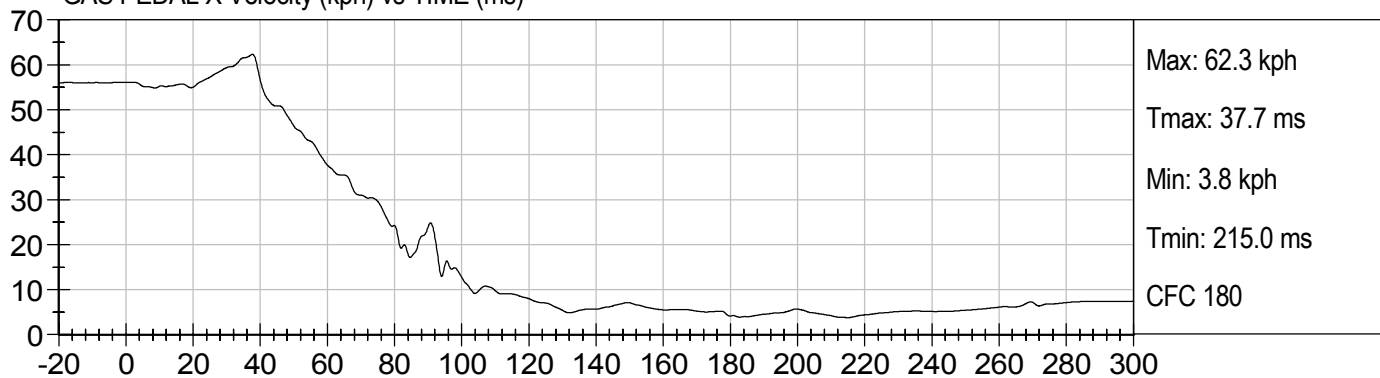




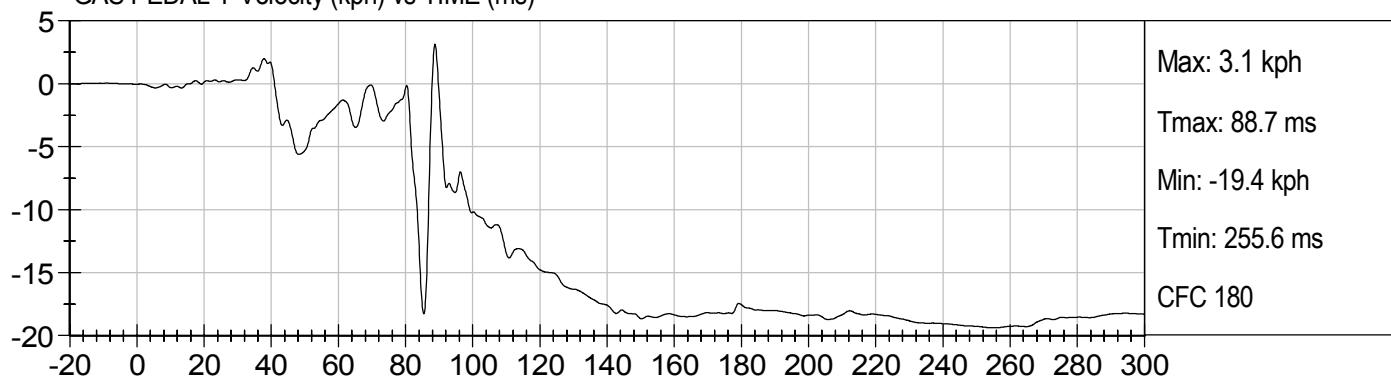




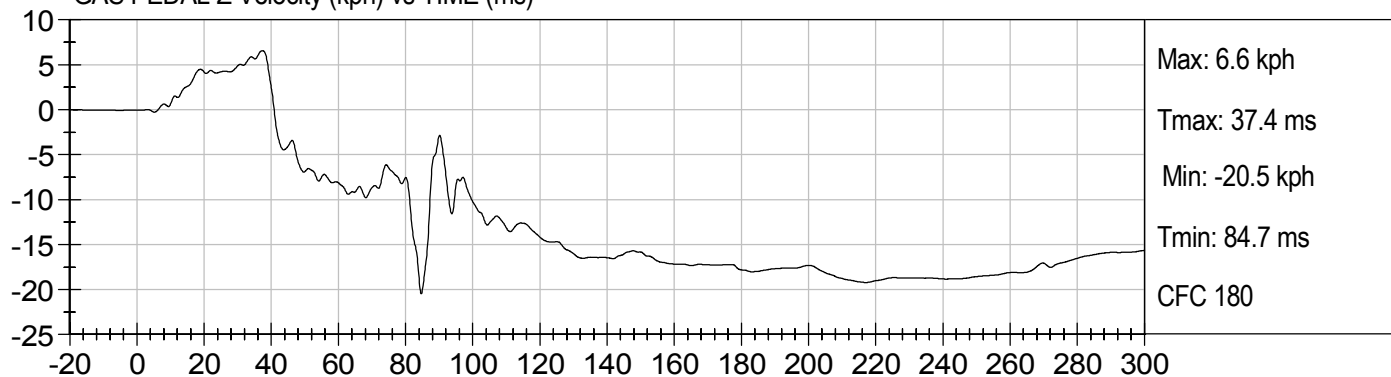
GAS PEDAL X Velocity (kph) vs TIME (ms)

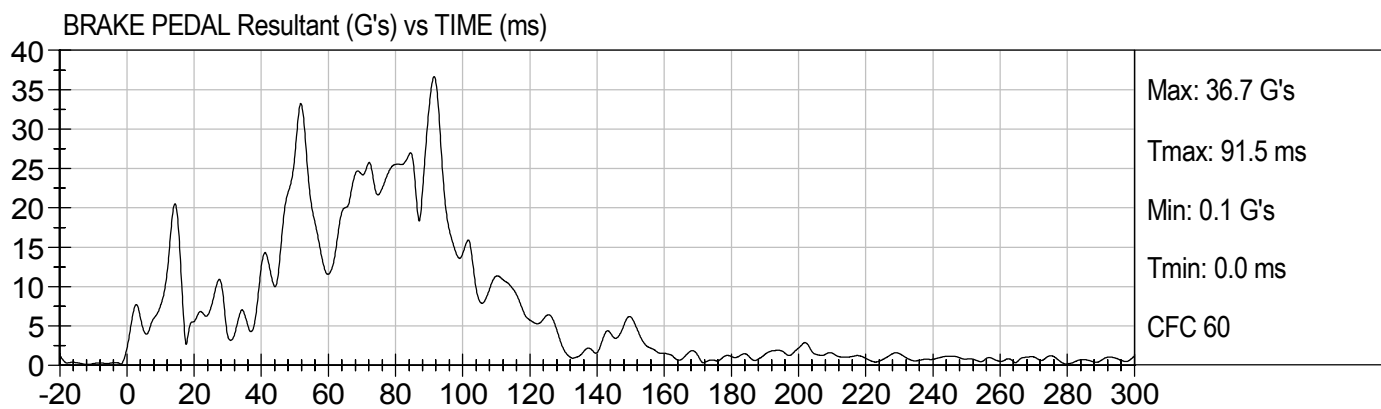
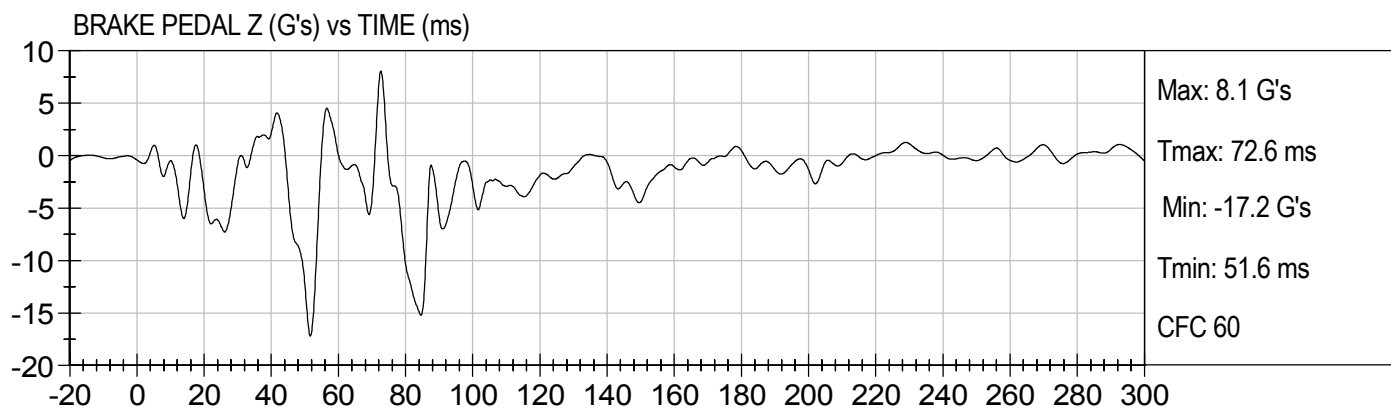
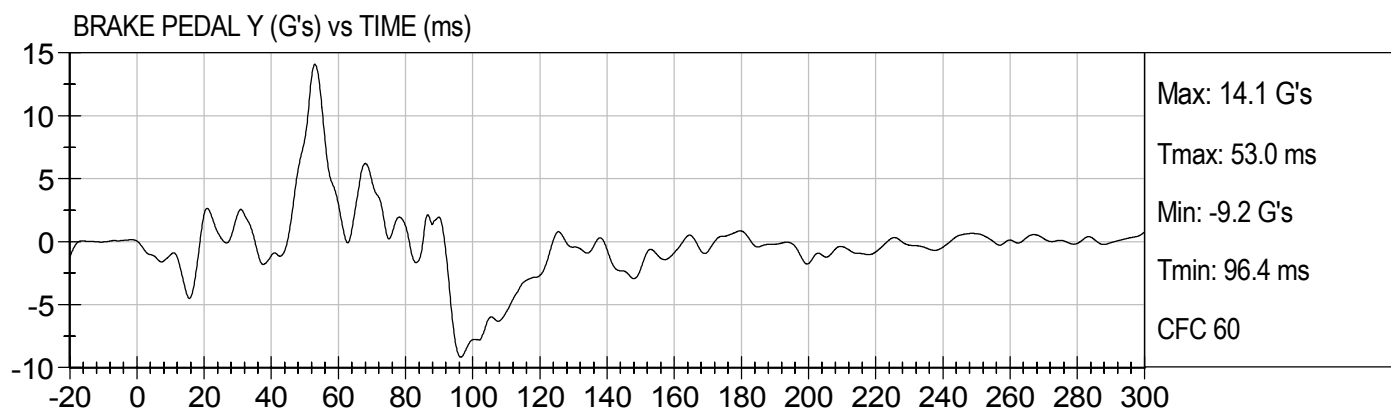
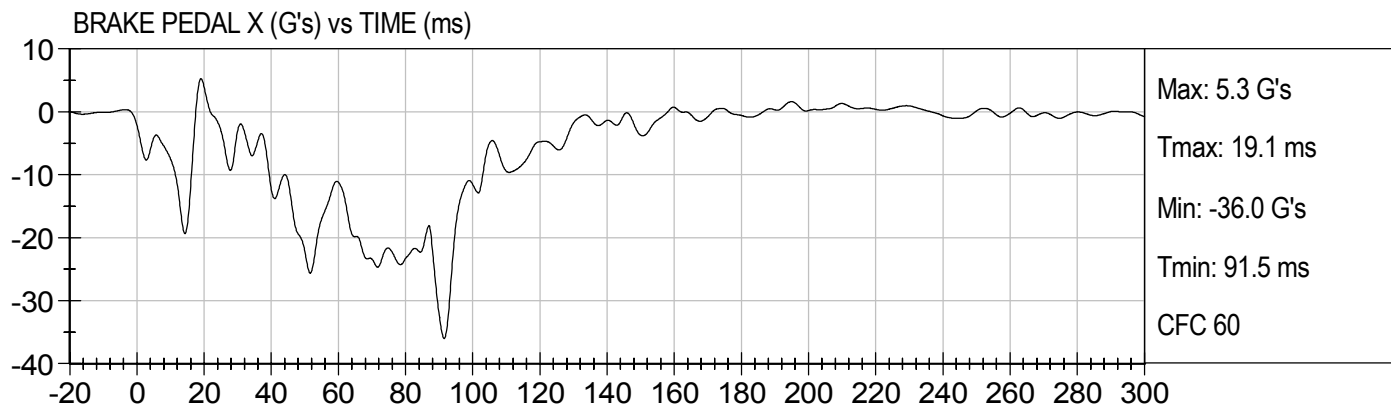


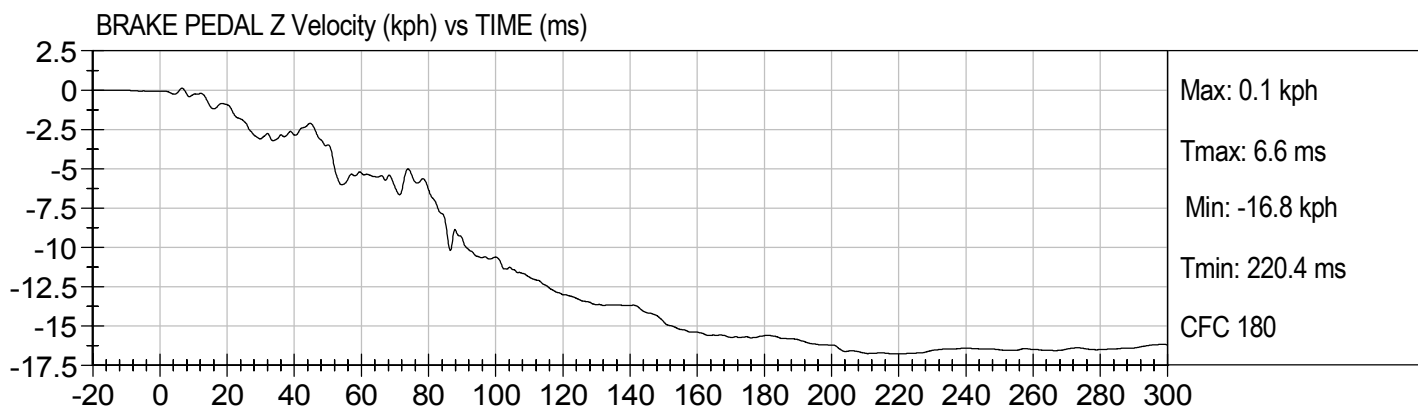
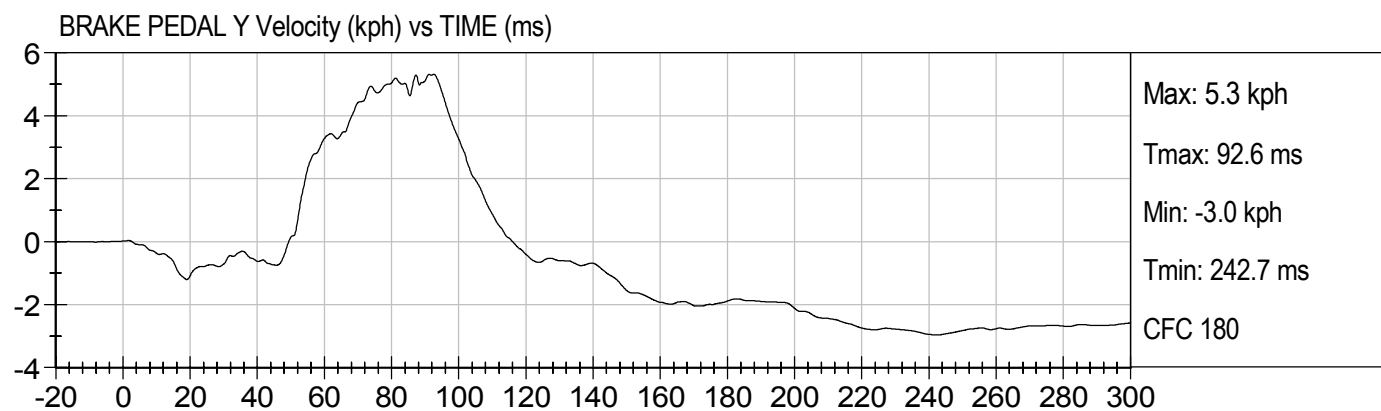
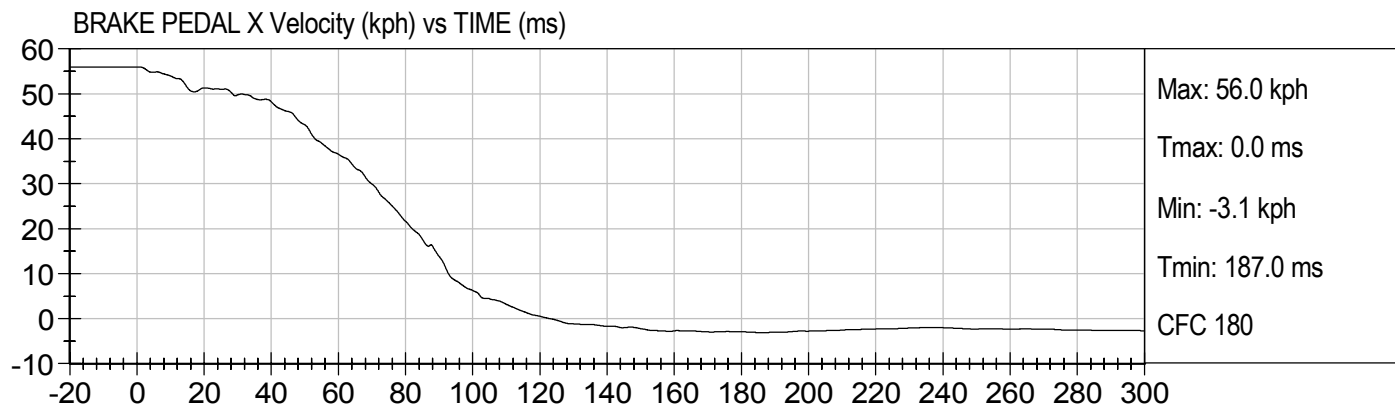
GAS PEDAL Y Velocity (kph) vs TIME (ms)



GAS PEDAL Z Velocity (kph) vs TIME (ms)



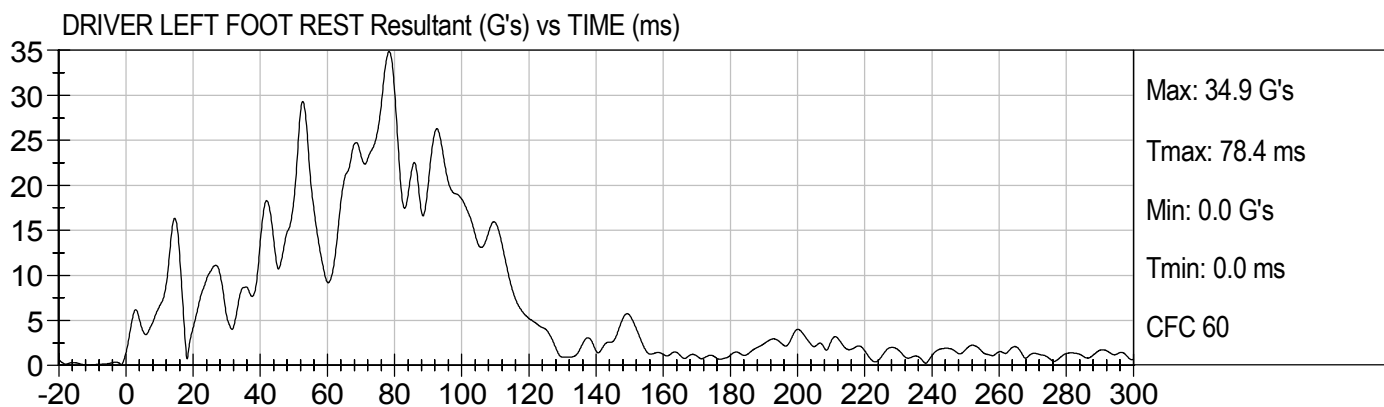
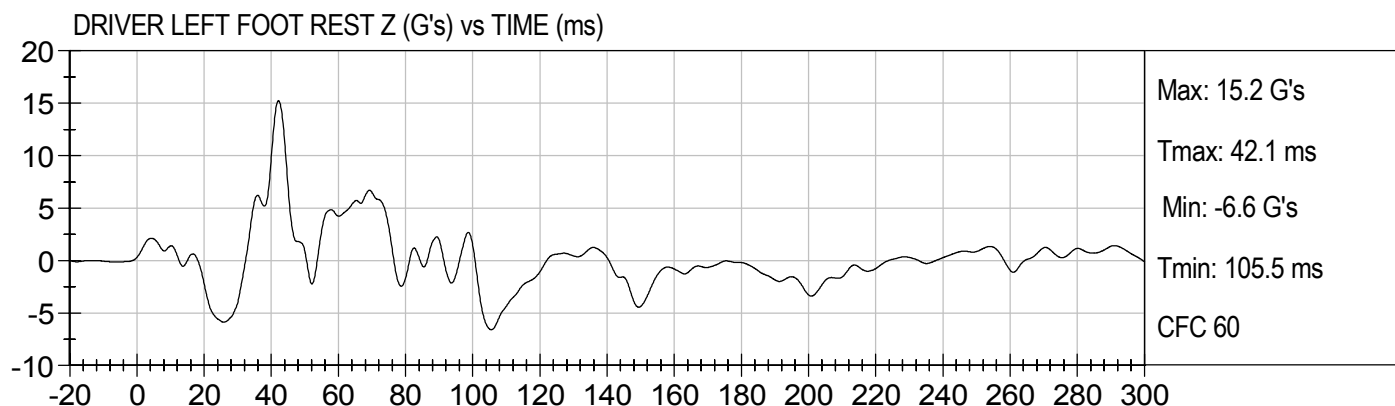
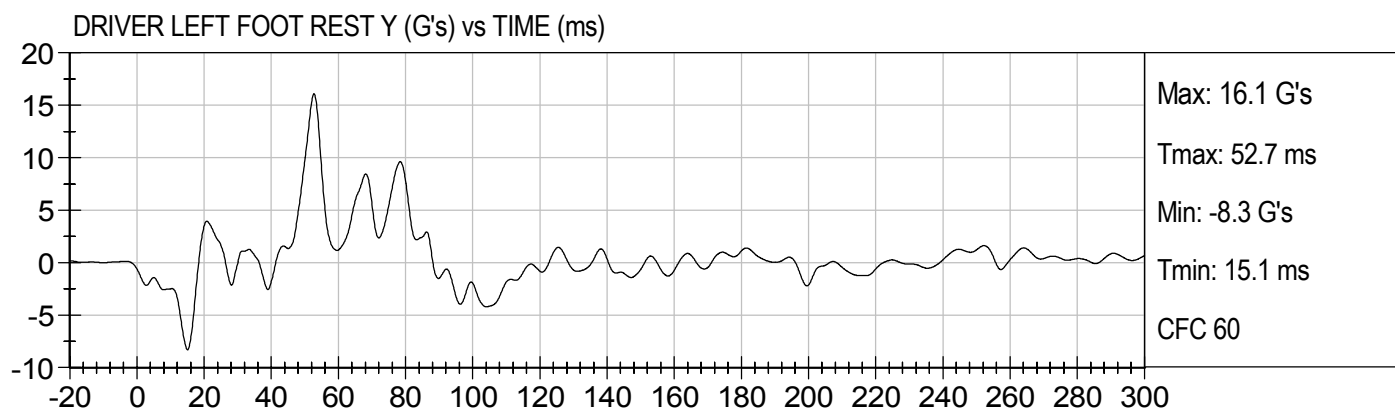
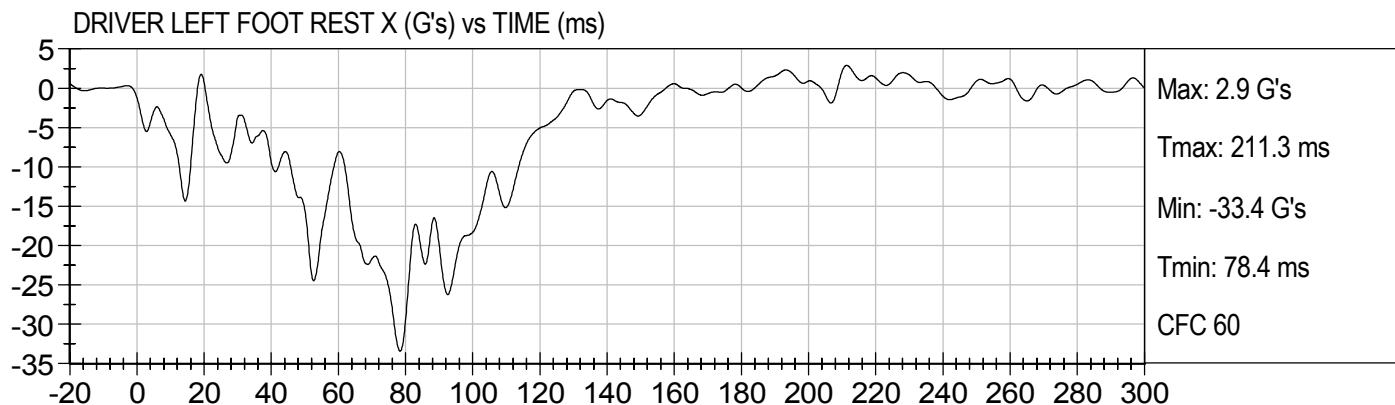


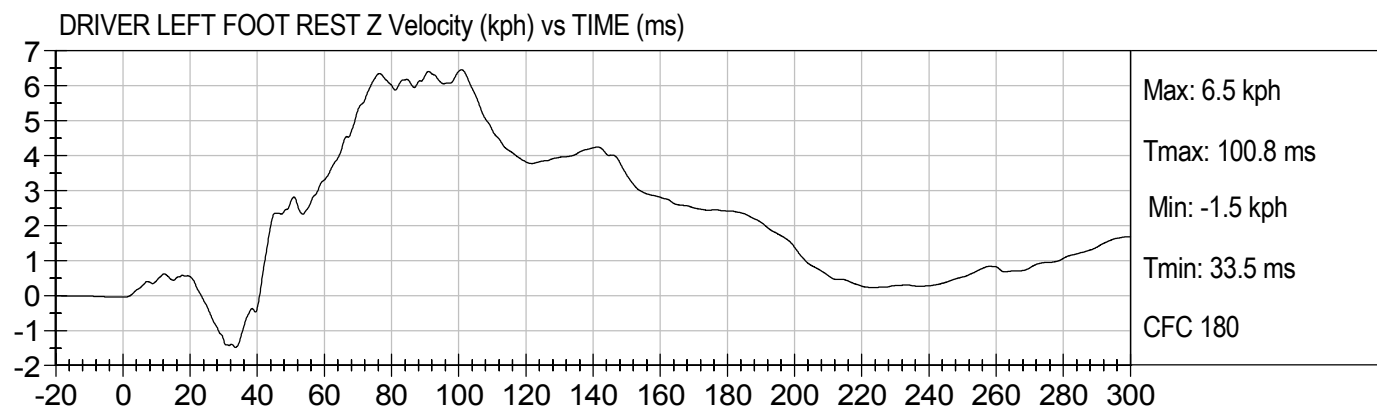
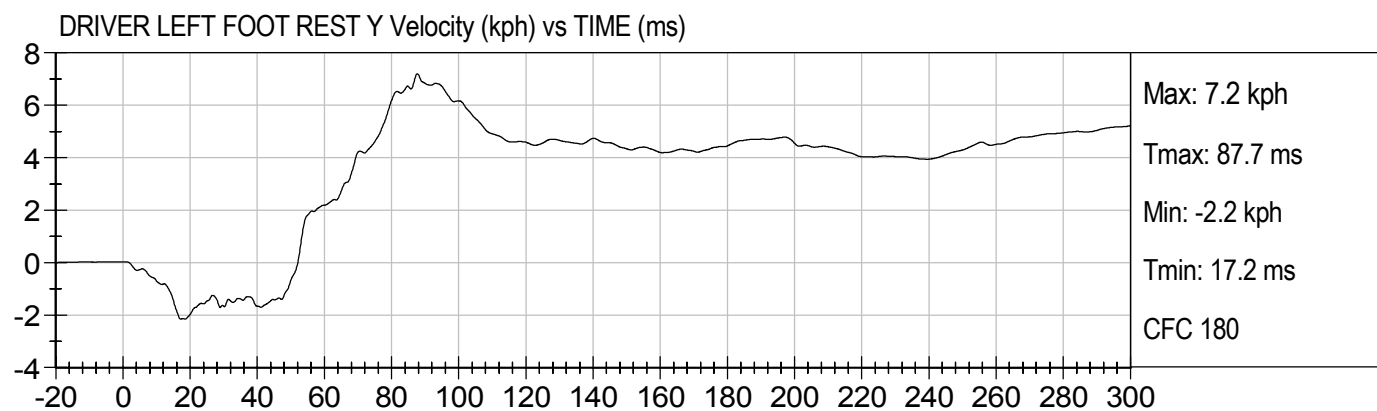
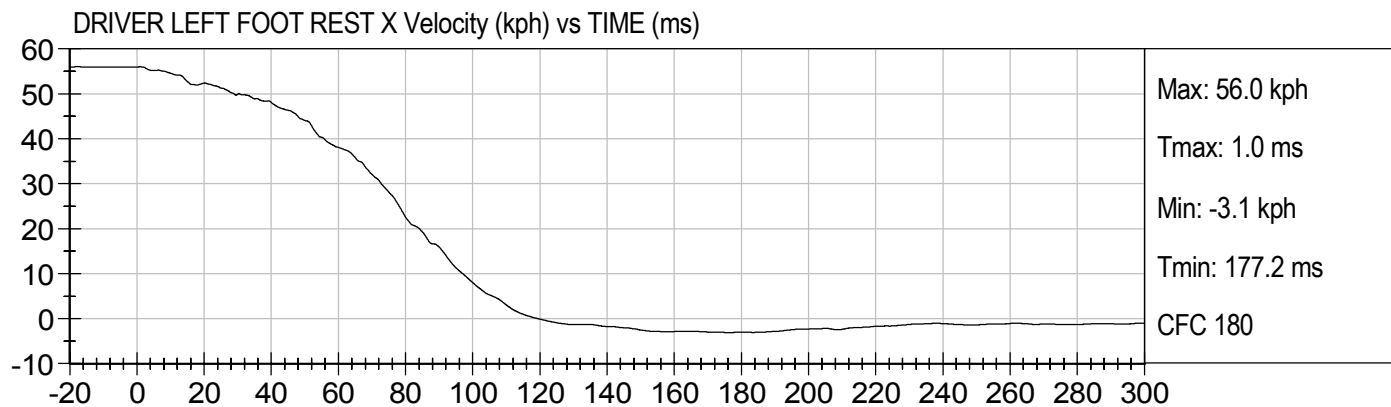




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)



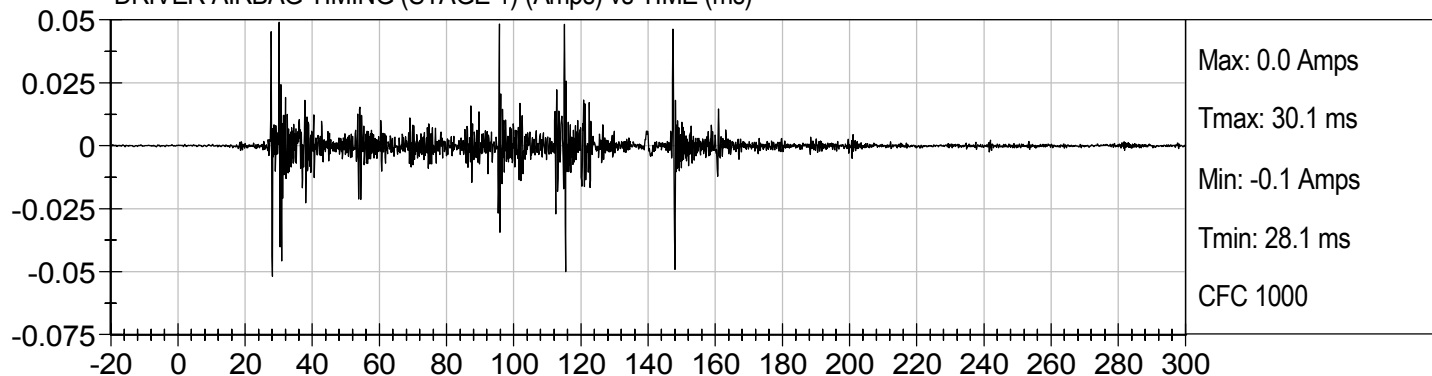




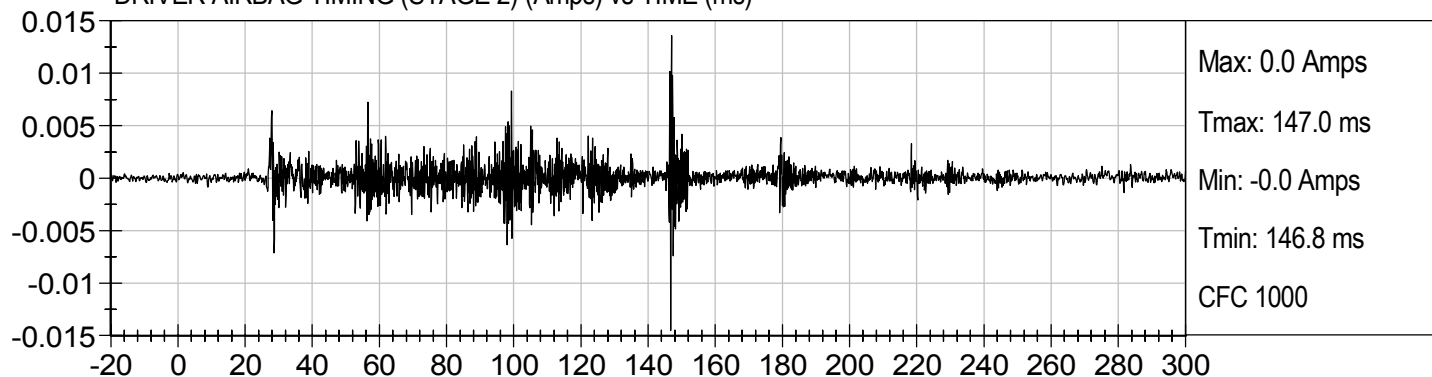
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

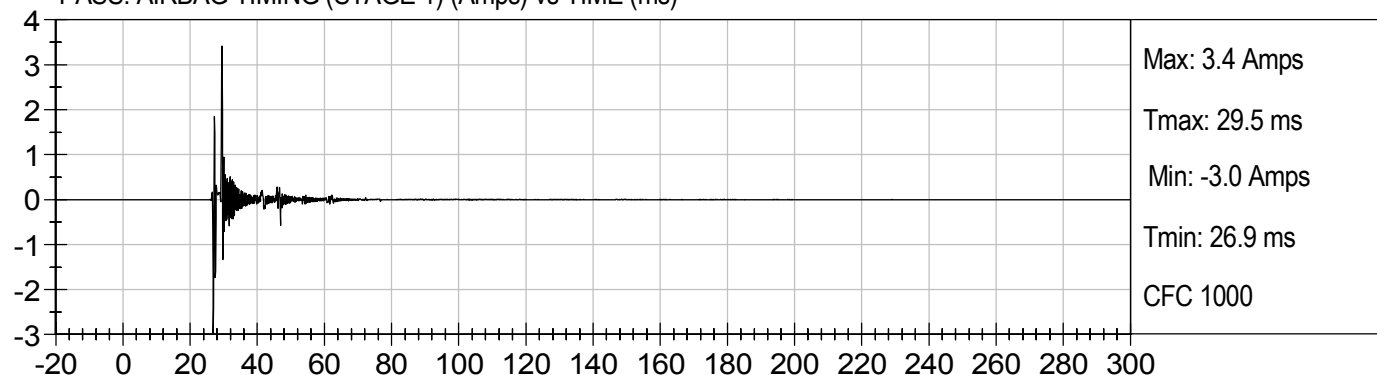
DRIVER AIRBAG TIMING (STAGE 1) (Amps) vs TIME (ms)



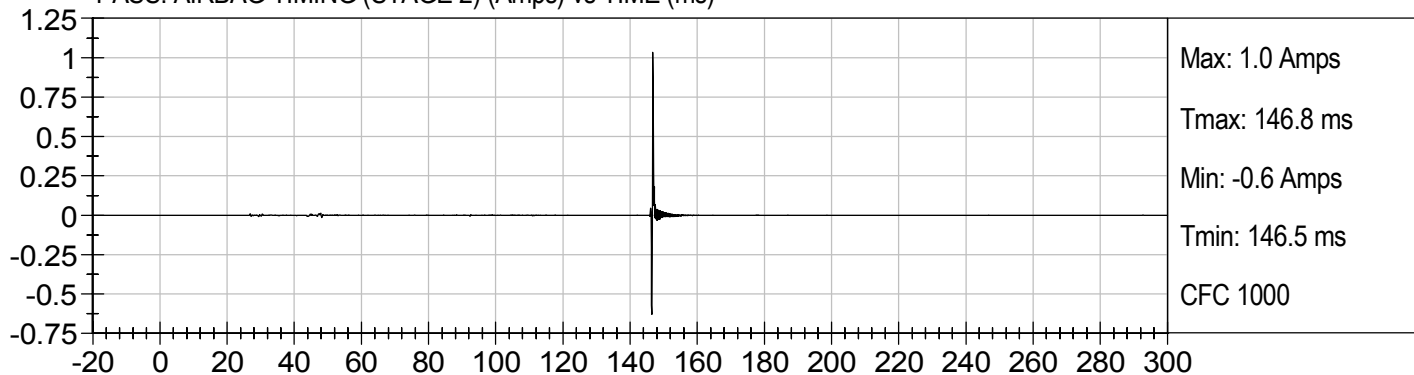
DRIVER AIRBAG TIMING (STAGE 2) (Amps) vs TIME (ms)

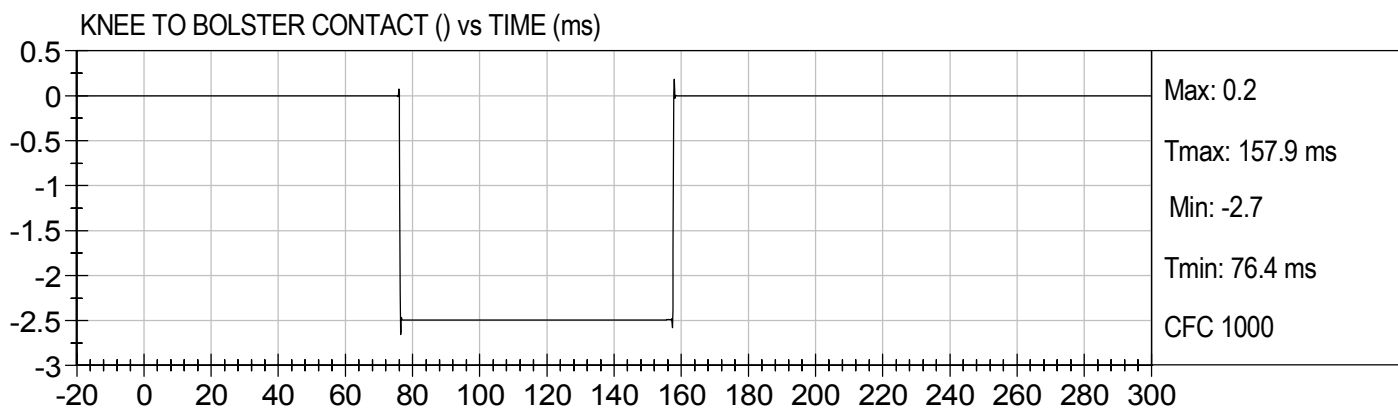
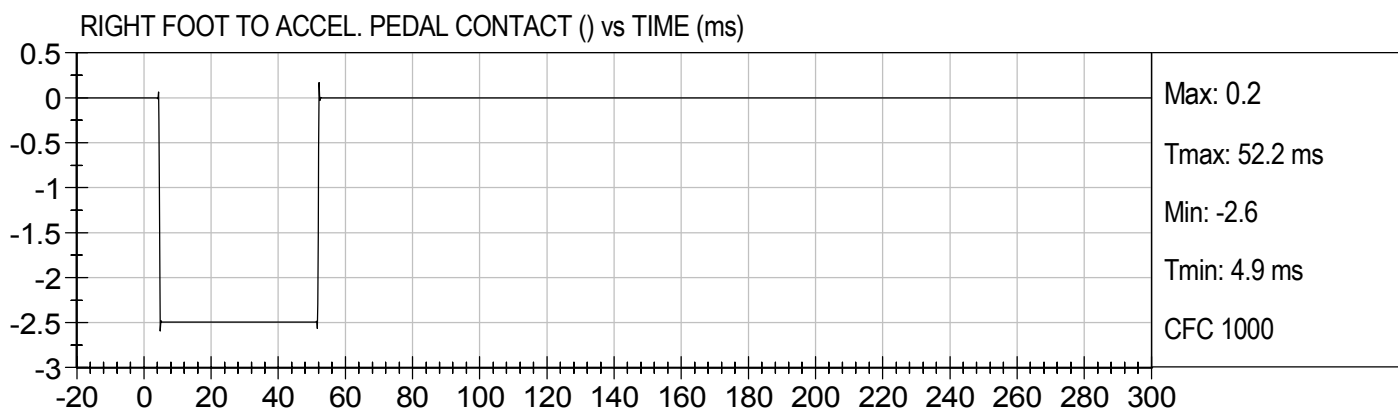
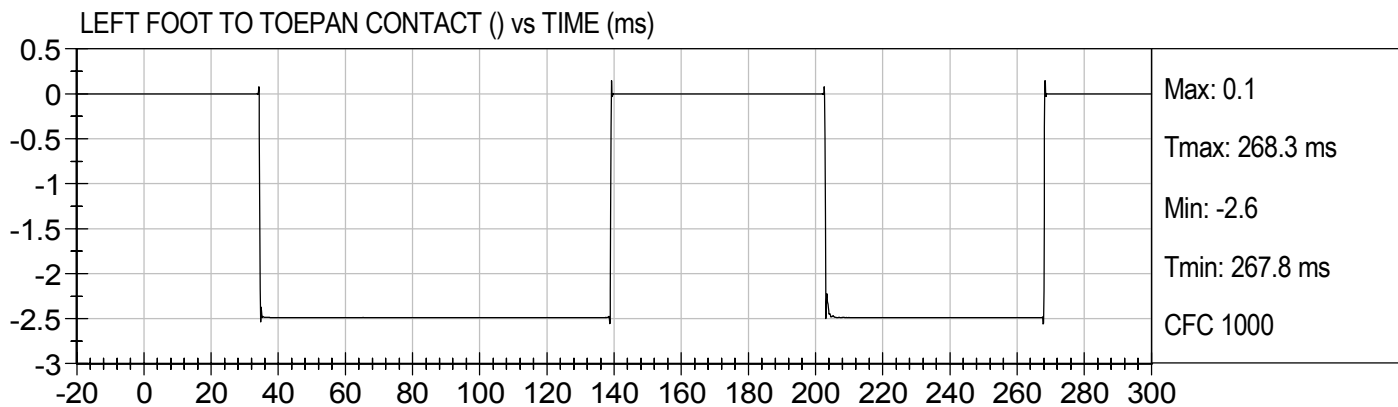


PASS. AIRBAG TIMING (STAGE 1) (Amps) vs TIME (ms)



PASS. AIRBAG TIMING (STAGE 2) (Amps) vs TIME (ms)



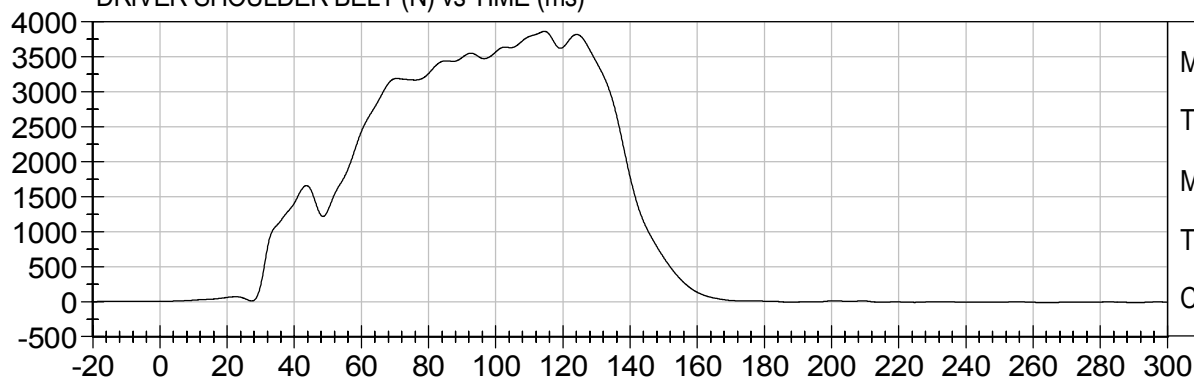




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

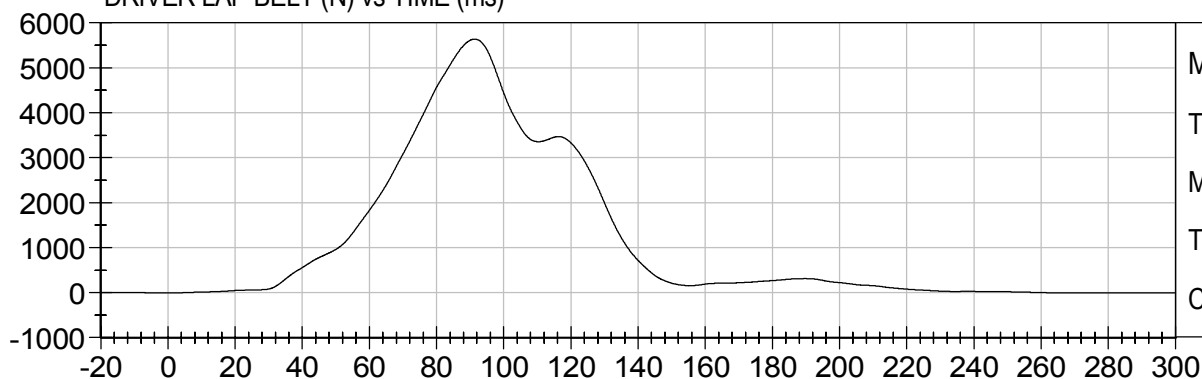
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

DRIVER SHOULDER BELT (N) vs TIME (ms)



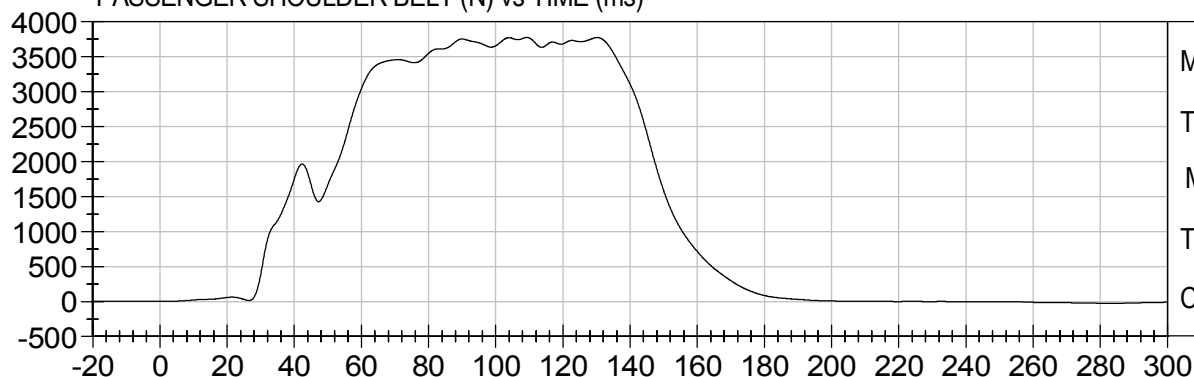
Max: 3864.0 N
Tmax: 114.5 ms
Min: -16.6 N
Tmin: 264.6 ms
CFC 60

DRIVER LAP BELT (N) vs TIME (ms)



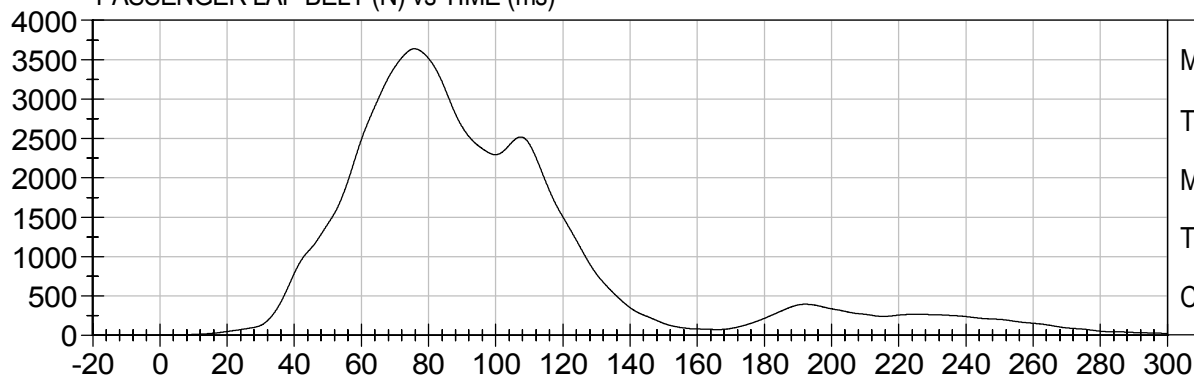
Max: 5637.9 N
Tmax: 91.3 ms
Min: -10.6 N
Tmin: 300.0 ms
CFC 60

PASSENGER SHOULDER BELT (N) vs TIME (ms)



Max: 3775.7 N
Tmax: 109.3 ms
Min: -26.4 N
Tmin: 280.7 ms
CFC 60

PASSENGER LAP BELT (N) vs TIME (ms)

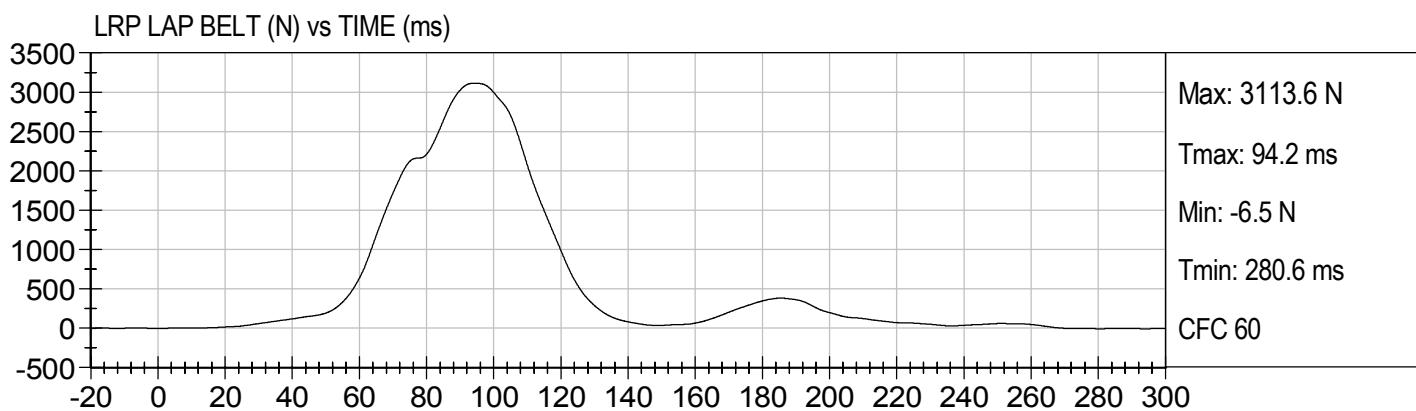
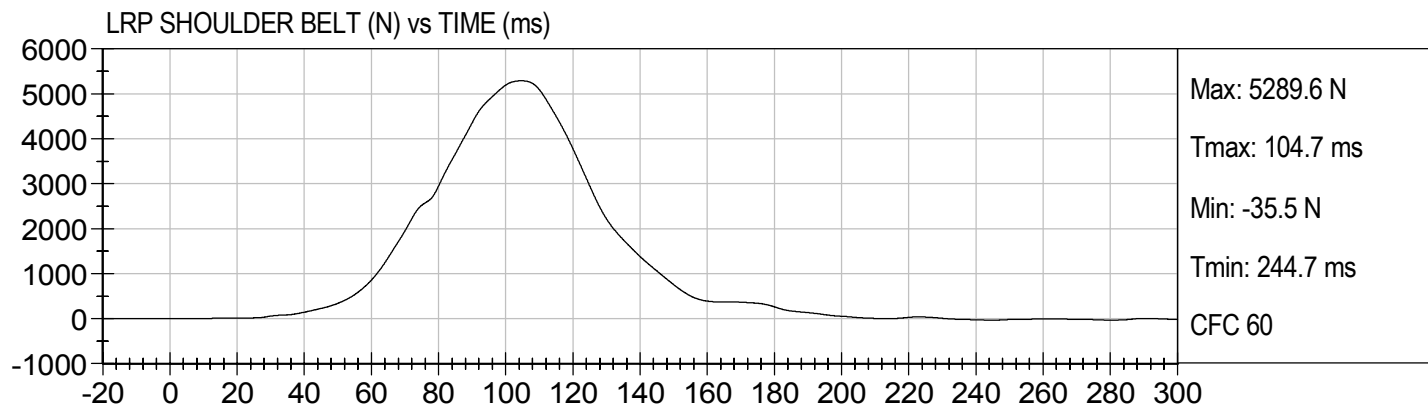


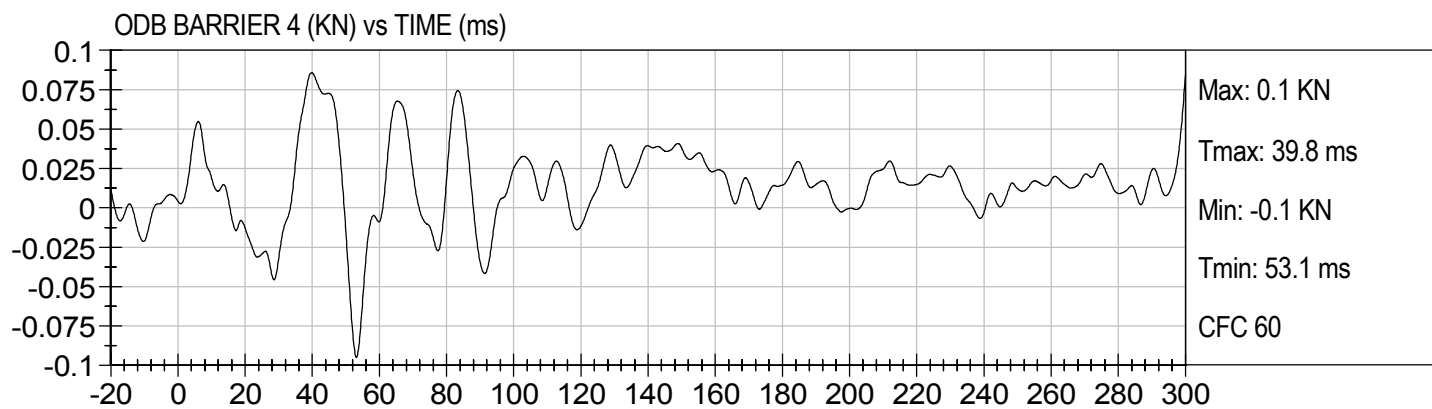
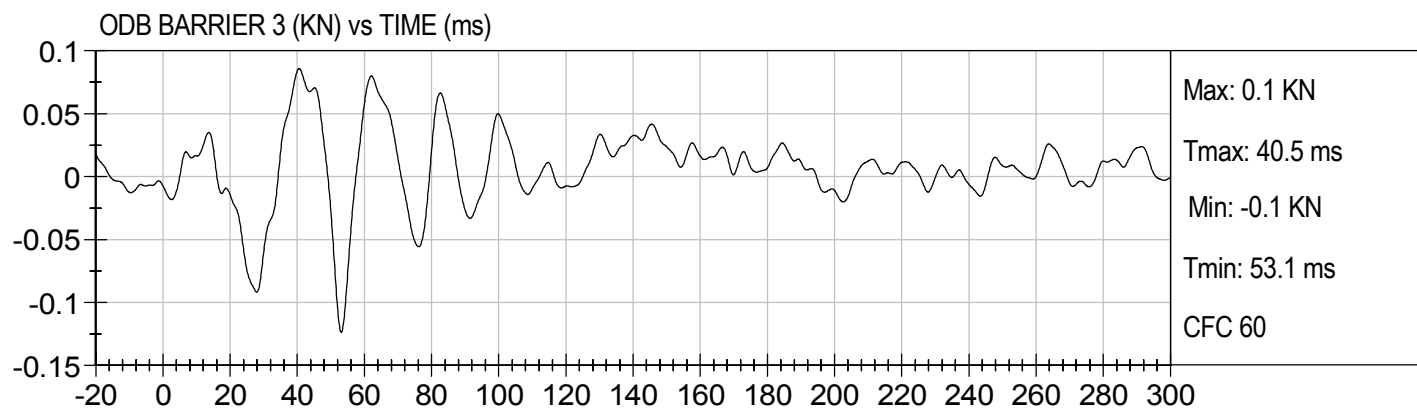
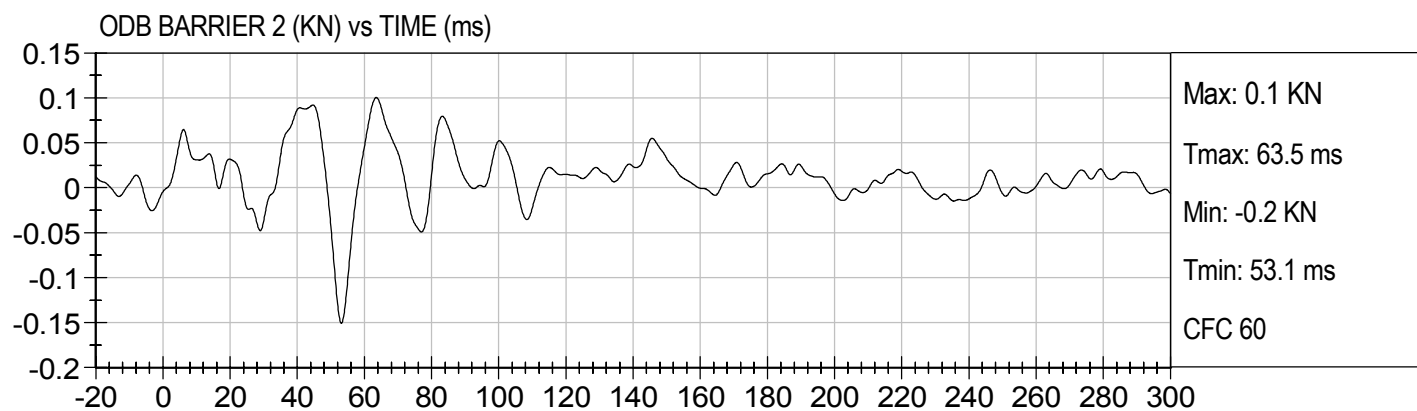
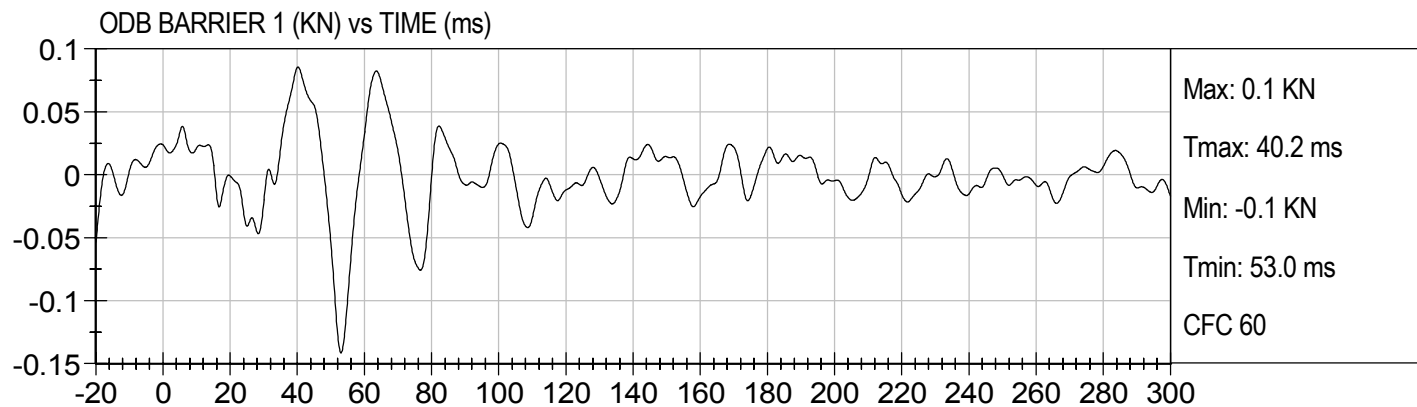
Max: 3639.1 N
Tmax: 75.8 ms
Min: 0.2 N
Tmin: 3.6 ms
CFC 60



NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

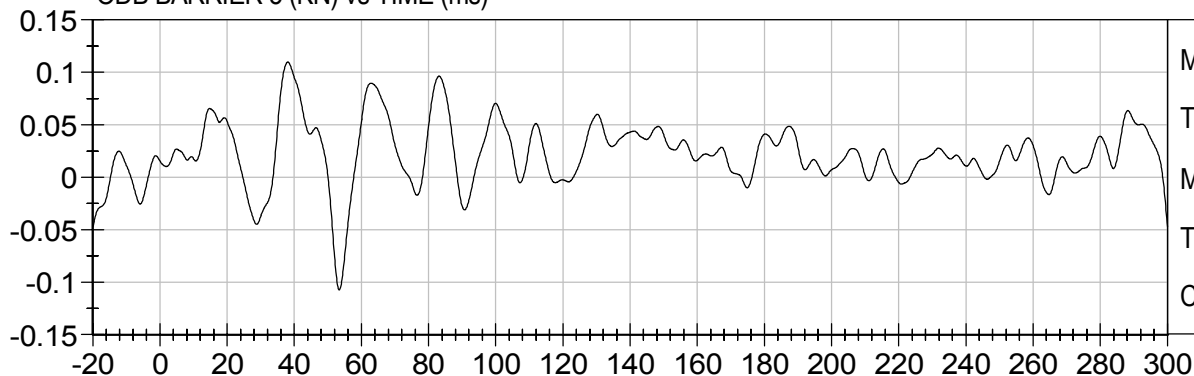
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)





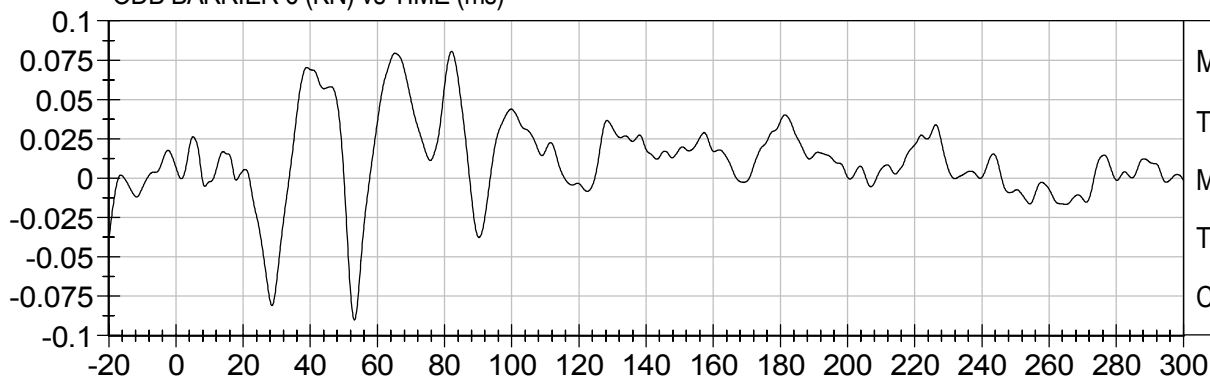


ODB BARRIER 5 (KN) vs TIME (ms)



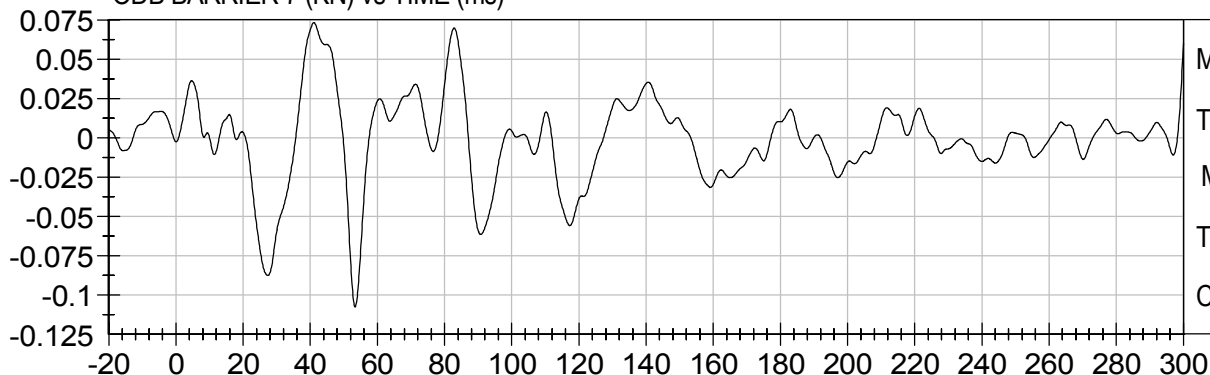
Max: 0.1 KN
Tmax: 38.1 ms
Min: -0.1 KN
Tmin: 53.4 ms
CFC 60

ODB BARRIER 6 (KN) vs TIME (ms)



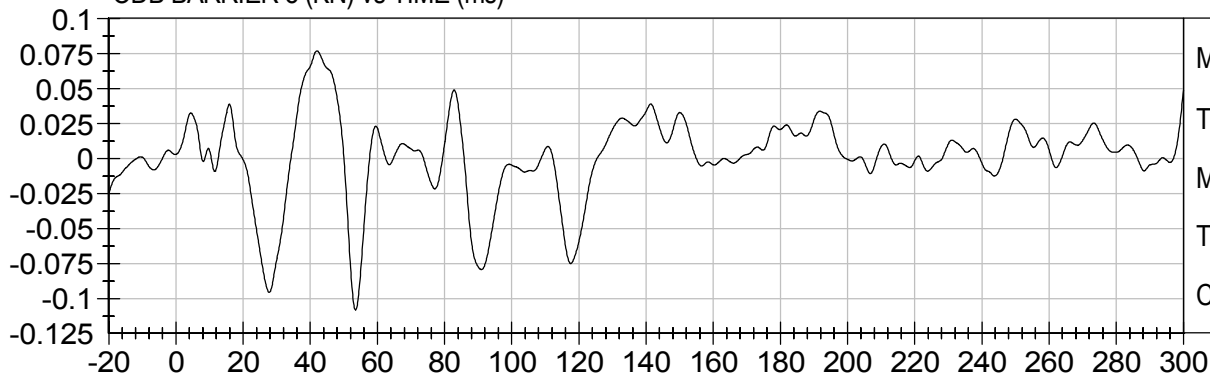
Max: 0.1 KN
Tmax: 82.1 ms
Min: -0.1 KN
Tmin: 53.1 ms
CFC 60

ODB BARRIER 7 (KN) vs TIME (ms)



Max: 0.1 KN
Tmax: 41.1 ms
Min: -0.1 KN
Tmin: 53.3 ms
CFC 60

ODB BARRIER 8 (KN) vs TIME (ms)

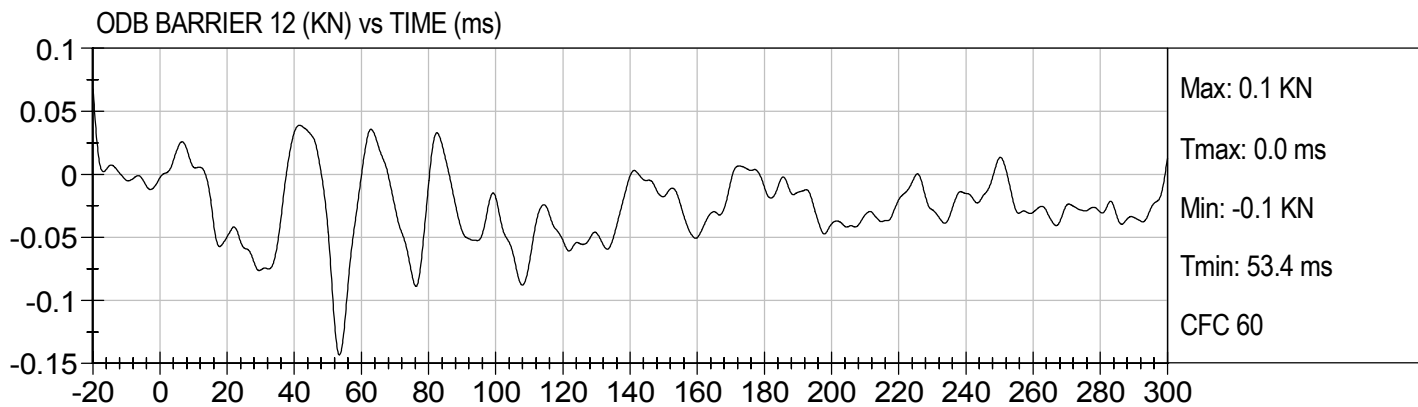
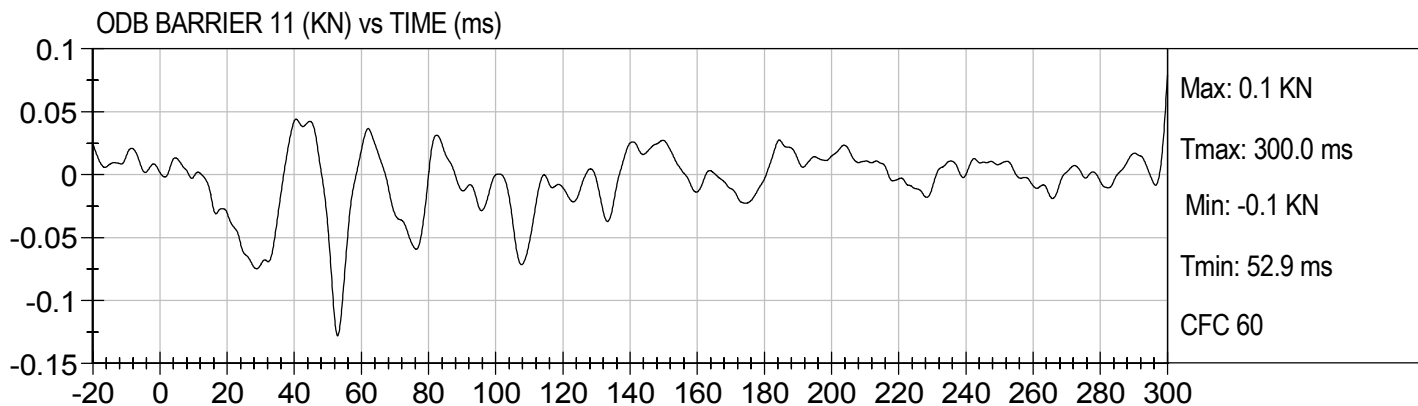
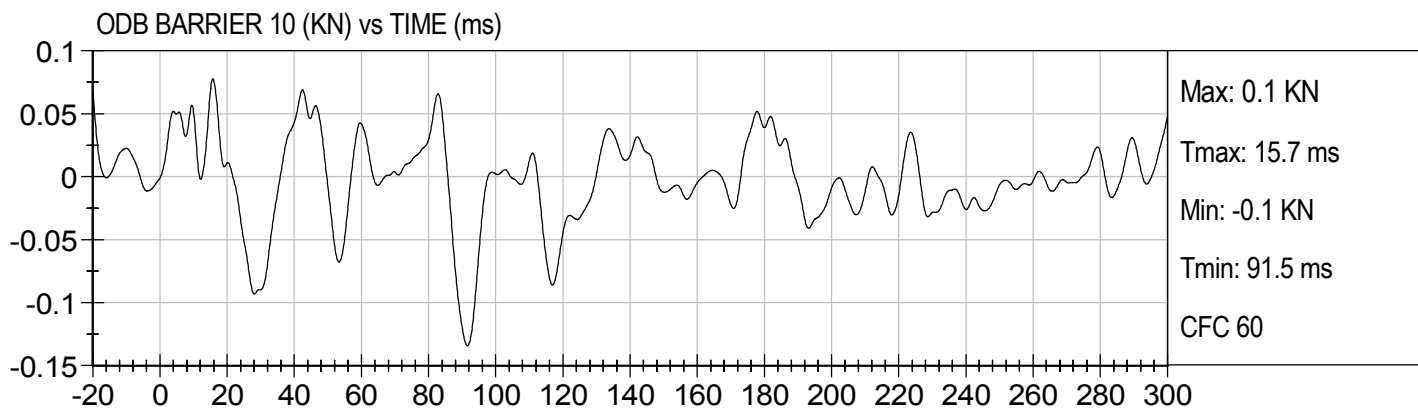
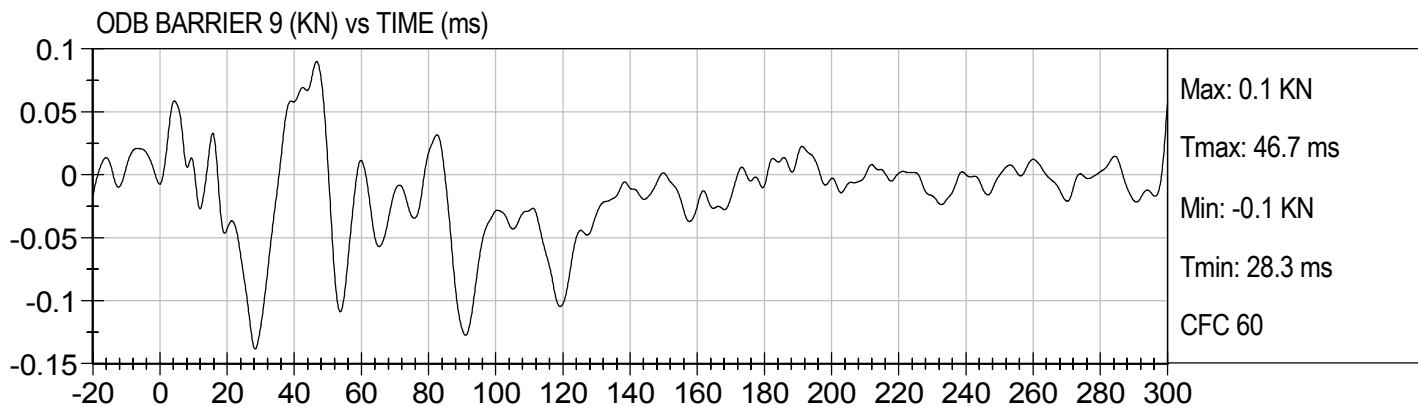


Max: 0.1 KN
Tmax: 42.0 ms
Min: -0.1 KN
Tmin: 53.5 ms
CFC 60



NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

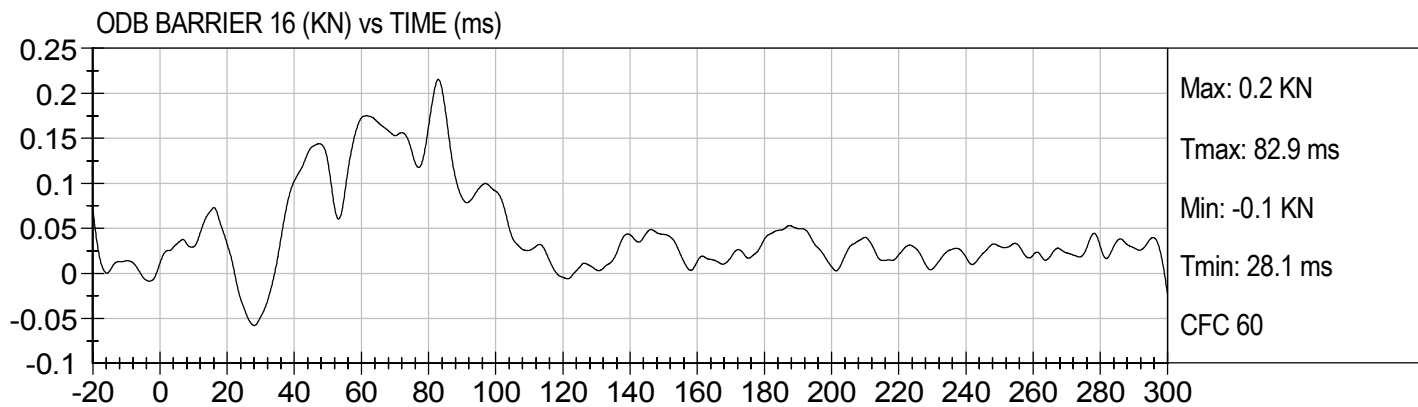
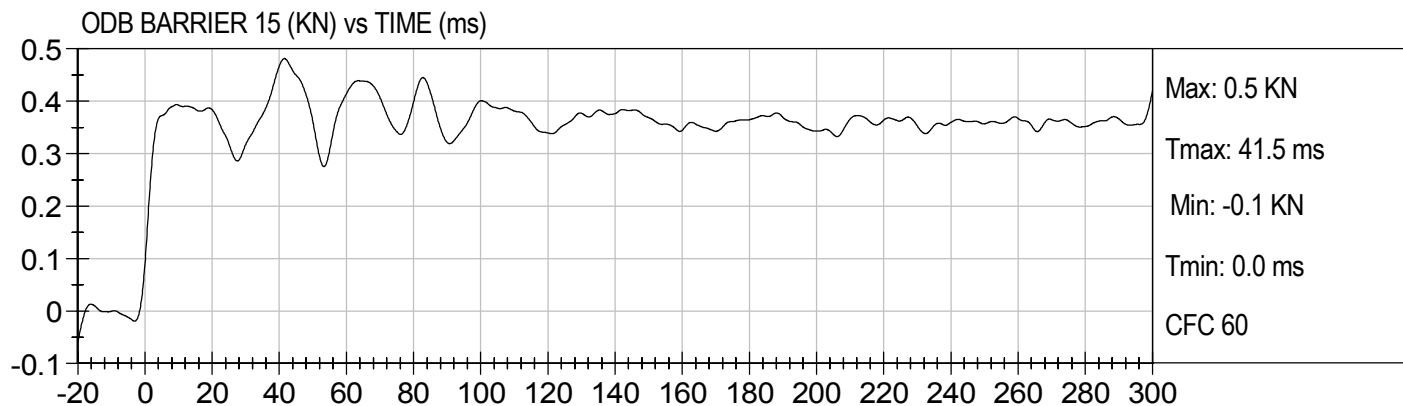
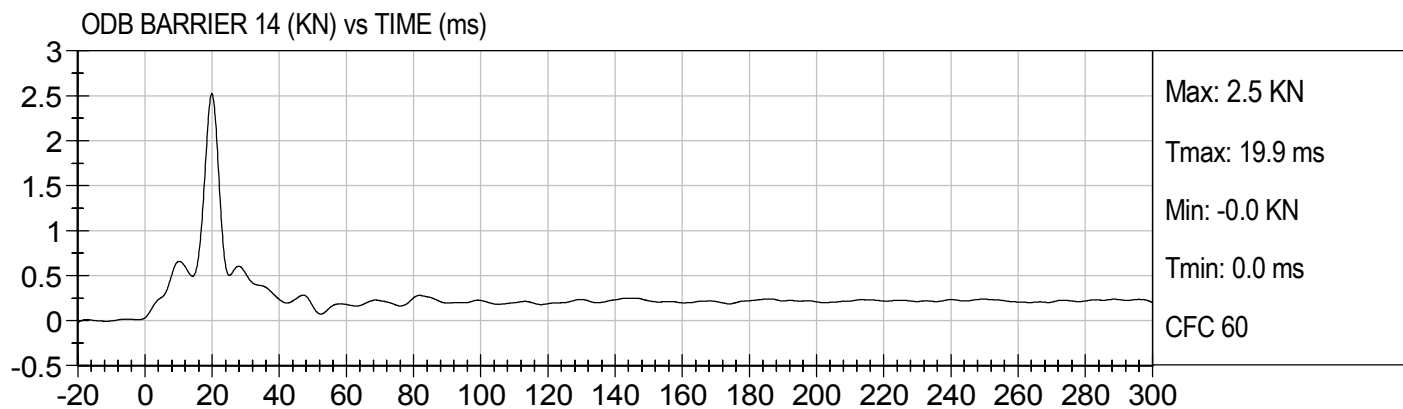
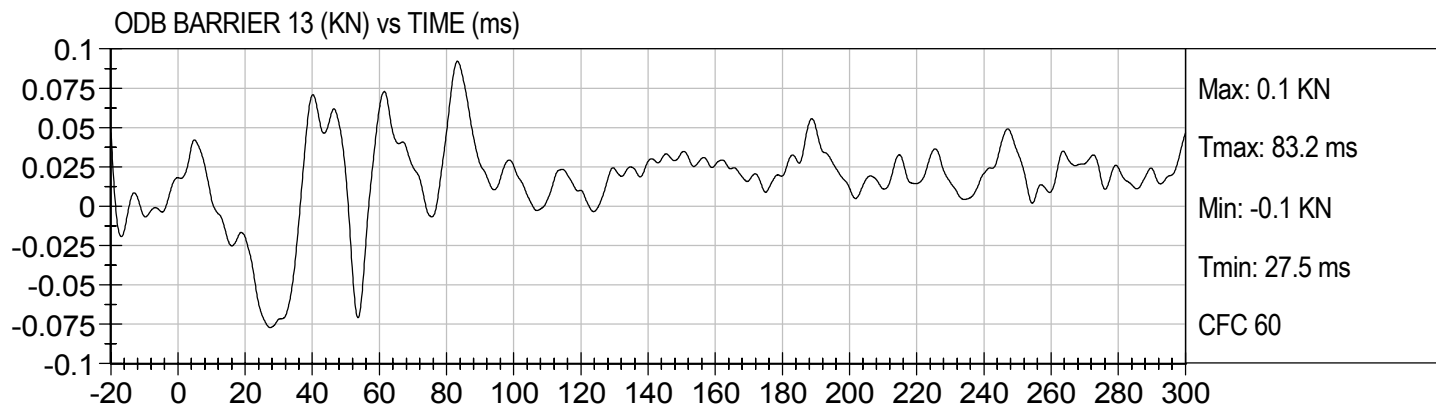
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

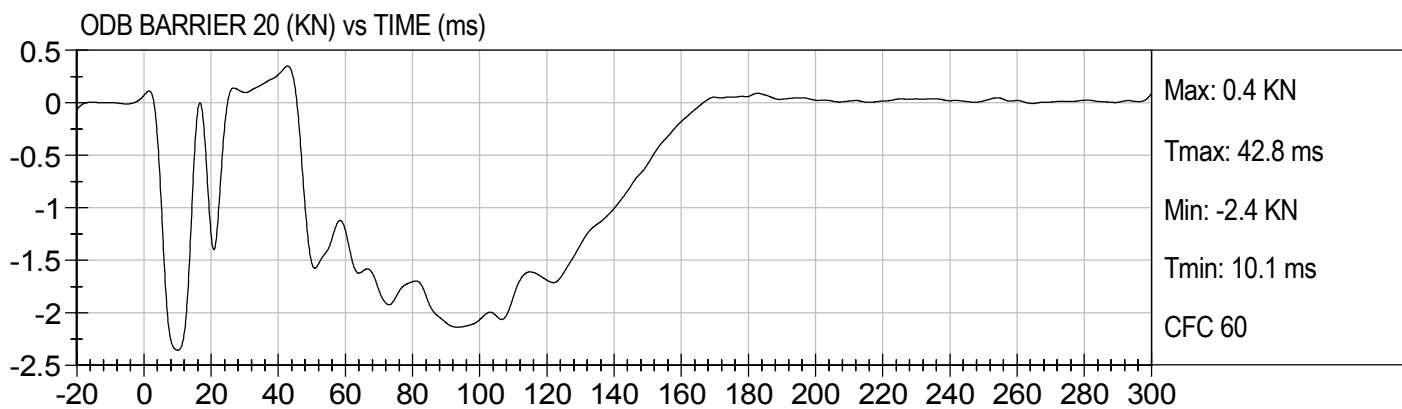
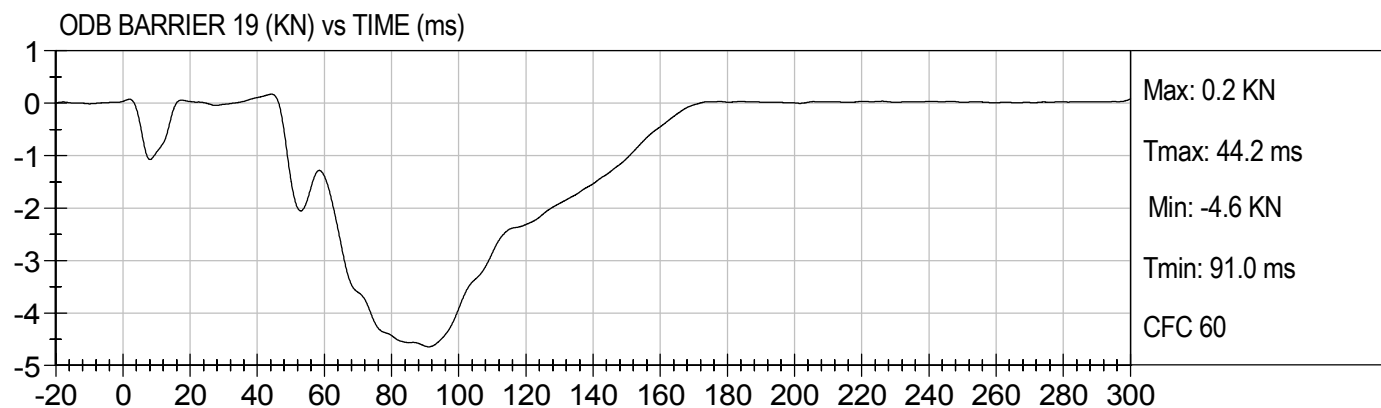
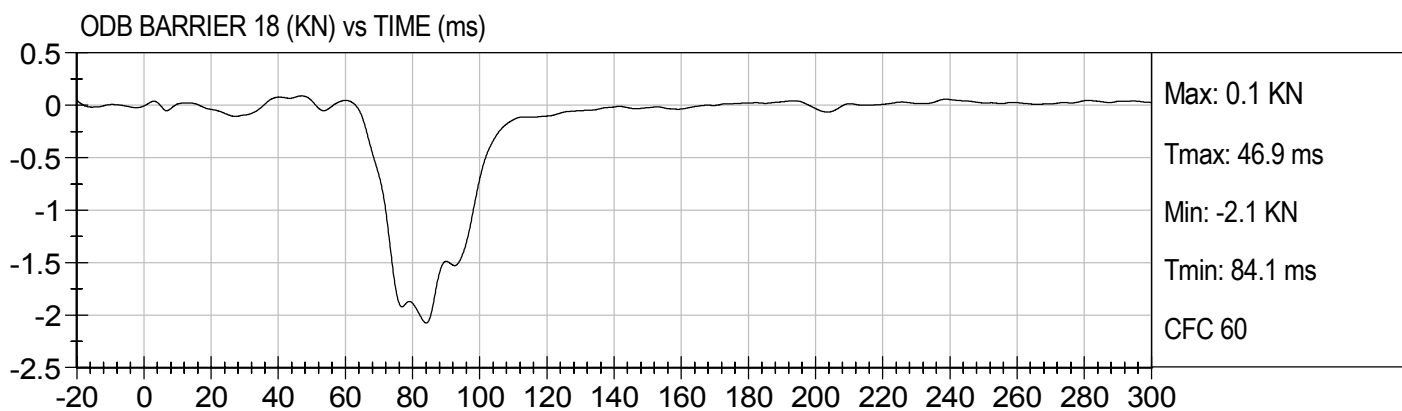
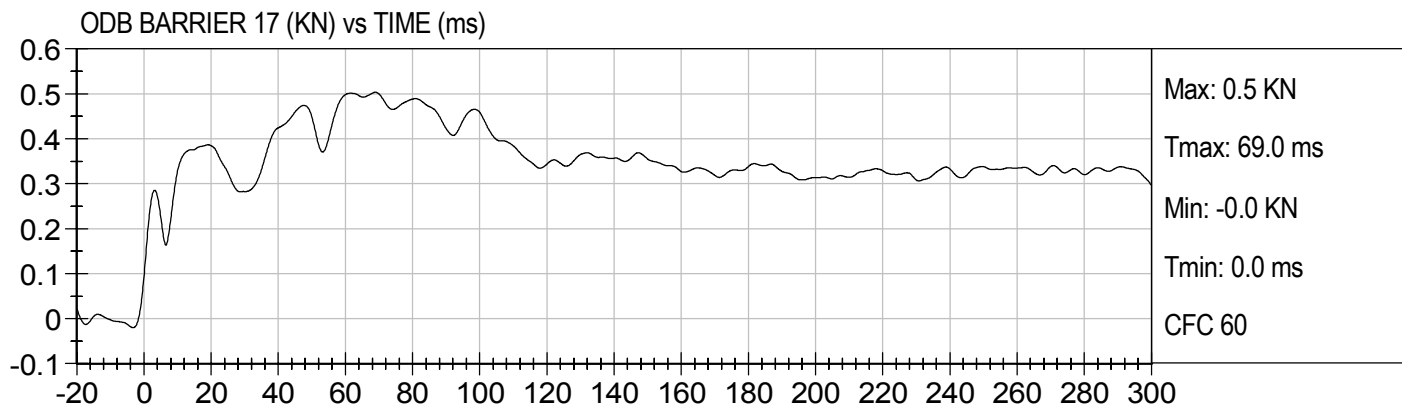




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

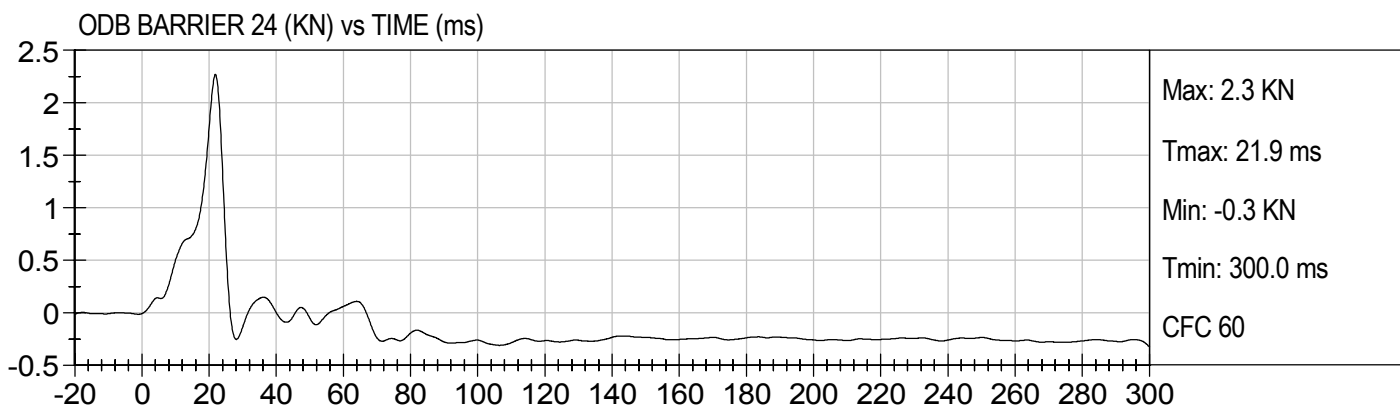
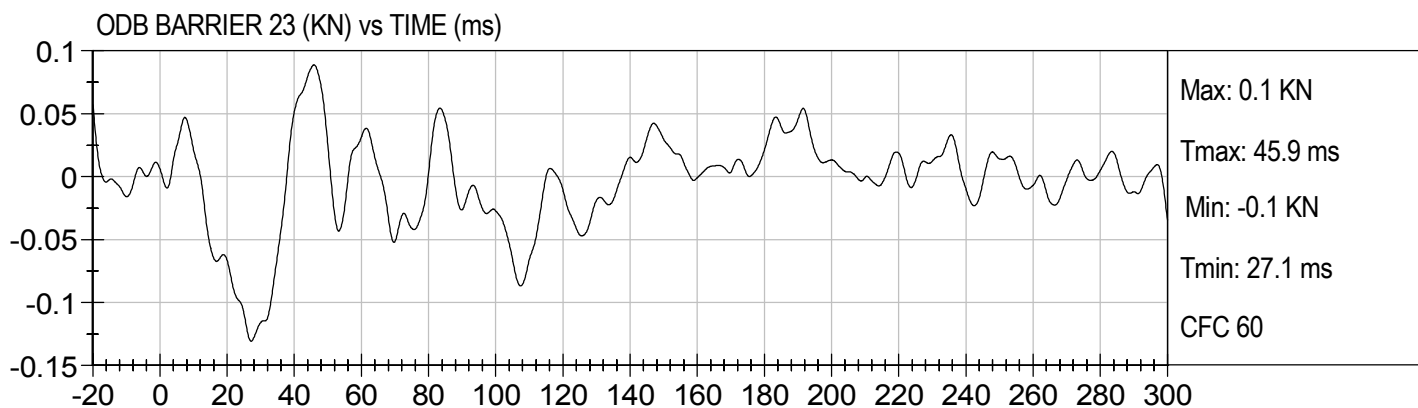
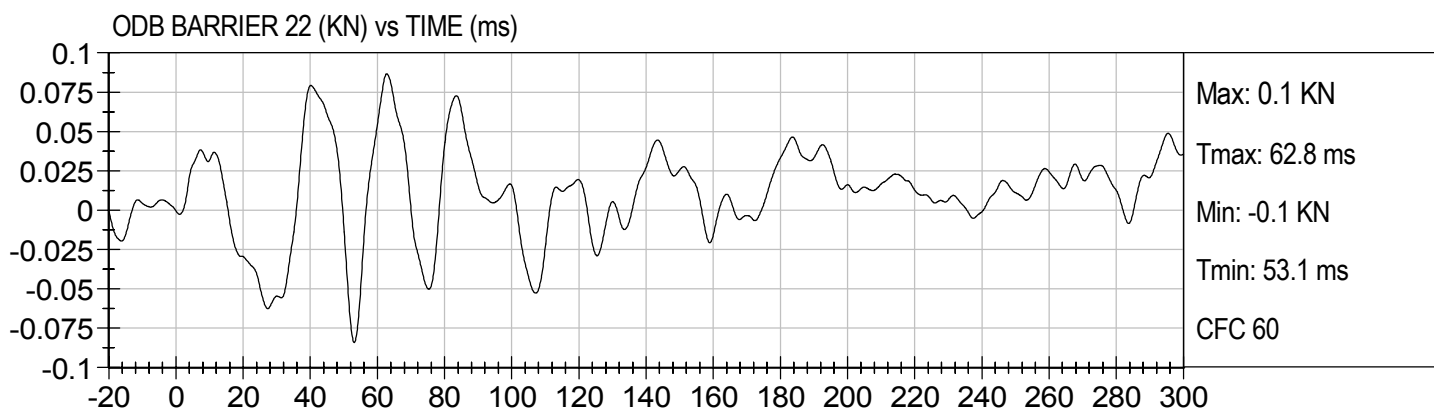
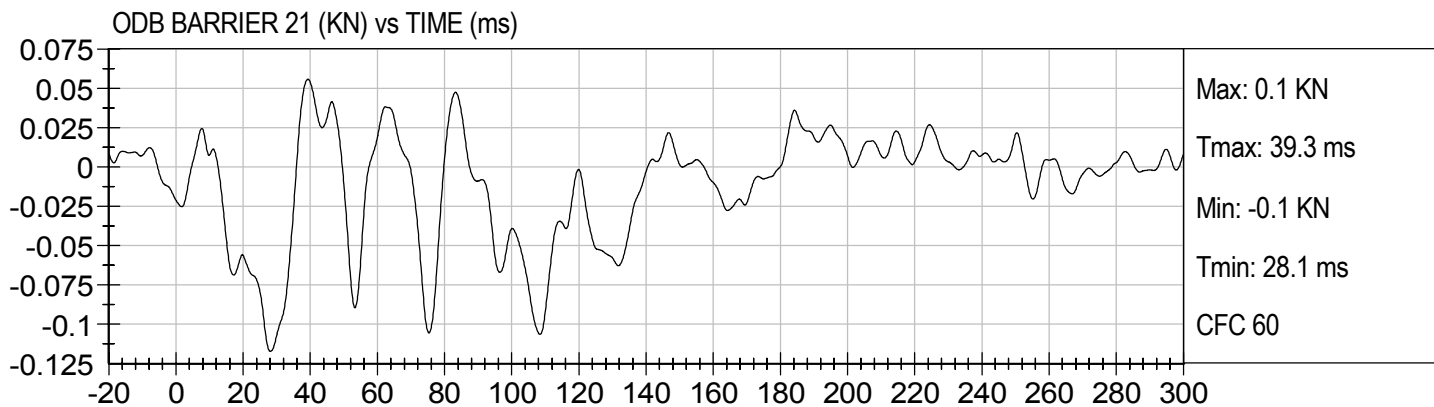


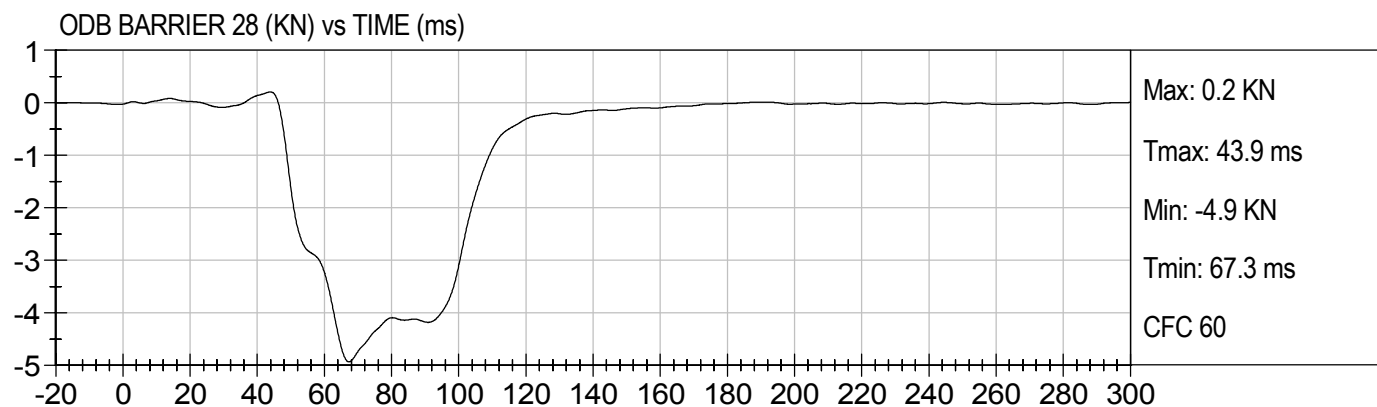
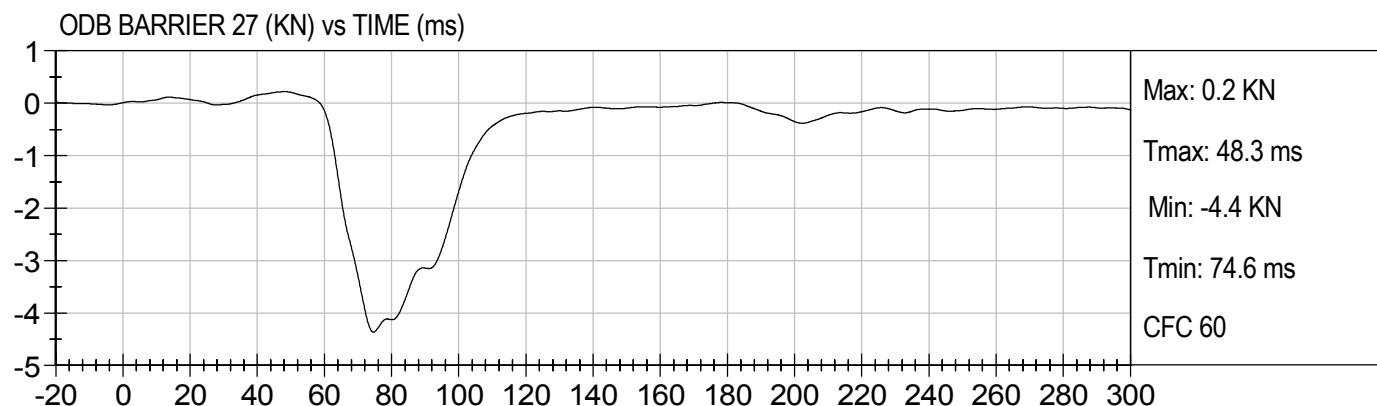
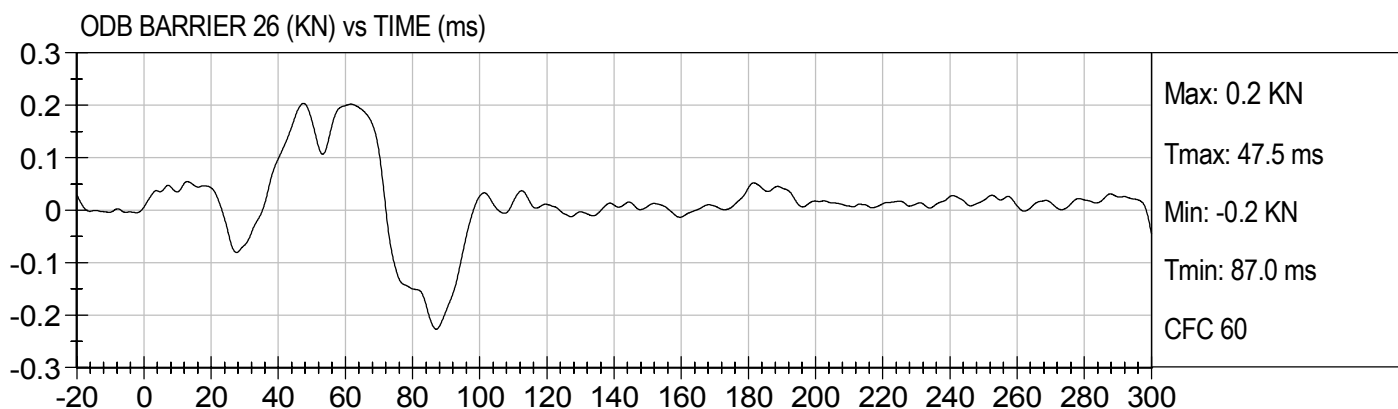
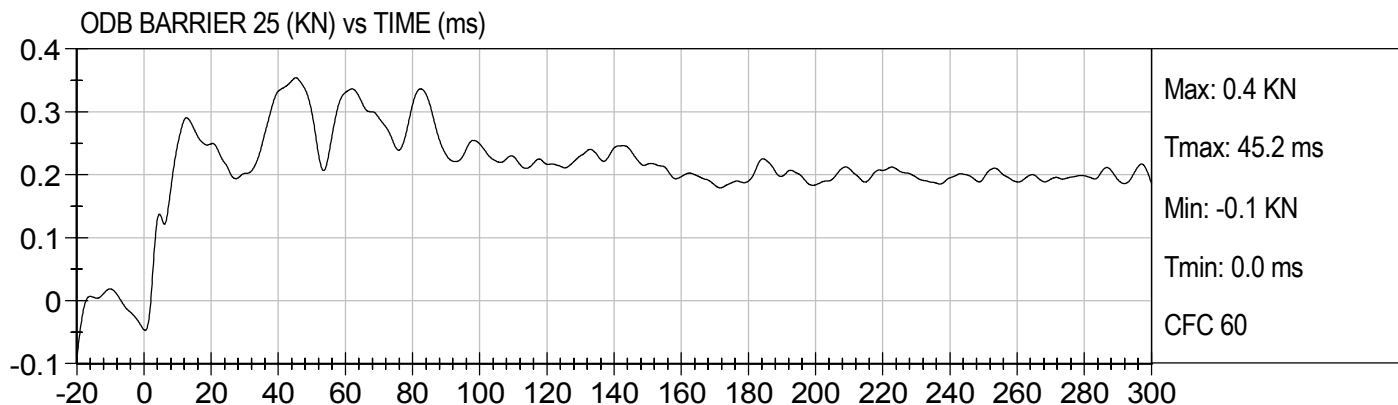




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

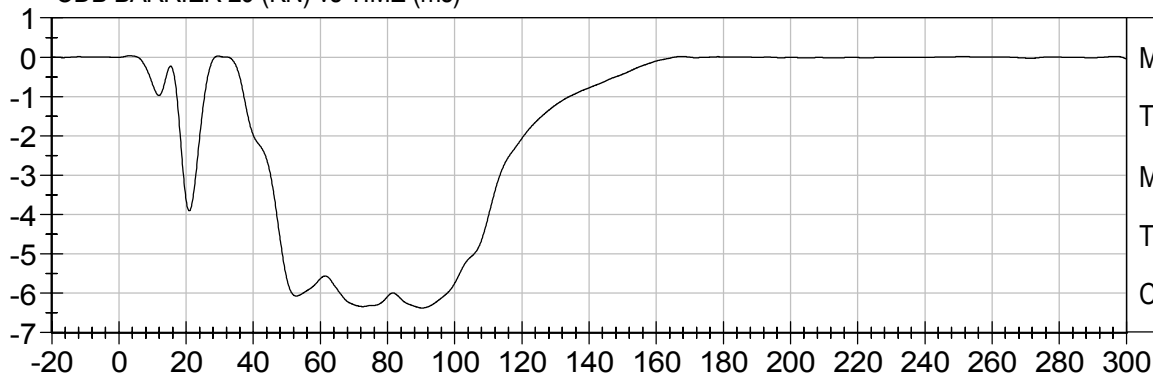
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)



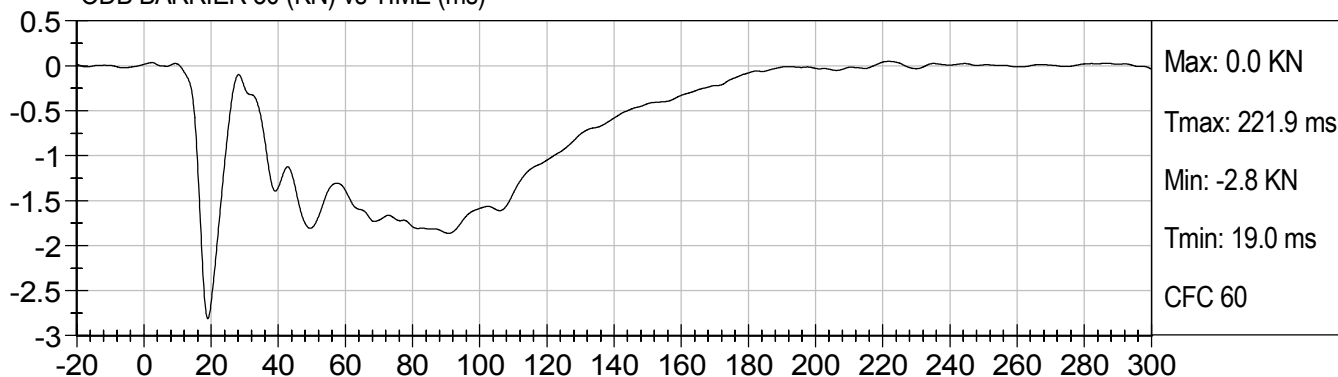




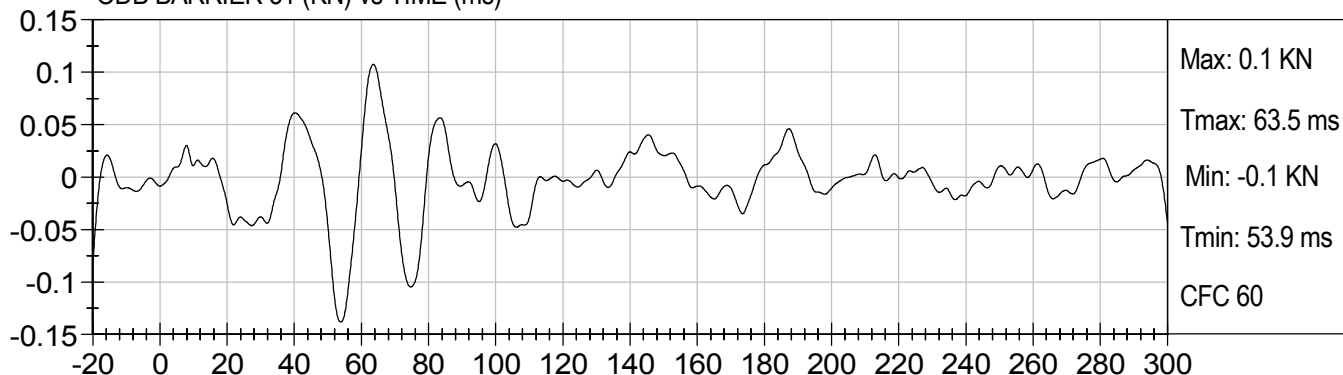
ODB BARRIER 29 (KN) vs TIME (ms)



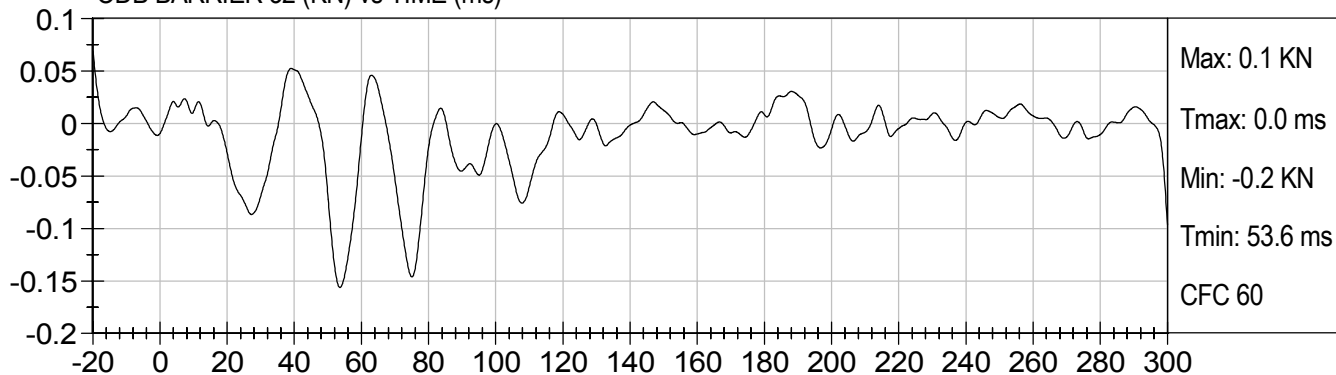
ODB BARRIER 30 (KN) vs TIME (ms)



ODB BARRIER 31 (KN) vs TIME (ms)



ODB BARRIER 32 (KN) vs TIME (ms)

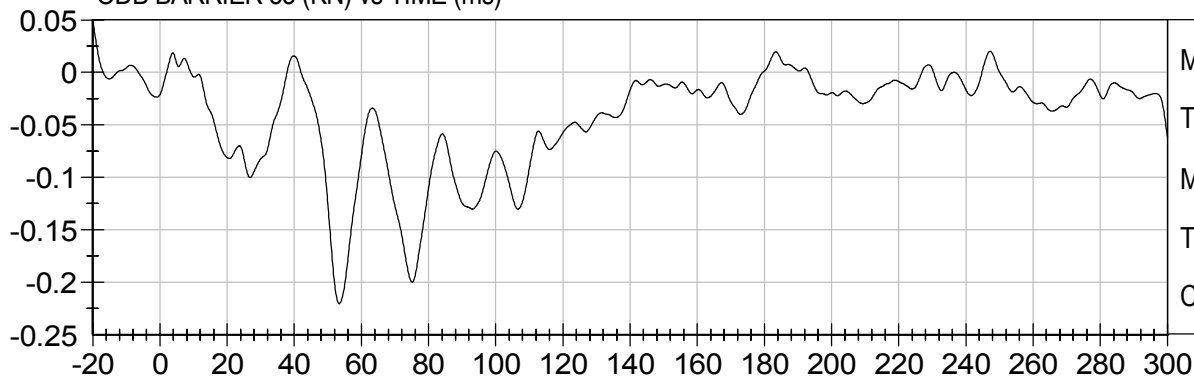




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

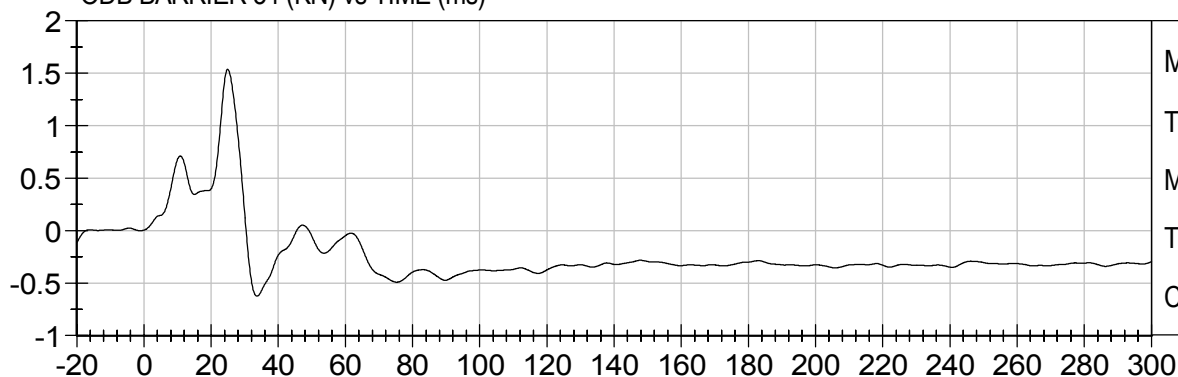
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

ODB BARRIER 33 (KN) vs TIME (ms)



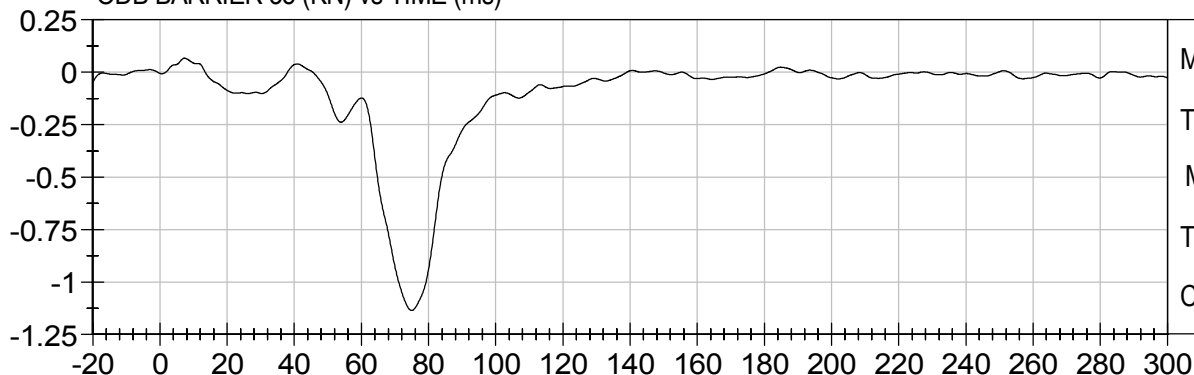
Max: 0.0 KN
Tmax: 0.0 ms
Min: -0.2 KN
Tmin: 53.4 ms
CFC 60

ODB BARRIER 34 (KN) vs TIME (ms)



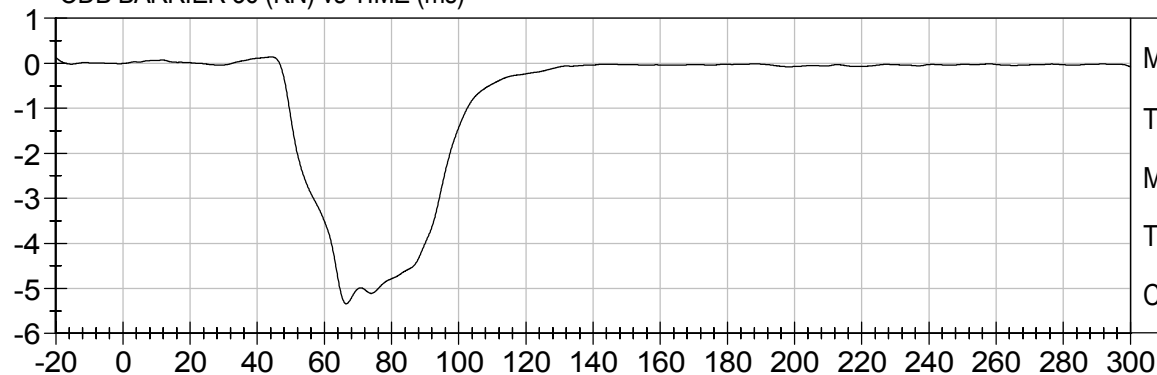
Max: 1.5 KN
Tmax: 24.9 ms
Min: -0.6 KN
Tmin: 33.7 ms
CFC 60

ODB BARRIER 35 (KN) vs TIME (ms)

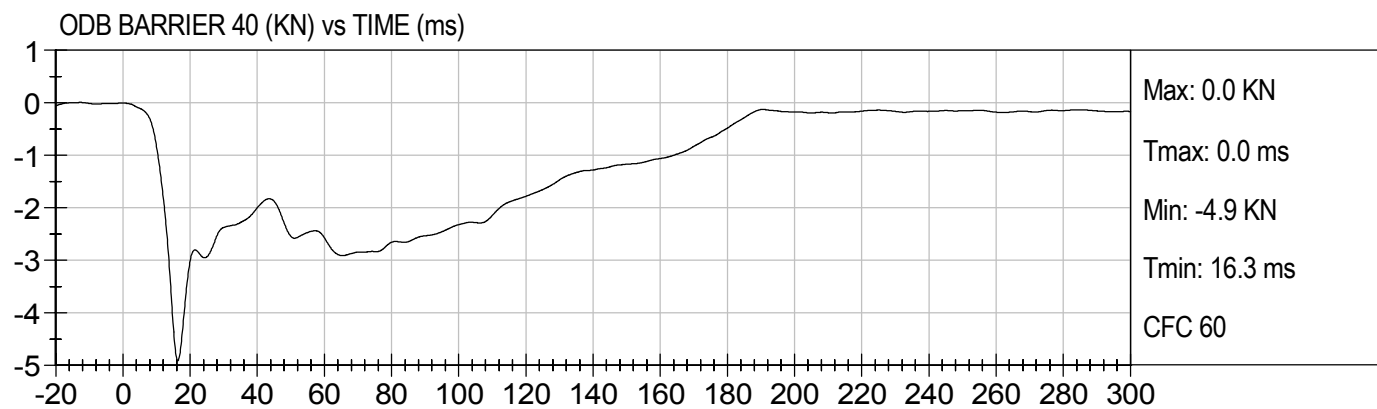
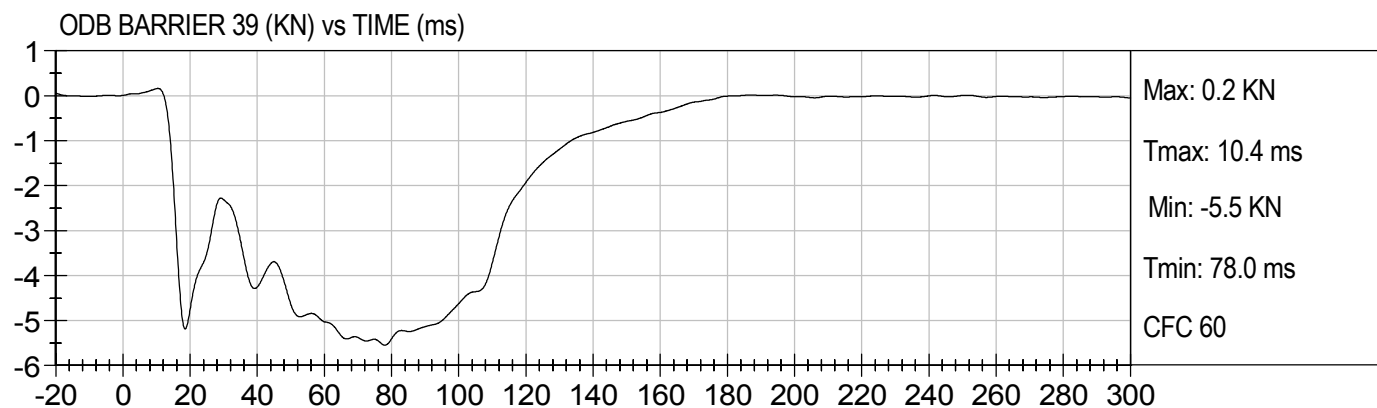
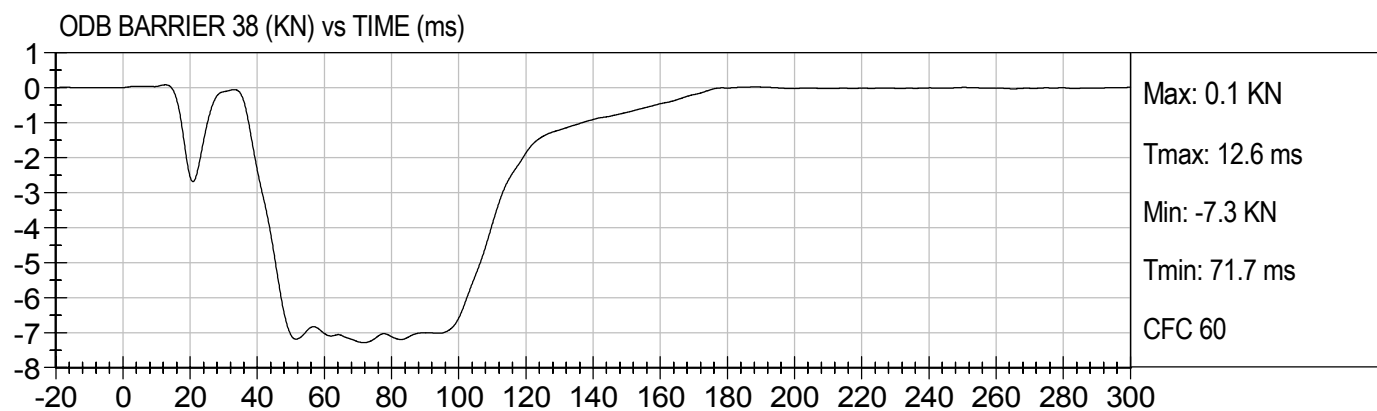
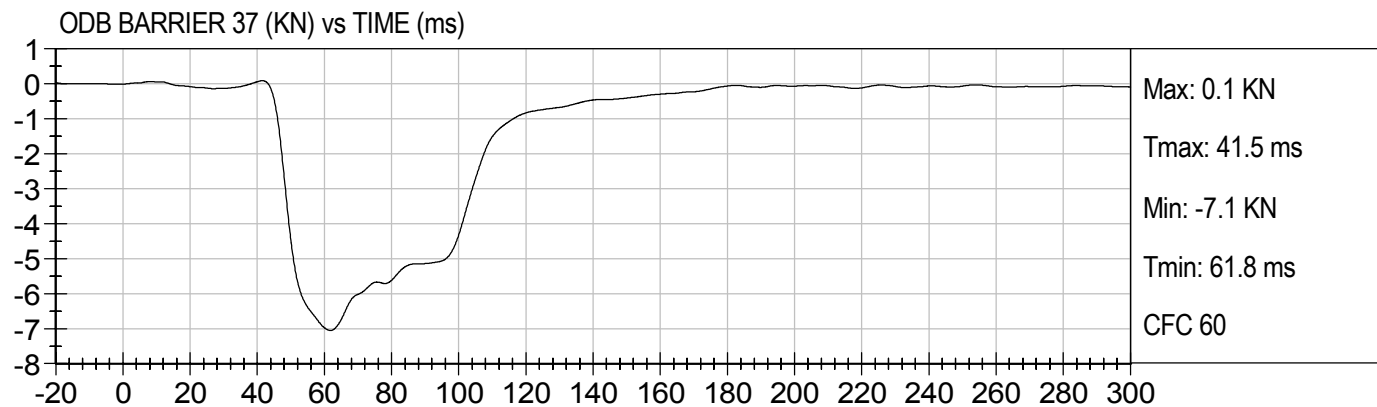


Max: 0.1 KN
Tmax: 7.3 ms
Min: -1.1 KN
Tmin: 75.0 ms
CFC 60

ODB BARRIER 36 (KN) vs TIME (ms)



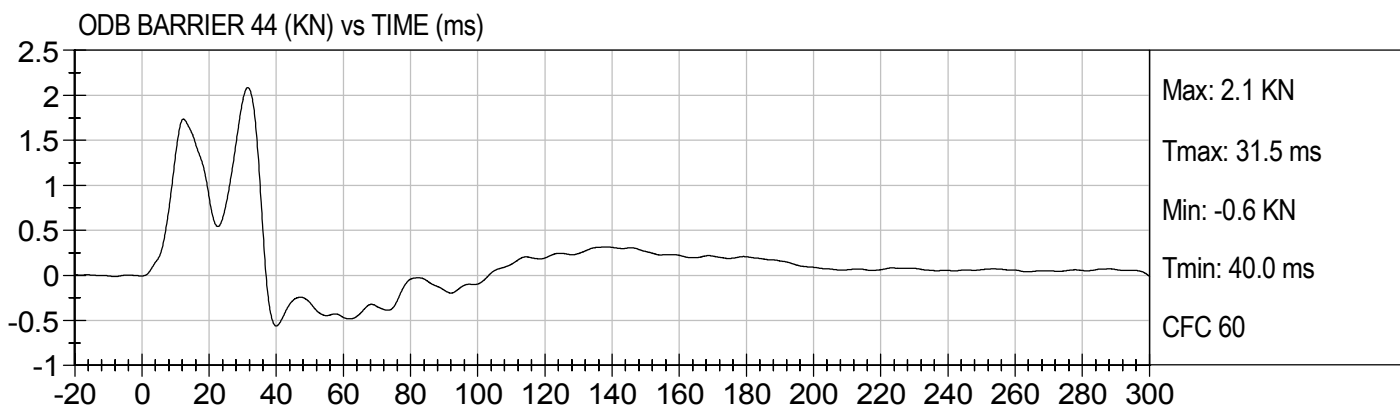
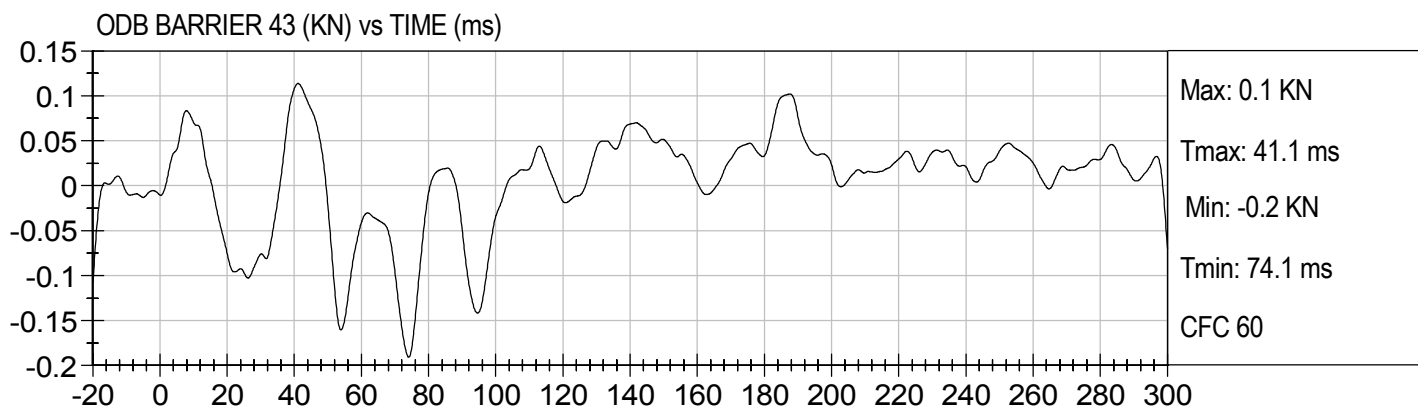
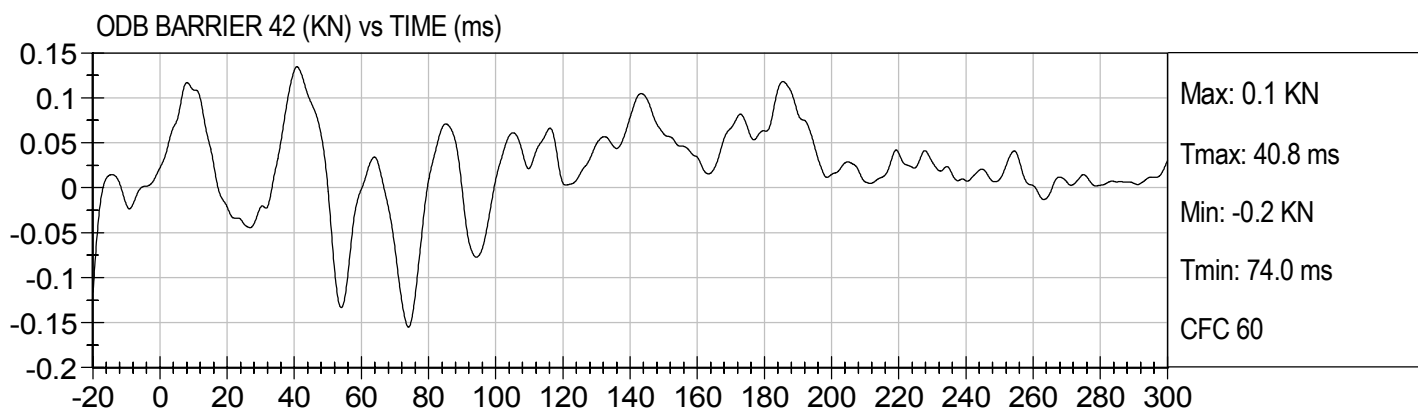
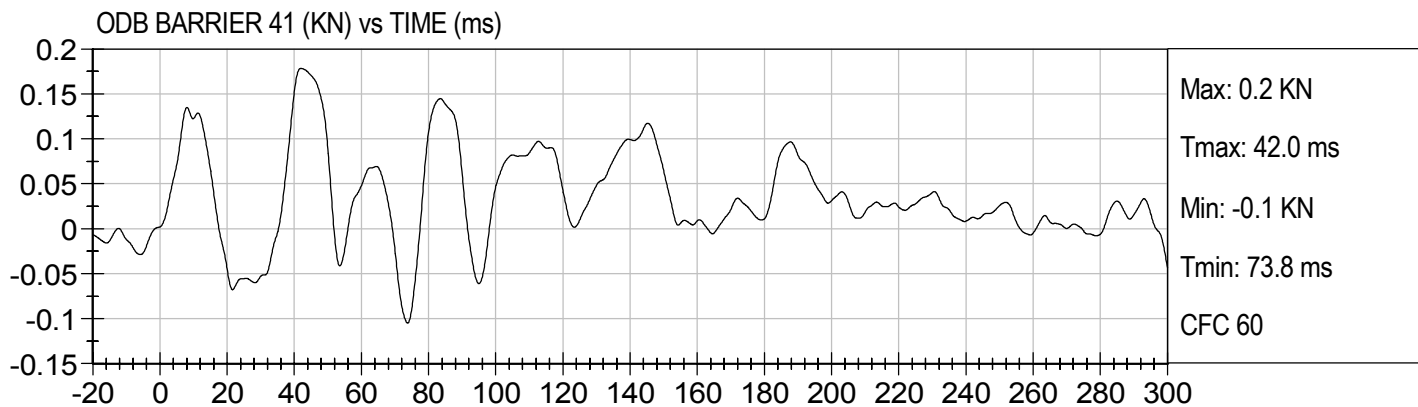
Max: 0.1 KN
Tmax: 44.2 ms
Min: -5.3 KN
Tmin: 66.5 ms
CFC 60

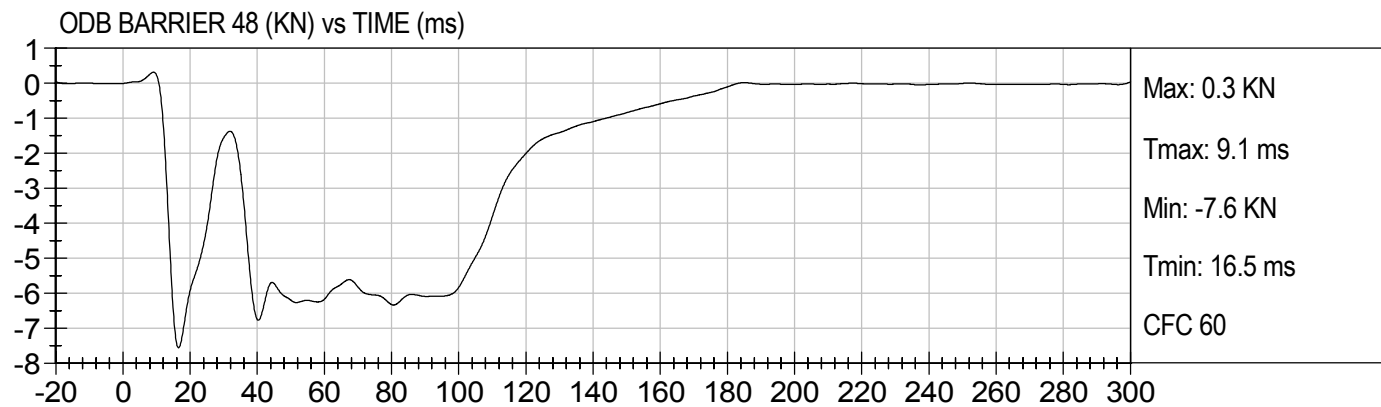
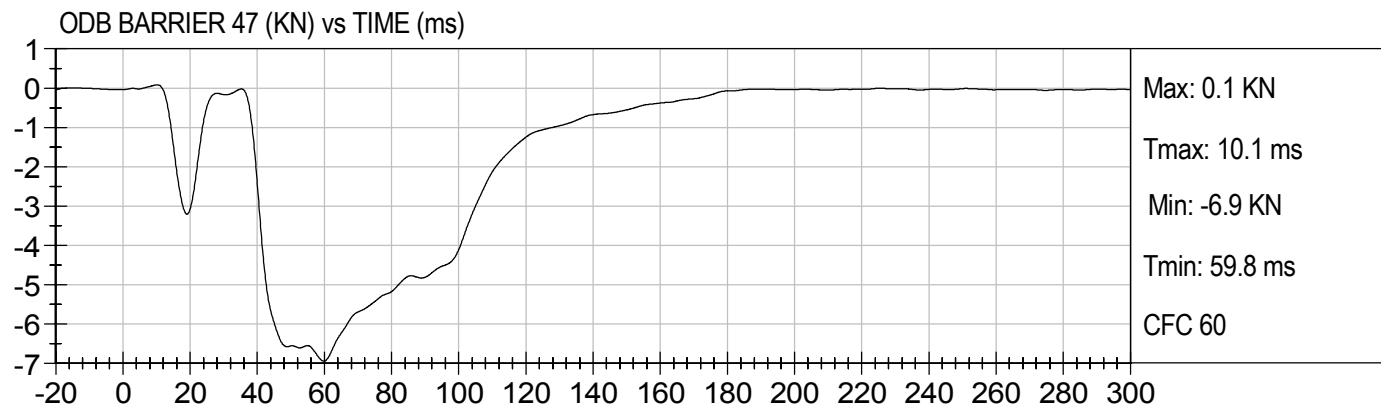
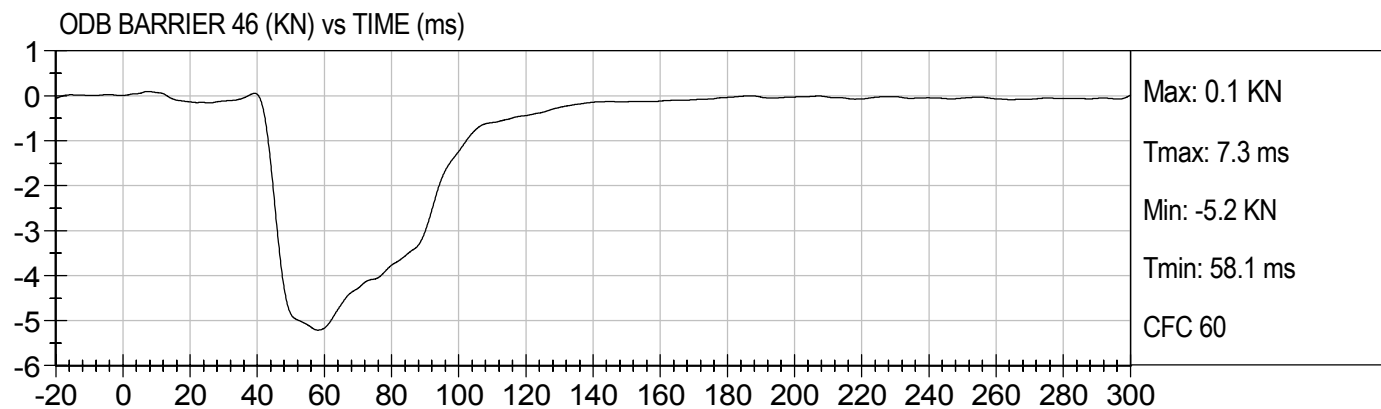
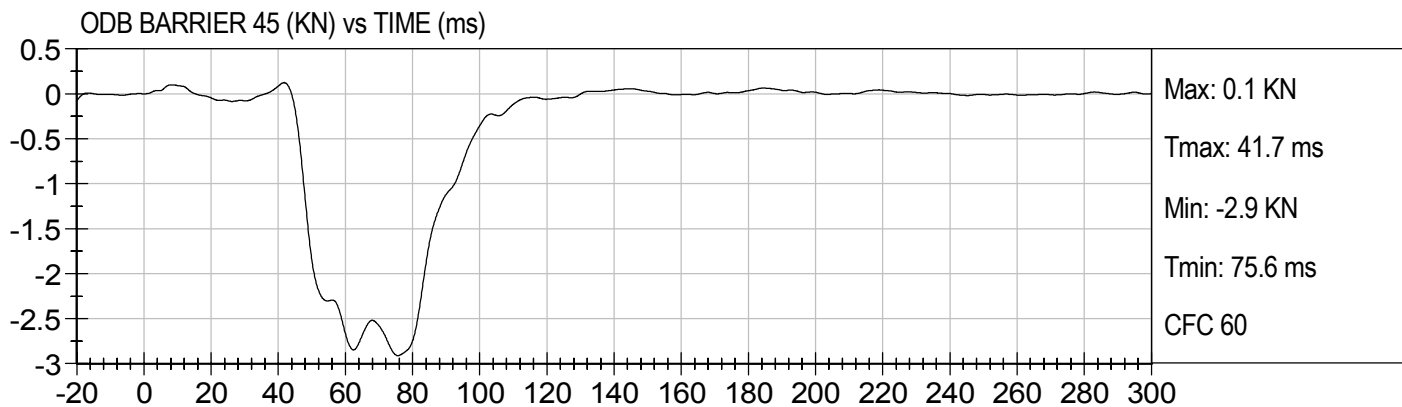


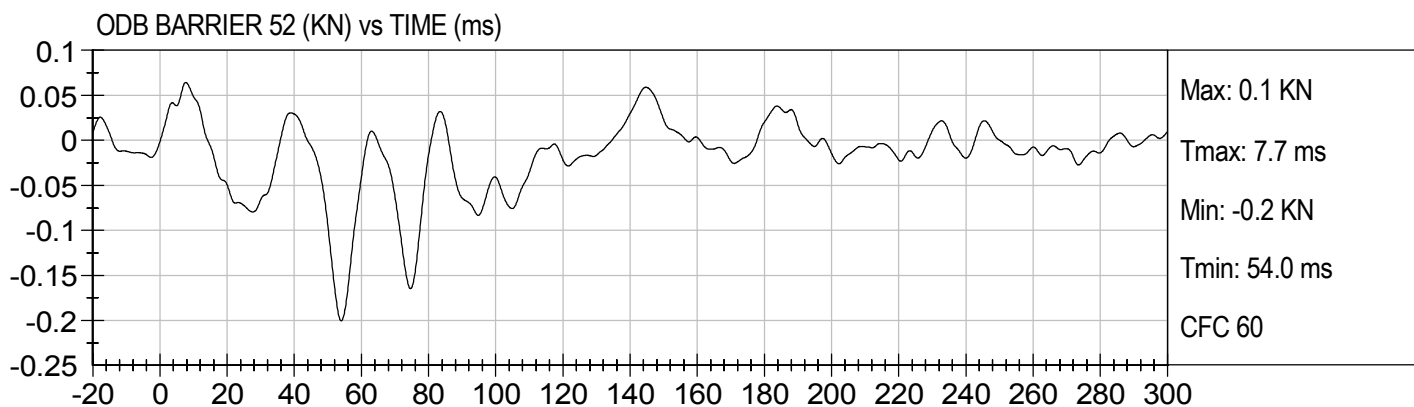
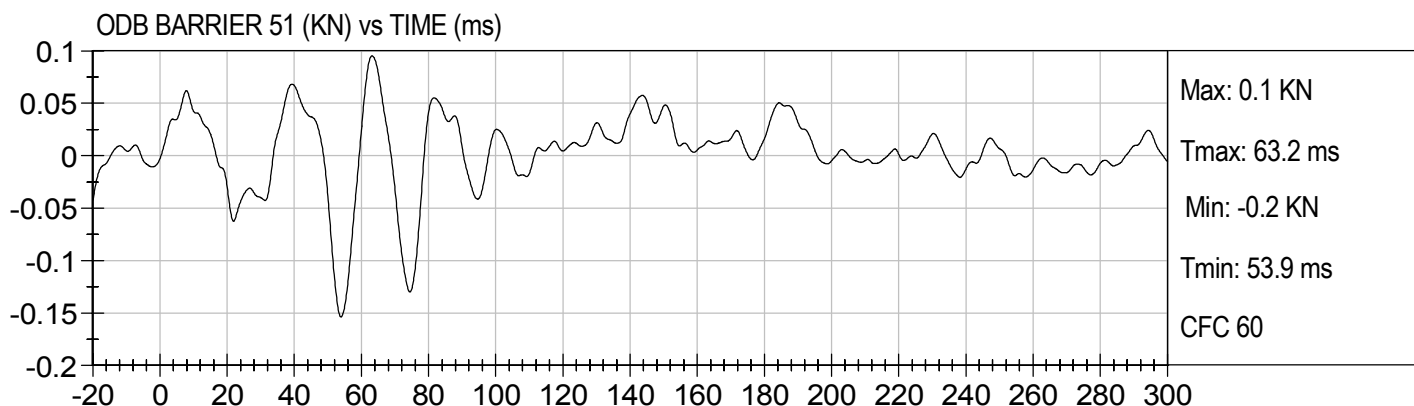
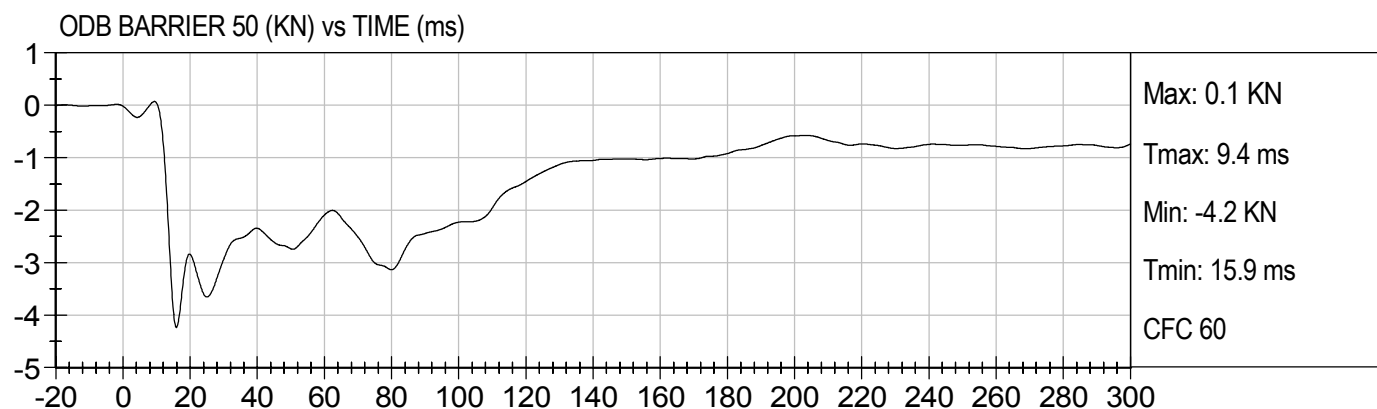
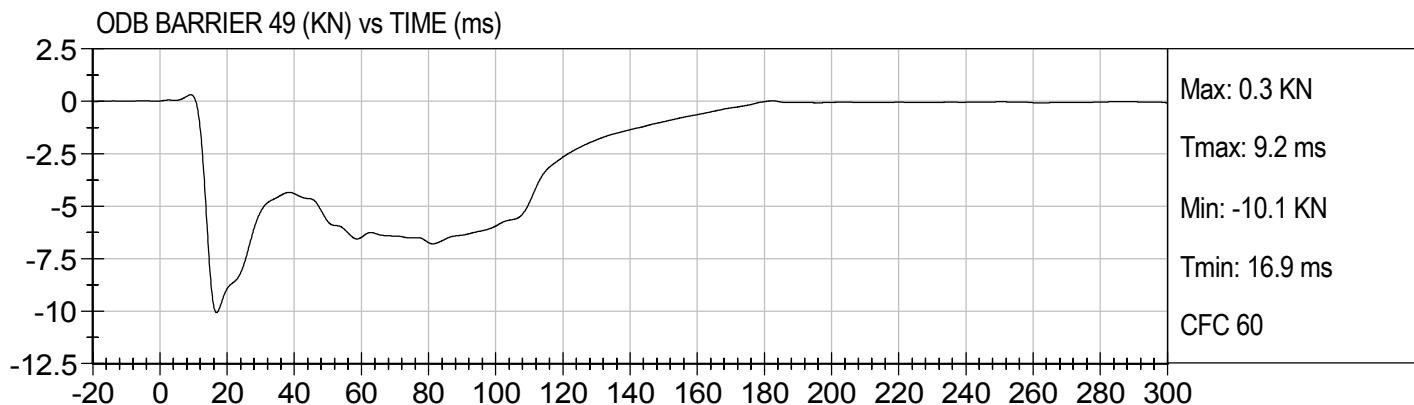


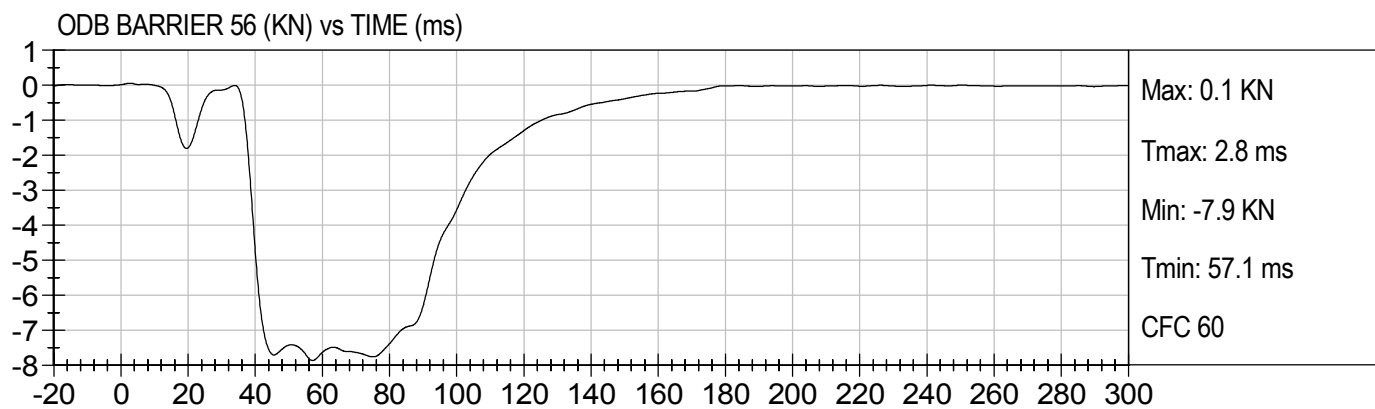
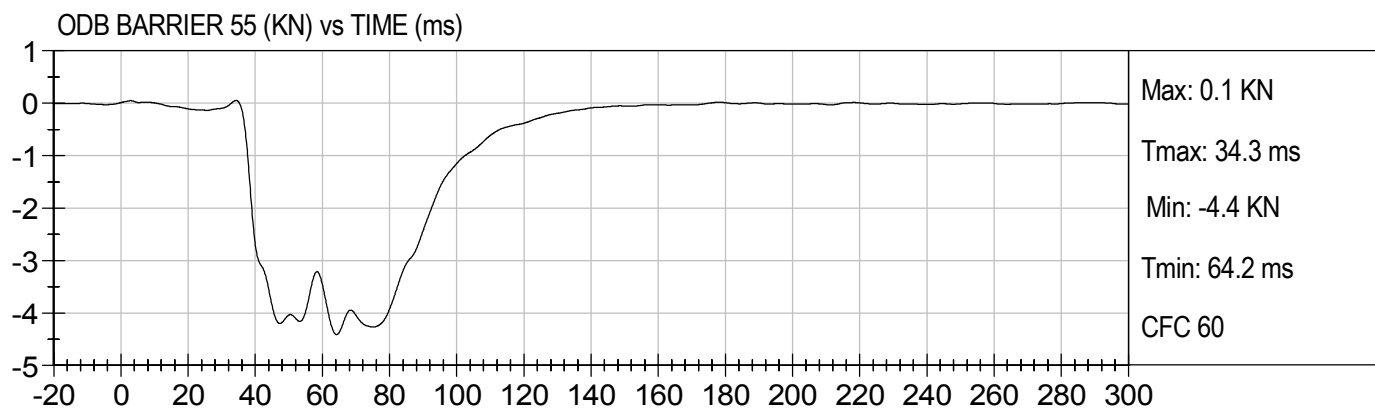
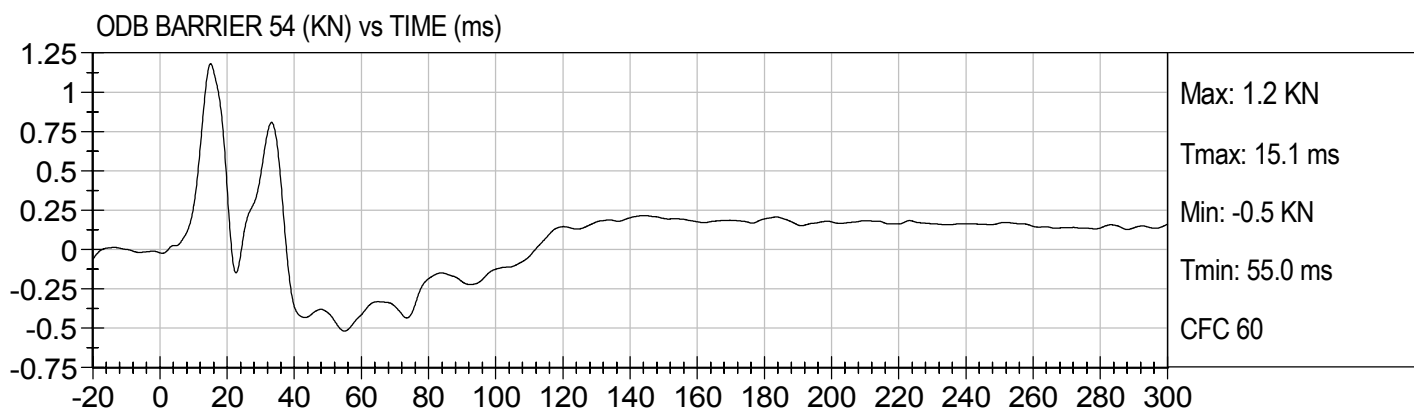
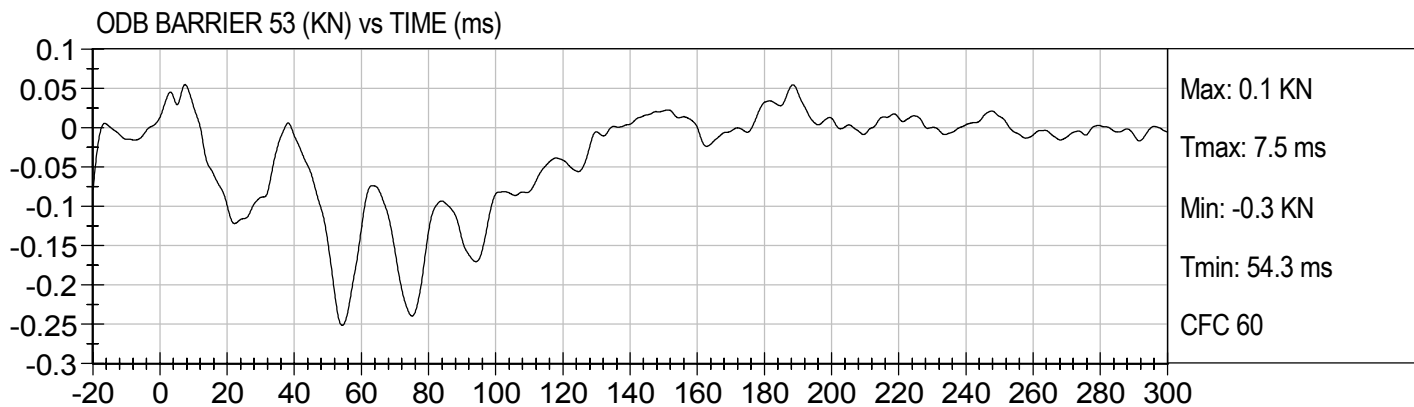
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

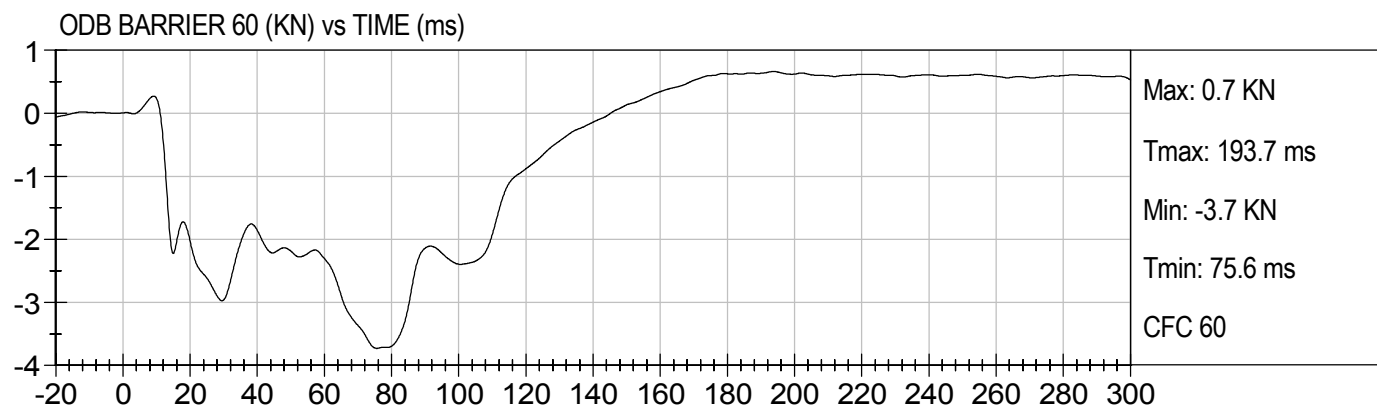
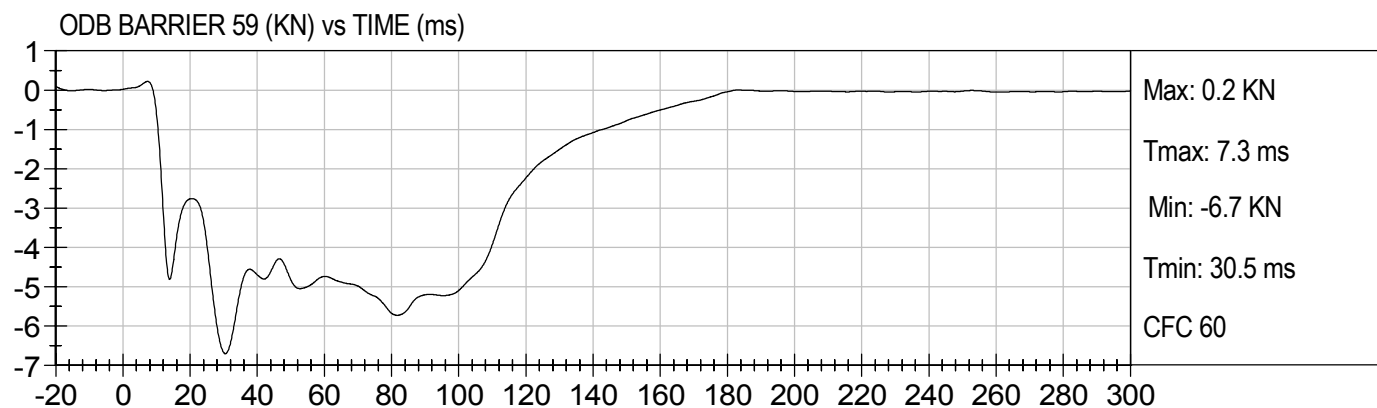
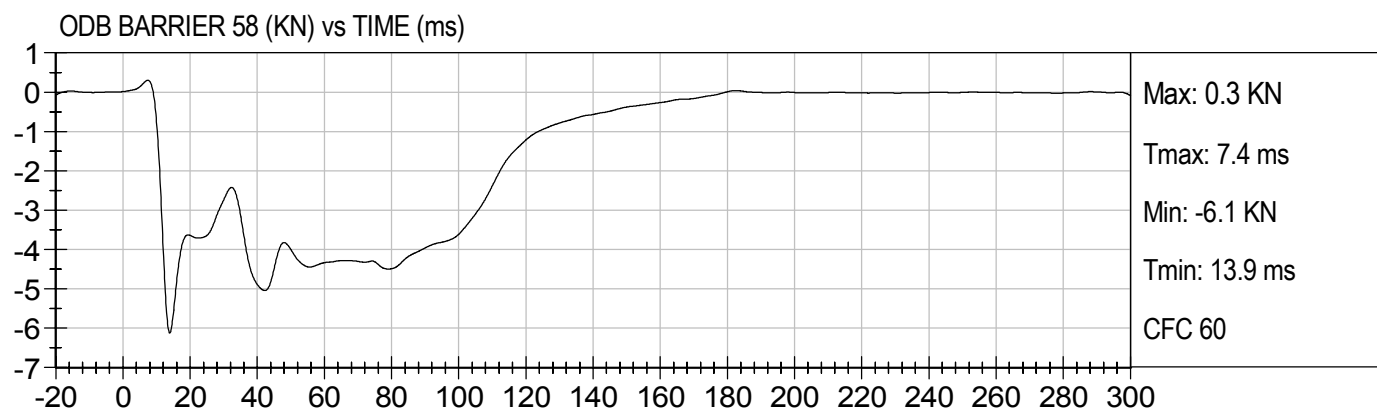
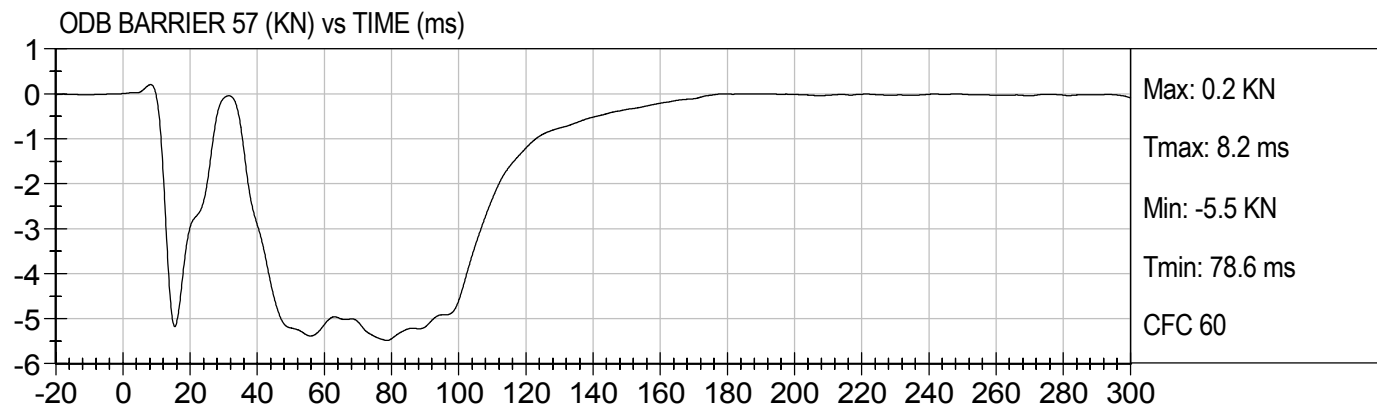
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

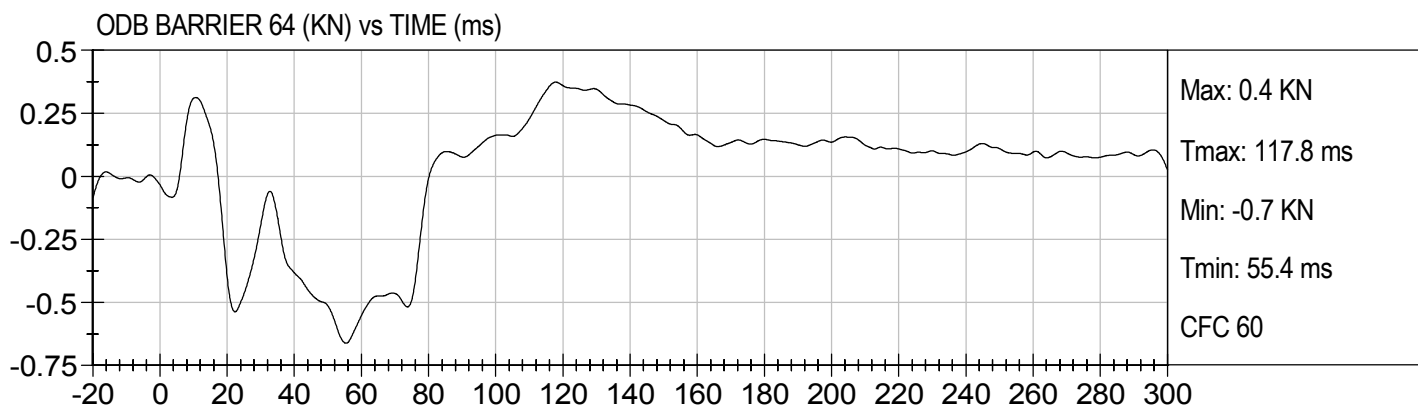
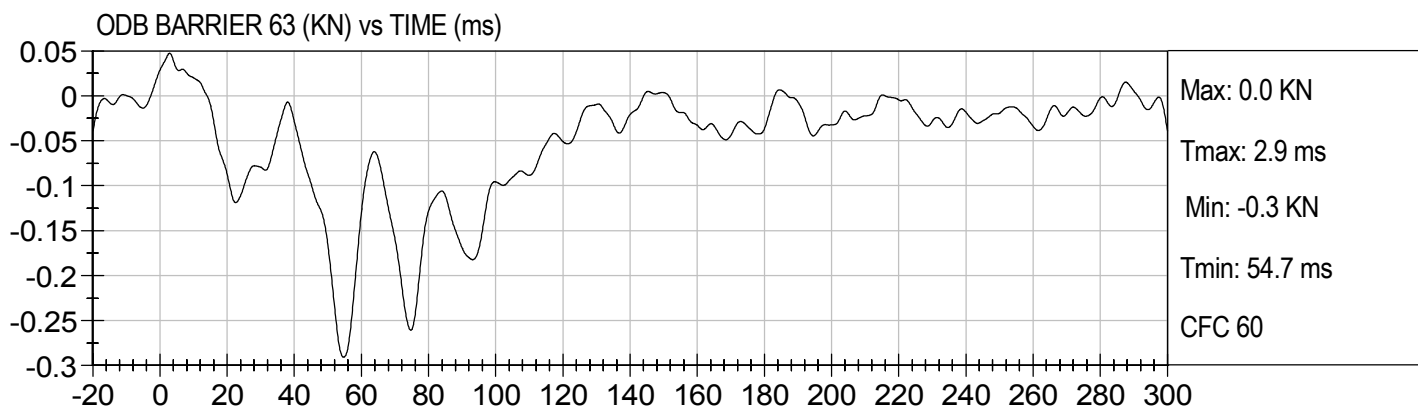
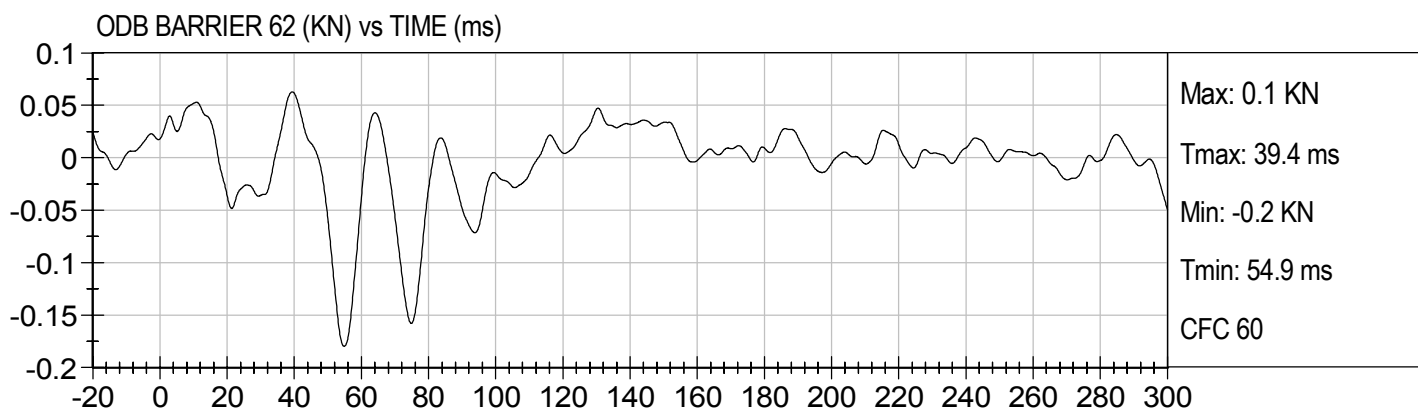
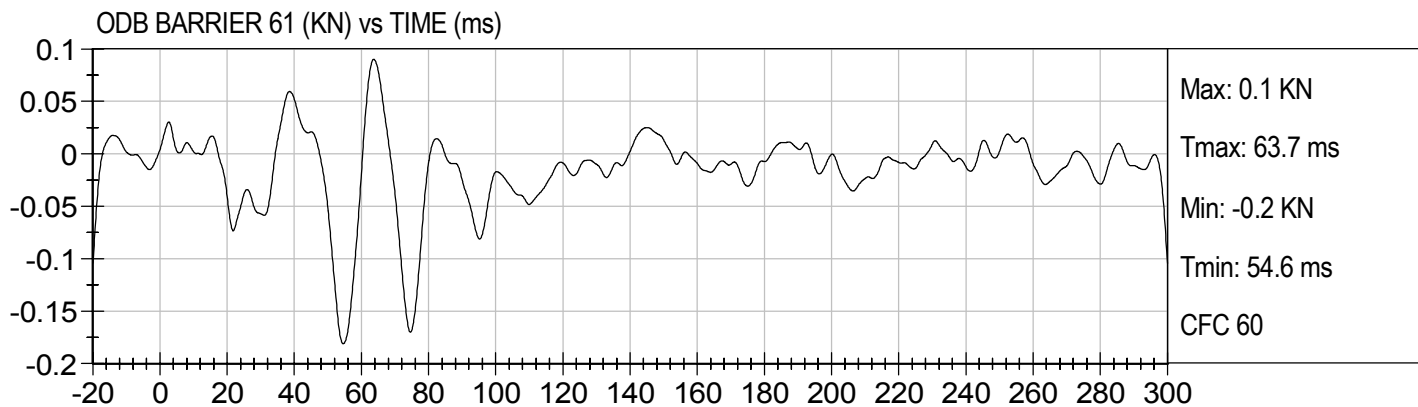


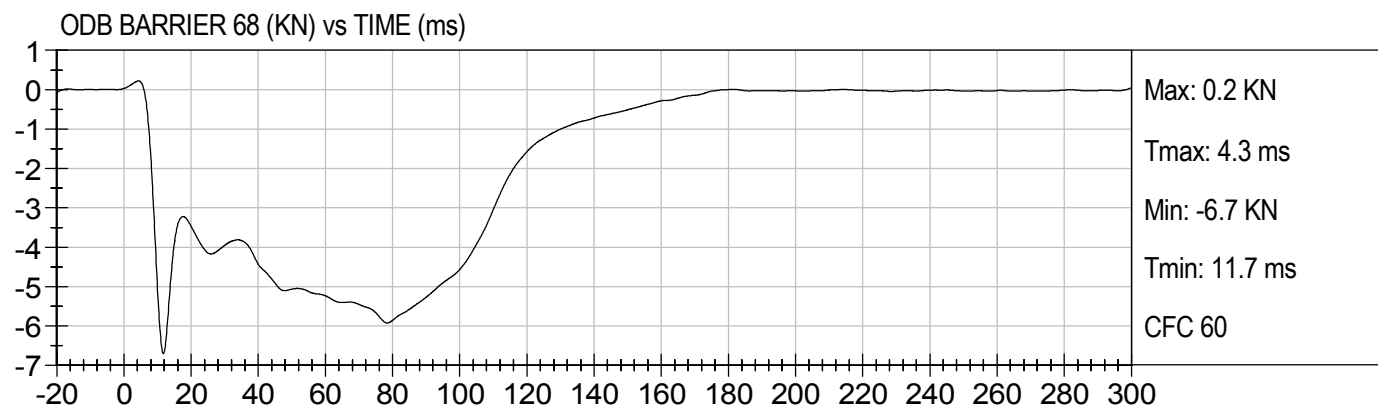
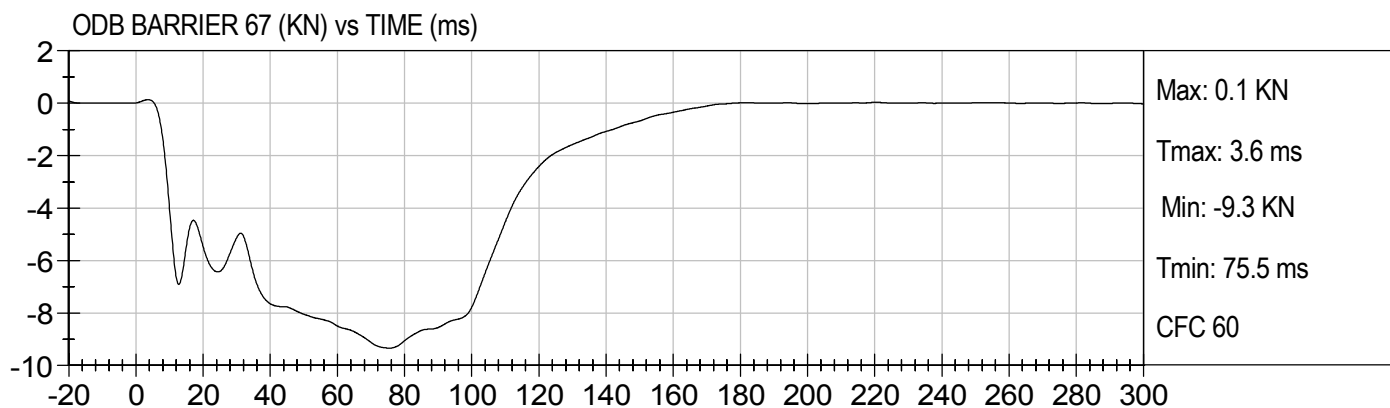
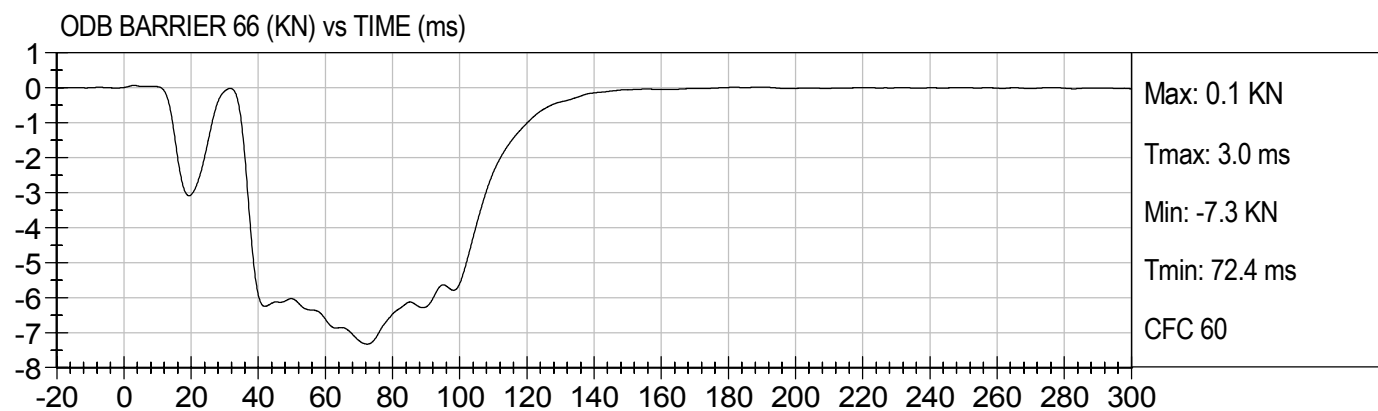
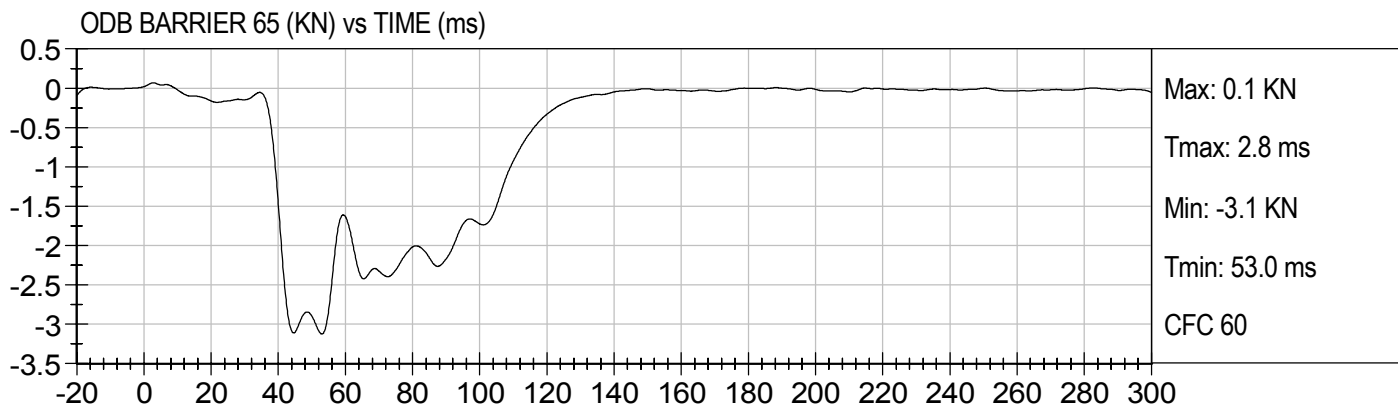


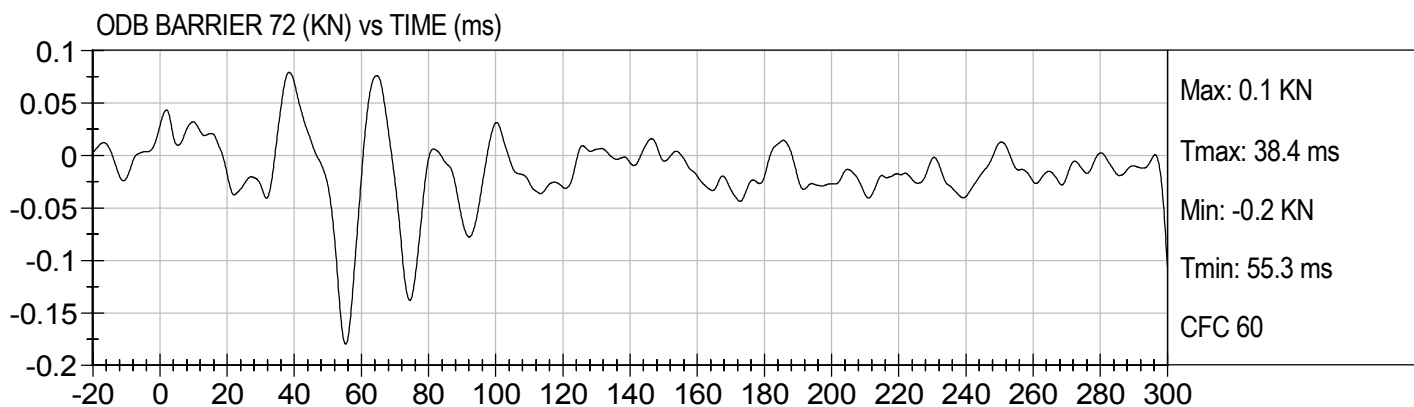
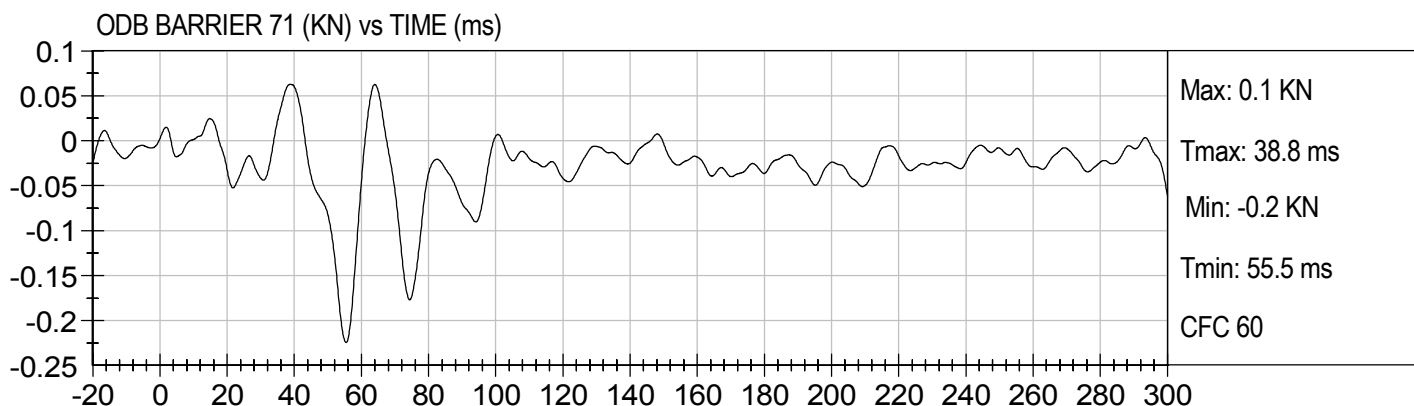
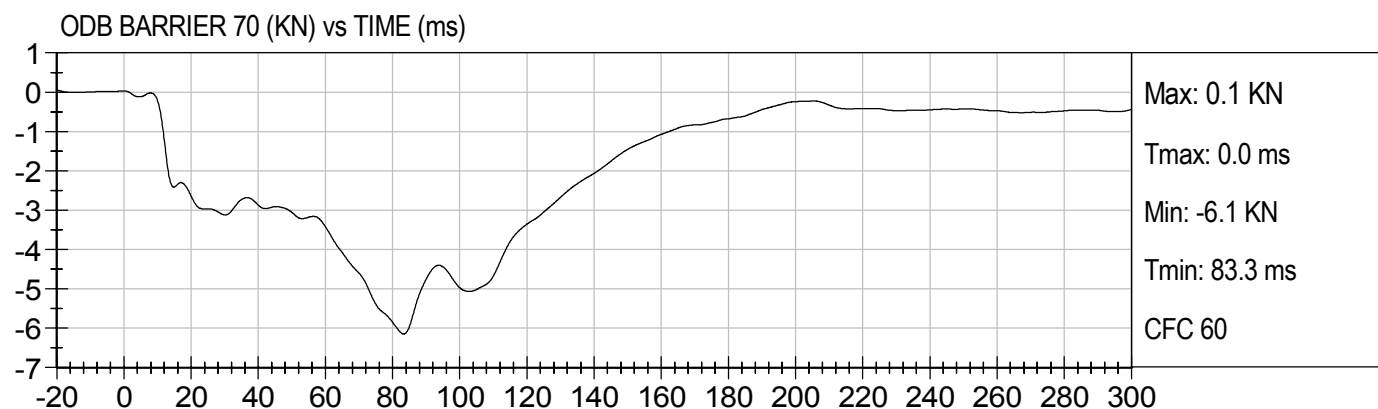
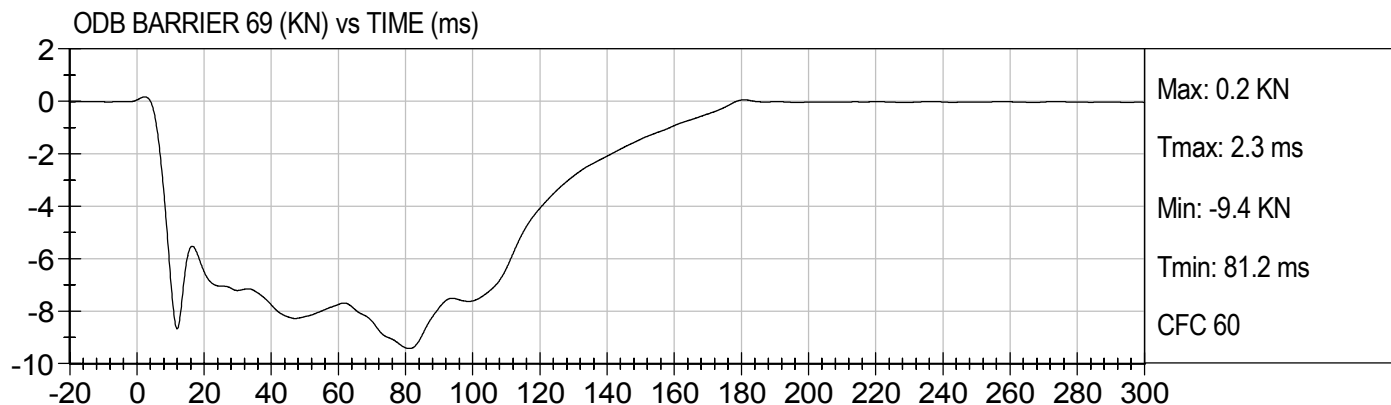








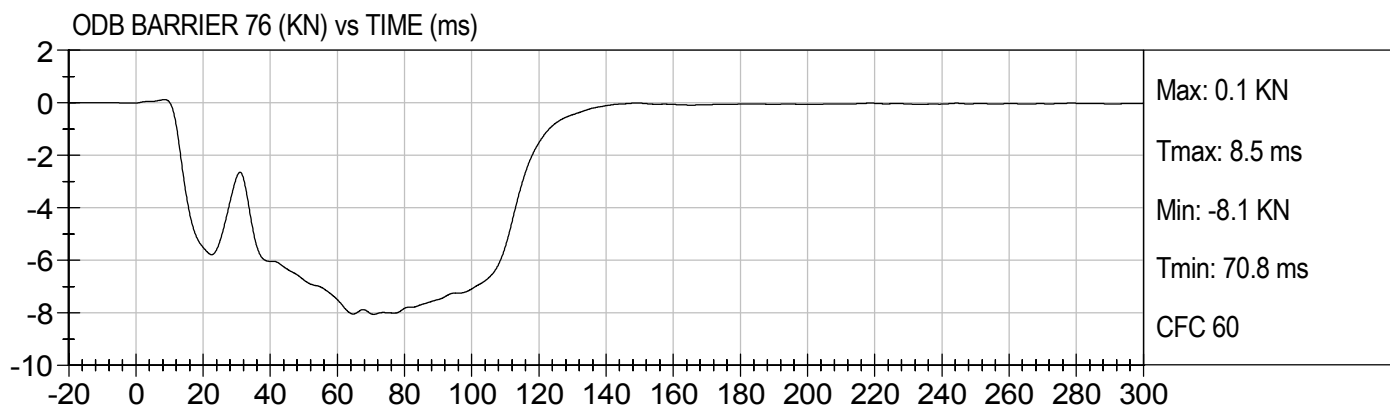
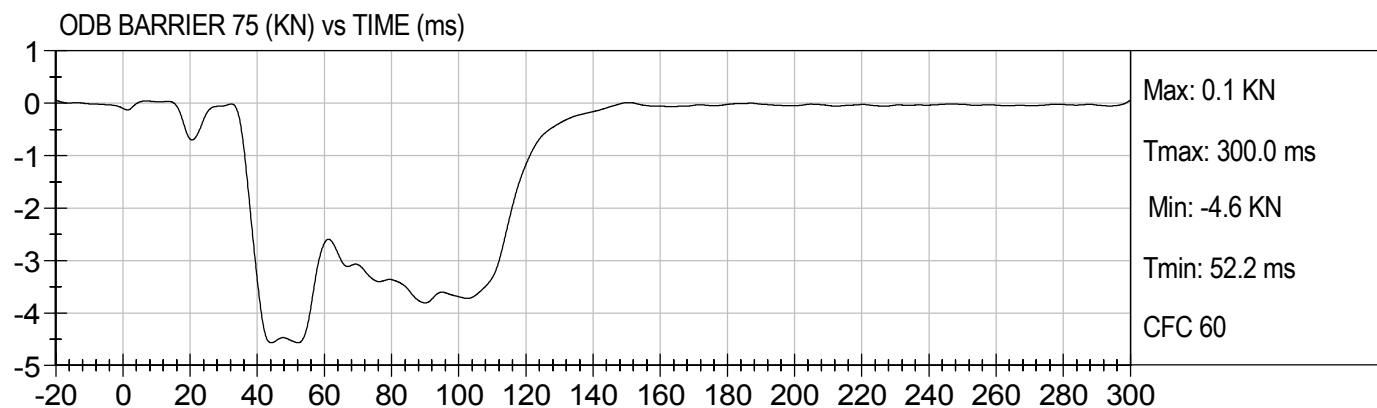
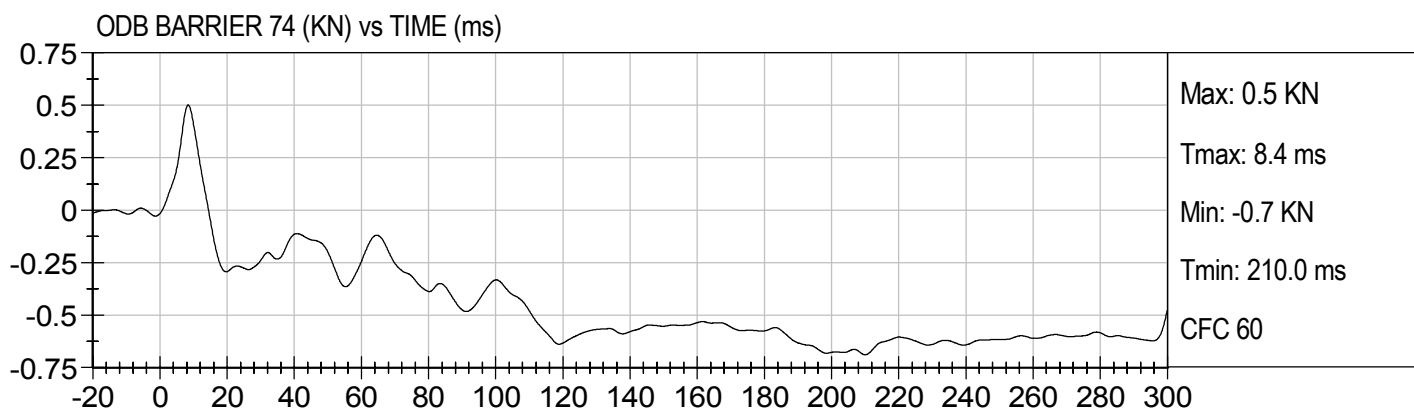
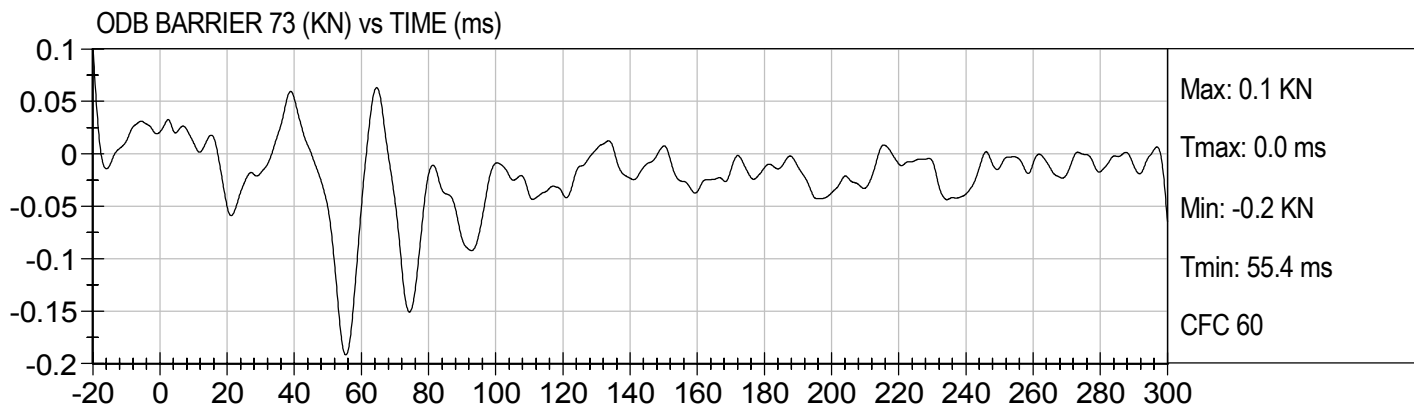






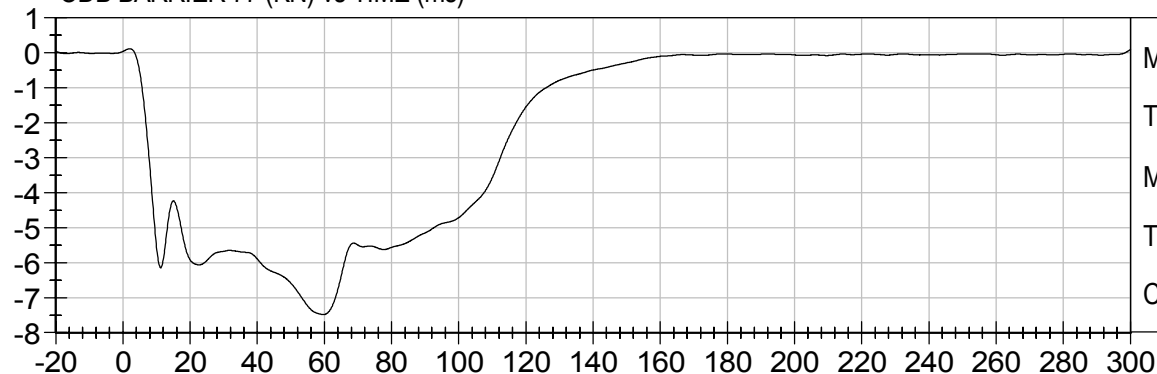
NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

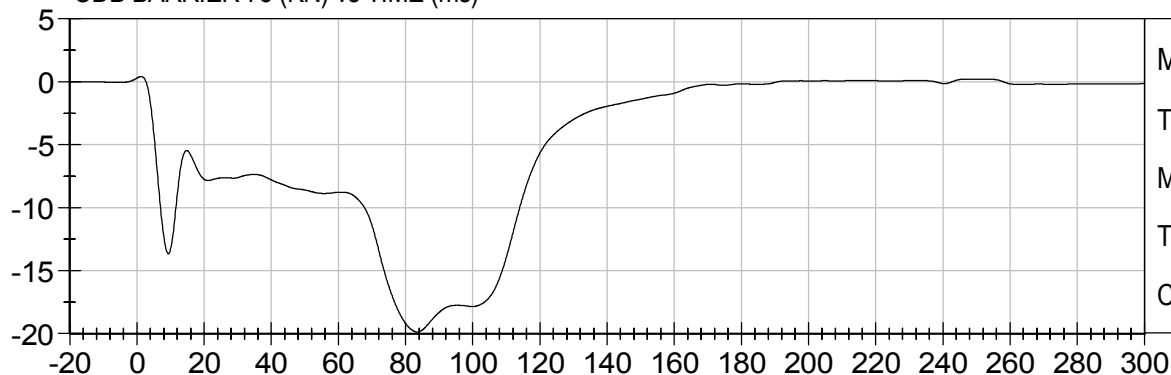




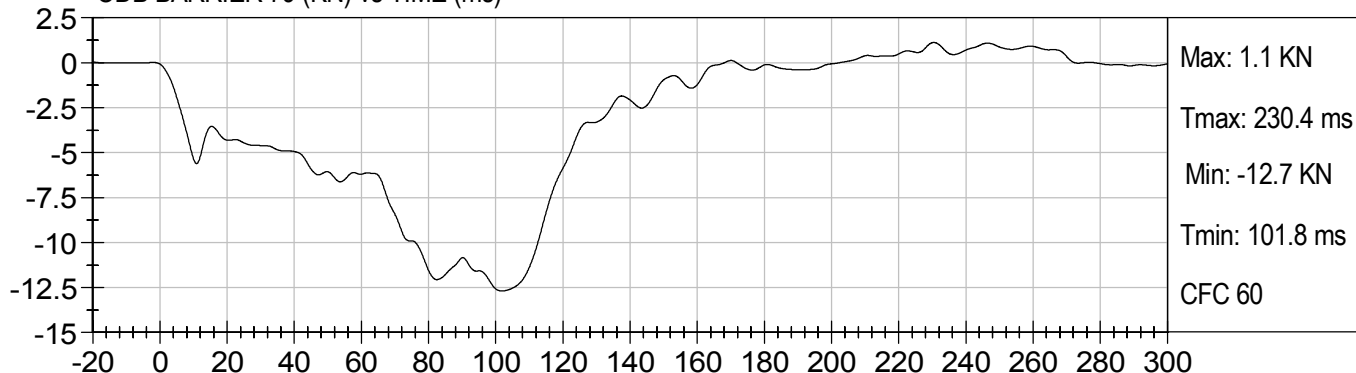
ODB BARRIER 77 (KN) vs TIME (ms)



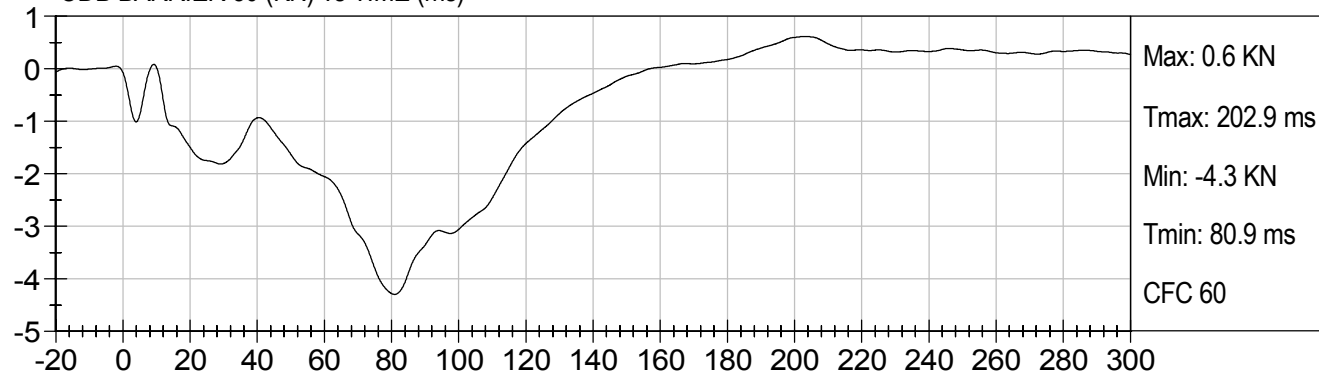
ODB BARRIER 78 (KN) vs TIME (ms)



ODB BARRIER 79 (KN) vs TIME (ms)



ODB BARRIER 80 (KN) vs TIME (ms)

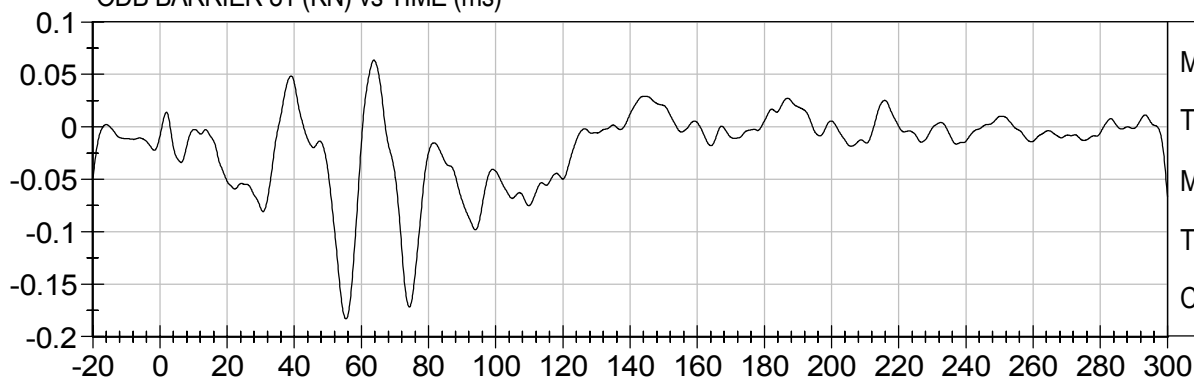




NHTSA 40% OFFSET ODB FRONTAL
2008 CHEVY AVEO R80173

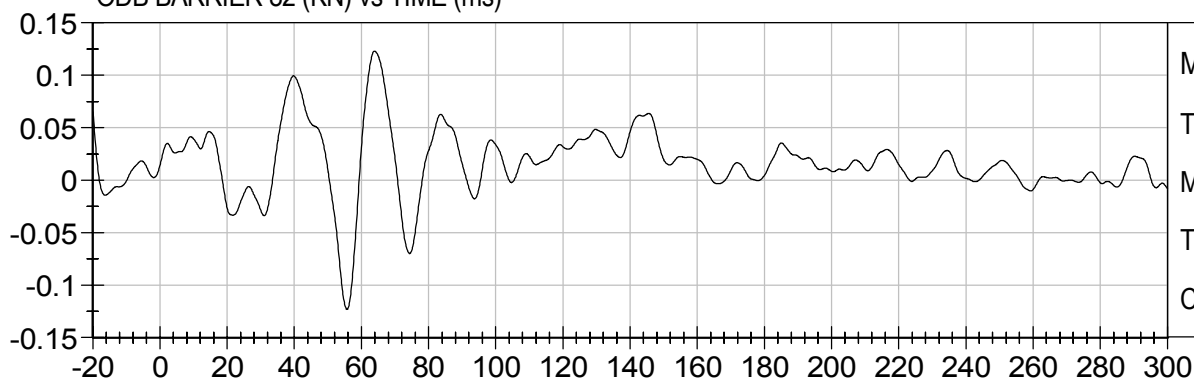
Test Date: 01/31/2008
Speed: 34.8 mph (56.0 km/h)

ODB BARRIER 81 (KN) vs TIME (ms)



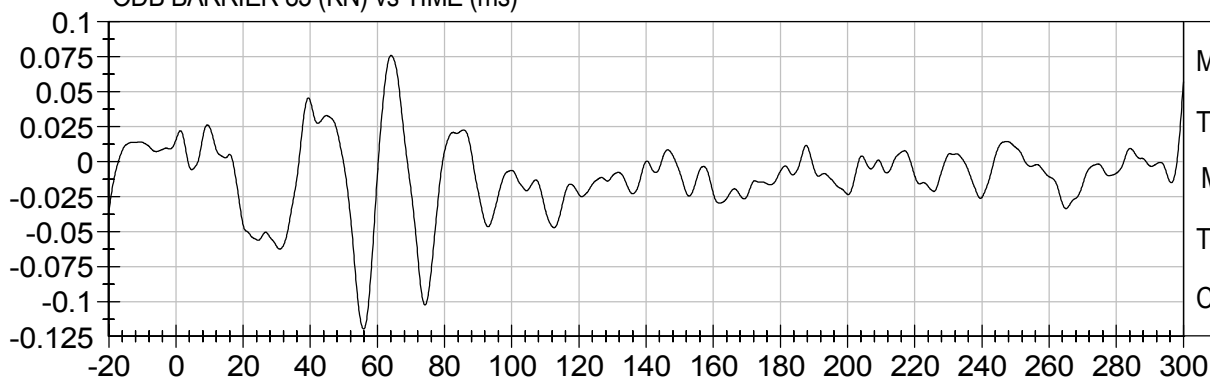
Max: 0.1 KN
Tmax: 63.7 ms
Min: -0.2 KN
Tmin: 55.4 ms
CFC 60

ODB BARRIER 82 (KN) vs TIME (ms)



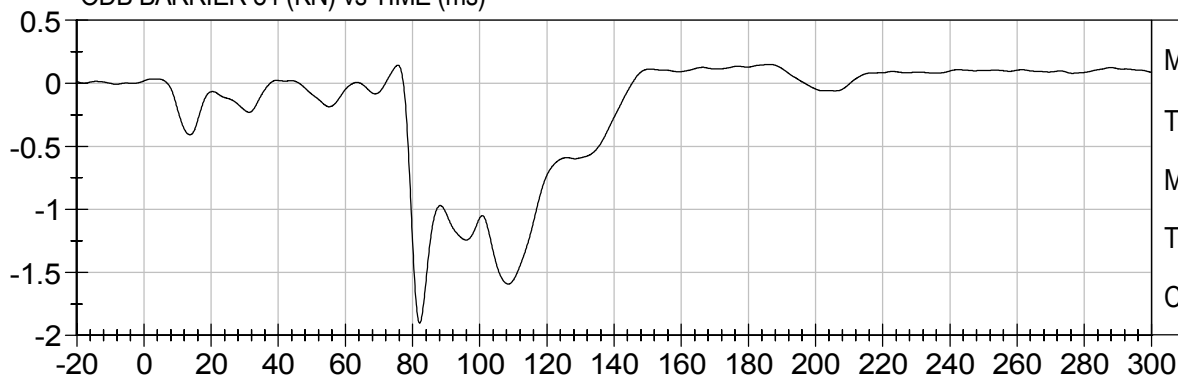
Max: 0.1 KN
Tmax: 63.9 ms
Min: -0.1 KN
Tmin: 55.7 ms
CFC 60

ODB BARRIER 83 (KN) vs TIME (ms)



Max: 0.1 KN
Tmax: 64.1 ms
Min: -0.1 KN
Tmin: 55.9 ms
CFC 60

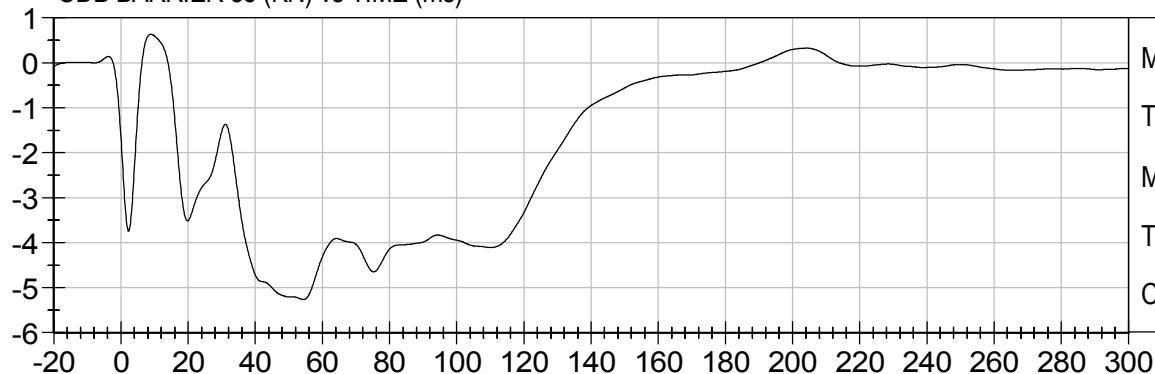
ODB BARRIER 84 (KN) vs TIME (ms)



Max: 0.2 KN
Tmax: 186.2 ms
Min: -1.9 KN
Tmin: 82.1 ms
CFC 60

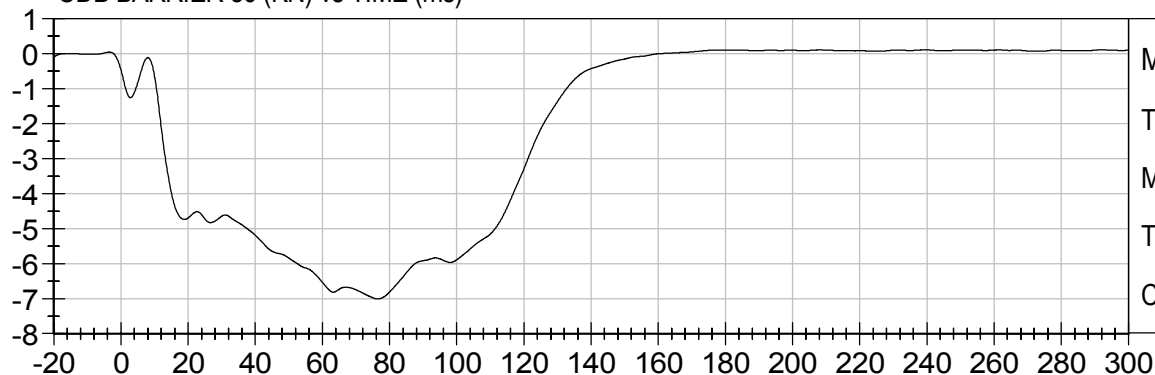


ODB BARRIER 85 (KN) vs TIME (ms)



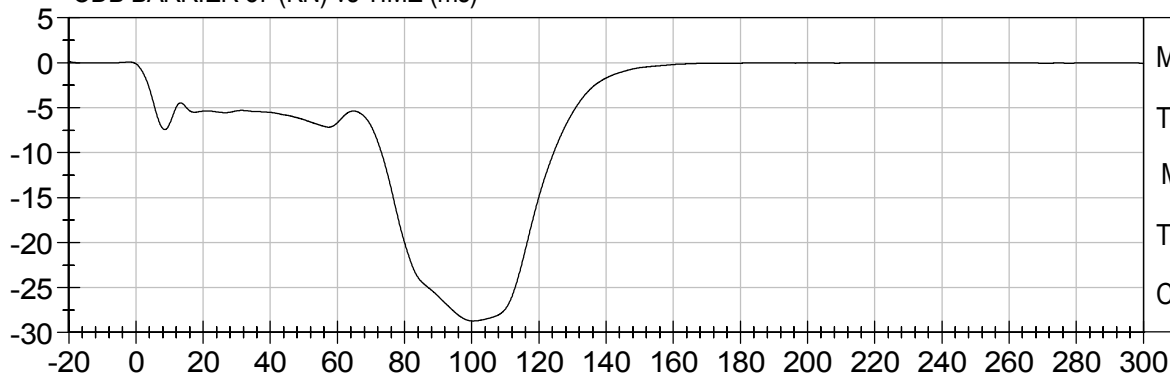
Max: 0.6 KN
Tmax: 8.9 ms
Min: -5.3 KN
Tmin: 54.3 ms
CFC 60

ODB BARRIER 86 (KN) vs TIME (ms)



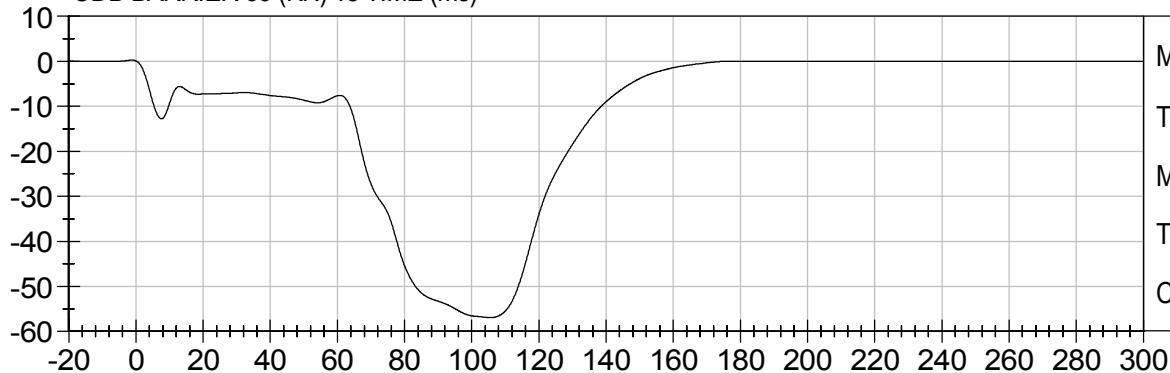
Max: 0.1 KN
Tmax: 239.6 ms
Min: -7.0 KN
Tmin: 76.5 ms
CFC 60

ODB BARRIER 87 (KN) vs TIME (ms)

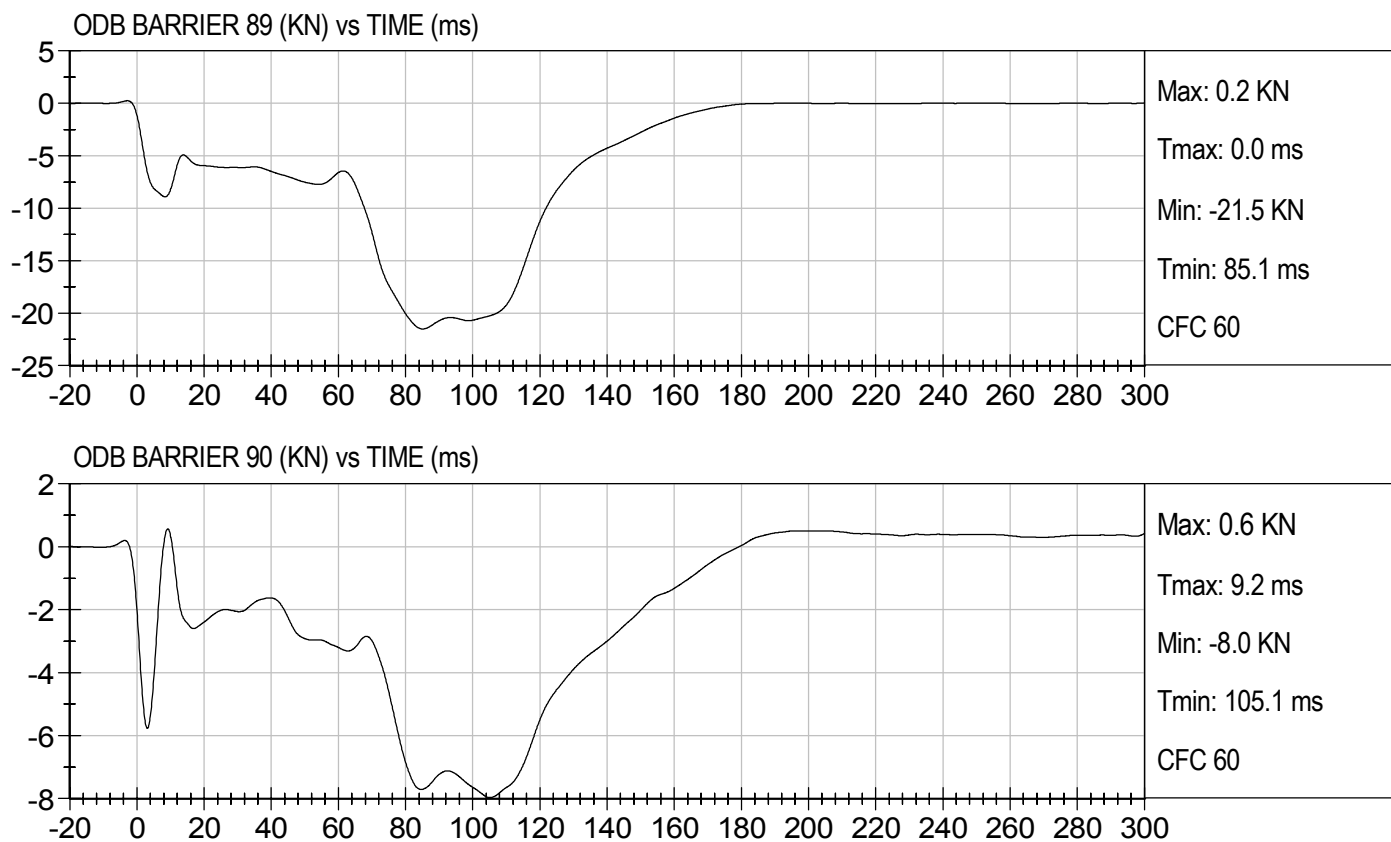


Max: 0.1 KN
Tmax: 0.0 ms
Min: -28.7 KN
Tmin: 100.4 ms
CFC 60

ODB BARRIER 88 (KN) vs TIME (ms)



Max: 0.3 KN
Tmax: 0.0 ms
Min: -56.9 KN
Tmin: 105.4 ms
CFC 60



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 202

Test ID: D08001

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	225 - 275	248	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-5.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

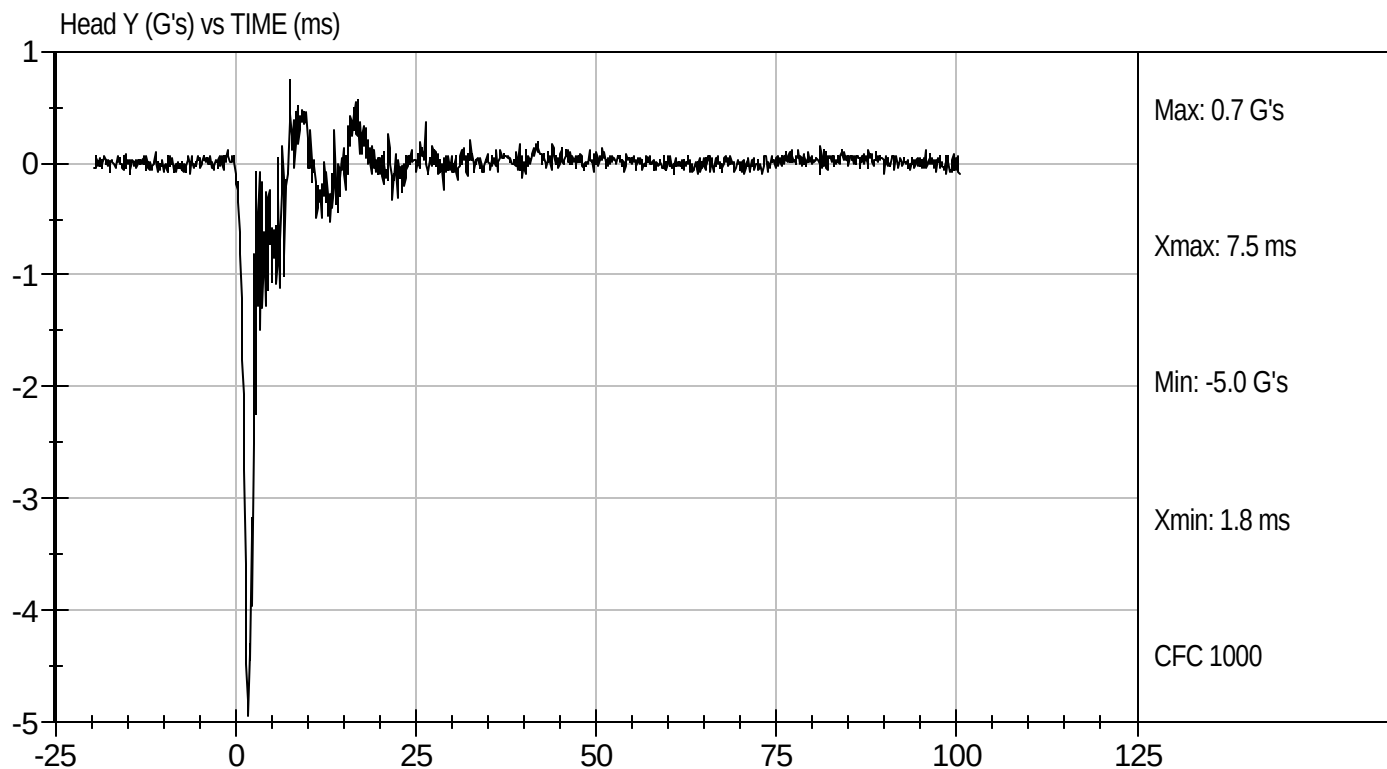
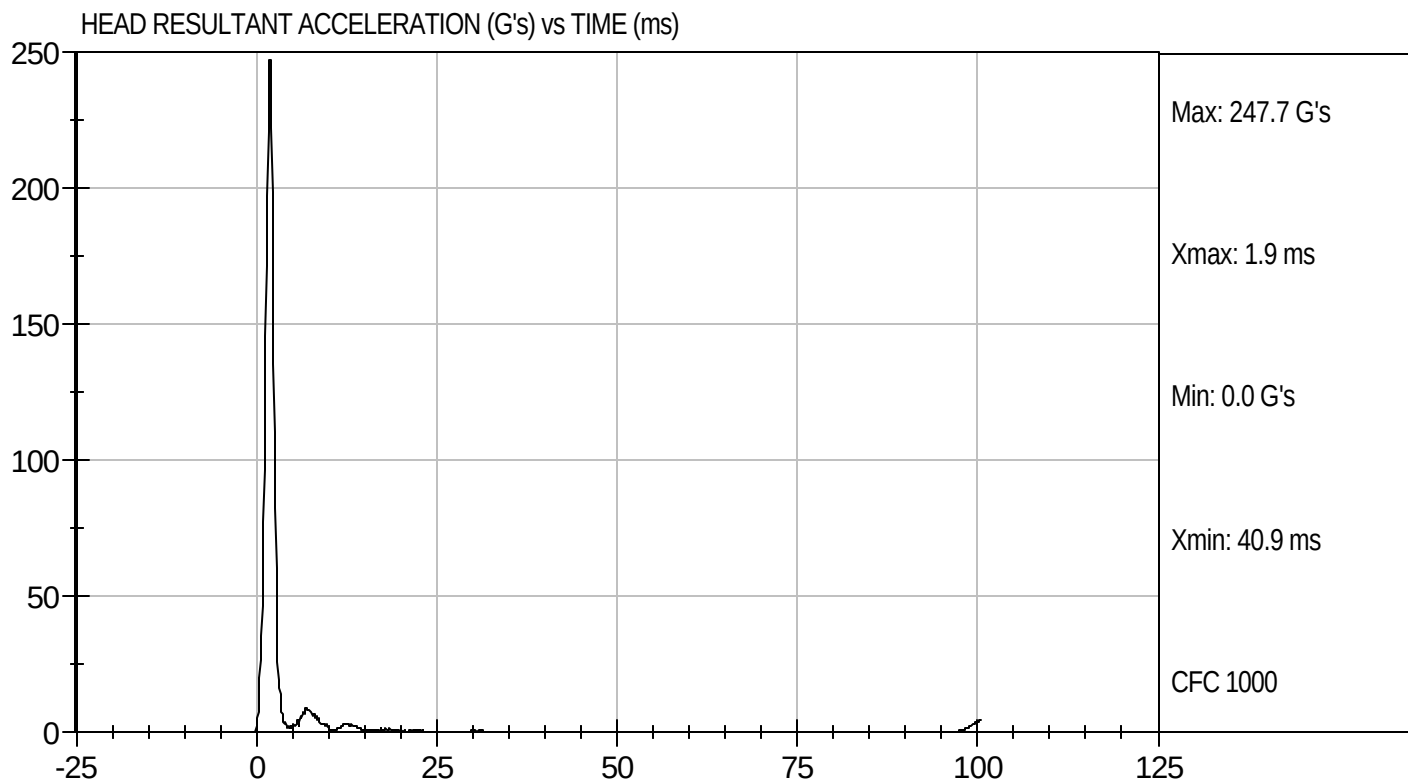
1/4/08
Test Date


Approved By



Test Desc: Head Drop
Component ID: D08001

Test Date: 1/4/08
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 202

Test I.D: D08002

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	18	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.05	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	23.26	Pass
	20 msec	G's	17.60 to 22.60	18.01	Pass
	30 msec	G's	12.50 to 18.50	13.88	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	13.84	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	36.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.7	Pass
	Time	msec	57.0 to 64.0	57.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.1	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	96.9	Pass
	Time	msec	47.0 to 58.0	49.7	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	97.6	Pass
Overall Test Results					Pass


 Laboratory Technician

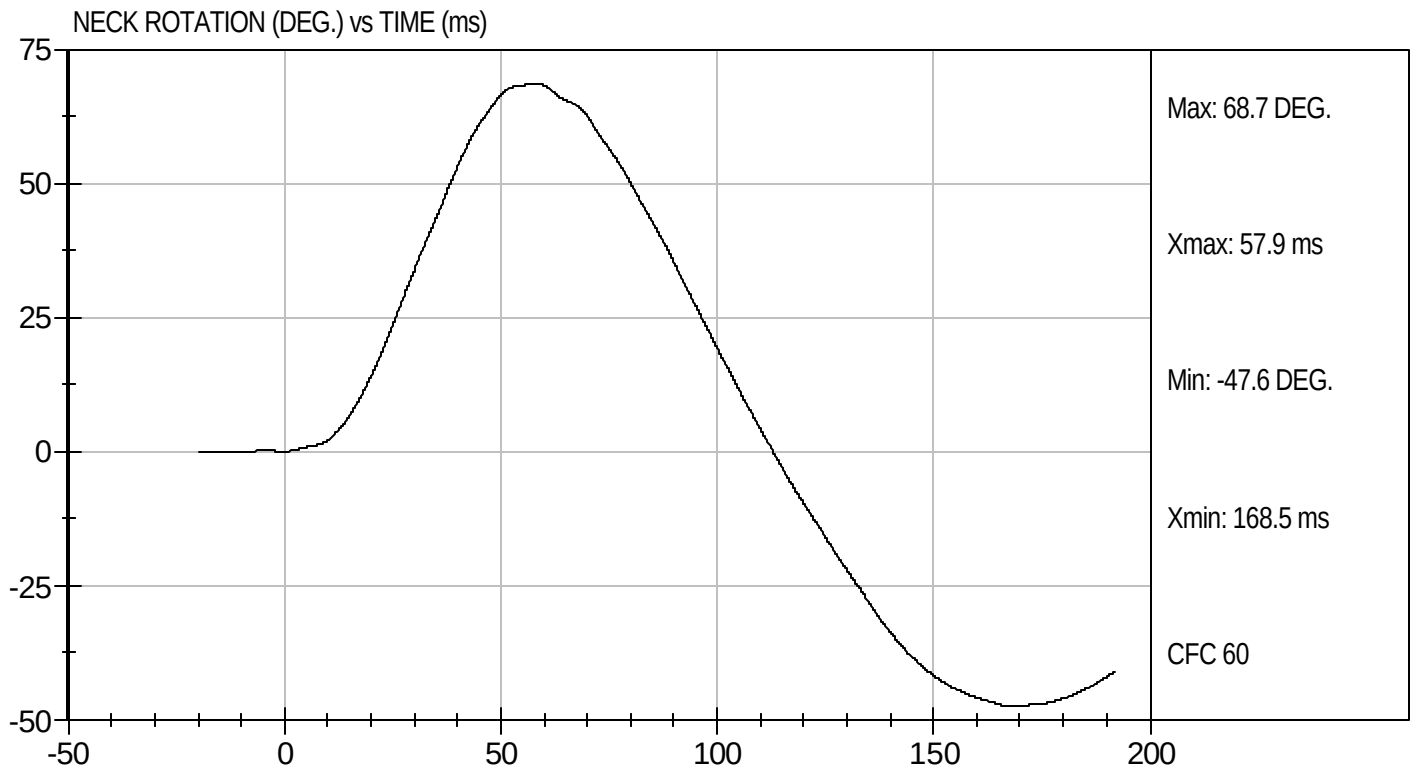
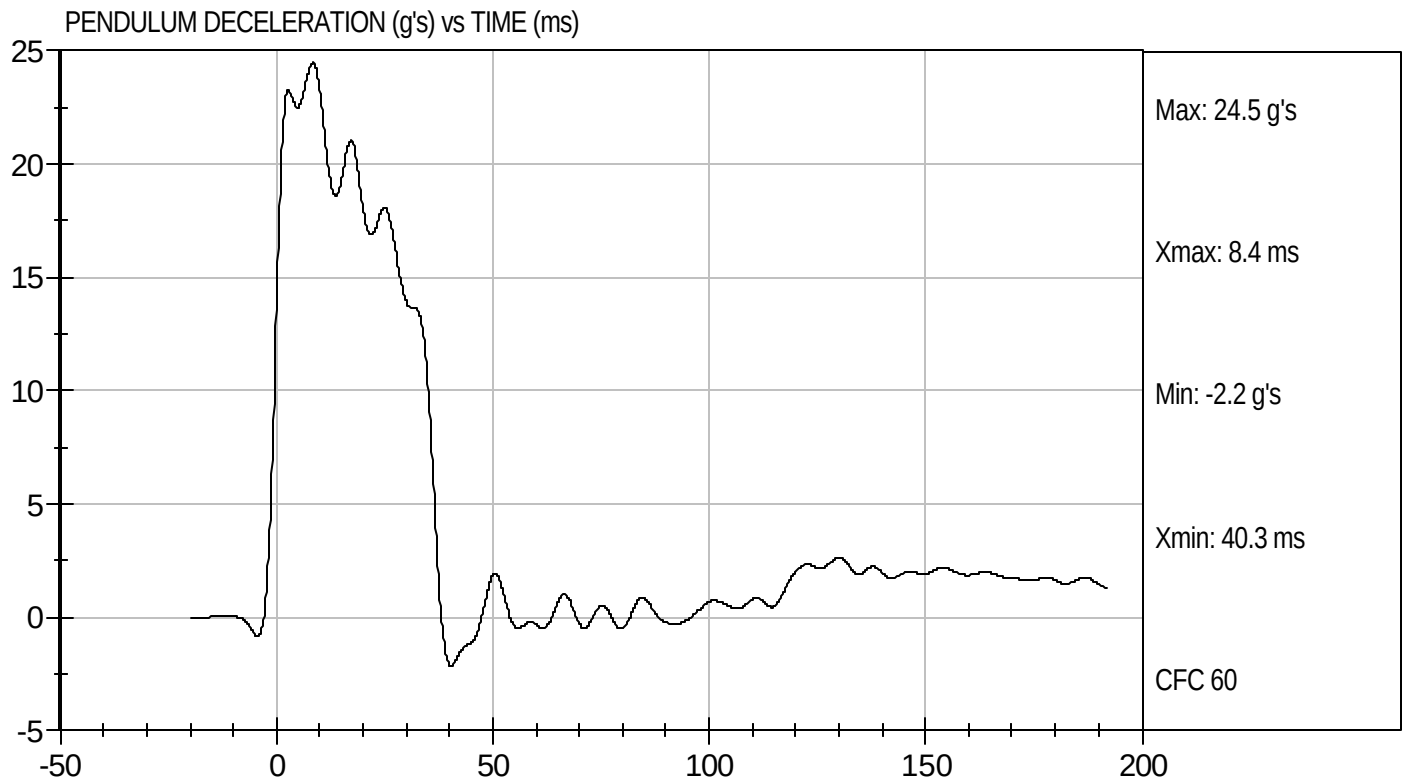
1/4/08
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D08002

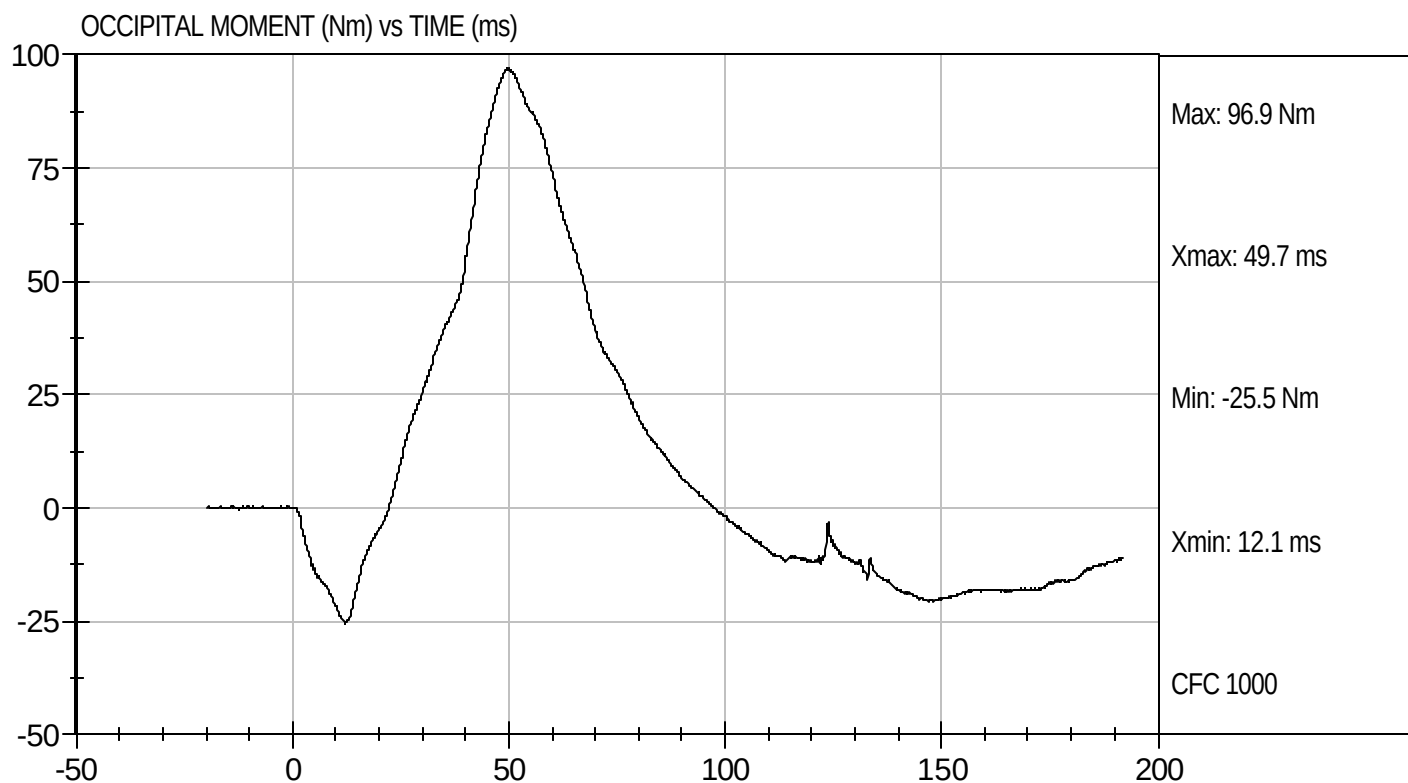
Test Date: 1/4/08
Velocity: 23.14 ft/s, 7.05 m/s





Test Desc: Neck Flexion
Component ID: D08002

Test Date: 1/4/08
Velocity: 23.14 ft/s, 7.05 m/s

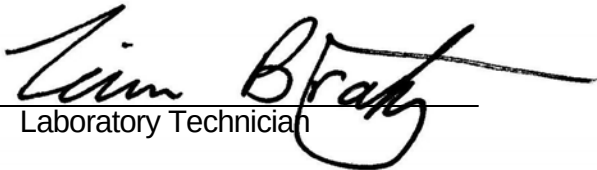


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 202

Test I.D: D08003

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	18	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	17.98	Pass
	20 msec	G's	14.00 to 19.00	16.18	Pass
	30 msec	G's	11.00 to 16.00	12.89	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.88	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	38.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	93.5	Pass
	Time	msec	72.0 to 82.0	77.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	155.1	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-64.4	Pass
	Time	msec	65.0 to 79.0	69.8	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	140.0	Pass
Overall Test Results					Pass


 Laboratory Technician

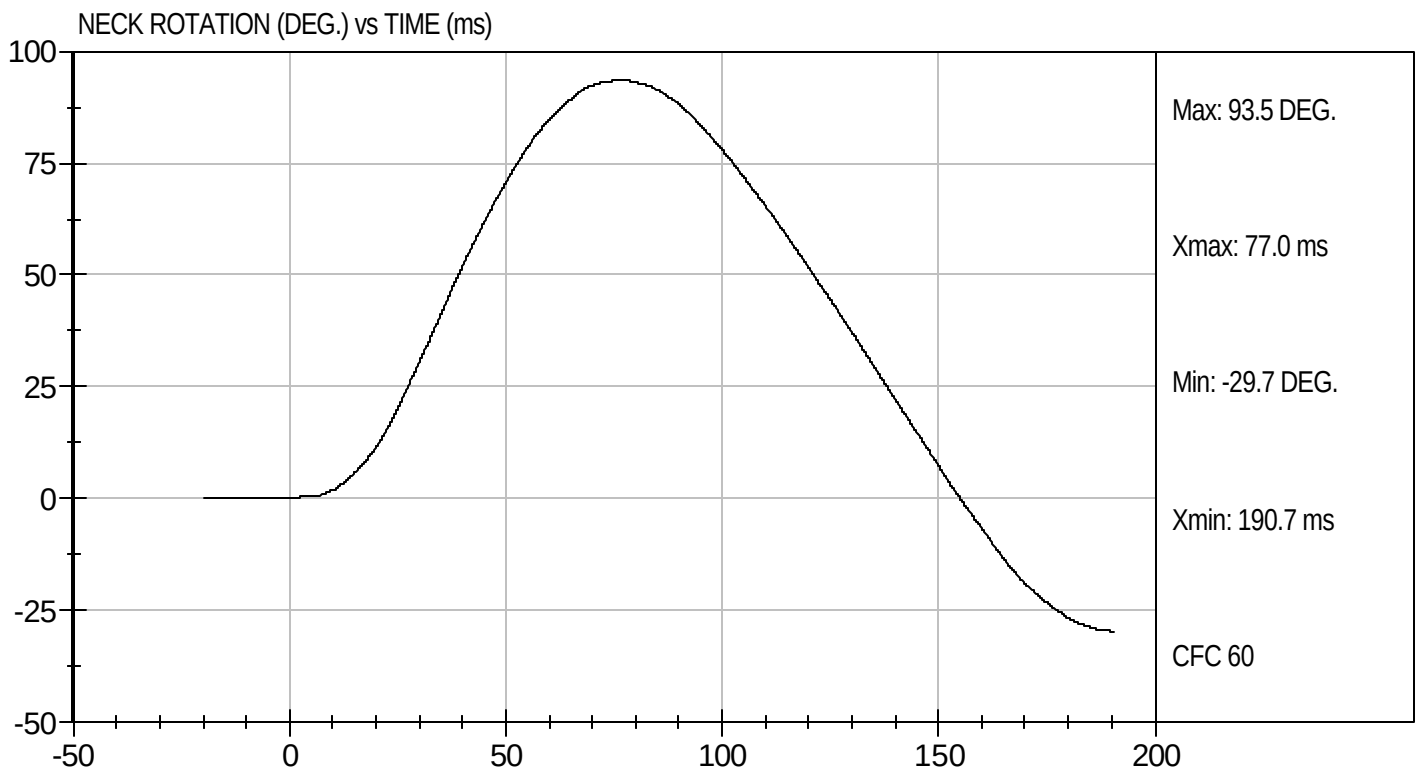
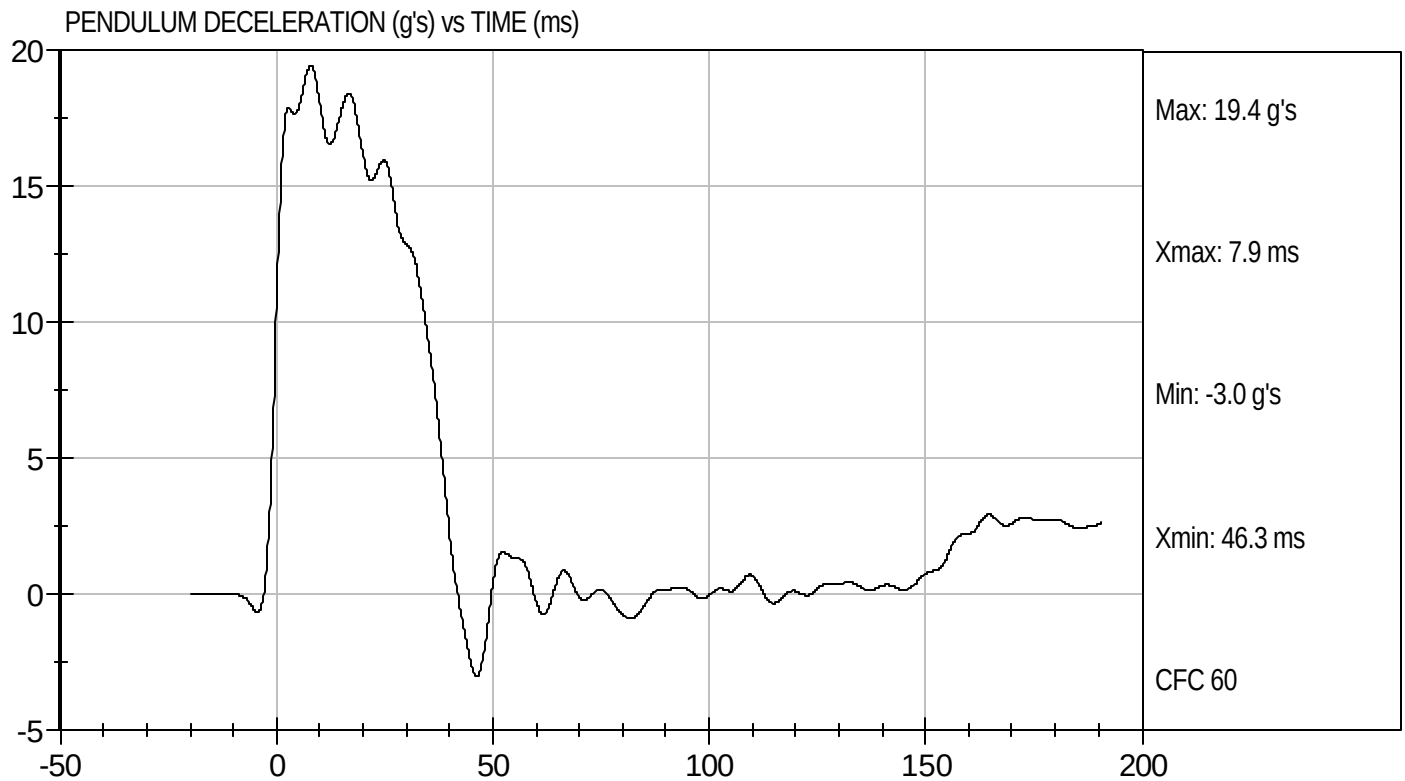
1/4/08
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D08003

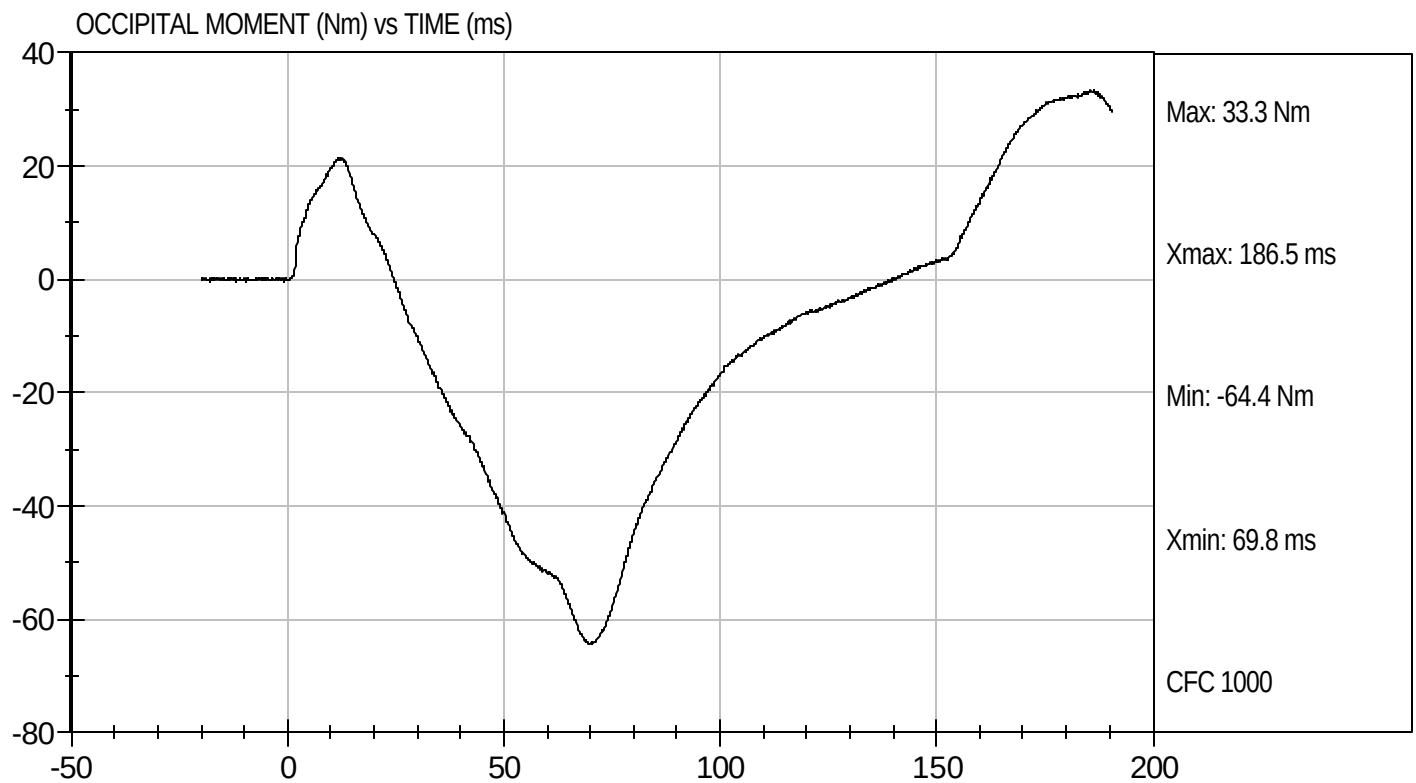
Test Date: 1/4/08
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D08003

Test Date: 1/4/08
Velocity: 20.08 ft/s, 6.12 m/s

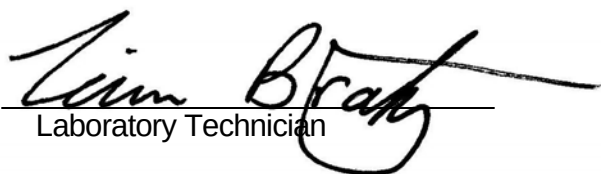


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 202

Test I.D: D08004

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,418	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.68	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Overall Test Results			Pass	


Laboratory Technician

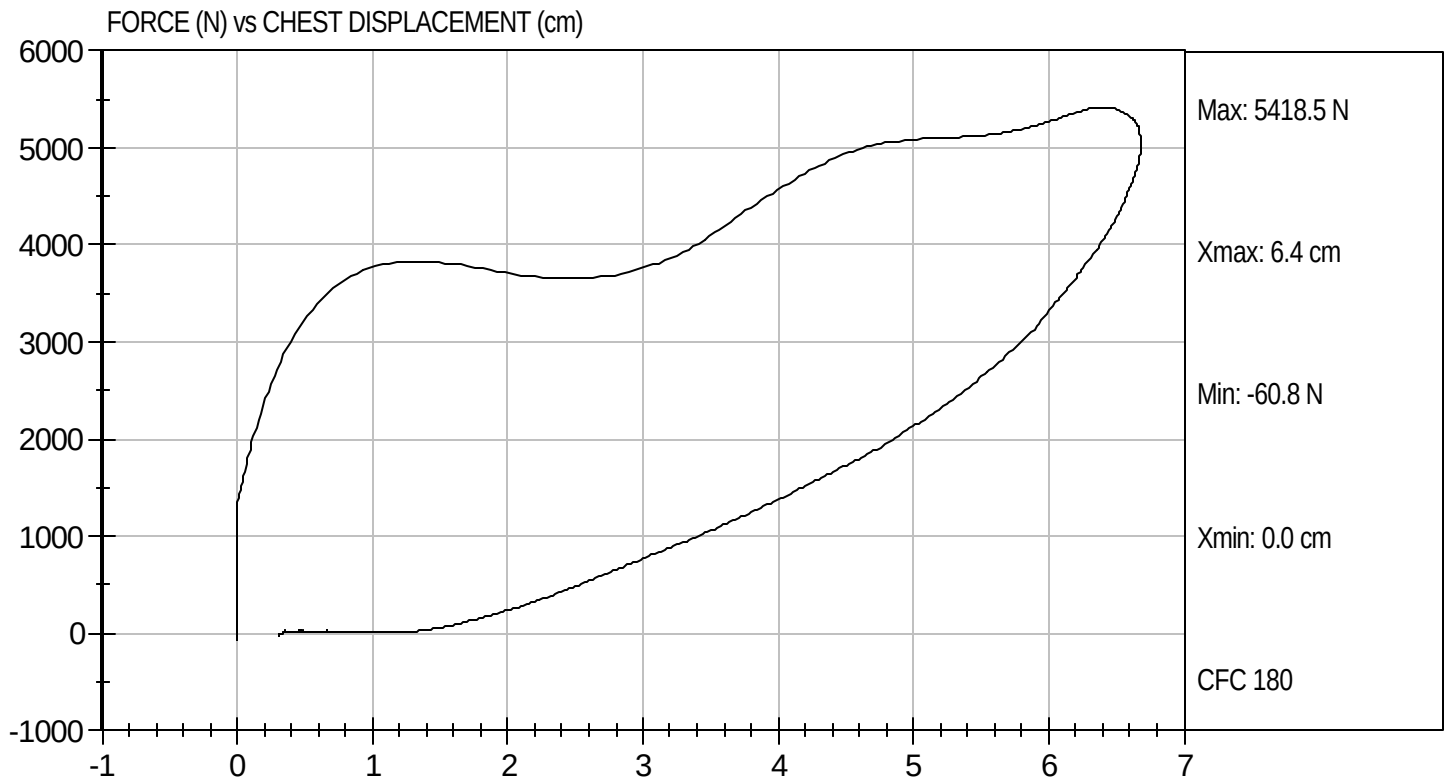
1/7/08
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D08004

Test Date: 1/7/08
Velocity: 21.92 ft/s, 6.68 m/s



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 202

Test I.D: D08005

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,165	Pass
Overall Test Results				Pass


Laboratory Technician

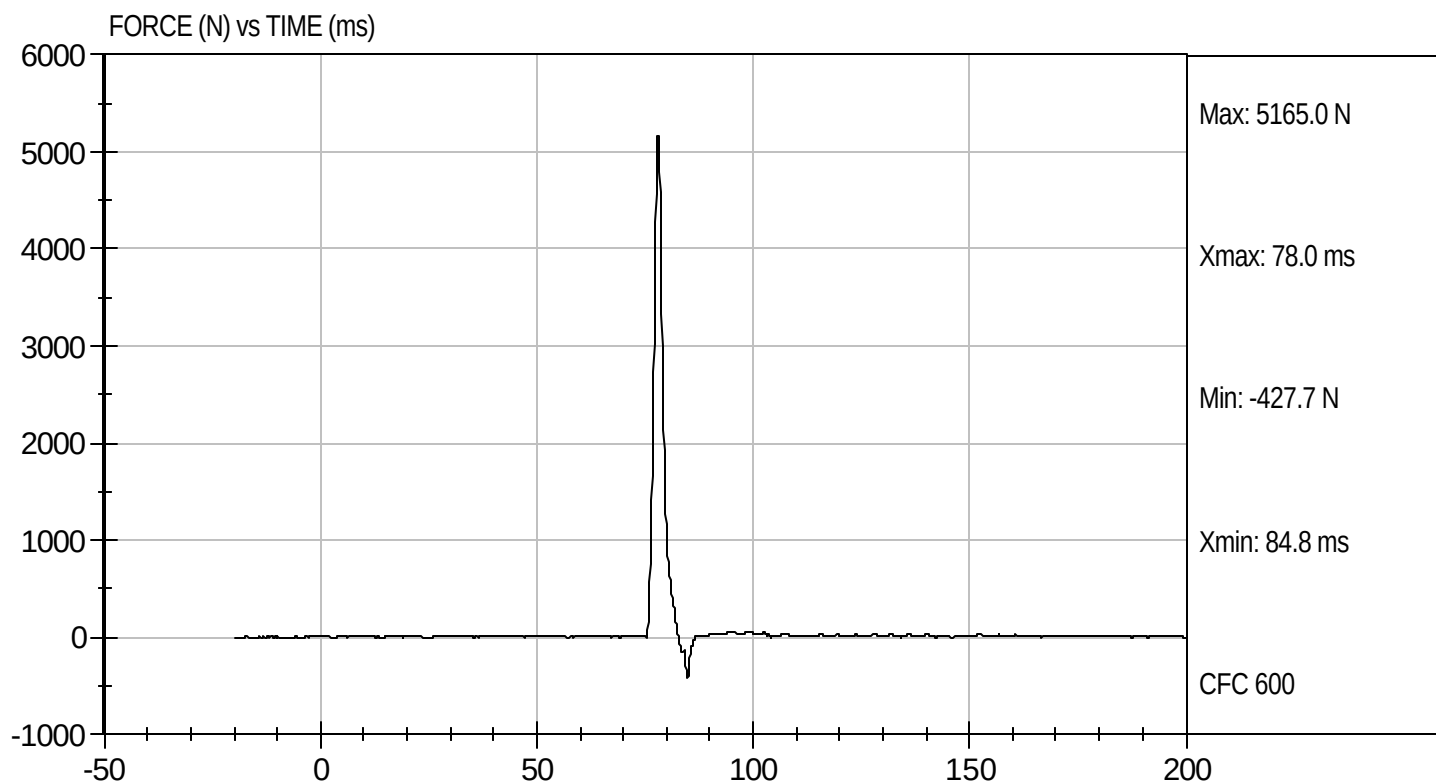
1/7/08
Test Date


Approved By



Test Desc: Right Knee
Component ID: D08005

Test Date: 1/7/08
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 202

Test I.D: D08006

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	4,862	Pass
Overall Test Results				Pass


Laboratory Technician

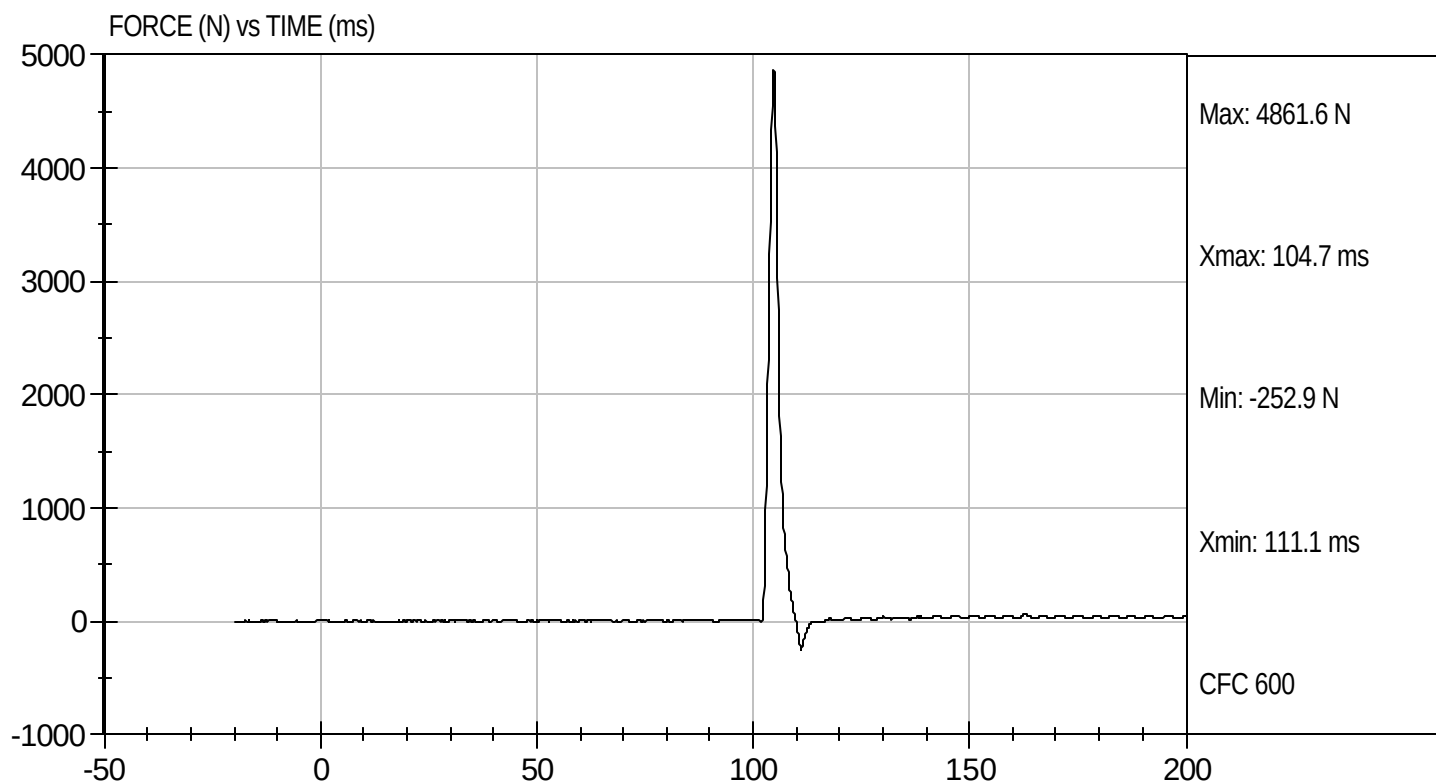
1/7/08
Test Date


Approved By



Test Desc: Left Knee
Component ID: D08006

Test Date: 1/7/08
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 202

Test I.D: D08000

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	18	18	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	83.1	77.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	41	42	Pass
Overall Test Results					Pass


 Laboratory Technician

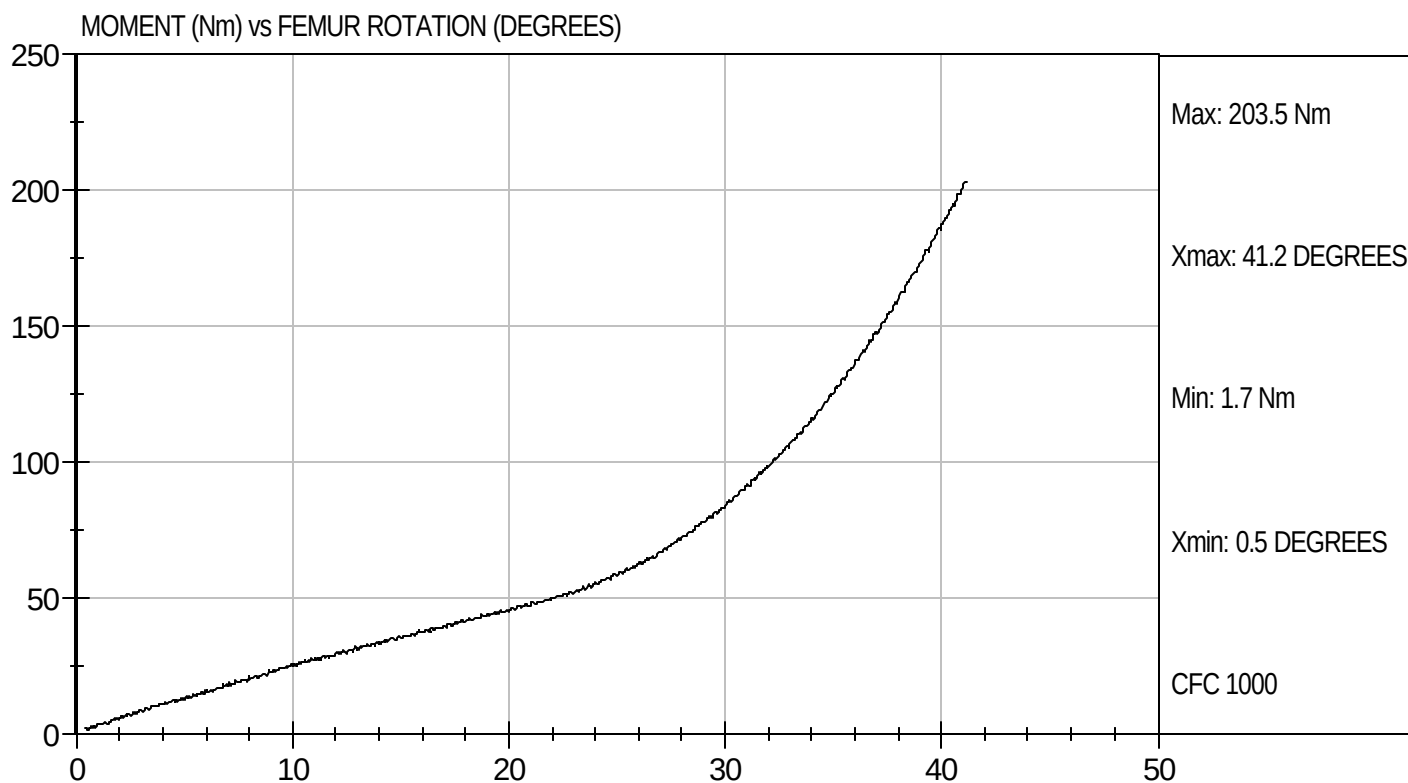
1/4/08
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D08009

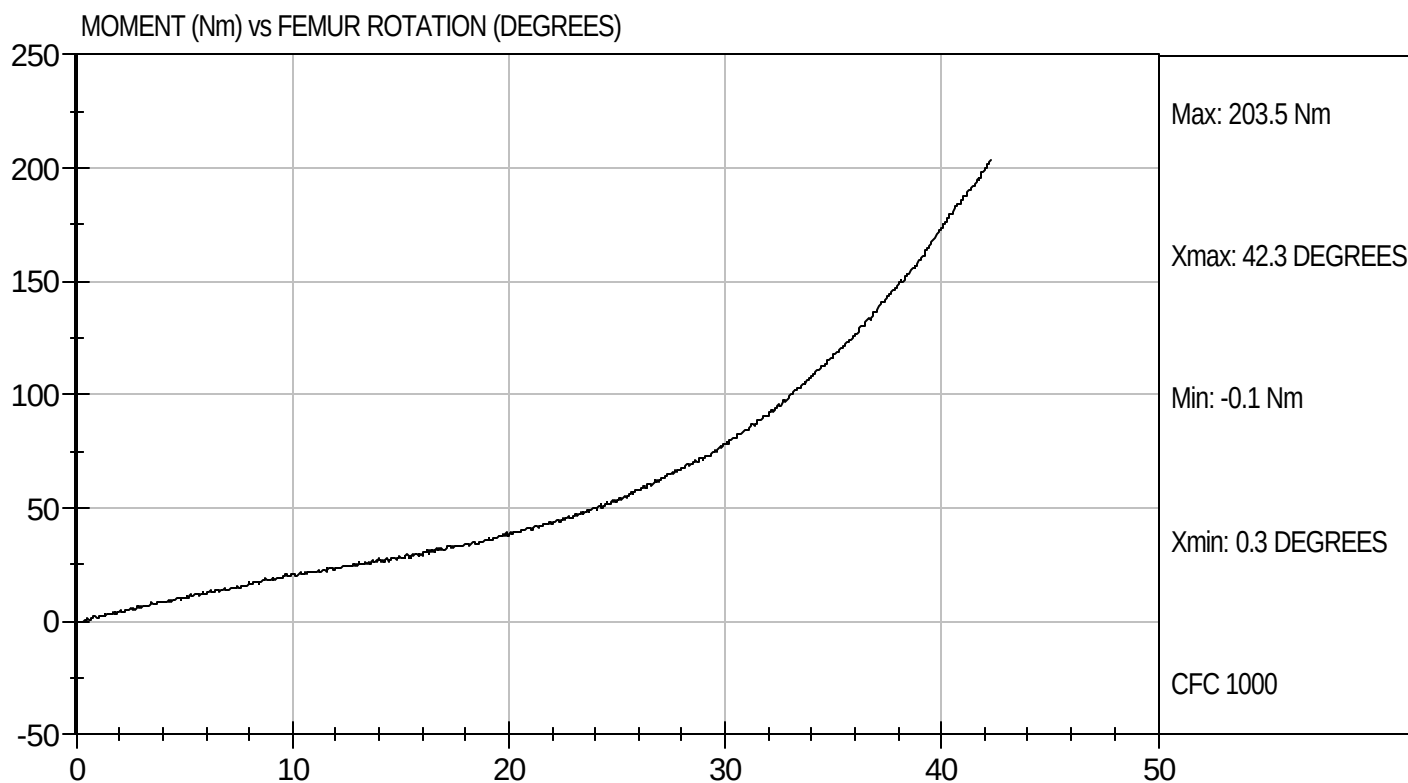
Test Date: 1/4/08
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D08000

Test Date: 1/4/08
Velocity: 0 ft/s, 0.00 m/s



CERTIFICATION DATA

Thor-Lx Legs #036 & #037

Installed in Hybrid III 50th Percentile Male Dummy #202

Test Performer: Vehicle Research and Test Center

Test Type: Dorsiflexion/Ball of Foot

Test Name: LX0036_19DEC07_DORSI_02

Test Date: 12/19/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(4.9 - 5.1)	4.97	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	27	Pass	
Peak Tibia Compressive Load (N)	(2956 - 3613)	3259.632	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(77.1 - 94.2)	77.124	Pass	Channel ANKLE MOMENT
Peak Ankle Y-axis Rotation (°)	(32.7 - 39.9)	35.293	Pass	Channel ANKRY

Test Performer: Vehicle Research and Test Center

Test Type: Heel of Foot

Test Name: LX0036_20DEC07_HEEL_03

Test Date: 12/20/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(3.9 - 4.1)	3.98	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	37	Pass	
Peak Tibia Compressive Load (N)	(2738 - 3346)	2755.950	Pass	Channel LTIBFZ

Test Performer: Vehicle Research and Test Center

Test Type: Eversion

Test Name: LX0036_19DEC07_EVER_01

Test Date: 12/19/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(1.9 - 2.1)	1.98	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	25	Pass	
Peak Tibia Compressive Load (N)	(552 - 675)	617.374	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(36.3 - 44.4)	40.916	Pass	Channel ANKLE MOMENT
Peak Ankle X-axis Rotation (°)	(-30.3 - -37.0)	-33.917	Pass	Channel ANKRX

Test Performer: Vehicle Research and Test Center

Test Type: Inversion

Test Name: LX0036_19DEC07_INVER_01

Test Date: 12/19/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(1.9 - 2.1)	2.00	Pass	
Temperature (°C)	(20.6 - 22.2)	22.1	Pass	
Relative Humidity (%)	(N/A)	25	Pass	
Peak Tibia Compressive Load (N)	(552 - 675)	640.921	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(-36.3 - -44.4)	-40.060	Pass	Channel ANKLE MOMENT
Peak Ankle X-axis Rotation (°)	(30.3 - 37.0)	32.901	Pass	Channel ANKRX

Test Performer: Vehicle Research and Test Center

Test Type: Dorsiflexion/Ball of Foot

Test Name: LX0037_12DEC07_DORSI_01

Test Date: 12/26/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(4.9 - 5.1)	5.04	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	33	Pass	
Peak Tibia Compressive Load (N)	(2956 - 3613)	3289.176	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(77.1 - 94.2)	84.367	Pass	Channel ANKLE MOMENT
Peak Ankle Y-axis Rotation (°)	(32.7 - 39.9)	33.943	Pass	Channel ANKRY

Test Performer: Vehicle Research and Test Center

Test Type: Heel of Foot

Test Name: LX0037_14DEC07_HEEL_01

Test Date: 12/14/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(3.9 - 4.1)	3.90	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	28	Pass	
Peak Tibia Compressive Load (N)	(2738 - 3346)	2982.207	Pass	Channel LTIBFZ

Test Performer: Vehicle Research and Test Center

Test Type: Eversion

Test Name: LX0037_13DEC07_EVER_01

Test Date: 12/13/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(1.9 - 2.1)	2.01	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	33	Pass	
Peak Tibia Compressive Load (N)	(552 - 675)	687.630	Fail	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(-36.3 - -44.4)	-42.357	Pass	Channel ANKLE MOMENT
Peak Ankle X-axis Rotation (°)	(30.3 - 37.0)	31.428	Pass	Channel ANKRX

Test Performer: Vehicle Research and Test Center

Test Type: Inversion

Test Name: LX0037_13DEC07_INVER_01

Test Date: 12/13/2007

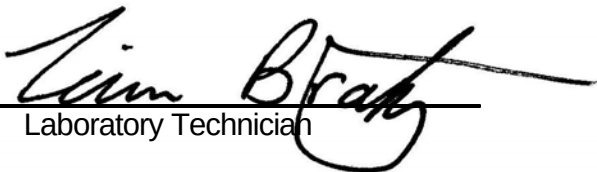
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Velocity (M/Sec)	(1.9 - 2.1)	2.00	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	33	Pass	
Peak Tibia Compressive Load (N)	(552 - 675)	631.205	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(36.3 - 44.4)	40.369	Pass	Channel ANKLE MOMENT
Peak Ankle X-axis Rotation (°)	(-30.3 - -37.0)	-34.108	Pass	Channel ANKRX

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 206

Test ID: D08011

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	225 - 275	233	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-10.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

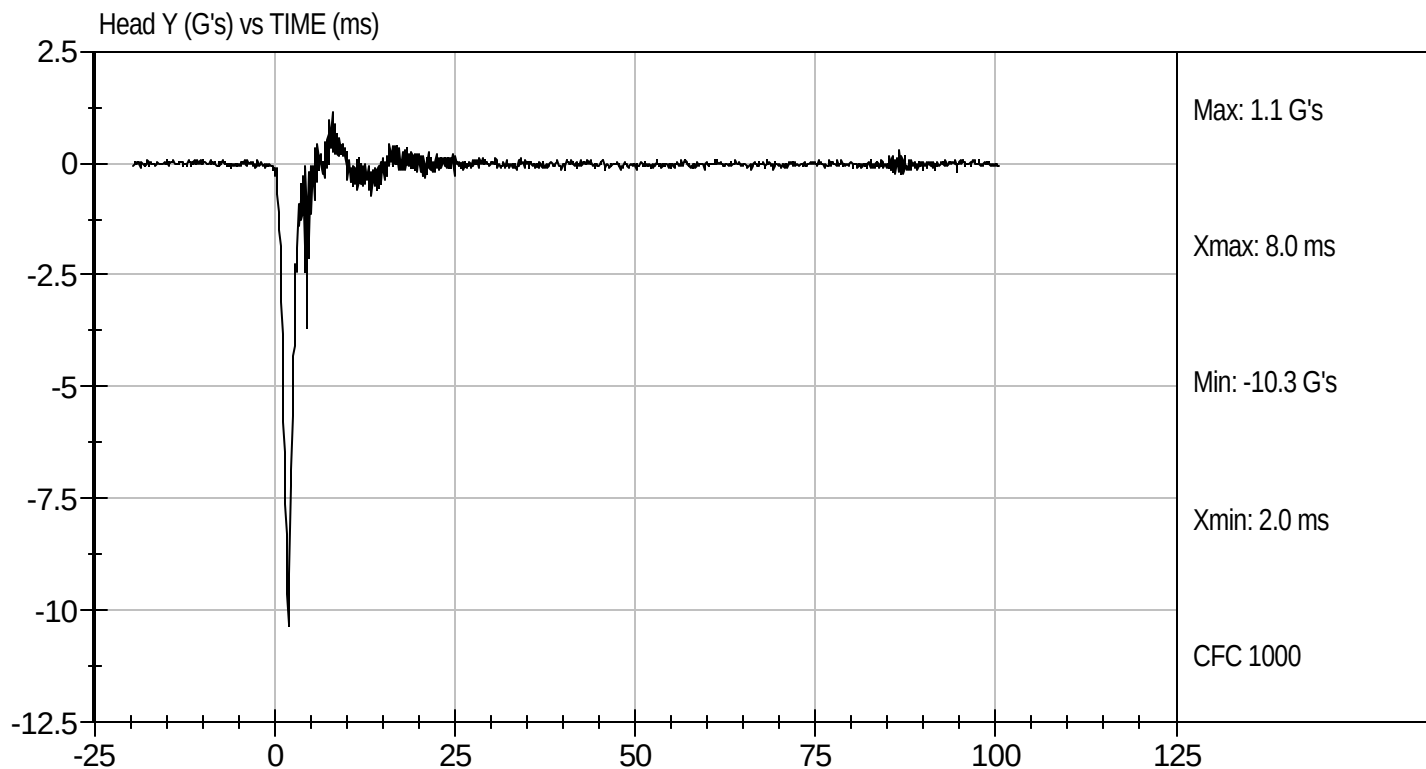
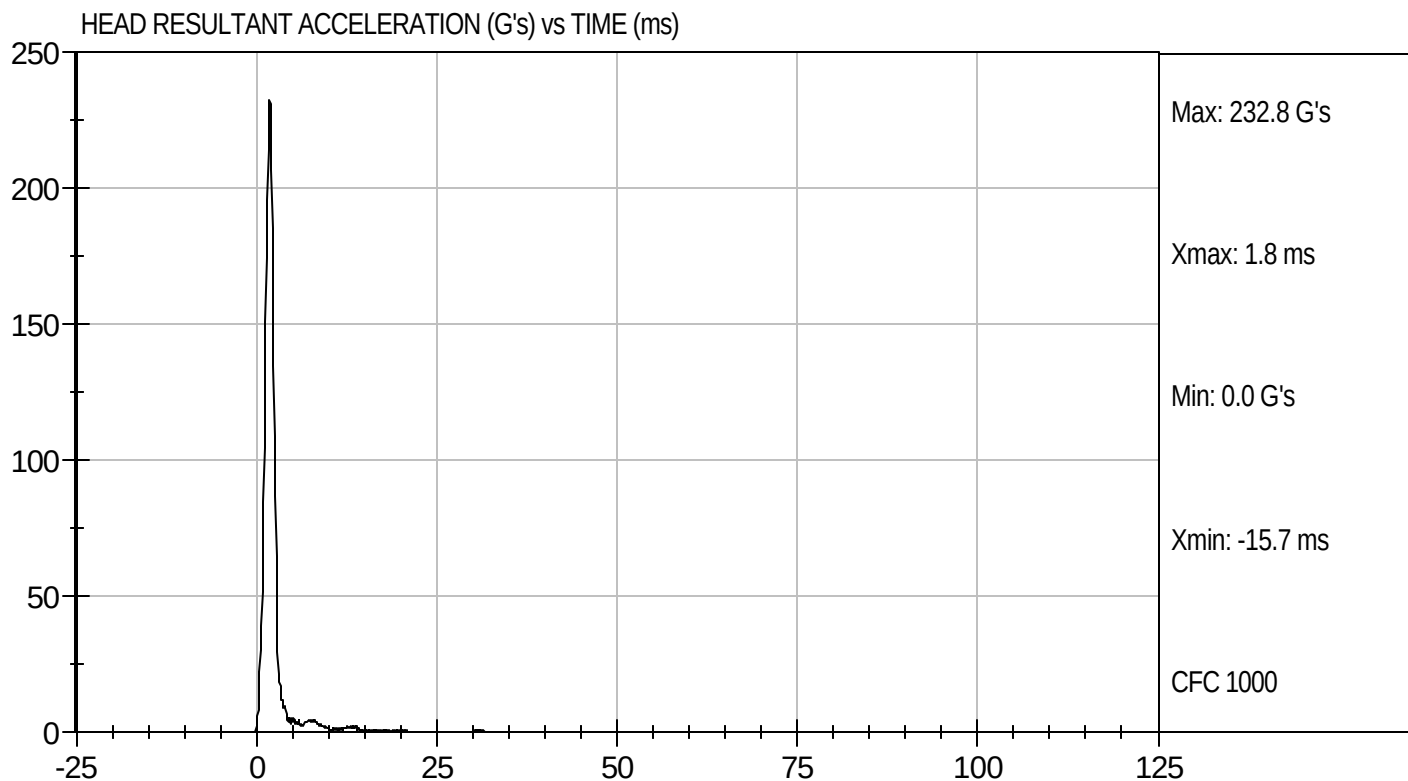
1/4/08
Test Date


Approved By



Test Desc: Head Drop
Component ID: D08011

Test Date: 1/4/08
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 206

Test I.D.: D08012

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.05	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	22.77	Pass
	20 msec	G's	17.60 to 22.60	19.43	Pass
	30 msec	G's	12.50 to 18.50	14.84	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.81	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	35.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.7	Pass
	Time	msec	57.0 to 64.0	59.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	116.9	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	92.5	Pass
	Time	msec	47.0 to 58.0	48.3	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	101.6	Pass
Overall Test Results					Pass


 Laboratory Technician

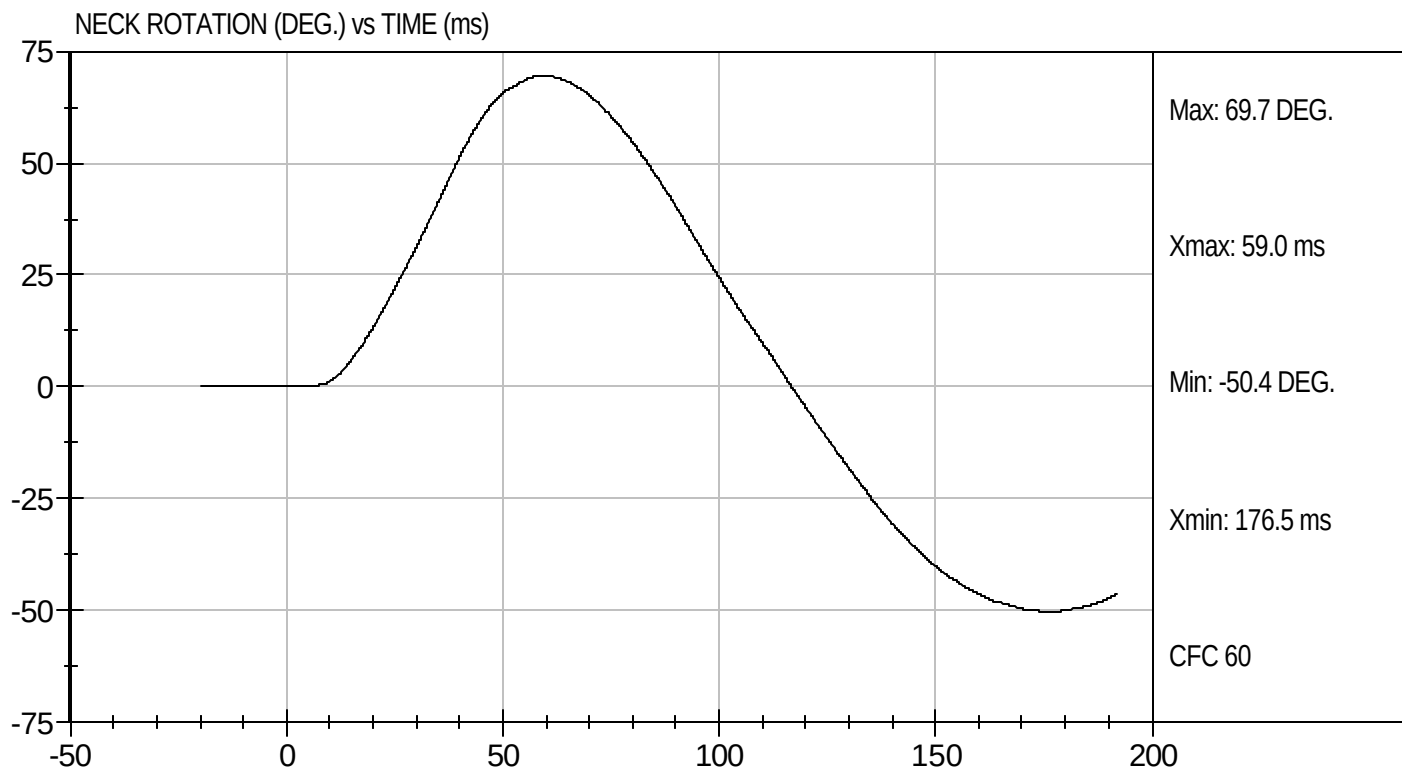
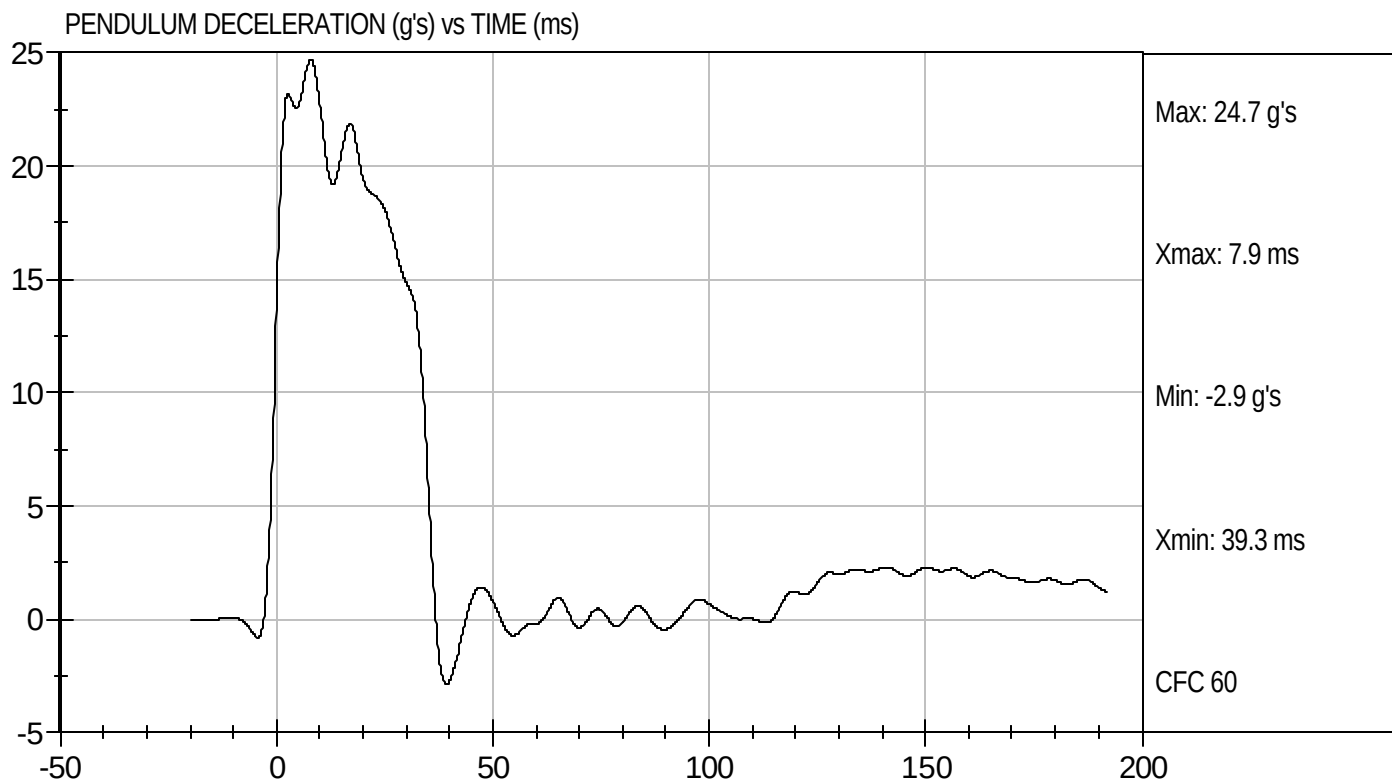
1/4/08
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D08012

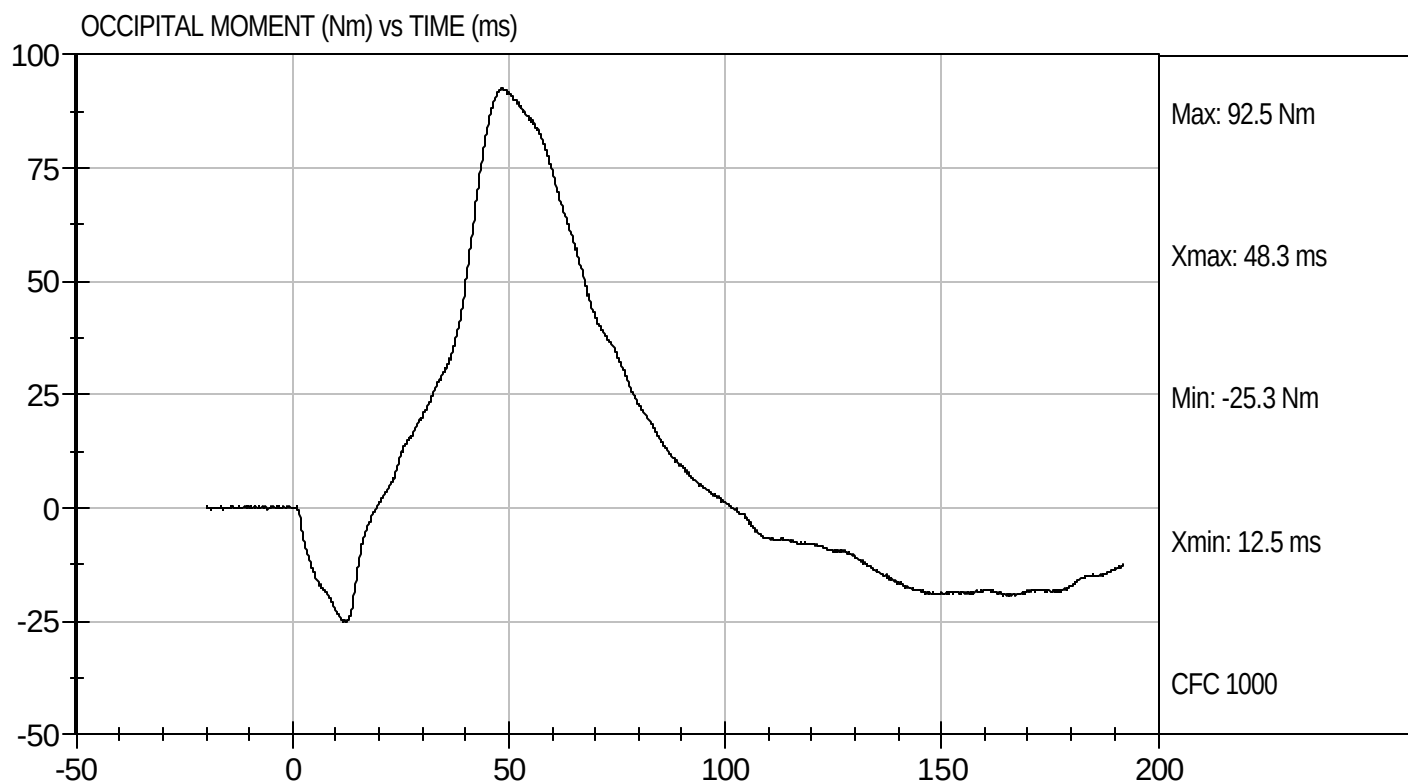
Test Date: 1/4/08
Velocity: 23.14 ft/s, 7.05 m/s





Test Desc: Neck Flexion
Component ID: D08012

Test Date: 1/4/08
Velocity: 23.14 ft/s, 7.05 m/s



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 206

Test I.D.: D08013

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	18	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	18.20	Pass
	20 msec	G's	14.00 to 19.00	15.74	Pass
	30 msec	G's	11.00 to 16.00	11.37	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	11.37	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	40.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	94.3	Pass
	Time	msec	72.0 to 82.0	75.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	159.6	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-62.8	Pass
	Time	msec	65.0 to 79.0	71.5	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	138.9	Pass
Overall Test Results					Pass


 Laboratory Technician

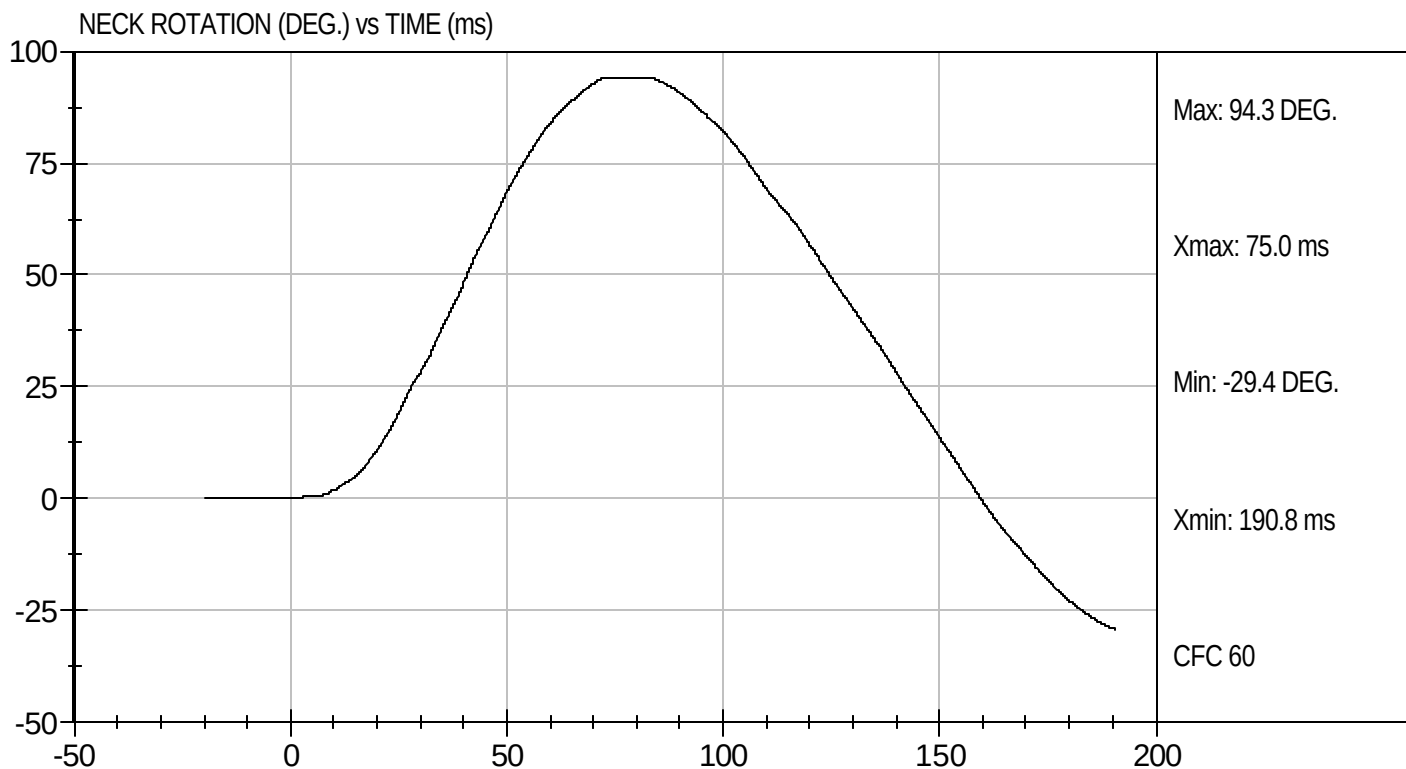
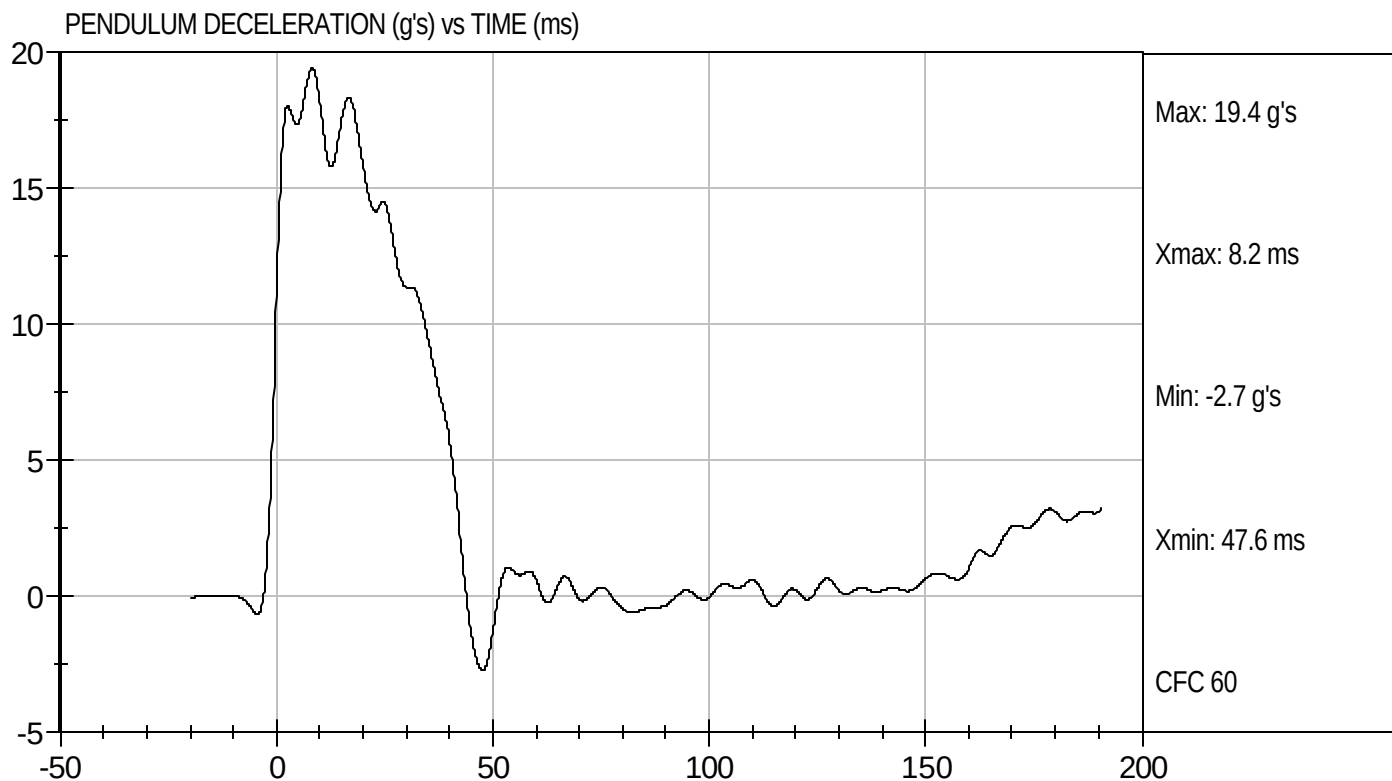
1/4/08
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D08013

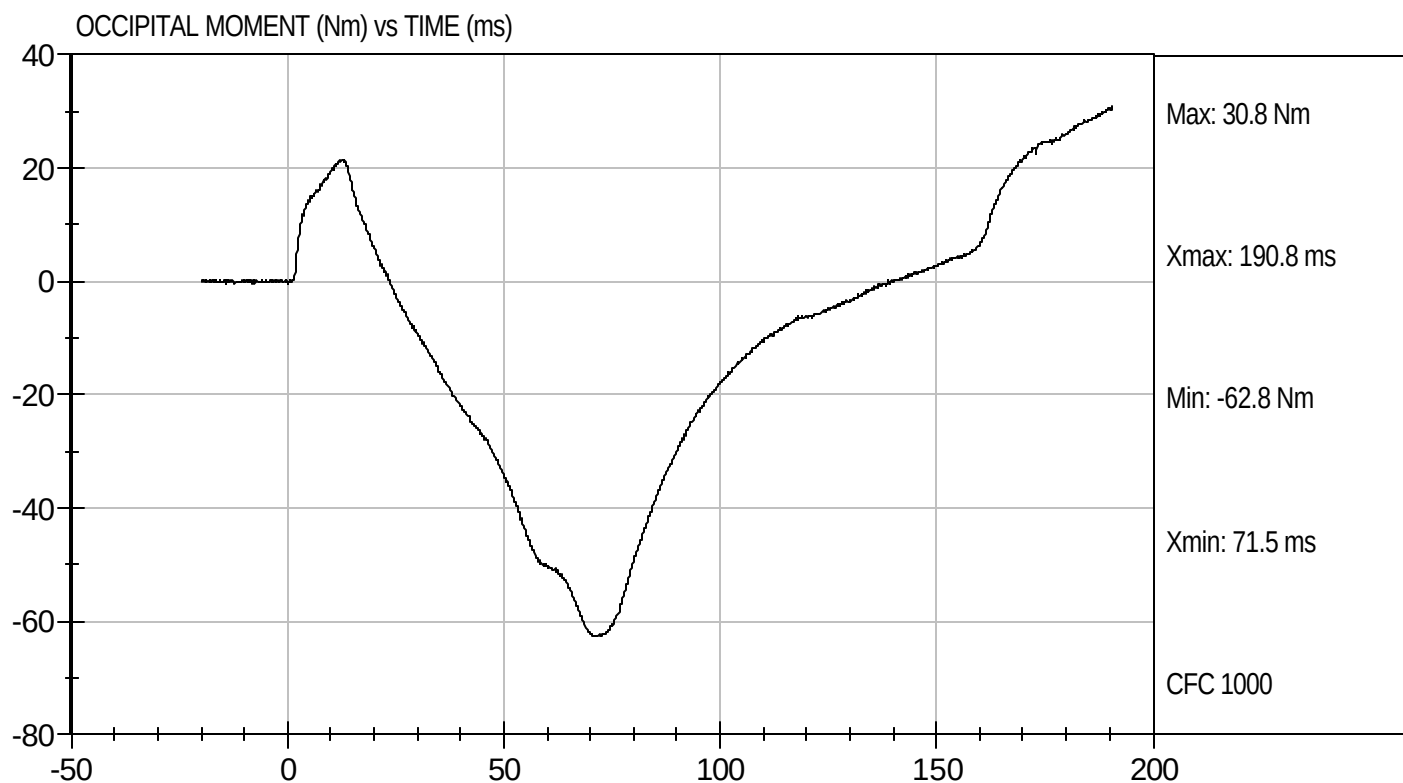
Test Date: 1/4/08
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D08013

Test Date: 1/4/08
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 206

Test I.D: D08014

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,451	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.63	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results			Pass	


Laboratory Technician

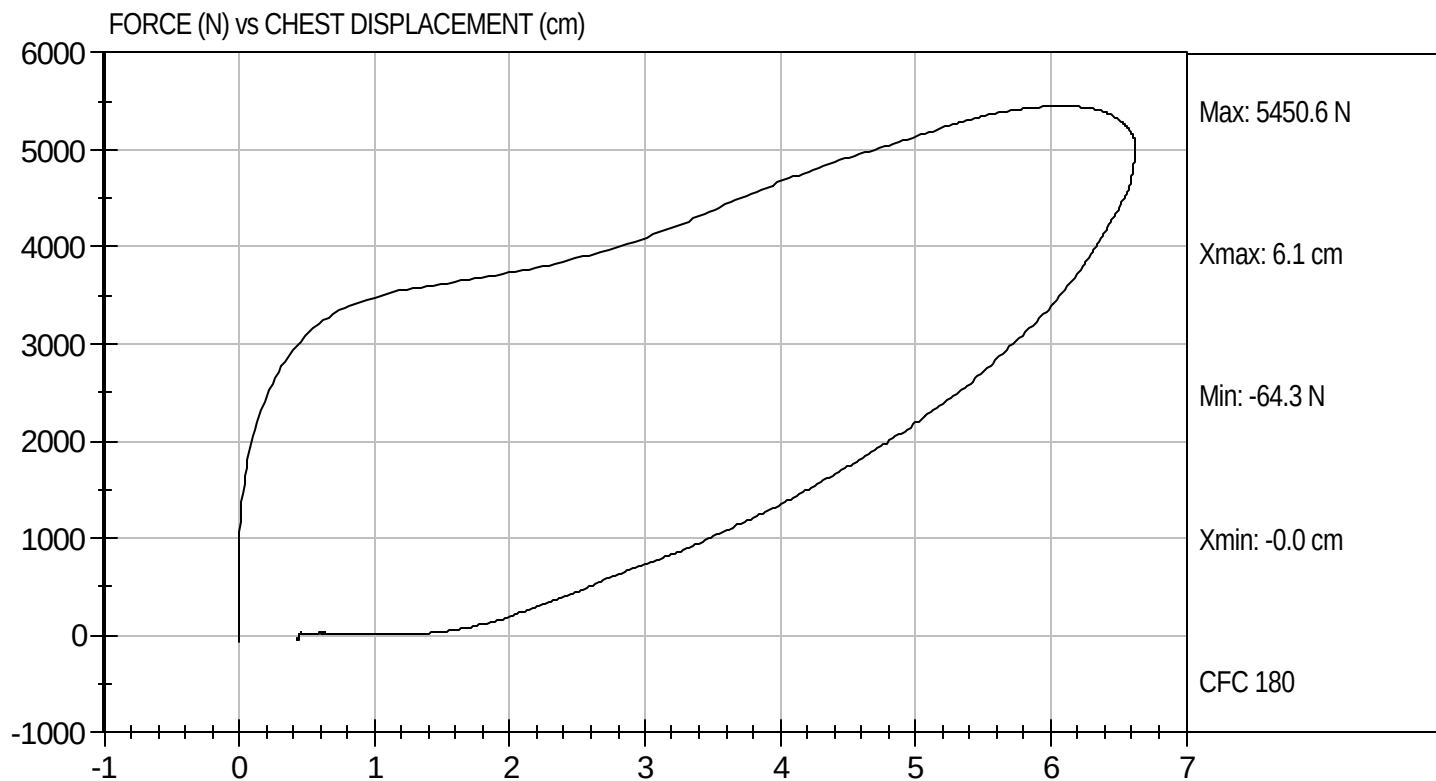
1/7/08
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D08014

Test Date: 1/7/08
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 206

Test I.D: D08015

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	4,839	Pass
Overall Test Results				Pass


Laboratory Technician

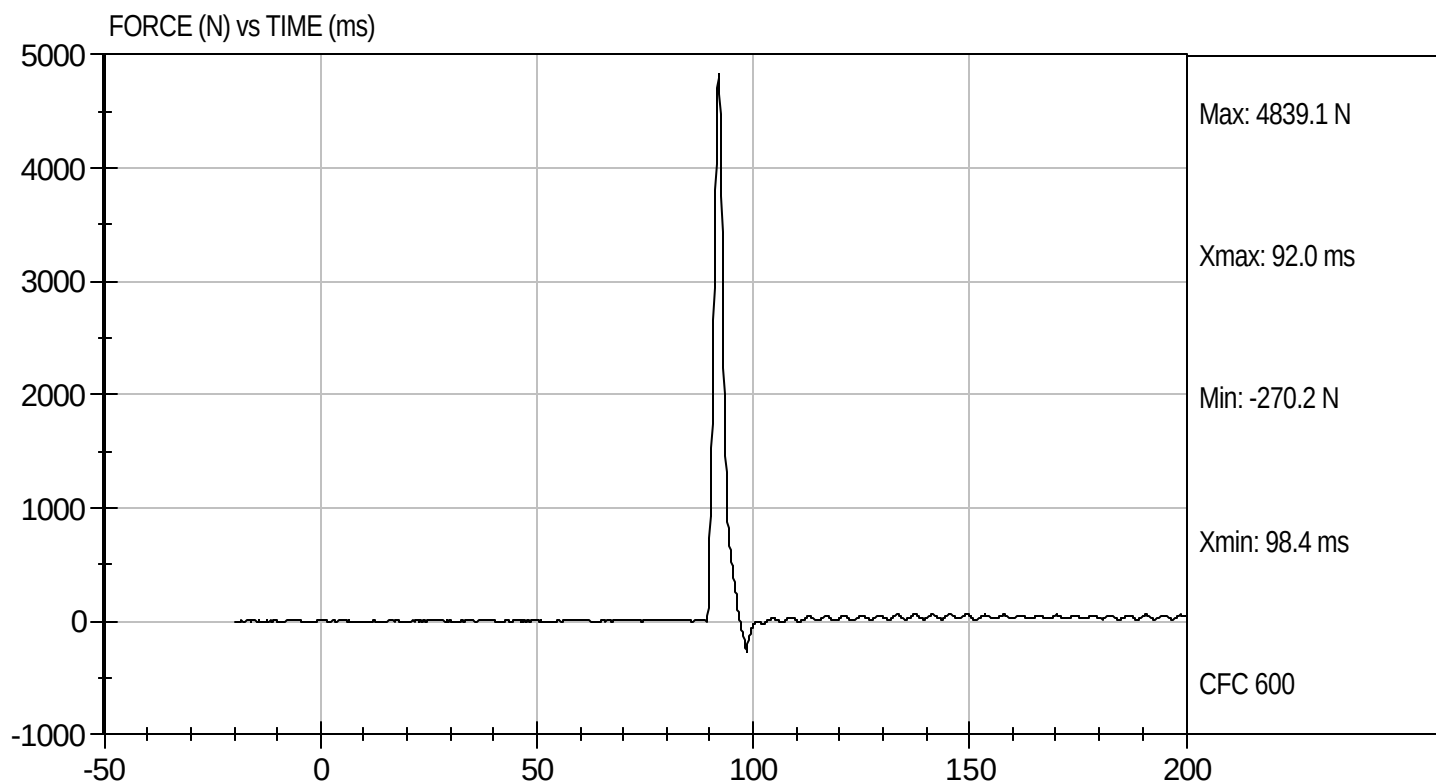
1/7/08
Test Date


Approved By



Test Desc: Right Knee
Component ID: D08015

Test Date: 1/7/08
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 206

Test I.D: D08016

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	4,846	Pass
Overall Test Results				Pass


Laboratory Technician

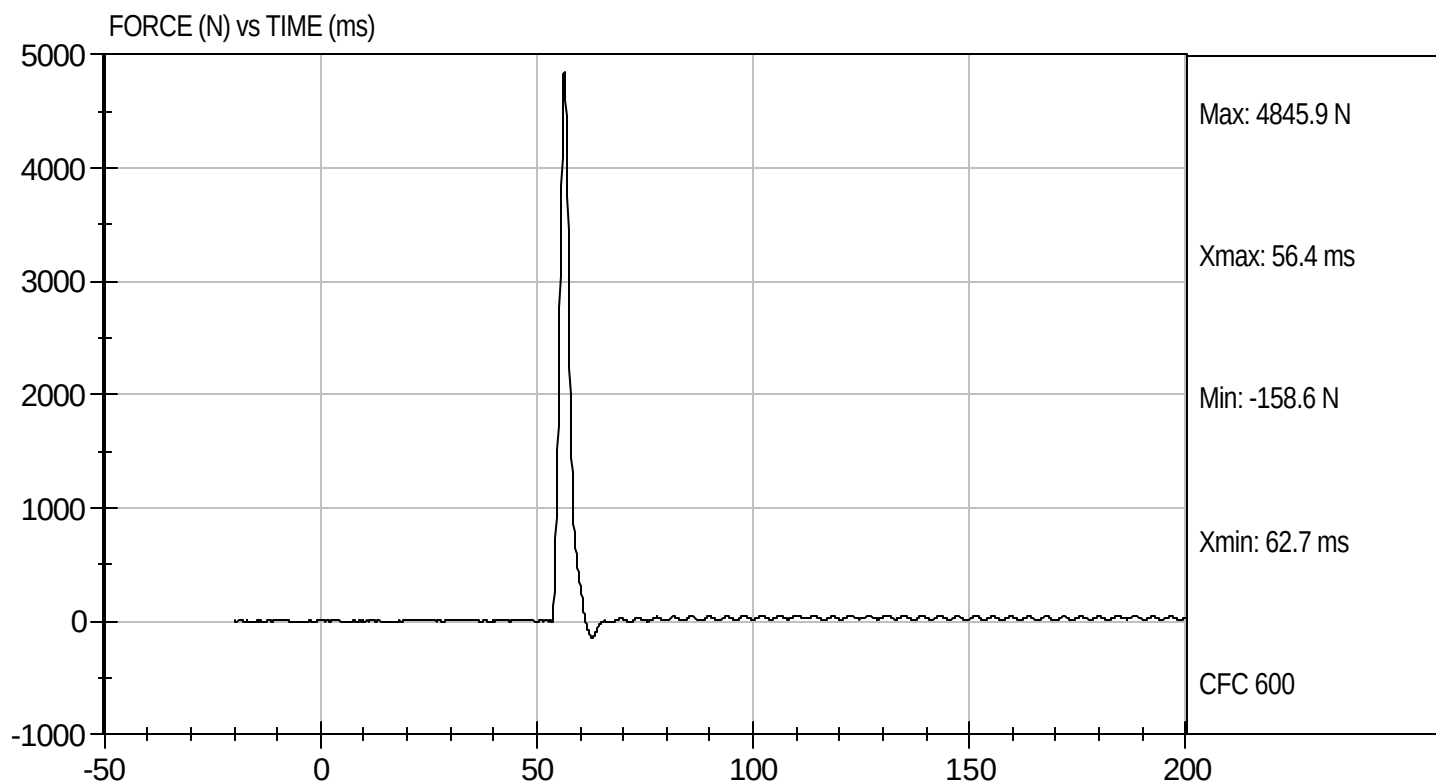
1/7/08
Test Date


Approved By



Test Desc: Left Knee
Component ID: D08016

Test Date: 1/7/08
Velocity: 6.85 ft/s, 2.09 m/s

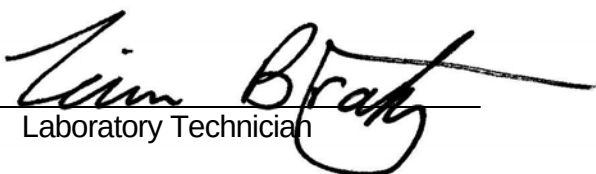


MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 206

Test I.D: D08010

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.8	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	17	17	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	72.5	59.8	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	42	44	Pass
Overall Test Results					Pass


Laboratory Technician

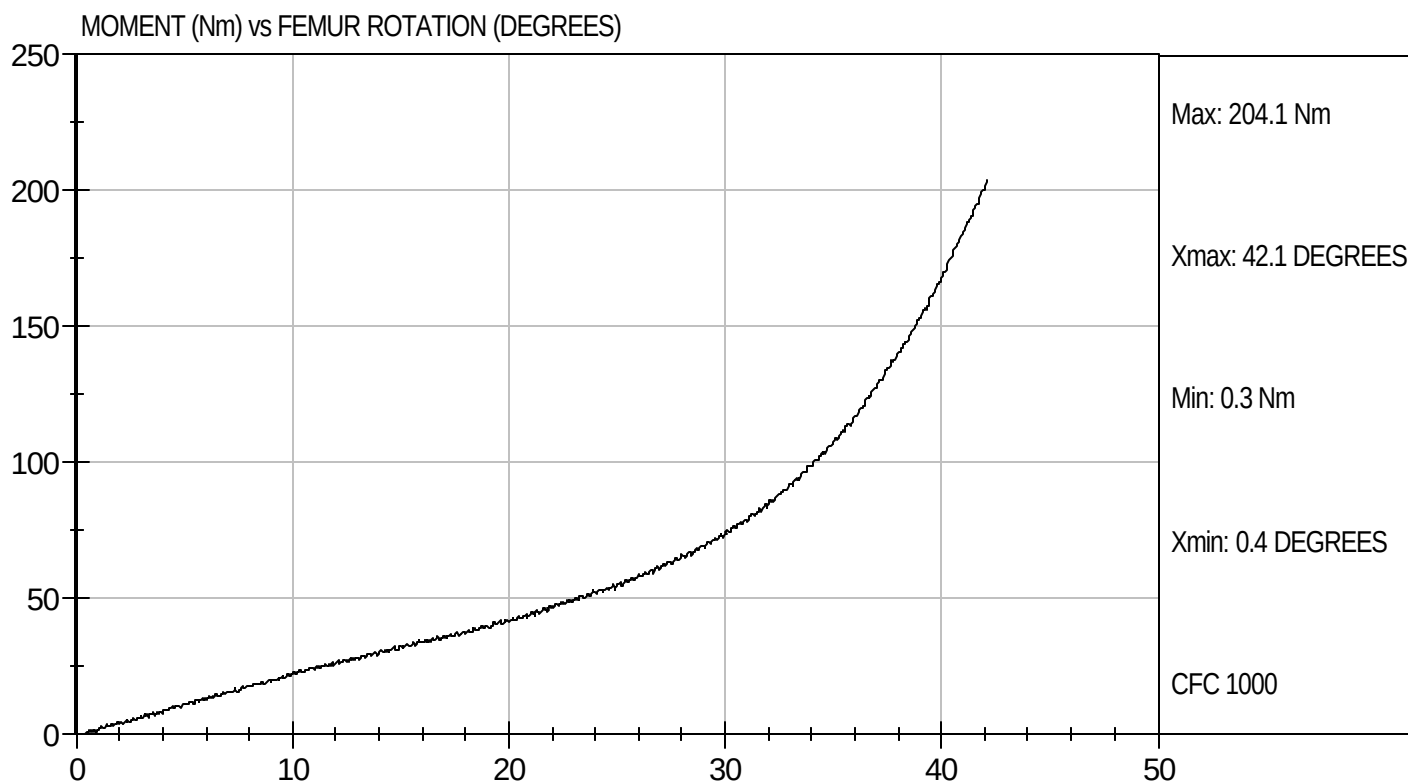
1/4/08
Test Date


Approved By



Test Desc: Hip Femur Flexion
Component ID: D08019

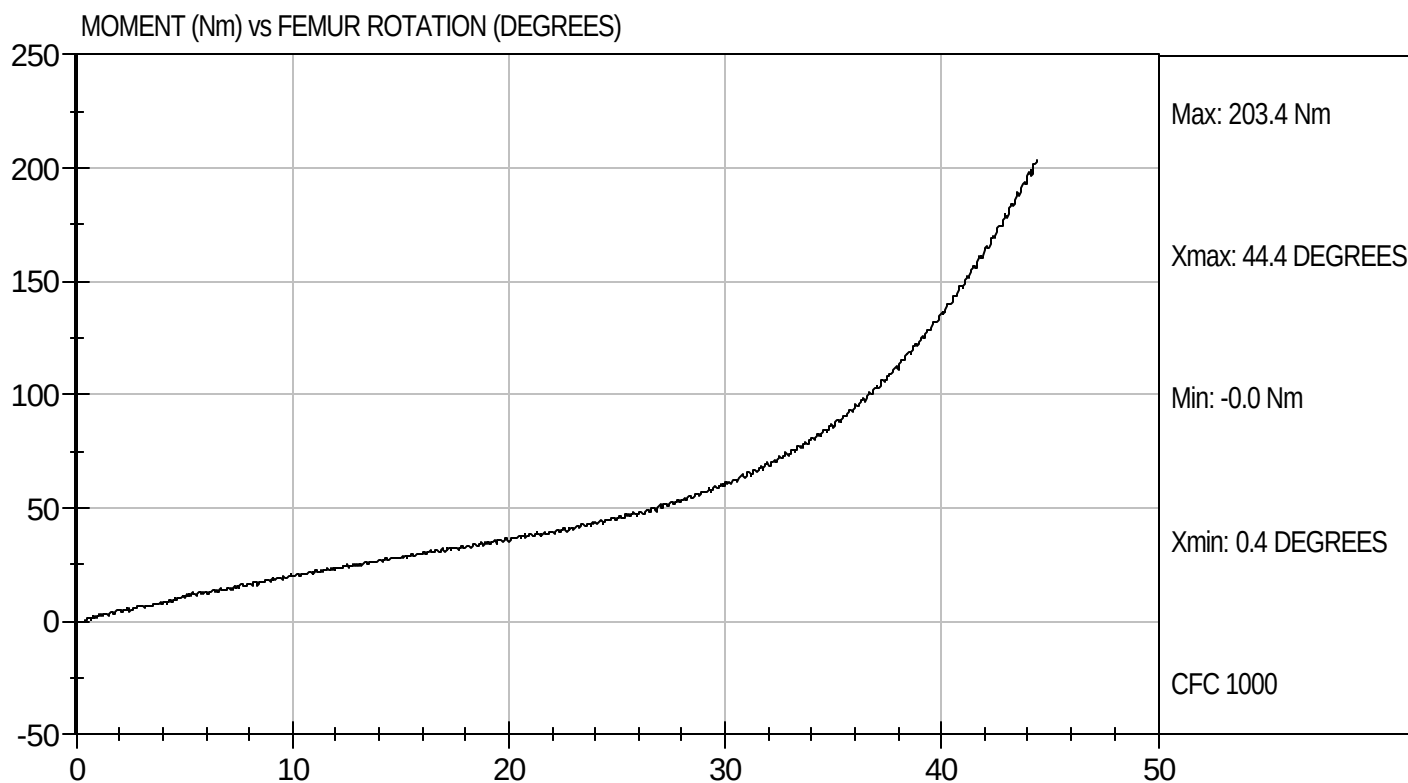
Test Date: 1/4/08
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D08010

Test Date: 1/4/08
Velocity: 0 ft/s, 0.00 m/s



CERTIFICATION DATA

Thor-Lx Legs #045 & #046

Installed in Hybrid III 50th Percentile Male Dummy #206

Test Performer: Vehicle Research and Test Center

Test Type: Dorsiflexion/Ball of Foot

Test Name: LX0045_20DEC07_DORSI_02

Test Date: 12/20/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(4.9 - 5.1)	4.95	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	32	Pass	
Peak Tibia Compressive Load (N)	(2956 - 3613)	3405.064	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(77.1 - 94.2)	76.161	Fail	Channel ANKLE MOMENT
Peak Ankle Y-axis Rotation (°)	(32.7 - 39.9)	33.762	Pass	Channel ANKRY

Test Performer: Vehicle Research and Test Center

Test Type: Heel of Foot

Test Name: LX0045_21DEC07_HEEL_01

Test Date: 12/21/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(3.9 - 4.1)	3.99	Pass	
Temperature (°C)	(20.6 - 22.2)	21.7	Pass	
Relative Humidity (%)	(N/A)	43	Pass	
Peak Tibia Compressive Load (N)	(2738 - 3346)	2981.474	Pass	Channel LTIBFZ

Test Performer: Vehicle Research and Test Center

Test Type: Eversion

Test Name: LX0045_20DEC07_EVER_01

Test Date: 12/20/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(1.9 - 2.1)	1.98	Pass	
Temperature (°C)	(20.6 - 22.2)	21.9	Pass	
Relative Humidity (%)	(N/A)	42	Pass	
Peak Tibia Compressive Load (N)	(552 - 675)	653.499	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(-36.3 - -44.4)	-42.979	Pass	Channel ANKLE MOMENT
Peak Ankle X-axis Rotation (°)	(30.3 - 37.0)	34.157	Pass	Channel ANKRX

Test Performer: Vehicle Research and Test Center

Test Type: Inversion

Test Name: LX0045_20DEC07_INVER_01

Test Date: 12/20/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(1.9 - 2.1)	2.00	Pass	
Temperature (°C)	(20.6 - 22.2)	21.9	Pass	
Relative Humidity (%)	(N/A)	39	Pass	
Peak Tibia Compressive Load (N)	(552 - 675)	565.271	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(36.3 - 44.4)	39.346	Pass	Channel ANKLE MOMENT
Peak Ankle X-axis Rotation (°)	(-30.3 - -37.0)	-34.633	Pass	Channel ANKRX

Test Performer: Vehicle Research and Test Center

Test Type: Dorsiflexion/Ball of Foot

Test Name: LX0046_26DEC2007 DORSI 01

Test Date: 12/26/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(4.9 - 5.1)	4.99	Pass	
Temperature (°C)	(20.6 - 22.2)	21.9	Pass	
Relative Humidity (%)	(N/A)	40	Pass	
Peak Tibia Compressive Load (N)	(2956 - 3613)	3167.941	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(77.1 - 94.2)	81.155	Pass	Channel ANKLE MOMENT
Peak Ankle Y-axis Rotation (°)	(32.7 - 39.9)	33.645	Pass	Channel ANKRY

Test Performer: Vehicle Research and Test Center

Test Type: Heel of Foot

Test Name: LX0046_26DEC2007 HEEL 01

Test Date: 12/26/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(3.9 - 4.1)	3.97	Pass	
Temperature (°C)	(20.6 - 22.2)	22.2	Pass	
Relative Humidity (%)	(N/A)	38	Pass	
Peak Tibia Compressive Load (N)	(2738 - 3346)	2922.693	Pass	Channel LTIBFZ

Test Performer: Vehicle Research and Test Center

Test Type: Eversion

Test Name: LX0046_26DEC2007 EVER 01

Test Date: 12/26/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(1.9 - 2.1)	1.97	Pass	
Temperature (°C)	(20.6 - 22.2)	22.1	Pass	
Relative Humidity (%)	(N/A)	40	Pass	
Peak Tibia Compressive Load (N)	(552 - 675)	647.880	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(36.3 - 44.4)	42.929	Pass	Channel ANKLE MOMENT
Peak Ankle X-axis Rotation (°)	(-30.3 - -37.0)	-34.110	Pass	Channel ANKRX

Test Performer: Vehicle Research and Test Center

Test Type: Inversion

Test Name: LX0046_26DEC2007 INVER 01

Test Date: 12/26/2007

Test Parameter:	Specification:	Test Results:	Pass/Fail:	Notes:
Velocity (M/Sec)	(1.9 - 2.1)	1.98	Pass	
Temperature (°C)	(20.6 - 22.2)	21.9	Pass	
Relative Humidity (%)	(N/A)	40	Pass	
Peak Tibia Compressive Load (N)	(552 - 675)	636.513	Pass	Channel LTIBFZ
Peak Ankle Resistive Moment (N-m)	(-36.3 - -44.4)	-41.810	Pass	Channel ANKLE MOMENT
Peak Ankle X-axis Rotation (°)	(30.3 - 37.0)	34.081	Pass	Channel ANKRX

Transportation Research Center Inc.

Front Head Drop

HHH 10YO Serial No. D001 Certification No. 14-1

Test Date: 6/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	270.3 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	9.1 g	Yes
Is Acceleration Curve Unimodal	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

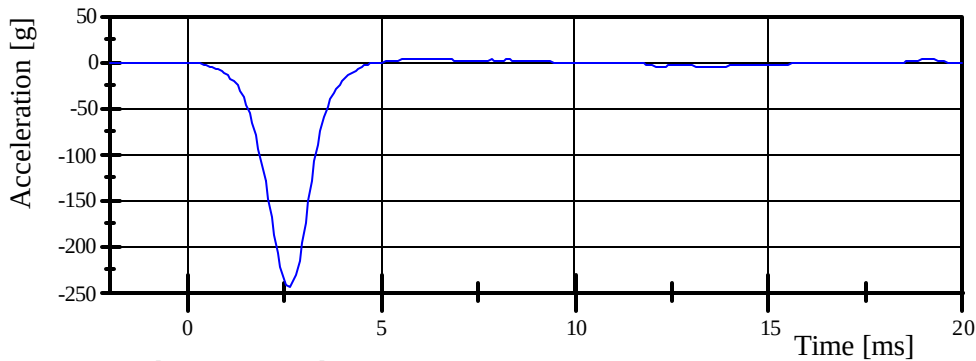
Transportation Research Center Inc.

Front Head Drop

HHH 10YO Serial No. D001 Certification No. 14-1

Test Date: 6/12/2007

Head X-Axis Acceleration

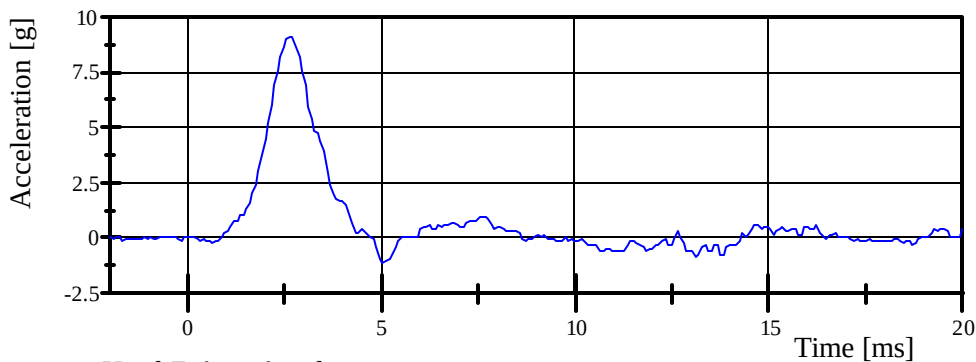


Filter Class: CFC_1000

Max: 4.4 g at 5.9 ms

Min: -243.9 g at 2.6 ms

Head Y-Axis Acceleration

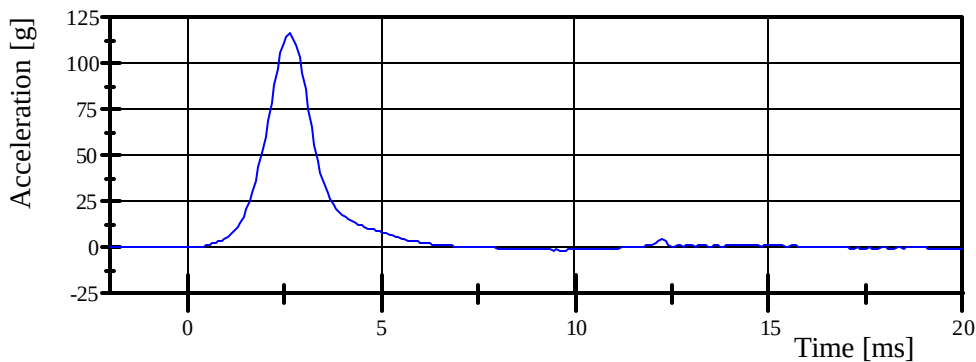


Filter Class: CFC_1000

Max: 9.1 g at 2.6 ms

Min: -1.1 g at 5.0 ms

Head Z-Axis Acceleration

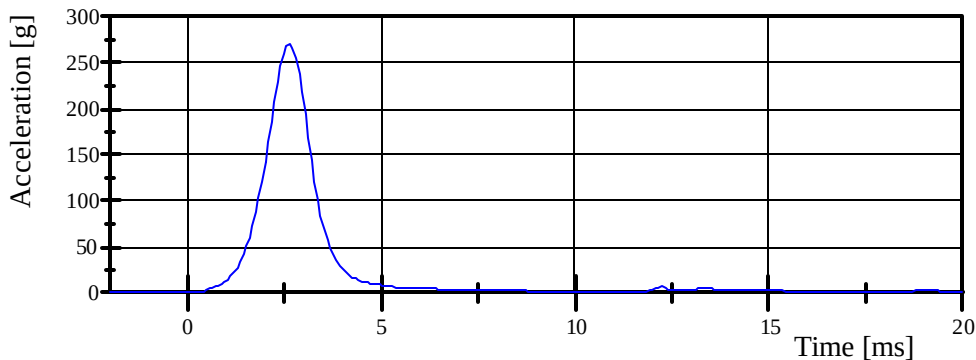


Filter Class: CFC_1000

Max: 116.1 g at 2.6 ms

Min: -1.3 g at 9.6 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 270.3 g at 2.6 ms

Min: 0.0 g at -1.6 ms

Transportation Research Center Inc.

Neck Flexion

HHH 10YO Serial No. D001 Certification No. 14-2

Test Date: 6/13/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Pendulum Impact Velocity	5.98 - 6.22 m/s	6.073 m/s	Yes
Pendulum Integrated Velocity at 10ms	(-1.64) - (-2.04) m/s	-1.648 m/s	Yes
Pendulum Integrated Velocity at 20ms	(-3.04) - (-4.04) m/s	-3.189 m/s	Yes
Pendulum Integrated Velocity at 30ms	(-4.45) - (-5.65) m/s	-4.692 m/s	Yes
Total Head D-Plane Rotation	(-76.0) - (-90.0) °	-82.31 °	Yes
Total Neck Occipital Condyles Moment Between -74° and -88° Rotation	50.0 - 62.0 Nm	52.09 Nm	Yes
Neck Occipital Condyles Moment Decay to 10 Nm	86.0 - 105.0 ms	100.64 ms	Yes

Test meets specifications.

Comments:

Technician

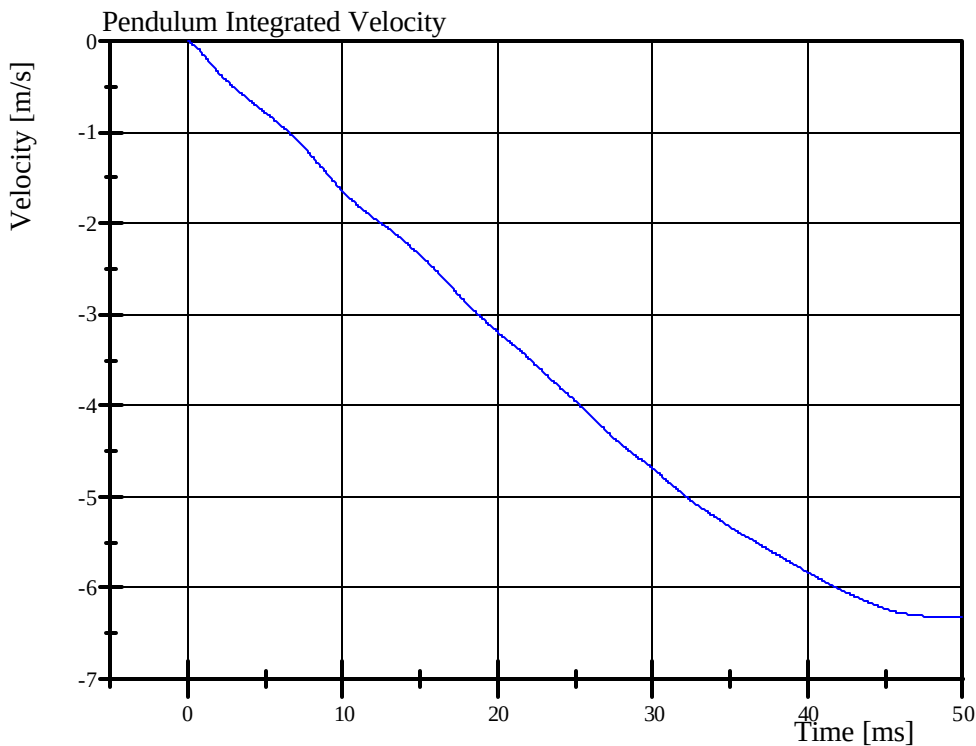
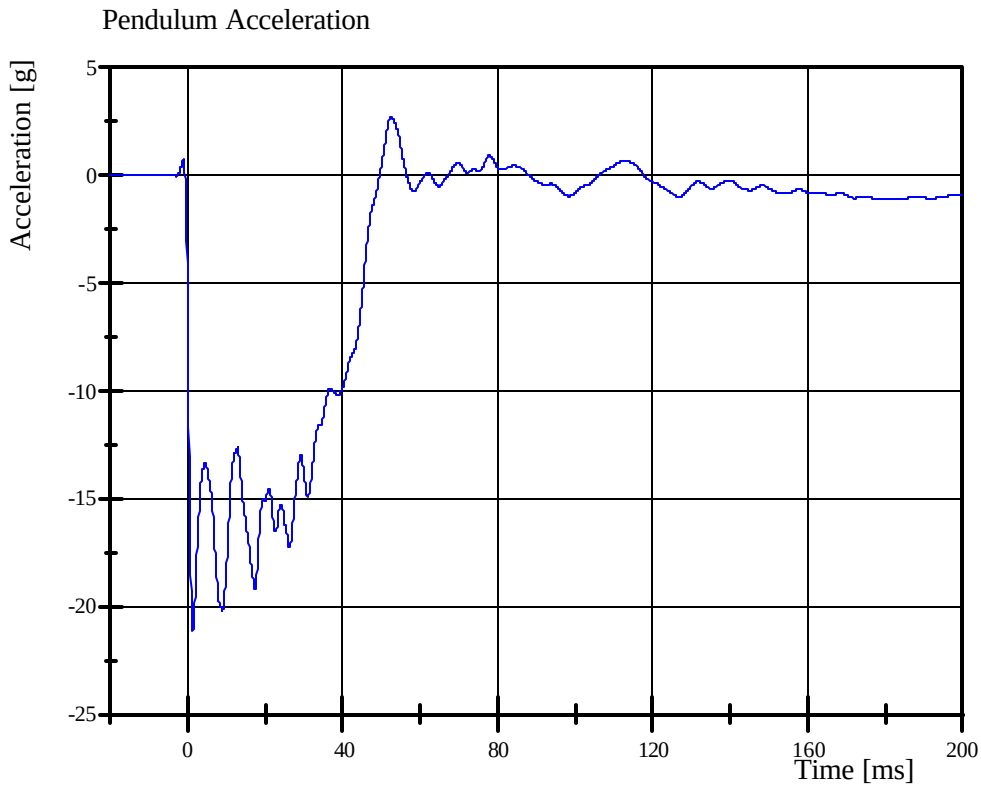
Approved

Transportation Research Center Inc.

Neck Flexion

HIH 10YO Serial No. D001 Certification No. 14-2

Test Date: 6/13/2007



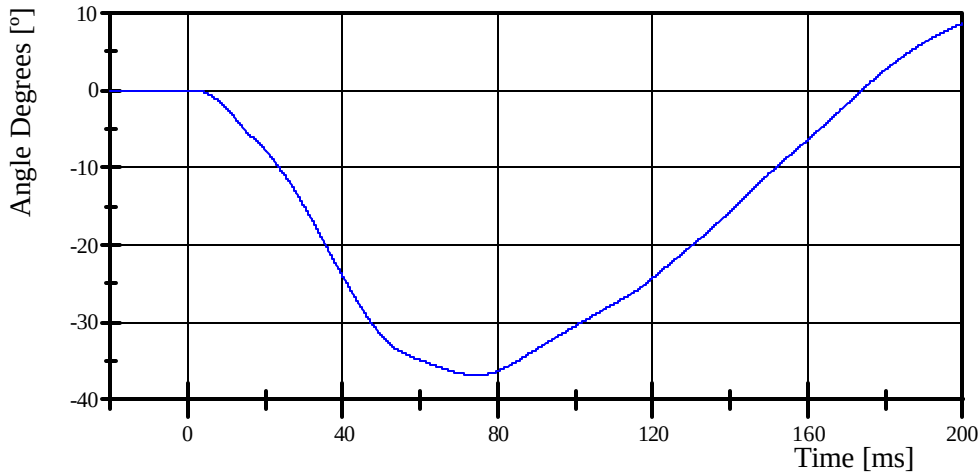
Transportation Research Center Inc.

Neck Flexion

HIII 10YO Serial No. D001 Certification No. 14-2

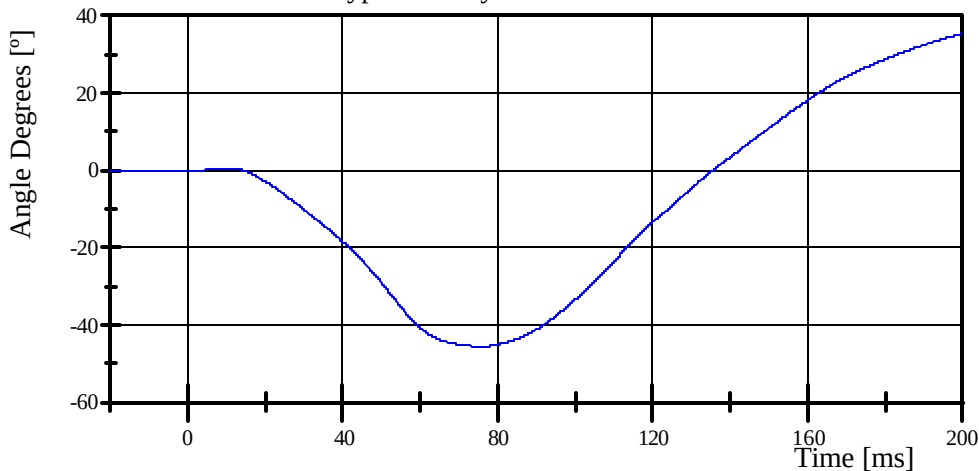
Test Date: 6/13/2007

Pot Rotation at the Base of Neck



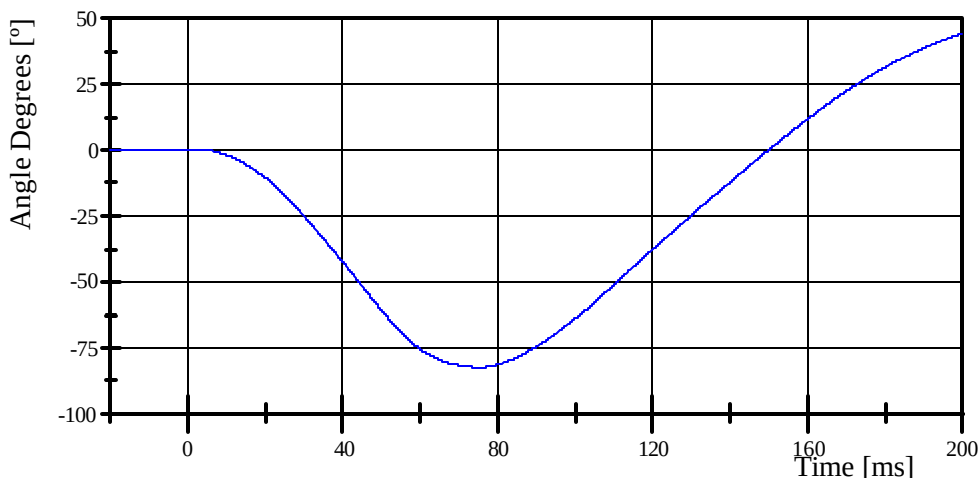
Filter Class: CFC_60
Max: 8.7 ° at 200.0 ms
Min: -36.8 ° at 74.3 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 35.4 ° at 200.0 ms
Min: -45.6 ° at 75.7 ms

Total Head D-Plane Rotation



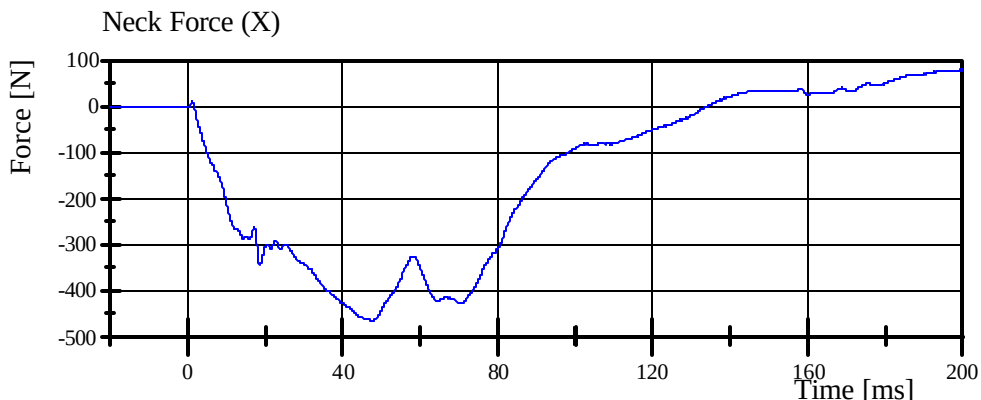
Filter Class: CFC_60
Max: 44.1 ° at 200.0 ms
Min: -82.3 ° at 75.3 ms

Transportation Research Center Inc.

Neck Flexion

HIII 10YO Serial No. D001 Certification No. 14-2

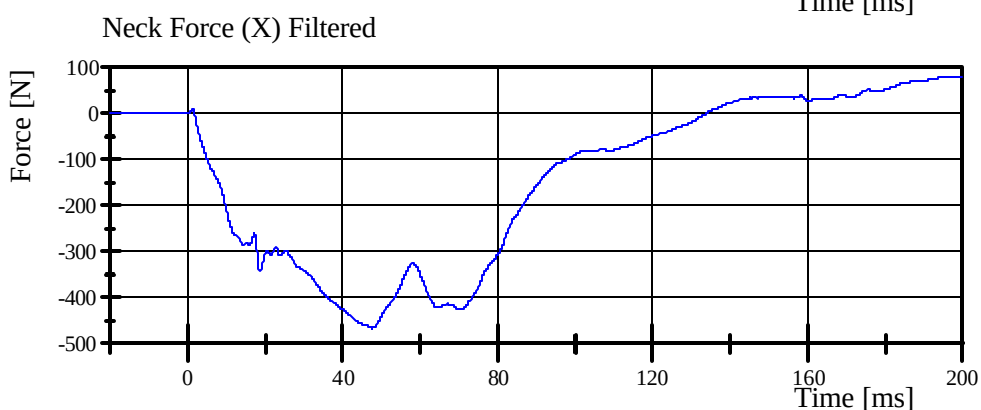
Test Date: 6/13/2007



Filter Class: CFC_1000

Max: 80.1 N at 199.8 ms

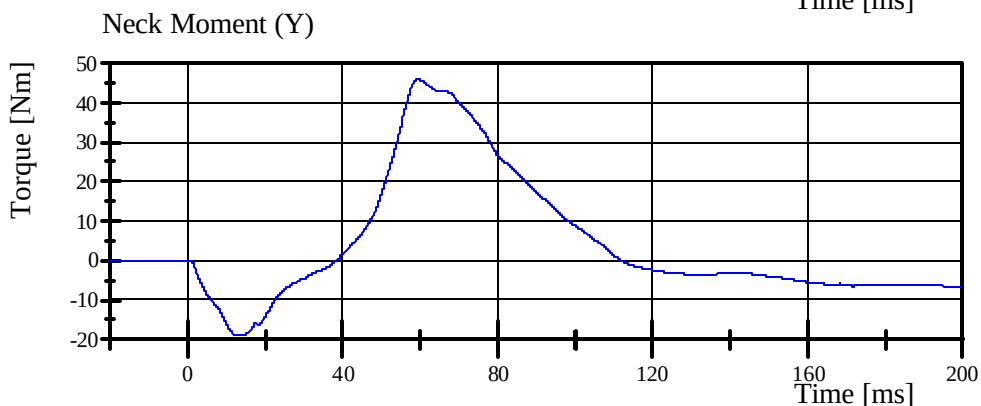
Min: -467.0 N at 47.6 ms



Filter Class: CFC_600

Max: 79.9 N at 200.0 ms

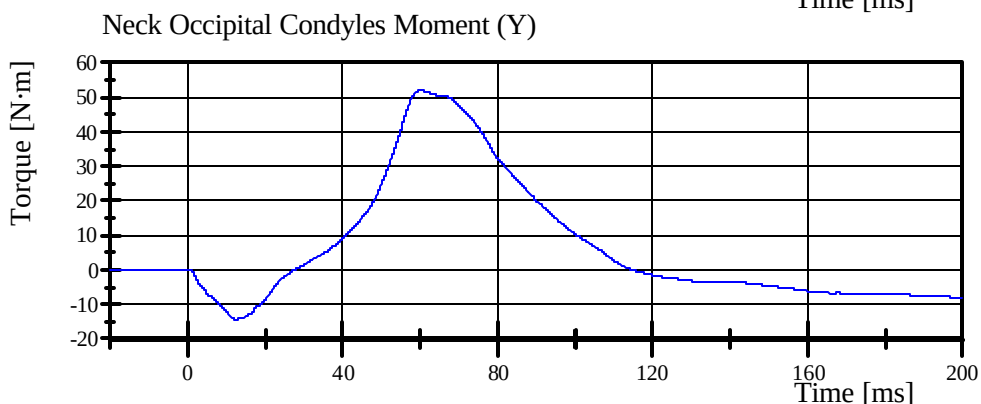
Min: -466.7 N at 47.5 ms



Filter Class: CFC_600

Max: 45.9 Nm at 59.6 ms

Min: -19.1 Nm at 14.1 ms



Filter Class: CFC_600

Max: 52.1 N·m at 60.2 ms

Min: -14.3 N·m at 12.8 ms

Transportation Research Center Inc.

Neck Extension

HHH 10YO Serial No. D001 Certification No. 14-1

Test Date: 6/13/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Pendulum Impact Velocity	4.91 - 5.15 m/s	5.018 m/s	Yes
Pendulum Integrated Velocity at 10ms	1.49 - 1.89 m/s	1.789 m/s	Yes
Pendulum Integrated Velocity at 20ms	2.88 - 3.68 m/s	3.403 m/s	Yes
Pendulum Integrated Velocity at 30ms	4.20 - 5.20 m/s	4.899 m/s	Yes
Total Head D-Plane Rotation	96.0 - 115.0 °	103.19 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-37.0) - (-46.0) Nm	-43.33 Nm	Yes
Neck Occipital Condyles Moment Decay to -10 Nm	100.0 - 116.0 ms	107.36 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

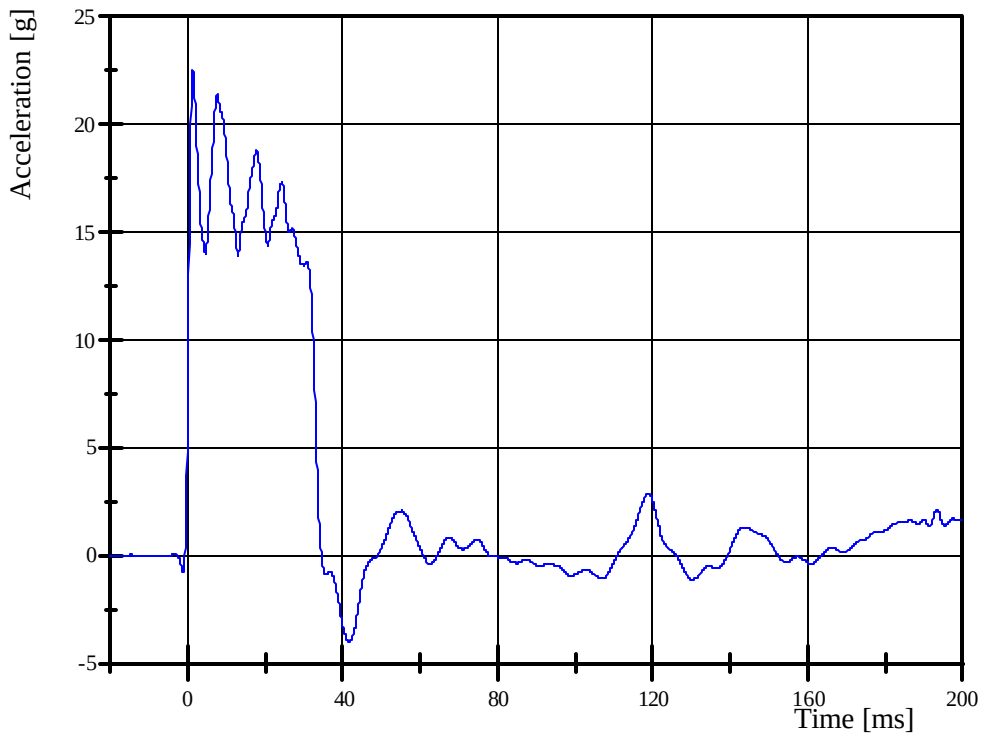
Transportation Research Center Inc.

Neck Extension

HIII 10YO Serial No. D001 Certification No. 14-1

Test Date: 6/13/2007

Pendulum Acceleration

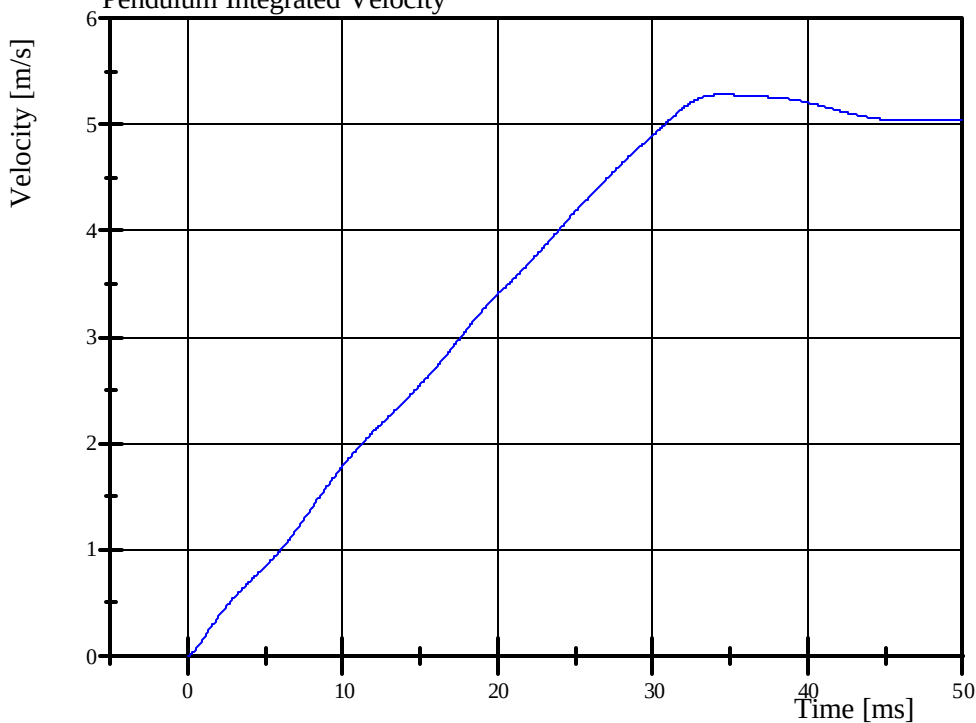


Filter Class: CFC_180

Max: 22.5 g at 1.2 ms

Min: -4.0 g at 41.5 ms

Pendulum Integrated Velocity



Filter Class: CFC_180

Max: 5.3 m/s at 34.5 ms

Min: 0.0 m/s at 0.0 ms

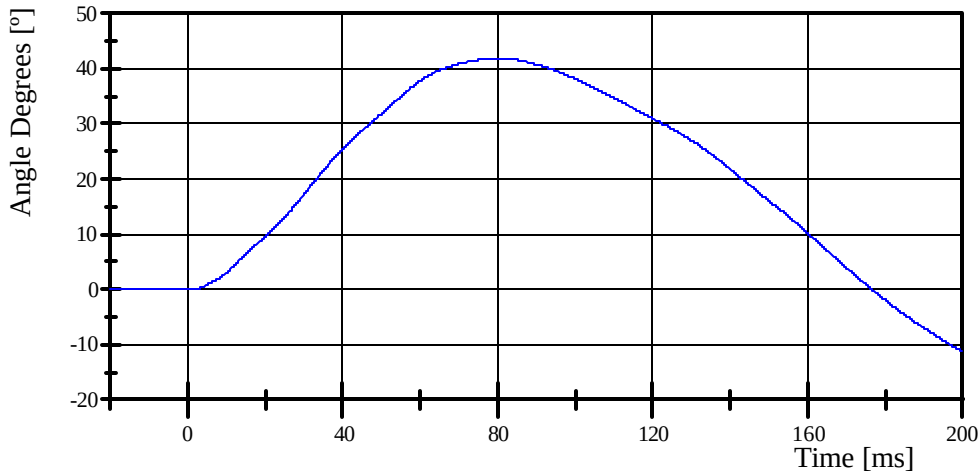
Transportation Research Center Inc.

Neck Extension

HIII 10YO Serial No. D001 Certification No. 14-1

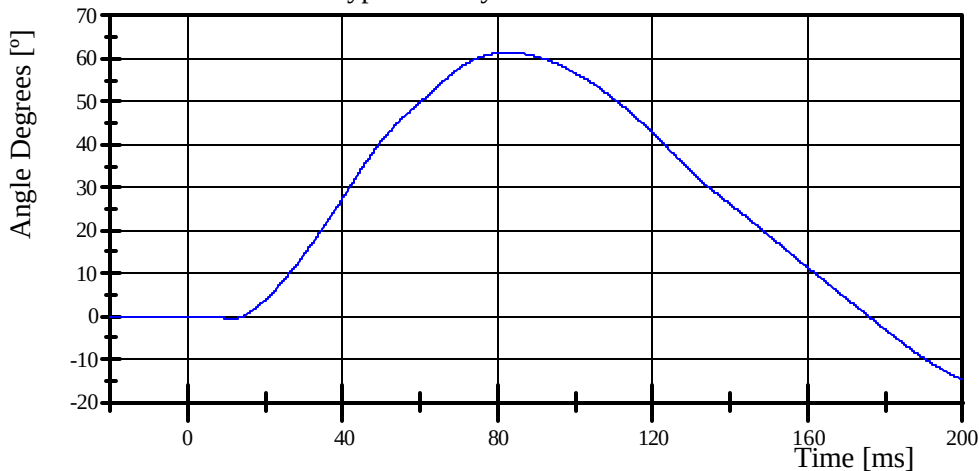
Test Date: 6/13/2007

Pot Rotation at the Base of Neck



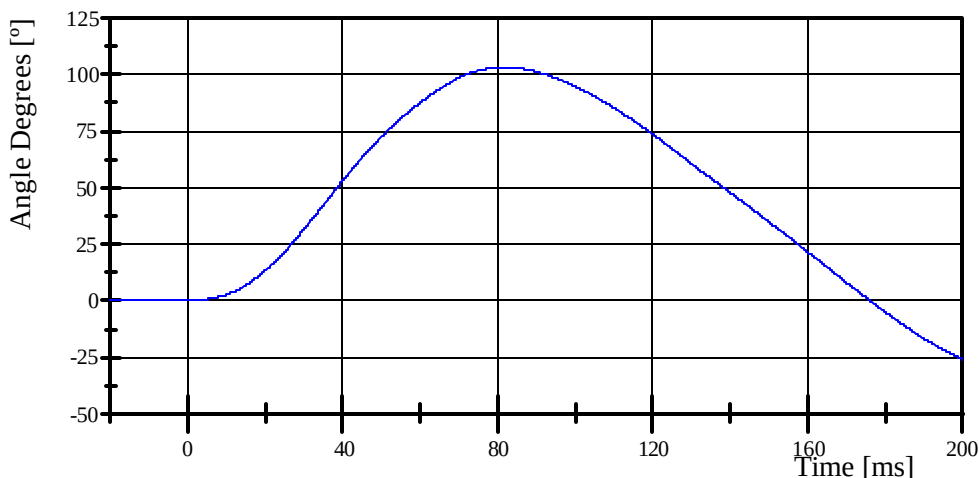
Filter Class: CFC_60
Max: 41.8 ° at 80.1 ms
Min: -11.2 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 61.4 ° at 83.0 ms
Min: -14.7 ° at 200.0 ms

Total Head D-Plane Rotation



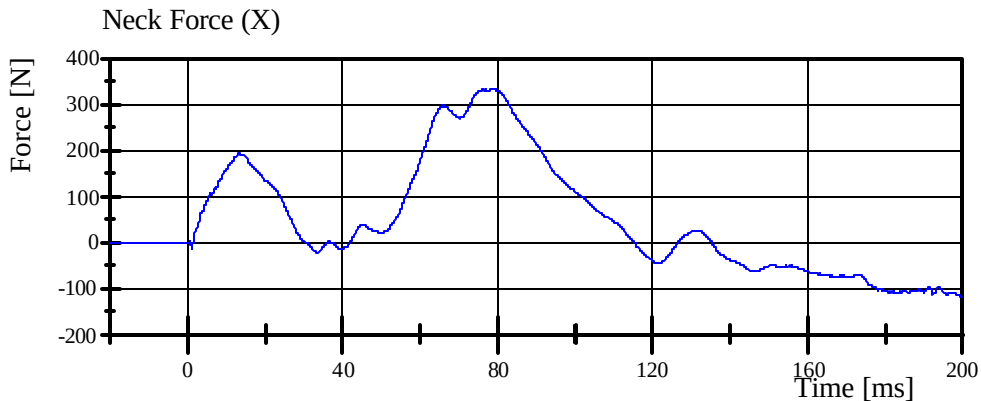
Filter Class: CFC_60
Max: 103.2 ° at 81.8 ms
Min: -25.9 ° at 200.0 ms

Transportation Research Center Inc.

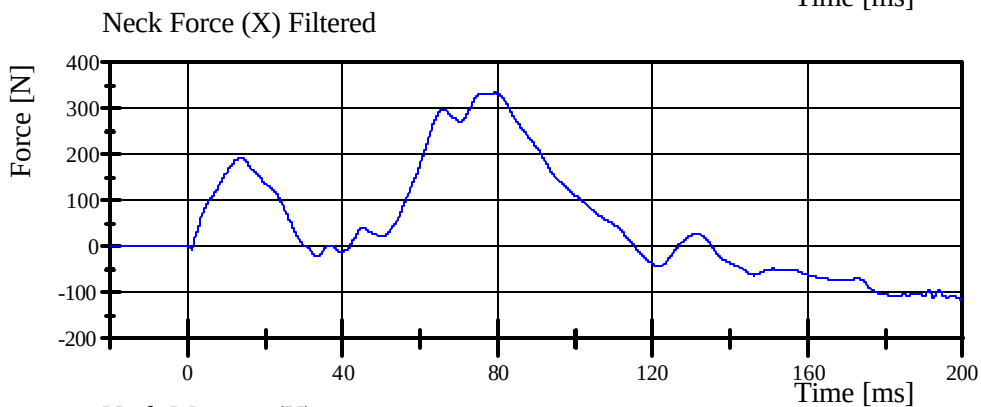
Neck Extension

HIII 10YO Serial No. D001 Certification No. 14-1

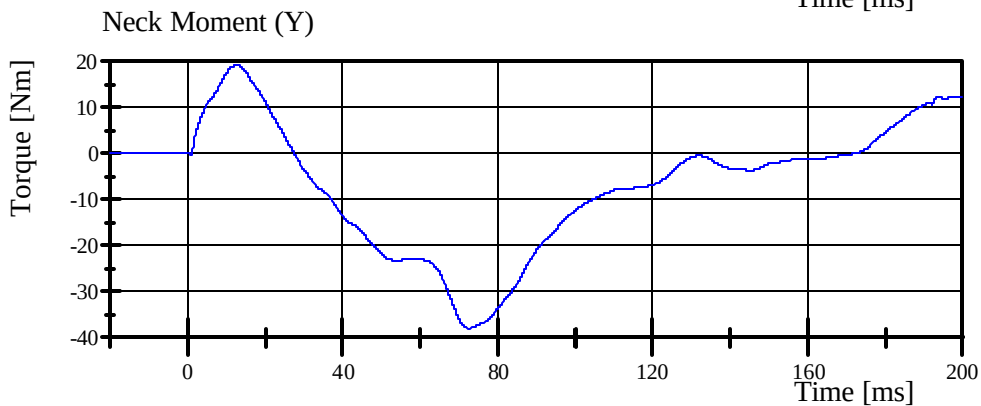
Test Date: 6/13/2007



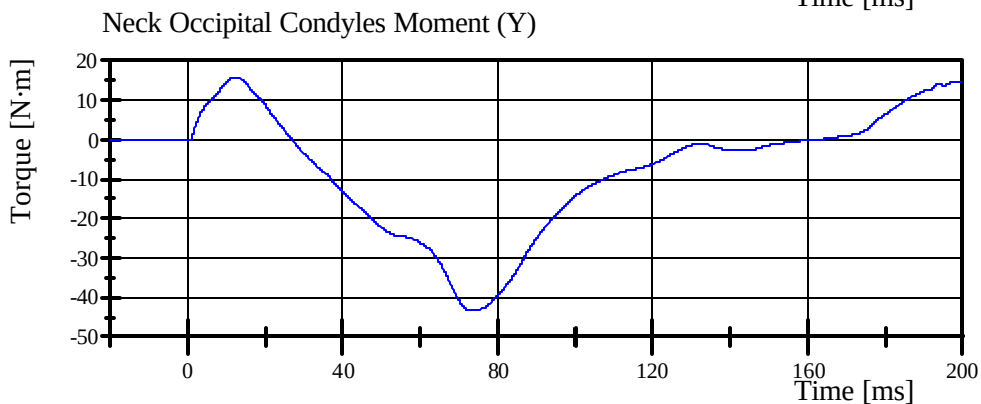
Filter Class: CFC_1000
Max: 333.9 N at 79.3 ms
Min: -118.3 N at 200.0 ms



Filter Class: CFC_600
Max: 333.5 N at 79.3 ms
Min: -118.2 N at 200.0 ms



Filter Class: CFC_600
Max: 19.3 Nm at 13.0 ms
Min: -38.0 Nm at 72.6 ms



Filter Class: CFC_600
Max: 15.9 N·m at 12.3 ms
Min: -43.3 N·m at 73.4 ms

Transportation Research Center Inc.

Front Thorax

HHH 10YO Serial No. D001 Certification No. 14-2

Test Date: 6/13/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Probe Velocity	5.88 - 6.12 m/s	5.946 m/s	Yes
Probe Force Peak Between 37.0 mm and 46.0 mm Chest Deflection	(-2,000) - (-2,450) N	-2,255.5 N	Yes
Probe Force Peak Between 20.0 mm and 40.5 mm Chest Deflection	>= (-2,450) N	-2,218.4 N	Yes
Maximum Chest Compression	(-37) - (-46) mm	-45.6 mm	Yes
Internal Hysteresis	69 - 85 %	79.2 %	Yes

Test meets specifications.

Comments:

Technician

Approved

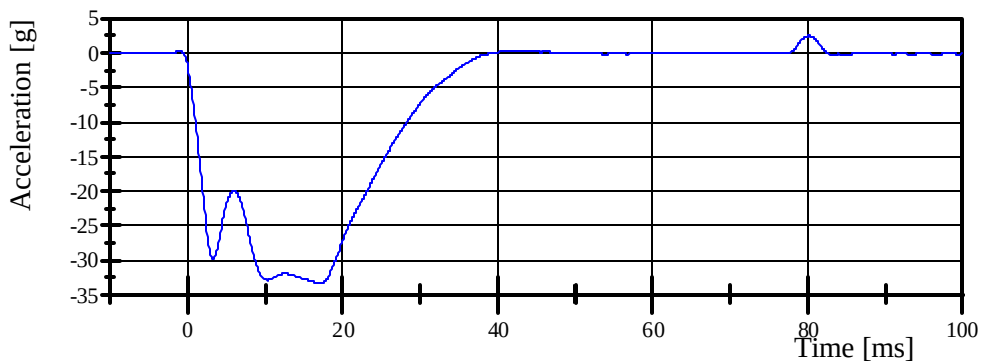
Transportation Research Center Inc.

Front Thorax

HIII 10YO Serial No. D001 Certification No. 14-2

Test Date: 6/13/2007

Pendulum Acceleration

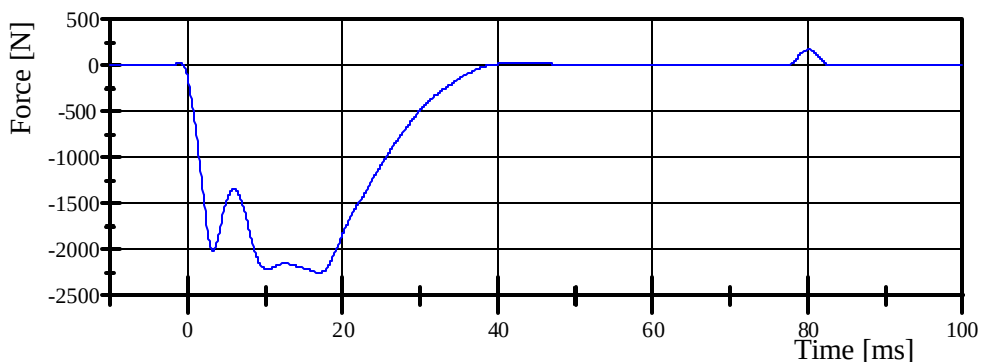


Filter Class: CFC_180

Max: 2.5 g at 80.2 ms

Min: -33.4 g at 17.0 ms

Pendulum Force

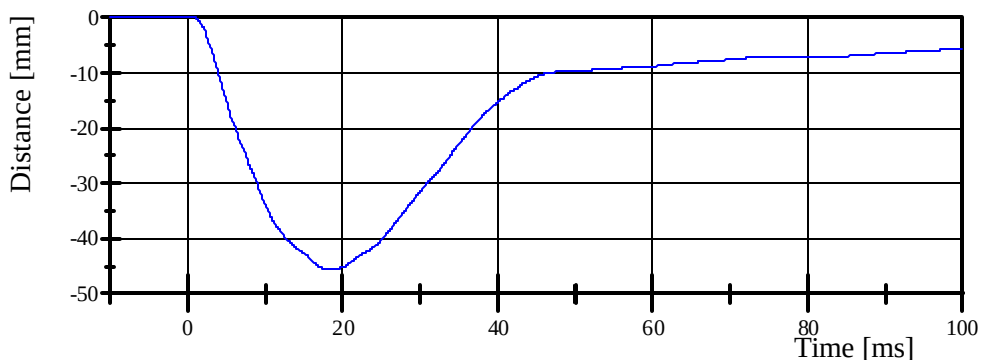


Filter Class: CFC_180

Max: 169.5 N at 80.2 ms

Min: -2,255.5 N at 17.0 ms

Thorax Displacement X-Axis

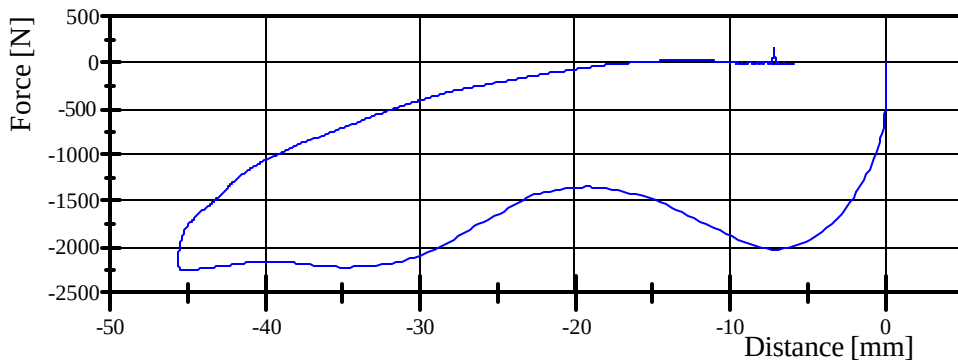


Filter Class: CFC_600

Max: 0.0 mm at -5.9 ms

Min: -45.6 mm at 18.5 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180

Max: 169.5 N at -7.2 mm

Min: -2,255.5 N at -45.1 mm

POST-TEST DUMMY INSPECTION

Position:	Driver
Dummy:	Hybrid III 50 th Percentile Male with THOR Lx Legs
Serial Number:	#202 (Right Leg #037; Left Leg #036)
Inspected By:	Jessica Gall
Date:	January 31, 2008
Comments:	No Damage.

Position:	Passenger
Dummy:	Hybrid III 50 th Percentile Male with THOR Lx Legs
Serial Number:	#206 (Right Leg #045; Left Leg #046)
Inspected By:	Jessica Gall
Date:	January 31, 2008
Comments:	No Damage.

Position:	Left Rear Passenger
Dummy:	Hybrid III 10 year old
Serial Number:	#D001
Inspected By:	Jessica Gall
Date:	January 31, 2008
Comments:	No Damage.

APPENDIX D

CUSTOMER PROVIDED SEATING PROCEDURE

CONTROL LOG

50th Percentile Male Dummy - Driver side

Rev. No.	Date	Description
00	1/16/2008	Original release by VRTC
01	1/22/2008	Modified left foot placement to avoid pedals (modified step 30 and 35)

A.2 50th Percentile Male Dummy - Driver side

- ___1. Position the seat's adjustable lumbar supports so that the lumbar supports are in the lowest, retracted or deflated adjustment positions.
___ N/A – No lumbar adjustment
- ___2. Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position.
___ N/A – No additional support adjustment
- ___3. Position an adjustable leg support system in its rearmost position
___ N/A – No adjustable leg support system
- ___4. Mark a point (seat cushion reference point) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion.
- ___5. Draw a line (seat cushion reference line) through the seat cushion reference point.
- ___6. Use only the controls that primarily move the seat in the fore-aft direction to move the seat cushion reference point to the rearmost position.
- ___7. If the seat cushion adjusts fore-aft, independent of the seat back, use only the controls that primarily move the seat cushion in the fore-aft direction to move the seat cushion reference point to the rearmost position.
___ N/A – No independent fore-aft seat cushion adjustment
- ___8. Use any part of any control, other than the parts just used for fore-aft positioning, to determine the range of angles of the seat cushion reference line and to set the seat cushion reference line at the mid-angle.
Maximum angle _____
Minimum angle _____
Mid-angle _____
- ___9. If the seat and/or seat cushion height is adjustable, use any part of any control other than the parts which primarily move the seat or seat cushion fore-aft, to put the seat cushion reference point in its lowest position with the seat cushion reference line angle at the mid-angle found in 8.
___ N/A – No seat height adjustment
- ___10. Use only the controls that primarily move the seat in the fore-aft direction to verify the seat is in the rearmost position.
- ___11. Place seat back at angle specified by the manufacturer. If angle is not provided, place seat back at 25 degrees from vertical.
___ N/A – No seat back angle adjustment
Manufacturer's design seat back angle _____
- ___12. Is the seat a bucket seat?
___ Yes, go to 13 and skip 14
___ No, go to 14 and skip 13
- ___13. Bucket seats:
Locate and mark for future reference the longitudinal centerline of the seat cushion. The intersection of the vertical longitudinal plane that passes through the SgRP and the seat cushion upper surface determines the longitudinal centerline of a bucket seat cushion.
- ___14. Bench seats
Locate and mark for future reference the longitudinal line on the seat cushion that marks the intersection of the vertical longitudinal plane through the centerline of the steering wheel and the seat cushion upper surface.
- ___15. Head Restraint Position
___ N/A Vehicle contains automatic head restraints.
___ N/A, there is no head restraint adjustment
___ Adjust the head restraint to its highest position.
- ___16. Place any adjustable seat belt anchorages at the vehicle manufacturer's nominal design position for a 50th percentile adult male occupant
___ N/A – No adjustable upper seat belt anchorage
Manufacturer's specified anchorage position. _____
Tested anchorage position _____

- ___17. Place adjustable pedals in the full forward position (towards the front of the vehicle.)
___N/A – the pedals are not adjustable.
- ___18. Locate and mark the right heel point (RHP) on the carpet.
Flat accelerator pedals: Extend a line through the axis of symmetry (that is closest to the vertical plane) of the accelerator pedal. The RHP is the intersection of that line with the floorpan.
Curved accelerator pedals: Construct a line in the side view tangent to the accelerator pedal such that the distance from the contact point on the pedal to the floorpan, along the tangent line, is 200 mm. The RHP is at the intersection of this tangent line and the floorpan
- ___19. Locate a longitudinal line L1 and a transverse line T1 on the floorpan through the RHP. Locate a Left Heel Point (LHP) point on the line T1 that is to the left of the seat centerline at the same distance from the seat centerline as the RHP. Locate a longitudinal line L2 through the LHP.
- ___20. Set the steering wheel hub at the geometric center of the full range of driving positions including any telescoping positions as determined in data sheet 14.3.
- ___21. Verify that the seat is in the rearmost seat track position and full down height adjustment with the seat cushion at the mid-angle with the seat back at the manufacturer's nominal seat back angle or as determined in step 11
- ___22. With the seat in the rearmost, full down, mid-angle position, determine the H-point using SAE J826 and the FMVSS 208 leg and thigh dimensions. Record the measurements.
- ___23. Place the dummy in the seat such that the midsagittal plane is coincident with the longitudinal seat cushion markings and the upper torso resting against the seat back.
- ___24. Rest the thighs on the seat cushion.
- ___25. Set the distance between the outboard knee clevis flange surfaces at 10.6 inches.
___measured distance (10.6 inches)
- ___26. Set the heels of the feet on the floor pan.
- ___27. Position the H-point of the dummy within 0.5 inch of the vertical dimension and 0.5 inch of the horizontal dimension of a point 0.25 inch below the H-point determined in step 22
Measure the pelvic angle with respect to the horizontal using the pelvic angle gage.
Adjust the dummy position until these three measurements are within the specifications.
___horizontal inches from the point 0.25 below the determined H-point (0.5 inch max.)
___vertical inches from the point 0.25 below the determined H-point (0.5 inch max.)
___pelvic angle (20° to 25°)
The H-point and pelvic angle are not adjusted after this step.
- ___28. Set the left and right feet in the neutral position (longitudinal centerline of foot in the same plane as the lower leg/thigh, foot Y angle at -15 degrees +/- 2 degrees to lower leg), as determined by the output of the potentiometers at the ankle.
- ___29. Without moving the seat, and while keeping the right thigh and leg in the same vertical plane, set the right foot heel on Line L1. If the vehicle interior prevents the heel from reaching L1, place the heel as close to L1 as possible, while maintaining a clearance of 0.25" from the vehicle interior.
- ___30. Without moving the seat, and while keeping the left thigh and leg in the same vertical plane, move the left foot laterally to the left **until any of the following occurs first:**
 - The right edge of the foot is clear of the brake or clutch pedal by 0.25" laterally or
 - The left edge of the shoe contacts the vehicle interior
- ___31. Place a 100 N +0, -5N weight (e.g. 100 N shot bag), no larger than 4" x 4", on each knee-thigh area. The weight should be centered on the assembly-hole on the top of the knee.
- ___32. Raise the heels off the floor pan so that the seat can be moved forward.
- ___33. Using only the control that primarily moves the seat in the fore-aft direction, move the seat forward and rest the rearmost point of the right foot heel on the floor pan such that:
 - the heel is on the line L1
 - the foot is in the same plane as the lower leg/thigh, foot at -15 degrees +/- 2 degrees (about the Y- axis) to lower leg,

- foot is contacting the accelerator pedal
 - the thighs are resting on the seat cushion
 - the thigh, leg and foot are in the same vertical plane
- ___33.1 If the heel is unable to reach line L1 because the foot contacts the vehicle interior, place the foot as close to the line L1 as possible while maintaining a gap of no more than 5 mm between the shoe and the vehicle interior.
- ___33.2 If the left foot contacts the brake or clutch pedals or the vehicle interior, then stop the forward movement of the left foot, raising the left knee off the seat cushion if needed. The pedals should not be depressed.
- ___34. If the right foot does not reach the accelerator pedal, move the adjustable pedal until it contacts the foot. Locate a new heel point. Repeat steps 18 – 33 to re-position the seat. If the pedals are not adjustable, place the heel at the point closest to the pedal, in the same longitudinal vertical plane as the line L1.
- ___N/A – the accelerator pedal is not adjustable
 - ___N/A – the accelerator pedal did not need to be moved.
- ___35. Verify that the left thigh and leg are in a vertical longitudinal plane, the foot in the neutral position (longitudinal centerline of foot in the same plane as the lower leg/thigh, foot at - 15 degrees +/- 2 degrees (Y-axis) to lower leg), the heel on the floor pan. Place the heel on the line L2, unless the left edge of the shoe contacts the vehicle, preventing the heel from reaching Line L2. If there is overlap with the pedal, move the leg to the left until a lateral clearance of 0.25" from the pedal is attained, unless the left edge of the shoe contacts the vehicle. If the left edge of the shoe contacts the vehicle interior, maintain a clearance of 0.25" from the vehicle interior.
- ___36. Remove the leg weights.
- ___37. Verify that the right foot is in the neutral position, at the lateral location determined in step 30, and is contacting the accelerator pedal. If the foot is not contacting the accelerator pedal, move the seat forward to rest the right foot on the accelerator pedal, keeping the foot in the neutral position
- ___38. While holding the thighs in place, push with a 50 lb force on a 3 inch diameter area of the chest that is centered 5" (127mm) vertically below the chin on the midsagittal plane of the dummy.
- ___39.1 Fasten the seat belt around the dummy.
- ___39.2 Remove all slack from the lap belt portion.
- ___39.3 Pull the upper torso webbing out of the retractor and allow it to retract; repeat this four times.
- ___39.4 Apply a 2 to 4 pound tension load to the lap belt.
- ___pound load applied
- ___39.5 Is the belt system equipped with a tension-relieving device?
- ___Yes, continue
 - ___No, go to 40
- ___39.6 Introduce the maximum amount of slack into the upper torso belt that is recommended by the vehicle manufacturer in the vehicle owner's manual..
- ___40. Place the upper arms adjacent to the torso with the centerline as close to a vertical plane as possible.
- ___41. Adjust the head level within ± 0.5 degrees using the seat back adjustment. Check the head angle after pushing on the chest with a 50 lb force on a 3 inch diameter area of the chest that is centered 5" (127mm) vertically below the chin on the midsagittal plane of the dummy, while holding the thighs in place, and releasing.
- ___42. No seat back adjustment. Adjust the neck bracket to achieve head level within ± 0.5 degrees. Record neck bracket setting. _____
- ___43. Maintaining the head alignment as determined above, place the right hand with the palm in contact with the steering wheel at the rim's horizontal centerline and with the thumb over the steering wheel.
- ___44. Maintaining the head alignment as determined above place the left hand with the palm in contact with the steering wheel at the rim's horizontal centerline and with the thumb over the steering wheel.

- ___45. If the hands don't reach the steering wheel at the horizontal centerline, maintaining the head alignment place them at symmetric location on the wheel, below the horizontal centerline.
- ___46. Tape the thumb of each hand to the steering wheel by using masking tape with a width of 0.25 inch. The length of the tape shall only be enough to go around the thumb and steering wheel one time.
- ___47. Verify that the feet are in the neutral position (± 2 deg), and at lateral locations determined in step 30 (right foot) and step 35 (left foot), and the head is level (± 0.5 deg). Adjust and repeat until the feet position and angles and head angles are within their ranges.

A.4 50th Percentile Male Dummy - Passenger Side

- ☐ 1. The seat is a bench seat for which the adjustments have already been made for the driver and there are no independent adjustments that can be made for the passenger. Go to 15.
☐ N/A- the passenger seat adjusts independently of the driver seat.
- ☐ 2. Position the seat's adjustable lumbar supports so that the lumbar supports are in the lowest, retracted or deflated adjustment positions.
☐ N/A – No lumbar adjustment
- ☐ 3. Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position.
☐ N/A – No additional support adjustment
- ☐ 4. Position an adjustable leg support system in its rearmost position.
☐ N/A – No adjustable leg support system
- ☐ 5. Mark a point (seat cushion reference point) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion.
- ☐ 6. Draw a line (seat cushion reference line) through the seat cushion reference point.
- ☐ 7. Use only the controls that primarily move the seat in the fore-aft direction to move the seat cushion reference point to the rearmost position.
- ☐ 8. If the seat cushion adjusts fore-aft, independent of the seat back, use only the controls that primarily move the seat cushion in the fore-aft direction to move the seat cushion reference point to the rearmost position.
☐ N/A – No independent fore-aft seat cushion adjustment
- ☐ 9. Use any part of any control, other than the parts just used for fore-aft positioning, to determine the range of angles of the seat cushion reference line and to set the seat cushion reference line at the mid-angle.
Maximum angle _____
Minimum angle _____
Mid-angle _____
- ☐ 10. If the seat and/or seat cushion height is adjustable, use any part of any control other than the parts which primarily move the seat or seat cushion fore-aft, to put the seat cushion reference point in its lowest position with the seat cushion reference line angle at the mid-angle found in 9.
☐ N/A – No seat height adjustment
- ☐ 11. Use only the controls that primarily move the seat in the fore-aft direction to verify the seat is in the rearmost position.
- ☐ 12. Place seat back at angle specified by the manufacturer. If angle is not provided, place seat back at 25 degrees from vertical.
☐ N/A – No seat back angle adjustment
Manufacturer's design seat back angle _____
- ☐ 13. Is the seat a bucket seat?
☐ Yes, go to 14 and skip 15
☐ No, go to 15 and skip 14
- ☐ 14. Bucket seats:
Locate and mark for future reference the longitudinal centerline of the seat cushion. The intersection of the vertical longitudinal plane that passes through the SgRP and the seat cushion upper surface determines the longitudinal centerline of a bucket seat cushion.
- ☐ 15. Bench seats:
Locate and mark for future reference the longitudinal centerline of the passenger seat cushion. The longitudinal centerline is the same distance from the longitudinal centerline of the vehicle as the center of the steering wheel.
Record the distance from the longitudinal centerline of the vehicle to the center of the steering wheel. _____

- Record the distance from the longitudinal centerline of the vehicle to the longitudinal centerline of the seat cushion. _____
- ___ 16. Head Restraint Position
 ___ N/A Vehicle contains automatic head restraints.
 ___ N/A, there is no head restraint adjustment
 ___ Adjust the head restraint to its highest position.
- ___ 17. Place any adjustable seat belt anchorages at the vehicle manufacturer's nominal design position for a 50th percentile adult male occupant
 ___ N/A – No adjustable upper seat belt anchorage
 Manufacturer's specified anchorage position. _____
 Tested anchorage position _____
- ___ 18. Verify that the seat is in the rearmost seat track position and full down height adjustment with the seat cushion at the mid-angle, the seat back is at the manufacturer's nominal design position for the 50th male.
- ___ 19. With the seat in the rearmost, full down, mid-angle position, seat back at the manufacturer's nominal design position for the 50th male, determine the H-point using SAE J826 and the FMVSS 208 leg and thigh dimensions.
- ___ 20. Place the dummy in the seat such that the midsagittal plane is coincident with the longitudinal seat cushion markings and the upper torso resting against the seat back.
- ___ 21. Rest the thighs on the seat cushion.
- ___ 22. Set the distance between the outboard knee clevis flange surfaces at $9 \frac{1}{4}$ (+/- $\frac{1}{4}$) inches, with the leg-knee-thigh in the same vertical plane.
 ___ Record knee separation
- ___ 23. Set the heels of the feet on the floor pan.
- ___ 24. Position the H-point of the dummy within 0.5 inch of the vertical dimension and 0.5 inch of the horizontal dimension of a point 0.25 inch below the H-point determined in Step 19. Measure the pelvic angle with respect to the horizontal using the pelvic angle gage. Adjust the dummy position until these three measurements are within the specifications.
 ___ horizontal inches from the point 0.25 below the determined H-point (0.5 inch max.)
 ___ vertical inches from the point 0.25 below the determined H-point (0.5 inch max.)
 ___ pelvic angle (20° to 25°)
The H-point and pelvic angle are not adjusted again after this step.
- ___ 25. Place a 100 N +0, -5N weight (e.g. 100 N shot bag), no larger than 4" x 4", on each knee-thigh area. The weight should be centered on the assembly-hole on the top of the knee.
- ___ 26. Set the left and right feet such that the following conditions are met after the feet are placed:
 ___ The foot is in neutral position.
 ___ The leg and thigh are in the same plane.
 ___ The thighs are resting on the seat cushion.
 ___ The heel is in contact with the floor pan.
- ___ 27. Lift the feet off the floor and set the toe towards the floorpan (Y angle = -25 ± 2 deg). Using controls that move the seat fore-aft, move the seat forward until either foot contacts vehicle interior or the seat reaches the full-forward position, whichever happens first. Position the feet at that seat location with the heels on the floor and the feet in neutral position (Y angle = -15 ± 2 deg). If the vehicle interior prevents the feet from reaching the neutral position, place the feet as close as possible to the neutral position while maintaining a distance of 5 mm from the vehicle interior.
- ___ 28. Move the seat forward while maintaining the foot orientations (± 2 deg) until either foot contacts the vehicle interior or the seat reaches full-forward position, whichever happens first.
- ___ 29. Keeping the thigh-leg in the same vertical plane, move the feet apart symmetrically about the dummy midsagittal plane until the either foot contacts the vehicle interior or the knee spacing of 10.6 inches between the outboard knee clevis flange surfaces is attained, whichever comes first. Place the feet in neutral position unless contact with the vehicle interior prevents the feet from reaching the neutral position.

Check all that applies:

- ☐ The right foot contacted a flat part of the toe board.
- ☐ The right foot contacted the right side of vehicle interior.
- ☐ The right foot contacted is at neutral position
- ☐ The left foot contacted a flat part of the toe board.
- ☐ The left foot contacted the left side of the vehicle interior.
- ☐ The left foot contacted is at neutral position
- ☐ 30. Remove the leg weights.
- ☐ 31. While holding the thighs in place, push with a 50 lb force on a 3 inch diameter area of the chest that is centered 5" (127mm) vertically below the chin on the midsagittal plane of the dummy.
- ☐ 32. Seat belt
- ☐ 32.1 Fasten the seat belt around the dummy.
- ☐ 32.2 Remove all slack from the lap belt portion.
- ☐ 32.3 Pull the upper torso webbing out of the retractor and allow it to retract; repeat this four times.
- ☐ 32.4 Apply a 2 to 4 pound tension load to the lap belt.
_____pound load applied
- ☐ 32.5 Is the belt system equipped with a tension-relieving device?
 - ☐ Yes, continue
 - ☐ No, go to 33
- ☐ 32.6 Introduce the maximum amount of slack into the upper torso belt that is recommended by the vehicle manufacturer in the vehicle owner's manual.
- ☐ 33. Place the upper arms adjacent to the torso with the centerline as close to a vertical plane as possible.
- ☐ 34. Place the right upper arm in contact with the seat back and side of the torso.
- ☐ 35. Place the left hand palm in contact with the outside of the left thigh and the little finger in contact with the seat cushion.
- ☐ 36. Place the right hand palm in contact with the outside of the right thigh and the little finger in contact with the seat cushion.
- ☐ 37. Adjust the head level within ± 0.5 degrees using the seat back adjustment. Check the head angle after pushing on the chest with a 50 lb force on a 3 inch diameter area of the chest that is centered 5" (127mm) vertically below the chin on the midsagittal plane of the dummy, while holding the thighs in place, and releasing.
- ☐ 37.1 No seat back adjustment. Adjust the neck bracket to achieve head level within ± 0.5 degrees. Record neck bracket setting. _____



U.S. Department
of Transportation

National Highway
Traffic Safety
Administration

Memorandum

Vehicle Research and Test Center P.O. Box B37
East Liberty, Ohio 43319
(937) 666-4511

Subject: VRTC Seating Procedure for FMVSS 213-Type Booster Seat
Testing with the Hybrid III 6 Year Old & 10 Year Old Child
Dummies

OCT 24 2007

From: *Joseph M. Kanianthra*
Joseph M. Kanianthra, Ph.D.
Associate Administrator for
Vehicle Safety Research

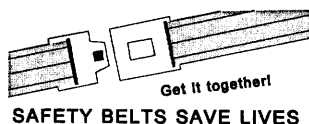
To: Docket NHTSA-2005-21245

Thru: *Anthony M. Cooke*
Anthony M. Cooke
Chief Counsel

VRTC Seating Procedure for Hybrid III 6 Year Old Child Dummy for Testing Belt Positioning Booster Seats

VRTC
Use the following procedure to position the dummy in the belt positioning booster seat:

- a) Place the booster seat on the FMVSS 213 bench seat such that it is centered between the lap belt anchor positions and the booster is pushed rearward until the intersection of the booster's back and bottom contacts the intersection of the FMVSS 213 bench seat's back and base cushions.
- b) Place the dummy in the booster seat so that the mid-sagittal line of the dummy is coincident with the centerline of the booster.
- c) Measure the X and Z locations of the left and right shoulder pivots. Position the dummy so that the difference between the X and Z values for these two points is less than or equal to 1 cm (see Figure 1).
- d) As illustrated in Figure 2 of this section, calculate the H-point location of the dummy relative to the FMVSS 213 seat Z point (see Figure 1B in FMVSS 213) by
 - a. Measuring the X and Z coordinates of the knee pivot (X_{KP} and Z_{KP}) and head center of gravity (X_{CG} and Z_{CG}).
 - b. Mathematically locating the intersection point of two circles using the knee pivot and head center of gravity as the centers and the known dummy anthropometric lengths as radii. The equations for calculating the H-point are as follows:



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$$X_{HP} = X_{CG} + \frac{A(X_{KP} - X_{CG})}{B} + \frac{\sqrt{473^2 - A^2}(Z_{KP} - Z_{CG})}{B}$$

$$Z_{HP} = Z_{CG} + \frac{A(Z_{KP} - Z_{CG})}{B} - \frac{\sqrt{473^2 - A^2}(X_{KP} - X_{CG})}{B}$$

Where:

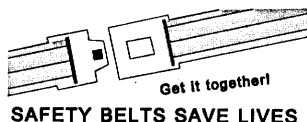
$$A = \frac{(473^2 - 238^2 + B^2)}{2B}$$

$$B = \sqrt{(X_{KP} - X_{CG})^2 + (Z_{KP} - Z_{CG})^2}$$

- e) Use the H-point location and head center of gravity location to determine the torso angle relative to vertical. This angle is calculated using

$$\text{Torso Angle} = \arctan\left(\frac{X_{HP} - X_{CG}}{Z_{CG} - Z_{HP}}\right)\left(\frac{180}{\pi}\right)$$

- f) Adjust the dummy until the torso angle is 14 ± 0.5 degrees from vertical.
- g) Secure the dummy and booster with belt restraint, following booster manufacturer's instructions for routing the shoulder and lap belts. Apply standard FMVSS 213 belt tensions.
- h) Locate the shoulder belt such that its outboard edge is inside of the outer edge of the chest jacket (see Figure 3). If it is not feasible to get the outboard edge of the belt inside the outer edge of the chest jacket, document the closest distance from the belt to the chest jacket that is obtainable.
- i) The straight line distance from the bottom of the dummy's chin to the center of the shoulder belt/middle of the sternum along the dummy's mid-sagittal line should be 15.5 ± 0.5 cm (see Figure 4). Measure and document the intersection of the dummy's mid-sagittal line and vertical center of shoulder belt's width.
- j) Measure and document the angle of the shoulder belt relative to horizontal. The shoulder belt angle should be $50^\circ \pm 10^\circ$. If it is not feasible to achieve the specified shoulder belt angle while following the manufacturer's instructions for belt routing, document angle that is obtainable.
- k) Locate the lap belt such that the top of the belt is 2.54 cm or more below the top rim of the pelvis molded skin at the dummy's mid-sagittal line (Figure 4). If it is not feasible to locate the lap belt at least 2.54 cm below the top of the pelvis while following the manufacturer's instructions for belt routing, position belt as low as possible on pelvis.
- l) Measure and document the intersection of the dummy's mid-sagittal line and center of lap belt width.
- m) Put upper arms as close as possible to, and in alignment with, the upper torso on sides and bend at elbows such that the hands are resting on the booster seat cushion if possible; otherwise bend lower arm perpendicular to upper arm and have hands pointed forward.



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- n) Level the top of the dummy's head $\pm 1^\circ$ off of horizontal.
- o) Document final H-point, Head CG, and Knee Pivot coordinates in addition to the torso angle.

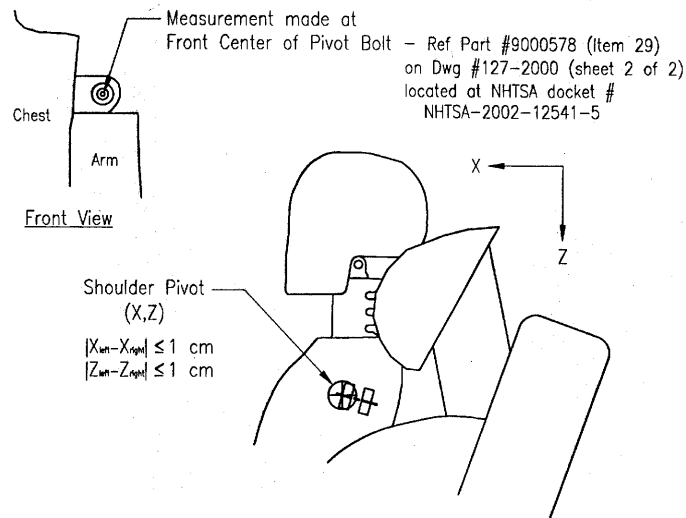


Figure 1. Shoulder Pivot Bolt Alignment

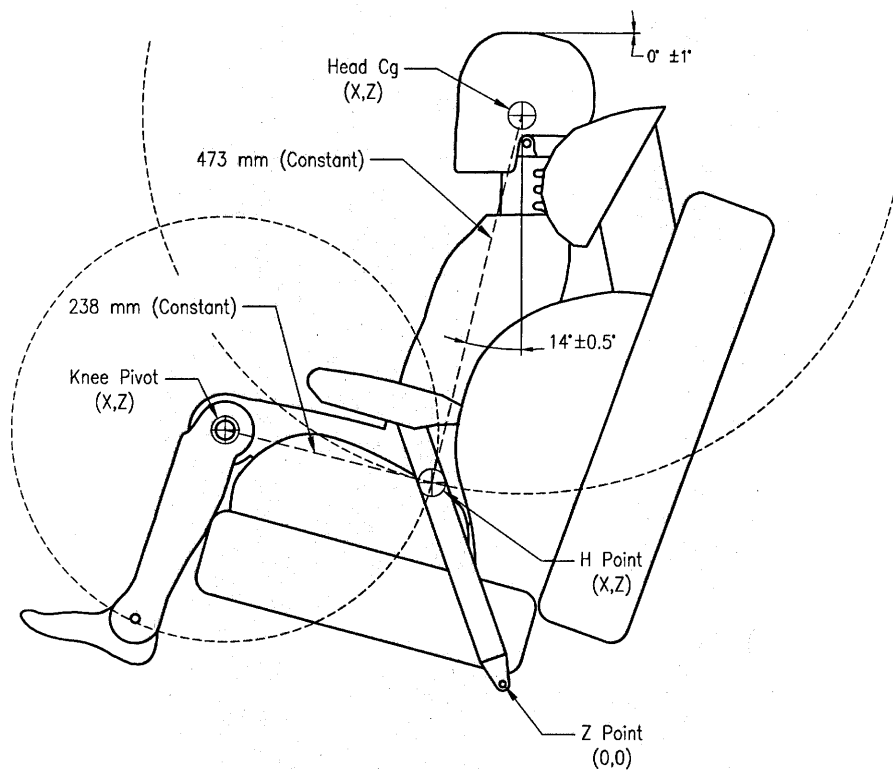
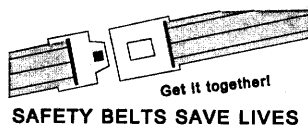


Figure 2. Locating the H-Point so that HIII-6C Torso Angle is 14 ± 0.5 Degrees from Vertical



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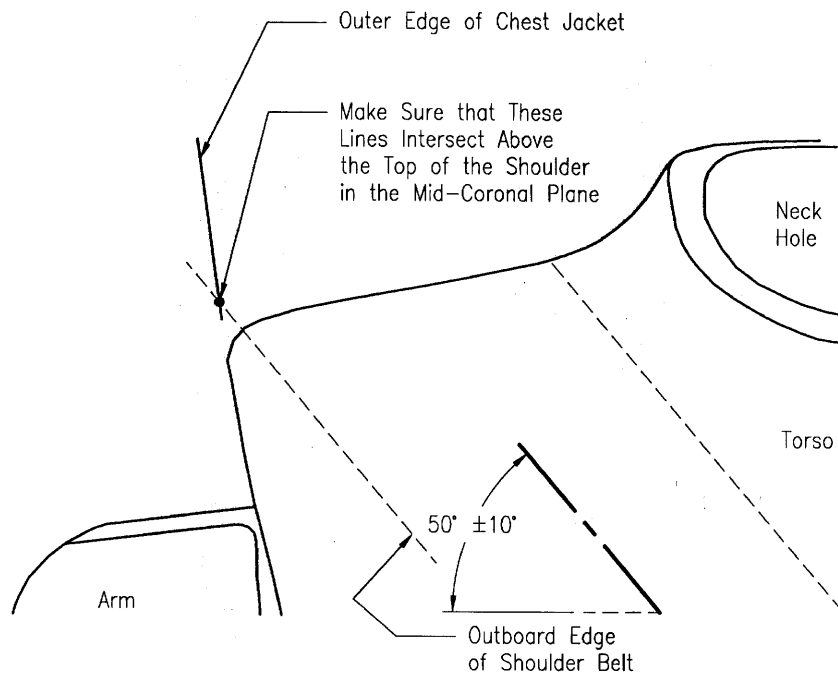
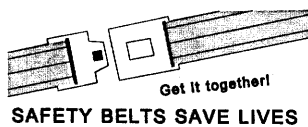


Figure 3. Shoulder Belt Placement



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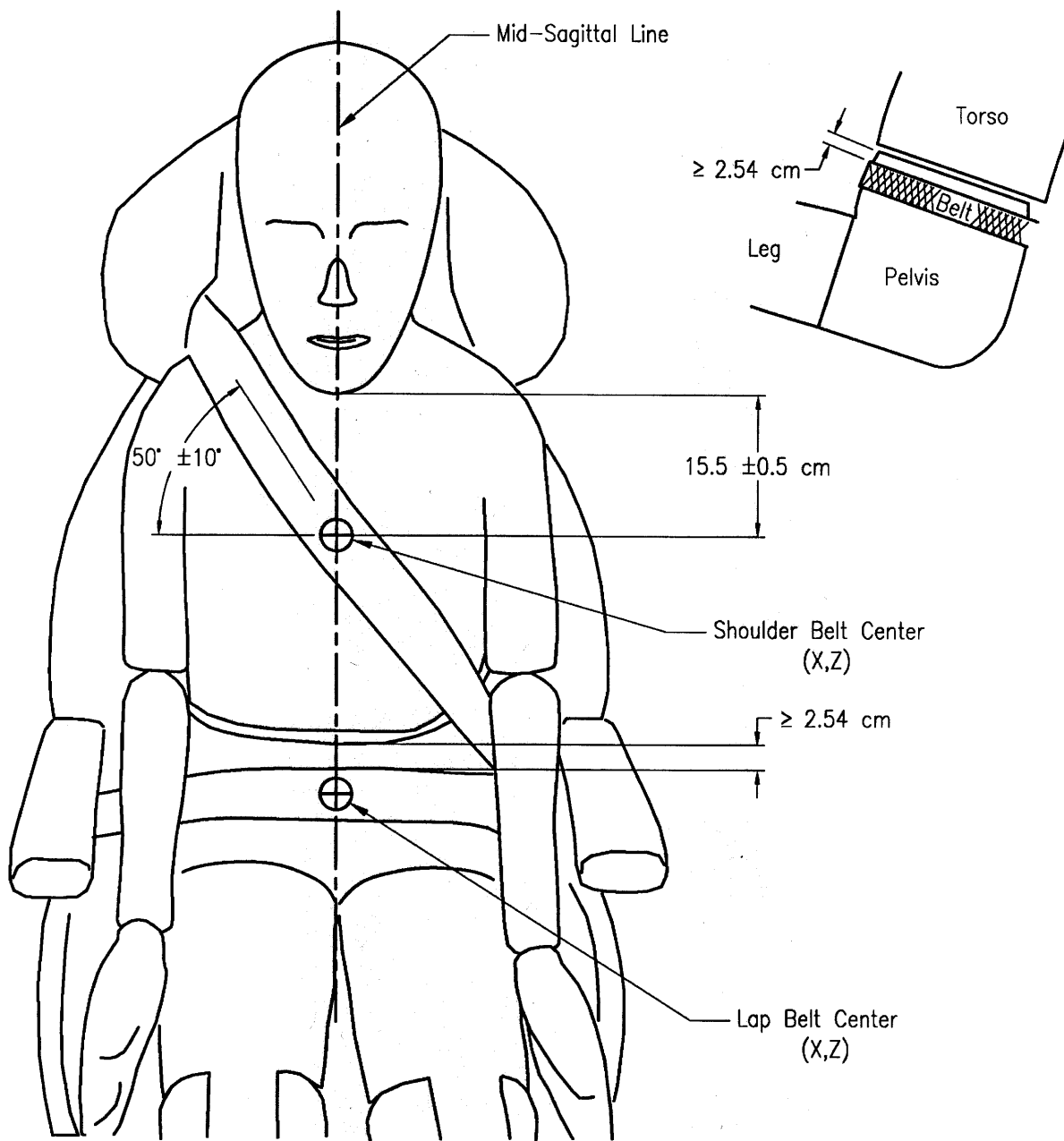
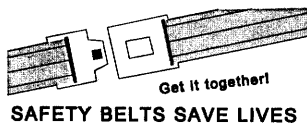


Figure 4. Overall Belt Placement for HIII-6C Dummy



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VRTC Seating Procedure for Hybrid III 10 Year Old Child Dummy for Testing Belt Positioning Booster Seats

Use the following procedure to position the dummy in the belt positioning booster seat:

- Set the dummy's neck angle at the SP-16 setting (Figure 5a). See also Figure 20 of PADI (NHTSA-2005-21247-8) for more detail.
- Set the dummy's lumbar angle at the SP-12 setting ("SP" means standard posture), see Figure 5b. This is done by aligning the notch on the lumbar adjustment bracket with the SP-12 notch on the lumbar attachment. See also Figure 45 of PADI for more detail.
- Place the booster seat on the FMVSS 213 bench seat such that it is centered between the lap belt anchor positions and the booster is pushed rearward until the intersection of the booster's back and bottom contacts the intersection of the FMVSS 213 bench seat's back and base cushions.
- Place the dummy in the booster seat so that the mid-sagittal line of the dummy is coincident with the centerline of the booster.
- Measure the X and Z locations of the left and right shoulder pivots. Position the dummy so that the difference between the X and Z values for these two points is less than or equal to 1 cm (see Figure 6).
- As illustrated in Figure 7 of this section, calculate the H-point location of the dummy relative to the FMVSS 213 seat Z point (see Figure 1B in FMVSS 213) by
 - Measuring the X and Z coordinates of the knee pivot (X_{KP} and Z_{KP}) and head center of gravity (X_{CG} and Z_{CG}).
 - Mathematically locating the intersection point of two circles using the knee pivot and head center of gravity as the centers and the known dummy anthropometric lengths as radii. The equations for calculating the H-point are as follows:

$$X_{HP} = X_{CG} + \frac{A(X_{KP} - X_{CG})}{B} + \frac{\sqrt{527^2 - A^2}(Z_{KP} - Z_{CG})}{B}$$

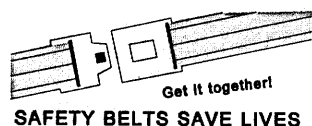
$$Z_{HP} = Z_{CG} + \frac{A(Z_{KP} - Z_{CG})}{B} - \frac{\sqrt{527^2 - A^2}(X_{KP} - X_{CG})}{B}$$

Where:

$$A = \frac{(527^2 - 288^2 + B^2)}{2B}$$

$$B = \sqrt{(X_{KP} - X_{CG})^2 + (Z_{KP} - Z_{CG})^2}$$

- Use the H-point location and head center of gravity location to determine the torso angle relative to vertical. This angle is calculated using



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$$\text{Torso Angle} = \arctan\left(\frac{X_{HP} - X_{CG}}{Z_{CG} - Z_{HP}}\right)\left(\frac{180}{\pi}\right)$$

- h) Adjust the dummy until the torso angle is 14 ± 0.5 degrees from vertical.
- i) Secure the dummy and booster with belt restraint, following booster manufacturer's instructions for routing the shoulder and lap belts. Apply standard FMVSS 213 belt tensions.
- j) Locate the shoulder belt such that its outboard edge is inside of the outer edge of the chest jacket (see Figure 8). If it is not feasible to get the outboard edge of the belt inside the outer edge of the chest jacket, document the closest distance from the belt to the chest jacket that is obtainable.
- k) The straight line distance from the bottom of the dummy's chin to the center of the shoulder belt/middle of the sternum along the dummy's mid-sagittal line should be 16 ± 0.5 cm (see Figure 9). Measure and document the intersection of the dummy's mid-sagittal line and vertical center of shoulder belt's width.
- l) Measure and document the angle of the shoulder belt relative to horizontal. The shoulder belt angle should be $50^\circ \pm 10^\circ$. If it is not feasible to achieve the specified shoulder belt angle while following the manufacturer's instructions for belt routing, document angle that is obtainable.
- m) Locate the lap belt such that the top of the belt is 2.54 cm or more below the top rim of the pelvis molded skin at the dummy's mid-sagittal line (Figure 9). If it is not feasible to locate the lap belt at least 2.54 cm below the top of the pelvis while following the manufacturer's instructions for belt routing, position belt as low as possible on pelvis.
- n) Measure and document the intersection of the dummy's mid-sagittal line and center of lap belt width.
- o) Put upper arms as close as possible to, and in alignment with, the upper torso on sides and bend at elbows such that the hands are resting on the booster seat cushion if possible; otherwise bend lower arm perpendicular to upper arm and have hands pointed forward.
- p) Level dummy's head $\pm 1^\circ$ off of horizontal.
- q) Document final H-point, Head CG, and Knee Pivot coordinates in addition to the torso angle.

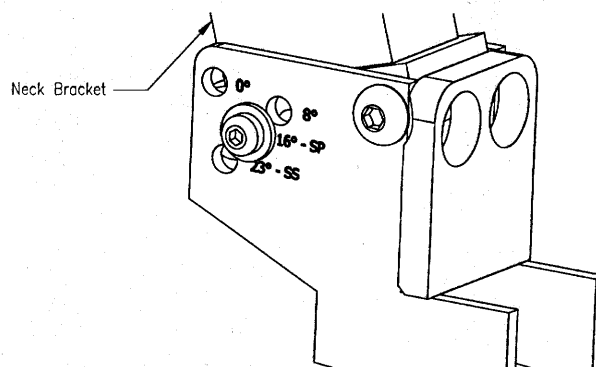
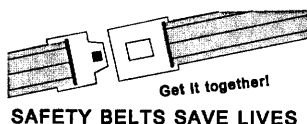


Figure 5a. Neck Angle Setting is SP-16 Degrees



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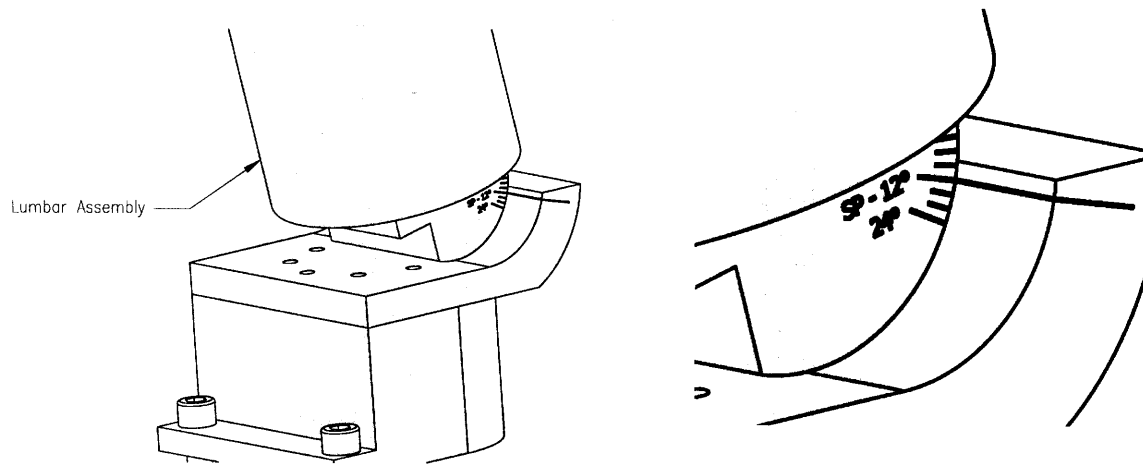


Figure 5b. Lumbar Angle Setting is SP-12 Degrees

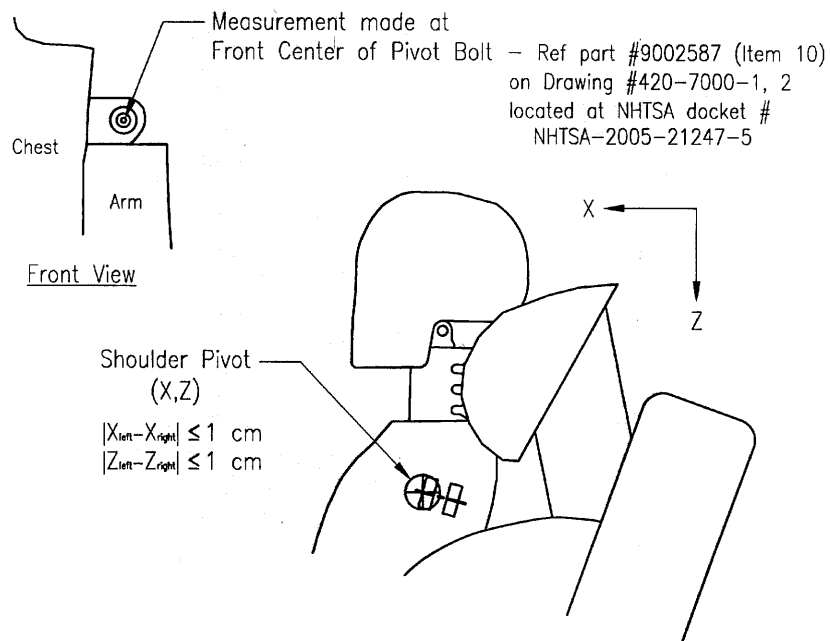
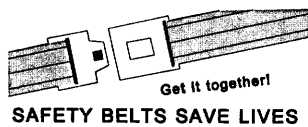


Figure 6. Shoulder Pivot Bolt Alignment



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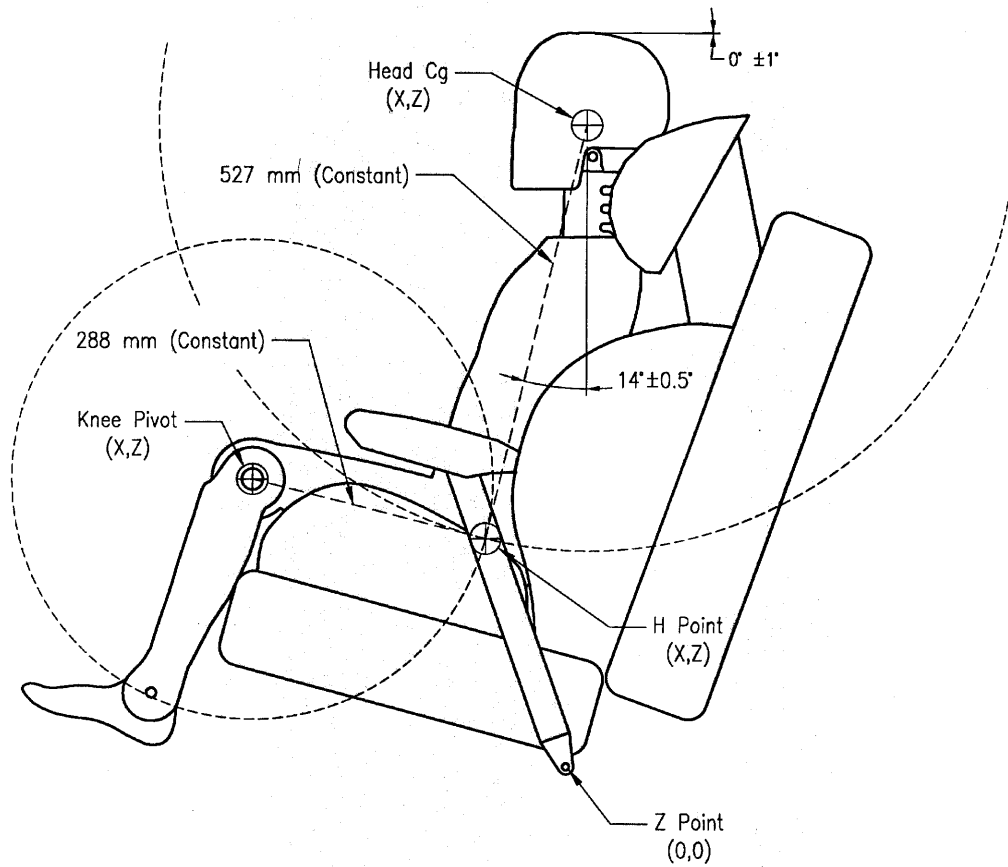


Figure 7. Locating the H-Point so that HIII-10C Torso Angle is 14 ± 0.5 Degrees from Vertical

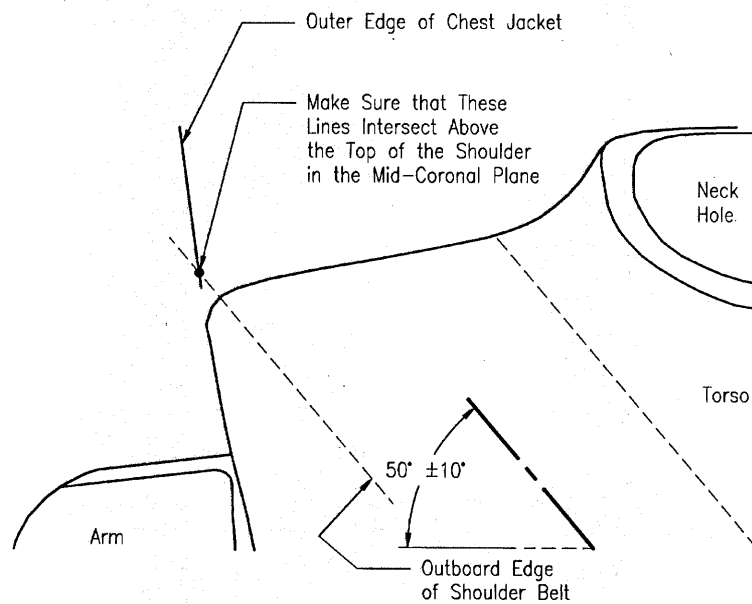
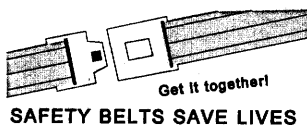


Figure 8. Shoulder Belt Placement



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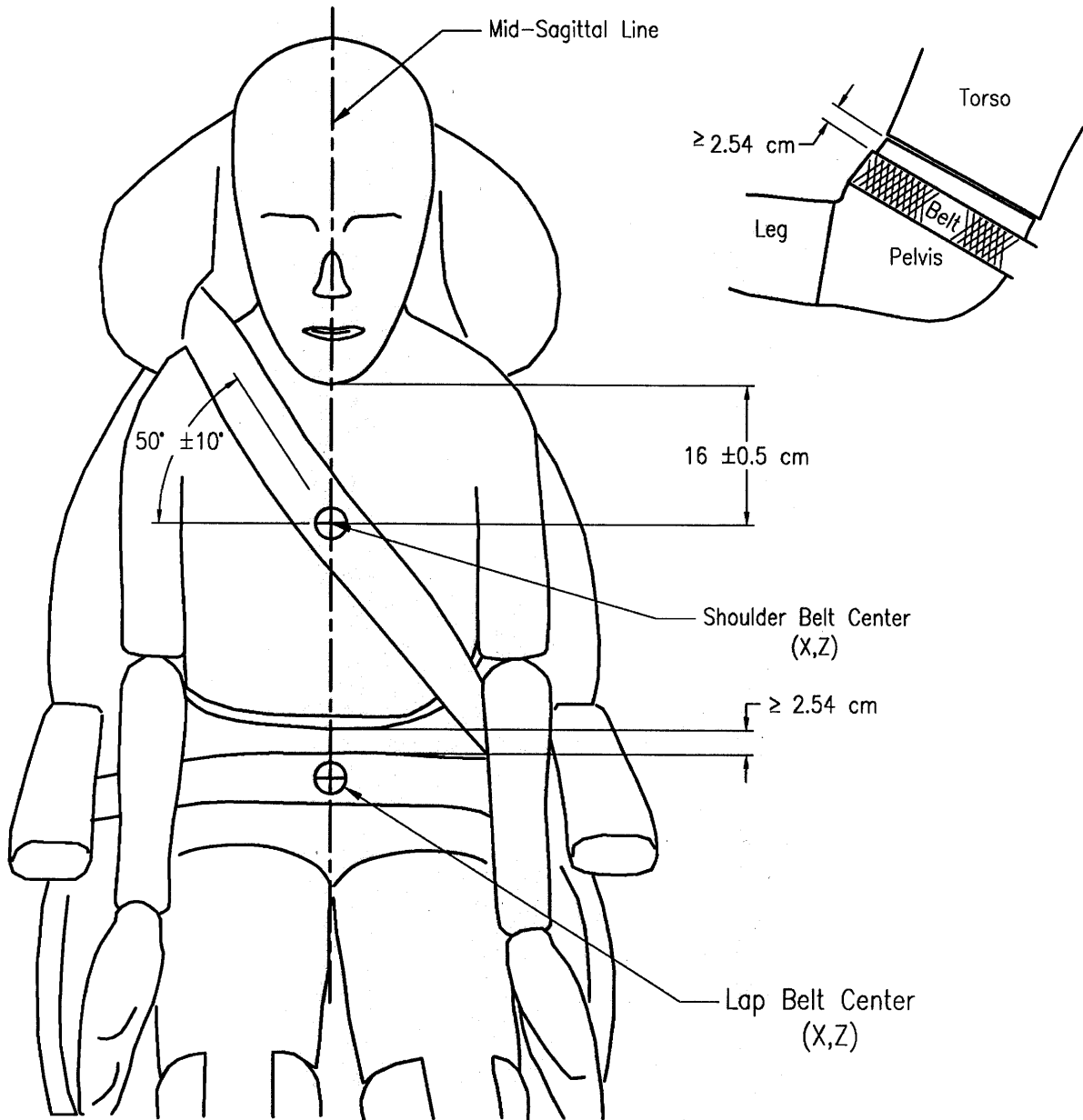
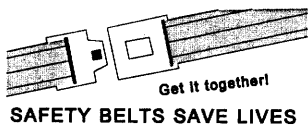


Figure 9. Overall Belt Placement for HIII-10C Dummy



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VRTC DUMMY SETUP SHEET

Dummy S/N _____ Test Date _____ Test No. _____

DUMMY CONFIGURATION

Lumbar Angle Setting (10YO only) _____ Neck Angle Setting (10YO only) _____

DUMMY ALIGNMENT

Dummy/Booster Centerline Coincident (check when confirmed) ☐

Left Shoulder Pivot Bolt: X _____ Z _____
 Right Shoulder Pivot Bolt: X _____ Z _____

BELT PLACEMENT

Belt routed per manufacturer instructions (check when confirmed) ☐

Shoulder Belt Tension _____ lbs
 Lap Belt Tension _____ lbs

Outside edge of shoulder belt inside outer edge of chest jacket (circle one)? Yes / No
 If "No", what is distance from outside edge of belt to outer edge of chest jacket (along top of shoulder)? _____ mm

Intersection of mid-sagittal plane and center of shoulder belt: X _____ Y _____ Z _____
 Shoulder belt angle relative to horizontal (50 ± 10 degrees): _____ deg

Top edge of lap belt ≥ 2.54 cm from pelvis rim (circle one)? Yes / No
 If "No", is belt positioned as low as possible (check when confirmed) ☐

Intersection of mid-sagittal plane and center of lap belt: X _____ Y _____ Z _____

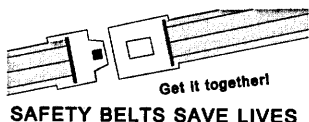
DUMMY POSTURE

Arms positioned correctly (check when confirmed) ☐

Head is level (0 ± 1 degree): _____ deg

Head Center of Gravity (outboard side): X _____ Y _____ Z _____
 H-Point (outboard side): X _____ Y _____ Z _____
 Knee Pivot (outboard side): X _____ Y _____ Z _____

Torso Angle (14 ± 0.5 degrees): _____ deg



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APPENDIX E
BARRIER CERTIFICATION



PL

CORE[®]

OFFSET FRONTAL BARRIER CERTIFICATION

Date: March 29, 2006

To: MGA Research Corporation
5000 Warren Road
Burlington, WI 53105

PURCHASE ORDER INFORMATION

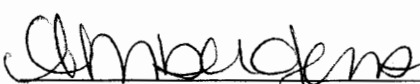
Customer P.O. Number: 03-06-0484
Work Order Number: 147175
Plascore Part Number: 20670
Quantity: 01 piece

CORE INFORMATION

Core Type: PCGA-5.2-1/4-P-3003-T
Cell Size: 0.250 inch
Density: 5.2 pcf

Block Number: 066B0605

This is to certify that the aluminum honeycomb core supplied, under the unit number provided, meets the crush requirements of 248.1 psi +0, -10% per DWG# WG11.


Quality Assurance Representative
Amber Jensen

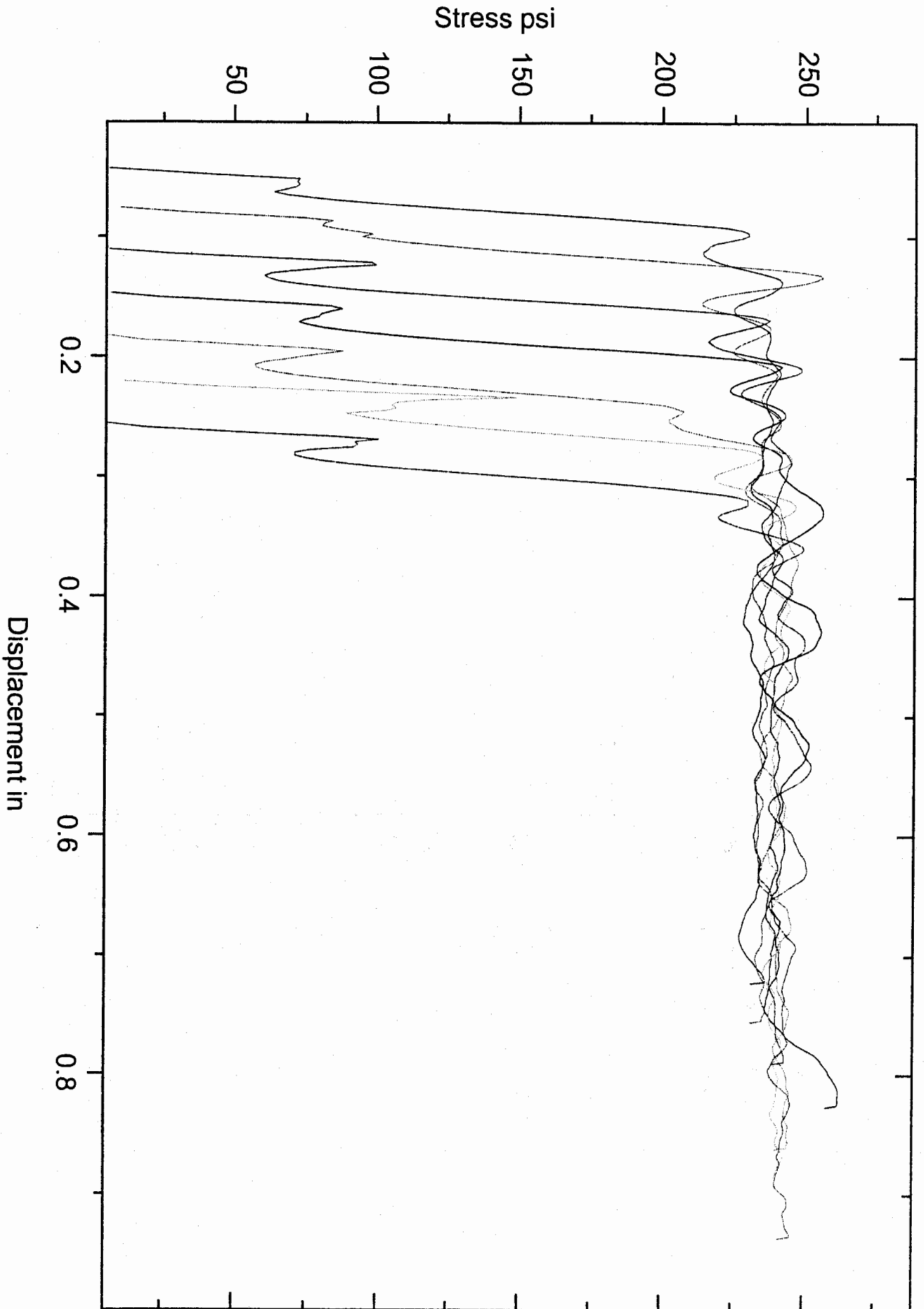


Crush Data
248.1 psi +0, -10% psi per DWG #WG11

Block Number: 066B0605

<u>Specimen Number</u>	<u>Zone 1</u>	<u>Zone 2</u>	<u>Zone 3</u>
1	236.33	232.30	233.87
2	236.75	235.08	235.82
3	238.54	239.90	238.66
4	243.14	244.72	240.58
5	241.23	239.07	242.32
6	239.22	239.90	239.07
7	244.51	244.77	242.01

BLOCK # 066B0605 Sample ID: IN234212



OFFSET FRONTAL BARRIER CERTIFICATION

Date: March 29, 2006

To: MGA Research Corporation
5000 Warren Road
Burlington, WI 53105

PURCHASE ORDER INFORMATION

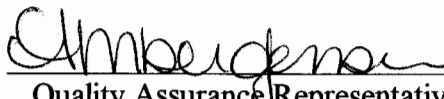
Customer P.O. Number: 03-06-0484
Work Order Number: 147175
Plascore Part Number: 20670
Quantity: 01 piece

CORE INFORMATION

Core Type: PCGA-3/4-1.8-P-3003
Cell Size: 0.750 inch
Density: 1.8 pcf

Block Number: 015B0206

This is to certify that the aluminum honeycomb core supplied, under the unit number provided, meets the crush requirements of 49.59 psi +0, -10% as per DWG# WG11.


Quality Assurance Representative
Amber Jensen



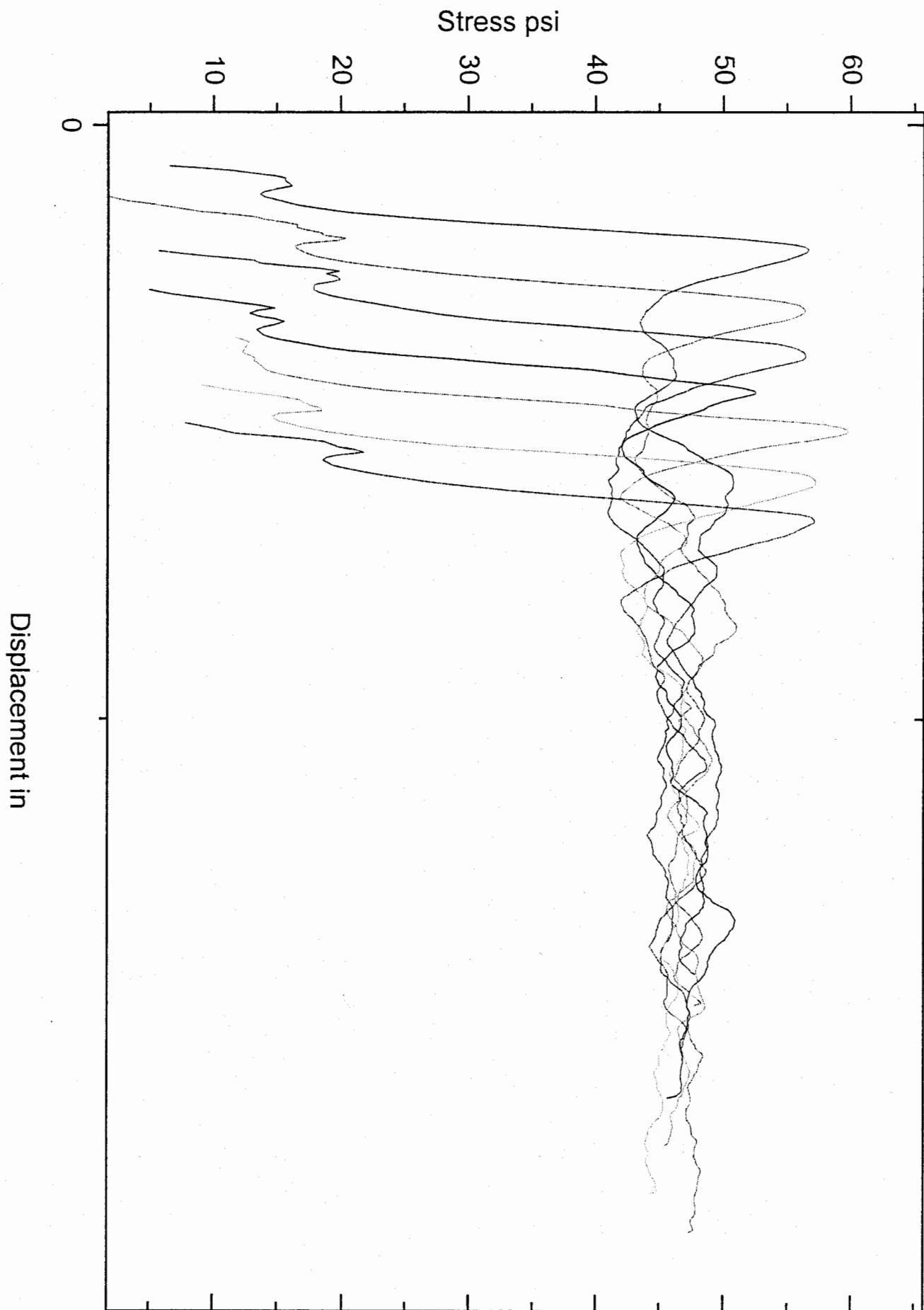
Crush Data

49.59 psi +0, -10% psi per DWG #WG11

Block Number: 015B0206

<u>Specimen Number</u>	<u>Zone 1</u>	<u>Zone 2</u>	<u>Zone 3</u>
1	49.19	47.89	49.03
2	48.63	47.55	46.71
3	45.27	45.19	45.64
4	46.36	47.56	48.90
5	47.53	47.11	47.24
6	46.54	46.59	45.44
7	47.27	45.96	47.67

Sample ID: BLOCK # 015B0206 Sample ID: IN338779



APPENDIX F

INSIA REPORT ON STRUCTURAL MEASUREMENTS



STRUCTURAL SURVEY OF CARS. MEASUREMENT METHODOLOGY OF THE MAIN RESISTANT ELEMENTS IN THE CAR BODY

**APARICIO IZQUIERDO, FRANCISCO
PÁEZ AYUSO, FRANCISCO JAVIER**

**INSIA
Carretera de Valencia, km. 7
Campus Sur de la Universidad Politécnica de Madrid
28031 – MADRID – (SPAIN)**

March, 1999

REPORT DOCUMENTATION PAGE	
Title:	<i>STRUCTURAL SURVEY OF CARS. MEASUREMENT METHODOLOGY OF THE MAIN RESISTANT ELEMENTS IN THE CAR BODY</i>
Author(s):	Aparicio Izquierdo, Francisco Páez Ayuso, Francisco Javier
Performing Organisation name and address:	INSIA – University Institute for Automobile Research Carretera de Valencia, Km. 7 – Campus Sur de la Universidad Politécnica de Madrid 28031 – Madrid – Spain
Supplementary notes:	Under contract to: THE EUROPEAN COMMUNITY Project: “Improvement of Crash Compatibility between Cars” Contract N°: RO – 97 – SC.1064
Abstract:	The main aim of this working package -<i>Structural Survey of Cars</i>- is the reduction of incompatibilities, both structural and geometric, between passenger vehicles and their potential collision partners. The understanding of these incompatibilities needs a previous step for the knowledge of the existing car fleet. Firstly, it is necessary to select the main resistant elements in the car body. These elements have to be chosen from the point of view of the sort of collision that we want to study, that is to say, frontal and side impacts. Detailed measurements have been taken from exterior and interior elements, spread to a total number of 74 models selected from the main vehicle manufacturers at Spain. All of them are being sold this year. Using the information available from the previous measurements in vehicles, the geometric characteristics of the main resistant elements involved in the geometric compatibility between cars will be defined. This report shows the methodology followed to get these measurements.
Subject terms:	Crash compatibility, geometric compatibility, resistant elements, measure methodology
Date:	March, 1999

1.- METHODOLOGY.

Detailed measurements have been taken from exterior and interior elements. Using the information available from the previous measurements in vehicles, the geometric characteristics of the main resistant elements involved in the geometric compatibility between cars have been defined. These elements are presented in the following figures, and have been divided in two main groups according to the vehicle zones studied in this project.

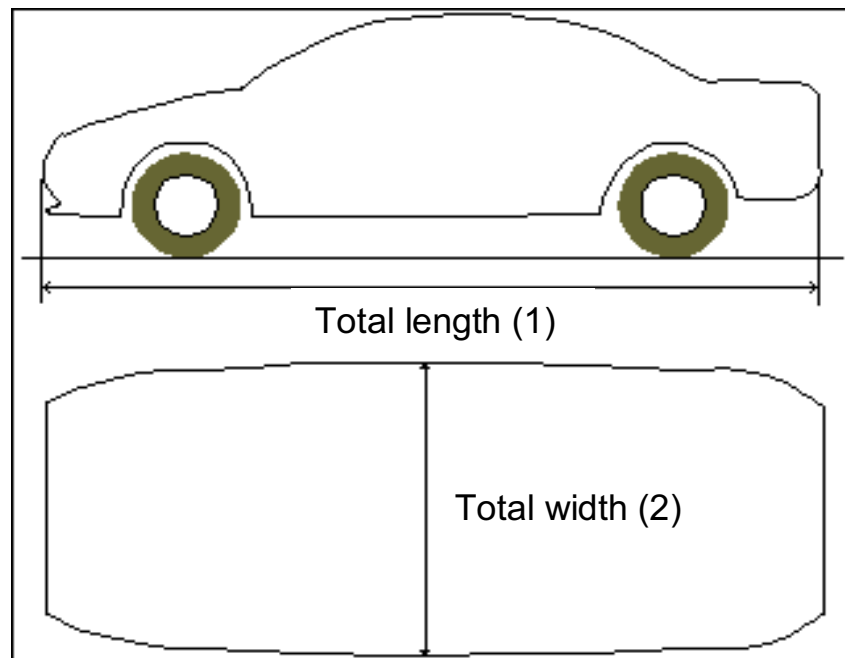


Figure 1.- Definition of the main resistant elements. General dimensions.

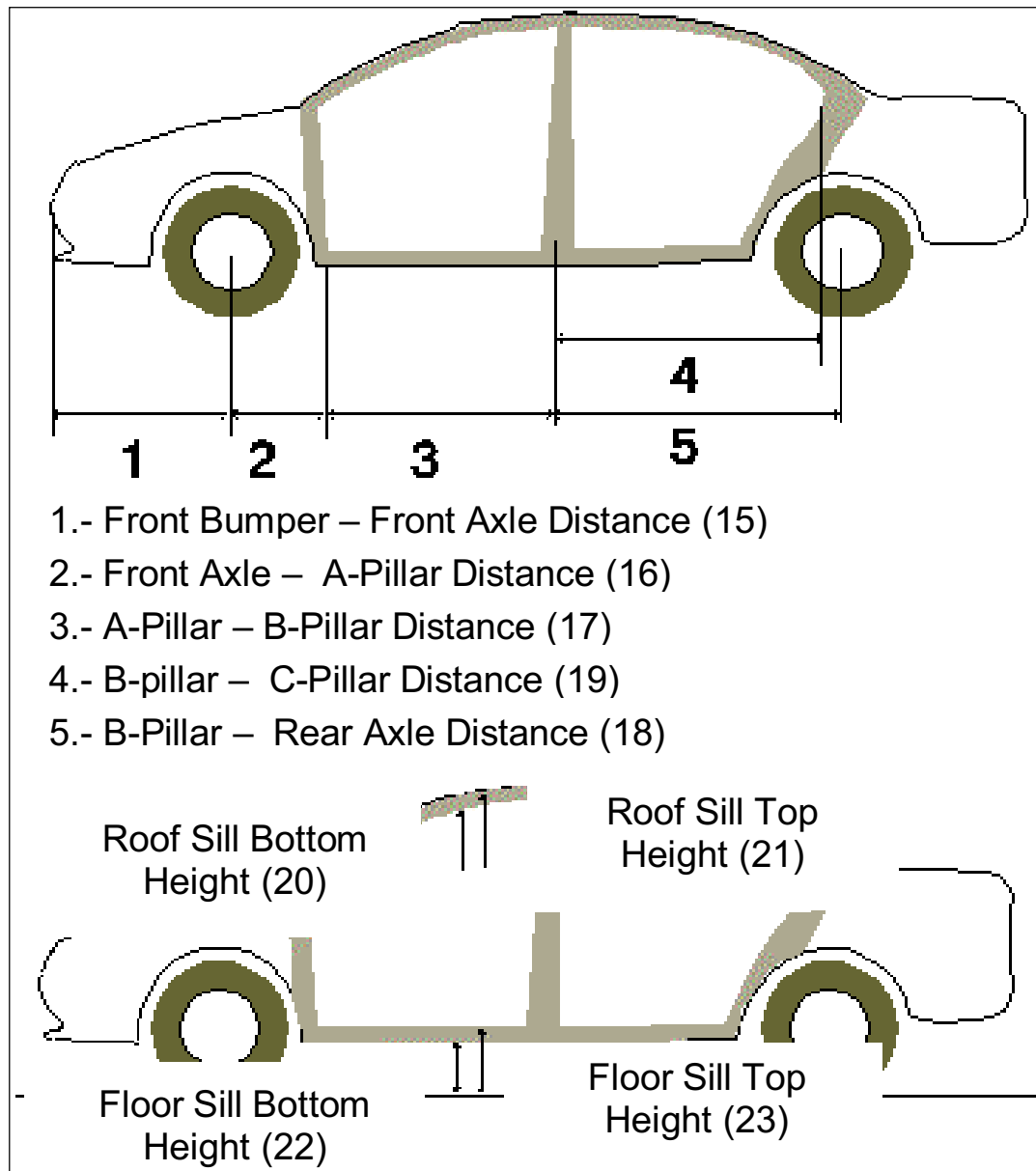


Figure 2.- Definition of the main resistant elements. Side elements.

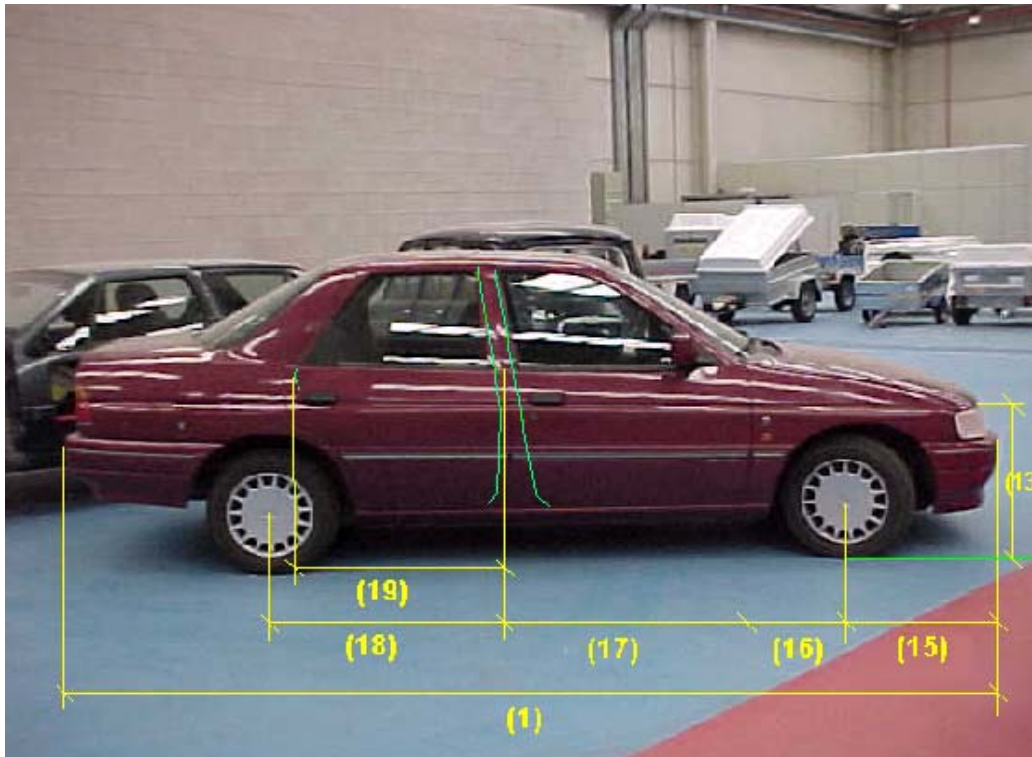


Figure 3.-
Measurements of
the side resistant
elements (outer).

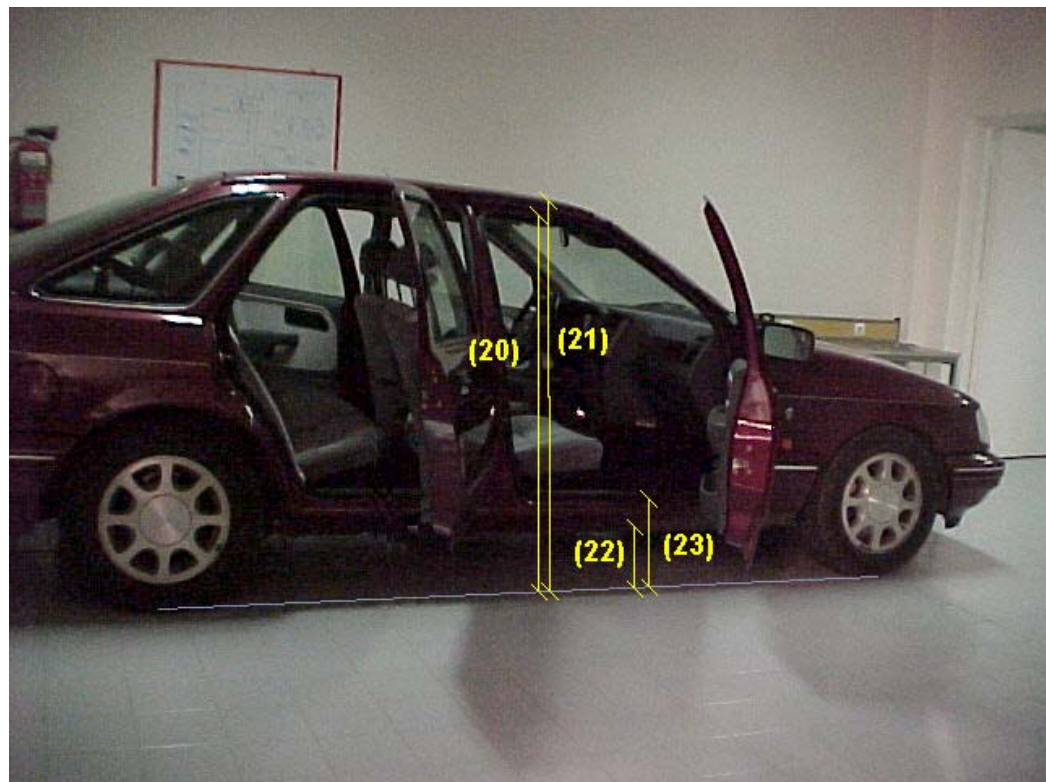


Figure 4.- Measurements
of the side resistant
elements (inner).

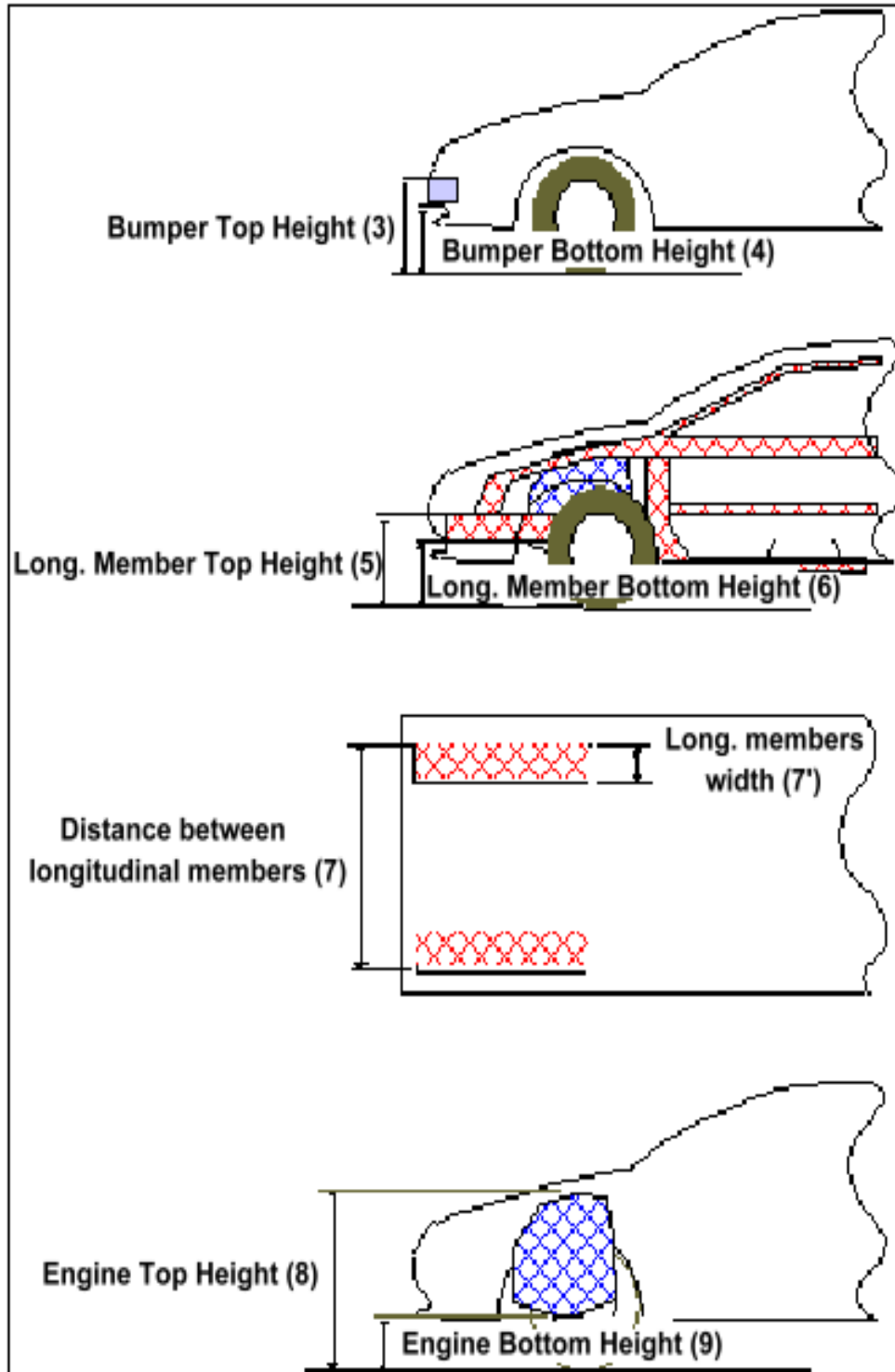


Figure 5.- Definition of the main resistant elements. Front elements.

Figure 6.-
Measurements of the
main resistant elements.
Front elements 1.

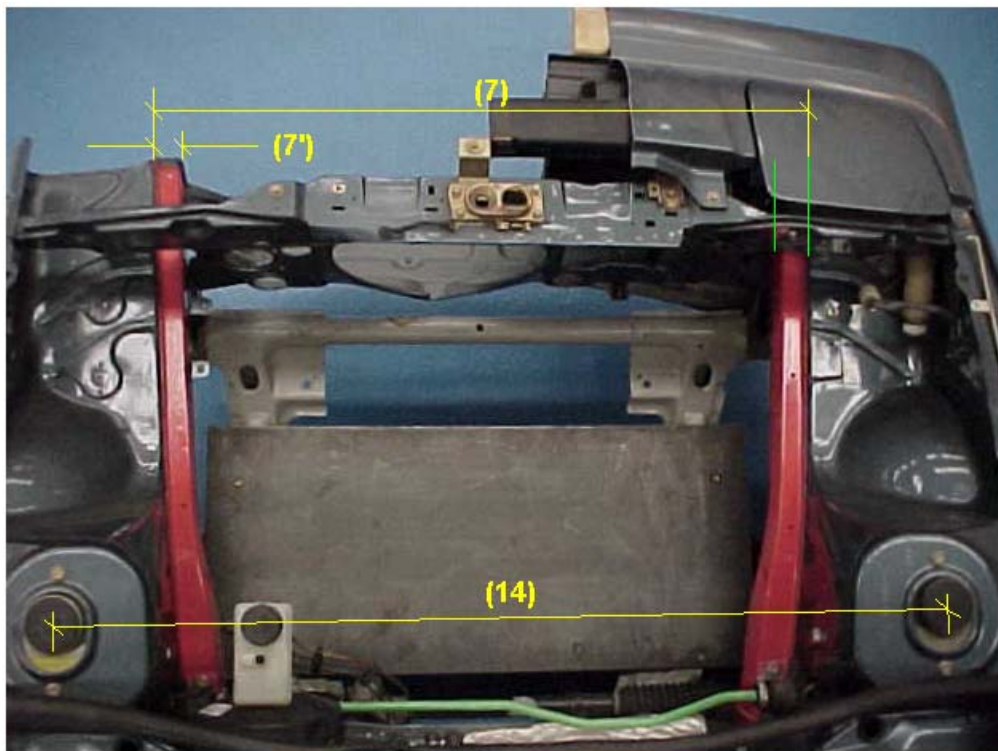
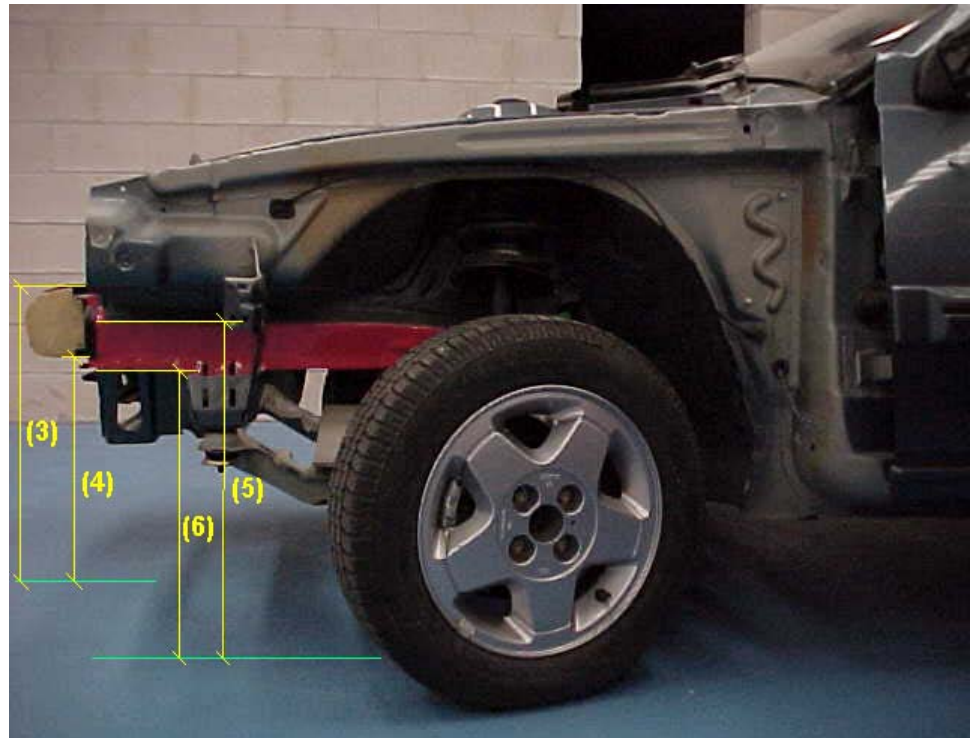


Figure 7.-
Measurements
of the main
resistant
elements. Front
elements 2.

Figure 8.-
Measurements of
the main resistant
elements. Front
elements 3.

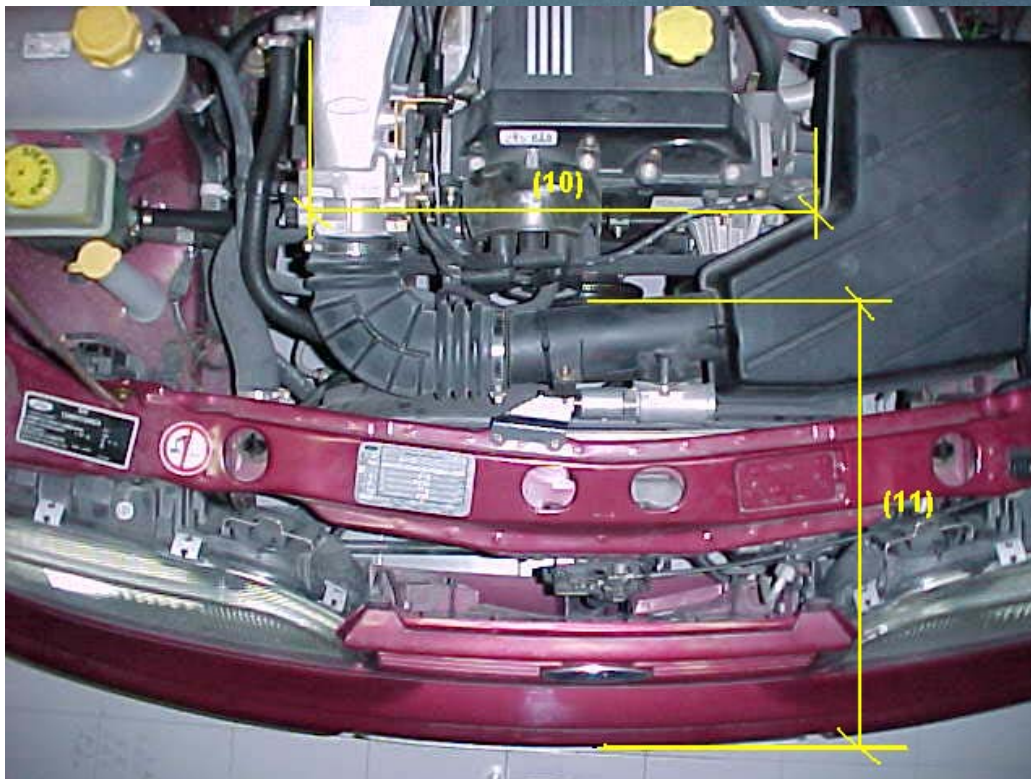
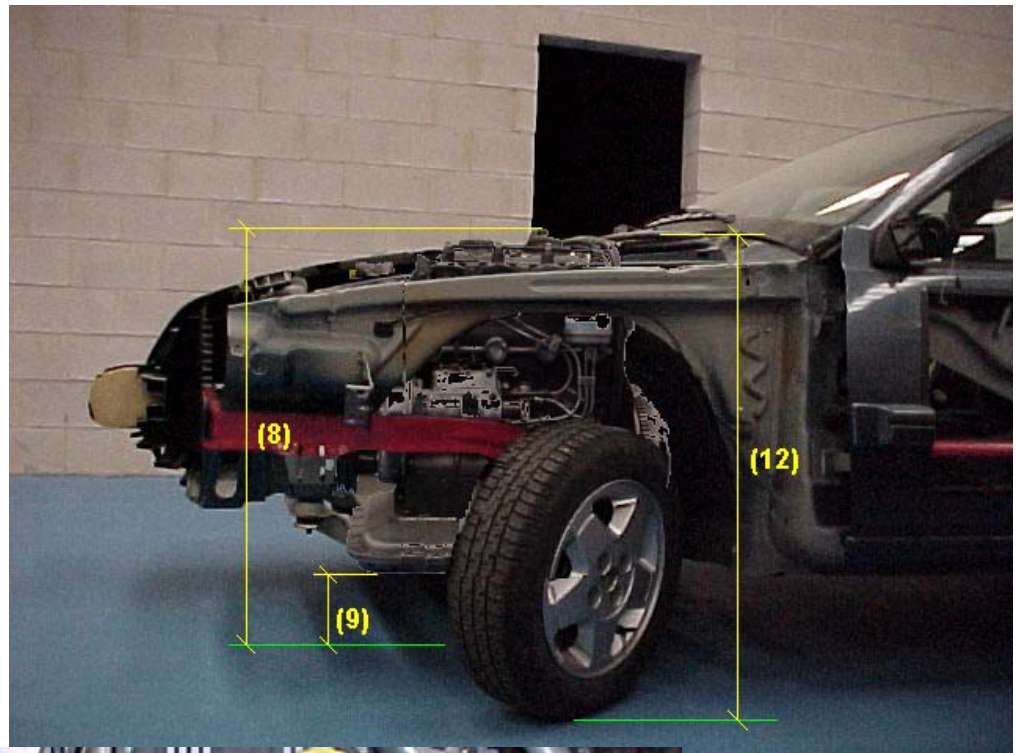


Figure 9.-
Definition of
the main
resistant
elements. Front
elements
(Longitudinal
engine).



The procedure considered to measure these elements is described as follows, where it is indicated the location of these ones in the Excel Sheet (SURVEY.XLS) into brackets:

FRONT ELEMENTS

- **Total Length –(1)- (Side & Front Sheets - C column):** distance between the point in the front bumper further on and the point in the rear bumper further back.
- **Weight (Side & Front Sheets - D column):** mass, including an average driver weight (70 kg), and the fuel tank mass (at half-capacity).
- **Total Width –(2)- (Side & Front Sheets - E column):** distance between the outer side points in a transverse plane of the vehicle (middle plane between the front and rear axles).
- **Bumper bottom height –(4)- (Front Sheet G column):** distance between the ground and the lowest point on the front bumper, being a resistant member (aerodynamic elements under the front bumper are not considered).
- **Bumper top height –(3)- (Front Sheet H column):** distance between the ground and the highest point on the front bumper, being a resistant member (aerodynamic elements are not considered).
- **Longitudinal member top height –(5)- (Front Sheet I column):** distance between the ground and the highest point on the longitudinal members, measured approximately in the front bumper-longitudinal member joint (when accessible).
- **Longitudinal member bottom height –(6)- (Front Sheet J column):** distance between the ground and the lowest point on the longitudinal members, measured approximately in the front bumper-longitudinal member joint.
- **Distance between longitudinal members (Front Sheet K column):** transverse distance between extreme points in longitudinal members, measured approximately in the front bumper-longitudinal member joint.

Depending on the accessibility of these members, the extreme points are the inner points (I) or the outer points (O).

- **Longitudinal member width -7'- (Front Sheet L column):** width of one of the longitudinal members, measured approximately in the front bumper-longitudinal member joint.

- **Engine top height (8) (Front Sheet N column):** distance between the ground and the highest point on the engine that can be a resistant member in case of accident (usually, the highest point on the head, or the highest point of the inlet or exhaust manifolds).
- **Engine bottom height (9) (Front Sheet M column):** distance between the ground and the lowest point on the engine (usually, the lowest point on the crankcase).
- **Engine and Gearbox width (10) (Front Sheet O & P columns):**
 - *Transverse configuration engine:* distance between extreme points in the gearbox-cylinder block unit or others resistant members attached to the cylinder block unit, i.e. fan belts (from a front point of view).
 - *Longitudinal configuration engine:* distance between extreme points in the cylinder block unit (from a front point of view).
- **Front bumper - Engine distance (11) (Front Sheet Q column):** distance between the point in the front bumper further on and the point in the engine further on that is a resistant element, i.e. the further on point of the exhaust manifold placed in the front of the engine.
- **Front shock absorber fixing width (14) (Front Sheet R column):** transverse distance between the front shock absorber - body car joints.
- **Front shock absorber fixing height (12) (Front Sheet S column):** distance between the ground and the front shock absorber-body car joint.
- **Bonnet leading edge height (Front Sheet T column):** distance between the ground and the bonnet edge further on.

SIDE ELEMENTS

- **Front bumper - Front axle distance (15) (Side Sheet G column):** distance between the point in the front bumper further on and the middle point in the front tyre-road contact patch.
- **Front axle - A Pillar distance (16) (Side Sheet H column):** distance between the middle point in the front tyre-road contact patch and the point in the A-pillar further back.
- **A Pillar - B Pillar distance (17) (Side Sheet I column):** distance between the point in the A-pillar further back and the middle point in the B-pillar.
- **B Pillar - C Pillar distance (19) (Side Sheet J column):** distance between the middle point in the B-pillar and the point in the C-pillar further back (only 4/5-door vehicles).
- **B Pillar - Rear axle distance (18) (Side Sheet K column):** distance between the middle point in the B-pillar and the middle point in the rear tyre-road contact patch.
- **Roof sill bottom height (20) (Side Sheet L column):** distance between the ground and the lowest point on the roof sill, measured in the front door middle point.
- **Roof sill top height (21) (Side Sheet M column):** distance between the ground and the highest point on the roof sill (usually located in the sill-roof joint), measured in the front door middle point.
- **Floor sill bottom height (22) (Side Sheet N column):** distance between the ground and the lowest point on the floor sill, measured in the front door middle point.
- **Floor sill top height (23) (Side Sheet O column):** distance between the ground and the highest point on the floor sill, measured in the front door middle point.

NOTE

- N/A: dimension not available.