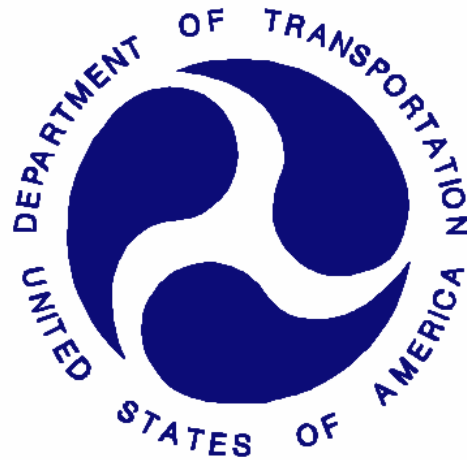


REPORT NUMBER: NCAP-MGA-2003-003

**NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST**

**2003 CHEVROLET AVALANCHE 4 DOOR
NHTSA NUMBER: M30100**

**PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105**



Test Date: January 8, 2003

Report Date: January 20, 2003

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5313
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-12005.

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Prepared by: _____ Date: _____
David Winkelbauer, Facility Director

Reviewed by: _____ Date: _____
Gary Strassburg, Project Engineer

FINAL REPORT ACCEPTED BY:

Manager, New Car Assessment Program

Date of Acceptance

COTR, NCAP Frontal Impact Program

Date of Acceptance

Technical Report Documentation Page

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		<p>14. <i>Sponsoring Agency Code</i> NVS-111</p>																										
<p>15. <i>Supplementary Notes</i></p>																												
<p>16. <i>Abstract</i> A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2003 Chevrolet Avalanche 4 Door at MGA Research Corporation on January 8, 2003. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.6 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum post test static crush is 562 mm located to the right of the vehicle centerline. The test vehicle is equipped with a 3-point continuous belt system and an airbag in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;"><u>Measurement Description</u></th> <th style="text-align: left;"><u>Units</u></th> <th style="text-align: left;"><u>Threshold</u></th> <th style="text-align: left;"><u>Driver ATD</u></th> <th style="text-align: left;"><u>Pass. ATD</u></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td>N/A</td> <td>1000</td> <td>786</td> <td>789</td> </tr> <tr> <td>Max. Thorax Accel. (3msec Clip)</td> <td>G's</td> <td>60</td> <td>51.7</td> <td>46.9</td> </tr> <tr> <td>Left Femur force</td> <td>Newtons</td> <td>10009</td> <td>-5736</td> <td>-5302</td> </tr> <tr> <td>Right Femur force</td> <td>Newtons</td> <td>10009</td> <td>-8175</td> <td>-5446</td> </tr> </tbody> </table>				<u>Measurement Description</u>	<u>Units</u>	<u>Threshold</u>	<u>Driver ATD</u>	<u>Pass. ATD</u>	Head Injury Criteria (HIC)	N/A	1000	786	789	Max. Thorax Accel. (3msec Clip)	G's	60	51.7	46.9	Left Femur force	Newtons	10009	-5736	-5302	Right Femur force	Newtons	10009	-8175	-5446
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No</u>
1	Purpose and Summary of the Test	1
2	Occupant and Vehicle Information / Data Sheets	3

<u>Data Sheet No.</u>		<u>Page No.</u>
1	Crash Test Summary	4
2	General Test and Vehicle Parameter Data	5
3	Test Vehicle Tire Information	7
4	Post Impact Data	8
5	Test Vehicle Information	9
6	Dummy Positioning in Vehicle	11
7	Seat Belt Positioning Data	13
8	Vehicle Accelerometer Location and Data Summary	14
9	Hybrid III ATD Injury Criteria and Sensor Data	15
10	Seat Belt Performance Assessment Test Data	18
11	Summary of FMVSS 212 Data	19
12	Windshield Zone Intrusion FMVSS 219 Data	20
13	FMVSS 301 Fuel System Integrity Post Impact Data	21
14	FMVSS 301 Static Rollover Data	22
15	Vehicle Measurements	23
16	Camera Locations	26
17	Photographic Reference Target Locations	28
18	Vehicle Intrusion Measurements	29
19	Load Cell Locations on Fixed Barrier	34
20	Accident Investigation Division Data	35
21	Dummy/Vehicle Temperature Stabilization Chart	36

<u>Appendix</u>		
A	Photographs	A
B	Dummy, Vehicle, and Barrier Response Data Traces	B
C	Dummy Calibration Data Traces and Tables	C
D	Test Equipment and Instrumentation Calibration	D

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.5 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-01-D-12005. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact in excess of the current 48.3 kph requirements.

SUMMARY

A load cell barrier consisting of 30 load cells was impacted by a 2003 Chevrolet Avalanche 4 door at a velocity of 56.6 kph. The test was performed at MGA Research Corporation on January 8, 2003. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and sixteen high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis triaxial accelerometers, chest displacement potentiometer, upper neck transducers, right/left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 065) and right-front passenger (position 2) ATD (Serial No. 066) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 151 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 562 mm and both the driver and passenger side doors remained closed and latched during the impact event.

The driver's head and chest contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the bolster. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glove box.

The occupant data is summarized below:

ATD position	HIC	Clip(g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)	Belt Spool (mm)
Driver	786	51.7	-25.6	-5736	-8175	74
Passenger	789	46.9	-23.7	-5302	-5446	73

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door

NHTSA No.: M30100

Test Program: 35mph Frontal Impact

Test Date: 1/8/2003

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	English Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressure	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	=(tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

*Based on the Recommended Practice in SAE J916, May 85

**DATA SHEET NO. 1
CRASH TEST SUMMARY**

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/hr	56.6
Test Weight	kg	2916.7
Average Rebound	mm	982
Maximum Static Crush	mm	562
Impact Angle	degrees	0

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Door remained closed and latched; Door opened with tools	Door remained closed and latched; Door opened with tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	3	0
Seat Back Failure	None	None

TEST DUMMY INFORMATION

Description	Driver	Passenger
Dummy Type / Serial No.	65	66
Head Contact	Airbag, Head rest	Airbag, Head rest
Chest Contact	Airbag	Airbag
Abdomen Contact	None	None
Left Knee Contact	Knee Bolster	Glove box
Right Knee Contact	Knee Bolster	Glove box

16mm MOVIE COVERAGE

High Speed	16
Real Time	1
Total	17

Driver ATD Sensors	42
Passenger ATD Sensors	42
Belt Assessment Sensors	4
Vehicle Structure Accelerometers	9
Rigid Barrier Load Cells	6
Total	103

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

TEST VEHICLE INFORMATION

Manufacturer	Chevrolet
Model	Avalanche
Body Style	MPV
NHTSA No.	M30100
VIN	3GNEK13T73G110398
Color	Blue
Delivery Date	9/6/02
Odometer Reading (mile)	22
Dealer	Lynch Chevrolet
Transmission	Automatic
Final Drive	Four wheel
Number of Cylinders	8
Engine Displacement (L)	5.3
Engine Placement	Longitudinal

TEST VEHICLE OPTIONS

Driver Airbag	Yes
Passenger Airbag	Yes
Force Limiter	No
Pretensioner	No
Power Windows	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
AM/FM/CD	Yes
Anti-theft System	Yes
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors de Mexico	GVWR (kg)	3175
Date of Manufacture	8/02	GAWR Front (kg)	1724
		GAWR Rear (kg)	1814

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	308	308
Cold Pressure (kPa)	210	210
Recommended Tire Size	P265/70R17	P265/70R17
Tire Size on Vehicle	P265/70R17	P265/70R17
Tire Manufacturer	Goodyear	Goodyear

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Split Bench	Split Bench		
Number Of Occupants	3	3		6
Capacity Wt. (VCW) (kg)				507.6
Cargo Wt. (RCLW) (kg)				99.3

DATA SHEET NO. 2...(continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door NHTSA No.: M30100
 Test Program: 35mph Frontal Impact Test Date: 1/8/2003

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	734.4	628.2		783.4	711.7	
Right	kg	660.4	644.6		703.1	718.5	
Ratio	%	52.3	47.7		51.0	49.0	
Totals	kg	1394.8	1272.8	2667.6	1486.5	1430.2	2916.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2667.6
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	99.3
Calculated Vehicle Target Weight (TVTW)	kg	2922.9

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	902	917	976	982	1579
As Tested	mm	900	910	954	962	1623
Post Test	mm	945	966	952	957	

Vehicle Wheelbase (mm): 3310

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

Vehicle Components Removed: Rigid cargo cover

Ballast weight does not include cameras, instrumentation, and brake abort system.

FUEL SYSTEM DATA

Fuel System Capacity From Owner's Manual (L): 117.3

Usable Capacity Figure Furnished by COTR (L): 117.3

Actual Test Volume (L): 110.3

Test Fluid Type: Stoddard Solvent ; Specific Gravity: 0.77

Is Vehicle Fuel Pump Electric or Mechanical? Electric

If electric, does pump operate with ignition switch "ON" & engine "OFF"? yes

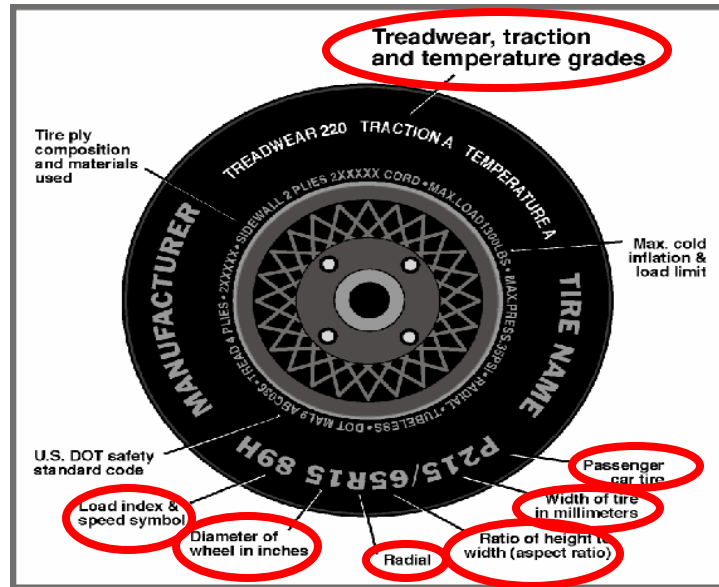
DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

Vehicle Year	2003	Vehicle Make	Chevrolet
VIN	3GNEK13T73G110398	Vehicle Model	Avalanche



	Front	Rear
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Wrangler AT/S	Wrangler AT/S
Tire Type	P	P
Tire Width (mm)	265	265
Ratio of Height to Width (aspect ratio)	70	70
Radial	R	R
Wheel Diameter	17	17
Load Index & Speed Symbol	113S	113S
Treadwear	360	360
Traction Grade	A	A
Temperature Grade	B	B

DATA SHEET NO. 4
POST IMPACT DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.5 – 57.1	56.6
Trap No. 1 Entry Distance	mm	<1524	1300
Trap No. 1 Exit Distance	mm	<1524	300
Trap No. 2 Velocity (Redundant)	km/h	55.5 – 57.1	No time
Trap No. 2 Entry Distance	mm	<1524	1425
Trap No. 2 Exit Distance	mm	<1524	425

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	5329	4951	378
Center	mm	5599	5063	536
Right Side	mm	5336	4860	476

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	966
Center	mm	940
Right Side	mm	1040
Average	mm	982

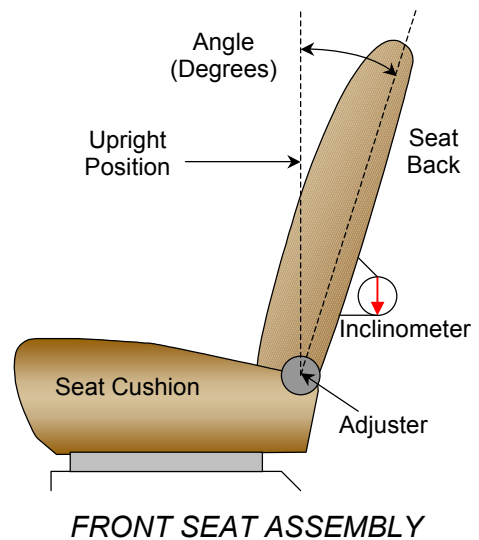
DATA SHEET NO. 5
TEST VEHICLE INFORMATION

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: Starting approximately 9-10 inches above the seat back pivot point near the outboard edge, press against the seat back rear surface to feel for the hard structure. Cut through the seat fabric, foam, and cardboard in this area to expose the metal frame, make sure that there is enough flat surface on the frame to correctly position the inclinometer. Place inclinometer firmly on the frame through the fabric opening and adjust the seat back until the correct angle is indicated. Measure without the dummy in the seat, and again with the dummy in the seat (adjust seat back angle if needed to achieve 15.5 degrees).



Driver seat back angle: 15.8 deg

Passenger seat back angle: 15.6 deg

SEAT FORE/AFT POSITIONS

The driver seat is electric and the passenger seat is manually operated.

Driver seat fore/aft total travel: 220 mm

Passenger seat fore/aft total travel: 23 notches

Driver seat fore/aft position: 110 mm

Passenger seat fore/aft position: 12th notch

SEAT BELT UPPER ANCHORAGE

The front outboard D-rings were non adjustable.

DATA SHEET NO. 5...(continued)

TEST VEHICLE INFORMATION

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003

FUEL TANK CAPACITY DATA

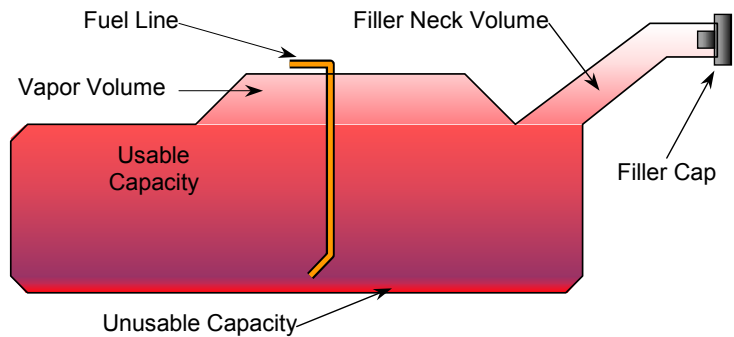
The "Usable Capacity" of the standard equipment fuel tank is: 117.3 liters

The "Usable Capacity" of any optional equipment fuel tank is: N/A liters

The "Usable Capacity" used for certification to FMVSS 301 requirements: 117.3 liters

Actual amount of Stoddard solvent added to vehicle for certification test: 110.3 liters

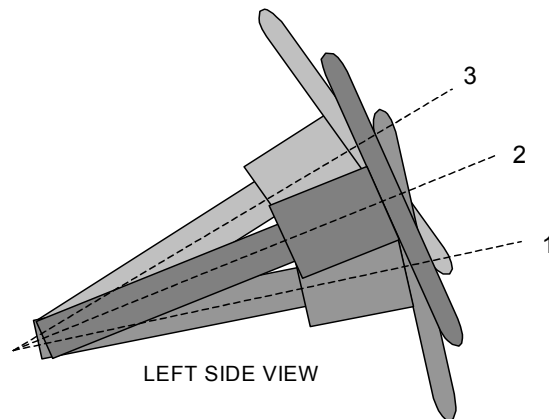
The test vehicle is equipped with an electric fuel pump. The fuel filler door is located on the left rear fender.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

The steering column has 6 adjustment positions. The column was set in the fourth position with the top position as 1.



STEERING COLUMN ASSEMBLY

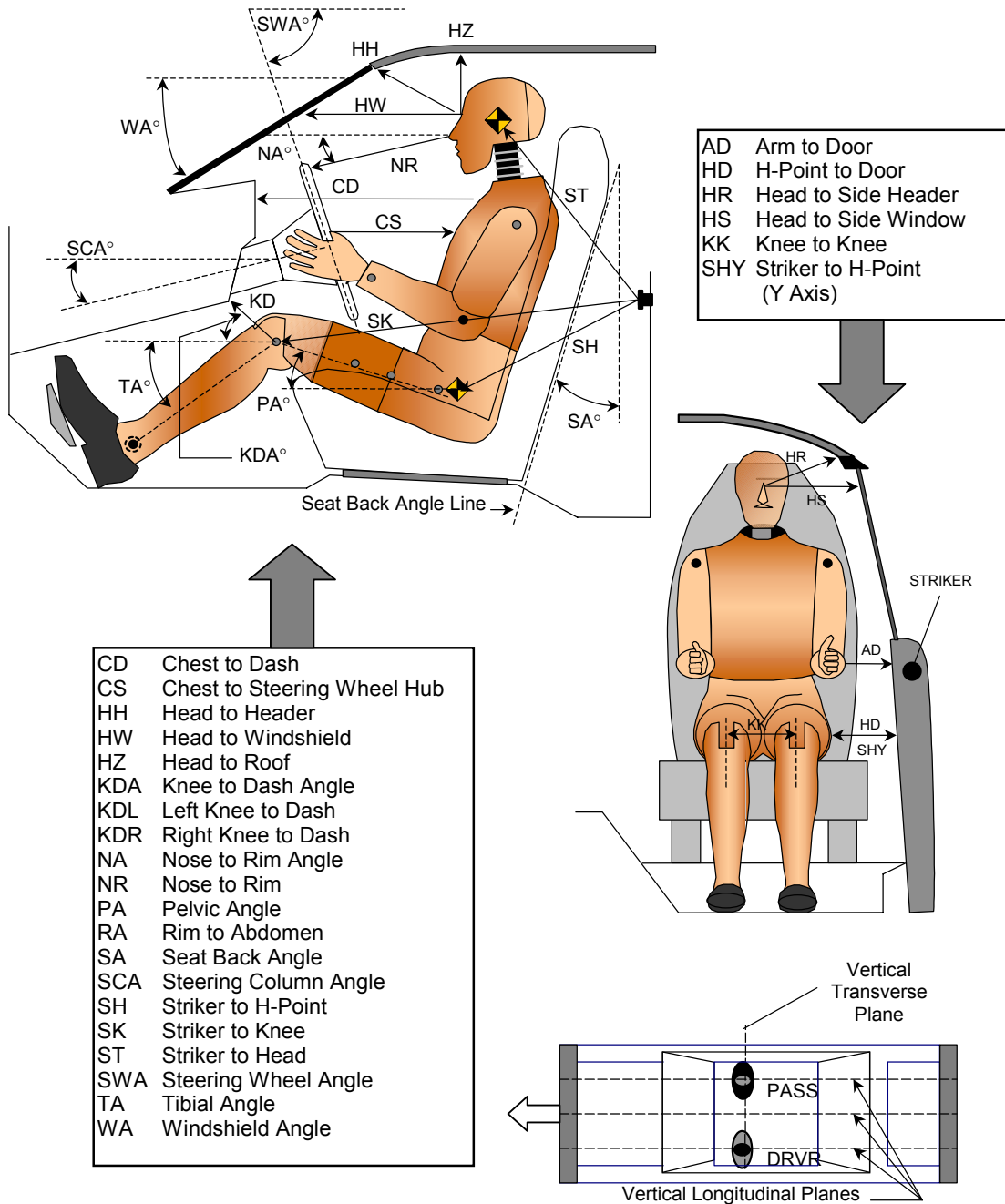
DATA SHEET NO. 6

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET NO. 6... (continued)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

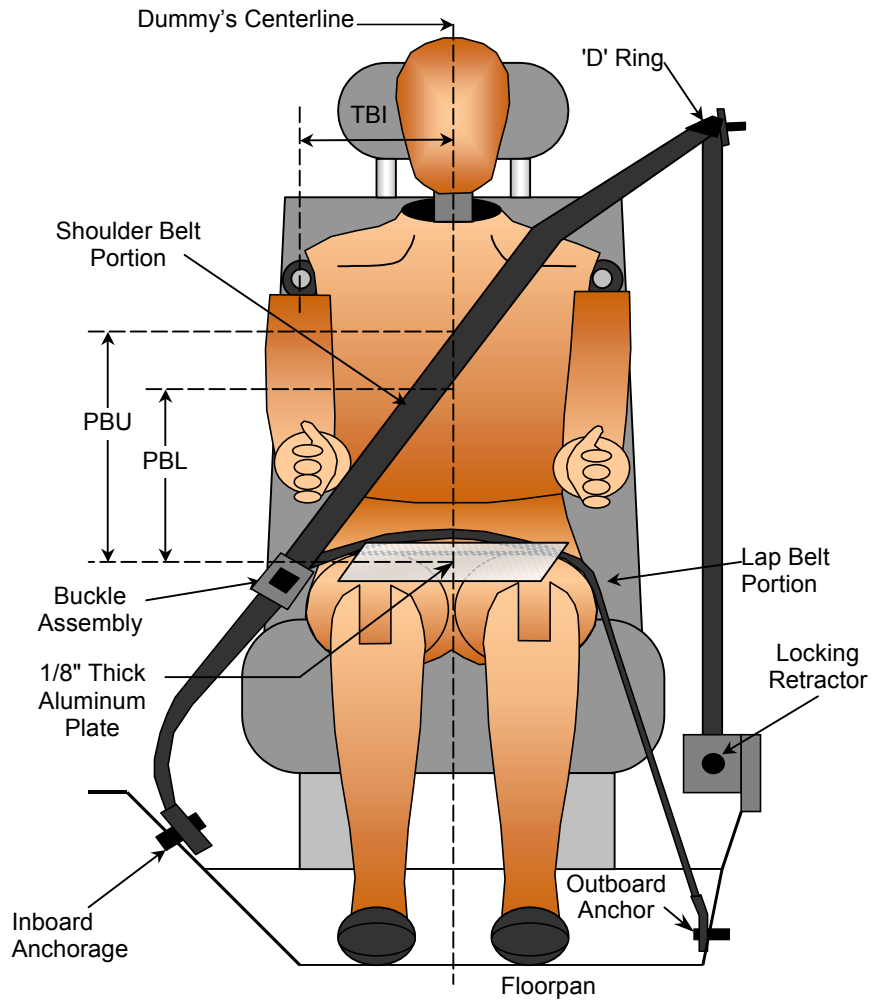
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		40.1		
SWA	Steering Wheel Angle		68.4		
SCA	Steering Column Angle		21.6		
SA	Seat Back Angle		15.8		15.6
HZ	Head to Roof (Z)	255	90	247	90
HH	Head to Header	494	19.0	466	17.3
HW	Head to Windshield	683	0	644	0
HR	Head to Side Header (Y)	252		240	
NR	Nose to Rim	385	10.1		
CD	Chest to Dash	562		434	
CS	Chest to Steering Hub	333	1.0		
RA	Rim to Abdomen	193	0		
KDL	Left Knee to Dash	181	0	163	
KDR	Right Knee to Dash	198		179	0
PA	Pelvic Angle		22.5		21.3
TA	Tibia Angle		47.0		50.2
KK	Knee to Knee (Y)	325		216	
SK	Striker to Knee	694	2.1	689	3.2
ST	Striker to Head	650	18.6	641	18.4
SH	Striker to H-Point	301	9.0	30.1	2.3
SHY	Striker to H-Point (Y)	247		247	
HS	Head to Side Window	342		324	
HD	H-Point to Door (Y)	150		152	
AD	Arm to Door (Y)	126		127	
AA	Ankle to Ankle	290		203	

DATA SHEET NO. 7
SEAT BELT POSITIONING DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	170	170
PBU - Top surface of reference to belt upper edge	mm	330	309
PBL - To surface of reference to belt lower edge	mm	245	225

DATA SHEET NO. 8

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

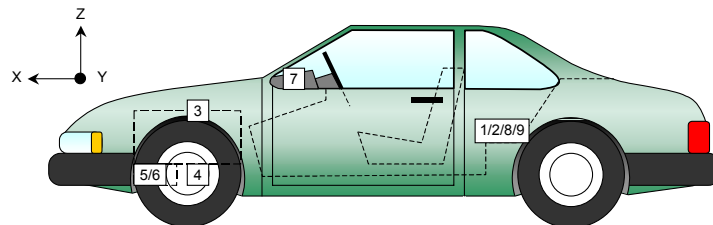
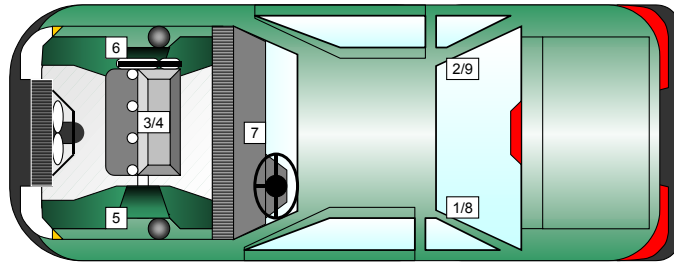
VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)			Peak Values				
		X	Y	Z	Units	Max	Time	Min	Time
1	Left Rear X-Member X	2595	-696	565	G's	1.7	198	-28.7	66
2	Right Rear X-Member X	2595	696	565	G's	2.4	200	-29.4	66
3	Engine Top X	4680	10	1171	G's	19.8	54	-73.1	34
4	Engine Bottom X	4400	35	385	G's	18.4	73	-64.7	42
5	Left Brake Caliper X **	4528	-690	515	G's	120.7	58	-129.9	29
6	Right Brake Caliper X	4528	690	515	G's	59.5	25	-101.4	31
7	Instrument Panel X	3802	0	1430	G's	11.4	113	-76.4	67
8	Left Rear X-Member Z	2595	-696	565	G's	8.2	42	-8.0	70
9	Right Rear X-Member Z	2595	696	565	G's	11.9	55	-9.0	94

Reference Points: X - Rear Surface of Vehicle (+ forward) ** No valid data after 70 msec

Y - Vehicle Centerline (+ to right)

Z - Ground Plane (+ up)



DATA SHEET NO. 9

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	1.7	29	-69.5	84	8.7	197	-65.7	89
Head CG	Y	G's	6.0	171	-18.2	88	11.2	91	4.8	164
Head CG	Z	G's	23.5	60	-12.3	123	28.5	68	-11.7	131
Head CG Resultant	N/A	G's	72.6	84			68.6	88		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.7	145	-51.1	80	3.4	190	-48.3	78
Chest CG	Y	G's	5.0	108	-5.9	58	4.2	77	-3.8	57
Chest CG	Z	G's	17.0	80	-16.0	127	16.0	69	-15.1	130
Chest CG Resultant	N/A	G's	53.9	80			49.6	78		

FEMUR PEAK FORCES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	239	40	-5736	52	265	40	-5302	49
Right Femur	Z	Newtons	202	40	-8175	60	405	131	-5446	56

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	4142	56			3564	56		
Shoulder Belt Force	N/A	Newtons	3757	78			3957	78		

HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg G's	T ¹	T ²	HIC	Avg G's	T ¹	T ²
Head CG Primary	786	58.7	69.2	99.0	789	54.5	66.3	102.3

CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	51.7	78.4	81.4	46.9	76.1	79.1

DATA SHEET NO. 9... (continued)

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	8.0	103	-107.2	52	4.7	105	-57.3	56
Pelvis	Y	G's	21.0	93	-15.9	51	4.8	93	-4.7	88
Pelvis	Z	G's	15.8	57	-44.8	102	5.7	51	-15.4	115

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	780	84	-307	158	907	83	-247	161
Neck Force	Y	Newtons	280	91	-40	126	42	77	-184	92
Neck Force	Z	Newtons	2210	77	-556	123	1831	72	534	132
Neck Moment	X	N•m	15.1	174	-20.8	90	18.8	102	-11.0	160
Neck Moment	Y	N•m	32.3	155	-11.4	56	61.7	82	-16.5	62
Neck Moment	Z	N•m	17.6	100	-5.4	157	3.3	140	-11.8	100

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	6.1	91	-87.8	53	63.5	68	-175.9	48
Left Foot Aft	Z	G's	13.3	75	-99.5	58	35.1	64	-89.3	57
Left Foot Fore	Z	G's	97.4	55	-105.6	60	94.5	64	-212.0	50
Right Foot Aft	X	G's	19.7	59	-311.2	51	5.9	45	-107.3	53
Right Foot Aft	Z	G's	26.0	75	-245.2	50	6.3	71	-81.8	59
Right Foot Fore	Z	G's	126.4	47	-504.4	50	32.5	71	-102.5	51

UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Lower Moment	X	N•m	37.2	57	-18.1	112	42.6	70	-32.3	59
Left Lower Moment	Y	N•m	71.5	55	-6.0	42	78.8	73	-7.6	42
Left Lower Force	Z	Newtons	79	145	-4794	58	115	194	-2081	55
Left Upper Moment	X	N•m	97.2	59	-36.6	115	9.8	71	-65.4	63
Left Upper Moment	Y	N•m	131.9	50	-92.0	62	66.1	45	-100.7	55
Left Upper Force	Z	Newtons	108	147	-4171	58	372	67	-2260	48
Right Lower Moment	X	N•m	72.6	52	-233.2	55	28.7	104	-39.4	61
Right Lower Moment	Y	N•m	98.5	71	-38.0	50	42.7	61	-11.6	45
Right Lower Force	Z	Newtons	157	175	-11627	51	175	46	-5103	59
Right Upper Moment	X	N•m	99.1	52	-117.0	55	41.5	109	-127.0	63
Right Upper Moment	Y	N•m	19.1	149	-266.6	57	102.8	51	-27.5	60
Right Upper Force	Z	Newtons	159	172	-9408	51	163	157	-4789	61

DATA SHEET NO. 9...(continued)

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	mm			-25.6	83			-23.7	83

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	1.2	30	-69.7	84	9.1	197	-65.1	92
Head CG	Y	G's	5.4	168	-15.7	85	12.1	92	-4.3	163
Head CG	Z	G's	24.4	78	-12.0	122	28.0	68	-11.7	131
Head CG	N/A	G's	72.5	84			67.6	88		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.5	158	-50.9	80	3.5	190	-48.5	78
Chest CG	Y	G's	4.7	108	-6.4	58	4.0	77	-3.4	57
Chest CG	Z	G's	17.0	80	-16.1	127	16.0	69	-14.9	130
Chest CG	N/A	G's	53.8	80			49.9	78		

REDUNDANT HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg G's	T ¹	T ²	HIC	Avg G's	T ¹	T ²
Head CG Primary Redundant	785	58.6	69.3	99.1	770	54.0	66.3	102.3

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary Redundant	51.8	78.7	81.7	46.7	75.8	78.8

DATA SHEET NO. 10**SEAT BELT PERFORMANCE ASSESSMENT TEST DATA**

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

SEAT BELT PLACEMENT MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	170	170
PBU - Top surface of reference to belt upper edge	mm	330	309
PBL - Top surface of reference to belt lower edge	mm	245	225

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Retractor reel to "D" ring **	mm	N/A	N/A
Shoulder belt length as measured on ATD	mm	802	812
Lap belt length as measured on ATD	mm	614	605
Remainder of belt on reel	mm	849	853
Total belt length for continuous webbing systems	mm	2265	2270

** Belt retractor in seat

SHOULDER BELT SPOOL-OUT DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	74	73

DATA SHEET NO. 11
SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

Windshield Mounting Details:

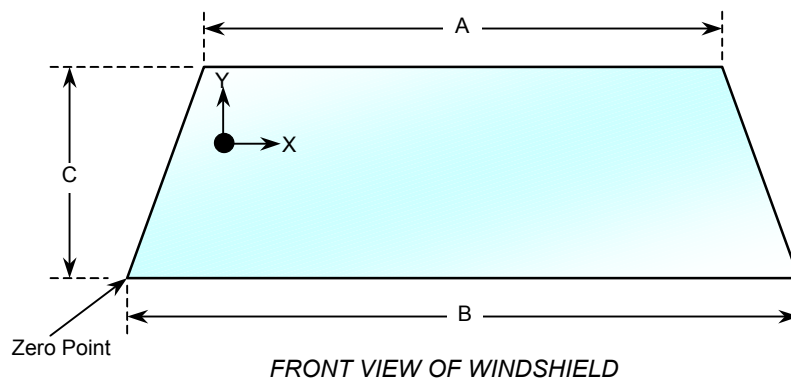
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2232	2232	100
Right Side	2237	2237	100
Total	4469	4469	100



WINDSHIELD DIMENSIONS

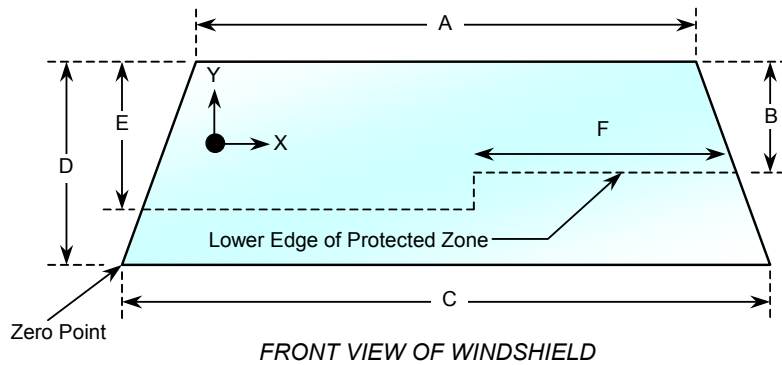
Item	Units	Segment Length	Molding Width
A	mm	1390	20
B	mm	1740	N/A
C	mm	667	26

DATA SHEET NO. 12

WINDSHIELD ZONE INTRUSION FMVSS 219 (Partial) DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003



Item	Units	Value
A	mm	1390
B	mm	388
C	mm	1740
D	mm	667
E	mm	458
F	mm	1050

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 NO. 13

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door

NHTSA No.: M30100

Test Program: 35mph Frontal Impact

Test Date: 1/8/2003

Temperature at Time of Impact: 21 C

Test Time: 12:00 pm

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

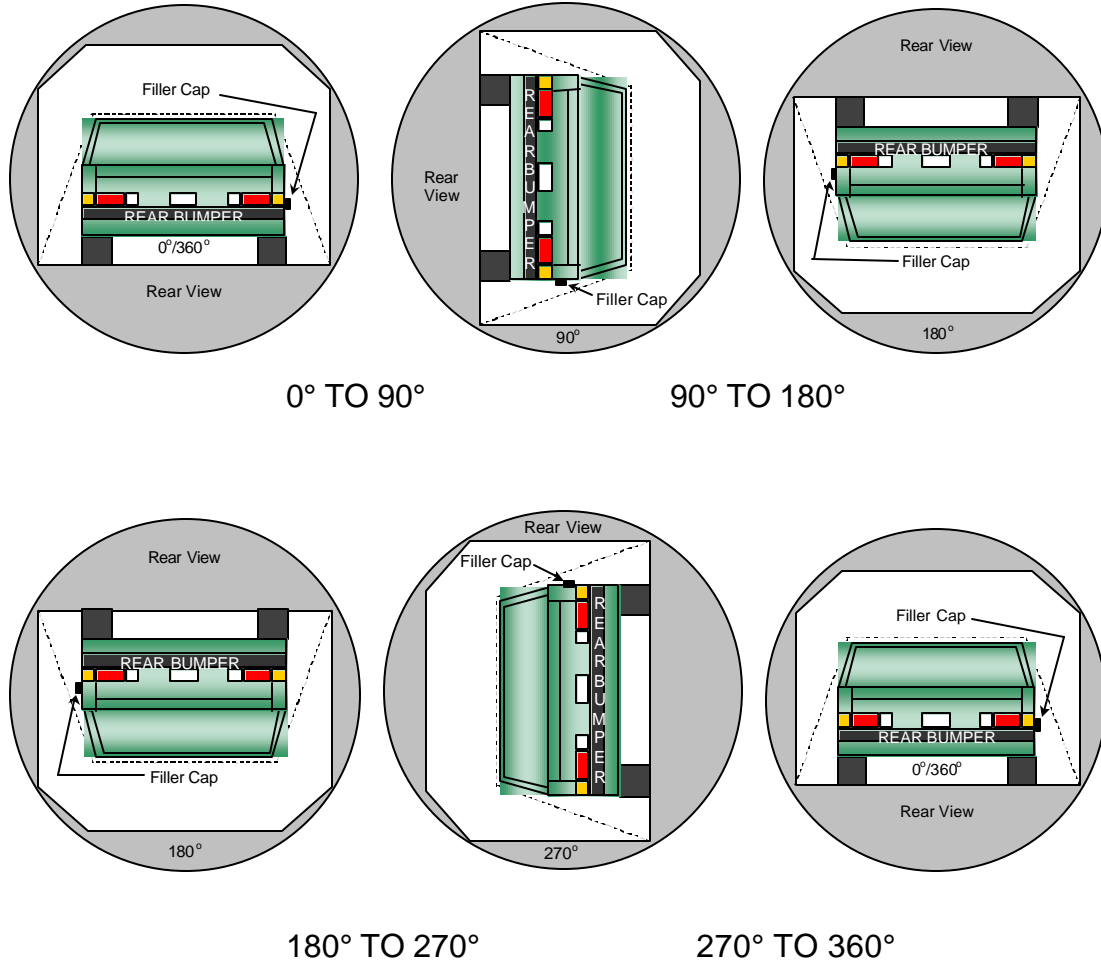
DATA SHEET NO. 14

FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

Test Time: 12:00 pm



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: None

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° TO 90°	152	300	0
90° TO 180°	168	300	0
180° TO 270°	156	300	0
270° TO 360°	160	300	0

DATA SHEET NO. 15
VEHICLE MEASUREMENTS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003

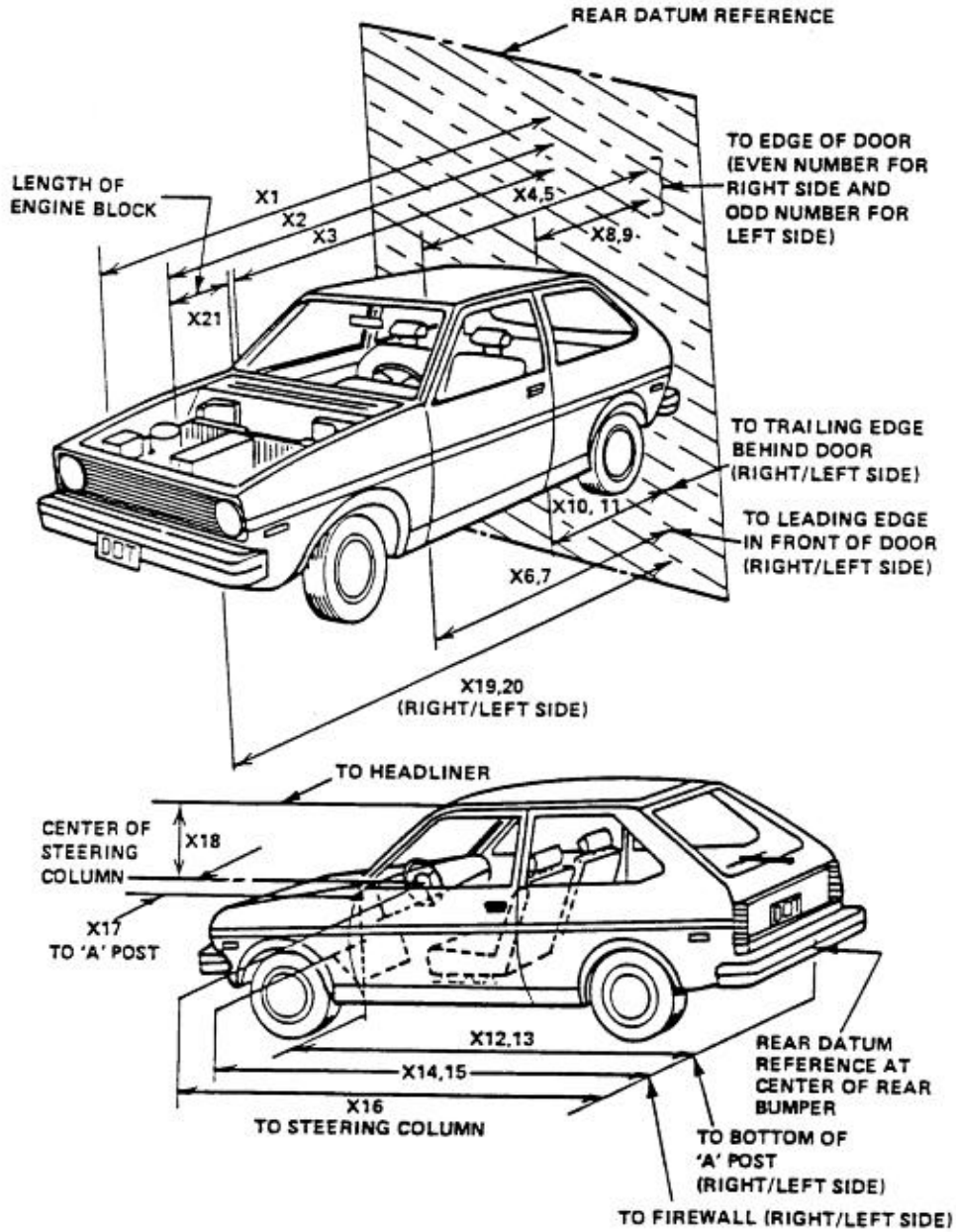
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	5599	5063	536
2	RSOV to front of engine	mm	4790	4581	209
3	RSOV to firewall centerline	mm	4390	4347	43
4	RSOV to leading edge of right door	mm	4069	4074	-5
5	RSOV to leading edge of left door	mm	4065	4044	21
6	RSOV to lower leading edge of right door	mm	4011	4012	-1
7	RSOV to lower leading edge of left door	mm	4006	3990	16
8	RSOV to upper leading edge of right door	mm	2887	2884	3
9	RSOV to upper leading edge of left door	mm	2884	2869	15
10	RSOV to lower trailing edge of right door	mm	2875	2869	6
11	RSOV to lower trailing edge of left door	mm	2865	2850	15
12	RSOV to bottom of right 'A' pillar	mm	4016	4013	3
13	RSOV to bottom of left 'A' pillar	mm	4002	4000	2
14	RSOV to firewall on right side	mm	4345	4272	73
15	RSOV to firewall on left side	mm	4359	4271	88
16	RSOV to steering column	mm	3562	3506	56
17	Center of steering column to left 'A' pillar	mm	388	398	-10
18	Center of steering column to headlining	mm	406	433	-27
19	RSOV to right side of front bumper	mm	5336	4860	476
20	RSOV to left side of front bumper	mm	5329	4951	378
21	Length of engine block	mm	470	470	0
RD	RSOV to right side of dash panel	mm	3742	3757	-15
CD	RSOV to center of dash panel	mm	3729	3666	63
LD	RSOV to left side of dash panel	mm	3736	3958	-222

DATA SHEET NO. 15...(continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003



DATA SHEET NO. 15... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door

NHTSA No.: M30100

Test Program: 35mph Frontal Impact

Test Date: 1/8/2003

Target Vehicle Structural Measurement

	Elements	Pre-Test (mm)
1	Total Length	5599
2	Total Width	2020
3	Bumper Top Height	723
4	Bumper Bottom Height	329
5	Longitudinal Member Top Height	590
6	Distance between Longitudinal Members	465
7	Longitudinal Member Width	888
8	Engine Top Height	1110
9	Engine Bottom Height	320
10	Engine and gearbox width	620
11	Front bumper-engine distance	734
12	Front shock absorber fixing height	695
13	Bonnet leading edge height	1090
14	Front shock absorber fixing width	885
15	Front bumper – front axle distance	1030
16	Front axle – a pillar distance	587
17	A-pillar – B-pillar distance	1135
18	B-Pillar – rear axle distance	1710
19	B-pillar – C-pillar distance	850
20	Roof sill bottom height	1735
21	Roof sill top height	1820
22	Floor sill bottom height	465
23	Floor sill top height	553

DATA SHEET NO. 16
CAMERA LOCATIONS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				18	32
2	Left Front View	1000	-8600	1560	13	1020
3	Steering Column Top	2300	-8000	1560	25	1005
4	Steering Column Bottom	2300	-8000	1030	25	1015
5	Driver Close-up	-1500	-9700	1510	35	1070
6	Driver Angle	4600	-5000	7020	50	1053
7	Left Rear				13	513
8	Right Rear				13	503
9	Right Overall	2400	8350	1720	13	1005
10	Right Passenger Half	1070	8350	1640	25	1000
11	Right Close-up	1550	10400	1700	35	1111
12	Right Angle	4800	5500	2120	50	1010
13	Windshield	330	0	2560	13	1010
14	Top Driver	-90	-430	1590	13	1015
15	Top Passenger	-90	460	1590	13	**
16	Pit Front	1100	0	-3220	13	1000
17	Pit Rear	3320	0	-3220	13	1005
18	Left Front	650	-9050	1500	25	500

*COORDINATES:

+X = film plane rearward of barrier

** no timing marks

+Y = film plane to right of monorail centerline

+Z = film plane above ground level

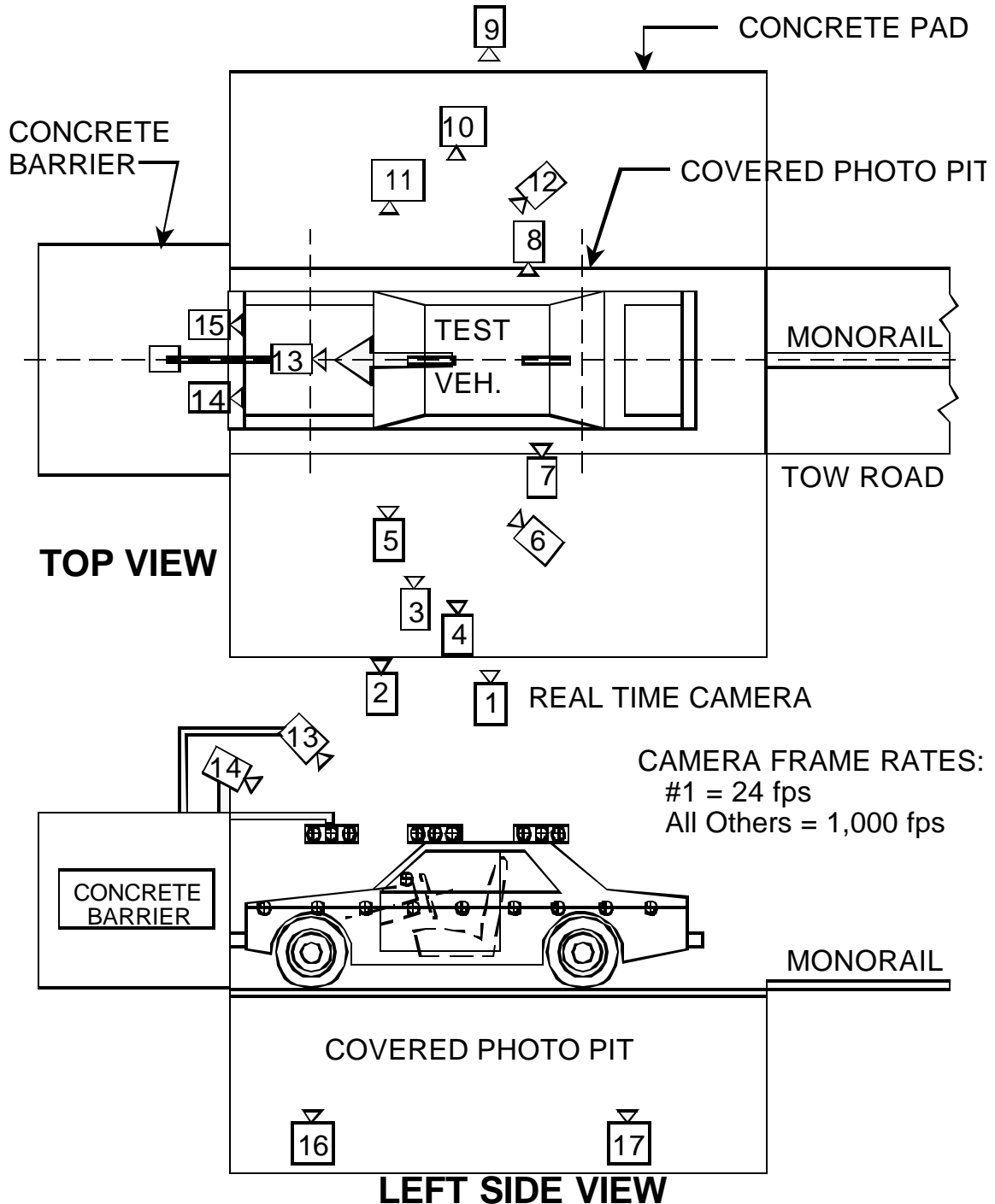
DATA SHEET NO. 16... (continued)

CAMERA LOCATIONS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003

CAMERA POSITIONS FOR FRONTAL IMPACTS



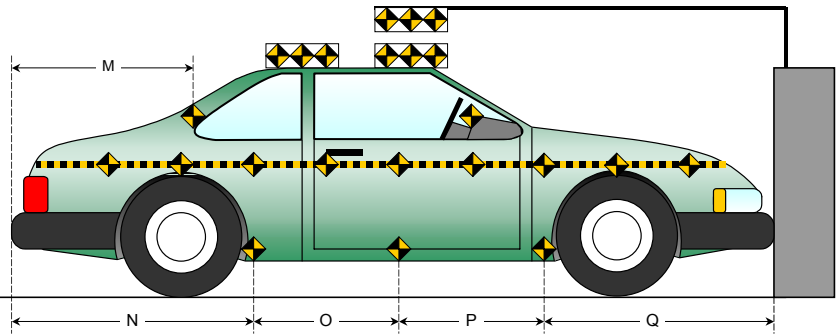
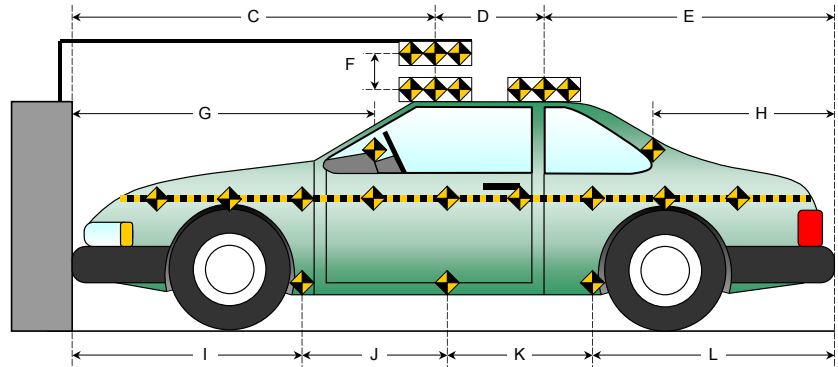
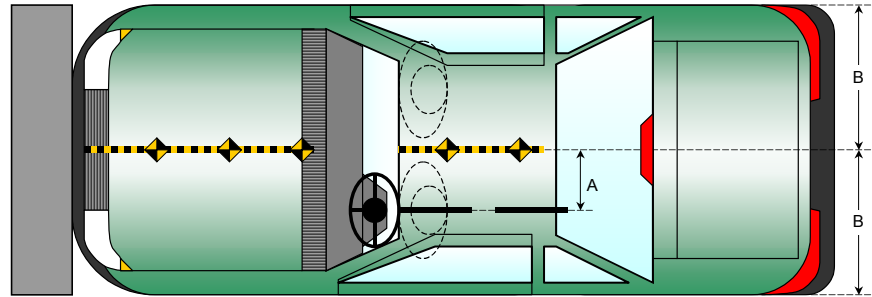
DATA SHEET NO. 17

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

Item	Value
A	440
B	1010
C	2473
D	610
E	2516
F	610
G	1813
H	1930
I	1472
J	1123
K	1121
L	1883
M	1940
N	1892
O	1123
P	1120
Q	1464



DATA SHEET NO. 18

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

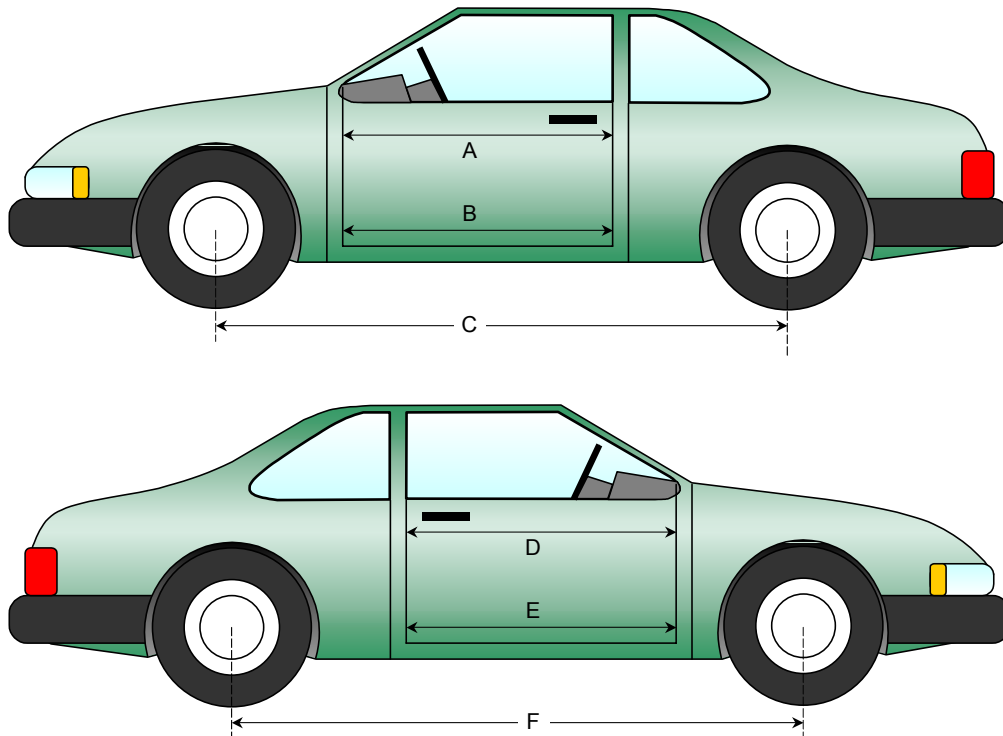
NHTSA No.: M30100
 Test Date: 1/8/2003

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1135	1111	24
B	Left Side Lower	mm	1130	1121	9
D	Right Side Upper	mm	1136	1125	11
E	Right Side Lower	mm	1135	1130	5

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3310	3141	169
F	Right Side Wheelbase	mm	3308	3188	120



DATA SHEET NO. 18... (continued)
VEHICLE INTRUSION MEASUREMENTS

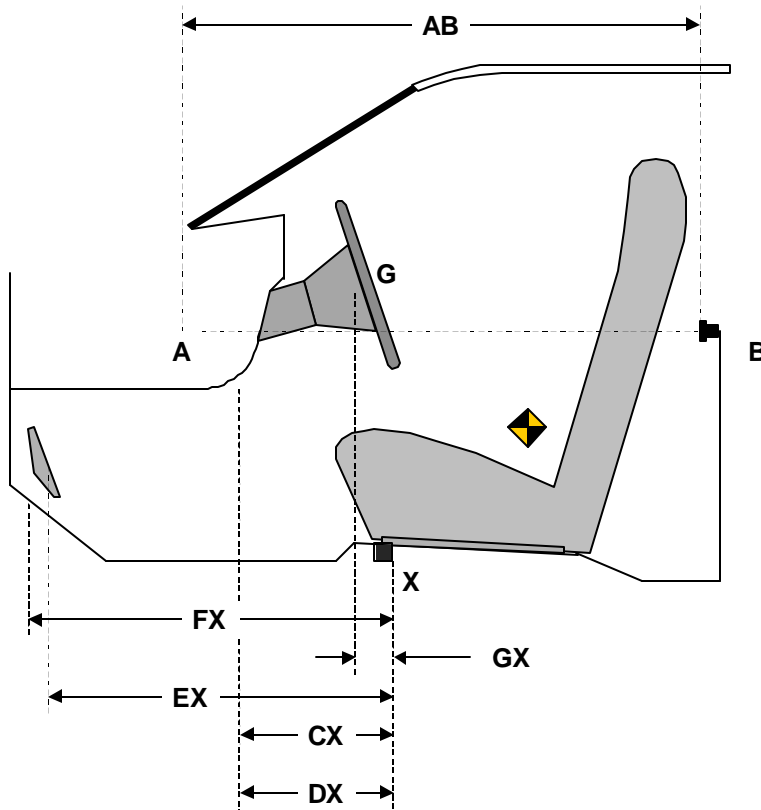
Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	1122	1094	28
CX	Left Knee Bolster to X	mm	280	260	20
DX	Right Knee Bolster to X	mm	255	150	105
EX	Brake Pedal to X	mm	545	355	190
FX	Foot Rest to X	mm	N/A	N/A	N/A
GX	Center of Steering Column Wheel Hub to X	mm	90	48	42

X = Left Front Seat Front Outboard Anchor Bolt Head



DRIVER COMPARTMENT

DATA SHEET NO. 18... (continued)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

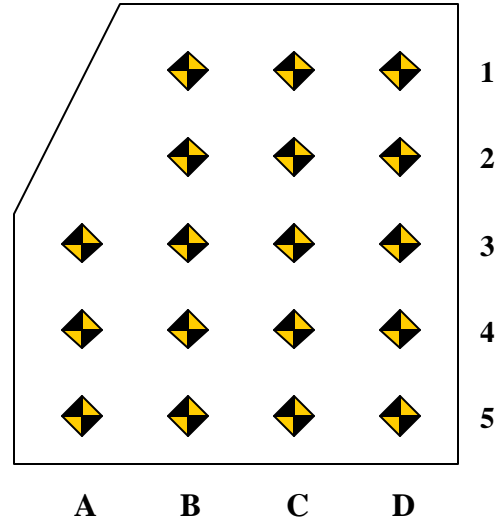
NHTSA No.: M30100
 Test Date: 1/8/2003

Measurement reference point for X and Z axis is the forward outboard seat mounting bolt.

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 FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	580	580	580	580	499	480	455	457	81	100	125	123
2	540	540	540	540	480	460	440	439	60	80	100	101
3	510	510	510	510	485	486	471	468	25	24	39	42
4	365	365	365	365	358	363	360	364	7	2	5	1
5	225	225	225	225	227	225	220	228	-2	0	5	-3

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	0	0	0	0	33	37	45	52	-33	-37	-45	-52
2	-25	-25	-25	-25	-12	0	4	12	-13	-25	-29	-37
3	-52	-52	-52	-52	-52	-35	-25	-15	0	-17	-27	-37
4	-48	-45	-48	-48	-30	-43	-53	-34	-18	-2	5	-14
5	-43	-38	-43	-43	-45	-28	-48	-49	2	-10	5	6

DATA SHEET NO. 18...(continued)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

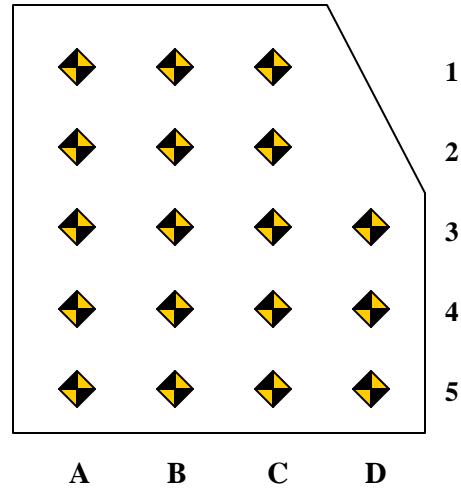
NHTSA No.: M30100
 Test Date: 1/8/2003

Measurement reference point for X and Z axis is the forward outboard seat mounting bolt.

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 FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	580	580	580	580	486	512	534	550	94	68	46	30
2	540	540	540	540	462	481	496	513	78	59	44	27
3	462	462	462	462	450	445	450	448	12	17	12	14
4	340	340	340	340	334	332	333	333	6	8	7	7
5	230	230	230	230	222	224	227	228	8	6	3	2

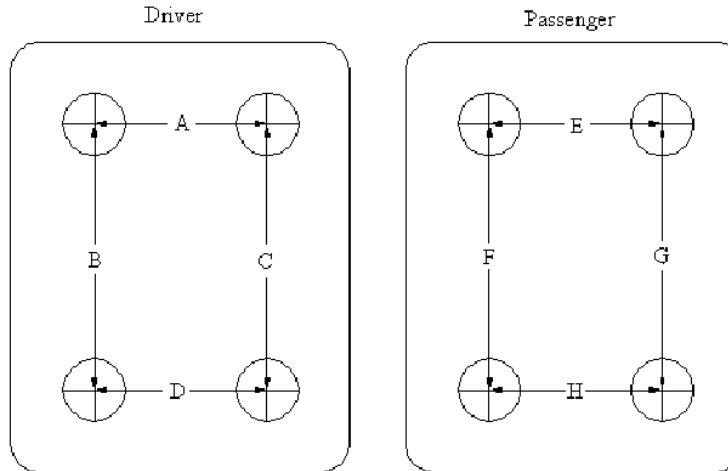
PASSENGER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	50	50	50	50	77	70	60	42	-27	-20	-10	8
2	20	20	20	20	58	48	39	19	-38	-28	-19	1
3	-52	-52	-52	-52	-42	-45	-39	-39	-10	-7	-13	-13
4	-48	-48	-48	-48	-17	-25	-35	-47	-31	-23	-13	-1
5	-41	-41	-41	-41	-34	-49	-64	-62	-7	8	23	21

DATA SHEET NO. 18...(continued)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003



UNDERBODY FLOORBOARD DEFORMATION

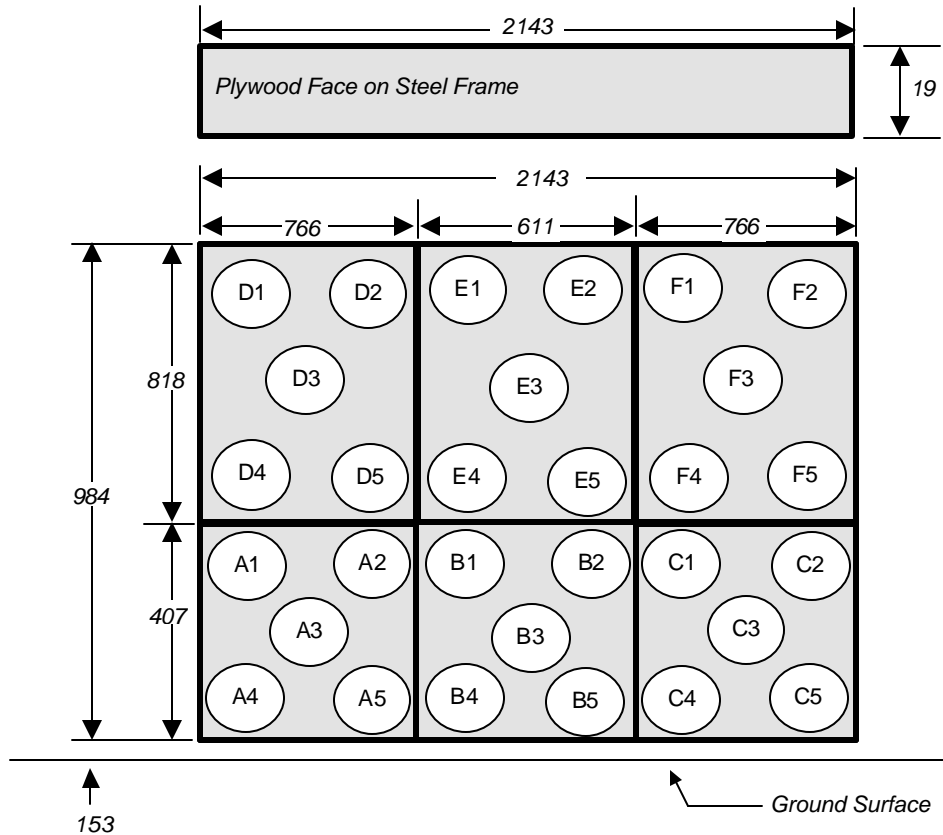
Measurement	Pre-Test	Post-Test	Difference
A	196	192	4
B	350	343	7
C	347	347	0
D	177	178	-1
E	186	186	0
F	340	329	11
G	347	337	10
H	190	191	-1

DATA SHEET NO. 19
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30100
 Test Date: 1/8/2003

30 Load Cell Rigid Barrier
Load Cell Locations on Fixed Barrier



Group 4 D1-D5	Group 5 E1-E5	Group 6 F1-F5
Group 1 A1-A5	Group 2 B1-B5	Group 3 C1-C5

6 Groups of 5 Load Cells Each

The Data is presented in Appendix B with the following requirements:

1. Sum data from 6 groupings shown above (5 cells/group)
2. Sum of left 2 groupings, center 2 groupings and right 2 groupings.
3. Total or sum of all 30 individual load cells.
4. Total versus average rear seat crossmember displacement.

DATA SHEET NO. 20

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2003 Chevrolet Avalanche 4 Door NHTSA No.: M30100
 Test Program: 35mph Frontal Impact Test Date: 1/8/2003

VEHICLE INFORMATION

VIN: 3GNEK13T73G110398 Wheelbase (mm) : 3310
 Vehicle Size Category: MPV Test Weight (kg) : 2917

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 13
 Cal. Procedure/Interval: MGA procedure / 6 month
 Integration Algorithm: Trapezoidal Linearity: > 99%
 Impact Velocity (km/h): 56.6
 Velocity Change (km/h): 63.8 Time of Separation (msec): 152

CRUSH PROFILE

Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
 Damage Region Length (mm): 1530 Impact Mode: Frontal

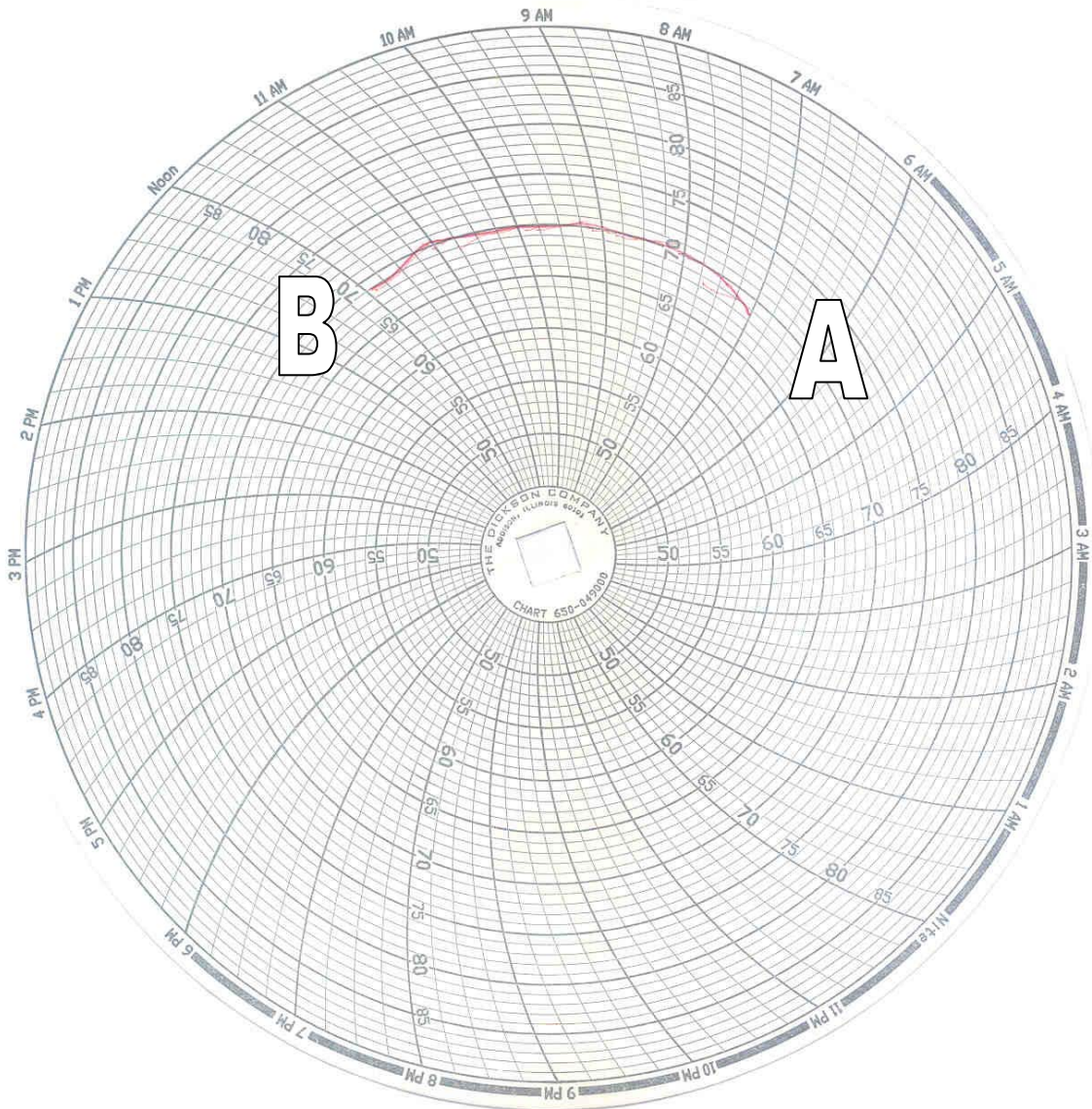
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5496	5076	420
C2	Crush zone 2 at left side	mm	5568	5111	457
C3	Crush zone 3 at left side	mm	5598	5087	511
C4	Crush zone 4 at right side	mm	5598	5050	548
C5	Crush zone 5 at right side	mm	5572	5010	562
C6	Crush zone 6 at right side	mm	5495	4963	532
L	C1 TO C6	mm	1530		

DATA SHEET NO. 21

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2003 Chevrolet Avalanche 4 Door
Test Program: 35mph Frontal Impact

NHTSA No.: M30100
Test Date: 1/8/2003



A = Dummies installed in vehicle at 7:00 a.m.

B = Test conducted at 12:00 p.m.

APPENDIX A
PHOTOGRAPHS

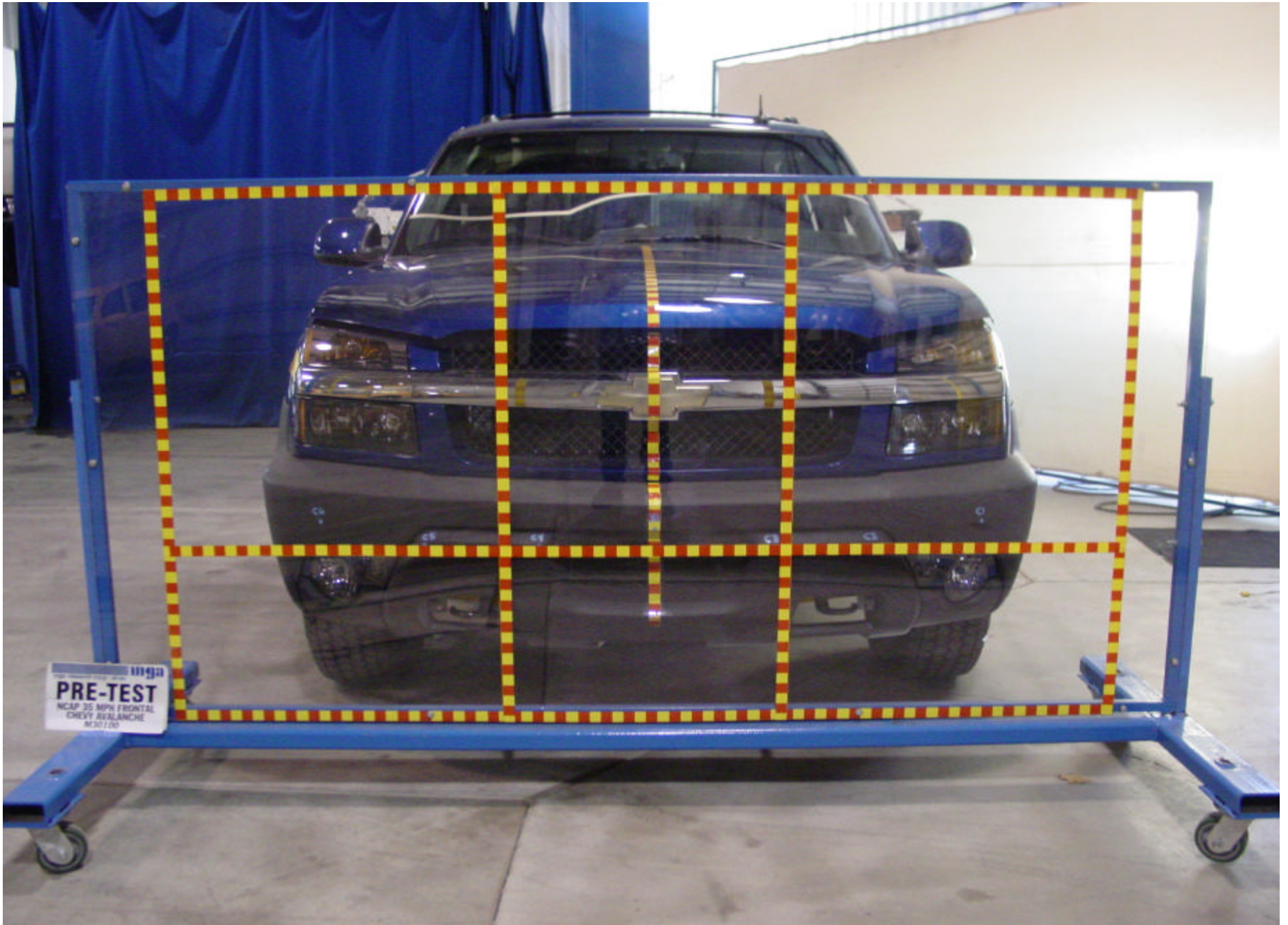
TABLE OF PHOTOGRAPHS

Photo No. 1.	Load Cell Location	A-1
Photo No. 2.	Vehicle Certification Label/Tire Placard	A-2
Photo No. 3.	Right Front View of Test Vehicle, as received	A-3
Photo No. 4.	Left Rear View of Test Vehicle, as received	A-4
Photo No. 5.	Pre-Test Front View of Test Vehicle	A-5
Photo No. 6.	Post-Test Front View of Test Vehicle	A-6
Photo No. 7.	Pre-Test Left Side View of Test Vehicle	A-7
Photo No. 8.	Post-Test Left Side View of Test Vehicle	A-8
Photo No. 9.	Pre-Test Right Side View of Test Vehicle	A-9
Photo No. 10.	Post-Test Right Side View of Test Vehicle	A-10
Photo No. 11.	Pre-Test Right Front Three-Quarter View of Test Vehicle	A-11
Photo No. 12.	Post-Test Right Front Three-Quarter View of Test Vehicle	A-12
Photo No. 13.	Pre-Test Left Rear Three-Quarter View of Test Vehicle	A-13
Photo No. 14.	Post-Test Left Rear Three-Quarter View of Test Vehicle	A-14
Photo No. 15.	Post-Test Left Rear Three-Quarter View of Doors After Impact	A-15
Photo No. 16.	Post-Test Right Rear Three-Quarter View of Door After Impact	A-16
Photo No. 17.	Pre-Test Windshield View	A-17
Photo No. 18.	Post-Test Windshield View	A-18
Photo No. 19.	Pre-Test Engine Compartment View	A-19
Photo No. 20.	Post-Test Engine Compartment View	A-20
Photo No. 21.	Pre-Test Fuel Filler Cap View	A-21
Photo No. 22.	Post-Test Fuel Filler Cap View	A-22
Photo No. 23.	Pre-Test Front Underbody View	A-23
Photo No. 24.	Pre-Test Front Underbody View	A-24
Photo No. 25.	Post-Test Front Underbody View	A-25
Photo No. 26.	Pre-Test Mid Underbody	A-26
Photo No. 27.	Pre-Test Mid Underbody	A-27
Photo No. 28.	Post-Test Mid Underbody	A-28
Photo No. 29.	Pre-Test Rear Underbody View	A-29

Photo No. 30.	Post-Test Rear Underbody View	A-30
Photo No. 31.	Pre-Test Driver Dummy Front View (head position)	A-31
Photo No. 32.	Post-Test Driver Dummy Front View (head position)	A-32
Photo No. 33.	Pre-Test Driver Dummy Position Left Side View	A-33
Photo No. 34.	Post-Test Driver Dummy Position Left Side View	A-34
Photo No. 35.	Pre-Test Driver Dummy Position Left Side View (Door Open)	A-35
Photo No. 36.	Pre-Test Driver Dummy Feet Position	A-36
Photo No. 37.	Post-Test Driver Dummy Feet Position	A-37
Photo No. 38.	Pre-Test Driver Side Knee Bolster View	A-38
Photo No. 39.	Post-Test Driver Side Knee Bolster View	A-39
Photo No. 40.	Pre-Test Driver Side Floor Pan View	A-40
Photo No. 41.	Post-Test Driver Side Floor Pan View	A-41
Photo No. 42.	Post-Test Driver Dummy Head Contact	A-42
Photo No. 43.	Post-Test Driver Dummy Knee Contact	A-43
Photo No. 44.	Post-Test Driver Dummy Airbag Contact	A-44
Photo No. 45.	Pre-Test Passenger Dummy Front View (head position)	A-45
Photo No. 46.	Post-Test Passenger Dummy Front View (head position)	A-46
Photo No. 47.	Pre-Test Passenger Dummy Position Right Side View	A-47
Photo No. 48.	Post-Test Passenger Dummy Position Right Side View	A-48
Photo No. 49.	Pre-Test Passenger Dummy Position Right Side View (Door Open)	A-49
Photo No. 50.	Post-Test Passenger Dummy Position Right Side View (Door Open)	A-50
Photo No. 51.	Pre-Test Passenger Dummy Feet Position	A-51
Photo No. 52.	Post-Test Passenger Dummy Feet Position	A-52
Photo No. 53.	Pre-Test Passenger Side Knee Bolster View	A-53
Photo No. 54.	Post-Test Passenger Side Knee Bolster View	A-54
Photo No. 55.	Pre-Test Passenger Side Floor Pan View	A-55
Photo No. 56.	Post-Test Passenger Side Floor Pan View	A-56
Photo No. 57.	Post-Test Passenger Dummy Head Contact	A-57
Photo No. 58.	Post-Test Passenger Dummy Knee Contact	A-58
Photo No. 59.	Post-Test Passenger Dummy Airbag Contact	A-59
Photo No. 60.	Rollover 90 Degrees	A-60

Photo No. 61.	Rollover 180 Degrees	A-61
Photo No. 62.	Rollover 270 Degrees	A-62
Photo No. 63.	Rollover 360 Degrees	A-63
Photo No. 64.	Vehicle Impact	A-64

A-1.



Load Cell Location



MFD BY GENERAL MOTORS DE MEXICO, S. DE R.L. DE C.V. 08/02

GVWR
3175KG(7000LB)

GAWR FRT
1724KG(3800LB)

GAWR RR
1814KG(4000LB)

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

3GNEK13T73G110398

TYPE: M.P.V.

MODEL: K15936

KPDH	TIRE SIZE	SPEED RTG	RIM	COLD TIRE PRESSURE
FRT	P265/70R17	S	17X7.5J	210KPA(30PSI)
RR	P265/70R17	S	17X7.5J	210KPA(30PSI)
SPA	P265/75R16	S	16X6.5J	240KPA(35PSI)

SEE OWNER'S MANUAL  FOR MORE INFORMATION.

F 369
T 224

A-2.

Vehicle Certification Label/Tire Placard

A-3.



Right Front View of Test Vehicle, as received

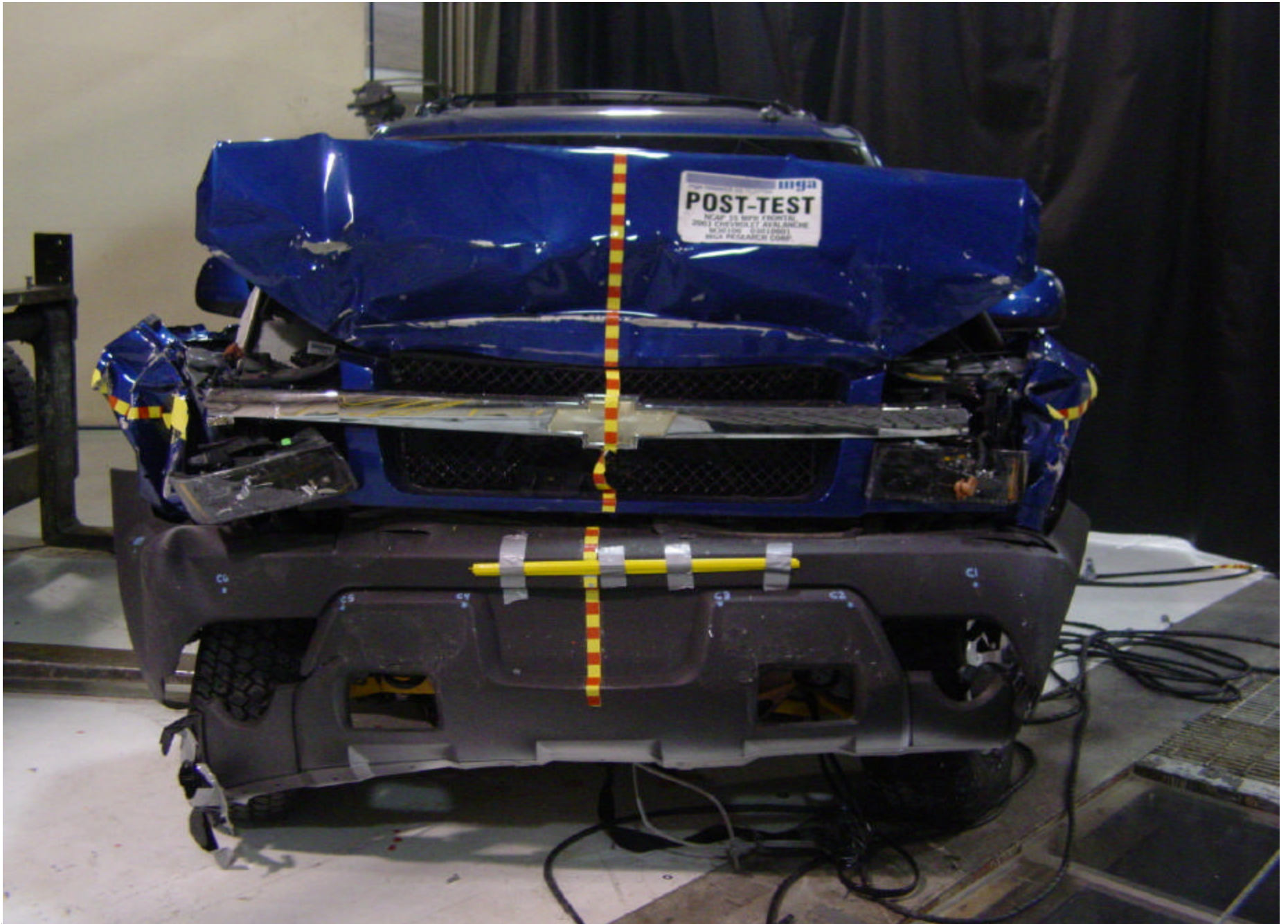
A-4.



Left Rear View of Test Vehicle, as received



Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



Pre-Test Left Side View of Test Vehicle



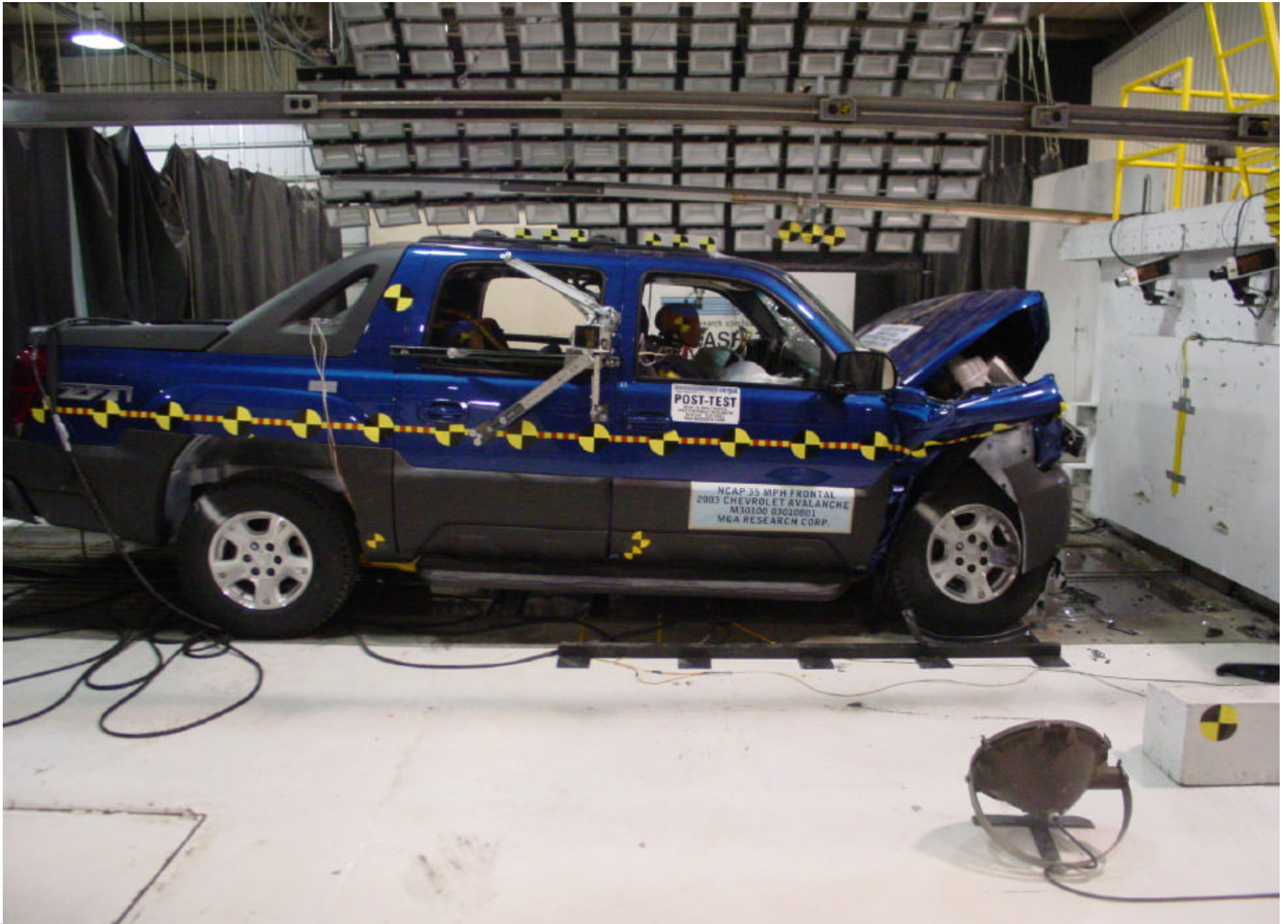
Post-Test Left Side View of Test Vehicle

A-9.



Pre-Test Right Side View of Test Vehicle

A-10.



Post-Test Right Side View of Test Vehicle

A-11.



Pre-Test Right Front Three-Quarter View of Test Vehicle



Post-Test Right Front Three-Quarter View of Test Vehicle

A-13.



Pre-Test Left Rear Three-Quarter View of Test Vehicle

A-14.



Post-Test Left Rear Three-Quarter View of Test Vehicle



Post-Test Left Rear Three-Quarter View of Doors After Impact



Post-Test Right Rear Three-Quarter View of Door After Impact



NCAP 35 MPH FRONTAL
2003 CHEVROLET AVALANCHE
M30100 03010801
MGA RESEARCH CORP.

mga
PRE-TEST
NCAP 35 MPH FRONTAL
2003 CHEVROLET AVALANCHE
M30100 03010801
MGA RESEARCH CORP.

Pre-Test Windshield View

A-18.



Post-Test Windshield View

A-19.



Pre-Test Engine Compartment View

A-20.



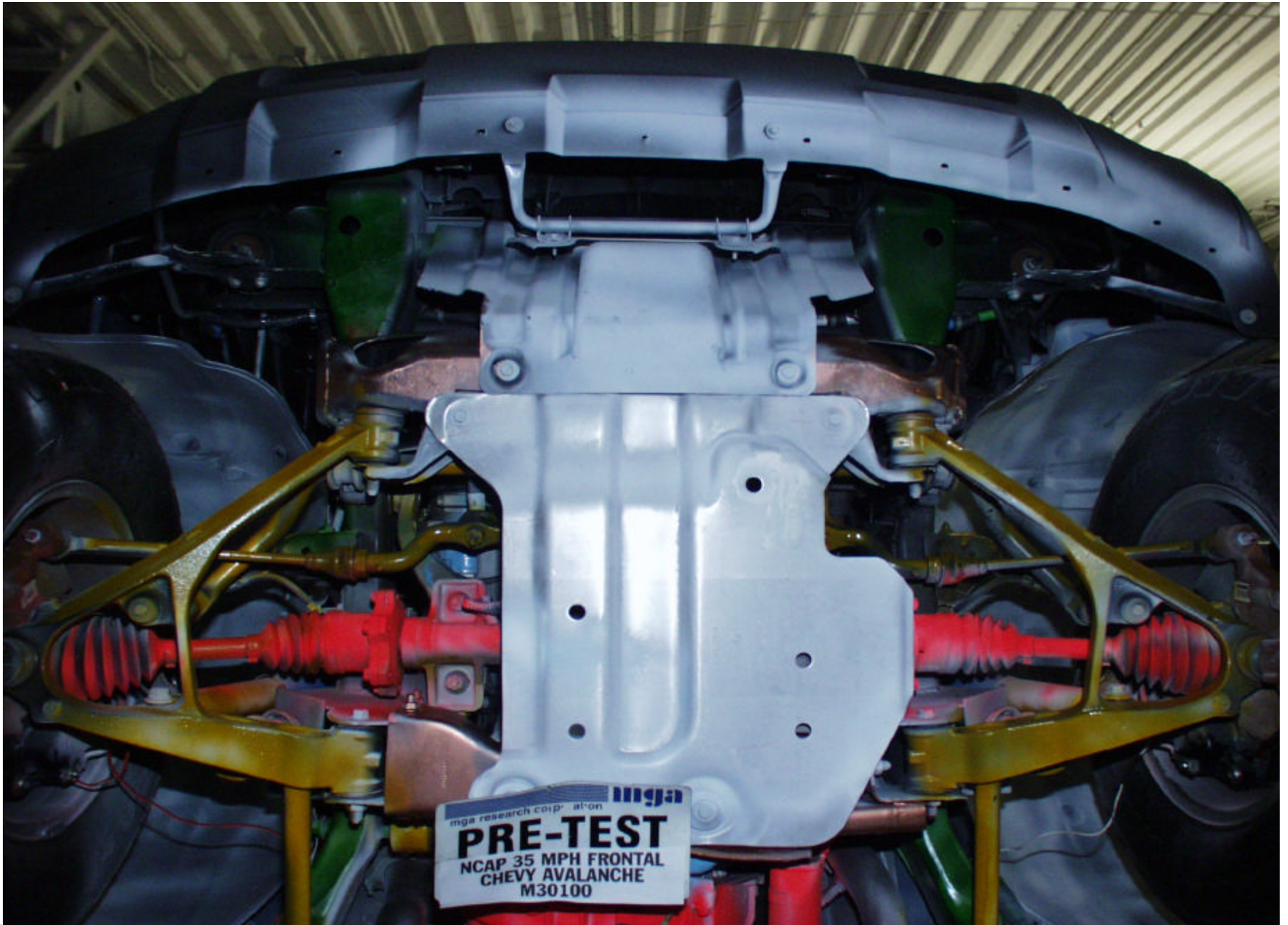
Post-Test Engine Compartment View



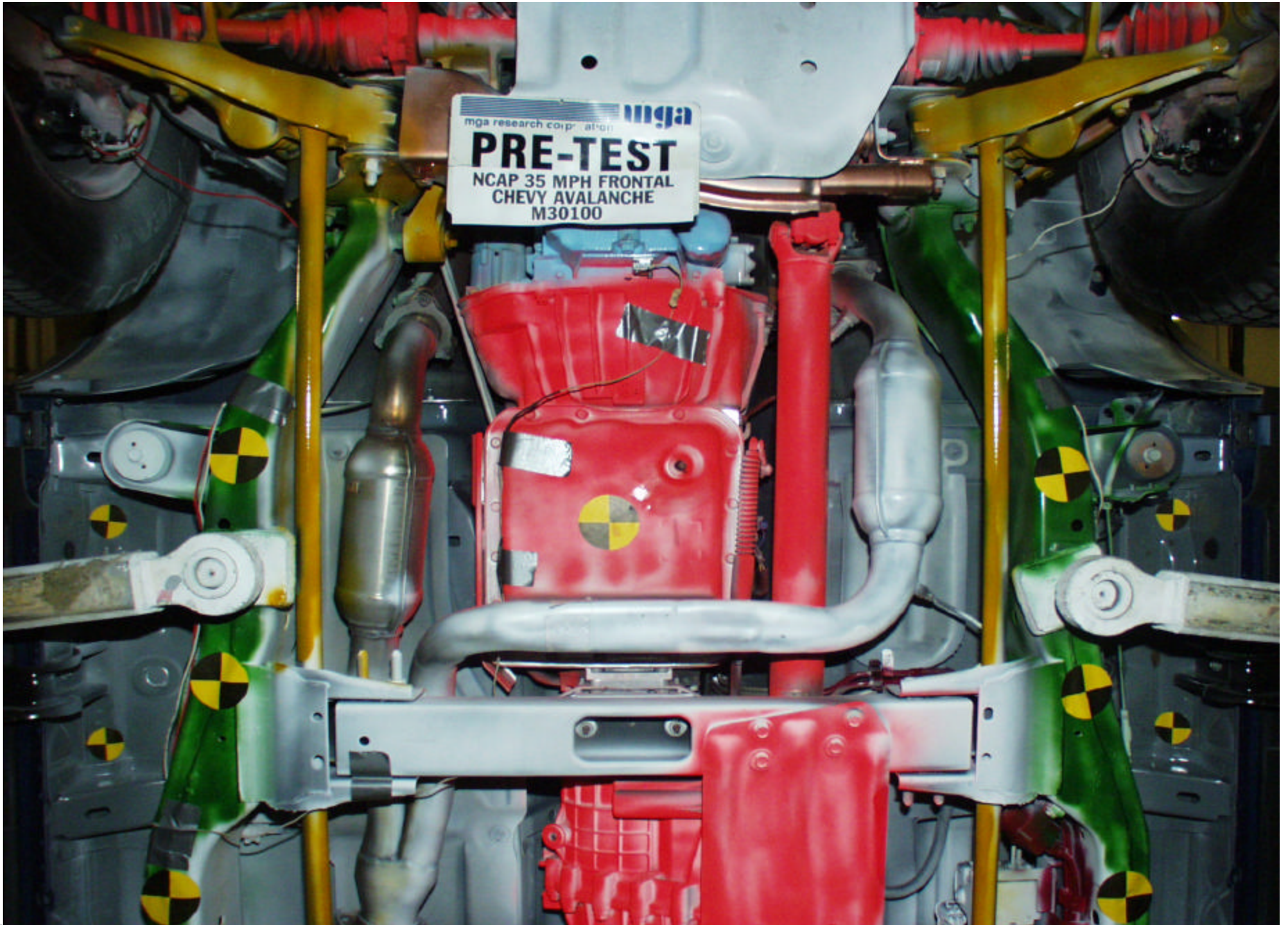
Pre-Test Fuel Filler Cap View



Post-Test Fuel Filler Cap View

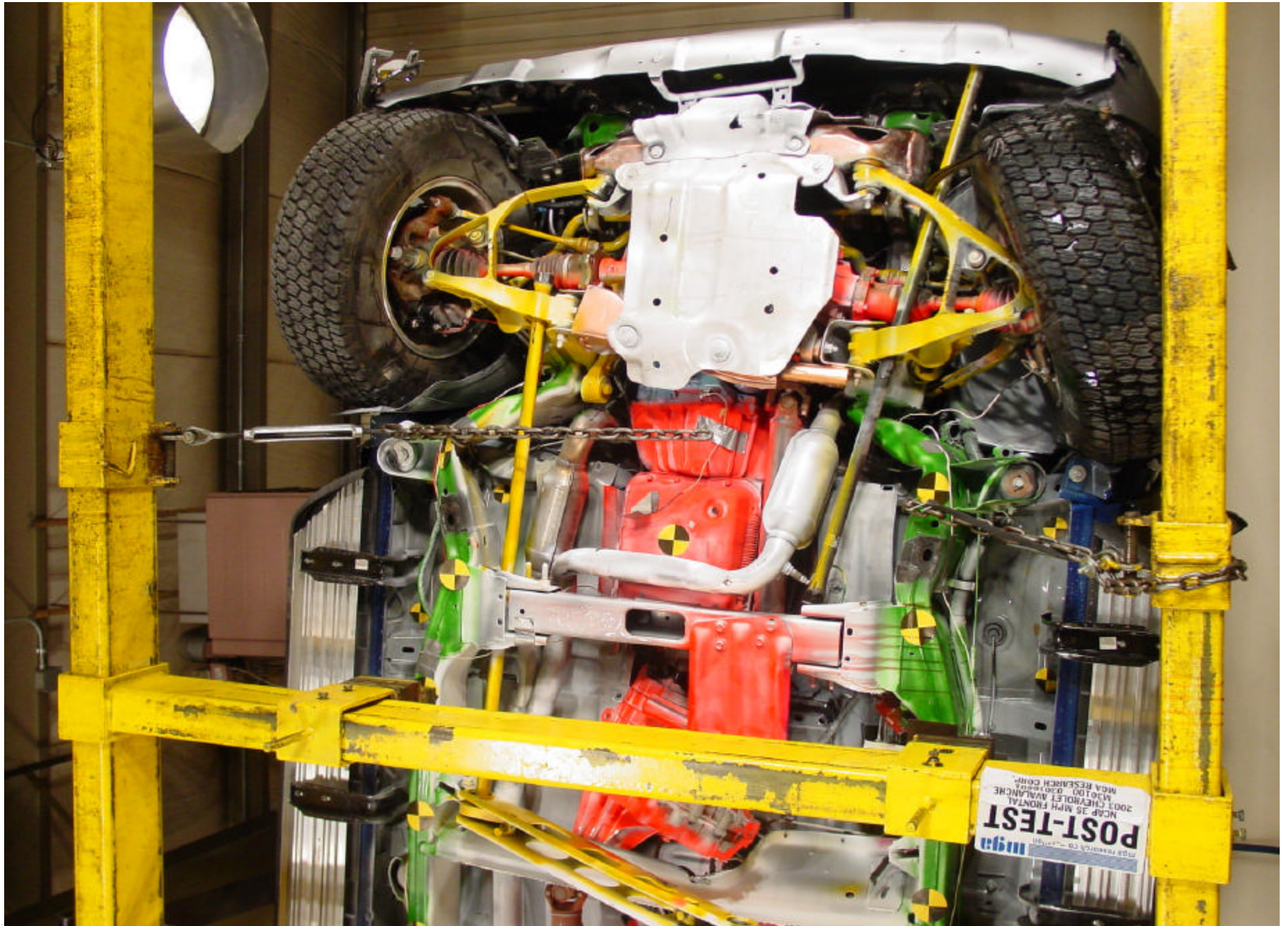


Pre-Test Front Underbody View

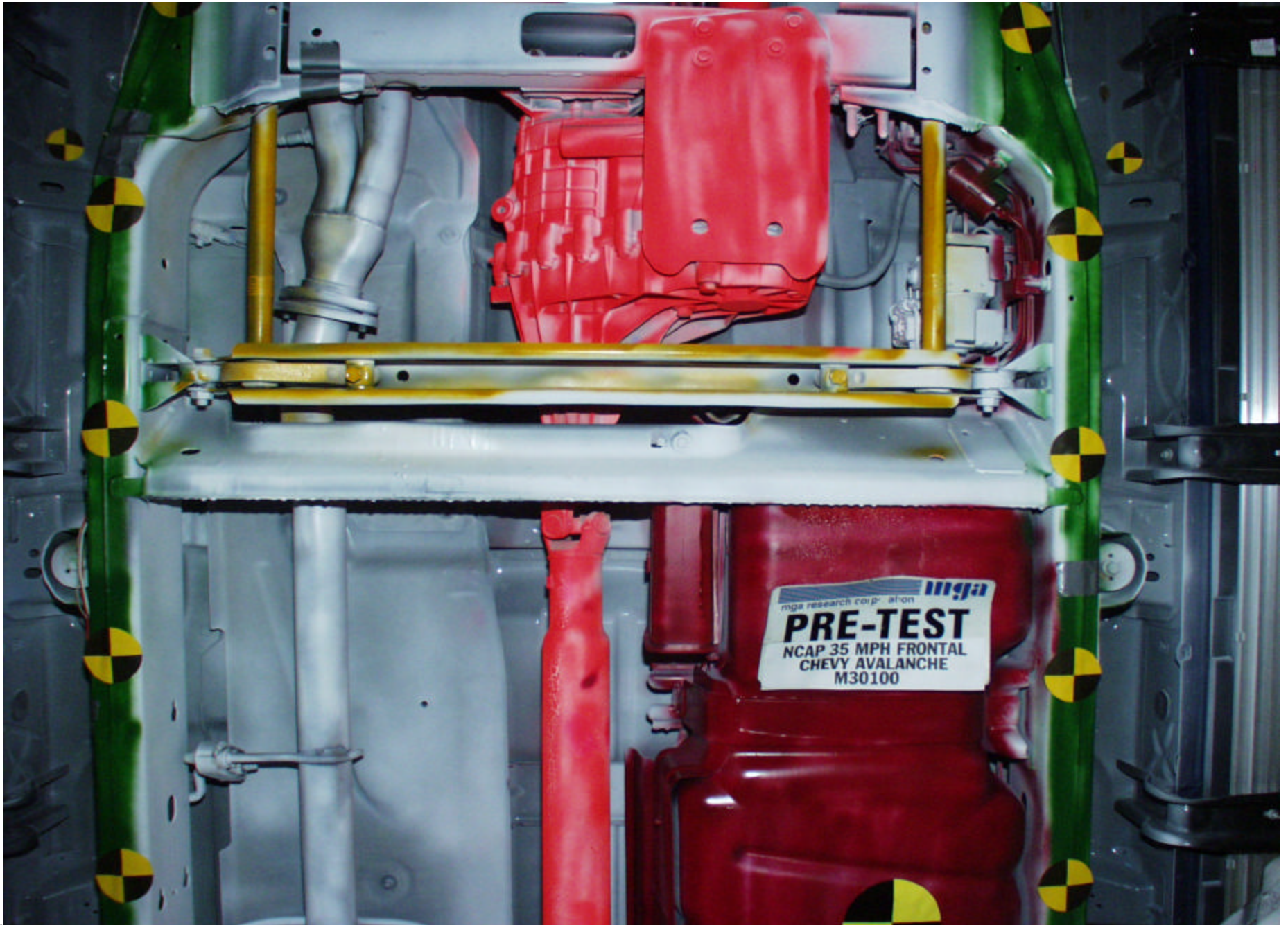


Pre-Test Front Underbody View

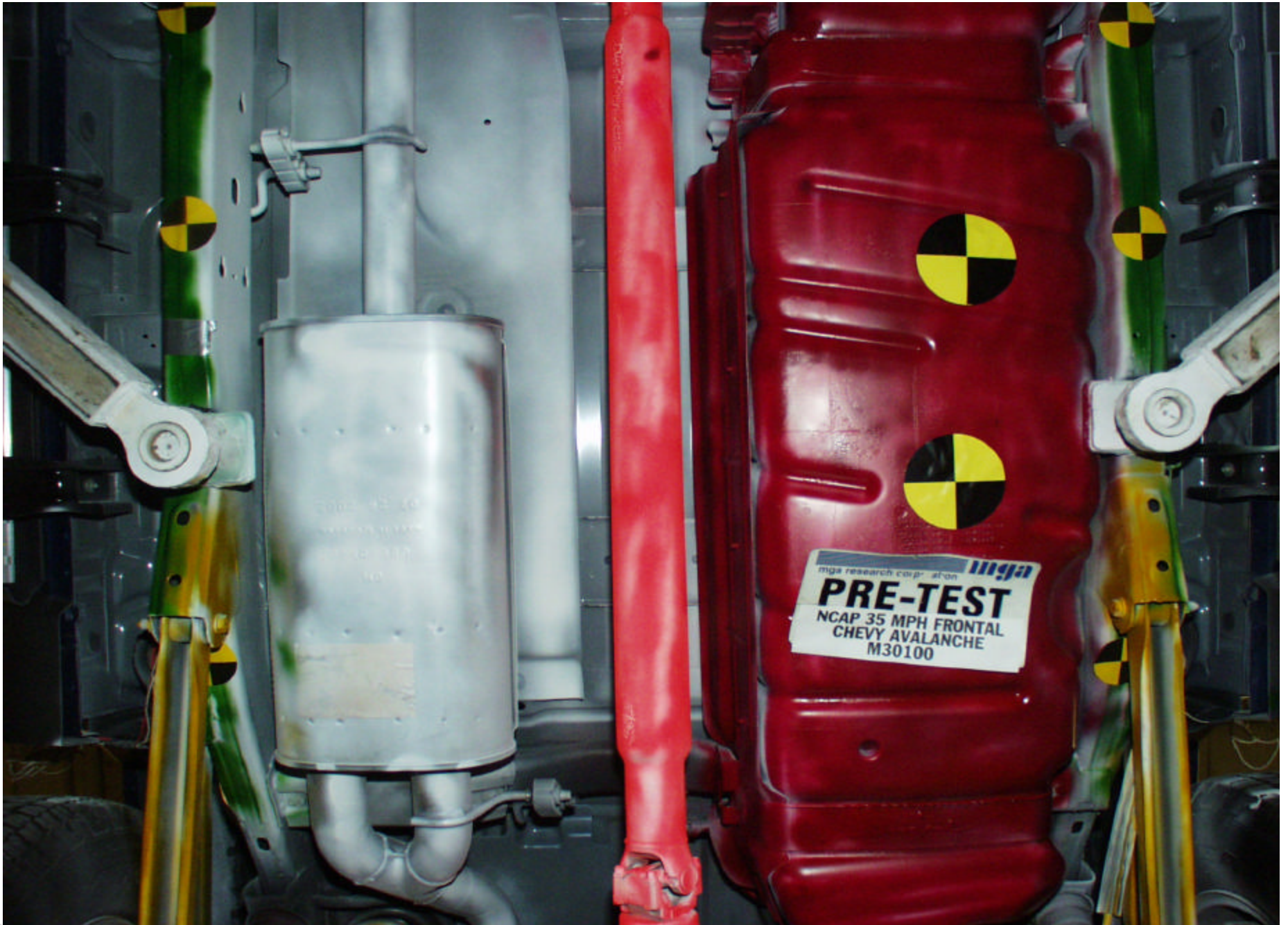
A-25.



Post-Test Front Underbody View



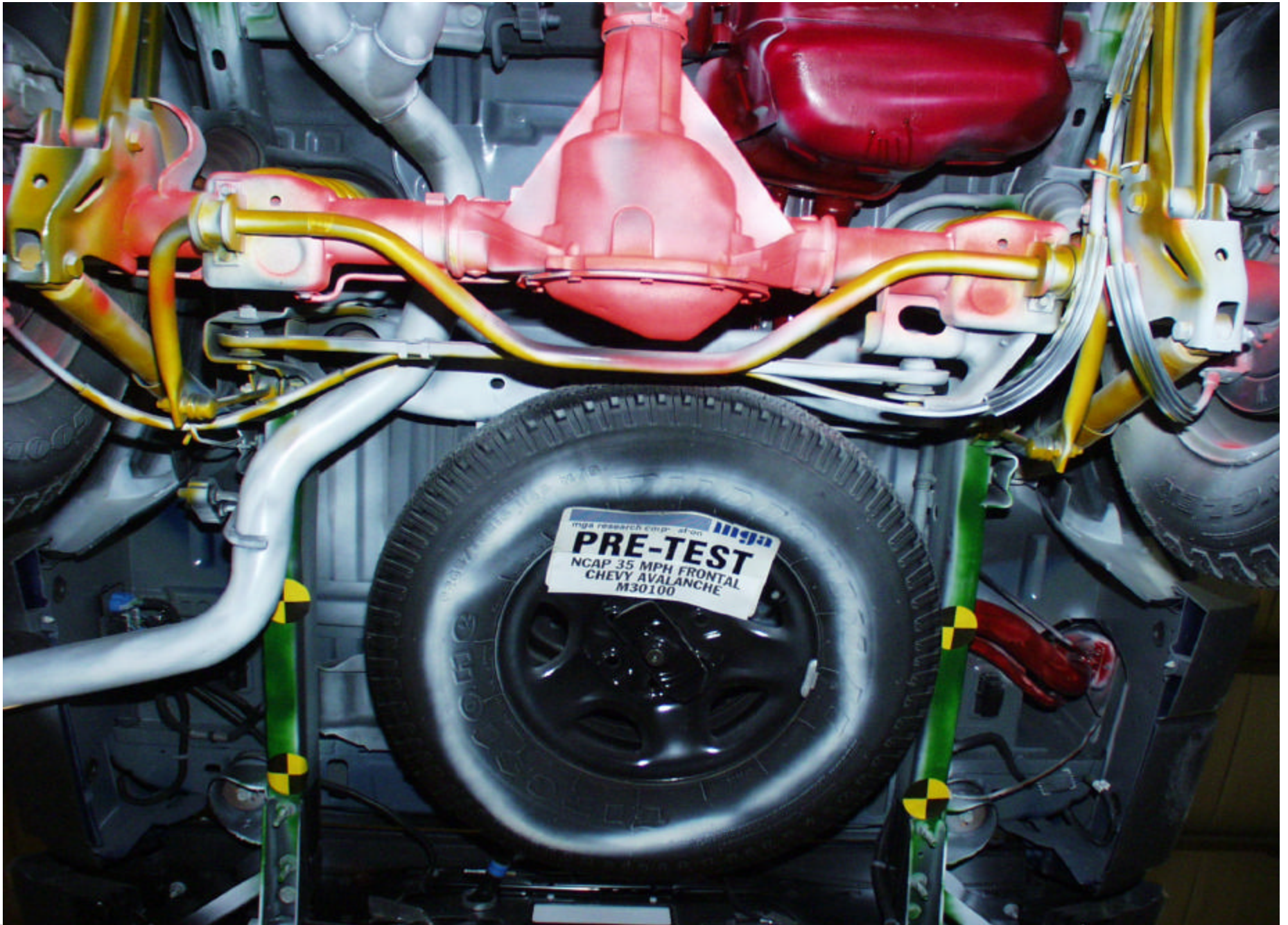
Pre-Test Mid Underbody



Pre-Test Mid Underbody

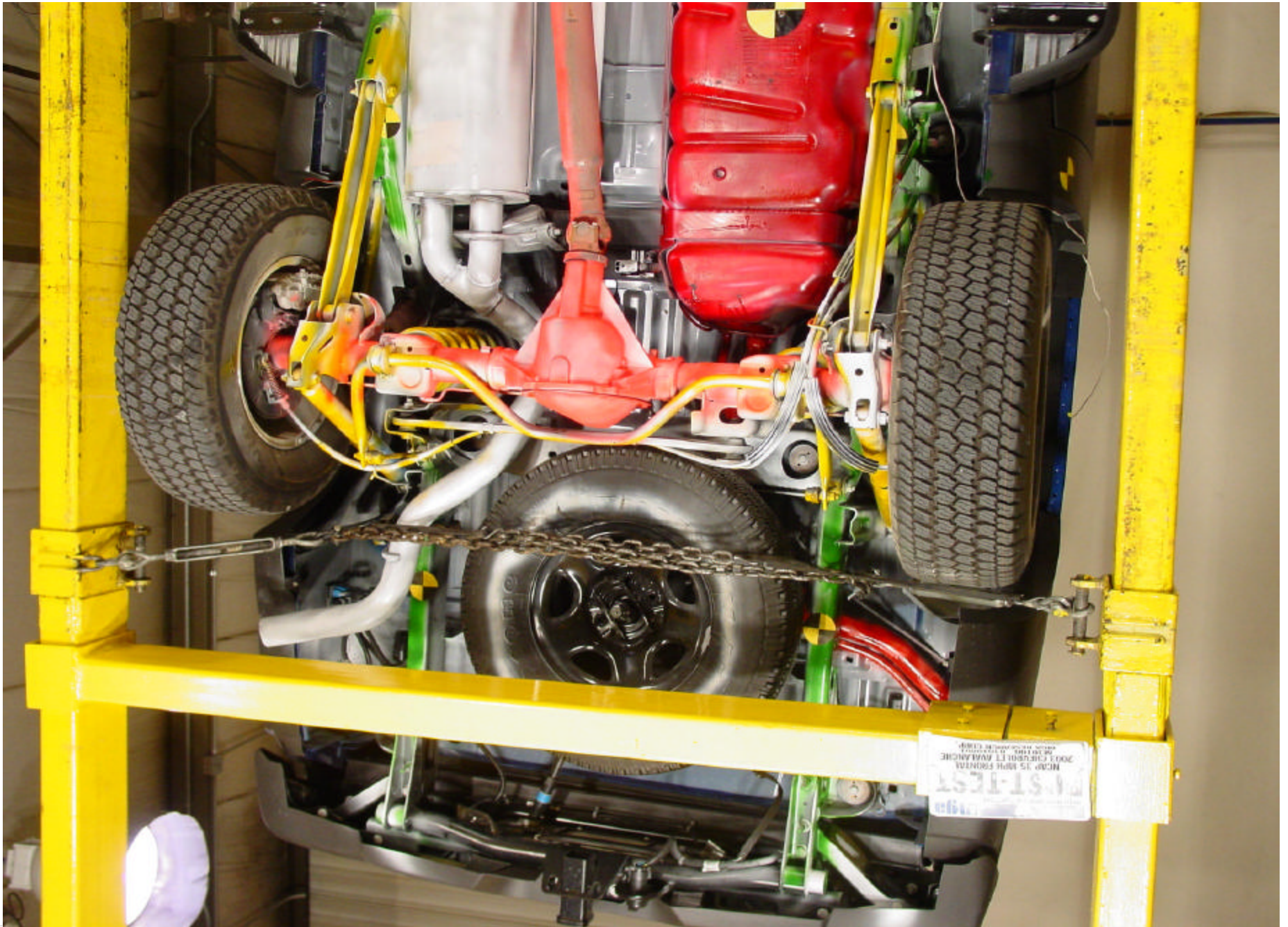


Post-Test Mid Underbody



Pre-Test Rear Underbody View

A-30.



Post-Test Rear Underbody View



Pre-Test Driver Dummy Front View (head position)

A-32.



Post-Test Driver Dummy Front View (head position)



Pre-Test Driver Dummy Position Left Side View

A-34.



Post-Test Driver Dummy Position Left Side View



Pre-Test Driver Dummy Position Left Side View (Door Open)



Pre-Test Driver Dummy Feet Position

A-37.



Post-Test Driver Dummy Feet Position

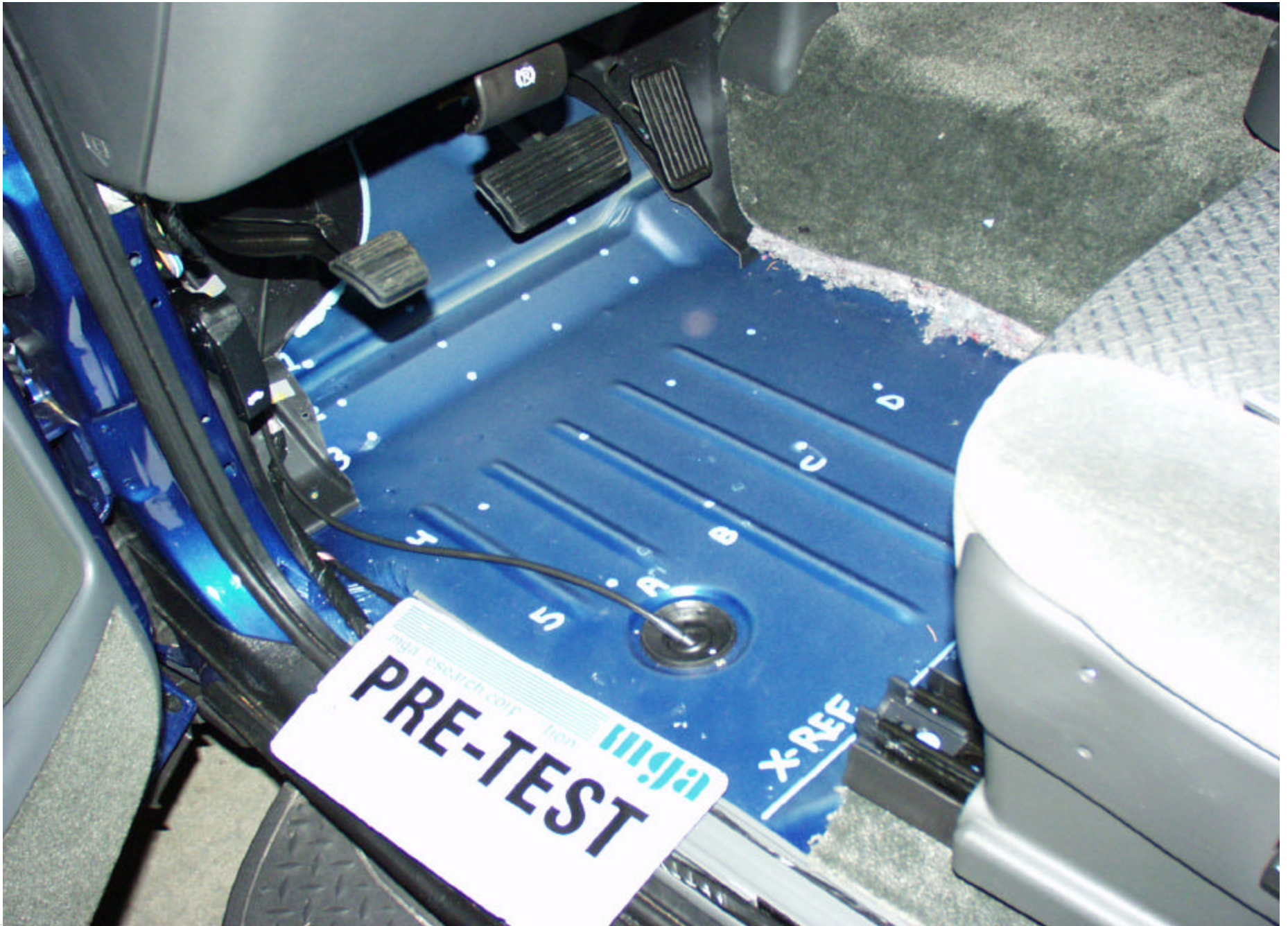


Pre-Test Driver Side Knee Bolster View



Post-Test Driver Side Knee Bolster View

A-40.



Pre-Test Driver Side Floor Pan View

A-41.



Post-Test Driver Side Floor Pan View



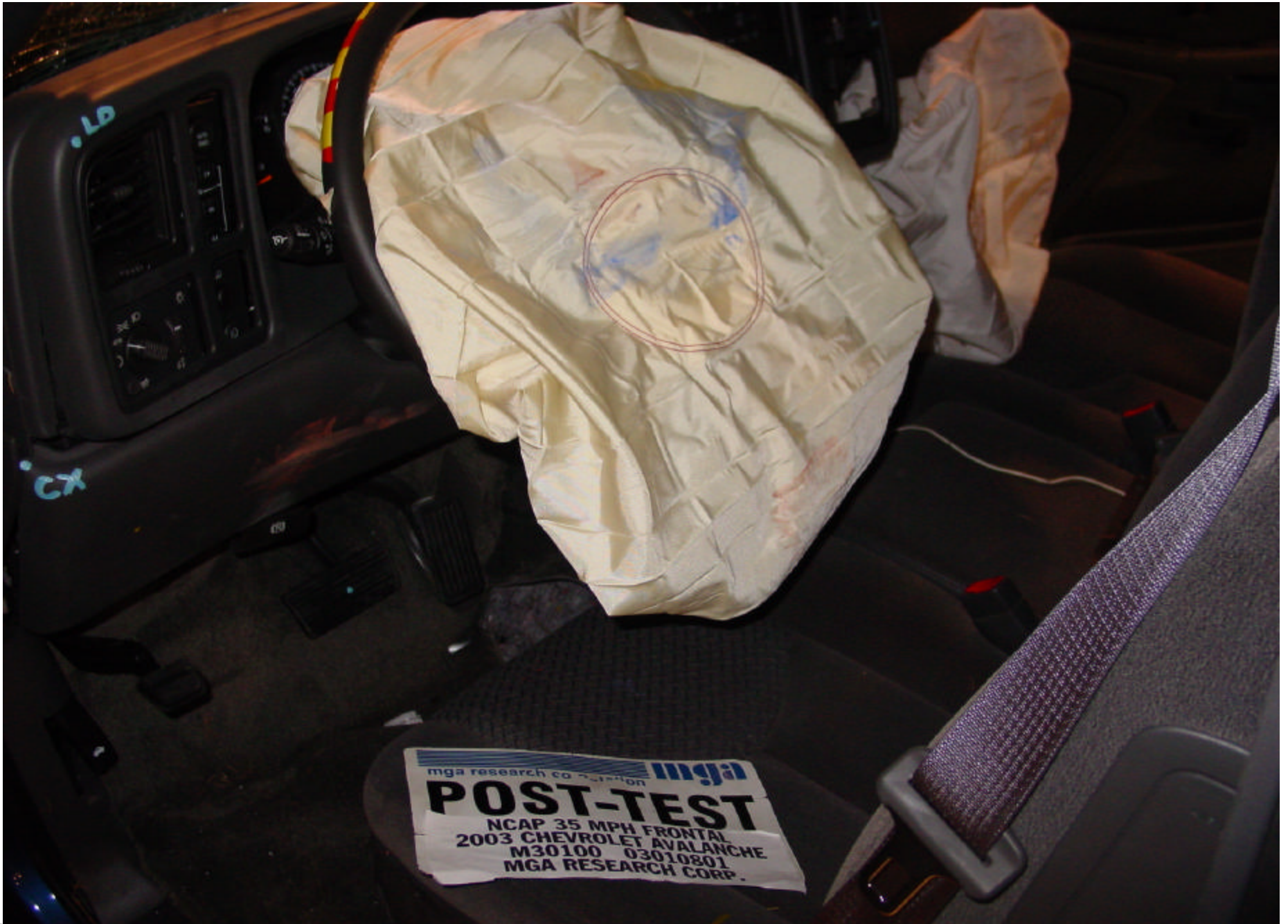
Post-Test Driver Dummy Head Contact

A-43.



Post-Test Driver Dummy Knee Contact

A-44.



Post-Test Driver Dummy Airbag Contact



Pre-Test Passenger Dummy Front View (head position)

A-46.



Post-Test Passenger Dummy Front View (head position)

A-47.



Pre-Test Passenger Dummy Position Right Side View

A-48.



Post-Test Passenger Dummy Position Right Side View



Pre-Test Passenger Dummy Position Right Side View (Door Open)

A-50.



Post-Test Passenger Dummy Position Right Side View (Door Open)



Pre-Test Passenger Dummy Feet Position

A-52.



Post-Test Passenger Dummy Feet Position

A-53.



Pre-Test Passenger Side Knee Bolster View

A-54.



Post-Test Passenger Side Knee Bolster View



Pre-Test Passenger Side Floor Pan View



Post-Test Passenger Side Floor Pan View

A-57.



Post-Test Passenger Dummy Head Contact

A-58.



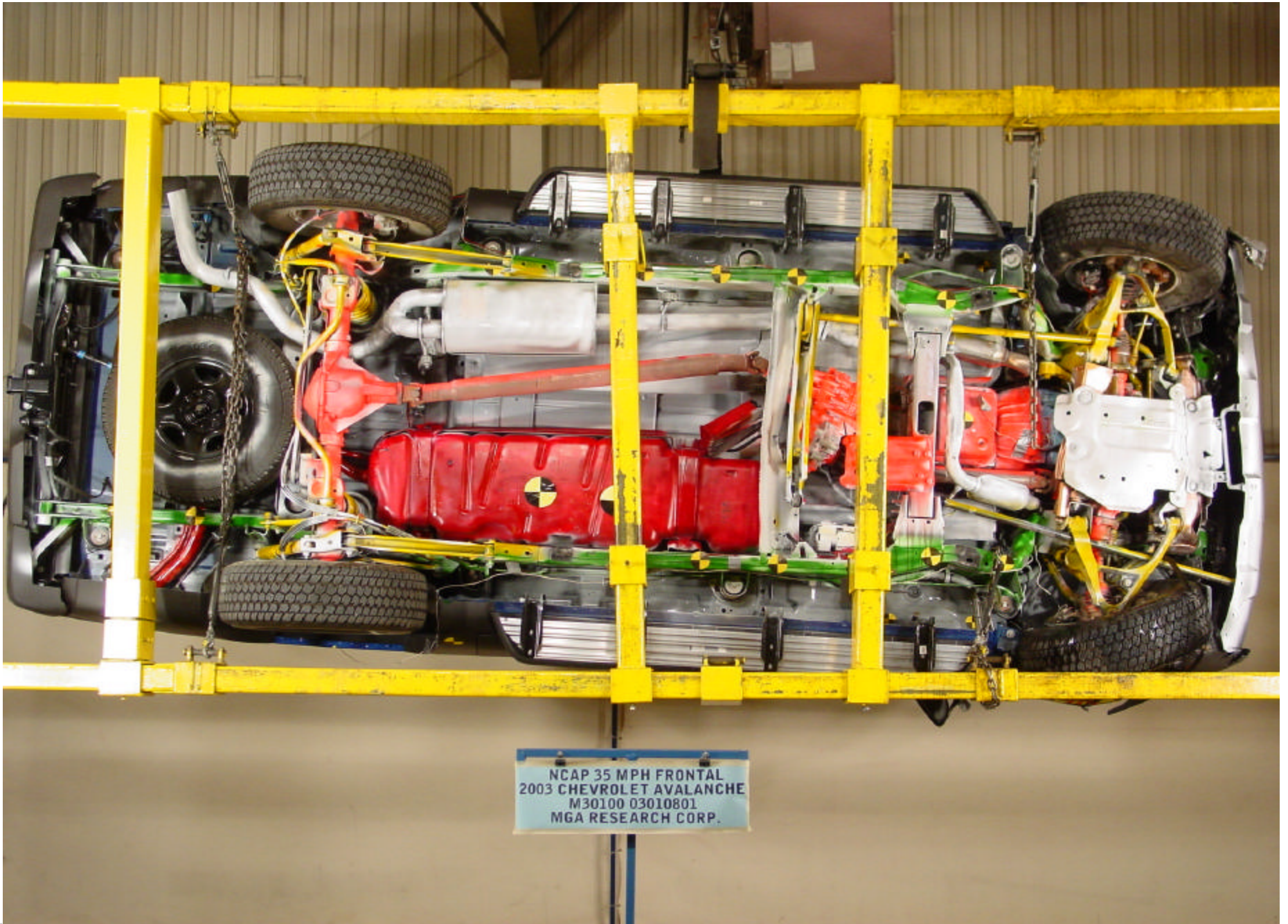
Post-Test Passenger Dummy Knee Contact

A-59.



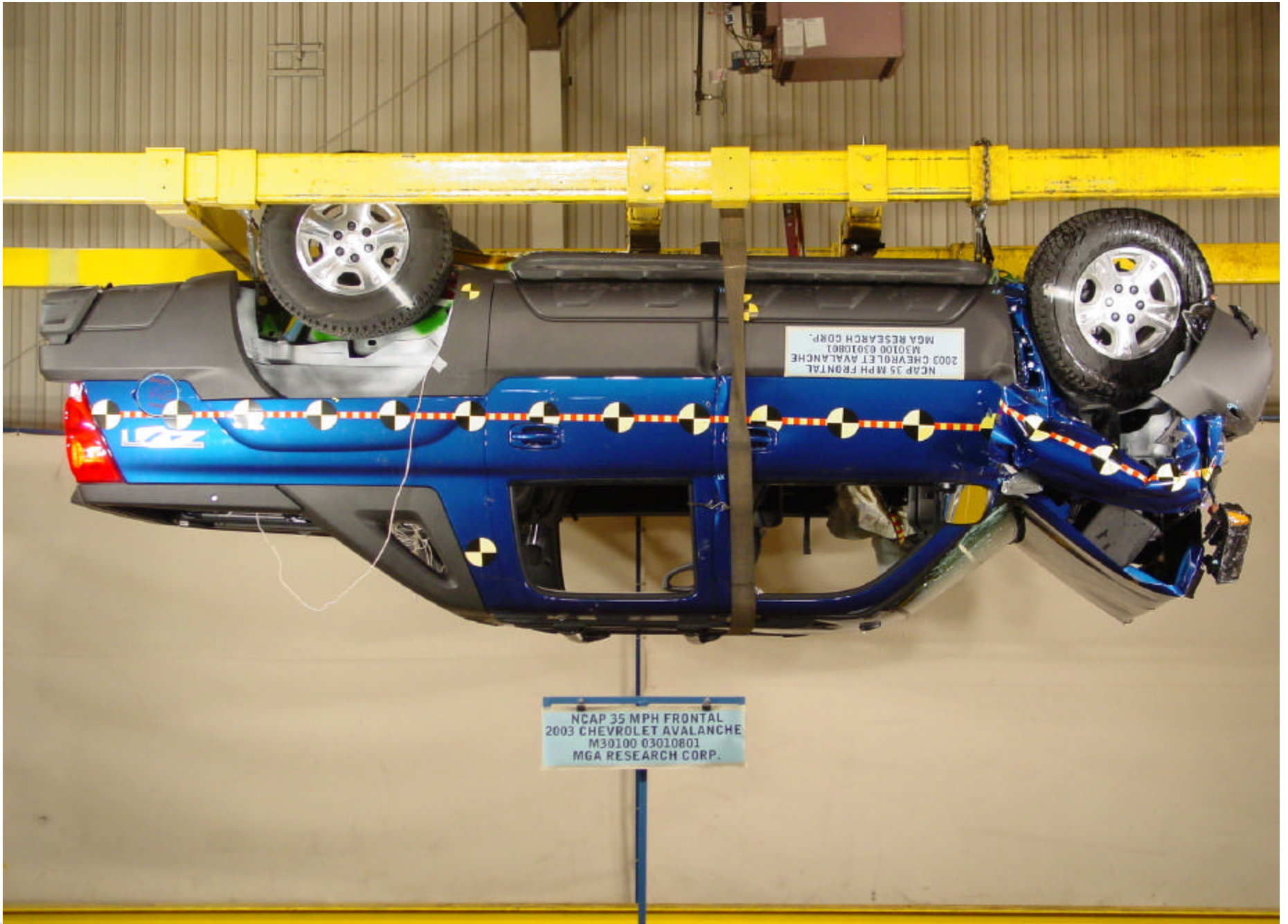
Post-Test Passenger Dummy Airbag Contact

A-60.



Rollover 90 Degrees

A-61.



Rollover 180 Degrees

A-62.



Rollover 270 Degrees

A-63.



Rollover 360 Degrees

A-64.



Vehicle Impact

APPENDIX B

DUMMY, VEHICLE, AND BARRIER RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Figure No. 1.	Driver Head X Acceleration vs. Time	B-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	B-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	B-1
Figure No. 5.	Driver Head X Velocity vs. Time	B-2
Figure No. 6.	Driver Head Y Velocity vs. Time	B-2
Figure No. 7.	Driver Head Z Velocity vs. Time	B-2
Figure No. 8.	Driver Head X Redundant Acceleration vs. Time	B-3
Figure No. 9.	Driver Head Y Redundant Acceleration vs. Time	B-3
Figure No. 10.	Driver Head Z Redundant Acceleration vs. Time	B-3
Figure No. 11.	Driver Head Resultant Redundant Acceleration vs. Time	B-3
Figure No. 12.	Driver Head X Redundant Velocity vs. Time	B-4
Figure No. 13.	Driver Head Y Redundant Velocity vs. Time	B-4
Figure No. 14.	Driver Head Z Redundant Velocity vs. Time	B-4
Figure No. 15.	Driver Neck Force X vs. Time	B-5
Figure No. 16.	Driver Neck Force Y vs. Time	B-5
Figure No. 17.	Driver Neck Force Z vs. Time	B-5
Figure No. 18.	Driver Neck Force Resultant vs. Time	B-5
Figure No. 19.	Driver Neck Moment X vs. Time	B-6
Figure No. 20.	Driver Neck Moment Y vs. Time	B-6
Figure No. 21.	Driver Neck Moment Z vs. Time	B-6
Figure No. 22.	Driver Neck Moment Resultant vs. Time	B-6
Figure No. 23.	Driver Chest X Acceleration vs. Time	B-7
Figure No. 24.	Driver Chest Y Acceleration vs. Time	B-7
Figure No. 25.	Driver Chest Z Acceleration vs. Time	B-7
Figure No. 26.	Driver Chest Resultant Acceleration vs. Time	B-7
Figure No. 27.	Driver Chest X Velocity vs. Time	B-8
Figure No. 28.	Driver Chest Y Velocity vs. Time	B-8
Figure No. 29.	Driver Chest Z Velocity vs. Time	B-8
Figure No. 30.	Driver Chest Displacement vs. Time	B-8

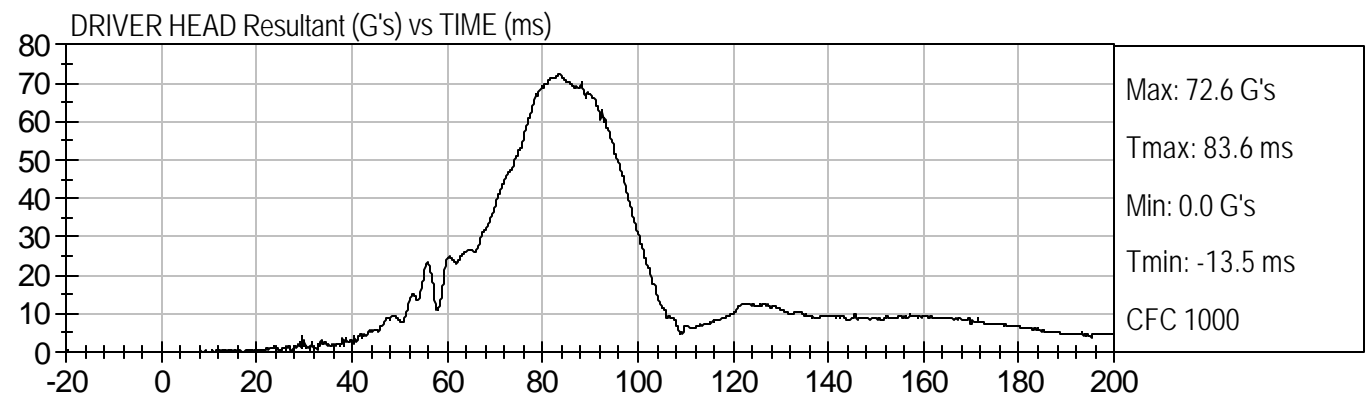
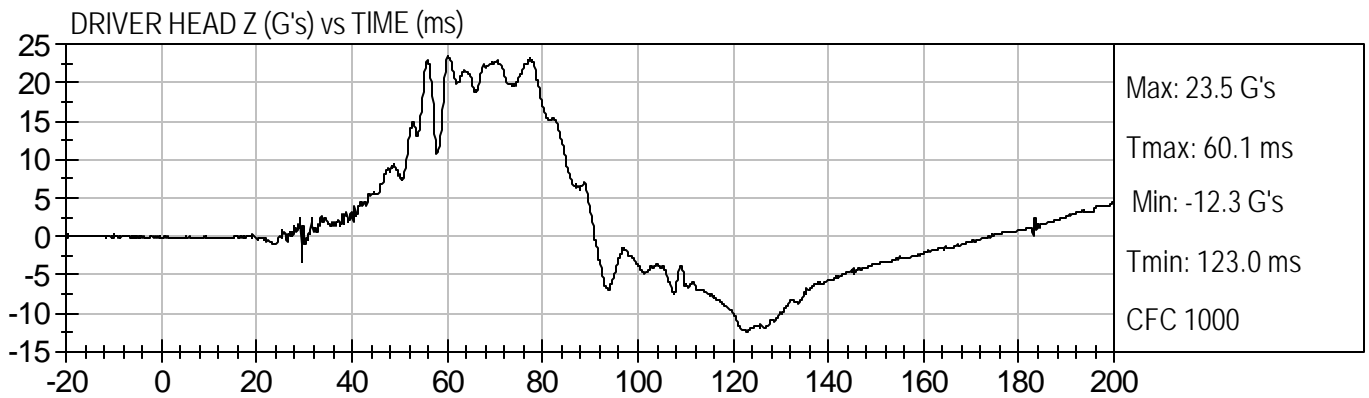
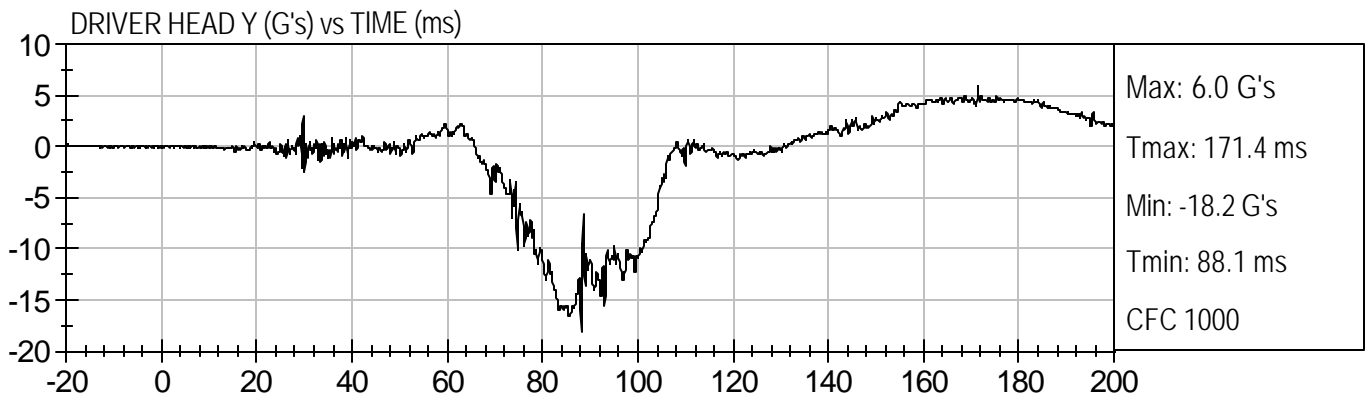
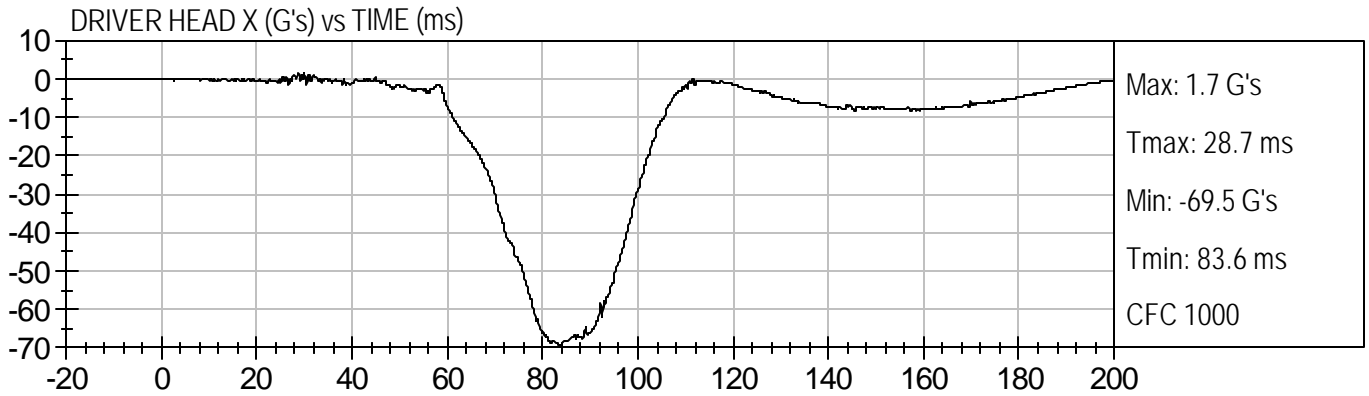
Figure No. 31.	Driver Chest X Redundant Acceleration vs. Time	B-9
Figure No. 32.	Driver Chest Y Redundant Acceleration vs. Time	B-9
Figure No. 33.	Driver Chest Z Redundant Acceleration vs. Time	B-9
Figure No. 34.	Driver Chest Resultant Redundant Acceleration vs. Time	B-9
Figure No. 35.	Driver Chest X Redundant Velocity vs. Time	B-10
Figure No. 36.	Driver Chest Y Redundant Velocity vs. Time	B-10
Figure No. 37.	Driver Chest Z Redundant Velocity vs. Time	B-10
Figure No. 38.	Driver Pelvis X Acceleration vs. Time	B-11
Figure No. 39.	Driver Pelvis Y Acceleration vs. Time	B-11
Figure No. 40.	Driver Pelvis Z Acceleration vs. Time	B-11
Figure No. 41.	Driver Pelvis Resultant Acceleration vs. Time	B-11
Figure No. 42.	Driver Pelvis X Velocity vs. Time	B-12
Figure No. 43.	Driver Pelvis Y Velocity vs. Time	B-12
Figure No. 44.	Driver Pelvis Z Velocity vs. Time	B-12
Figure No. 45.	Driver Left Femur Force vs. Time	B-13
Figure No. 46.	Driver Right Femur Force vs. Time	B-13
Figure No. 47.	Driver Lap Belt Force vs. Time	B-23
Figure No. 48.	Driver Shoulder Belt Force vs. Time	B-23
Figure No. 49.	Driver Left Upper Tibia Moment X vs. Time	B-14
Figure No. 50.	Driver Left Upper Tibia Moment Y vs. Time	B-14
Figure No. 51.	Driver Left Upper Tibia Force Z vs. Time	B-14
Figure No. 52.	Driver Left Lower Tibia Moment X vs. Time	B-15
Figure No. 53.	Driver Left Lower Tibia Moment Y vs. Time	B-15
Figure No. 54.	Driver Left Lower Tibia Force Z vs. Time	B-15
Figure No. 55.	Driver Right Upper Tibia Moment X vs. Time	B-16
Figure No. 56.	Driver Right Upper Tibia Moment Y vs. Time	B-16
Figure No. 57.	Driver Right Upper Tibia Force Z vs. Time	B-16
Figure No. 58.	Driver Right Lower Tibia Moment X vs. Time	B-17
Figure No. 59.	Driver Right Lower Tibia Moment Y vs. Time	B-17
Figure No. 60.	Driver Right Lower Tibia Force Z vs. Time	B-17
Figure No. 61.	Driver Left Foot Z – Front Acceleration vs. Time	B-18

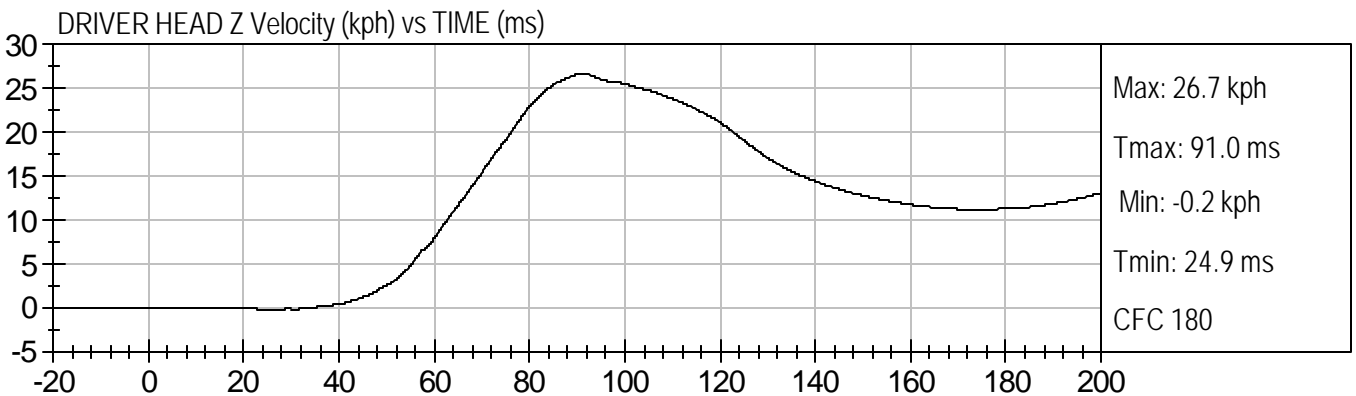
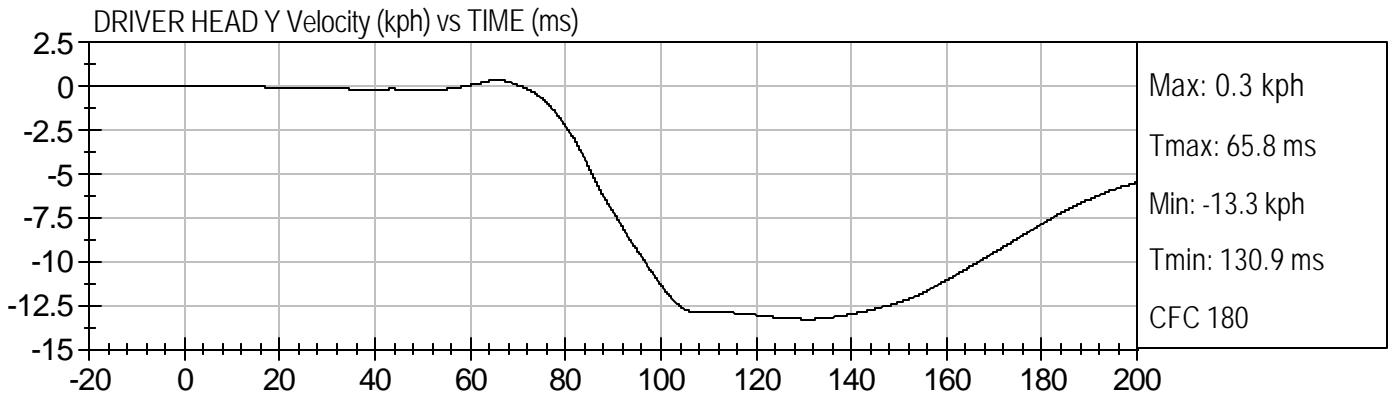
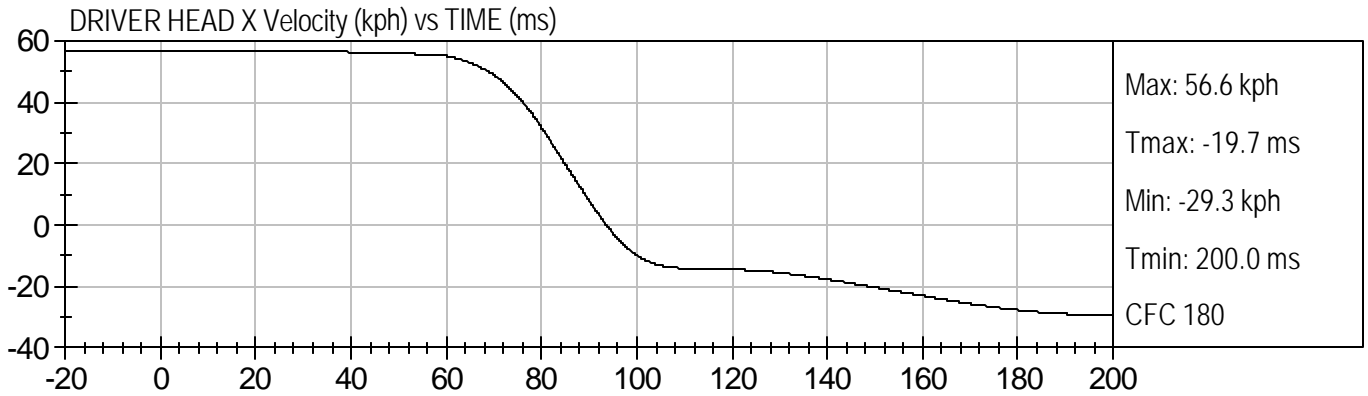
Figure No. 62.	Driver Left Ankle X Acceleration vs. Time	B-18
Figure No. 63.	Driver Left Ankle Z Acceleration vs. Time	B-18
Figure No. 64.	Driver Right Foot Z – Front Acceleration vs. Time	B-19
Figure No. 65.	Driver Right Ankle X Acceleration vs. Time	B-19
Figure No. 66.	Driver Right Ankle Z Acceleration vs. Time	B-19
Figure No. 67.	Passenger Head X Acceleration vs. Time	B-20
Figure No. 68.	Passenger Head Y Acceleration vs. Time	B-20
Figure No. 69.	Passenger Head Z Acceleration vs. Time	B-20
Figure No. 70.	Passenger Head Resultant Acceleration vs. Time	B-20
Figure No. 71.	Passenger Head X Velocity vs. Time	B-21
Figure No. 72.	Passenger Head Y Velocity vs. Time	B-21
Figure No. 73.	Passenger Head Z Velocity vs. Time	B-21
Figure No. 74.	Passenger Head X Redundant Acceleration vs. Time	B-22
Figure No. 75.	Passenger Head Y Redundant Acceleration vs. Time	B-22
Figure No. 76.	Passenger Head Z Redundant Acceleration vs. Time	B-22
Figure No. 77.	Passenger Head Resultant Redundant Acceleration vs. Time	B-22
Figure No. 78.	Passenger Head X Redundant Velocity vs. Time	B-23
Figure No. 79.	Passenger Head Y Redundant Velocity vs. Time	B-23
Figure No. 80.	Passenger Head Z Redundant Velocity vs. Time	B-23
Figure No. 81.	Passenger Neck Force X vs. Time	B-24
Figure No. 82.	Passenger Neck Force Y vs. Time	B-24
Figure No. 83.	Passenger Neck Force Z vs. Time	B-24
Figure No. 84.	Passenger Neck Force Resultant vs. Time	B-24
Figure No. 85.	Passenger Neck Moment X vs. Time	B-25
Figure No. 86.	Passenger Neck Moment Y vs. Time	B-25
Figure No. 87.	Passenger Neck Moment Z vs. Time	B-25
Figure No. 88.	Passenger Neck Moment Resultant vs. Time	B-25
Figure No. 89.	Passenger Chest X Acceleration vs. Time	B-26
Figure No. 90.	Passenger Chest Y Acceleration vs. Time	B-26
Figure No. 91.	Passenger Chest Z Acceleration vs. Time	B-26
Figure No. 92.	Passenger Chest Resultant Acceleration vs. Time	B-26

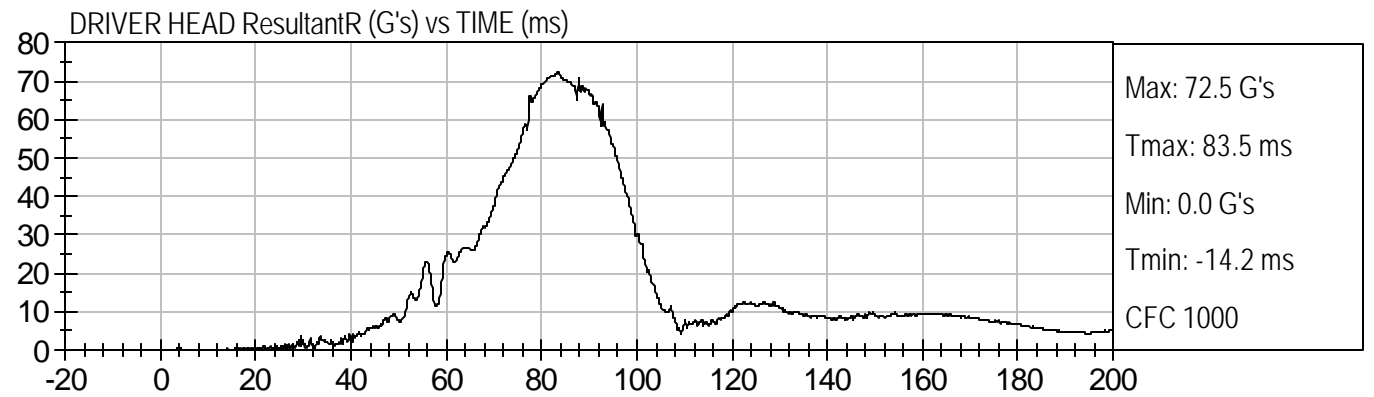
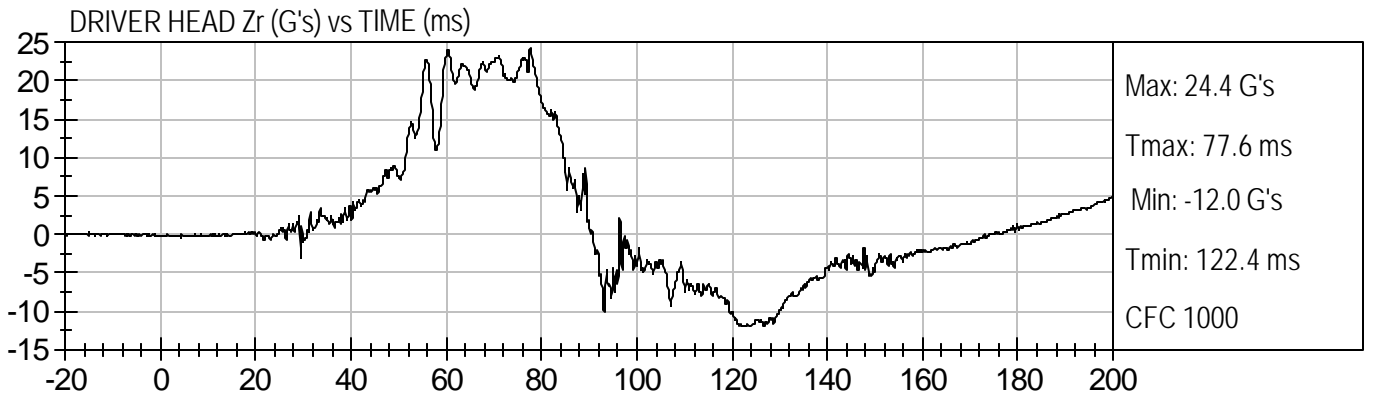
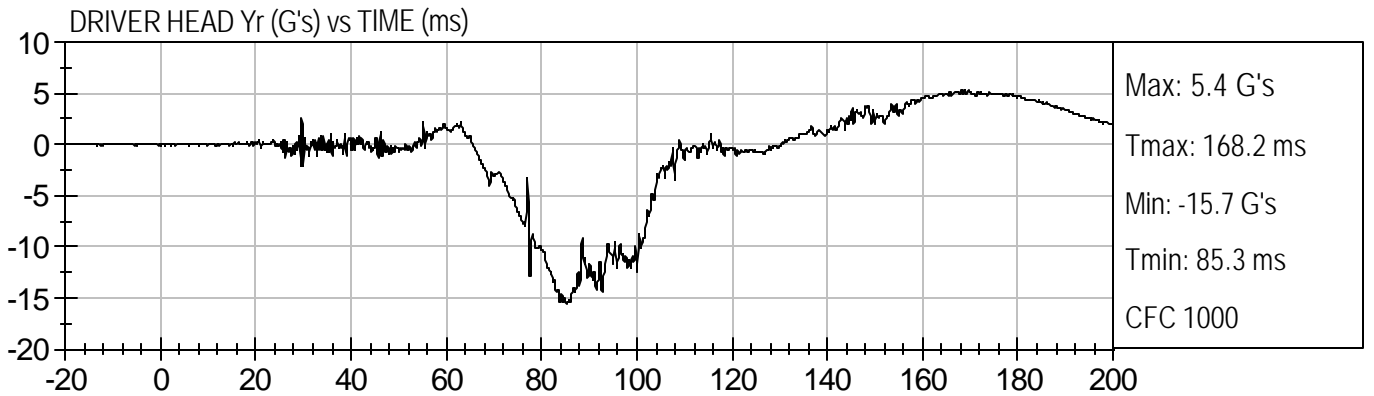
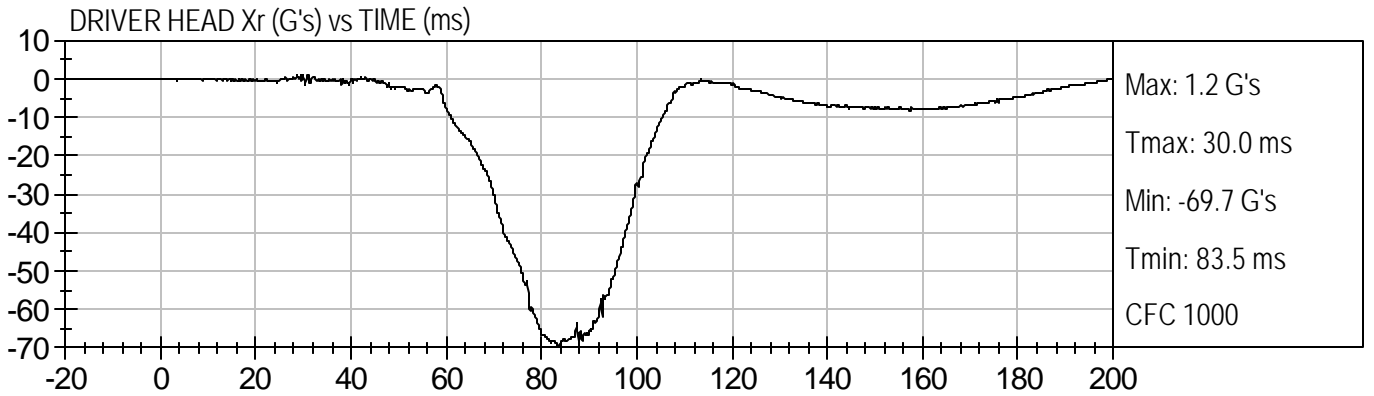
Figure No. 93.	Passenger Chest X Velocity vs. Time	B-27
Figure No. 94.	Passenger Chest Y Velocity vs. Time	B-27
Figure No. 95.	Passenger Chest Z Velocity vs. Time	B-27
Figure No. 96.	Passenger Chest Displacement vs. Time	B-27
Figure No. 97.	Passenger Chest X Redundant Acceleration vs. Time	B-28
Figure No. 98.	Passenger Chest Y Redundant Acceleration vs. Time	B-28
Figure No. 99.	Passenger Chest Z Redundant Acceleration vs. Time	B-28
Figure No. 100.	Passenger Chest Resultant Redundant Acceleration vs. Time	B-28
Figure No. 101.	Passenger Chest X Redundant Velocity vs. Time	B-29
Figure No. 102.	Passenger Chest Y Redundant Velocity vs. Time	B-29
Figure No. 103.	Passenger Chest Z Redundant Velocity vs. Time	B-29
Figure No. 104.	Passenger Pelvis X Acceleration vs. Time	B-30
Figure No. 105.	Passenger Pelvis Y Acceleration vs. Time	B-30
Figure No. 106.	Passenger Pelvis Z Acceleration vs. Time	B-30
Figure No. 107.	Passenger Pelvis Resultant Acceleration vs. Time	B-30
Figure No. 108.	Passenger Pelvis X Velocity vs. Time	B-31
Figure No. 109.	Passenger Pelvis Y Velocity vs. Time	B-31
Figure No. 110.	Passenger Pelvis Z Velocity vs. Time	B-31
Figure No. 111.	Passenger Left Femur Force vs. Time	B-32
Figure No. 112.	Passenger Right Femur Force vs. Time	B-32
Figure No. 113.	Passenger Lap Belt Force vs. Time	B-32
Figure No. 114.	Passenger Shoulder Belt Force vs. Time	B-32
Figure No. 115.	Passenger Left Upper Tibia Moment X vs. Time	B-33
Figure No. 116.	Passenger Left Upper Tibia Moment Y vs. Time	B-33
Figure No. 117.	Passenger Left Upper Tibia Force Z vs. Time	B-33
Figure No. 118.	Passenger Left Lower Tibia Moment X vs. Time	B-34
Figure No. 119.	Passenger Left Lower Tibia Moment Y vs. Time	B-34
Figure No. 120.	Passenger Left Lower Tibia Force Z vs. Time	B-34
Figure No. 121.	Passenger Right Upper Tibia Moment X vs. Time	B-35
Figure No. 122.	Passenger Right Upper Tibia Moment Y vs. Time	B-35
Figure No. 123.	Passenger Right Upper Tibia Force Z vs. Time	B-35

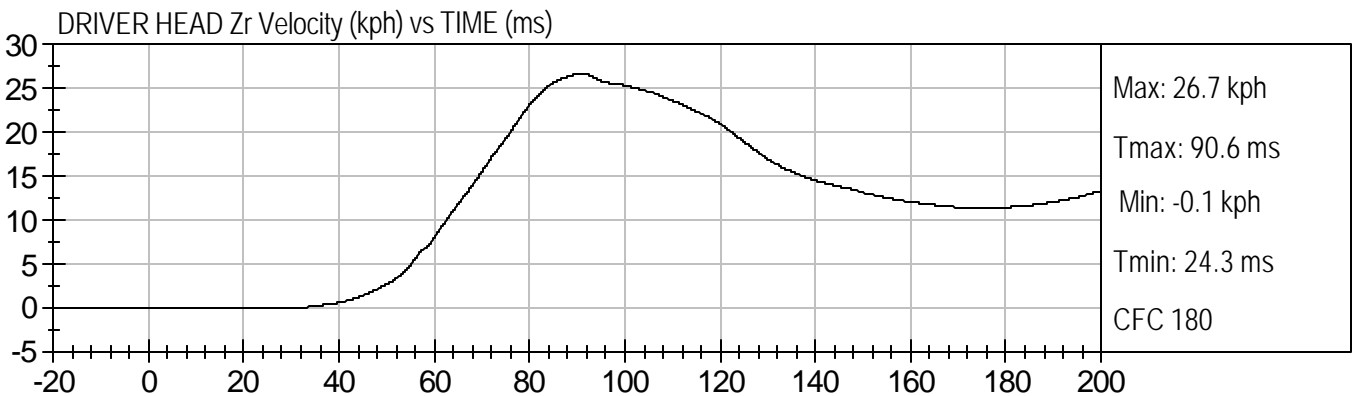
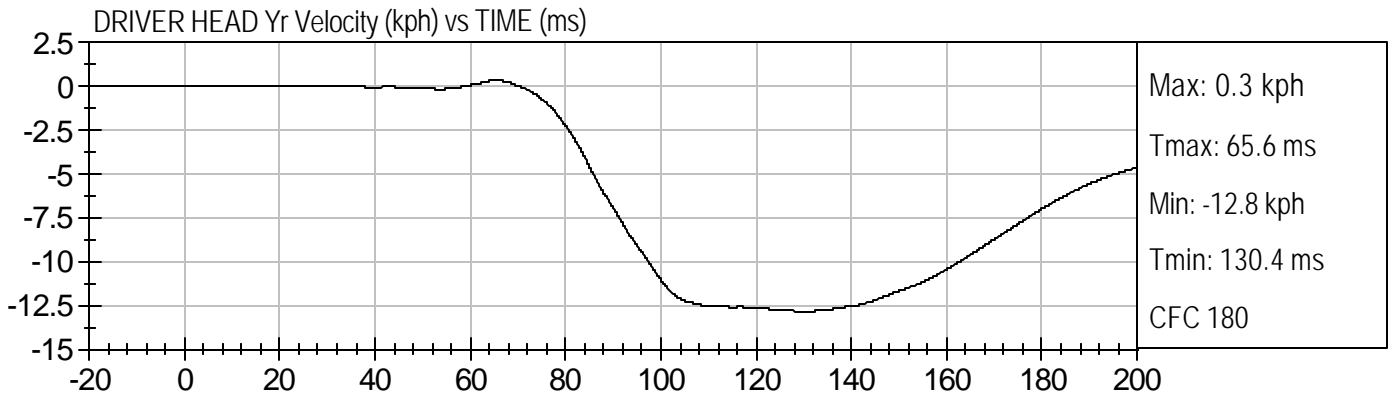
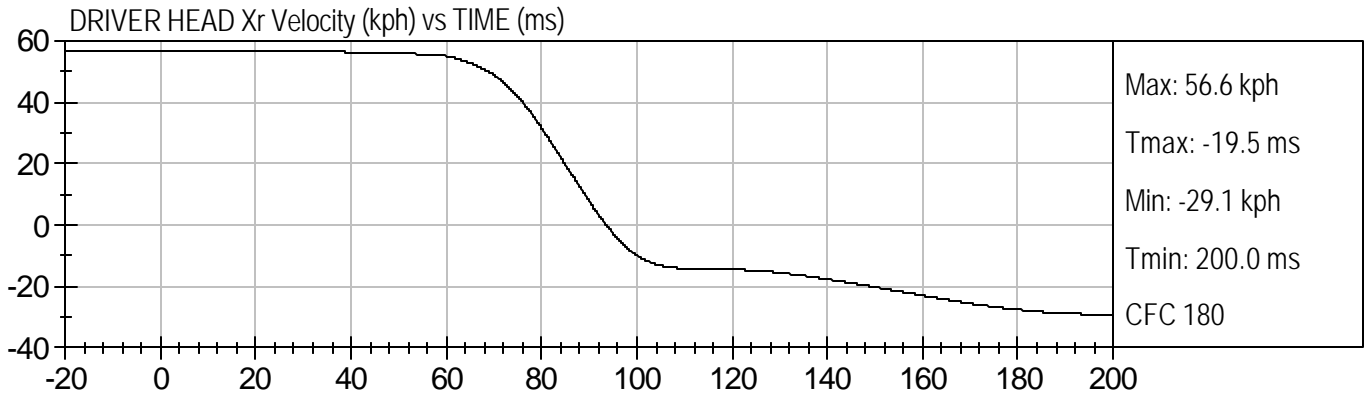
Figure No. 124.	Passenger Right Lower Tibia Moment X vs. Time	B-36
Figure No. 125.	Passenger Right Lower Tibia Moment Y vs. Time	B-36
Figure No. 126.	Passenger Right Lower Tibia Force Z vs. Time	B-36
Figure No. 127.	Passenger Left Foot Z – Front Acceleration vs. Time	B-37
Figure No. 128.	Passenger Left Ankle X Acceleration vs. Time	B-37
Figure No. 129.	Passenger Left Ankle Z Acceleration vs. Time	B-37
Figure No. 130.	Passenger Right Foot Z – Front Acceleration vs. Time	B-38
Figure No. 131.	Passenger Right Ankle X Acceleration vs. Time	B-38
Figure No. 132.	Passenger Right Ankle Z Acceleration vs. Time	B-38
Figure No. 133.	Left Rear Seat Crossmember X Acceleration vs. Time	B-39
Figure No. 134.	Left Rear Seat Crossmember X Velocity vs. Time	B-39
Figure No. 135.	Left Rear Seat Crossmember X Displacement vs. Time	B-39
Figure No. 136.	Left Rear Seat Crossmember Z Acceleration vs. Time	B-40
Figure No. 137.	Left Rear Seat Crossmember Z Velocity vs. Time	B-40
Figure No. 138.	Left Rear Seat Crossmember Z Displacement vs. Time	B-40
Figure No. 139.	Right Rear Seat Crossmember X Acceleration vs. Time	B-41
Figure No. 140.	Right Rear Seat Crossmember X Velocity vs. Time	B-41
Figure No. 141.	Right Rear Seat Crossmember X Displacement vs. Time	B-41
Figure No. 142.	Right Rear Seat Crossmember Z Acceleration vs. Time	B-42
Figure No. 143.	Right Rear Seat Crossmember Z Velocity vs. Time	B-42
Figure No. 144.	Right Rear Seat Crossmember Z Displacement vs. Time	B-42
Figure No. 145.	Top of Engine X Acceleration vs. Time	B-43
Figure No. 146.	Top of Engine X Velocity vs. Time	B-43
Figure No. 147.	Top of Engine X Displacement vs. Time	B-43
Figure No. 148.	Bottom of Engine X Acceleration vs. Time	B-44
Figure No. 149.	Bottom of Engine X Velocity vs. Time	B-44
Figure No. 150.	Bottom of Engine X Displacement vs. Time	B-44
Figure No. 151.	Left Brake Caliper X Acceleration vs. Time	B-45
Figure No. 152.	Left Brake Caliper X Velocity vs. Time	B-45
Figure No. 153.	Left Brake Caliper X Displacement vs. Time	B-45
Figure No. 154.	Right Brake Caliper X Acceleration vs. Time	B-46

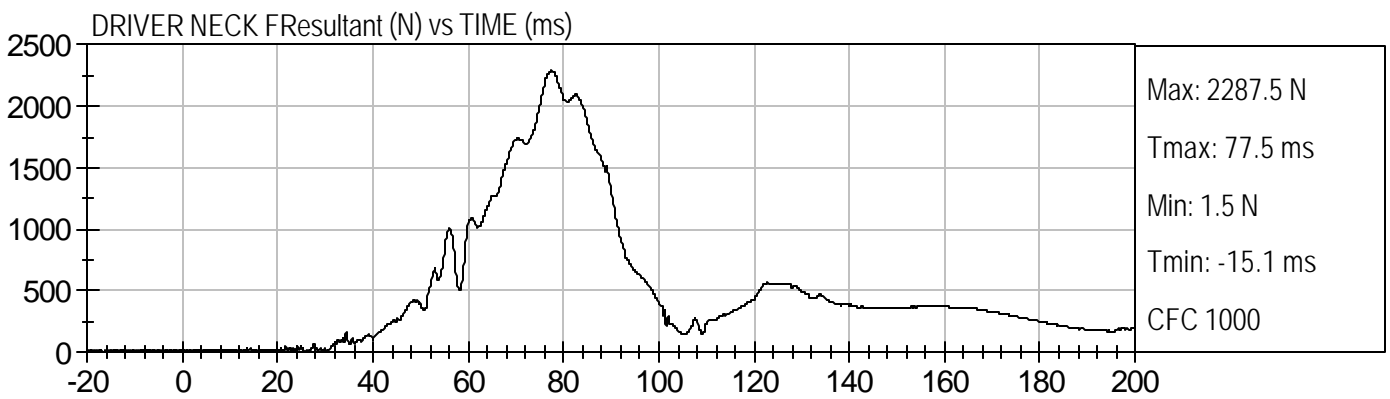
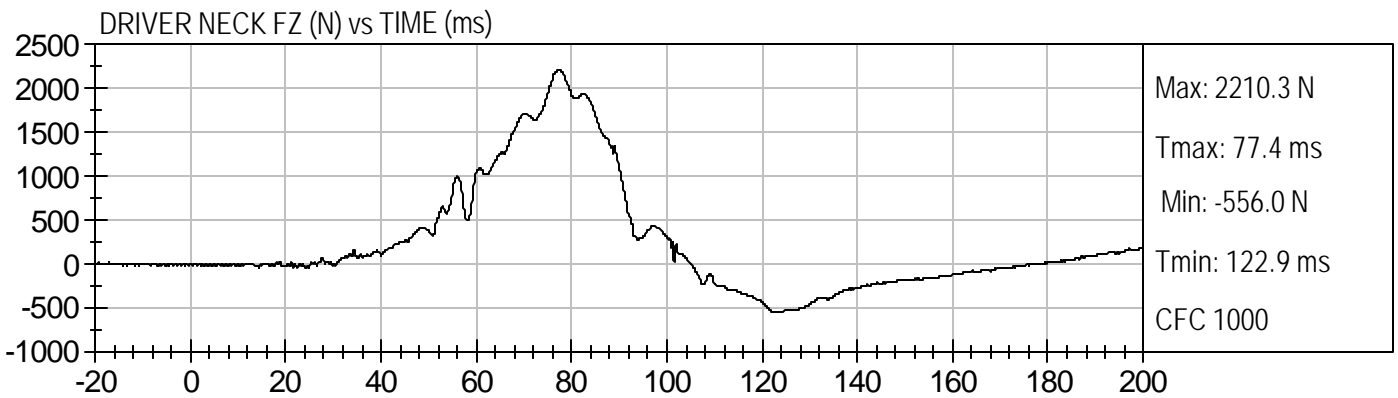
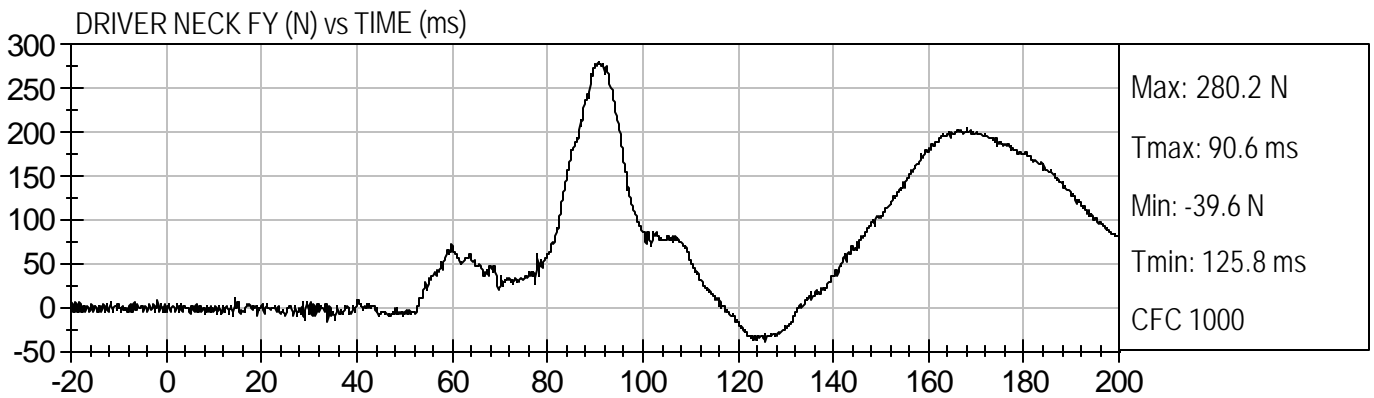
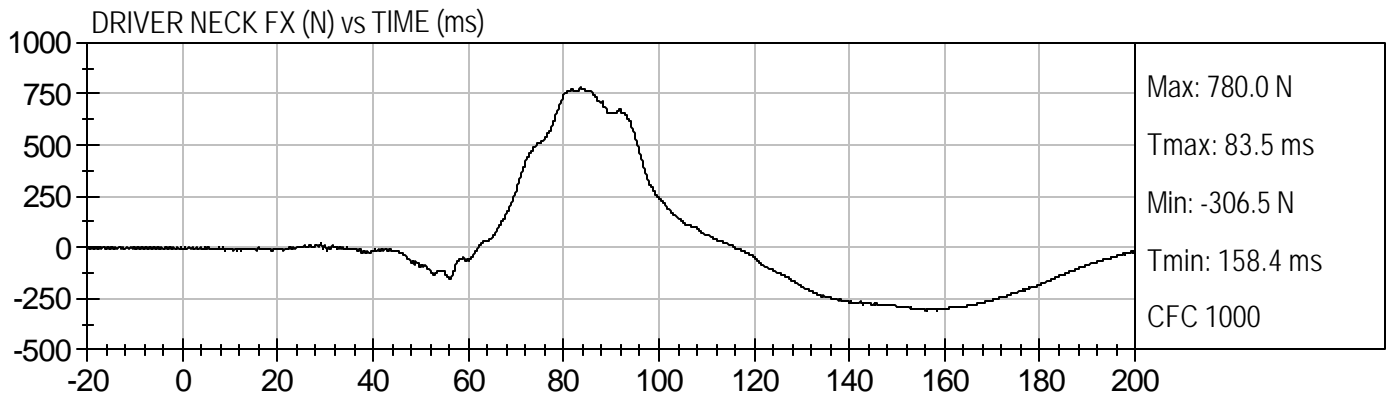
Figure No. 155.	Right Brake Caliper X Velocity vs. Time	B-46
Figure No. 156.	Right Brake Caliper X Displacement vs. Time	B-46
Figure No. 157.	Instrument Panel X Acceleration vs. Time	B-47
Figure No. 158.	Instrument Panel X Velocity vs. Time	B-47
Figure No. 159.	Instrument Panel X Displacement vs. Time	B-47
Figure No. 160.	Barrier Force – Upper Left vs. Time	B-48
Figure No. 161.	Barrier Force – Upper Center vs. Time	B-48
Figure No. 162.	Barrier Force – Upper Right vs. Time	B-48
Figure No. 163.	Barrier Force – Lower Left vs. Time	B-49
Figure No. 164.	Barrier Force – Lower Center vs. Time	B-49
Figure No. 165.	Barrier Force – Lower Right vs. Time	B-49
Figure No. 166.	Barrier Force – Sum Left vs. Time	B-50
Figure No. 167.	Barrier Force – Sum Center vs. Time	B-50
Figure No. 168.	Barrier Force – Sum Right vs. Time	B-50
Figure No. 169.	Barrier Force – Sum All vs. Time	B-51
Figure No. 170.	Barrier Force – Sum All vs. Average Seat X-member Displacement	B-51

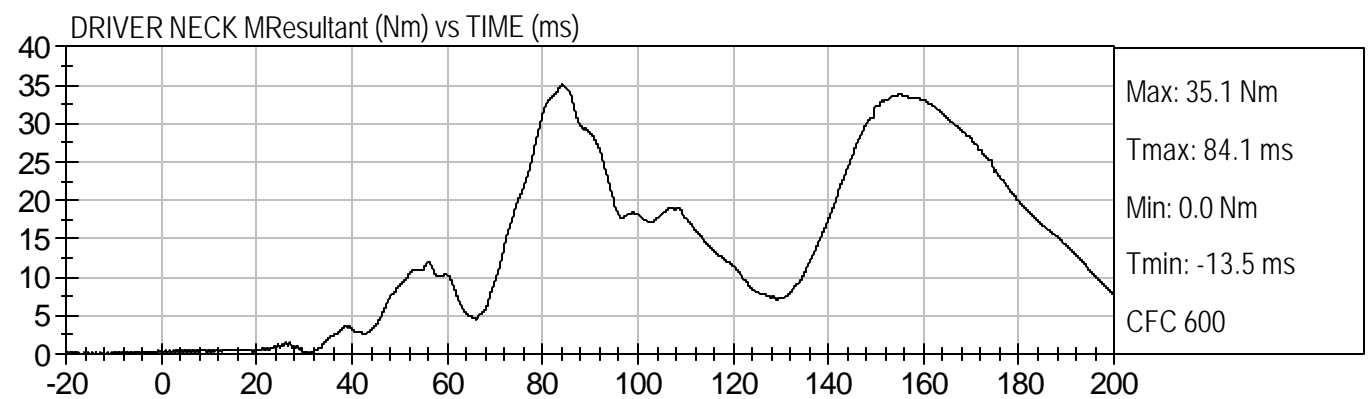
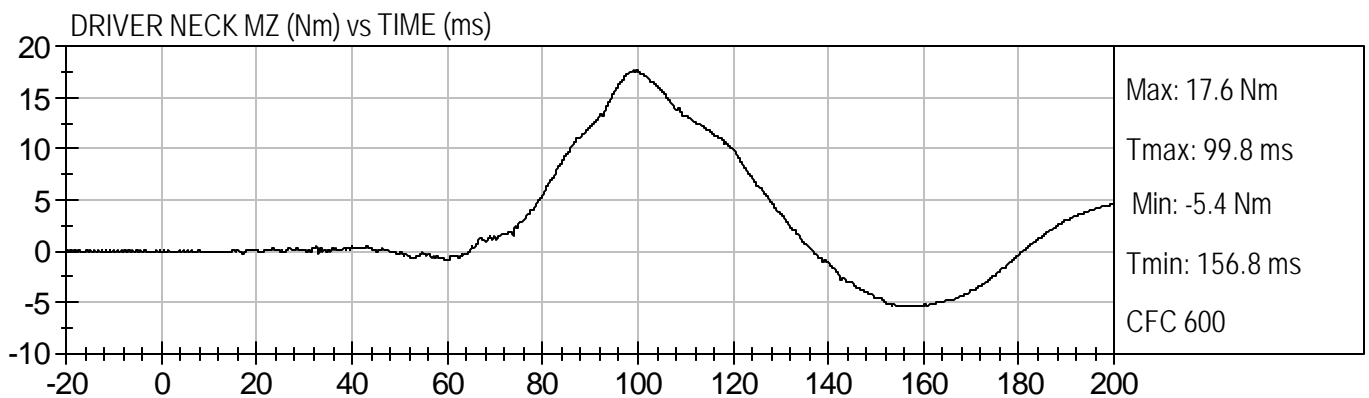
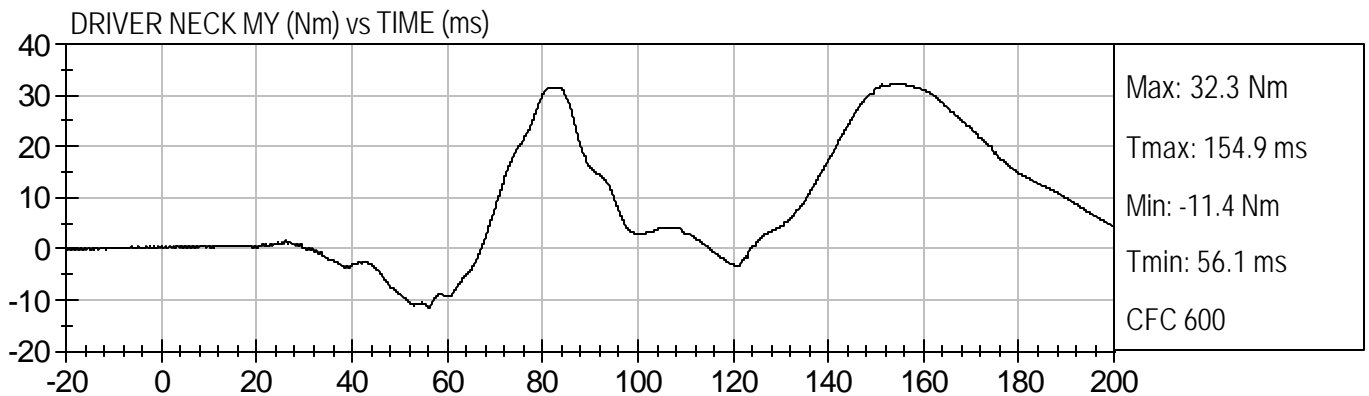
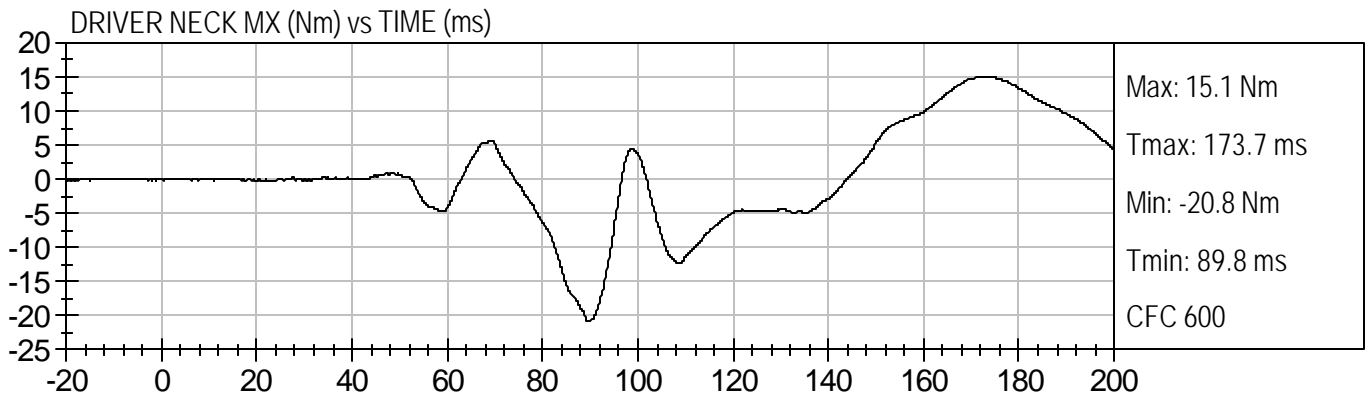


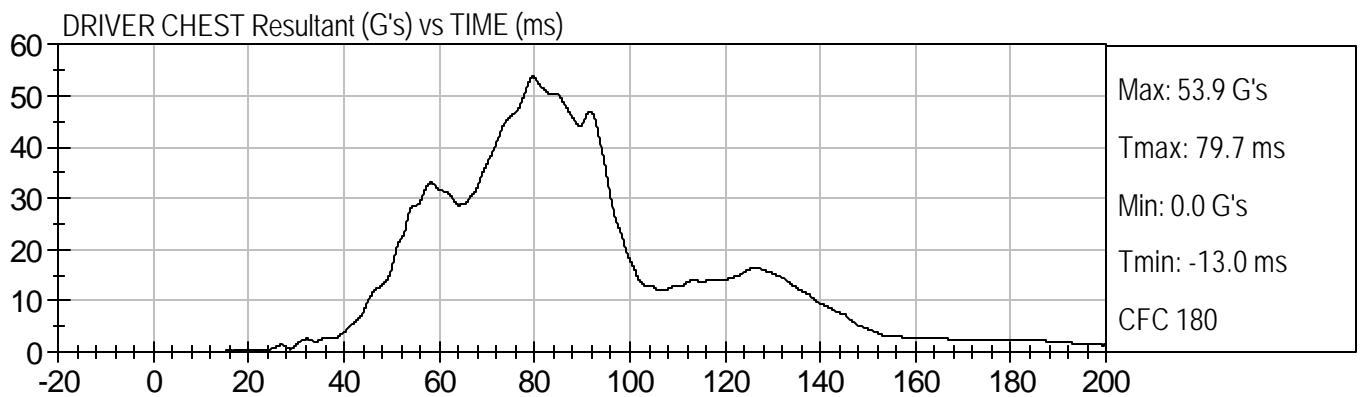
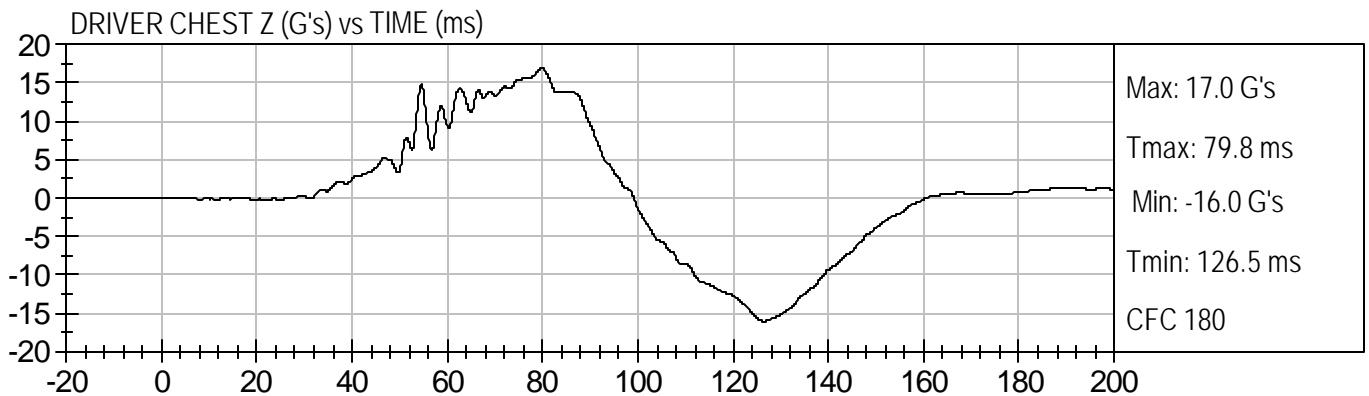
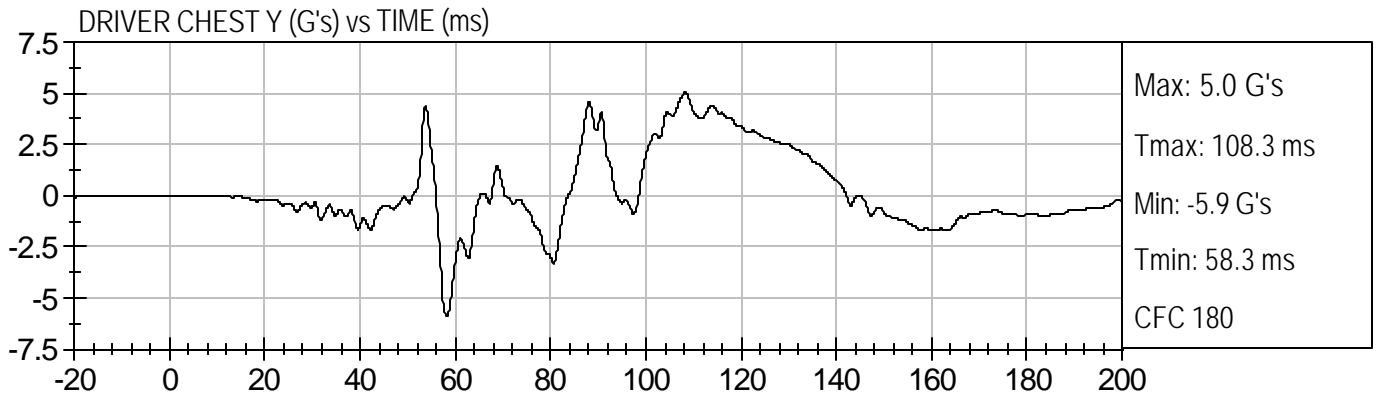
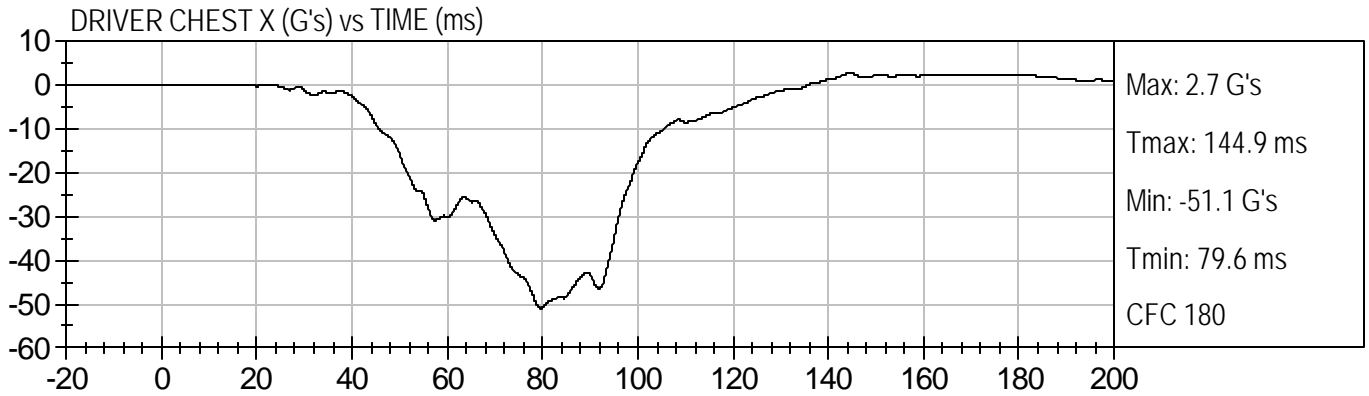


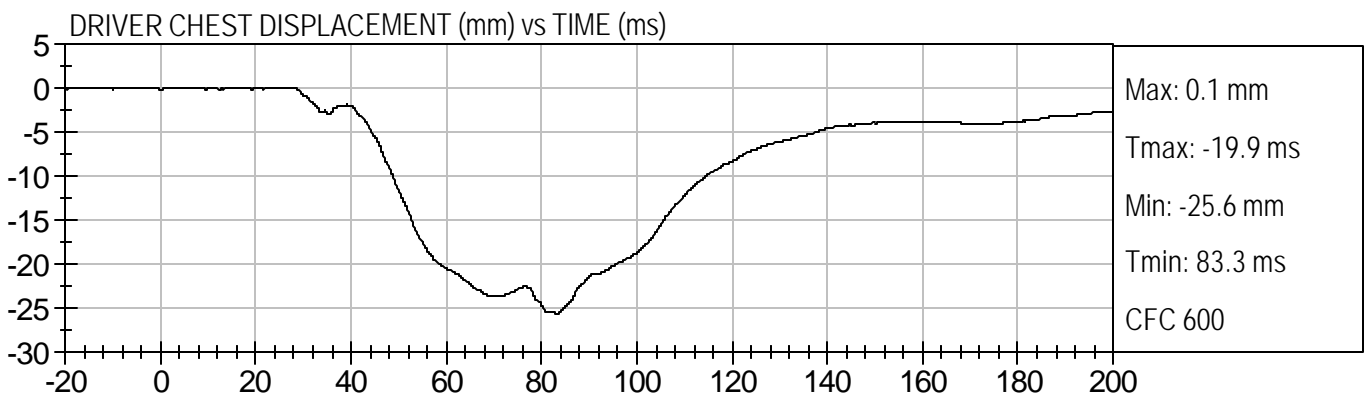
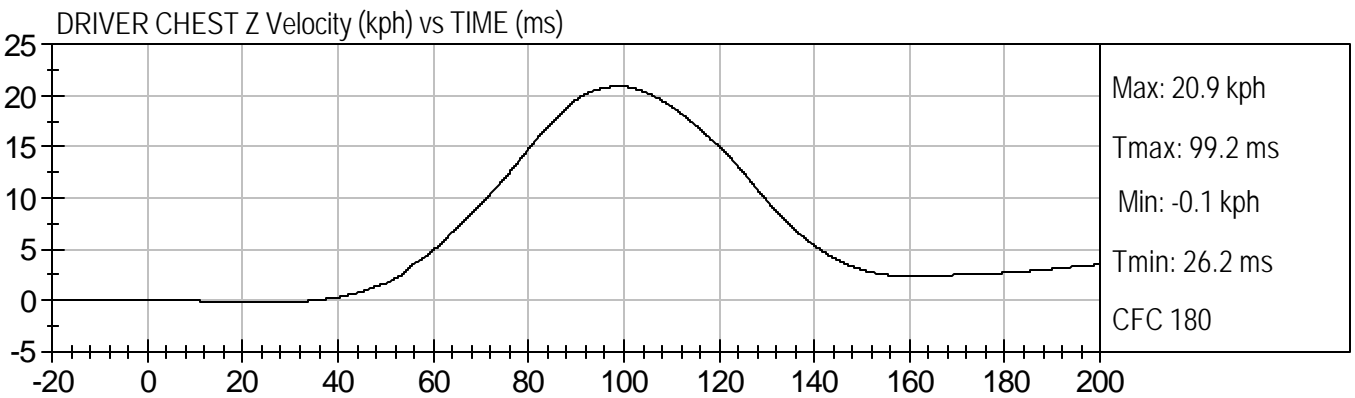
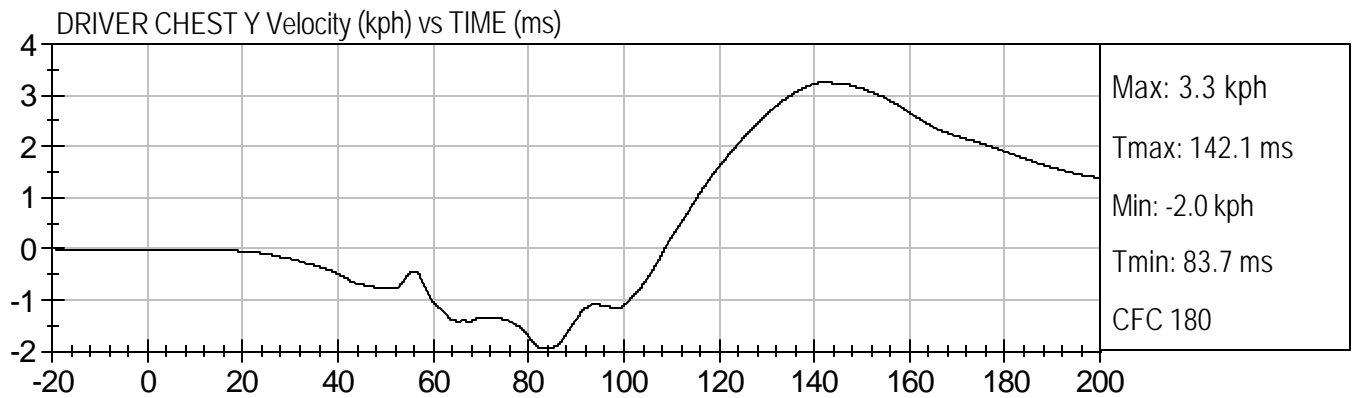
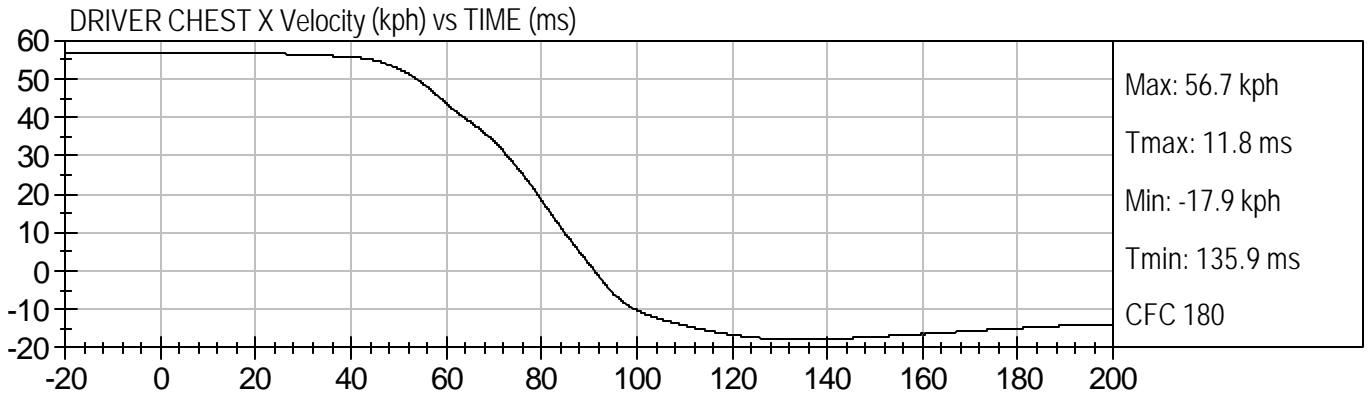


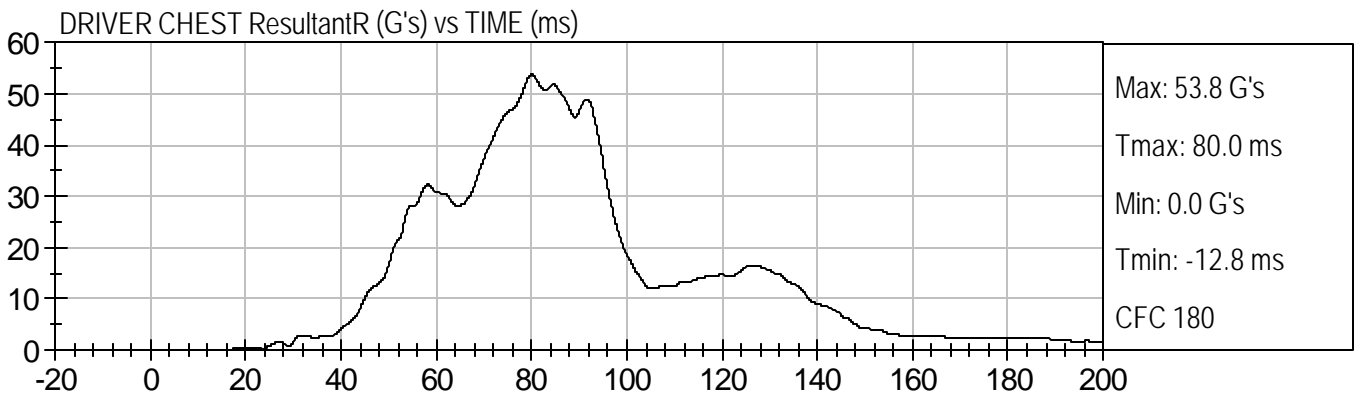
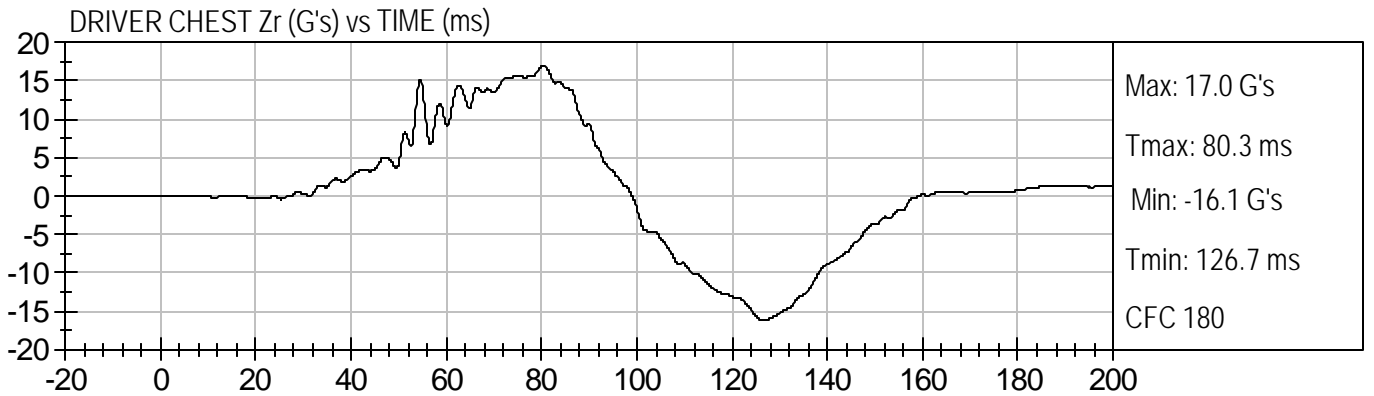
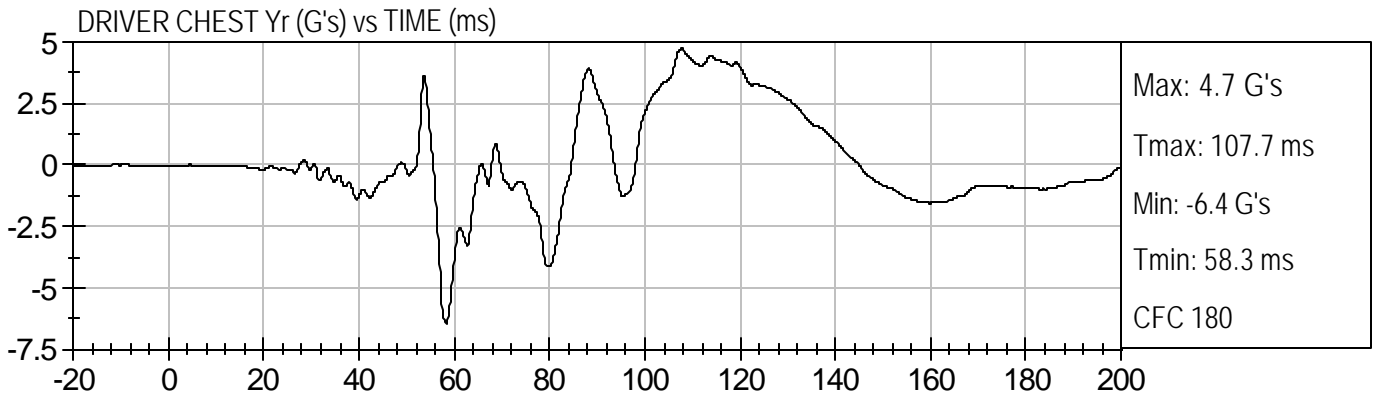
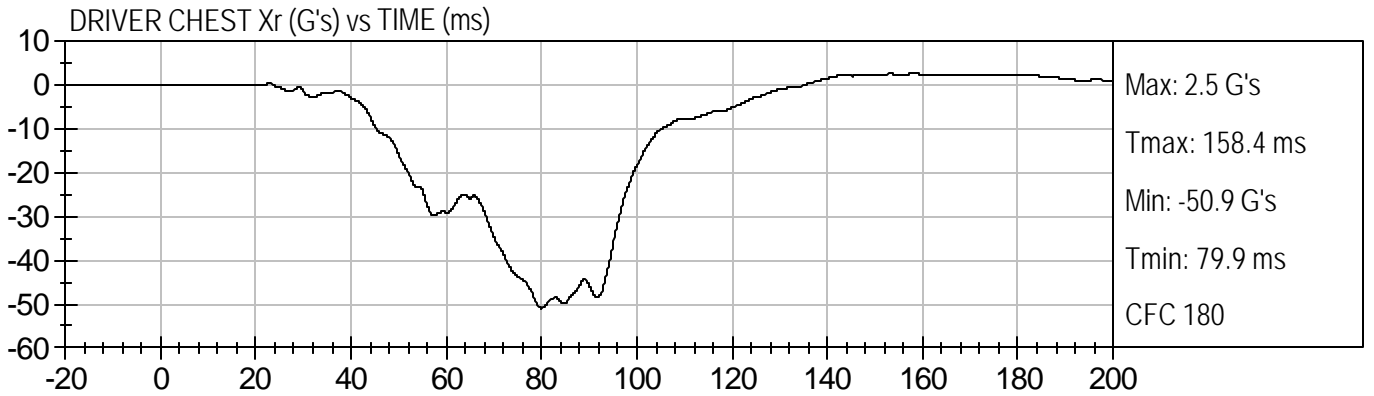


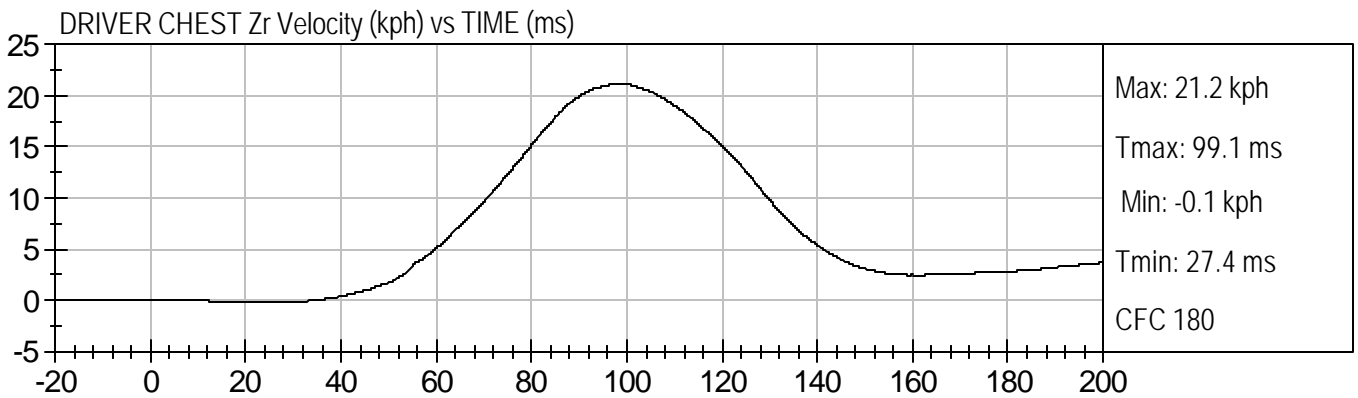
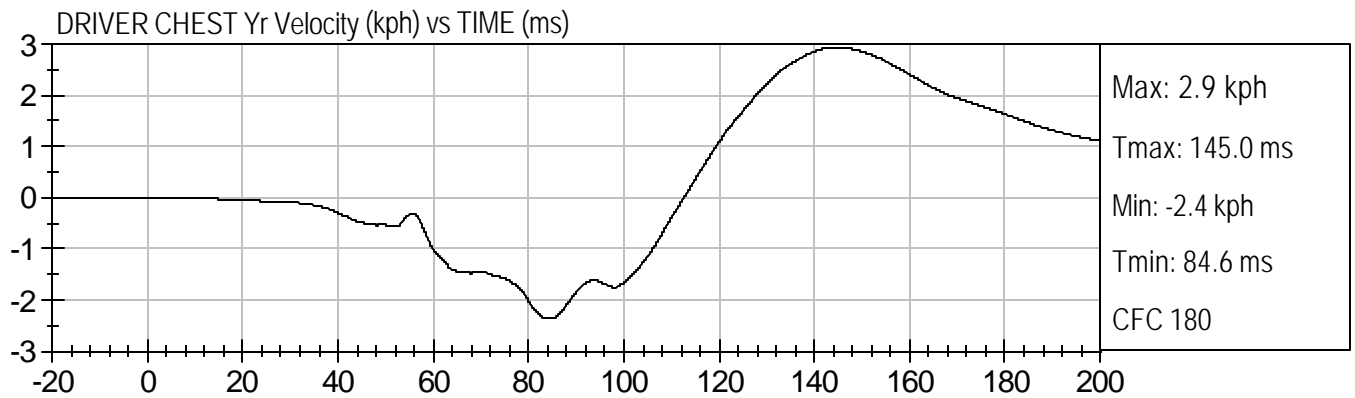
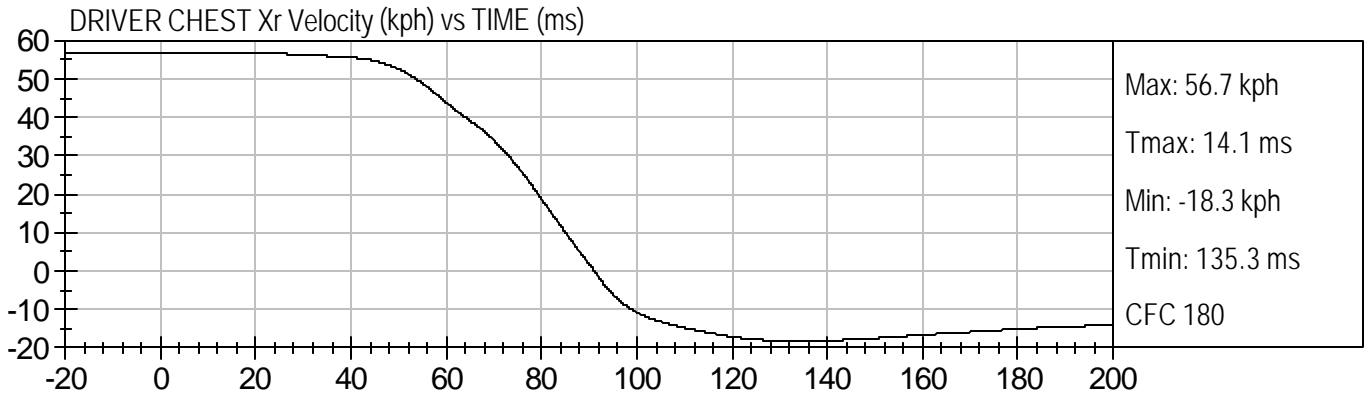


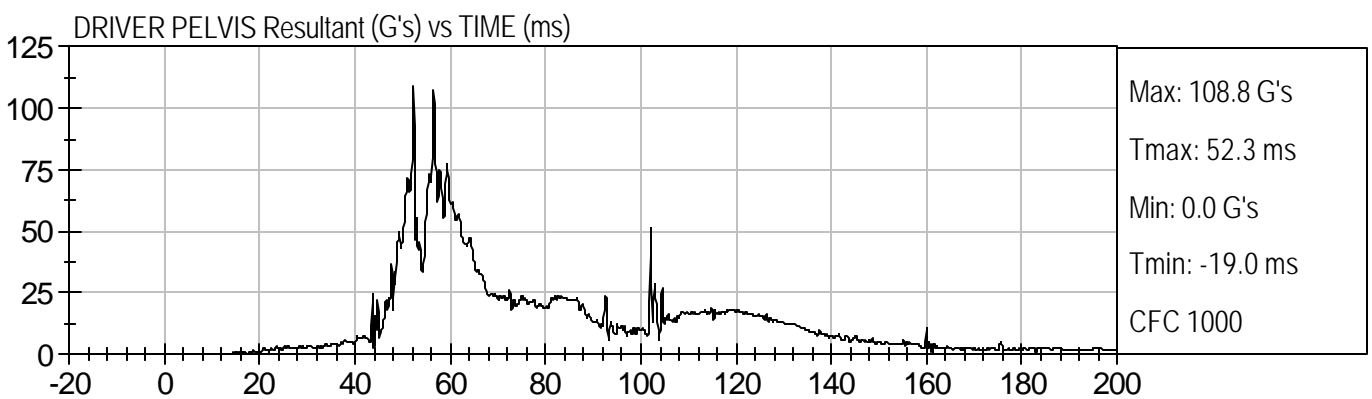
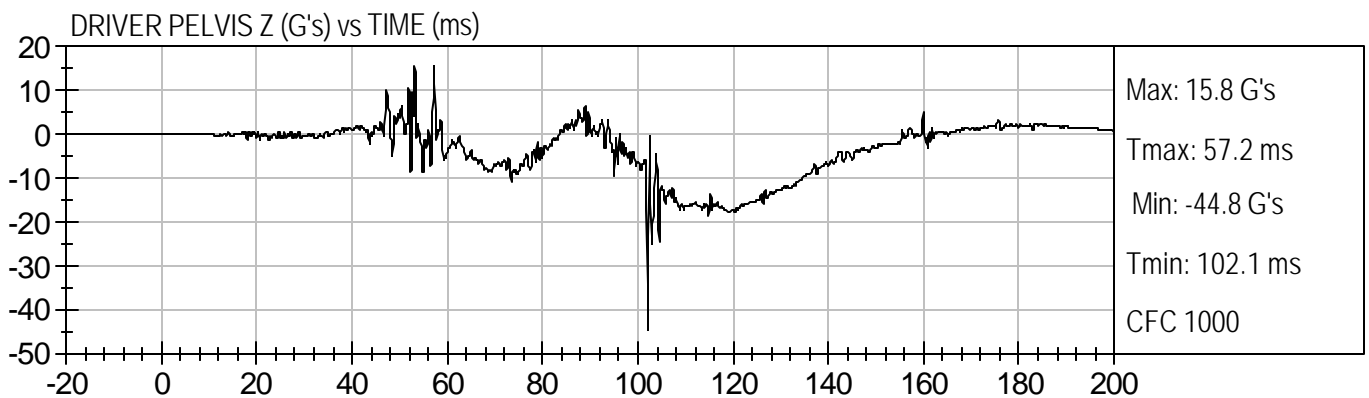
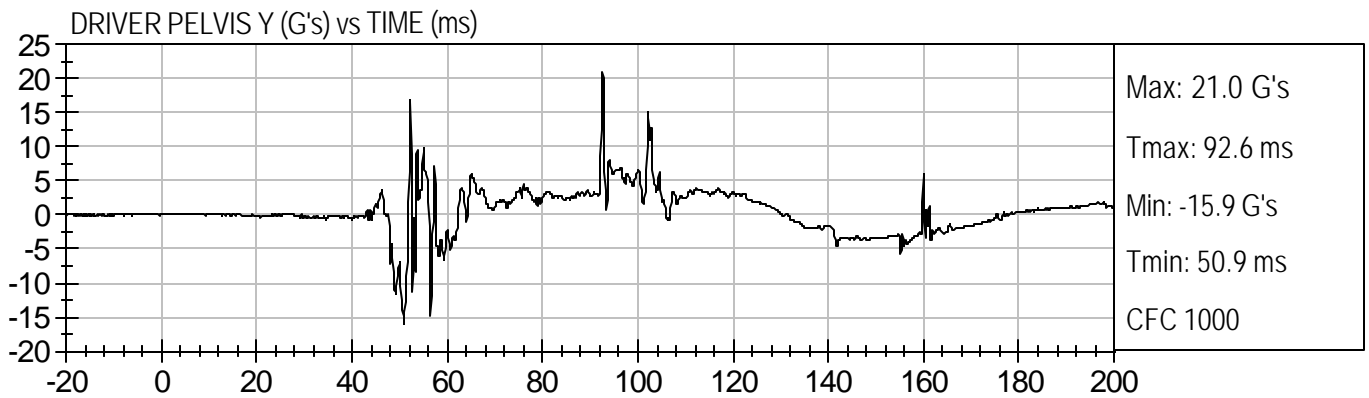
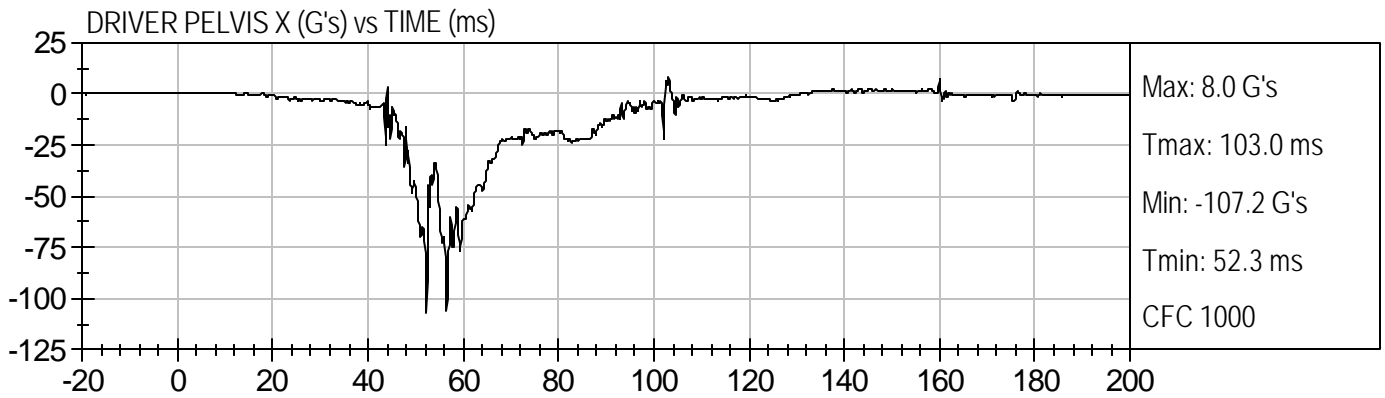


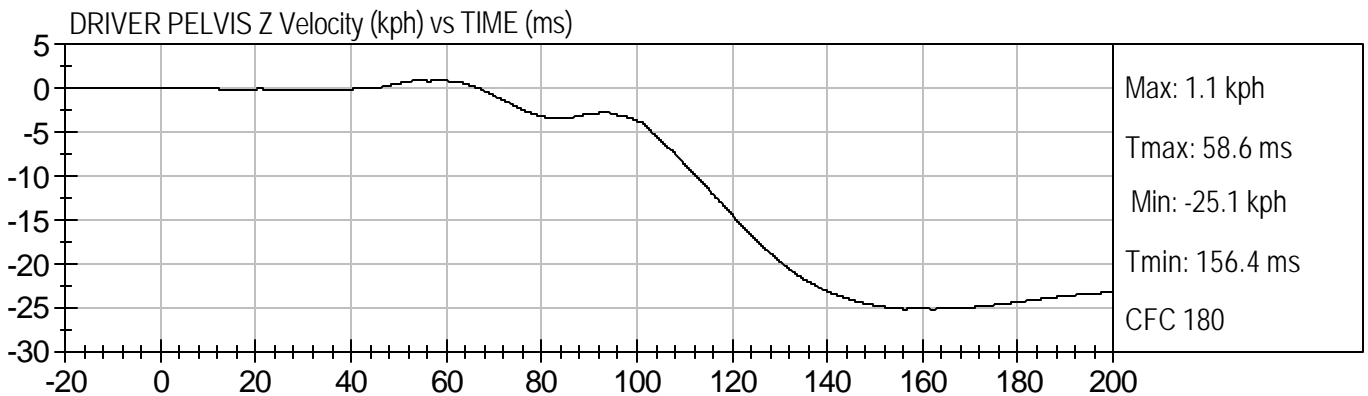
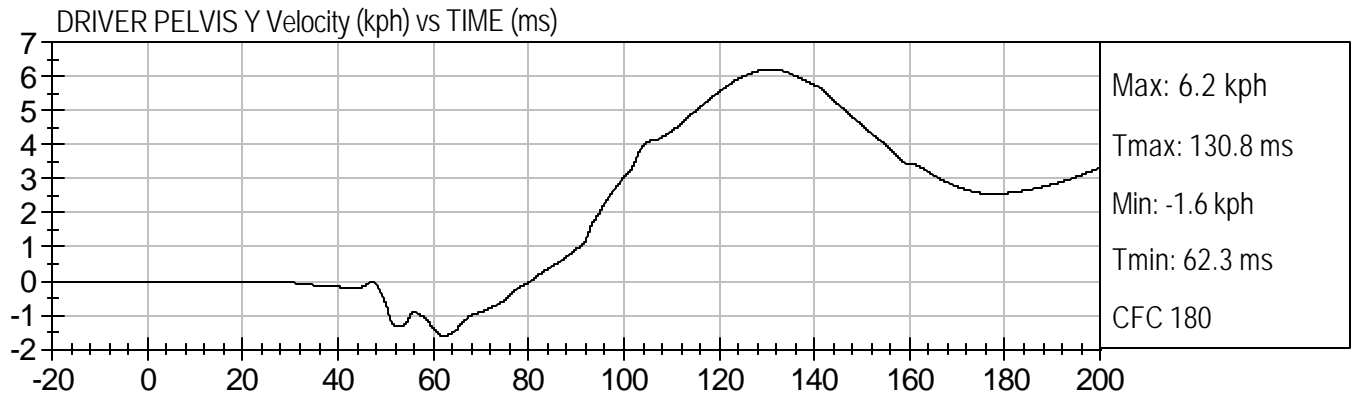
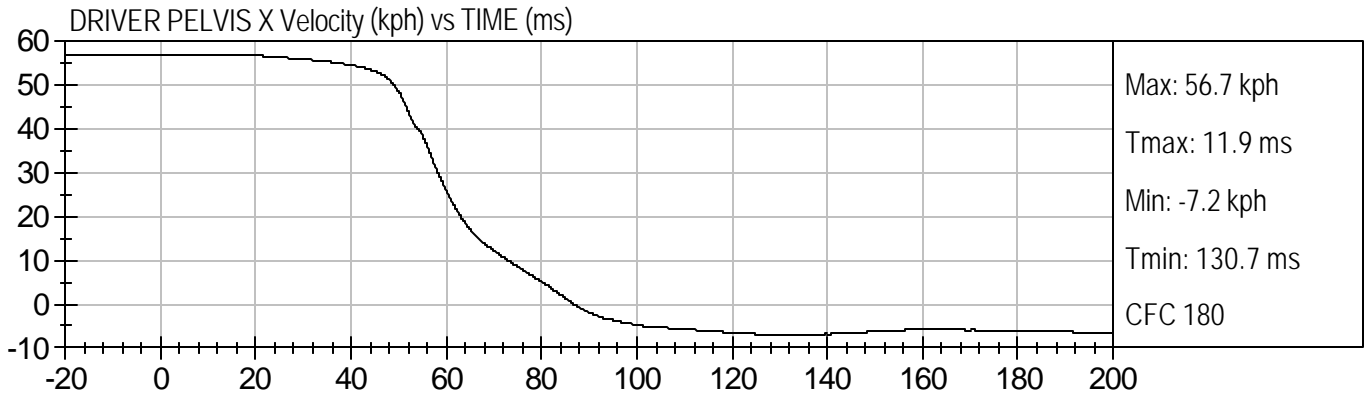


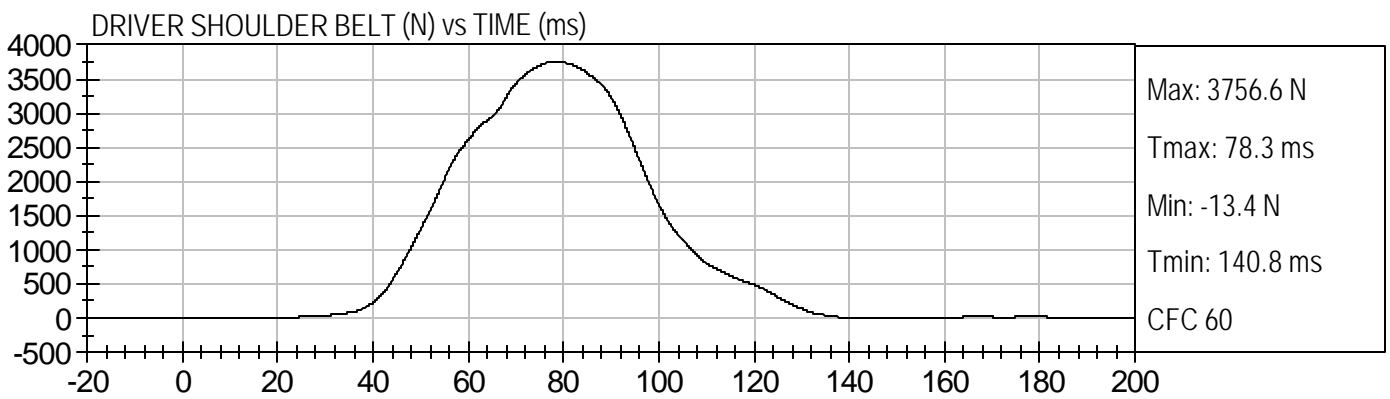
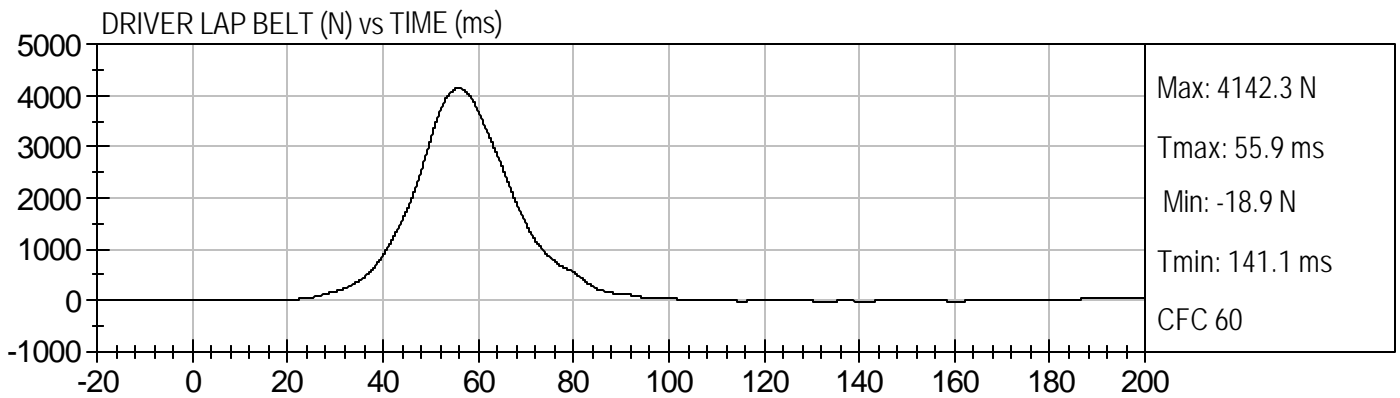
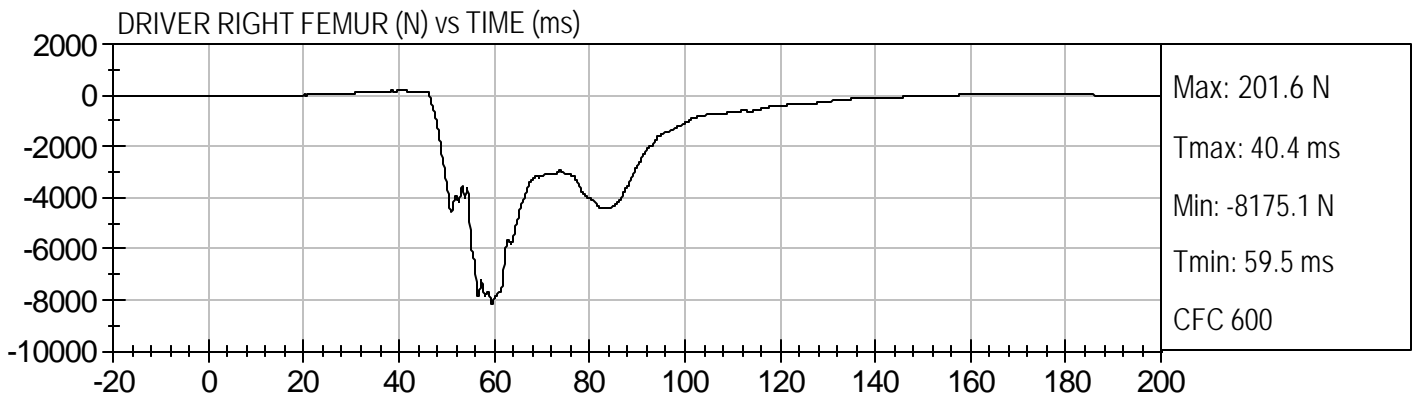
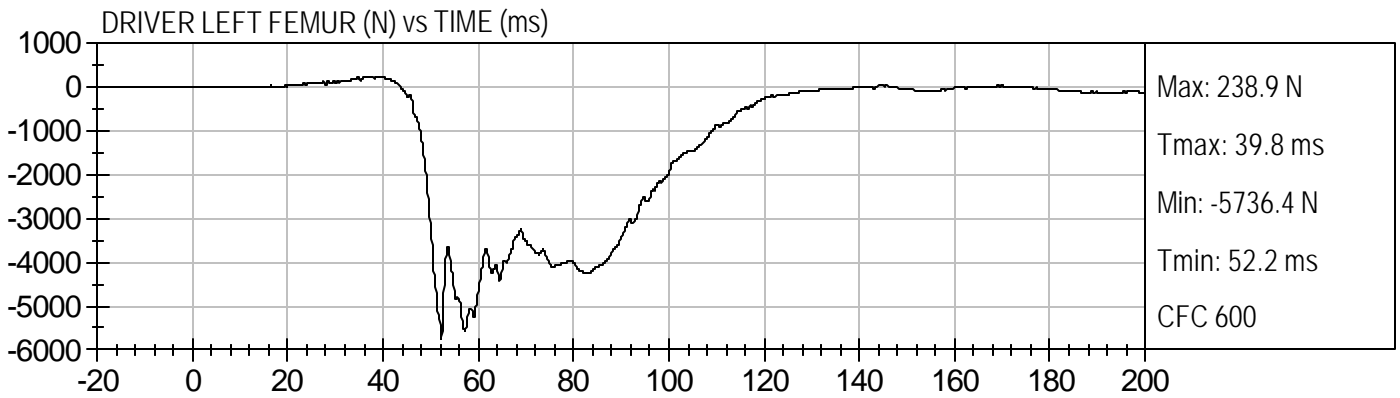


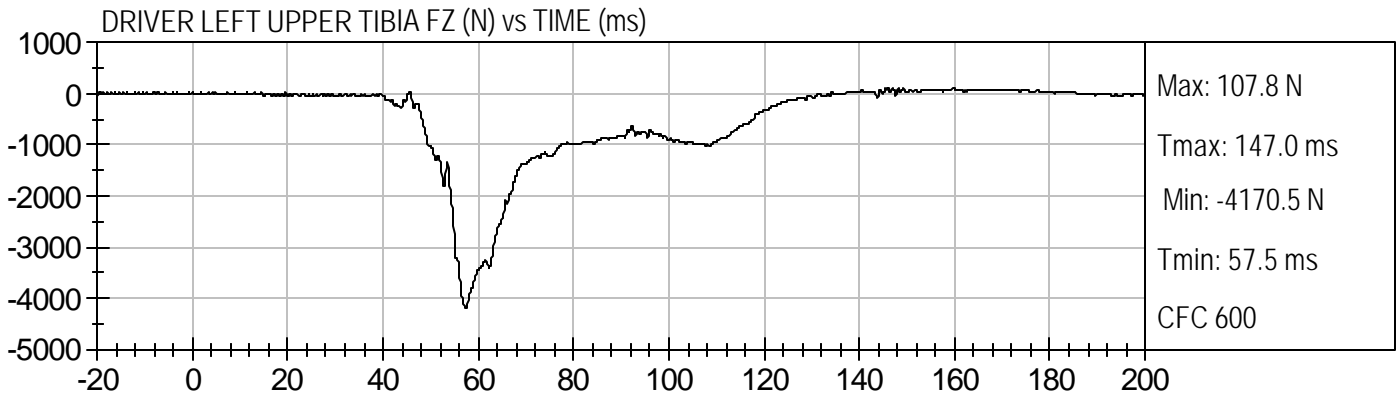
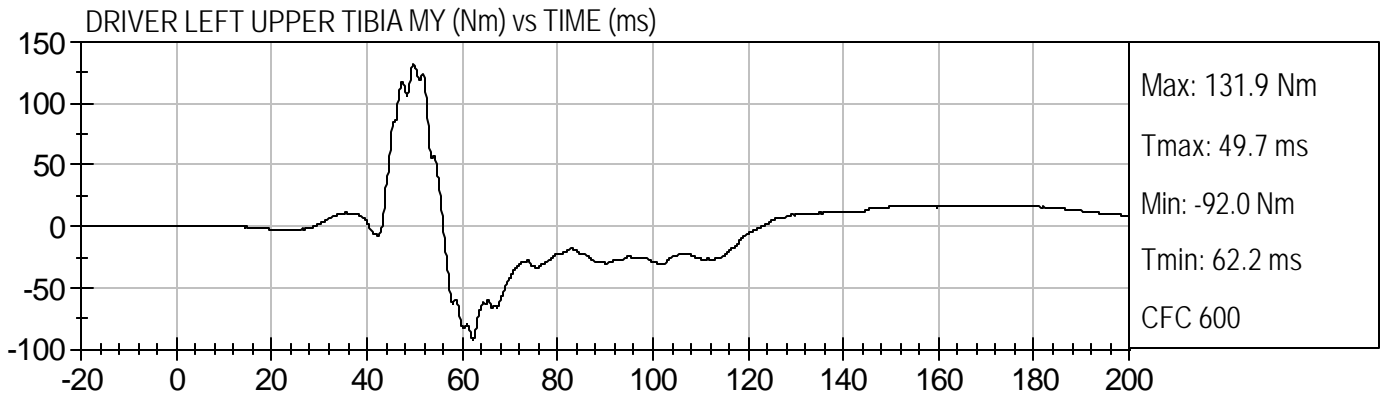
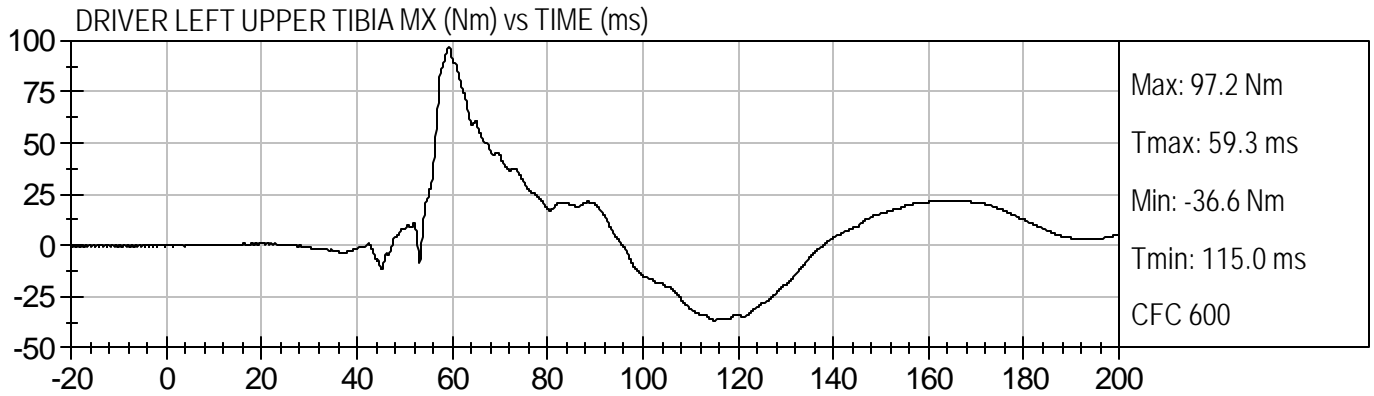


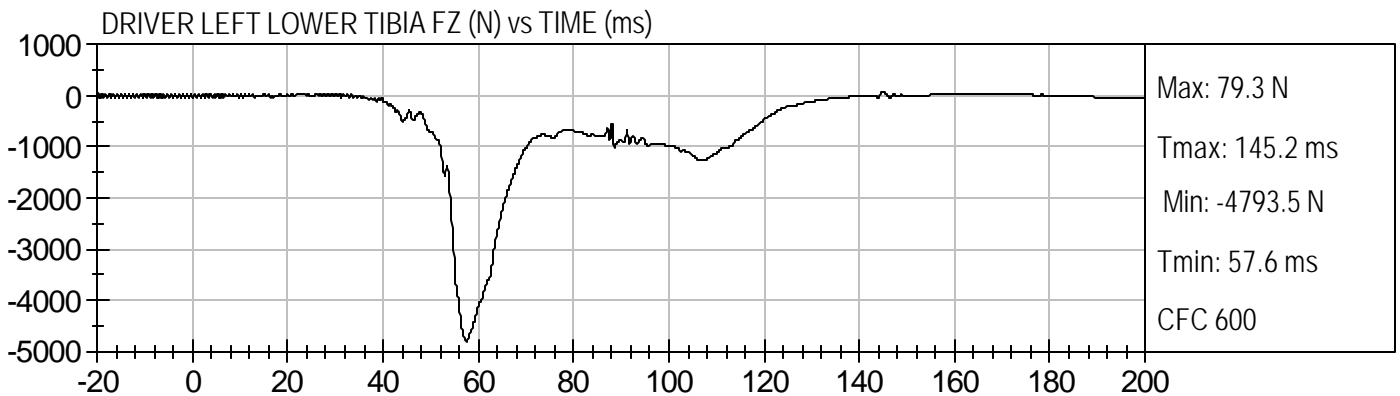
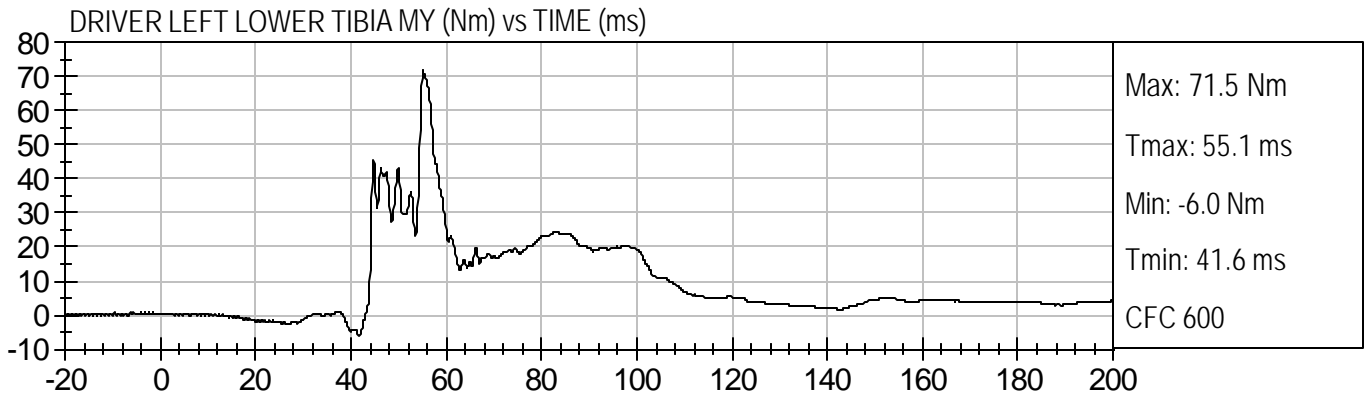
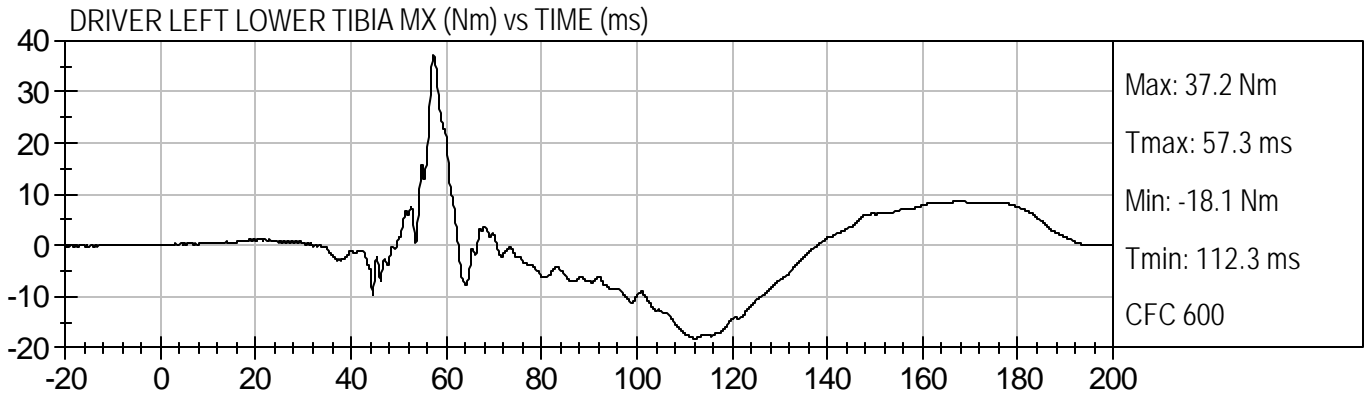


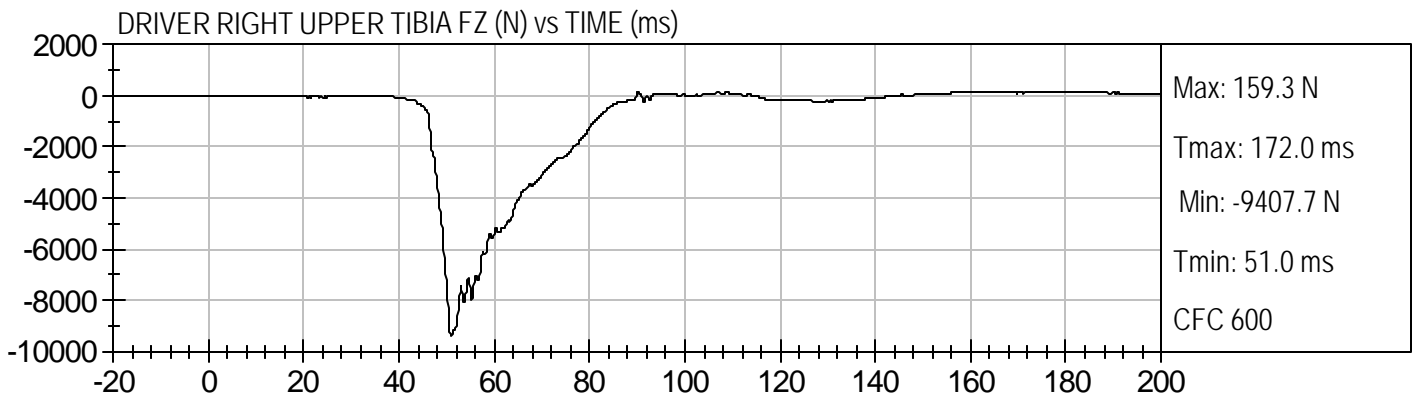
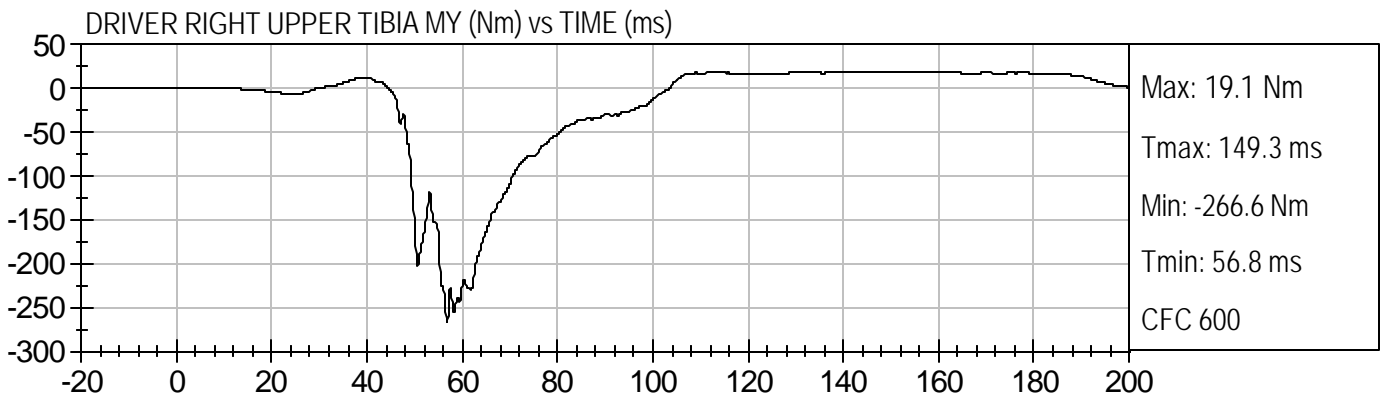
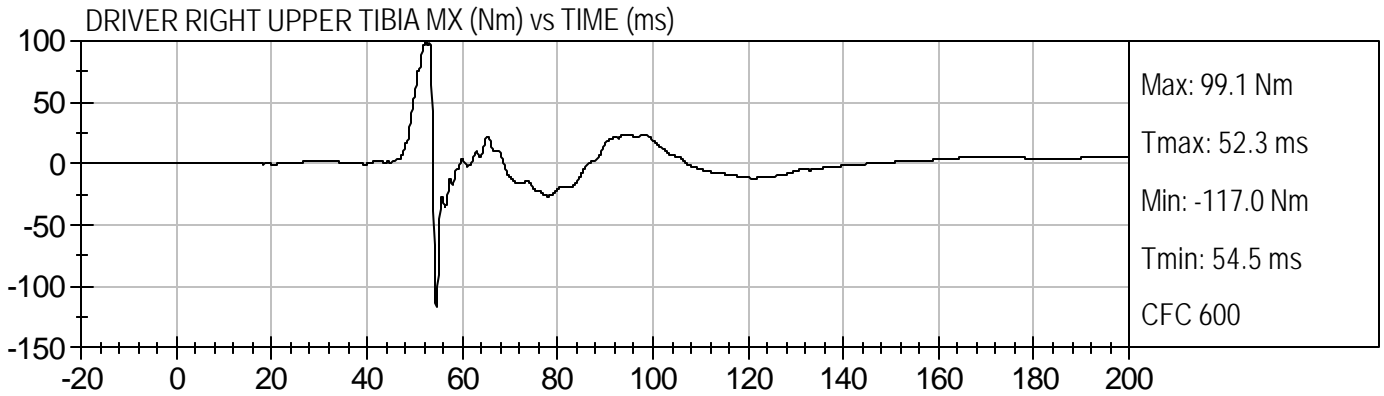








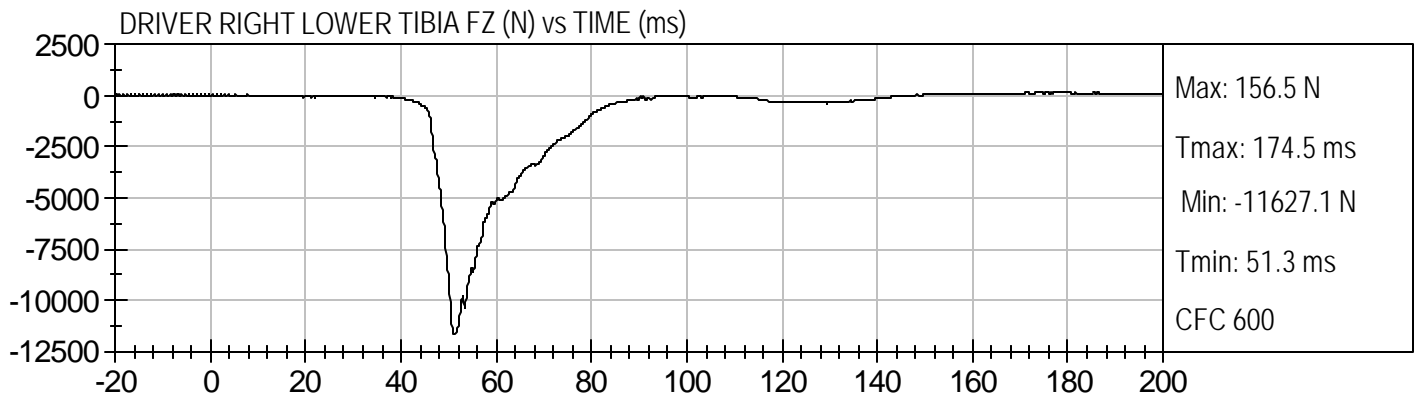
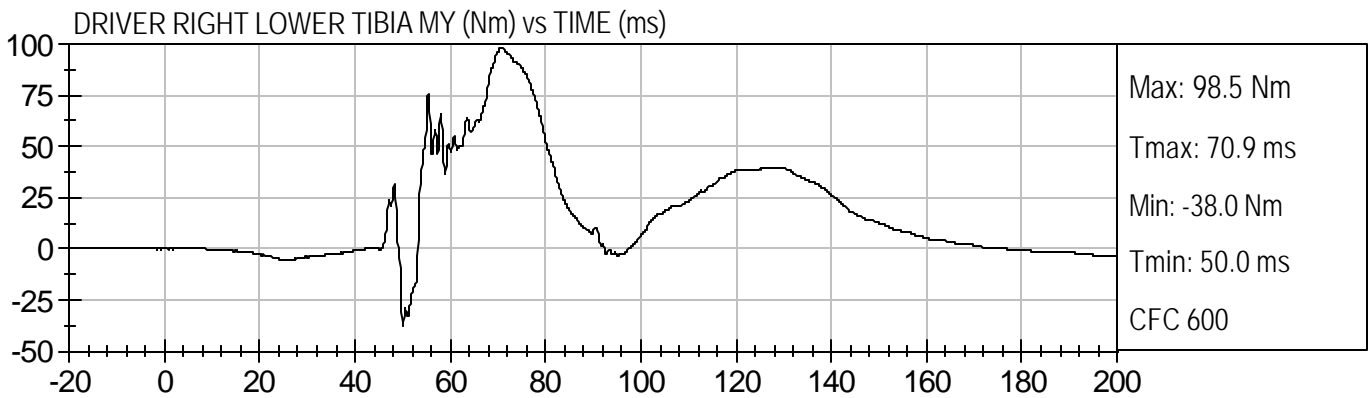
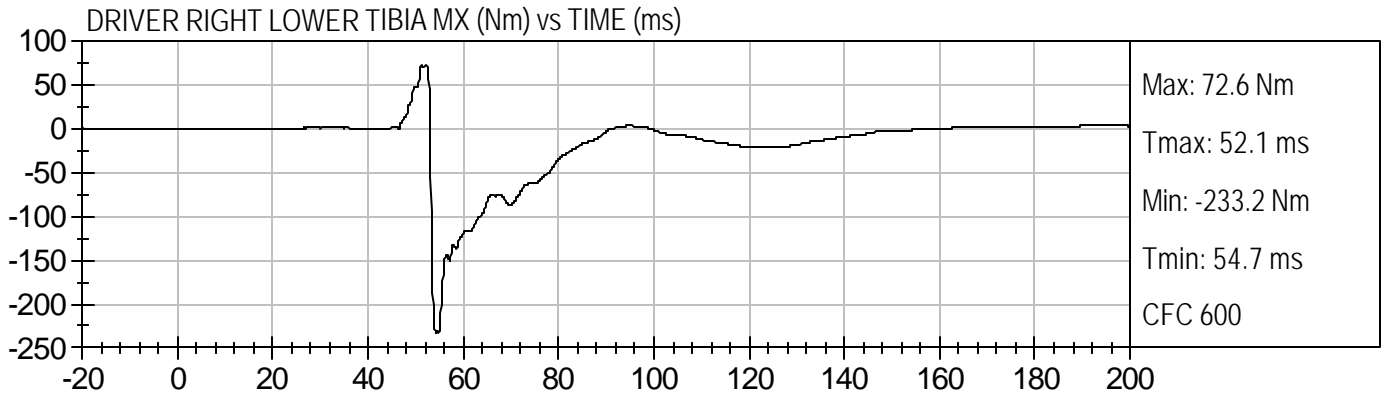


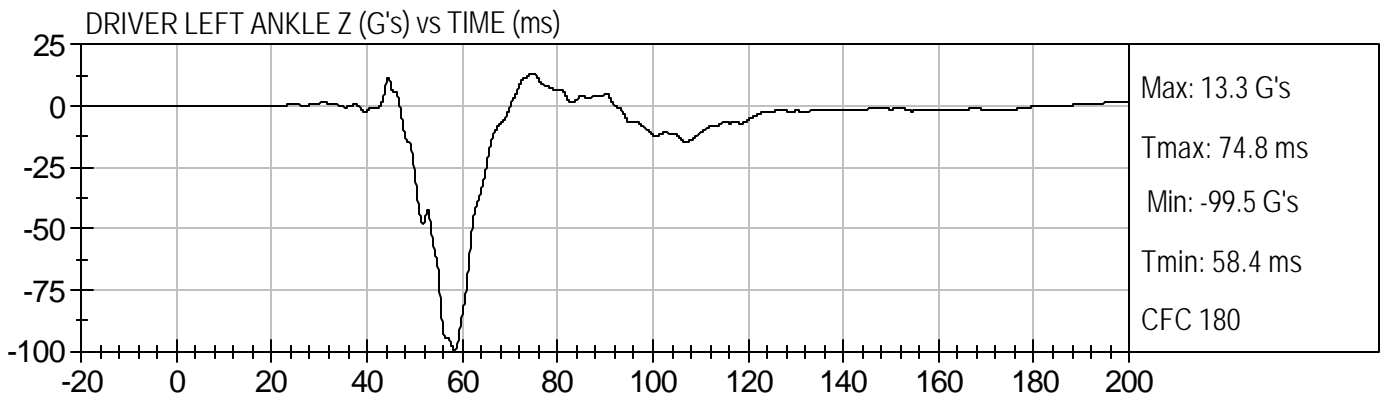
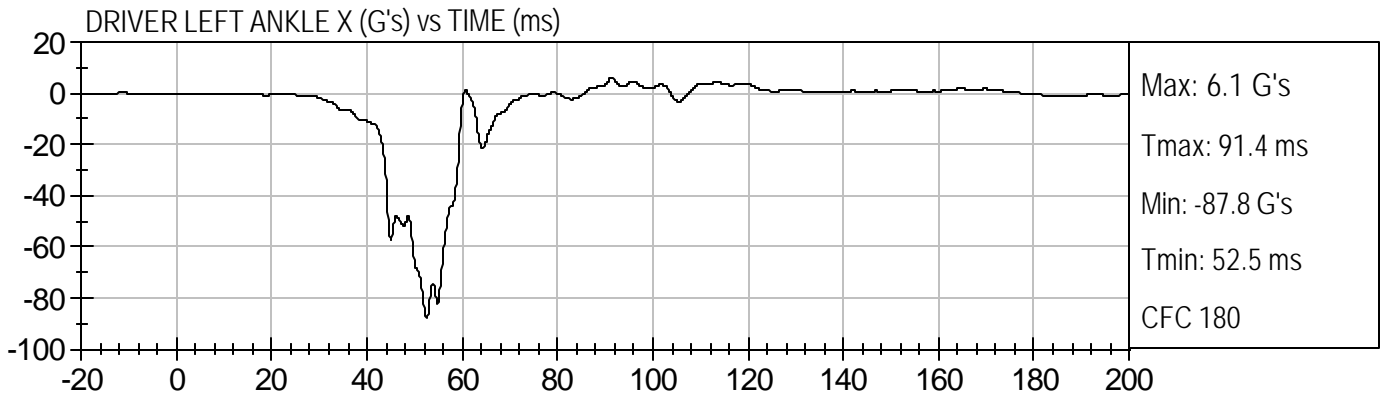
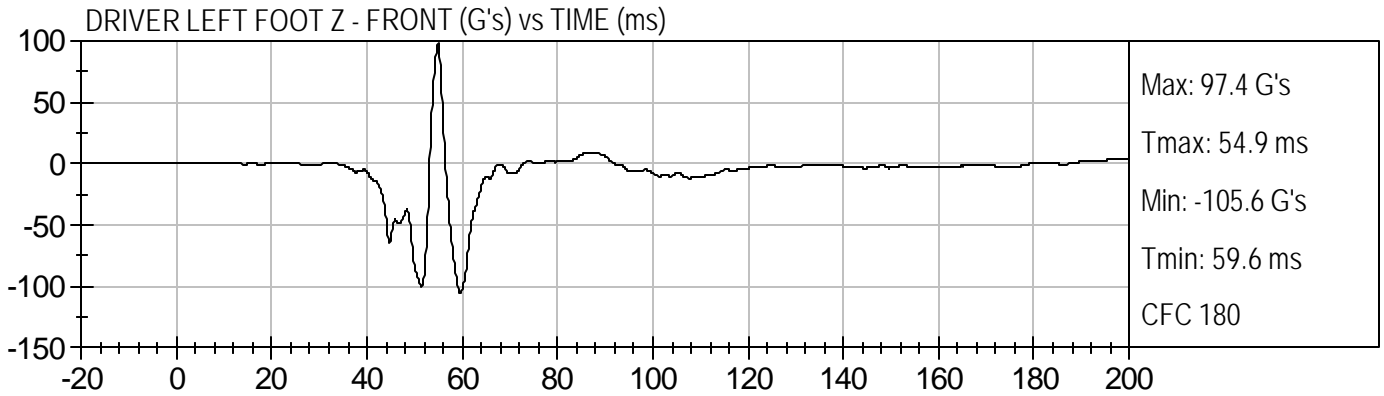


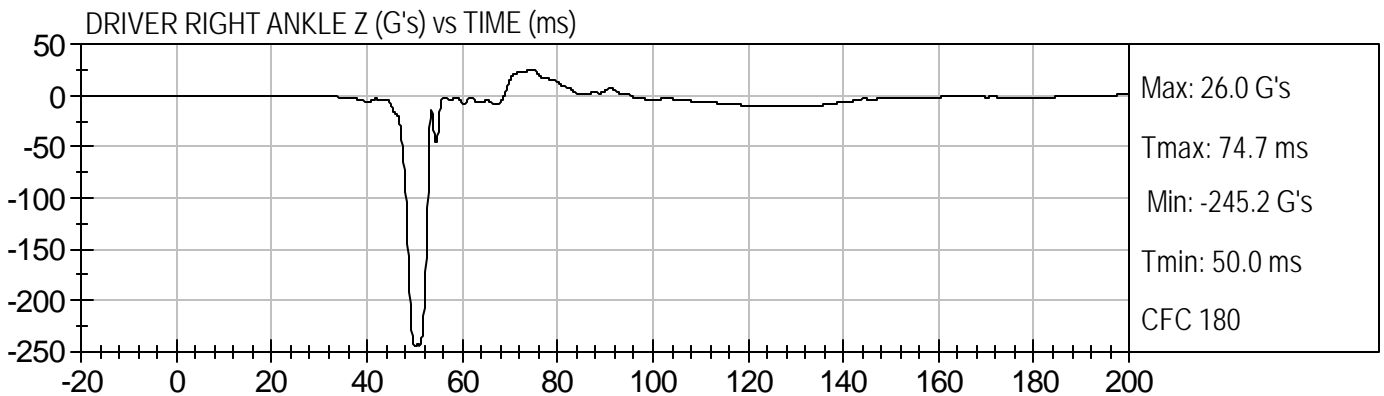
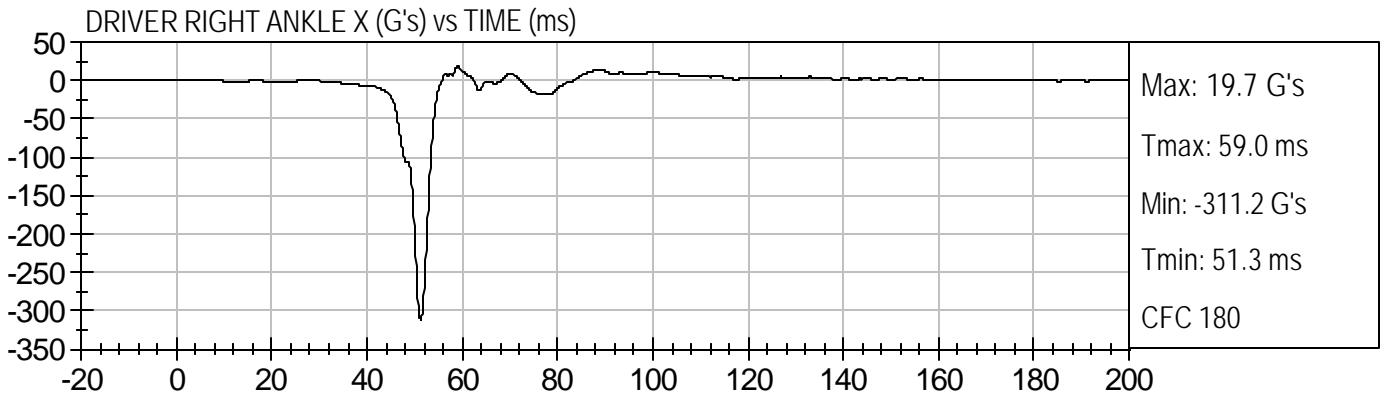
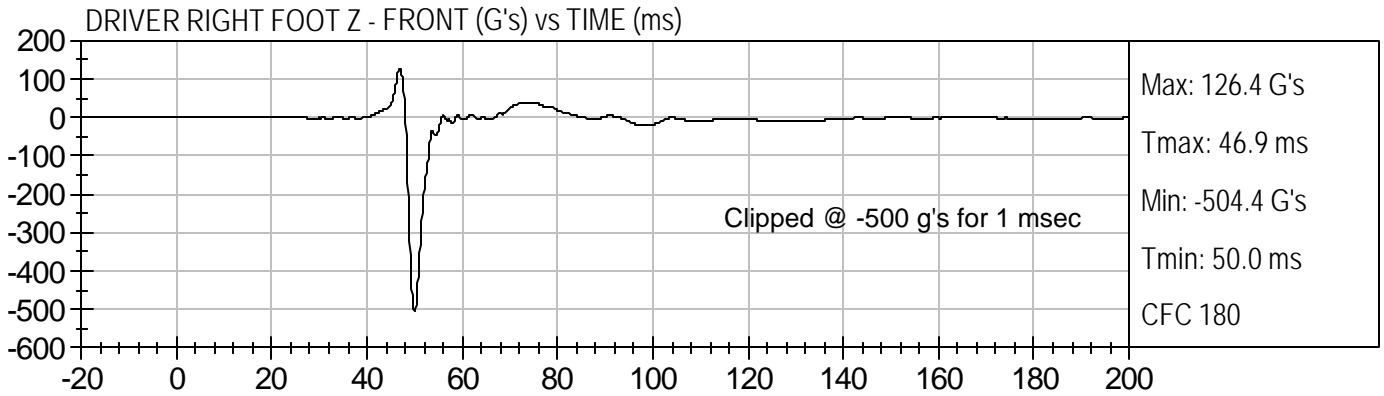


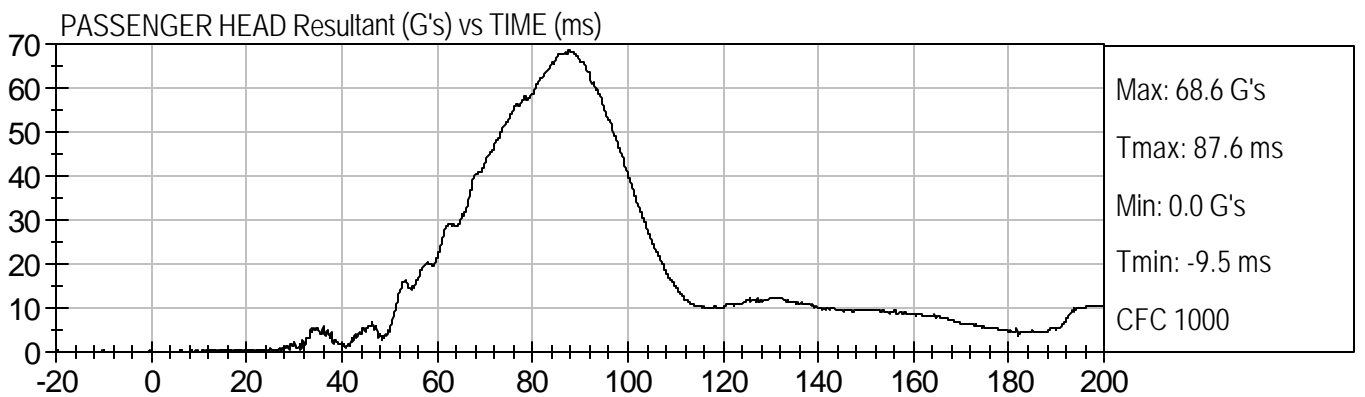
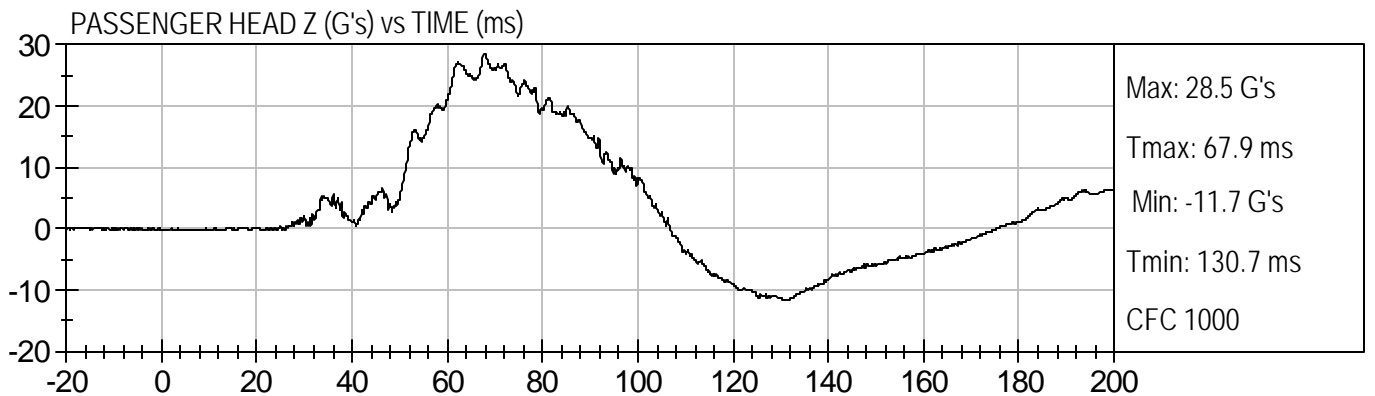
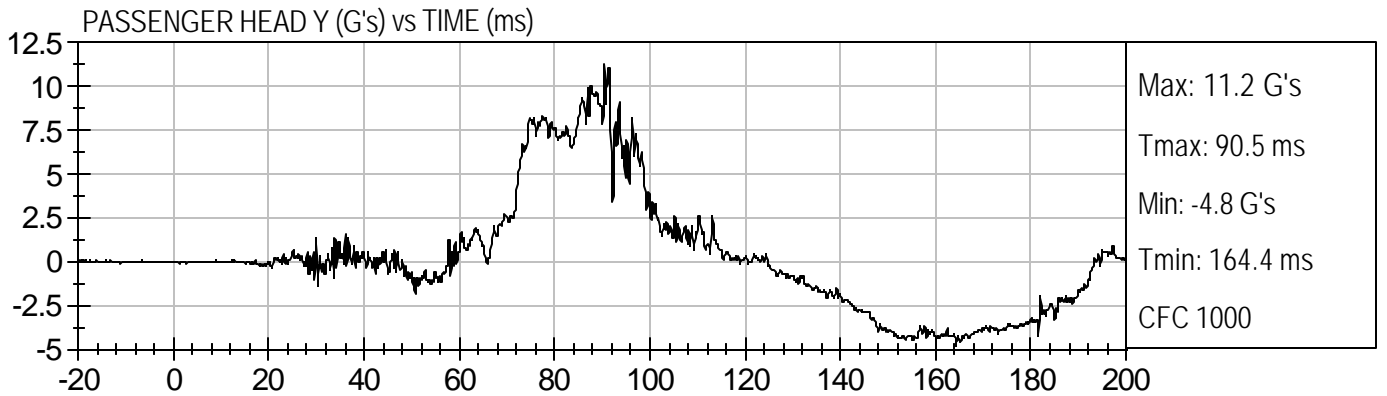
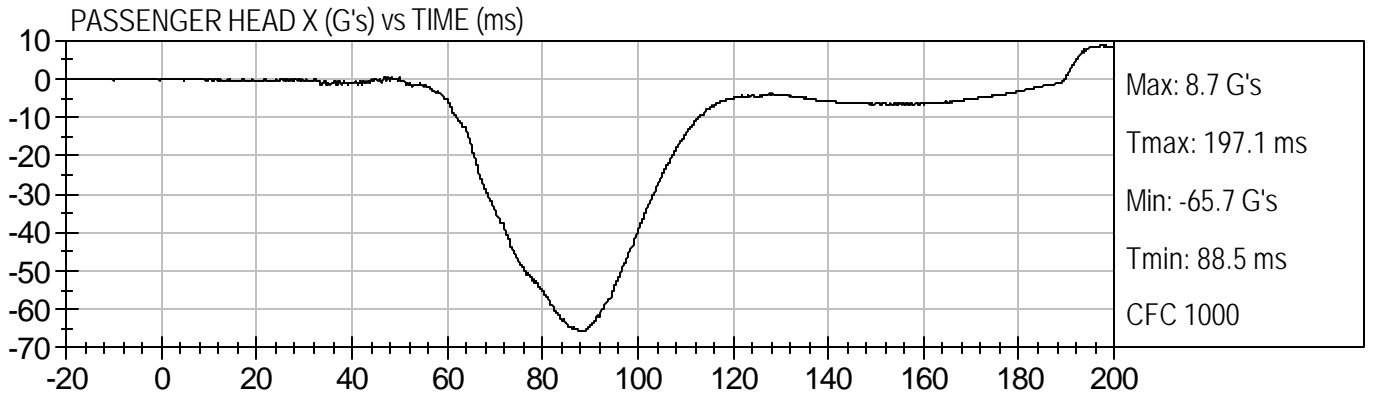
35 MPH FRONTAL IMPACT
2003 CHEVROLET AVALANCHE (M30100)

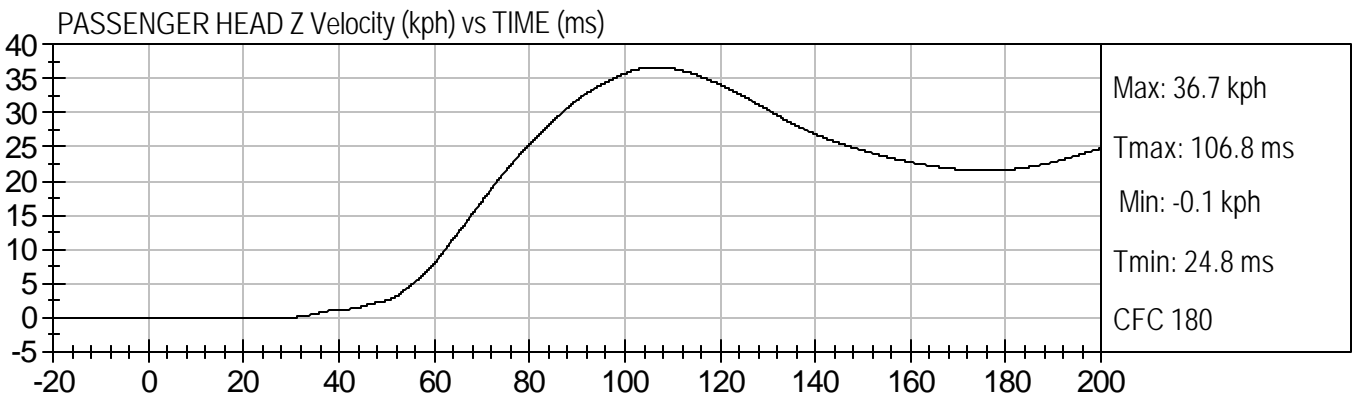
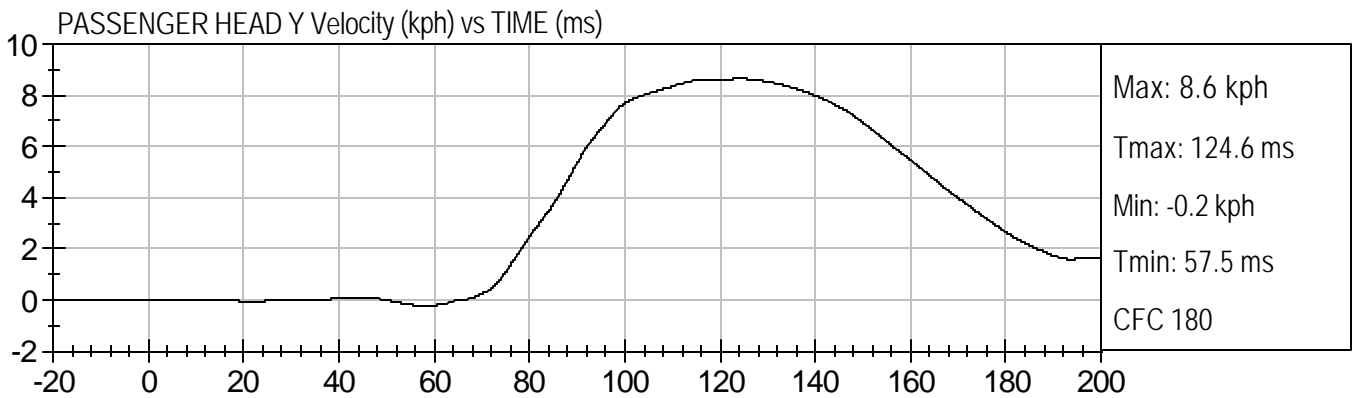
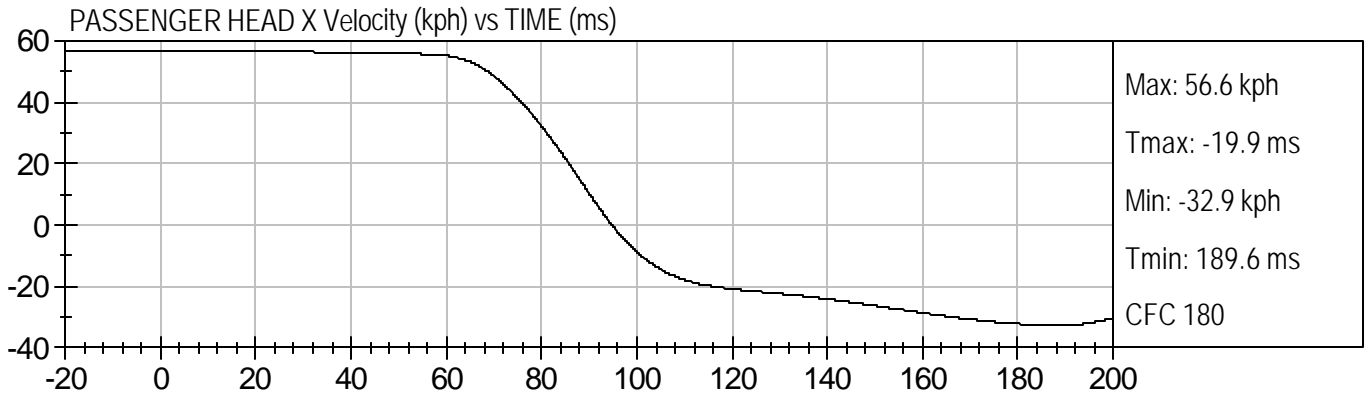
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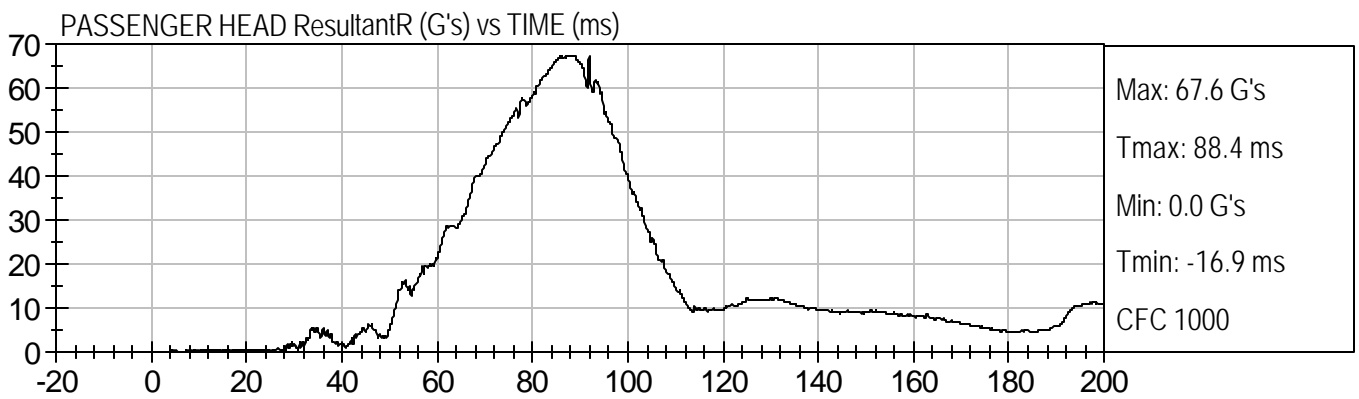
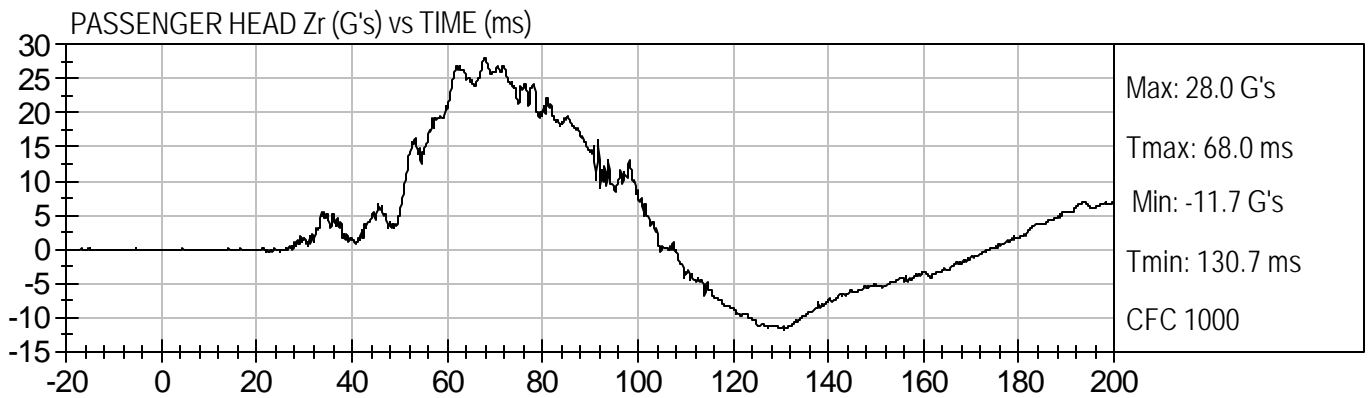
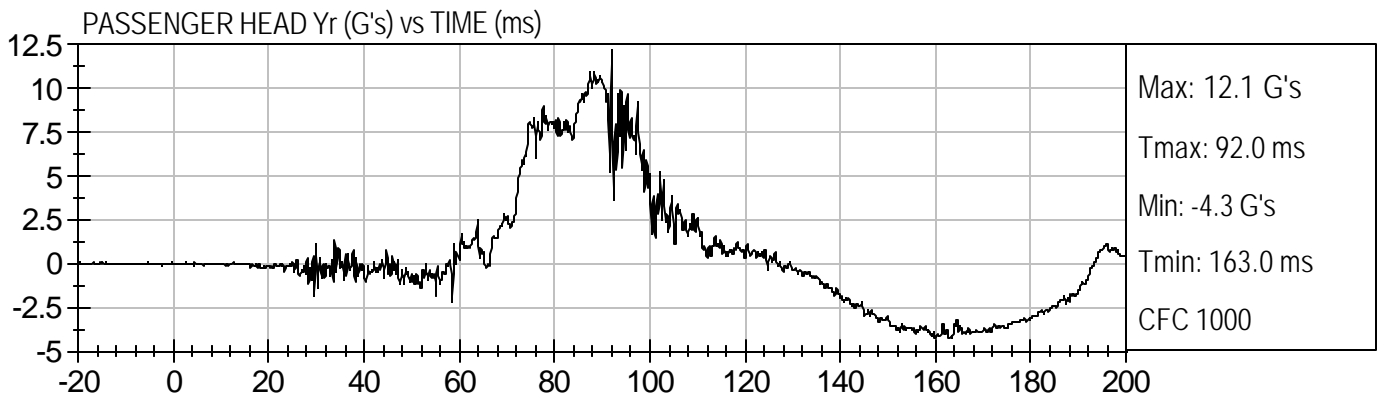
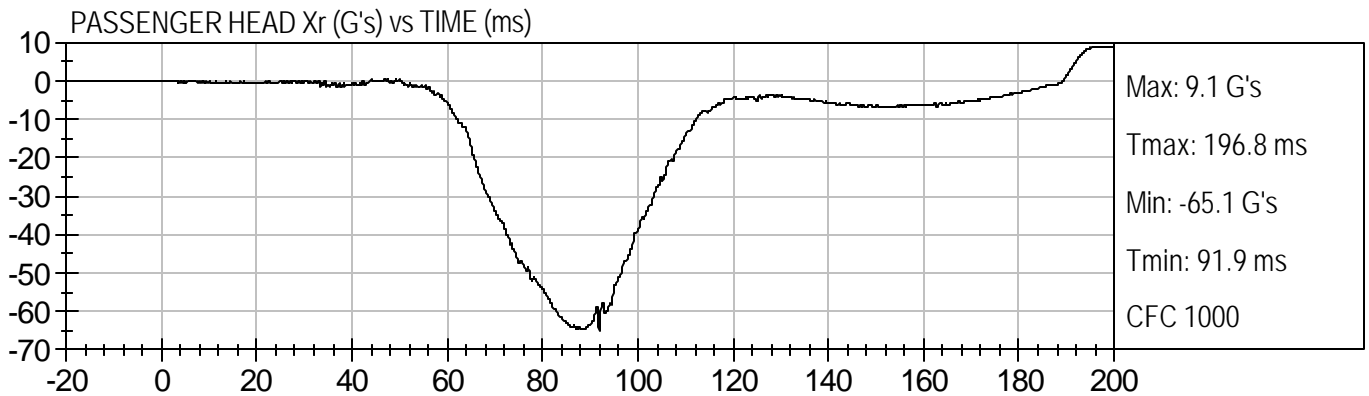


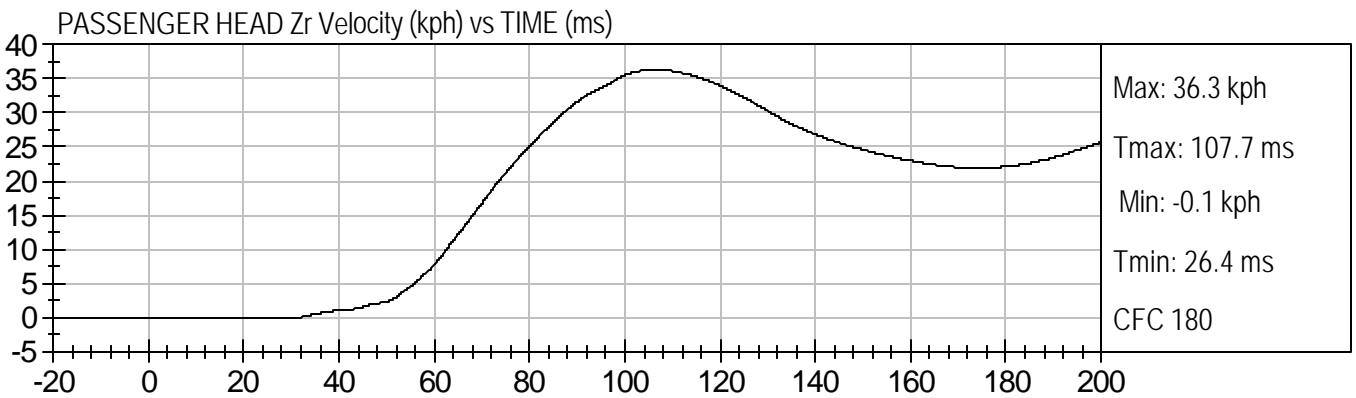
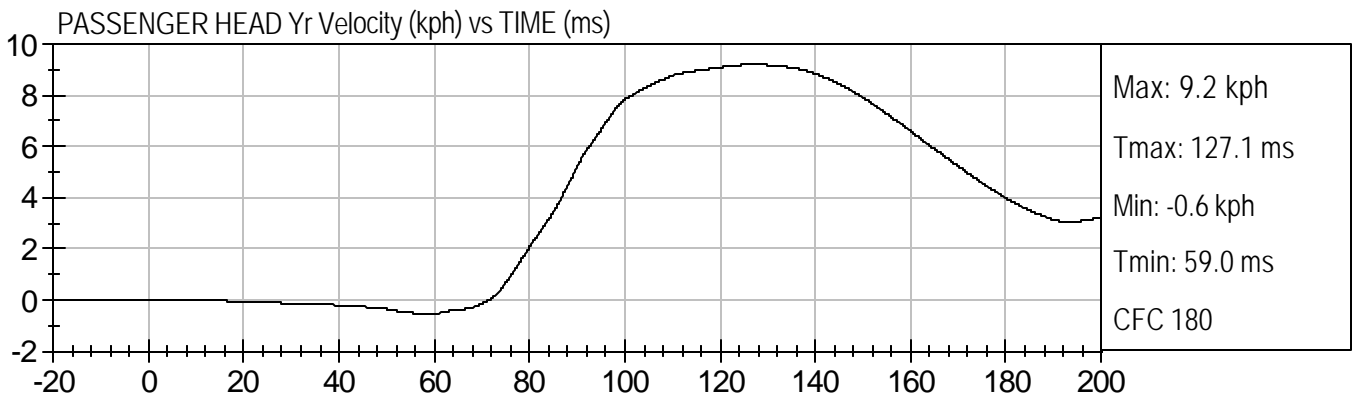
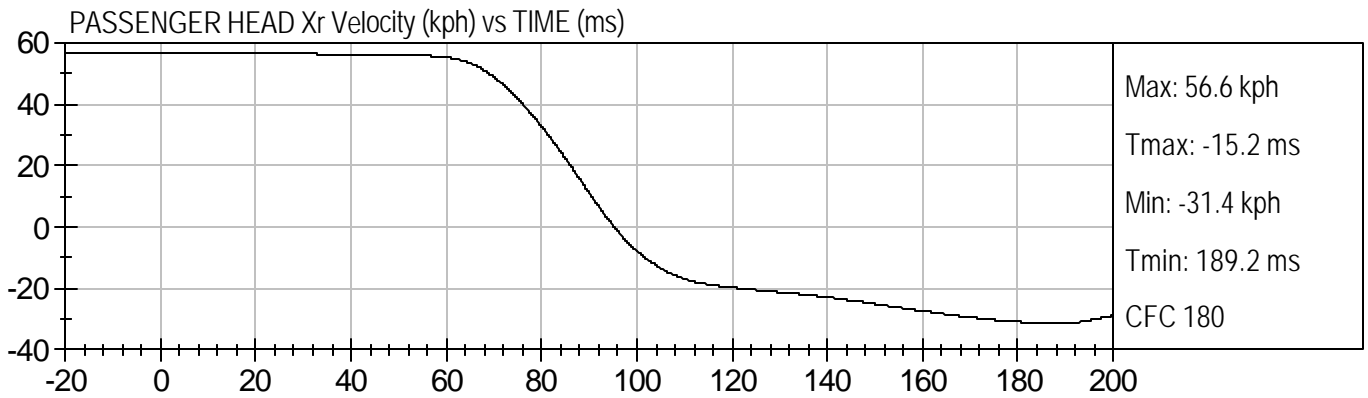








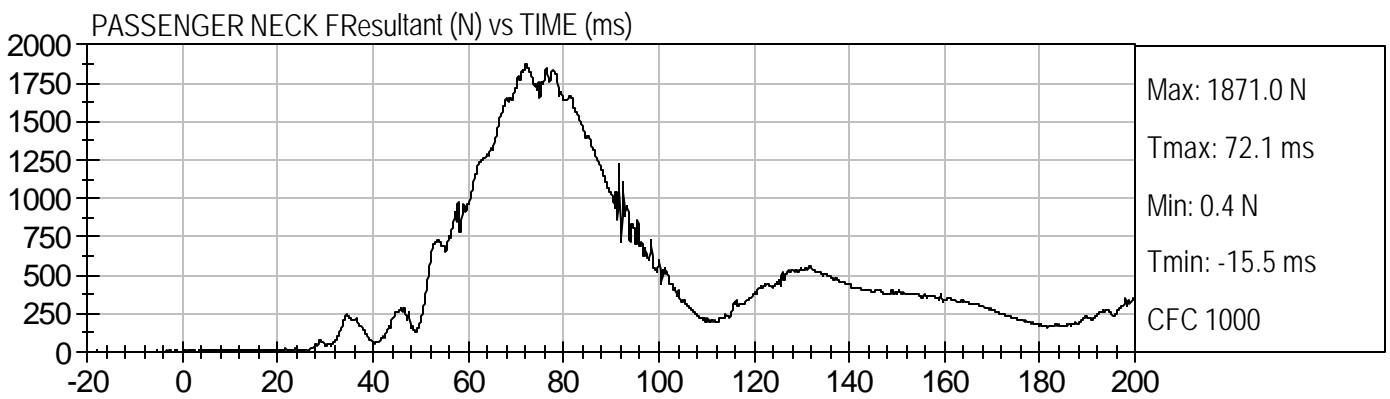
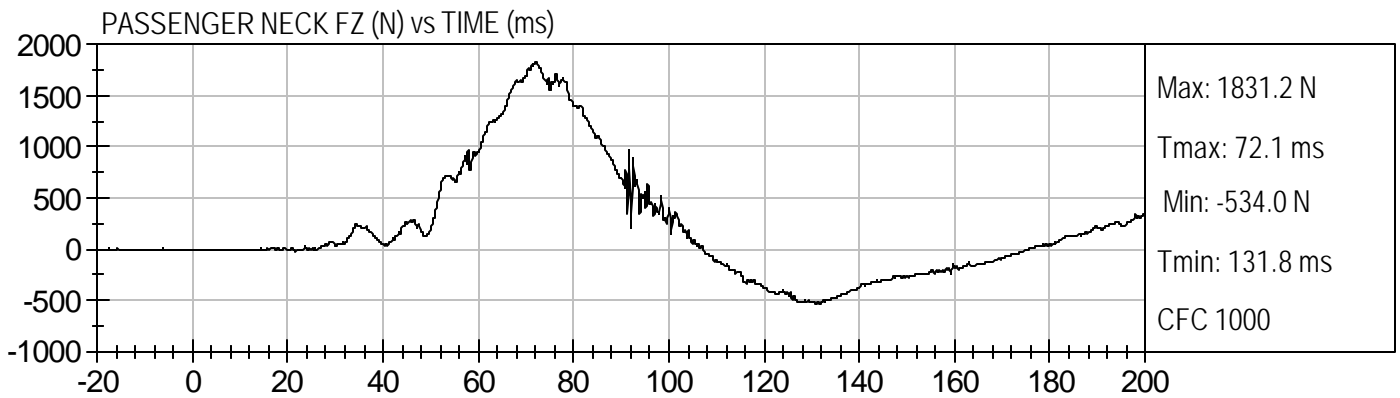
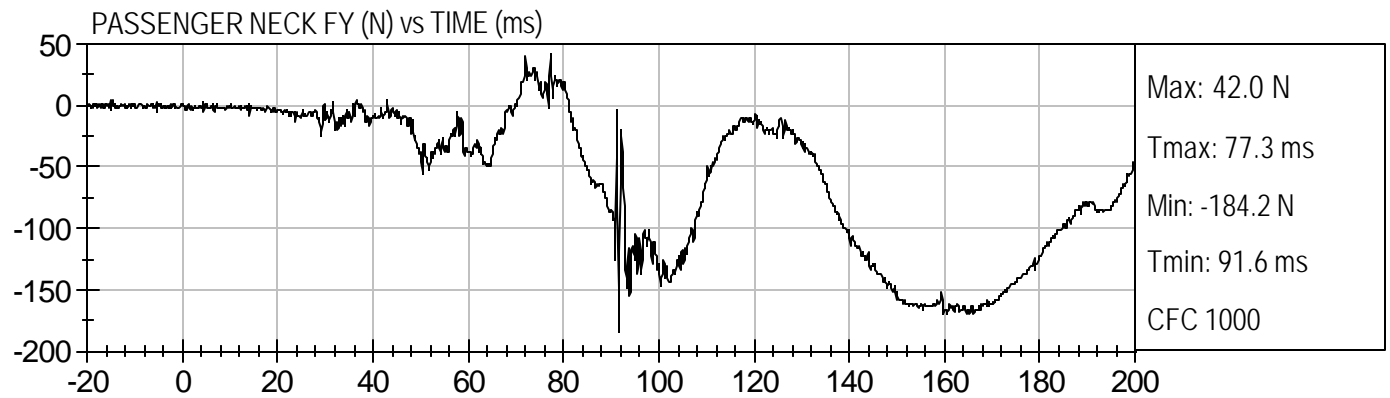
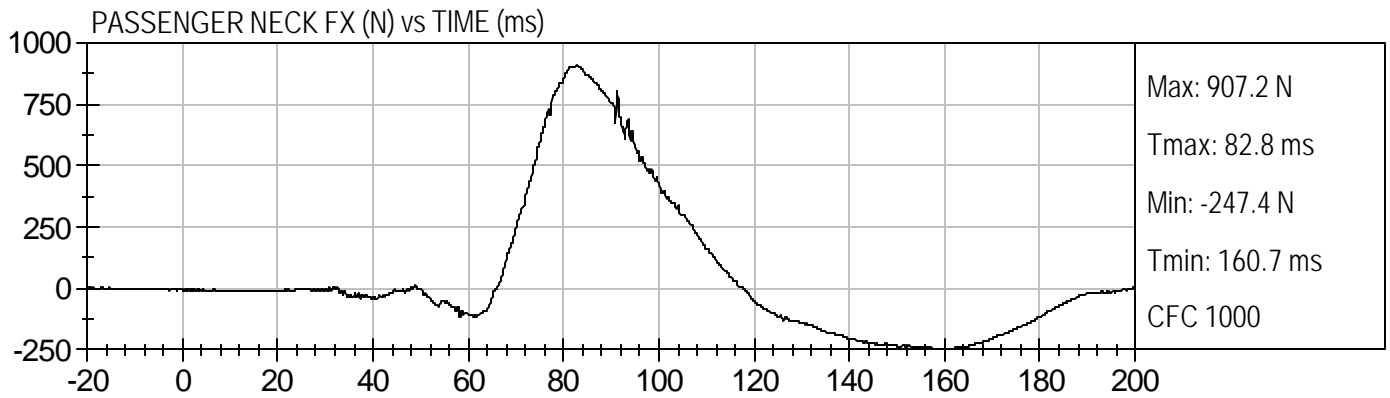






35 MPH FRONTAL IMPACT
2003 CHEVROLET AVALANCHE (M30100)

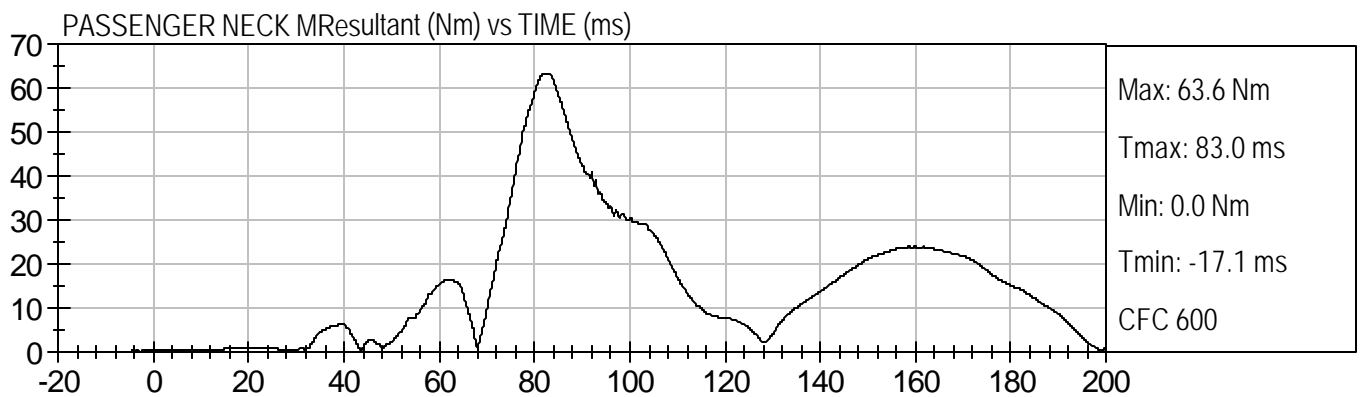
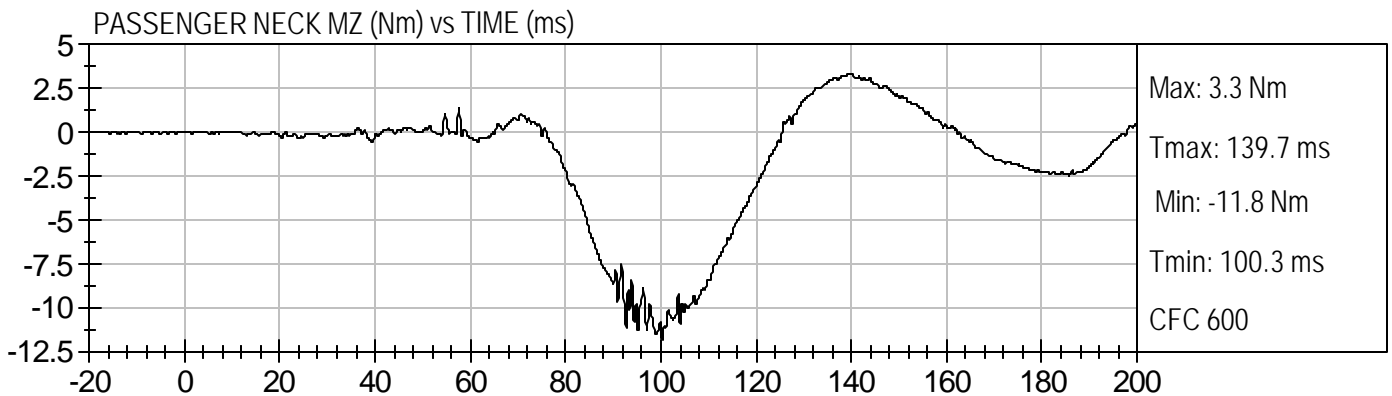
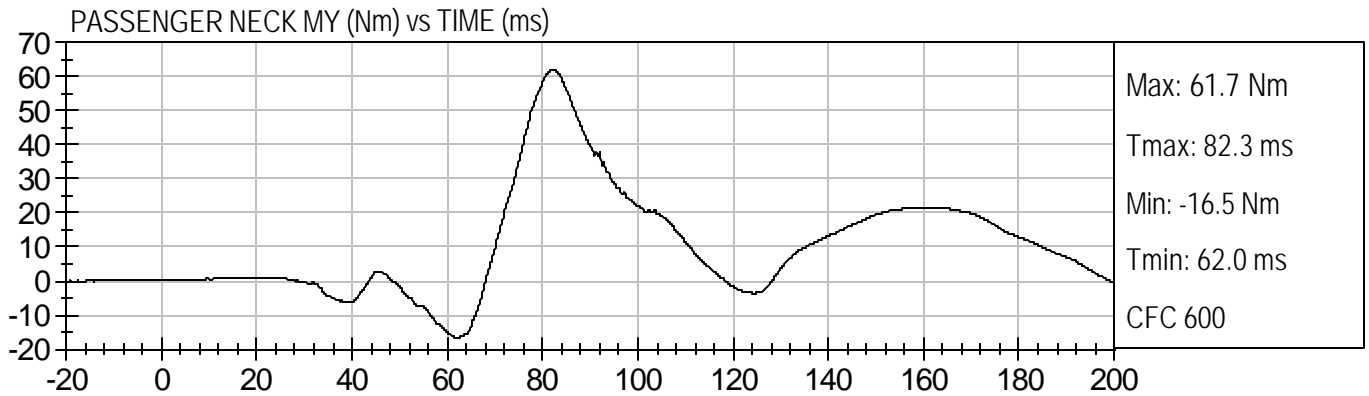
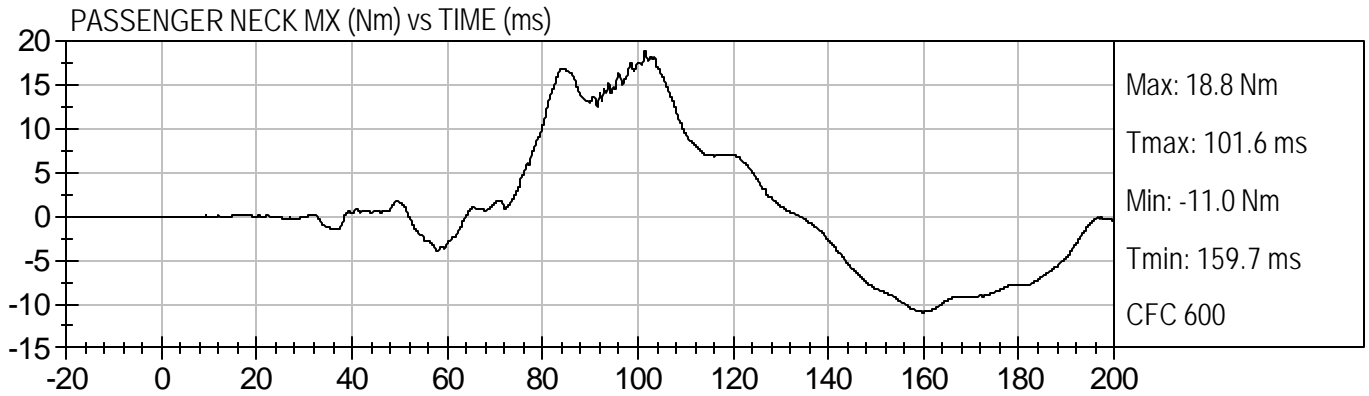
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Speed: 35.2 mph (56.6 km/h)

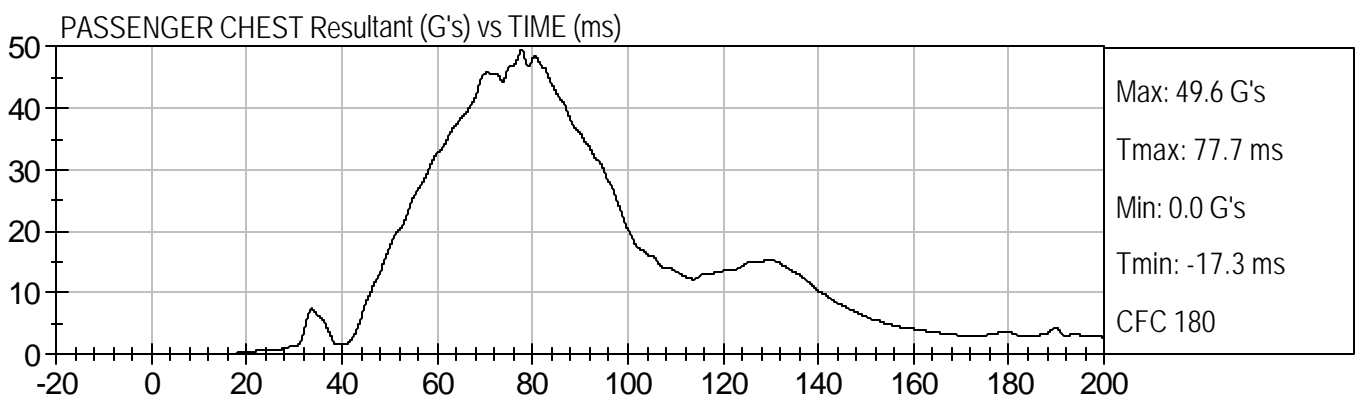
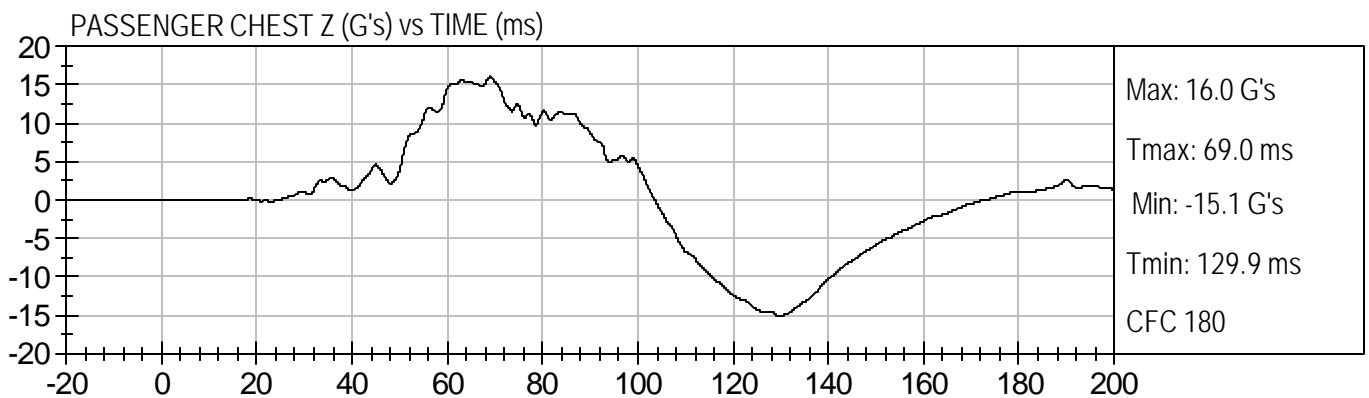
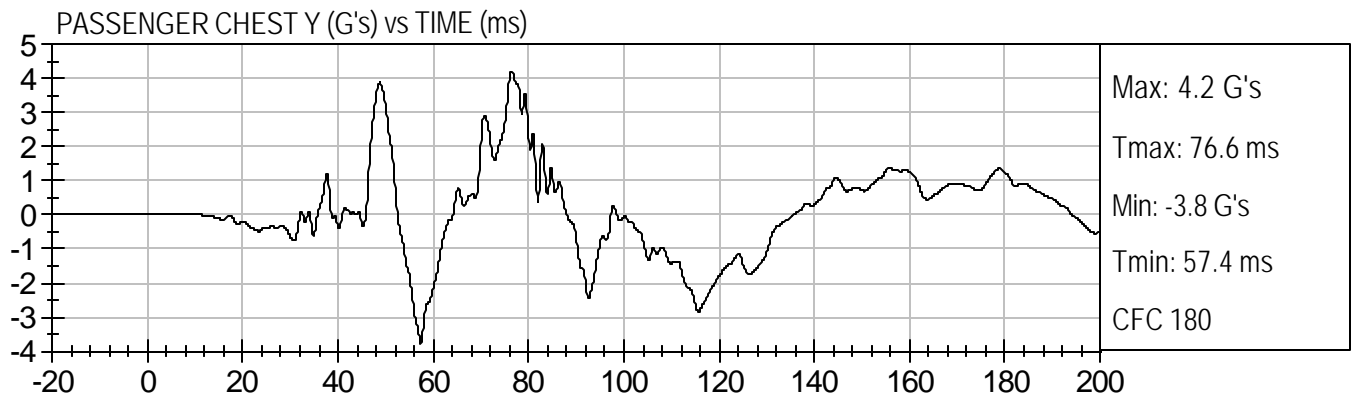
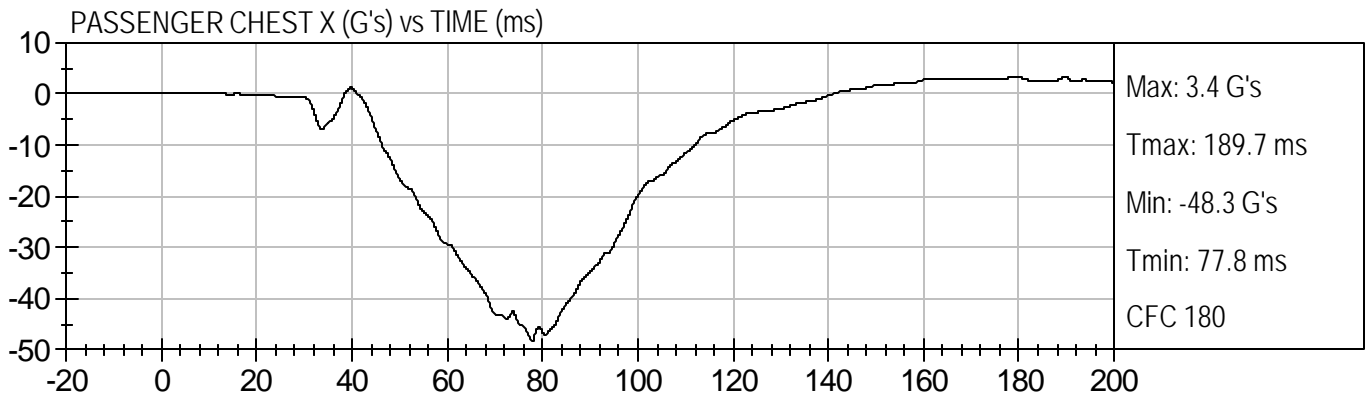


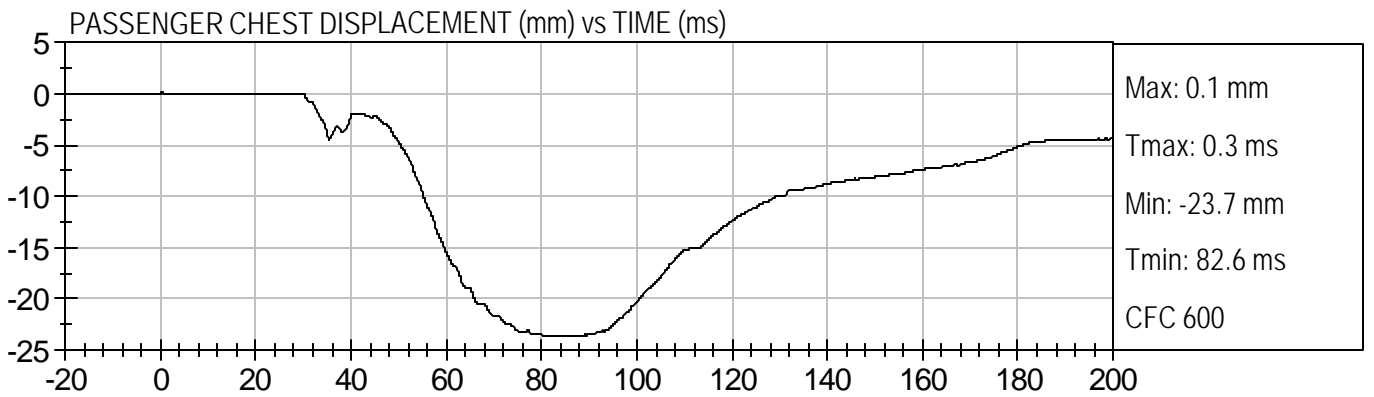
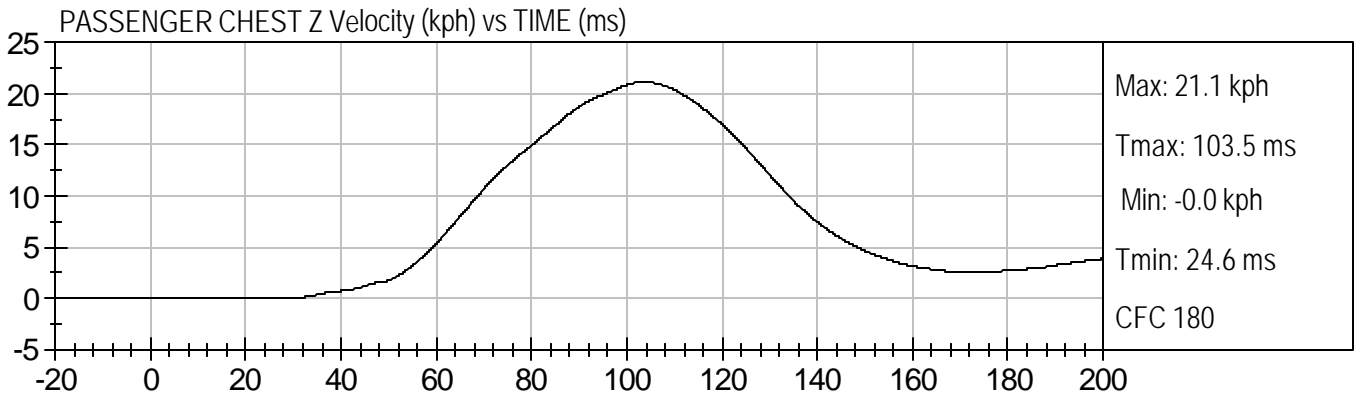
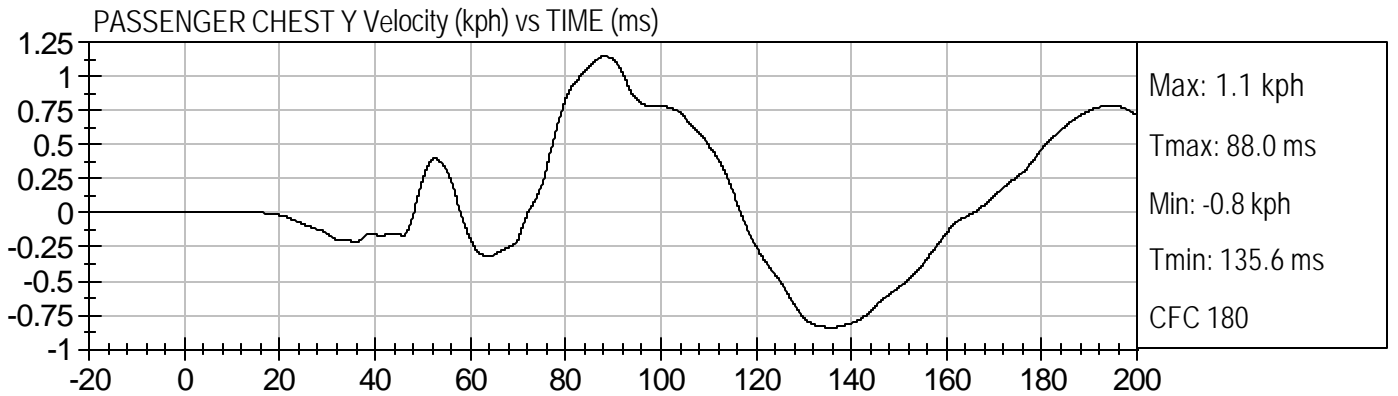
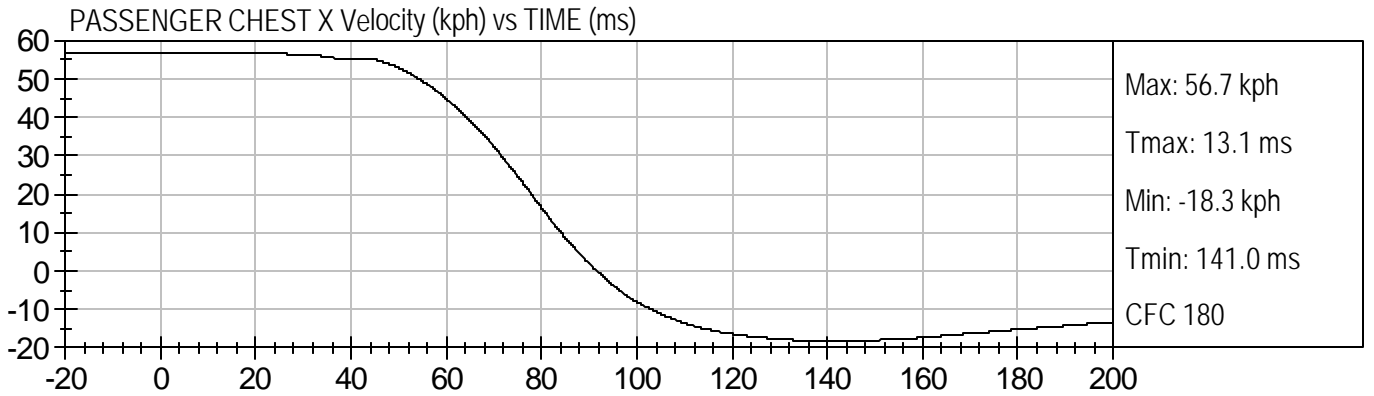


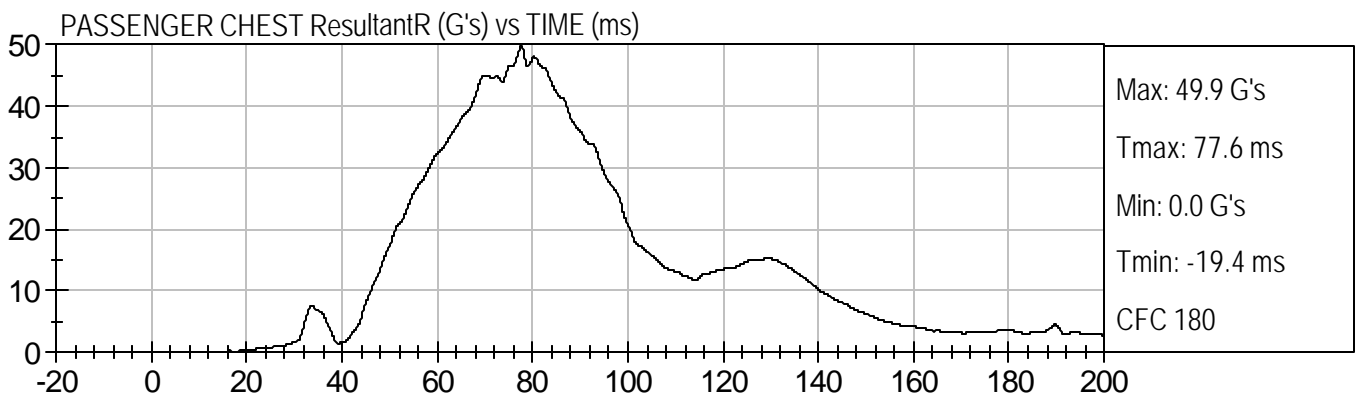
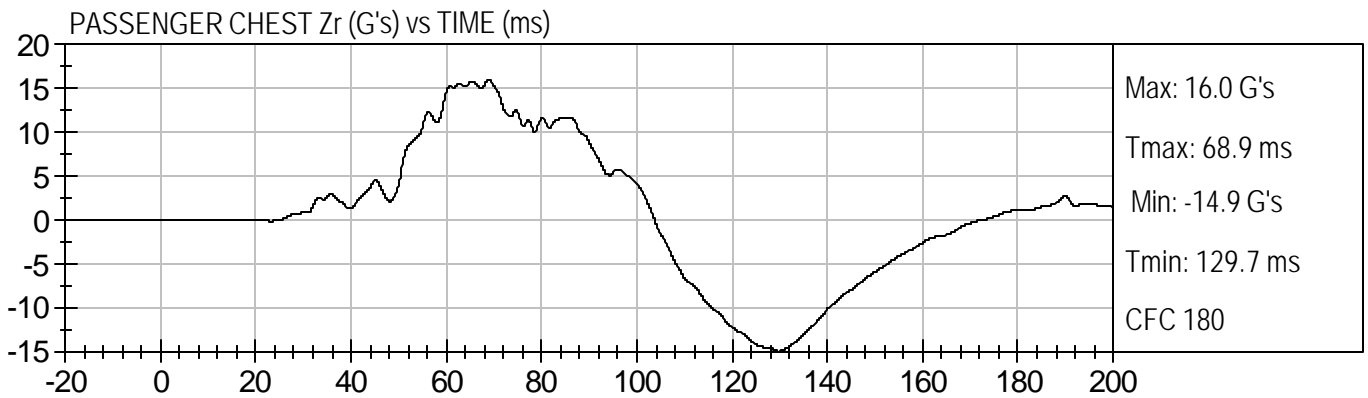
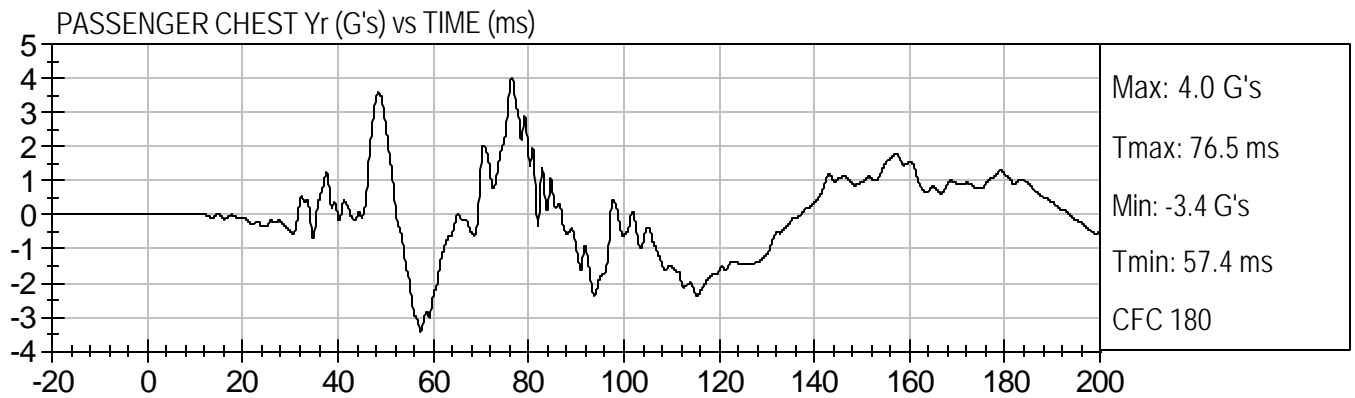
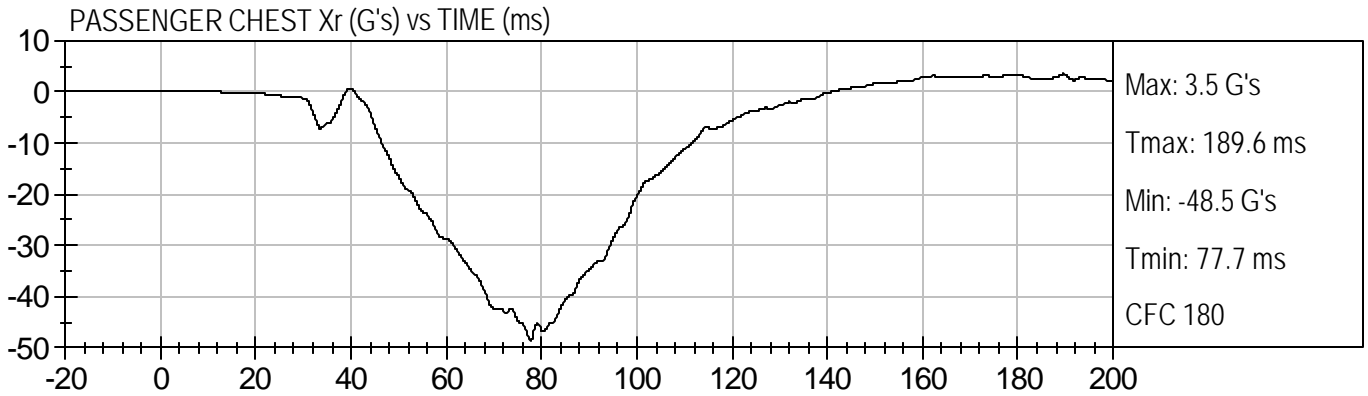
35 MPH FRONTAL IMPACT
2003 CHEVROLET AVALANCHE (M30100)

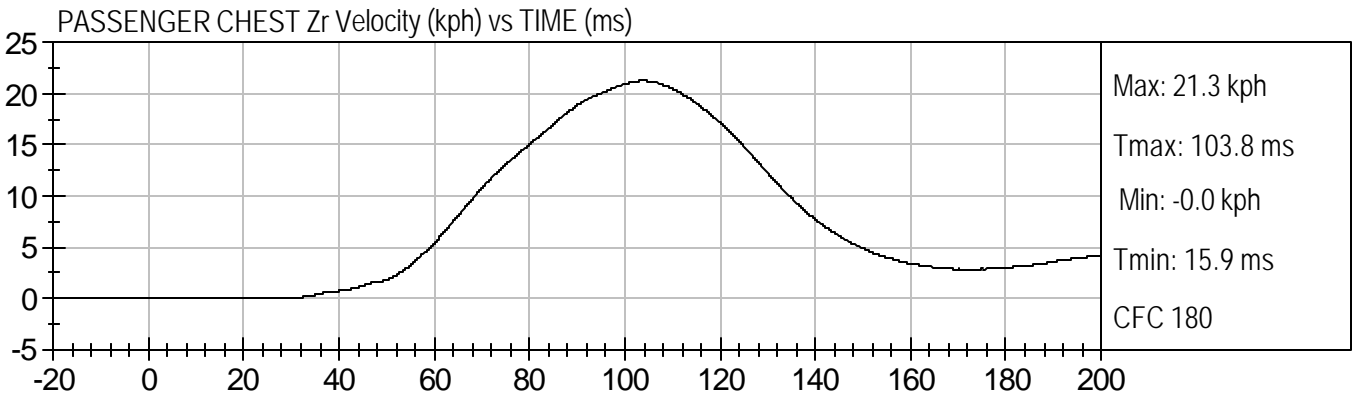
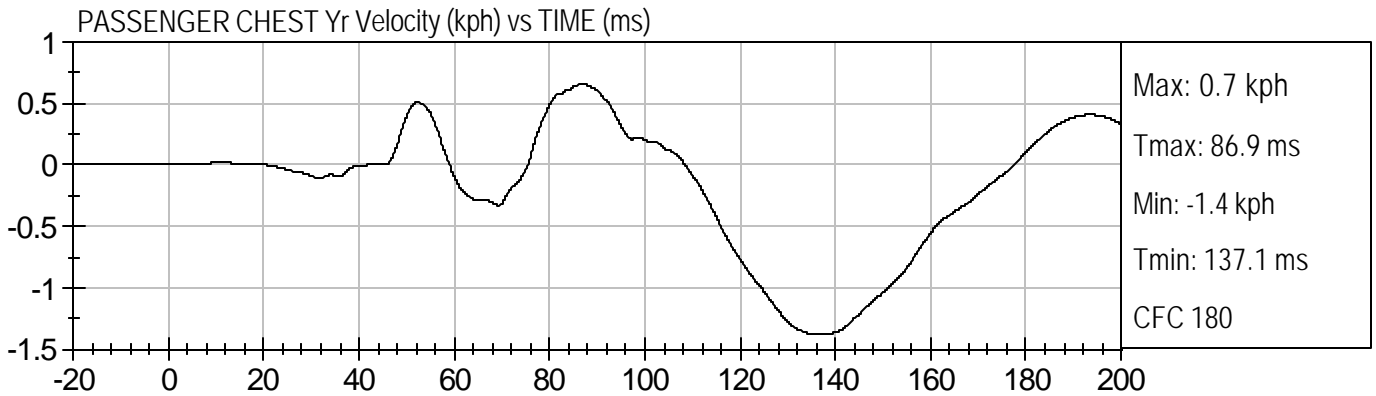
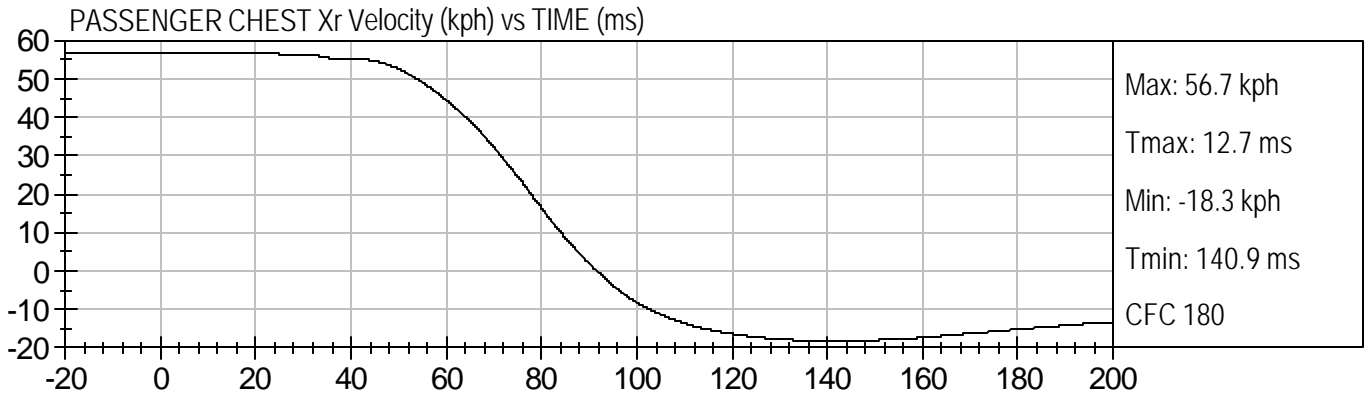
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Speed: 35.2 mph (56.6 km/h)

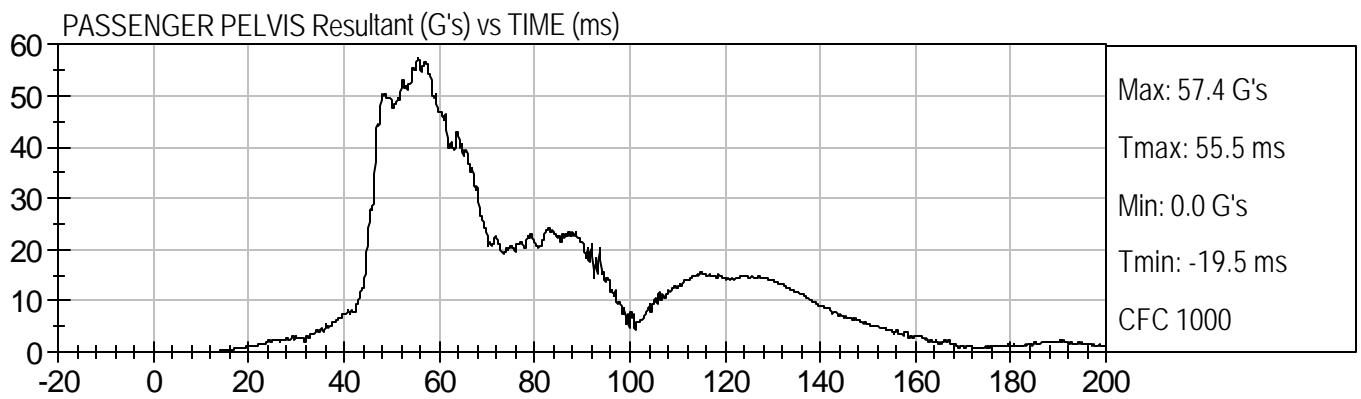
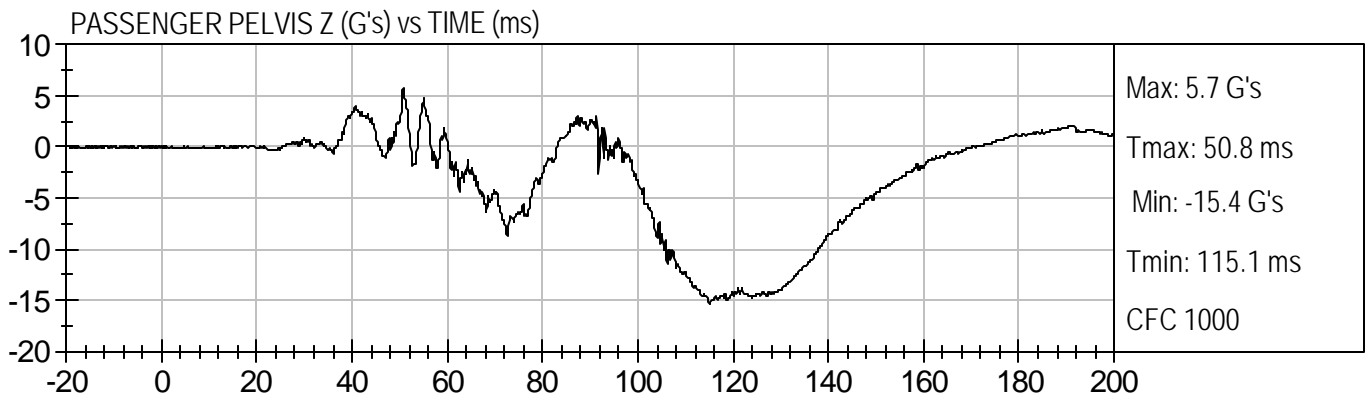
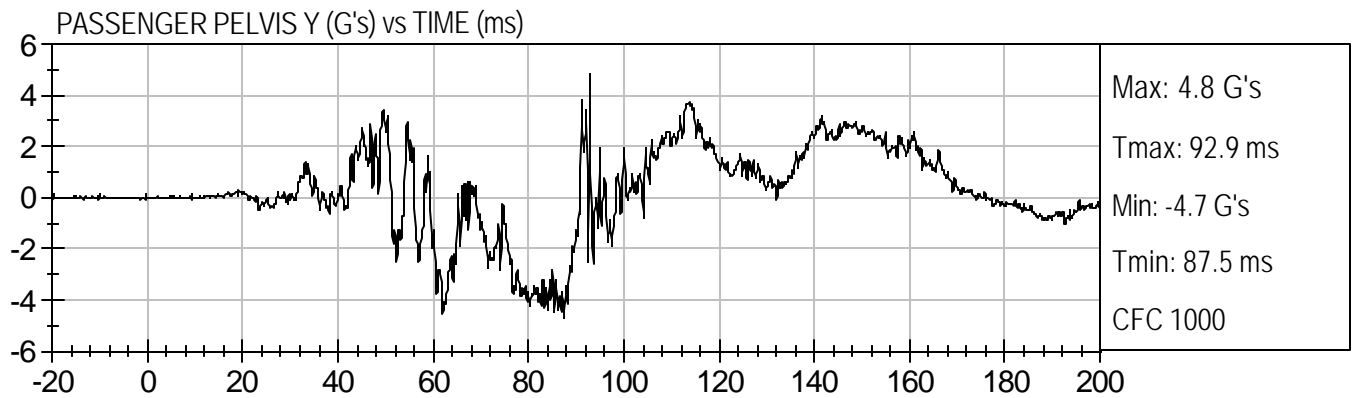
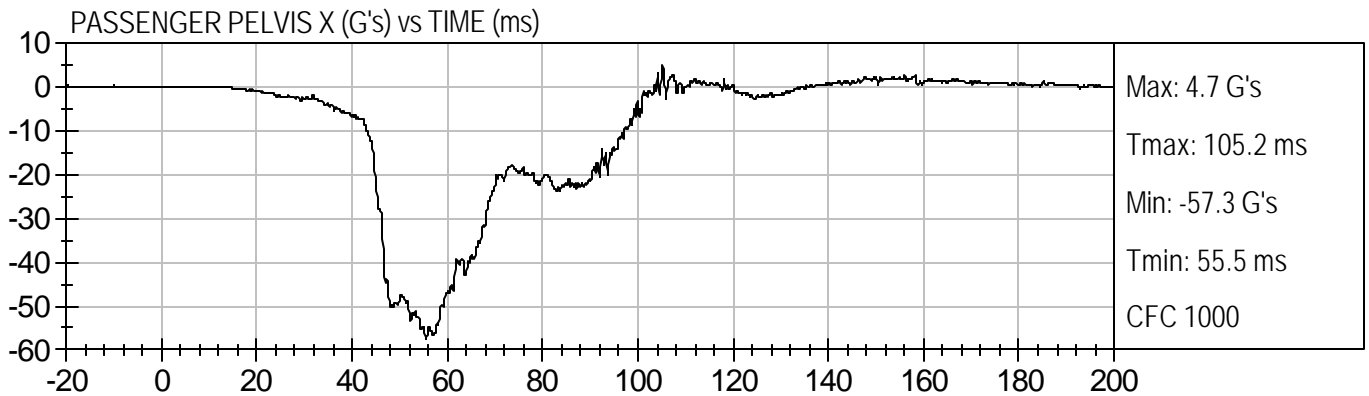


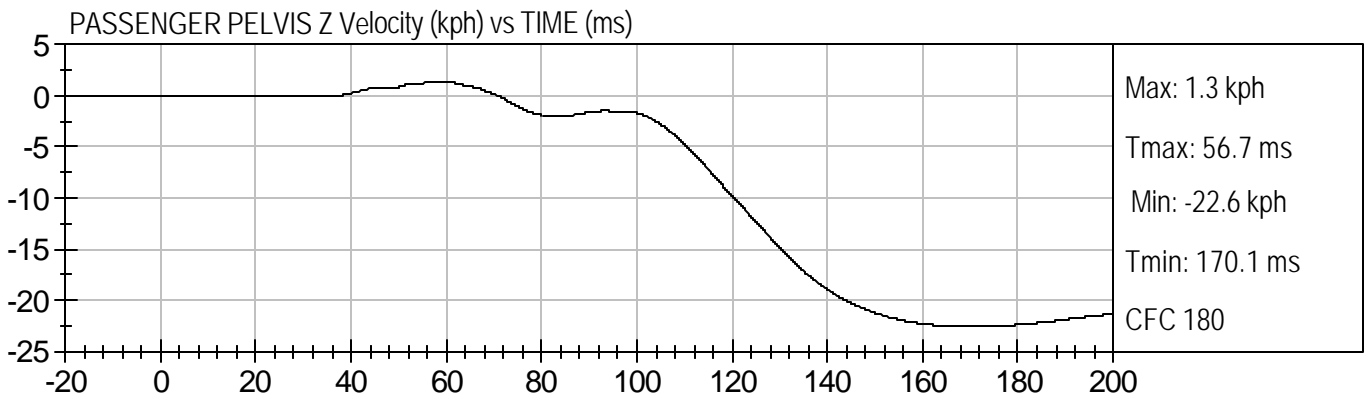
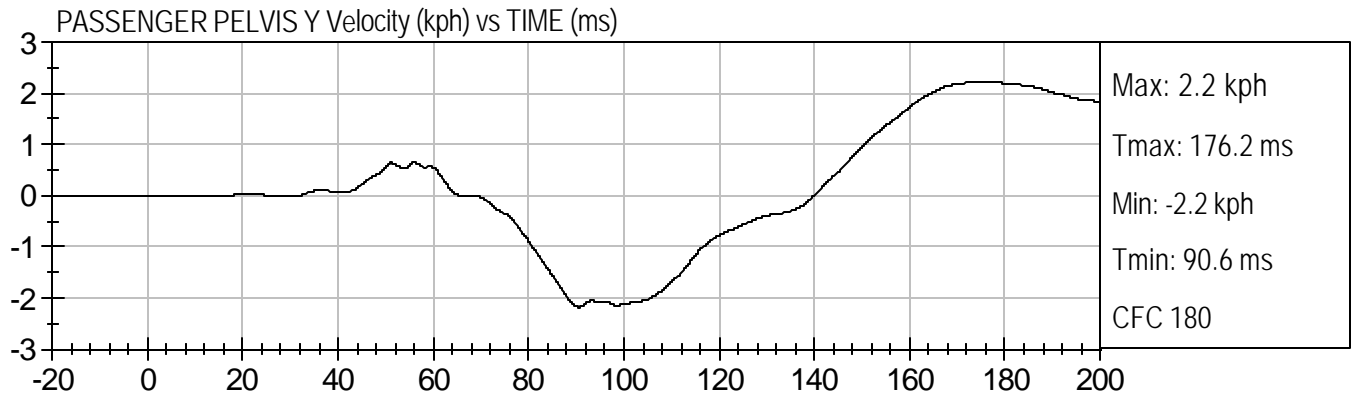
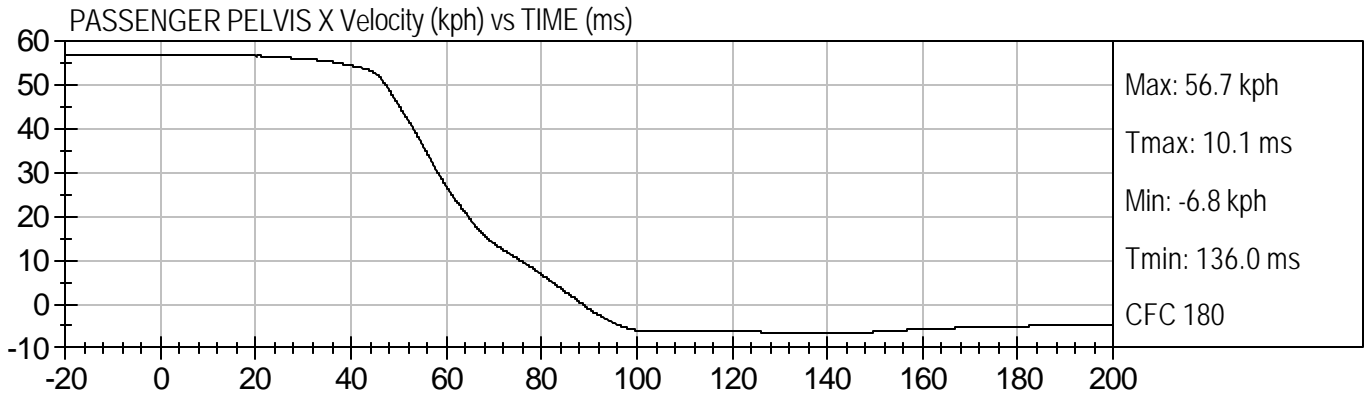


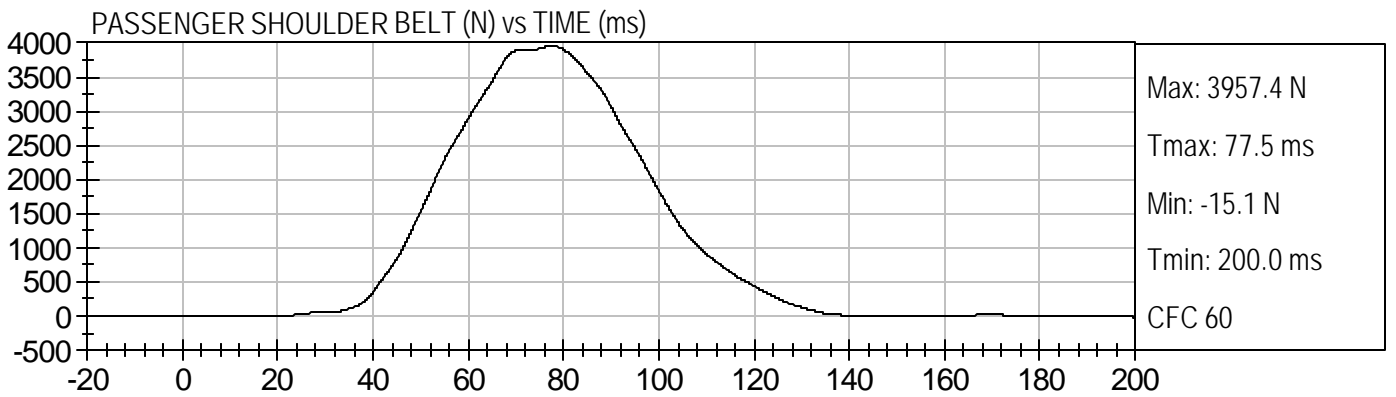
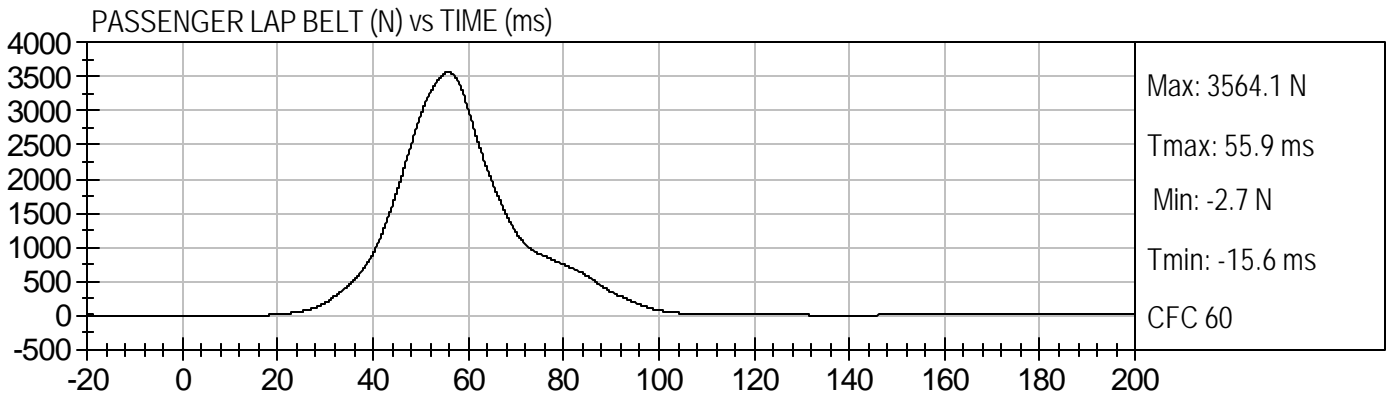
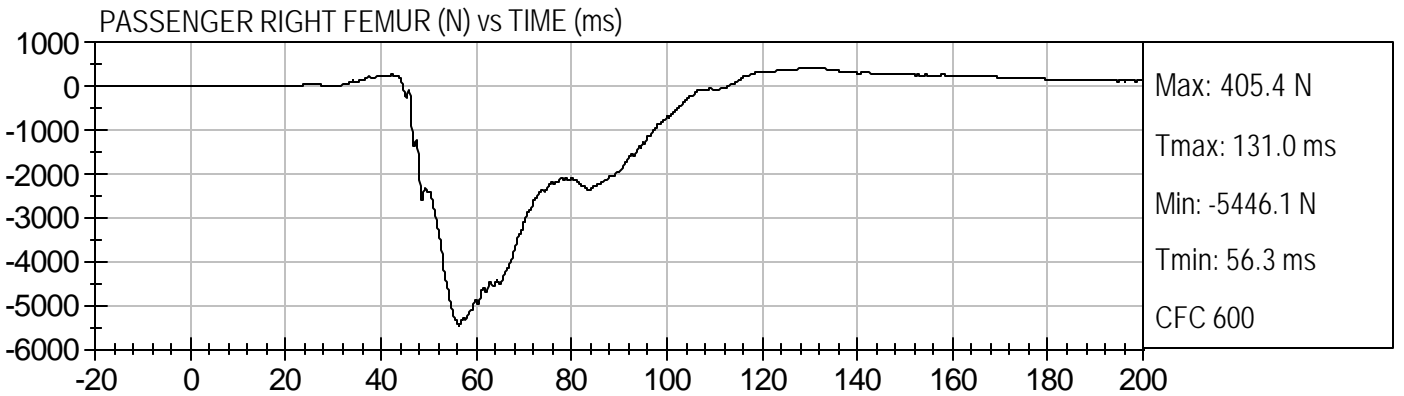
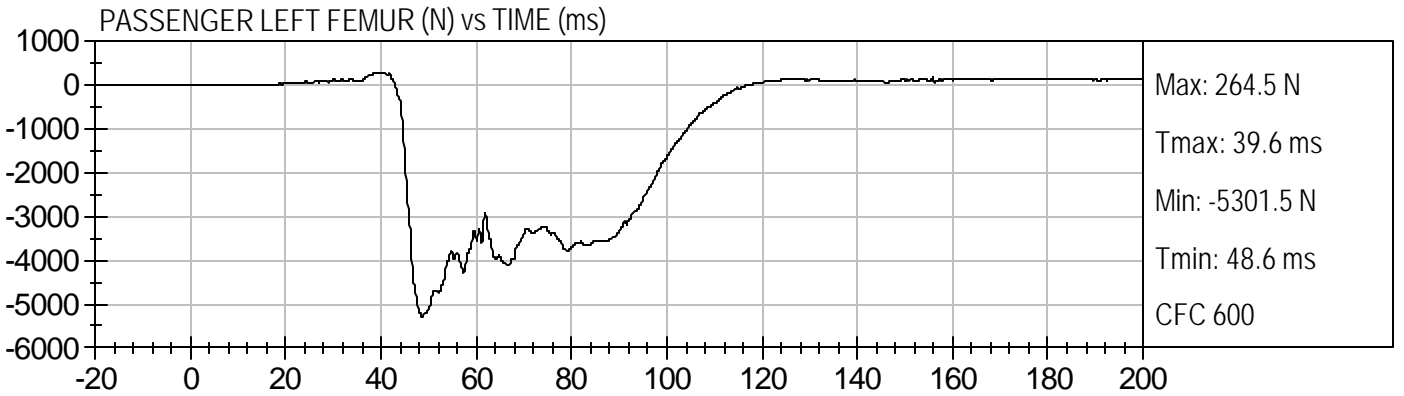


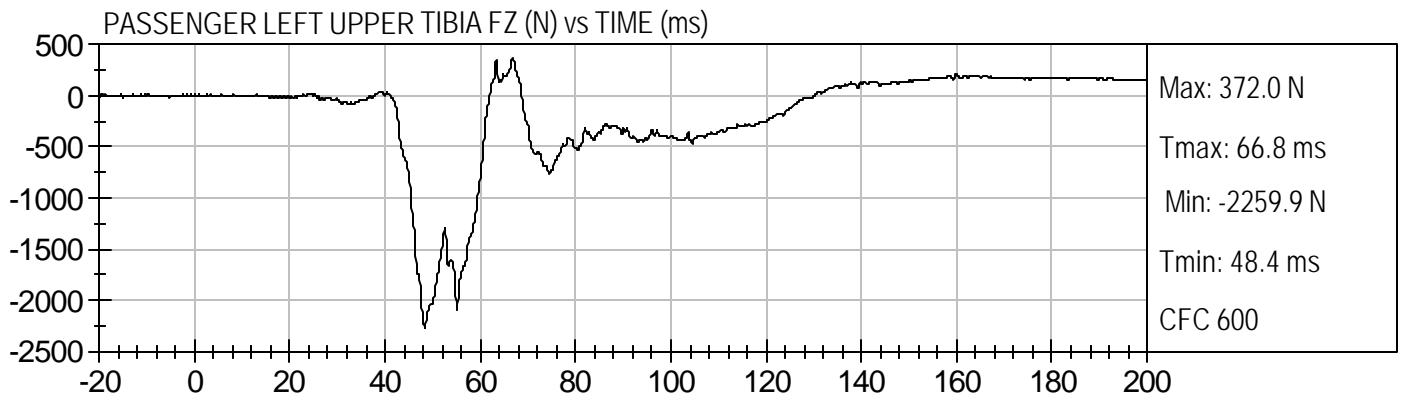
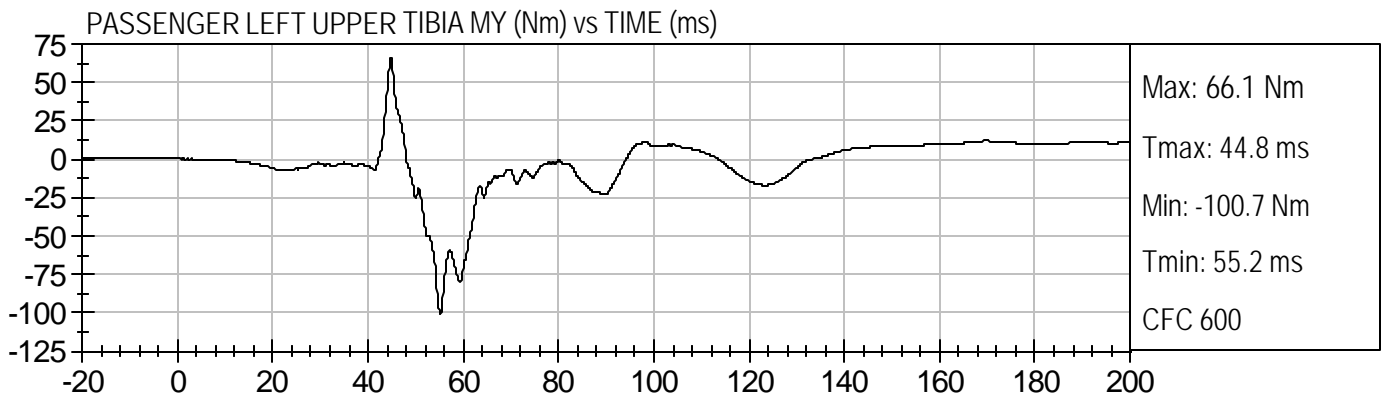
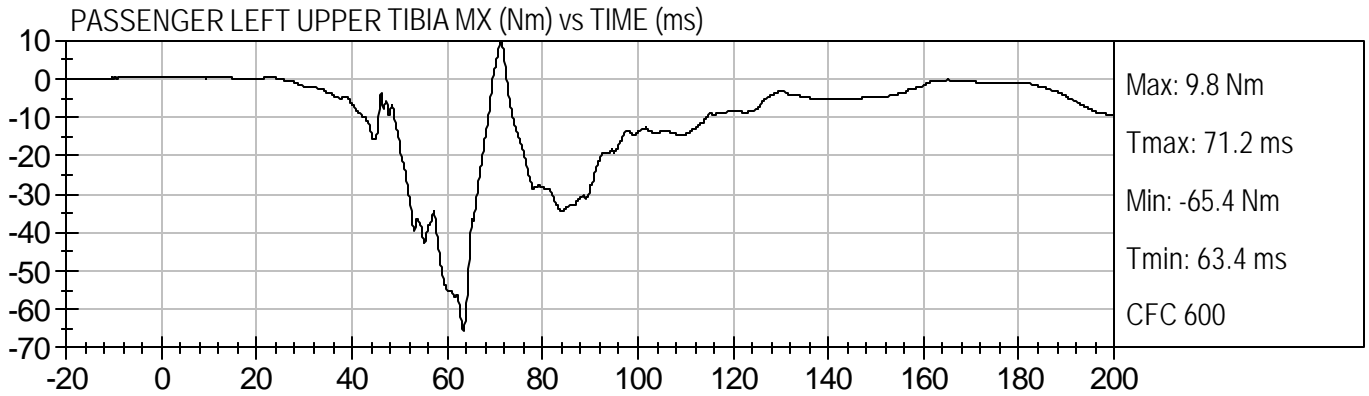






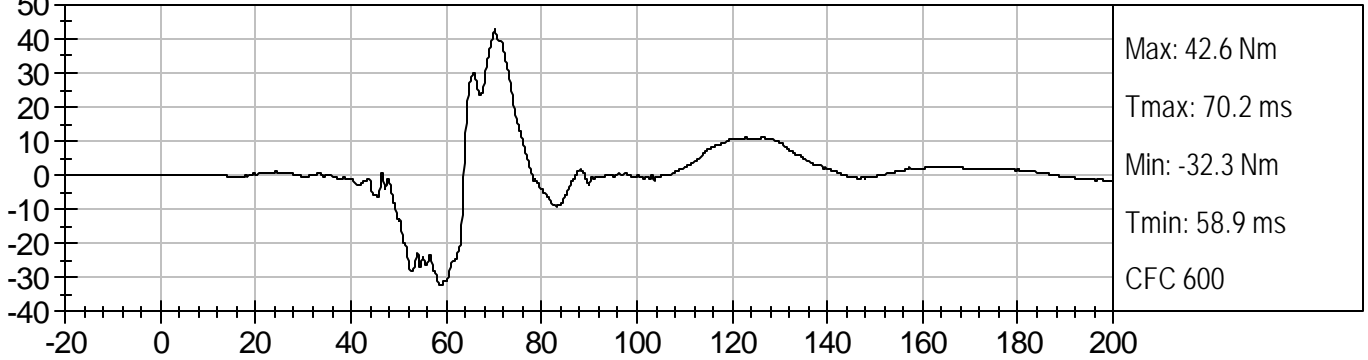




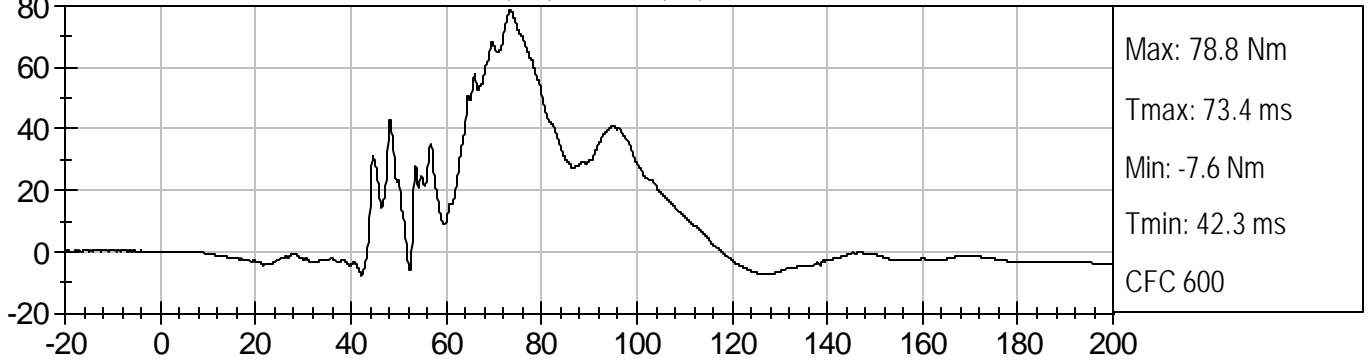




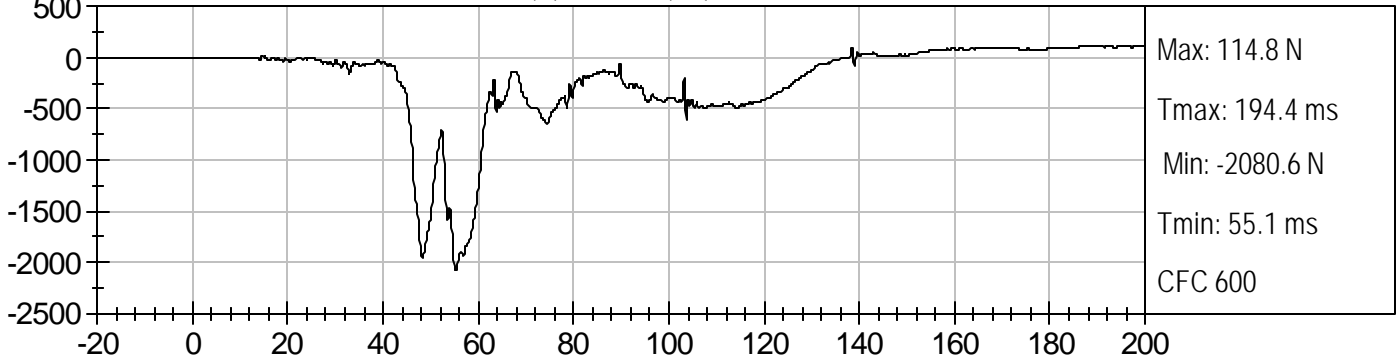
PASSENGER LEFT LOWER TIBIA MX (Nm) vs TIME (ms)

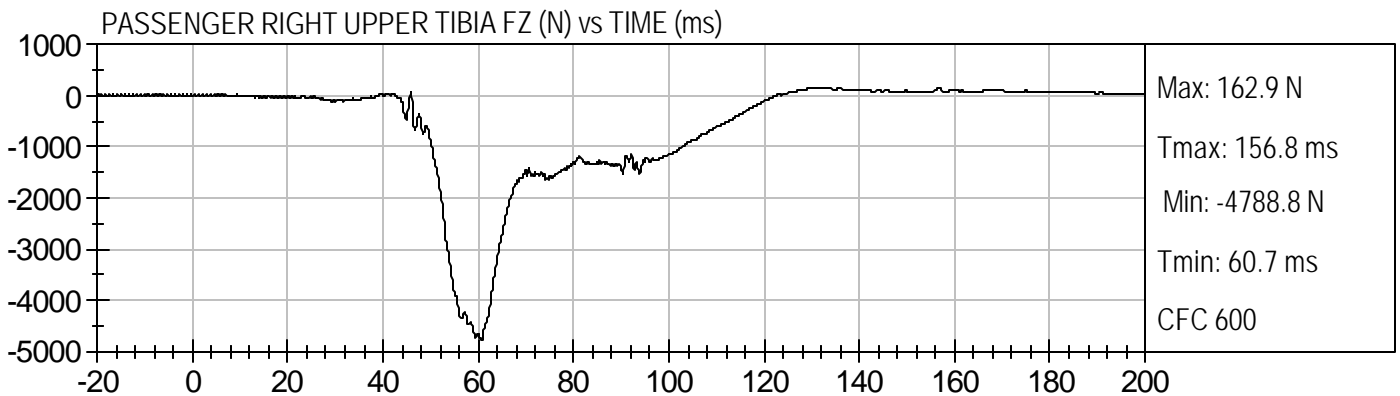
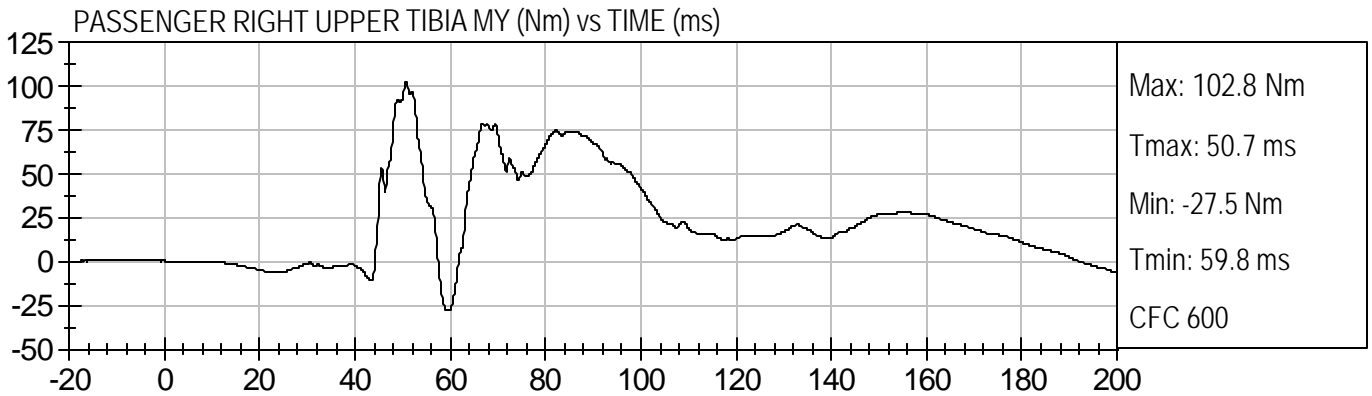
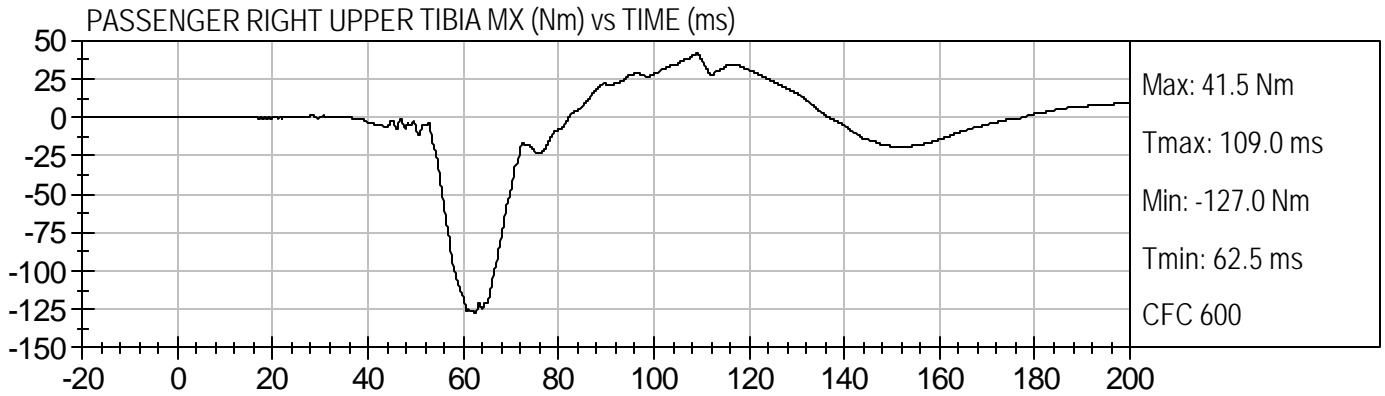


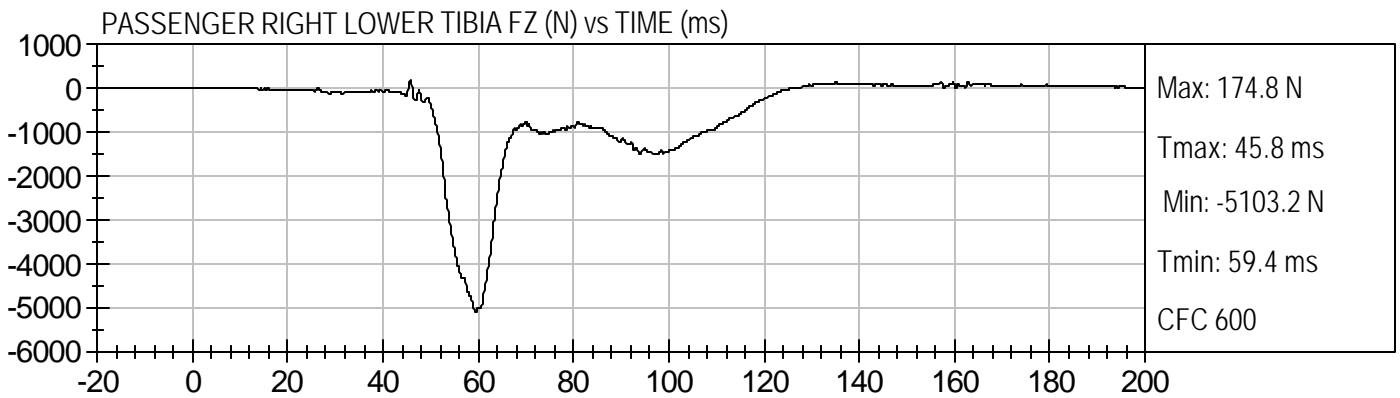
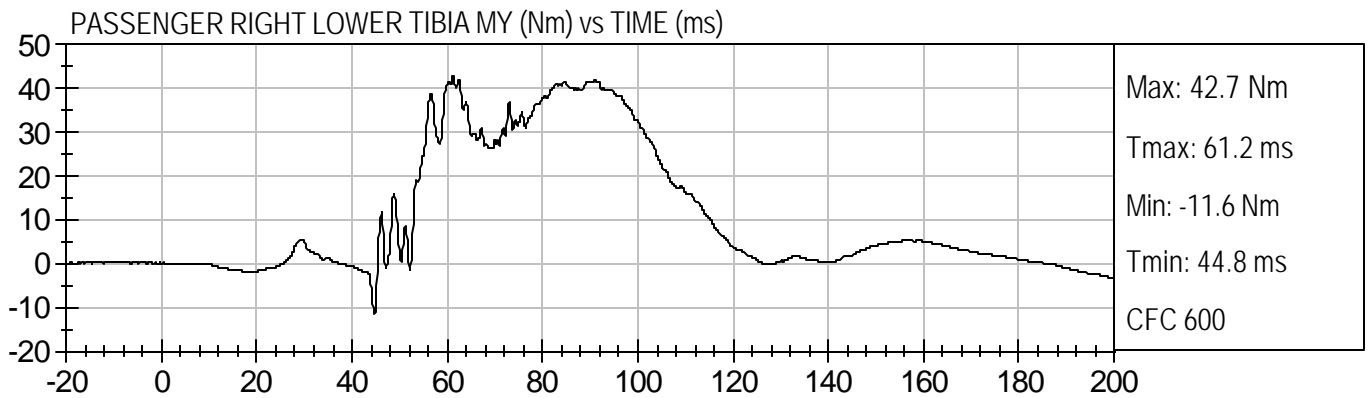
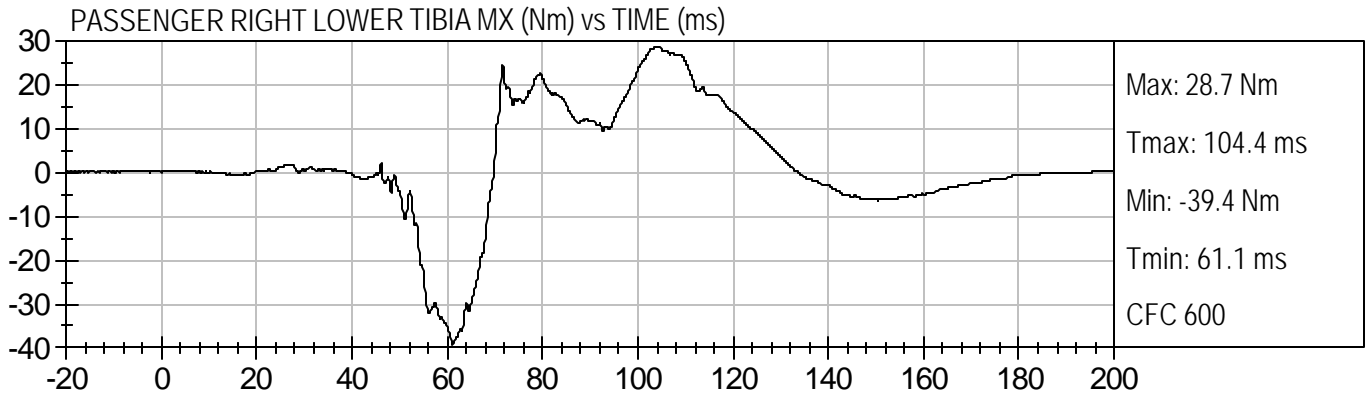
PASSENGER LEFT LOWER TIBIA MY (Nm) vs TIME (ms)

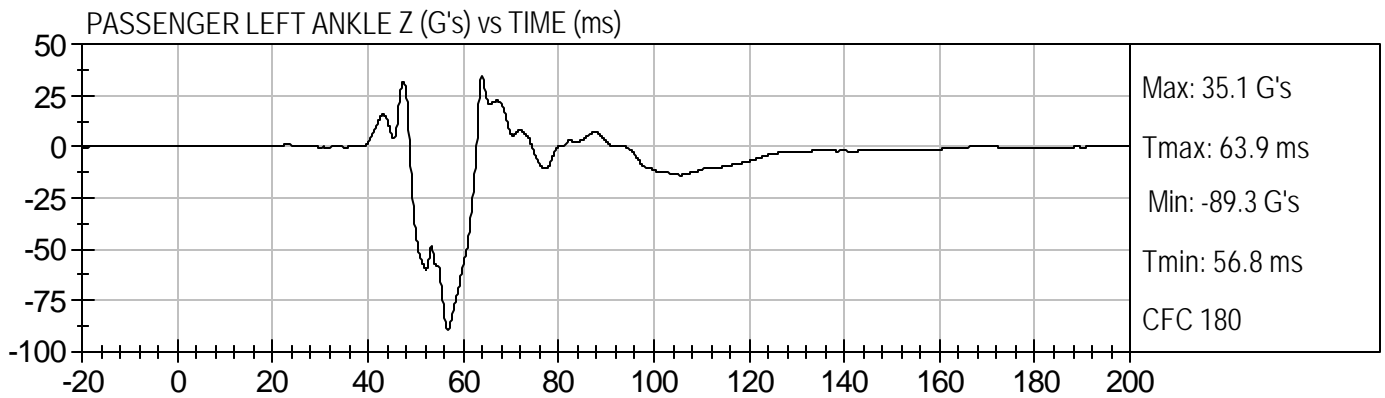
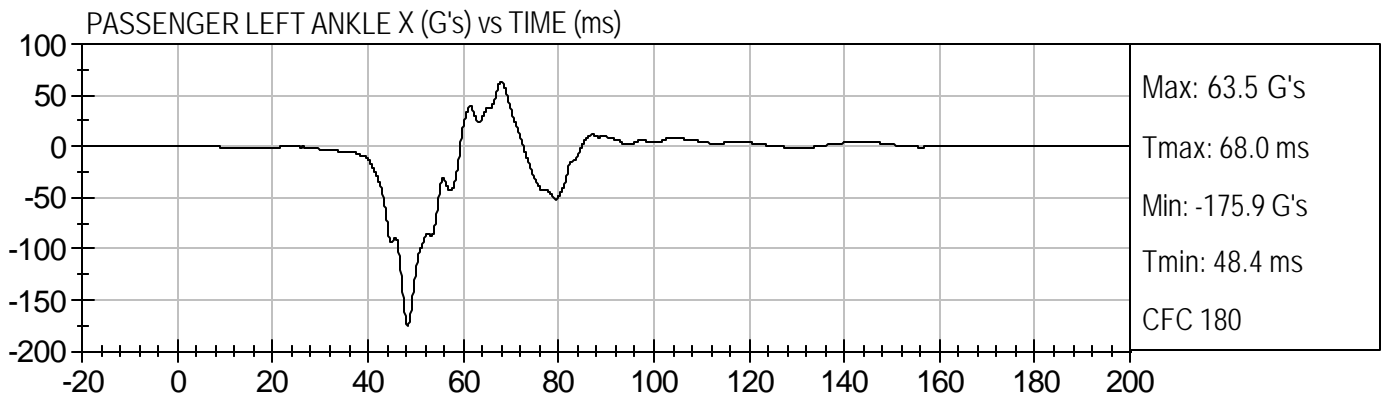
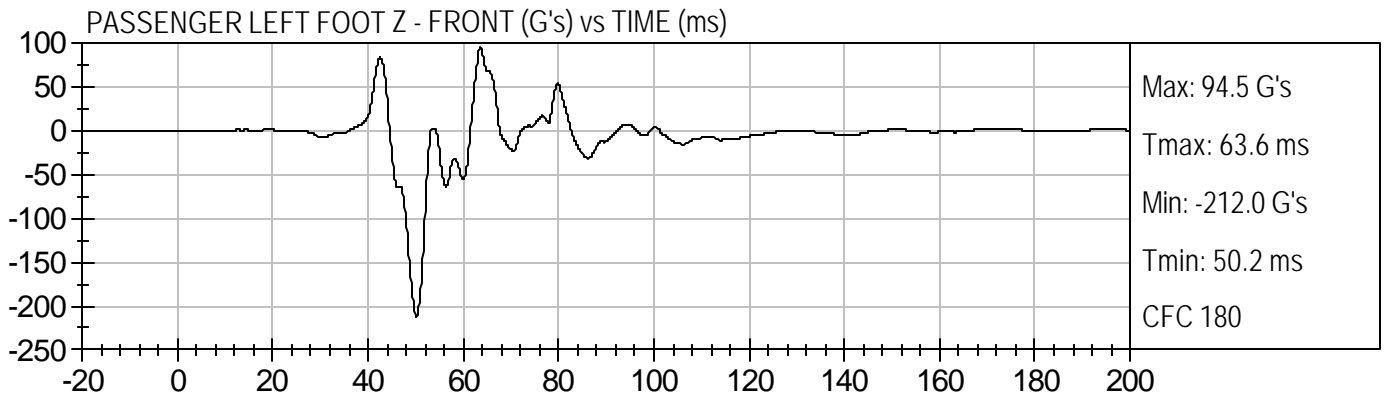


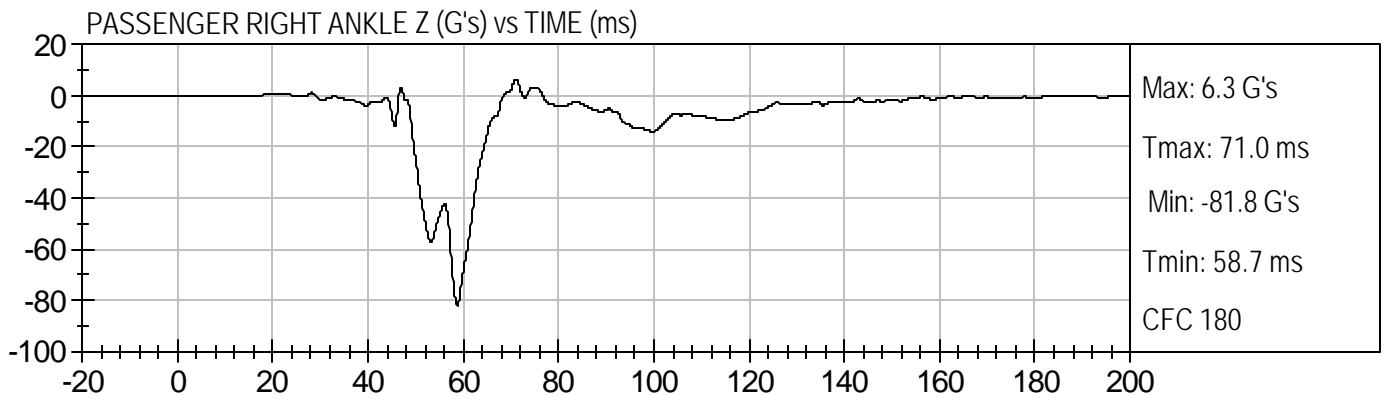
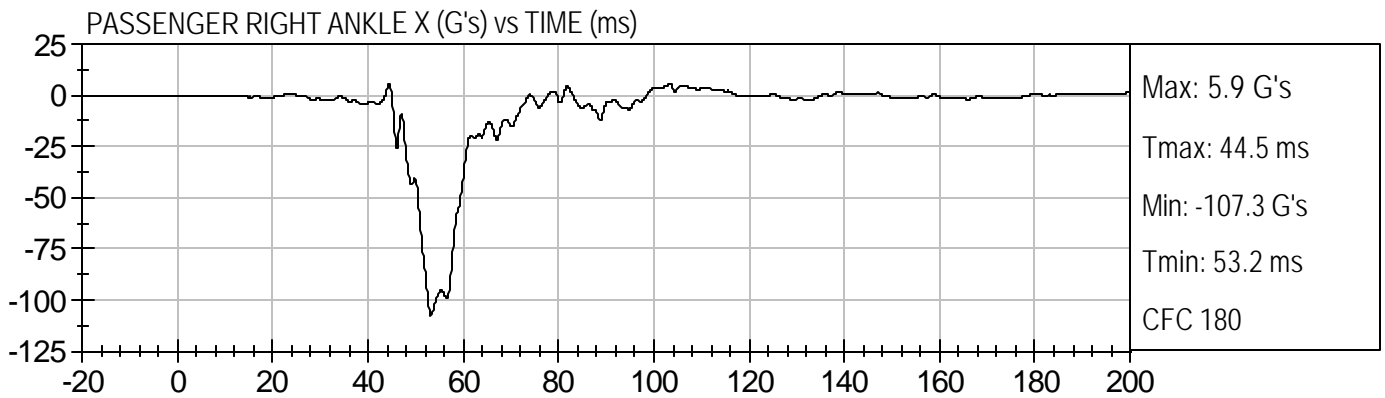
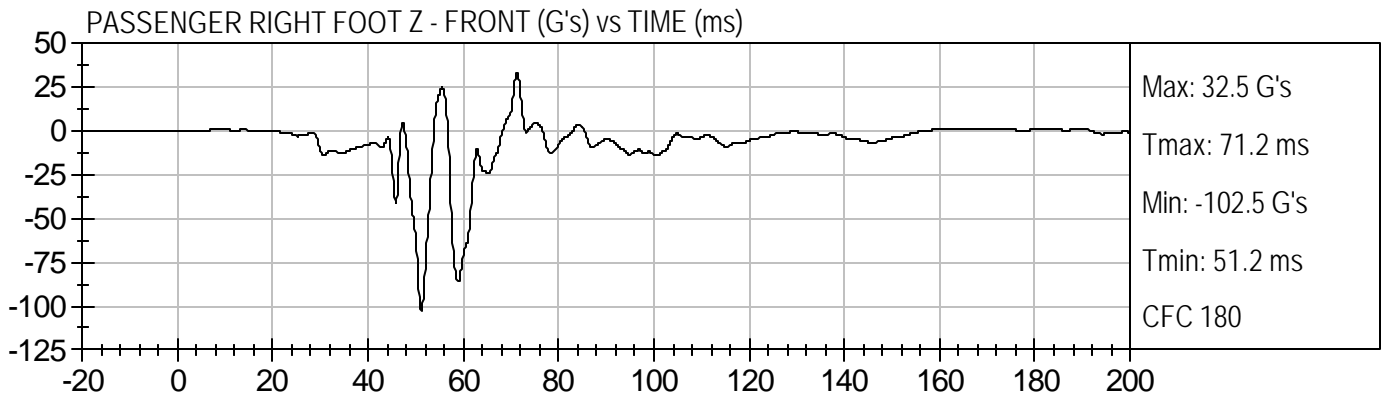
PASSENGER LEFT LOWER TIBIA FZ (N) vs TIME (ms)

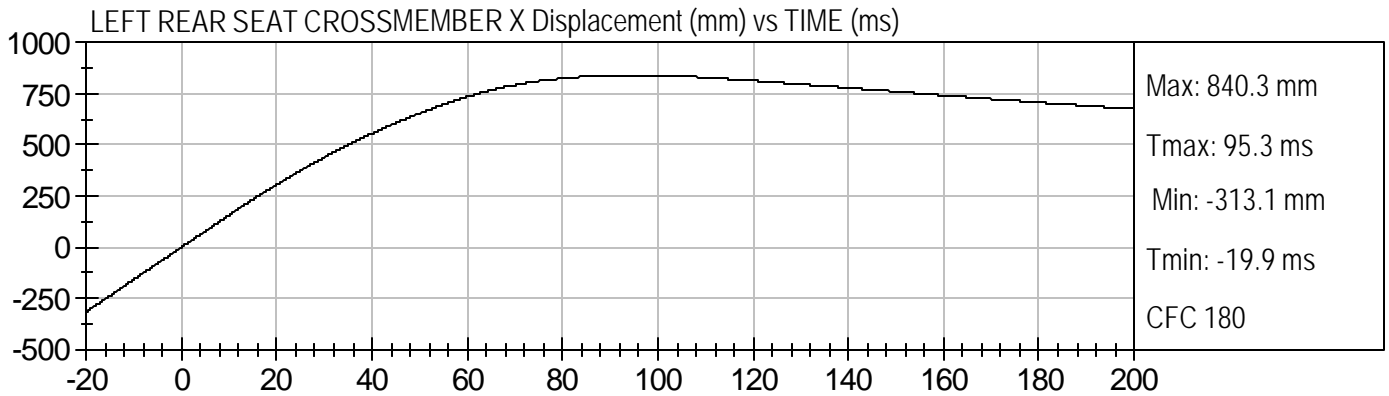
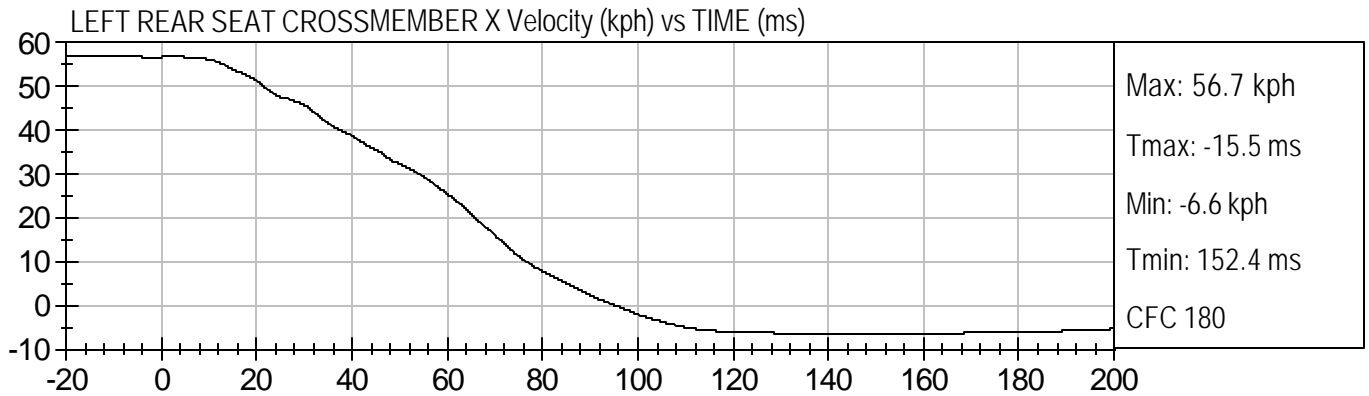
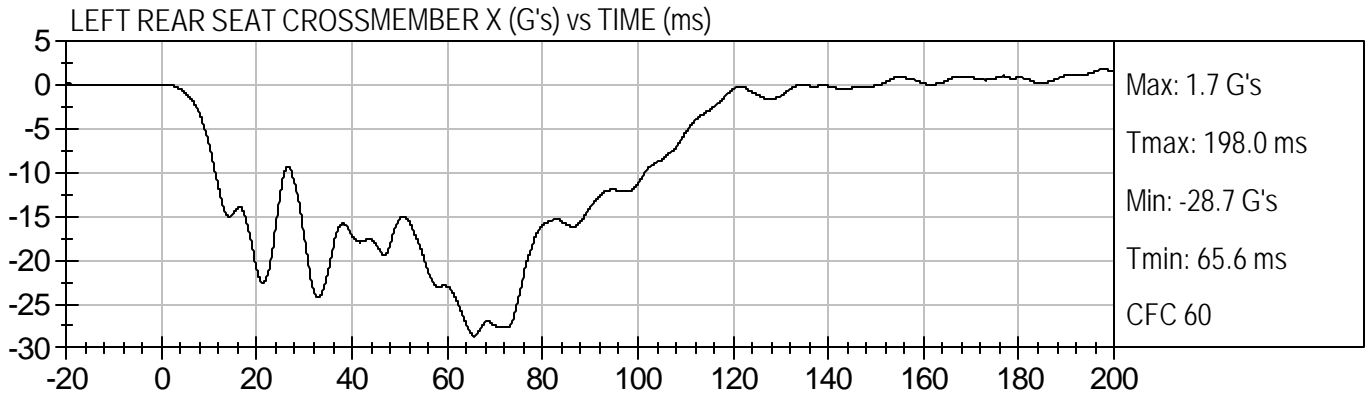


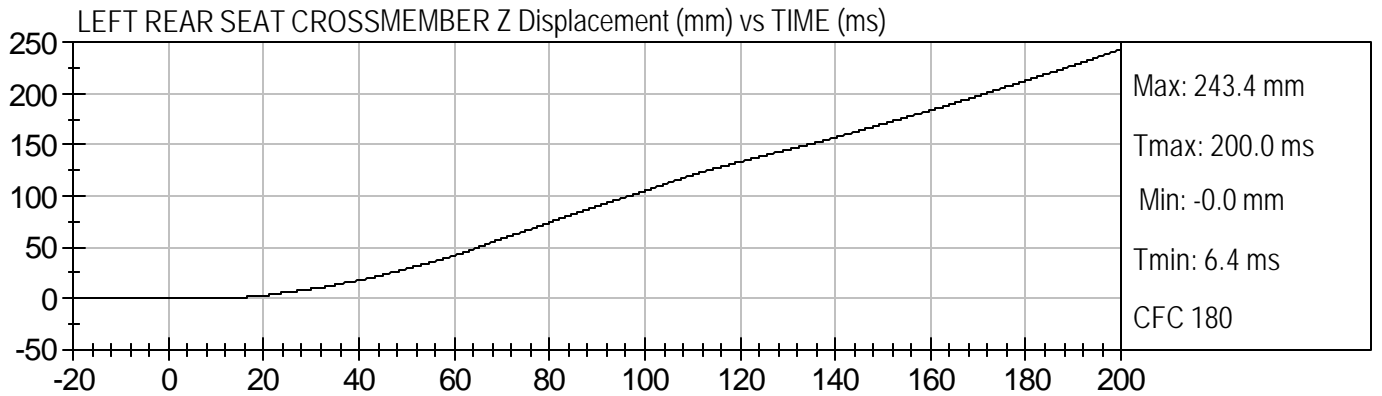
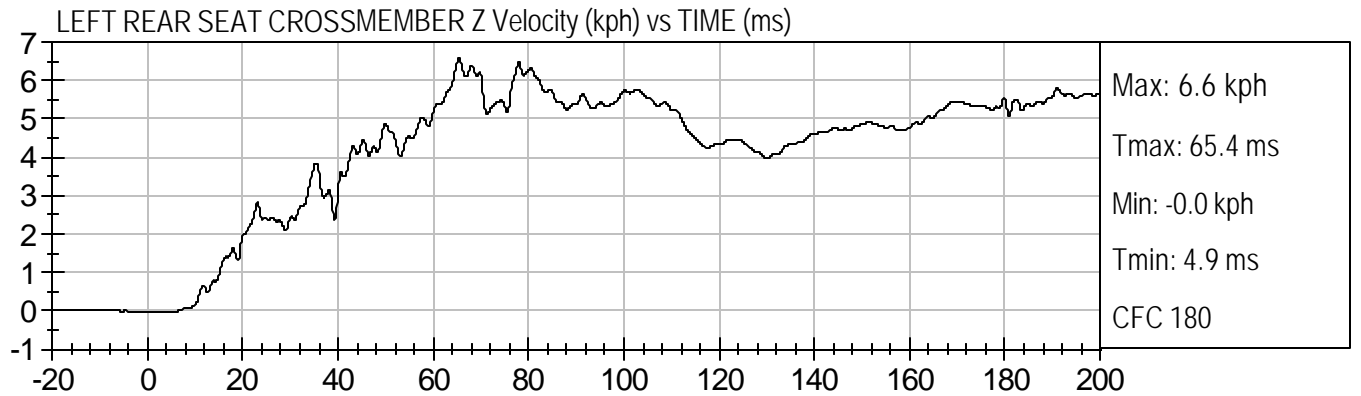
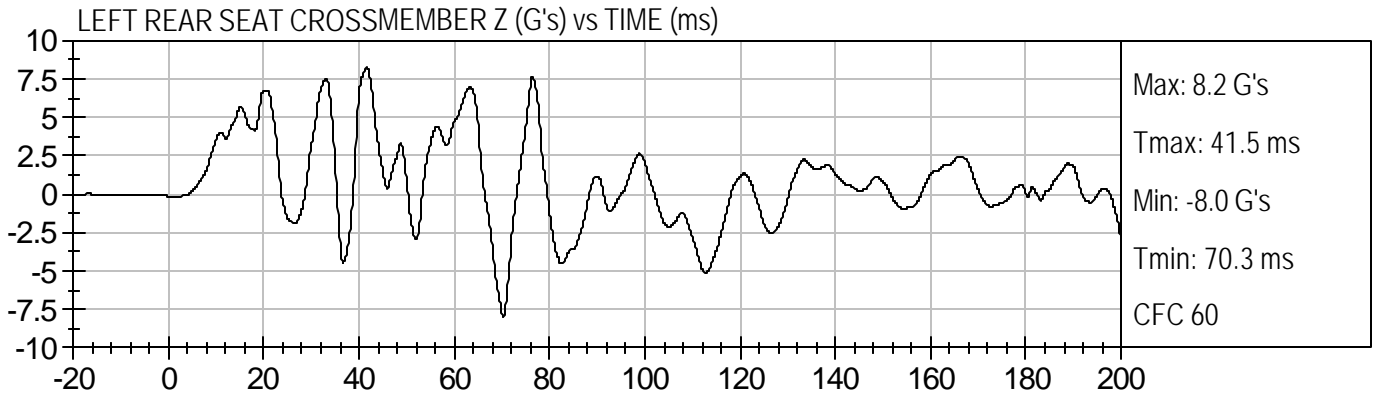


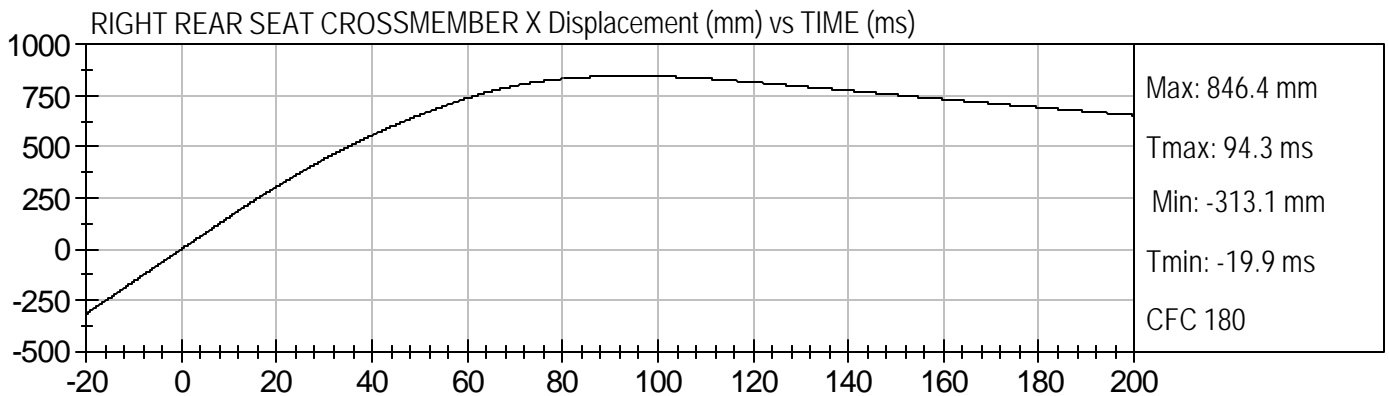
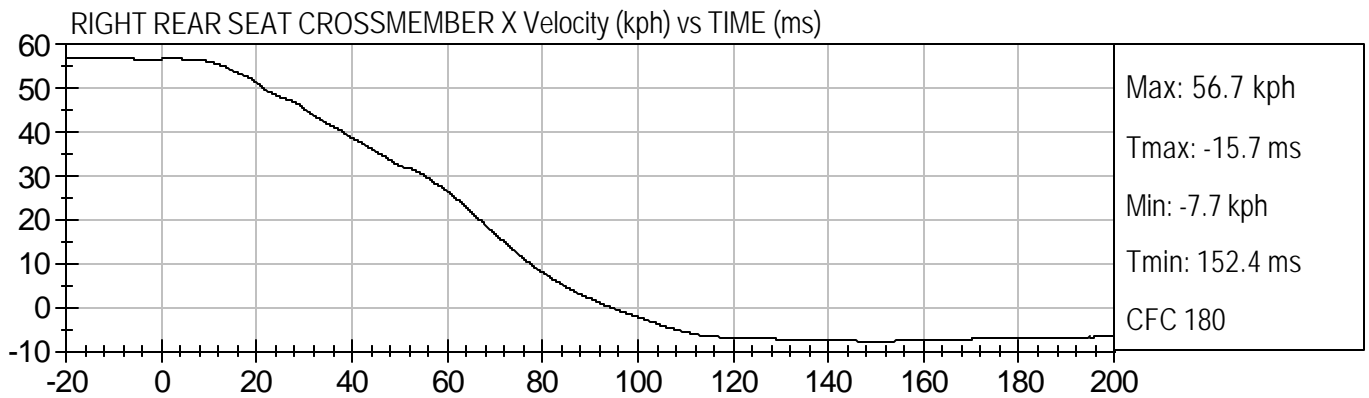
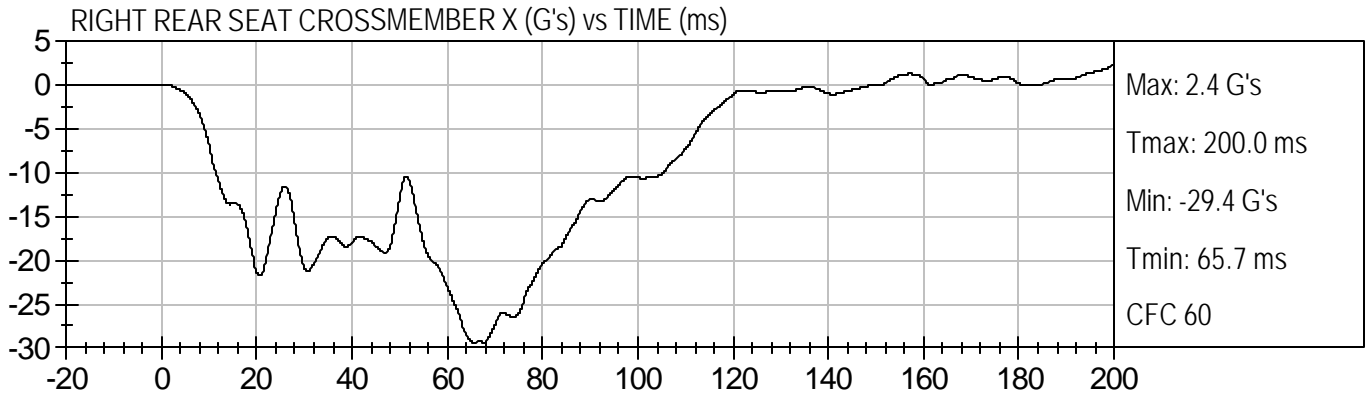


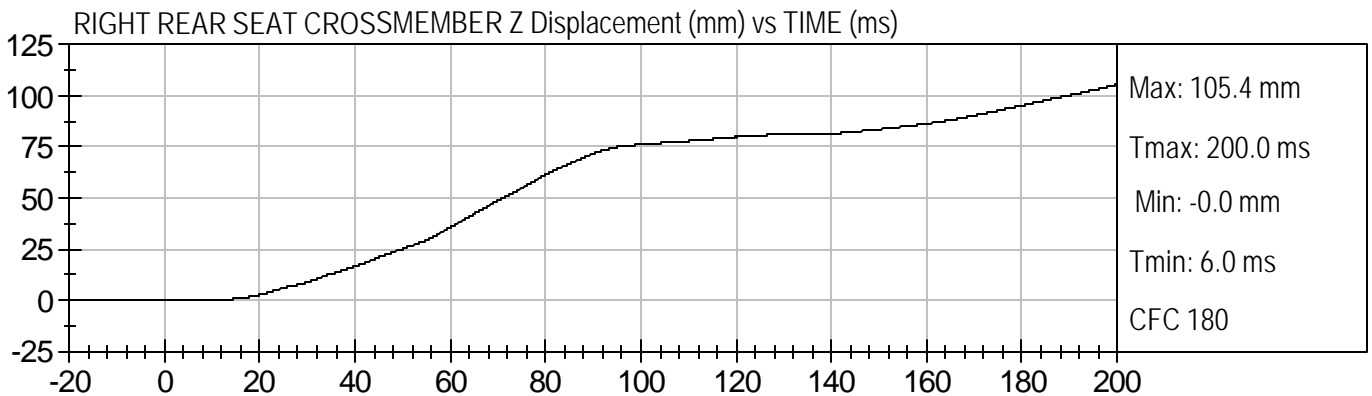
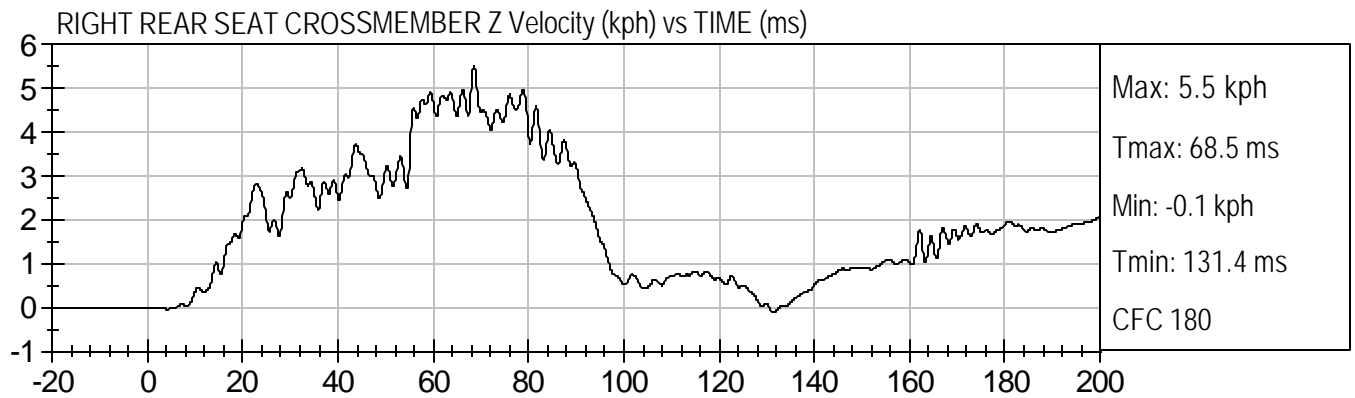
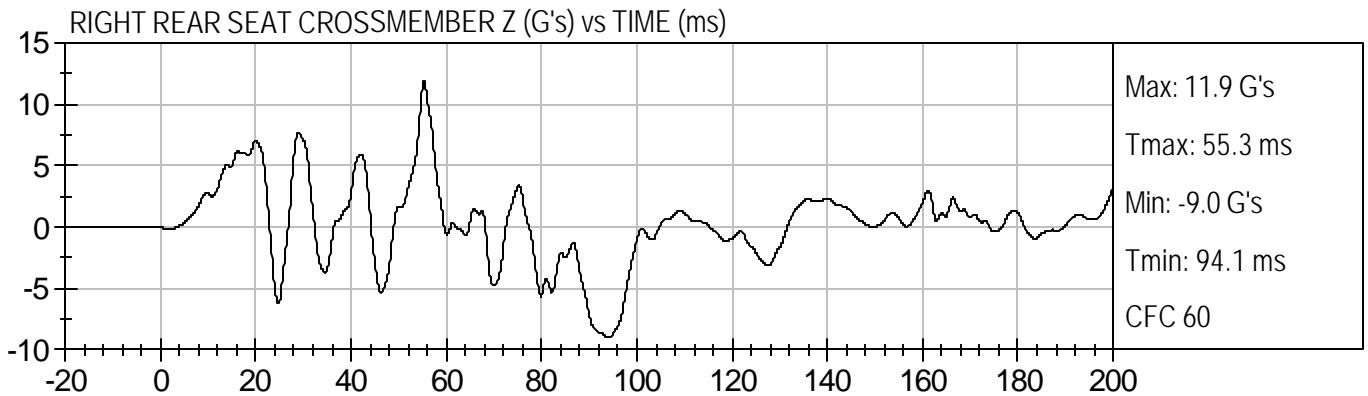


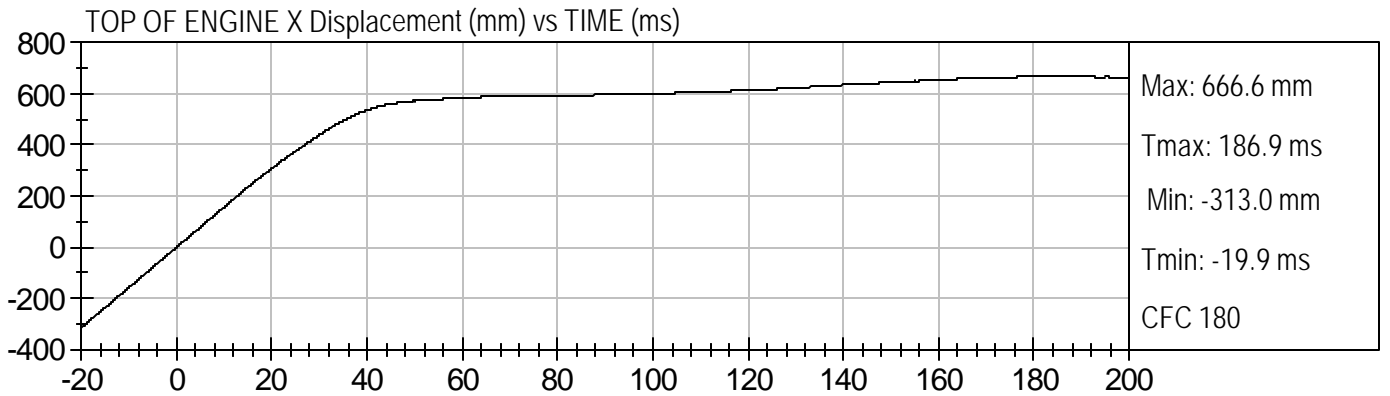
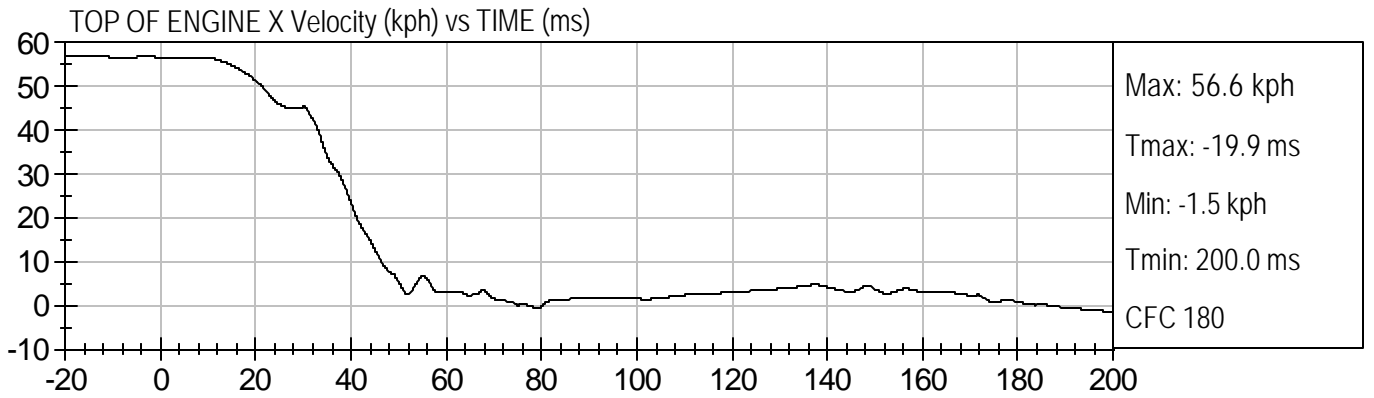
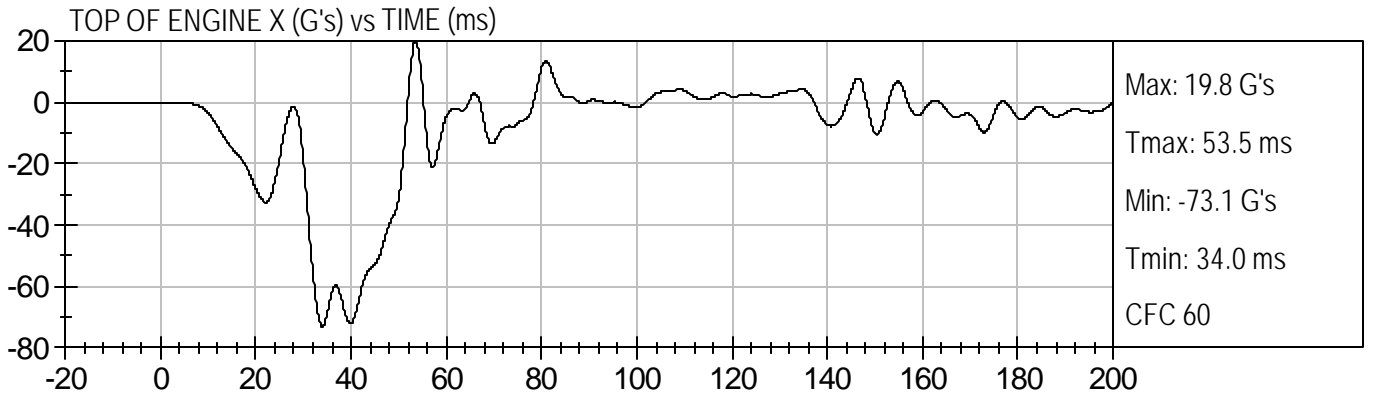


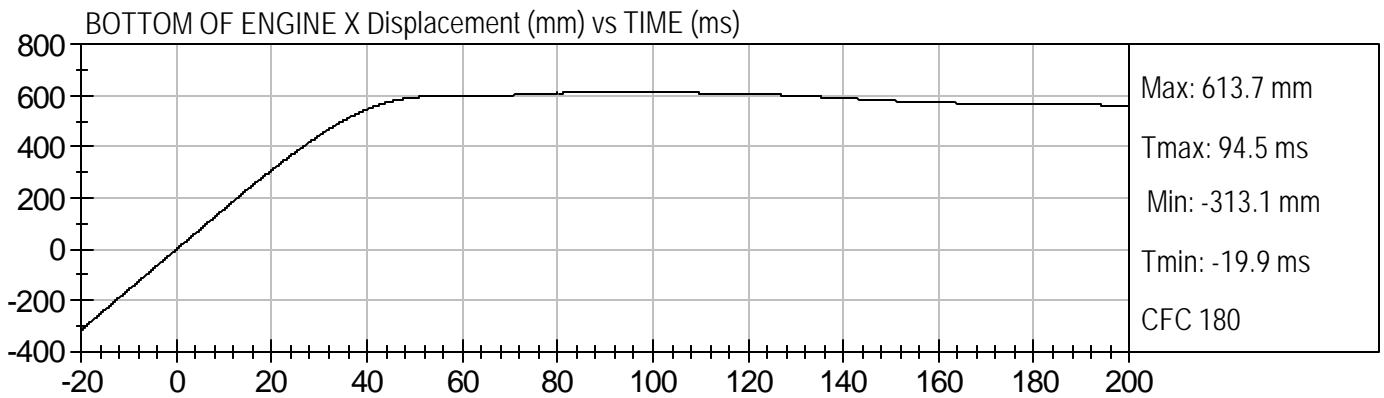
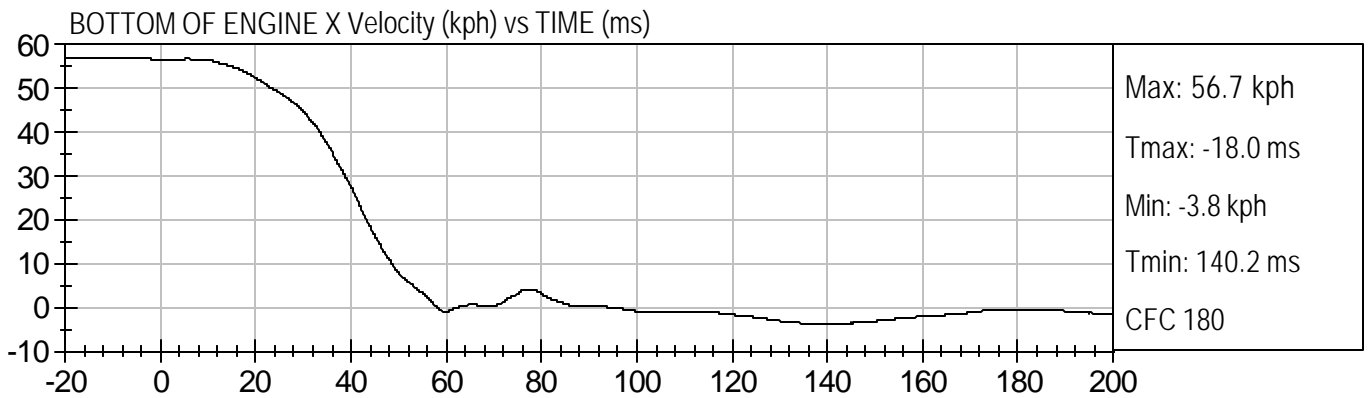
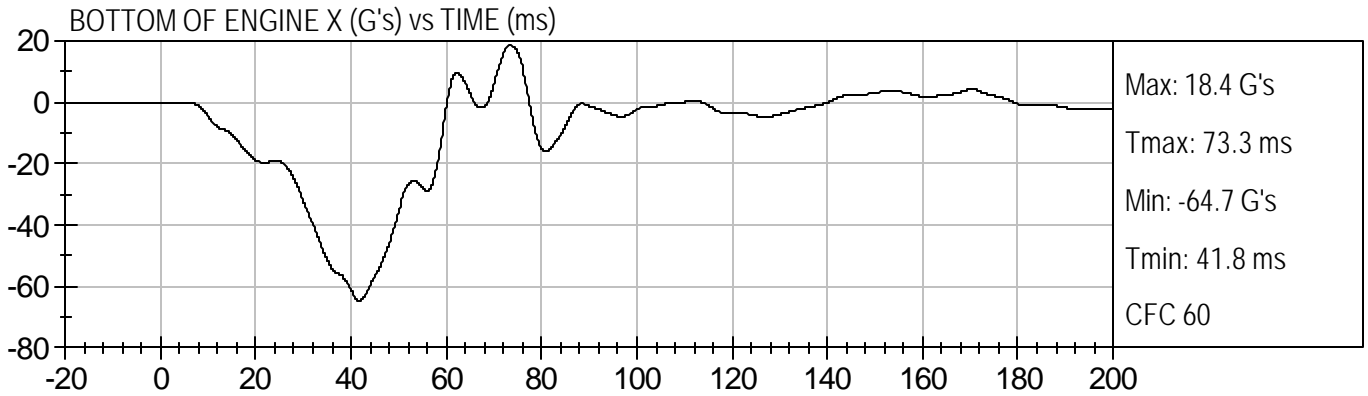


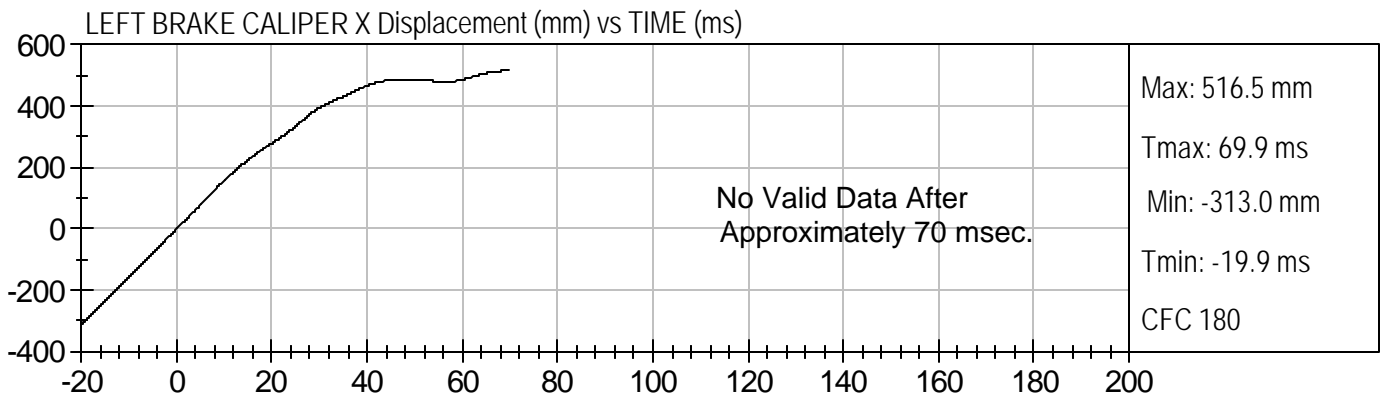
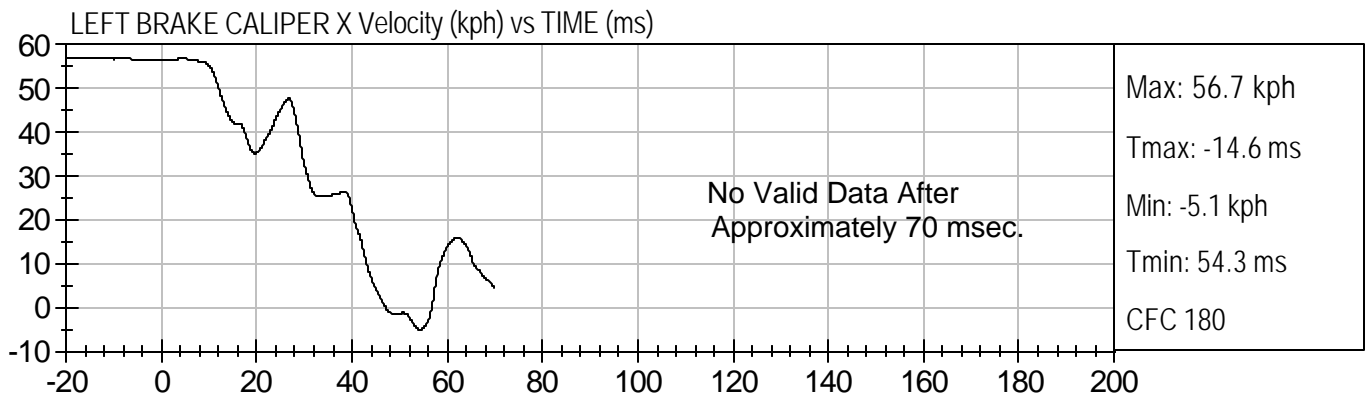
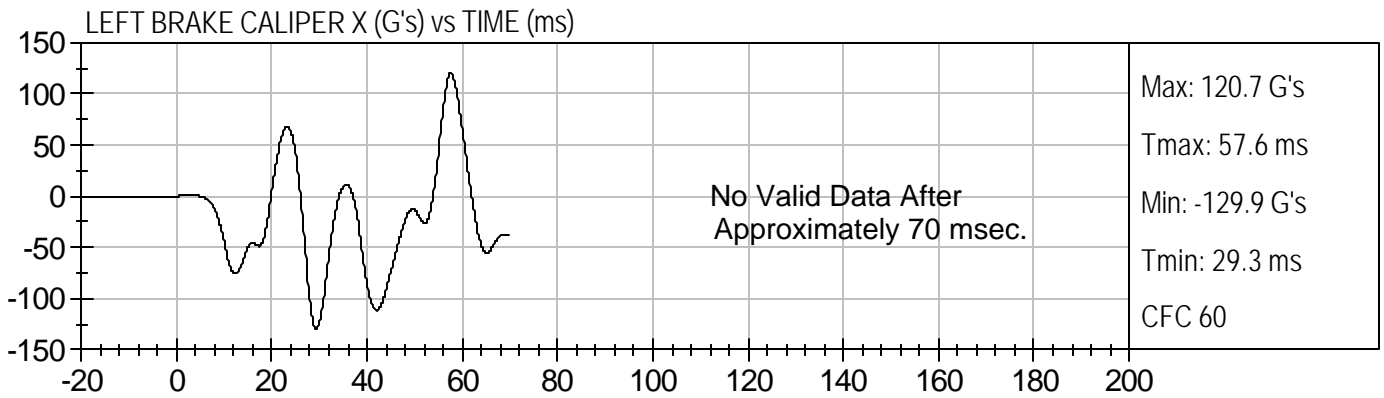


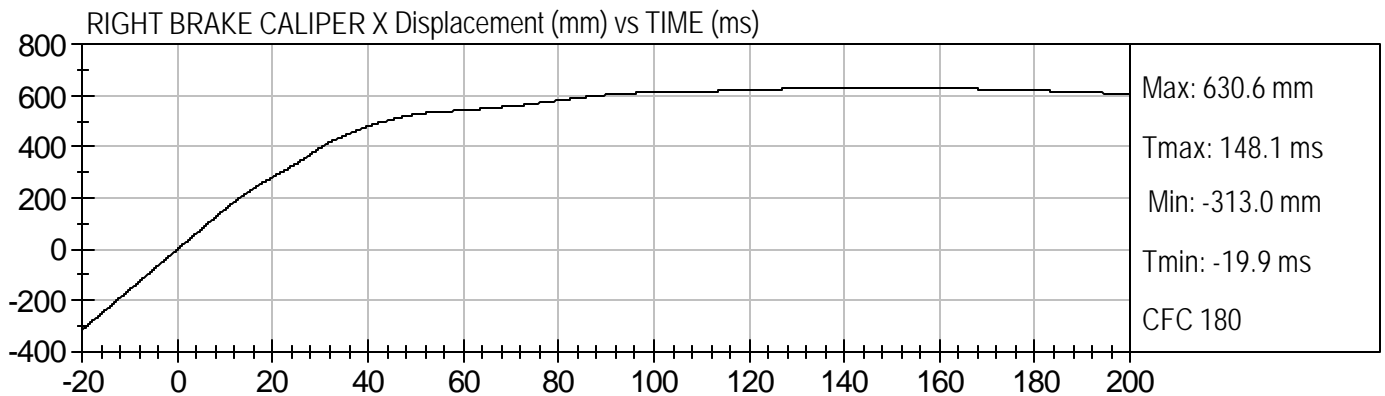
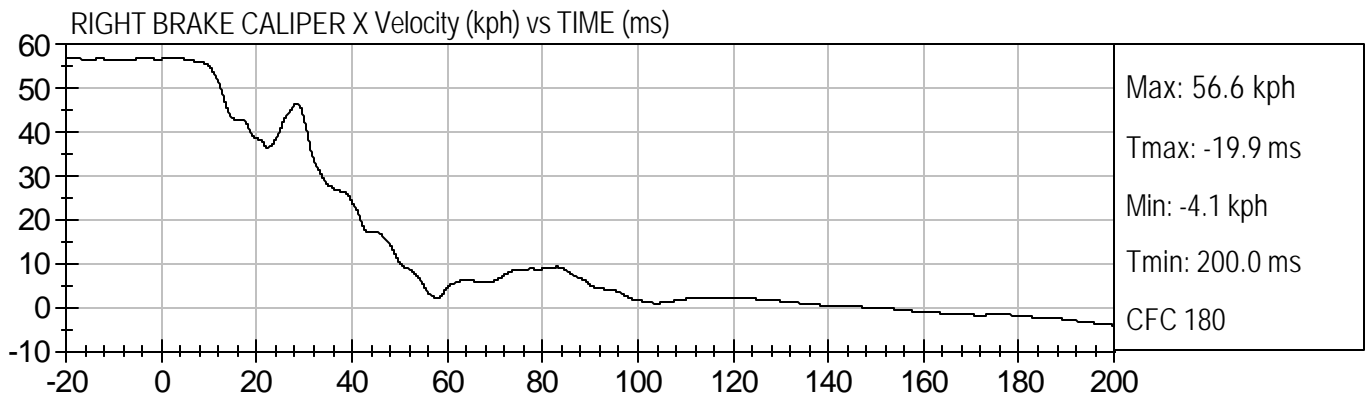
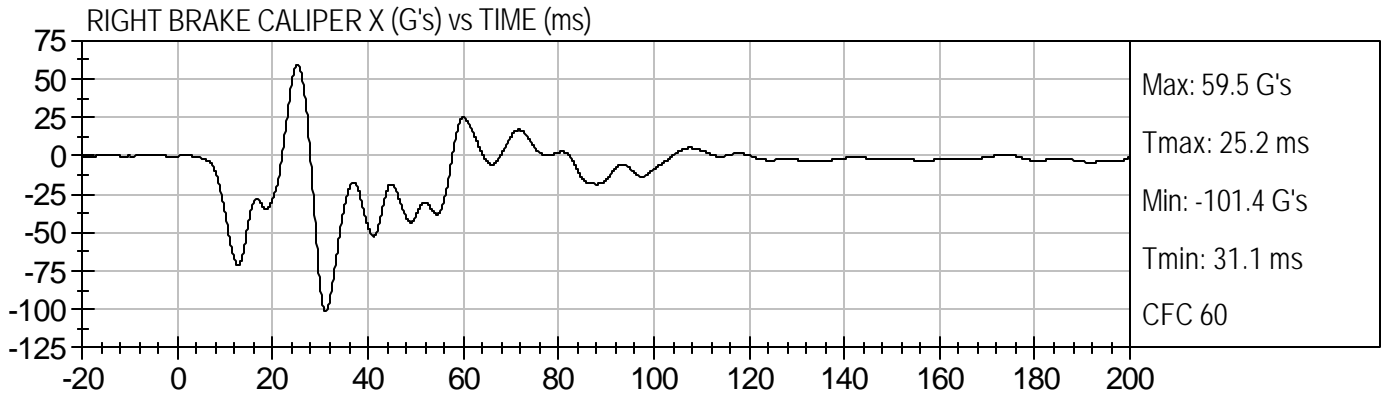


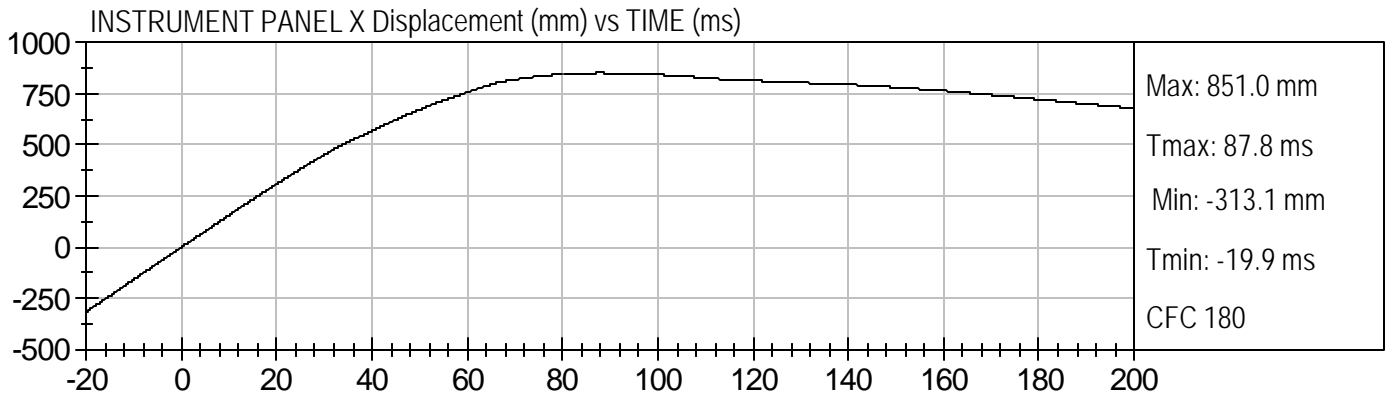
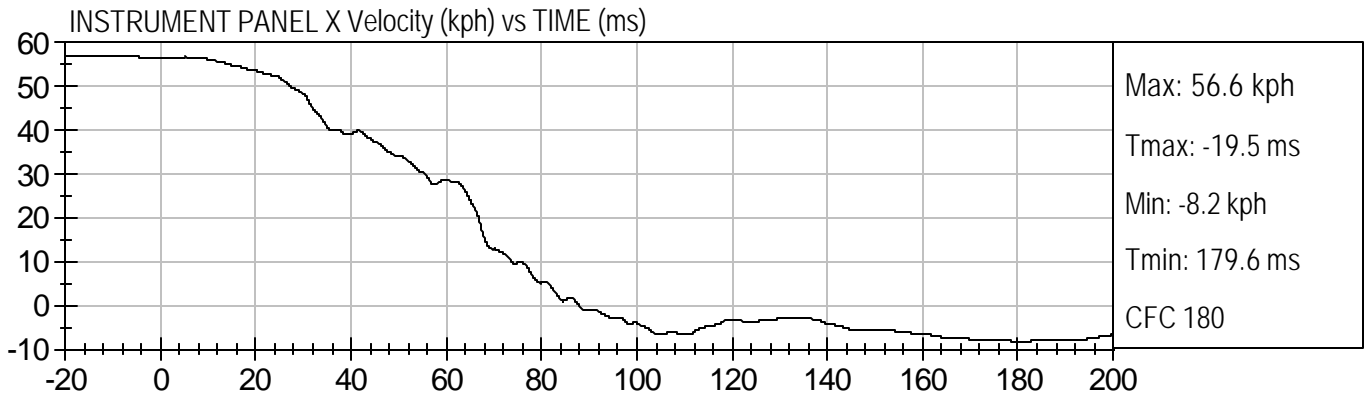
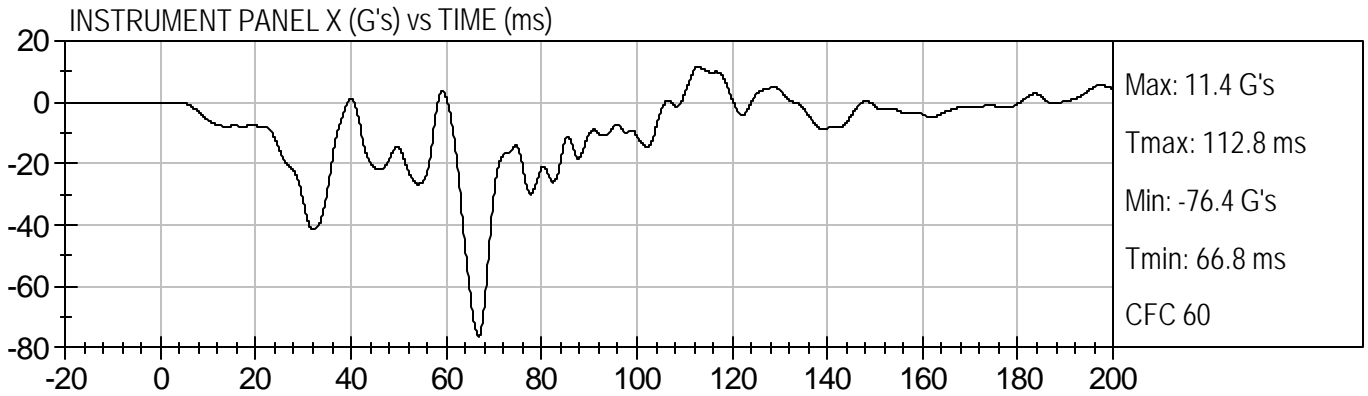


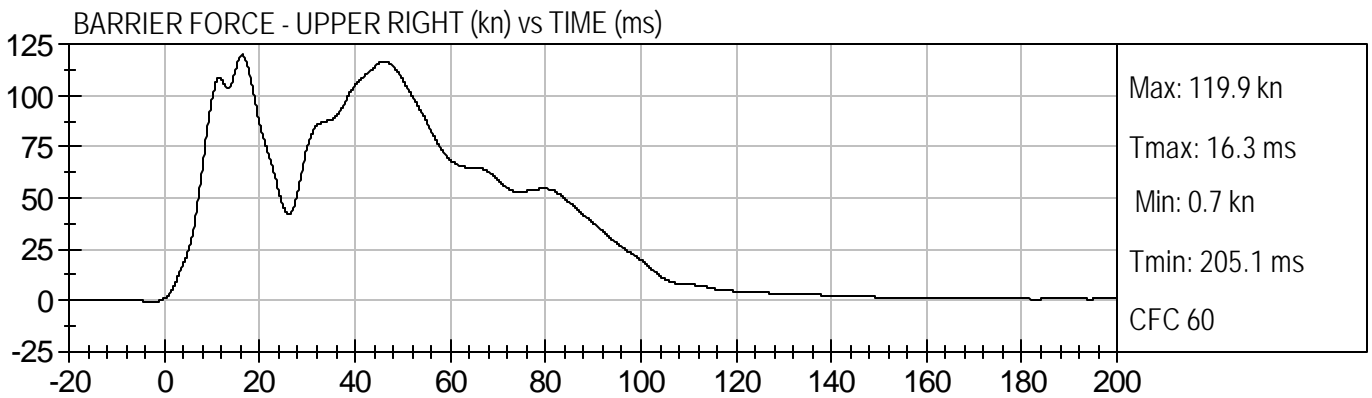
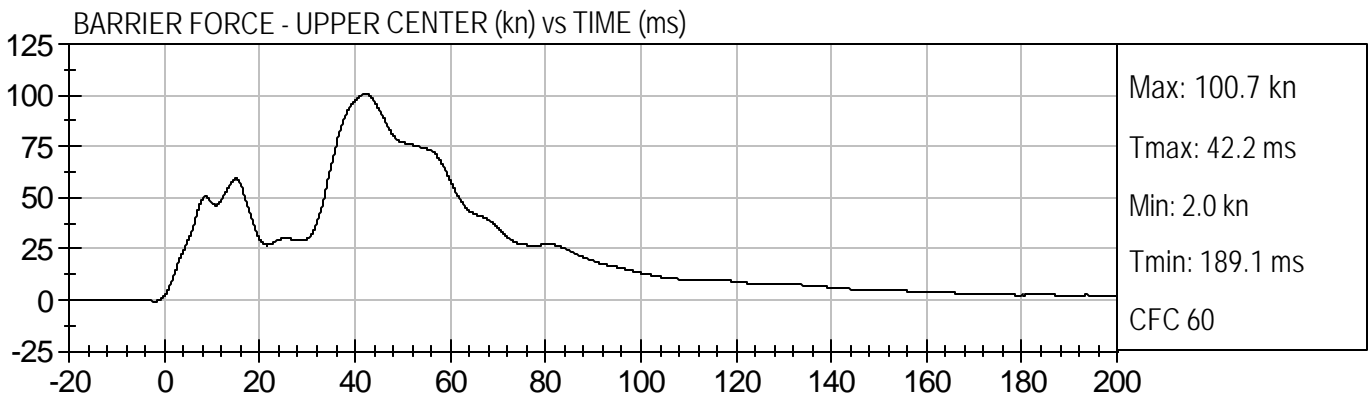
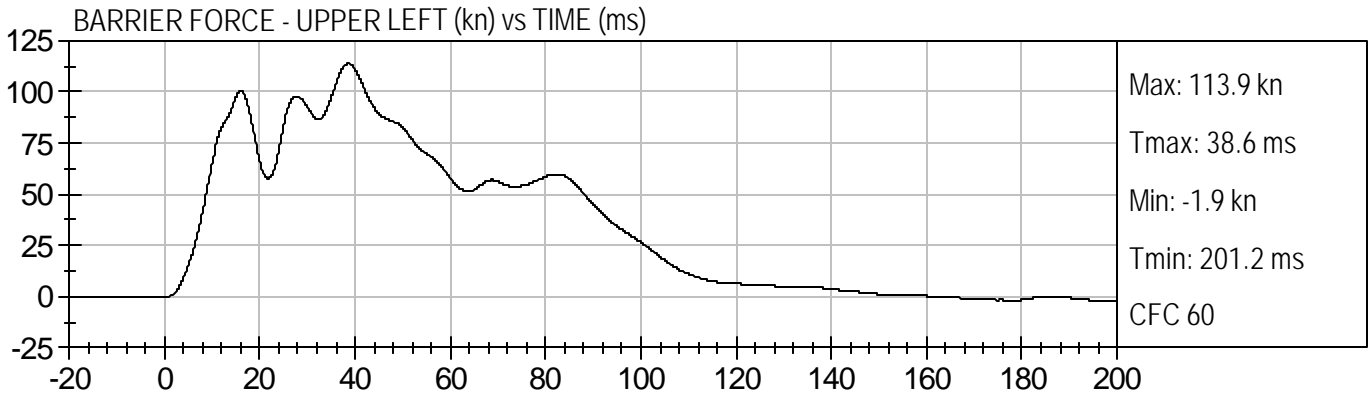


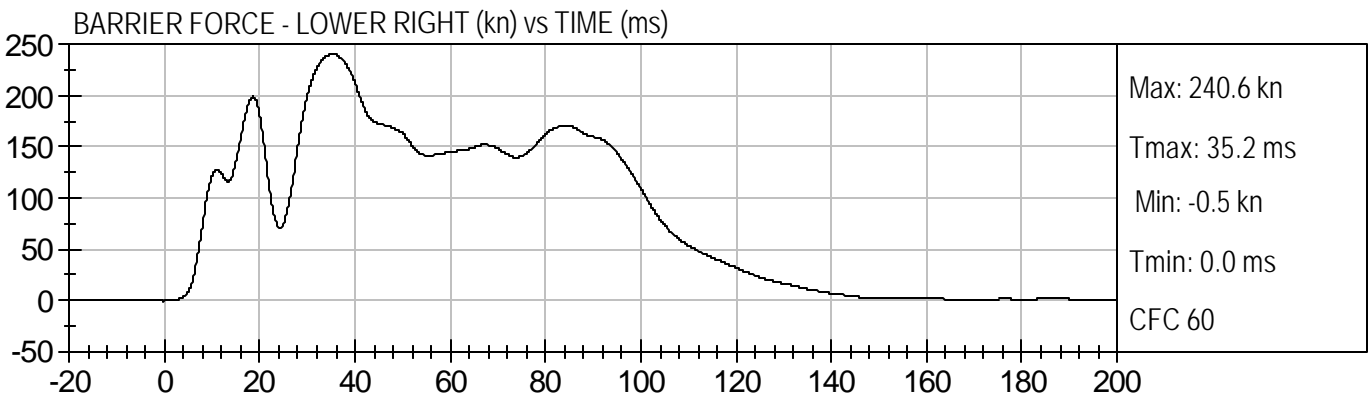
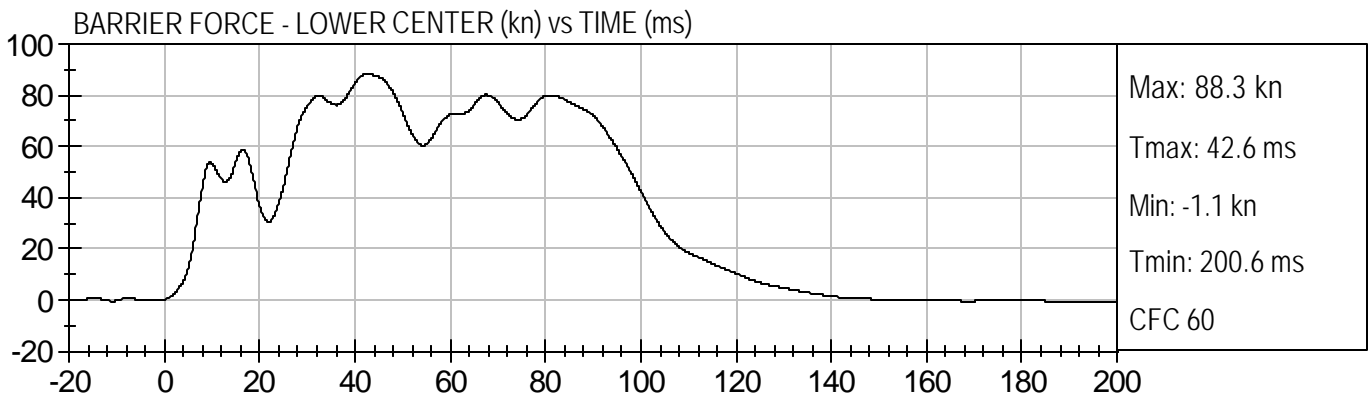
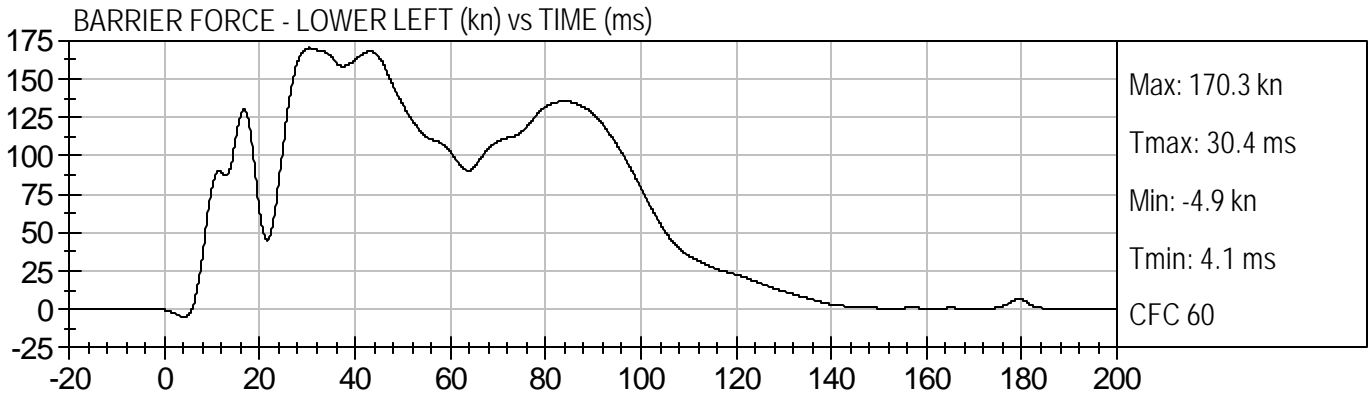


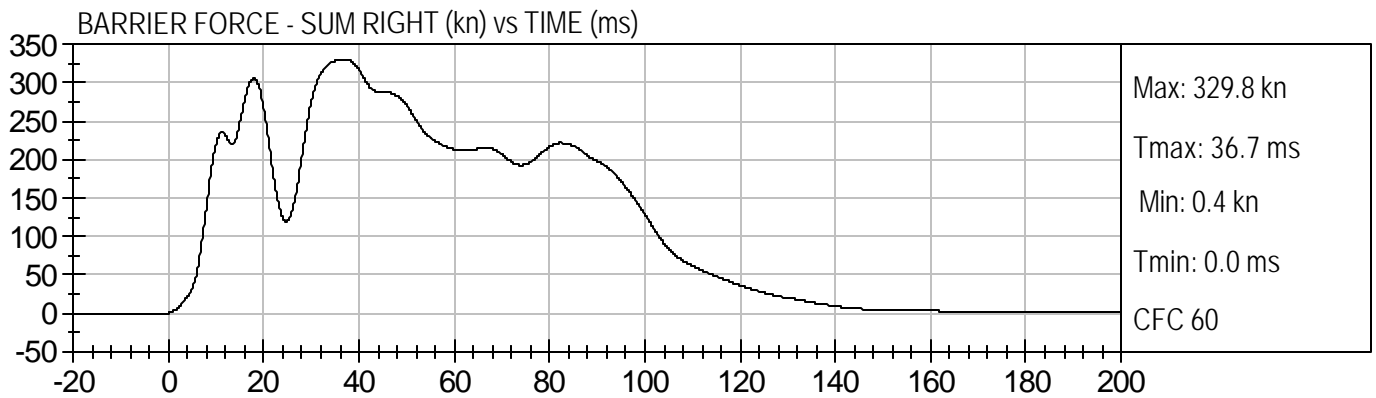
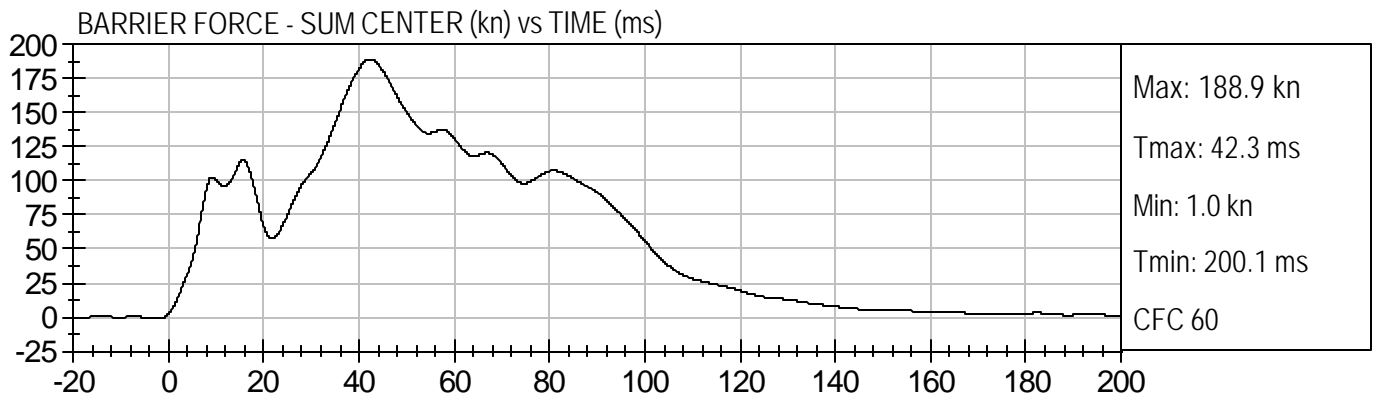
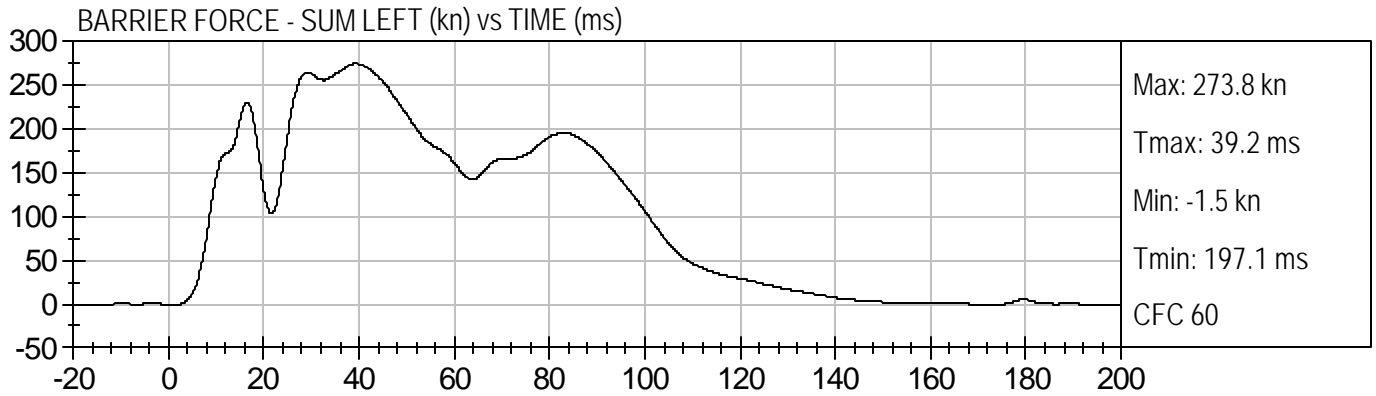








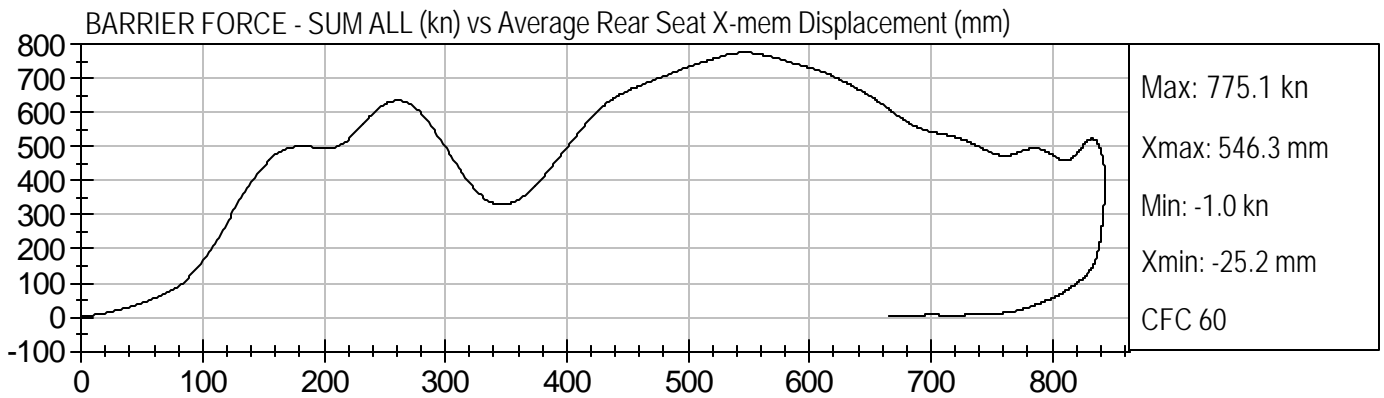
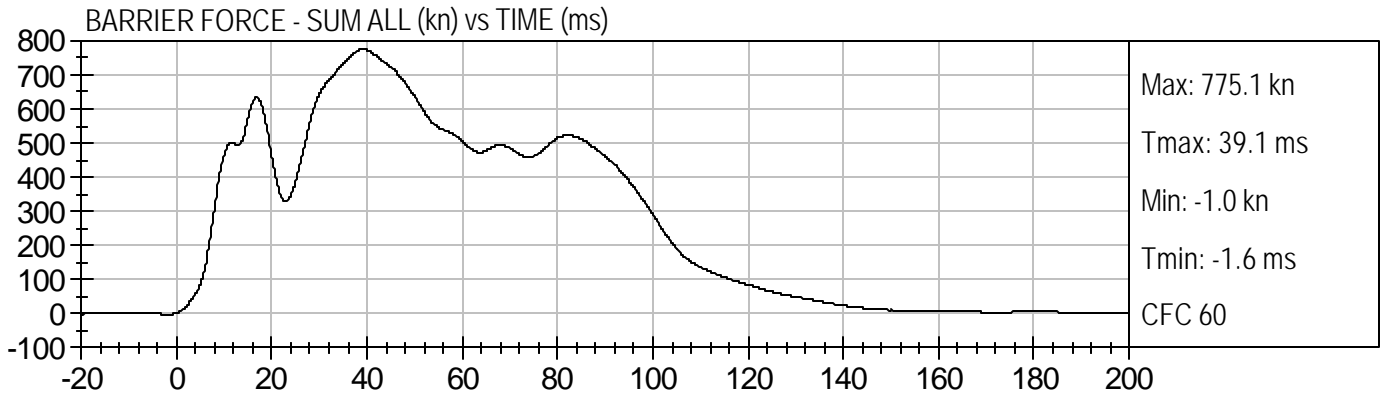






35 MPH FRONTAL IMPACT
2003 CHEVROLET AVALANCHE (M30100)

Test Date: 1/8/2003
Speed: 35.2 mph (56.6 km/h)



APPENDIX C

DUMMY CALIBRATION DATA TRACES AND TABLES

Hybrid III Calibration Data Sheet
50th Percentile Male
Head Drop Calibration

ATD Serial No: 065

Test I.D.: D021431

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	230.0	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	12.9	Pass
Is Acceleration Unimodal?	Yes/No	< 10% Peak	Yes	Pass
Overall Test Results				Pass

 Laboratory Technician

 11/08/2002
 Test Date

 Approved By



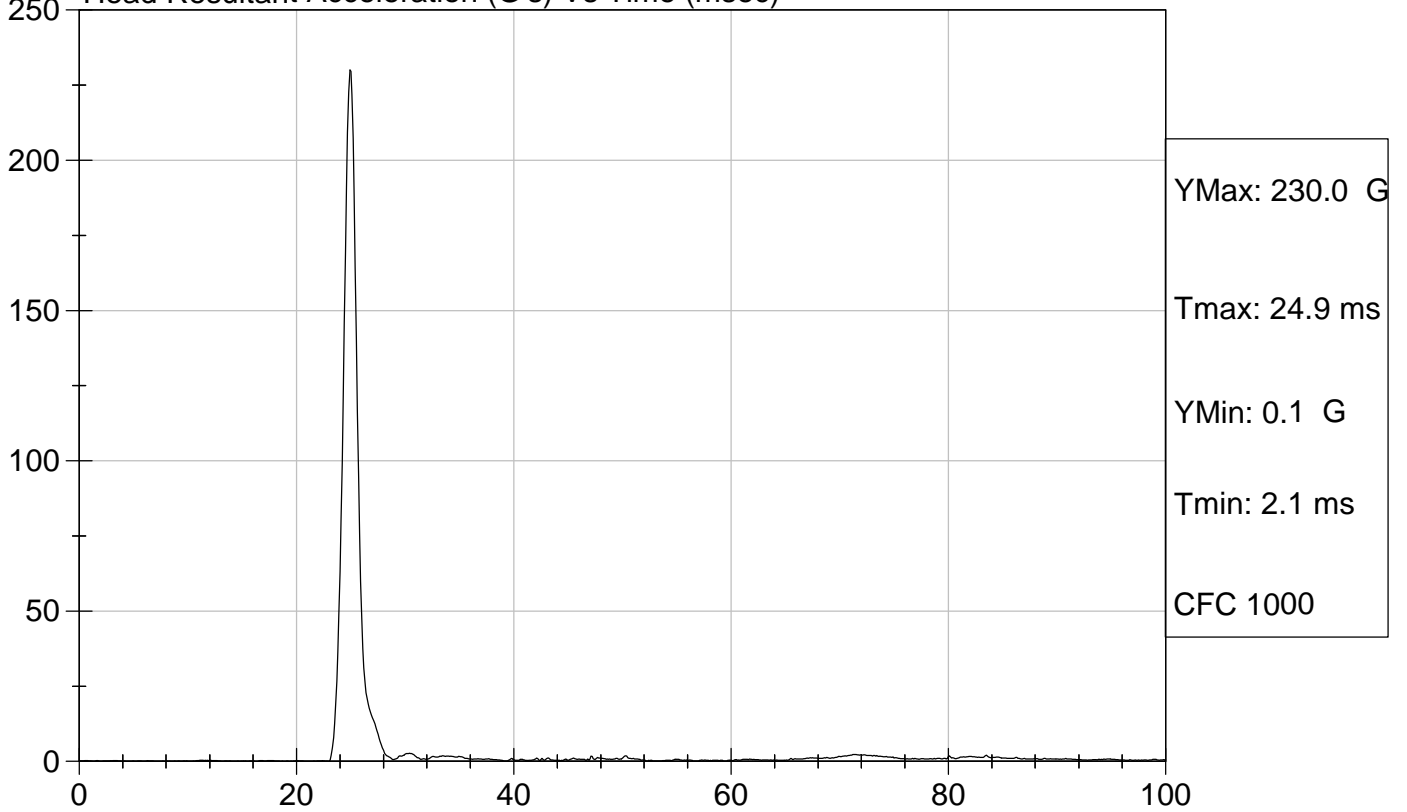
Test Description: Head Drop

Test Date: 11/08/2002

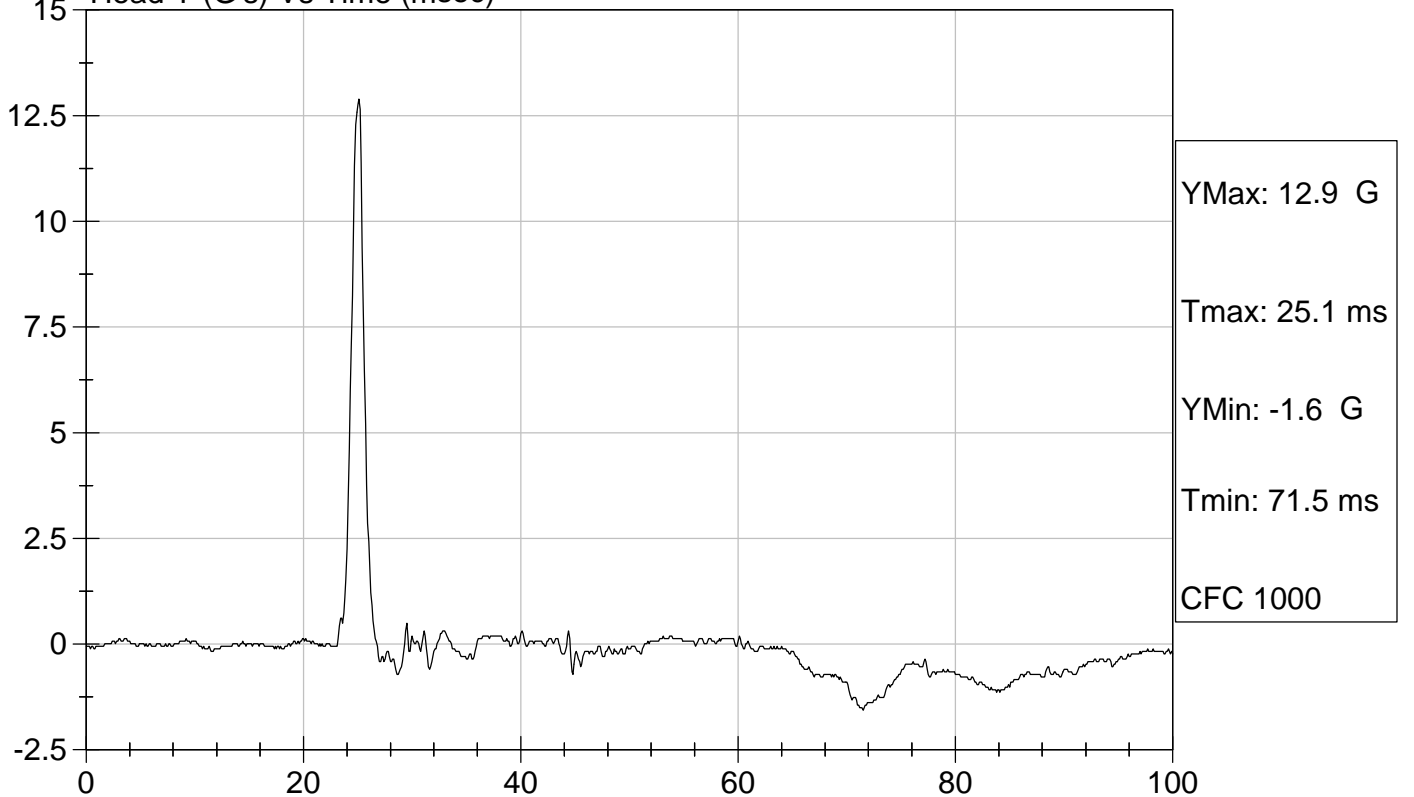
Component: D021431

Speed: 0 ft/s, 0.00 m/s

Head Resultant Acceleration (G's) Vs Time (msec)



Head Y (G's) Vs Time (msec)



Hybrid III Calibration Data Sheet
50th Percentile Male
Neck Flexion Test

ATD Serial No: 065

Test I.D: D021432

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	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	23.50	Pass
	20 msec	G's	17.60 to 22.60	19.41	Pass
	30 msec	G's	12.50 to 18.50	14.04	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.04	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	38.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.1	Pass
	Time	msec	57.0 to 64.0	57.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.9	Pass
Moment About Occipital Condyle	Maximum	N m	84.1 to 108.5	91.1	Pass
	Time	msec	47.0 to 58.0	50.4	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	101.5	Pass

Overall Test Results	Pass
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Laboratory Technician

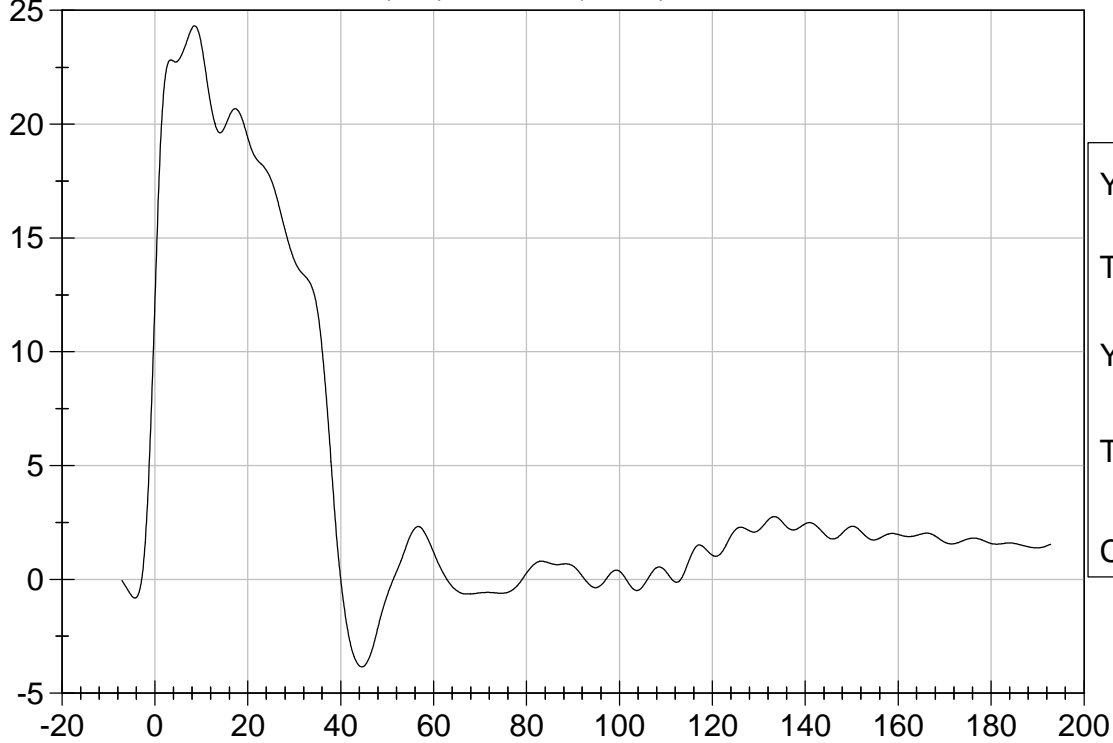
11/08/2002

Test Date

Approved By

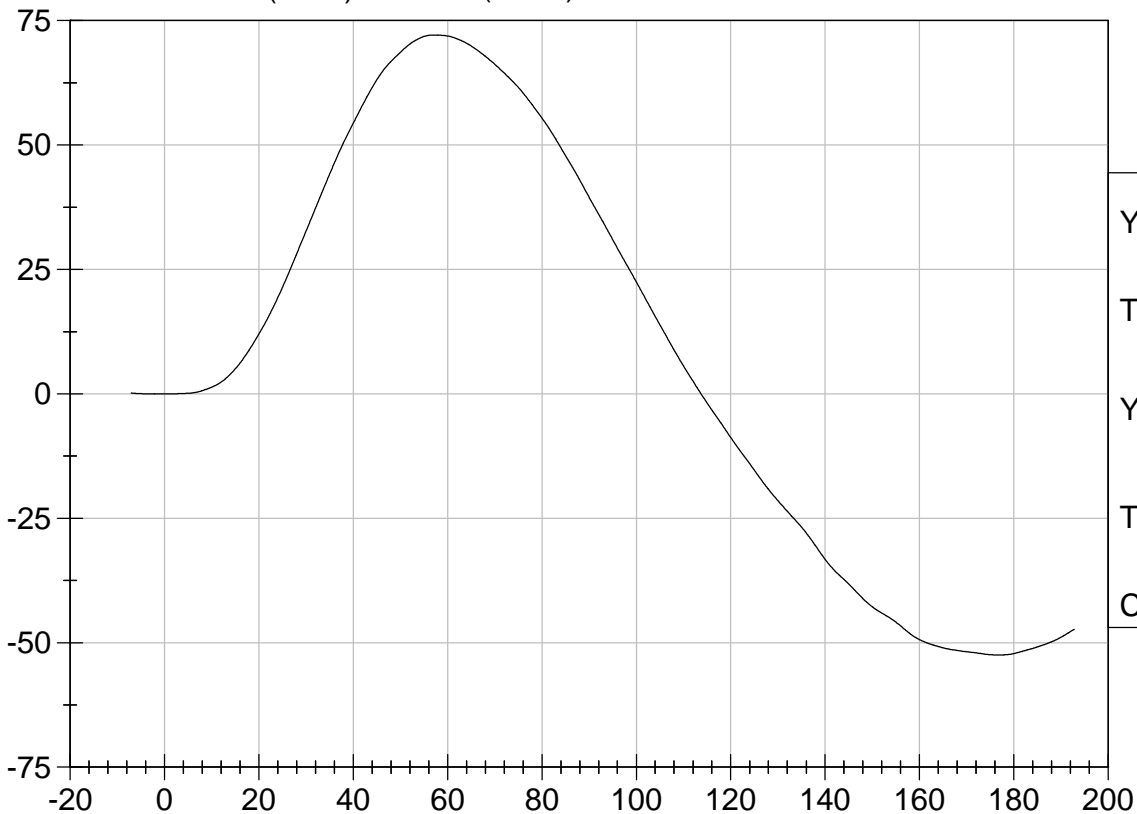


Pendulum Deceleration (G's) vs Time (msec)



YMax: 24.3 G'S
Tmax: 8.5 ms
YMin: -3.8 G'S
Tmin: 44.6 ms
CFC 60

Neck Rotation (DEG) vs Time (msec)

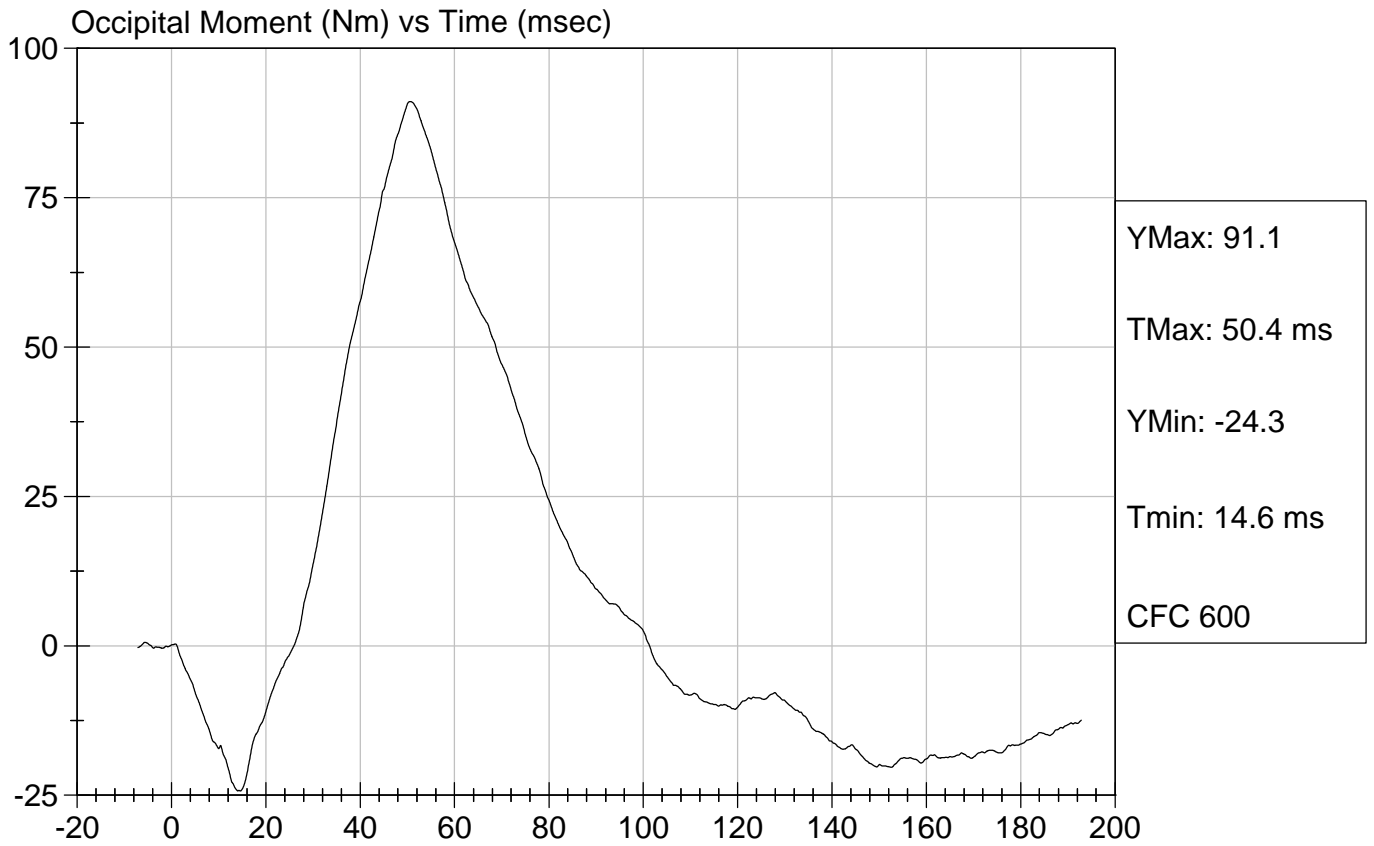


YMax: 72.1
Tmax: 57.1 ms
YMin: -52.5
Tmin: 176.8 ms
CFC 60



Test Desc: Neck Flexion
Component ID: D021432

Test Date: 11/08/2002
Speed: 23.1 ft/sec, 7.04 m/sec



Hybrid III Calibration Data Sheet
50th Percentile Male
Neck Extension Test

ATD Serial No: 065

Test I.D: D021433

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	30	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	18.88	Pass
	20 msec	G's	14.00 to 19.00	15.86	Pass
	30 msec	G's	11.00 to 16.00	12.62	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.6	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	40.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	100.1	Pass
	Time	msec	72.0 to 82.0	77.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	155.2	Pass
Moment About Occipital Condyle	Minimum	N m	-52.9 to -79.9	-63.5	Pass
	Time	msec	65.0 to 79.0	72.5	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	141.4	Pass

Overall Test Results	Pass
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Laboratory Technician

11/08/2002

Test Date

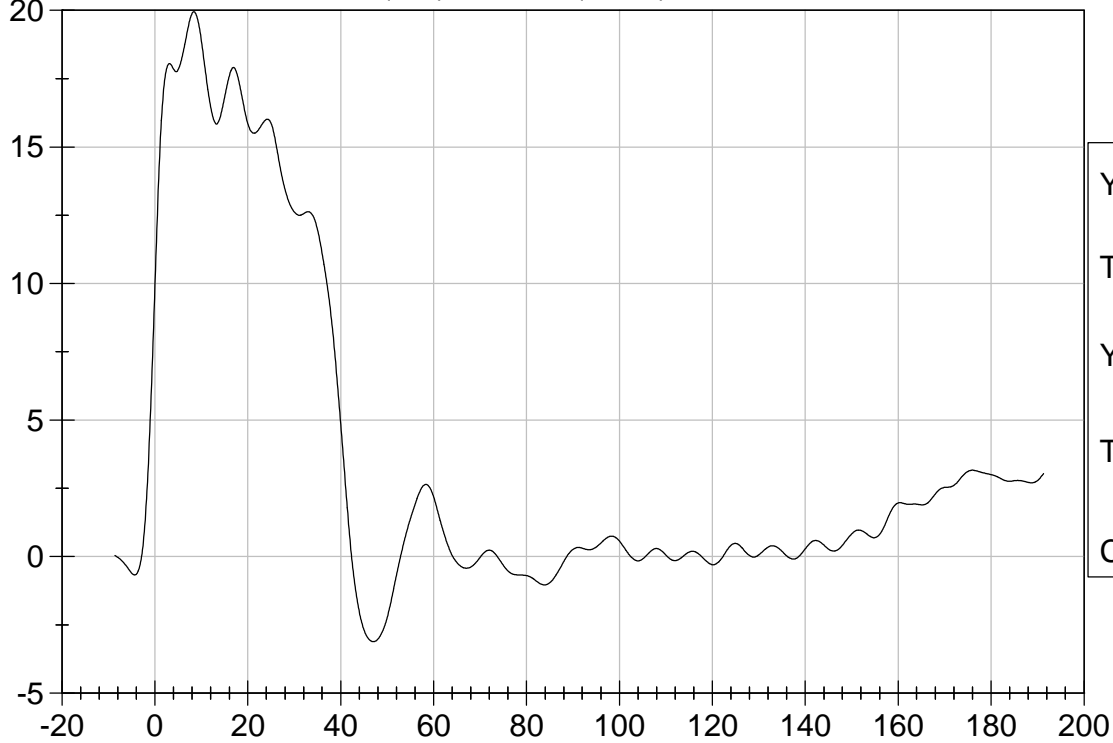
Approved By



Test Desc: Neck Extension
Component ID: D021433

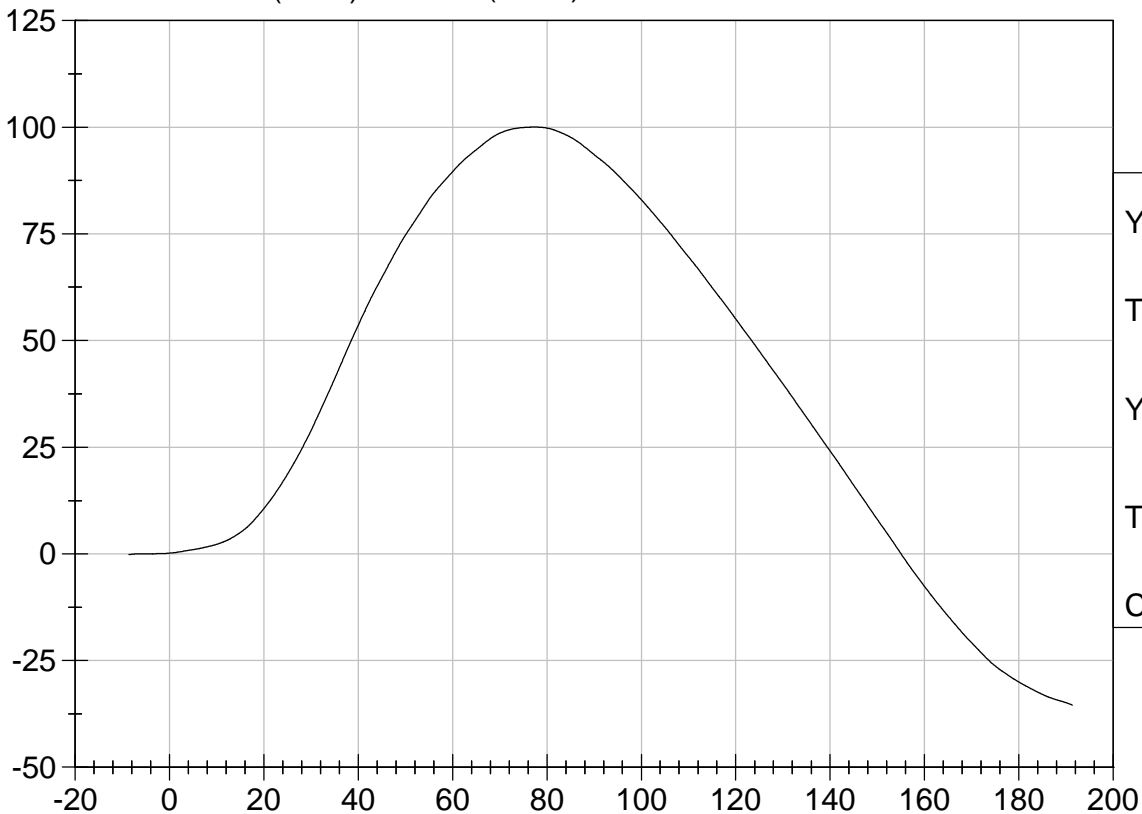
Test Date: 11/08/2002
Speed: 20.1 ft/sec, 6.13 m/sec

Pendulum Deceleration (G's) vs Time (msec)

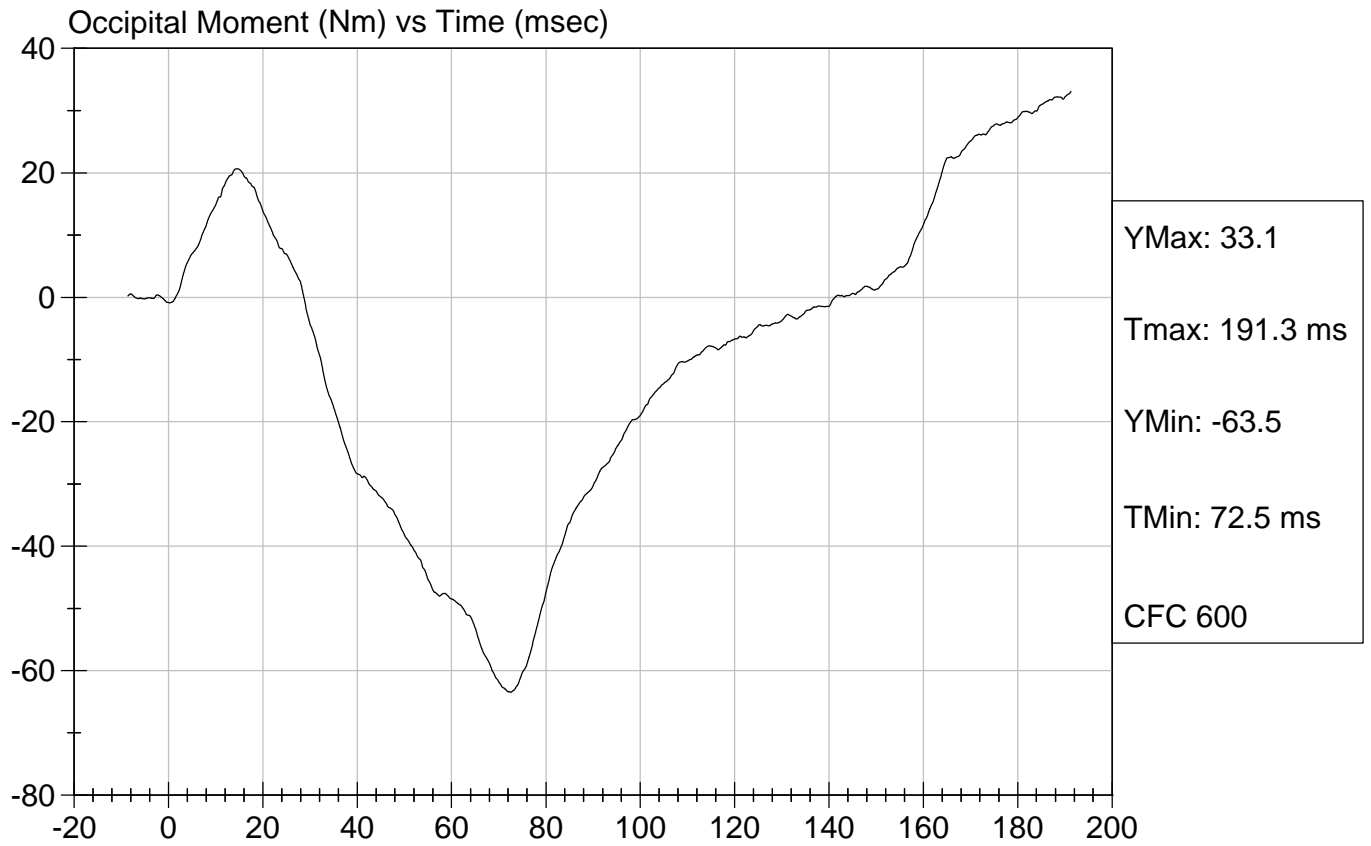


YMax: 20.0 G'S
Tmax: 8.4 ms
YMin: -3.1 G'S
Tmin: 47.0 ms
CFC 60

Neck Rotation (DEG) vs Time (msec)



YMax: 100.1
TMax: 77.2 ms
YMin: -35.4
Tmin: 191.3 ms
CFC 60



**Hybrid III Calibration Data Sheet
50th Percentile Male
Thorax Impact Test**

ATD Serial No: 065

Test I.D.: D021434

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	6.58 to 6.82	6.76	Pass
Peak Probe Force	Newtons	5159 to 5893	5,738	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.03	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results				Pass

Laboratory Technician

11/12/2002

Test Date

Approved By

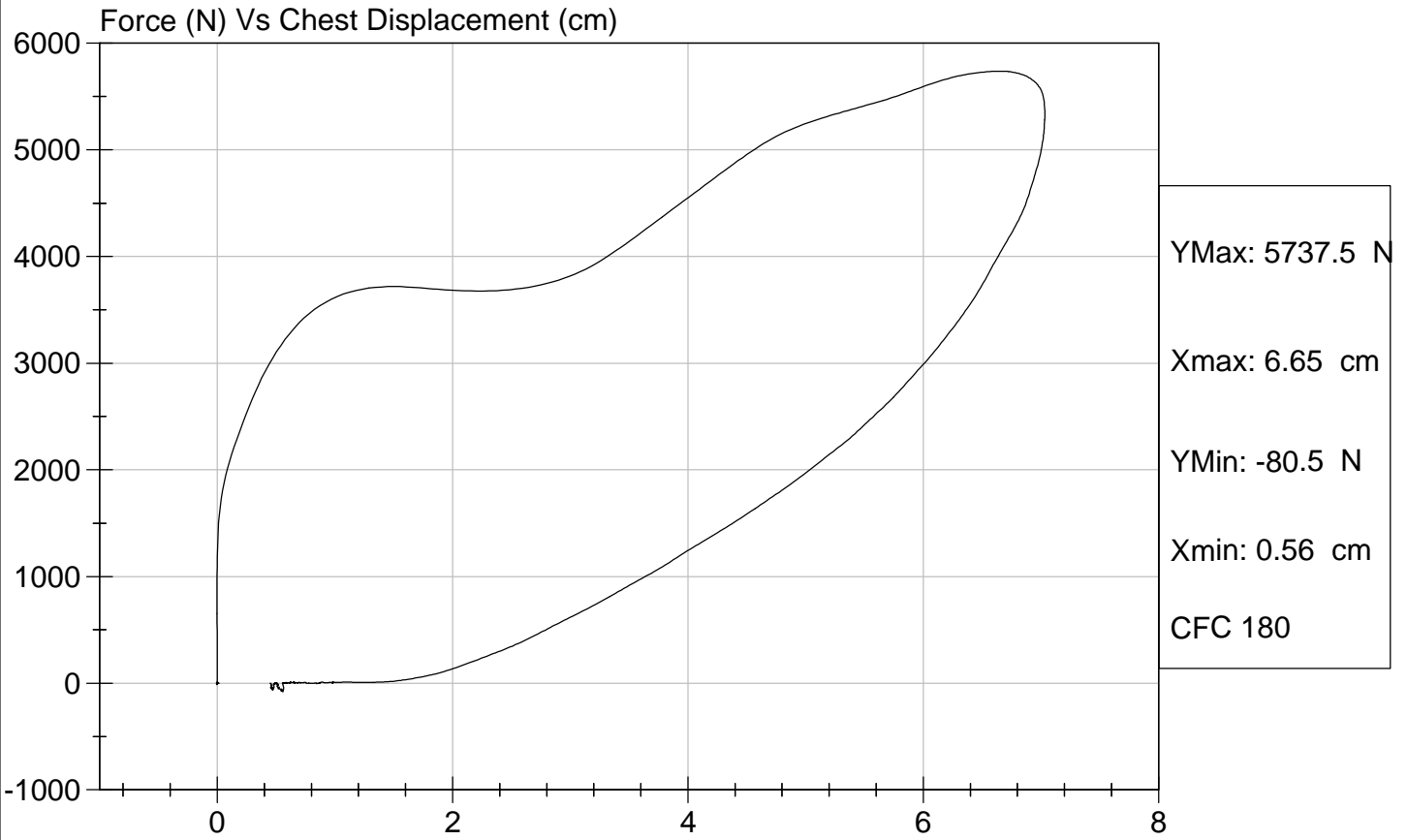


Test Description: Thorax Impact

Test Date: 11/12/2002

Component: D021434

Speed: 22.18 ft/sec, 6.76 m/sec



**Hybrid III Calibration Data Sheet
50th Percentile Male
Right Knee Impact Test**

ATD Serial No: 065

Test I.D.: D021435

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,923	Pass
Overall Test Results				Pass

Laboratory Technician

11/08/2002

Test Date

Approved By

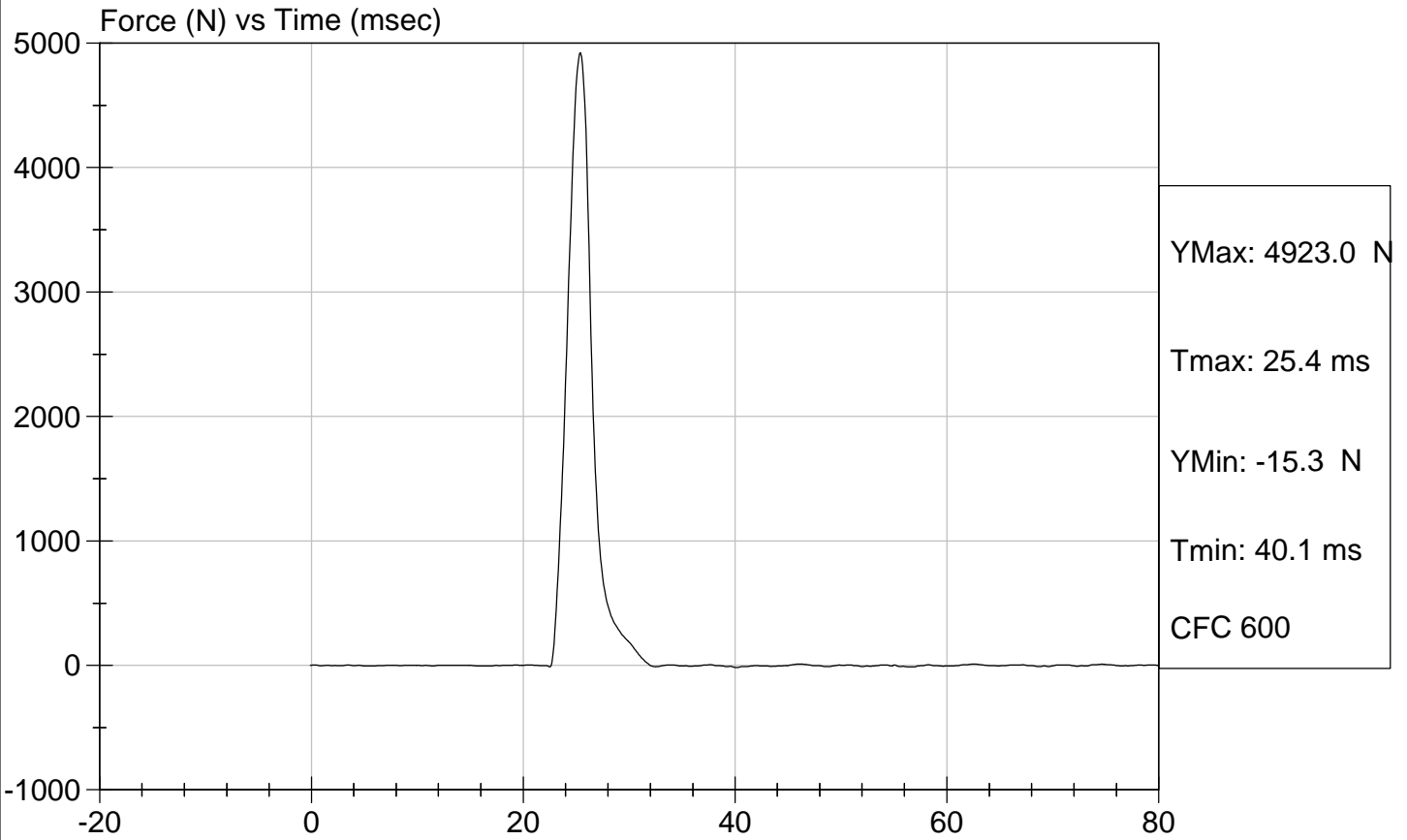


Test Description: Right Knee

Test Date: 11/08/2002

Component: D021435

Speed: 6.9 ft/sec, 2.10 m/sec



Hybrid III Calibration Data Sheet
50th Percentile Male
Left Knee Impact Test

ATD Serial No: 065

Test I.D.: D021436

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,139	Pass
Overall Test Results				Pass

 Laboratory Technician

11/08/2002

 Test Date

 Approved By

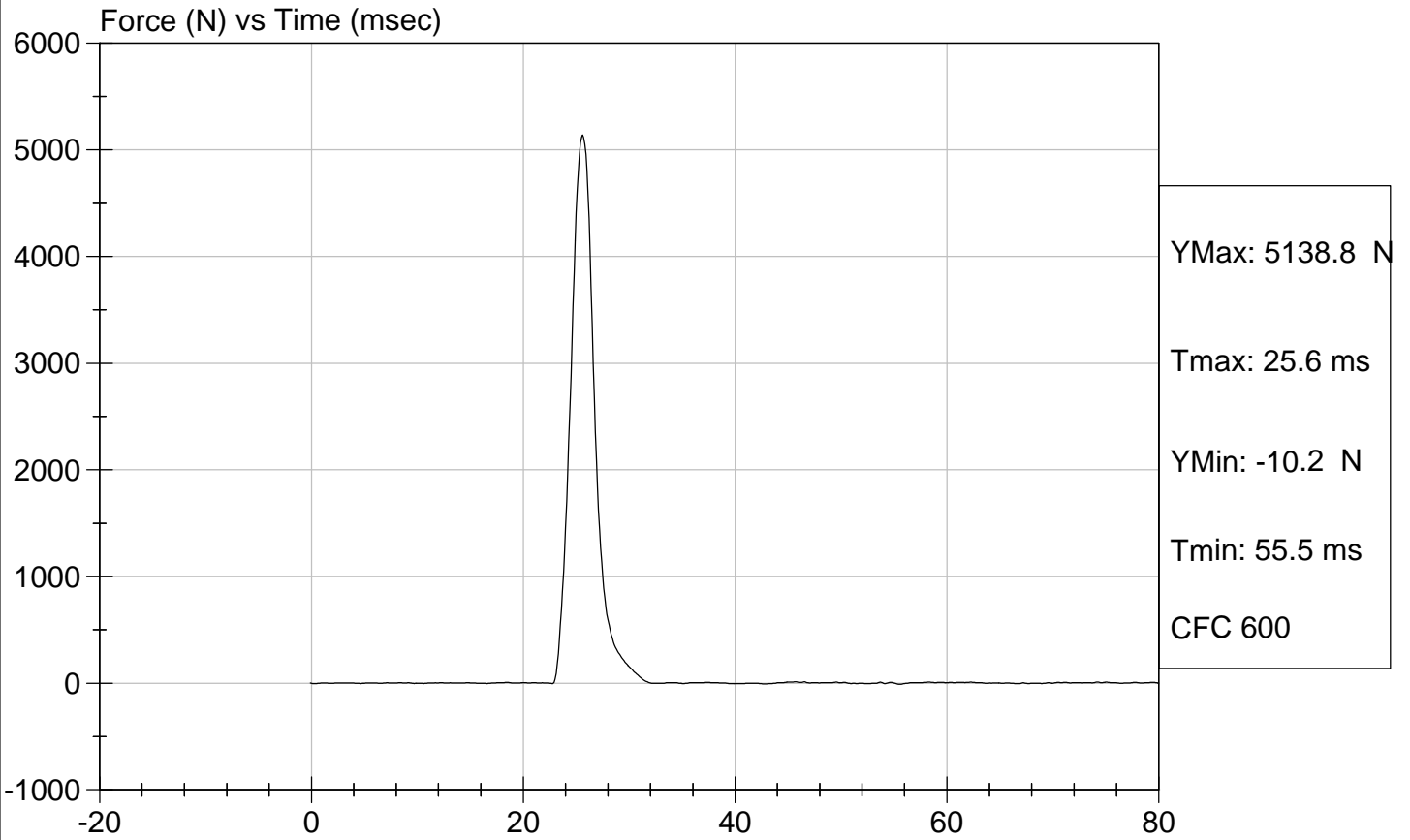


Test Description: Left Knee

Test Date: 11/08/2002

Component: D021436

Speed: 6.95 ft/sec, 2.12 m/sec



**Hybrid III Calibration Data Sheet
50th Percentile Male
Hip-Femur Flexion Test**

ATD Serial No: 065

Test I.D.: D021439/0

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.9	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	33	33	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	64.1	70.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	46	45	Pass
Overall Test Results					Pass

Laboratory Technician

11/12/2002

Test Date

Approved By

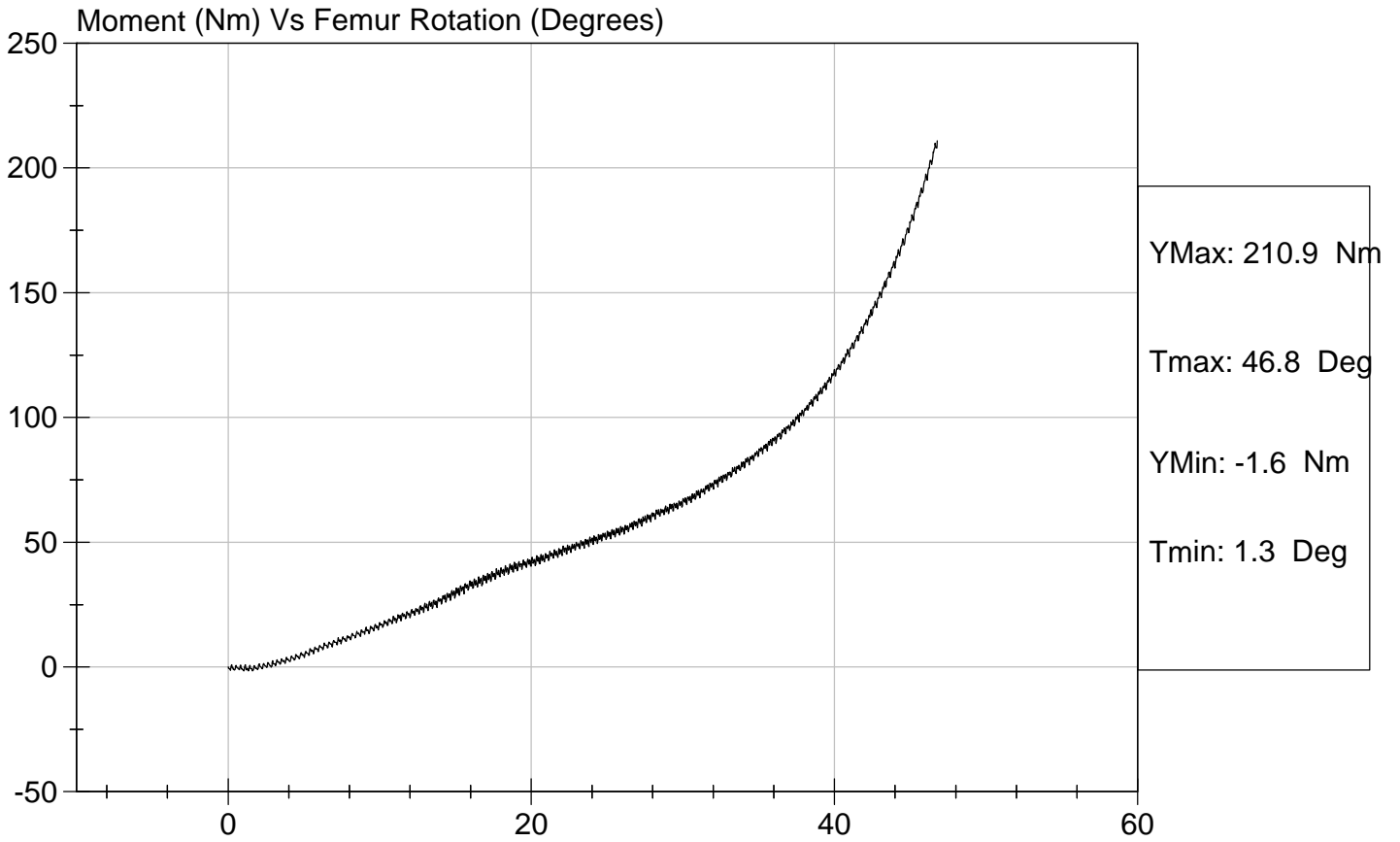


Test Description: Hip Femur Flexion

Test Date: 11/12/2002

Component: D021439

Speed: 0 ft/sec, 0.00 m/sec



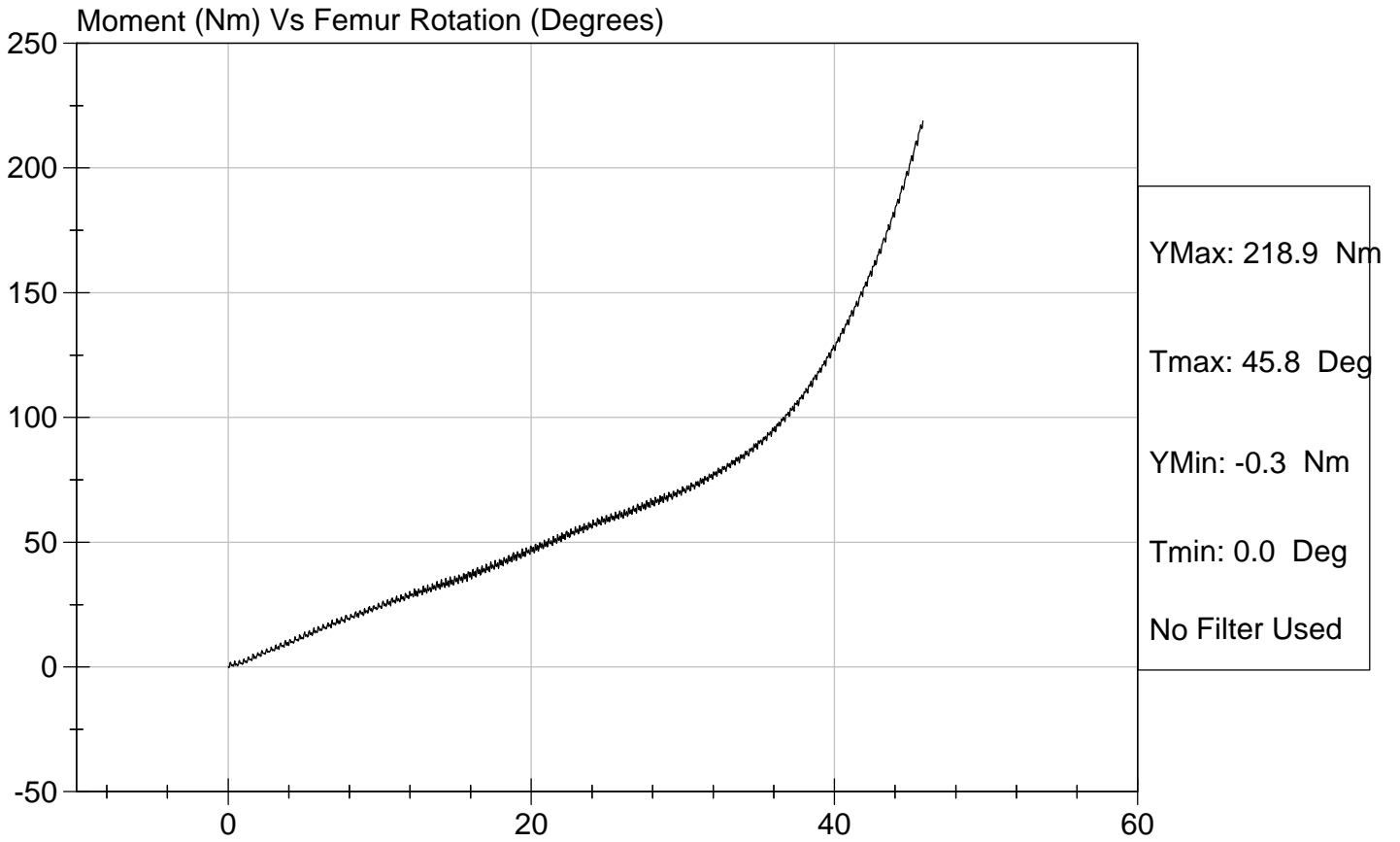


Test Description: Hip Femur Flexion

Test Date: 11/12/2002

Component: D021430

Speed: 0 ft/sec, 0.00 m/sec



Hybrid III Calibration Data Sheet
50th Percentile Male
Head Drop Calibration

ATD Serial No: 066

Test I.D.: D021441

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	240.4	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	14.9	Pass
Is Acceleration Unimodal?	Yes/No	< 10% Peak	Yes	Pass
Overall Test Results				Pass

 Laboratory Technician

 11/08/2002
 Test Date

 Approved By



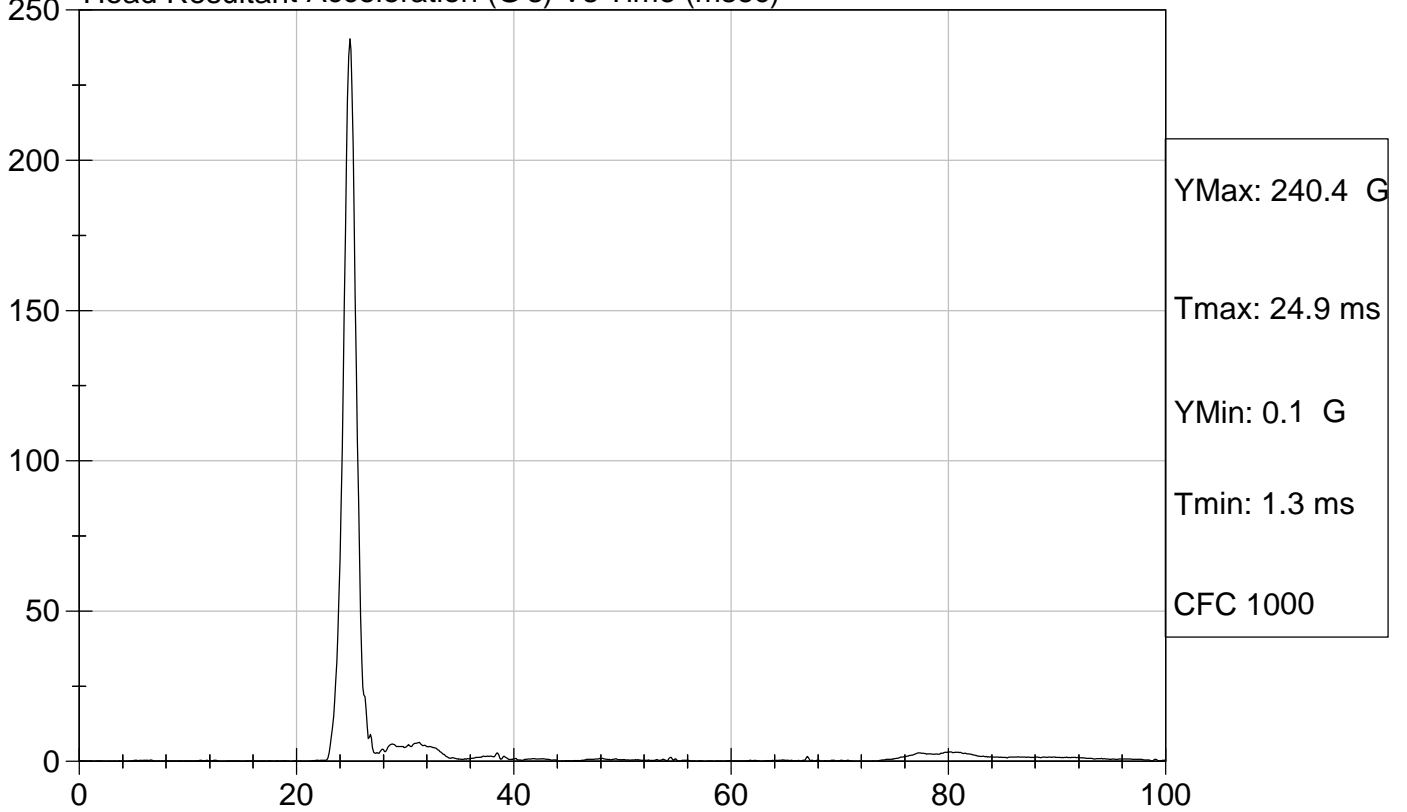
Test Description: Head Drop

Test Date: 11/08/2002

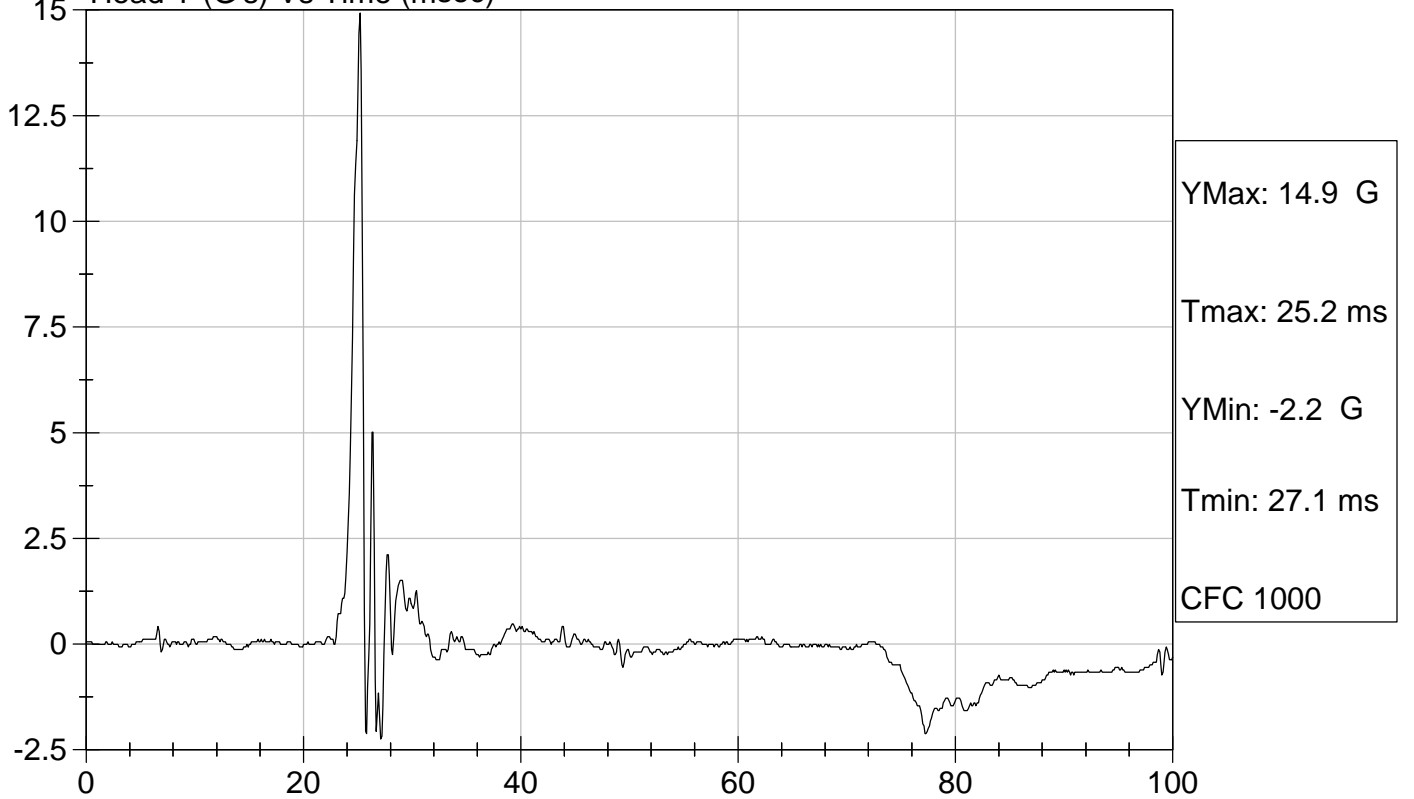
Component: D021441

Speed: 0 ft/s, 0.00 m/s

Head Resultant Acceleration (G's) Vs Time (msec)



Head Y (G's) Vs Time (msec)



Hybrid III Calibration Data Sheet
50th Percentile Male
Neck Flexion Test

ATD Serial No: 066

Test I.D: D021442

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	31	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.05	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	23.86	Pass
	20 msec	G's	17.60 to 22.60	20.08	Pass
	30 msec	G's	12.50 to 18.50	16.34	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	16.34	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	71.9	Pass
	Time	msec	57.0 to 64.0	57.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	114.2	Pass
Moment About Occipital Condyle	Maximum	N m	84.1 to 108.5	95.7	Pass
	Time	msec	47.0 to 58.0	48.8	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	99.6	Pass

Overall Test Results				Pass	
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Laboratory Technician

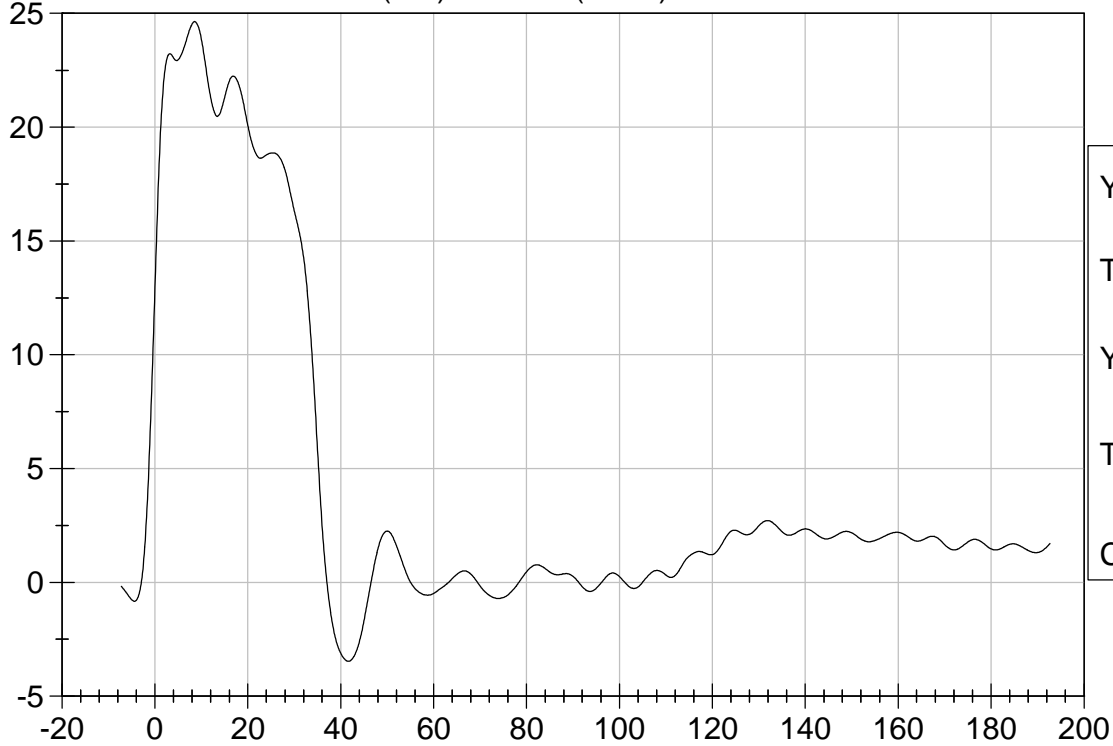
11/08/2002

Test Date

Approved By

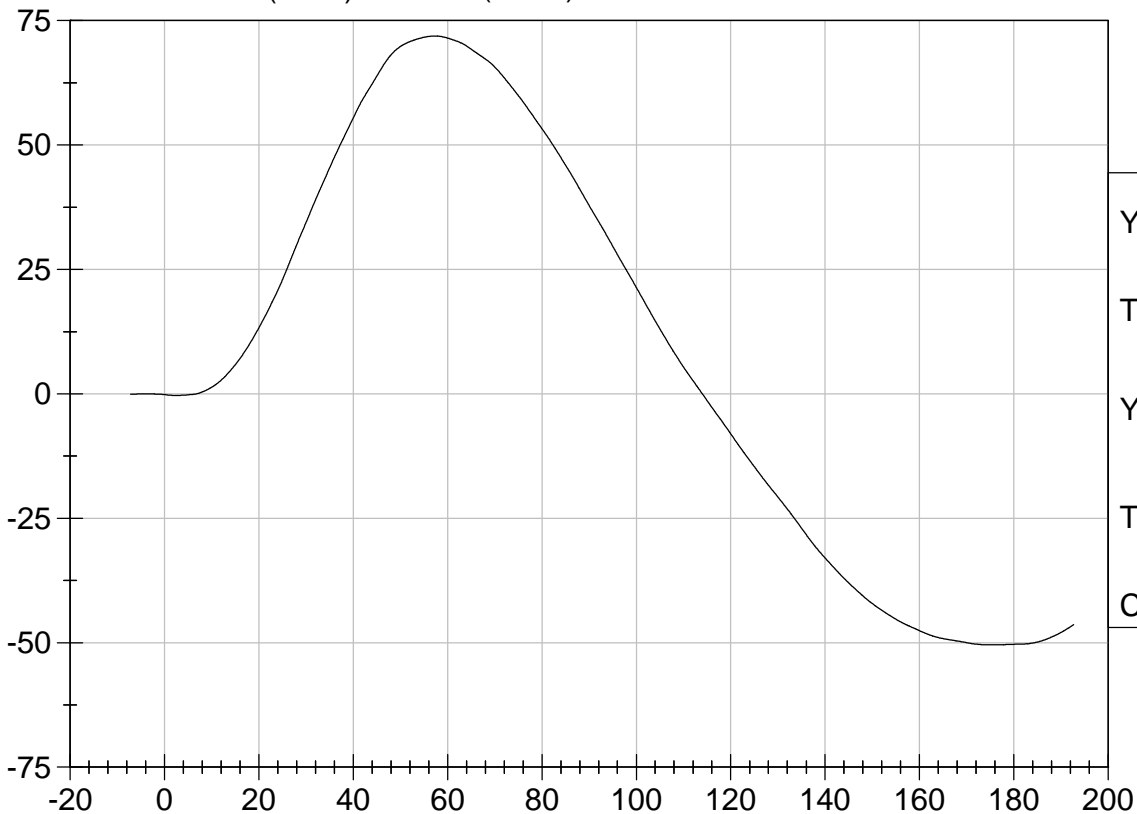


Pendulum Deceleration (G's) vs Time (msec)



YMax: 24.6 G'S
Tmax: 8.6 ms
YMin: -3.5 G'S
Tmin: 41.7 ms
CFC 60

Neck Rotation (DEG) vs Time (msec)

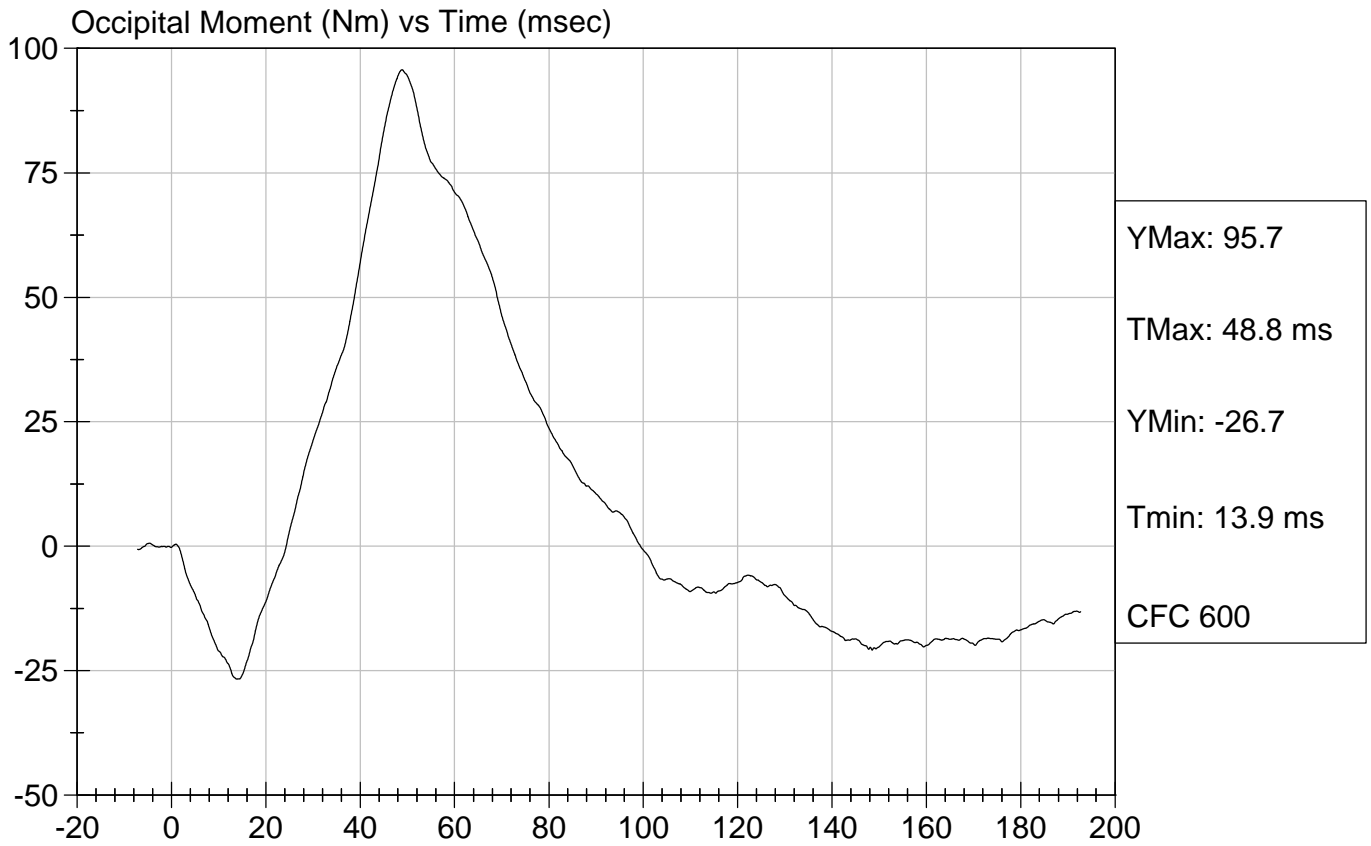


YMax: 71.9
Tmax: 57.3 ms
YMin: -50.4
Tmin: 175.1 ms
CFC 60



Test Desc: Neck Flexion
Component ID: D021442

Test Date: 11/08/2002
Speed: 23.12 ft/sec, 7.05 m/sec



Hybrid III Calibration Data Sheet
50th Percentile Male
Neck Extension Test

ATD Serial No: 066

Test I.D: D021443

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	31	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.93	Pass
	20 msec	G's	14.00 to 19.00	16.75	Pass
	30 msec	G's	11.00 to 16.00	13.36	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	13.4	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	98.9	Pass
	Time	msec	72.0 to 82.0	78.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	154.0	Pass
Moment About Occipital Condyle	Minimum	N m	-52.9 to -79.9	-70.8	Pass
	Time	msec	65.0 to 79.0	70.7	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	142.6	Pass

Overall Test Results	Pass
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Laboratory Technician

11/08/2002

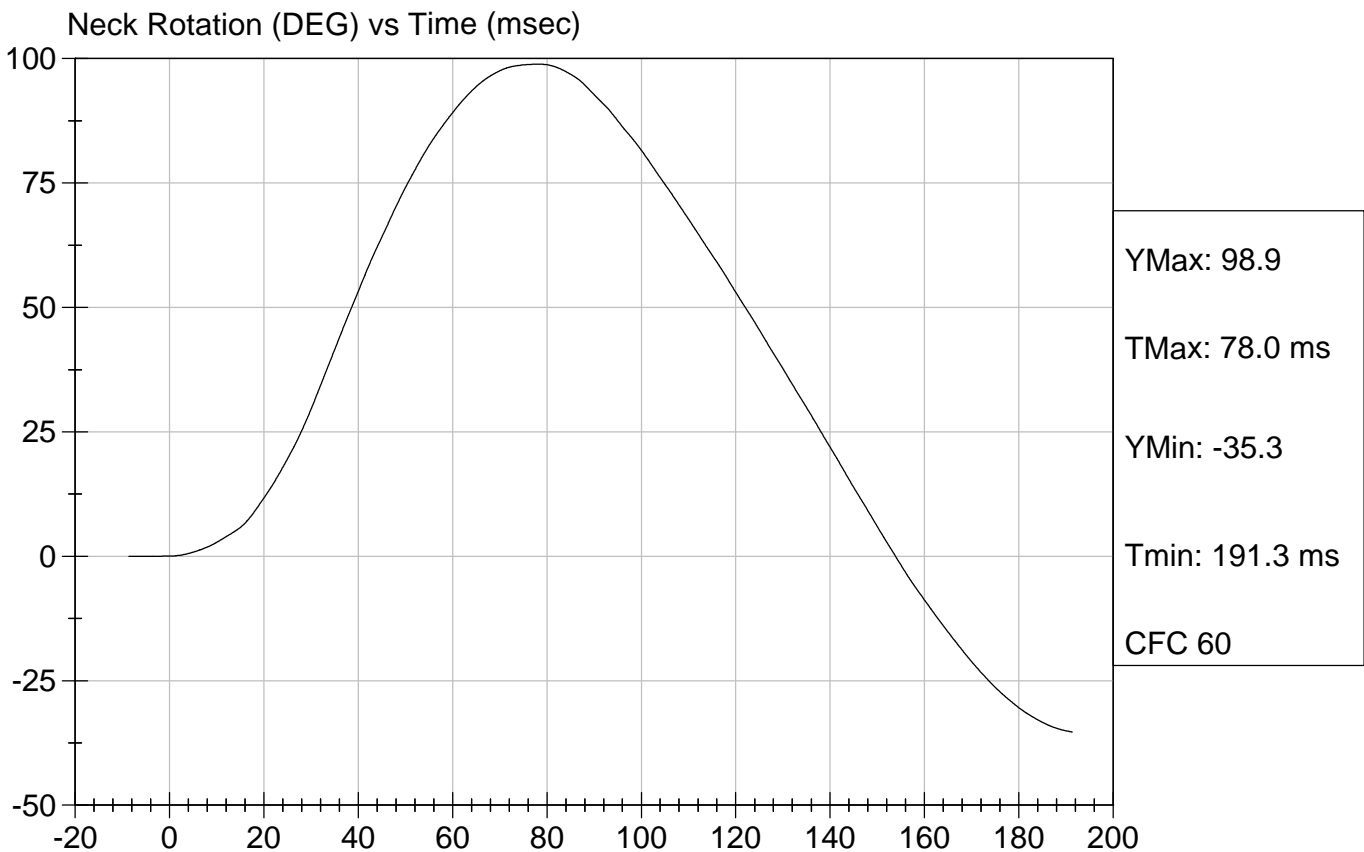
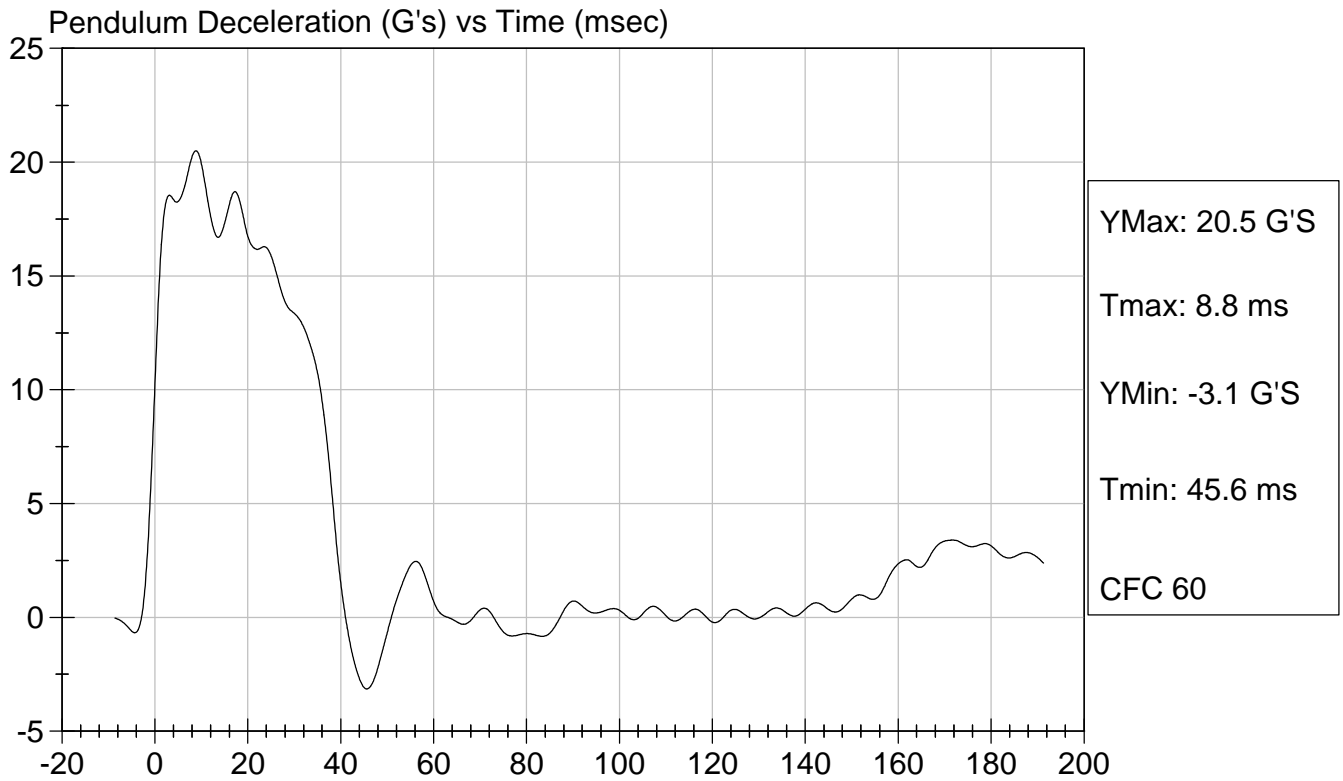
Test Date

Approved By



Test Desc: Neck Extension
Component ID: D021443

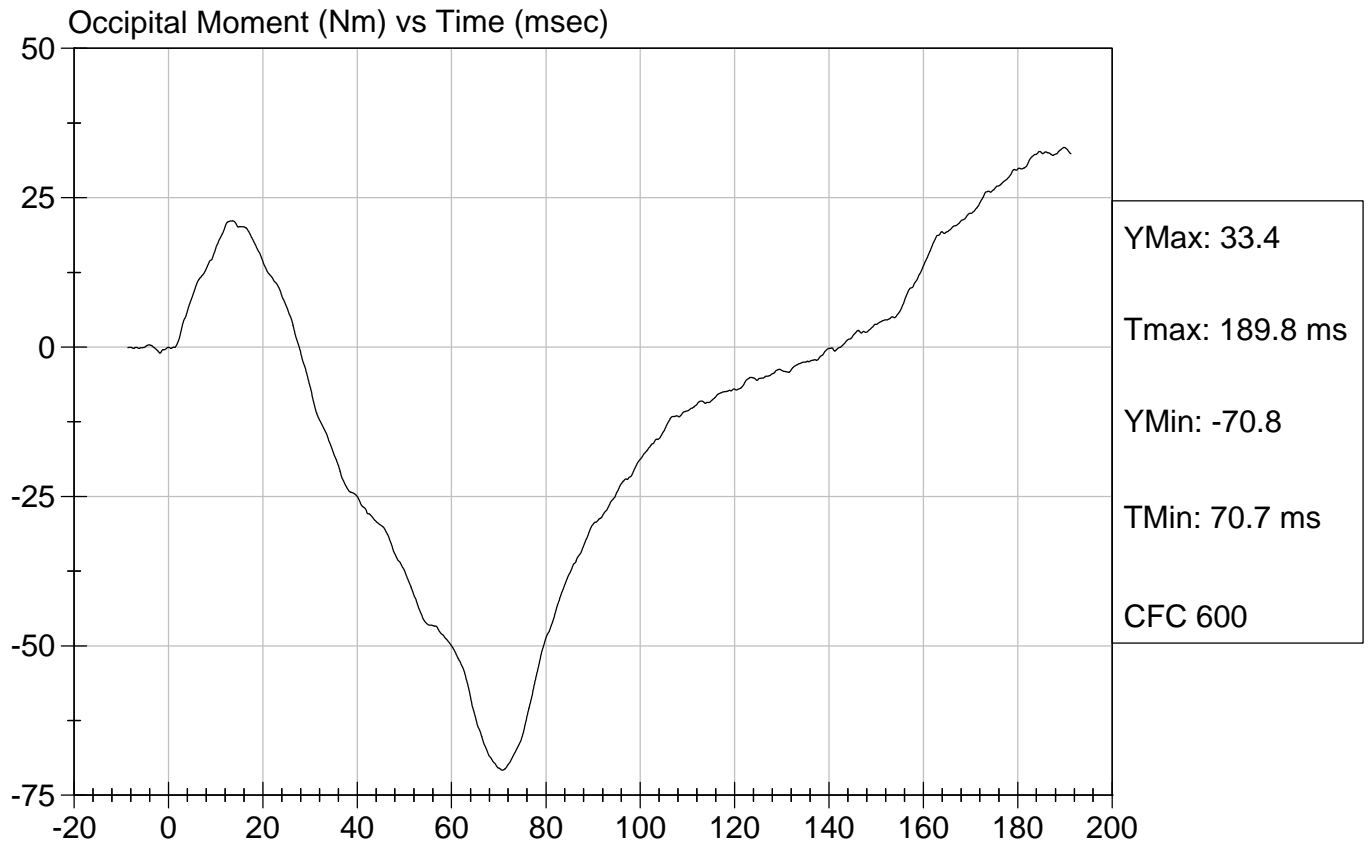
Test Date: 11/08/2002
Speed: 20.11 ft/sec, 6.13 m/sec





Test Desc: Neck Extension
Component ID: D021443

Test Date: 11/08/2002
Speed: 20.11 ft/sec, 6.13 m/sec



Hybrid III Calibration Data Sheet
50th Percentile Male
Thorax Impact Test

ATD Serial No: 066

Test I.D.: D021444

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	6.58 to 6.82	6.76	Pass
Peak Probe Force	Newtons	5159 to 5893	5,556	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.47	Pass
Internal Hysteresis	%	69 to 85	77	Pass
Overall Test Results				Pass

 Laboratory Technician

11/12/2002

 Test Date

 Approved By



Test Description: Thorax Impact

Test Date: 11/12/2002

Component: D021444

Speed: 22.18 ft/sec, 6.76 m/sec



Hybrid III Calibration Data Sheet
50th Percentile Male
Right Knee Impact Test

ATD Serial No: 066

Test I.D.: D021445

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	4,769	Pass
Overall Test Results				Pass

 Laboratory Technician

11/08/2002

 Test Date

 Approved By

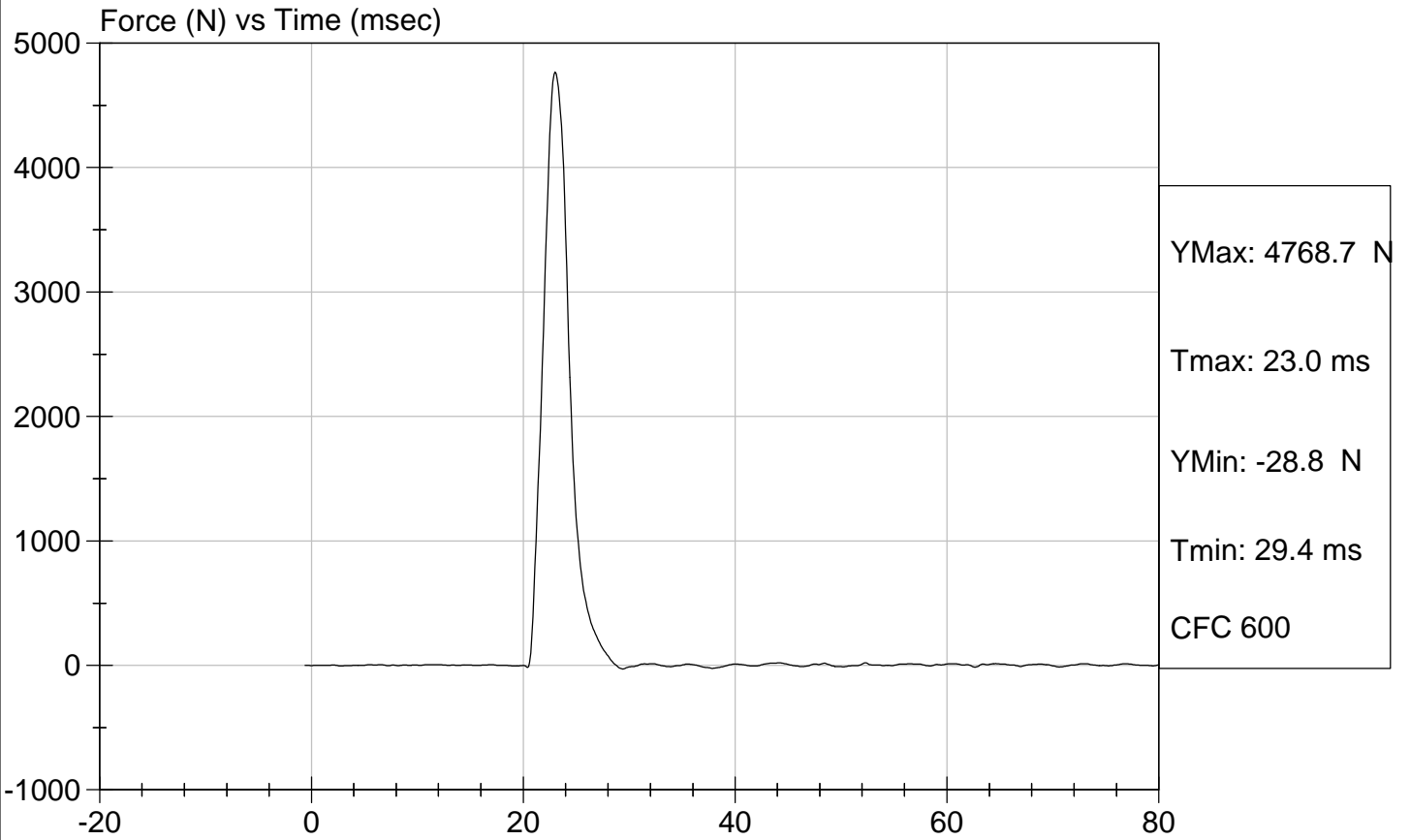


Test Description: Right Knee

Test Date: 11/08/2002

Component: D021445

Speed: 6.92 ft/sec, 2.11 m/sec



Hybrid III Calibration Data Sheet
50th Percentile Male
Left Knee Impact Test

ATD Serial No: 066

Test I.D.: D021446

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,071	Pass
Overall Test Results				Pass

 Laboratory Technician

11/08/2002

 Test Date

 Approved By

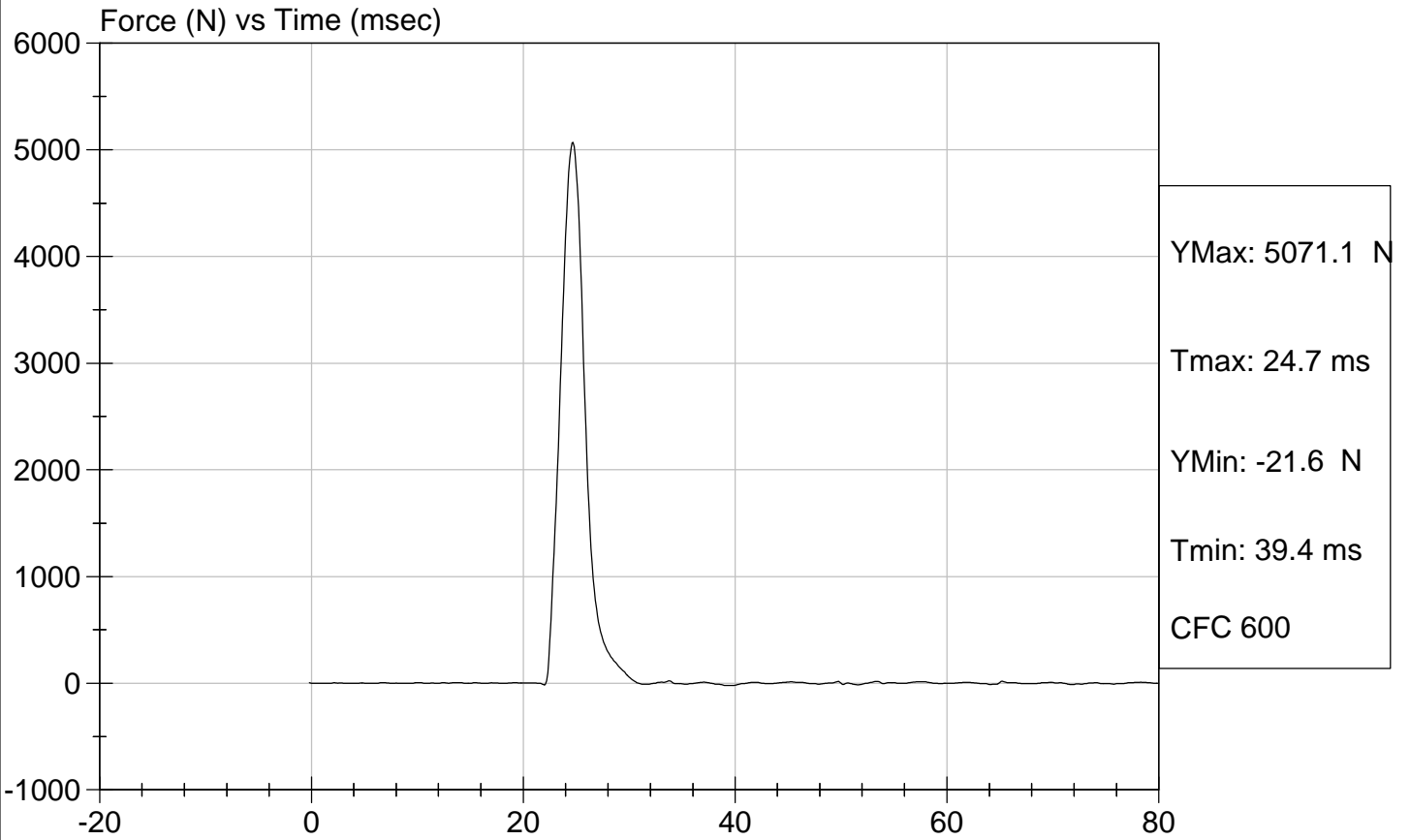


Test Description: Left Knee

Test Date: 11/08/2002

Component: D021446

Speed: 6.93 ft/sec, 2.11 m/sec



Hybrid III Calibration Data Sheet
50th Percentile Male
Hip-Femur Flexion Test

ATD Serial No: 066

Test I.D.: D021449/0

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	22.1	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	31	31	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	78.3	79.0	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	44	41	Pass
Overall Test Results					Pass

 Laboratory Technician

11/12/2002
 Test Date

 Approved By

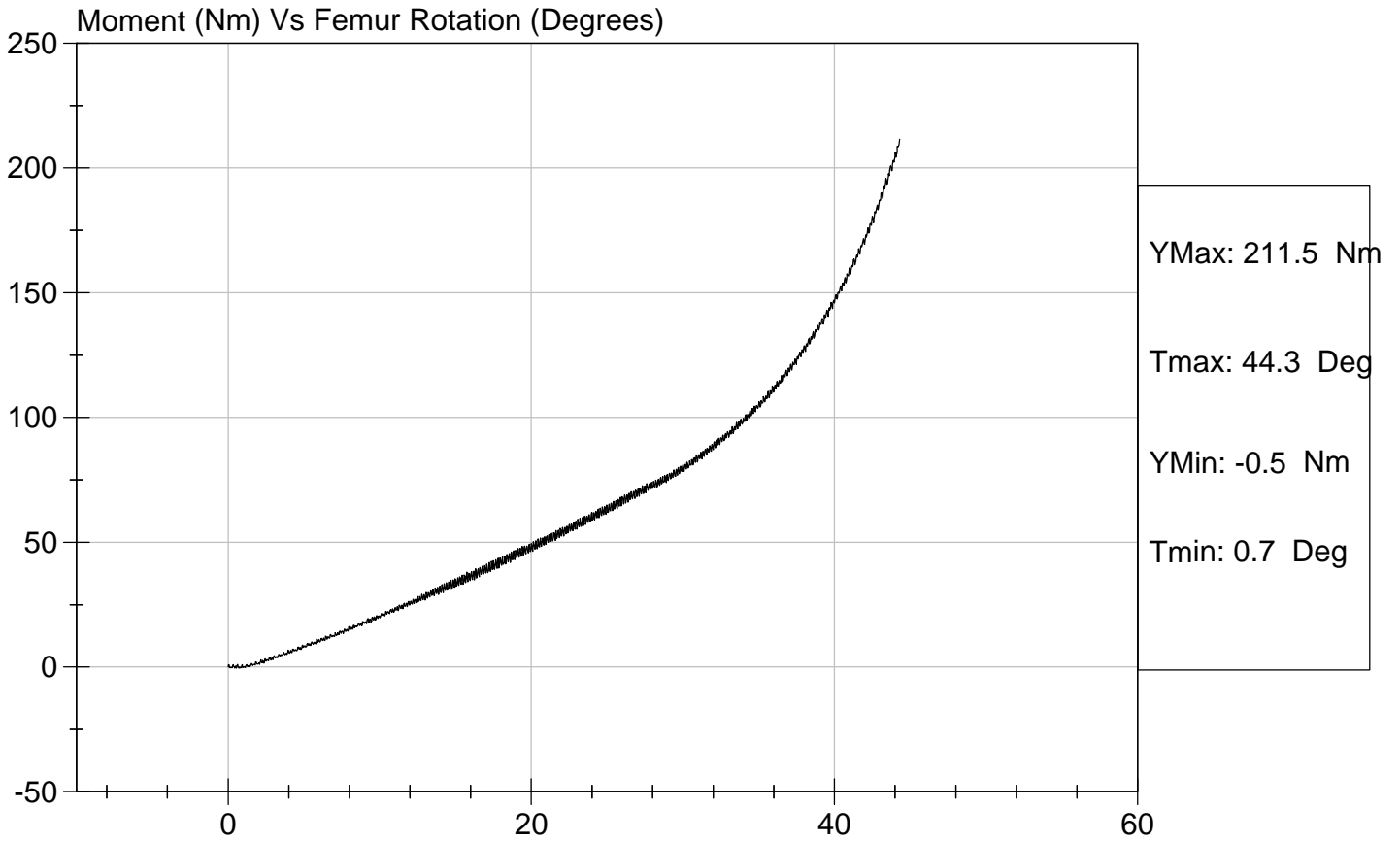


Test Description: Hip Femur Flexion

Test Date: 11/12/2002

Component: D021449

Speed: 0 ft/sec, 0.00 m/sec



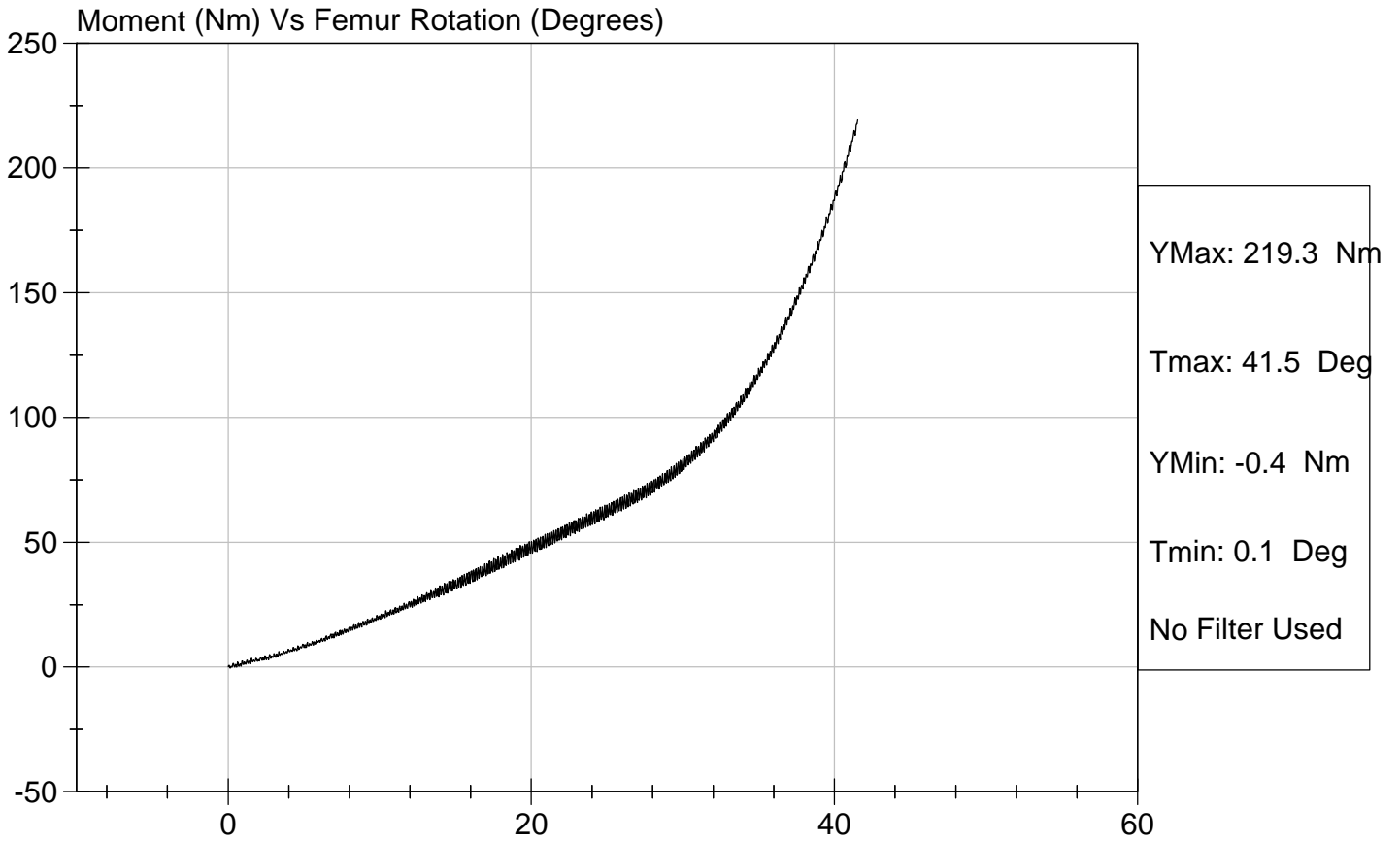


Test Description: Hip Femur Flexion

Test Date: 11/12/2002

Component: D021440

Speed: 0 ft/sec, 0.00 m/sec



APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

INSTRUMENTS FOR DRIVER DUMMY NO. 065

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCY6	Endevco	12/11/02
Head Y	J13941	Endevco	12/11/02
Head Z	AAMW5	Endevco	12/11/02
Head X Redundant	J18724	Endevco	12/11/02
Head Y Redundant	J14235	Endevco	12/11/02
Head Z Redundant	AJ5R0	Endevco	12/11/02
Neck Load Cell	442	Denton	10/9/02
Chest X	ACC78	Endevco	12/11/02
Chest Y	ACCE6	Endevco	12/11/02
Chest Z	ACCY3	Endevco	12/11/02
Chest Deflection Gauge	065	Servo	11/12/02
Chest X Redundant	J19927	Endevco	12/11/02
Chest Y Redundant	J20580	Endevco	12/11/02
Chest Z Redundant	J23914	Endevco	12/11/02
Pelvis X	AHTN3	Endevco	10/9/02
Pelvis Y	AHOC3	Endevco	10/9/02
Pelvis Z	AHT12	Endevco	10/9/02
Left Femur Load Cell	259	Denton	11/21/02
Right Femur Load Cell	256	Denton	11/21/02
Left Upper Tibia Load Cell	105	Denton	9/18/02
Left Lower Tibia Load Cell	133	Denton	9/18/02
Right Upper Tibia Load Cell	103	Denton	9/18/02
Right Lower Tibia Load Cell	134	Denton	9/18/02
Left Foot Z – Front	J14120	Endevco	12/11/02
Left Ankle X	J23774	Endevco	12/11/02
Left Ankle Z	APYY3	Endevco	12/11/02
Right Foot Z – Front	J18736	Endevco	12/11/02
Right Ankle X	J23946	Endevco	12/11/02
Right Ankle Z	J27513	Endevco	12/11/02
Shoulder Belt Load Cell	194	Denton	11/21/02
Lap Belt Load Cell	199	Denton	11/25/02

INSTRUMENTS FOR PASSENGER DUMMY NO. 066

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMN8	Endevco	12/11/02
Head Y	ACC61	Endevco	12/11/02
Head Z	ACCW9	Endevco	12/11/02
Head X Redundant	J19884	Endevco	12/11/02
Head Y Redundant	J21988	Endevco	12/11/02
Head Z Redundant	J28986	Endevco	12/11/02
Neck Load Cell	443	Denton	9/18/02
Chest X	ACCY1	Endevco	12/11/02
Chest Y	ACCC8	Endevco	12/11/02
Chest Z	ACCT7	Endevco	12/11/02
Chest Deflection Gauge	066	Servo	11/12/02
Chest X Redundant	J13541	Endevco	12/11/02
Chest Y Redundant	J20093	Endevco	12/11/02
Chest Z Redundant	J19440	Endevco	12/11/02
Pelvis X	J22033	Endevco	10/16/02
Pelvis Y	J21691	Endevco	10/16/02
Pelvis Z	J21970	Endevco	10/16/02
Left Femur Load Cell	262	Denton	11/21/02
Right Femur Load Cell	261	Denton	11/21/02
Left Upper Tibia Load Cell	109	Denton	9/18/02
Left Lower Tibia Load Cell	138	Denton	9/18/02
Right Upper Tibia Load Cell	106	Denton	9/18/02
Right Lower Tibia Load Cell	135	Denton	9/18/02
Left Foot Z – Front	J28988	Endevco	12/11/02
Left Ankle X	J22036	Endevco	12/11/02
Left Ankle Z	J20569	Endevco	12/11/02
Right Foot Z – Front	J20382	Endevco	12/11/02
Right Ankle X	J20165	Endevco	12/11/02
Right Ankle Z	J28708	Endevco	12/11/02
Shoulder Belt Load Cell	192	Denton	11/22/02
Lap Belt Load Cell	198	Denton	11/27/02

INSTRUMENTS FOR VEHICLE AND LABORATORY

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	K21-N01	Entran	6/25/02
Left Rear Seat Crossmember Z	K21-N09	Entran	6/25/02
Right Rear Seat Crossmember X	99F254	Entran	10/31/02
Right Rear Seat Crossmember Z	99F253	Entran	11/4/02
Top of Engine X	H14-N01	Entran	6/17/02
Bottom of Engine X	AK956	Endevco	11/4/02
Left Brake Caliper X	H14-N08	Entran	10/7/02
Right Brake Caliper X	99F18A	Entran	11/4/02
Instrument Panel X	D11-F14	Entran	11/19/02

Note: All Endevco accelerometers are Model No. 7264-2000
All Entran accelerometers are Model No. EGE-72