

REPORT NUMBER: NCAP-MGA-2003-001

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

**2003 FORD EXPEDITION 4 DOOR
NHTSA NUMBER: M30202**

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



Test Date: November 26, 2002

Report Date: December 9, 2002

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
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WASHINGTON, D.C. 20590**

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Date of Acceptance

COTR, NCAP Frontal Impact Program

Date of Acceptance

Technical Report Documentation Page

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16. Abstract A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2003 Ford Expedition 4 door at MGA Research Corporation on November 26, 2002. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.5 km/h. The ambient temperature at the barrier face at the time of impact was 22 degrees Celsius. The vehicle's maximum post test static crush is 649 mm located to the left 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: <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>461</td> <td>596</td> </tr> <tr> <td>Max. Thorax Accel. (3msec Clip)</td> <td>G's</td> <td>60</td> <td>38</td> <td>37</td> </tr> <tr> <td>Left Femur force</td> <td>Newtons</td> <td>10009</td> <td>-2977</td> <td>-1706</td> </tr> <tr> <td>Right Femur force</td> <td>Newtons</td> <td>10009</td> <td>-3122</td> <td>-1475</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	461	596	Max. Thorax Accel. (3msec Clip)	G's	60	38	37	Left Femur force	Newtons	10009	-2977	-1706	Right Femur force	Newtons	10009	-3122	-1475
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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 Ford Expedition at a velocity of 56.5 kph. The test was performed at MGA Research Corporation on November 26, 2002. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and seventeen 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 147 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 649 mm and both the driver and passenger side doors remained closed and latched during the impact event and were operable after the impact.

The driver's head and chest contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the lower dash. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the dash. The right child dummy's head contacted the right rear vehicle headrest. The feet of this dummy contacted the right front seatback. The left child dummy's head contacted the child seat overhead shield. The feet of this dummy contacted the left front seatback.

The occupant data is summarized below:

ATD position	HIC	Clip(g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)	Belt Spool (mm)
Driver	461	38	-22	-2977	-3122	*
Passenger	596	37	-23	-1706	-1475	*

* Not recorded at vehicle manufacturer's request.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

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 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/hr	56.5
Test Weight	kg	2757.8
Average Rebound	mm	442
Maximum Static Crush	mm	649
Impact Angle	degrees	90.2

DOOR OPENING AND SEAT TRACK INFORMATION

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

TEST DUMMY INFORMATION

Description	Driver	Passenger
Dummy Type / Serial No.	065	066
Head Contact	Airbag, headrest	Airbag, headrest
Chest Contact	Airbag	Airbag
Abdomen Contact	None	None
Left Knee Contact	Lower Dash	Dash
Right Knee Contact	Lower Dash	Dash

16mm MOVIE COVERAGE

High Speed	17
Real Time	1
Total	18

Driver ATD Sensors	42
Passenger ATD Sensors	42
Belt Assessment Sensors	0
Vehicle Structure Accelerometers	9
Rigid Barrier Load Cells	6
Total	99

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

TEST VEHICLE INFORMATION

Manufacturer	Ford Motor Company
Model	Expedition
Body Style	4 door
NHTSA No.	M30202
VIN	1FMPU16WX3LA60628
Color	White
Delivery Date	9/5/02
Odometer Reading (mile)	103
Dealer	Donley Ford
Transmission	Automatic
Final Drive	4 wheel
Number of Cylinders	8
Engine Displacement (L)	4.6
Engine Placement	Longitudinal

TEST VEHICLE OPTIONS

Driver Airbag	Yes
Passenger Airbag	Yes
Force Limiter	Yes
Pretensioner	Yes
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/Cassette	Yes
Anti-theft System	No
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Company	GVWR (kg)	3220
Date of Manufacture	8/02	GAWR Front (kg)	1428
		GAWR Rear (kg)	1837

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	308	308
Cold Pressure (kPa)	245	245
Recommended Tire Size	P265/70R17	P265/70R17
Tire Size on Vehicle	P265/70R17	P265/70R17
Tire Manufacturer	Continental	Continental

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Split Bench	Split Bench	Split Bench	
Number Of Occupants	3	3	3	9
Capacity Wt. (VCW) (kg)				712.5
Cargo Wt. (RCLW) (kg)				100.2

DATA SHEET NO. 2...(continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	624.6	641.4		674.0	725.3	
Right	kg	625.1	616.9		670.4	688.1	
Ratio	%	49.8	50.2		48.7	51.3	
Totals	kg	1249.7	1258.3	2508.0	1344.4	1413.4	2757.8

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2508.0
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	100.2
Calculated Vehicle Target Weight (TVTW)	kg	2764.2

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	899	903	901	905	1515
As Tested	mm	886	898	889	892	1548
Post Test	mm	909	873	900	892	

Vehicle Wheelbase (mm): 3020

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

Vehicle Components Removed: None

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

FUEL SYSTEM DATA

Fuel System Capacity From Owner's Manual (L): 106.0

Usable Capacity Figure Furnished by COTR (L): 106.0

Actual Test Volume (L): 98.4

Test Fluid Type: Stoddard Solvent ; Specific Gravity: 0.77

Is Vehicle Fuel Pump Electric or Mechanical? Electric

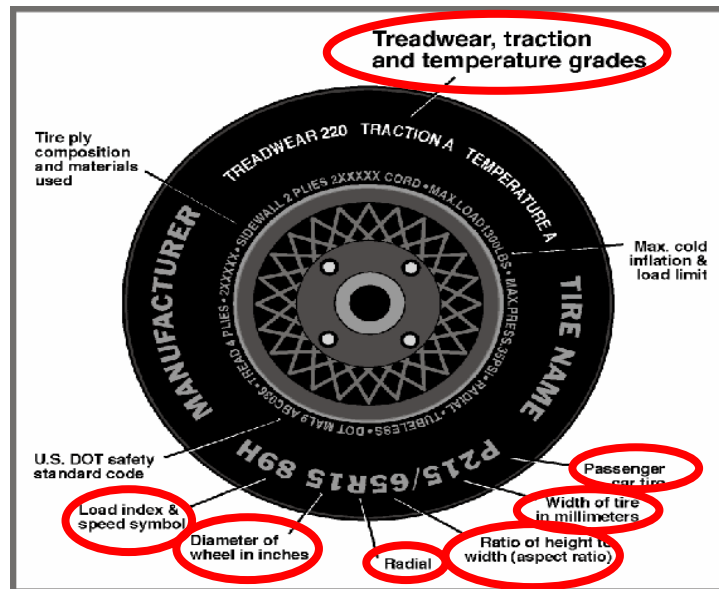
If electric, does pump operate with ignition switch "ON" & engine "OFF"?: yes

DATA SHEET NO. 3 **TEST VEHICLE TIRE INFORMATION**

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

Vehicle Year	2003	Vehicle Make	Ford
VIN	1FMPU16WX3LA60628	Vehicle Model	Expedition



	Front	Rear
Tire Manufacturer	Continental	Continental
Tire Name	Contitrac	Contitrac
Tire Type	SUV	SUV
Tire Width (mm)	65	65
Ratio of Height to Width (aspect ratio)	70	70
Radial	R	R
Wheel Diameter	17	17
Load Index & Speed Symbol	113S	113S
Treadwear	520	520
Traction Grade	A	A
Temperature Grade	B	B

DATA SHEET NO. 4
POST IMPACT DATA

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.5 – 57.1	56.5
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	56.5
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	5124	4518	606
Center	mm	5195	4549	646
Right Side	mm	5125	4554	571

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	440
Center	mm	440
Right Side	mm	445
Average	mm	441

DATA SHEET NO. 5
TEST VEHICLE INFORMATION

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

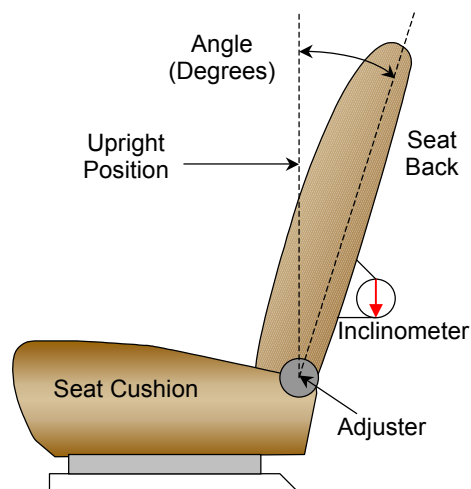
NHTSA No.: M30202
Test Date: 11/26/2002

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: The seat back angle is measured relative to the rocker sill. Remove the seat back panel and position inclinometer as shown in the drawing 13 inches above the back pivot point on the rear outboard seat frame. Avoid taking measurement on reinforcement plates.

Driver seat back angle: 16.9 deg

Passenger seat back angle: 16.9 deg



FRONT SEAT ASSEMBLY

SEAT FORE/AFT POSITIONS

The driver seat is power operated and the passenger seat is manually operated. The total travel on the driver seat is 200 mm and the passenger is 19 seat positions. The fore/aft position is set at the middle position for both driver and passenger.

Driver seat fore/aft total travel: 200 mm

Passenger seat fore/aft total travel: 19 notches

Driver seat fore/aft position: 100 of 200 mm

Passenger seat fore/aft position: 10 of 19 notches

SEAT BELT UPPER ANCHORAGE

The front outboard D-rings were placed in the 3rd of 5 positions.

DATA SHEET NO. 5...(continued)

TEST VEHICLE INFORMATION

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

FUEL TANK CAPACITY DATA

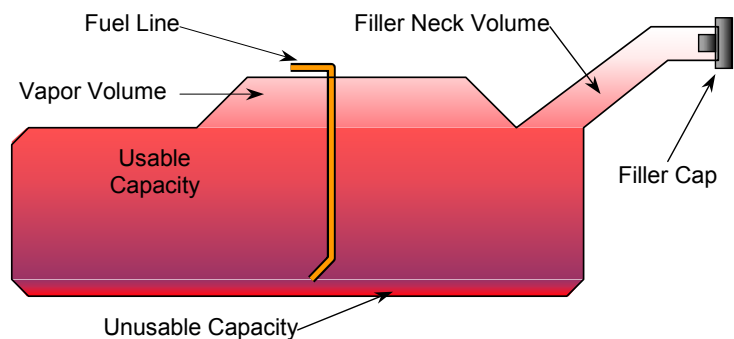
The "Usable Capacity" of the standard equipment fuel tank is: 106.0 liters

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

The "Usable Capacity" used for certification to FMVSS 301 requirements: 106.0 liters

Actual amount of Stoddard solvent added to vehicle for certification test: 98.4 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

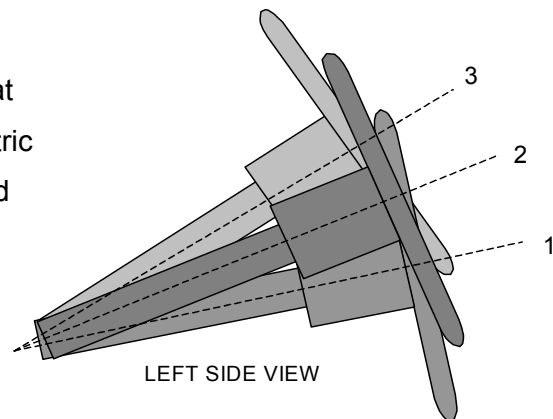
STEERING COLUMN ADJUSTMENT

Adjustable steering controls are adjusted so that the steering wheel hub is located at the geometric center of the locus it describes when it is moved through its full range of driving positions.

Lowermost, position 1: 18.4

Geometric center, position 2: 21.5

Uppermost, position 3: 24.6



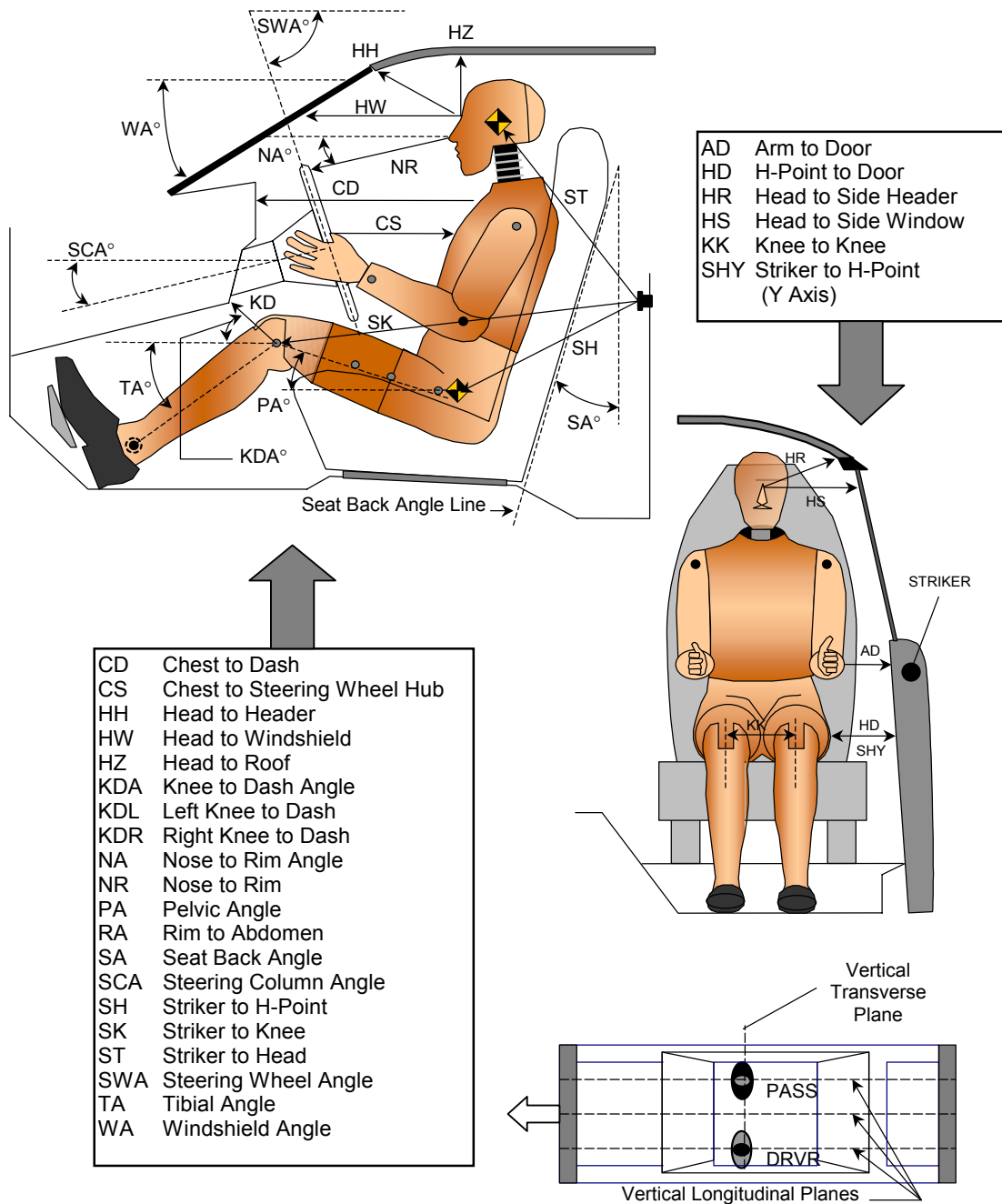
STEERING COLUMN ASSEMBLY

DATA SHEET NO. 6 **DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2003 Ford Expedition 4 door
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NHTSA No.: M30202
 Test Date: 11/26/2002

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET NO. 6...(continued)
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

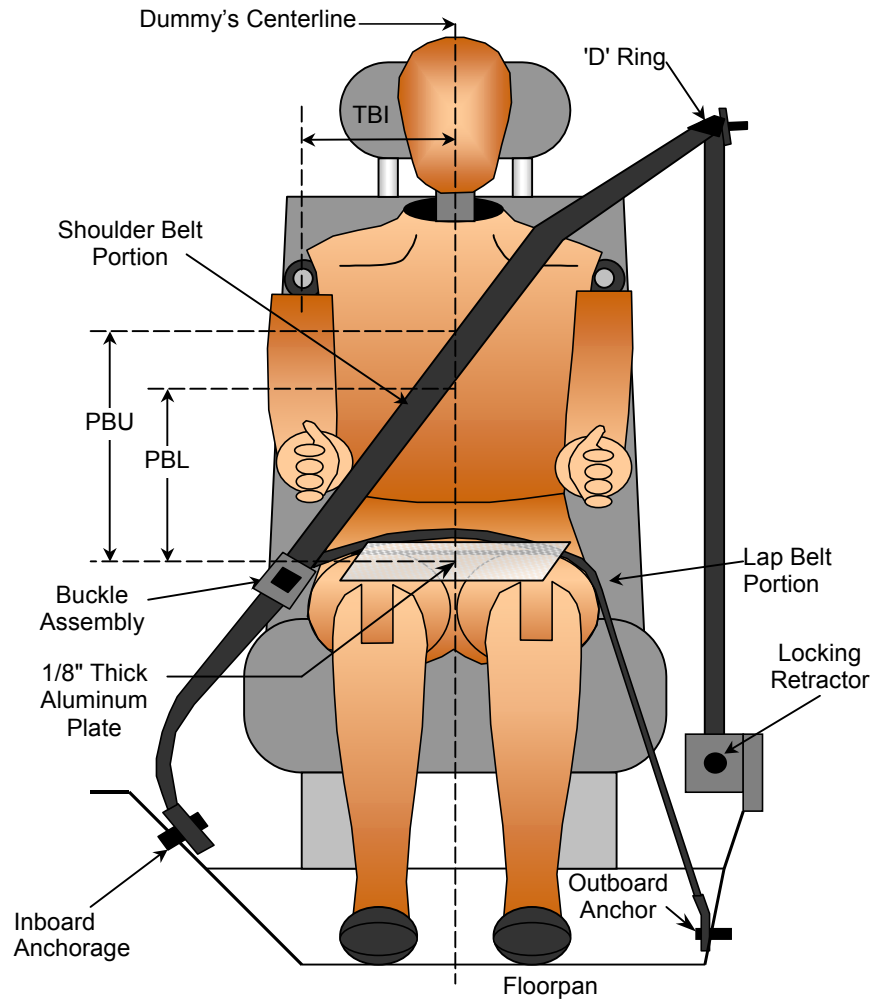
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		33.8		
SWA	Steering Wheel Angle		68.5		
SCA	Steering Column Angle		21.5		
SA	Seat Back Angle		16.9		16.9
HZ	Head to Roof (Z)	204	90	193	90
HH	Head to Header	394	21.1	359	23.1
HW	Head to Windshield	587	0	544	0
HR	Head to Side Header (Y)	193		204	
NR	Nose to Rim	394	16.6		
CD	Chest to Dash	545		562	
CS	Chest to Steering Hub	328	12.9		
RA	Rim to Abdomen	215	0		
KDL	Left Knee to Dash	181	0	161	
KDR	Right Knee to Dash	198		163	0
PA	Pelvic Angle		21.7		21.8
TA	Tibia Angle		45.2		55.1
KK	Knee to Knee (Y)	278		250	
SK	Striker to Knee	629	86.1	635	82.6
ST	Striker to Head	652	12.5	683	15.4
SH	Striker to H-Point	222	89.7	233	87.5
SHY	Striker to H-Point (Y)	264		275	
HS	Head to Side Window	309		321	
HD	H-Point to Door (Y)	170		168	
AD	Arm to Door (Y)	119		134	
AA	Ankle to Ankle	310		233	

DATA SHEET NO. 7 **SEAT BELT POSITIONING DATA**

Test Vehicle: 2003 Ford Expedition 4 door
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NHTSA No.: M30202
 Test Date: 11/26/2002



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	349	308
PBL - To surface of reference to belt lower edge	mm	270	210

DATA SHEET NO. 8

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2003 Ford Expedition 4 door
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NHTSA No.: M30202
 Test Date: 11/26/2002

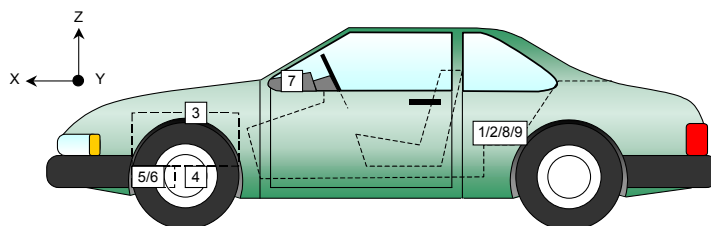
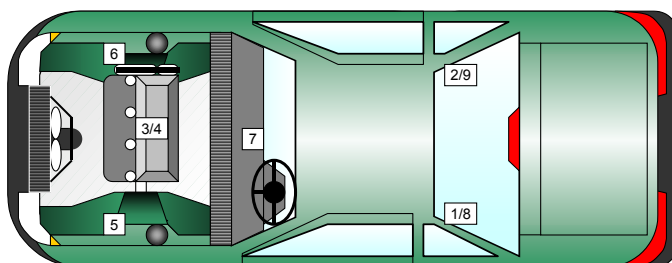
VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)			Peak Values				
		X	Y	Z	Units	Max	Time	Min	Time
1	Left Rear X-Member X	2065	-685	620	G's	4.5	133	-34.3	18
2	Right Rear X-Member X	2065	685	620	G's	3.4	134	-31.4	17
3	Engine Top X	4300	188	900	G's	1.4	133	-45.5	23
4	Engine Bottom X	3826	-70	330	G's	2.4	155	-45.3	22
5	Left Brake Caliper X	4075	-705	350	G's	106.7	43	-126.7	20
6	Right Brake Caliper X	4075	705	350	G's	118.5	23	-153.6	31
7	Instrument Panel X	3370	0	1380	G's	3.5	120	-61.1	32
8	Left Rear X-Member Z	2065	-685	620	G's	15.5	31	-21.2	41
9	Right Rear X-Member Z	2065	685	620	G's	21.5	29	-21.2	33

Reference Points: X - Rear Surface of Vehicle (+ forward)

Y - Vehicle Centerline (+ to right)

Z - Ground Plane (+ up)



DATA SHEET NO. 9

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2003 Ford Expedition 4 door
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Test Date: 11/26/2002

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	1.3	191	-55.5	85	4.9	200	-58.9	86
Head CG	Y	G's	3.6	139	-12.3	91	5.5	67	-12.2	79
Head CG	Z	G's	20.3	50	-1.9	139	21.5	70	-5.0	129
Head CG Resultant	N/A	G's	57.2	85			60.8	88		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.5	156	-37.7	87	6.3	181	-38.5	76
Chest CG	Y	G's	6.2	105	-2.7	56	4.6	95	-4.8	80
Chest CG	Z	G's	11.0	49	-3.7	82	10.7	47	-6.4	128
Chest CG Resultant	N/A	G's	38.1	87			38.6	76		

FEMUR PEAK FORCES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	391.5	37	-2976.6	63	646.4	40	-1705.9	77
Right Femur	Z	Newtons	411.6	38	-3121.5	58	592.1	40	-1474.6	50

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	*	*	*	*	*	*	*	*
Shoulder Belt	N/A	Newtons	*	*	*	*	*	*	*	*

* Not recorded at vehicle manufacturer's request.

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	461.3	44.6	64.5	99.3	595.8	50.1	69.5	103.1

CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	37.7	85.0	88.0	37.4	70.3	73.3

DATA SHEET NO. 9...(continued)

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	8.3	159	-47.1	47	5.1	120	-42.5	50
Pelvis	Y	G's	12.3	78	-3.9	108	5.8	50	-7.5	98
Pelvis	Z	G's	6.5	46	-19.7	70	6.2	43	-20.4	70

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	736	84	-387	56	424	86	-257	54
Neck Force	Y	Newtons	368	90	-69	58	619	87	-33	129
Neck Force	Z	Newtons	1263	70	-165	159	763	53	-814	87
Neck Moment	X	N•m	10.2	159	-29.1	89	3.0	127	-51.7	86
Neck Moment	Y	N•m	52.0	78	-23.1	56	42.4	84	-16.2	55
Neck Moment	Z	N•m	16.6	94	-9.3	147	14.5	87	-8.4	138

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	5.6	56	-55.4	49	30.8	51	-96.8	40
Left Foot Aft	Z	G's	2.3	59	-78.0	51	17.5	35	-37.2	50
Left Foot Fore	Z	G's	58.0	48	-111.1	42	82.1	35	-93.8	42
Right Foot Aft	X	G's	8.8	40	-66.5	42	1.9	185	-67.3	49
Right Foot Aft	Z	G's	7.5	95	-98.8	46	2.5	200	-29.8	45
Right Foot	Z	G's	37.4	34	-174.0	41	8.3	56	-63.4	47

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	25.5	53	-28.6	57	7.1	102	-5.9	55
Left Lower Moment	Y	N•m	55.3	51	-21.2	43	46.3	52	-67.8	40
Left Lower Force	Z	Newton	89	32	-3691	51	62	158	-1806	52
Left Upper Moment	X	N•m	84.3	55	-13.8	111	20.5	74	-13.2	88
Left Upper Moment	Y	N•m	67.2	48	-31.4	42	31.2	103	-105.3	40
Left Upper Force	Z	Newton	143	31	-3133	52	170	159	-1397	52
Right Lower Moment	X	N•m	70.6	85	-57.3	46	3.2	119	-11.7	83
Right Lower Moment	Y	N•m	56.6	87	-31.8	42	63.5	55	-15.4	37
Right Lower Force	Z	Newton	102	197	-6767	46	161	151	-1865	50
Right Upper Moment	X	N•m	24.2	98	-79.9	48	11.5	71	-51.1	83
Right Upper Moment	Y	N•m	17.6	147	-150.6	46	85.1	52	-21.7	40
Right Upper Force	Z	Newton	122	147	-5540	46	82	178	-2279	49

DATA SHEET NO. 9...(continued)

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	mm			-22.0	80			-22.7	90

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	1.1	200	-55.1	85	5.2	200	-58.7	86
Head CG	Y	G's	3.3	137	-12.0	86	7.0	66	-12.3	79
Head CG	Z	G's	20.9	50	-2.1	141	21.4	70	-4.9	129
Head CG	N/A	G's	56.6	86			60.6	91		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.5	179	-37.3	87	6.5	181	-38.0	72
Chest CG	Y	G's	6.4	105	-2.2	56	4.7	95	-3.9	80
Chest CG	Z	G's	11.7	49	-3.3	85	10.7	47	-6.3	128
Chest CG	N/A	G's	37.8	87			38.1	72		

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	454.2	44.1	64.3	99.4	582.1	49.6	69.5	103.0

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary Redundant	37.2	85.0	88.0	36.9	74.7	77.7

DATA SHEET NO. 10
SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

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	349	308
PBL - Top surface of reference to belt lower edge	mm	270	210

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Retractor reel to "D" ring	mm	274	274
Shoulder belt length as measured on ATD	mm	873	873
Lap belt length as measured on ATD	mm	852	860
Remainder of belt on reel	mm	650	652
Total belt length for continuous webbing systems	mm	2649	2659

SHOULDER BELT SPOOL-OUT DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	*	*
As determined electronically	mm	*	*

* Not recorded at vehicle manufacturer's request.

DATA SHEET NO. 11
SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

Windshield Mounting Details:

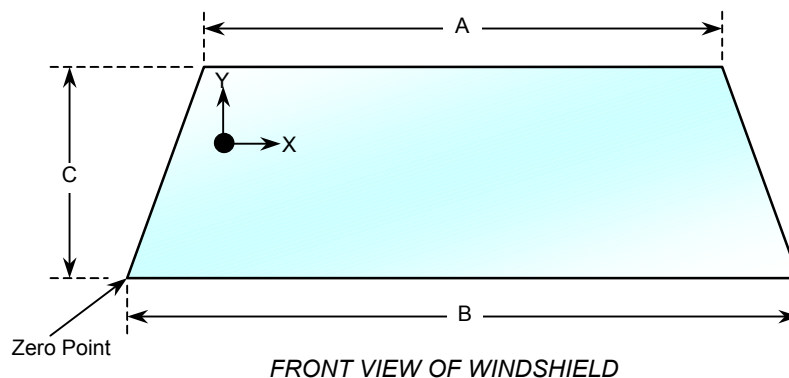
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 22 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2277	2277	100
Right Side	2280	2280	100
Total	4557	4557	100



WINDSHIELD DIMENSIONS

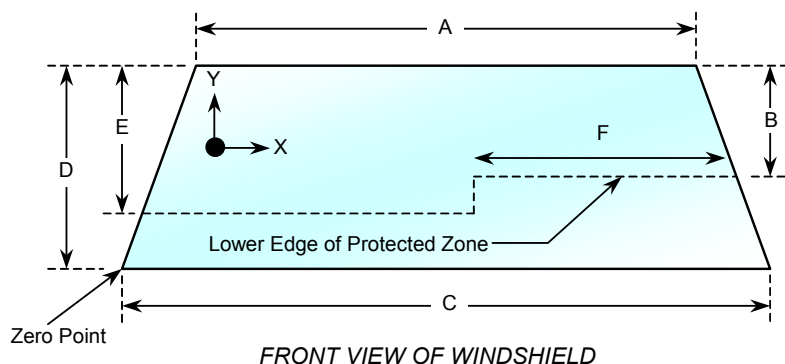
Item	Units	Segment Length	Molding Width
A	mm	1365	30
B	mm	1760	10
C	mm	716	25

DATA SHEET NO. 12

WINDSHIELD ZONE INTRUSION FMVSS 219 (Partial) DATA

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002



Item	Units	Value
A	mm	1365
B	mm	488
C	mm	1760
D	mm	716
E	mm	490
F	mm	540

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 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

Temperature at Time of Impact: 22° C Test Time: 10:22 am

Stoddard Solvent Spillage Measurements

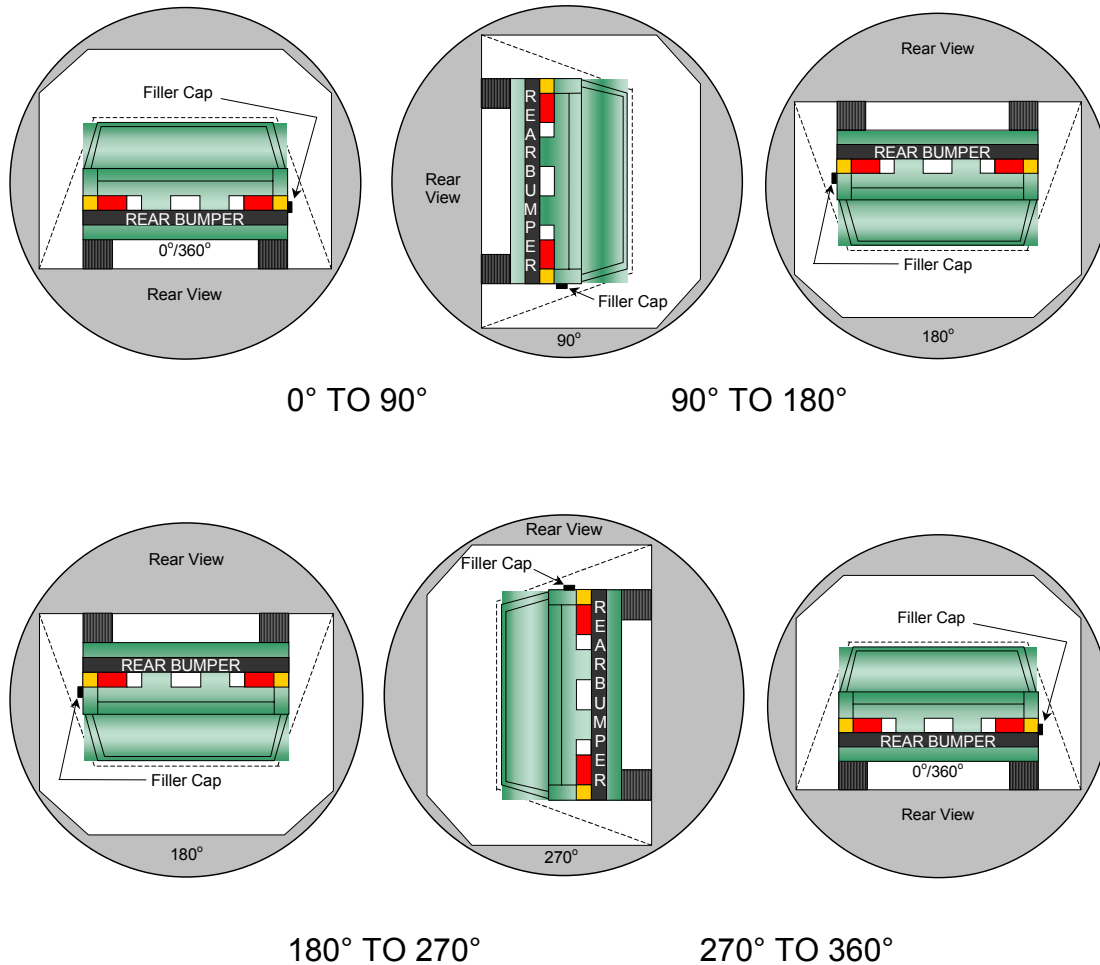
- A. From impact until vehicle motion ceases: 0 oz.
 (Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0 oz.
 (Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0 oz.
 (Maximum Allowable = 1 oz./minute)
- D. Spillage : None

DATA SHEET NO. 14
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

Test Time: 10:22am



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°	160	300	0
90° TO 180°	150	300	0
180° TO 270°	140	300	0
270° TO 360°	165	300	0

DATA SHEET NO. 15
VEHICLE MEASUREMENTS

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

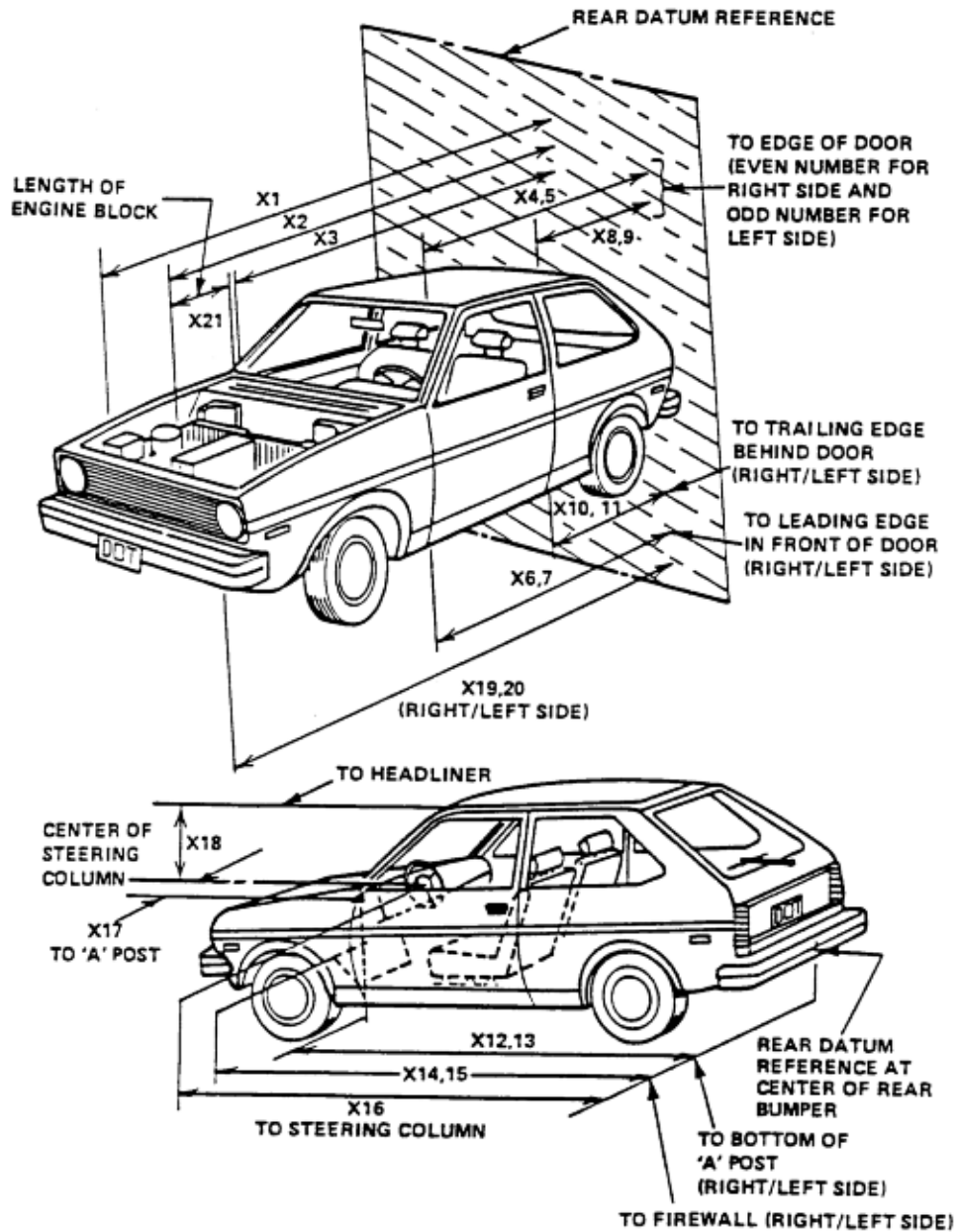
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	5195	4549	646
2	RSOV to front of engine	mm	4334	4213	121
3	RSOV to firewall centerline	mm	4030	3996	34
4	RSOV to leading edge of right door	mm	3604	3604	0
5	RSOV to leading edge of left door	mm	3603	3594	9
6	RSOV to lower leading edge of right door	mm	3505	3503	2
7	RSOV to lower leading edge of left door	mm	3505	3489	16
8	RSOV to upper leading edge of right door	mm	2468	2484	-16
9	RSOV to upper leading edge of left door	mm	2469	2467	2
10	RSOV to lower trailing edge of right door	mm	2442	2439	3
11	RSOV to lower trailing edge of left door	mm	2442	2434	8
12	RSOV to bottom of right 'A' pillar	mm	3510	3519	-9
13	RSOV to bottom of left 'A' pillar	mm	3508	3501	7
14	RSOV to firewall on right side	mm	3992	3956	36
15	RSOV to firewall on left side	mm	3986	3947	39
16	RSOV to steering column	mm	3102	3114	-12
17	Center of steering column to left 'A' pillar	mm	360	301	59
18	Center of steering column to headlining	mm	484	422	62
19	RSOV to right side of front bumper	mm	4636	4551	85
20	RSOV to left side of front bumper	mm	4635	4423	212
21	Length of engine block	mm	490	490	0
RD	RSOV to right side of dash panel	mm	3444	3438	6
CD	RSOV to center of dash panel	mm	3352	3401	-49
LD	RSOV to left side of dash panel	mm	3412	3426	-14

DATA SHEET NO. 15...(continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002



DATA SHEET NO. 15... (continued)**VEHICLE MEASUREMENTS**Test Vehicle: 2003 Ford Expedition 4 doorNHTSA No.: M30202Test Program: 35mph Frontal ImpactTest Date: 11/26/2002**Target Vehicle Structural Measurement**

	Elements	Pre-Test (mm)
1	Total Length	5195
2	Total Width	1995
3	Bumper Top Height	497
4	Bumper Bottom Height	410
5	Longitudinal Member Top Height	541
6	Distance between Longitudinal Members	942
7	Longitudinal Member Width	90
8	Engine Top Height	1056
9	Engine Bottom Height	269
10	Engine and gearbox width	455
11	Front bumper-engine distance	640
12	Front shock absorber fixing height	798
13	Bonnet leading edge height	1053
14	Front shock absorber fixing width	1255
15	Front bumper – front axle distance	1004
16	Front axle – a pillar distance	755
17	A-pillar – B-pillar distance	991
18	B-Pillar – rear axle distance	1334
19	B-pillar – C-pillar distance	978
20	Roof sill bottom height	1734
21	Roof sill top height	1764
22	Floor sill bottom height	430
23	Floor sill top height	504

DATA SHEET NO. 16
CAMERA LOCATIONS

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

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	-8380	1580	13	No Timing
3	Steering Column Top	2000	-8240	1580	25	1015
4	Steering Column Bottom	2000	-8240	1040	25	1031
5	Driver Close-up	1600	-9240	1580	50	1026
6	Driver Angle	4600	-5000	2030	50	1005
7	Onboard Left Rear				13	505
8	Onboard Right Rear				13	503
9	Right Overall	2400	8500	1700	13	1020
10	Right Passenger Half	-1000	8500	1720	25	1015
11	Right Close-up	1650	10200	1700	35	1136
12	Right Angle	4600	5600	2100	50	952
13	Windshield	-400	0	2700	13	1020
14	Top Driver	170	-440	1710	13	1015
15	Top Passenger	170	460	1720	13	1000
16	Pit Front	1000	0	-3400	13	1010
17	Pit Rear	3000	0	-3400	13	Did Not Run
18	Left Overall	700	-8660	1650	25	508

*COORDINATES:

+X = film plane rearward of barrier

+Y = film plane to right of monorail centerline

+Z = film plane above ground level

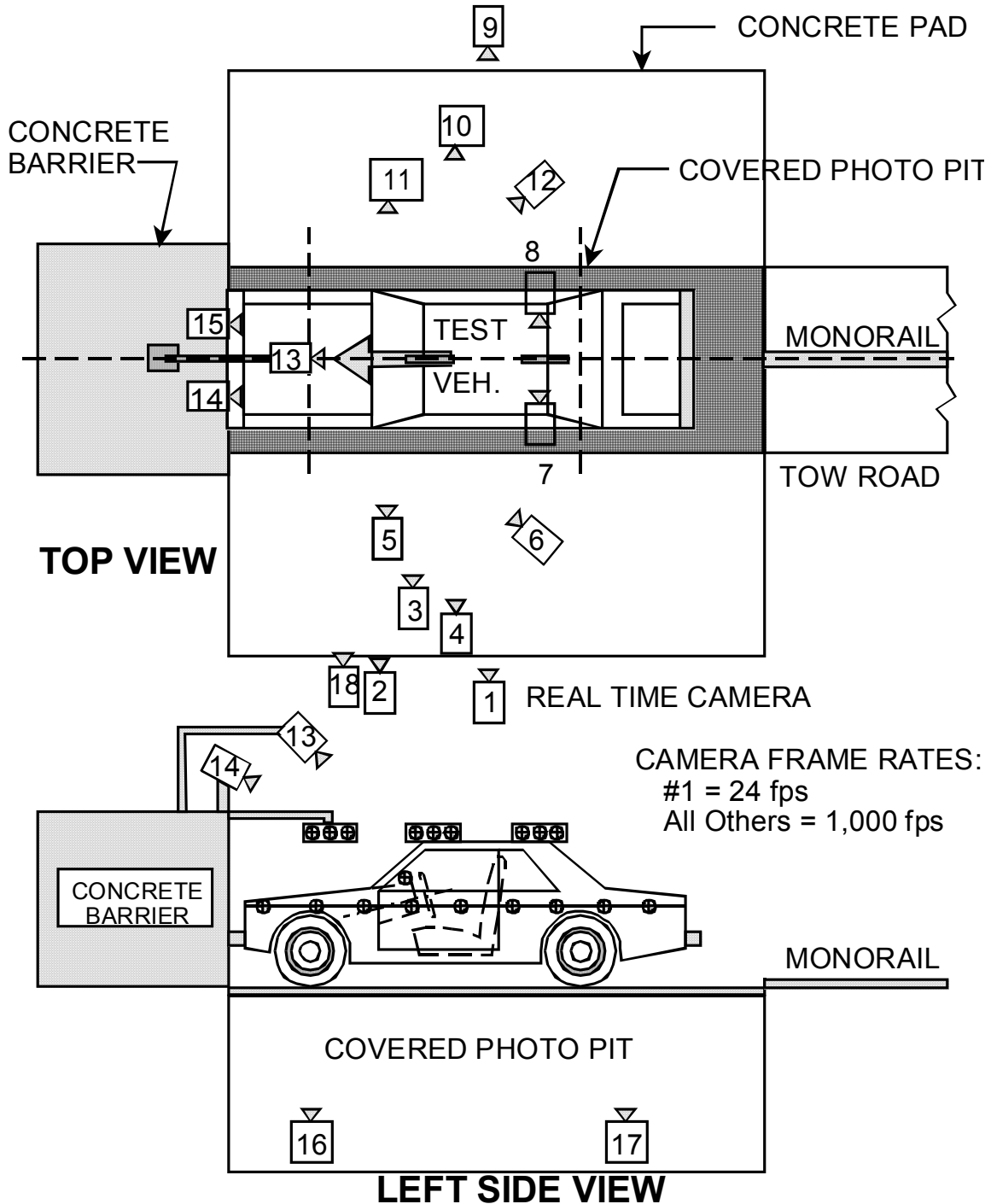
DATA SHEET NO. 16...(continued)

CAMERA LOCATIONS

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002

CAMERA POSITIONS FOR FRONTAL IMPACTS

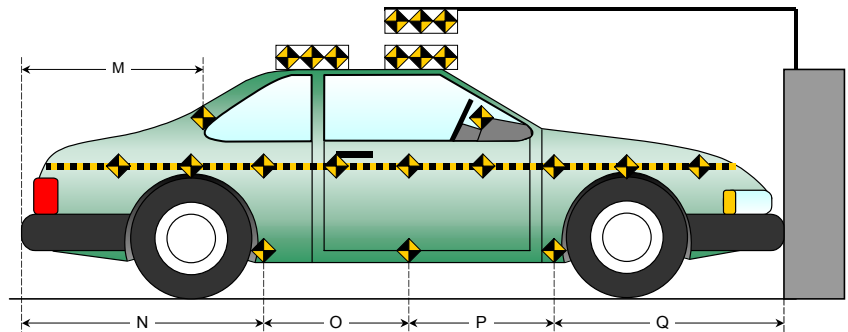
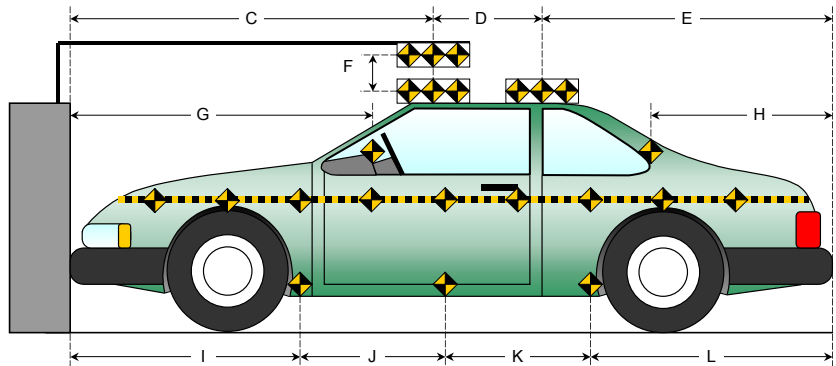
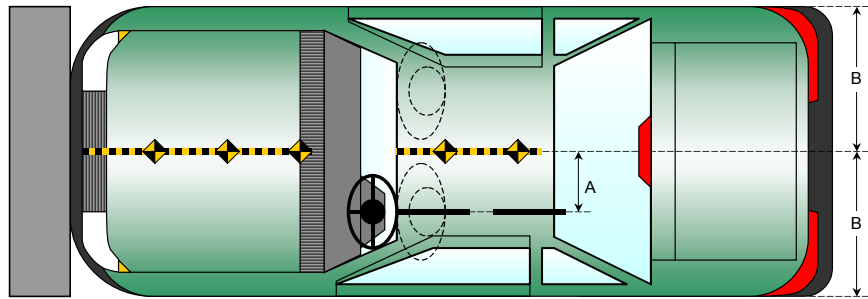


DATA SHEET NO. 17
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

Item	Value
A	490
B	998
C	2503
D	610
E	2092
F	610
G	NA*
H	1567
I	1507
J	946
K	946
L	1829
M	1568
N	1813
O	943
P	945
Q	1520



* Steering Column target removed.

DATA SHEET NO. 18
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

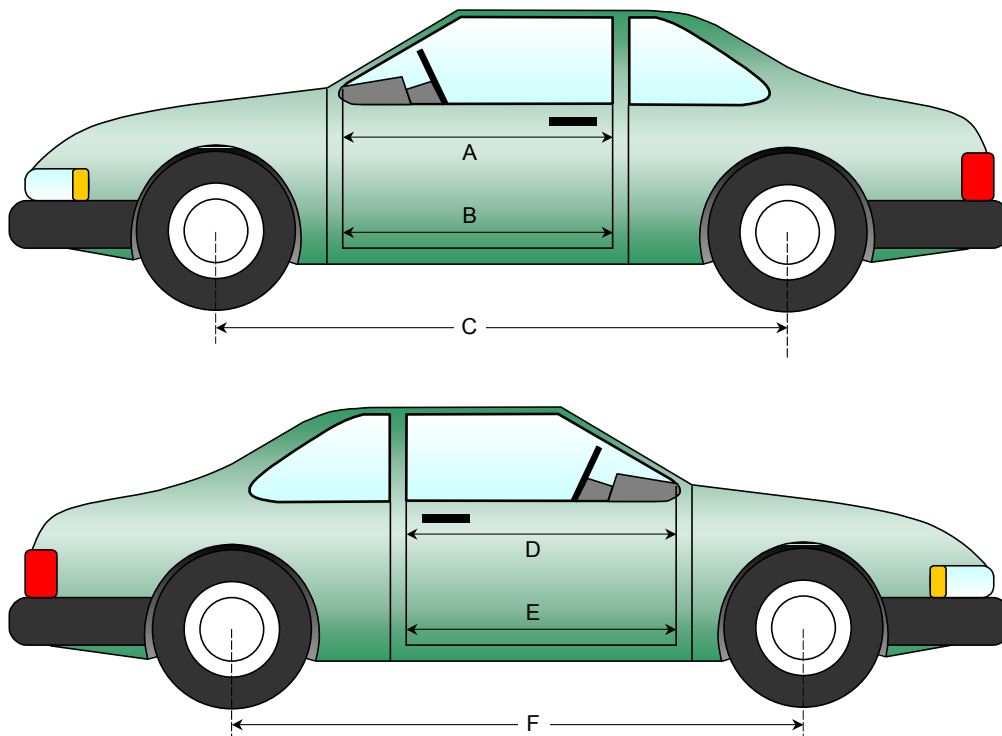
NHTSA No.: M30202
 Test Date: 11/26/2002

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1045	1033	12
B	Left Side Lower	mm	964	954	10
D	Right Side Upper	mm	1042	1033	9
E	Right Side Lower	mm	962	956	6

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3020	2861	159
F	Right Side Wheelbase	mm	3019	3015	4



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

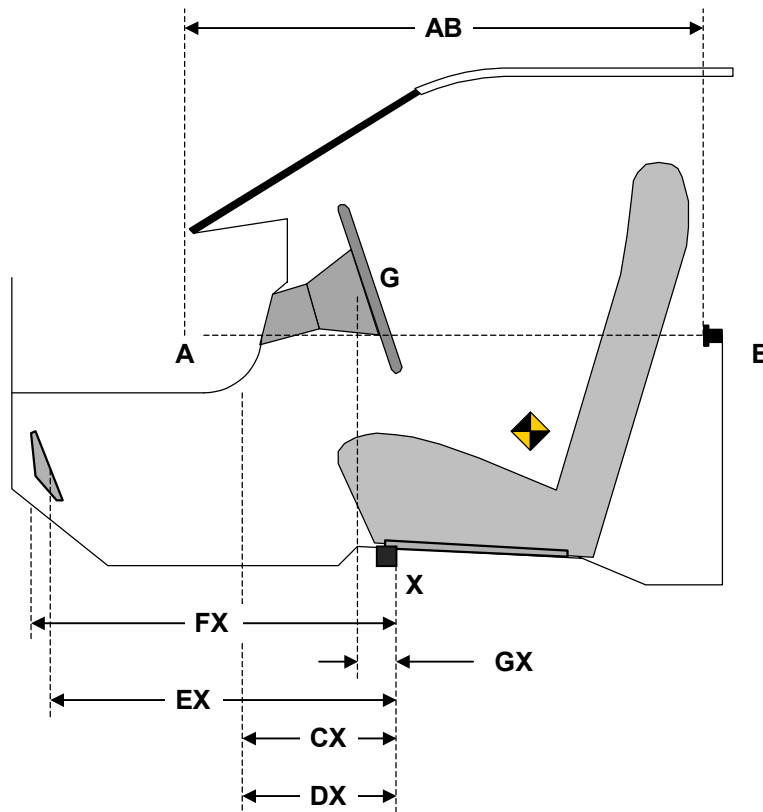
Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	714	711	3
CX	Left Knee Bolster to X	mm	302	272	30
DX	Right Knee Bolster to X	mm	302	249	53
EX	Brake Pedal to X	mm	562	503	59
FX	Foot Rest to X	mm	770	699	71
GX	Center of Steering Column Wheel Hub to X	mm	97	95	2

X = Left Front Seat Front Outboard Anchor Bolt Head



DRIVER COMPARTMENT

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

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

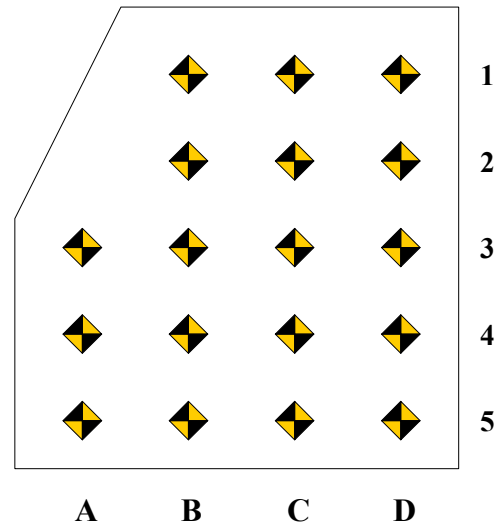
NHTSA No.: M30202
 Test Date: 11/26/2002

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	716	715	714	718	690	698	692	676	26	17	22	42
2	618		617	617	617		610	577	1		7	40
3	515	515	515	515	510	510	509	487	5	5	6	28
4	412	413	410	415	405	405	405	405	7	8	5	10
5	310	310	310	310	305	305	304	305	5	5	6	5

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	38	3	5	3	91	76	73	58	53	-73	-68	-55
2	-47		-48	-48	-32		-9	29	-15		-39	-77
3	-83	-81	-81	-84	-71	-71	-63	-50	-12	-10	-18	-34
4	-100	-96	-85	-78	-87	-82	-72	-79	-13	-14	-13	1
5	-91	-84	-78	-91	-83	-86	-70	-79	-8	2	-8	-12

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

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

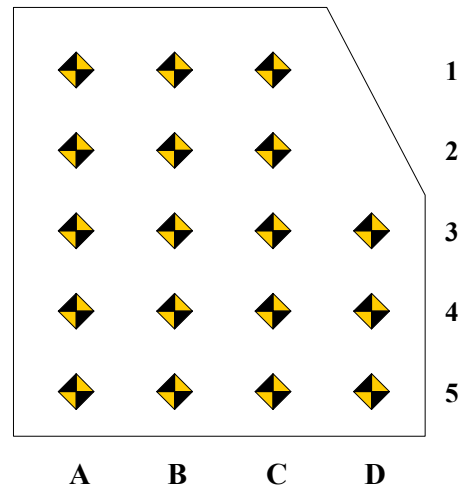
NHTSA No.: M30202
 Test Date: 11/26/2002

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	755	780	785		750	750	780		5	30	5	
2	693	710	715		695	699	710		-2	11	5	
3	613	613		610	610	610		610	3	3		0
4	457	460	460	457	460	460	458	459	-3	0	2	-2
5	305	305	305	305	310	310	305	305	-5	-5	0	0

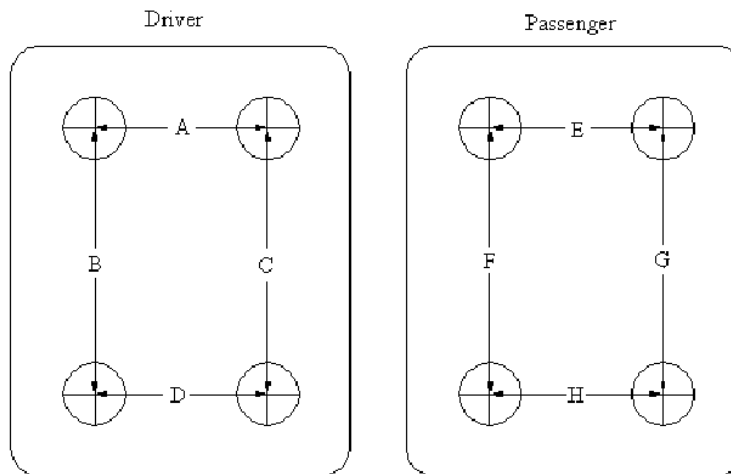
PASSENGER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	15	90	90		147	119	132		-132	-29	-42	
2	50	31	31		86	59	58		-36	-28	-27	
3	-12	-18		-5	26	24		13	-38	-42		-18
4	-67	-61	-59	-68	-40	-34	-29	-34	-27	-27	-30	-34
5	-60	-52	-55	-56	-52	-44	-45	-45	-8	-8	-10	-11

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

Test Vehicle: 2003 Ford Expedition 4 door
 Test Program: 35mph Frontal Impact

NHTSA No.: M30202
 Test Date: 11/26/2002



UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test	Post-Test	Difference
A	231	232	-1
B	441	443	-2
C	436	434	2
D	188	183	5
E	237	238	-1
F	443	446	-3
G	448	449	-1
H	186	186	0

LOAD CELL LOCATIONS ON FIXED BARRIER

NHTSA No.: M30202
Test Date: 11/26/2002

Technical drawing of a rectangular structure, likely a container or tray, showing dimensions and internal layout.

Dimensions:

- Overall width: 2143
- Overall height: 984
- Internal width segments: 766, 611, 766
- Internal height segments: 818, 407
- Bottom offset from ground surface: 153
- Top offset: 19

Internal Layout:

The structure is divided into a 2x3 grid of sections. The top section is labeled "Plywood Face on Steel Frame". The bottom section is divided into six sub-sections (A, B, C) arranged in two rows and three columns.

Labels and Components:

- Top Section:** Plywood Face on Steel Frame
- Bottom Section (A, B, C):** Each sub-section contains five circular components labeled A1-A5, B1-B5, and C1-C5.

Ground Surface: Indicated by an arrow pointing to the bottom edge of the structure.

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

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 Ford Expedition 4 door NHTSA No.: M30202
 Test Program: 35mph Frontal Impact Test Date: 11/26/2002

VEHICLE INFORMATION

VIN: 1FMPU16WX3LA60628 Wheelbase (mm) : 3020
 Vehicle Size Category: SUV Test Weight (kg) : 2757.8

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): 56.5
 Velocity Change (km/h): 61.3 Time of Separation (msec): 114

CRUSH PROFILE

Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
 Damage Region Length (mm): 1080 Impact Mode: Frontal

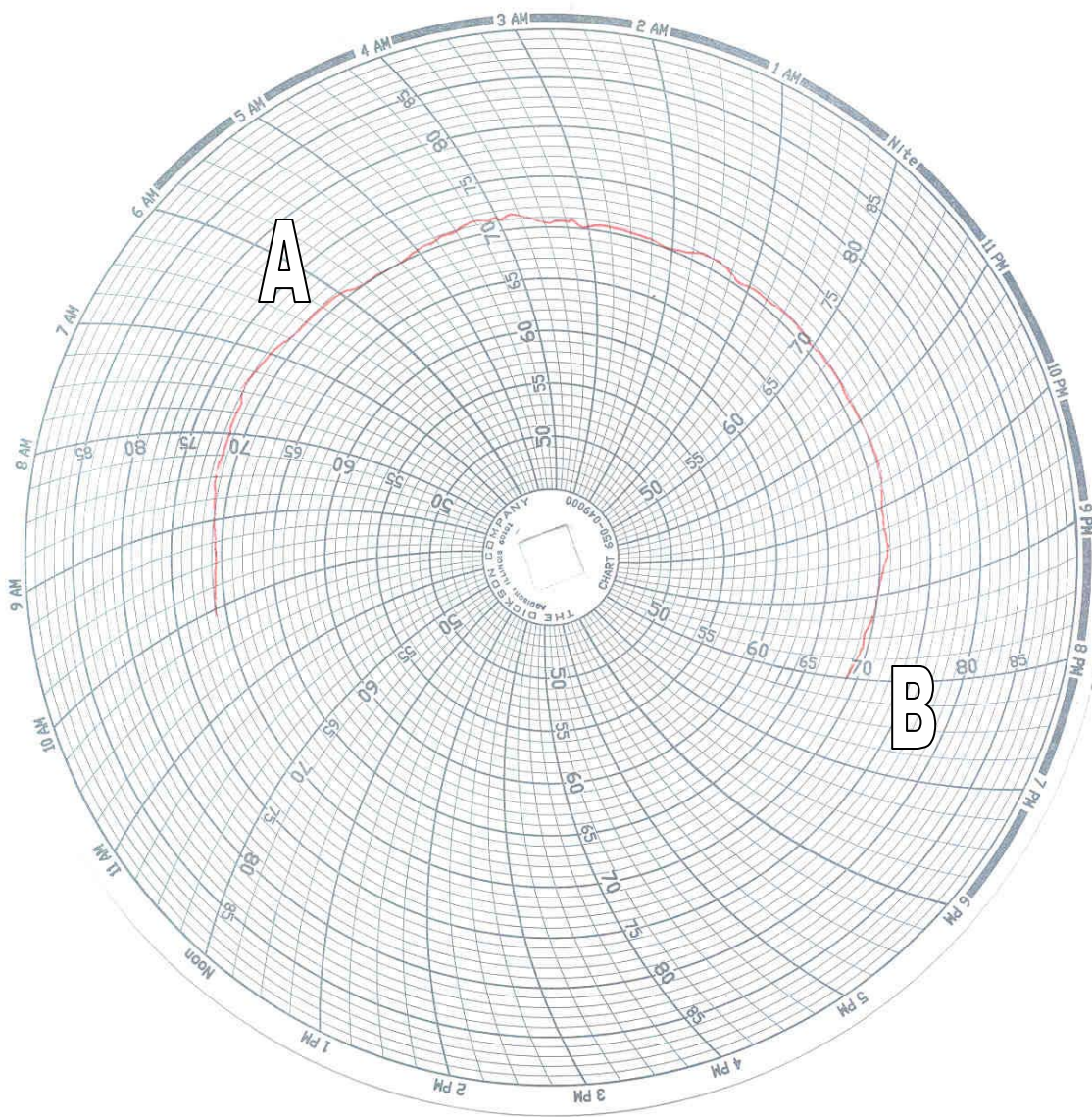
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5124	4518	606
C2	Crush zone 2 at left side	mm	5156	4508	648
C3	Crush zone 3 at left side	mm	5172	4523	649
C4	Crush zone 4 at right side	mm	5173	4536	637
C5	Crush zone 5 at right side	mm	5158	4531	627
C6	Crush zone 6 at right side	mm	5125	4554	571
L	C1 TO C6	mm	1080	1050	30

DATA SHEET NO. 21

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2003 Ford Expedition 4 door
Test Program: 35mph Frontal Impact

NHTSA No.: M30202
Test Date: 11/26/2002



A = Dummies installed in vehicle at 6:00 a.m.

B = Test conducted at 10:22 a.m.

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Load Cell Location

MFD. BY FORD MOTOR CO. IN U.S.A.

DATE: 08/02

FRONT GAWR: 3150LB

1428KG

P265/70R17SL

17X7.5J

AT 241 kPa/35

GVWR: 7100LB/3220KG

REAR GAWR: 4050LB

1837KG

P265/70R17SL

17X7.5J

AT 241 kPa/35

WITH
TIRES
RIMS
PSI COLD

WITH
TIRES
RIMS
PSI COLD

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

VIN: 1FMPU16WX3LA60628

TYPE: MPV

F0109
T0208



EXT PNT: YZ

IRC: 47

DSO:

WB BRK

INT TR

TP/PS

R AXLE

TR

SPR

3B716

119 4

MG

K 16

U

BF

B05

1200208024209

UTC

2U5A1520472-AA

Vehicle Certification Label/Tire Placard



Right Front View of Test Vehicle, as received



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



Post-Test Right Side View of Test Vehicle



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



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



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



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 FORD EXPEDITION
M30202 02112601
MGA RESEARCH CORP.

Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



Post-Test Engine Compartment View



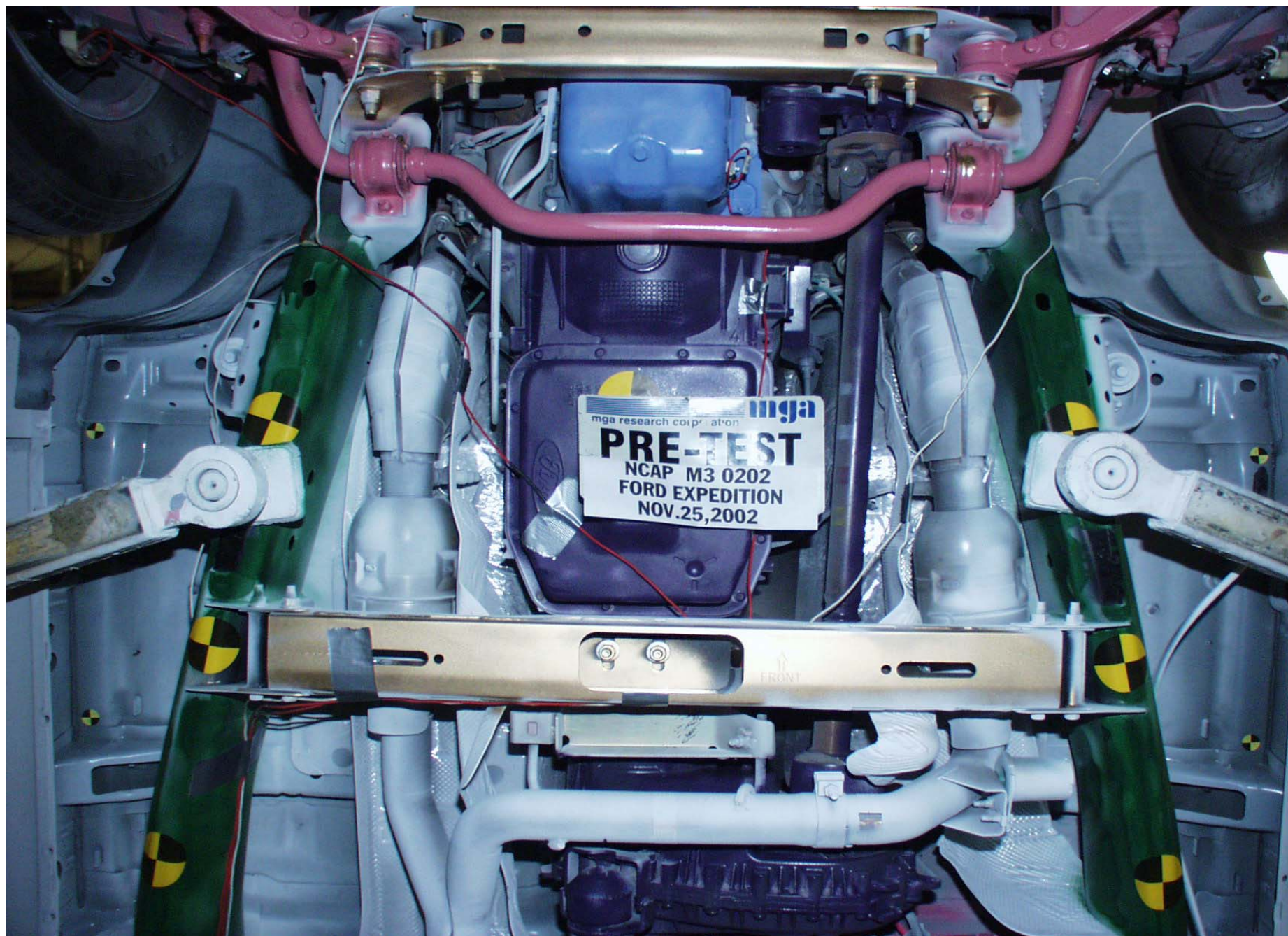
Pre-Test Fuel Filler Cap View



Post-Test Fuel Filler Cap View

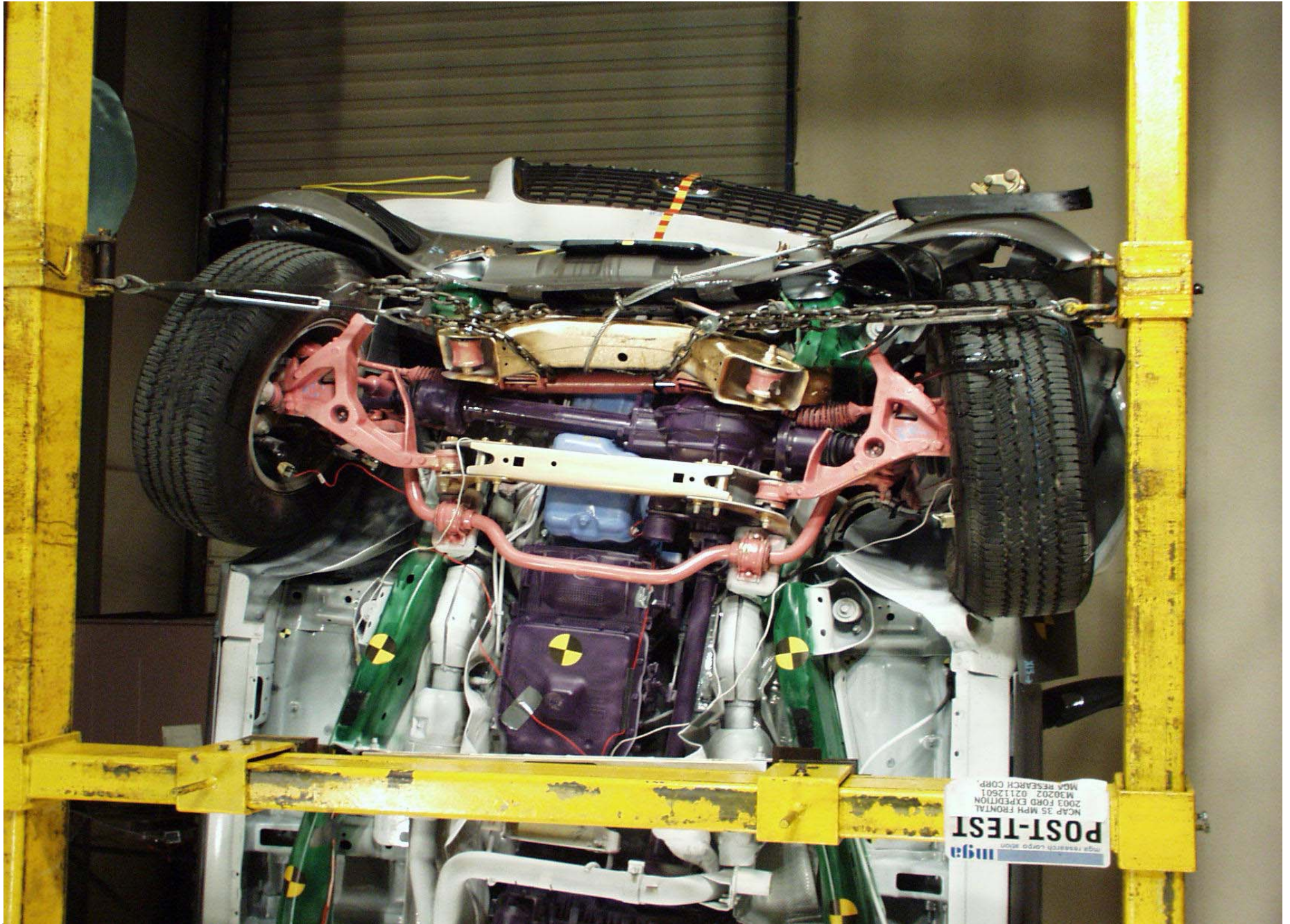


Pre-Test Front Underbody View

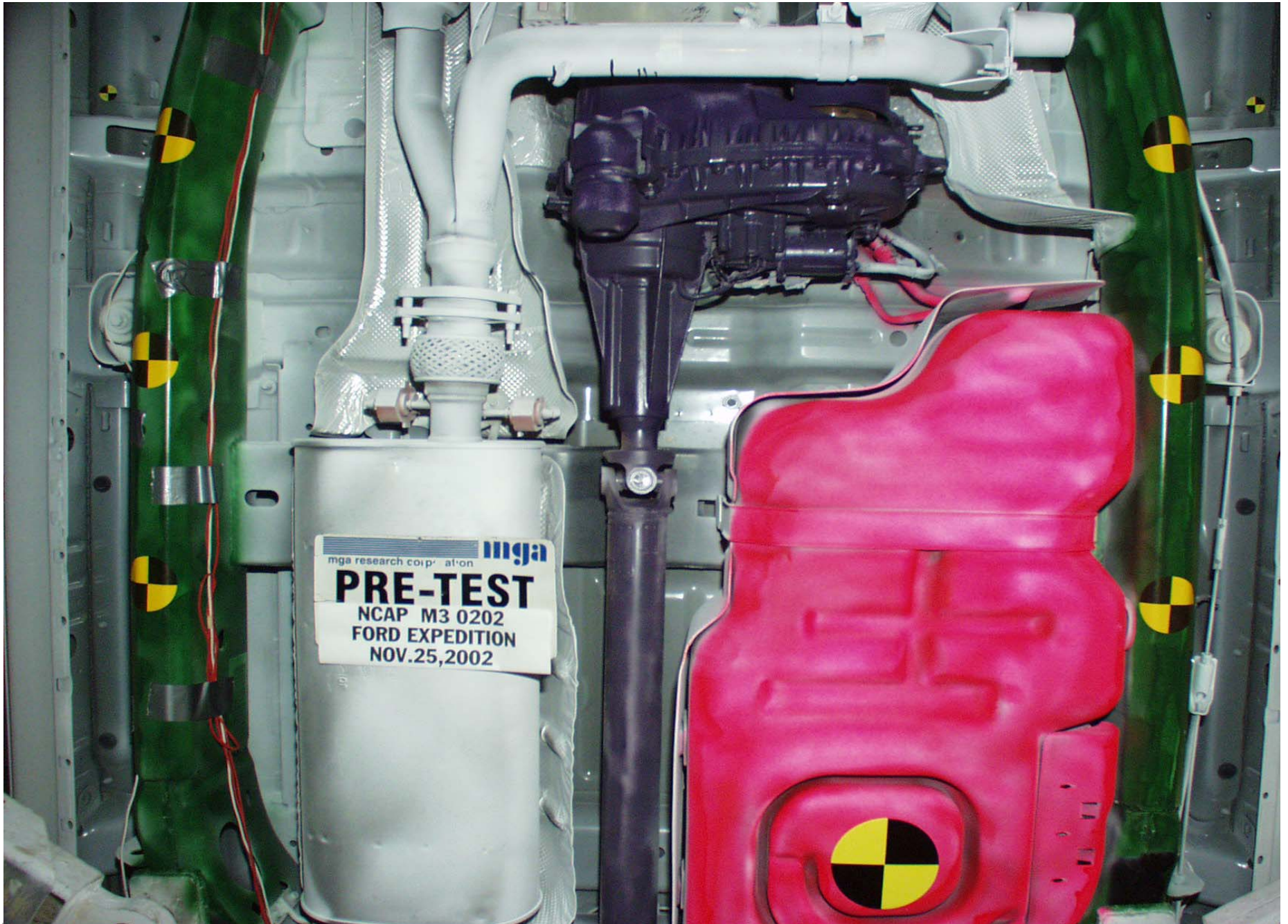


Pre-Test Front Underbody View

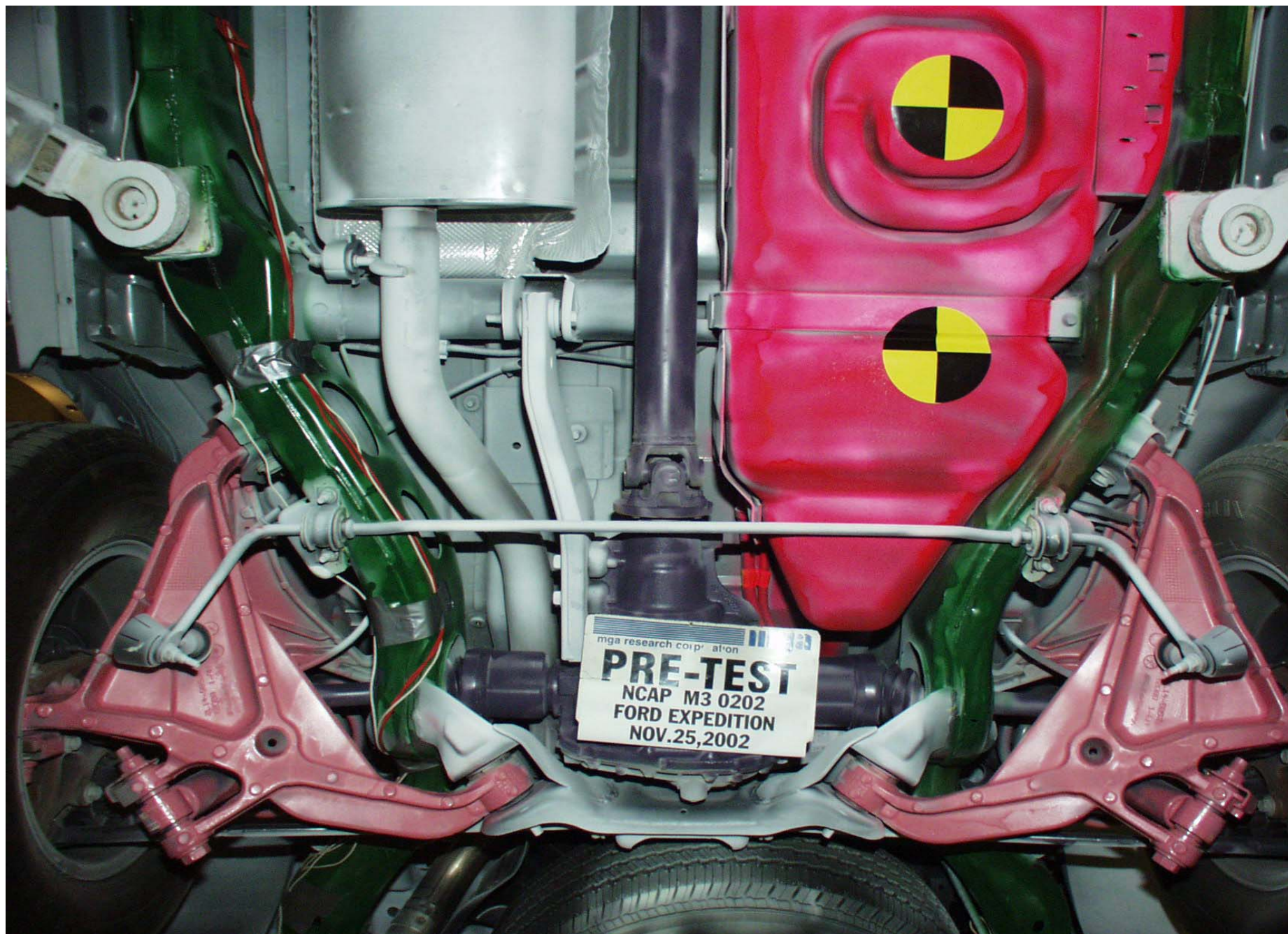
A-25.



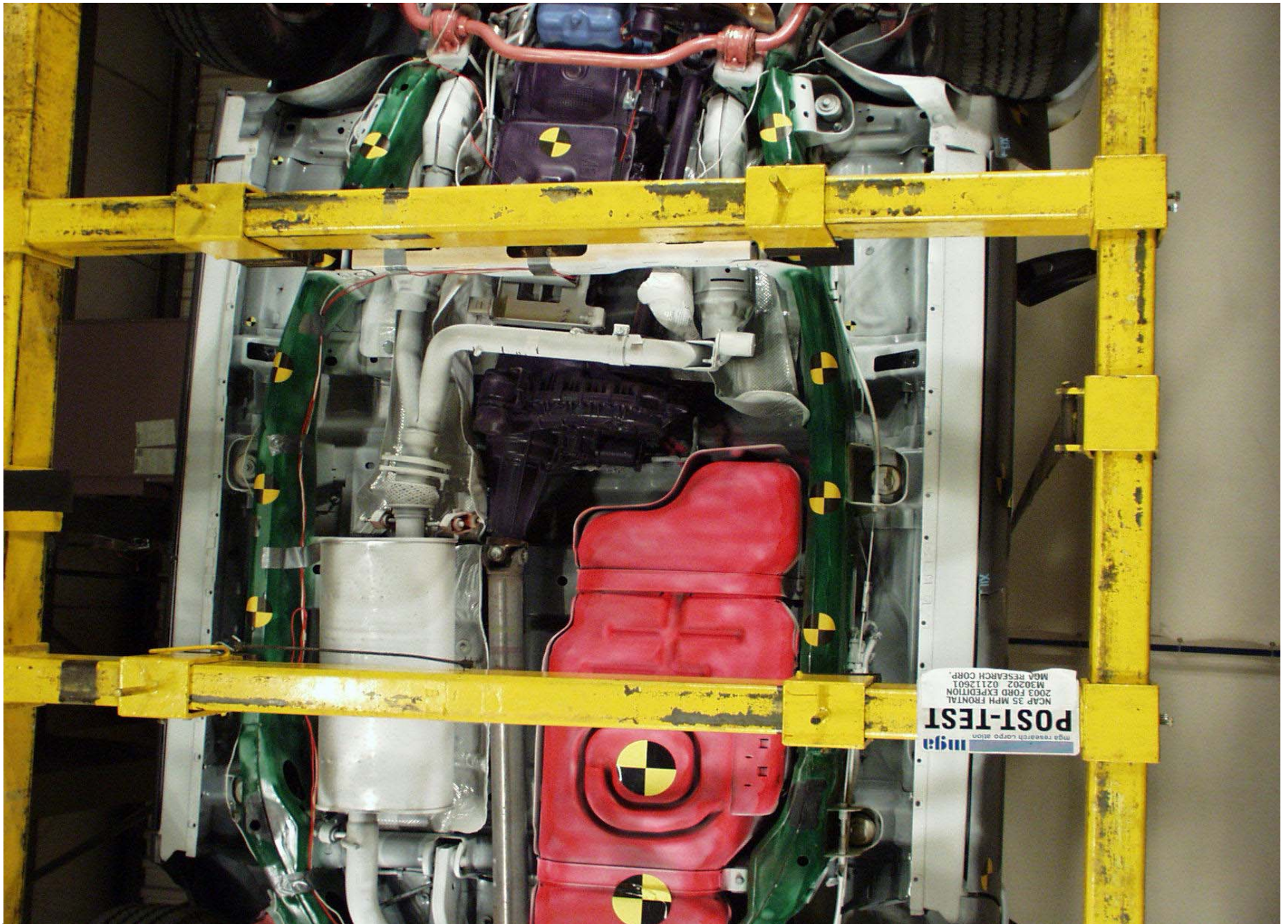
Post-Test Front Underbody View



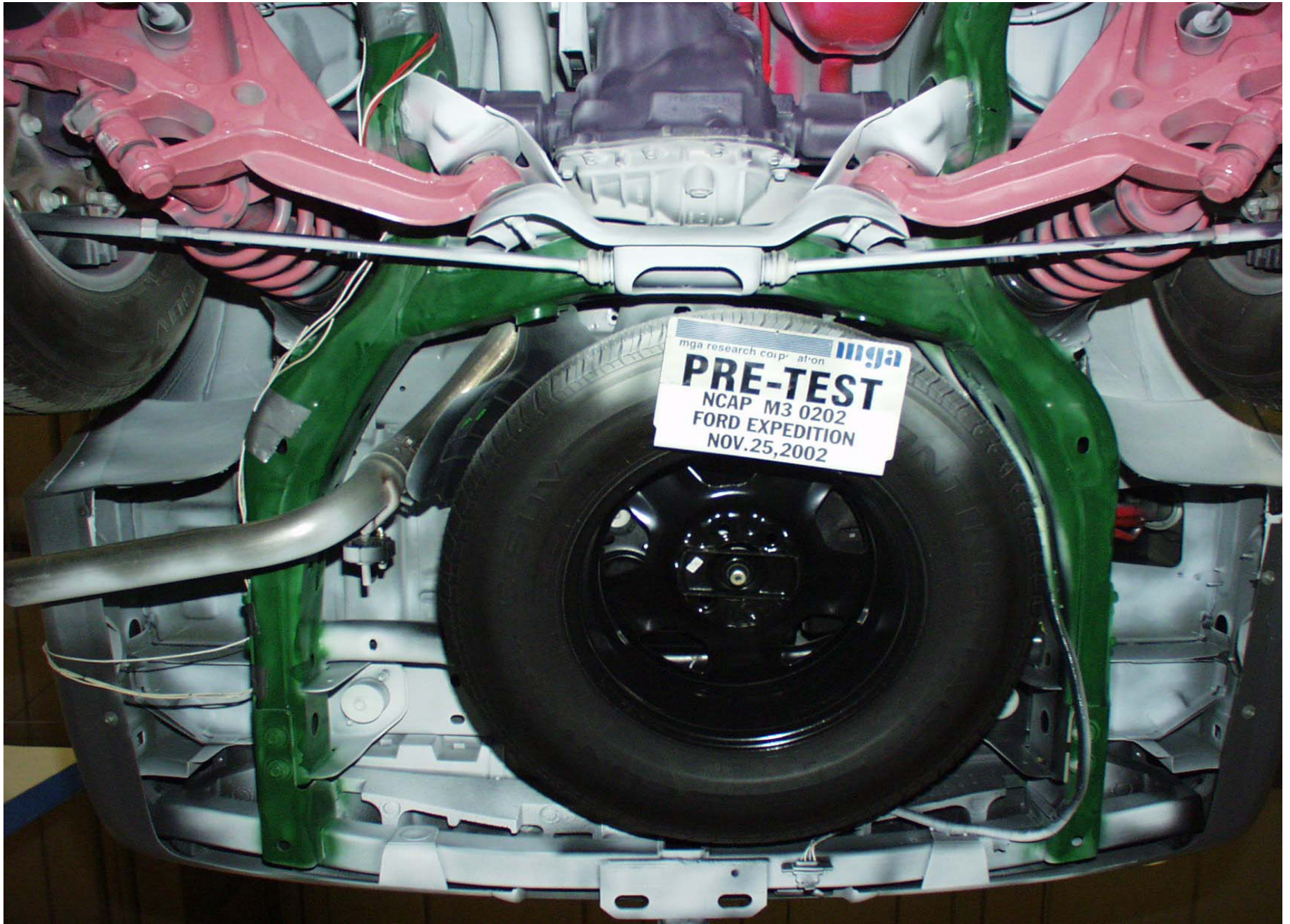
Pre-Test Mid Underbody



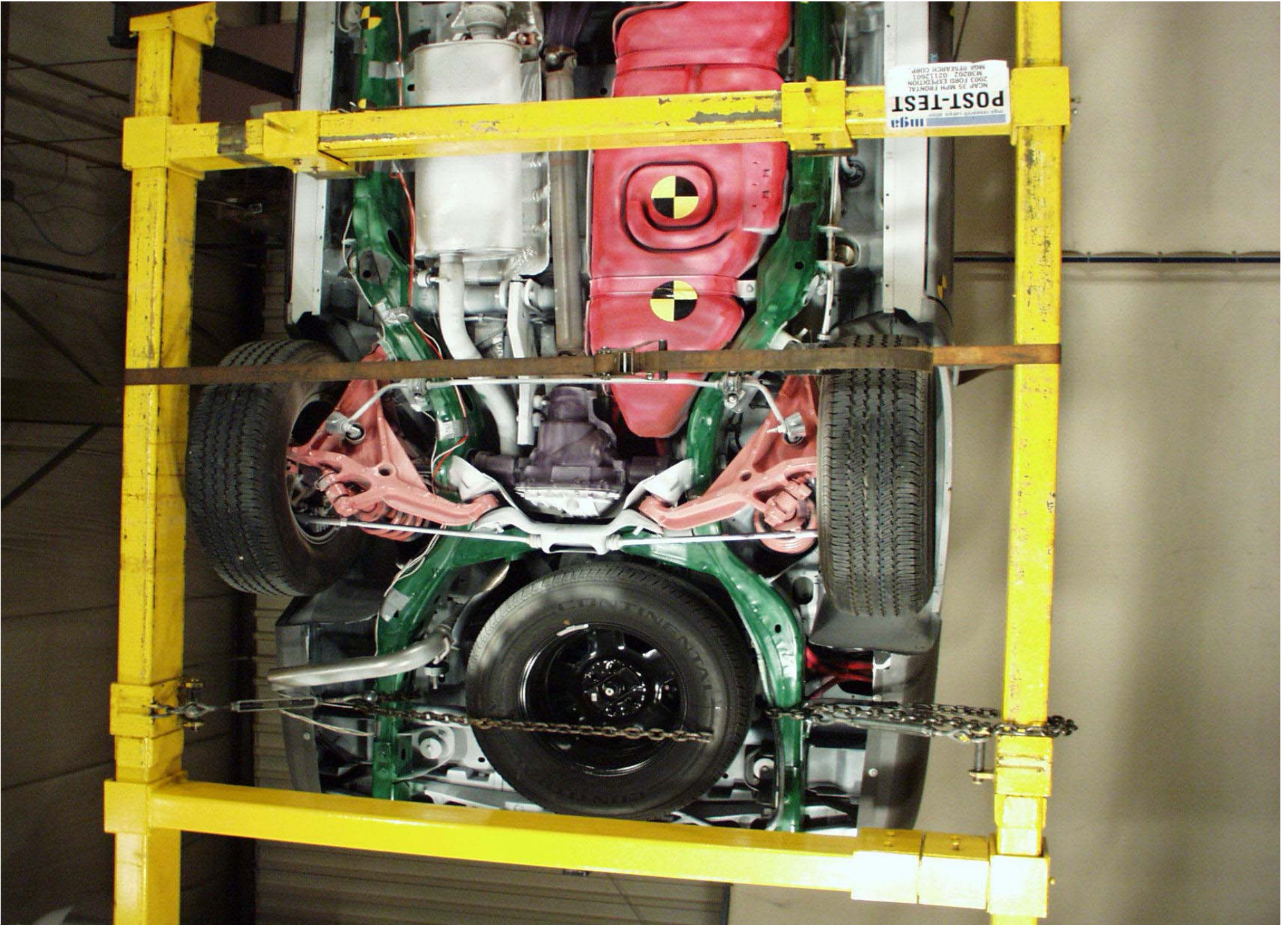
Pre-Test Mid Underbody



Post-Test Mid Underbody



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Driver Dummy Front View (head position)



Post-Test Driver Dummy Front View (head position)



Pre-Test Driver Dummy Position Left Side View



Post-Test Driver Dummy Position Left Side View



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



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



Pre-Test Driver Dummy Feet Position



Post-Test Driver Dummy Feet Position



Pre-Test Driver Side Knee Bolster View



Post-Test Driver Side Knee Bolster View

A-41.



Post-Test Driver Side Floor Pan View



Post-Test Driver Dummy Head Contact

A-43.



Post-Test Driver Dummy Knee Contact



Post-Test Driver Dummy Airbag Contact



Pre-Test Passenger Dummy Front View (head position)



Post-Test Passenger Dummy Front View (head position)



Pre-Test Passenger Dummy Position Right Side View



Post-Test Passenger Dummy Position Right Side View



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



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



Pre-Test Passenger Dummy Feet Position



Post-Test Passenger Dummy Feet Position



Pre-Test Passenger Side Knee Bolster View



Post-Test Passenger Side Knee Bolster View



Post-Test Passenger Side Floor Pan View



Post-Test Passenger Dummy Head Contact

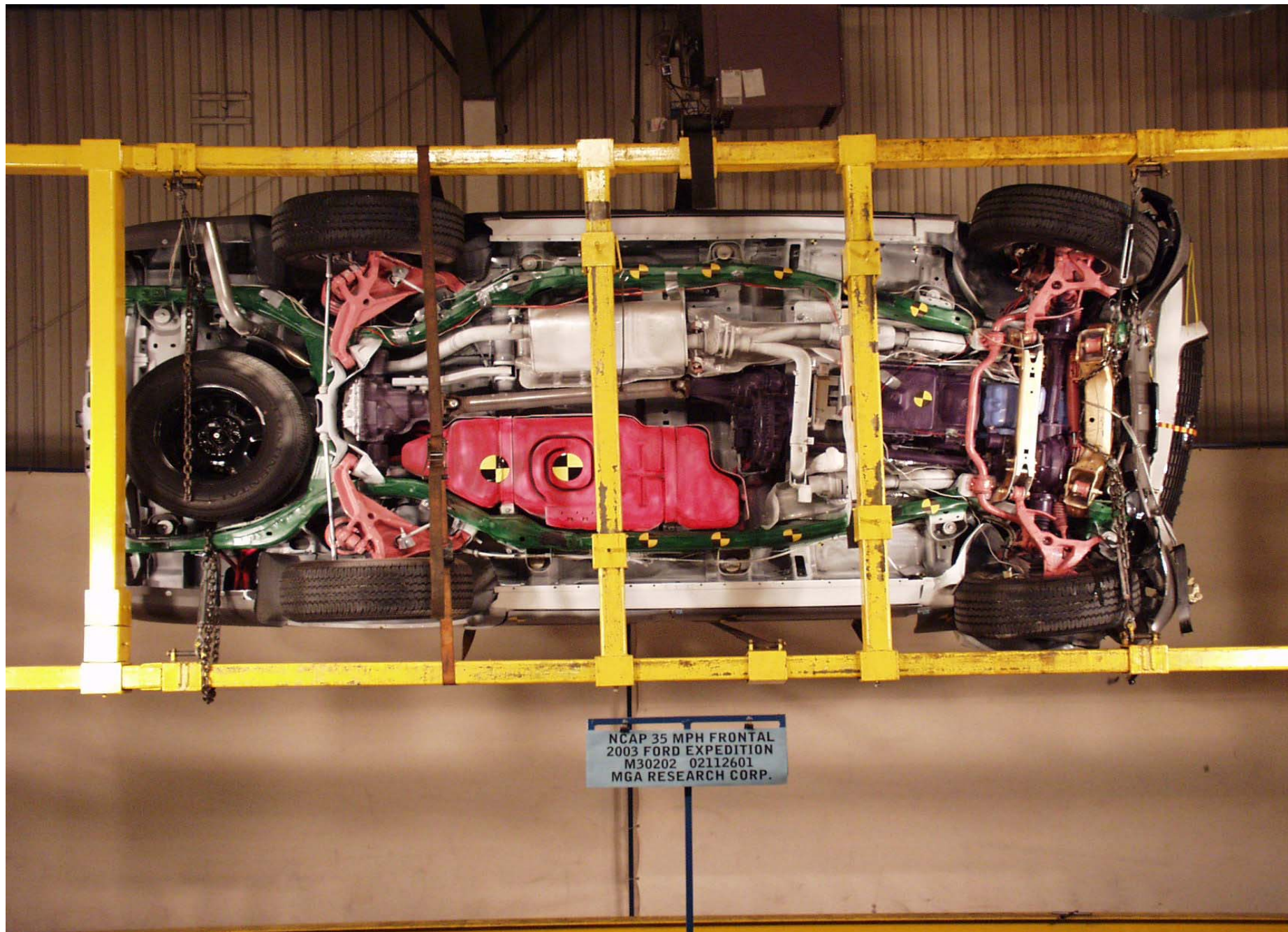


Post-Test Passenger Dummy Knee Contact



Post-Test Passenger Dummy Airbag Contact

A-59.



Rollover 90 Degrees



Rollover 180 Degrees

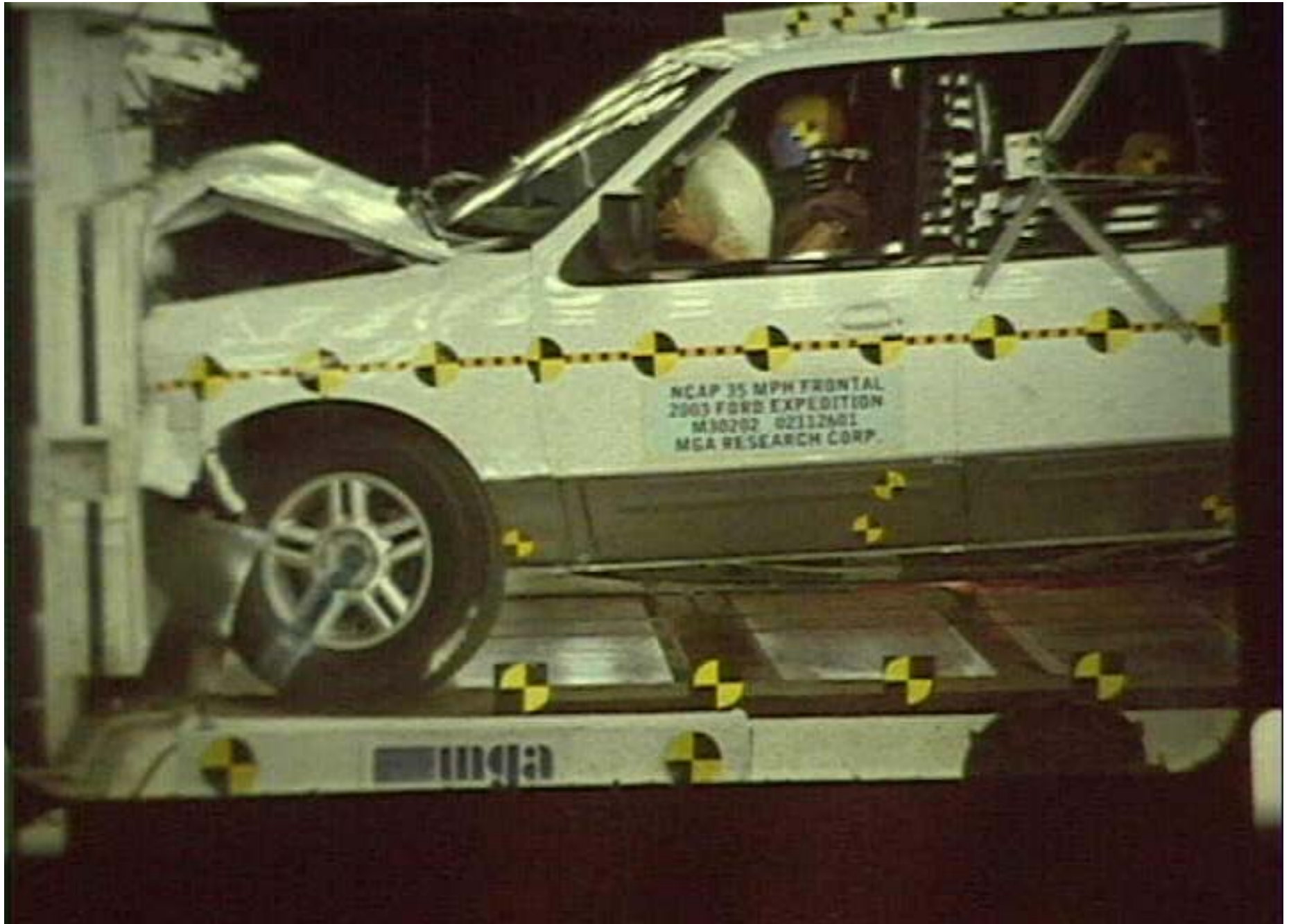


A-61.

Rollover 270 Degrees



Rollover 360 Degrees



Vehicle Impact

APPENDIX B

DUMMY AND VEHICLE RESPONSE DATA TRACES

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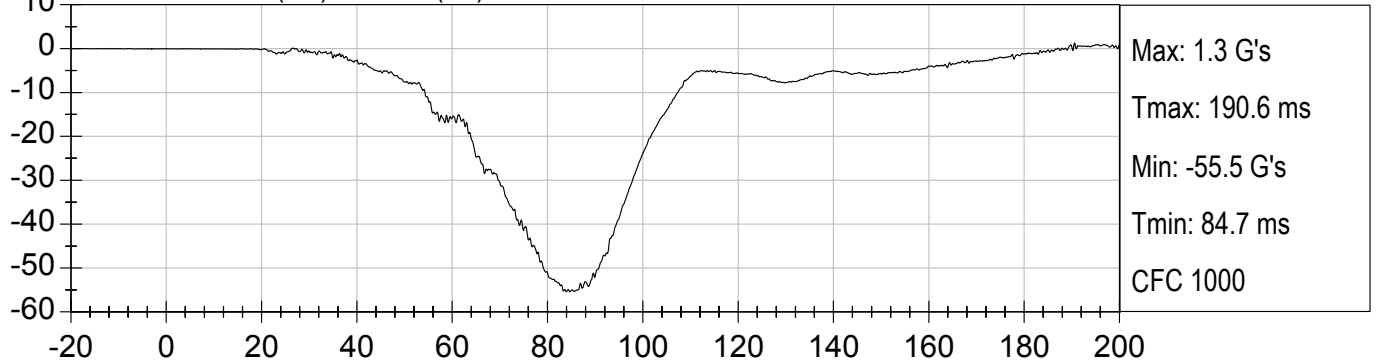
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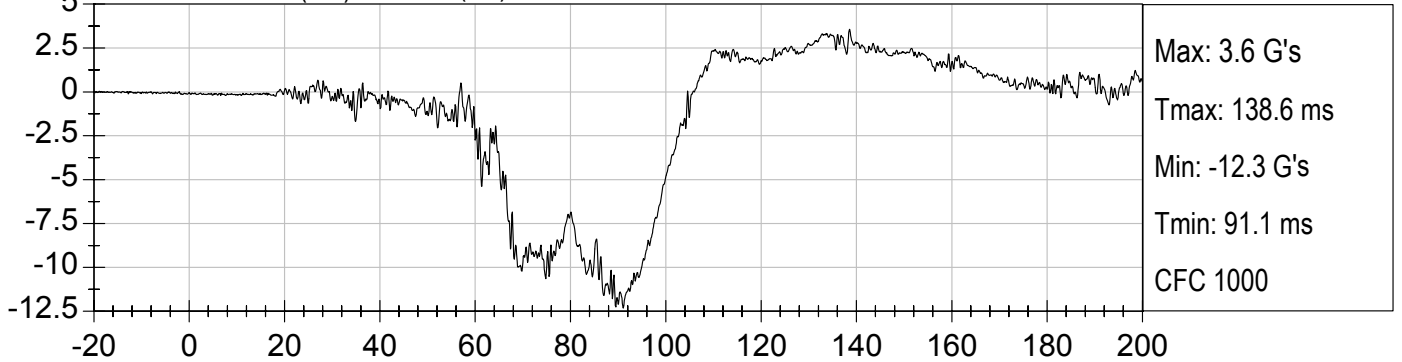
35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

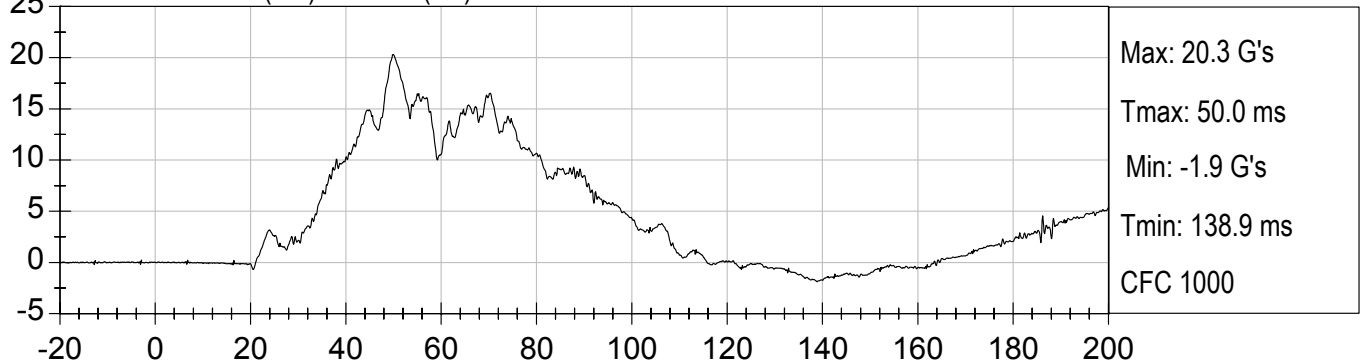
DRIVER HEAD X (G's) vs TIME (ms)



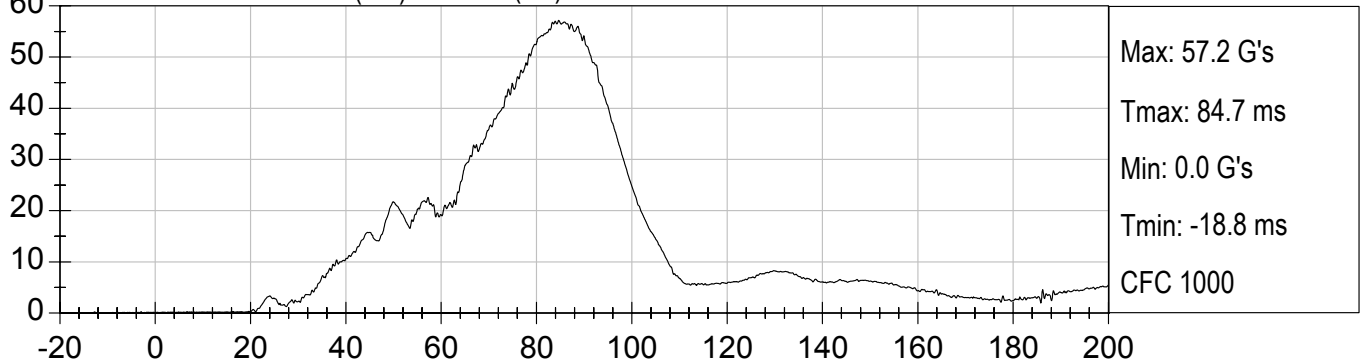
DRIVER HEAD Y (G's) vs TIME (ms)



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

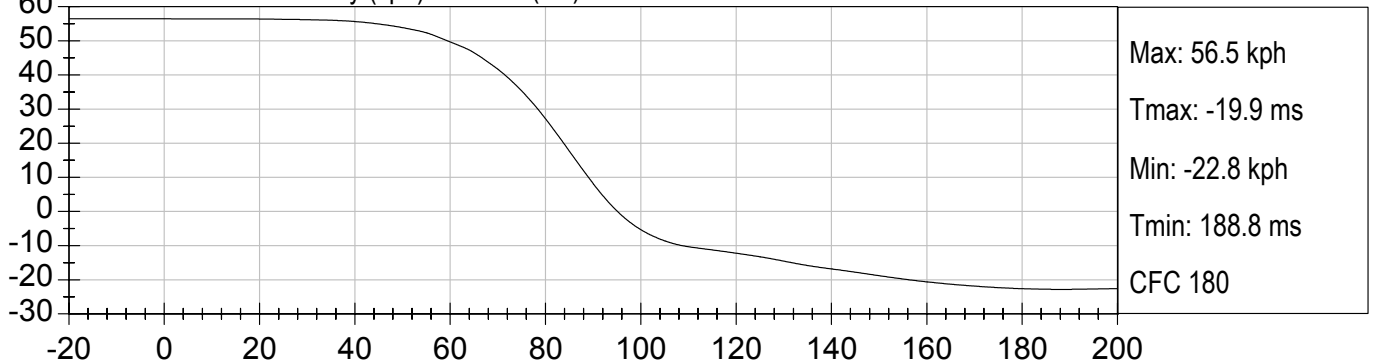


DRIVER HEAD Resultant (G's) vs TIME (ms)

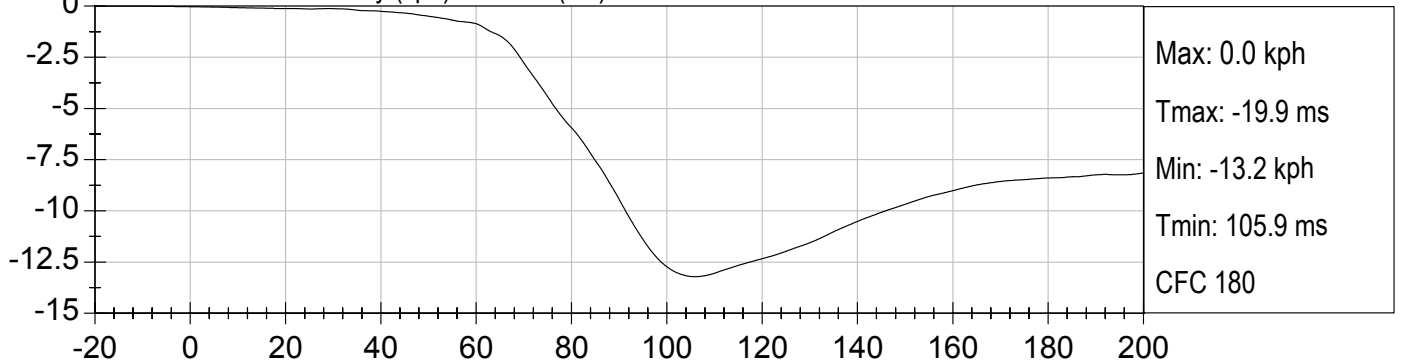




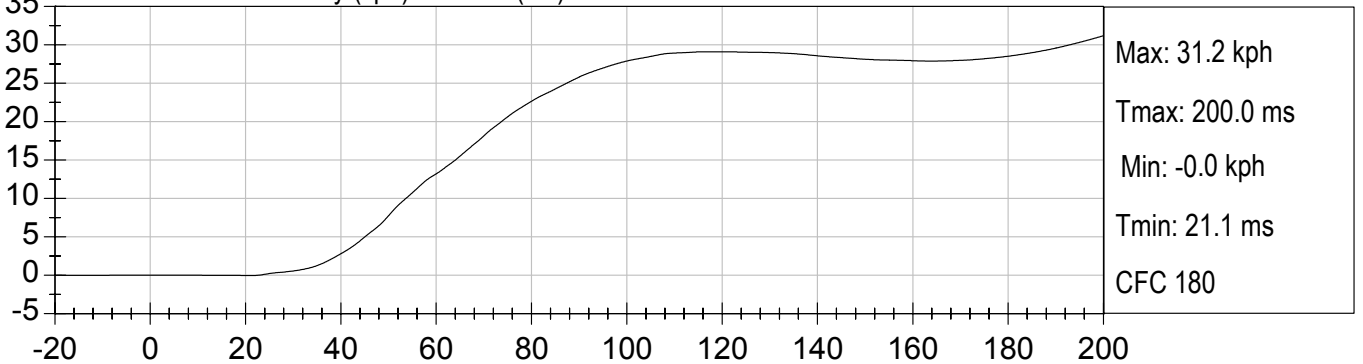
DRIVER HEAD X Velocity (kph) vs TIME (ms)



DRIVER HEAD Y Velocity (kph) vs TIME (ms)



DRIVER HEAD Z Velocity (kph) vs TIME (ms)

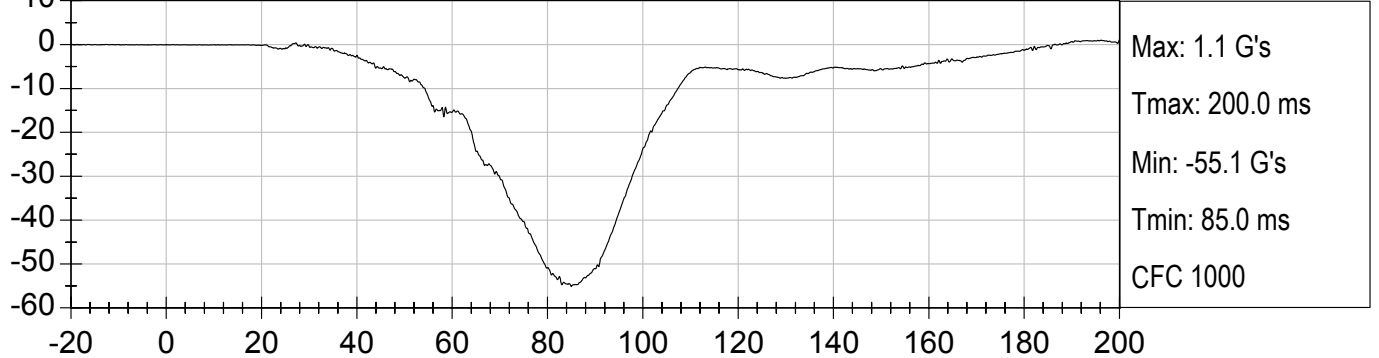




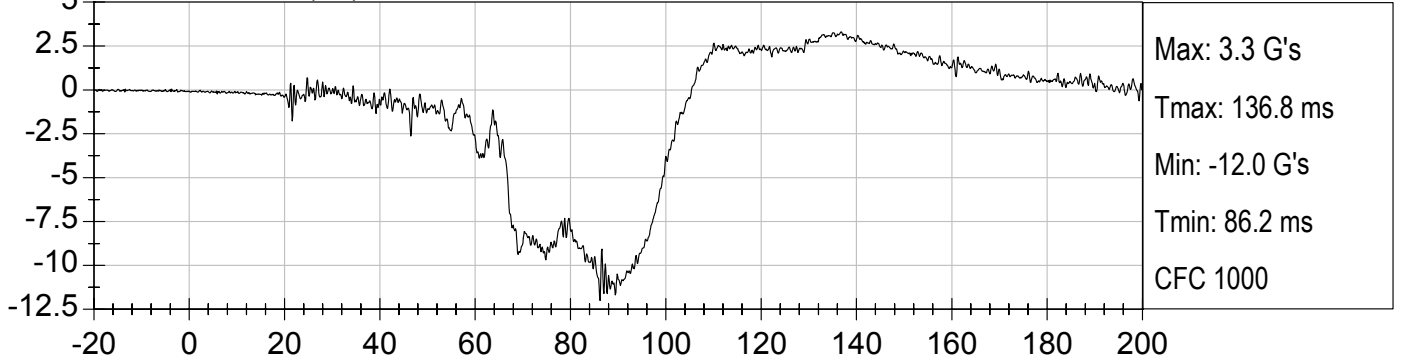
35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

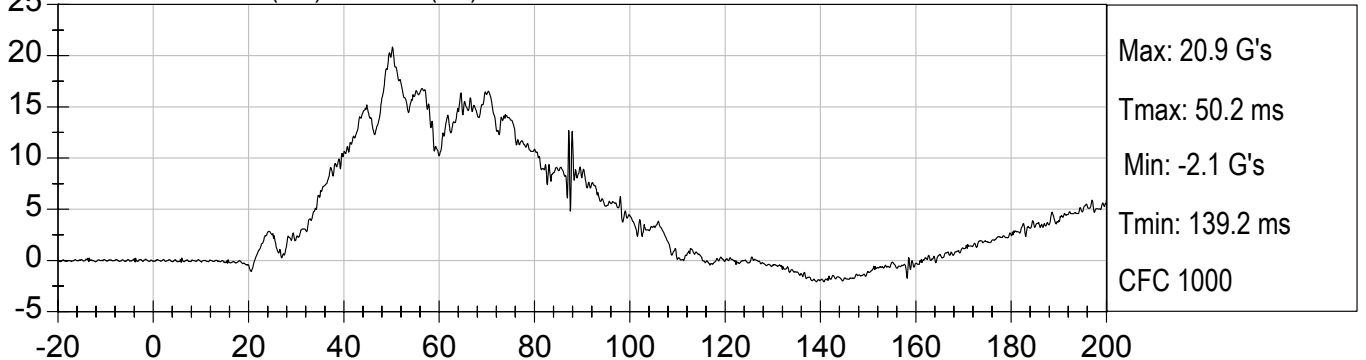
DRIVER HEAD Xr (G's) vs TIME (ms)



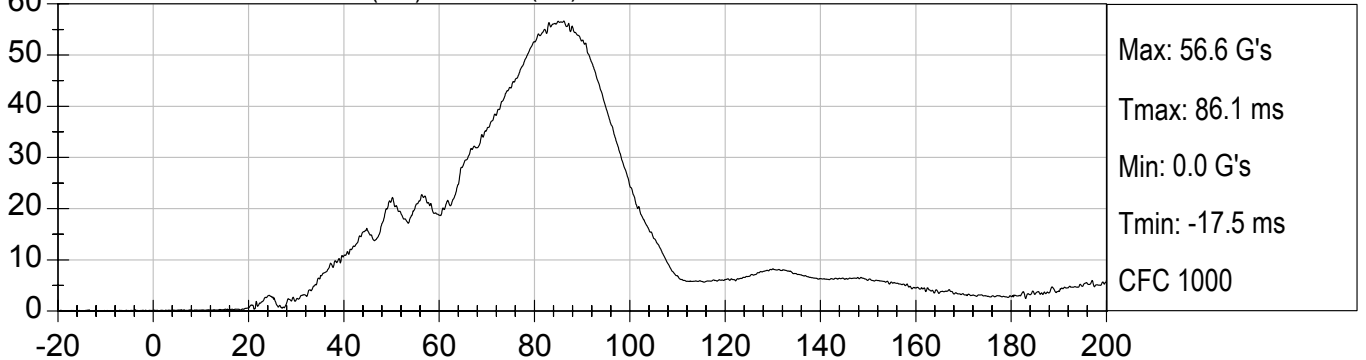
DRIVER HEAD Yr (G's) vs TIME (ms)

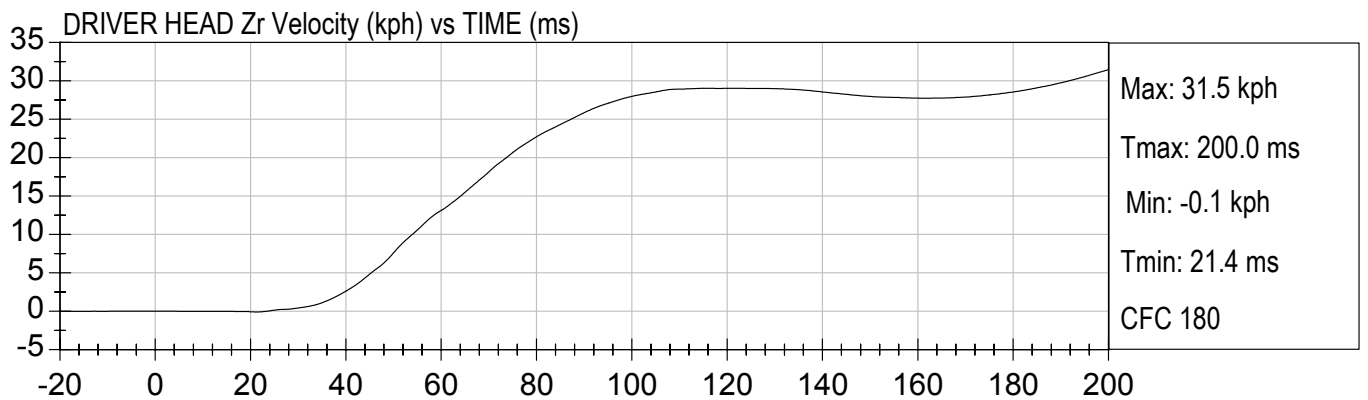
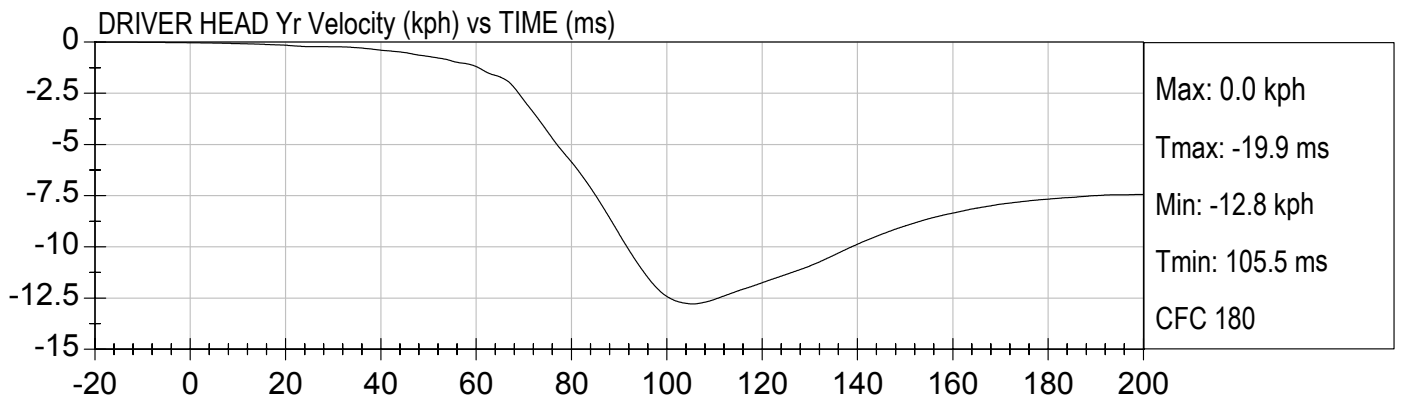
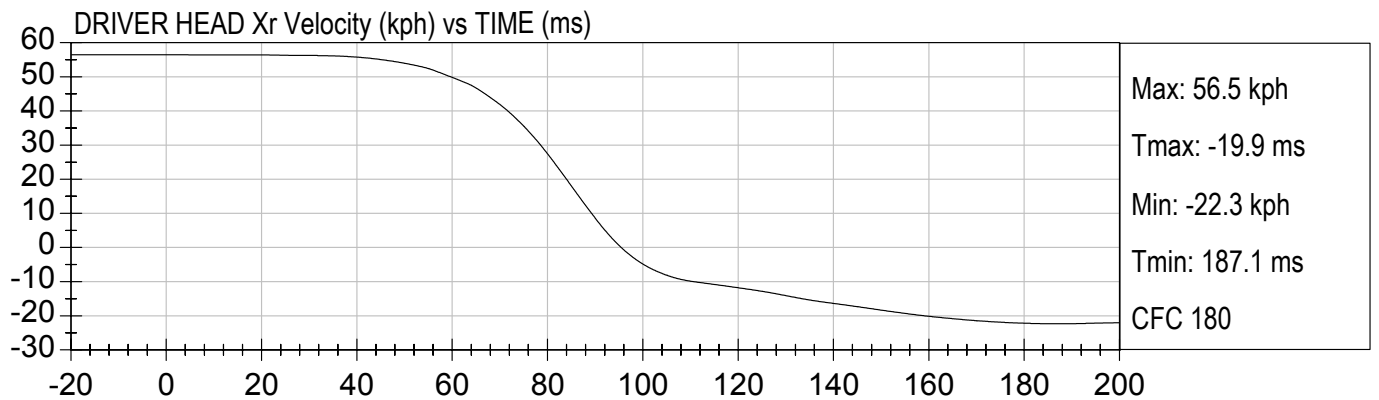


DRIVER HEAD Zr (G's) vs TIME (ms)



DRIVER HEAD ResultantR (G's) vs TIME (ms)

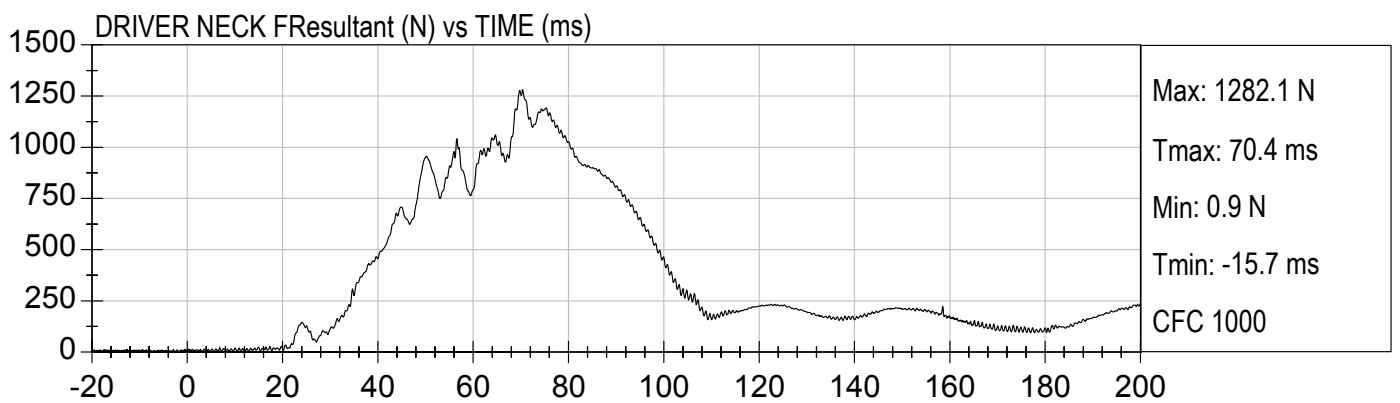
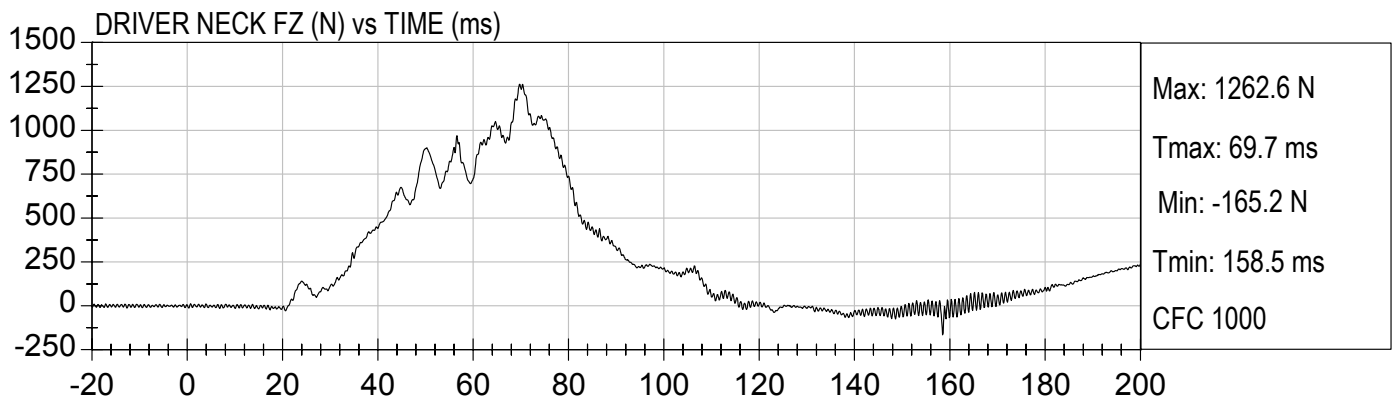
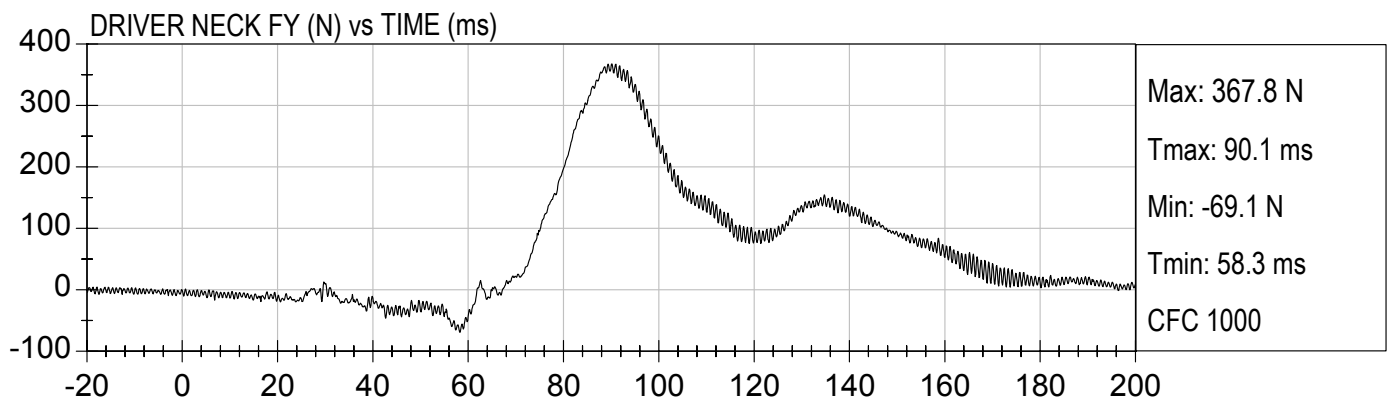
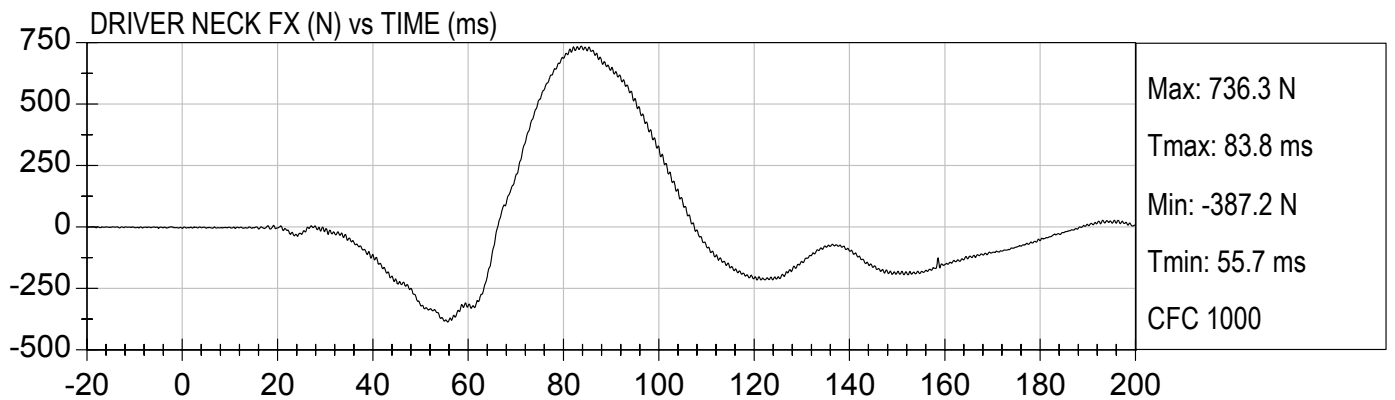






35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

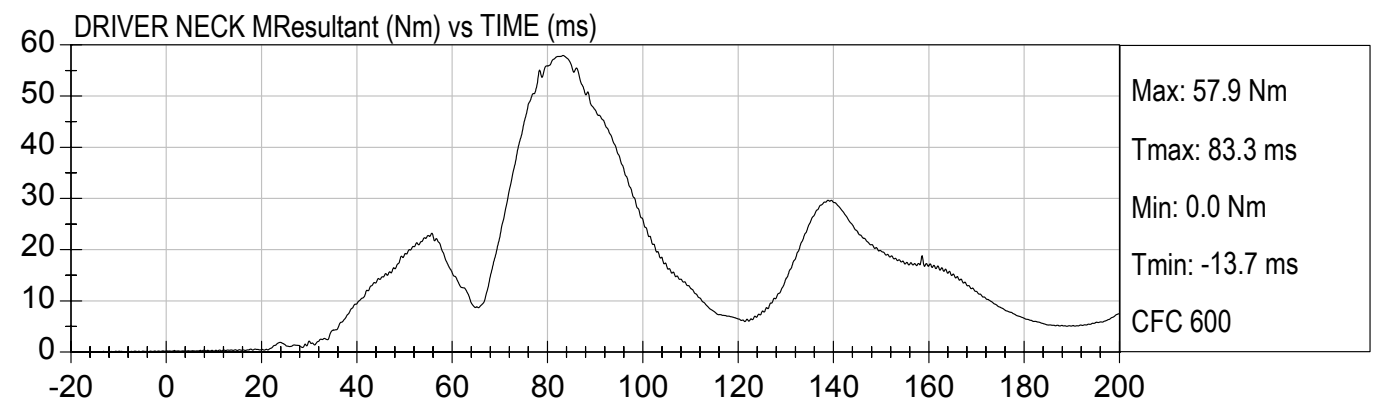
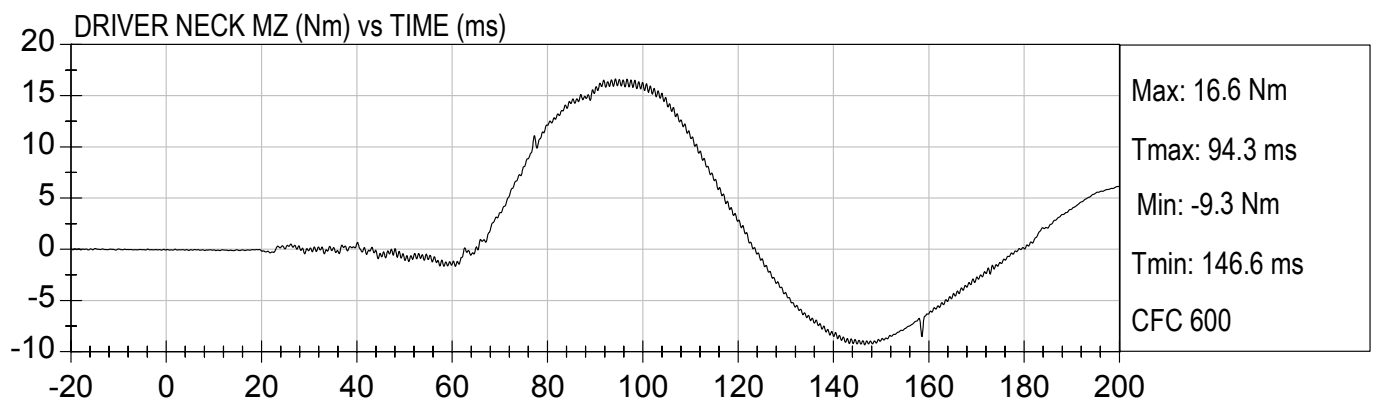
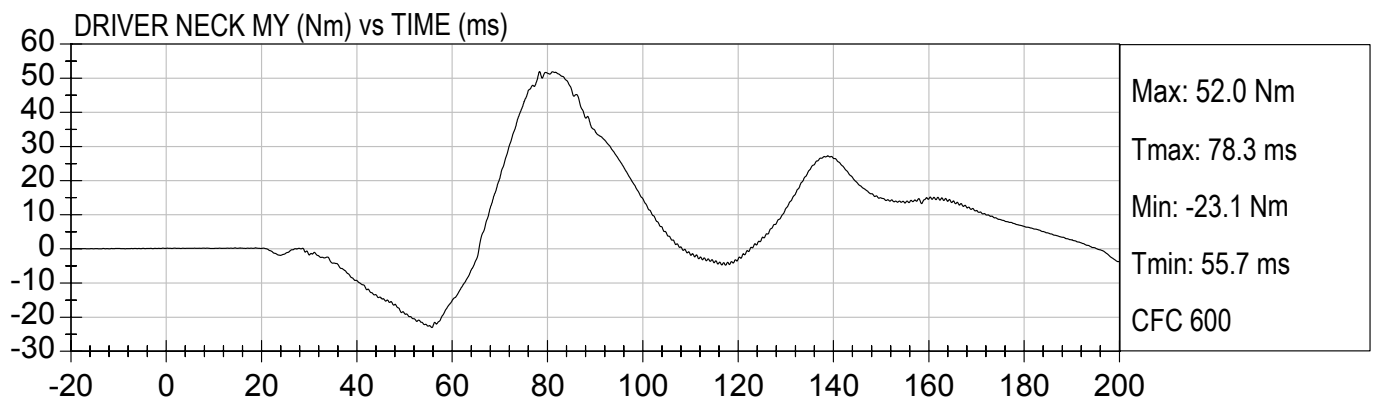
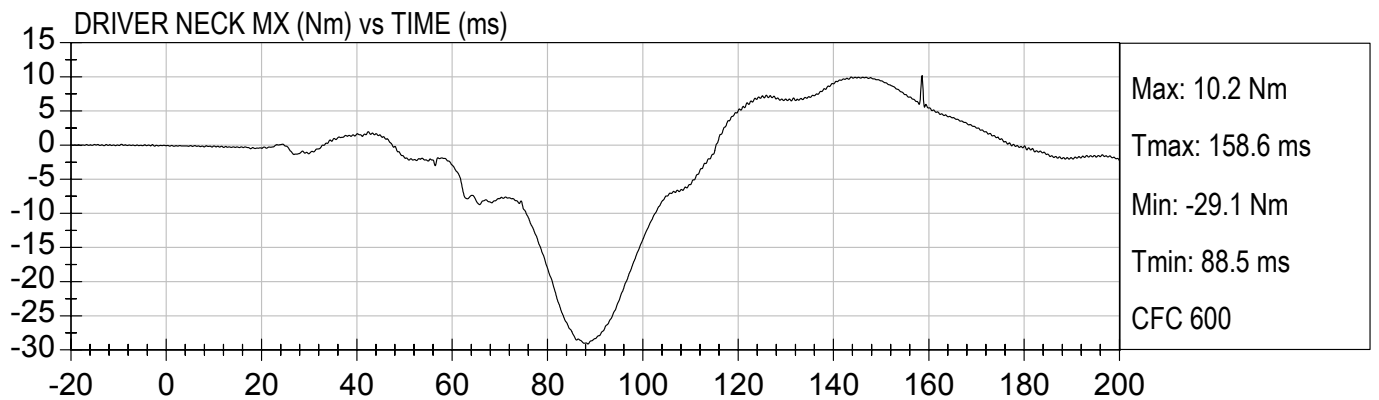
Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)





35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

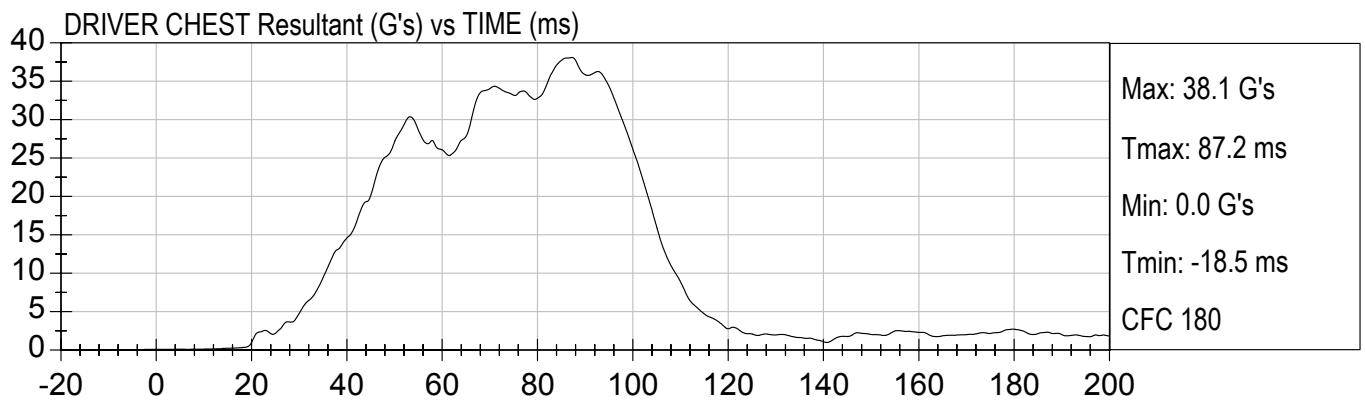
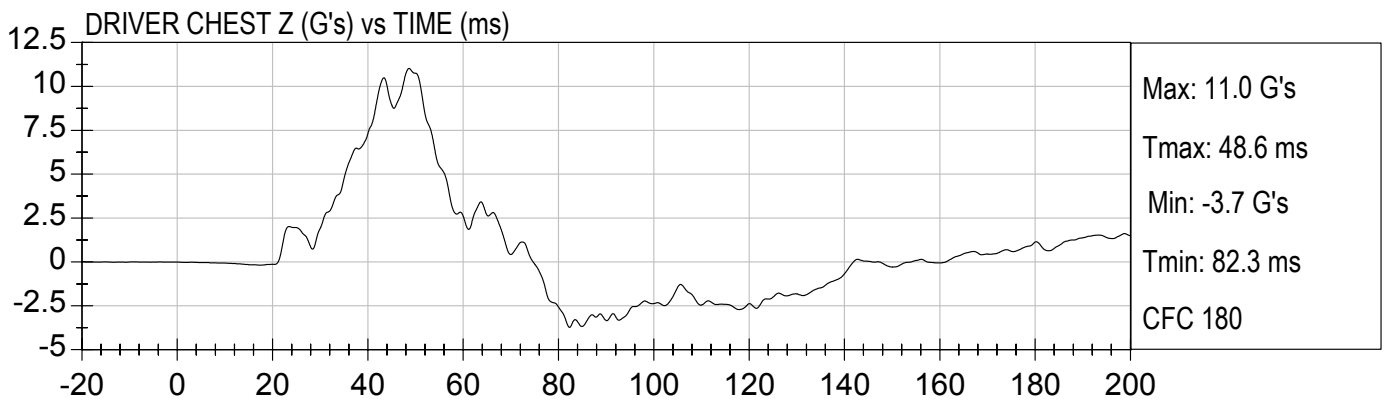
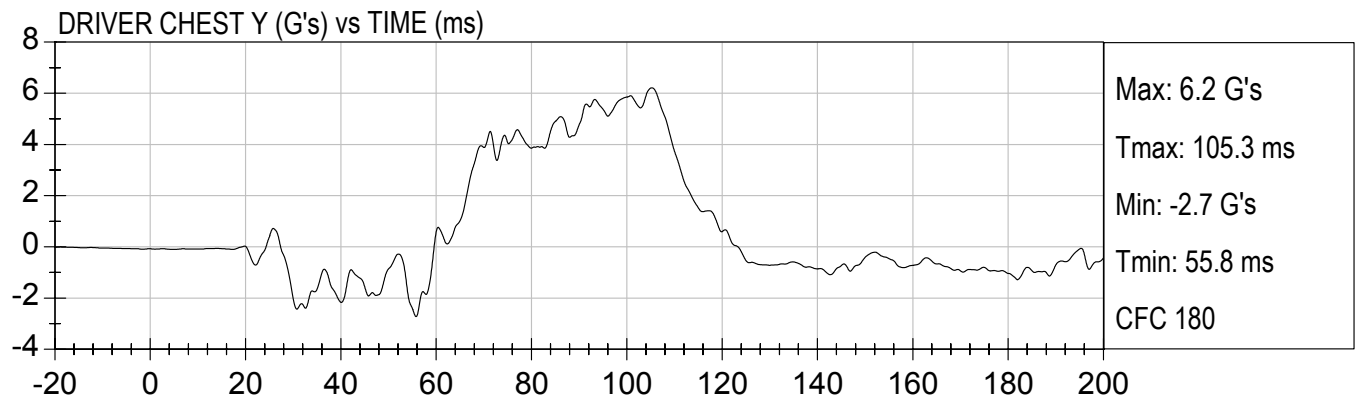
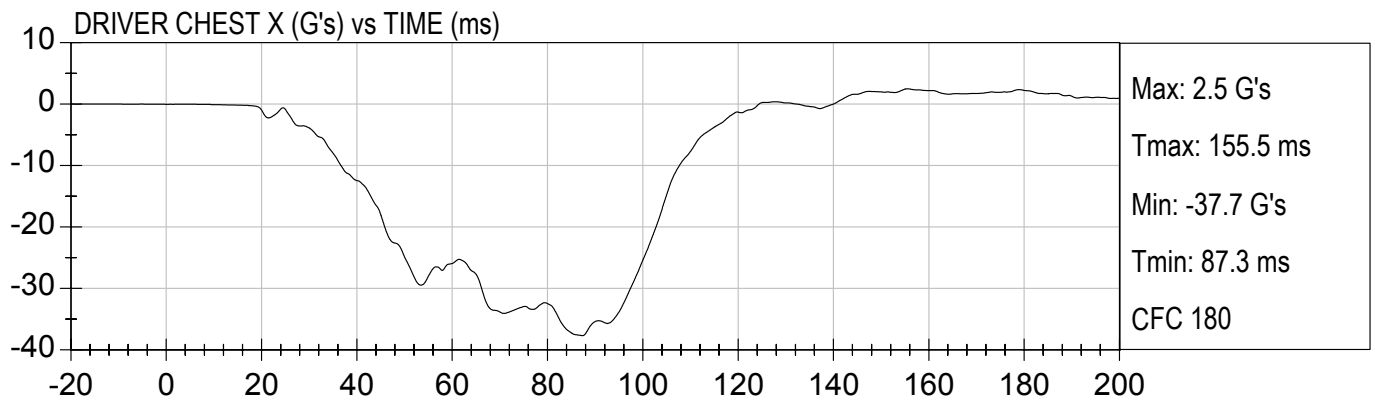
Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

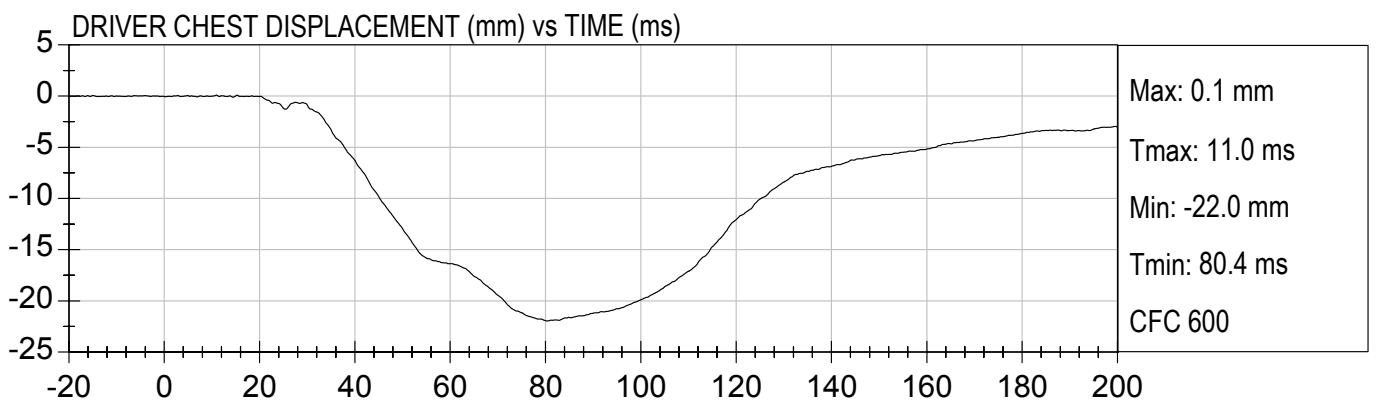
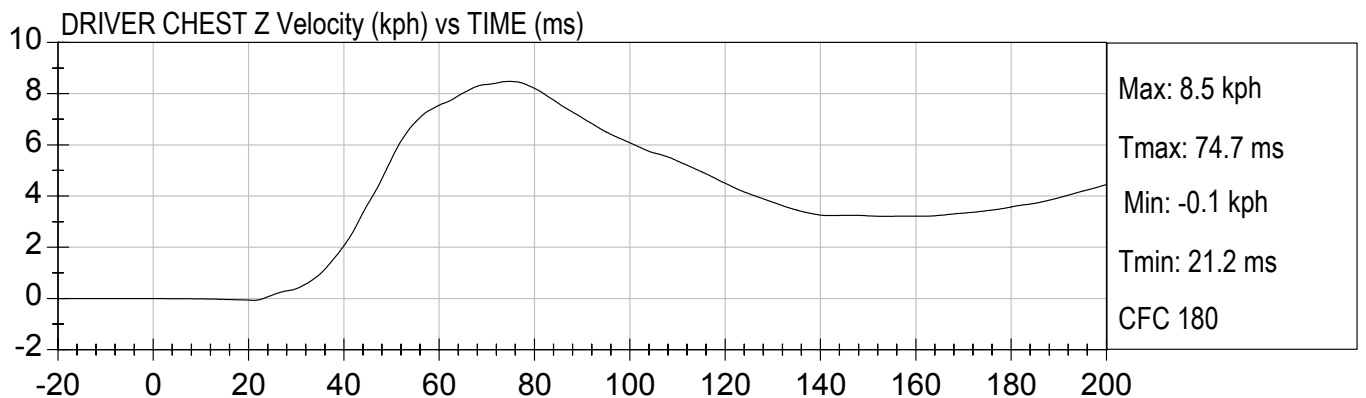
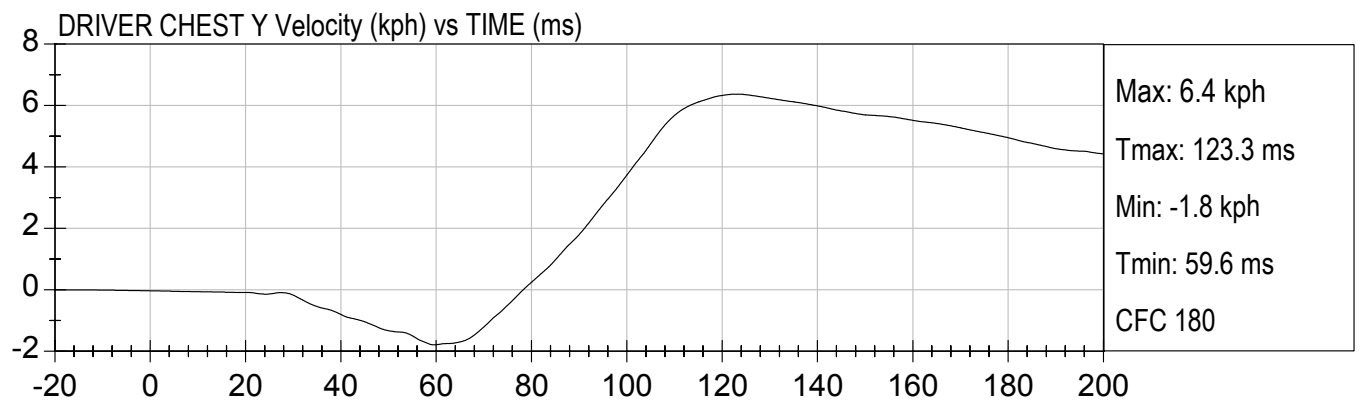
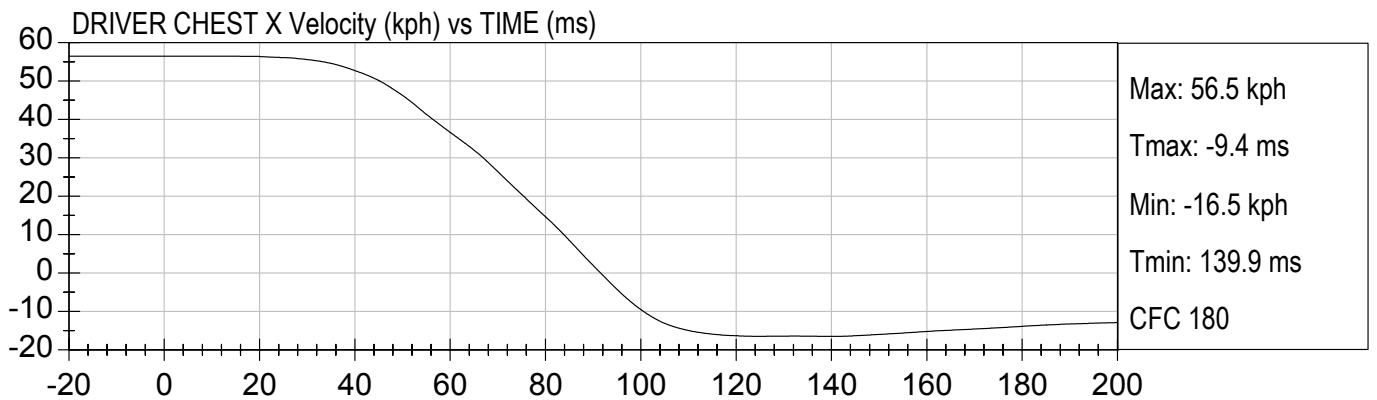




35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

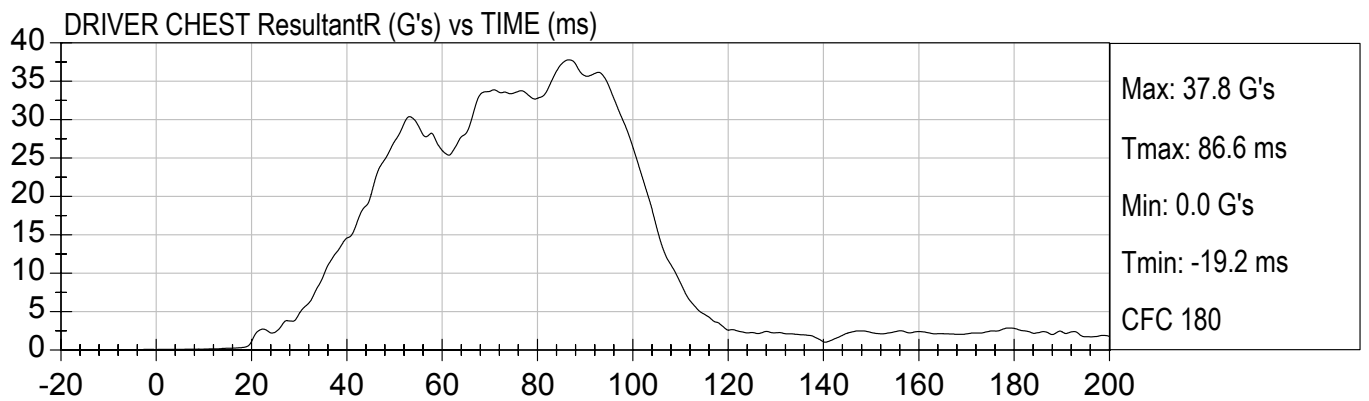
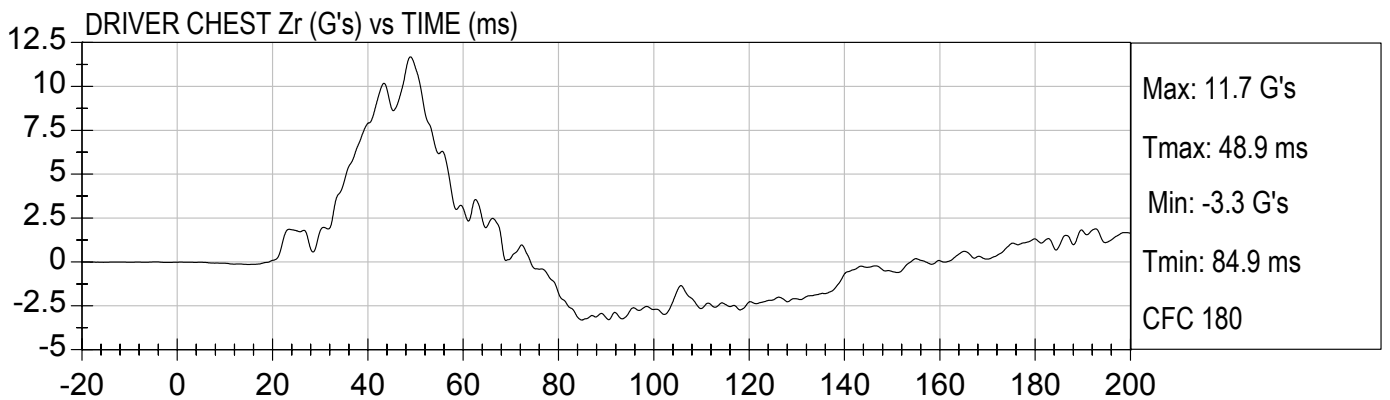
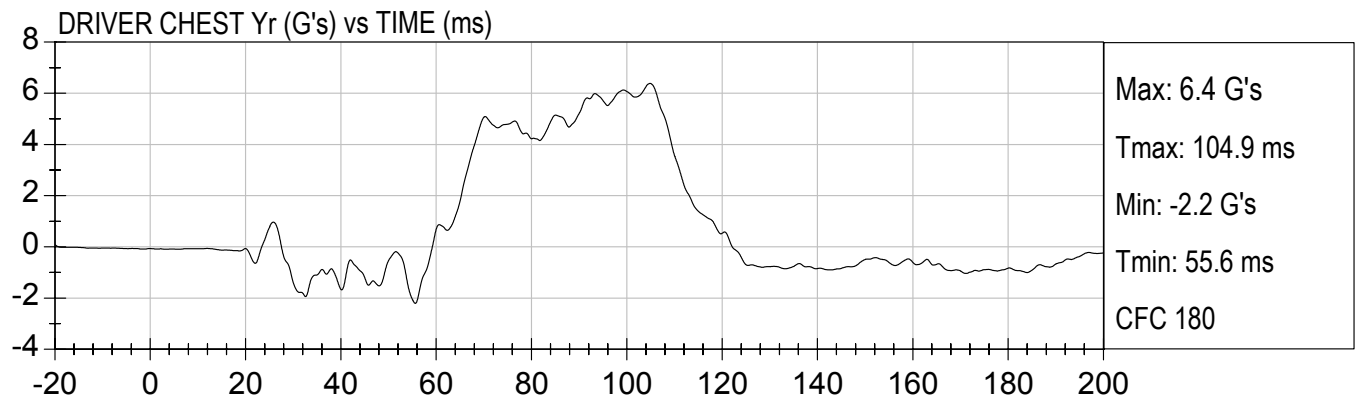
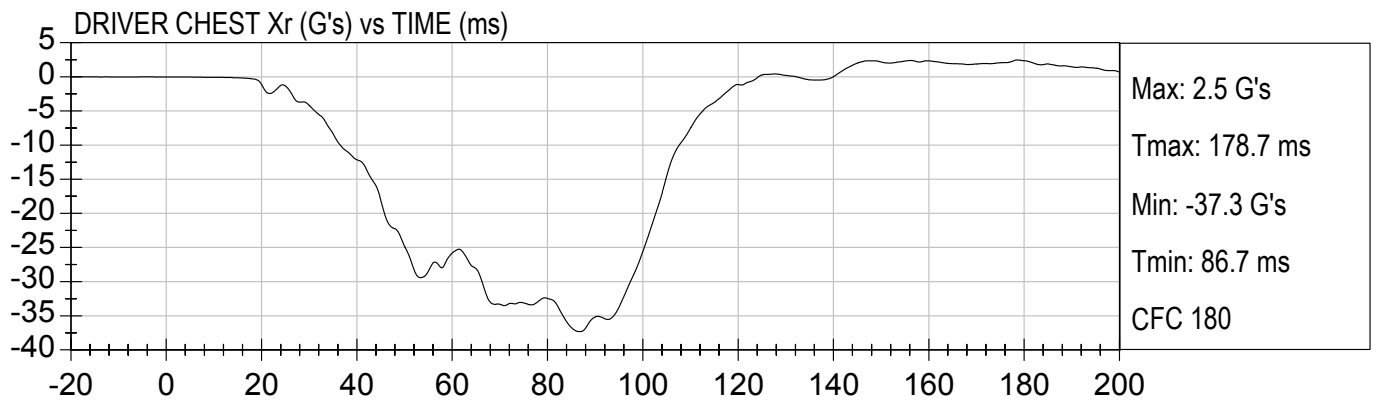


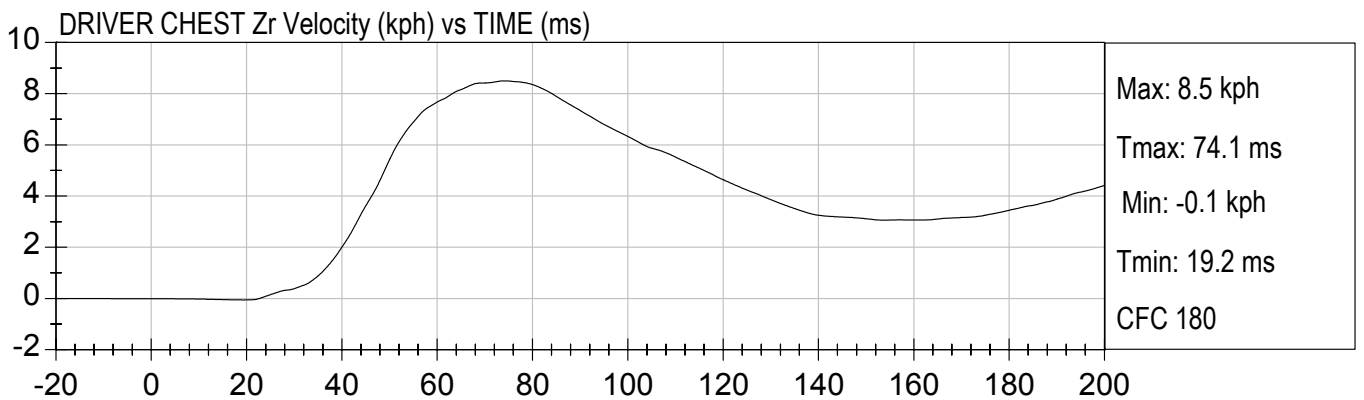
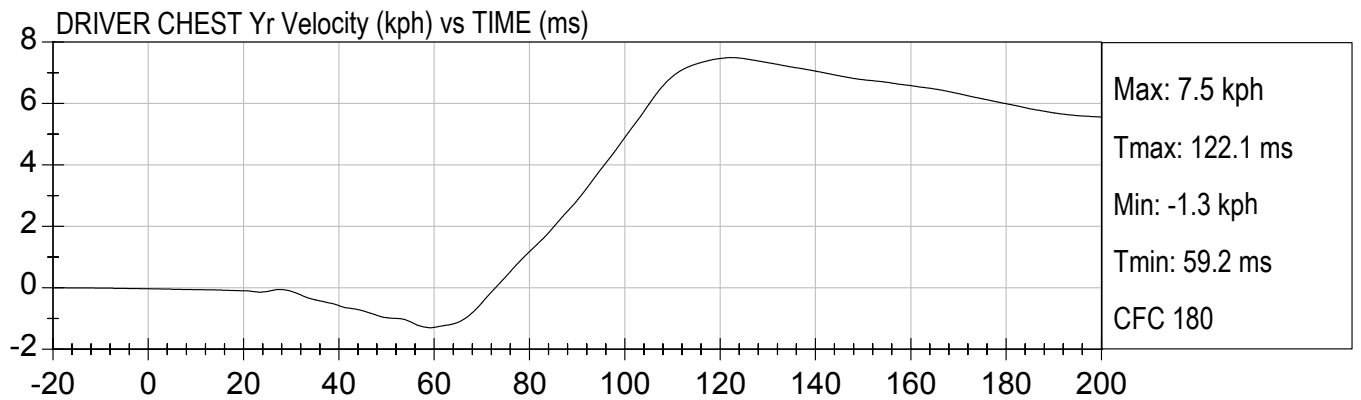
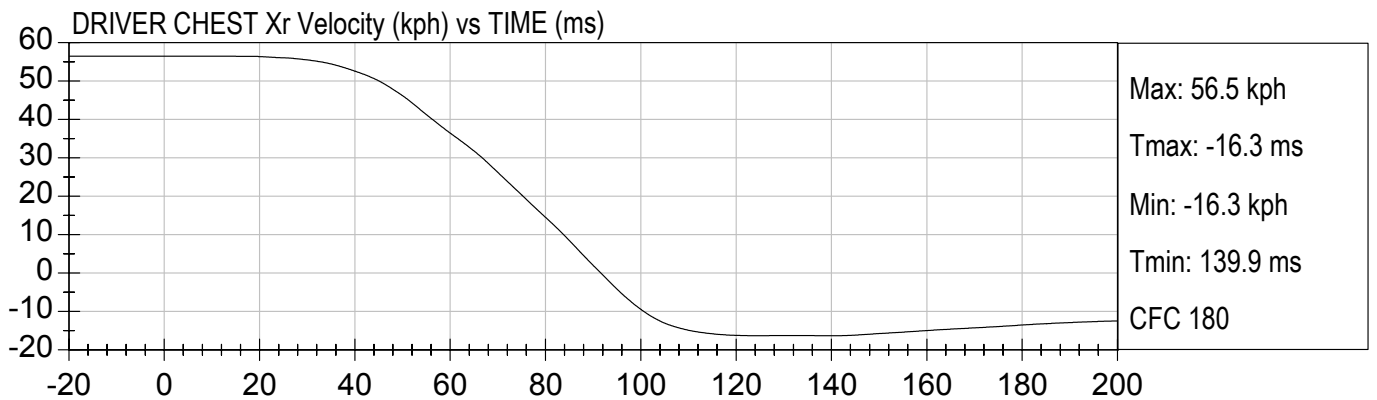




35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

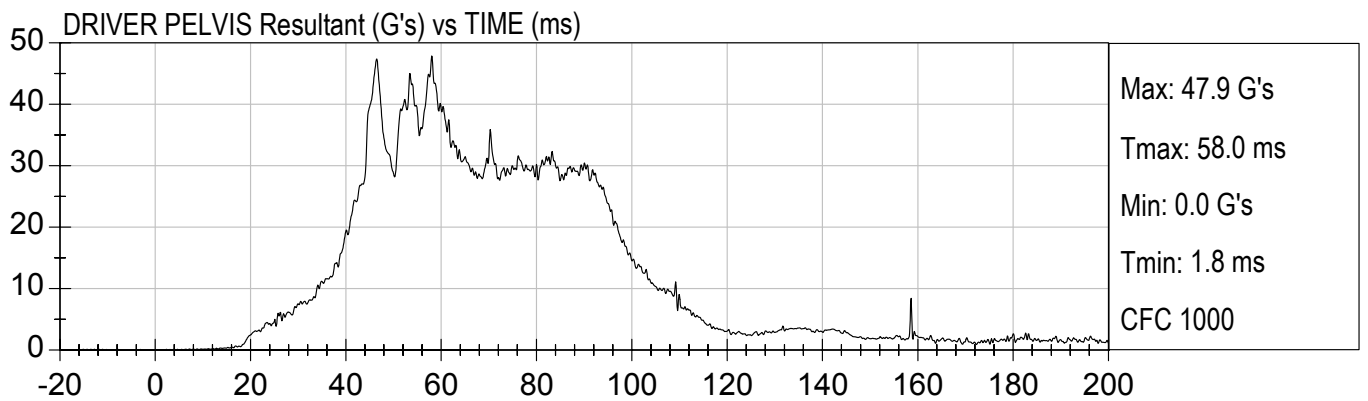
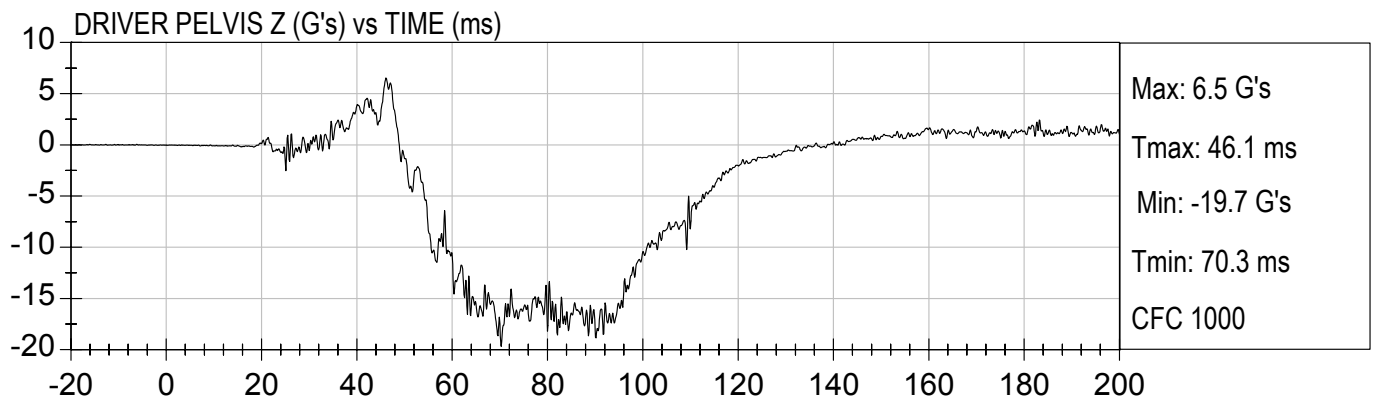
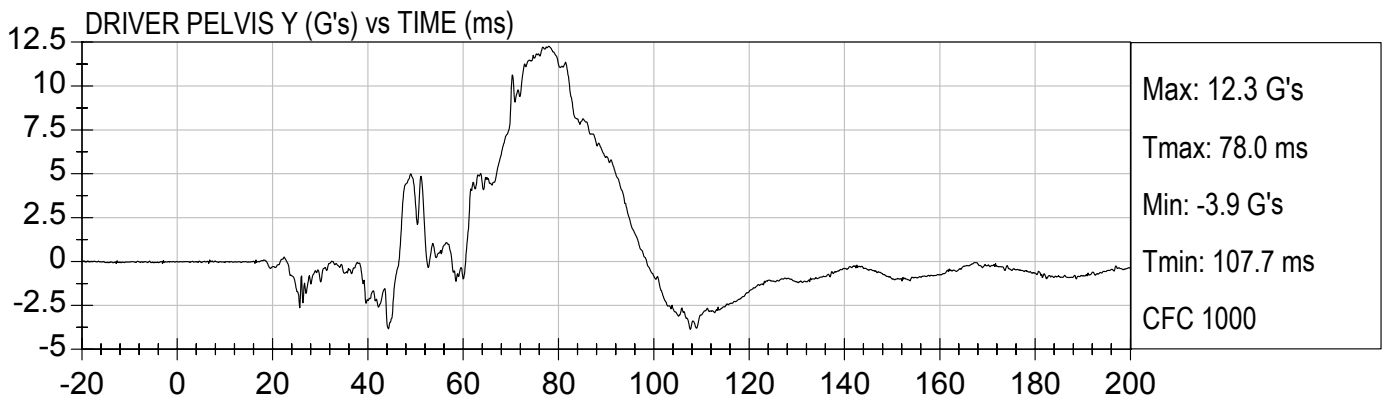
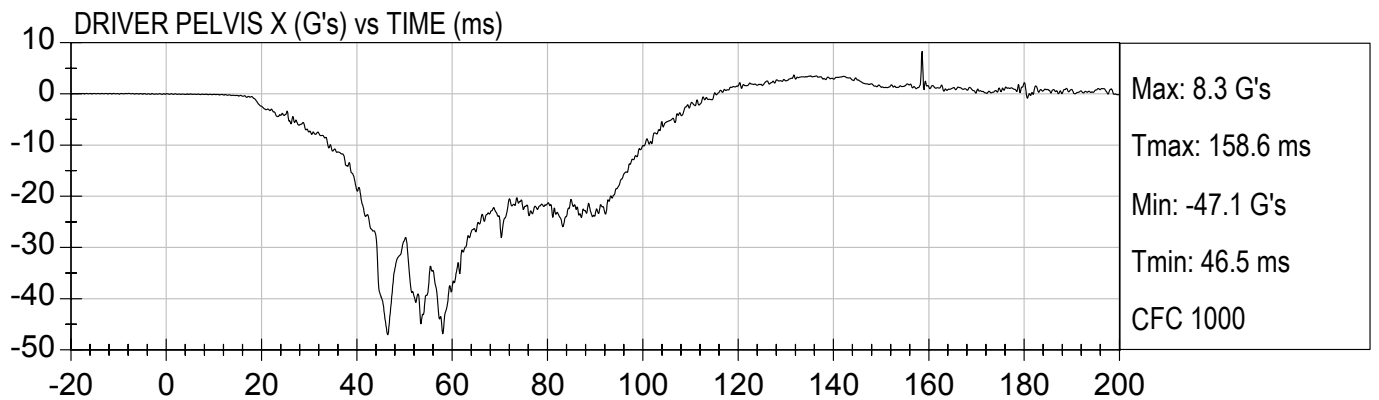


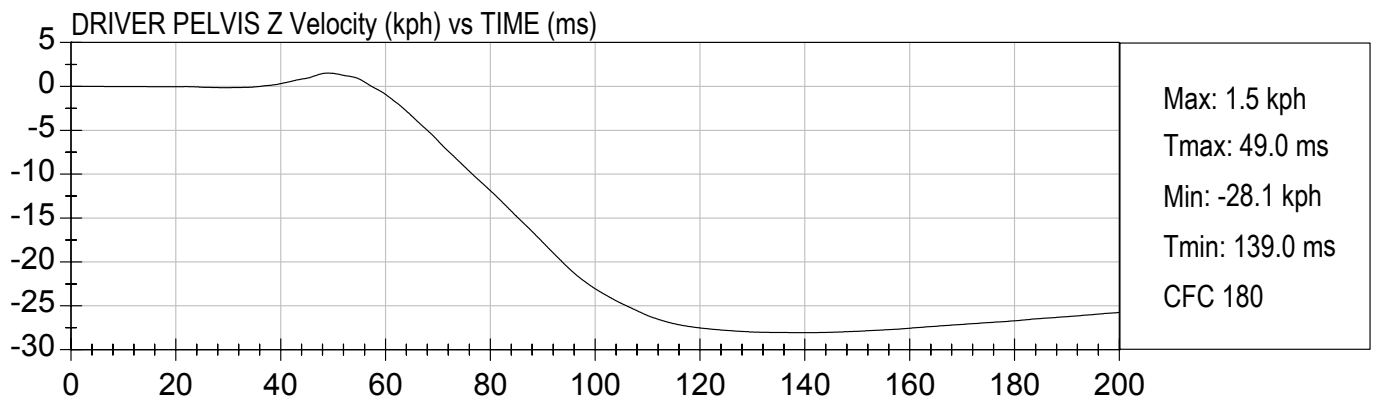
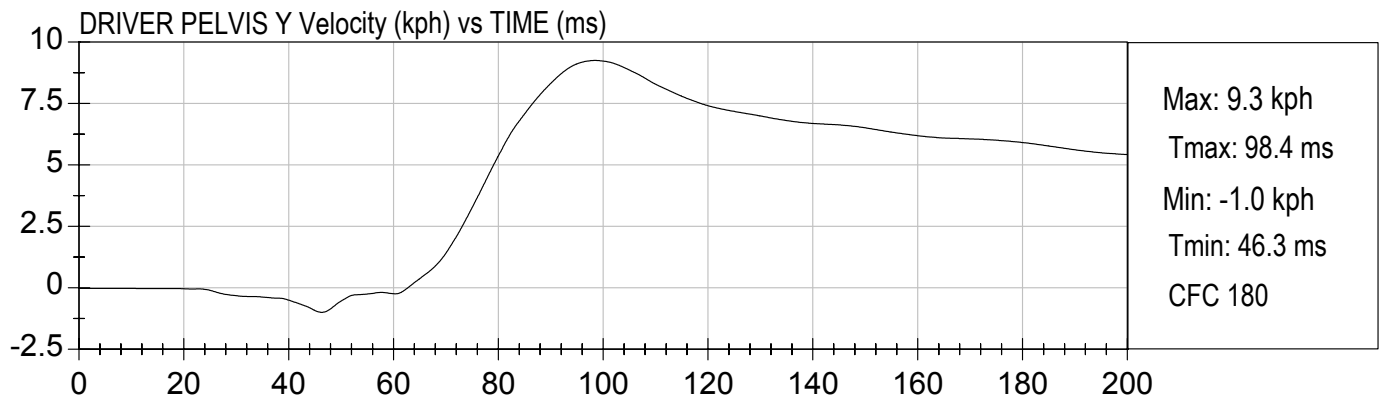
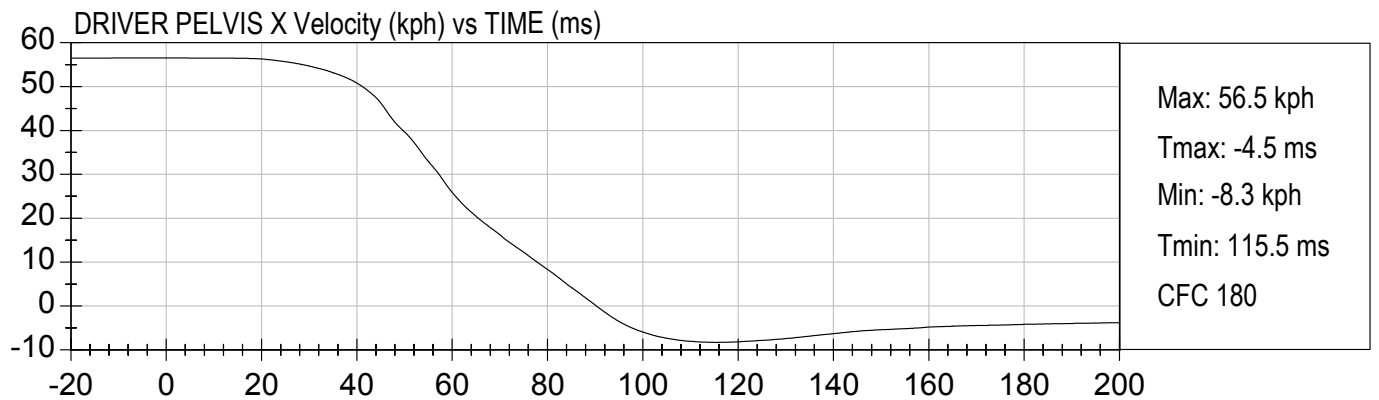




35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

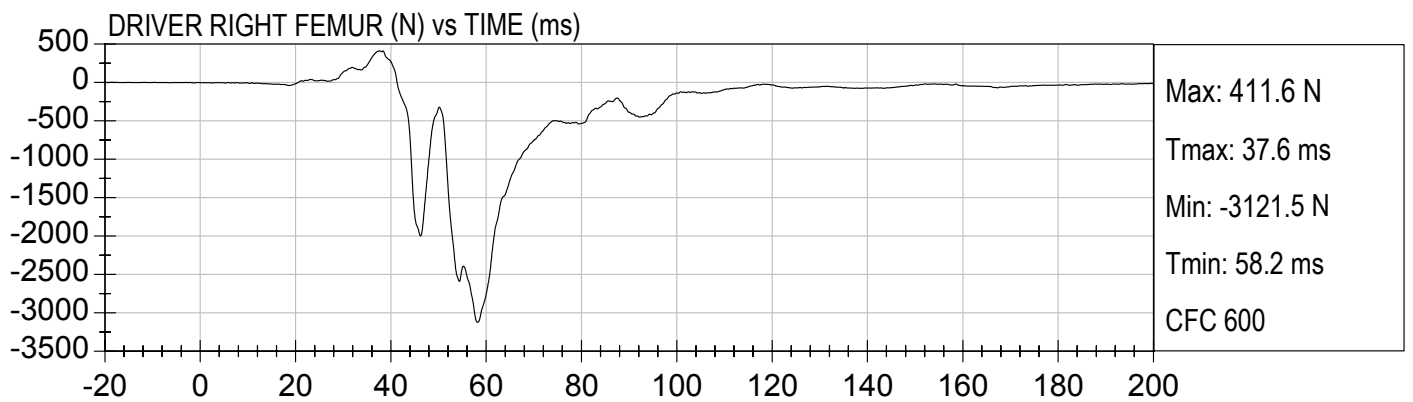
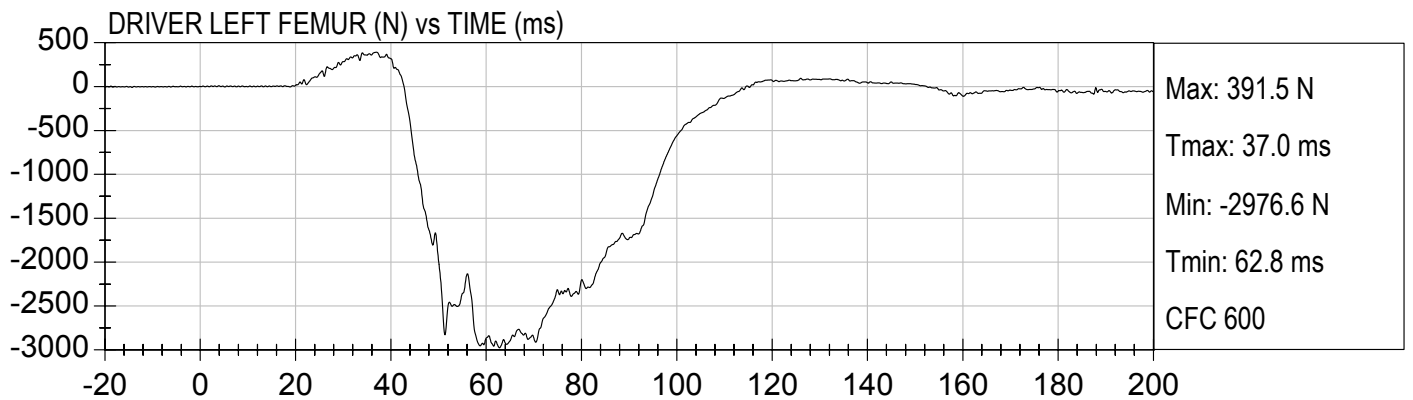






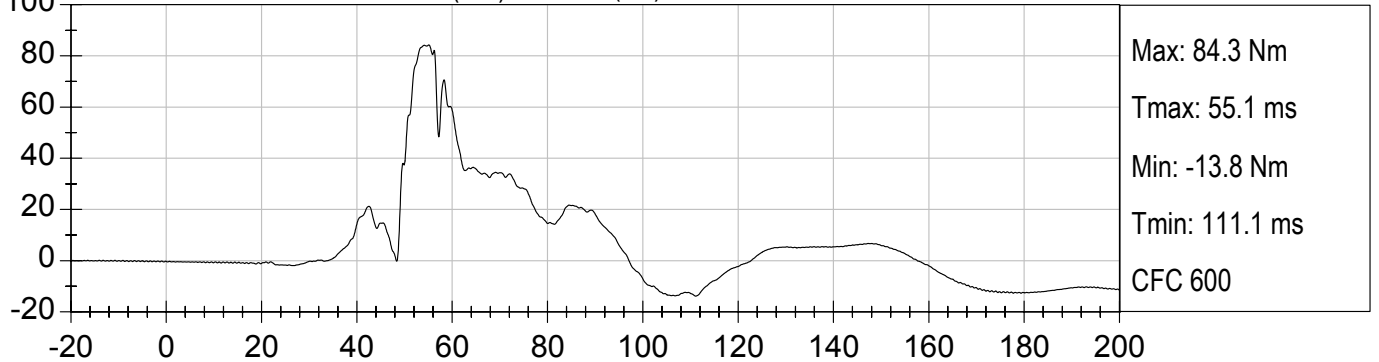
35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

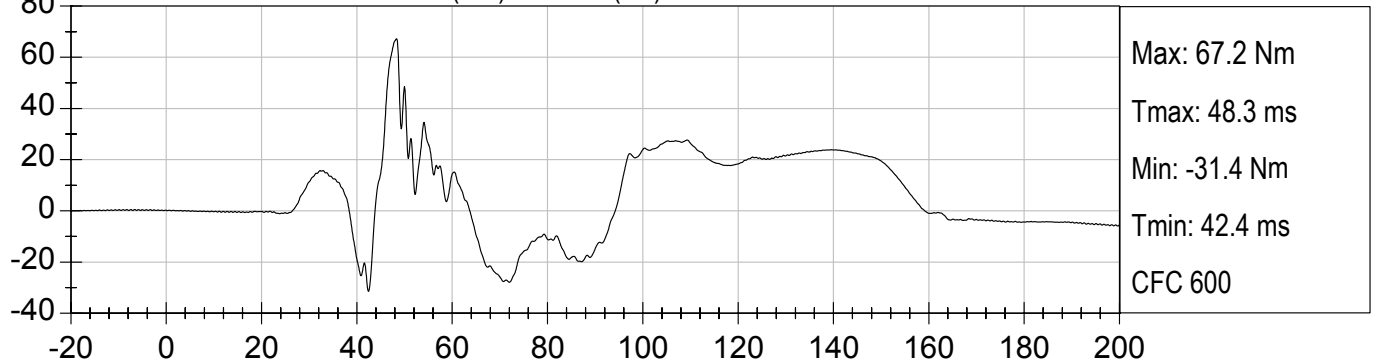




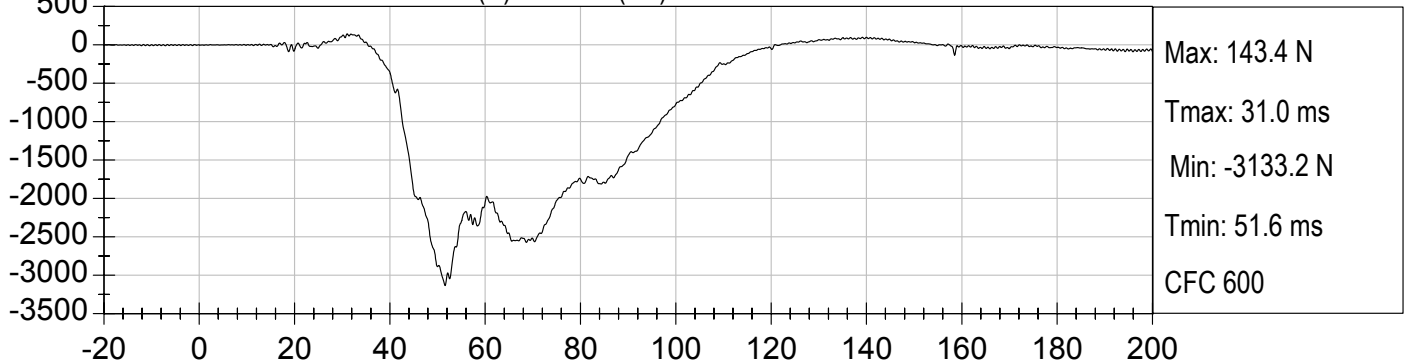
DRIVER LEFT UPPER TIBIA MX (Nm) vs TIME (ms)



DRIVER LEFT UPPER TIBIA MY (Nm) vs TIME (ms)

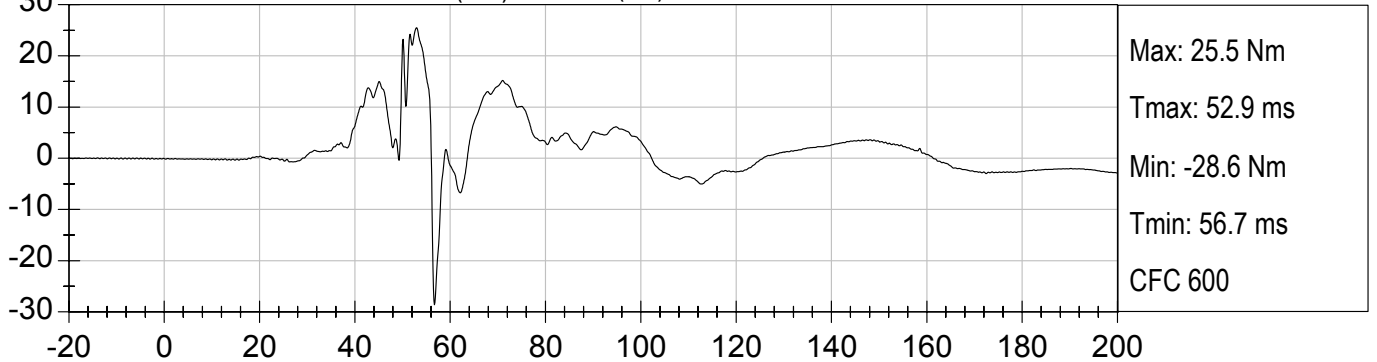


DRIVER LEFT UPPER TIBIA FZ (N) vs TIME (ms)

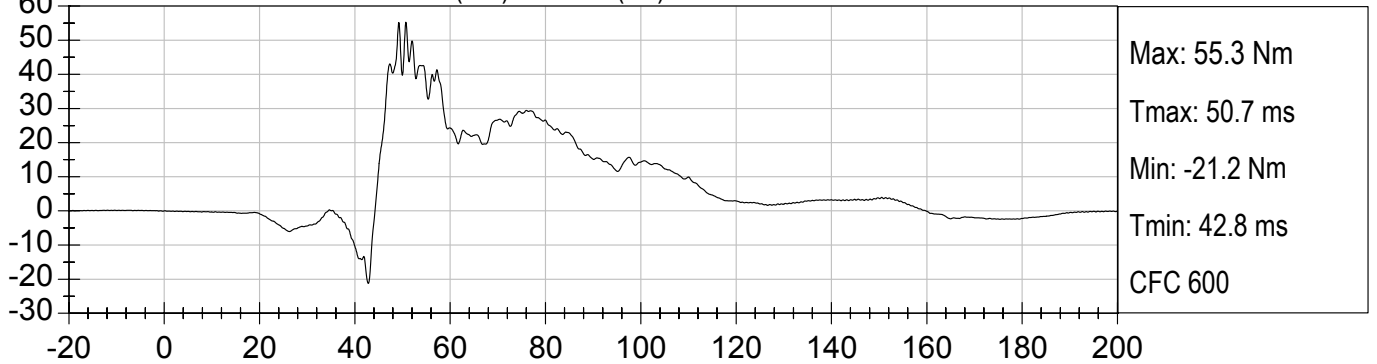




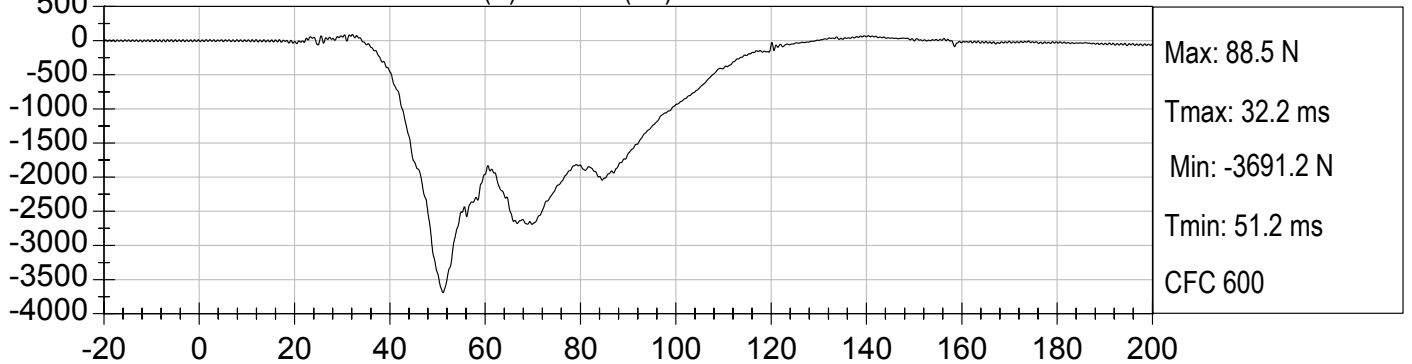
DRIVER LEFT LOWER TIBIA MX (Nm) vs TIME (ms)

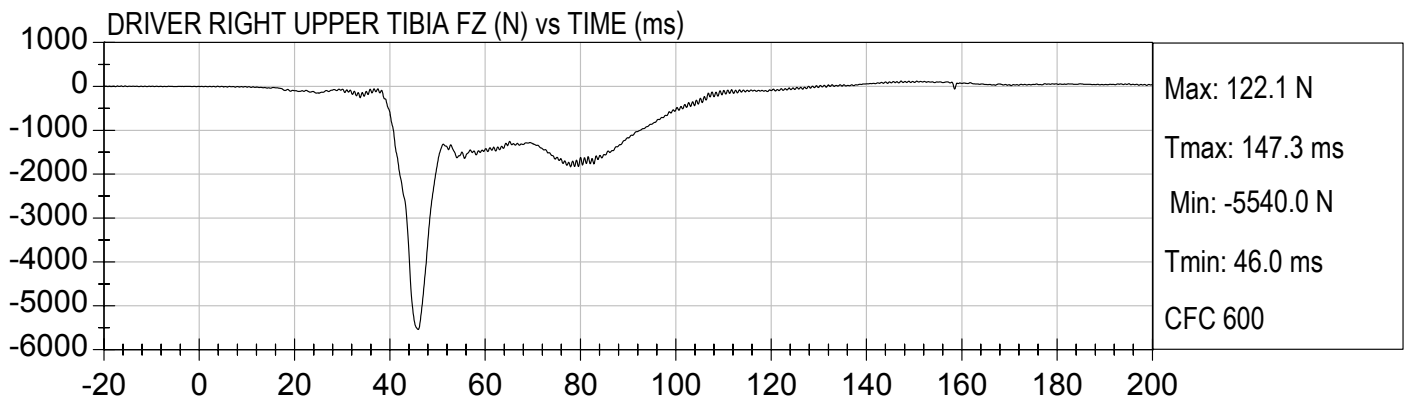
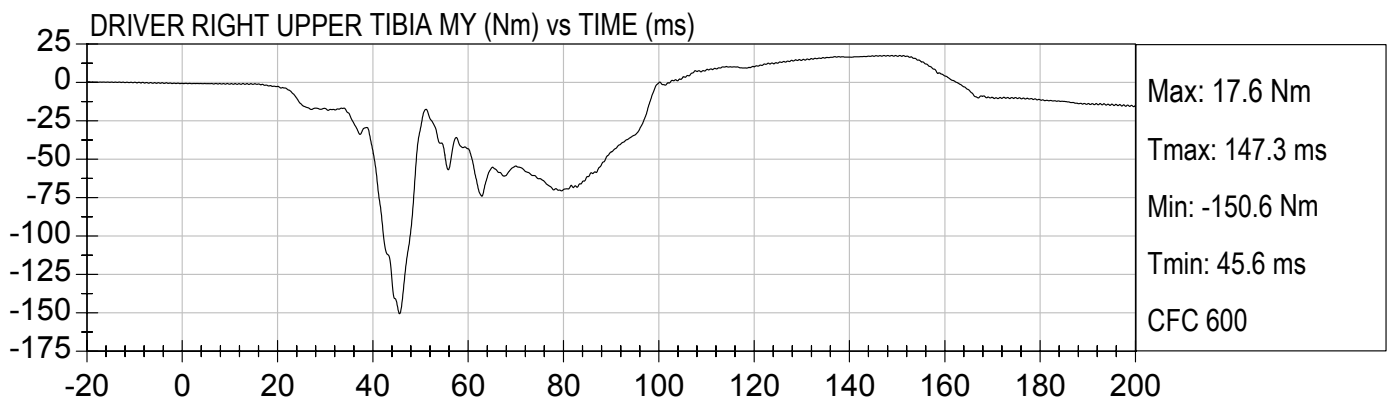
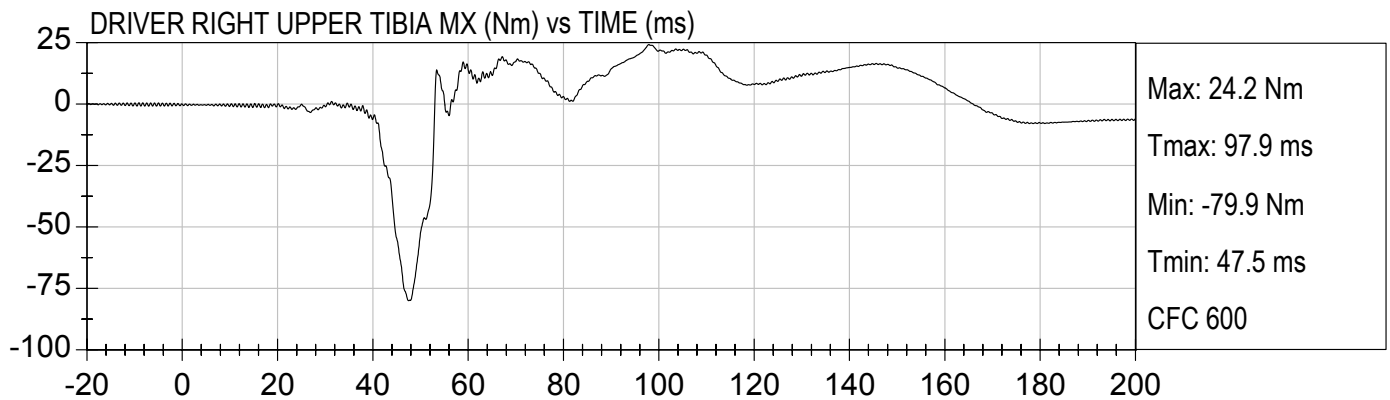


DRIVER LEFT LOWER TIBIA MY (Nm) vs TIME (ms)



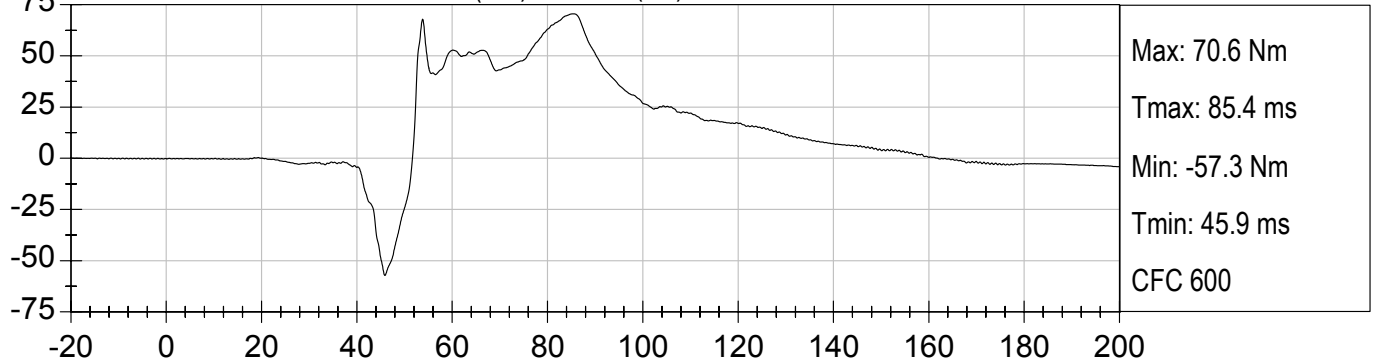
DRIVER LEFT LOWER TIBIA FZ (N) vs TIME (ms)



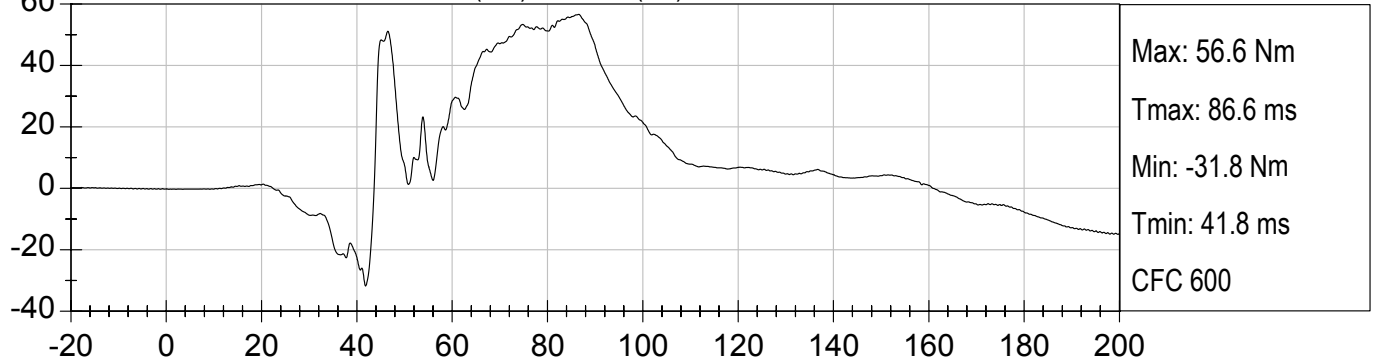




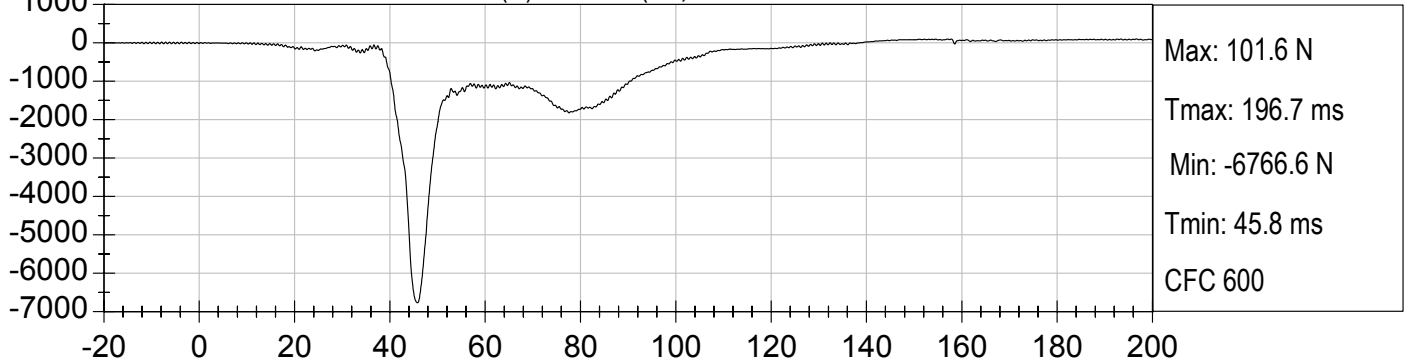
DRIVER RIGHT LOWER TIBIA MX (Nm) vs TIME (ms)

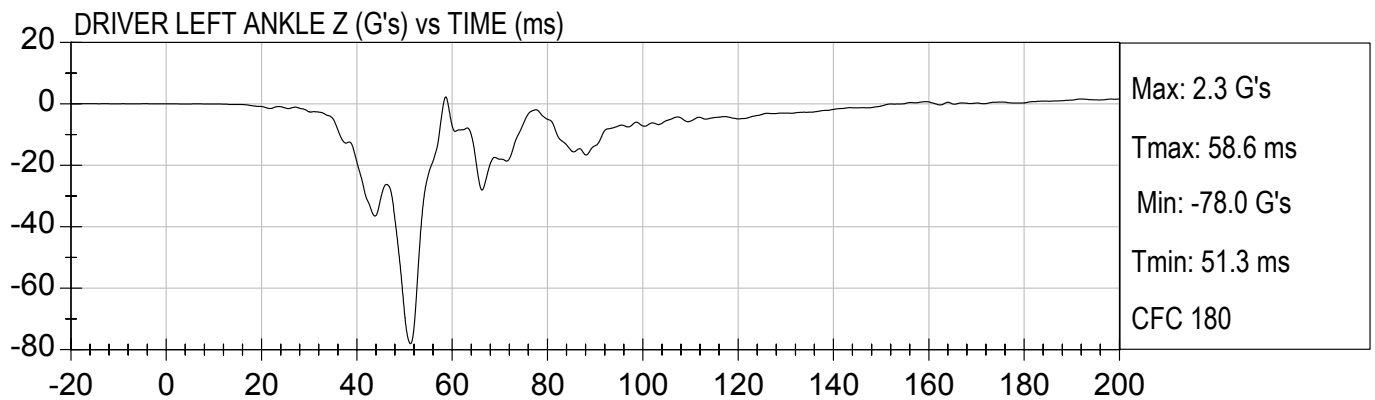
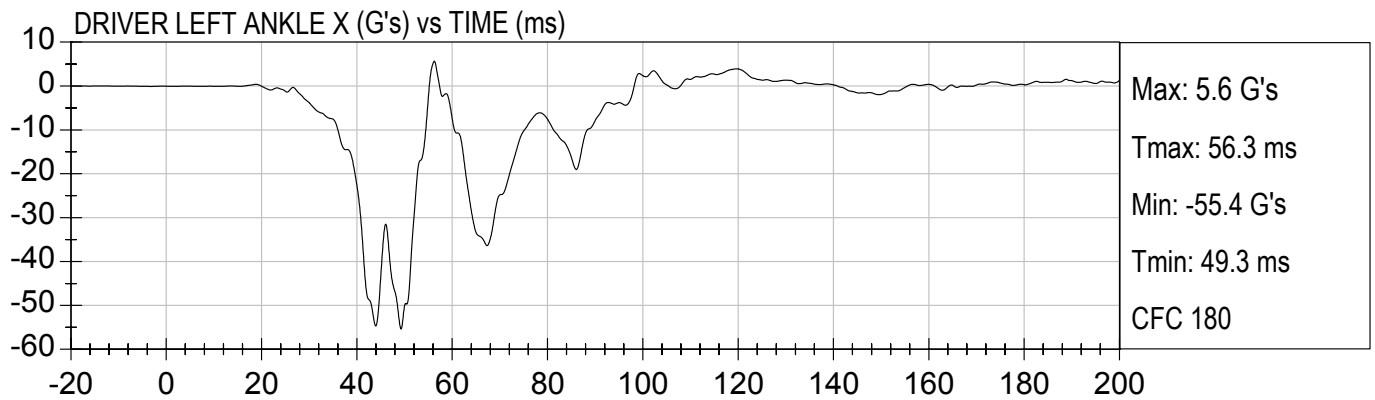
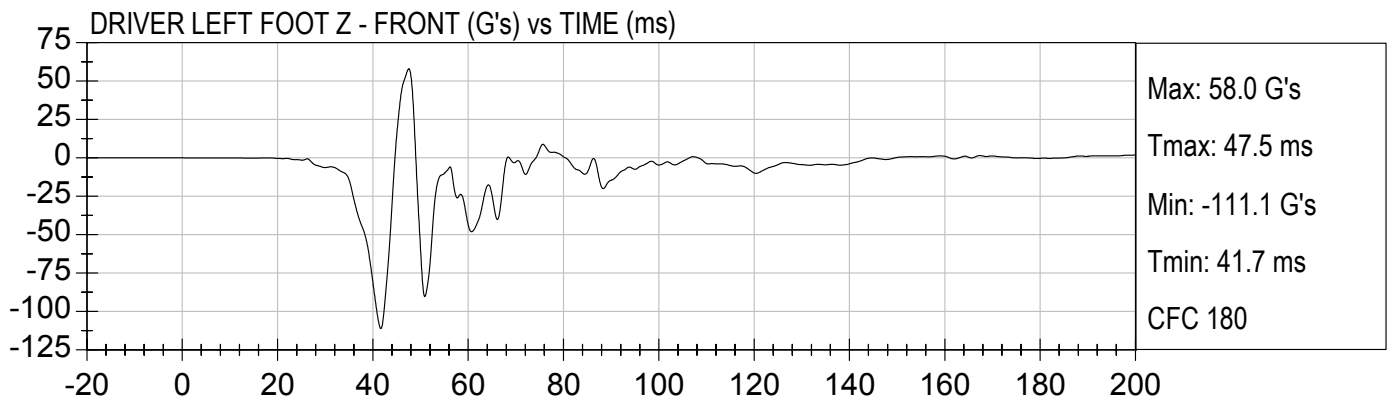


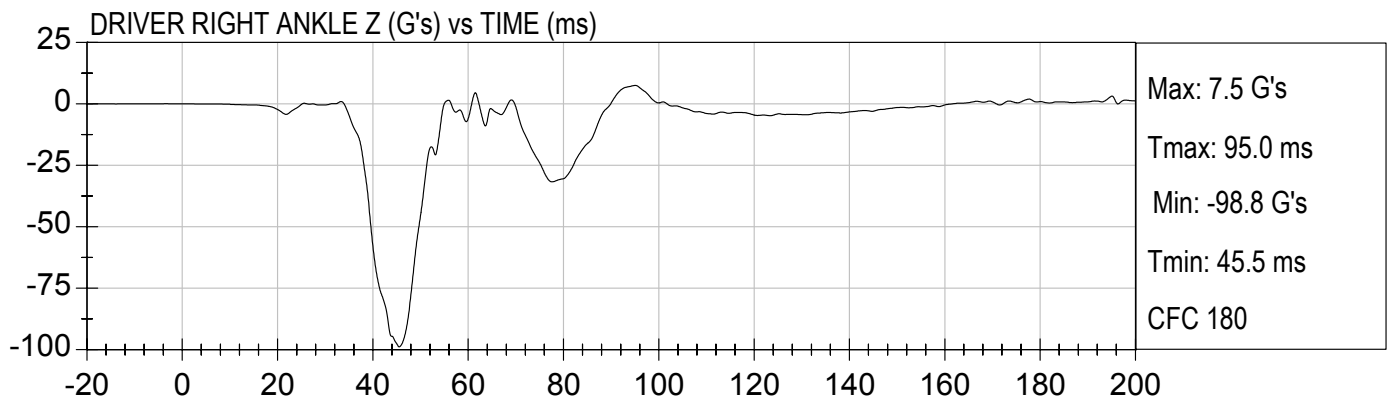
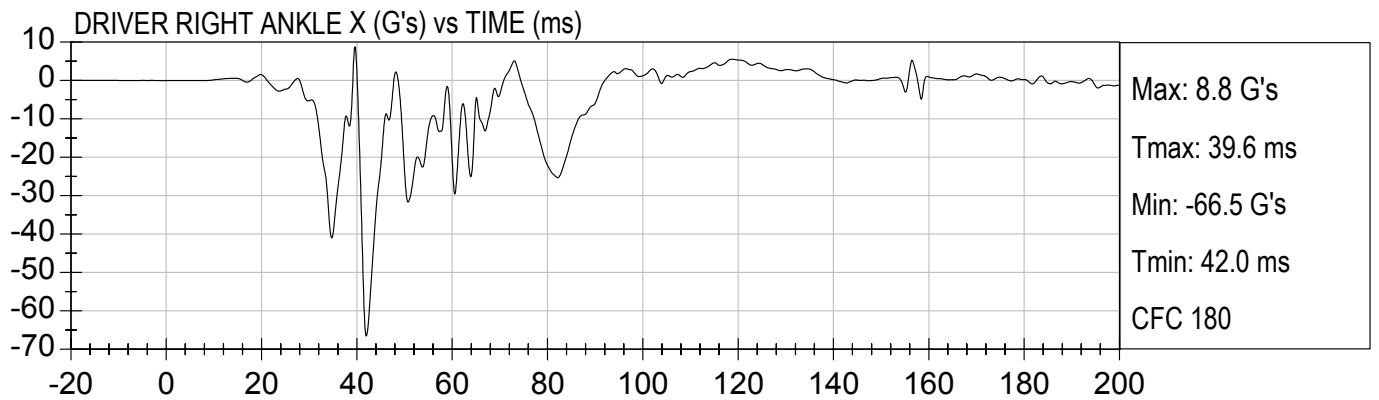
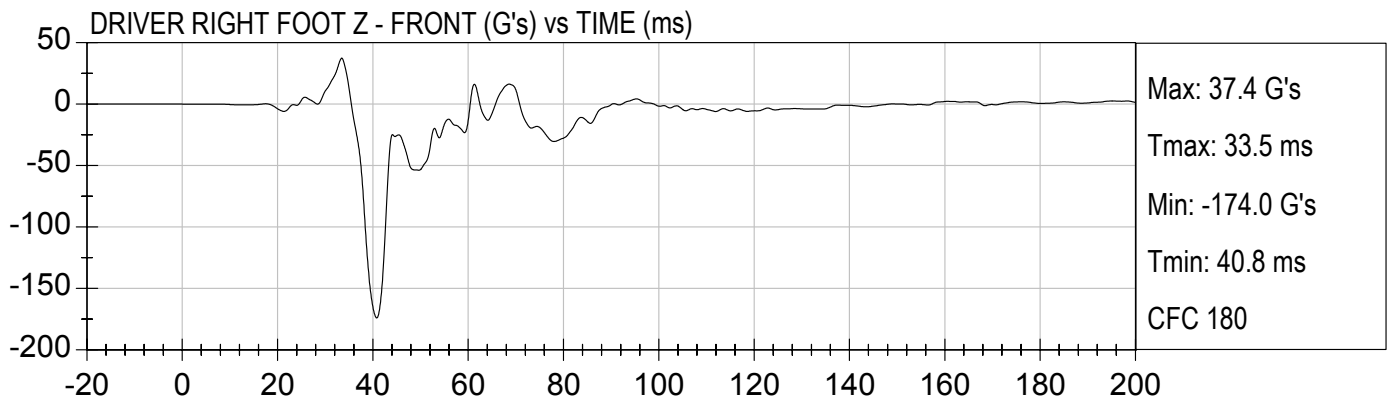
DRIVER RIGHT LOWER TIBIA MY (Nm) vs TIME (ms)



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





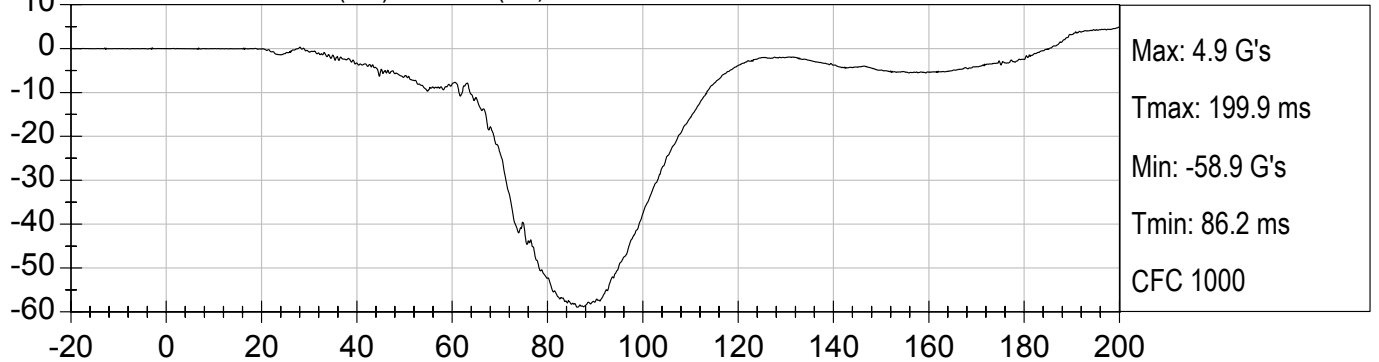




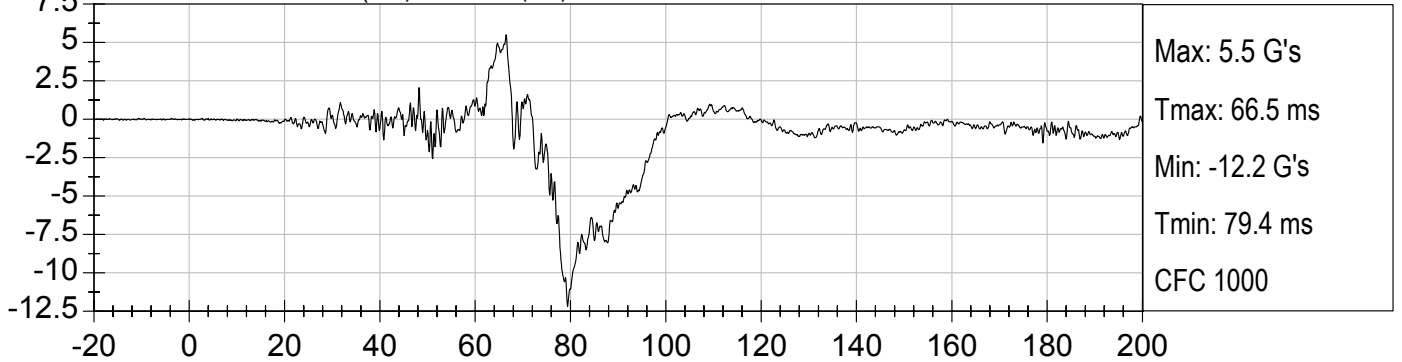
35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

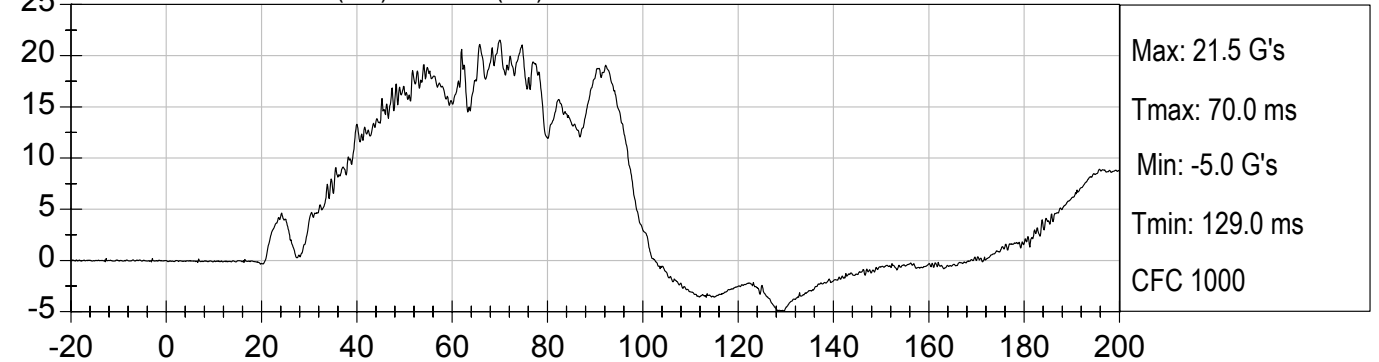
PASSENGER HEAD X (G's) vs TIME (ms)



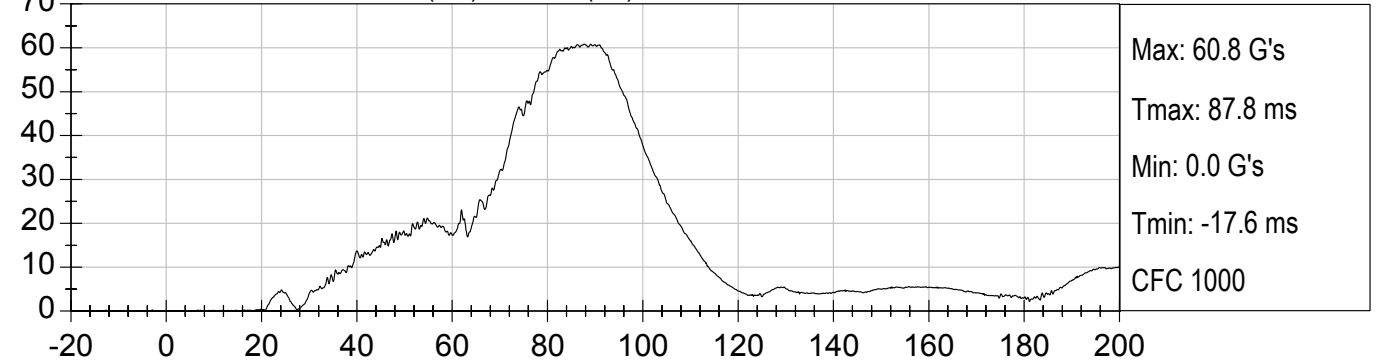
PASSENGER HEAD Y (G's) vs TIME (ms)

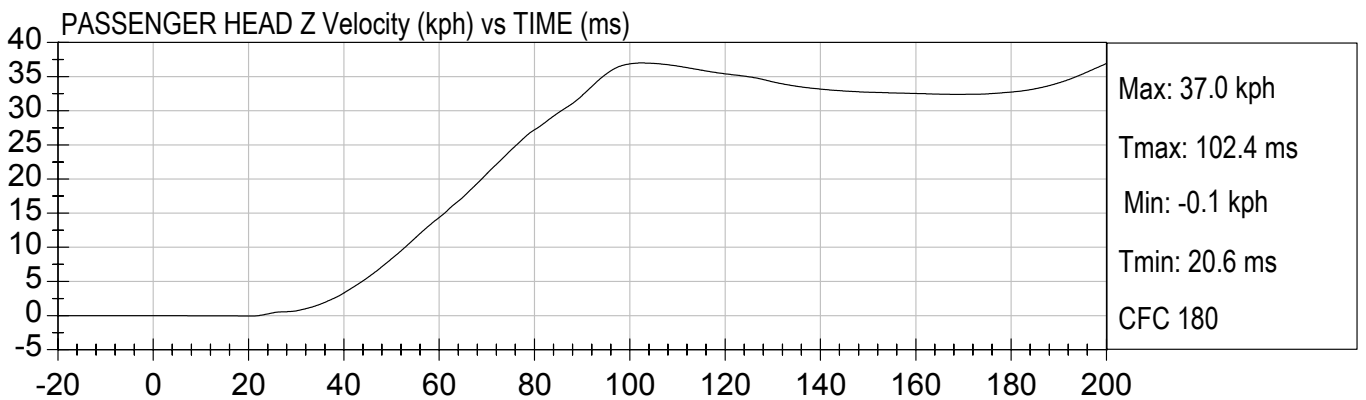
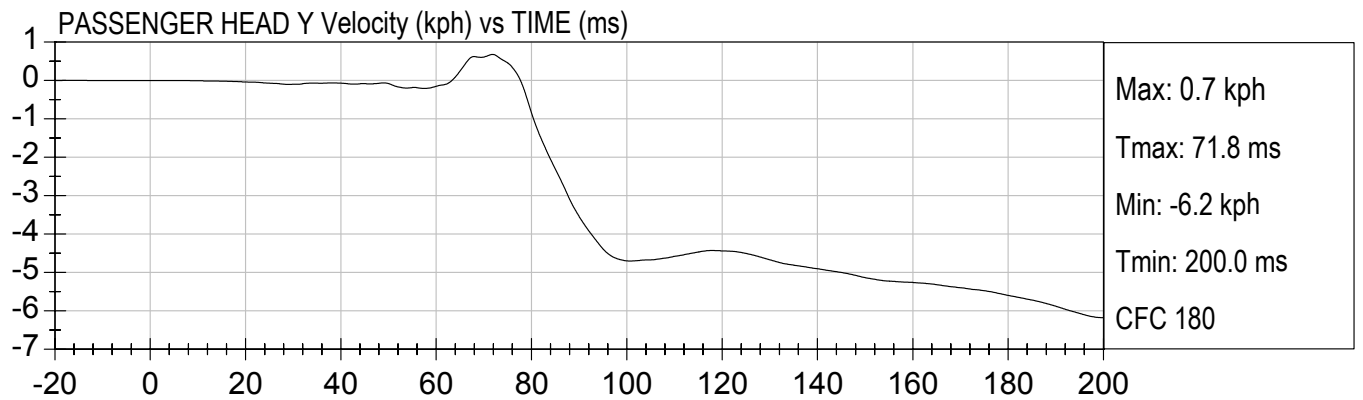
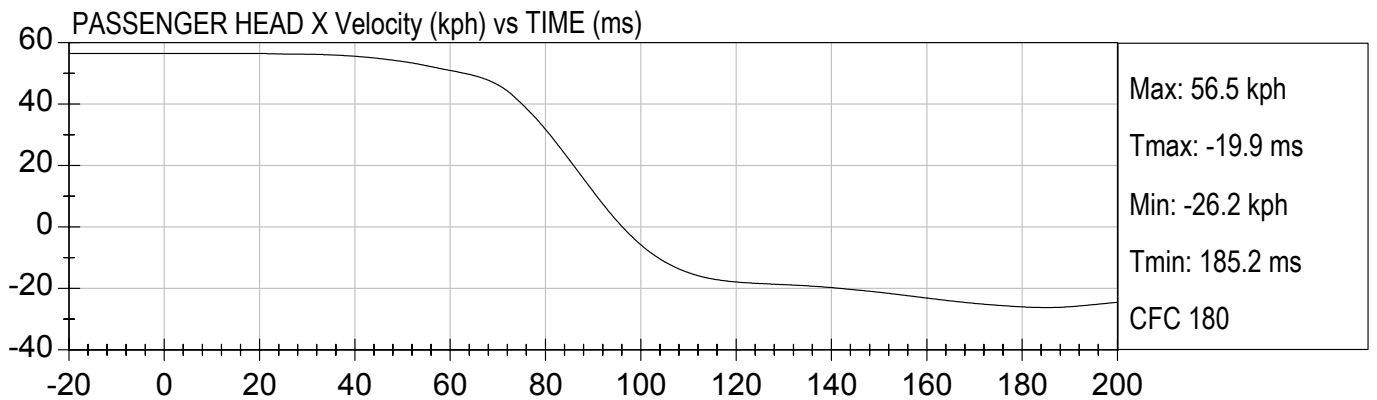


PASSENGER HEAD Z (G's) vs TIME (ms)



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



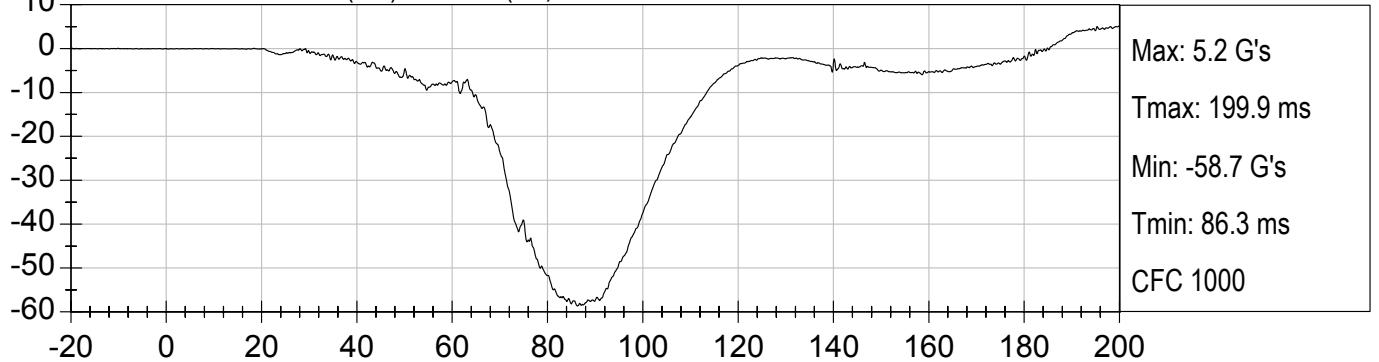




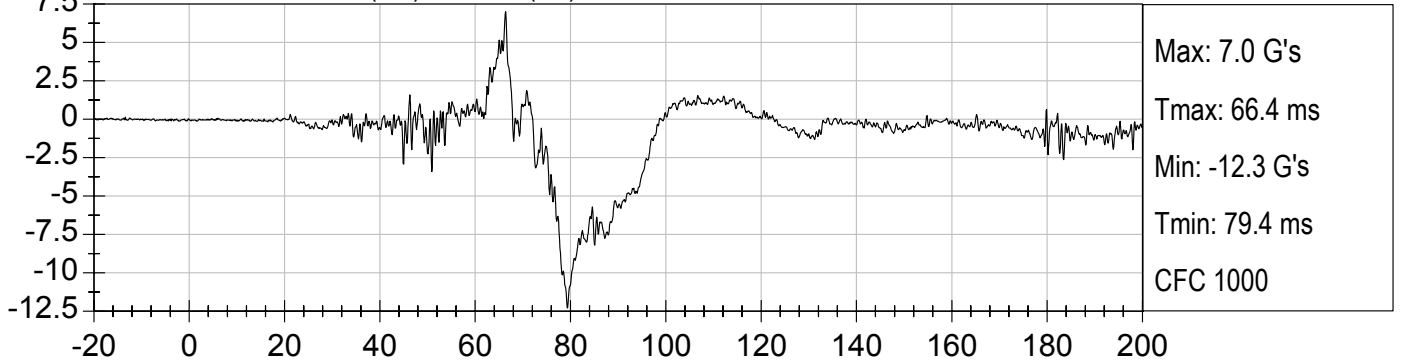
35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

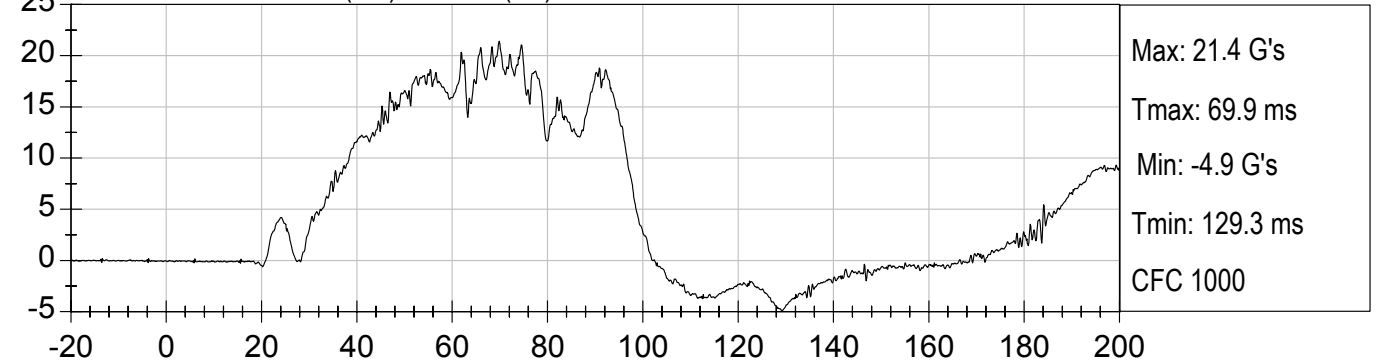
PASSENGER HEAD Xr (G's) vs TIME (ms)



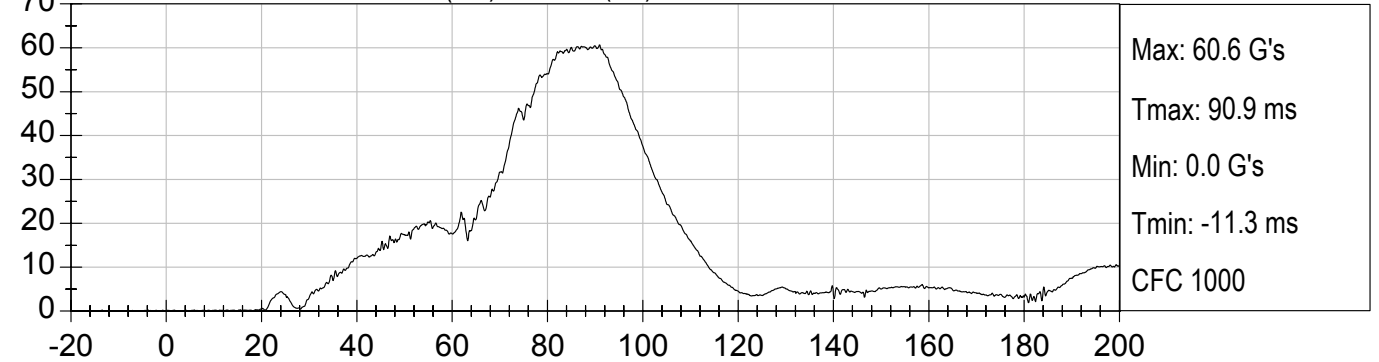
PASSENGER HEAD Yr (G's) vs TIME (ms)

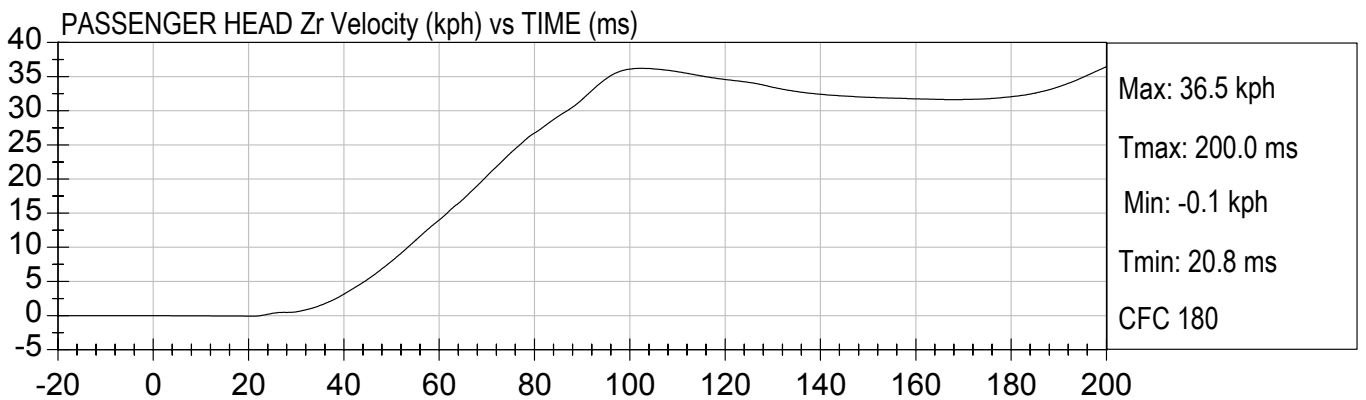
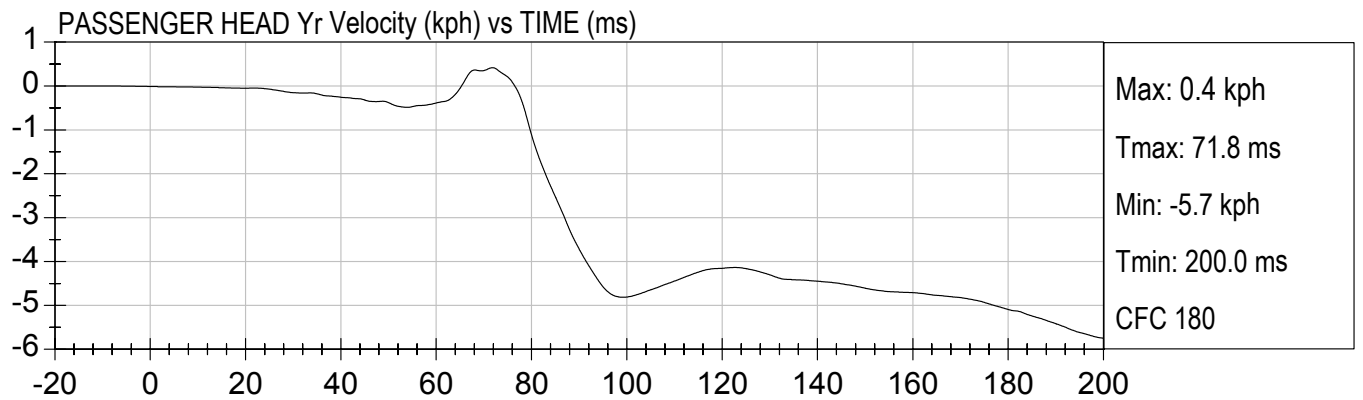
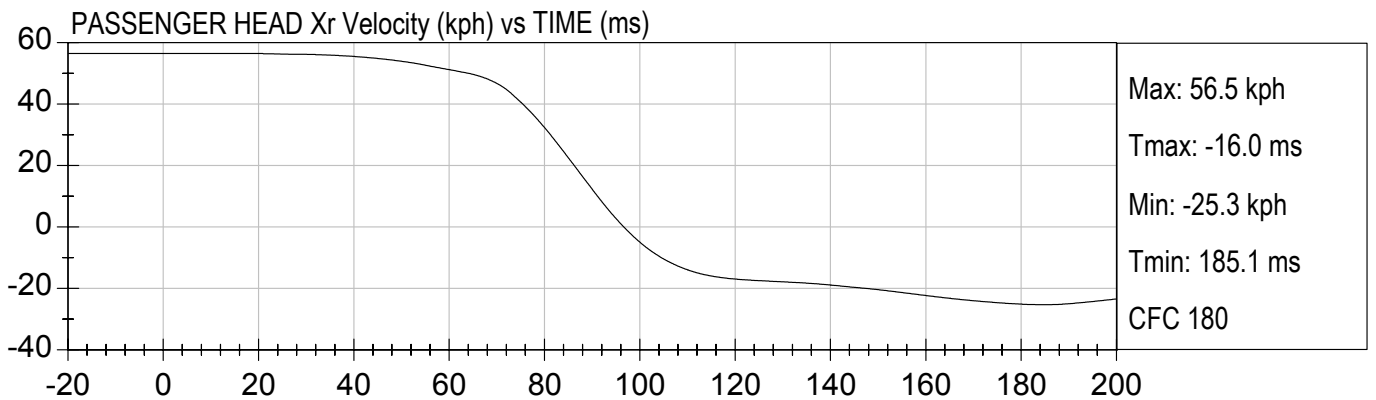


PASSENGER HEAD Zr (G's) vs TIME (ms)



PASSENGER HEAD ResultantR (G's) vs TIME (ms)



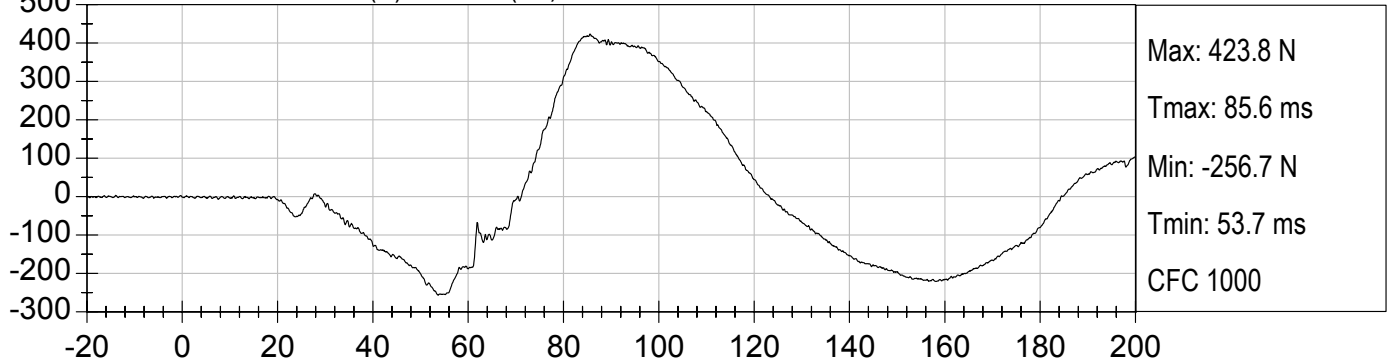




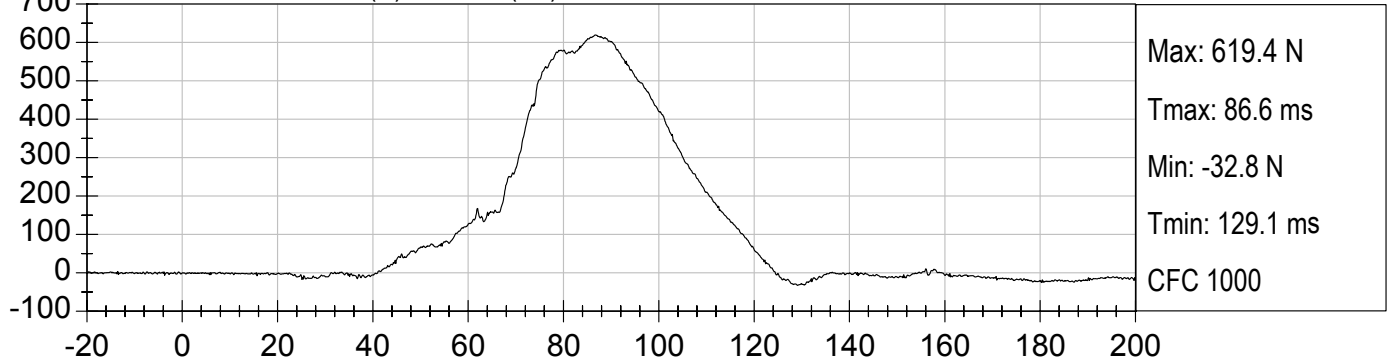
35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

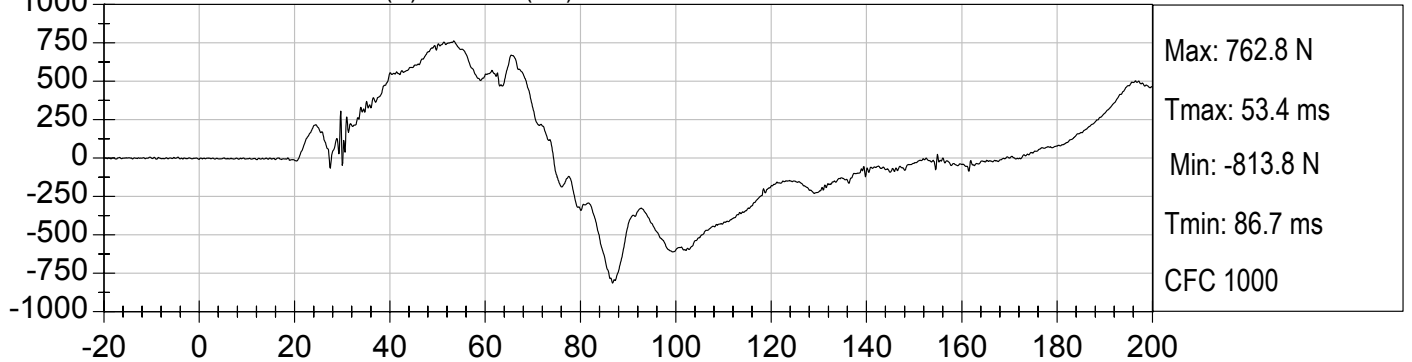
PASSENGER NECK FX (N) vs TIME (ms)



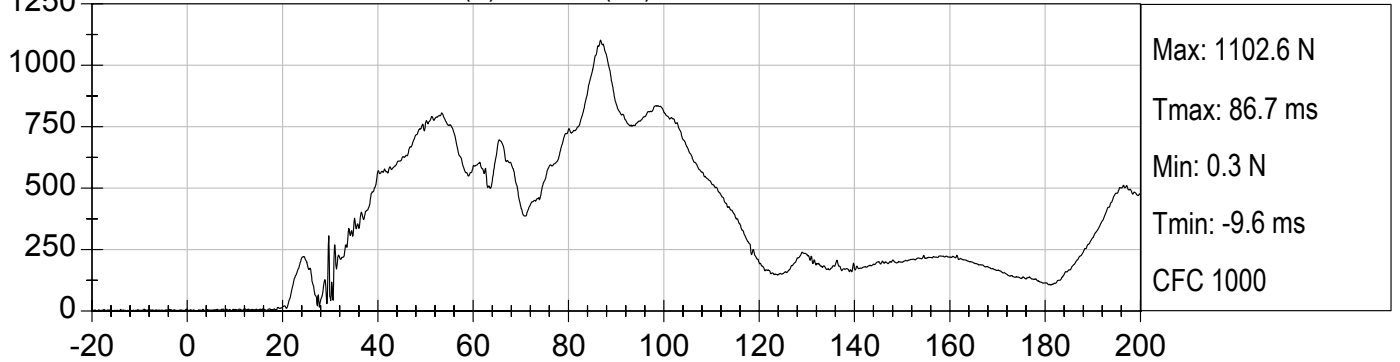
PASSENGER NECK FY (N) vs TIME (ms)



PASSENGER NECK FZ (N) vs TIME (ms)



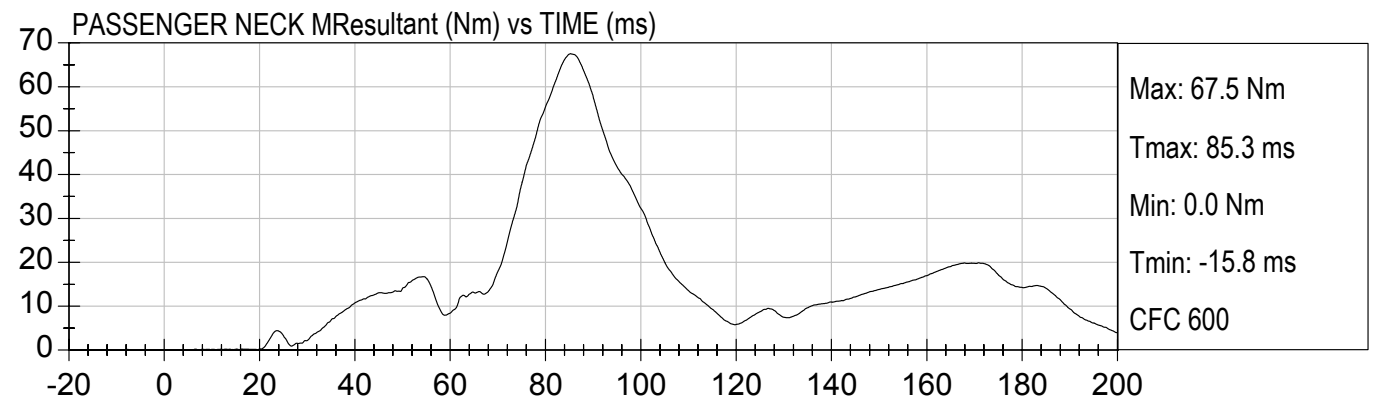
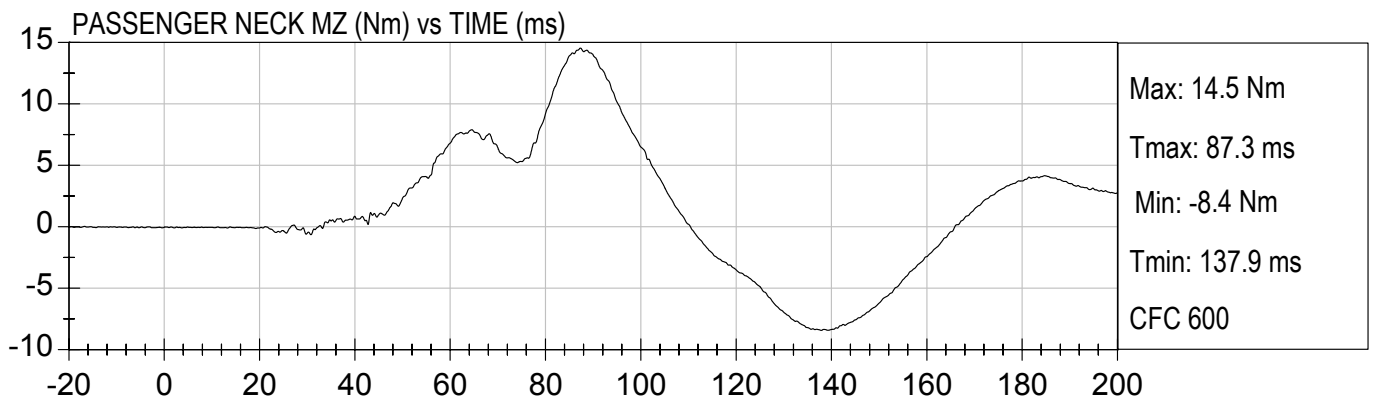
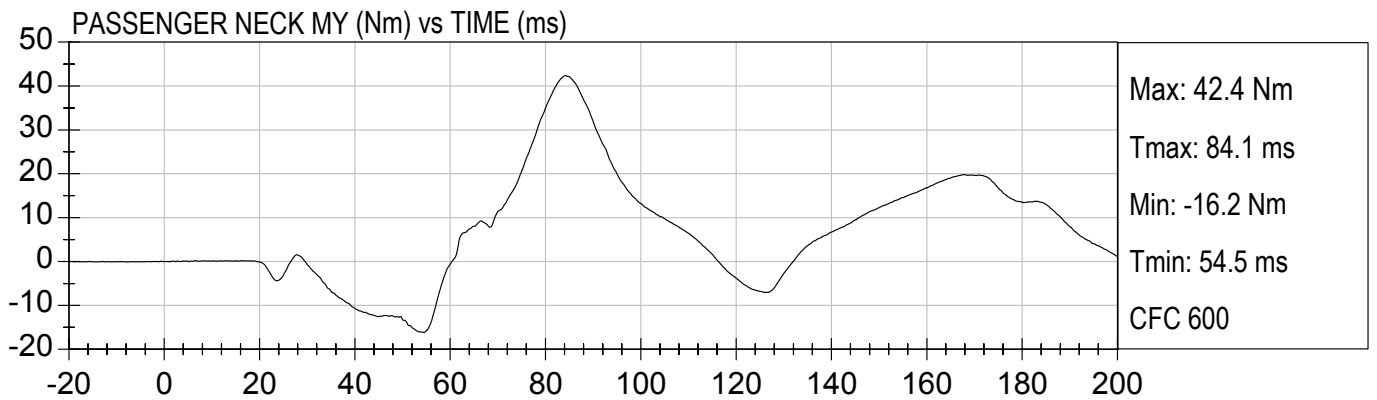
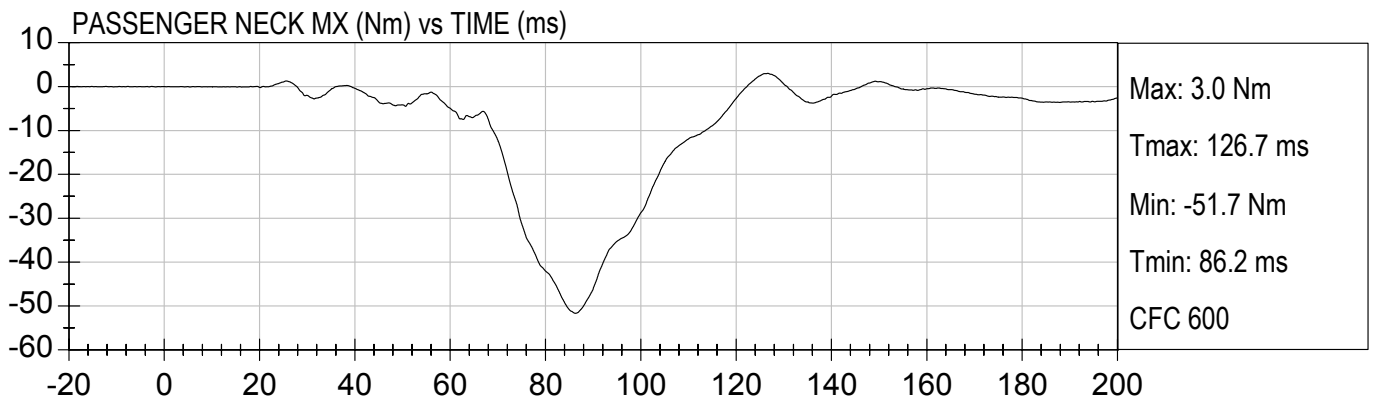
PASSENGER NECK FResultant (N) vs TIME (ms)





35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

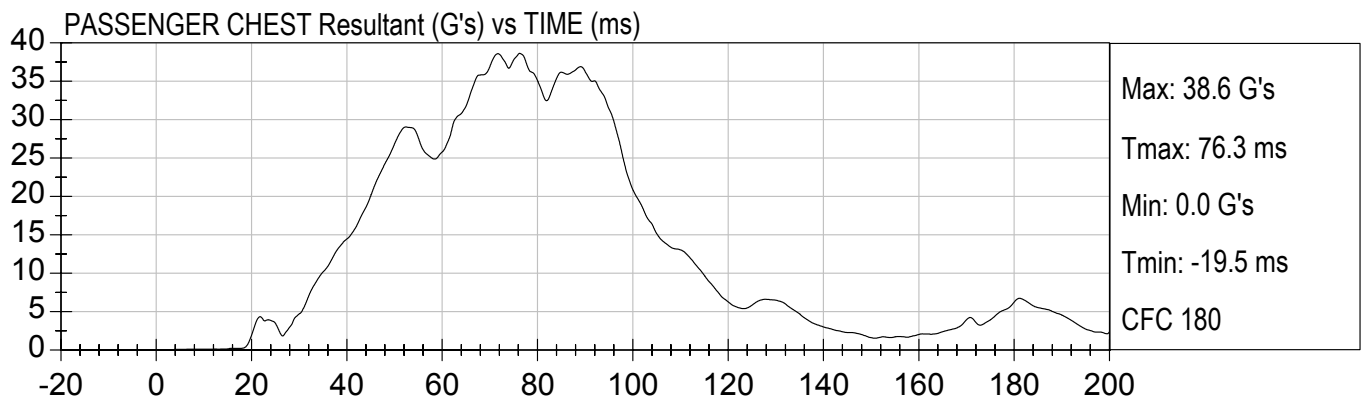
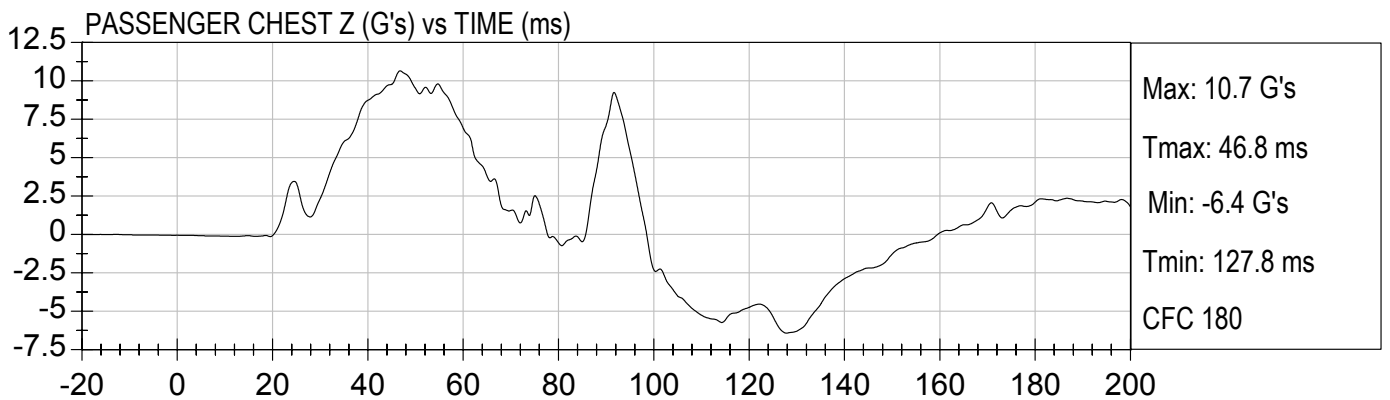
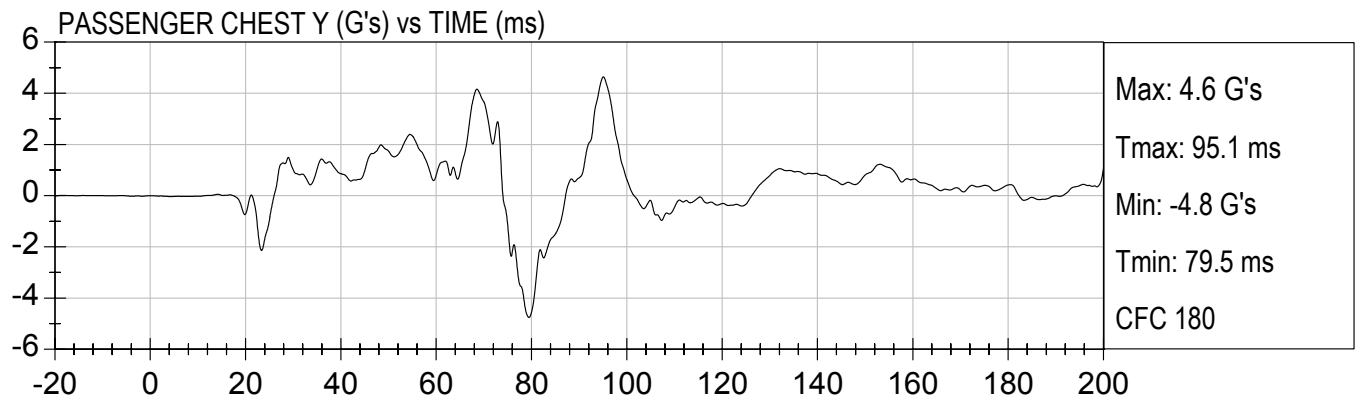
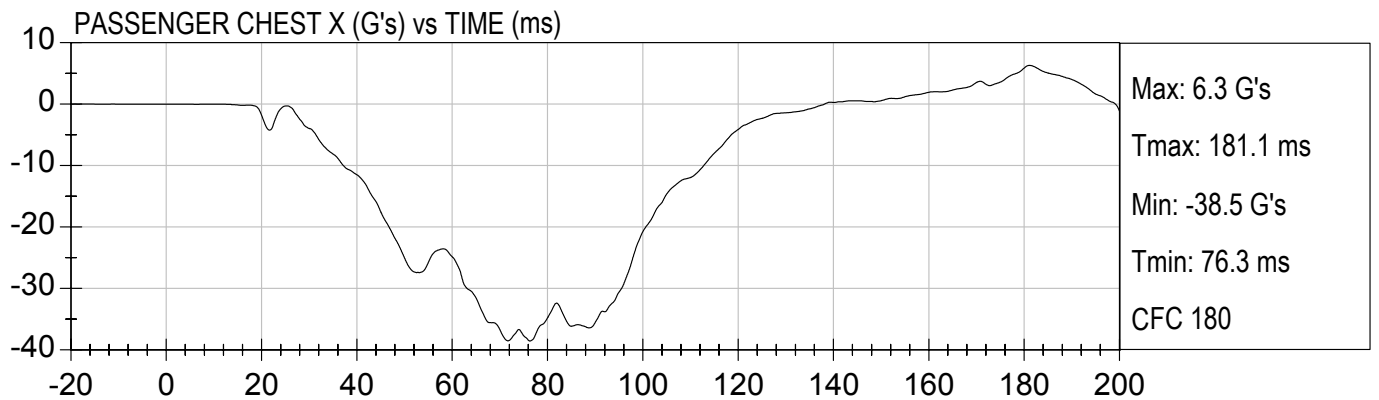
Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

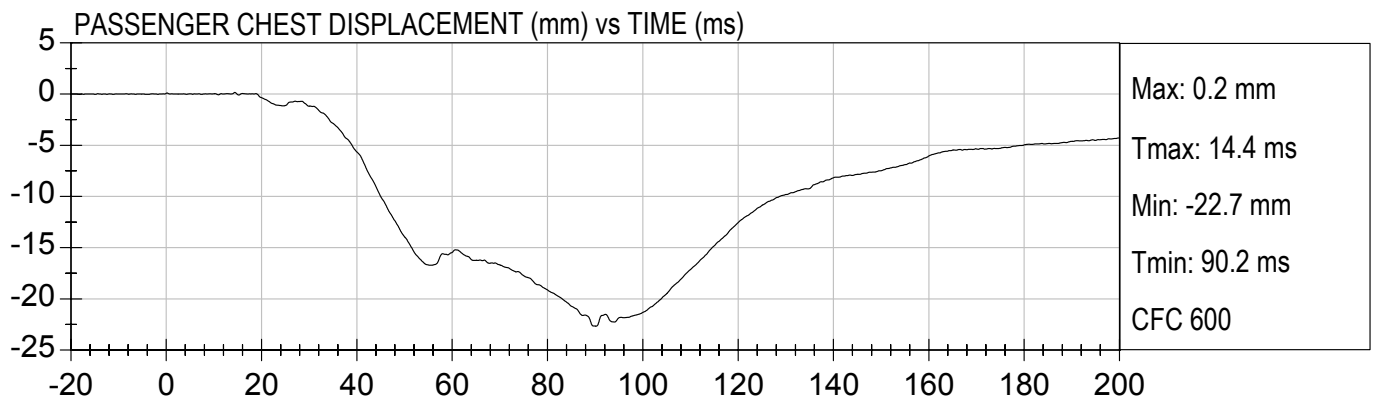
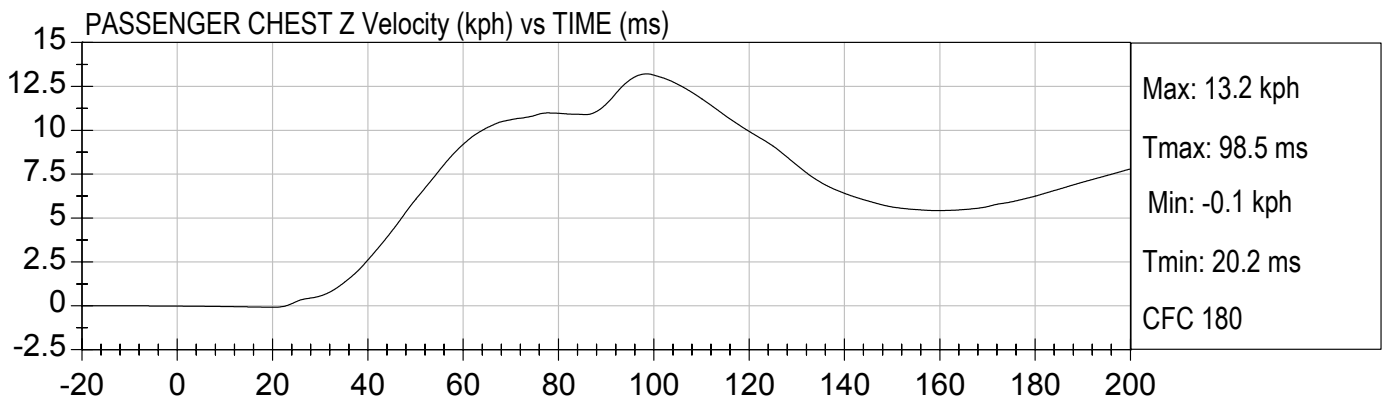
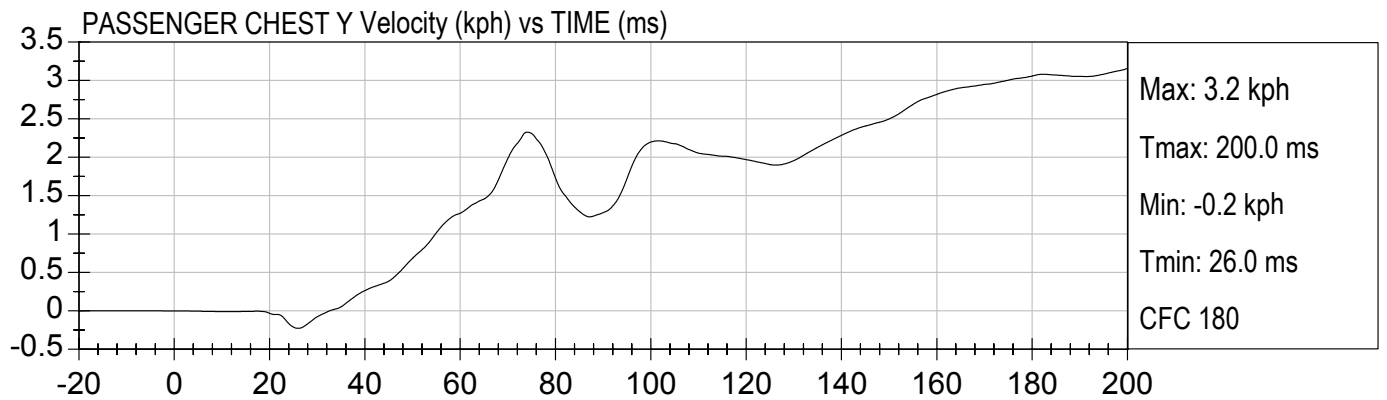
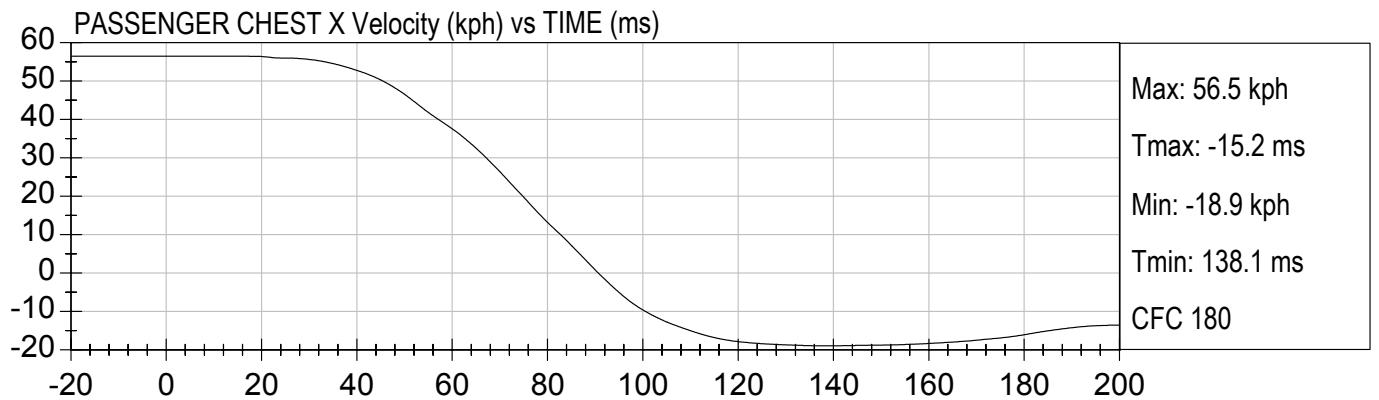




35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

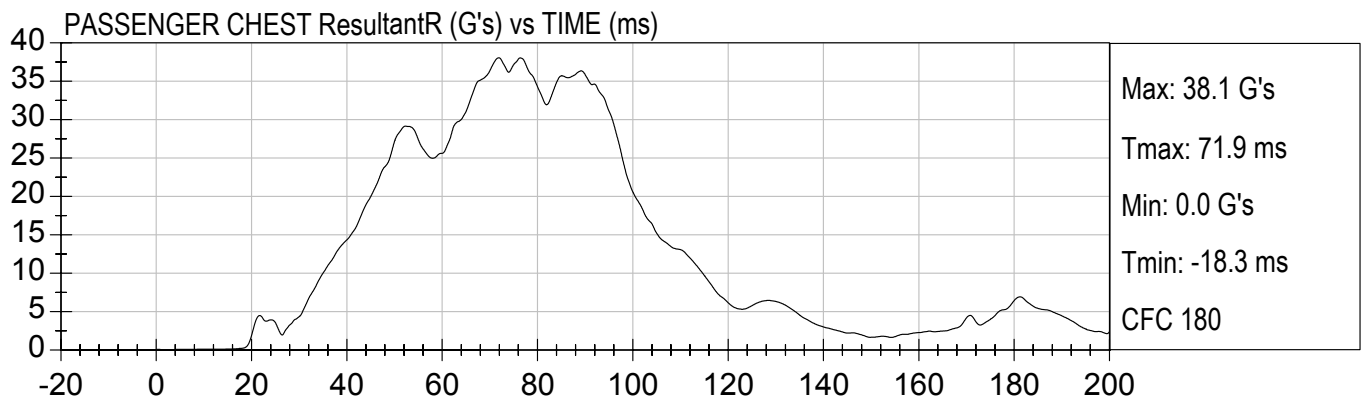
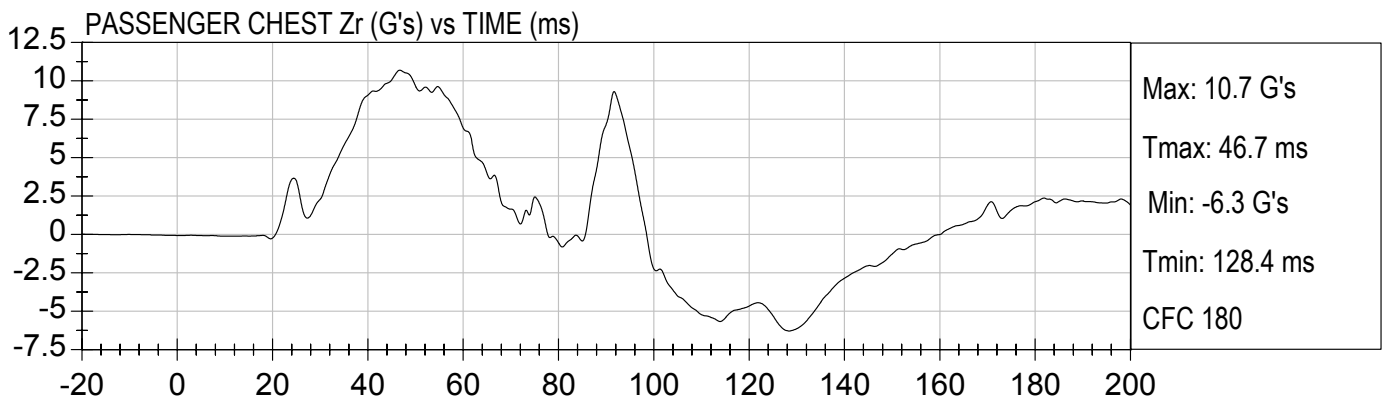
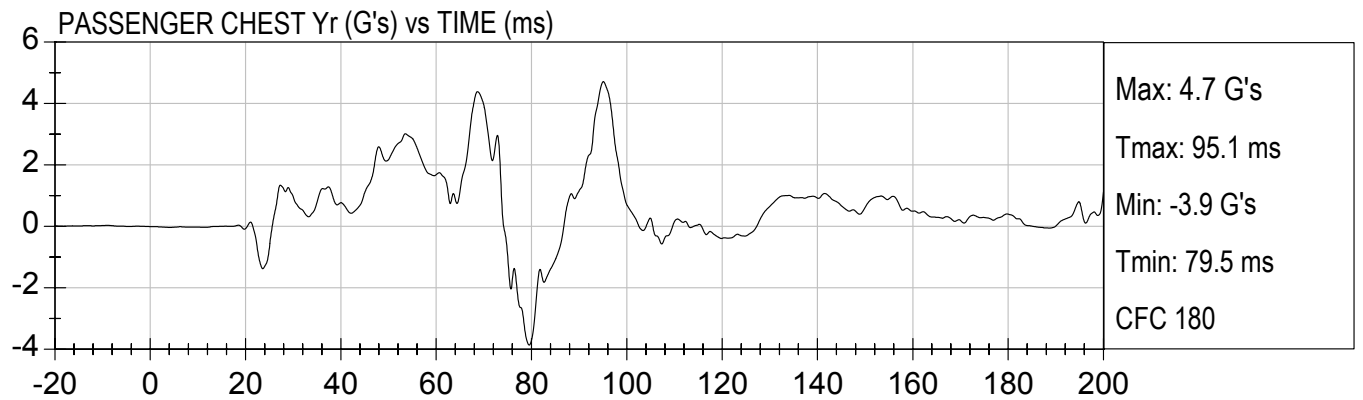
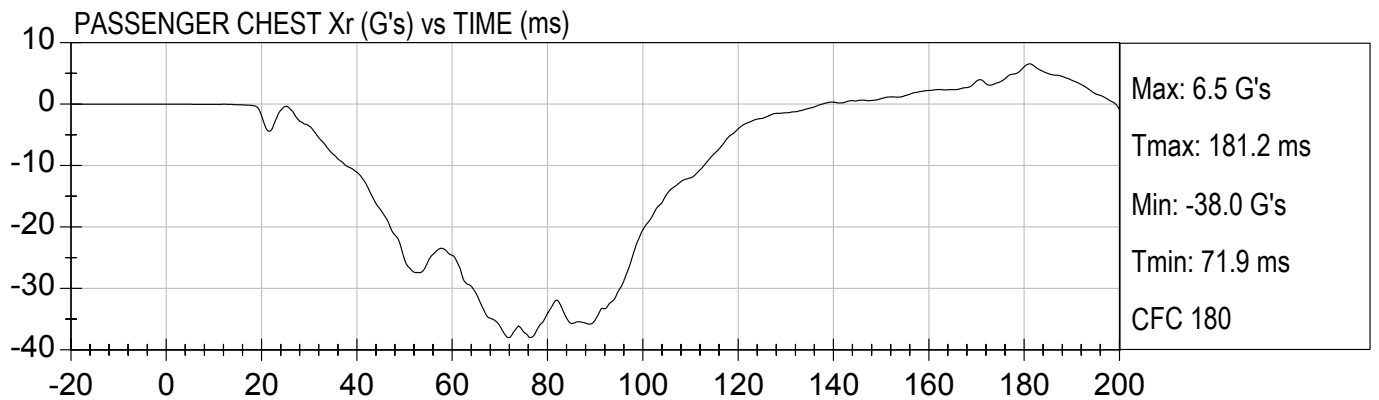


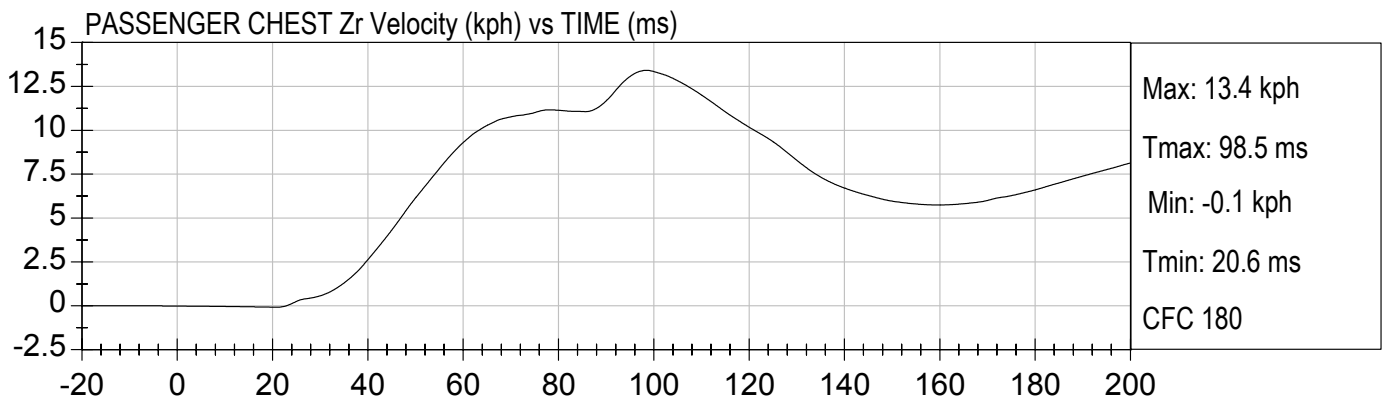
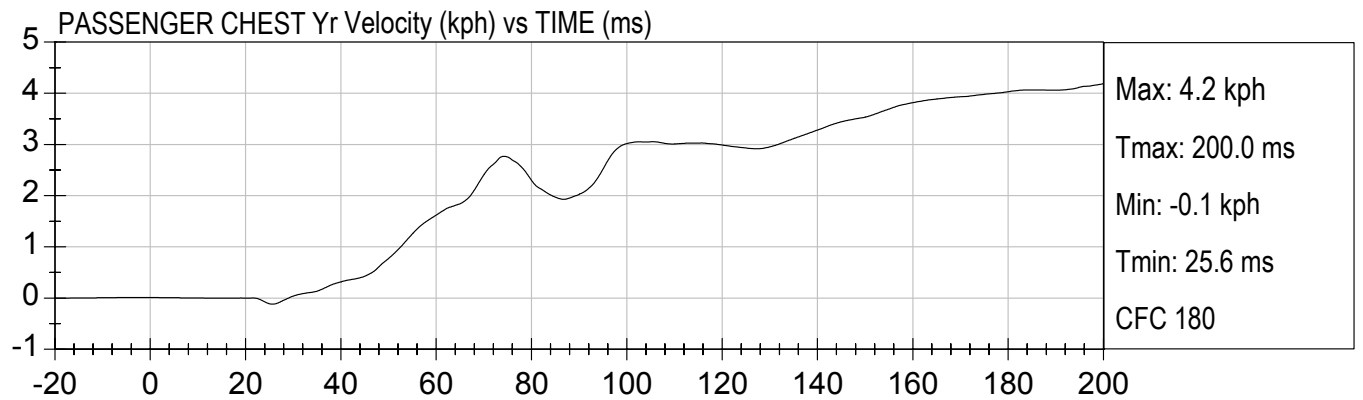
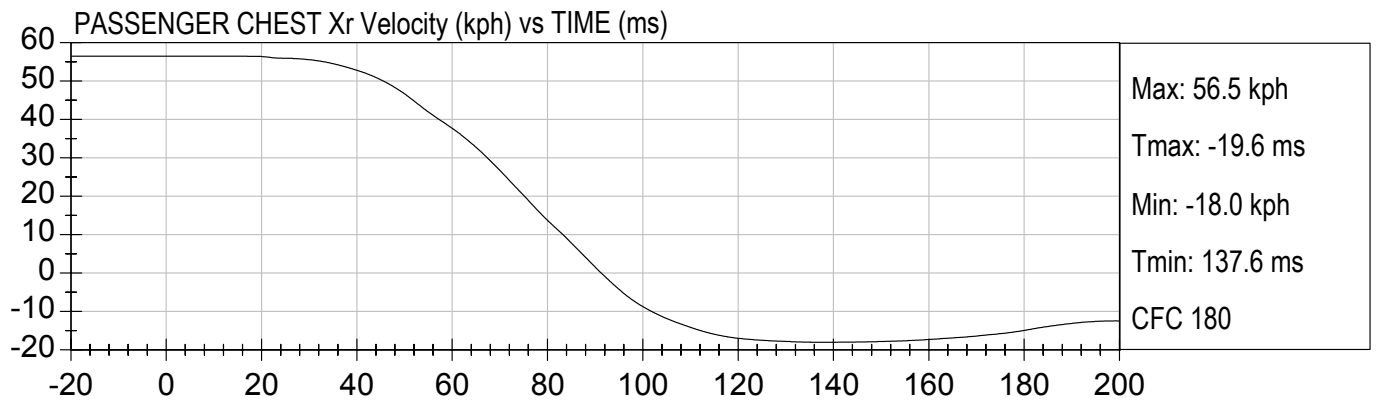




35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

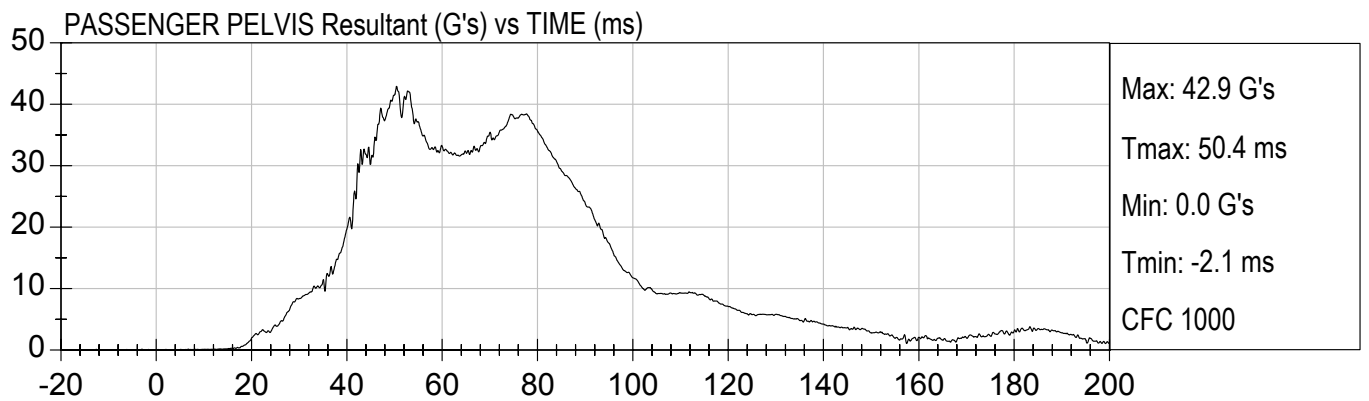
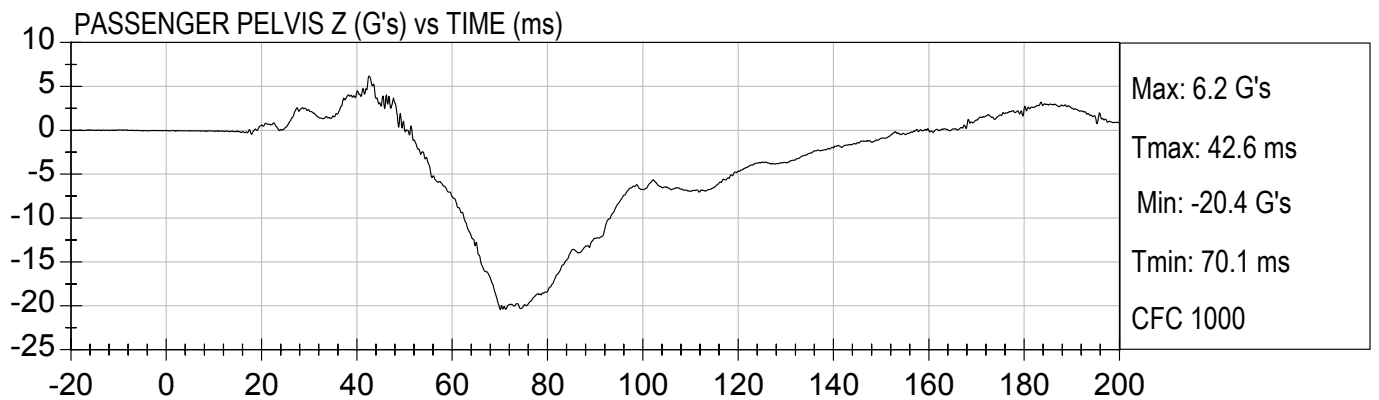
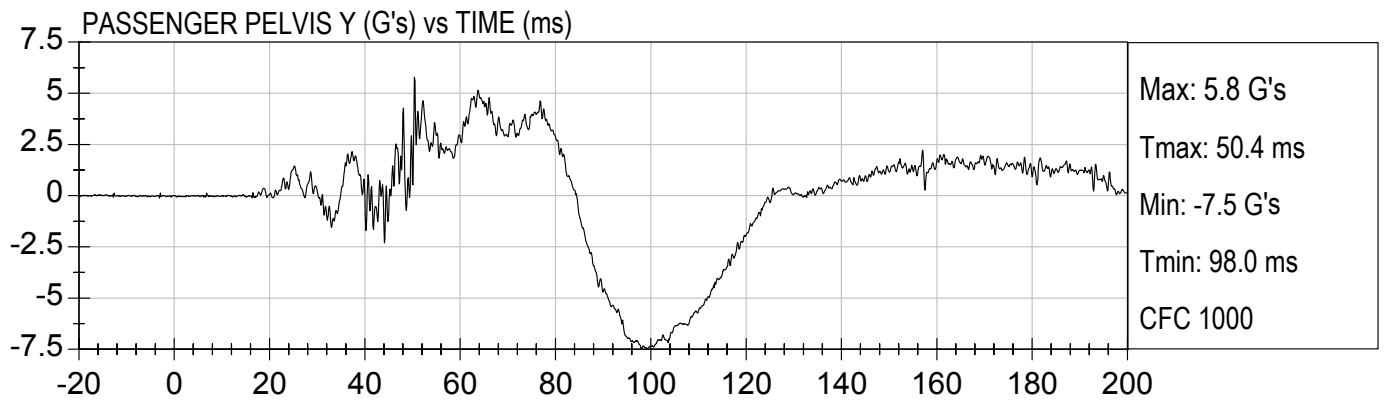
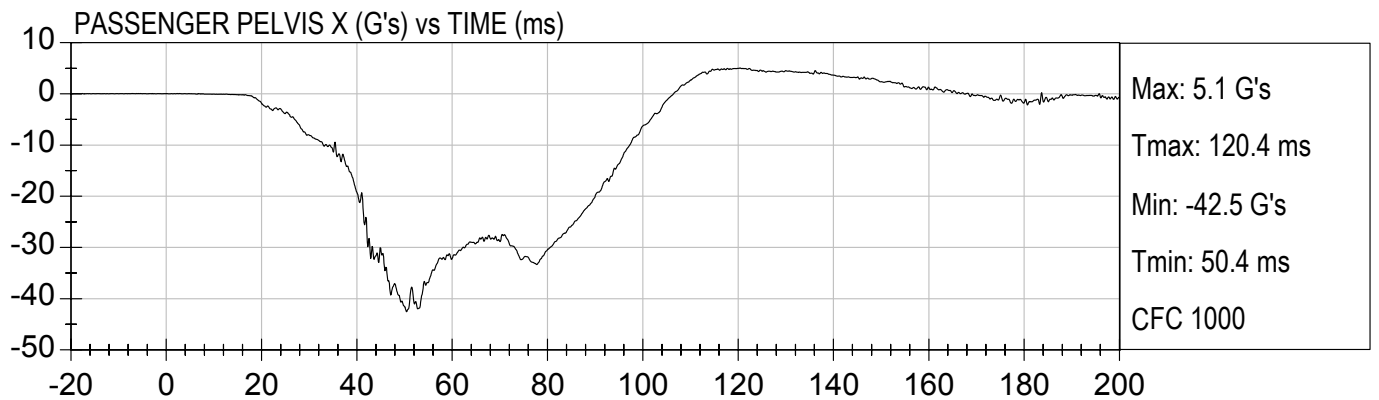


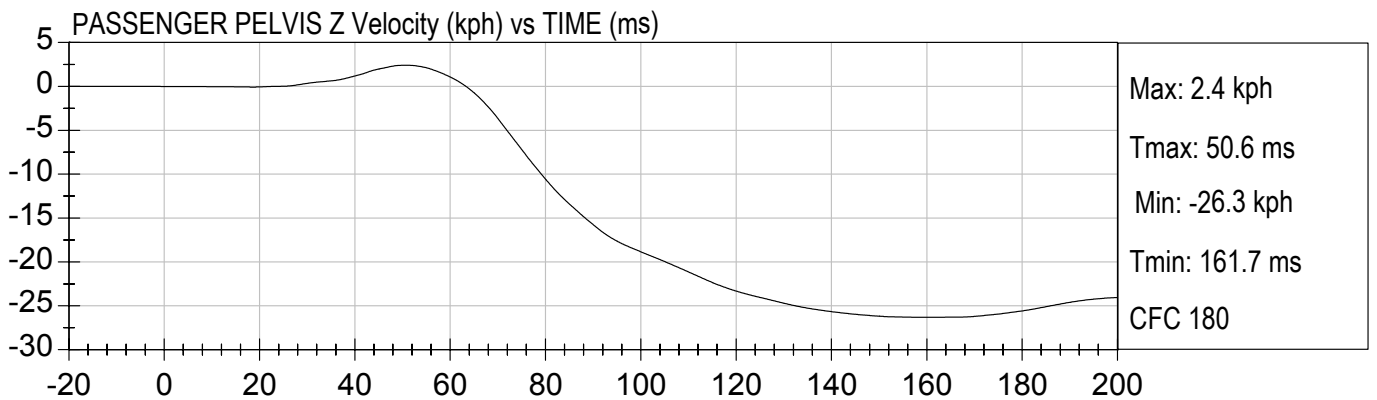
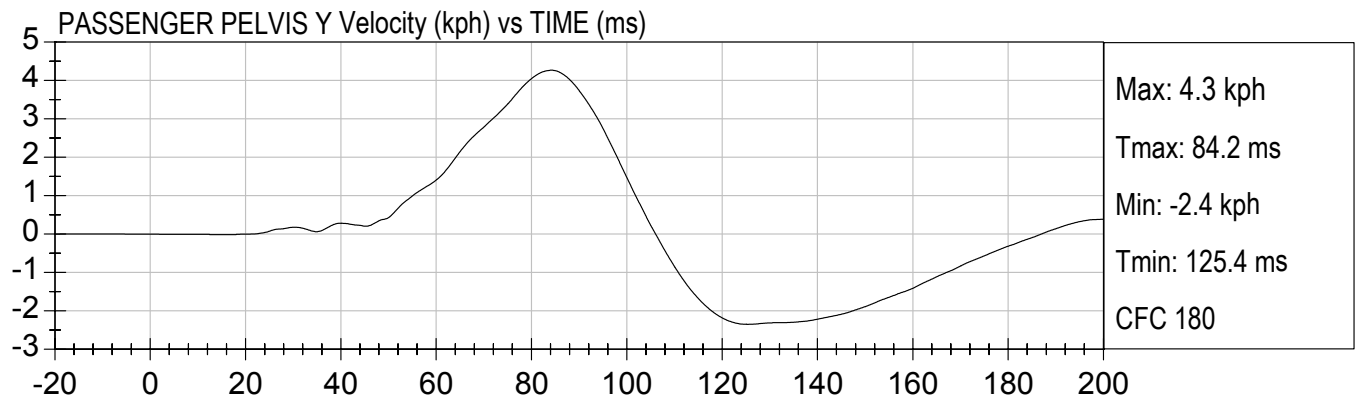
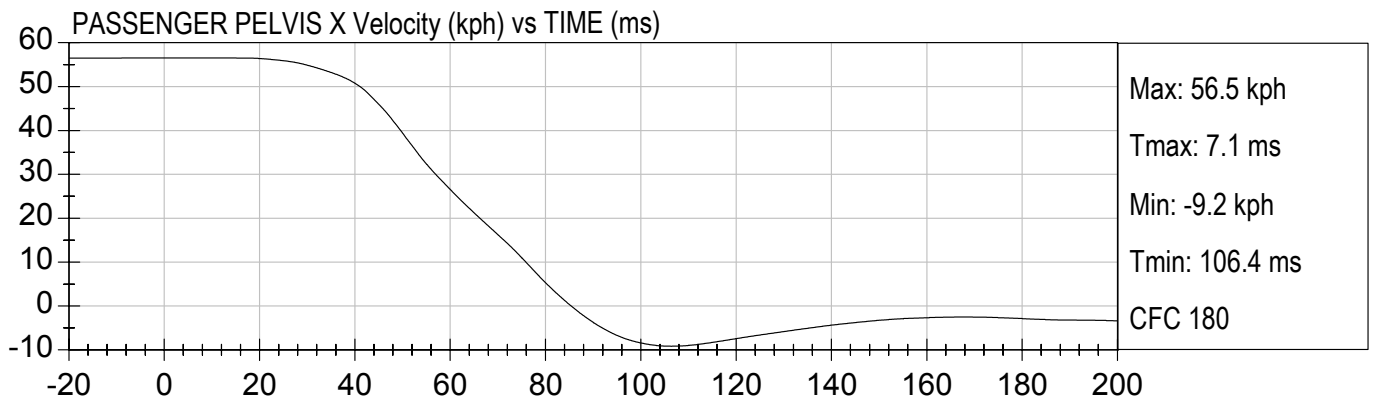




35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

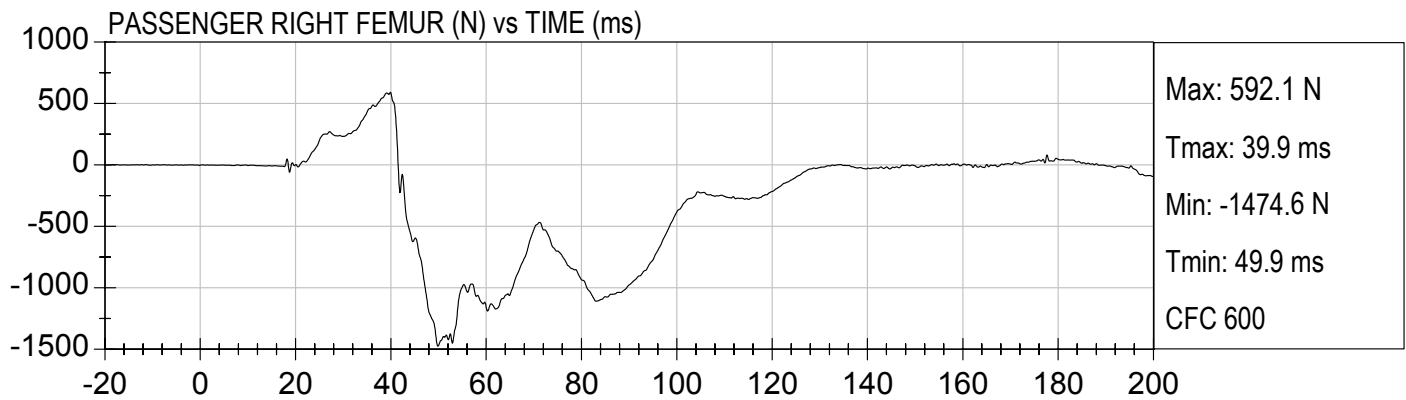
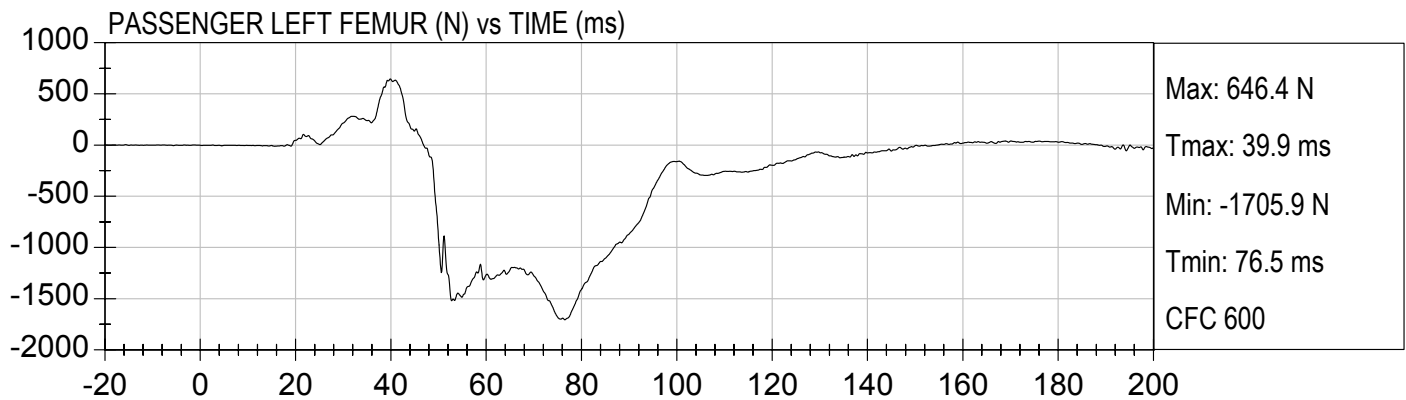






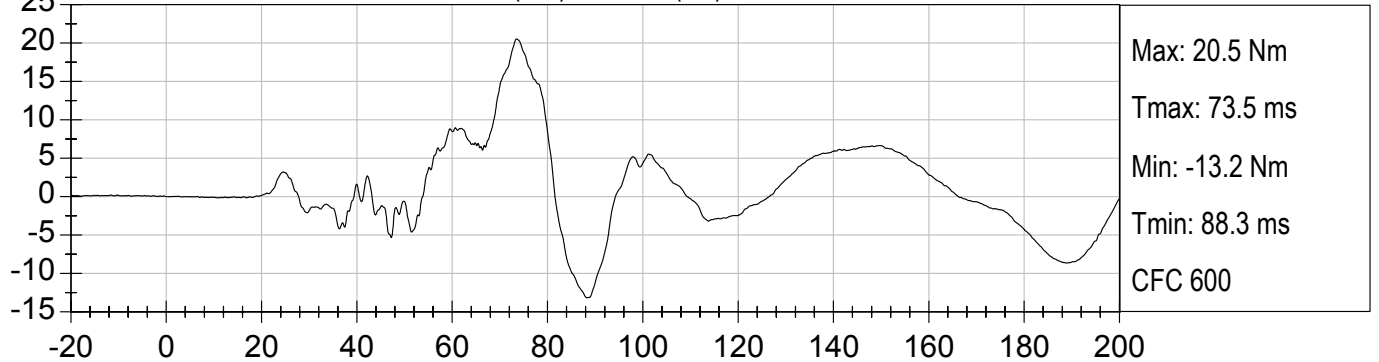
35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)

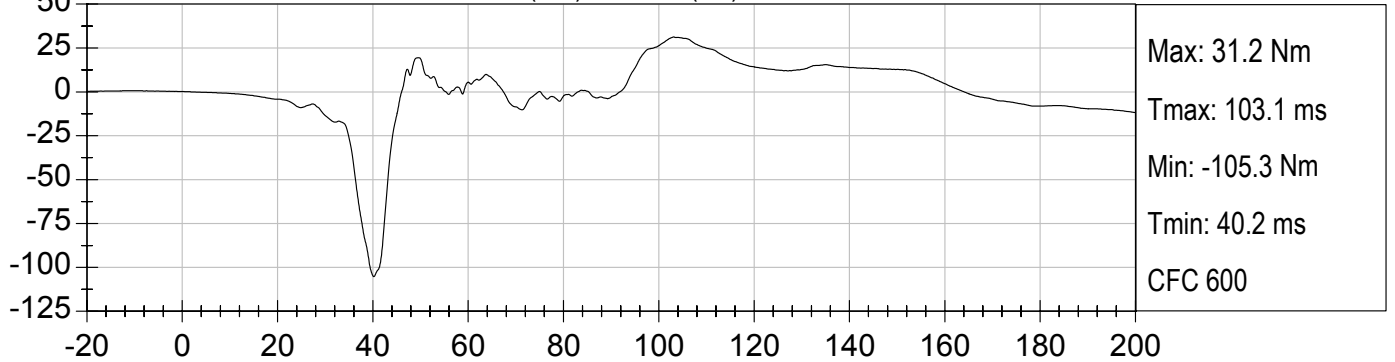




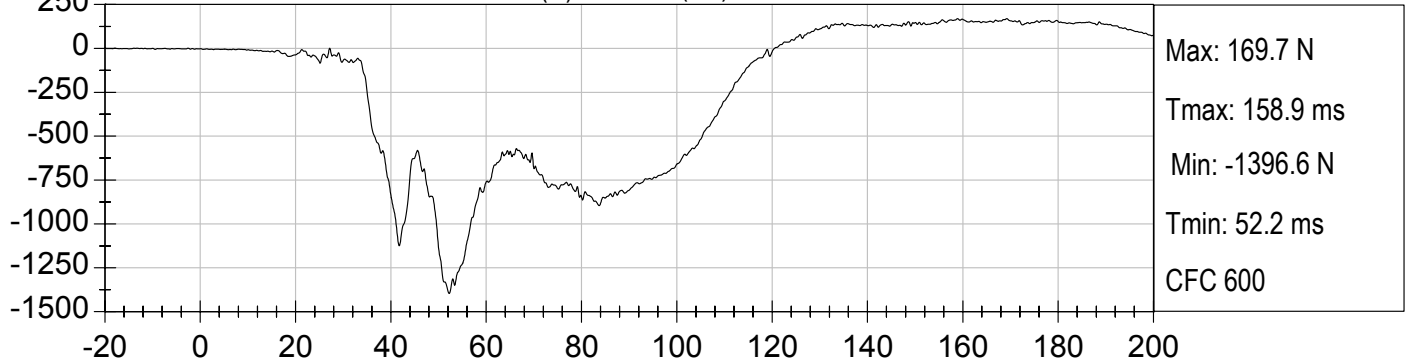
PASSENGER LEFT UPPER TIBIA MX (Nm) vs TIME (ms)



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

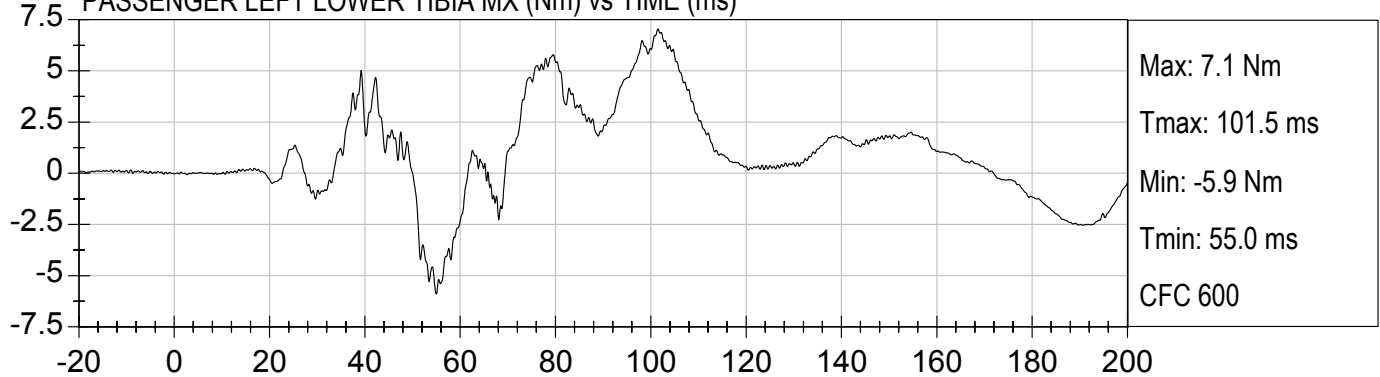


PASSENGER LEFT UPPER TIBIA FZ (N) vs TIME (ms)

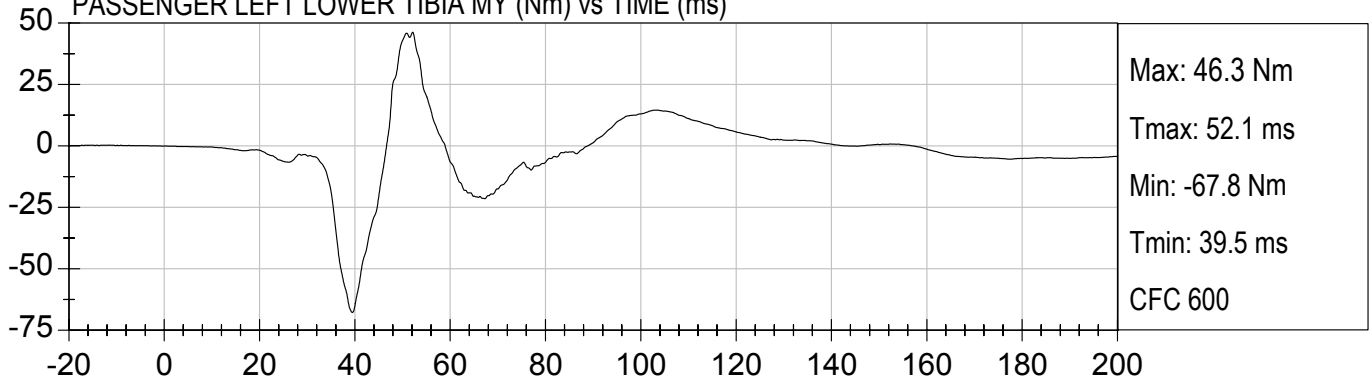




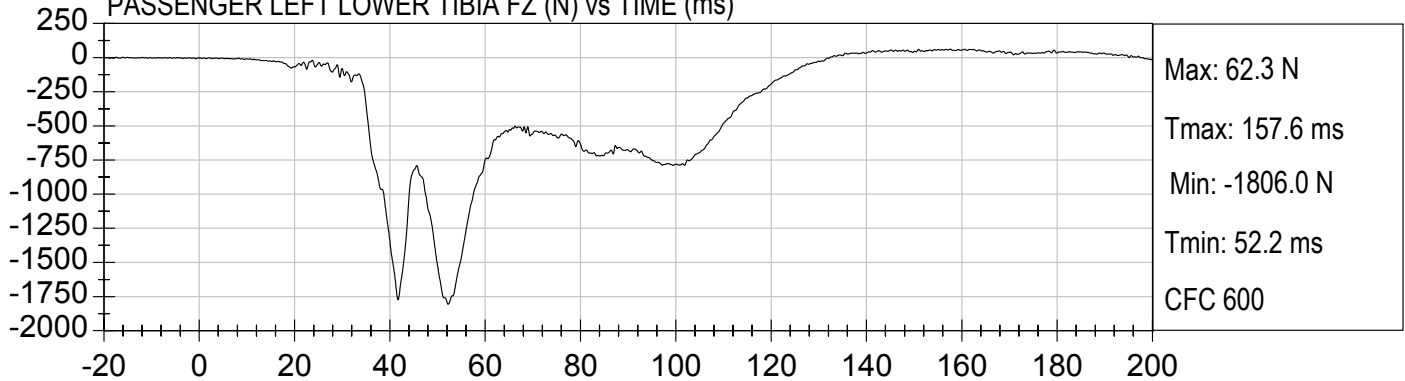
PASSENGER LEFT LOWER TIBIA MX (Nm) vs TIME (ms)



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

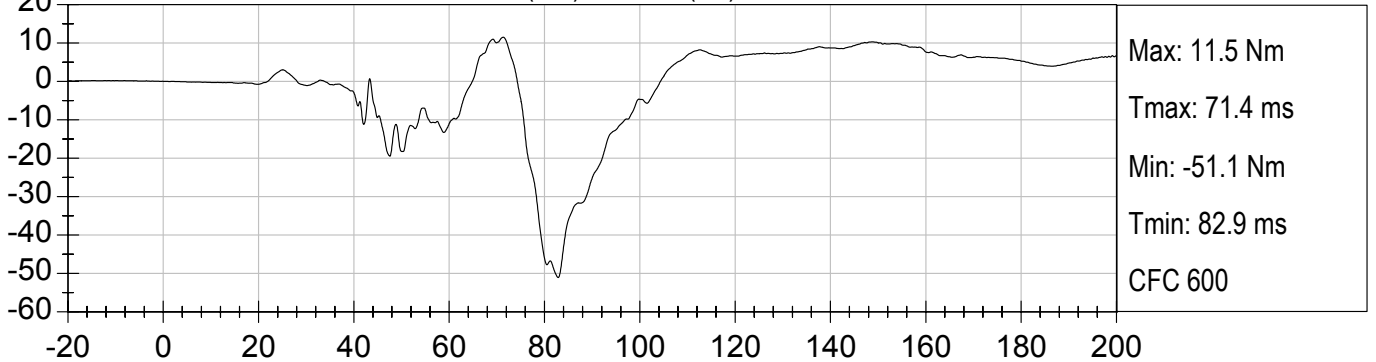


PASSENGER LEFT LOWER TIBIA FZ (N) vs TIME (ms)

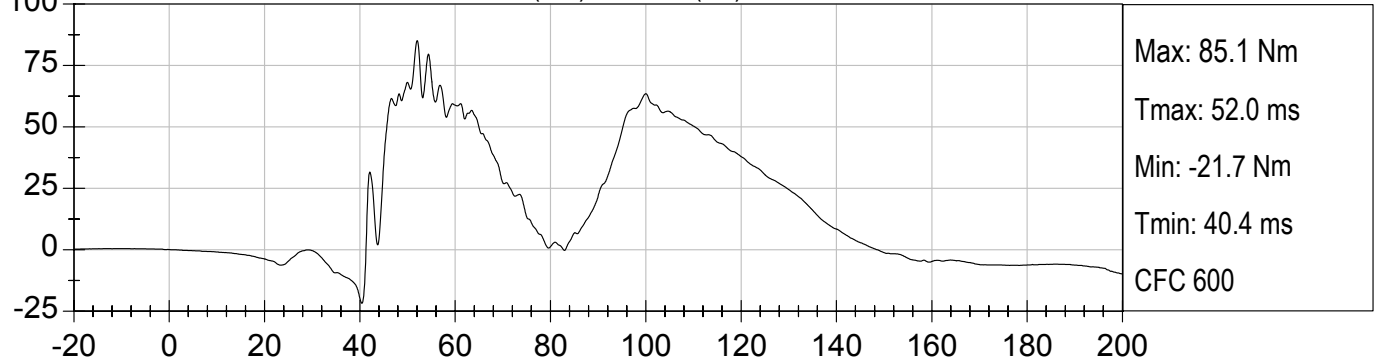




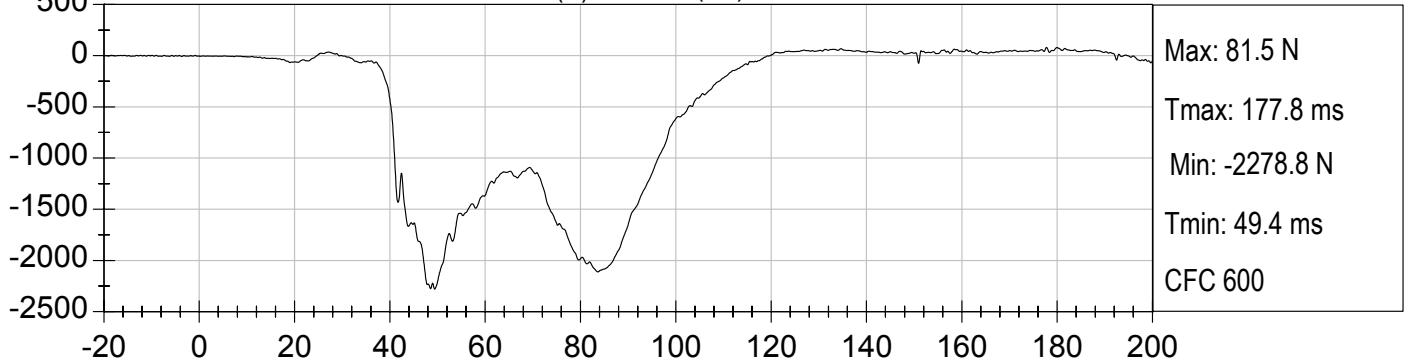
PASSENGER RIGHT UPPER TIBIA MX (Nm) vs TIME (ms)

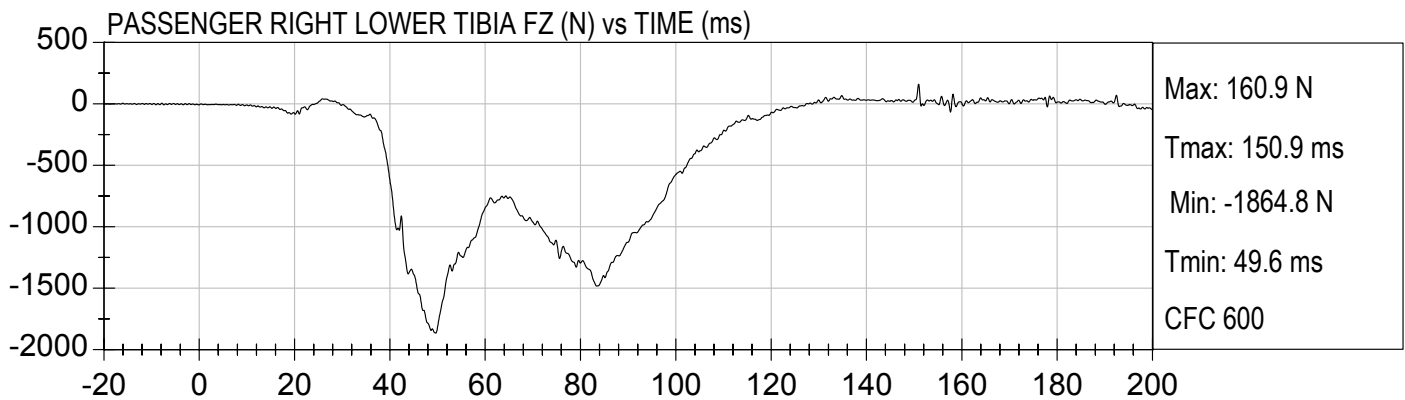
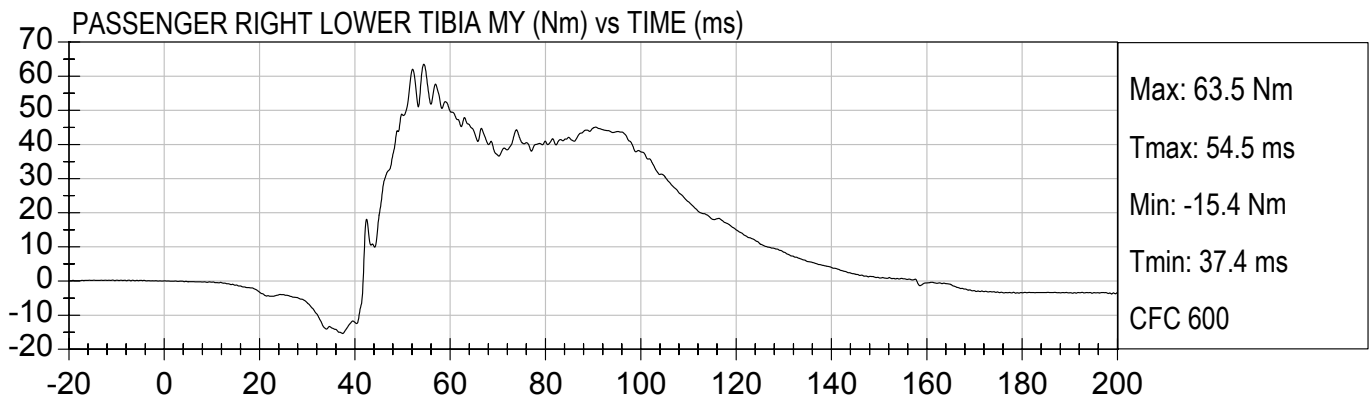
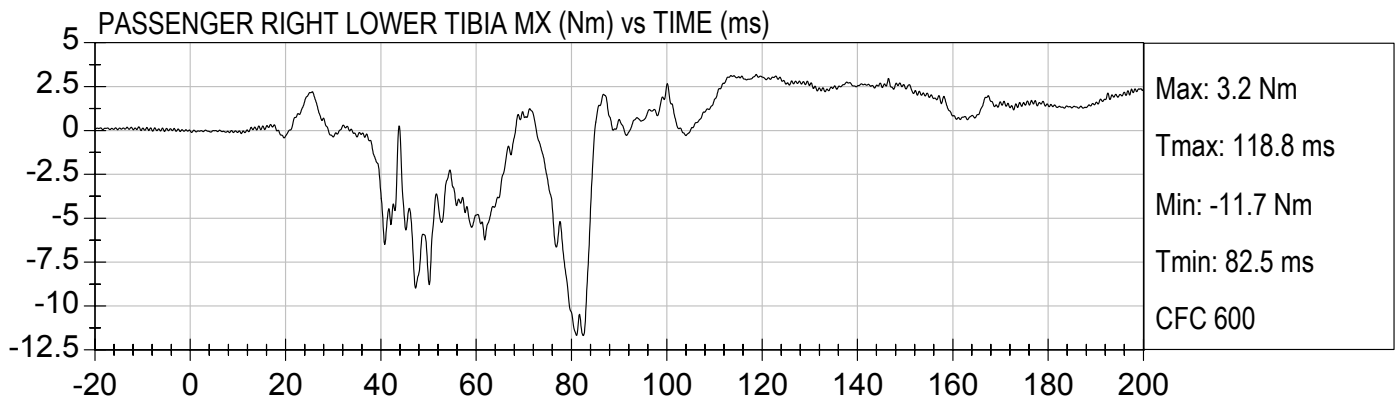


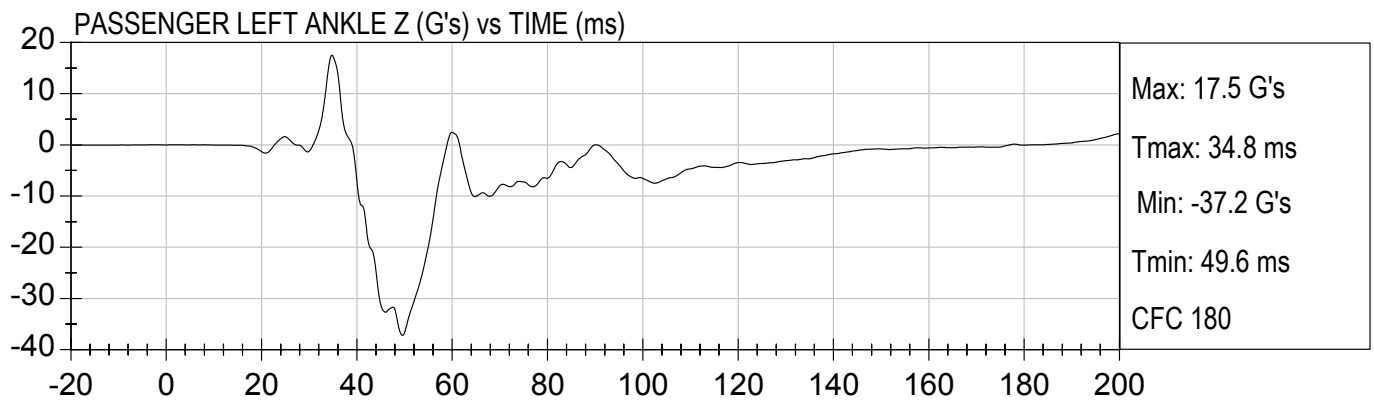
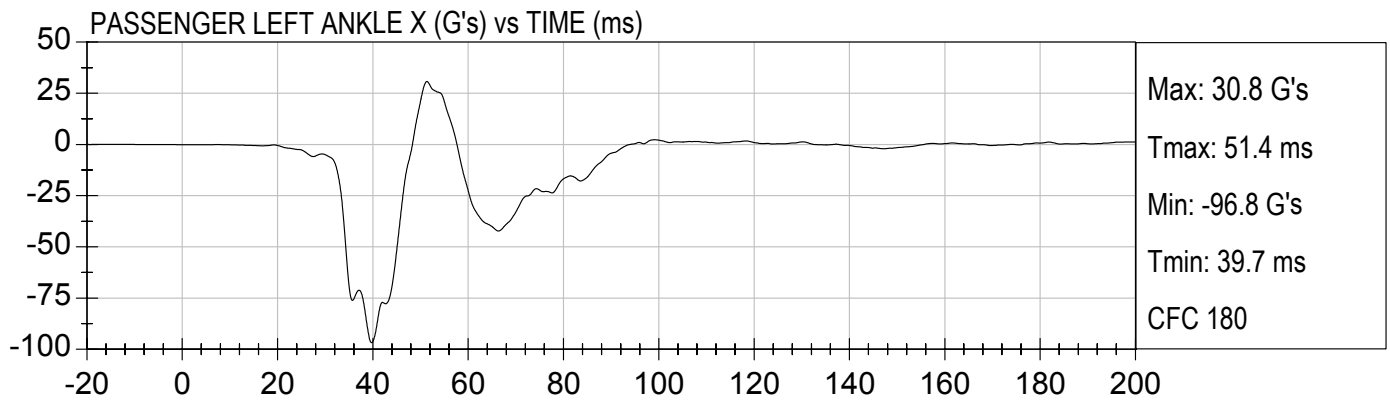
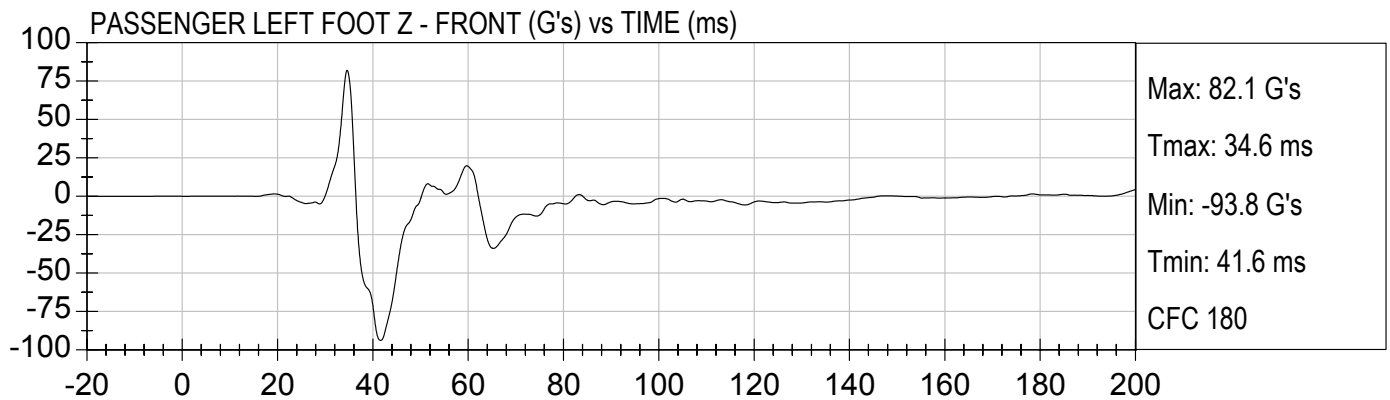
PASSENGER RIGHT UPPER TIBIA MY (Nm) vs TIME (ms)

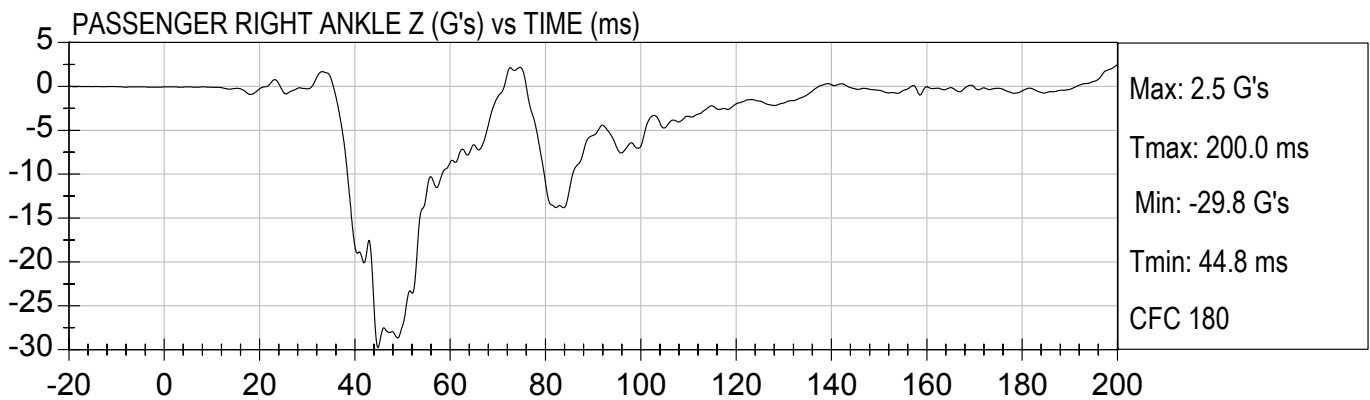
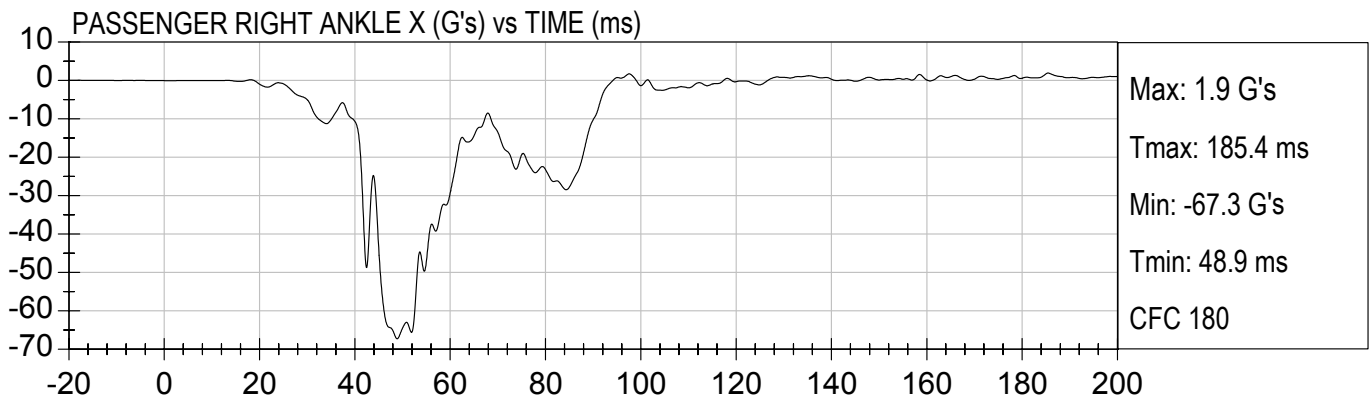
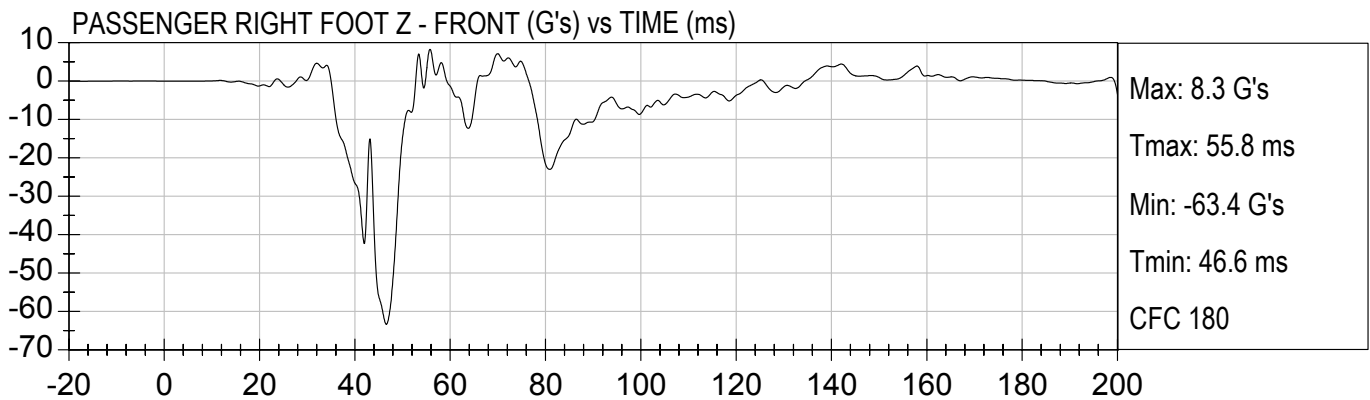


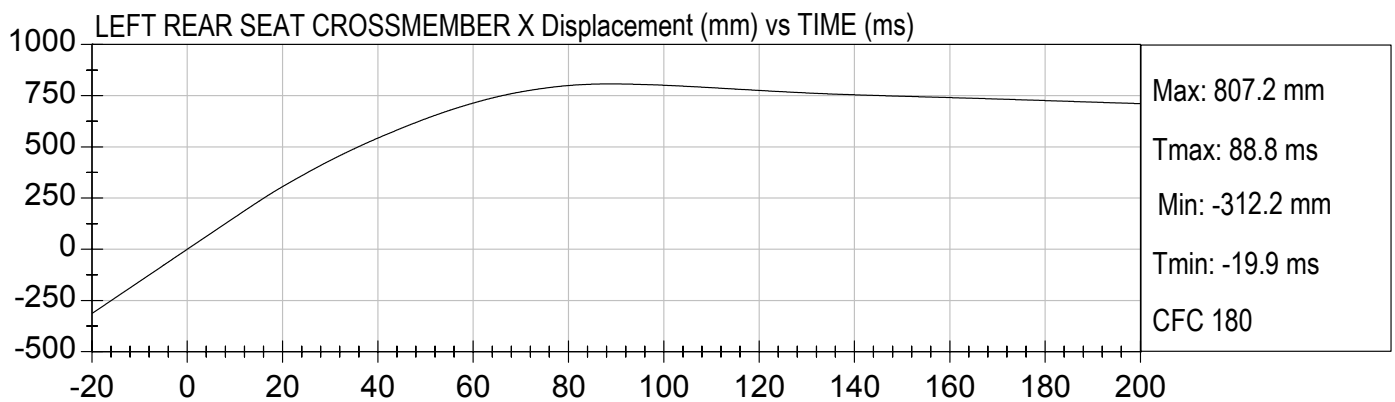
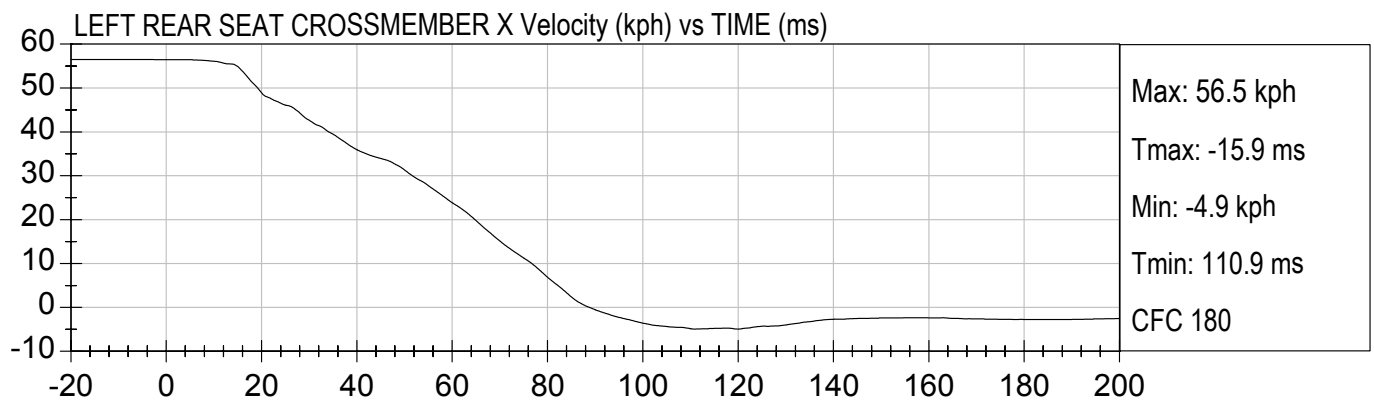
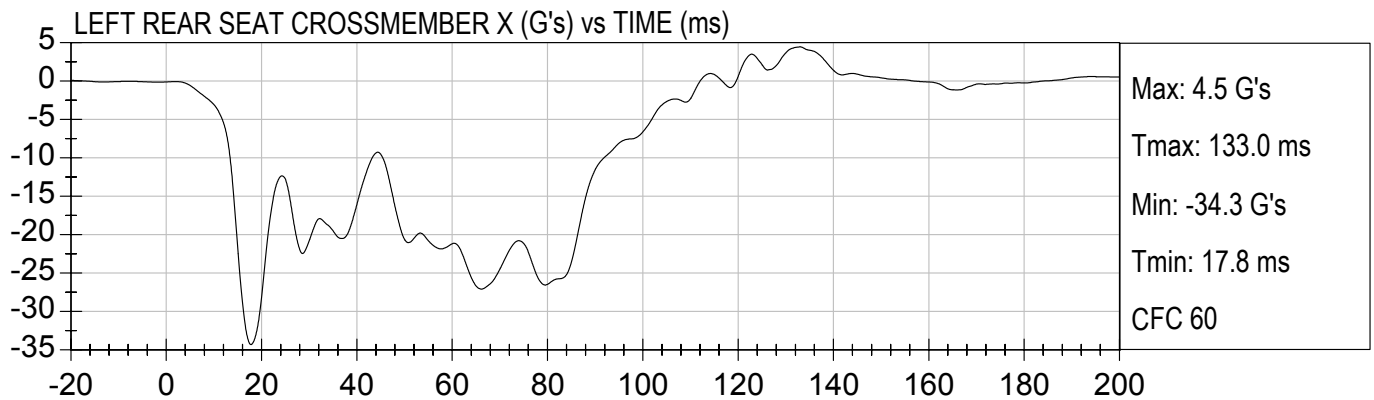
PASSENGER RIGHT UPPER TIBIA FZ (N) vs TIME (ms)

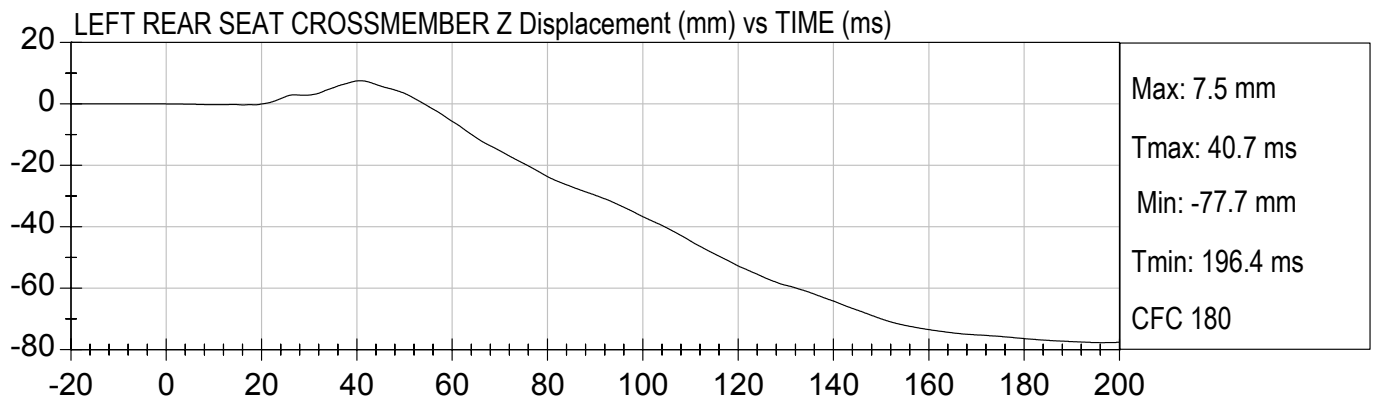
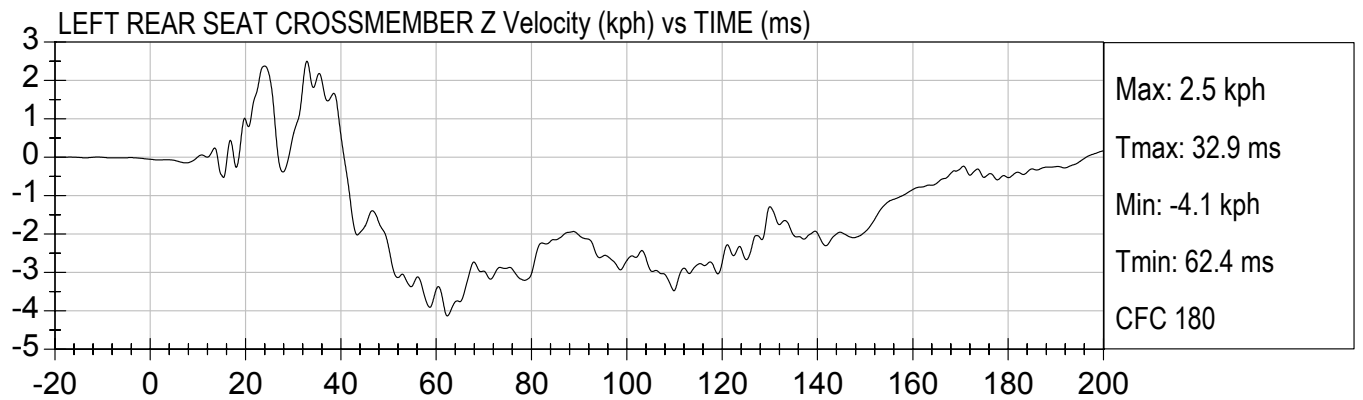
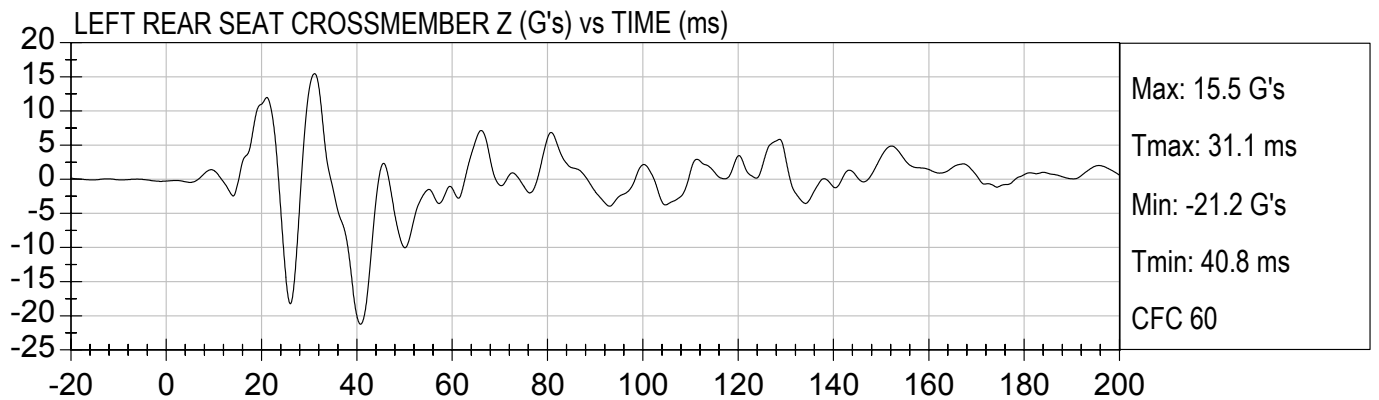


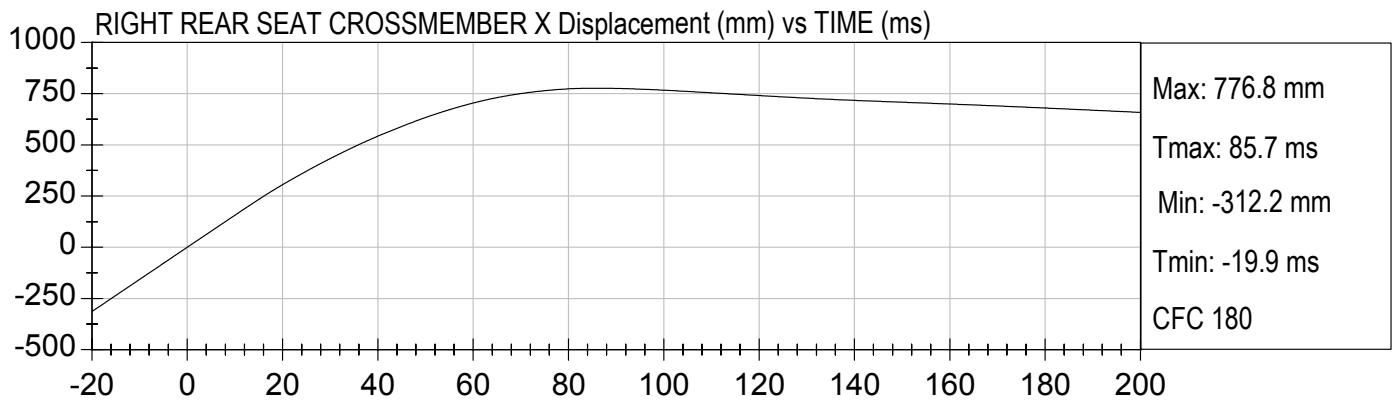
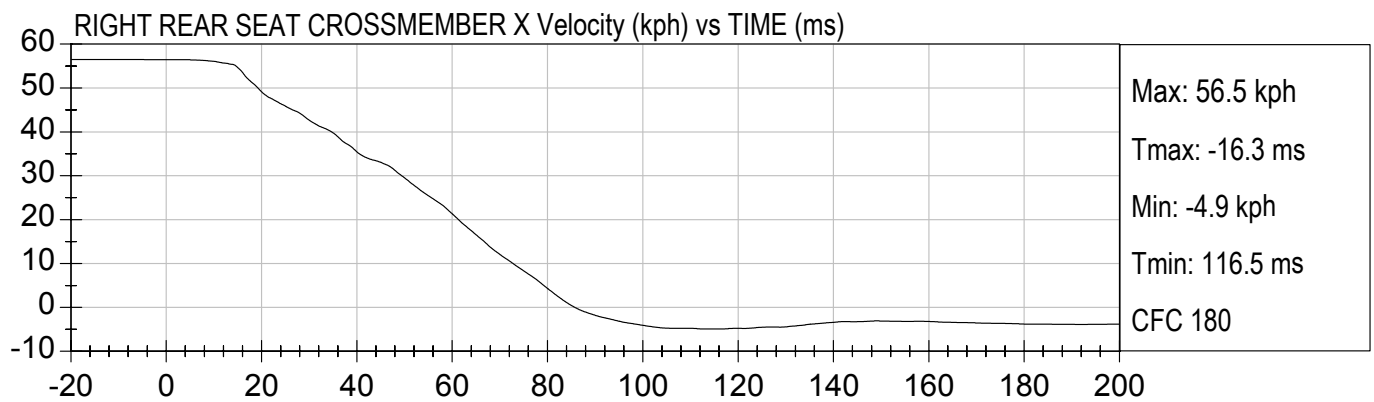
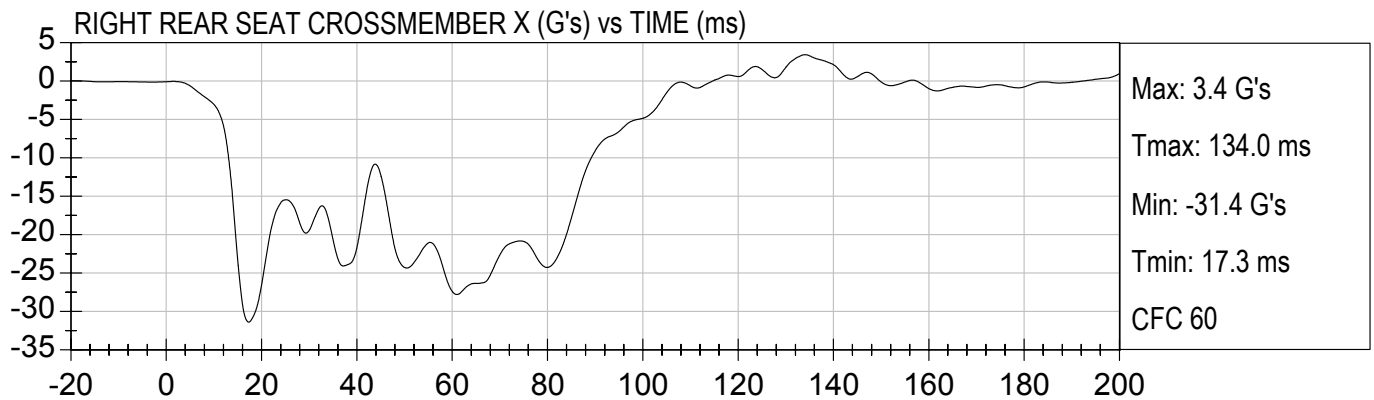


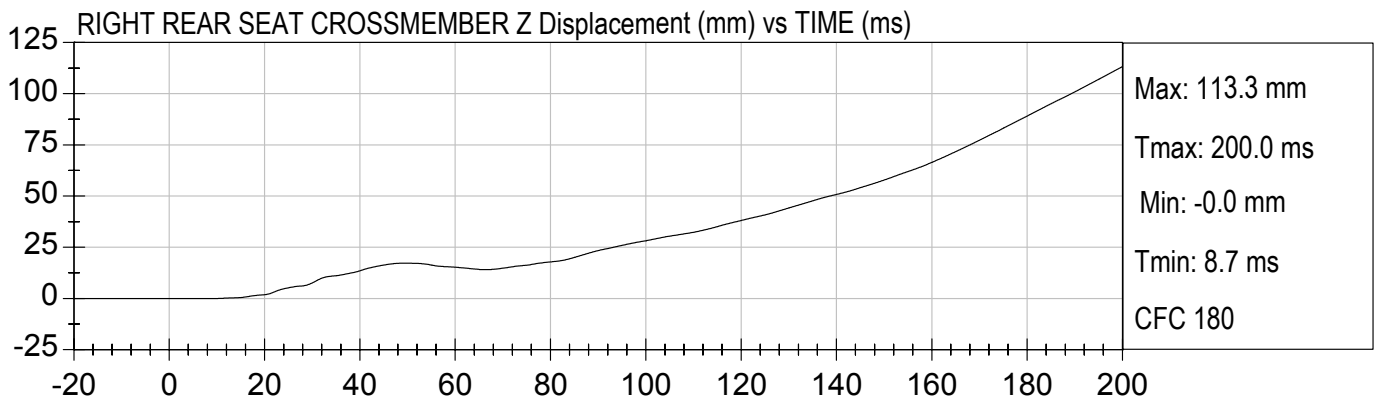
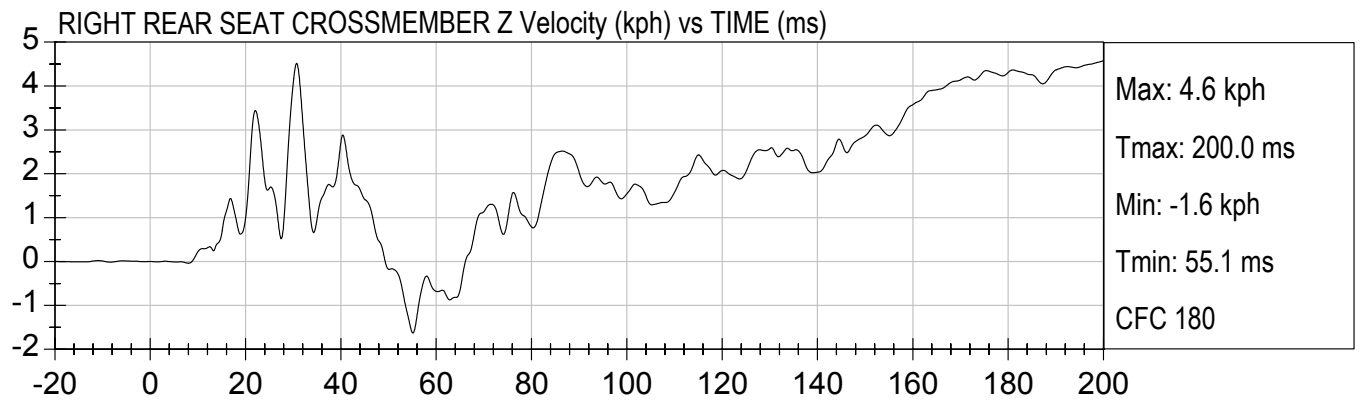
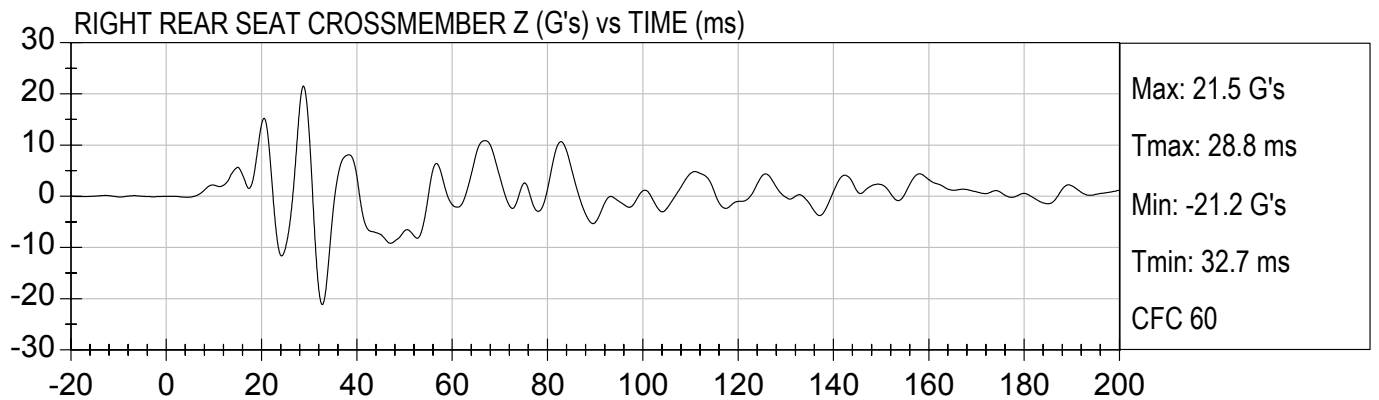






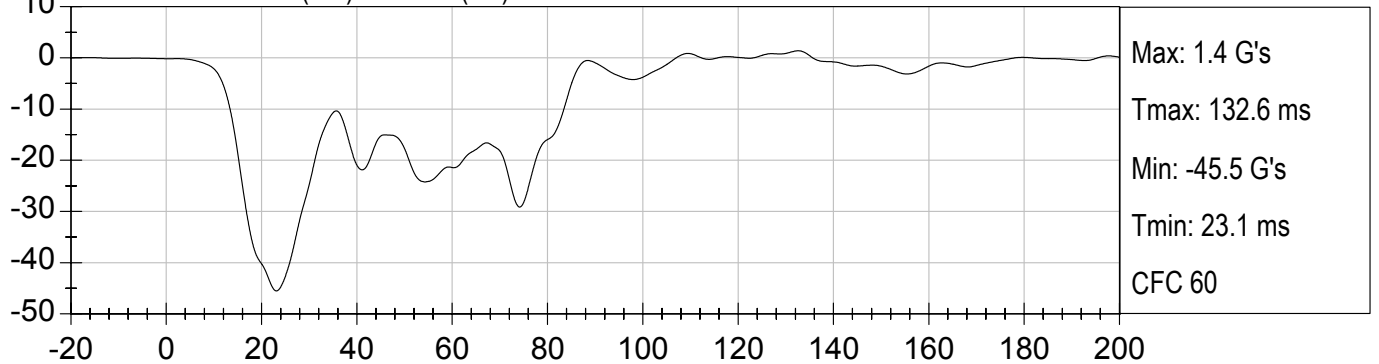




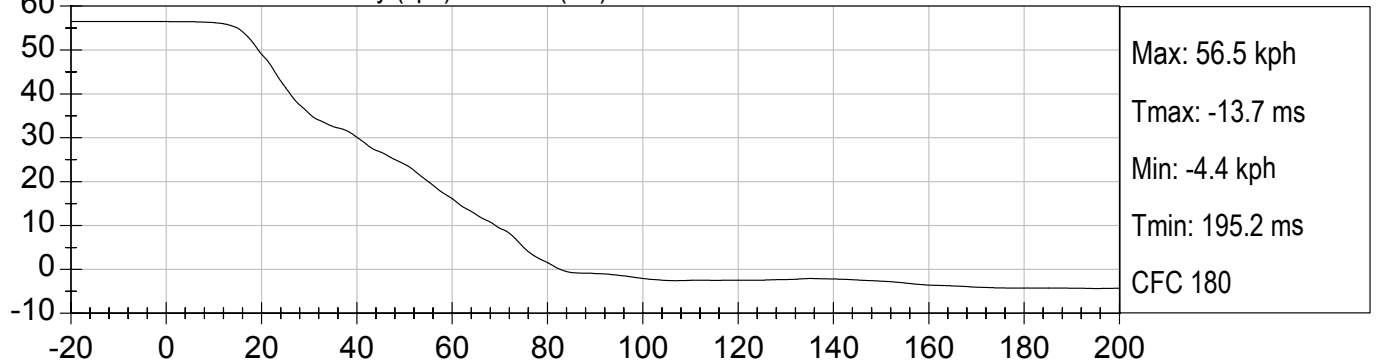




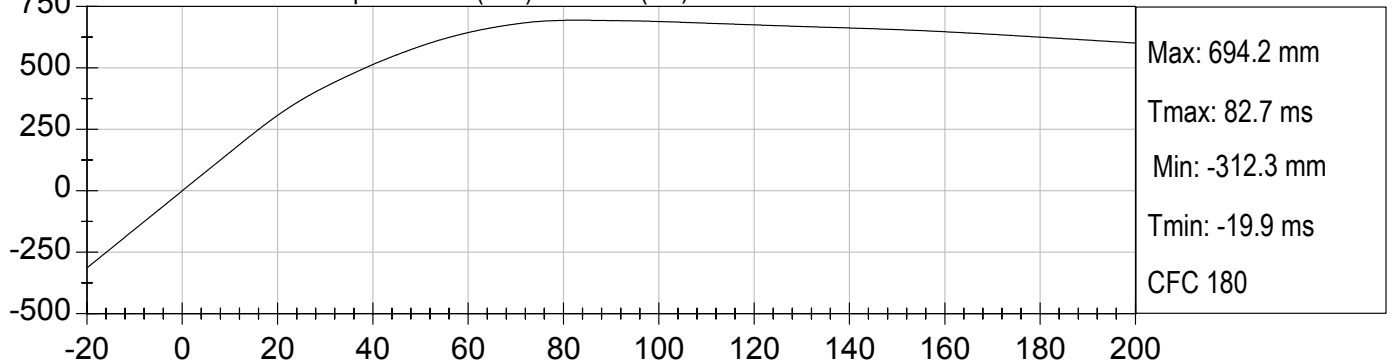
TOP OF ENGINE X (G's) vs TIME (ms)

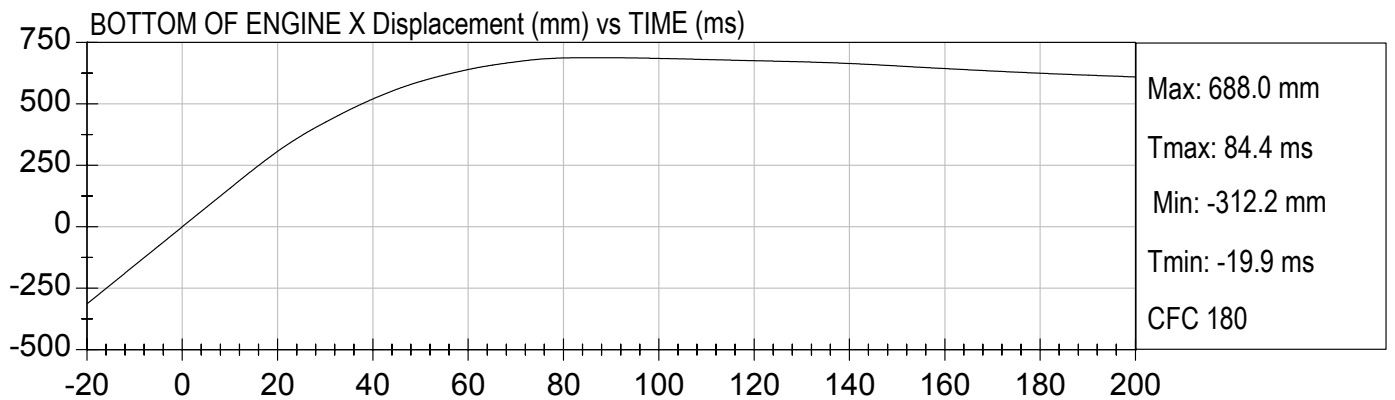
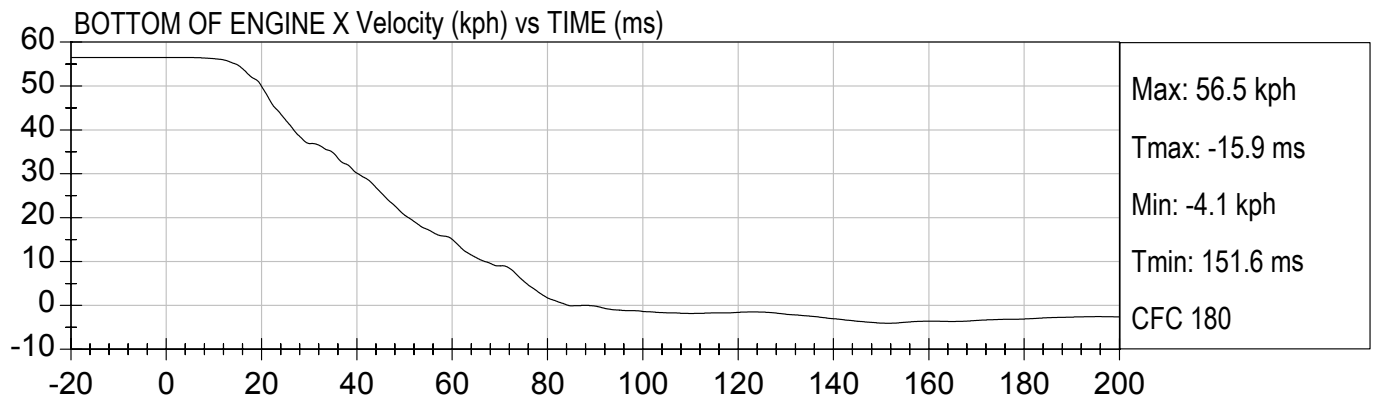
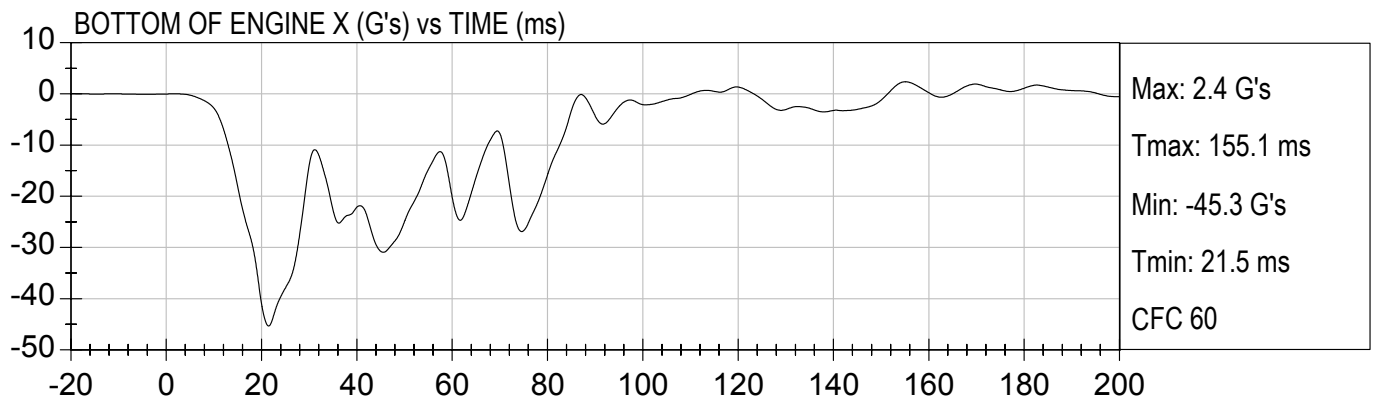


TOP OF ENGINE X Velocity (kph) vs TIME (ms)



TOP OF ENGINE X Displacement (mm) vs TIME (ms)

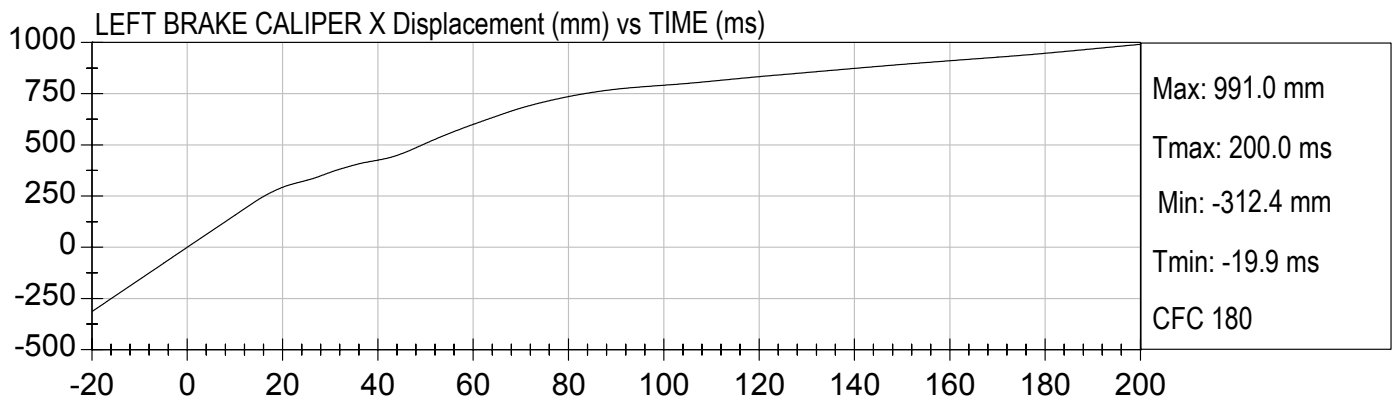
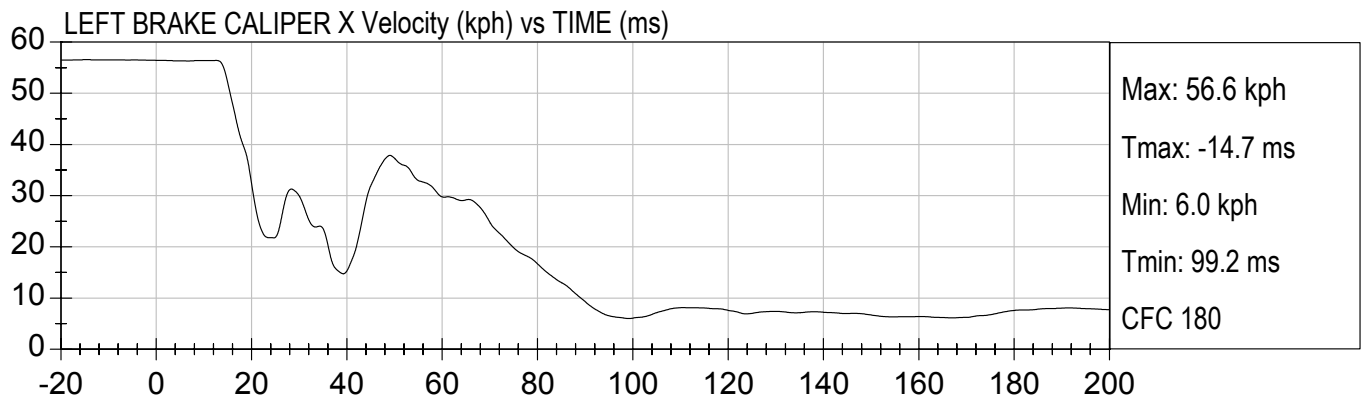
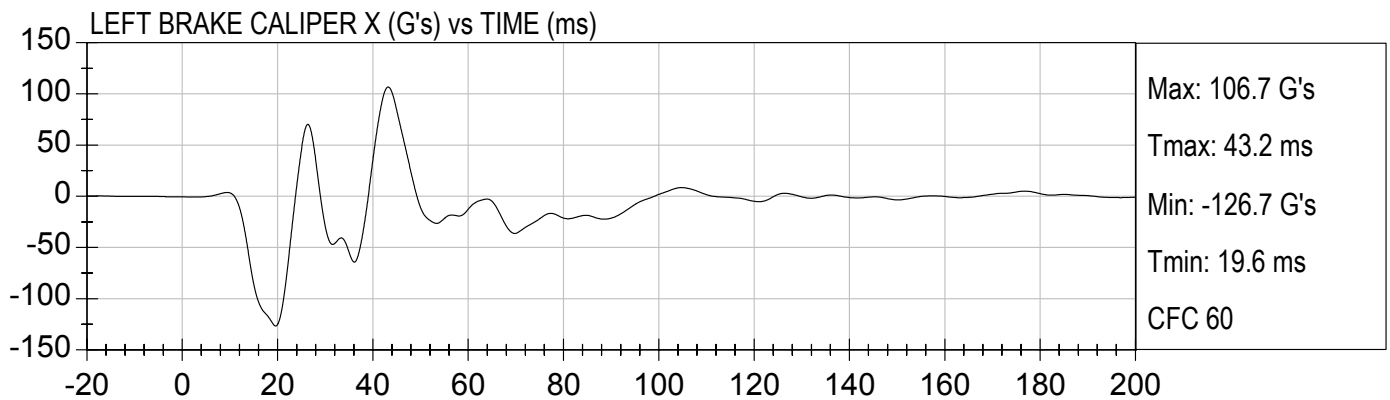


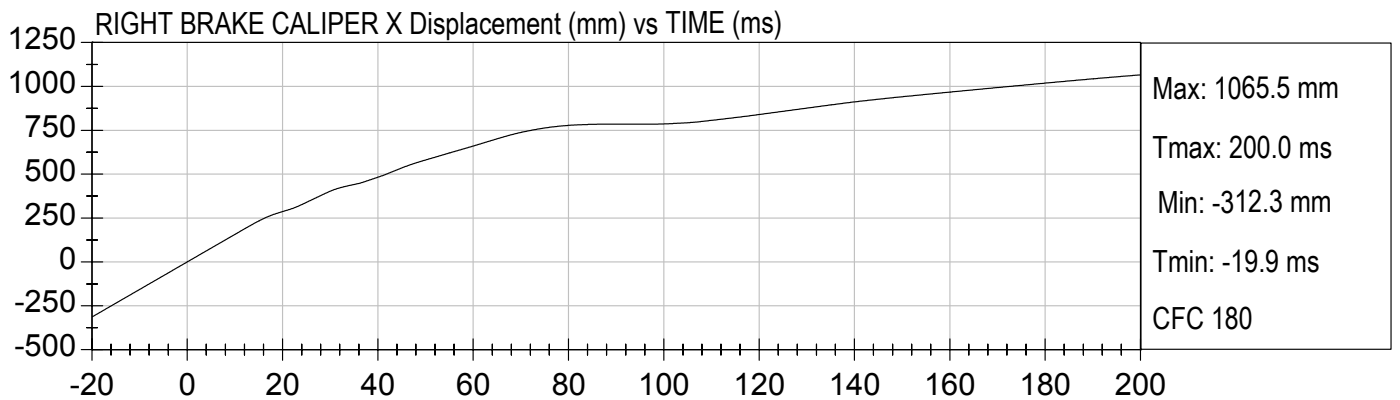
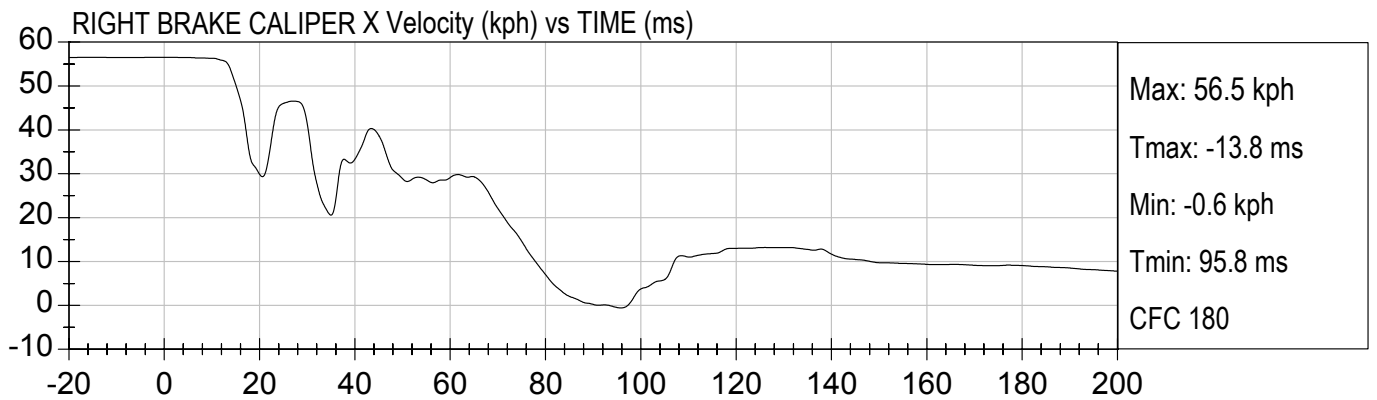
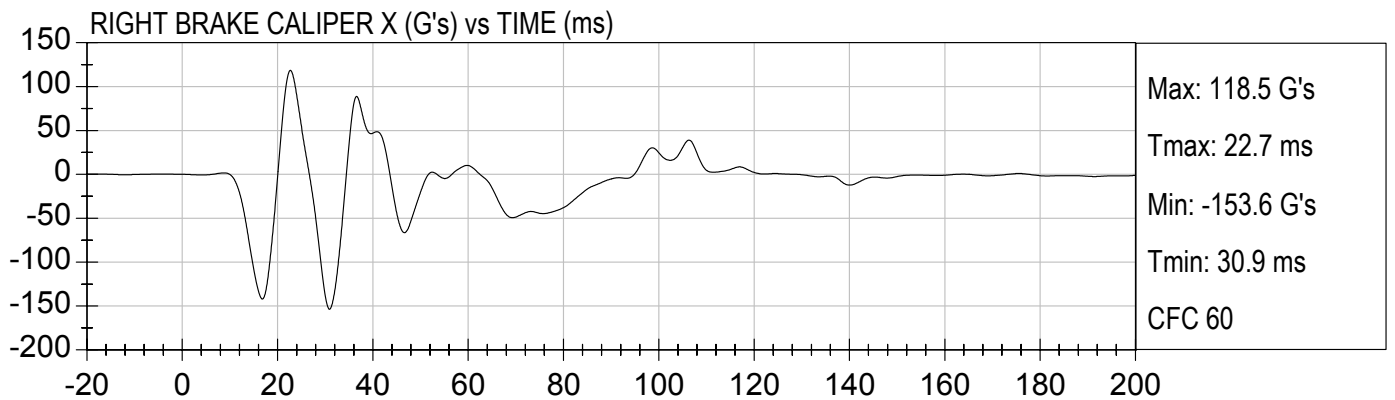


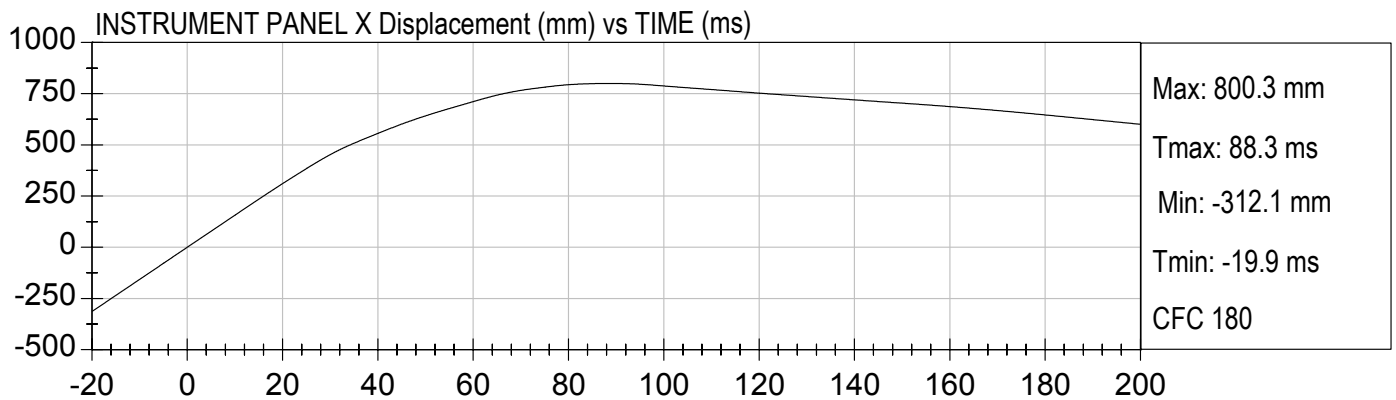
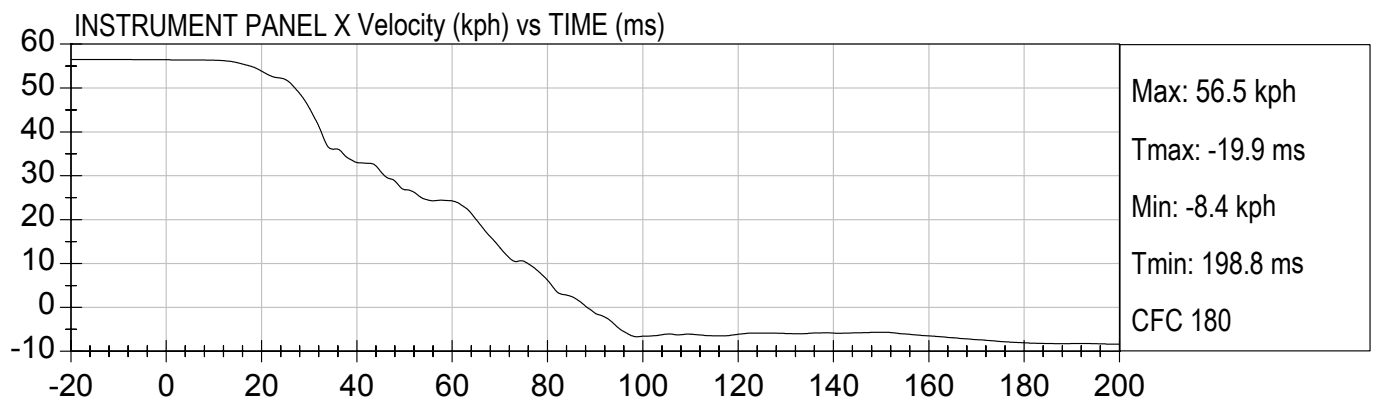
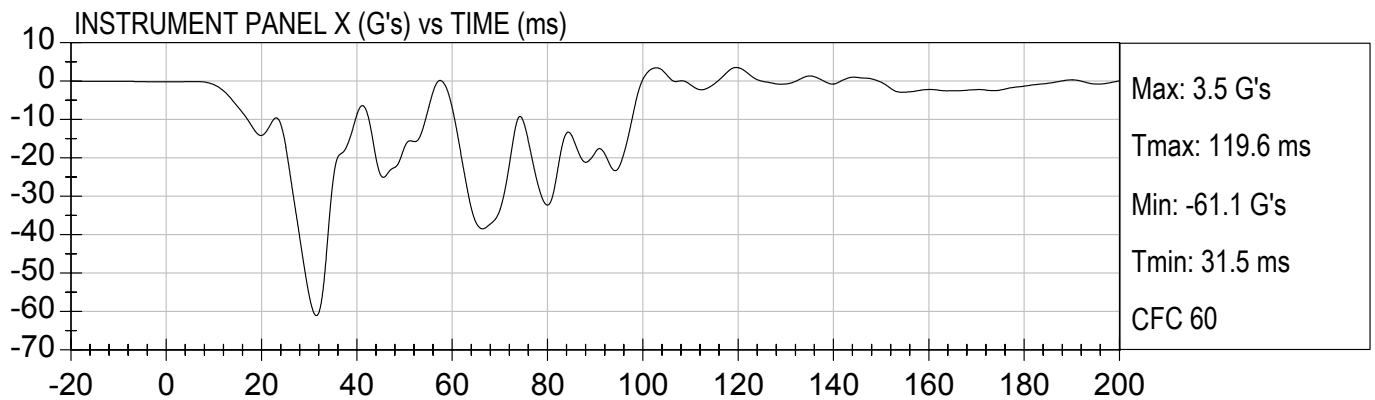


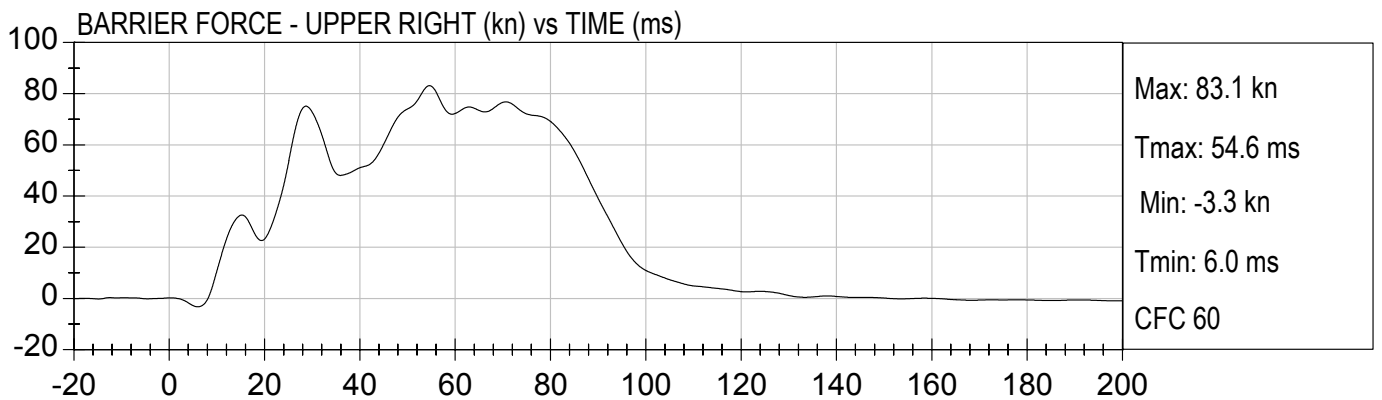
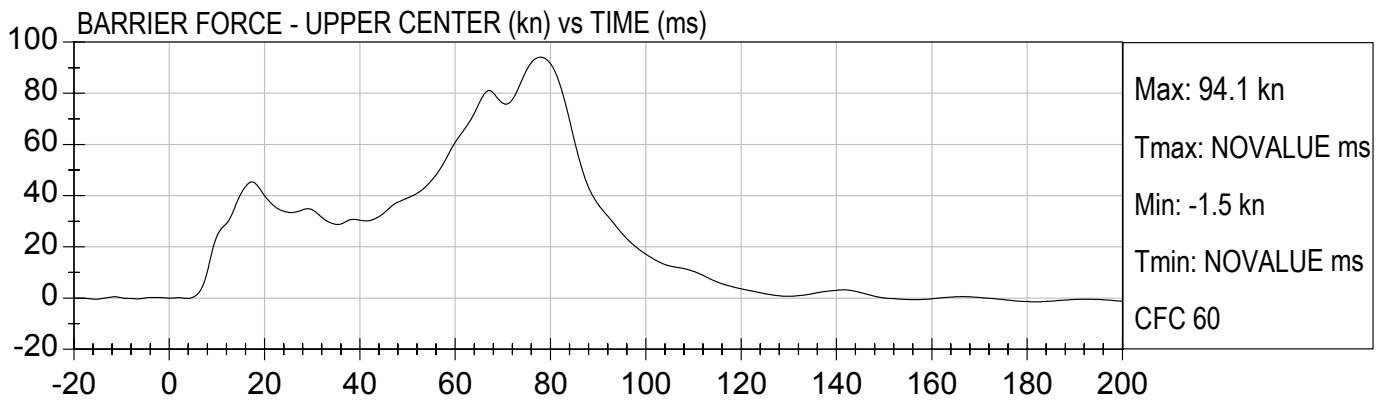
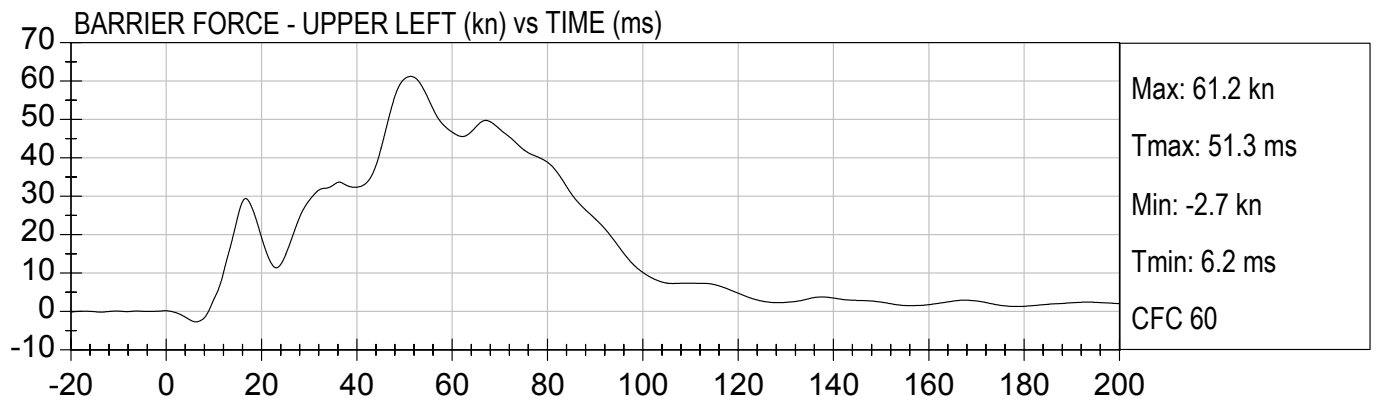
35 MPH FRONTAL IMPACT
2003 FORD EXPEDITION (M30202)

Test Date: 11/26/2002
Speed: 35.1 mph (56.5 km/h)



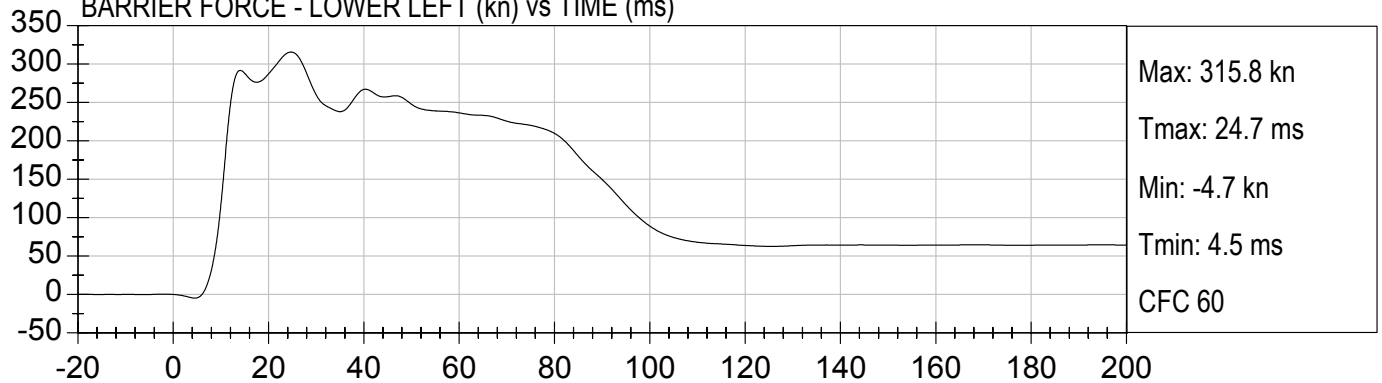




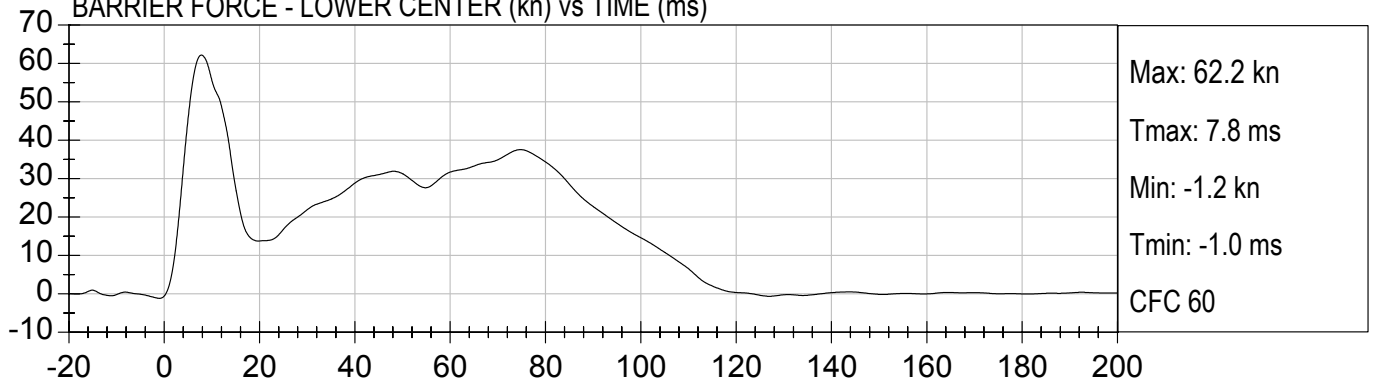




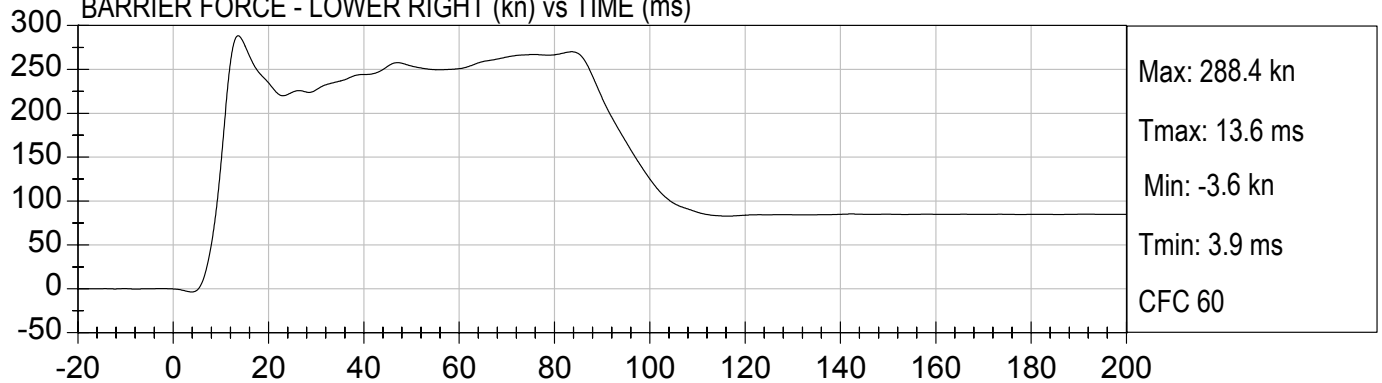
BARRIER FORCE - LOWER LEFT (kn) vs TIME (ms)



BARRIER FORCE - LOWER CENTER (kn) vs TIME (ms)

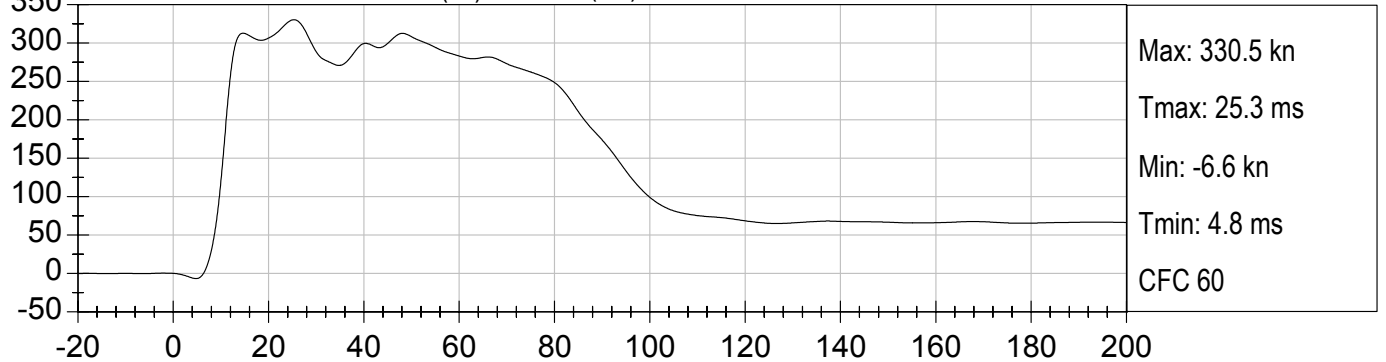


BARRIER FORCE - LOWER RIGHT (kn) vs TIME (ms)

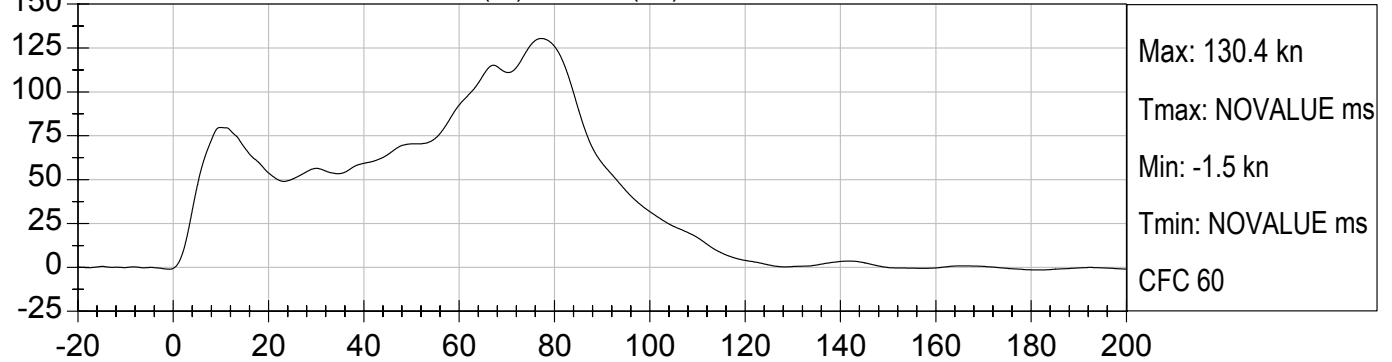




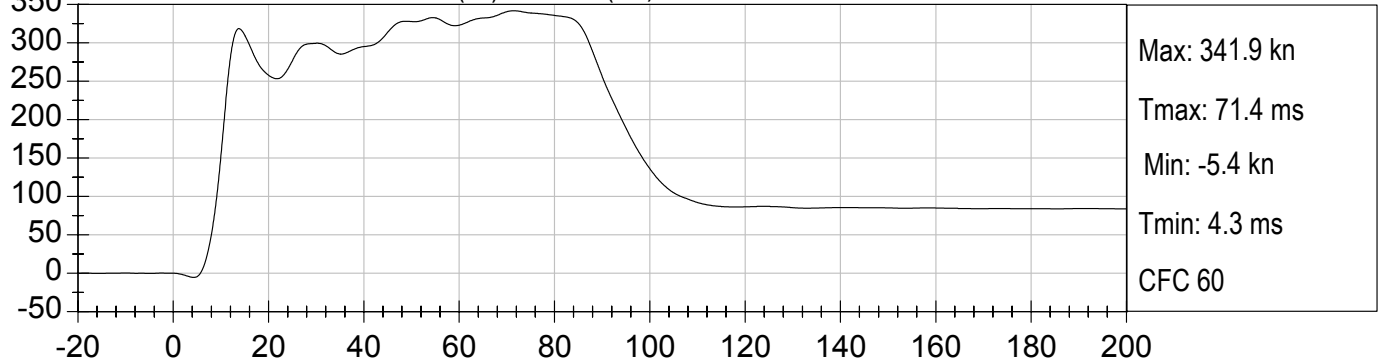
BARRIER FORCE - SUM LEFT (kn) vs TIME (ms)

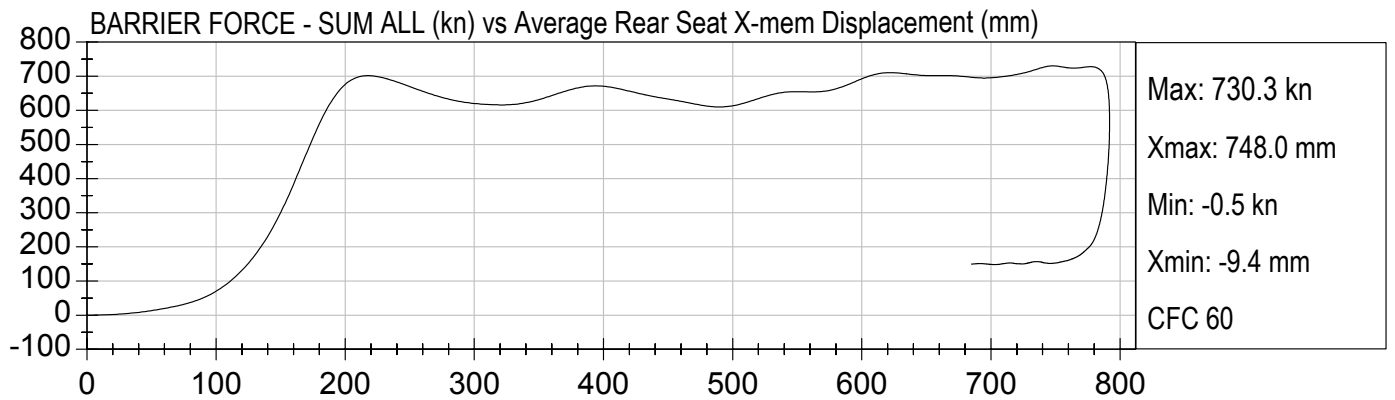
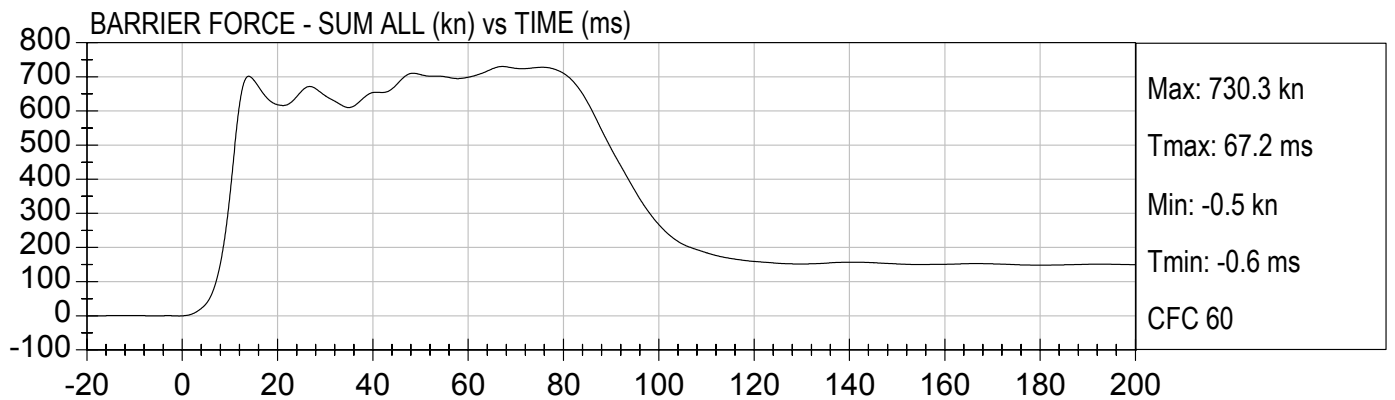


BARRIER FORCE - SUM CENTER (kn) vs TIME (ms)



BARRIER FORCE - SUM RIGHT (kn) vs TIME (ms)





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



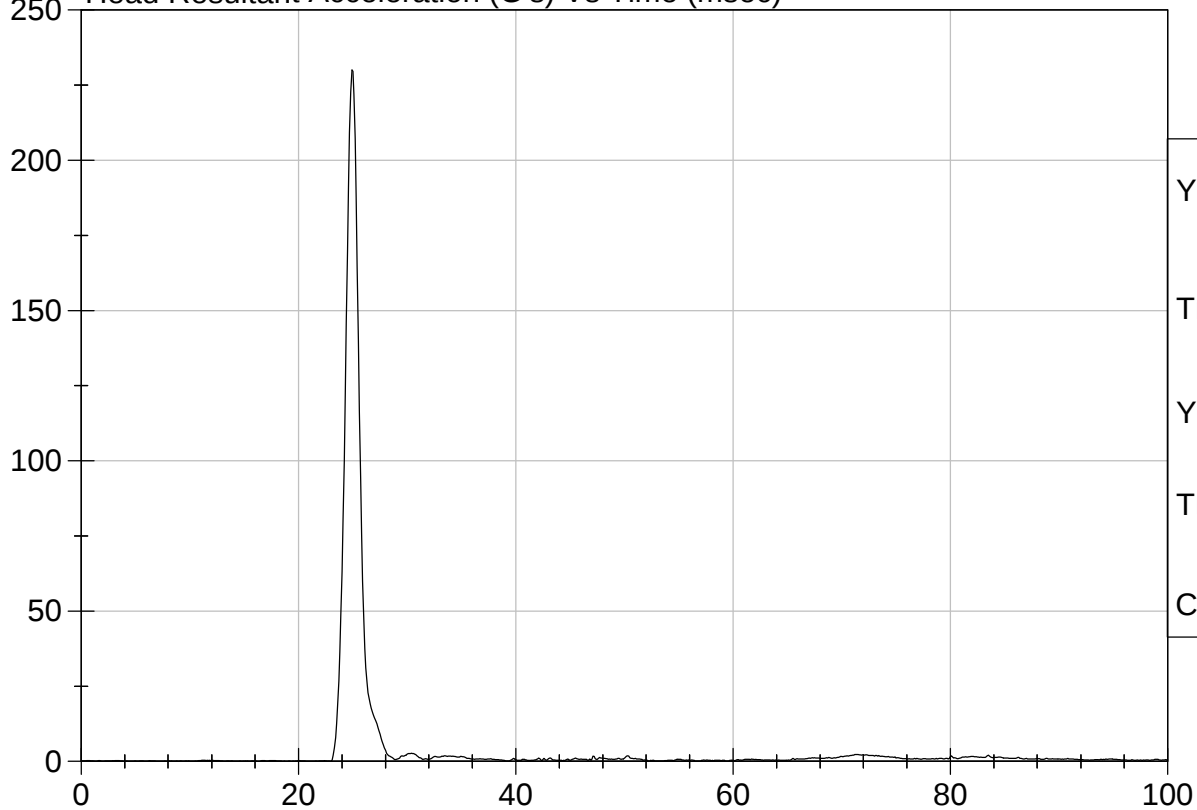
Test Description: Head Drop

Test Date: 11/08/2002

Component: D021431

Speed: 0 ft/s, 0.00 m/s

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



YMax: 230.0 G

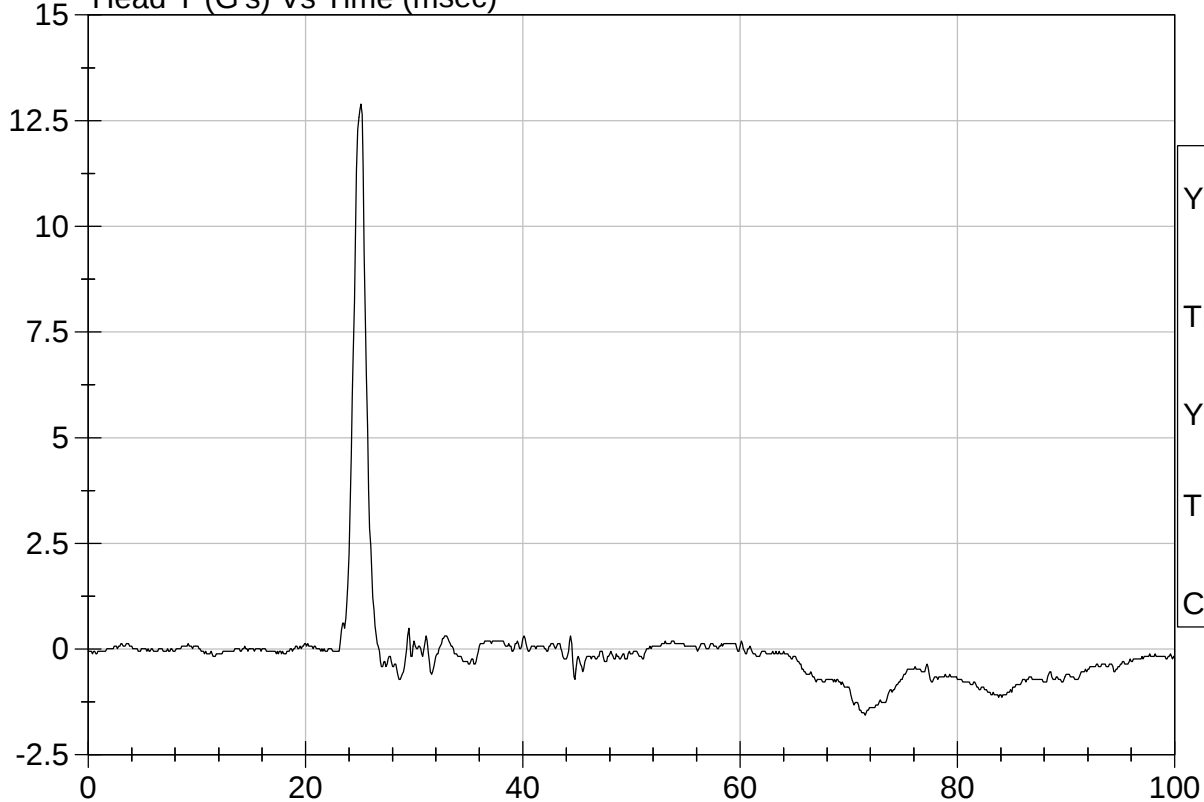
Tmax: 24.9 ms

YMin: 0.1 G

Tmin: 2.1 ms

CFC 1000

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



YMax: 12.9 G

Tmax: 25.1 ms

YMin: -1.6 G

Tmin: 71.5 ms

CFC 1000

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

Laboratory Technician

11/08/2002

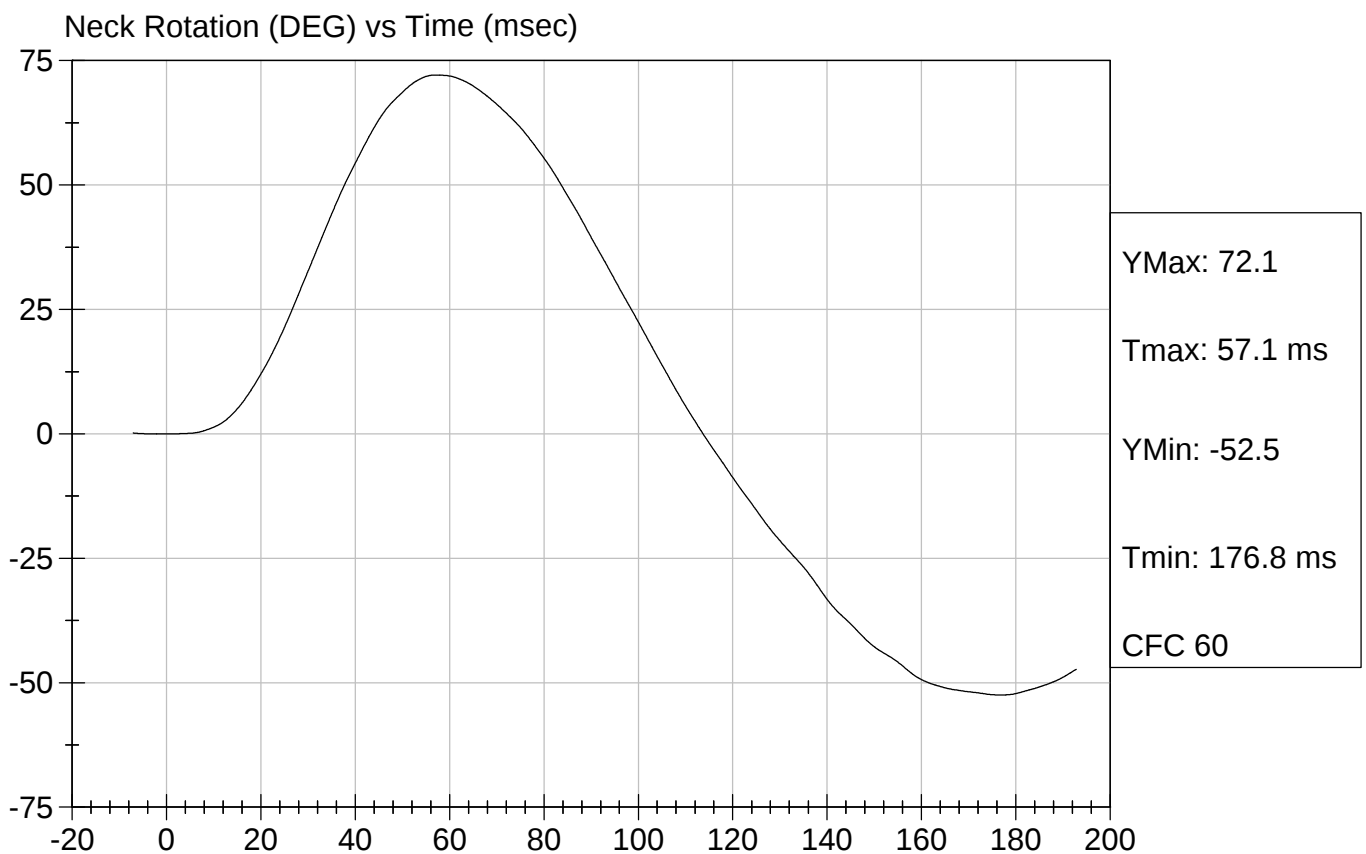
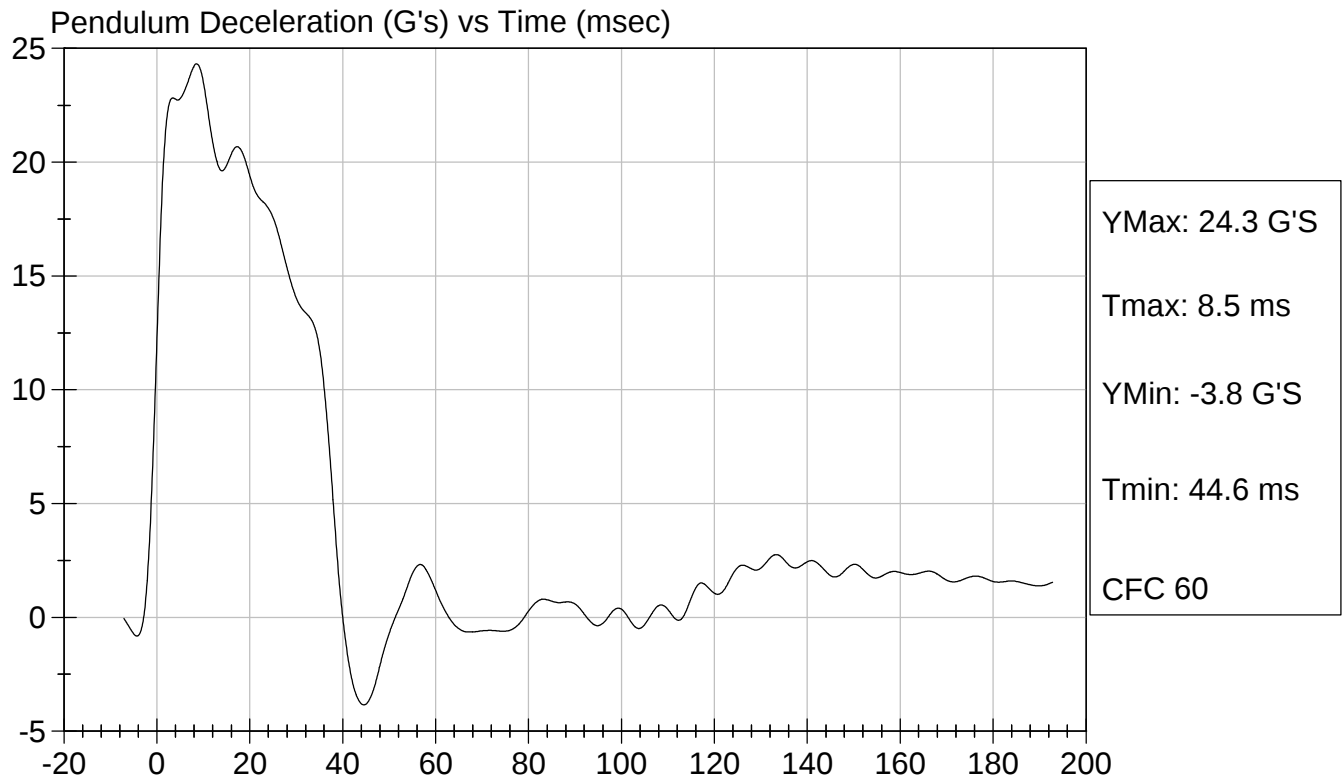
Test Date

Approved By



Test Desc: Neck Flexion
Component ID: D021432

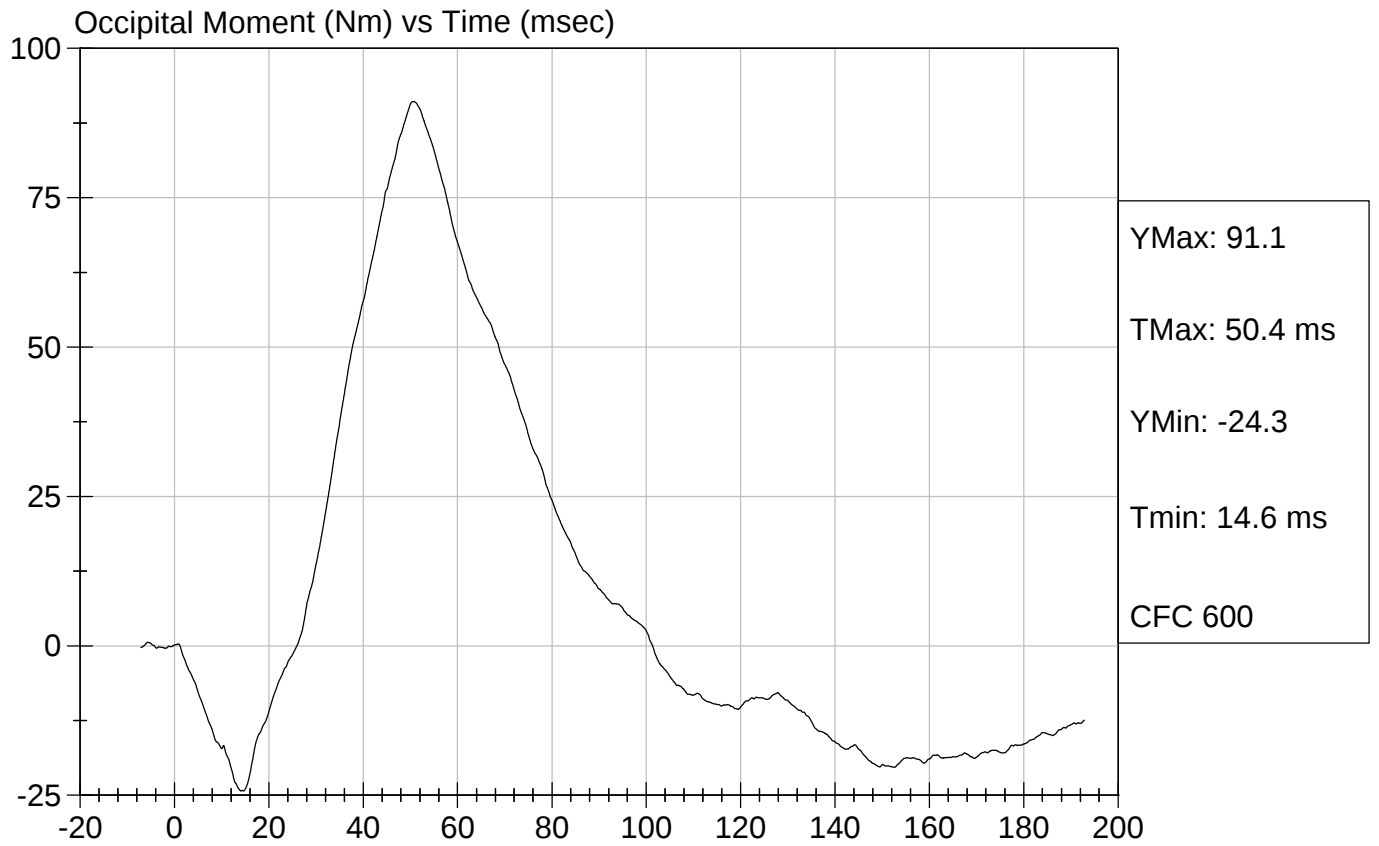
Test Date: 11/08/2002
Speed: 23.1 ft/sec, 7.04 m/sec





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

Laboratory Technician

11/08/2002

Test Date

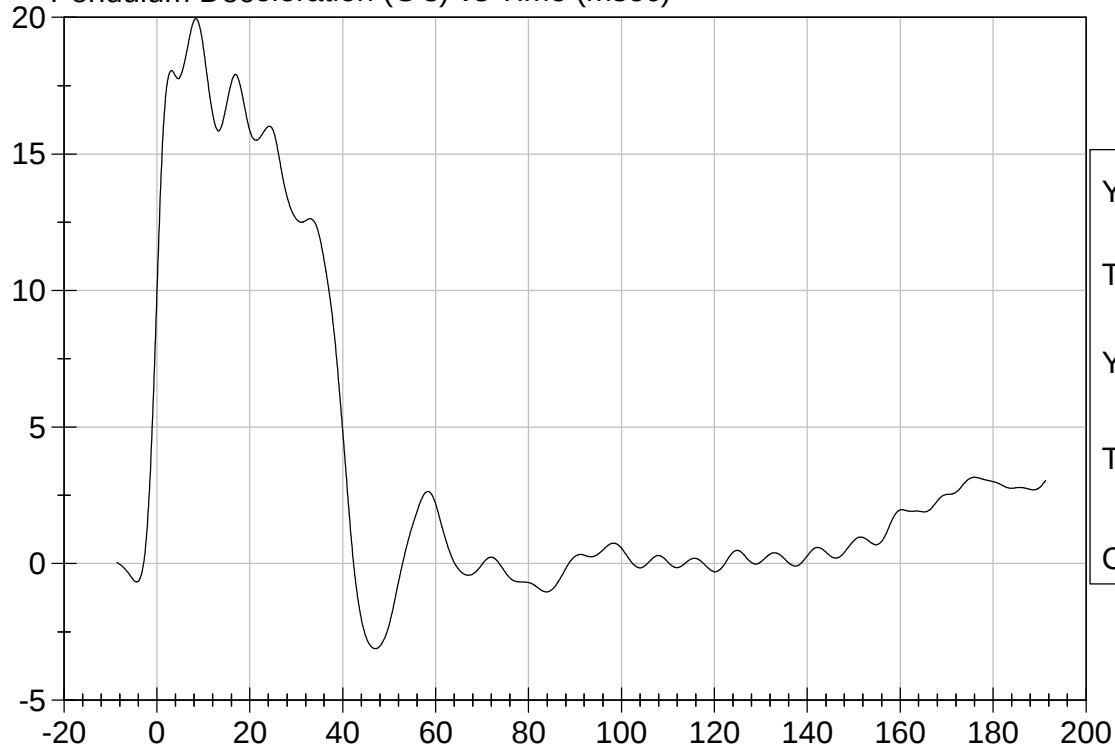
Approved By



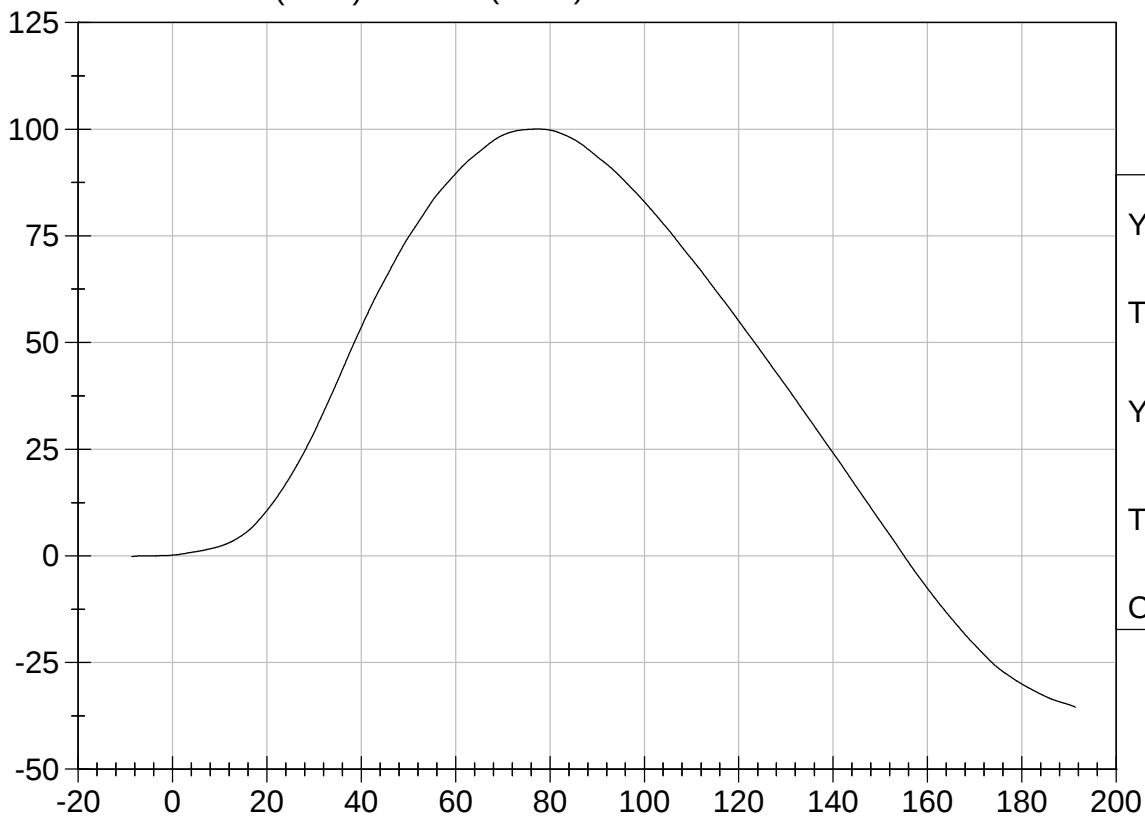
Test Desc: Neck Extension
Component ID: D021433

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

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



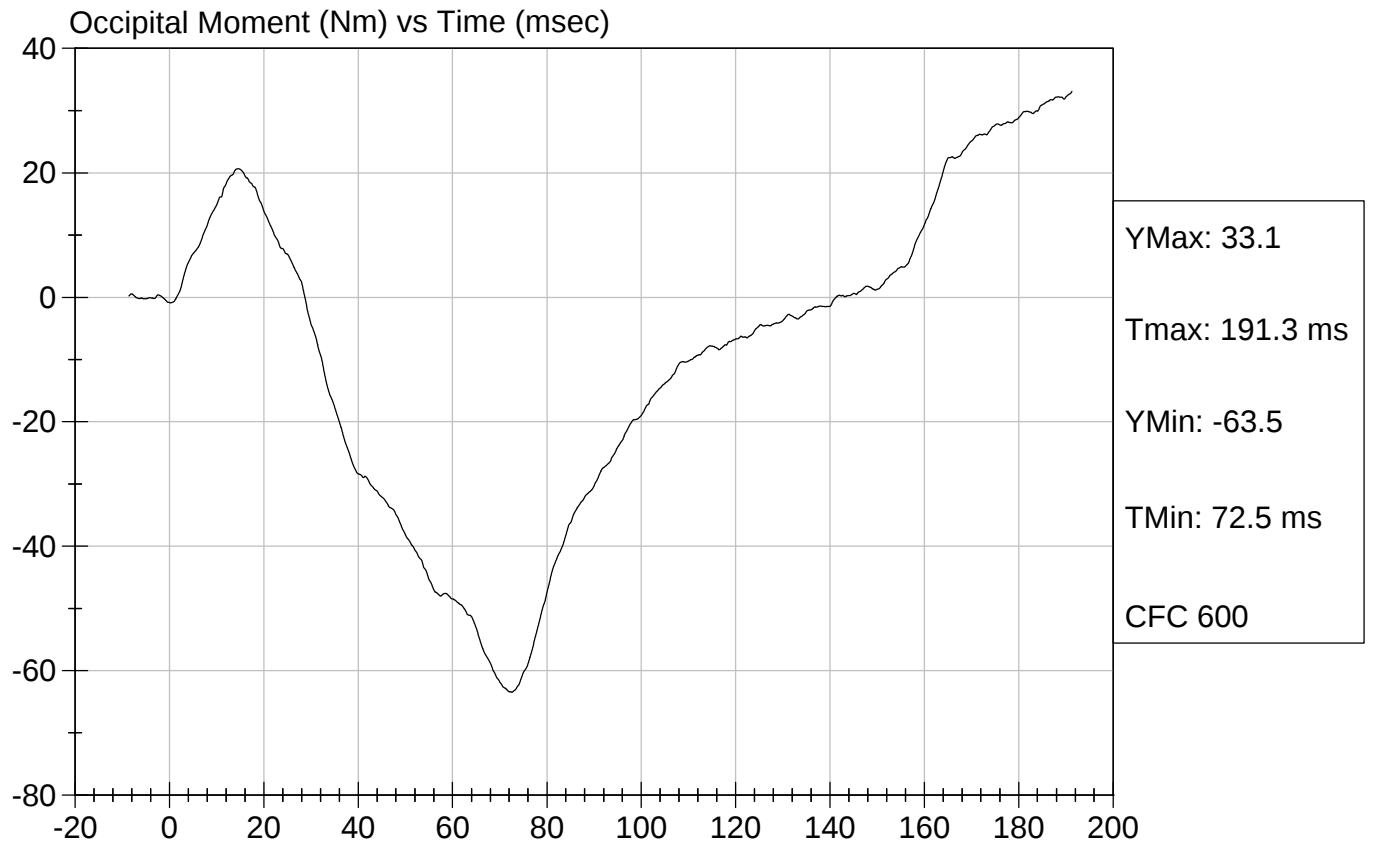
Neck Rotation (DEG) vs Time (msec)





Test Desc: Neck Extension
Component ID: D021433

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



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

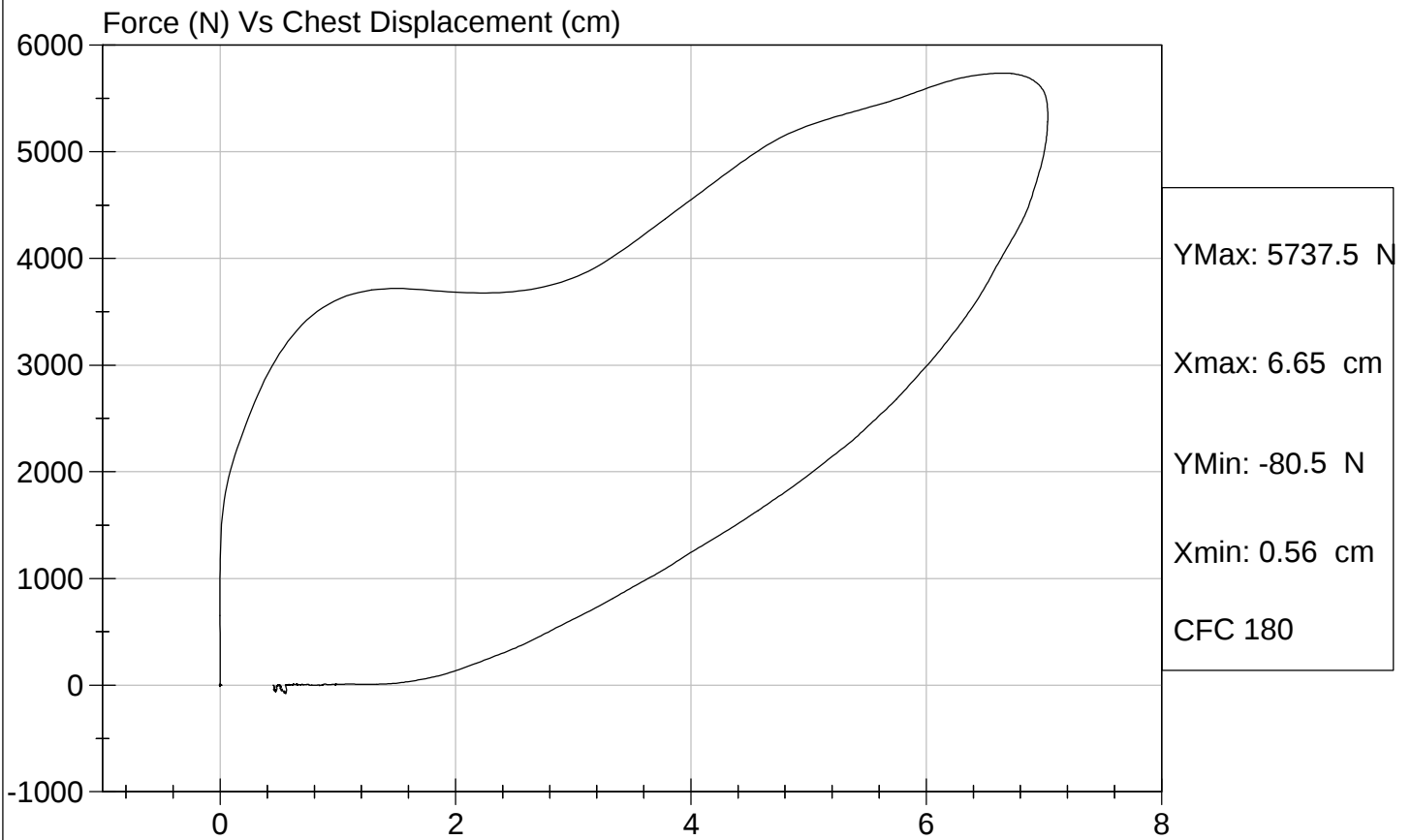


Test Description: Thorax Impact

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

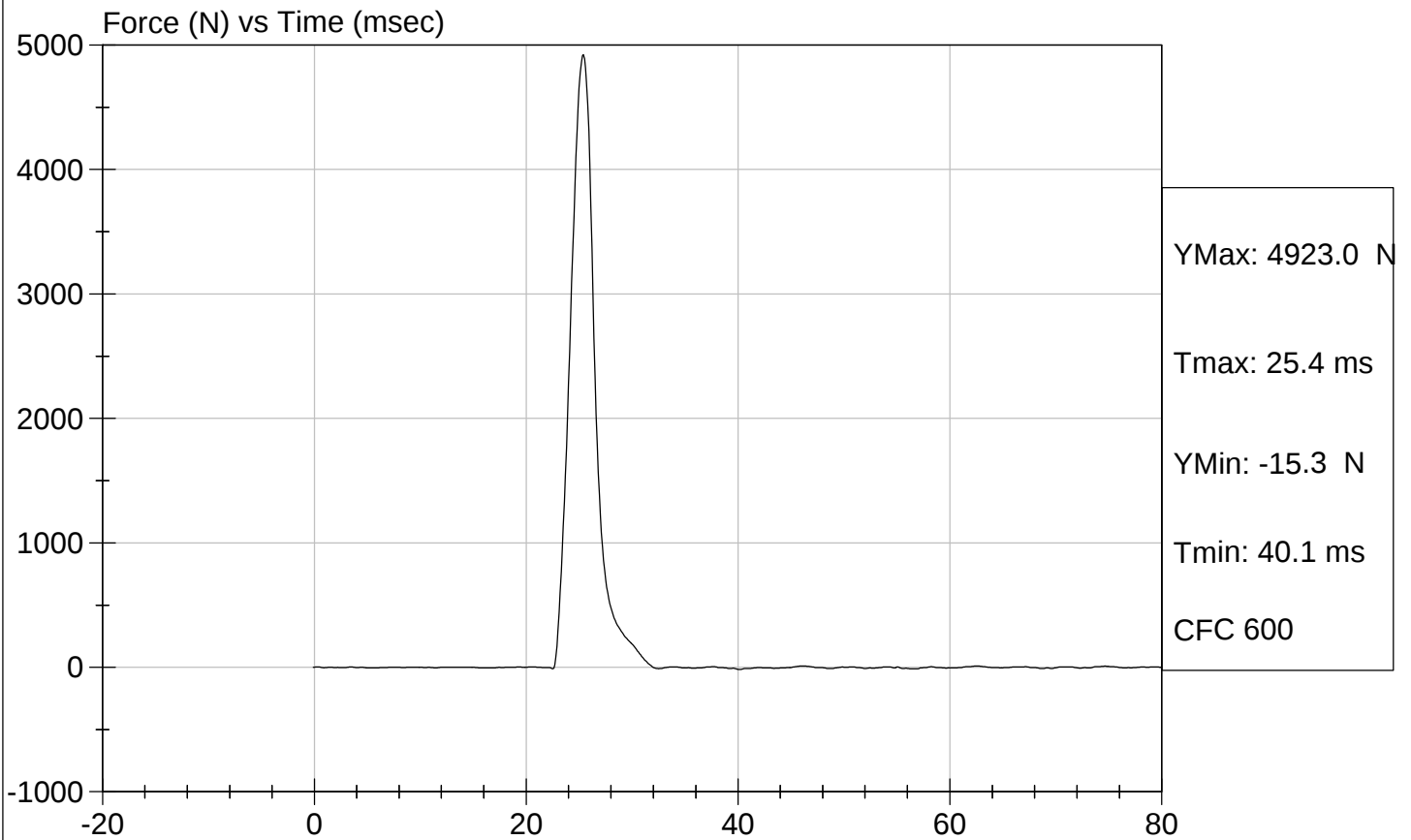


Test Description: Right Knee

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

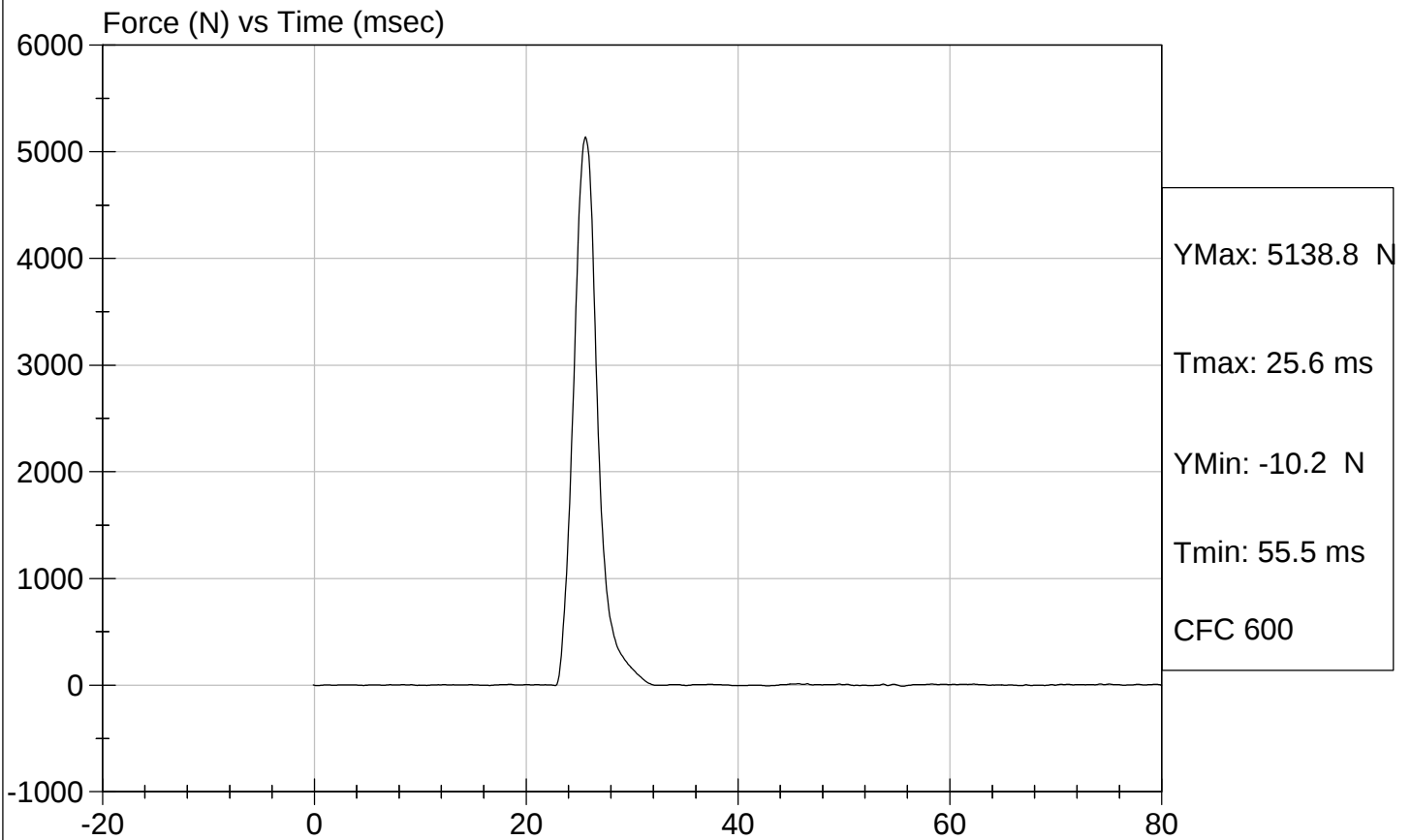


Test Description: Left Knee

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

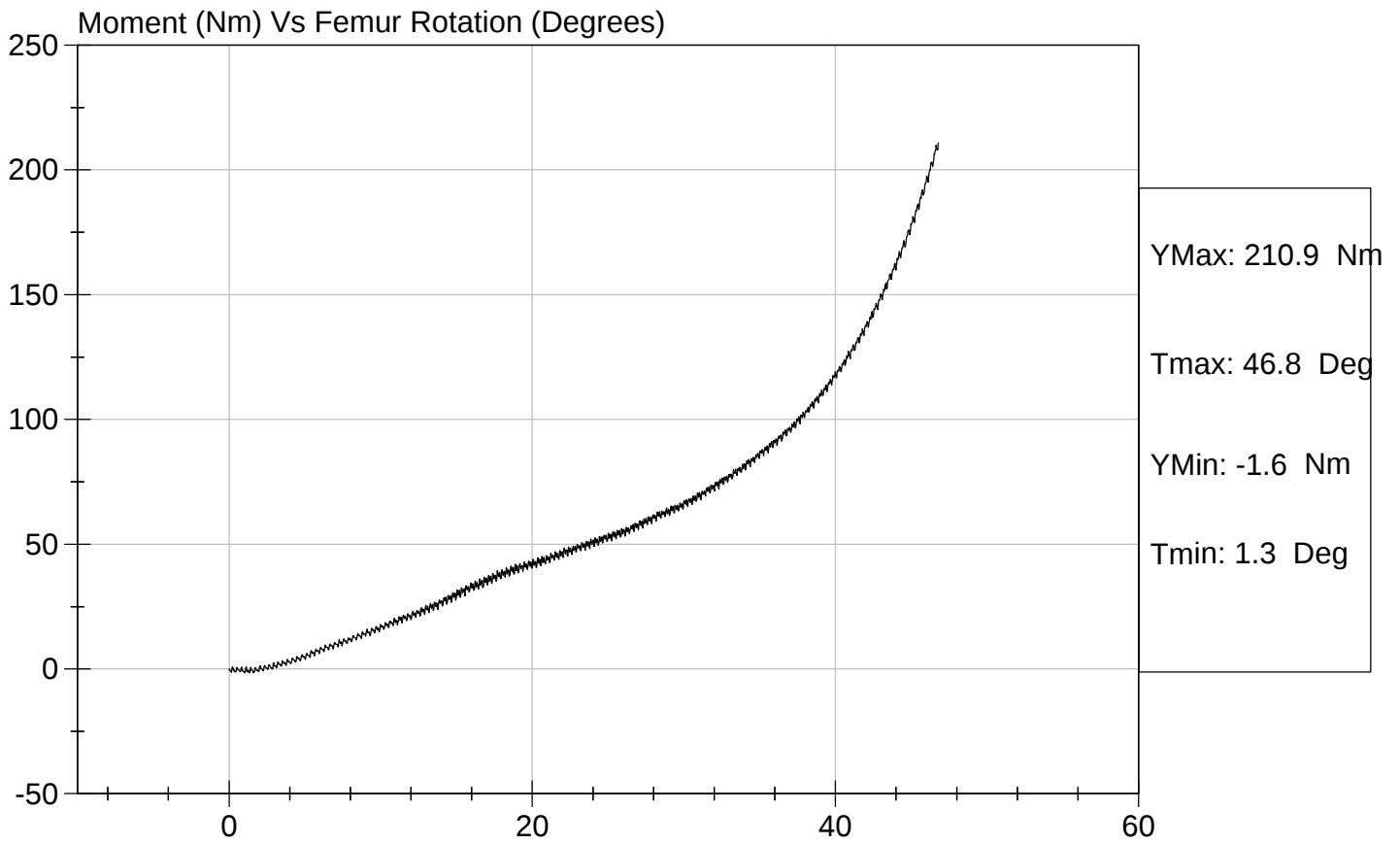


Test Description: Hip Femur Flexion

Test Date: 11/12/2002

Component: D021439

Speed: 0 ft/sec, 0.00 m/sec



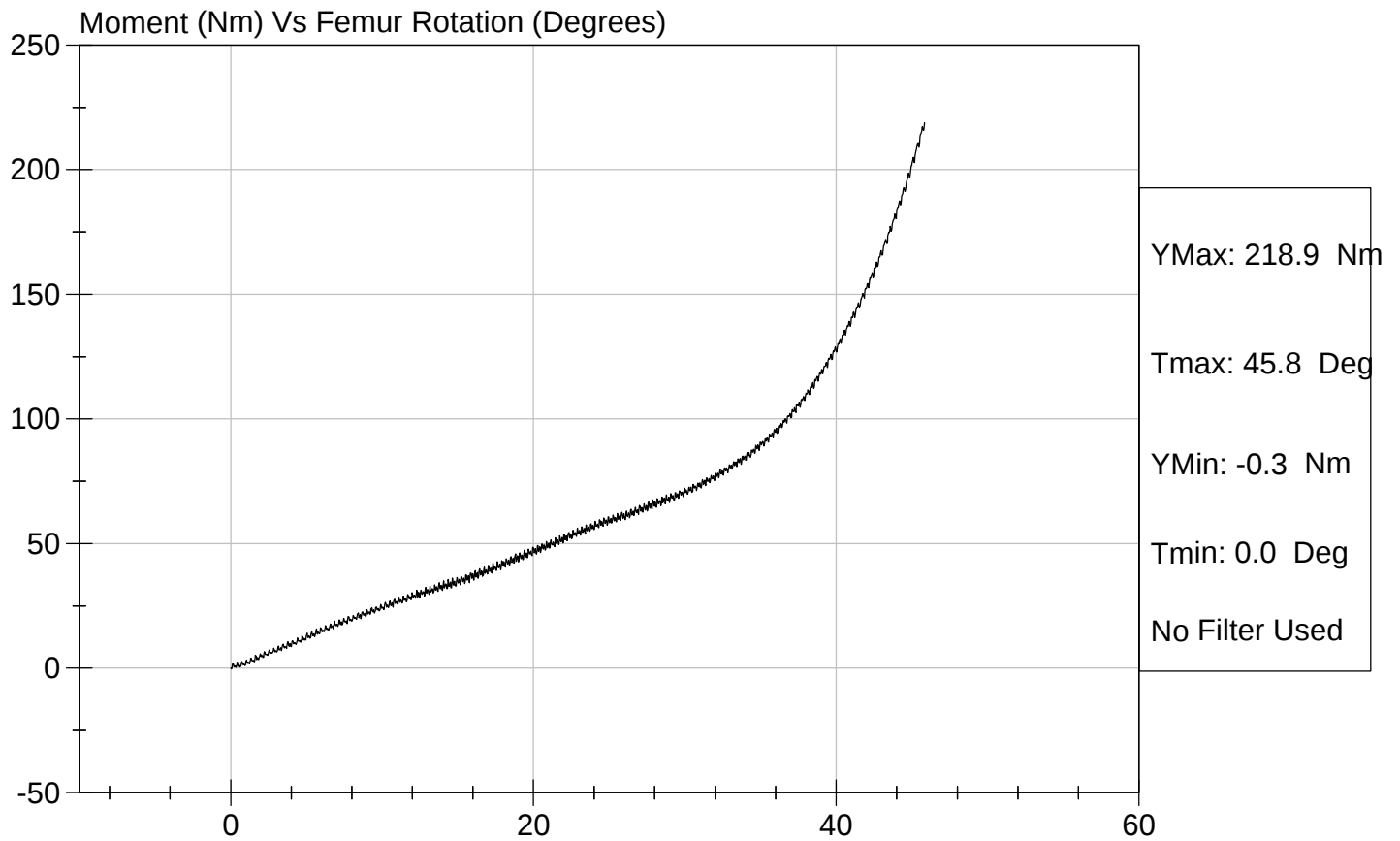


Test Description: Hip Femur Flexion

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



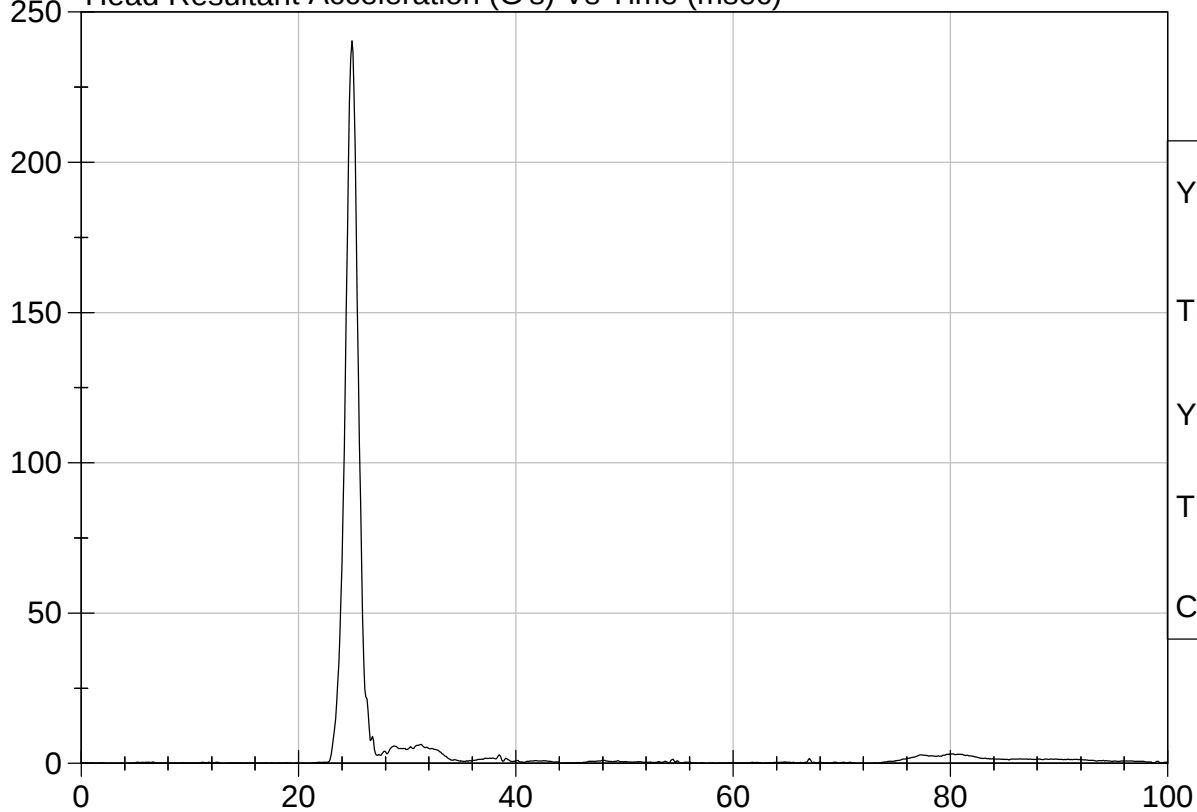
Test Description: Head Drop

Test Date: 11/08/2002

Component: D021441

Speed: 0 ft/s, 0.00 m/s

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



YMax: 240.4 G

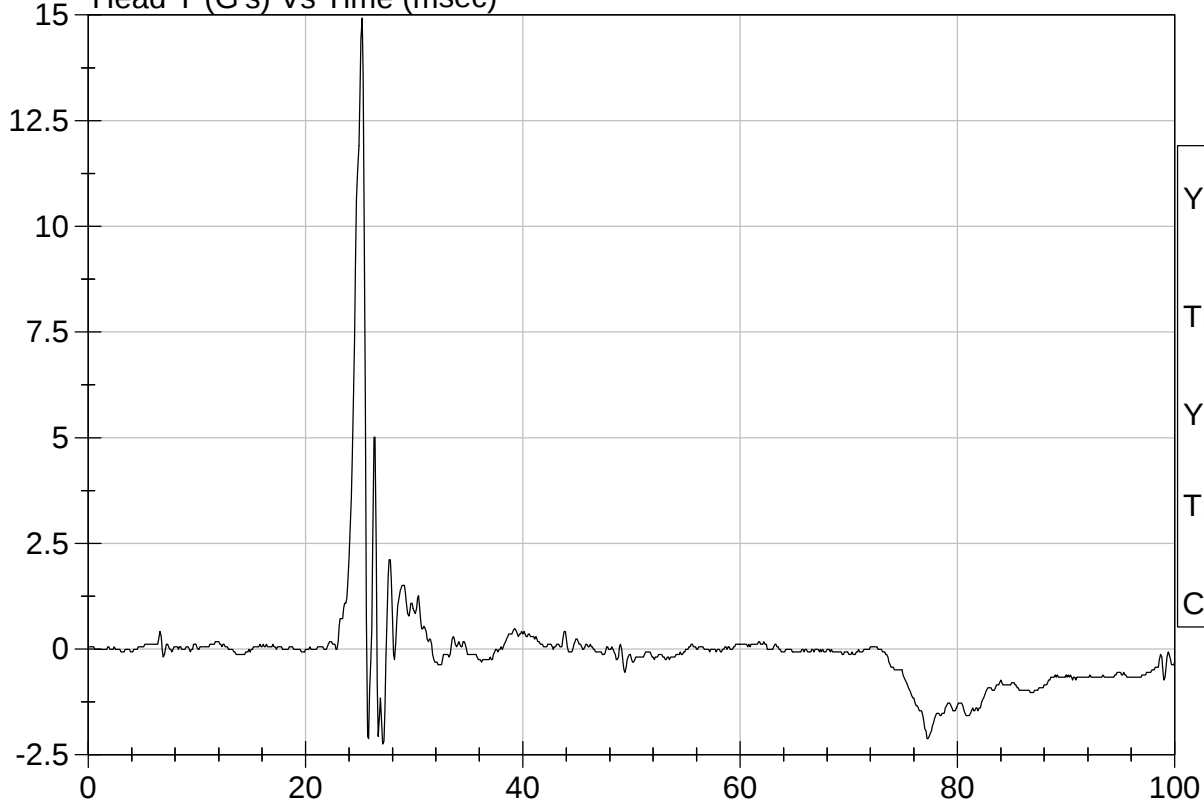
Tmax: 24.9 ms

YMin: 0.1 G

Tmin: 1.3 ms

CFC 1000

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



YMax: 14.9 G

Tmax: 25.2 ms

YMin: -2.2 G

Tmin: 27.1 ms

CFC 1000

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

Laboratory Technician

11/08/2002

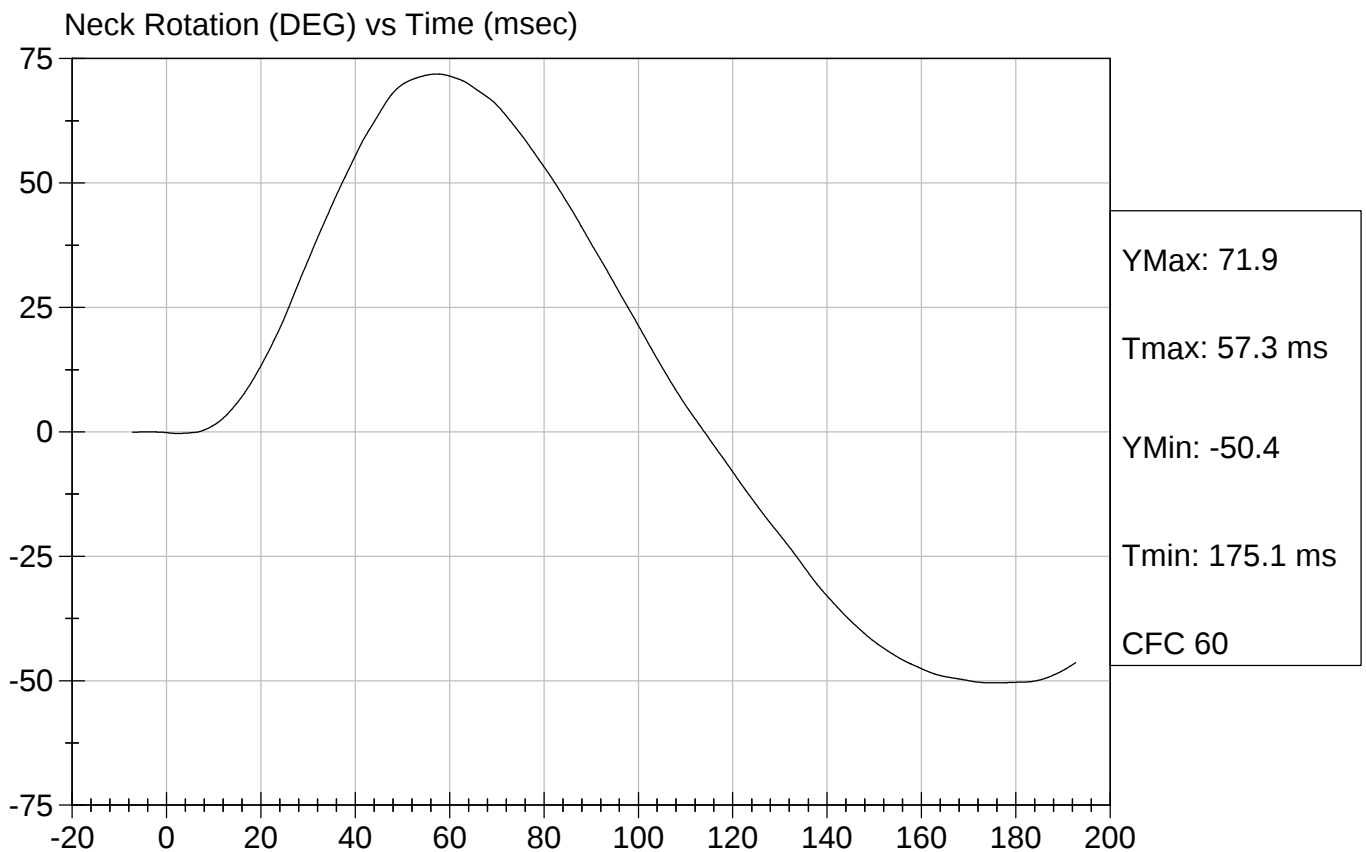
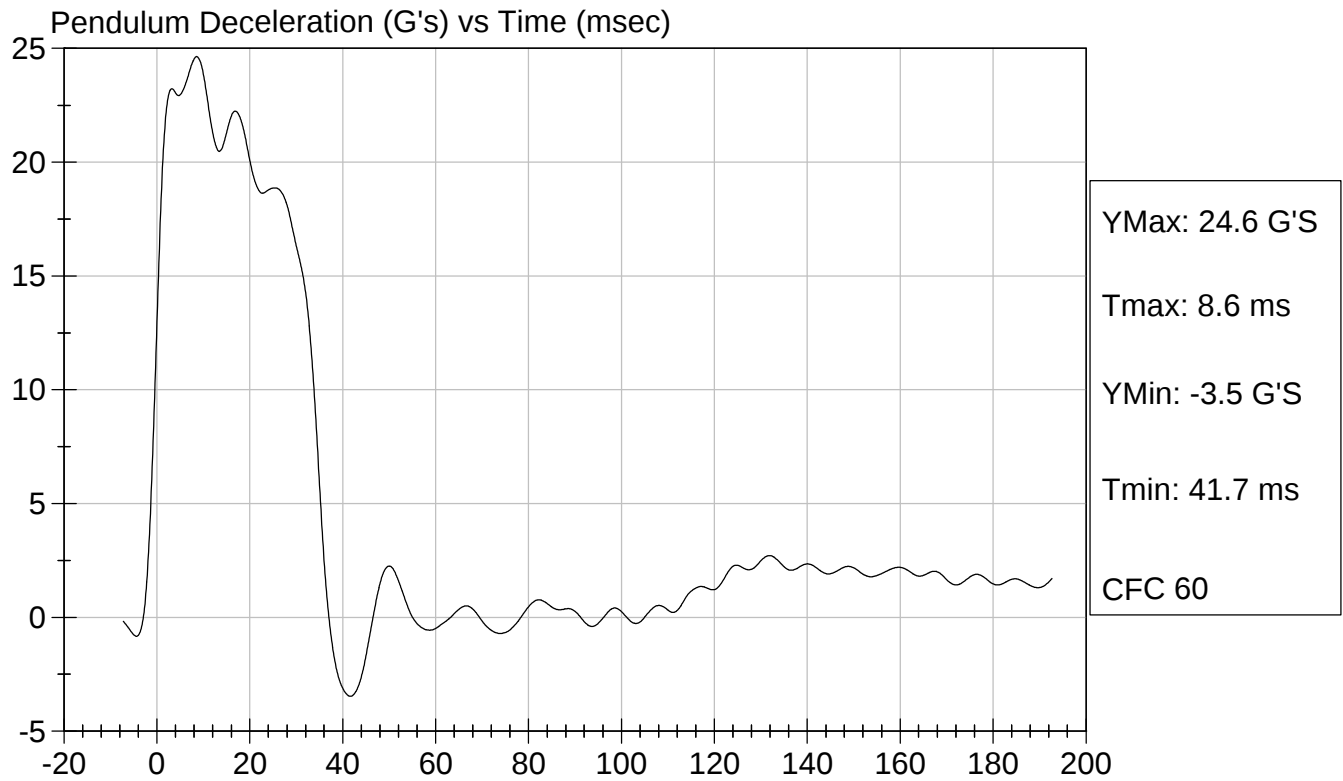
Test Date

Approved By



Test Desc: Neck Flexion
Component ID: D021442

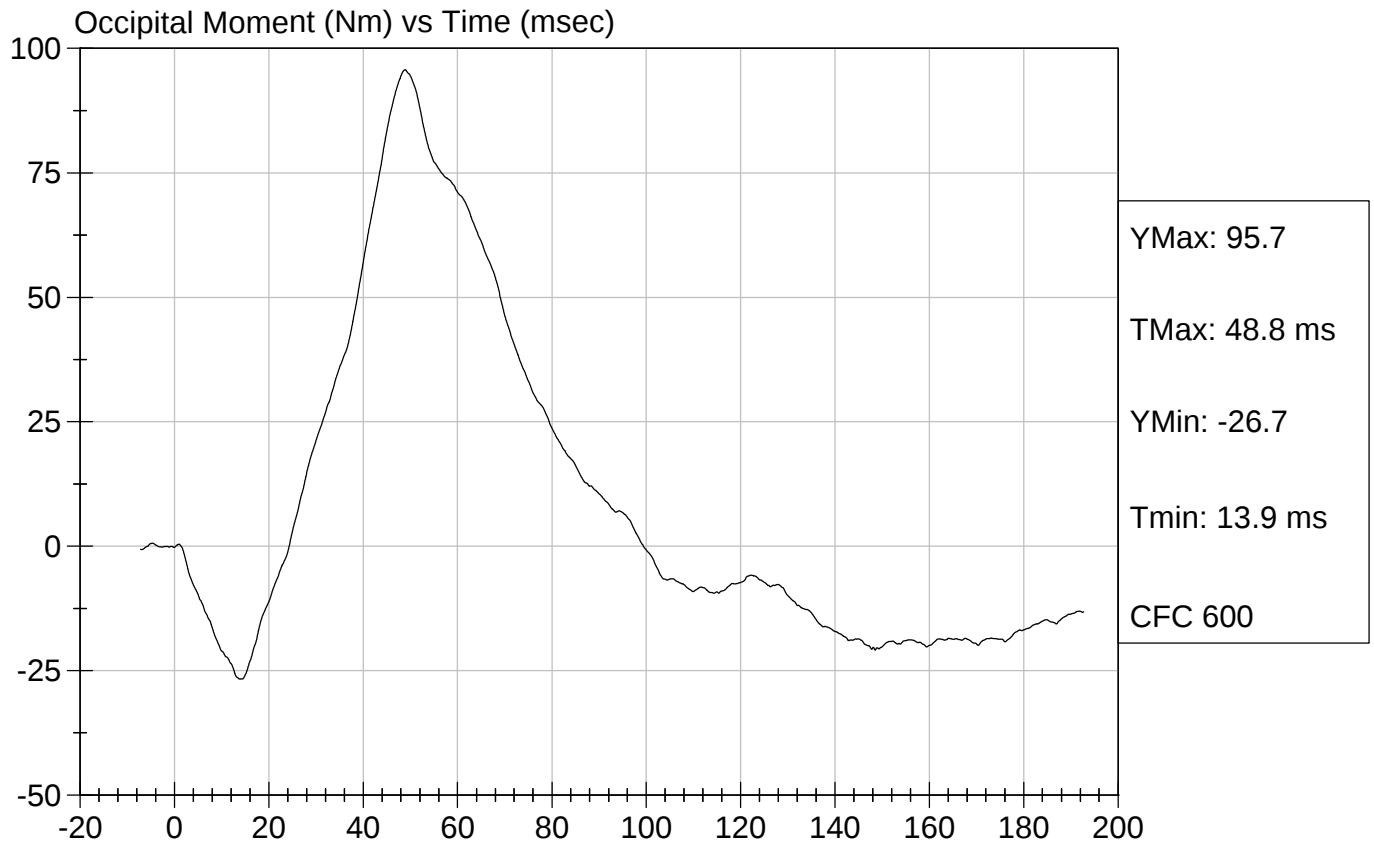
Test Date: 11/08/2002
Speed: 23.12 ft/sec, 7.05 m/sec





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

Laboratory Technician

11/08/2002

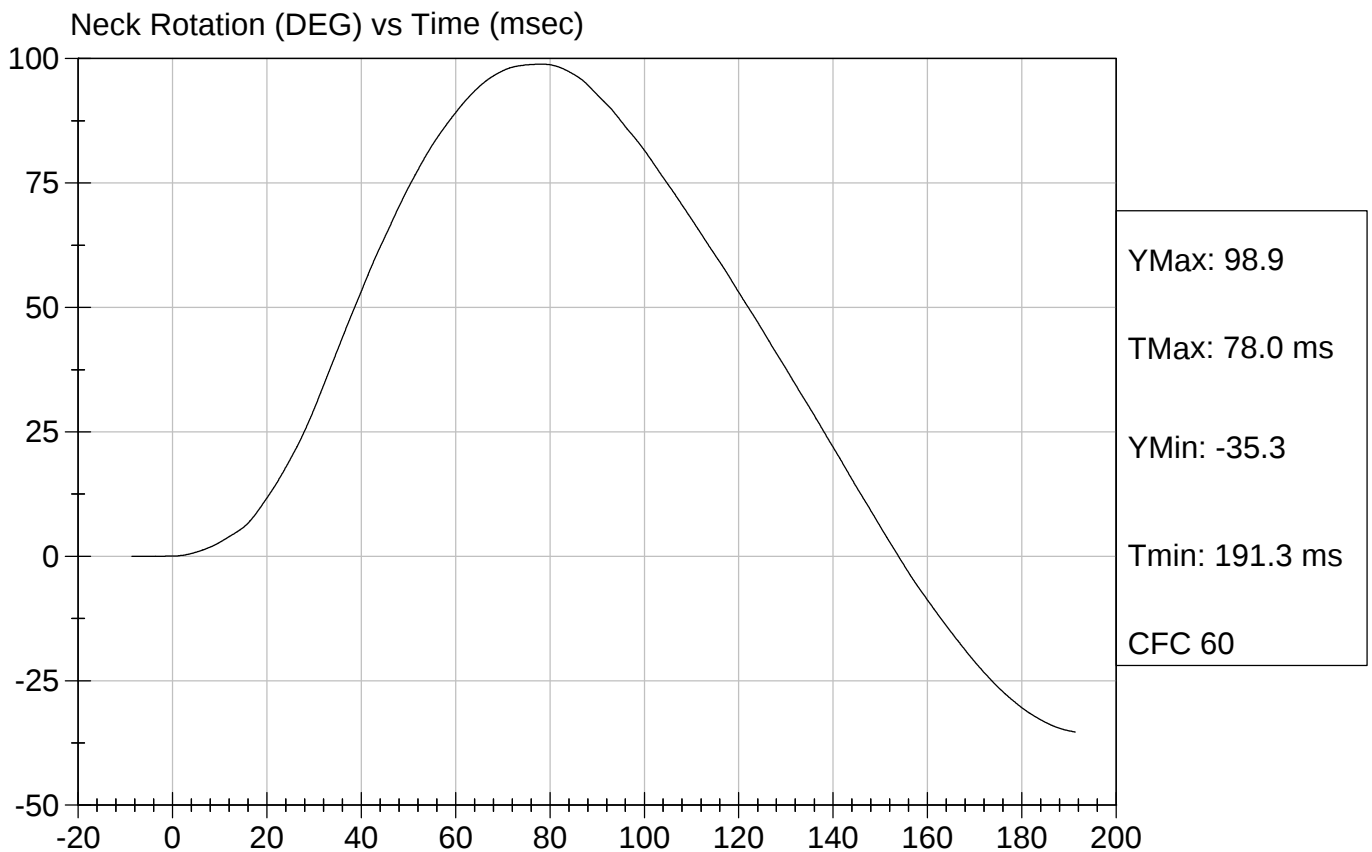
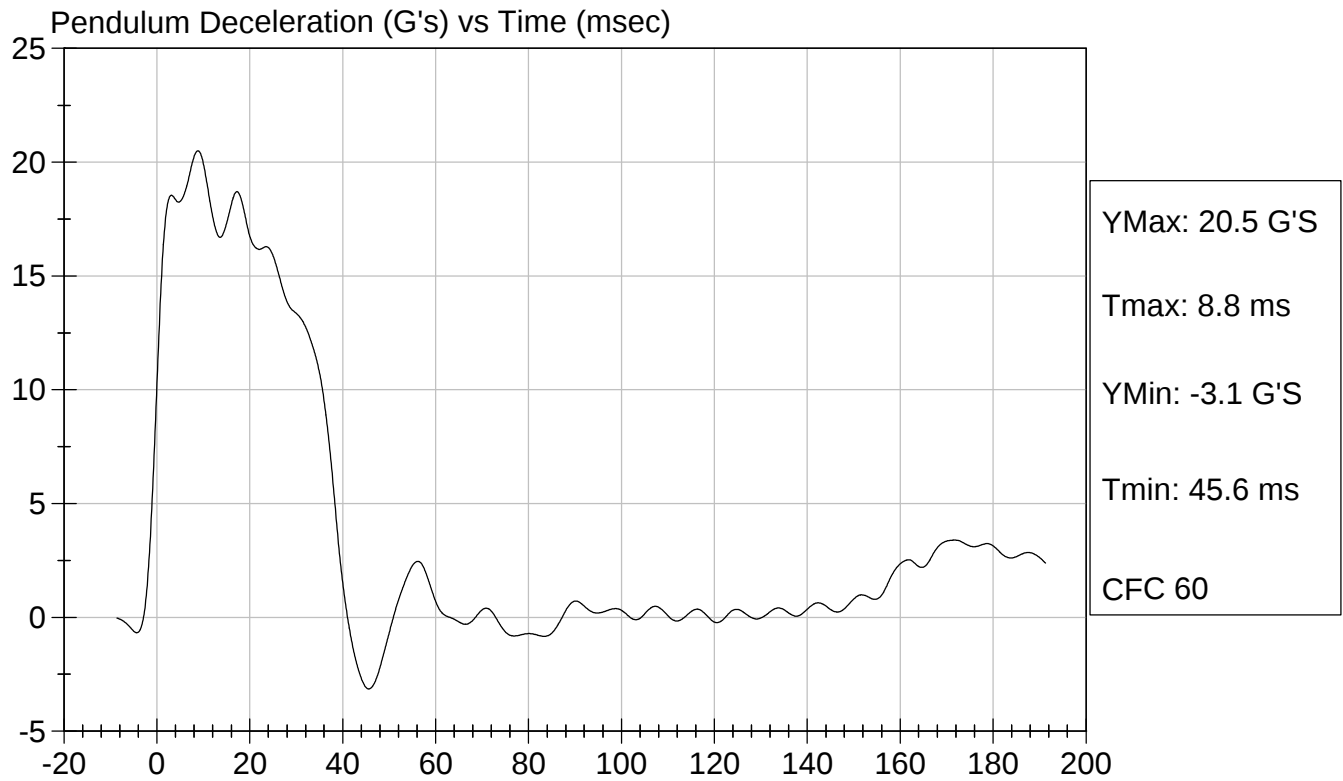
Test Date

Approved By



Test Desc: Neck Extension
Component ID: D021443

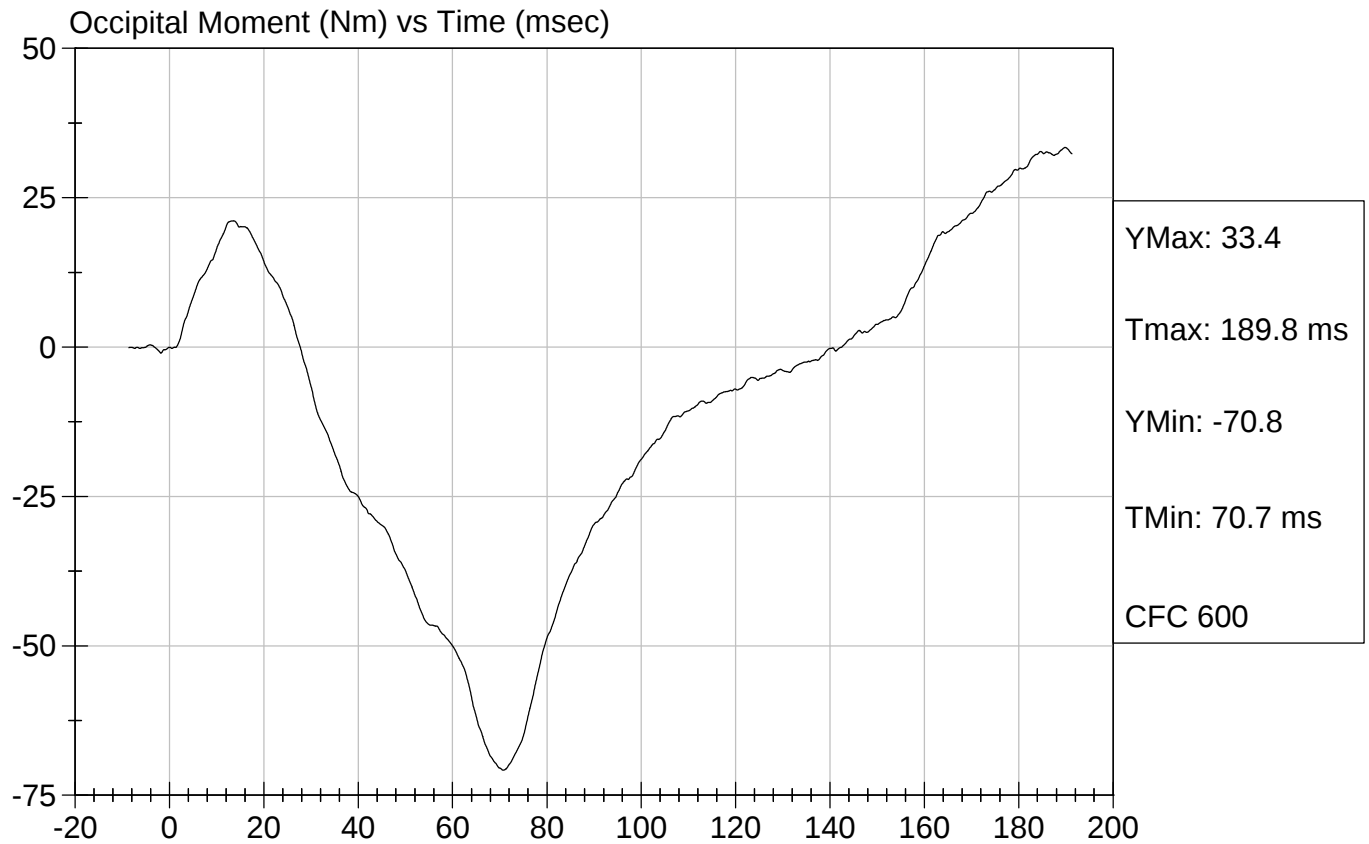
Test Date: 11/08/2002
Speed: 20.11 ft/sec, 6.13 m/sec





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

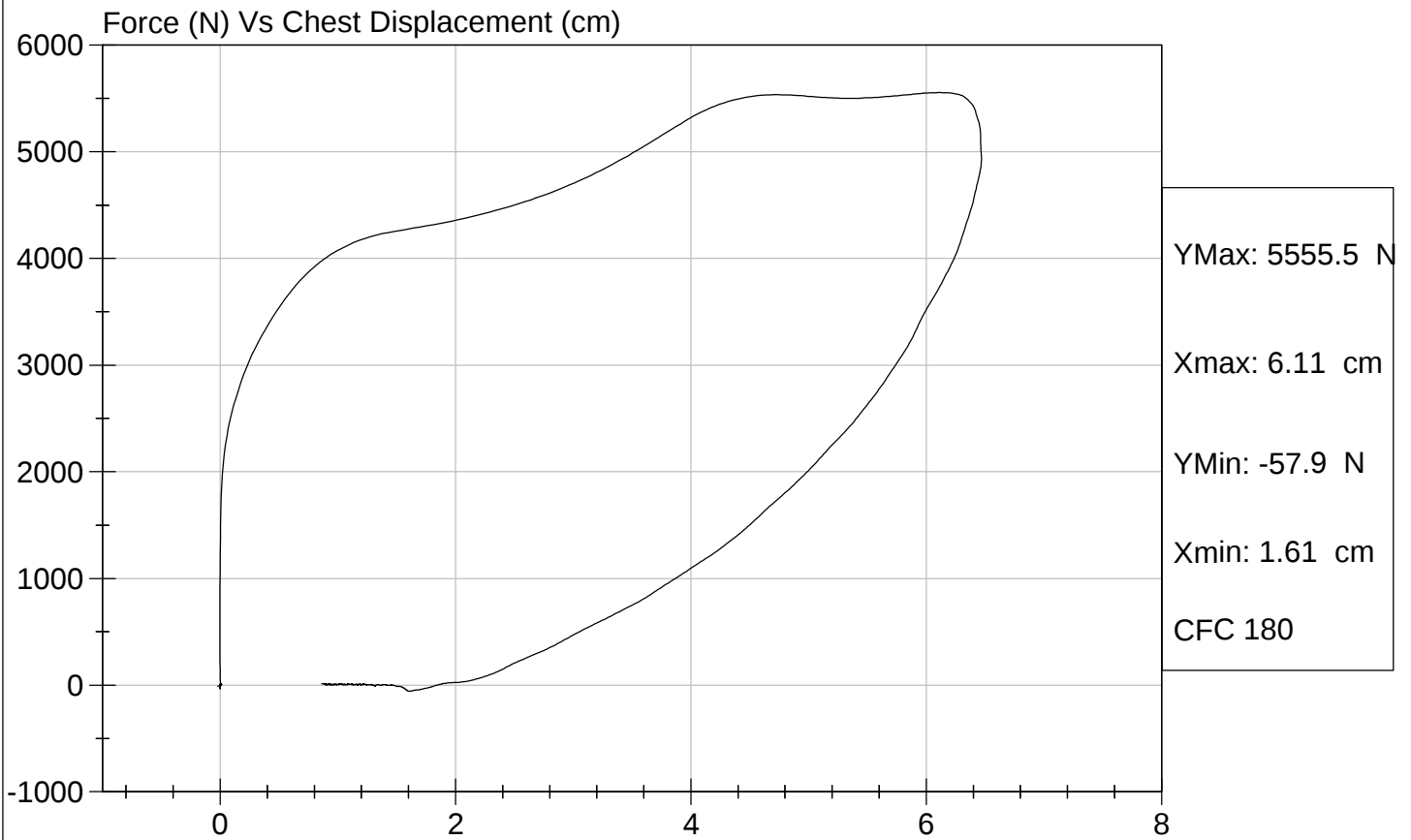


Test Description: Thorax Impact

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

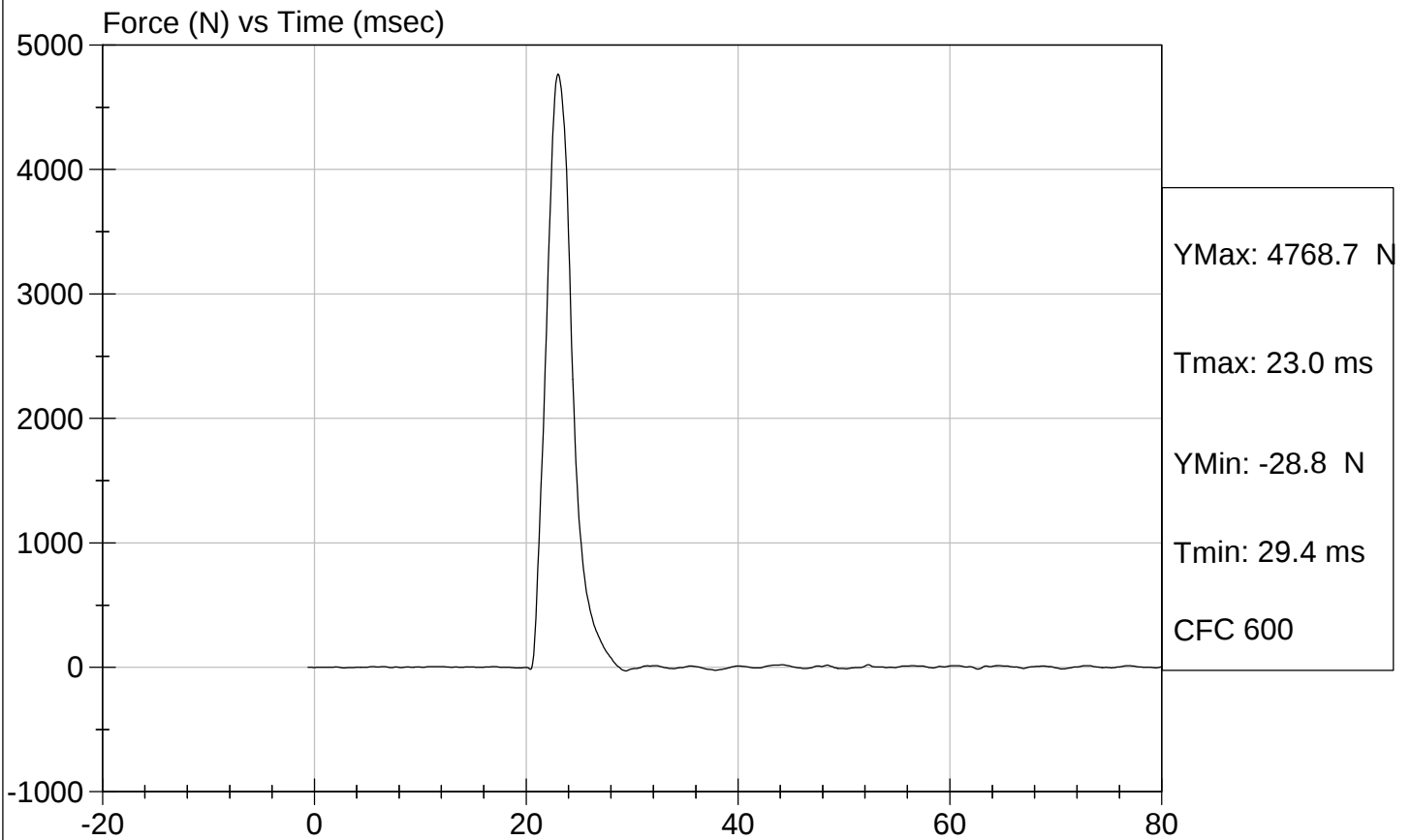


Test Description: Right Knee

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

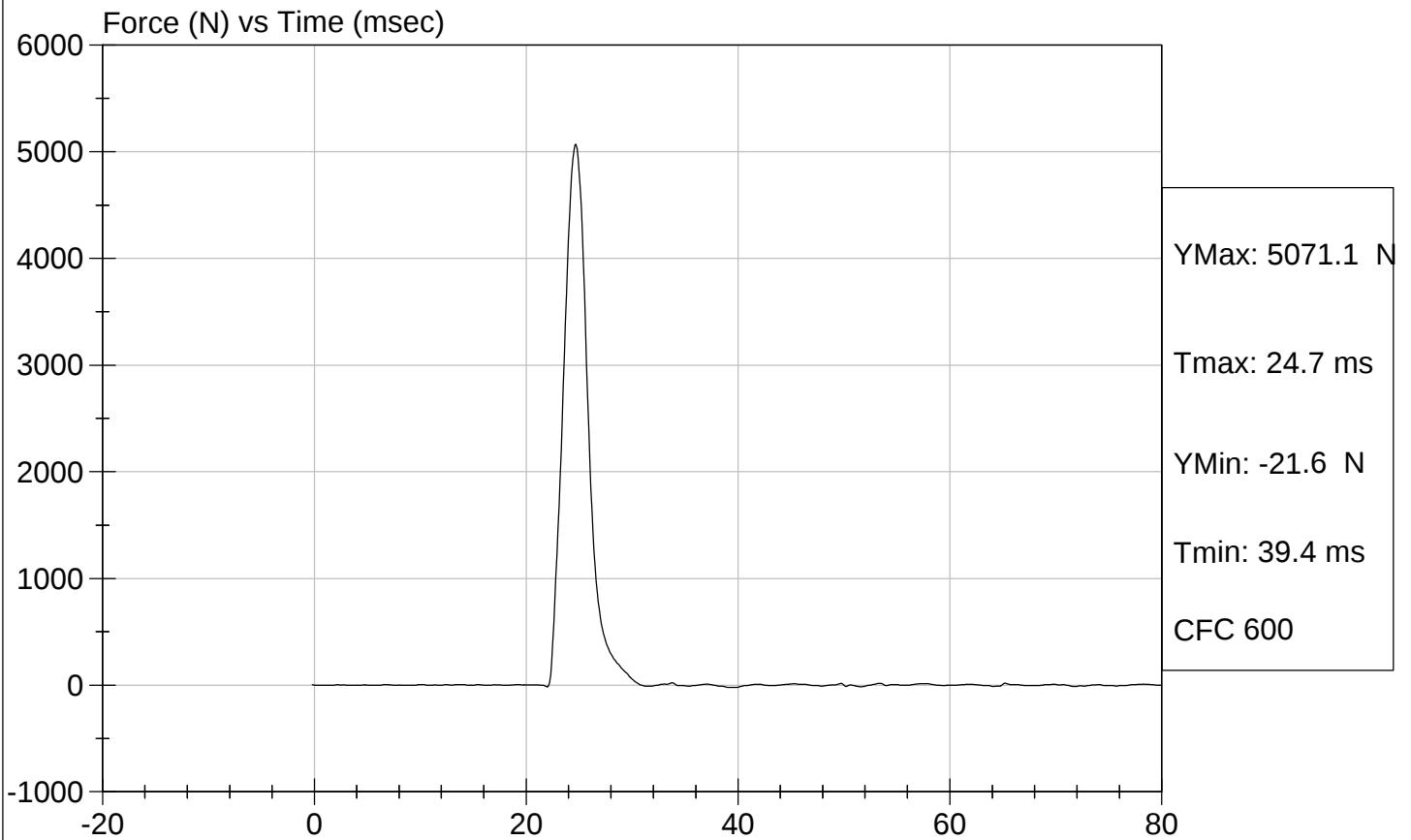


Test Description: Left Knee

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

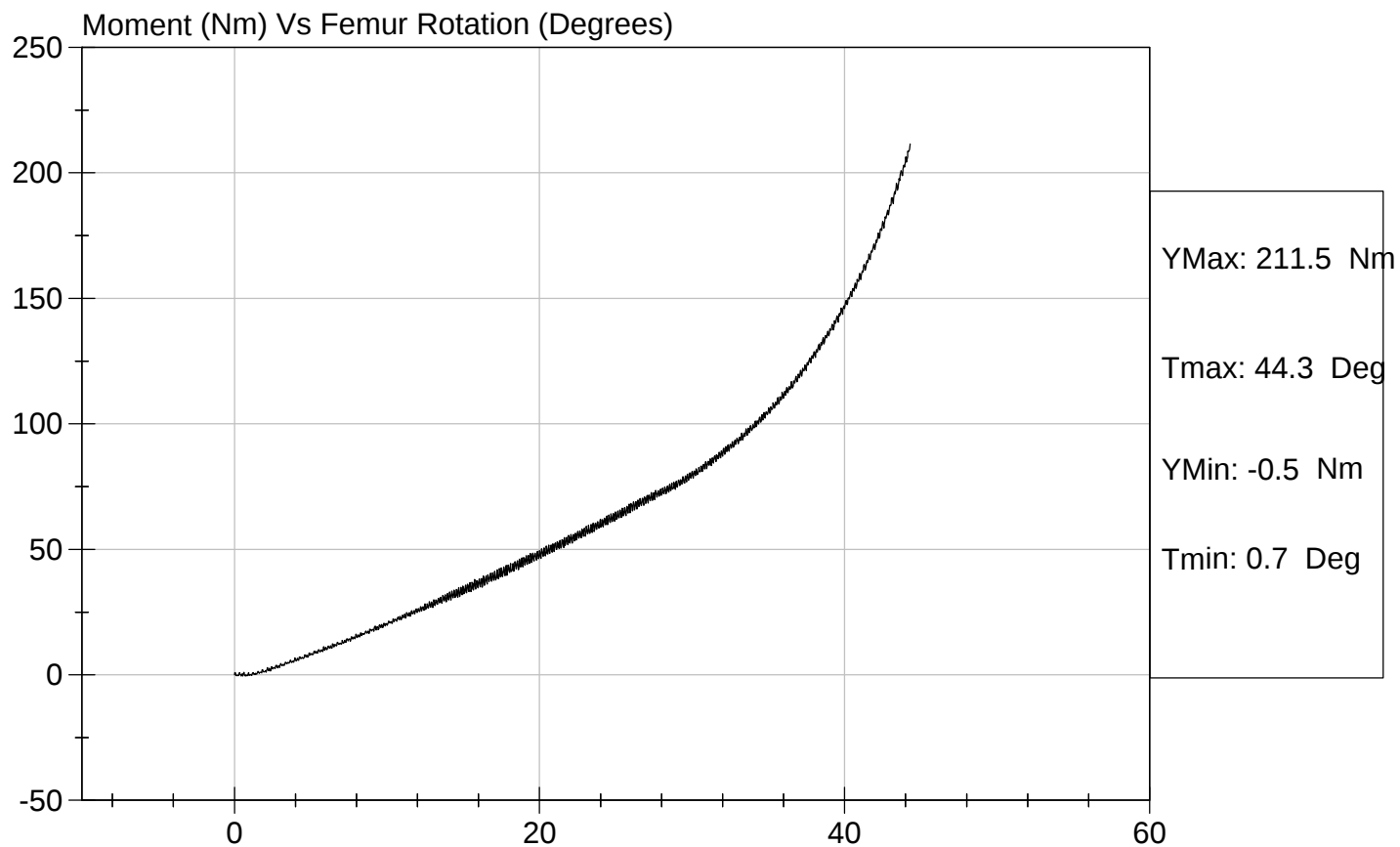


Test Description: Hip Femur Flexion

Test Date: 11/12/2002

Component: D021449

Speed: 0 ft/sec, 0.00 m/sec



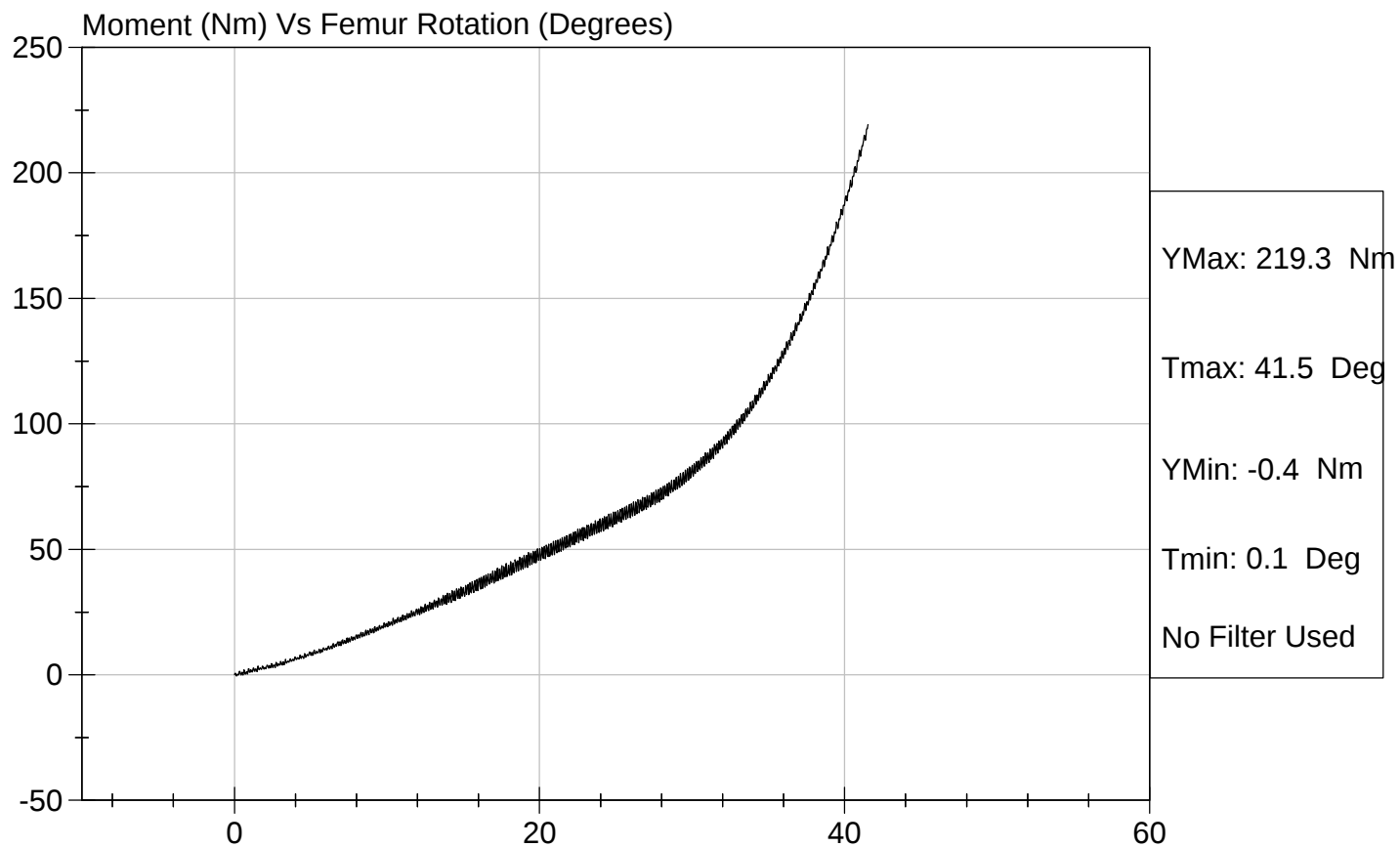


Test Description: Hip Femur Flexion

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	10/14/02
Head Y	J13941	Endevco	10/14/02
Head Z	AAMW5	Endevco	10/14/02
Head X Redundant	J18724	Endevco	10/14/02
Head Y Redundant	J14235	Endevco	10/14/02
Head Z Redundant	AJ5R0	Endevco	10/14/02
Neck Load Cell	442	Denton	9/7/02
Chest X	ACC78	Endevco	10/14/02
Chest Y	ACCE6	Endevco	10/14/02
Chest Z	ACCY3	Endevco	10/14/02
Chest Deflection Gauge	65	Servo	11/12/02
Chest X Redundant	J19927	Endevco	10/14/02
Chest Y Redundant	J20580	Endevco	10/14/02
Chest Z Redundant	J23914	Endevco	10/14/02
Pelvis X	AHTN3	Endevco	10/9/02
Pelvis Y	AH0C3	Endevco	10/9/02
Pelvis Z	AHT12	Endevco	10/9/02
Left Femur Load Cell	256	Denton	11/21/02
Right Femur Load Cell	259	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	6/25/02
Left Ankle X	J23774	Endevco	10/14/02
Left Ankle Z	APYY3	Endevco	10/14/02
Right Foot Z – Front	J18736	Endevco	10/14/02
Right Ankle X	J23946	Endevco	10/14/02
Right Ankle Z	J27513	Endevco	10/14/02

INSTRUMENTS FOR PASSENGER DUMMY NO. 066

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMN8	Endevco	10/14/02
Head Y	ACC61	Endevco	10/14/02
Head Z	ACCW9	Endevco	10/14/02
Head X Redundant	J19884	Endevco	10/14/02
Head Y Redundant	J21988	Endevco	10/14/02
Head Z Redundant	J28986	Endevco	10/14/02
Neck Load Cell	443	Denton	9/18/02
Chest X	ACCY1	Endevco	10/14/02
Chest Y	ACCC8	Endevco	10/14/02
Chest Z	ACCT7	Endevco	10/14/02
Chest Deflection Gauge	66	Servo	11/12/02
Chest X Redundant	J13541	Endevco	10/14/02
Chest Y Redundant	J20093	Endevco	10/14/02
Chest Z Redundant	J19440	Endevco	10/14/02
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	10/14/02
Left Ankle X	J22036	Endevco	10/14/02
Left Ankle Z	J20569	Endevco	10/14/02
Right Foot Z – Front	J20382	Endevco	10/14/02
Right Ankle X	J20165	Endevco	10/14/02
Right Ankle Z	J28708	Endevco	10/14/02

INSTRUMENTS FOR VEHICLE AND LABORATORY

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	H01-N13	Entran	10/30/02
Left Rear Seat Crossmember Z	H01-N12	Entran	10/30/02
Right Rear Seat Crossmember X	H01-N15	Entran	10/30/02
Right Rear Seat Crossmember Z	H05-F05	Entran	10/31/02
Top of Engine X	H01-N11	Entran	10/31/02
Bottom of Engine X	99F18A	Entran	11/4/02
Left Brake Caliper X	99F216	Entran	10/31/02
Right Brake Caliper X	99F238	Entran	11/4/02
Instrument Panel X	H01-N14	Entran	10/31/02

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