

**REPORT NUMBER: NCAP-MGA-2003-005**

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

**2003 Honda Accord 4 Door  
NHTSA NUMBER: M35304**

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



**Test Date: February 11, 2003**

**Report Date: February 24, 2003**

**FINAL REPORT**

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

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

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COTR, NCAP Frontal Impact Program

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Date of Acceptance

### Technical Report Documentation Page

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<b>15. Supplementary Notes</b>																												
<b>16. Abstract</b> A 34.7 mph (55.8 km/h) frontal barrier impact was conducted on a 2003 Honda Accord 4 Door at MGA Research Corporation on February 11, 2003. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 55.8 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum post test static crush is 481 mm located at 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%; margin-top: 10px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Measurement Description</u></th> <th style="text-align: center;"><u>Units</u></th> <th style="text-align: center;"><u>Threshold</u></th> <th style="text-align: center;"><u>Driver ATD</u></th> <th style="text-align: center;"><u>Pass. ATD</u></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">245</td> <td style="text-align: center;">334</td> </tr> <tr> <td>Max. Thorax Accel. (3msec Clip)</td> <td style="text-align: center;">G's</td> <td style="text-align: center;">60</td> <td style="text-align: center;">41</td> <td style="text-align: center;">39</td> </tr> <tr> <td>Left Femur force</td> <td style="text-align: center;">Newton</td> <td style="text-align: center;">10009</td> <td style="text-align: center;">-861</td> <td style="text-align: center;">-3674</td> </tr> <tr> <td>Right Femur force</td> <td style="text-align: center;">Newton</td> <td style="text-align: center;">10009</td> <td style="text-align: center;">-1144</td> <td style="text-align: center;">-1408</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	245	334	Max. Thorax Accel. (3msec Clip)	G's	60	41	39	Left Femur force	Newton	10009	-861	-3674	Right Femur force	Newton	10009	-1144	-1408
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<b>17. Key Words</b>  56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2003 Honda Accord 4 Door NHTSA No: M35304		<b>18. Distribution Statement</b> Copies of this report are available from: National Highway Traffic Safety Admin., Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590																										
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## SECTION 1

### PURPOSE AND SUMMARY OF TEST

#### PURPOSE

This 55.8 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 Honda Accord 4 door at a velocity of 55.8 kph. The test was performed at MGA Research Corporation on February 11, 2003. 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, 50<sup>th</sup> 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 tri-axial 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 142 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 481 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 bolster and steering column. The driver's abdomen contacted the airbag. The passenger's head, chest and abdomen contacted the airbag. The passenger's head contacted the headrest. The passenger's knees contacted the glove box.

The occupant data is summarized below:

ATD position	HIC	Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)	Belt Spool (mm)
Driver	245	41	-22.4	-861	-1144	*
Passenger	334	39	-23.0	-3674	-1408	*

\* Not recorded at vehicle manufacturer's request.

## SECTION 2

### OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003

#### CONVERSION FACTORS USED IN THIS REPORT\*

Quantity	Typical Application	English Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressure	lbf/in <sup>2</sup>	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 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003

**PRIMARY IMPACT DATA**

Measured Parameter	Units	Value
Velocity at Impact	km/hr	55.8
Test Weight	kg	1571.3
Average Rebound	mm	597
Maximum Static Crush	mm	481
Impact Angle	degrees	0.0

**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.	65	66
Head Contact	Airbag, headrest	Airbag, headrest
Chest Contact	Airbag	Airbag
Abdomen Contact	Airbag	Airbag
Left Knee Contact	Knee bolster, steering column	Glovebox
Right Knee Contact	Knee bolster, steering column	Glovebox

**16mm MOVIE COVERAGE**

High Speed	17
Real Time	1
Total	18

Driver ATD Sensors	42
Passenger ATD Sensors	42
Belt Assessment Sensors	2
Vehicle Structure Accelerometers	9
Rigid Barrier Load Cells	6
Total	101

**DATA SHEET NO. 2**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**TEST VEHICLE INFORMATION**

Manufacturer	Honda
Model	Accord
Body Style	Sedan
NHTSA No.	M35304
VIN	1HGCM55103A002847
Color	Gold
Delivery Date	January 17, 2003
Odometer Reading (mile)	161
Dealer	Schlossmann's Honda City
Transmission	Manual
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2.4
Engine Placement	Lateral

**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	No
Power Brakes	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	No
Anti-lock Brakes	Yes
AM/FM/Cassette	Yes
Anti-theft System	Yes
Cruise Control	No

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Honda Of America	GVWR (kg)	1850.7
Date of Manufacture	8/02	GAWR Front (kg)	995.6
		GAWR Rear (kg)	889.1

**DATA FROM TIRE PLACARD**

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	210
Recommended Tire Size	P195/65R15 89H	P195/65R15 89H
Tire Size on Vehicle	P195/65R15 89H	P195/65R15 89H
Tire Manufacturer	Bridgestone	Bridgestone

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	N/A	
Number Of Occupants	2	3	0	5
Capacity Wt. (VCW) (kg)				385
Cargo Wt. (RCLW) (kg)				45.4

**DATA SHEET NO. 2... (continued)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	420.5	268.5		488.1	312.1	
Right	kg	408.2	280.8		458.1	313.0	
Ratio	%	60.1	39.9		60.2	39.8	
Totals	kg	828.7	549.3	1378.0	946.2	625.1	1571.3

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1378.0
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	45.4
Calculated Vehicle Target Weight (TVTW)	kg	1579.4

**TEST VEHICLE ATTITUDES AND CG**

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	705	705	695	692	1093
As Tested	mm	679	689	678	682	1091
Post Test	mm	754	761	682	678	

Vehicle Wheelbase (mm): 2742

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

Vehicle Components Removed: Rear taillights, spare tire, trunk interior, trunk lid, rear bumper and cover, muffler, and both outside mirrors.

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

**FUEL SYSTEM DATA**

Fuel System Capacity From Owner's Manual (L): 64.7

Usable Capacity Figure Furnished by COTR (L): 65.1

Actual Test Volume (L): 60.6

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"? No

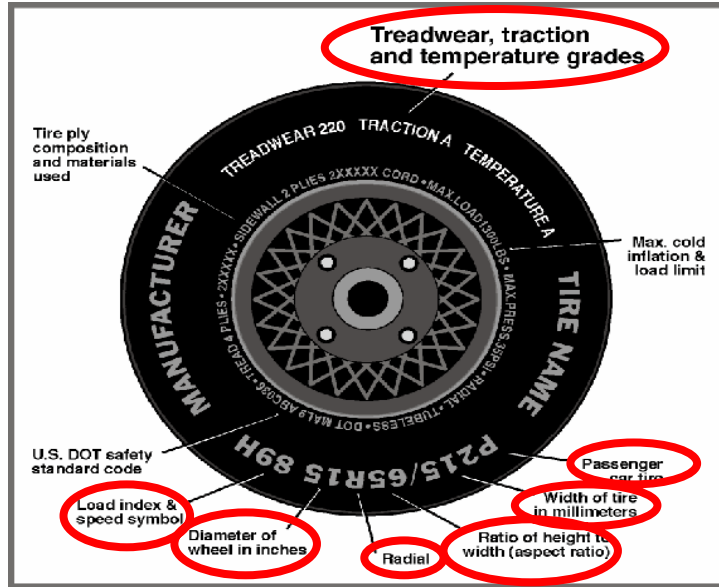
### DATA SHEET NO. 3

### TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

Vehicle Year	2003	Vehicle Make	Honda
VIN	1HGCM55103A002847	Vehicle Model	Accord 4 Door



	Front	Rear
Tire Manufacturer	Bridgestone	Bridgestone
Tire Name	Turanza	Turanza
Tire Type	Passenger	Passenger
Tire Width (mm)	215	215
Ratio of Height to Width (aspect ratio)	65%	65%
Radial	Yes	Yes
Wheel Diameter	15	15
Load Index & Speed Symbol	89H	89H
Treadwear	300	300
Traction Grade	A	A
Temperature Grade	A	A

**DATA SHEET NO. 4**  
**POST IMPACT DATA**

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.5 – 57.1	55.8
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	55.8
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	4494	4219	275
Center	mm	4813	4332	481
Right Side	mm	4496	4189	307

**VEHICLE REBOUND FROM BARRIER**

Measured Parameter	Units	Value
Left Side	mm	598
Center	mm	552
Right Side	mm	640
Average	mm	597

**DATA SHEET NO. 5**  
**TEST VEHICLE INFORMATION**

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

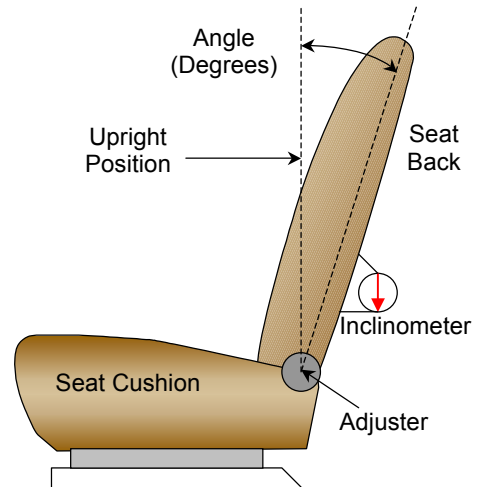
NHTSA No.: M35304  
Test Date: 02/11/2003

**NORMAL DESIGN RIDING POSITION**

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: 4 detents rearward from the first locking detent

Driver seat back angle: 12.4 deg on headrest post

Passenger seat back angle: 12.8 deg on headrest post



*FRONT SEAT ASSEMBLY*

**SEAT FORE/AFT POSITIONS**

Position the seat in the mechanical mid position. The driver and passenger are manual adjustable seats.

Driver seat fore/aft total travel: 25 notches

Passenger seat fore/aft total travel: 25 notches

Driver seat fore/aft position: 13th notch

Passenger seat fore/aft position: 13th notch

**SEAT BELT UPPER ANCHORAGE**

The front outboard D-rings were adjusted to the full up position.

## DATA SHEET NO. 5... (continued)

### TEST VEHICLE INFORMATION

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003

### FUEL TANK CAPACITY DATA

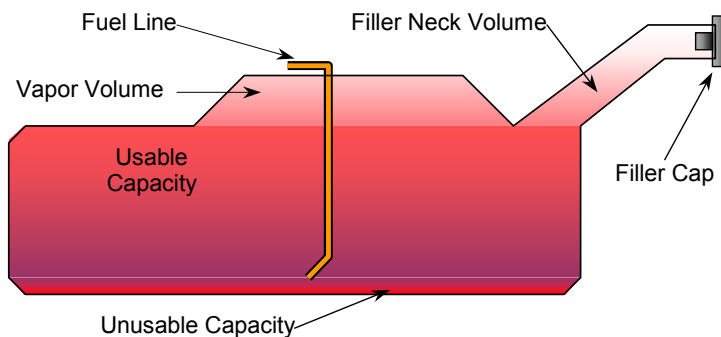
The "Usable Capacity" of the standard equipment fuel tank is: 64.7 liters

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

The "Usable Capacity" used for certification to FMVSS 301 requirements: 65.1 liters

Actual amount of Stoddard solvent added to vehicle for certification test: 60.6 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

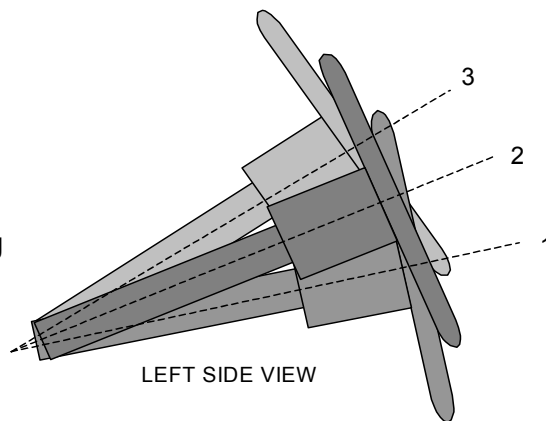
### STEERING COLUMN ADJUSTMENT

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: 18.7°

Geometric center, position 2: 21.9°

Uppermost, position 3: 25.1°



STEERING COLUMN ASSEMBLY

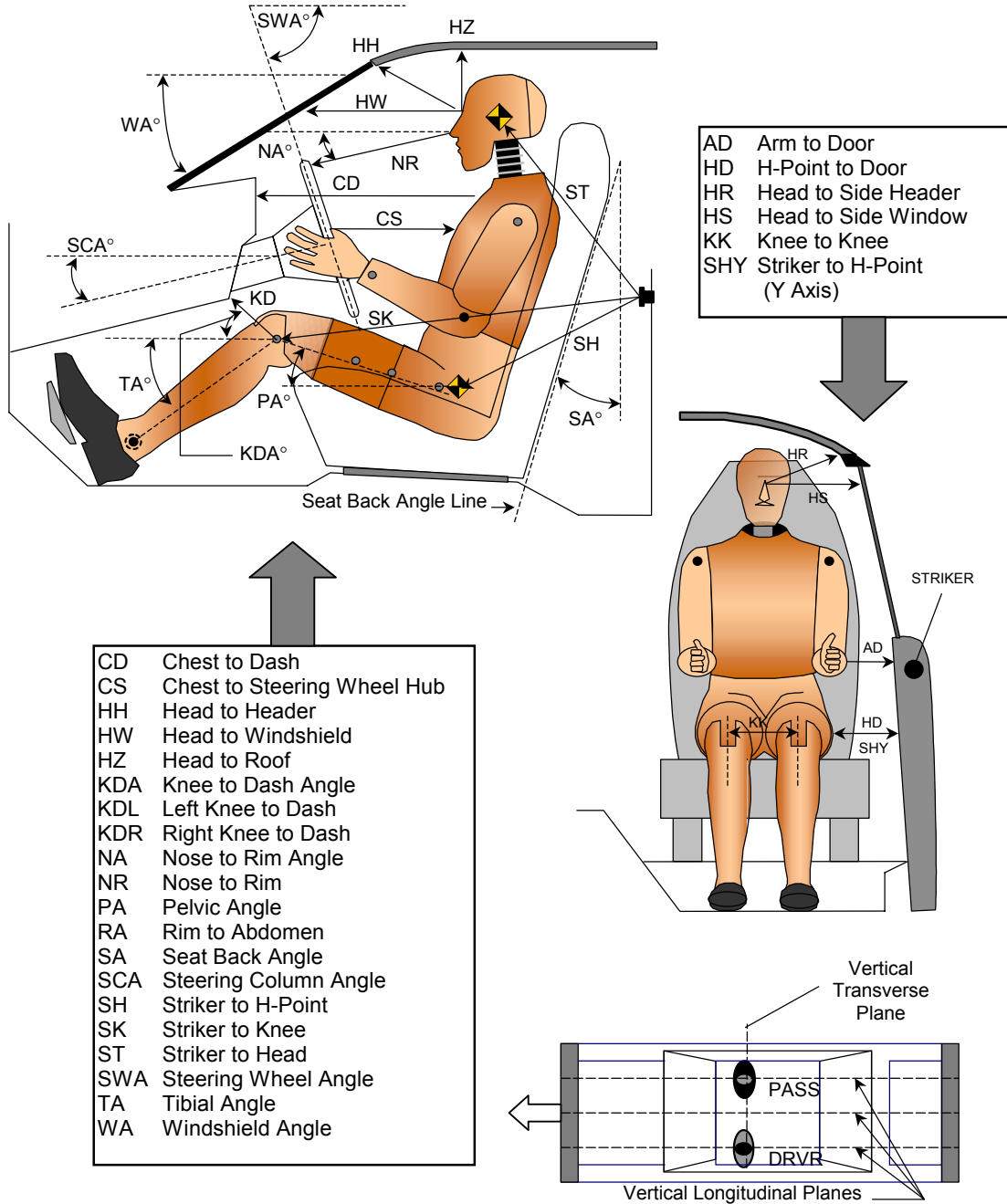
# DATA SHEET NO. 6

## DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

### DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



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

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

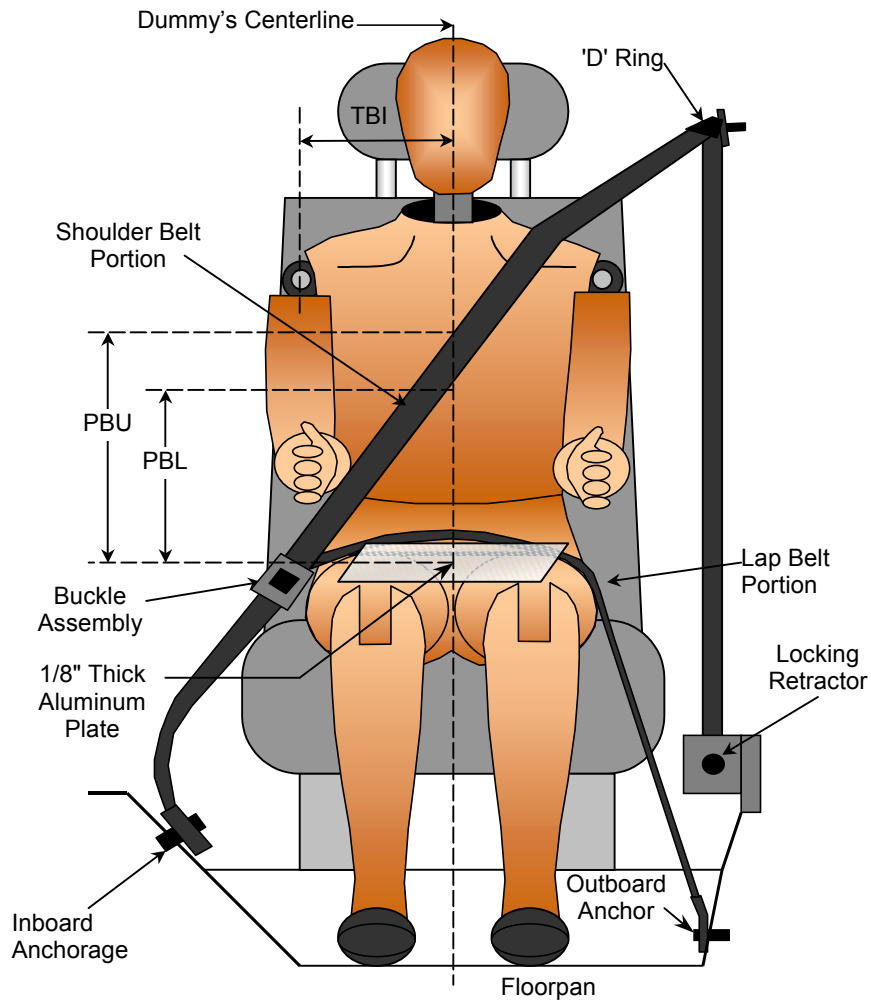
**TEST DUMMY POSITION MEASUREMENTS**

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		26.7		
SWA	Steering Wheel Angle		68.1		
SCA	Steering Column Angle		22.0		
SA	Seat Back Angle (Measured on headrest post)		12.4		12.8
HZ	Head to Roof (Z)	186	90	166	90
HH	Head to Header	355	20.6	336	19.5
HW	Head to Windshield	636	0	597	0
HR	Head to Side Header (Y)	210		191	
NR	Nose to Rim	400	13.5		
CD	Chest to Dash	521		551	
CS	Chest to Steering Hub	328	10.9		
RA	Rim to Abdomen	192	0		
KDL	Left Knee to Dash	210	0	179	
KDR	Right Knee to Dash	189		228	0
PA	Pelvic Angle		23.3		24.3
TA	Tibia Angle		37.9		37.5
KK	Knee to Knee (Y)	323		285	
SK	Striker to Knee	601	95.1	603	92.1
ST	Striker to Head	525	9.7	518	10.5
SH	Striker to H-Point	241	106.5	241	120.4
SHY	Striker to H-Point (Y)	266		250	
HS	Head to Side Window	323		296	
HD	H-Point to Door (Y)	144		136	
AD	Arm to Door (Y)	126		118	
AA	Ankle to Ankle	351		222	

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

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003



**SEAT BELT POSITIONING MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	170	170
PBU - Top surface of reference to belt upper edge	mm	360	349
PBL - To surface of reference to belt lower edge	mm	280	254

**DATA SHEET NO. 8**

**VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

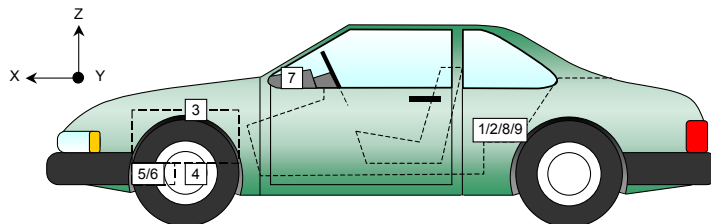
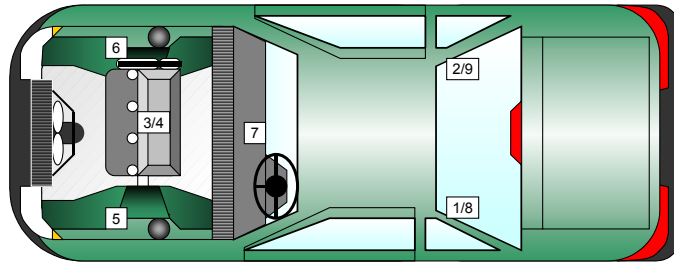
**VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS**

No.	Accelerometer Location	Measurements (mm)			Peak Values				
		X	Y	Z	Units	Max	Time	Min	Time
1	Left Rear X-Member X	1860	-498	360	G's	3.2	118	-35.4	57
2	Right Rear X-Member X	1860	498	360	G's	3.7	118	-31.2	70
3	Engine Top X	3952	0	864	G's	25.8	49	-162.4	33
4	Engine Bottom X	4055	65	165	G's	29.2	57	-134.6	37
5	Left Brake Caliper X	3930	-672	260	G's	*	*	*	*
6	Right Brake Caliper X	3930	672	260	G's	18.8	25	-96.6	35
7	Instrument Panel X	3178	0	1055	G's	**	**	**	**
8	Left Rear X-Member Z	1860	-498	360	G's	4.6	104	-12.6	44
9	Right Rear X-Member Z	1860	498	360	G's	4.6	101	-12.5	45

\*- no valid data collected after 53 msec.

\*\* - no valid data collected

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 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**HEAD PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	1.0	200	-37.8	68	1.5	200	-46.3	79
Head CG	Y	G's	3.4	43	-1.7	26	4.2	57	-2.2	97
Head CG	Z	G's	16.0	43	-6.0	86	17.7	52	-0.8	18
Head CG Resultant	N/A	G's	38.5	68			46.8	79		

**CHEST PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.7	128	-40.0	77	1.4	150	-39.1	85
Chest CG	Y	G's	3.0	110	-4.1	44	2.7	36	-8.7	87
Chest CG	Z	G's	5.6	29	-15.5	85	5.7	42	-10.9	84
Chest CG Resultant	N/A	G's	41.8	77			40.8	85		

**FEMUR PEAK FORCES**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	1307	57	-861	20	949	48	-3674	58
Right Femur	Z	Newtons	1016	50	-1144	66	824	53	-1408	37

**SEAT BELT SENSOR PEAK VALUES**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	7026	62			5732	60		
Shoulder Belt Force	N/A	Newtons	*	*			*	*		

\* Not recorded at manufacturers request

**HEAD INJURY CRITERIA (HIC)**

Location	Driver				Passenger			
	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>
Head CG Primary	245.1	34.1	48.3	84.3	334.1	38.6	58.7	94.7

**CHEST CLIP (3MSEC)**

Location	Driver			Passenger		
	CLIP	T <sup>1</sup>	T <sup>2</sup>	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Primary	40.9	74.9	77.9	39.1	83.3	86.3

**DATA SHEET NO. 9... (continued)**

**HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**PELVIC PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	4.7	200	-41.5	64	1.7	195	-47.0	62
Pelvis	Y	G's	10.5	92	-7.9	27	6.8	54	-8.1	81
Pelvis	Z	G's	17.8	122	-35.7	78	2.4	200	-30.7	84

**UPPER NECK PEAK FORCES AND MOMENTS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	414	67	-357	107	119	72	-442	57
Neck Force	Y	Newtons	65	85	-47	44	76	56	-64	108
Neck Force	Z	Newtons	1196	48	-84	87	1048	58	-52	19
Neck Moment	X	N•m	4.1	169	-8.2	82	10.5	84	-5.7	133
Neck Moment	Y	N•m	40.1	64	-27.3	100	26.1	129	-24.4	57
Neck Moment	Z	N•m	3.1	115	-2.9	51	2.3	109	-4.4	71

**FOOT PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	5.0	30	-36.2	20	15.7	62	-47.8	53
Left Foot Aft	Z	G's	1.0	113	-41.3	19	1.5	200	-72.4	36
Left Foot Fore	Z	G's	11.3	22	-94.2	19	73.4	28	-97.9	20
Right Foot Aft	X	G's	20.5	34	-57.4	38	5.7	36	-36.7	29
Right Foot Aft	Z	G's	1.0	200	-63.8	34	1.9	27	-65.9	37
Right Foot	Z	G's	47.8	61	-204.4	34	49.1	28	-88.0	20

**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	8.6	59	-7.8	82	24.8	63	-4.5	32
Left Lower Moment	Y	N•m	8.6	26	-18.4	50	51.6	36	-32.4	52
Left Lower Force	Z	Newton	106	127	-2256	19	59	173	-5233	36
Left Upper Moment	X	N•m	25.8	112	-27.4	78	66.7	63	-18.2	149
Left Upper Moment	Y	N•m	19.0	200	-66.9	20	21.1	99	-94.0	36
Left Upper Force	Z	Newton	90	127	-1909	19	51	120	-3990	36
Right Lower Moment	X	N•m	38.2	65	-26.3	39	6.6	69	-8.3	49
Right Lower Moment	Y	N•m	86.6	69	-24.0	50	47.3	37	-20.9	58
Right Lower Force	Z	Newton	48	135	-2676	38	134	133	-4273	37
Right Upper Moment	X	N•m	24.3	150	-52.1	40	12.7	161	-23.8	112
Right Upper Moment	Y	N•m	20.9	199	-85.1	37	40.7	110	-95.2	37
Right Upper Force	Z	Newton	33	140	-2148	38	107	122	-3498	37

**DATA SHEET NO. 9... (continued)**

**HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**CHEST PEAK DISPLACEMENTS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	mm			-22.4	80			-23.0	79

**HEAD REDUNDANT PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	1.0	200	-37.5	67	1.7	200	-45.9	79
Head CG	Y	G's	3.1	43	-1.9	37	4.7	75	-1.8	127
Head CG	Z	G's	16.0	48	-6.0	86	17.1	51	-0.9	18
Head CG	N/A	G's	38.5	67			46.5	79		

**CHEST REDUNDANT PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.8	128	-39.6	77	1.5	149	-39.0	85
Chest CG	Y	G's	3.1	109	-4.7	44	2.7	36	-8.9	87
Chest CG	Z	G's	5.9	26	-15.1	84	5.9	42	-10.8	84
Chest CG	N/A	G's	41.5	77			40.6	85		

**REDUNDANT HEAD INJURY CRITERIA (HIC)**

Location	Driver				Passenger			
	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>
Head CG Primary Redundant	245.4	34.1	48.2	84.2	325.4	38.2	58.9	94.9

**REDUNDANT CHEST CLIP (3MSEC)**

Location	Driver			Passenger		
	CLIP	T <sup>1</sup>	T <sup>2</sup>	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Primary Redundant	40.3	75.1	78.1	38.9	83.3	86.3

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

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**SEAT BELT PLACEMENT MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	170	170
PBU - Top surface of reference to belt upper edge	mm	360	349
PBL - Top surface of reference to belt lower edge	mm	280	254

**BELT LENGTH DATA**

Measurement Description	Units	Driver	Passenger
Retractor reel to "D" ring	mm	156	156
Shoulder belt length as measured on ATD	mm	892	905
Lap belt length as measured on ATD	mm	868	870
Remainder of belt on reel	mm	1289	1283
Total belt length for continuous webbing systems	mm	3205	3214

**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 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**Windshield Mounting Details:**

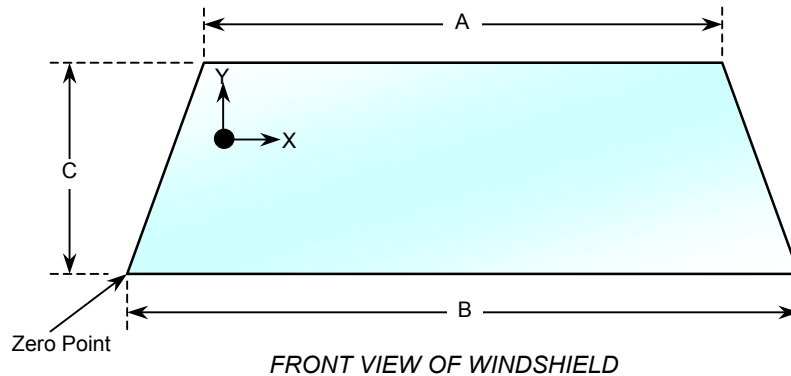
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21 °C

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2135	2135	100
Right Side	2155	2155	100
Total	4290	4290	100



**WINDSHIELD DIMENSIONS**

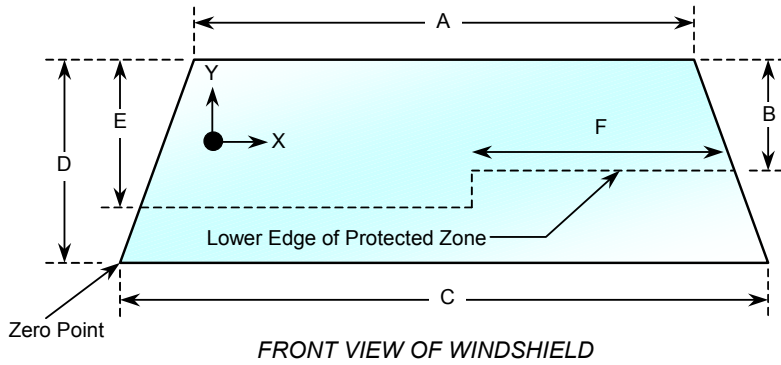
Item	Units	Segment Length	Molding Width
A	mm	1150	16
B	mm	1484	22
C	mm	828	12

**DATA SHEET NO. 12**

**WINDSHIELD ZONE INTRUSION FMVSS 219 (Partial) DATA**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003



Item	Units	Value
A	mm	1150
B	mm	440
C	mm	1484
D	mm	828
E	mm	547
F	mm	512

**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 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003

Temperature at Time of Impact: 21° C      Test Time: 12:37 pm

**Stoddard Solvent Spillage Measurements**

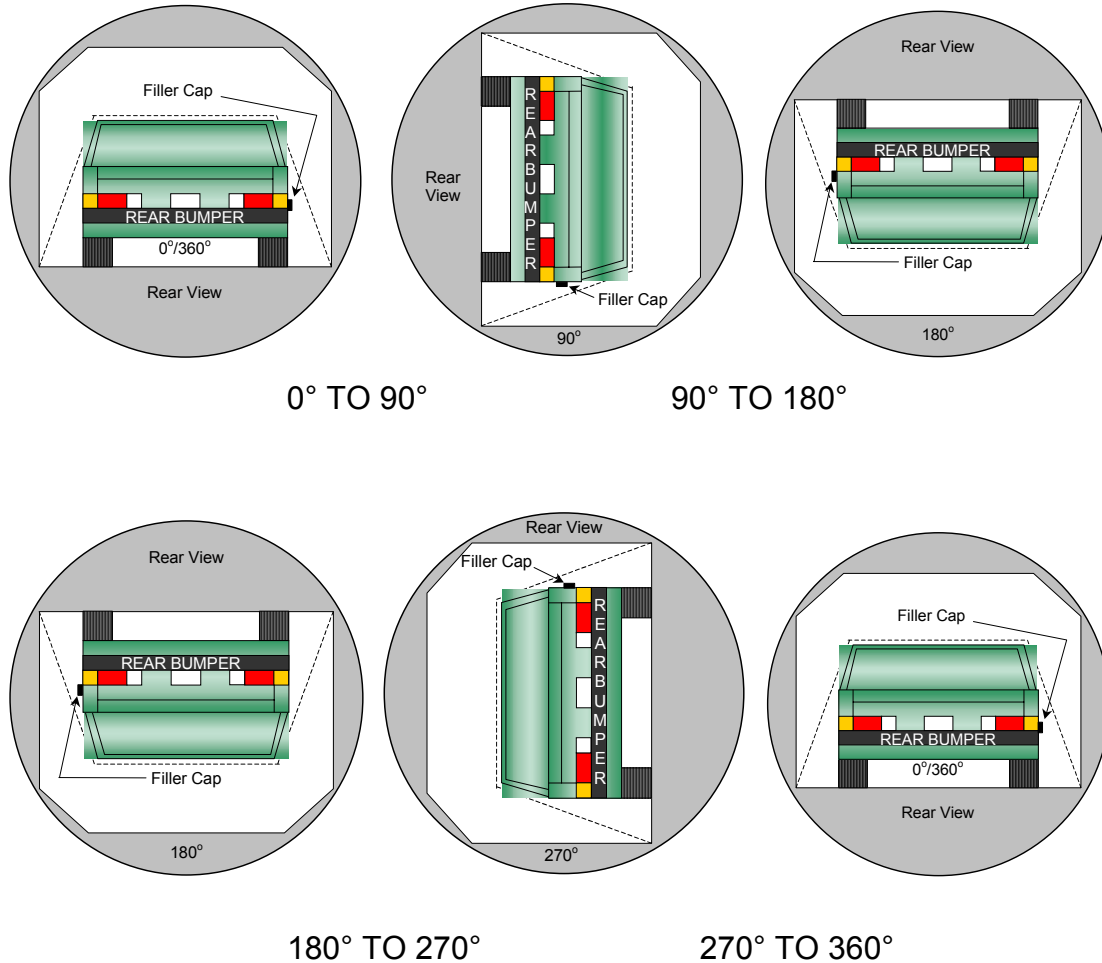
- A. From impact until vehicle motion ceases: 0 oz.  
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0 oz.  
(Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0 oz.  
(Maximum Allowable = 1 oz./minute)
- D. Spillage : None

**DATA SHEET NO. 14**  
**FMVSS 301 STATIC ROLLOVER DATA**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

Test Time: 12:37 pm



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage locations: None

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° TO 90°	166	300	0
90° TO 180°	151	300	0
180° TO 270°	145	300	0
270° TO 360°	165	300	0

**DATA SHEET NO. 15**  
**VEHICLE MEASUREMENTS**

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003

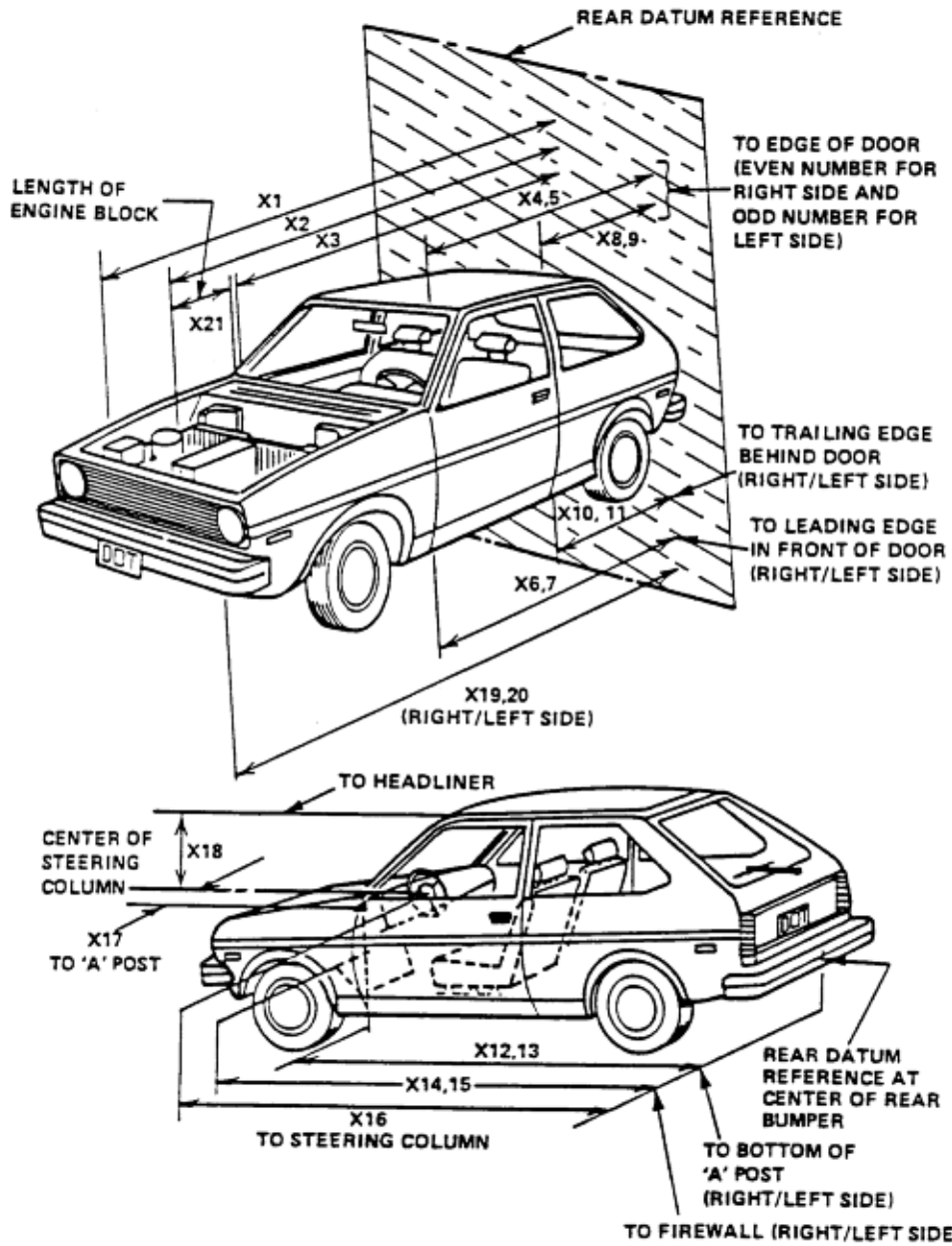
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4813	4332	481
2	RSOV to front of engine	mm	4278	4032	246
3	RSOV to firewall centerline	mm	3708	3720	-12
4	RSOV to leading edge of right door	mm	3319	3307	12
5	RSOV to leading edge of left door	mm	3312	3310	2
6	RSOV to lower leading edge of right door	mm	3320	3310	10
7	RSOV to lower leading edge of left door	mm	3316	3317	-1
8	RSOV to upper leading edge of right door	mm	2174	2174	0
9	RSOV to upper leading edge of left door	mm	2162	2177	-15
10	RSOV to lower trailing edge of right door	mm	2183	2177	6
11	RSOV to lower trailing edge of left door	mm	2179	2181	-2
12	RSOV to bottom of right 'A' pillar	mm	3315	3315	0
13	RSOV to bottom of left 'A' pillar	mm	3310	3311	-1
14	RSOV to firewall on right side	mm	3722	3727	-5
15	RSOV to firewall on left side	mm	3700	3731	-31
16	RSOV to steering column	mm	2804	2813	-9
17	Center of steering column to left 'A' pillar	mm	394	339	55
18	Center of steering column to headlining	mm	420	356	64
19	RSOV to right side of front bumper	mm	4496	4189	307
20	RSOV to left side of front bumper	mm	4494	4219	275
21	Length of engine block	mm	475	475	0
RD	RSOV to right side of dash panel	mm	3008	3007	1
CD	RSOV to center of dash panel	mm	2995	2971	24
LD	RSOV to left side of dash panel	mm	3007	3014	-7

DATA SHEET NO. 15...(continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003



**DATA SHEET NO. 15... (continued)****VEHICLE MEASUREMENTS**Test Vehicle: 2003 Honda Accord 4 DoorNHTSA No.: M35304Test Program: 35mph Frontal ImpactTest Date: 02/11/2003**Target Vehicle Structural Measurement**

	Elements	Pre-Test (mm)
1	Total Length	4813
2	Total Width	1824
3	Bumper Top Height	525
4	Bumper Bottom Height	405
5	Longitudinal Member Top Height	489
6	Distance between Longitudinal Members	1131
7	Longitudinal Member Width	84
8	Engine Top Height	810
9	Engine Bottom Height	173
10	Engine and gearbox width	920
11	Front bumper-engine distance	425
12	Front shock absorber fixing height	820
13	Bonnet leading edge height	636
14	Front shock absorber fixing width	963
15	Front bumper – front axle distance	1020
16	Front axle – a pillar distance	398
17	A-pillar – B-pillar distance	1147
18	B-Pillar – rear axle distance	1135
19	B-pillar – C-pillar distance	1098
20	Roof sill bottom height	1365
21	Roof sill top height	1408
22	Floor sill bottom height	319
23	Floor sill top height	343

**DATA SHEET NO. 16**  
**CAMERA LOCATIONS**

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				18	32
2	Left Front View	1000	-8000	1580	25	1042
3	Steering Column Top	2000	-7530	1560	25	1015
4	Steering Column Bottom	2000	-7530	1030	25	1005
5	Driver Close-up	-1500	-8900	1500	35	873
6	Driver Angle	4600	-5000	7020	50	1093
7	Left Rear				13	513
8	Right Rear				13	513
9	Right Overall	2370	8000	1460	13	995
10	Right Passenger Half	1000	8000	1620	25	939
11	Right Close-up	1230	8600	1440	50	830
12	Right Angle	4600	450	2710	50	1058
13	Windshield	450	0	2710	13	1000
14	Top Driver	-100	-430	1600	13	1010
15	Top Passenger	-100	480	1600	13	513
16	Pit Front	1040	0	-3220	13	1020
17	Pit Rear	3380	0	-3220	13	1026
18	Left Front	650	-8800	1560	25	500

\*COORDINATES:

- +X = film plane rearward of barrier
- +Y = film plane to right of monorail centerline
- +Z = film plane above ground level

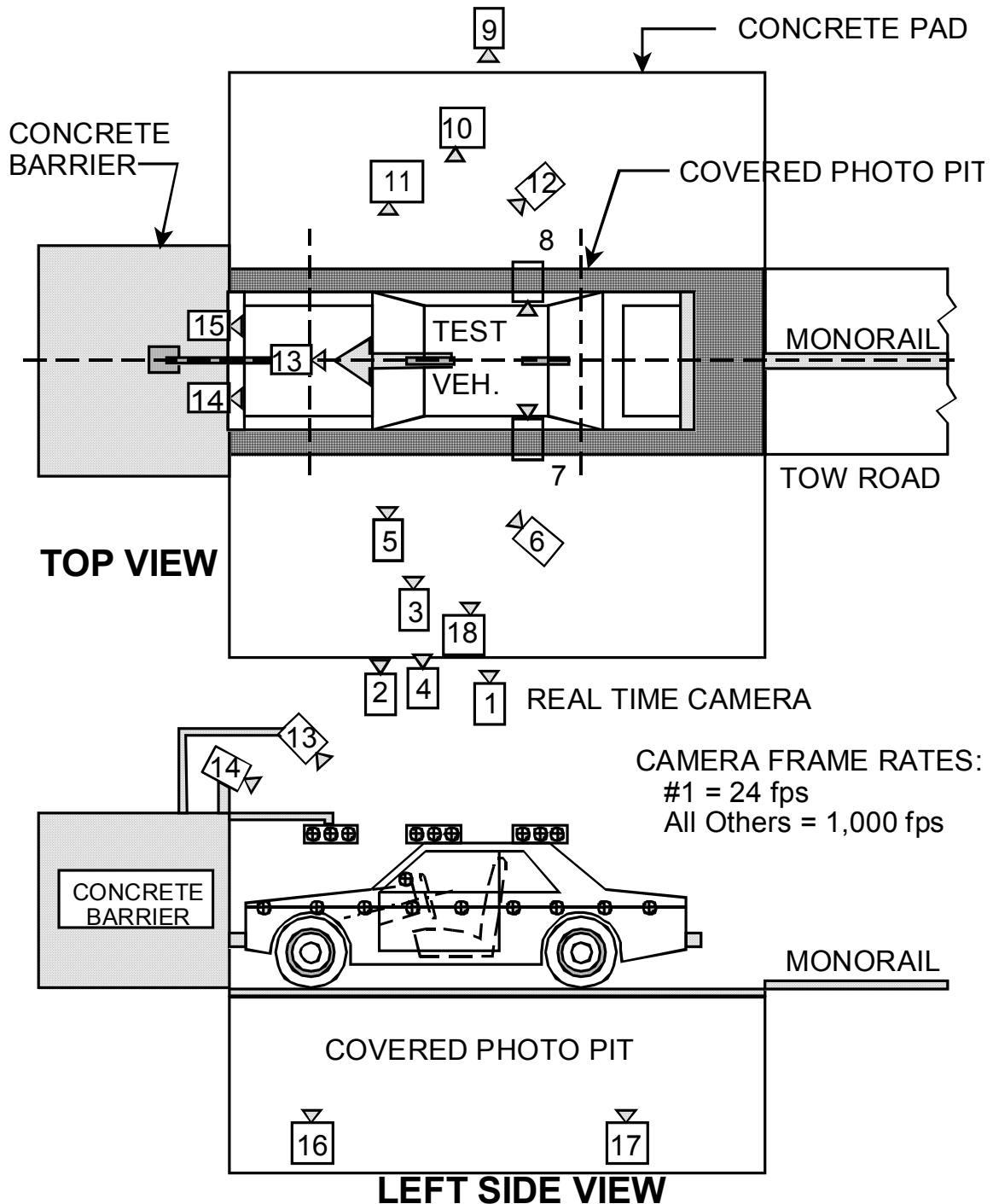
DATA SHEET NO. 16... (continued)

CAMERA LOCATIONS

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003

CAMERA POSITIONS FOR FRONTAL IMPACTS



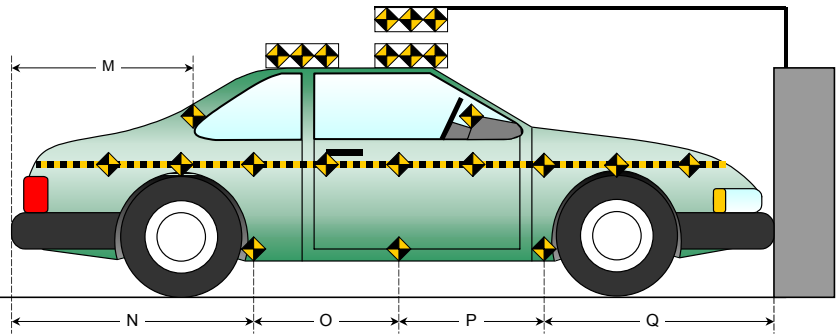
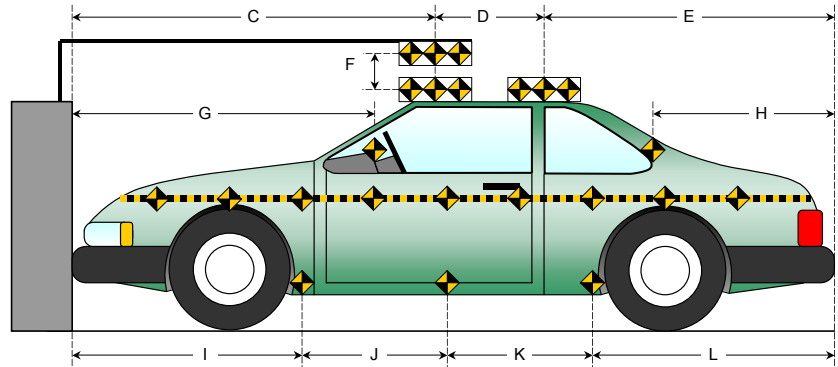
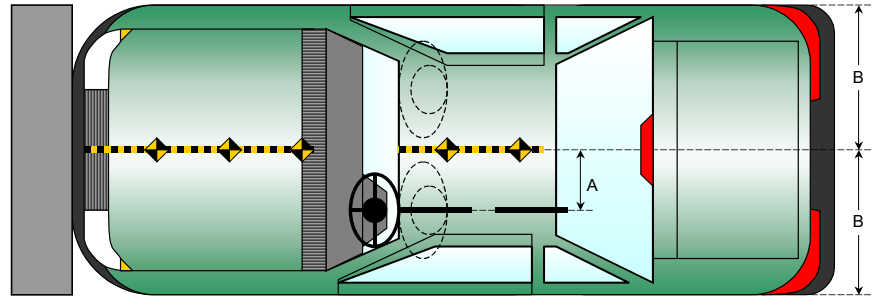
## DATA SHEET NO. 17

### PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

Item	Value
A	359
B	912
C	2432
D	610
E	1717
F	213
G	1828
H	1222
I	1450
J	942
K	942
L	1479
M	1221
N	1507
O	942
P	942
Q	1422



**DATA SHEET NO. 18**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

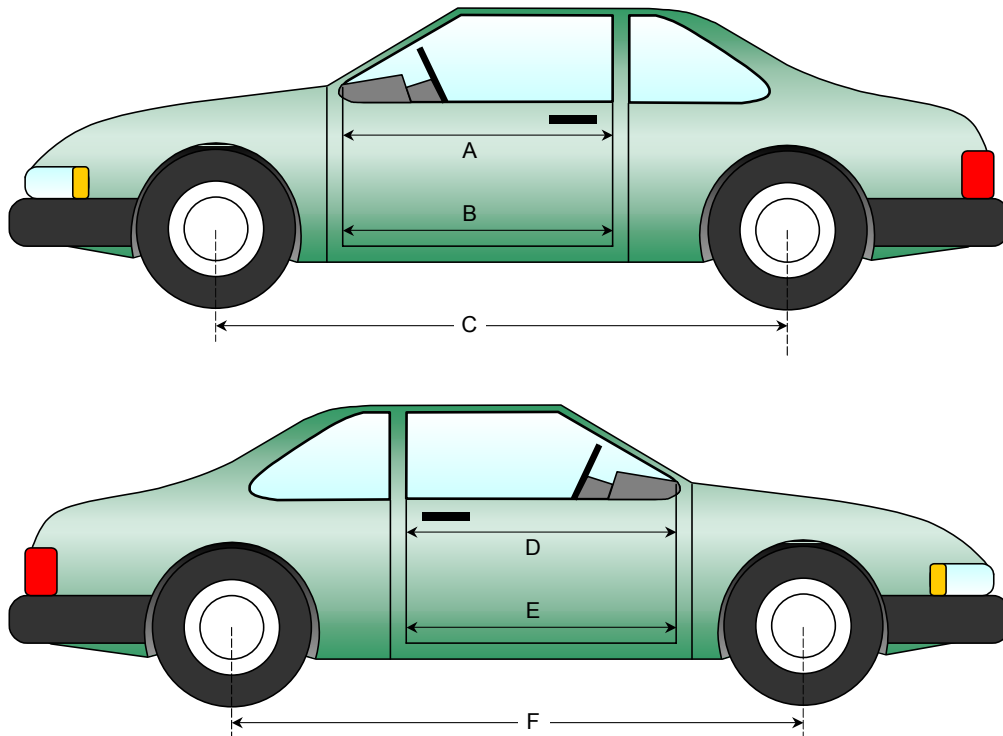
NHTSA No.: M35304  
 Test Date: 02/11/2003

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1100	1097	3
B	Left Side Lower	mm	1008	1010	-2
D	Right Side Upper	mm	1100	1102	-2
E	Right Side Lower	mm	995	997	-2

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2736	2613	123
F	Right Side Wheelbase	mm	2738	2626	112



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

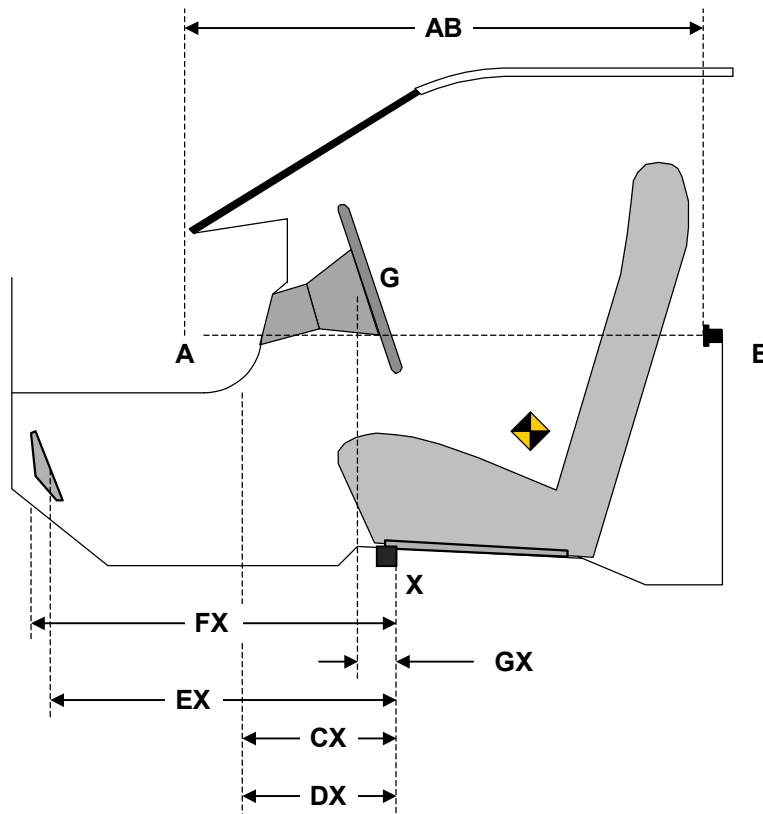
Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	1060	1071	-11
CX	Left Knee Bolster to X	mm	316	311	5
DX	Right Knee Bolster to X	mm	300	309	-9
EX	Brake Pedal to X	mm	590	598	-8
FX	Foot Rest to X	mm	624	624	0
GX	Center of Steering Column Wheel Hub to X	mm	90	97	-7

X = Left Front Seat Front Outboard Anchor Bolt Head



**DRIVER COMPARTMENT**

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

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

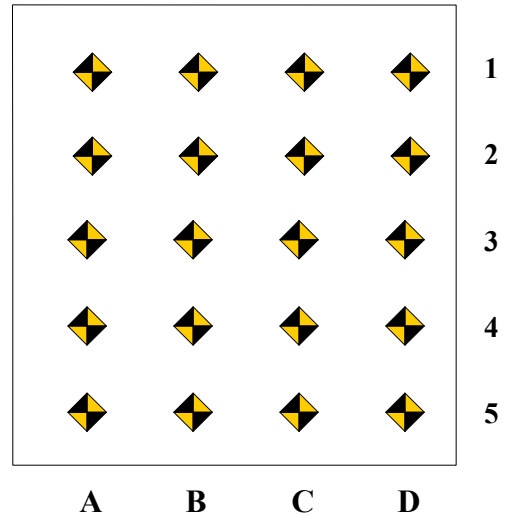
NHTSA No.: M35304  
 Test Date: 02/11/2003

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

Columns A through D are evenly spaced.

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

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



**DRIVER FLOOR PAN X-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	710	715	710	708	698	702	686	693	12	13	24	15
2	643	643	641	611	635	640	625	596	8	3	16	15
3	542	549	550	544	540	548	548	541	2	1	2	3
4	452	455	450	453	449	452	449	451	3	3	1	2
5	340	342	340	342	337	339	338	341	3	3	2	1

**DRIVER FLOOR PAN Z-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	0	0	16	16	0	3	9	0	0	-3	7	16
2	-58	-51	-48	-27	-62	-57	-53	-30	4	6	5	3
3	-72	-73	-78	-71	-90	-78	-94	-93	18	5	16	22
4	-70	-70	-70	-75	-87	-86	-88	-93	17	16	18	18
5	-70	-72	-68	-73	-86	-94	-93	-89	16	22	25	16

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

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

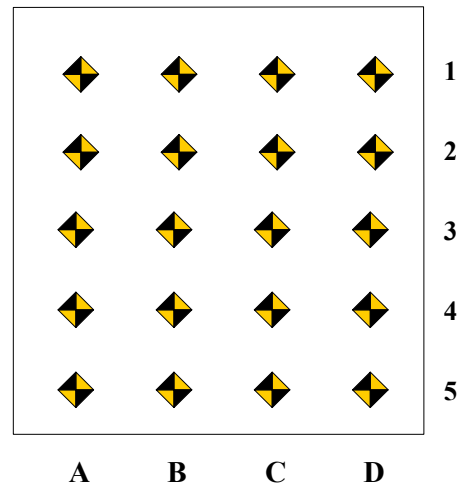
NHTSA No.: M35304  
 Test Date: 02/11/2003

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

Columns A through D are evenly spaced.

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

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



**PASSENGER FLOOR PAN X-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	728	751	755	757	712	727	730	739	16	24	25	18
2	681	680	680	689	665	670	671	678	16	10	9	11
3	608	605	605	607	593	601	601	601	15	4	4	6
4	472	473	474	473	470	471	471	470	2	2	3	3
5	341	342	342	343	340	340	340	341	1	2	2	2

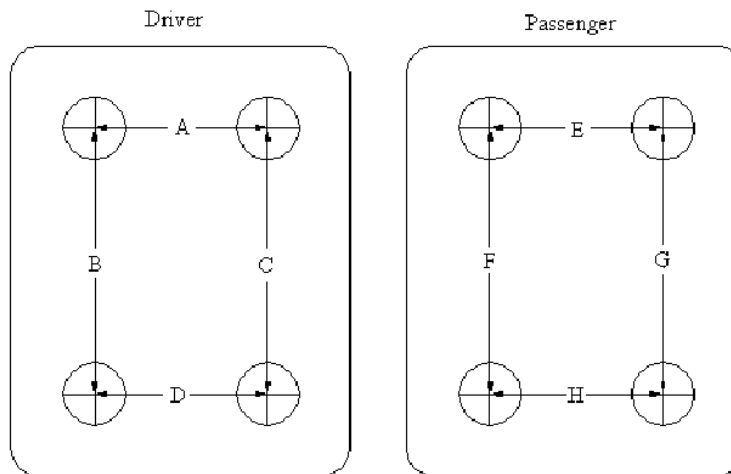
**PASSENGER FLOOR PAN Z-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	50	72	76	68	51	67	74	69	-1	5	2	-1
2	-17	-25	-22	-25	-18	-26	-25	-25	1	1	3	0
3	-78	-76	-75	-77	-79	-80	-73	-88	1	4	-2	11
4	-73	-71	-73	-71	-88	-87	-88	-89	15	16	15	18
5	-73	-67	-70	-67	-95	-89	-92	-83	22	22	22	16

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

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003



**UNDERBODY FLOORBOARD DEFORMATION**

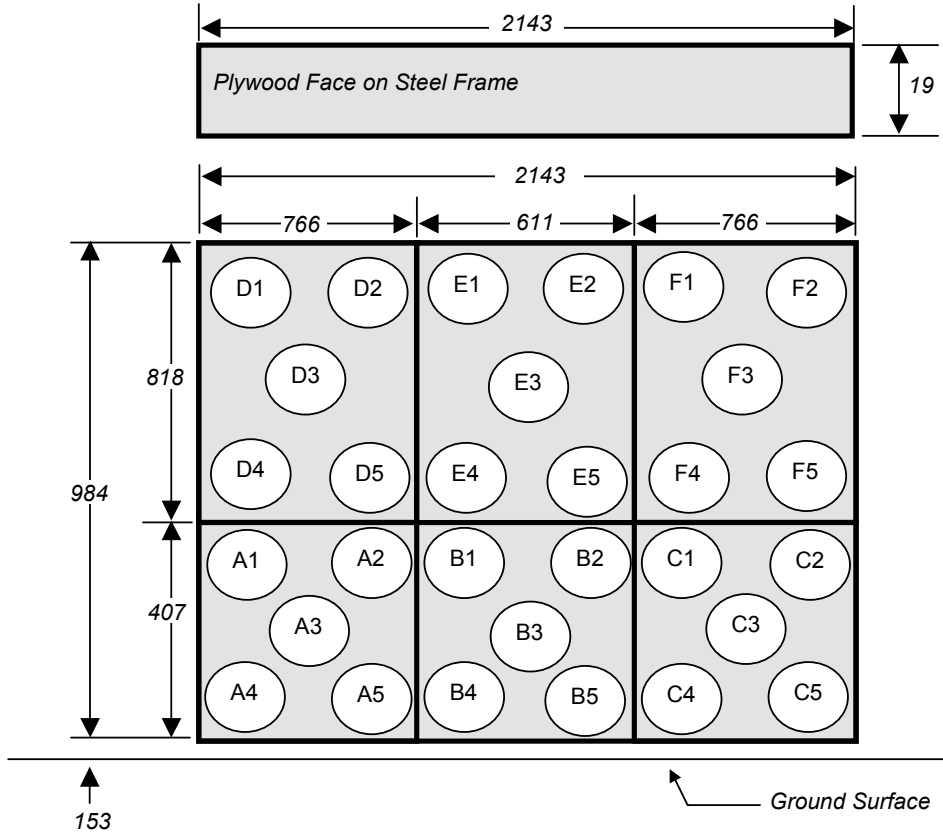
Measurement	Pre-Test	Post-Test	Difference
A	379	381	-2
B	351	349	2
C	360	360	0
D	376	378	-2
E	355	348	7
F	400	399	1
G	375	377	-2
H	392	391	1

**DATA SHEET NO. 19**  
**LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2003 Honda Accord 4 Door  
 Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
 Test Date: 02/11/2003

**30 Load Cell Rigid Barrier**  
**Load Cell Locations on Fixed Barrier**



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

6 Groups of 5 Load Cells Each

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

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

**DATA SHEET NO. 20**

**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2003 Honda Accord 4 Door NHTSA No.: M35304  
 Test Program: 35mph Frontal Impact Test Date: 02/11/2003

**VEHICLE INFORMATION**

VIN: 1HGCM55103A002847 Wheelbase (mm) : 2742  
 Vehicle Size Category: Sedan Test Weight (kg) : 1571

**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): 55.8  
 Velocity Change (km/h): 63.0 Time of Separation (msec): 108.5

**CRUSH PROFILE**

Collision Deformation Classification: Frontal Midpoint of Damage: RightSide  
 Damage Region Length (mm): 1670 Impact Mode: Frontal

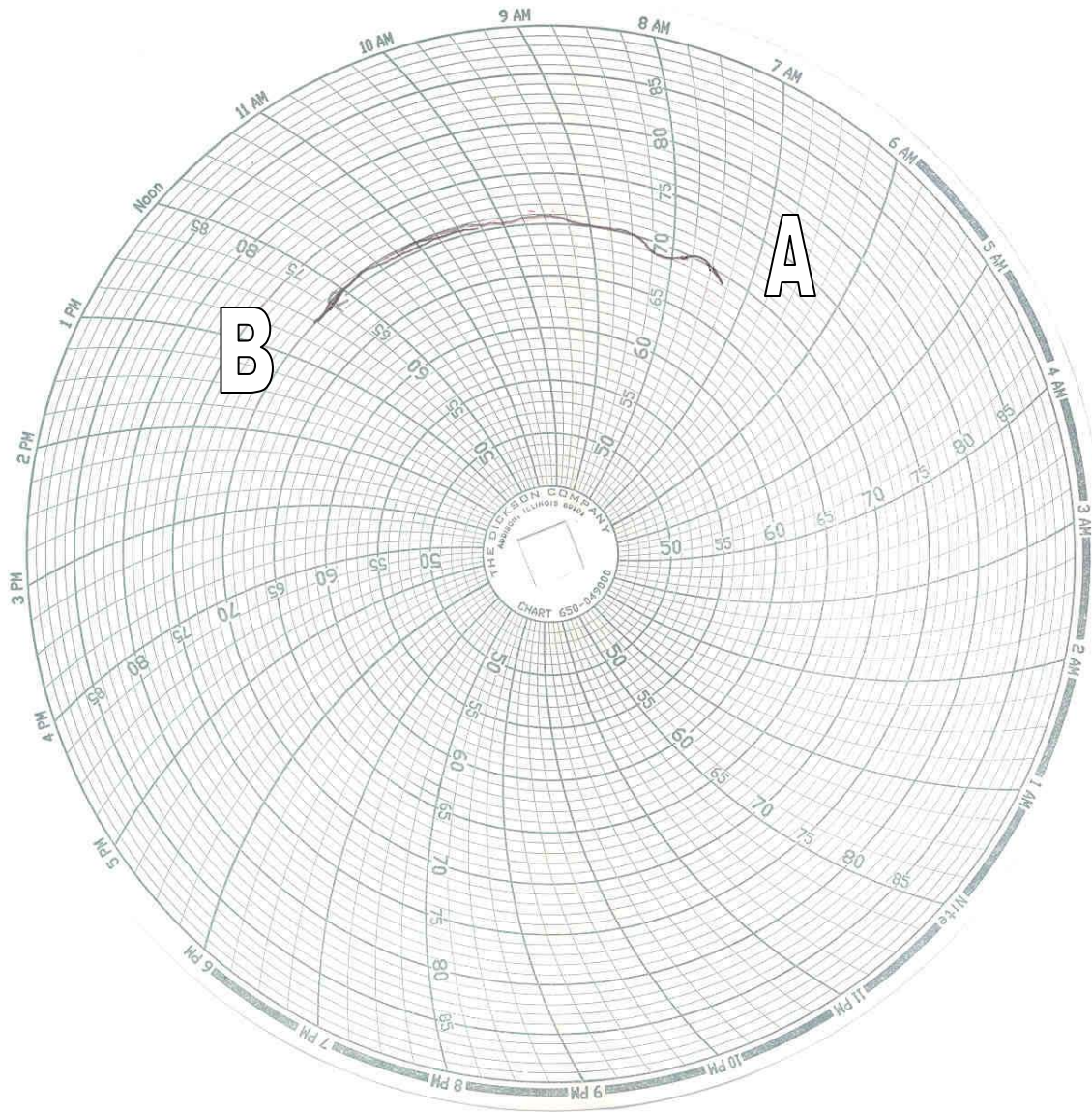
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4494	4219	275
C2	Crush zone 2 at left side	mm	4645	4290	355
C3	Crush zone 3 at left side	mm	4733	4281	452
C4	Crush zone 4 at right side	mm	4732	4329	403
C5	Crush zone 5 at right side	mm	4646	4322	324
C6	Crush zone 6 at right side	mm	4496	4189	307
L	C1 TO C6	mm	1670		

**DATA SHEET NO. 21**

**DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART**

Test Vehicle: 2003 Honda Accord 4 Door  
Test Program: 35mph Frontal Impact

NHTSA No.: M35304  
Test Date: 02/11/2003



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

B = Test conducted at 12:37 p.m.

**APPENDIX A**  
**PHOTOGRAPHS**

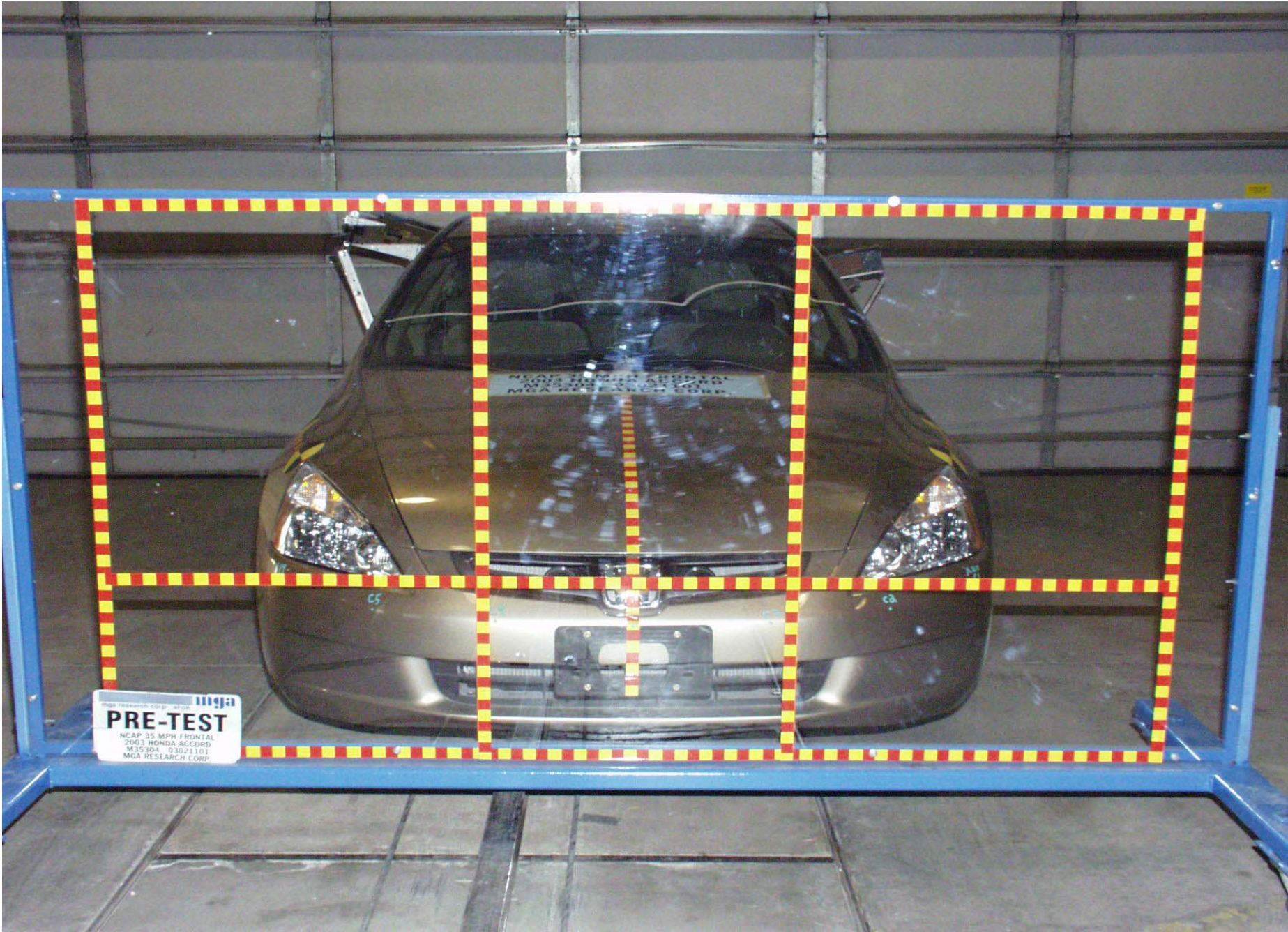
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A-1.



Load Cell Location

MFD. BY HONDA OF AMERICA MFG., INC. 8/02

GVWR 4080LBS GAWR F 2195LBS R 1960LBS

THIS VEHICLE CONFORMS TO ALL APPLICABLE  
FEDERAL MOTOR VEHICLE SAFETY, BUMPER,  
AND THEFT PREVENTION STANDARDS IN EFFECT  
ON THE DATE OF MANUFACTURE SHOWN ABOVE:

V.I.N. **1HGCM55103A002847**



PASSENGER CAR

A-2.

Vehicle Certification Label

## TIRE INFORMATION

VEHICLE CAPACITY WEIGHT		SEATING CAPACITY	
850 LBS (385KG)		TOTAL 5   FRONT 2   REAR 3	
RECOMMENDED TIRE SIZE	COLD TIRE INFLATION PRESSURE		SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
P195/65R15 89H	FRONT	220KPA, 32PSI	
	REAR	210KPA, 30PSI	
COMPACT SPARE TIRE	UP TO VEHICLE CAPACITY WEIGHT		
T135/90D15 100M	420KPA, 60PSI		42762-SDA-A010

Tire Placard

A-4.

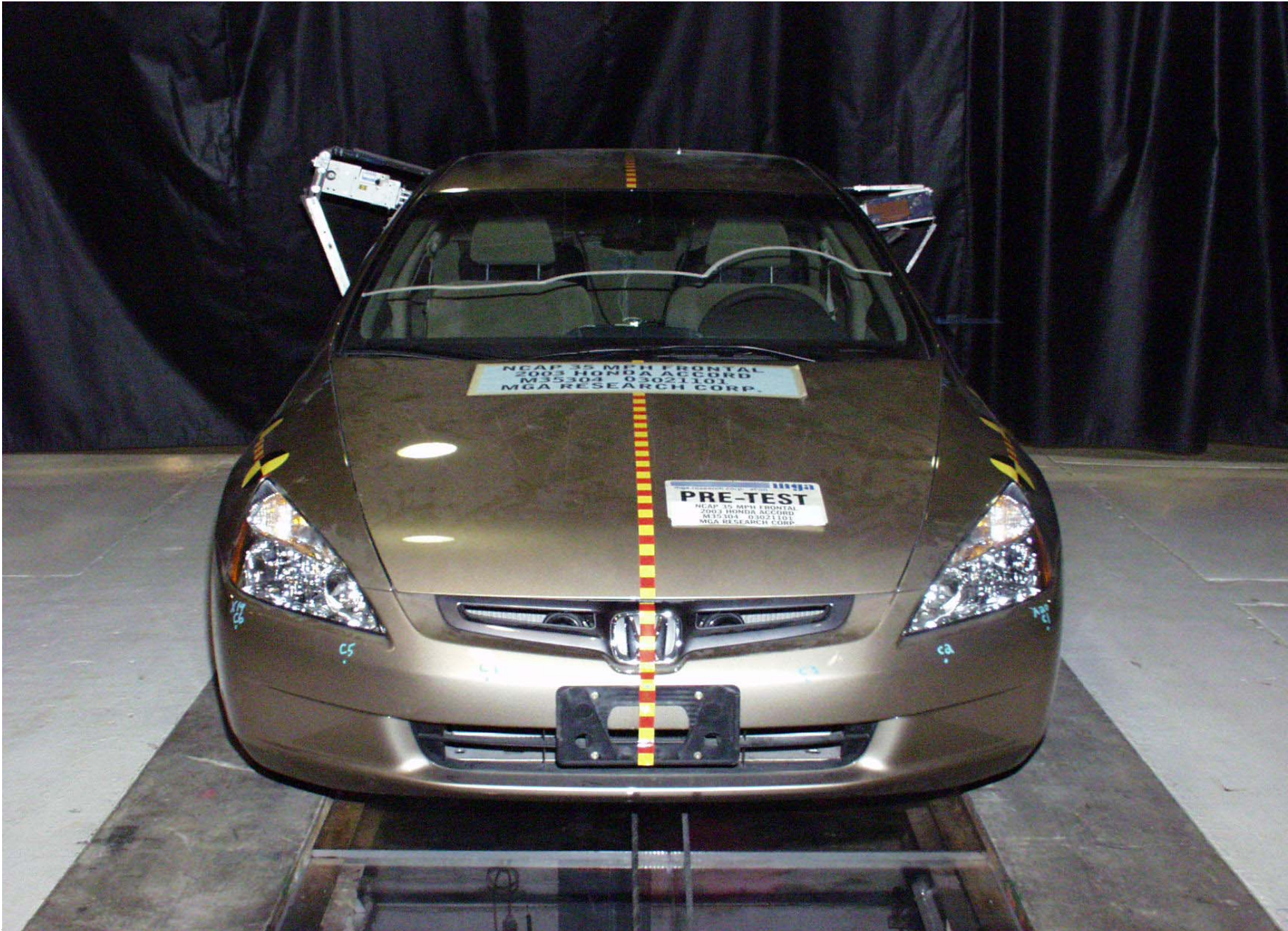


Right Front View of Test Vehicle, as received

A-5.



Left Rear View of Test Vehicle, as received



Pre-Test Front View of Test Vehicle

A-7.



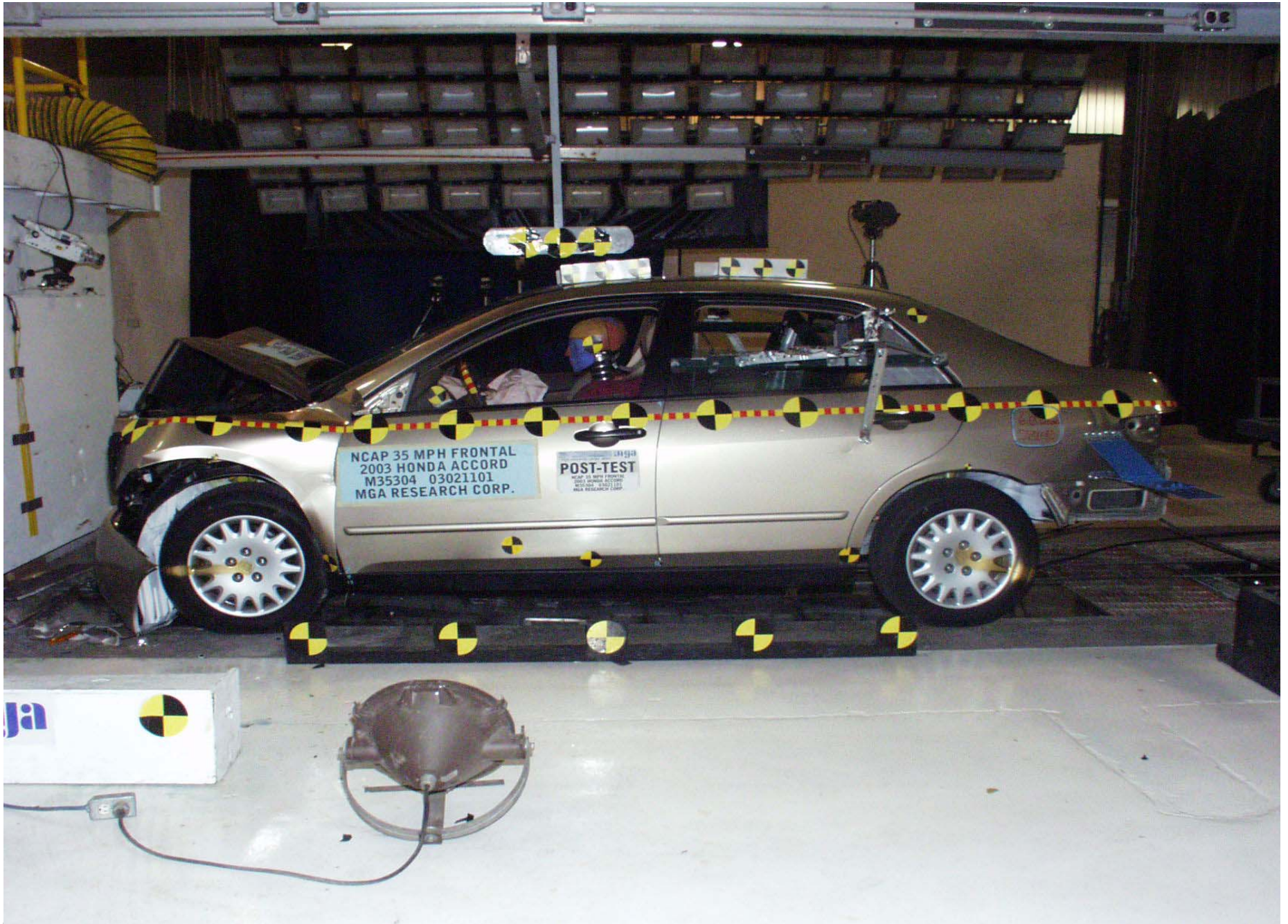
Post-Test Front View of Test Vehicle

A-8.



Pre-Test Left Side View of Test Vehicle

A-9.



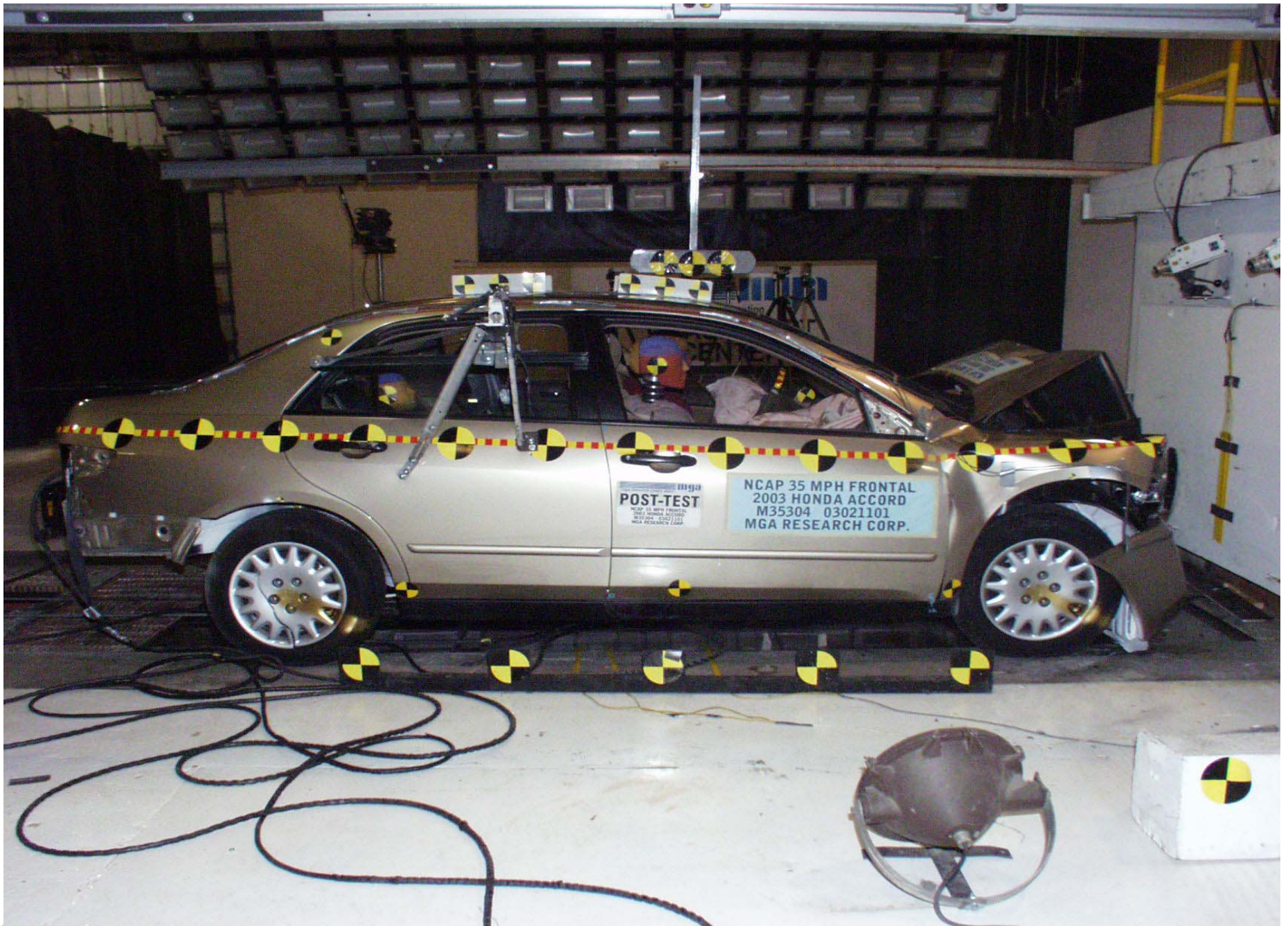
Post-Test Left Side View of Test Vehicle

A-10.

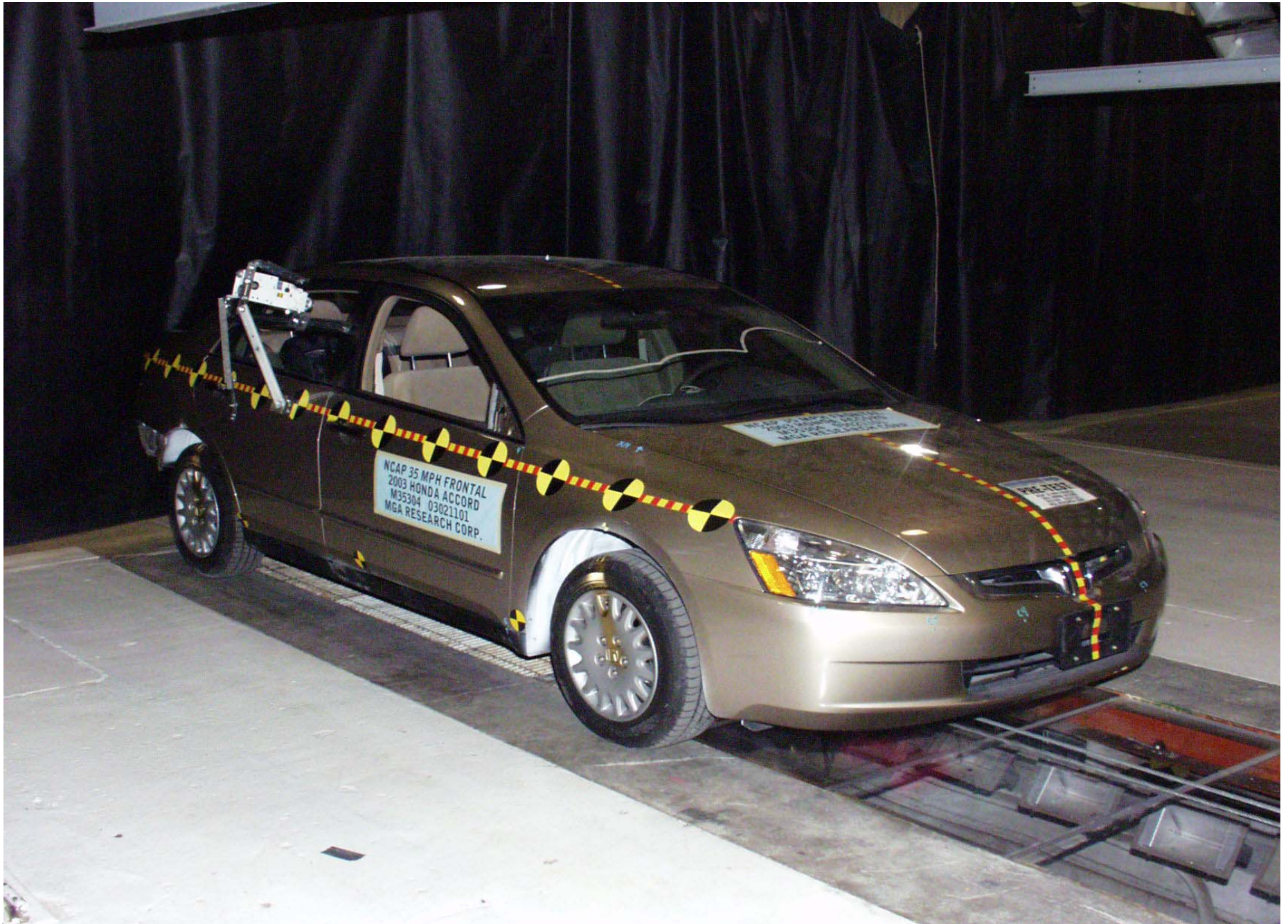


Pre-Test Right Side View of Test Vehicle

A-11.



Post-Test Right Side View of Test Vehicle



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

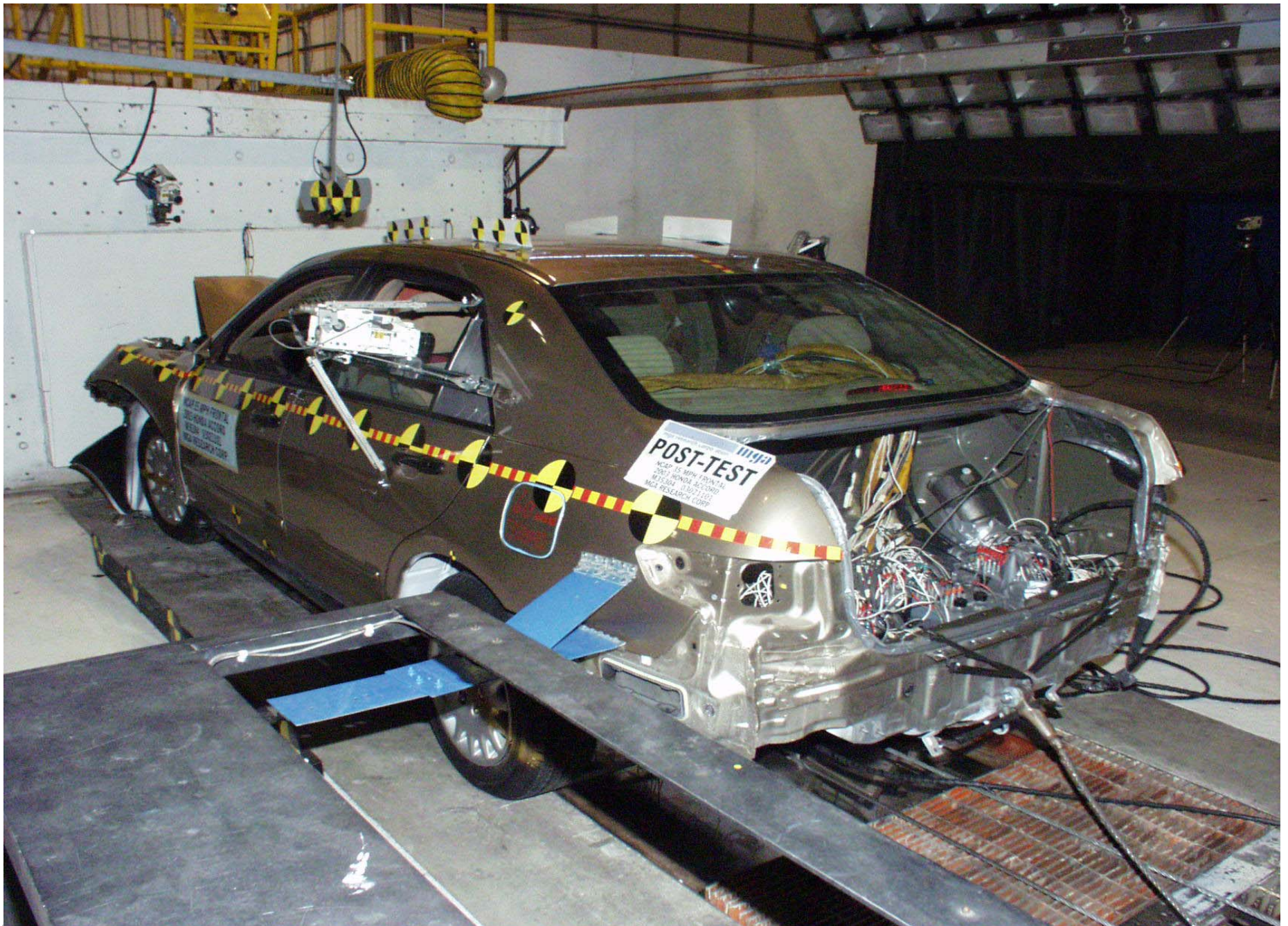


Post-Test Right Front Three-Quarter View of Test Vehicle

A-14.



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 Doors After Impact



Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View

A-21.



Post-Test Engine Compartment View

mga  
mga research corporation  
**PRE-TEST**  
NCAP 35 MPH FRONTAL  
2003 HONDA ACCORD  
M35304 03021101  
MGA RESEARCH CORP.

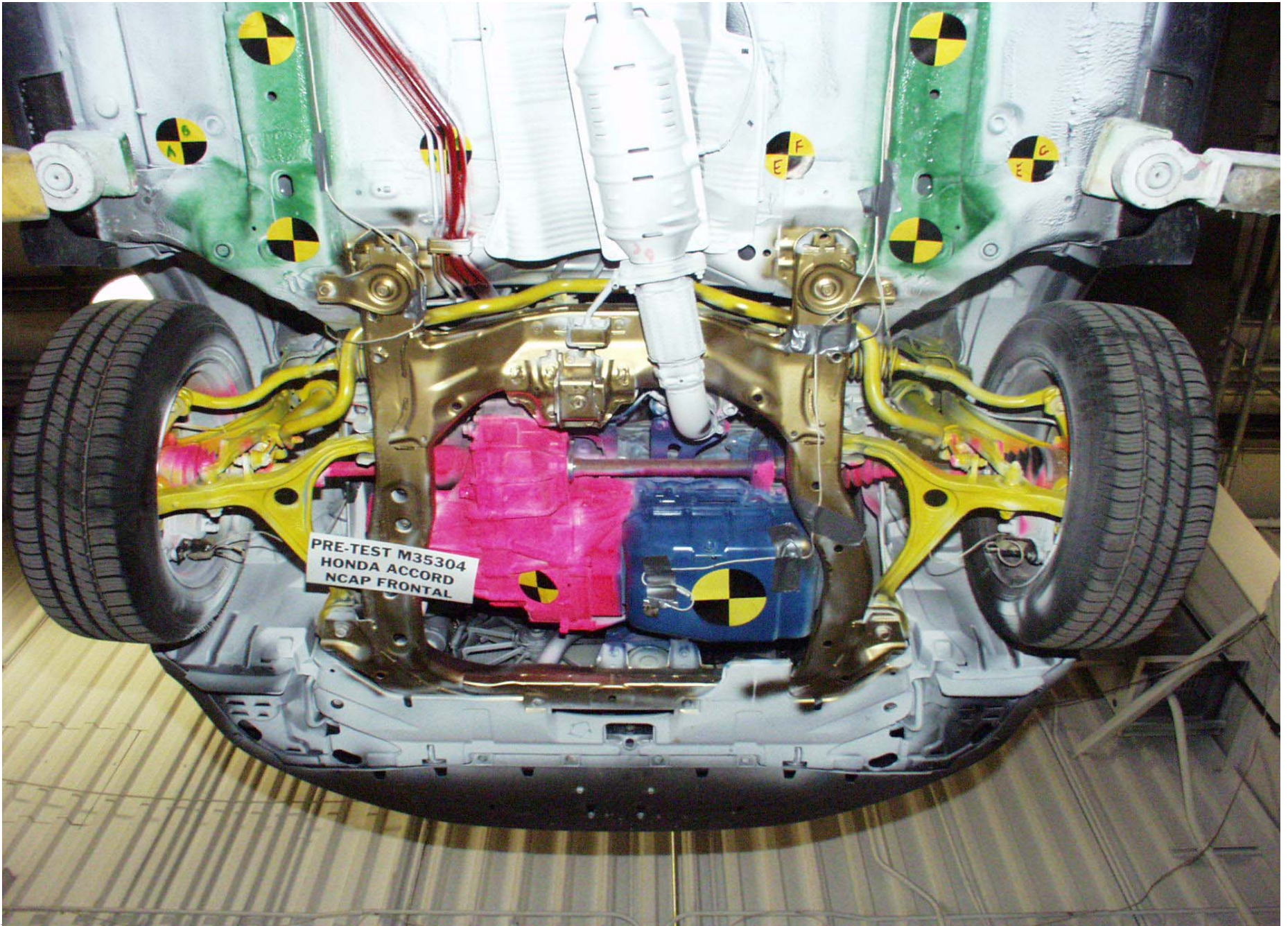


A-22.

Pre-Test Fuel Filler Cap View



Post-Test Fuel Filler Cap View



Pre-Test Front Underbody View



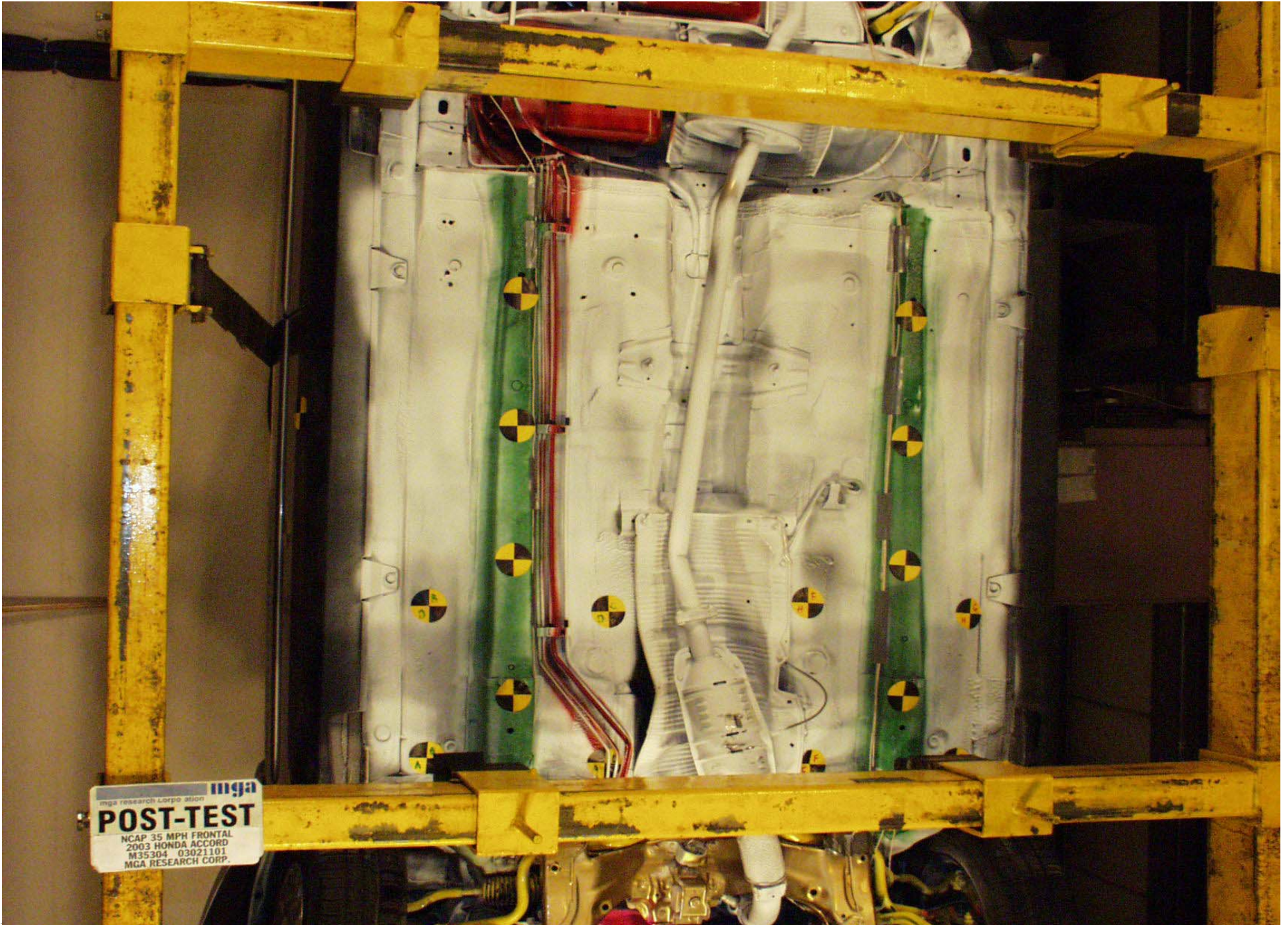
Post-Test Front Underbody View



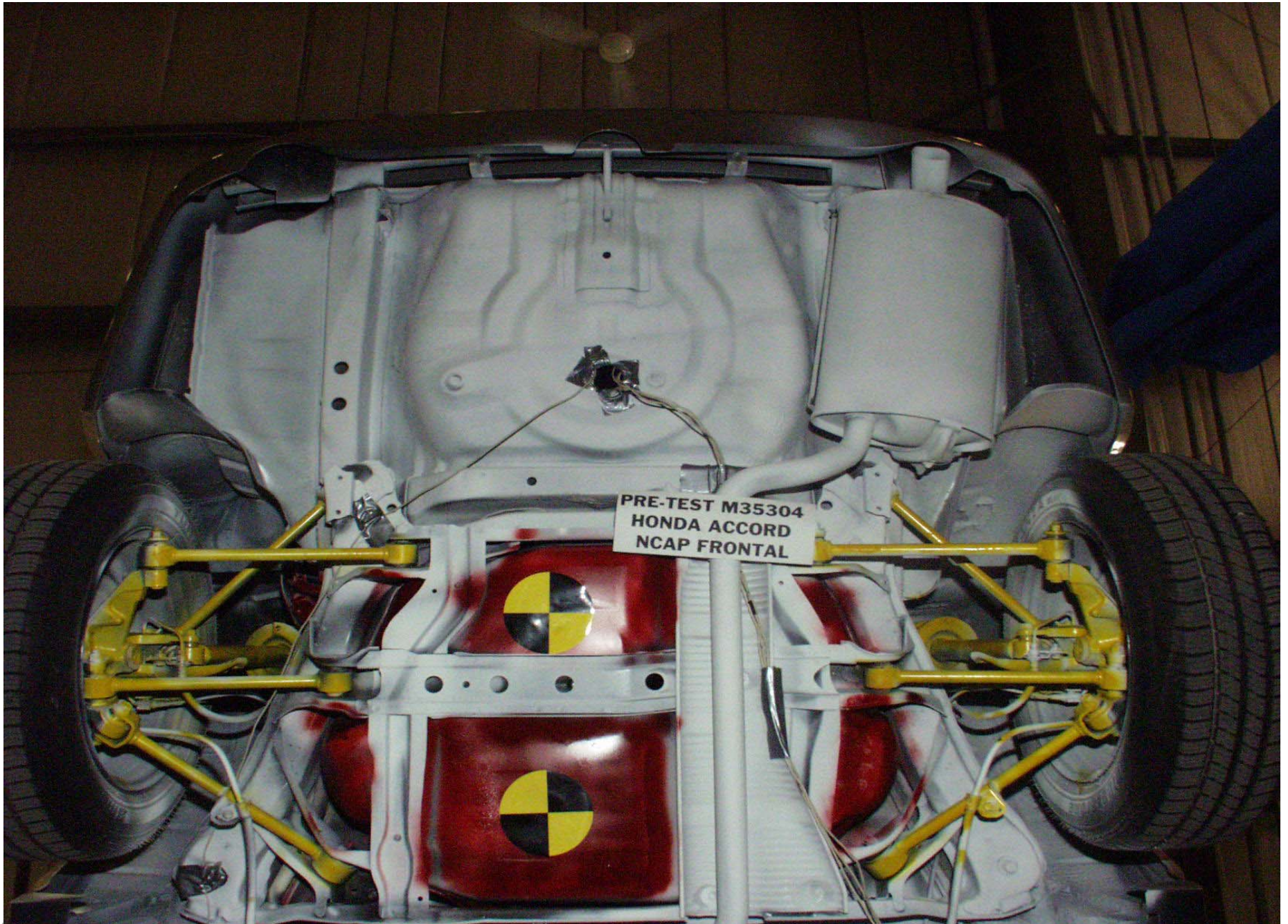
Pre-Test Mid Underbody View



Pre-Test Mid Underbody View

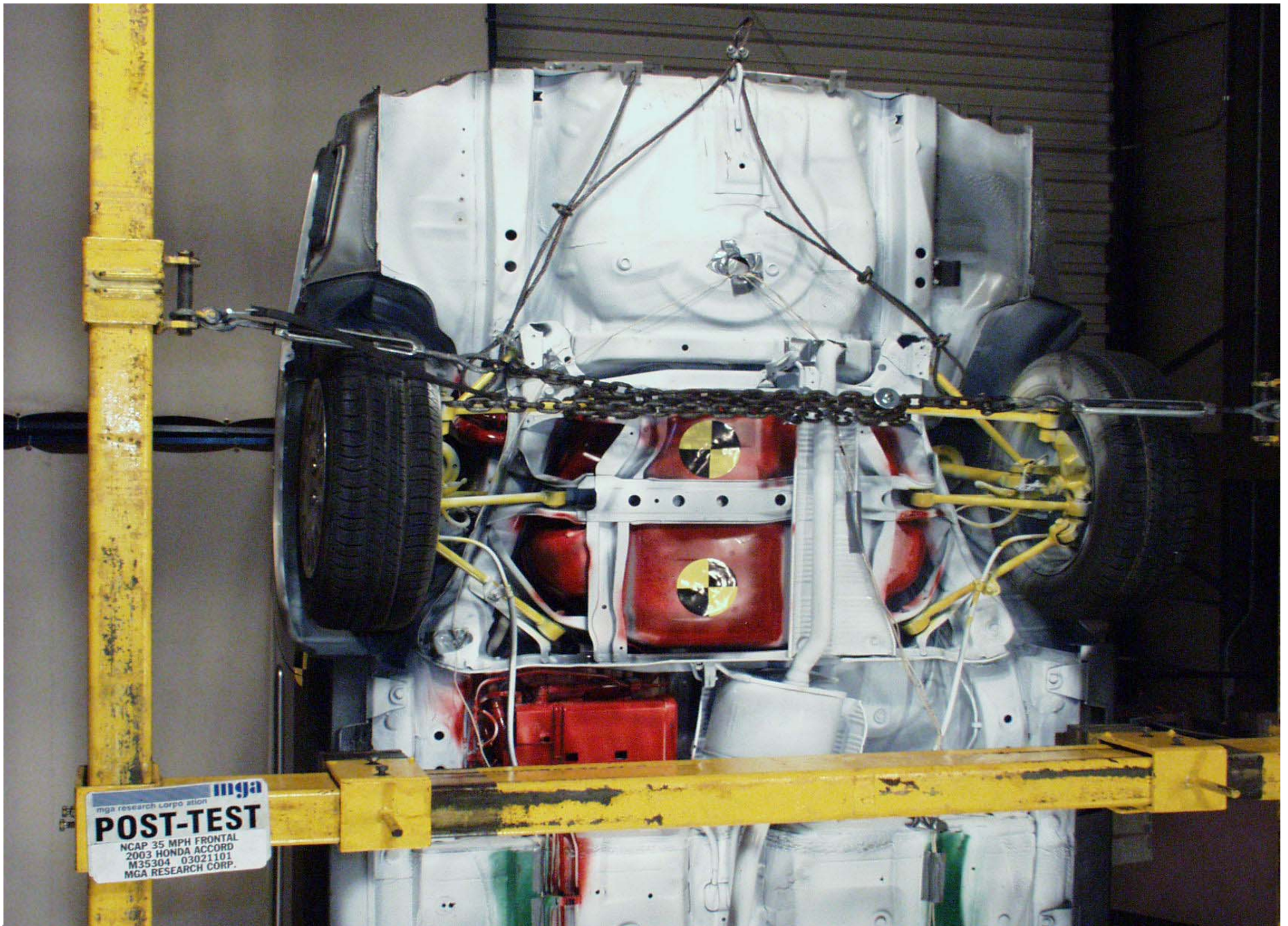


Post-Test Mid Underbody View



Pre-Test Rear Underbody View

A-30.

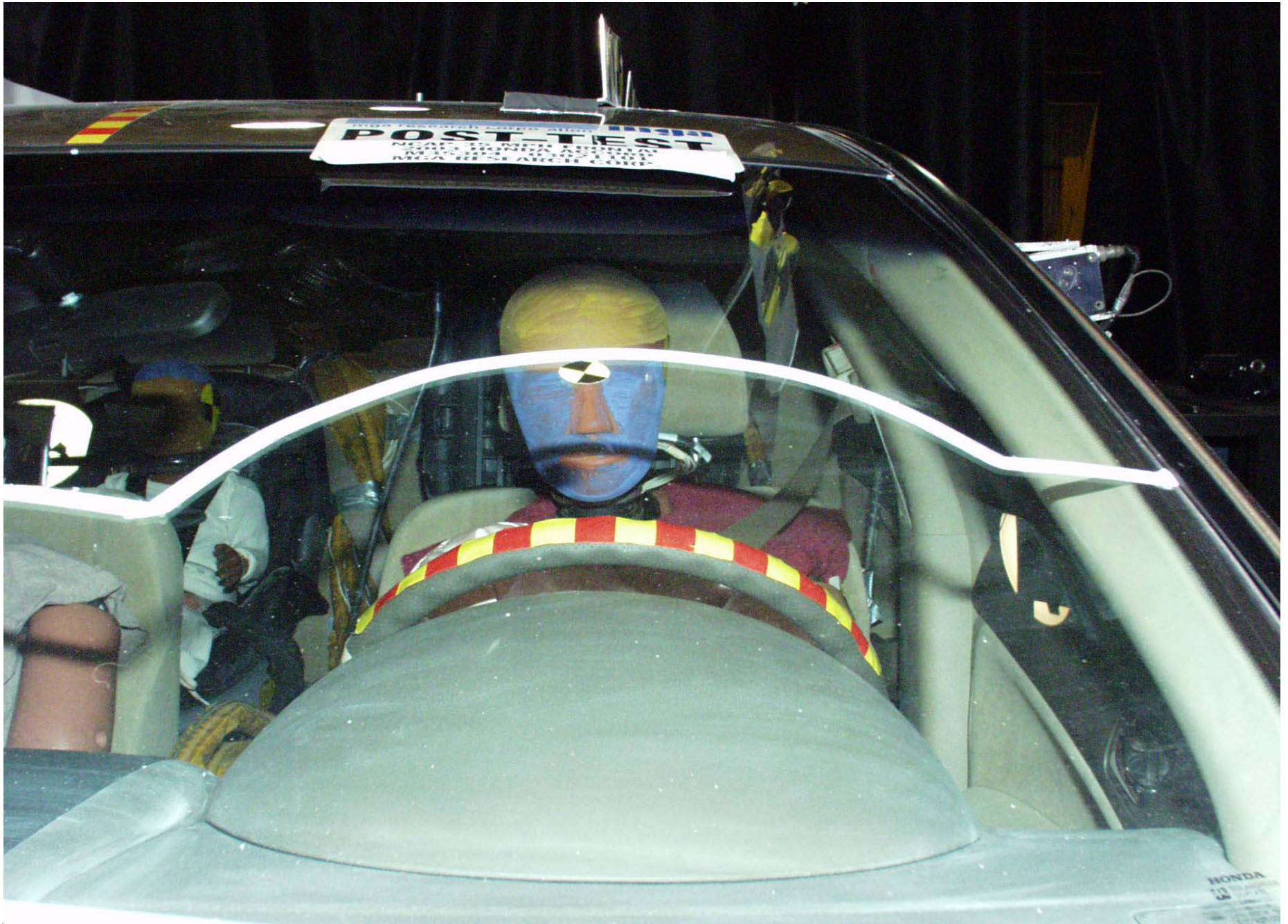


Post-Test Rear Underbody View

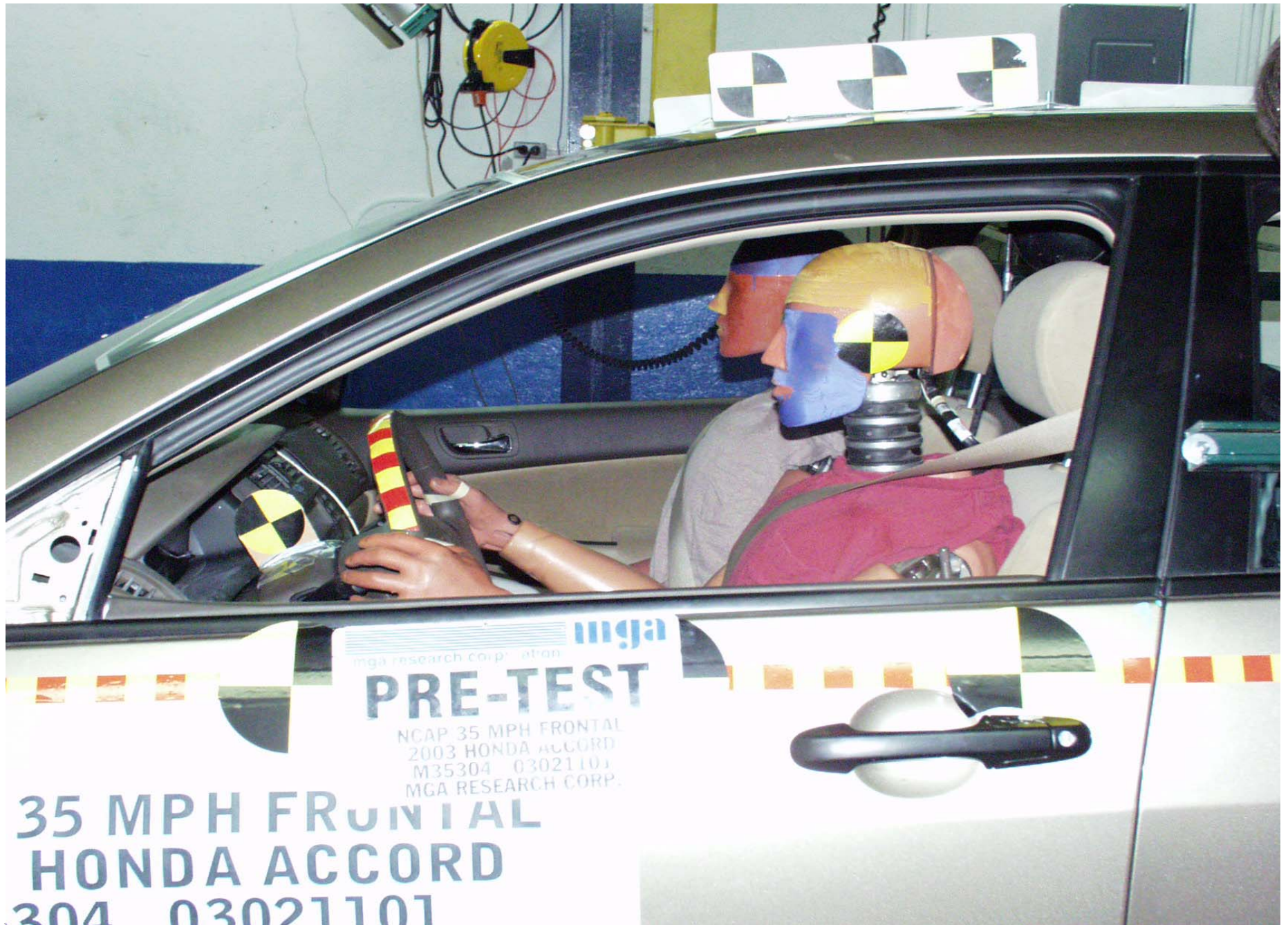


Pre-Test Driver Dummy Front View (head position)

A-32.



Post-Test Driver Dummy Front View (head position)



Pre-Test Driver Dummy Position Left Side View



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



Pre-Test Driver Side Floor Pan View



Post-Test Driver Side Floor Pan View



Post-Test Driver Dummy Head Contact



Post-Test Driver Dummy Knee Contact

A-45.

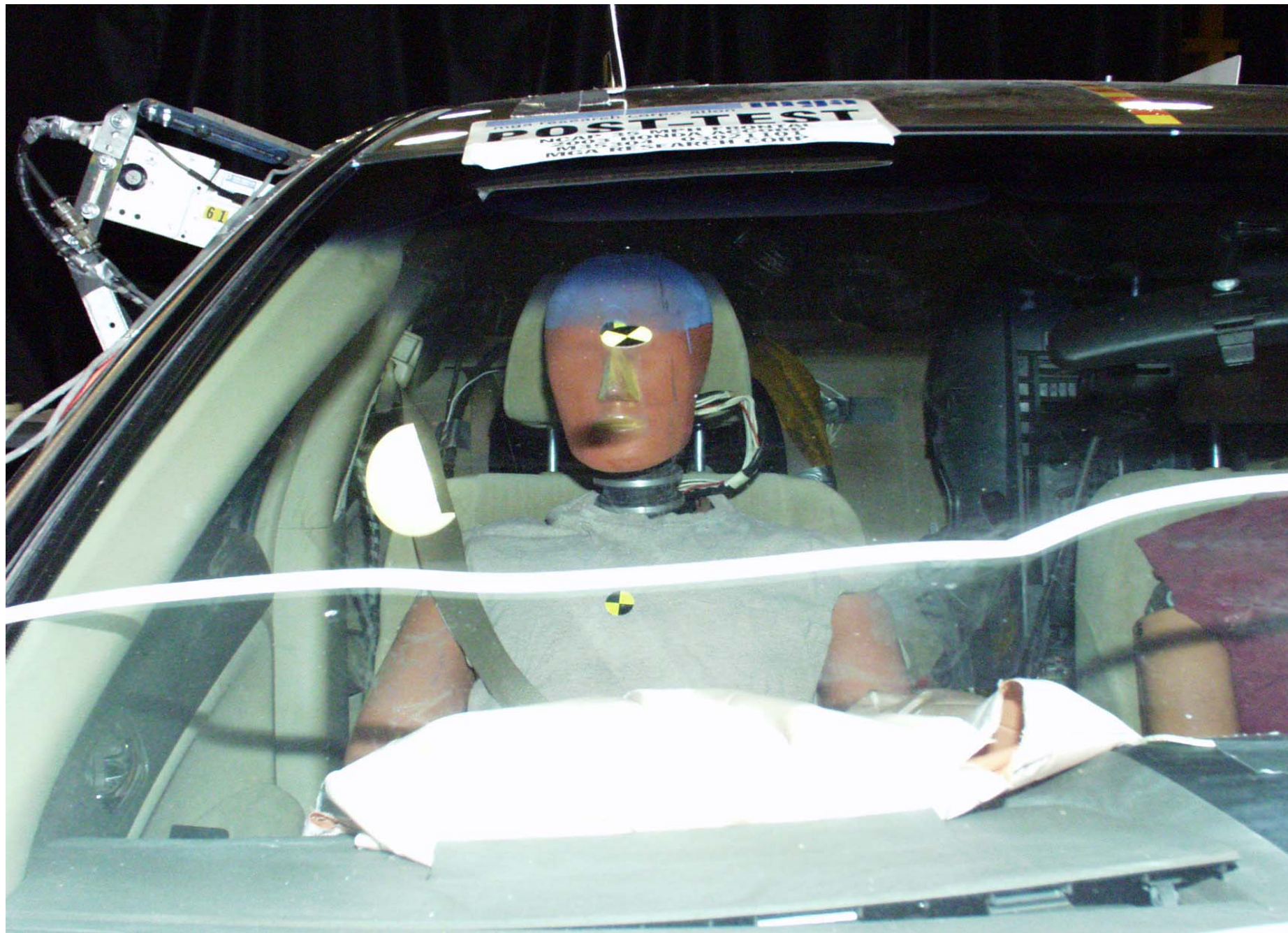


Post-Test Driver Dummy Airbag Contact



Pre-Test Passenger Dummy Front View (Head Position)

A-47.



Post-Test Passenger Dummy Front View (Head Position)



Pre-Test Passenger Dummy Position Right Side View



Post-Test Passenger Dummy Position Right Side View

A-50.



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

A-51.



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



Pre-Test Passenger Side Floor Pan View

A-57.



Post-Test Passenger Side Floor Pan View



Post-Test Passenger Dummy Head Contact

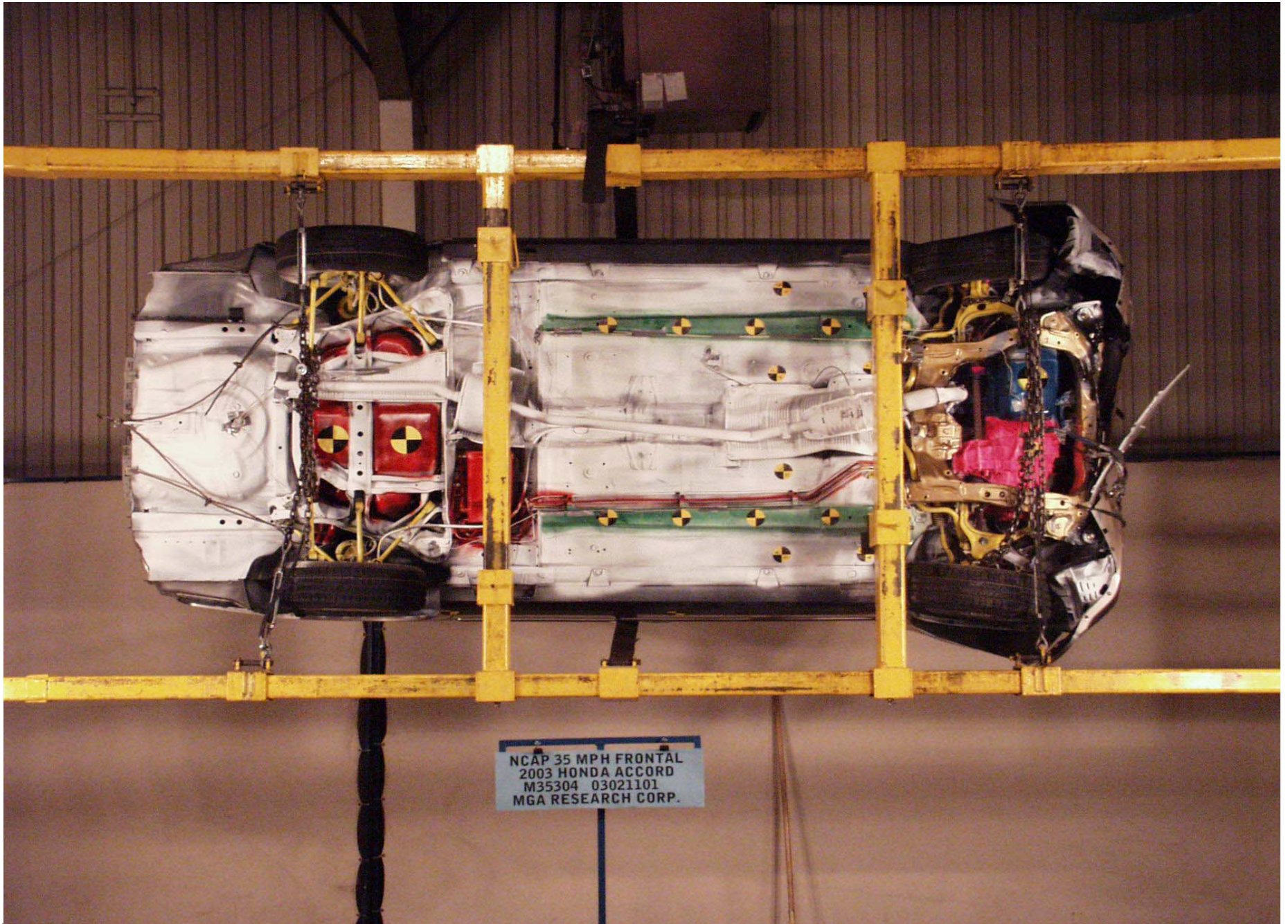


Post-Test Passenger Dummy Knee Contact

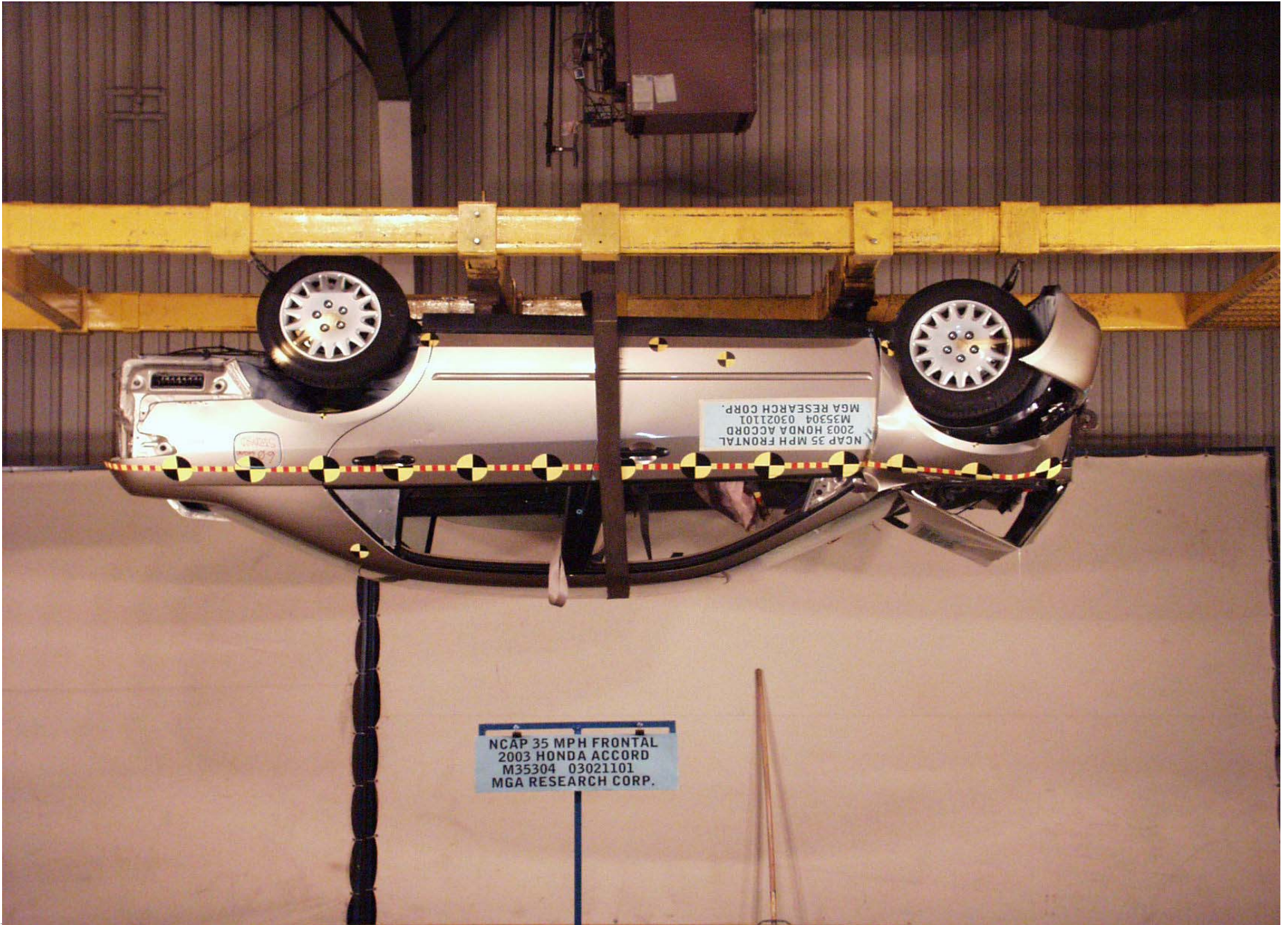


Post-Test Passenger Dummy Airbag Contact

A-61.



Rollover 90 Degrees



Rollover 180 Degrees



Rollover 270 Degrees

A-64.



Rollover 360 Degrees



Vehicle Impact

**APPENDIX B**

**DUMMY, VEHICLE, AND BARRIER RESPONSE DATA TRACES**

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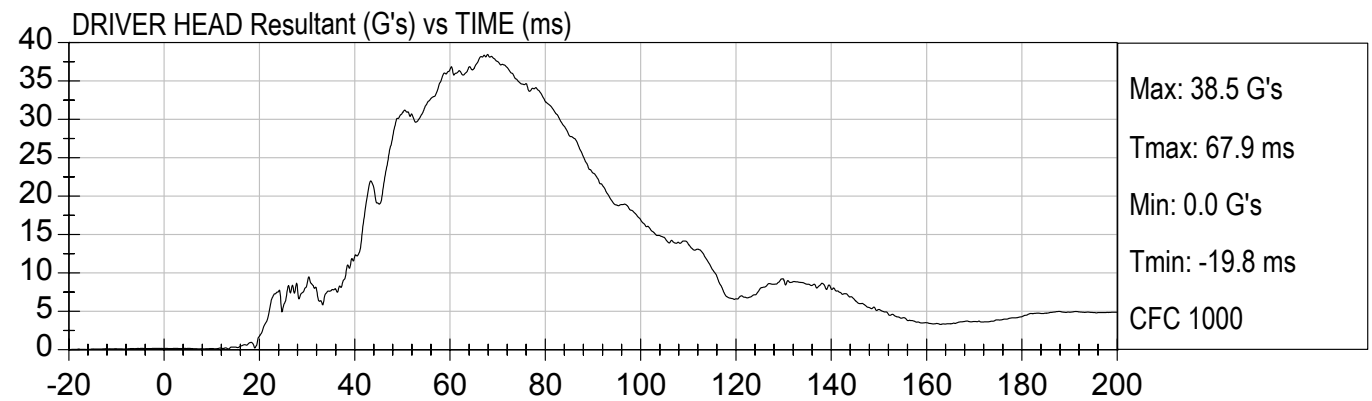
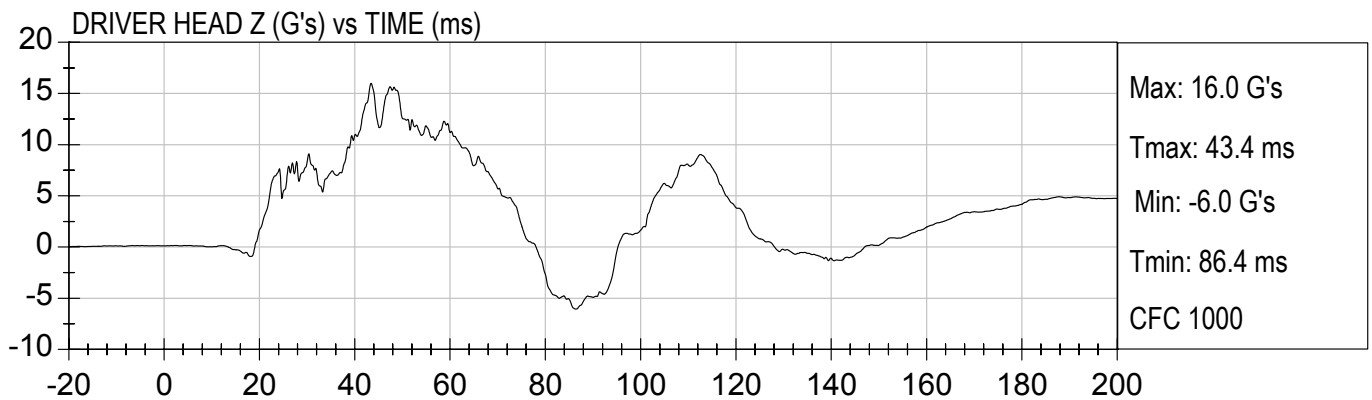
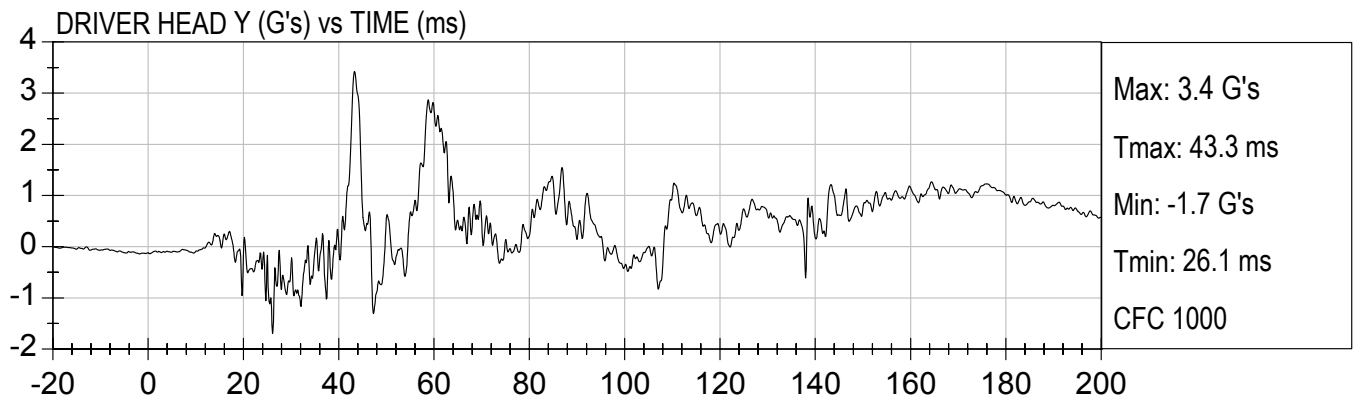
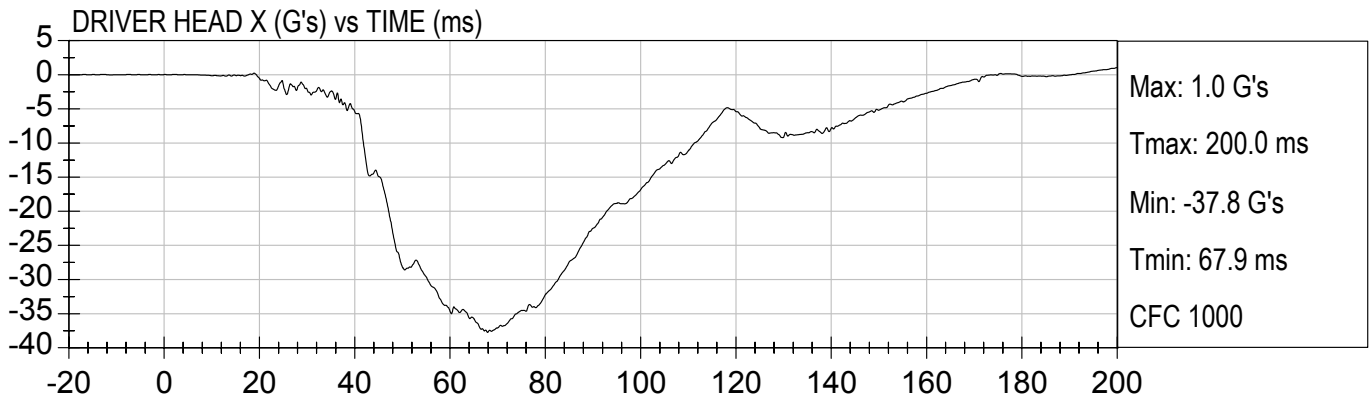
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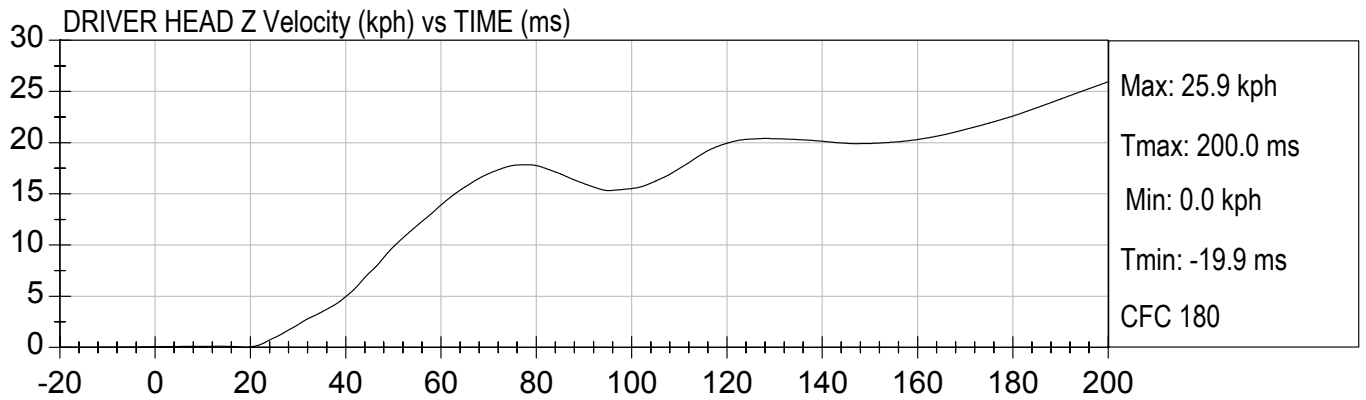
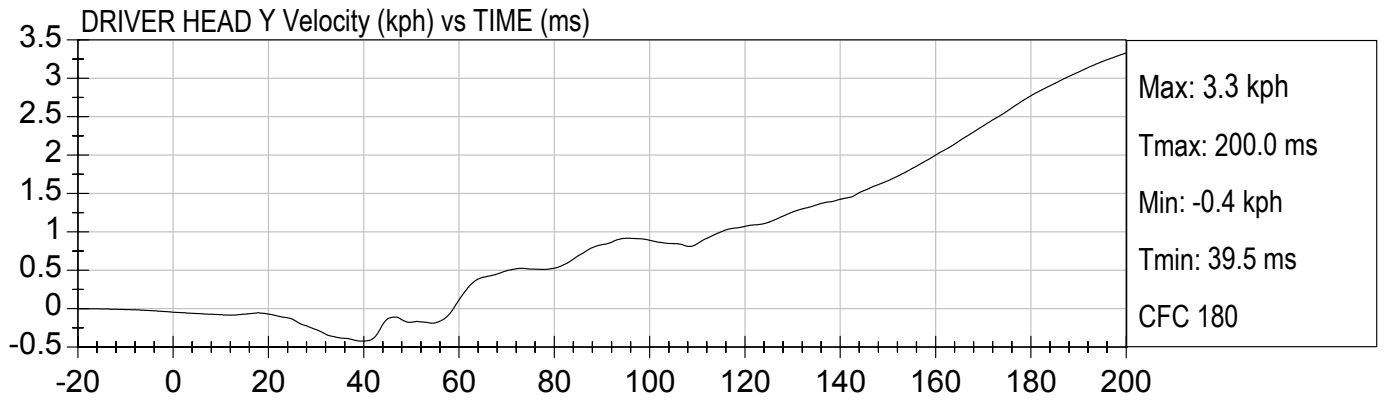
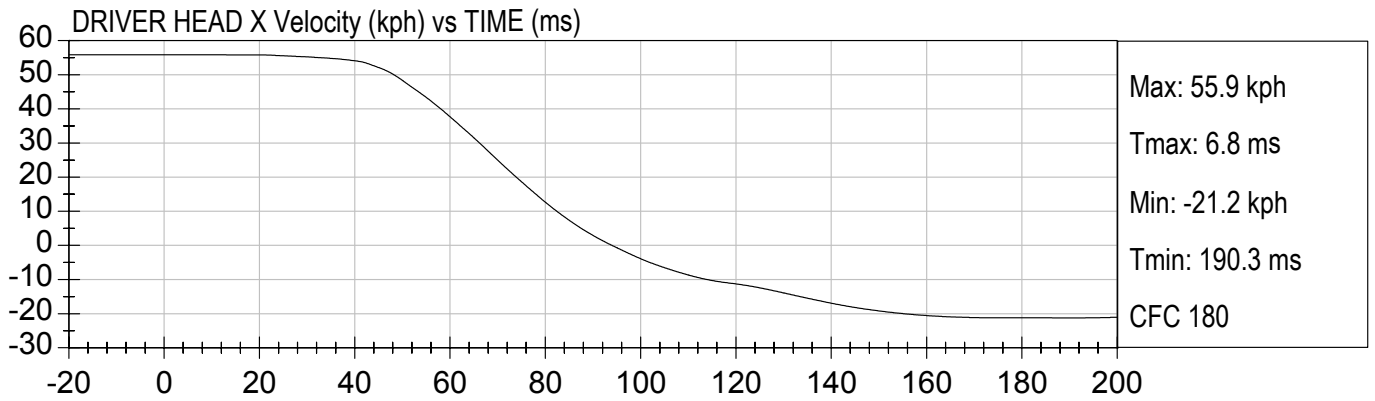
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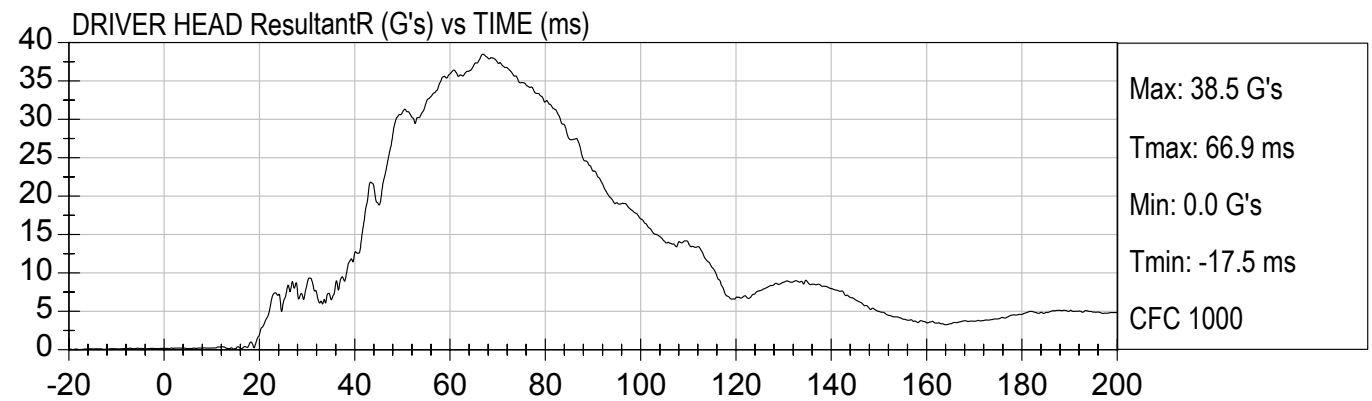
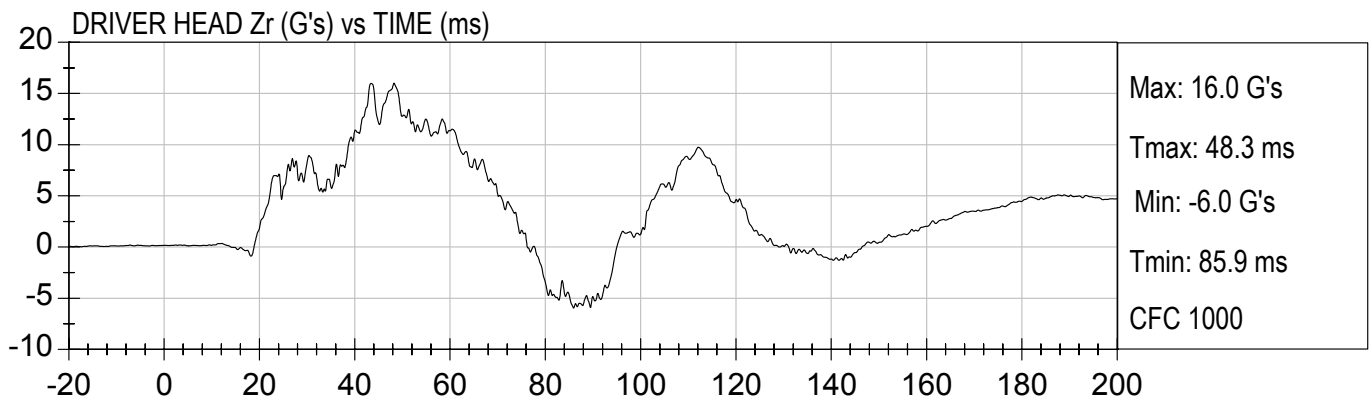
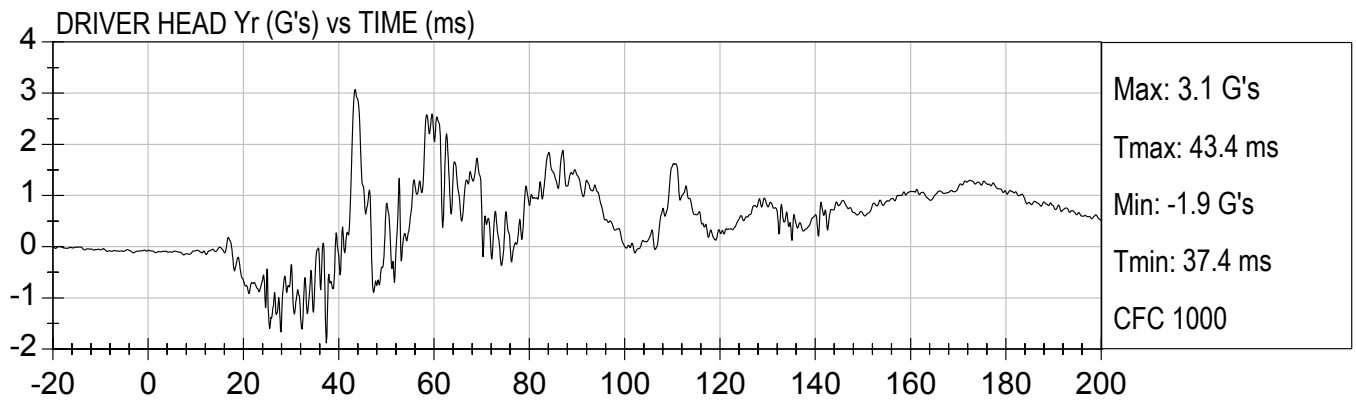
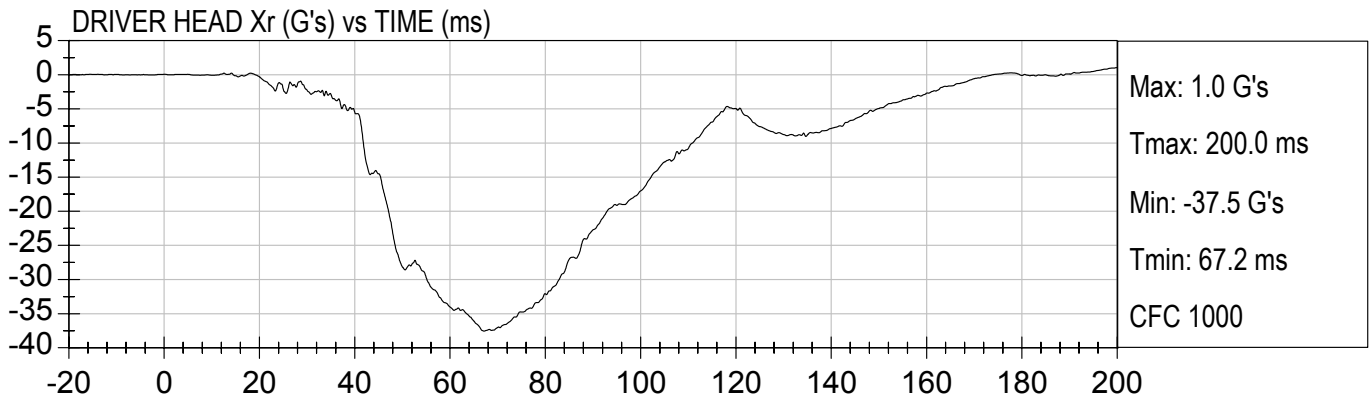
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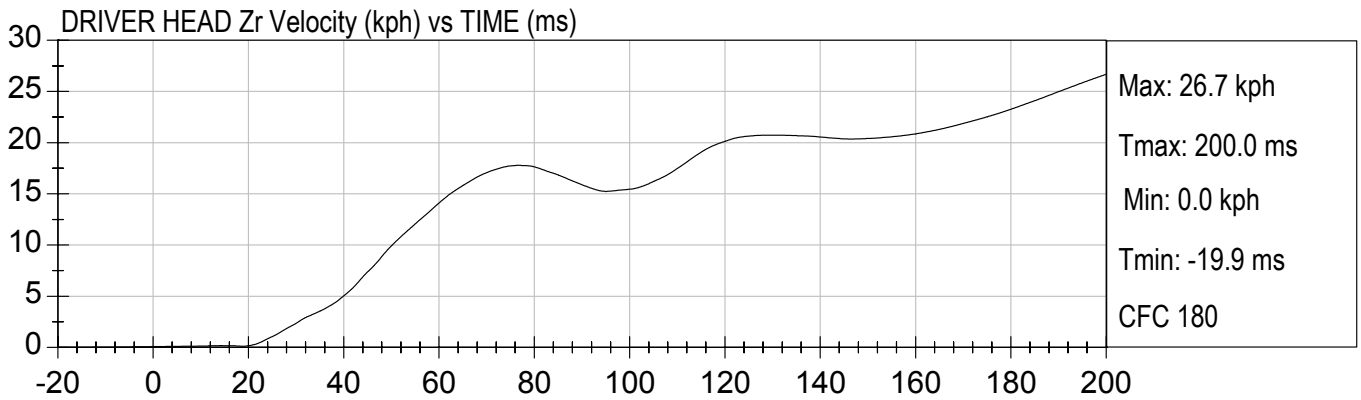
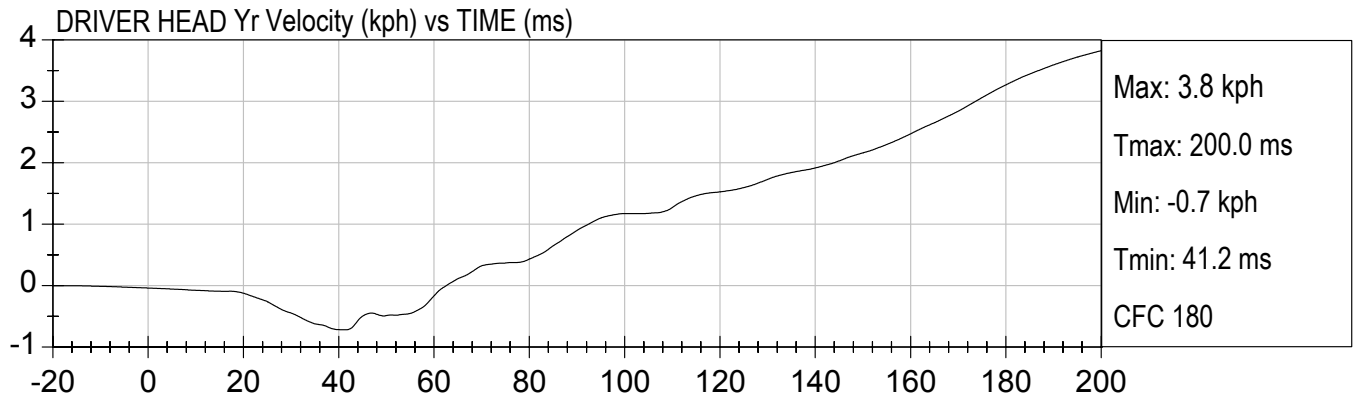
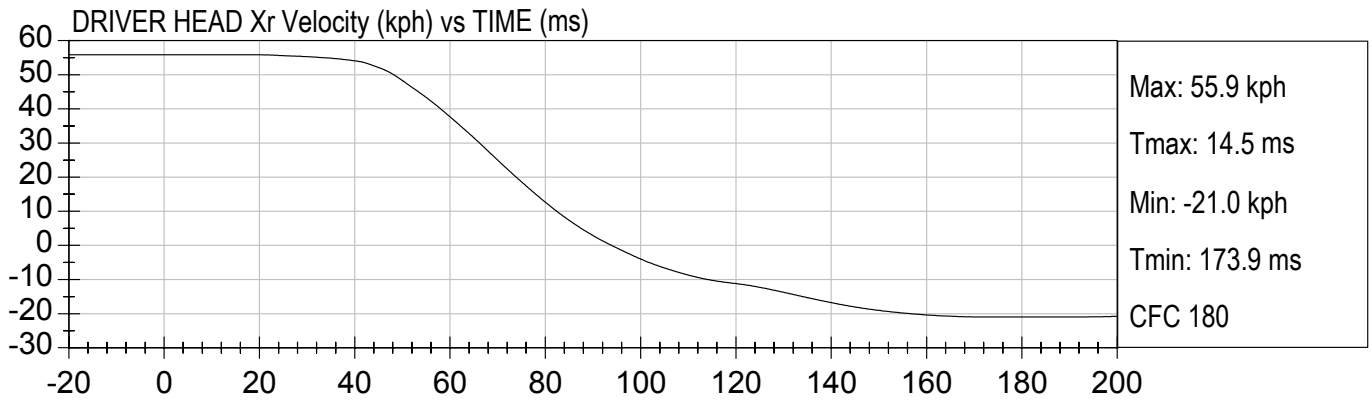
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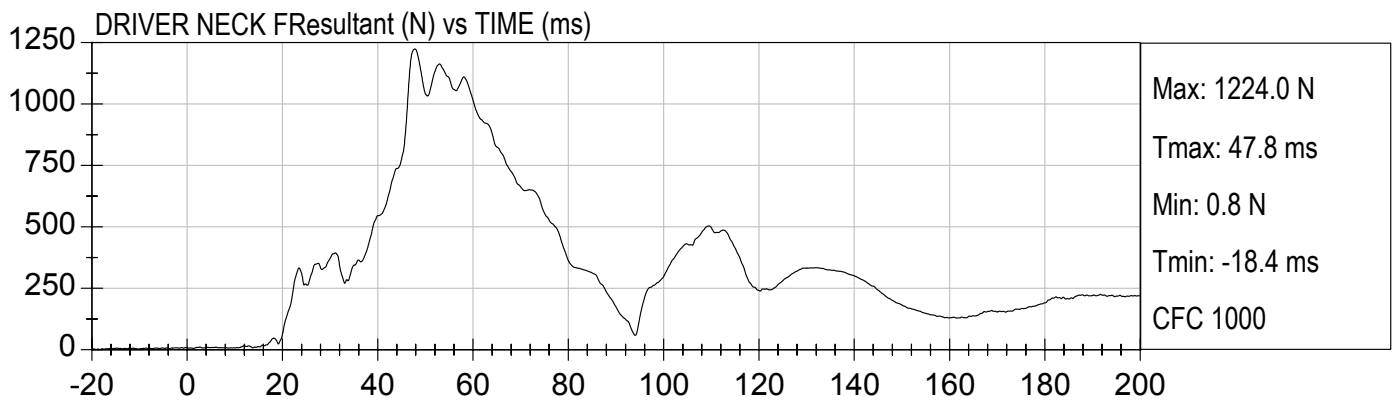
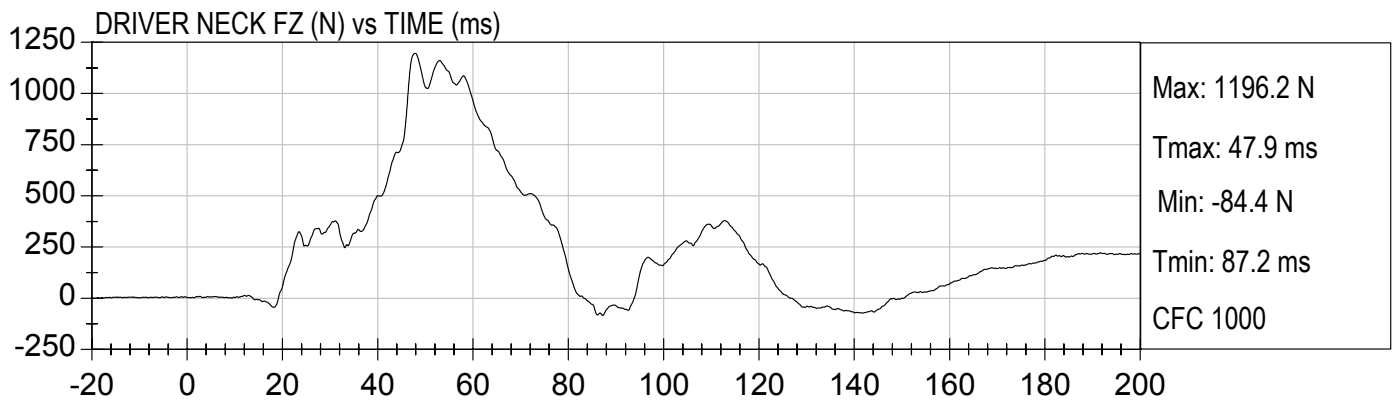
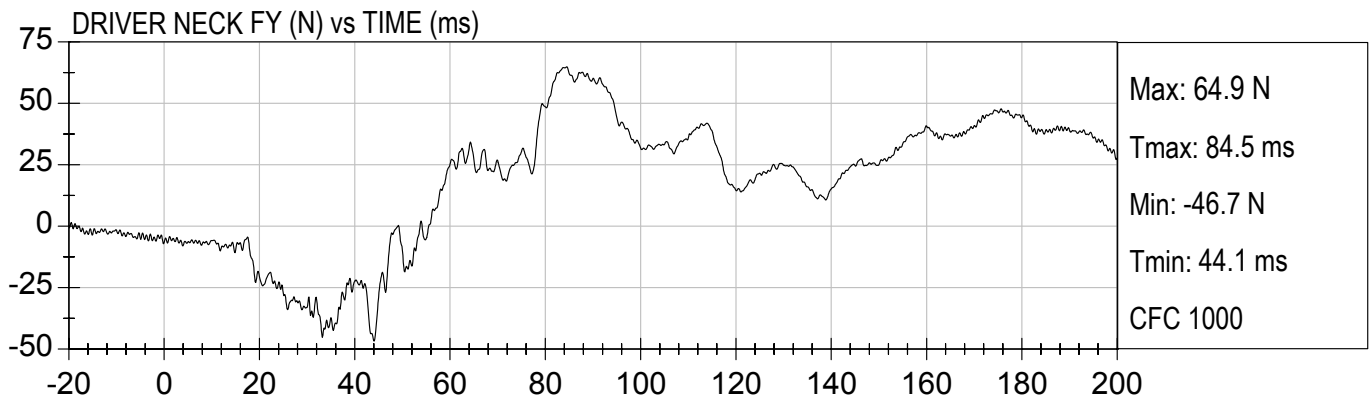
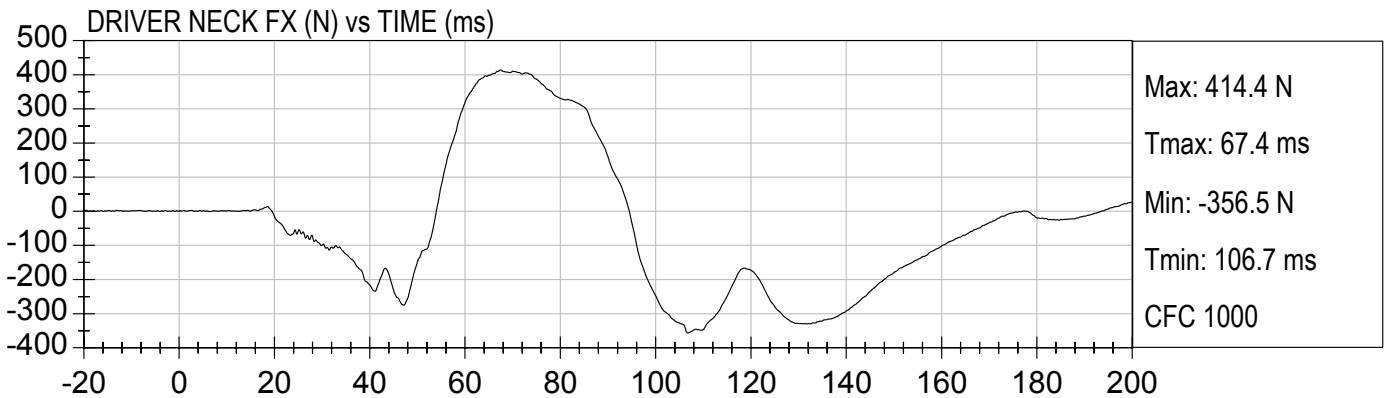
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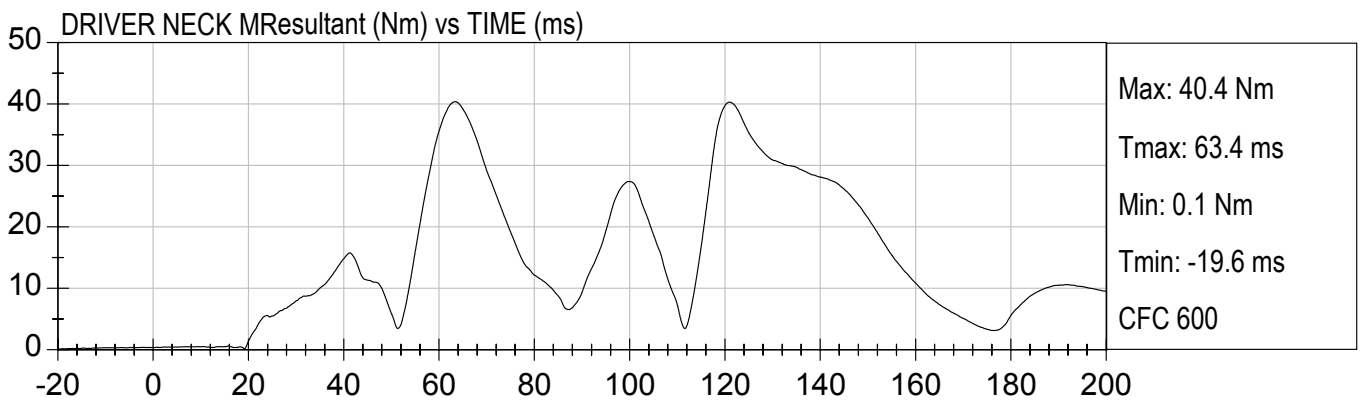
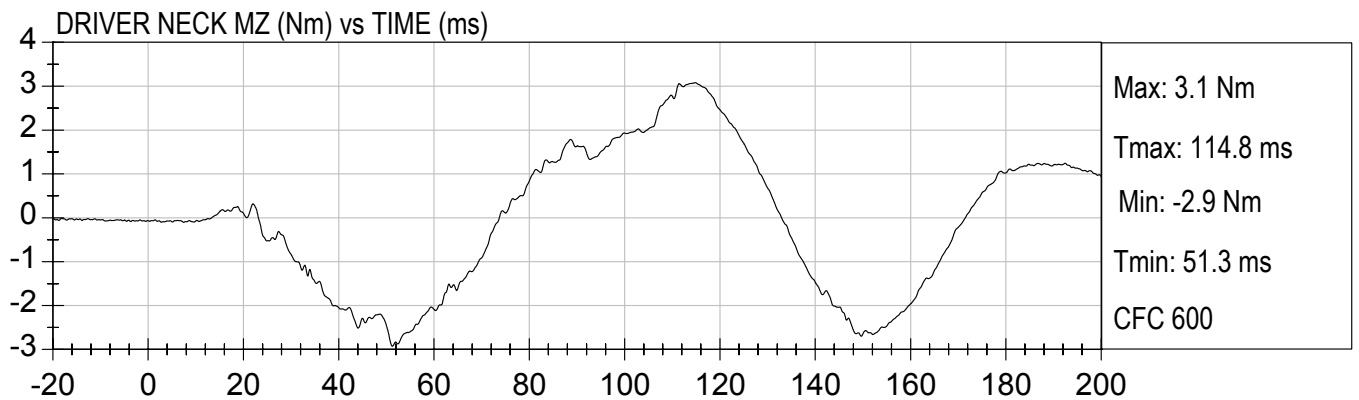
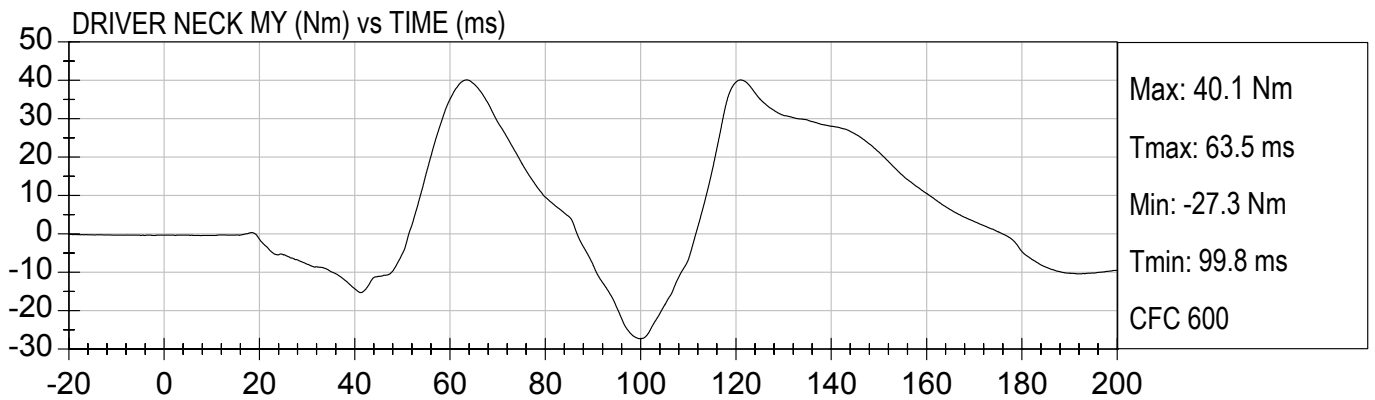
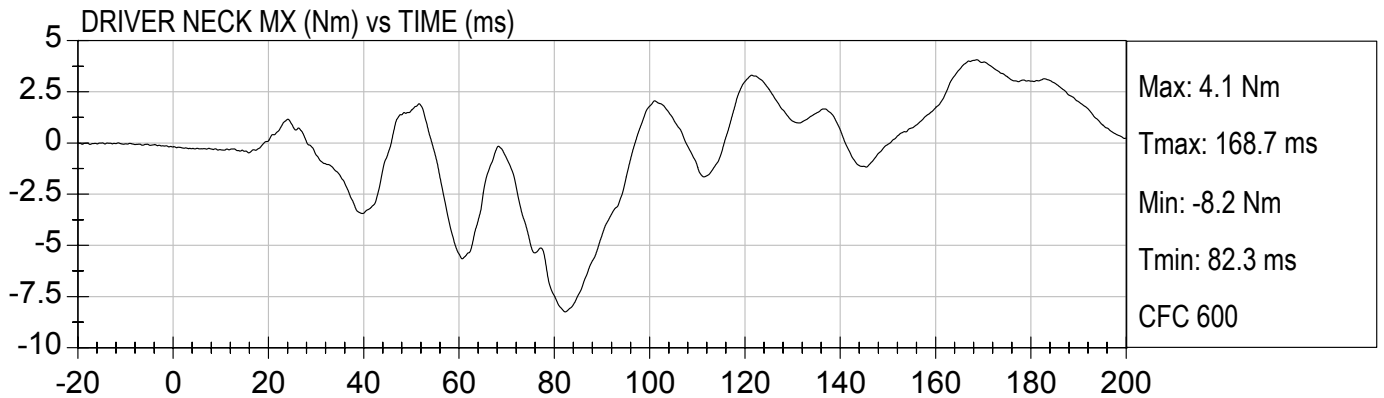


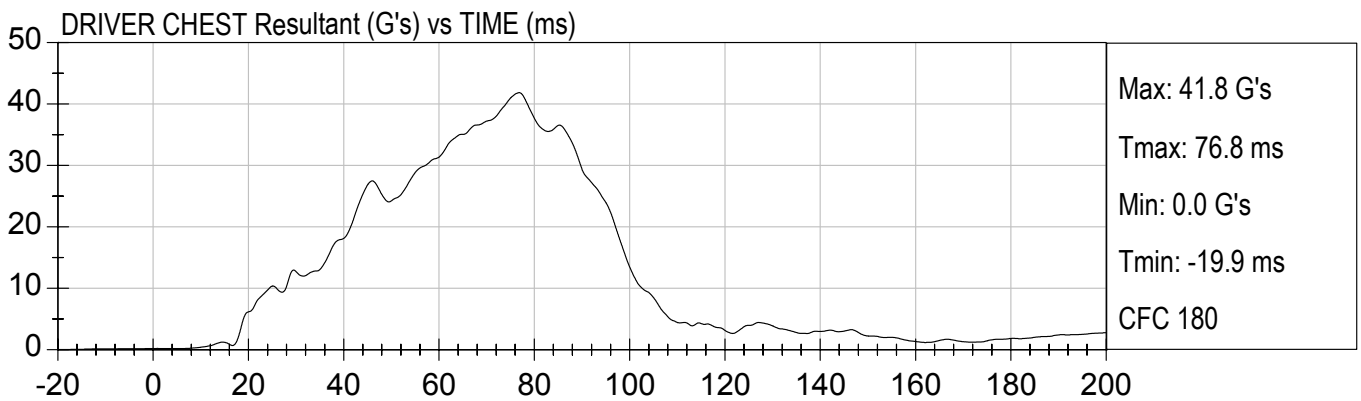
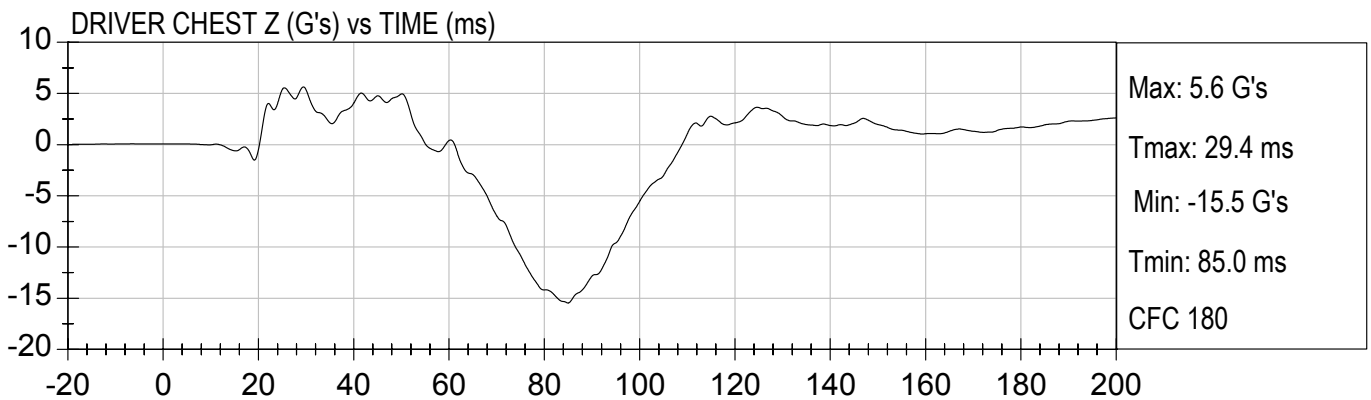
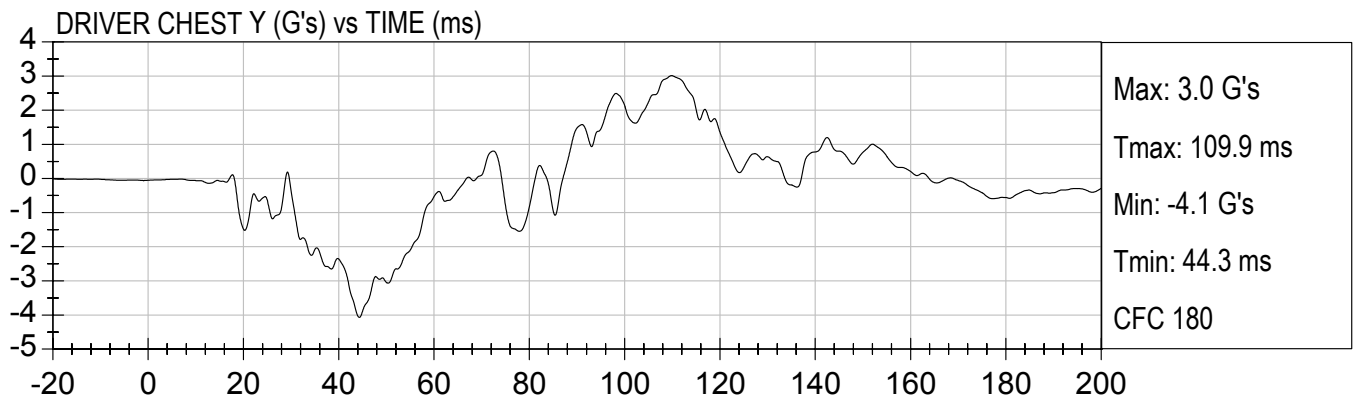
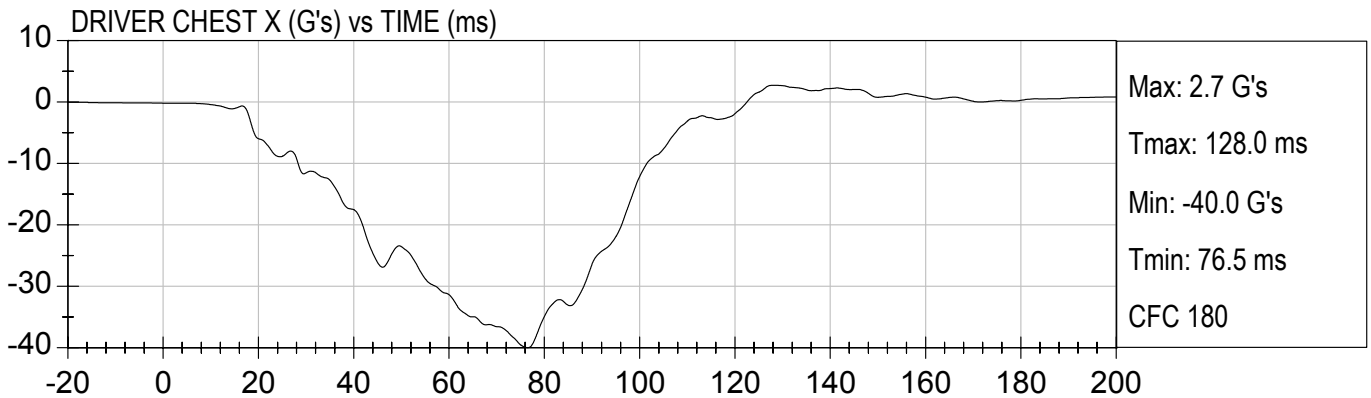


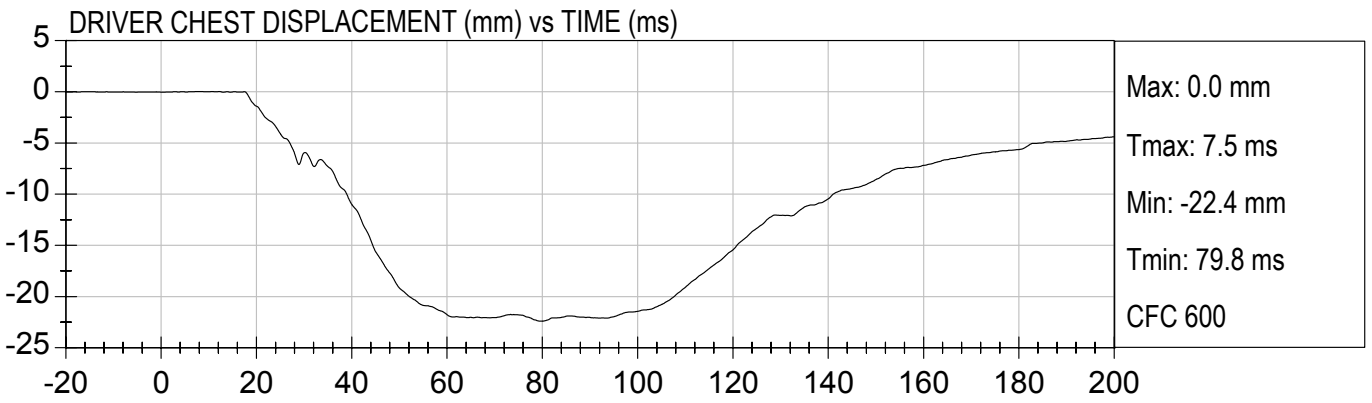
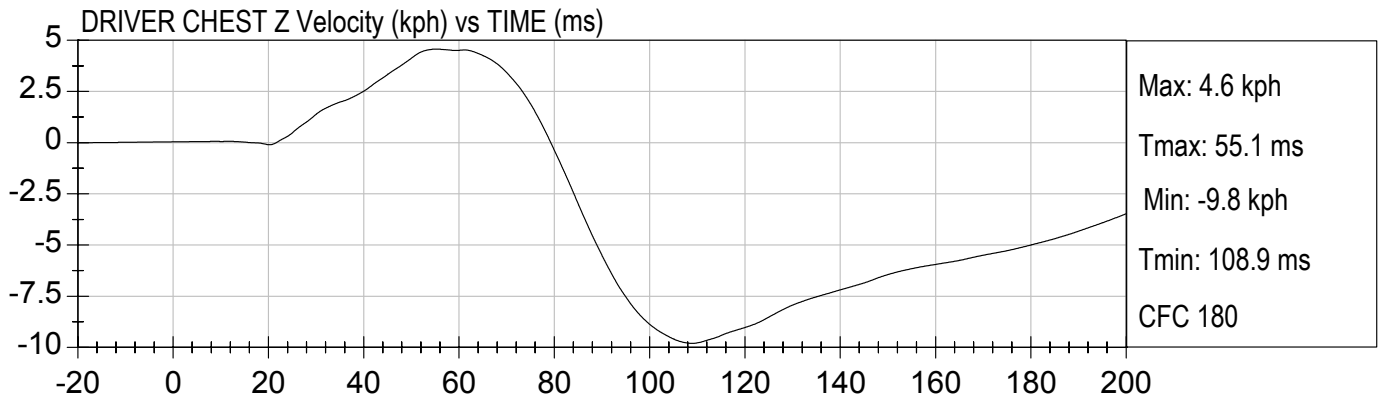
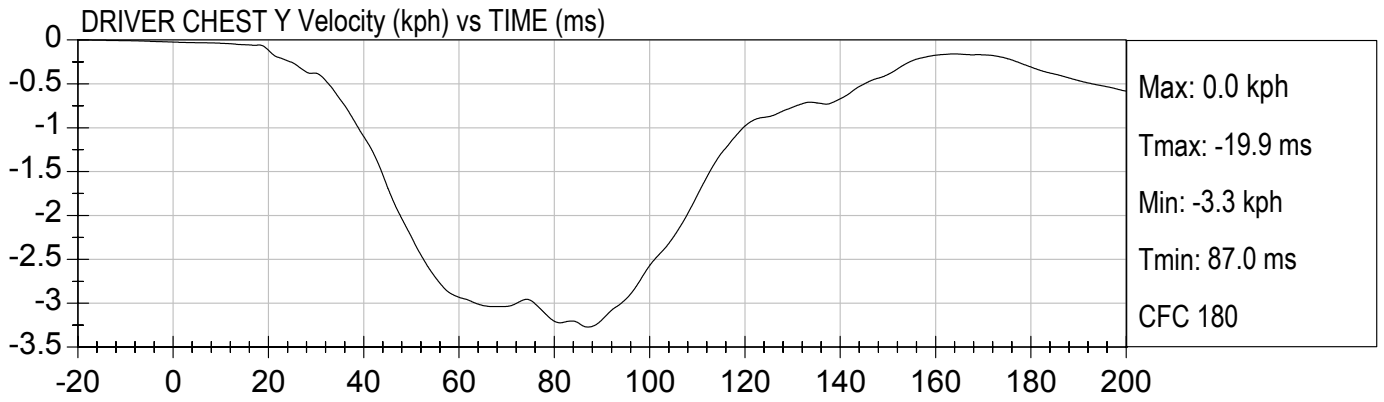
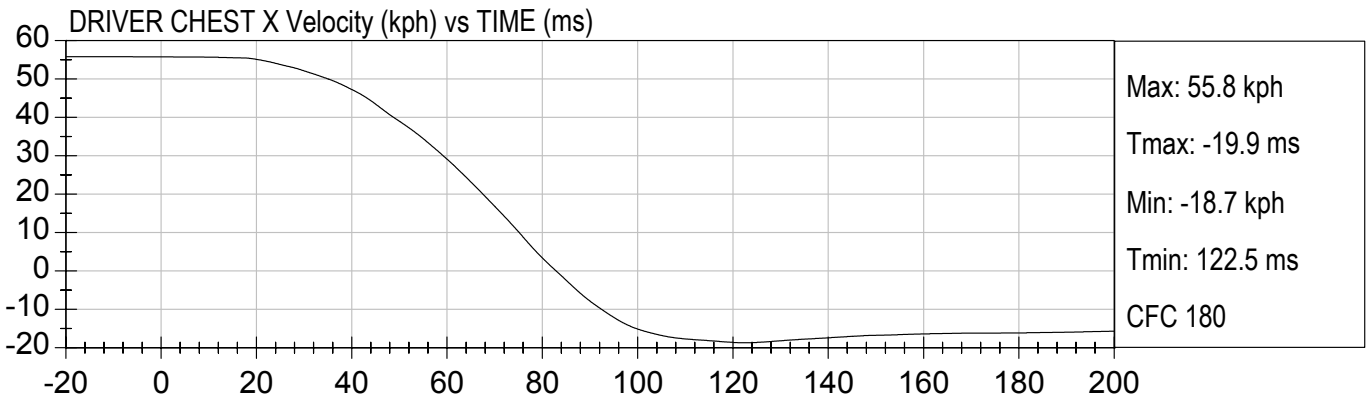


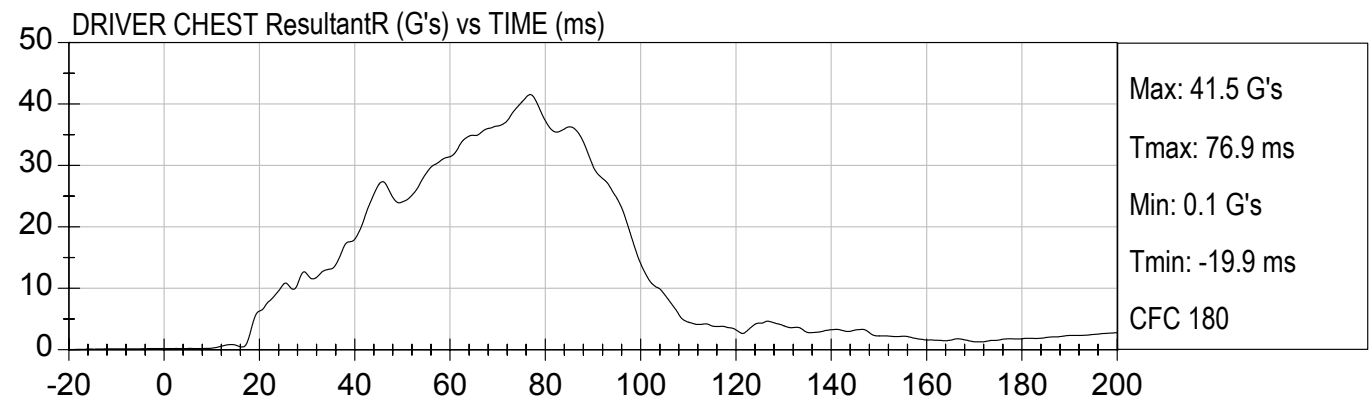
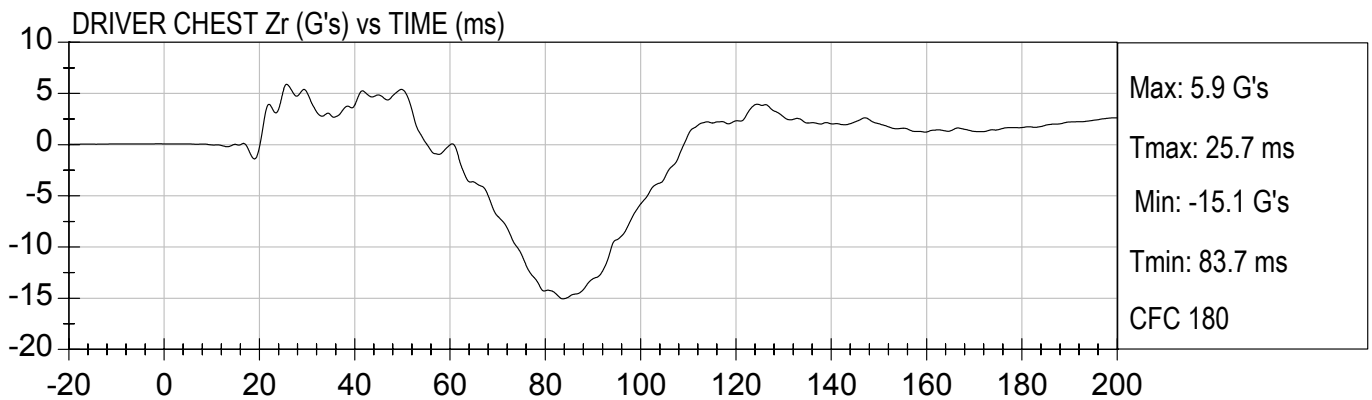
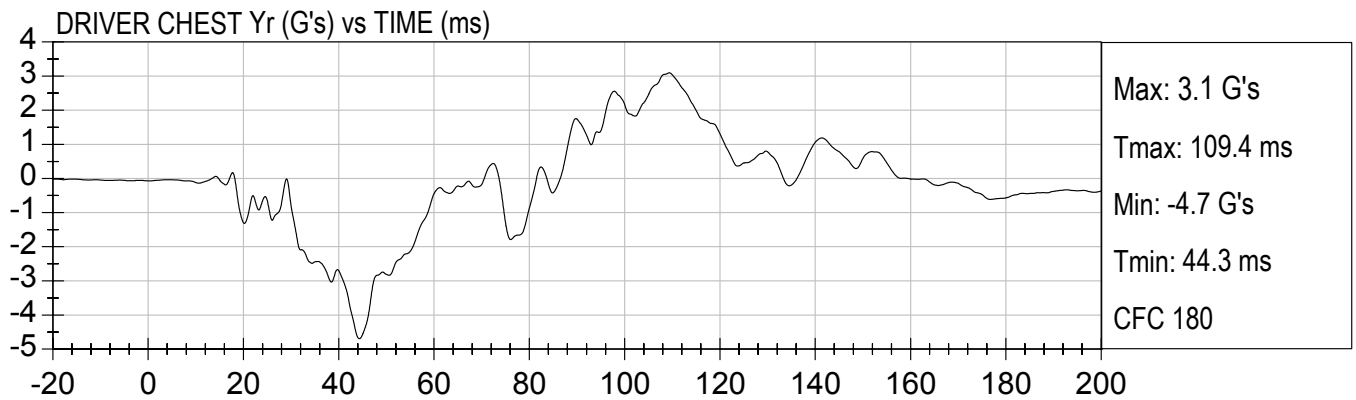
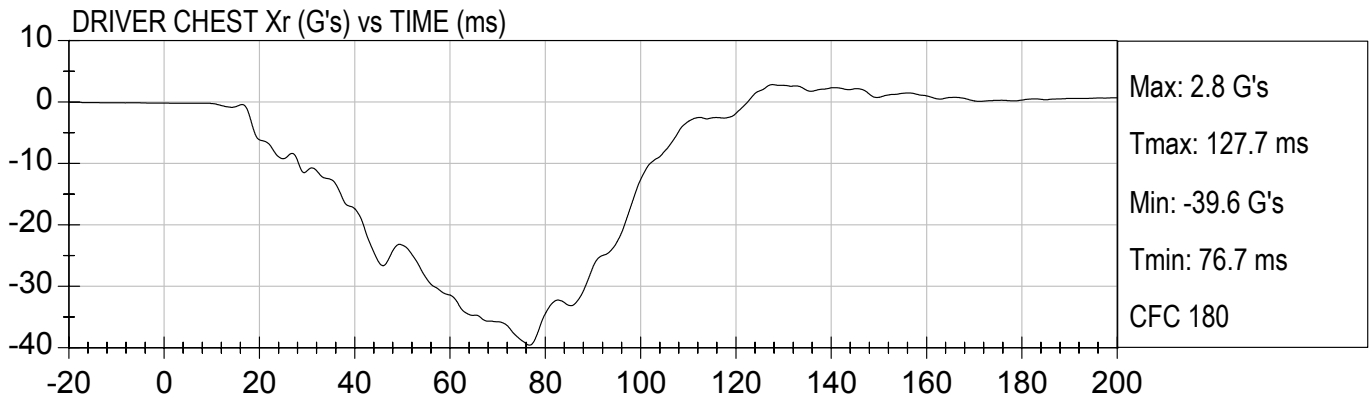


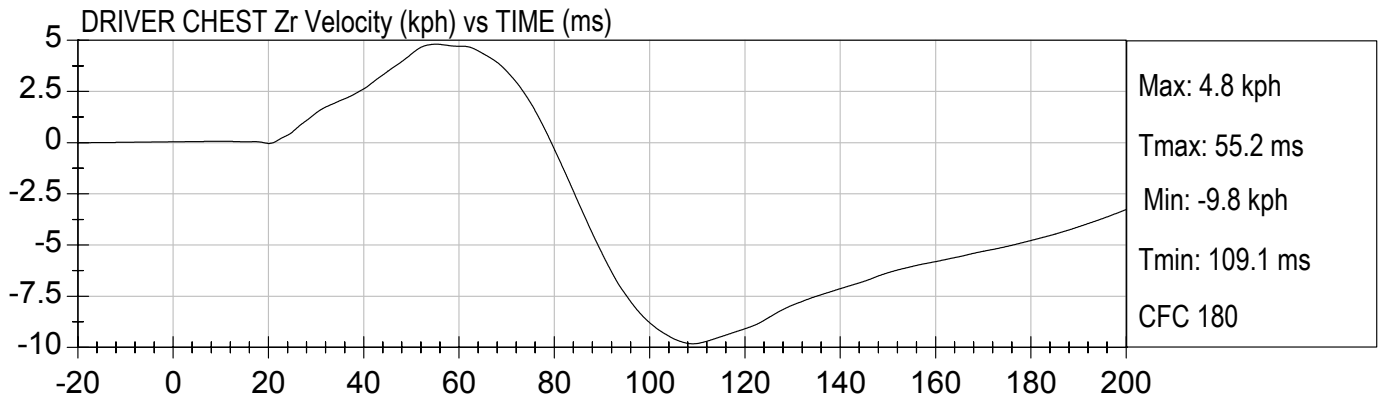
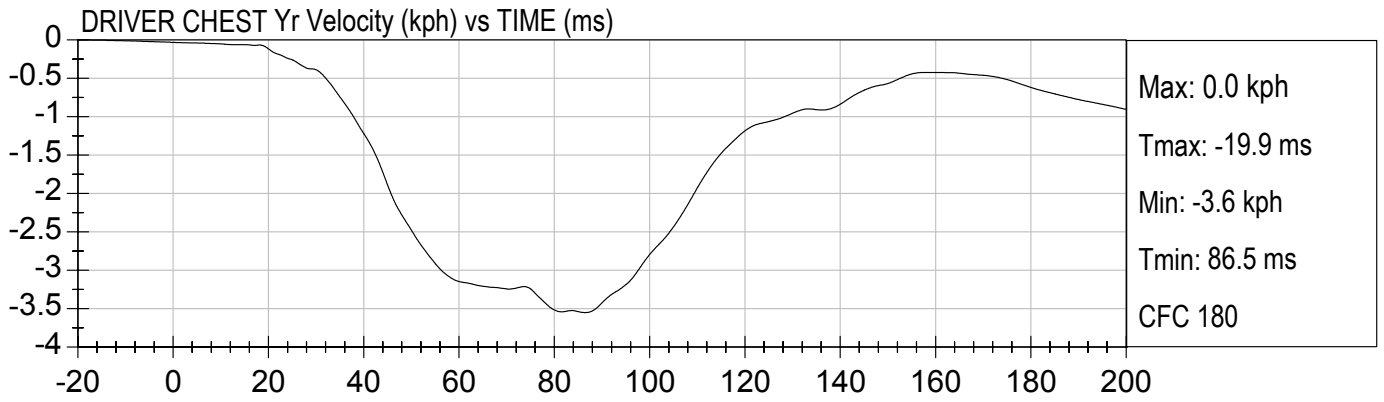
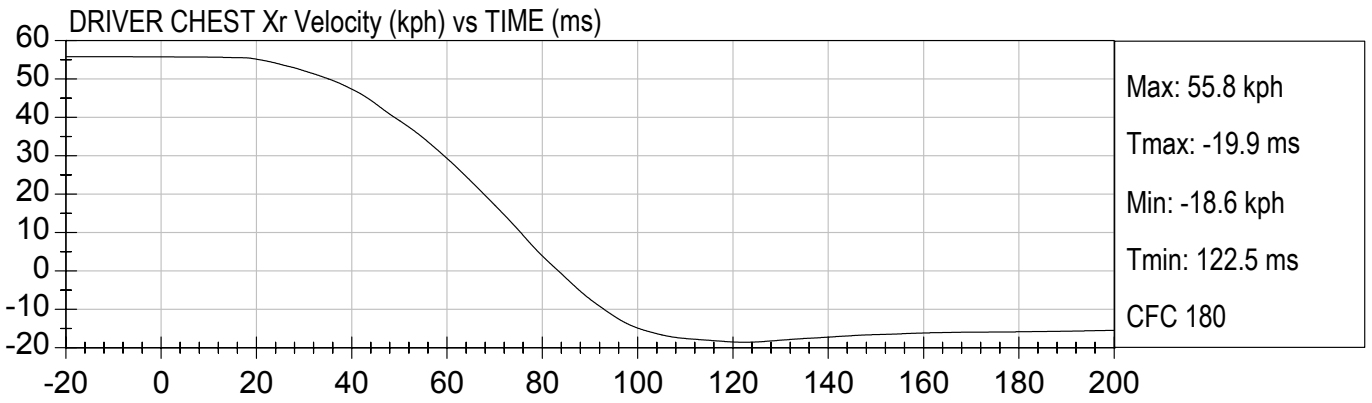


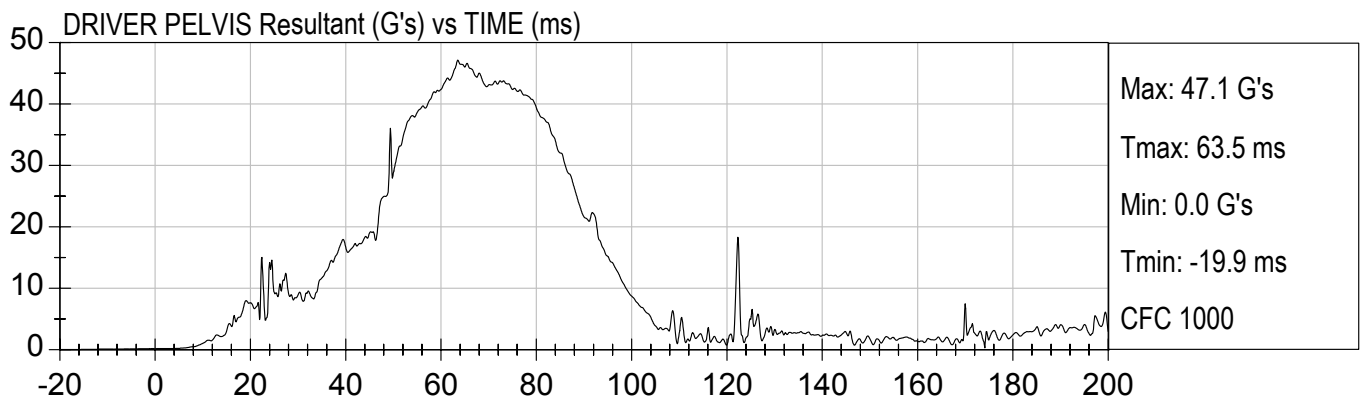
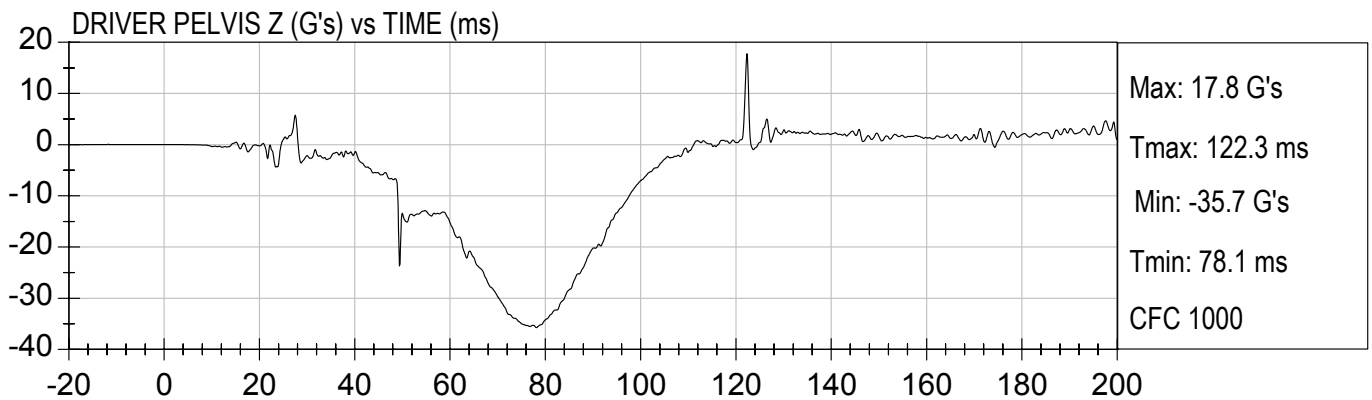
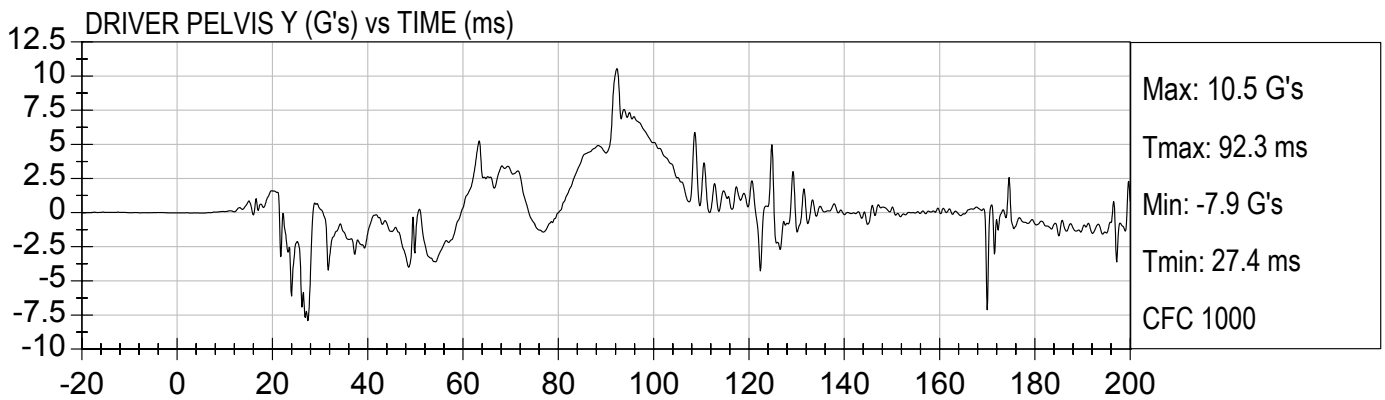
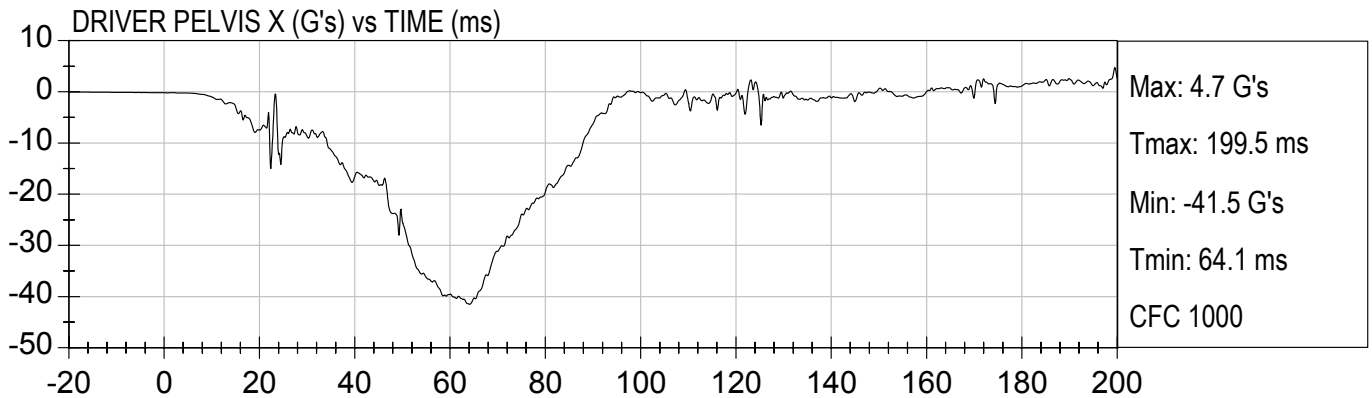


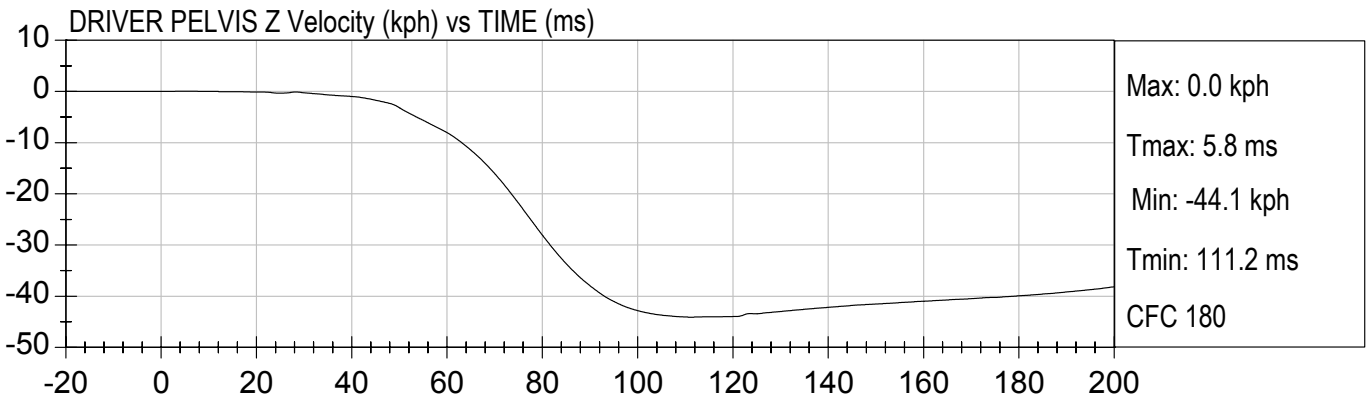
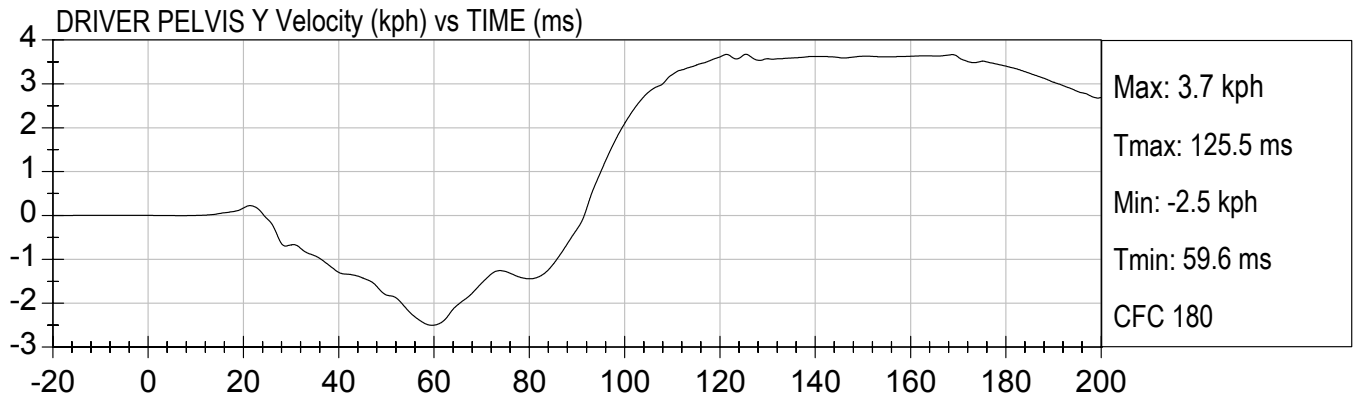
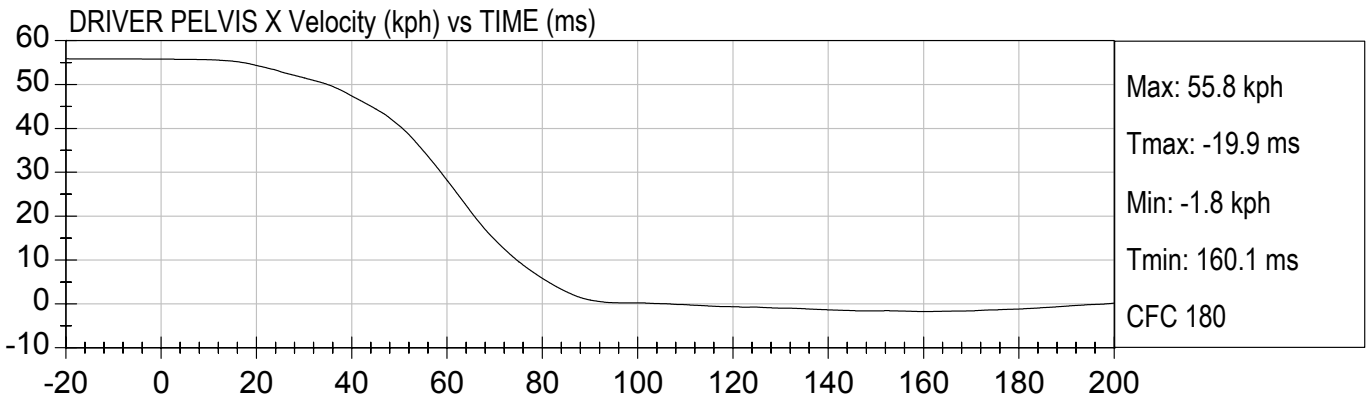


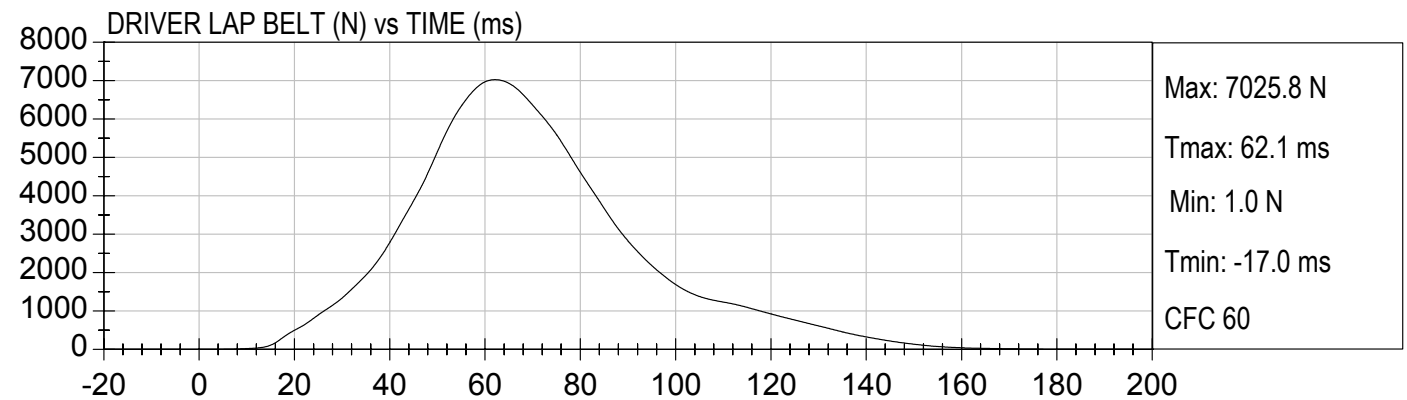
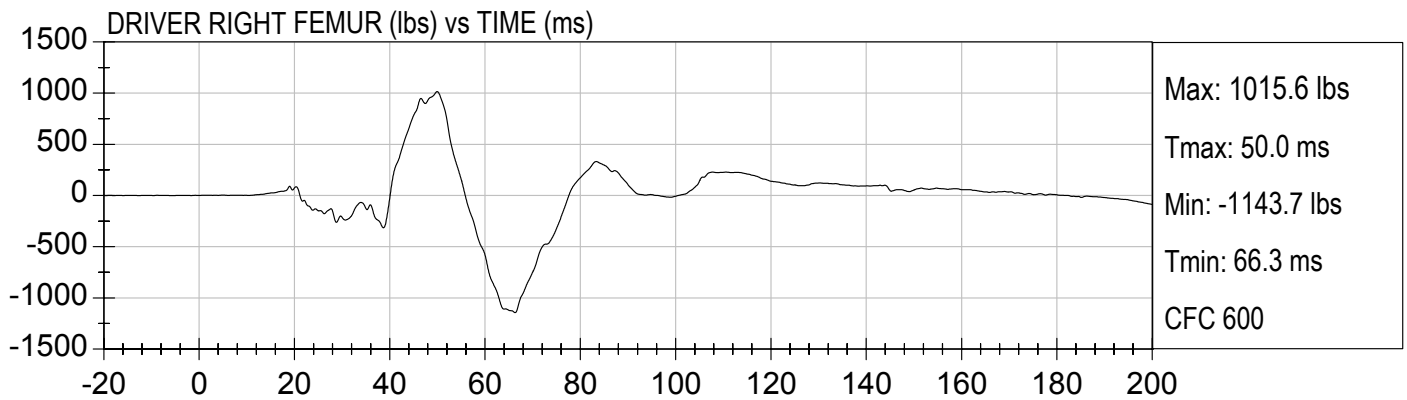
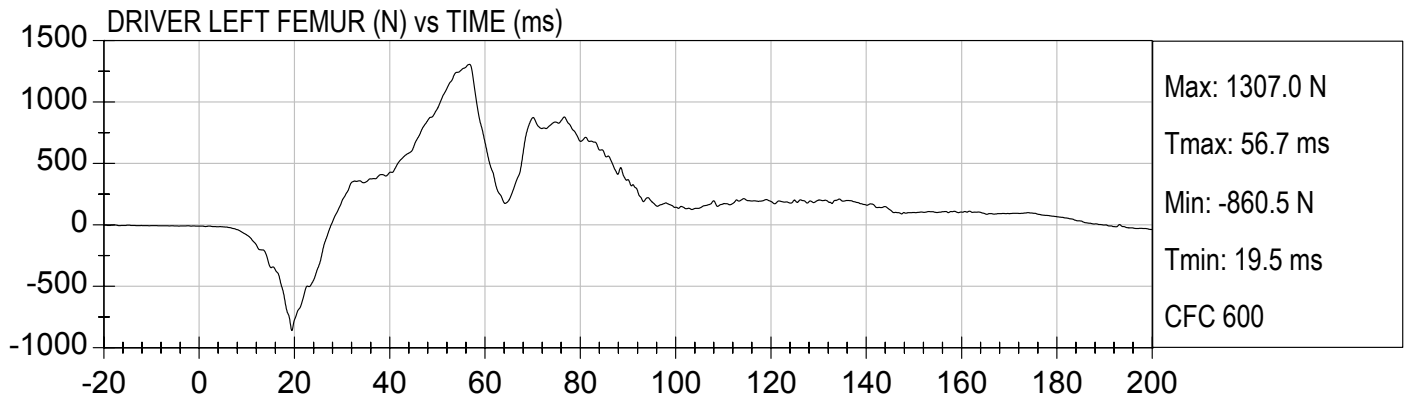


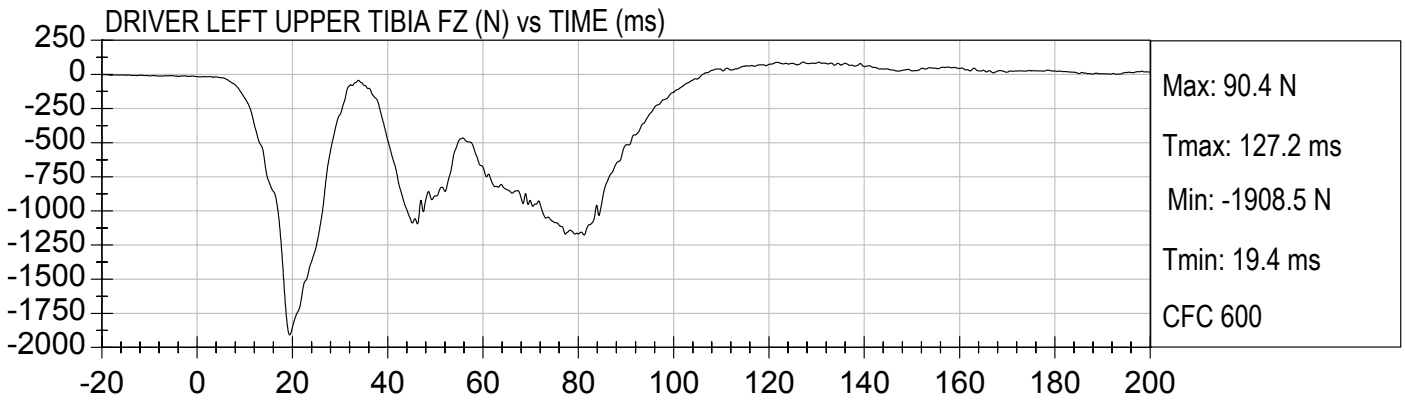
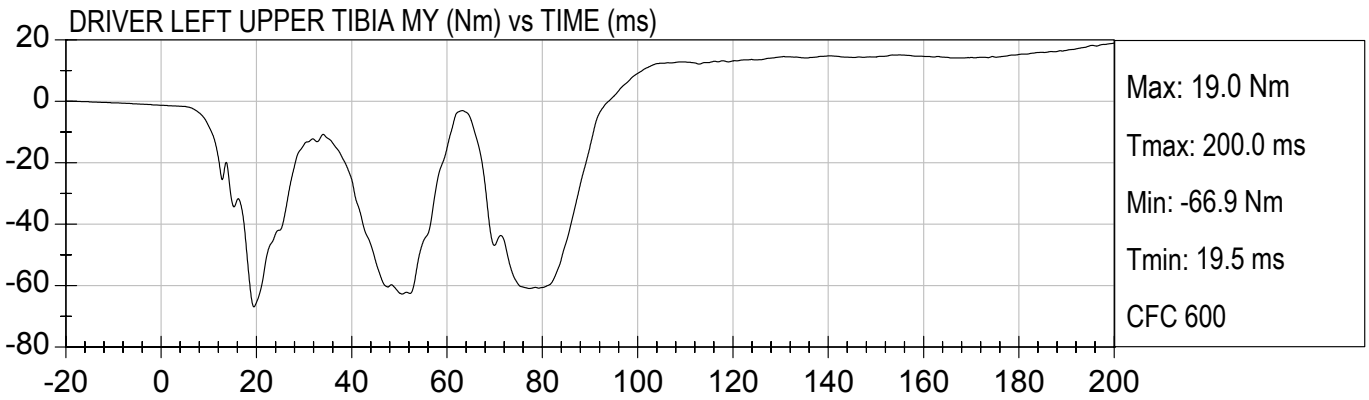
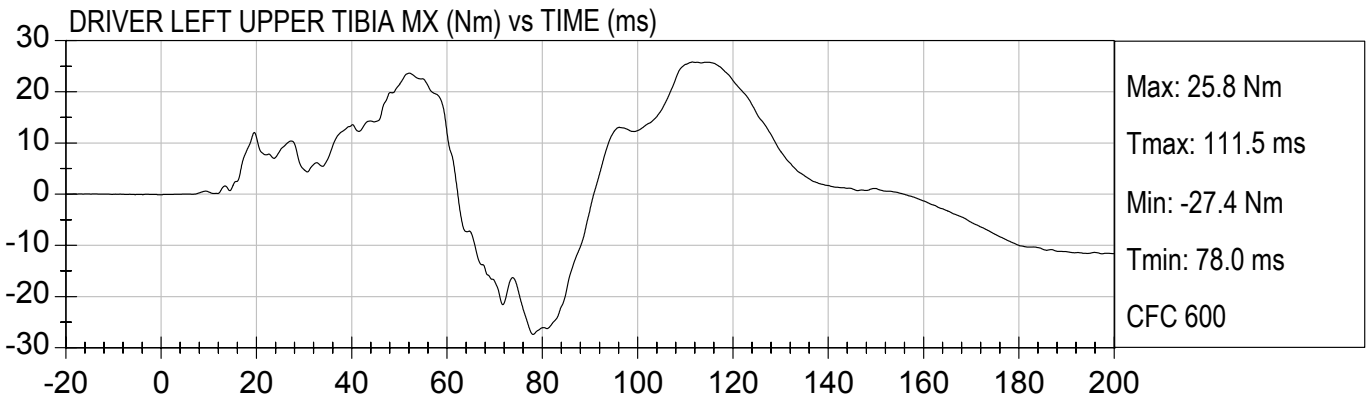


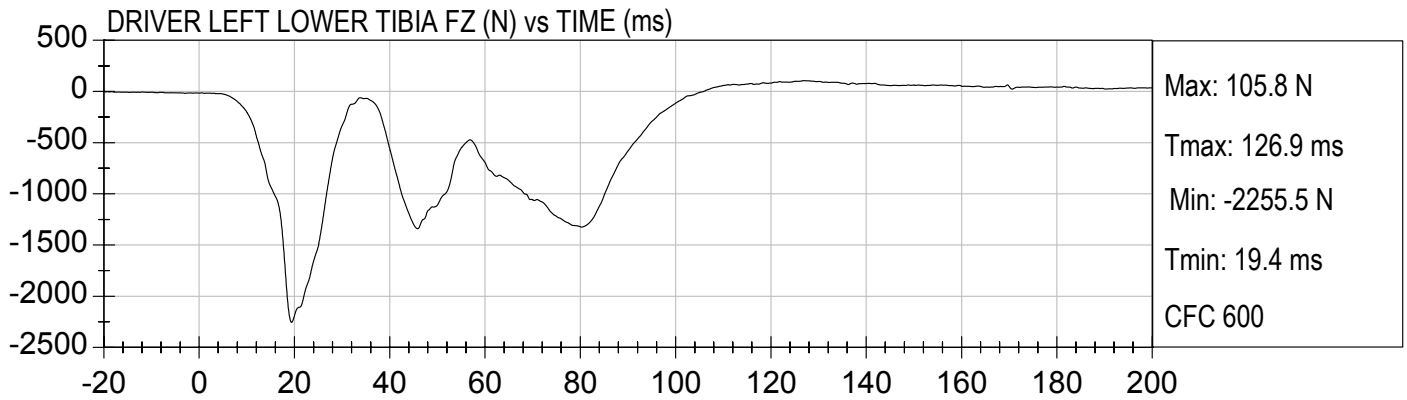
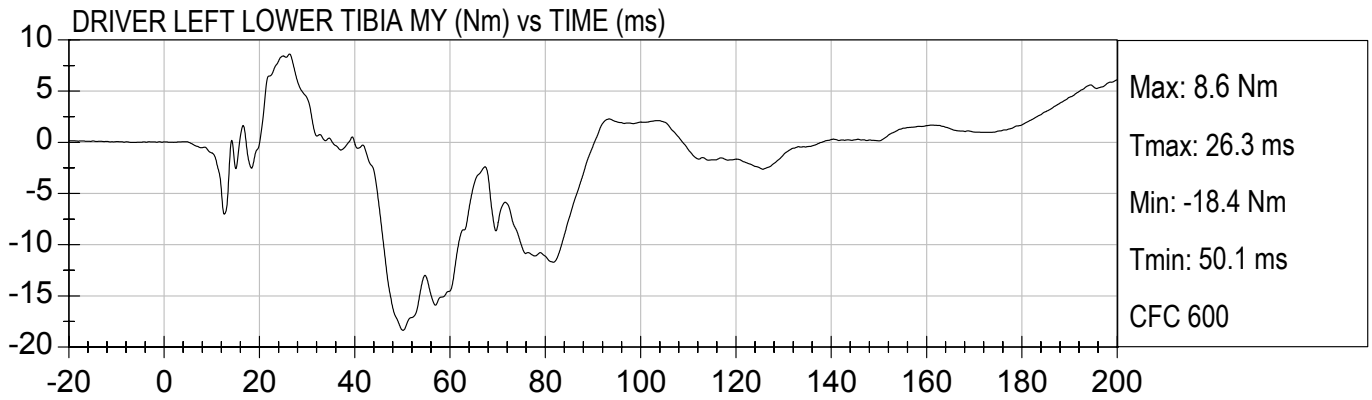
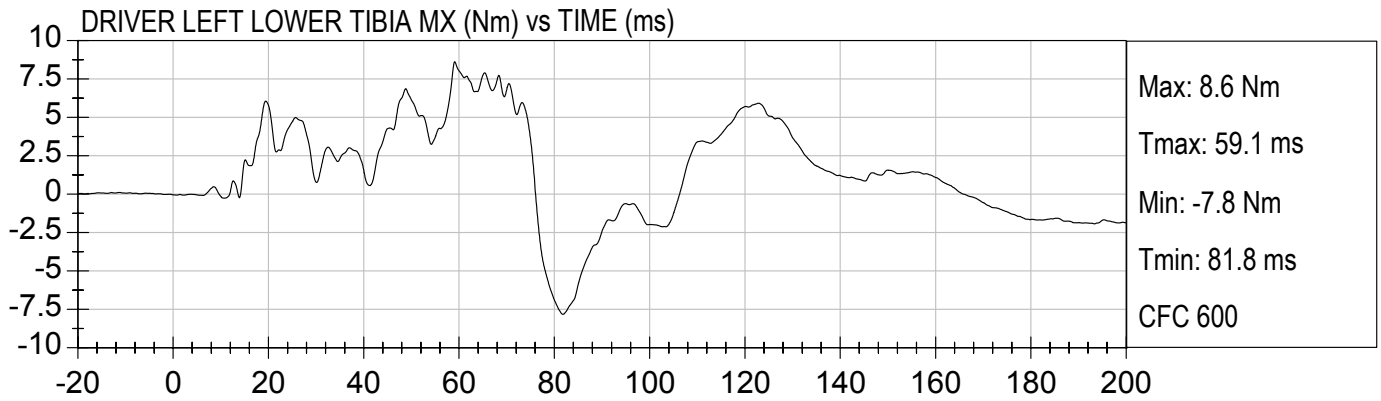






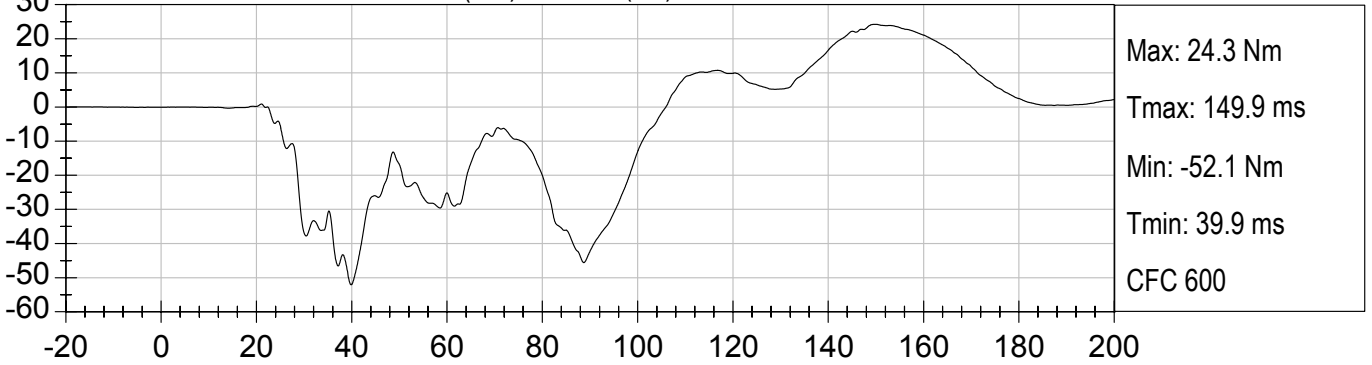




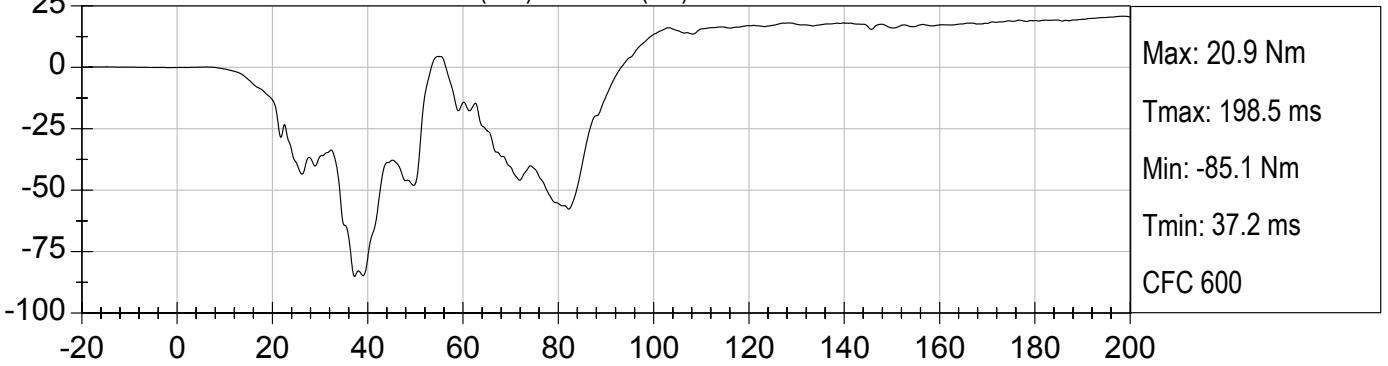




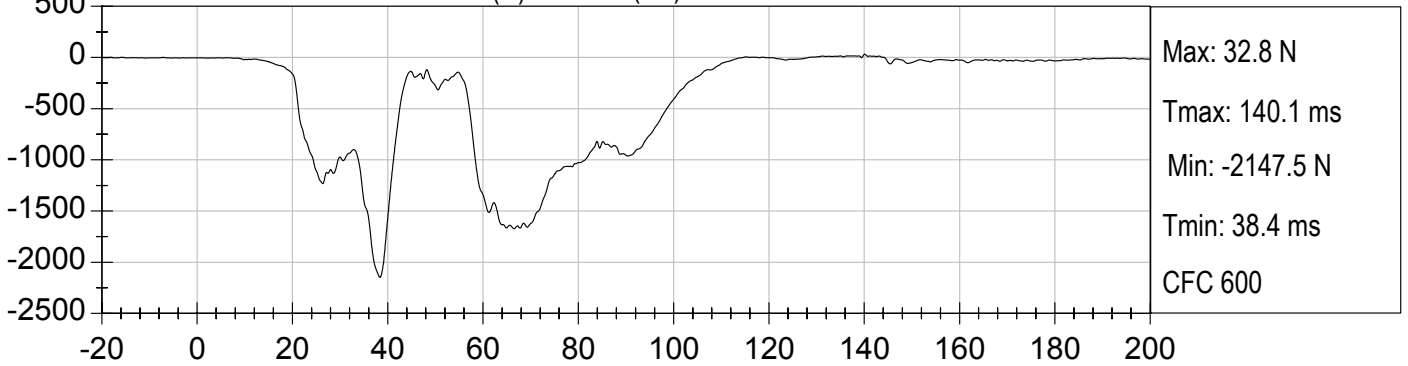
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DRIVER RIGHT UPPER TIBIA MY (Nm) vs TIME (ms)

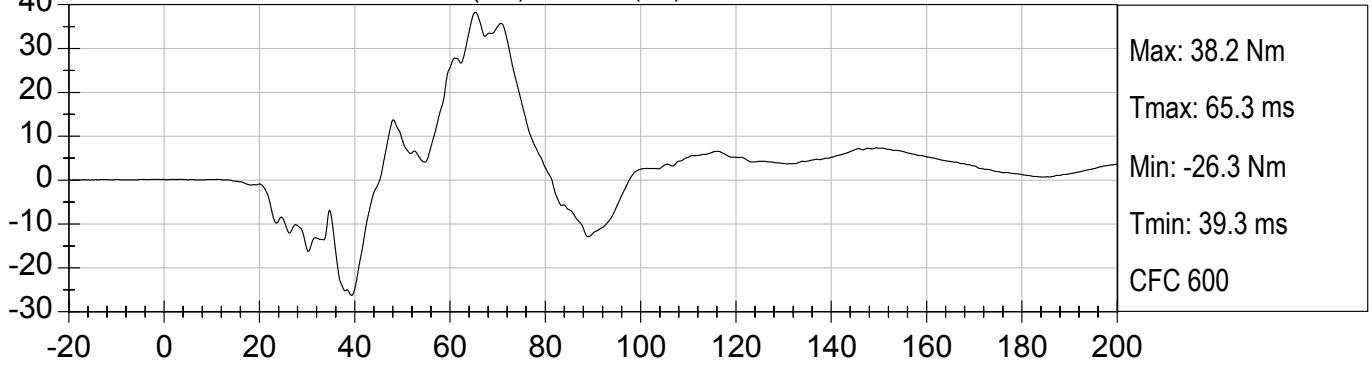


DRIVER RIGHT UPPER TIBIA FZ (N) vs TIME (ms)

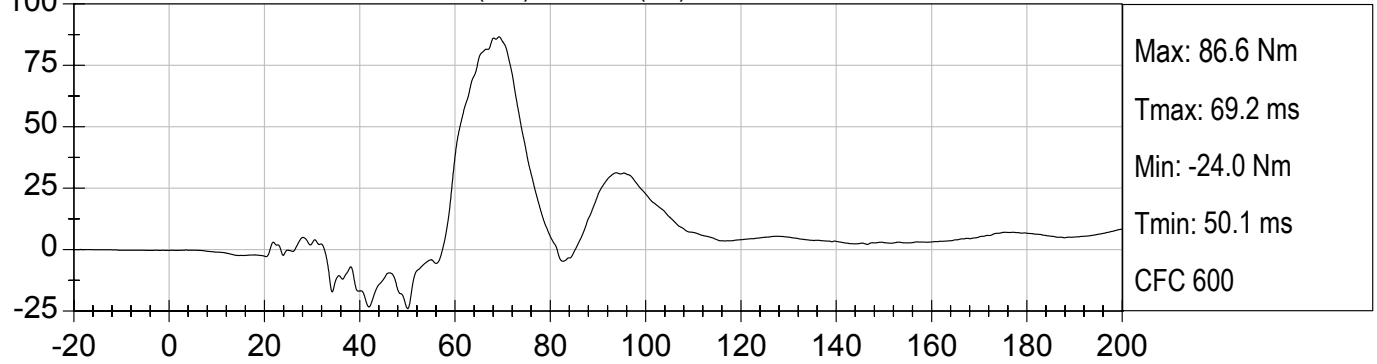




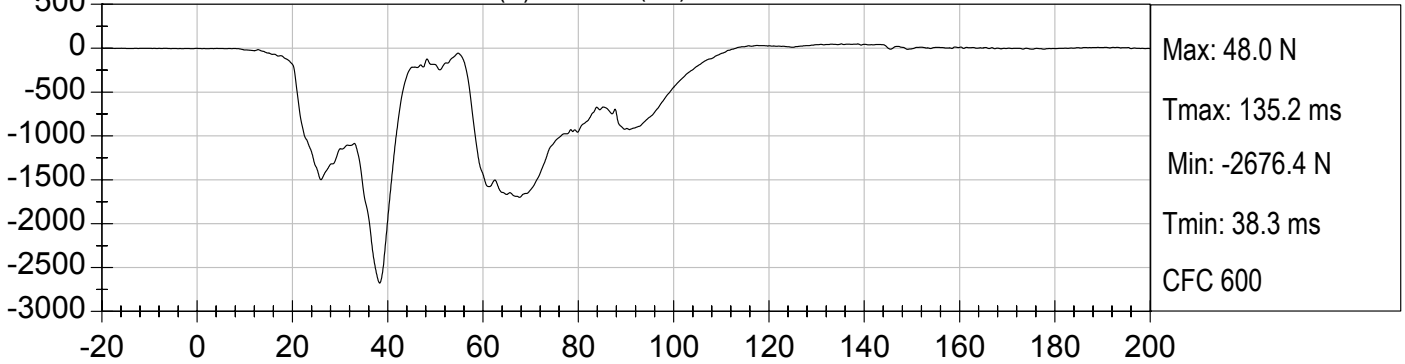
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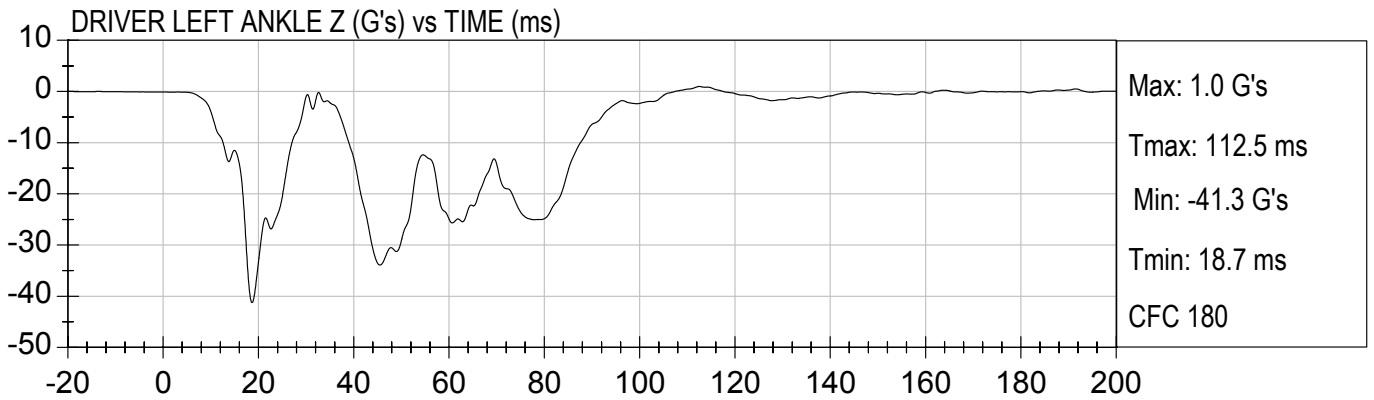
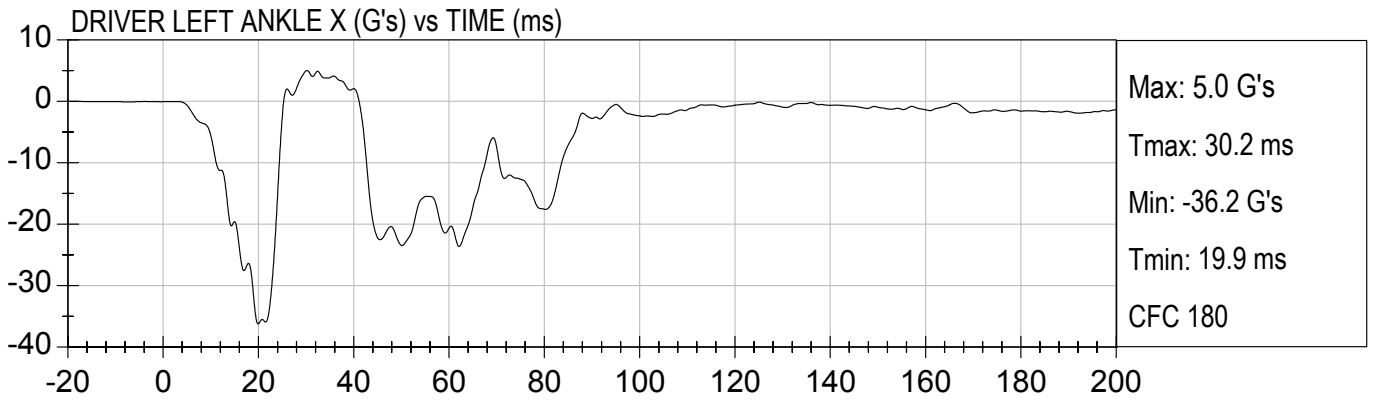
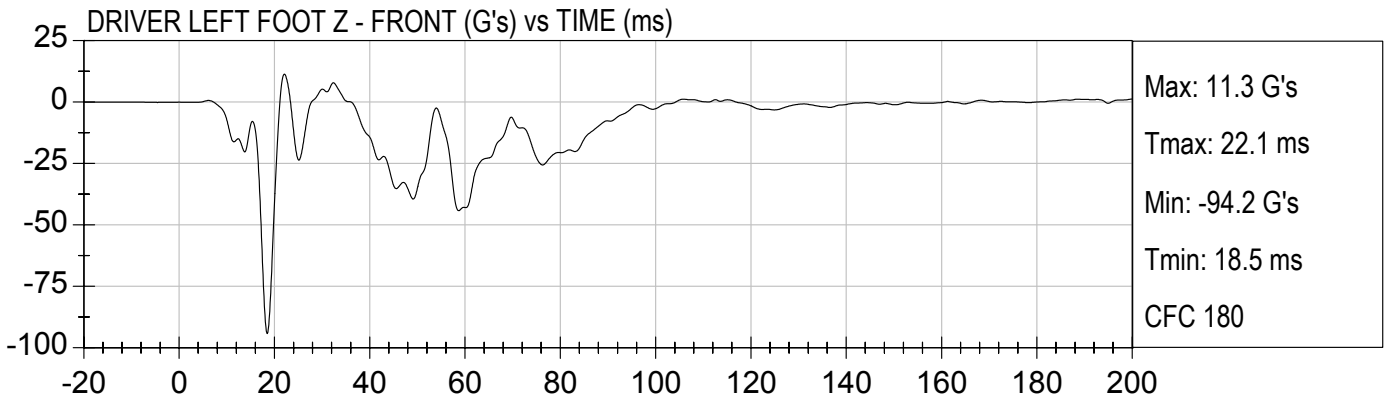


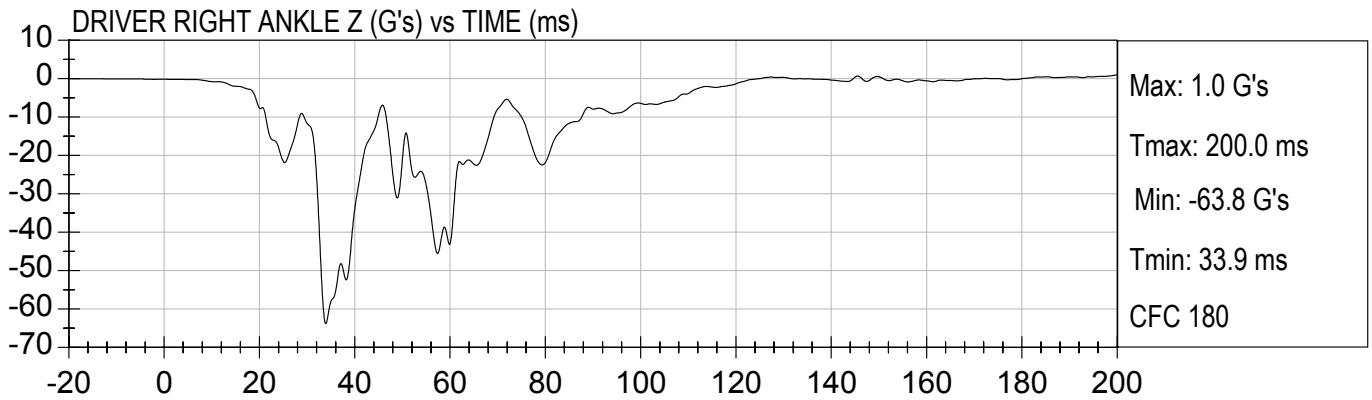
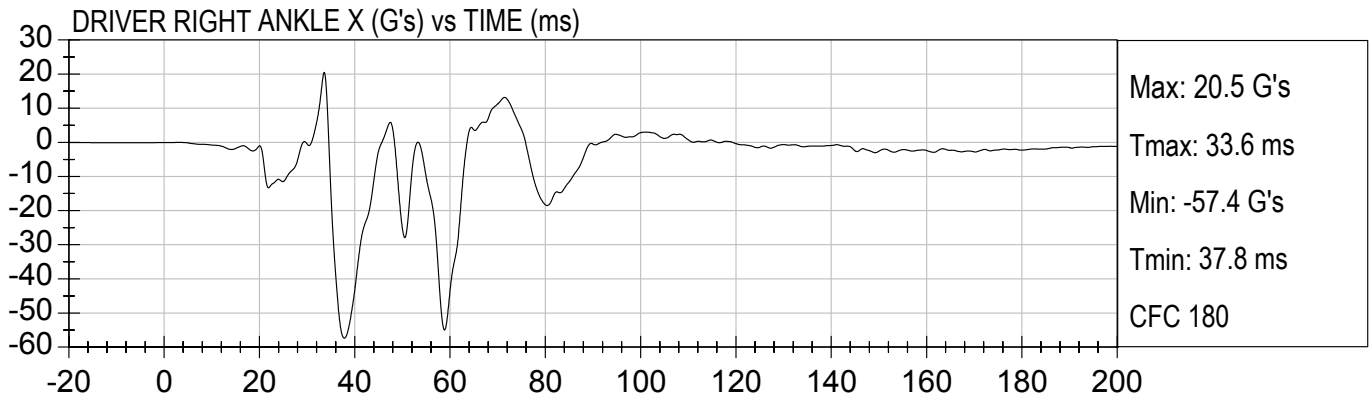
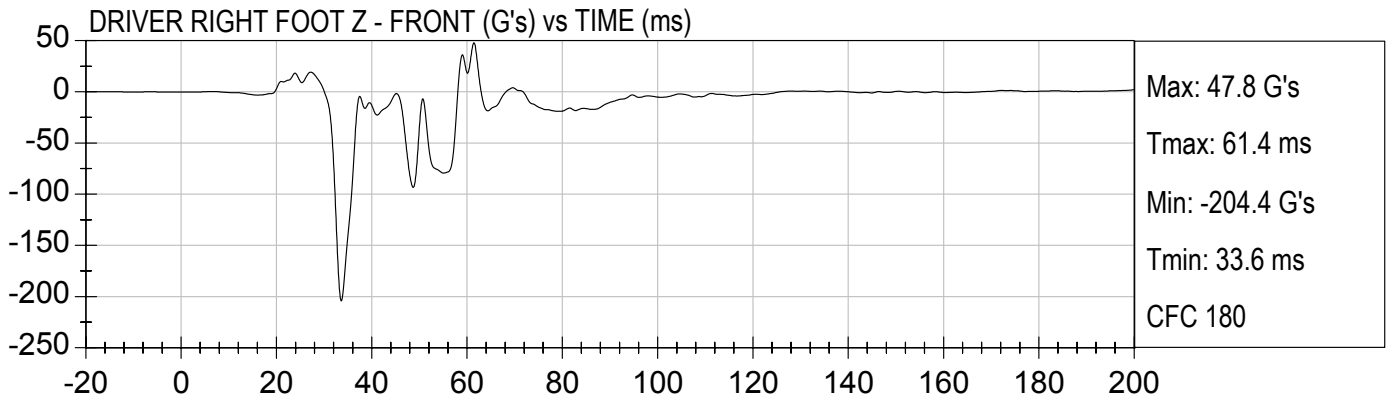
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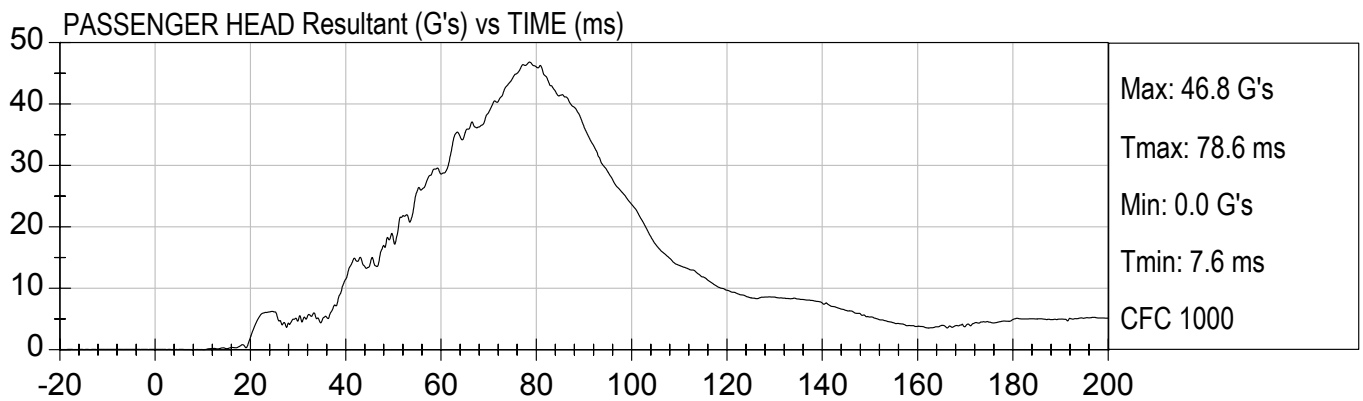
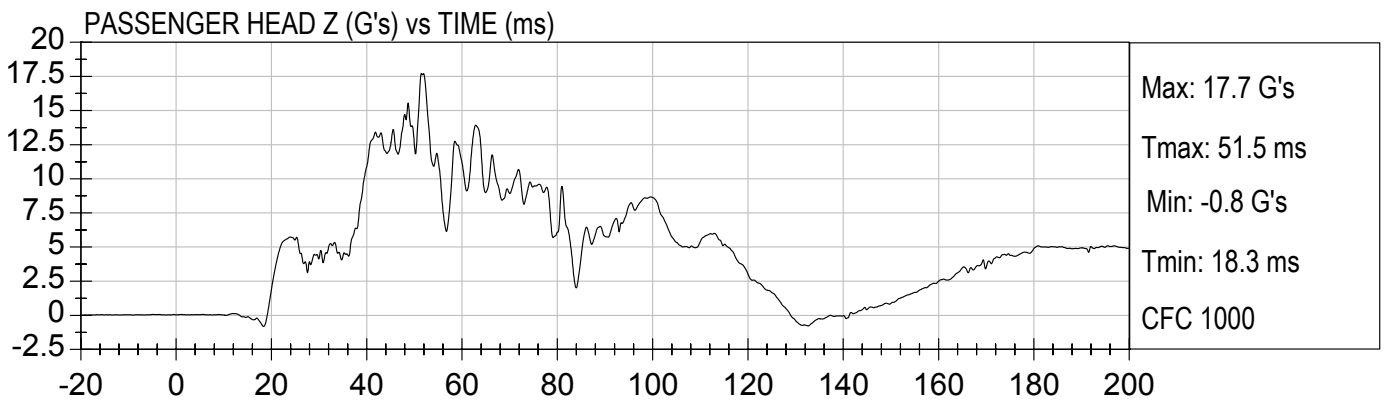
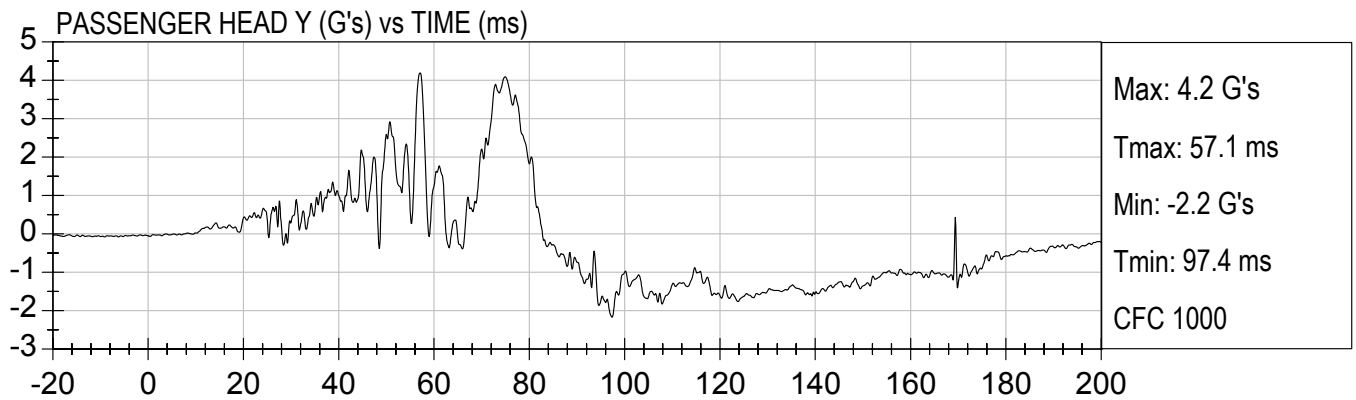
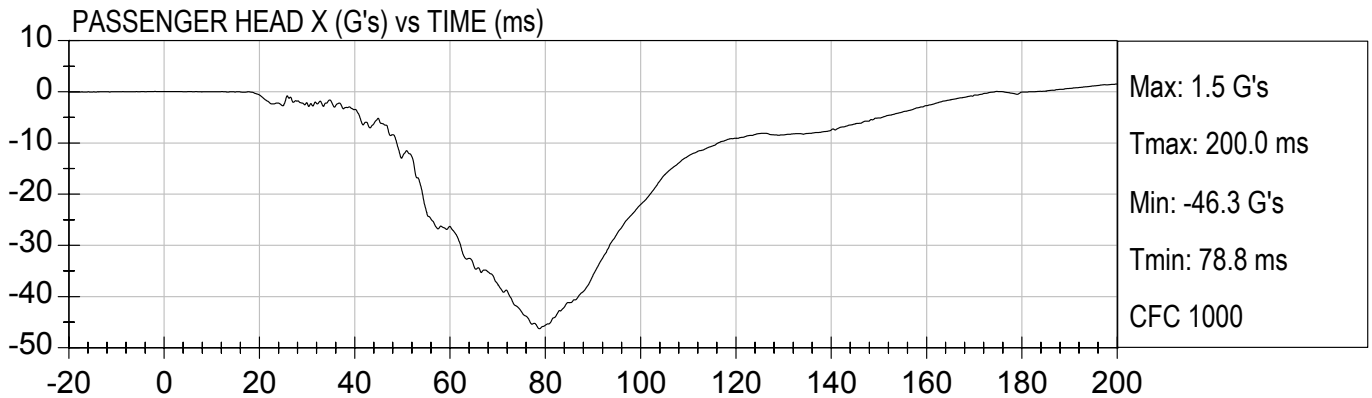


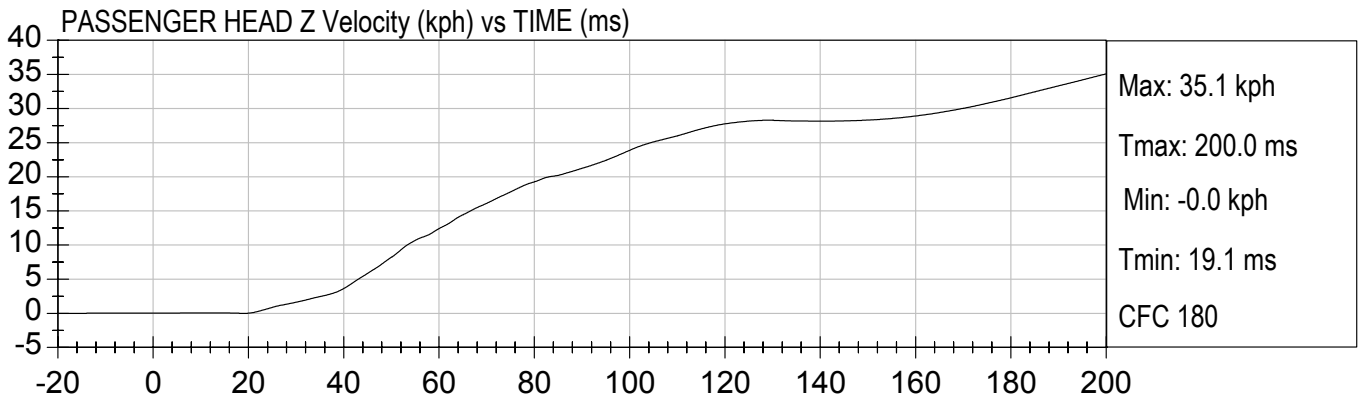
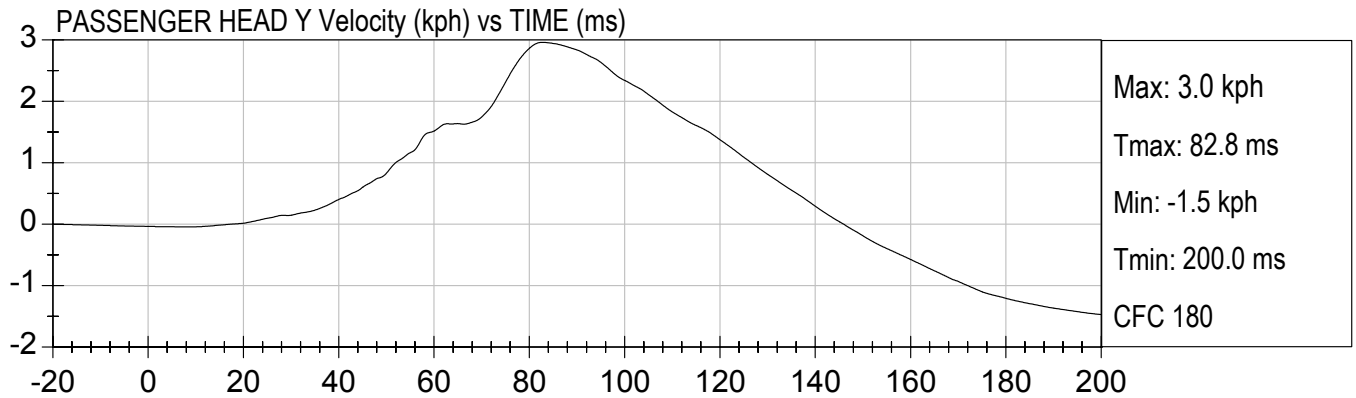
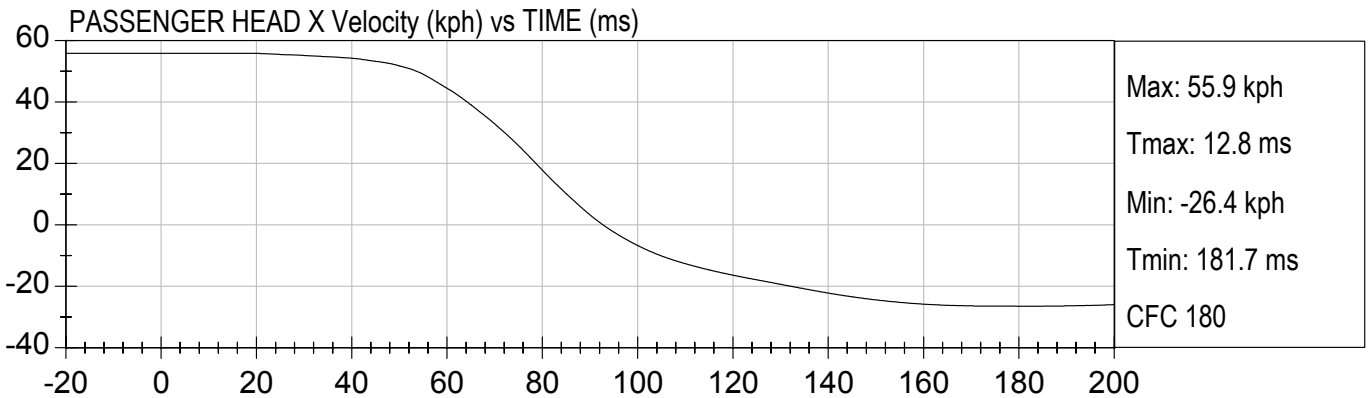
DRIVER RIGHT LOWER TIBIA FZ (N) vs TIME (ms)

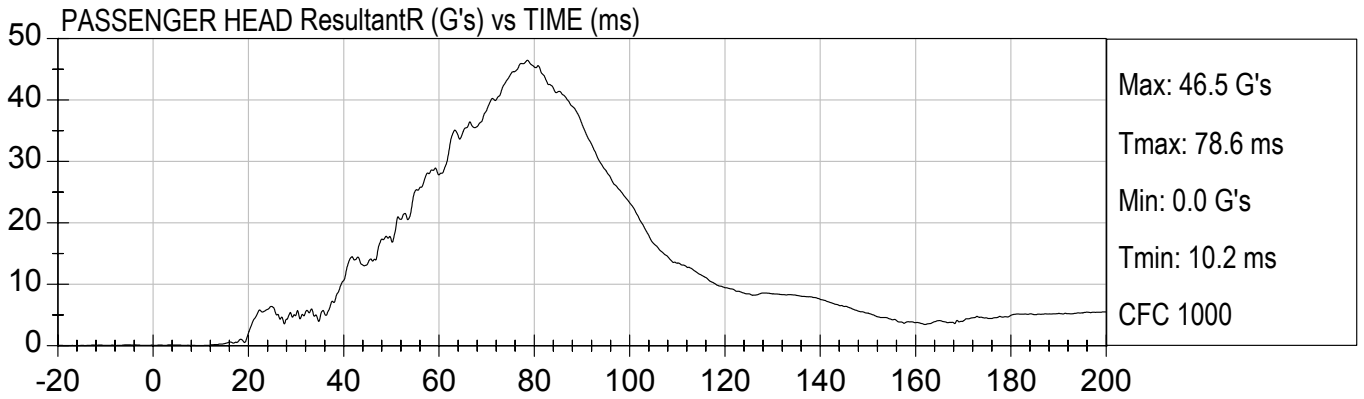
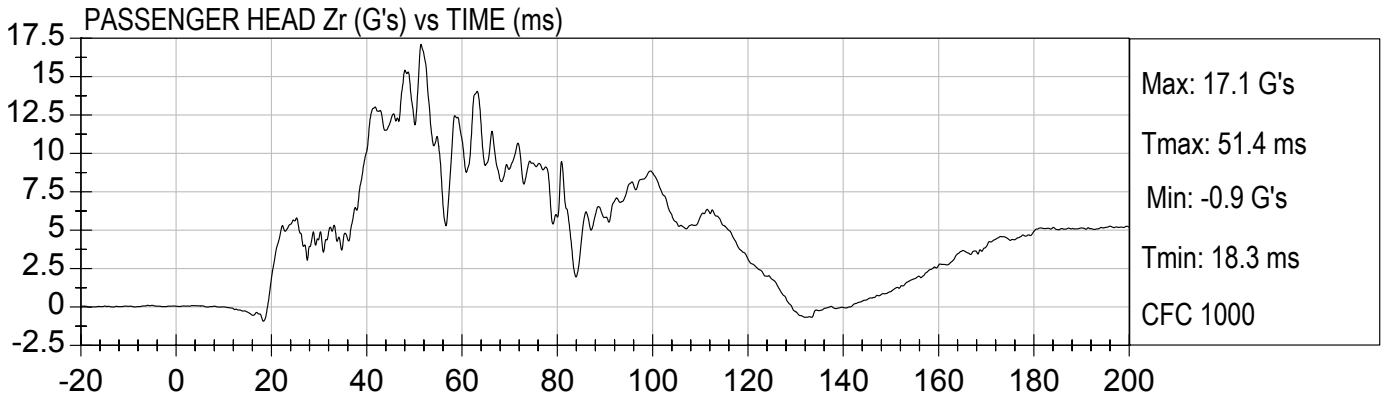
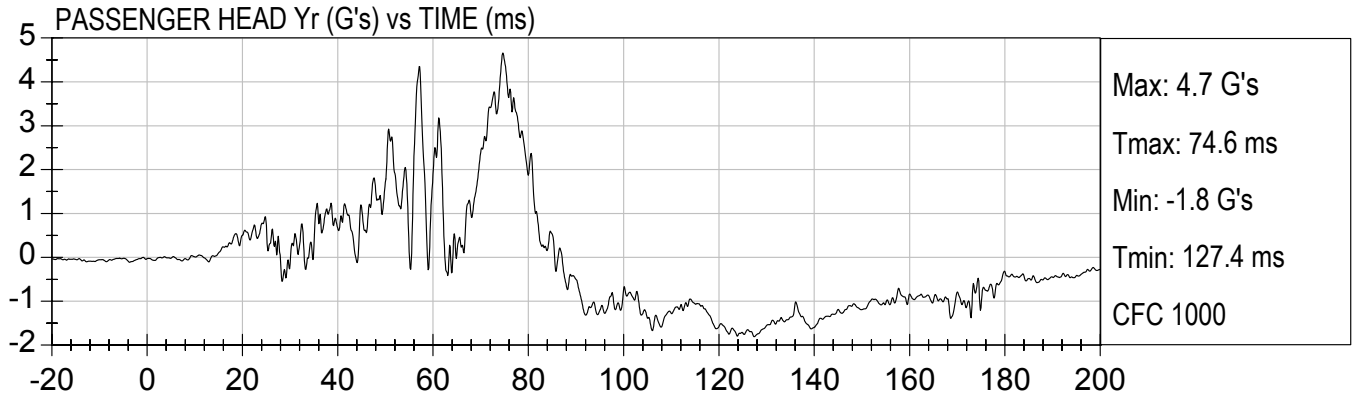
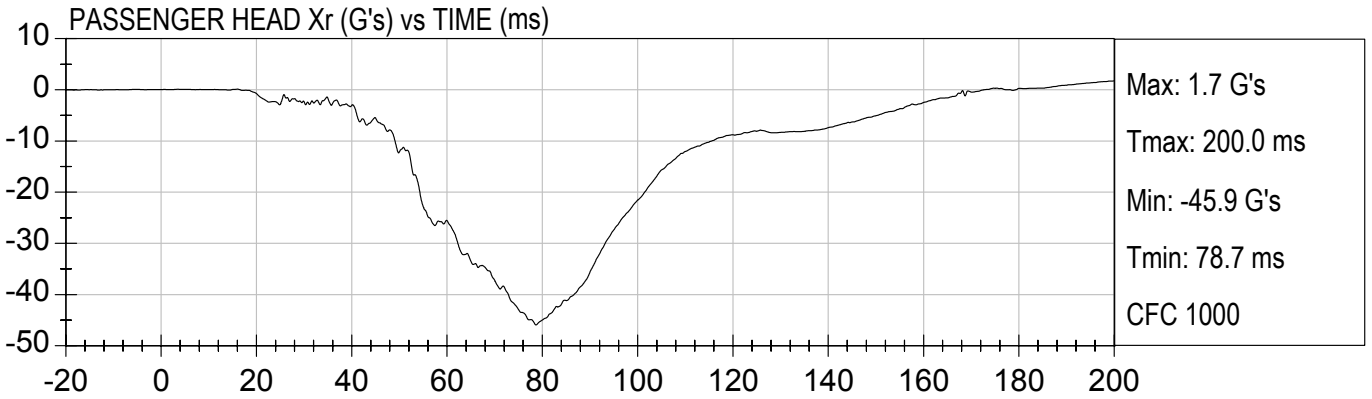


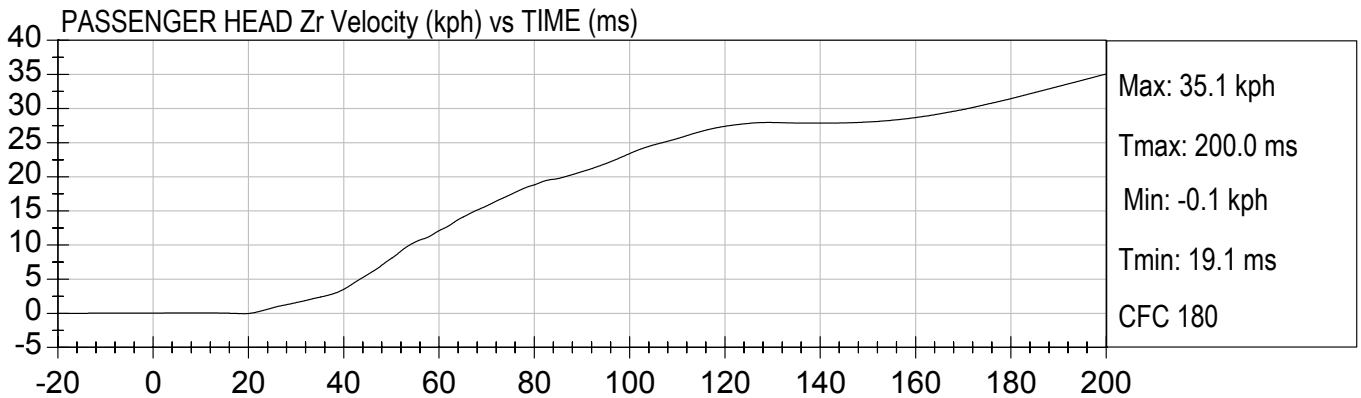
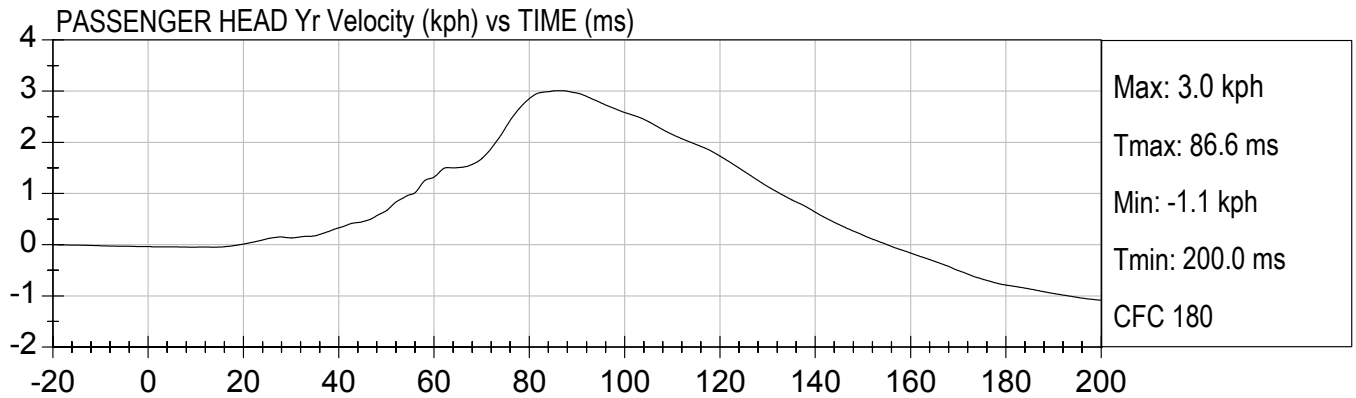
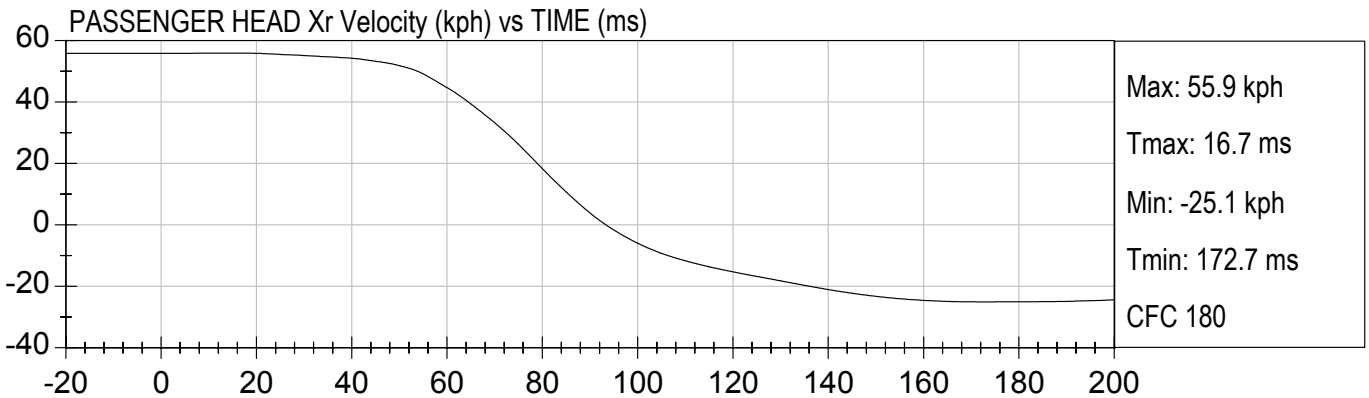


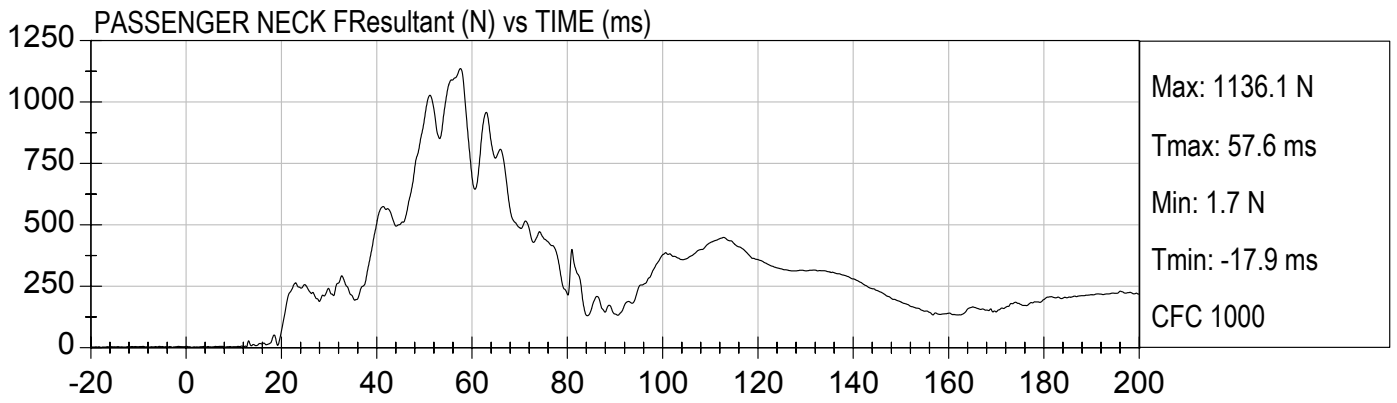
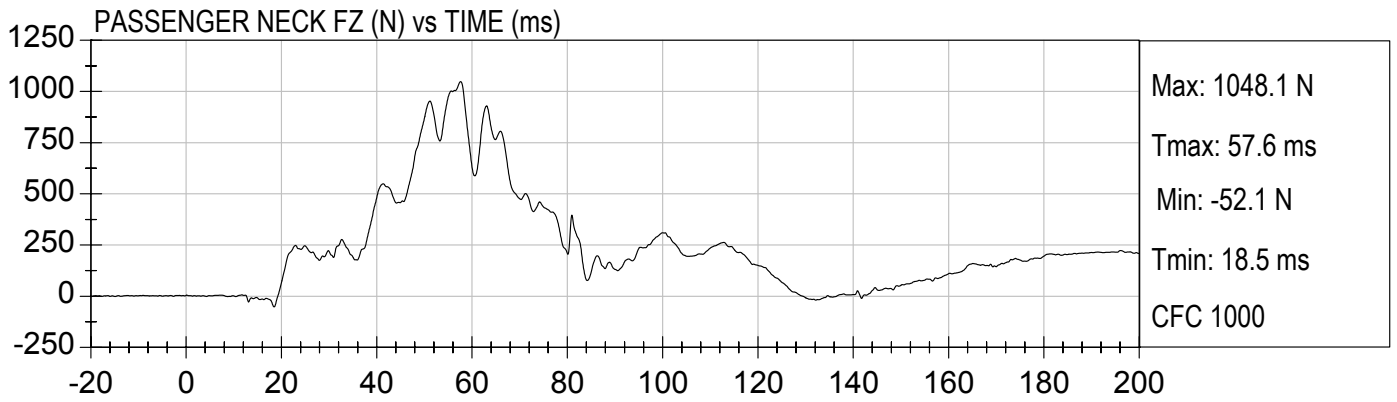
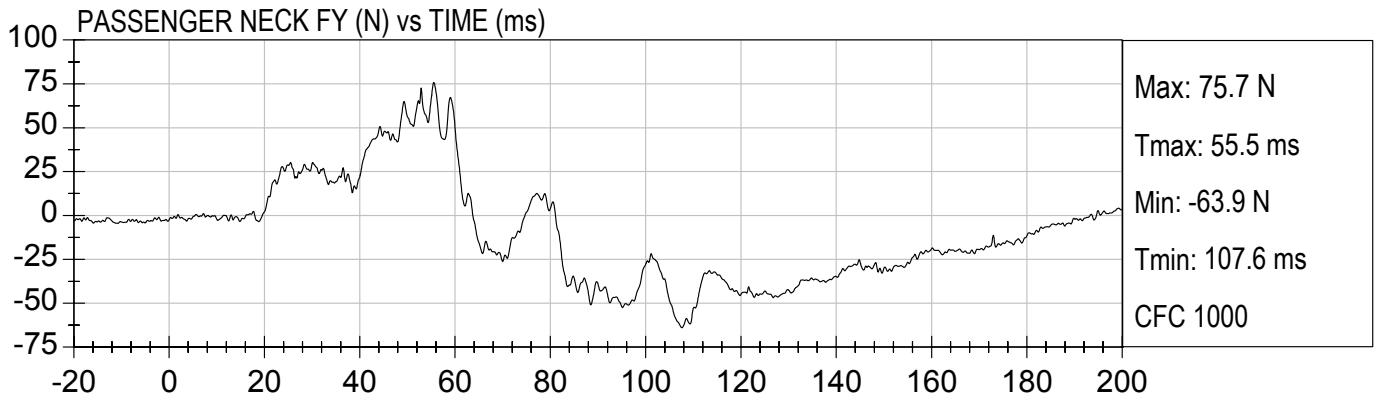
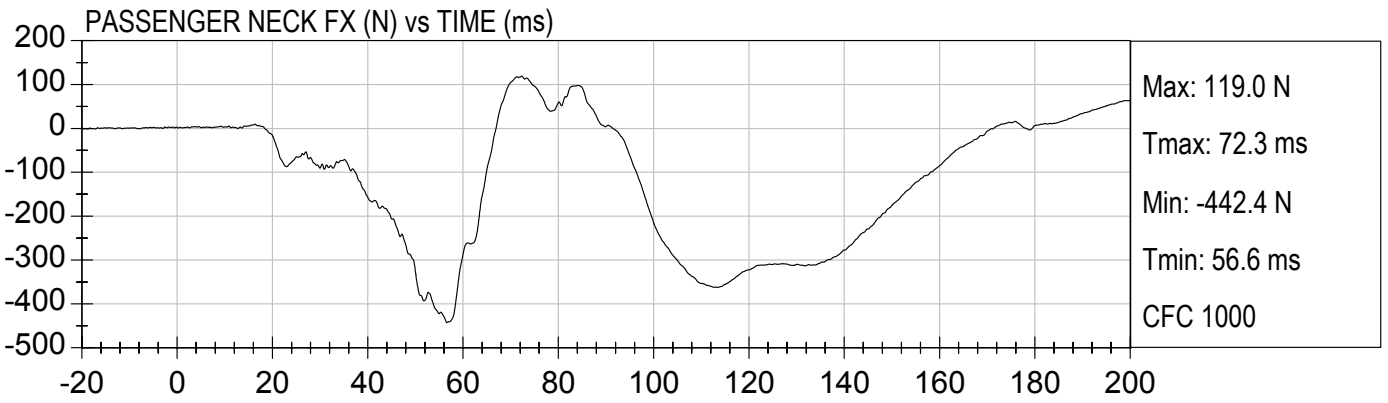


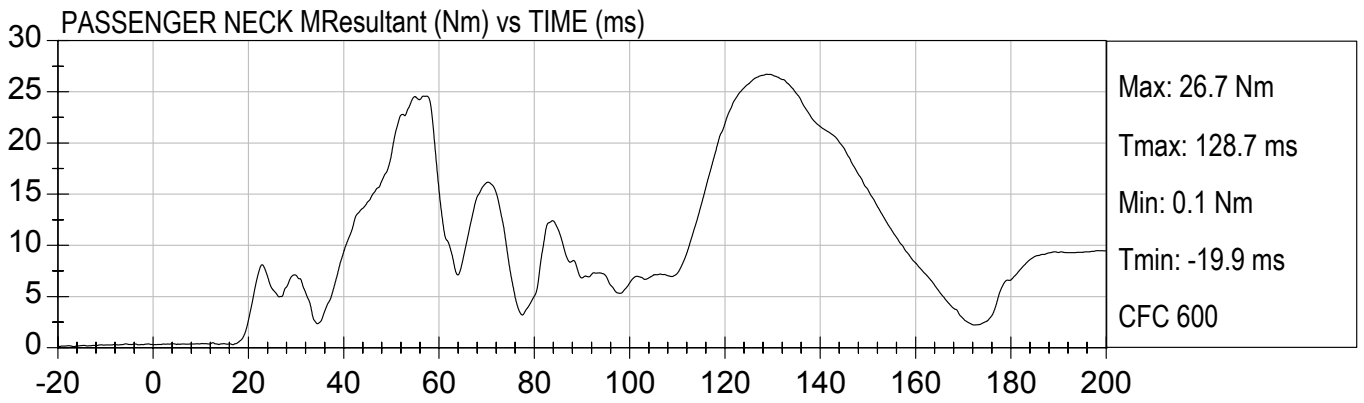
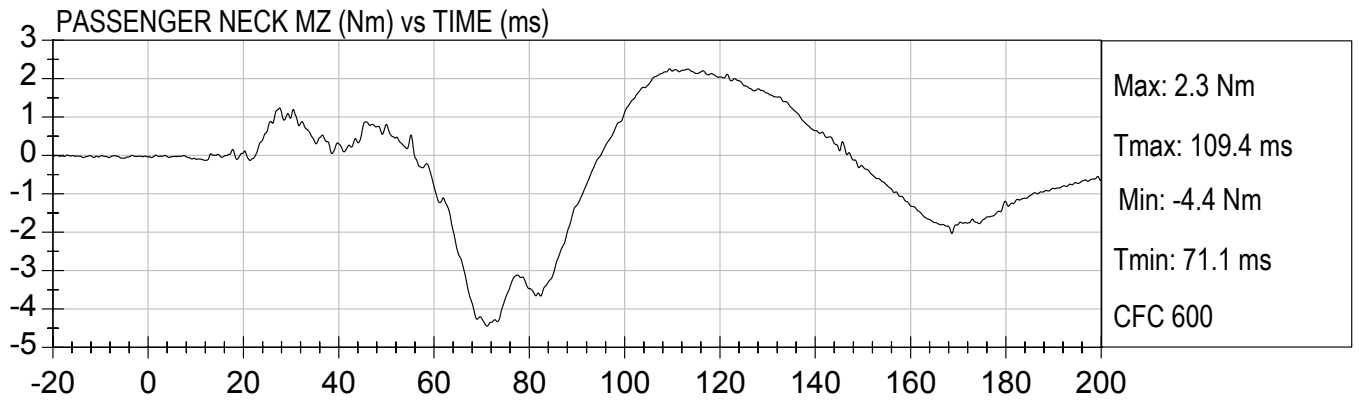
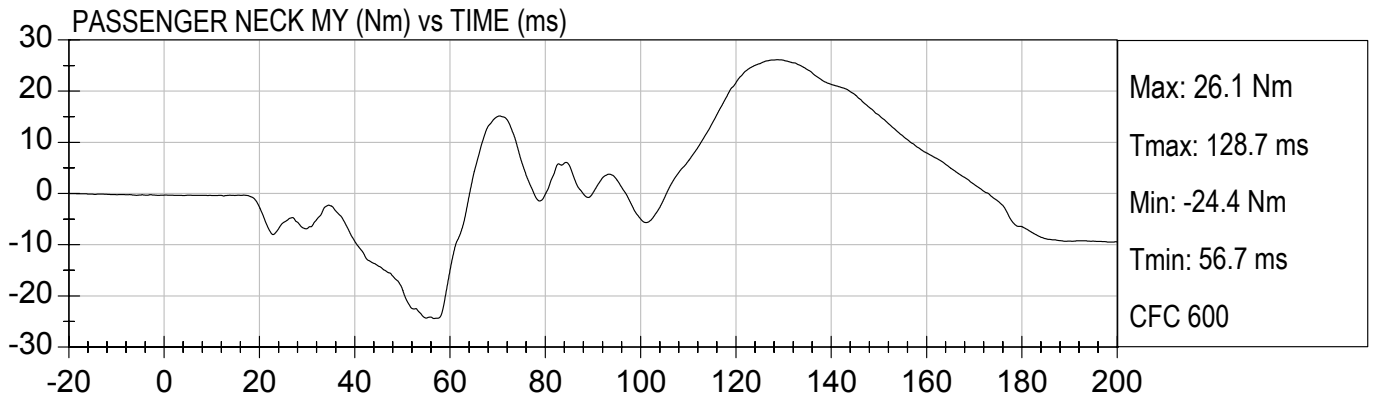
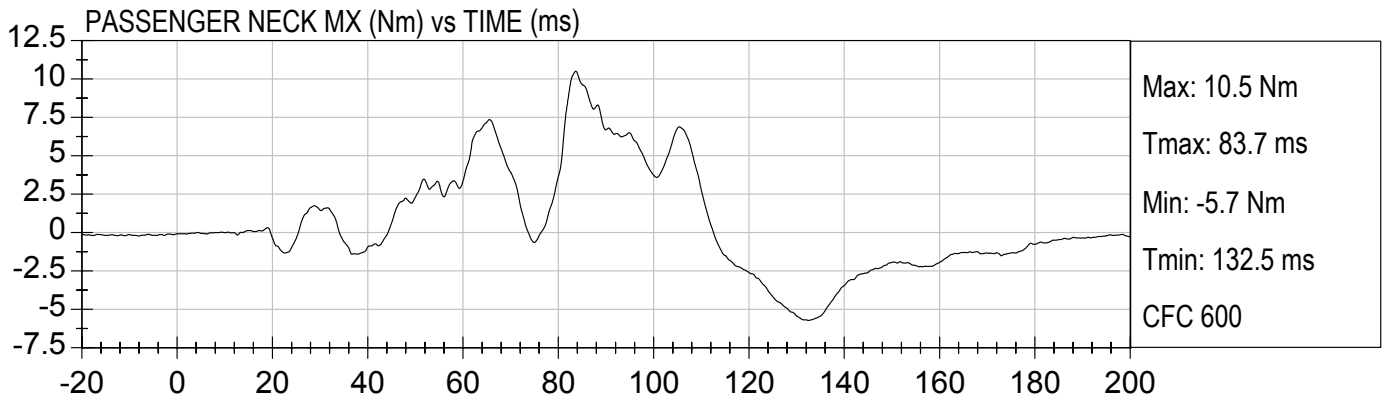


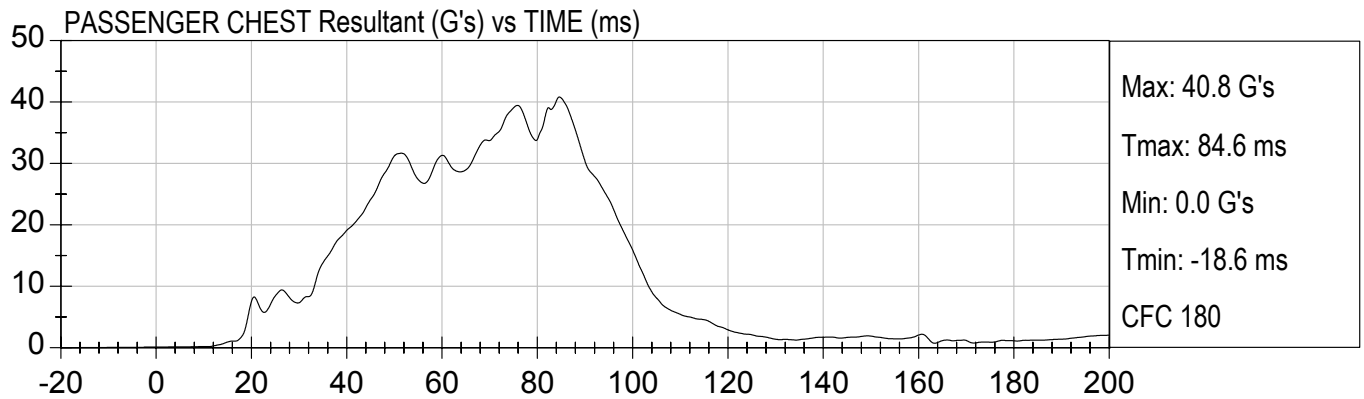
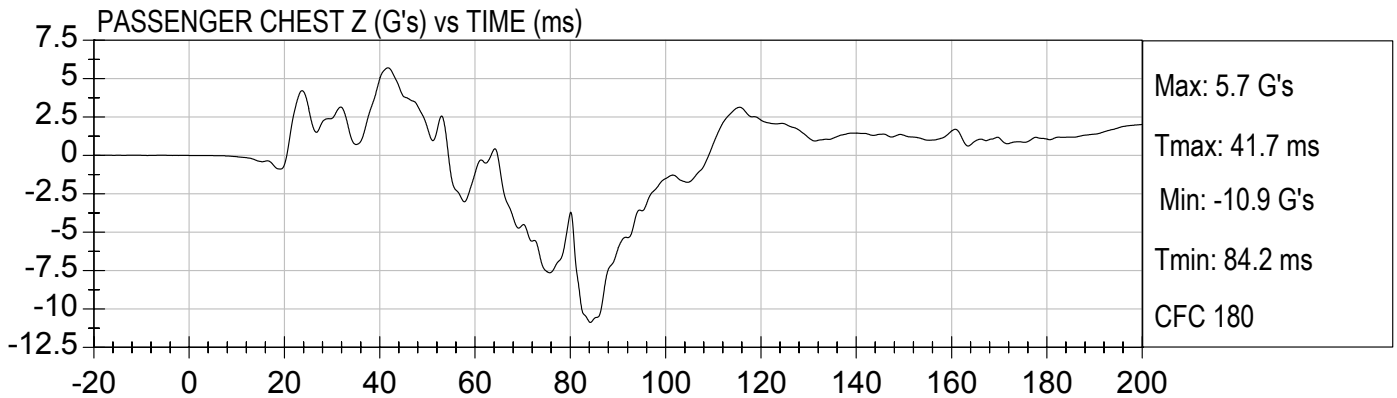
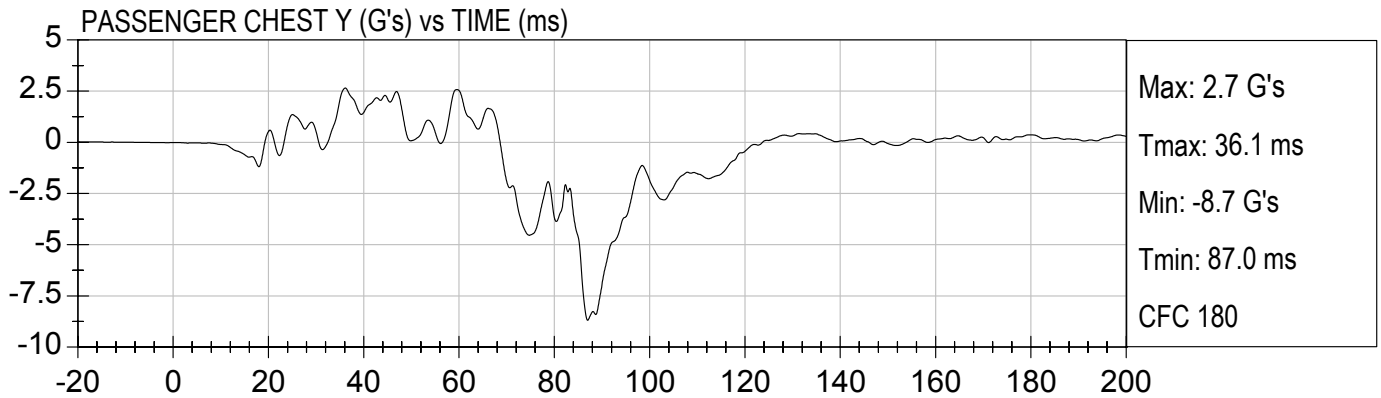
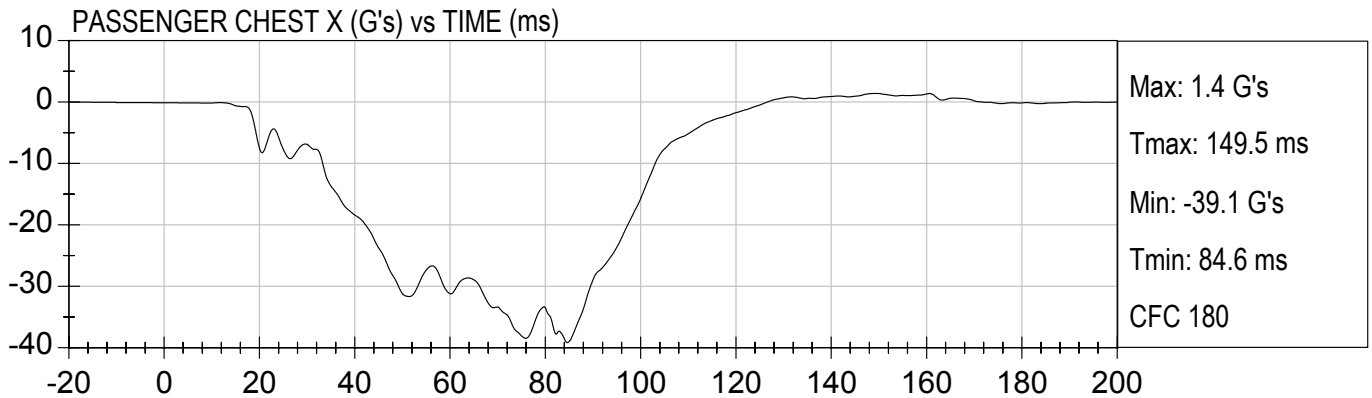


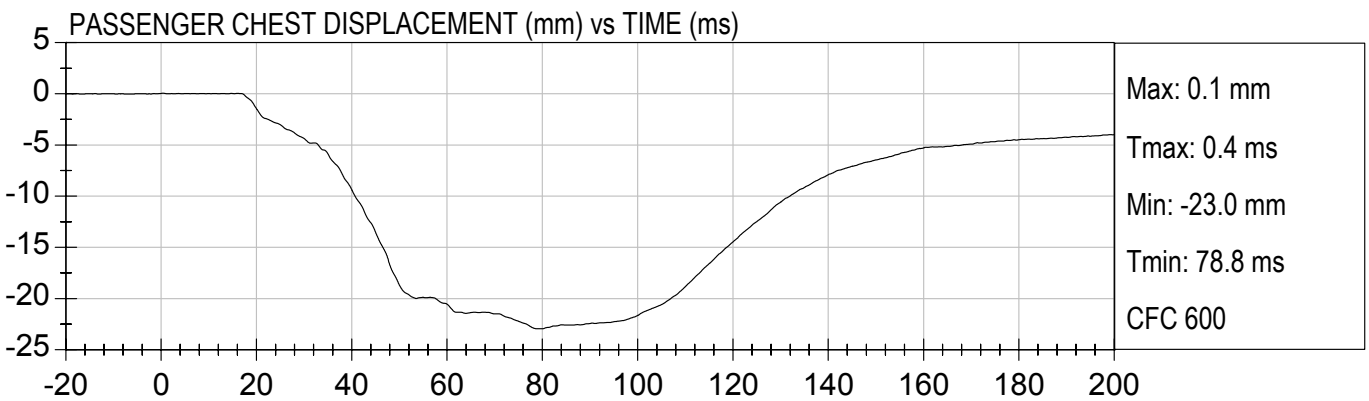
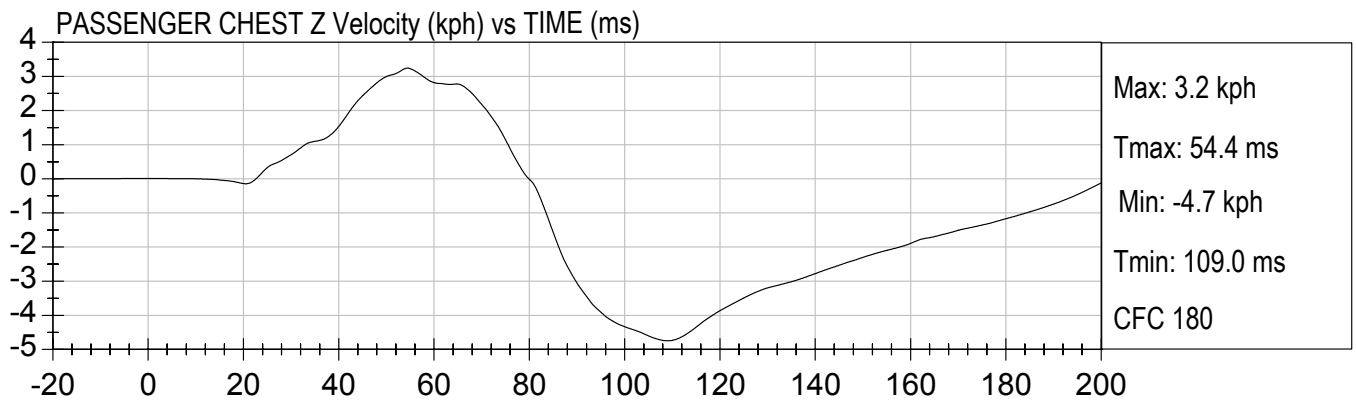
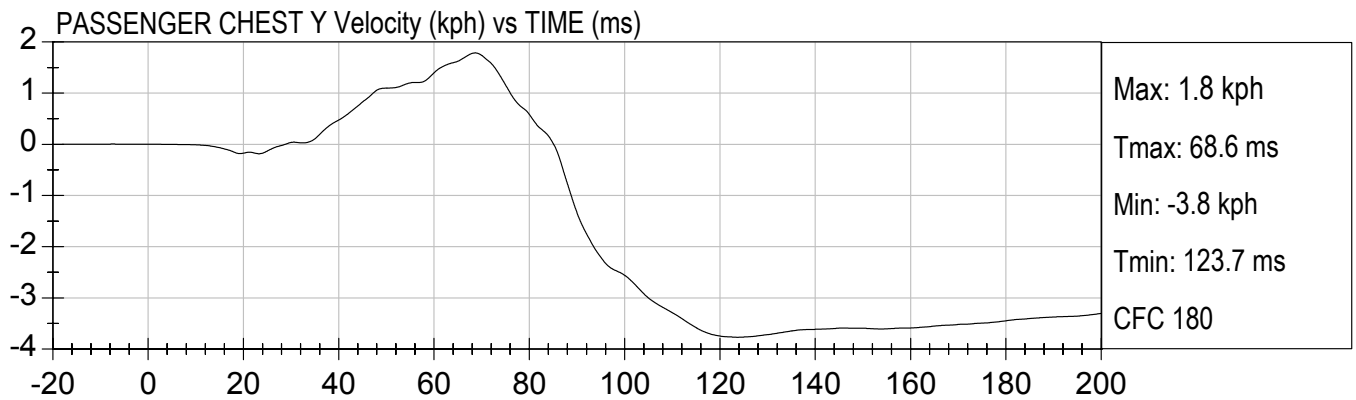
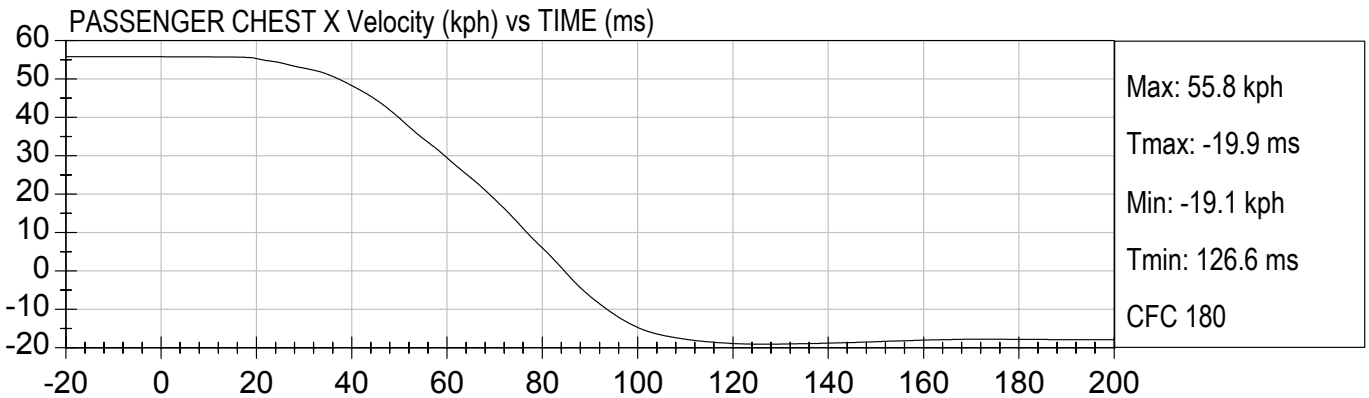


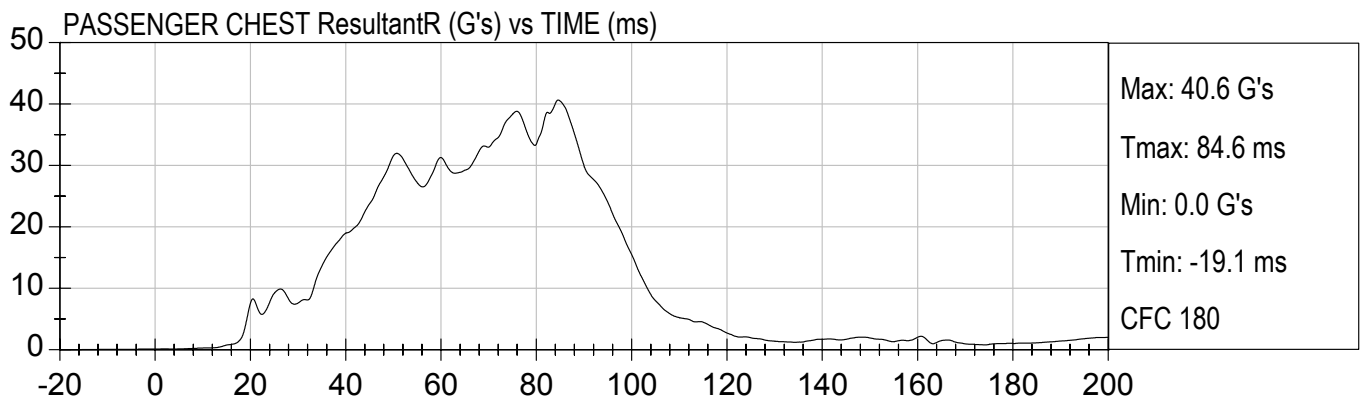
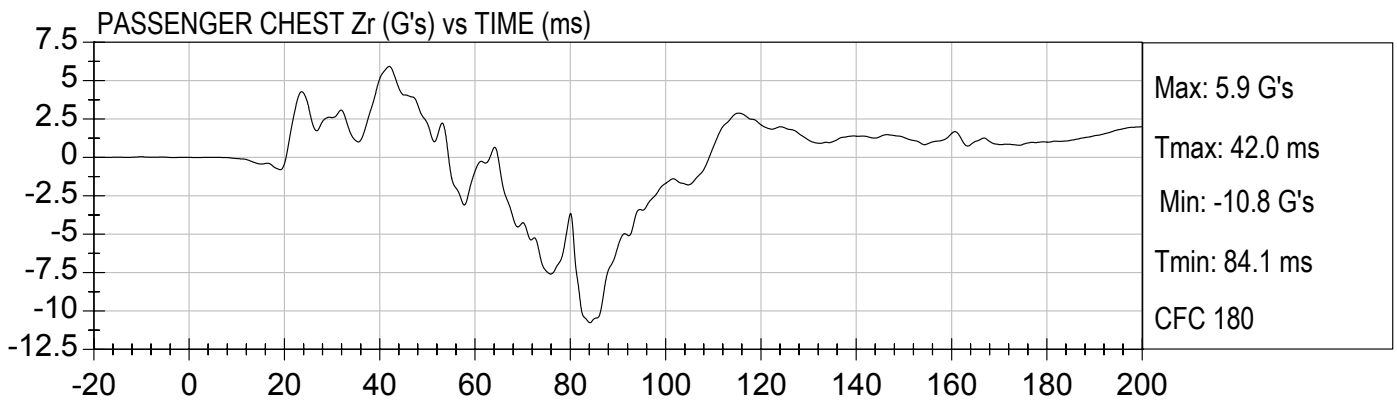
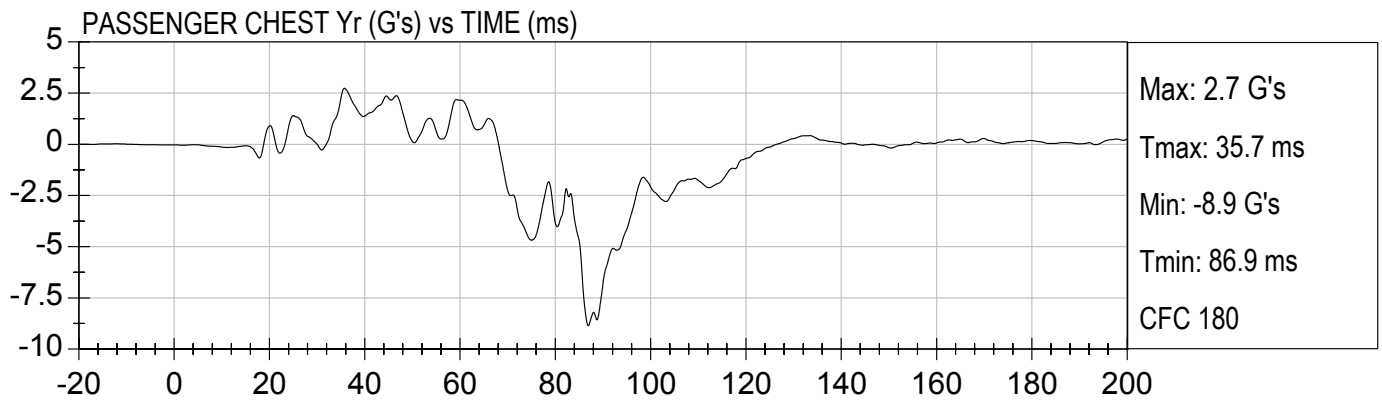
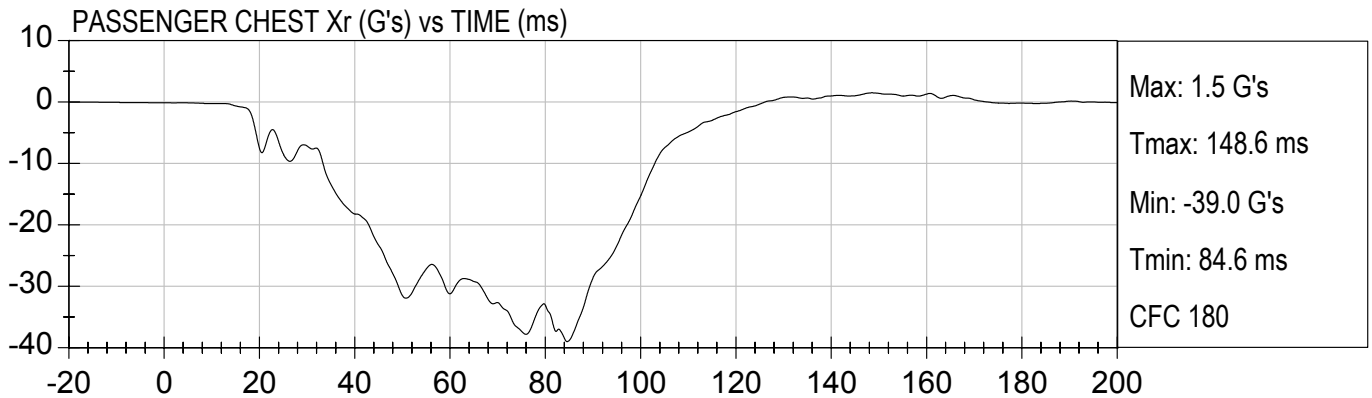


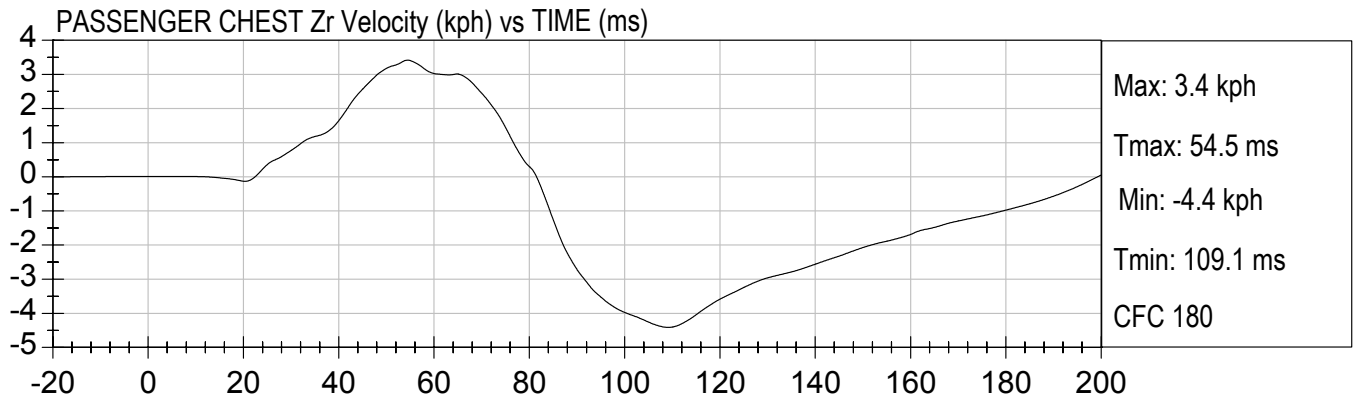
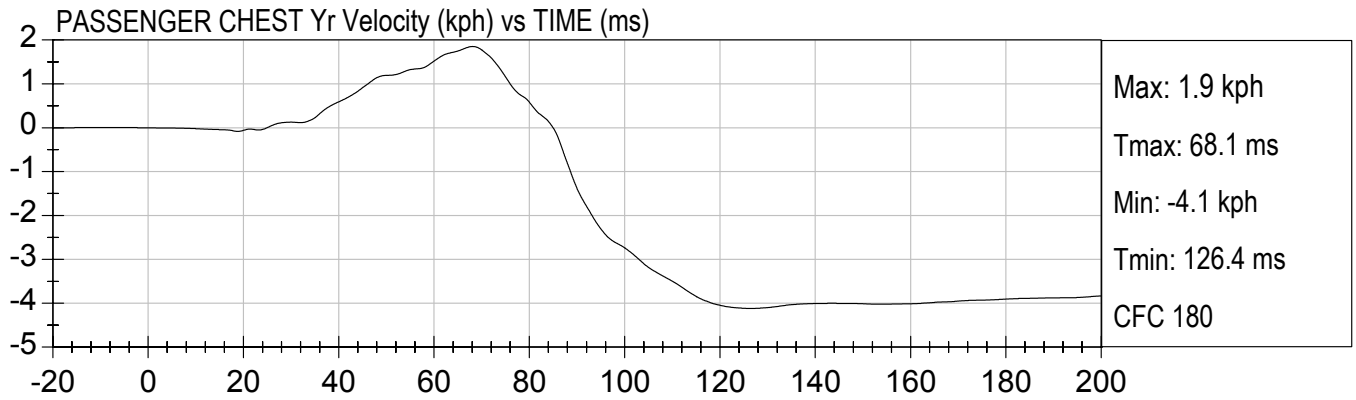
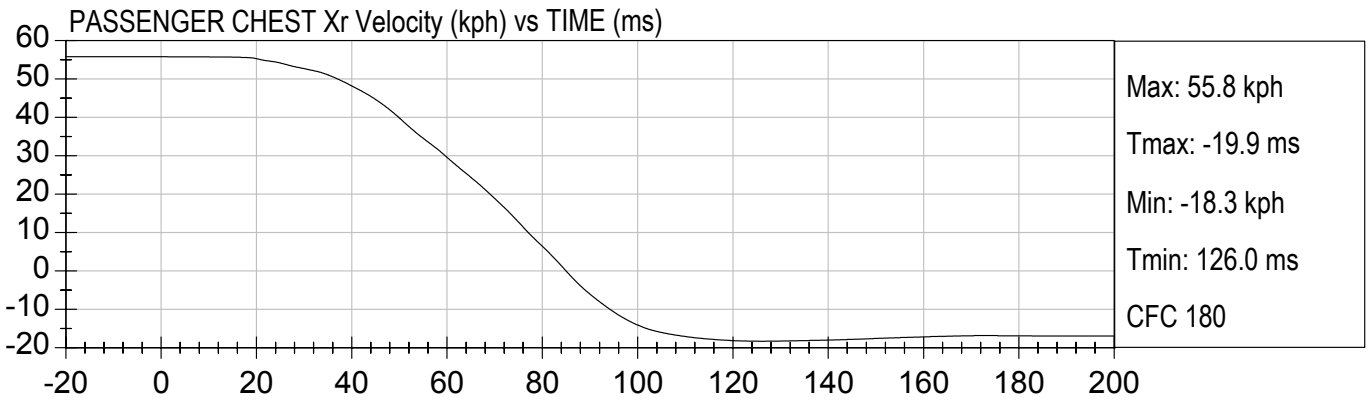


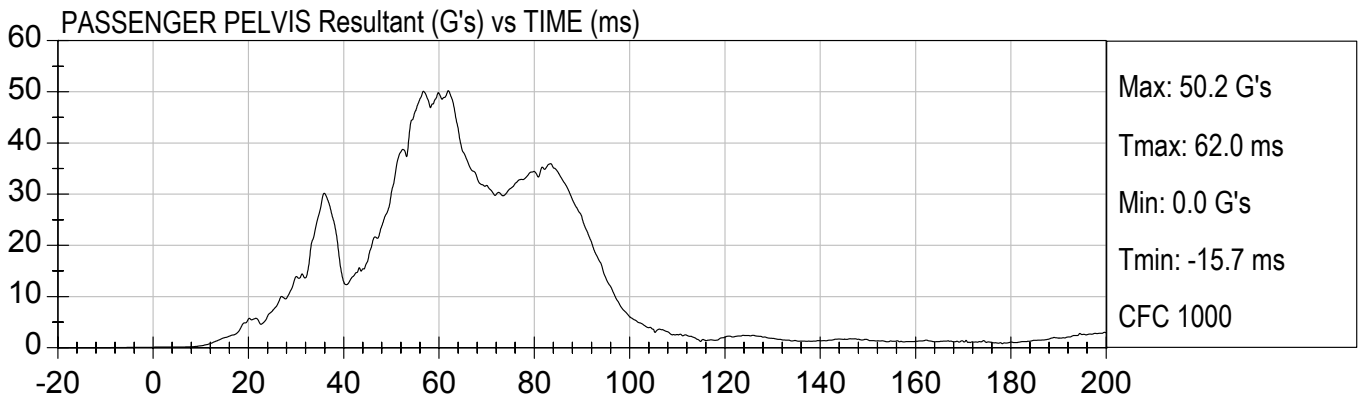
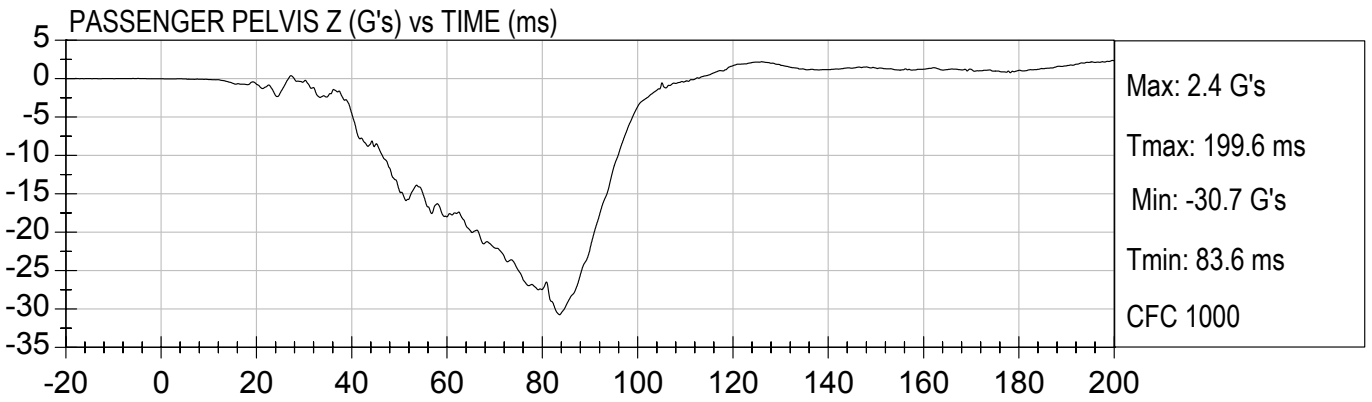
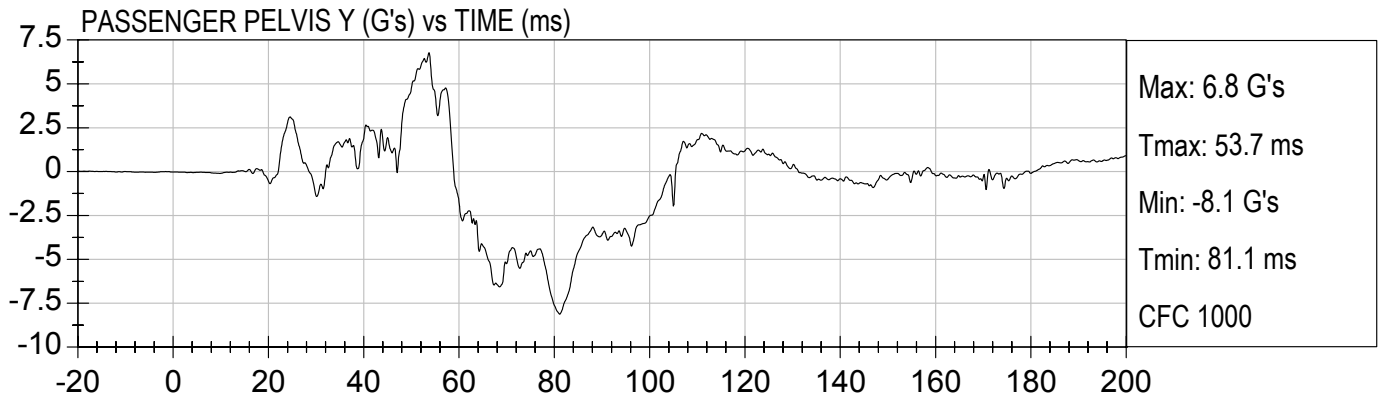
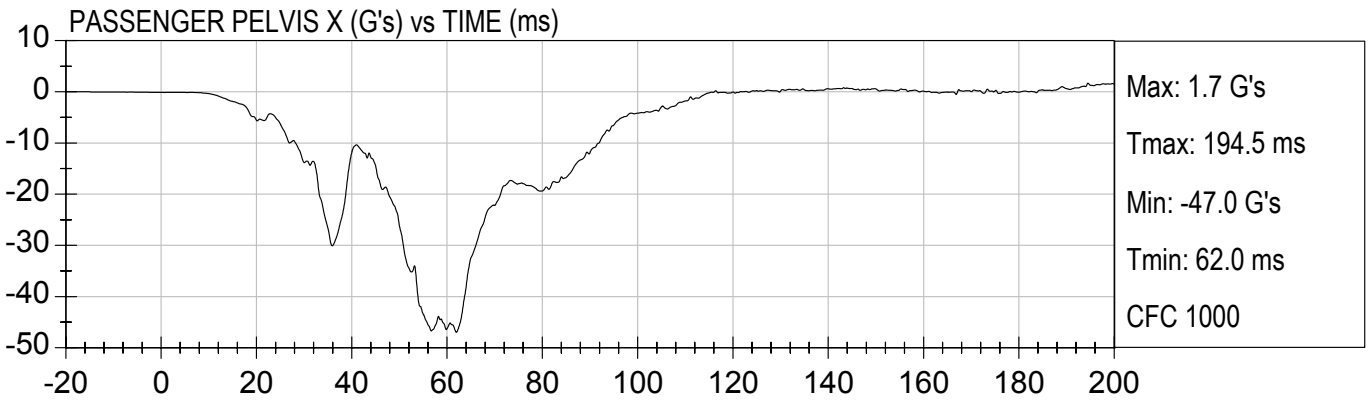


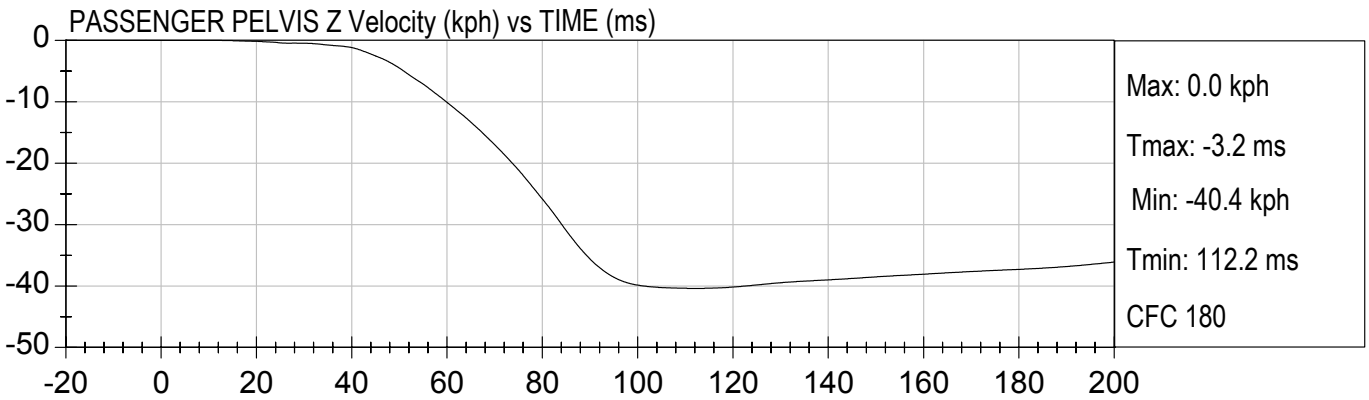
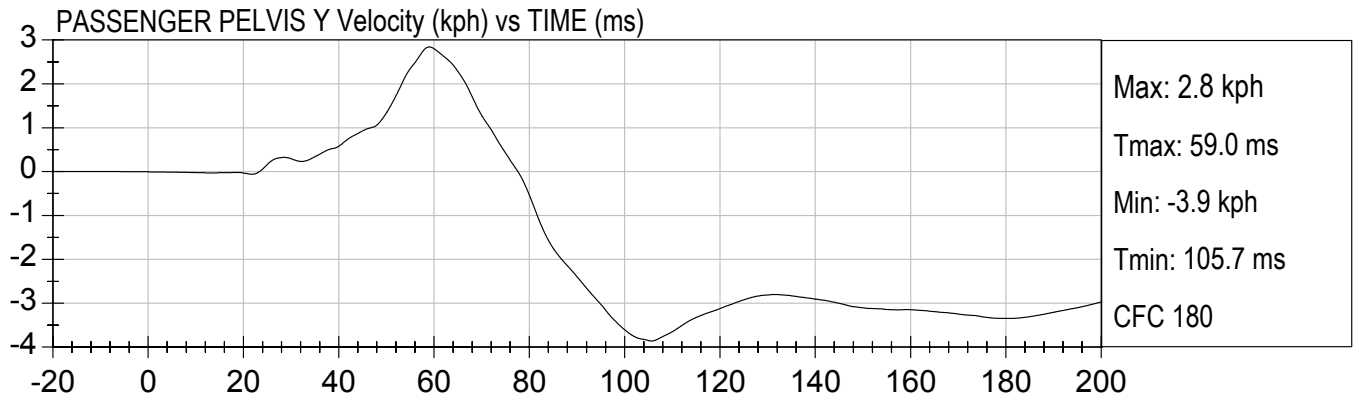
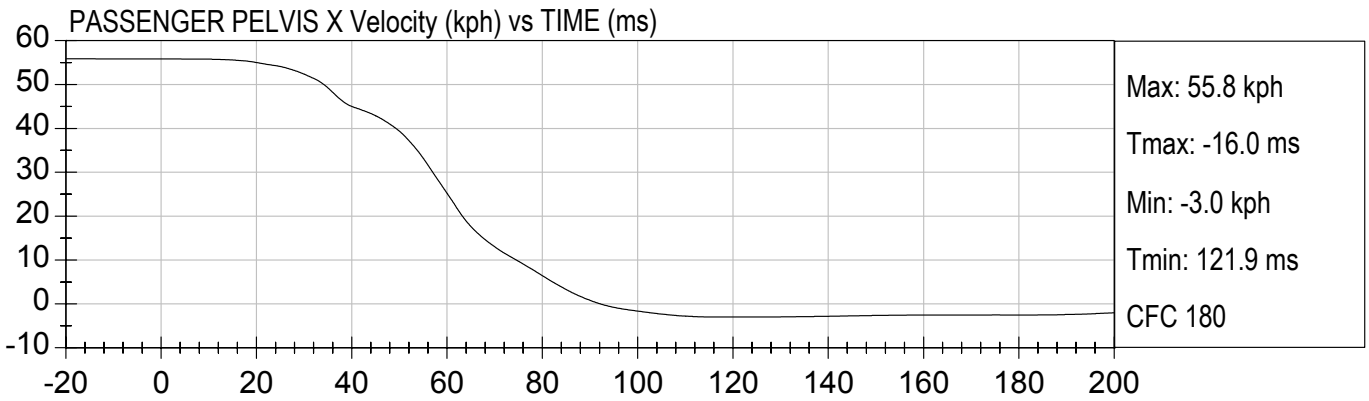


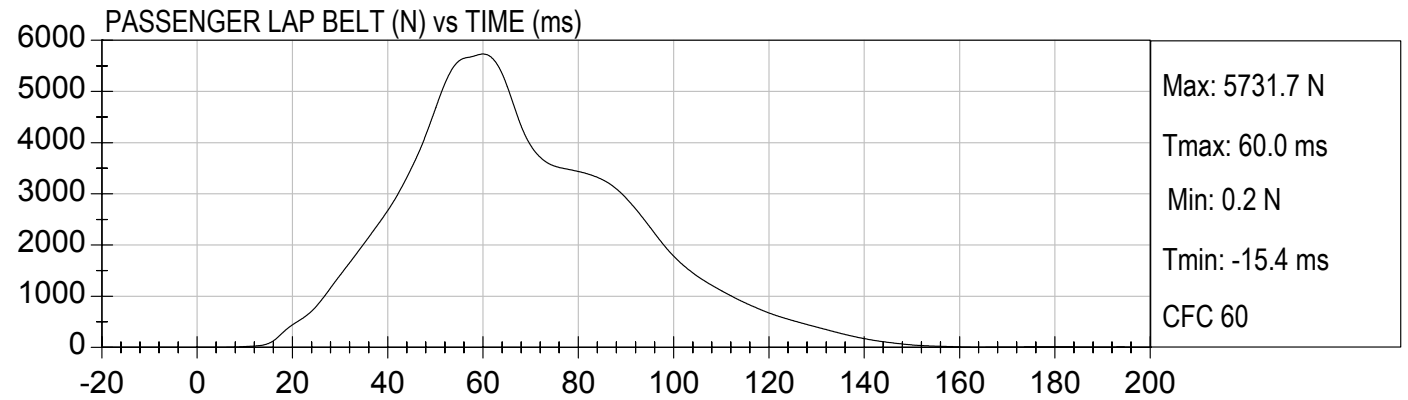
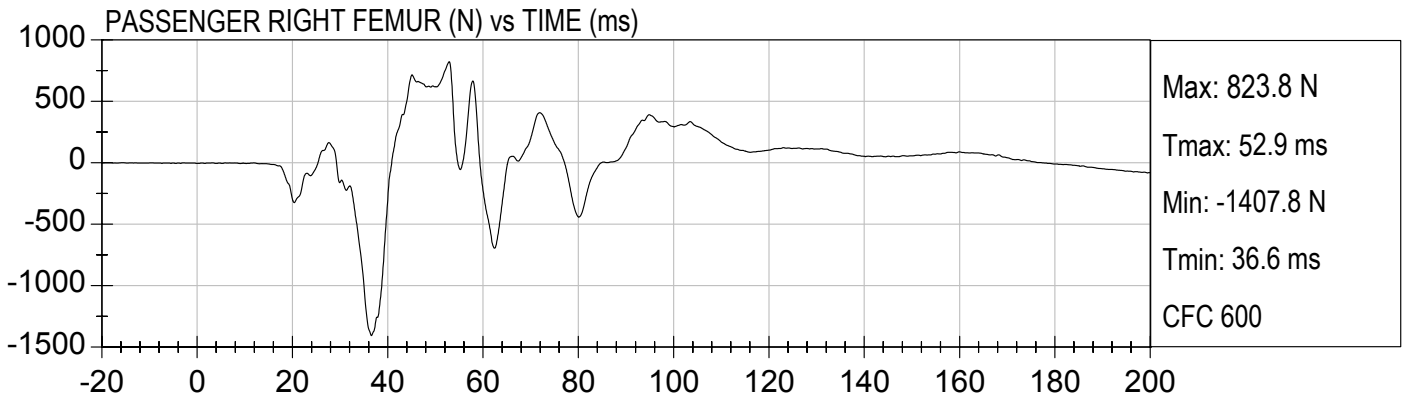
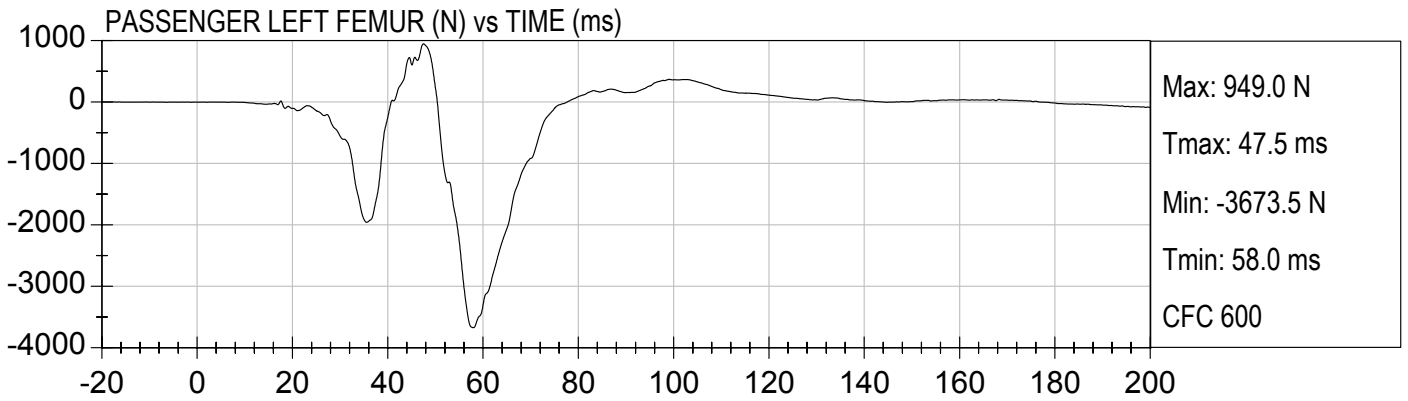






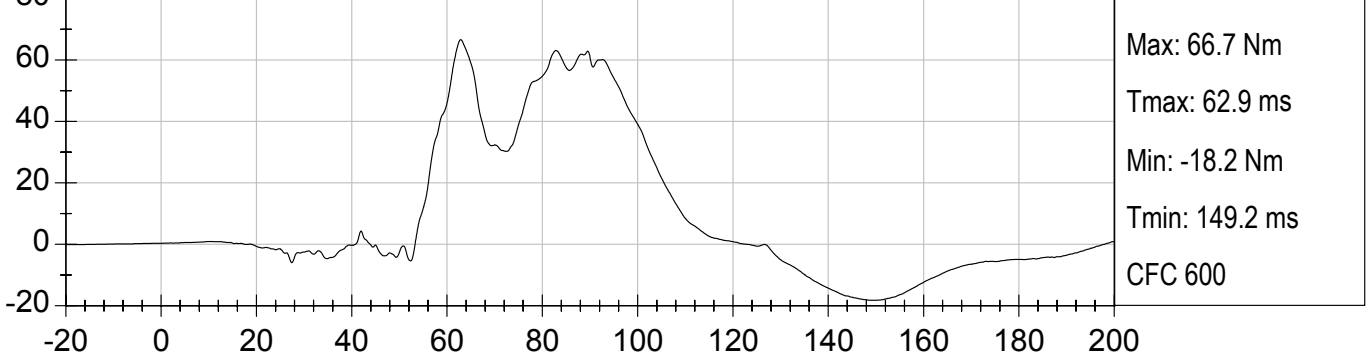




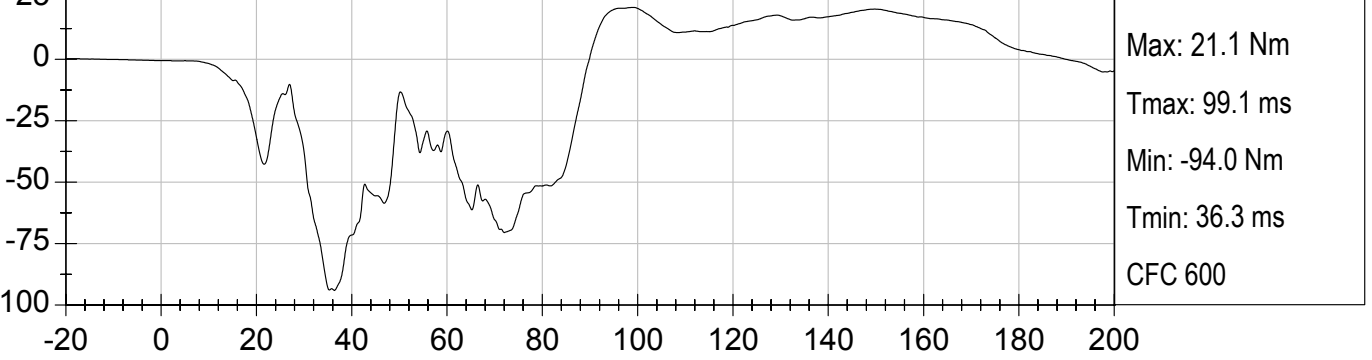




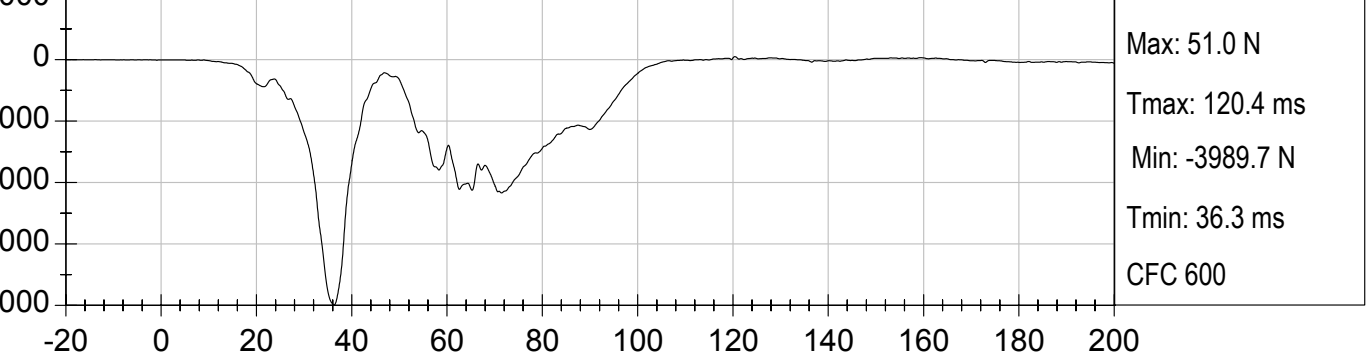
PASSENGER LEFT UPPER TIBIA MX (Nm) vs TIME (ms)



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

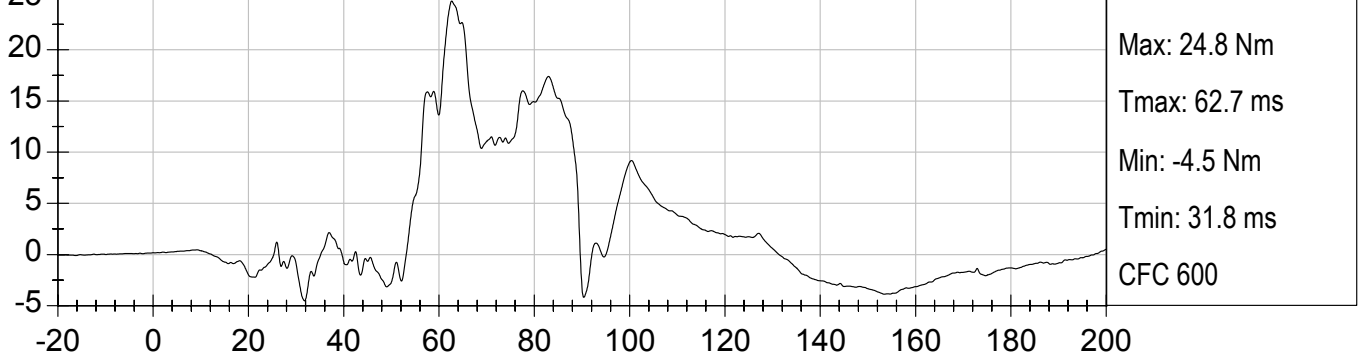


PASSENGER LEFT UPPER TIBIA FZ (N) vs TIME (ms)

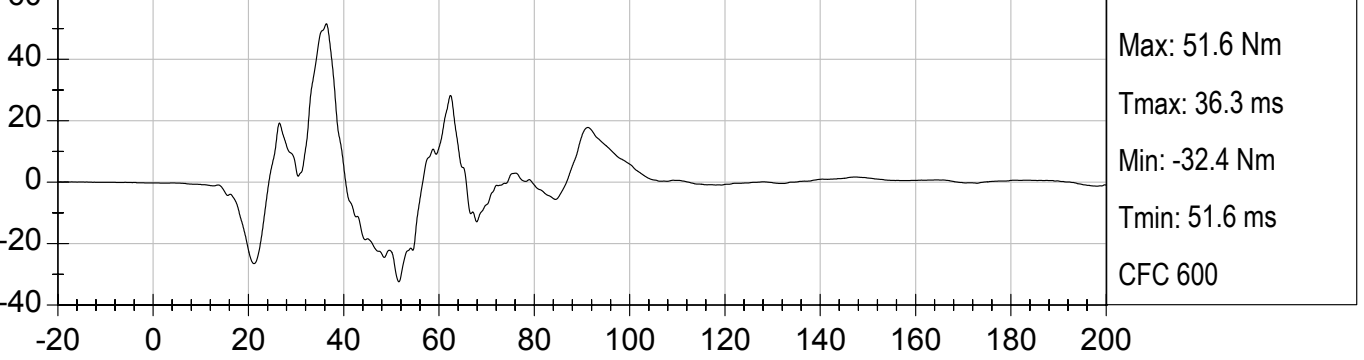




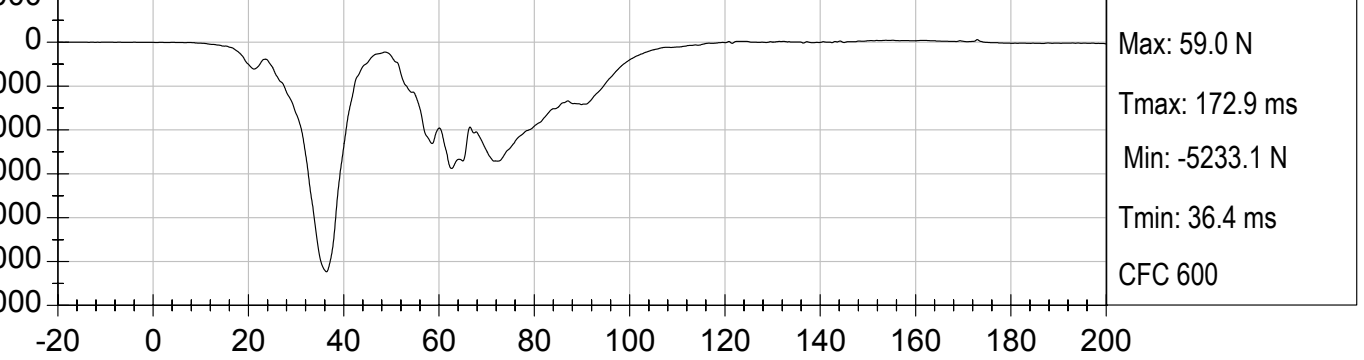
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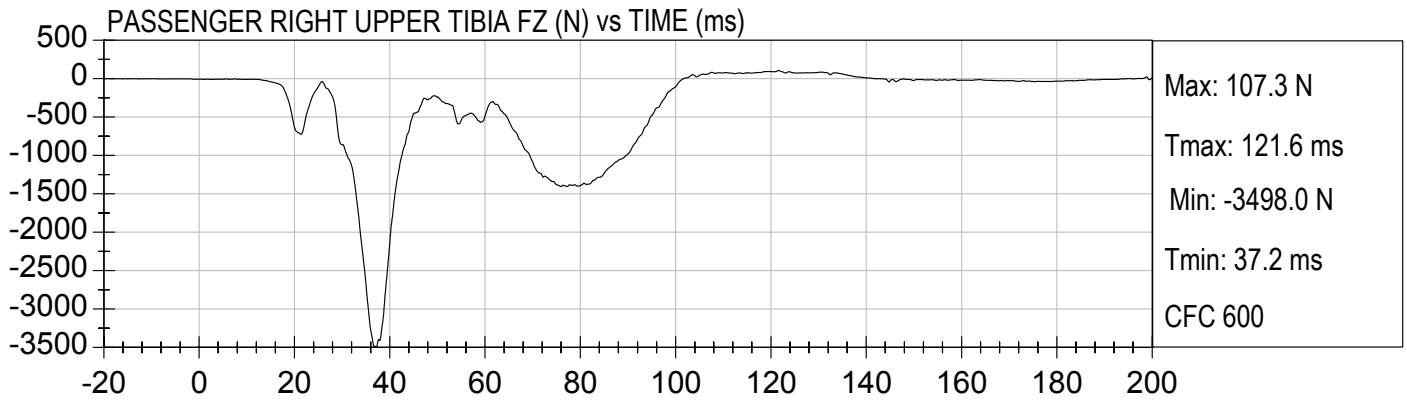
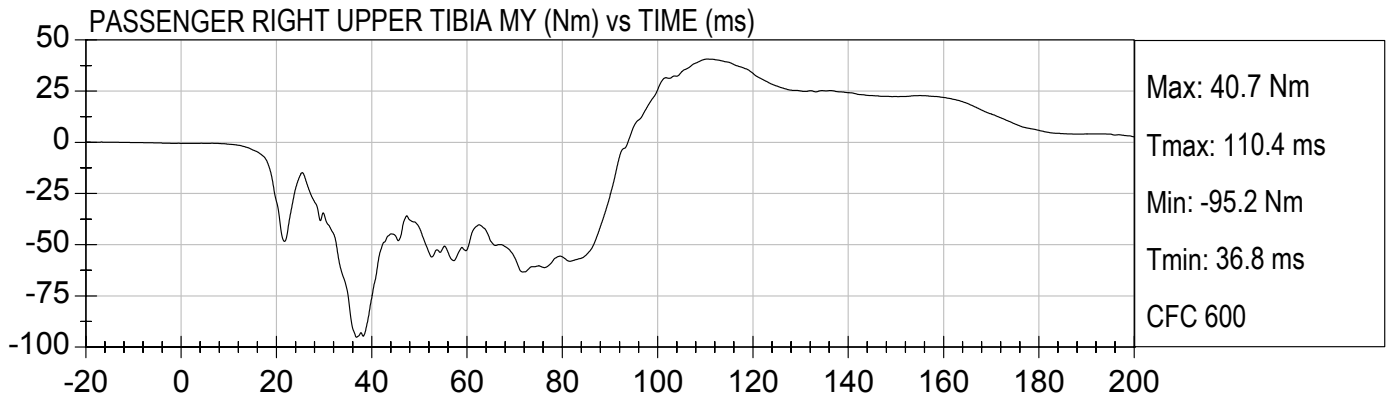
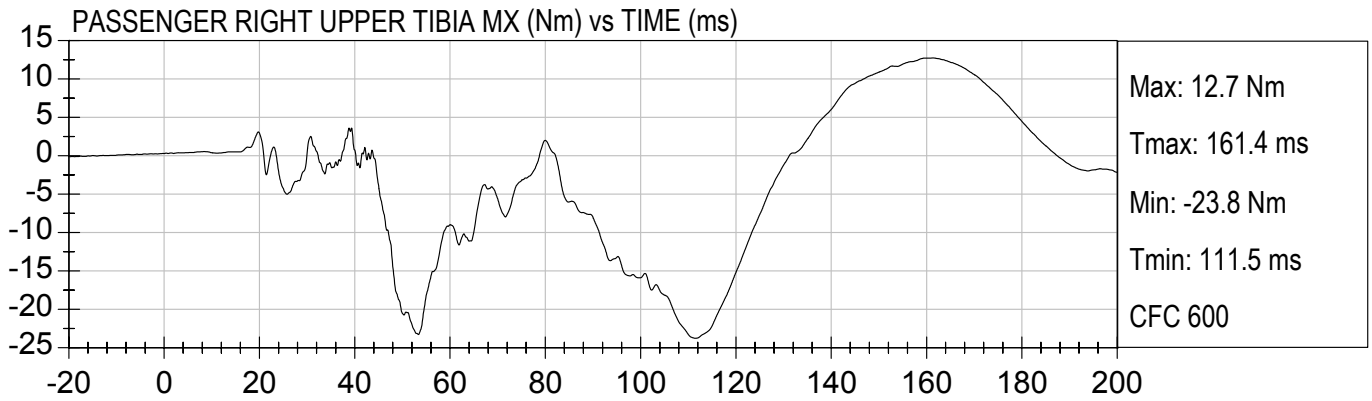


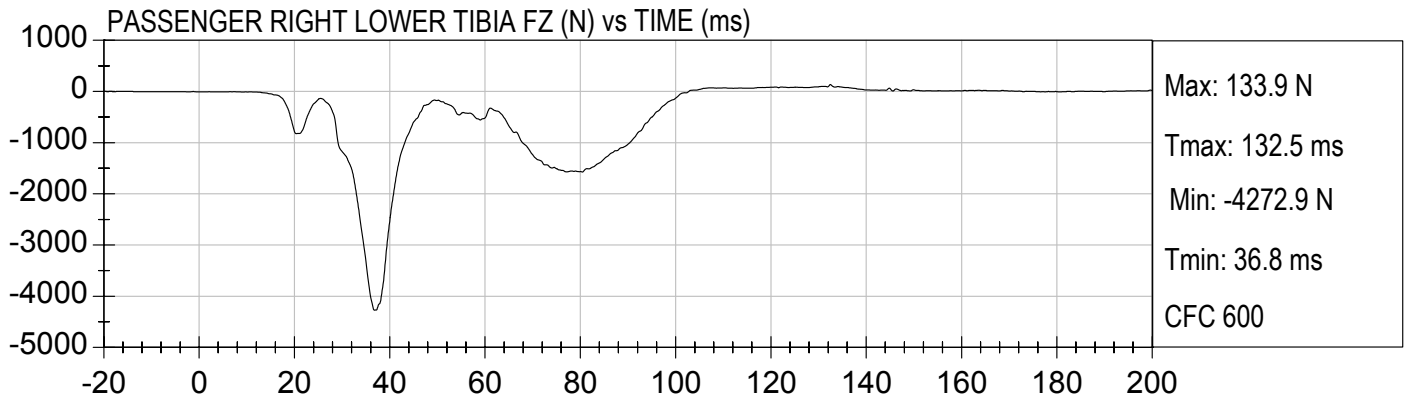
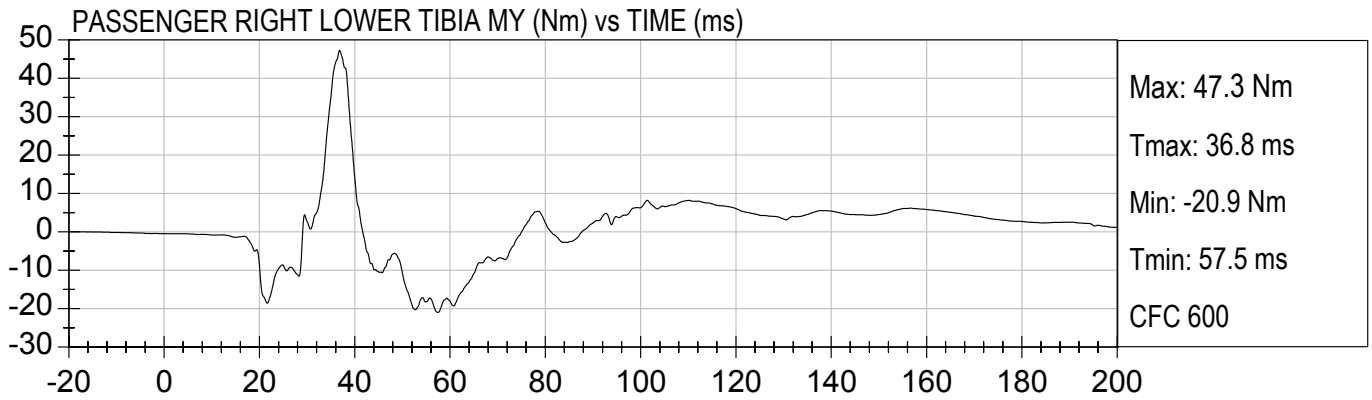
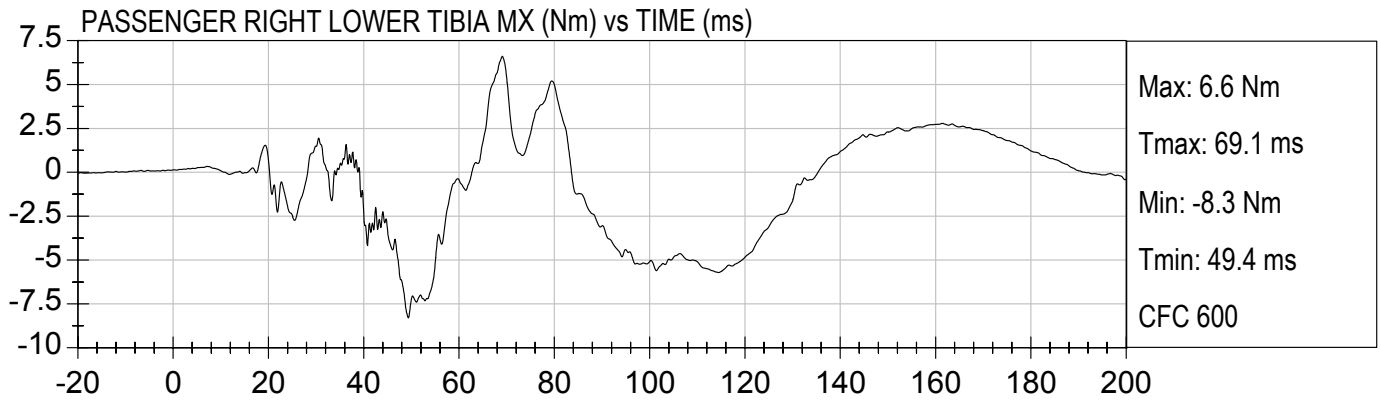
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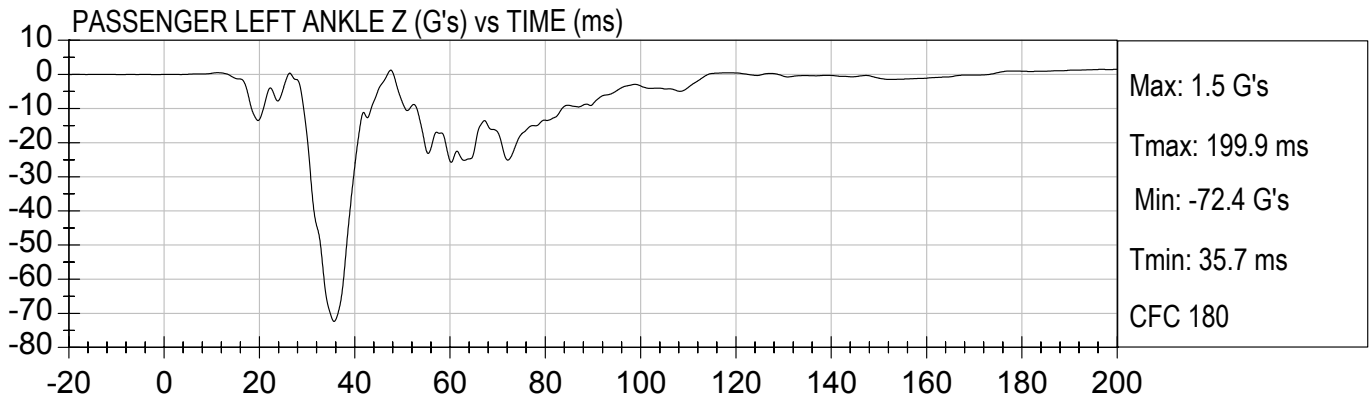
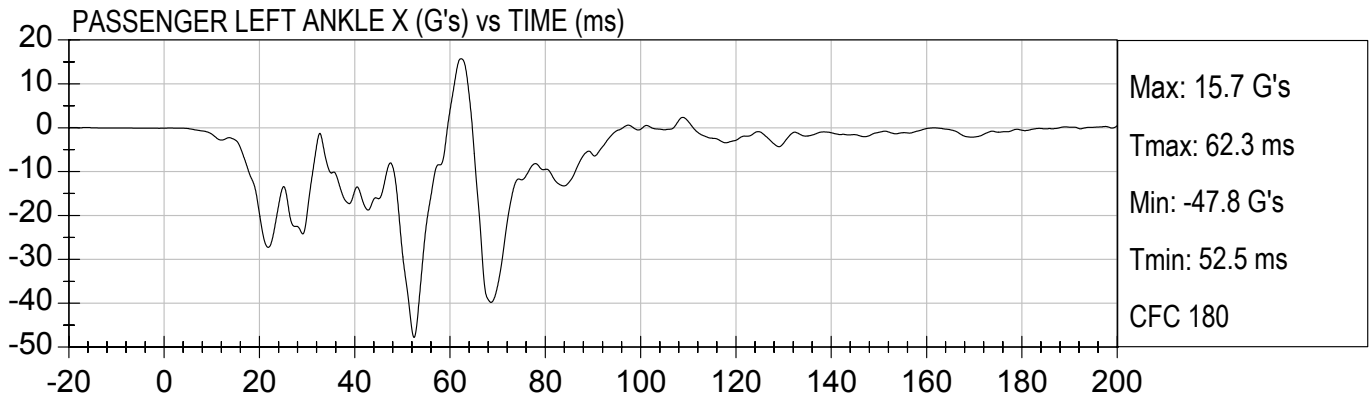
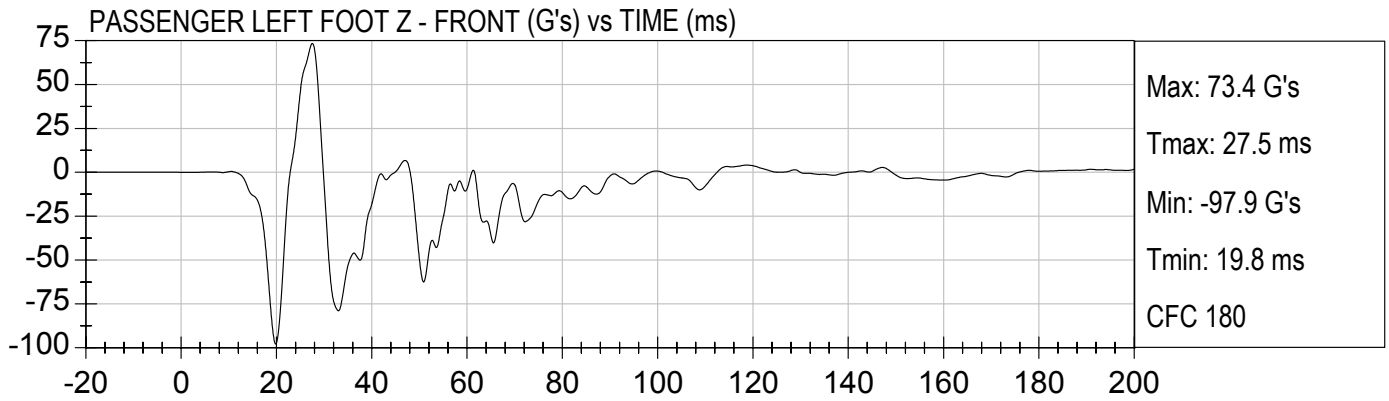


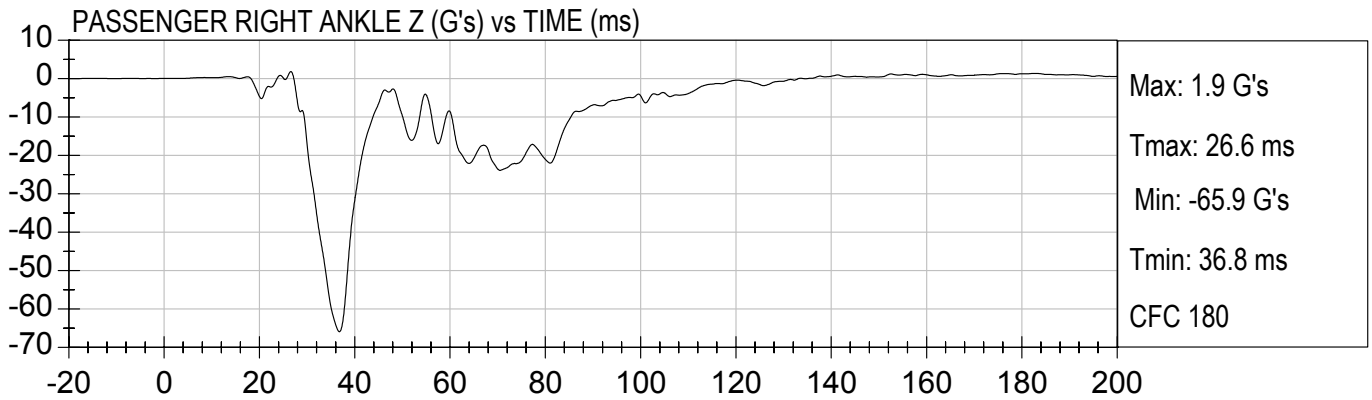
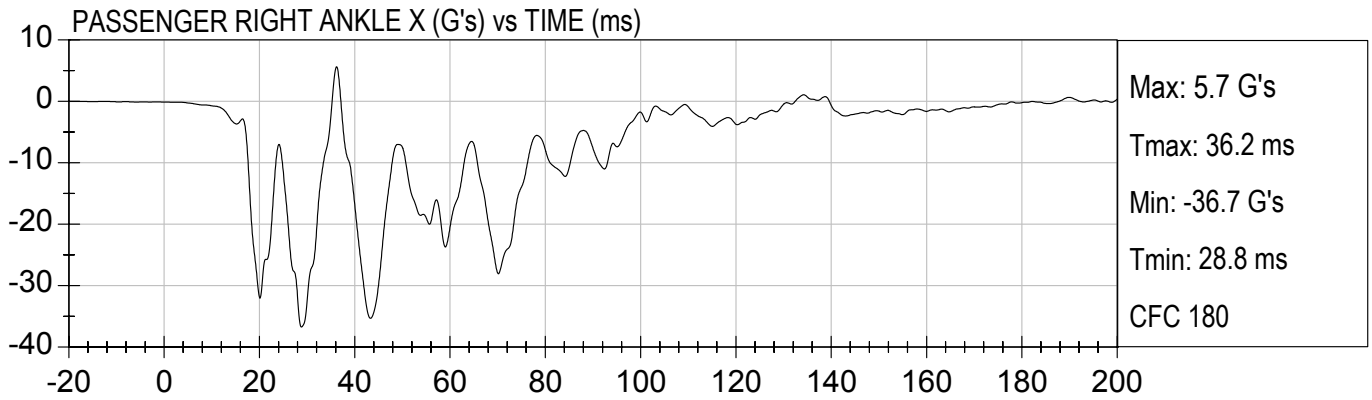
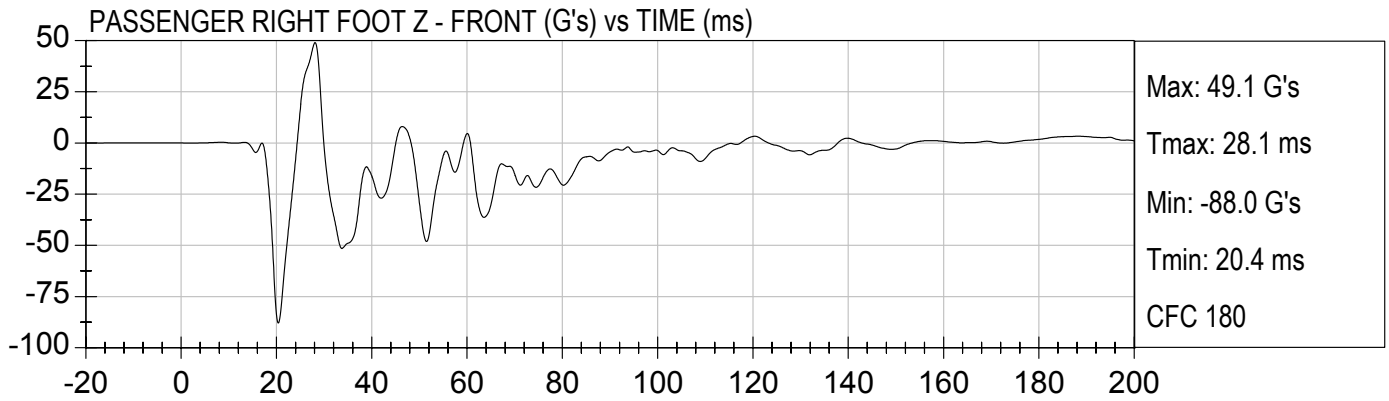
PASSENGER LEFT LOWER TIBIA FZ (N) vs TIME (ms)

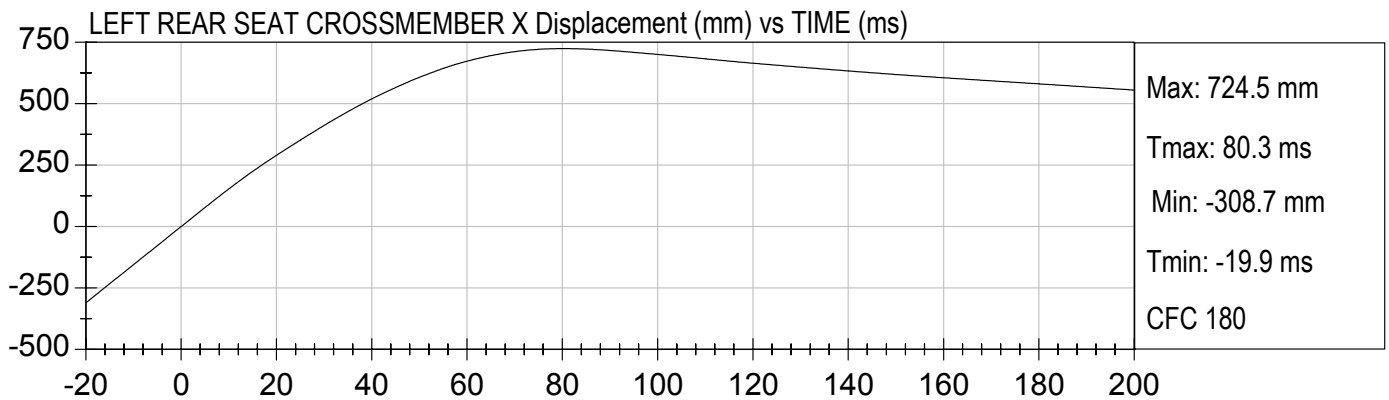
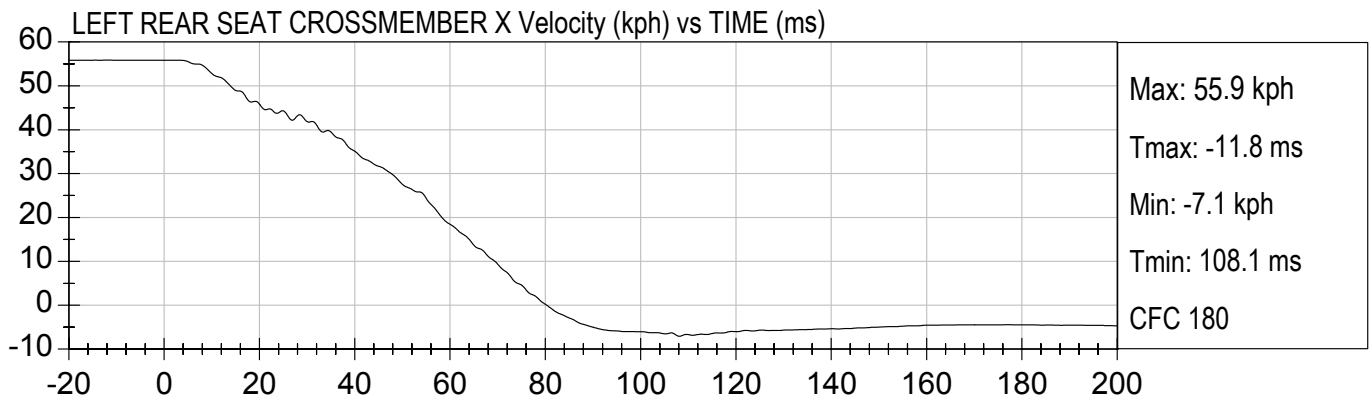
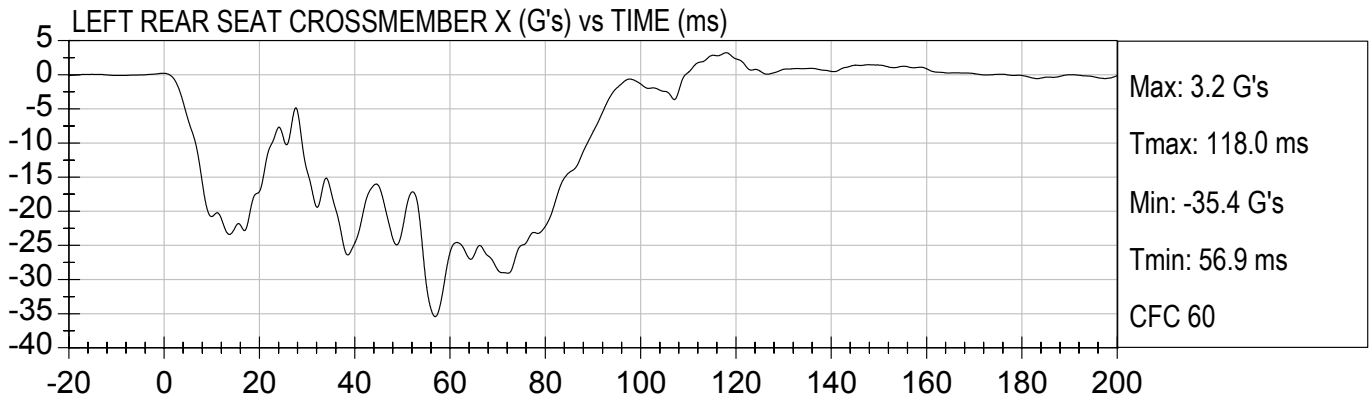


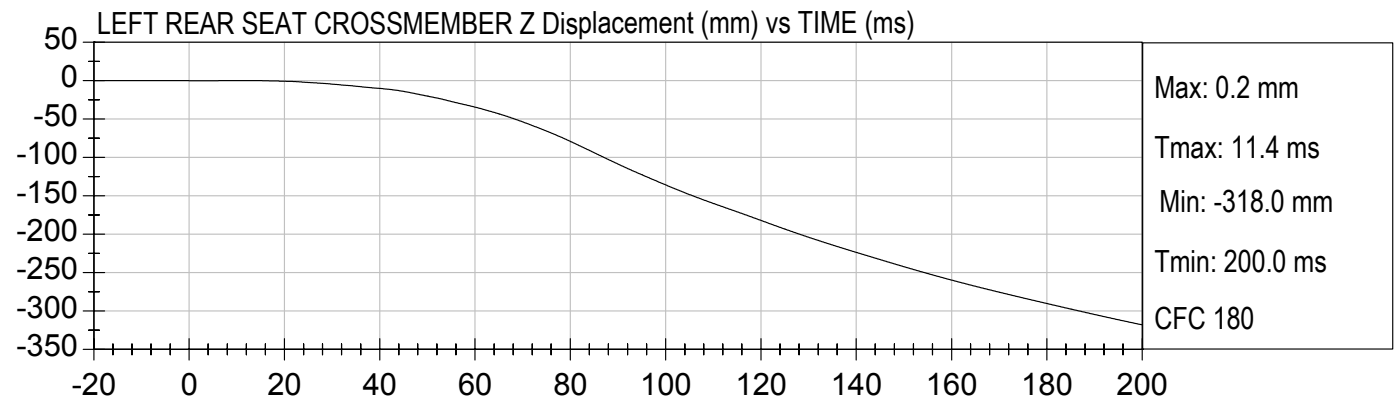
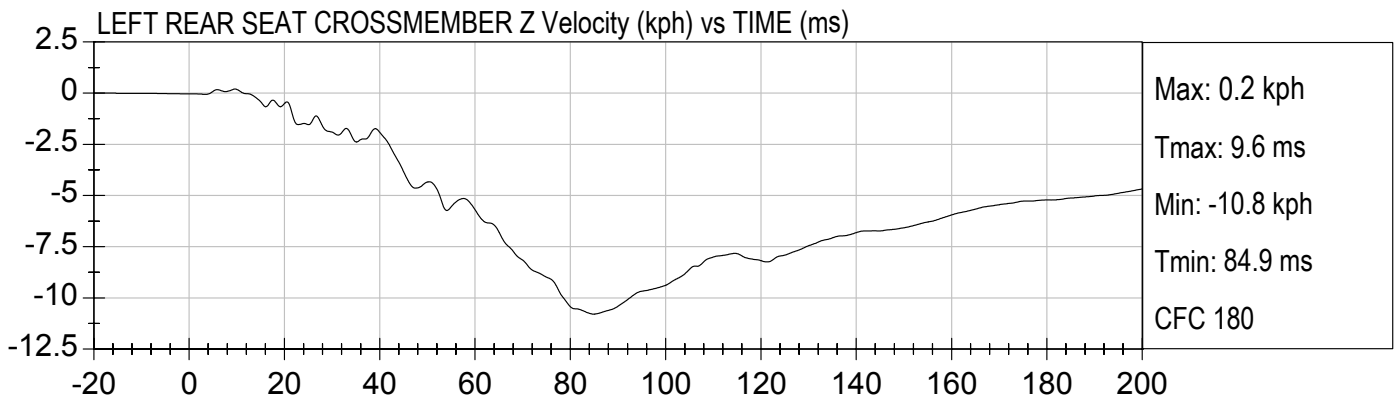
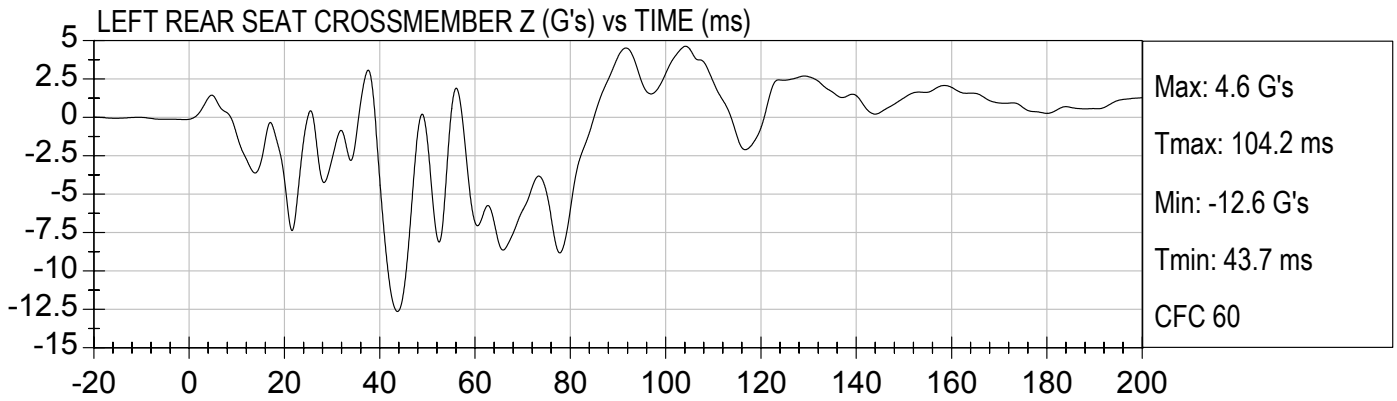


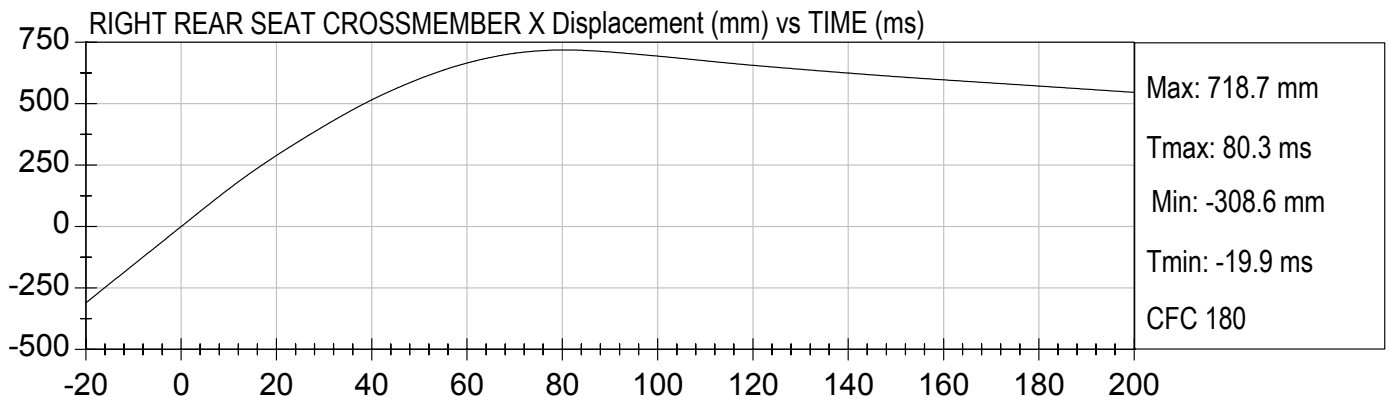
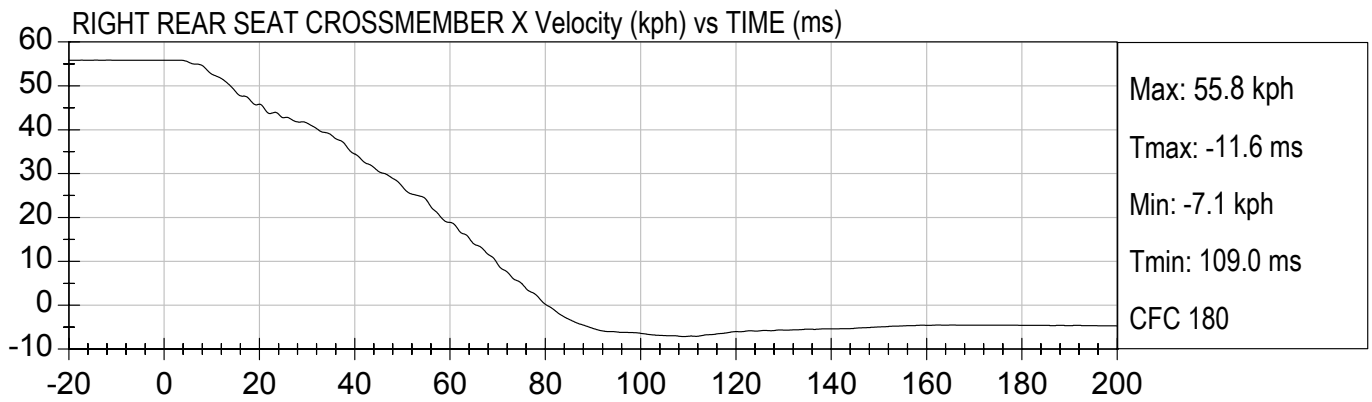
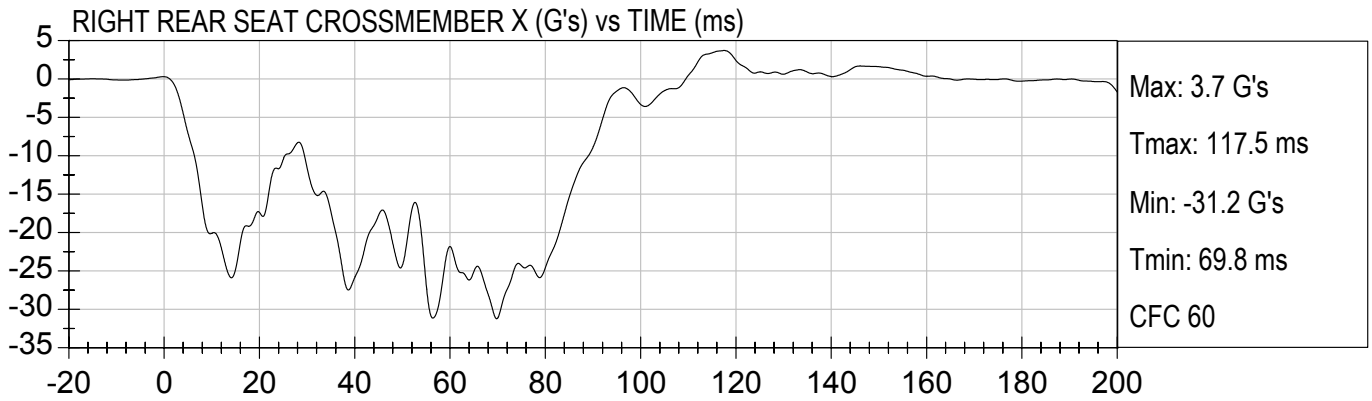


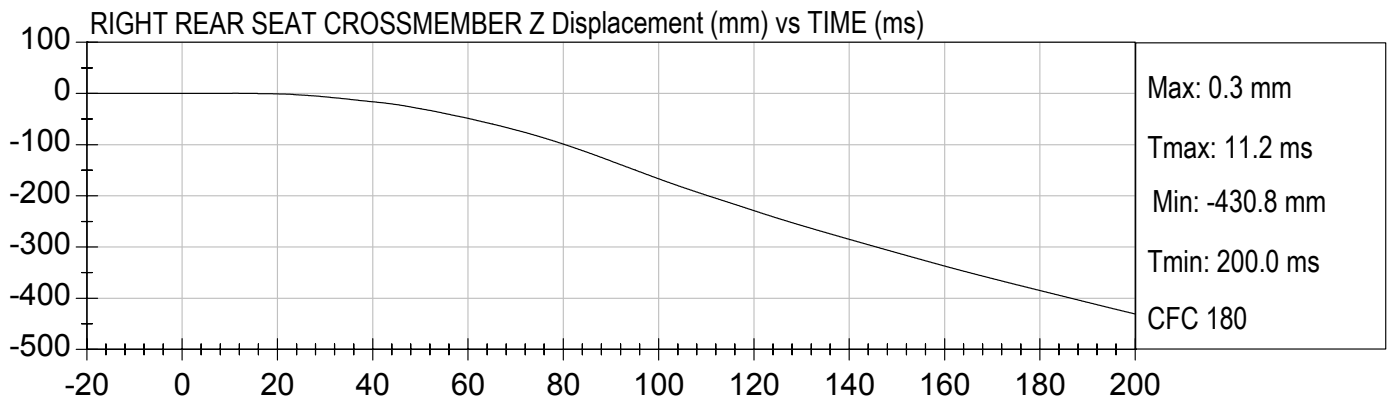
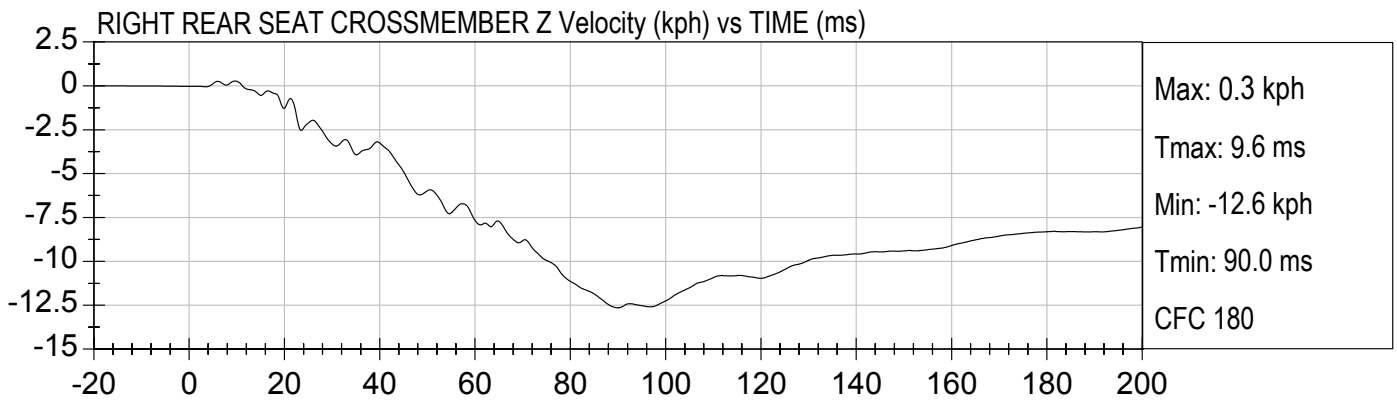
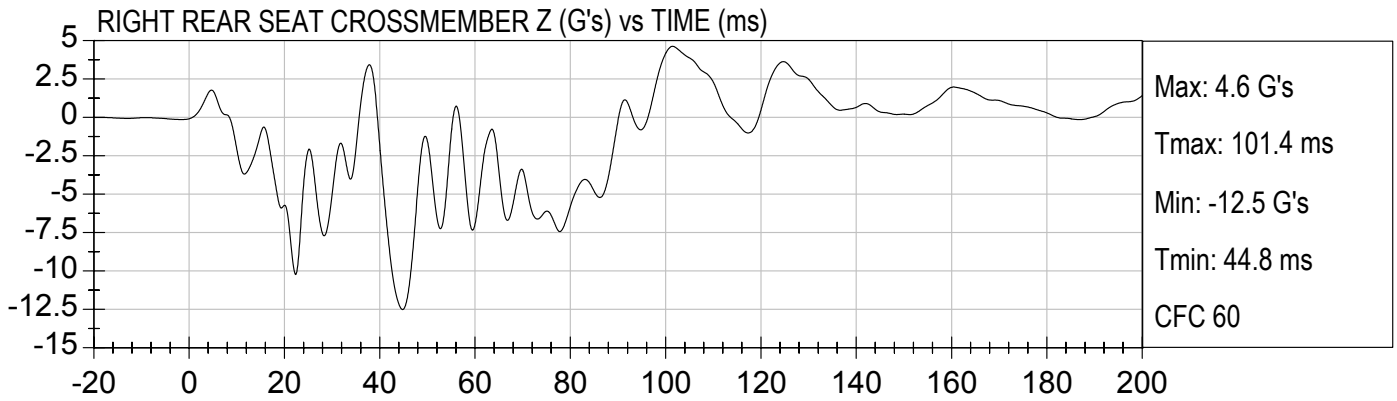


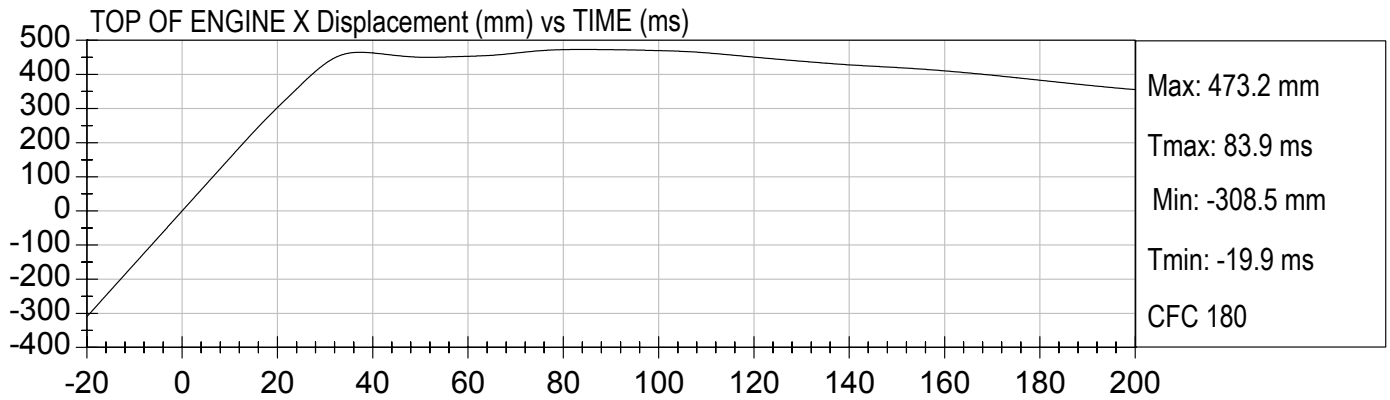
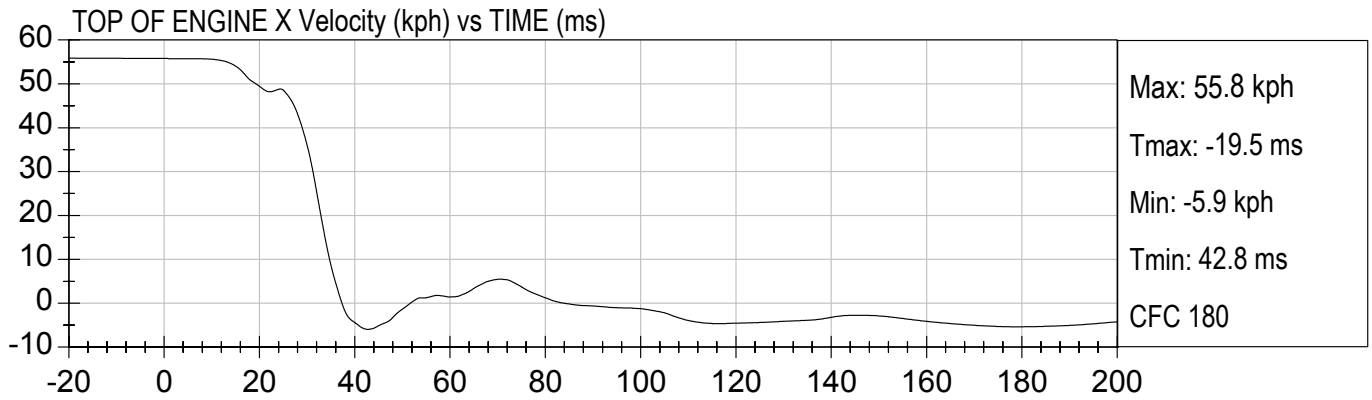
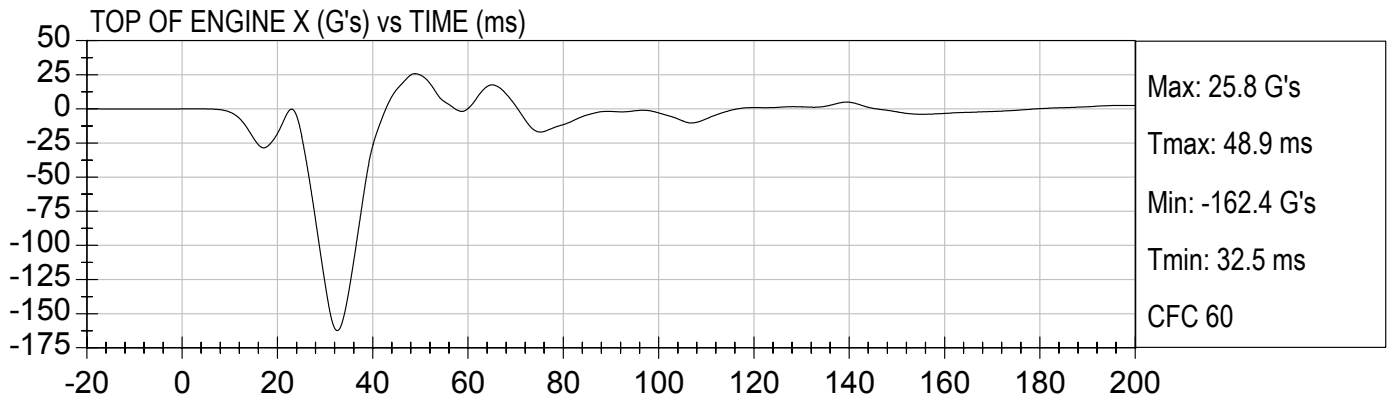


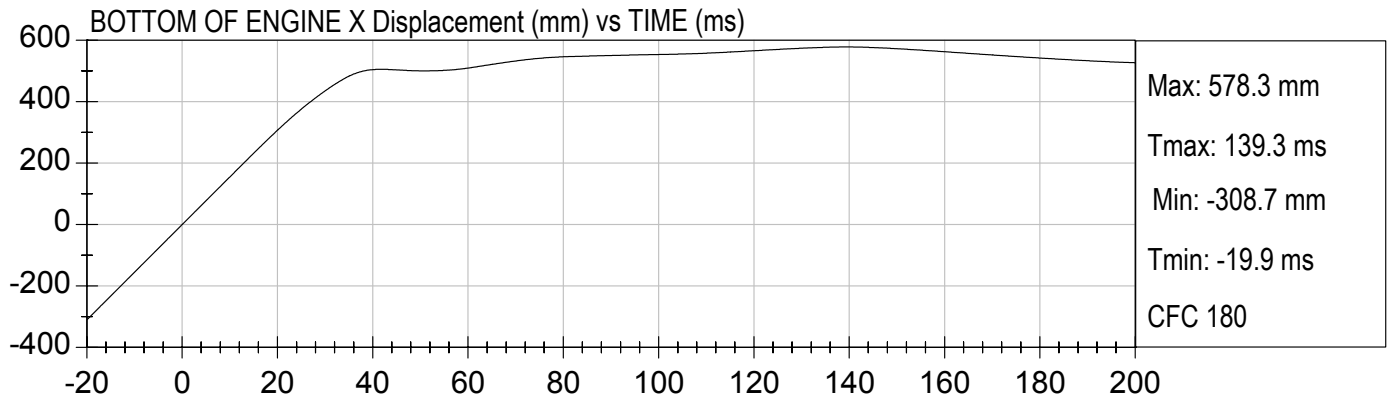
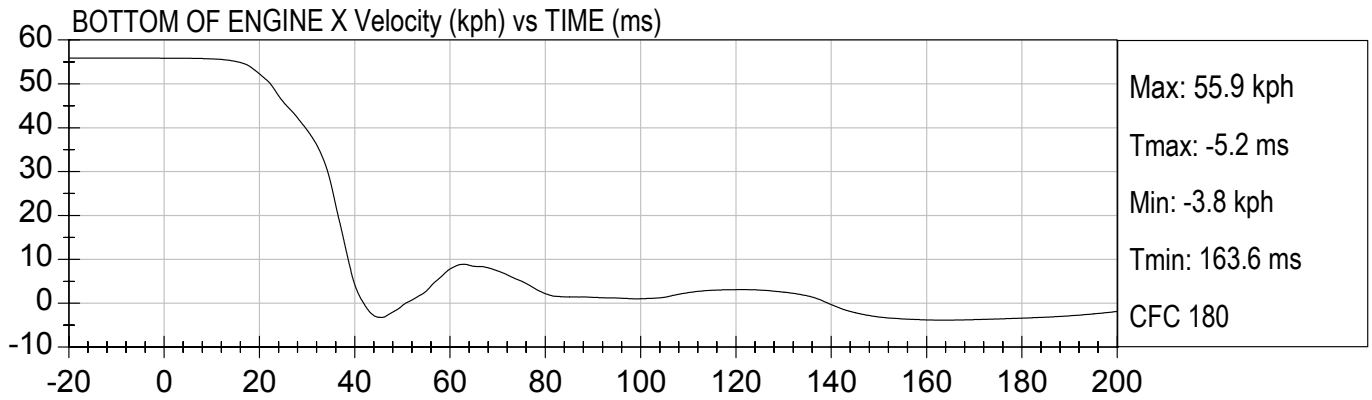
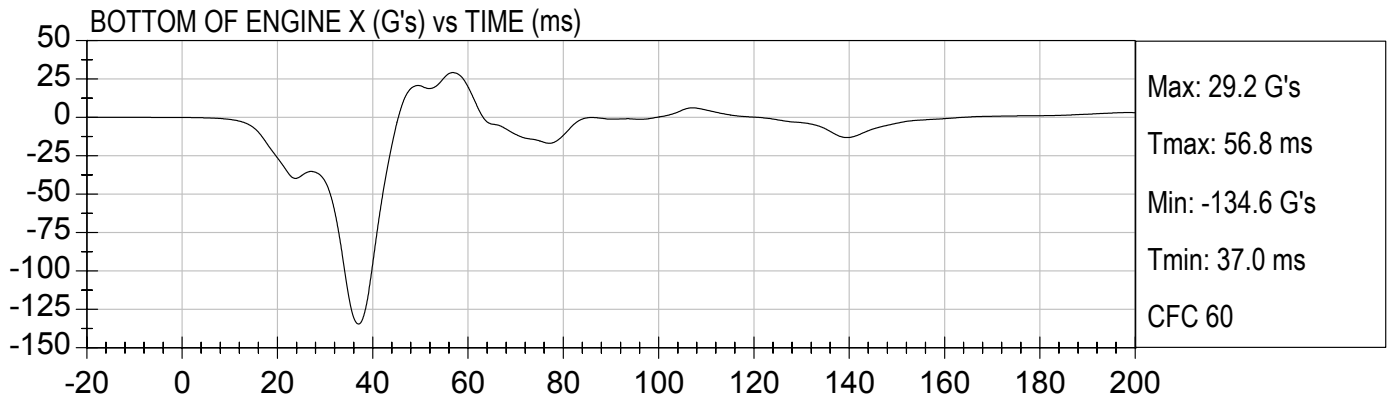


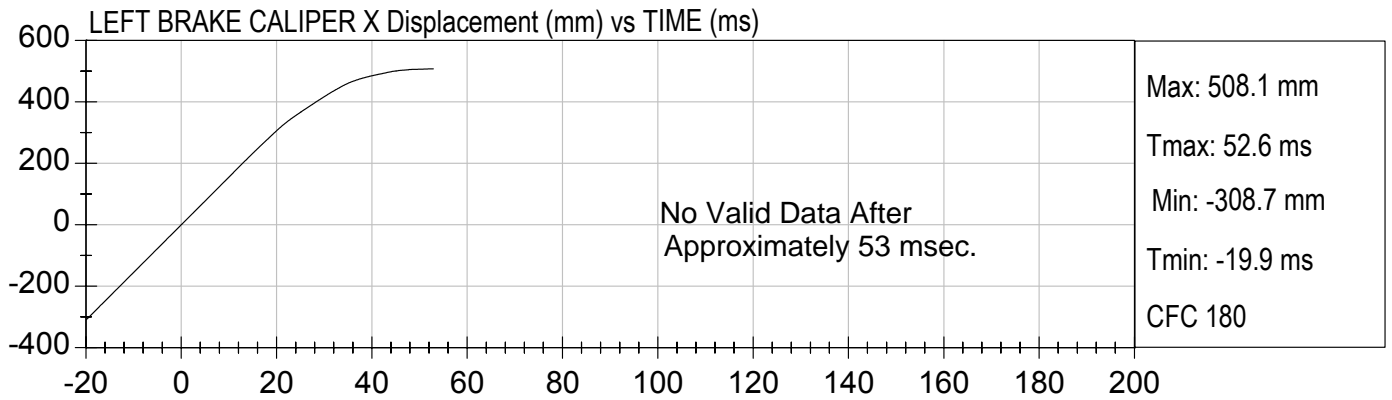
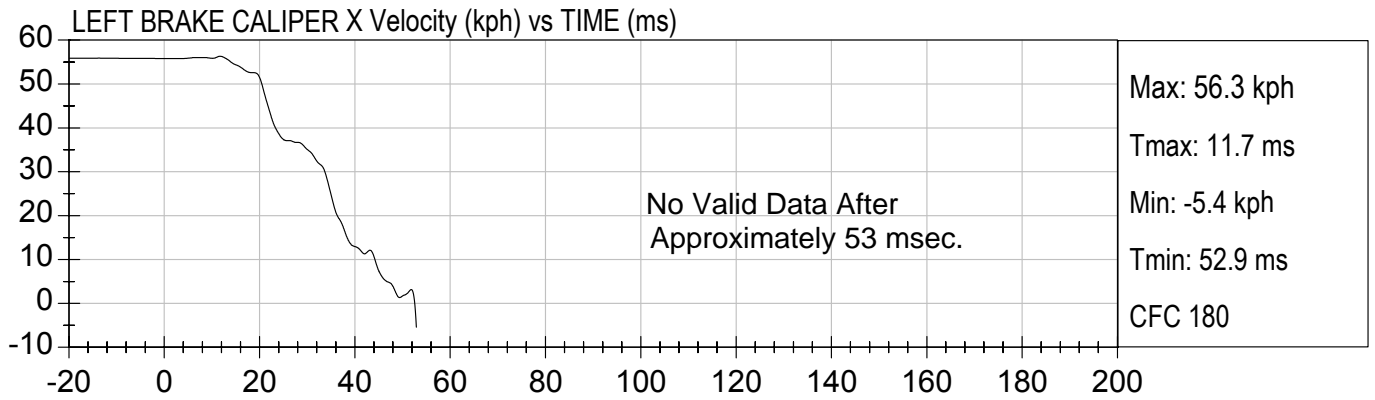
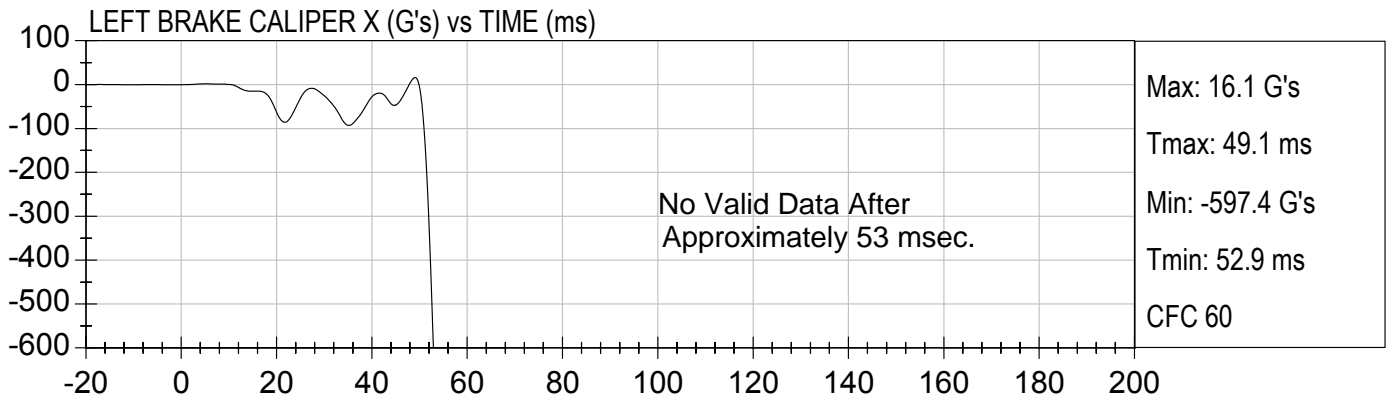


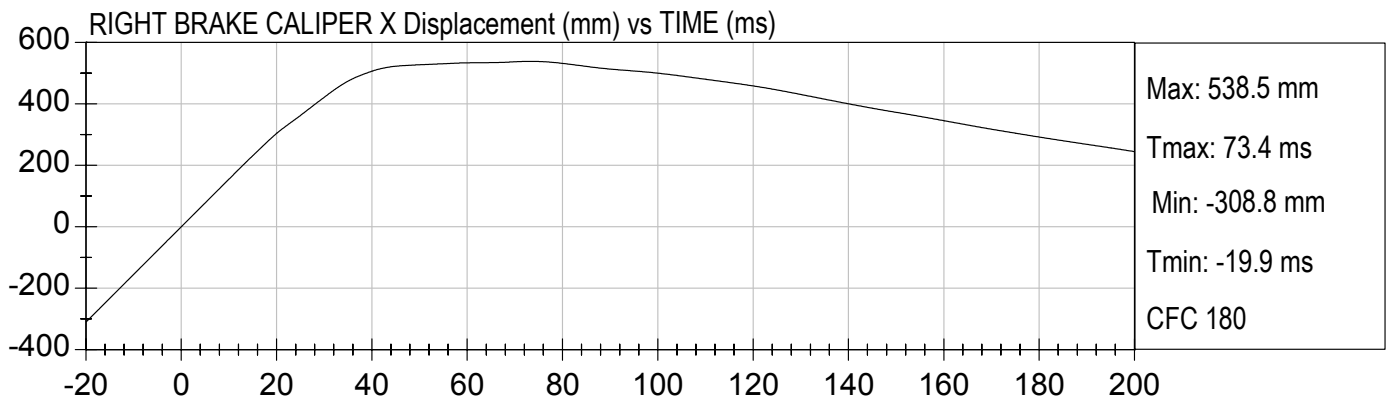
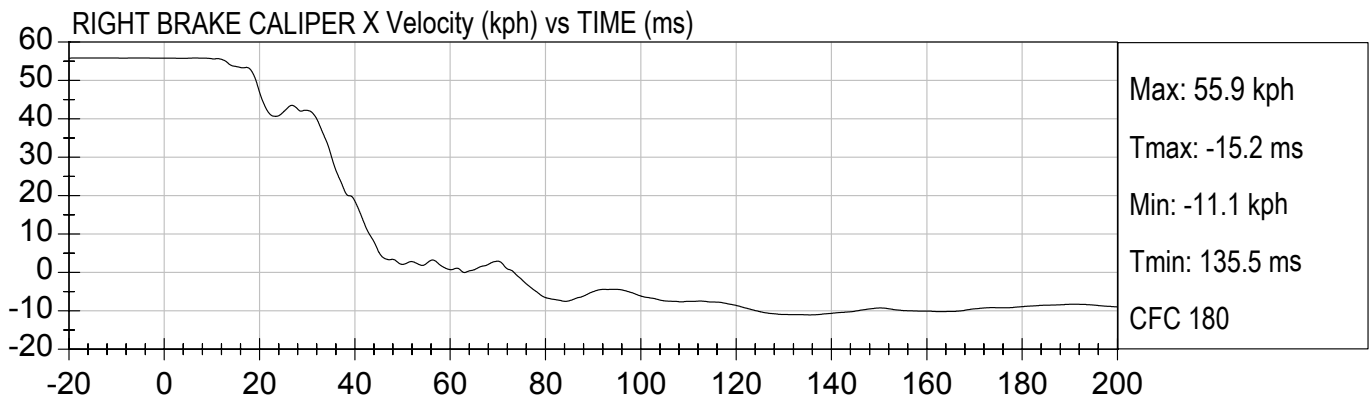
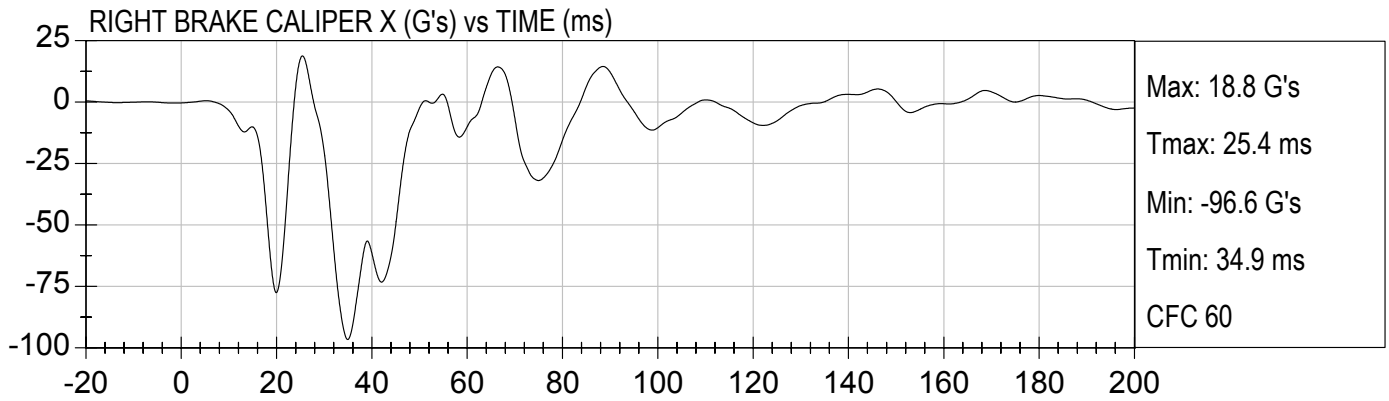


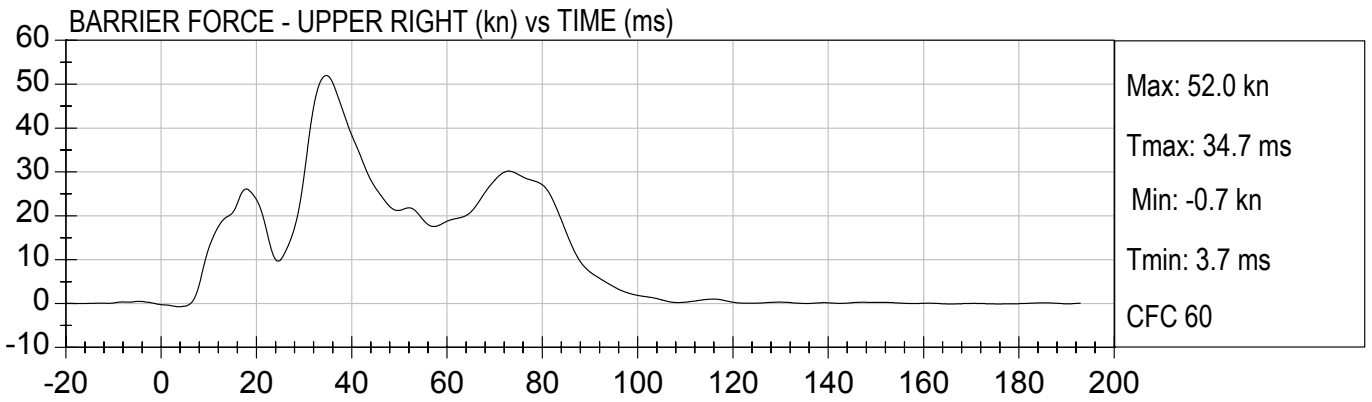
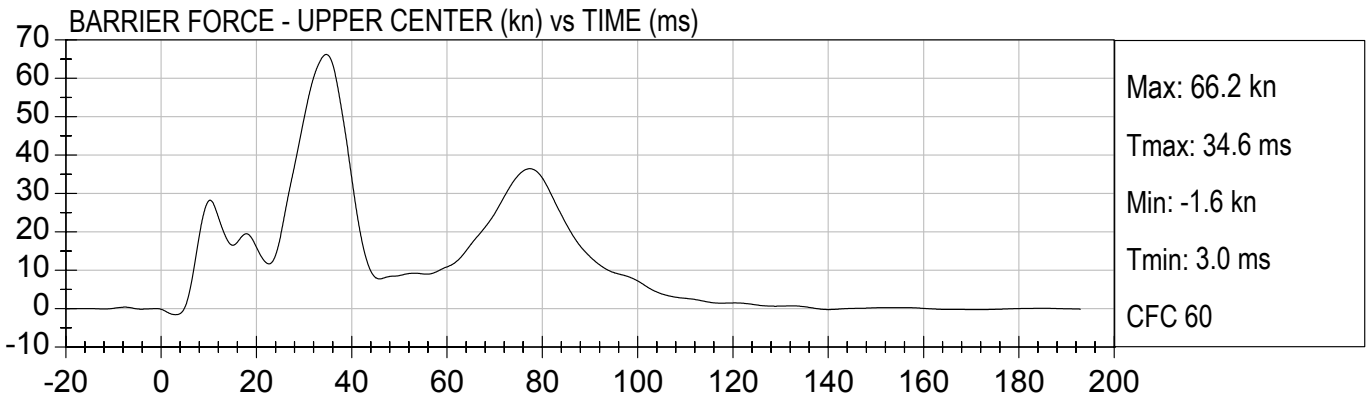
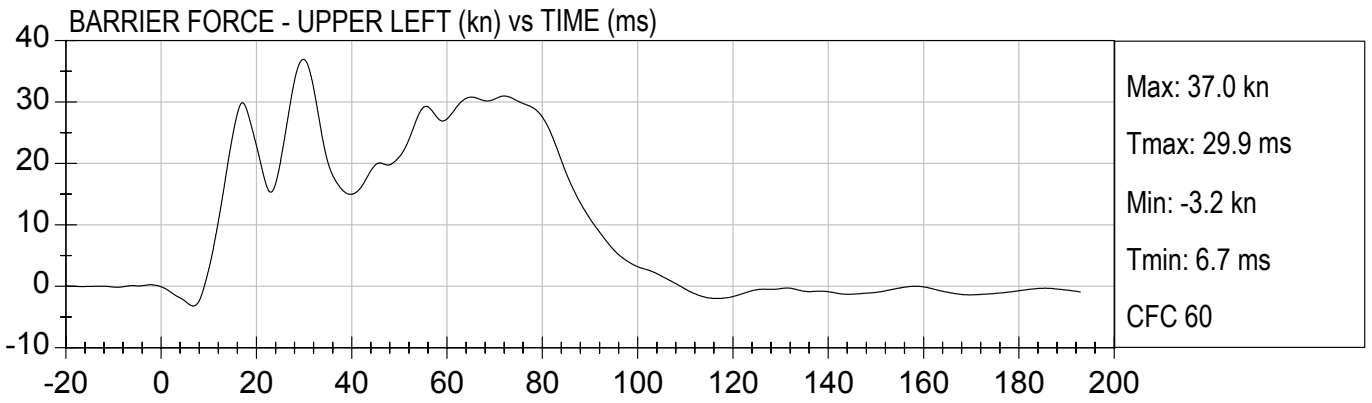






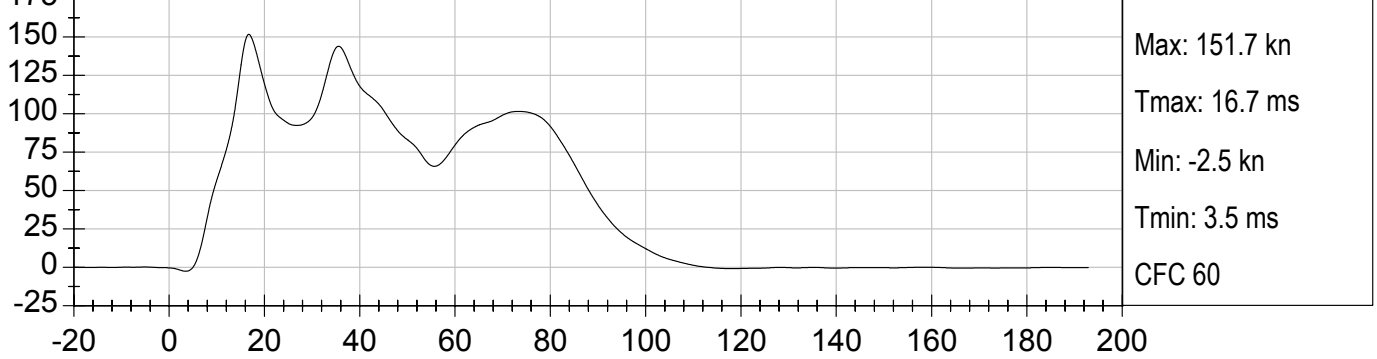




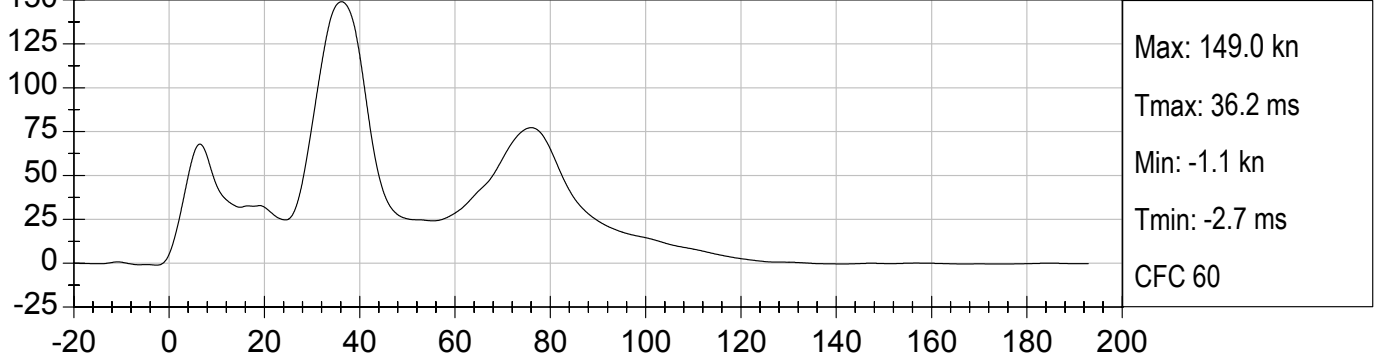




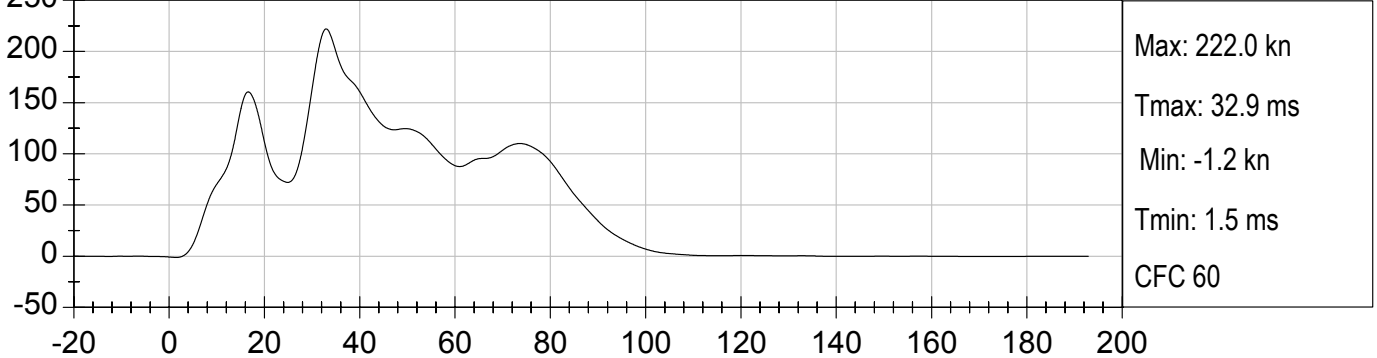
BARRIER FORCE - LOWER LEFT (kn) vs TIME (ms)

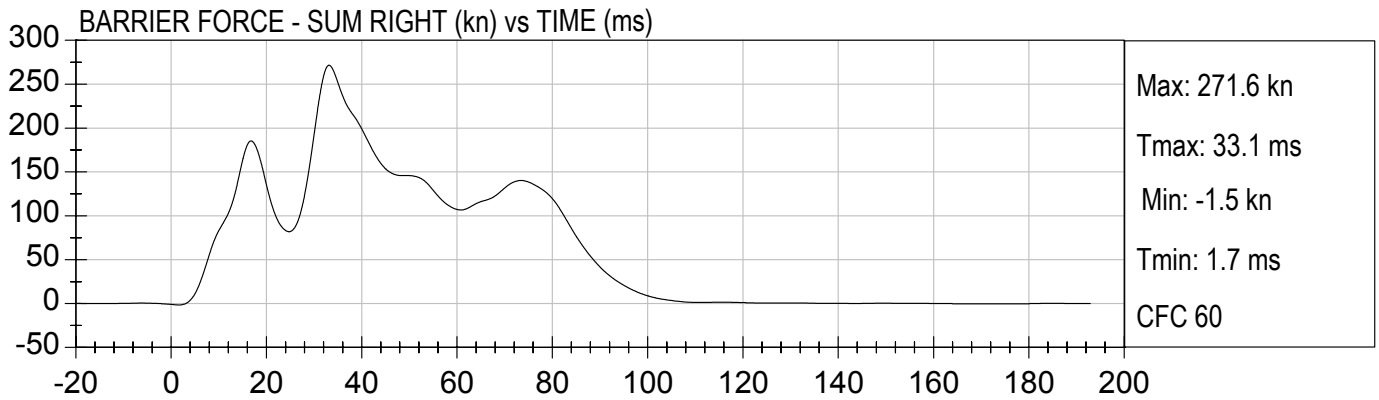
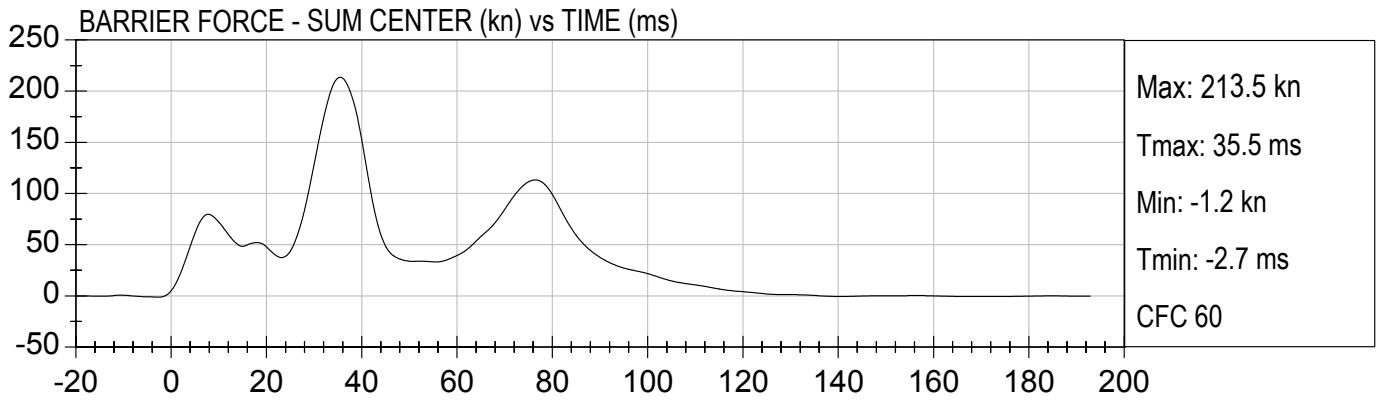
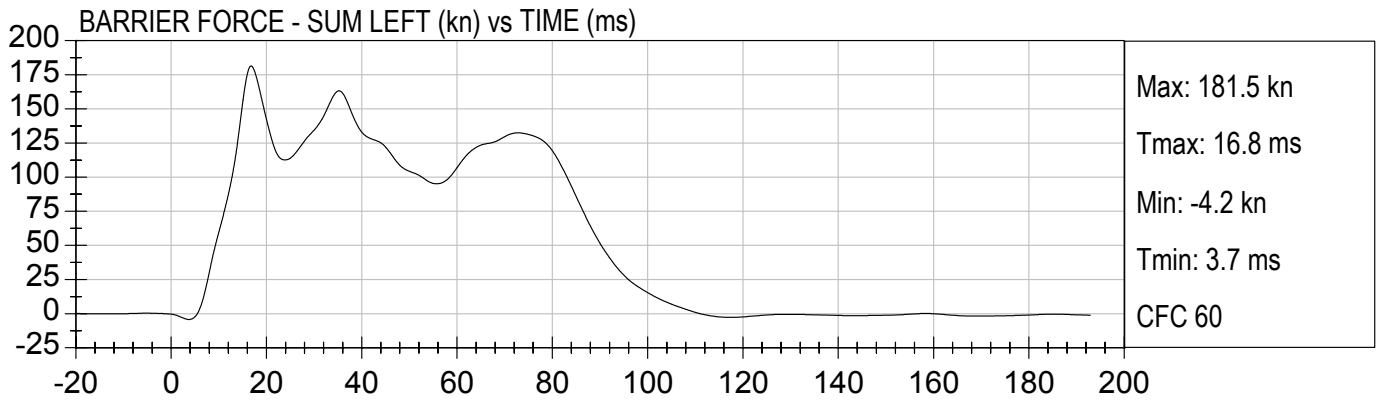


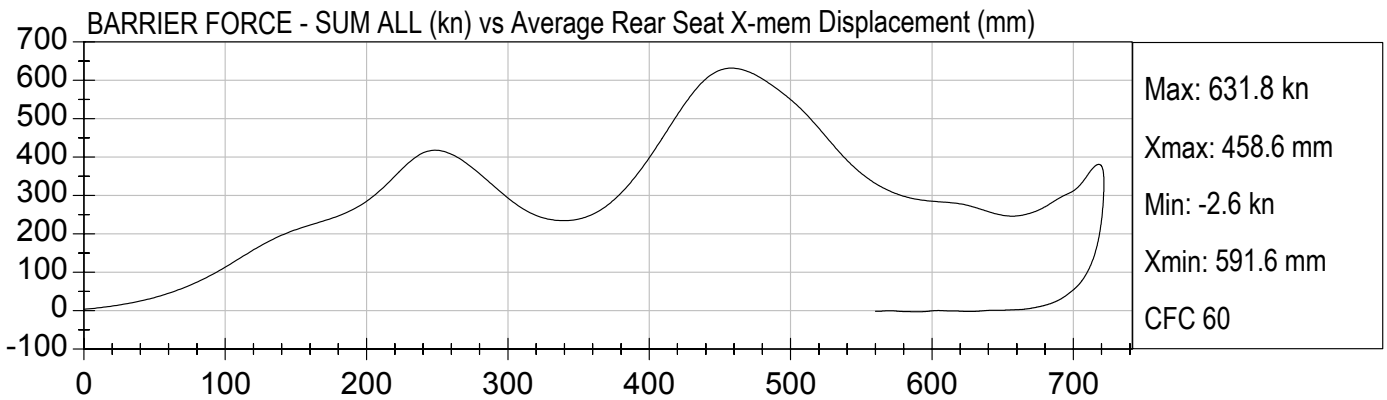
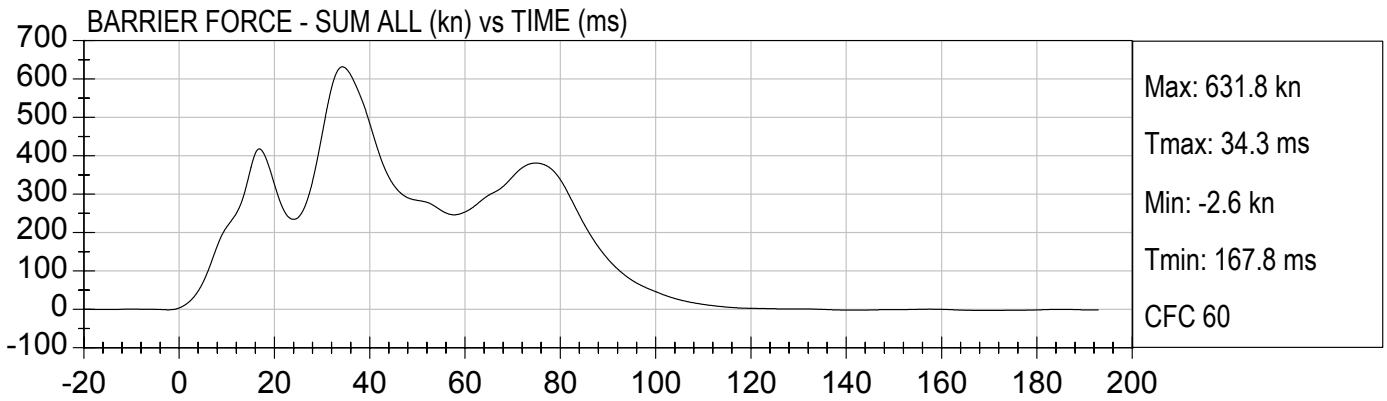
BARRIER FORCE - LOWER CENTER (kn) vs TIME (ms)



BARRIER FORCE - LOWER 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.:** D03031

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	14.9	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	251.1	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	12.4	Pass
Is Acceleration Unimodal?	Yes/No	< 10% Peak	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>

\_\_\_\_\_  
 Laboratory Technician

01/13/2003  
 Test Date

\_\_\_\_\_  
 Approved By



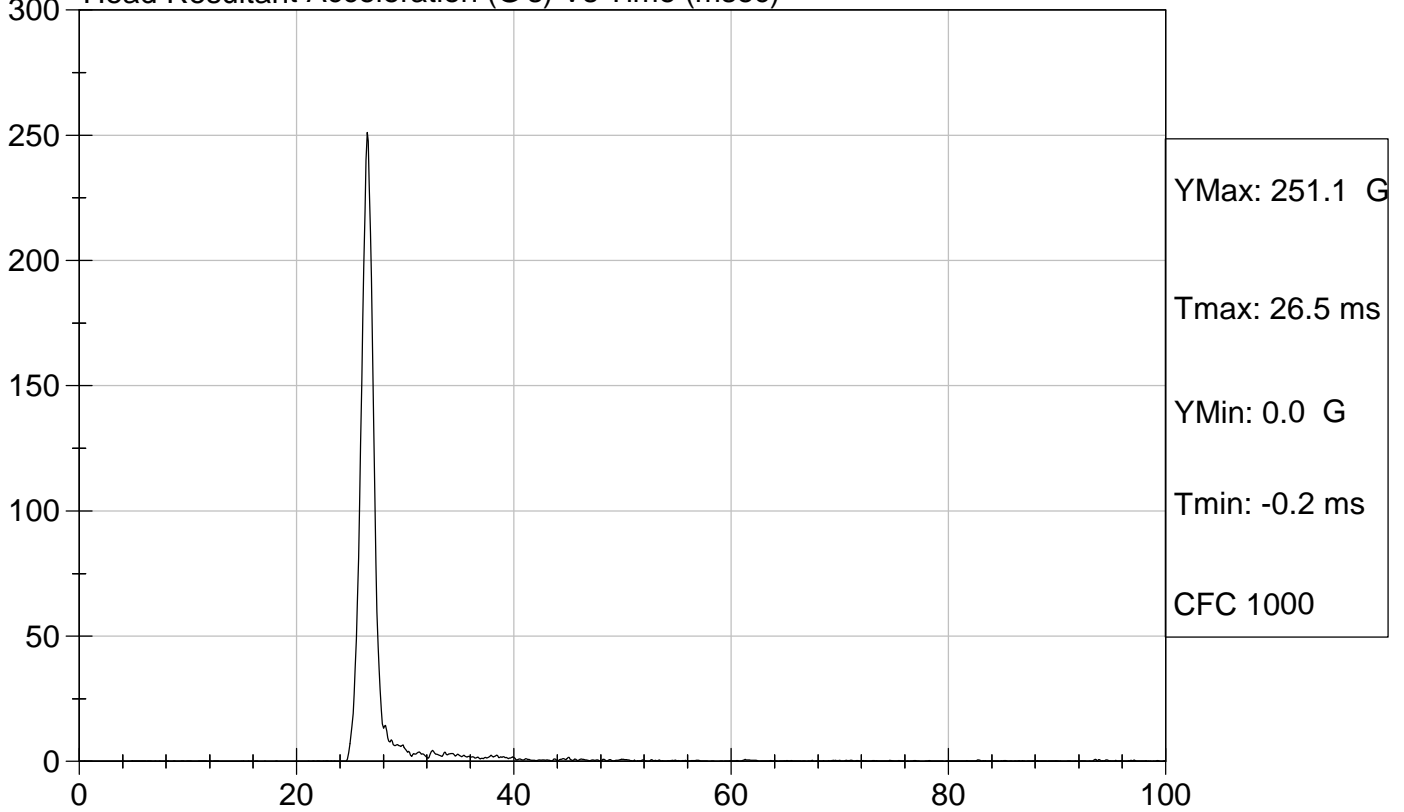
Test Description: Head Drop

Test Date: 01/13/2003

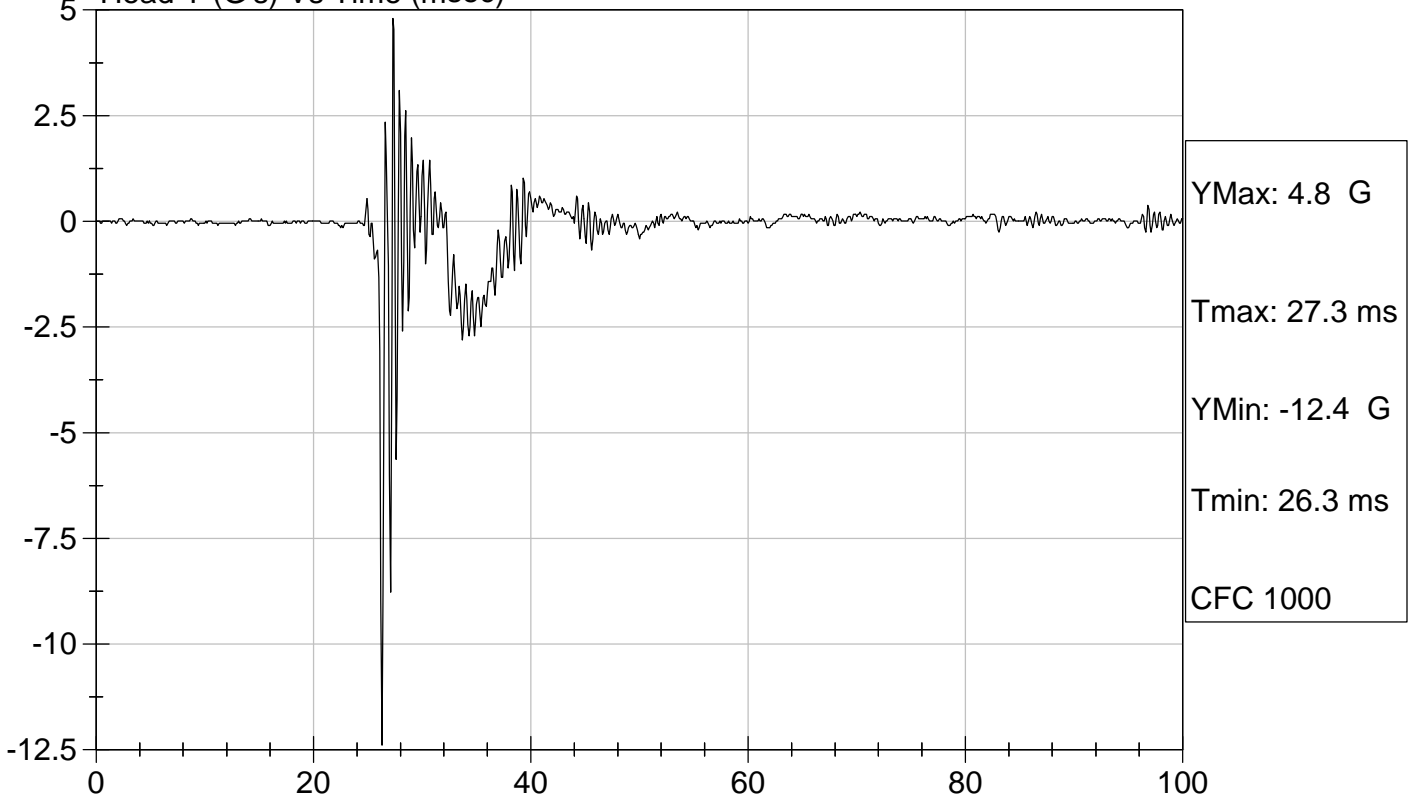
Component: D03031

Speed: 0 ft/s, 0.00 m/s

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



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



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

**ATD Serial No:** 065

**Test I.D:** D03032

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity		%	10 to 70	15	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.07	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	22.82	Pass
	20 msec	G's	17.60 to 22.60	19.18	Pass
	30 msec	G's	12.50 to 18.50	13.56	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	13.56	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	39.7	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	113.8	Pass
Moment About Occipital Condyle	Maximum	N m	84.1 to 108.5	90.2	Pass
	Time	msec	47.0 to 58.0	51.7	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	102.6	Pass

Overall Test Results	Pass
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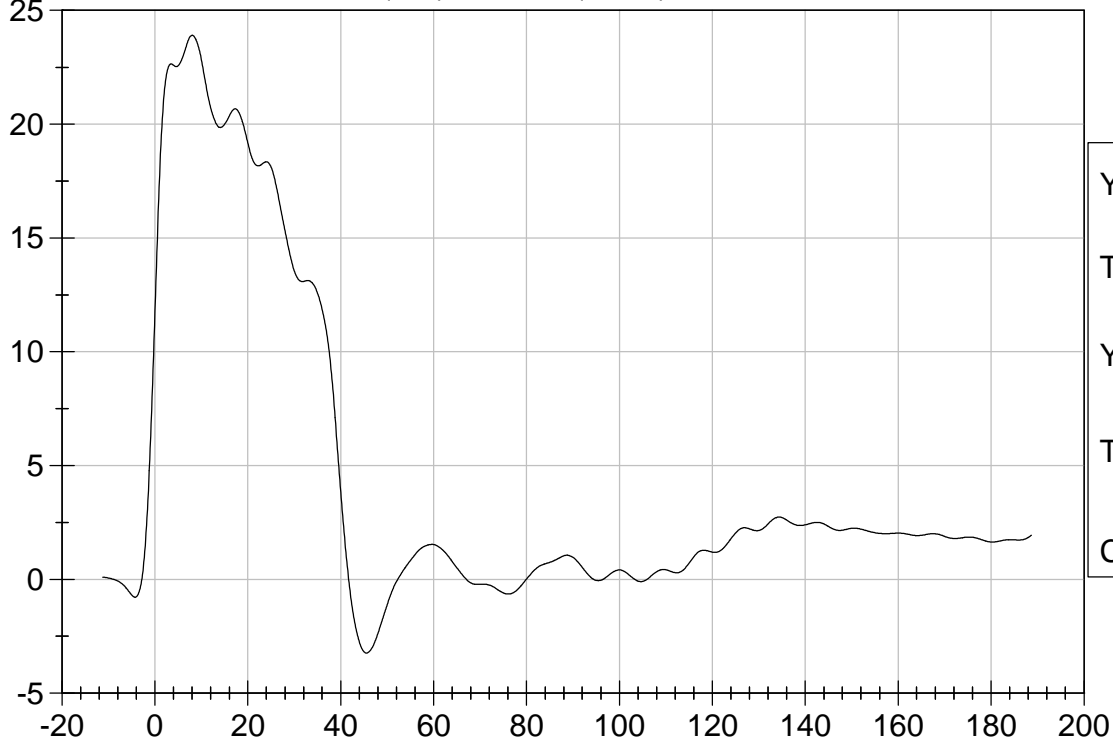
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Laboratory Technician

01/10/2003  
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Test Date

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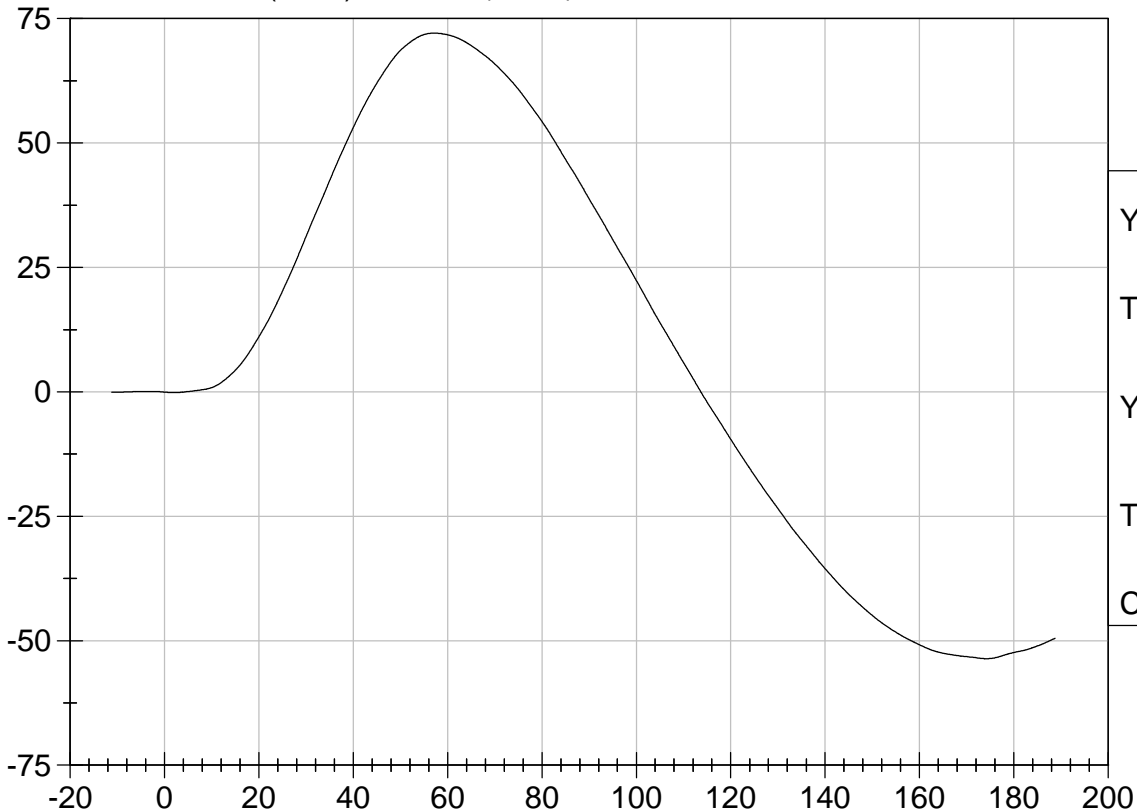


Pendulum Deceleration (G's) vs Time (msec)



YMax: 23.9 G'S  
Tmax: 8.0 ms  
YMin: -3.2 G'S  
Tmin: 45.5 ms  
CFC 60

Neck Rotation (DEG) vs Time (msec)

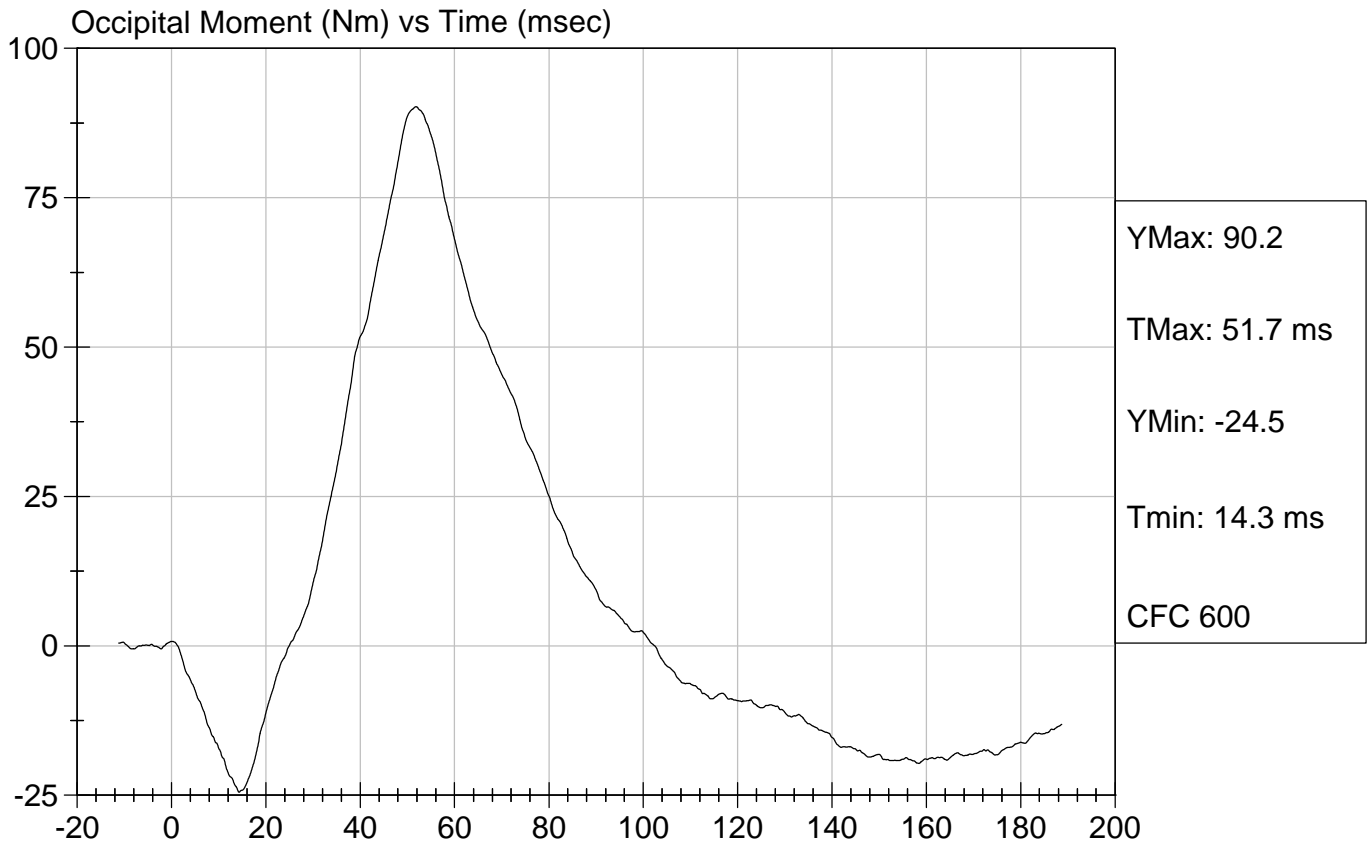


YMax: 72.1  
Tmax: 57.1 ms  
YMin: -53.6  
Tmin: 174.2 ms  
CFC 60



Test Desc: Thorax Impact  
Component ID: D03032

Test Date: 01/10/2003  
Speed: 23.21 ft/sec, 7.07 m/sec



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

**ATD Serial No:** 065

**Test I.D:** D03033

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity		%	10 to 70	15	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.02	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	18.19	Pass
	20 msec	G's	14.00 to 19.00	15.63	Pass
	30 msec	G's	11.00 to 16.00	12.25	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.2	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	42.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.9	Pass
	Time	msec	72.0 to 82.0	77.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	156.9	Pass
Moment About Occipital Condyle	Minimum	N m	-52.9 to -79.9	-58.9	Pass
	Time	msec	65.0 to 79.0	74.6	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	144.4	Pass

Overall Test Results	Pass
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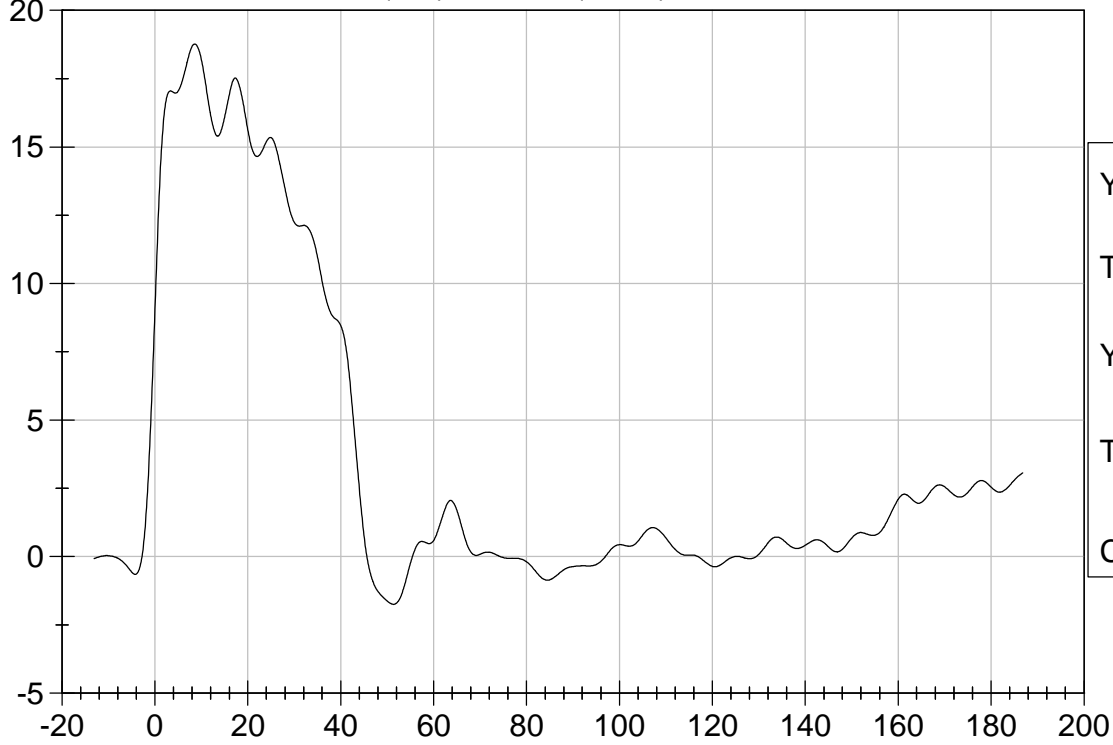
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Laboratory Technician

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Test Date

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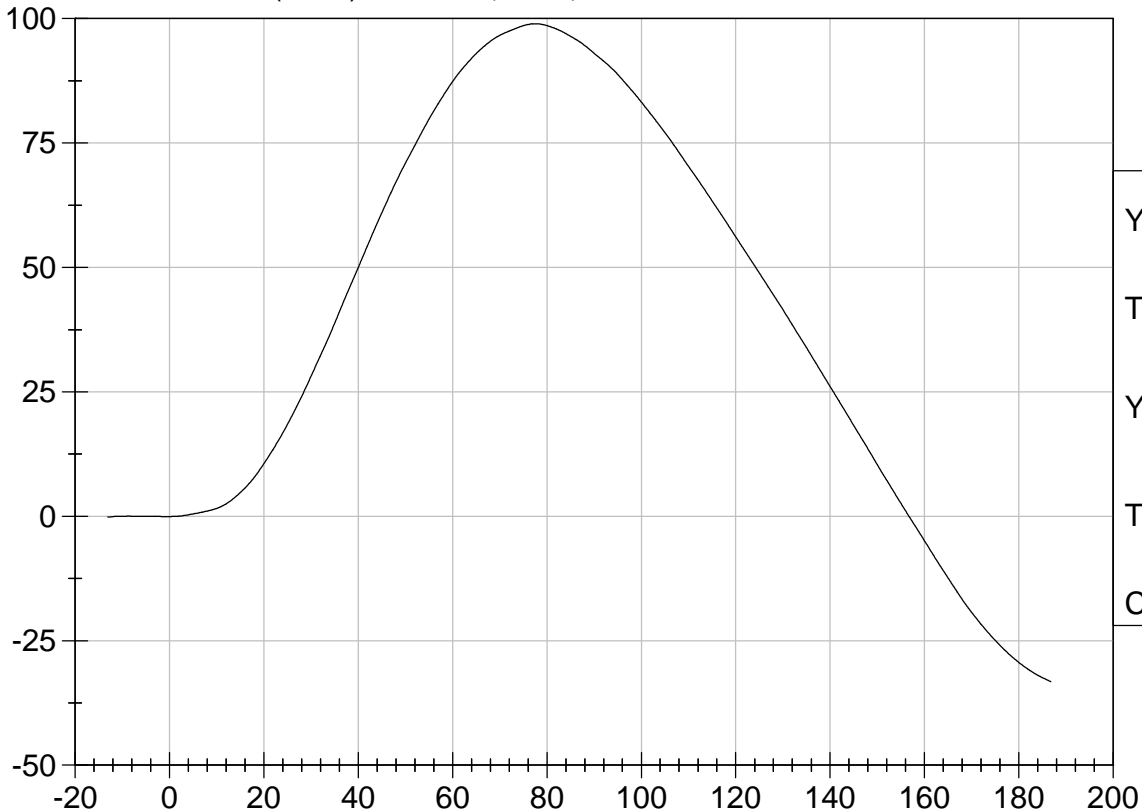


Pendulum Deceleration (G's) vs Time (msec)



YMax: 18.8 G'S  
Tmax: 8.6 ms  
YMin: -1.7 G'S  
Tmin: 51.4 ms  
CFC 60

Neck Rotation (DEG) vs Time (msec)

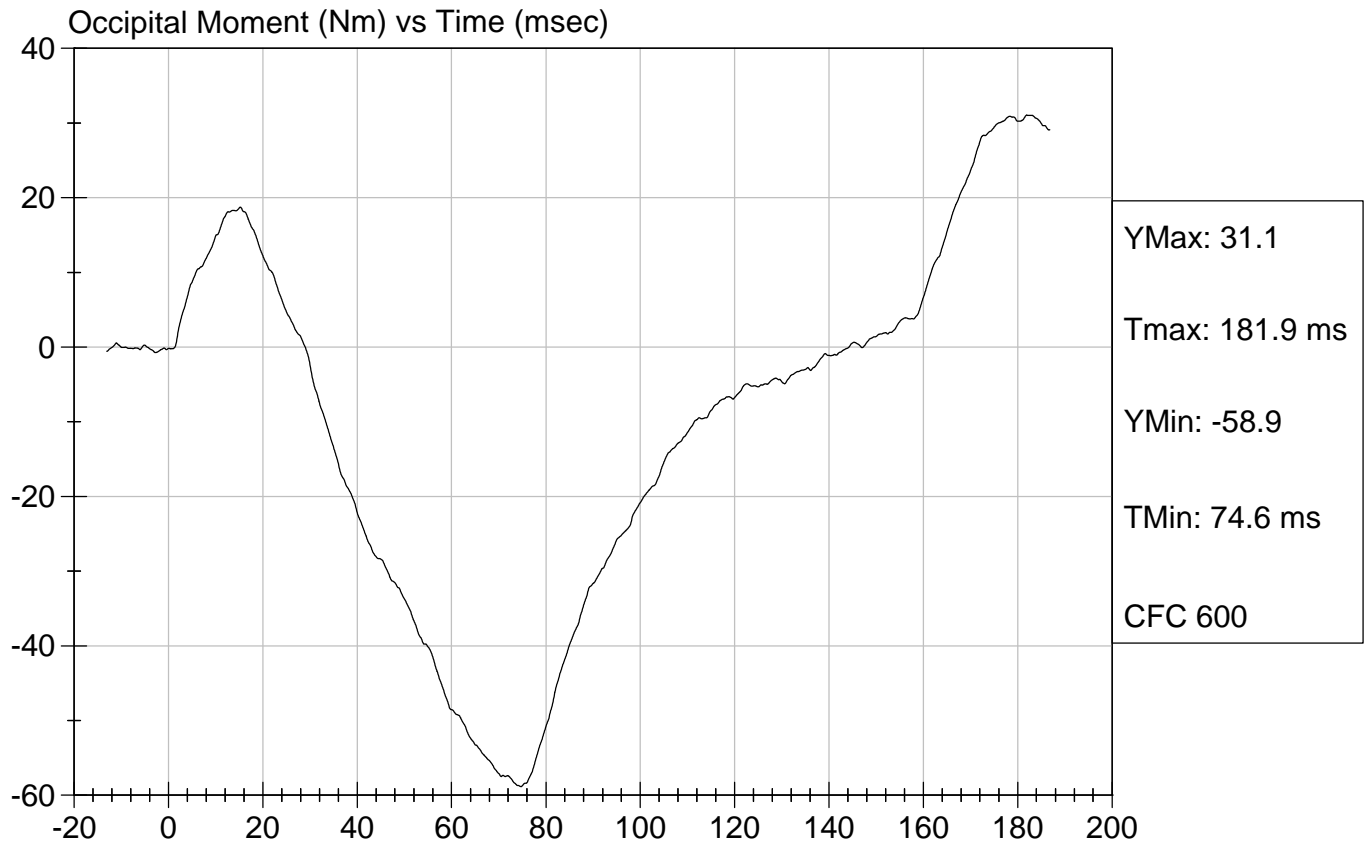


YMax: 98.9  
TMax: 77.4 ms  
YMin: -33.2  
Tmin: 186.8 ms  
CFC 60



Test Desc: Thorax Impact  
Component ID: D03033

Test Date: 01/10/2003  
Speed: 19.74 ft/sec, 6.02 m/sec



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

**ATD Serial No:** 065

**Test I.D.:** D03034

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	Newtons	5159 to 5893	5,582	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.36	Pass
Internal Hysteresis	%	69 to 85	72	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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 01/17/2003  
 Test Date

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Test Description: Thorax Impact

Test Date: 01/17/2003

Component: D03034

Speed: 22.2 ft/sec, 6.77 m/sec



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

**ATD Serial No:** 065

**Test I.D.:** D03035

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	15.4	Pass
Probe Velocity	m/s	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,357	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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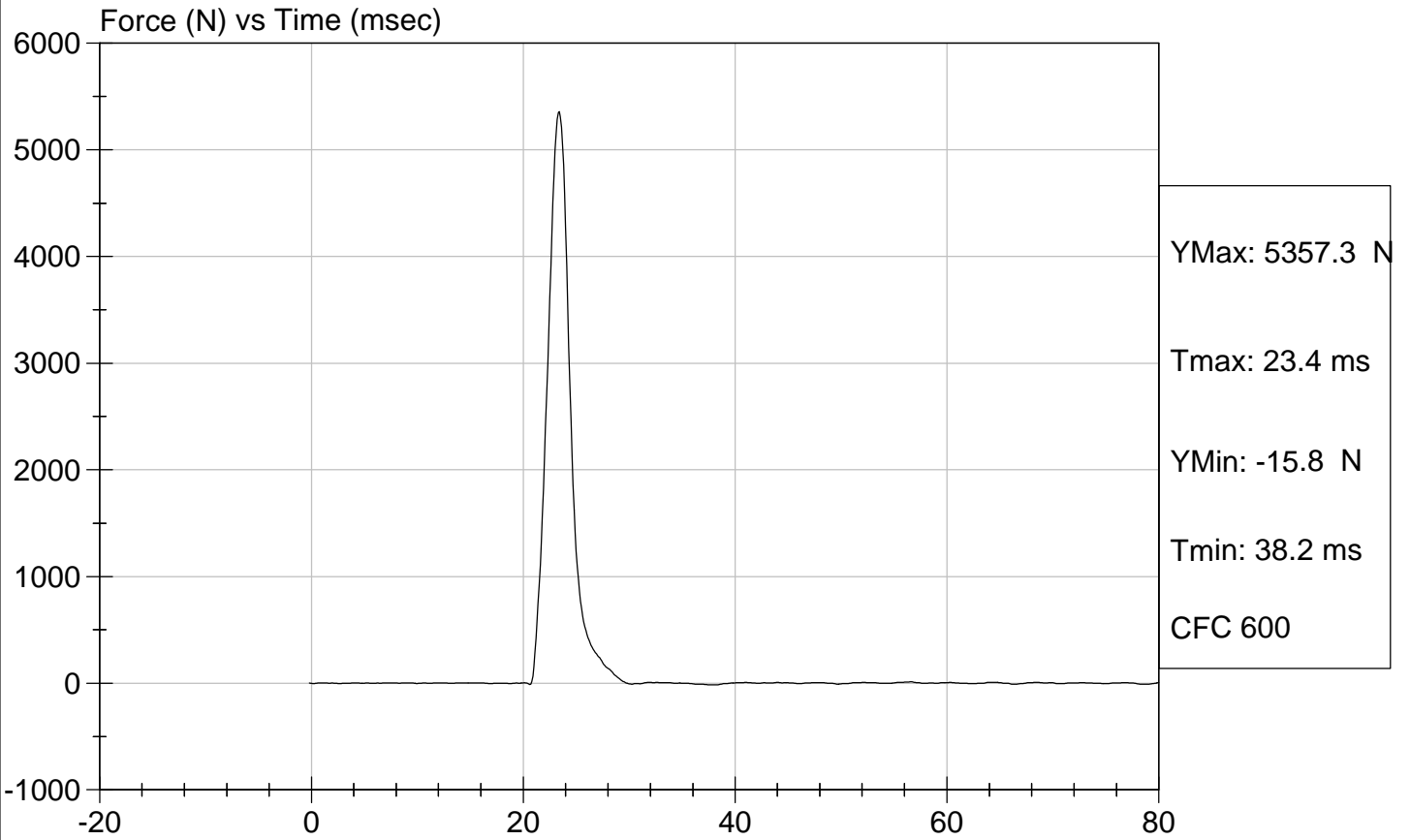


Test Description: Right Knee

Test Date: 01/14/2003

Component: D03035

Speed: 6.81 ft/sec, 2.08 m/sec



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

**ATD Serial No:** 065

**Test I.D.:** D03036

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	15.4	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5,516	Pass
Overall Test Results				Pass

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 Laboratory Technician

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 01/14/2003  
 Test Date

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 Approved By

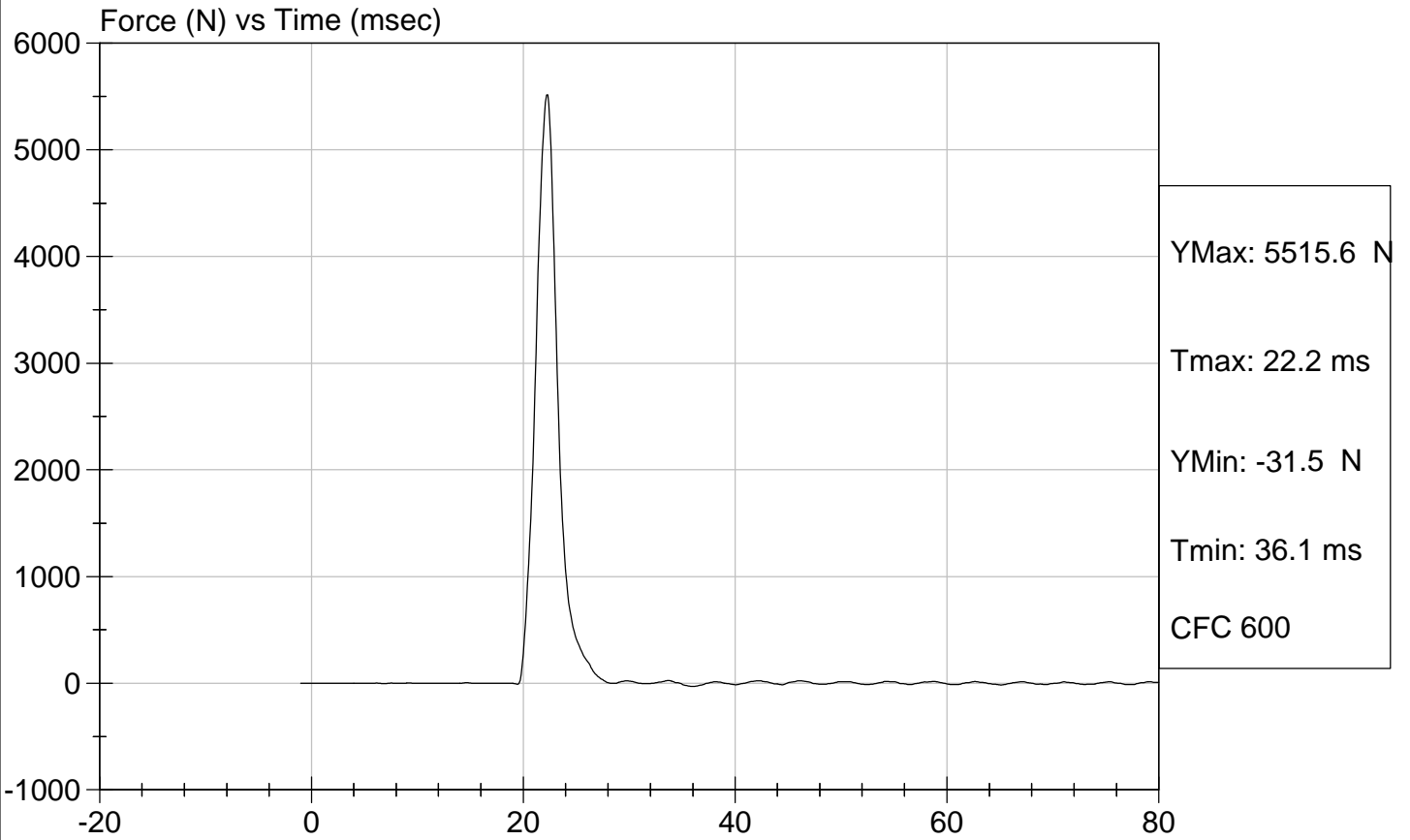


Test Description: Left Knee

Test Date: 01/14/2003

Component: D03036

Speed: 6.89 ft/sec, 2.10 m/sec



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

**ATD Serial No:** 065

**Test I.D.:** D03030

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.7	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	15.4	15.4	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	64.4	71.0	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	46	45	Pass
Overall Test Results					Pass

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 Laboratory Technician

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 Test Date

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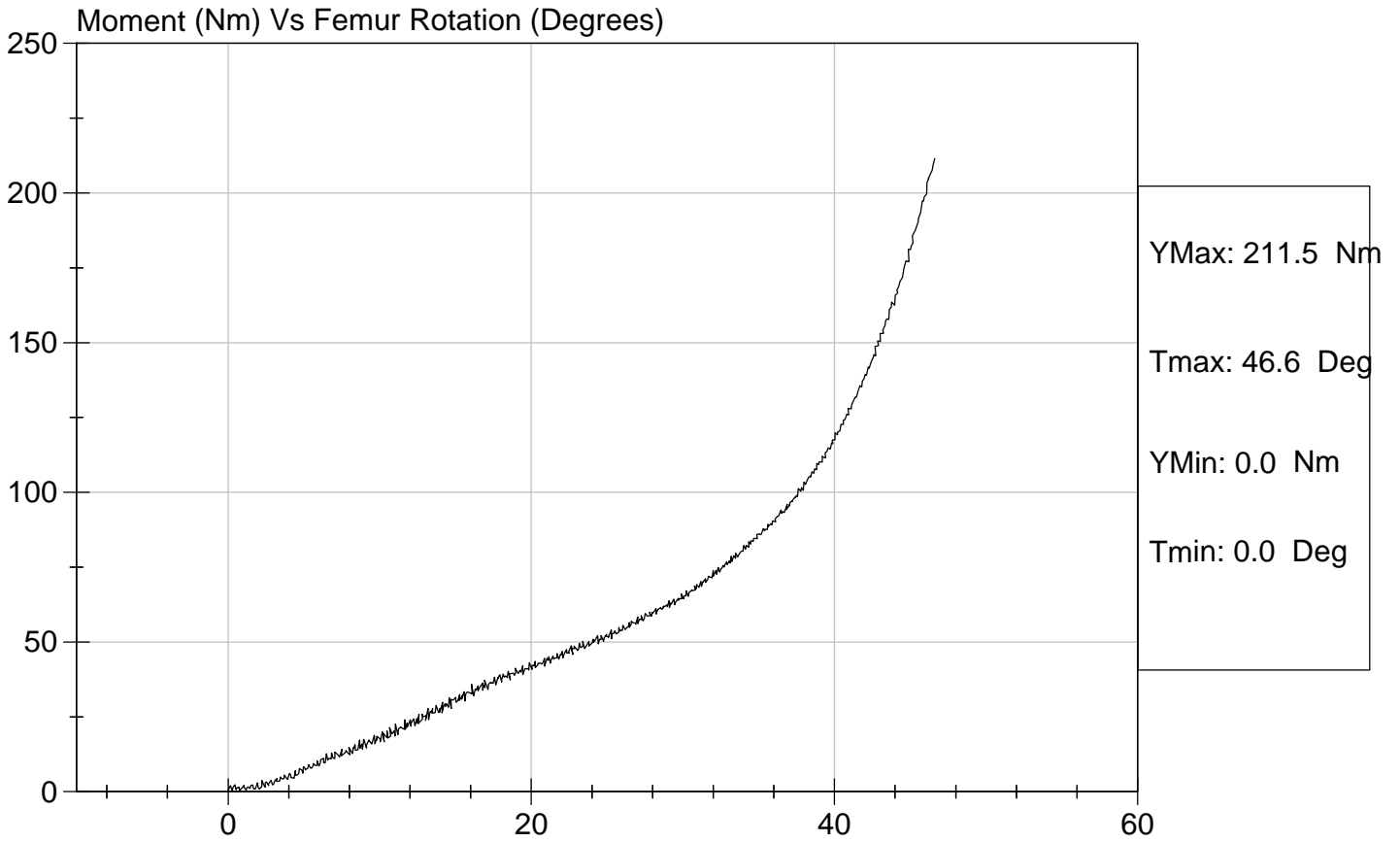


Test Description: Thorax Impact

Test Date: 01/14/2003

Component: D03039

Speed: 0 ft/sec, 0.00 m/sec



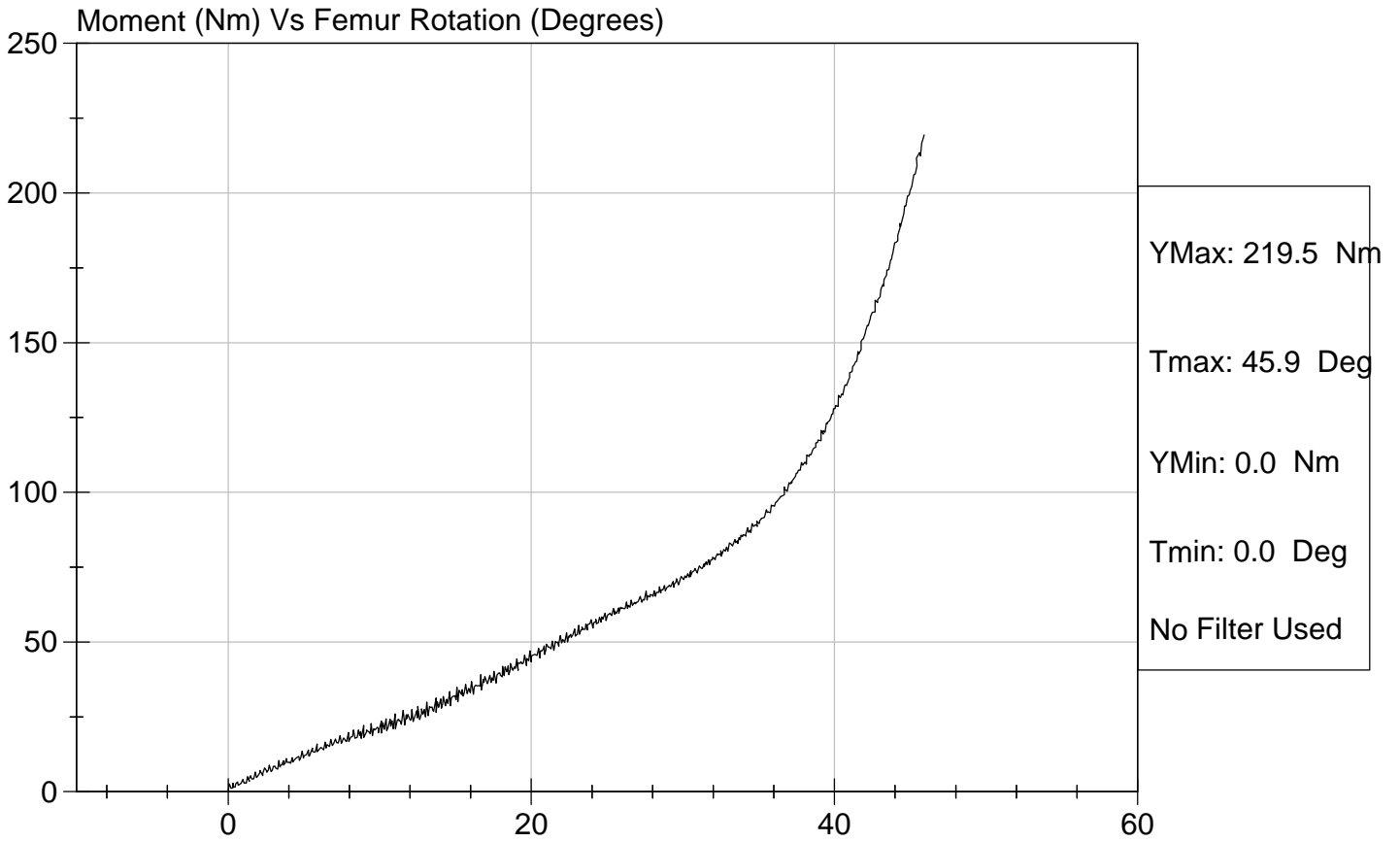


Test Description: Hip Femur Flexion

Test Date: 01/14/2003

Component: D03030

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.:** D03041

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	15.1	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	244.3	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	9.3	Pass
Is Acceleration Unimodal?	Yes/No	< 10% Peak	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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 Laboratory Technician

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 01/13/2003  
 Test Date

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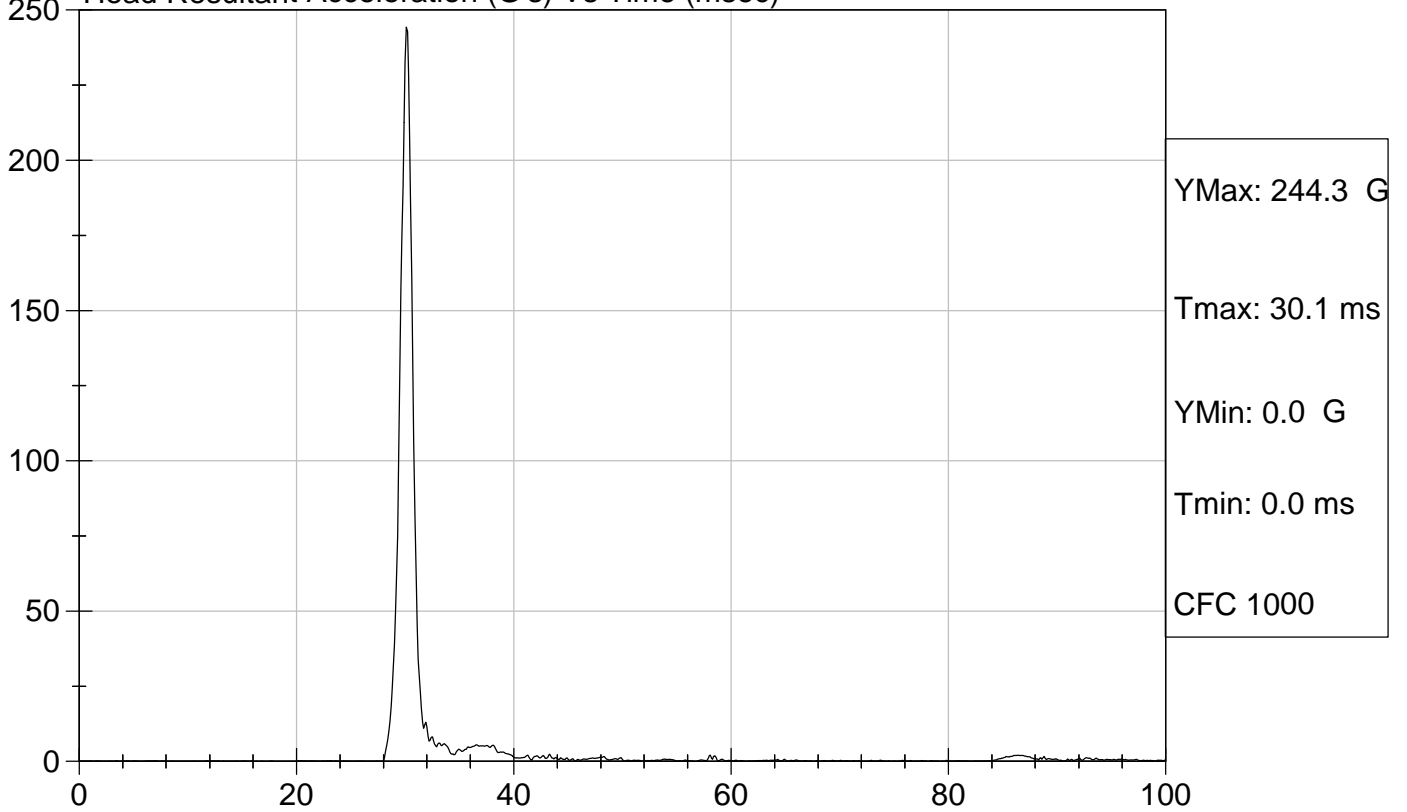
Test Description: Head Drop

Test Date: 01/13/2003

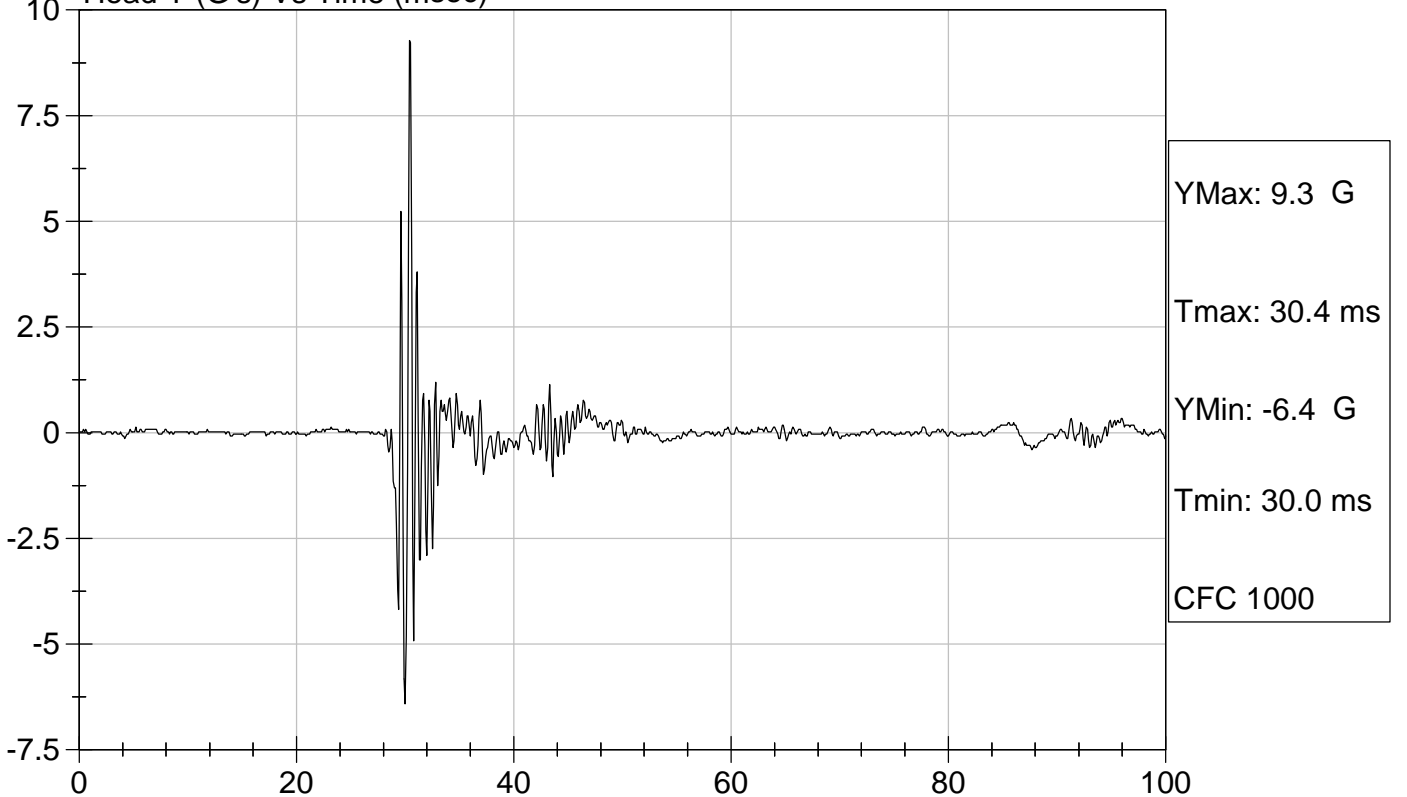
Component: D03041

Speed: 0 ft/s, 0.00 m/s

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



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



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

**ATD Serial No:** 066

**Test I.D:** D03042

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity		%	10 to 70	15	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.03	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	23.30	Pass
	20 msec	G's	17.60 to 22.60	20.33	Pass
	30 msec	G's	12.50 to 18.50	14.00	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.00	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	39.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.8	Pass
	Time	msec	57.0 to 64.0	57.7	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	86.7	Pass
	Time	msec	47.0 to 58.0	51.3	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	101.9	Pass

Overall Test Results	Pass
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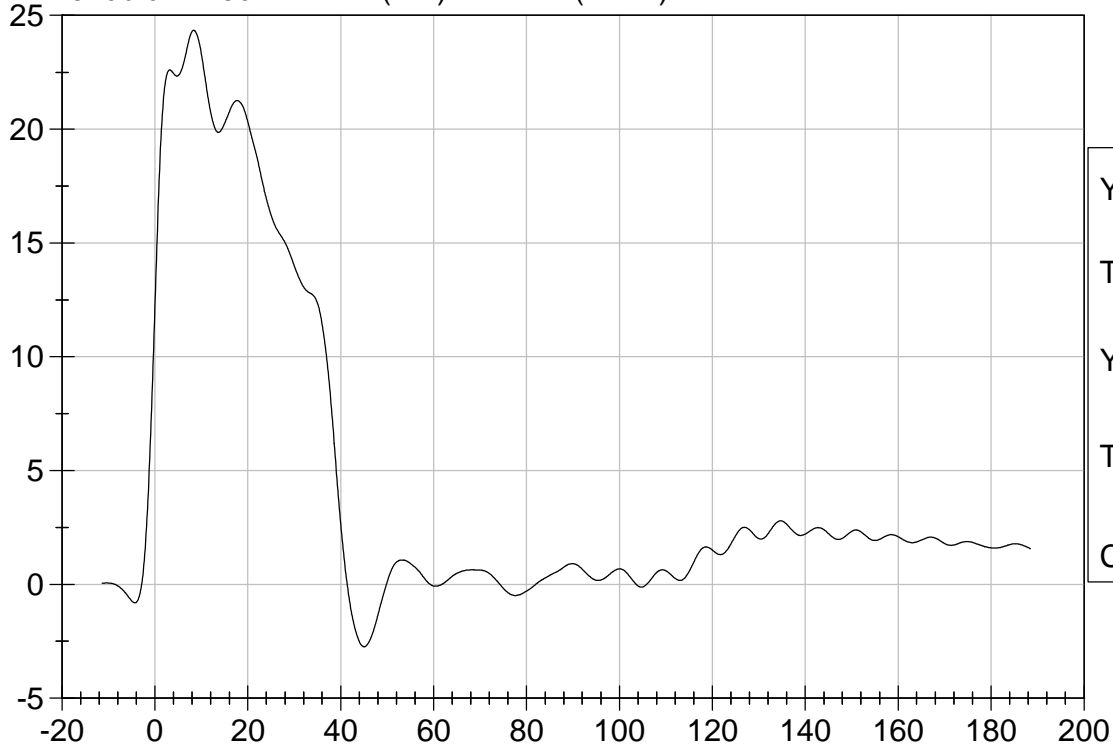
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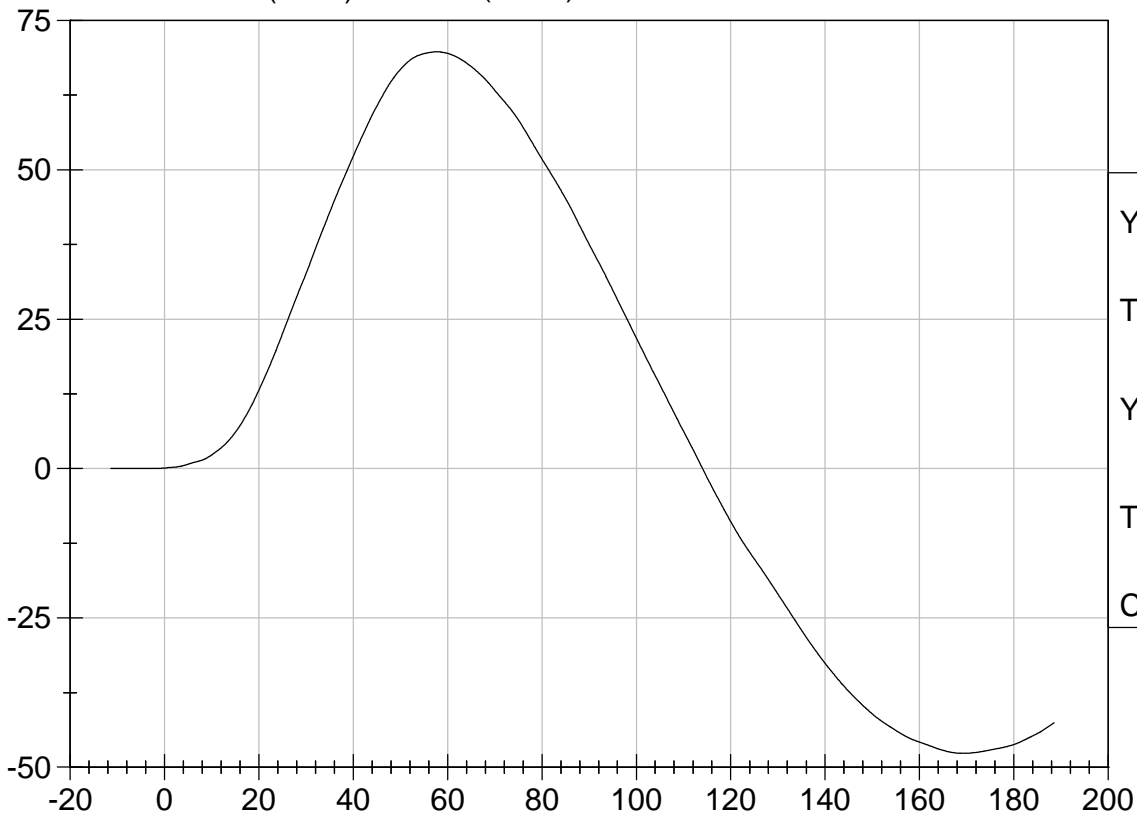


Pendulum Deceleration (G's) vs Time (msec)



YMax: 24.3 G'S  
Tmax: 8.4 ms  
YMin: -2.7 G'S  
Tmin: 45.0 ms  
CFC 60

Neck Rotation (DEG) vs Time (msec)

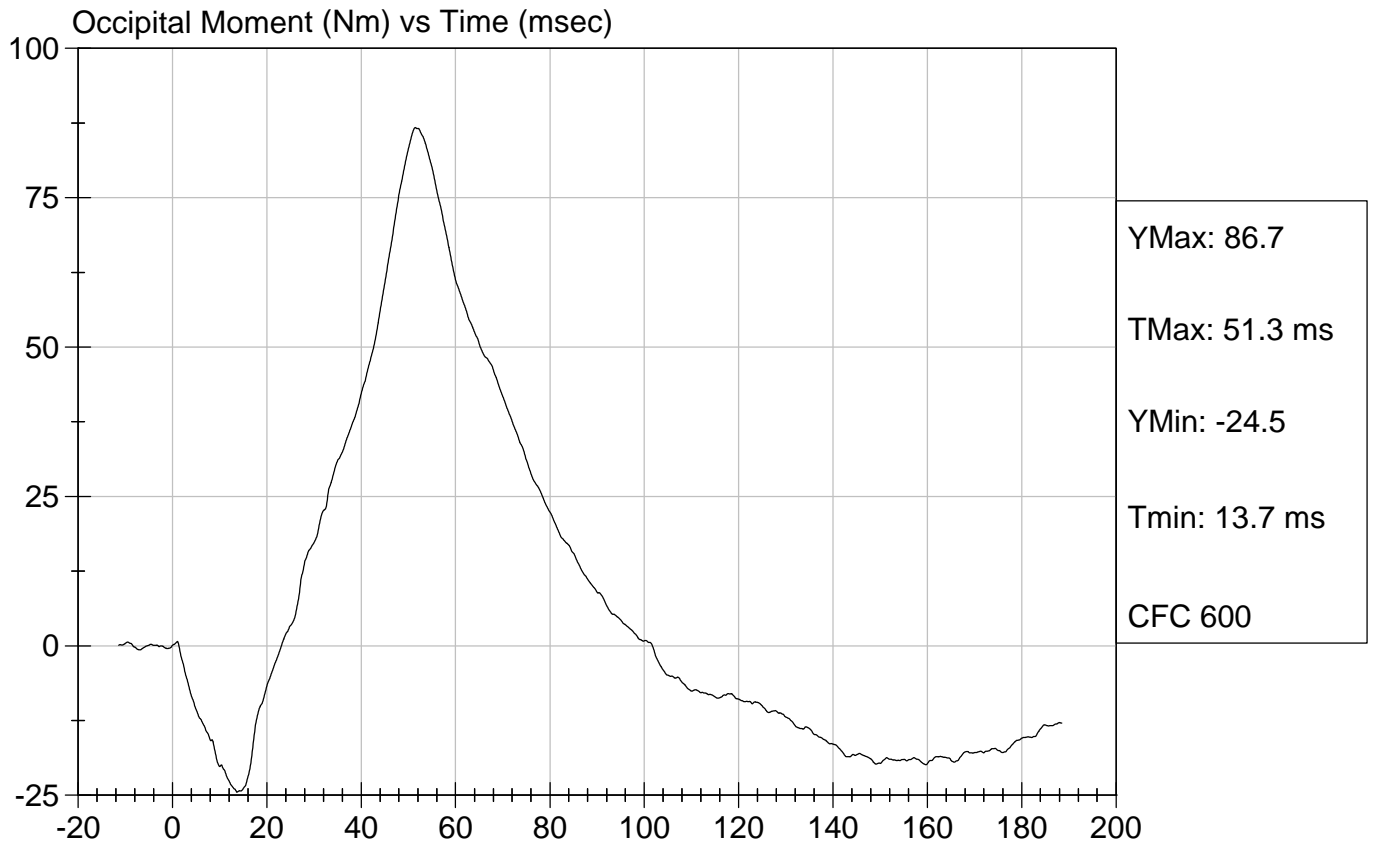


YMax: 69.8  
Tmax: 57.7 ms  
YMin: -47.7  
Tmin: 169.2 ms  
CFC 60



Test Desc: Thorax Impact  
Component ID: D03042

Test Date: 01/10/2003  
Speed: 23.08 ft/sec, 7.03 m/sec



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

**ATD Serial No:** 066

**Test I.D:** D03043

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	18	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.06	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	18.69	Pass
	20 msec	G's	14.00 to 19.00	16.98	Pass
	30 msec	G's	11.00 to 16.00	13.73	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	13.7	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	39.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.2	Pass
	Time	msec	72.0 to 82.0	75.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	152.8	Pass
Moment About Occipital Condyle	Minimum	N m	-52.9 to -79.9	-61.4	Pass
	Time	msec	65.0 to 79.0	70.7	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	139.0	Pass

Overall Test Results	Pass
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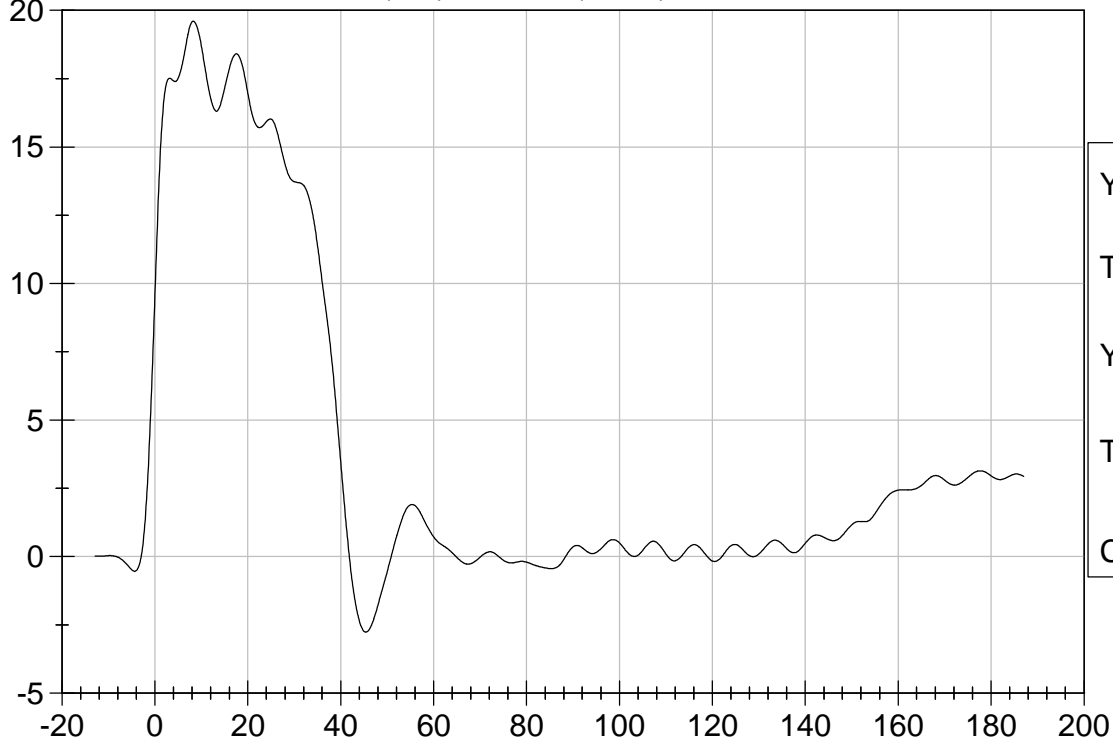
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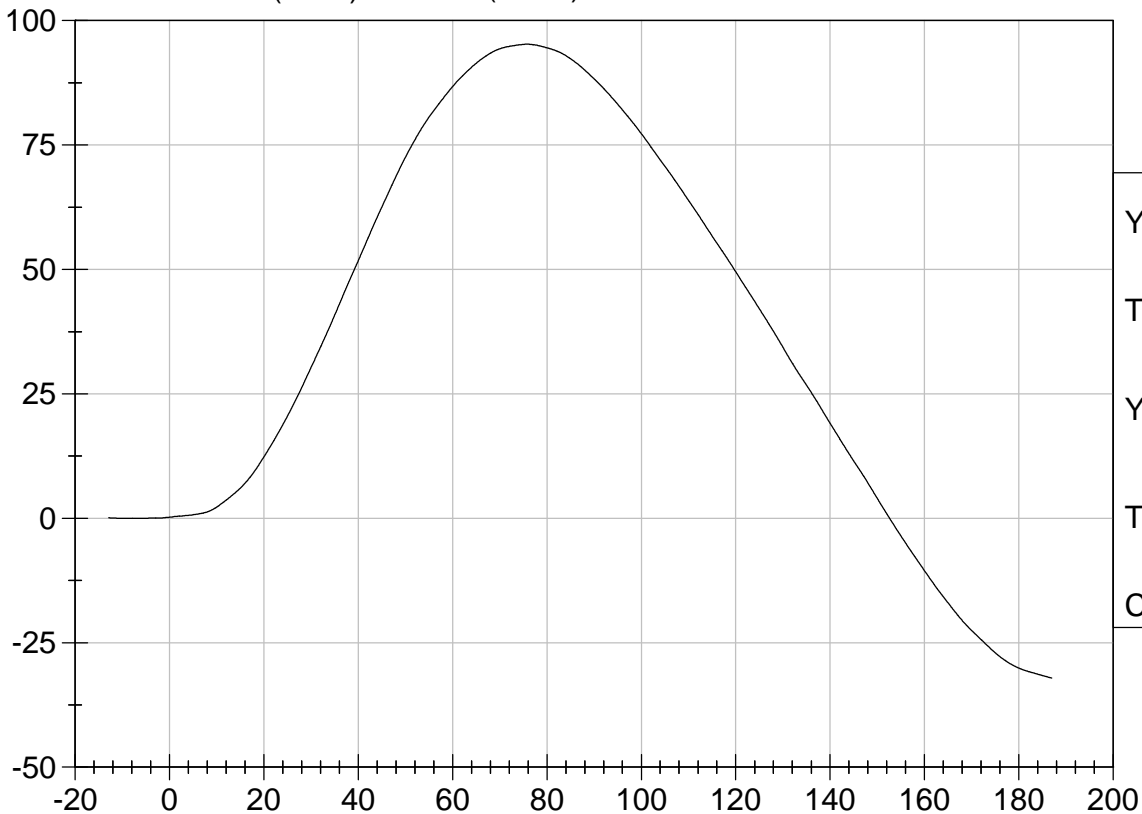


Pendulum Deceleration (G's) vs Time (msec)

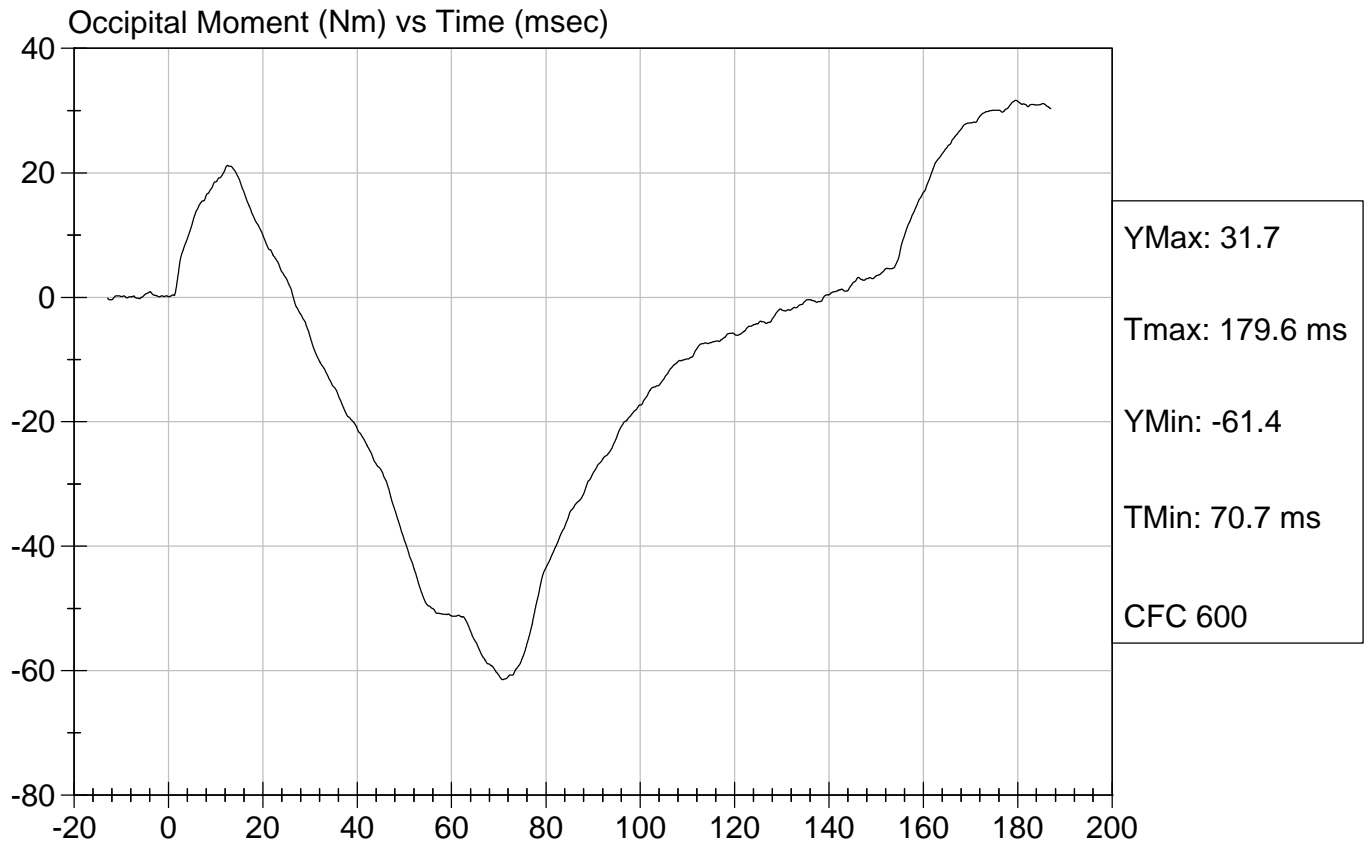


YMax: 19.6 G'S  
Tmax: 8.3 ms  
YMin: -2.8 G'S  
Tmin: 45.4 ms  
CFC 60

Neck Rotation (DEG) vs Time (msec)



YMax: 95.2  
TMax: 75.7 ms  
YMin: -32.1  
Tmin: 187.0 ms  
CFC 60



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

**ATD Serial No:** 066

**Test I.D.:** D03044

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Velocity	m/s	6.58 to 6.82	6.73	Pass
Peak Probe Force	Newtons	5159 to 5893	5,662	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.46	Pass
Internal Hysteresis	%	69 to 85	73	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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 Test Date

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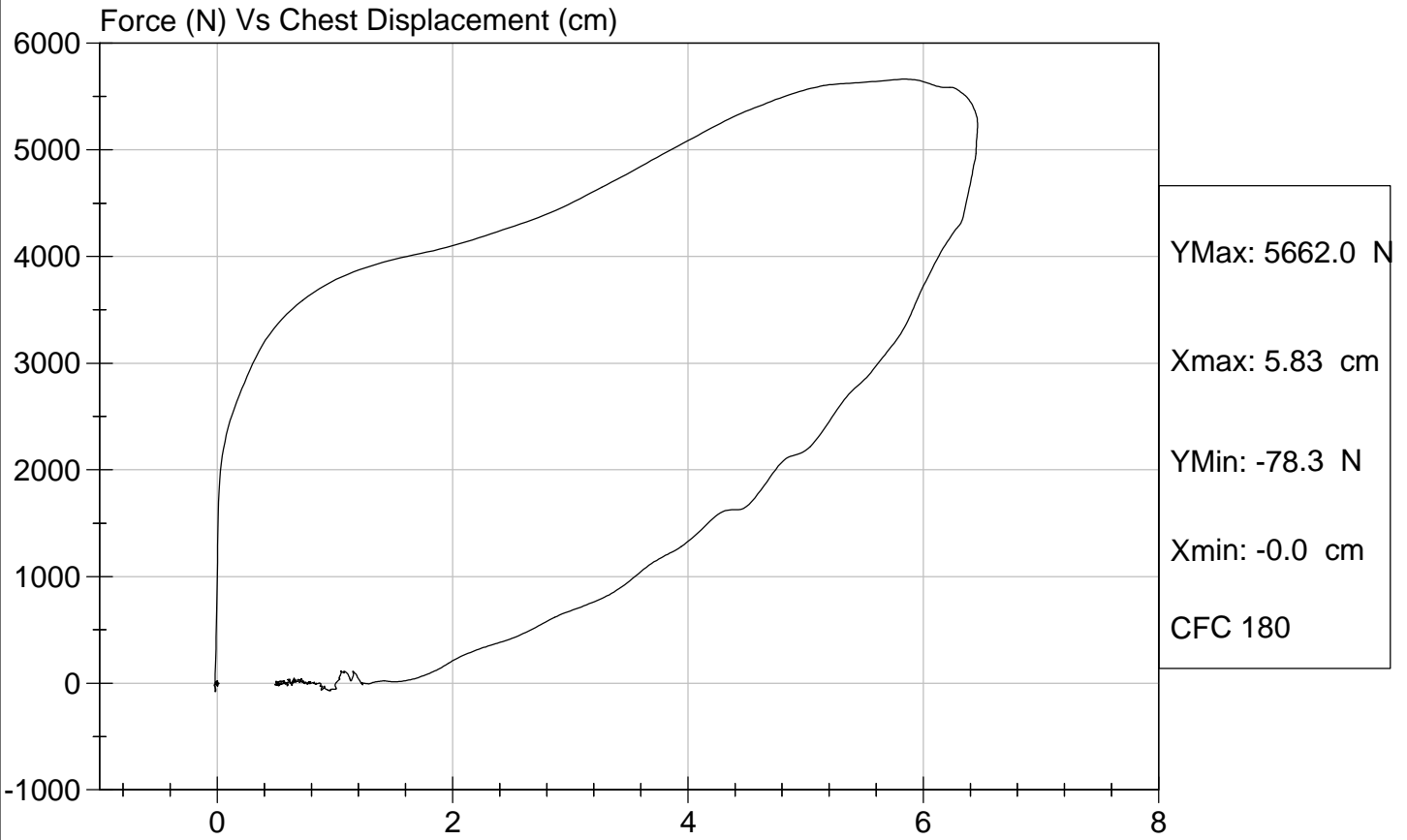


Test Description: Thorax Impact

Test Date: 01/17/2003

Component: D03044

Speed: 22.09 ft/sec, 6.73 m/sec



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

**ATD Serial No:** 066

**Test I.D.:** D03045

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	15.4	Pass
Probe Velocity	m/s	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,197	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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 Test Date

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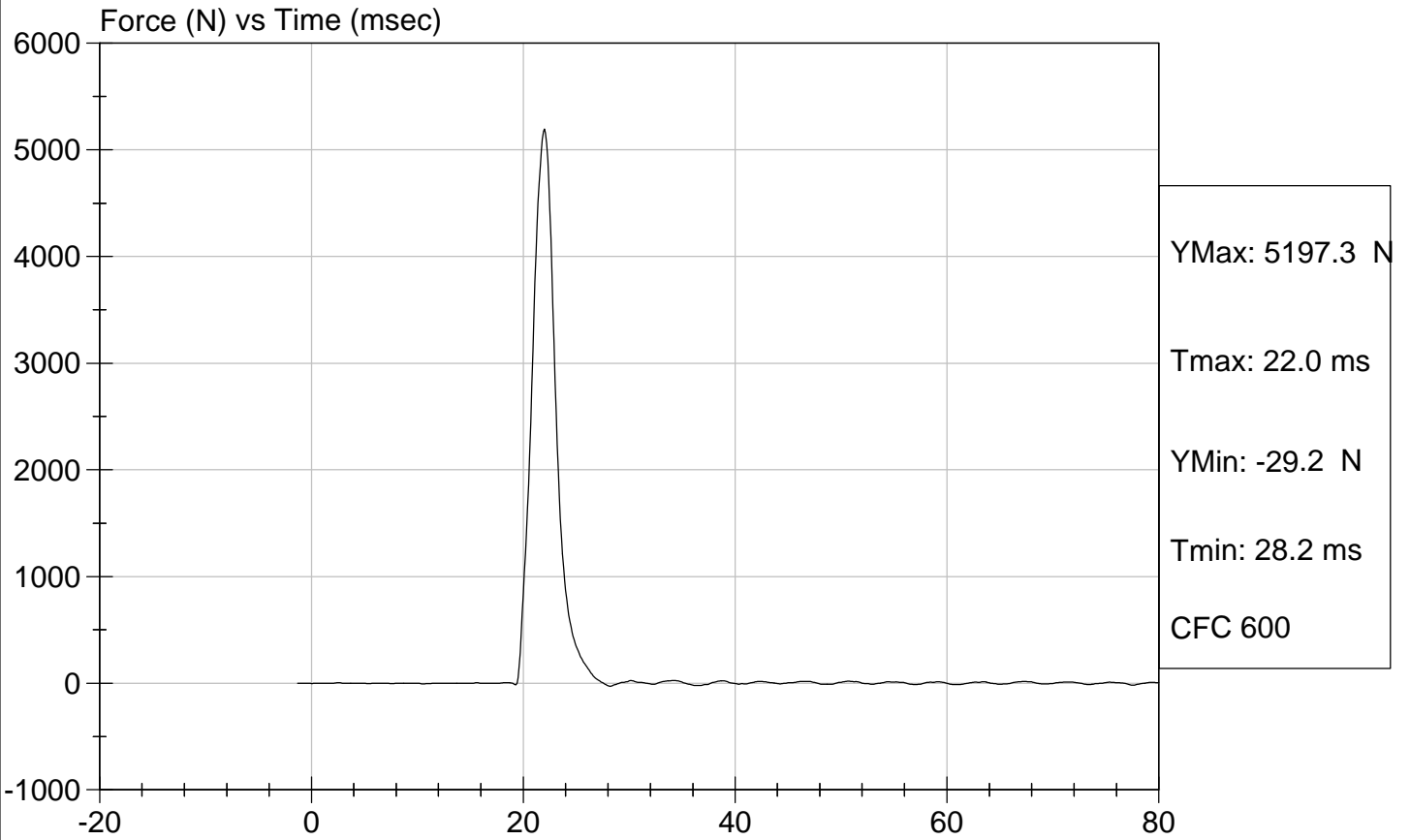


Test Description: Right Knee

Test Date: 01/14/2003

Component: D03045

Speed: 6.82 ft/sec, 2.08 m/sec



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

**ATD Serial No:** 066

**Test I.D.:** D03046

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	15.4	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,314	Pass
Overall Test Results				Pass

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 Laboratory Technician

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 01/14/2003  
 Test Date

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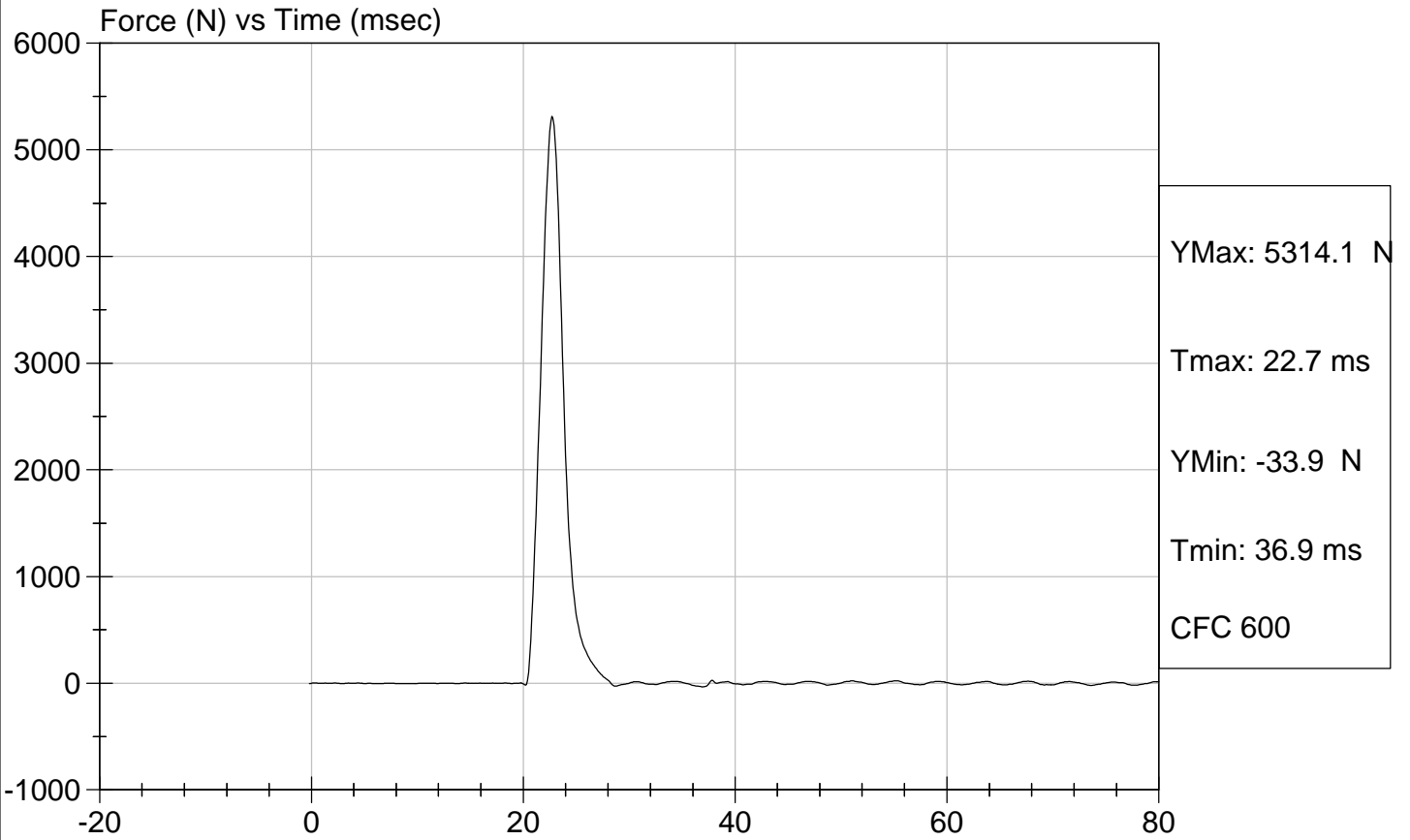


Test Description: Left Knee

Test Date: 01/14/2003

Component: D03046

Speed: 6.92 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.:** D03040

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.7	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	15.4	15.4	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	90.6	89.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	43	40	Pass
Overall Test Results					Pass

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Laboratory Technician

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Test Date

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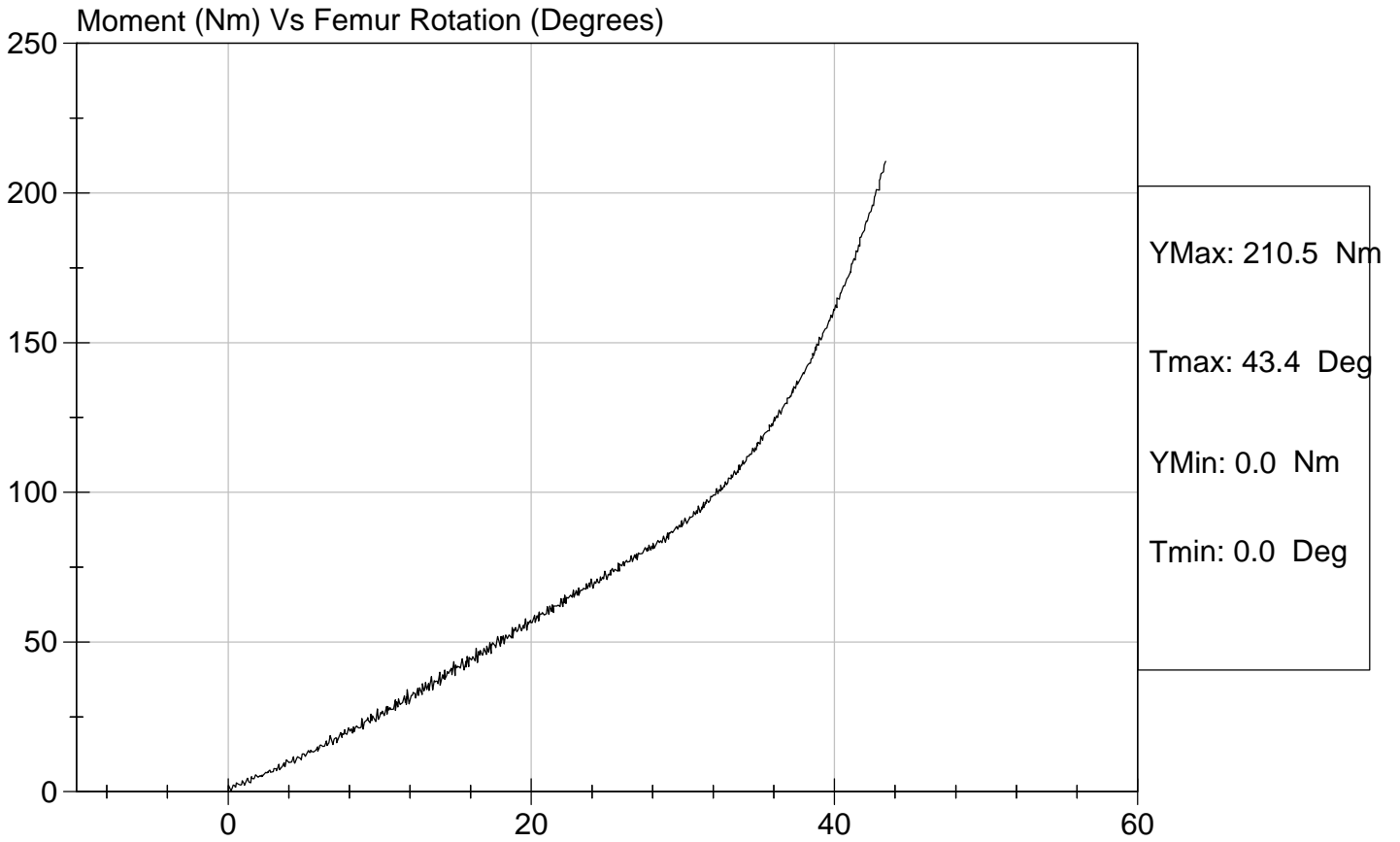


Test Description: Hip Femur Flexion

Test Date: 01/14/2003

Component: D03049

Speed: 0 ft/sec, 0.00 m/sec



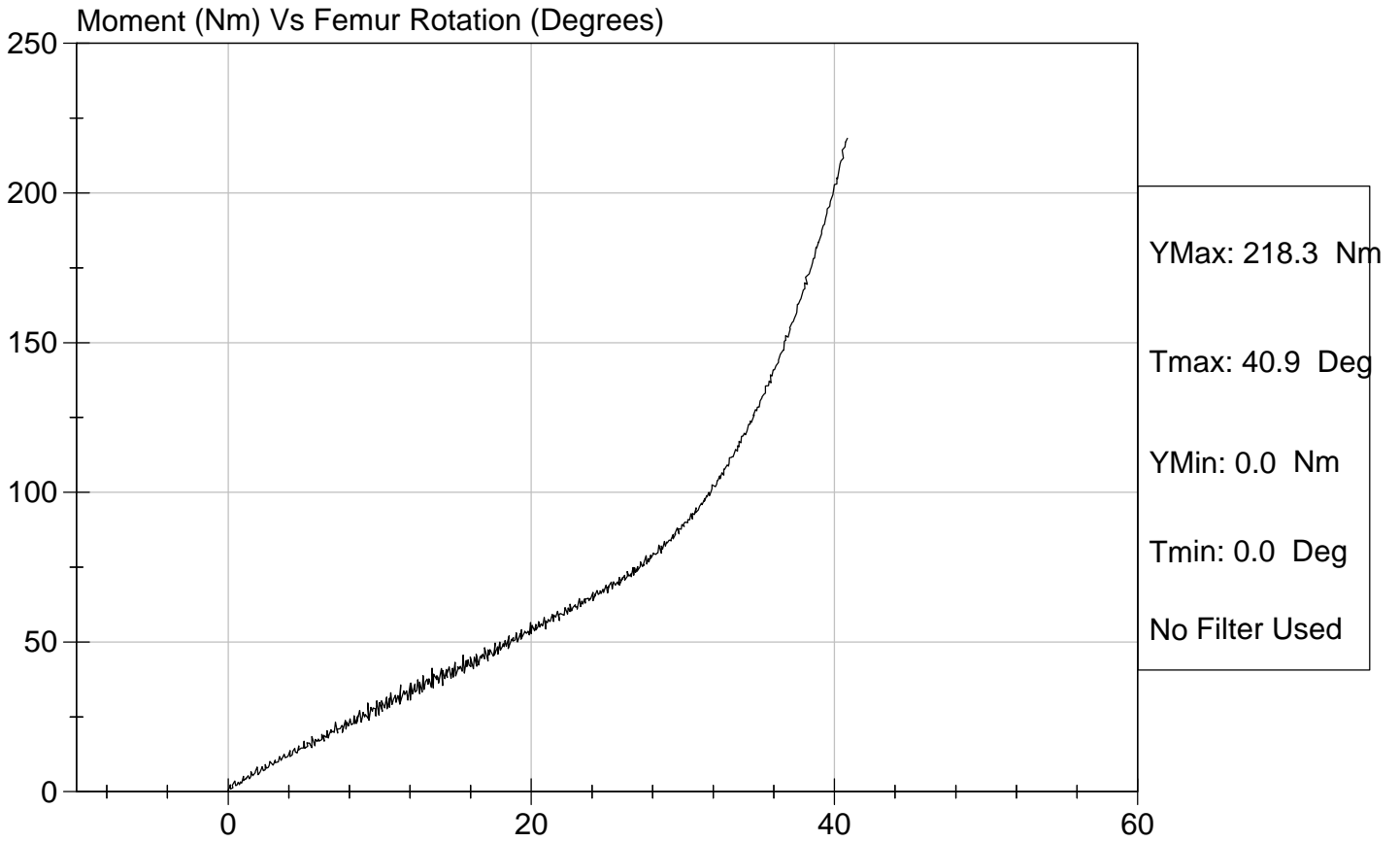


Test Description: Hip Femur Flexion

Test Date: 01/14/2003

Component: D03040

Speed: 0 ft/sec, 0.00 m/sec



## **APPENDIX D**

### **TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION**

### INSTRUMENTS FOR DRIVER DUMMY NO. 065

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCY6	Endevco	12/11/02
Head Y	J13941	Endevco	12/11/02
Head Z	AAMW5	Endevco	12/11/02
Head X Redundant	J18724	Endevco	12/11/02
Head Y Redundant	J14235	Endevco	12/11/02
Head Z Redundant	AJ5R0	Endevco	12/11/02
Neck Load Cell	442	Denton	10/9/02
Chest X	ACC78	Endevco	12/11/02
Chest Y	ACCE6	Endevco	12/11/02
Chest Z	ACCY3	Endevco	12/11/02
Chest Deflection Gauge	065	Servo	11/12/02
Chest X Redundant	J19927	Endevco	12/11/02
Chest Y Redundant	J20580	Endevco	12/11/02
Chest Z Redundant	J23914	Endevco	12/11/02
Pelvis X	AHTN3	Endevco	10/9/02
Pelvis Y	AH0C3	Endevco	10/9/02
Pelvis Z	AHT12	Endevco	10/9/02
Left Femur Load Cell	259	Denton	11/21/02
Right Femur Load Cell	256	Denton	11/21/02
Left Upper Tibia Load Cell	105	Denton	9/18/02
Left Lower Tibia Load Cell	133	Denton	9/18/02
Right Upper Tibia Load Cell	103	Denton	9/18/02
Right Lower Tibia Load Cell	134	Denton	9/18/02
Left Foot Z – Front	J14120	Endevco	12/11/02
Left Ankle X	J23774	Endevco	12/11/02
Left Ankle Z	APYY3	Endevco	12/11/02
Right Foot Z – Front	J18736	Endevco	12/11/02
Right Ankle X	J23946	Endevco	12/11/02
Right Ankle Z	J27513	Endevco	12/11/02
Lap Belt	193	Denton	11/22/02

**INSTRUMENTS FOR PASSENGER DUMMY NO. 066**

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

## INSTRUMENTS FOR VEHICLE AND LABORATORY

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	G01-N21	Entran	1/16/03
Left Rear Seat Crossmember Z	G13-F18	Entran	1/16/03
Right Rear Seat Crossmember X	G13-F03	Entran	1/24/03
Right Rear Seat Crossmember Z	K21-N01	Entran	1/24/03
Top of Engine X	I25-F09	Entran	1/16/03
Bottom of Engine X	99F349	Entran	10/31/02
Left Brake Caliper X	F20-G10	Entran	1/30/03
Right Brake Caliper X	I12-F05	Entran	1/30/03
Instrument Panel X	I25-F02	Entran	1/30/03

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

**REPORT NUMBER: NCAPCHILD-MGA-2003-005**

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

**Evenflo Vanguard 5**

**NHTSA NUMBER: M35304**

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



**Test Date: February 11, 2003**

**Report Date: February 24, 2003**

**FINAL REPORT**

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

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

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Prepared by: Shefalika Agarwal Date: 2/18/03  
Shefalika Agarwal, Project Engineer

Reviewed by: David Winkelbauer Date: 2/18/03  
David Winkelbauer, Facility Director

FINAL REPORT ACCEPTED BY:

\_\_\_\_\_  
Manager, New Car Assessment Program

\_\_\_\_\_  
Date of Acceptance

\_\_\_\_\_  
COTR, NCAP Frontal Impact Program

\_\_\_\_\_  
Date of Acceptance

**Technical Report Documentation Page**

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				6. Performing Organization Code MGA																									
7. Author(s) Shefalika Agarwal, Project Engineer				8. Performing Organization Report No. NCAPCHILD-MGA-2003-005																									
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105				10. Work Unit No.																									
				11. Contract or Grant No. DTNH22-01-D-12005																									
12. Sponsoring Agency Name and Address  U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 400 Seventh Street, SW, Room 5313 Washington, D.C. 20590				13. Type of Report and Period Covered Final Report 2/11/03 to 2/24/03																									
				14. Sponsoring Agency Code NVS-111																									
15. Supplementary Notes																													
16. Abstract A CRS test was performed in conjunction with a New Car Assessment Program (NCAP) load cell barrier test. This test was conducted at MGA Research Corporation, in Burlington, Wisconsin on February 11, 2003.																													
<table border="1"> <thead> <tr> <th>Measurement Description</th> <th>Units</th> <th colspan="2">Threshold / Pos. 3 ATD</th> <th colspan="2">Threshold / Pos. 4 ATD</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC36)</td> <td>N/A</td> <td>N/A</td> <td>366</td> <td>N/A</td> <td>*</td> </tr> <tr> <td>Head Injury Criteria (HIC15)</td> <td>N/A</td> <td>570</td> <td>290</td> <td>390</td> <td>*</td> </tr> <tr> <td>Max. Thorax Accel. (3msec Clip)</td> <td>G's</td> <td>55</td> <td>34</td> <td>50</td> <td>64</td> </tr> </tbody> </table>						Measurement Description	Units	Threshold / Pos. 3 ATD		Threshold / Pos. 4 ATD		Head Injury Criteria (HIC36)	N/A	N/A	366	N/A	*	Head Injury Criteria (HIC15)	N/A	570	290	390	*	Max. Thorax Accel. (3msec Clip)	G's	55	34	50	64
Measurement Description	Units	Threshold / Pos. 3 ATD		Threshold / Pos. 4 ATD																									
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17. Key Words  56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) Evenflo Vanguard 5 NHTSA No: M35304				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin., Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590																									
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## SECTION 1

### PURPOSE AND SUMMARY OF TEST

#### PURPOSE

The purpose of this test was to obtain CRS performance data in a frontal impact NCAP condition.

This 55.8 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.

#### SUMMARY

Both child dummies were instrumented with head, chest, and pelvic triaxial accelerometers. In addition, head rear Z acceleration and upper and lower six axial neck force and moment sensors were utilized for the right rear (Position 3) child dummy. There were upper six axial neck force and moment sensors for the left rear (Position 4) child dummy.

The right rear (Position 3) child dummy (S/N 42) and left rear (Position 4) child dummy (S/N 074) were calibrated previous to this test. Child dummy certification information is found in Appendix C.

The right rear child dummy's HIC36 was 366.1; maximum chest deceleration over 3 msec was 34.2 g's. The left rear child dummy's HIC36 was not calculated (loss of data for left child head X channel). The maximum chest deceleration over 3 msec was 64.3 g's. Position 3 was forward facing and used the vehicle LATCH and top tether for attachment. Position 4 was rear facing and used the vehicle LATCH attachment without the top tether.

**SECTION 2  
DATA SHEET NO. 1  
CRASH TEST SUMMARY**

**TEST DUMMY INFORMATION**

Description	Position 3 CRS	Position 4 CRS
Dummy Type / Serial No.	HIII 3 Year Old / 42	12 month old CRABI / 074
Number of Data Channels	23	16
Restraint System	Evenflo Vanguard 5 (Forward Facing)	Evenflo Vanguard 5 (Rear Facing)

**CAMERA COVERAGE**

High Speed	17
Real Time	1
Total	18

**POST TEST DOOR OPENING**

Description	Front	Rear
Left Side Doors	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Right Side Doors	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Hatch/Other Door	N/A	N/A

**POST TEST SEAT DATA**

Location	Seat Movement (mm)	Seat Back Failure
P1 (Left Front)	0	None
P2 (Right Front)	0	None
P3 (Right Rear)	0	None
P4 (Left Rear)	0	None

**VISIBLE DUMMY CONTACT POINTS**

Description	Position 3 CRS (S/N 42)	Position 4 CRS (S/N 074)
Head Contact	Back of head to CRS	Back of head to CRS
Upper Torso Contact	None	None
Lower Torso Contact	None	None
Left Foot Contact	None	Foot to vehicle rear seat
Right Foot Contact	None	Foot to vehicle rear seat

**SECTION 2... (continued)**

**DATA SHEET NO. 2  
CRS PARAMETER DATA**

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Rear Facing) Evenflo Vanguard 5
NHTSA No.	M35304

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1378.0
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	45.4
Calculated Vehicle Target Weight (TVTW)	kg	1579.4

**TEST VEHICLE WEIGHTS**

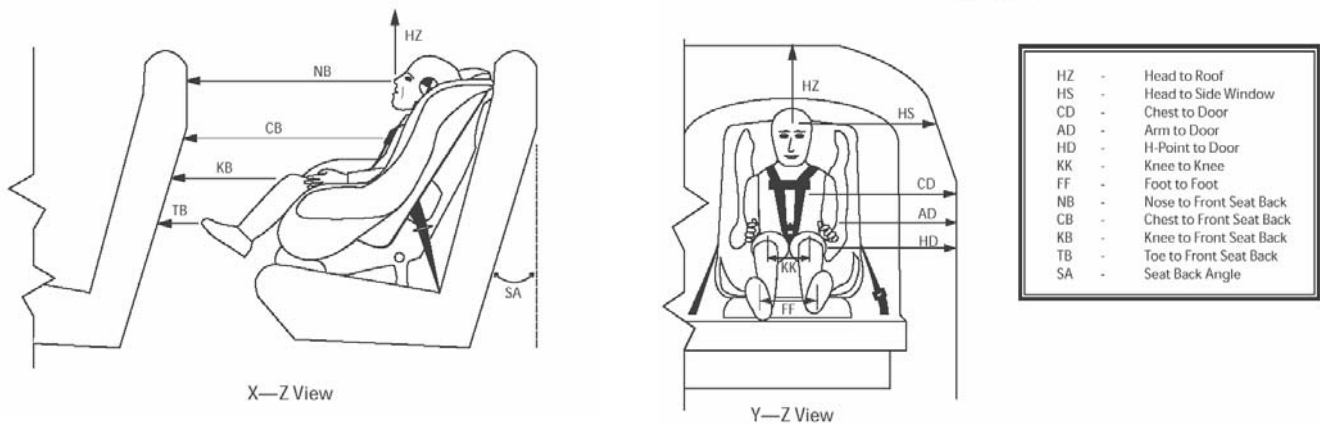
	Units	As Tested (ATW) (Axle)		
		Front	Rear	Total
Left	kg	488.1	312.1	
Right	kg	458.1	313.0	
Ratio	%	60.2	39.8	
Totals	kg	946.2	625.1	1571.3

As tested weight of vehicle includes two ATDs, one 3 year old with CRS, one 12 month old CRABI with CRS, cargo, equipment and instrumentation.

**SECTION 2... (continued)**  
**DATA SHEET NO. 3**  
**CHILD DUMMY POSITIONING IN VEHICLE**

Child Restraint System (Position 3)	Evenflo Vanguard 5 (Forward Facing)
NHTSA No.	M35304

Dummy Measurements for CRS Passengers



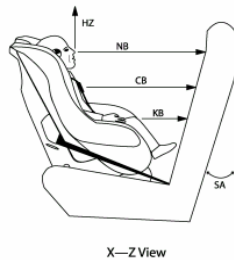
Measurement	Pre-Test (mm)	Post-Test (mm)
	P3 CRS (42)	P3 CRS (42)
SA (deg)	17.3	17.3
HS	441	408
CD	386	409
AD	246	308
HD	302	362
HZ	372	405
NB	625	472
CB	602	465
KK	152	110
FF	159	110
KB - LEFT	433	209
KB - RIGHT	430	210
TB - LEFT	170	60
TB - RIGHT	171	58

All dimensions in mm (unless noted)  
P3 – Right Rear Passenger (Forward Facing)

**SECTION 2... (continued)**  
**DATA SHEET NO. 3**  
**CHILD DUMMY POSITIONING IN VEHICLE**

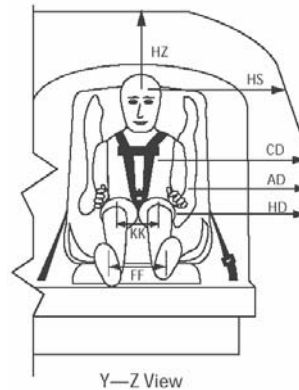
Child Restraint System (Position 4)	Evenflo Vanguard 5 (Rear Facing)
NHTSA No.	M35304

Dummy Measurements for Rear-facing CRS Passengers



X—Z View

HZ	-	Head to Roof
NB	-	Nose to Front of Back Seat
CB	-	Chest to Front of Back Seat
KB	-	Knee to Front of Back Seat
SA	-	Seat Back Angle



Y—Z View

X—Z View

HZ	-	Head to Roof
HS	-	Head to Side Window
CD	-	Chest to Door
AD	-	Arm to Door
HD	-	H-Point to Door
KK	-	Knee to Knee
FF	-	Foot to Foot
NB	-	Nose to Front Seat Back
CB	-	Chest to Front Seat Back
KB	-	Knee to Front Seat Back
TB	-	Toe to Front Seat Back
SA	-	Seat Back Angle

Measurement	Pre-Test (mm)	Post-Test (mm)
	P4 CRS (74)	P4 CRS (74)
SA (deg)	17.3	17.3
HS	415	408
CD	384	408
AD	245	275
HD	311	333
HZ	365	345
NB	610	262
CB	611	315
KK	170	110
FF	210	108
KB - LEFT	410	170
KB - RIGHT	425	174
TB - LEFT	124	15
TB - RIGHT	126	15

All dimensions in mm (unless noted)  
P4 – Left Rear Passenger (Rear facing)

**SECTION 2... (continued)**

**DATA SHEET NO. 4  
CHILD DUMMY INJURY CRITERIA VALUES**

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Rear Facing) Evenflo Vanguard 5
NHTSA No.	M35304

**HEAD PEAK ACCELERATIONS**

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	0.7	36	-28.3	82	*	*	*	*
Head CG	Y	G's	0.7	133	-8.4	113	1.1	123	-16.3	76
Head CG	Z	G's	48.0	83	-11.9	40	34.9	65	-11.9	83
Resultant	N/A	G's	55.4	82			36.0	64		
Head Rear	Z	G's	67.4	82	-17.3	39				

\* NO VALID DATA COLLECTED

**UPPER NECK PEAK FORCES AND MOMENTS**

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	N	7.6	15	-684.8	81	123.1	86	-186.1	63
Neck Force	Y	N	57.9	62	-29.5	128	34.1	113	-158.7	77
Neck Force	Z	N	1680.6	85	-338.2	39	1090.7	64	-182.3	81
Resultant	N/A	N	1801.7	85			1106.9	64		
Neck Moment	X	N•m	0.9	178	-10.9	84	7.1	76	-0.2	111
Neck Moment	Y	N•m	13.6	54	-6.0	145	7.5	84	-5.3	63
Neck Moment	Z	N•m	2.2	111	-1.1	128	1.5	154	-1.6	77
Resultant	N/A	N•m	13.6	54			9.4	78		

**LOWER NECK PEAK FORCES AND MOMENTS**

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	N	9.8	64	-612.5	84				
Neck Force	Y	N	8.9	20	-232.7	74				
Neck Force	Z	N	1042.7	86	-465.0	40				
Resultant	N/A	N	1196.3	85						
Neck Moment	X	N•m	2.4	130	-14.0	86				
Neck Moment	Y	N•m	2.1	200	-103.7	82				
Neck Moment	Z	N•m	1.3	114	-11.9	86				
Resultant	N/A	N•m	105.0	82						

**SECTION 2... (continued)**  
**DATA SHEET NO. 4... (continued)**  
**CHILD DUMMY INJURY CRITERIA VALUES**

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Rear Facing) Evenflo Vanguard 5
NHTSA No.	M35304

**CHEST PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	1.7	171	-33.4	84	65.9	74	-2.6	180
Chest CG	Y	G's	1.2	92	-4.5	67	8.5	86	-3.3	47
Chest CG	Z	G's	11.2	86	-21.2	59	21.4	66	-2.8	82
Resultant	N/A	G's	35.1	86			65.9	74		

**TETHER FORCE**

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Tether Force	N/A	N	**	**	**	**				

\*\* Not recorded because the load cell would not fit between the tether anchor and the CRS

**PELVIC PEAK ACCELERATIONS**

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	5.0	169	-36.3	75	57.0	75	-6.1	173
Pelvis	Y	G's	2.6	103	-9.2	61	7.2	71	-2.7	44
Pelvis	Z	G's	7.1	123	-23.3	67	33.6	66	-5.0	173
Resultant	N/A	G's	41.0	65			62.7	76		

**HEAD PEAK REDUNDANT ACCELERATIONS**

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	0.2	19	-28.4	82				
Head CG	Y	G's	0.4	130	-9.4	113				
Head CG	Z	G's	48.4	84	-11.7	40				
Resultant	N/A	G's	56.0	83						
Head Rear	Z	G's	68.9	82						

**SECTION 2... (continued)**  
**DATA SHEET NO. 4... (continued)**  
**CHILD DUMMY INJURY CRITERIA VALUES**

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Rear Facing) Evenflo Vanguard 5
NHTSA No.	M35304

**HEAD INJURY CRITERIA (HIC36)**

Location	HIC	T <sup>1</sup> (msec)	T <sup>2</sup> (msec)	Average Acceleration (G's)
Position 3 - Right	366.1	62.3	92.1	43.2
Position 4 - Left	*	*	*	*

HIC is as defined in FMVSS 208. The maximum time interval from t1 to t2 is 36 milliseconds.

**HEAD INJURY CRITERIA (HIC15)**

Location	HIC	T <sup>1</sup> (msec)	T <sup>2</sup> (msec)	Average Acceleration (G's)
Position 3 - Right	289.9	72.1	87.1	51.8
Position 4 - Left	*	*	*	*

HIC is as defined in FMVSS 208. The maximum time interval from t1 to t2 is 15 milliseconds.

**CLIP SUMMARY**

Location	CLIP	T <sup>1</sup> (msec)	T <sup>2</sup> (msec)
Position 3 - Right	34.2	82.4	86.1
Position 4 - Left	64.3	72.3	75.3

The maximum chest resultant acceleration is defined as the maximum acceleration, which exceeds 0.003 seconds in duration.

**POSITION 3 NECK INJURY SUMMARIES**

Nij V10	Nij
Ntf	0.79
Nte	0.65
Ncf	0.17
Nce	0.03

**POSITION 4 NECK INJURY SUMMARIES**

Nij V10	Nij
Ntf	0.34
Nte	0.98
Ncf	0.28
Nce	0

\* - no valid data collected for left head X

**SECTION 2... (continued)**

**DATA SHEET NO. 5  
CRS PERFORMANCE DATA**

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Rear Facing) Evenflo Vanguard 5
NHTSA No.	M35304

**POSITION 3 CRS POST-TEST INSPECTION**

Location	Damage	Remarks
Upper Tether Strap	None	
Upper Tether Buckle	None	
Upper Tether Hook	None	
Vehicle Upper Tether Anchor	None	
Lower Anchor Strap	None	
Lower Anchor Buckle	None	
Lower Anchor Hooks	None	
Vehicle Lower CRS Anchors	None	
Five Point Harness Connections	None	
Cracks on CRS	Yes	On back from tether strap
Fabric Tears on CRS	None	
Vehicle Seat Structure	None	
Vehicle Seat Fabric Tears	None	
Child Dummy	None	

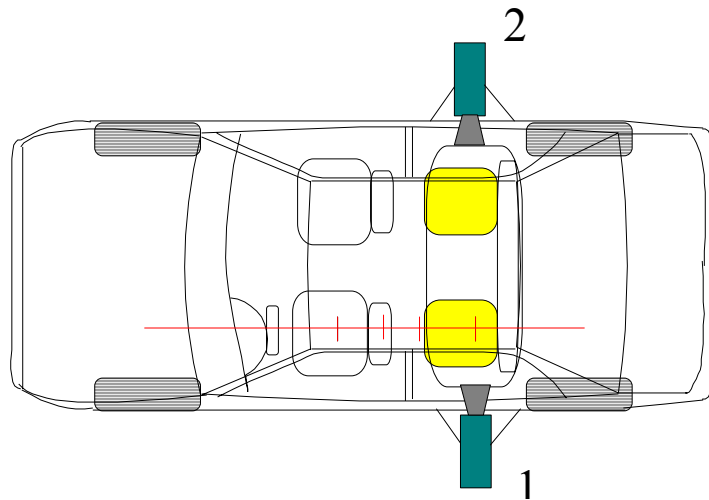
**POSITION 4 CRS POST-TEST INSPECTION**

Location	Damage	Remarks
Upper Tether Strap	None	
Upper Tether Buckle	None	
Upper Tether Hook	None	
Vehicle Upper Tether Anchor	None	
Lower Anchor Strap	None	
Lower Anchor Buckle	None	
Lower Anchor Hooks	None	
Vehicle Lower CRS Anchors	None	
Five Point Harness Connections	None	
Cracks on CRS	None	
Fabric Tears on CRS	None	
Vehicle Seat Structure	None	
Vehicle Seat Fabric Tears	None	
Child Dummy	None	

SECTION 2... (continued)

DATA SHEET NO. 6  
CRS CAMERA DATA

Child Restraint System (Position 3)	Evenflo Vanguard 5 (Forward Facing)
Child Restraint System (Position 4)	Evenflo Vanguard 5 (Rear Facing)
NHTSA No.	M35304



No.	Camera View	Location (mm) *			Angle (deg)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Left Side CRS Lateral View					13	513
2	Right Side CRS Lateral View					13	513

\*COORDINATES:

+X = film plane rearward of barrier

+Y = film plane to right of monorail centerline

+Z = film plane above ground level

**APPENDIX A**  
**PHOTOGRAPHS**

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A-1.



Close-up View of Position 3 CRS Label

A-2.



Pre-Test Front View of Position 3 CRS

A-3.



Post-Test Front View of Position 3 CRS

A-4.



Pre-Test Rear View of Position 3 CRS

A-5.



Post-Test Rear View of Position 3 CRS

A-6.



Pre-Test Left Side View of Position 3 CRS

A-7.



Post-Test Left Side View of Position 3 CRS

A-8.



Pre-Test Right Side View of Position 3 CRS

A-9.



Post-Test Right Side View of Position 3 CRS

Manufactured in 22NOV02  
Model # 3691261 P1

THIS PRODUCT AFTER DECEMBER

Close-up View of Position 4 CRS Label

A-10.

A-11.



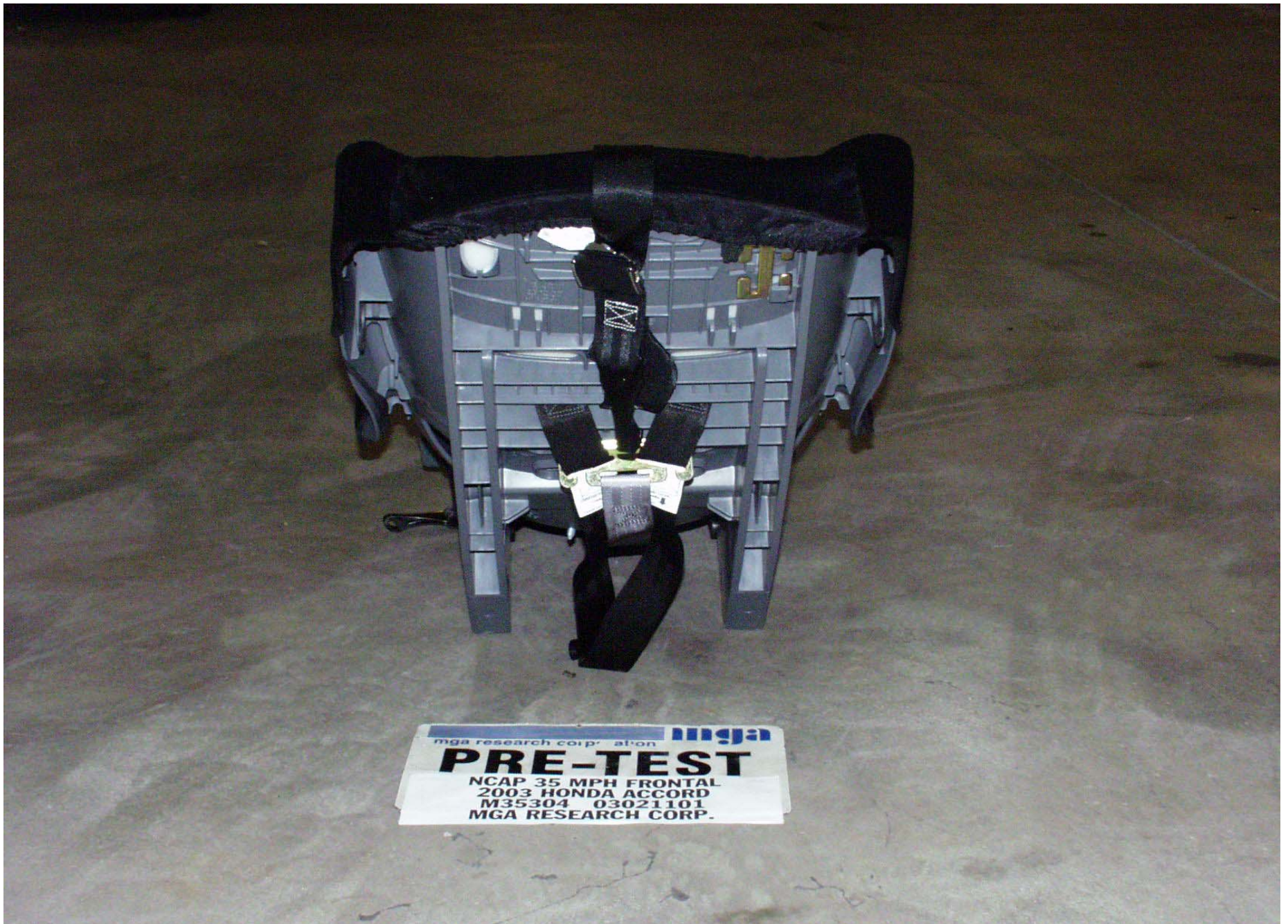
Pre-Test Front View of Position 4 CRS

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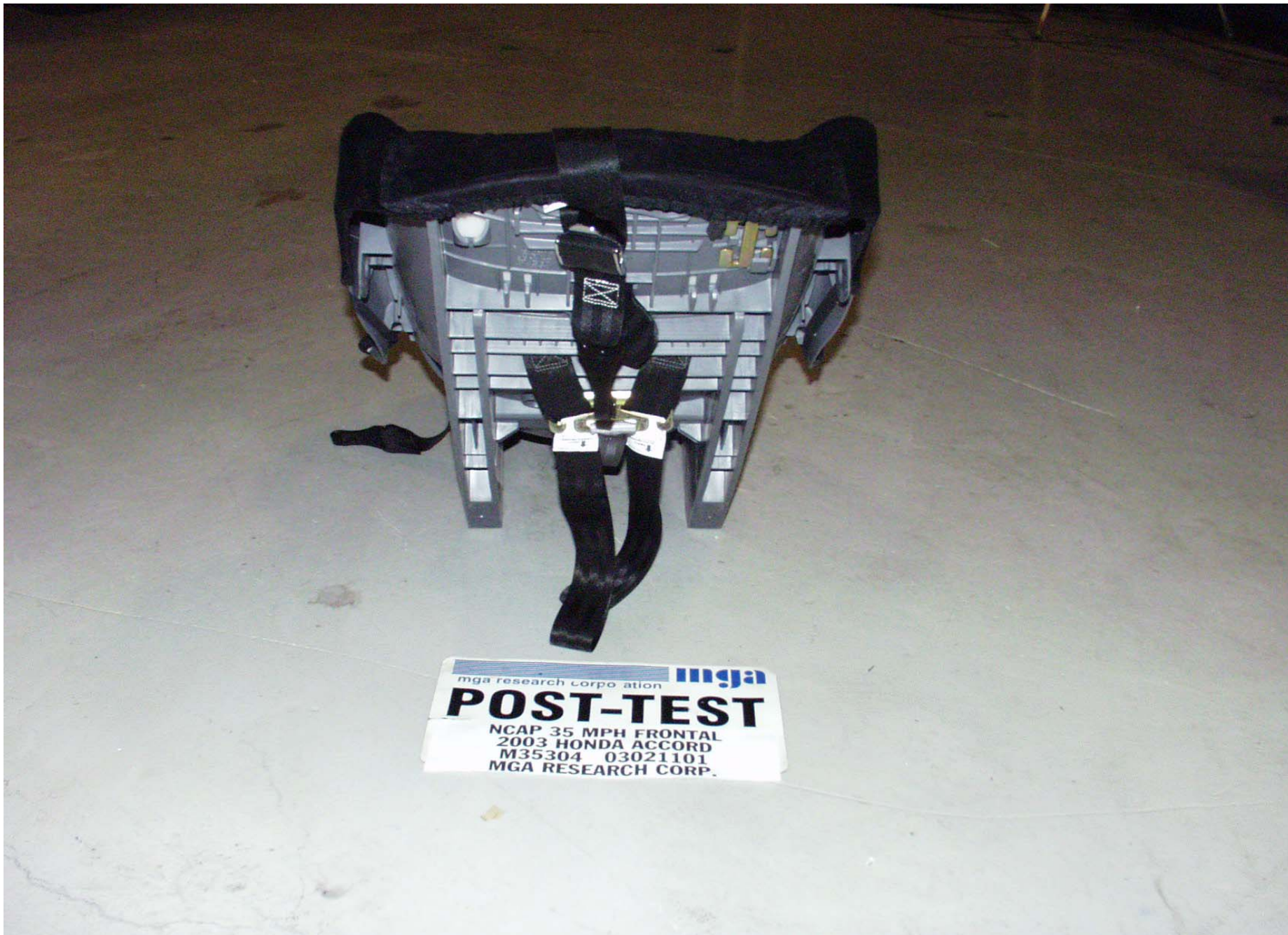
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Post-Test Rear View of Position 4 CRS

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Pre-Test Left Side View of Position 4 CRS

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Post-Test Left Side View of Position 4 CRS

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Pre-Test Right Side View of Position 4 CRS

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Post-Test Right Side View of Position 4 CRS

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Pre-Test Position 3 Right Side View



Post-Test Position 3 Right Side View

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Pre-Test Position 3 Left Side View

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Post-Test Position 3 Left Side View



Pre-Test Position 4 Left Side View



Post-Test Position 4 Left Side View

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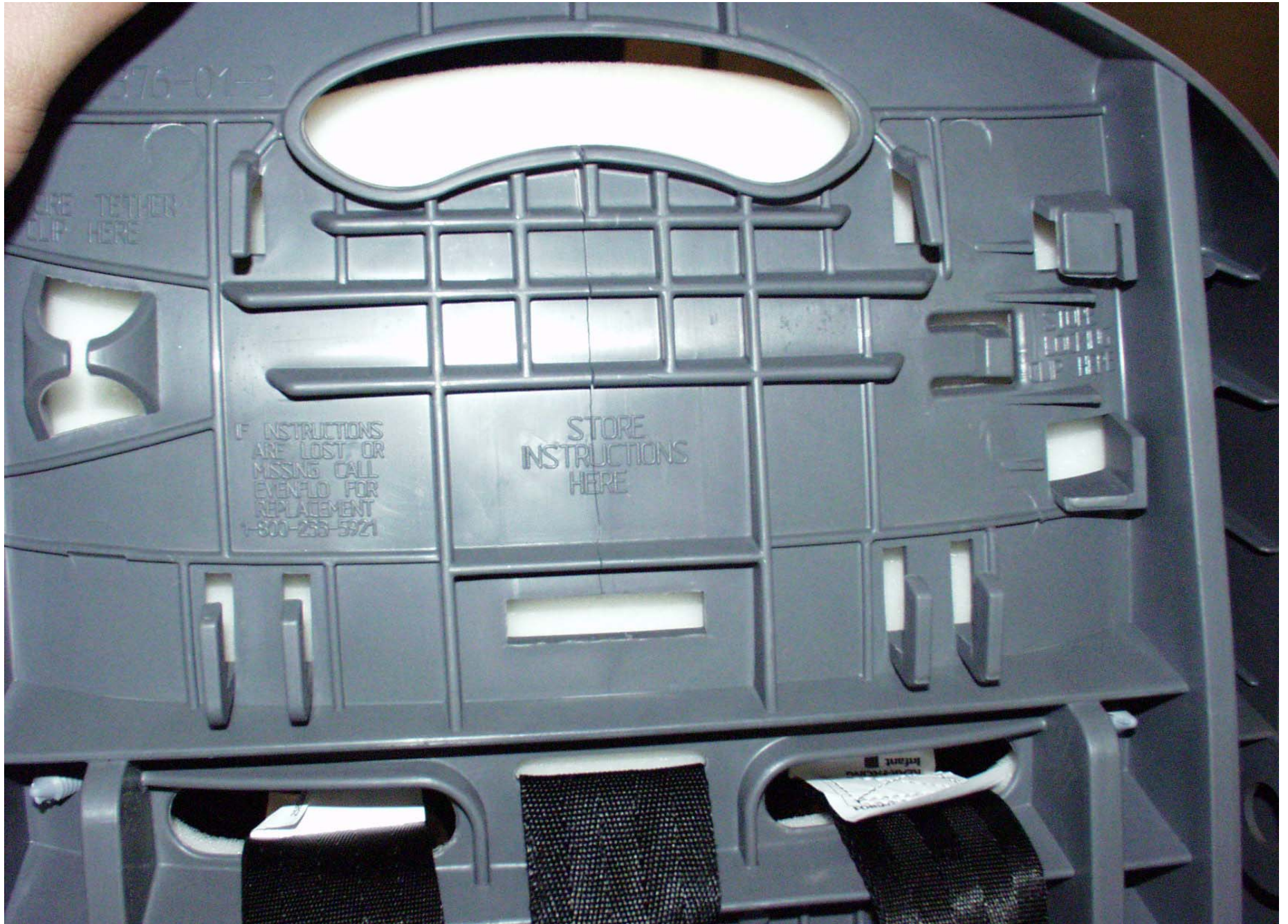


Pre-Test Position 4 Right Side View

A-26.



Post-Test Position 4 Right Side View



Post-Test Position 3 Seat Damage

**APPENDIX B**

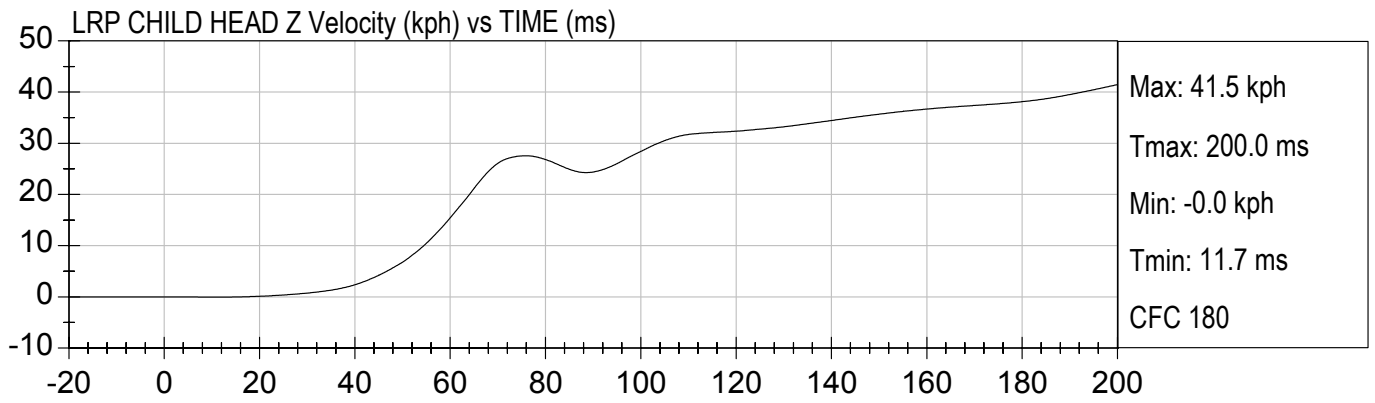
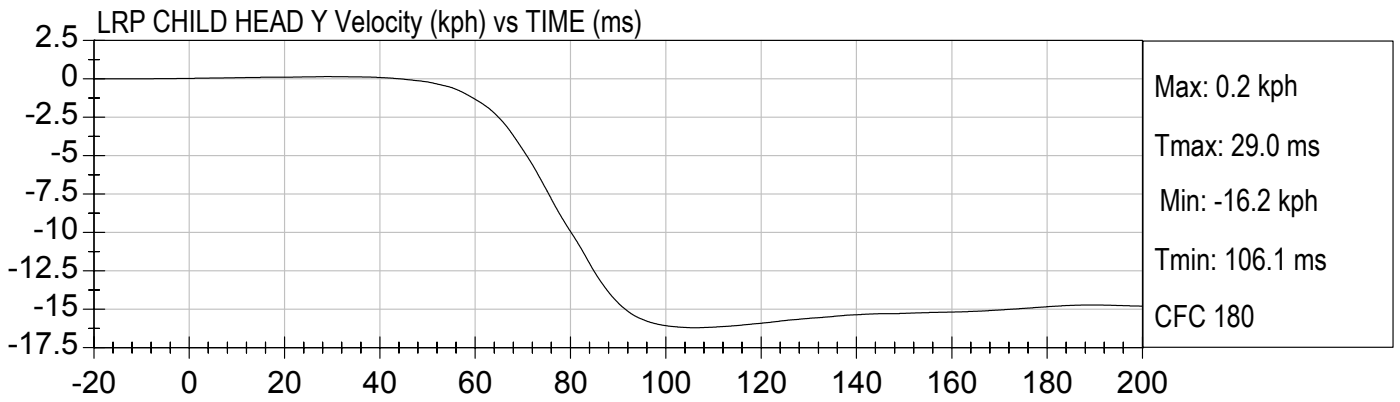
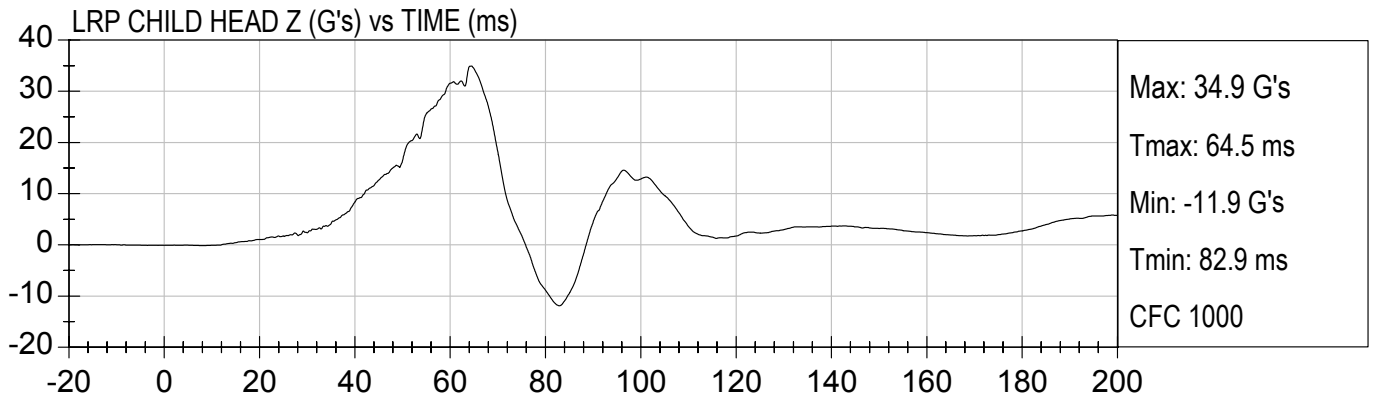
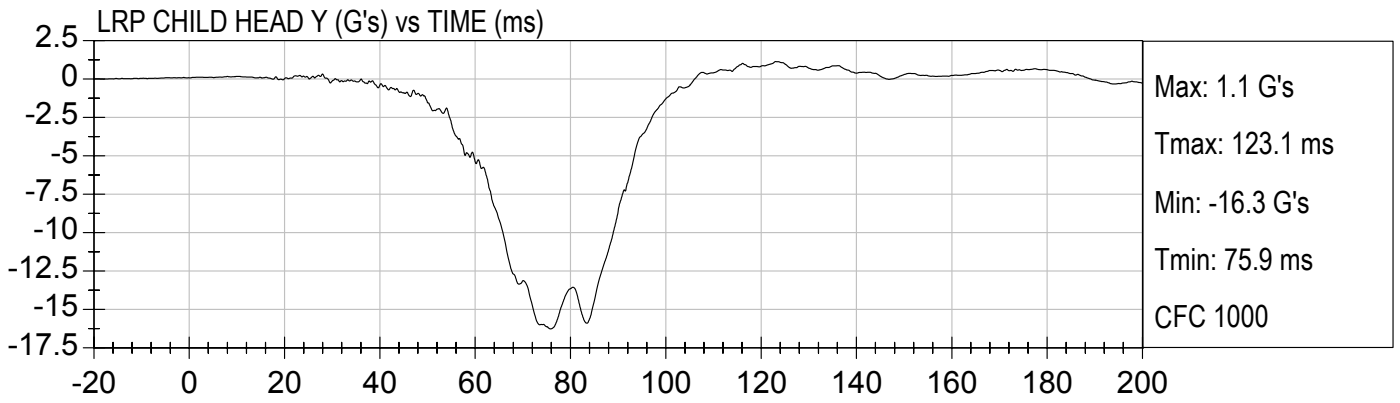
**CHILD DUMMY RESPONSE DATA TRACES**

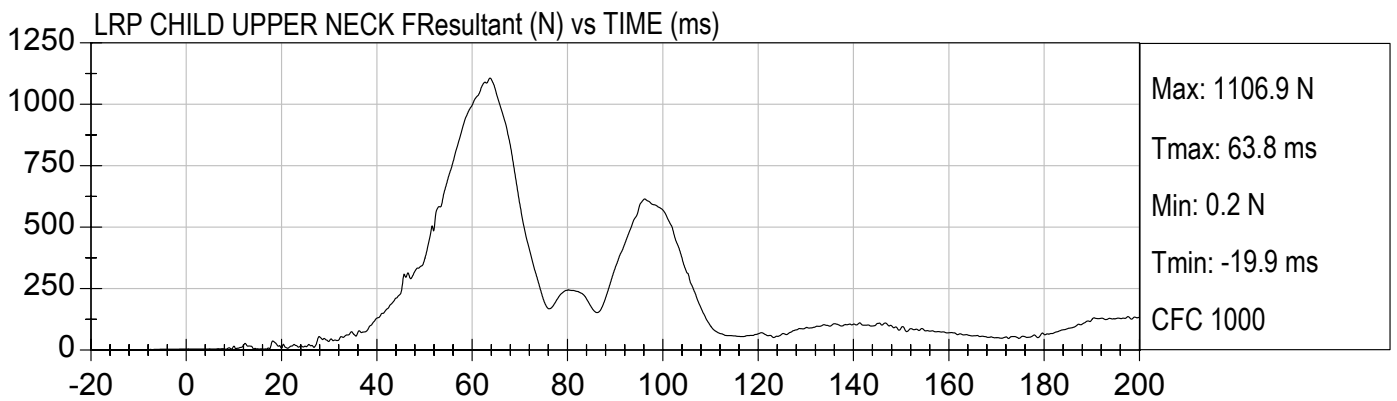
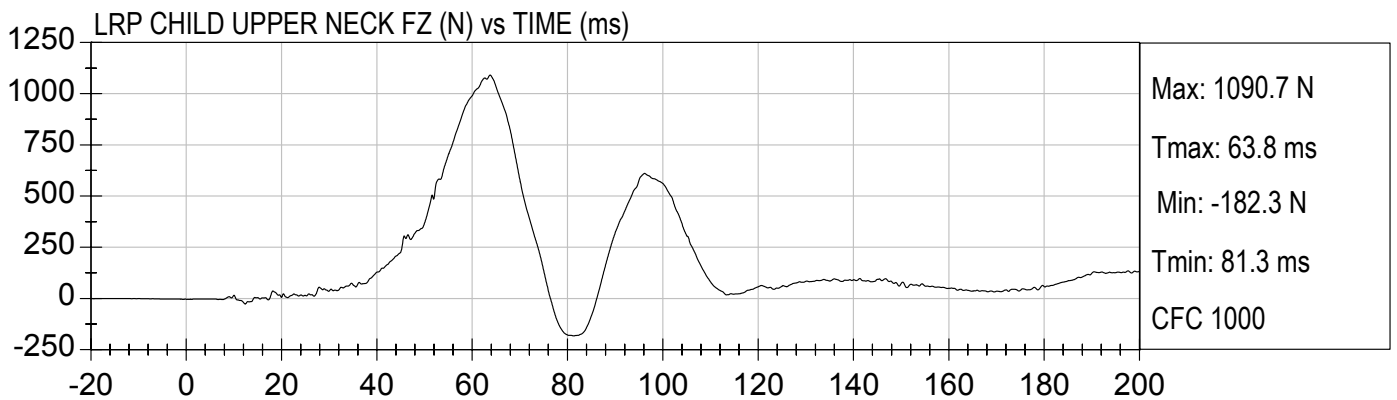
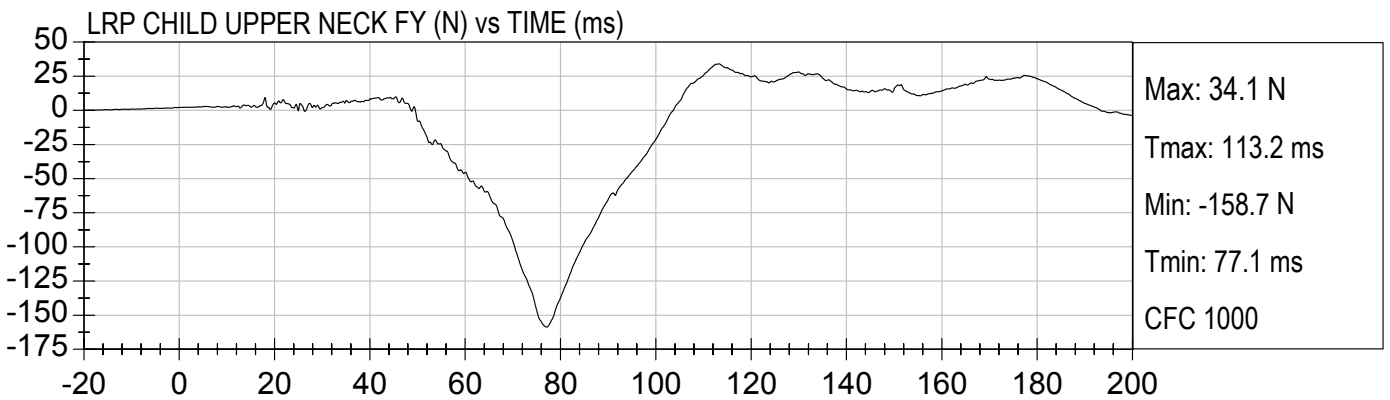
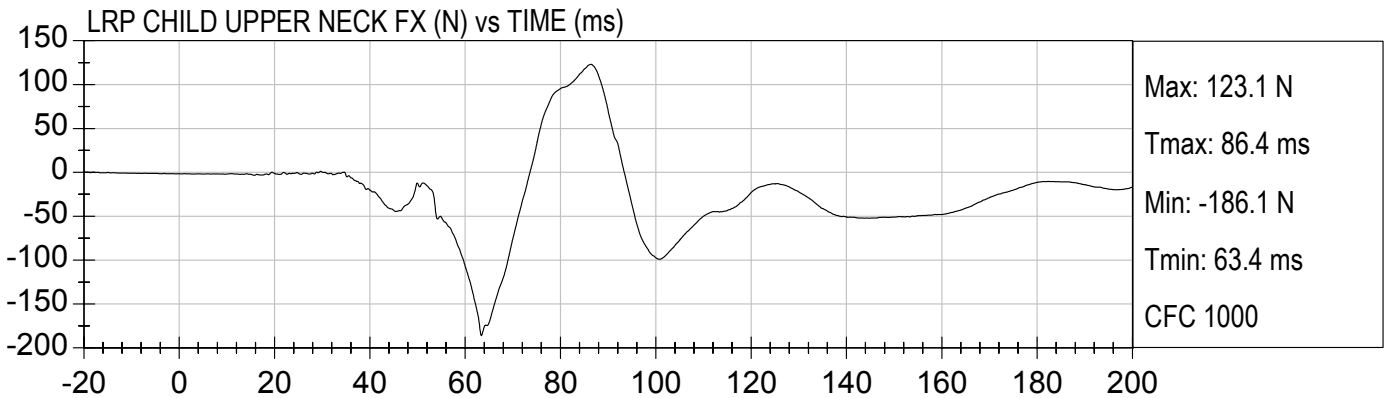
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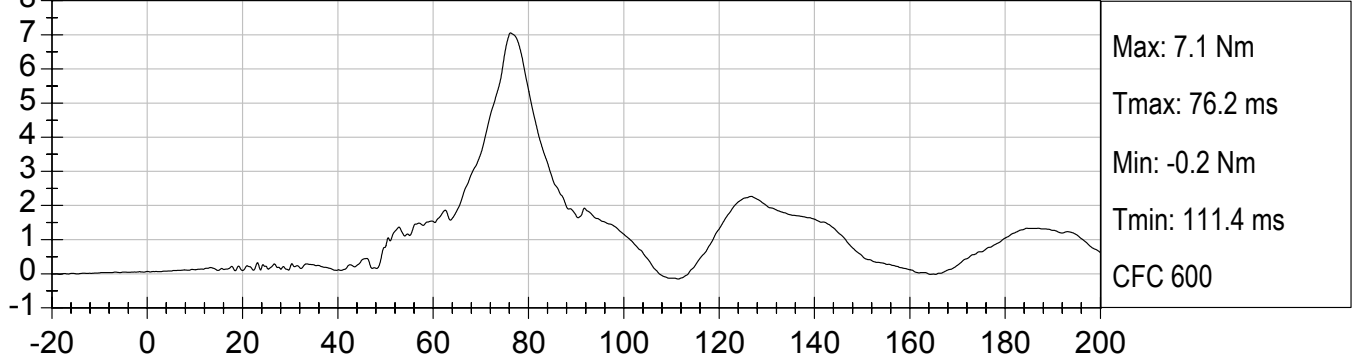
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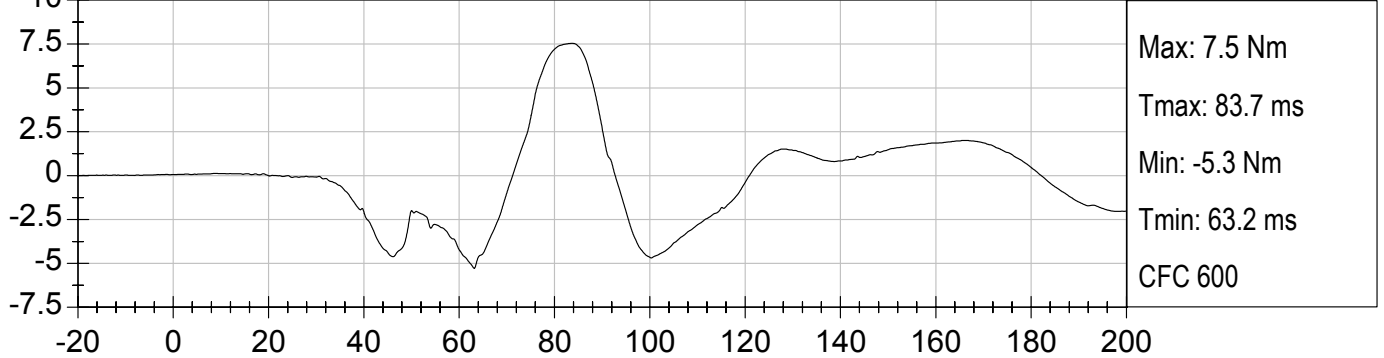




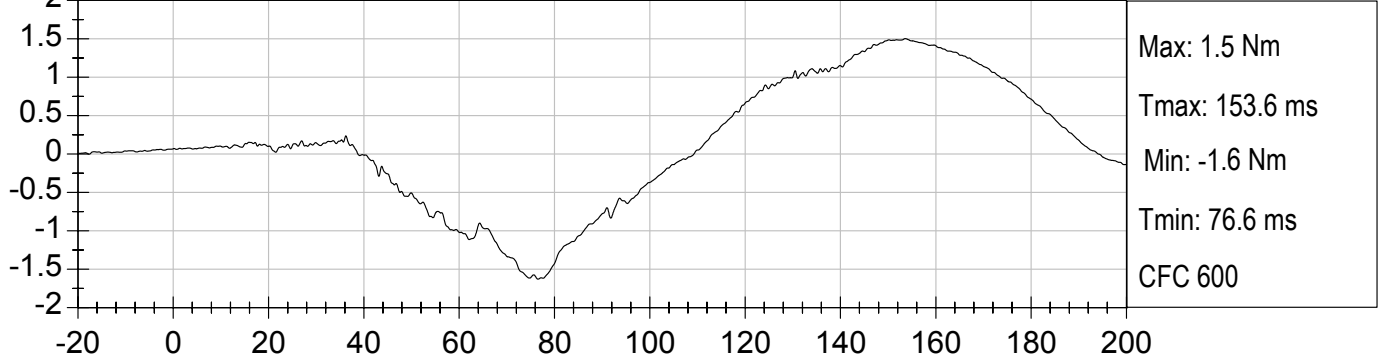
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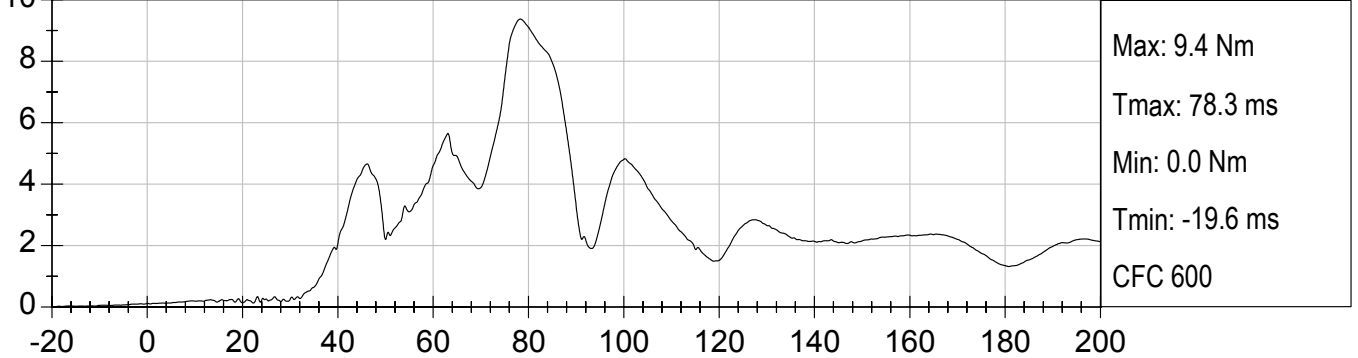
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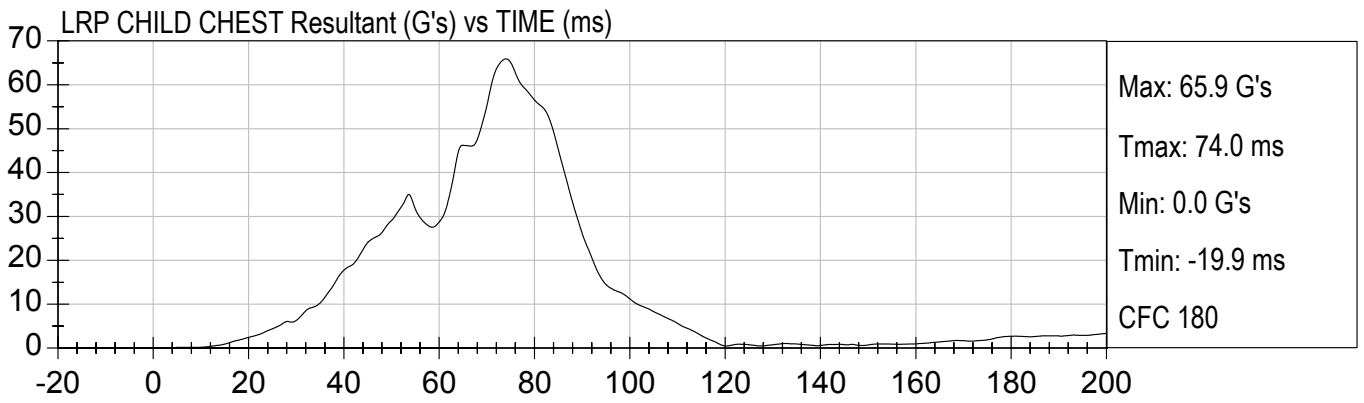
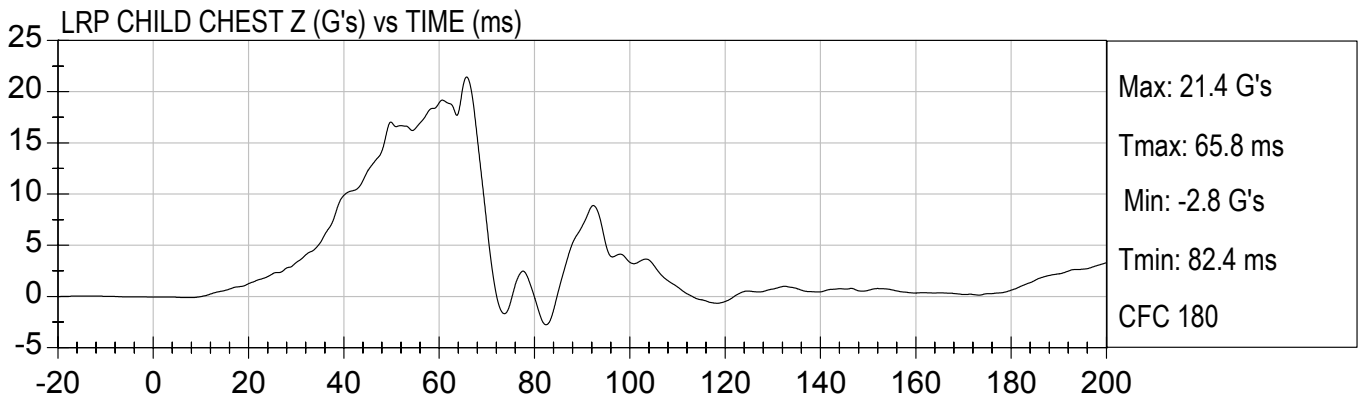
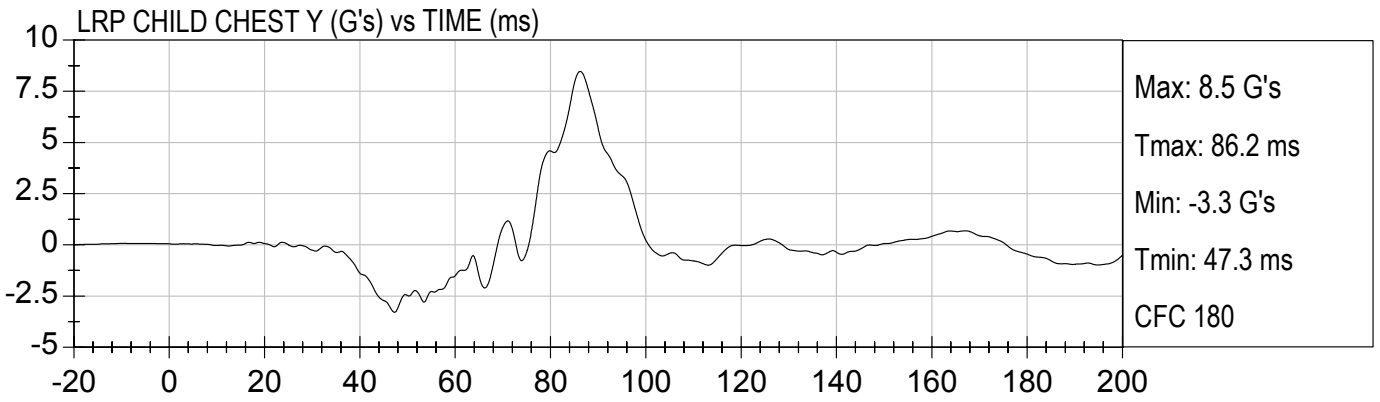
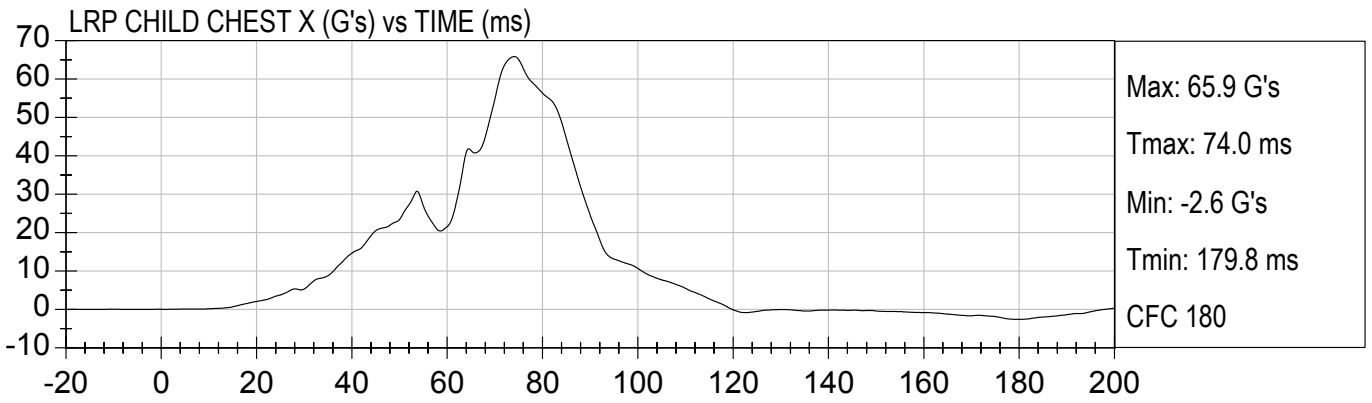


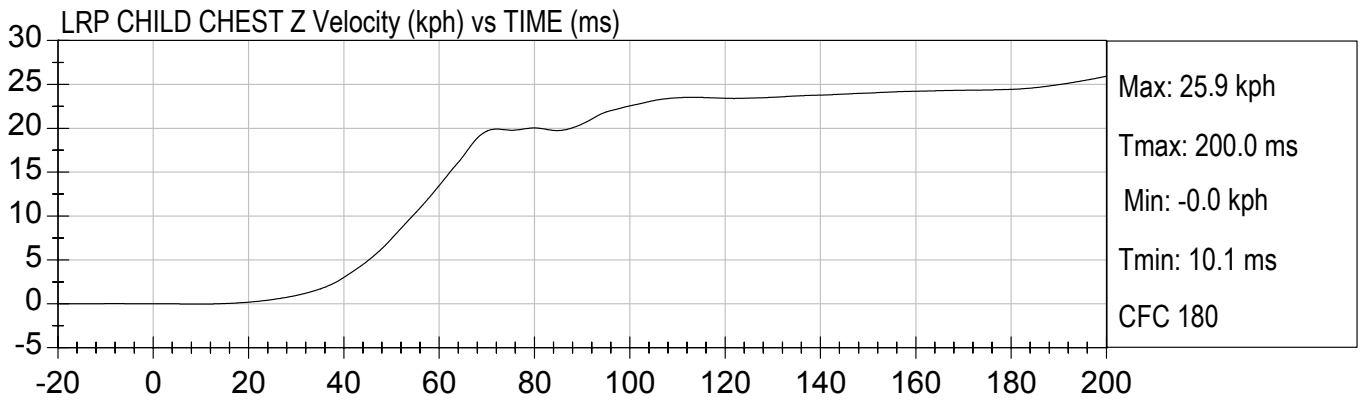
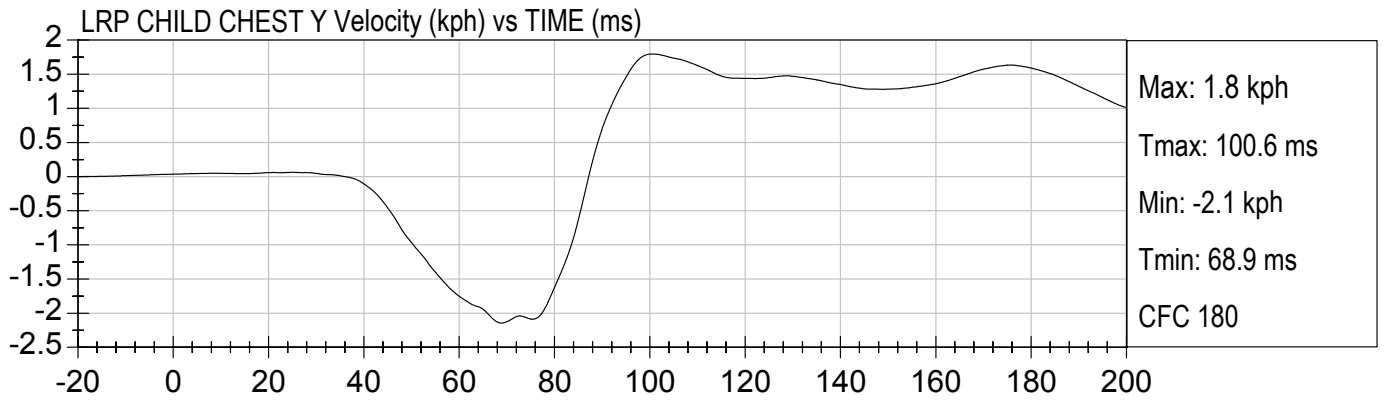
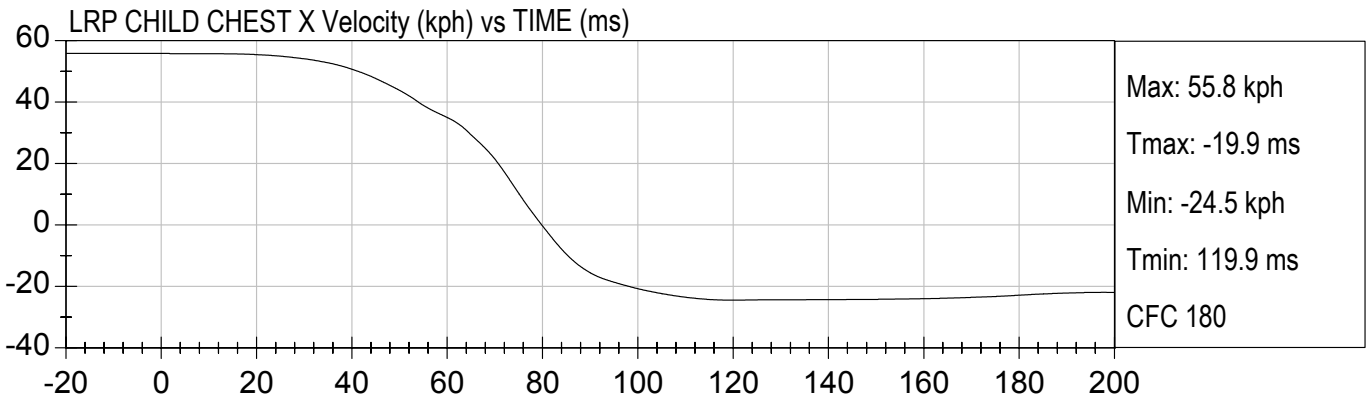
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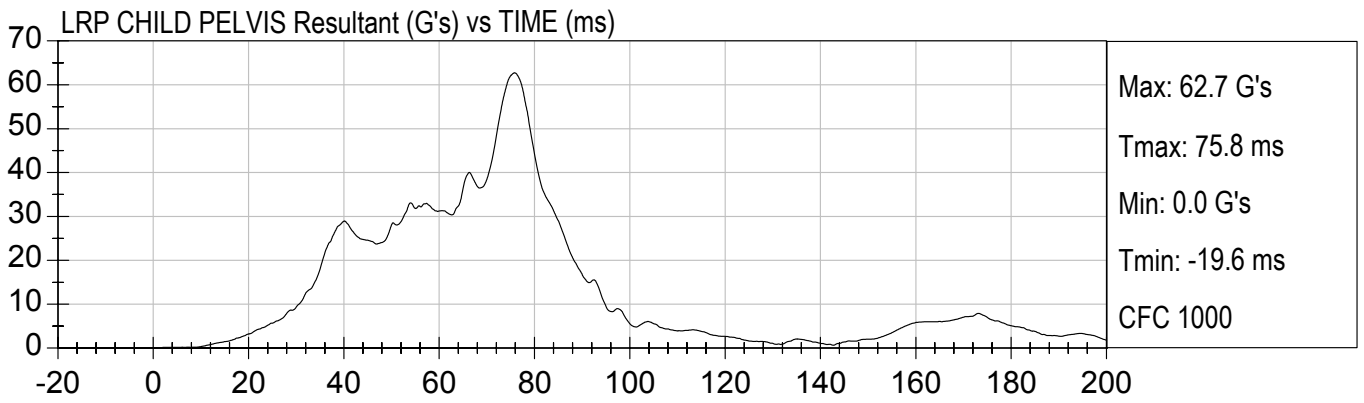
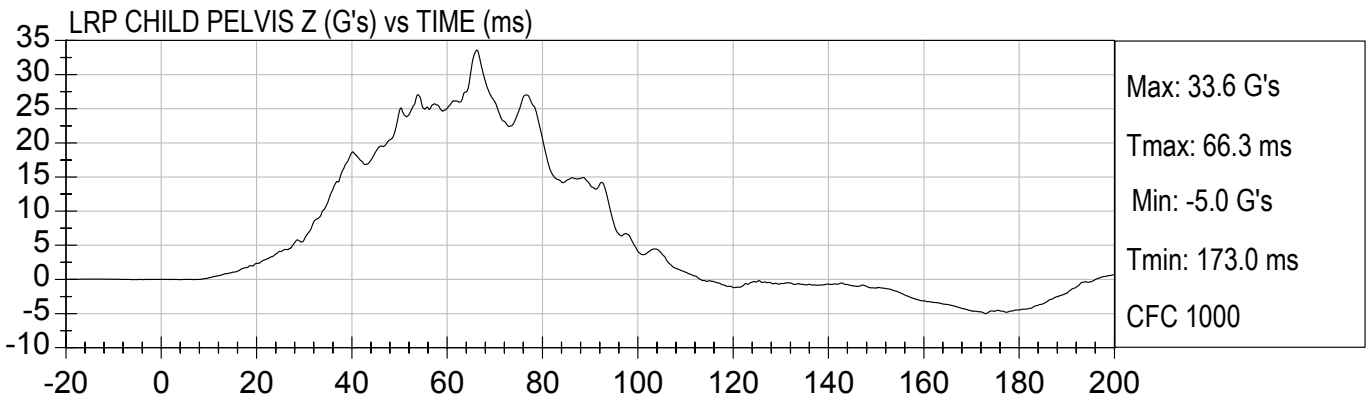
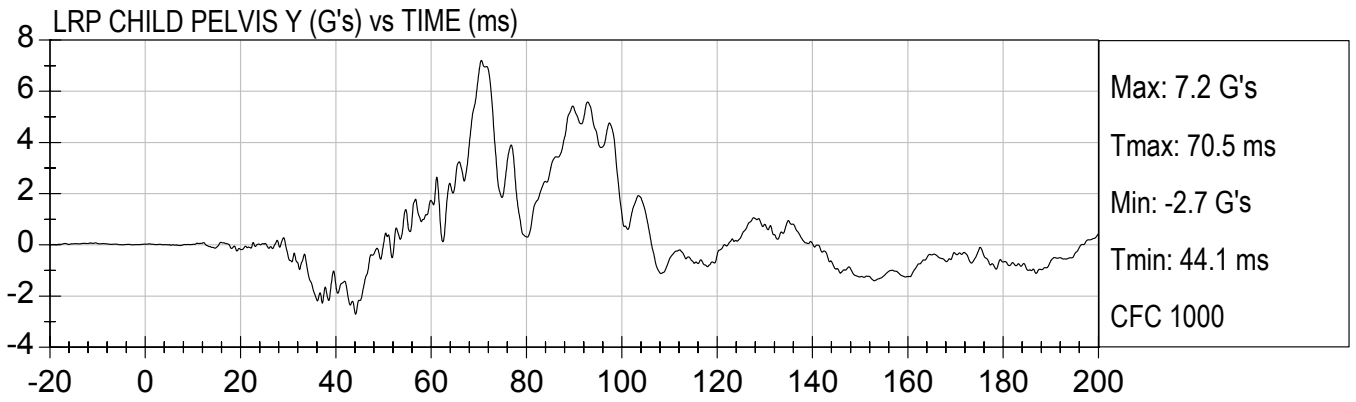
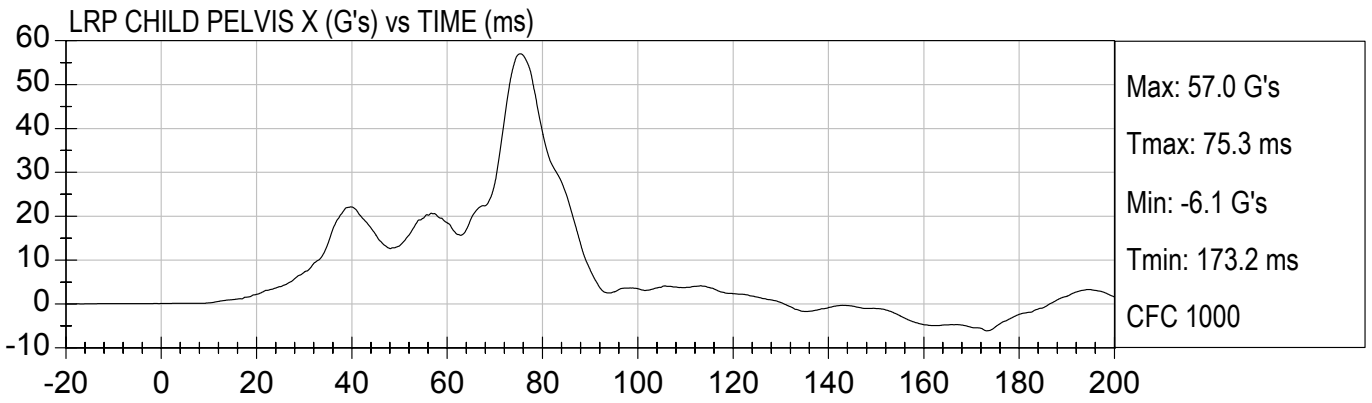


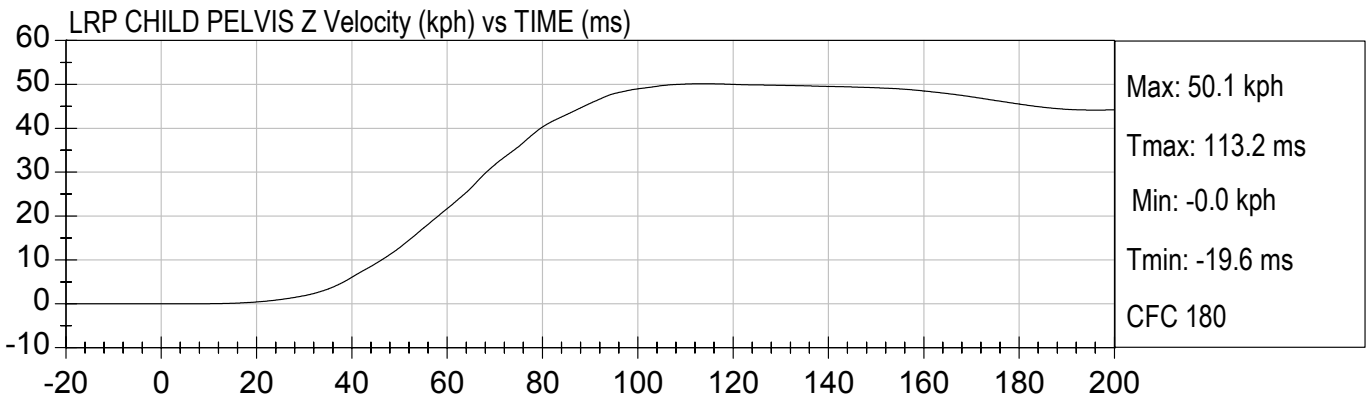
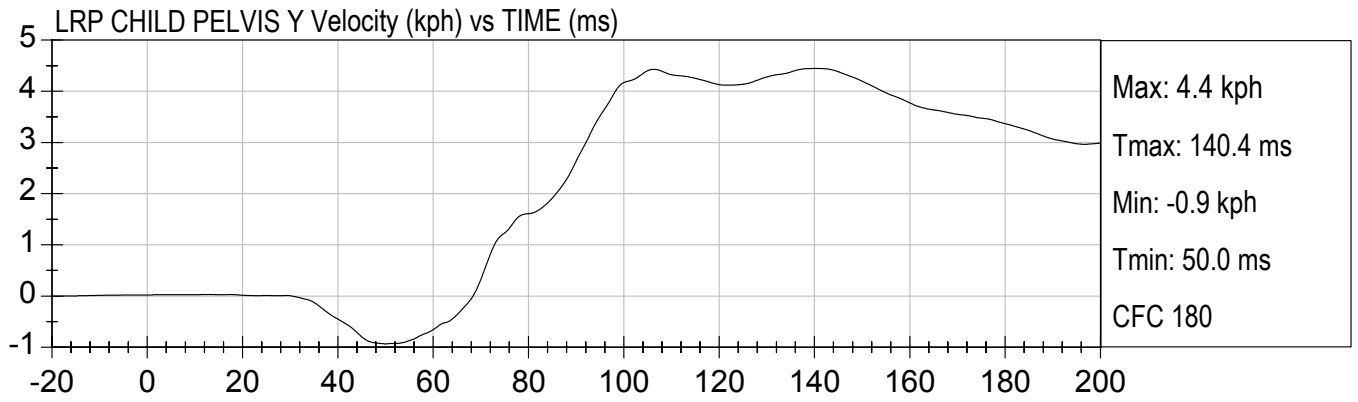
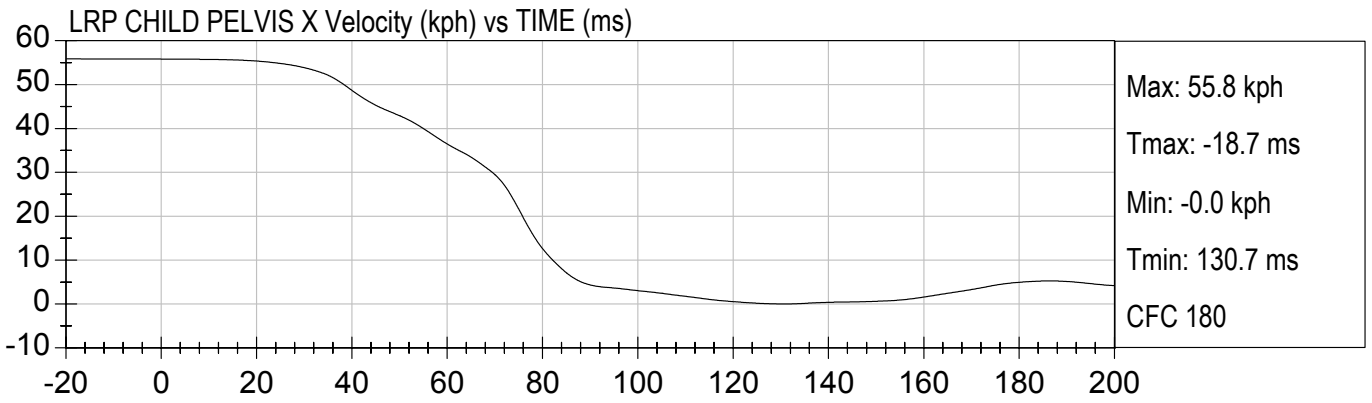
LRP CHILD UPPER NECK MResultant (Nm) vs TIME (ms)

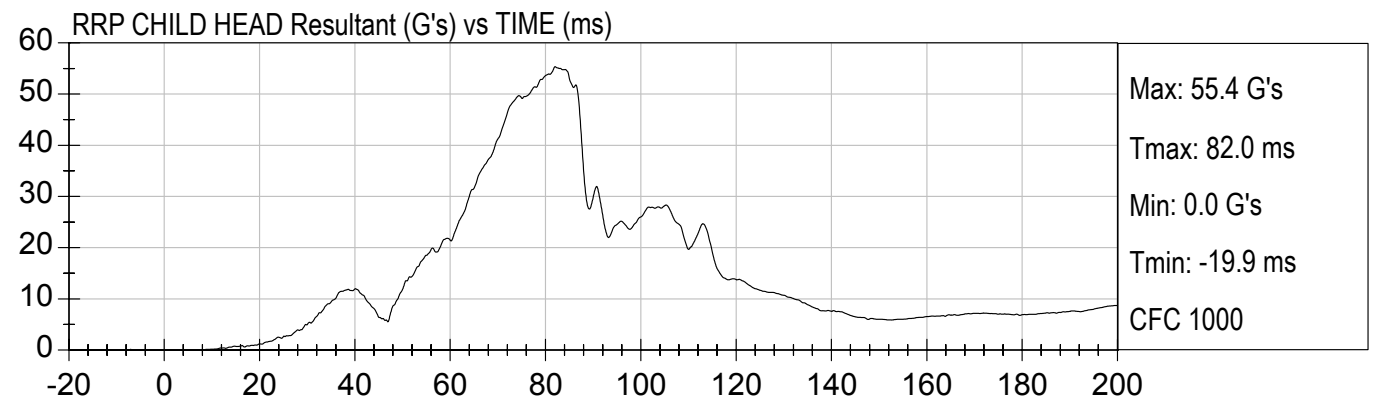
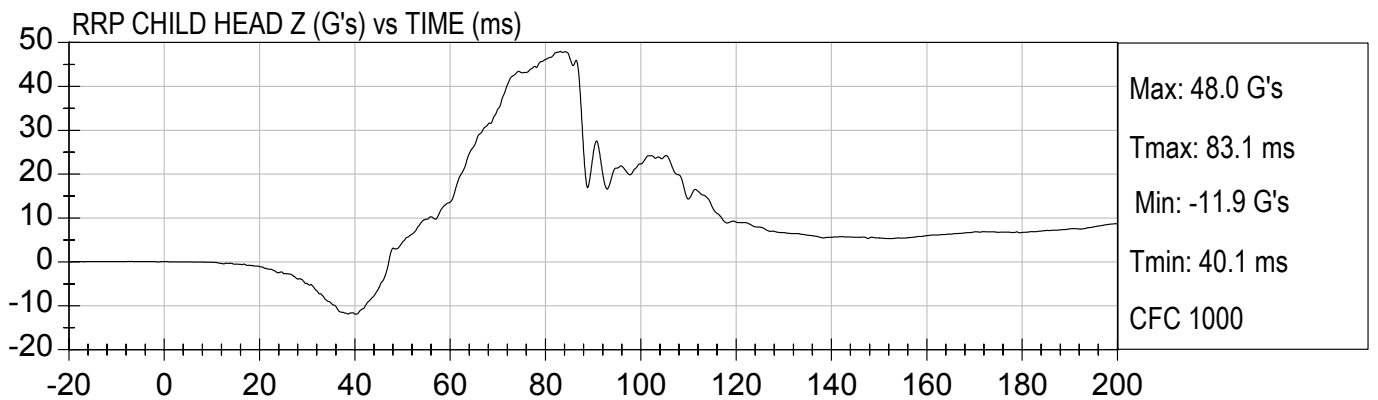
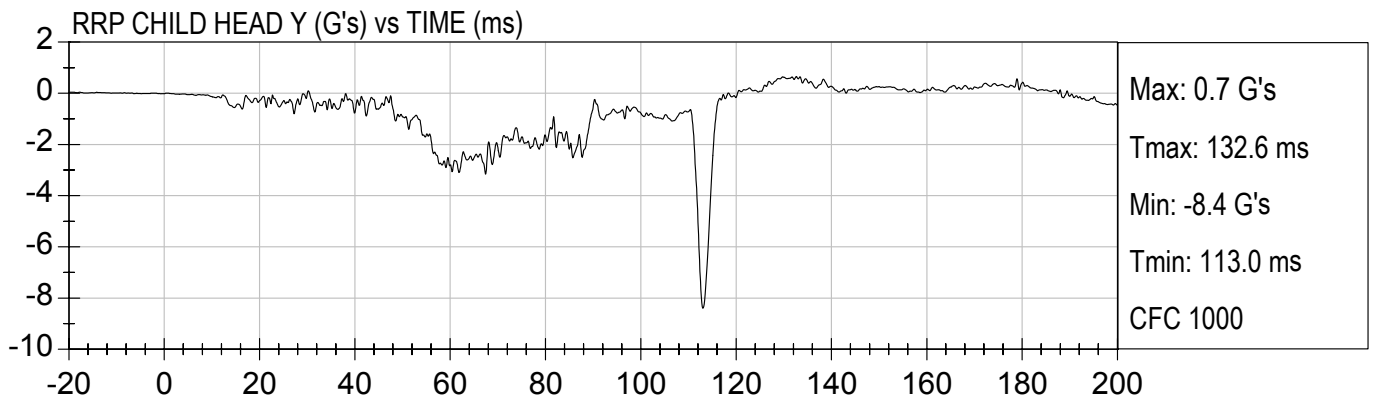
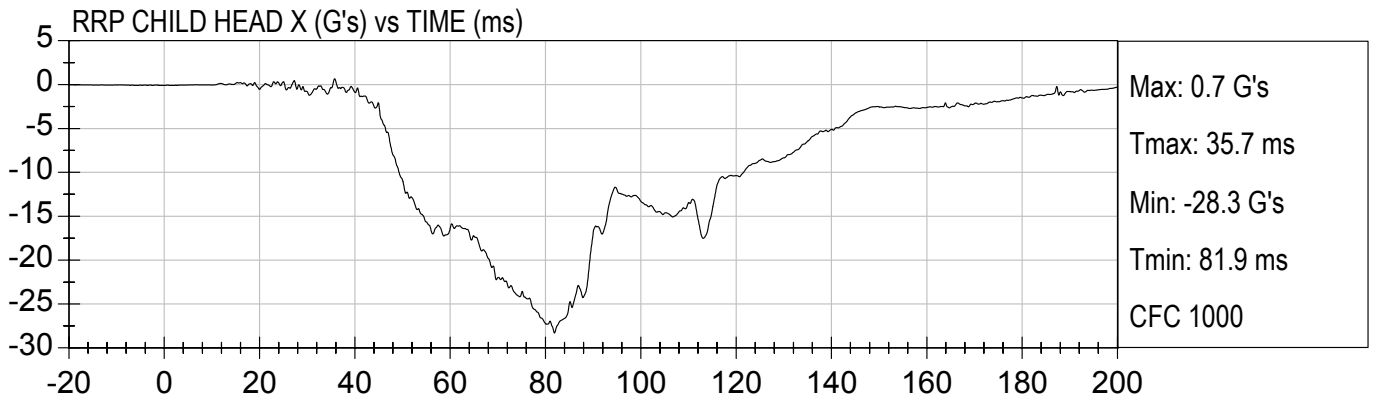






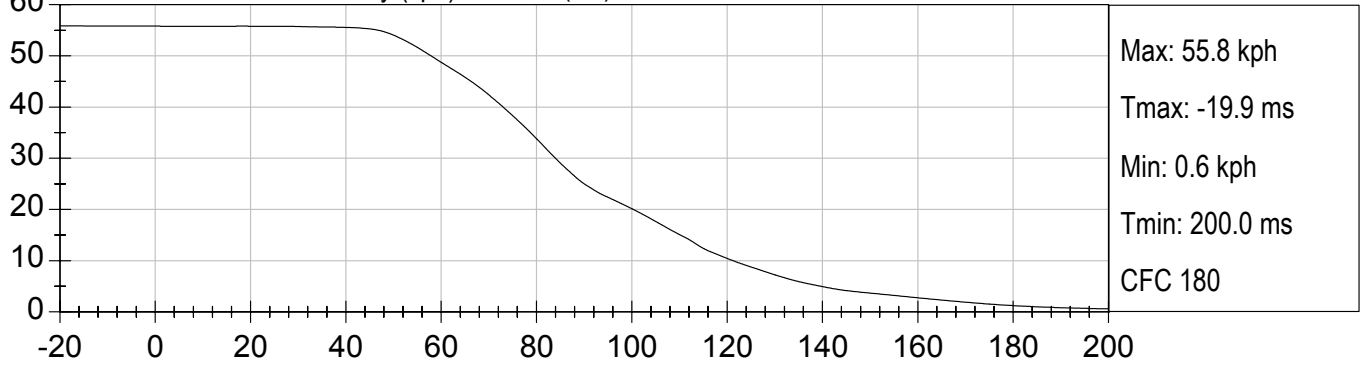




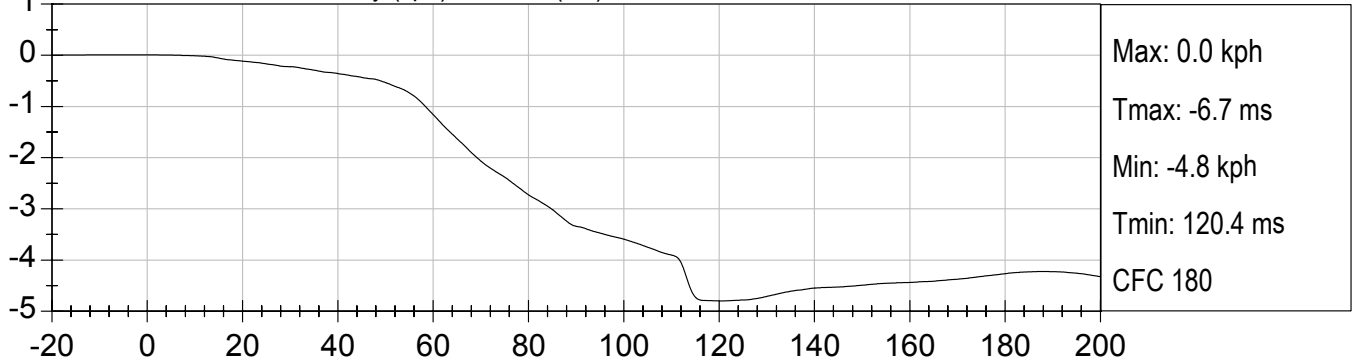




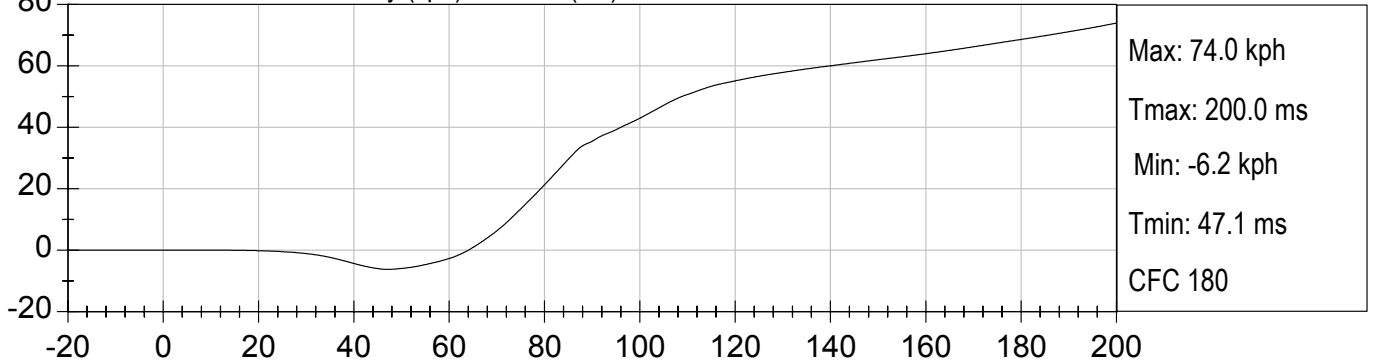
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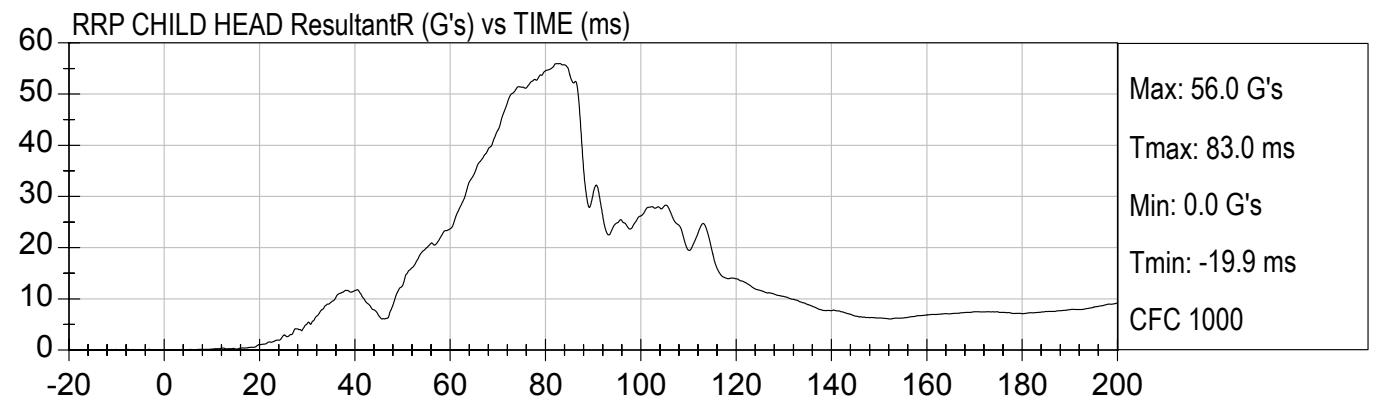
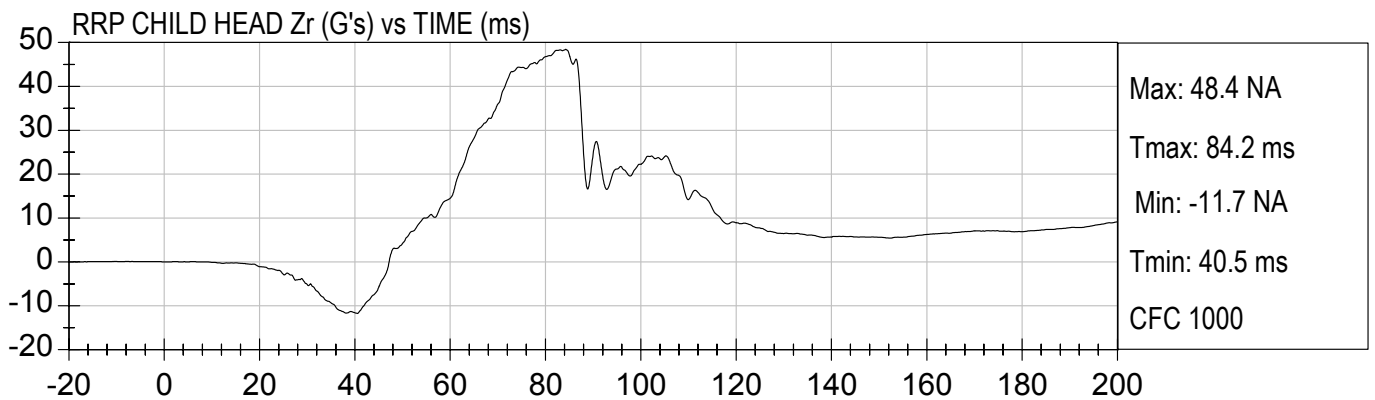
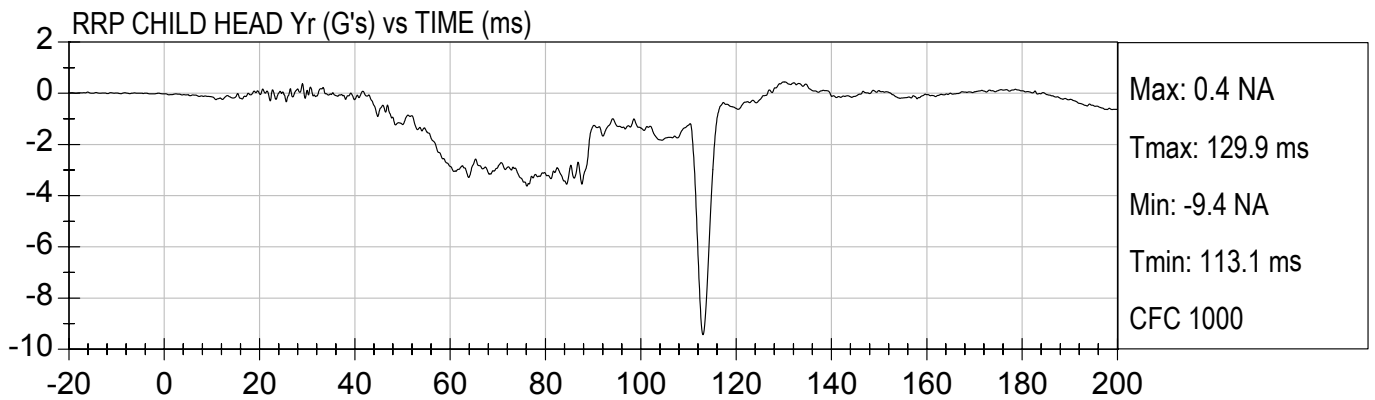
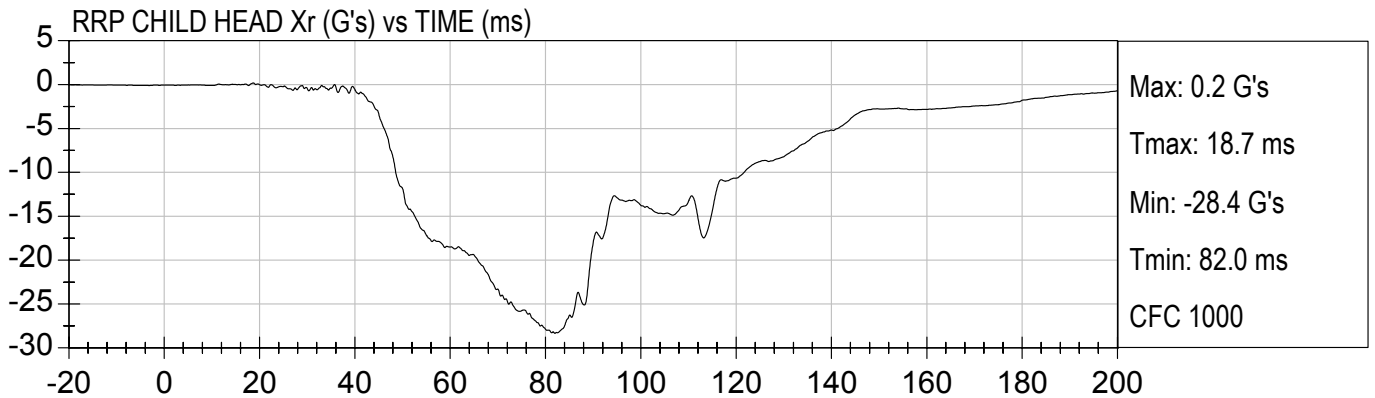


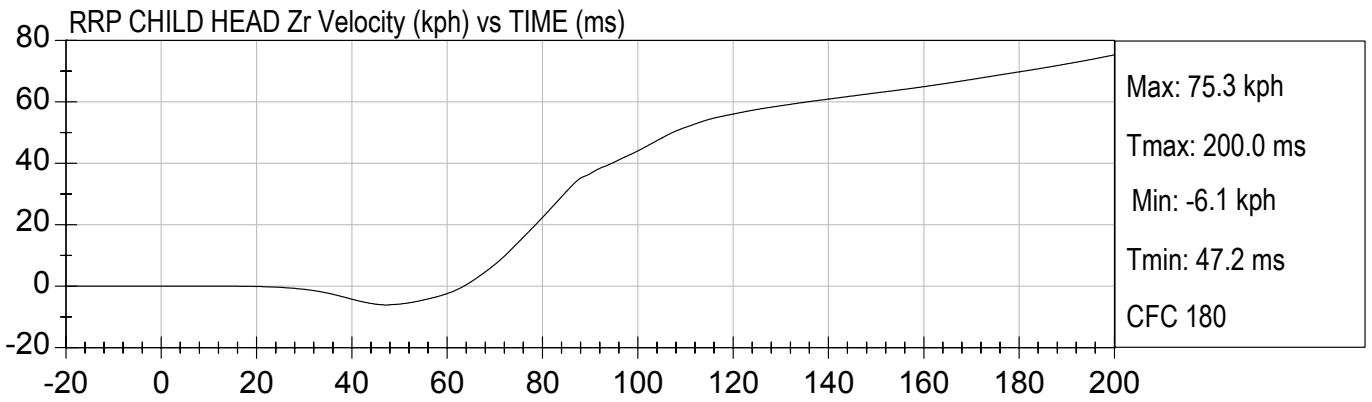
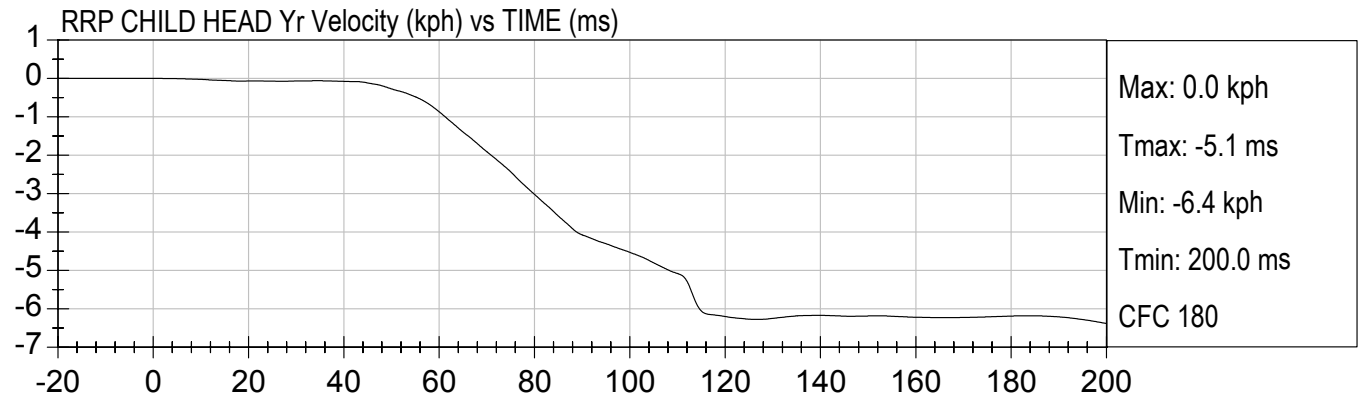
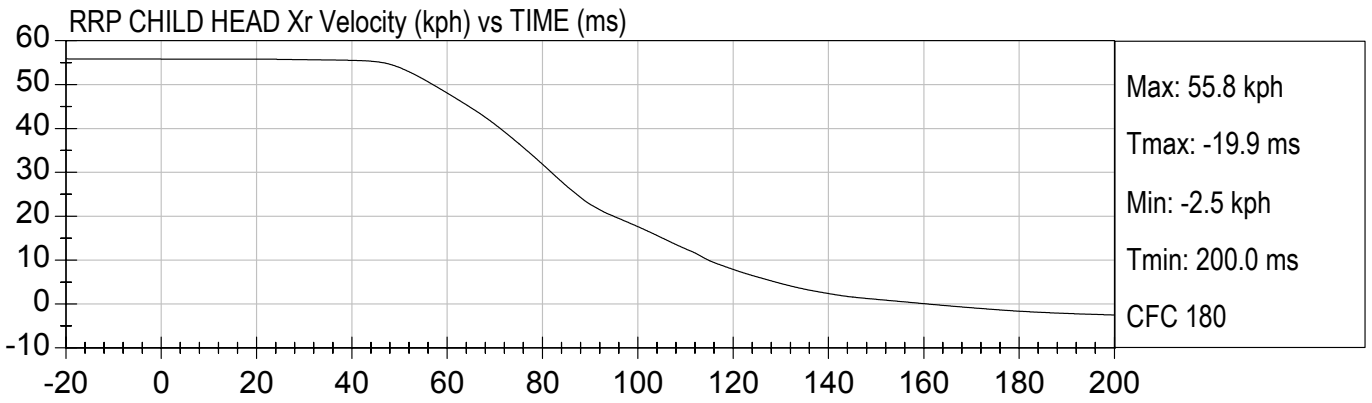
RRP CHILD HEAD Y Velocity (kph) vs TIME (ms)

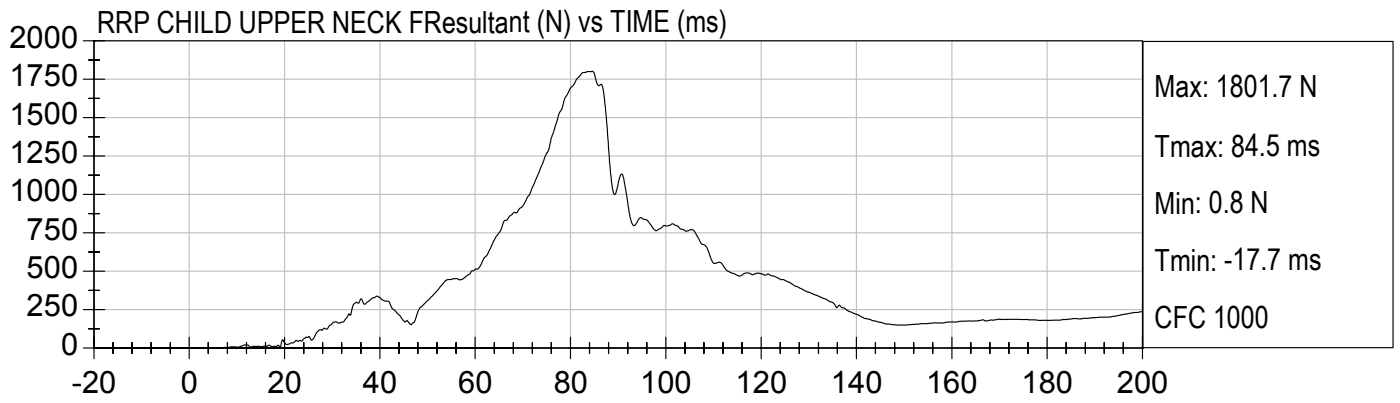
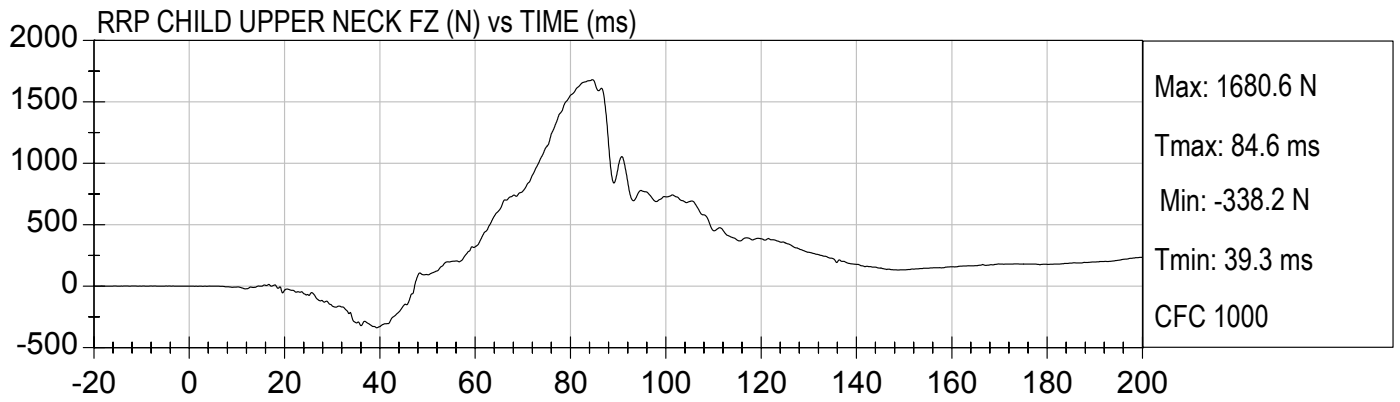
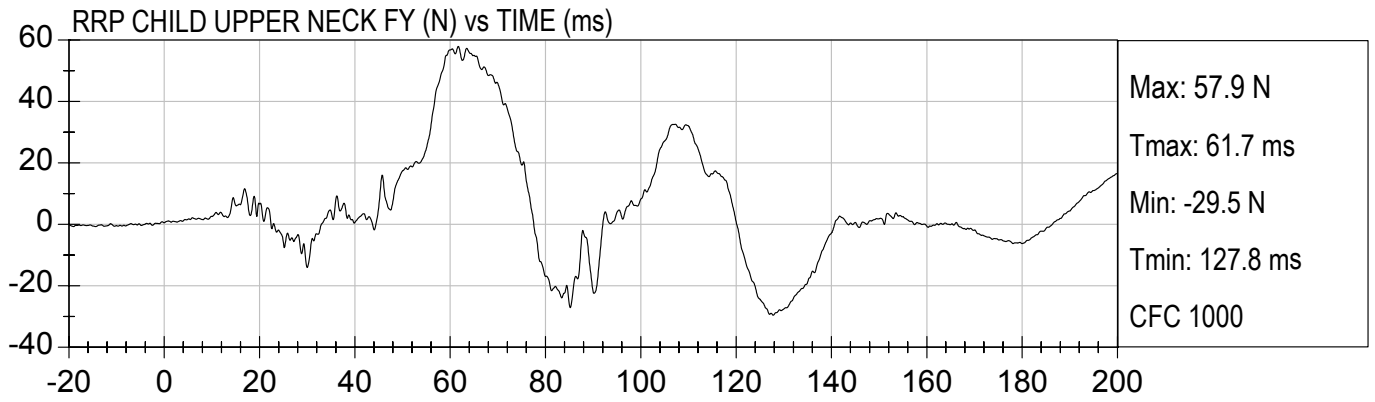
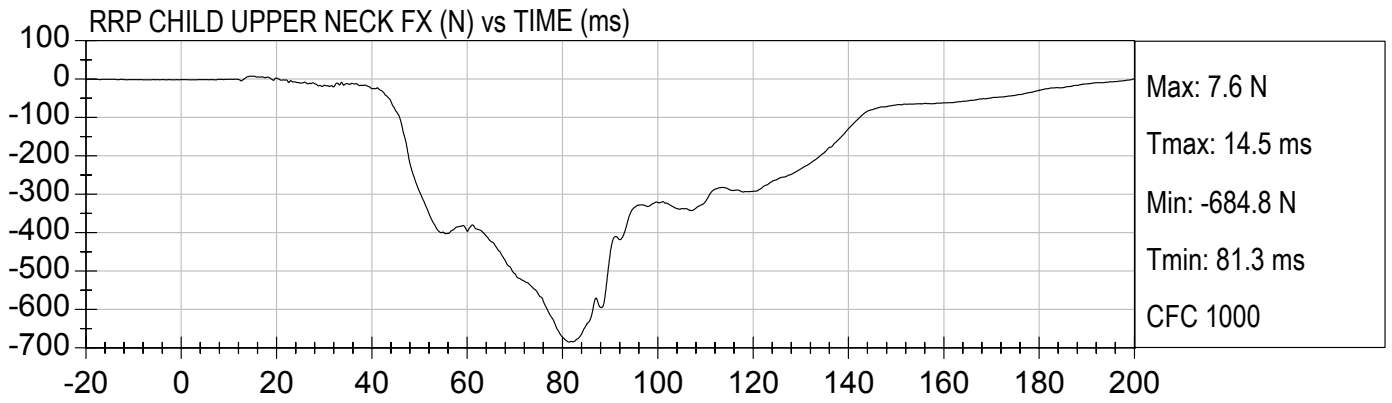


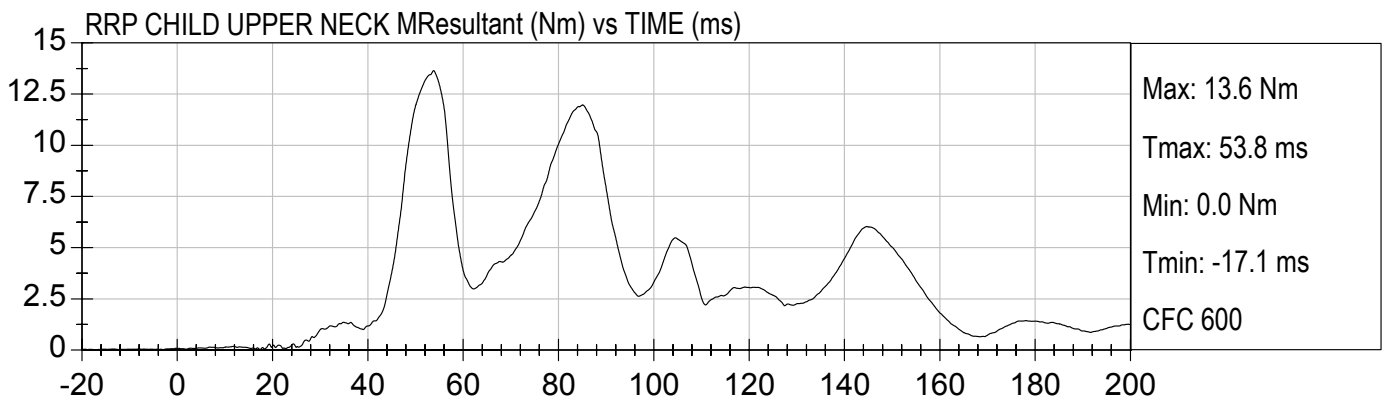
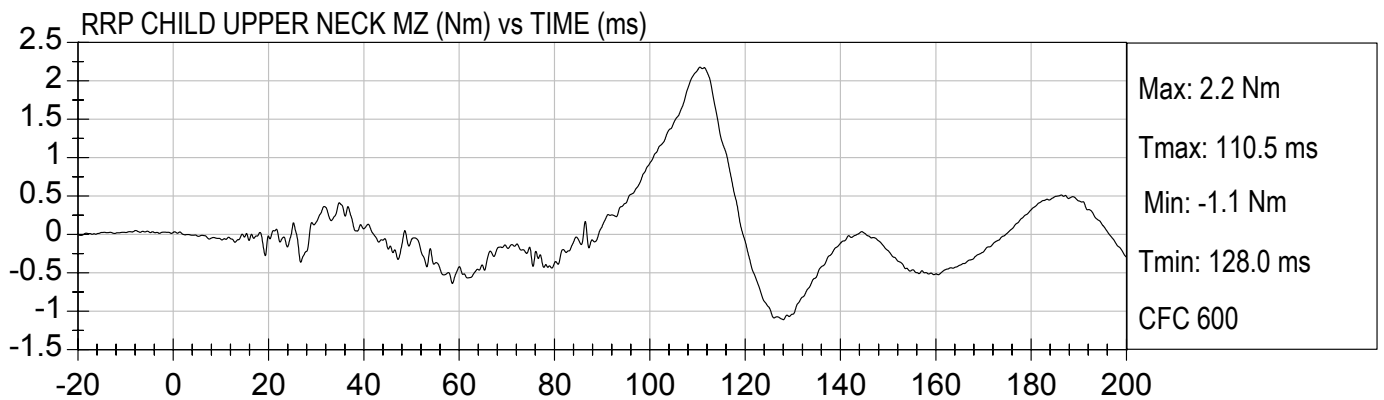
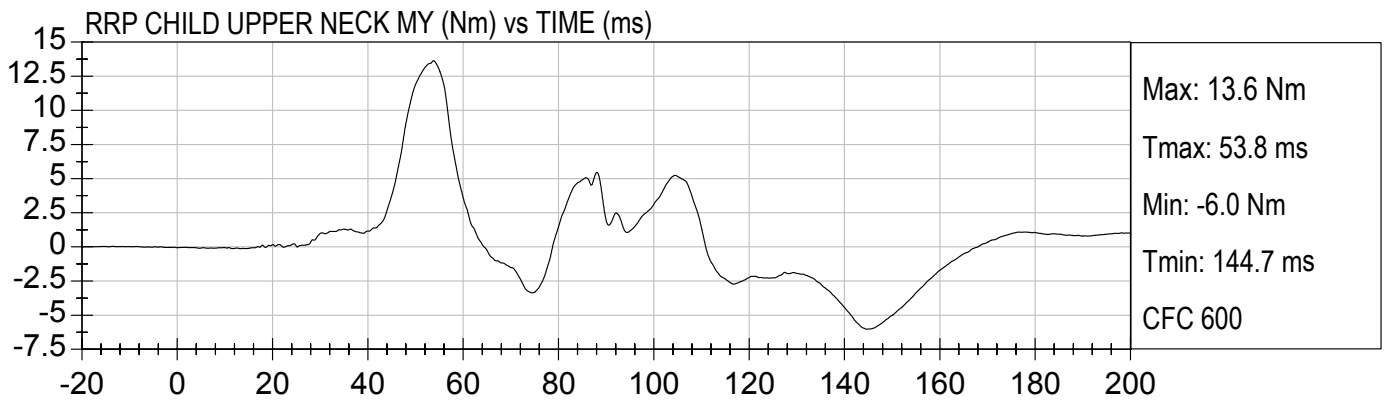
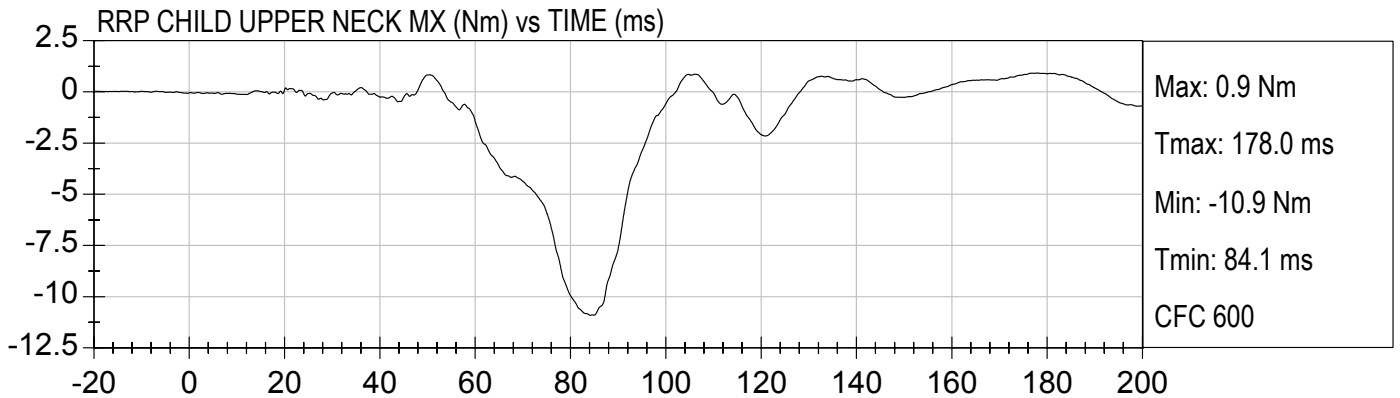
RRP CHILD HEAD Z Velocity (kph) vs TIME (ms)

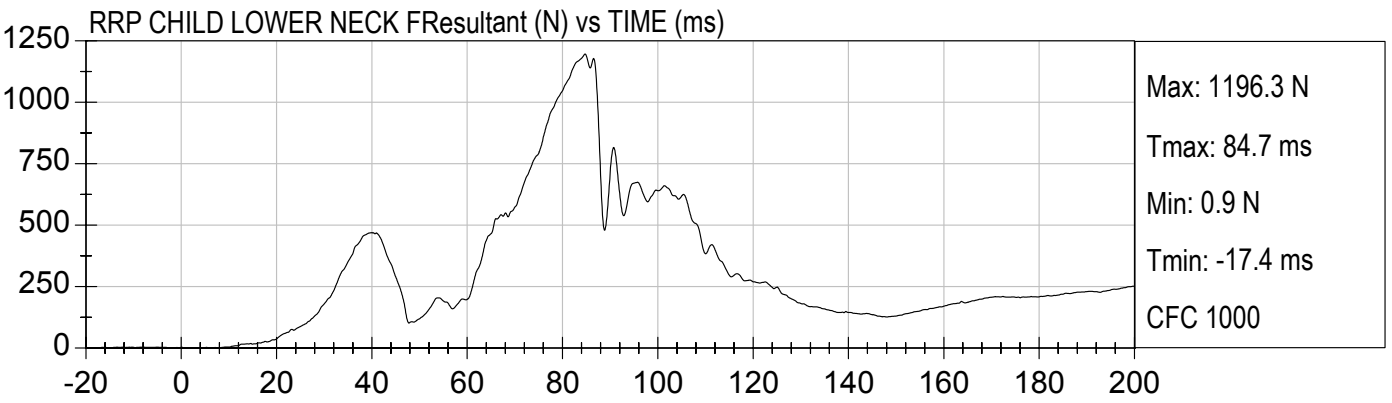
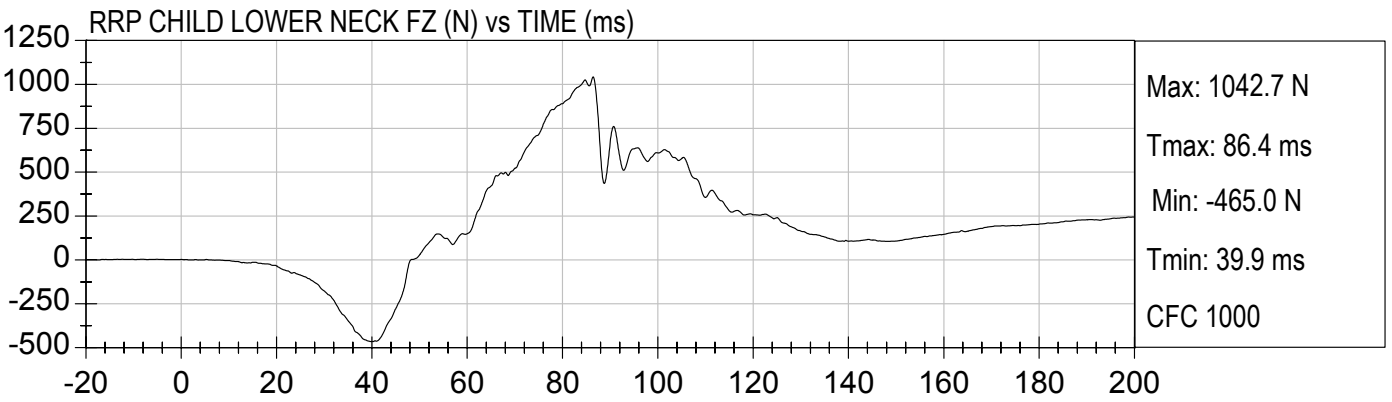
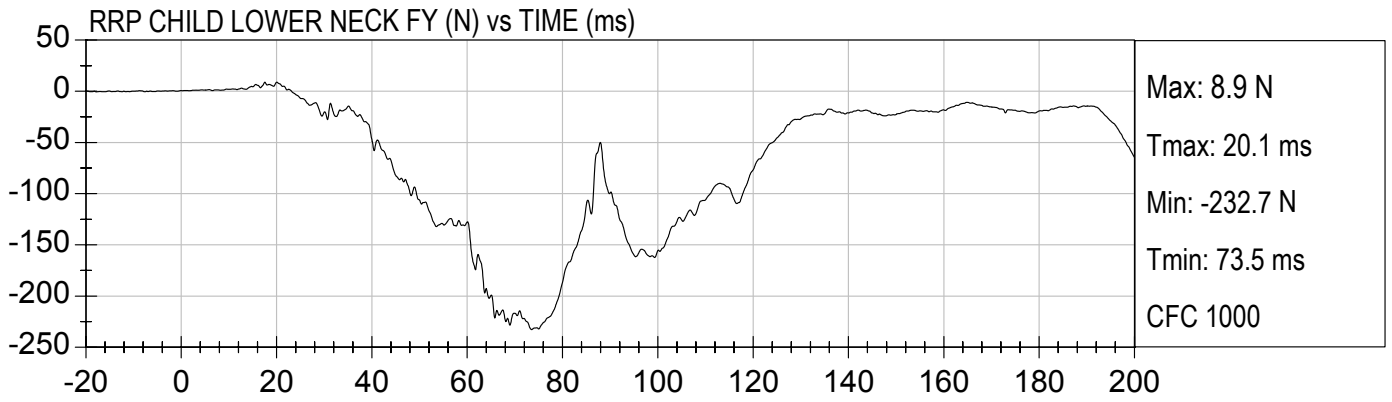
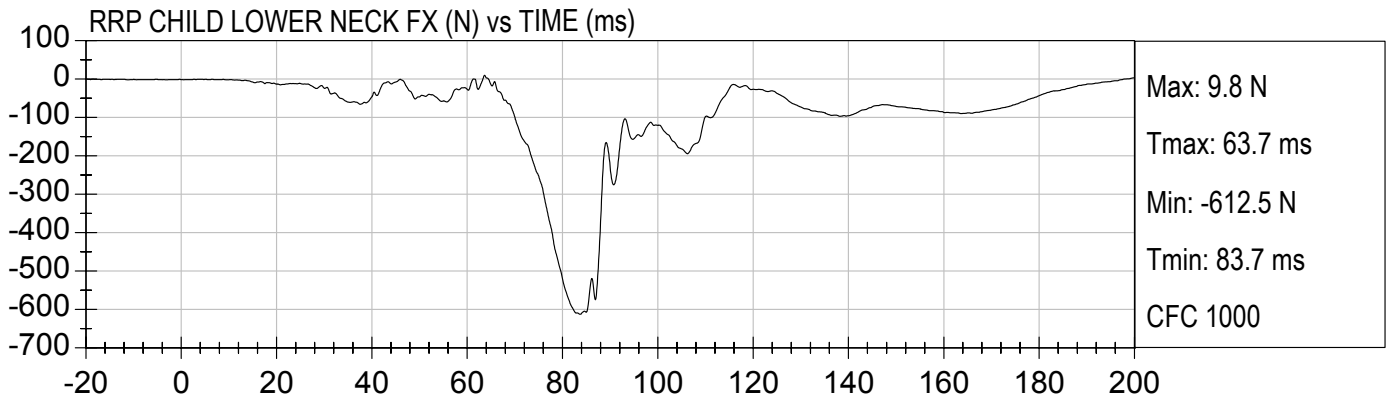


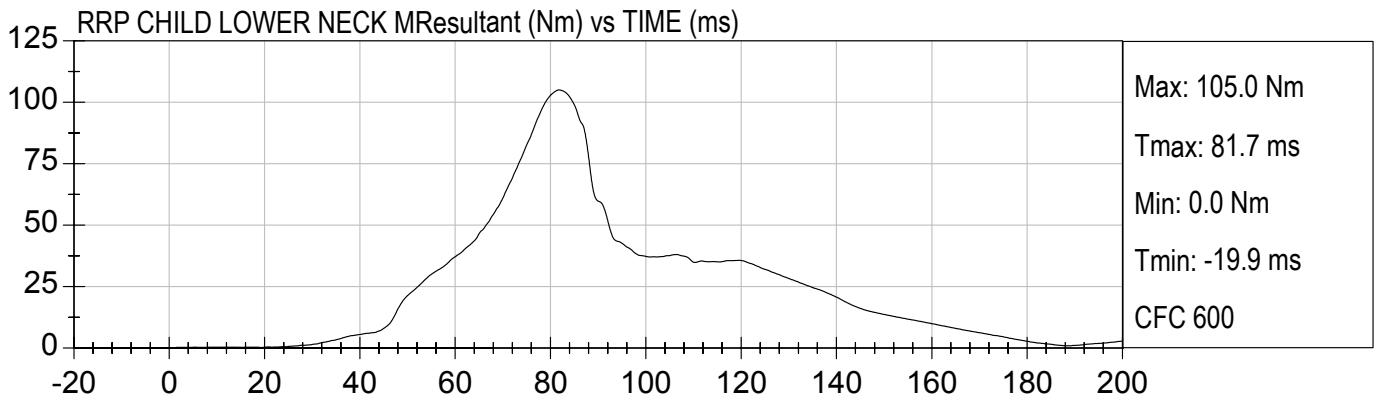
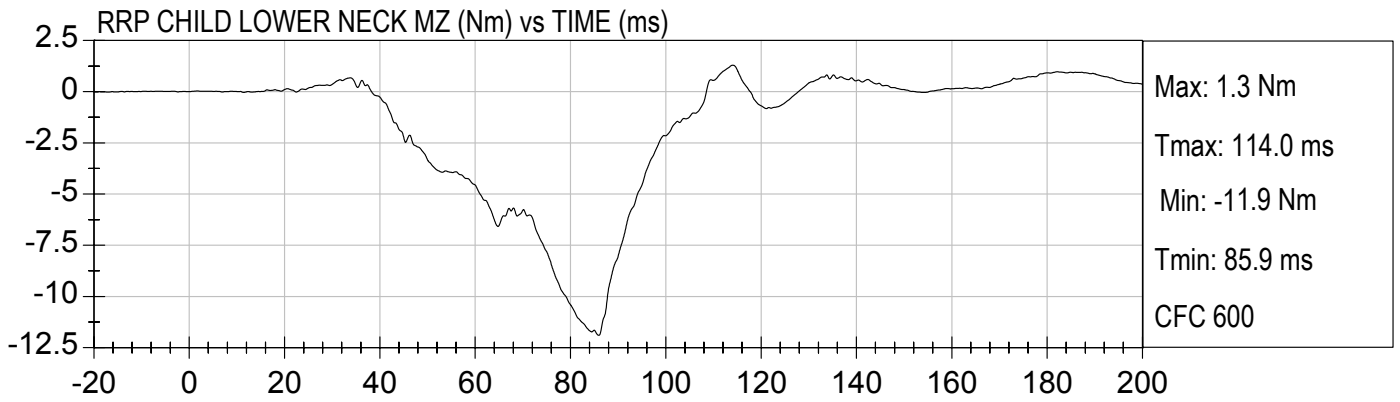
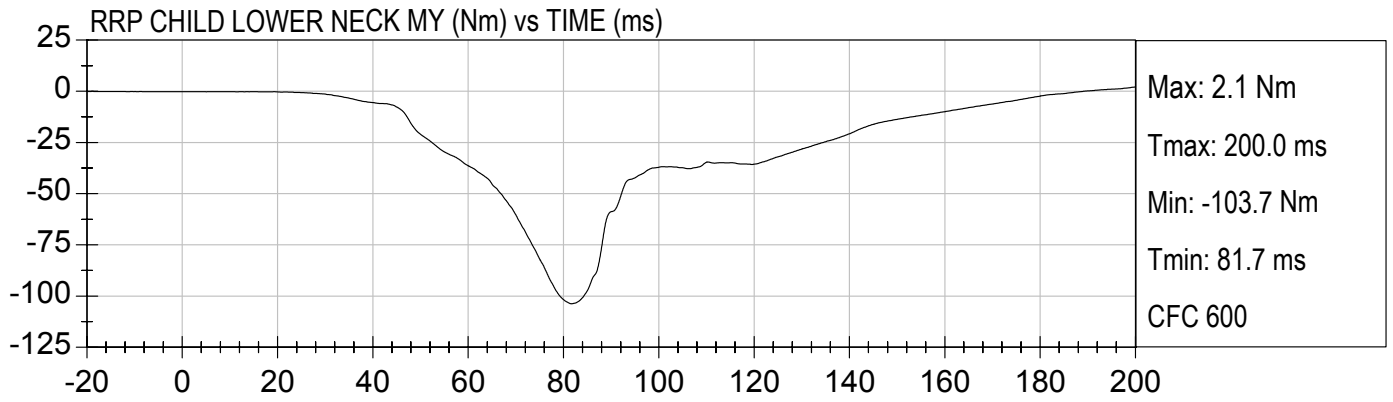
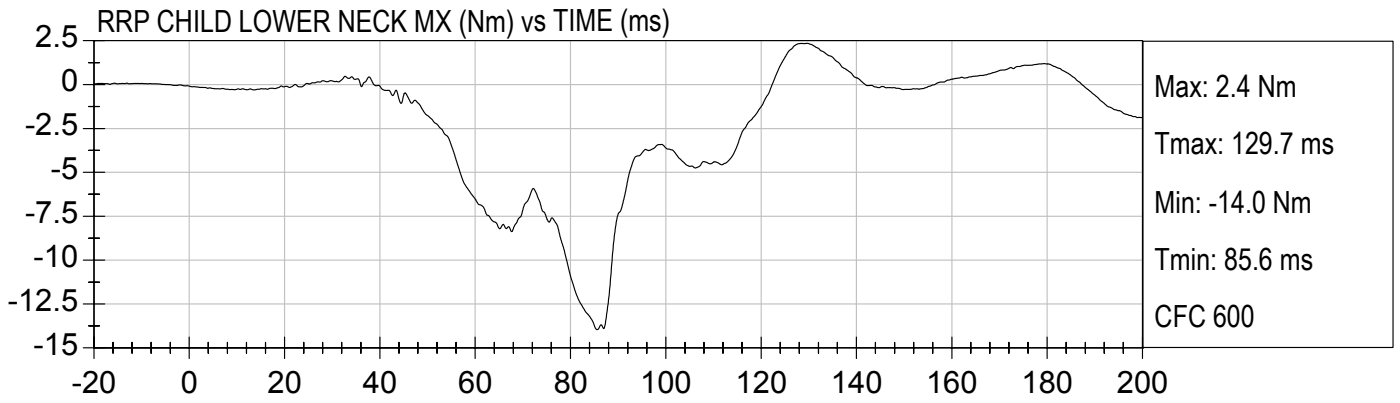


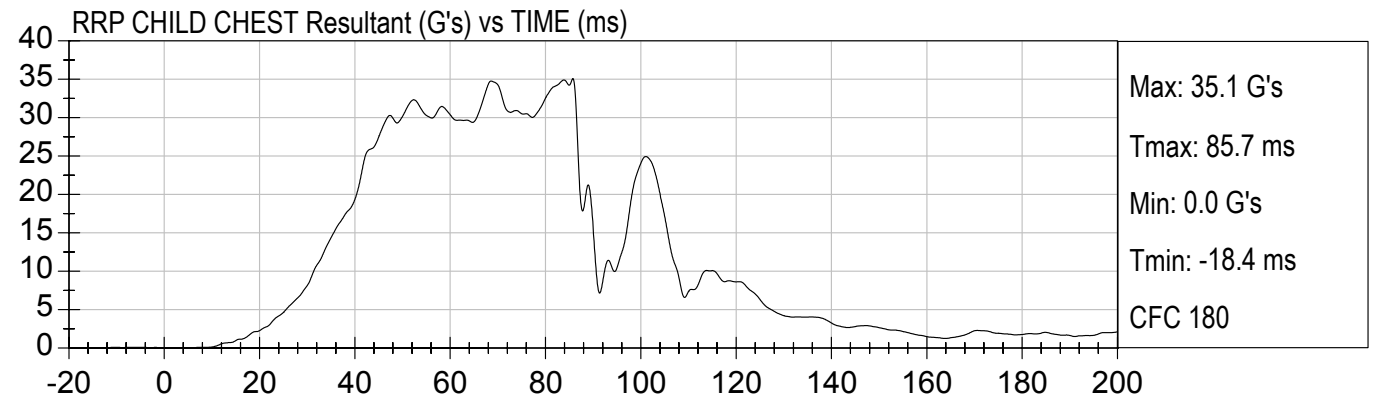
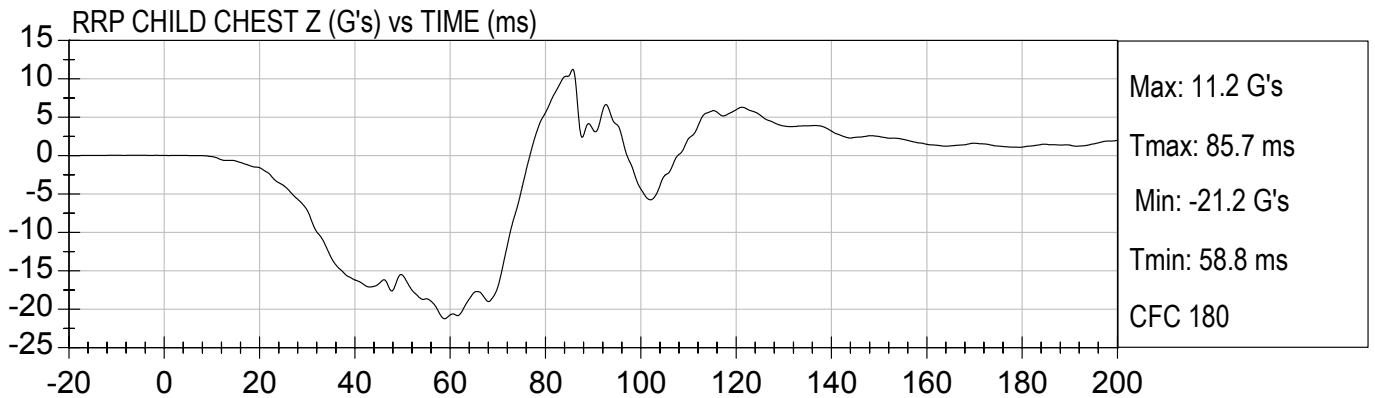
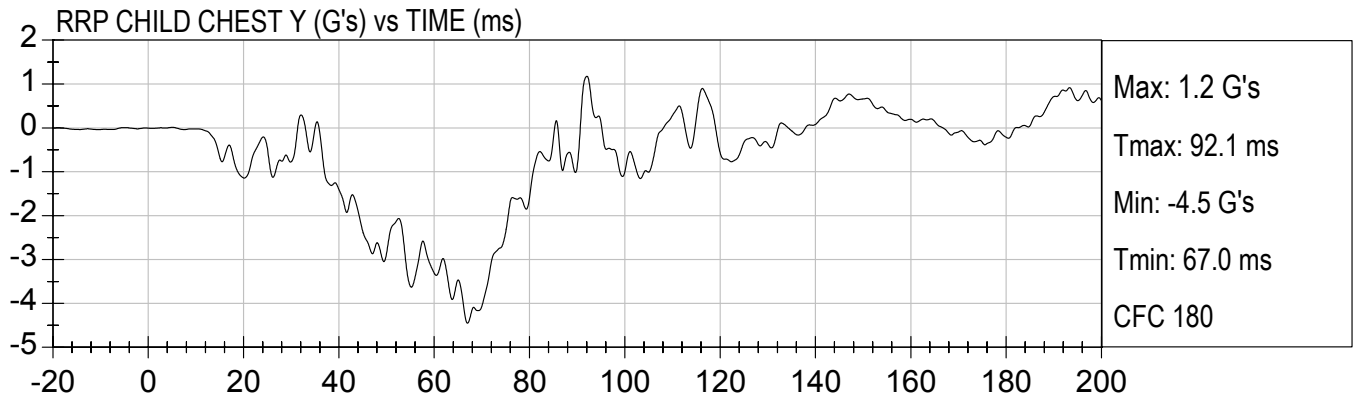
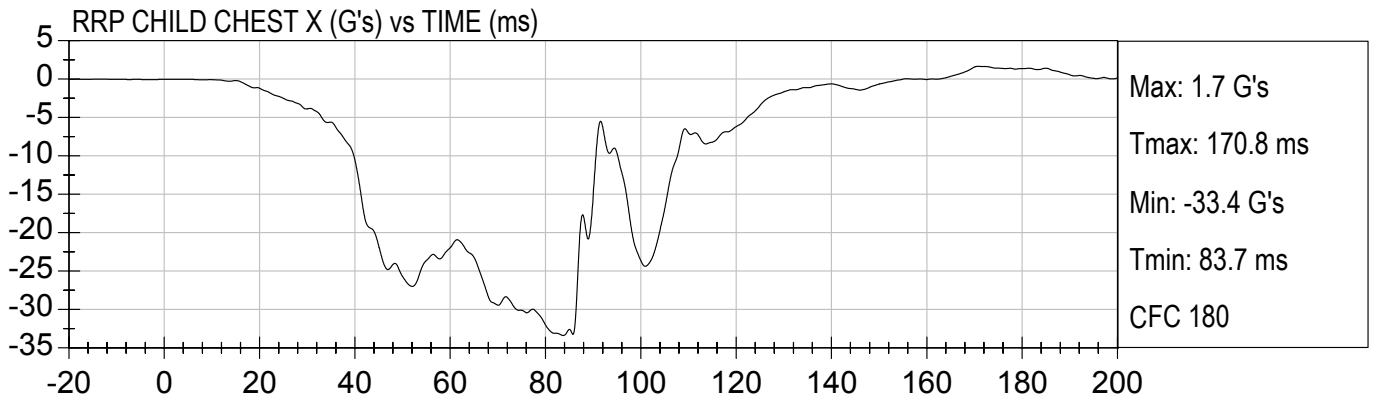


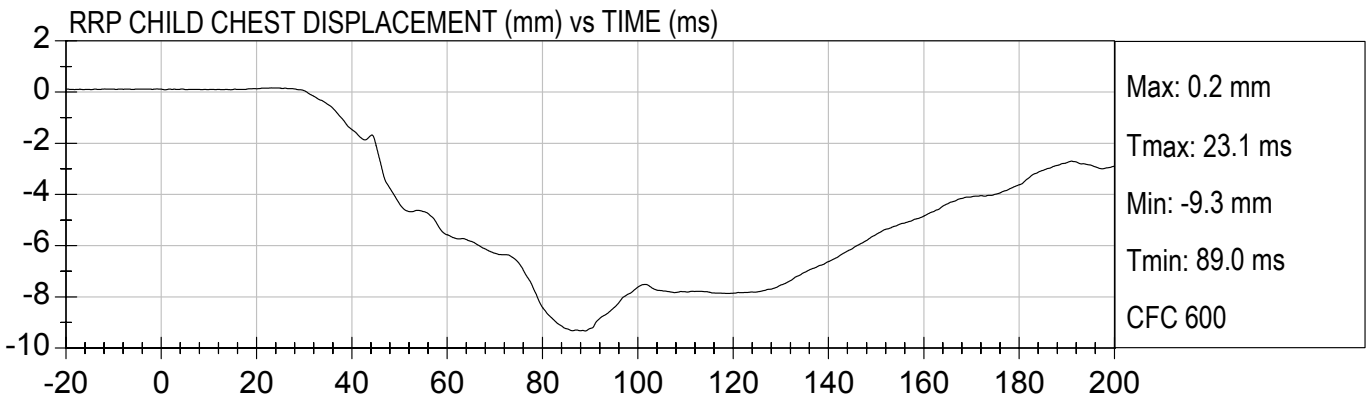
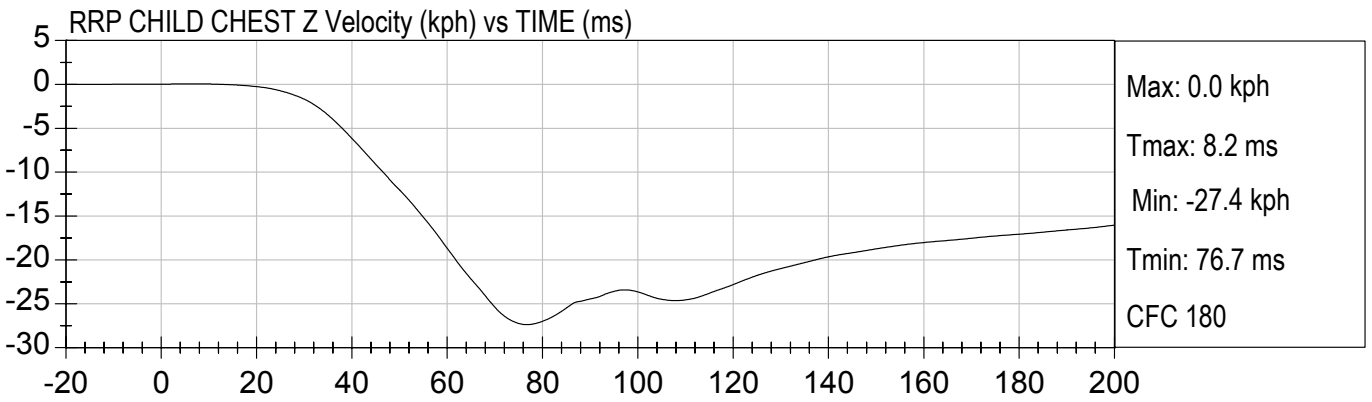
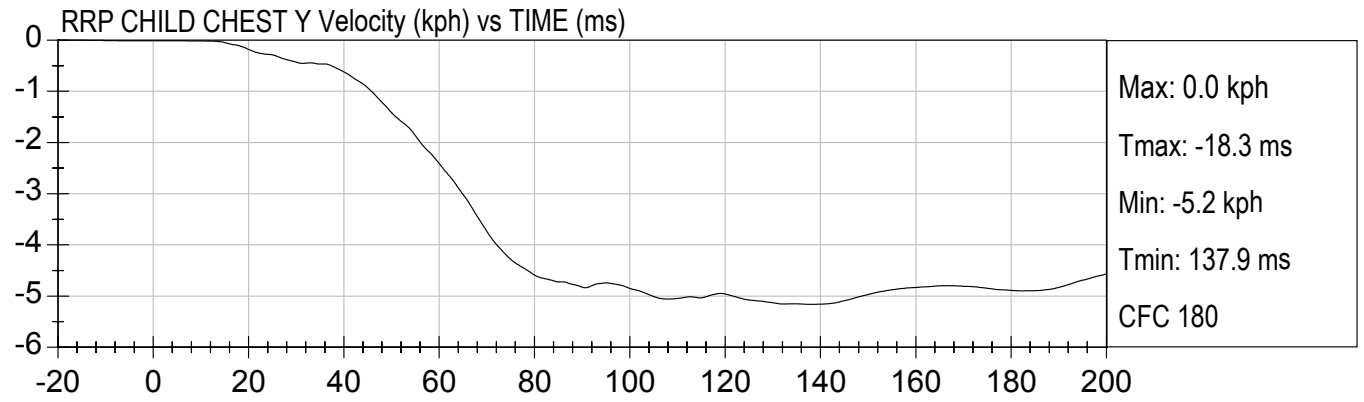
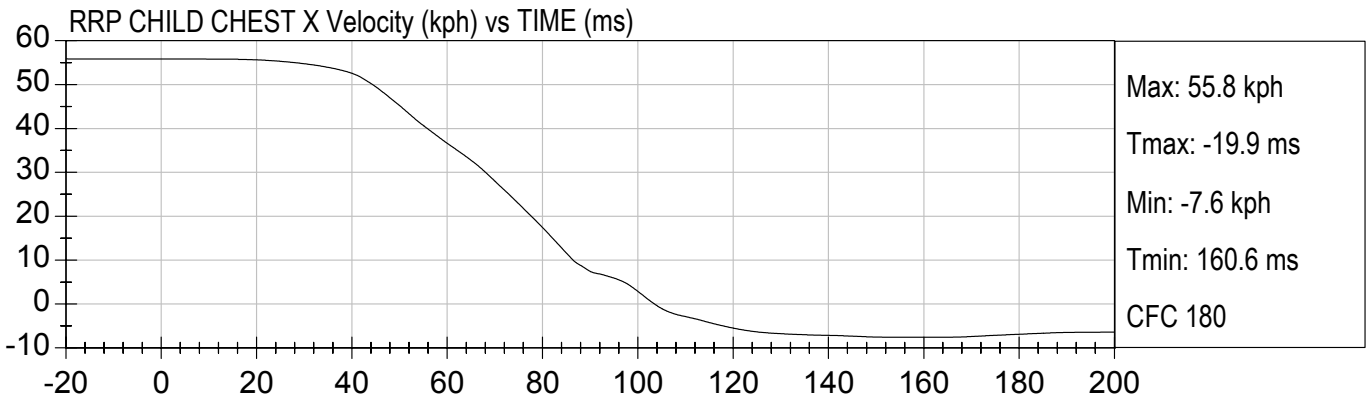


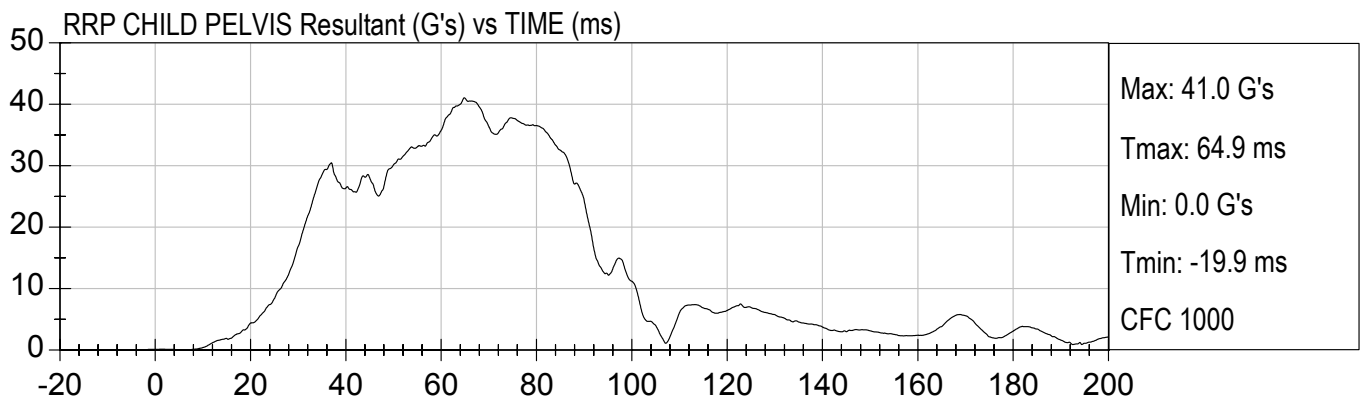
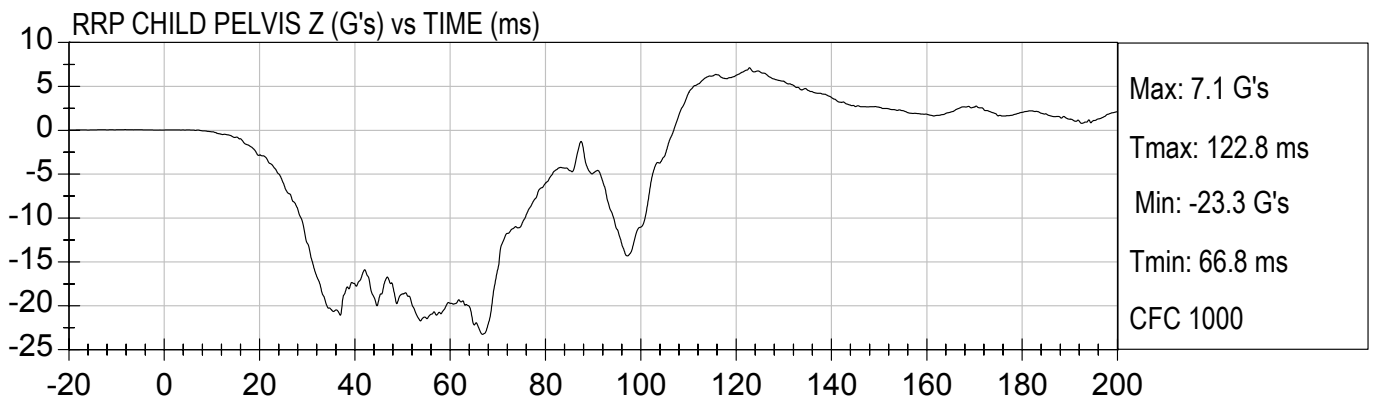
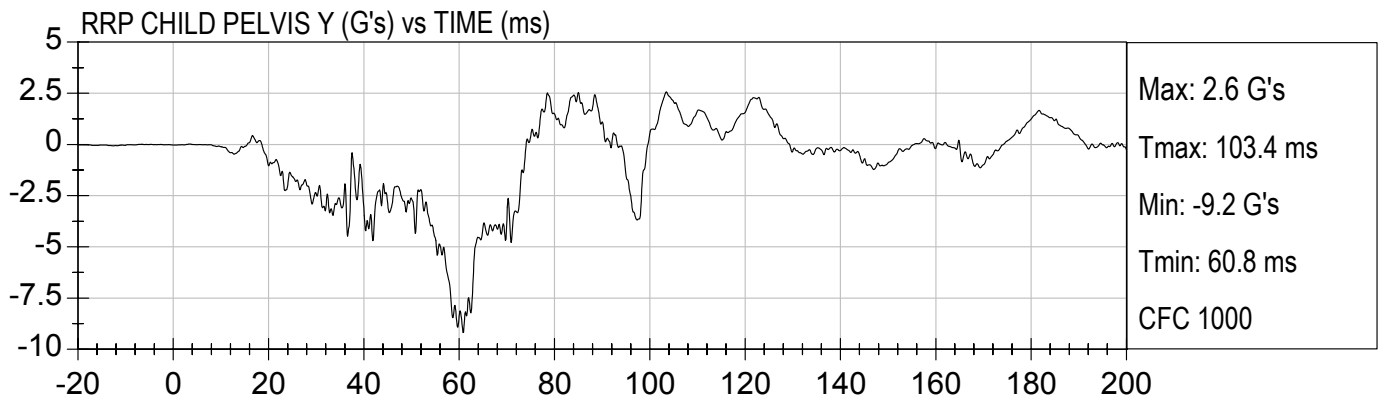
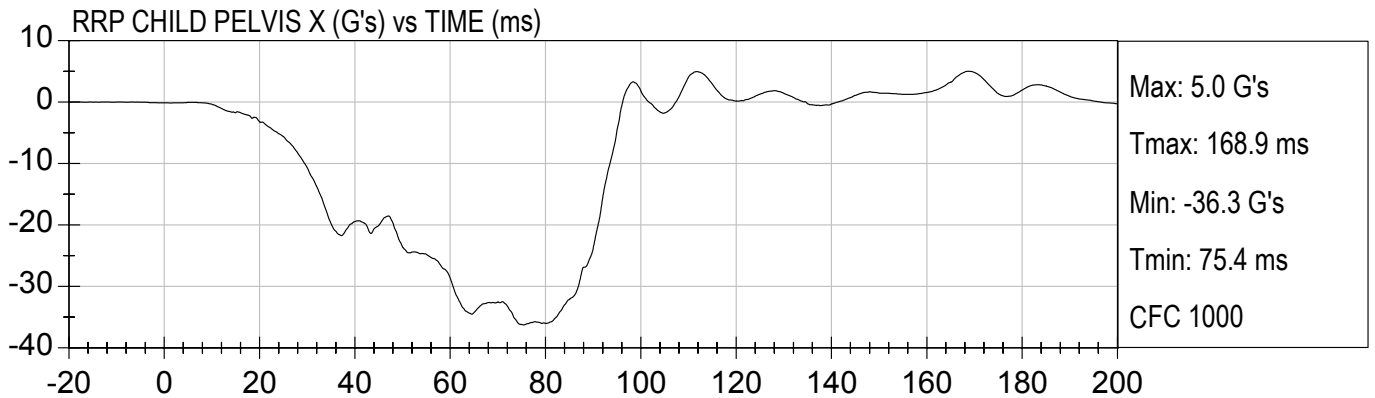


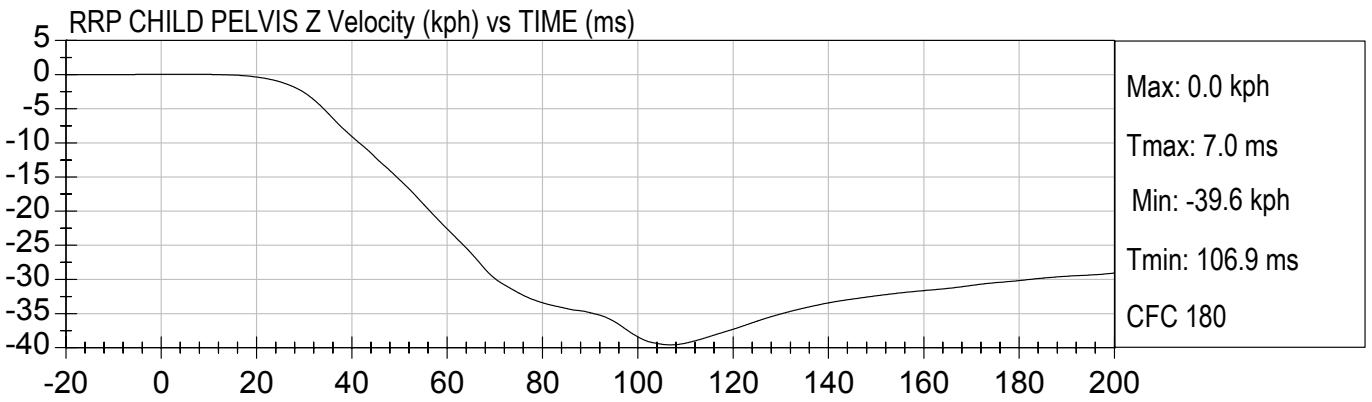
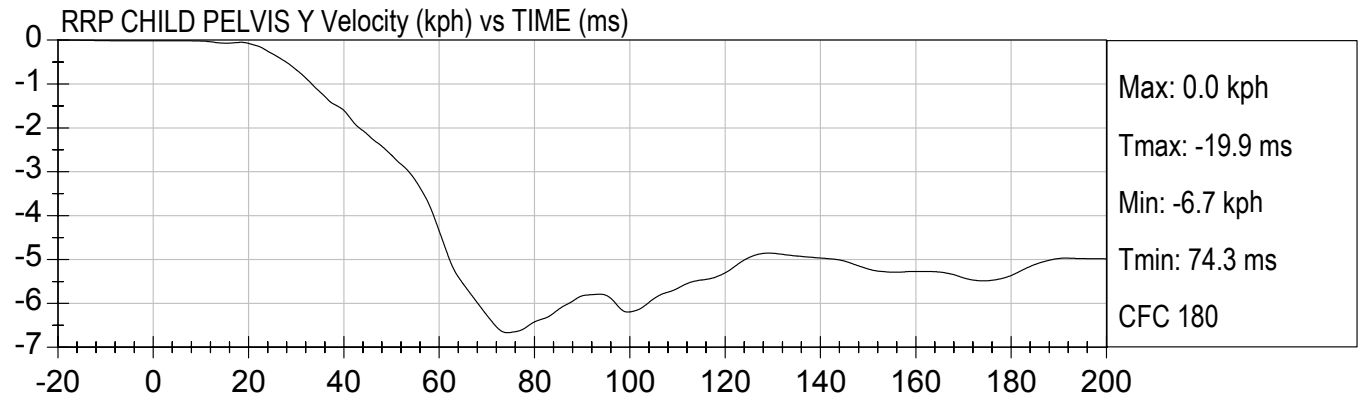
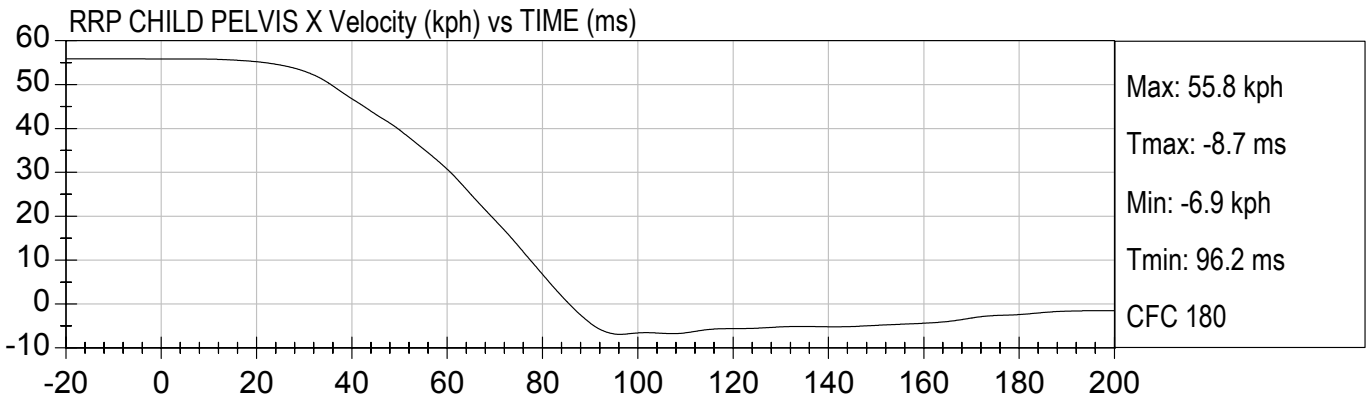


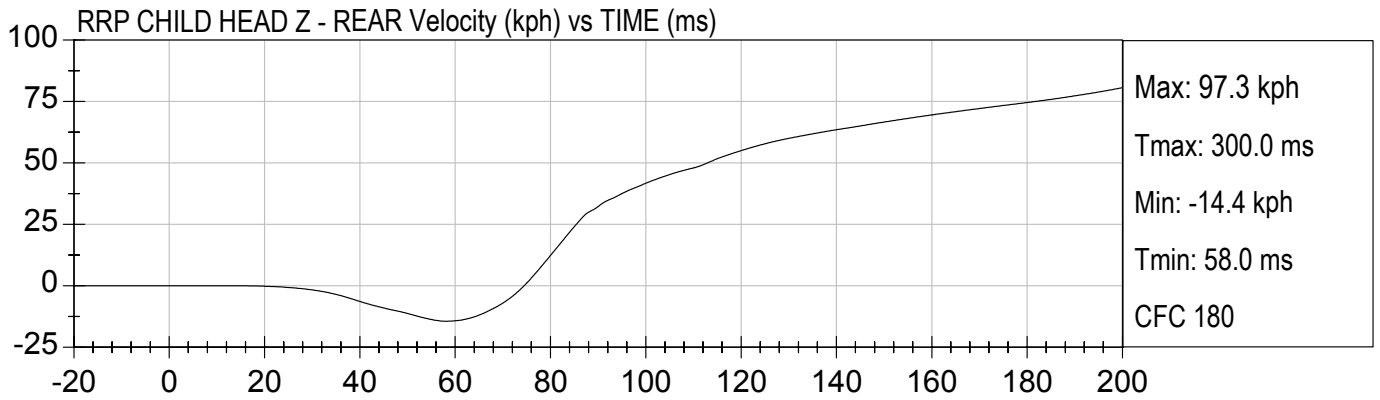
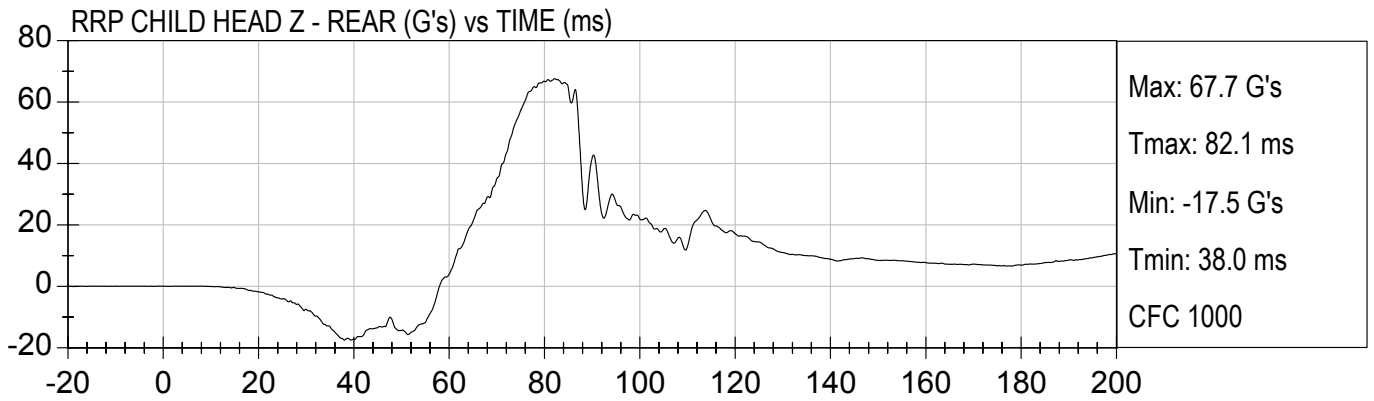












**APPENDIX C**  
**CHILD DUMMY CALIBRATION INFORMATION**

**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Head Drop Calibration**

**ATD Serial No:** 042

**Test I.D.:** D021461

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	258.3	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	9.9	Pass
Is Acceleration Unimodal?	Yes/No	< 10% Peak	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>

\_\_\_\_\_  
 Laboratory Technician

\_\_\_\_\_  
 11/13/2002  
 Test Date

\_\_\_\_\_  
 Approved By



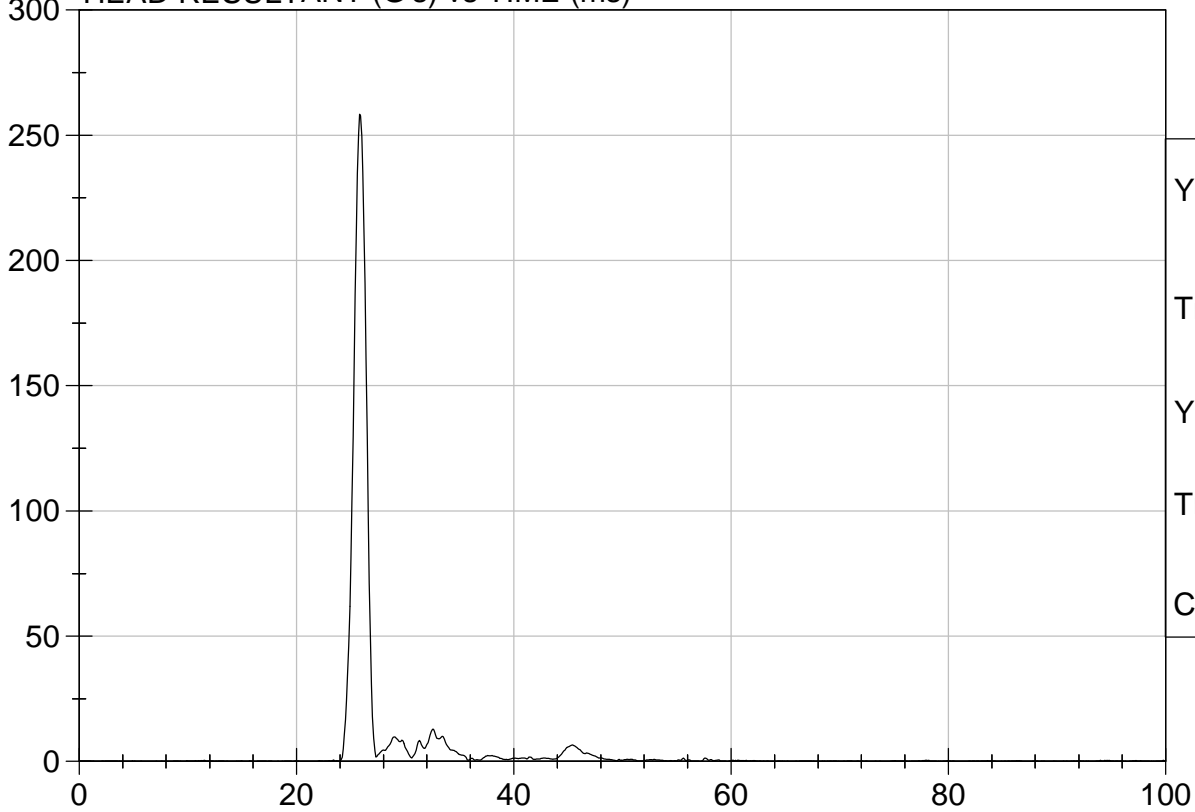
Test Description: Head Drop

Test Date: 11/13/2002

Component: D021461

Speed: 0 ft/s, 0.00 m/s

HEAD RESULTANT (G's) vs TIME (ms)



YMax: 258.3 G

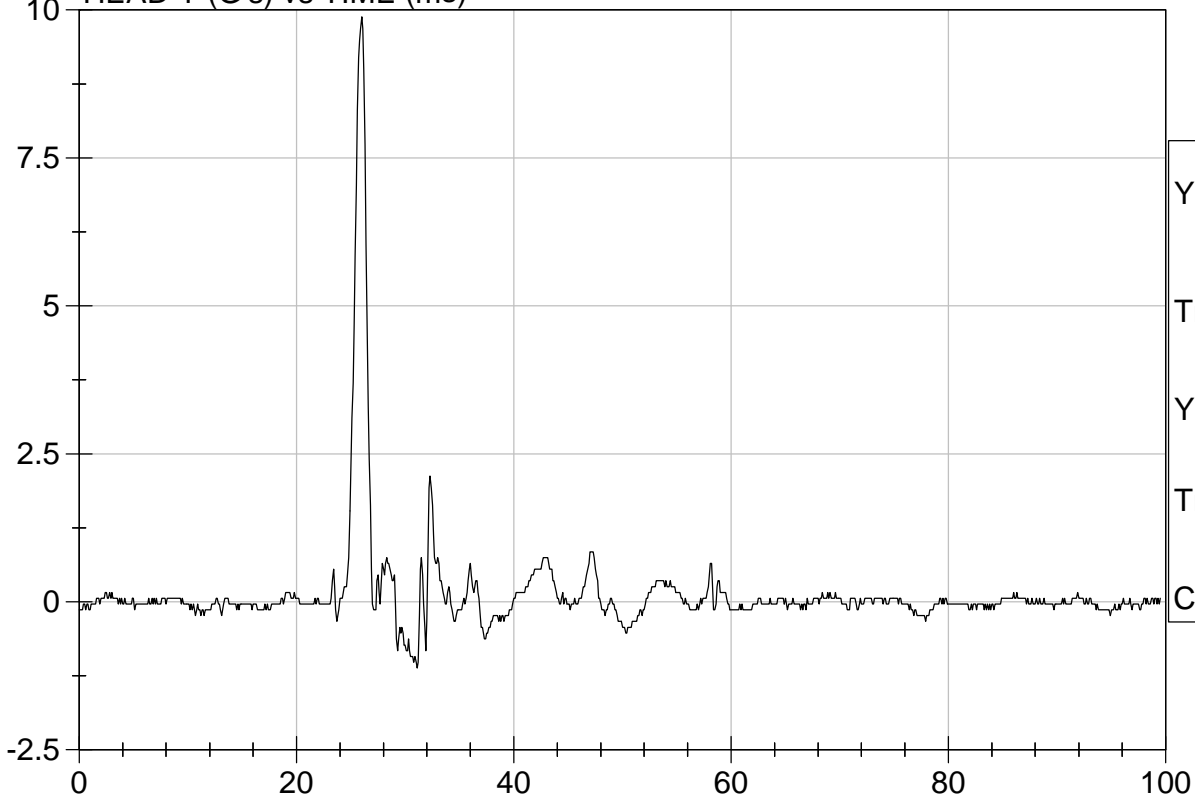
Tmax: 25.8 ms

YMin: 0.1 G

Tmin: 1.1 ms

CFC 1000

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



YMax: 9.9 G

Tmax: 26.0 ms

YMin: -1.1 G

Tmin: 31.1 ms

CFC 1000

**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Neck Flexion Test**

**ATD Serial No:** 042

**Test I.D:** D021462

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	31	Pass
Pendulum Speed		m/s	5.4 to 5.6	5.53	Pass
Pendulum Deceleration	10 msec	m/s	2.0 - 2.7	2.3	Pass
	15 msec	m/s	3.0 - 4.0	3.4	Pass
	20 msec	m/s	4.0 - 5.1	4.5	Pass
D Plane Rotation		deg	70 - 82	81.0	Pass
Peak Moment within Deflection Corridor		deg	42.0 - 53.0	45.1	Pass
Positive Moment - Time Curve Decay to 10 Nm		msec	60.0 - 80.0	72.0	Pass
Overall Test Results					Pass

\_\_\_\_\_  
Laboratory Technician

11/14/2002  
\_\_\_\_\_  
Test Date

\_\_\_\_\_  
Approved By

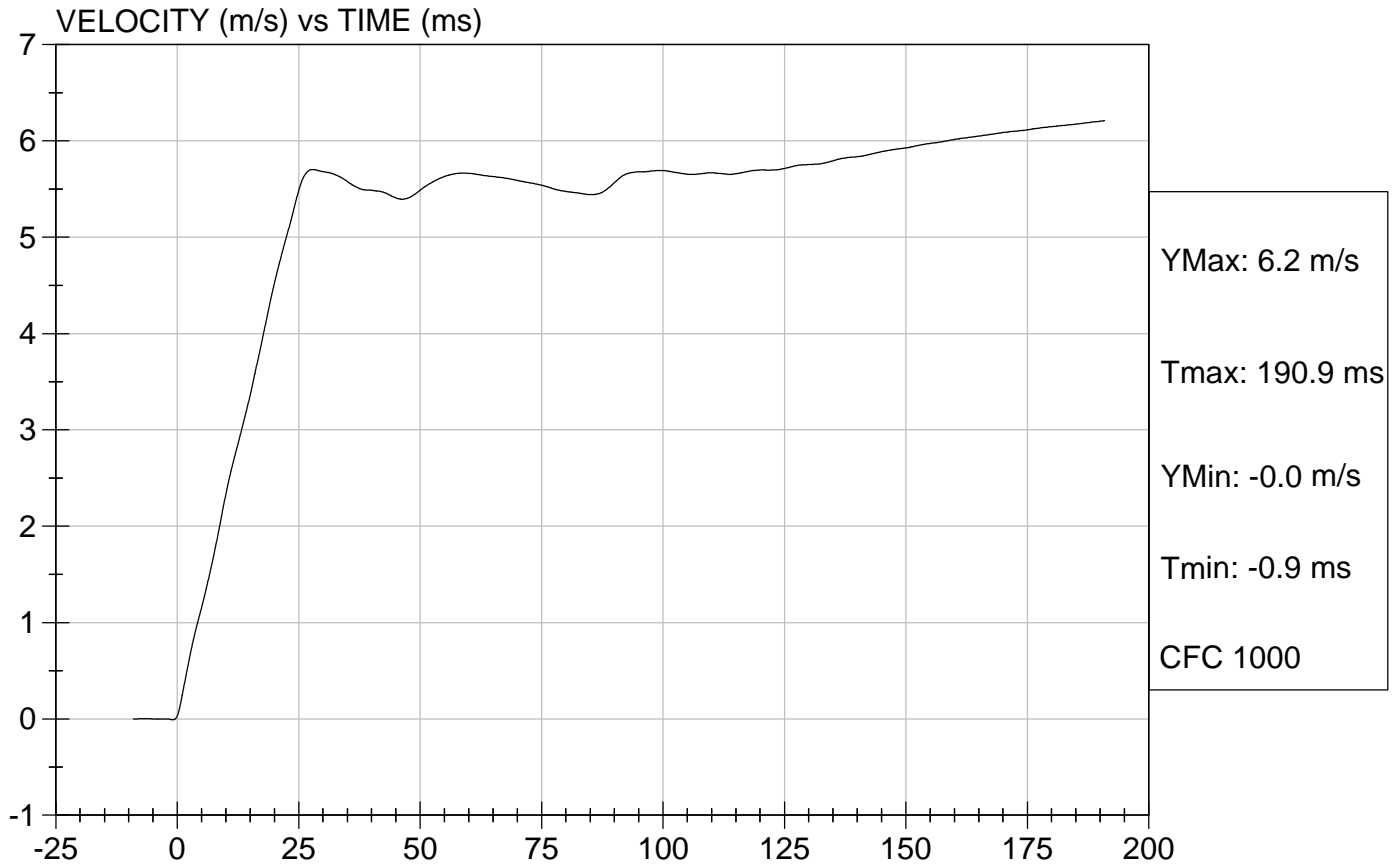


Test Description: Neck Flexion

Test Date: 11/14/2002

Component: D021462

Speed: 18.15 ft/sec, 5.53 m/sec





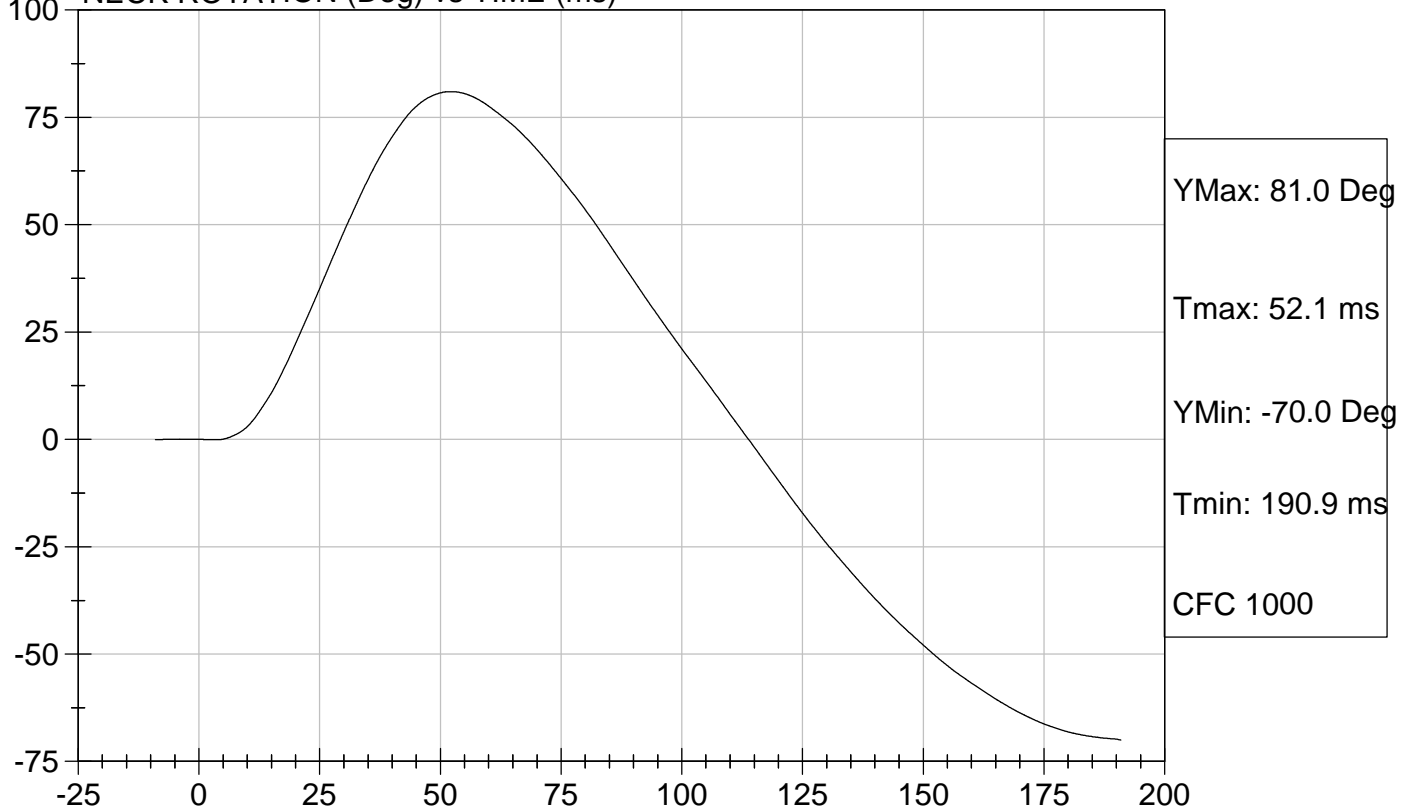
Test Description: Neck Flexion

Test Date: 11/14/2002

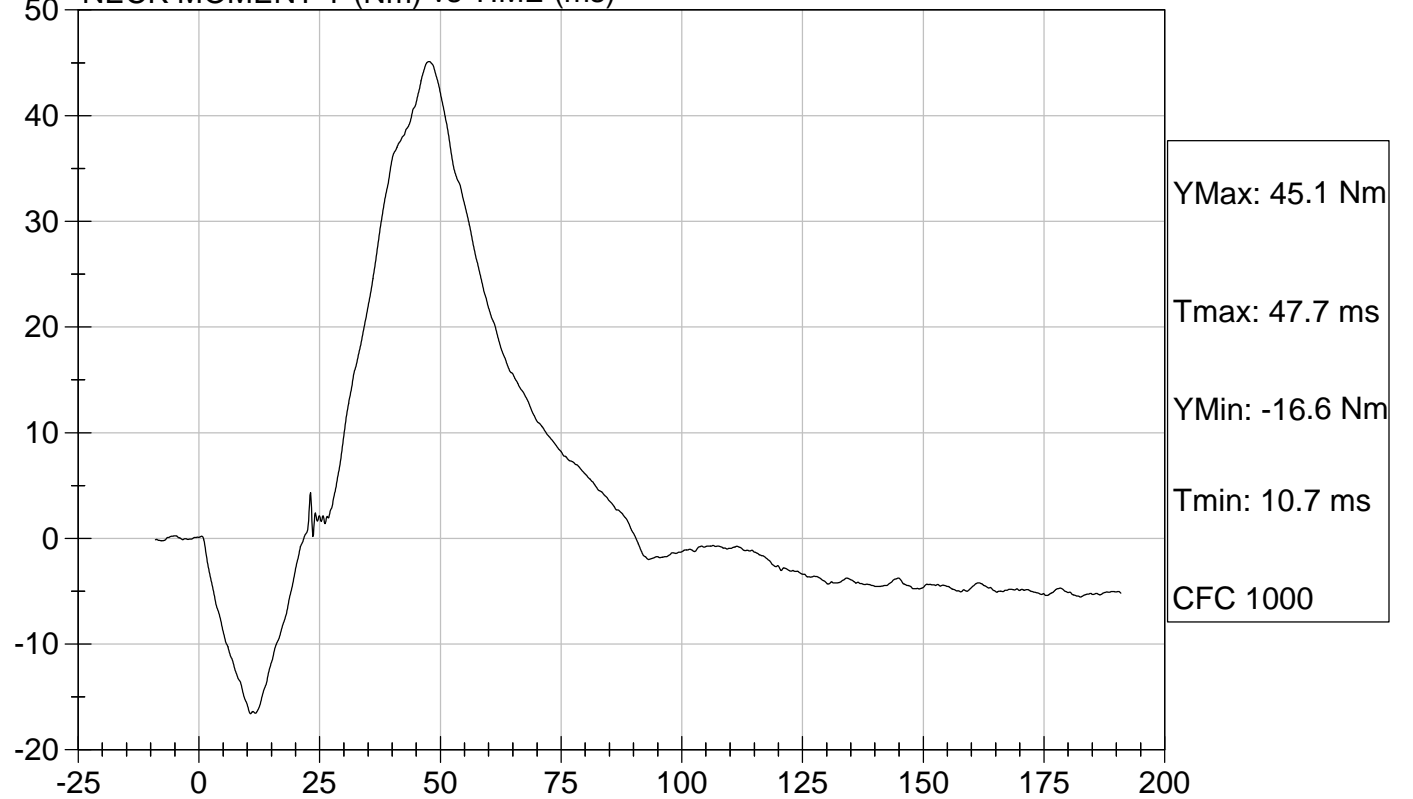
Component: D021462

Speed: 18.15 ft/s, 5.53 m/s

NECK ROTATION (Deg) vs TIME (ms)



NECK MOMENT Y (Nm) vs TIME (ms)



**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Neck Extension Test**

**ATD Serial No:** 042

**Test I.D:** D021463

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	31	Pass
Pendulum Speed		m/s	3.55 to 3.75	3.73	Pass
Pendulum Deceleration	6 msec	m/s	1.0 - 1.4	1.3	Pass
	10 msec	m/s	1.9 - 2.5	2.2	Pass
	14 msec	m/s	2.8 - 3.5	3.0	Pass
D Plane Rotation		deg	83 - 93	85.8	Pass
Peak Moment within Deflection Corridor		deg	-53.3 - -43.7	-44.5	Pass
Negative Moment - Time Curve Decay to -10 Nm		msec	60.0 - 80.0	69.9	Pass
Overall Test Results					Pass

\_\_\_\_\_  
 Laboratory Technician

11/14/2002  
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 Test Date

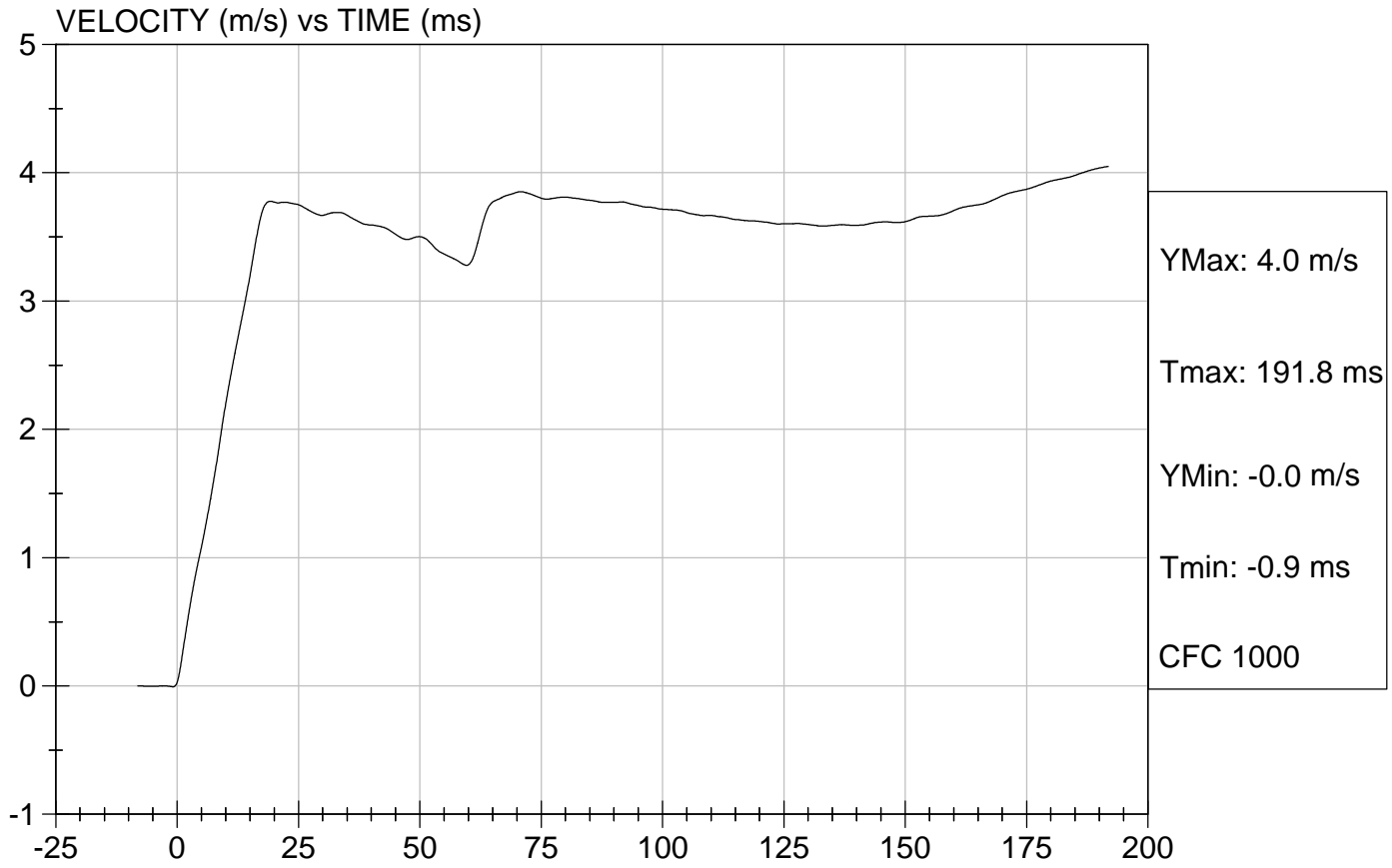
\_\_\_\_\_  
 Approved By



Test Description: Neck Extension Test Date: 11/14/2002

Component: D021463

Speed: 12.23 ft/sec, 3.73 m/sec





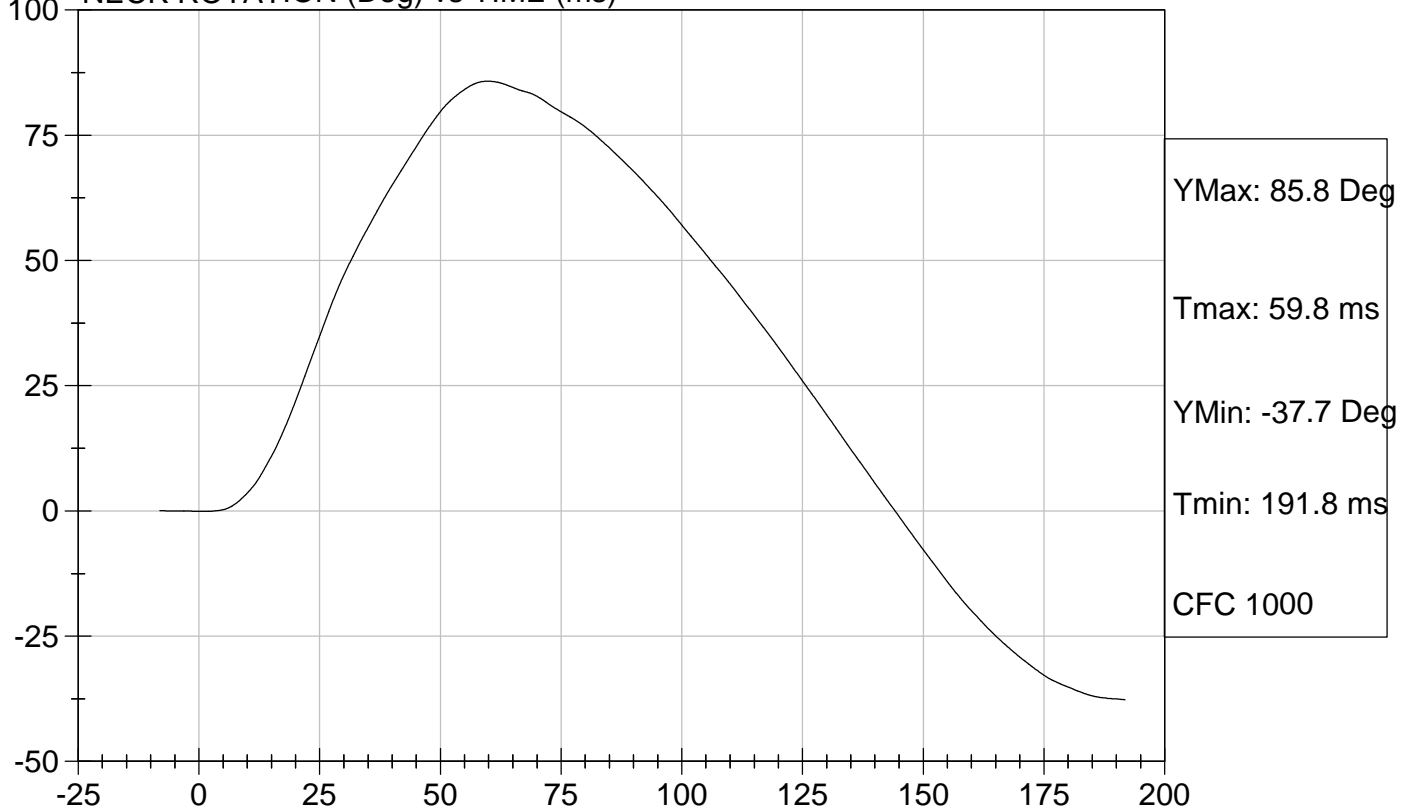
Test Description: Neck Extension

Test Date: 11/14/2002

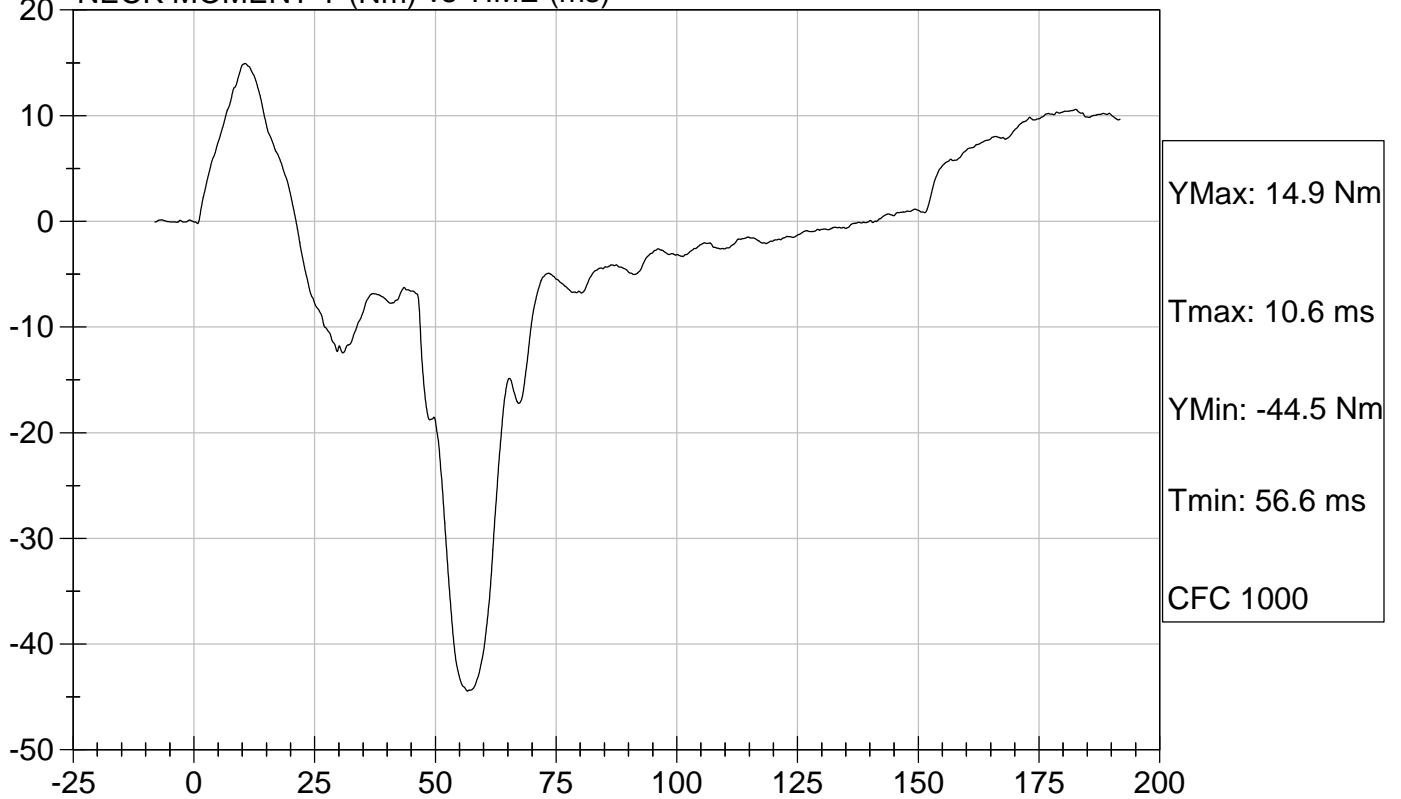
Component: D021463

Speed: 12.23 ft/s, 3.73 m/s

NECK ROTATION (Deg) vs TIME (ms)



NECK MOMENT Y (Nm) vs TIME (ms)



**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Thorax Impact Test**

**ATD Serial No:** 042

**Test I.D.:** D021464

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Probe Velocity	m/s	5.9 to 6.1	6.00	Pass
Peak Deflection	mm	32 - 38	33	Pass
Peak Resistive Force w/in Deflection Corridor	kN	0.68 - 0.81	0.72	Pass
Internal Hysteresis	%	65 to 85	72	Pass
Max Force 12.5 mm - 32 mm Deflection	kN	Max 0.86	0.80	Pass
Overall Test Results				Pass

\_\_\_\_\_  
 Laboratory Technician

\_\_\_\_\_  
 11/15/2002  
 Test Date

\_\_\_\_\_  
 Approved By

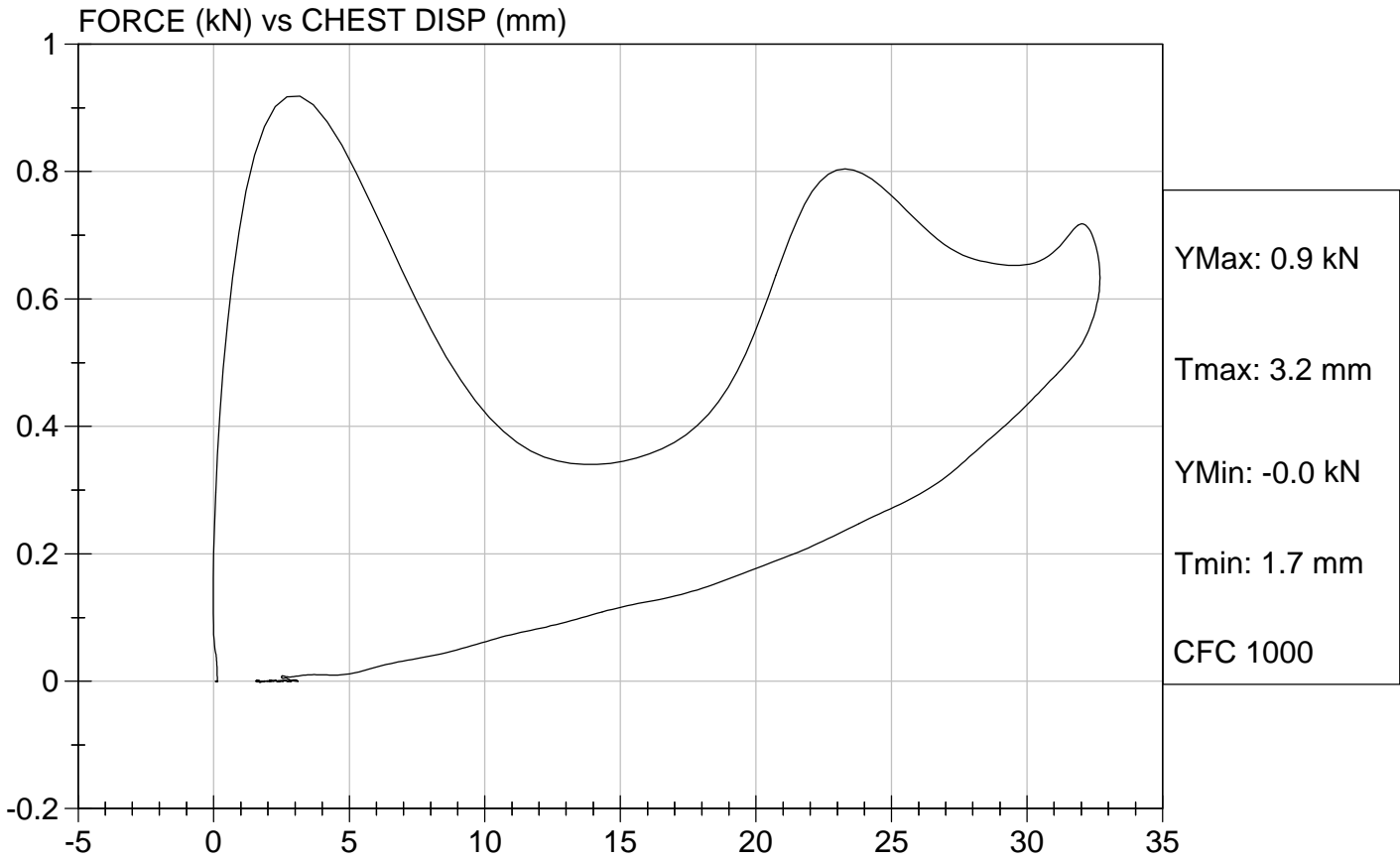


Test Description: Thorax Impact

Test Date: 11/15/2002

Component: D021464

Speed: 19.67 ft/sec, 6.00 m/sec



**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Torso Lumbar Flexion**

**ATD Serial No:** 042

**Test I.D.:** D021465

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Force At 45 deg.	N	130 - 180	157	Pass
Initial Angle	deg	0 - 15	8	Pass
Return Angle	deg	0 - 10	6	Pass
<b>Overall Test Results</b>				<b>Pass</b>

\_\_\_\_\_  
 Laboratory Technician

\_\_\_\_\_  
 11/19/02  
 Test Date

\_\_\_\_\_  
 Approved By

**Transportation Research Center  
Inc.**

**ATD Calibration Report**

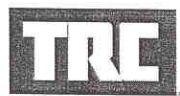
**for**

**VRTC**

**12 Month Old CRABI**

**Serial No. 074**

**Calibration No. 02**



Transportation Research Center Inc.  
P.O. Box B-67  
10820 St. Rt. 347  
East Liberty, OH 43319-0367

# Transportation Research Center Inc.

572R Frontal Head Drop Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/19/2002

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Peak Resultant Acceleration	100 - 120 g	113.9 g	Yes
Peak Lateral Acceleration	15 g Max	3.7 g	Yes
Is Acceleration Curve Unimodal?	Yes	Yes	Yes

Comments:

Technician



Approved



12.19.2002 12:34:41 598

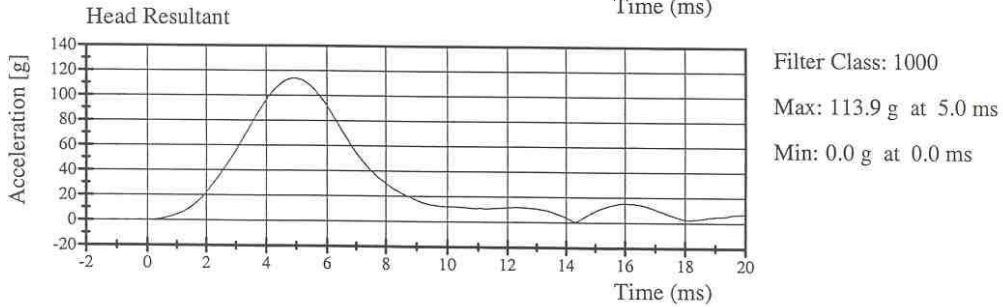
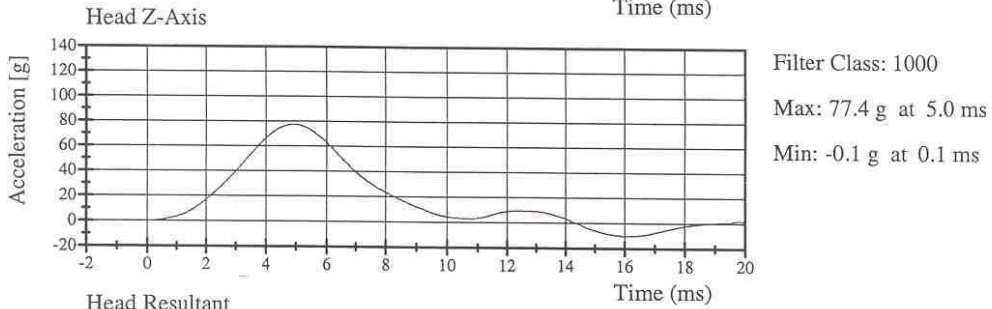
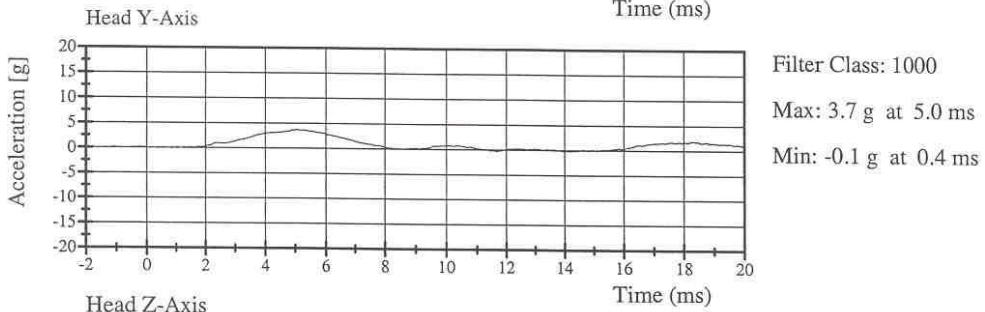
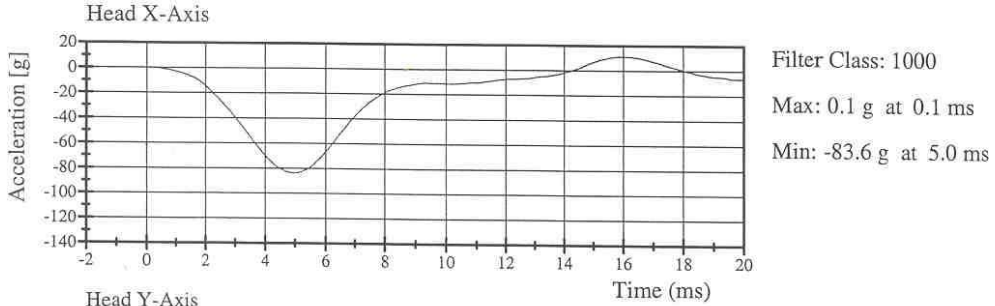


# Transportation Research Center Inc.

572R Frontal Head Drop Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/19/2002



12.19.2002 12:34:42 598



# Transportation Research Center Inc.

572R Rear Head Drop Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/19/2002

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Peak Resultant Acceleration	55 - 71 g	65.7 g	Yes
Peak Lateral Acceleration	15 g Max	2.6 g	Yes
Is Acceleration Curve Unimodal?	Yes	Yes	Yes

Comments:

Technician



Approved



12.19.2002 14:21:46 596

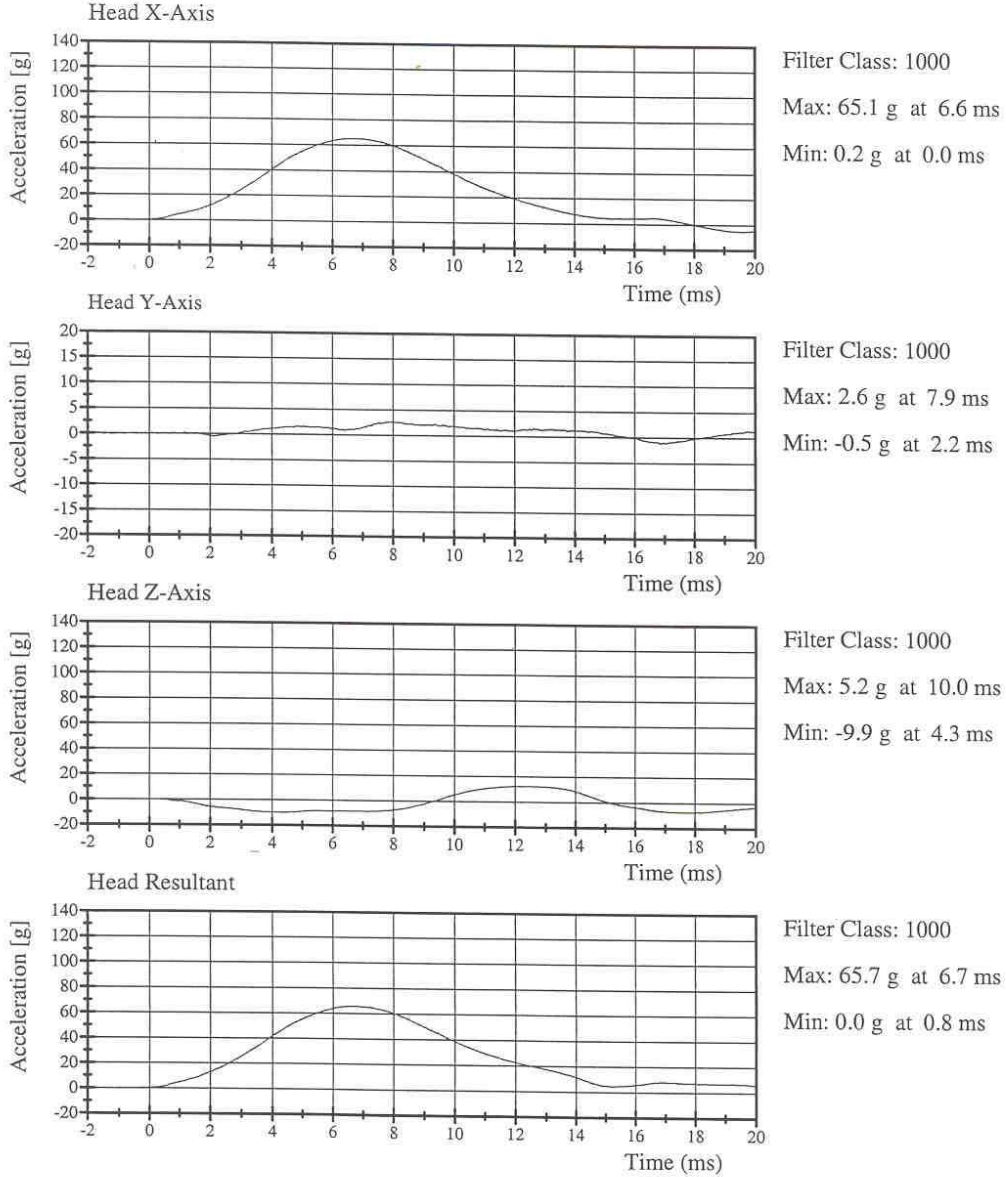


# Transportation Research Center Inc.

572R Rear Head Drop Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/19/2002



12.19.2002 14:21:47 596



# Transportation Research Center Inc.

572R Neck Flexion Test - 6 Channel Transducer

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 3

Test Date 12/20/2002

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	21 %	Yes
Impact Velocity	5.10 - 5.30 m/s	5.22 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.60 - 2.30 m/s	1.97 m/s	Yes
20 ms	3.40 - 4.20 m/s	3.83 m/s	Yes
25 ms	4.30 - 5.20 m/s	4.68 m/s	Yes
Peak D Plane Rotation	75 - 86 °	75.4 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	36.0 - 45.0 N·m	41.78 N·m	Yes
Positive Moment Decay Time To 5 N·m	60 - 80 ms	71.76 ms	Yes

Comments:

Technician



Approved



12.20.2002 14:29:15 665

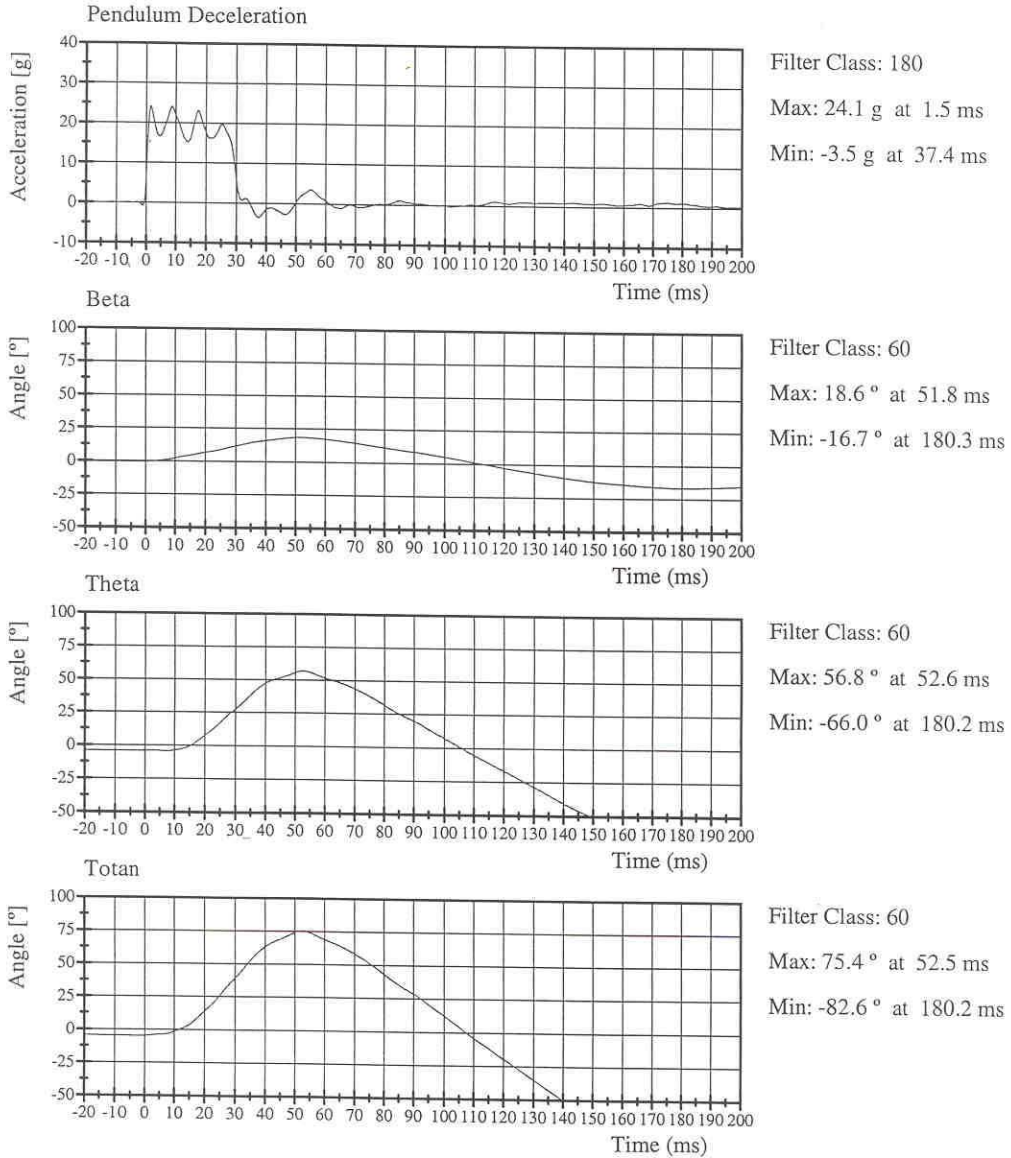


# Transportation Research Center Inc.

572R Neck Flexion Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 3

Test Date 12/20/2002



12.20.2002 14:29:17 665

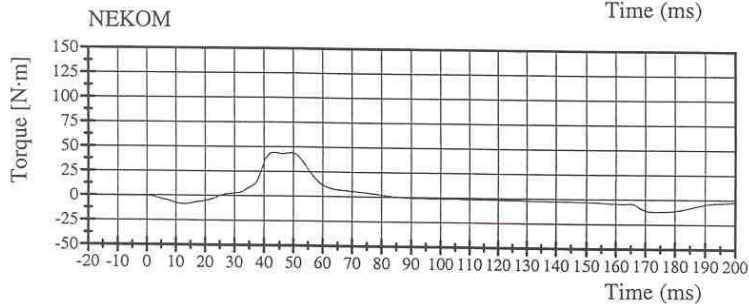
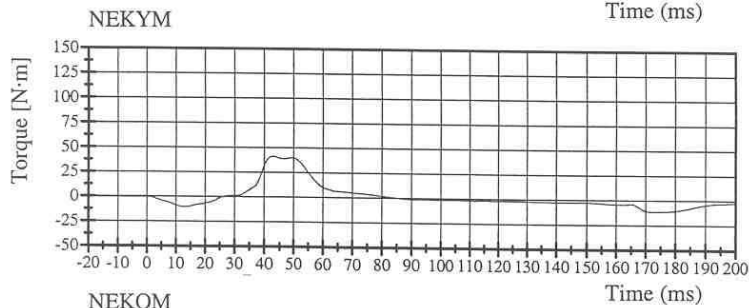
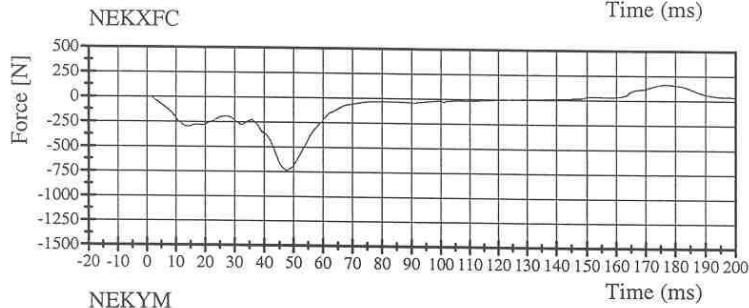
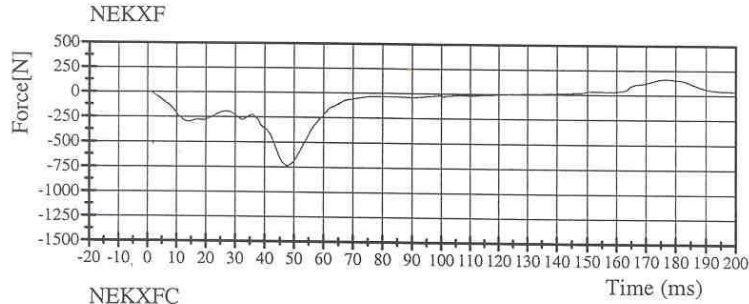


# Transportation Research Center Inc.

572R Neck Flexion Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 3

Test Date 12/20/2002



12.20.2002 14:29:20 665



# Transportation Research Center Inc.

572R Neck Extension Test - 6 Channel Transducer

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/20/2002

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	23 %	Yes
Impact Velocity	2.40 - 2.60 m/s	2.53 m/s	Yes
Integrated Pendulum Velocity			
6 ms	0.80 - 1.20 m/s	0.99 m/s	Yes
10 ms	1.50 - 2.10 m/s	1.76 m/s	Yes
14 ms	2.20 - 2.90 m/s	2.37 m/s	Yes
Peak D Plane Rotation	80 - 92 °	81.7 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	-23.0 - (-12.0) N·m	-18.85 N·m	Yes
Positive Moment Decay Time To -5 N·m	76 - 90 ms	78.96 ms	Yes

**Comments:**

Technician



Approved



12.20.2002 15:05:51 1405

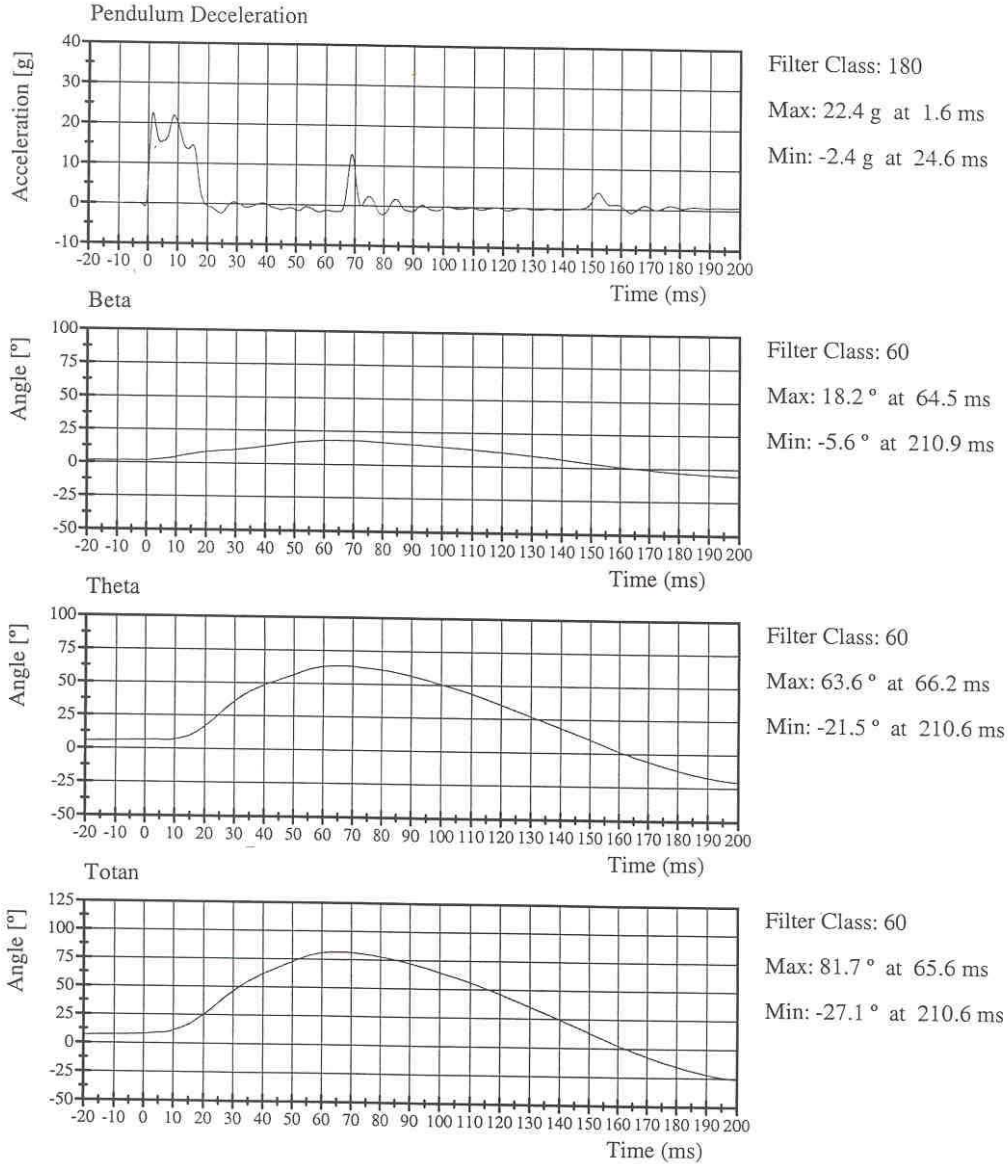


# Transportation Research Center Inc.

572R Neck Extension Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/20/2002



12.20.2002 15:05:52 1405

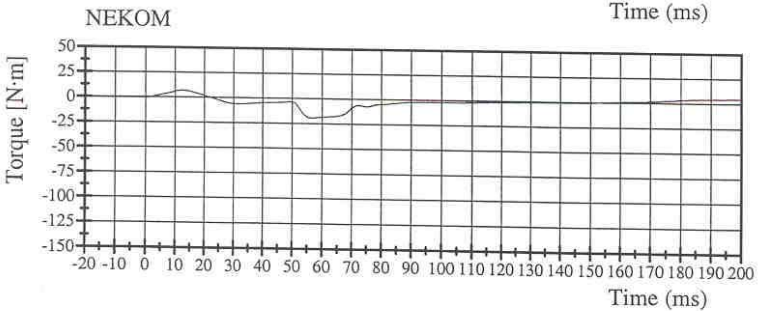
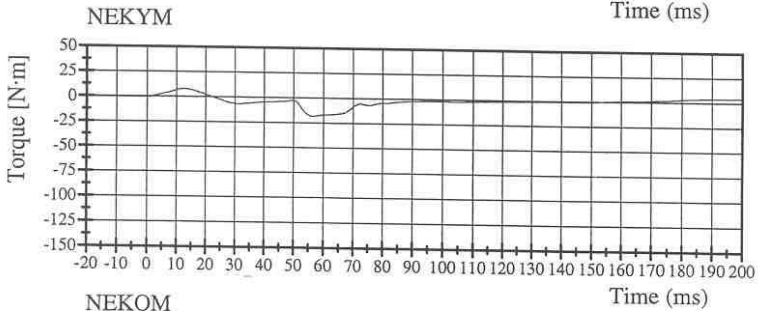
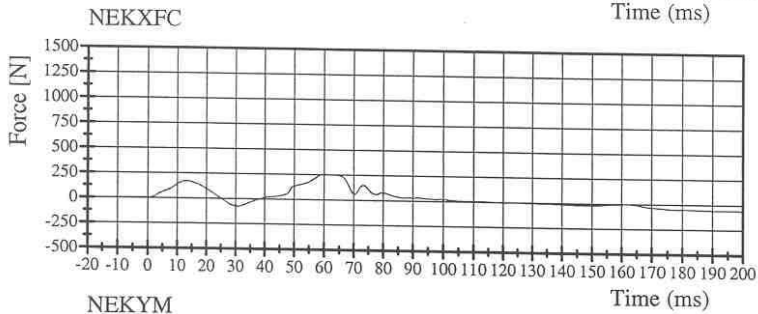
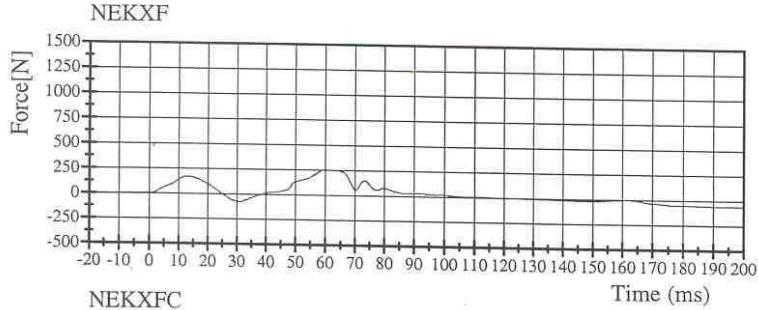


# Transportation Research Center Inc.

572R Neck Extension Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/20/2002



12.20.2002 15:05:53 1405



# Transportation Research Center Inc.

572R Thorax Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/23/2002

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	21 %	Yes
Pendulum Velocity	4.90 - 5.10 m/s	5.04 m/s	Yes
Peak Impact Probe Force	1514 - 1796 N	1672 N	Yes

Comments:

Technician



Approved



12.23.2002 14:25:44 1125

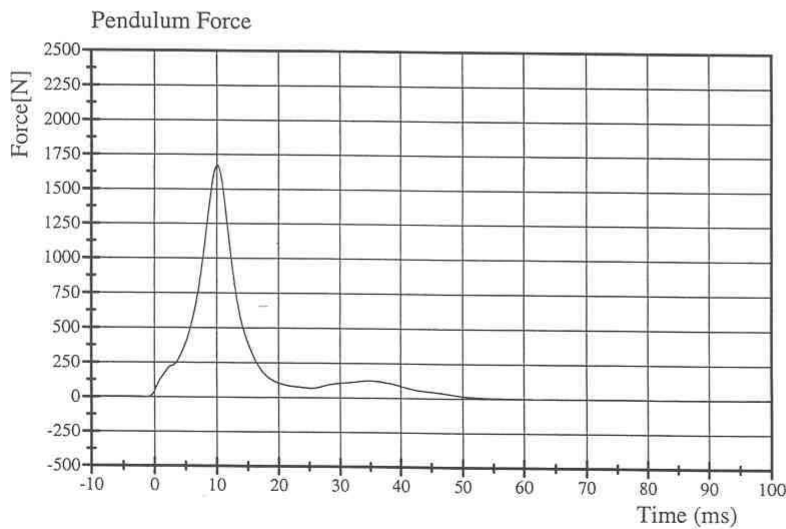
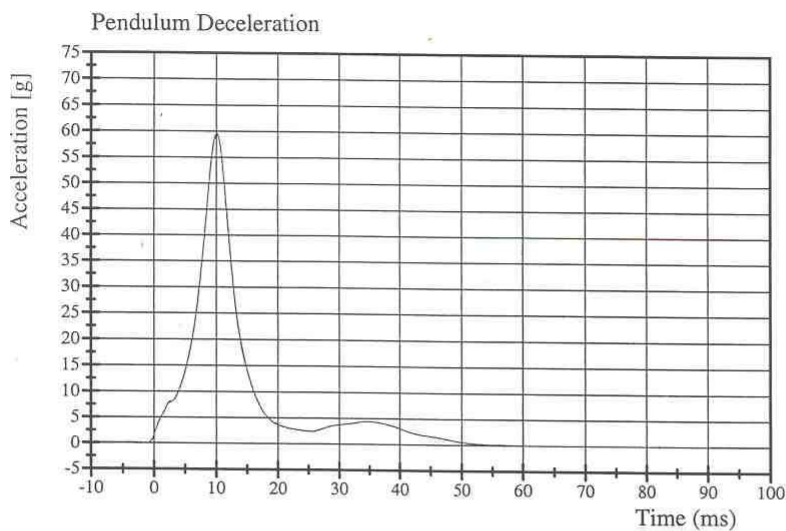


# Transportation Research Center Inc.

572R Thorax Test

12 Month Old CRABI Serial No. 074 Calibration No. 02 - 1

Test Date 12/23/2002



12.23.2002 14:25:45 1125



**APPENDIX D**

**TEST EQUIPMENT LIST AND CALIBRATION INFORMATION**

**INSTRUMENTS FOR RRP CHILD DUMMY S/N: 42**

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMD5	Entran	11/16/02
Head Y	J27509	Entran	11/13/02
Head Z	J20014	Endevco	11/16/02
Head Z-Rear	AC9F9	Endevco	11/16/02
Head X Redundant	P23012	Entran	1/30/03
Head Y Redundant	J22190	Entran	1/30/03
Head Z Redundant	J22180	Endevco	1/30/03
Head Z-Rear Redundant	P22805	Endevco	1/30/03
Upper Neck Load Cell	86	FTSS	10/4/02
Lower Neck Load Cell	210	FTSS	10/4/02
Chest X	AC9P8	Endevco	11/13/02
Chest Y	J23996	Endevco	11/16/02
Chest Z	H12-F08	Endevco	11/16/02
Chest Deflection Gauge	42	Servo	11/15/02
Pelvis X	BG37J	Endevco	11/16/02
Pelvis Y	J35560	Endevco	11/16/02
Pelvis Z	DE15J	Entran	11/16/02

**INSTRUMENTS FOR LRP CHILD DUMMY S/N: 074**

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	I10-N16	Endevco	11/14/02
Head Y	I05-F23	Endevco	11/14/02
Head Z	I05-F22	Endevco	11/14/02
Upper Neck Load Cell	279	Denton	12/16/03
Chest X	I10-N14	Endevco	11/14/02
Chest Y	I10-N22	Endevco	11/14/02
Chest Z	I16-A15	Entran	11/14/02
Pelvis X	I05-F09	Endevco	11/14/02
Pelvis Y	I10-N24	Endevco	11/14/02
Pelvis Z	I10-N12	Endevco	11/13/02