

**REPORT NUMBER: TO11-MGA-2003-002**

**FULL SCALE SIDE IMPACT POLE TESTS  
OF BASELINE VEHICLES  
Task Order #T0007 RFP # 0011**

**SAAB AUTOMOBILE AB  
2000 Saab 9-5 4 Door  
NHTSA NUMBER: RY0517**

**PREPARED BY:  
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**TEST DATE: January 29, 2003**

**FINAL REPORT SUBMITTED: September 2, 2003**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
VOLPE NATIONAL TRANSPORTATION SYSTEM CENTER  
55 BROADWAY, KENDALL SQUARE  
CAMBRIDGE, MA 02142**

This final test report was prepared for the U.S. Department of Transportation, Volpe National Transportation System Center, in response to Contract Number DTRS57-98-D-00041.

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## TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Test Procedure	1
2	Summary of Side Impact Test	2
3	Side Impact Dummy (SID/HIII) and Vehicle Test Data	5
4	Occupant and Vehicle Information	11
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	6
2	Test Vehicle Tire Information	9
3	Post Test Observations	10
4	Vehicle Pre-Test and Post Test Measurements	12
5	SID/HIII Longitudinal Clearance Dimensions	13
6	SID/HIII Lateral Clearance Dimensions	14
7	Vehicle Side Measurements	15
8	Vehicle Exterior Crush Profiles	16
9	Vehicle Damage Profile Distances	19
10	Vehicle Accelerometer Locations and Data Summary	20
11	High Speed Camera Locations and Data	23
<u>Appendix</u>		
A	Photographs	A
B	Vehicle and Dummy Response Data Traces	B
C	Dummy Configuration and Performance Verification Data	C
D	Test Equipment List and Calibration Information	D
E	Dummy Peak Responses	E

**SECTION 1**  
**PURPOSE AND TEST PROCEDURE**

This Side Impact test is conducted as part of Contract No. DTRS57-98-D-00041, task order T0007, RFP NO.0011, sponsored by the U.S. Department of Transportation, Volpe National Transportation System Center. The purpose of this test is to evaluate the responses of the ES-2 and SID/HIII dummies in a 2000 Saab 9-5 4 door, when subjected to a rigid pole side impact at 285 degrees.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

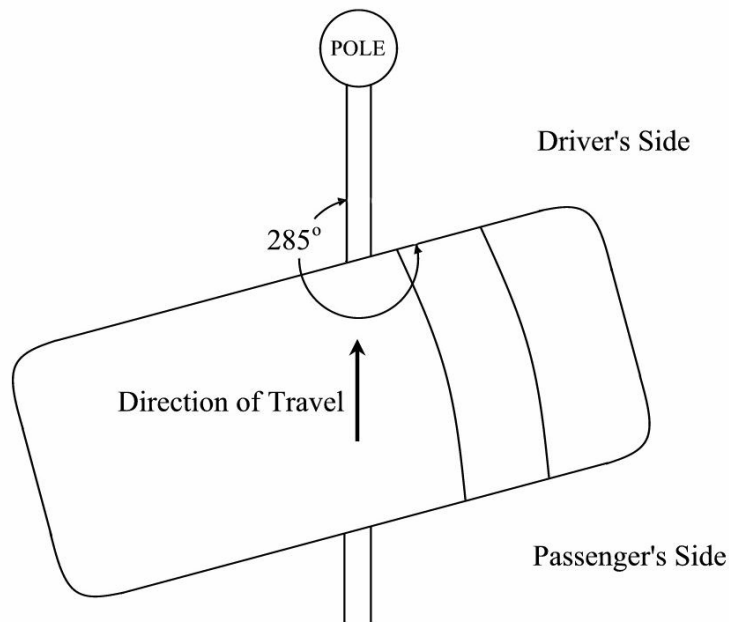
## SECTION 2

### SUMMARY OF SIDE IMPACT TEST

A rigid pole side impact test at 285 degrees was performed on a 2000 Saab 9-5 4 door. The subject vehicle was towed into a rigid pole at a velocity of 31.9 km/h. The weight of the vehicle as tested was 1699.2 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on January 29, 2003. Pre- and post-test photographs of the test vehicle and the dummies are included in Appendix A.

One SID/HIII side impact dummy was placed in the left front designated seating position according to instructions specified in the NHTSA Office of Vehicle Safety Compliance Laboratory Test Procedure TP-214D-06, dated July 26, 2001. The side impact event was documented by ten high speed cameras. Camera locations and other pertinent camera information can be found in this report.

Appendix B contains the vehicle and dummy response data traces. A summary of the dummy configuration and performance verification test data is shown in Appendix C. Dummy and vehicle calibration data can be found in Appendix D of this report. Appendix E contains the dummy peak responses.



**SECTION 2... (continued)**  
**SUMMARY OF SIDE IMPACT TEST**

The following table summarizes the results of the Left Side Impact Test:

		Left Front
HIC	T1 (msec)	45.4
	T2 (msec)	68.1
	T2 – T1 (msec)	22.7
	HIC	182

Fir Filtered		Left Front
Upper Rib Y (g's)		79.5
Lower Rib Y (g's)		67.9
Upper Spine Y (g's)		63.9
Lower Spine Y (g's)		74.6
Pelvis Y (g's)		81.1
TTI (g's)		77

Contacts		Left Front
Rib (msec)		10.4
Pelvis (msec)		30.7

## TEST NOTES

The Dummy and vehicle X and Y velocities presented in this report do not contain the correct initial velocity. The correct initial velocities should be:

X – Test Speed \* Sine 15 Degrees

Y – Test Speed \* Cosine 15 Degrees

Previous tests in this series used the FMVSS 201P dummy seating procedure.

**SECTION 3**  
**SIDE IMPACT DUMMY (SID/HIII) AND VEHICLE TEST DATA**

## DATA SHEET NO. 1

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

#### TEST VEHICLE INFORMATION

Make	Saab
Model	9-5
Body Style	4 Door
VIN	YS3EF48Z6Y3009254
Color	Painted Orange
Odometer Reading (mile)	24,539
Transmission	4 speed Automatic
Final Drive	Front wheel
Number of Cylinders	6
Engine Placement	Lateral

#### TEST VEHICLE OPTIONS

Front Airbag	Yes
Side Airbags	Seat side
Power Windows	Yes
Power Steering	Yes
Power Door	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
Anti-lock Brakes	Yes
AM/FM/CD	Yes
Cruise Control	Yes

#### DATA FROM CERTIFICATION LABEL

Manufactured By	Saab Automobile AB	GVWR (kg)	2091
Date of Manufacture	09/99	GAWR Front (kg)	1136
		GAWR Rear (kg)	1050

#### DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	273	273
Cold Pressure (kPa)	220	220
Recommended Tire Size	P215/55R16	P215/55R16
Tire Size on Vehicle	P215/55R16	P215/55R16
Tire Manufacturer	Michelin	Michelin

Measured Parameter	Front	Rear	Third	Total
Type of Seats	bucket	bench		
Number Of Occupants x 68.04 kg.	2	3		5
Capacity Wt. (VCW) (kg)				418.2
Cargo Wt. (RCLW) (kg)				77.3

**DATA SHEET NO. 1... (continued)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	513.0	320.2		535.2	328.9	
Right	kg	495.3	308.9		520.3	314.8	
Ratio	%	61.6	38.4		62.1	37.9	
Totals	kg	1008.3	629.1	1637.4	1055.5	643.7	1699.2

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value
Calculated Vehicle Target Weight (TVTGW)	kg	1698.8

**TEST VEHICLE ATTITUDES**

	Unit	As Delivered	Fully Loaded	Ready for Test
Right Door Sill Angle	Deg	0.6 ND	0.2 ND	0.5 ND
Left Door Sill Angle	Deg	0.5 ND	0.1 ND	0.5 ND
Front Bumper Angle	Deg	0.4 LD	0.2 LD	0.3 LD
Rear Bumper Angle	Deg	0.5 LD	0.3 LD	0.3 LD

ND=Nose down, BD = Back Down, LD = Left Down, RD = Right Down

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2704
Total Vehicle Length at Left Side	mm	3902
Total Vehicle Length at Centerline	mm	4847
Total Vehicle Length at Right Side	mm	3898
Total Vehicle Width	mm	1798
Weight of Ballast in Cargo Area	kg	0
Amount of water in Fuel Tank	liters	0

**TEST VEHICLE VERTICAL IMPACT LINE DATA**

Measurement Description	Units	Value
Actual Impact Point	mm	13 Rear

**DATA SHEET NO. 1... (continued)**

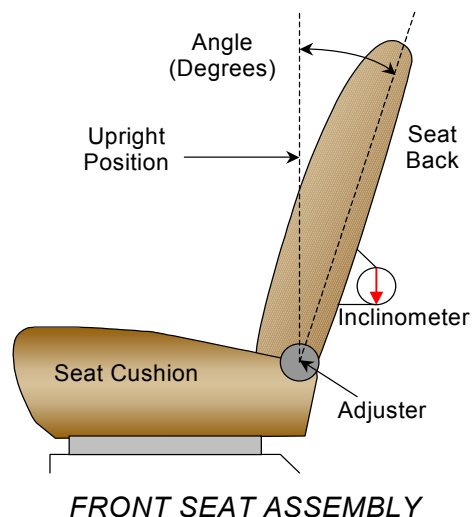
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

**NORMAL DESIGN RIDING POSITION**

Driver seat back angle: 2.8 degrees from vertical  
measured on headrest post



**SEAT FORE/AFT POSITIONS**

The driver's seat is electronically operated.  
The fore/aft is set to the middle position for the driver's seat.

Driver seat fore/aft total travel: 280 mm

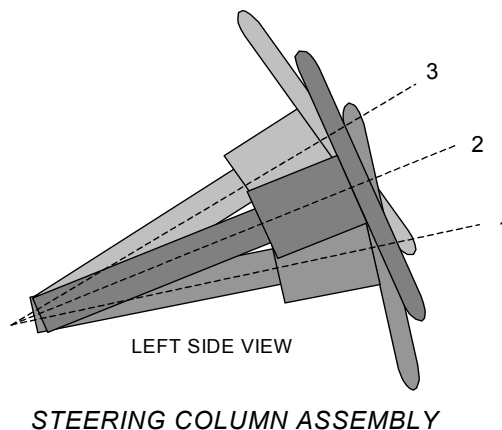
Driver seat fore/aft position: 140 mm

**SEAT BELT UPPER ANCHORAGE**

The test vehicle "D" ring anchorage for the driver's seat position was placed in the full up position.

**STEERING COLUMN ADJUSTMENT**

The steering column was placed in the mid position of travel.

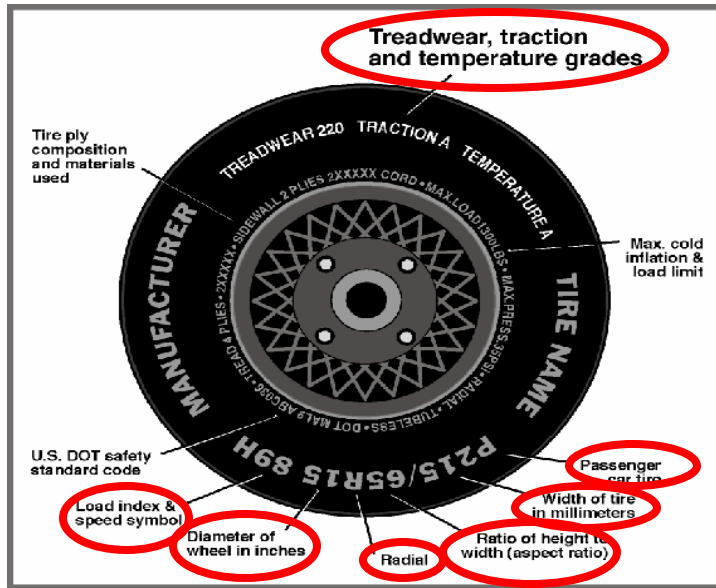


**DATA SHEET NO. 2**  
**TEST VEHICLE TIRE INFORMATION**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

Vehicle Year	2000	Vehicle Make	Saab
Vin	YS3EF48Z6Y3009254	Vehicle Model	9-5/ 4 door



	Front	Rear
Tire Manufacturer	Michelin	Michelin
Tire Name	Energy	Energy
Tire Type	MXV4	MXV4
Tire Width (mm)	215	215
Ratio of Height to Width (aspect ratio)	55	55
Radial	Yes	Yes
Wheel Diameter	16	16
Load Index & Speed Symbol	93V	93V
Treadwear	340	340
Traction Grade	A	A
Temperature Grade	A	A

**DATA SHEET NO. 3**  
**POST TEST OBSERVATIONS**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

**TEST DUMMY INFORMATION AND CONTACT POINTS**

Description	Left Front
Dummy Type	SID HIII
Head Contact	Side airbag, head rest
Upper Torso Contact	Side airbag
Lower Torso Contact	Arm rest
Left Knee Contact	Left door below arm rest
Right Knee Contact	Left knee

**POST TEST DOOR OPENING**

Description	Left Front	Left Rear
Left Side Door Opening	Remained latched and closed	Remained latched and closed
Right Side Door Opening	Remained latched and closed	Remained latched and closed

**POST TEST STRUCTURAL OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No failures
Sill Separation	None
Windshield Damage	Left Front windshield breakage
Window Damage	Left side windows down
Other Notable Effects	None

**AIRBAG DEPLOYMENT**

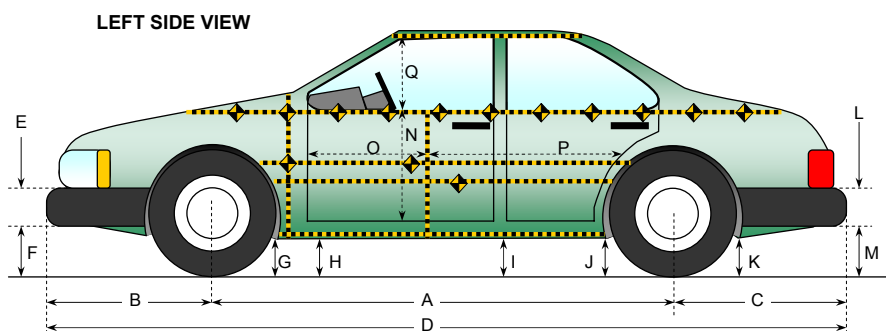
	Driver
Front	Yes
Side	Yes
Curtain	None

**SECTION 4**  
**OCCUPANT AND VEHICLE INFORMATION**

**DATA SHEET NO. 4**  
**VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003



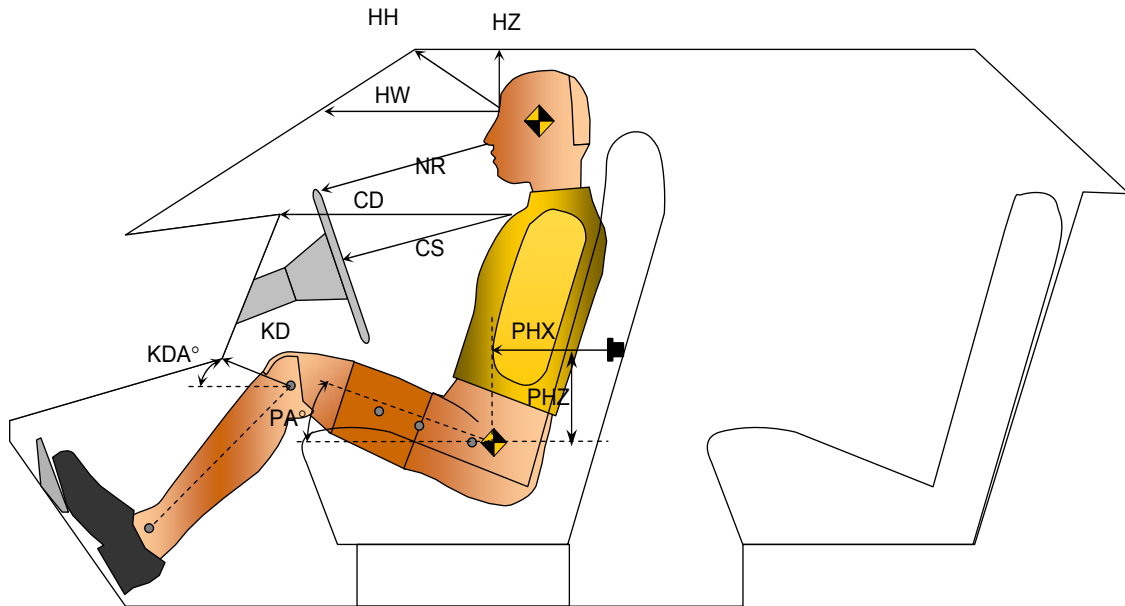
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2704	2518	-186
B	Front Axle to FSOV	1008	975	-33
C	Rear Axle to RSOV	1135	1080	-55
D	Total Length at Centerline	4847	4573	-274
E	Front Bumper Thickness	208	208	0
F	Front Bumper Bottom to Ground	448	520	72
G	Sill Height at Front Wheel Well	311	327	16
H	Sill Height at Front Door Leading Edge	317	329	12
I	Sill Height at "B" Pillar	331	328	-3
J1	Sill Height at Rear Wheel Well	352	387	35
J2	Pinch Weld Height at Rear Wheel Well	341	382	41
K	Sill Height Aft of Rear Wheel Well	396	418	22
L	Rear Bumper Thickness	225	225	0
M	Rear Bumper Bottom to Ground	494	480	-14
N	Sill Height to Window Bottom Sill	695	695	0
O	Front Door Leading Edge to Impact CL	848	846	-2
P	Rear Door Trailing Edge to Impact CL	1079	1054	-25
Q	Front Window Opening	475	422	-53
R	Right Side Length	3898	3927	29
S	Left Side Length	3902	3709	-193
T	Vehicle Width at "B" Post	1798	1390	-408

**DATA SHEET NO. 5**  
**SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

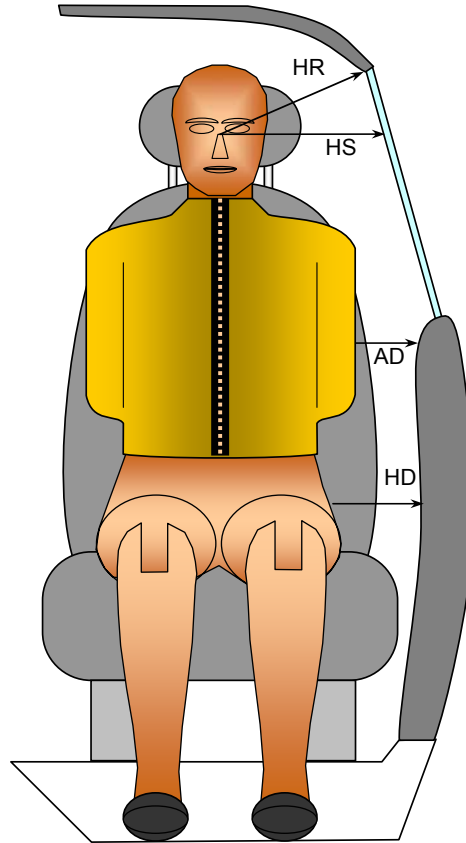


Driver Code	Measurement Description	Left Front	
		Length(mm)	Angle(°)
HH	Head to Header	437	
HW	Head to Windshield	635	
HZ	Head to Roof	165	
NR	Nose to Rim	505	
CD	Chest to Dash	572	
CS	Chest to Steering Wheel	381	
KDL	Left Knee to Dash	175	0
KDR	Right Knee to Dash	186	0
PA	Pelvic Angle (Longitudinal)		24.4
PHX	H-Point to Striker (X-Axis)	179	
PHZ	H-Point to Striker (Z-Axis)	98	

**DATA SHEET NO. 6**  
**SID/HIII LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003



*FRONT VIEW OF DUMMY*

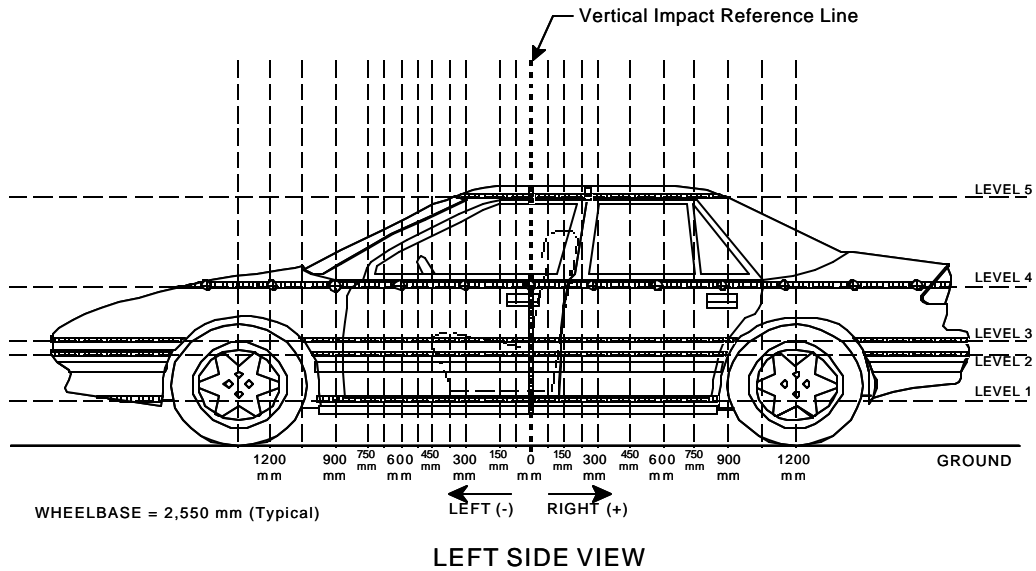
Code	Measurement Description	Units	Left Front
HR	Head to Side Header	mm	222
HS	Head to Side Window	mm	332
AD	Arm to Door	mm	119
HD	H-Point to Door	mm	160

**DATA SHEET NO. 7**  
**VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

**PRETEST AND POST TEST EXTERIOR PROFILE MEASUREMENTS**



Measurements are taken with vehicle in the as tested condition.  
 Measurements along the vertical 0 mm.  
 All measurements below in mm.

Note: The target impact line is 36mm near 0.

Level	Measurement Description	Height Above Ground
5	Window	1346
4	Window Sill	873
3	Mid Door	577
2	Occupant H-Point	517
1	Sill Top	286

**DATA SHEET NO. 8**  
**VEHICLE EXTERIOR CRUSH PROFILES**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1950															
-1800															
-1650				305					305					0	
-1500				288					289					1	
-1350				274					272					-2	
-1200				264					256					-8	
-1050				255					252					-3	
-900	239	211	211	250		264	223	219	253		25	12	8	3	
-825	242	212	210	247		262	244	239	259		20	32	29	12	
-750	242	211	208	247		315	271	265	265		73	60	57	18	
-675	244	210	207	243		338	299	291	282		94	89	84	39	
-600	245	209	206	241		362	322	318	313		117	113	112	72	
-525	247	208	205	241		382	349	351	350		135	141	146	109	
-450	249	208	204	240		407	380	386	387		158	172	182	147	
-375	250	207	204	240		433	417	422	427		183	210	218	187	
-300	251	207	203	239		463	458	459	464		212	251	256	225	
-225	251	207	203	240		482	488	487	493		231	281	284	253	
-150	252	207	203	239	477	529	539	536	542	532	277	332	333	303	55
-75	254	208	203	239	475	588	584	583	594	605	334	376	380	355	130
0	254	207	203	239	475	617	627	632	627	647	363	420	429	388	172
75	256	208	203	241	476	611	626	631	645	678	355	418	428	404	202
150	256	207	203	241	477	583	598	601	628	660	327	361	398	387	183
225	256	207	204	243	478	534	555	551	591	623	278	348	347	348	145
300	257	208	205	244	486	487	478	480	550	596	230	270	275	306	110
375	257	209	206	244	481	436	433	434	518	574	179	224	228	274	93
450	257	209	206	246	483	382	392	399	493	565	125	183	193	247	82
600	255	210	208	251	487	293	325	344	442	546	38	115	136	191	59
750	253	211	209	258	493	249	275	294	391	530	-4	64	85	133	37
900	251	212	211	264	499	215	236	248	339	513	-36	24	37	75	14
1050		216	216	273	511		217	210	300	505		1	-6	27	-6
1200				282	527				274	526				-8	-1
1350				291					301					10	
1500				303					309					6	
1650			240	317				244	318				4	1	
1800			272	335				281	336				9	1	
1950			291	353				295	353				4	0	
2100				375					370					-5	

Reference plane is parallel to test vehicle longitudinal centerline.  
Given dimensions = Reference plane to car body. Measurements in mm.

**DATA SHEET NO. 8... (continued)**  
**VEHICLE EXTERIOR CRUSH PROFILES**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

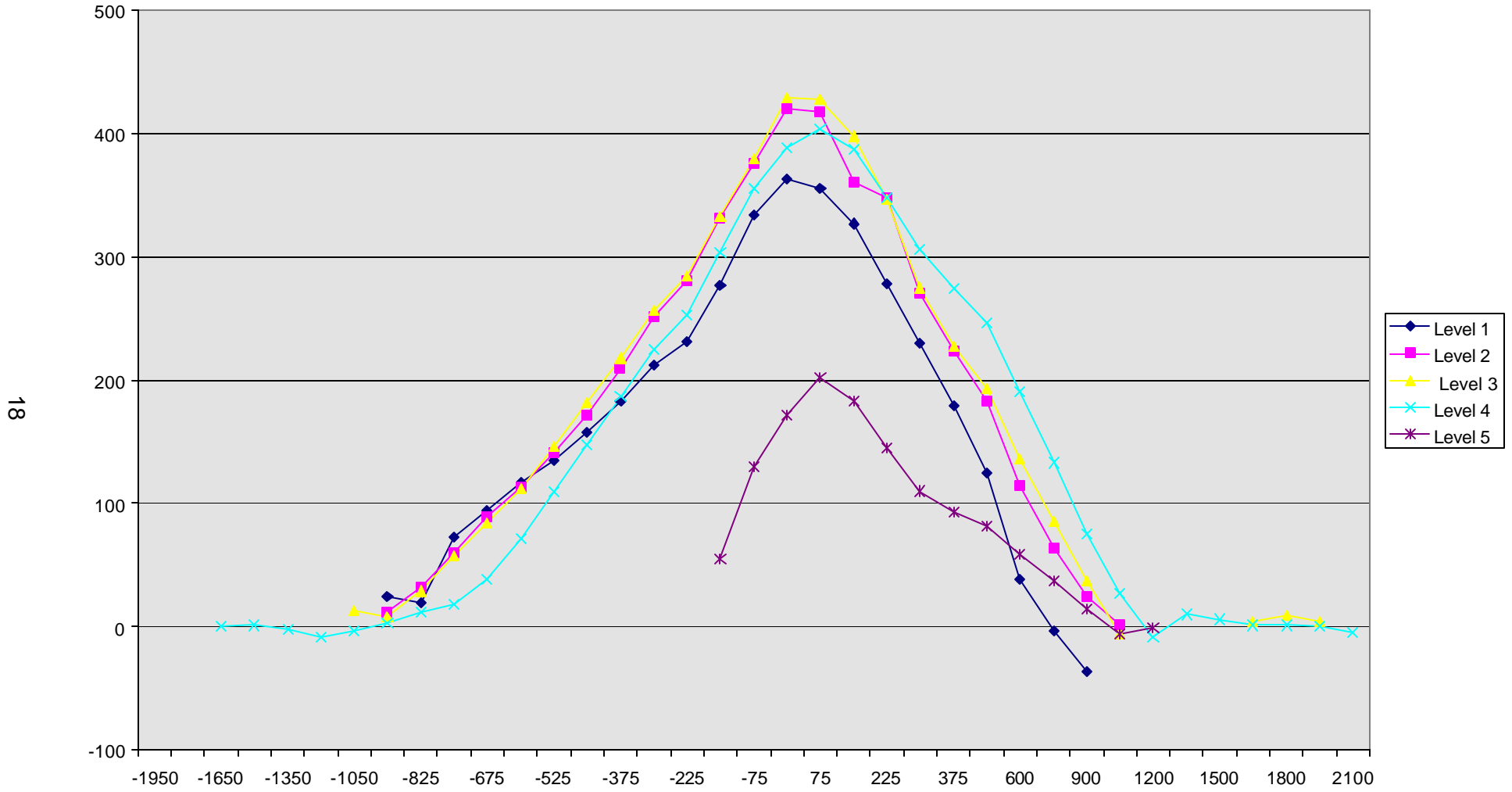
	Pre Test Level 6	Post Test Level 6	Difference at Level 6
-2100	1100	1110	10
-1950	1097	1109	12
-1800	1097	1119	22
-1650	1095	1129	34
-1500	1099	1140	41
-1350	1097	1150	53
-1200	1098	1166	68
-1050			
-975			
-900			
-825			
-750			
-675			
-600			
-525			
-450			
-375			
-300	1096	1214	118
-225	1090	1222	132
-150	1096	1222	126
-75	1101	1224	123
0	1102	1230	128
75	1103	1231	128
150	1104	1228	124
225	1104	1224	120
300	1104	1224	120
375	1104	1223	119
450	1101	1215	114
525			
600	1103	1207	104
750	1102	1198	96
900	1101	1192	91
1050	1098	1182	84
1200	1098	1174	76
1350			
1500			
1650			
1800			
1950			
2100	0196	1124	28

Reference plane is parallel to test vehicle longitudinal centerline.  
 Given dimensions = Reference plane to car body. Measurements in mm.

DATA SHEET NO. 8... (continued)  
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

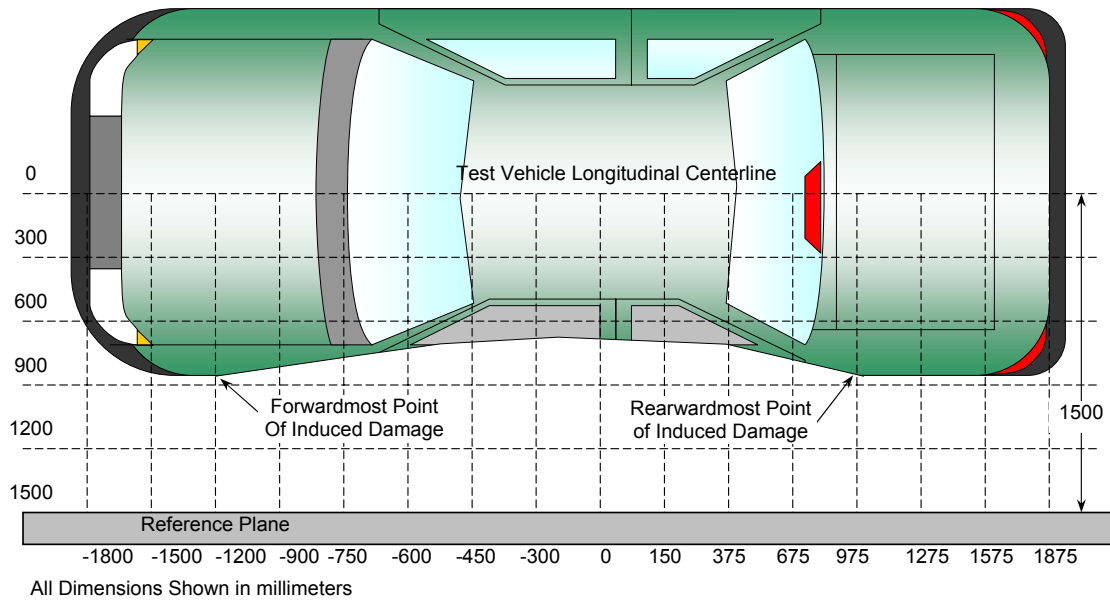


Measurement in mm.

**DATA SHEET NO. 9**  
**VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003



**TOP VIEW**

**Damage Profile Distances**

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2100 mm	4	375	398	23
2	1384 mm	4	295	363	68
3	630 mm	4	242	532	290
4	-150 mm	3	203	536	333
5	-950 mm	4	252	333	81
6	-1650 mm	4	305	339	34

Reference plane is parallel to test vehicle longitudinal centerline.

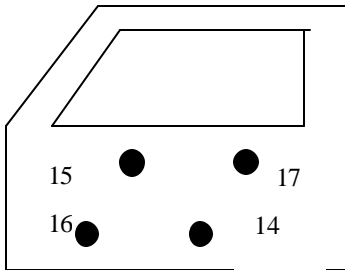
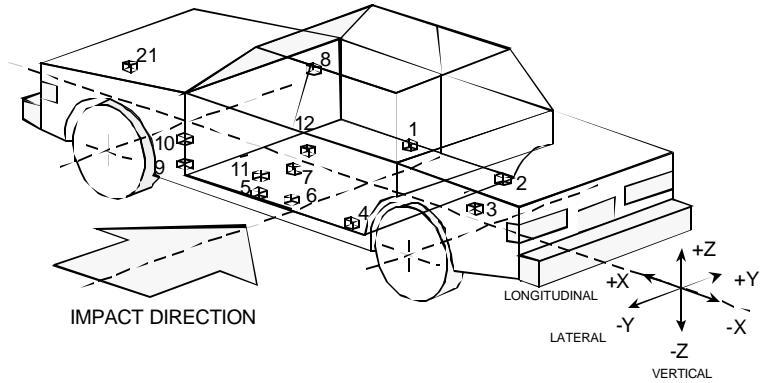
Given dimensions = Reference plane to car body.

## DATA SHEET NO. 10

### VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003



No.	Location
1	Right Side Sill at Front Seat
2	Right Side Sill at Rear Seat
3	Rear Floorpan Above Axle
4	Left Side Sill at Rear Door
5	Left Side Sill at Front Door
6	Left Lower B-Post
7	Left Mid B-Post
8	Left Upper B-Post
9	Left Lower A-Post
10	Left Mid A-Post
11	Driver Seat Track

No.	Location
12	Vehicle CG
13	Left A-Pillar @ Roof
14	Left Front Door @ Pelvis
15	Left Front Door @ Arm
16	Left Front Door @ Knee
17	Left Front Door @ Rib
19	Left Driver Seat Frame
20	Right Driver Seat Frame
21	Lower Center Radiator Support

**DATA SHEET NO. 10... (continued)**

**VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

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

Loc. No.	Accelerometer Location	Long (X) Maximums (g's) (CFC 60)		Lat. (Y) Maximums (g's) (CFC 60)		Vert. (Z) Maximums (g's) (CFC 60)		Resultant (g's) (CFC 60)
		Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Max.
1	Right Side Sill at Front Seat	1.2	2.5	9.3	0.3	4.8	3.7	9.7
2	Right Side Sill at Rear Seat	2.8	1.1	12.6	0.2	4.6	0.8	12.6
3	Rear Floorpan Above Axle	1.5	3.1	12.6	0.1	3.4	2.2	12.8
4	Left Side Sill at Rear Door			14.3	0.7			
5	Left Side Sill at Front Door			32.9	4.4			
6	Left Lower B-Post			43.9	2.9			
7	Left Mid B-Post			67.5	21.4			
8	Left Upper B-Post			50.1	29.2			
9	Left Lower A-Post			13.7	0.2			
10	Left Mid A-Post			14.7	9.6			
11	Driver Left Seat Track			52.0	15.8			
12	Vehicle CG	2.2	4.3	21.5	0.3	6.6	6.0	21.6
13	Left A-Pillar at Roof			38.8	6.9			
14	Left Front Door at Pelvis			80.3	27.8			
15	Left Front Door at Arm			69.3	29.0			
16	Left Front Door at Knee			110.8	42.2			
17	Left Front Door at Rib			76.9	42.8			
19	Left Driver Seat Frame			46.9	21.5			
20	Right Driver Seat Frame			39.5	12.1			
21	Lower Center Radiator Support	0.6	6.2	8.0	1.4	2.2	4.8	8.0

Sign Convention      X - + forward  
                                  Y - + to right  
                                  Z - + down

**DATA SHEET NO. 10... (continued)**

**VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY**

Test Vehicle: 2000 Saab/ 9-5/ 4 Door

Test Date: January 29, 2003

**VEHICLE ACCELEROMETER COORDINATES**

Loc. No.	Description	Coordinates (mm)		
		X	Y	Z
1	Right Side Sill at Front Seat	2492	675	227
2	Right Side Sill at Rear Seat	1872	675	244
3	Rear Floorpan Above Axle	1097	10	544
4	Left Side Sill at Rear Door	1488	-675	236
5	Left Side Sill at Front Door	2724	-675	219
6	Left Lower B-Post	2178	-657	332
7	Left Mid B-Post	*	*	*
8	Left Upper B-Post	2129	-516	1384
9	Left Lower A-Post	3267	-704	273
10	Left Mid A-Post	3317	-788	903
11	Driver Left Seat Track	2333	-549	339
12	Vehicle CG	2817	90	339
13	Left A-Pillar @ Roof	2707	-567	1275
14	Left Door @ Pelvis	2523	-764	658
15	Left Door @ Arm	2708	-757	832
16	Left Door @ Knee	*	*	*
17	Left Door @ Rib	*	*	*
19	Left Driver Seat Frame	*	*	*
20	Right Driver Seat Frame	*	*	*
21	Lower Center Radiator Support	4372	0	213

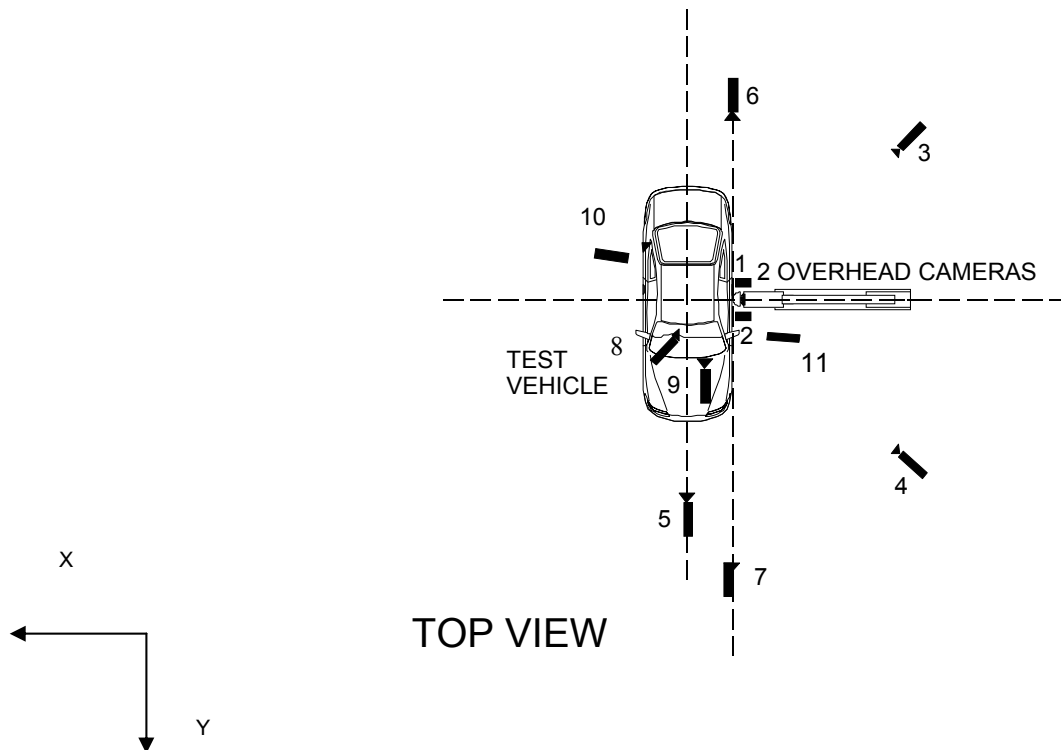
Sign Convention      X – Rear Bumper (+ forward)  
                                  Y – Vehicle Centerline (+ to right)  
                                  Z – Ground Plane (+ up)

\* = Measurements not recorded

**DATA SHEET NO. 11**  
**HIGH SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2000 Saab 9-5 4 Door

Test Date: January 29, 2003



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Overall	600	0	5000	8	1036
2	Overhead Close-up	0	0	5000	13	1000
3	Left Side 45 deg. Rearward Pole View	-3000	-6000	1430	50	1042
4	Left Side 45 deg. Forward Pole View	-3300	5100	1370	50	952
5	Real Time					
6	Left Side Rear Pole View	500	-9000	1560	25	1047
7	Front Ground Level Vehicle/Pole Impact	750	9150	1700	25	909
8	Test Vehicle Onboard Driver Hip				8	521
9	Test Vehicle Onboard Hood				13	513
10	Test Vehicle Onboard Driver Head Contact				13	518
11	Test Vehicle Onboard Driver Door				13	518

Reference Points X - + Forward of Impact  
Y - + Right of Impact  
Z - + Up from Ground

**APPENDIX A**  
**PHOTOGRAPHS**

## TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 1.	Pre-Test Front View of Test Vehicle	A-1
Photo No. 2.	Post-Test Front View of Test Vehicle	A-2
Photo No. 3.	Pre-Test Rear View of Test Vehicle	A-3
Photo No. 4.	Post-Test Rear View of Test Vehicle	A-4
Photo No. 5.	Pre-Test Left Side View of Test Vehicle	A-5
Photo No. 6.	Post-Test Left Side View of Test Vehicle	A-6
Photo No. 7.	Pre-Test Left $\frac{3}{4}$ Front View of Test Vehicle	A-7
Photo No. 8.	Post-Test Left $\frac{3}{4}$ Front View of Test Vehicle	A-8
Photo No. 9.	Pre-Test Left $\frac{3}{4}$ Rear View of Test Vehicle	A-9
Photo No. 10.	Post-Test Left $\frac{3}{4}$ Rear View of Test Vehicle	A-10
Photo No. 11.	Pre-Test Vehicle Positioned Against Pole (left side)	A-11
Photo No. 12.	Post-Test Pole and Vehicle (left side)	A-12
Photo No. 13.	Pre-Test Vehicle Positioned Against Pole (right side)	A-13
Photo No. 14.	Post-Test Pole and Vehicle	A-14
Photo No. 15.	Pre-Test Vehicle Positioned Against Pole Overhead View	A-15
Photo No. 16.	Post-Test Pole and Vehicle Overhead View	A-16
Photo No. 17.	Pre-Test Driver Seat Position	A-17
Photo No. 18.	Pre-Test Driver Dummy Left Side View (Door open)	A-18
Photo No. 19.	Pre-Test Driver Dummy Left Side View	A-19
Photo No. 20.	Post-Test Driver Dummy Left Side View	A-20
Photo No. 21.	Pre-Test Driver Dummy Right Side View	A-21
Photo No. 22.	Post-Test Driver Dummy Right Side View	A-22
Photo No. 23.	Pre-Test Driver Dummy Shoulder and Door Top View	A-23
Photo No. 24.	Post Test Driver Dummy Shoulder and Door Top View	A-24
Photo No. 25.	Post-Test Driver Dummy Lower Body Contact	A-25
Photo No. 26.	Post-Test Driver Dummy Head Contact	A-26
Photo No. 27.	Pre-Test Impact Point on Vehicle	A-27
Photo No. 28.	Post-Test Impact Point on Vehicle (Close-up)	A-28
Photo No. 29.	Vehicle Certification Label	A-29
Photo No. 30.	Impact	A-30

A-1.



Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



Pre-Test Rear View of Test Vehicle



Post-Test Rear View of Test Vehicle

A-5.



Pre-Test Left Side View of Test Vehicle

A-6.



Post-Test Left Side View of Test Vehicle



Pre-Test Left ¾ Front View of Test Vehicle



Post-Test Left ¾ Front View of Test Vehicle



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

A-10.



Post-Test Left ¾ Rear View of Test Vehicle



Pre-Test Vehicle Positioned Against Pole (left side)



Post-Test Pole and Vehicle (left side)

A-13.



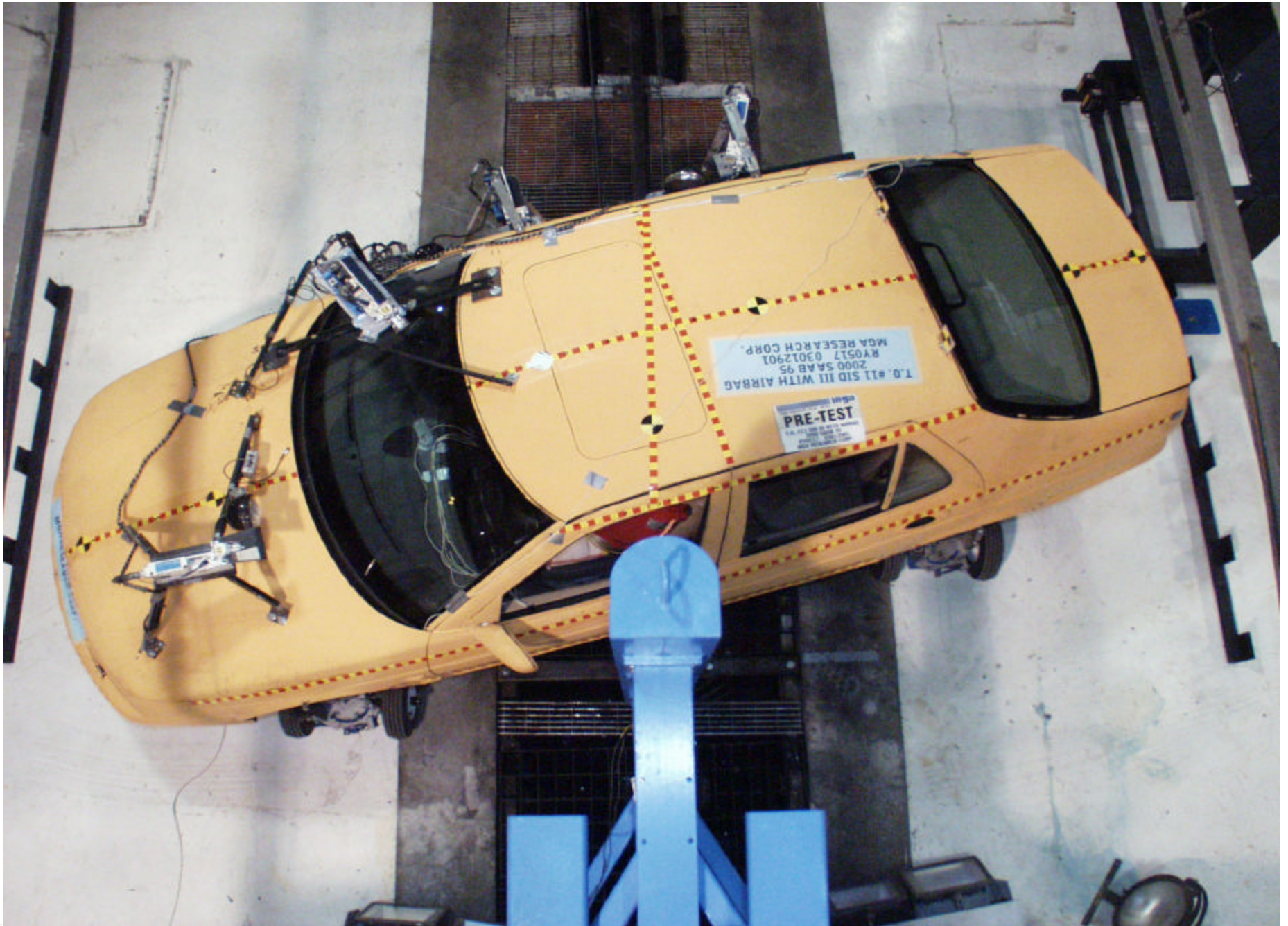
Pre-Test Vehicle Positioned Against Pole (right side)

A-14.

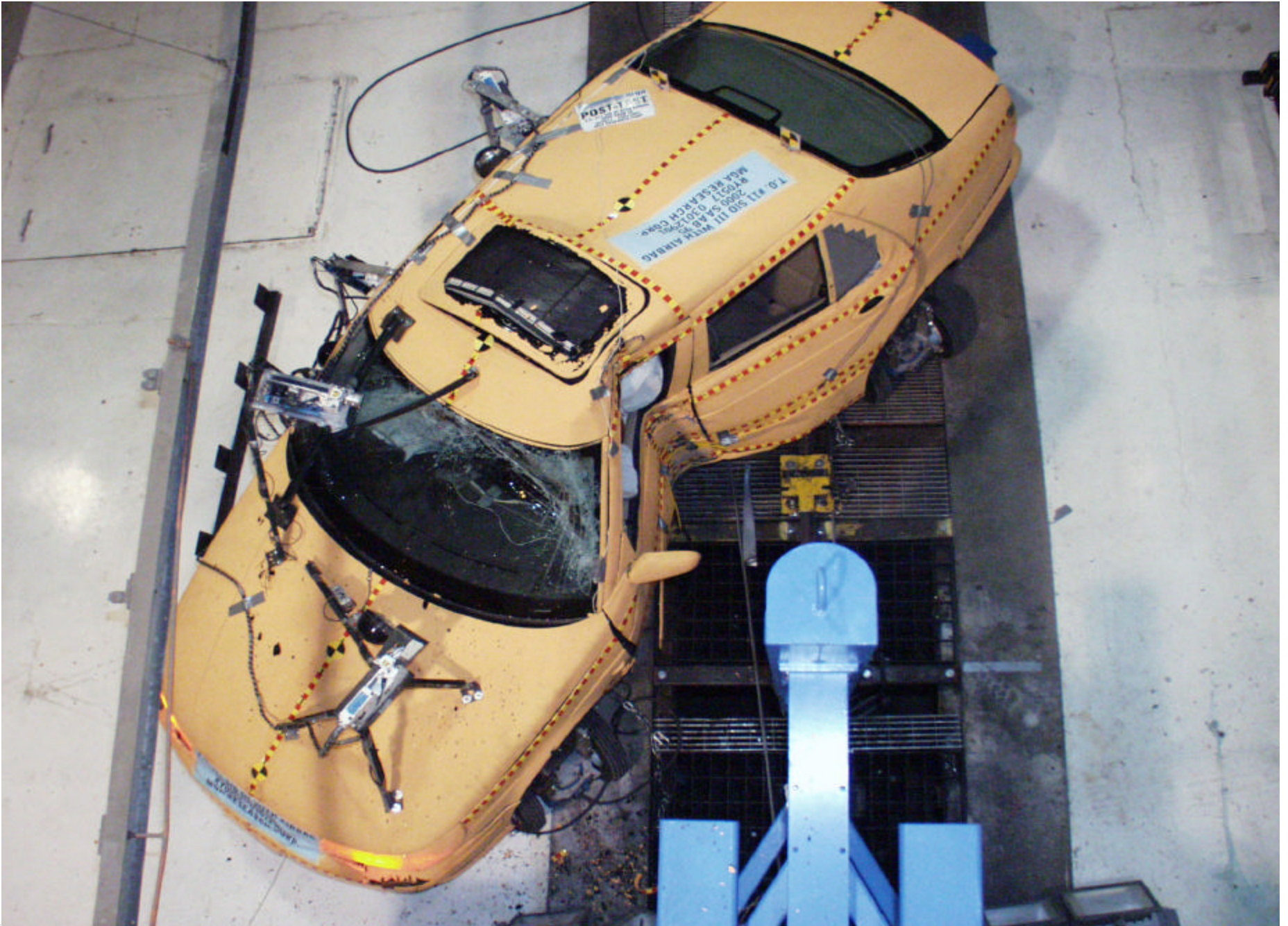


Post-Test Pole and Vehicle

A-15.



Pre-Test Vehicle Positioned Against Pole Overhead View



Post-Test Pole and Vehicle Overhead View



Pre-Test Driver Seat Position

A-18.



Pre-Test Driver Dummy Left Side View (Door open)



Pre-Test Driver Dummy Left Side View



Post-Test Driver Dummy Left Side View



Pre-Test Driver Dummy Right Side View



Post-Test Driver Dummy Right Side View



Pre-Test Driver Dummy Shoulder and Door Top View





Post-Test Driver Dummy Lower Body Contact



Post-Test Driver Dummy Head Contact



Pre-Test Impact Point on Vehicle



Post-Test Impact Point on Vehicle (Close-up)



Vehicle Certification Label

A-30.



Impact

**APPENDIX B**

**VEHICLE AND DUMMY RESPONSE DATA TRACES**

## TABLE OF DATA PLOTS

**The dummy and vehicle X and Y velocities presented in this report do not contain the correct initial velocity. The correct initial velocities should be:**

**X – Test Speed \* Sine 15 Degrees**

**Y - Test Speed \* Cosine 15 Degrees**

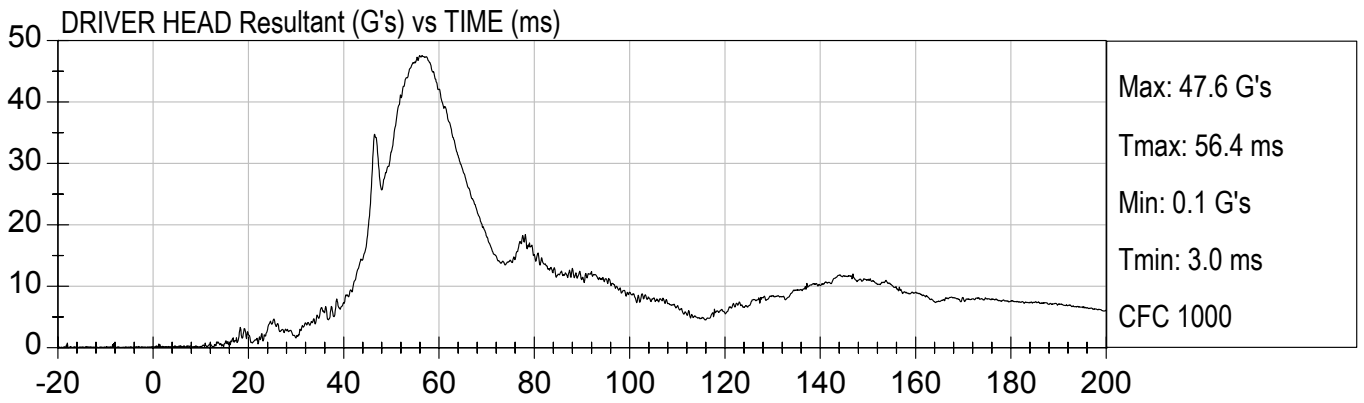
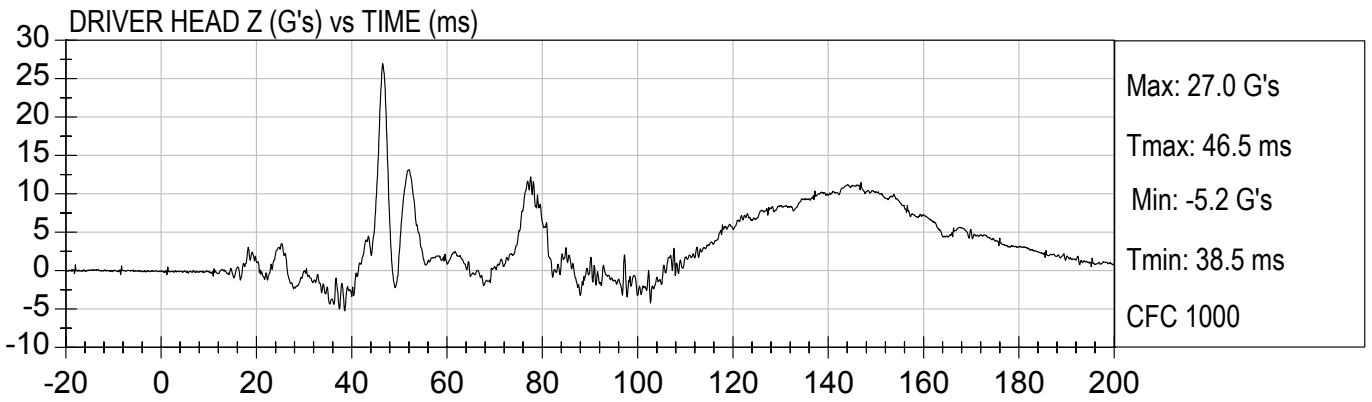
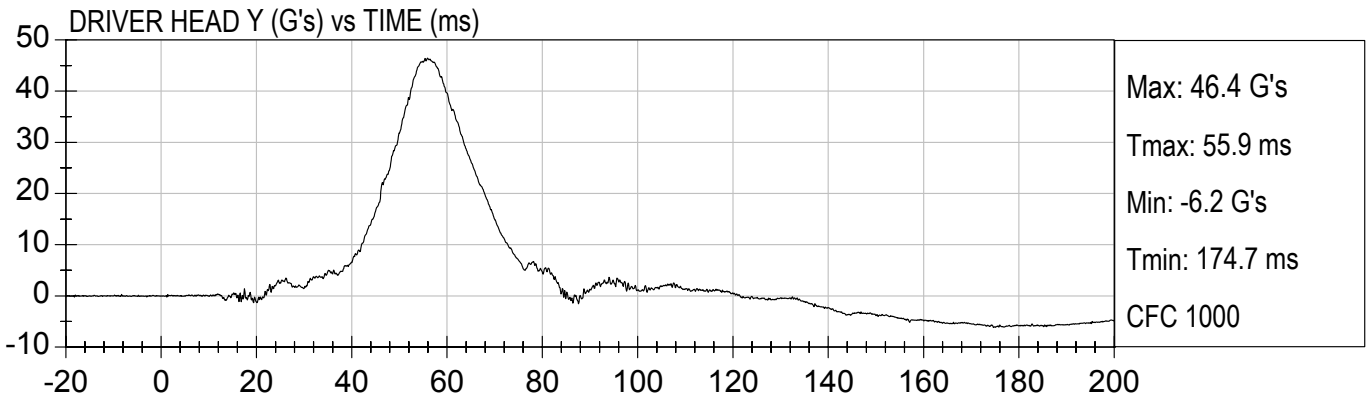
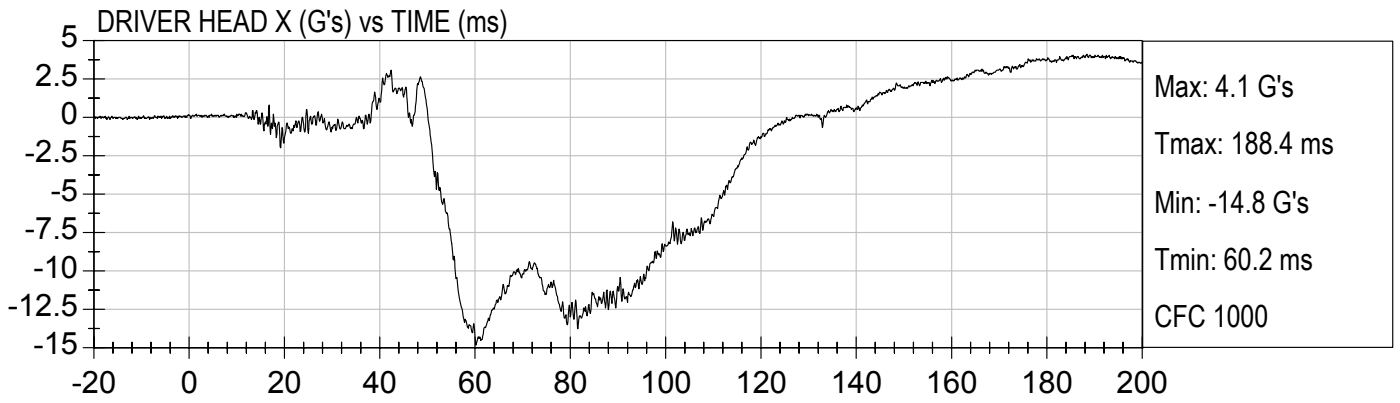
Figure No. 1.	Driver Head X Acceleration vs. Time	B-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	B-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	B-1
Figure No. 5.	Driver Head X Velocity vs. Time	B-2
Figure No. 6.	Driver Head Y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

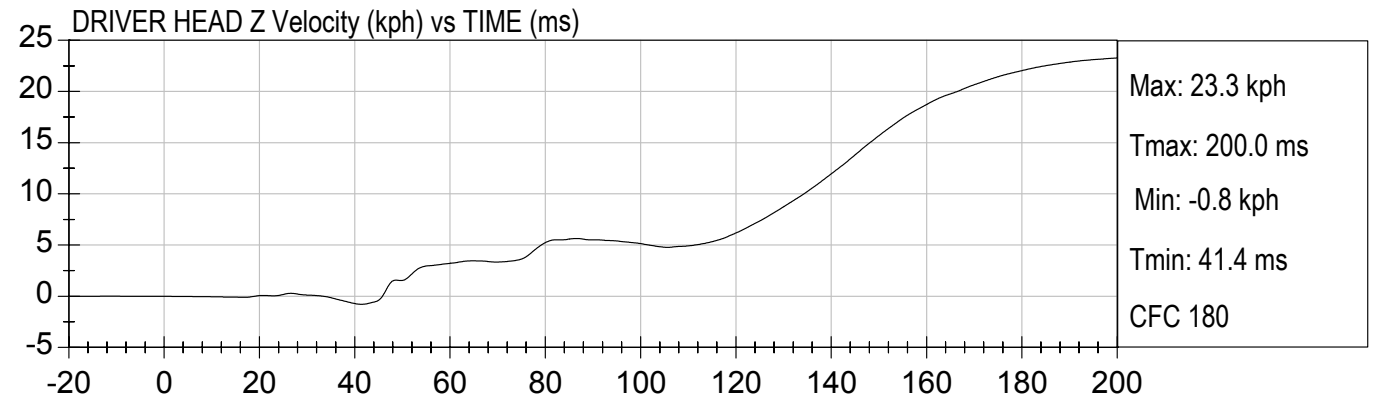
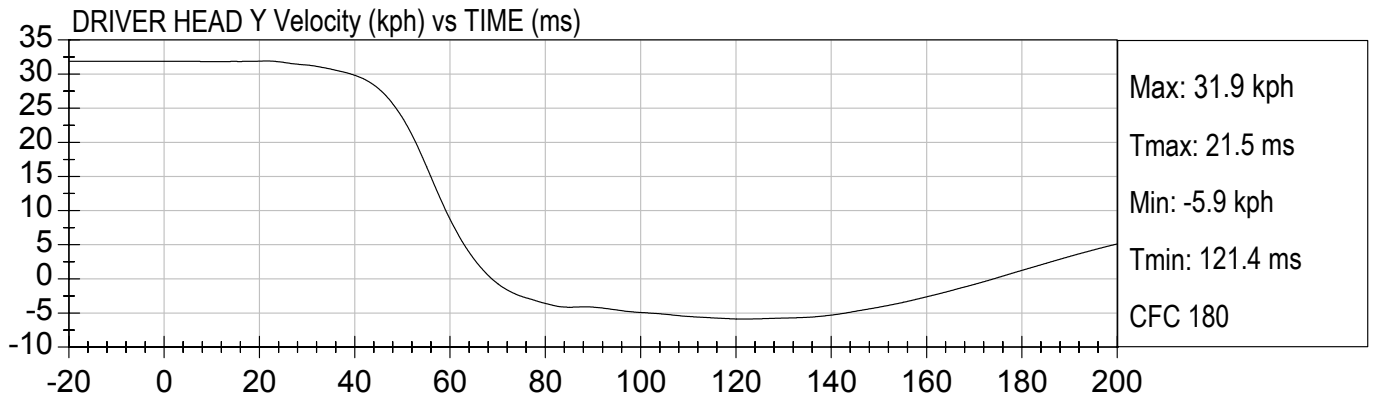
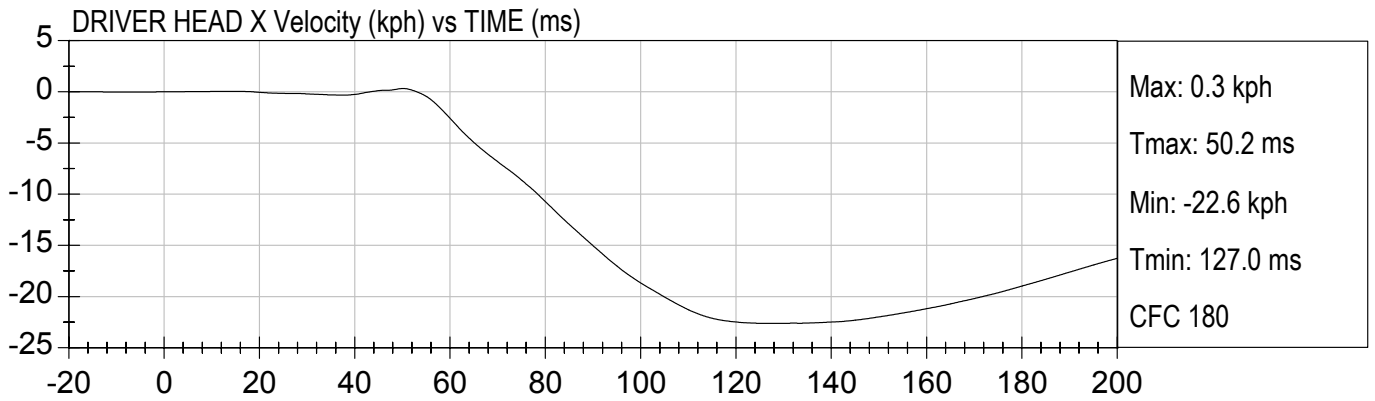
Figure No. 29.	Driver Upper Spine Y Acceleration vs. Time	B-8
Figure No. 30.	Driver Upper Spine Z Acceleration vs. Time	B-8
Figure No. 31.	Driver Upper Spine Resultant Acceleration vs. Time	B-8
Figure No. 32.	Driver Upper Spine X Velocity vs. Time	B-9
Figure No. 33.	Driver Upper Spine Y Velocity vs. Time	B-9
Figure No. 34.	Driver Upper Spine Z Velocity vs. Time	B-9
Figure No. 35.	Driver Upper Rib Y Acceleration vs. Time (CFC 1000)	B-10
Figure No. 36.	Driver Lower Rib Y Acceleration vs. Time (CFC 1000)	B-10
Figure No. 37.	Driver Upper Rib Y Acceleration vs. Time (CFC 180)	B-10
Figure No. 38.	Driver Lower Rib Y Acceleration vs. Time (CFC 180)	B-10
Figure No. 39.	Driver Upper Rib Y Velocity vs. Time (CFC 180)	B-11
Figure No. 40.	Driver Lower Rib Y Velocity vs. Time (CFC 180)	B-11
Figure No. 41.	Driver Lower Spine X Acceleration vs. Time	B-12
Figure No. 42.	Driver Lower Spine Y Acceleration vs. Time	B-12
Figure No. 43.	Driver Lower Spine Z Acceleration vs. Time	B-12
Figure No. 44.	Driver Lower Spine Resultant Acceleration vs. Time	B-12
Figure No. 45.	Driver Lower Spine X Velocity vs. Time	B-13
Figure No. 46.	Driver Lower Spine Y Velocity vs. Time	B-13
Figure No. 47.	Driver Lower Spine Z Velocity vs. Time	B-13
Figure No. 48.	Driver Pelvis X Acceleration vs. Time	B-14
Figure No. 49.	Driver Pelvis Y Acceleration vs. Time	B-14
Figure No. 50.	Driver Pelvis Z Acceleration vs. Time	B-14
Figure No. 51.	Driver Pelvis Resultant Acceleration vs. Time	B-14
Figure No. 52.	Driver Pelvis X Velocity vs. Time	B-15
Figure No. 53.	Driver Pelvis Y Velocity vs. Time	B-15
Figure No. 54.	Driver Pelvis Z Velocity vs. Time	B-15
Figure No. 55.	Driver Rib Contact vs. Time	B-16
Figure No. 56.	Driver Pelvis Contact vs. Time	B-16
Figure No. 57.	Right Front Sill X Acceleration vs. Time	B-17
Figure No. 58.	Right Front Sill Y Acceleration vs. Time	B-17
Figure No. 59.	Right Front Sill Z Acceleration vs. Time	B-17
Figure No. 60.	Right Front Sill Resultant Acceleration vs. Time	B-17

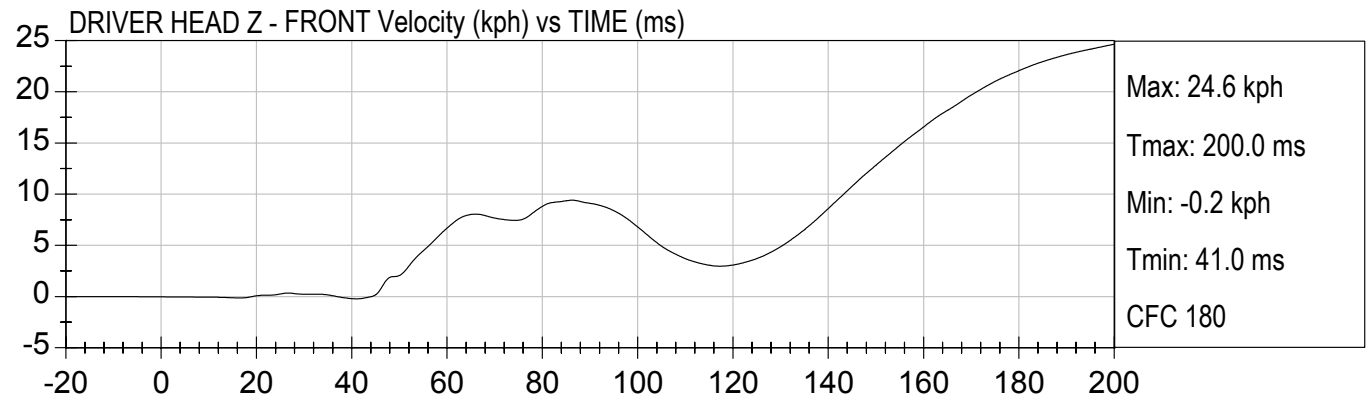
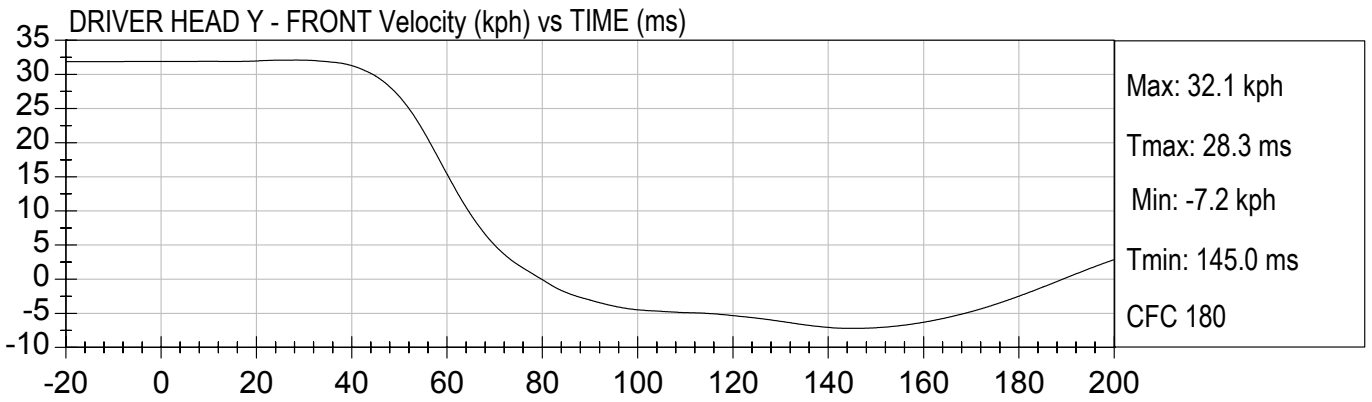
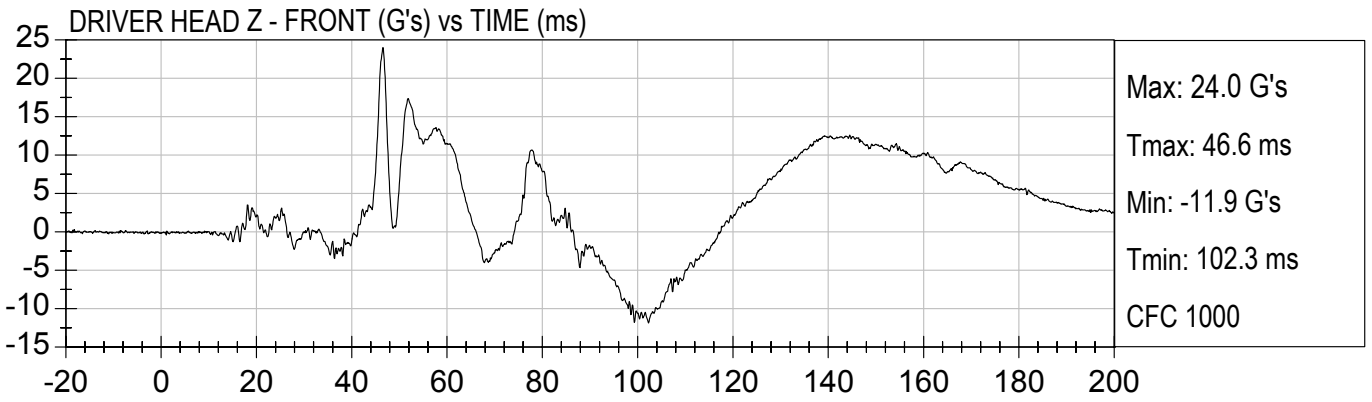
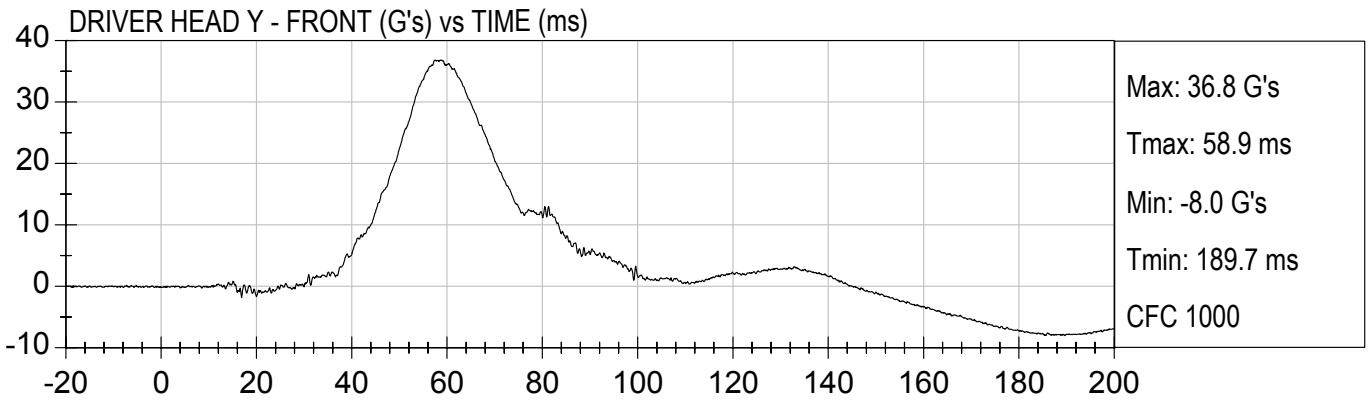
Figure No. 61.	Right Front Sill X Velocity vs. Time	B-18
Figure No. 62.	Right Front Sill Y Velocity vs. Time	B-18
Figure No. 63.	Right Front Sill Z Velocity vs. Time	B-18
Figure No. 64.	Right Rear Sill X Acceleration vs. Time	B-19
Figure No. 65.	Right Rear Sill Y Acceleration vs. Time	B-19
Figure No. 66.	Right Rear Sill Z Acceleration vs. Time	B-19
Figure No. 67.	Right Rear Sill Resultant Acceleration vs. Time	B-19
Figure No. 68.	Right Rear Sill X Velocity vs. Time	B-20
Figure No. 69.	Right Rear Sill Y Velocity vs. Time	B-20
Figure No. 70.	Right Rear Sill Z Velocity vs. Time	B-20
Figure No. 71.	Floorpan @ Rear Axle X Acceleration vs. Time	B-21
Figure No. 72.	Floorpan @ Rear Axle Y Acceleration vs. Time	B-21
Figure No. 73.	Floorpan @ Rear Axle Z Acceleration vs. Time	B-21
Figure No. 74.	Floorpan @ Rear Axle Resultant Acceleration vs. Time	B-21
Figure No. 75.	Floorpan @ Rear Axle X Velocity vs. Time	B-22
Figure No. 76.	Floorpan @ Rear Axle Y Velocity vs. Time	B-22
Figure No. 77.	Floorpan @ Rear Axle Z Velocity vs. Time	B-22
Figure No. 78.	Left Front Sill Y Acceleration vs. Time	B-23
Figure No. 79.	Left Front Sill Y Velocity vs. Time	B-23
Figure No. 80.	Left Rear Sill Y Acceleration vs. Time	B-23
Figure No. 81.	Left Rear Sill Y Velocity vs. Time	B-23
Figure No. 82.	Left Lower A-Post Y Acceleration vs. Time	B-24
Figure No. 83.	Left Lower A-Post Y Velocity vs. Time	B-24
Figure No. 84.	Left Mid A-Post Y Acceleration vs. Time	B-24
Figure No. 85.	Left Mid A-Post Y Velocity vs. Time	B-24
Figure No. 86.	Left A-Post @ Roof Y Acceleration vs. Time	B-25
Figure No. 87.	Left A-Post @ Roof Y Velocity vs. Time	B-25
Figure No. 88.	Left Upper B-Post Y Acceleration vs. Time	B-25
Figure No. 89.	Left Upper B-Post Y Velocity vs. Time	B-25
Figure No. 90.	Left Lower B-Post Y Acceleration vs. Time	B-26
Figure No. 91.	Left Lower B-Post Y Velocity vs. Time	B-26
Figure No. 92.	Left Mid B-Post Y Acceleration vs. Time	B-26

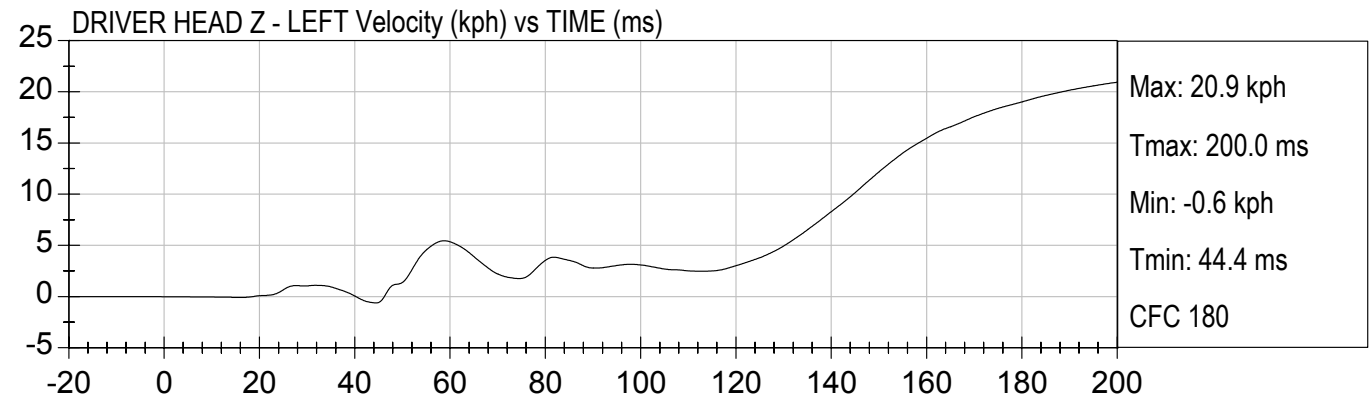
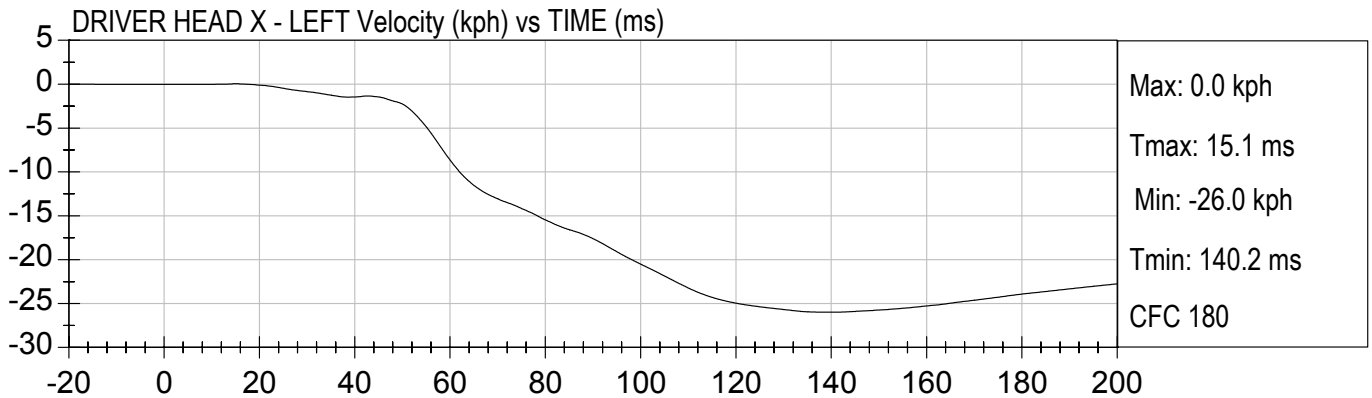
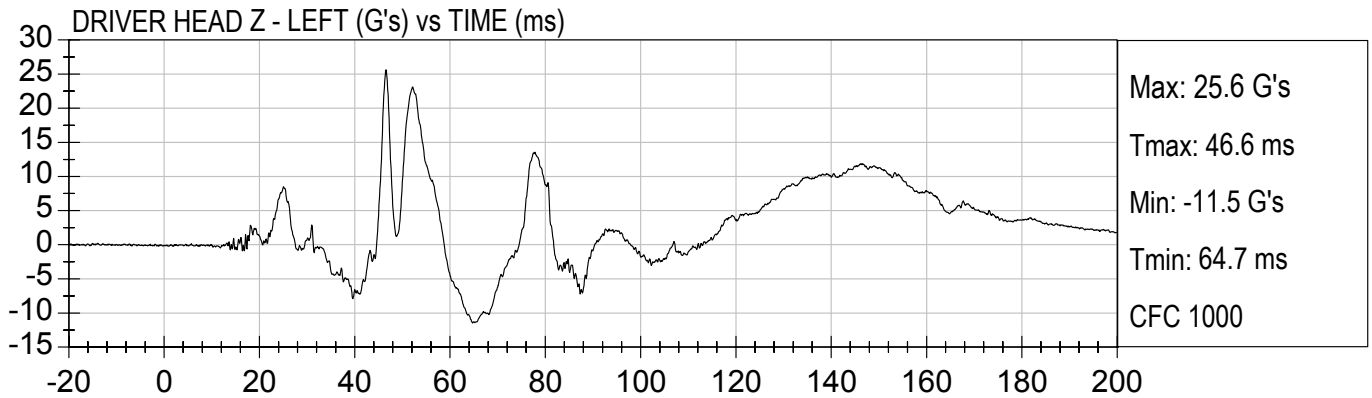
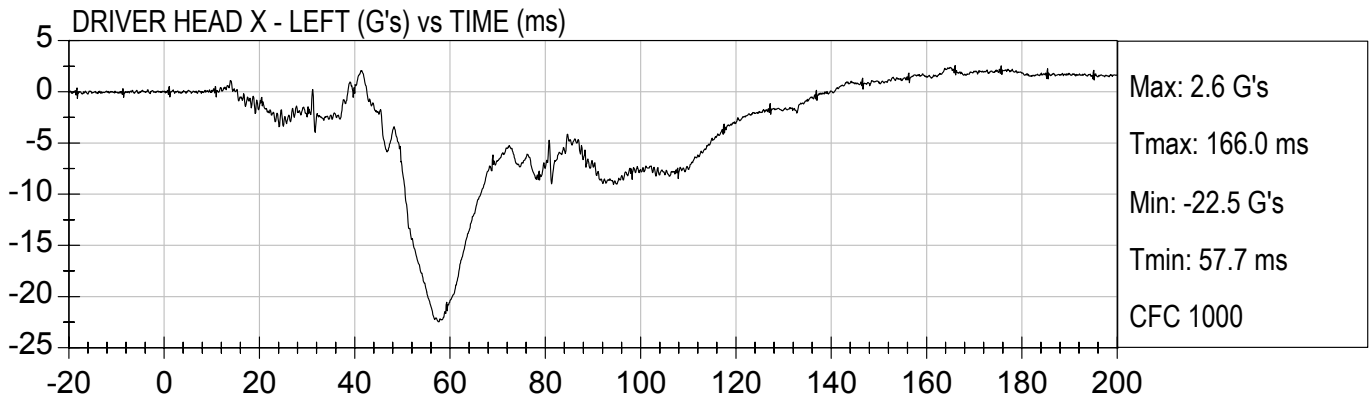
Figure No. 93.	Left Mid B-Post Y Velocity vs. Time	B-26
Figure No. 94.	Driver Seat Track Y Acceleration vs. Time	B-27
Figure No. 95.	Driver Seat Track Y Velocity vs. Time	B-27
Figure No. 96.	Driver Left Seat Frame Y Acceleration vs. Time	B-28
Figure No. 97.	Driver Left Seat Frame Y Velocity vs. Time	B-28
Figure No. 98.	Driver Right Seat Frame Y Acceleration vs. Time	B-28
Figure No. 99.	Driver Right Seat Frame Y Velocity vs. Time	B-28
Figure No. 100.	Vehicle CG X Acceleration vs. Time	B-29
Figure No. 101.	Vehicle CG Y Acceleration vs. Time	B-29
Figure No. 102.	Vehicle CG Z Acceleration vs. Time	B-29
Figure No. 103.	Vehicle CG Resultant Acceleration vs. Time	B-29
Figure No. 104.	Vehicle CG X Velocity vs. Time	B-30
Figure No. 105.	Vehicle CG Y Velocity vs. Time	B-30
Figure No. 106.	Vehicle CG Z Velocity vs. Time	B-30
Figure No. 107.	Left Front Door @ Arm Y Acceleration vs. Time	B-31
Figure No. 108.	Left Front Door @ Rib Y Acceleration vs. Time	B-31
Figure No. 109.	Left Front Door @ Pelvis Y Acceleration vs. Time	B-31
Figure No. 110.	Left Front Door @ Knee Y Acceleration vs. Time	B-31
Figure No. 111.	Left Front Door @ Arm Y Velocity vs. Time	B-32
Figure No. 112.	Left Front Door @ Rib Y Velocity vs. Time	B-32
Figure No. 113.	Left Front Door @ Pelvis Y Velocity vs. Time	B-32
Figure No. 114.	Left Front Door @ Knee Y Velocity vs. Time	B-32
Figure No. 115.	Lower Center Radiator Support X Acceleration vs. Time	B-33
Figure No. 116.	Lower Center Radiator Support Y Acceleration vs. Time	B-33
Figure No. 117.	Lower Center Radiator Support Z Acceleration vs. Time	B-33
Figure No. 118.	LC Radiator Support Resultant Acceleration vs. Time	B-33
Figure No. 119.	Lower Center Radiator Support X Velocity vs. Time	B-34
Figure No. 120.	Lower Center Radiator Support Y Velocity vs. Time	B-34
Figure No. 121.	Lower Center Radiator Support Z Velocity vs. Time	B-34
Figure No. 122.	Driver Head X Redundant Acceleration vs. Time	B-35
Figure No. 123.	Driver Head Y Redundant Acceleration vs. Time	B-35
Figure No. 124.	Driver Head Z Redundant Acceleration vs. Time	B-35

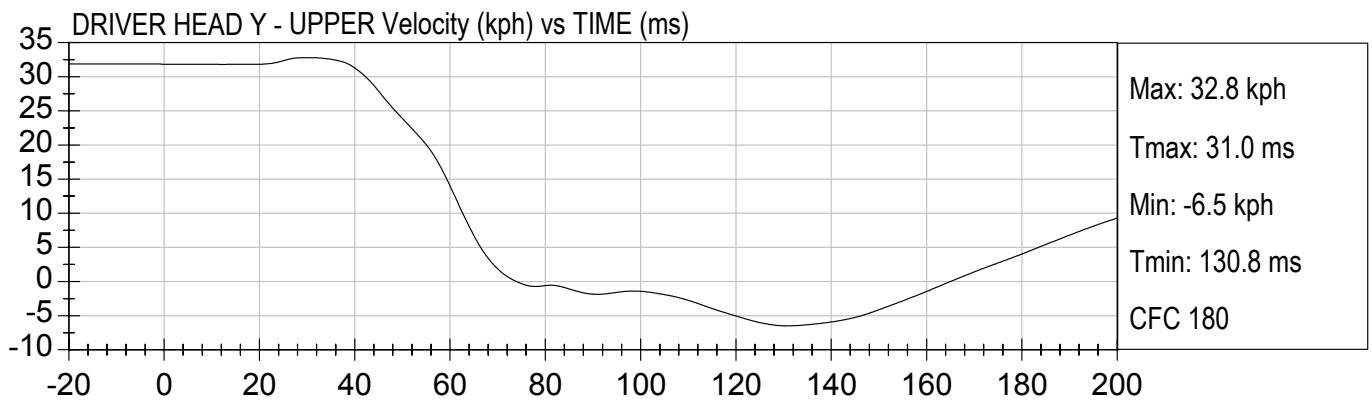
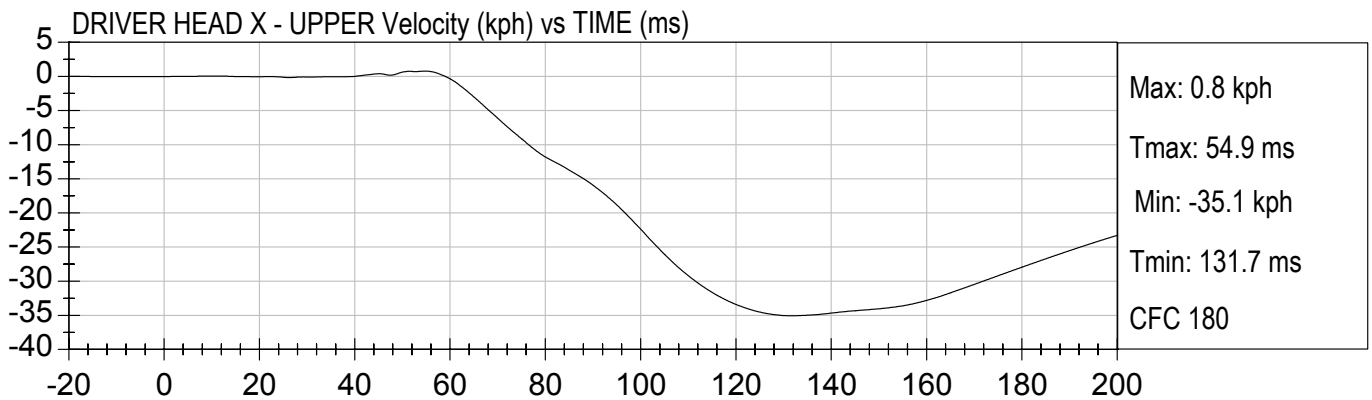
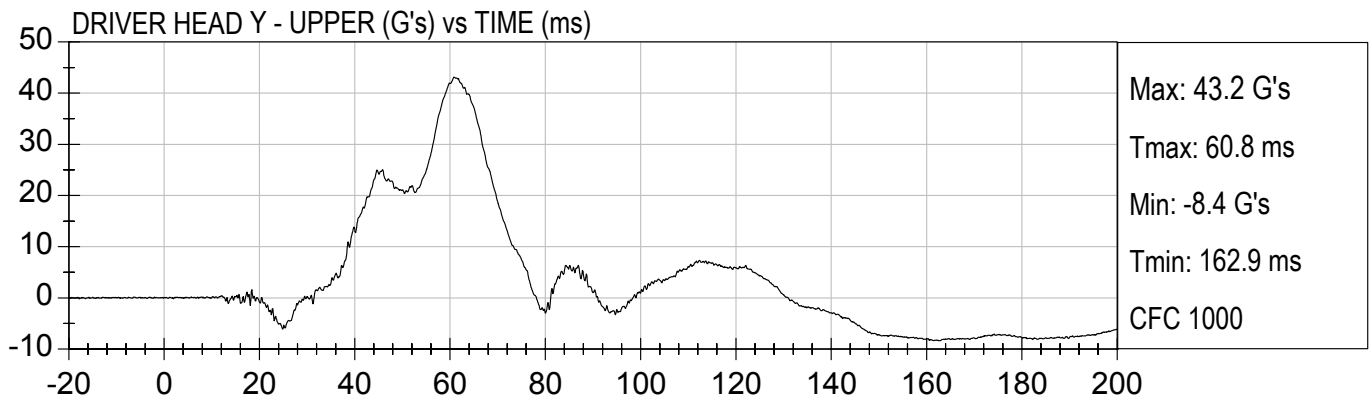
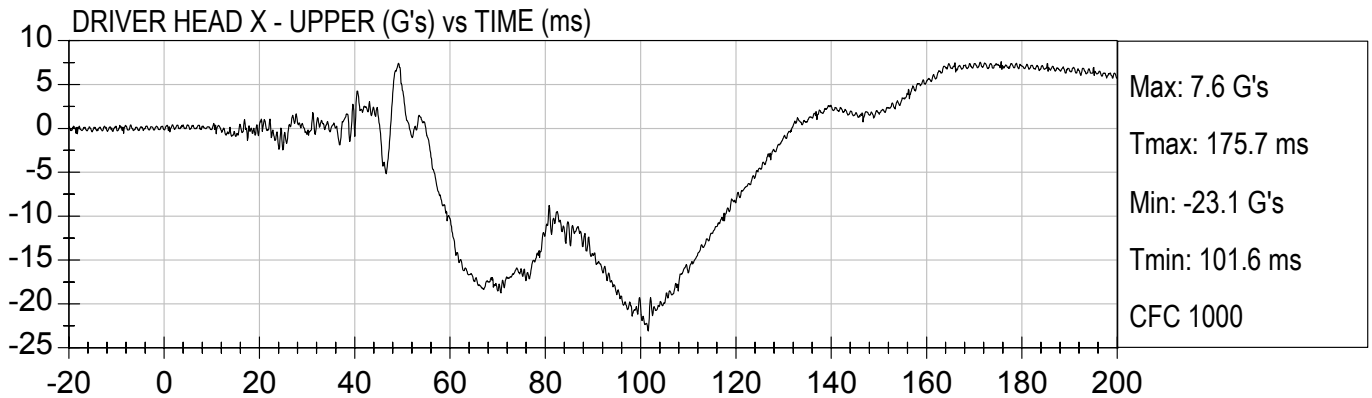
Figure No. 125.	Driver Head Resultant Redundant Acceleration vs. Time	B-35
Figure No. 126.	Driver Head X Redundant Velocity vs. Time	B-36
Figure No. 127.	Driver Head Y Redundant Velocity vs. Time	B-36
Figure No. 128.	Driver Head Z Redundant Velocity vs. Time	B-36
Figure No. 129.	Driver Upper Rib Y Redundant Acceleration vs. Time	B-37
Figure No. 130.	Driver Upper Rib Redundant Velocity vs. Time	B-37
Figure No. 131.	Driver Lower Rib Y Redundant Acceleration vs. Time	B-37
Figure No. 132.	Driver Lower Rib Y Redundant Velocity vs. Time	B-37
Figure No. 133.	Driver Upper Spine Y Redundant Acceleration vs. Time	B-38
Figure No. 134.	Driver Upper Spine Y Redundant Velocity vs. Time	B-38
Figure No. 135.	Driver Lower Spine Y Redundant Acceleration vs. Time	B-38
Figure No. 136.	Driver Lower Spine Y Redundant Velocity vs. Time	B-38
Figure No. 137.	Driver Pelvis Y Redundant Acceleration vs. Time	B-39
Figure No. 138.	Driver Pelvis Y Redundant Velocity vs. Time	B-39
Figure No. 139.	Driver Upper Spine X Acceleration vs. Time (FIR Filtered)	B-40
Figure No. 140.	Driver Upper Spine Y Acceleration vs. Time (FIR Filtered)	B-40
Figure No. 141.	Driver Upper Spine Z Acceleration vs. Time (FIR Filtered)	B-40
Figure No. 142.	Driver Upper Spine Y Redundant Acceleration vs. Time (FIR Filtered)	B-40
Figure No. 143.	Driver Upper Rib Y Acceleration vs. Time (FIR Filtered)	B-41
Figure No. 144.	Driver Upper Rib Y Redundant Acceleration vs. Time (FIR Filtered)	B-41
Figure No. 145.	Driver Lower Rib Y Acceleration vs. Time (FIR Filtered)	B-41
Figure No. 146.	Driver Lower Rib Y Redundant Acceleration vs. Time (FIR Filtered)	B-41
Figure No. 147.	Driver Lower Spine X Acceleration vs. Time (FIR Filtered)	B-42
Figure No. 148.	Driver Lower Spine Y Acceleration vs. Time (FIR Filtered)	B-42
Figure No. 149.	Driver Lower Spine Z Acceleration vs. Time (FIR Filtered)	B-42
Figure No. 150.	Driver Lower Spine Y Redundant Acceleration vs. Time (FIR Filtered)	B-42
Figure No. 151.	Driver Pelvis X Acceleration vs. Time (FIR Filtered)	B-43
Figure No. 152.	Driver Pelvis Y Acceleration vs. Time (FIR Filtered)	B-43
Figure No. 153.	Driver Pelvis Z Acceleration vs. Time (FIR Filtered)	B-43
Figure No. 154.	Driver Pelvis Y Redundant Acceleration vs. Time (FIR Filtered)	B-43







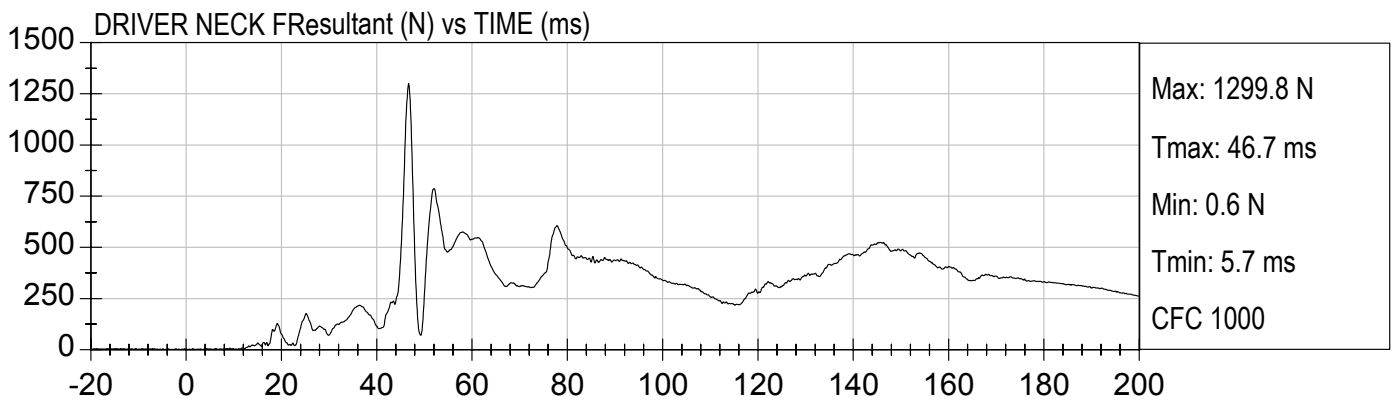
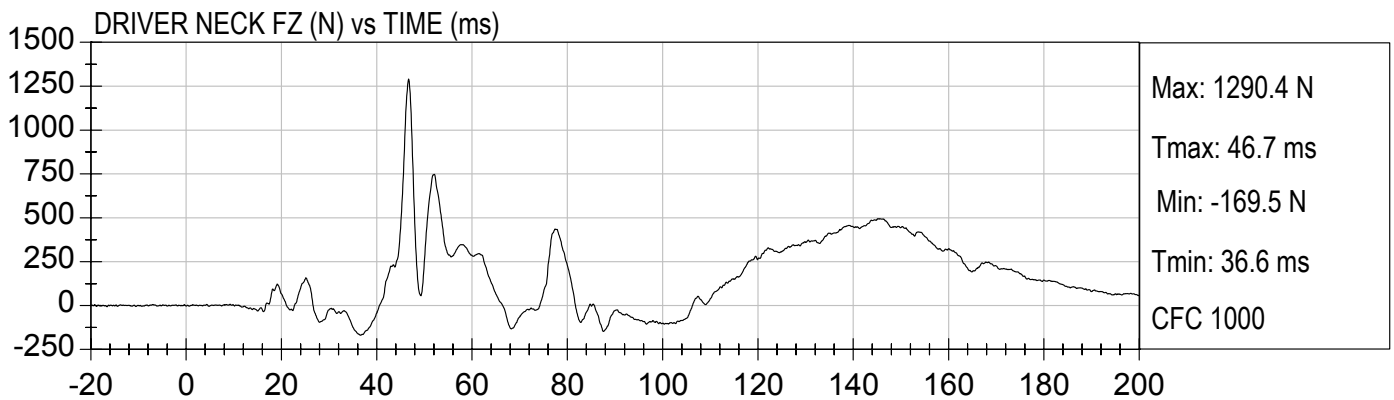
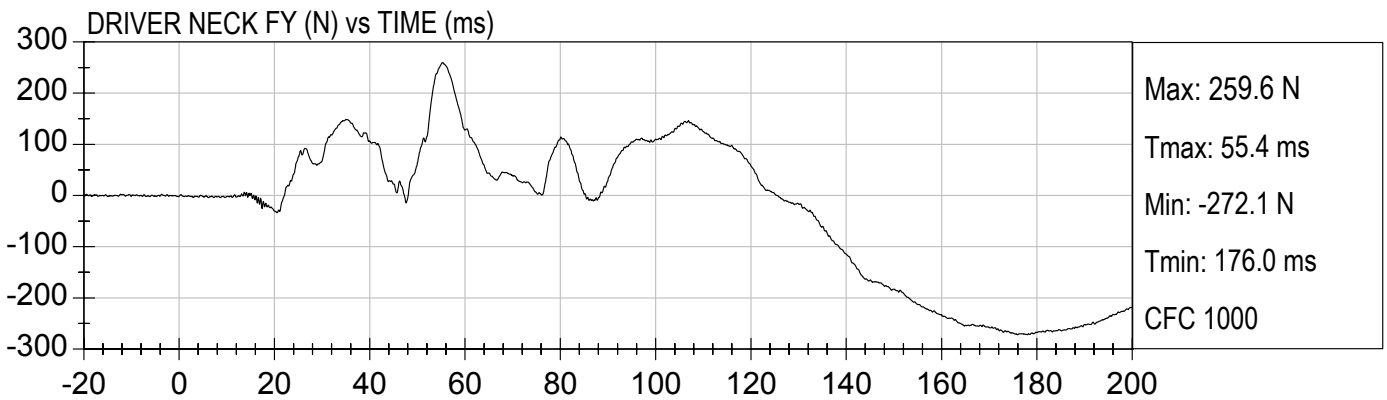
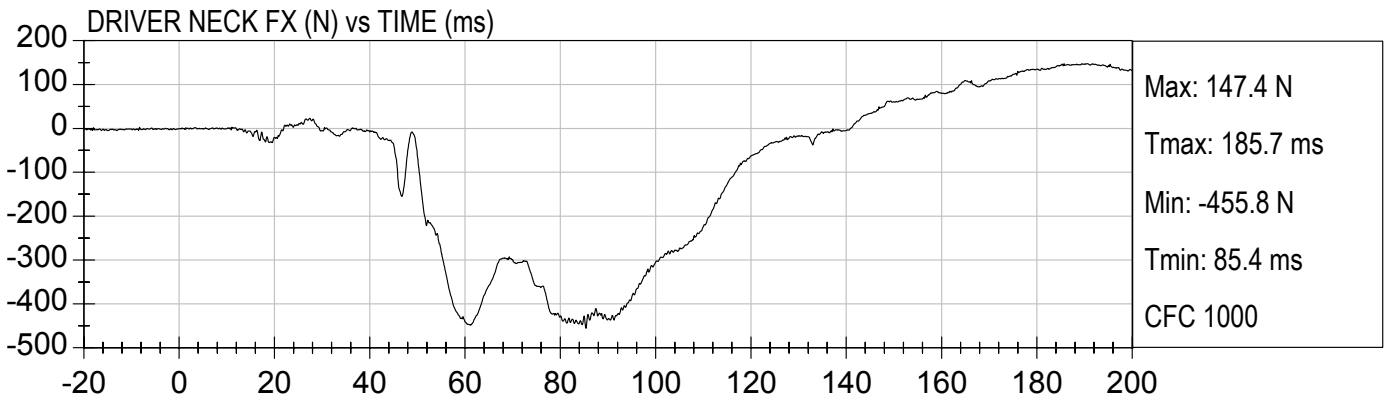






20 MPH SIDE POLE  
2000 SAAB 9-5 (RY0517)

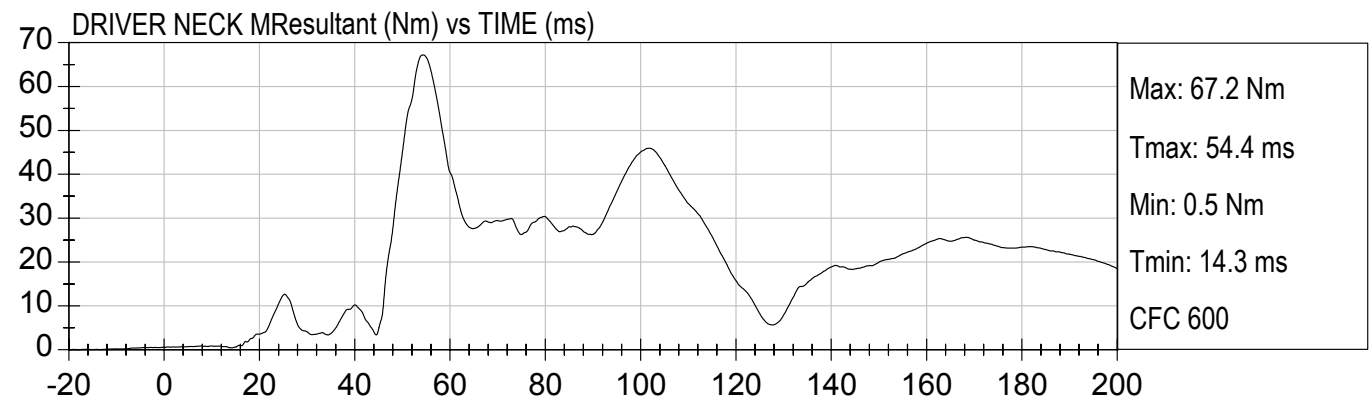
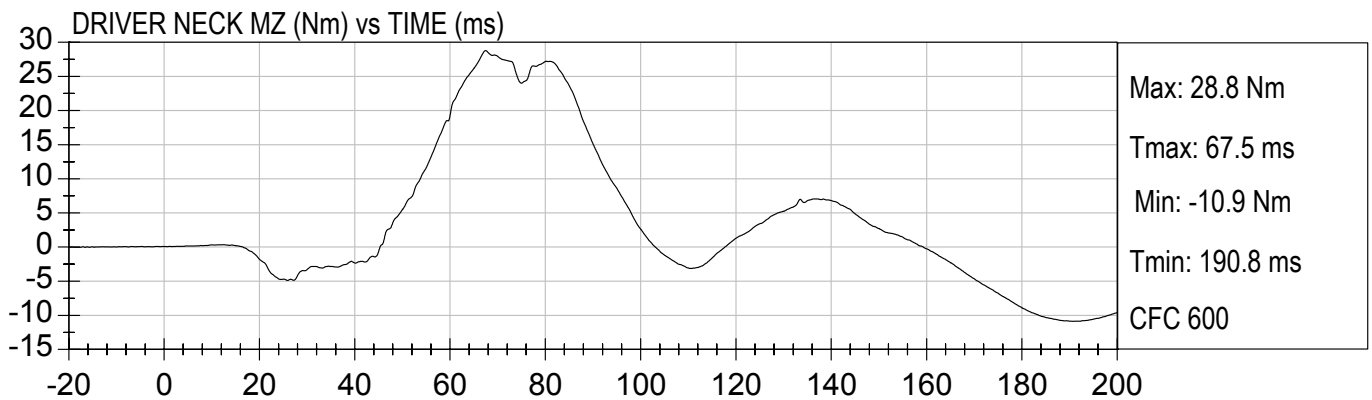
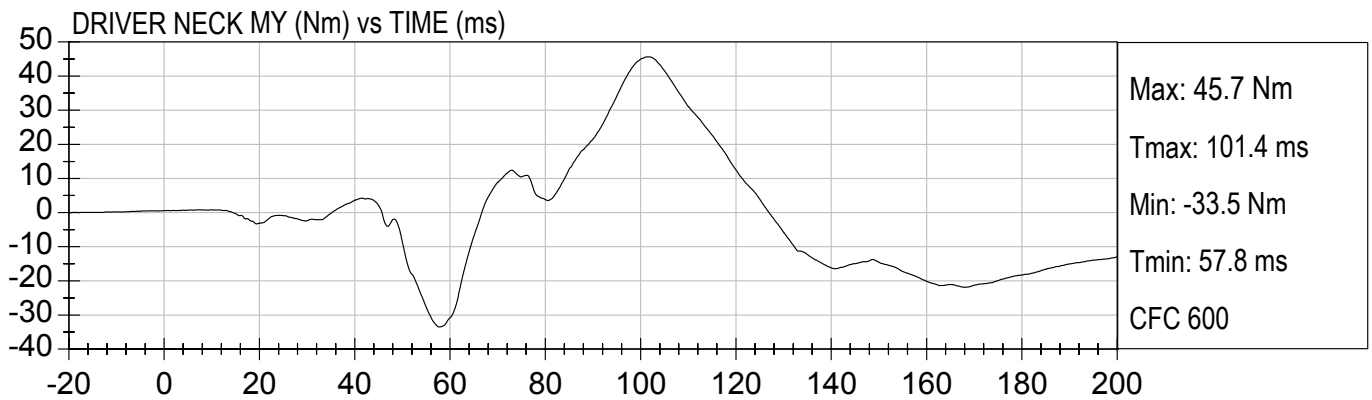
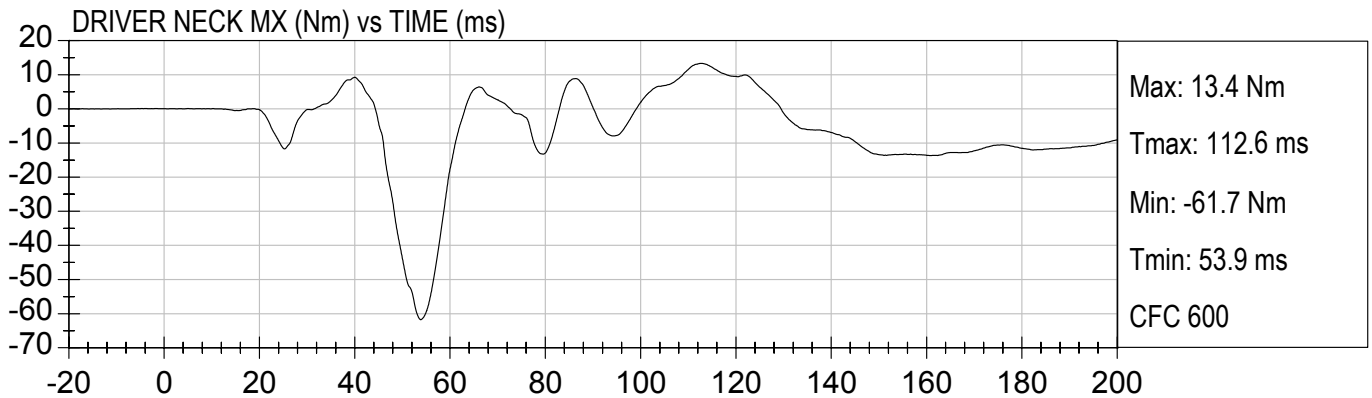
Test Date: 1/29/2003  
Speed: 19.8 mph (31.9 km/h)

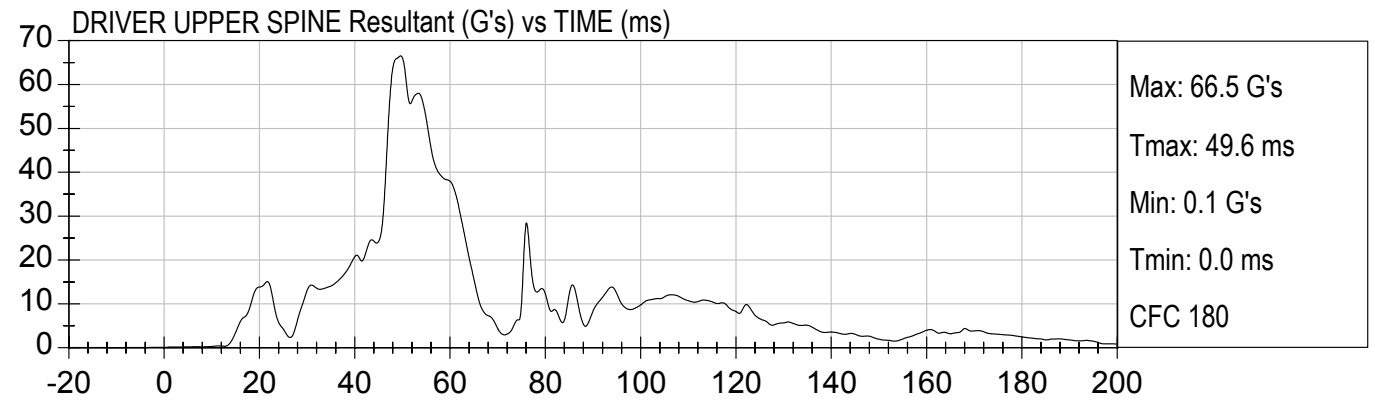
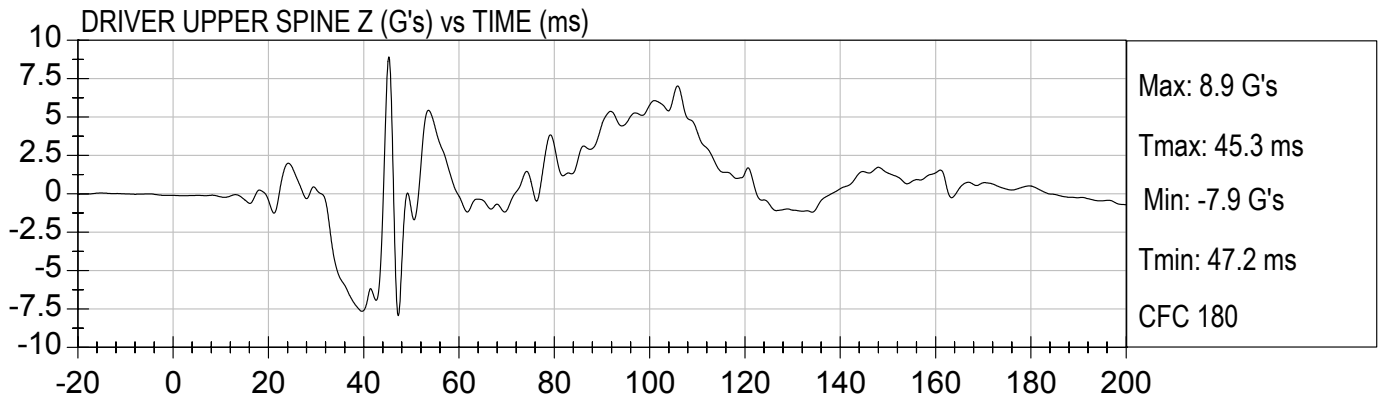
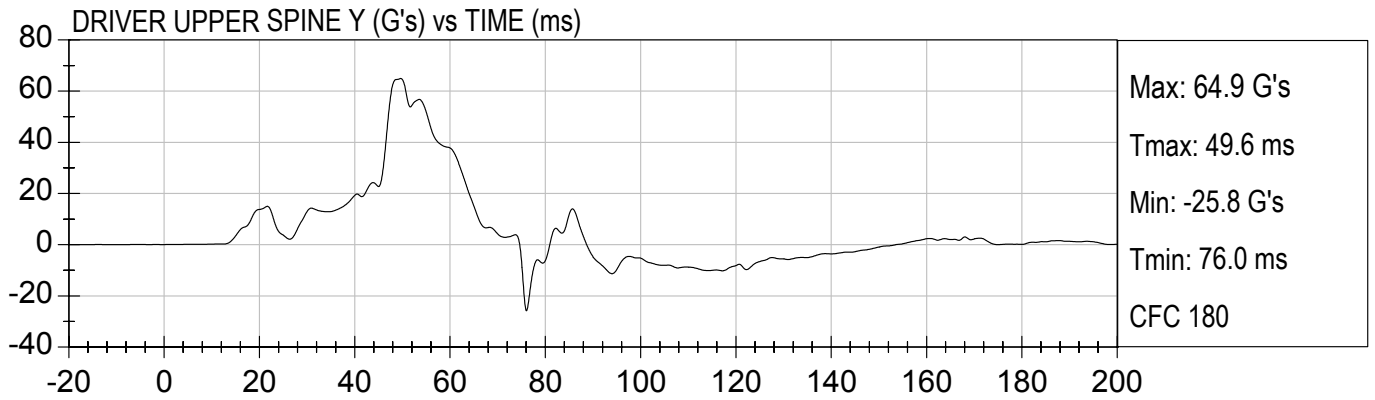
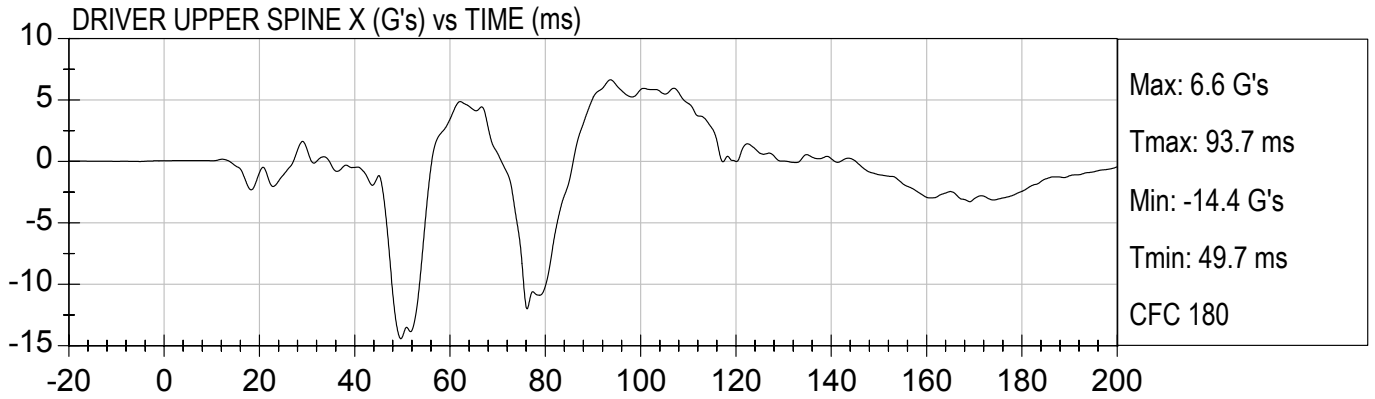


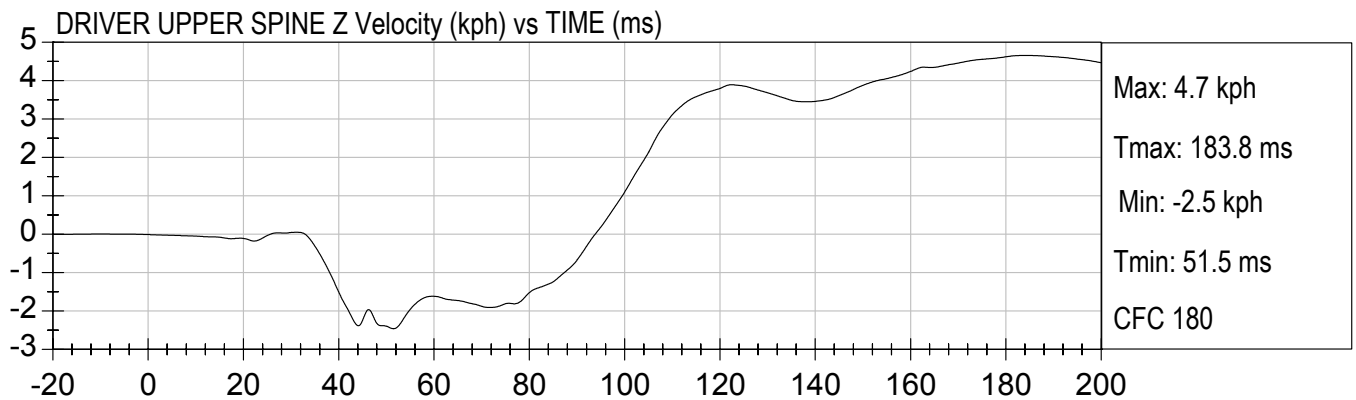
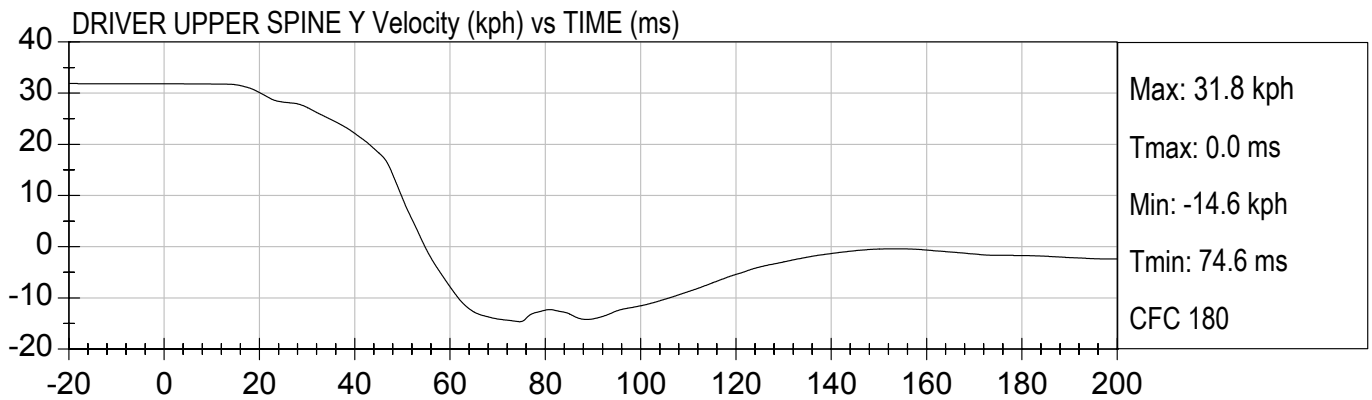
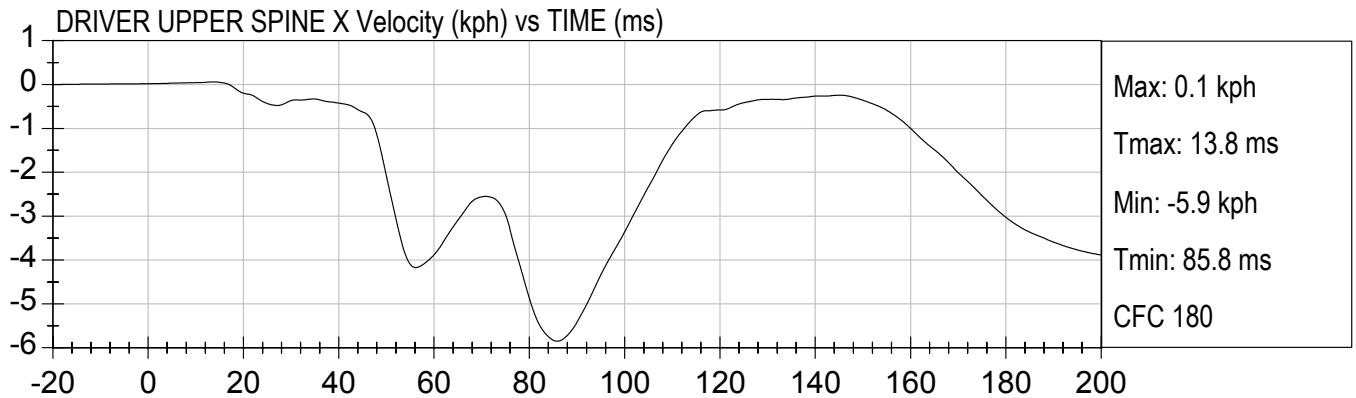


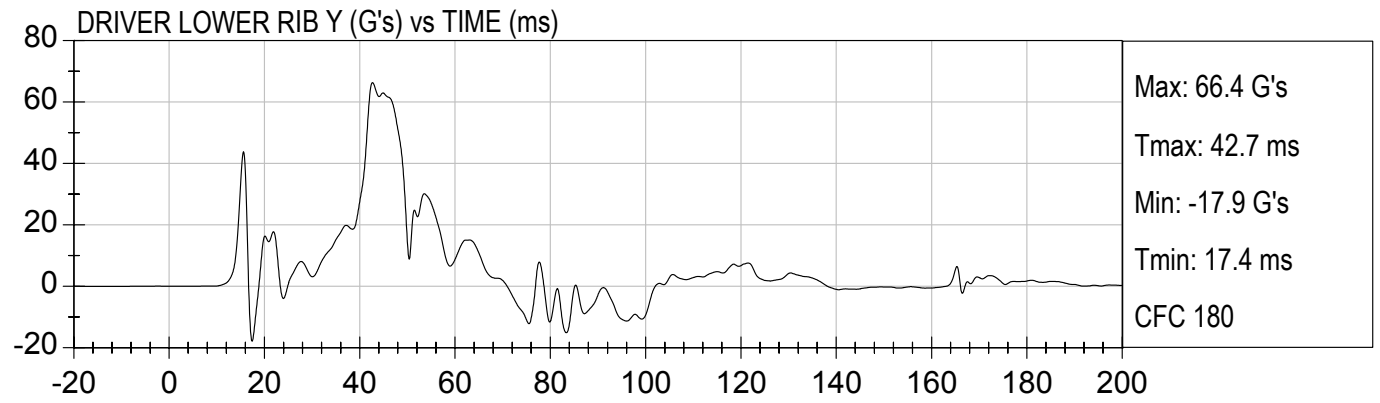
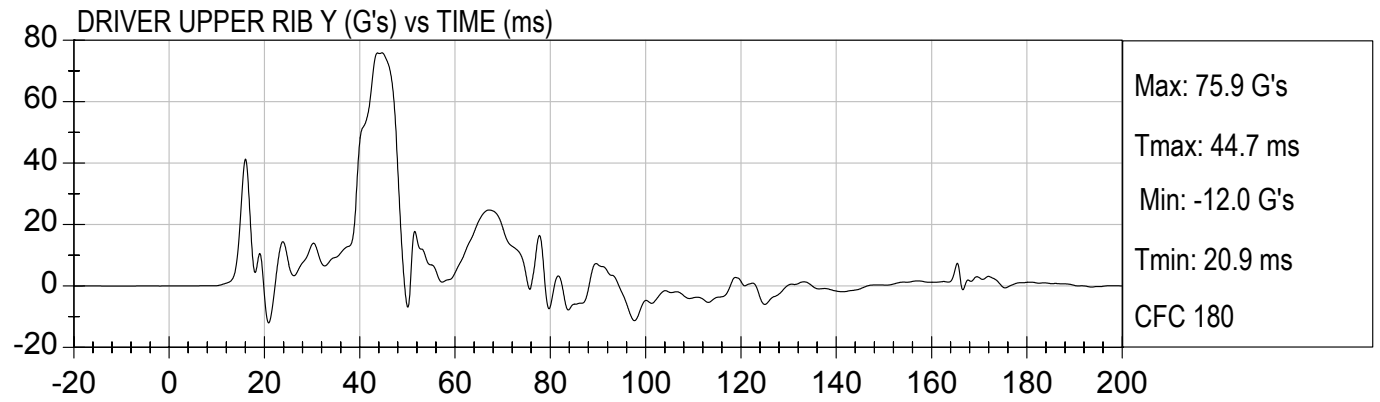
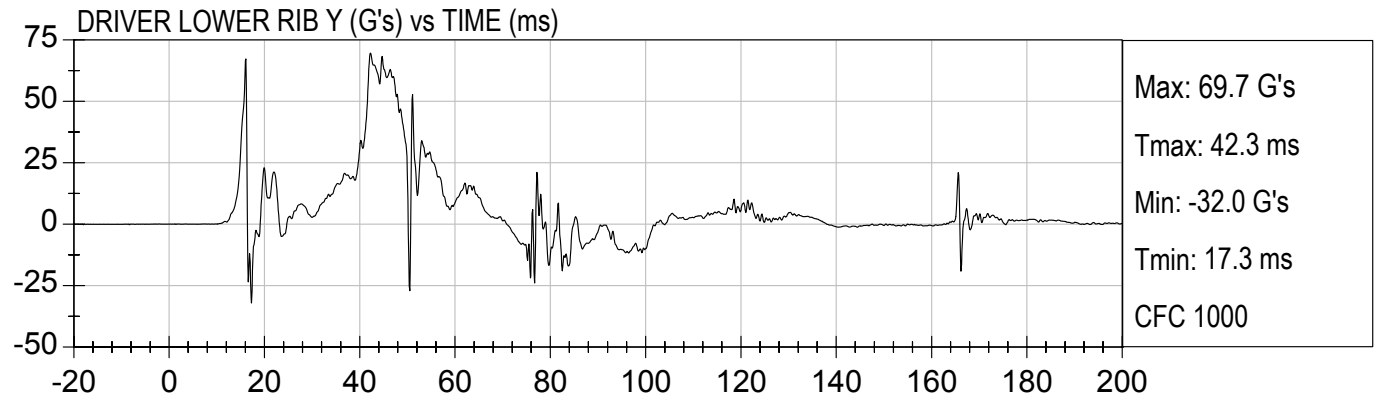
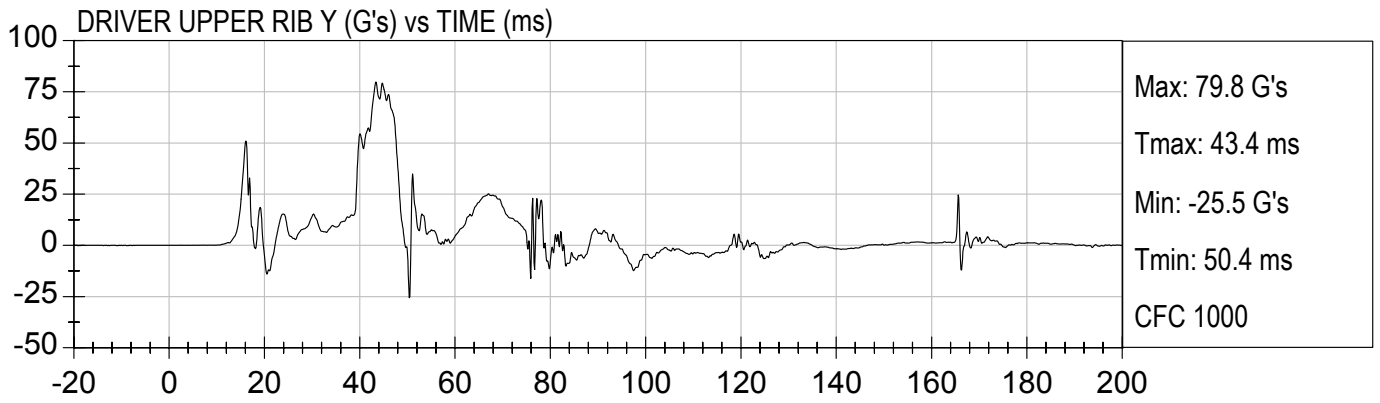
20 MPH SIDE POLE  
2000 SAAB 9-5 (RY0517)

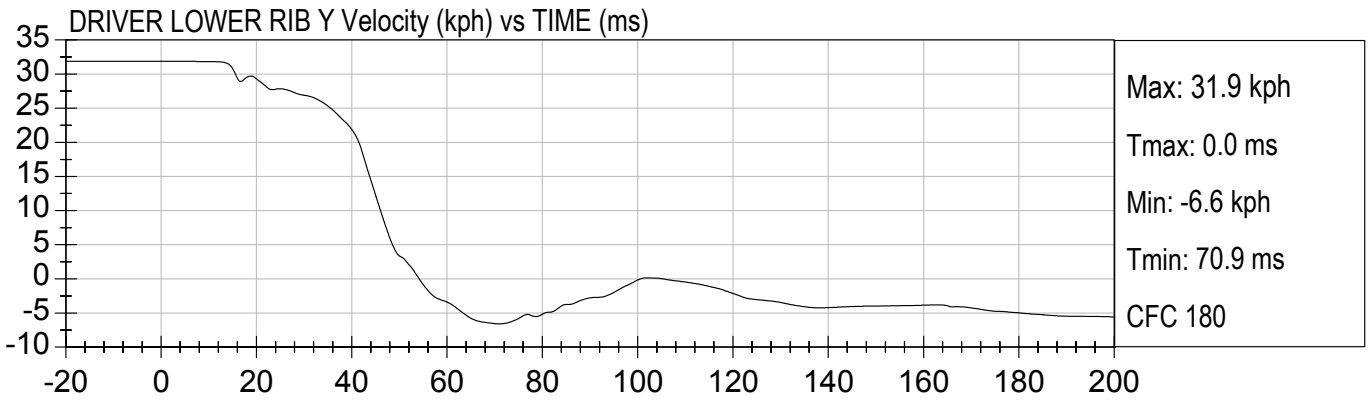
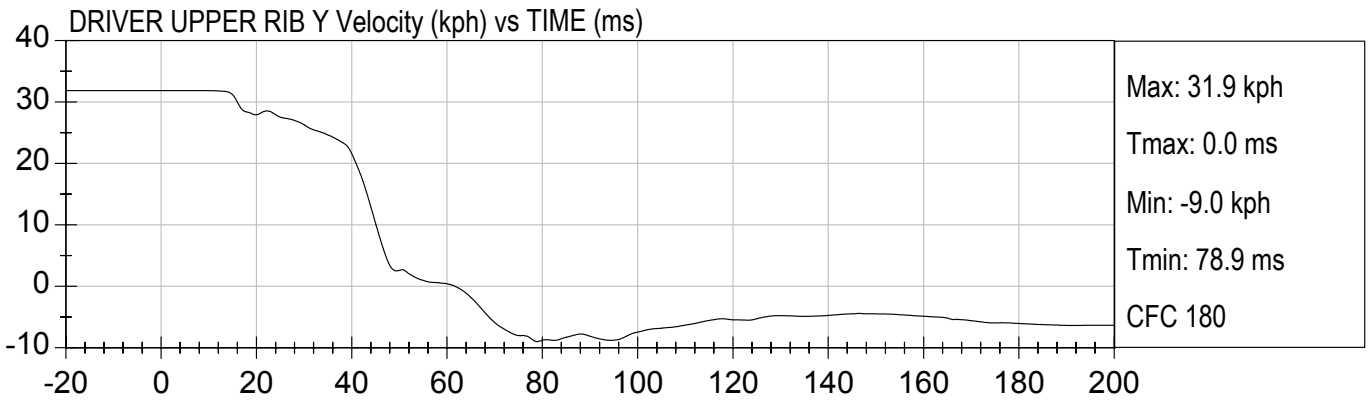
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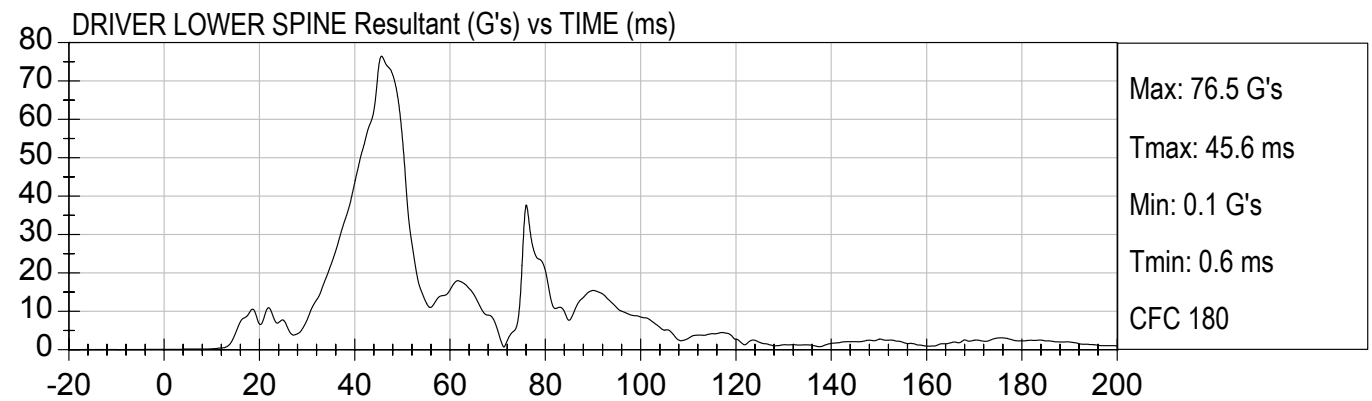
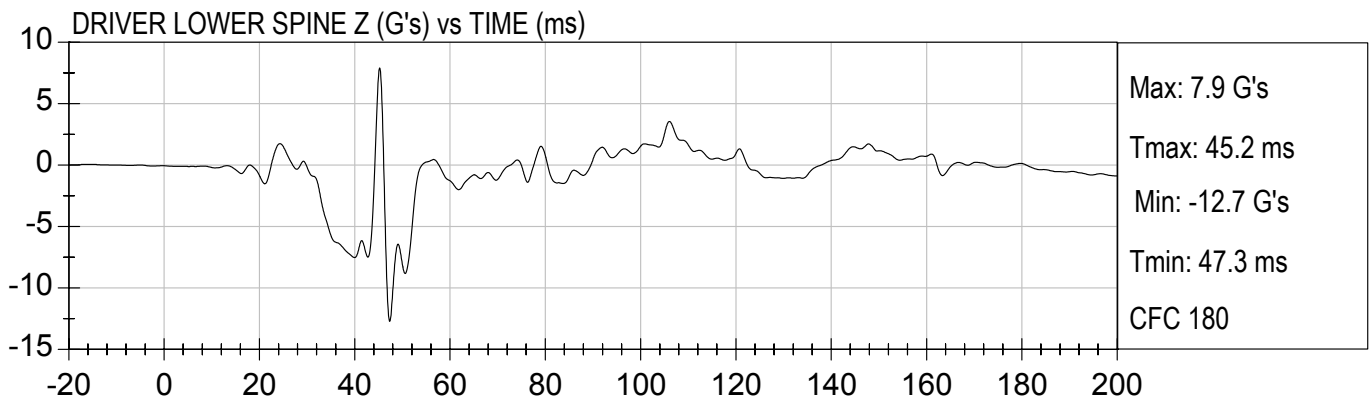
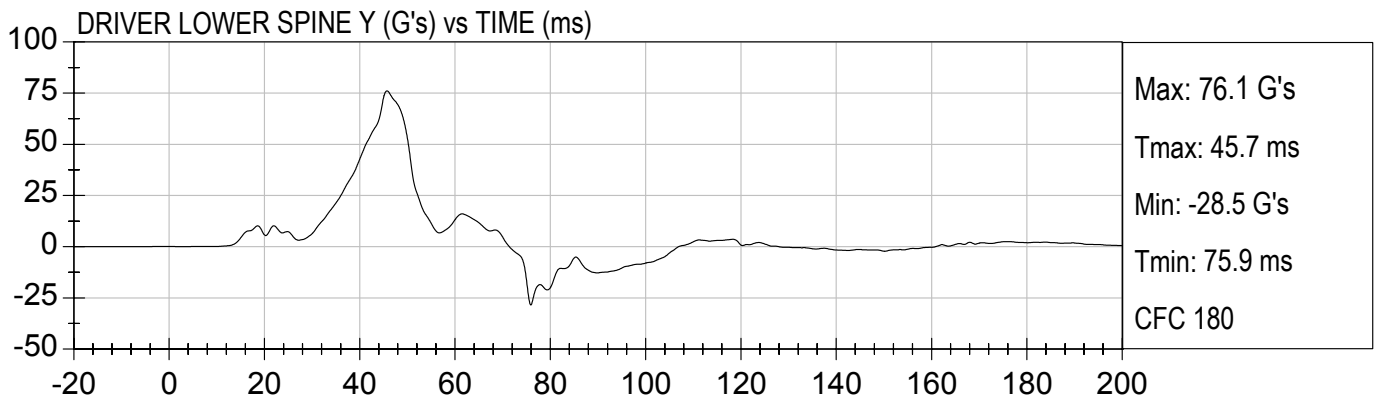
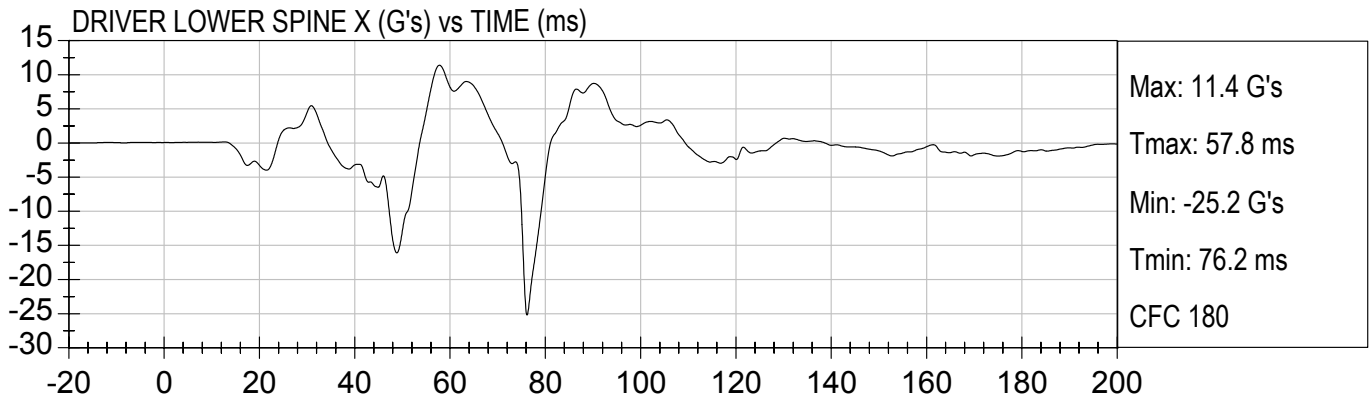


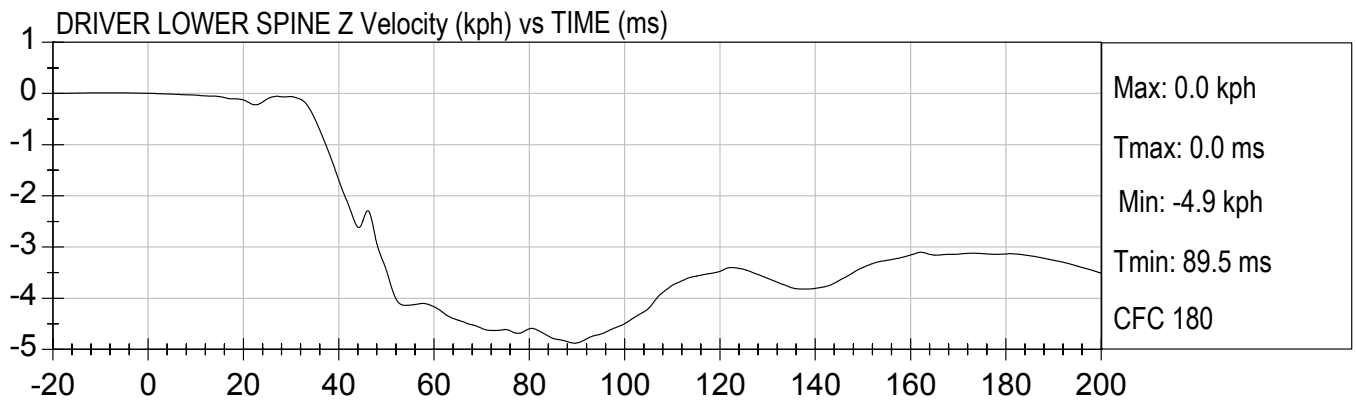
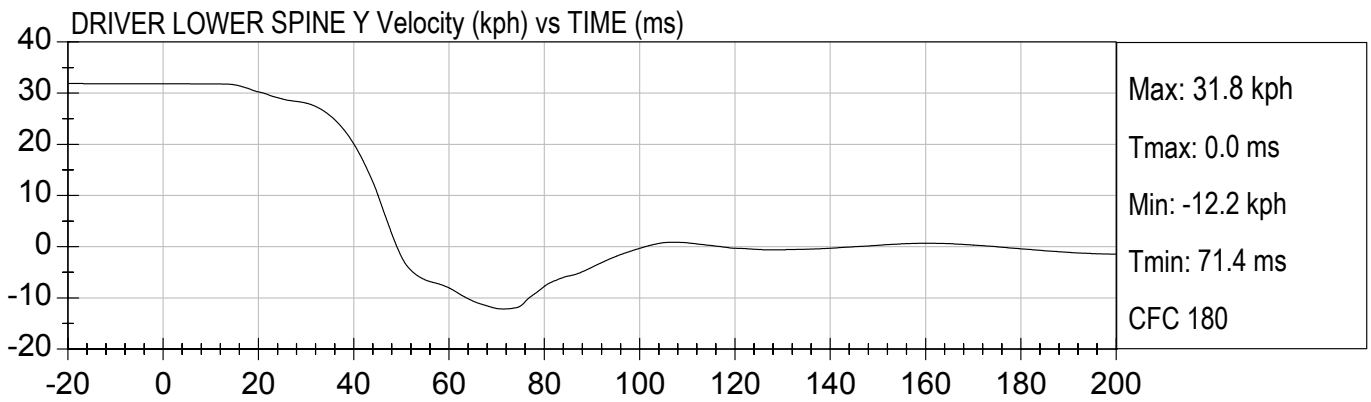
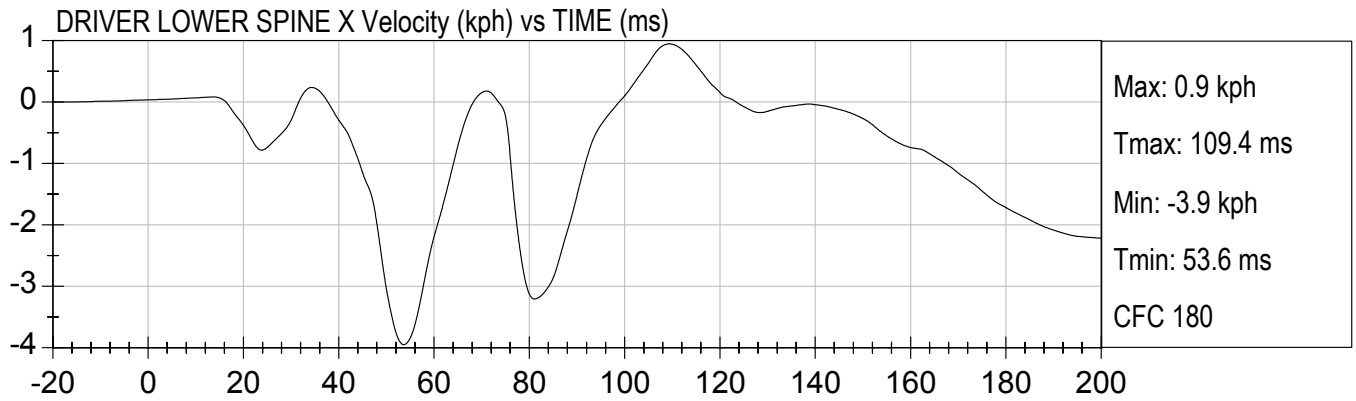


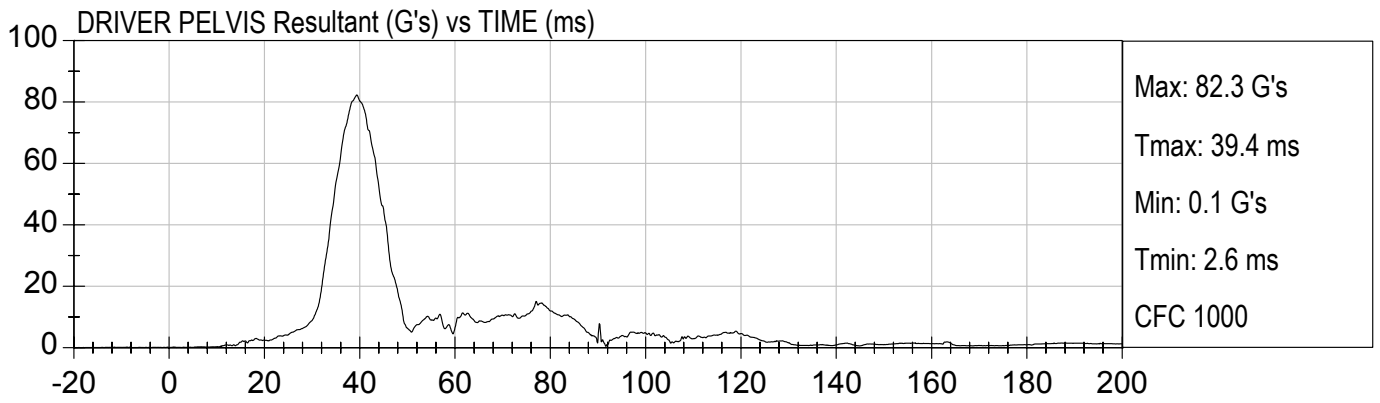
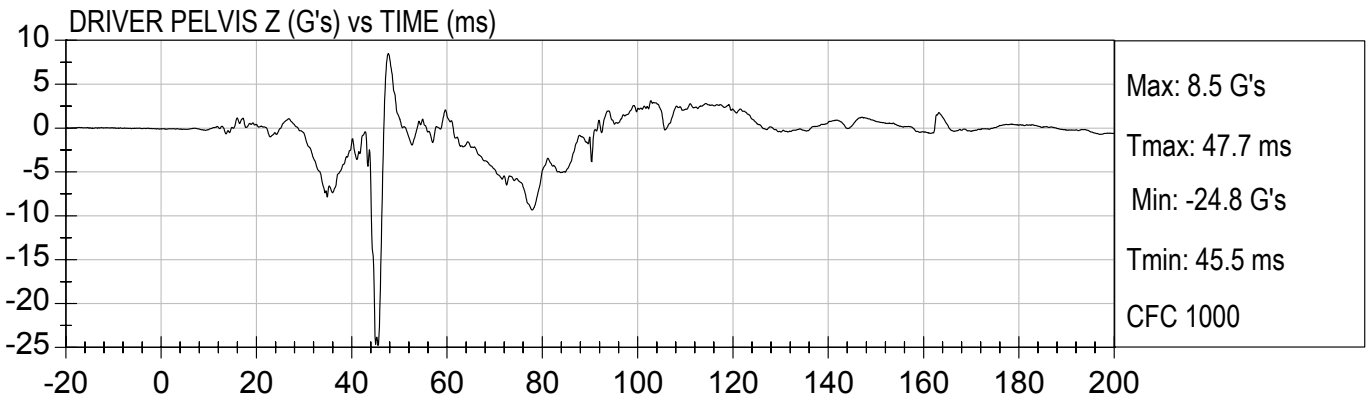
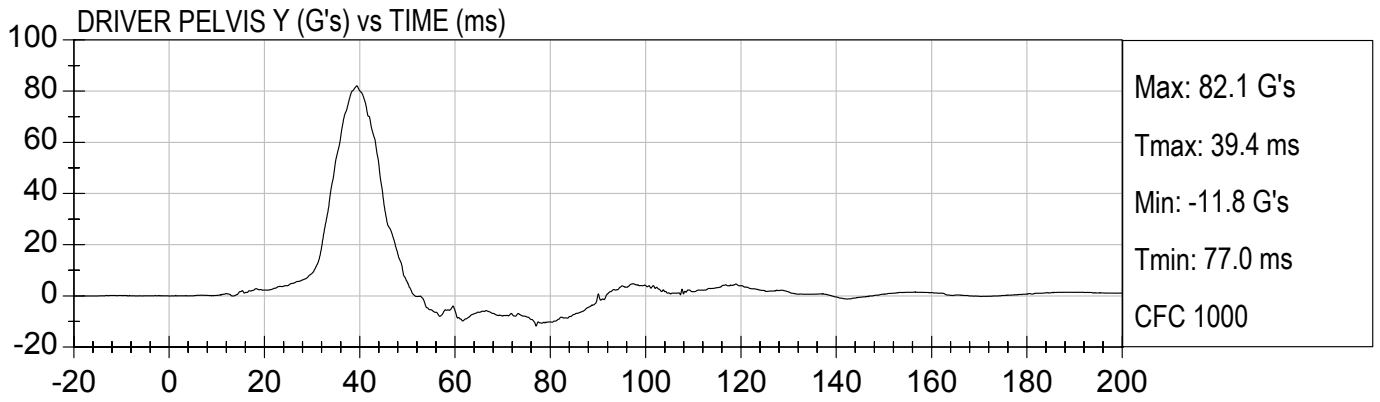
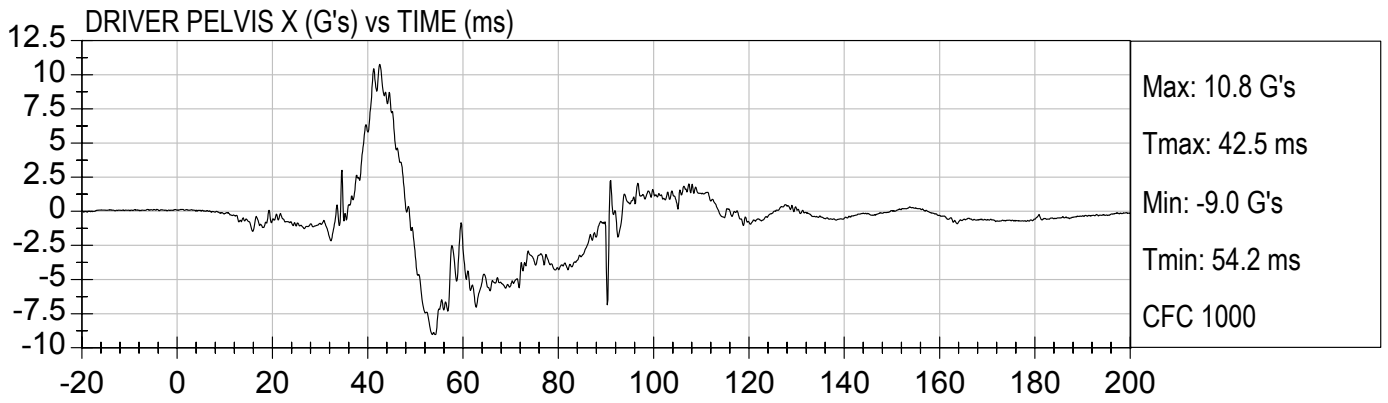


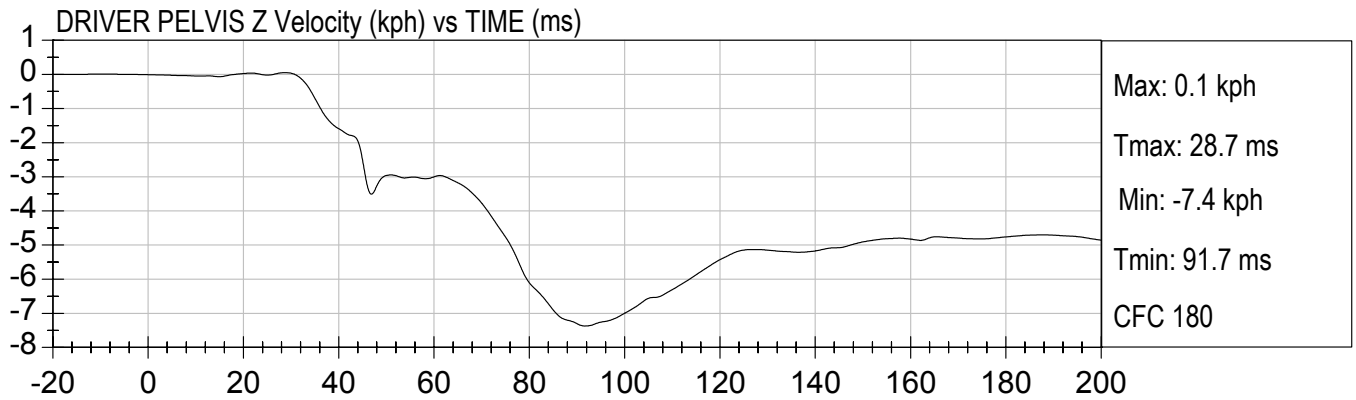
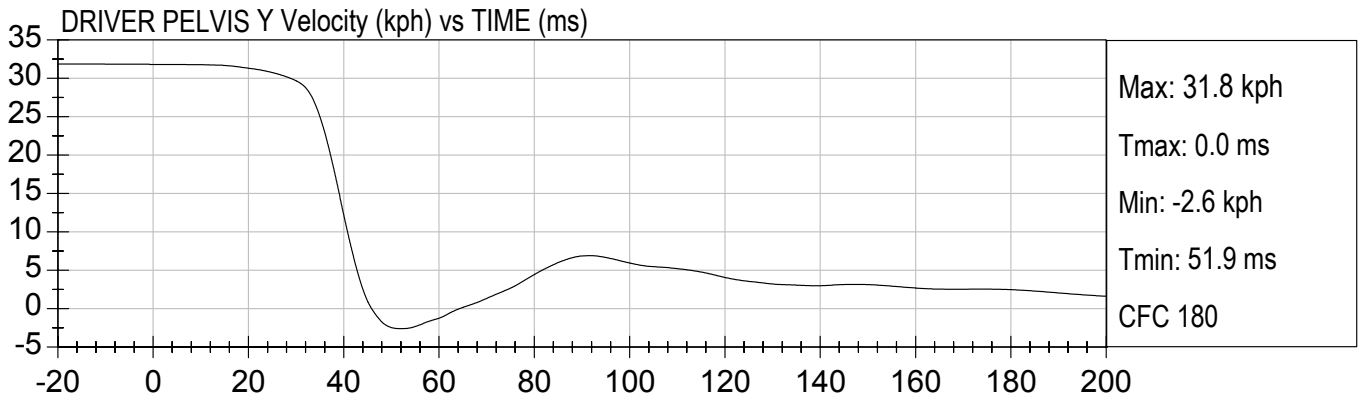
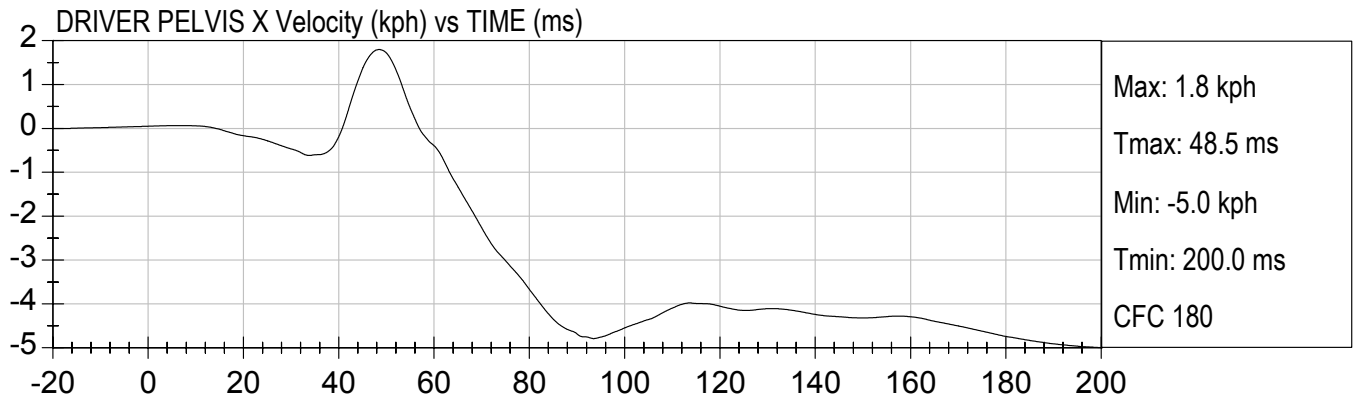
20 MPH SIDE POLE  
2000 SAAB 9-5 (RY0517)

Test Date: 1/29/2003  
Speed: 19.8 mph (31.9 km/h)





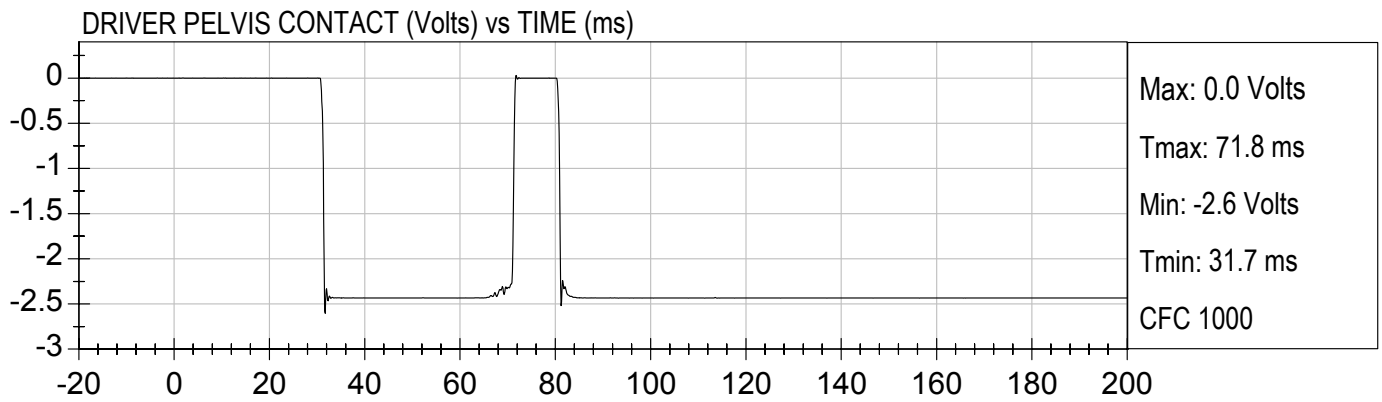
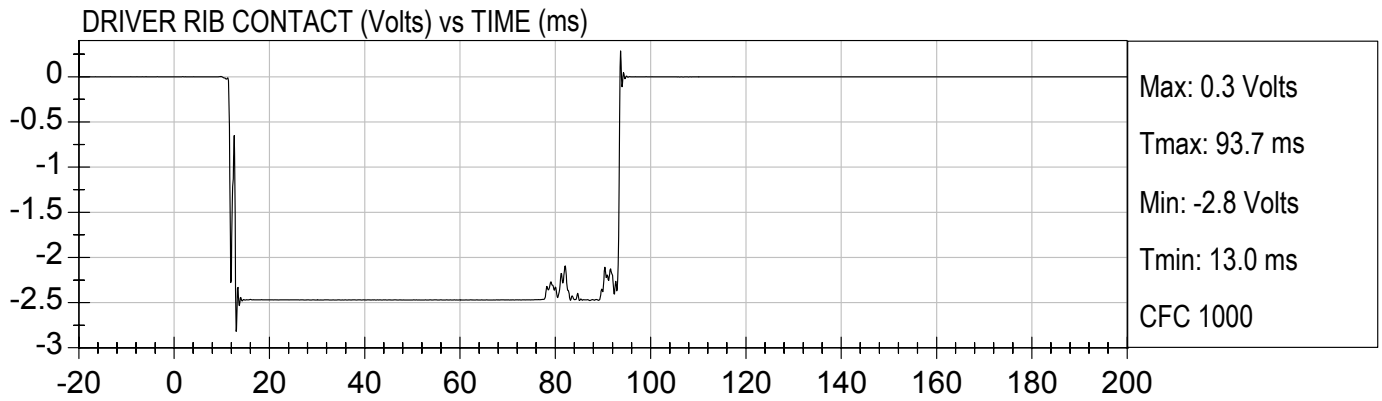


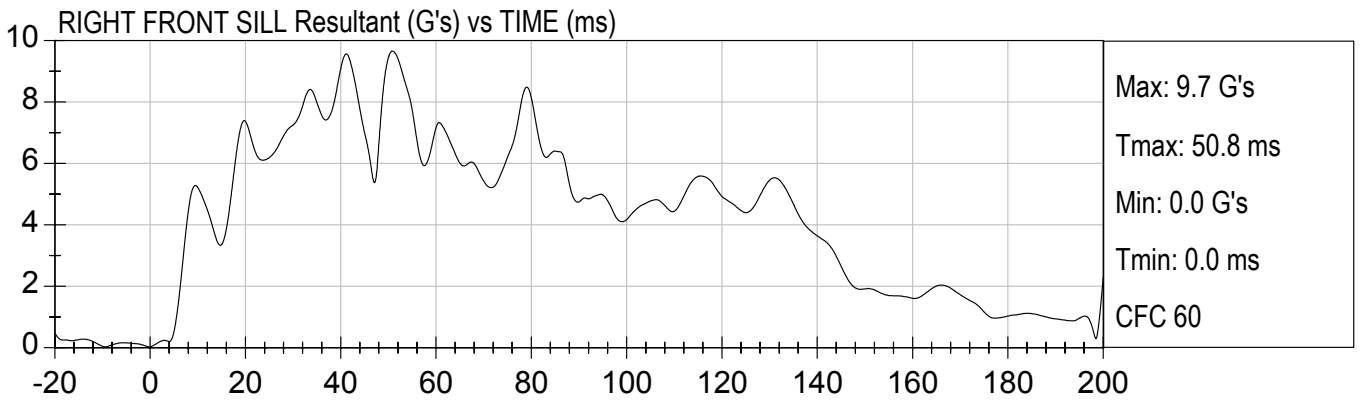
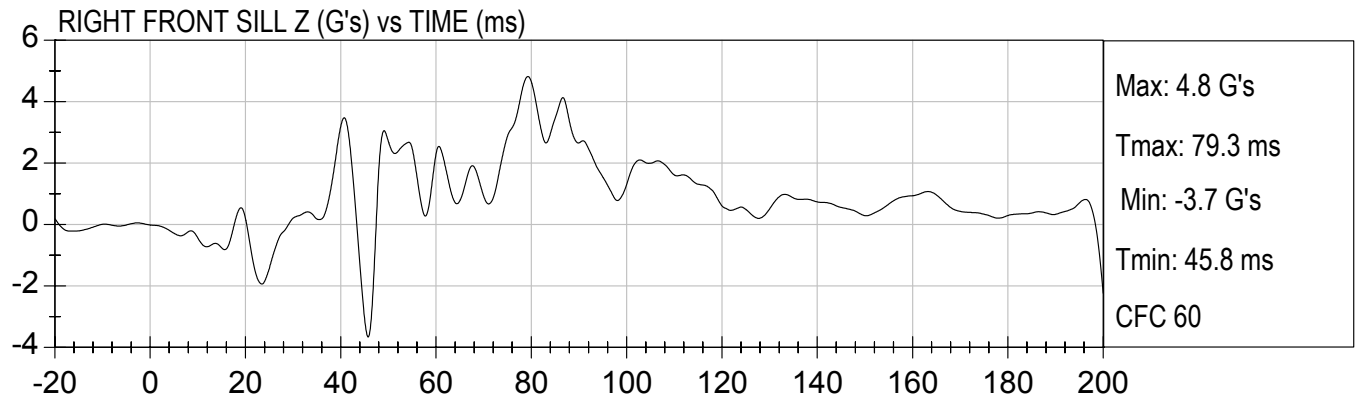
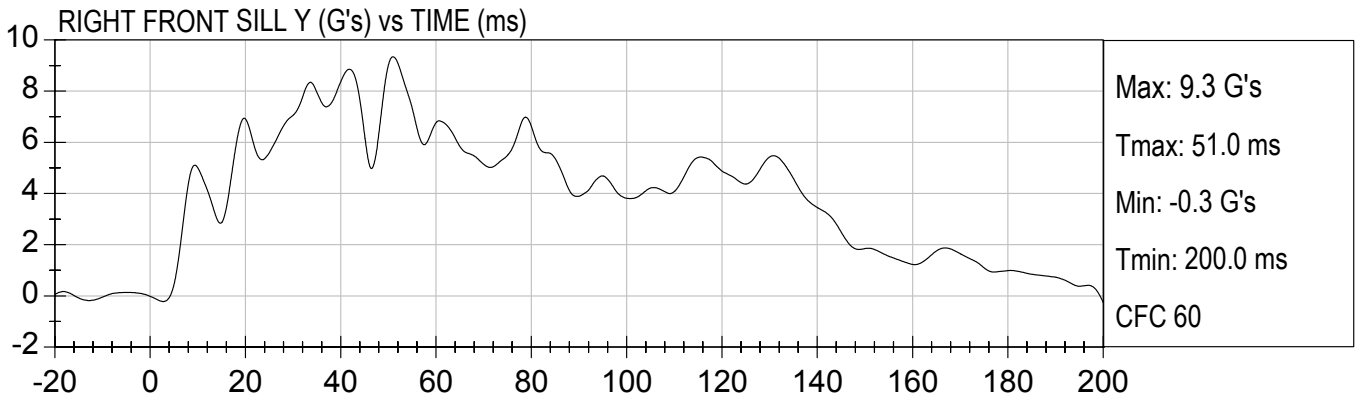
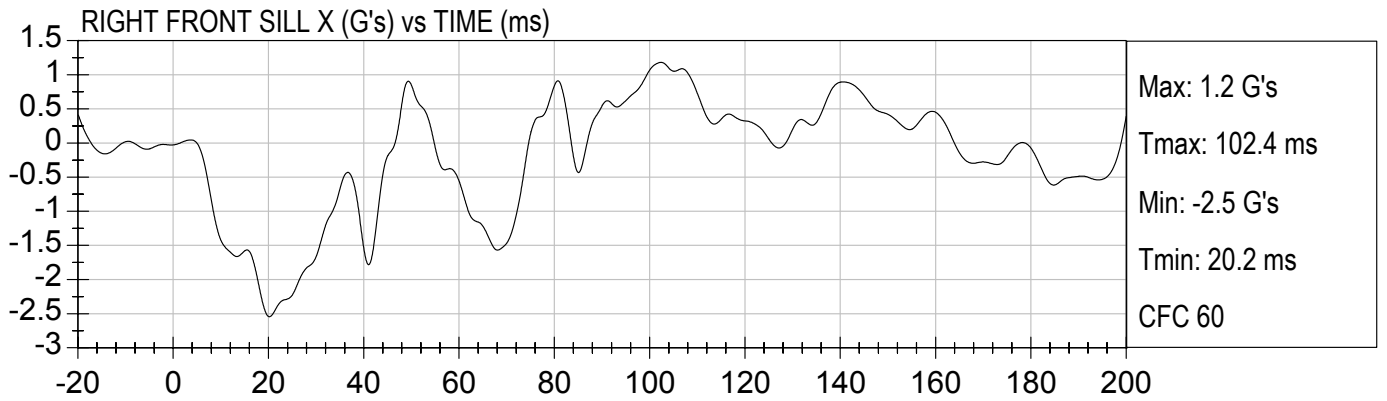


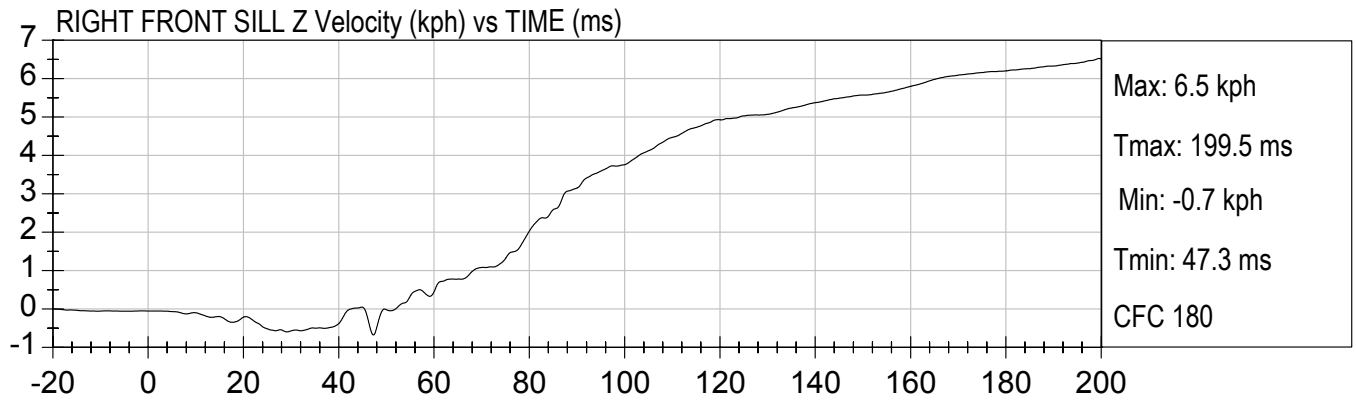
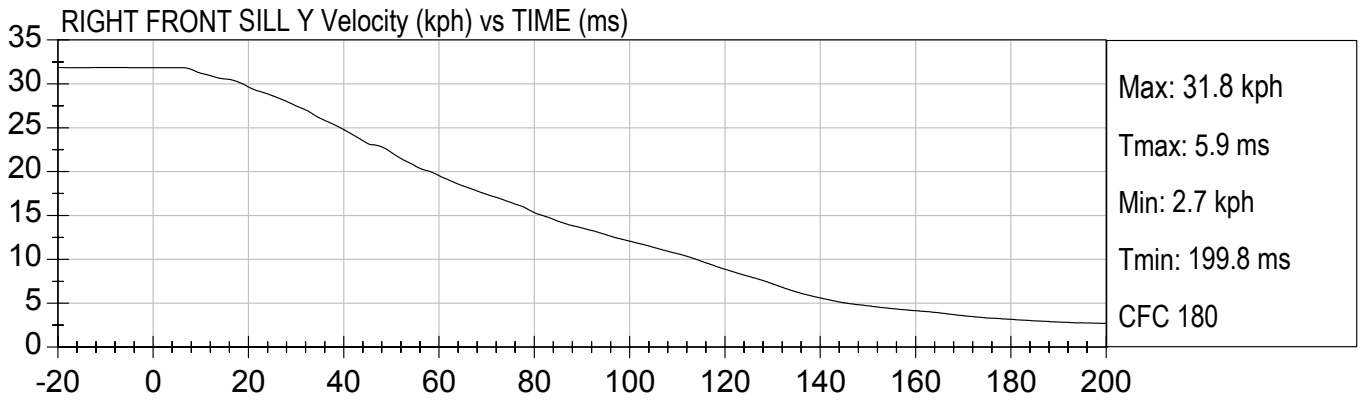
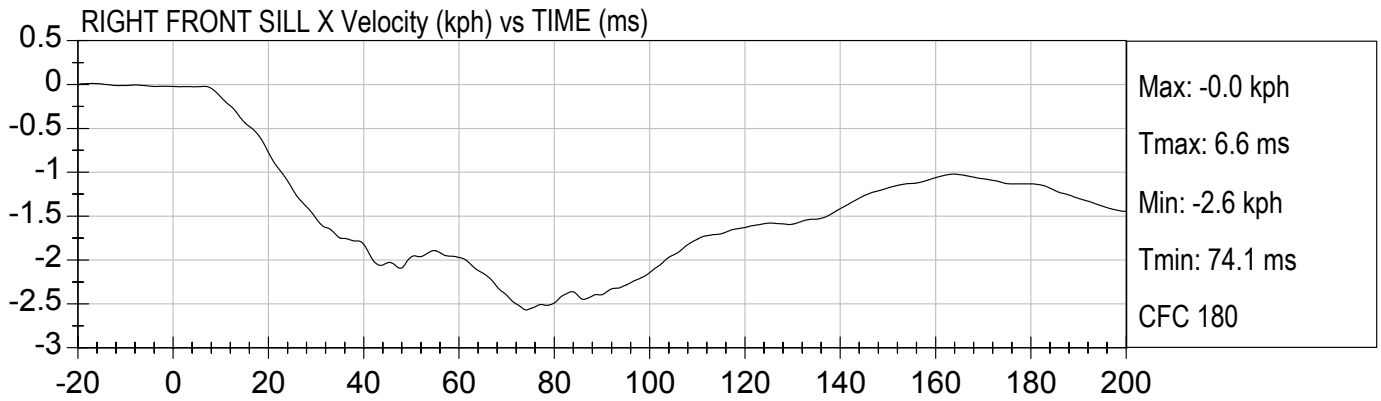


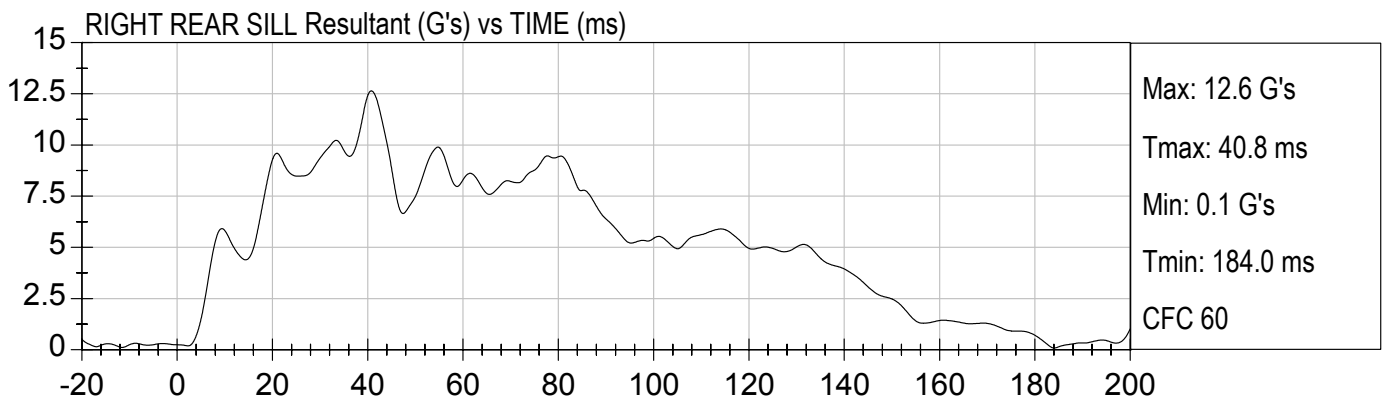
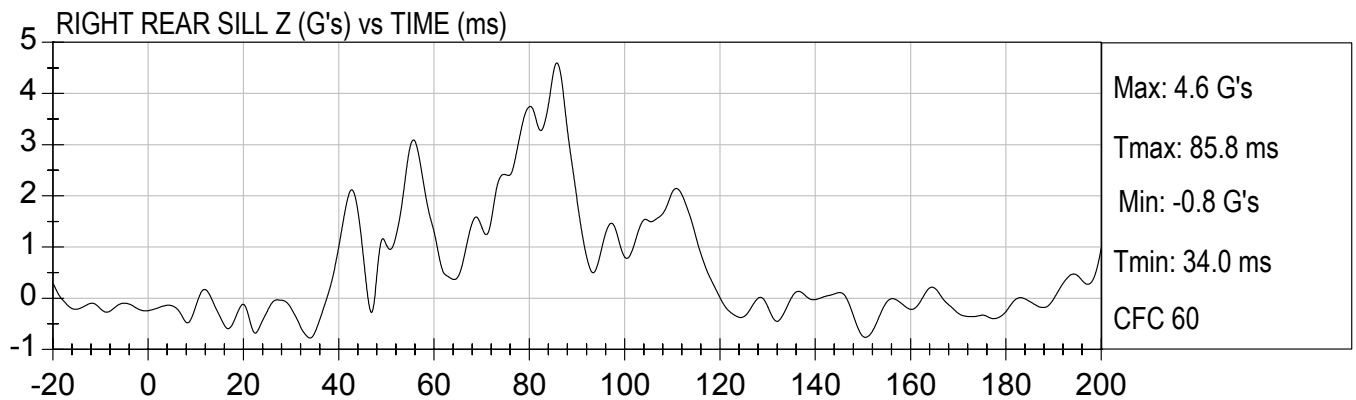
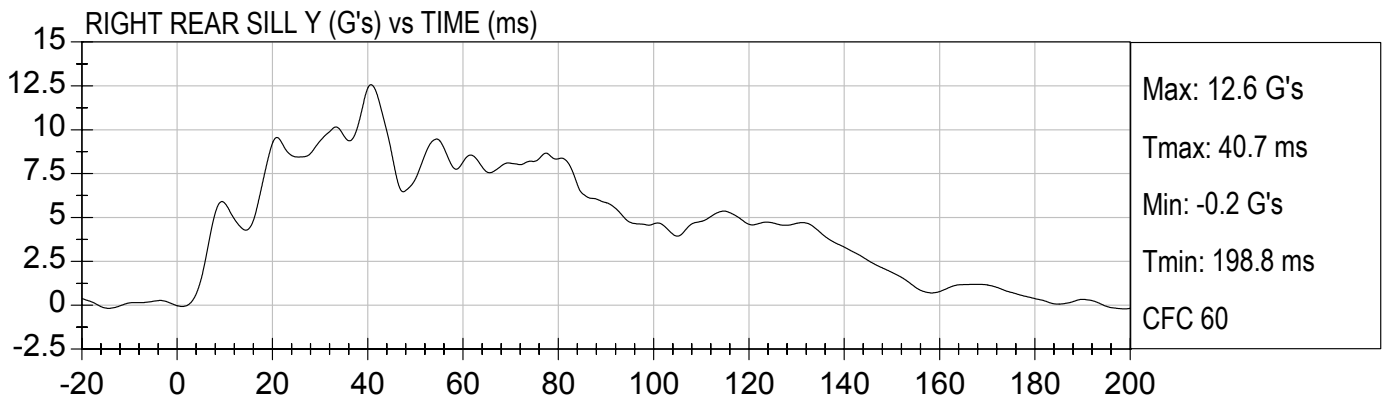
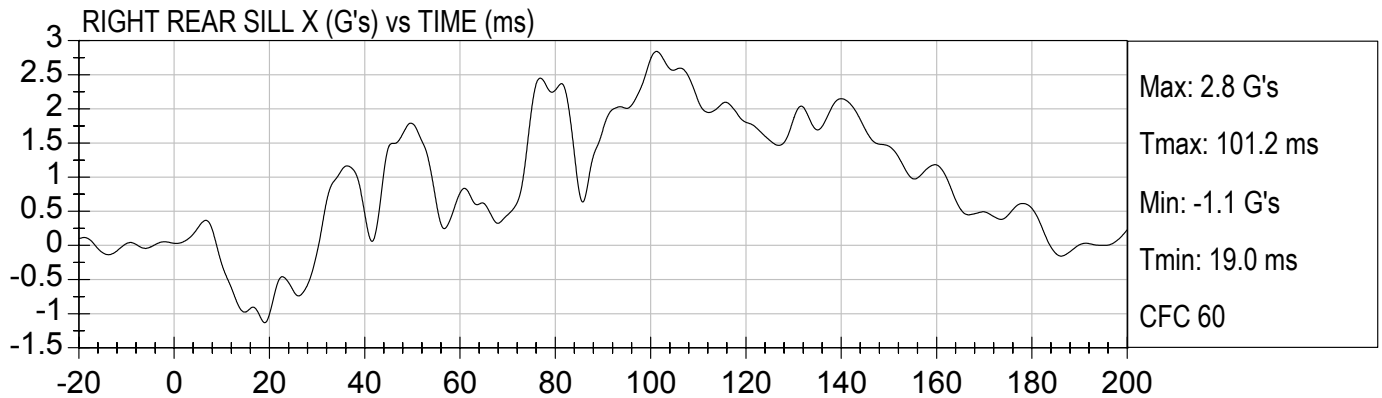
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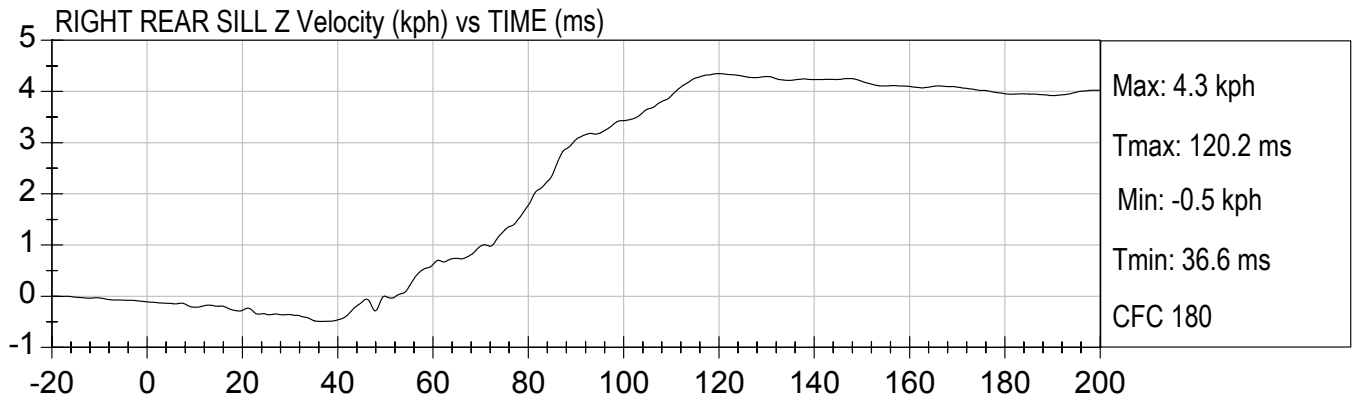
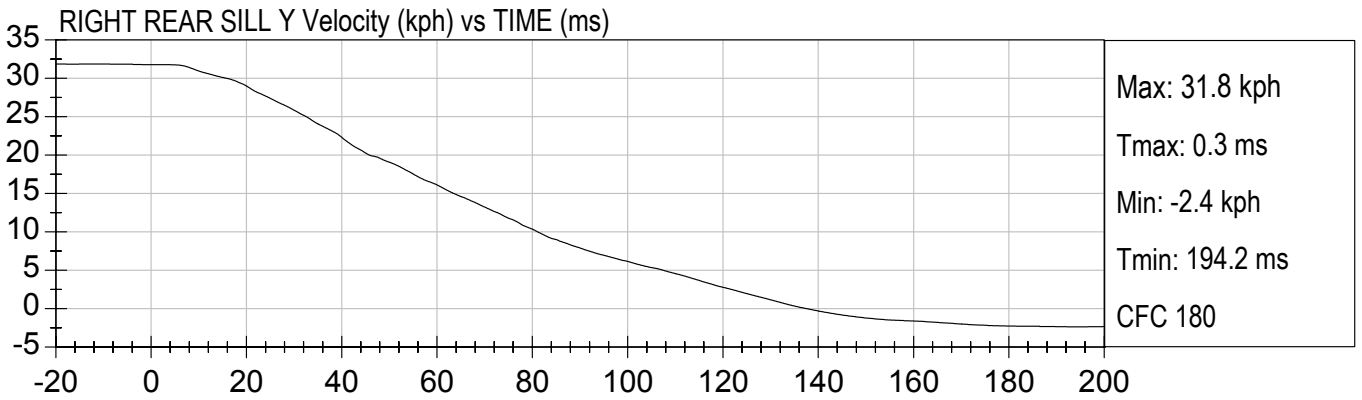
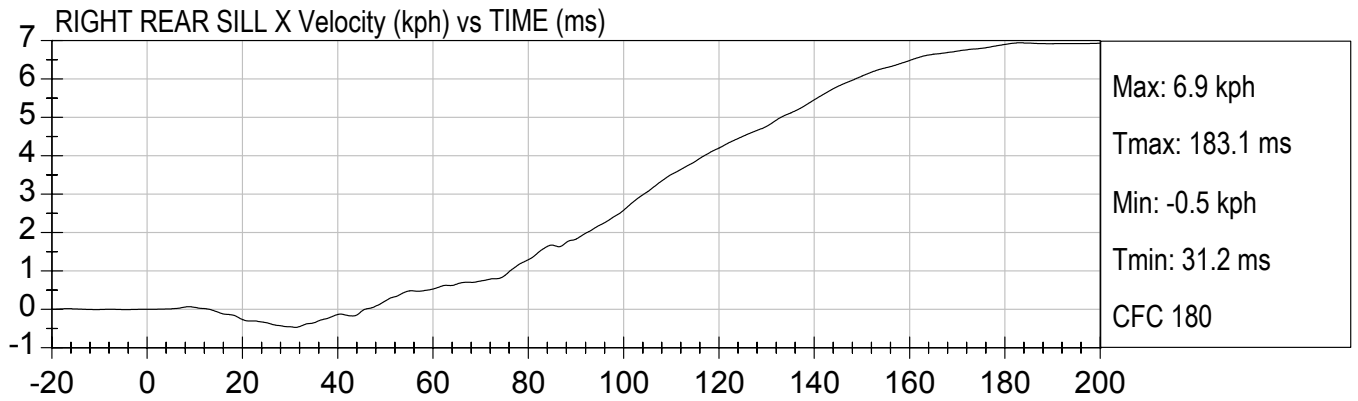
Test Date: 1/29/2003  
Speed: 19.8 mph (31.9 km/h)





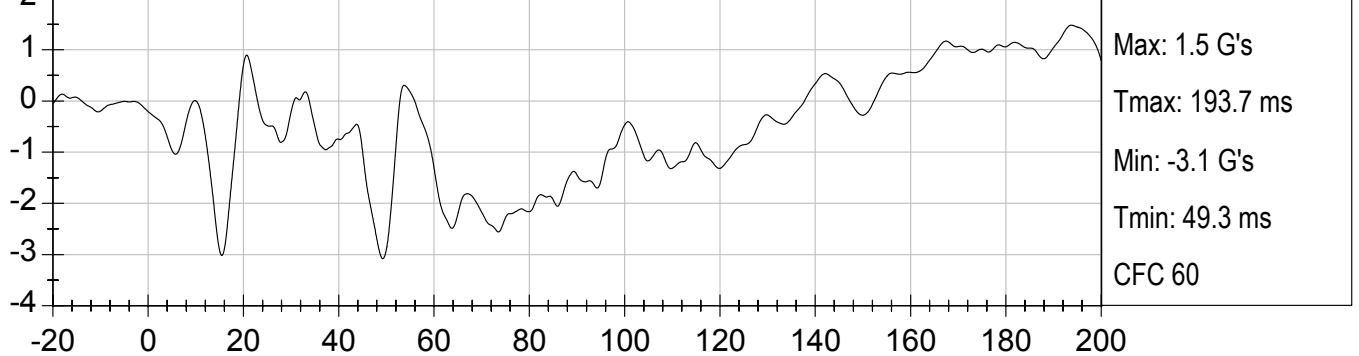




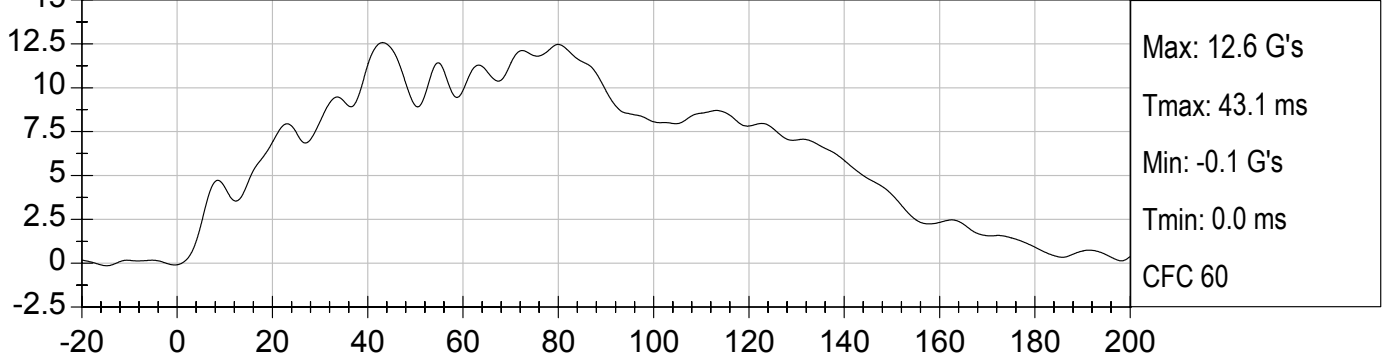




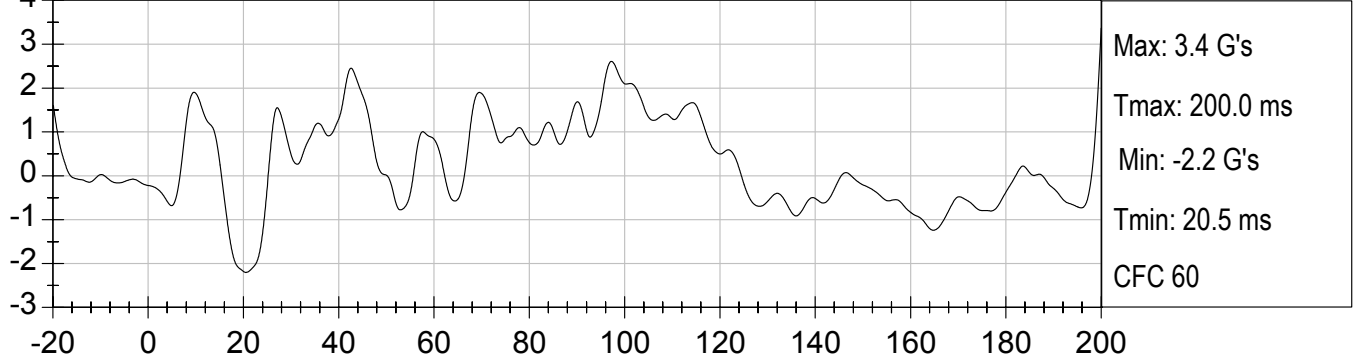
FLOORPAN @ REAR AXLE X (G's) vs TIME (ms)



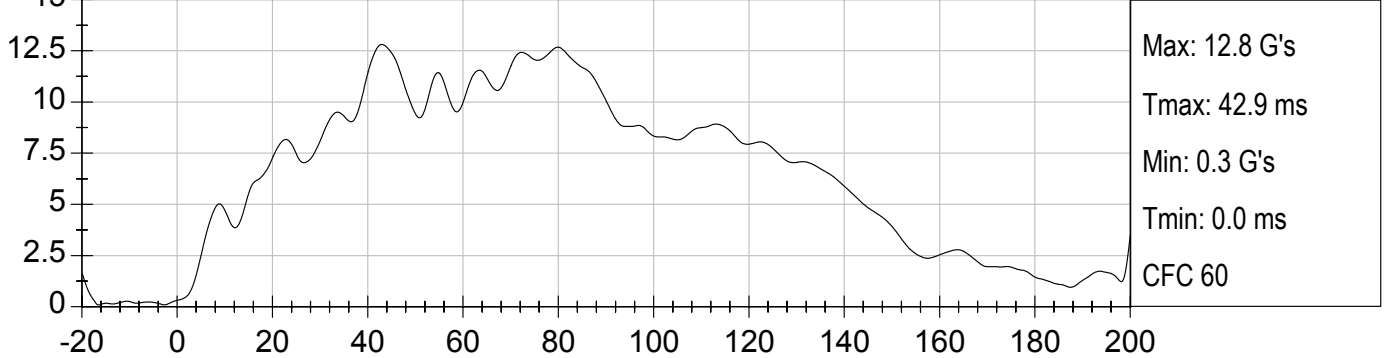
FLOORPAN @ REAR AXLE Y (G's) vs TIME (ms)



FLOORPAN @ REAR AXLE Z (G's) vs TIME (ms)

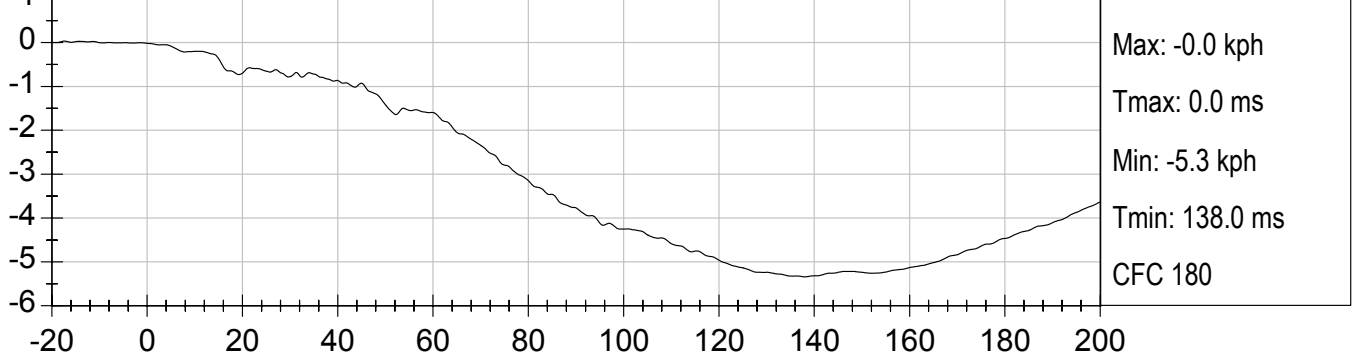


FLOORPAN @ REAR AXLE Resultant (G's) vs TIME (ms)

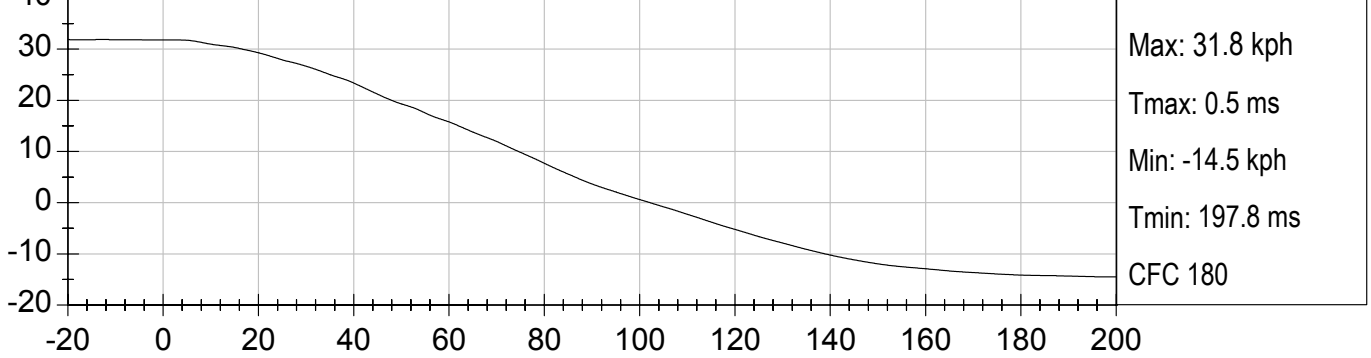




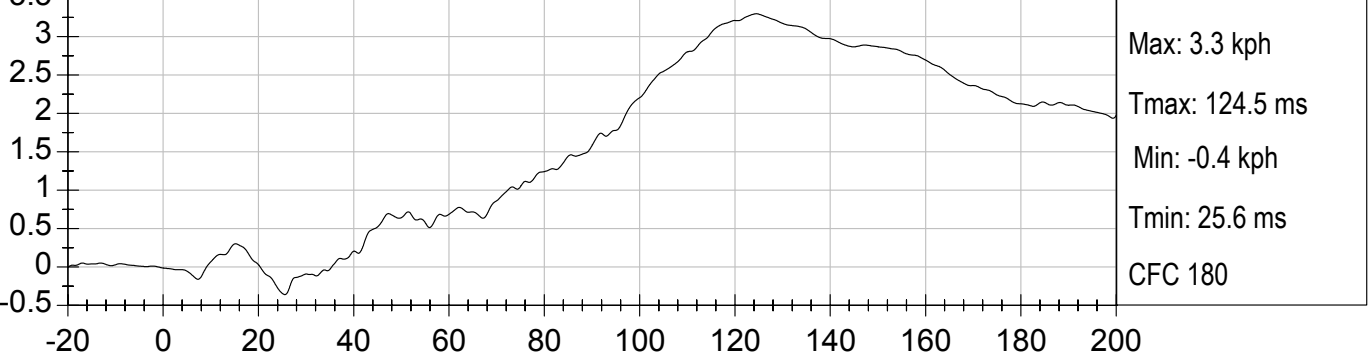
1 FLOORPAN @ REAR AXLE X Velocity (kph) vs TIME (ms)



FLOORPAN @ REAR AXLE Y Velocity (kph) vs TIME (ms)

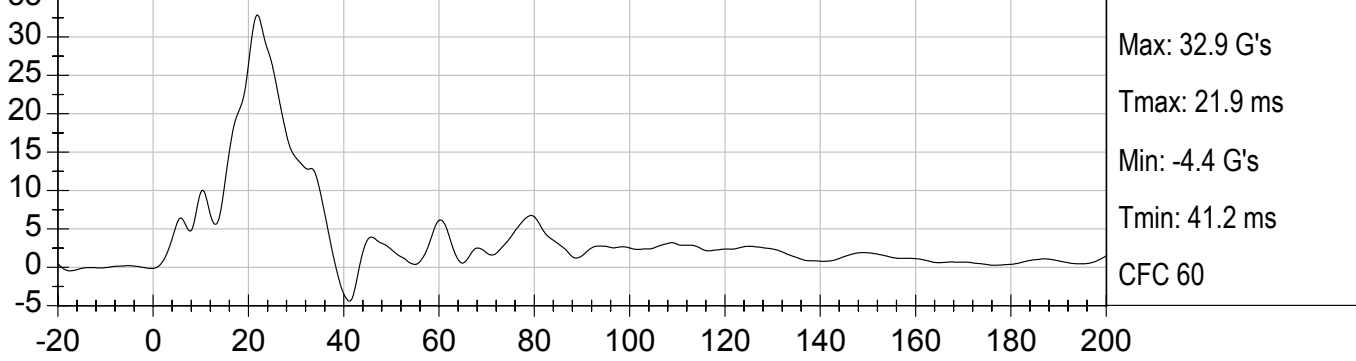


FLOORPAN @ REAR AXLE Z Velocity (kph) vs TIME (ms)

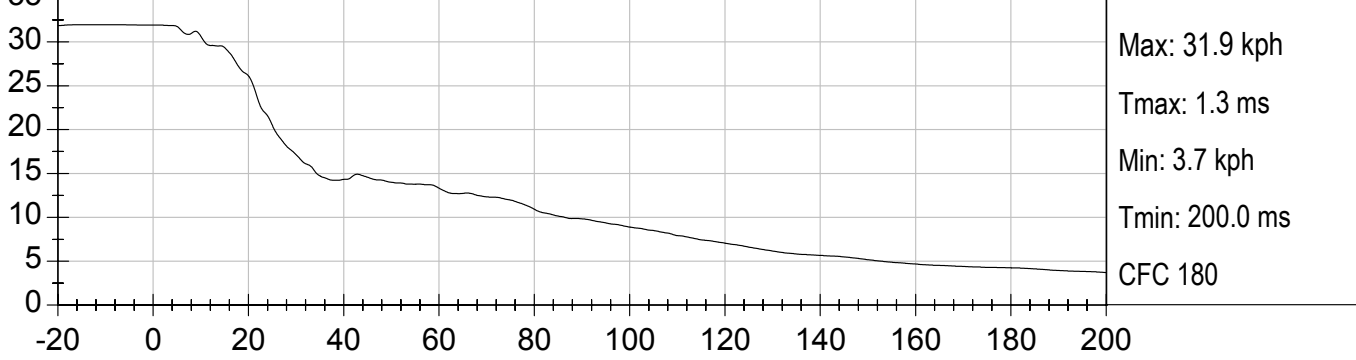




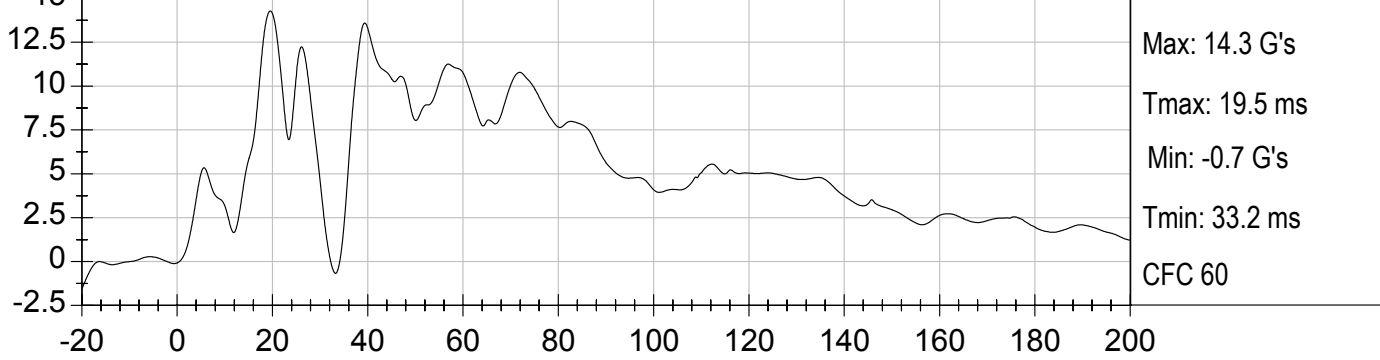
LEFT FRONT SILL Y (G's) vs TIME (ms)



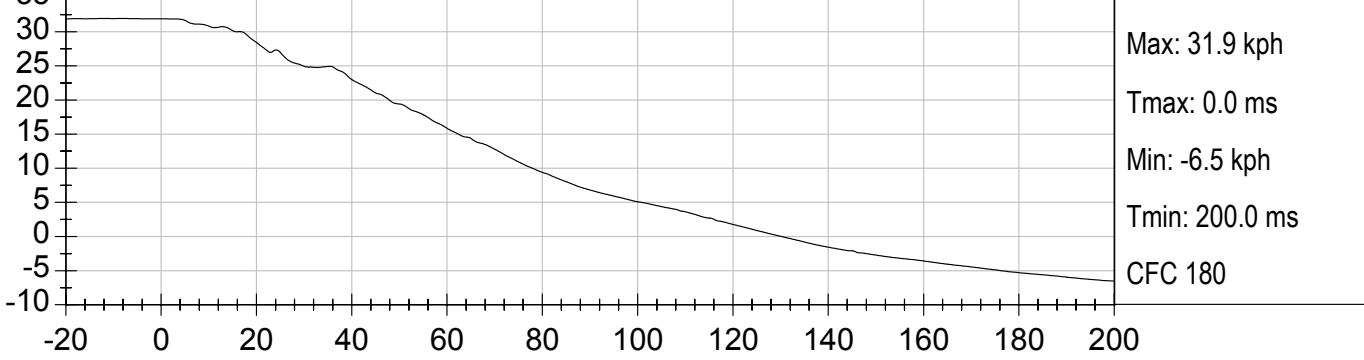
LEFT FRONT SILL Y Velocity (kph) vs TIME (ms)

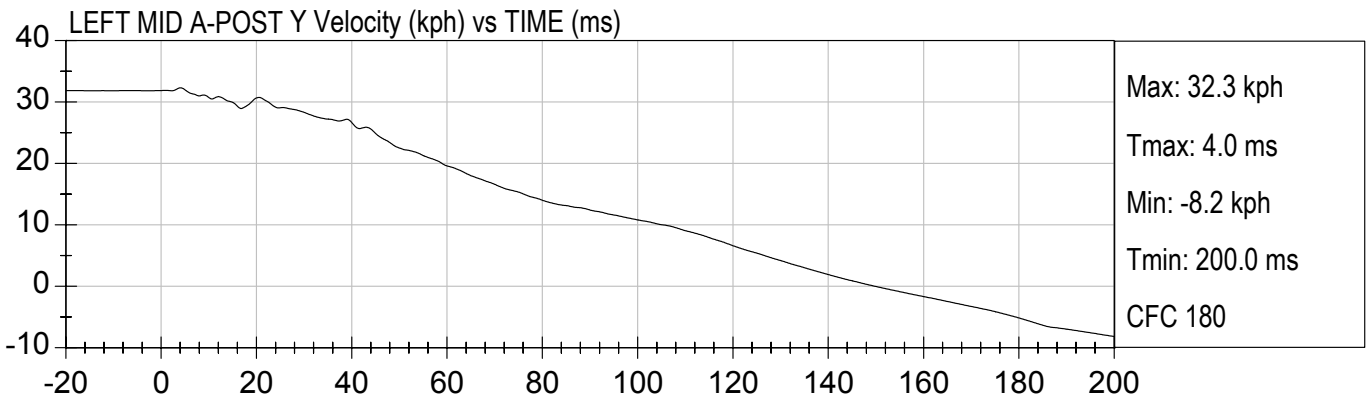
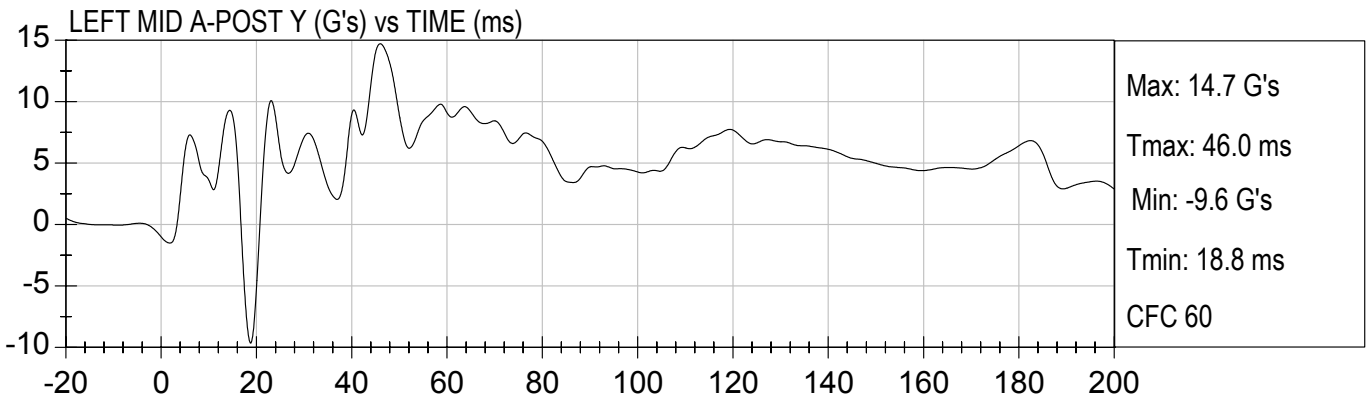
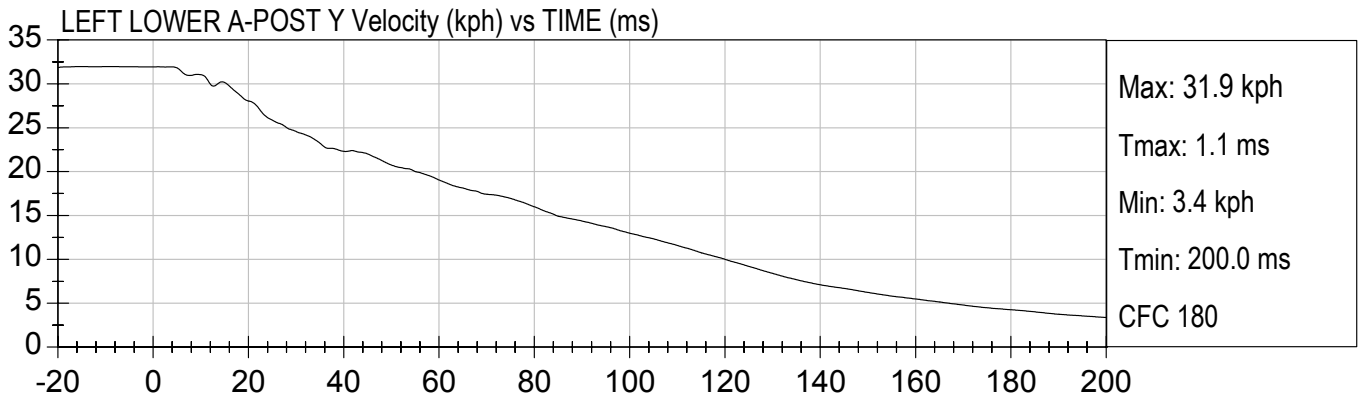
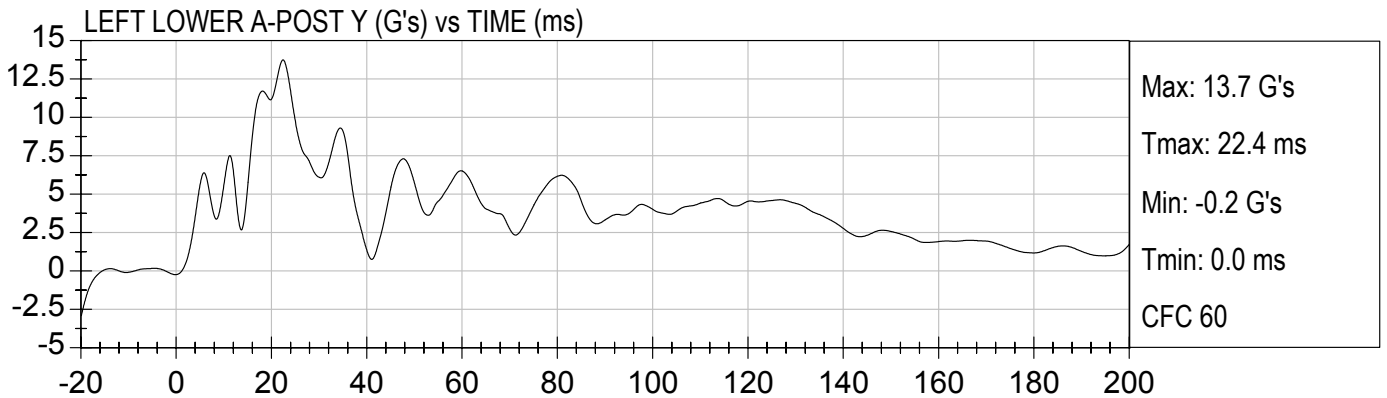


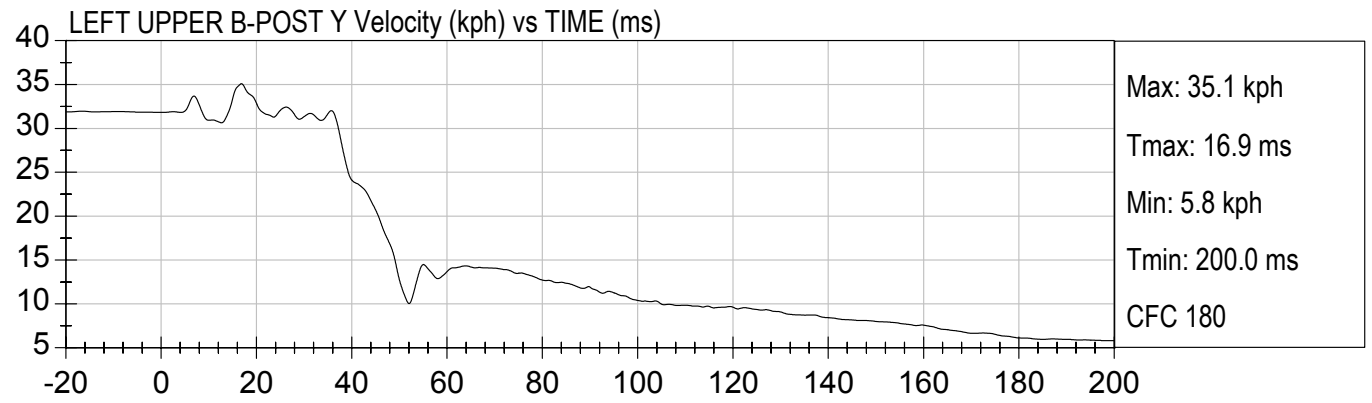
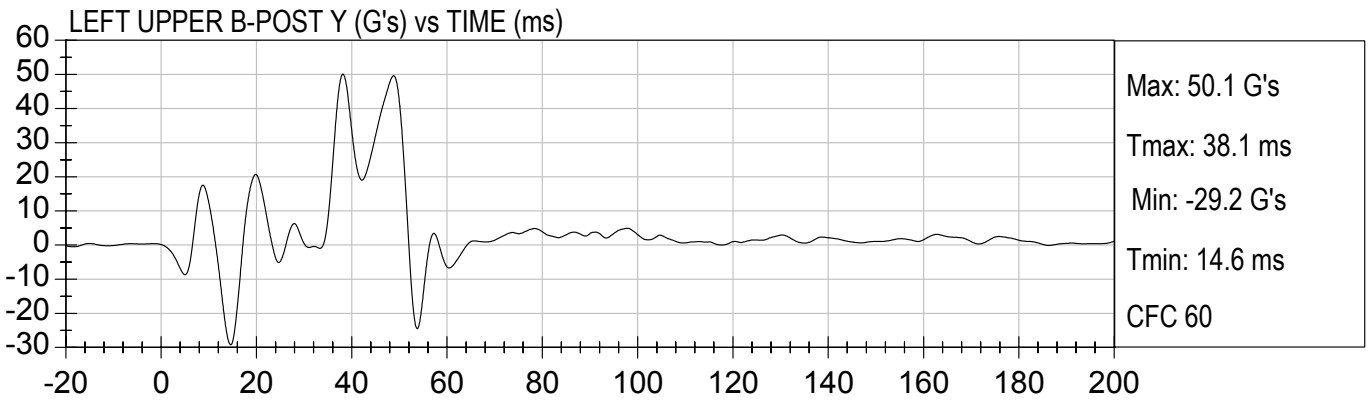
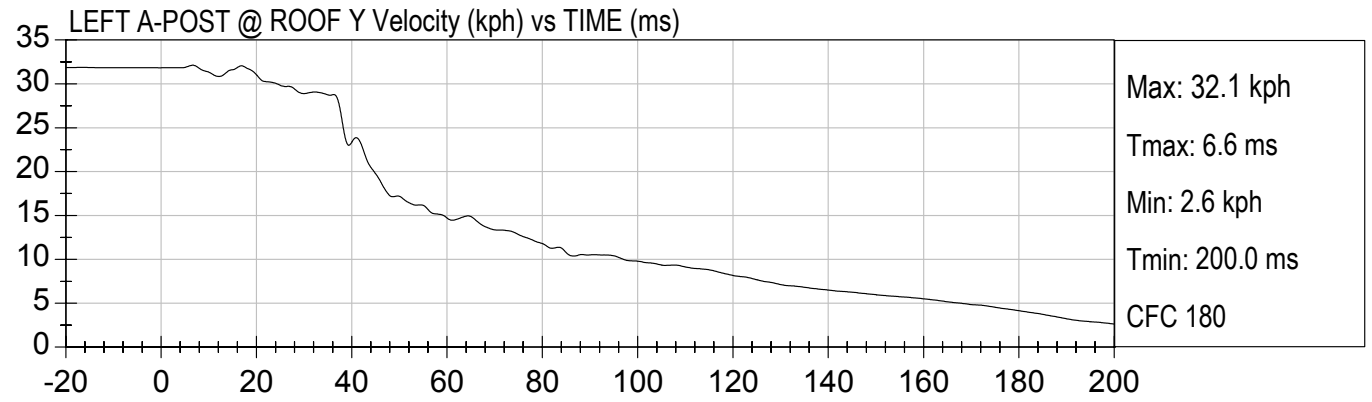
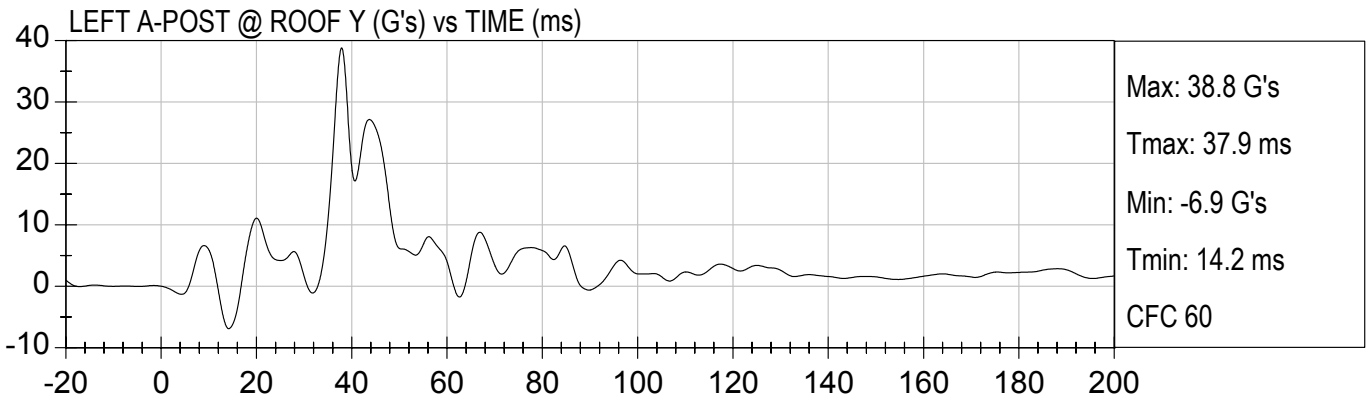
LEFT REAR SILL Y (G's) vs TIME (ms)

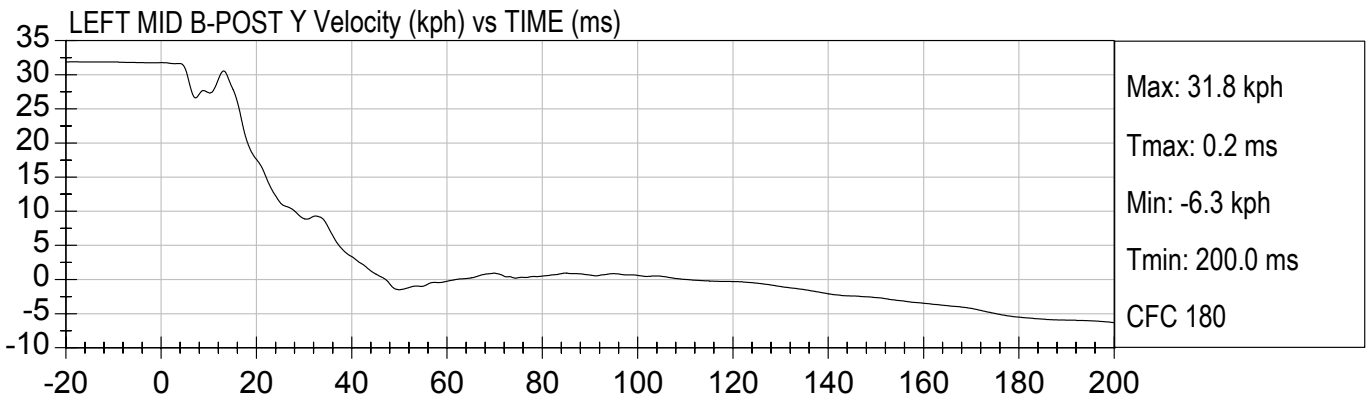
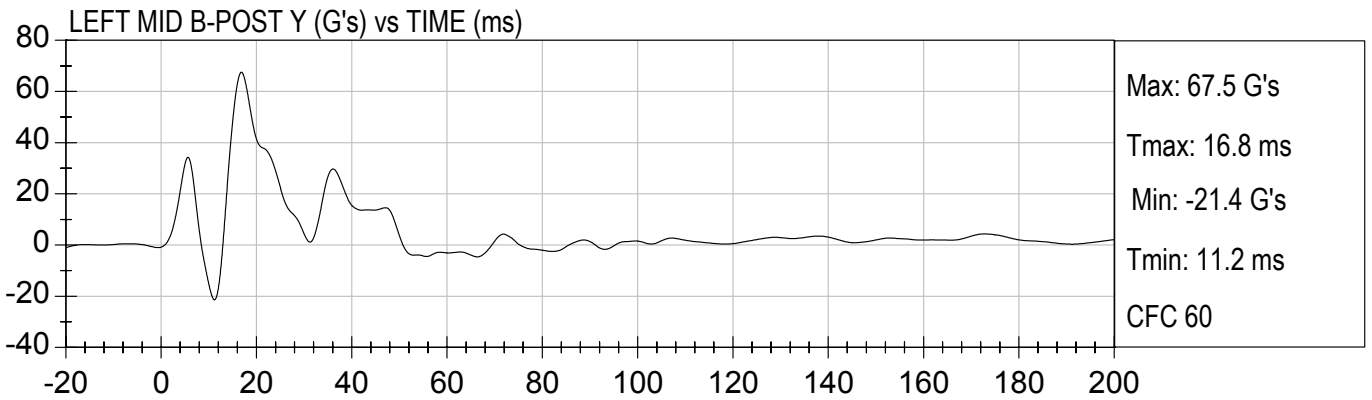
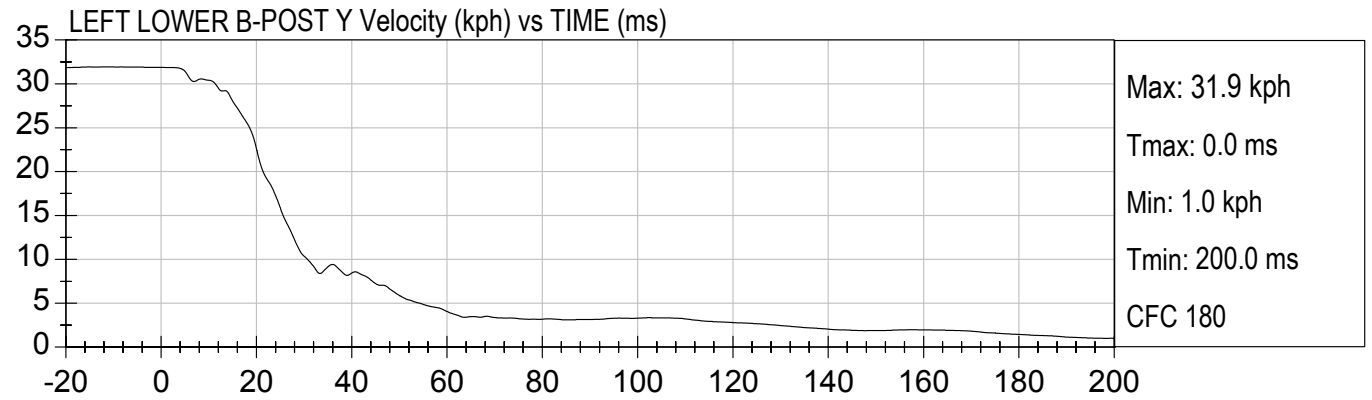
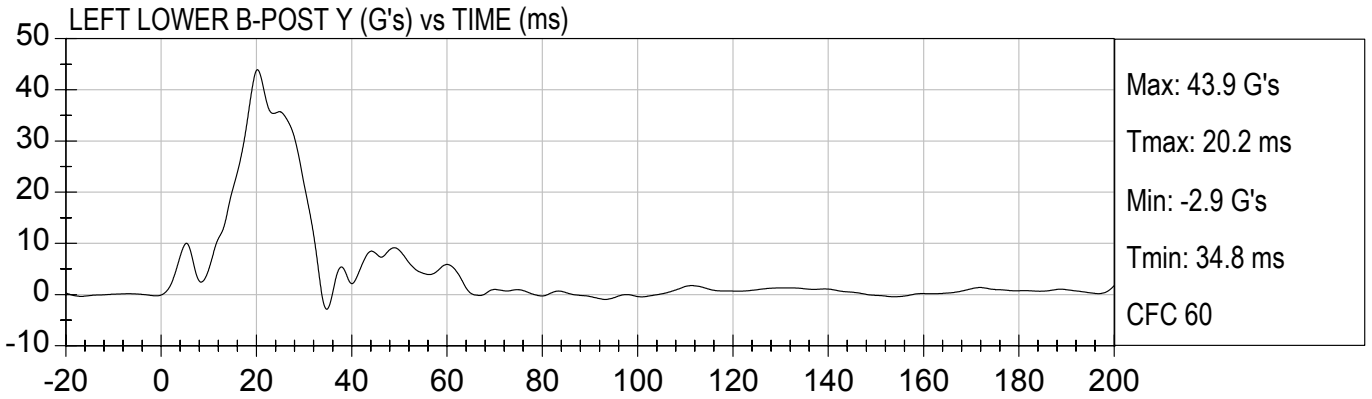


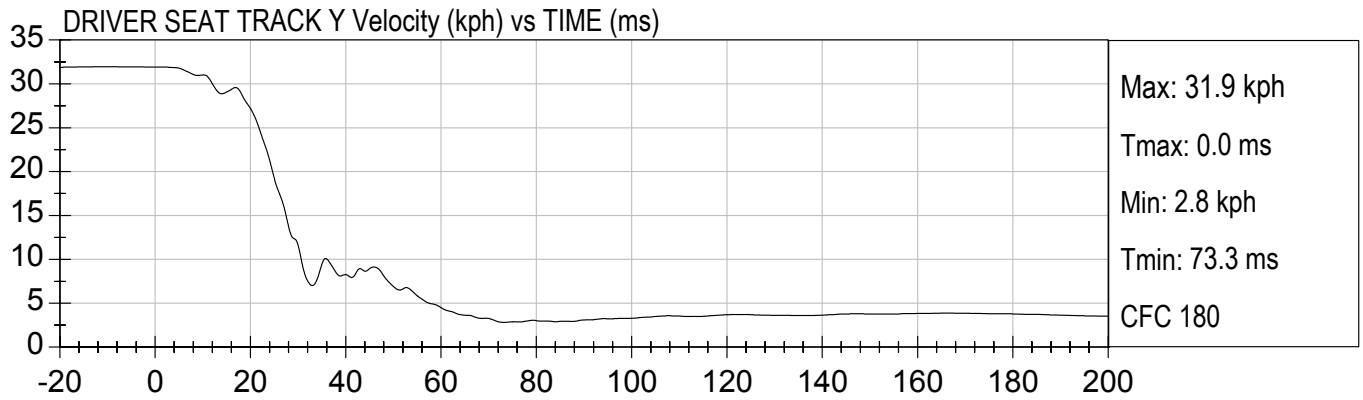
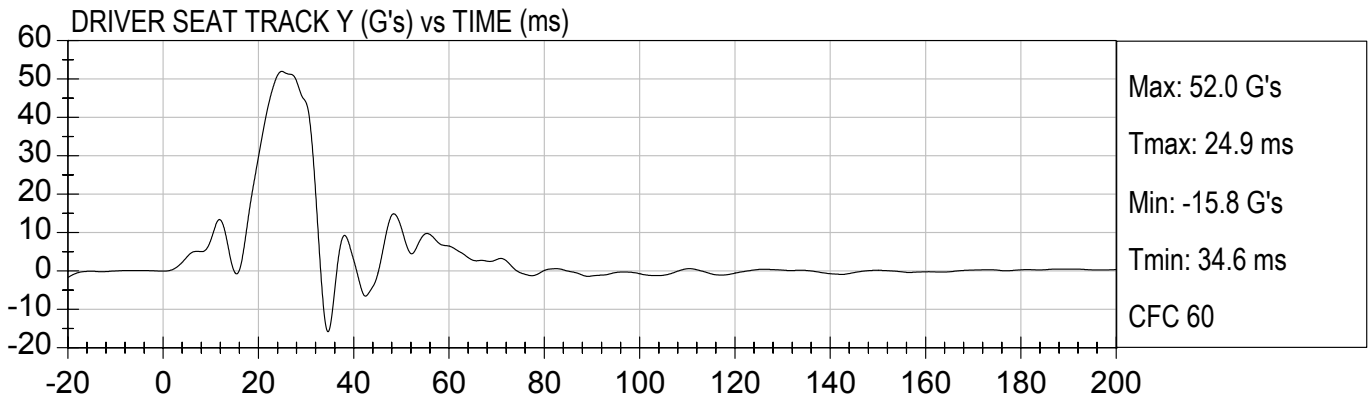
LEFT REAR SILL Y Velocity (kph) vs TIME (ms)

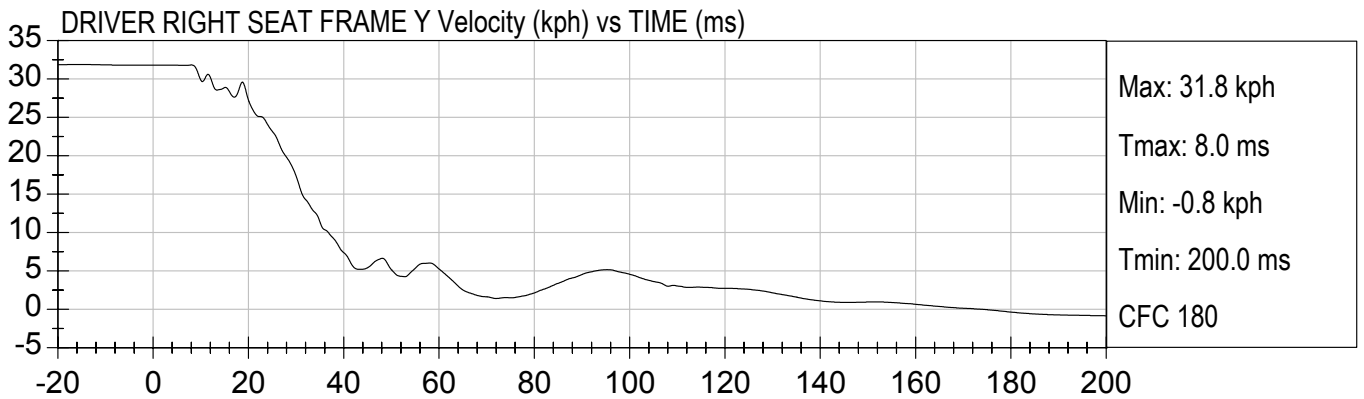
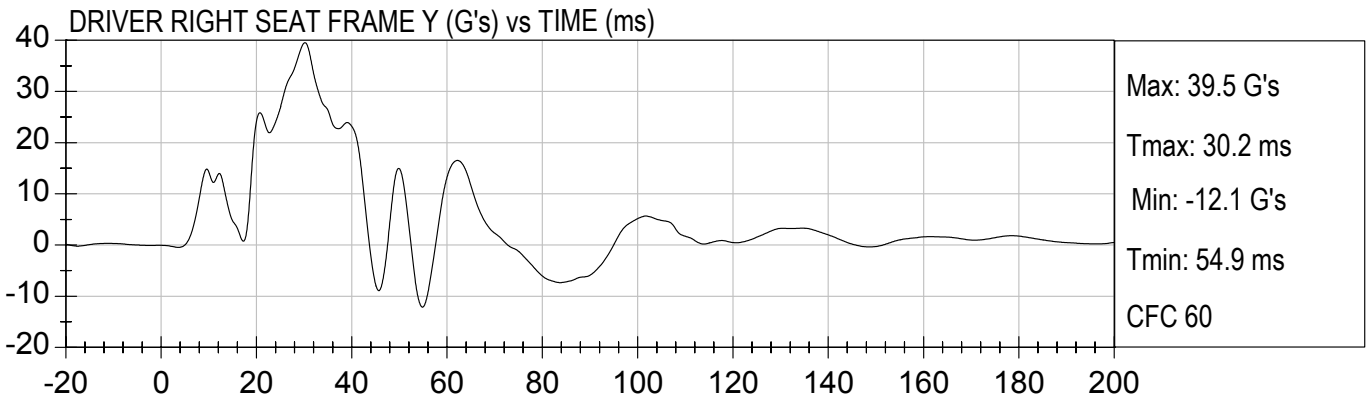
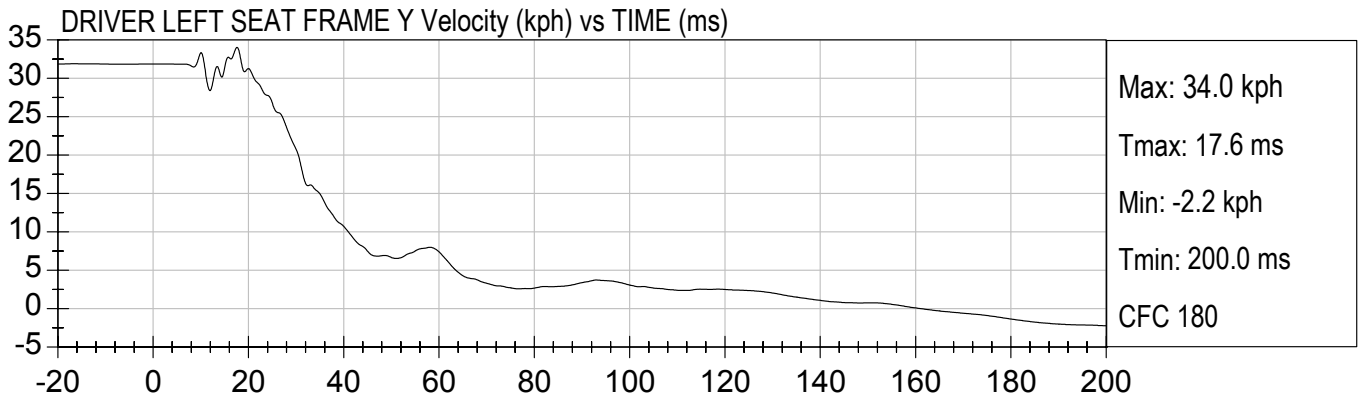
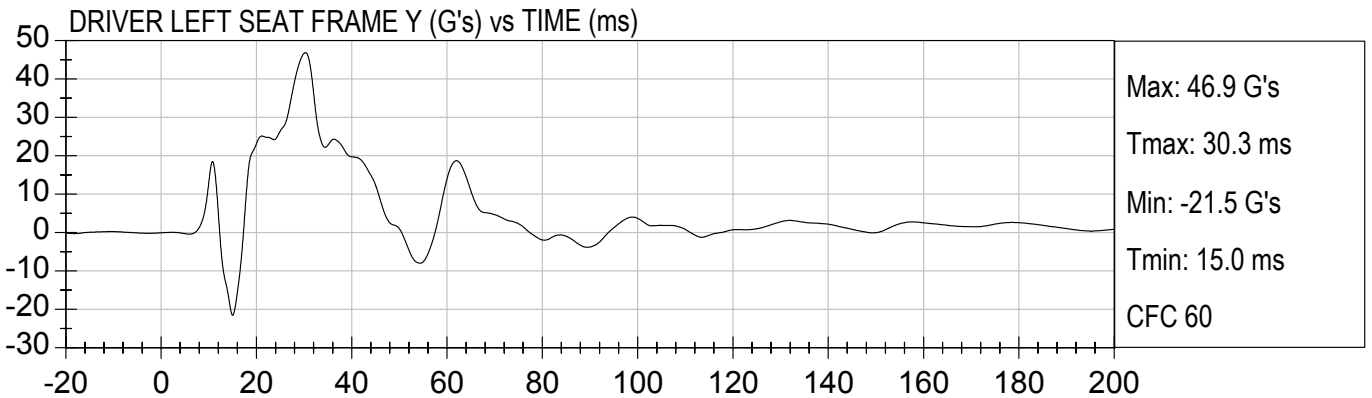






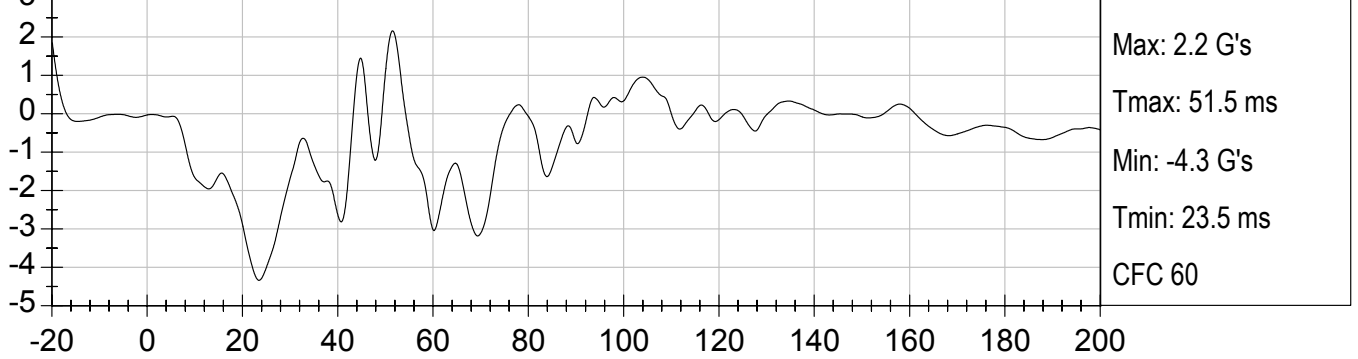




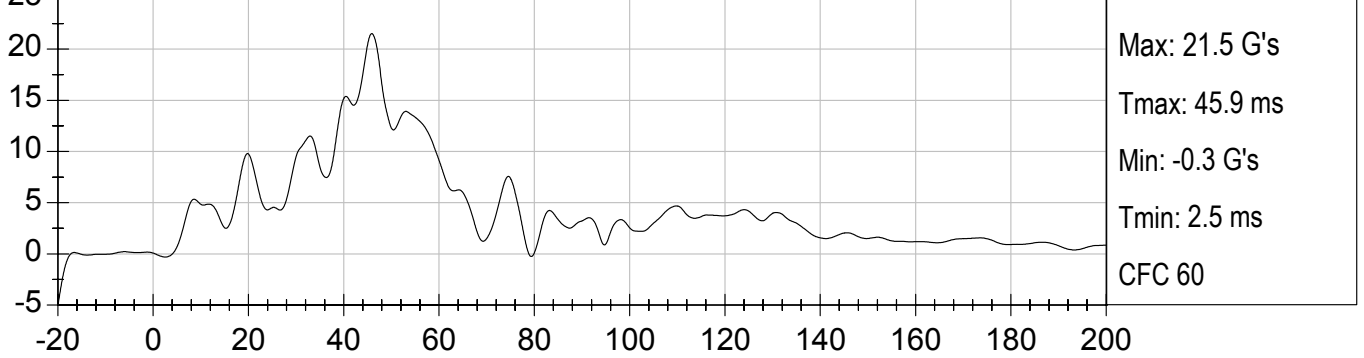




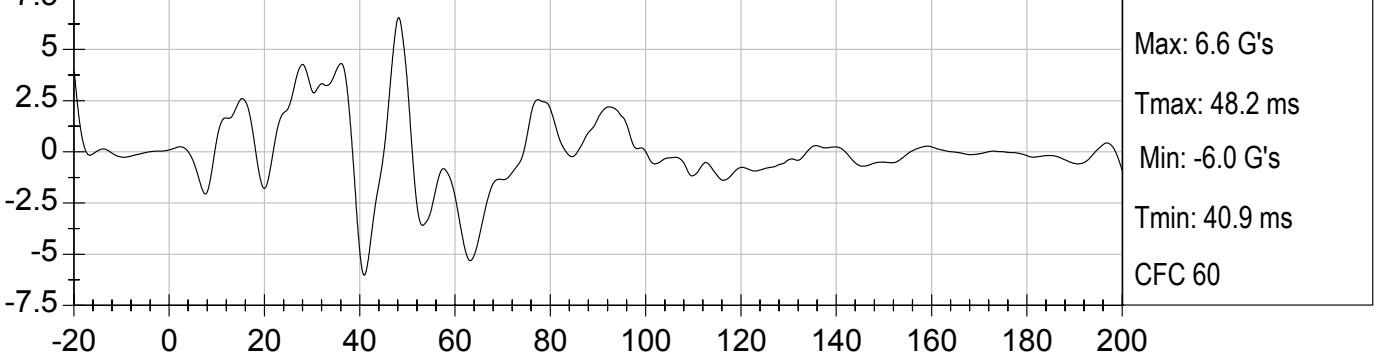
VEHICLE CG X (G's) vs TIME (ms)



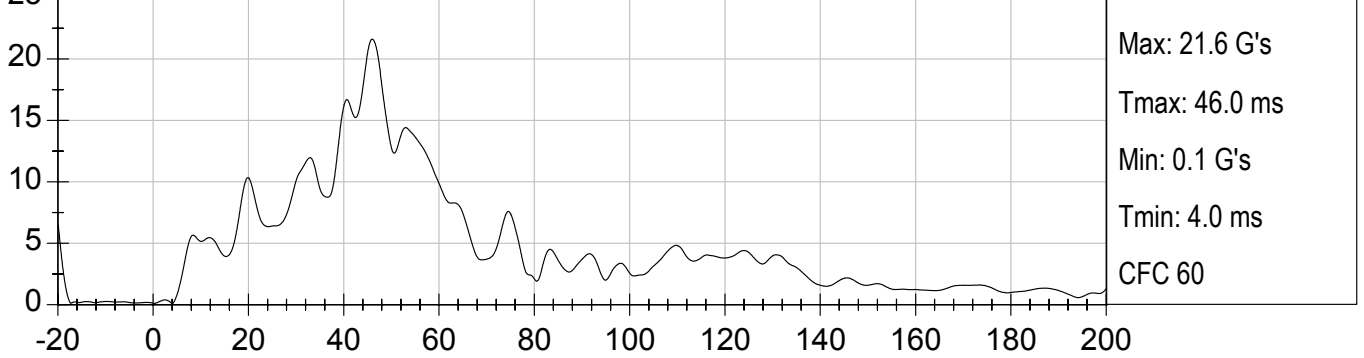
VEHICLE CG Y (G's) vs TIME (ms)



VEHICLE CG Z (G's) vs TIME (ms)

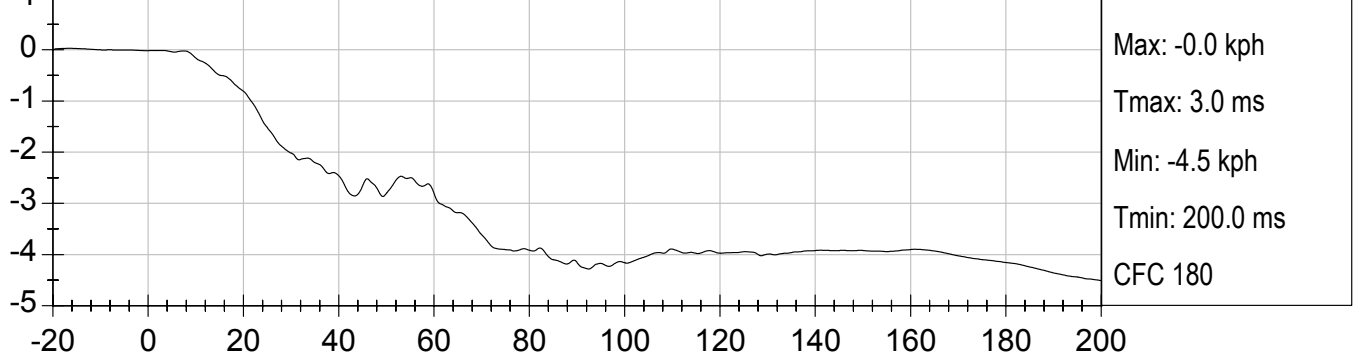


VEHICLE CG Resultant (G's) vs TIME (ms)

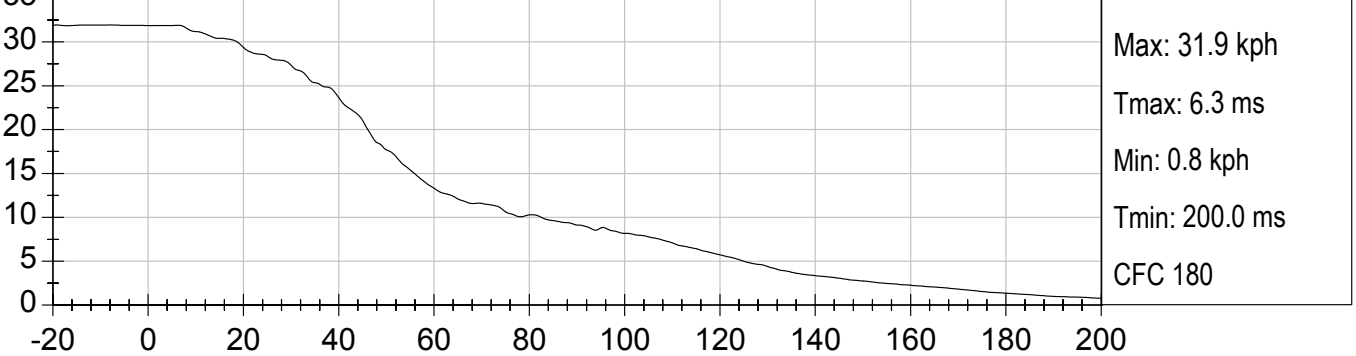




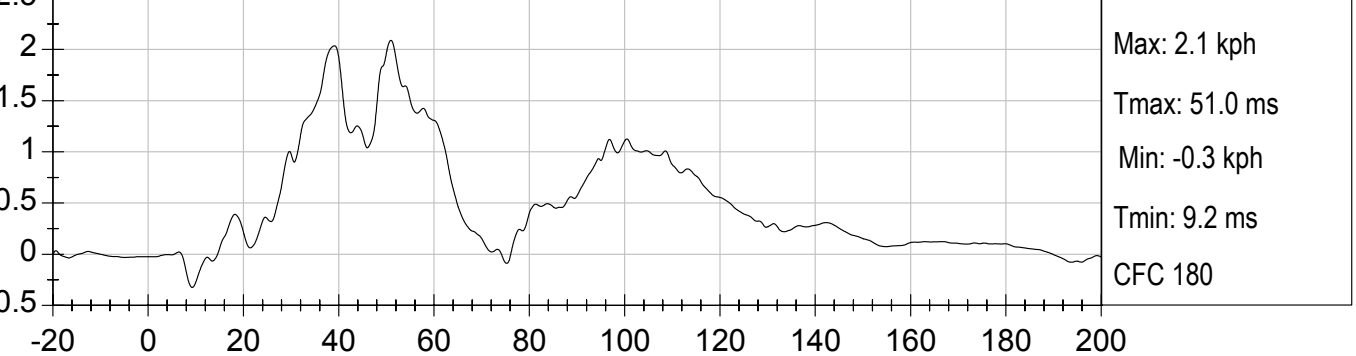
1 VEHICLE CG X Velocity (kph) vs TIME (ms)

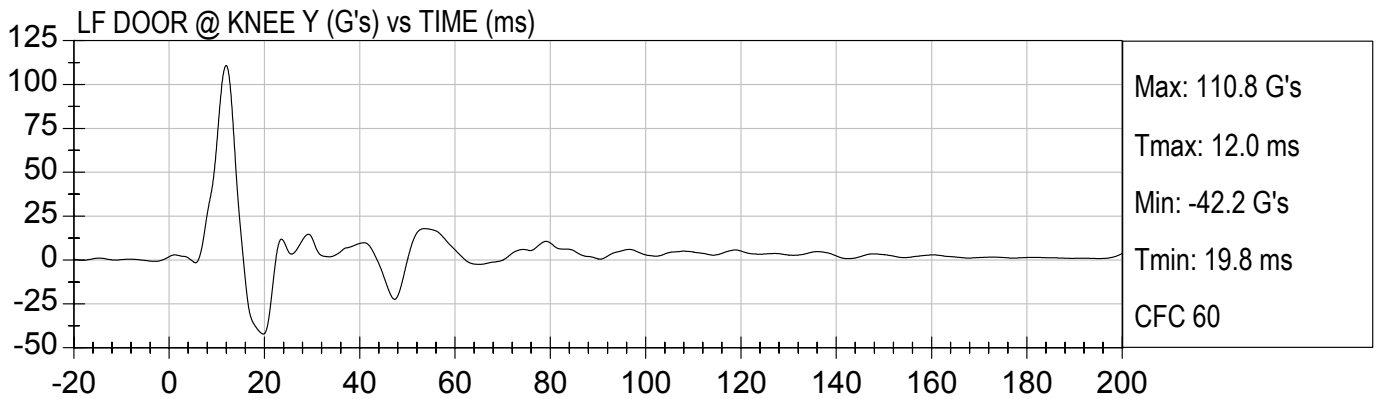
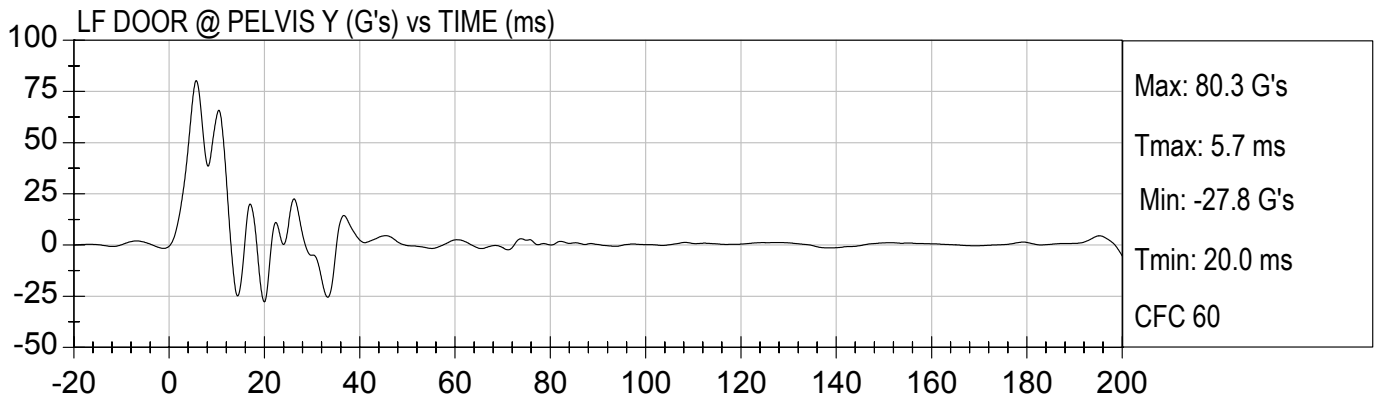
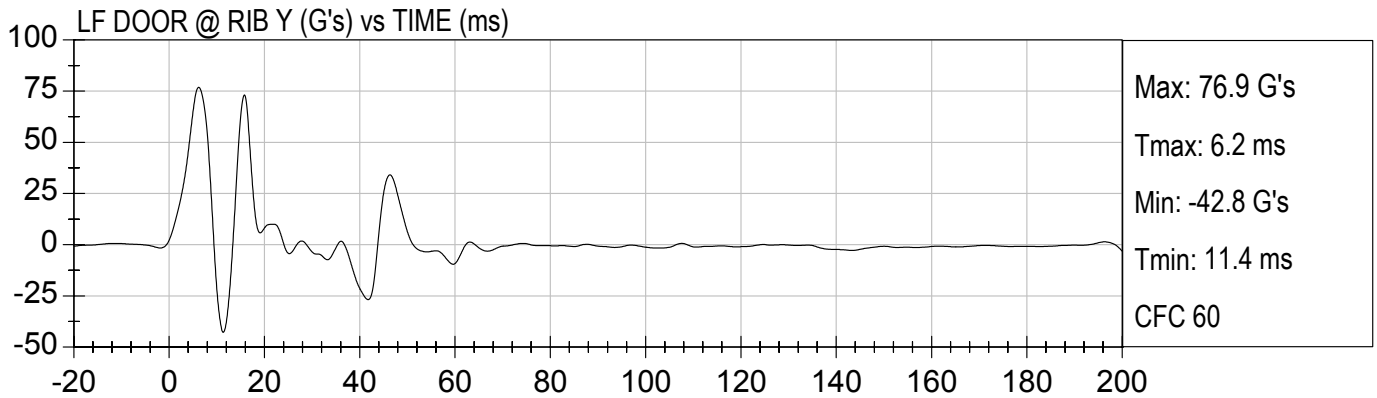
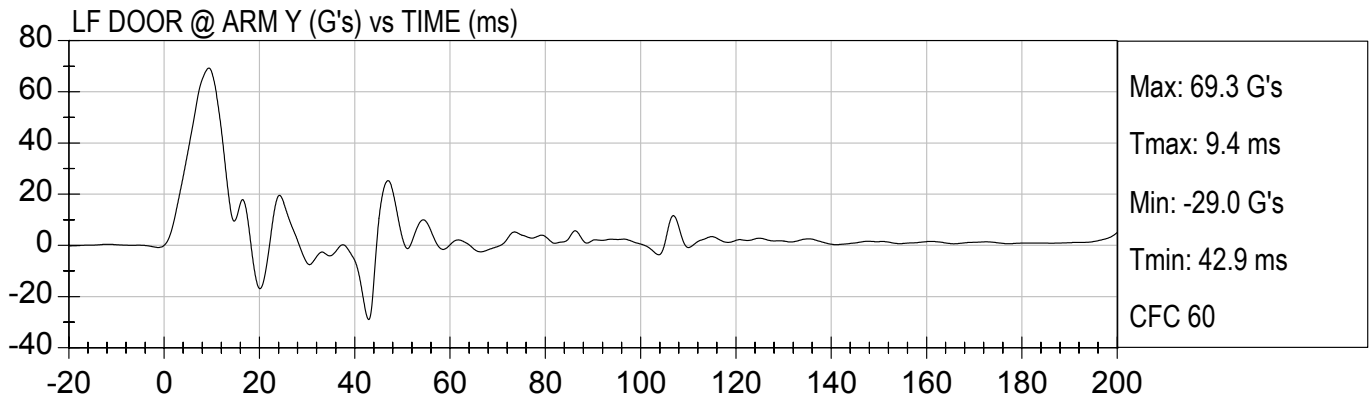


35 VEHICLE CG Y Velocity (kph) vs TIME (ms)



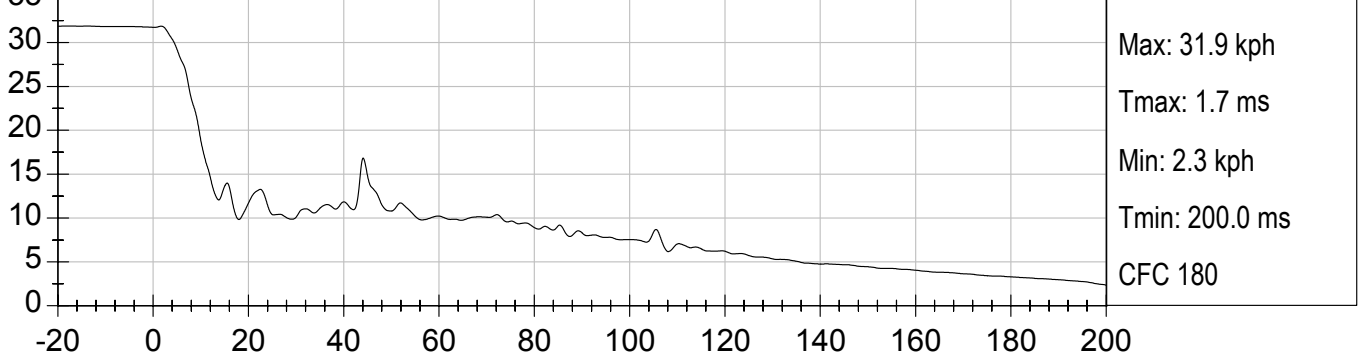
2.5 VEHICLE CG Z Velocity (kph) vs TIME (ms)



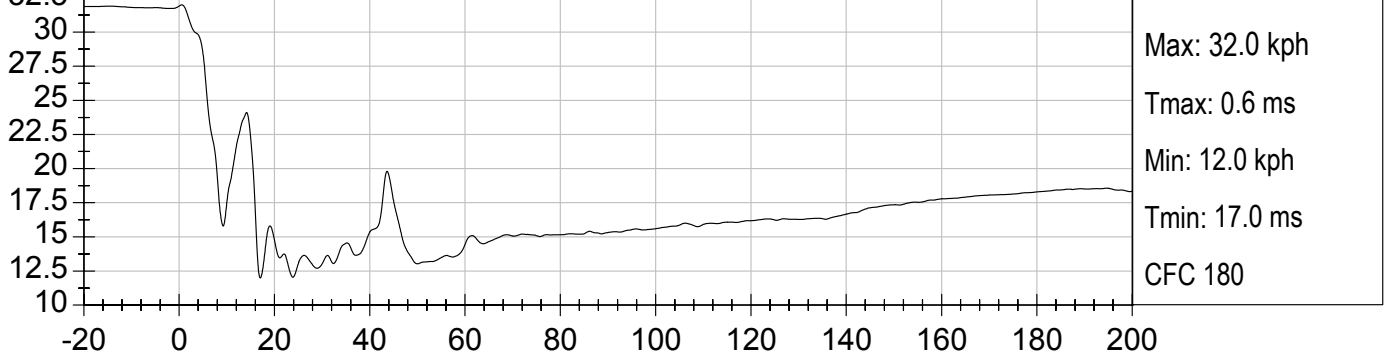




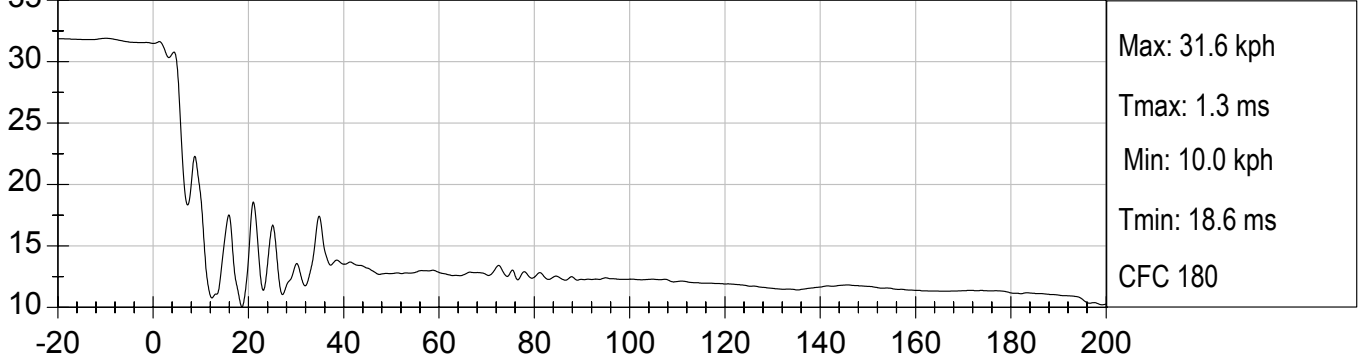
LF DOOR @ ARM Y Velocity (kph) vs TIME (ms)



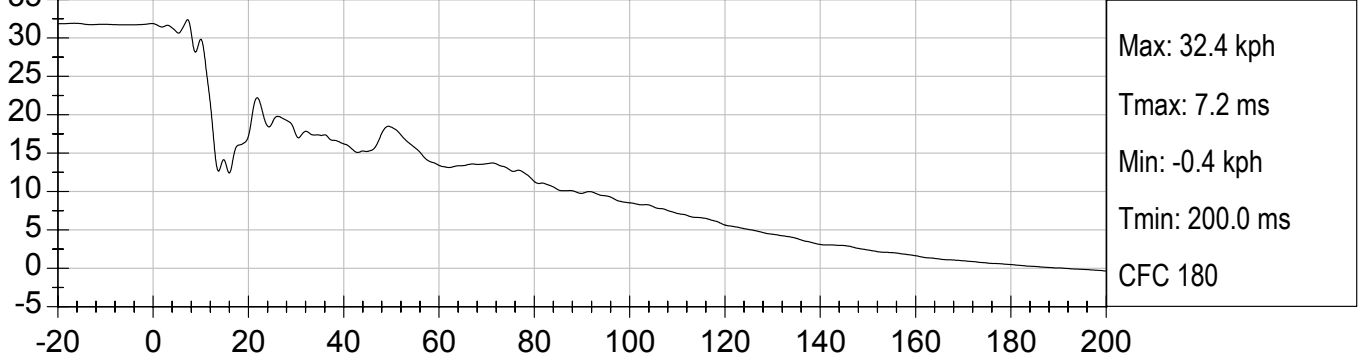
LF DOOR @ RIB Y Velocity (kph) vs TIME (ms)

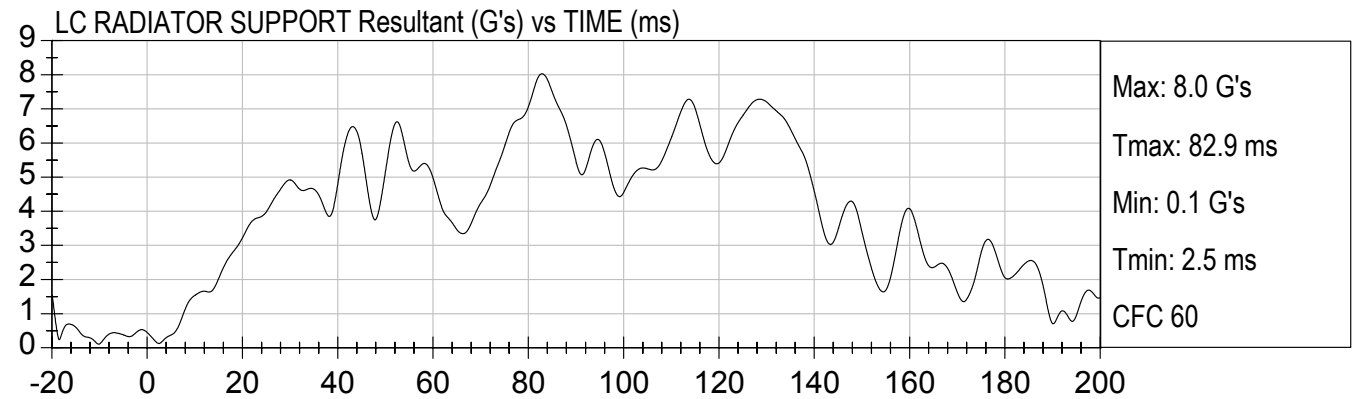
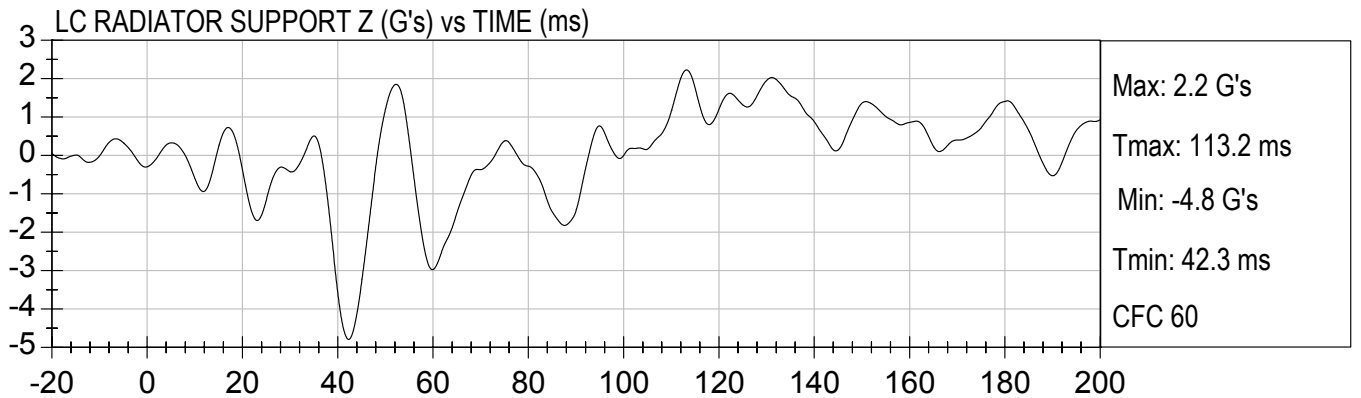
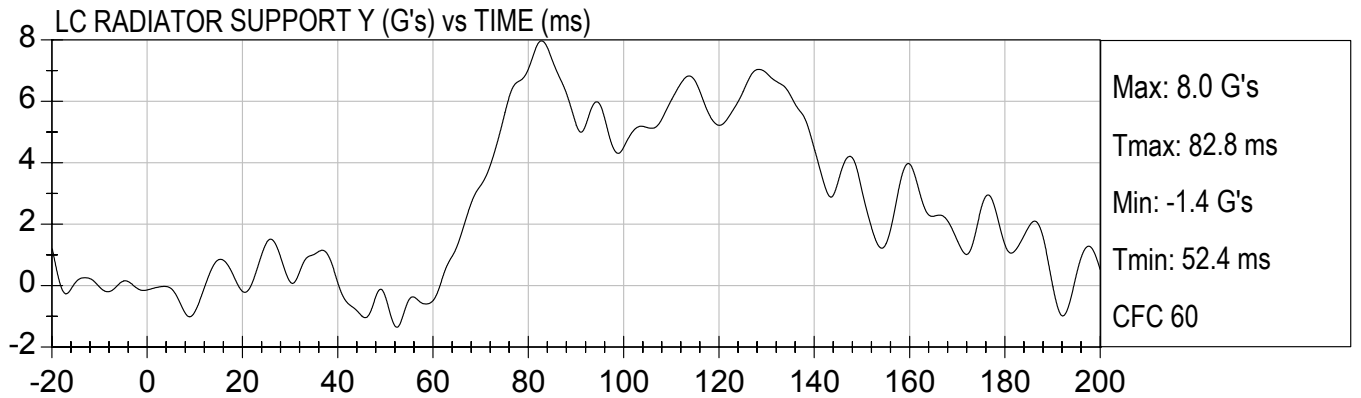
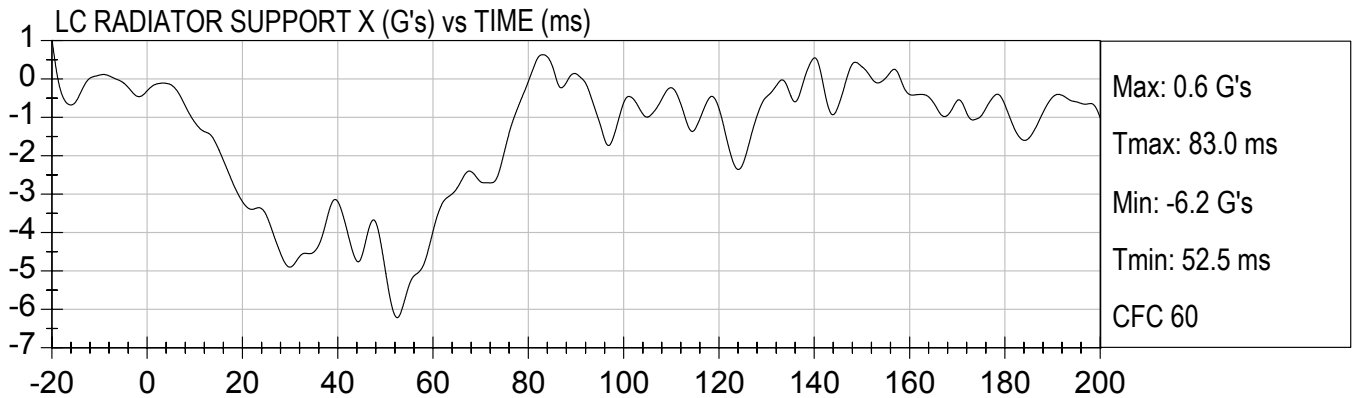


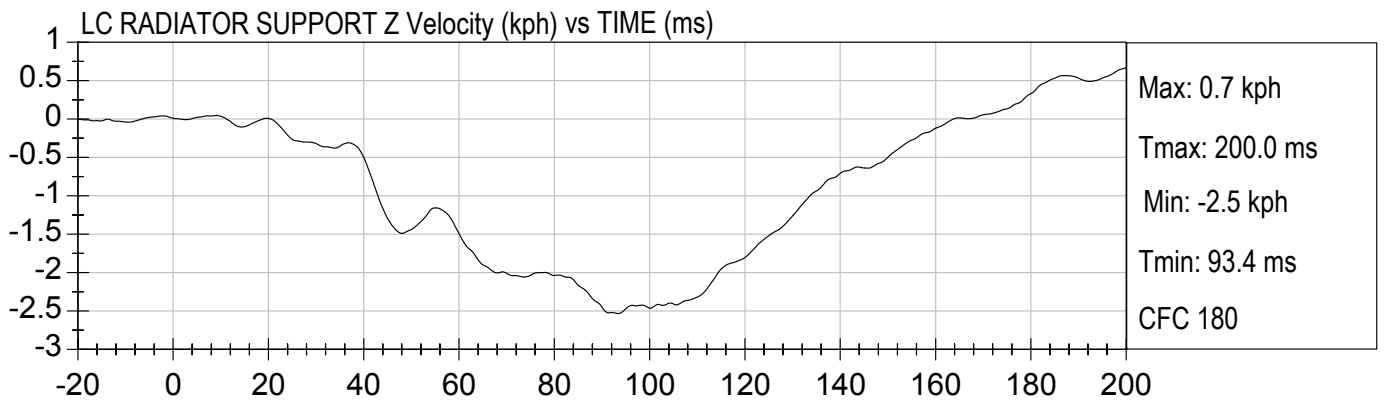
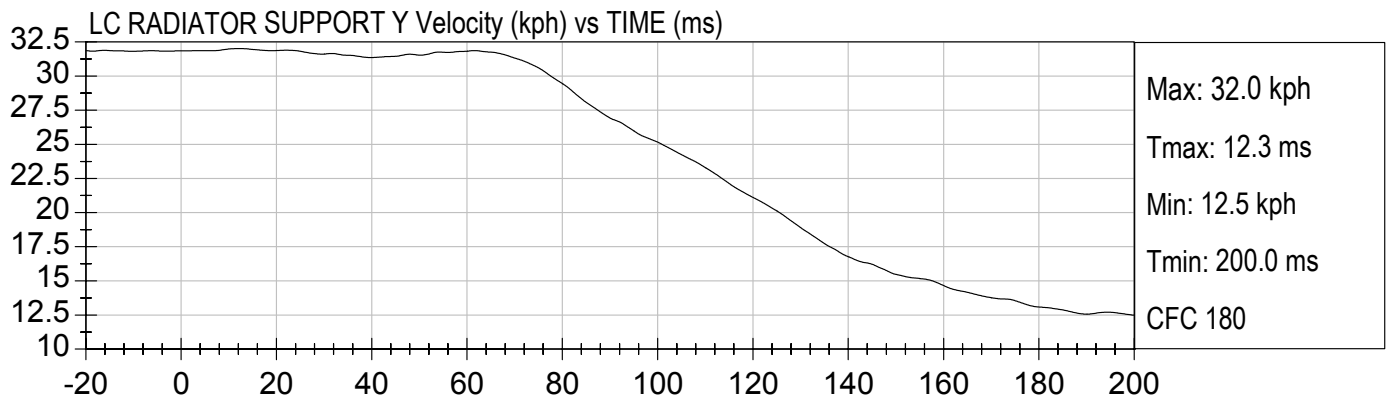
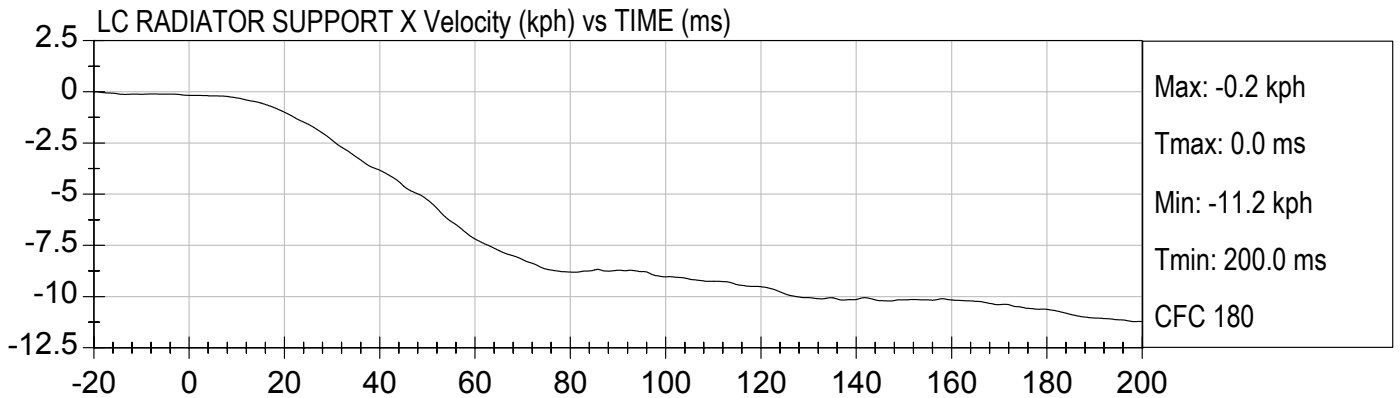
LF DOOR @ PELVIS Y Velocity (kph) vs TIME (ms)

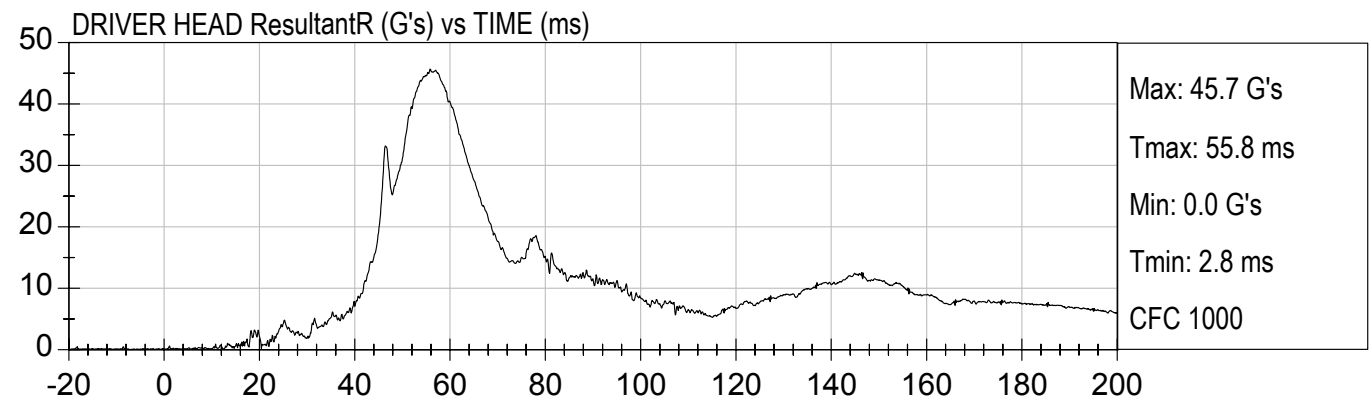
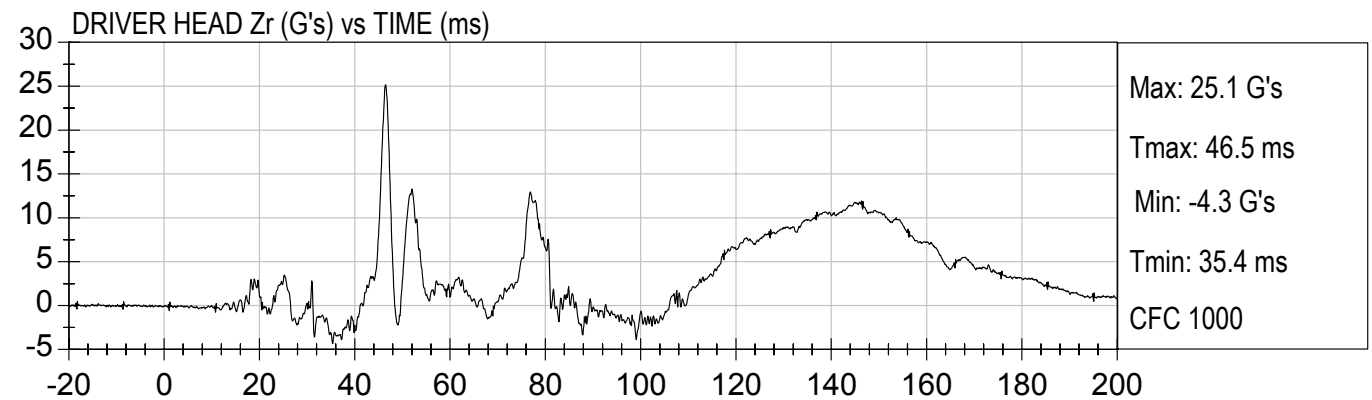
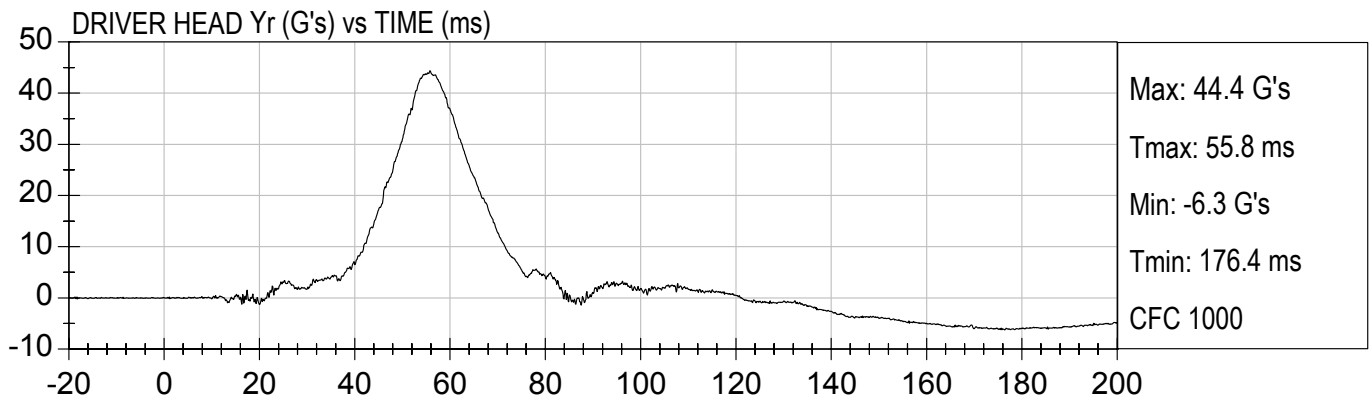
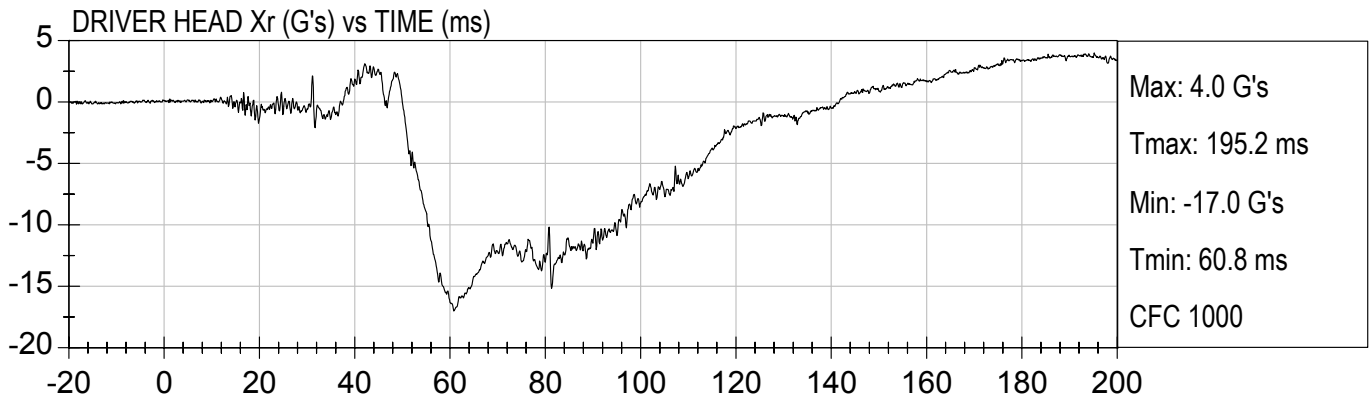


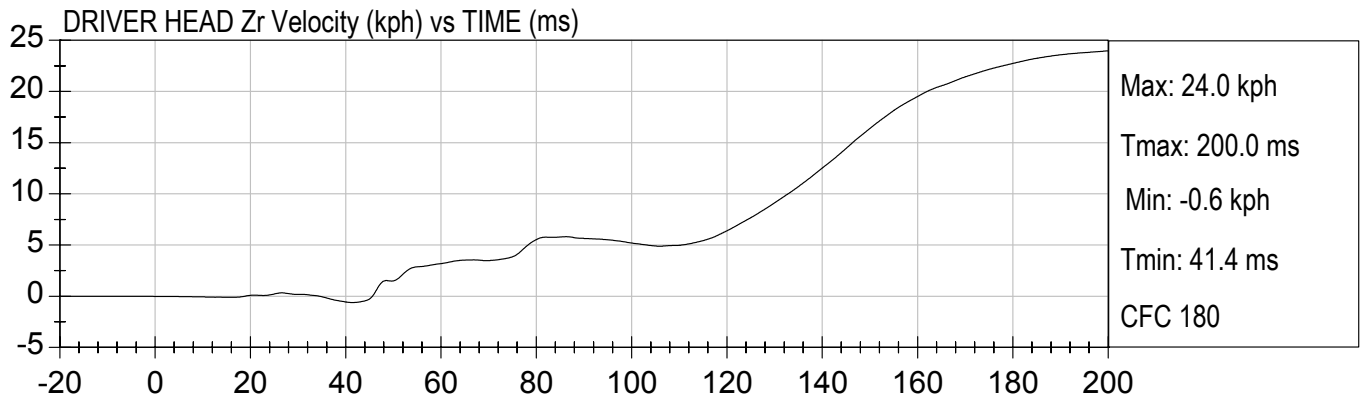
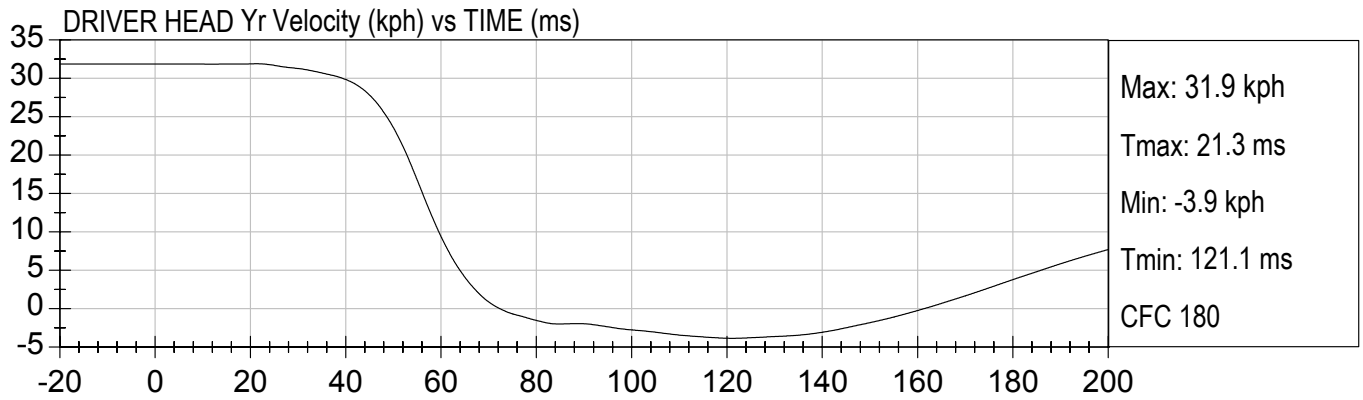
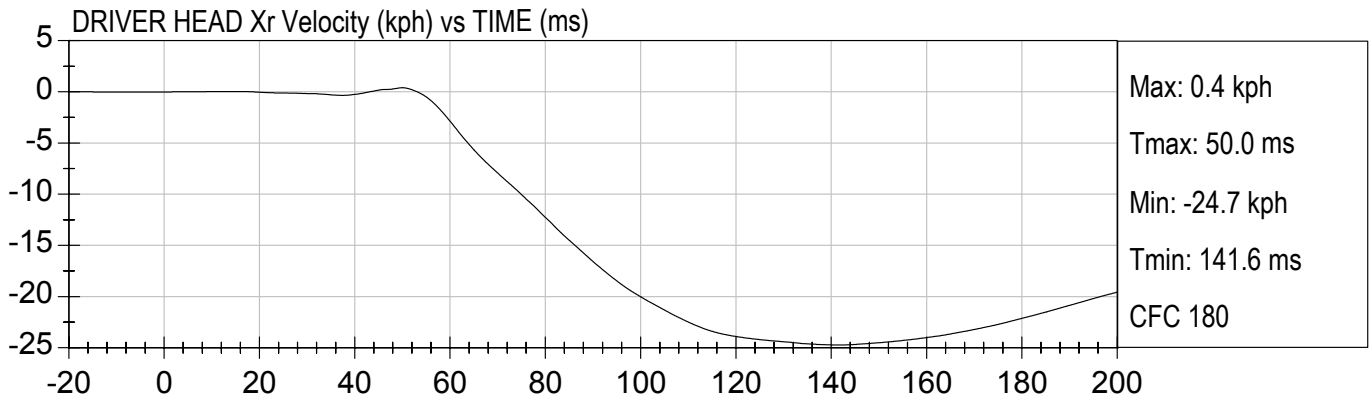
LF DOOR @ KNEE Y Velocity (kph) vs TIME (ms)

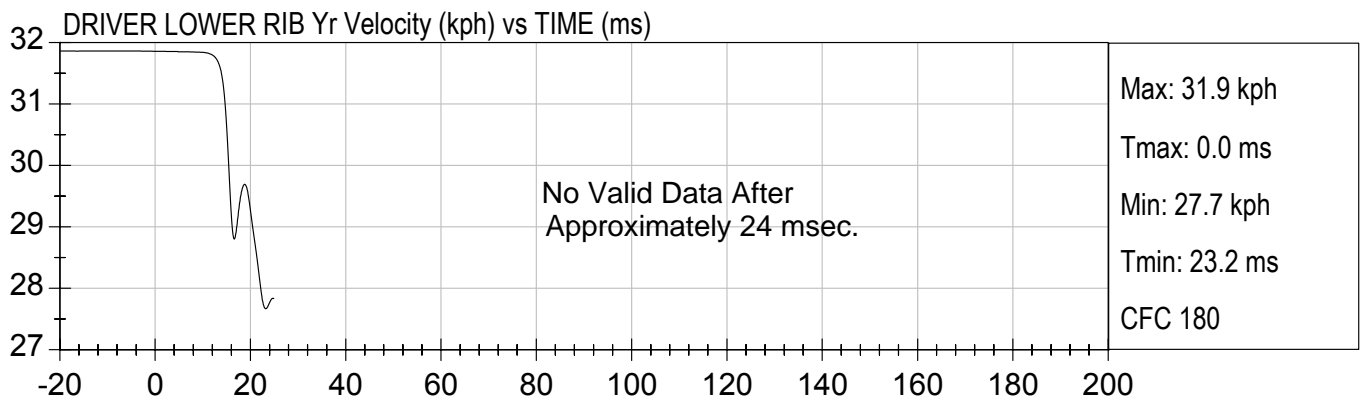
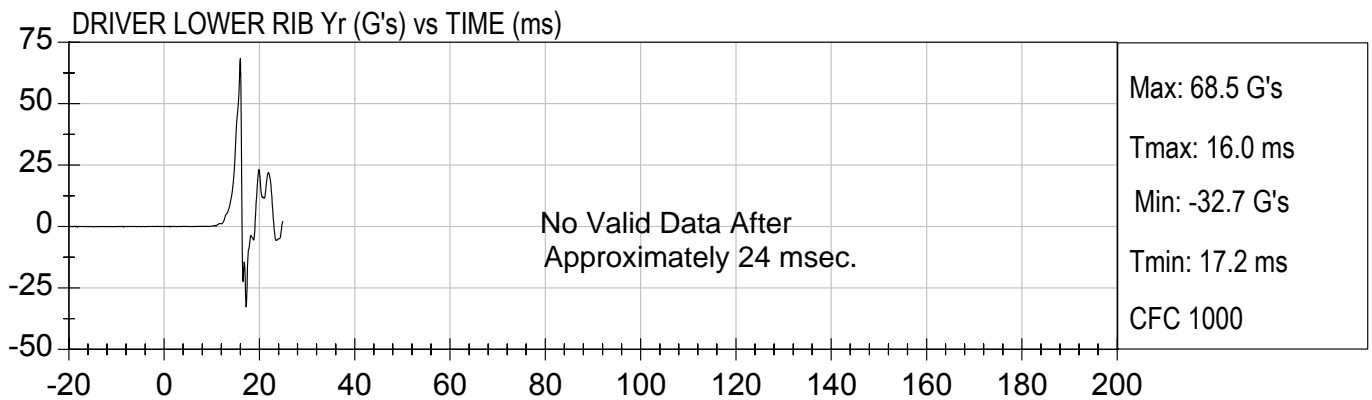
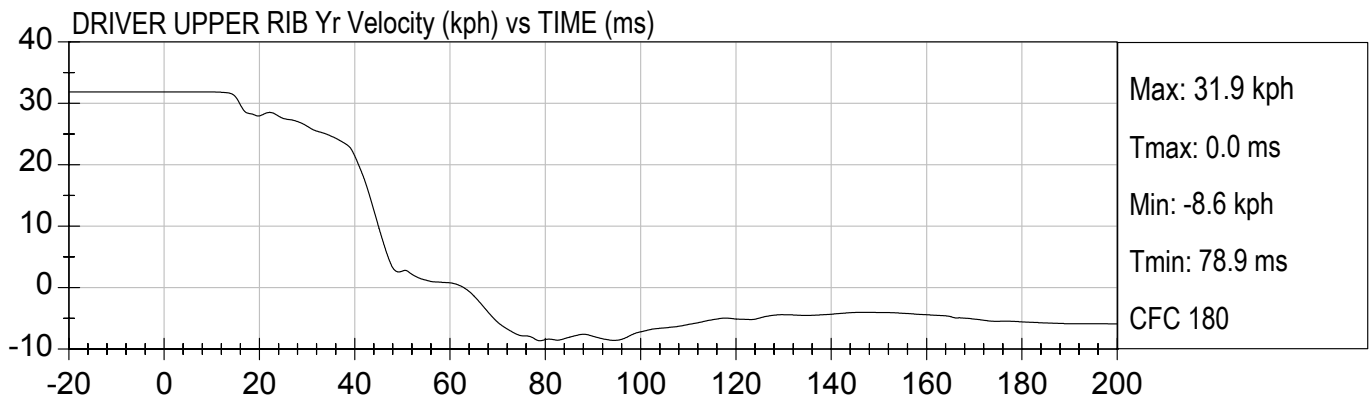
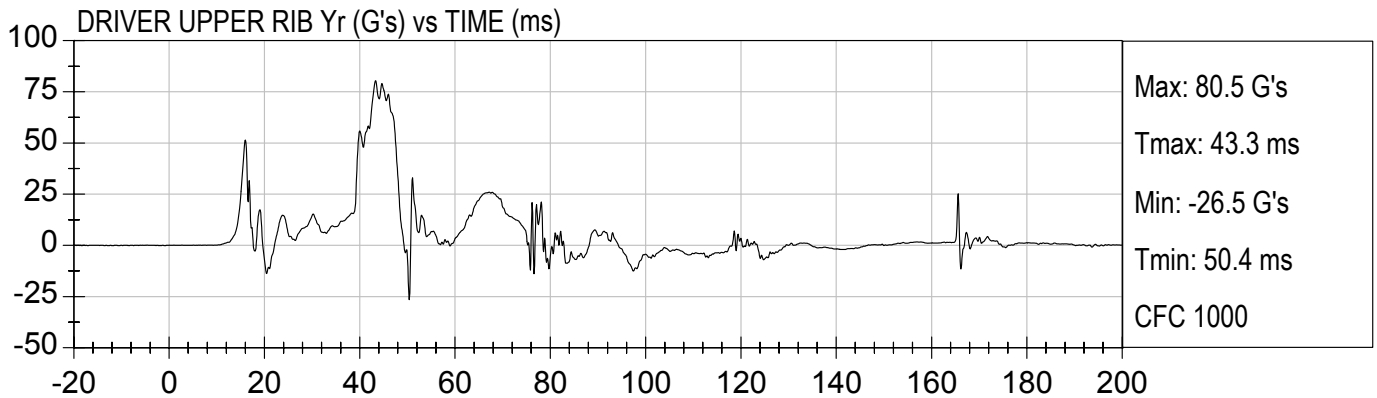


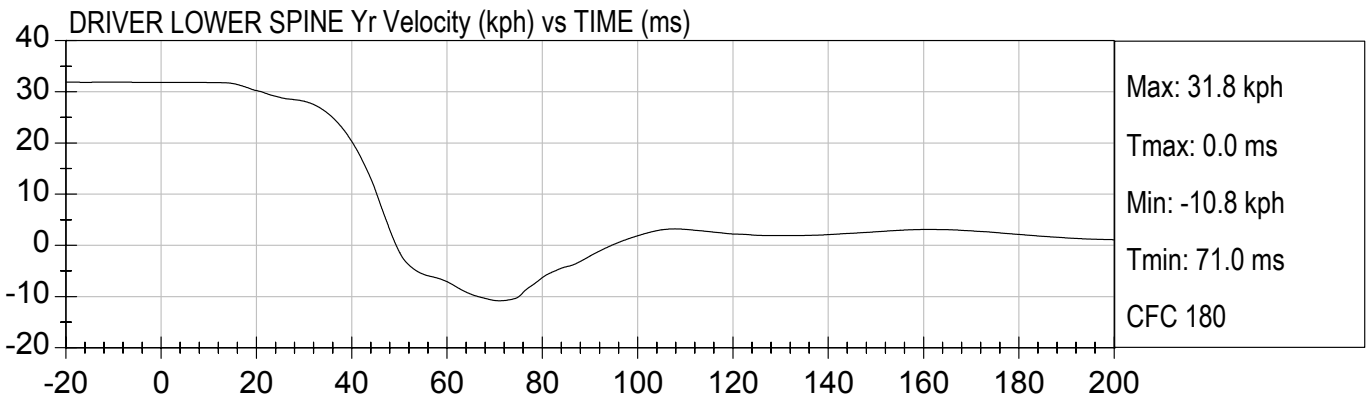
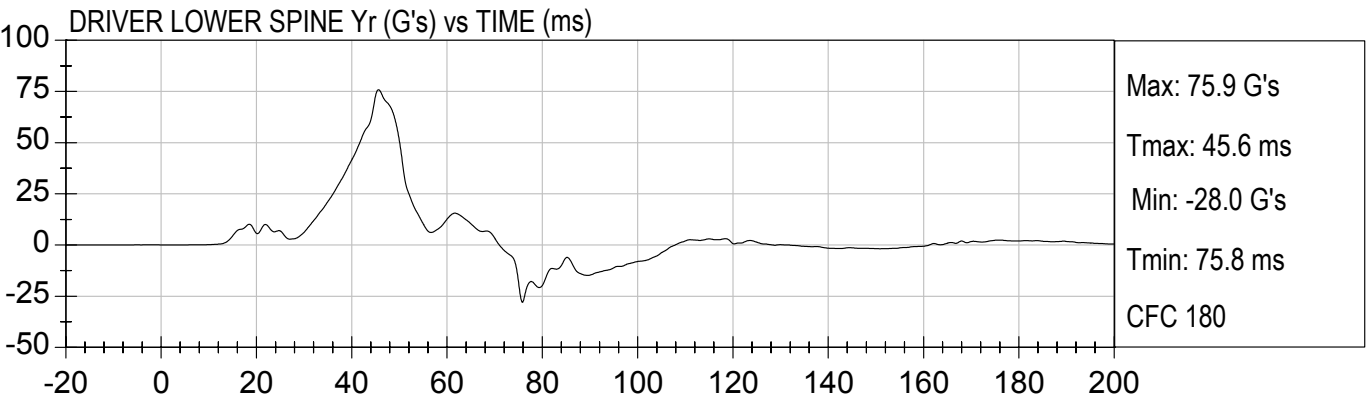
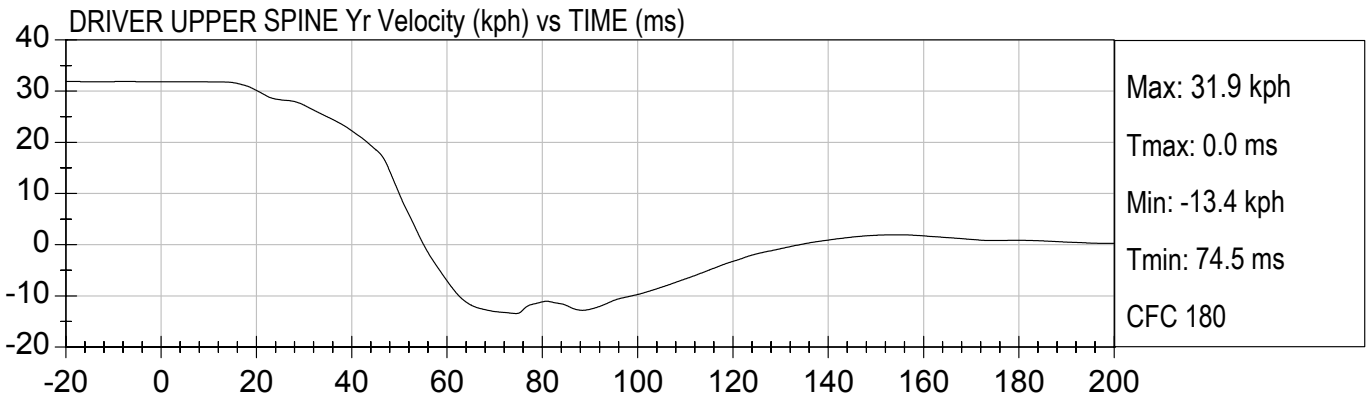
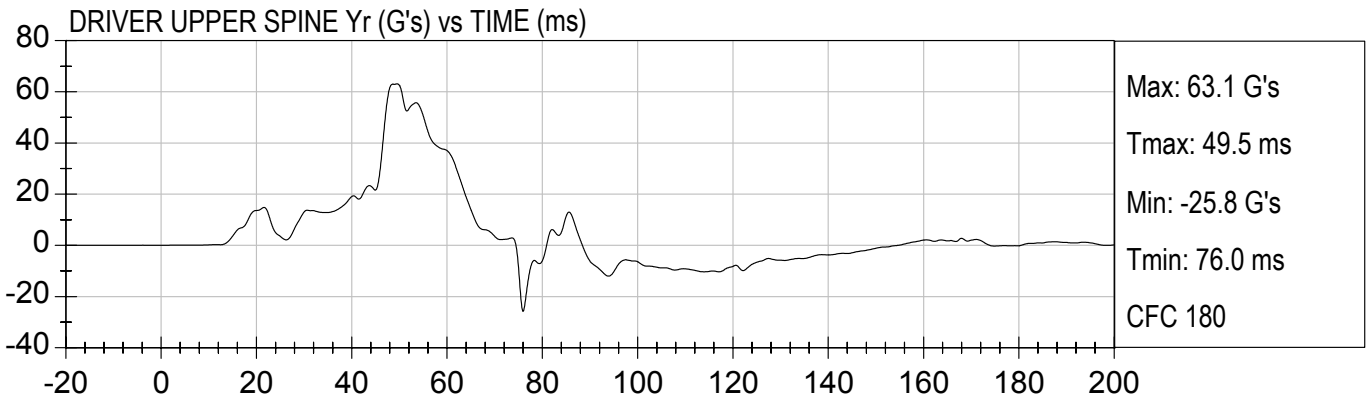


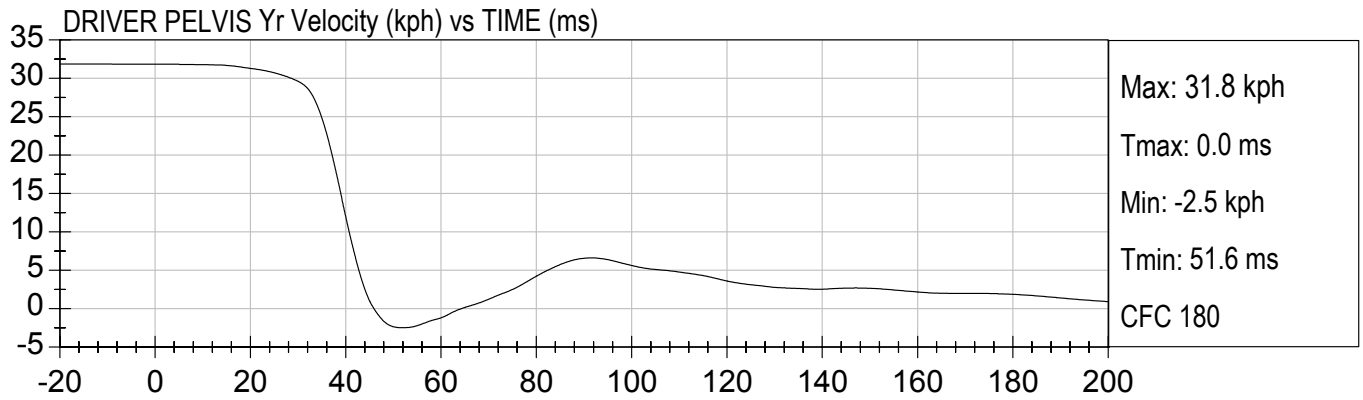
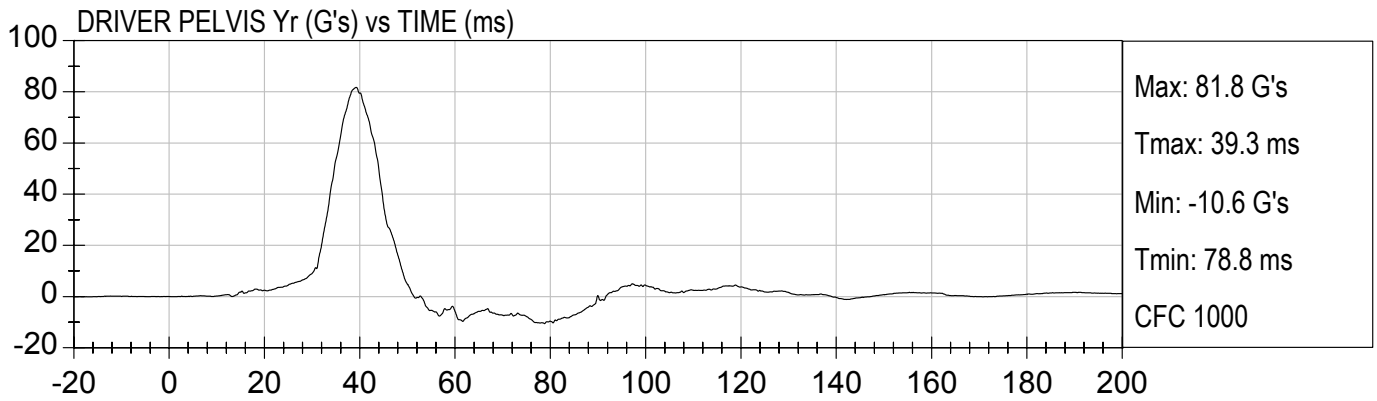


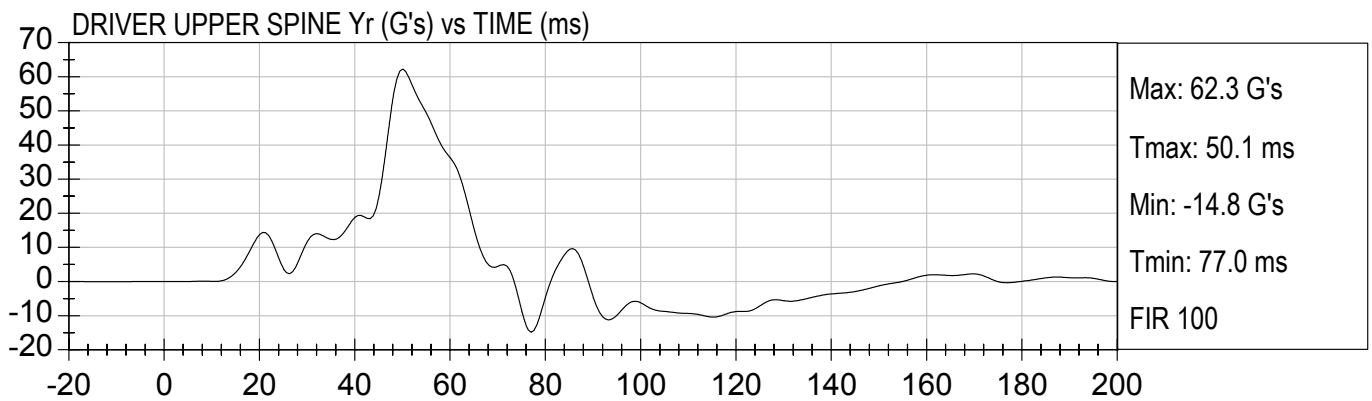
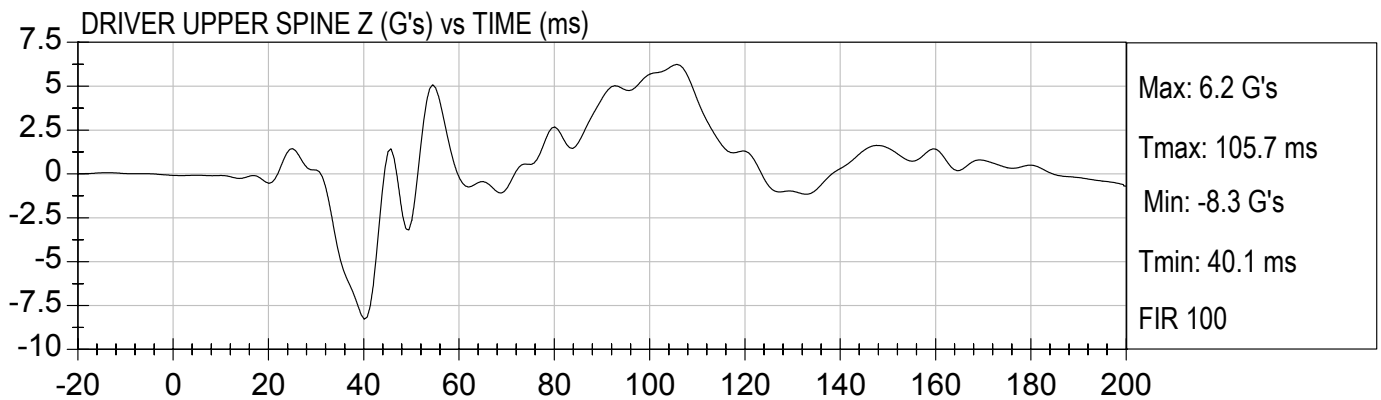
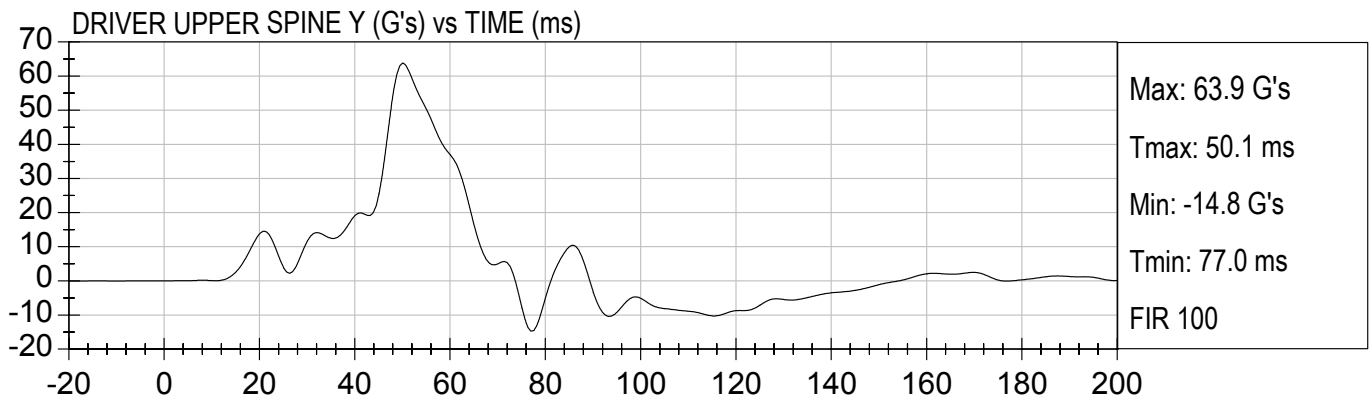
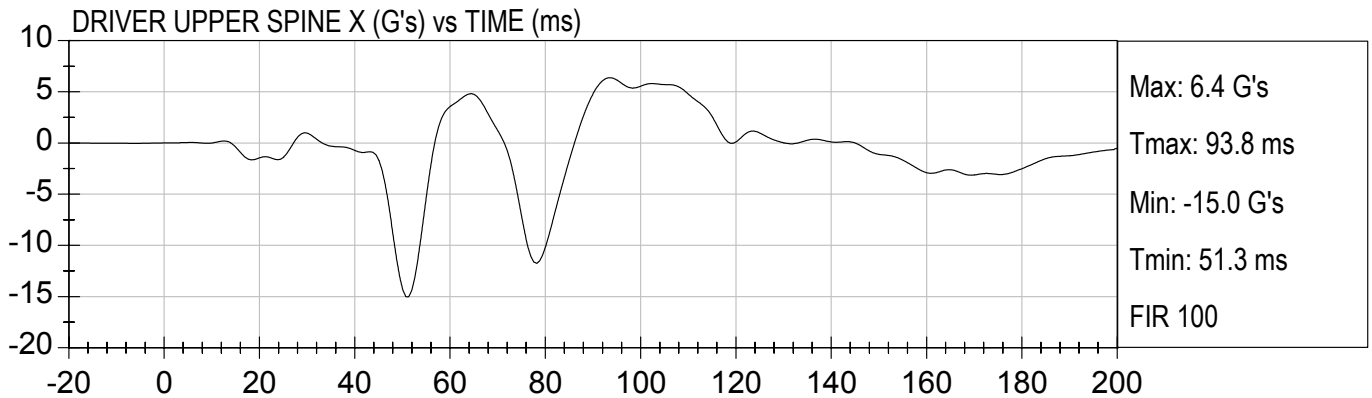


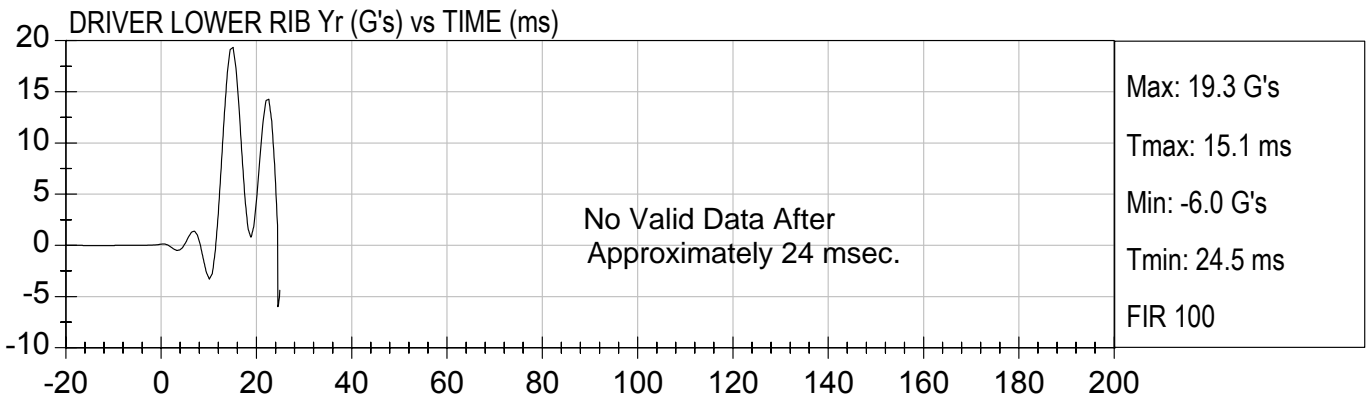
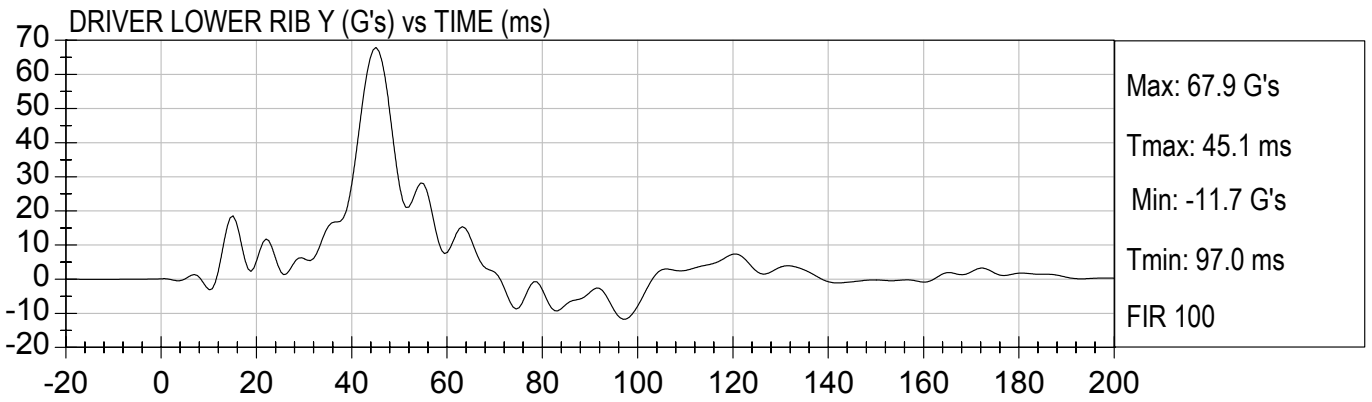
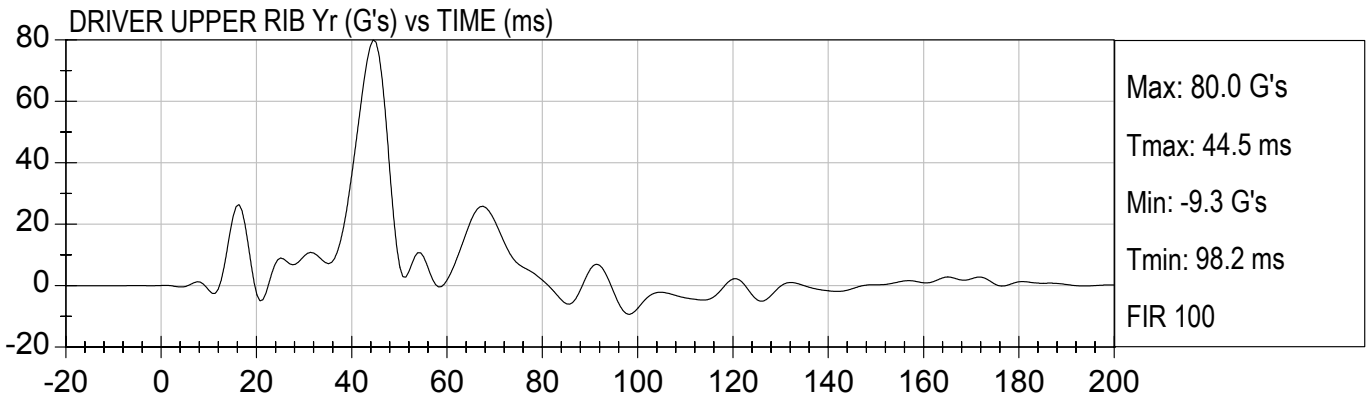
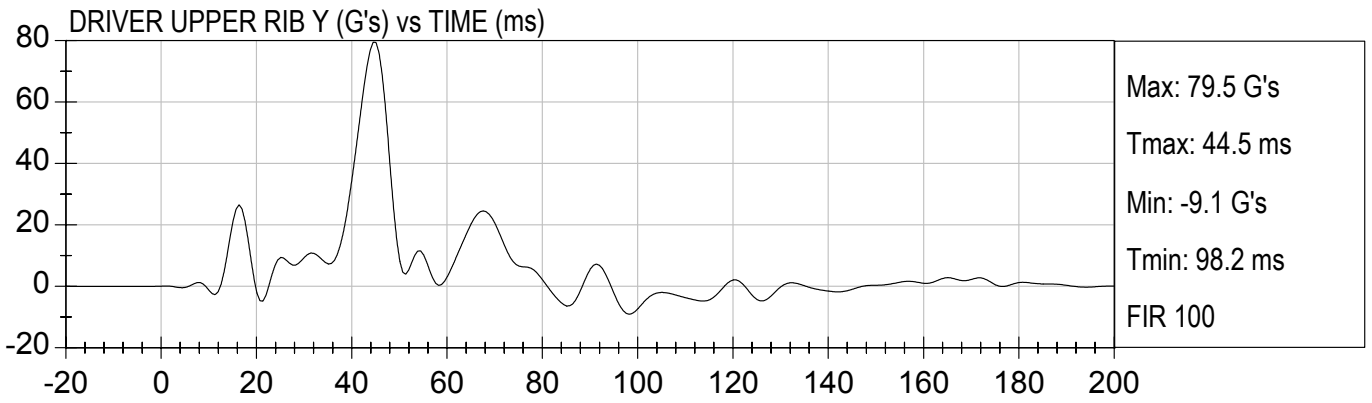


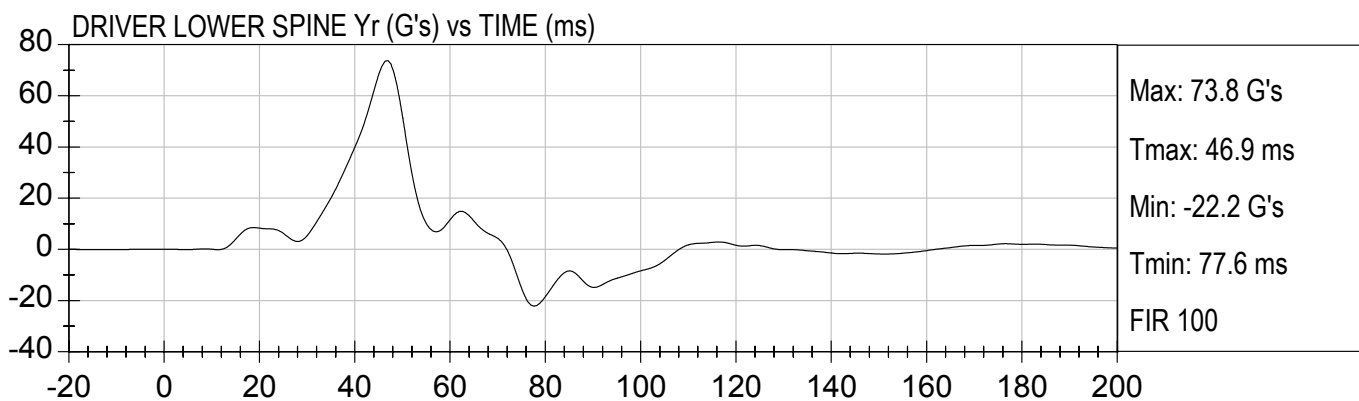
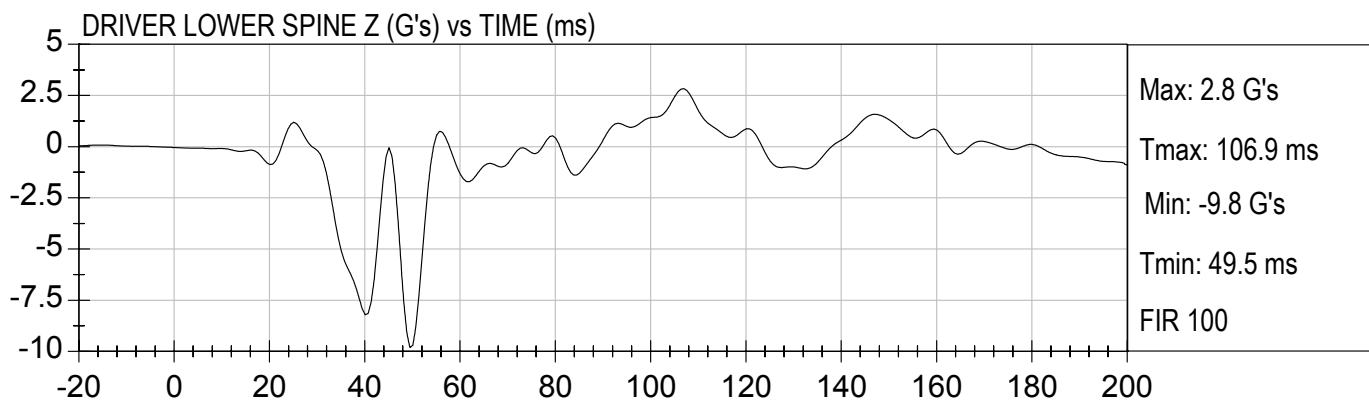
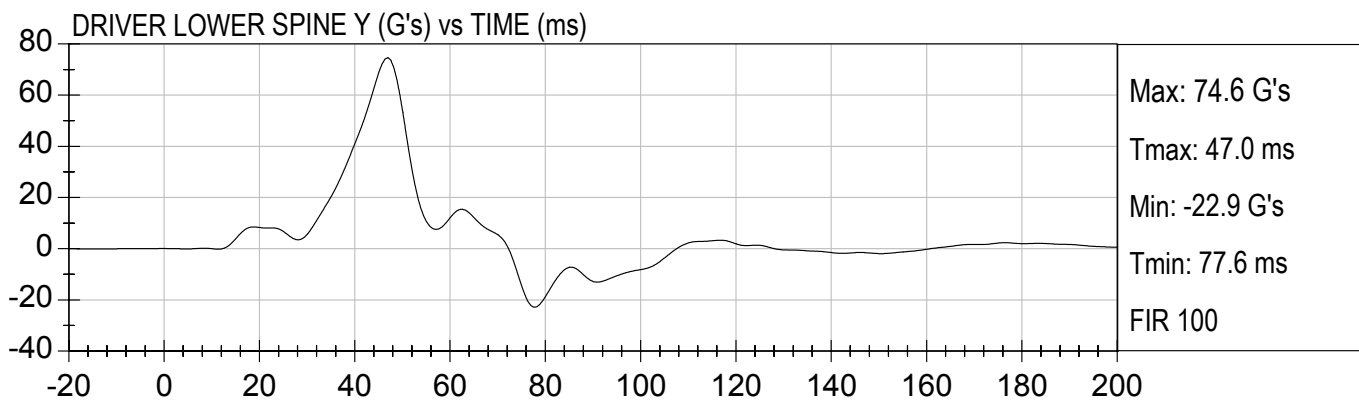
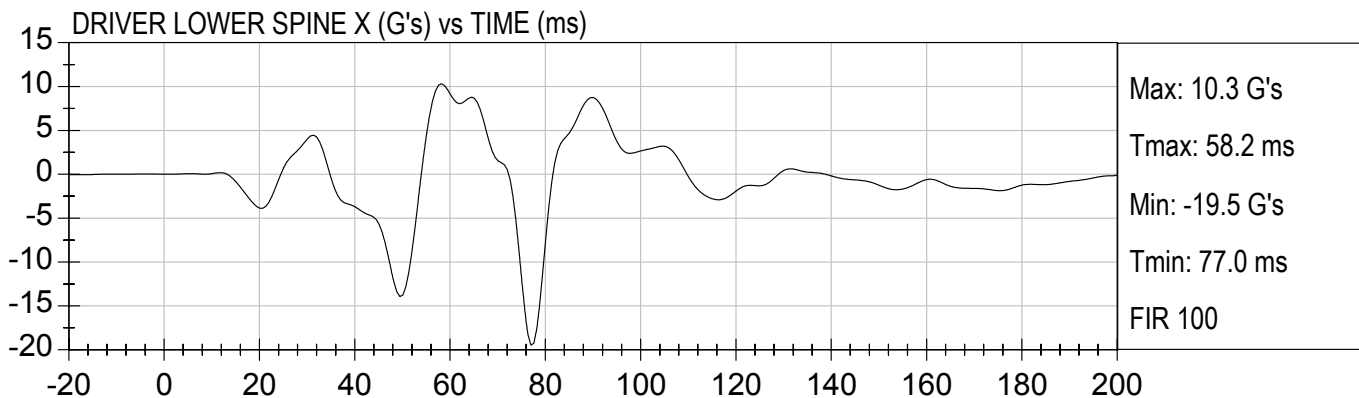


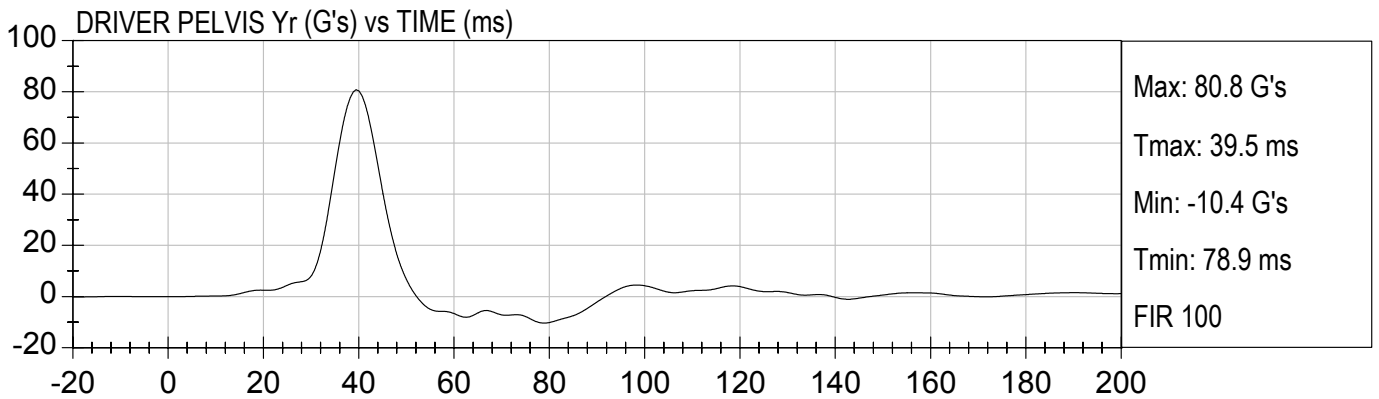
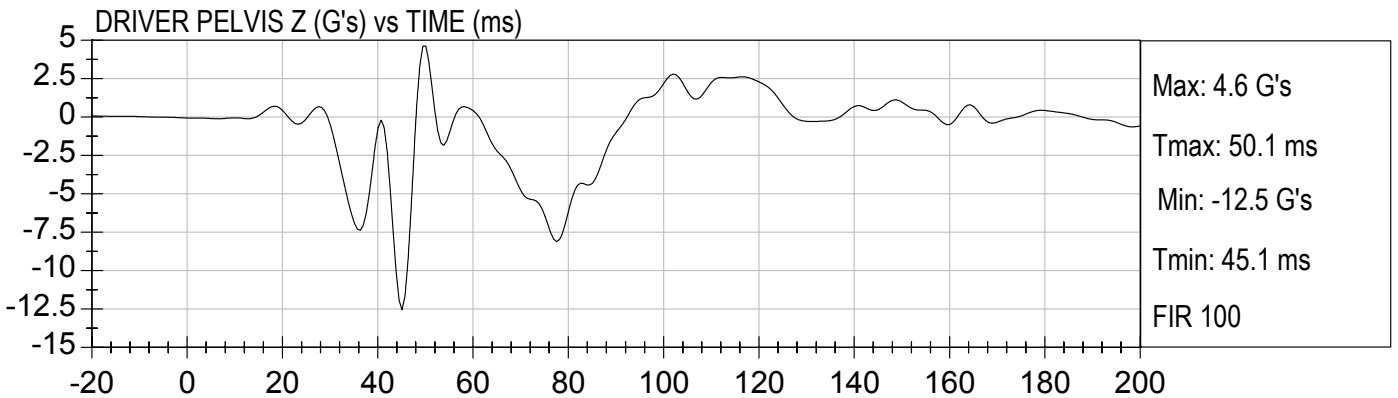
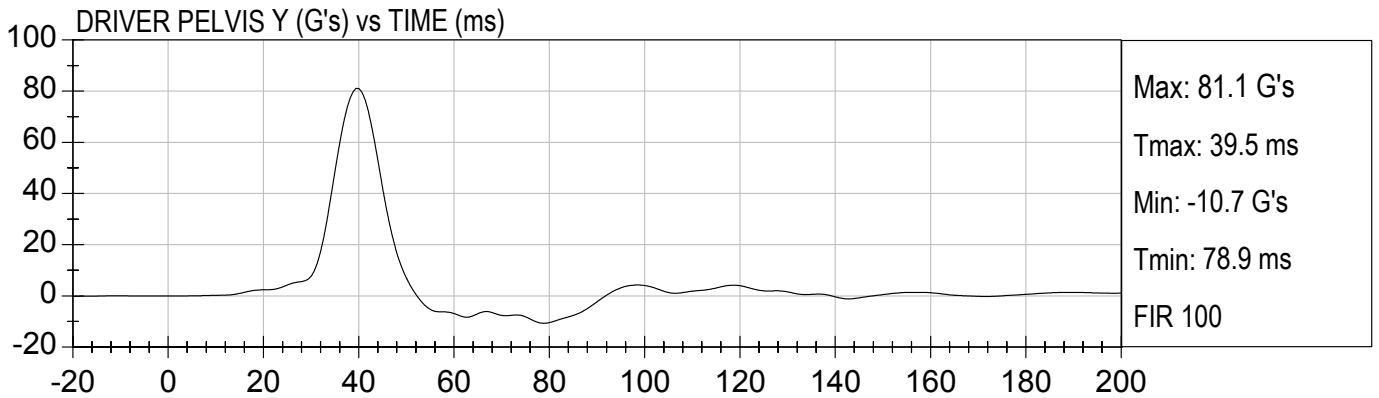
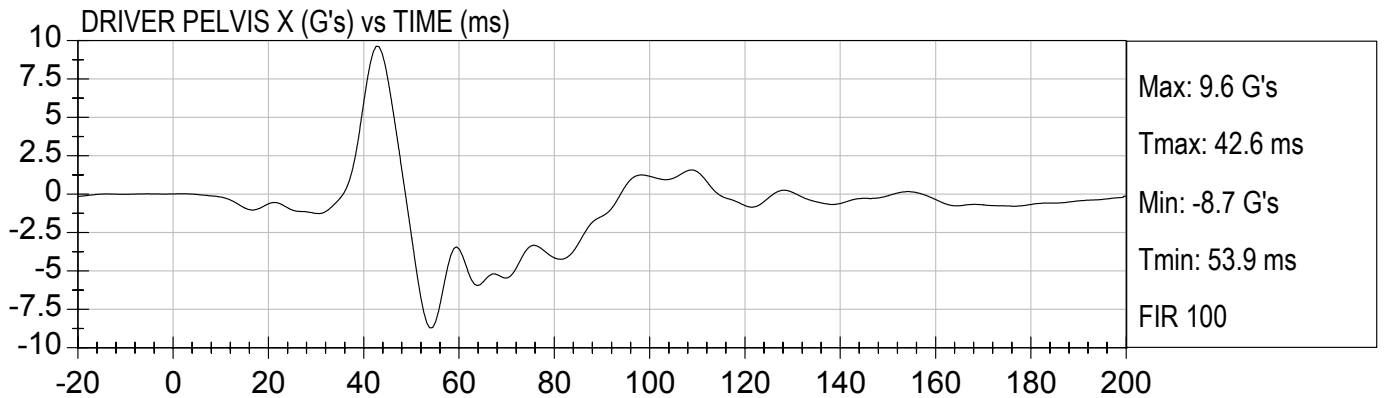












## **APPENDIX C**

### **SID-HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA**

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

**ATD Serial No:** 036

**Test I.D.:** D021411

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Peak Resultant Acceleration	G's	120 to 150	147	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-7	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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

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 11/01/2002  
 Test Date

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 Approved By



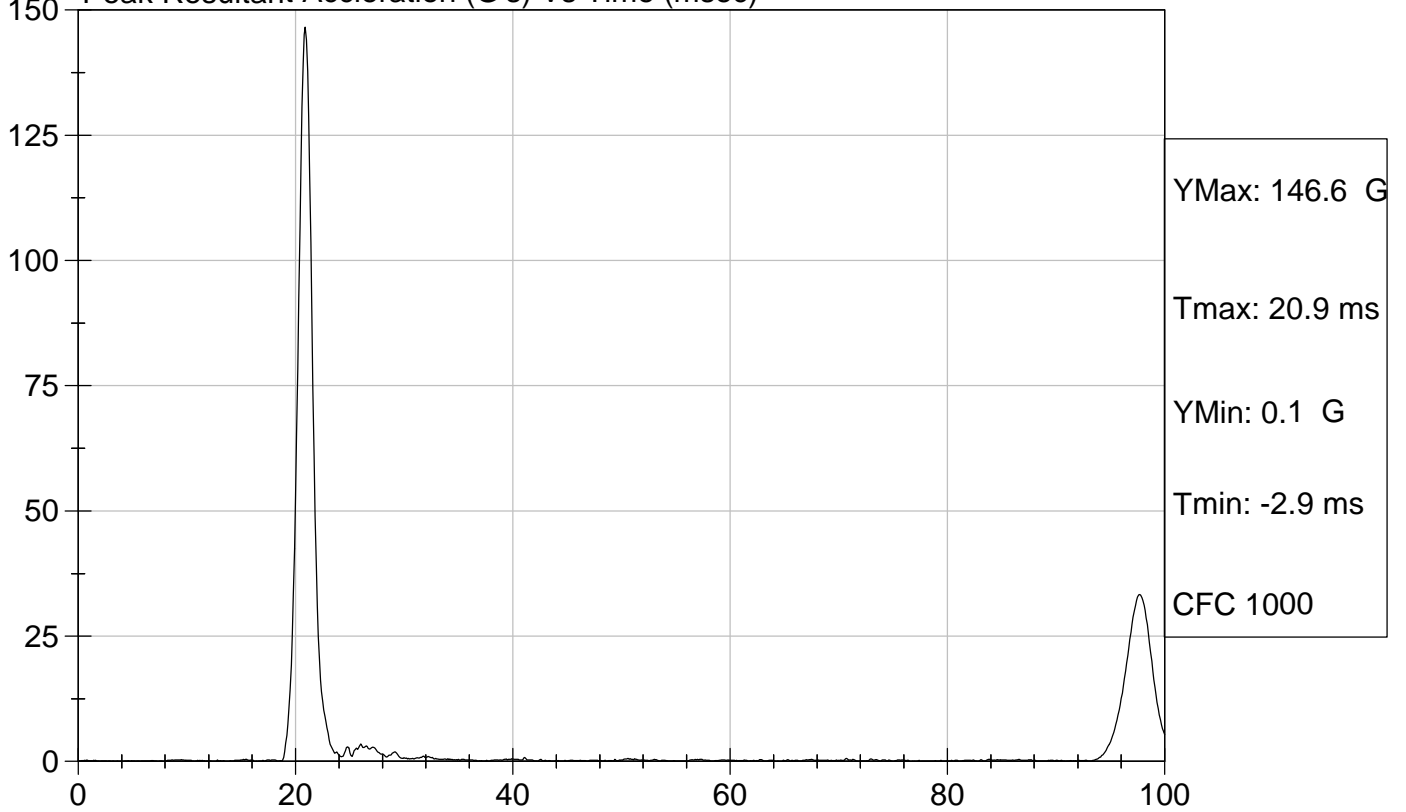
Test Description: Head Drop

Test Date: 11/01/2002

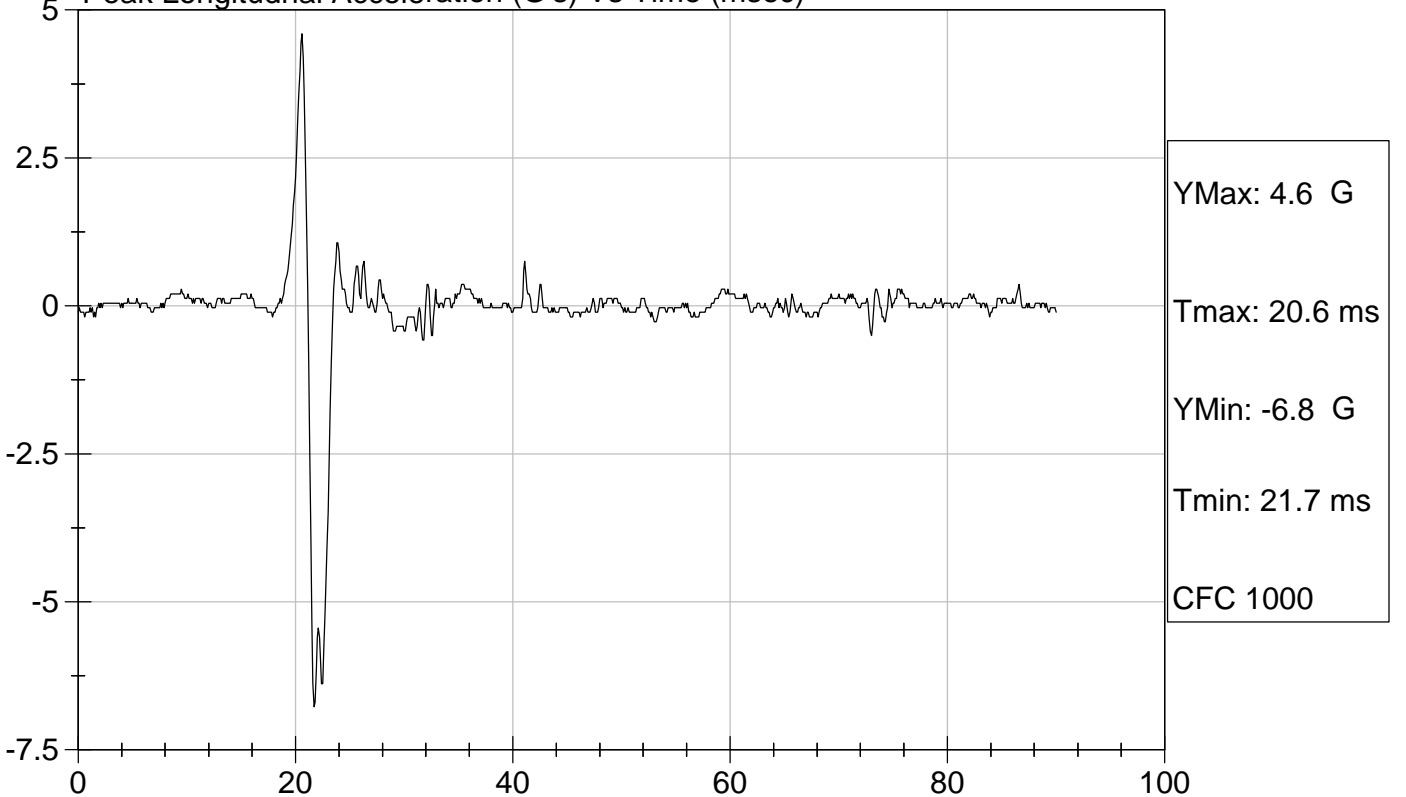
Component: D021411

Speed: 0 ft/s, 0.00 m/s

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



Peak Longitudinal Acceleration (G's) Vs Time (msec)



**SID Calibration Data Sheet**  
**Side Impact Dummy (SID)**  
**Neck Pendulum Test**

ATD Serial No: 036

Test I.D: D021419

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	26	Pass	
Impact Velocity	m/s	6.89 to 7.13	7.05	Pass	
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.41	Pass
	20 msec	m/s	4.12 to 5.10	4.76	Pass
	30 msec	m/s	5.73 to 7.01	6.61	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.88	Pass
Midsaggital Plane Max Rotation	deg	66 to 82	73	Pass	
Head Rotation Peak to Zero - Decay Time	msec	58 to 67	59	Pass	
Max. Mx at Occipital Condyles	Nm	73 to 88	79	Pass	
Mx Peak To Zero - Decay Time	msec	49 to 64	57	Pass	
Mx Peak to Max. Head Rotation	msec	2 to 16	15	Pass	

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Laboratory Technician

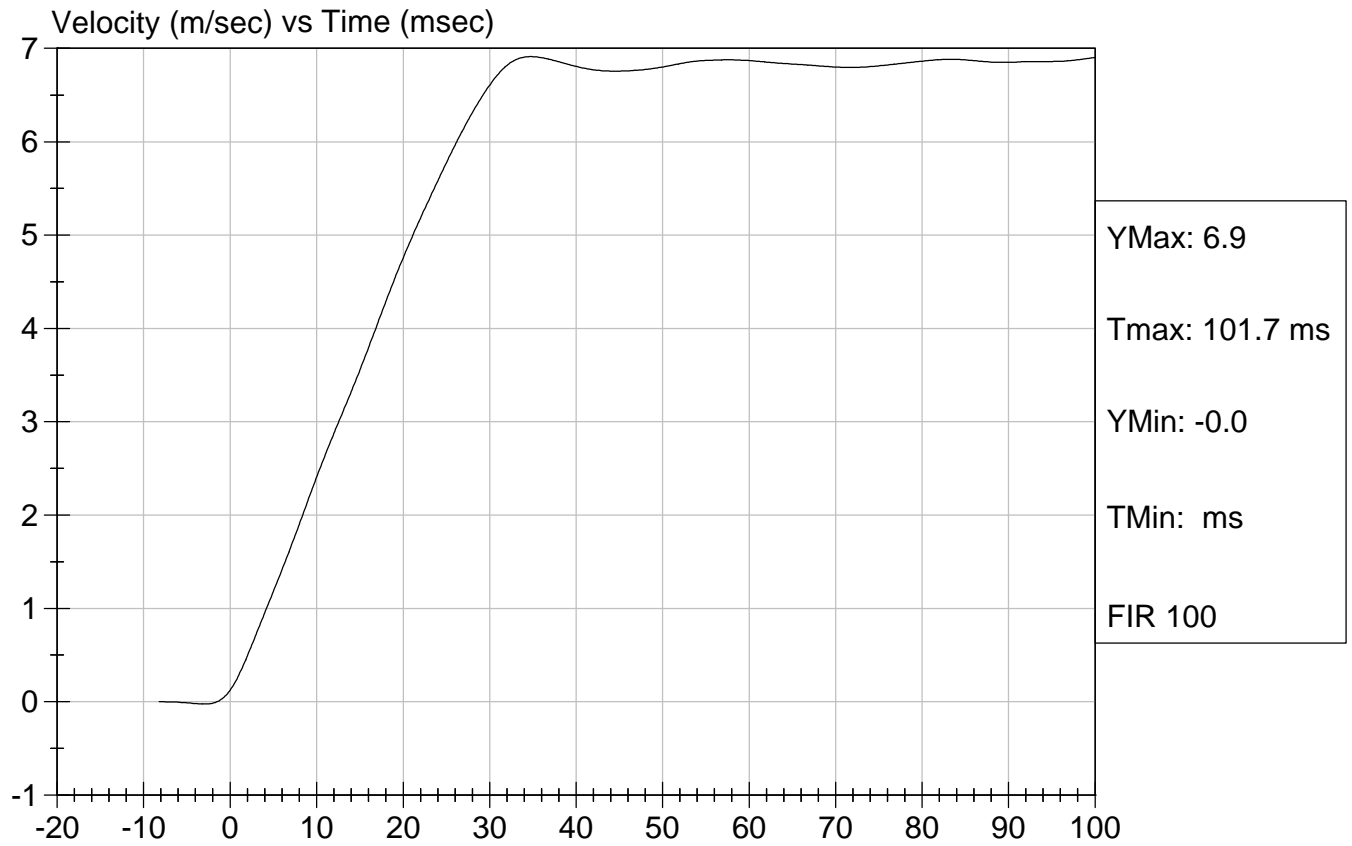
11/01/2002  
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Test Date

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Approved By



Test Desc: Neck Bending  
Component ID: D021419

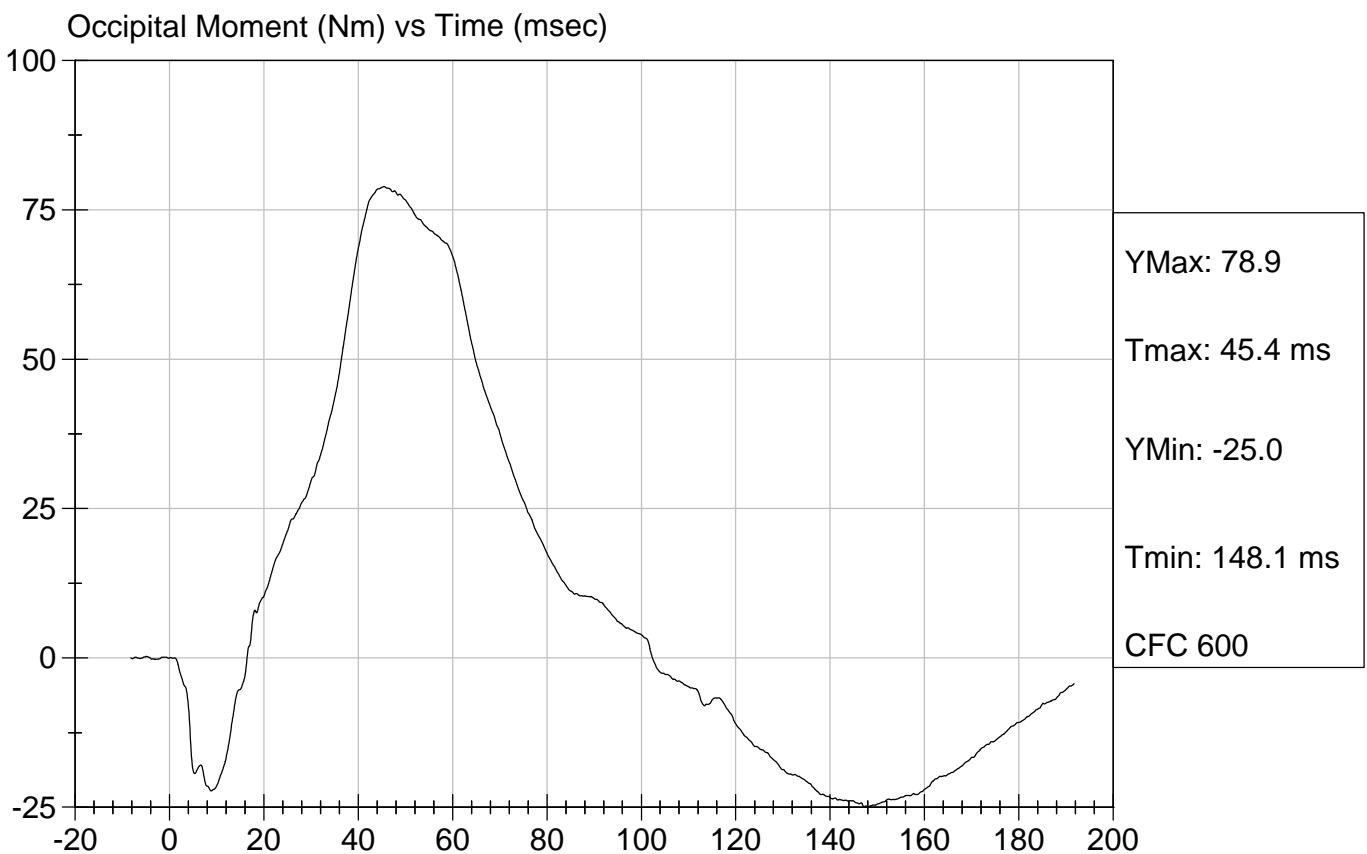
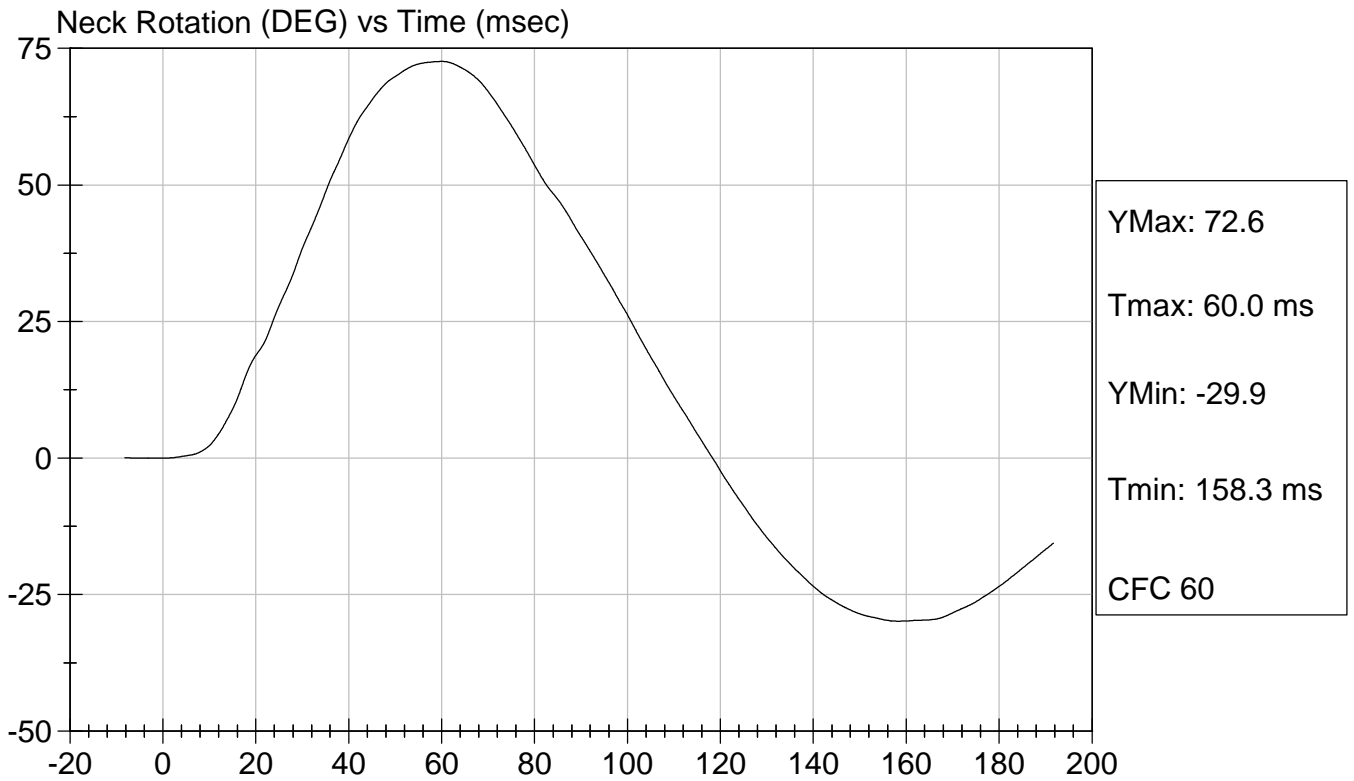
Test Date: 11/01/2002  
Speed: 23.14 ft/sec, 7.05 m/sec





Test Desc: Neck Bending  
Component ID: D021419

Test Date: 11/01/2002  
Speed: 23.14 ft/sec, 7.05 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

**ATD Serial No:** 036

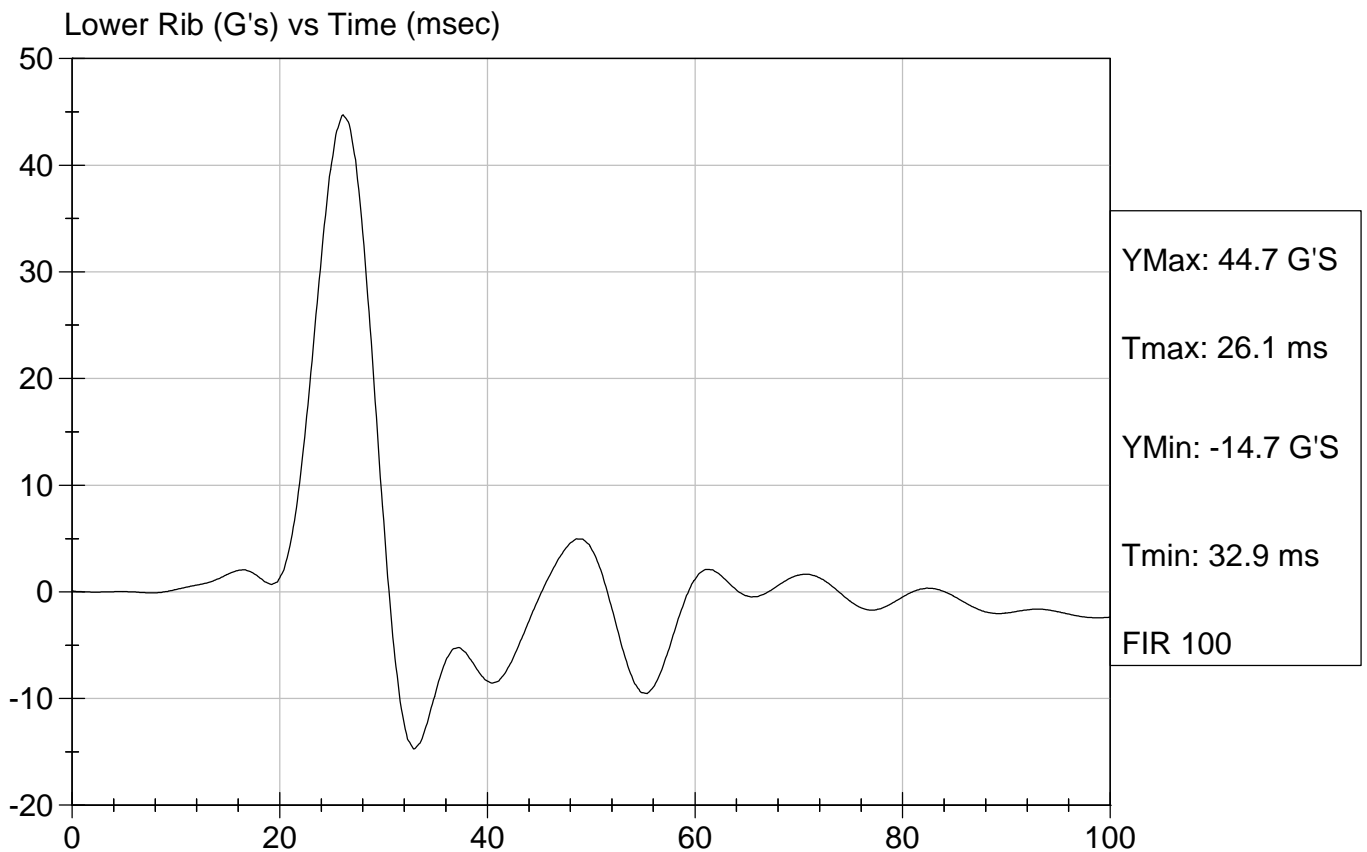
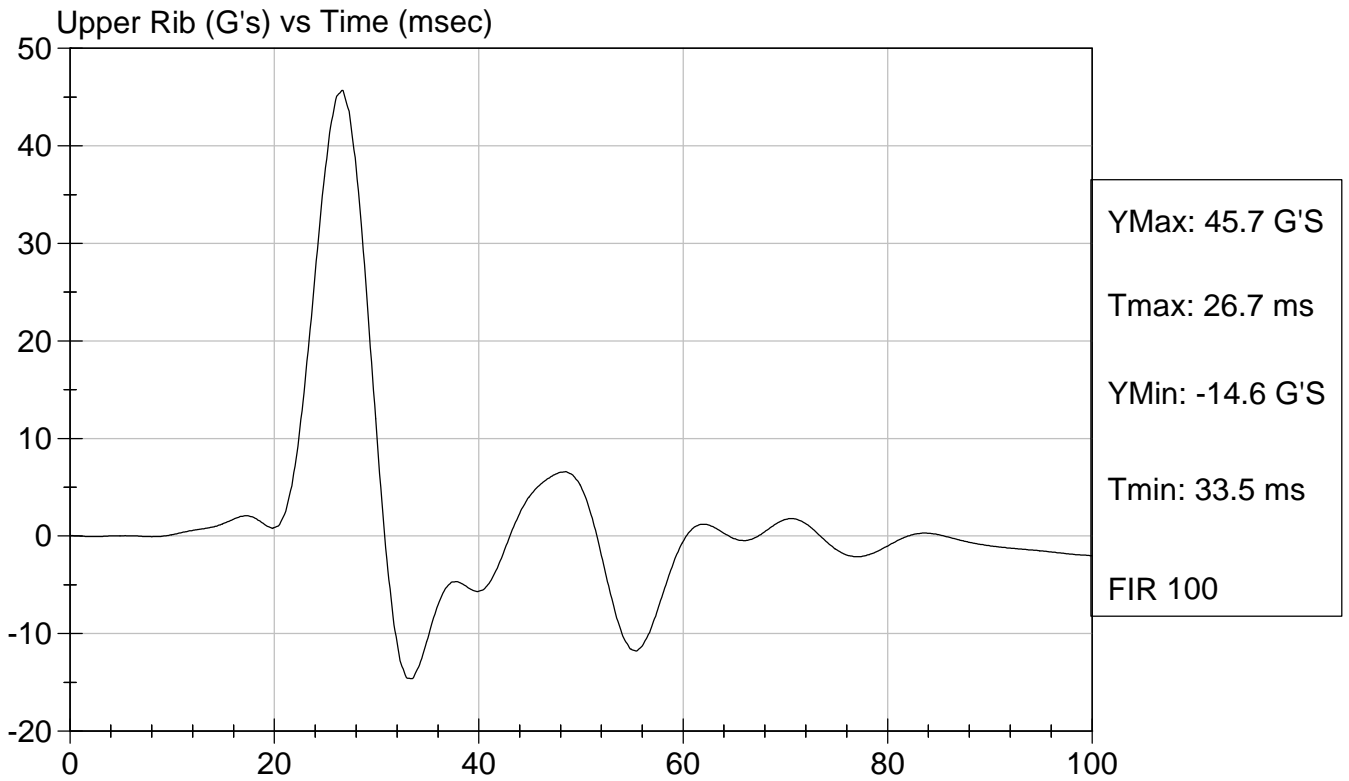
**Test I.D.:** D021412

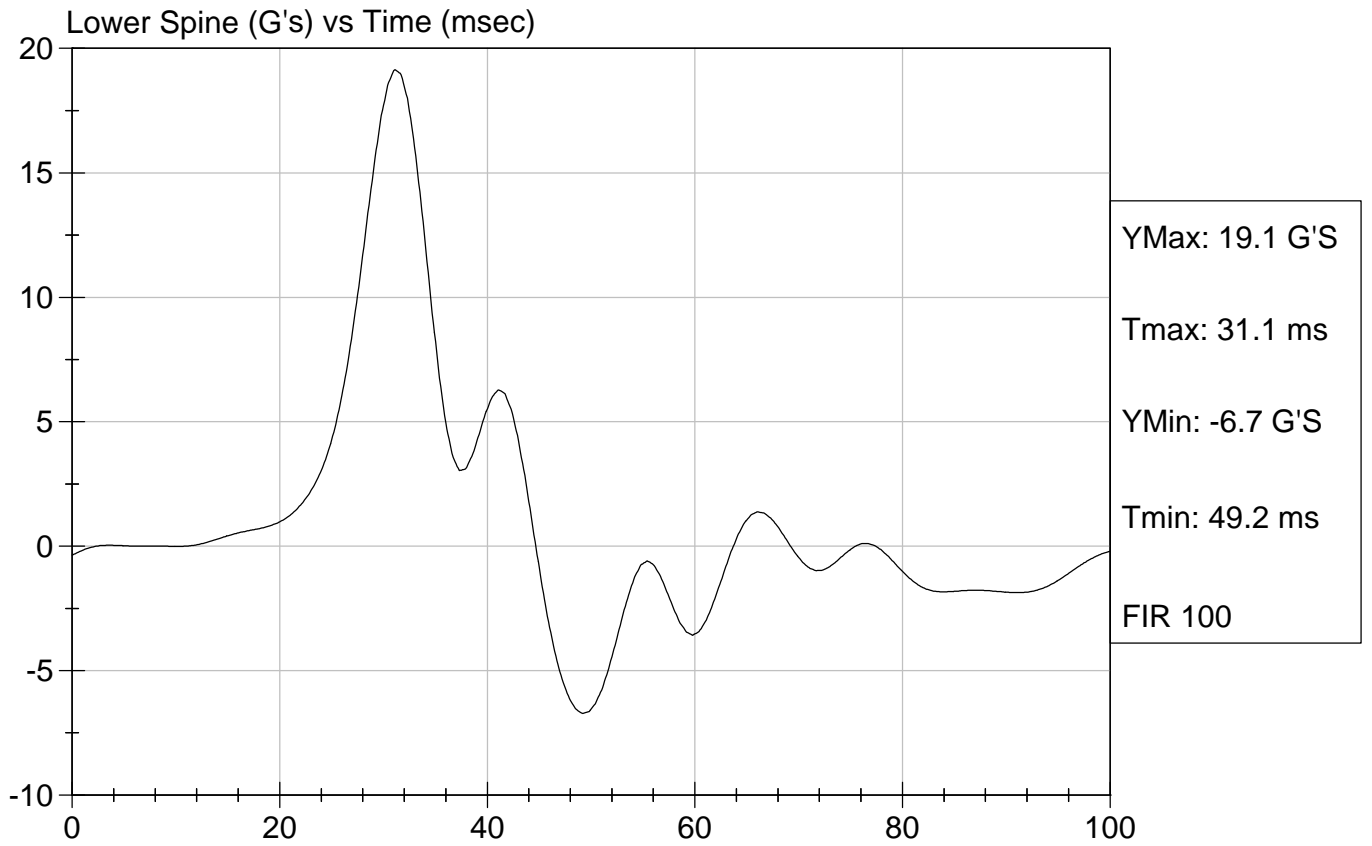
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Upper Rib	G's	37 - 46	46	Pass
Lower Rib	G's	37 - 46	45	Pass
Lower Spine	G's	15 - 22	19	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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 Laboratory Technician

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 11/01/2002  
 Test Date

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 Approved By





**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

**ATD Serial No:** 036

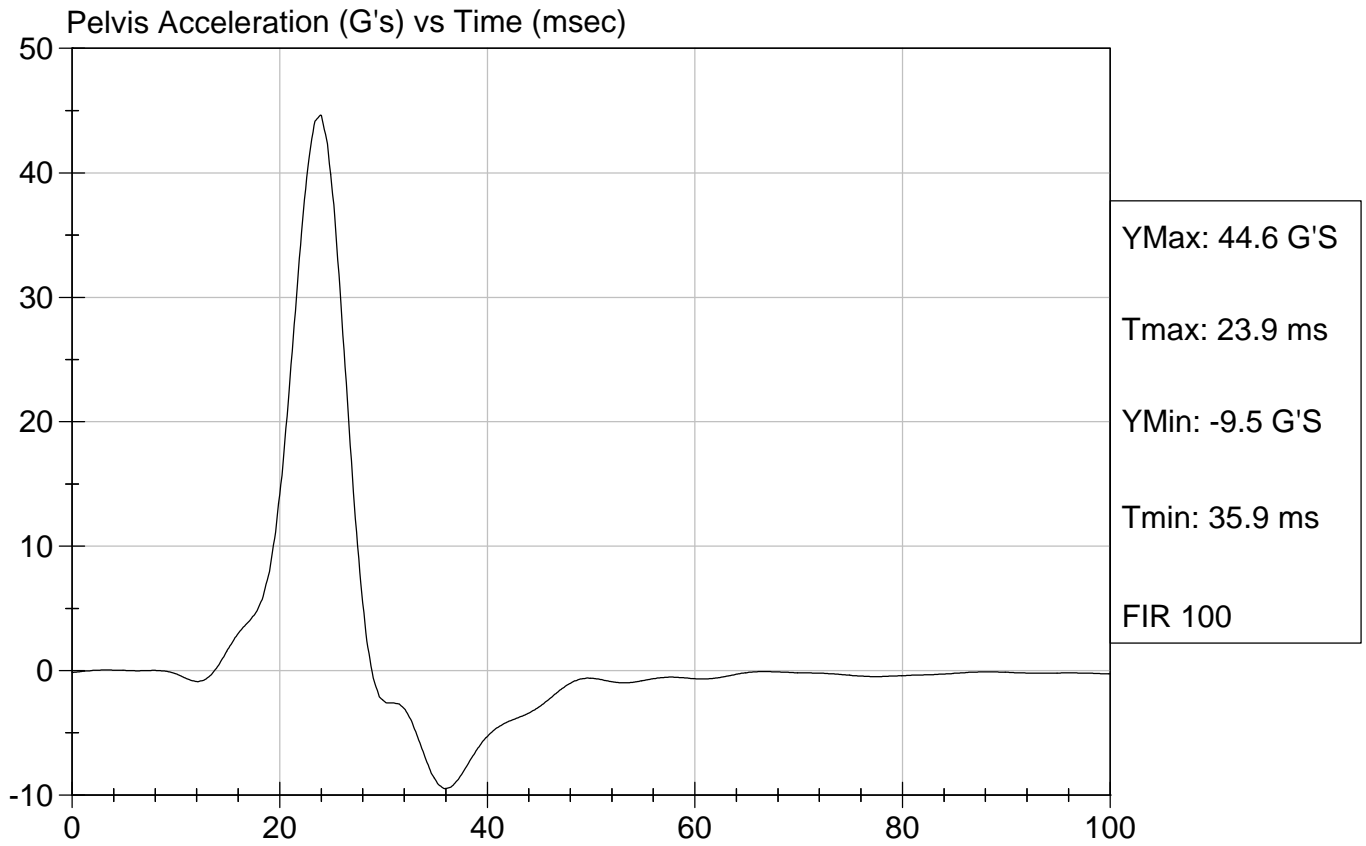
**Test I.D.:** D021413

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Probe Velocity	m/s	4.27 - 4.33	4.29	Pass
Pelvis Acceleration	G's	40 - 60	45	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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 Laboratory Technician

11/01/2002  
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 Test Date

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 Approved By



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**

**ATD Serial No:** 036

**Test I.D.:** D021414

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Force At 12.7 mm	N	104 -162	147	Pass
Force At 19 mm	N	163 - 222	201	Pass
Force At 25.4 mm	N	222 - 280	269	Pass
Force At 33 mm	N	325 - 391	373	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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 Laboratory Technician

11/01/2002  
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 Test Date

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 Approved By



Test Description: Abdomen Compression Test Date: 11/01/2002

Component: D021414

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

**ATD Serial No:** 036

**Test I.D.:** D021415

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Force At 0 deg	N	0 - 26.7	0.0	Pass
Force At 20 deg	N	97.9 - 151.2	102.0	Pass
Force At 30 deg	N	151.2 - 204.6	154.3	Pass
Force At 40 deg	N	204.6 - 258.0	234.8	Pass
Return Angle	Deg	12 Maximum	6	Pass
			Overall Test Results	Pass

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 Laboratory Technician

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 11/01/2002  
 Test Date

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 Approved By

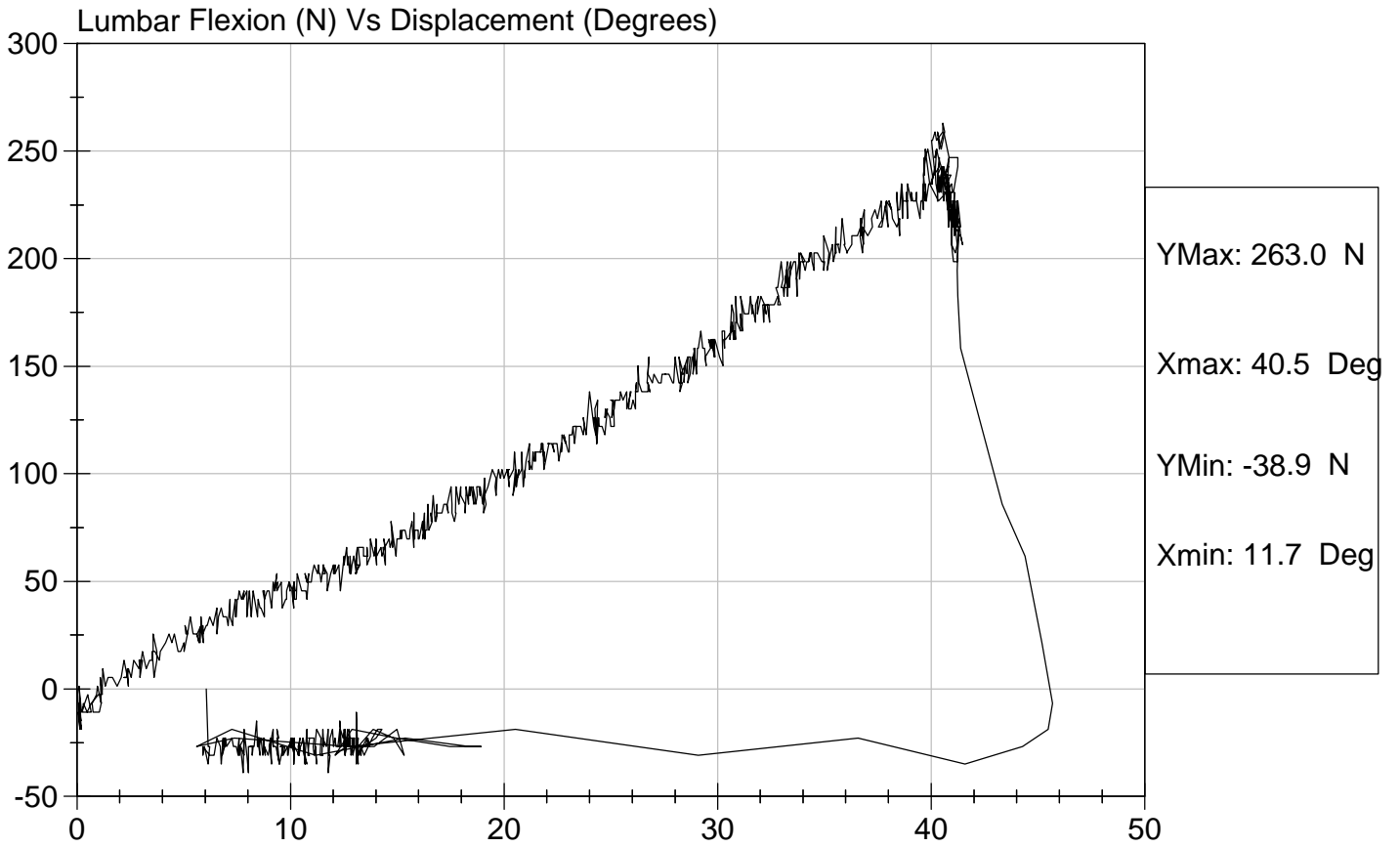


Test Description: Lumbar Flexion

Test Date: 11/01/2002

Component: D021415

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

**ATD Serial No:** 036

**Test I.D.:** D03111

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.3	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Peak Resultant Acceleration	G's	120 to 150	133	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-14	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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

02/04/2003  
 Test Date

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 Approved By



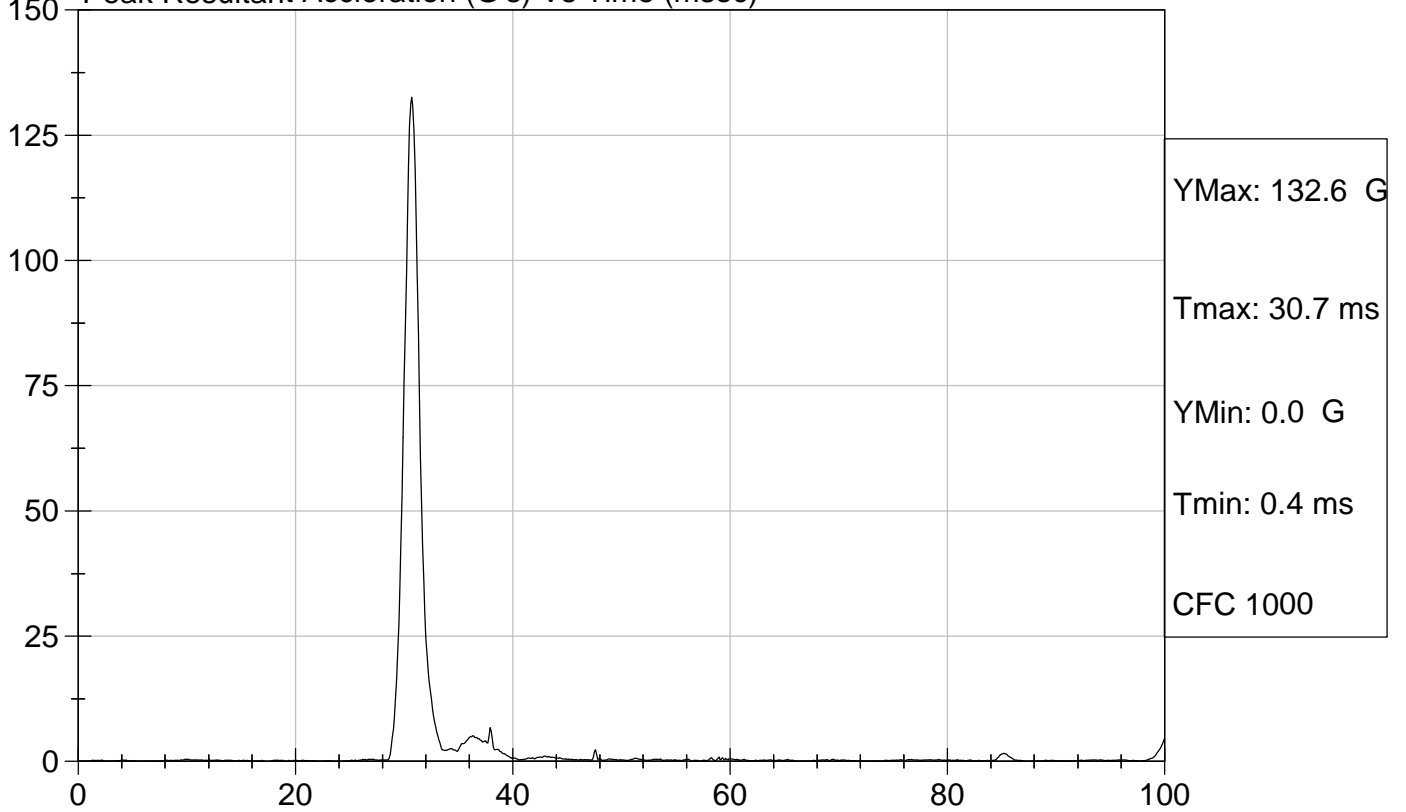
Test Description: Head Drop

Test Date: 02/04/2003

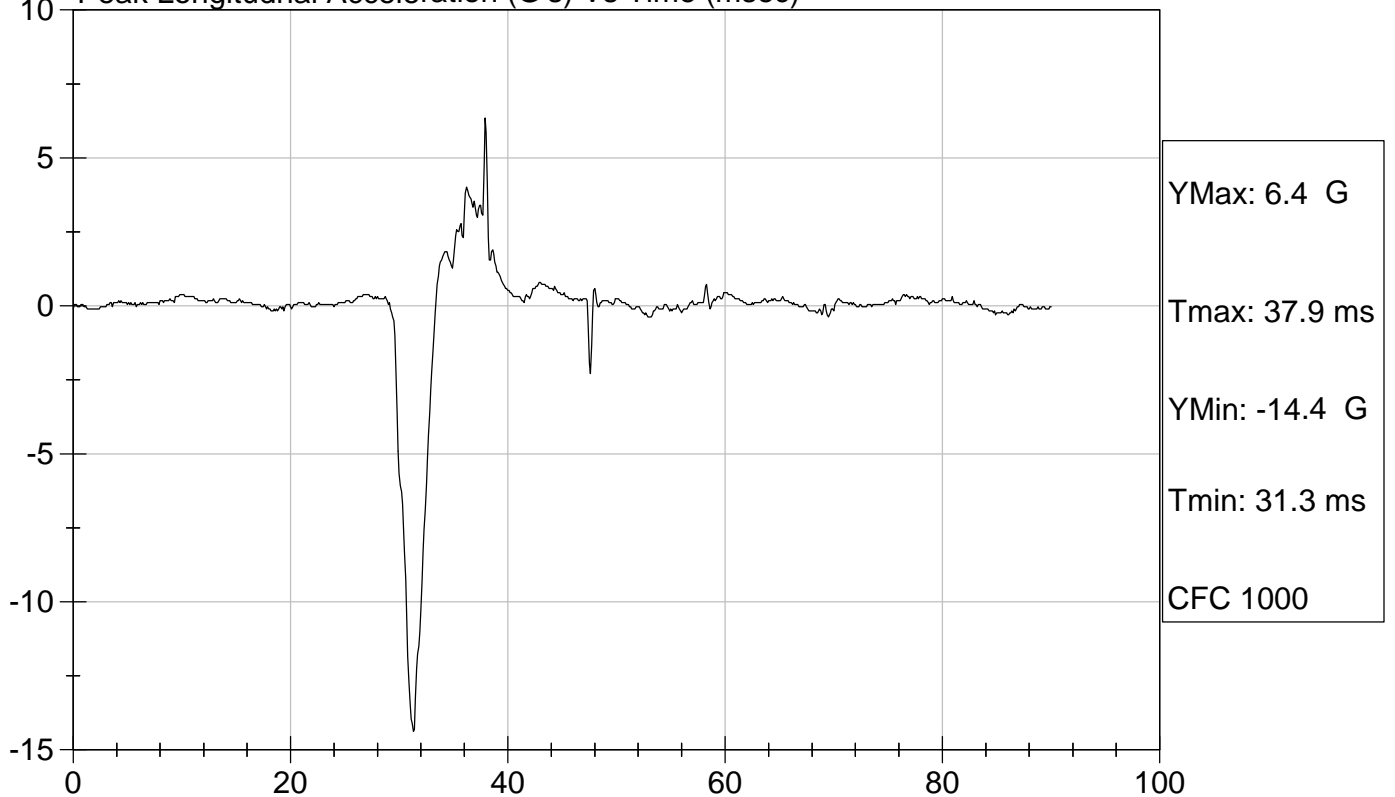
Component: D03111

Speed: 0 ft/s, 0.00 m/s

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



Peak Longitudnal Acceleration (G's) Vs Time (msec)



**SID Calibration Data Sheet**  
**Side Impact Dummy (SID)**  
**Neck Pendulum Test**

**ATD Serial No:** 036

**Test I.D:** D03119

Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass	
Laboratory Relative Humidity	%	10 to 70	20	Pass	
Impact Velocity	m/s	6.89 to 7.13	7.03	Pass	
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.27	Pass
	20 msec	m/s	4.12 to 5.10	4.48	Pass
	30 msec	m/s	5.73 to 7.01	6.26	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.94	Pass
Midsaggital Plane Max Rotation	deg	66 to 82	71	Pass	
Head Rotation Peak to Zero - Decay Time	msec	58 to 67	61	Pass	
Max. Mx at Occipital Condyles	Nm	73 to 88	79	Pass	
Mx Peak To Zero - Decay Time	msec	49 to 64	54	Pass	
Mx Peak to Max. Head Rotation	msec	2 to 16	12	Pass	

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Laboratory Technician

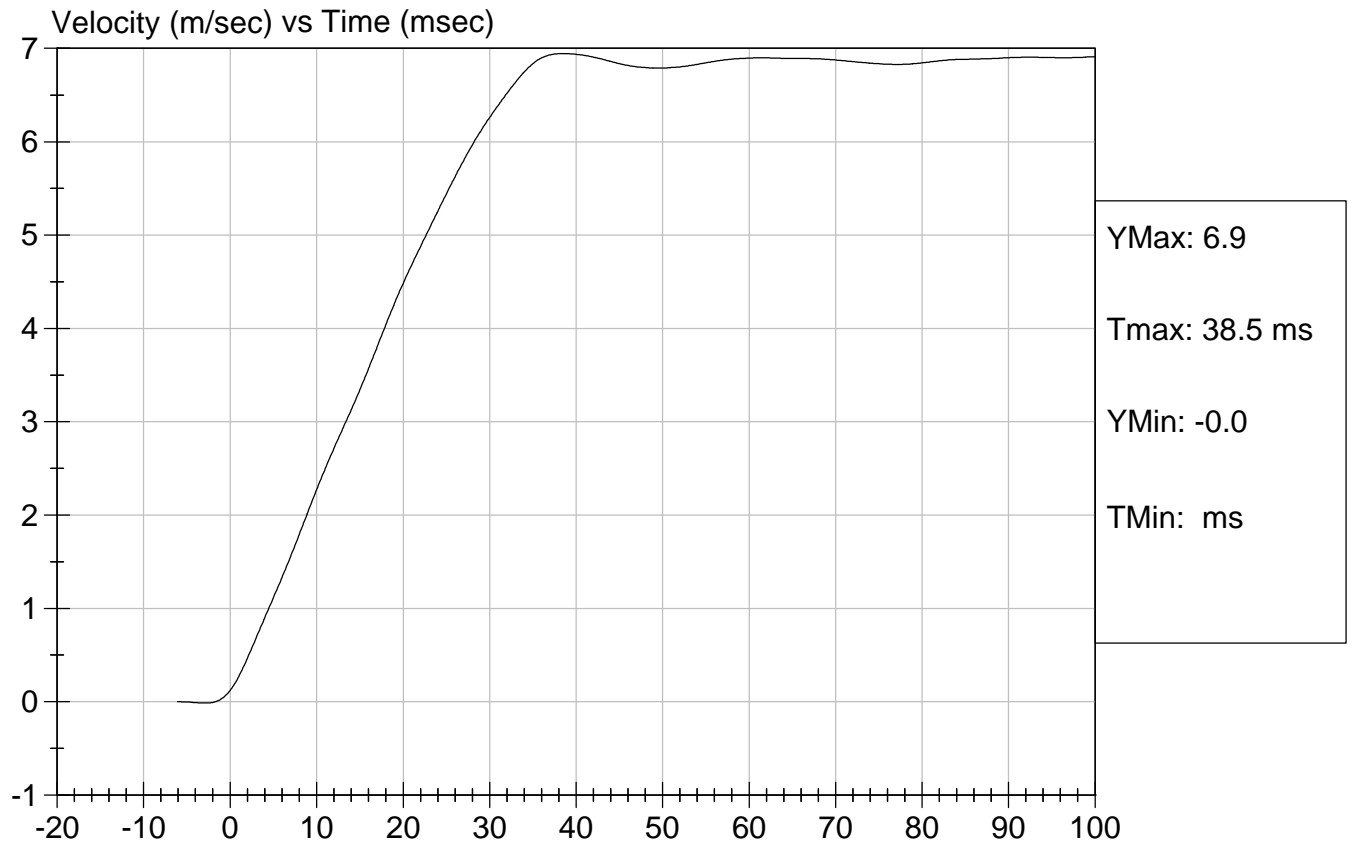
02/05/2003  
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Test Date

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Approved By



Test Desc: Neck Bending  
Component ID: D03119

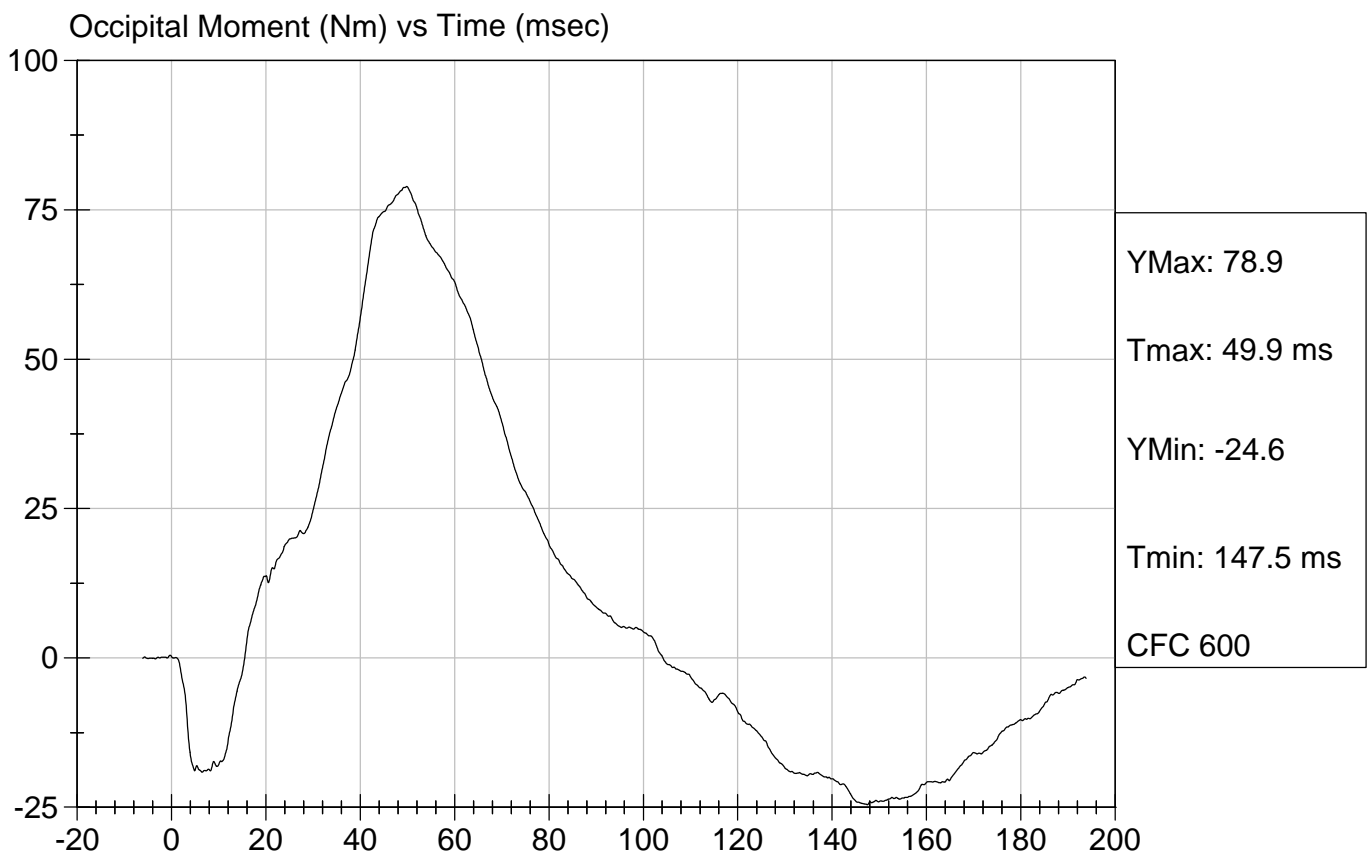
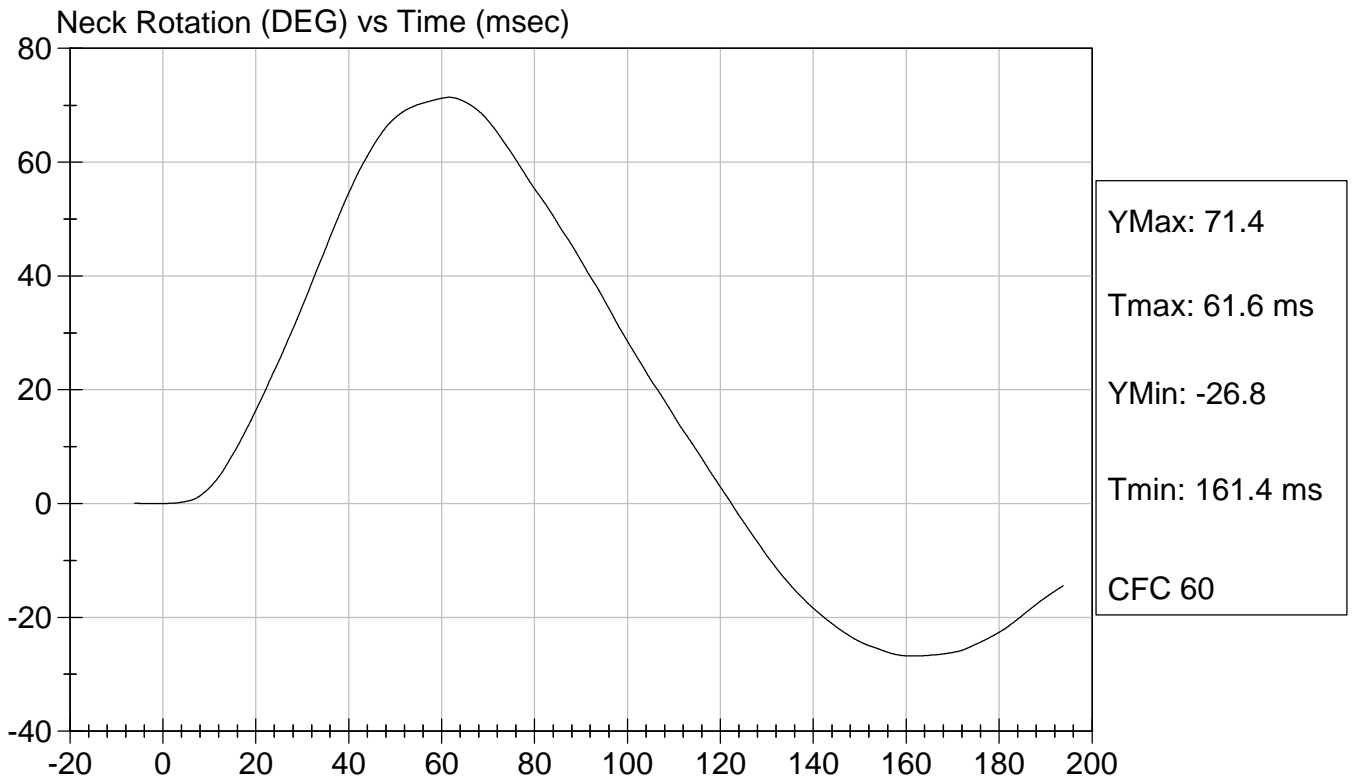
Test Date: 02/05/2003  
Speed: 23.07 ft/sec, 7.03 m/sec





Test Desc: Neck Bending  
Component ID: D03119

Test Date: 02/05/2003  
Speed: 23.07 ft/sec, 7.03 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

**ATD Serial No:** 036

**Test I.D.:** D03112

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.2	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Upper Rib	G's	37 - 46	41	Pass
Lower Rib	G's	37 - 46	45	Pass
Lower Spine	G's	15 - 22	19	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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 Laboratory Technician

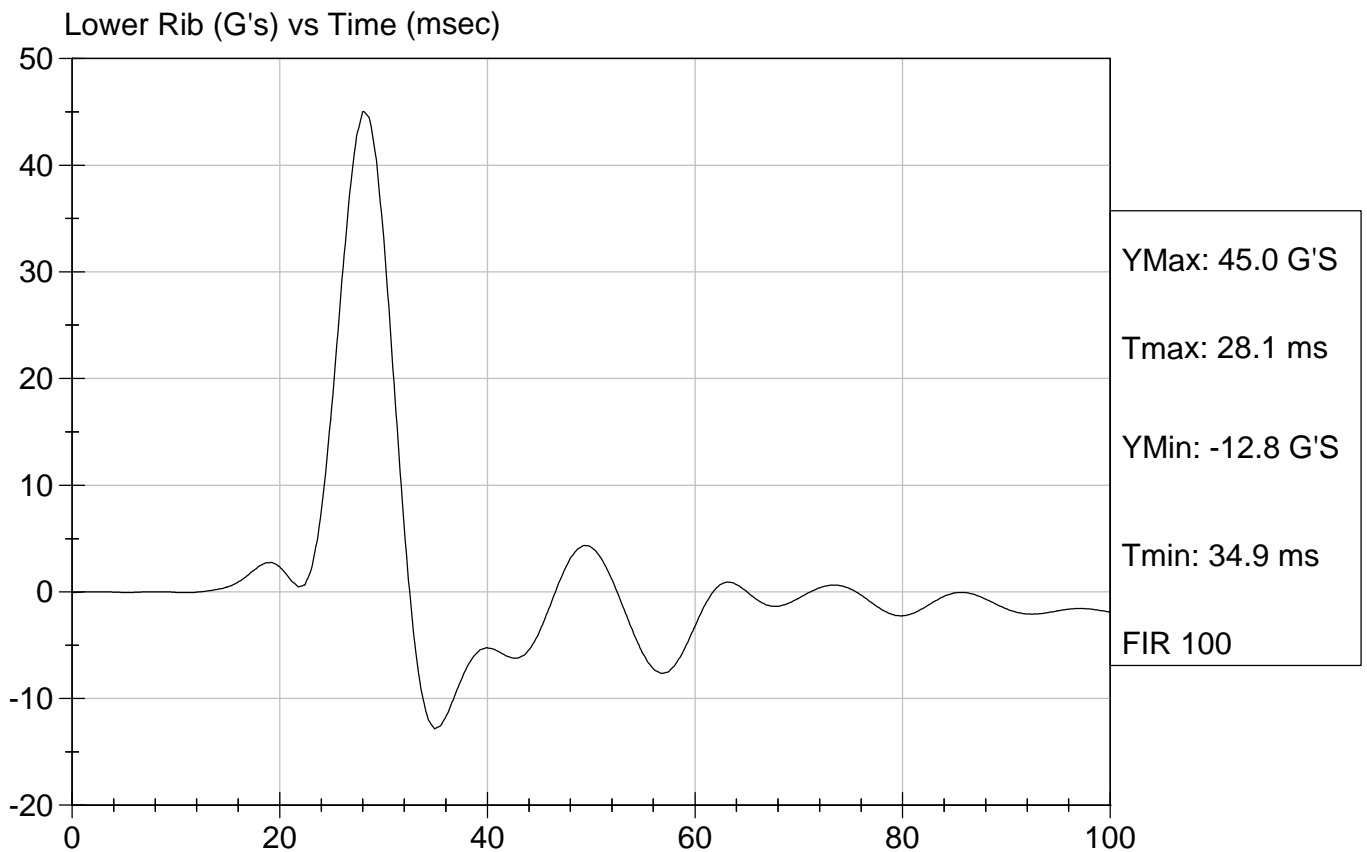
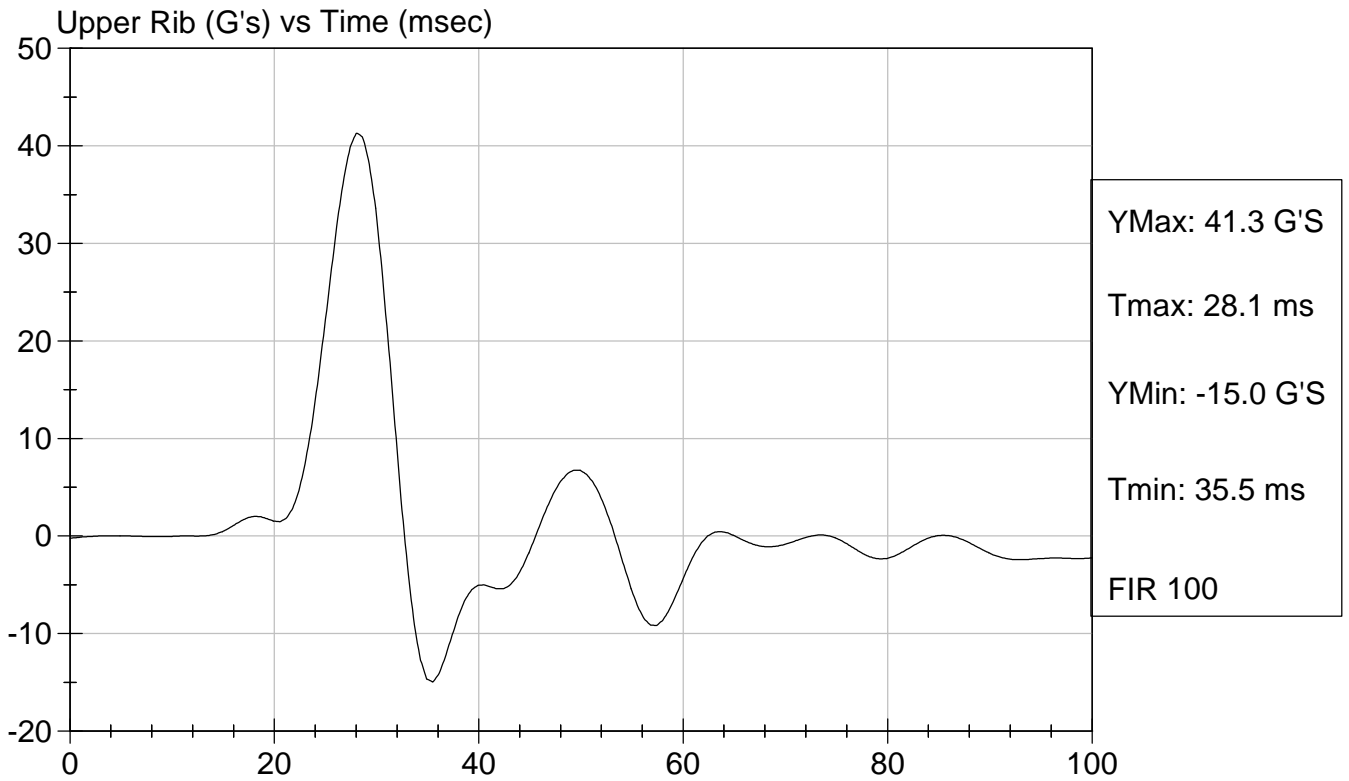
02/06/2003  
 Test Date

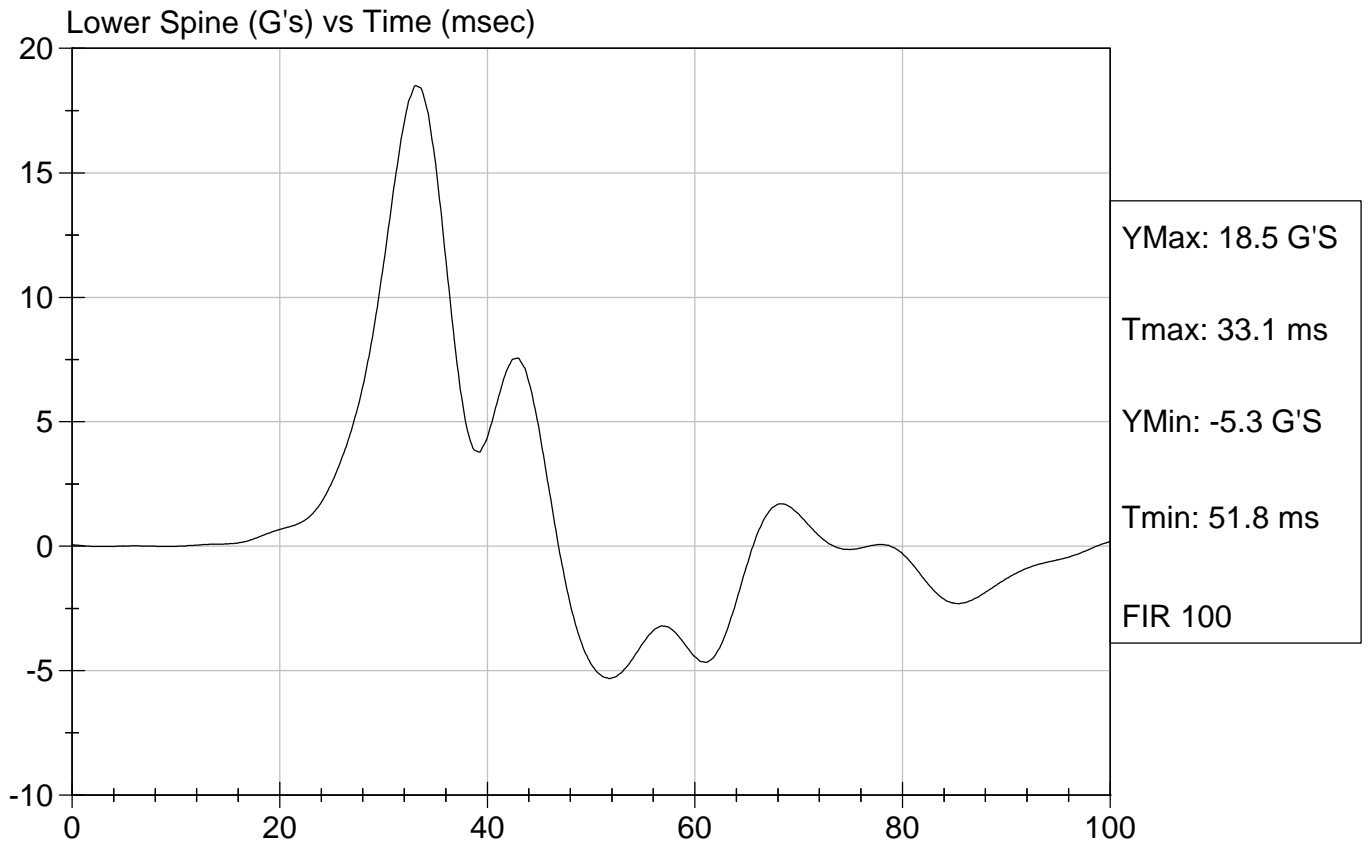
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 Approved By



Test Desc: Thorax Impact  
Component ID: D03112

Test Date: 02/06/2003  
Speed: 14 ft/sec, 4.27 m/sec





**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

**ATD Serial No:** 036

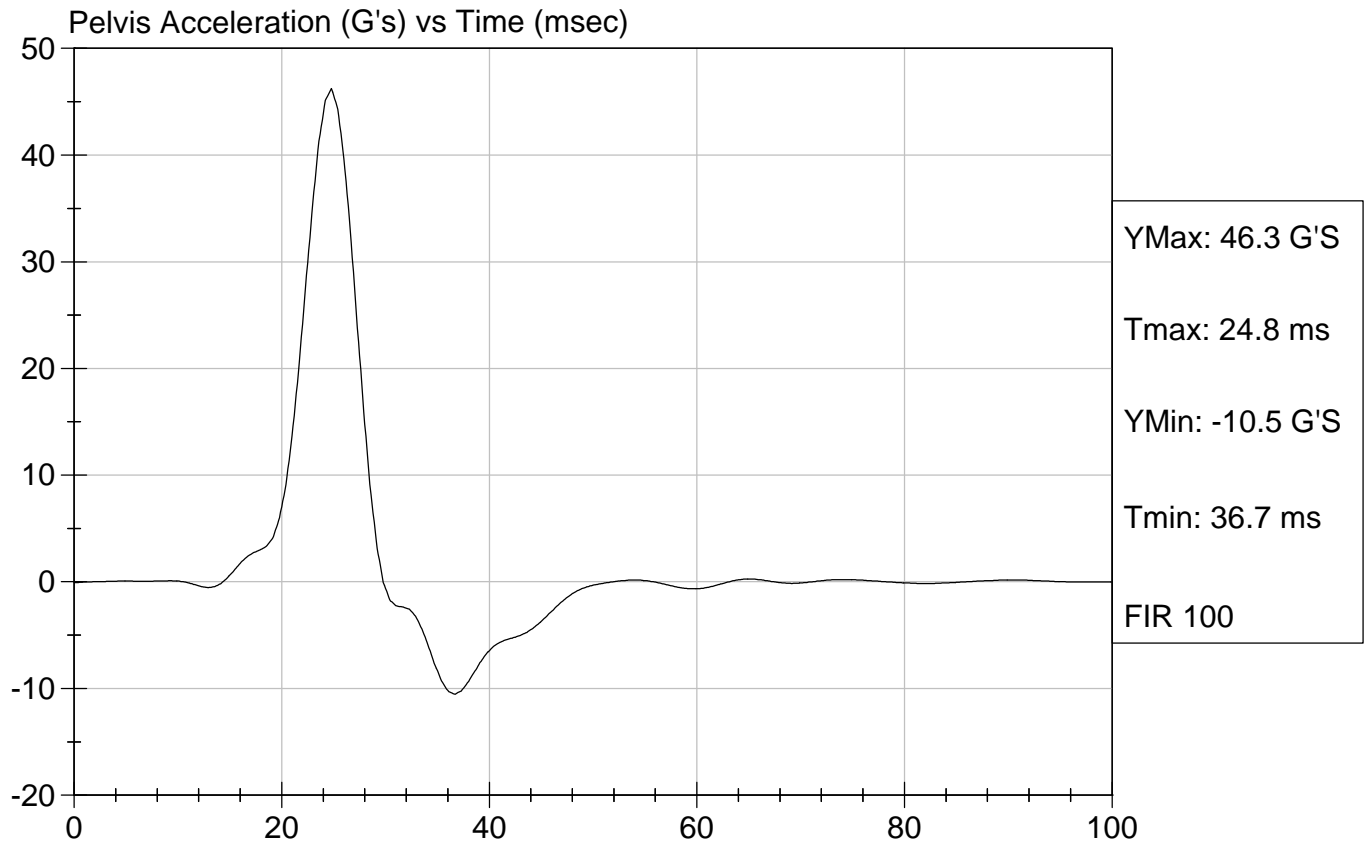
**Test I.D.:** D03113

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.2	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Velocity	m/s	4.27 - 4.33	4.29	Pass
Pelvis Acceleration	G's	40 - 60	46	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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

02/06/2003  
 Test Date

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



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**

**ATD Serial No:** 036

**Test I.D.:** D03114

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	14	Pass
Force At 12.7 mm	N	104 -162	150	Pass
Force At 19 mm	N	163 - 222	210	Pass
Force At 25.4 mm	N	222 - 280	271	Pass
Force At 33 mm	N	325 - 391	381	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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

02/05/2003  
 Test Date

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



Test Description: Abdomen Compression Test Date: 02/05/2003

Component: D03114

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

**ATD Serial No:** 036

**Test I.D.:** D03115

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	14	Pass
Force At 0 deg	N	0 - 26.7	0.0	Pass
Force At 20 deg	N	97.9 - 151.2	109.5	Pass
Force At 30 deg	N	151.2 - 204.6	160.1	Pass
Force At 40 deg	N	204.6 - 258.0	210.8	Pass
Return Angle	Deg	12 Maximum	6	Pass
<b>Overall Test Results</b>				<b>Pass</b>

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

02/05/2003  
 Test Date

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

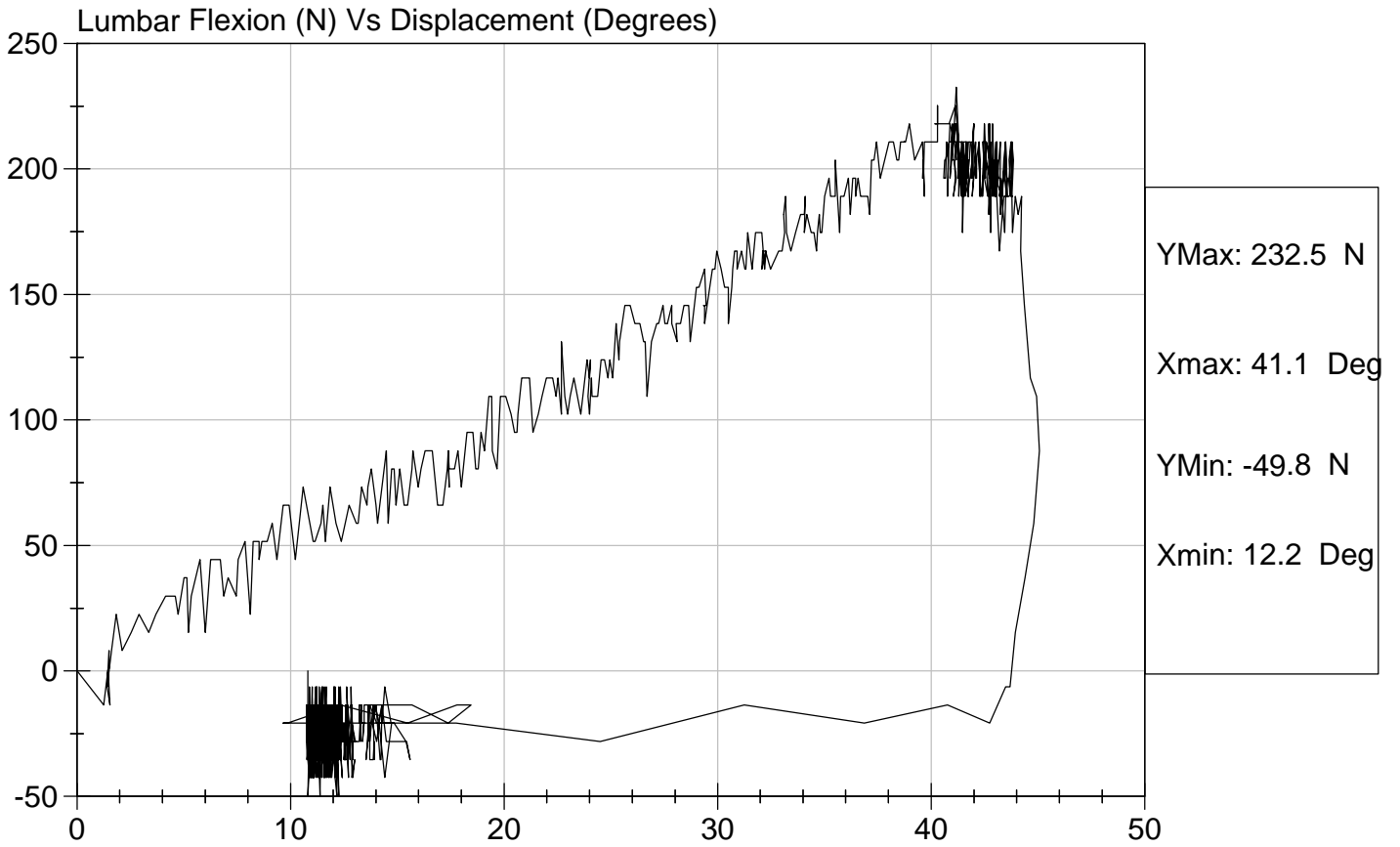


Test Description: Lumbar Flexion

Test Date: 02/05/2003

Component: D03115

Speed: 0 ft/sec, 0 m/sec



**APPENDIX D**  
**TEST EQUIPMENT LIST AND CALIBRATION INFORMATION**

DUMMY AND VEHICLE CALIBRATION DATA

	INSTRUMENTS FOR LEFT FRONT DUMMY NO. 009		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X Accelerometer	J22107	Endevco	1/21/03
Head Y Accelerometer	J22055	Endevco	1/21/03
Head Z Accelerometer	AKAH1	Endevco	1/21/03
Driver Head Y – Front	J10195	Endevco	1/21/03
Driver Head Z – Front	AJ4J0	Endevco	1/21/03
Driver Head X – Left	AM751	Endevco	1/21/03
Driver Head Z – Left	AH1G2	Endevco	1/21/03
Driver Head X – Upper	AP138	Endevco	1/21/03
Driver Head Y – Upper	AP0G2	Endevco	1/21/03
Driver Head X – Redundant	AJ412	Endevco	1/21/03
Driver Head Y – Redundant	J18260	Endevco	1/21/03
Driver Head Z – Redundant	J20965	Endevco	1/21/03
Upper Neck Force X Load Cell	N376FX	Denton	12/9/02
Upper Neck Force Y Load Cell	N376FY	Denton	12/9/02
Upper Neck Force Z Load Cell	N376FZ	Denton	12/9/02
Upper Neck Moment X	N376MX	Denton	12/9/02
Upper Neck Moment Y	N376MY	Denton	12/9/02
Upper Neck Moment Z	N376MZ	Denton	12/9/02
Upper Spine X Accelerometer	J12465	Endevco	9/9/02
Upper Spine Y Accelerometer	AGP28	Endevco	9/9/02
Upper Spine Z Accelerometer	J11361	Endevco	9/9/02
Upper Spine Y– Redundant	AN8D5	Endevco	9/9/02
Upper Rib Y Accelerometer	J13851	Endevco	8/8/02
Upper Rib Y– Redundant	J13658	Endevco	8/8/02
Rib Displacement	037	Servco	1/28/03
Lower Rib Y Accelerometer	J13642	Endevco	8/8/02
Lower Rib Y – Redundant	AKAC4	Endevco	8/8/02
Lower Spine X Accelerometer	AP042	Endevco	1/15/03
Lower Spine Y Accelerometer	AP120	Endevco	1/15/03
Lower Spine Z Accelerometer	AP2D6	Endevco	1/8/03
Lower Spine Y– Redundant	ALEK9	Endevco	1/15/03
Pelvis X Accelerometer	J20298	Endevco	1/15/03
Pelvis Y Accelerometer	J17709	Endevco	1/15/03
Pelvis Z Accelerometer	J20473	Endevco	1/15/03

## VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Mid A-Post Y	G03-N08	ENTRAN	9/6/02
Left Lower A-Post Y	H05-F03	ENTRAN	10/30/02
Left Mid B-Post Y	G01-N20	ENTRAN	7/31/02
Left Lower B-Post Y	H05-F09	ENTRAN	10/31/02
Floorpan @ Rear Axle X	H01-N08	ENTRAN	11/19/02
Floorpan @ Rear Axle Y	F04-N08	ENTRAN	10/18/02
Floorpan @ Rear Axle Z	L23-A05	ENTRAN	11/19/02
Driver Seat Track Y	G01-N18	ENTRAN	7/31/02
Right Front Sill X	G03-N11	ENTRAN	9/6/02
Right Front Sill Y	F07-A14	ENTRAN	9/6/02
Right Front Sill Z	E03-H24	ENTRAN	9/6/02
Right Rear Sill X	A08-A05	ENTRAN	9/6/02
Right Rear Sill Y	99F15A	ENTRAN	1/16/03
Right Rear Sill Z	G03-N13	ENTRAN	10/7/02
Left Front Sill Y	99F159	ENTRAN	9/13/02
Left Rear Sill Y	99F349	ENTRAN	10/31/02
Vehicle CG X	G01-N06	ENTRAN	7/23/02
Vehicle CG Y	K21-N27	ENTRAN	10/18/02
Vehicle CG Z	K21-N31	ENTRAN	10/9/02
Left Front Door @ Mid Rib Y	G13-B07	ENTRAN	10/8/02
Left Front Door @ Pelvis Y	E03-H14	ENTRAN	10/8/02
Left Front Door @ Knee Y	J10-E03	ENTRAN	10/8/02
Left Front Door @ Arm Y	D11-F01	ENTRAN	11/19/02
Lower Center Radiator Support X	H01-N09	ENTRAN	11/19/02
Lower Center Radiator Support Y	99F216	ENTRAN	10/31/02
Lower Center Radiator Support Z	H01-N26	ENTRAN	11/19/02
Driver Left Seat Frame Y	99F253	ENTRAN	11/4/02
Driver Right Seat Frame Y	G01-N02	ENTRAN	7/31/02
Left A – Post @ Roof Y	K21-N09	ENTRAN	1/24/03
Left Upper B – Post Y	G01-N09	ENTRAN	7/24/02

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

**APPENDIX E**  
**DUMMY PEAK RESPONSES**

DRIVER PEAK RESPONSE TABLE

Location	Peak Values										
				1999 Saab 10/23/01 ES-2		2000 Saab 9/19/02 ES-2		2000 Saab 10/24/02 SID HIII		2000 Saab 1/29/03 214 seating SID H3	
	Class	Axis	Units	Peak	Time	Peak	Time	Peak	Time	Peak	Time
Head	1000	X	G	-8.2	63	-60.8	64	-235.2	61	-14.8	60.2
	1000	Y	G	31.9	58	100.9	64	606.6	61	46.4	55.9
	1000	Z	G	13.9	58	25.9	64	115.3	61	27.0	46.5
	1000	RES	G	35.0	58	119.6	64	655.7	61	47.6	56.4
Head Injury Criteria (HIC)				114		243		5155.4		182	
t1				42.8		50.8		60.6		45.4	
t2				69.9		66.2		61.4		68.1	
Upper Neck Force	1000	X	N	-211	63	-424	63	-729	58	-456	85.4
	1000	Y	N	-258	186	-328	167	556	62	-272	176.0
	1000	Z	N	476	46	512	96	-3154	61	1290	46.7
	1000	RES	N	481	46	674	62	3216	61	1300	46.7
Upper Neck Moment	600	X	Nm	-23.5	173	-28.3	157	-76.3	62	-61.7	53.9
	600	Y	Nm	17.6	104	-41.2	63	-41.1	57	45.7	101.4
	600	Z	Nm	18.8	69	27.4	70	21.4	60	28.8	67.5
	600	RES	Nm	27.4	175	47.7	63	76.3	62	67.2	54.4

DRIVER PEAK RESPONSE TABLE (CONTINUED)

Location	Peak Values										
				1999 Saab 10/23/01 ES-2		2000 Saab 9/19/02 ES-2		2000 Saab 10/24/02 SID HIII		2000 Saab 1/29/03 214 seating SID H3	
	Class	Axis	Units	Peak	Time	Peak	Time	Peak	Time	Peak	Time
Lower Neck Force	1000	X	N	-209	60	-679	63				
	1000	Y	N	286	29	-500	53				
	1000	Z	N	438	46	517	55				
	1000	RES	N	443	46	789	63				
Lower Neck Moment	600	X	Nm	-60.0	189	-67.8	168				
	600	Y	Nm	32.2	81	74.1	64				
	600	Z	Nm	14.7	73	29.4	60				
	600	RES	Nm	67.7	189	89.2	64				
Shoulder Force	600	X	N	381	21	-615	20				
	600	Y	N	1161	21	1295	20				
	600	Z	N	386	22	-379	19				
Upper Spine	180	X	G	7.1	53	-10.7	44	-28.4	52	-14.4	49.7
	180	Y	G	37.7	55	57.6	55	80.8	52	64.9	49.6
	180	Z	G	4.7	68	-4.9	53	18.3	62	8.9	45.3
	180	Res	G	38.4	55	57.8	55	86.6	52	66.5	49.6

E-2

DRIVER PEAK RESPONSE TABLE (CONTINUED)

Location	Peak Values										
				1999 Saab 10/23/01 ES-2		2000 Saab 9/19/02 ES-2		2000 Saab 10/24/02 SID HIII		2000 Saab 1/29/03 214 seating SID H3	
	Class	Axis	Units	Peak	Time	Peak	Time	Peak	Time	Peak	Time
Lower Spine	180	X	G	8.1	45	-5.9	86	-25.2	49	-25.2	76.2
	180	Y	G	39.7	53	58.3	52	79.8	47	76.1	45.7
	180	Z	G	4.3	68	-5.2	92	17.2	62	-12.7	47.3
	180	Res	G	40.2	51	58.3	52	83.7	48	76.5	45.6
Upper Rib	180	Y	G	97.9	49	180.9	48	108.9	44	75.9	44.7
Mid Rib	180	Y	G	122.5	15	148.8	46				
Lower Rib	180	Y	G	136.5	14	106.2	48	101.1	45	66.4	42.7
Upper Rib Deflection	180	Y	mm	37.8	58	-49.9	59				
Mid Rib Deflection	180	Y	mm	29.4	57	-43.0	56				
Lower Rib Deflection	180	Y	mm	29.1	56	-33.2	55				
Upper Rib VC	180	Y	m/sec	0.50	51	1.3	51				
Mid Rib VC	180	Y	m/sec	0.31	53	0.9	51				
Lower Rib VC	180	Y	m/sec	0.29	52	0.5	51				
Torso Force	600	X	N	534	49	286	58				
	600	Y	N	-225	63	-423	51				
Torso Moment	600	Y	Nm	13.4	47	-7	62				
	600	Z	Nm	22.4	50	16.9	58				

DRIVER PEAK RESPONSE TABLE (CONTINUED)

	Peak Values										
				1999 Saab 10/23/01 ES-2		2000 Saab 9/19/02 ES-2		2000 Saab 10/24/02 SID HIII		2000 Saab 1/29/03 214 seating SID H3	
	Class	Axis	Units	Peak	Time	Peak	Time	Peak	Time	Peak	Time
T12 Force	600	X	N	619	58	893	61				
	600	Y	N	1172	50	1975	49				
T12 Moment	600	X	Nm			-124.3	49				
	600	Y	Nm	84	58	126.0	68				
Abdomen Front Force	600		N	103	71	219	49				
Abdomen Mid Force	600		N	255	50	466	48				
Abdomen Rear Force	600		N	556	49	702	48				
Abdomen Summed Force	600		N	849	50	1382	49				
Pubic Symphysis Force	600		N	1733	55	-2673	47				
Right Femur Force	600	X	N	352	59	330	89				
	600	Y	N	-1207	63	1083	86				
	600	Z	N	680	79	1064	100				
	600	Res	N	1237	63	1439	86				
Right Femur Moment	600	X	Nm	-105.0	44	-123.8	81				
	600	Y	Nm	-28.3	69	-33.8	120				
	600	Z	Nm	-30.0	56	-33.4	92				
	600	Res	Nm	106.9	44	125.4	81				

DRIVER PEAK RESPONSE TABLE (CONTINUED)

Location	Peak Values										
				1999 Saab 10/23/01 ES-2		2000 Saab 9/19/02 ES-2		2000 Saab 10/24/02 SID HIII		2000 Saab 1/29/03 214 seating SID H3	
	Class	Axis	Units	Peak	Time	Peak	Time	Peak	Time	Peak	Time
Left Femur Force	600	X	N	472	73	459	97.9				
	600	Y	N	-795	58	701	82.3				
	600	Z	N	1046	60	1207	81.3				
	600	Res	N	1298	60	1393	82.3				
Left Femur Moment	600	X	Nm	-82.2	40	75.9	84.1				
	600	Y	Nm	-25.6	49	-40.4	70.0				
	600	Z	Nm	-30.1	62	25.6	143.6				
	600	Res	Nm	82.6	40	78.1	84				
Pelvis	1000	X		18.9	59	-11.3	39.7	10.2	41	10.8	42.5
	1000	Y		50.2	42	79.2	42	80.4	38	82.1	39.4
	1000	Z		-6.6	18	-9.2	96	10.7	63	-24.8	45.5