REPORT NUMBER: TO1-MGA-2004-027

FULL SCALE SIDE IMPACT TESTS

214 LEFT SIDE IMPACT
DRIVER ES-2RE
PASSENGER ES-2RE
TEST DATE: August 10, 2005
Task Order # T0001 / RFP # 0004

2005 SATURN ION
NHTSA NUMBER # R50167

PREPARED BY:
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FINAL REPORT SUBMITTED:

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
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This final test report was prepared for the U.S. Department of Transportation, Volpe National Transportation System Center, under Contract No. DTRS57-04-D-30001.

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TABLE OF CONTENTS

SECTION 1
PURPOSE AND TEST PROCEDURE

This Side Impact test is conducted as part of Contract No. DTRS57-04-D-30001, RFP 4, Task Order 1, sponsored by the U.S. Department of Transportation, Volpe National Transportation System Center. The purpose of this test was to study the response of a ES-2RE.

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

SECTION 2
SUMMARY OF SIDE IMPACT TEST

A 2005 Saturn Ion 4 door was impacted on the left side by a Moving Deformable Barrier (MDB) which was moving forward in a 27 degree position to the tow road guidance system at a velocity of 53.3 kph (33.1 mph). The target vehicle was stationary and positioned at an angle of 63 degrees to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, WI on August 10, 2005. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies are included in Appendix A.

Two ES-2RE side impact dummies were placed in the driver and left rear designated seating positions according to instructions specified in TP-214P-00 dated May 21, 2004. The side impact event was documented by ten high speed cameras and one real time camera. 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 side impact dummy (ES-2RE) 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.

SECTION 2... (continued)

SUMMARY OF SIDE IMPACT TEST

		Driver	Left Rear
HIC 15 (CFC 1000)	T1 (msec)	40.4	45.3
	T2 (msec	55.4	60.3
	HIC 15	89	162
HIC 36 (CFC 1000)	T1 (msec)	32.3	44.0
	T2 (msec)	62.0	63.3
	HIC 36	110	168
Thorax (CFC 180)			
Chest Deflection	Upper Rib Deflection	-27	-27
	Mid Rib Deflection	-28	-24
	Lower Rib Deflection	-29	-21
Lower Spine (CFC 180)			
	Lower Spine Resultant	51.9	46.8
Abdomen (CFC 600)			
	Front Abdominal Force	220	279
	Mid Abdominal Force	553	705
	Rear Abdominal Force	854	678
	Sum of Abdominal Force	1524	1511
Pelvis (CFC 600)			
	Pubic Symphysis Force	-2341	-2275

TEST NOTES

Left Lower A Post Y – No valid data collected after 15 msec
Left Mid A Post Y – no valid data collected after 30 msec
Driver Seat Track Y – No valid data collected after 80 msec
RR Occupant Compartment Y – No valid data collected

SECTION 3

SIDE IMPACT DUMMY (ES-2RE) AND VEHICLE TEST DATA

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

TEST VEHICLE INFORMATION

Make / Model	Saturn Ion
Body Style	4 door
NHTSA No.	R50167
VIN	1G8AJ54F65Z165741
Odometer Reading	187
Transmission	Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2.2
Engine Placement	Lateral

TEST VEHICLE OPTIONS

Front Airbag	Yes
Side Airbags	Curtain
Power Windows	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
AM/FM/CD	Yes
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Saturn Corporation
Date of Manufacture	04/05

GVWR (kg)	1717
GAWR Front (kg)	898
GAWR Rear (kg)	819

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Cold / Test Pressure (kPa)	210	210
Recommended Tire Size	P195/60R15	P195/60R15
Tire Size on Vehicle	P195/60R15	P195/60R15
Tire Manufacturer	Firestone	Firestone

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				408
Cargo Wt. (RCLW) (kg)				67.6

DATA SHEET NO. 1... (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	382.8	263.1		440.4	357.0	
Right	kg	398.7	243.6		400.5	311.2	
Ratio	%	60.7	39.3		55.7	44.3	
Totals	kg	781.5	506.7	1288.2	840.9	668.2	1509.1

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1288.2
Weight of 2 ES-2RE Side Impact Dummy	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	67.6
Calculated Vehicle Target Weight (TVTW)	kg	1517.3

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	686	685	693	696	1035
As Tested	mm	671	679	650	663	1165
Fully Loaded	mm	670	679	647	662	

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2632
Target Impact Point Aft of Front Axle	mm	376
Actual Impact Point Aft of Front Axle	mm	384

DATA SHEET NO. 1… (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

NORMAL DESIGN RIDING POSITION

Driver seat back angle: 9.8° on head rest post

Rear passenger seat back angle: Not Adjustable

SEAT FORE/AFT POSITIONS

Driver seat fore/aft total travel: 27 Positions

Rear passenger seat fore/aft total travel: Not Adjustable

Driver seat fore/aft position: 13th of 27, with the 1st as zero

Rear passenger seat fore/aft position: Not Adjustable

SEAT BELT UPPER ANCHORAGE

The D ring was placed in the mid position.

STEERING COLUMN ADJUSTMENT

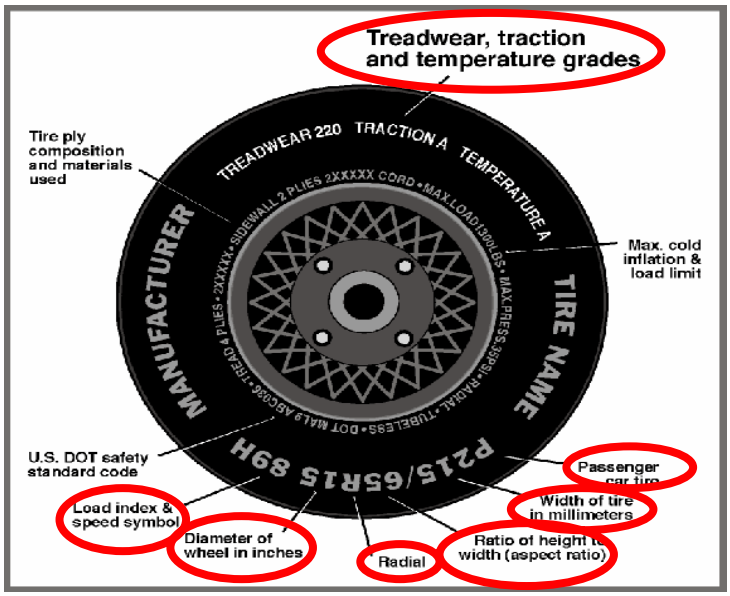
The steering column was placed in the mid position.

DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

Vehicle Year	2005	Vehicle Make	Saturn
VIN	1G8AJ54F65Z165741	Vehicle Model	Ion



	Front	Rear
Tire Manufacturer	Firestone	Firestone
Tire Name	Affinity	Affinity
Tire Type	M+S	M+S
Tire Width (mm)	195	195
Ratio of Height to Width (aspect ratio)	60	60
Radial	R	R
Wheel Diameter	15	15
Load Index & Speed Symbol	875	875
Treadwear	500	500
Traction Grade	A	A
Temperature Grade	B	B

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheel base of Framework Carriage	2590
C.G. Location aft of Front Axle	1127

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	473.5	219.5	
Right	kg	308.3	359.5	
Ratio	%	57.5	42.5	
Totals	kg	781.8	579.0	1360.8

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	53.3
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	53.3
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush
Level	Description	Height	Distance	Direction	
1	Center of Bumper (mm)	432	800	Right	138
2	Top of Bumper (mm)	533	800	Right	82
3	Mid Level (mm)	686	800	Left	99
4	Top of Stack (mm)	813	800	Left	117

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	6
Contact Switches	2
High Speed Cameras	2

DATA SHEET NO. 4

POST TEST OBSERVATIONS

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat	Rear Seat
Dummy Type / Serial No.	ES-2RE / 009	ES-2RE / 010
Head Contact	Curtain airbag, Headrest, Headliner	Headliner
Upper Torso Contact	Door panel	Door panel
Lower Torso Contact	Door panel	Door panel
Left Knee Contact	Door panel	Door panel
Right Knee Contact	Left knee	Left knee

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	Remained closed and latched	Remained closed and latched
Right Side Door Opening	Remained closed and latched	Remained closed and latched
Left Side Seat Movement	None	None
Left Side Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No failures
Sill Separation	None
Windshield Damage	Broke
Window Damage	Left side driver and passenger broke
Other Notable Effects	None

AIRBAG DEPLOYMENT

	Driver	Rear Passenger
Front	Yes	NA
Side	NA	NA
Curtain	Yes	Yes

MDB LEFT EDGE IMPACT POINT DATA

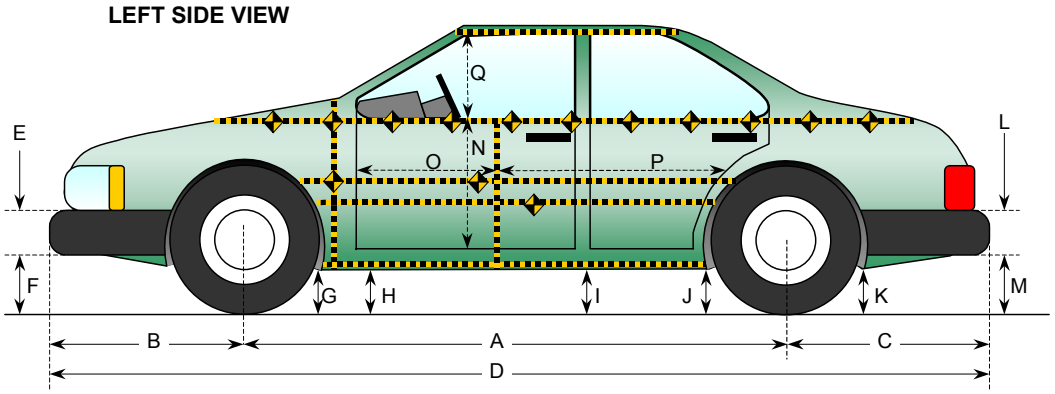
Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	8mm rear
Vertical Offset	mm	+/-20	2mm down

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005



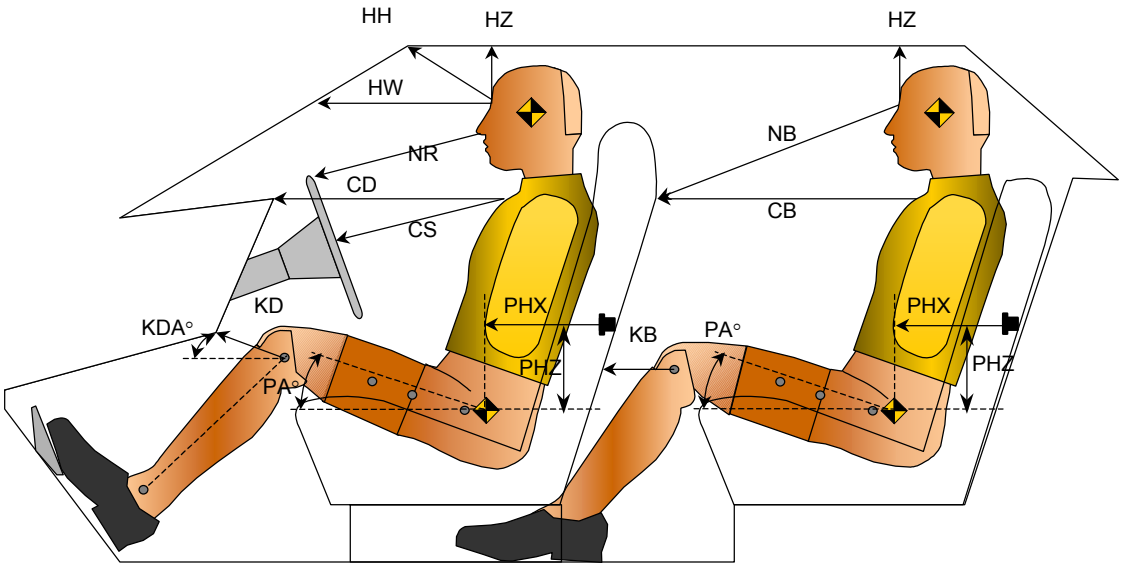
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2632	2620	12
B	Front Axle to FSOV	1048	972	76
C	Rear Axle to RSOV	1045	1040	5
D	Total Length at Centerline	4725	4632	93
E	Front Bumper Thickness	173	173	0
F	Front Bumper Bottom to Ground	249	264	-15
G	Sill Height at Front Wheel Well	177	224	-47
H	Sill Height at Front Door Leading Edge	175	201	-26
I	Sill Height at "B" Pillar	174	203	-29
J1	Sill Height at Rear Wheel Well	165	183	-18
J2	Pinch Weld Height at Rear Wheel Well	166	186	-20
K	Sill Height Aft of Rear Wheel Well	207	207	0
L	Rear Bumper Thickness	311	311	0
M	Rear Bumper Bottom to Ground	305	304	1
N	Sill Height to Window Bottom Sill	687	618	69
O	Front Door Leading Edge to Impact CL	839	836	3
P	Rear Door Trailing Edge to Impact CL	1172	1136	36
Q	Front Window Opening	393	385	8
R	Right Side Length	3920	3927	-7
S	Left Side Length	3920	3908	12
T	Vehicle Width at "B" Post	1709	1512	197

DATA SHEET NO. 6

ES-2RE LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

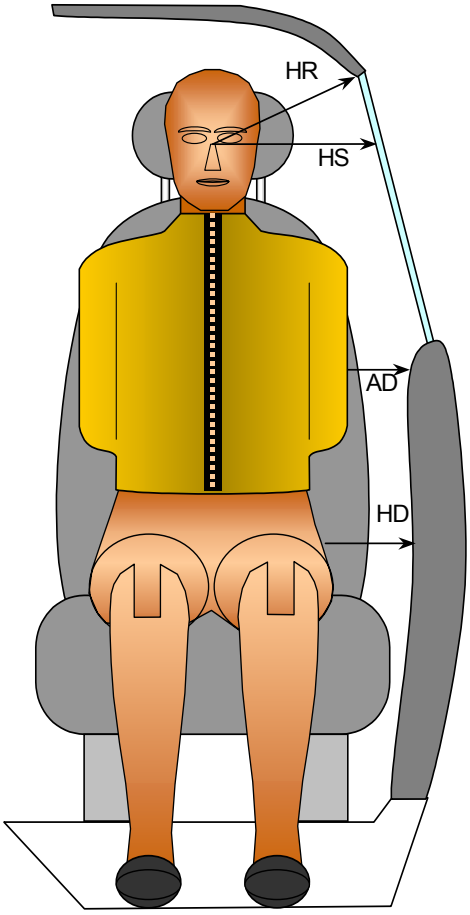


Driver Code	Pass. Code	Measurement Description	Driver S/N 009		Passenger S/N 010	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	464			
HW		Head to Windshield	753			
HZ	HZ	Head to Roof	203		162	
NR	NB	Nose to Rim/Nose to Seatback	483		511	
CD	CB	Chest to Dash or Seatback	793		453	
CS		Chest to Steering Wheel	413			
KDL	KBL	Left Knee to Dash or Seatback	151	35	147	24
KDR	KBR	Right Knee to Dash or Seatback	132	39	150	26
PA	PA	Pelvic Angle		24.3		25.0
PHX	PHX	H-Point to Striker (X-Axis)	206		228	
PHZ	PHZ	H-Point to Striker (Z-Axis)	121		246	

DATA SHEET NO. 7

ES-2RE LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005



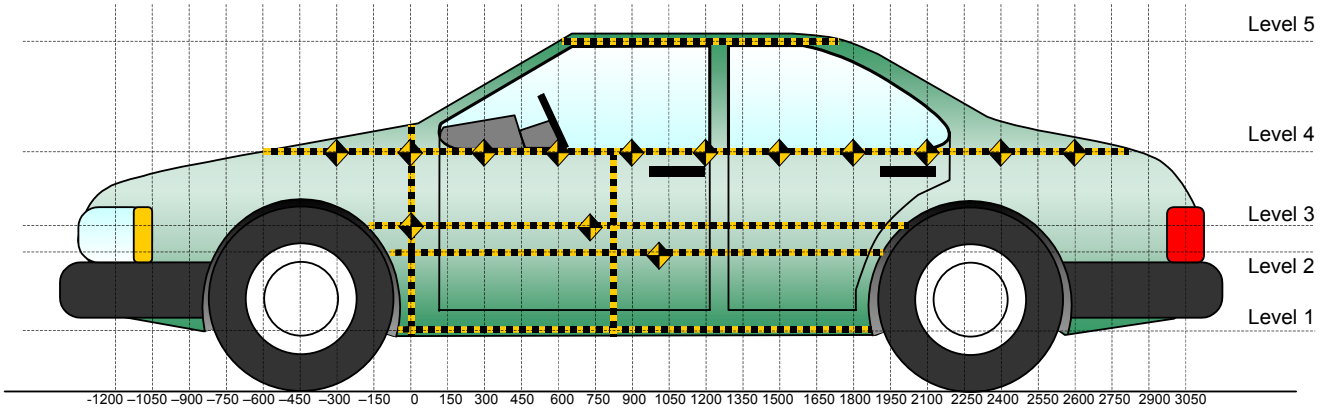
FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver S/N 009	Passenger S/N 010
HR	Head to Side Header	mm	189	144
HS	Head to Side Window	mm	359	330
AD	Arm to Door	mm	71	60
HD	H-Point to Door	mm	109	99

DATA SHEET NO. 8

VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005



All Measurements Shown in mm

LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.
Measurements along the vertical 800 mm.
All measurements below in mm.

Level	Measurement Description	Height Above Ground
5	Window	1326
4	Window Sill	902
3	Mid Door	603
2	Occupant H-Point	528
1	Sill Top	242

DATA SHEET NO. 9

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1050															
-900															
-750				340					328					-12	
-600				331					319					-12	
-450				322					314					-8	
-300				317					312					-5	
-150				314					312					2	
0	301	257	257	310		302	278	276	314		1	21	19	4	
150	300	262	261	310		303	430	433	350		3	168	172	40	
300	297	257	256	305		383	436	450	388		86	179	194	83	
450	294	253	252	309		387	445	463	413		93	192	211	104	
600	294	250	251	306		391	458	468	434		97	208	217	128	
750	293	250	250	309	502	393	475	478	451	497	100	225	228	142	-5
900	293	250	249	304	501	396	482	483	457	502	103	232	234	153	1
1050	293	250	250	309	503	397	484	489	468	508	104	234	239	159	5
1200	293	250	251	309	506	392	508	496	471	514	99	258	245	162	8
1350	294	251	252	314	510	378	496	490	437	515	84	245	238	123	5
1500	297	252	250	314	512	363	481	482	415	513	66	229	232	101	1
1650	297	254	253	319	516	335	462	470	393	515	38	208	217	74	-1
1800	294	254	257	321	521	303	416	437	362	520	9	162	180	41	-1
1950		246	250	324	534		281	313	330	531		35	63	6	-3
2100				329					308					-21	

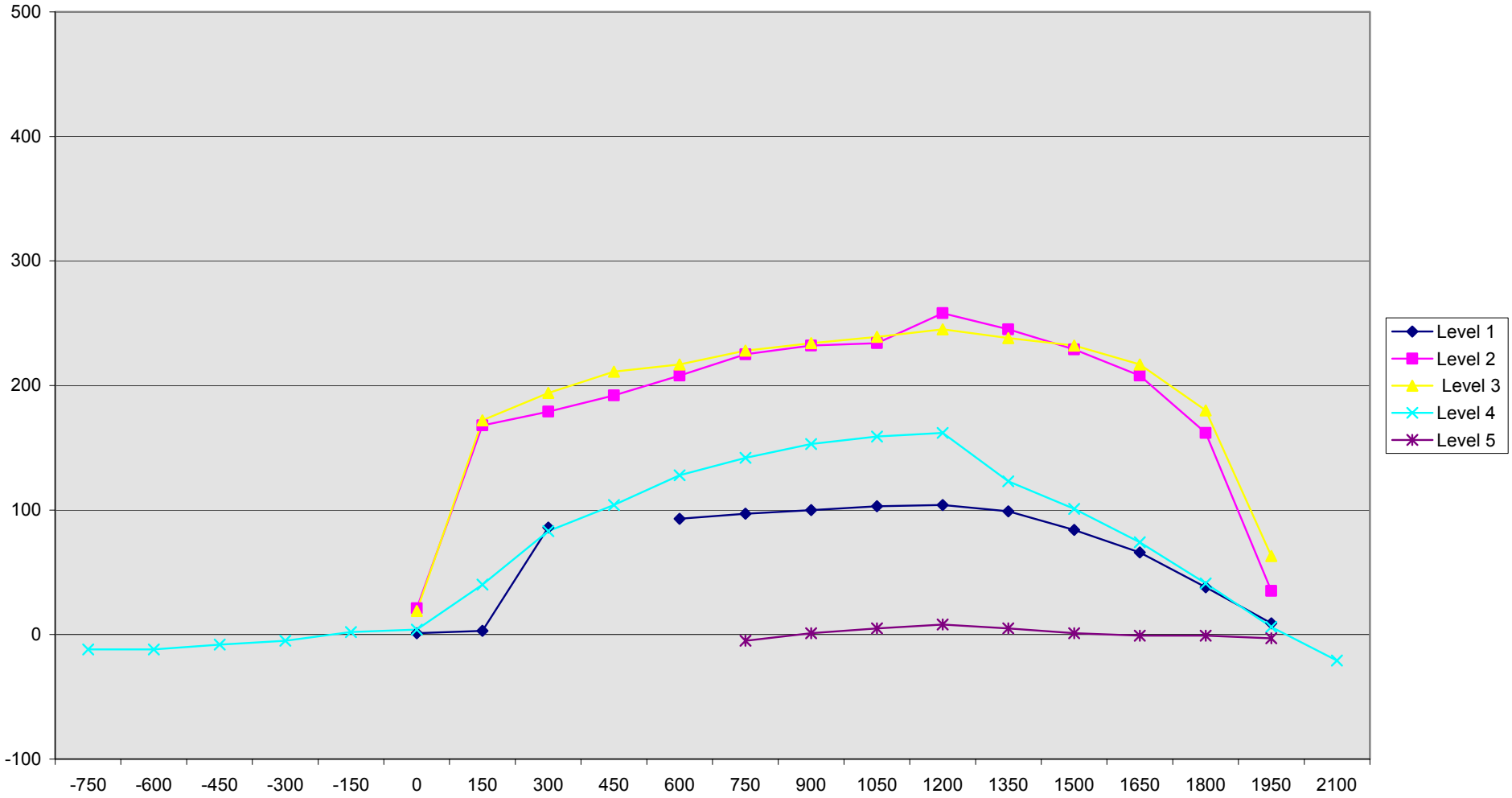
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

DATA SHEET NO. 9... (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

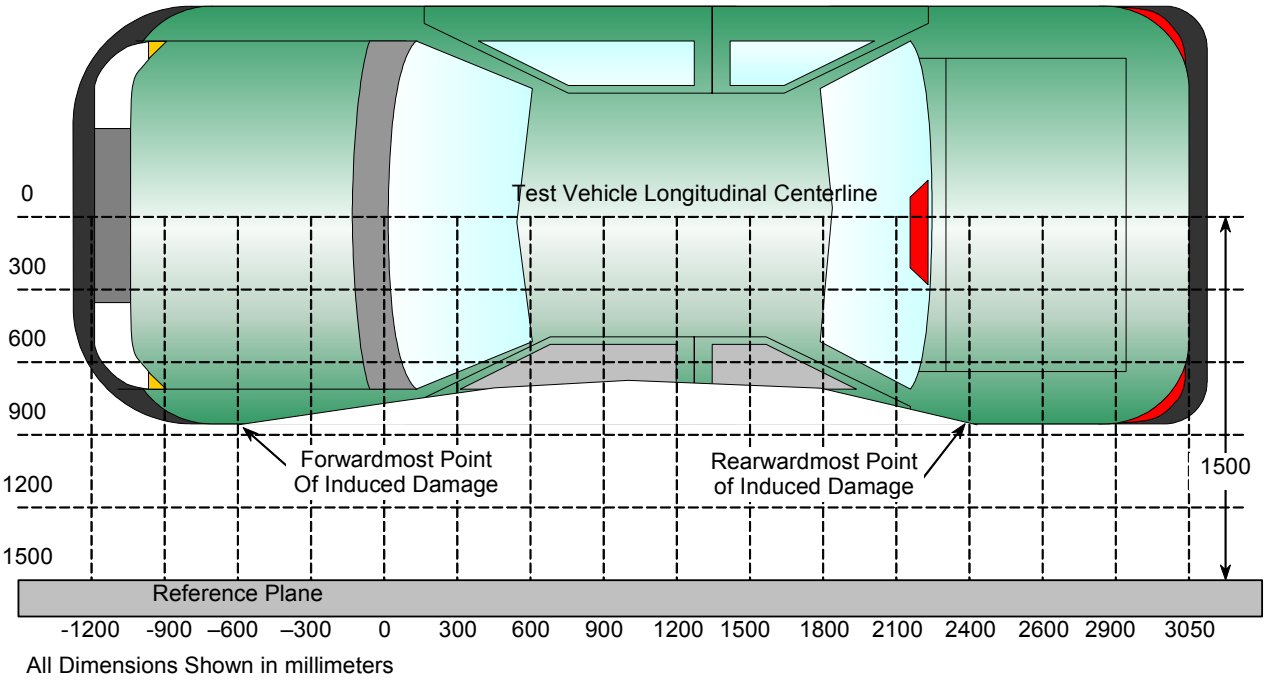


Measurement in mm.

DATA SHEET NO. 10

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005



TOP VIEW

Damage Profile Distances

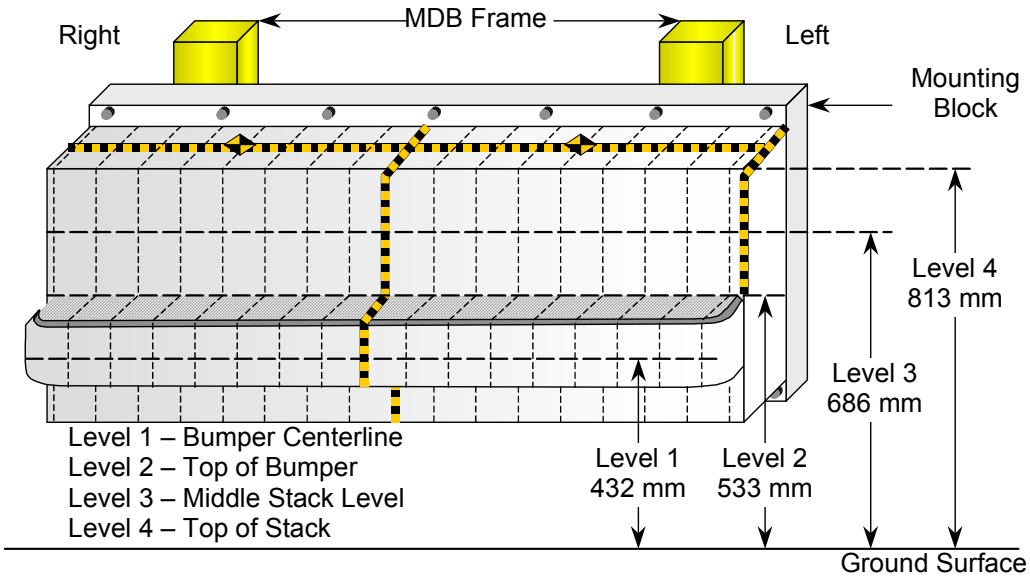
DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2100 mm	4	329	308	-21
2	1640 mm	3	253	471	218
3	1160 mm	2	250	501	251
4	675 mm	3	250	473	223
5	195 mm	3	260	438	178
6	-300 mm	4	340	328	-12

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

DATA SHEET NO. 11

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005



DEFORMABLE BARRIER STATIC CRUSH

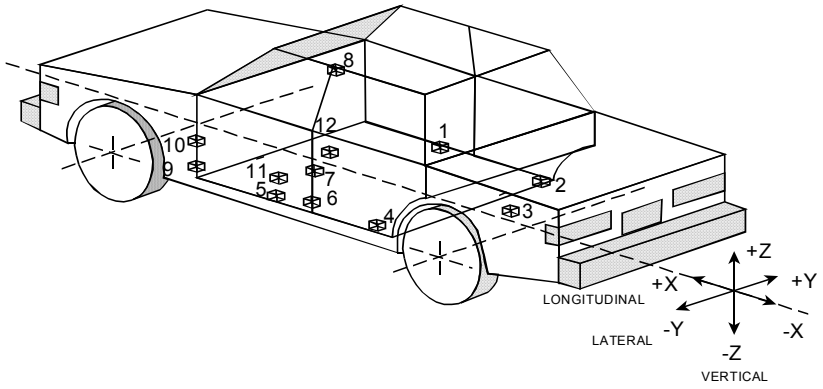
Stack Level	Distance Right of Center								C_L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	138	118	83	66	60	63	61	59	58	59	61	61	63	64	70	92	53
2	82	67	47	34	25	27	26	24	24	28	31	32	34	37	41	48	55
3	15	3	3	4	4	4	7	6	5	6	8	9	10	11	14	39	99
4	57	17	0	-6	-6	-3	3	5	7	4	5	6	8	9	37	73	117

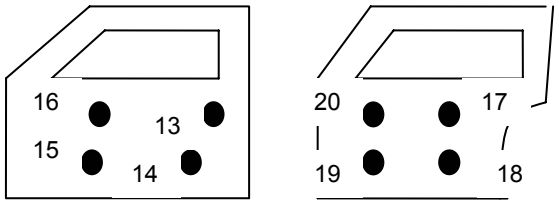
All Dimensions in mm

DATA SHEET NO. 12

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005





No.	Location
1	Right Sill at Front Seat
2	Right Sill at Rear Seat
3	Rear Floorpan Above Axle
4	Left Sill at Rear Door
5	Left 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
12	Vehicle CG

No.	Location
13	Left Front Door @ Mid Rib
14	Left Front Door @ Pelvis
15	Left Front Door @ Knee
16	Left Front Door @ Arm
17	Left Rear Door @ Mid Rib
18	Left Rear Door @ Pelvis
19	Left Rear Door @ Knee
20	Left Rear Door @ Arm
21	Left Driver Seat Frame
22	Right Driver Seat Frame
23	Right Rear Occupant Compartment

DATA SHEET NO. 12... (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

VEHICLE ACCELEROMETER PEAK DATA

Loc. No.	Accelerometer Location	Longitudinal (X) Maximum (g's) (CFC 60)		Lateral (Y) Maximum (g's) (CFC 60)		Vertical (Z) Maximum (g's) (CFC 60)		Result. (g's) (CFC 60)
		Pos	Neg	Pos	Neg	Pos	Neg	Max
1	Right Sill at Front Seat	2.5	-6.1	23.5	-2.3	8.1	-5.0	23.6
2	Right Sill at Rear Seat	2.7	-6.3	25.2	-2.7	7.9	-5.8	25.2
3	Rear Floorpan Above Axle	2.2	-7.3	28.5	-1.9	9.2	-10.6	29.9
4	Left Sill at Rear Door			34.1	-4.5			
5	Left Sill at Front Door			36.9	-9.8			
6	Left Lower B Post			214.8	-33.4			
7	Left Mid B Post			163.7	-67.8			
8	Left Upper B Post			****	****			
9	Left Lower A Post			*	*			
10	Left Mid A Post			**	**			
11	Driver Seat Track			***	***			
12	Vehicle CG	4.1	-7.4	23.9	-2.1	11.9	-5.7	24.8
13	Left Front Door @ Rib			133.0	-96.2			
14	Left Front Door @ Pelvis			274.6	-170.7			
15	Left Front Door @ Knee			178.2	-76.2			
16	Left Front Door @ Arm			89.4	-129.2			
17	Left Rear Door @ Rib			49.0	-31.5			
18	Left Rear Door @ Pelvis			217.9	-21.7			
19	Left Rear Door @ Knee			137.8	-62.2			
20	Left Rear Door @ Arm			89.8	-64.3			
21	Left Driver Seat Frame			****	****			
22	Right Driver Seat Frame			****	****			
23	Right Rear Occupant Compartment			*****	*****			

* No valid data collected after 15 msec ** No valid data collected after 30 msec
*** No valid data collected after 80 msec
**** Not used to avoid interference with side airbag *****No valid data collected

DATA SHEET NO. 12... (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

VEHICLE ACCELEROMETER COORDINATES

Loc. No.	Description	Coordinates (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2671	708	224
2	Right Sill at Rear Seat	1776	712	232
3	Rear Floorpan Above Axle	971	0	519
4	Left Sill at Rear Door	1755	-709	238
5	Left Sill at Front Door	2672	-705	232
6	Left Lower B Post	2045	-689	664
7	Left Mid B Post	2046	-673	865
8	Left Upper B Post	*	*	*
9	Left Lower A Post	3086	-759	502
10	Left Mid A Post	3079	-743	728
11	Driver Seat Track	2192	-565	432
12	Vehicle CG	2406	0	374
13	Left Front Door @ Mid Rib	2289	-724	905
14	Left Front Door @ Pelvis	2474	-718	589
15	Left Front Door @ Knee	2768	-712	633
16	Left Front Door @ Arm	2549	-727	868
17	Left Rear Door @ Mid Rib	1402	-725	964
18	Left Rear Door @ Pelvis	1484	-715	580
19	Left Rear Door @ Knee	1865	-705	691
20	Left Rear Door @ Arm	1643	-723	899
21	Left Driver Seat Frame	*	*	*
22	Right Driver Seat Frame	*	*	*
23	Right Rear Occupant Compartment	1863	349	338

Reference Points X – Rear Bumper (+forward)

Y – Vehicle Centerline (+ right)

Z – Ground Level (+ up)

* Not used to avoid interference with side airbag

DATA SHEET NO. 13

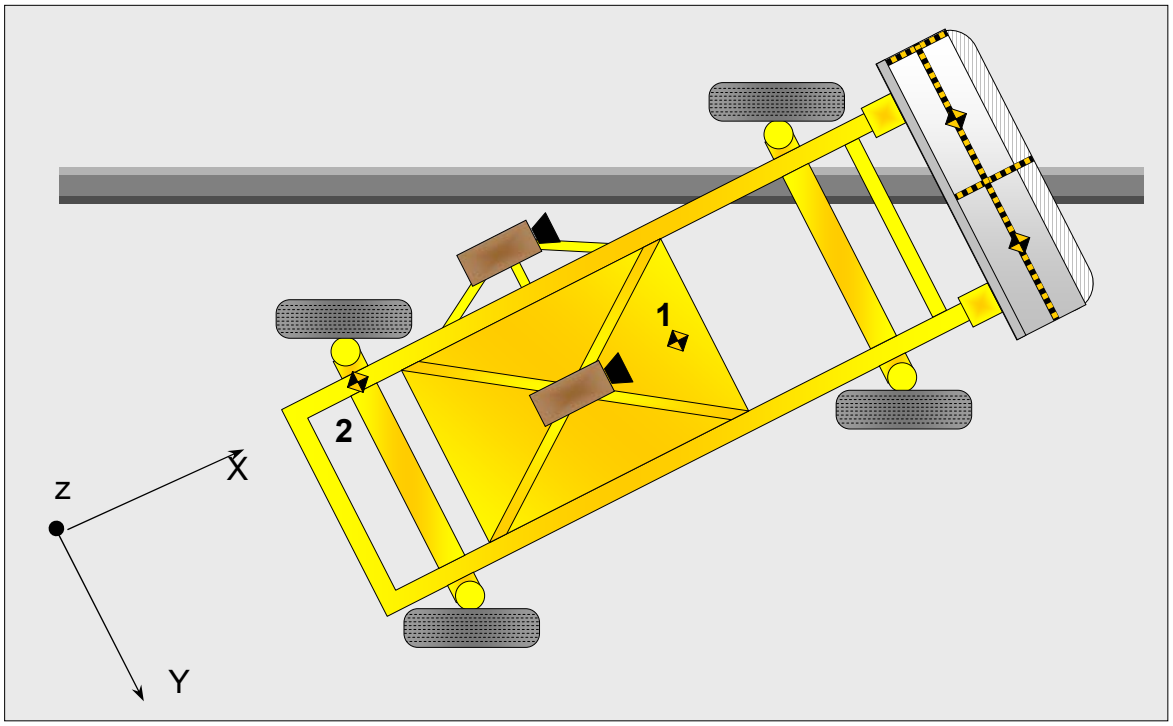
MDB ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005

MDB ACCELEROMETER PEAK DATA AND LOCATIONS

Loc. No.	Accelerometer Location	Measurement (mm)			Peak Values (G's)				
		X	Y	Z	Axis	Max	Time	Min	Time
1	MDB CG	-1092	0	483	X	1.2	300	-18.0	40
					Y	0.9	60	-7.4	26
					Z	17.1	53	-24.4	68
					RES	25.3	45		
2	MDB Rear	-2591	-625	622	X	1.0	96	-20.7	33
					Y	5.5	27	-1.7	195
					Z	5.4	43	-2.9	77
					RES	20.8	33		

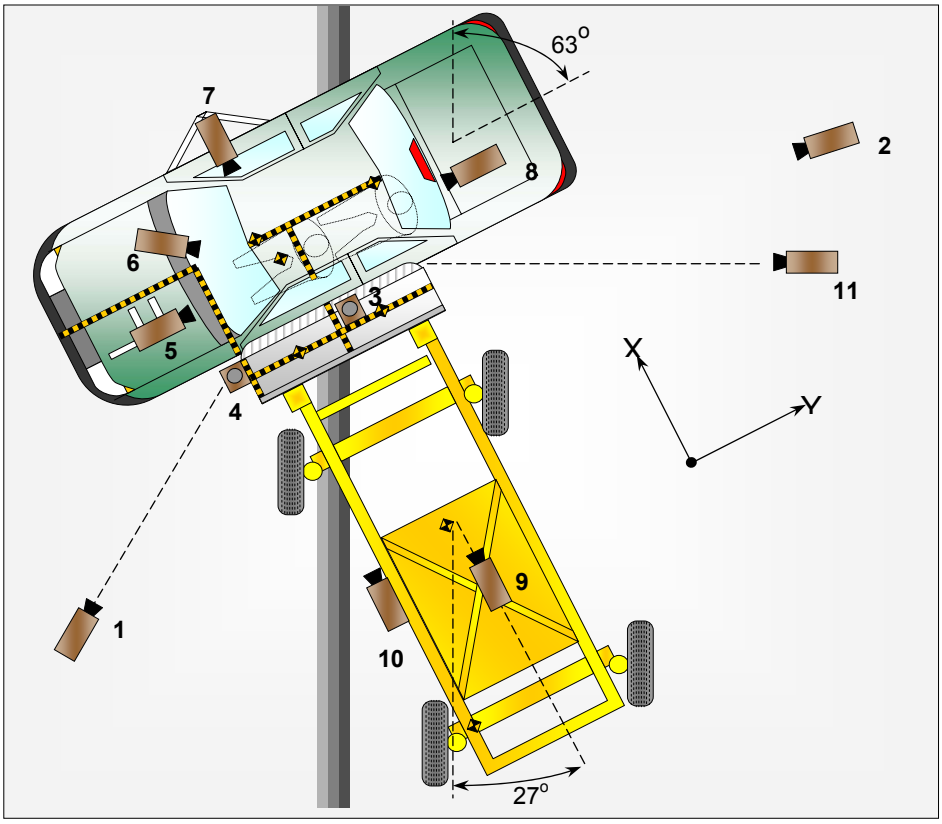
Reference Points X - MDB Front Axle (+ forward)
Y - MDB Centerline (+ to right)
Z - Ground Plane (+ down)



DATA SHEET NO. 14

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2005 Saturn Ion 4 door Test Date: August 10, 2005



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Front Overall	2650	-4505	1360	24	1000
2	Rear Overall	-300	7380	1480	24	1000
3	Overhead Overall	10	-100	5460	14	1000
4	Overhead Close Up	670	45	4240	50	1000
5	Onboard Driver Front				13	500
6	Onboard Driver Hip				10	500
7	Onboard Driver Side				8	500
8	Onboard Passenger Rear				13	500
9	Cart Overall				25	500
10	Cart Close Up				50	500
11	Real Time Coverage				13	24

Reference Points X - + Forward of Impact
Y - MDB Left Edge Impact Point (+ right)
Z - Ground Plane (+ up)

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

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

Pre-Test Left Side View of Test Vehicle

Post-Test Left Side View of Test Vehicle

Post-Test Left Side View of Test Vehicle (Close Up)

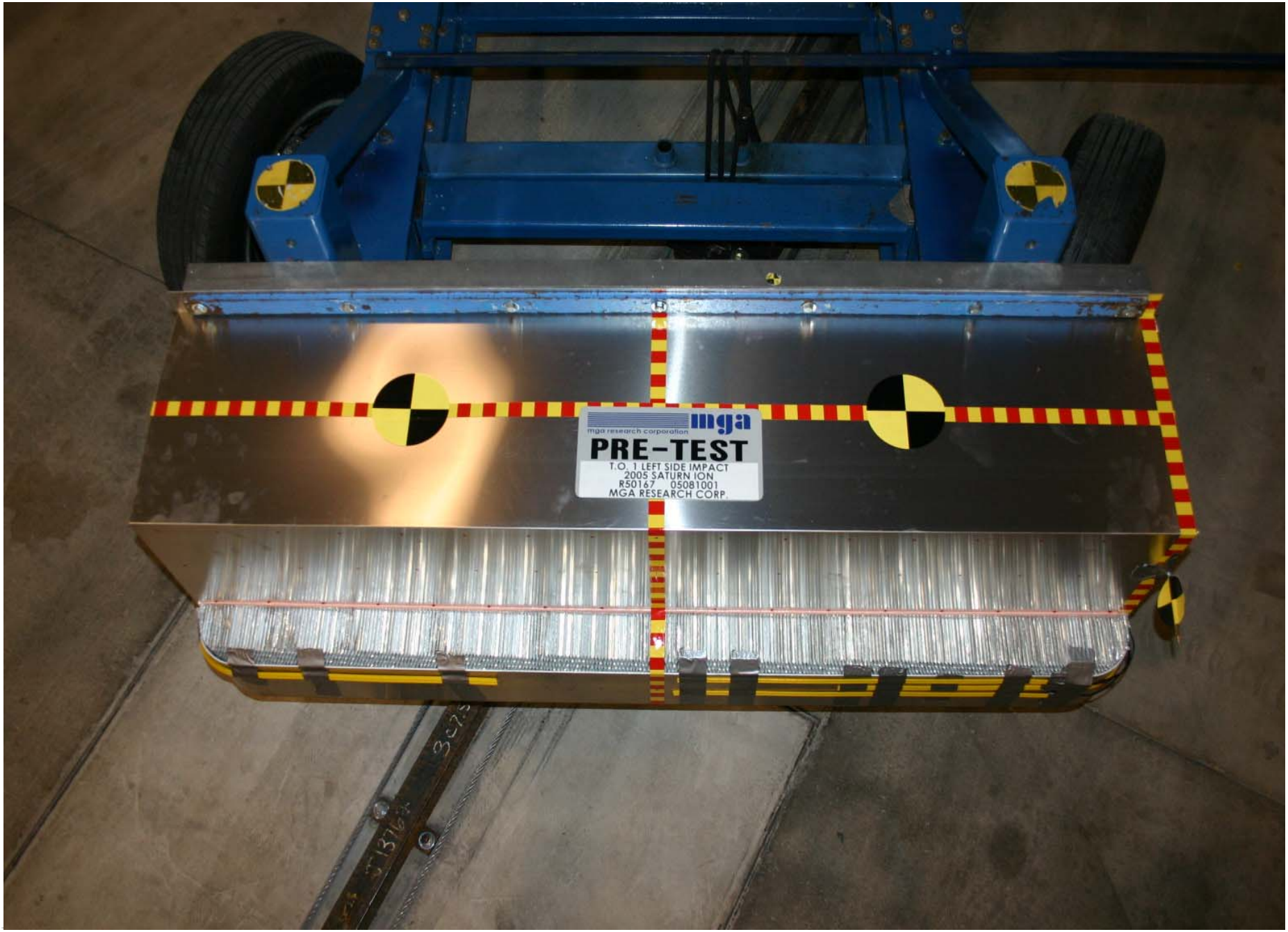
Pre-Test MDB Positioned Against Vehicle (right side)

Pre-Test MDB Positioned Against Vehicle (left side)

Post-Test MDB and Vehicle

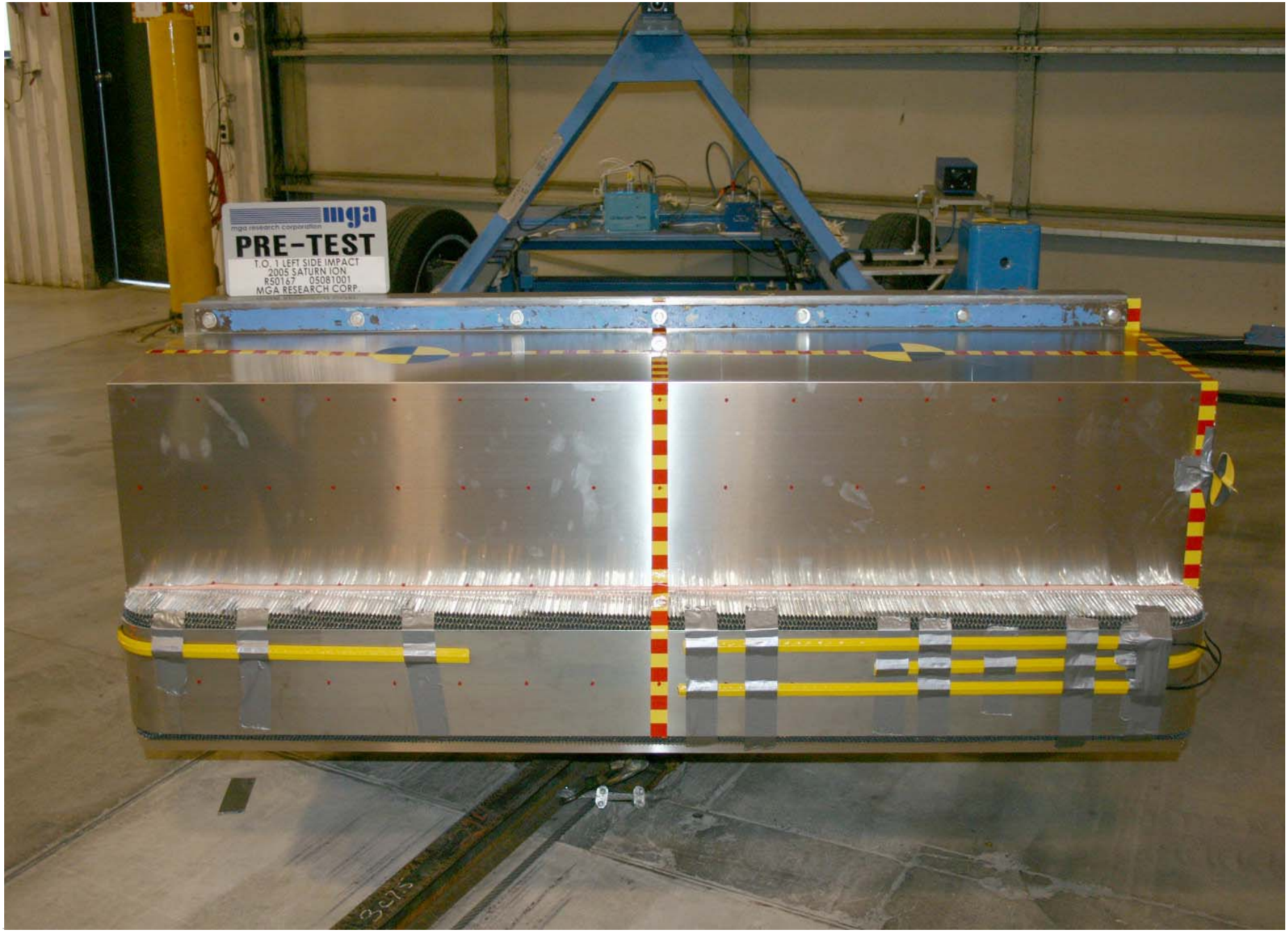
Pre-Test MDB Positioned Against Vehicle (overhead view)

Post-Test Vehicle Overhead View



Pre-Test MDB Top View

Post-Test MDB Top View



Pre-Test MDB Front View

Post-Test MDB Front View

Pre-Test MDB Left Side View

Post-Test MDB Left Side View

Pre-Test MDB Right Side View

Post-Test MDB Right Side View

Pre-Test Driver Dummy Left Side View

Post-Test Driver Dummy Left Side View

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

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 Head Contact

Post-Test Driver Dummy Contact

Post-Test Driver Dummy Lower Body Contact

Pre-Test Passenger Dummy Left Side View

Post-Test Passenger Dummy Left Side View

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

Pre-Test Passenger Dummy Right Side View

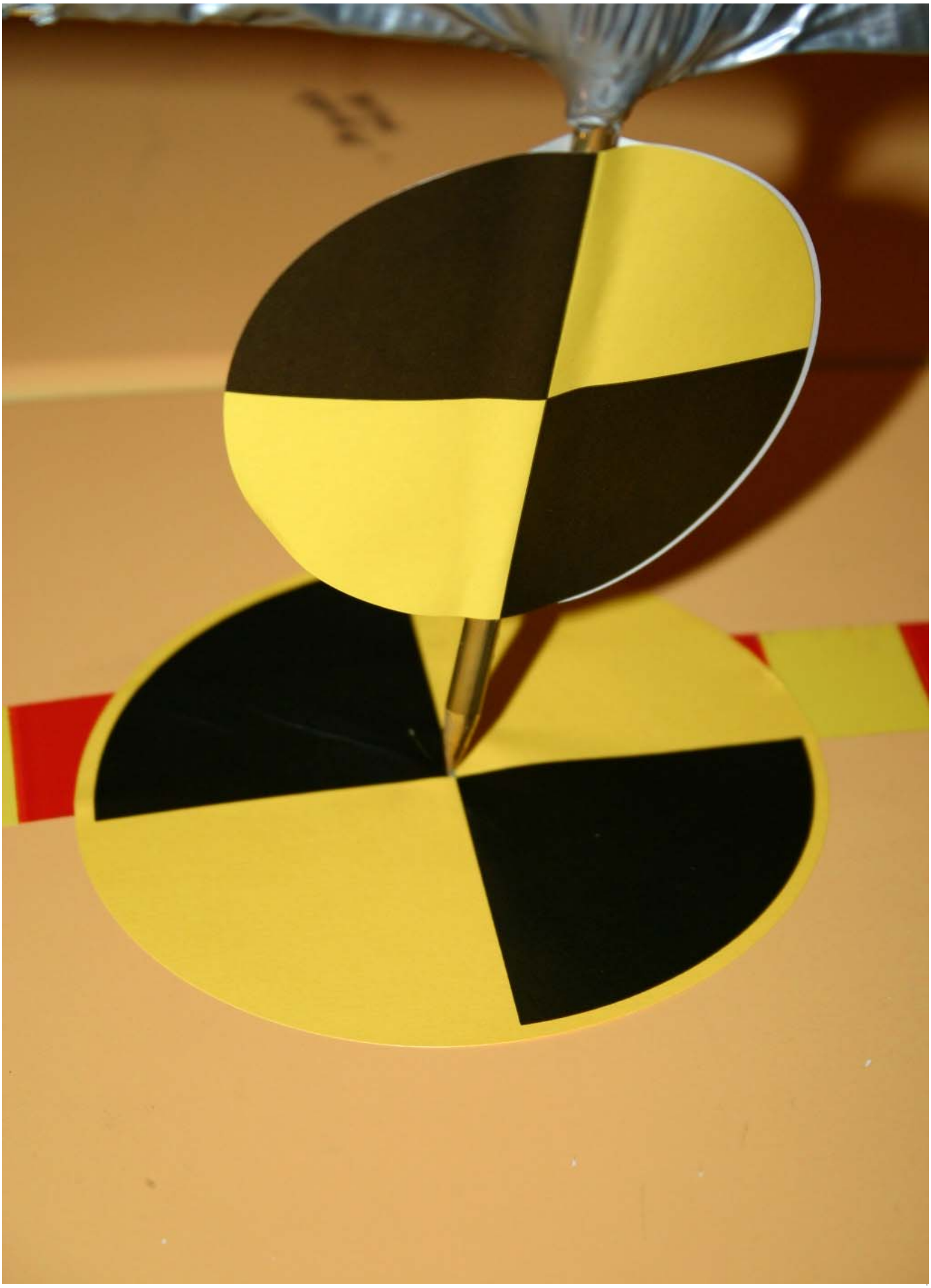
Post-Test Passenger Dummy Right Side View

Pre-Test Passenger Dummy Shoulder and Door Top View

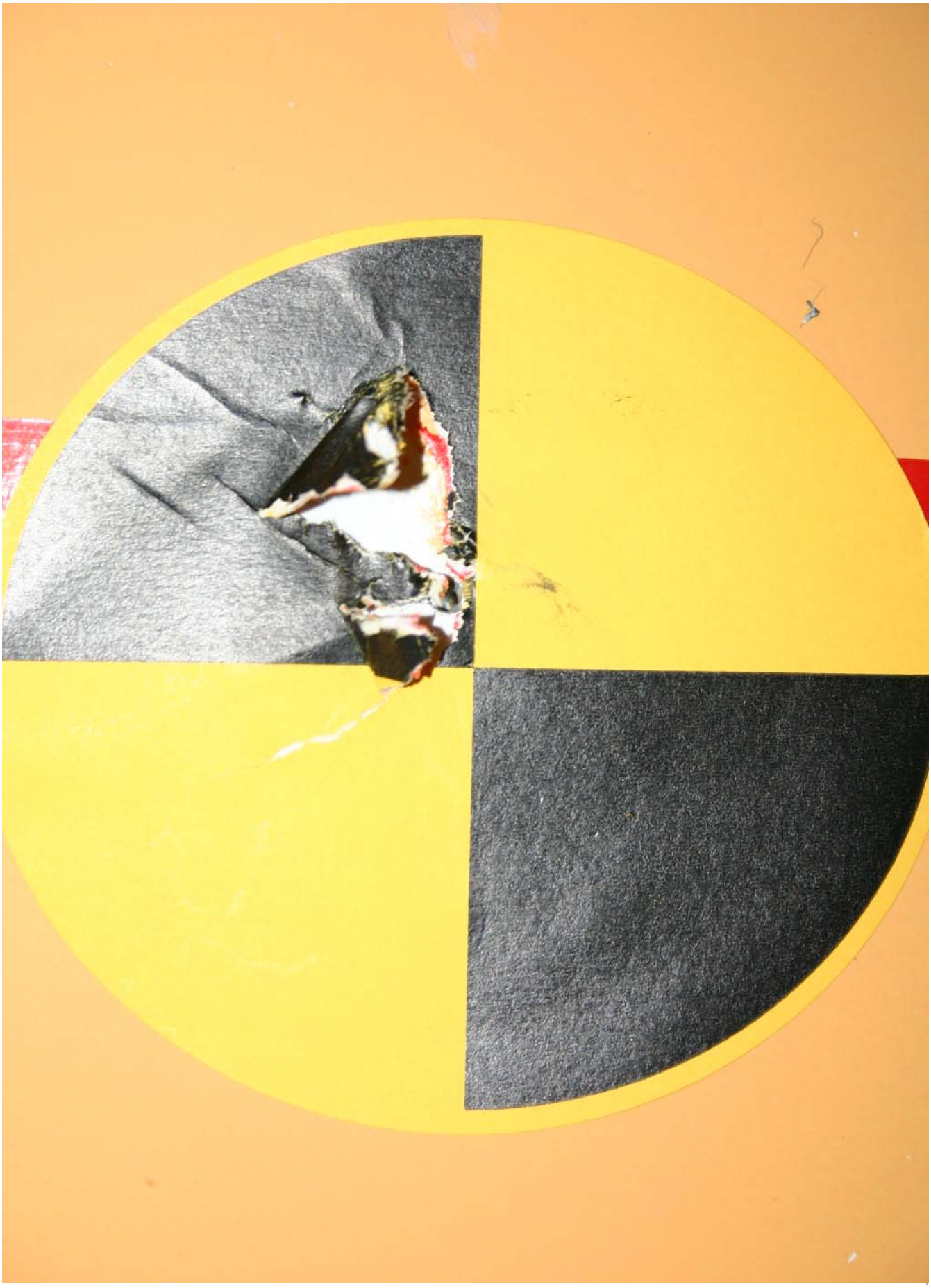
Post-Test Passenger Dummy Head Contact

Post-Test Passenger Dummy Contact

Post-Test Passenger Dummy Lower Body Contact



Pre-Test Impact Point View



Post-Test Impact Point View

Vehicle Certification

Tire Placard

Vehicle Impact

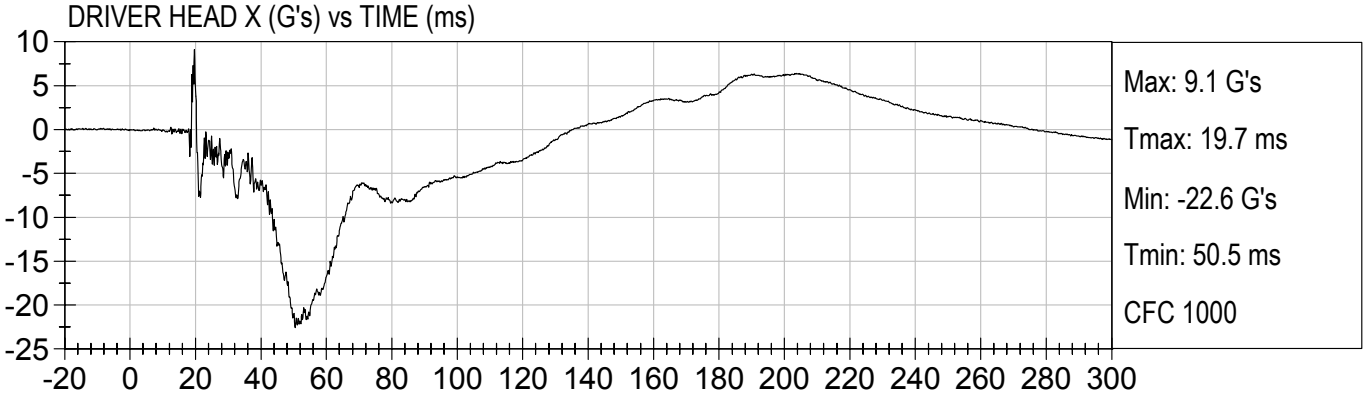
APPENDIX B

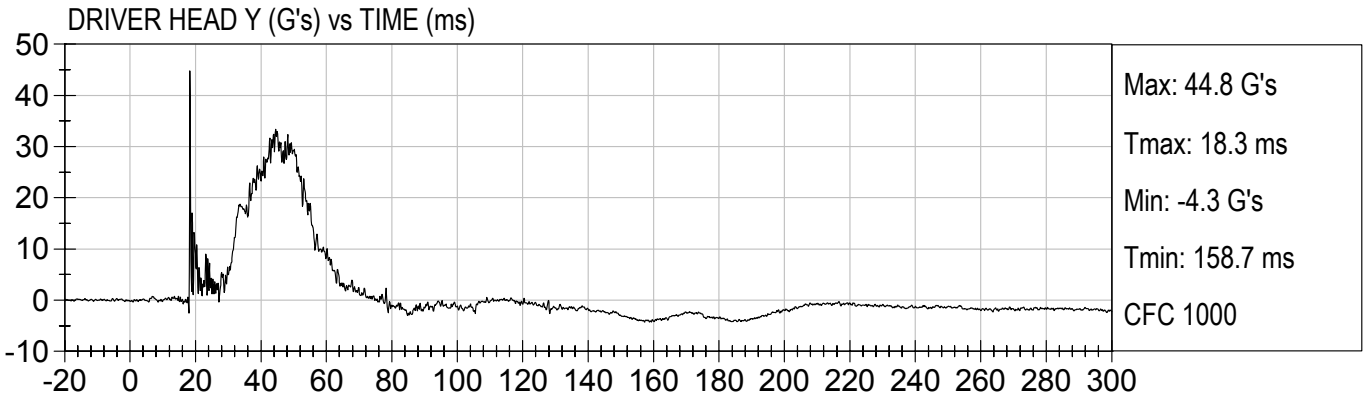
ES-2RE, VEHICLE, AND MDB RESPONSE DATA

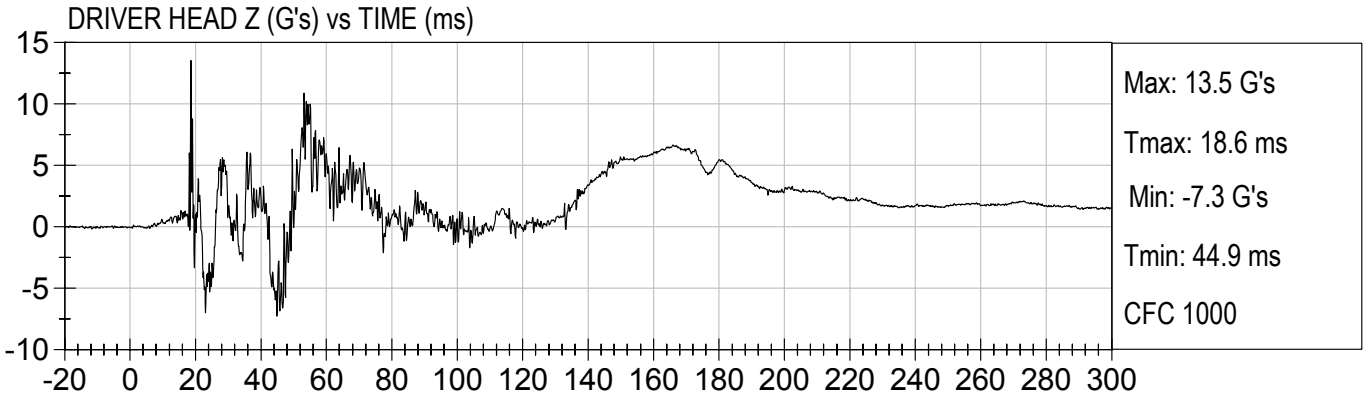
TABLE OF DATA PLOTS

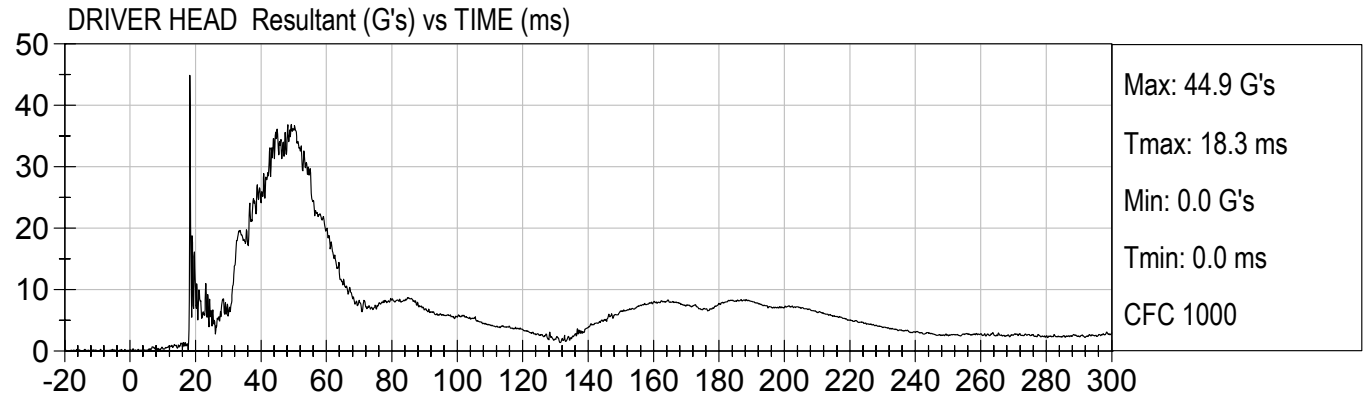
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)



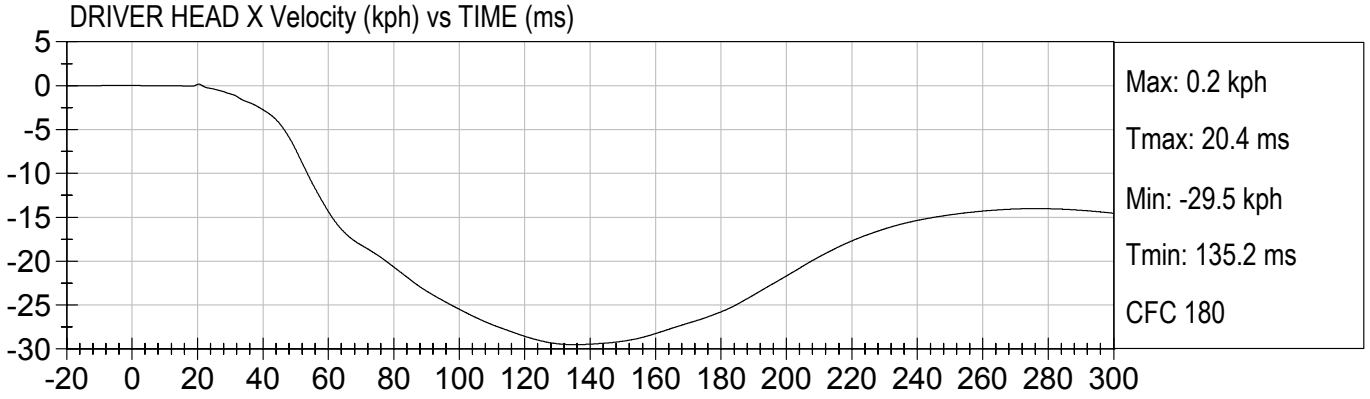


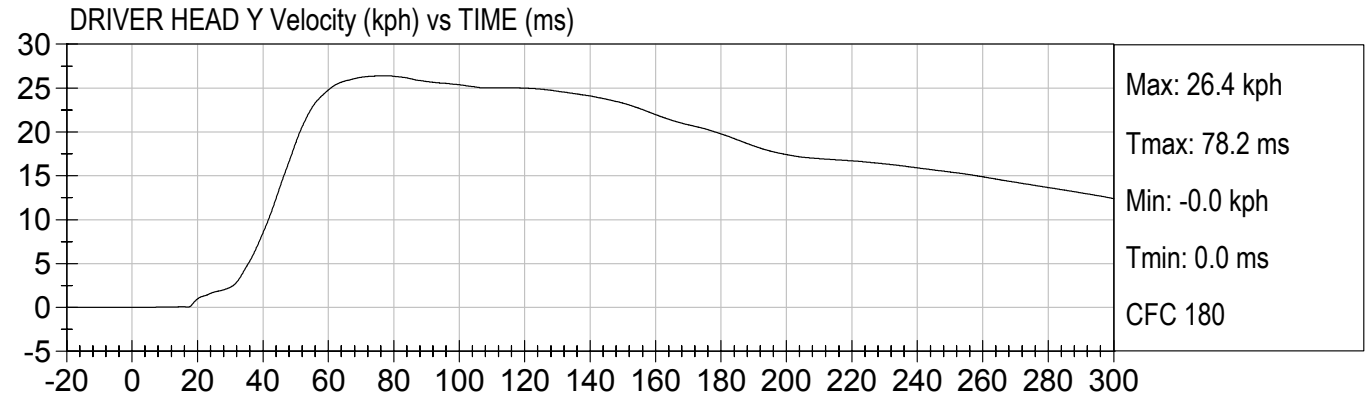


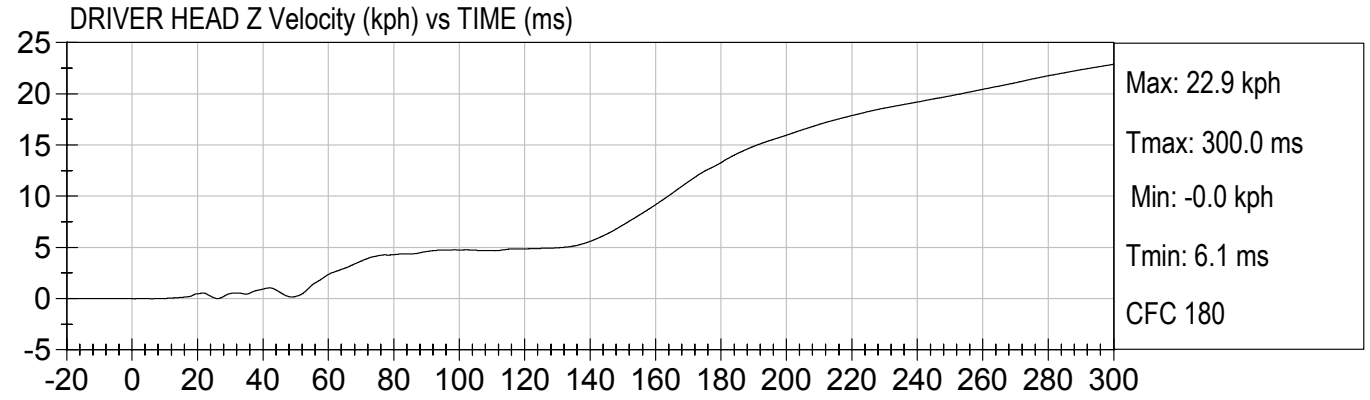


T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)



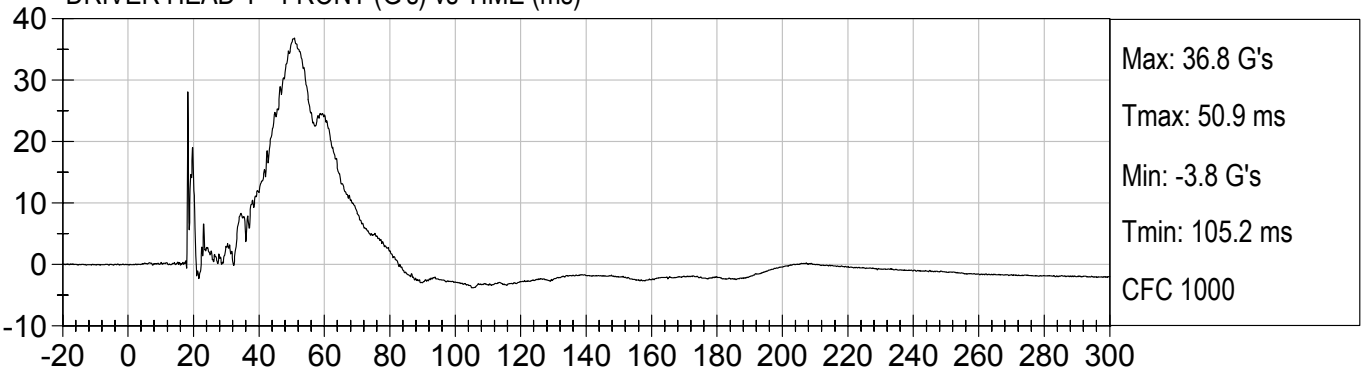




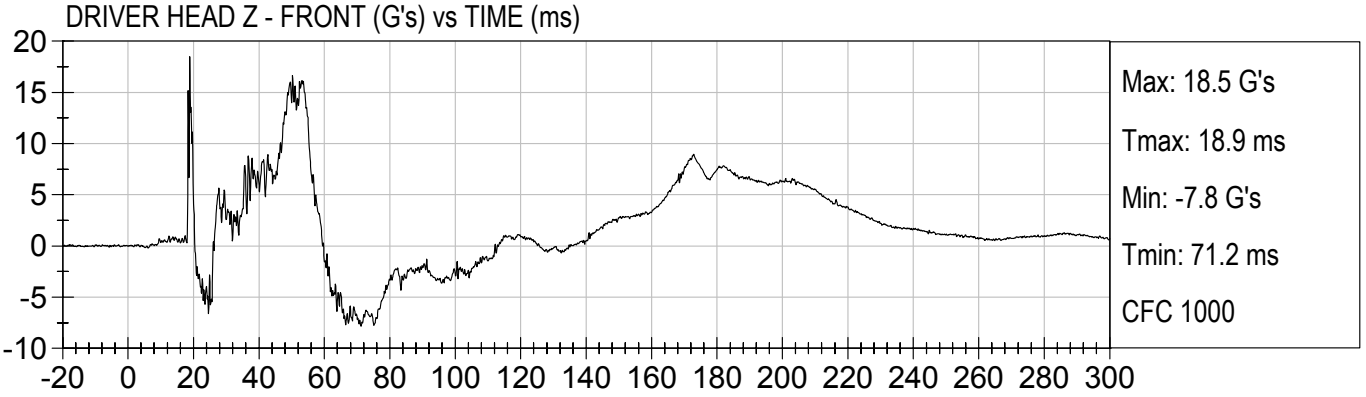
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

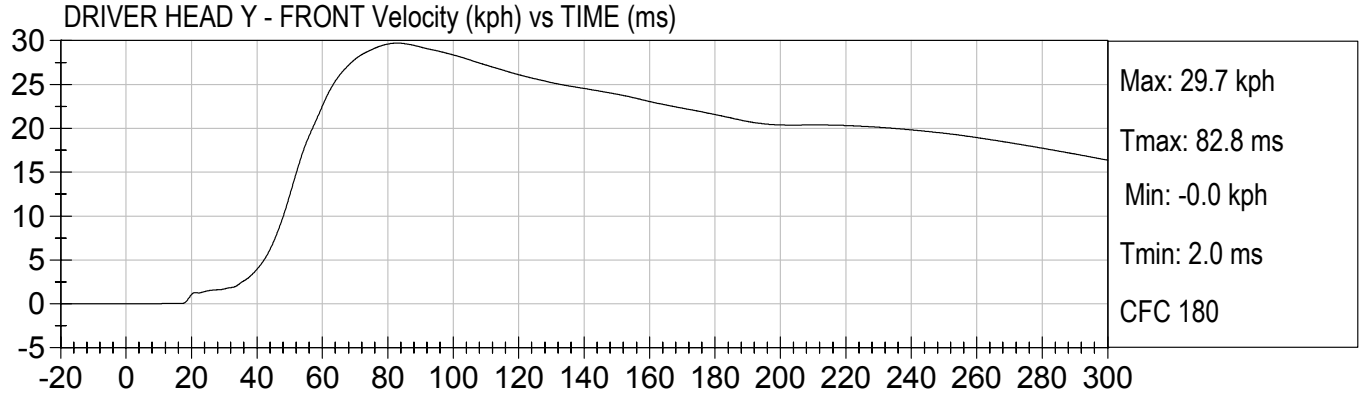
DRIVER HEAD Y - FRONT (G's) vs TIME (ms)



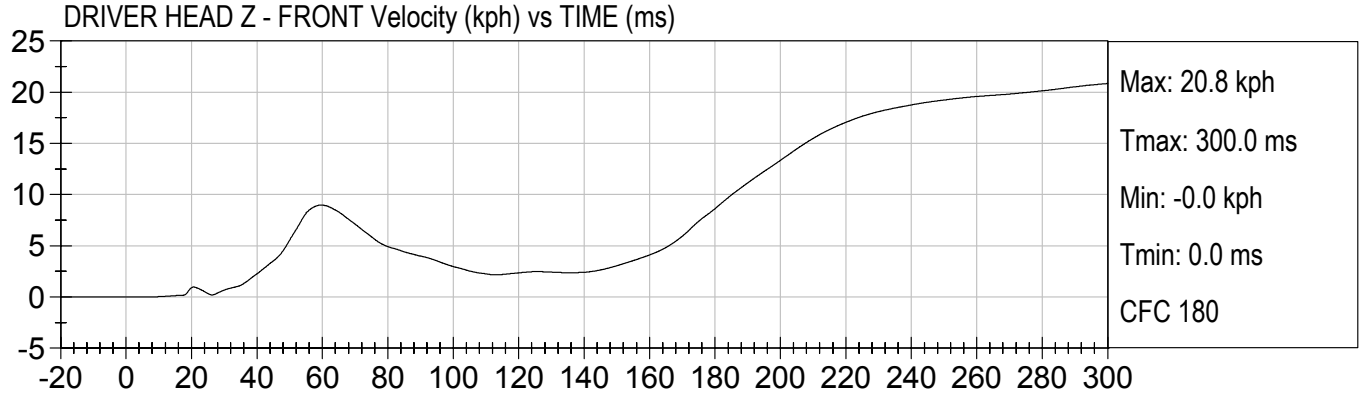
DRIVER HEAD Z - FRONT (G's) vs TIME (ms)



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



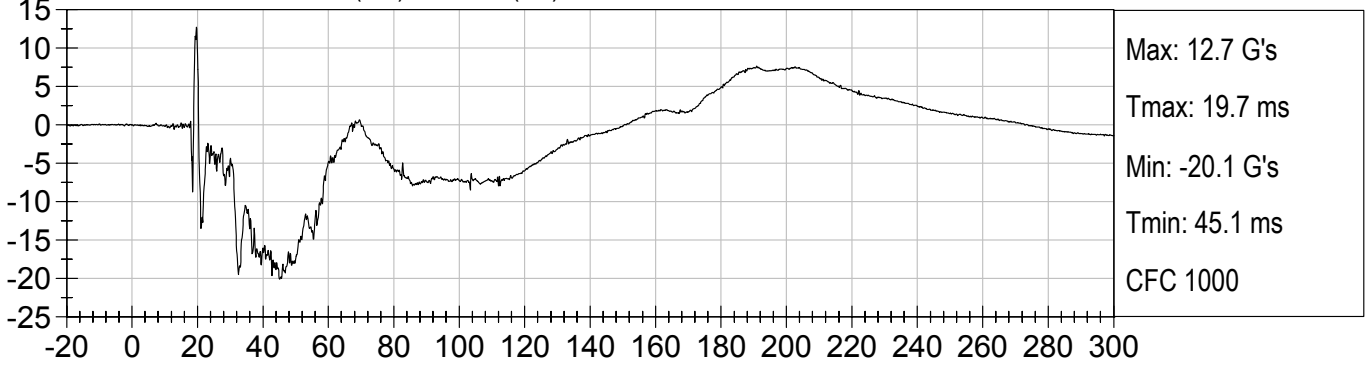
DRIVER HEAD Z - FRONT Velocity (kph) vs TIME (ms)



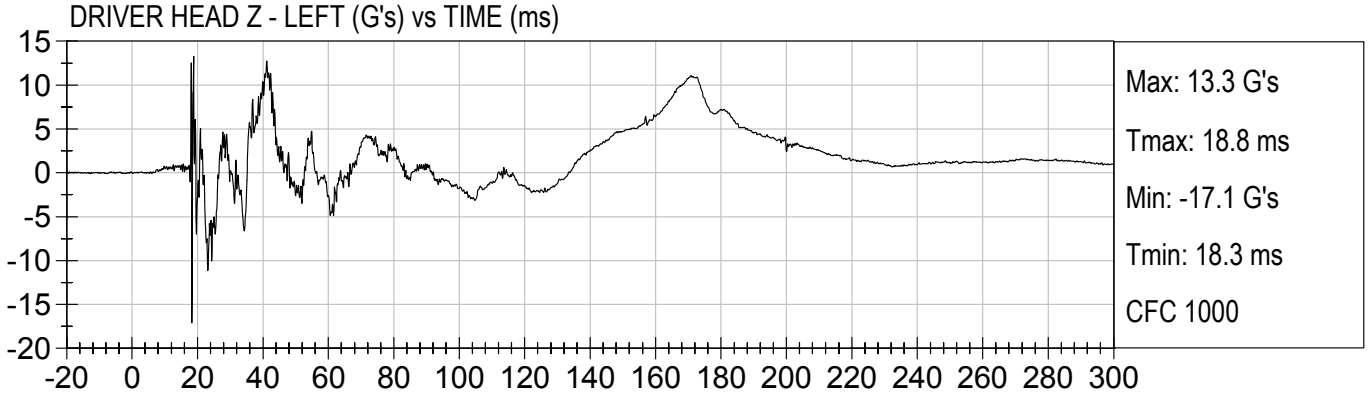
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

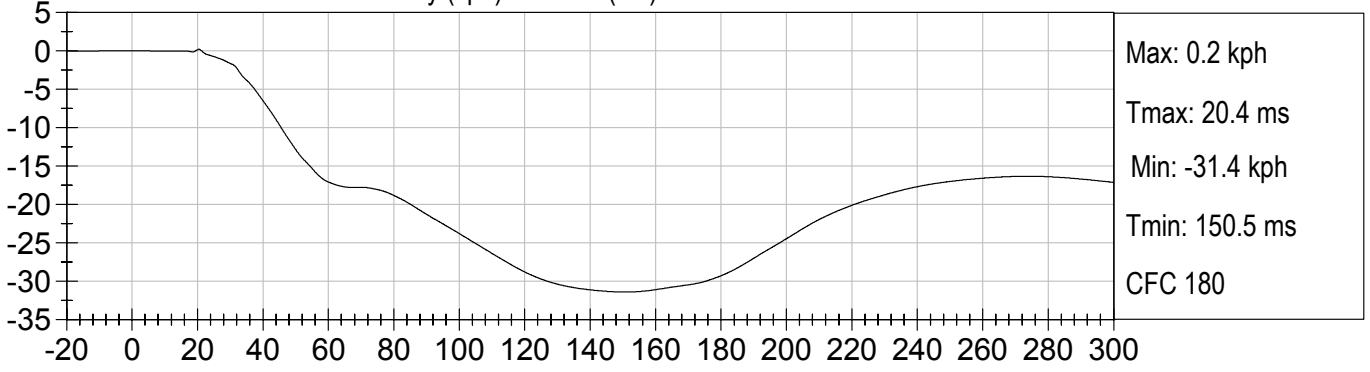
DRIVER HEAD X - LEFT (G's) vs TIME (ms)



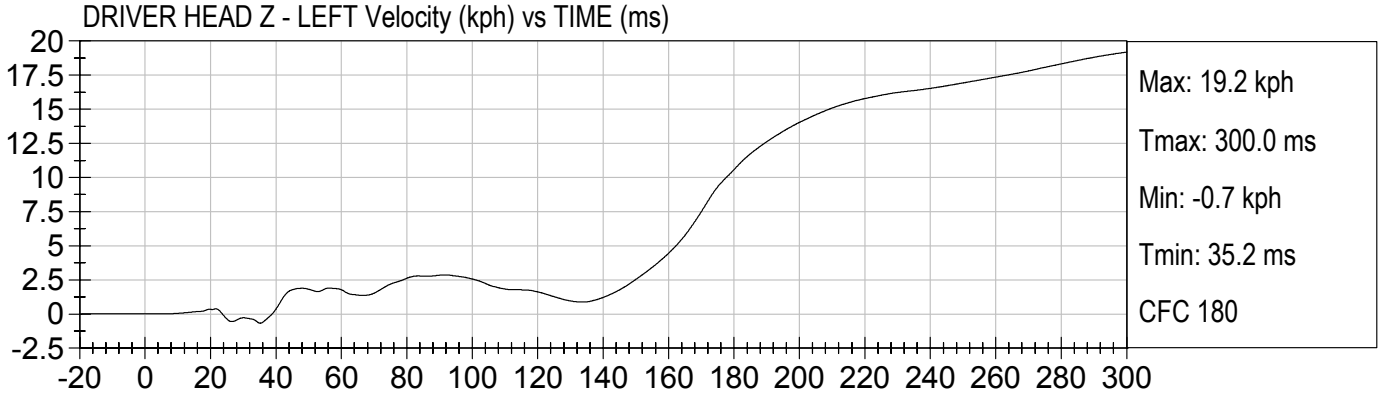
DRIVER HEAD Z - LEFT (G's) vs TIME (ms)



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



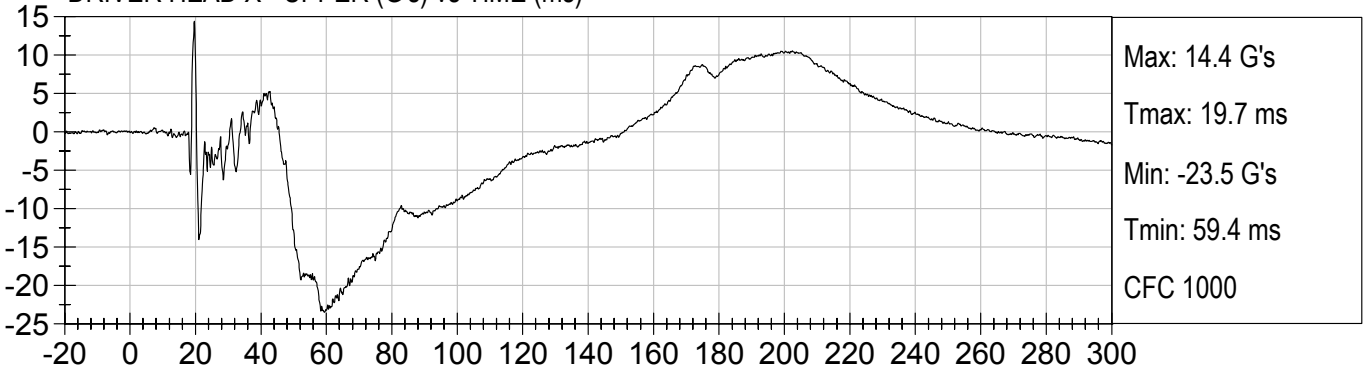
DRIVER HEAD Z - LEFT Velocity (kph) vs TIME (ms)



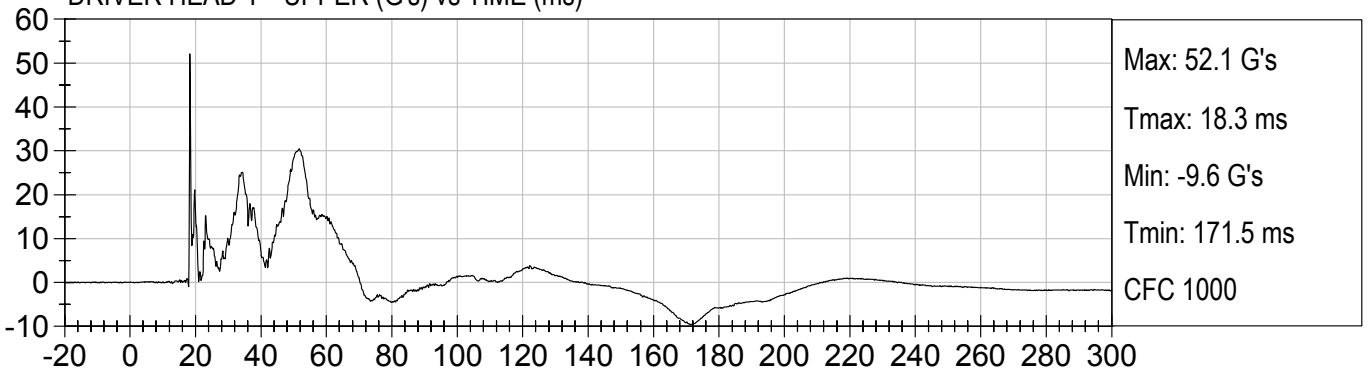
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

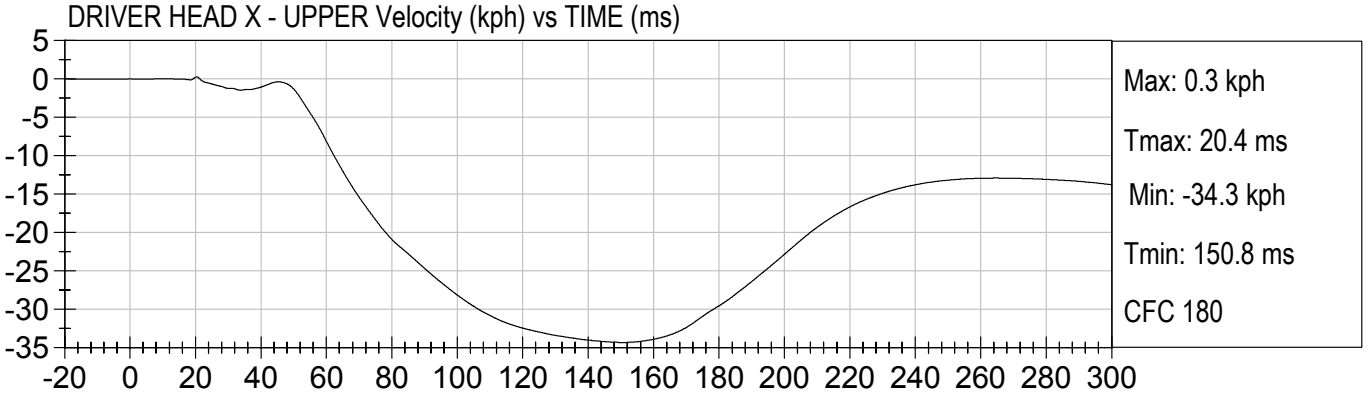
DRIVER HEAD X - UPPER (G's) vs TIME (ms)



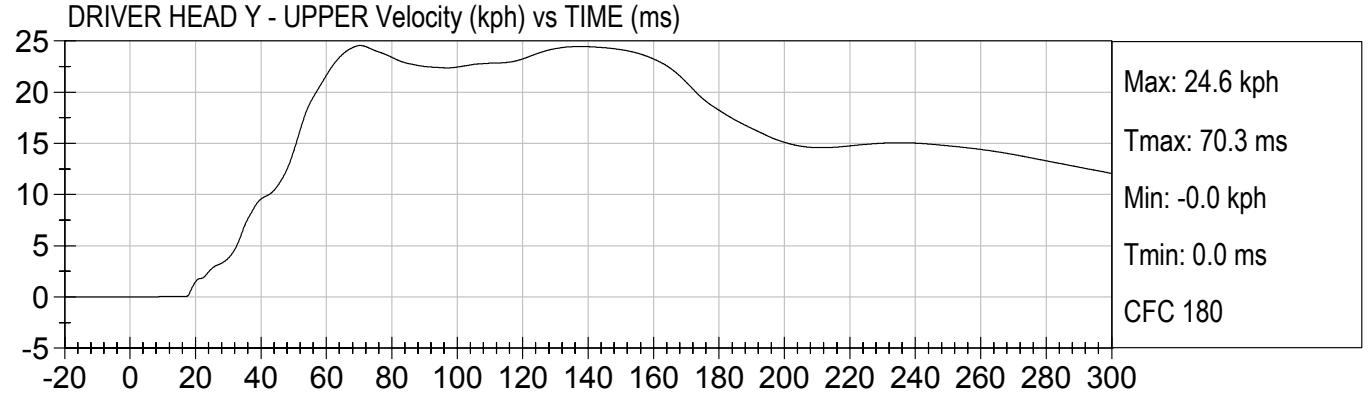
DRIVER HEAD Y - UPPER (G's) vs TIME (ms)



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



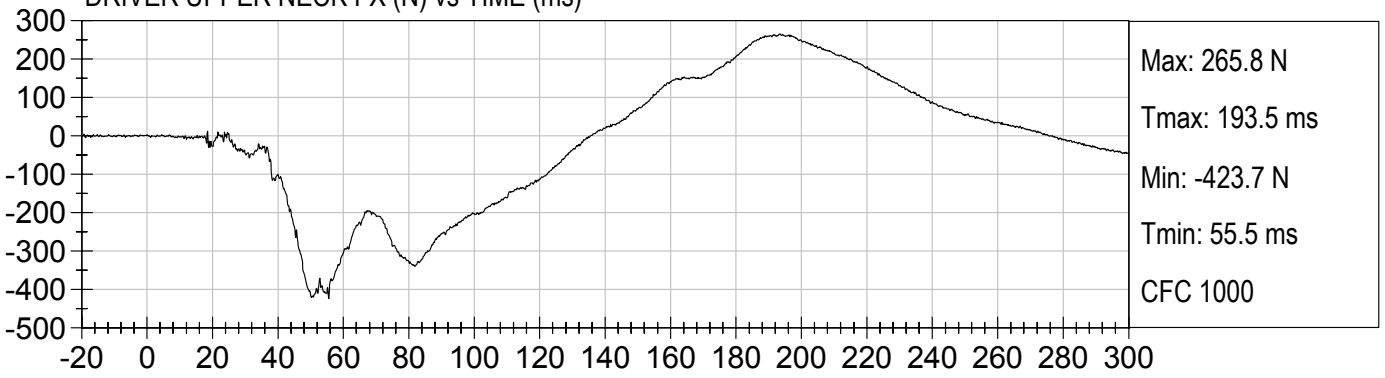
DRIVER HEAD Y - UPPER Velocity (kph) vs TIME (ms)



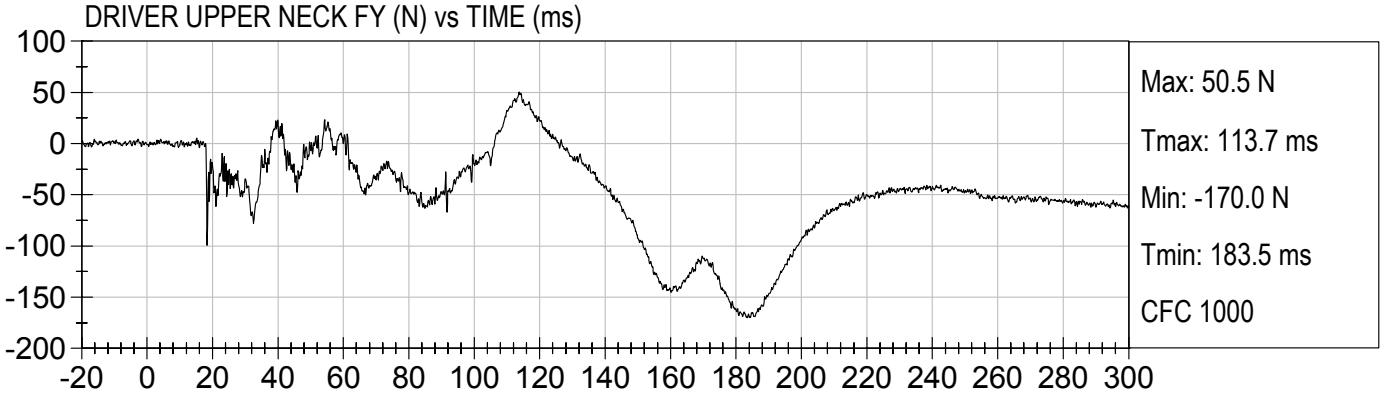
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

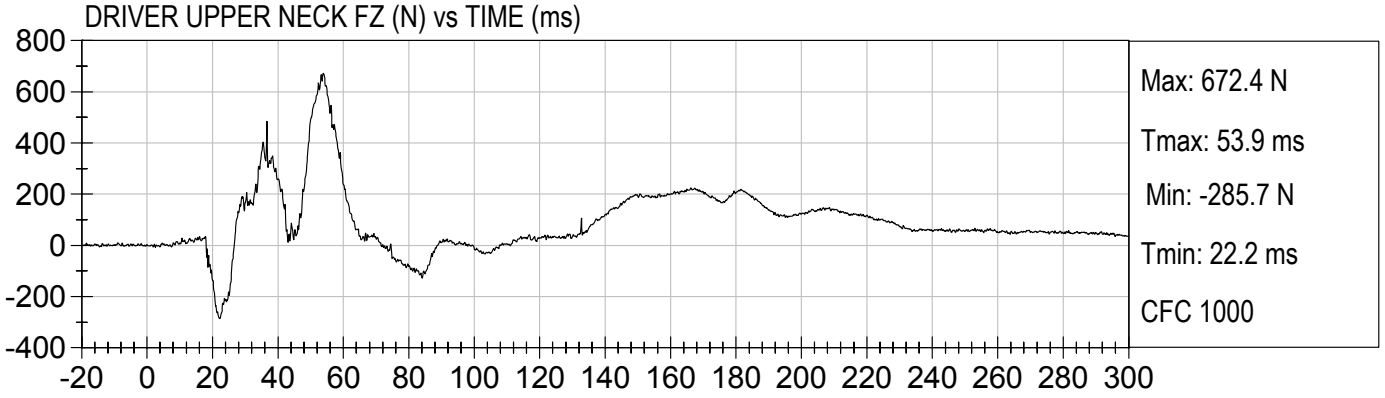
DRIVER UPPER NECK FX (N) vs TIME (ms)



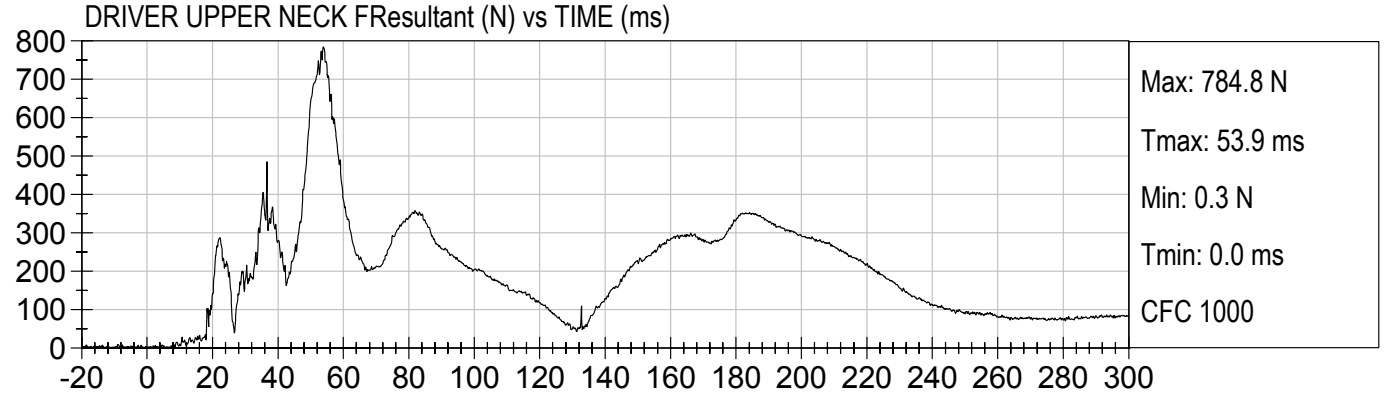
DRIVER UPPER NECK FY (N) vs TIME (ms)



DRIVER UPPER NECK FZ (N) vs TIME (ms)



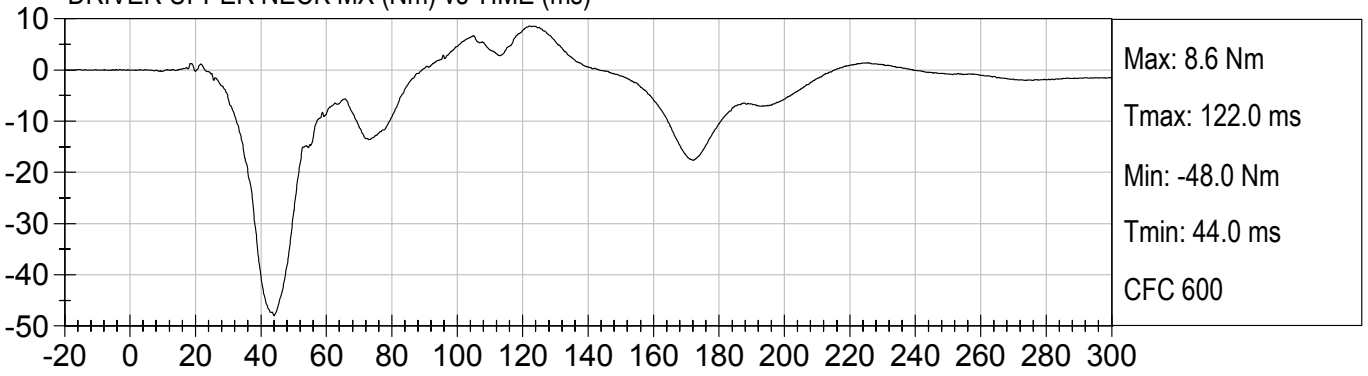
DRIVER UPPER NECK FResultant (N) vs TIME (ms)



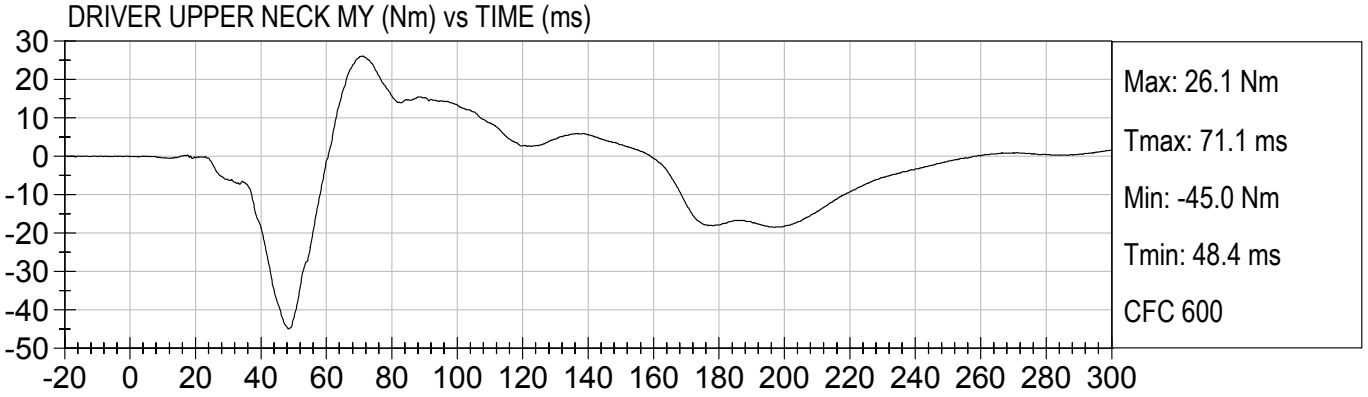
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

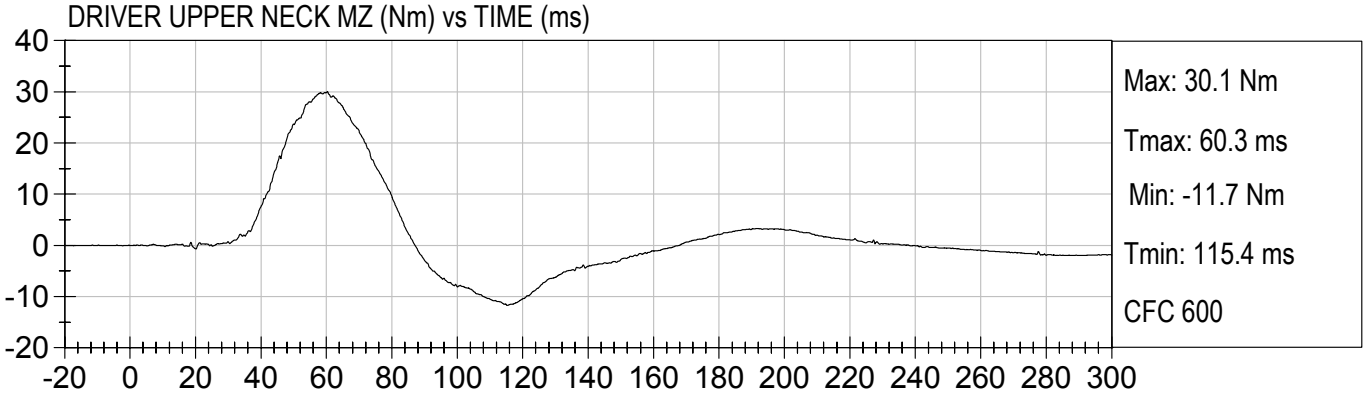
DRIVER UPPER NECK MX (Nm) vs TIME (ms)



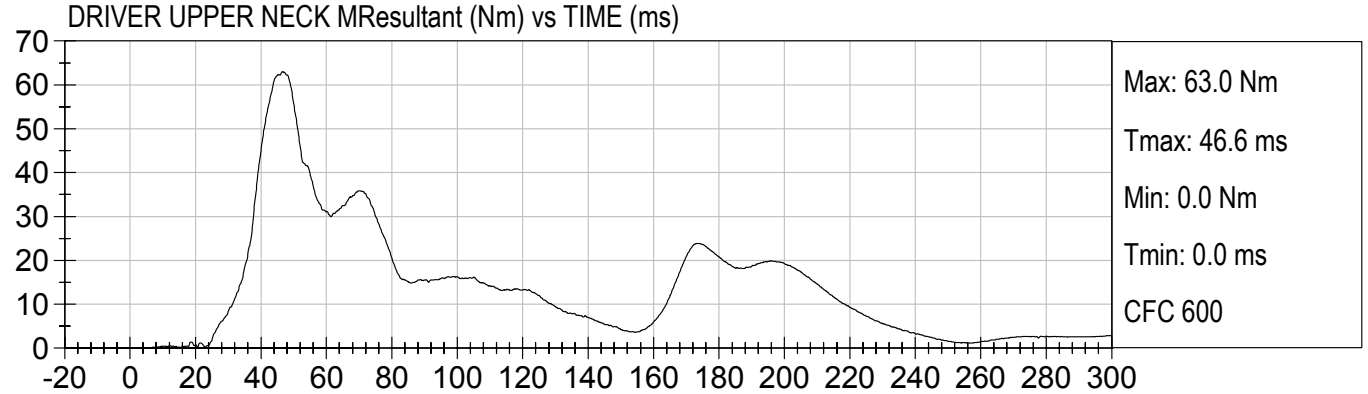
DRIVER UPPER NECK MY (Nm) vs TIME (ms)



DRIVER UPPER NECK MZ (Nm) vs TIME (ms)



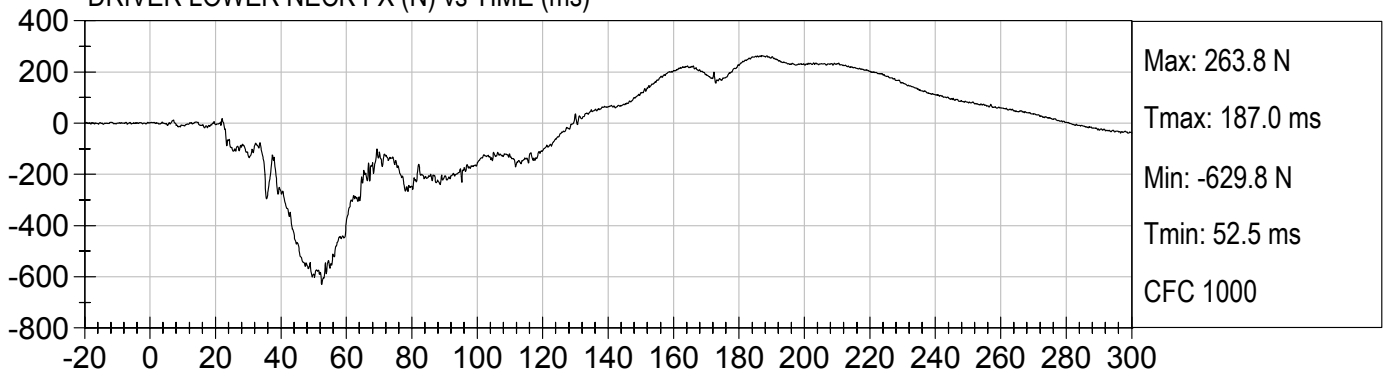
DRIVER UPPER NECK MResultant (Nm) vs TIME (ms)



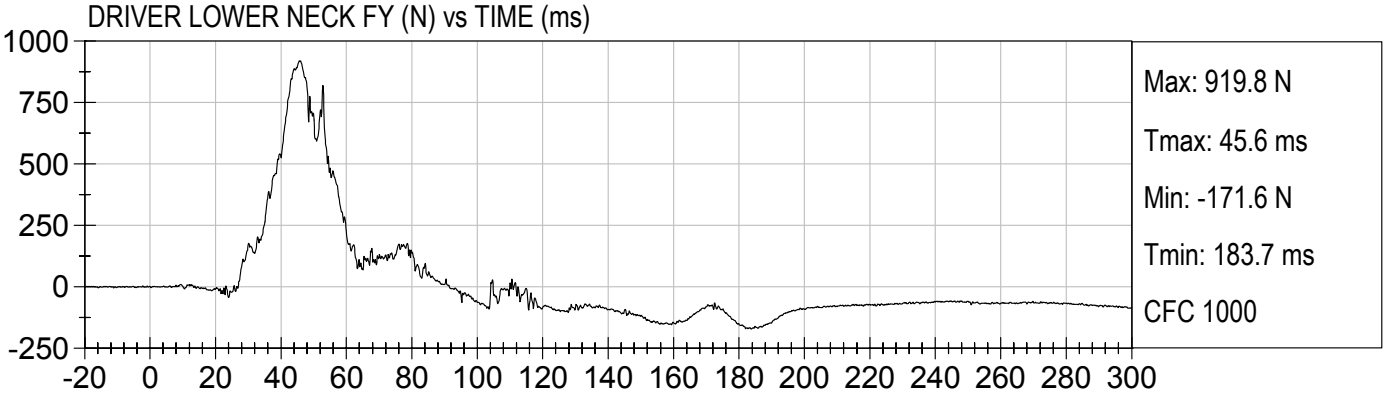
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

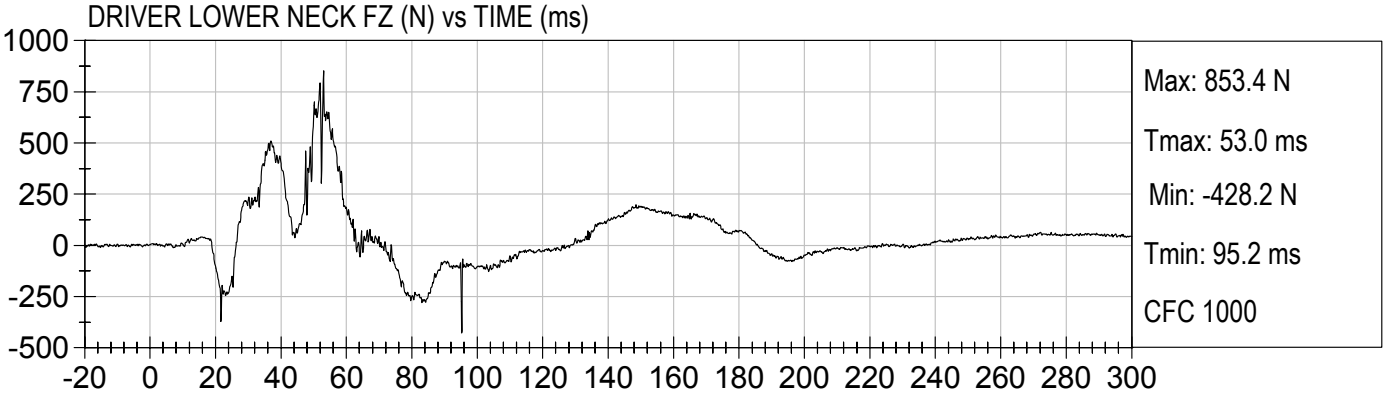
DRIVER LOWER NECK FX (N) vs TIME (ms)



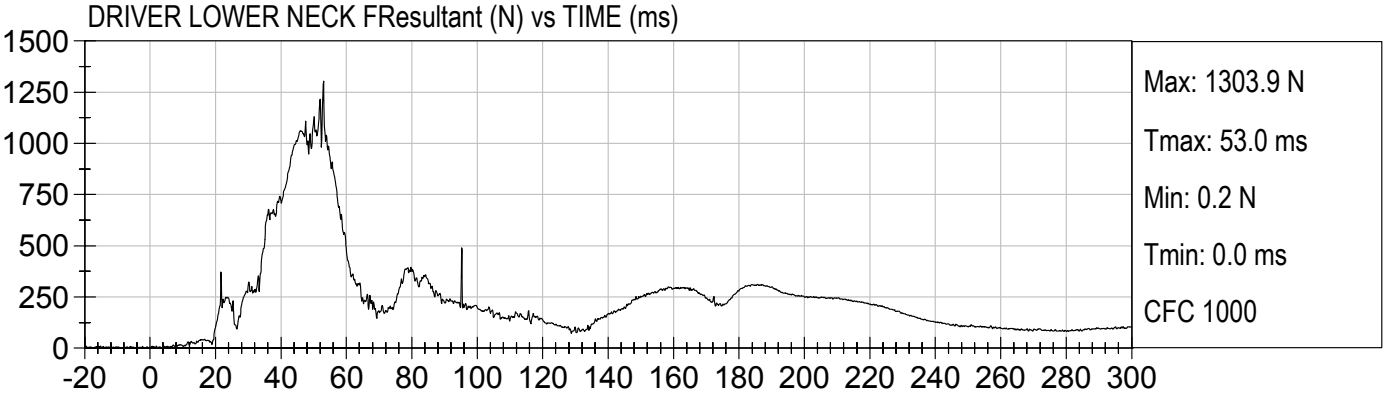
DRIVER LOWER NECK FY (N) vs TIME (ms)



DRIVER LOWER NECK FZ (N) vs TIME (ms)



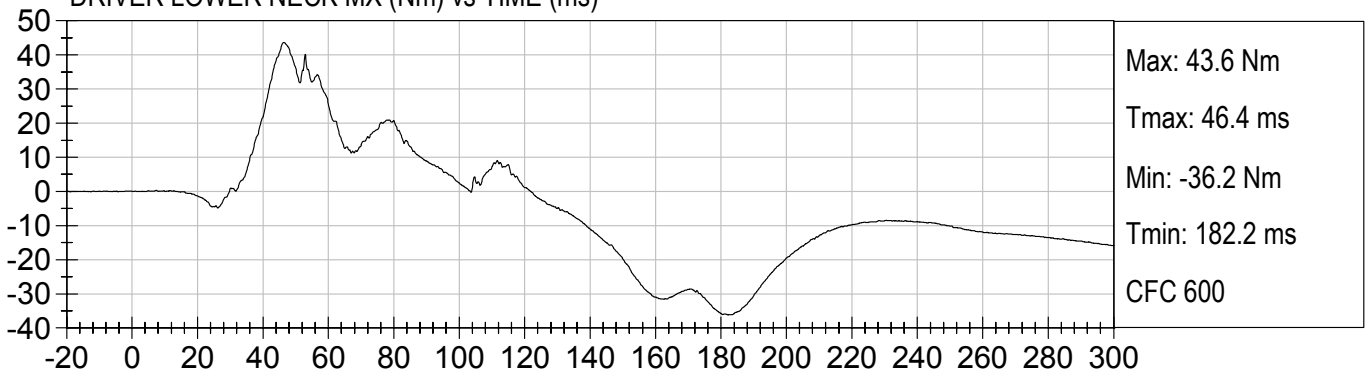
DRIVER LOWER NECK FResultant (N) vs TIME (ms)



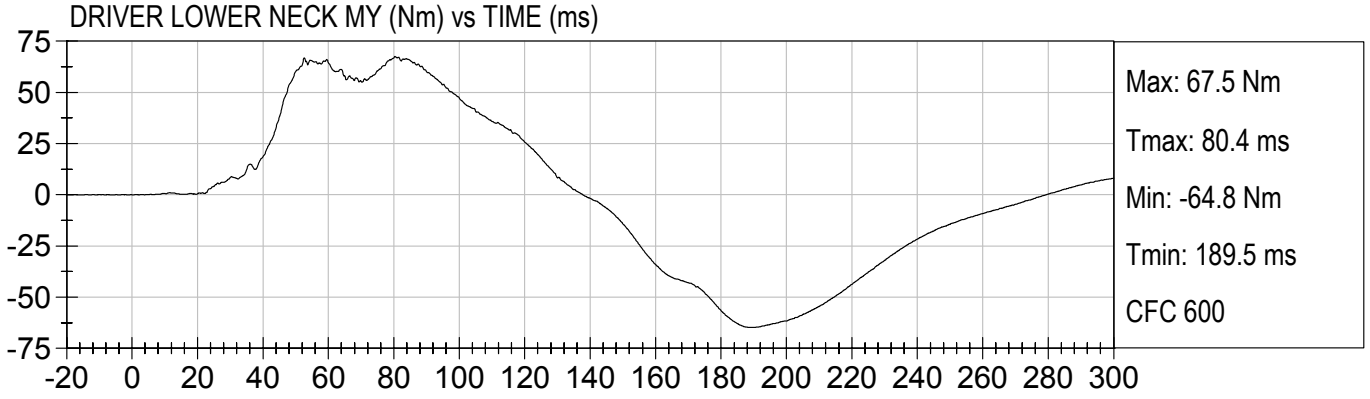
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

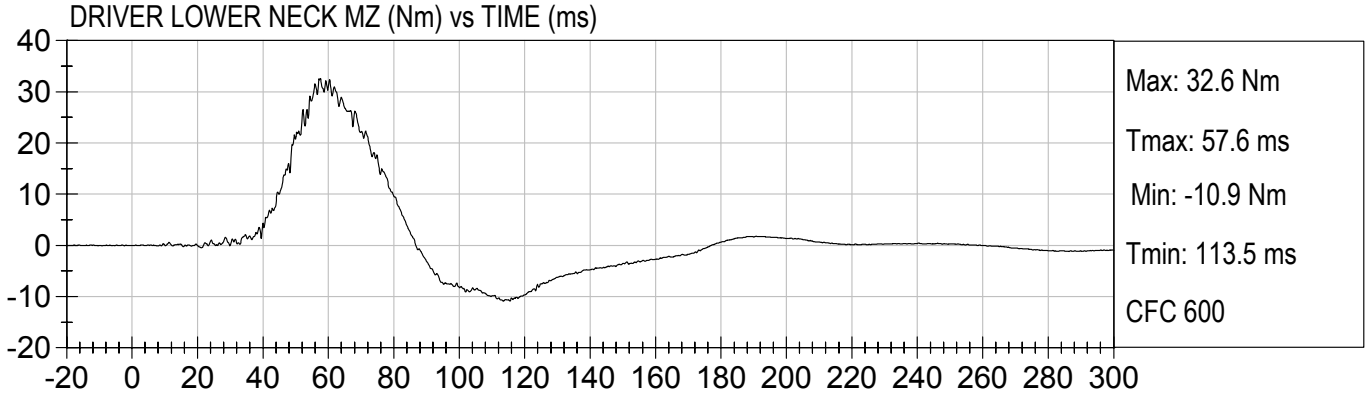
DRIVER LOWER NECK MX (Nm) vs TIME (ms)



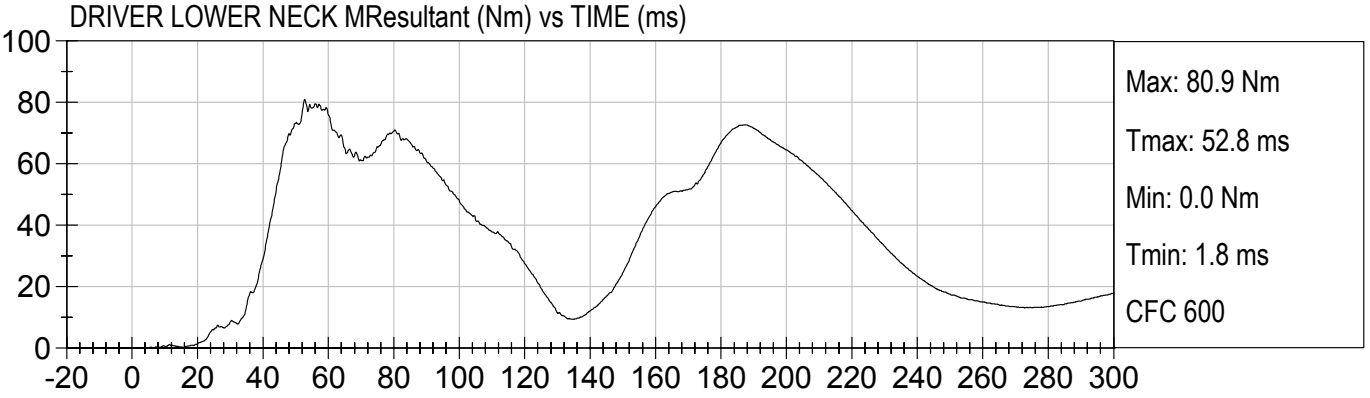
DRIVER LOWER NECK MY (Nm) vs TIME (ms)



DRIVER LOWER NECK MZ (Nm) vs TIME (ms)



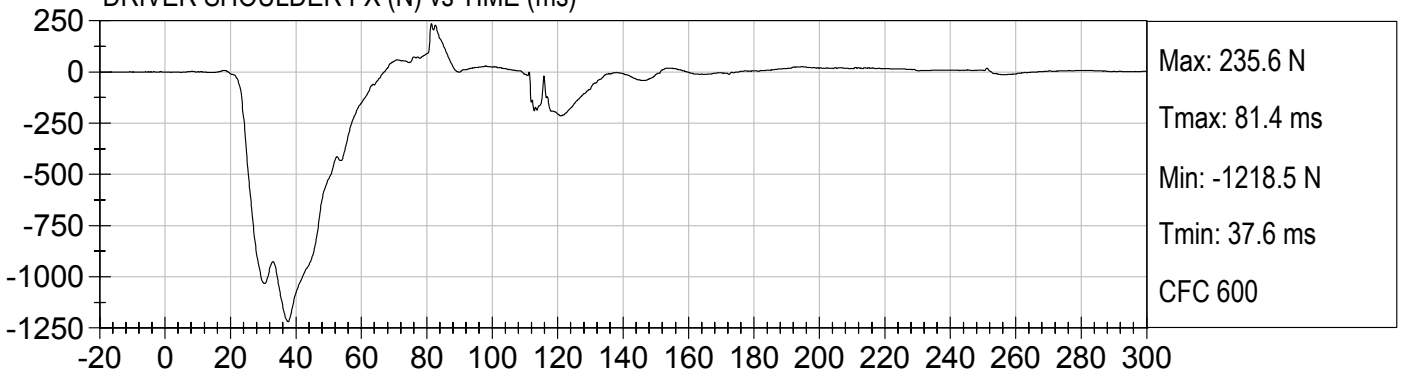
DRIVER LOWER NECK MResultant (Nm) vs TIME (ms)



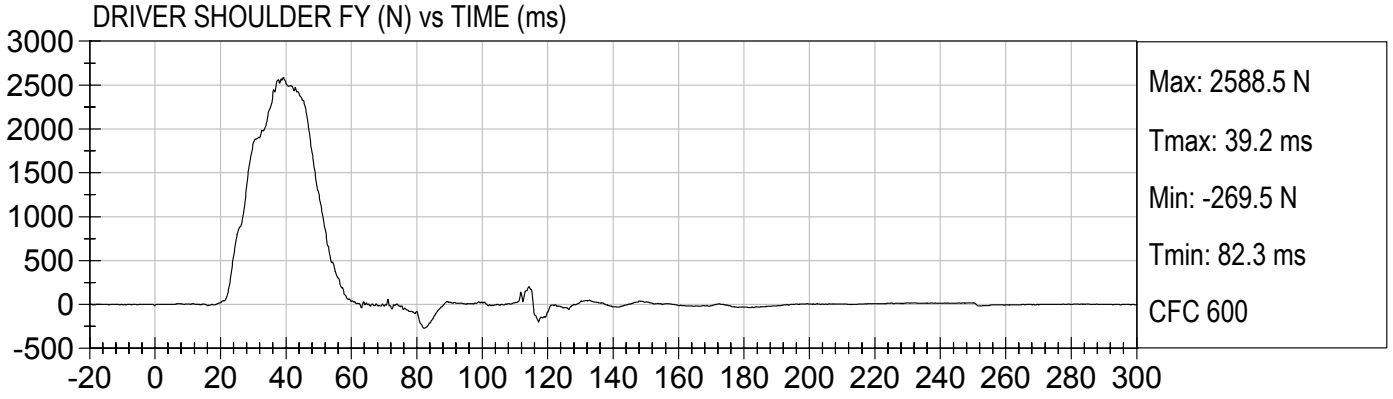
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

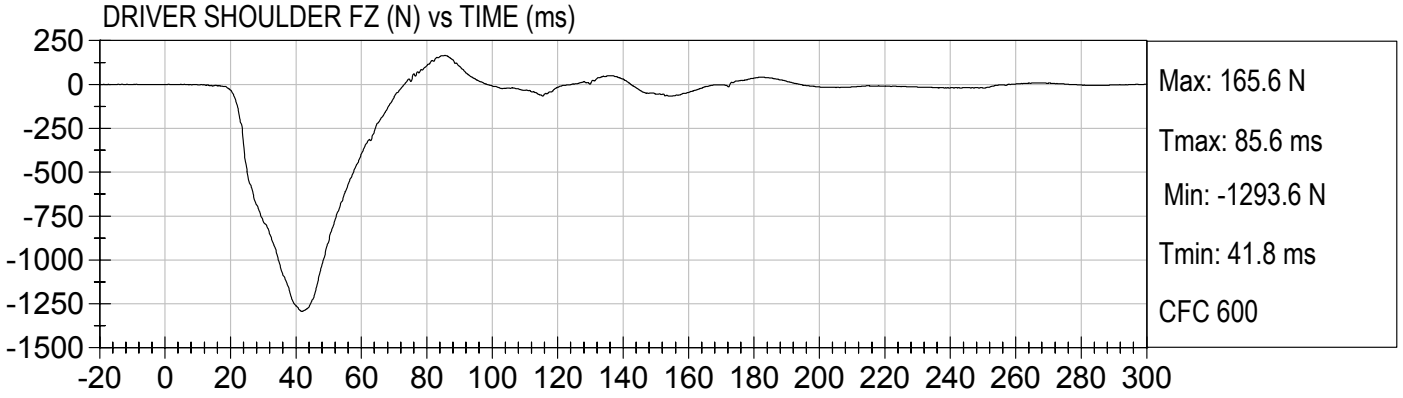
DRIVER SHOULDER FX (N) vs TIME (ms)



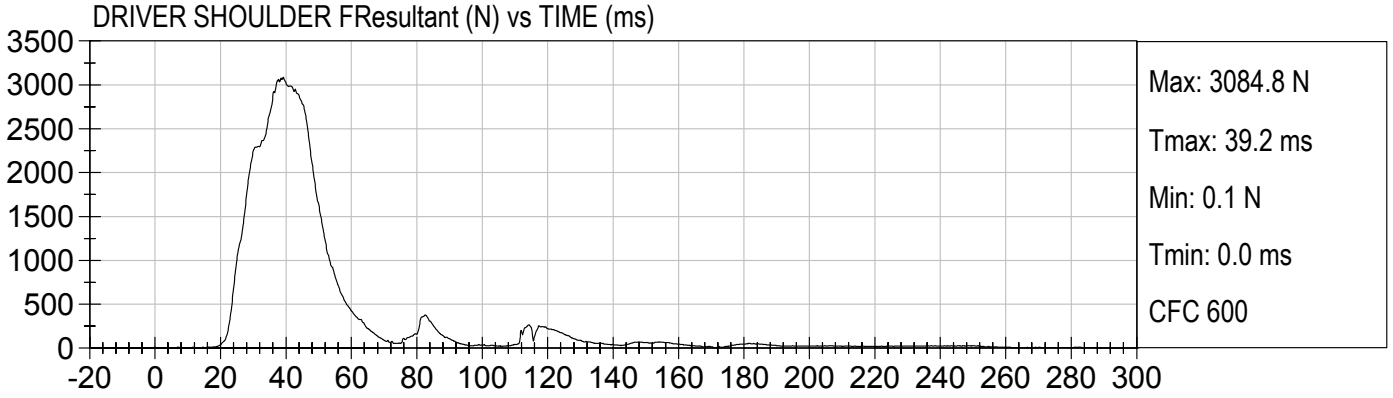
DRIVER SHOULDER FY (N) vs TIME (ms)



DRIVER SHOULDER FZ (N) vs TIME (ms)



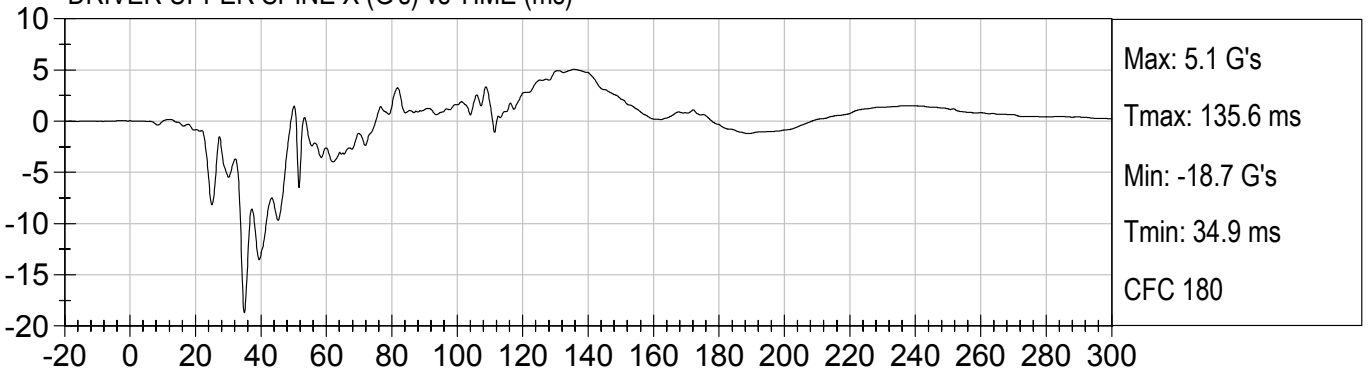
DRIVER SHOULDER FResultant (N) vs TIME (ms)



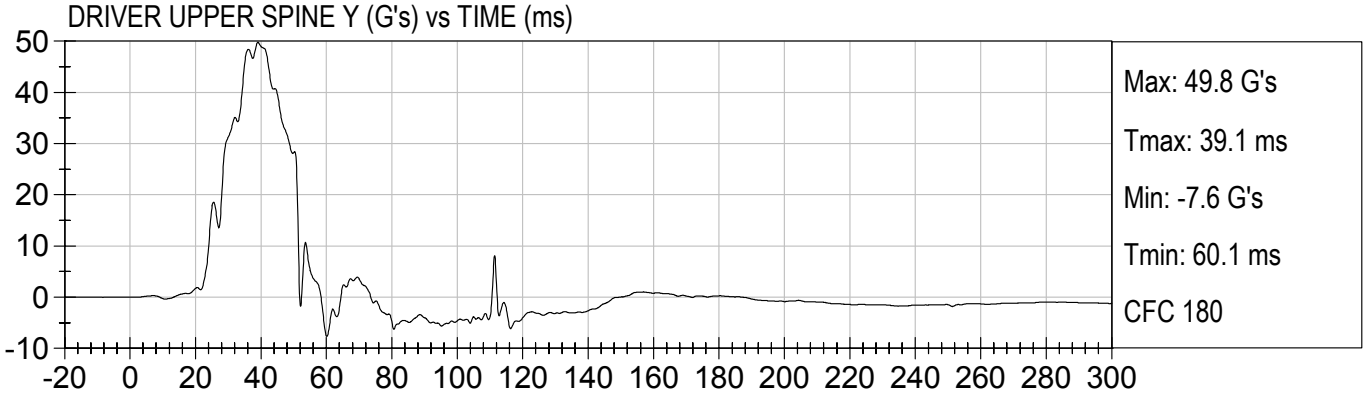
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

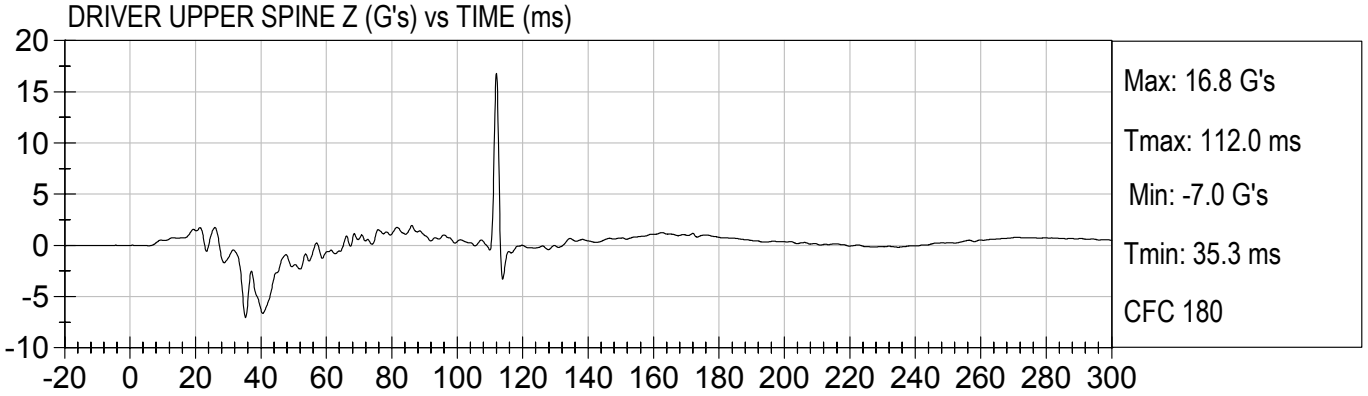
DRIVER UPPER SPINE X (G's) vs TIME (ms)



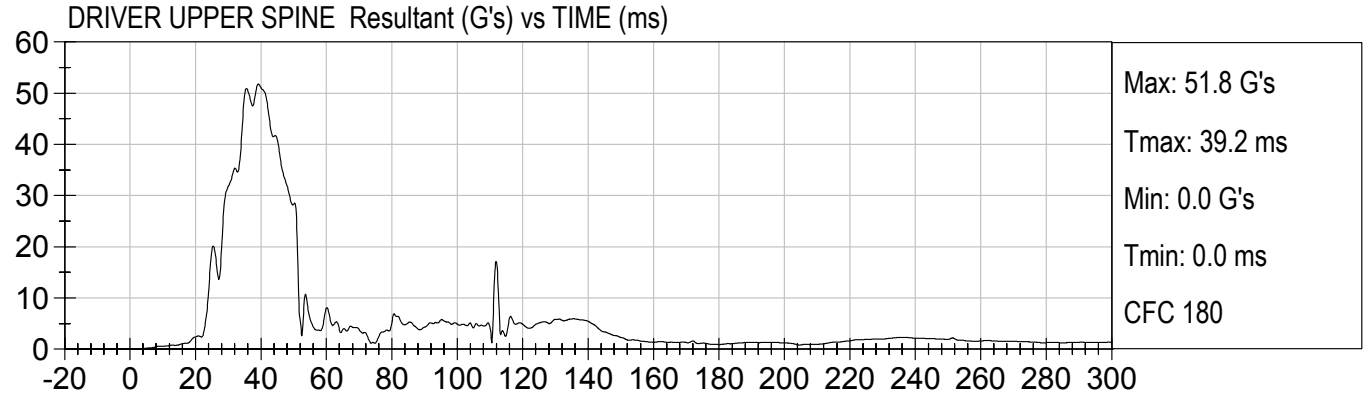
DRIVER UPPER SPINE Y (G's) vs TIME (ms)

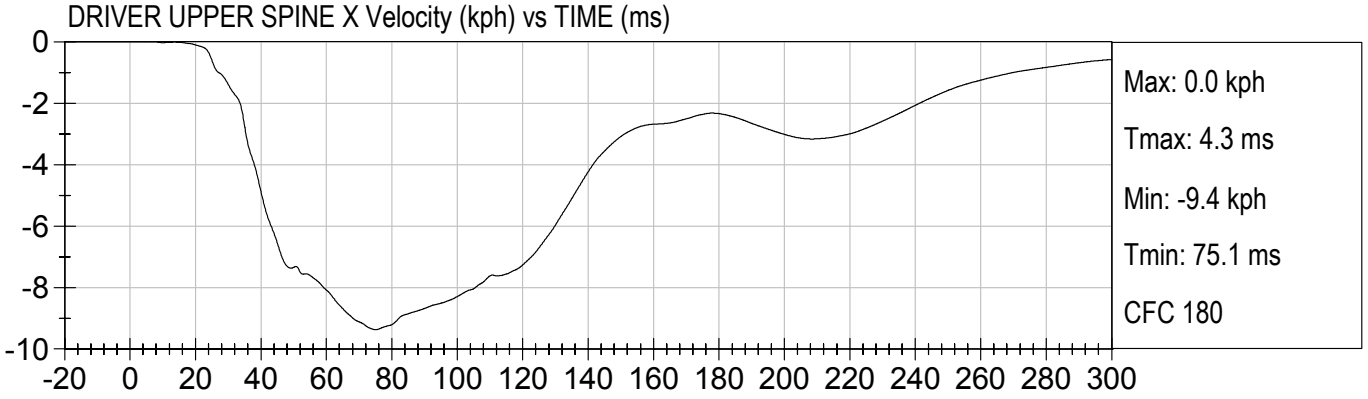


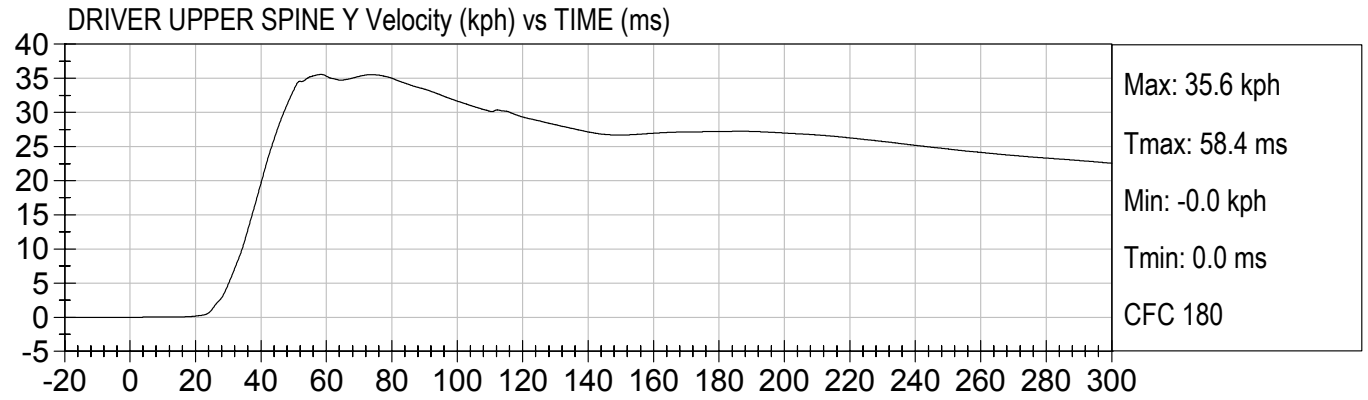
DRIVER UPPER SPINE Z (G's) vs TIME (ms)

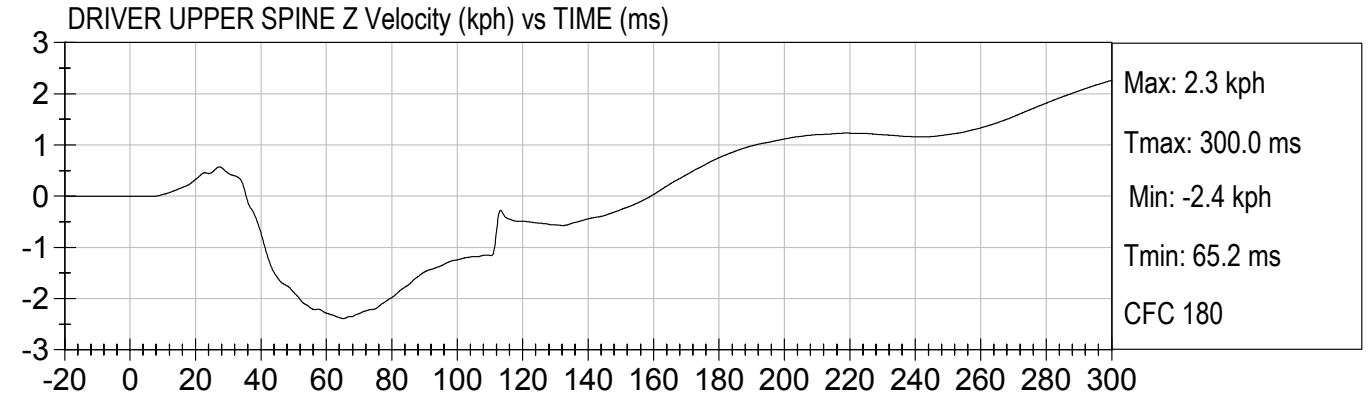


DRIVER UPPER SPINE Resultant (G's) vs TIME (ms)




DRIVER UPPER SPINE X Velocity (kph) vs TIME (ms)
0
-2
-4
-6
-8
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.0 kph
Tmax: 4.3 ms
Min: -9.4 kph
Tmin: 75.1 ms
CFC 180

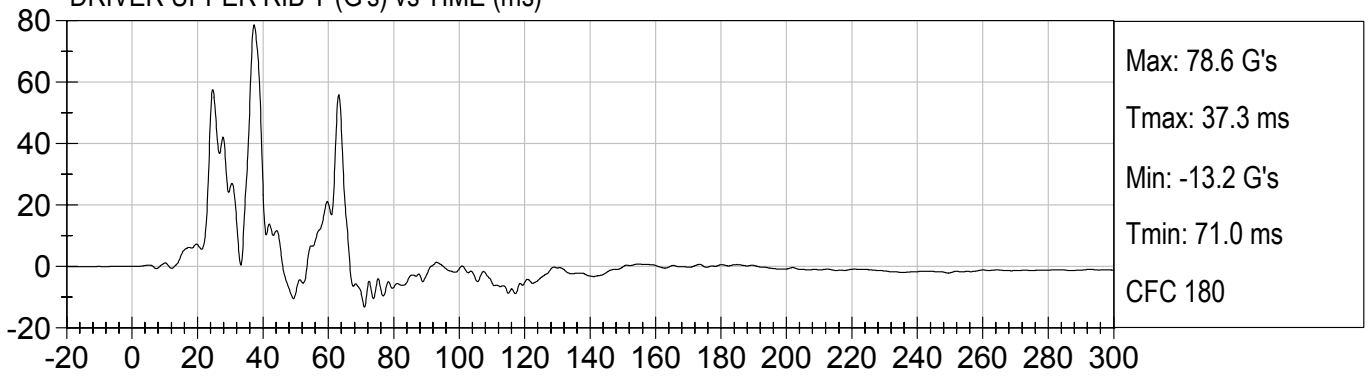

DRIVER UPPER SPINE Y Velocity (kph) vs TIME (ms)
40
35
30
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 35.6 kph
Tmax: 58.4 ms
Min: -0.0 kph
Tmin: 0.0 ms
CFC 180


DRIVER UPPER SPINE Z Velocity (kph) vs TIME (ms)
3
2
1
0
-1
-2
-3
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.3 kph
Tmax: 300.0 ms
Min: -2.4 kph
Tmin: 65.2 ms
CFC 180

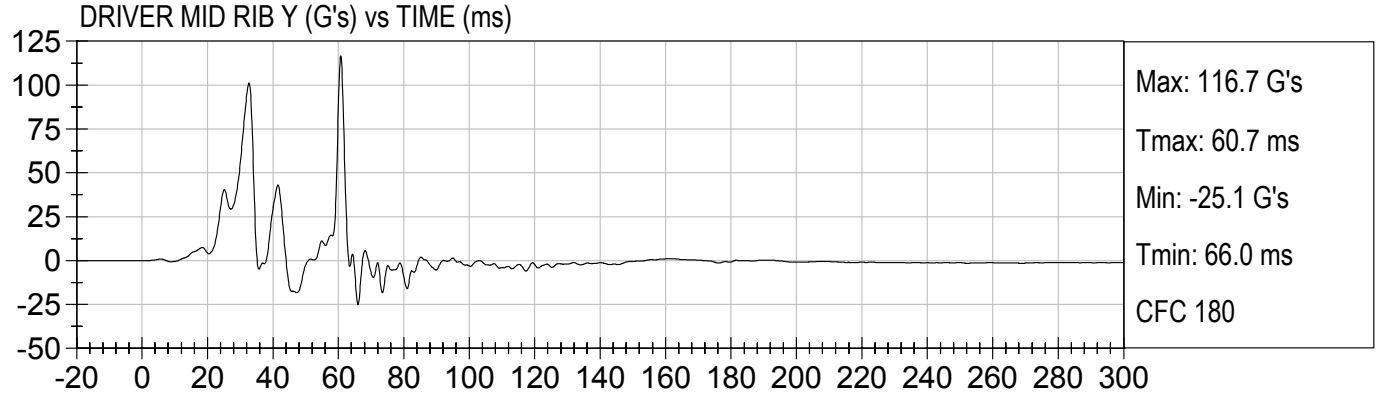
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

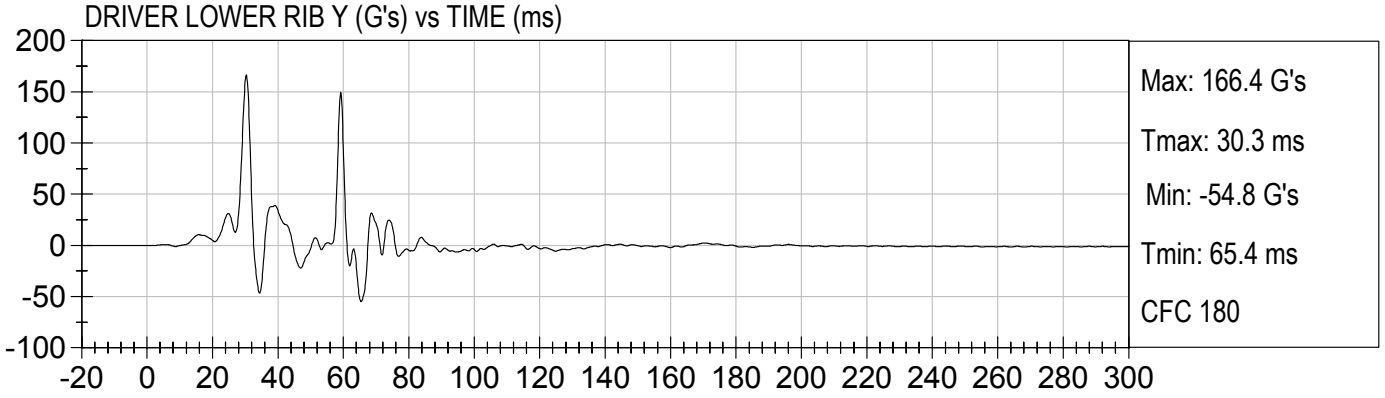
DRIVER UPPER RIB Y (G's) vs TIME (ms)



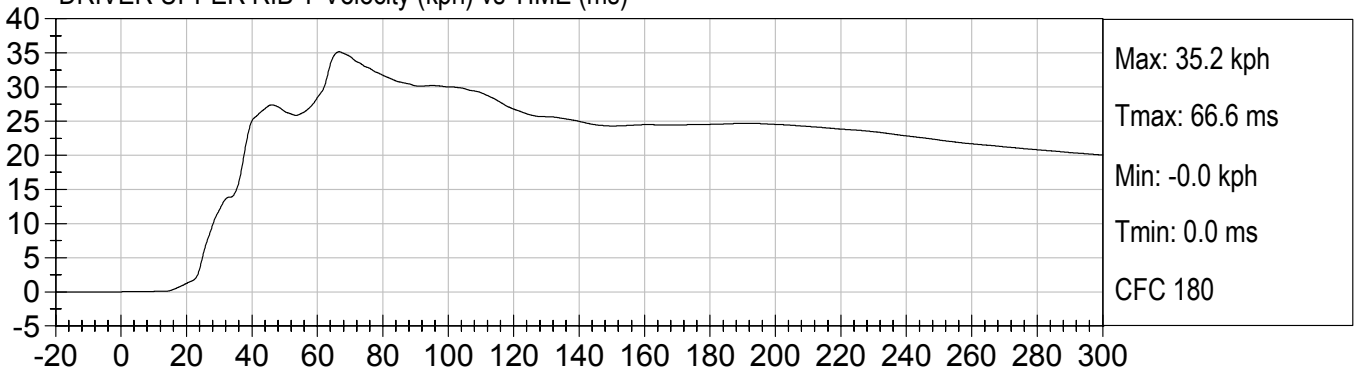
DRIVER MID RIB Y (G's) vs TIME (ms)



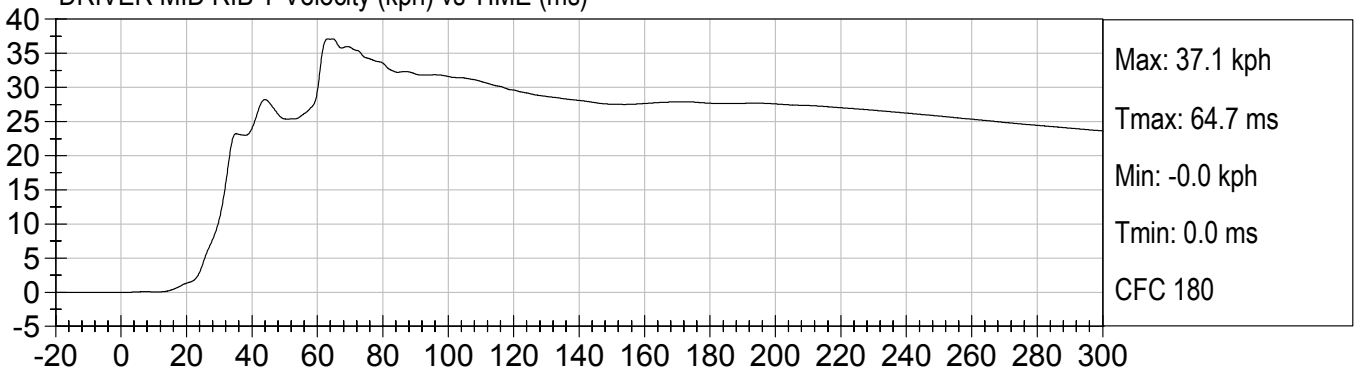
DRIVER LOWER RIB Y (G's) vs TIME (ms)



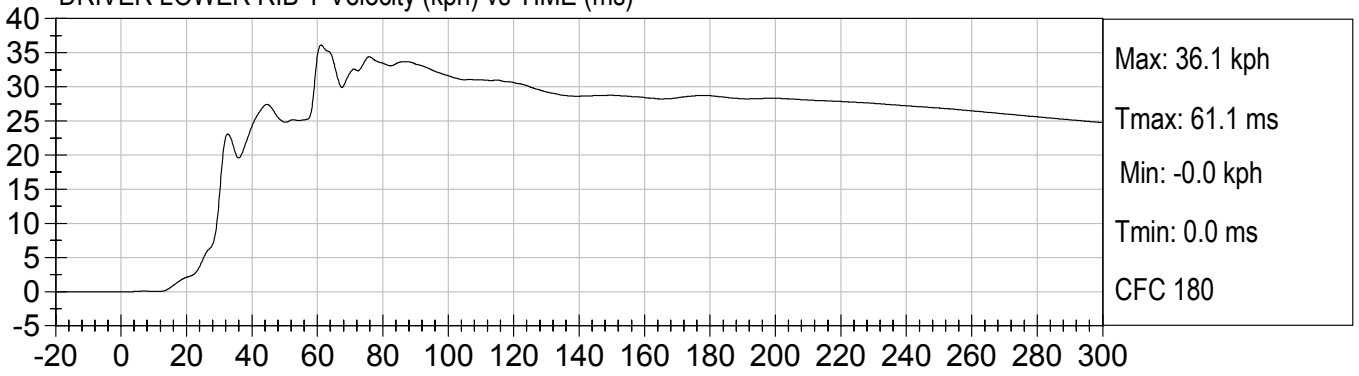
DRIVER UPPER RIB Y Velocity (kph) vs TIME (ms)



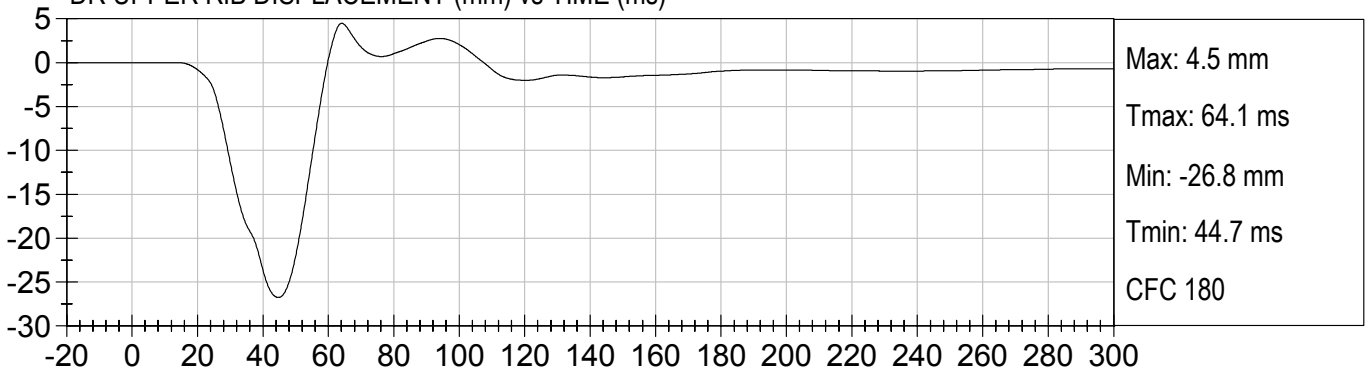
DRIVER MID RIB Y Velocity (kph) vs TIME (ms)



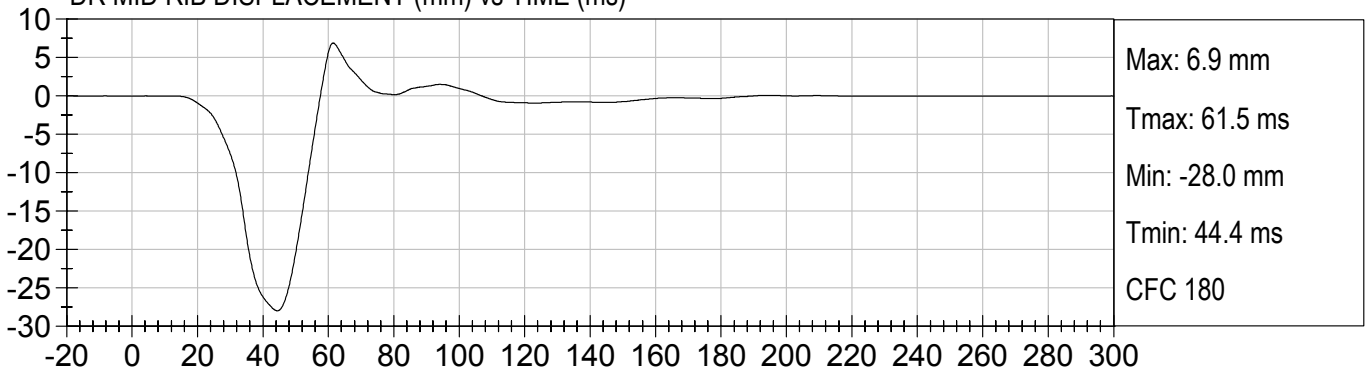
DRIVER LOWER RIB Y Velocity (kph) vs TIME (ms)



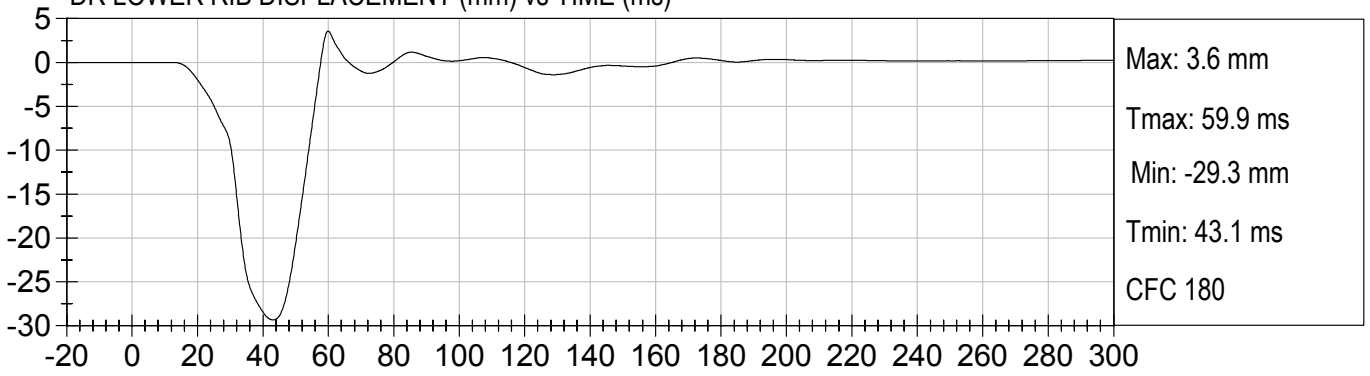
DR UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



DR MID RIB DISPLACEMENT (mm) vs TIME (ms)



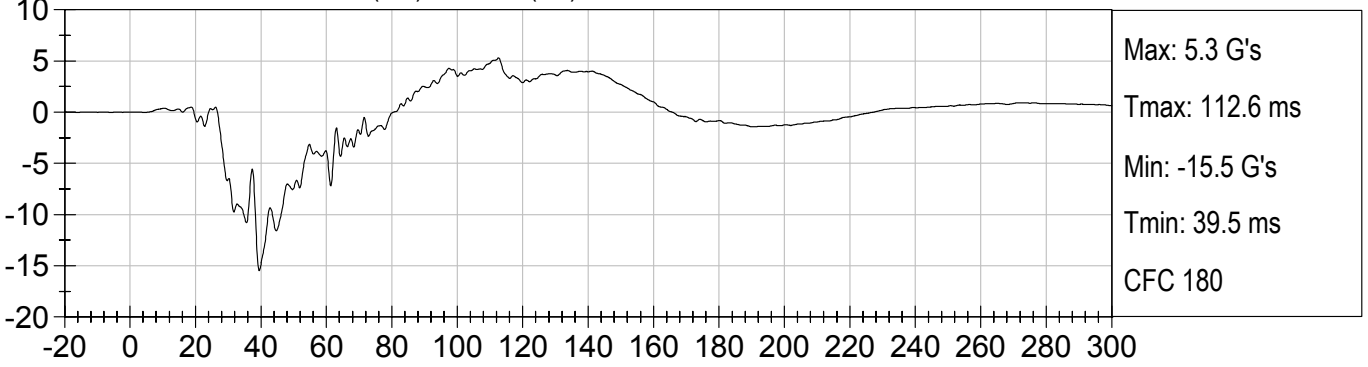
DR LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



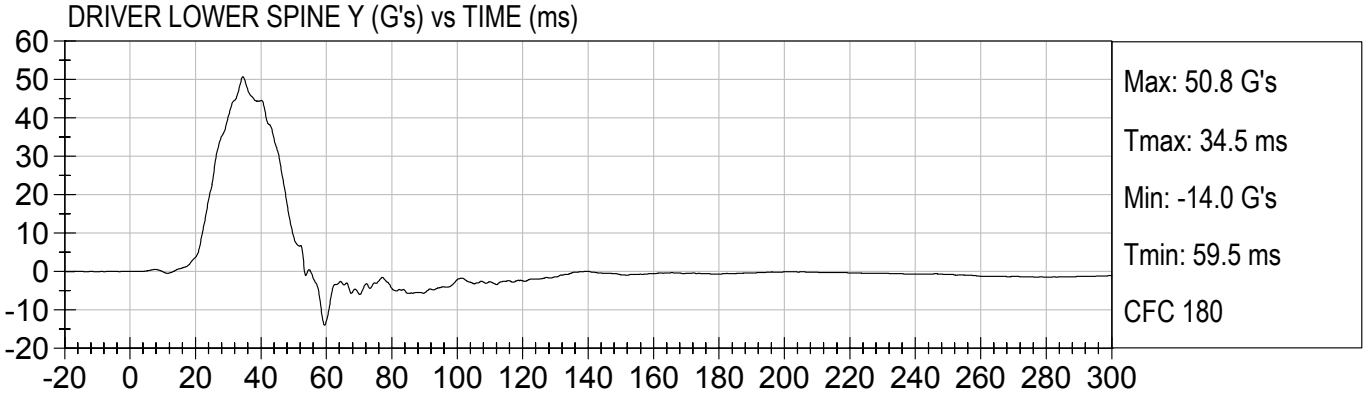
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

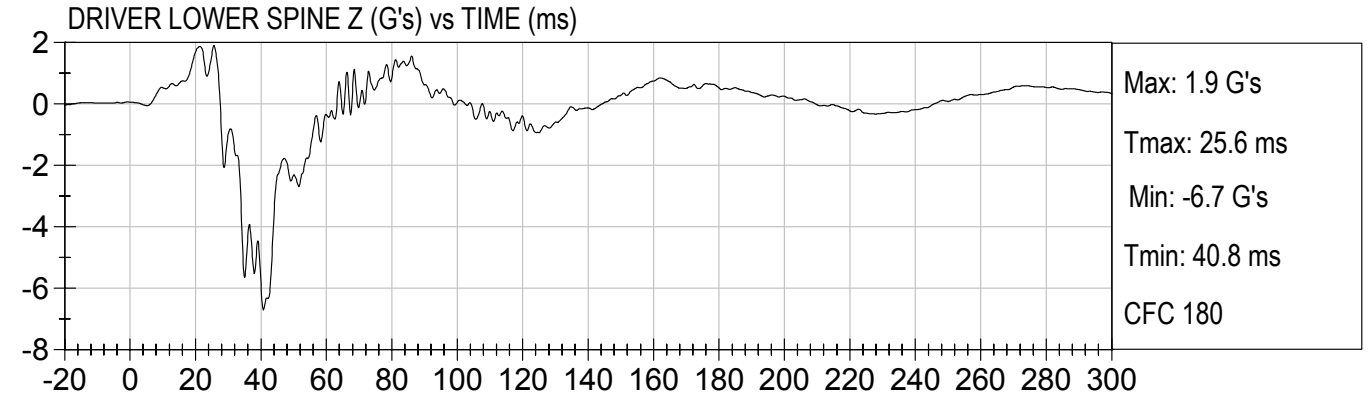
DRIVER LOWER SPINE X (G's) vs TIME (ms)



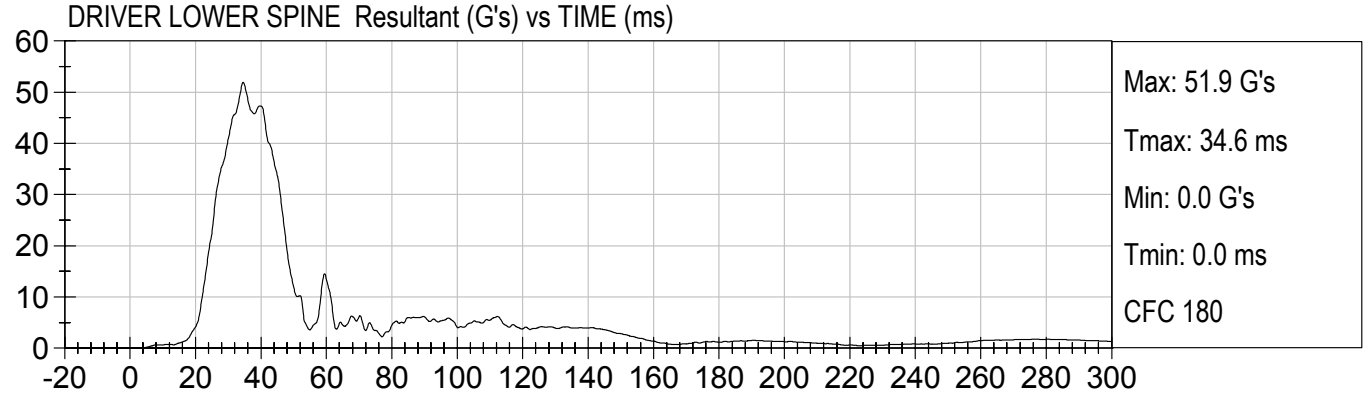
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



DRIVER LOWER SPINE Z (G's) vs TIME (ms)

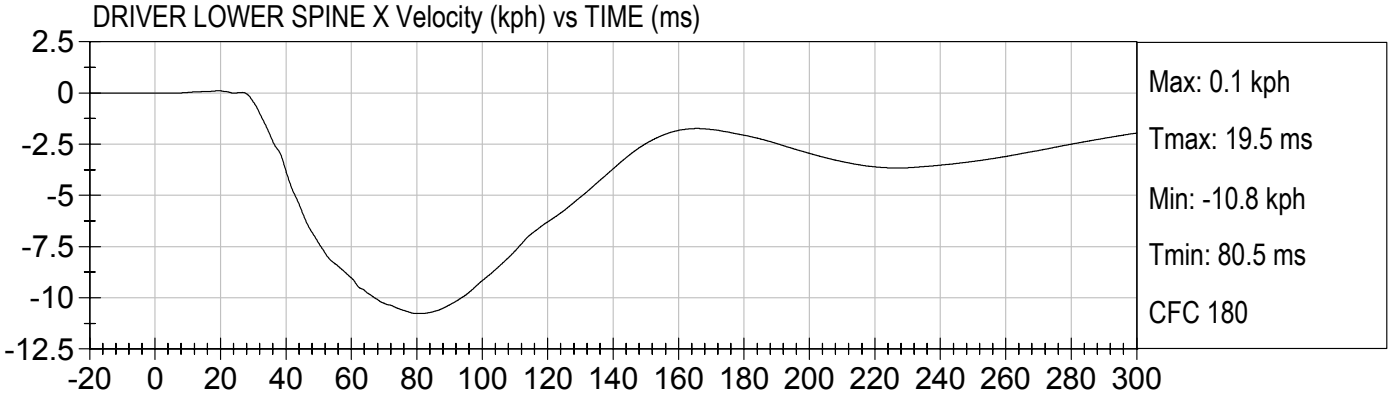


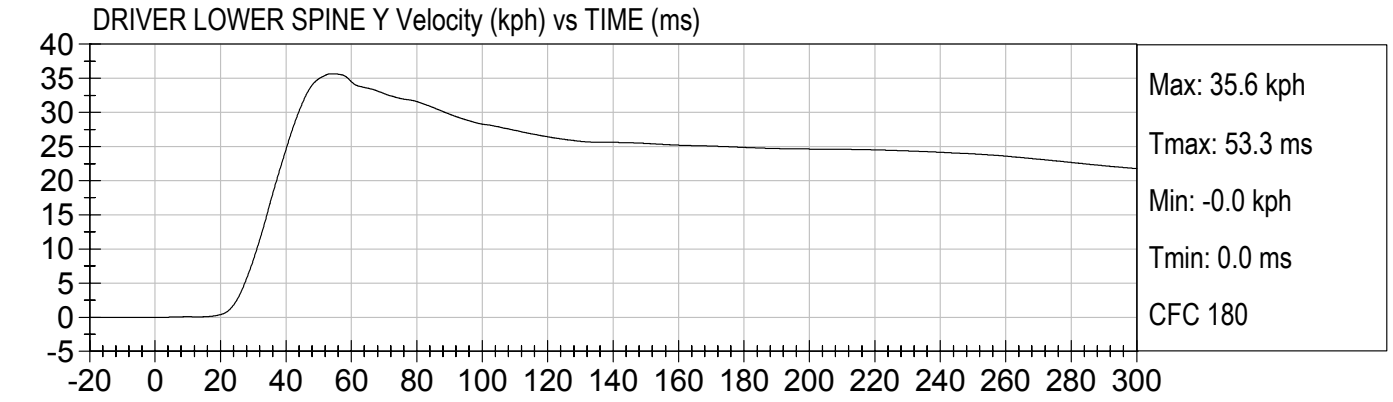
DRIVER LOWER SPINE Resultant (G's) vs TIME (ms)

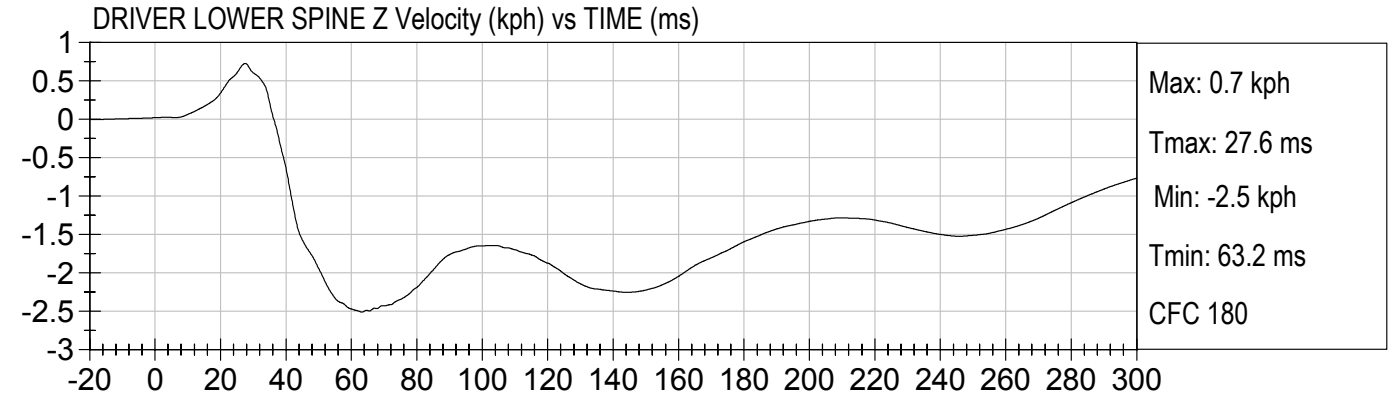


T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)



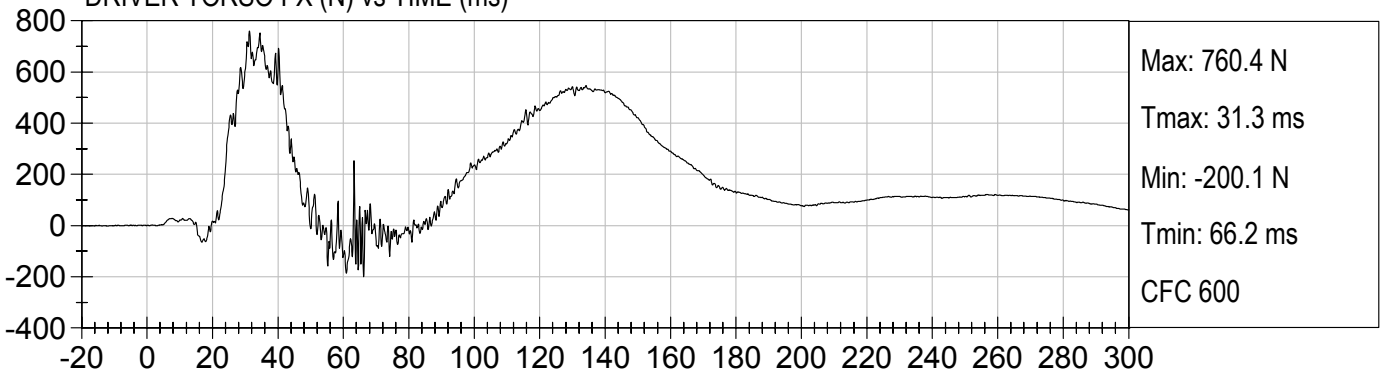




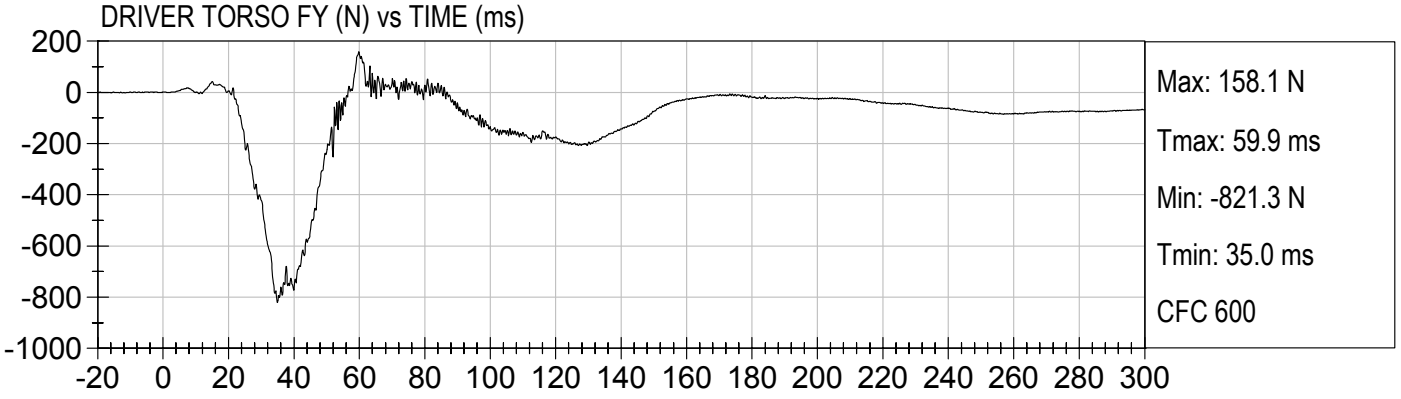
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

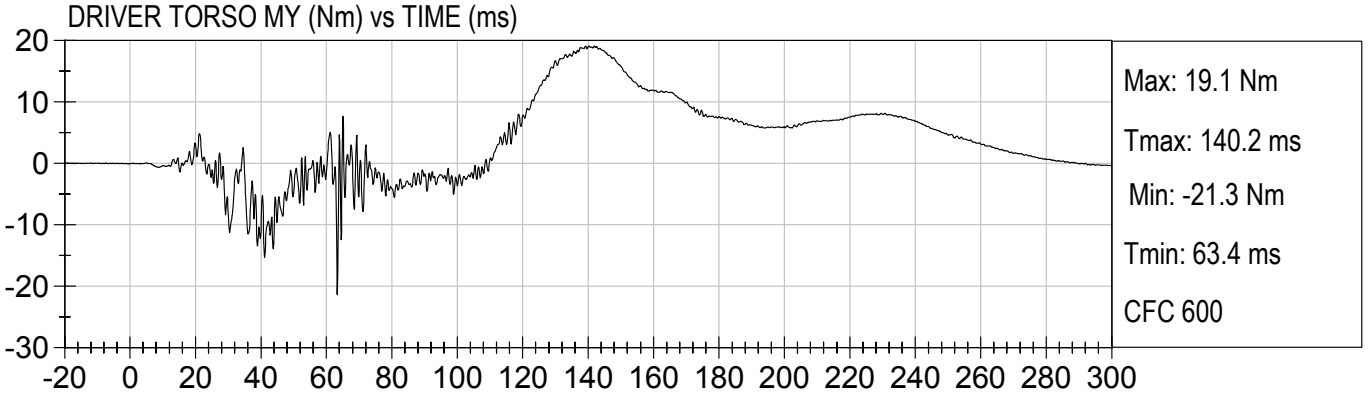
DRIVER TORSO FX (N) vs TIME (ms)



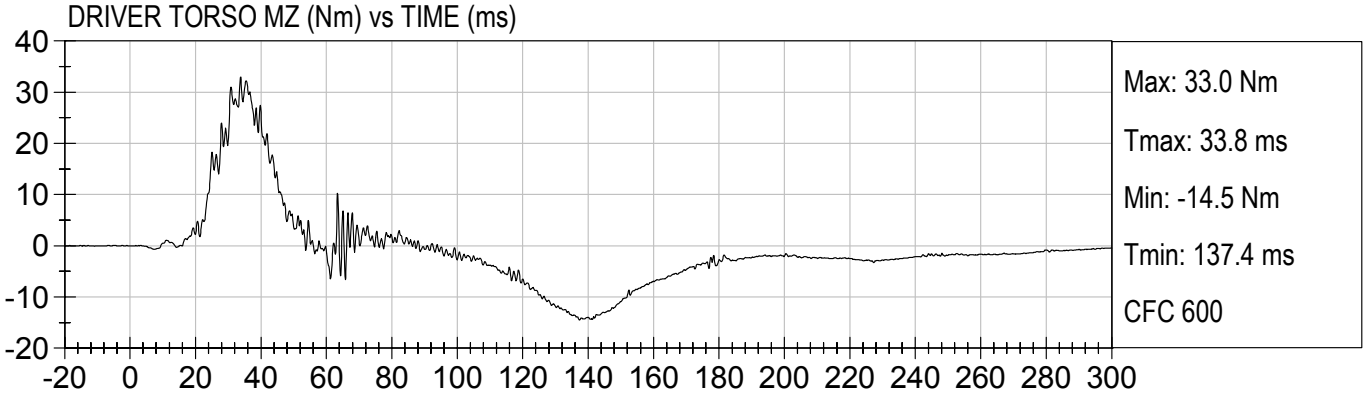
DRIVER TORSO FY (N) vs TIME (ms)



DRIVER TORSO MY (Nm) vs TIME (ms)

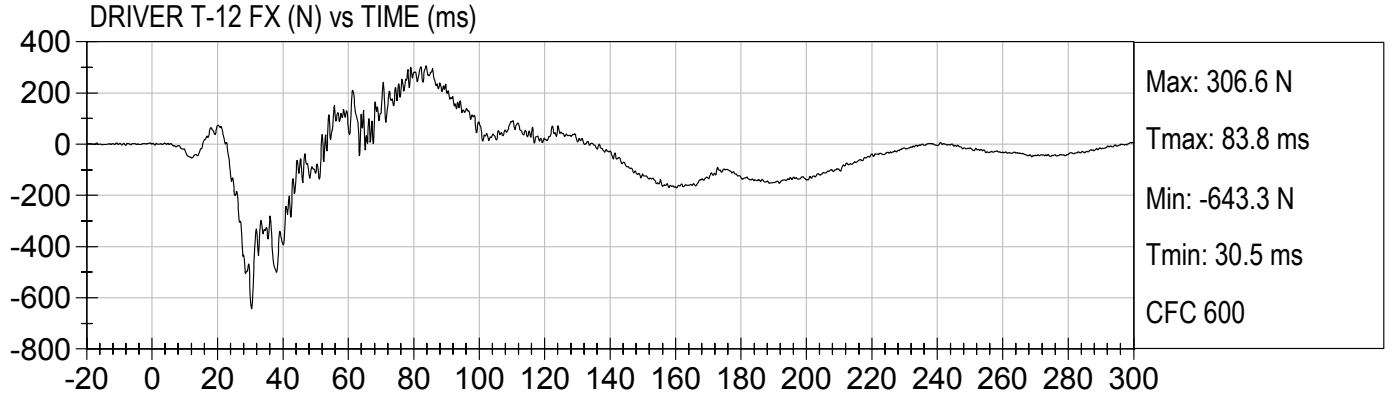


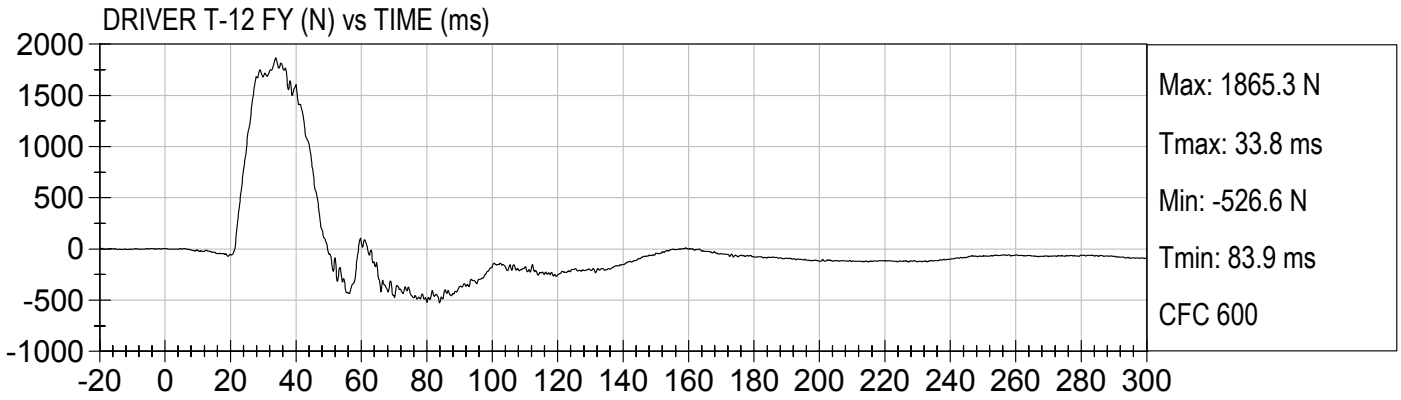
DRIVER TORSO MZ (Nm) vs TIME (ms)

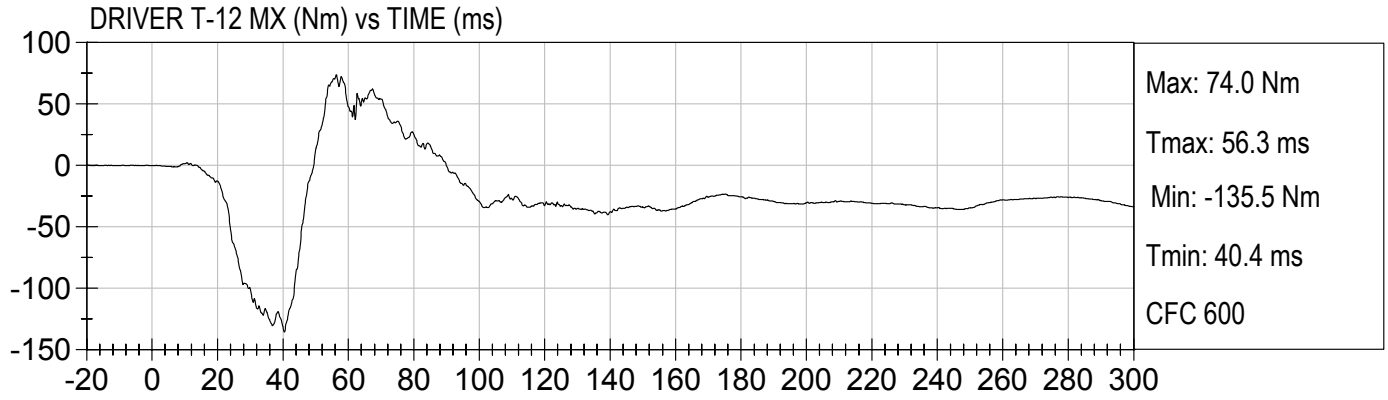


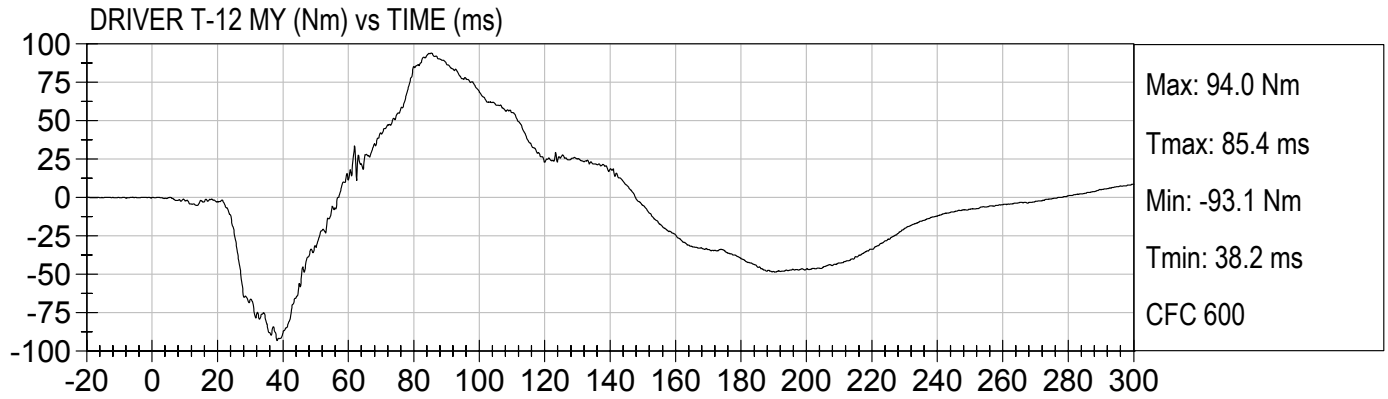
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)





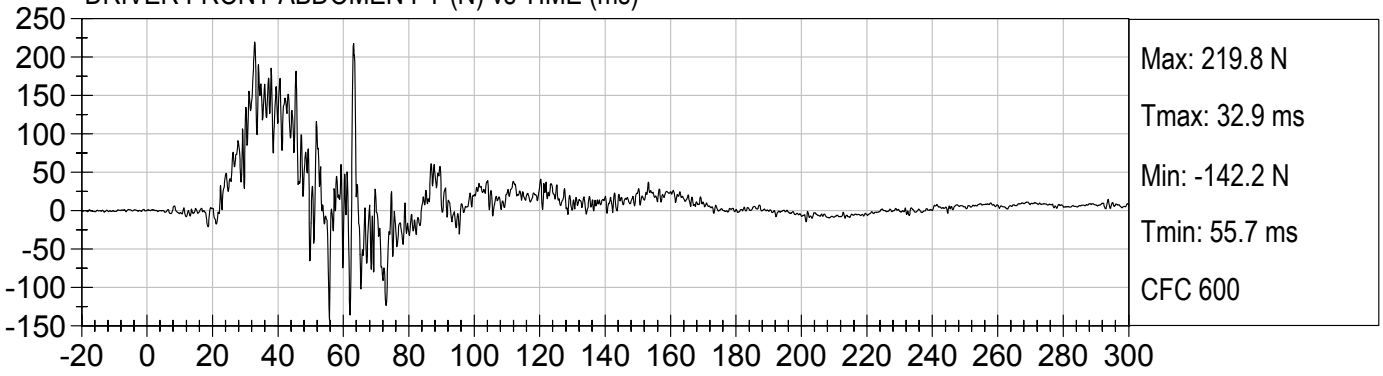




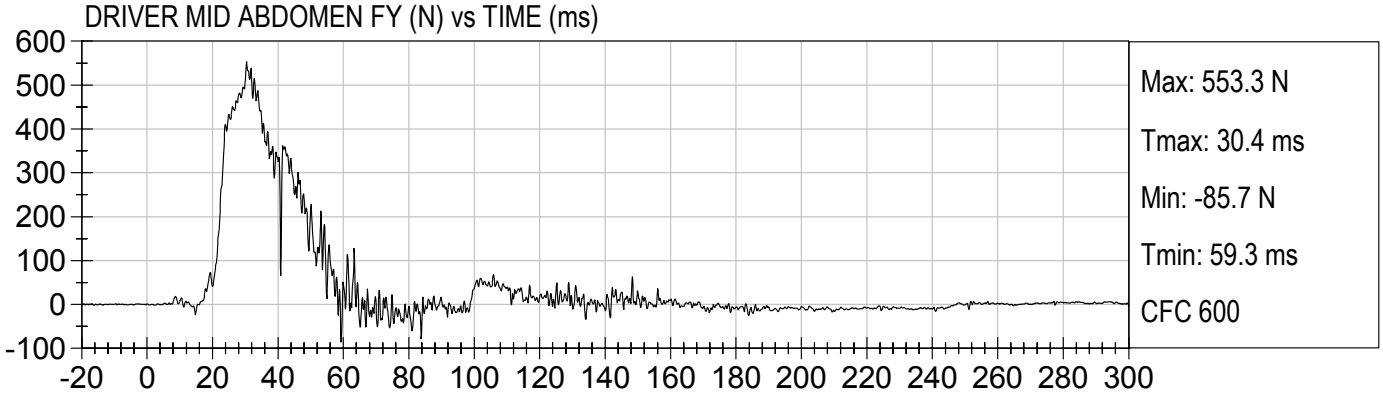
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

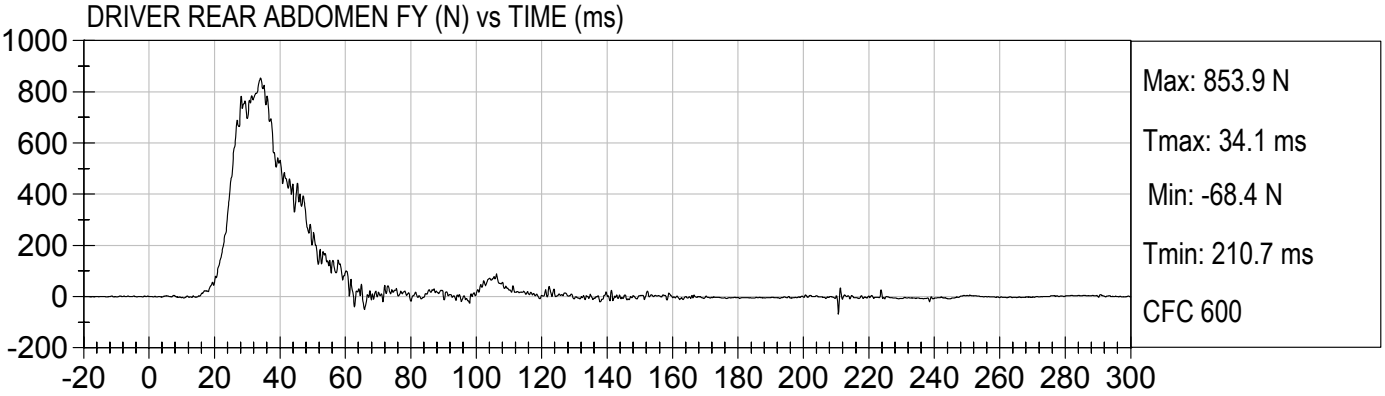
DRIVER FRONT ABDOMEN FY (N) vs TIME (ms)



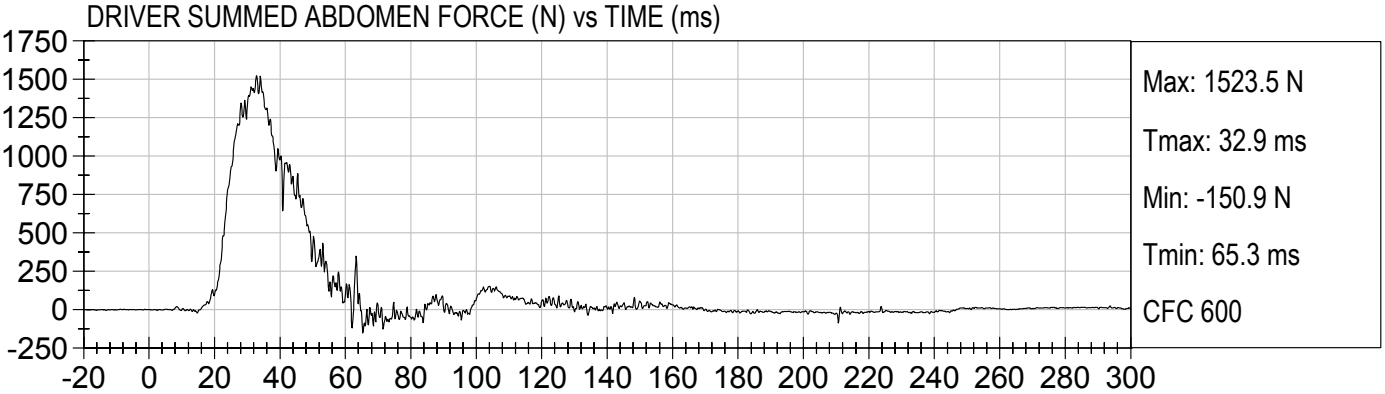
DRIVER MID ABDOMEN FY (N) vs TIME (ms)



DRIVER REAR ABDOMEN FY (N) vs TIME (ms)



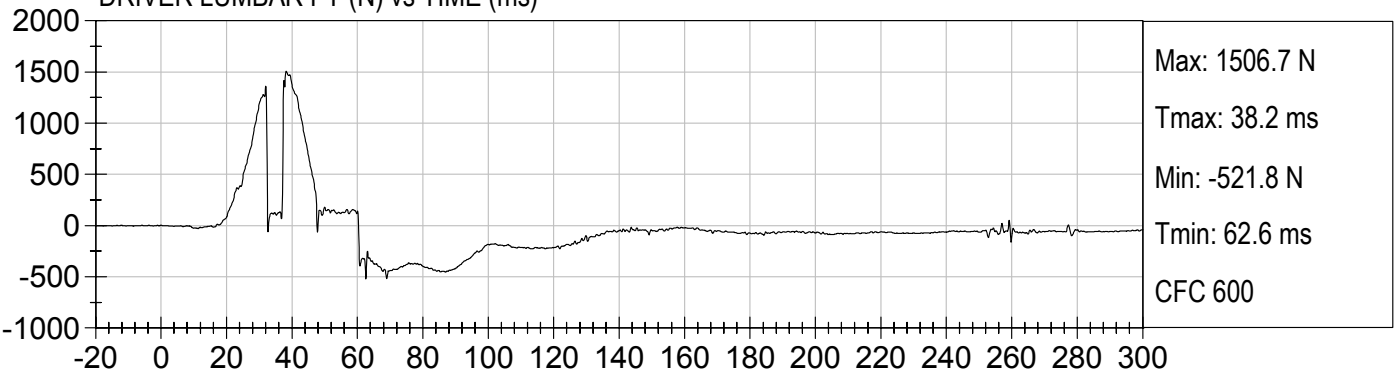
DRIVER SUMMED ABDOMEN FORCE (N) vs TIME (ms)



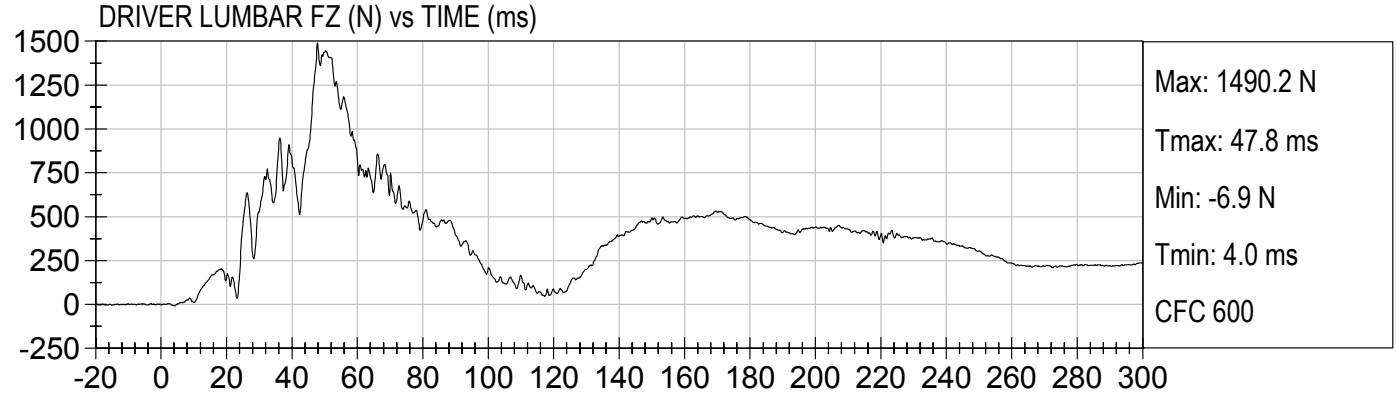
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

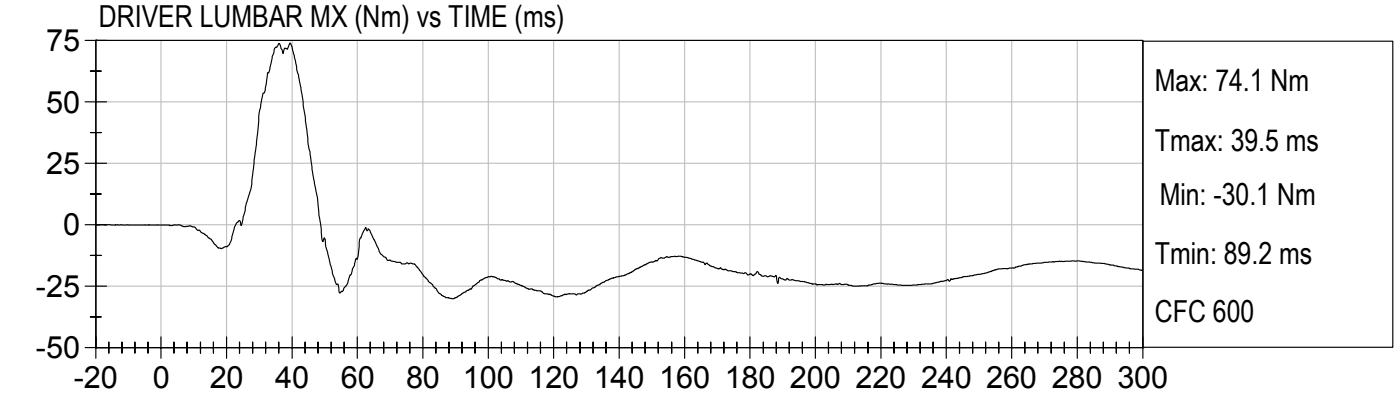
DRIVER LUMBAR FY (N) vs TIME (ms)



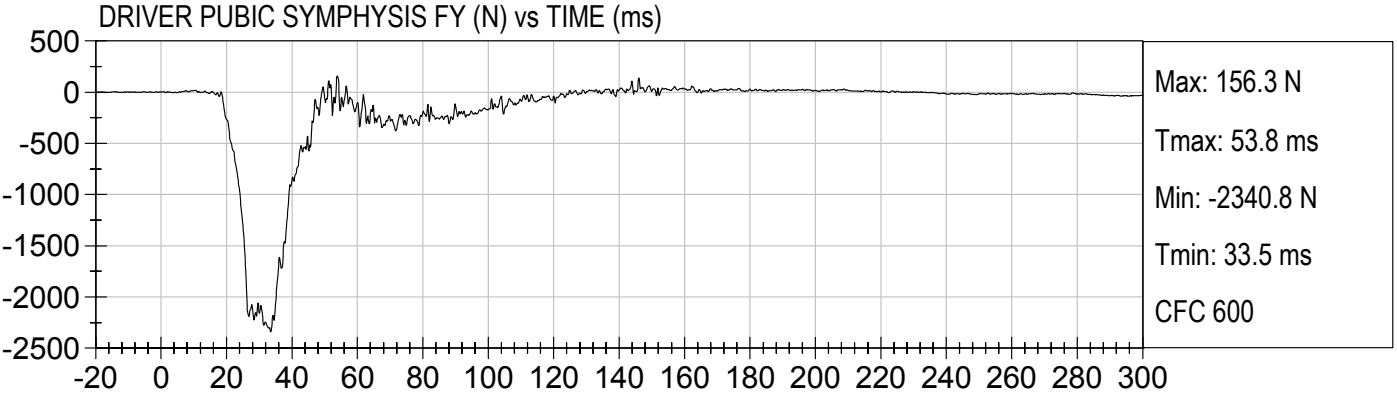
DRIVER LUMBAR FZ (N) vs TIME (ms)



DRIVER LUMBAR MX (Nm) vs TIME (ms)



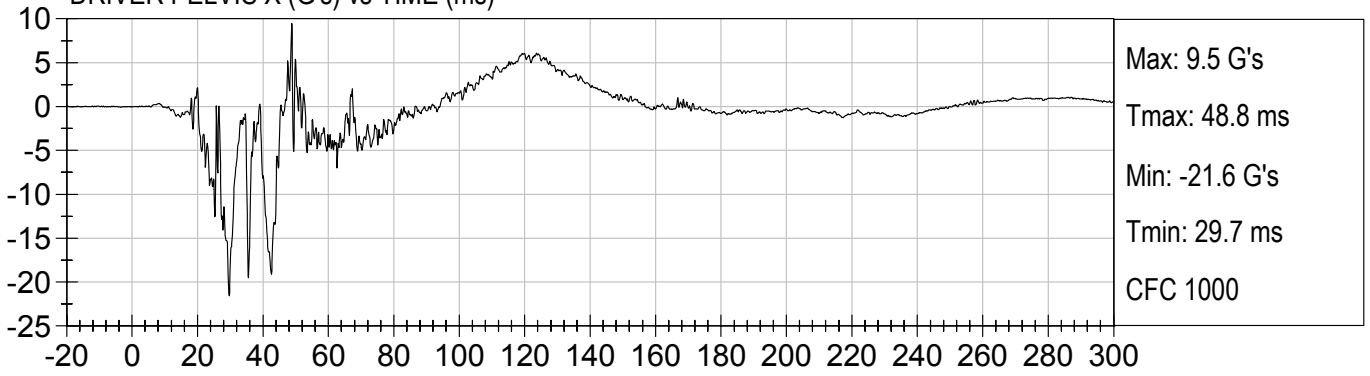
DRIVER PUBIC SYMPHYSIS FY (N) vs TIME (ms)



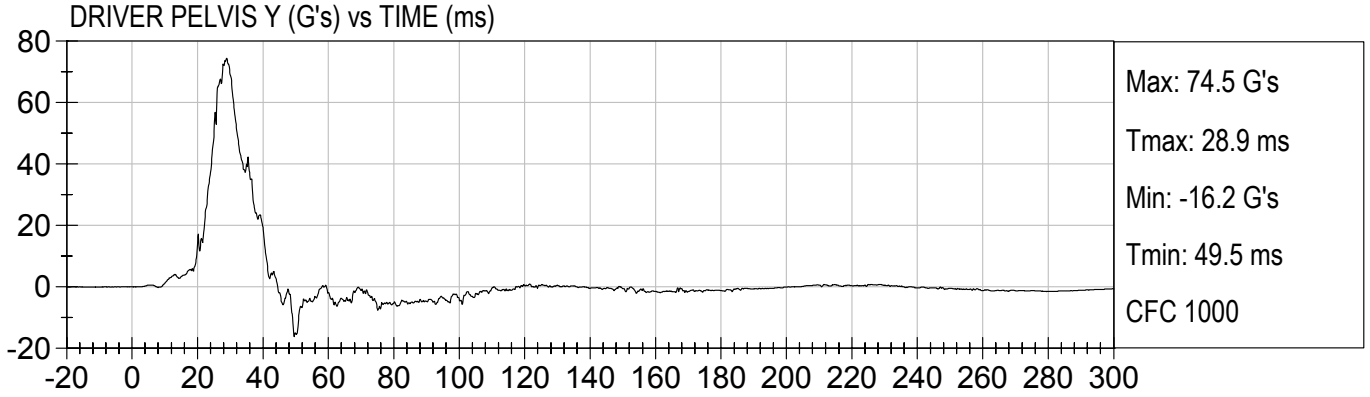
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

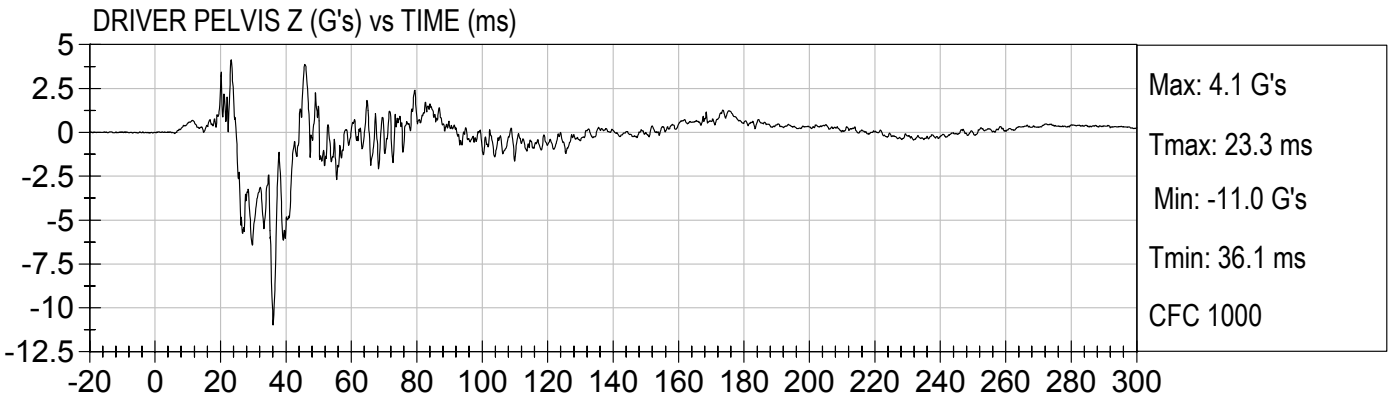
DRIVER PELVIS X (G's) vs TIME (ms)



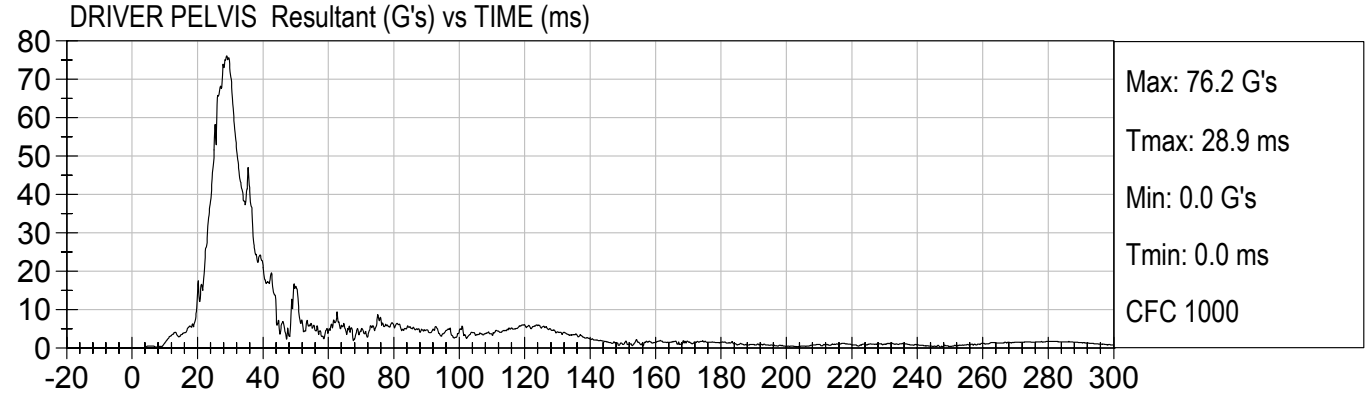
DRIVER PELVIS Y (G's) vs TIME (ms)

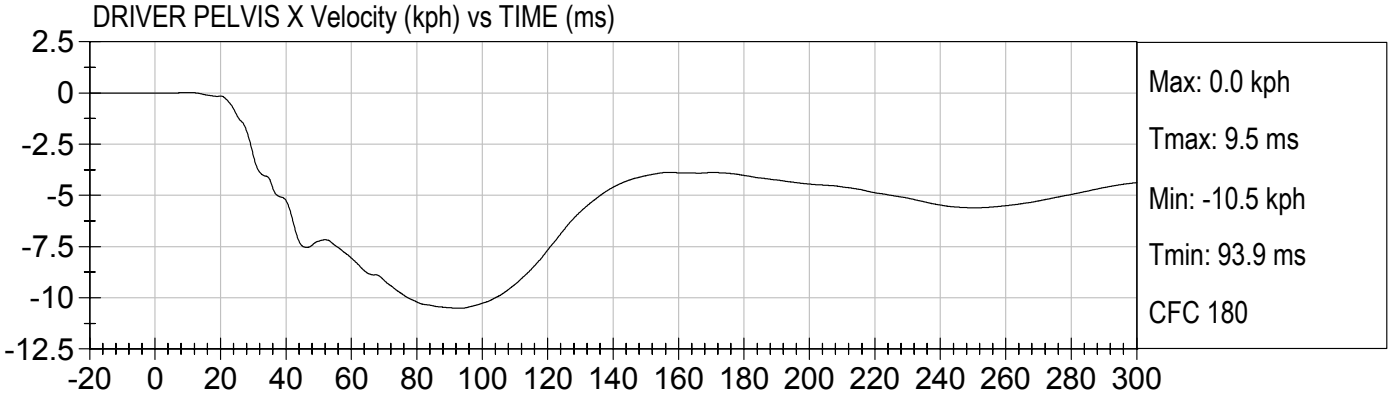


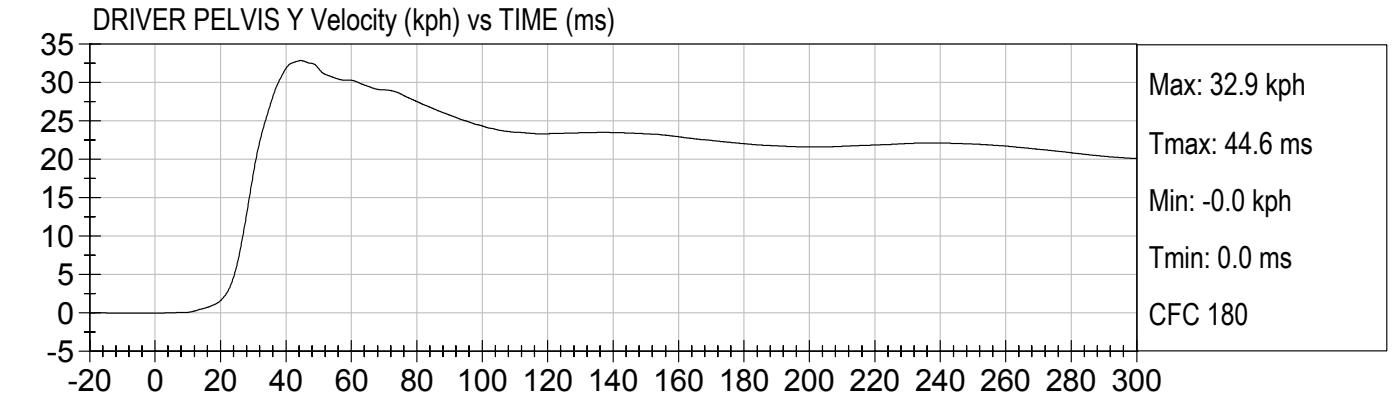
DRIVER PELVIS Z (G's) vs TIME (ms)

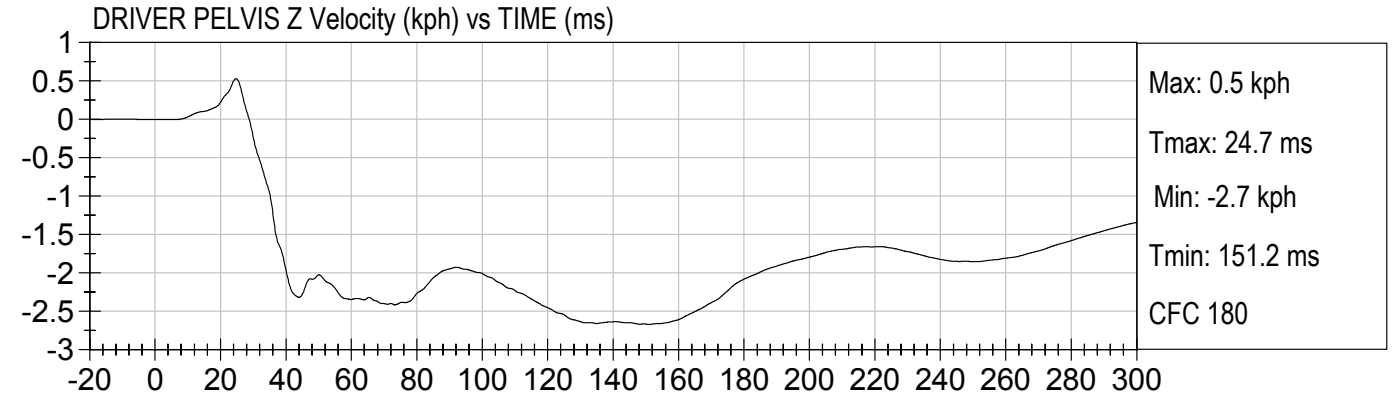


DRIVER PELVIS Resultant (G's) vs TIME (ms)




DRIVER PELVIS X Velocity (kph) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.0 kph
Tmax: 9.5 ms
Min: -10.5 kph
Tmin: 93.9 ms
CFC 180

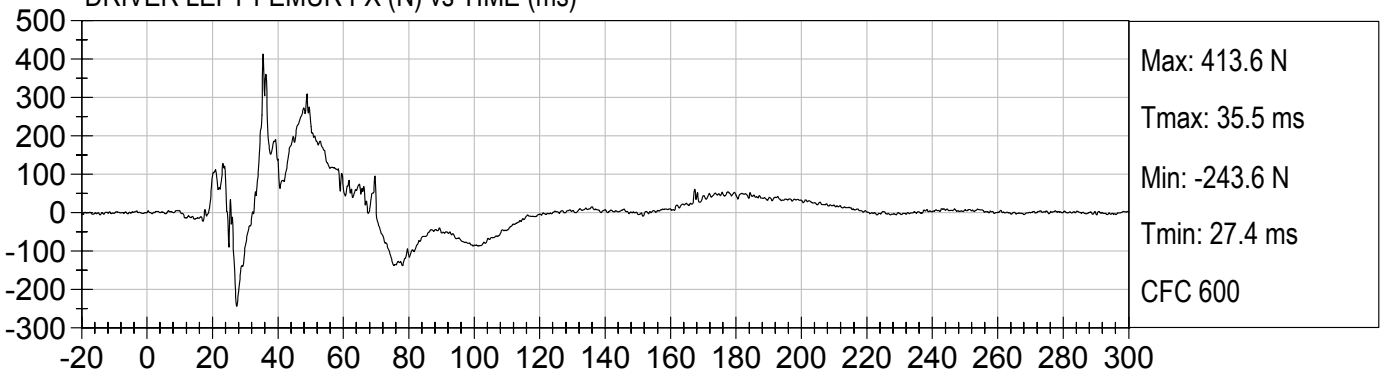

DRIVER PELVIS Y Velocity (kph) vs TIME (ms)
35
30
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 32.9 kph
Tmax: 44.6 ms
Min: -0.0 kph
Tmin: 0.0 ms
CFC 180


DRIVER PELVIS Z Velocity (kph) vs TIME (ms)
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.5 kph
Tmax: 24.7 ms
Min: -2.7 kph
Tmin: 151.2 ms
CFC 180

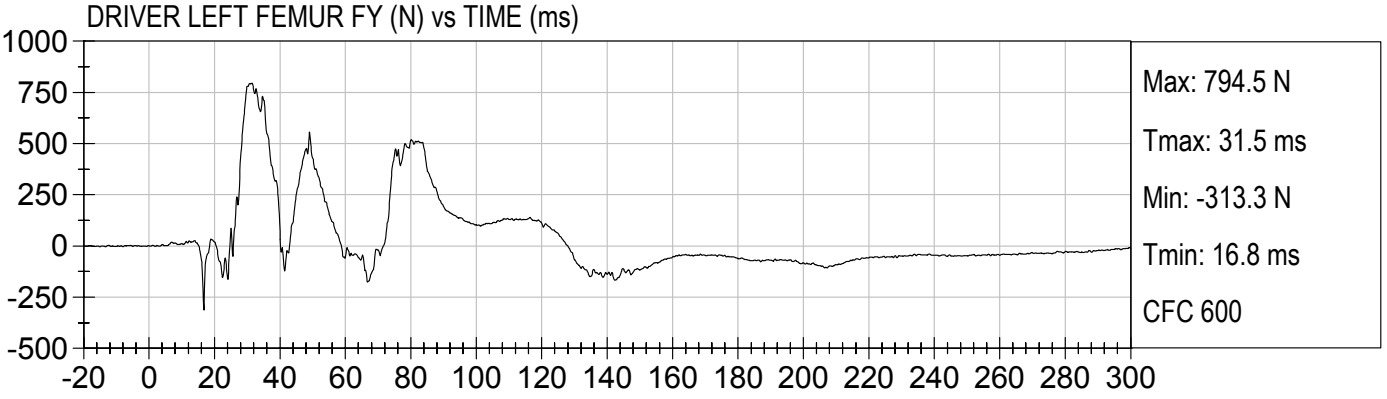
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

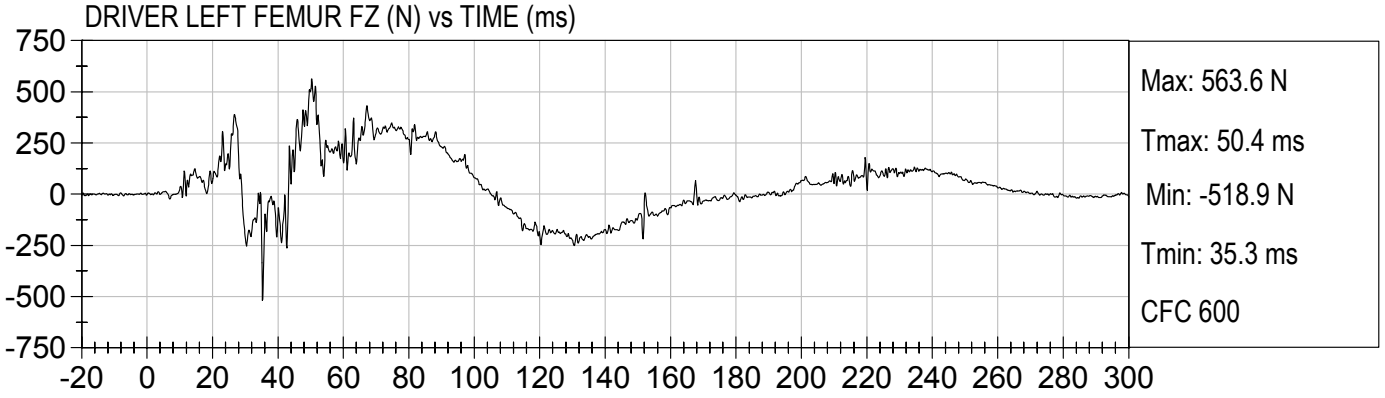
DRIVER LEFT FEMUR FX (N) vs TIME (ms)



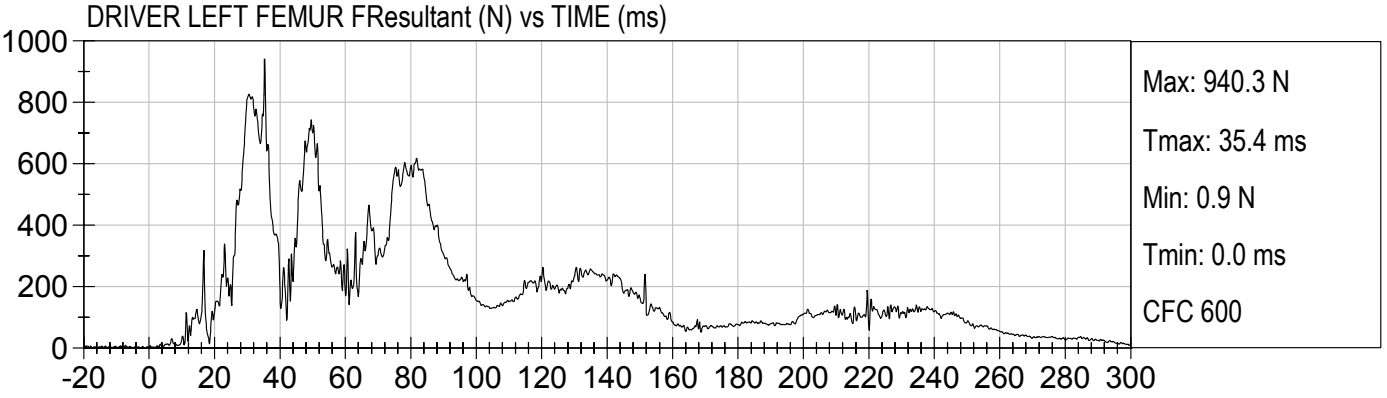
DRIVER LEFT FEMUR FY (N) vs TIME (ms)



DRIVER LEFT FEMUR FZ (N) vs TIME (ms)



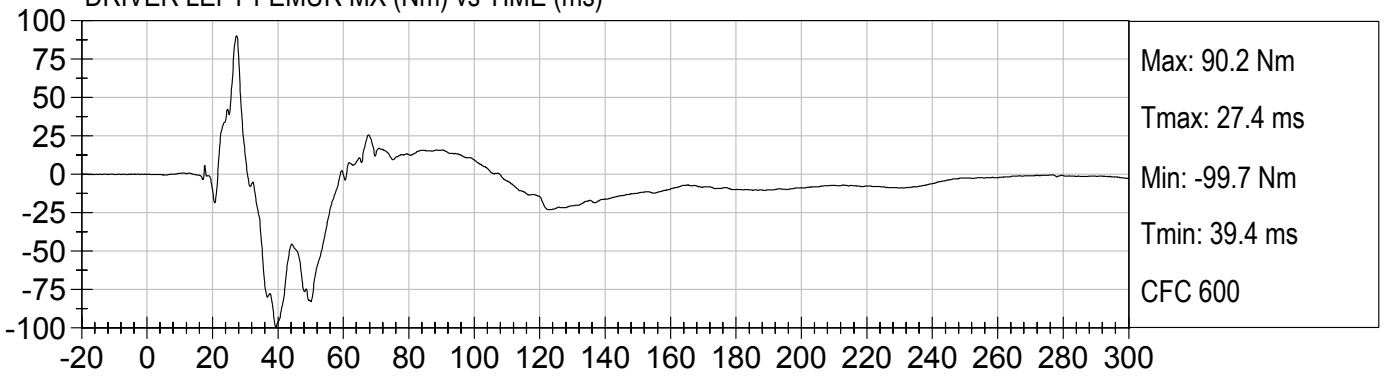
DRIVER LEFT FEMUR FResultant (N) vs TIME (ms)



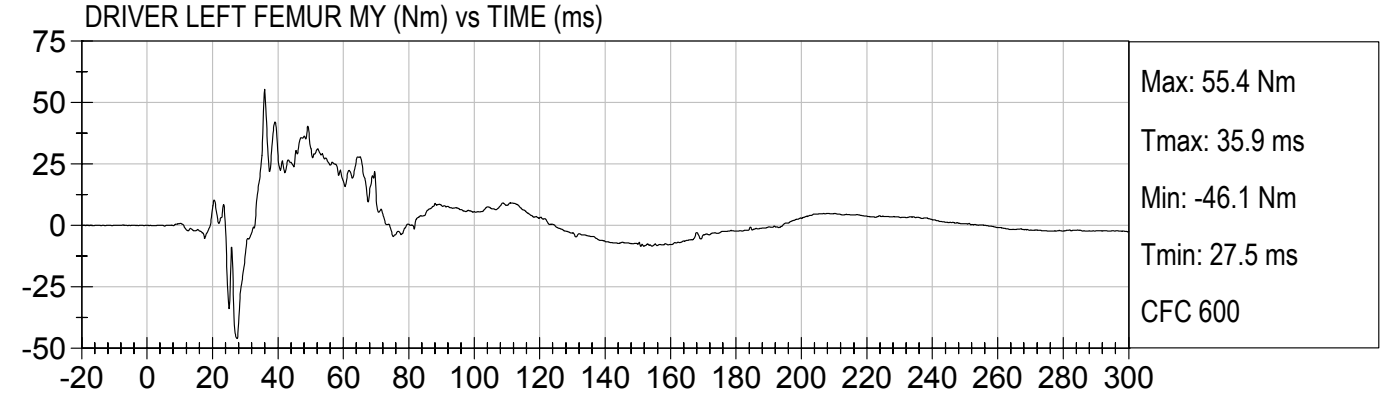
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

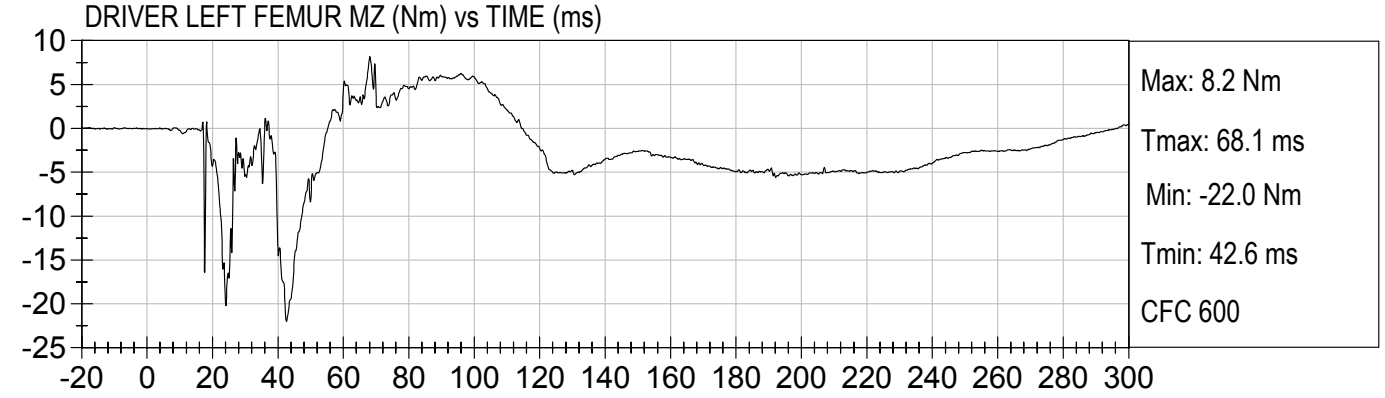
DRIVER LEFT FEMUR MX (Nm) vs TIME (ms)



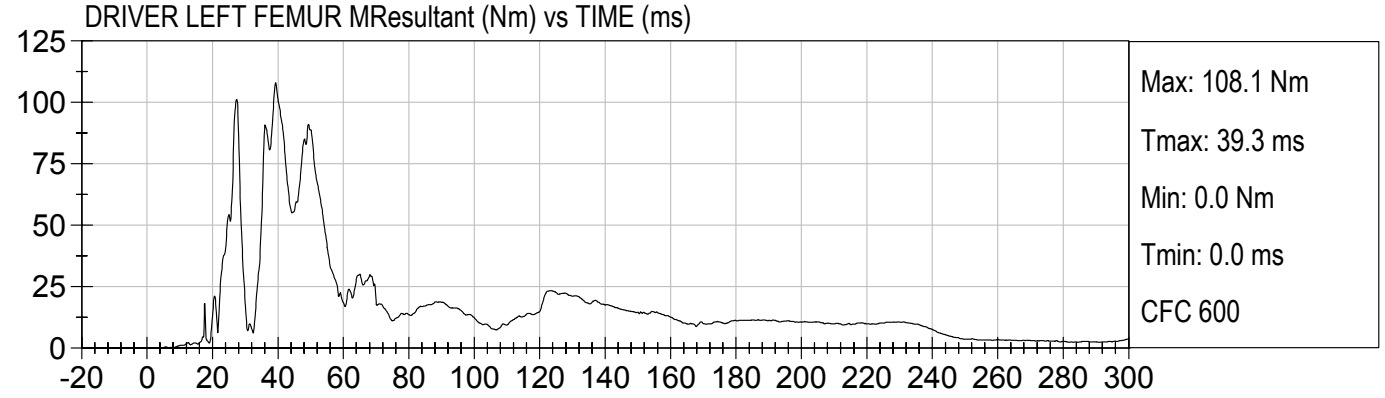
DRIVER LEFT FEMUR MY (Nm) vs TIME (ms)



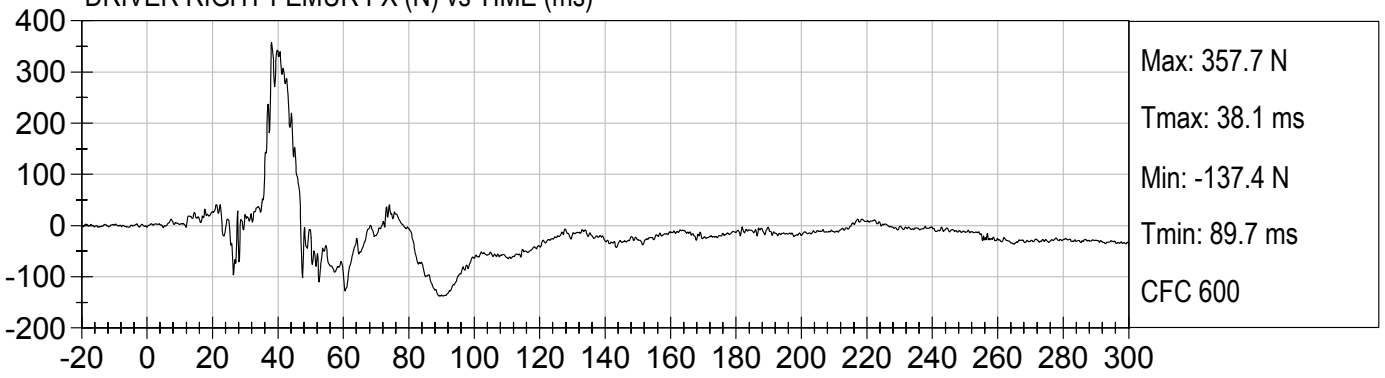
DRIVER LEFT FEMUR MZ (Nm) vs TIME (ms)



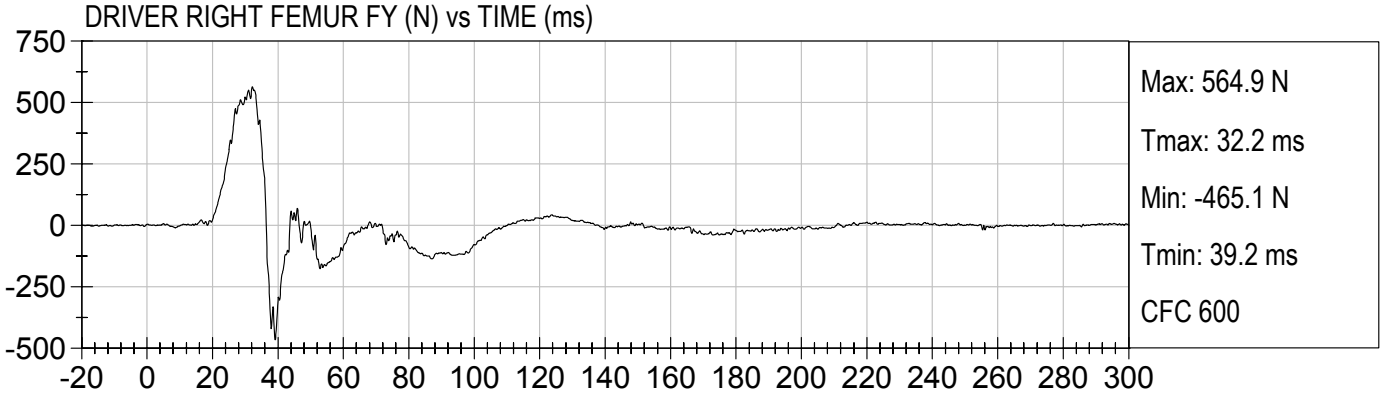
DRIVER LEFT FEMUR MResultant (Nm) vs TIME (ms)



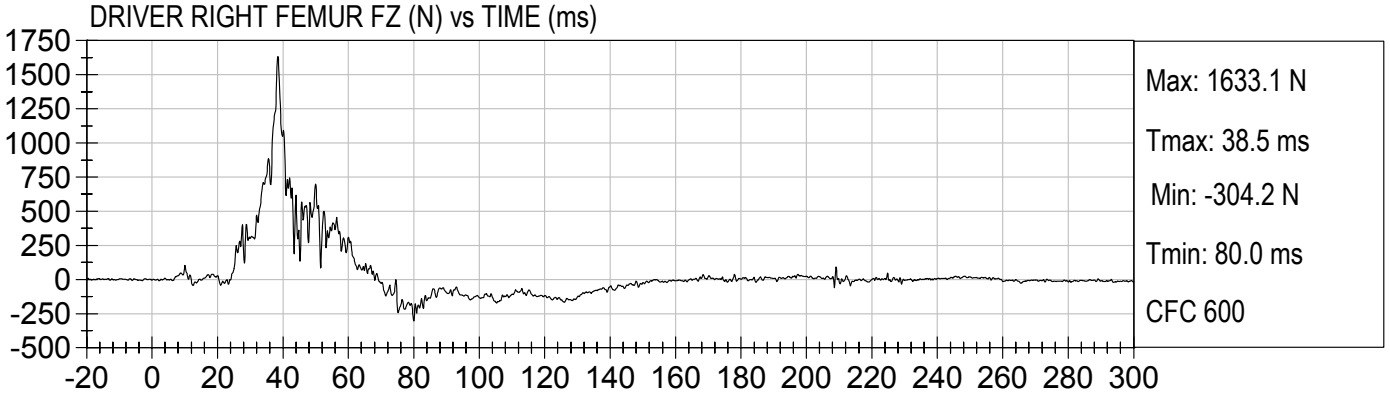
DRIVER RIGHT FEMUR FX (N) vs TIME (ms)



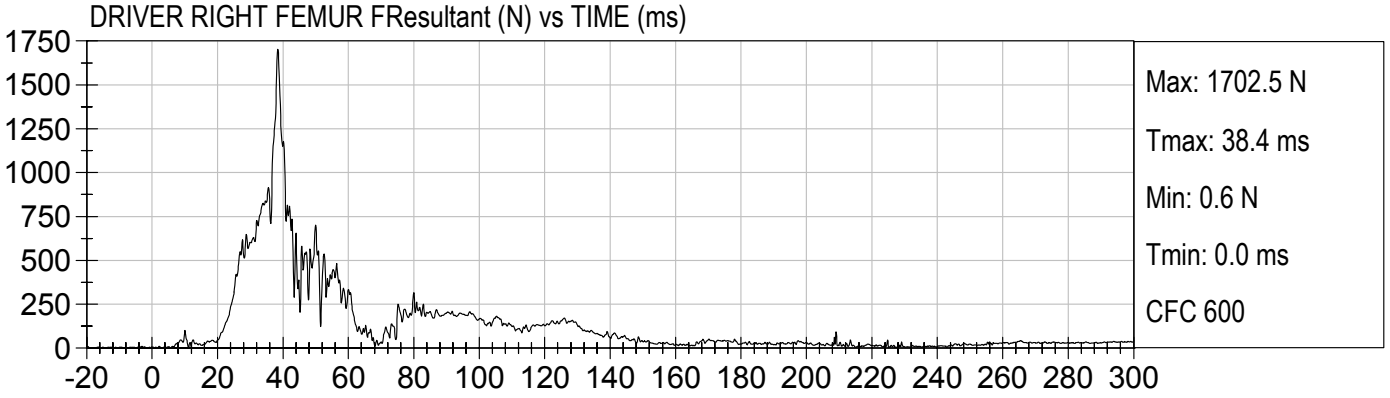
DRIVER RIGHT FEMUR FY (N) vs TIME (ms)



DRIVER RIGHT FEMUR FZ (N) vs TIME (ms)



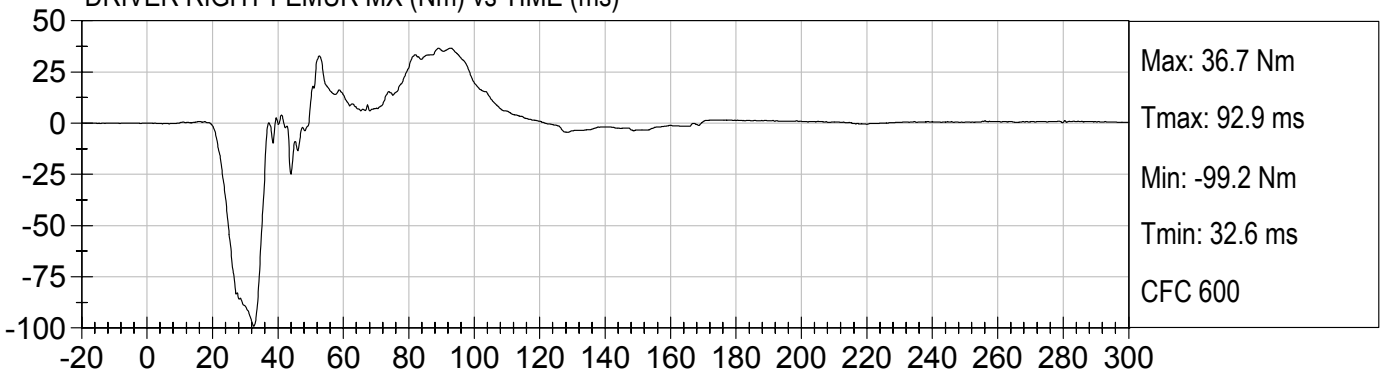
DRIVER RIGHT FEMUR FResultant (N) vs TIME (ms)



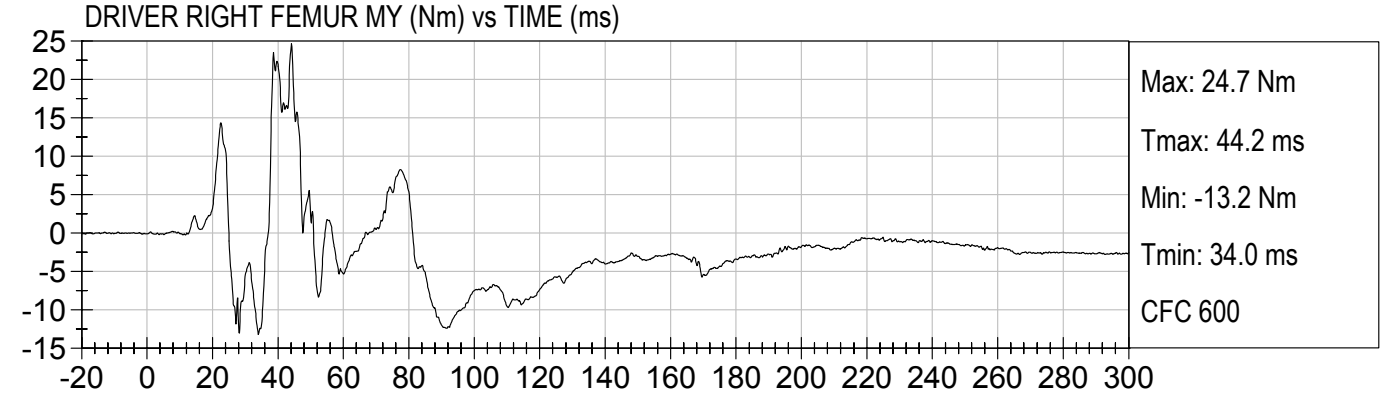
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

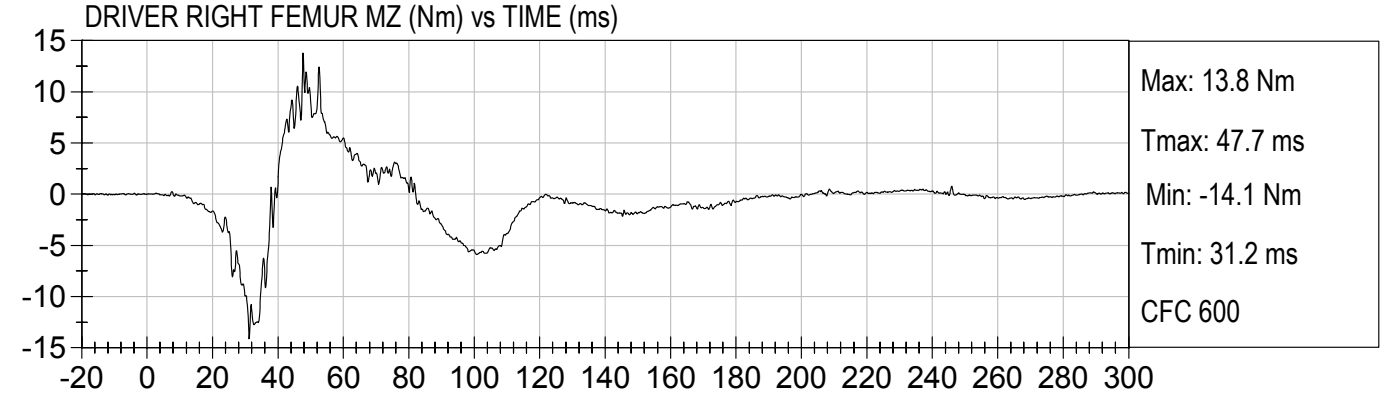
DRIVER RIGHT FEMUR MX (Nm) vs TIME (ms)



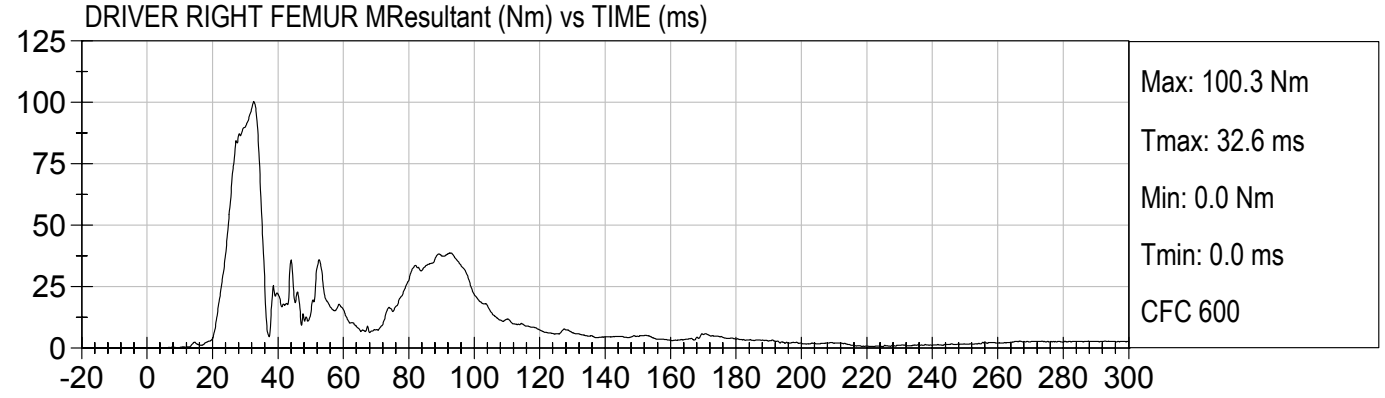
DRIVER RIGHT FEMUR MY (Nm) vs TIME (ms)



DRIVER RIGHT FEMUR MZ (Nm) vs TIME (ms)

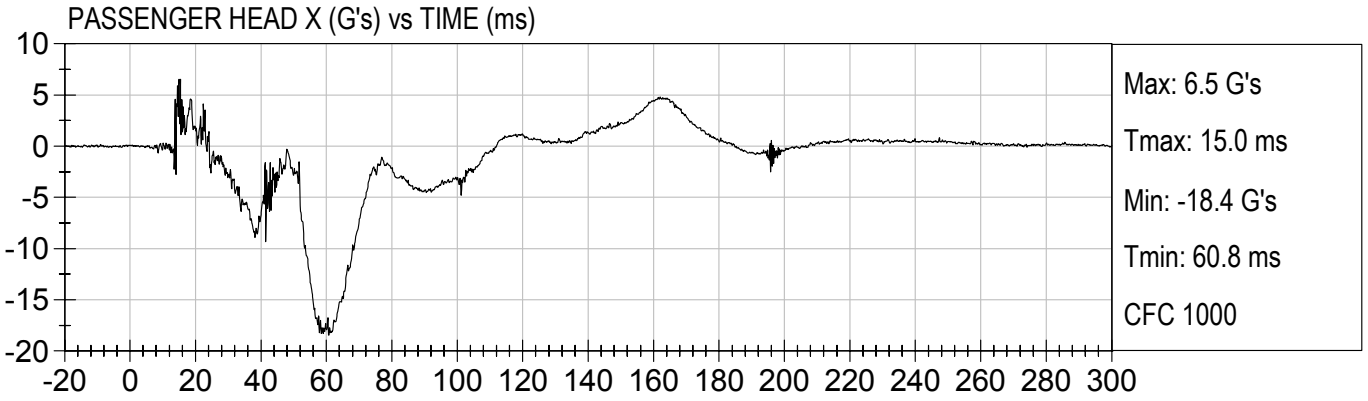


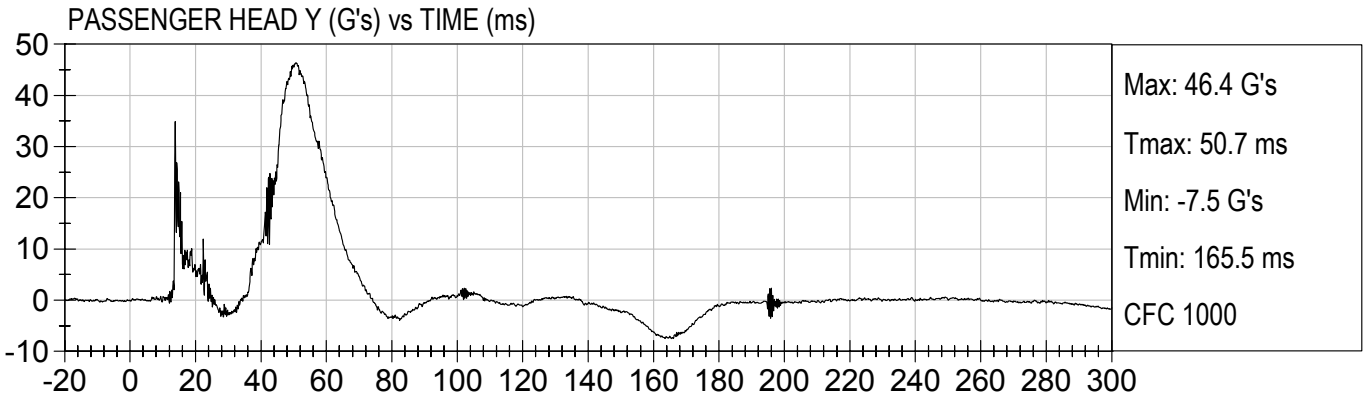
DRIVER RIGHT FEMUR MResultant (Nm) vs TIME (ms)

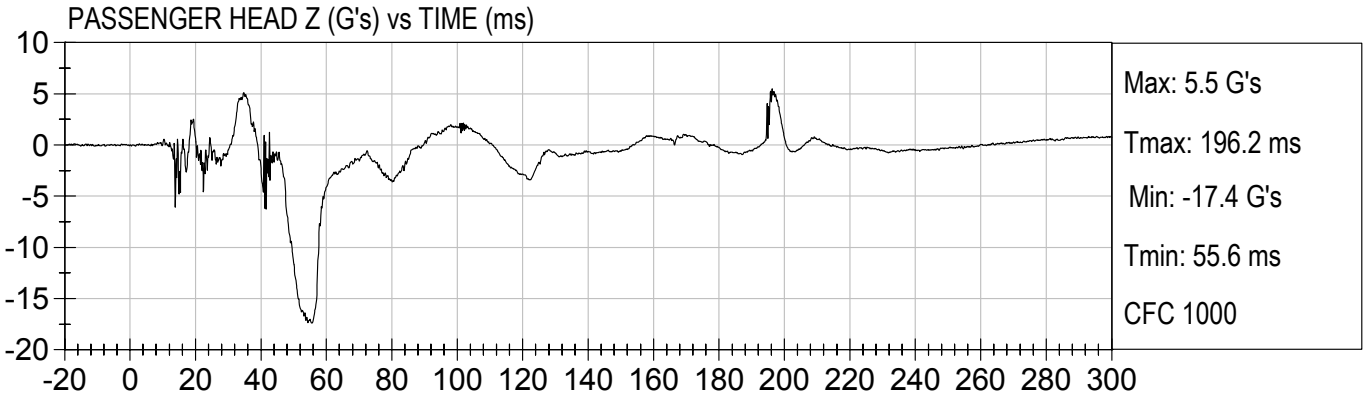


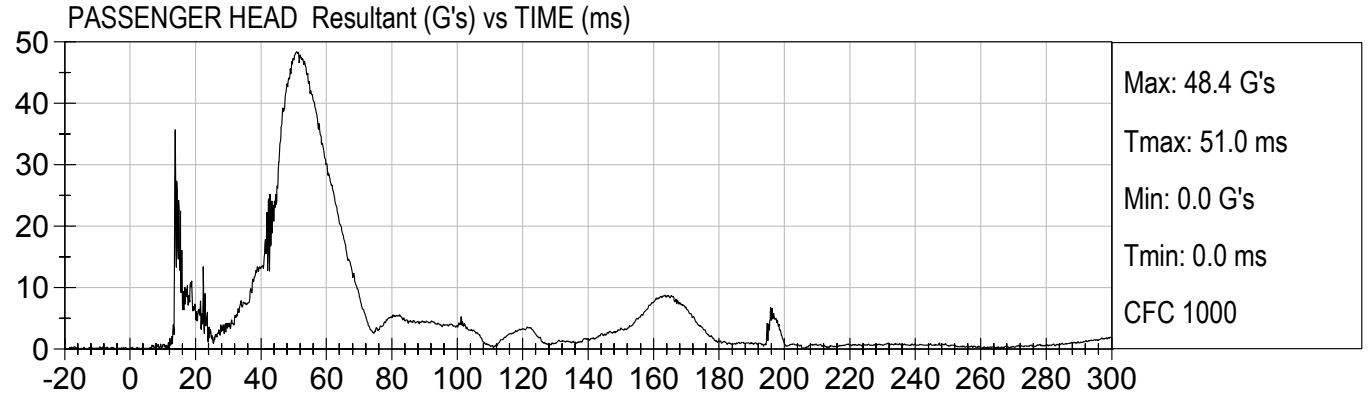
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)



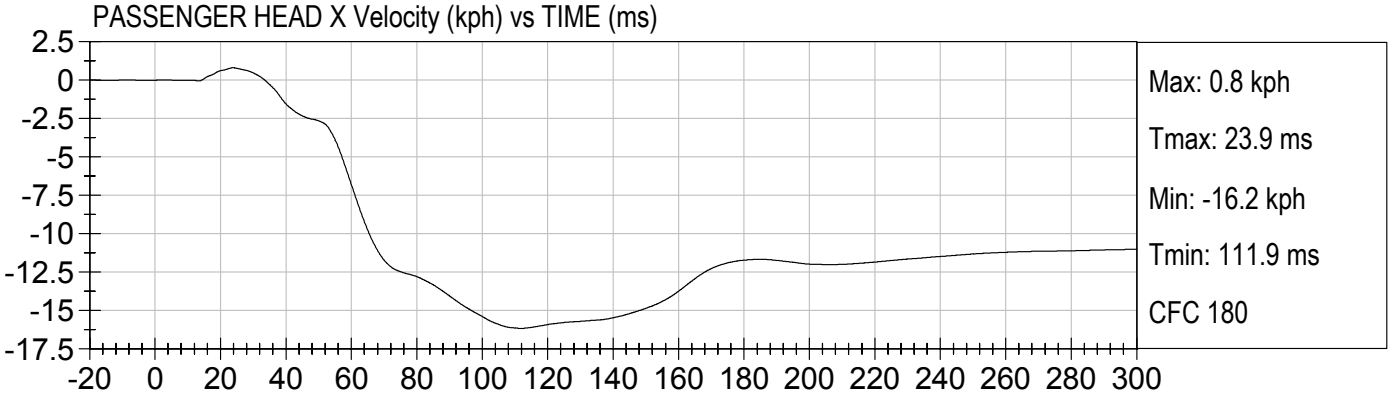


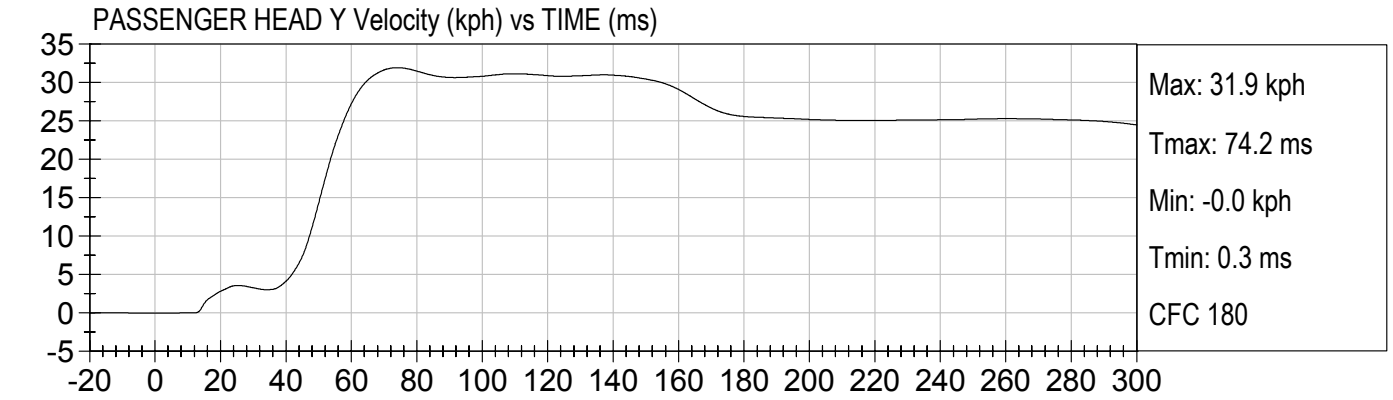


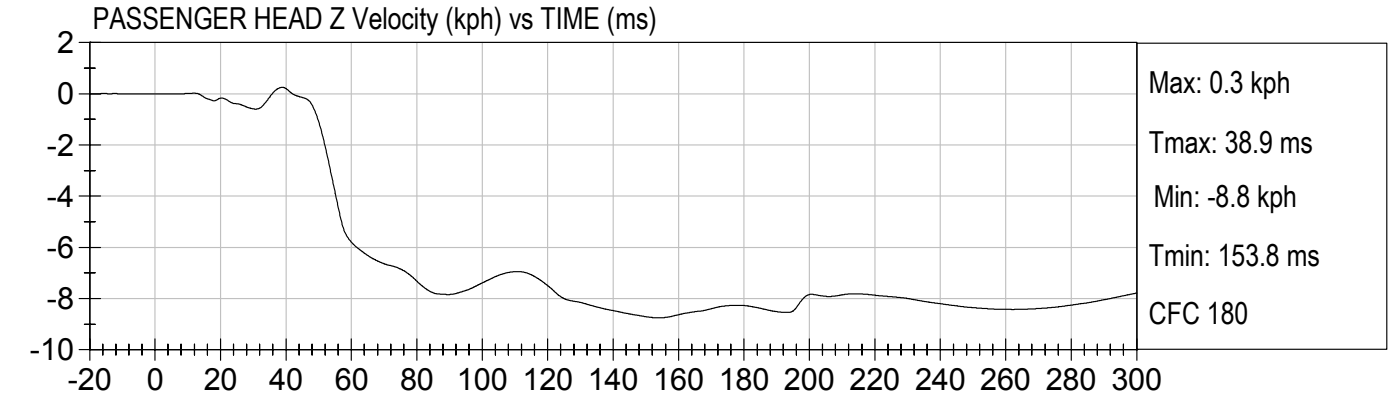


T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

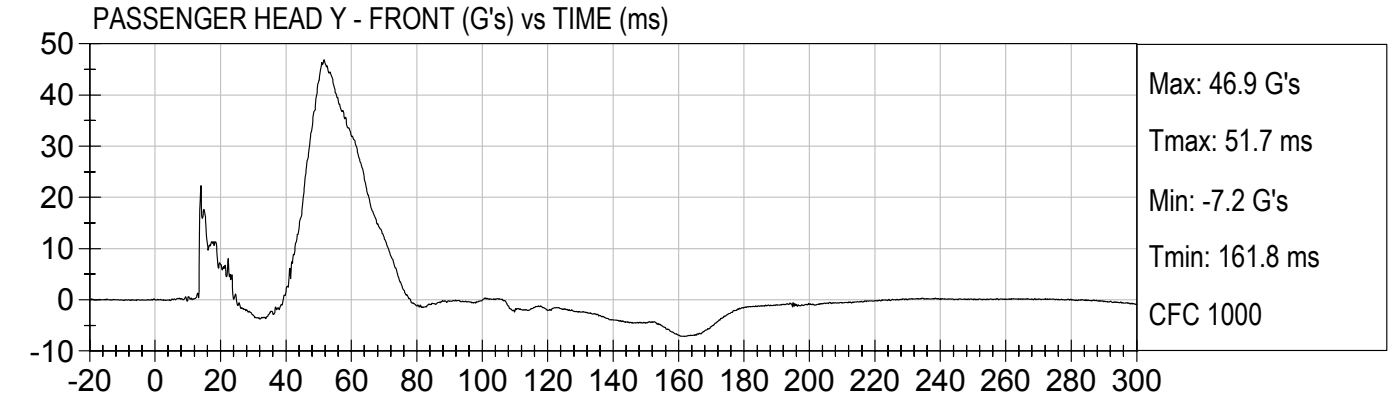


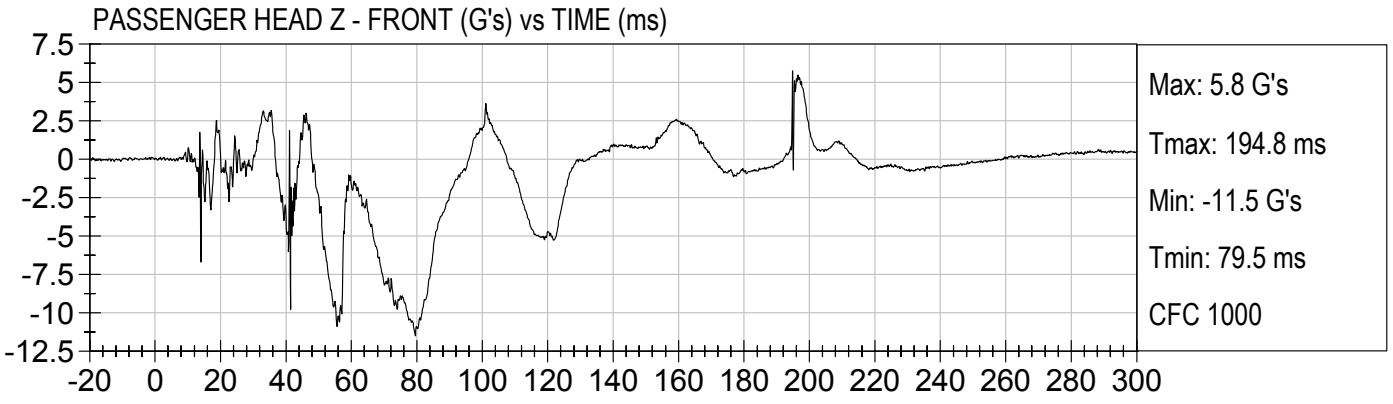


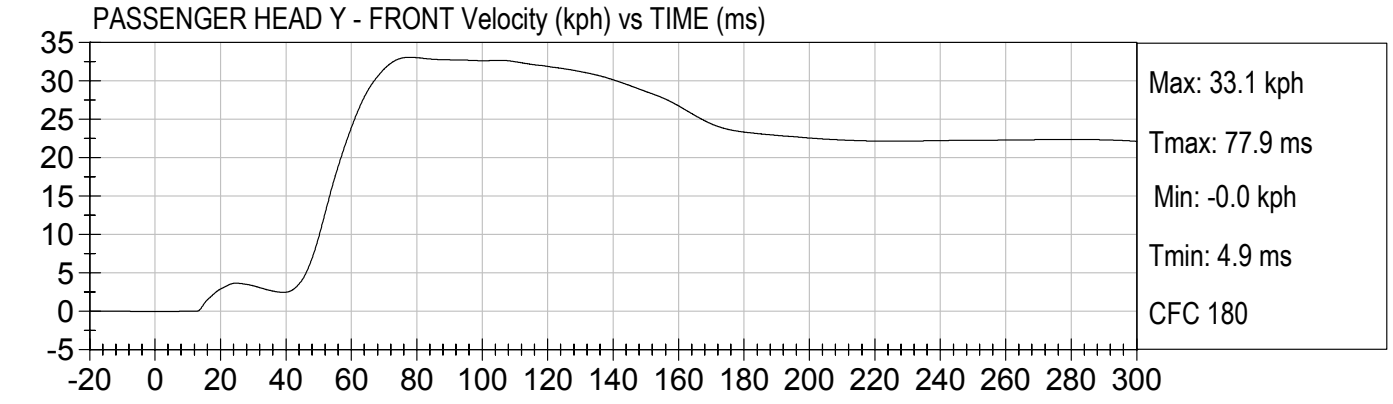


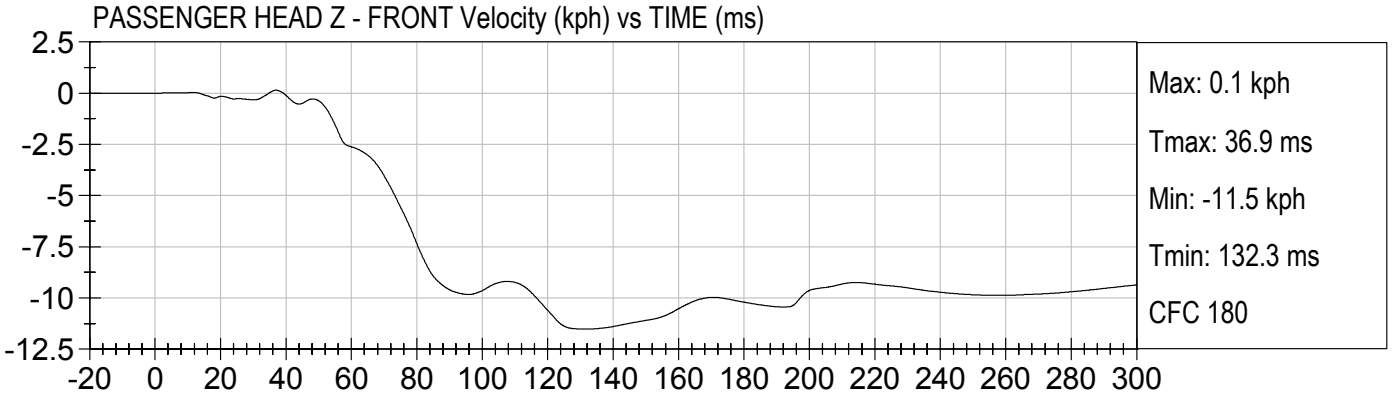
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)



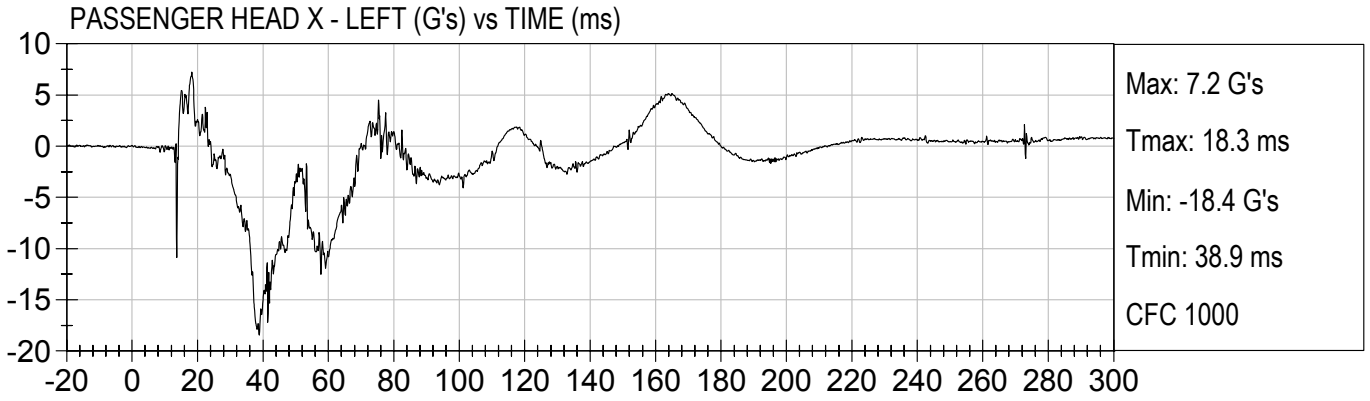


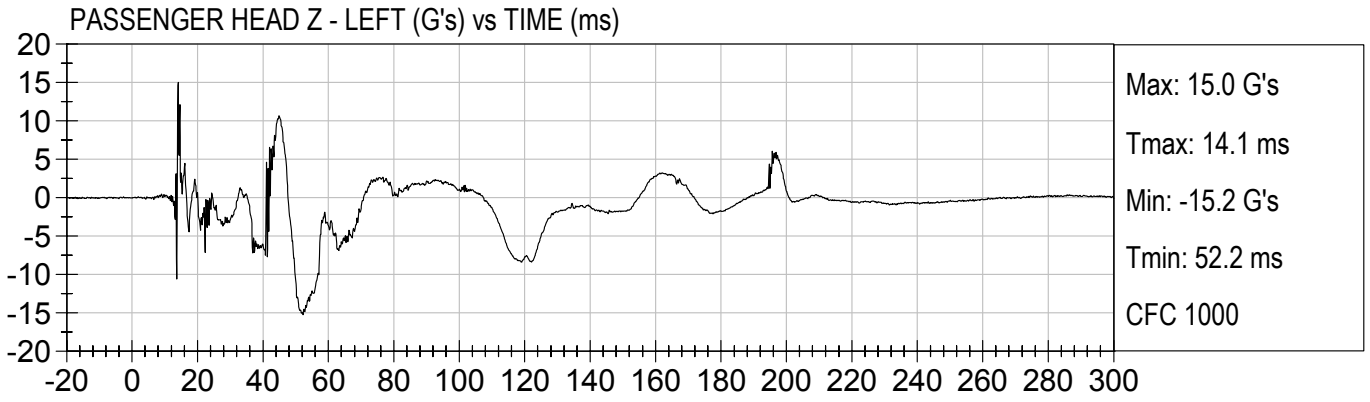


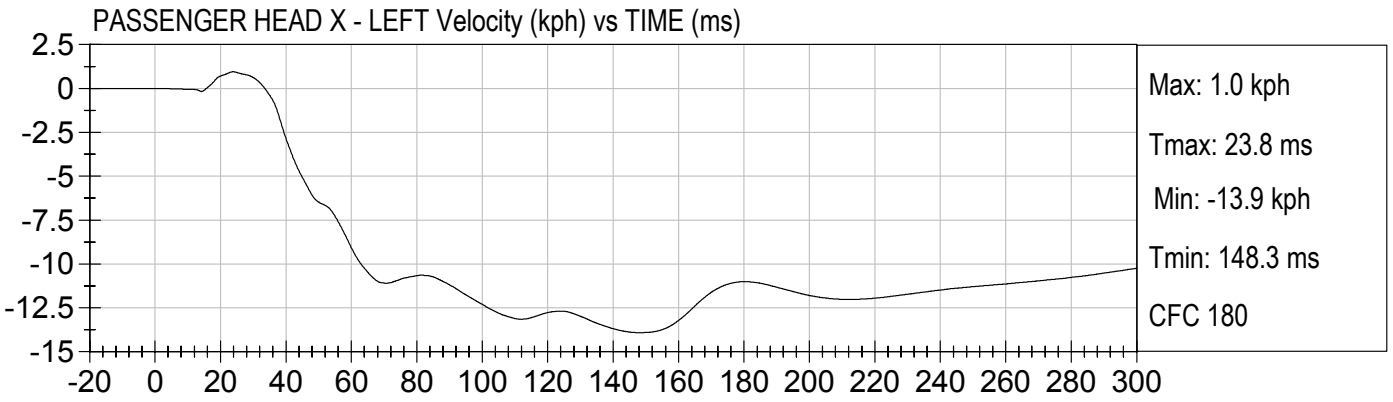


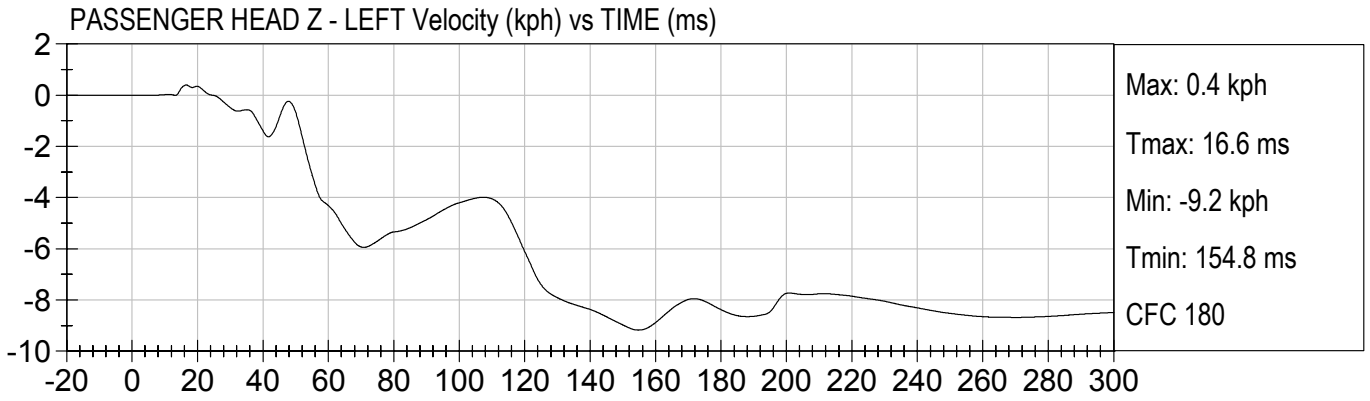
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)





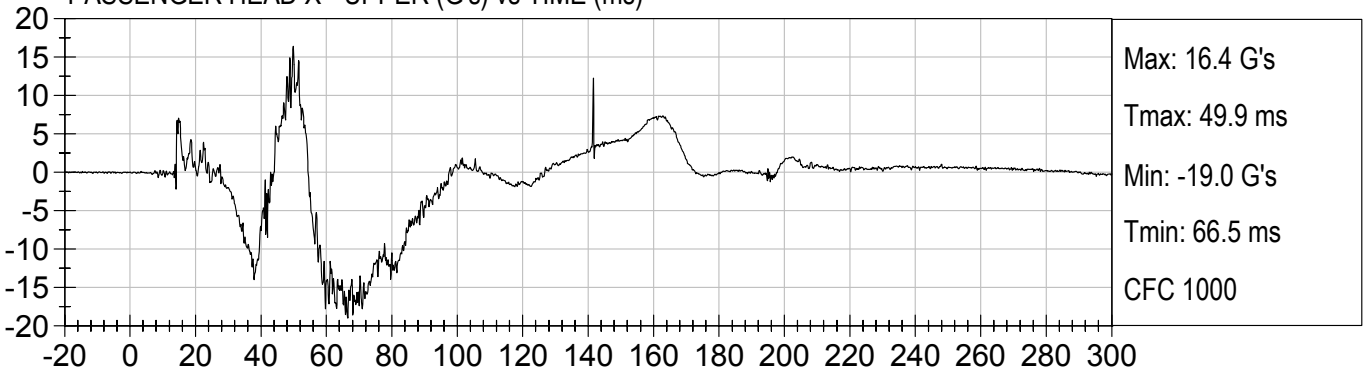




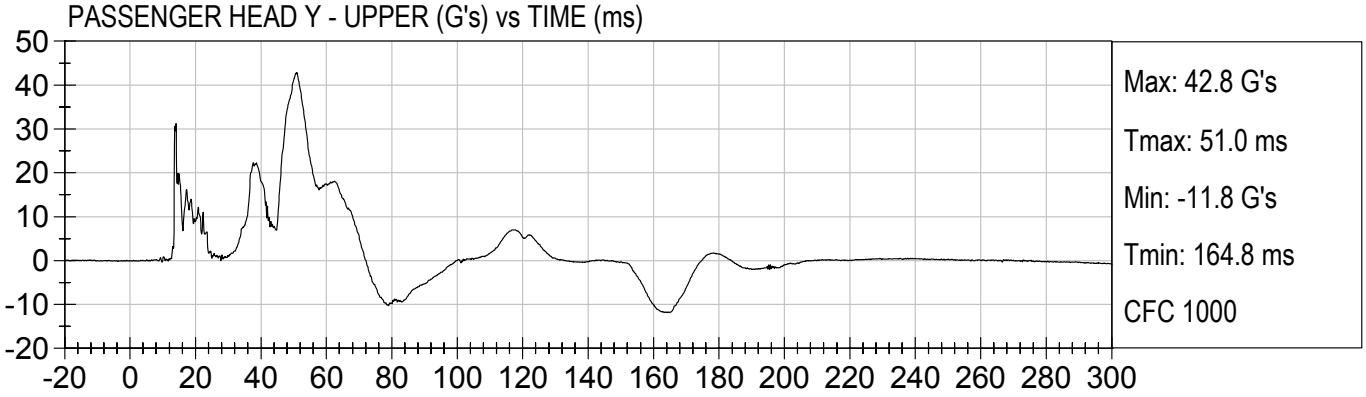
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

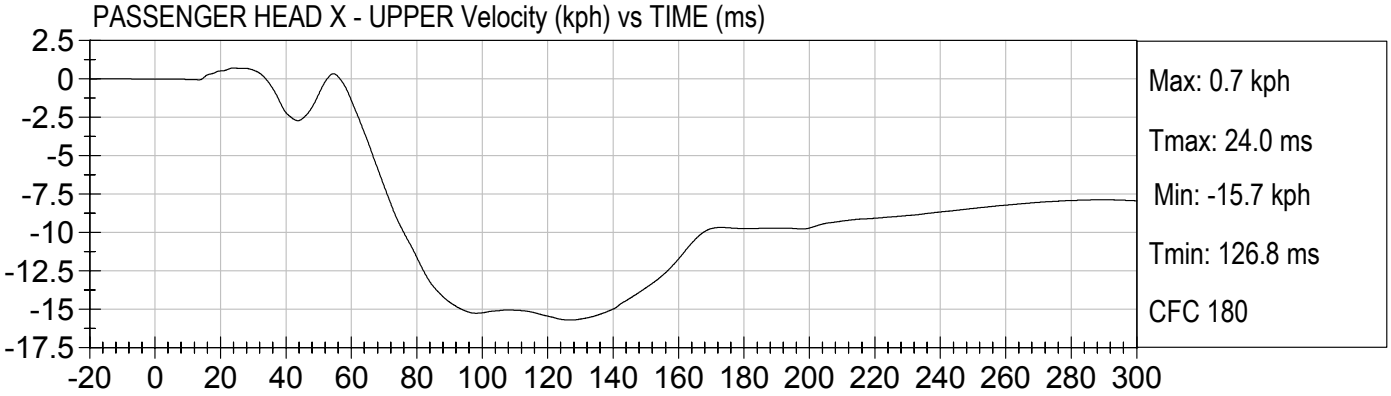
PASSENGER HEAD X - UPPER (G's) vs TIME (ms)



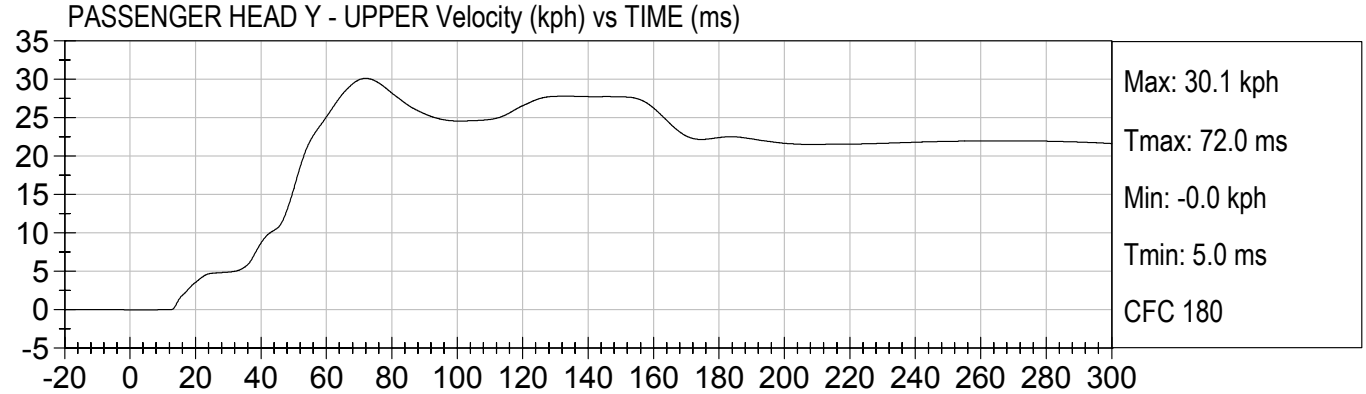
PASSENGER HEAD Y - UPPER (G's) vs TIME (ms)



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



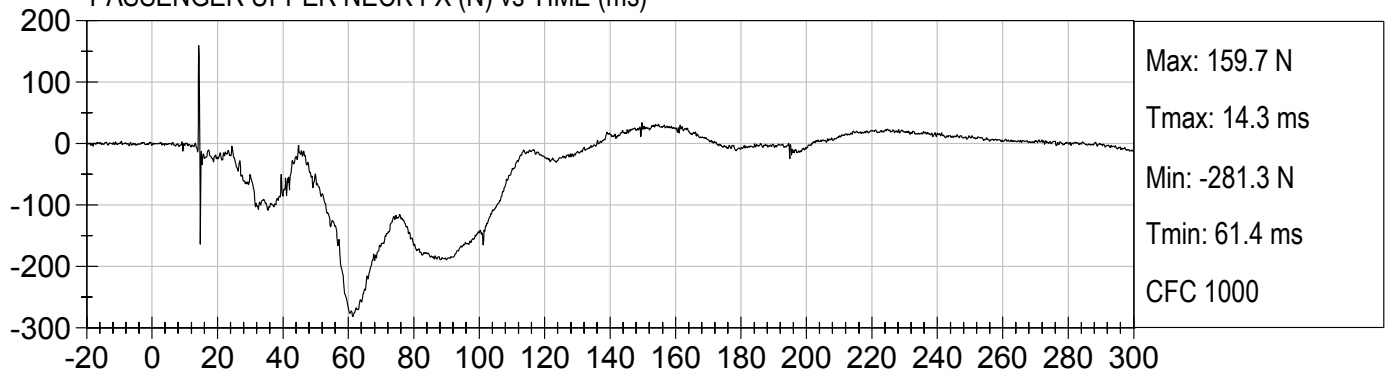
PASSENGER HEAD Y - UPPER Velocity (kph) vs TIME (ms)



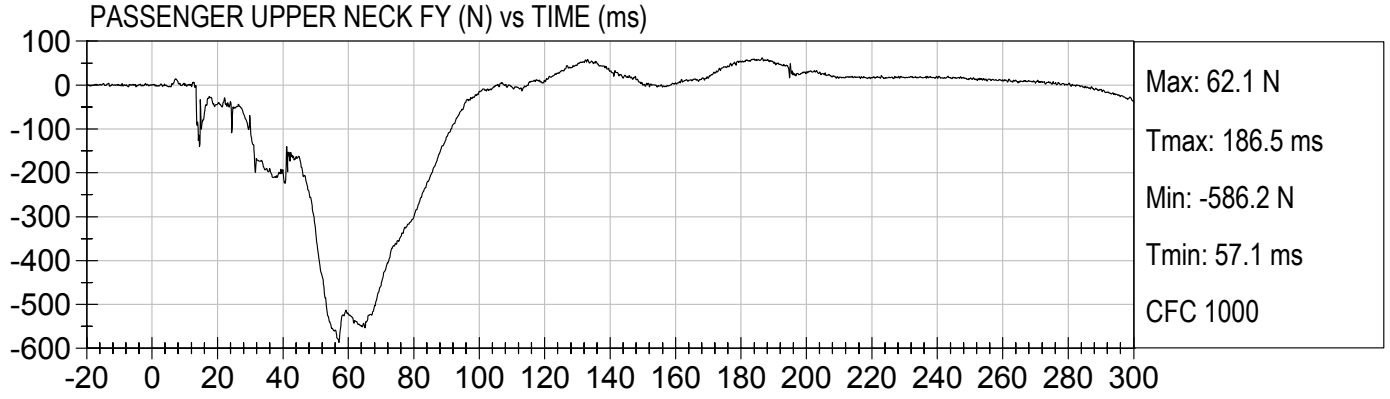
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

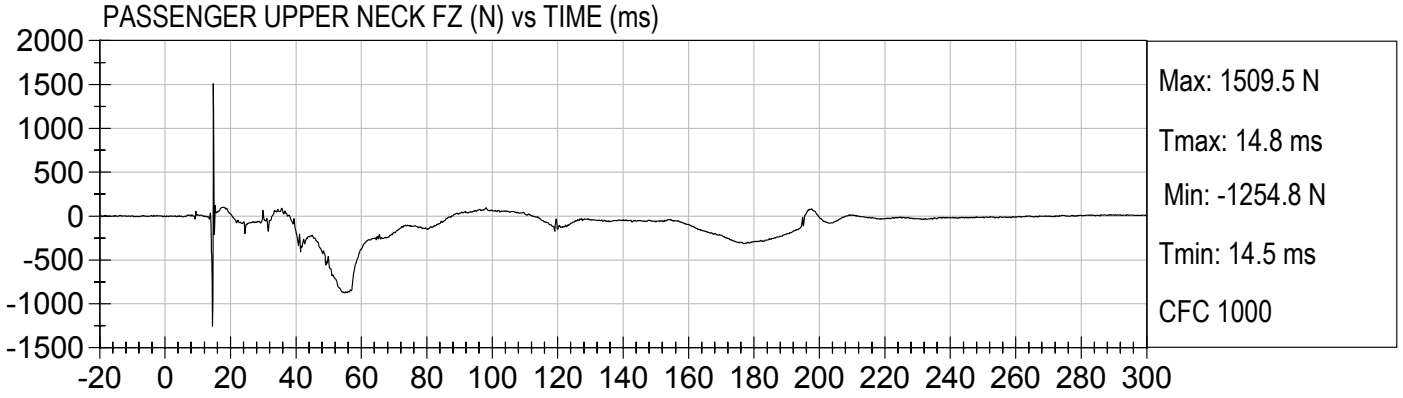
PASSENGER UPPER NECK FX (N) vs TIME (ms)



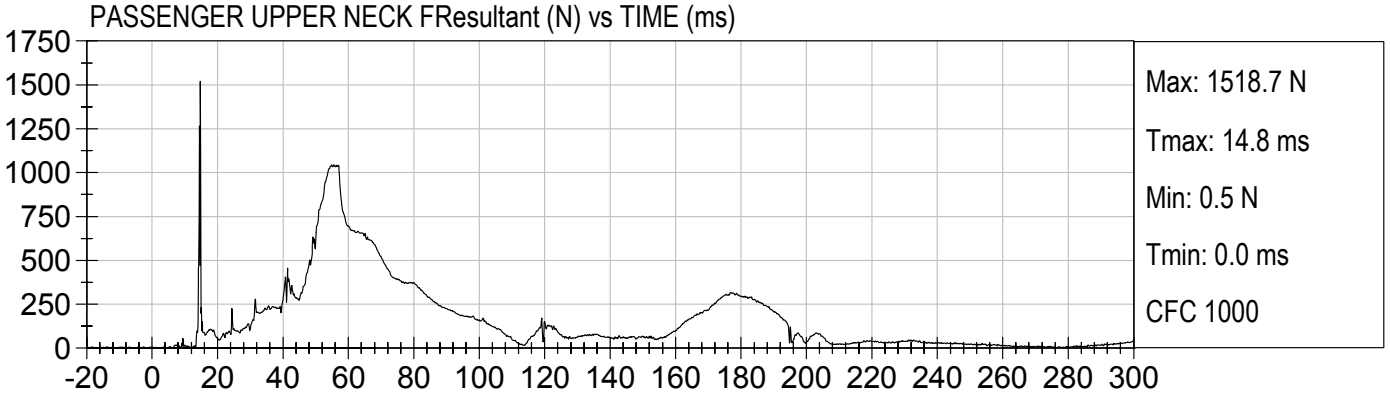
PASSENGER UPPER NECK FY (N) vs TIME (ms)



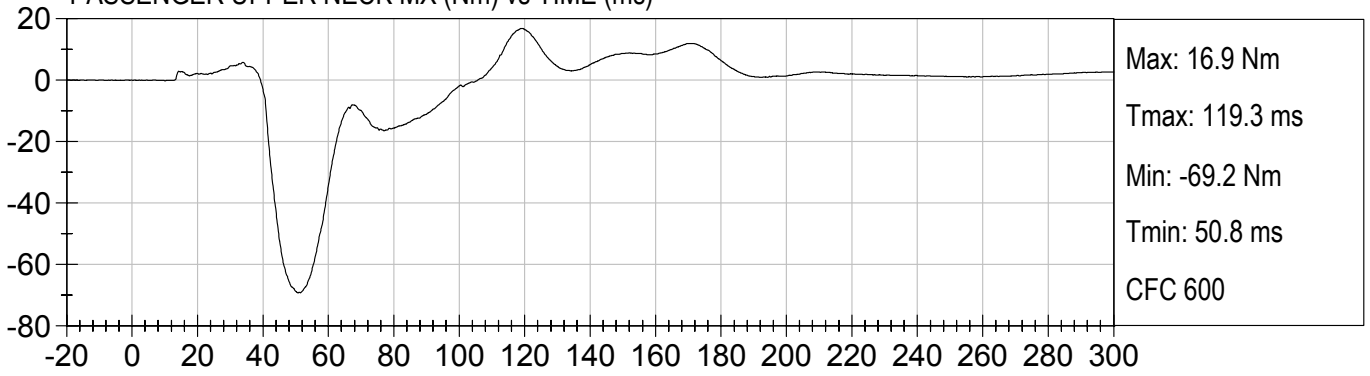
PASSENGER UPPER NECK FZ (N) vs TIME (ms)



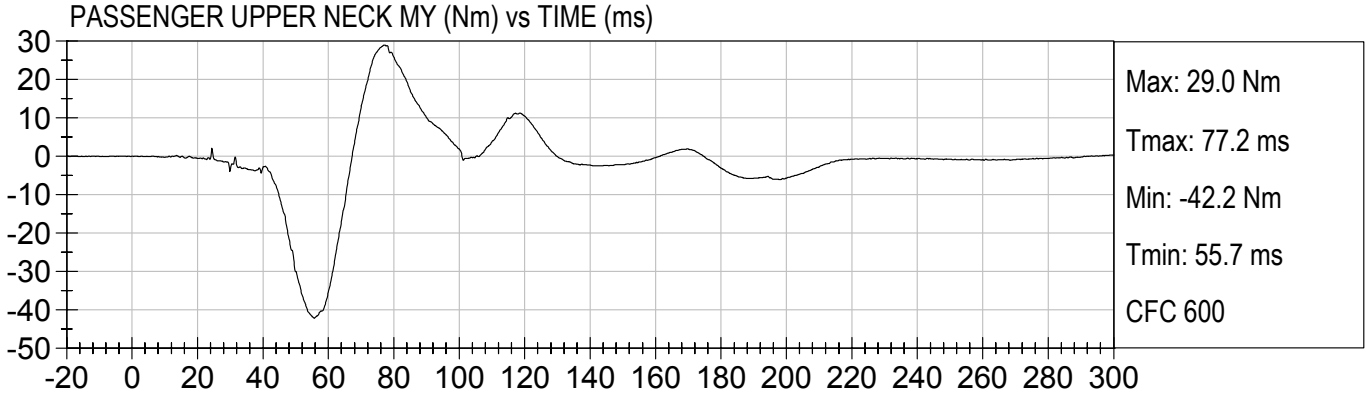
PASSENGER UPPER NECK FResultant (N) vs TIME (ms)



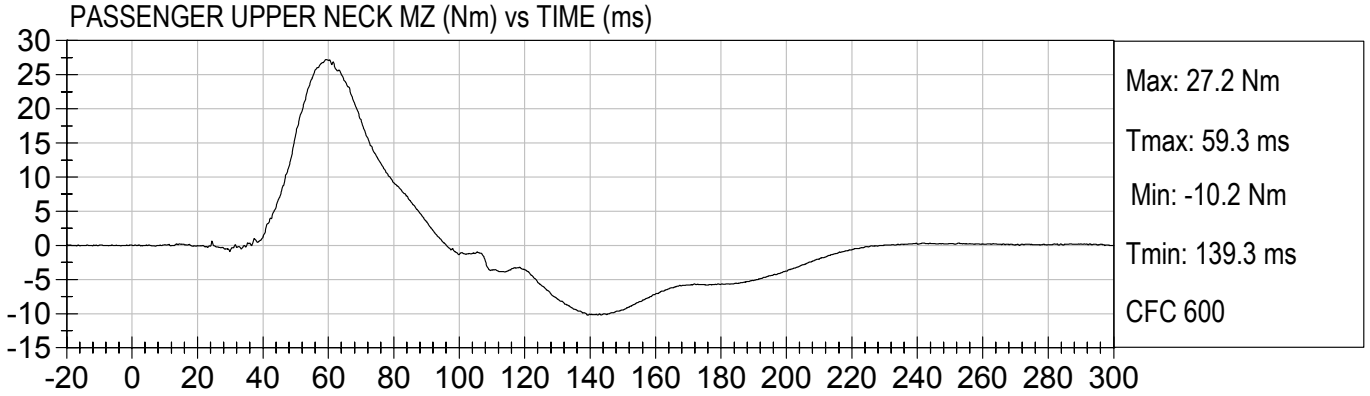
PASSENGER UPPER NECK MX (Nm) vs TIME (ms)



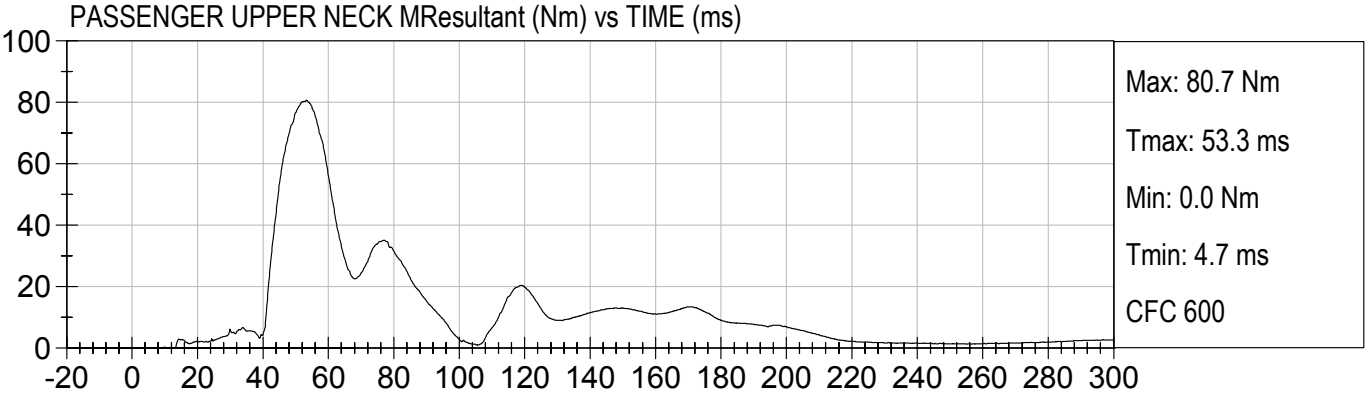
PASSENGER UPPER NECK MY (Nm) vs TIME (ms)



PASSENGER UPPER NECK MZ (Nm) vs TIME (ms)

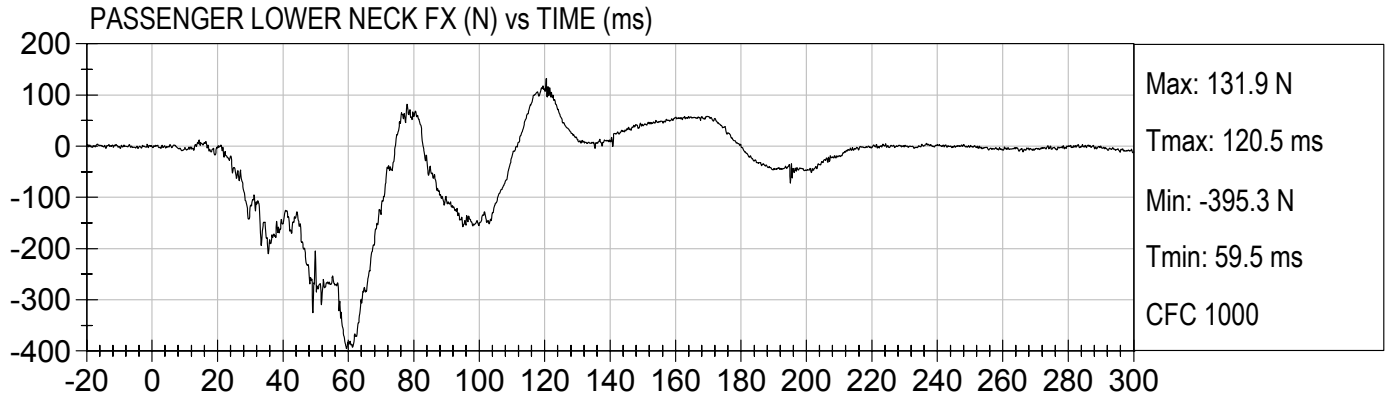


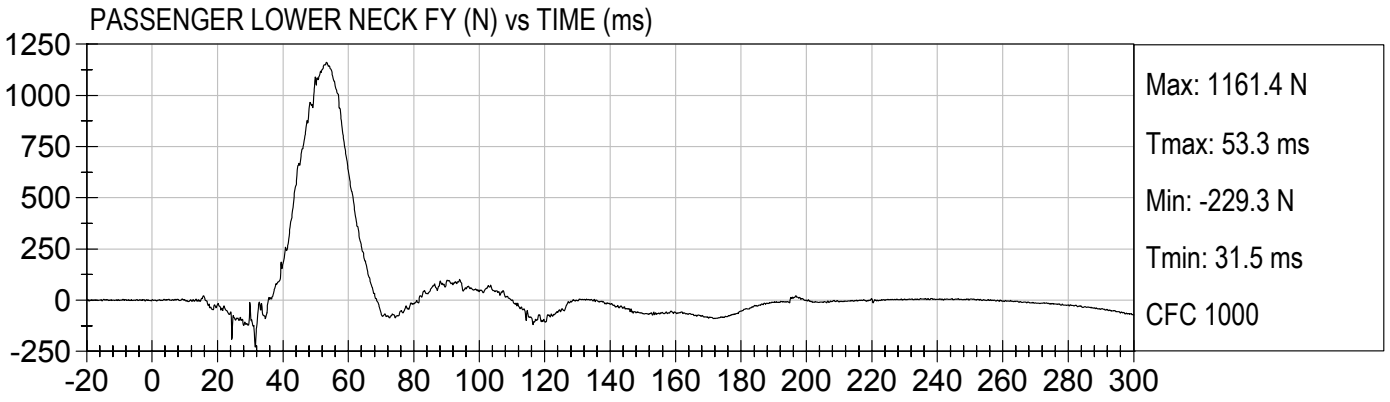
PASSENGER UPPER NECK MResultant (Nm) vs TIME (ms)

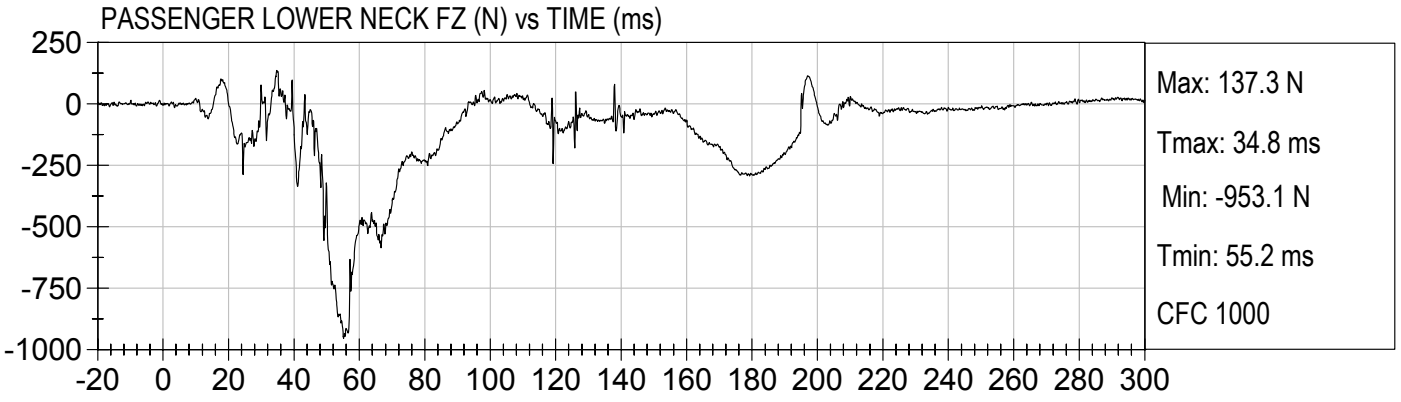


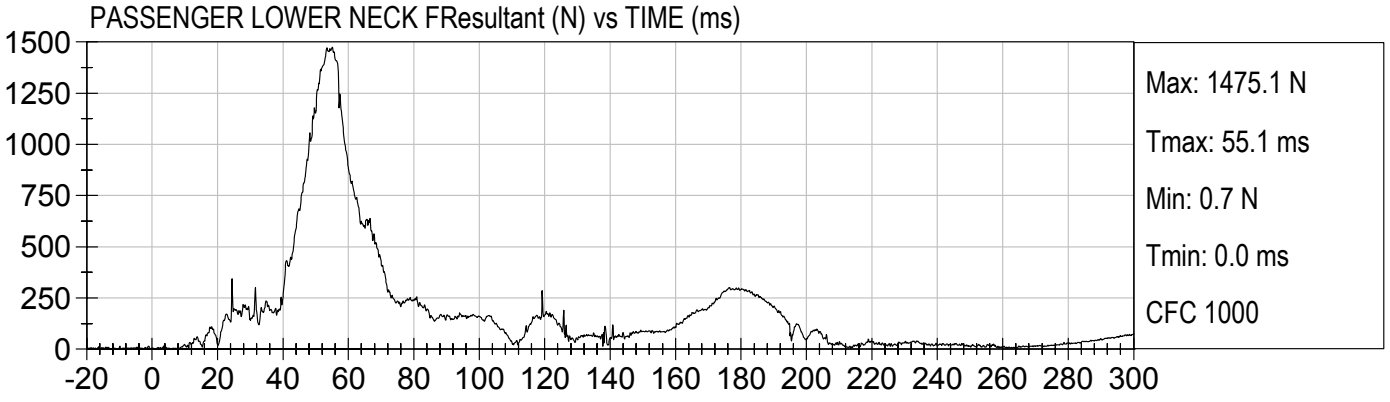
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)





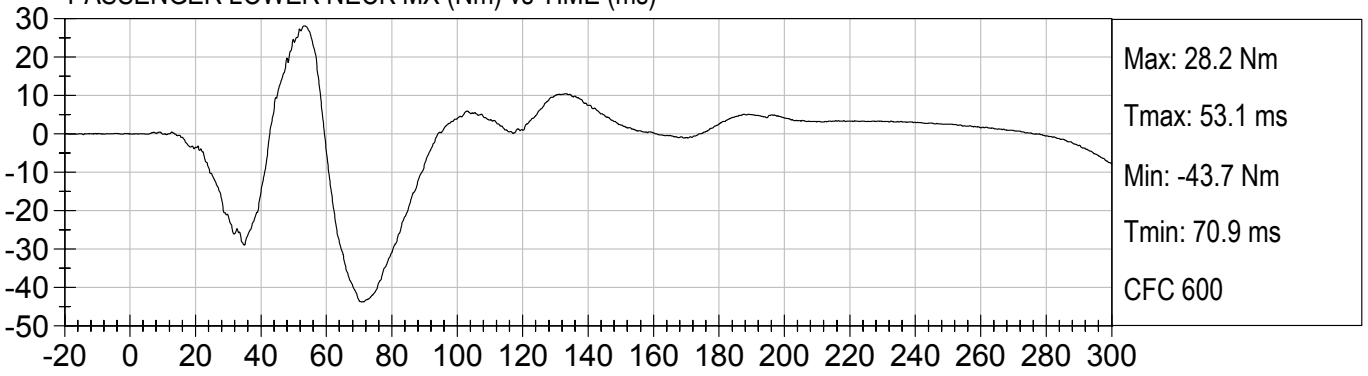




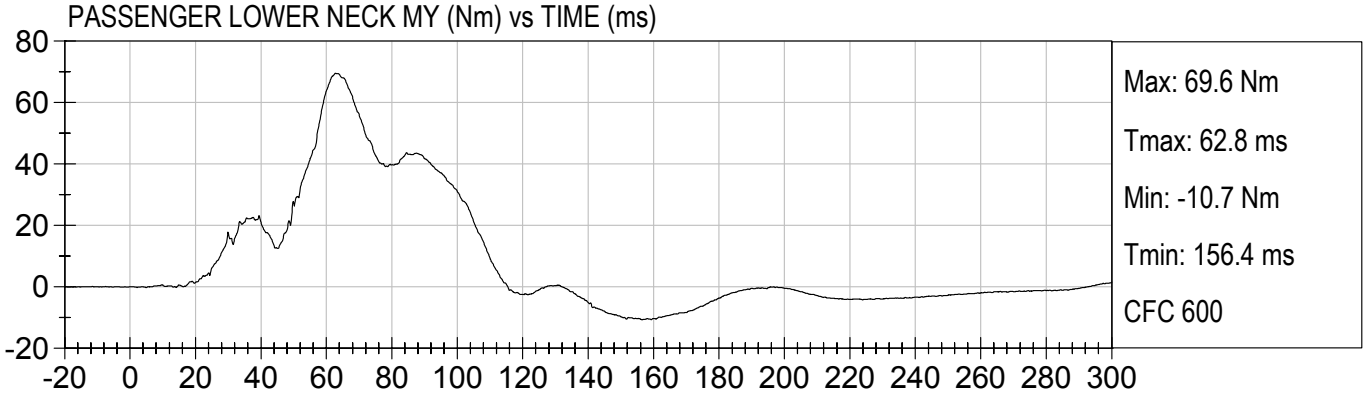
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

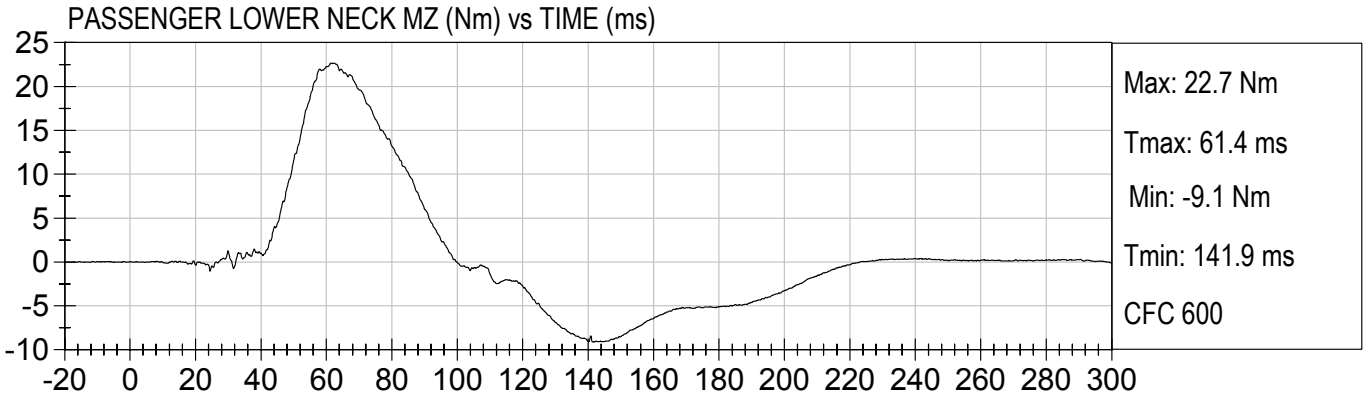
PASSENGER LOWER NECK MX (Nm) vs TIME (ms)



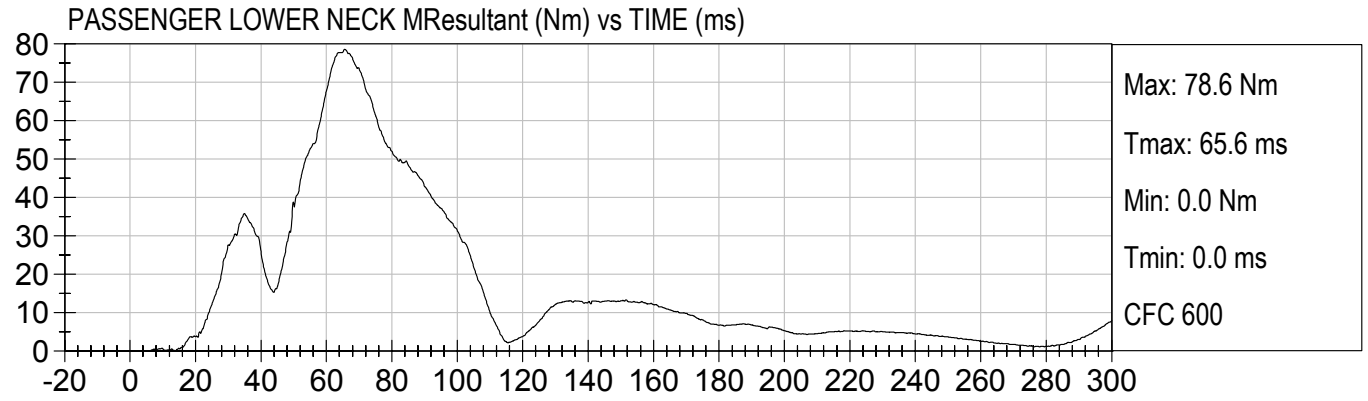
PASSENGER LOWER NECK MY (Nm) vs TIME (ms)



PASSENGER LOWER NECK MZ (Nm) vs TIME (ms)



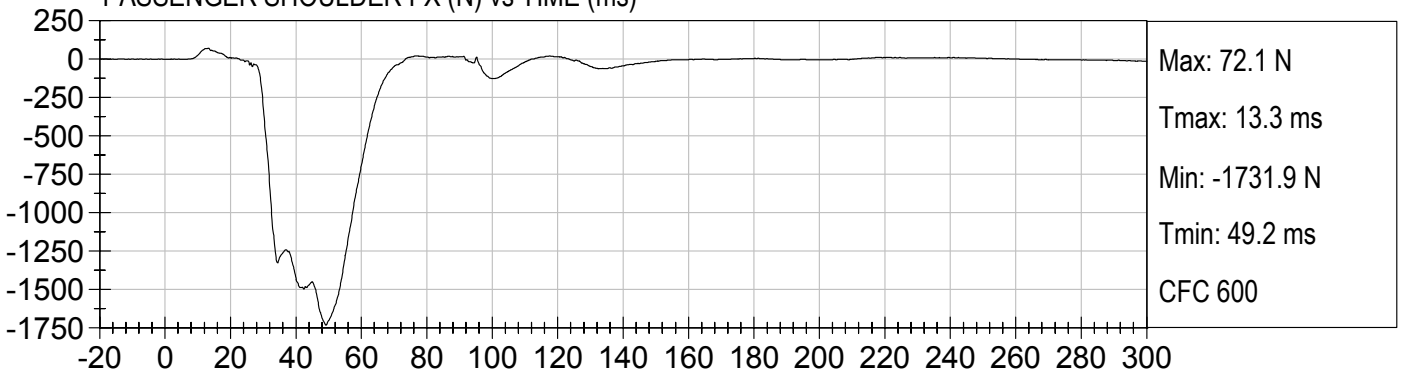
PASSENGER LOWER NECK MResultant (Nm) vs TIME (ms)



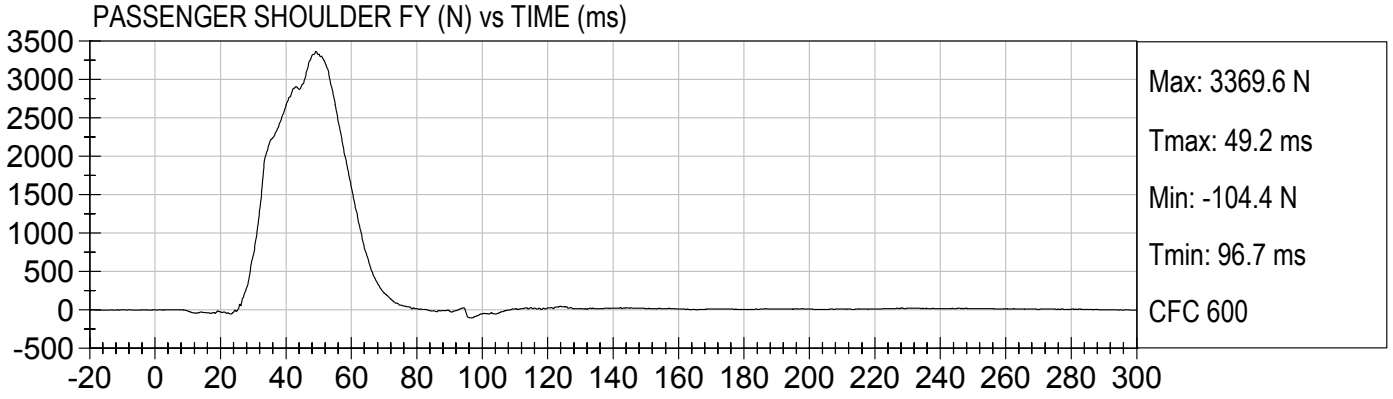
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

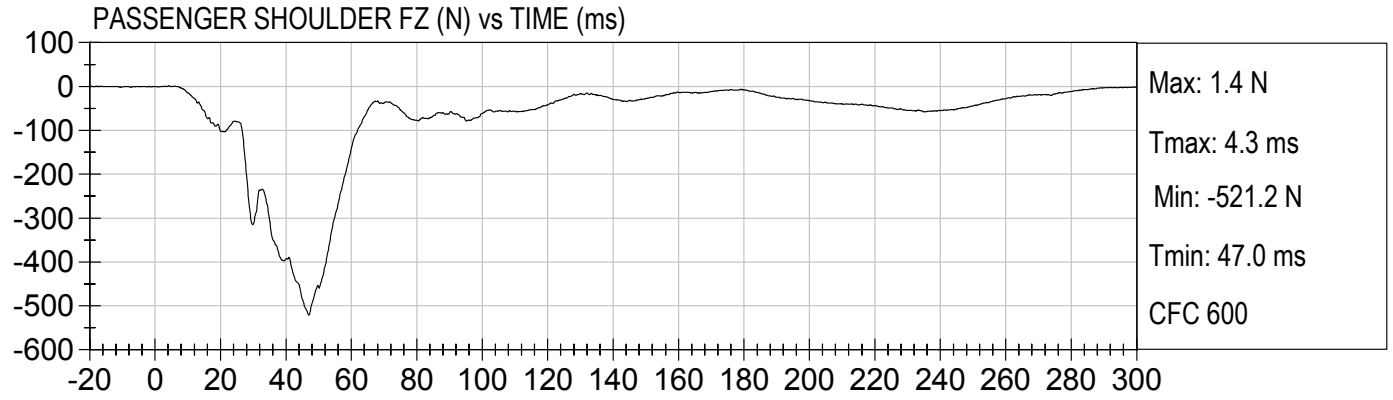
PASSENGER SHOULDER FX (N) vs TIME (ms)



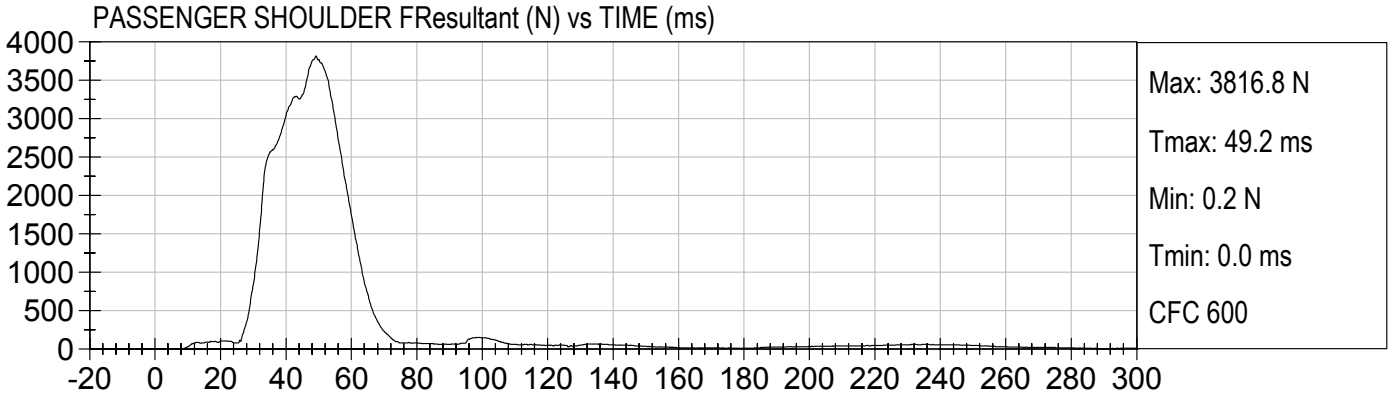
PASSENGER SHOULDER FY (N) vs TIME (ms)



PASSENGER SHOULDER FZ (N) vs TIME (ms)



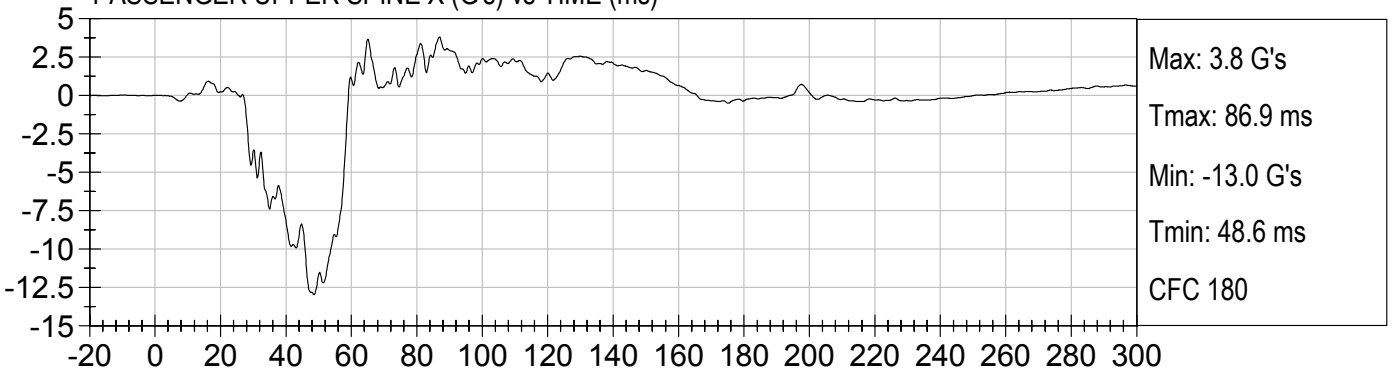
PASSENGER SHOULDER FResultant (N) vs TIME (ms)



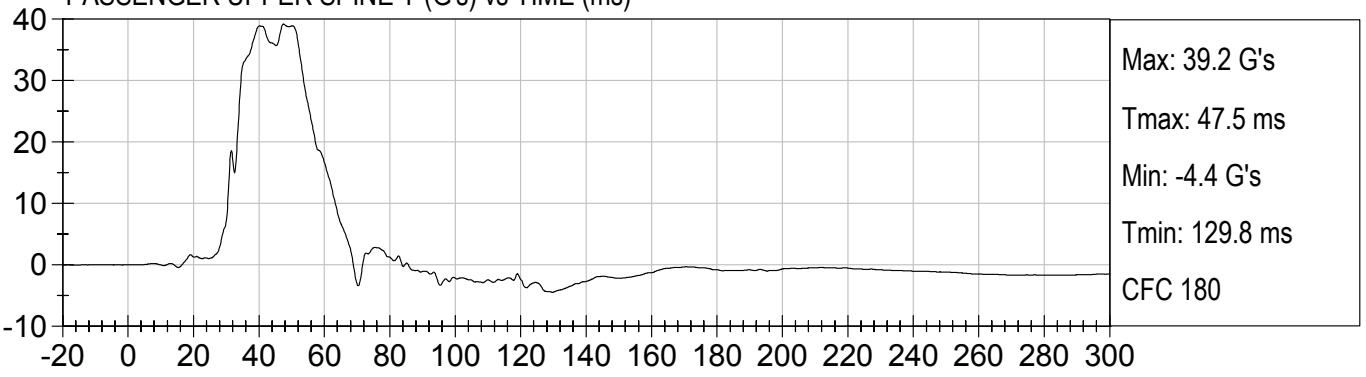
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

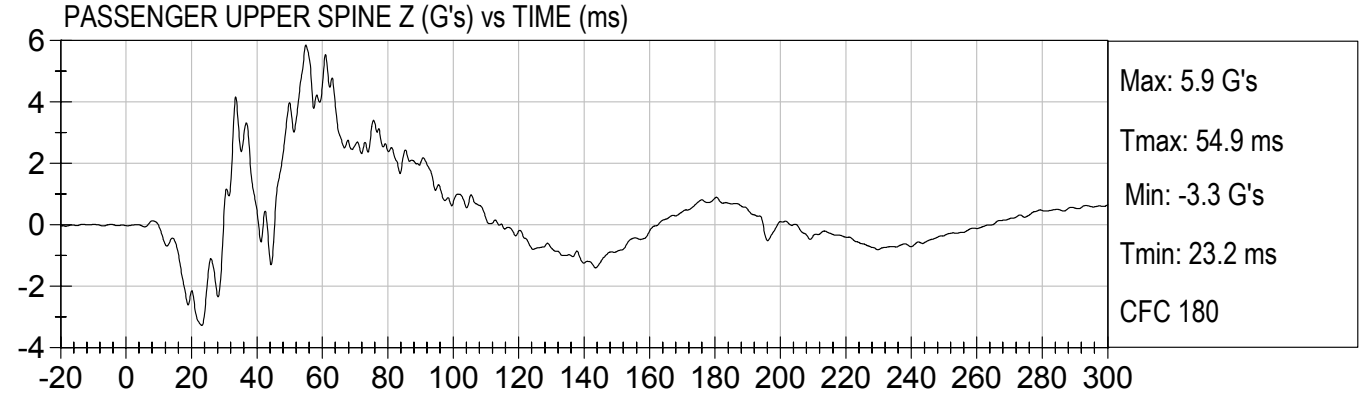
PASSENGER UPPER SPINE X (G's) vs TIME (ms)



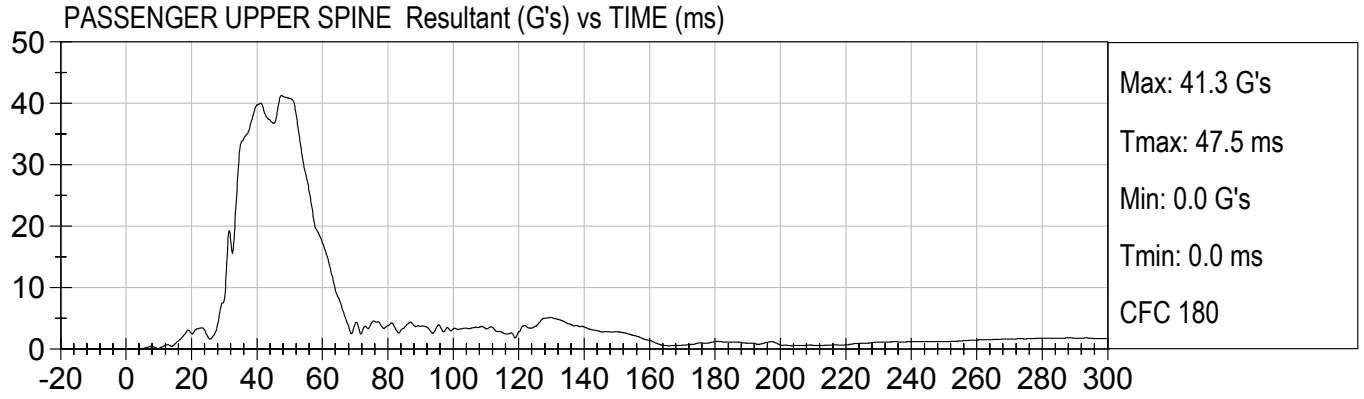
PASSENGER UPPER SPINE Y (G's) vs TIME (ms)

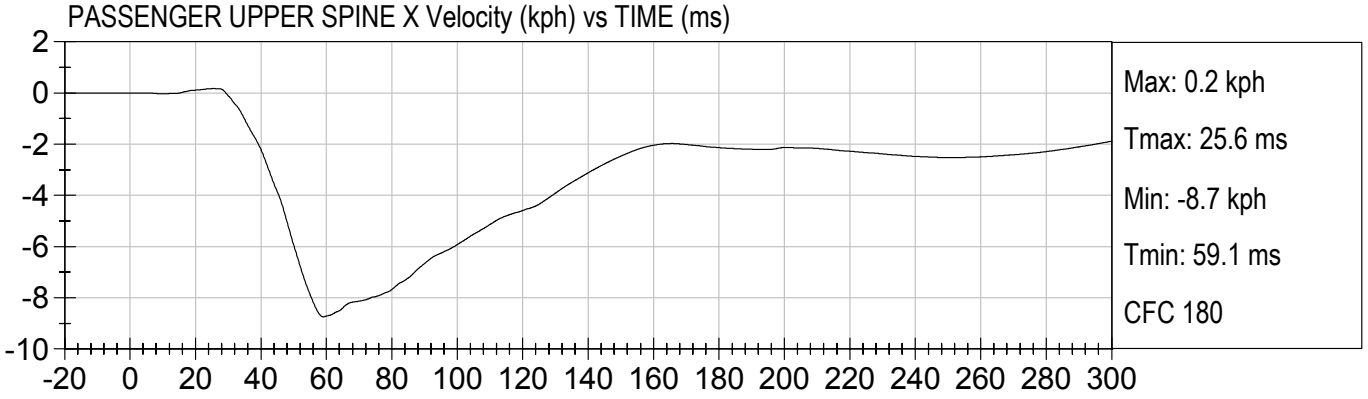


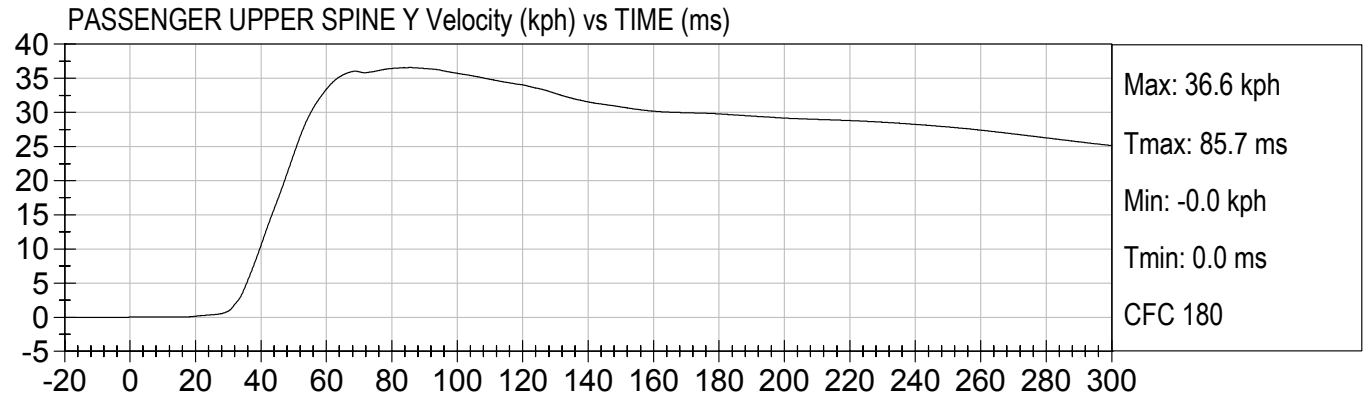
PASSENGER UPPER SPINE Z (G's) vs TIME (ms)

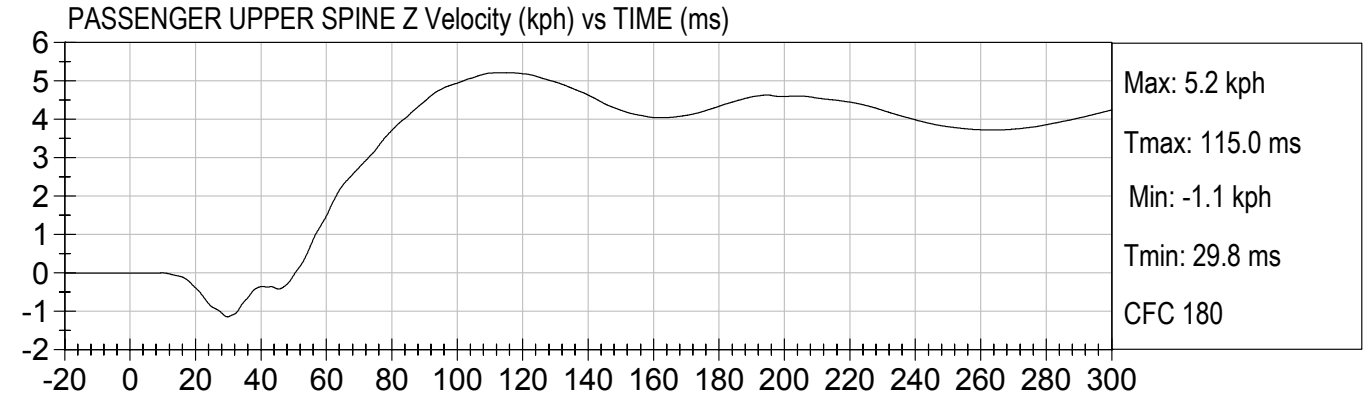


PASSENGER UPPER SPINE Resultant (G's) vs TIME (ms)

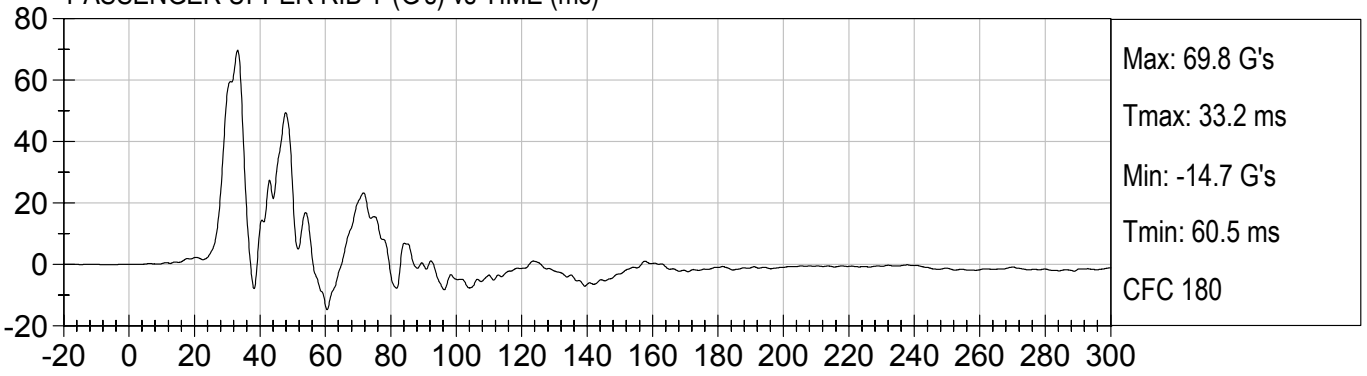



PASSENGER UPPER SPINE X Velocity (kph) vs TIME (ms)
2
0
-2
-4
-6
-8
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2 kph
Tmax: 25.6 ms
Min: -8.7 kph
Tmin: 59.1 ms
CFC 180

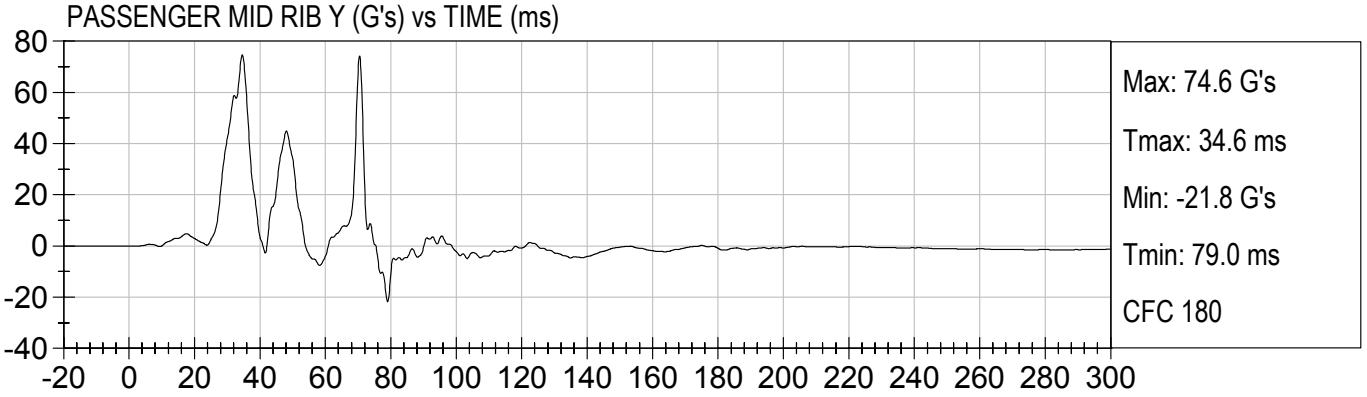

PASSENGER UPPER SPINE Y Velocity (kph) vs TIME (ms)
40
35
30
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 36.6 kph
Tmax: 85.7 ms
Min: -0.0 kph
Tmin: 0.0 ms
CFC 180


PASSENGER UPPER SPINE Z Velocity (kph) vs TIME (ms)
6
5
4
3
2
1
0
-1
-2
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 5.2 kph
Tmax: 115.0 ms
Min: -1.1 kph
Tmin: 29.8 ms
CFC 180

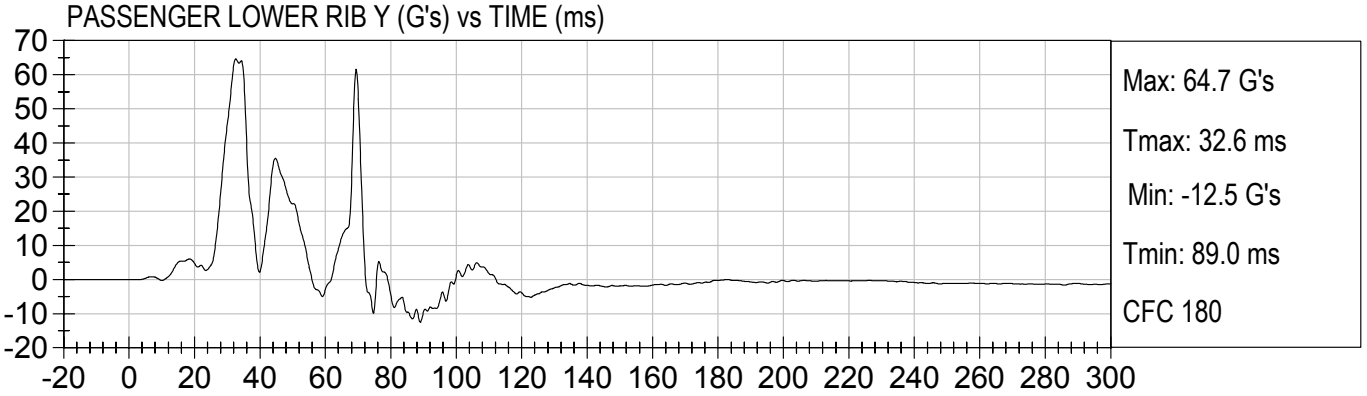
PASSENGER UPPER RIB Y (G's) vs TIME (ms)



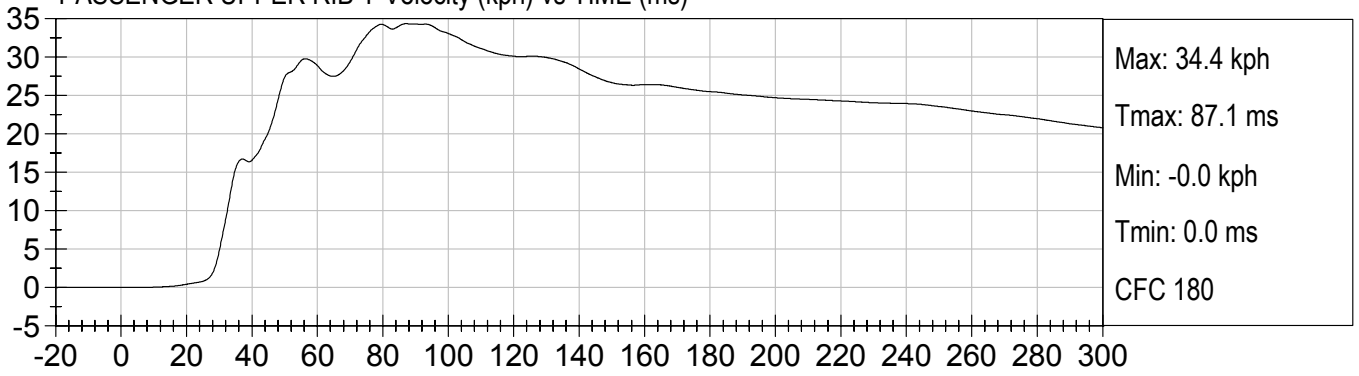
PASSENGER MID RIB Y (G's) vs TIME (ms)



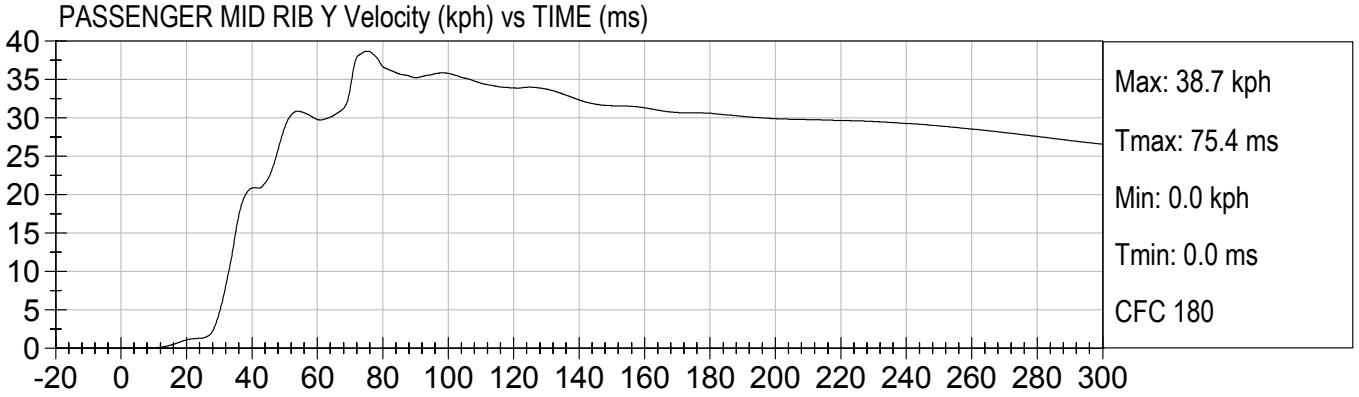
PASSENGER LOWER RIB Y (G's) vs TIME (ms)



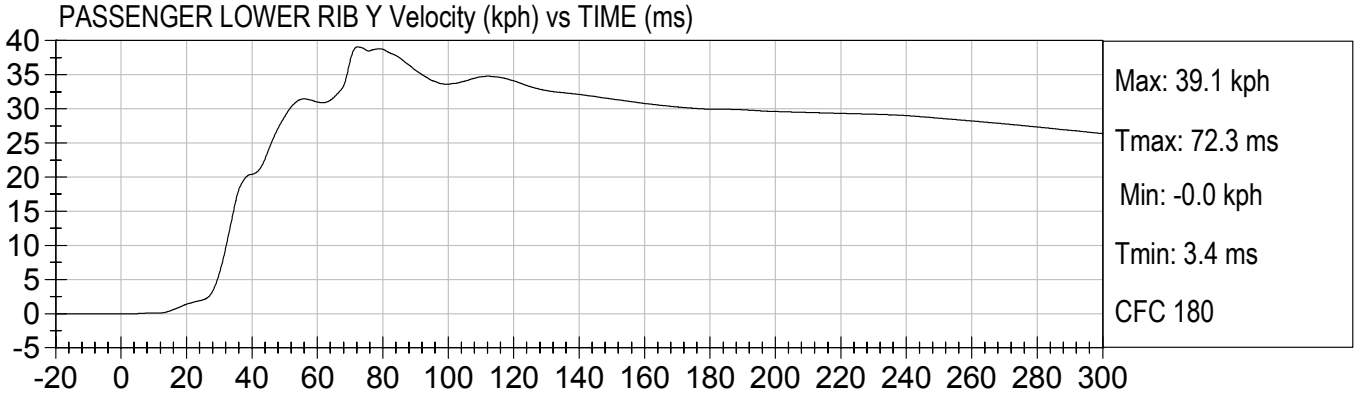
PASSENGER UPPER RIB Y Velocity (kph) vs TIME (ms)



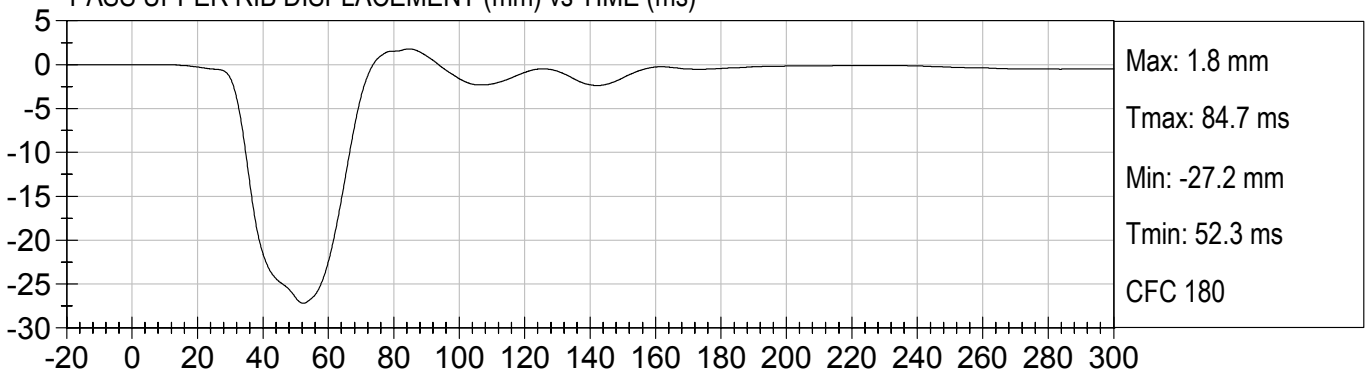
PASSENGER MID RIB Y Velocity (kph) vs TIME (ms)



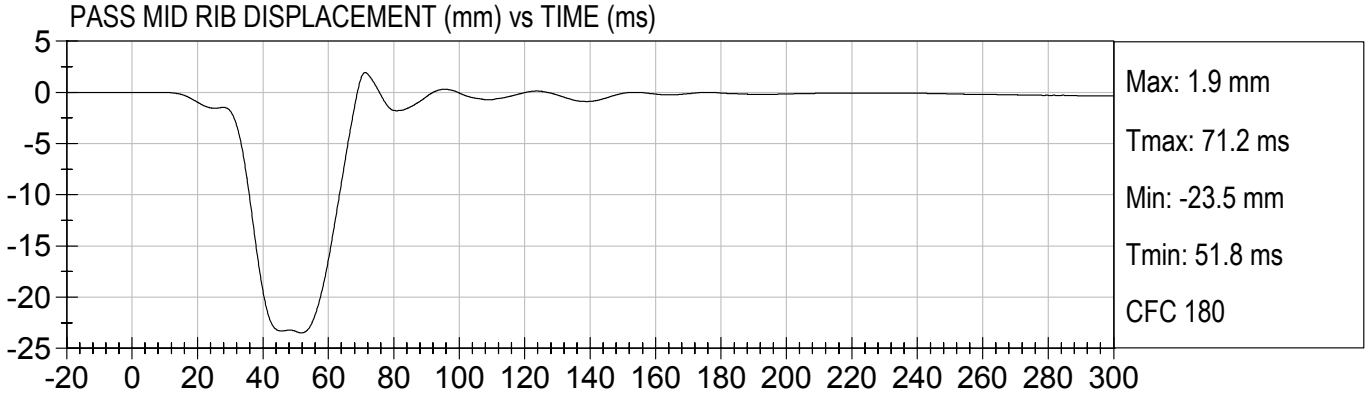
PASSENGER LOWER RIB Y Velocity (kph) vs TIME (ms)



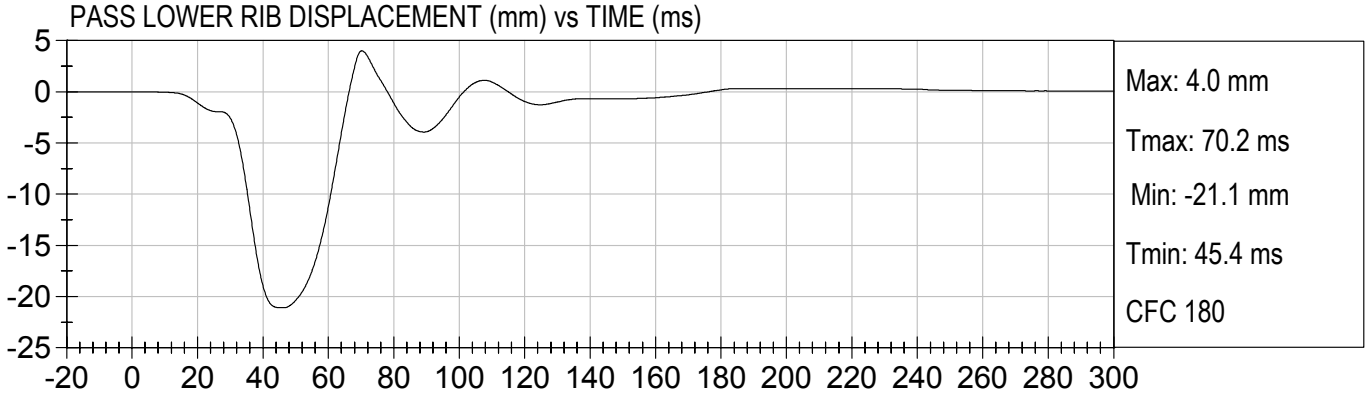
PASS UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



PASS MID RIB DISPLACEMENT (mm) vs TIME (ms)



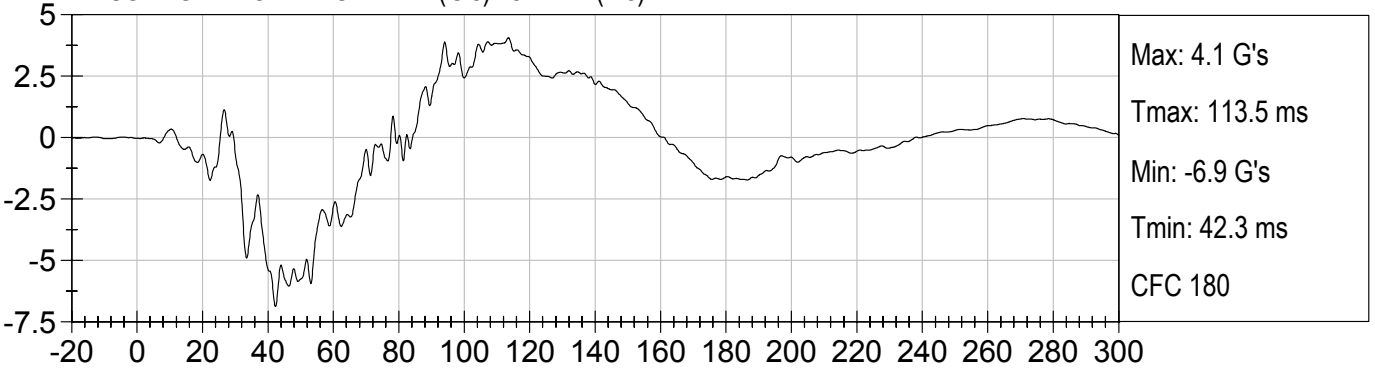
PASS LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



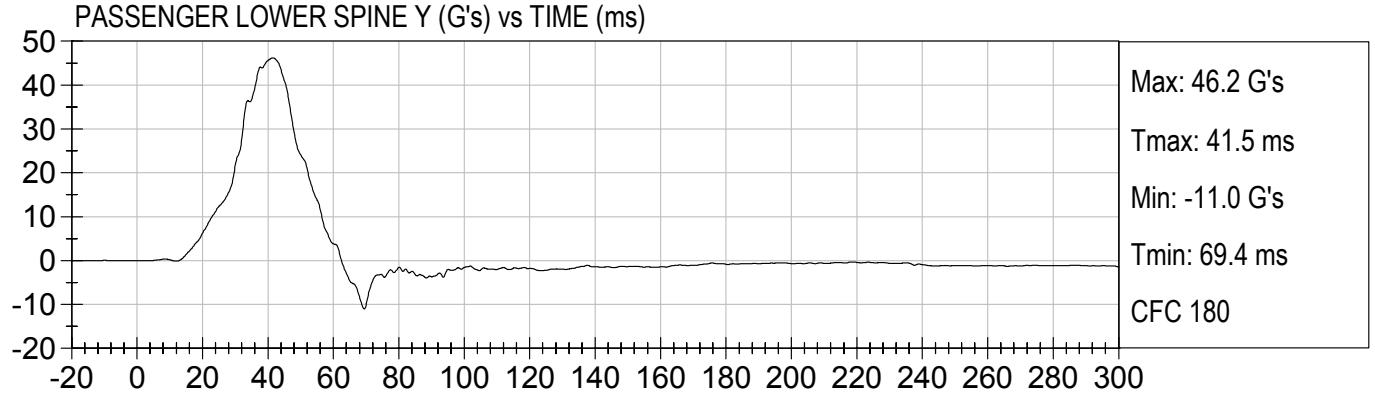
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

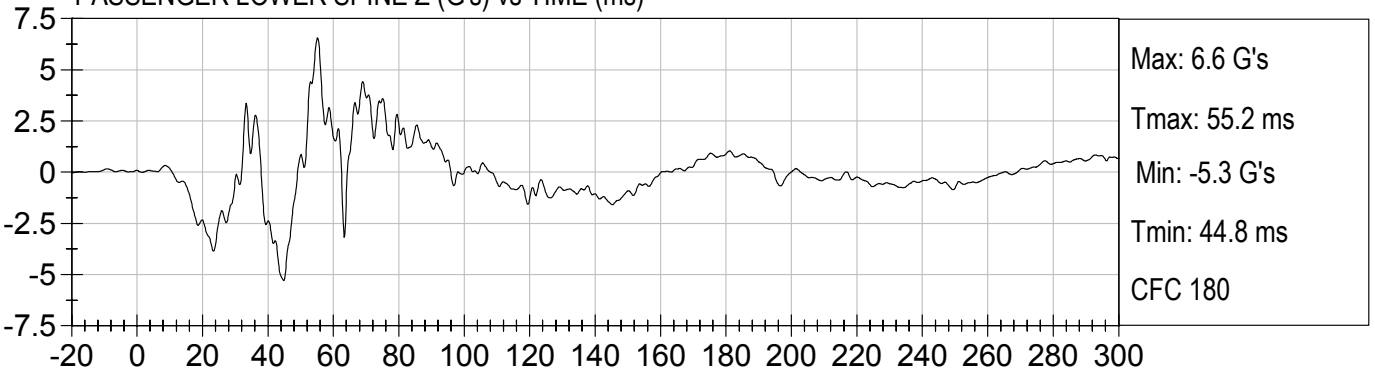
PASSENGER LOWER SPINE X (G's) vs TIME (ms)



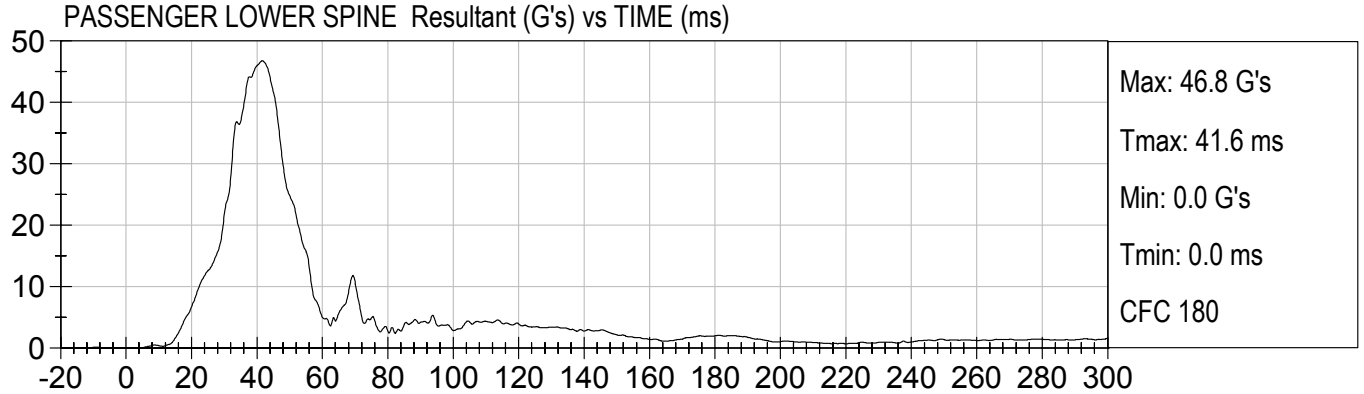
PASSENGER LOWER SPINE Y (G's) vs TIME (ms)



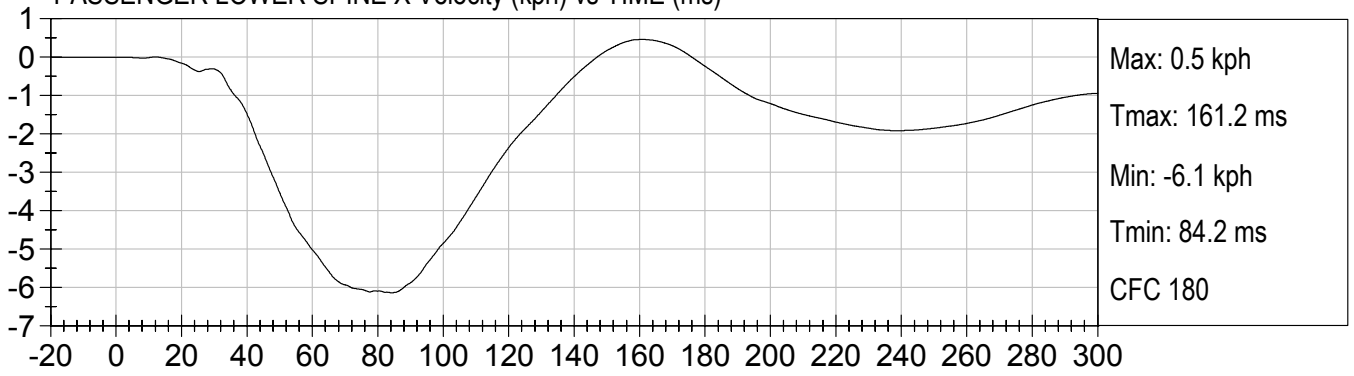
PASSENGER LOWER SPINE Z (G's) vs TIME (ms)



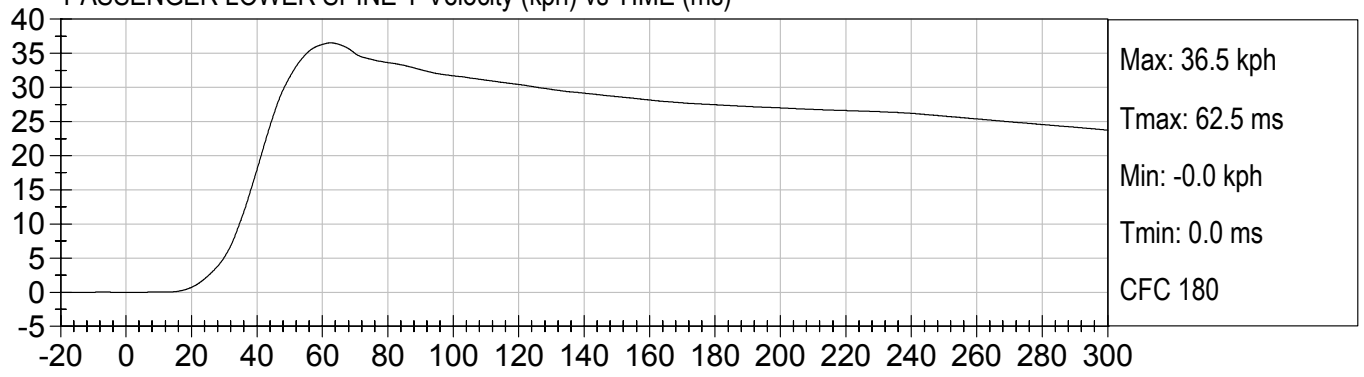
PASSENGER LOWER SPINE Resultant (G's) vs TIME (ms)



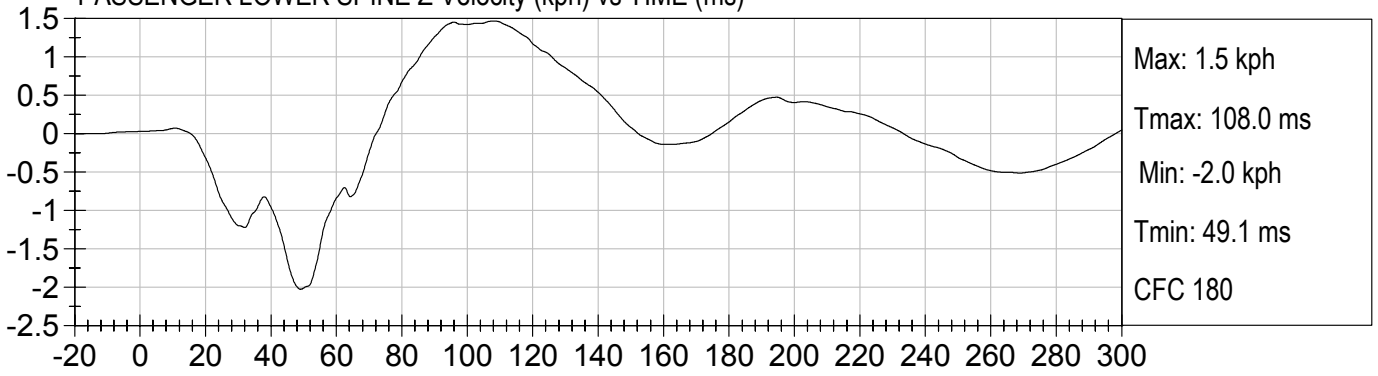
PASSENGER LOWER SPINE X Velocity (kph) vs TIME (ms)



PASSENGER LOWER SPINE Y Velocity (kph) vs TIME (ms)



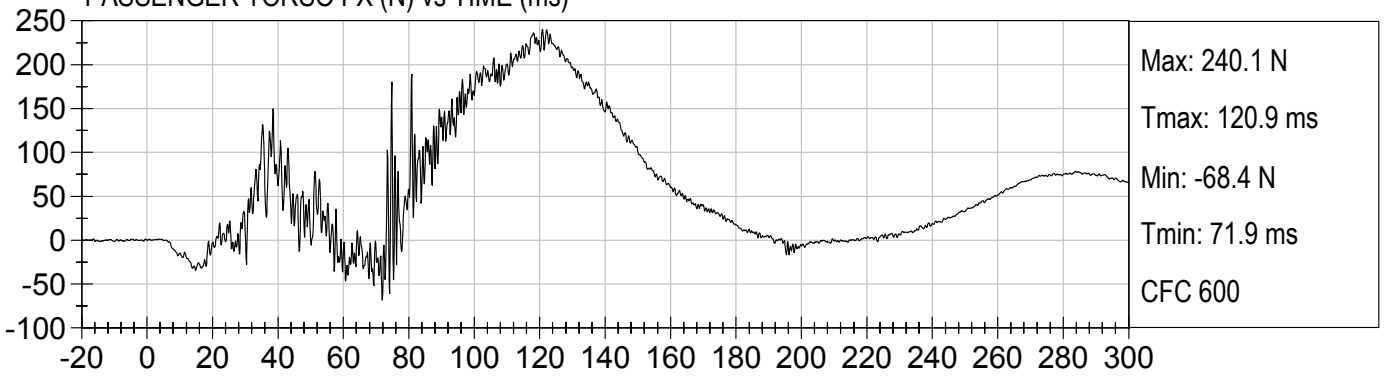
PASSENGER LOWER SPINE Z Velocity (kph) vs TIME (ms)



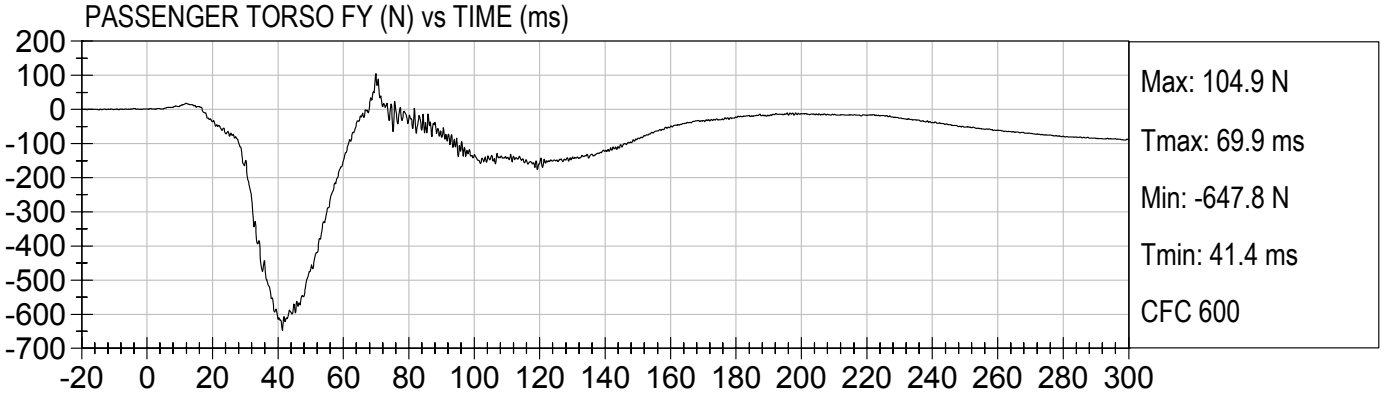
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

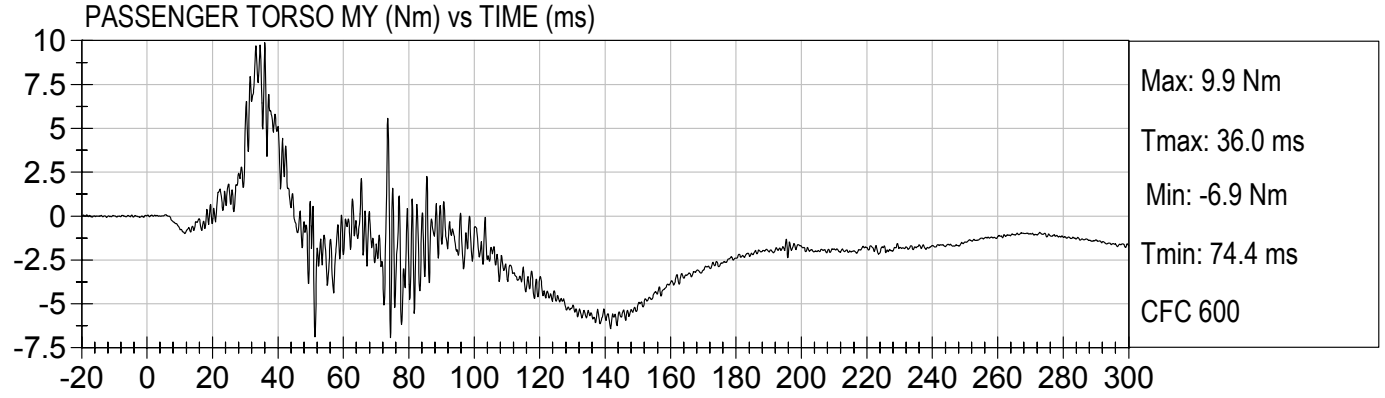
PASSENGER TORSO FX (N) vs TIME (ms)



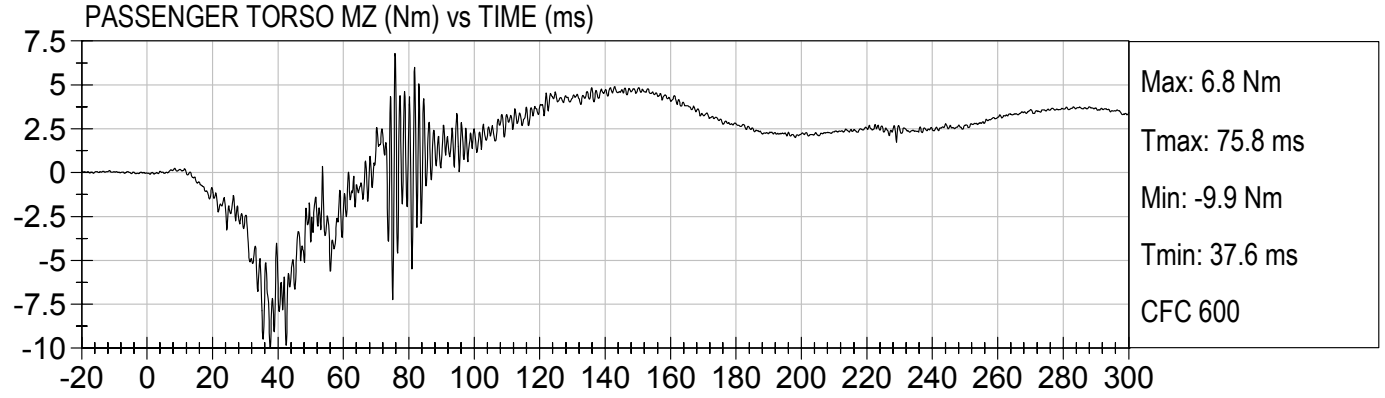
PASSENGER TORSO FY (N) vs TIME (ms)



PASSENGER TORSO MY (Nm) vs TIME (ms)



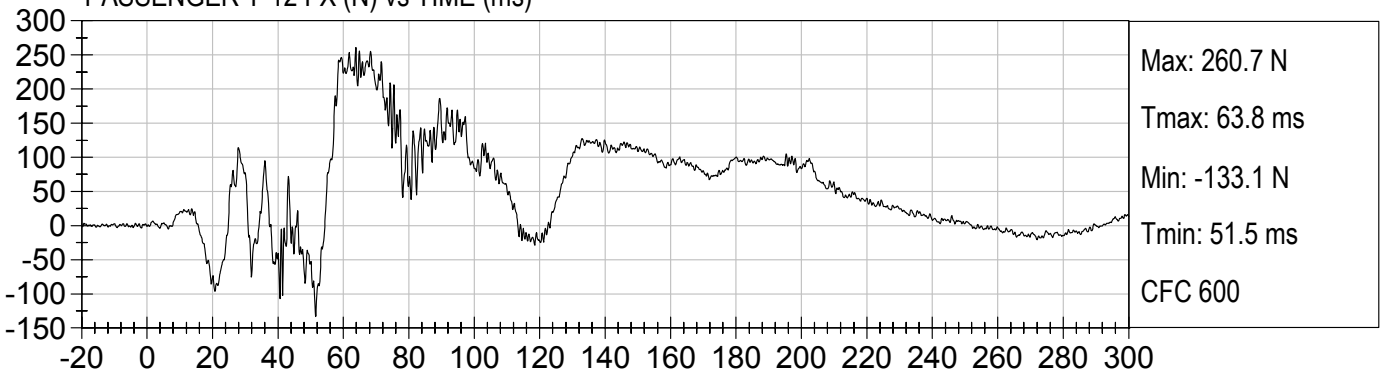
PASSENGER TORSO MZ (Nm) vs TIME (ms)



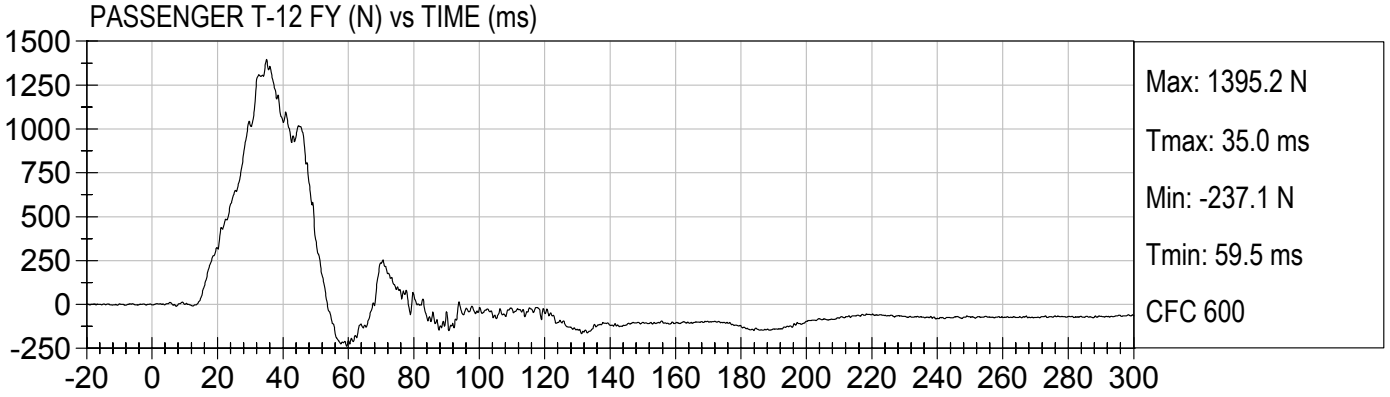
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

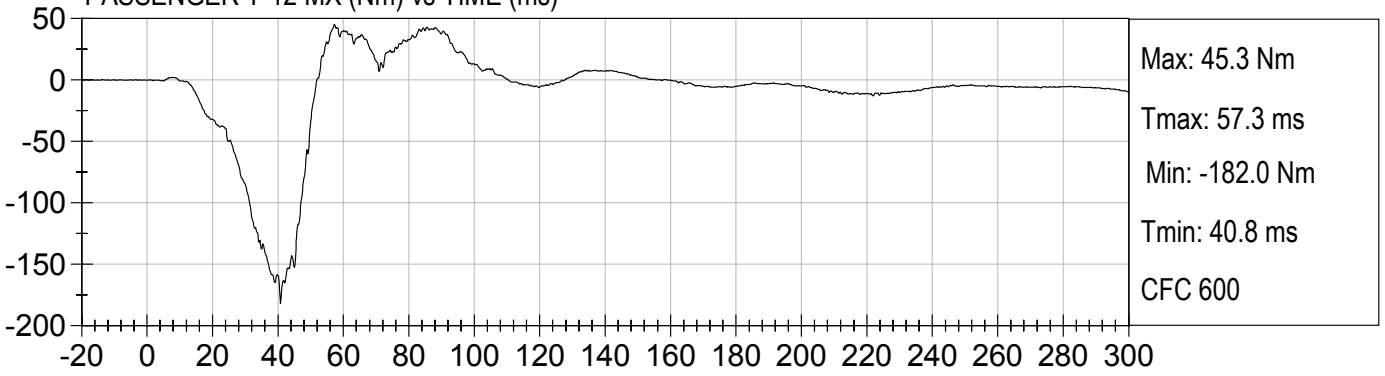
PASSENGER T-12 FX (N) vs TIME (ms)



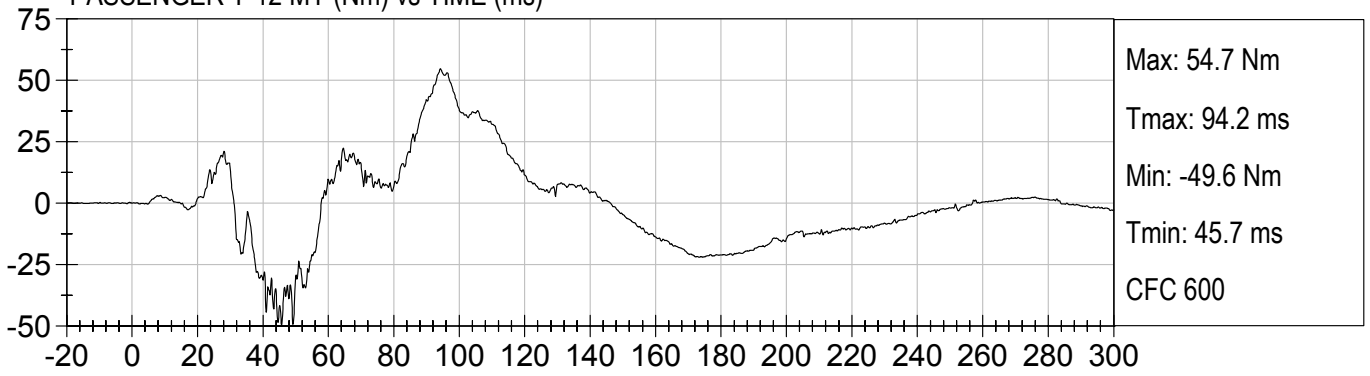
PASSENGER T-12 FY (N) vs TIME (ms)



PASSENGER T-12 MX (Nm) vs TIME (ms)



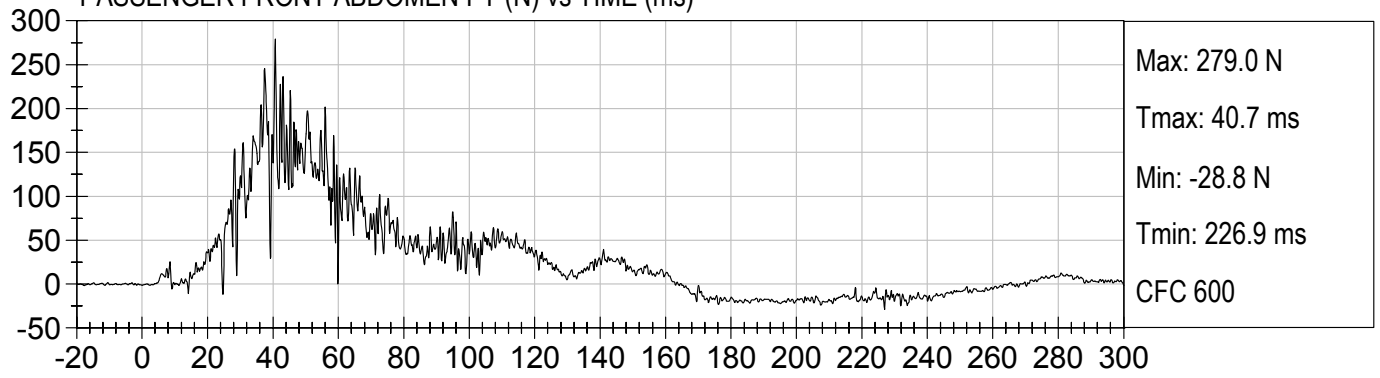
PASSENGER T-12 MY (Nm) vs TIME (ms)



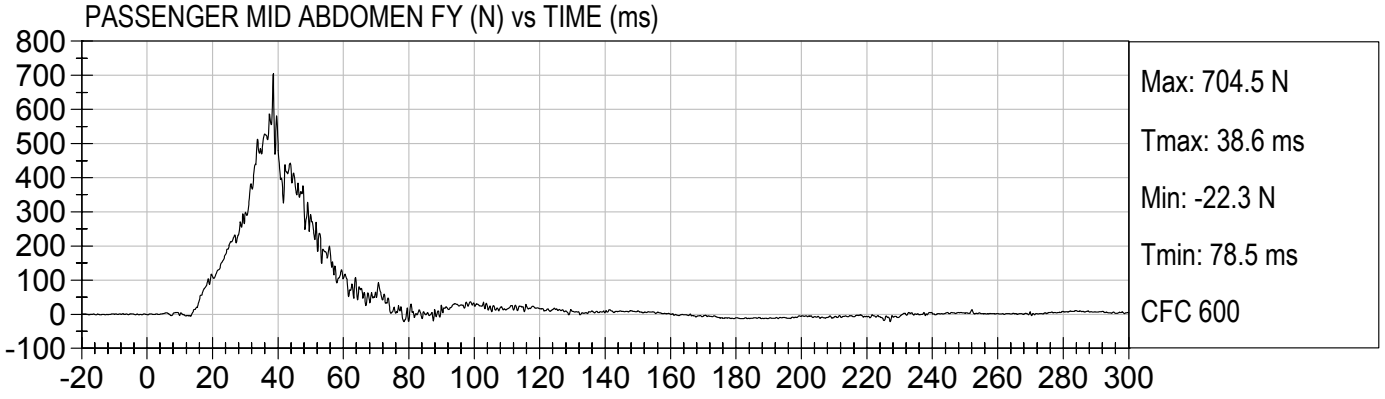
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

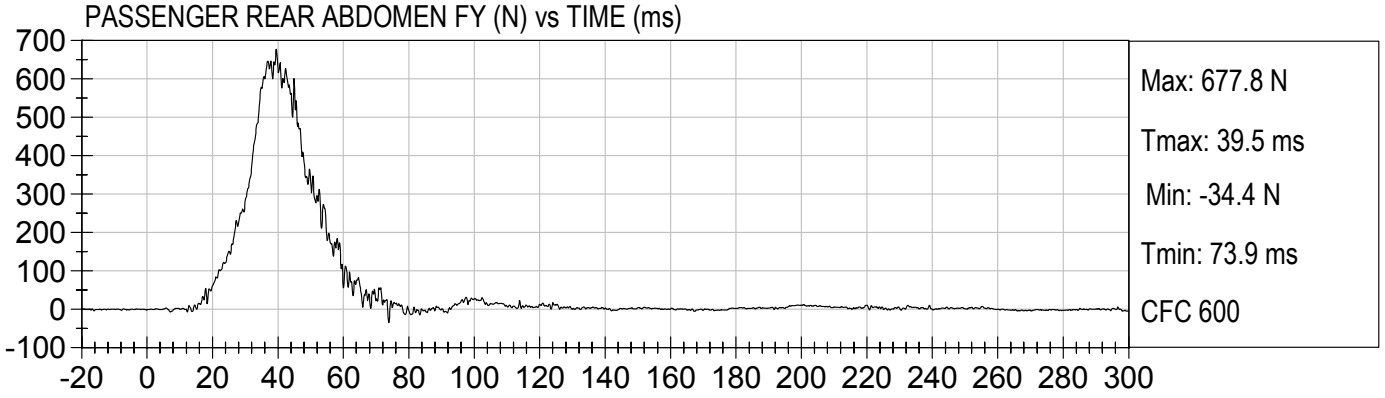
PASSENGER FRONT ABDOMEN FY (N) vs TIME (ms)



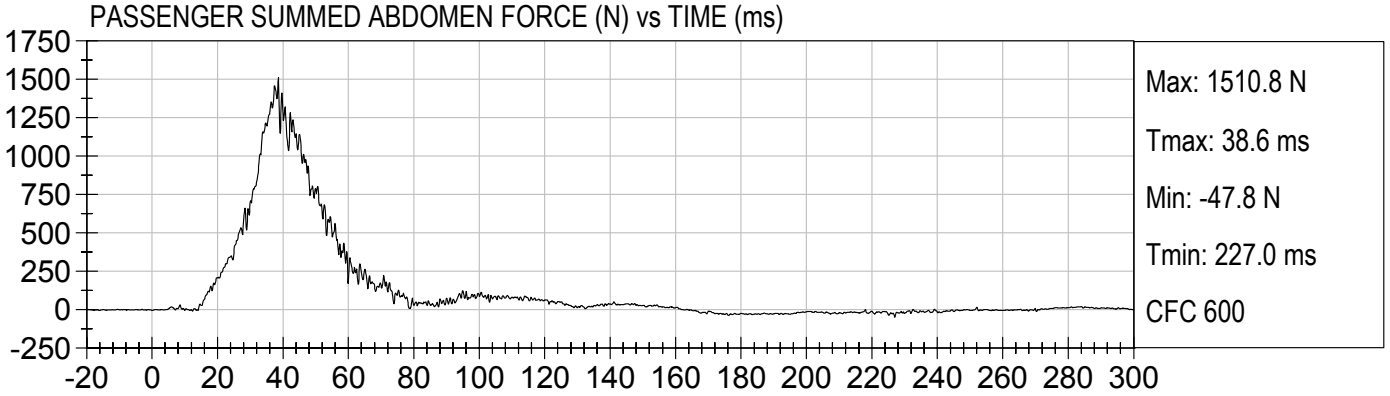
PASSENGER MID ABDOMEN FY (N) vs TIME (ms)



PASSENGER REAR ABDOMEN FY (N) vs TIME (ms)



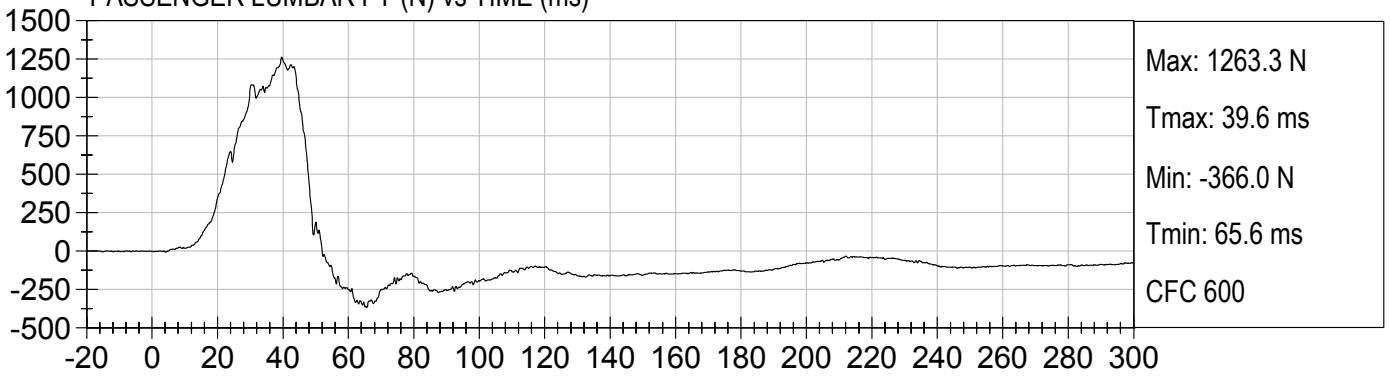
PASSENGER SUMMED ABDOMEN FORCE (N) vs TIME (ms)



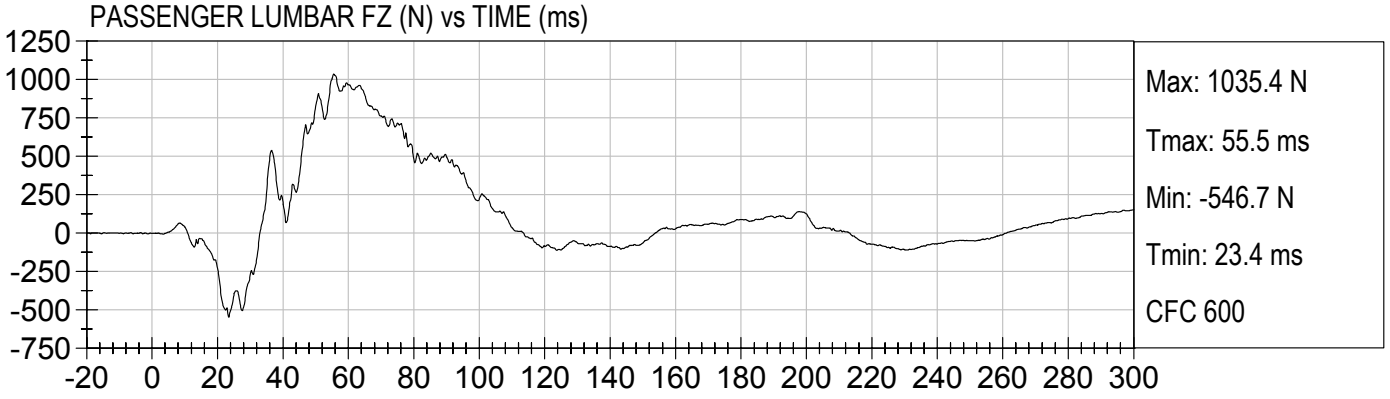
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

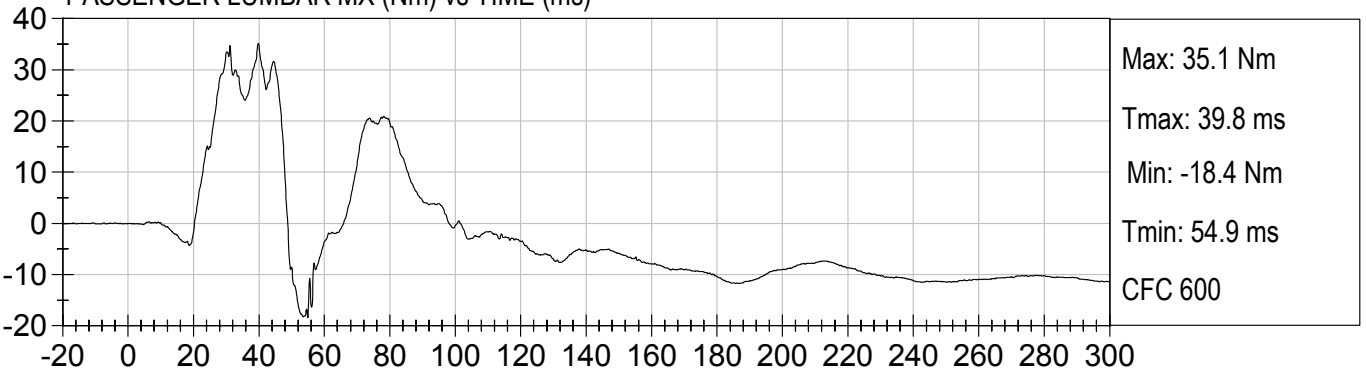
PASSENGER LUMBAR FY (N) vs TIME (ms)



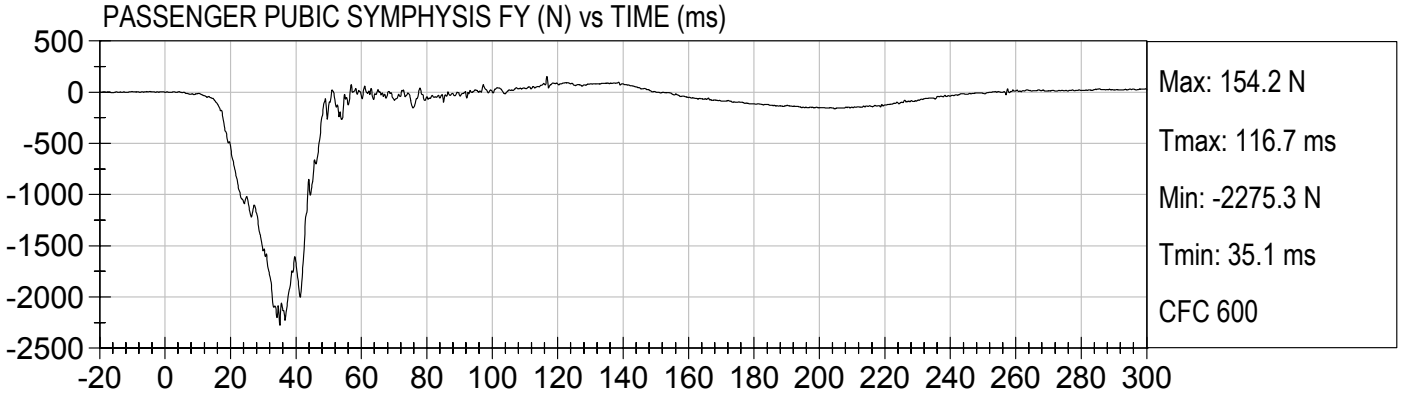
PASSENGER LUMBAR FZ (N) vs TIME (ms)



PASSENGER LUMBAR MX (Nm) vs TIME (ms)

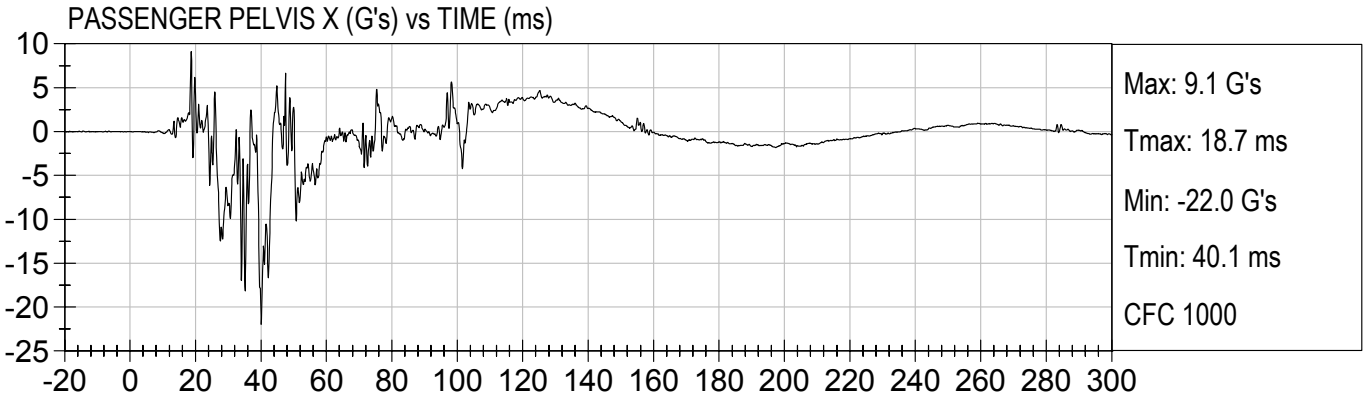


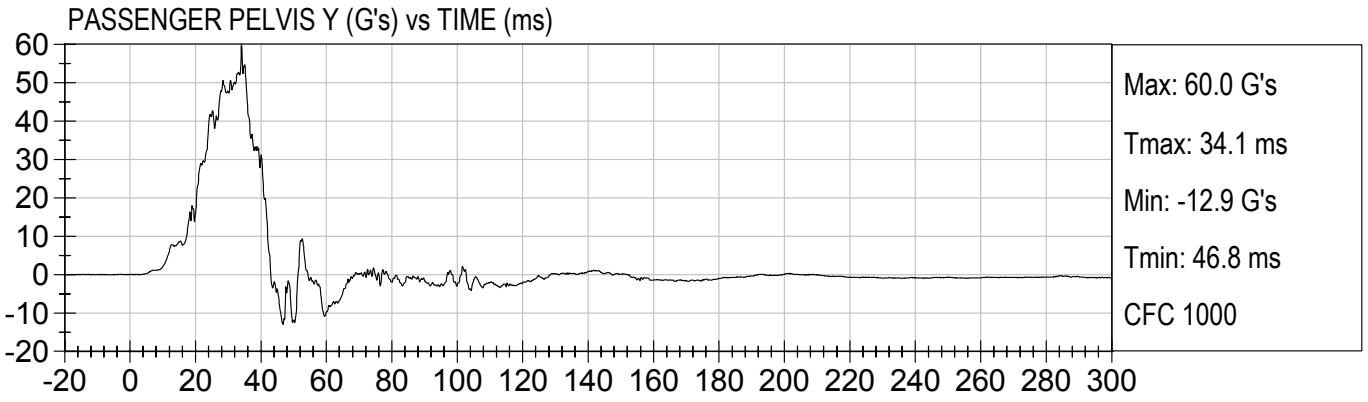
PASSENGER PUBIC SYMPHYSIS FY (N) vs TIME (ms)

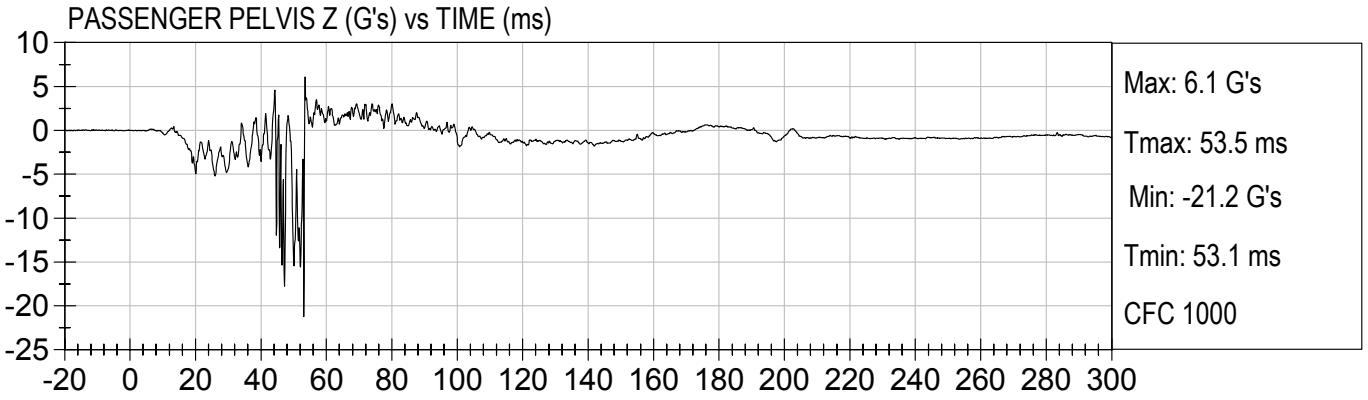


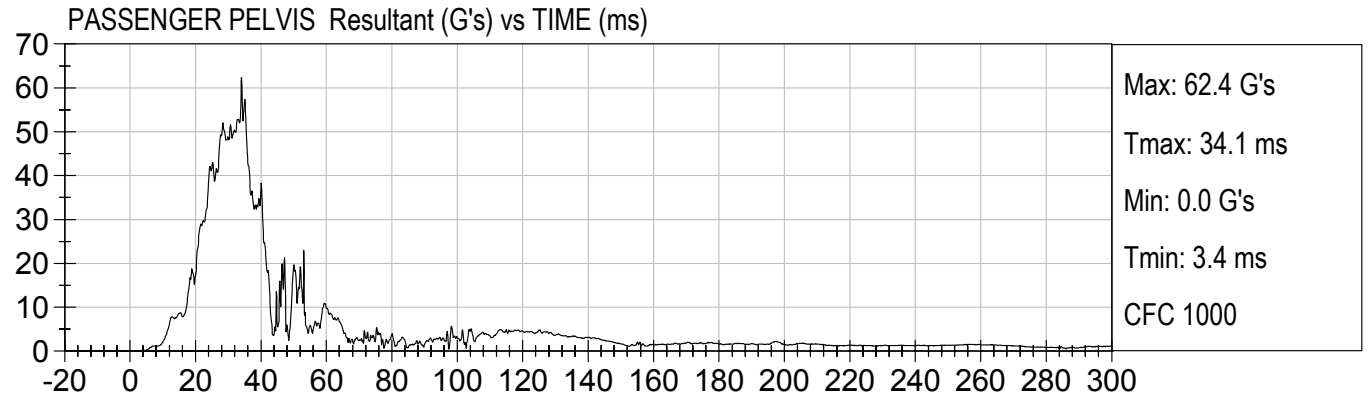
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

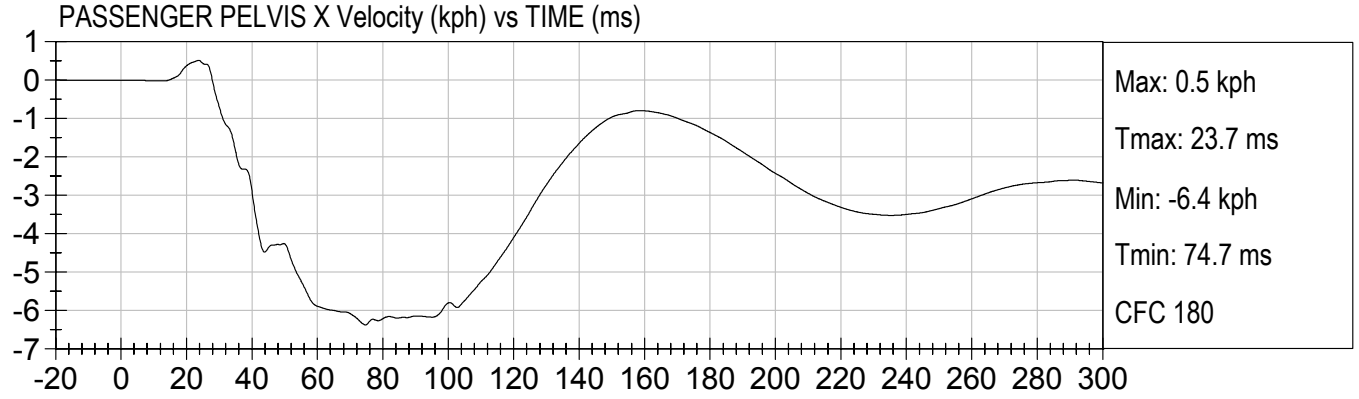
Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

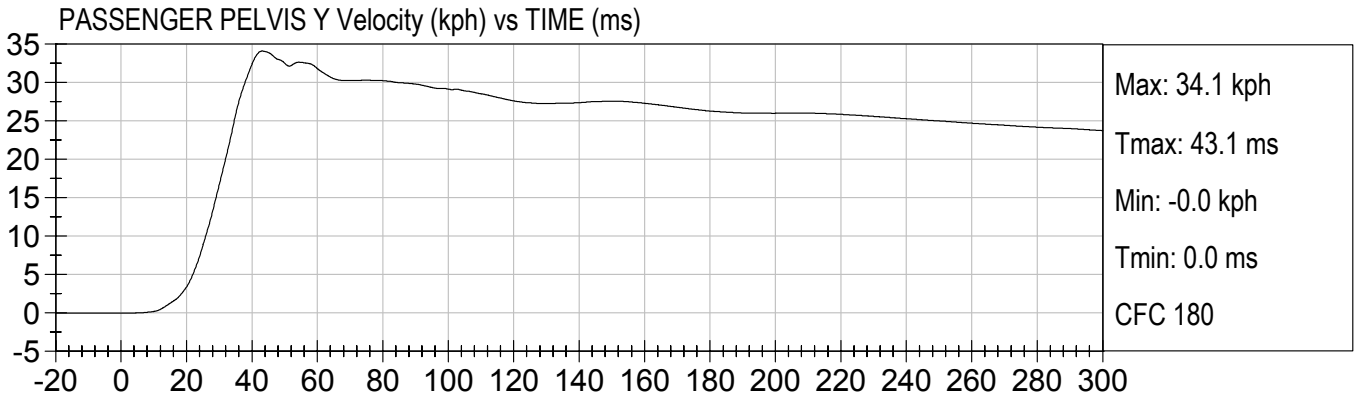


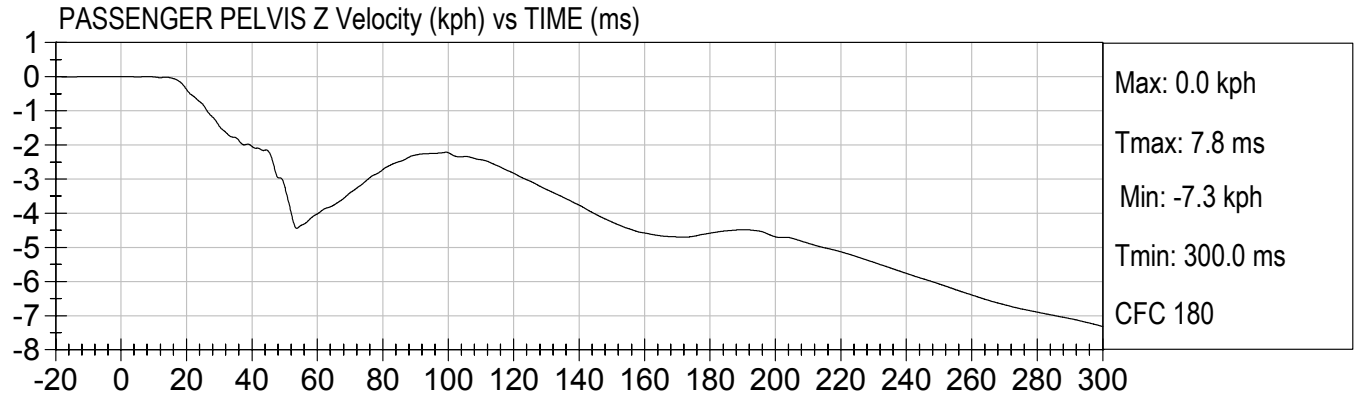







PASSENGER PELVIS X Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-5
-6
-7
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.5 kph
Tmax: 23.7 ms
Min: -6.4 kph
Tmin: 74.7 ms
CFC 180

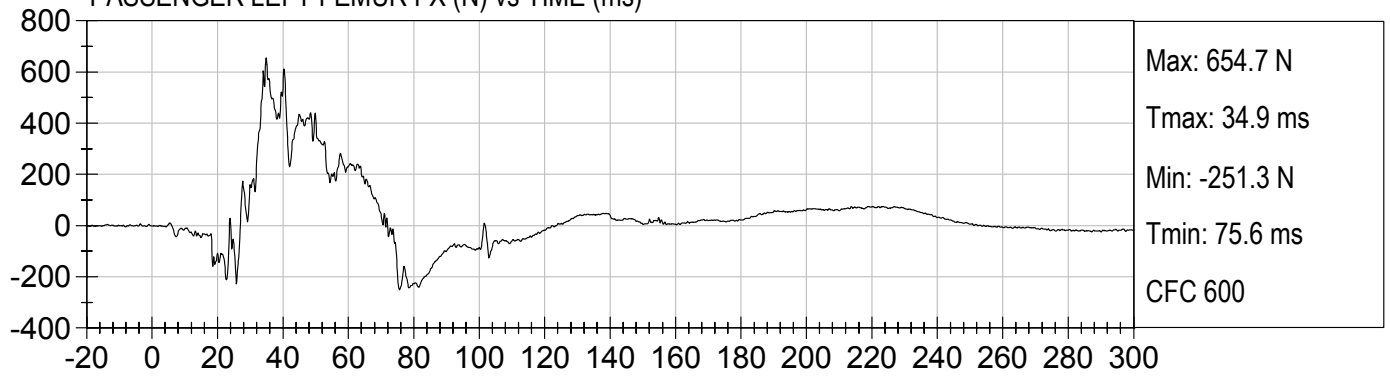

PASSENGER PELVIS Y Velocity (kph) vs TIME (ms)
35
30
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 34.1 kph
Tmax: 43.1 ms
Min: -0.0 kph
Tmin: 0.0 ms
CFC 180


PASSENGER PELVIS Z Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.0 kph
Tmax: 7.8 ms
Min: -7.3 kph
Tmin: 300.0 ms
CFC 180

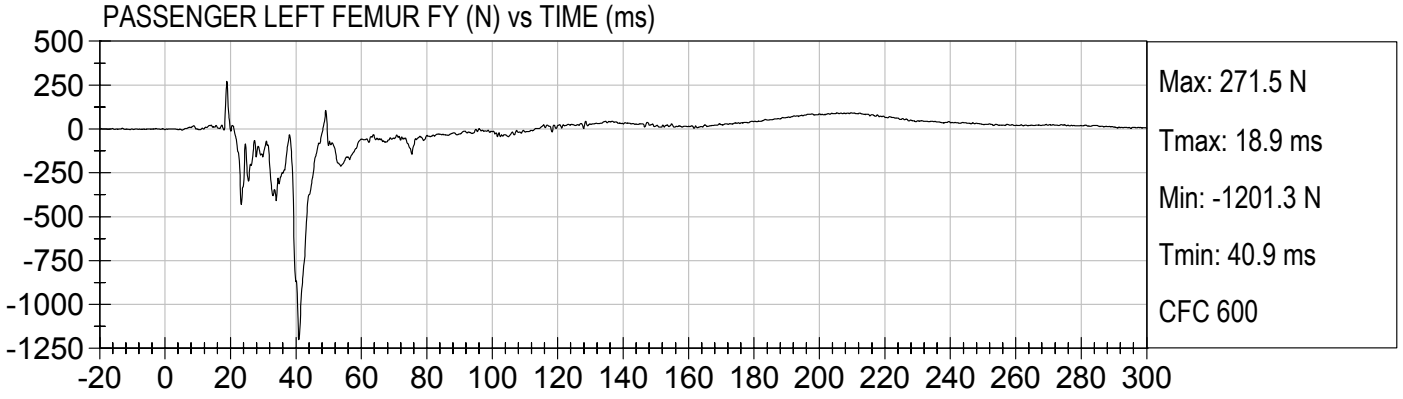
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

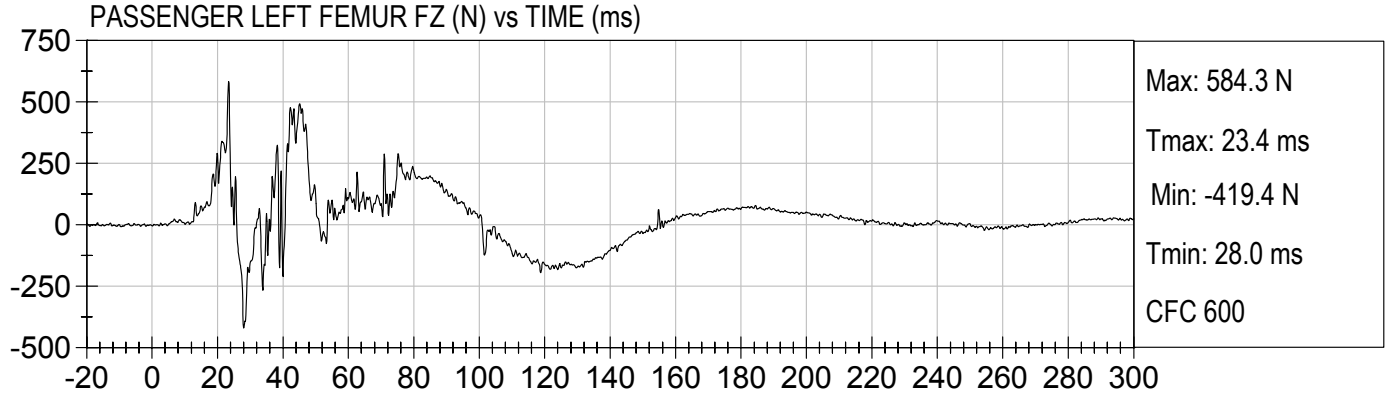
PASSENGER LEFT FEMUR FX (N) vs TIME (ms)



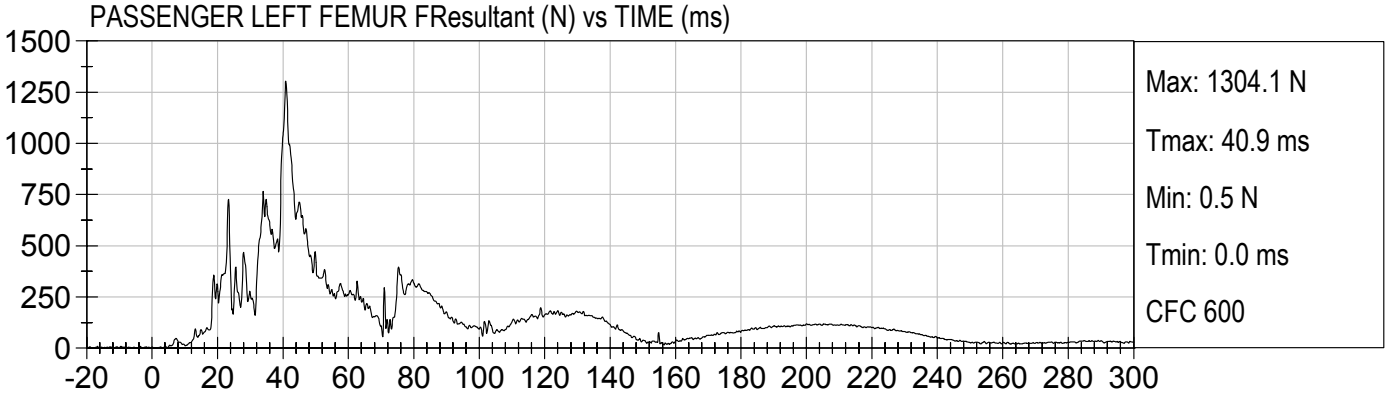
PASSENGER LEFT FEMUR FY (N) vs TIME (ms)



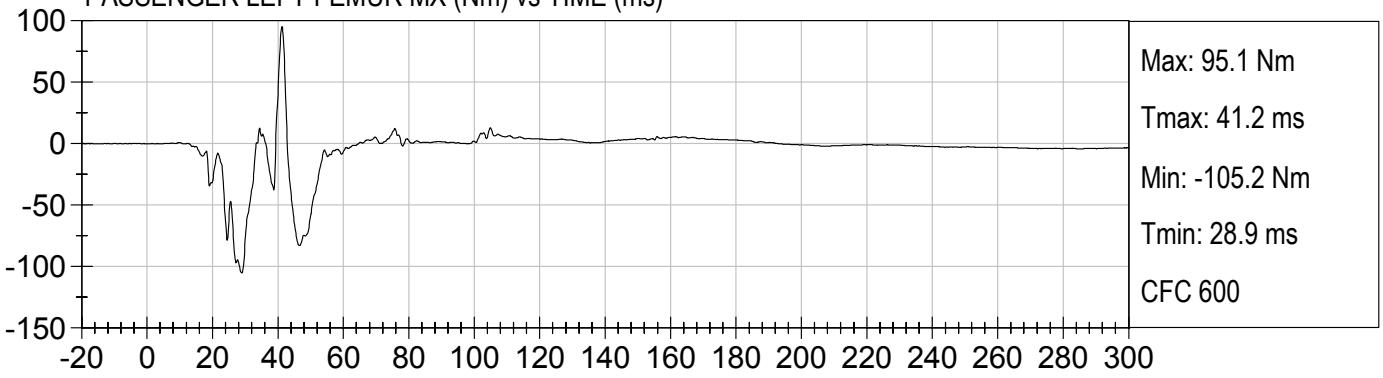
PASSENGER LEFT FEMUR FZ (N) vs TIME (ms)



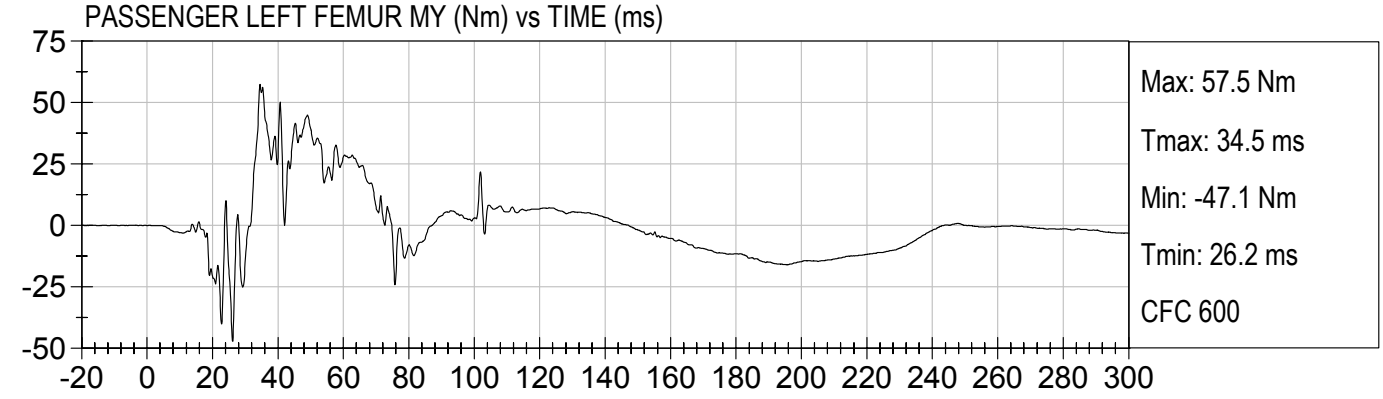
PASSENGER LEFT FEMUR FResultant (N) vs TIME (ms)



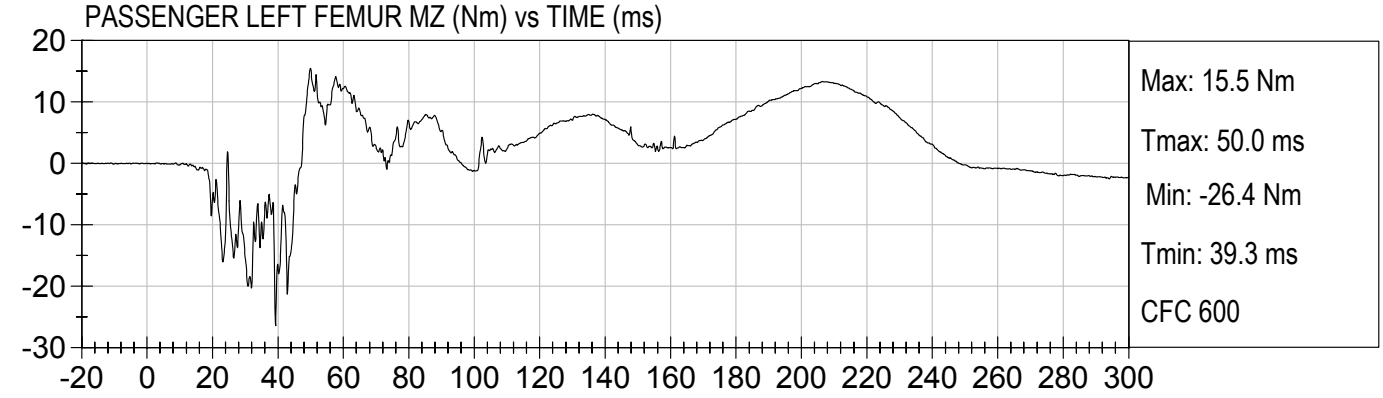
PASSENGER LEFT FEMUR MX (Nm) vs TIME (ms)



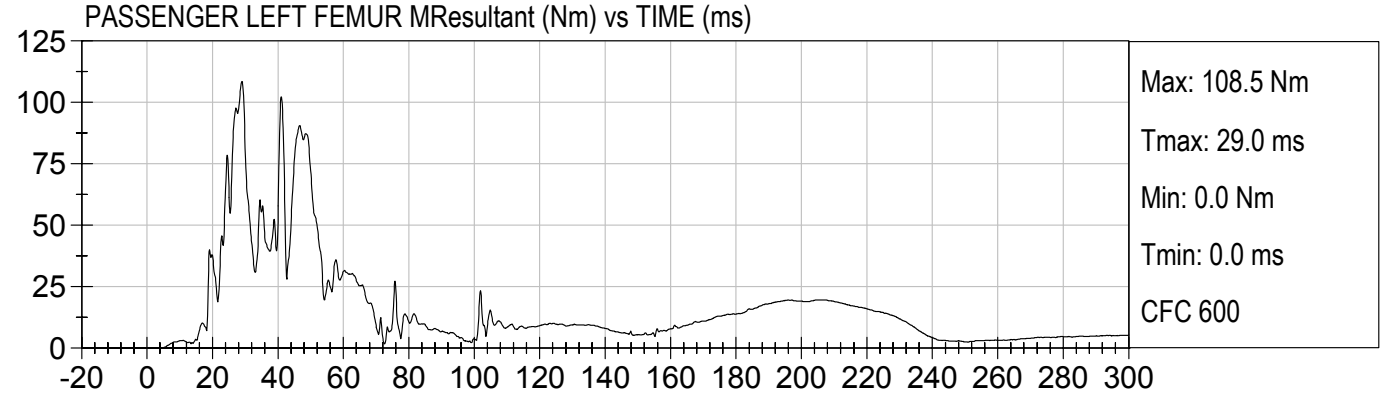
PASSENGER LEFT FEMUR MY (Nm) vs TIME (ms)



PASSENGER LEFT FEMUR MZ (Nm) vs TIME (ms)



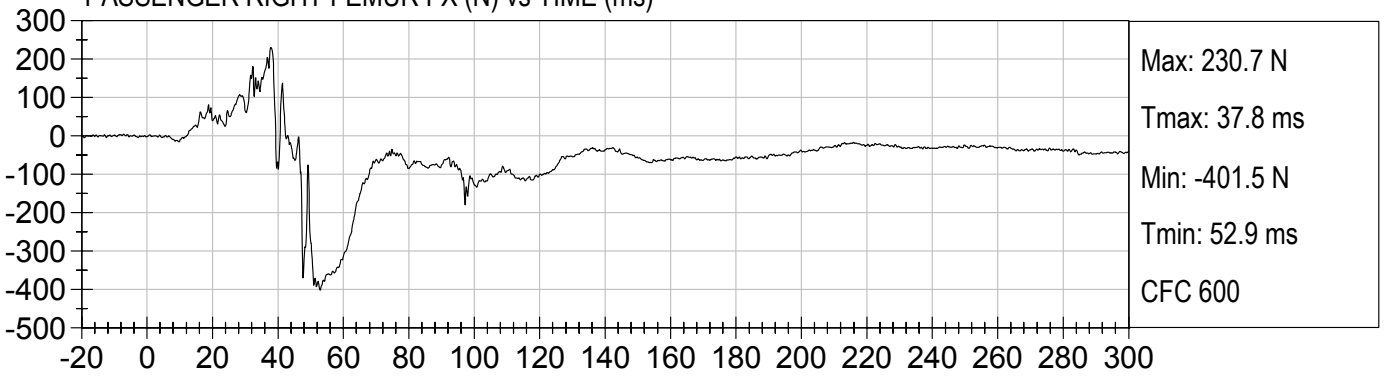
PASSENGER LEFT FEMUR MResultant (Nm) vs TIME (ms)



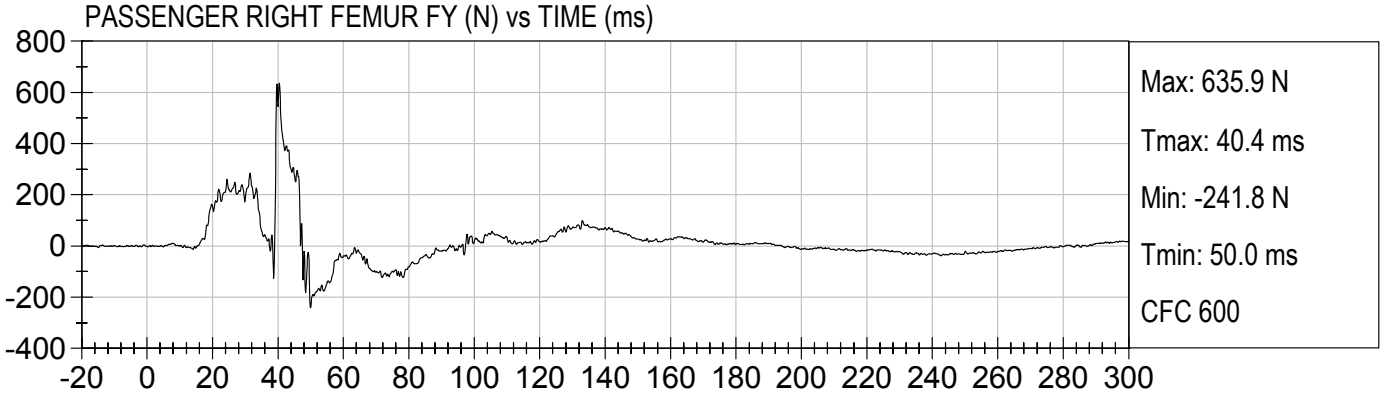
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

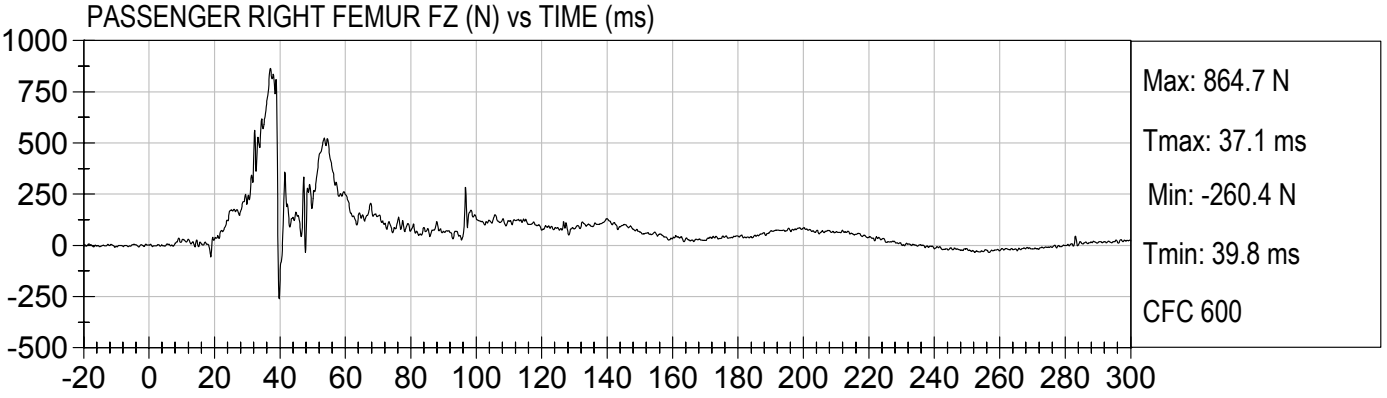
PASSENGER RIGHT FEMUR FX (N) vs TIME (ms)



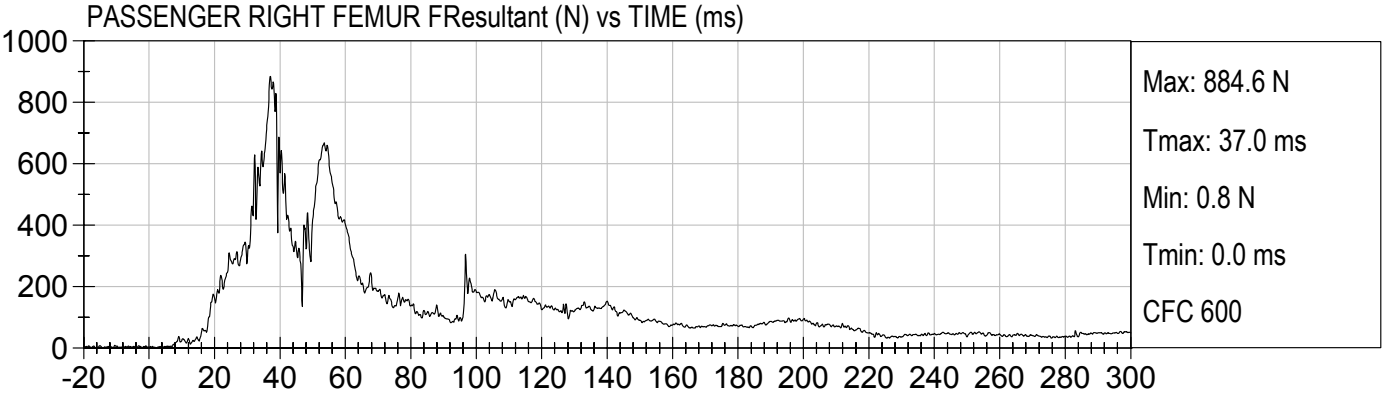
PASSENGER RIGHT FEMUR FY (N) vs TIME (ms)



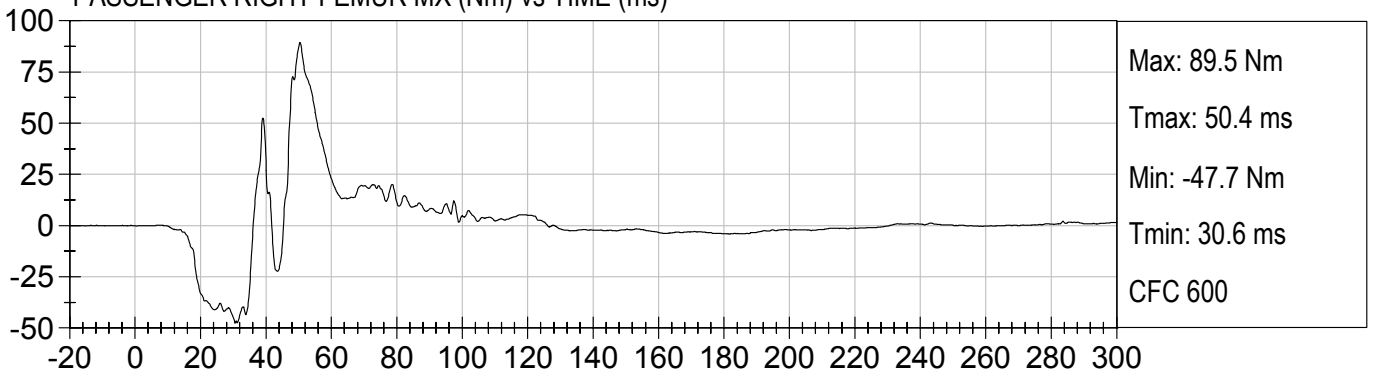
PASSENGER RIGHT FEMUR FZ (N) vs TIME (ms)



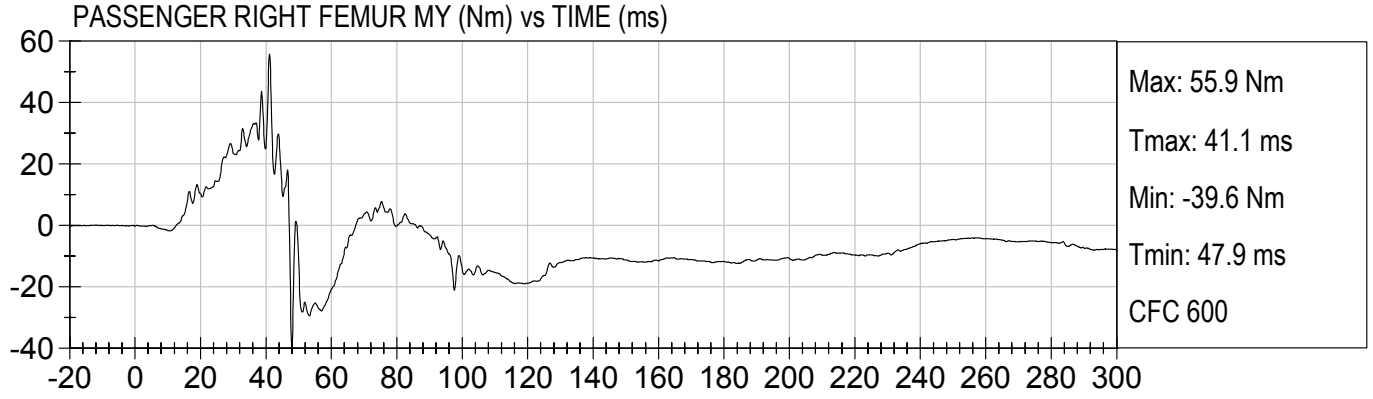
PASSENGER RIGHT FEMUR FResultant (N) vs TIME (ms)



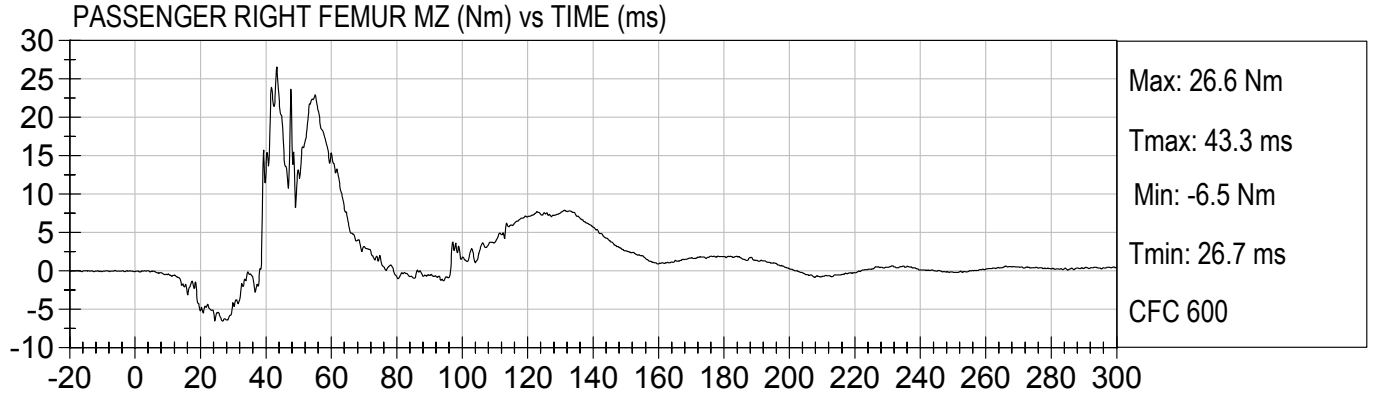
PASSENGER RIGHT FEMUR MX (Nm) vs TIME (ms)



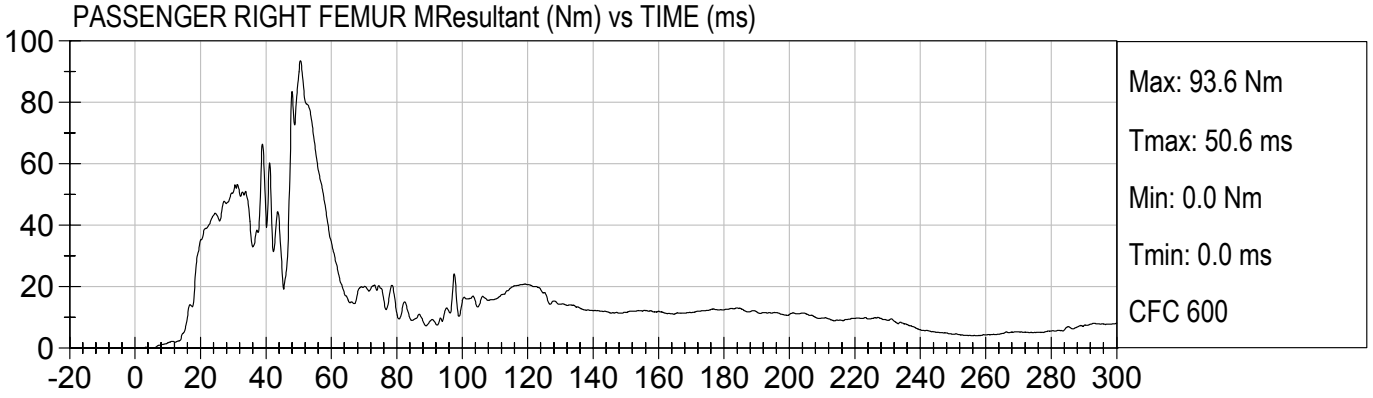
PASSENGER RIGHT FEMUR MY (Nm) vs TIME (ms)



PASSENGER RIGHT FEMUR MZ (Nm) vs TIME (ms)



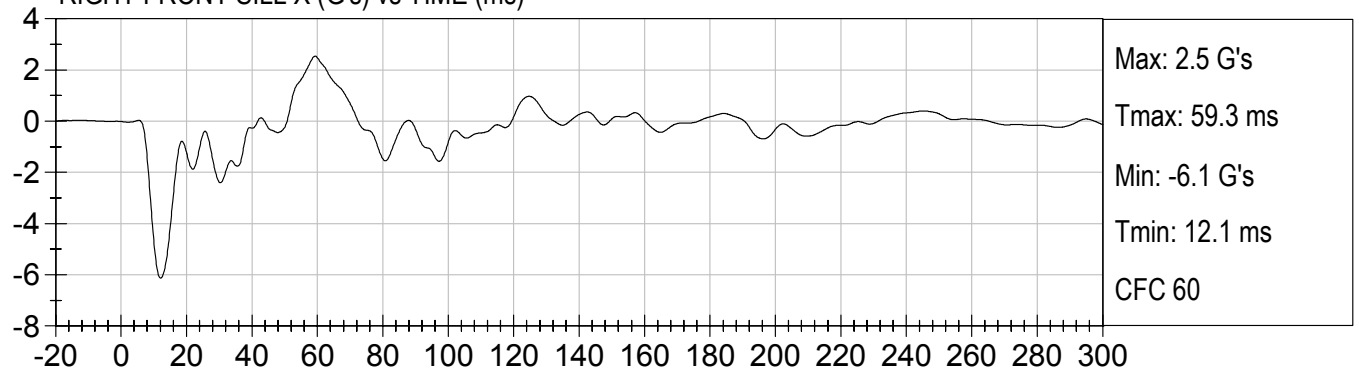
PASSENGER RIGHT FEMUR MResultant (Nm) vs TIME (ms)



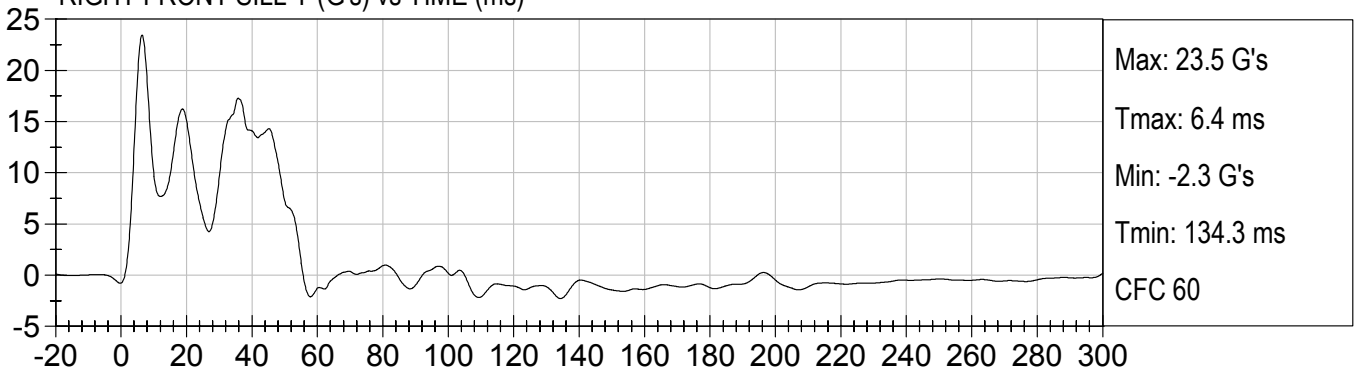
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

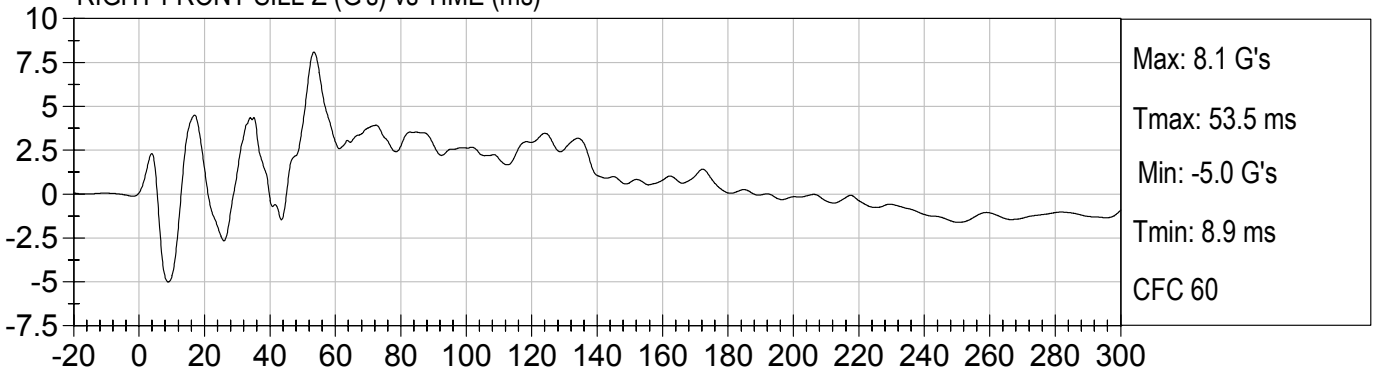
RIGHT FRONT SILL X (G's) vs TIME (ms)



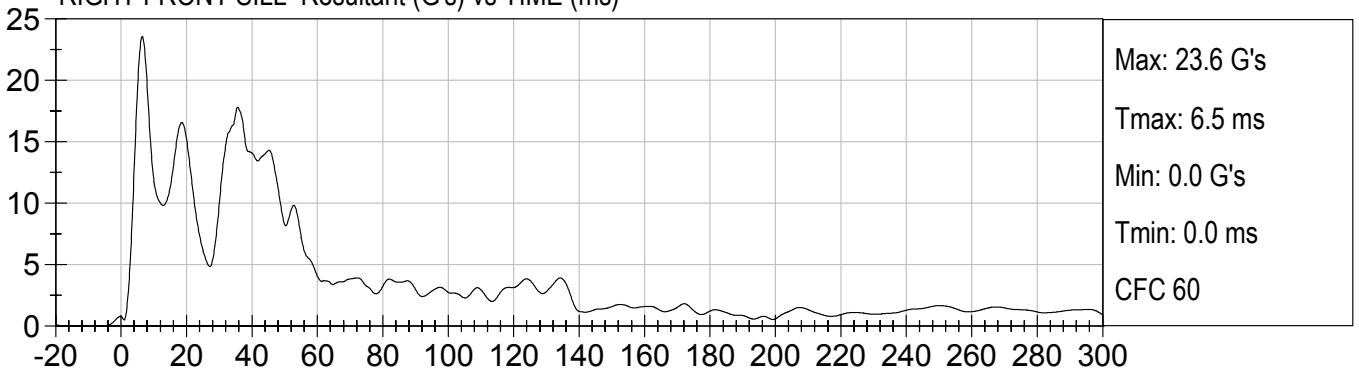
RIGHT FRONT SILL Y (G's) vs TIME (ms)



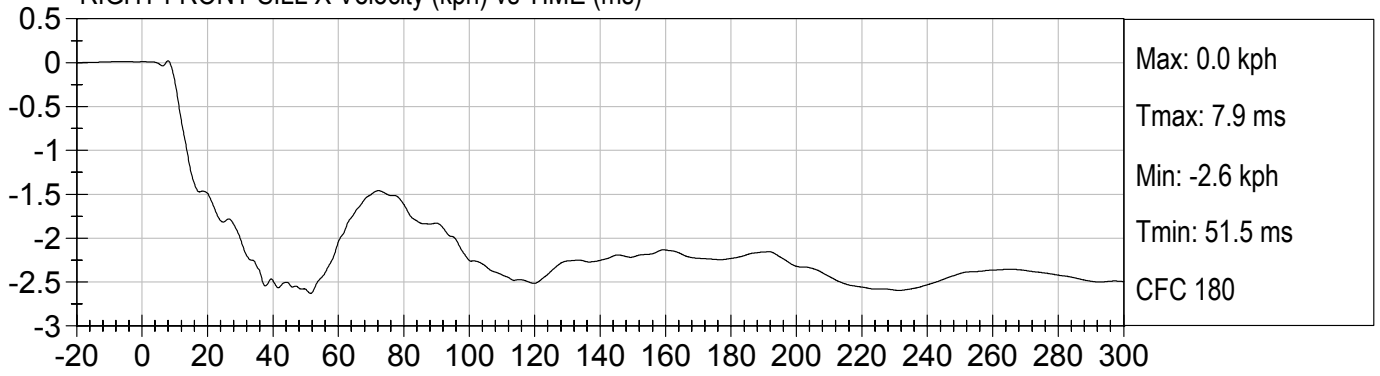
RIGHT FRONT SILL Z (G's) vs TIME (ms)



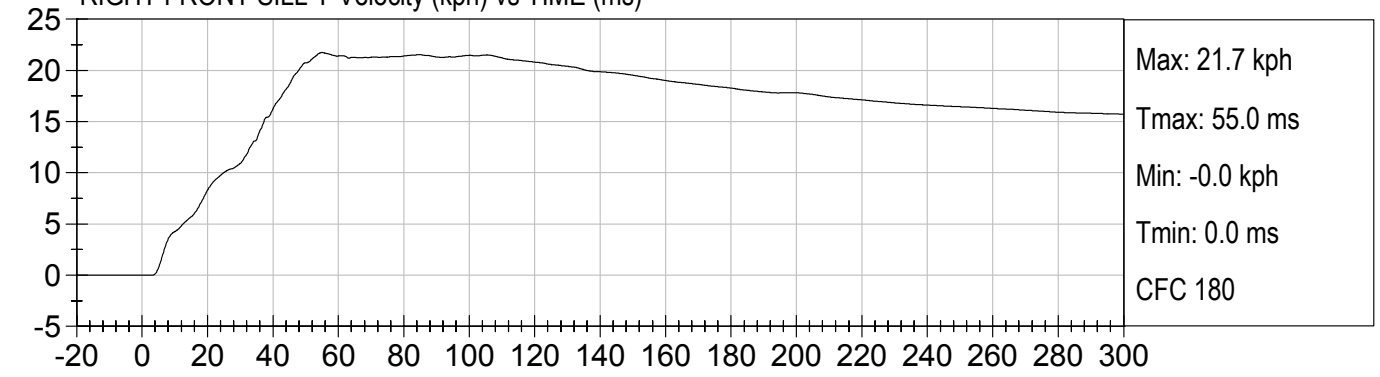
RIGHT FRONT SILL Resultant (G's) vs TIME (ms)



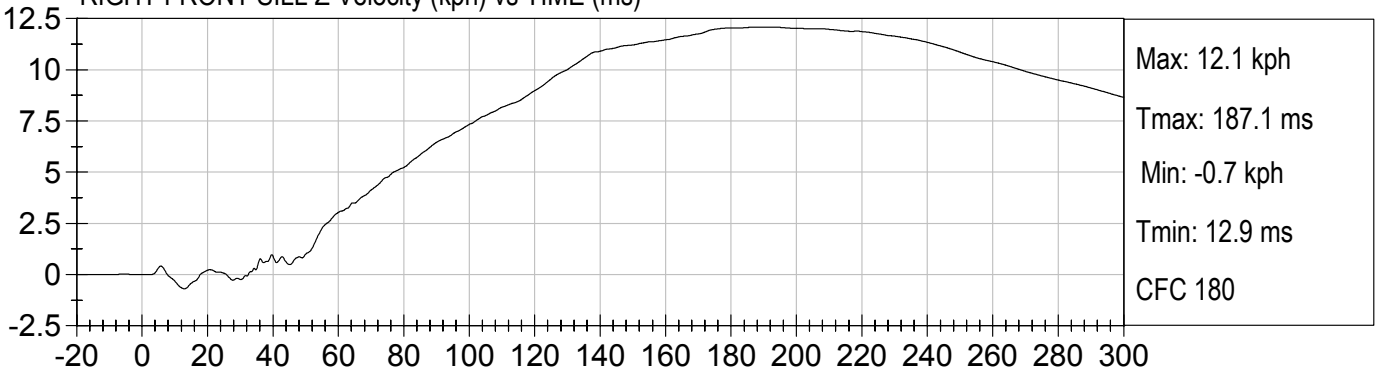
RIGHT FRONT SILL X Velocity (kph) vs TIME (ms)

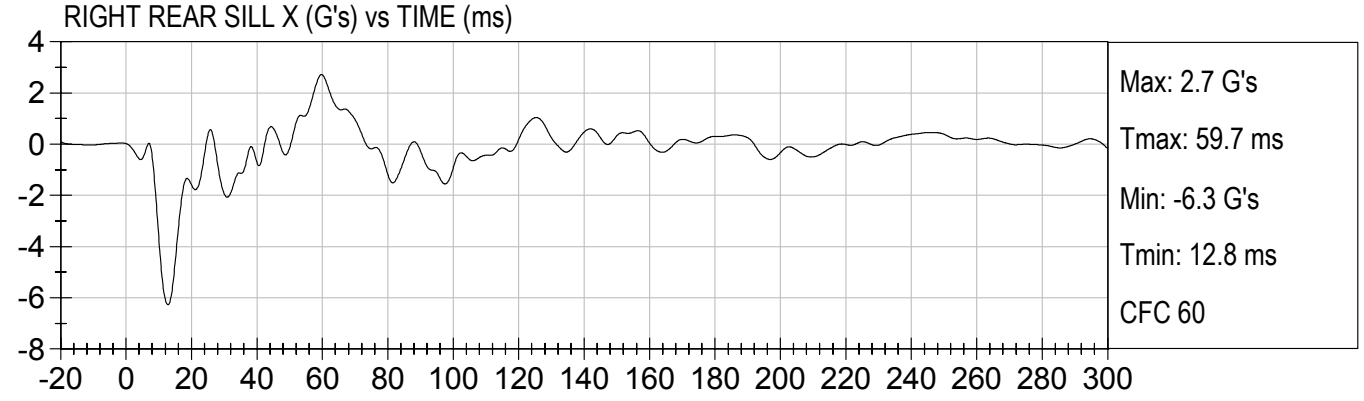


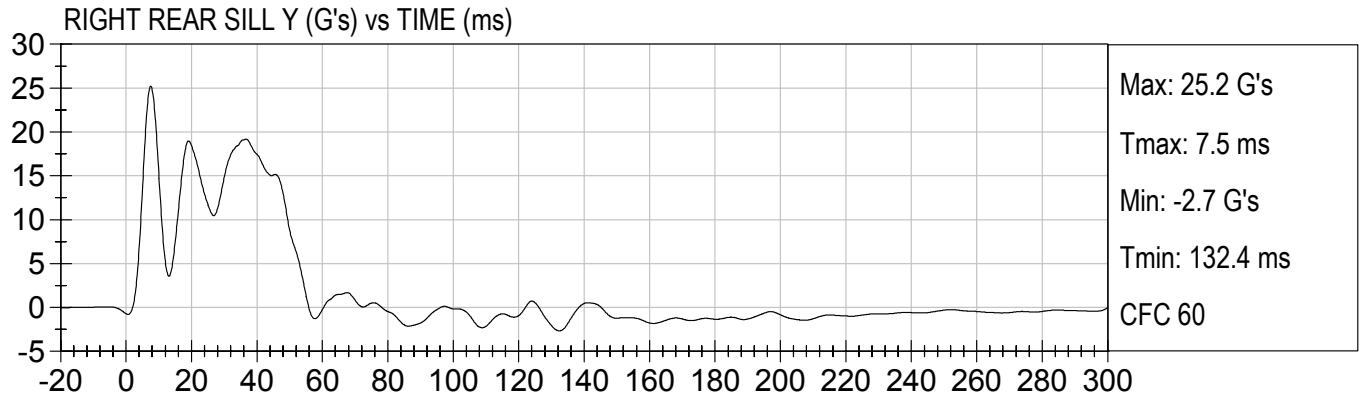
RIGHT FRONT SILL Y Velocity (kph) vs TIME (ms)

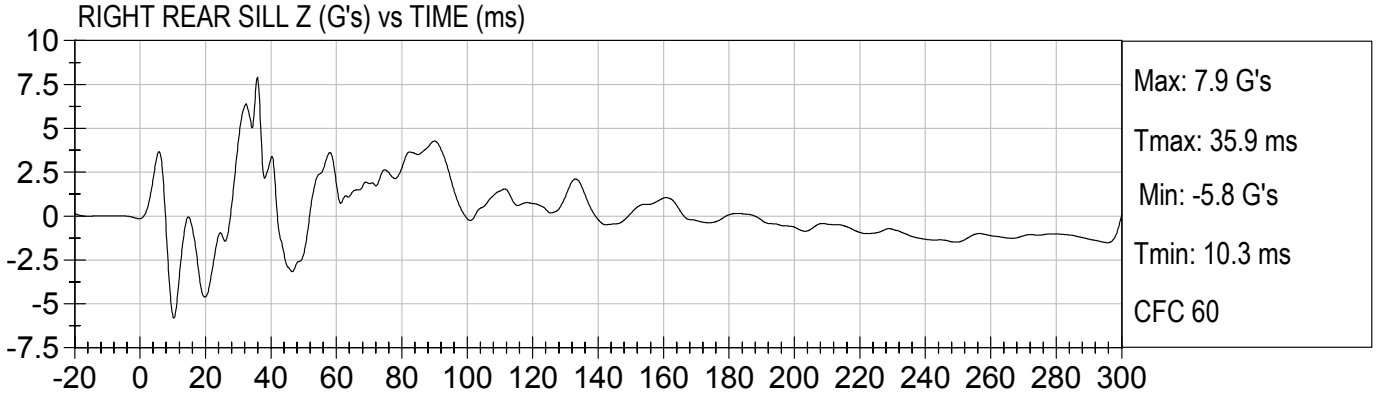


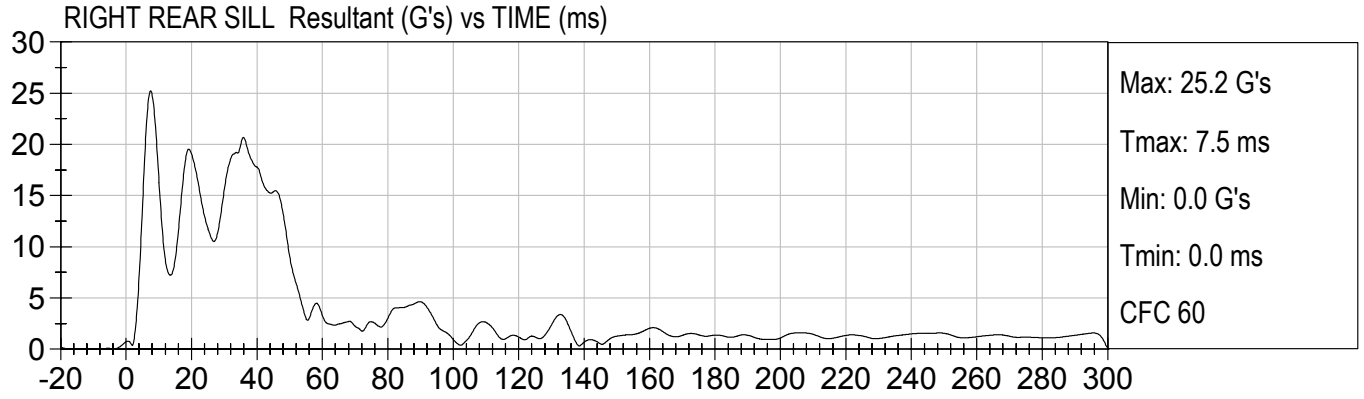
RIGHT FRONT SILL Z Velocity (kph) vs TIME (ms)



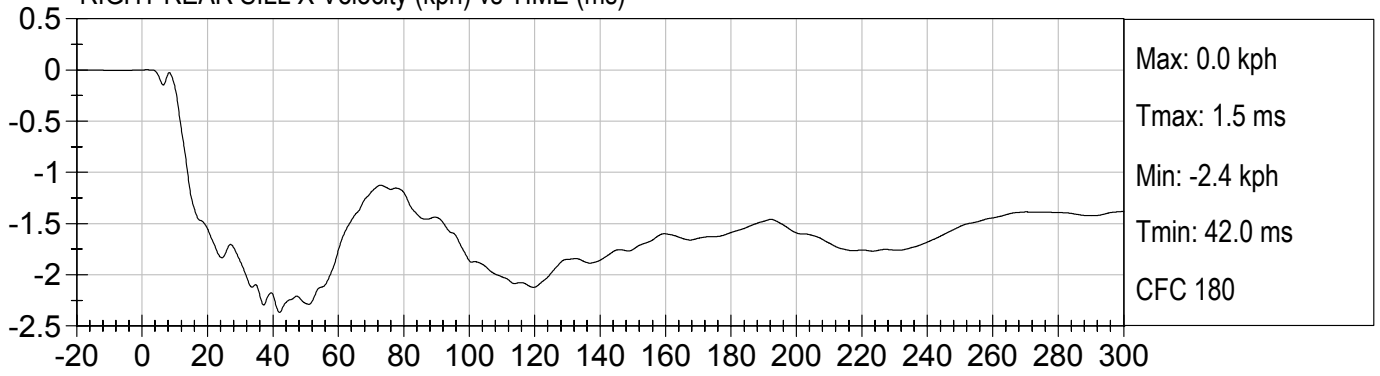

RIGHT REAR SILL X (G's) vs TIME (ms)
4
2
0
-2
-4
-6
-8
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.7 G's
Tmax: 59.7 ms
Min: -6.3 G's
Tmin: 12.8 ms
CFC 60


RIGHT REAR SILL Y (G's) vs TIME (ms)
30
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 25.2 G's
Tmax: 7.5 ms
Min: -2.7 G's
Tmin: 132.4 ms
CFC 60

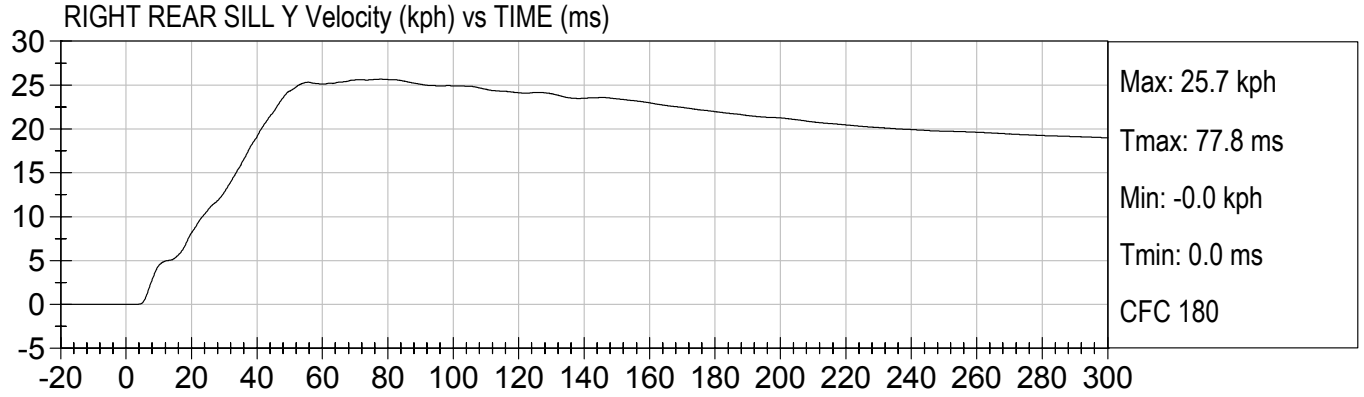

RIGHT REAR SILL Z (G's) vs TIME (ms)
10
7.5
5
2.5
0
-2.5
-5
-7.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 7.9 G's
Tmax: 35.9 ms
Min: -5.8 G's
Tmin: 10.3 ms
CFC 60


RIGHT REAR SILL Resultant (G's) vs TIME (ms)
30
25
20
15
10
5
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 25.2 G's
Tmax: 7.5 ms
Min: 0.0 G's
Tmin: 0.0 ms
CFC 60

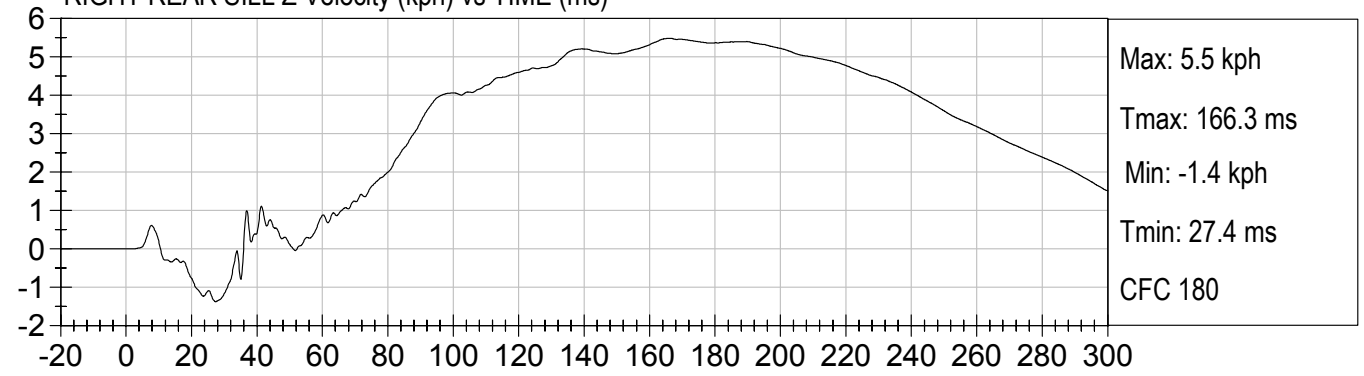
RIGHT REAR SILL X Velocity (kph) vs TIME (ms)



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

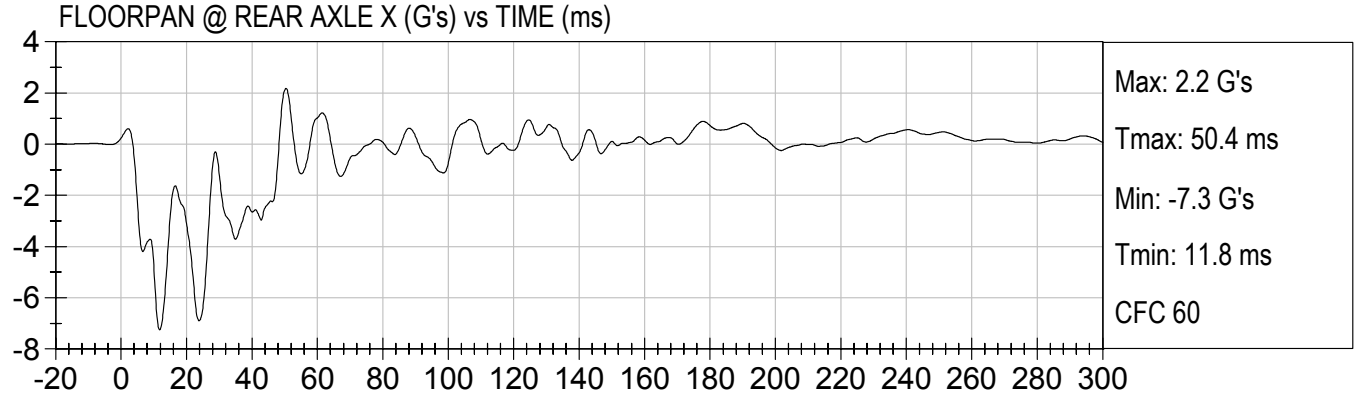


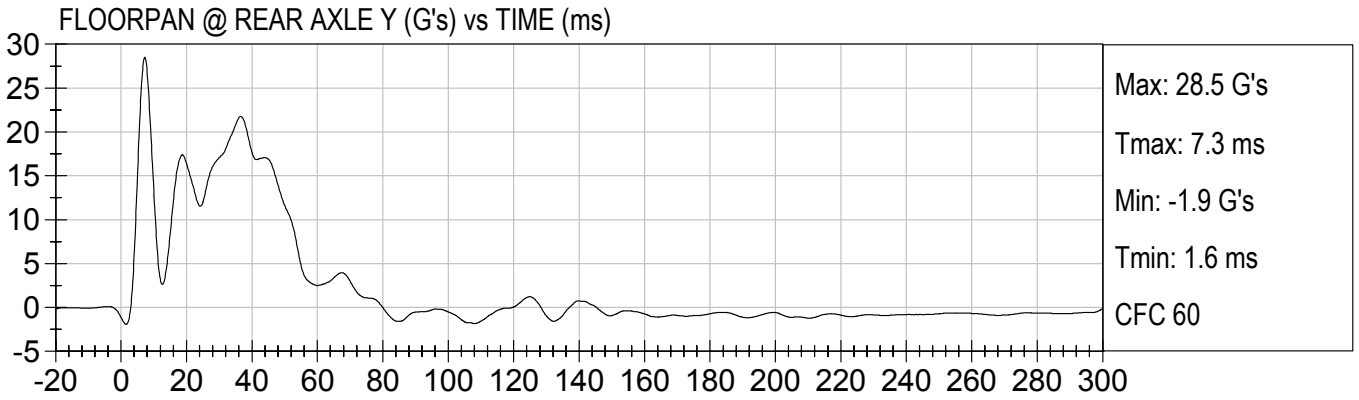
RIGHT REAR SILL Z Velocity (kph) vs TIME (ms)

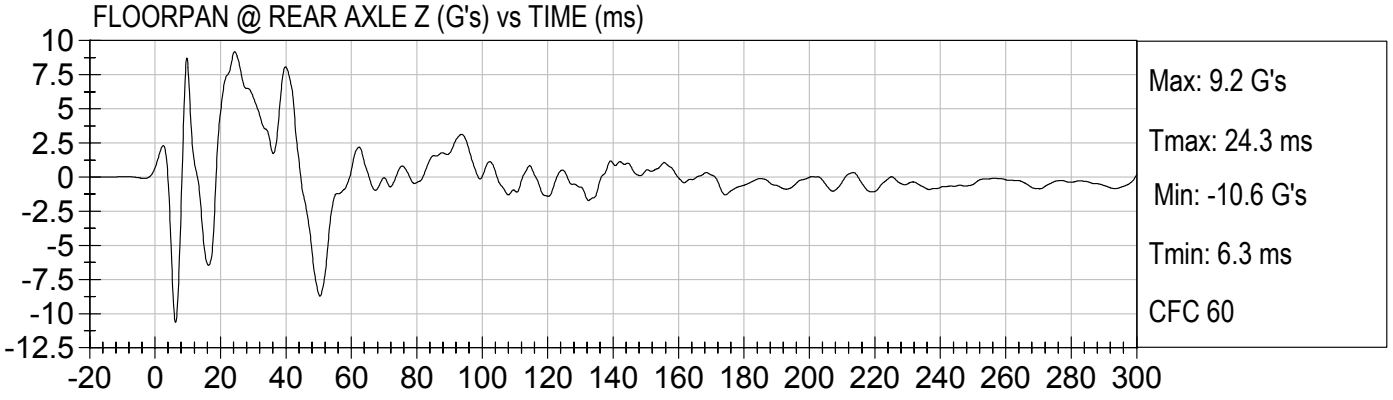


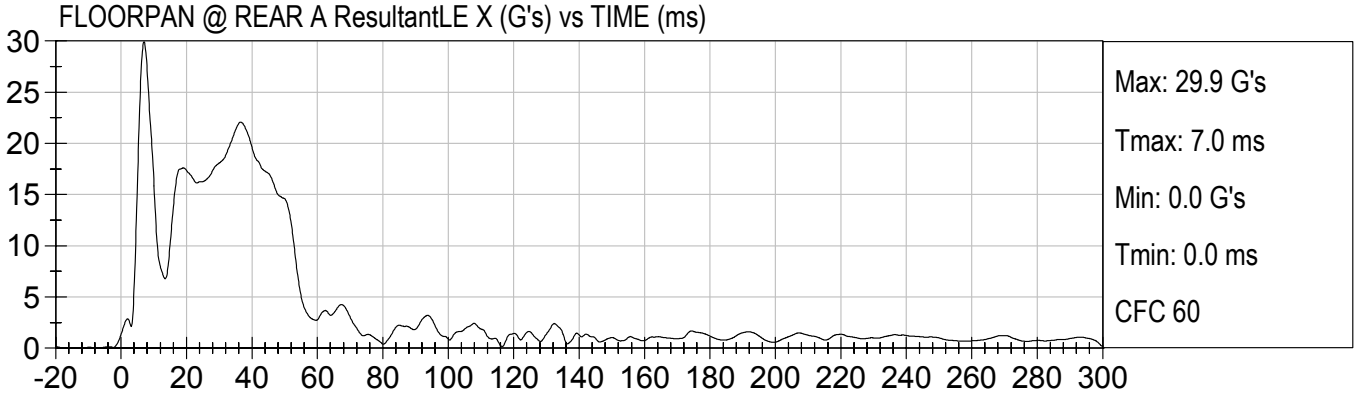
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

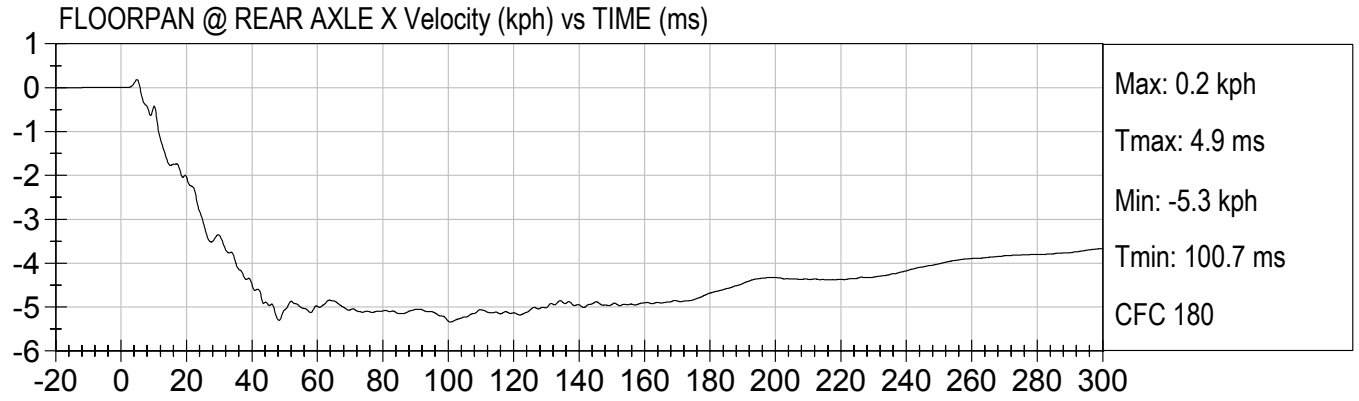
Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

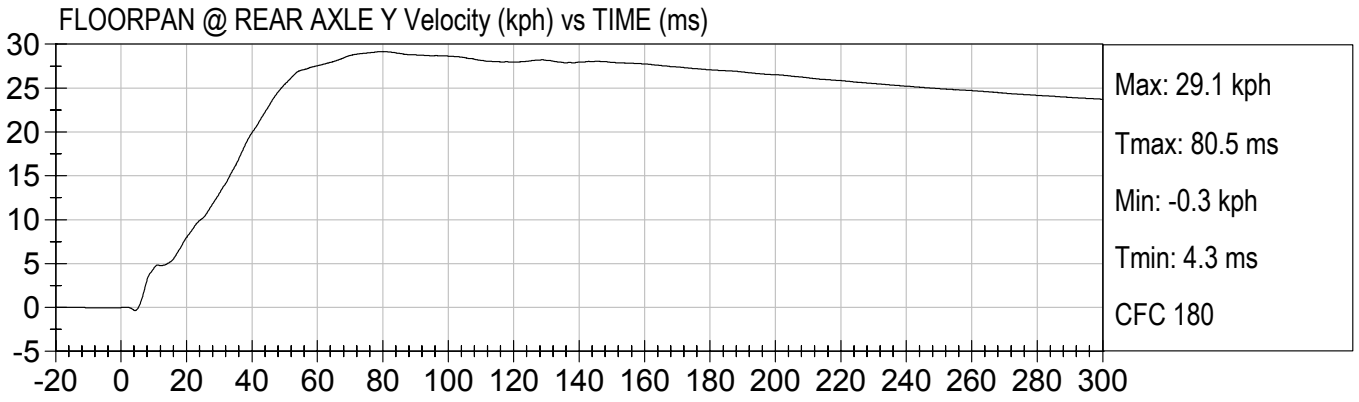


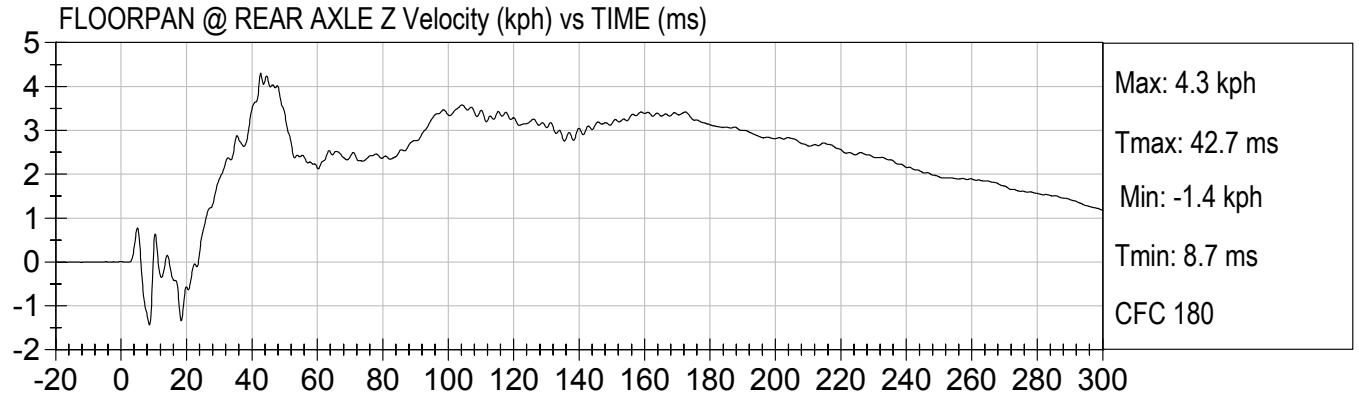




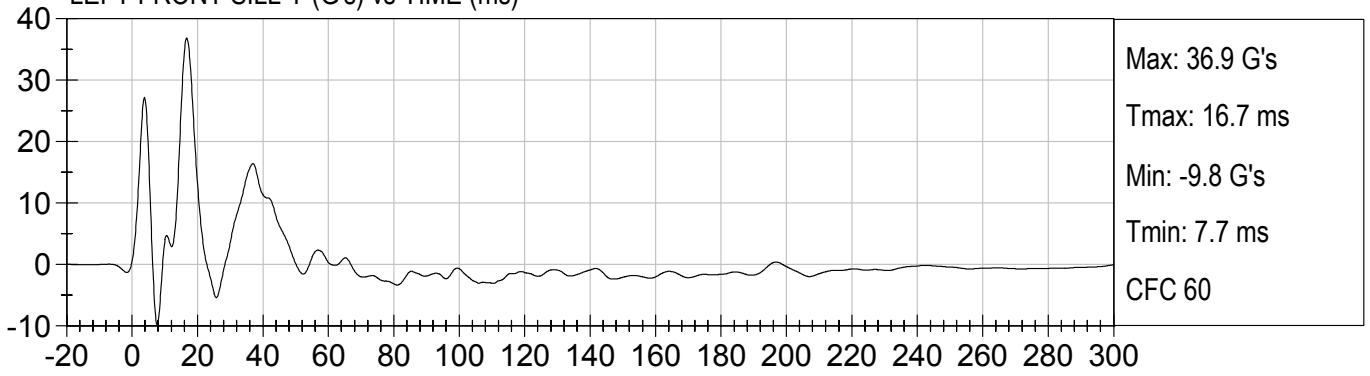



FLOORPAN @ REAR AXLE X Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-5
-6
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2 kph
Tmax: 4.9 ms
Min: -5.3 kph
Tmin: 100.7 ms
CFC 180

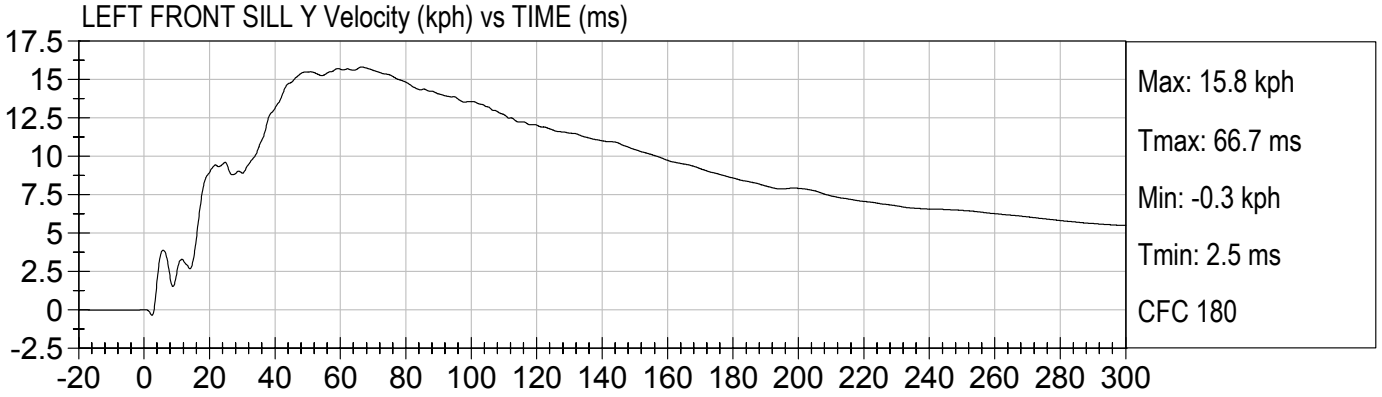

FLOORPAN @ REAR AXLE Y Velocity (kph) vs TIME (ms)
30
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 29.1 kph
Tmax: 80.5 ms
Min: -0.3 kph
Tmin: 4.3 ms
CFC 180


FLOORPAN @ REAR AXLE Z Velocity (kph) vs TIME (ms)
5
4
3
2
1
0
-1
-2
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 4.3 kph
Tmax: 42.7 ms
Min: -1.4 kph
Tmin: 8.7 ms
CFC 180

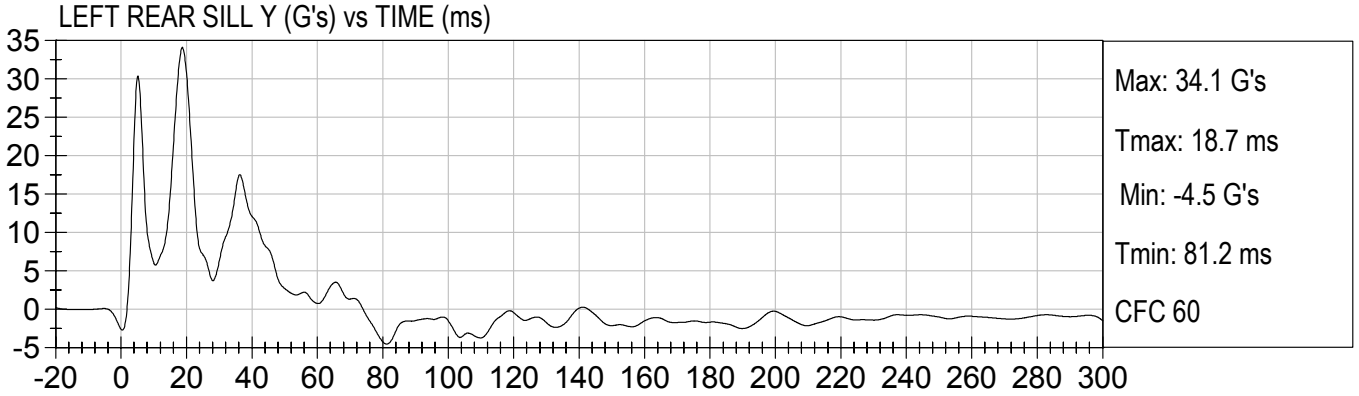
LEFT FRONT SILL Y (G's) vs TIME (ms)



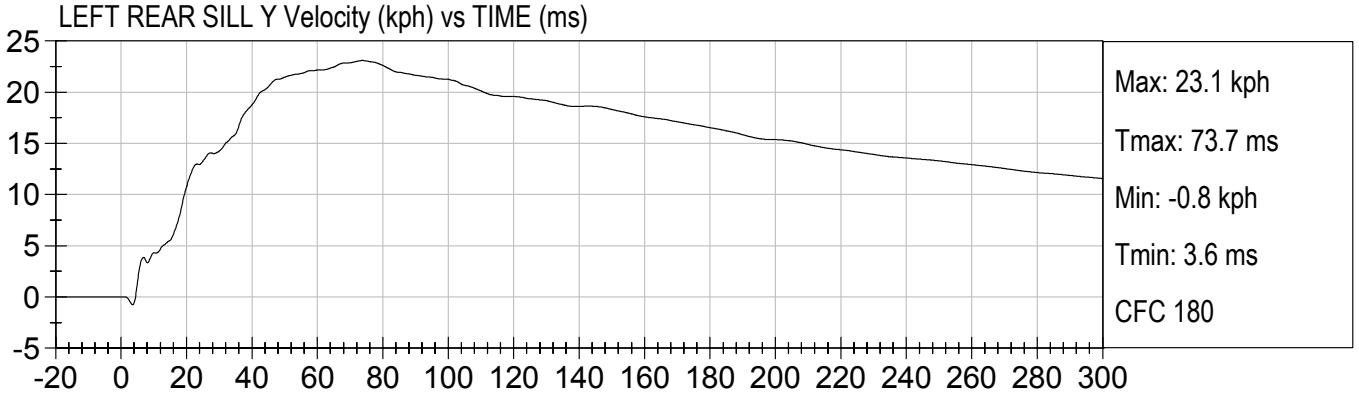
LEFT FRONT SILL Y Velocity (kph) vs TIME (ms)



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



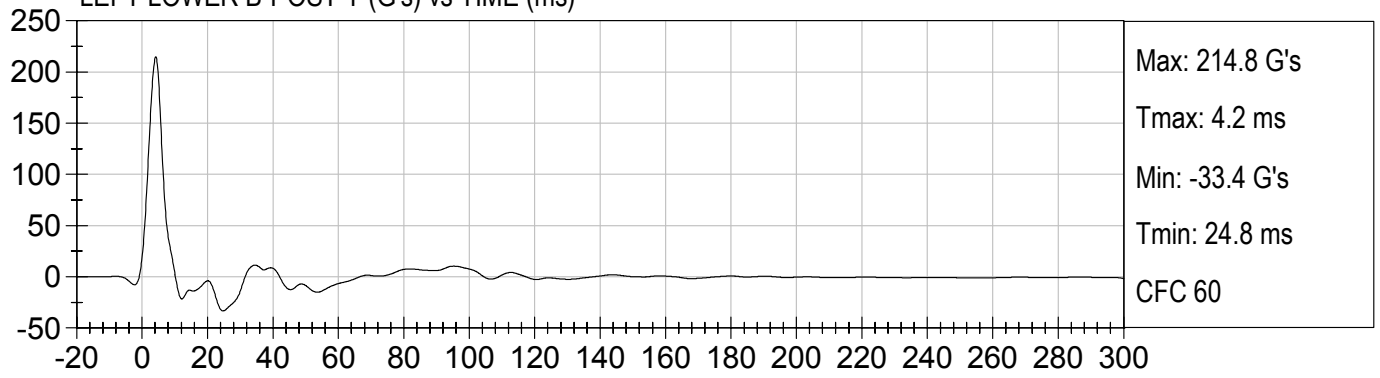
LEFT REAR SILL Y Velocity (kph) vs TIME (ms)



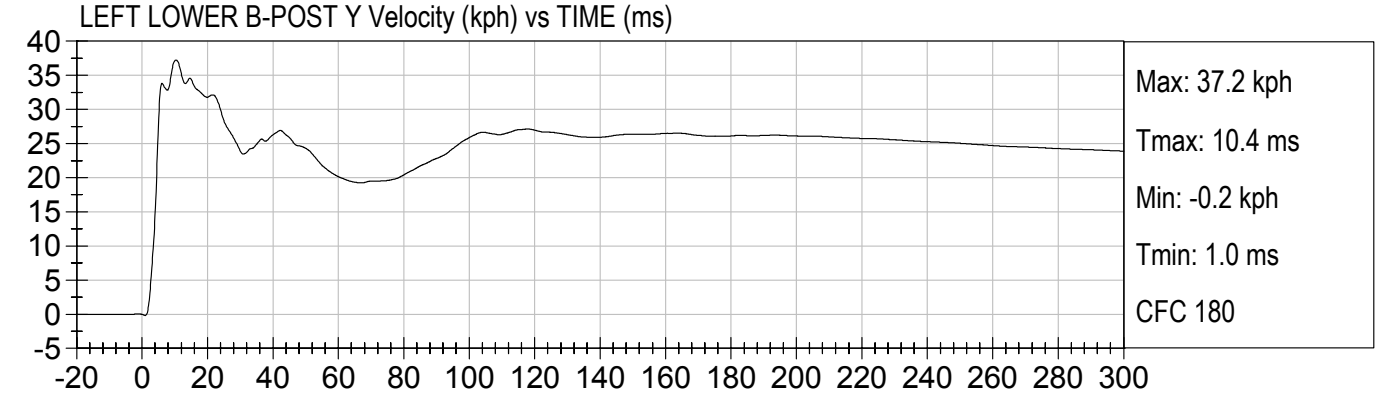
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

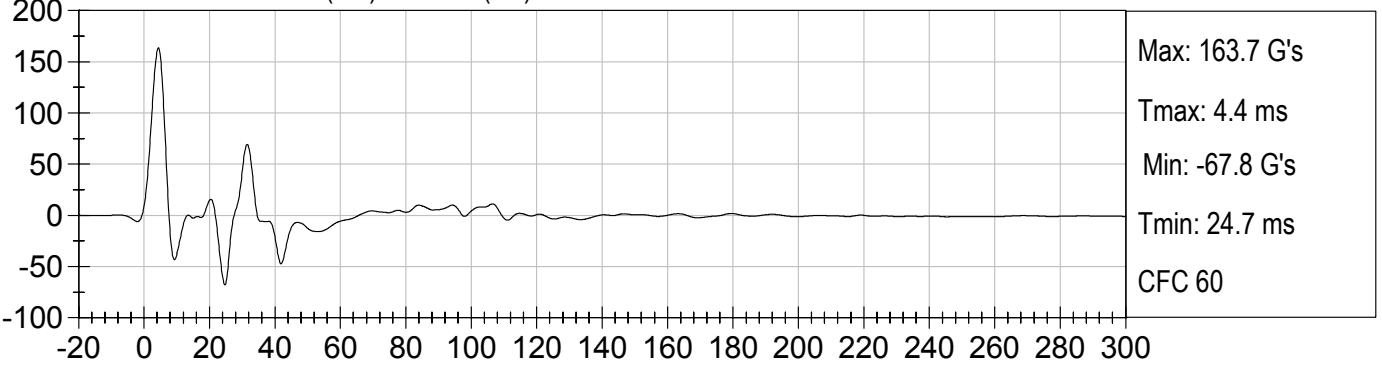
LEFT LOWER B-POST Y (G's) vs TIME (ms)



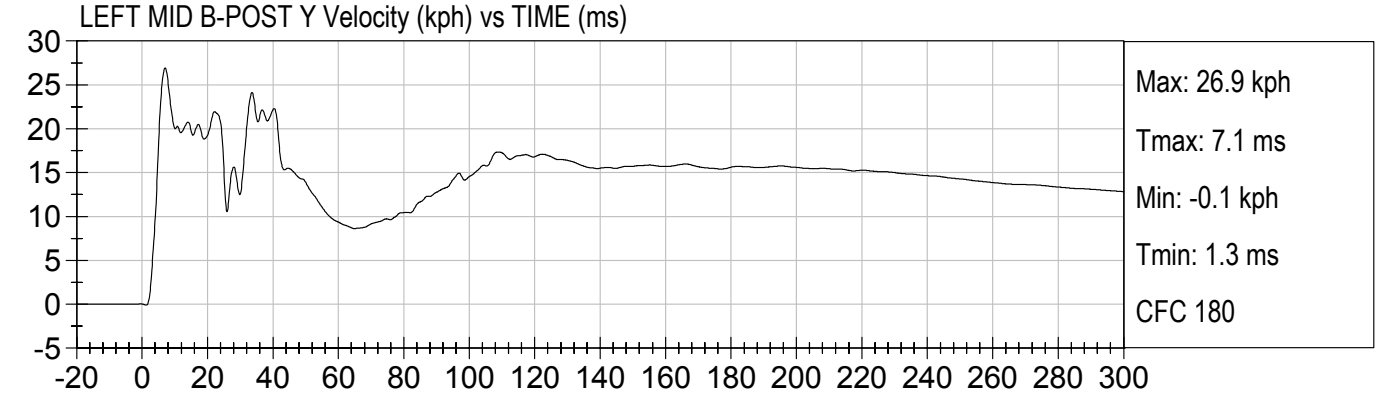
LEFT LOWER B-POST Y Velocity (kph) vs TIME (ms)



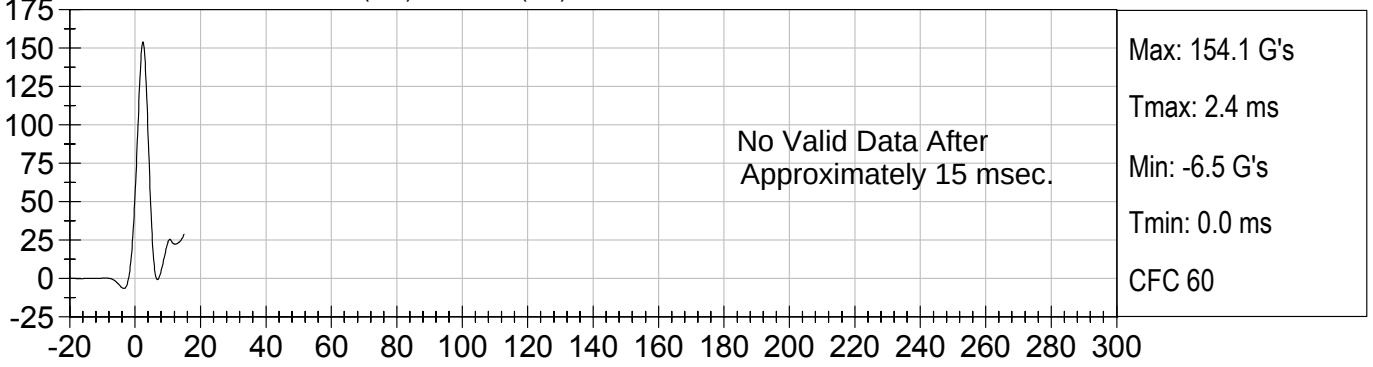
LEFT MID B-POST Y (G's) vs TIME (ms)



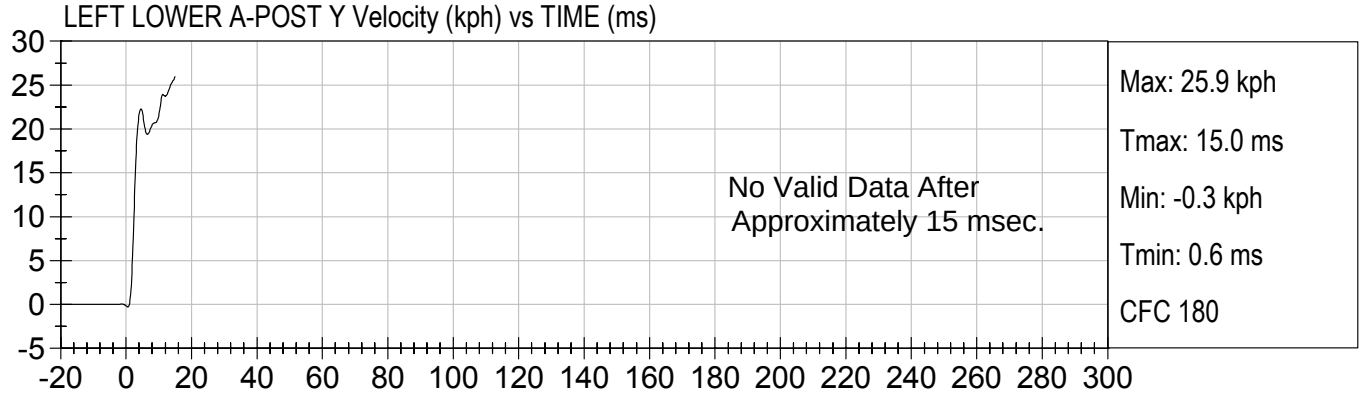
LEFT MID B-POST Y Velocity (kph) vs TIME (ms)



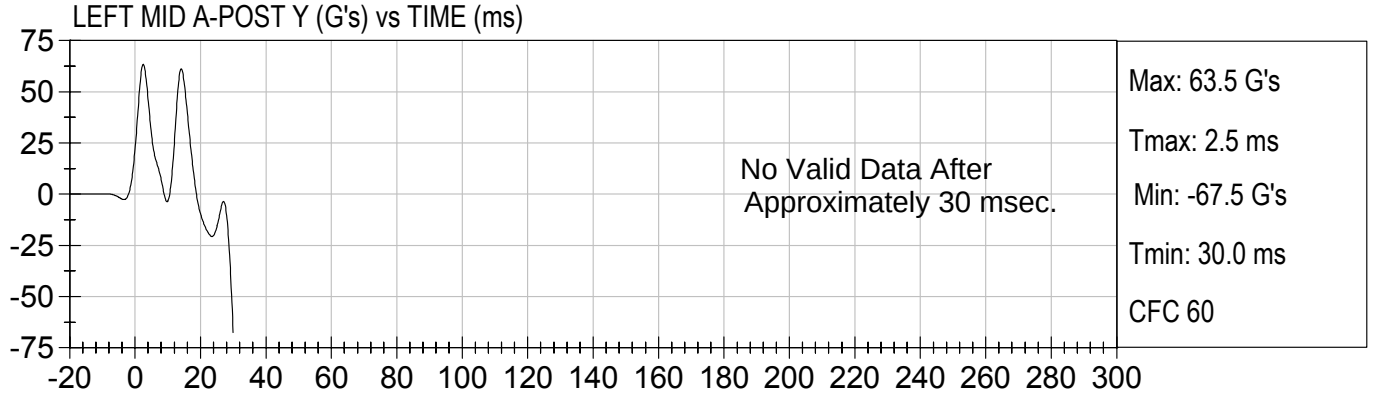
LEFT LOWER A-POST Y (G's) vs TIME (ms)



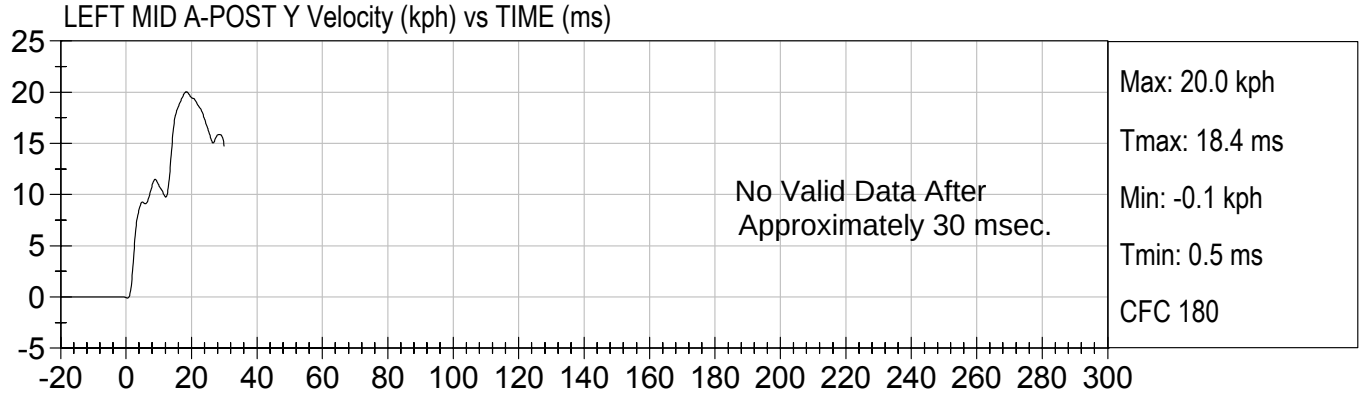
LEFT LOWER A-POST Y Velocity (kph) vs TIME (ms)



LEFT MID A-POST Y (G's) vs TIME (ms)



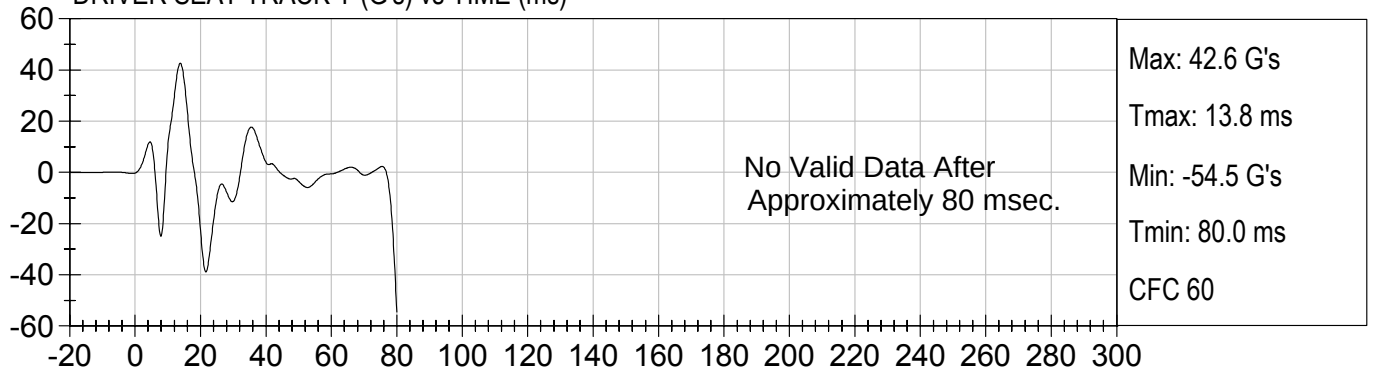
LEFT MID A-POST Y Velocity (kph) vs TIME (ms)



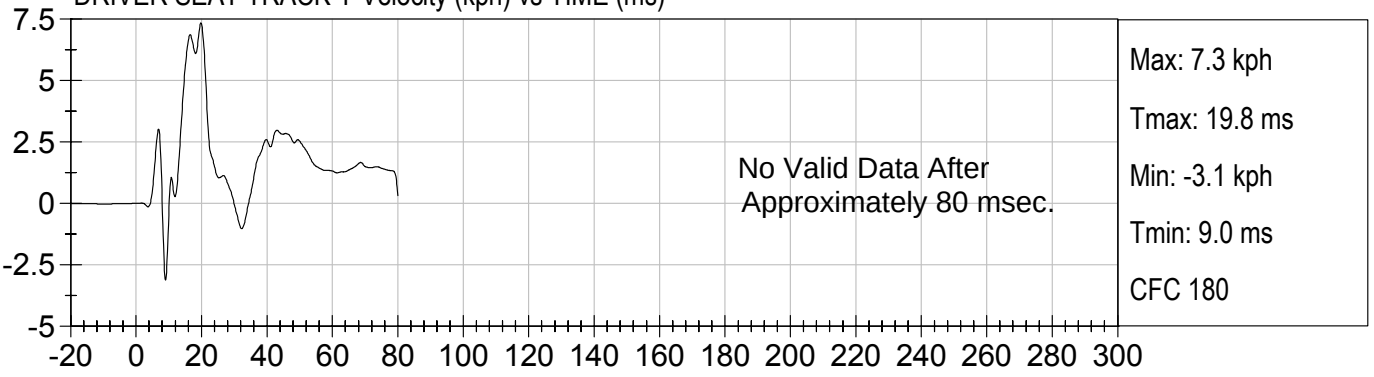
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

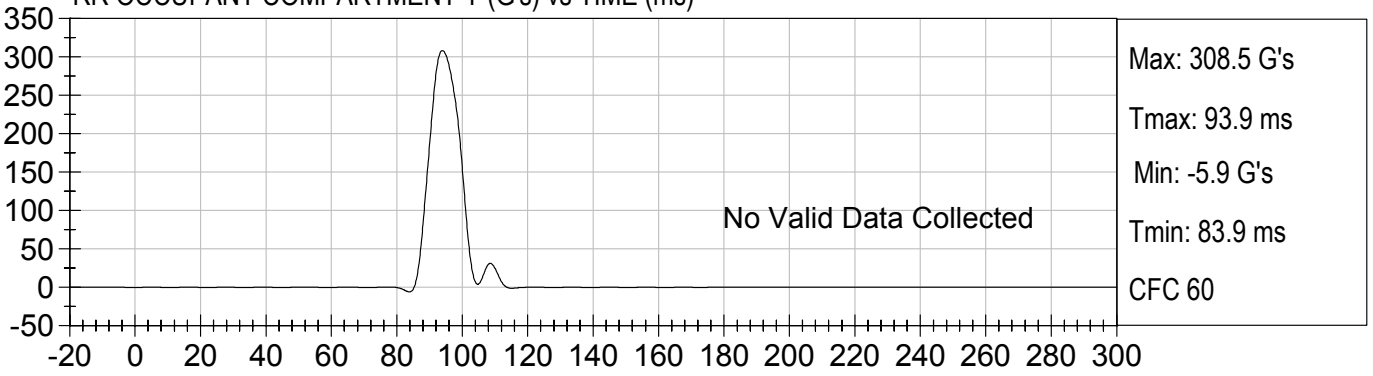
DRIVER SEAT TRACK Y (G's) vs TIME (ms)



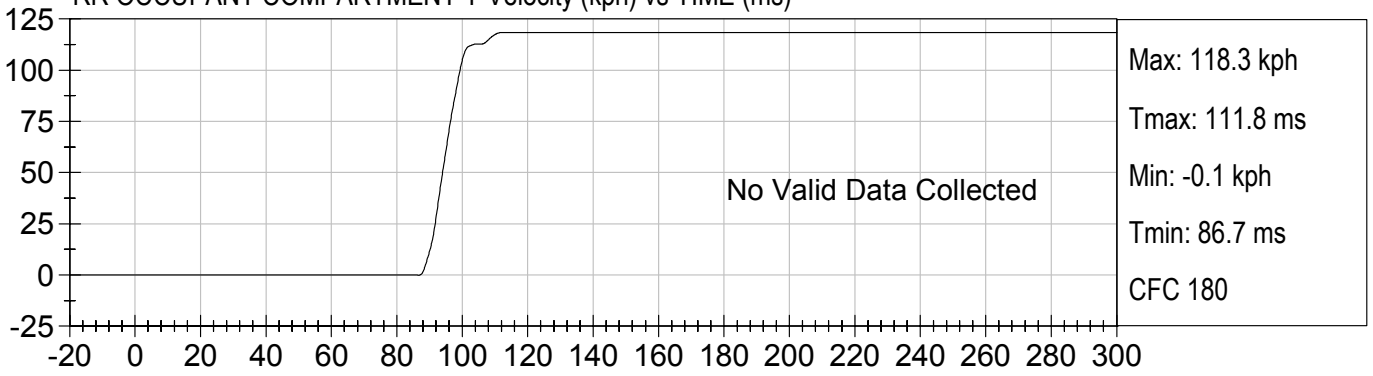
DRIVER SEAT TRACK Y Velocity (kph) vs TIME (ms)



RR OCCUPANT COMPARTMENT Y (G's) vs TIME (ms)

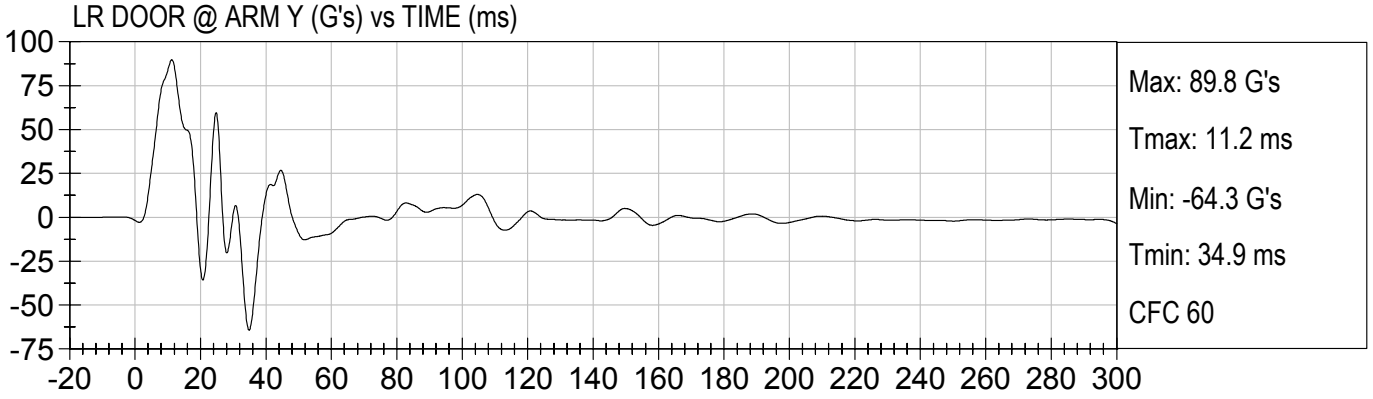


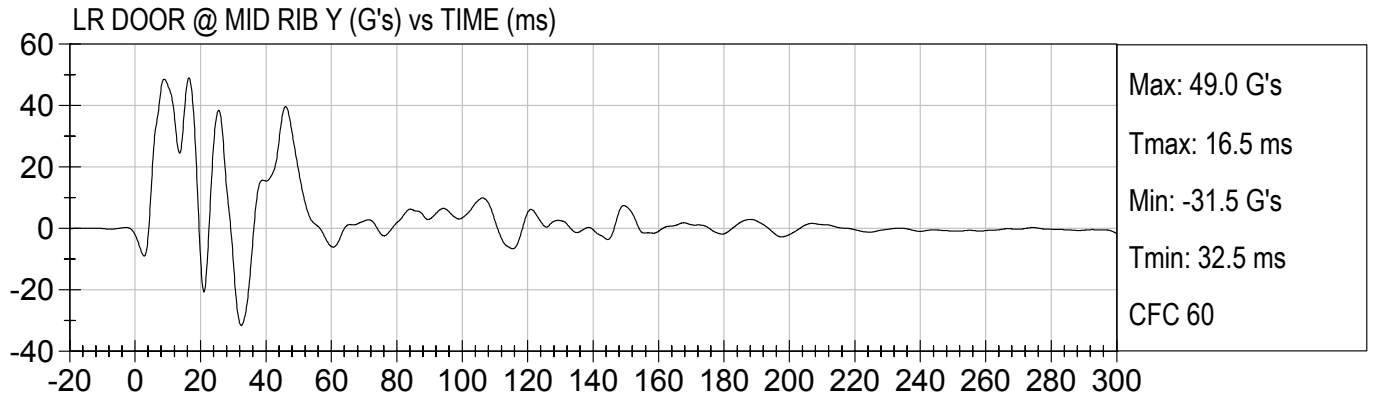
RR OCCUPANT COMPARTMENT Y Velocity (kph) vs TIME (ms)

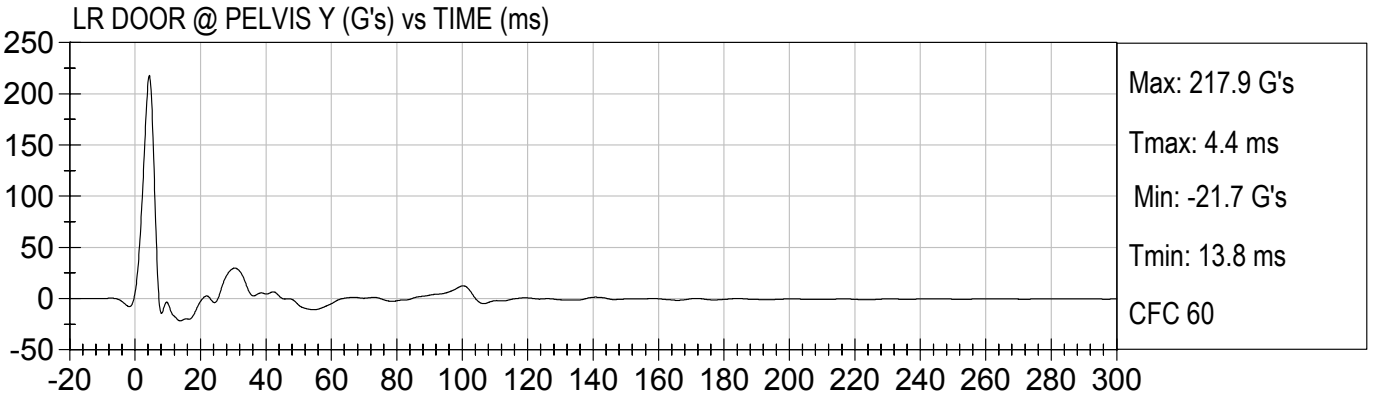


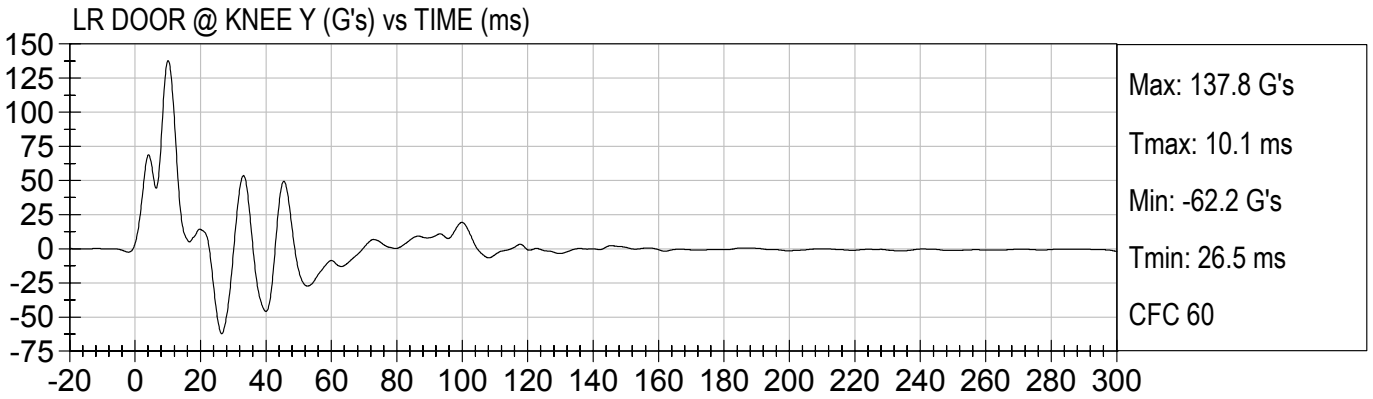
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

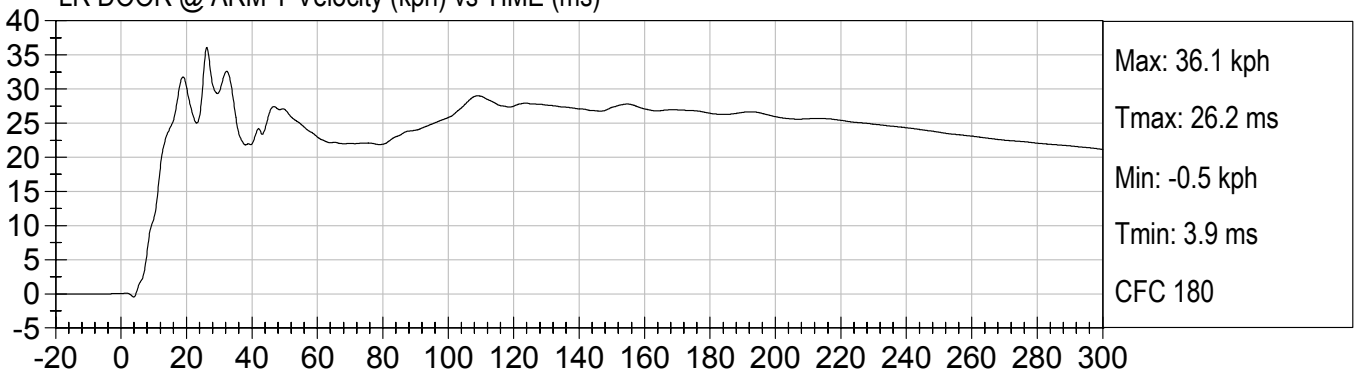




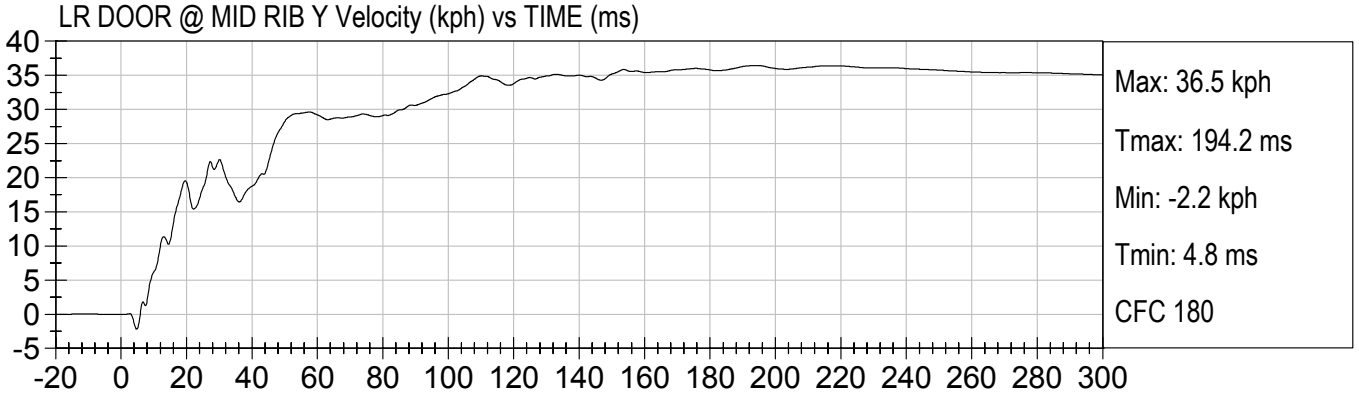




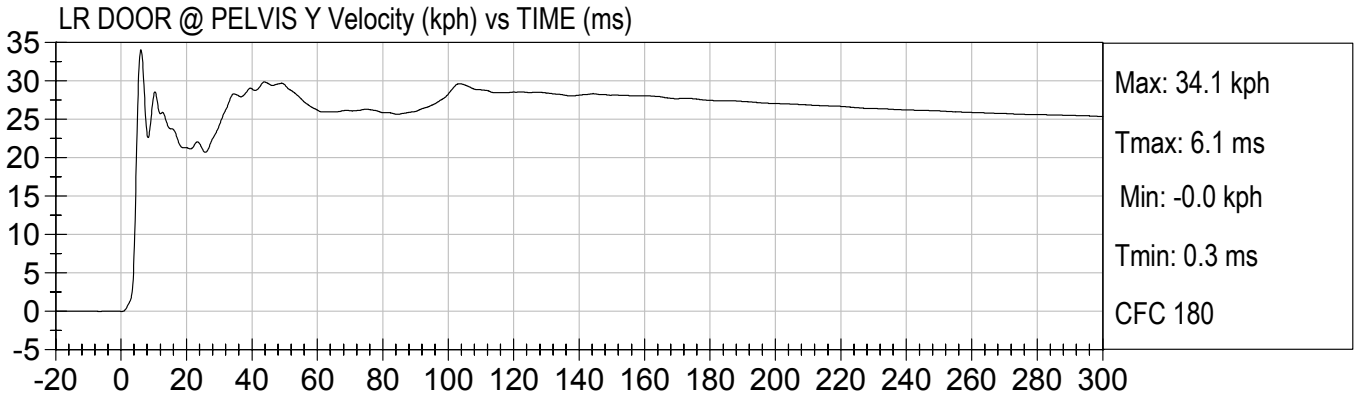
LR DOOR @ ARM Y Velocity (kph) vs TIME (ms)



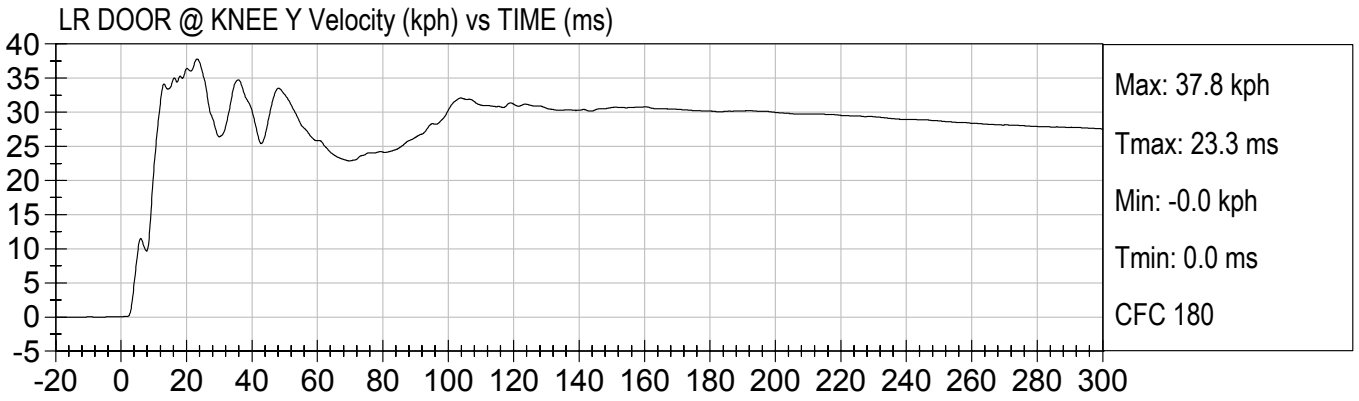
LR DOOR @ MID RIB Y Velocity (kph) vs TIME (ms)



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

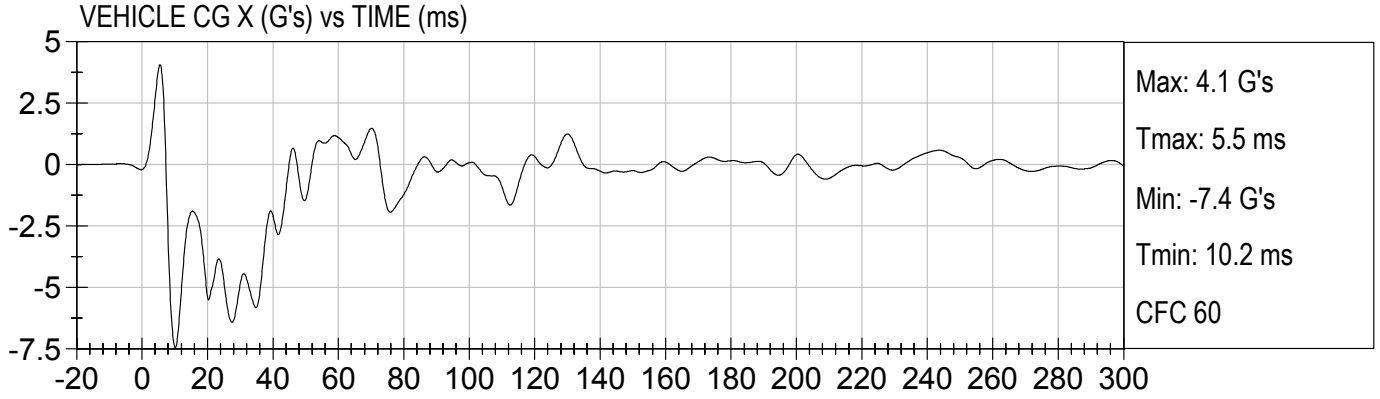


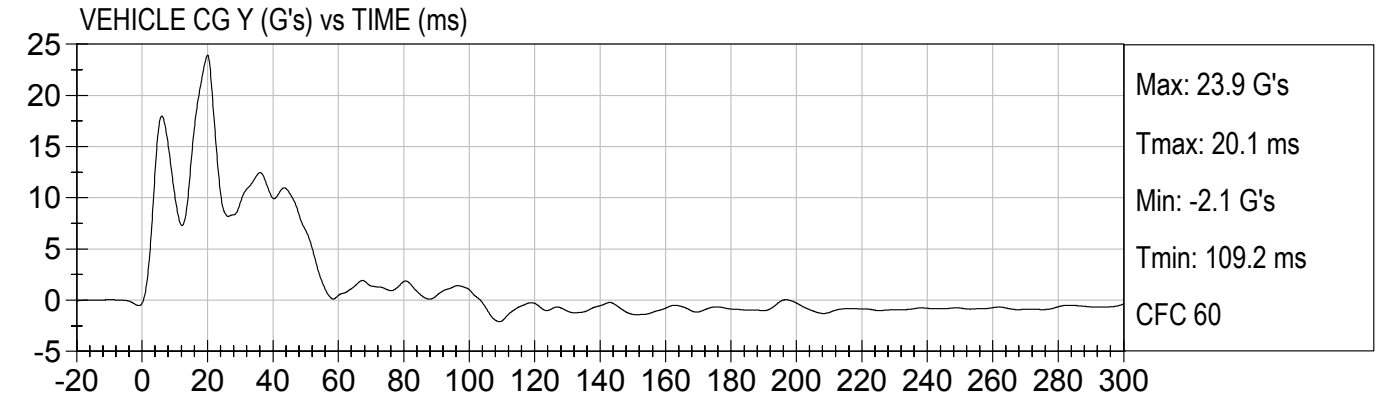
LR DOOR @ KNEE Y Velocity (kph) vs TIME (ms)

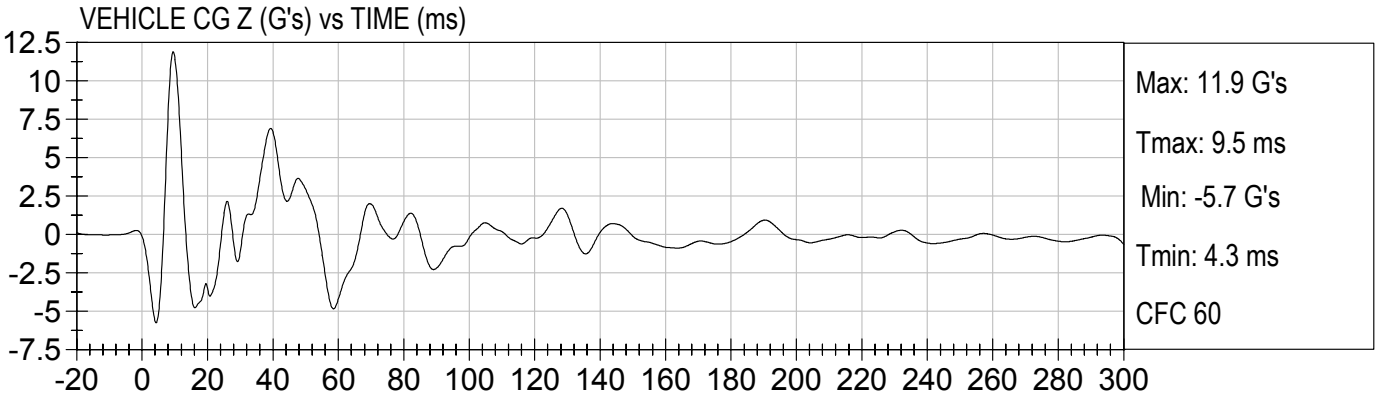


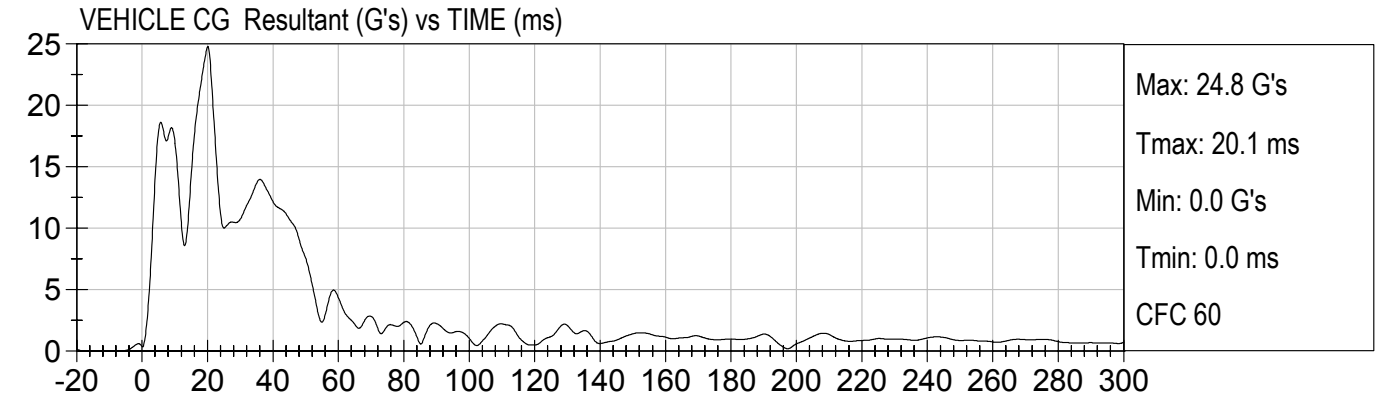
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

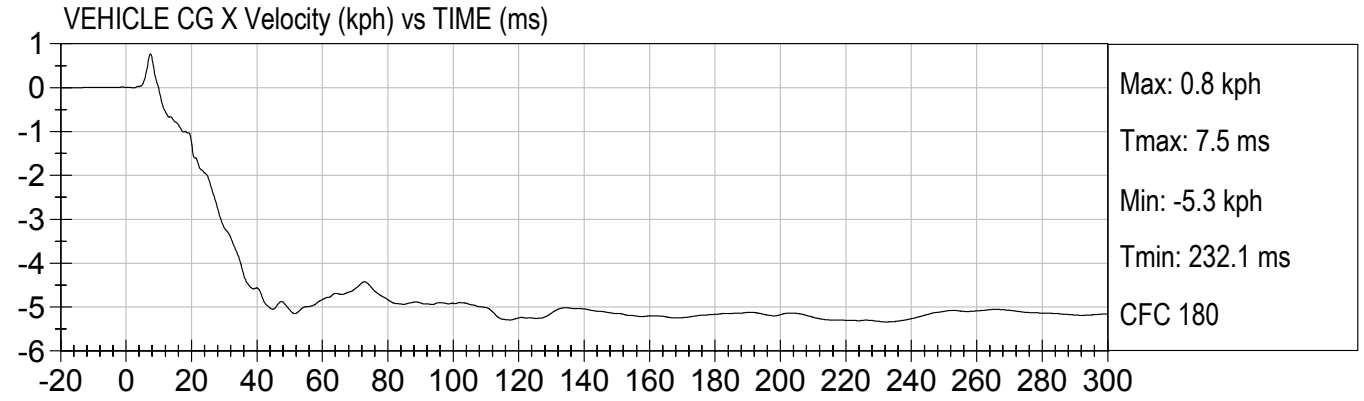
Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

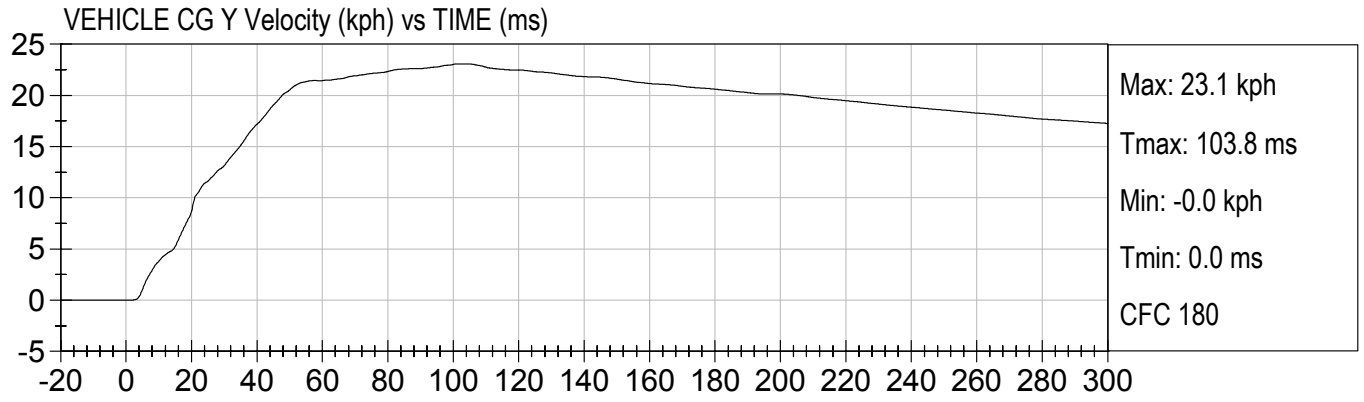


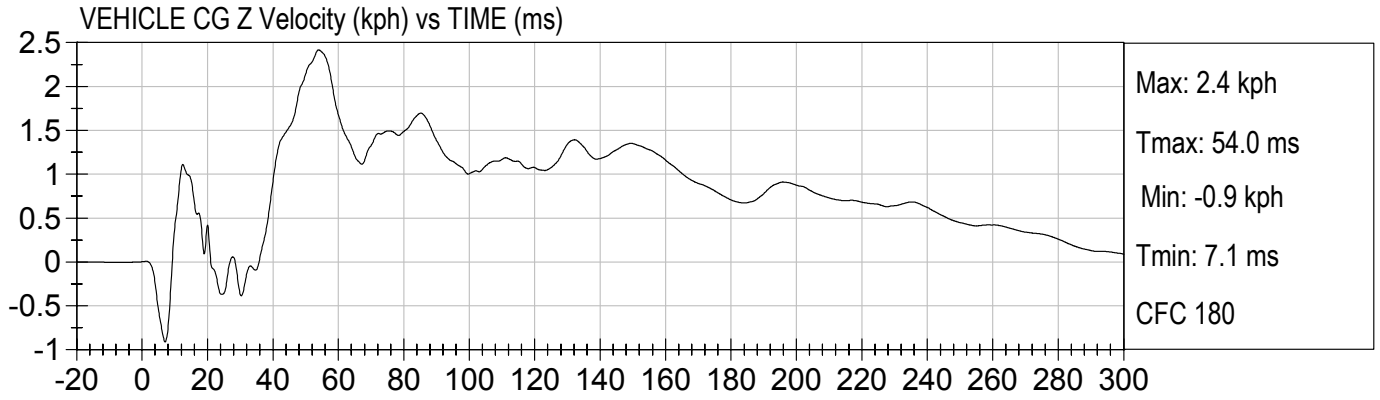







VEHICLE CG X Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-5
-6
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.8 kph
Tmax: 7.5 ms
Min: -5.3 kph
Tmin: 232.1 ms
CFC 180

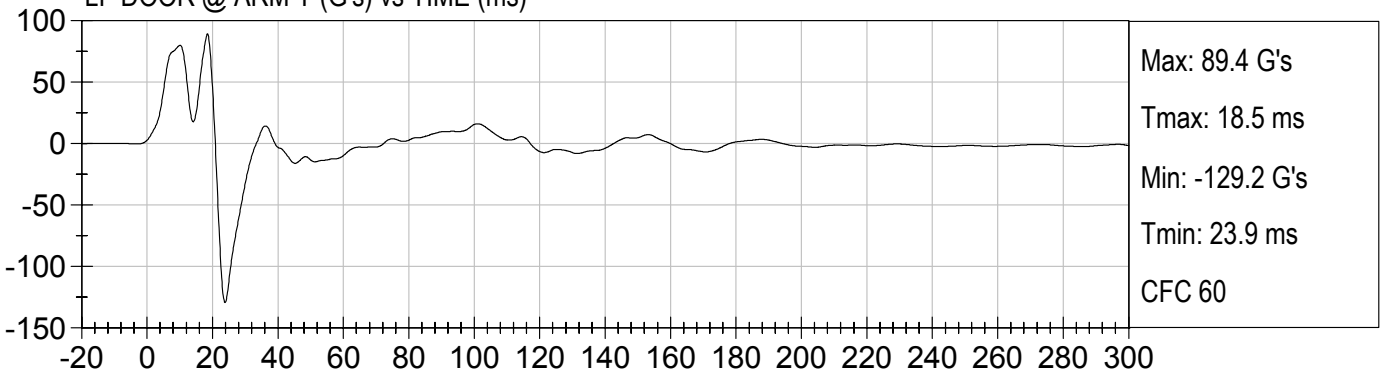

VEHICLE CG Y Velocity (kph) vs TIME (ms)
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 23.1 kph
Tmax: 103.8 ms
Min: -0.0 kph
Tmin: 0.0 ms
CFC 180


VEHICLE CG Z Velocity (kph) vs TIME (ms)
2.5
2
1.5
1
0.5
0
-0.5
-1
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.4 kph
Tmax: 54.0 ms
Min: -0.9 kph
Tmin: 7.1 ms
CFC 180

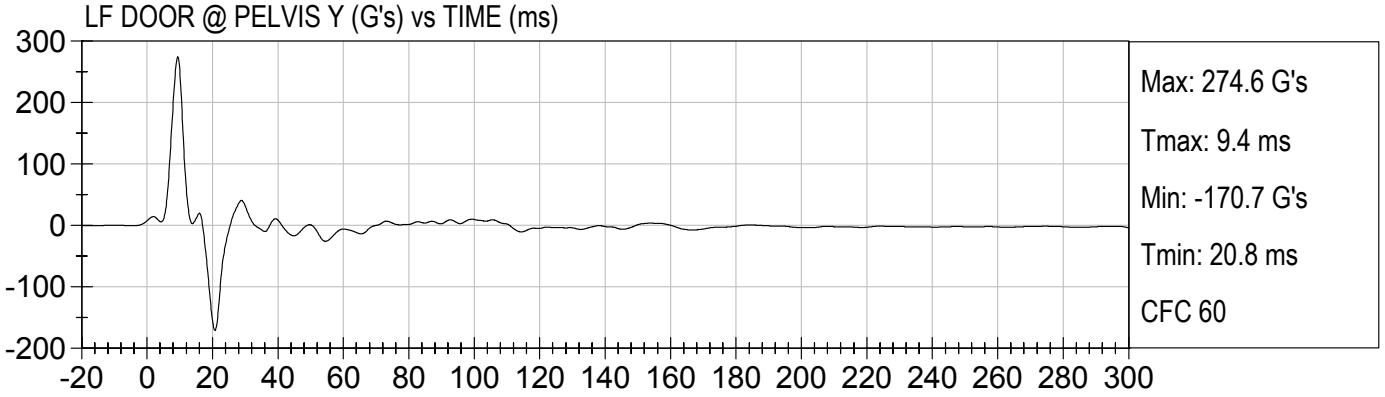
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

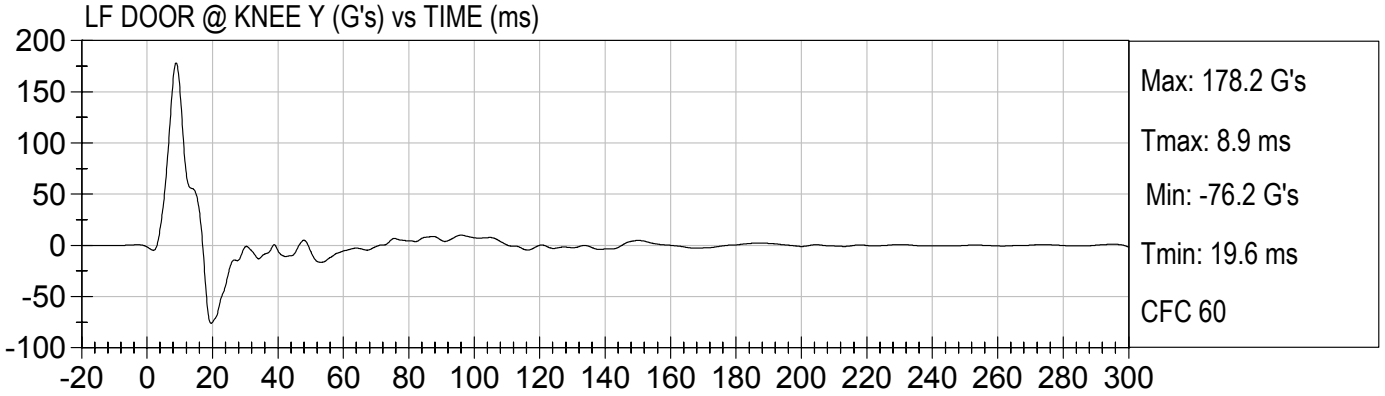
LF DOOR @ ARM Y (G's) vs TIME (ms)



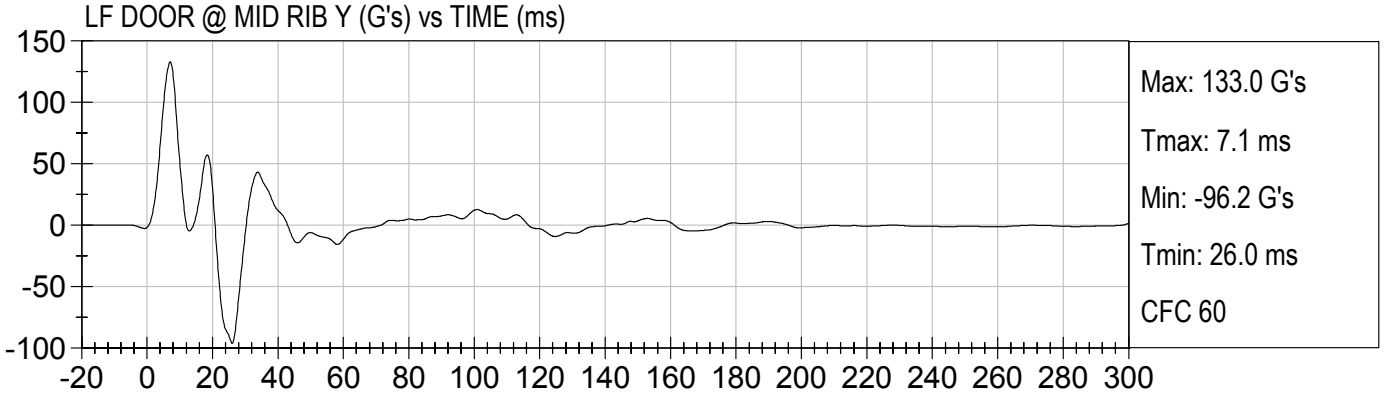
LF DOOR @ PELVIS Y (G's) vs TIME (ms)



LF DOOR @ KNEE Y (G's) vs TIME (ms)



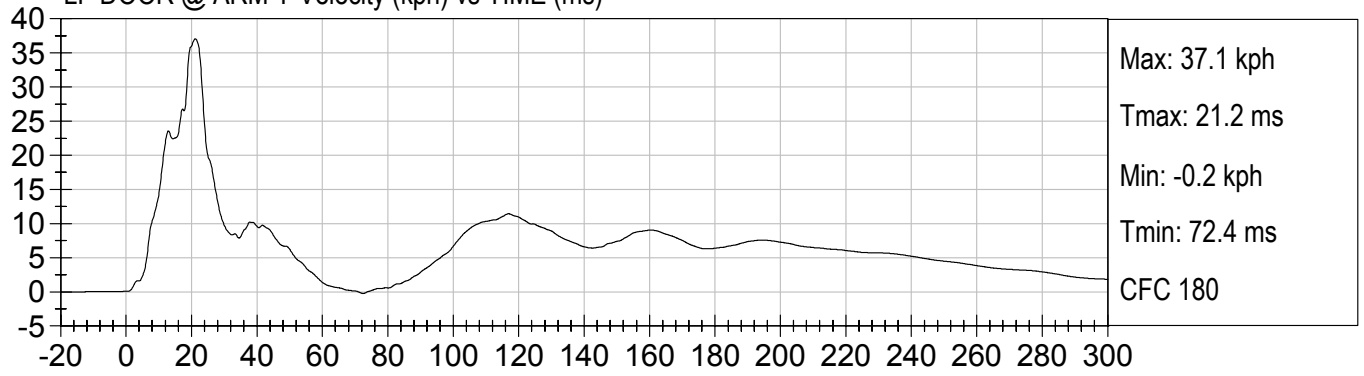
LF DOOR @ MID RIB Y (G's) vs TIME (ms)



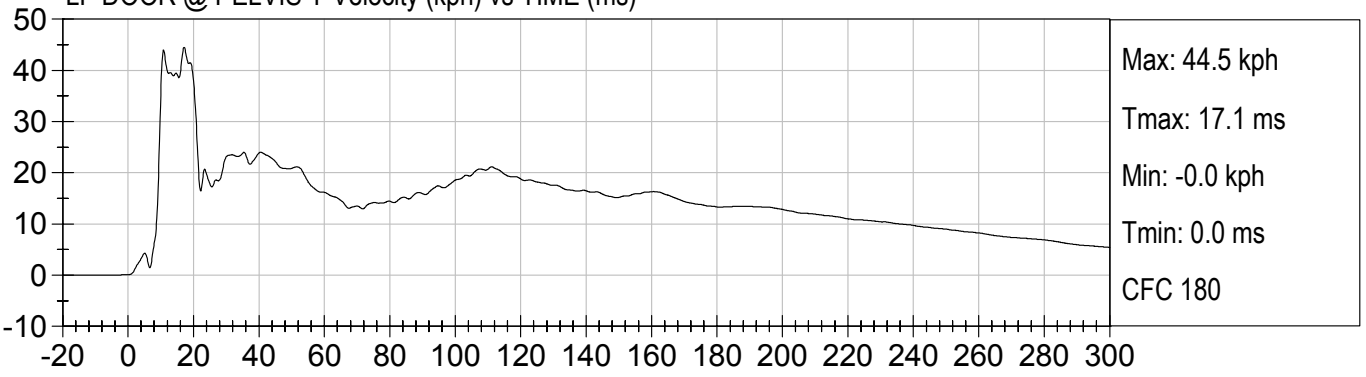
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

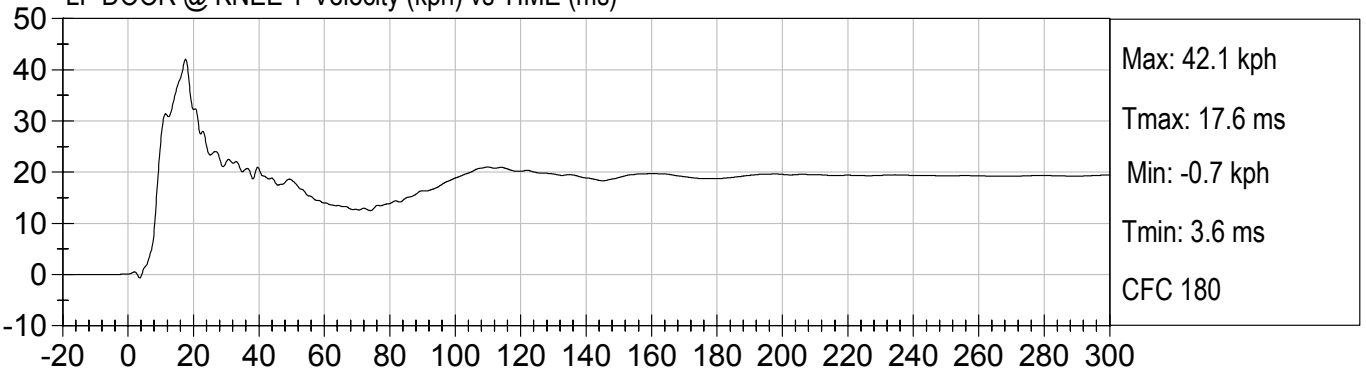
LF DOOR @ ARM Y Velocity (kph) vs TIME (ms)



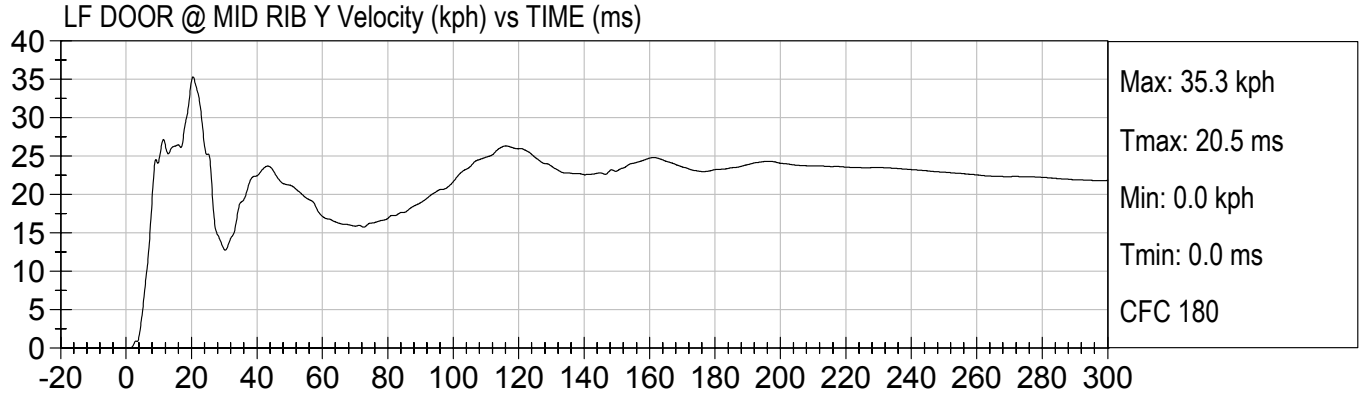
LF DOOR @ PELVIS Y Velocity (kph) vs TIME (ms)



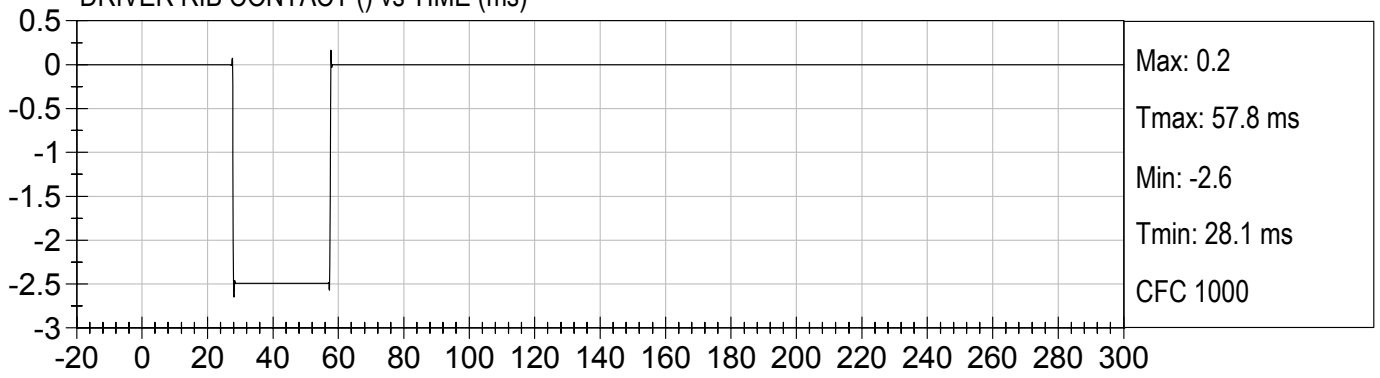
LF DOOR @ KNEE Y Velocity (kph) vs TIME (ms)



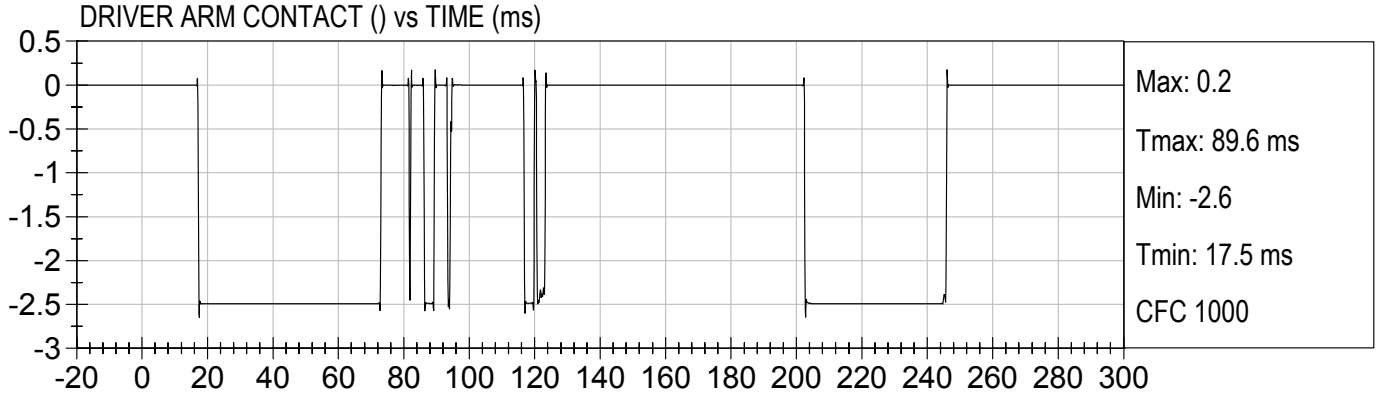
LF DOOR @ MID RIB Y Velocity (kph) vs TIME (ms)



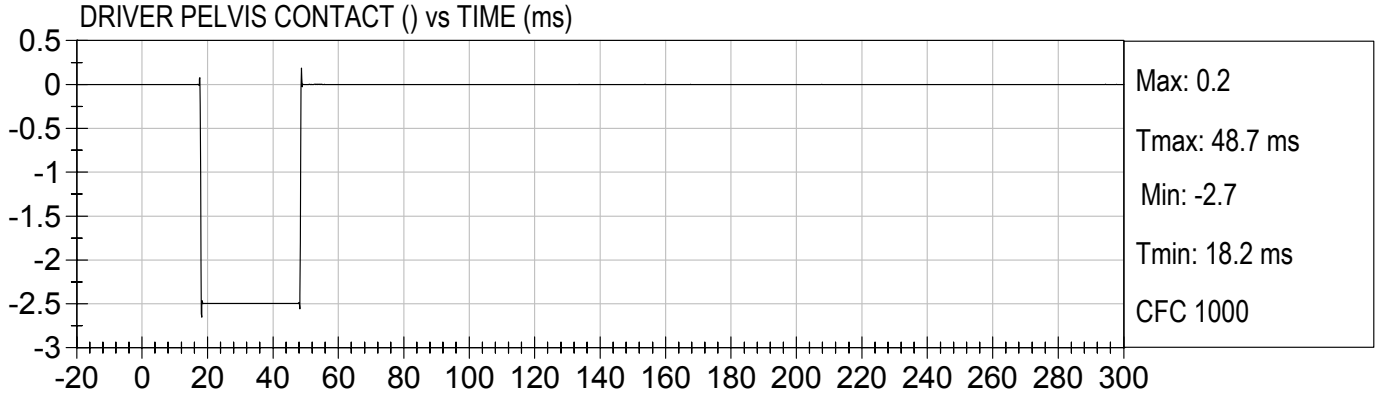
DRIVER RIB CONTACT () vs TIME (ms)

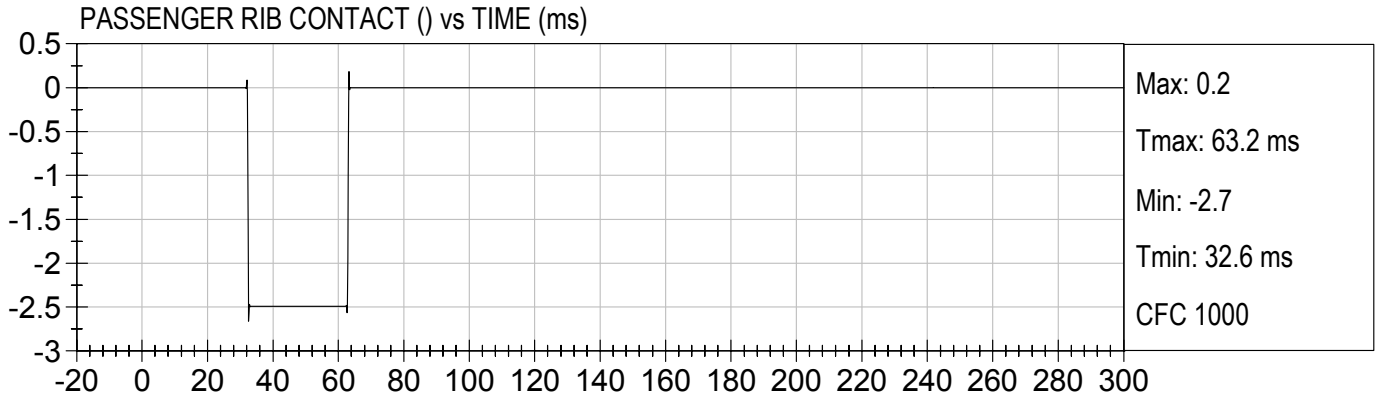


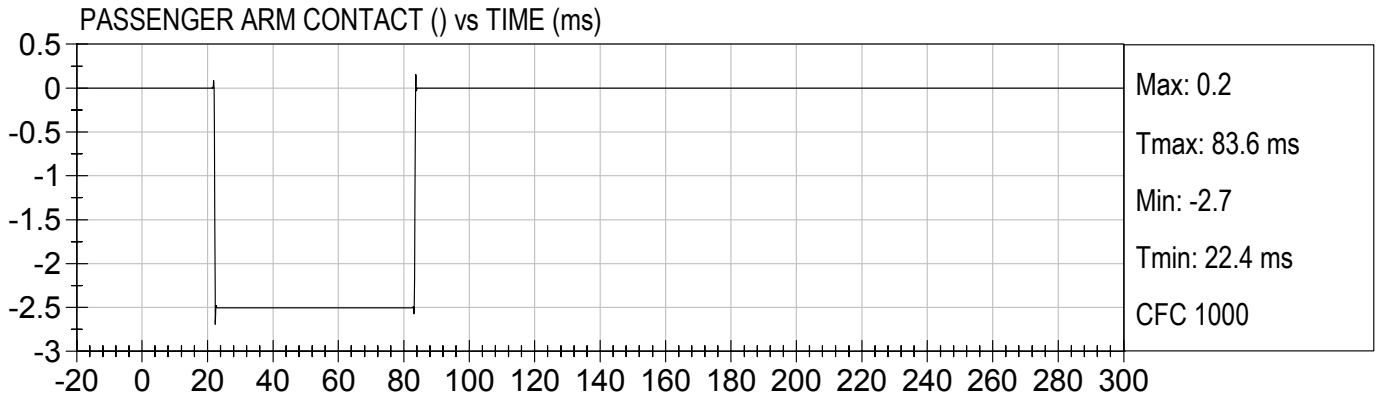
DRIVER ARM CONTACT () vs TIME (ms)

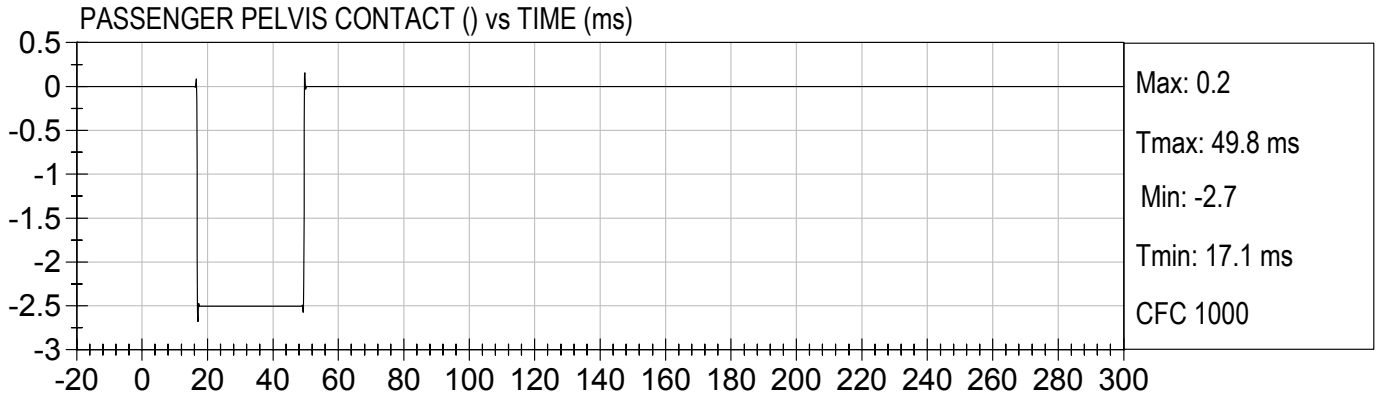


DRIVER PELVIS CONTACT () vs TIME (ms)



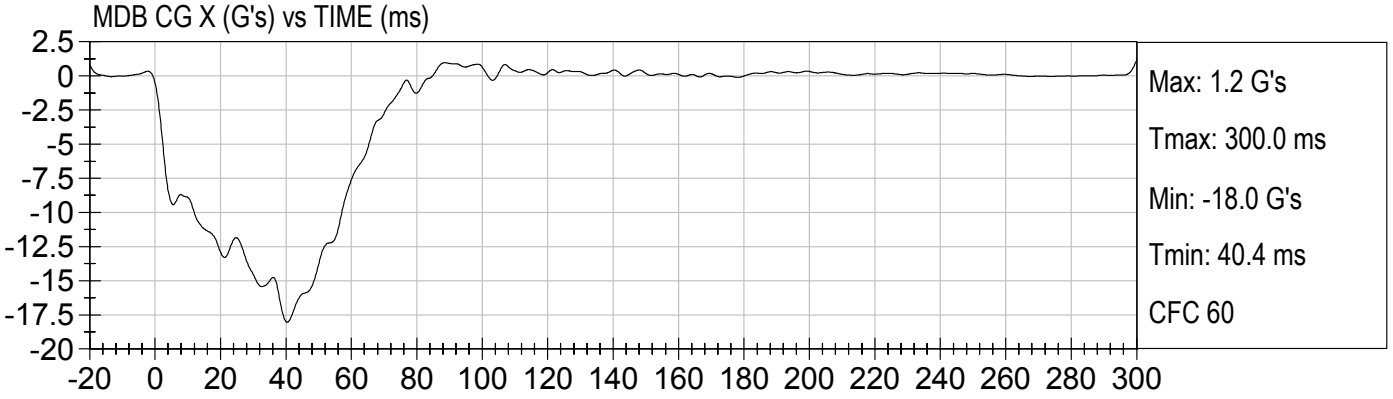

PASSENGER RIB CONTACT () vs TIME (ms)
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2
Tmax: 63.2 ms
Min: -2.7
Tmin: 32.6 ms
CFC 1000

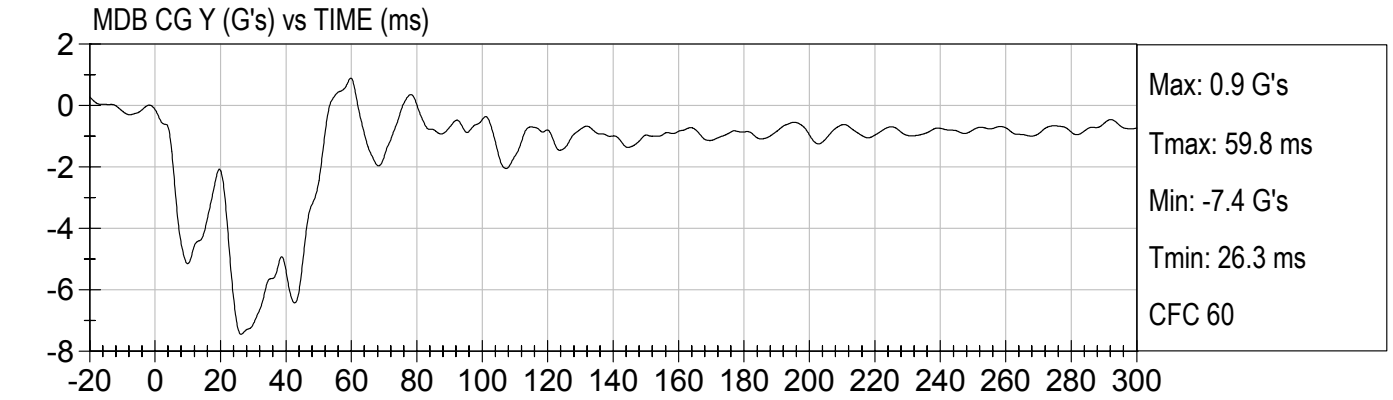

PASSENGER ARM CONTACT () vs TIME (ms)
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2
Tmax: 83.6 ms
Min: -2.7
Tmin: 22.4 ms
CFC 1000

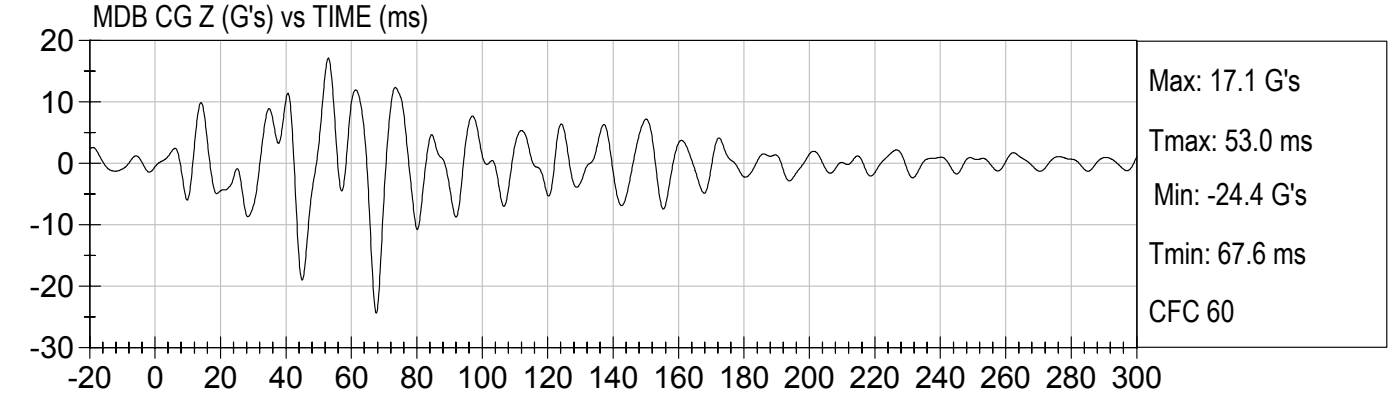

PASSENGER PELVIS CONTACT () vs TIME (ms)
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2
Tmax: 49.8 ms
Min: -2.7
Tmin: 17.1 ms
CFC 1000

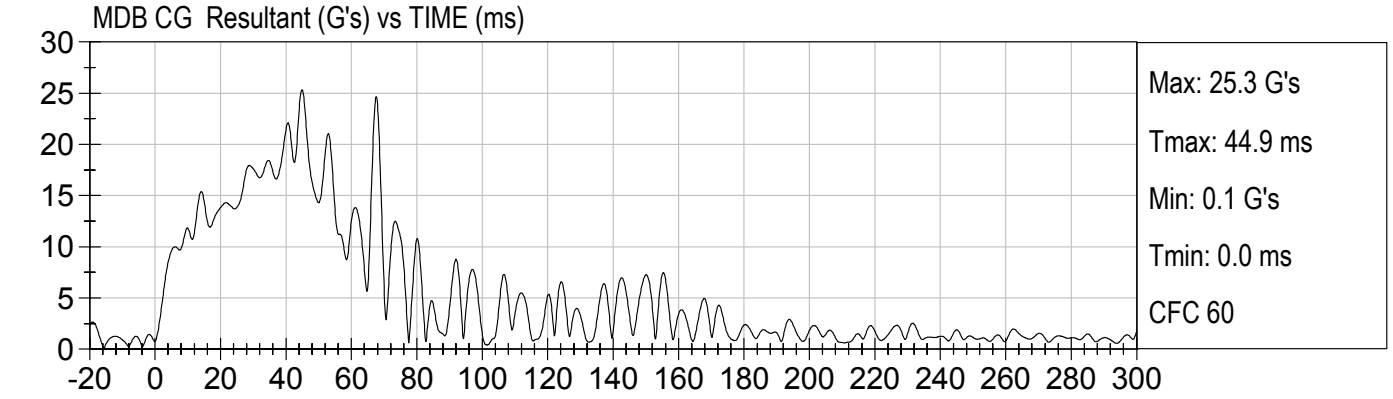
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)



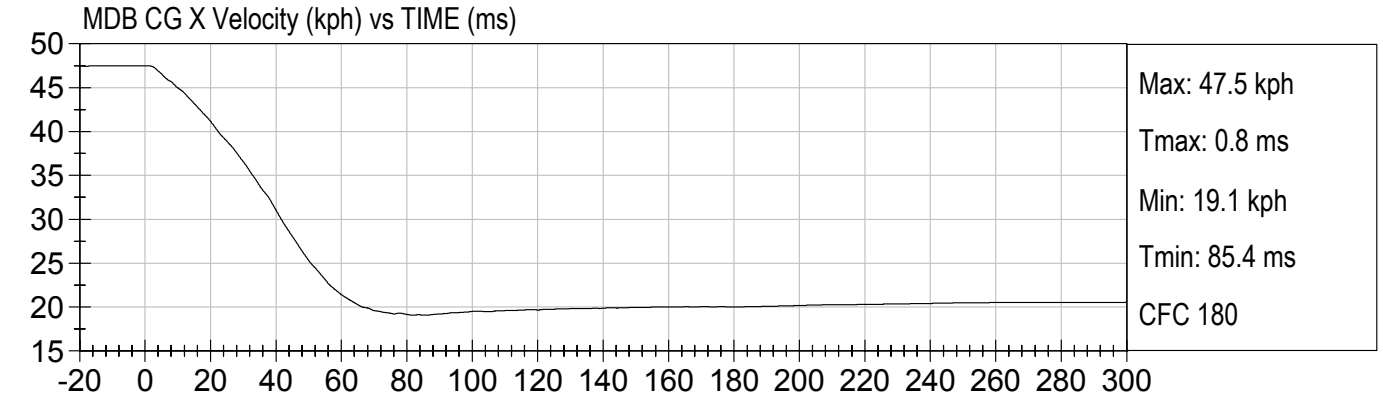


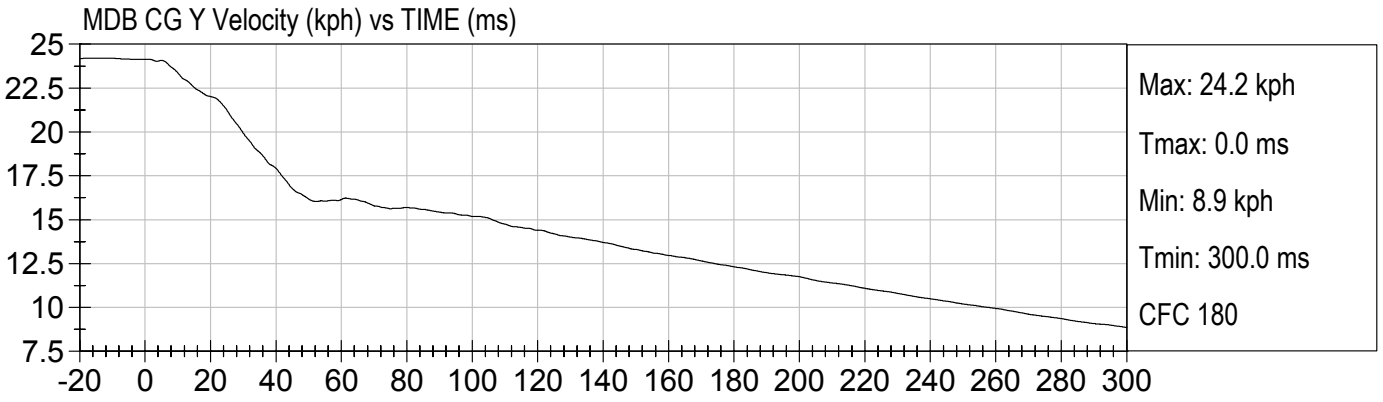


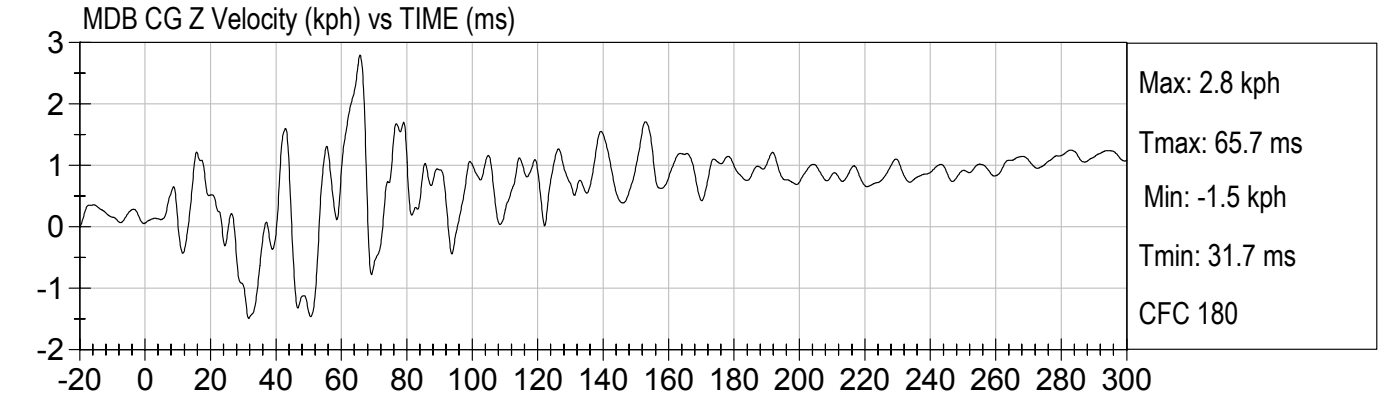


T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

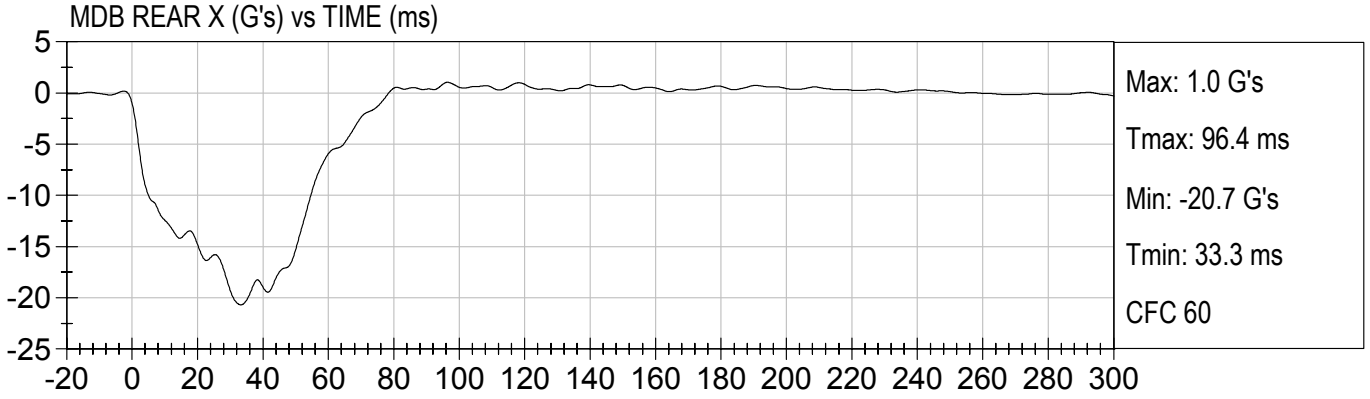


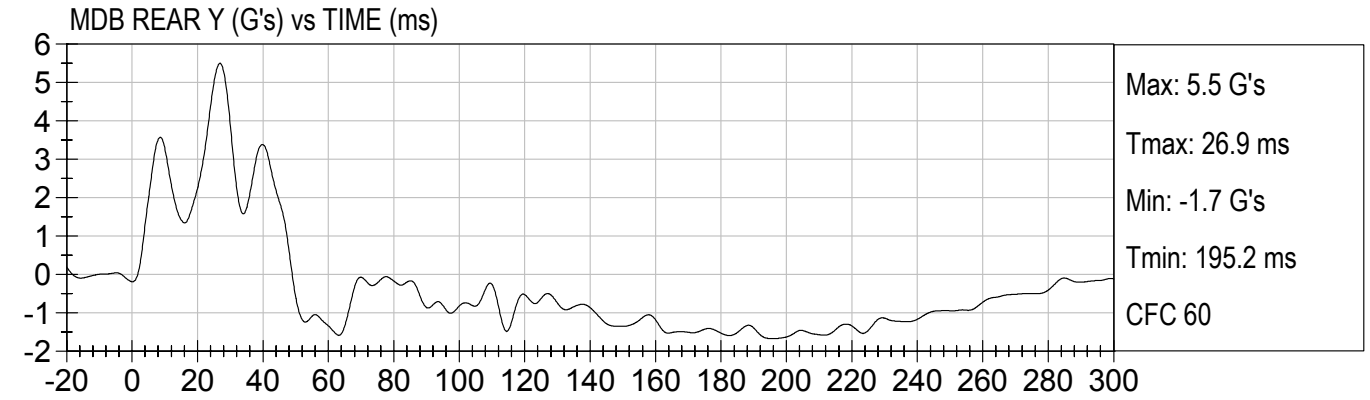


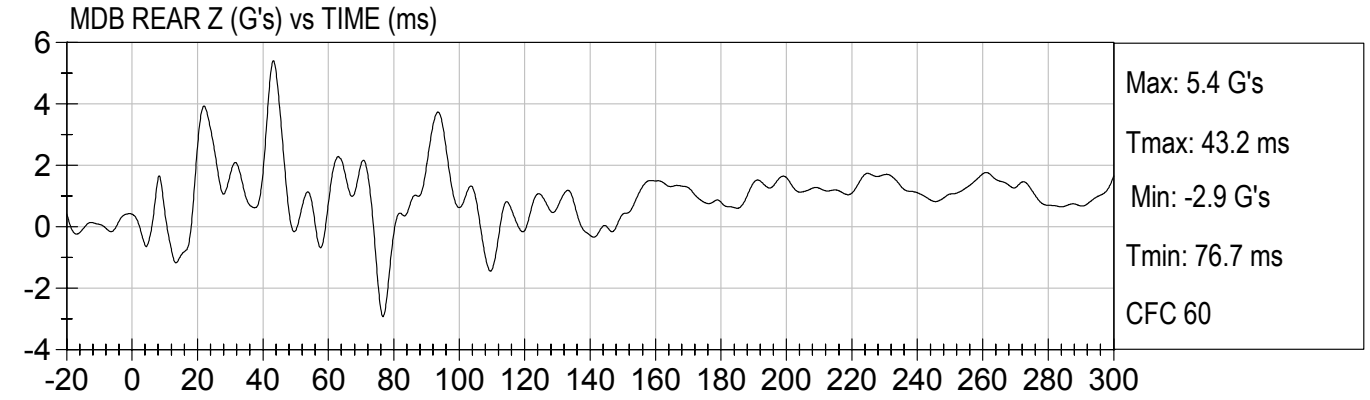


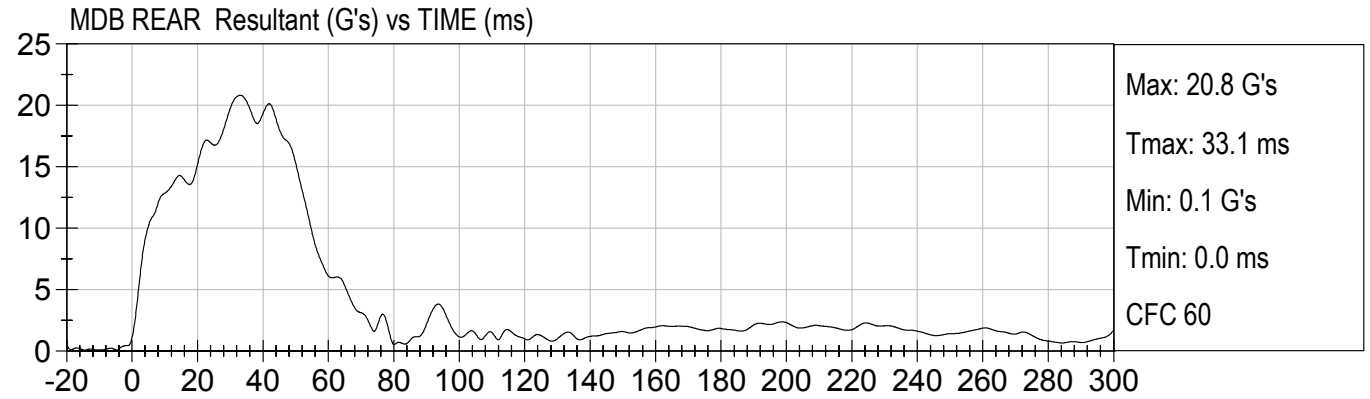
T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

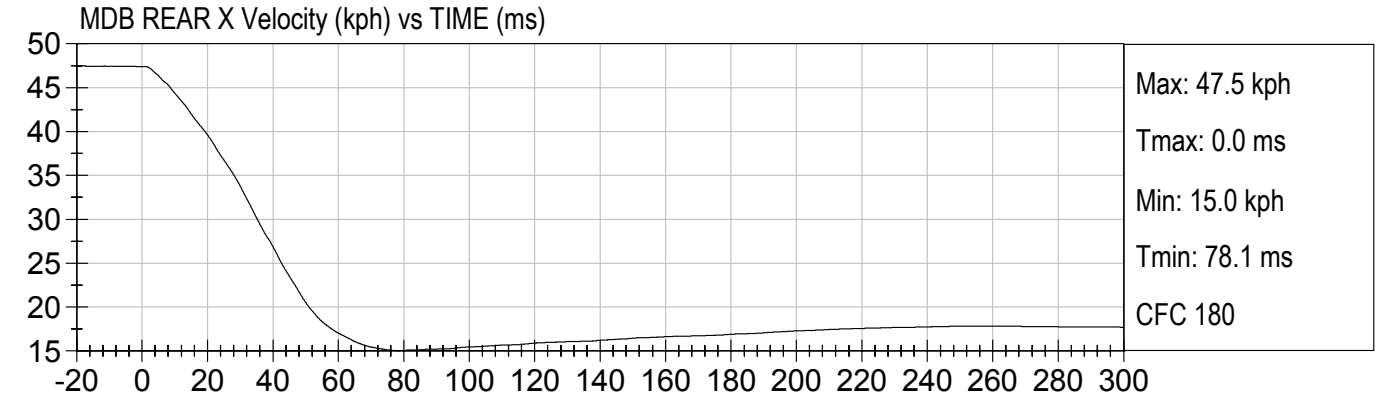
Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)

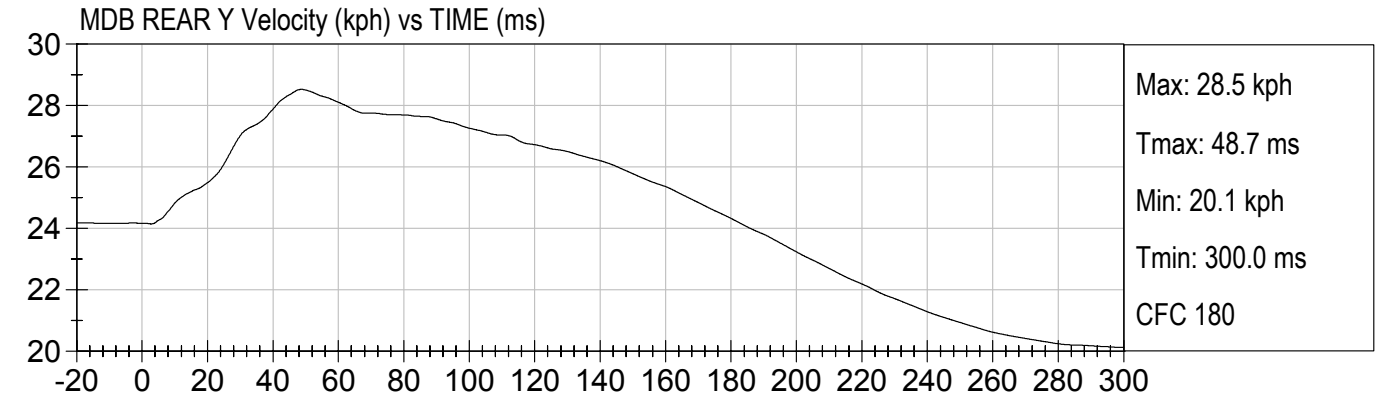


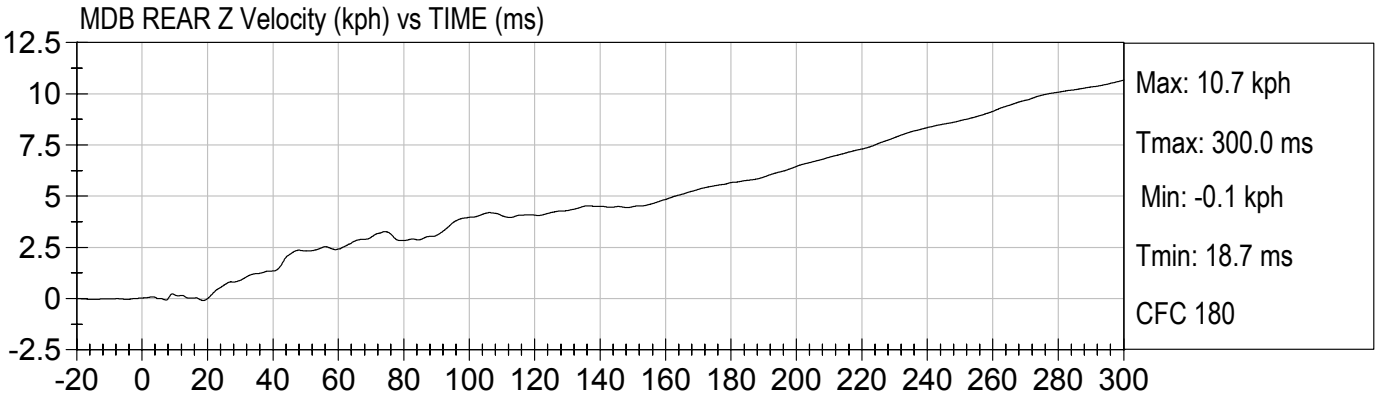






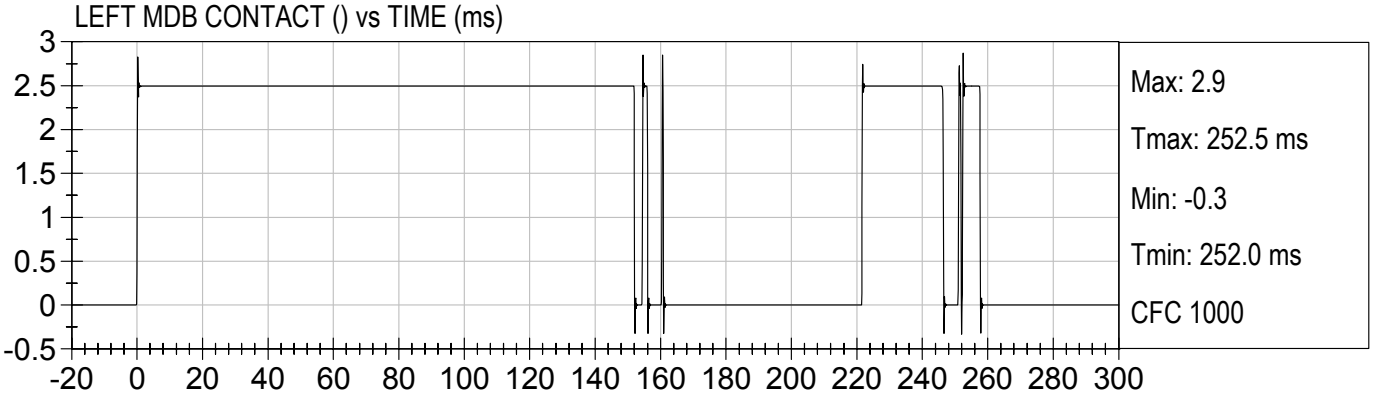

MDB REAR X Velocity (kph) vs TIME (ms)
50
45
40
35
30
25
20
15
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 47.5 kph
Tmax: 0.0 ms
Min: 15.0 kph
Tmin: 78.1 ms
CFC 180

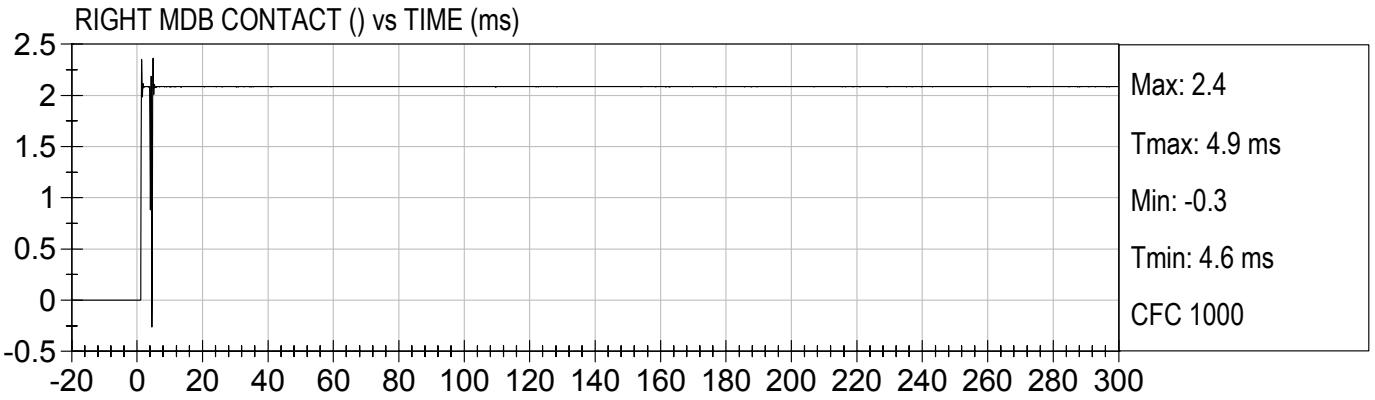

MDB REAR Y Velocity (kph) vs TIME (ms)
30
28
26
24
22
20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 28.5 kph
Tmax: 48.7 ms
Min: 20.1 kph
Tmin: 300.0 ms
CFC 180


MDB REAR Z Velocity (kph) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 10.7 kph
Tmax: 300.0 ms
Min: -0.1 kph
Tmin: 18.7 ms
CFC 180

T.O 1 LEFT SIDE IMPACT
2005 SATURN ION (R50167)

Test Date: 08/10/05
Speed: 33.1 mph (53.3 km/h)





APPENDIX C

ES-2RE CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CERTIFICATION DATA

Dummy Serial Number: 009

PRE-TEST CALIBRATION

MGA RESEARCH CORPORATION

HEAD DROP TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test ID:** D052071

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 - 22.0	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Peak Resultant Acceleration	G's	100 - 150	147	Pass
Time of Maximum Resultant Acceleration	msec	NA	34.5	Pass
		Overall Test Results		Pass

Joe Fleck

Laboratory Technician

07/27/2005

Test Date

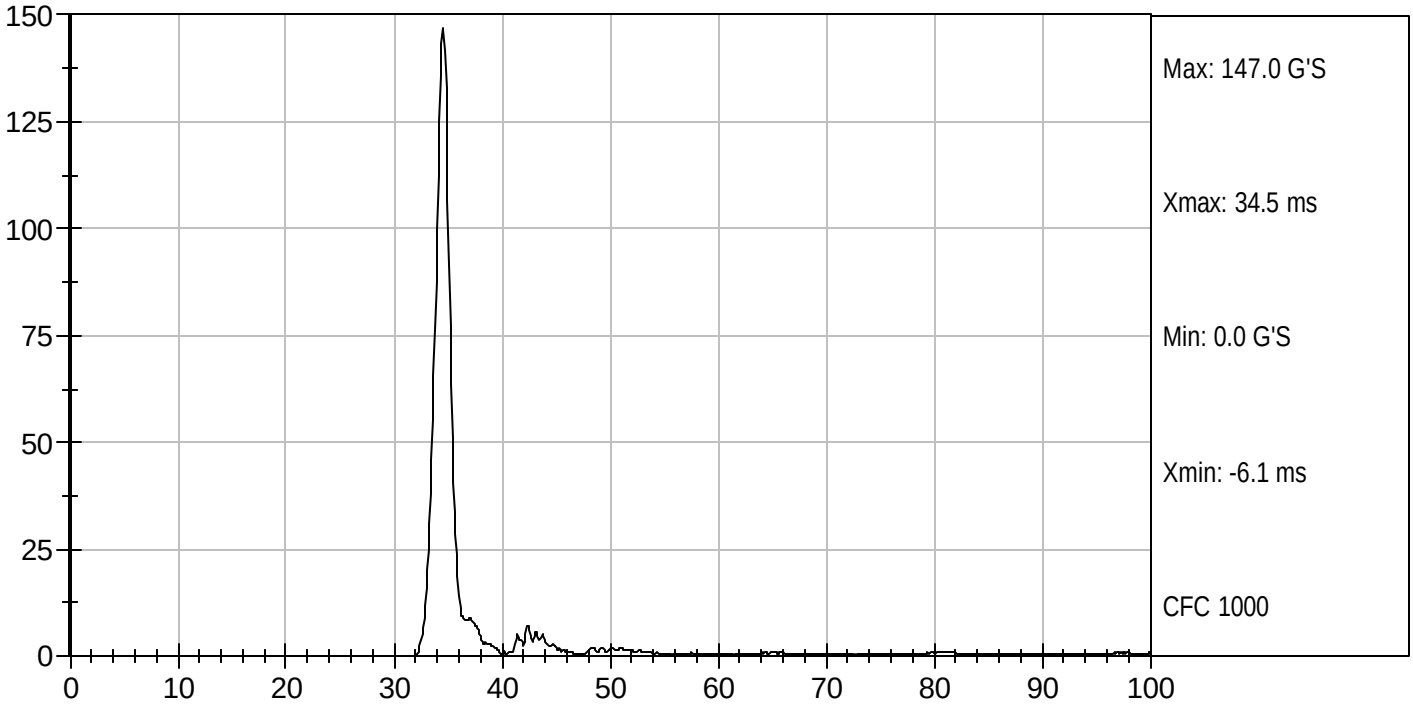
David Winkelbauer

Approved By

Test Desc: Head Drop
Componet ID: D052071

Test Date: 07/27/2005
Velocity: 0 ft/s, 0.00 m/s

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK PENDULUM TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052072

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.5	Pass
Pendulum Deceleration	3 msec	G's	-0.25 to -0.53	-0.25	Pass
	8 msec	G's	-1.59 to -2.04	-1.63	Pass
	14 msec	G's	-3.20 to -3.85	-3.36	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	50.9	Pass
Time of Maximum Flexion Angle		msec	54.0 to 66.0	60.5	Pass
Maximum Angle Theta (A)		deg	32.7 to 37.0	34.0	Pass
Time of Maximum Theta (A)		msec	53.0 to 63.0	57.1	Pass
Maximum Angle Theta (B)		deg	29.33 to 31.83	31.82	Pass
Time of Maximum Theta (B)		msec	54.0 to 64.0	60.7	Pass
			Overall Test Results		Pass

Joe Fleck

Laboratory Technician

07/27/2005

Test Date

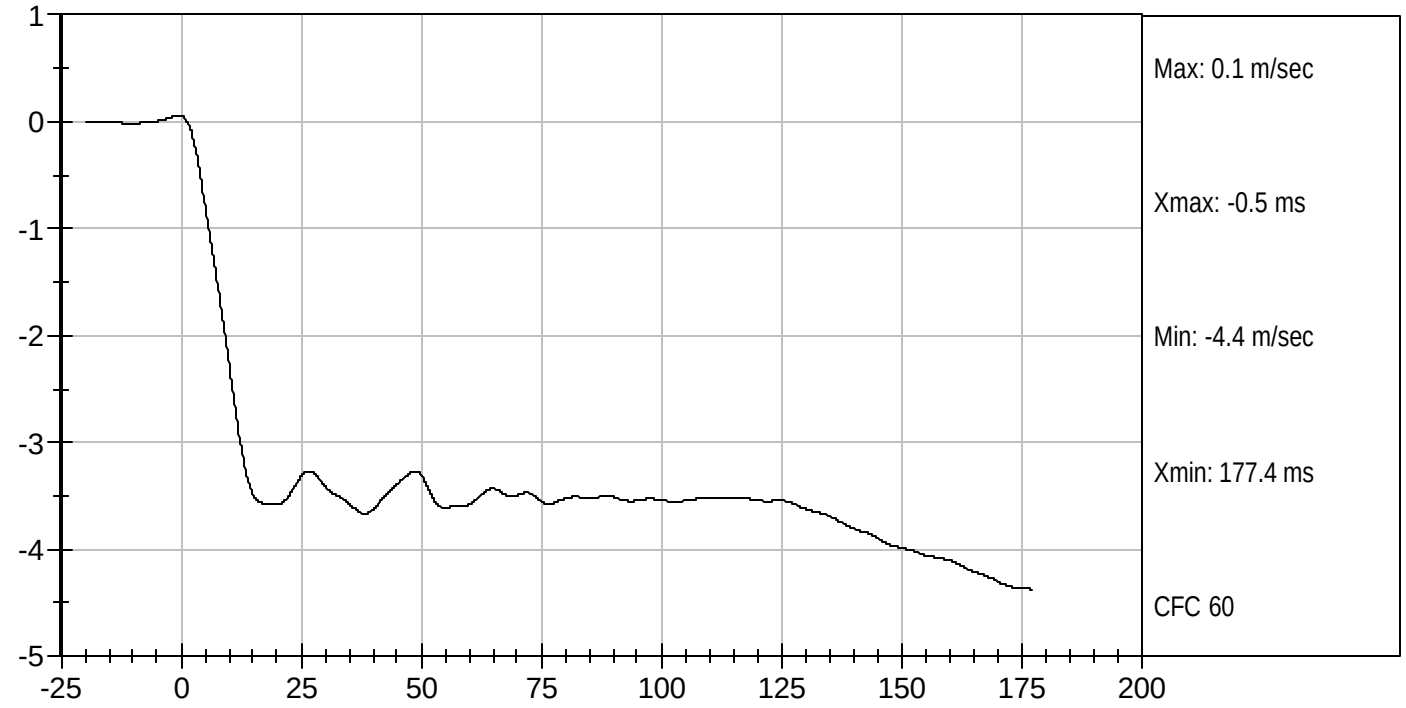
David Winkelbauer

Approved By

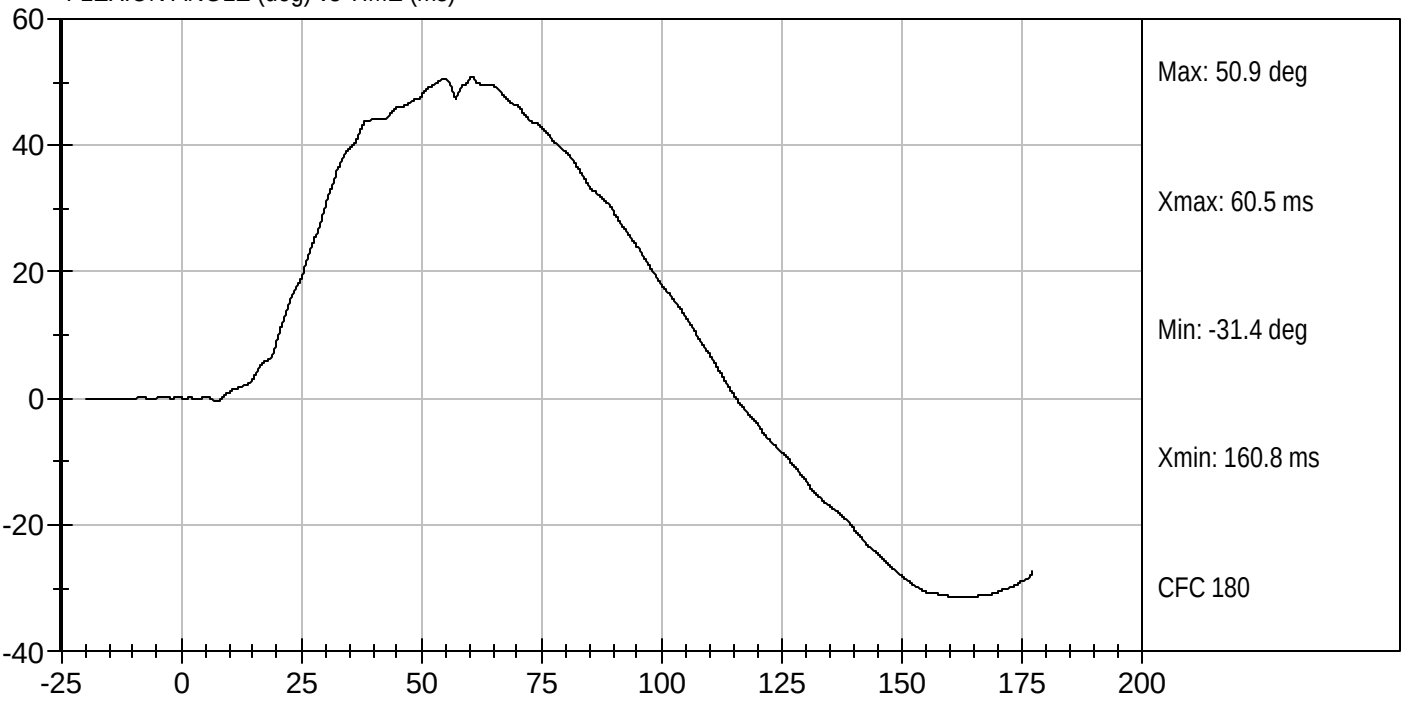
Test Desc: Neck Bending
Componet ID: D052072

Test Date: 07/27/2005
Velocity: 11.39 ft/s, 3.5 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)



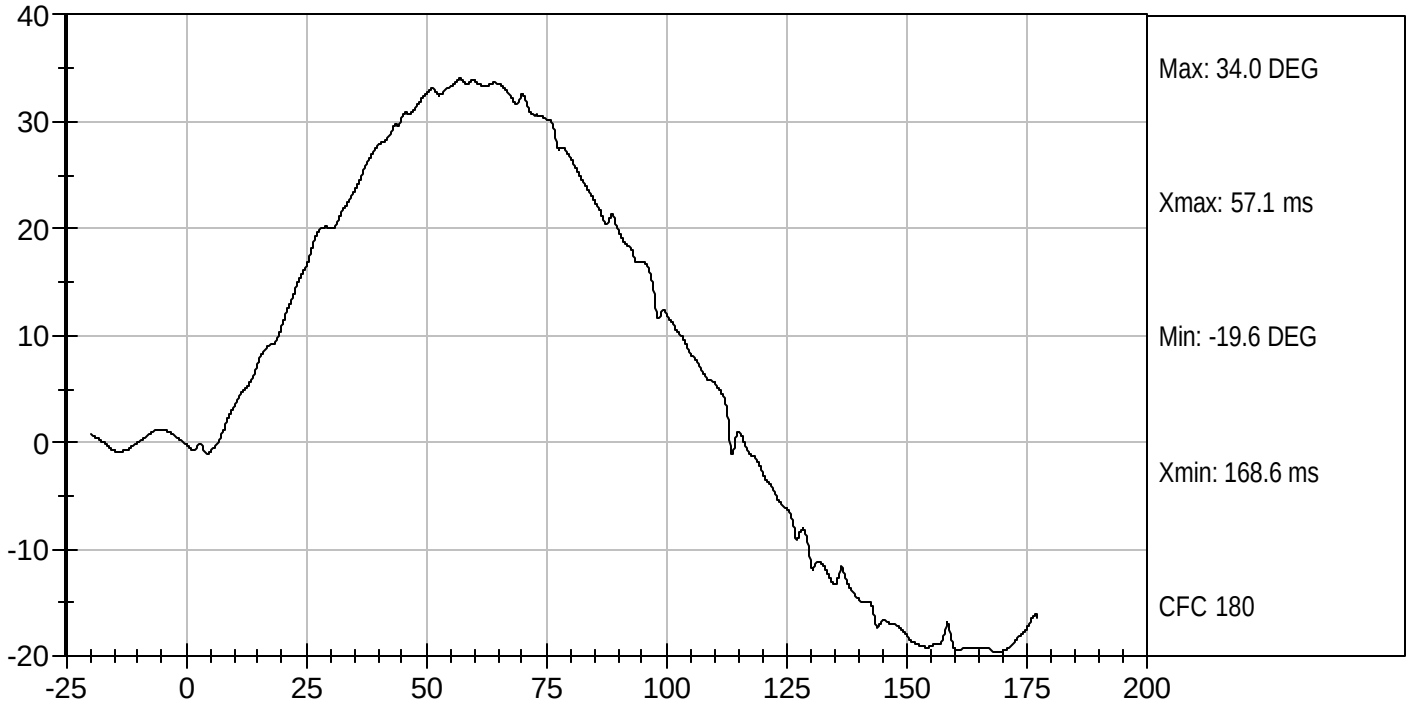
FLEXION ANGLE (deg) vs TIME (ms)



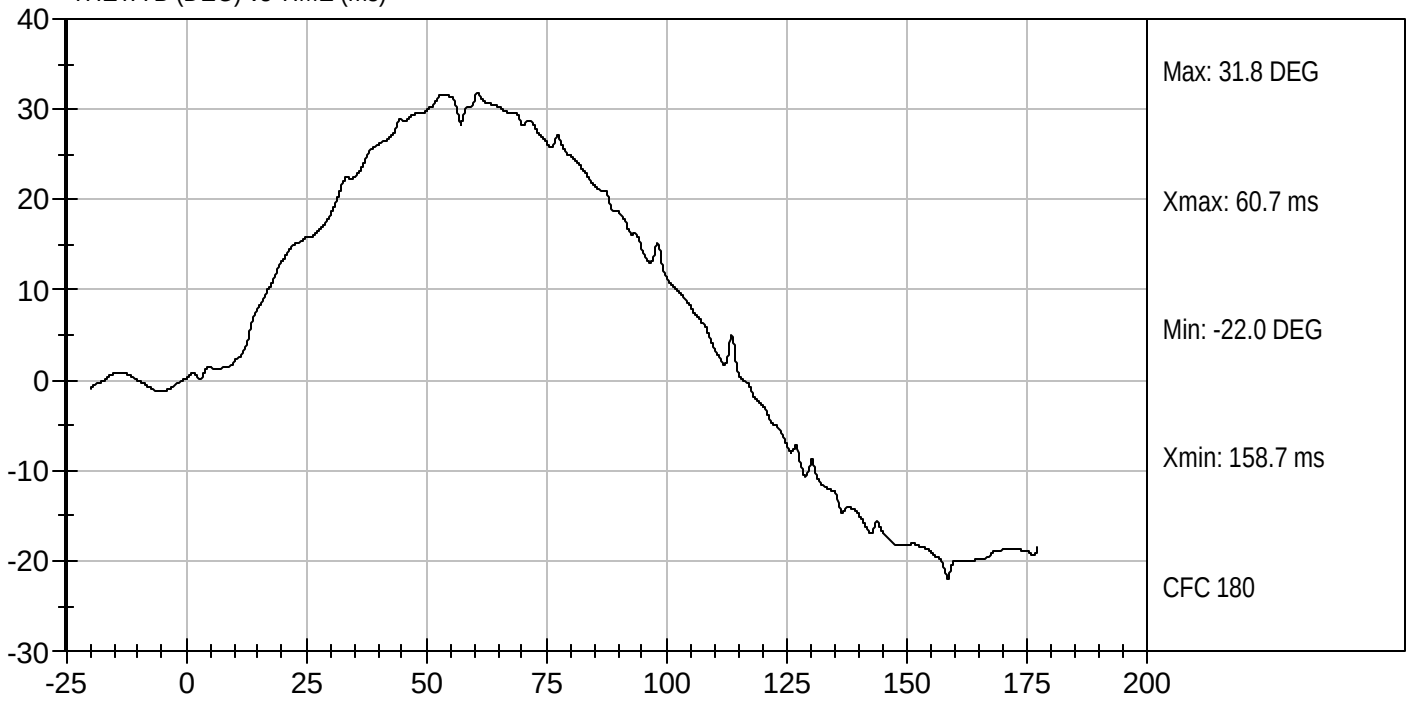
Test Desc: Neck Bending
Componet ID: D052072

Test Date: 07/27/2005
Velocity: 11.39 ft/s, 3.5 m/s

THETA A (DEG) vs TIME (ms)



THETA B (DEG) vs TIME (ms)



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052073

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.2	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	10.3	Pass
Time of Peak Shoulder Acceleration	msec	NA	17.9	Pass
		Overall Test Results		Pass

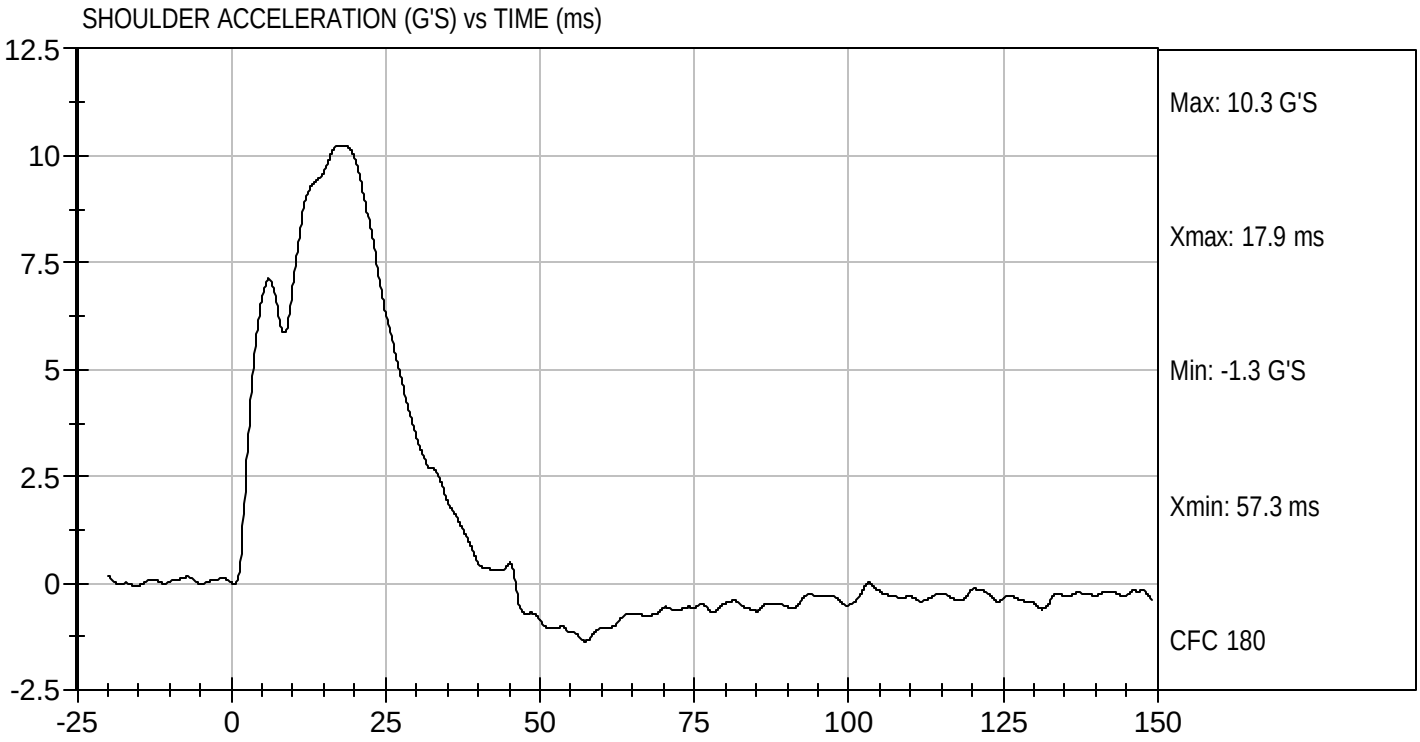
Joe Fleck
Laboratory Technician

07/28/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Shoulder Impact
Componet ID: D052073

Test Date: 07/28/2005
Velocity: 13.92 ft/s, 4.2 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052074

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	25.4	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	37.4	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	48.8	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

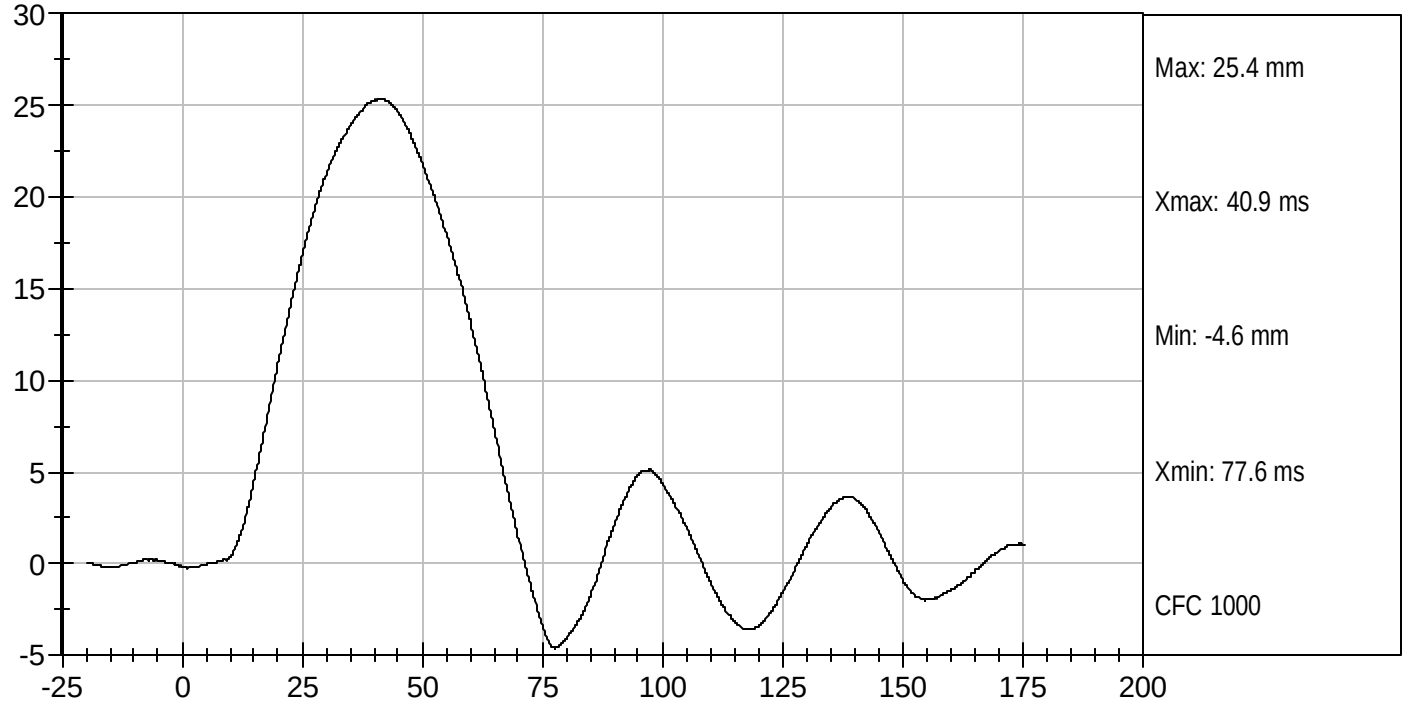
07/27/2005
Test Date

David Winkelbauer
Approved By

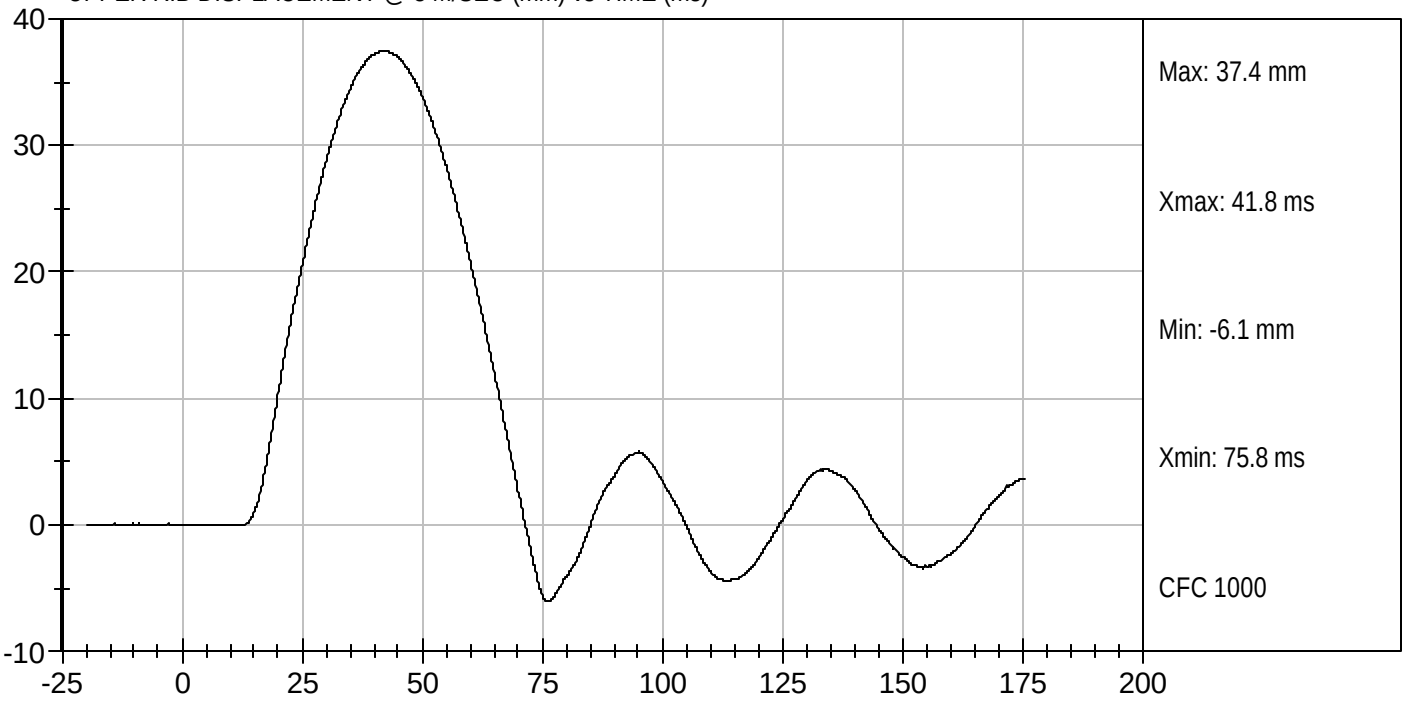
Test Desc: Rib Impact - Upper
Componet ID: D052074

Test Date: 07/27/2005
Velocity: 2, 3, 4 m/s

UPPER RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)

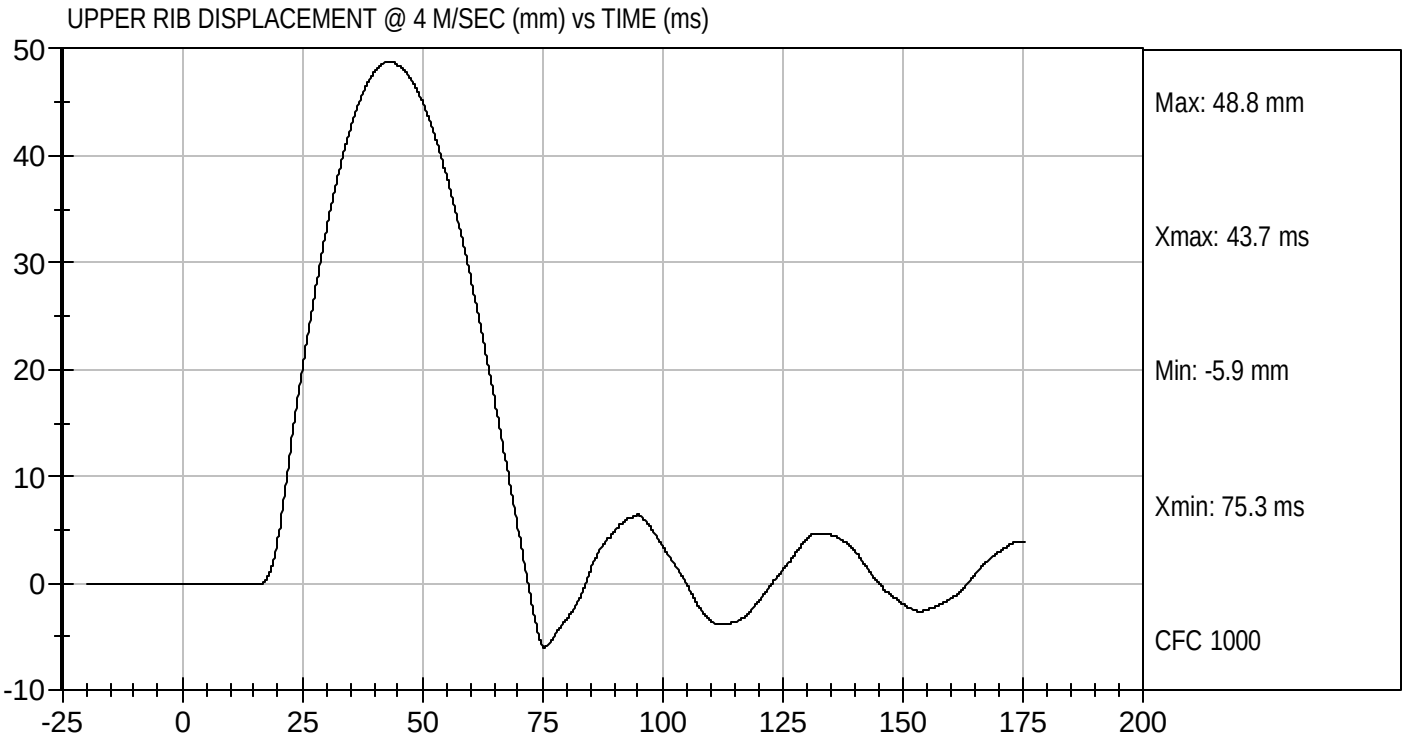


UPPER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Upper
Componet ID: D052074

Test Date: 07/27/2005
Velocity: 2, 3, 4 m/s



MGA RESEARCH CORPORATION

MID RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052075

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	24.8	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	37.7	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	48.4	Pass
		Overall Test Results		Pass

Laboratory Technician

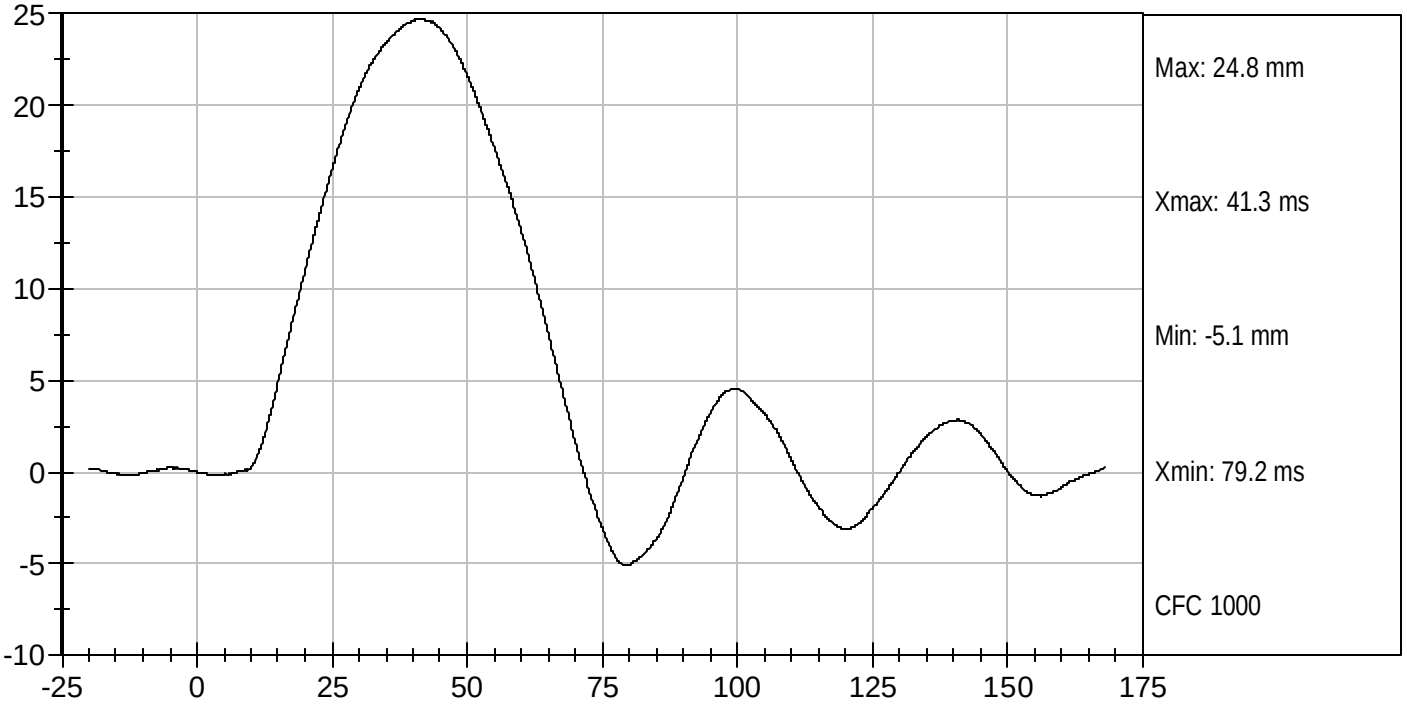
07/27/2005
Test Date

David Winkelbauer
Approved By

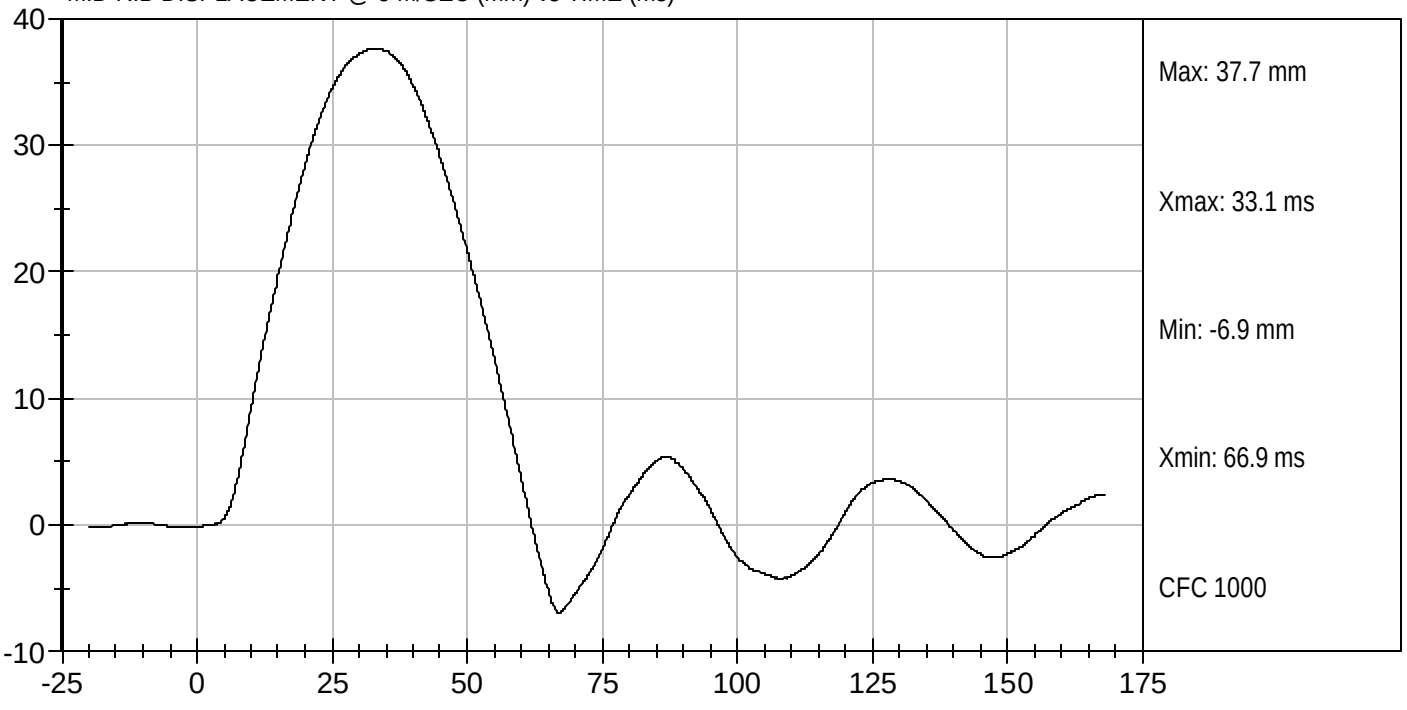
Test Desc: Rib Impact - Mid
Componet ID: D052075

Test Date: 07/27/2005
Velocity: 2, 3, 4 m/s

MID RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)



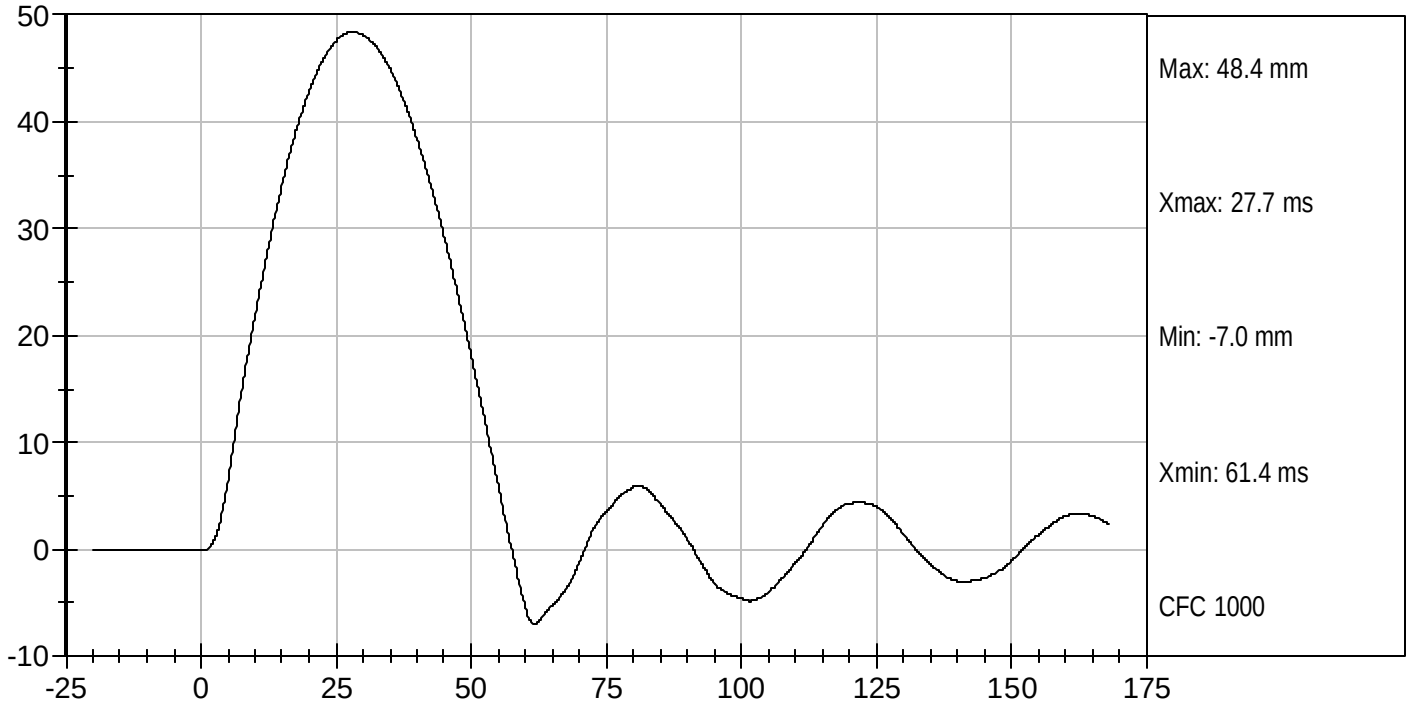
MID RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Mid
Componet ID: D052075

Test Date: 07/27/2005
Velocity: 2, 3, 4 m/s

MID RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

LOWER RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052076

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	27.0	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	38.7	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	50.0	Pass
		Overall Test Results		Pass

Laboratory Technician

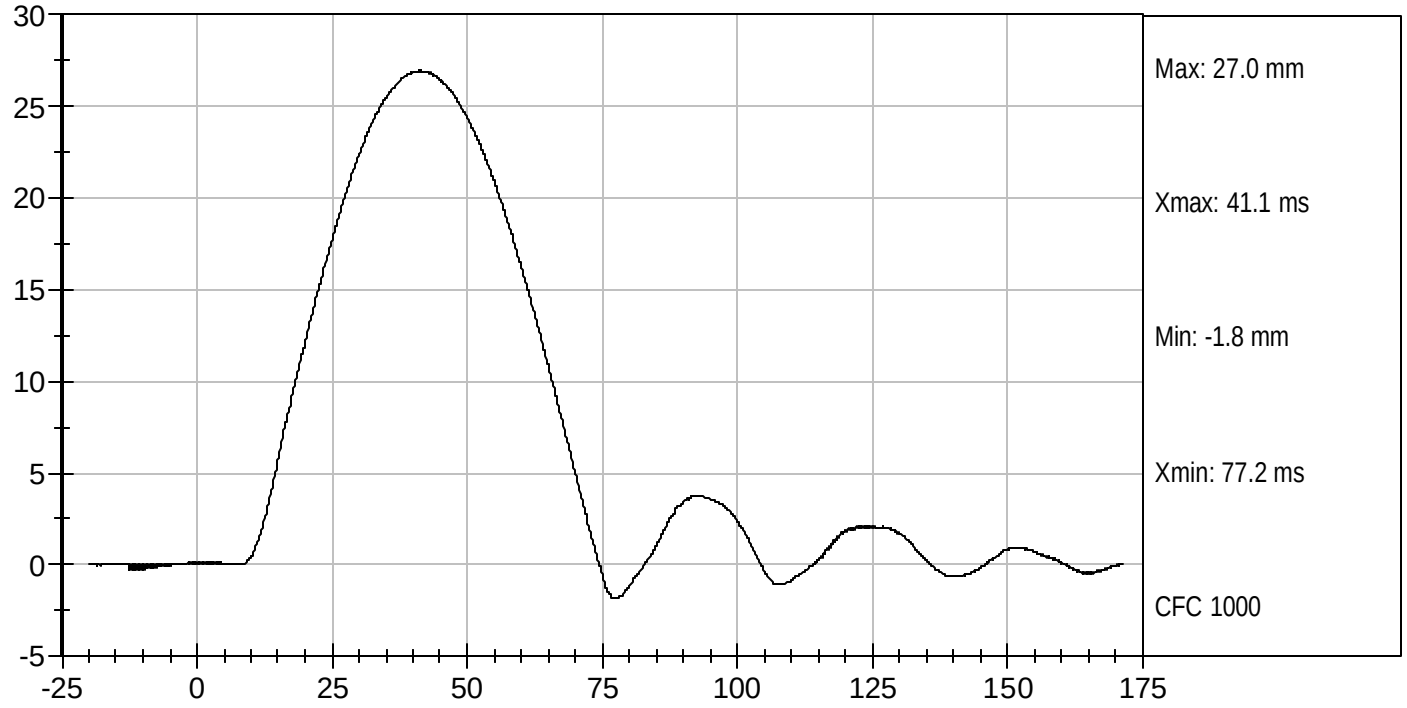
07/27/2005
Test Date

David Winkelbauer
Approved By

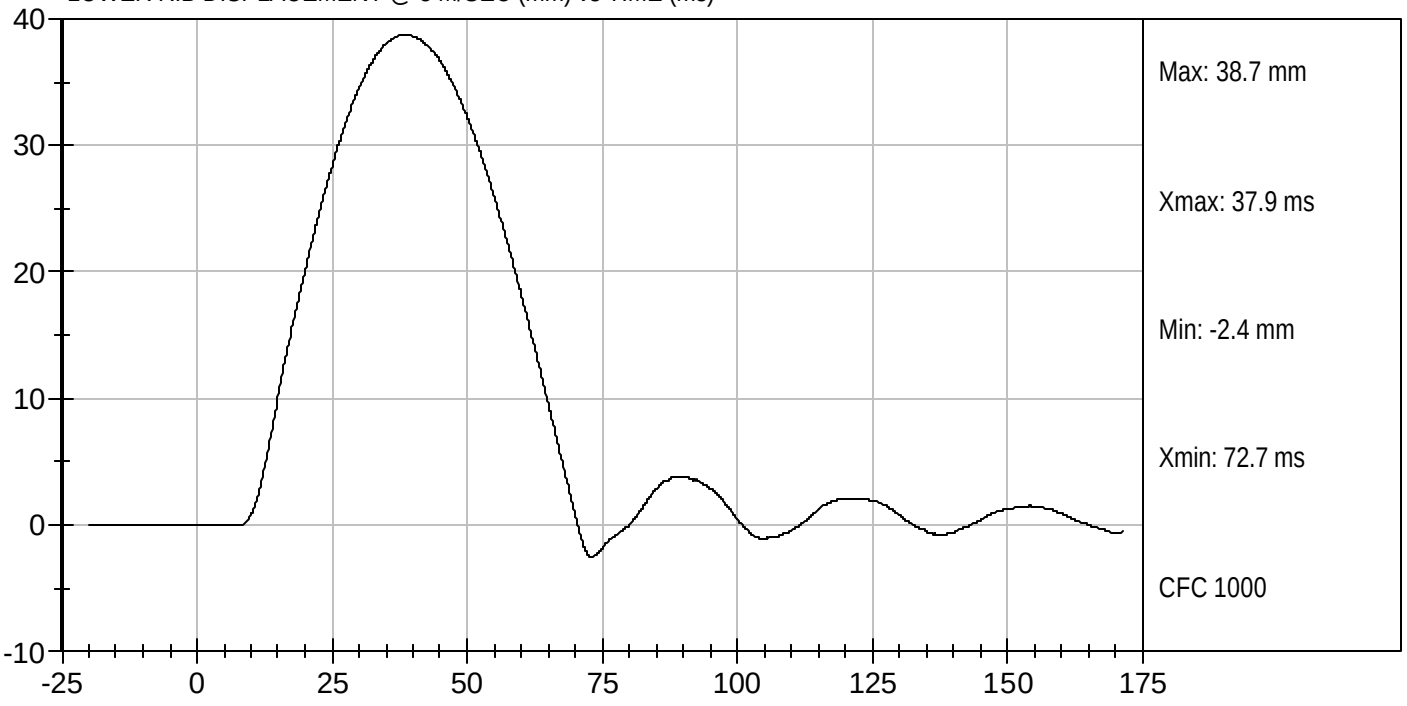
Test Desc: Rib Impact - Lower
Componet ID: D052076

Test Date: 07/27/2005
Velocity: 2, 3, 4 m/s

LOWER RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)



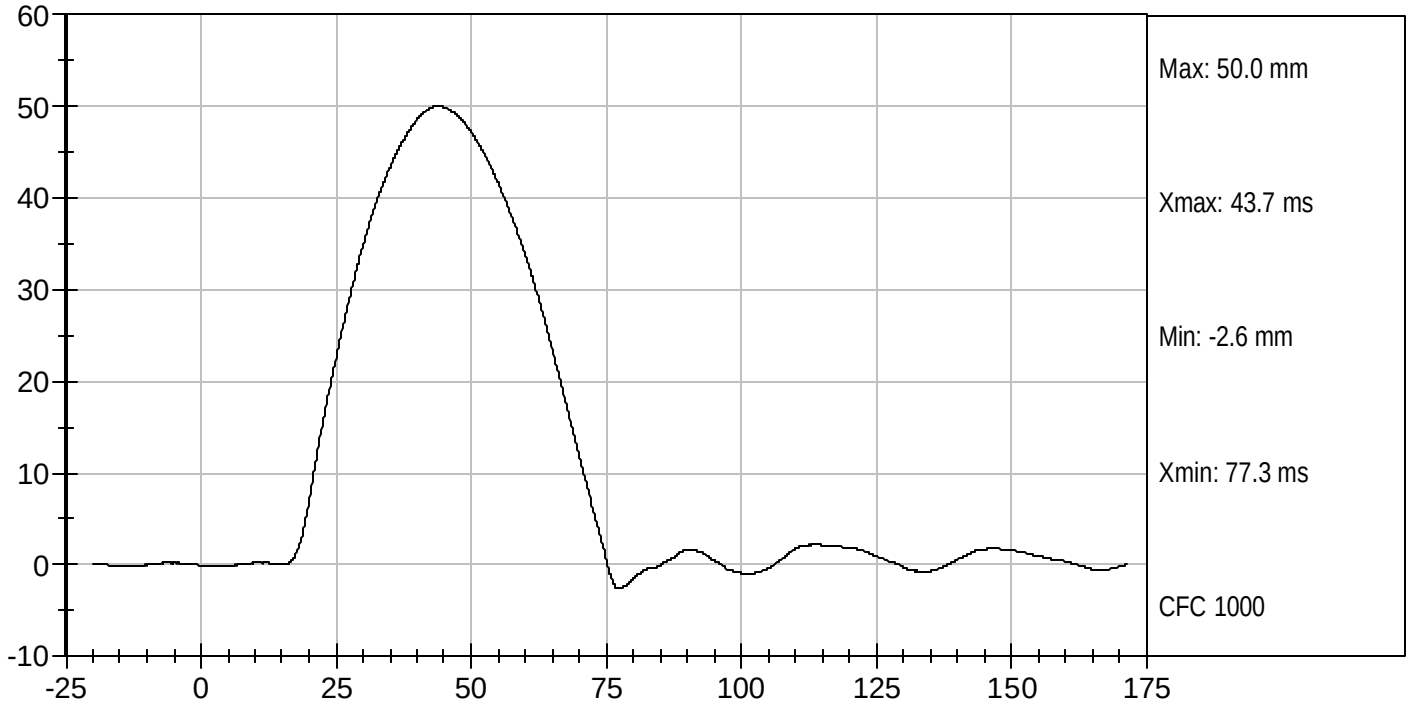
LOWER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Lower
Componet ID: D052076

Test Date: 07/27/2005
Velocity: 2, 3, 4 m/s

LOWER RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052077

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.42	Pass
Time of Maximum Impactor Force	msec	10.60 to 13.00	12.30	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.38	Pass
Time of Maximum Abdomen Force	msec	10.00 to 12.30	11.60	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

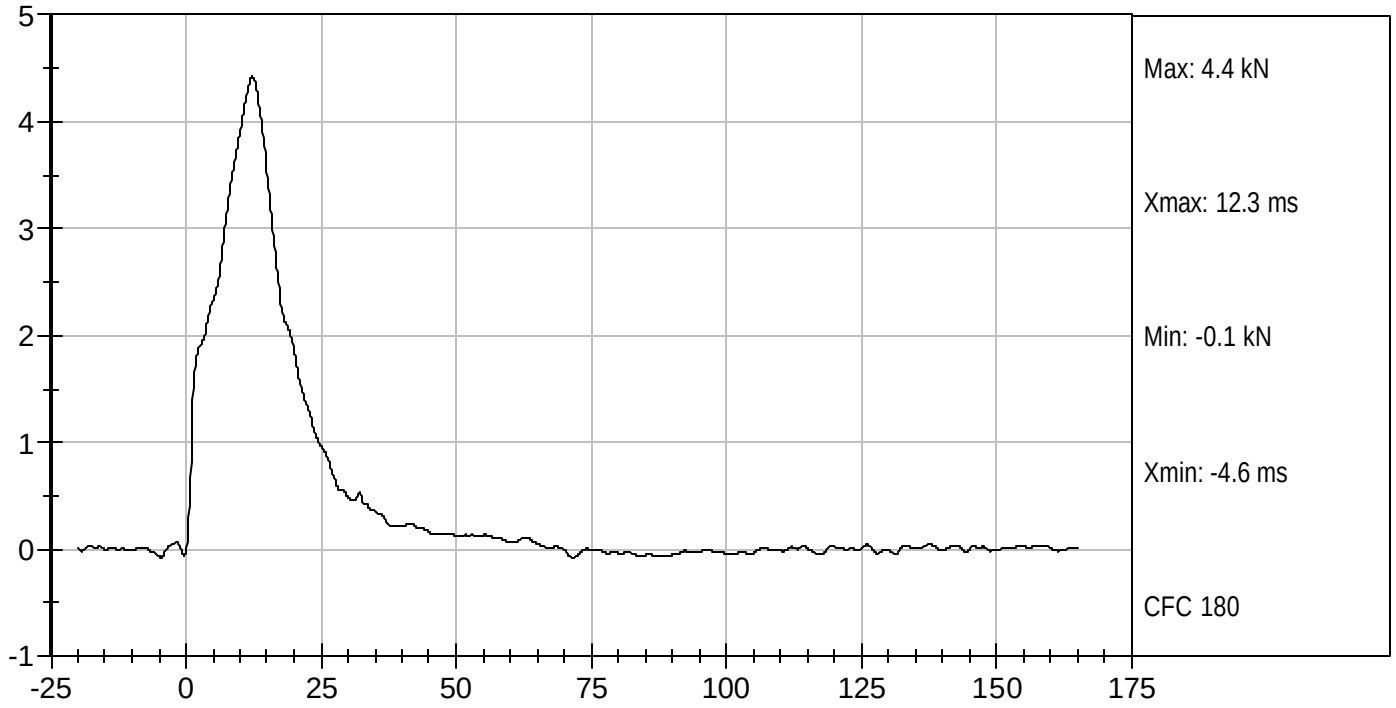
07/28/2005
Test Date

David Winkelbauer
Approved By

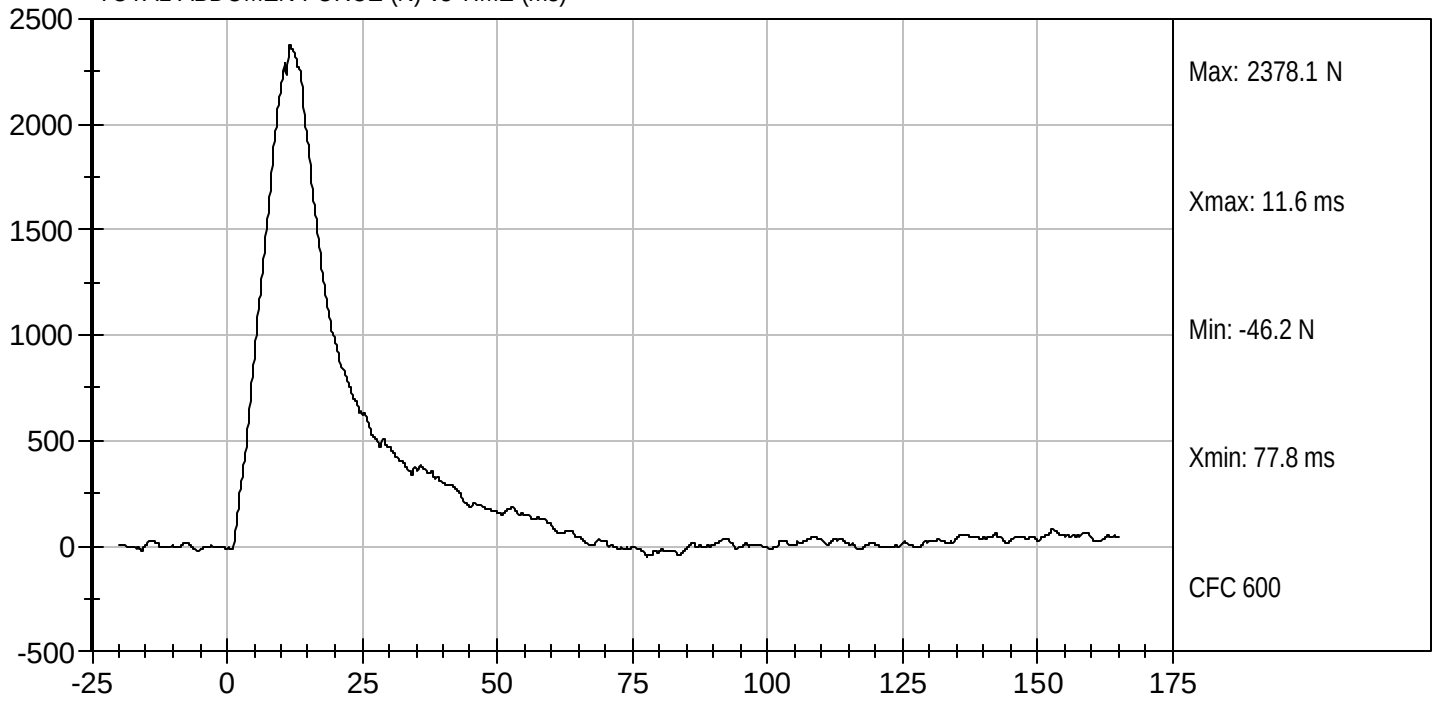
Test Desc: Abdomen Impact
Componet ID: D052077

Test Date: 07/28/2005
Velocity: 13.31 ft/s, 4.1 m/s

IMPACTOR FORCE (kN) vs TIME (ms)



TOTAL ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052078

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	42	Pass
Pendulum Speed		m/sec	5.95 to 6.15	6.14	Pass
Pendulum Deceleration	10 msec	m/sec	-2.46 to -1.59	-2.24	Pass
	20 msec	m/sec	-5.25 to -4.07	-5.07	Pass
	25 msec	m/sec	-6.64 to -5.30	-6.16	Pass
	30 msec	m/sec	>= -6.5	-6.4	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	47.7	Pass
Time of Maximum Flexion Angle		msec	39.0 to 53.0	45.0	Pass
Maximum Theta (A)		deg	31.0 to 35.0	32.4	Pass
Time of Maximum Theta (A)		msec	44.0 to 52.0	45.1	Pass
Maximum Theta (B)		deg	27.92 to 30.42	29.87	Pass
Time of Maximum Theta (B)		msec	44.0 to 52.0	45.7	Pass
			Overall Results		Pass

Laboratory Technician

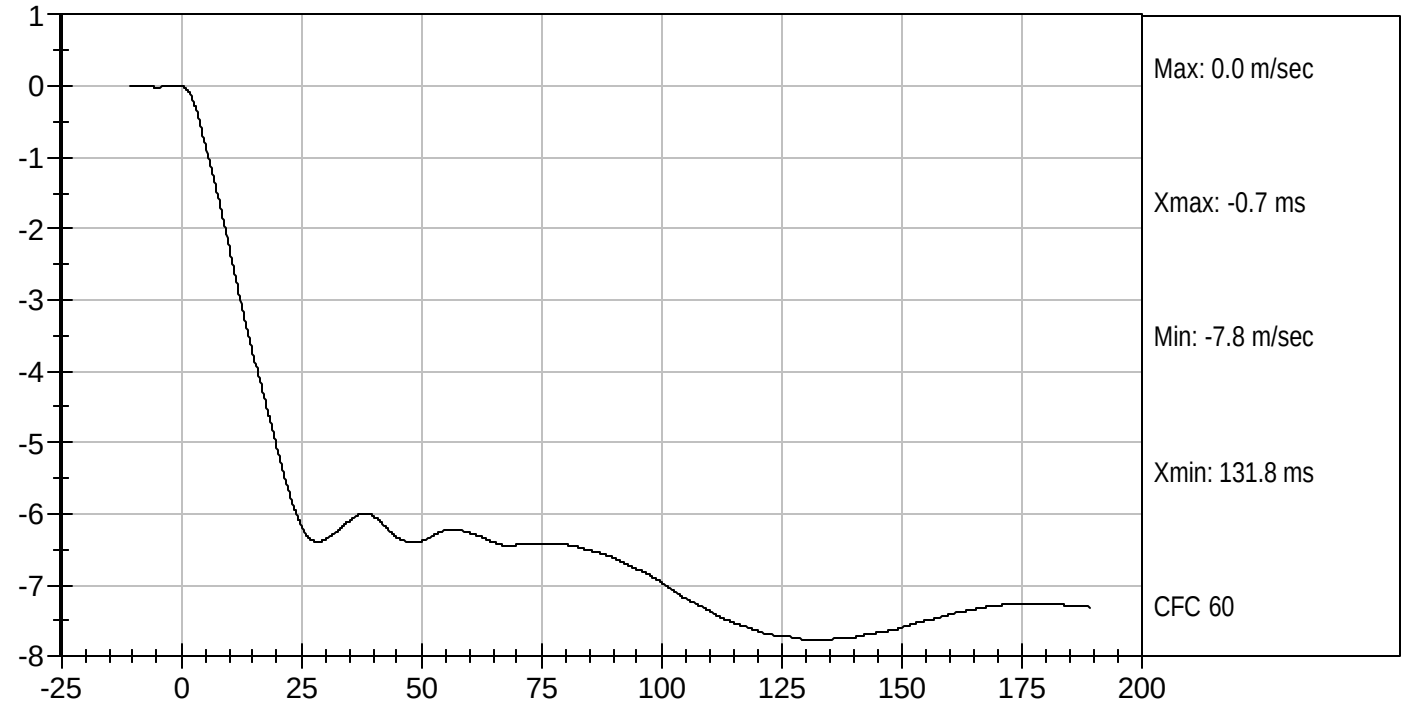
07/29/2005
Test Date

David Winkelbauer
Approved By

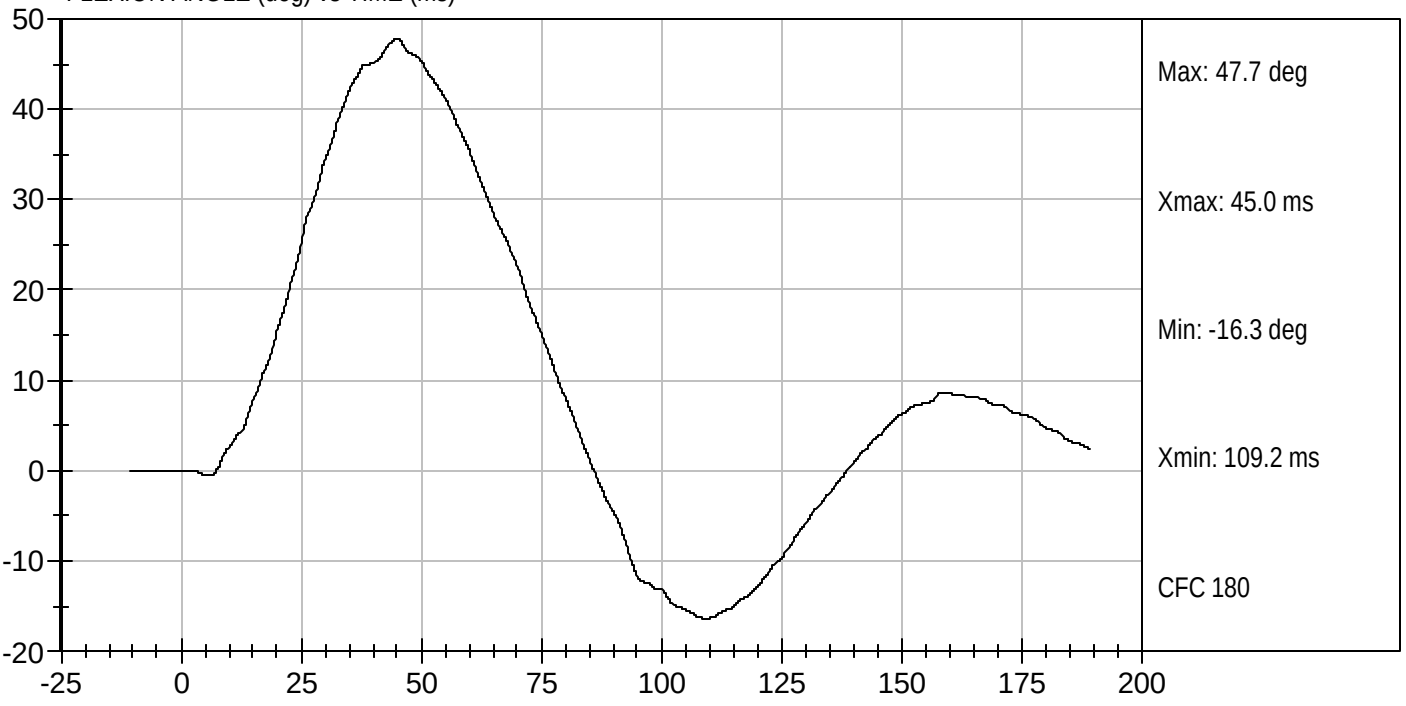
Test Desc: Lumbar Bending
Componet ID: D052078

Test Date: 07/29/2005
Velocity: 20.13 ft/s, 6.14 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)

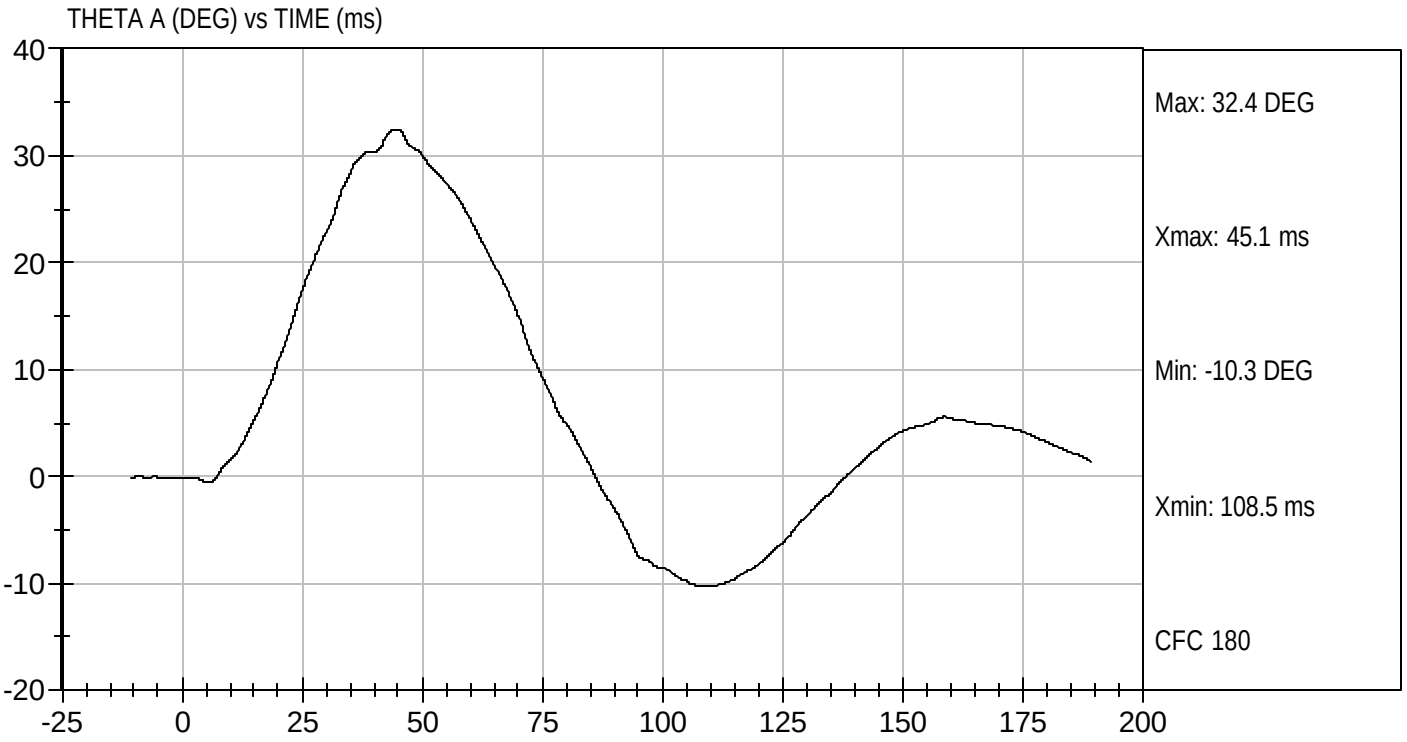


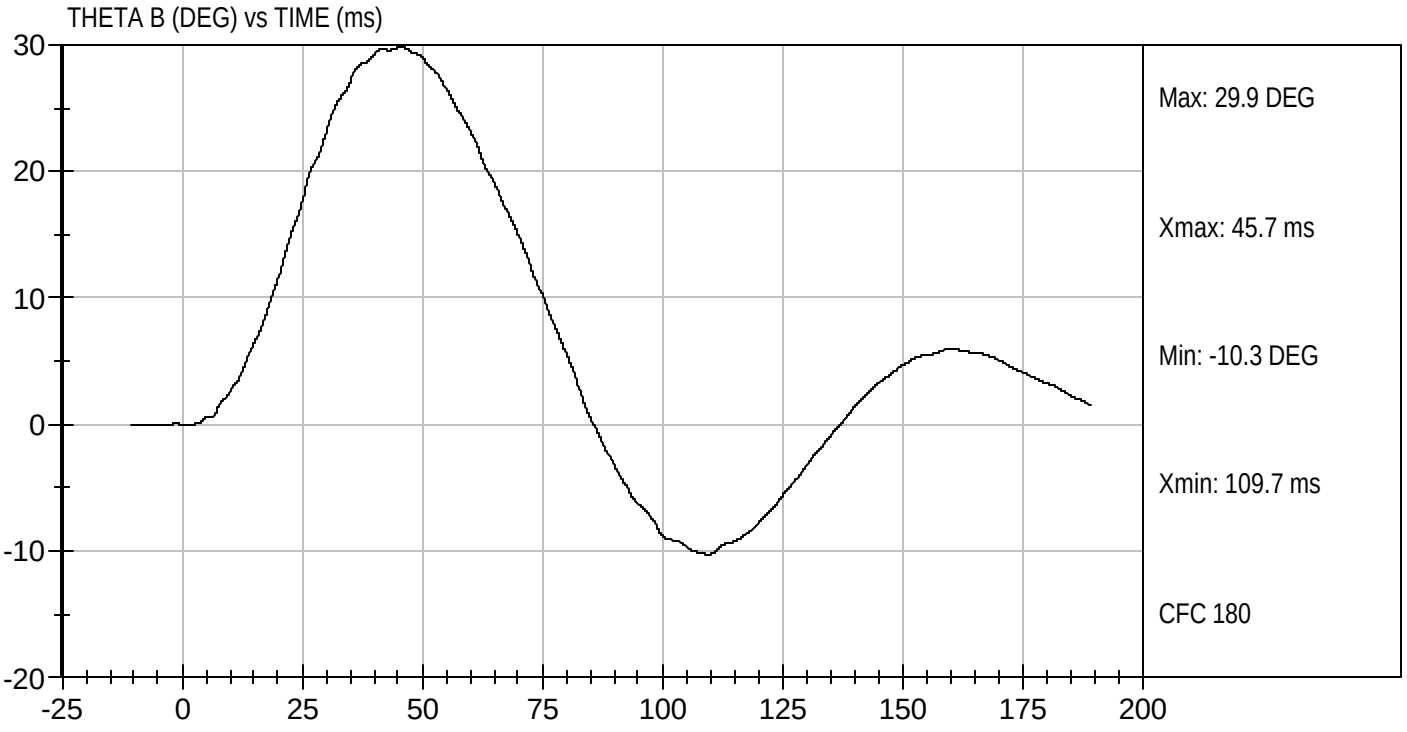
FLEXION ANGLE (deg) vs TIME (ms)



Test Desc: Lumbar Bending
Componet ID: D052078

Test Date: 07/29/2005
Velocity: 20.13 ft/s, 6.14 m/s





MGA RESEARCH CORPORATION

PELVIS TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052079

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Speed	m/s	4.20 to 4.40	4.33	Pass
Maximum Impactor Force	kN	4.40 to 5.40	5.29	Pass
Time of Maximum Impactor Force	msec	10.30 to 15.50	14.30	Pass
Maximum Pubic Force	kN	1.04 to 1.64	1.31	Pass
Time of Maximum Pubic Force	msec	9.90 to 15.90	14.50	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

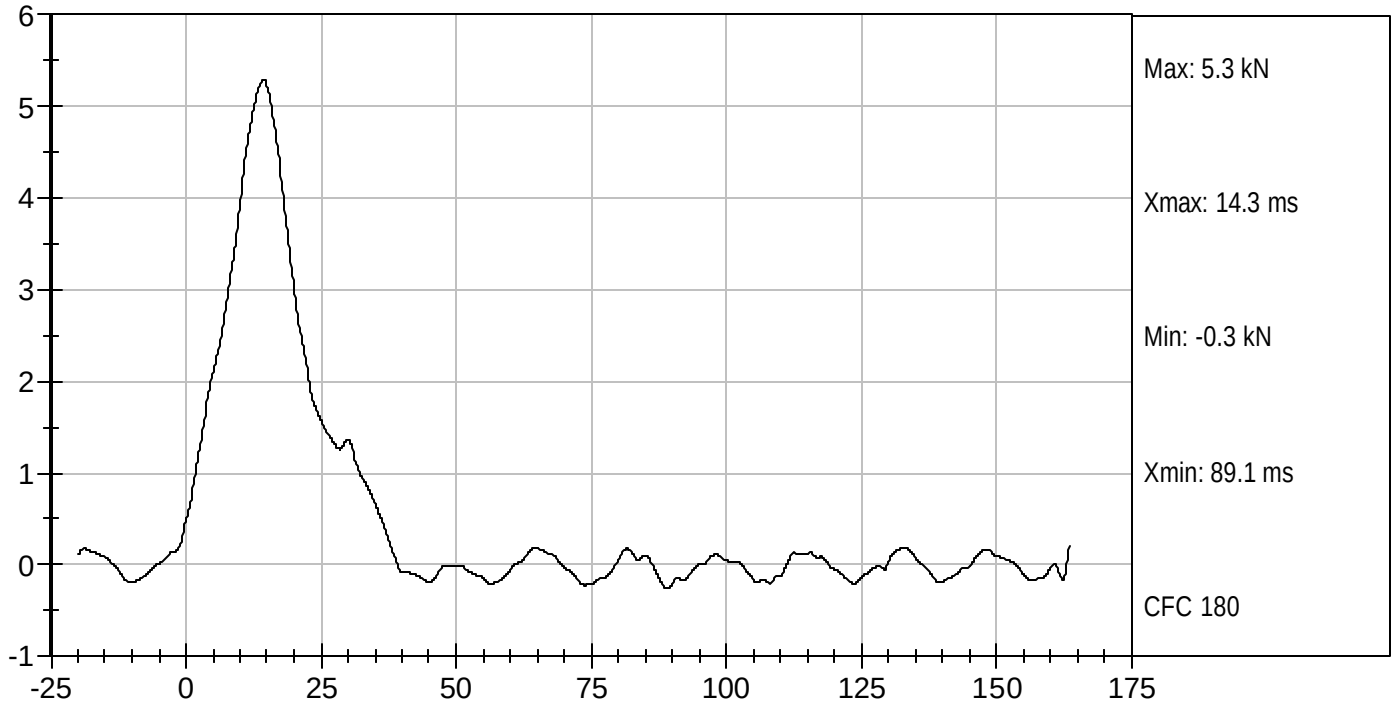
07/28/2005
Test Date

David Winkelbauer
Approved By

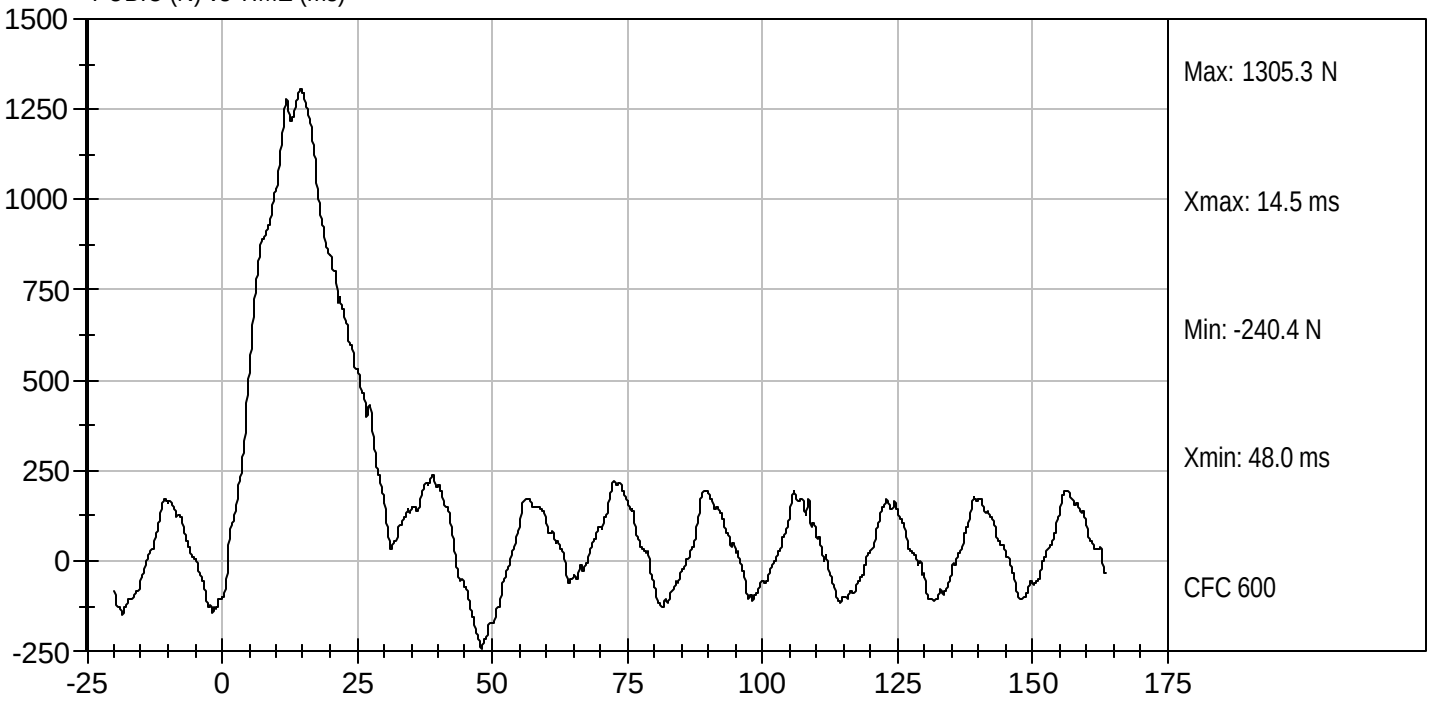
Test Desc: Pelvis Impact
Componet ID: D052079

Test Date: 07/28/2005
Velocity: 14.21 ft/s, 4.3 m/s

IMPACTOR FORCE (kN) vs TIME (ms)



PUBIC (N) vs TIME (ms)



CERTIFICATION DATA

Dummy Serial Number: 009

POST-TEST CALIBRATION

MGA RESEARCH CORPORATION

HEAD DROP TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test ID:** D052251

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 - 22.0	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Peak Resultant Acceleration	G's	100 - 150	142	Pass
Time of Maximum Resultant Acceleration	msec	NA	27.7	Pass
		Overall Test Results		Pass

Joe Fleck

Laboratory Technician

08/12/2005

Test Date

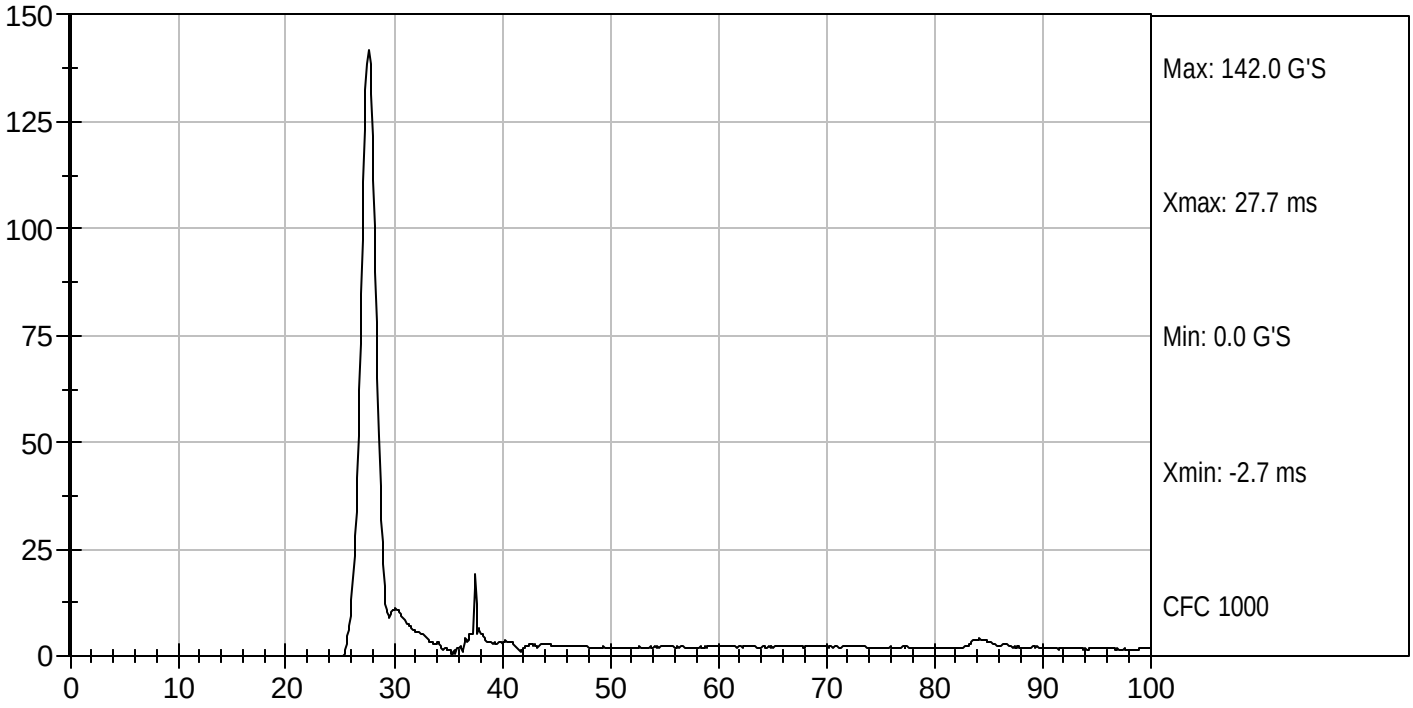
David Winkelbauer

Approved By

Test Desc: Head Drop
Componet ID: D052251

Test Date: 08/12/2005
Velocity: 0 ft/s, 0.00 m/s

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK PENDULUM TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052252

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	46	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.5	Pass
Pendulum Deceleration	3 msec	G's	-0.25 to -0.53	-0.41	Pass
	8 msec	G's	-1.59 to -2.04	-1.76	Pass
	14 msec	G's	-3.20 to -3.85	-3.46	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	52.0	Pass
Time of Maximum Flexion Angle		msec	54.0 to 66.0	54.6	Pass
Maximum Angle Theta (A)		deg	32.7 to 37.0	34.1	Pass
Time of Maximum Theta (A)		msec	53.0 to 63.0	60.7	Pass
Maximum Angle Theta (B)		deg	29.34 to 31.84	30.76	Pass
Time of Maximum Theta (B)		msec	54.0 to 64.0	55.7	Pass
			Overall Test Results		Pass

Ian Fleck

Laboratory Technician

08/11/2005

Test Date

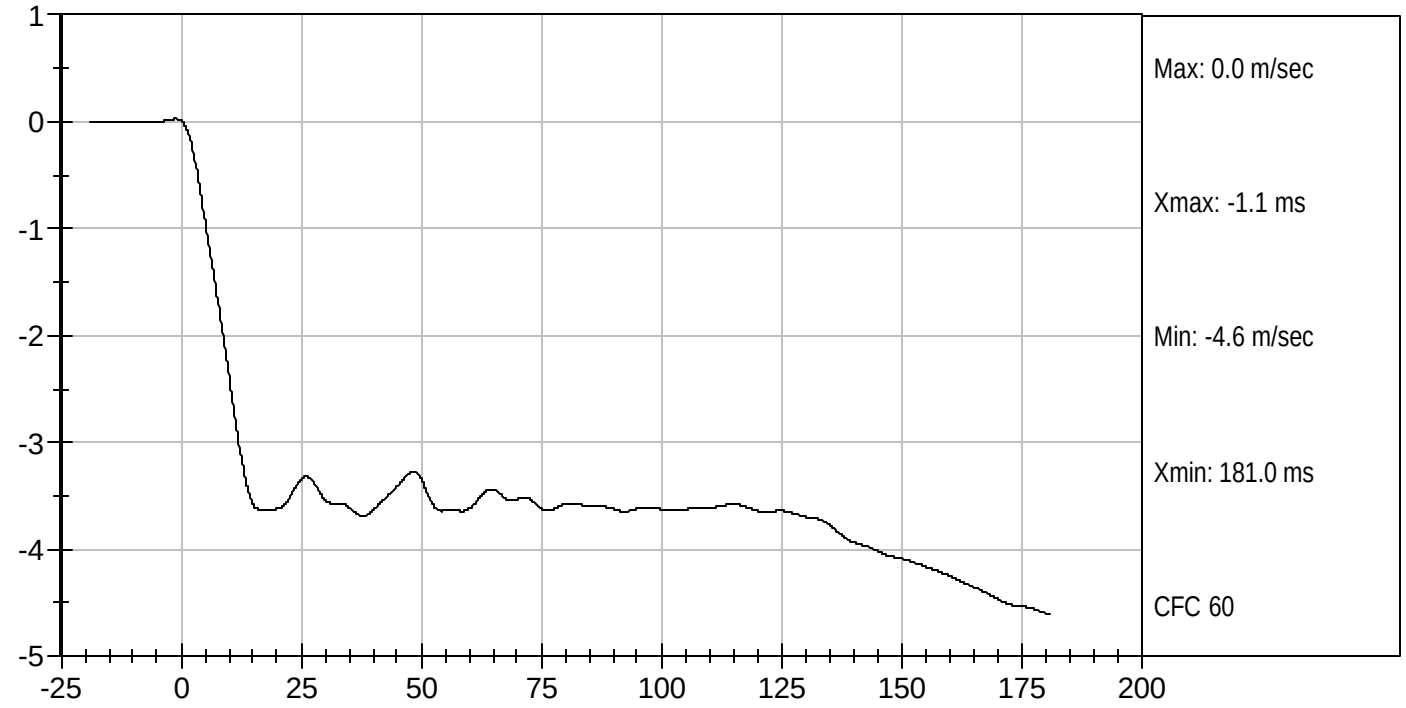
David Winkelbauer

Approved By

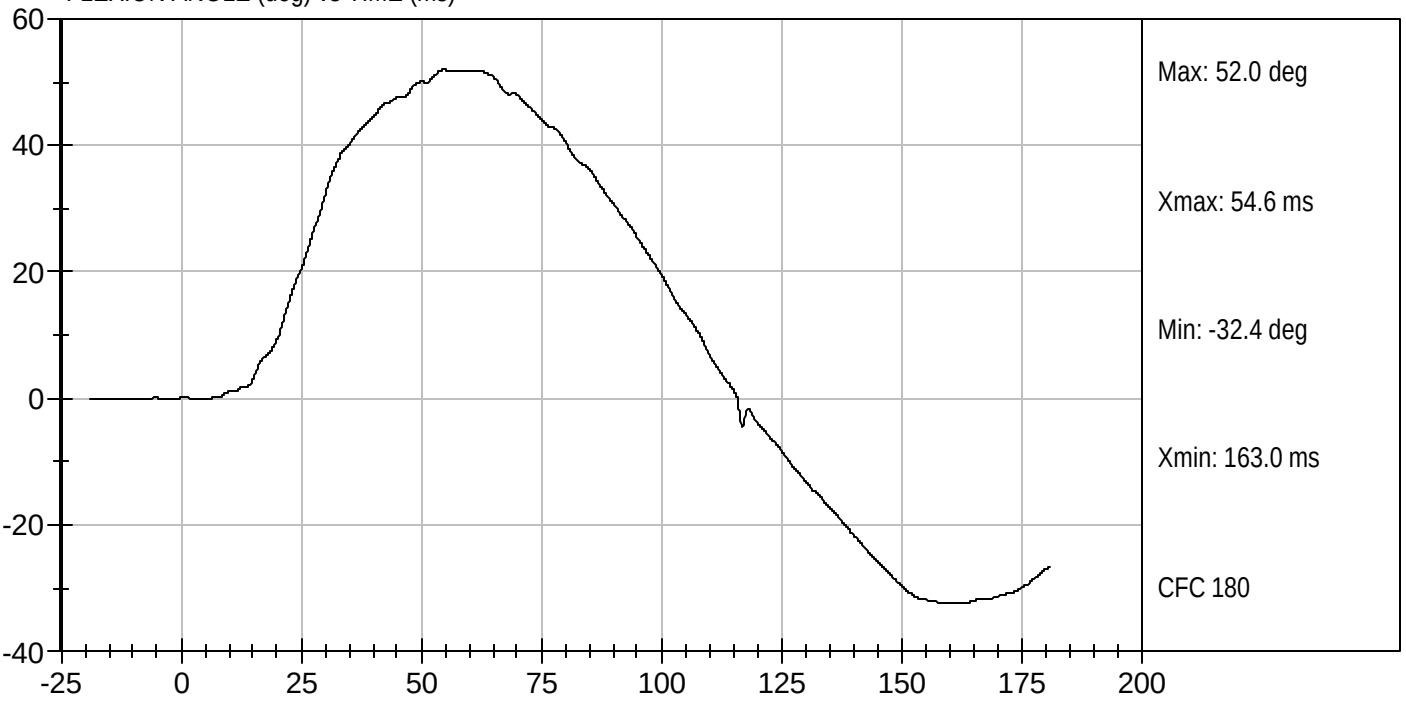
Test Desc: Neck Bending
Componet ID: D052252

Test Date: 08/11/2005
Velocity: 11.42 ft/s, 3.5 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)

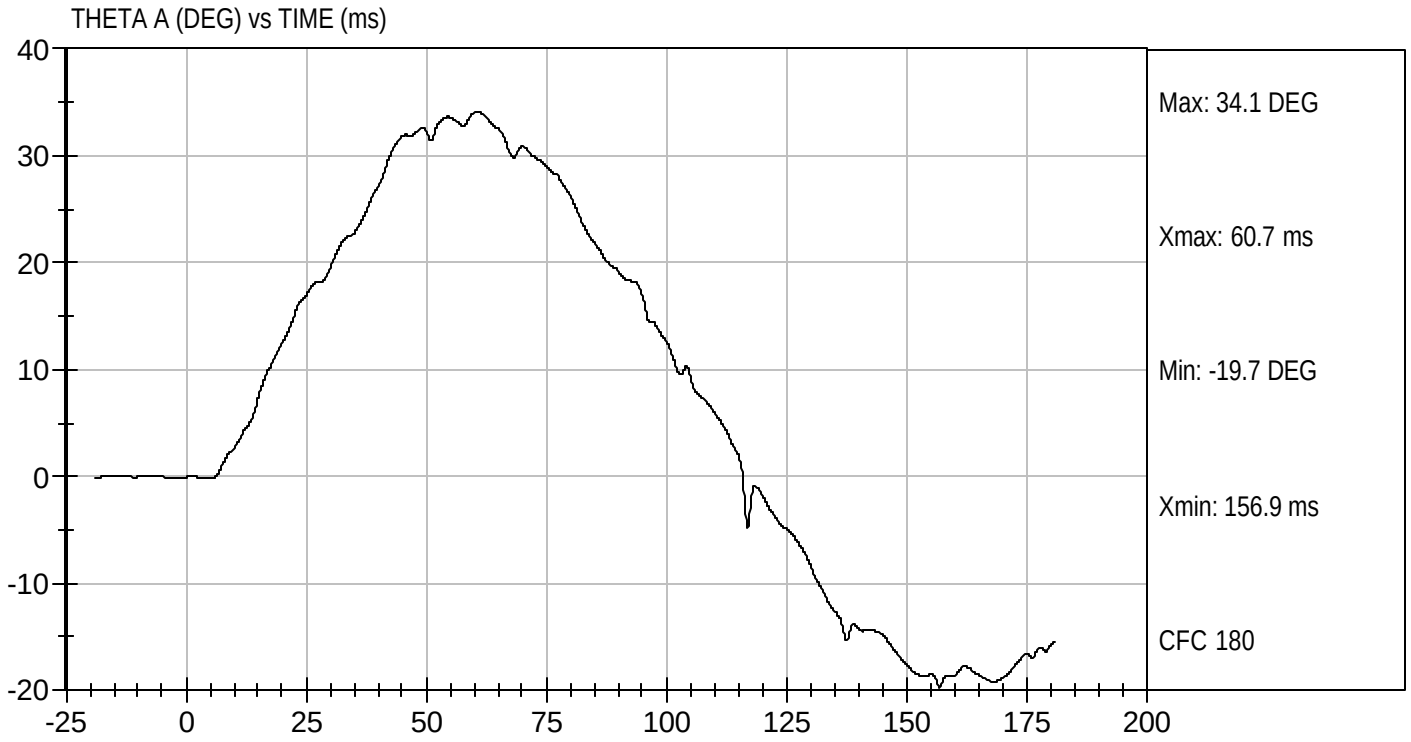


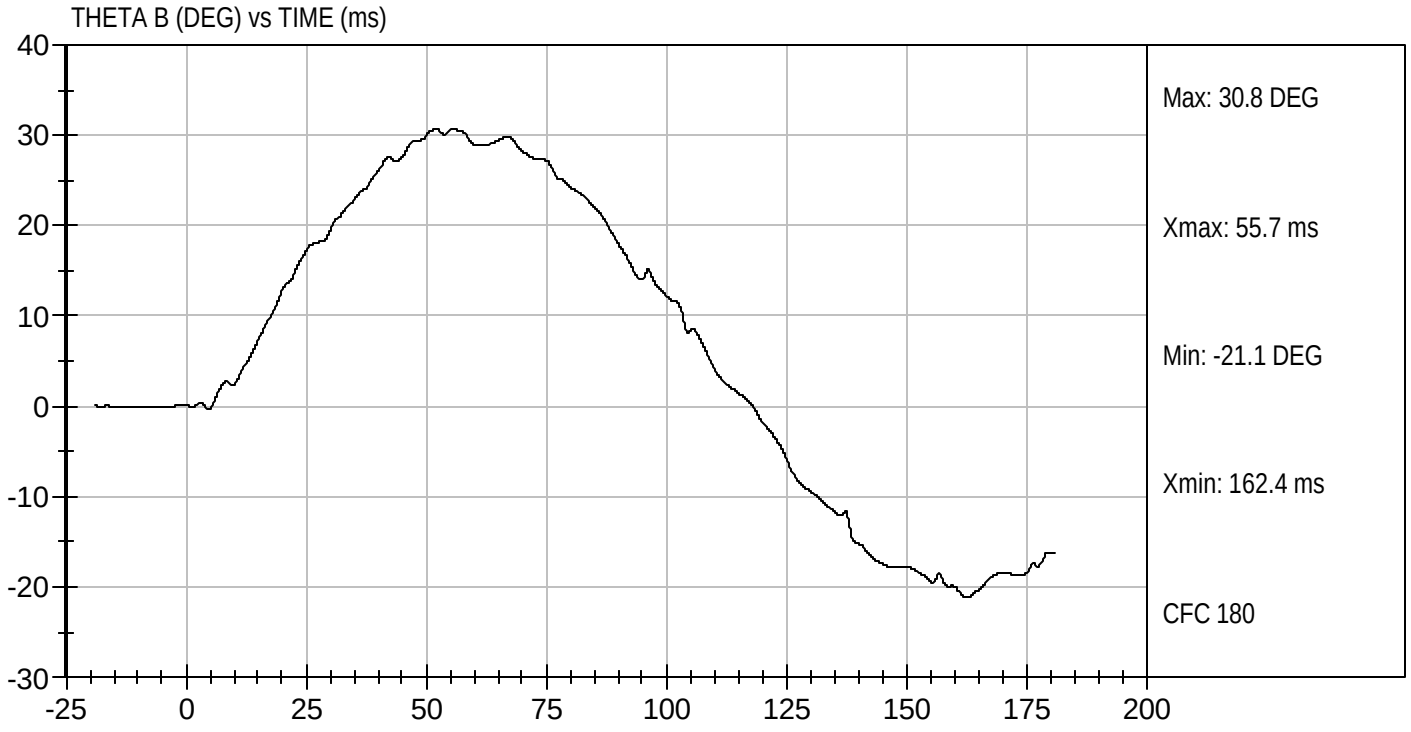
FLEXION ANGLE (deg) vs TIME (ms)



Test Desc: Neck Bending
Componet ID: D052252

Test Date: 08/11/2005
Velocity: 11.42 ft/s, 3.5 m/s





MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052253

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	8.2	Pass
Time of Peak Shoulder Acceleration	msec	NA	37.2	Pass
		Overall Test Results		Pass

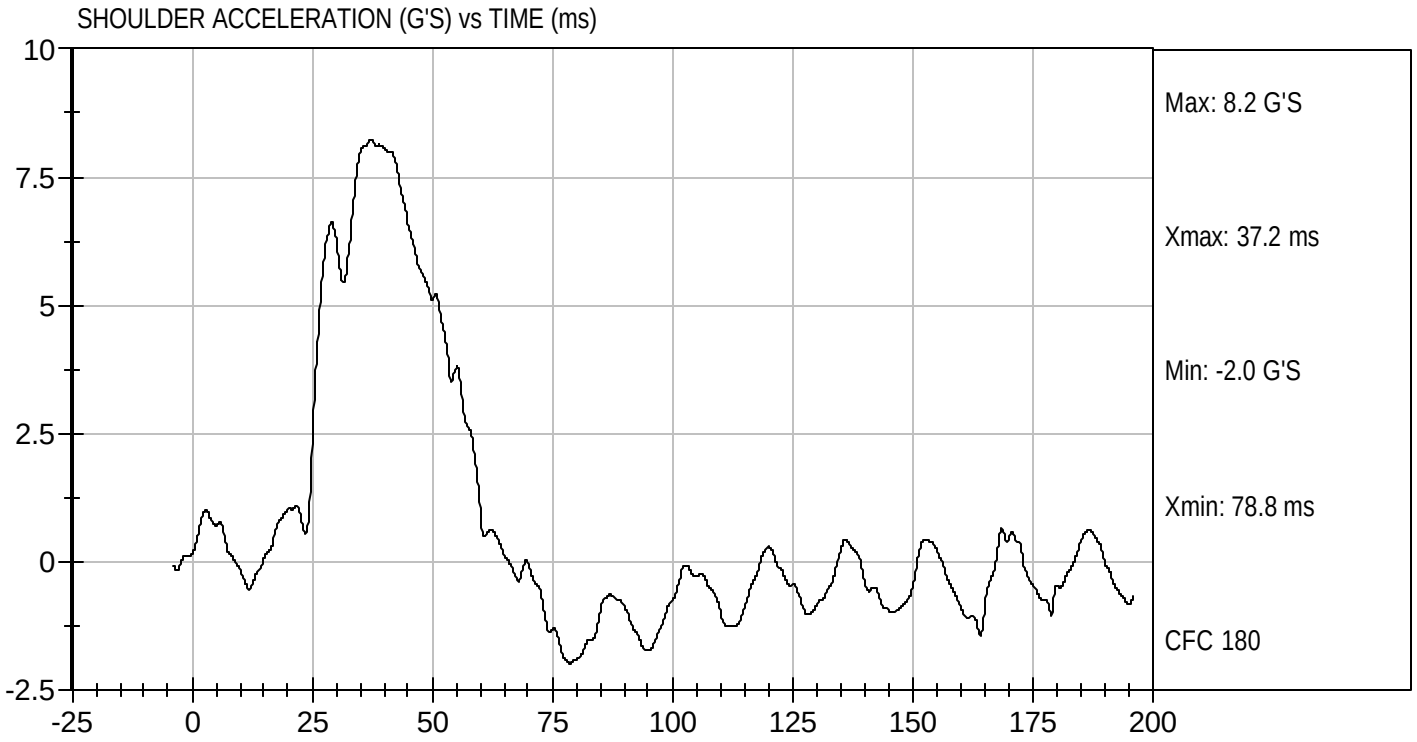
Jessica Hall
Laboratory Technician

08/10/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Shoulder Impact
Componet ID: D052253

Test Date: 08/10/2005
Velocity: 14.06 ft/s, 4.3 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052254

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	25.7	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	37.8	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	48.8	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

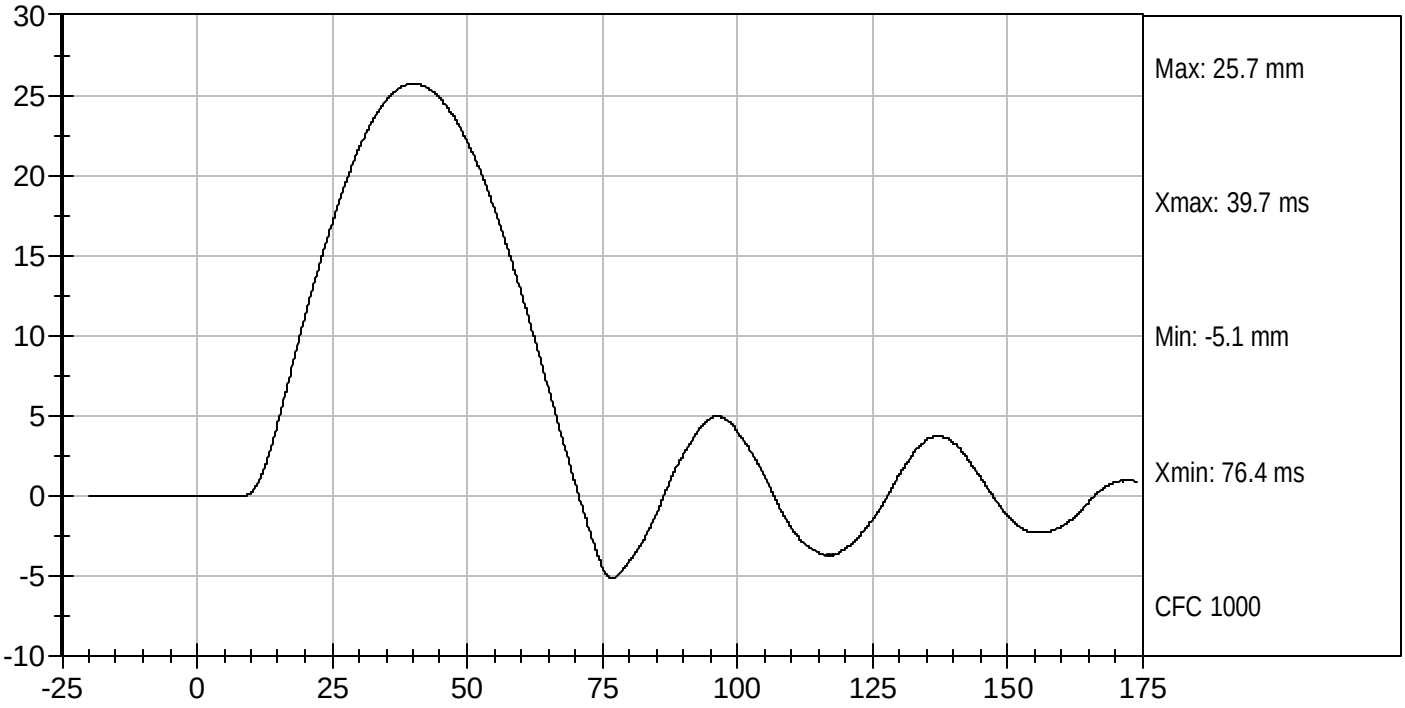
08/11/2005
Test Date

David Winkelbauer
Approved By

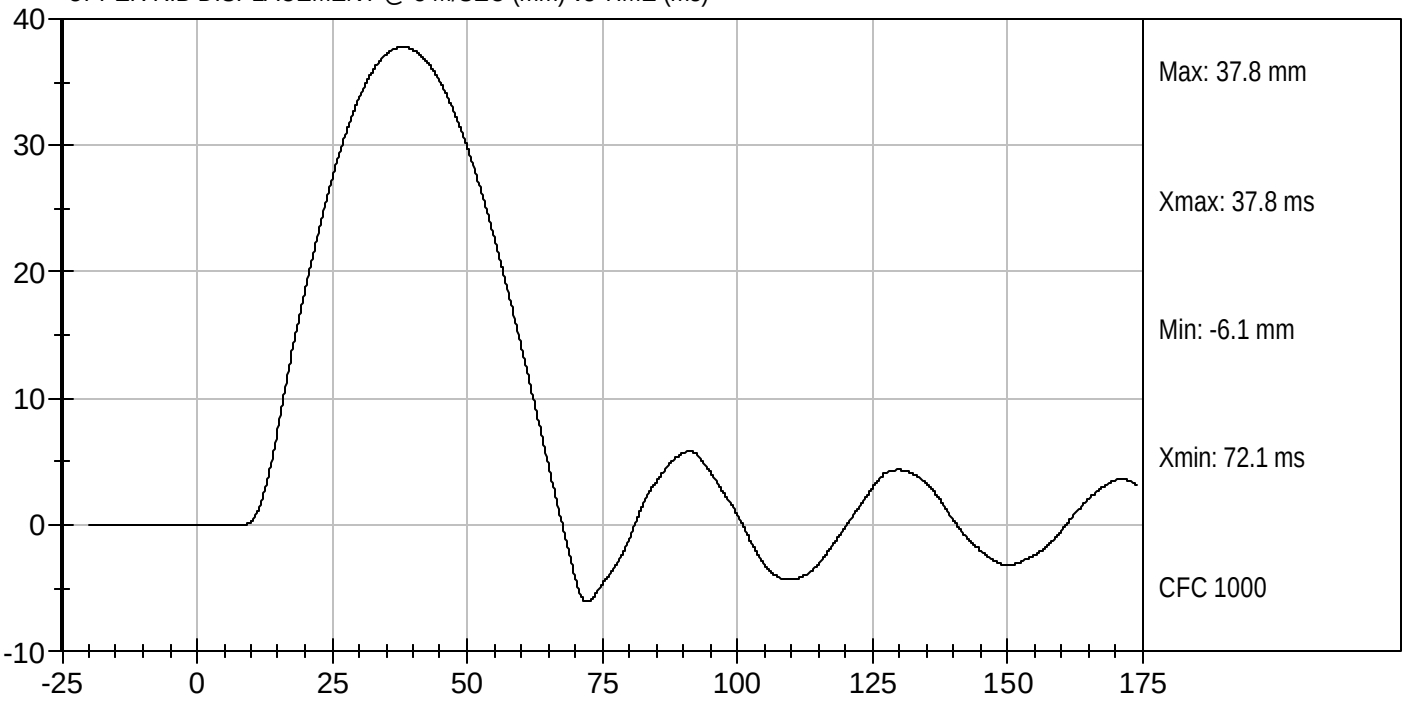
Test Desc: Rib Impact - Upper
Componet ID: D052254

Test Date: 08/11/2005
Velocity: 6.56 ft/s, 2 m/s

UPPER RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)



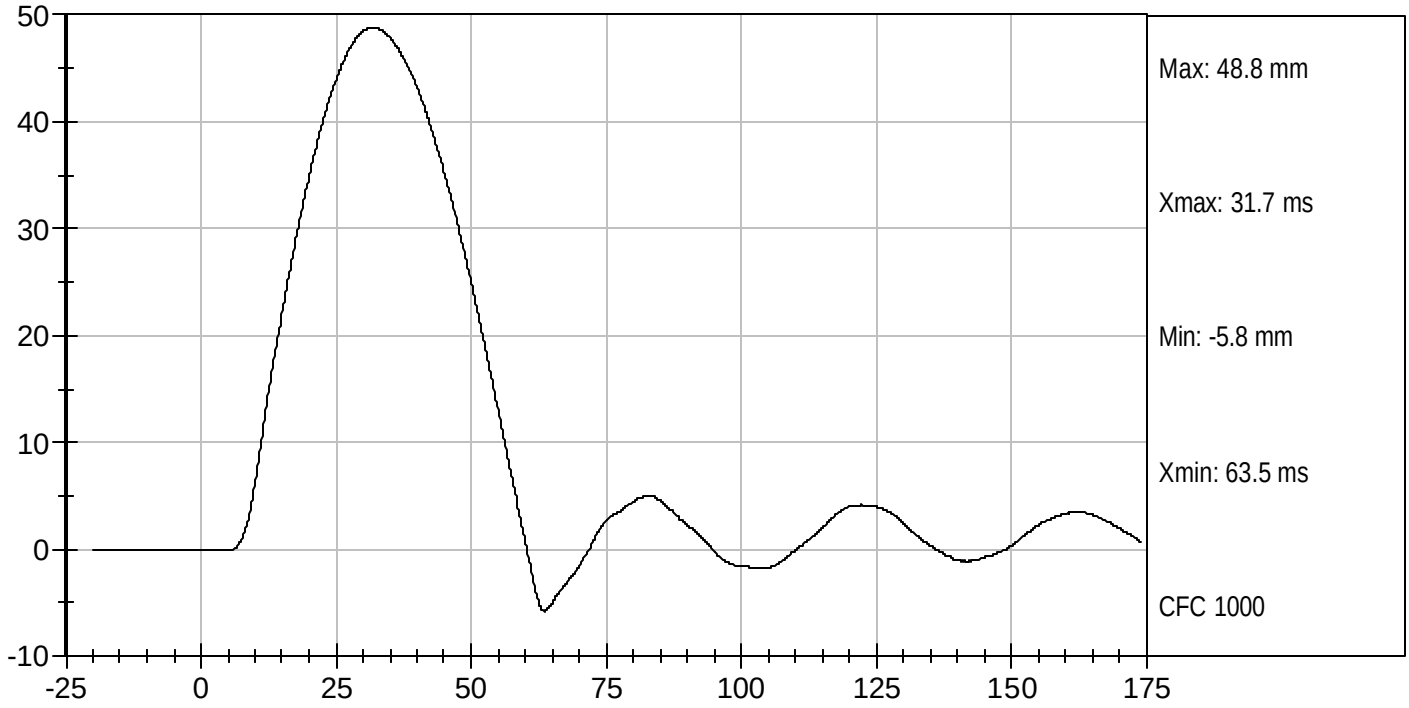
UPPER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Upper
Componet ID: D052254

Test Date: 08/11/2005
Velocity: 13.12 ft/s, 4 m/s

UPPER RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

MID RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052255

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	25.3	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	37.4	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	49.3	Pass
		Overall Test Results		Pass

Laboratory Technician

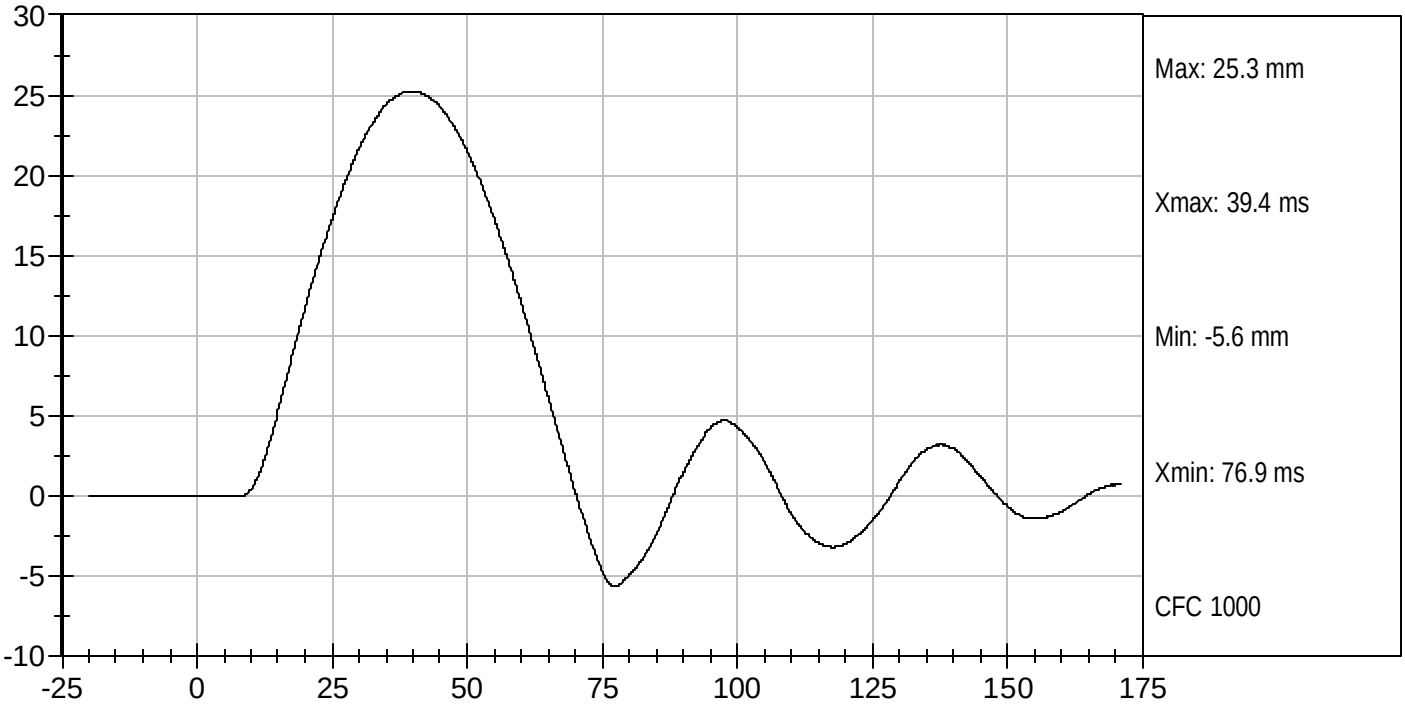
08/12/2005
Test Date

David Winkelbauer
Approved By

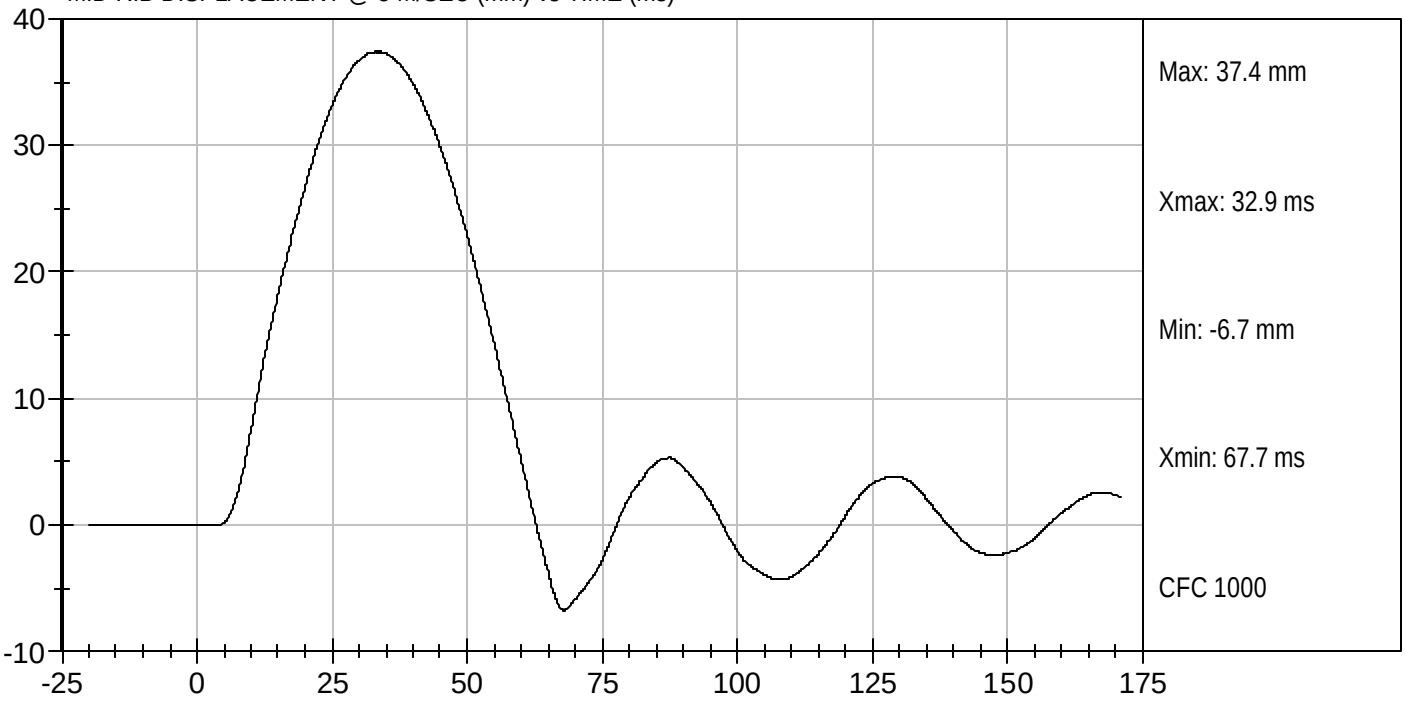
Test Desc: Rib Impact - Mid
Componet ID: D052255

Test Date: 08/12/2005
Velocity: 6.56 ft/s, 2 m/s

MID RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)



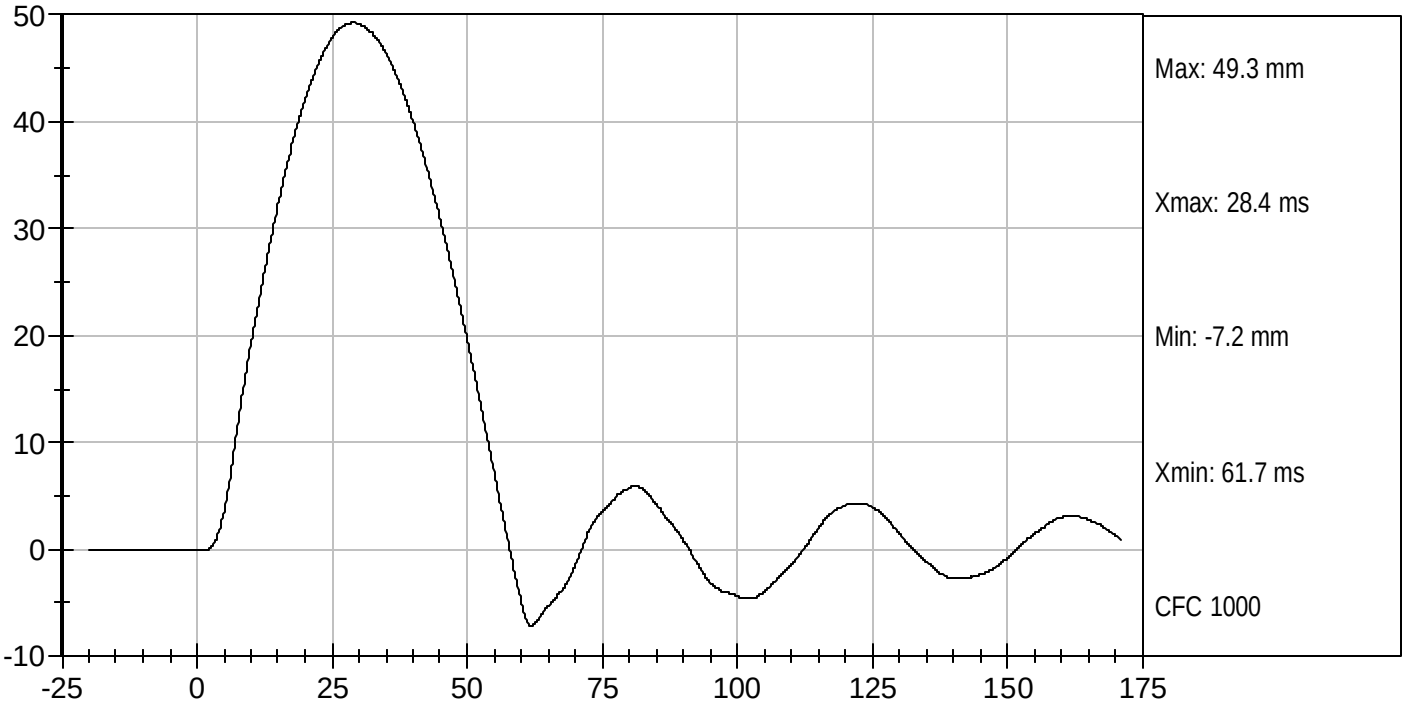
MID RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Mid
Componet ID: D052255

Test Date: 08/12/2005
Velocity: 13.12 ft/s, 4 m/s

MID RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

LOWER RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052256

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	25.4	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	37.7	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	48.2	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

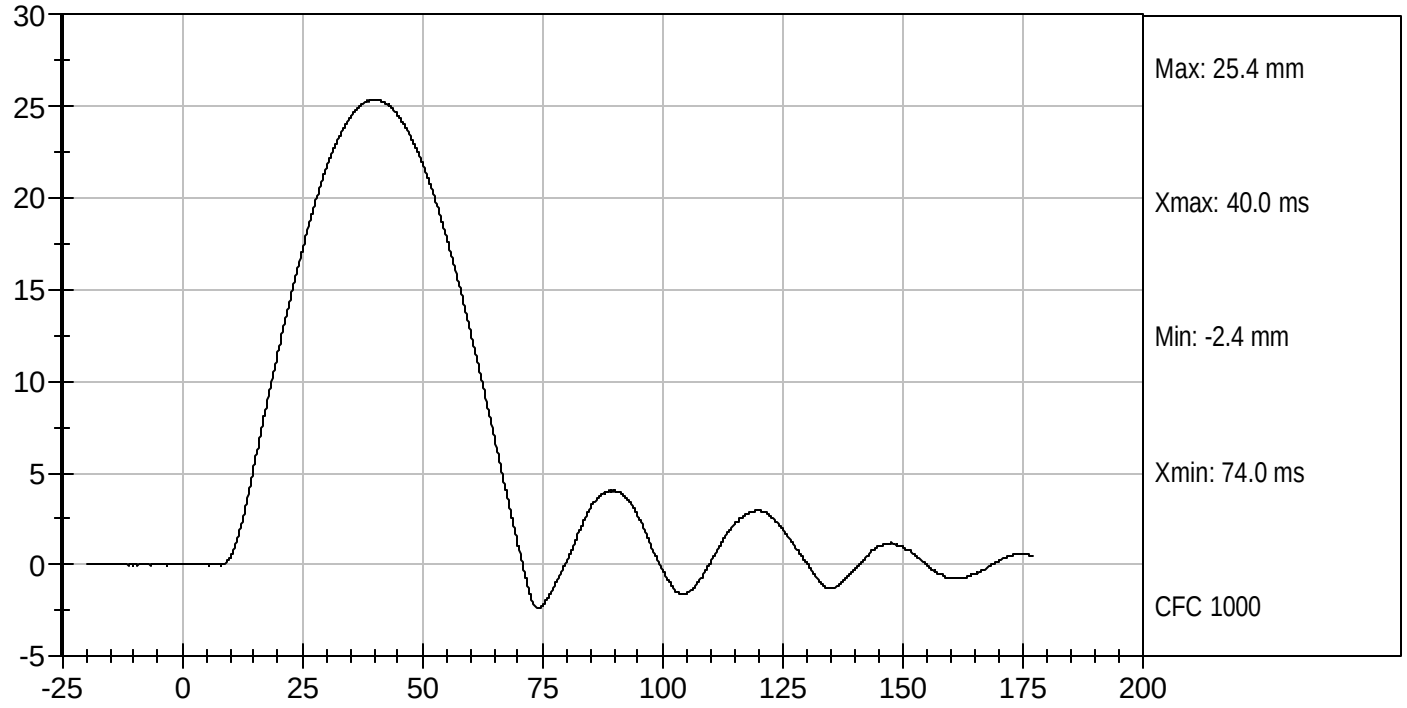
08/12/2005
Test Date

David Winkelbauer
Approved By

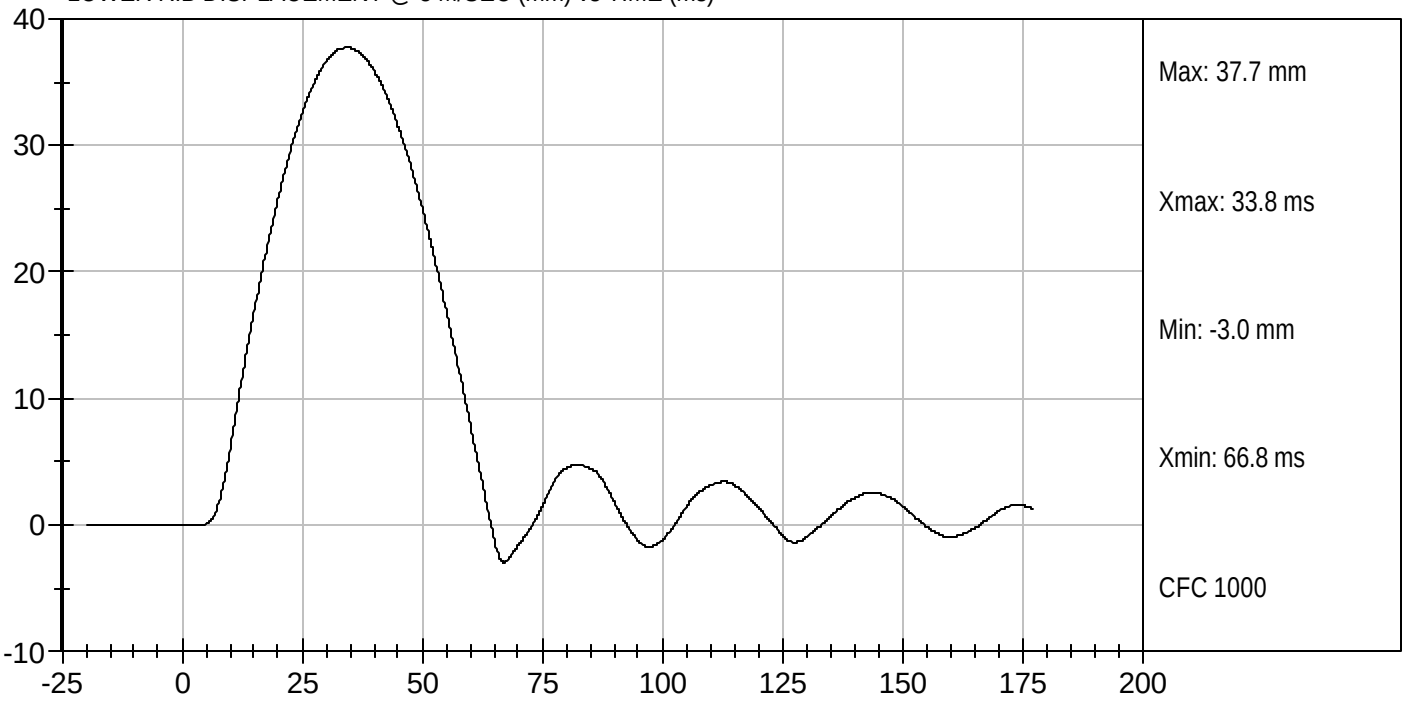
Test Desc: Rib Impact - Lower
Componet ID: D052256

Test Date: 08/12/2005
Velocity: 6.56 ft/s, 2 m/s

LOWER RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)



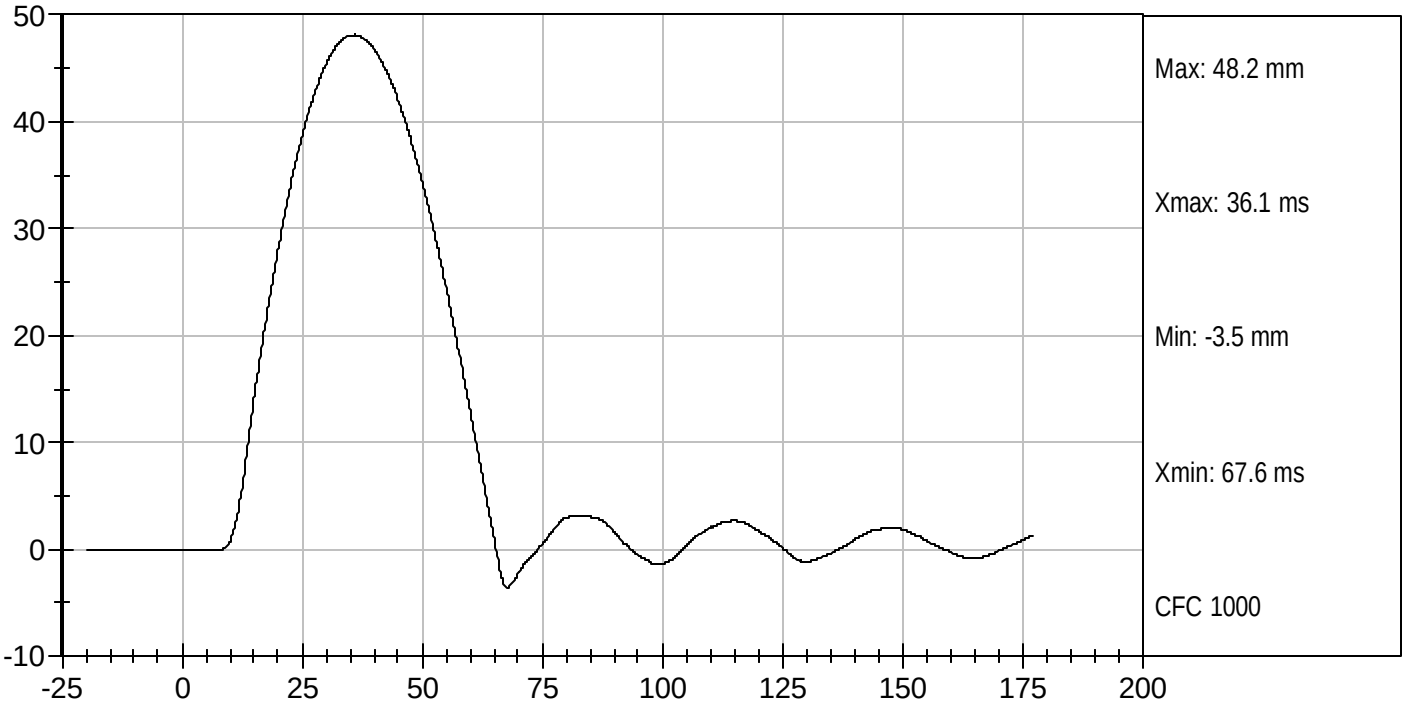
LOWER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Lower
Componet ID: D052256

Test Date: 08/12/2005
Velocity: 13.12 ft/s, 4 m/s

LOWER RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052257

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Speed	m/s	3.90 to 4.10	4.04	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.43	Pass
Time of Maximum Impactor Force	msec	10.60 to 13.00	12.30	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.49	Pass
Time of Maximum Abdomen Force	msec	10.00 to 12.30	11.40	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

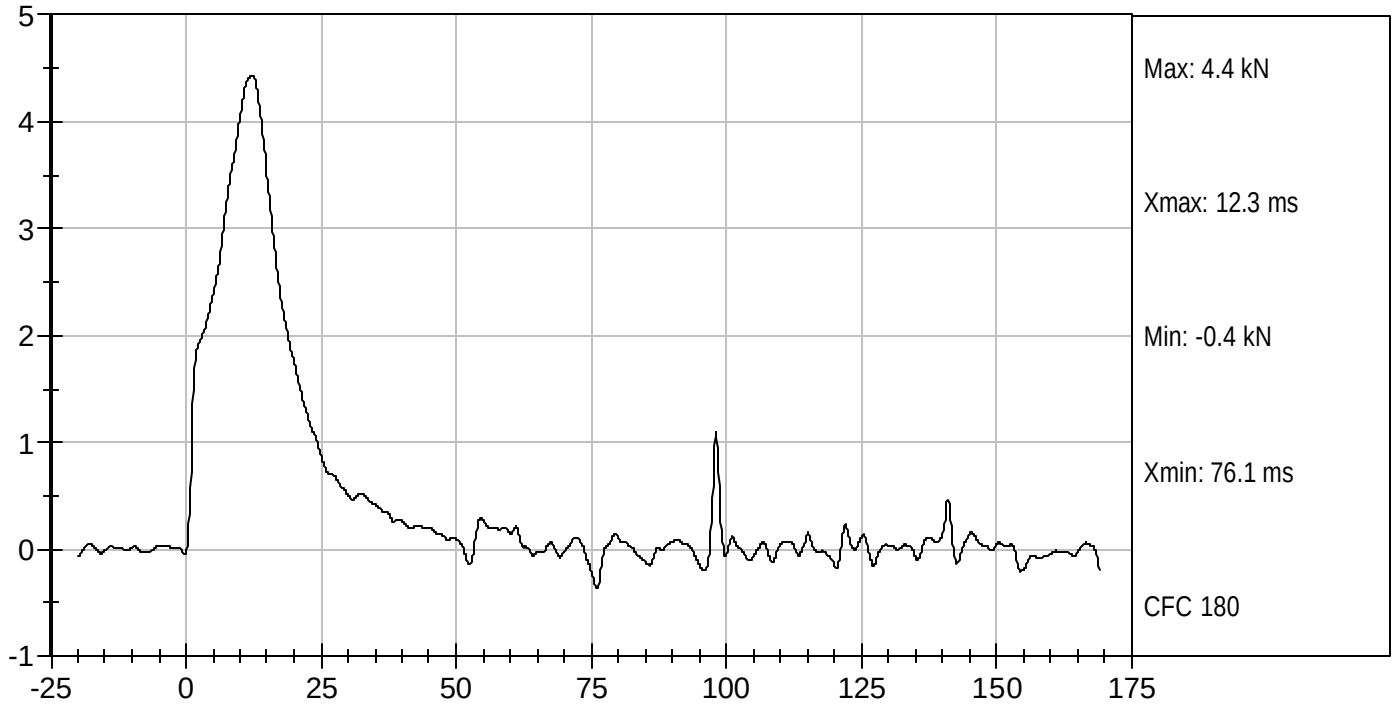
08/10/2005
Test Date

David Winkelbauer
Approved By

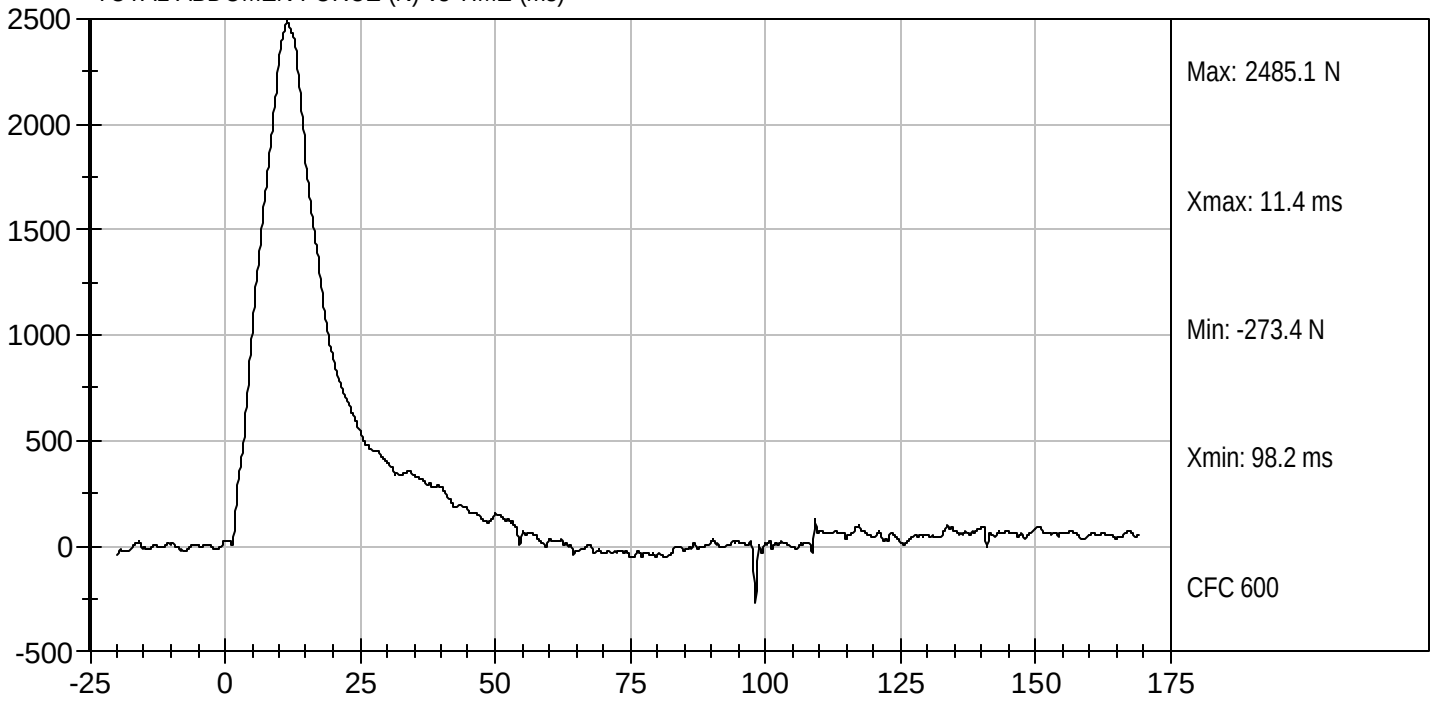
Test Desc: Abdomen Impact
Componet ID: D052257

Test Date: 08/10/2005
Velocity: 13.25 ft/s, 4.04 m/s

IMPACTOR FORCE (kN) vs TIME (ms)



TOTAL ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052258

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Speed		m/sec	5.95 to 6.15	6.11	Pass
Pendulum Deceleration	10 msec	m/sec	-2.46 to -1.59	-2.26	Pass
	20 msec	m/sec	-5.25 to -4.07	-5.19	Pass
	25 msec	m/sec	-6.64 to -5.30	-6.22	Pass
	30 msec	m/sec	>= -6.5	-6.3	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	47.8	Pass
Time of Maximum Flexion Angle		msec	39.0 to 53.0	45.3	Pass
Maximum Theta (A)		deg	31.0 to 35.0	32.8	Pass
Time of Maximum Theta (A)		msec	44.0 to 52.0	44.6	Pass
Maximum Theta (B)		deg	28.27 to 30.77	30.23	Pass
Time of Maximum Theta (B)		msec	44.0 to 52.0	46.4	Pass
			Overall Results		Pass

Laboratory Technician

08/12/2005
Test Date

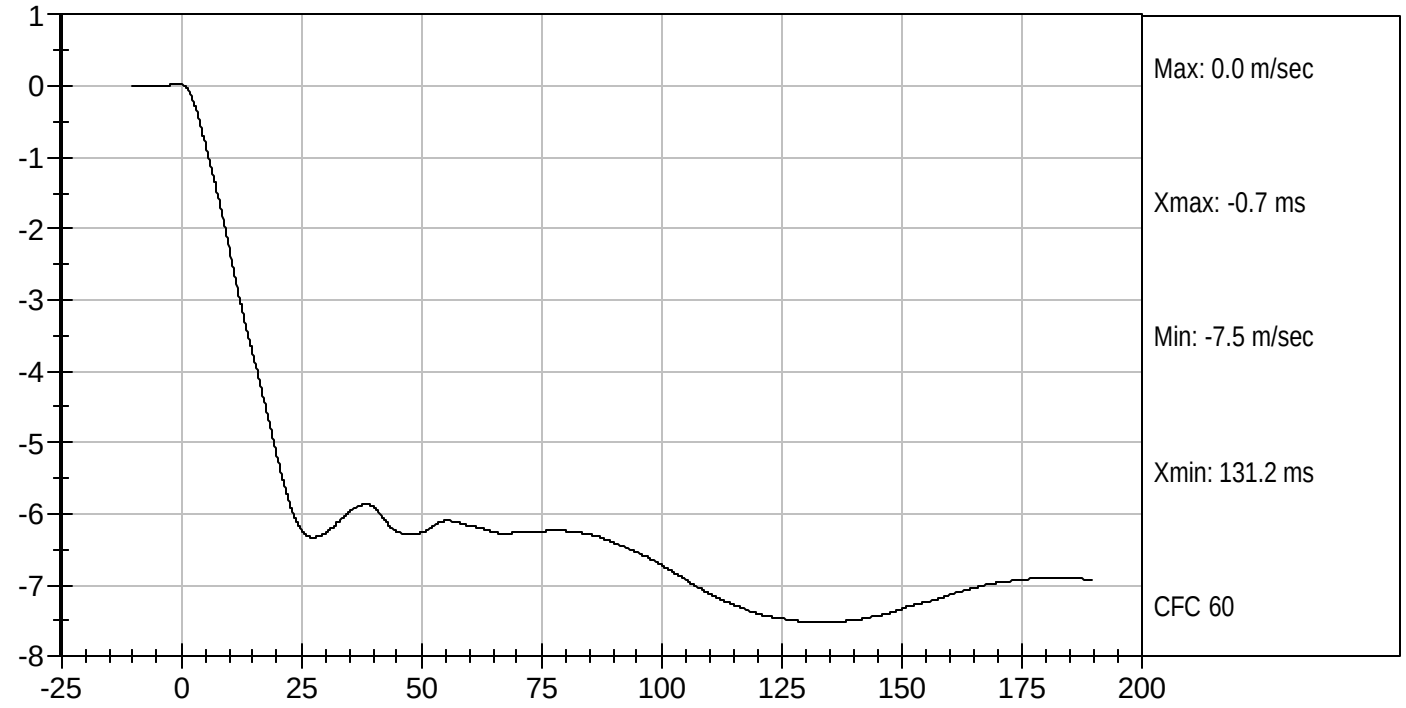
David Winkelbauer

Approved By

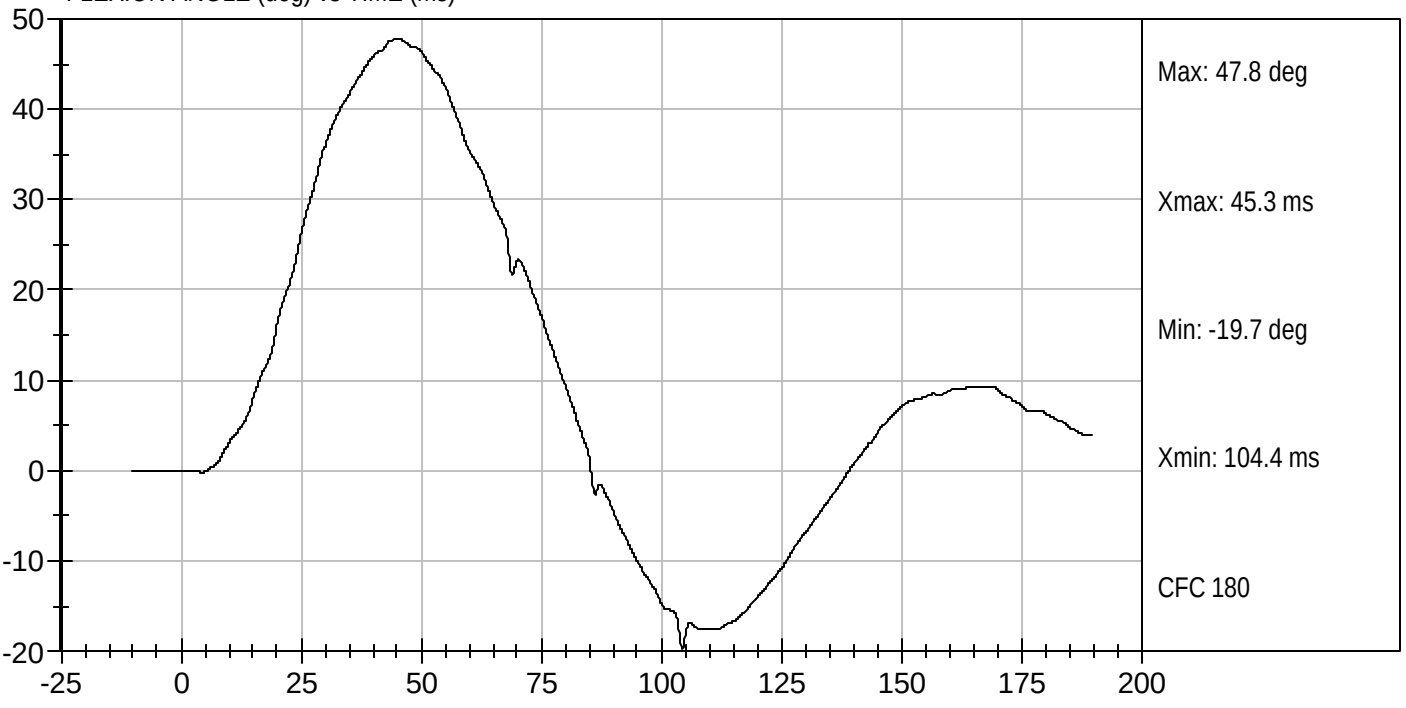
Test Desc: Lumbar Bending
Componet ID: D052258

Test Date: 08/12/2005
Velocity: 20.05 ft/s, 6.11 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)

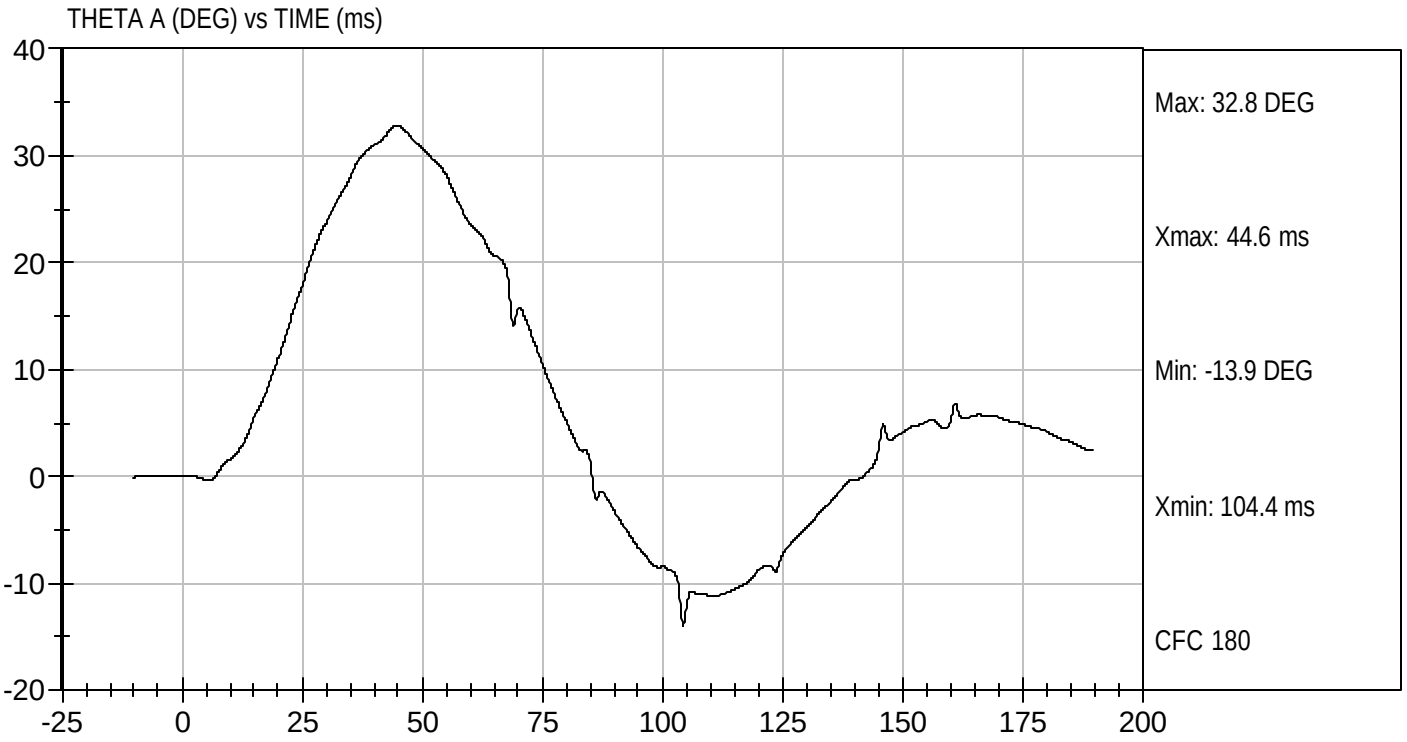


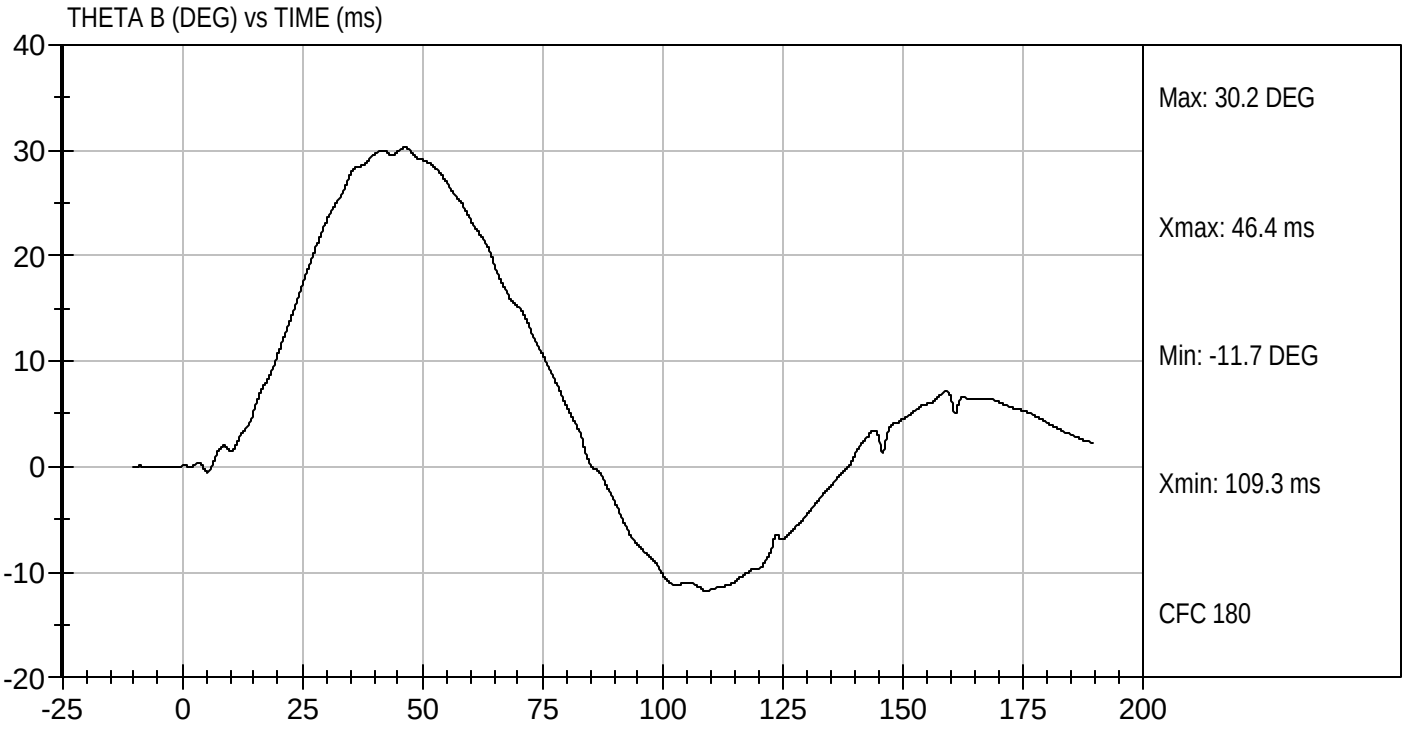
FLEXION ANGLE (deg) vs TIME (ms)



Test Desc: Lumbar Bending
Componet ID: D052258

Test Date: 08/12/2005
Velocity: 20.05 ft/s, 6.11 m/s





MGA RESEARCH CORPORATION

PELVIS TEST

EUROSID 2 DUMMY

ATD Serial No: 009 **Test I.D:** D052259

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Speed	m/s	4.20 to 4.40	4.29	Pass
Maximum Impactor Force	kN	4.40 to 5.40	5.18	Pass
Time of Maximum Impactor Force	msec	10.30 to 15.50	14.40	Pass
Maximum Pubic Force	kN	1.04 to 1.64	1.44	Pass
Time of Maximum Pubic Force	msec	9.90 to 15.90	15.30	Pass
		Overall Test Results		Pass

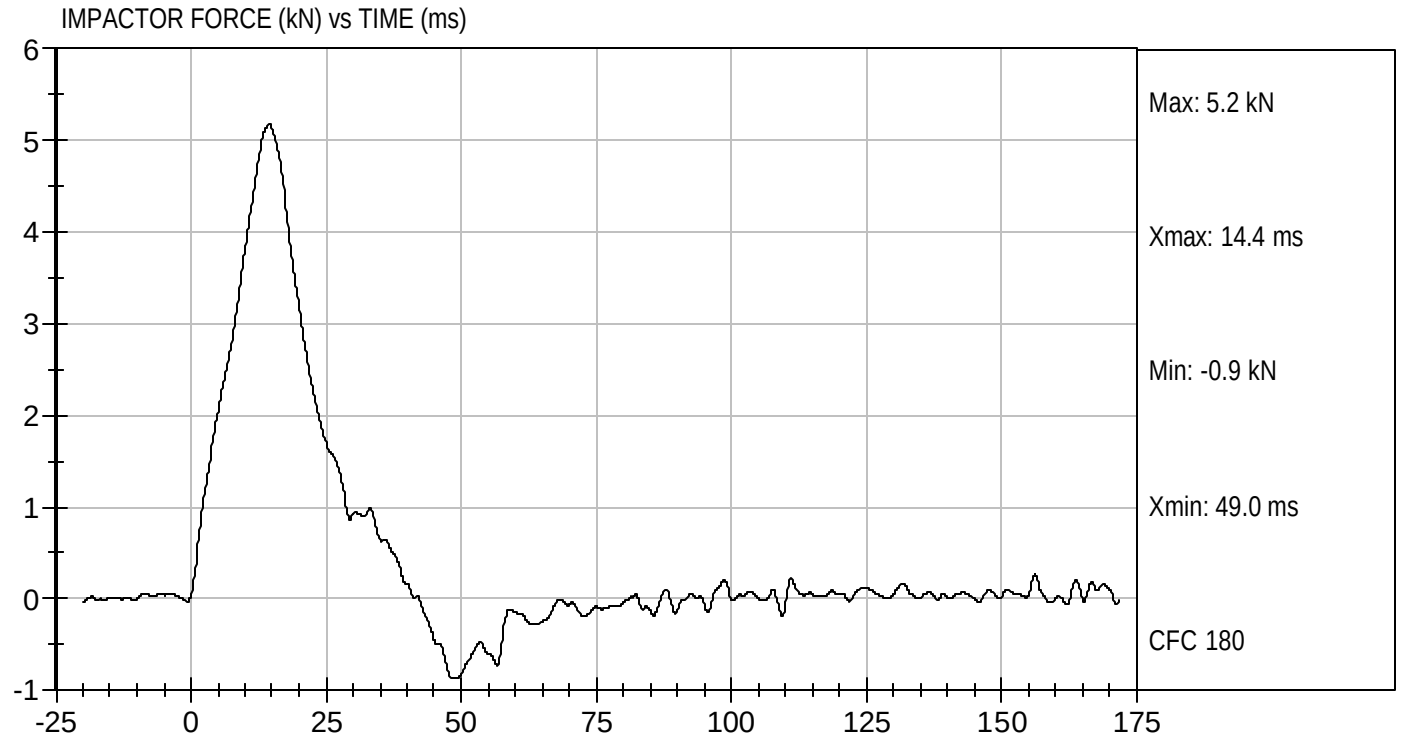
Joe Fleck
Laboratory Technician

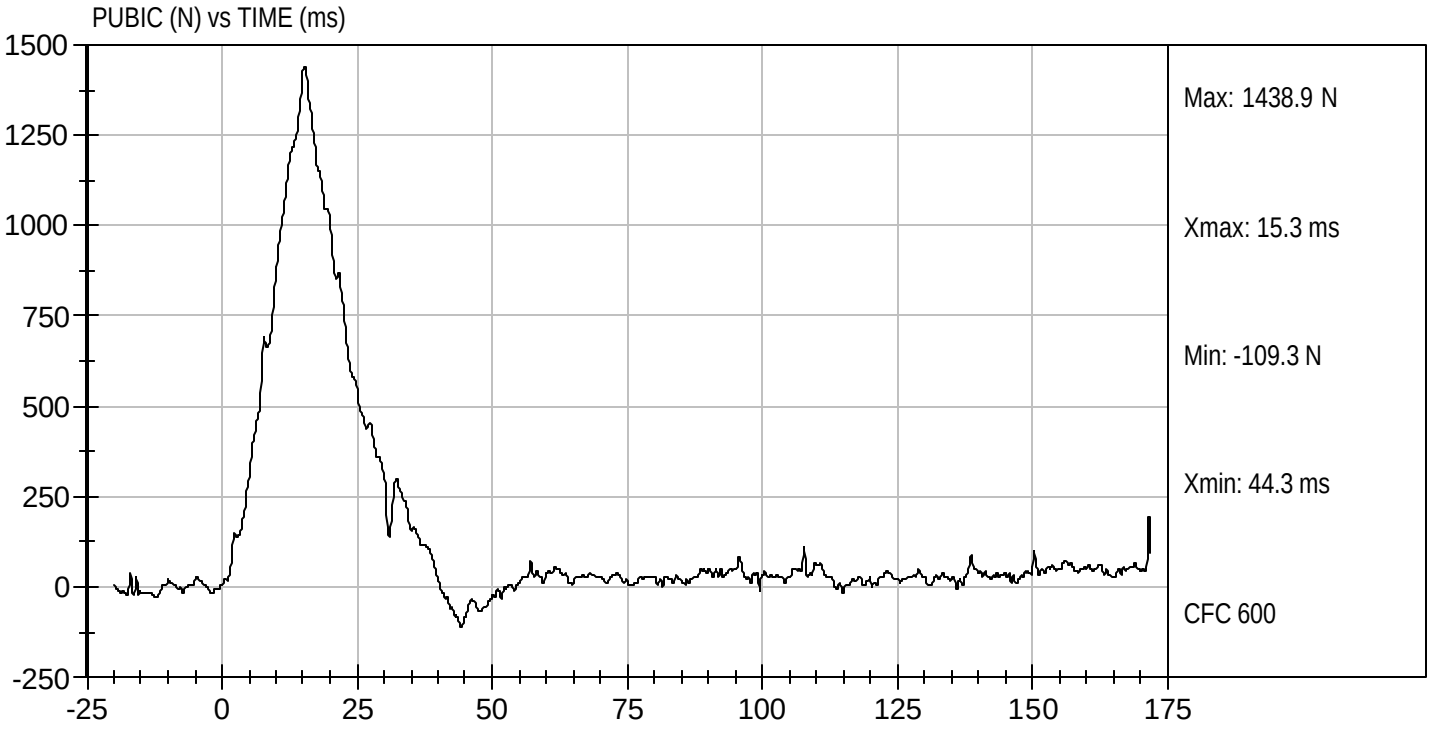
08/10/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Pelvis Impact
Componet ID: D052259

Test Date: 08/10/2005
Velocity: 14.08 ft/s, 4.3 m/s





CERTIFICATION DATA

Dummy Serial Number: 010

PRE-TEST CALIBRATION

MGA RESEARCH CORPORATION

HEAD DROP TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test ID:** D052201

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 - 22.0	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Peak Resultant Acceleration	G's	100 - 150	127	Pass
Time of Maximum Resultant Acceleration	msec	NA	31.3	Pass
		Overall Test Results		Pass

Joe Fleck

Laboratory Technician

08/05/2005

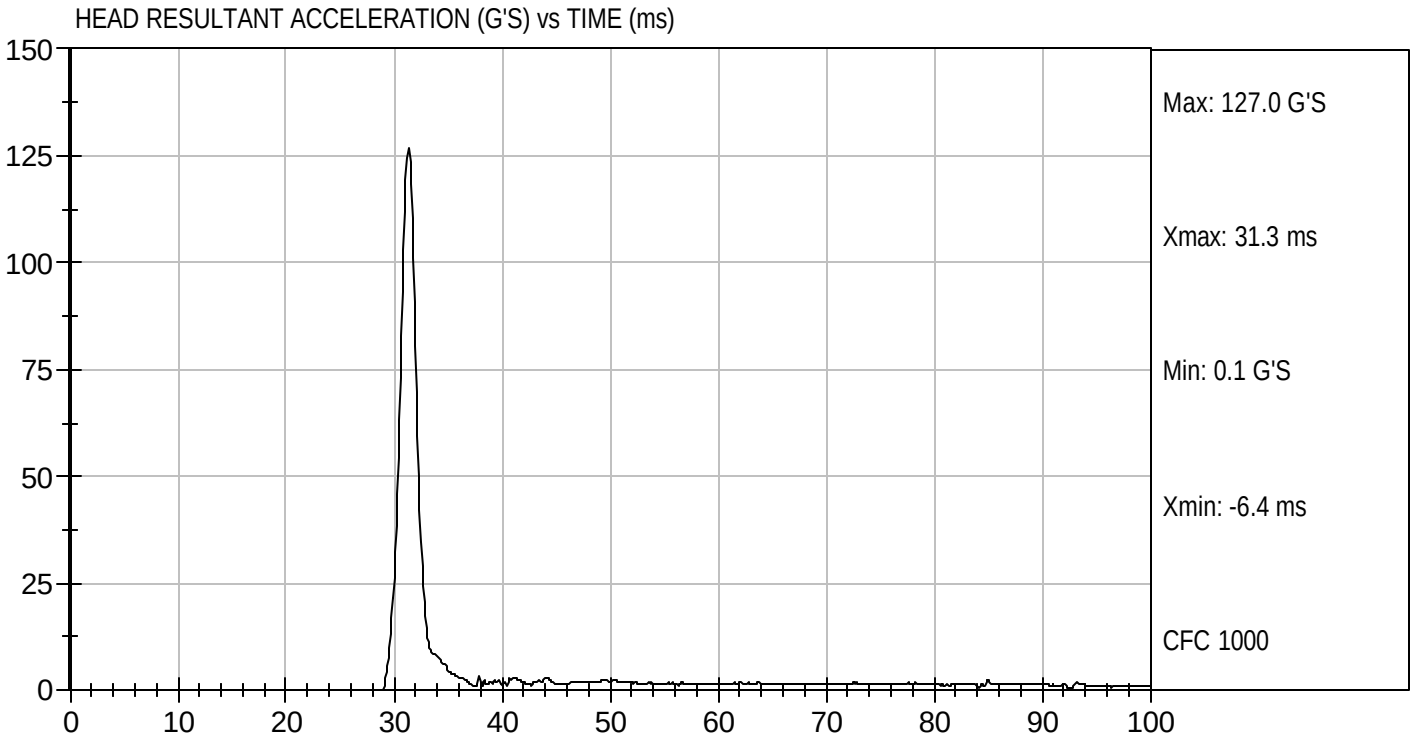
Test Date

David Winkelbauer

Approved By

Test Desc: Head Drop
Componet ID: D052201

Test Date: 08/05/2005
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

NECK PENDULUM TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052202

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	48	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.3	Pass
Pendulum Deceleration	3 msec	G's	-0.25 to -0.53	-0.40	Pass
	8 msec	G's	-1.59 to -2.04	-1.91	Pass
	14 msec	G's	-3.20 to -3.85	-3.46	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	55.5	Pass
Time of Maximum Flexion Angle		msec	54.0 to 66.0	62.5	Pass
Maximum Angle Theta (A)		deg	32.7 to 37.0	36.0	Pass
Time of Maximum Theta (A)		msec	53.0 to 63.0	56.2	Pass
Maximum Angle Theta (B)		deg	30.91 to 33.41	33.20	Pass
Time of Maximum Theta (B)		msec	54.0 to 64.0	62.8	Pass
			Overall Test Results		Pass

Ian Fleck

Laboratory Technician

08/08/2005

Test Date

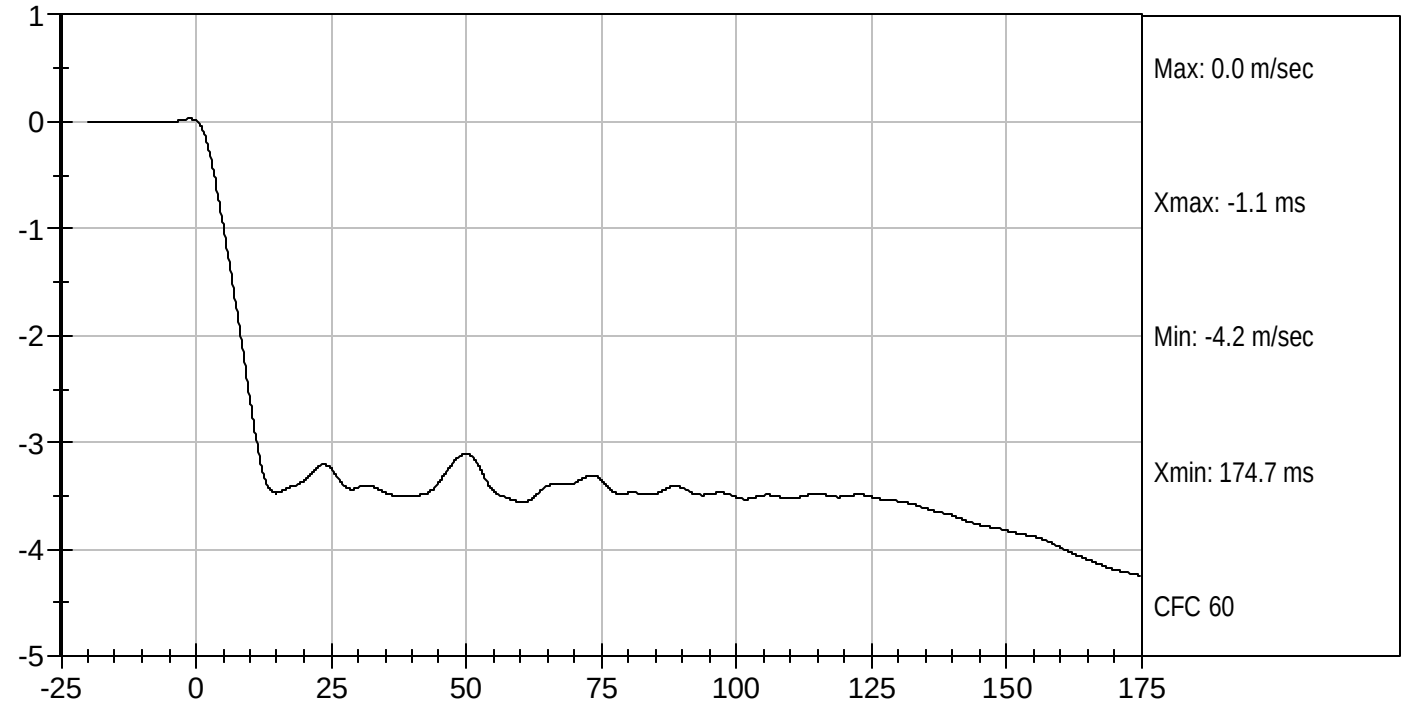
David Winkelbauer

Approved By

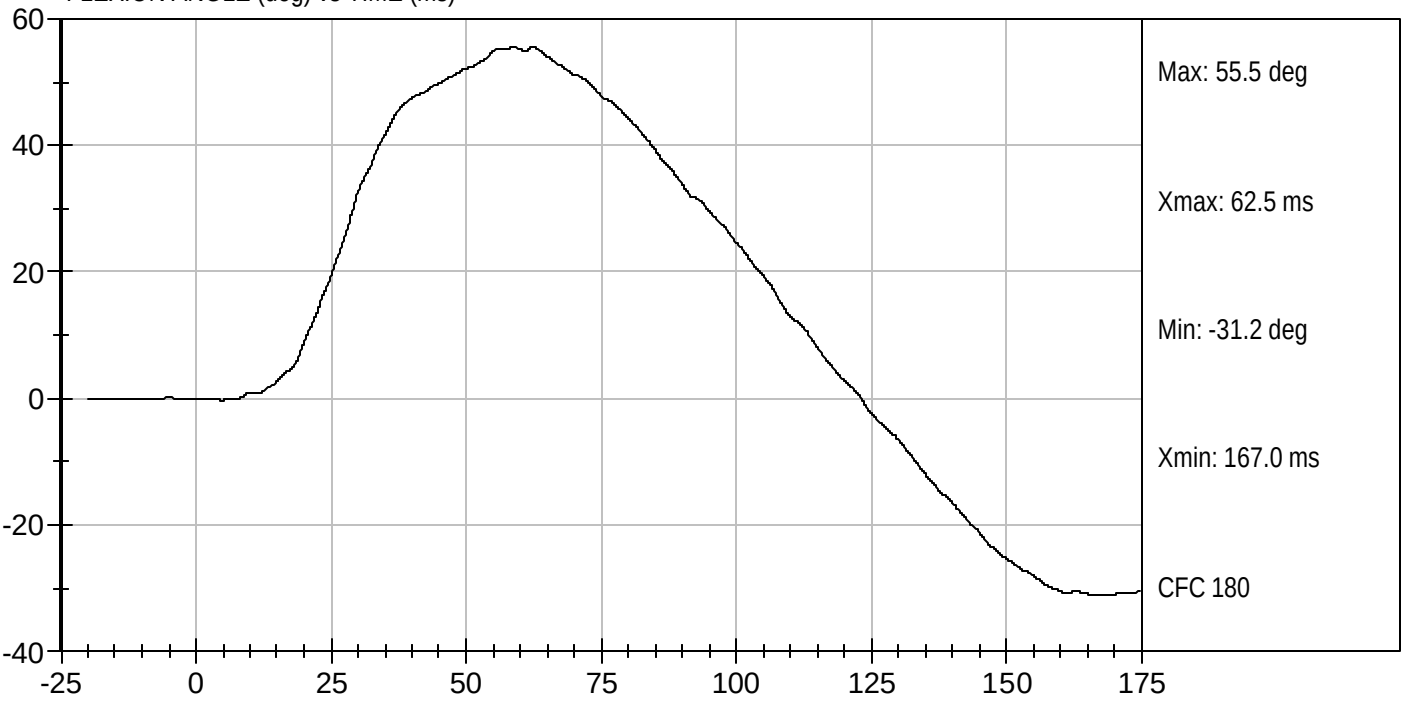
Test Desc: Neck Bending
Componet ID: D052202

Test Date: 08/08/2005
Velocity: 10.89 ft/s, 3.3 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)



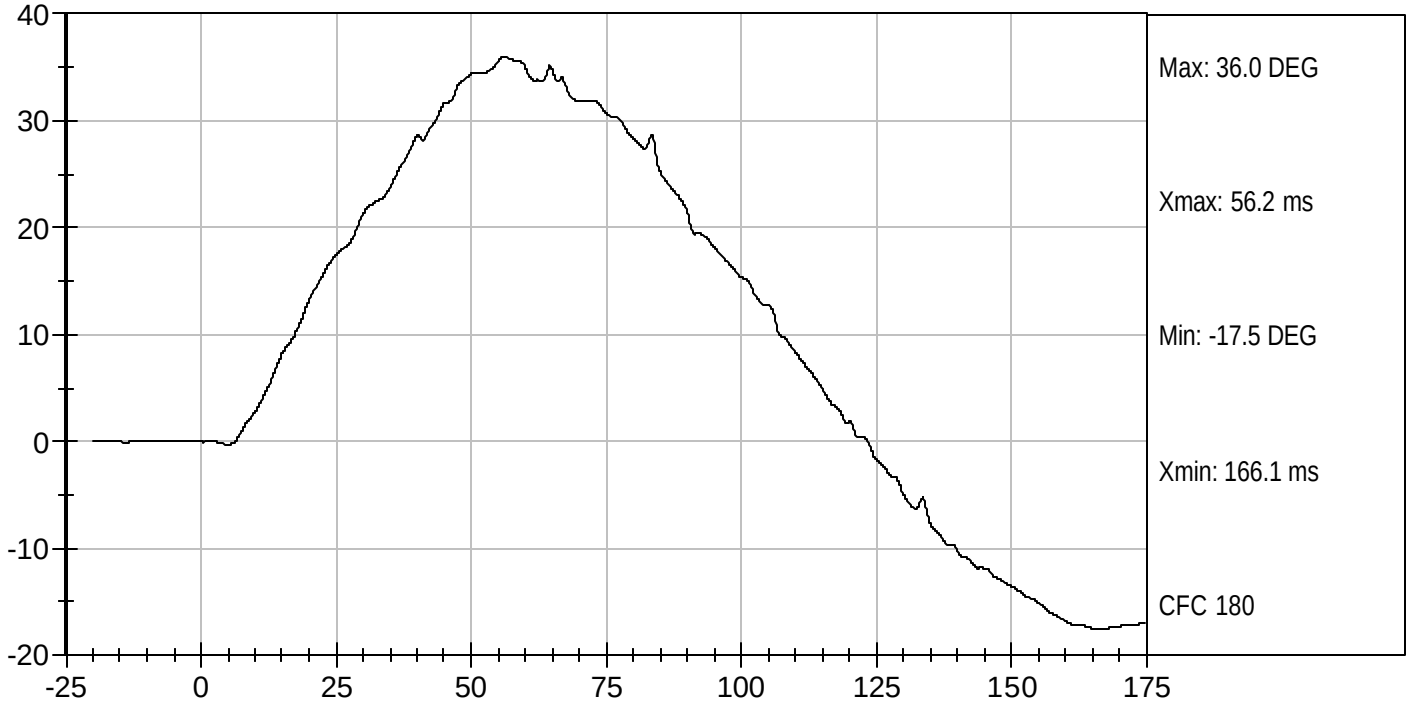
FLEXION ANGLE (deg) vs TIME (ms)



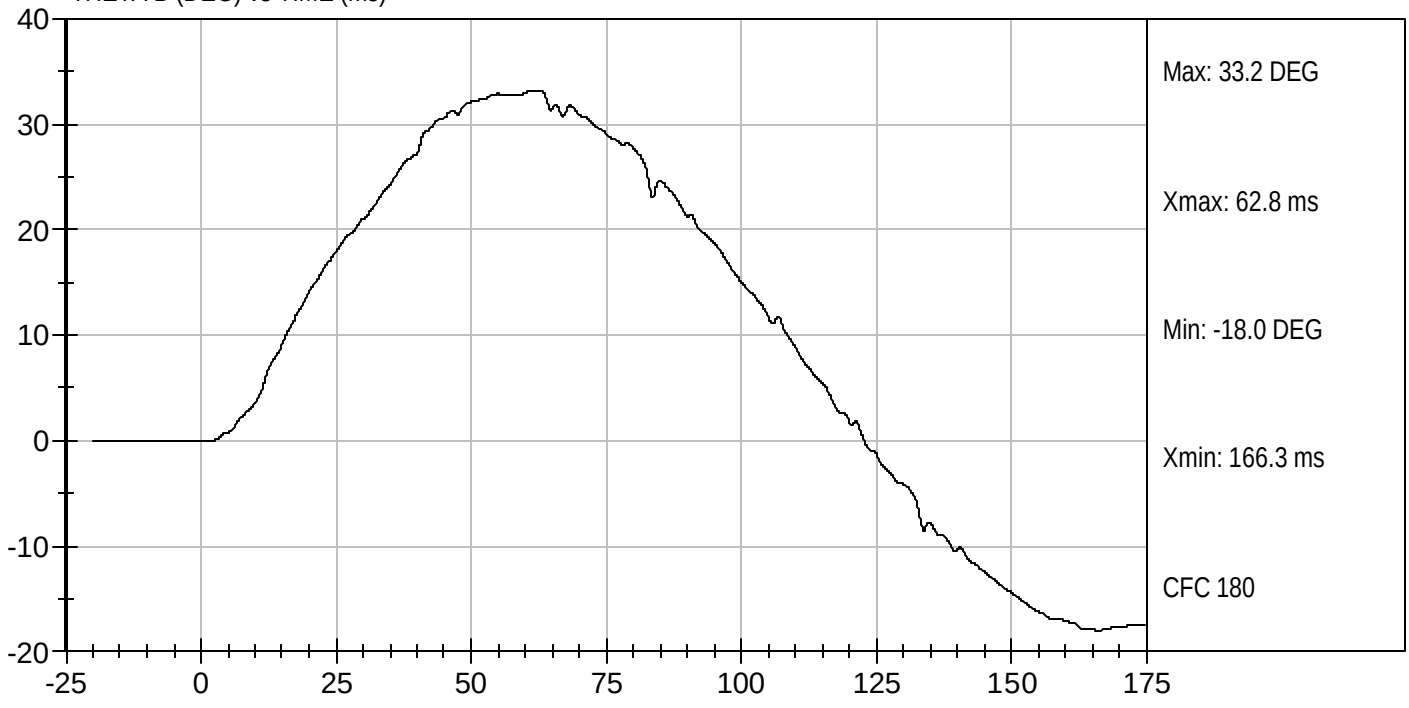
Test Desc: Neck Bending
Componet ID: D052202

Test Date: 08/08/2005
Velocity: 10.89 ft/s, 3.3 m/s

THETA A (DEG) vs TIME (ms)



THETA B (DEG) vs TIME (ms)



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052203

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.2	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	9.3	Pass
Time of Peak Shoulder Acceleration	msec	NA	13.0	Pass
		Overall Test Results		Pass

Laboratory Technician

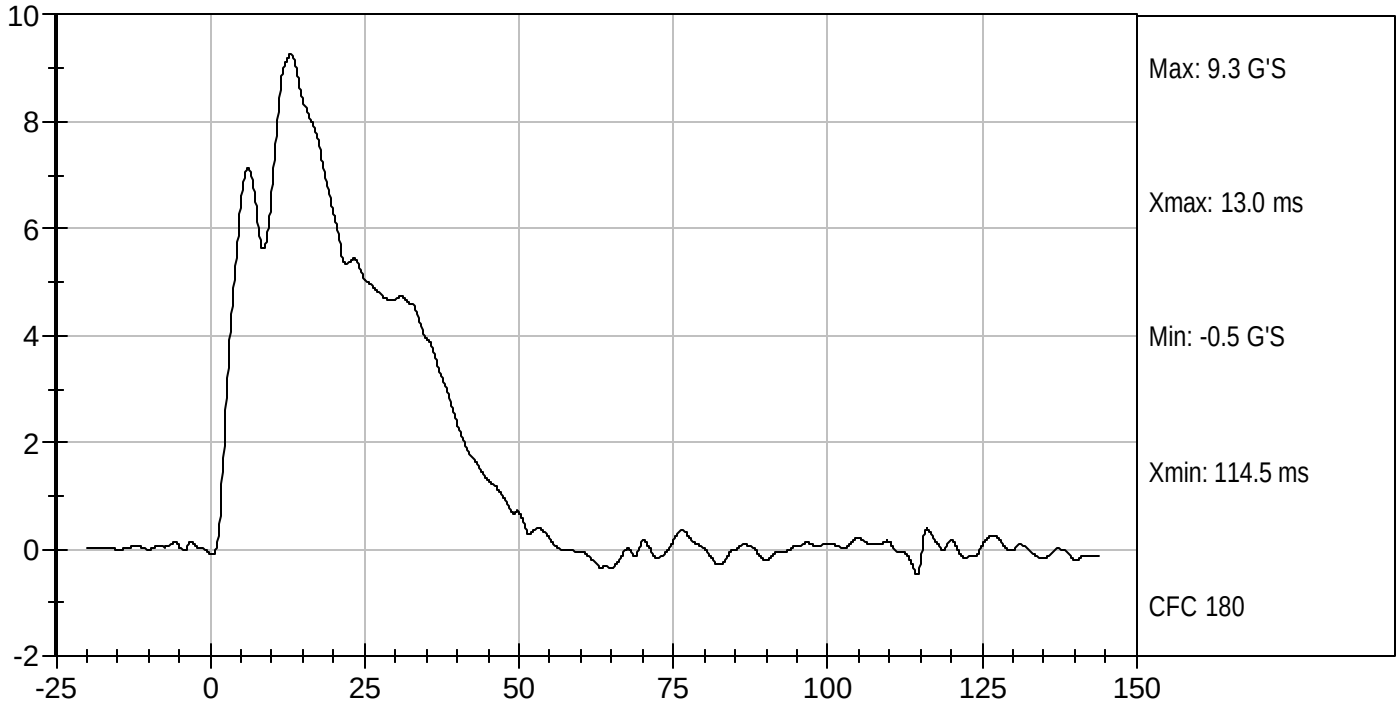
08/08/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Shoulder Impact
Componet ID: D052203

Test Date: 08/08/2005
Velocity: 13.88 ft/s, 4.2 m/s

SHOULDER ACCELERATION (G'S) vs TIME (ms)



MGA RESEARCH CORPORATION

UPPER RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052204

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	25.7	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	36.5	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	47.4	Pass
		Overall Test Results		Pass

Laboratory Technician

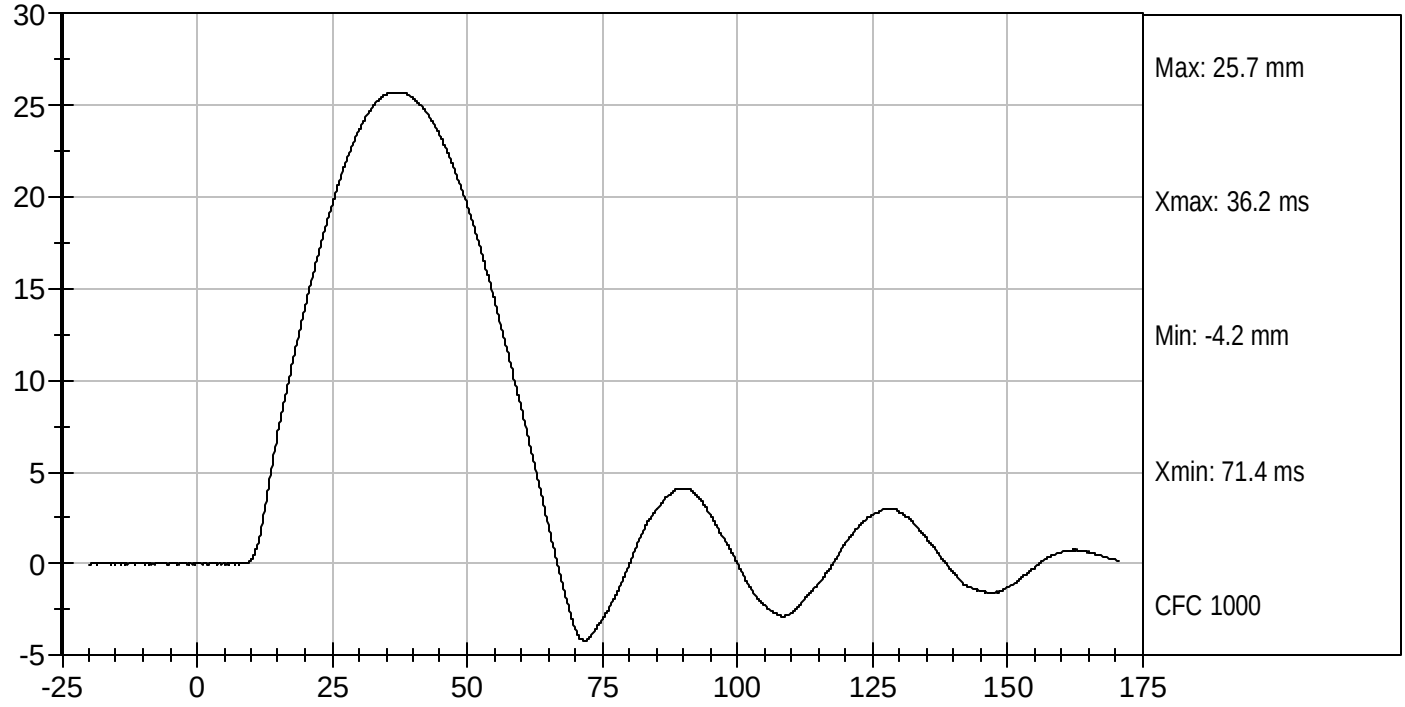
08/05/2005
Test Date

David Winkelbauer
Approved By

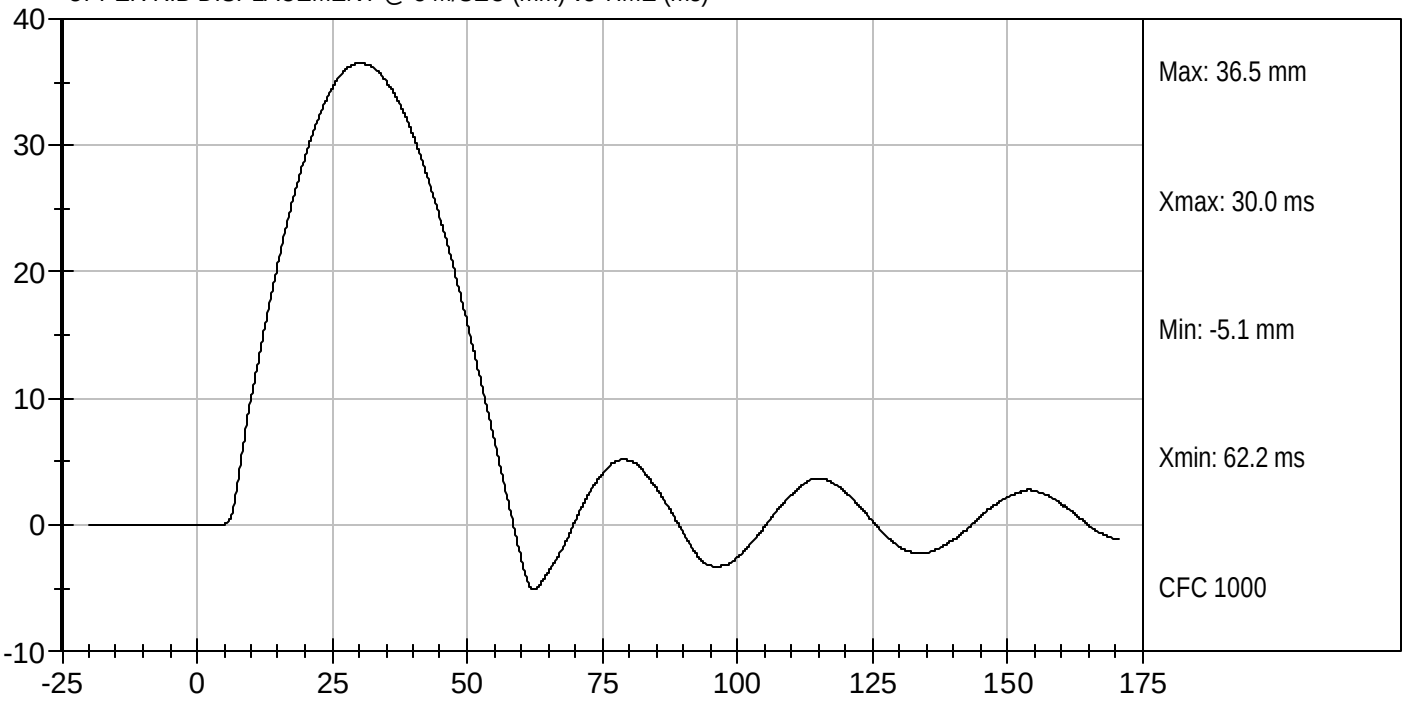
Test Desc: Rib Impact - Upper
Componet ID: D052204

Test Date: 08/05/2005
Velocity: 6.56 ft/s, 2 m/s

UPPER RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)

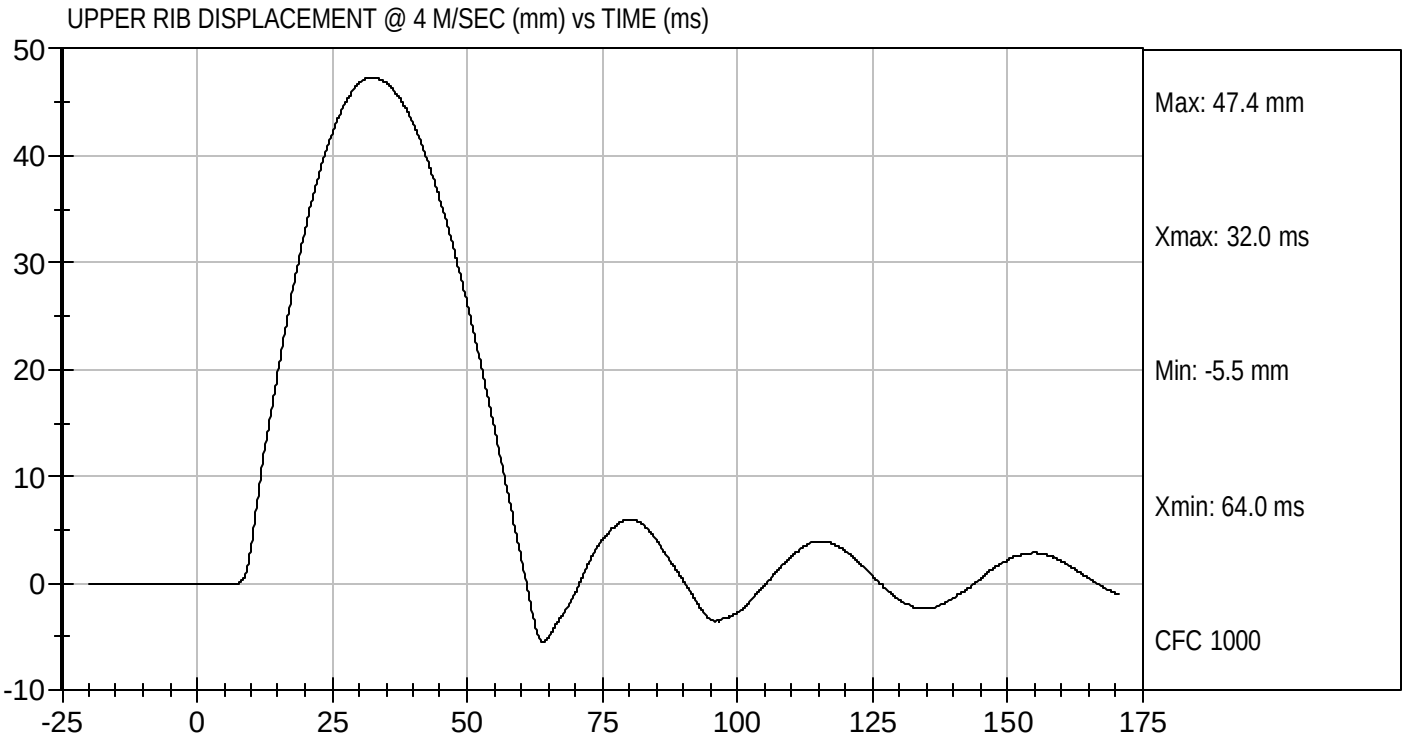


UPPER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Upper
Componet ID: D052204

Test Date: 08/05/2005
Velocity: 13.12 ft/s, 4 m/s



MGA RESEARCH CORPORATION

MID RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052205

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	26.7	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	38.3	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	49.0	Pass
		Overall Test Results		Pass

Laboratory Technician

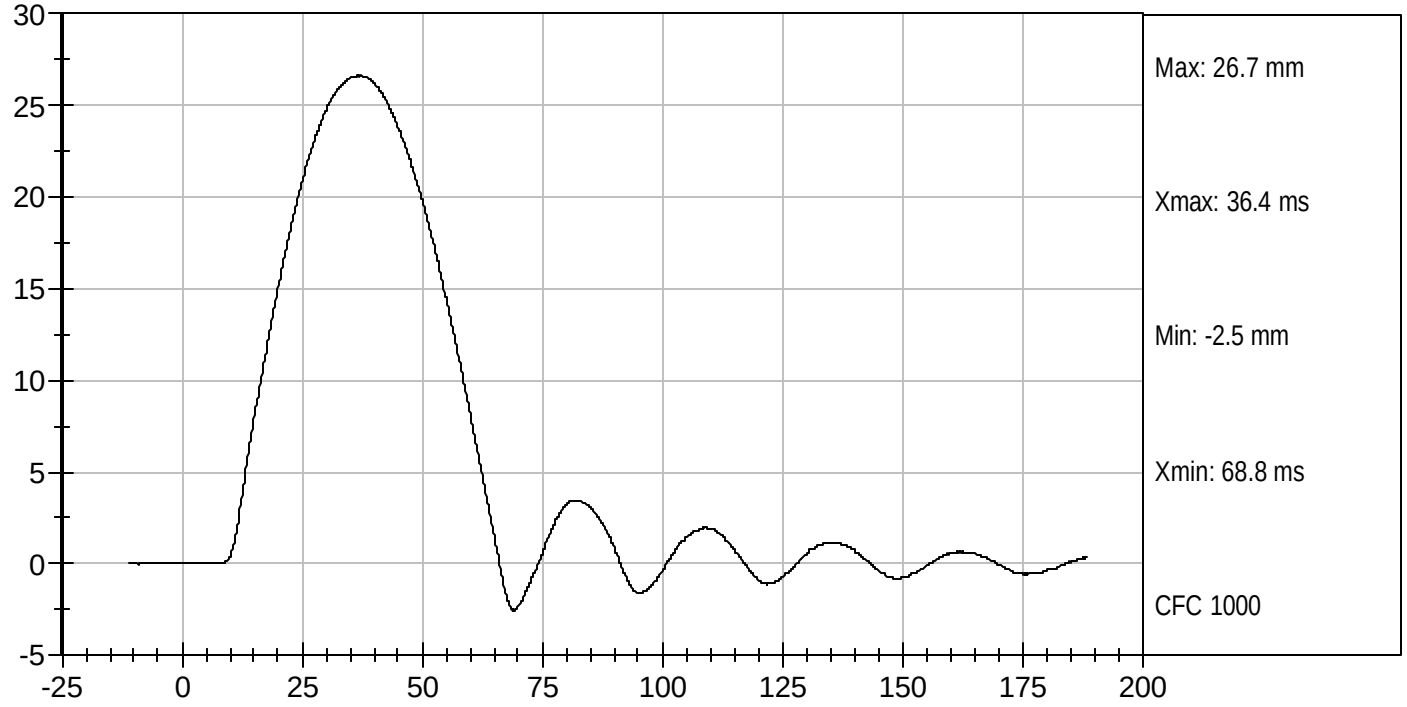
08/05/2005
Test Date

David Winkelbauer
Approved By

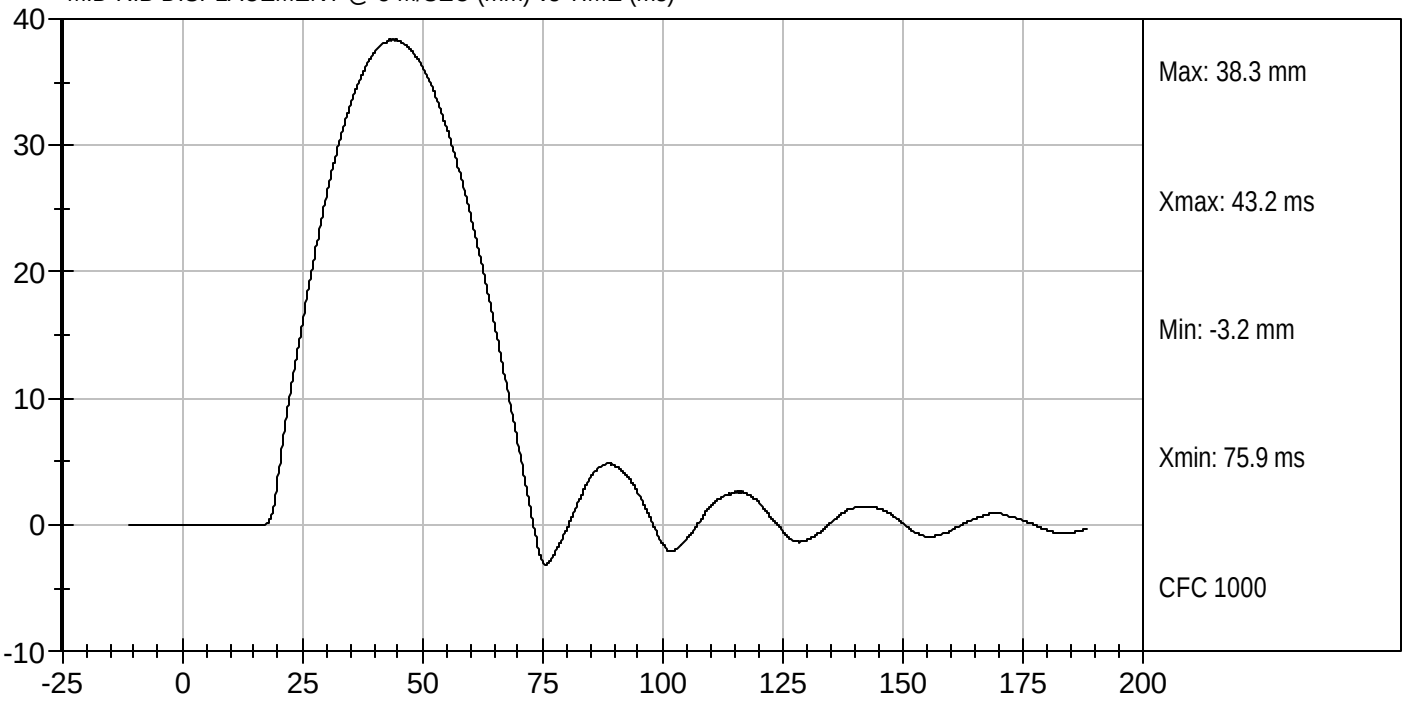
Test Desc: Rib Impact - Mid
Componet ID: D052205

Test Date: 08/05/2005
Velocity: 6.56 ft/s, 2 m/s

MID RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)

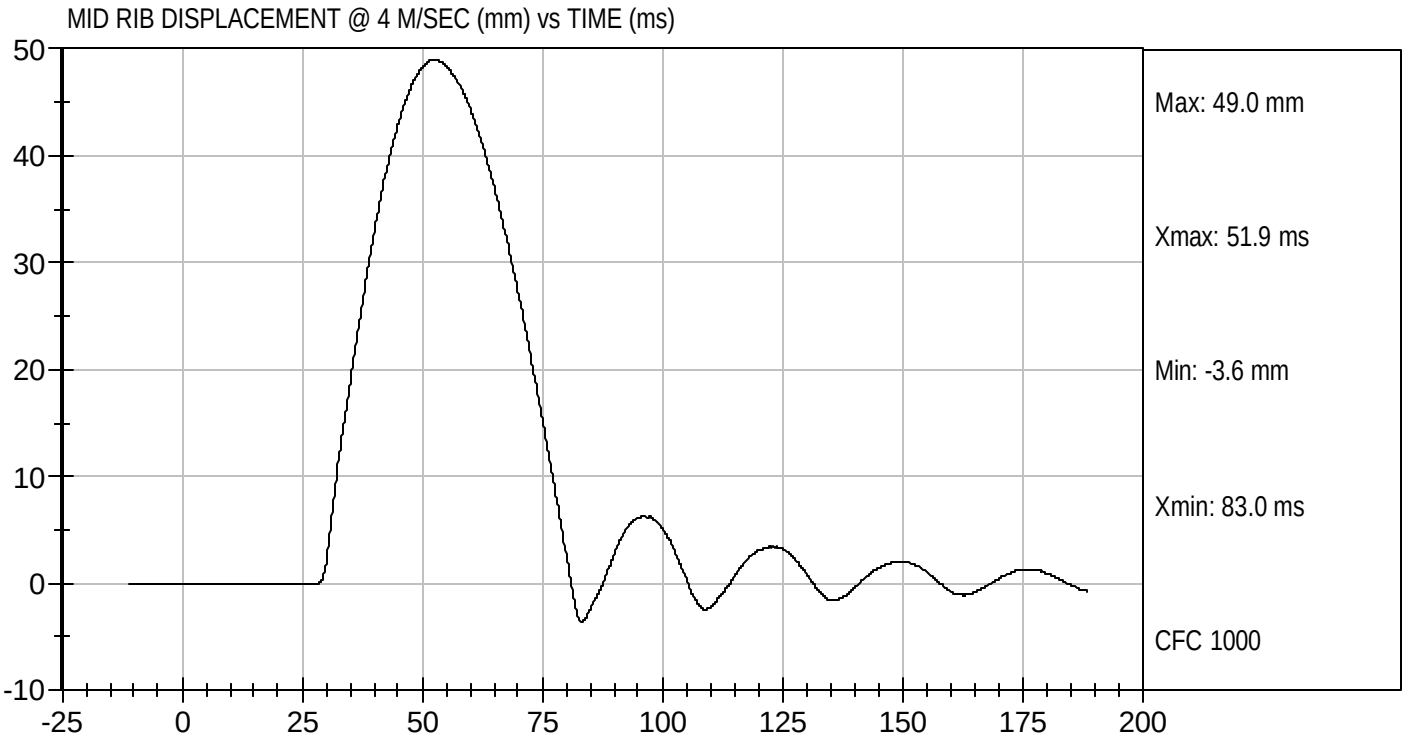


MID RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Mid
Componet ID: D052205

Test Date: 08/05/2005
Velocity: 13.12 ft/s, 4 m/s



MGA RESEARCH CORPORATION

LOWER RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052206

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	26.3	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	37.5	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	47.0	Pass
		Overall Test Results		Pass

Laboratory Technician

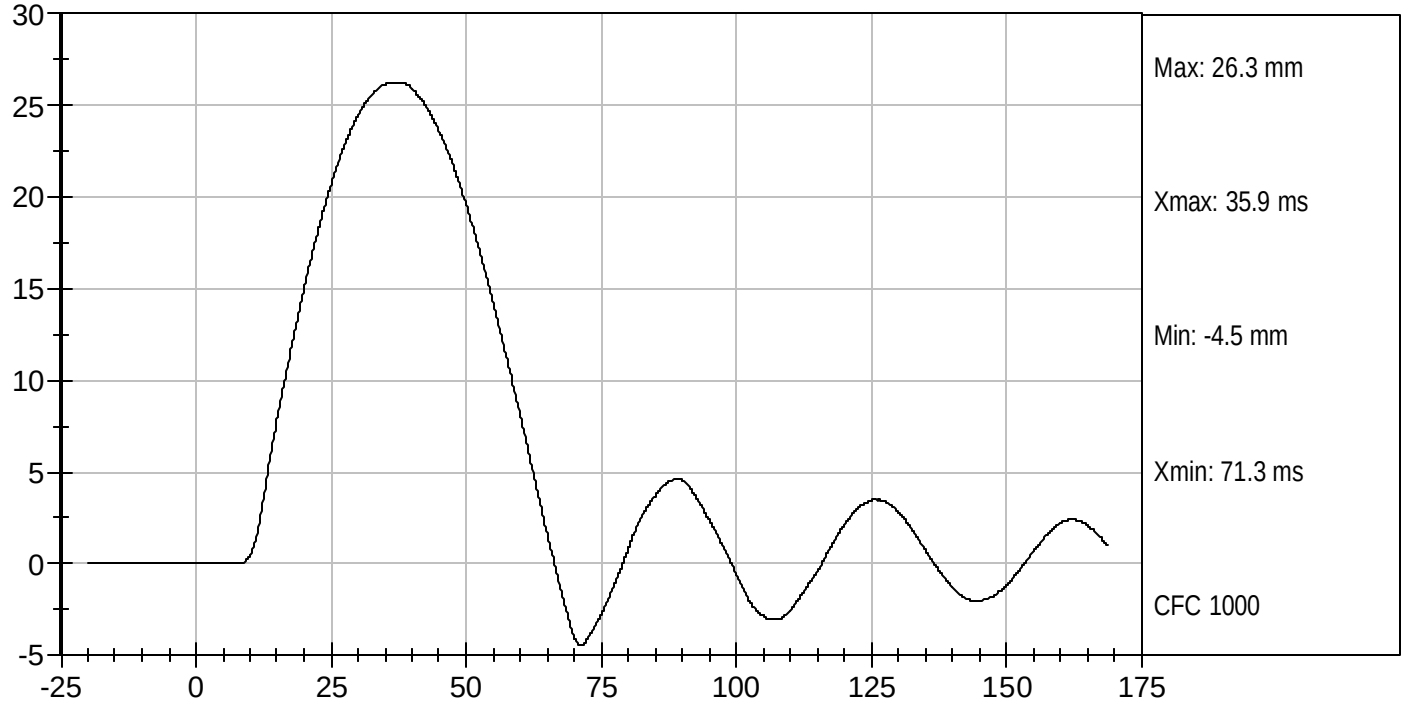
08/08/2005
Test Date

David Winkelbauer
Approved By

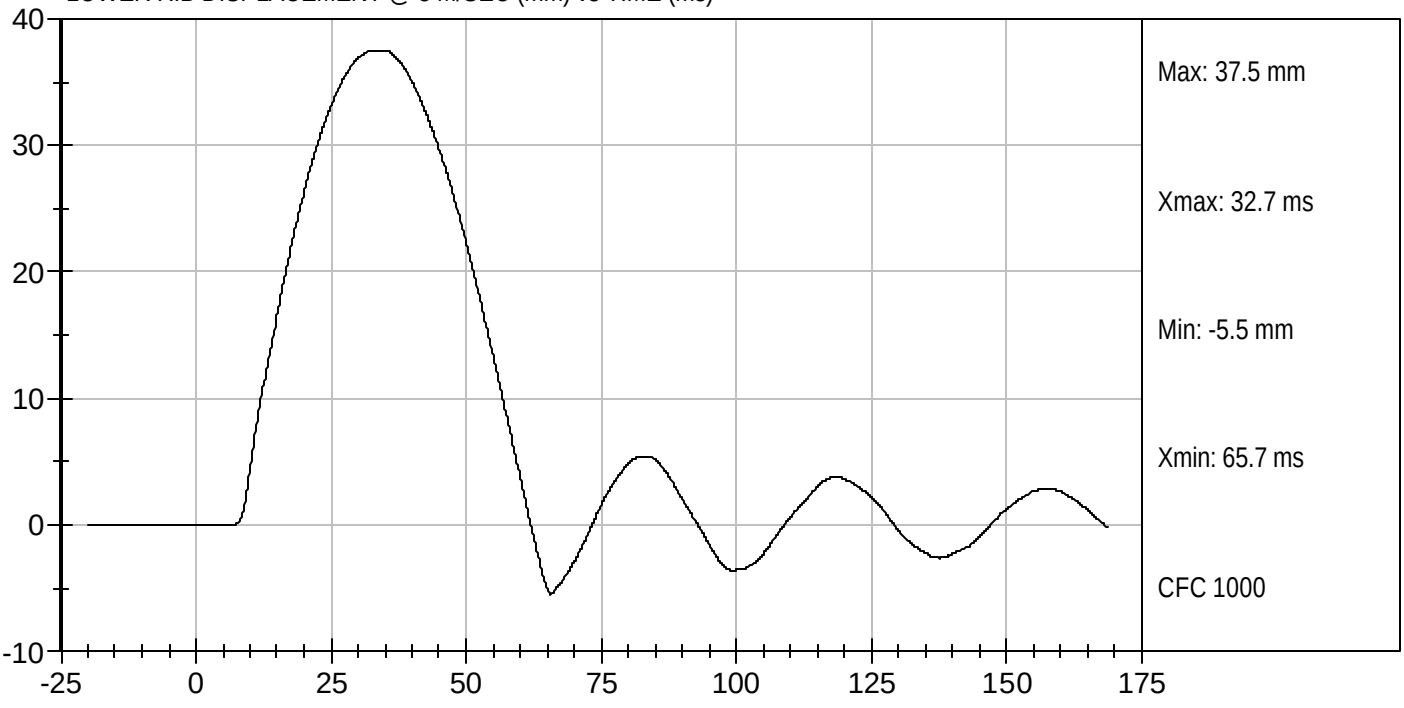
Test Desc: Rib Impact - Lower
Componet ID: D052206

Test Date: 08/08/2005
Velocity: 6.56 ft/s, 2 m/s

LOWER RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)



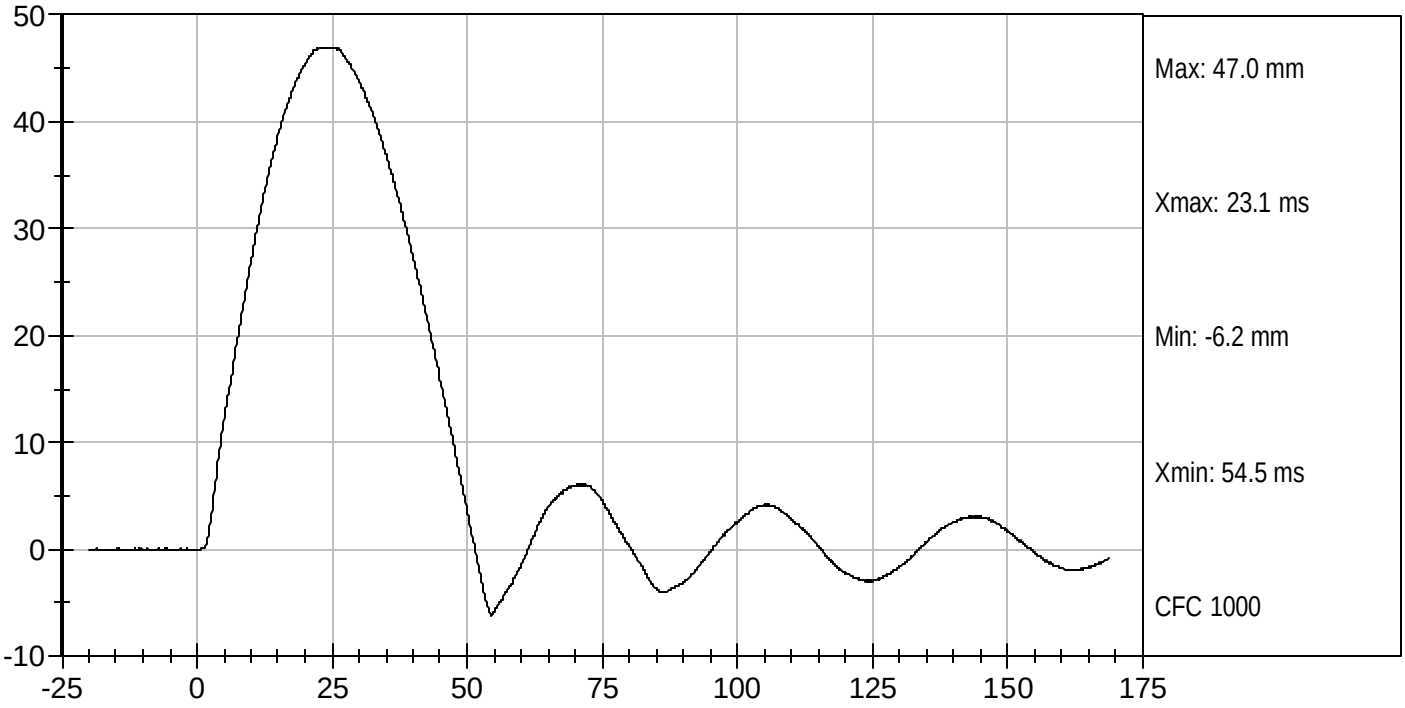
LOWER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Lower
Componet ID: D052206

Test Date: 08/08/2005
Velocity: 13.12 ft/s, 4 m/s

LOWER RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052207

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Speed	m/s	3.90 to 4.10	3.93	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.24	Pass
Time of Maximum Impactor Force	msec	10.60 to 13.00	12.60	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.51	Pass
Time of Maximum Abdomen Force	msec	10.00 to 12.30	10.20	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

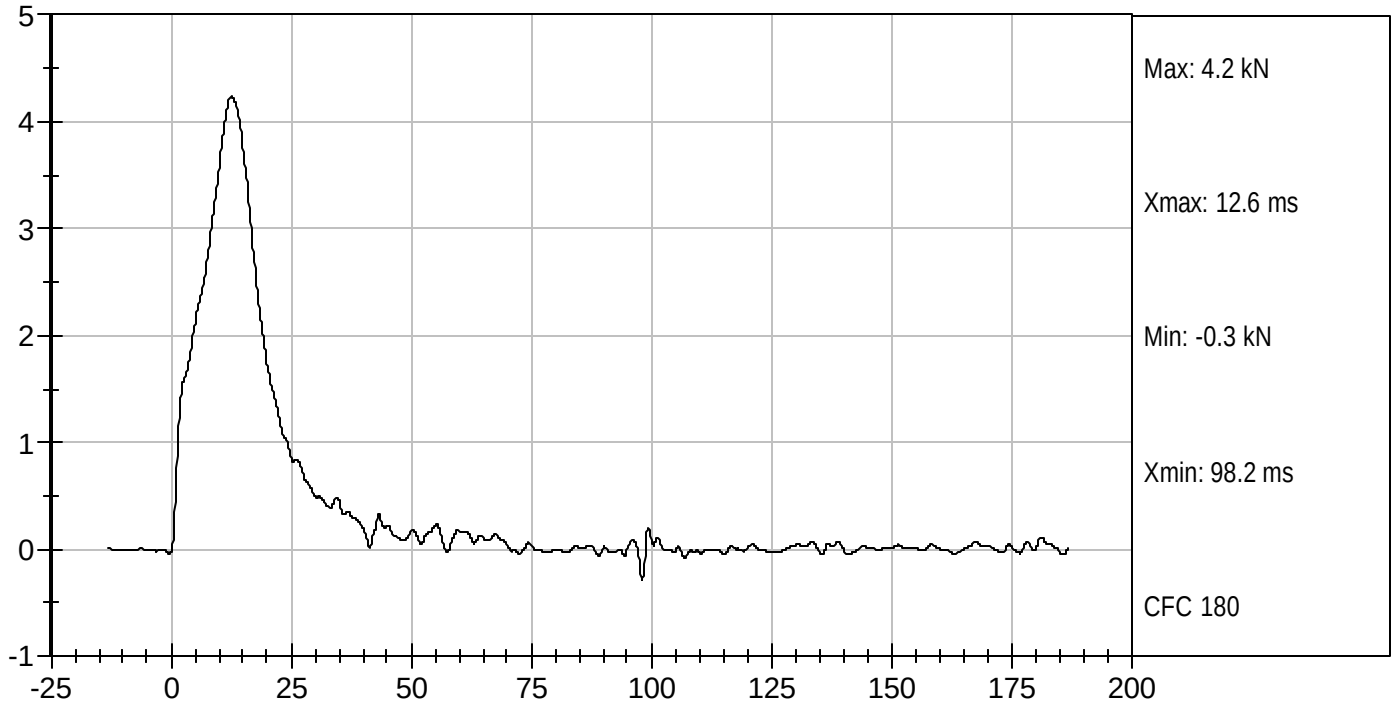
08/08/2005
Test Date

David Winkelbauer
Approved By

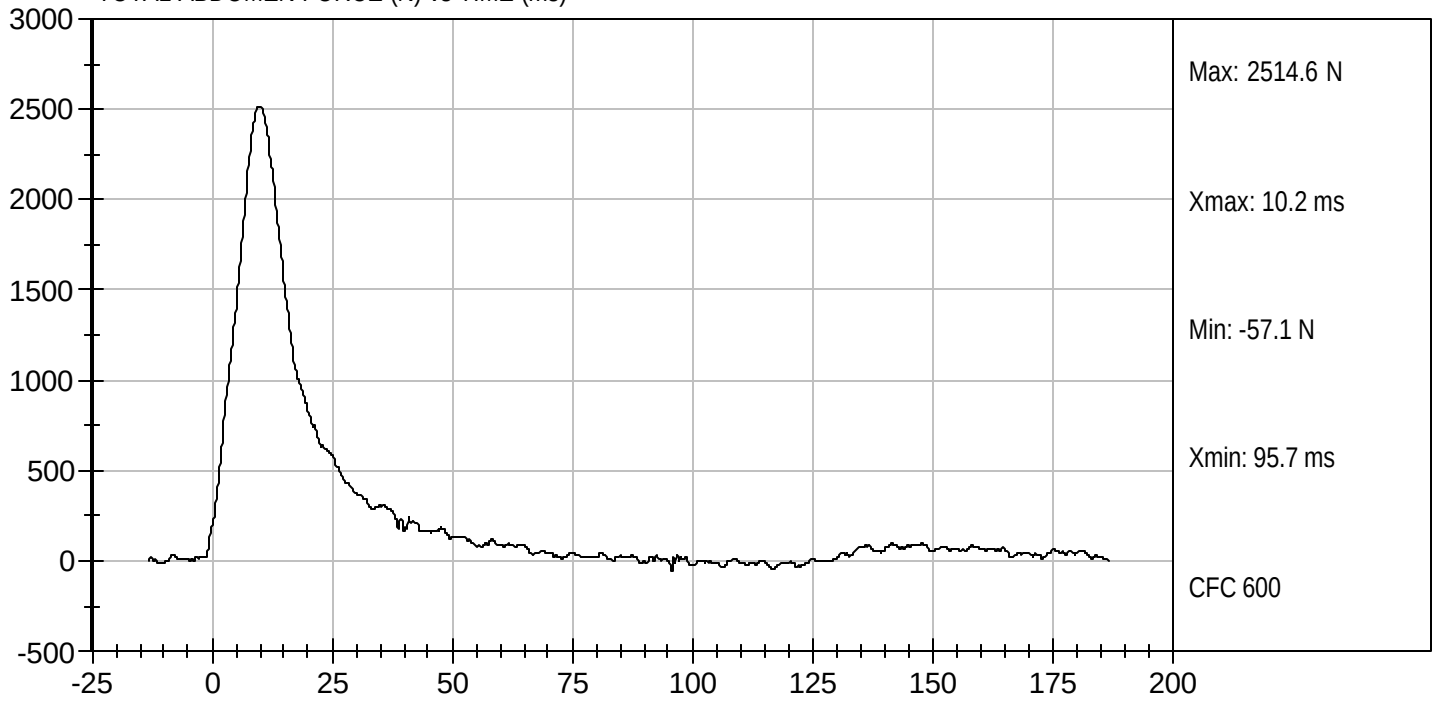
Test Desc: Abdomen Impact
Componet ID: D052207

Test Date: 08/08/2005
Velocity: 12.9 ft/s, 3.93 m/s

IMPACTOR FORCE (kN) vs TIME (ms)



TOTAL ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052208

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	48	Pass
Pendulum Speed		m/sec	5.95 to 6.15	6.07	Pass
Pendulum Deceleration	10 msec	m/sec	-2.46 to -1.59	-2.19	Pass
	20 msec	m/sec	-5.25 to -4.07	-5.16	Pass
	25 msec	m/sec	-6.64 to -5.30	-6.22	Pass
	30 msec	m/sec	>= -6.5	-6.2	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.4	Pass
Time of Maximum Flexion Angle		msec	39.0 to 53.0	45.0	Pass
Maximum Theta (A)		deg	31.0 to 35.0	31.2	Pass
Time of Maximum Theta (A)		msec	44.0 to 52.0	44.5	Pass
Maximum Theta (B)		deg	26.94 to 29.44	29.23	Pass
Time of Maximum Theta (B)		msec	44.0 to 52.0	45.3	Pass
			Overall Results		Pass

Ian Fleck

Laboratory Technician

08/08/2005

Test Date

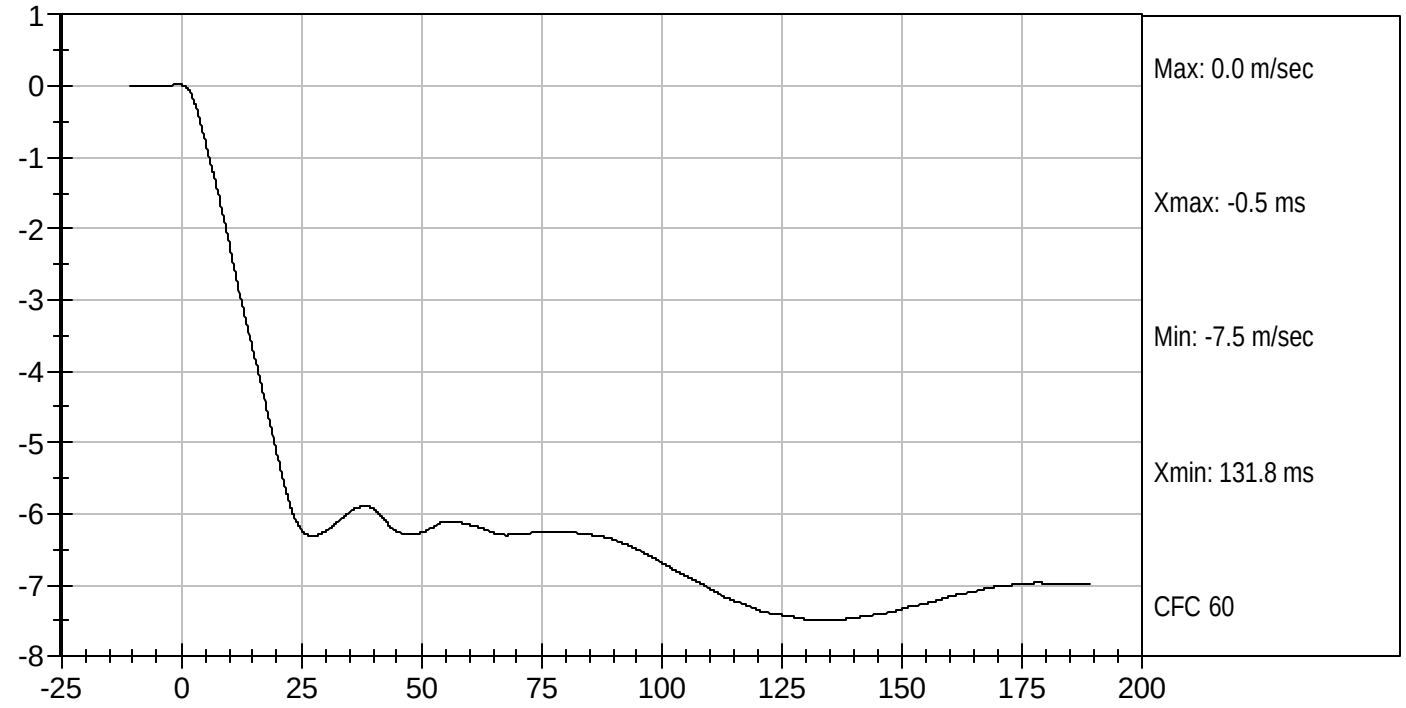
David Winkelbauer

Approved By

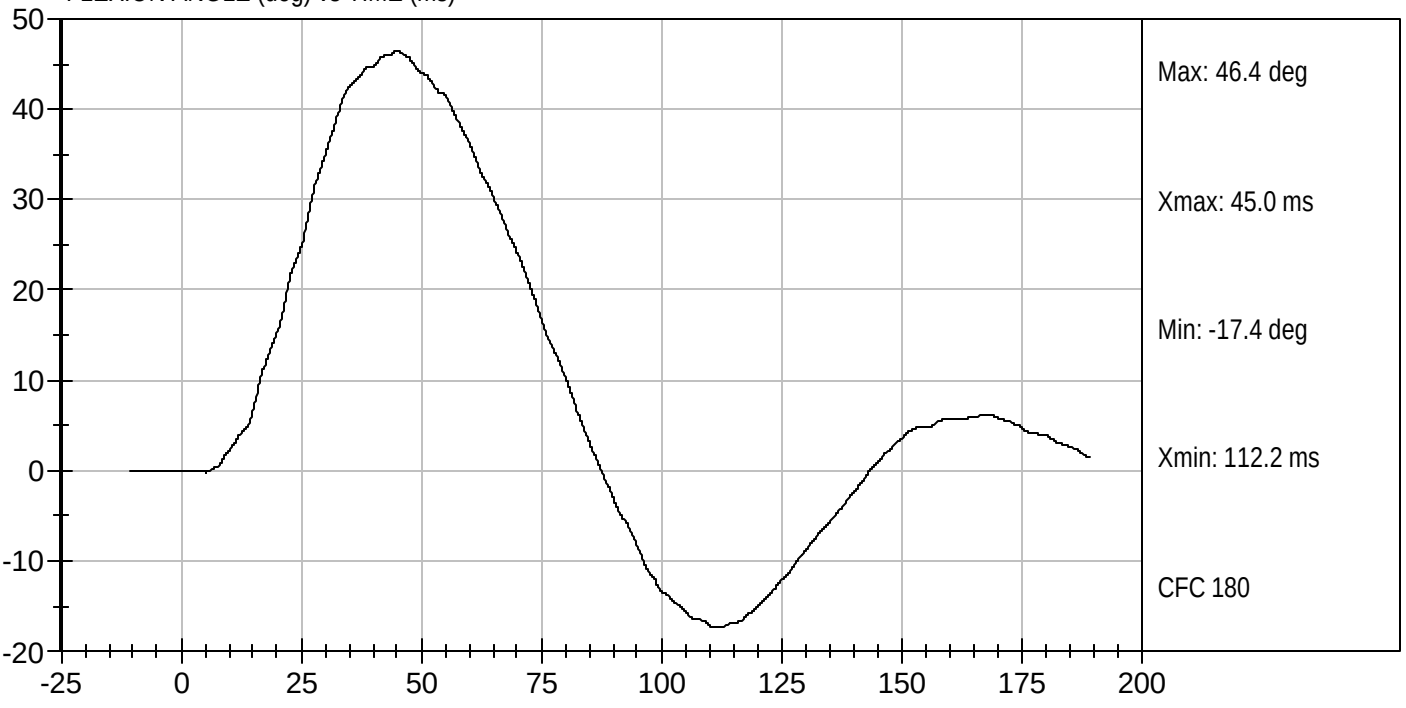
Test Desc: Lumbar Bending
Componet ID: D052208

Test Date: 08/08/2005
Velocity: 19.92 ft/s, 6.07 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)

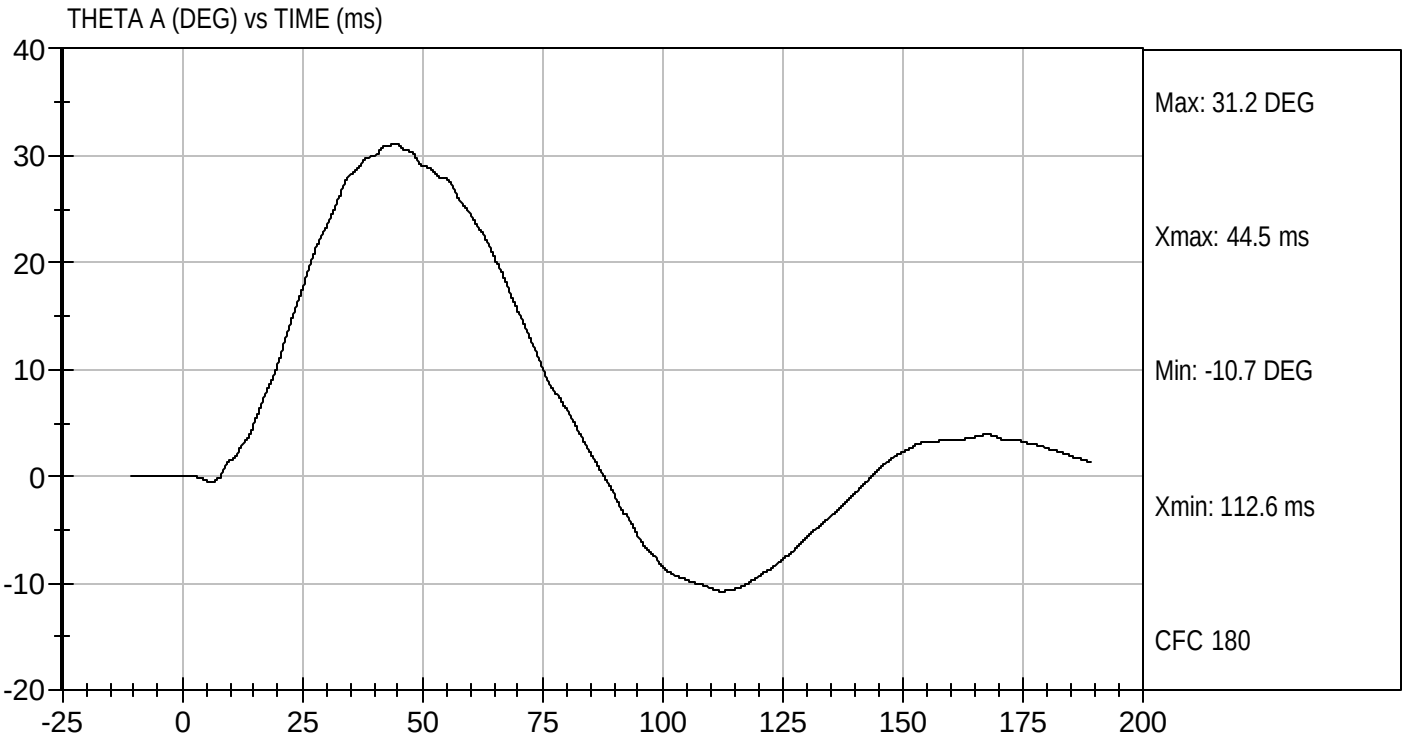


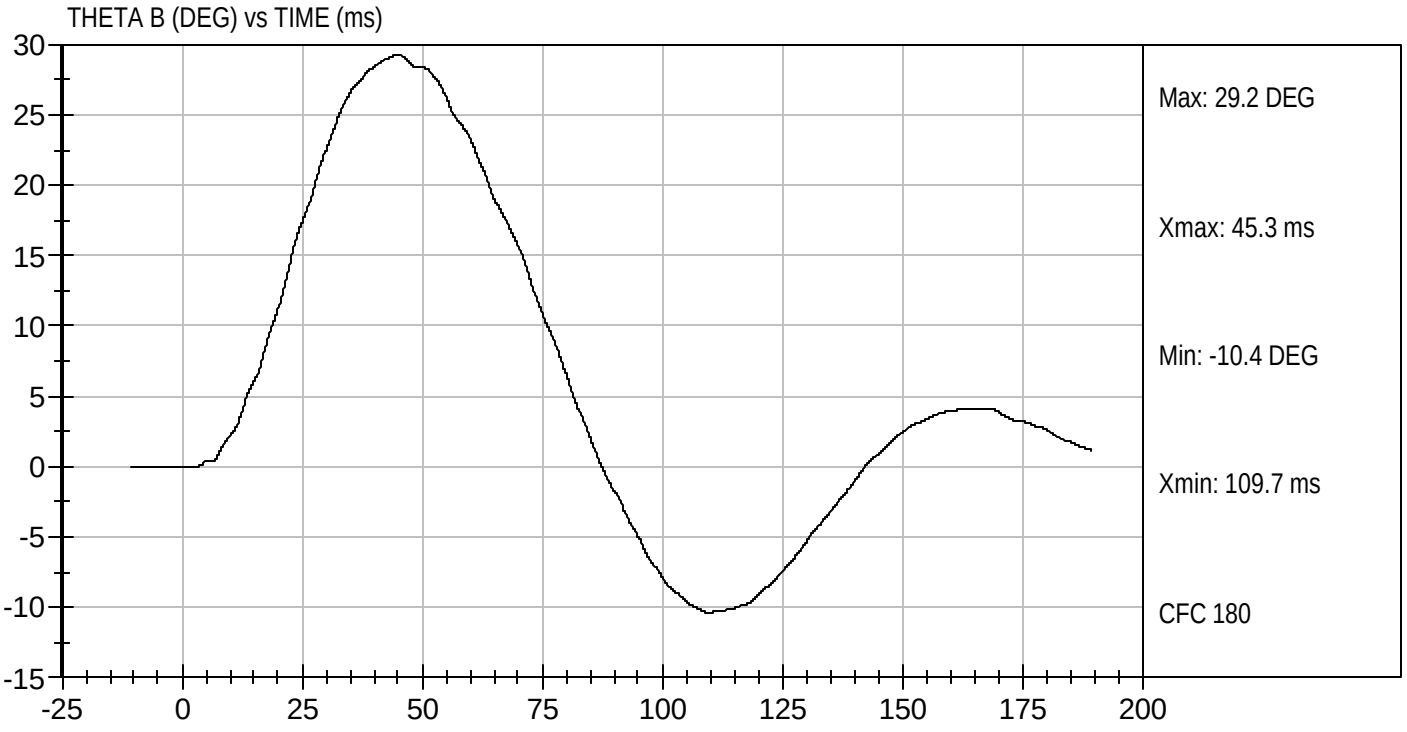
FLEXION ANGLE (deg) vs TIME (ms)



Test Desc: Lumbar Bending
Componet ID: D052208

Test Date: 08/08/2005
Velocity: 19.92 ft/s, 6.07 m/s





MGA RESEARCH CORPORATION

PELVIS TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052209

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Speed	m/s	4.20 to 4.40	4.26	Pass
Maximum Impactor Force	kN	4.40 to 5.40	4.59	Pass
Time of Maximum Impactor Force	msec	10.30 to 15.50	14.50	Pass
Maximum Pubic Force	kN	1.04 to 1.64	1.29	Pass
Time of Maximum Pubic Force	msec	9.90 to 15.90	15.90	Pass
		Overall Test Results		Pass

Laboratory Technician

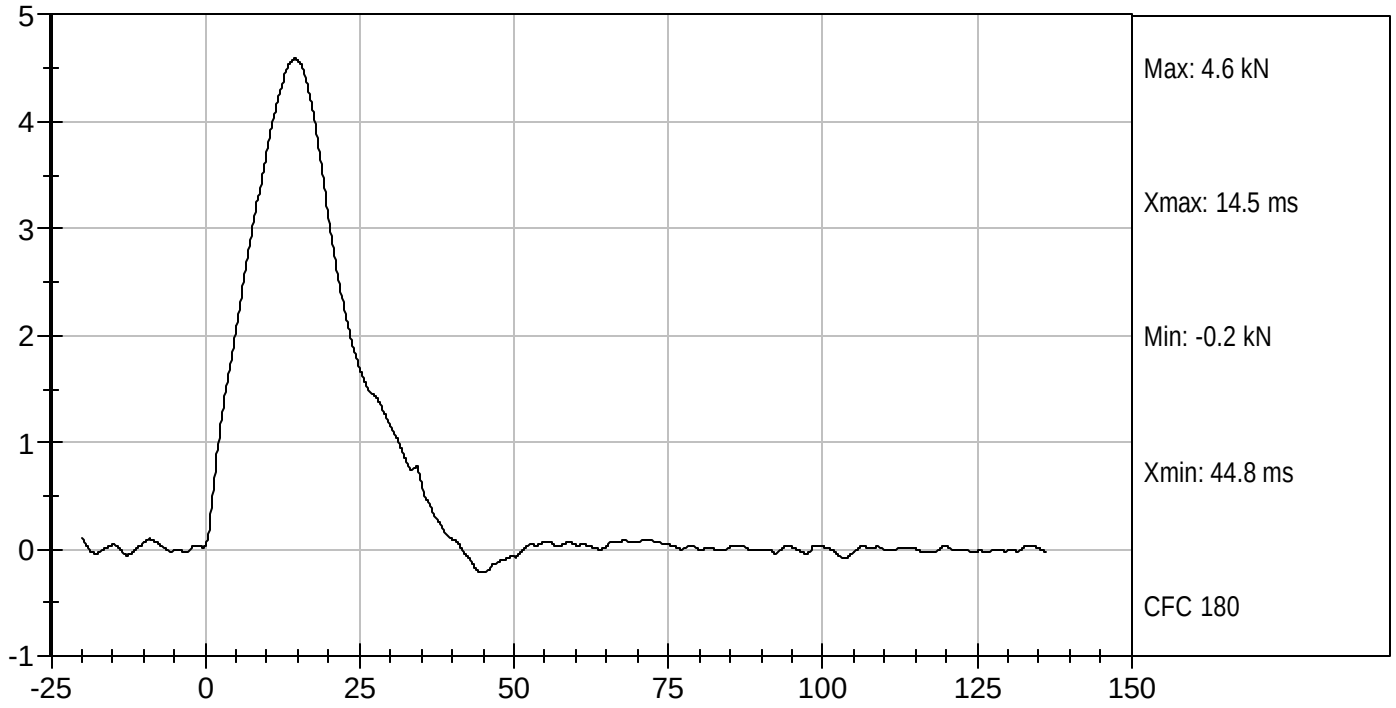
08/08/2005
Test Date

David Winkelbauer
Approved By

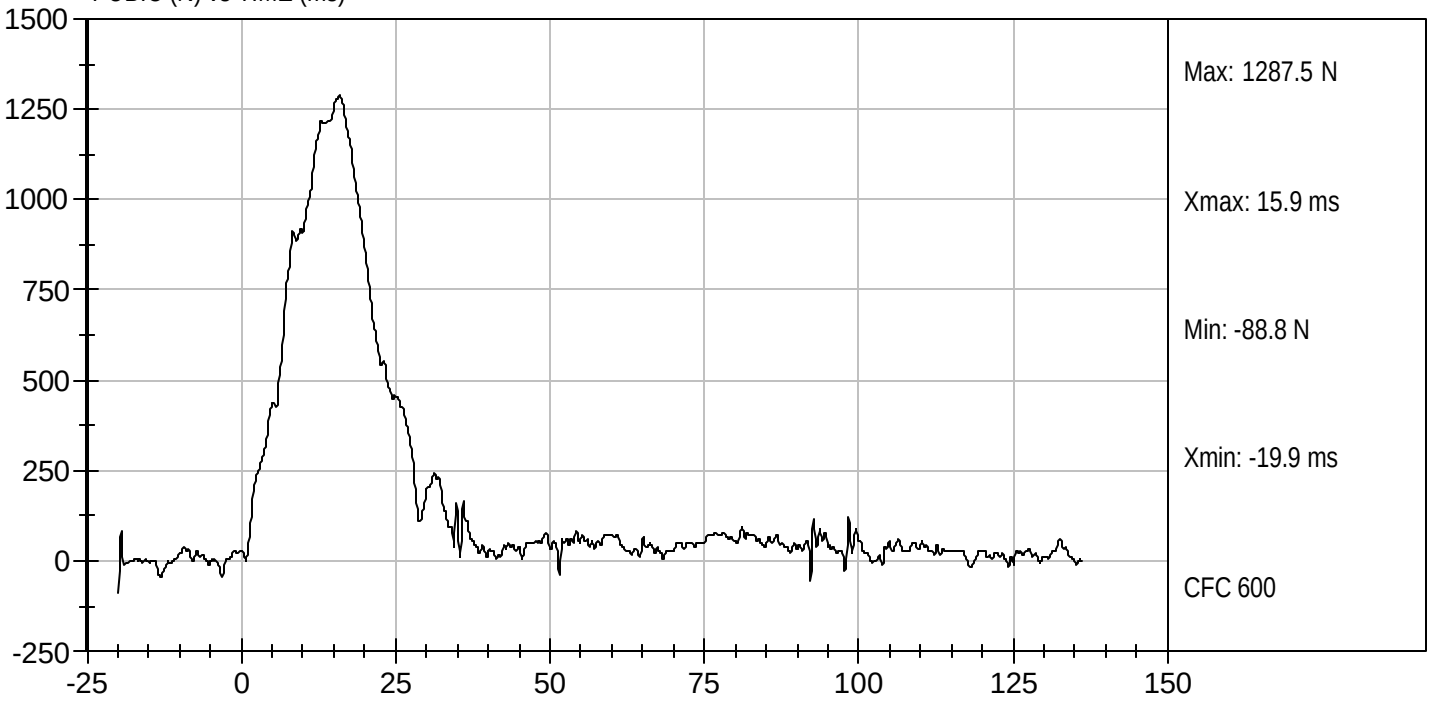
Test Desc: Pelvis Impact
Componet ID: D052209

Test Date: 08/08/2005
Velocity: 14.0 ft/s, 4.26 m/s

IMPACTOR FORCE (kN) vs TIME (ms)



PUBIC (N) vs TIME (ms)



CERTIFICATION DATA

Dummy Serial Number: 010

POST-TEST CALIBRATION

MGA RESEARCH CORPORATION

HEAD DROP TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test ID:** D052261

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 - 22.0	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Peak Resultant Acceleration	G's	100 - 150	140	Pass
Time of Maximum Resultant Acceleration	msec	NA	36.1	Pass
		Overall Test Results		Pass

Joe Fleck

Laboratory Technician

08/12/2005

Test Date

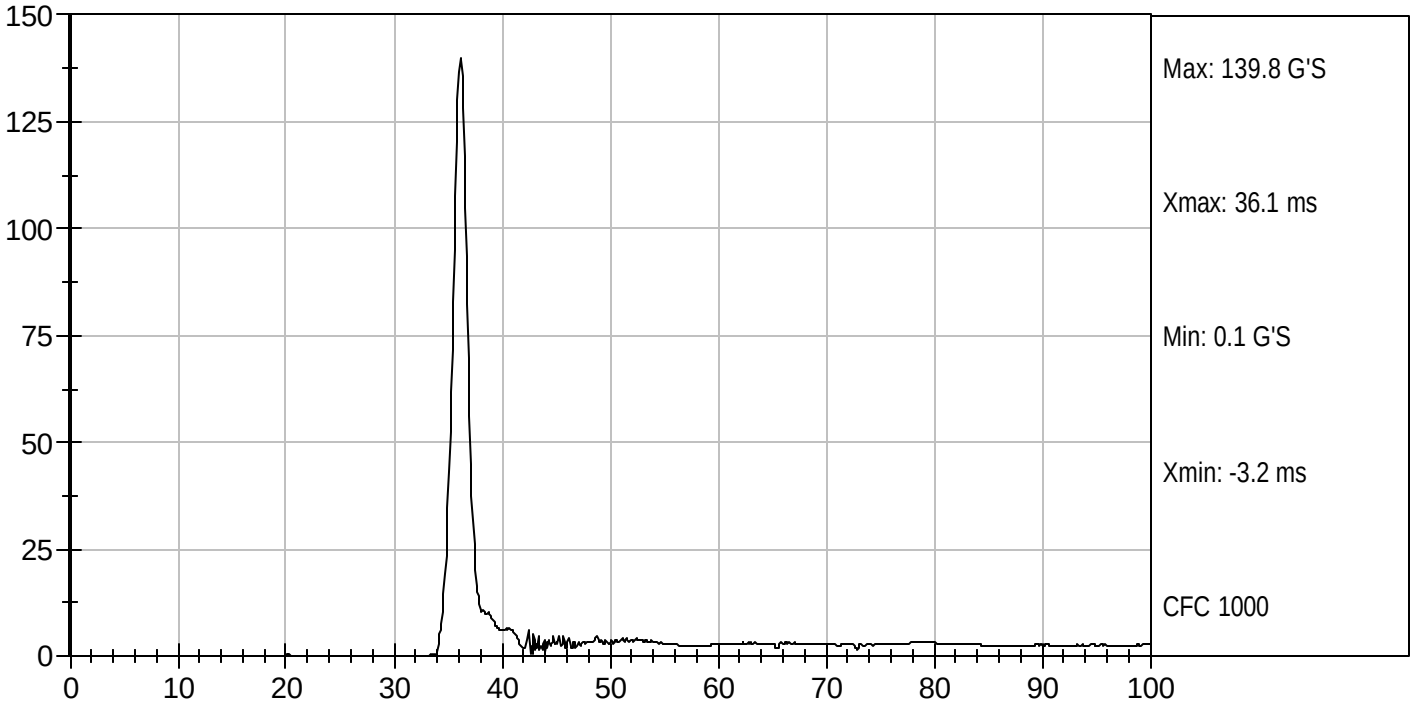
David Winkelbauer

Approved By

Test Desc: Head Drop
Componet ID: D052261

Test Date: 08/12/2005
Velocity: 0 ft/s, 0.00 m/s

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK PENDULUM TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052262

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	42	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.3	Pass
Pendulum Deceleration	3 msec	G's	-0.25 to -0.53	-0.39	Pass
	8 msec	G's	-1.59 to -2.04	-1.92	Pass
	14 msec	G's	-3.20 to -3.85	-3.42	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	55.5	Pass
Time of Maximum Flexion Angle		msec	54.0 to 66.0	57.7	Pass
Maximum Angle Theta (A)		deg	32.7 to 37.0	35.7	Pass
Time of Maximum Theta (A)		msec	53.0 to 63.0	57.4	Pass
Maximum Angle Theta (B)		deg	30.70 to 33.20	32.90	Pass
Time of Maximum Theta (B)		msec	54.0 to 64.0	55.2	Pass
			Overall Test Results		Pass

Ian Fleck

Laboratory Technician

08/11/2005

Test Date

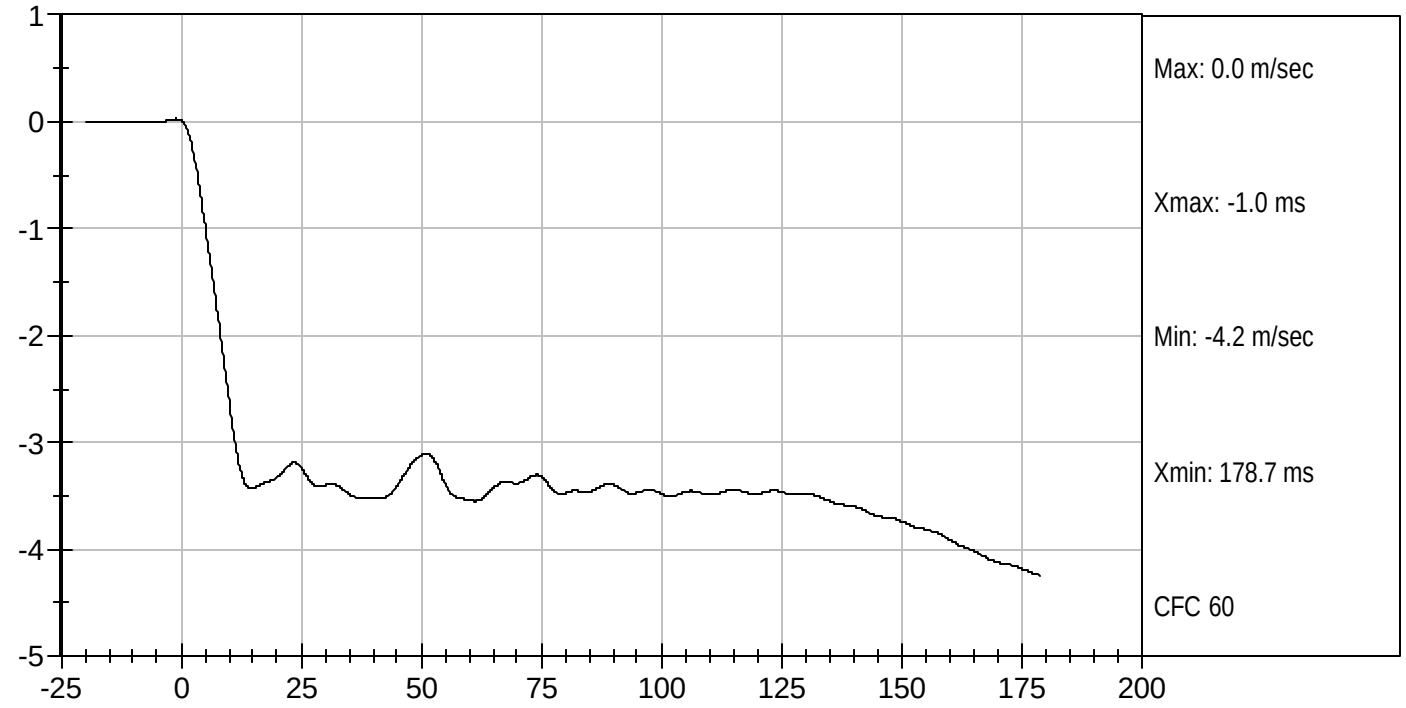
David Winkelbauer

Approved By

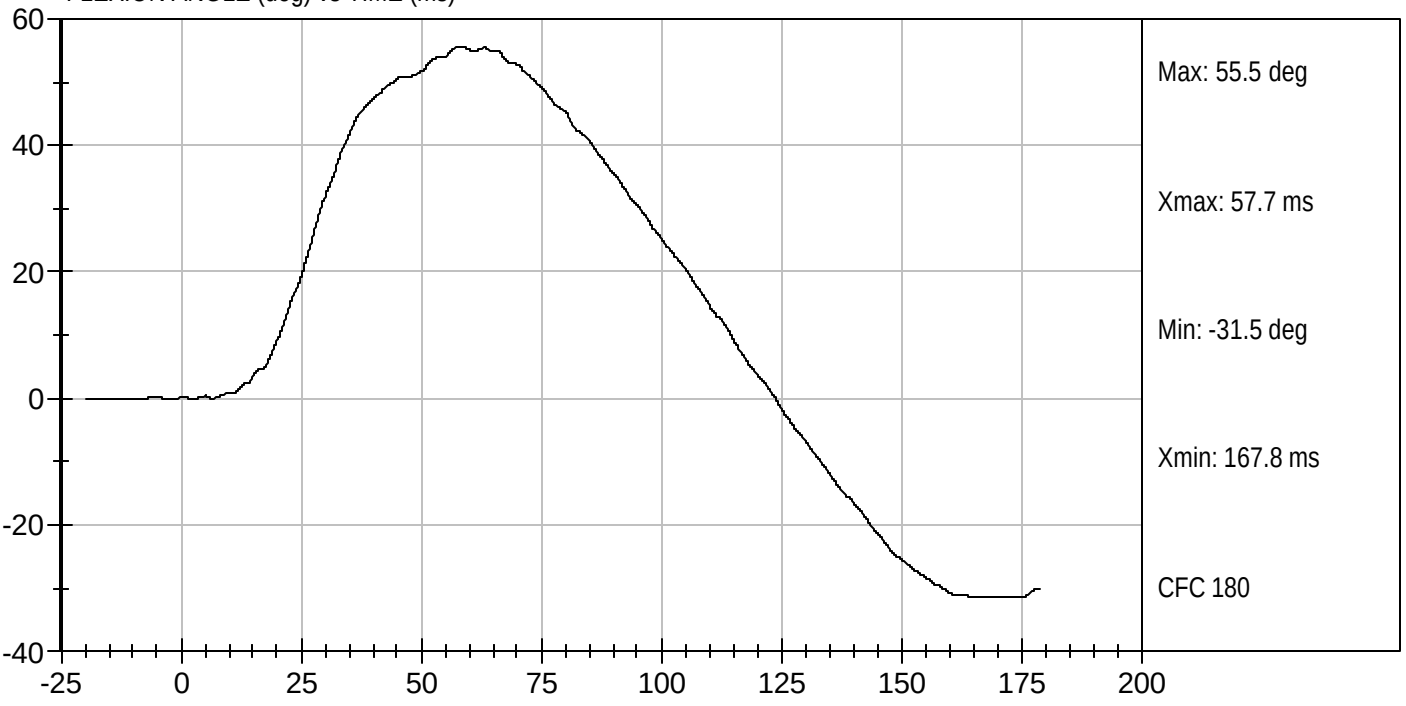
Test Desc: Neck Bending
Componet ID: D052262

Test Date: 08/11/2005
Velocity: 10.85 ft/s, 3.3 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)

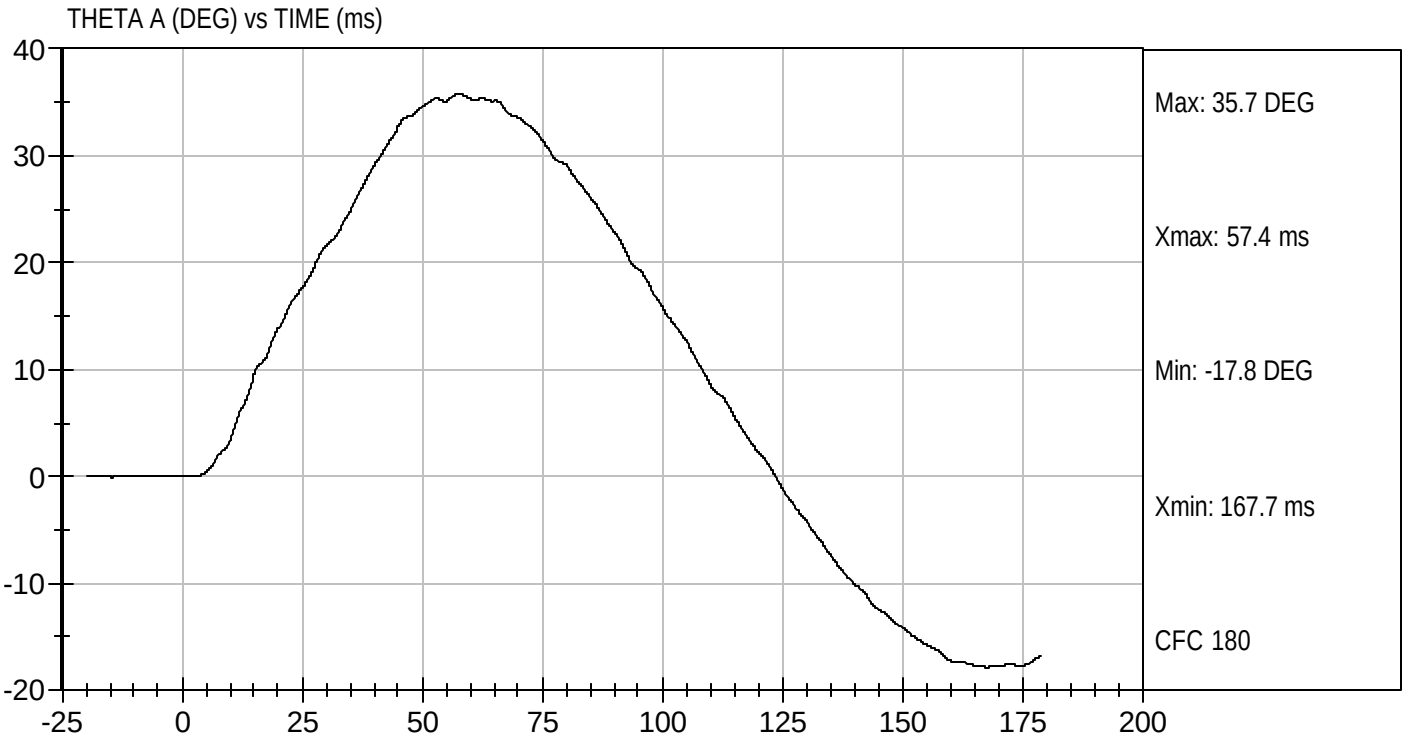


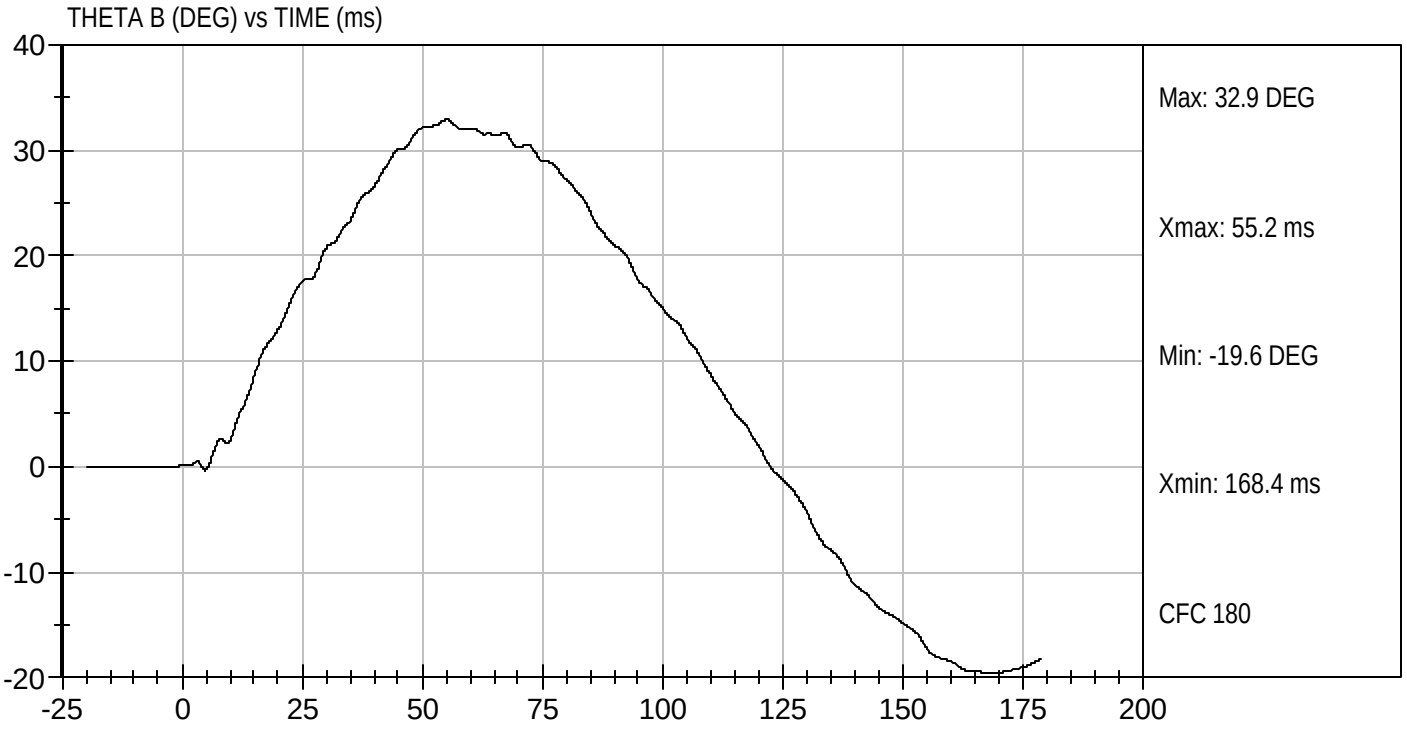
FLEXION ANGLE (deg) vs TIME (ms)



Test Desc: Neck Bending
Componet ID: D052262

Test Date: 08/11/2005
Velocity: 10.85 ft/s, 3.3 m/s





MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052263

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	8.9	Pass
Time of Peak Shoulder Acceleration	msec	NA	17.3	Pass
		Overall Test Results		Pass

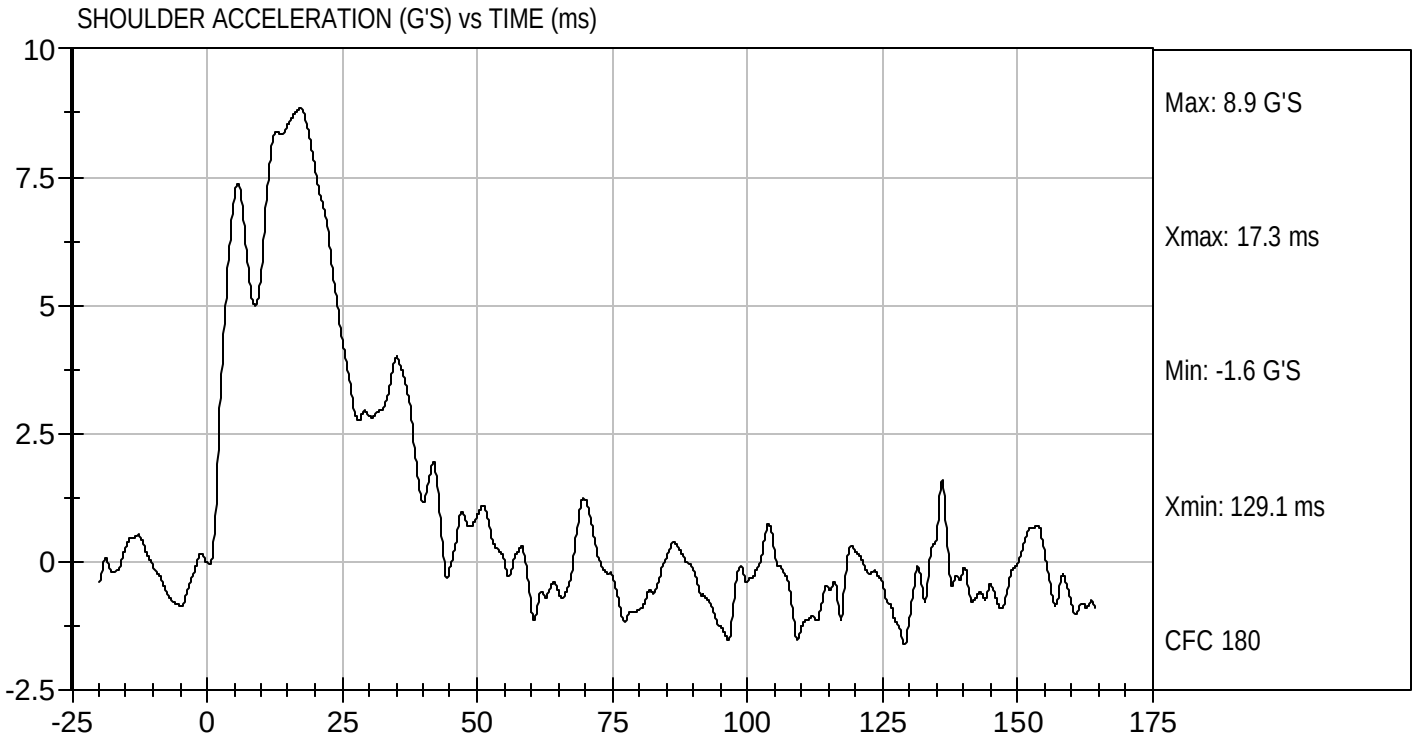
Joe Fleck
Laboratory Technician

08/10/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Shoulder Impact
Componet ID: D052263

Test Date: 08/10/2005
Velocity: 14.07 ft/s, 4.3 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052264

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	26.3	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	37.1	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	47.1	Pass
		Overall Test Results		Pass

Laboratory Technician

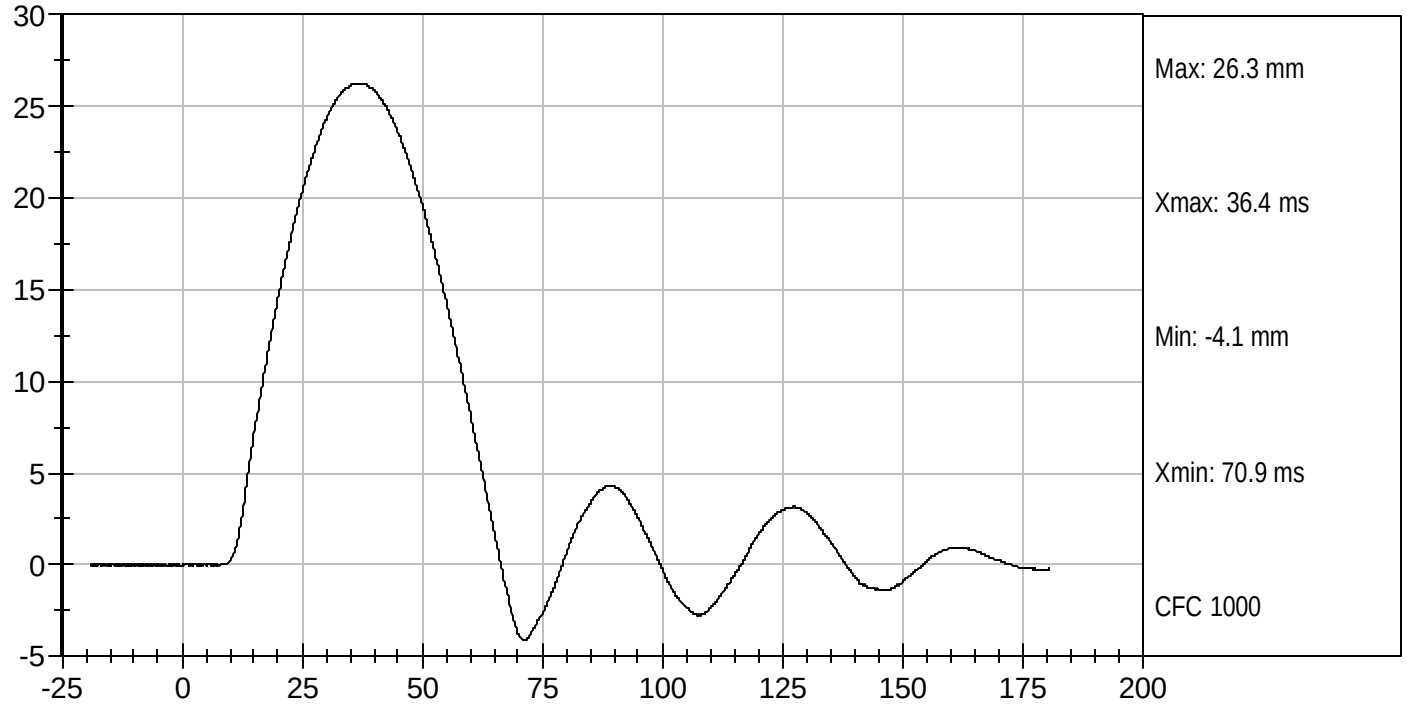
08/11/2005
Test Date

David Winkelbauer
Approved By

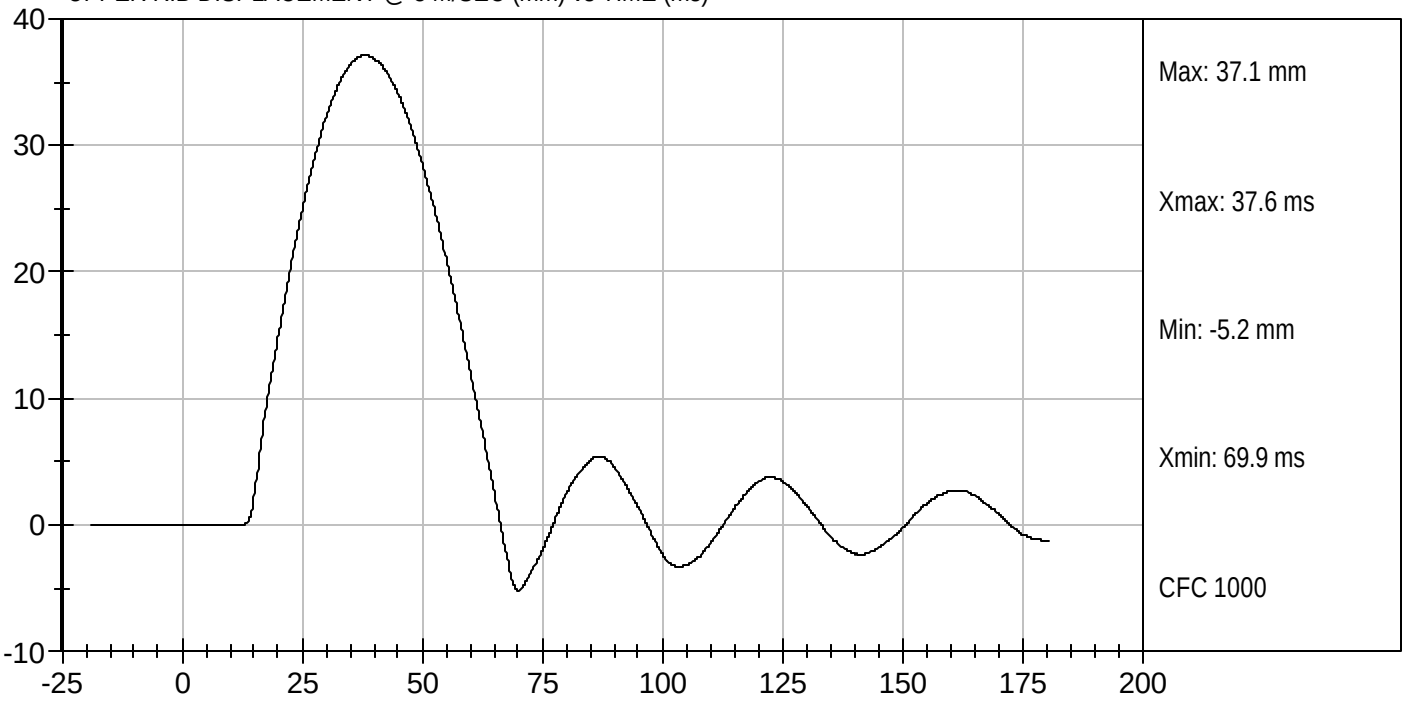
Test Desc: Rib Impact - Upper
Componet ID: D052264

Test Date: 08/11/2005
Velocity: 6.56 ft/s, 2 m/s

UPPER RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)



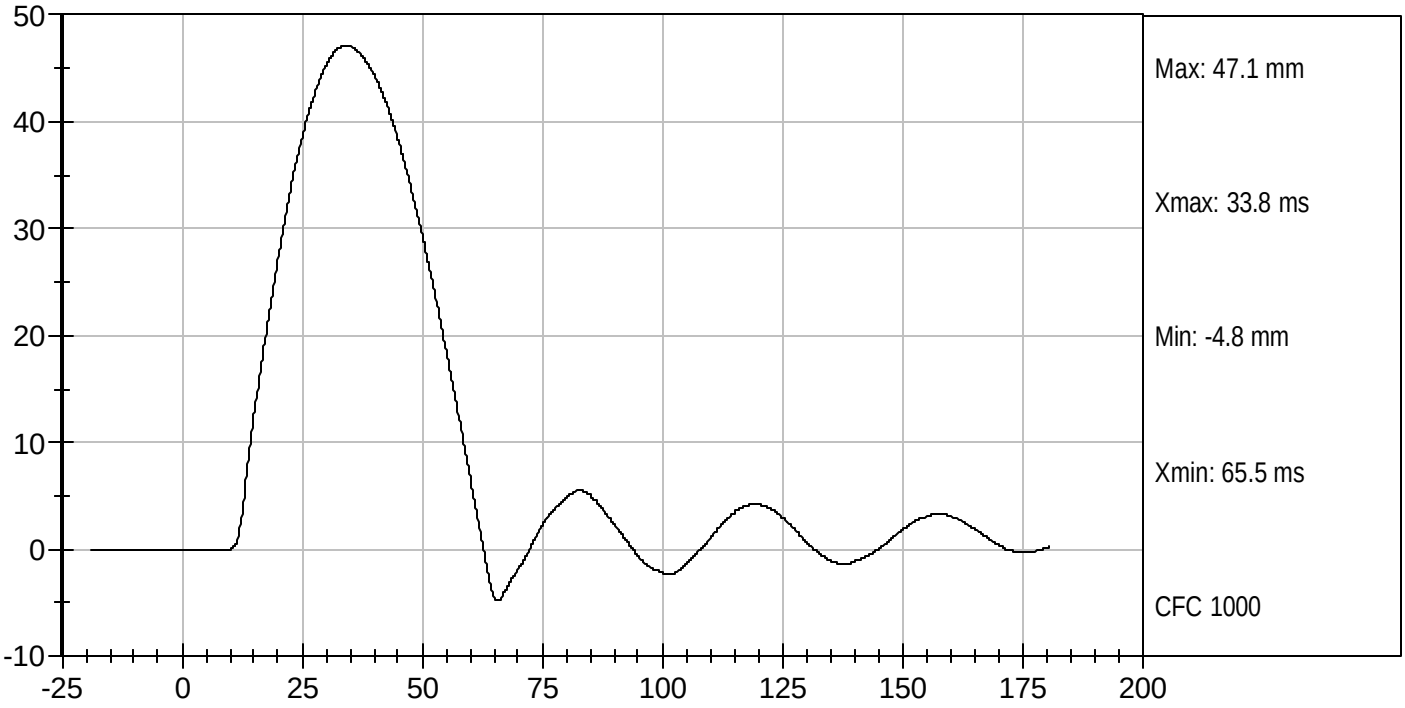
UPPER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Upper
Componet ID: D052264

Test Date: 08/11/2005
Velocity: 13.12 ft/s, 4 m/s

UPPER RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

MID RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052265

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	26.8	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	39.1	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	48.6	Pass
		Overall Test Results		Pass

Laboratory Technician

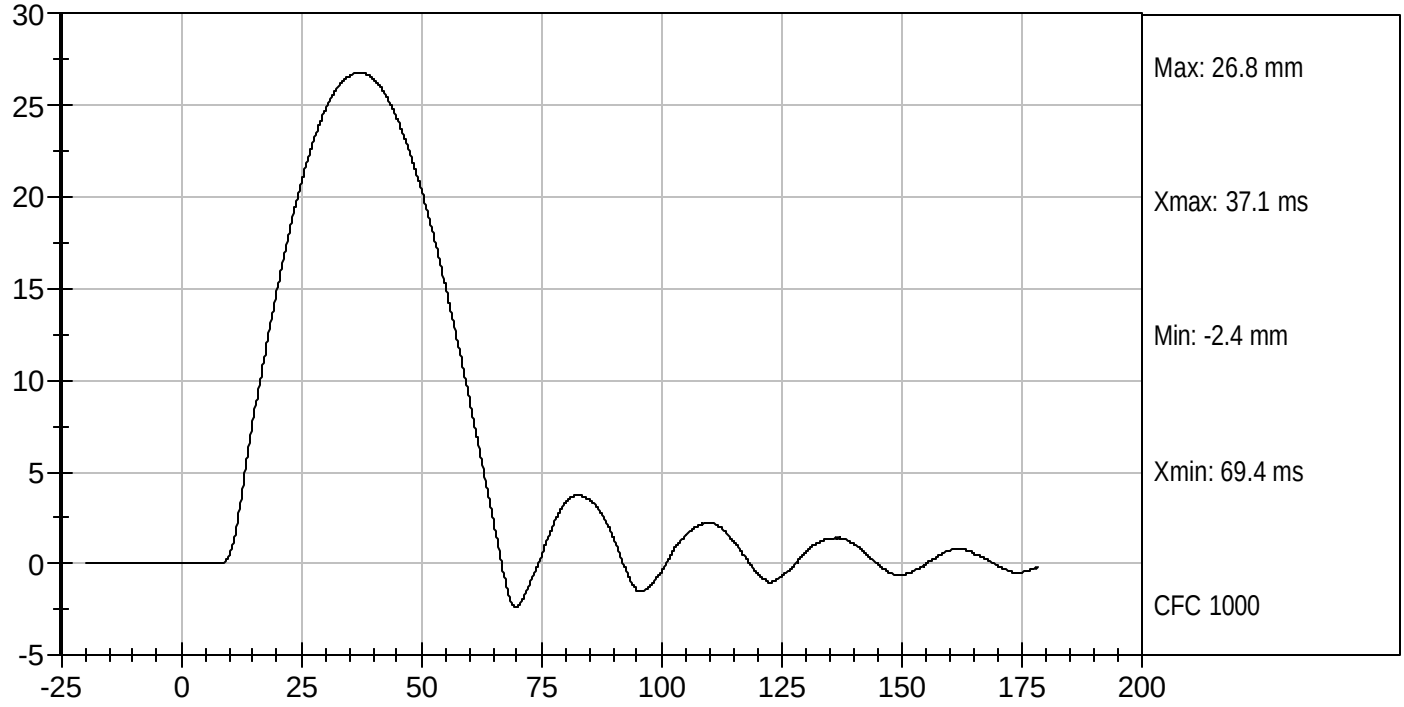
08/11/2005
Test Date

David Winkelbauer
Approved By

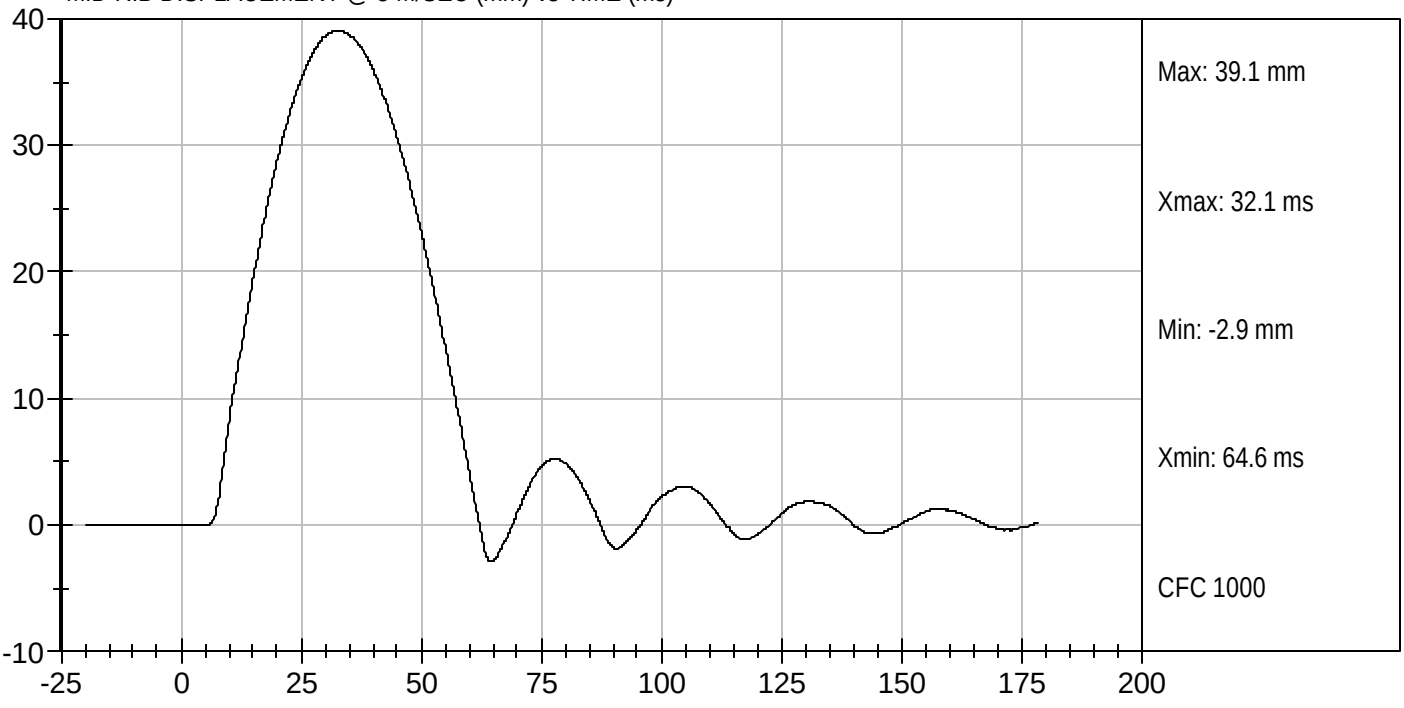
Test Desc: Rib Impact - Mid
Componet ID: D052265

Test Date: 08/11/2005
Velocity: 6.56 ft/s, 2 m/s

MID RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)

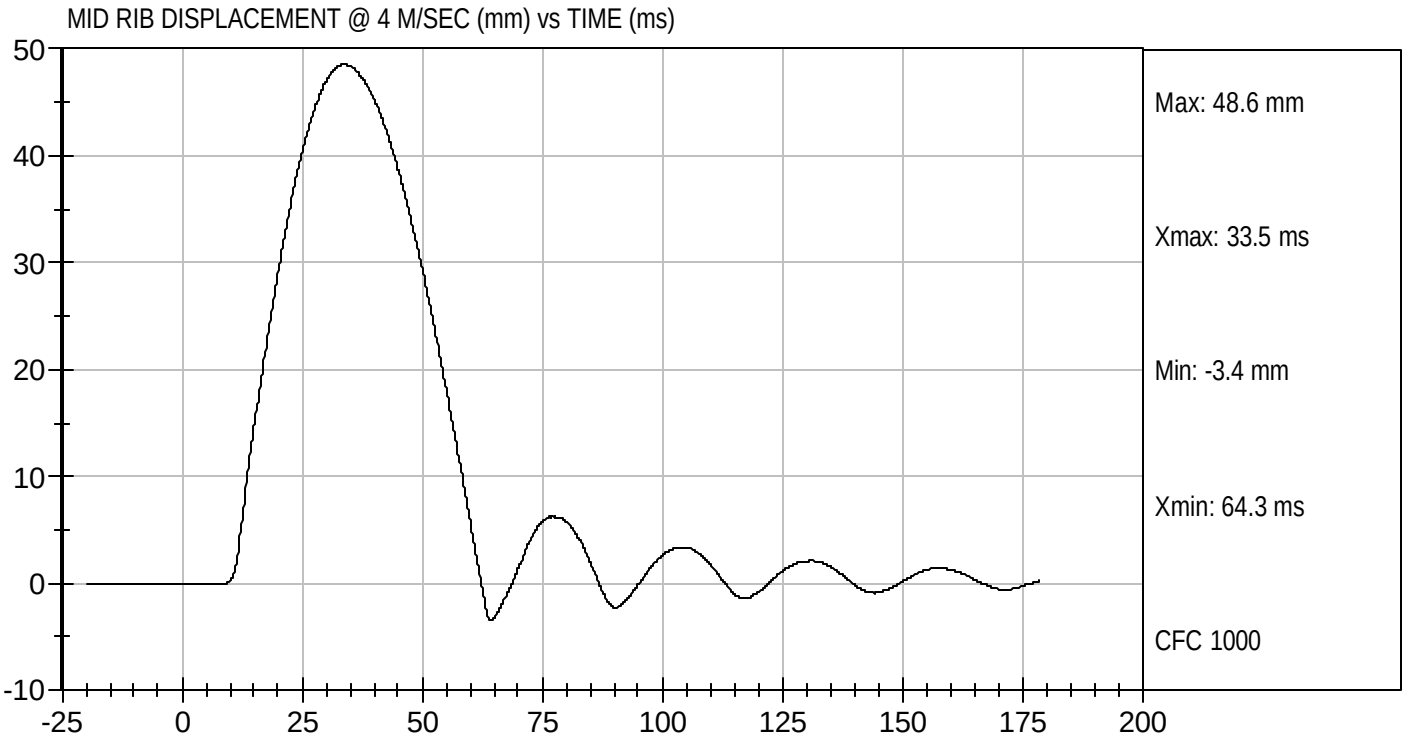


MID RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Mid
Componet ID: D052265

Test Date: 08/11/2005
Velocity:13.12 ft/s, 4 m/s



MGA RESEARCH CORPORATION

LOWER RIB TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052266

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Displacement at 2 m/s	m/s	23.5 to 27.5	26.8	Pass
Displacement at 3 m/s	G's	36.0 to 40.0	38.2	Pass
Displacement at 4 m/s	msec	46.0 to 51.0	46.9	Pass
		Overall Test Results		Pass

Laboratory Technician

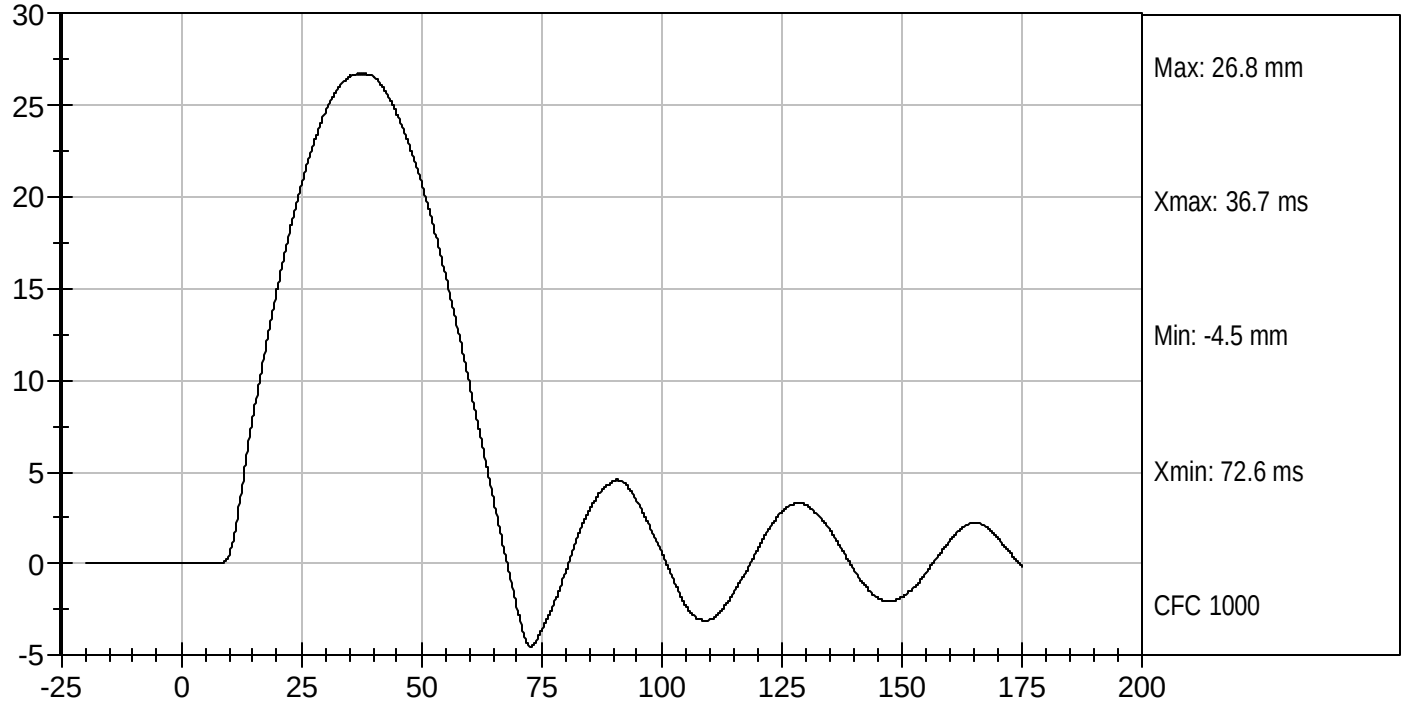
08/11/2005
Test Date

David Winkelbauer
Approved By

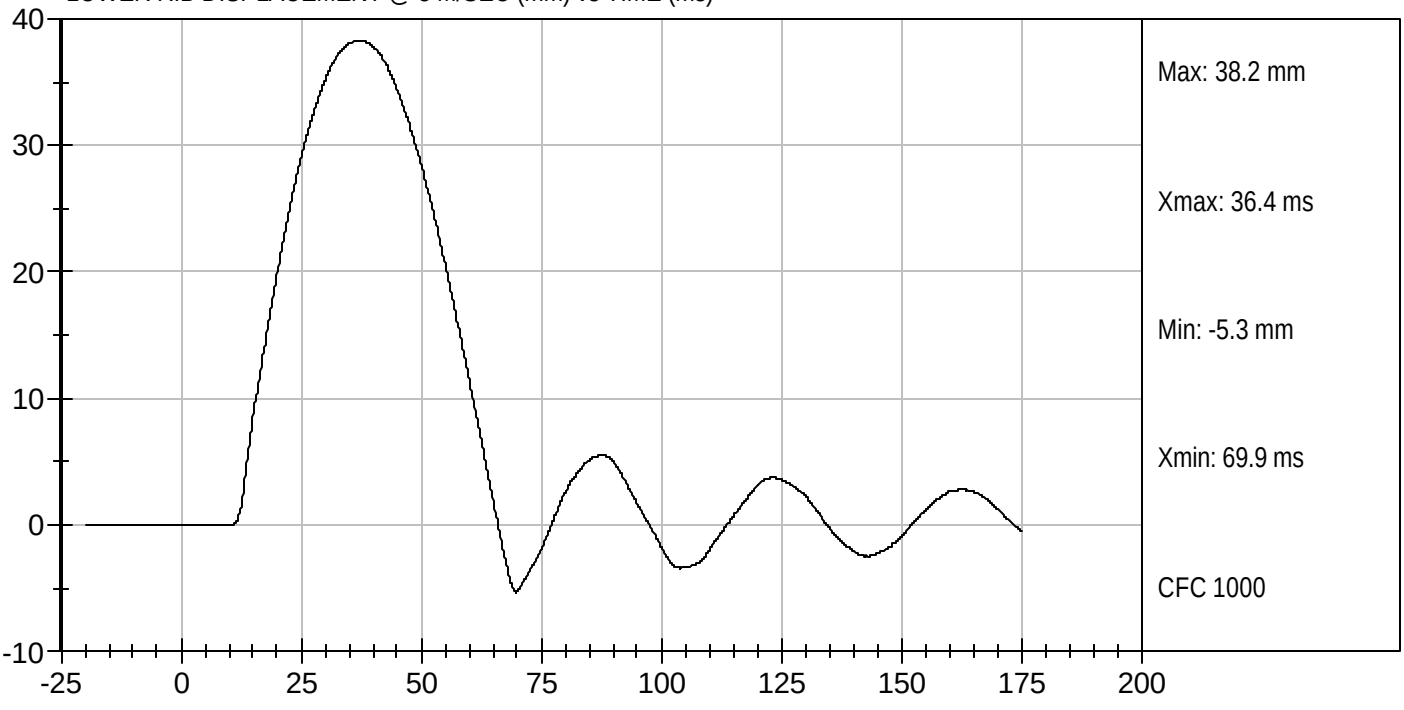
Test Desc: Rib Impact - Lower
Componet ID: D052266

Test Date: 08/11/2005
Velocity: 6.56 ft/s, 2 m/s

LOWER RIB DISPLACEMENT @ 2 M/SEC (mm) vs TIME (ms)



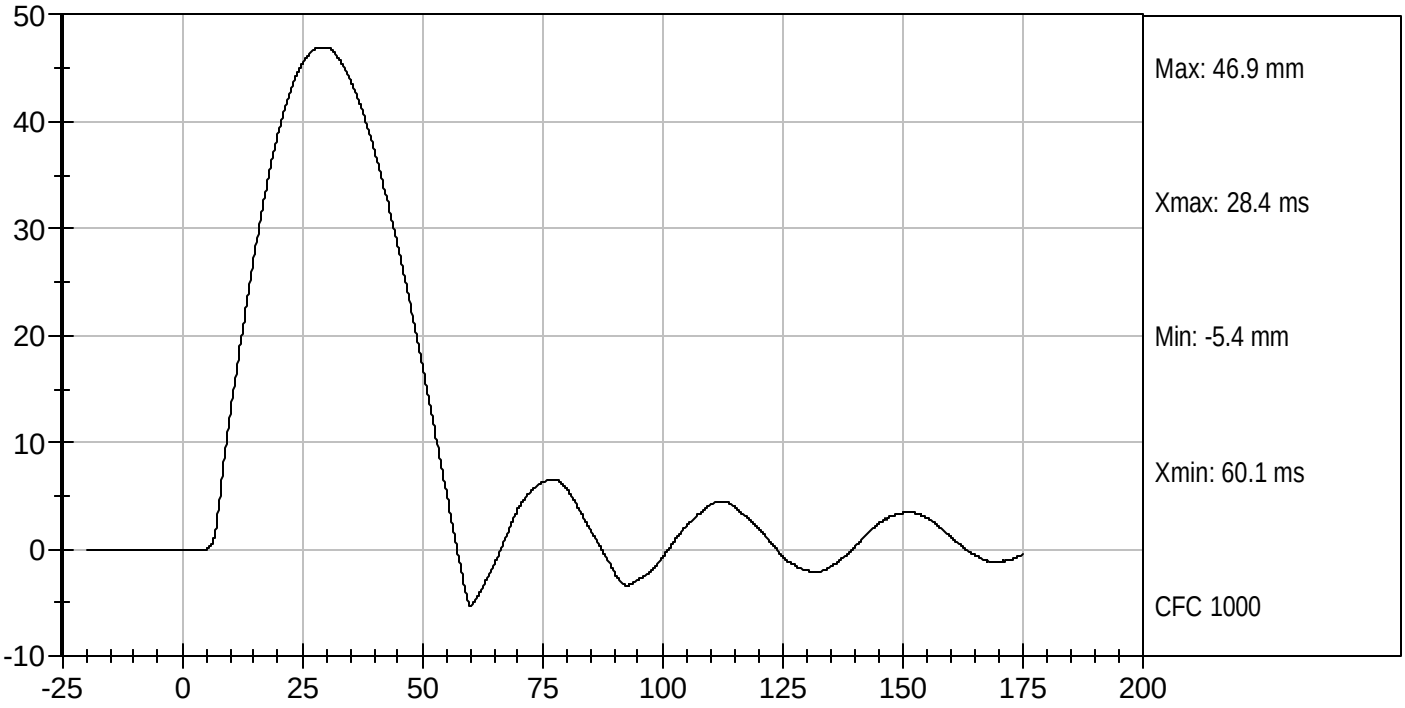
LOWER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



Test Desc: Rib Impact - Lower
Componet ID: D052266

Test Date: 08/11/2005
Velocity: 13.12 ft/s, 4 m/s

LOWER RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052267

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Speed	m/s	3.90 to 4.10	3.91	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.45	Pass
Time of Maximum Impactor Force	msec	10.60 to 13.00	12.70	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.36	Pass
Time of Maximum Abdomen Force	msec	10.00 to 12.30	11.20	Pass
		Overall Test Results		Pass

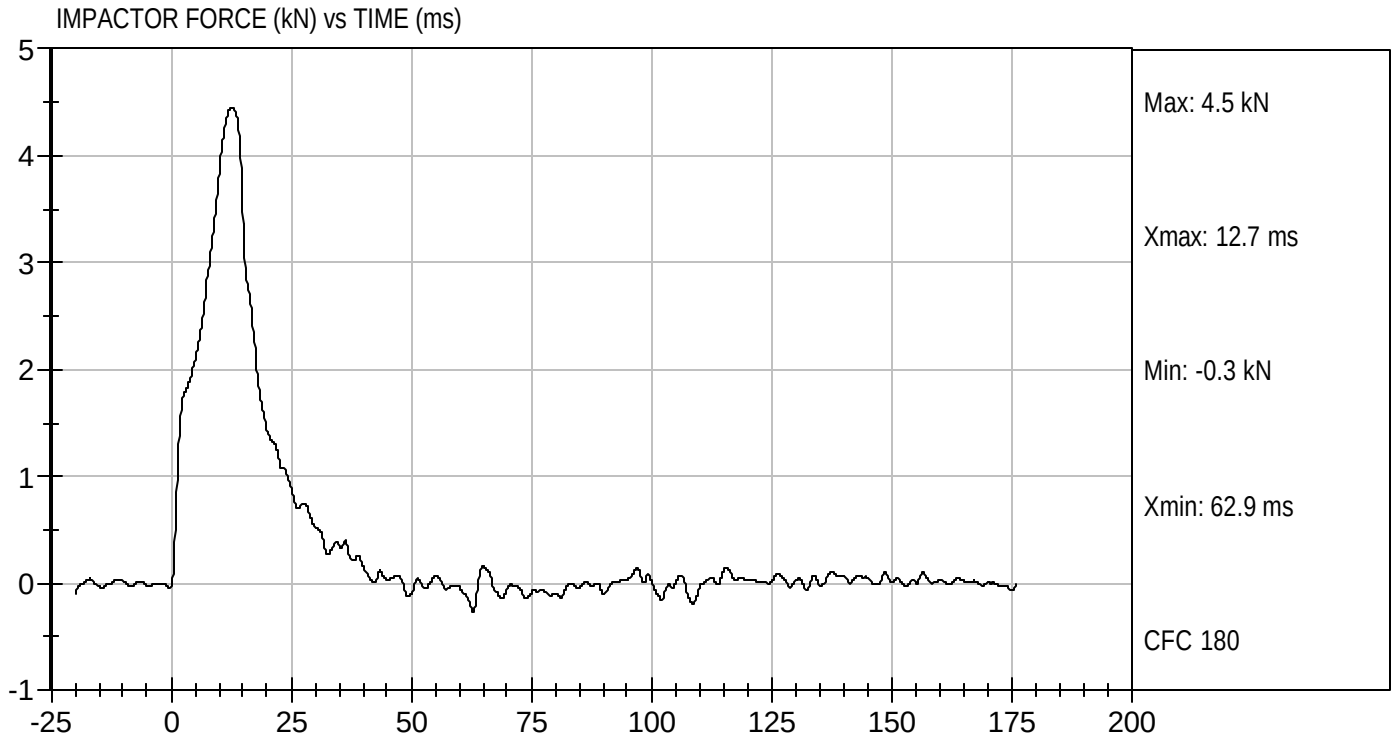
Joe Fleck
Laboratory Technician

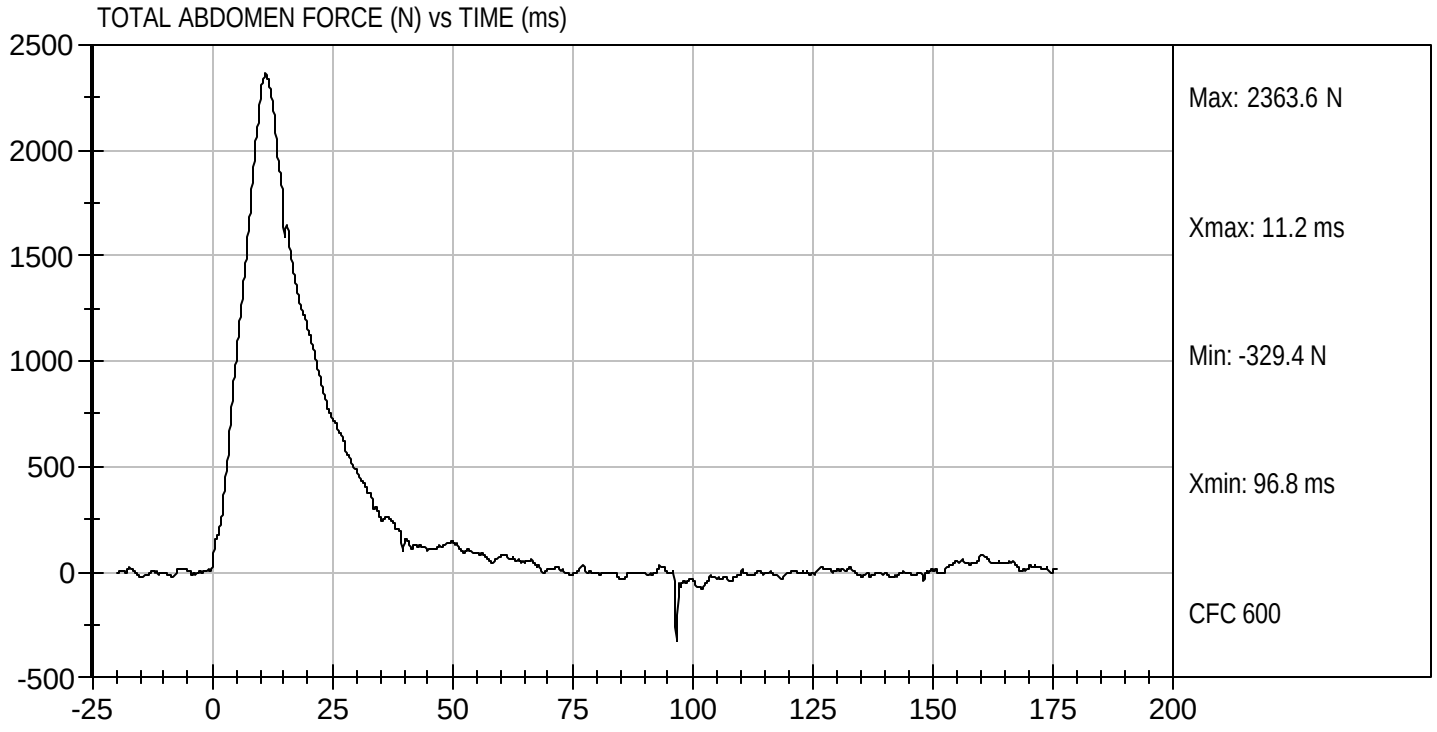
08/11/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Abdomen Impact
Componet ID: D052267

Test Date: 08/11/2005
Velocity: 12.84 ft/s, 3.91 m/s





MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052268

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Speed		m/sec	5.95 to 6.15	6.10	Pass
Pendulum Deceleration	10 msec	m/sec	-2.46 to -1.59	-2.24	Pass
	20 msec	m/sec	-5.25 to -4.07	-5.14	Pass
	25 msec	m/sec	-6.64 to -5.30	-6.18	Pass
	30 msec	m/sec	>= -6.5	-6.3	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	48.5	Pass
Time of Maximum Flexion Angle		msec	39.0 to 53.0	44.2	Pass
Maximum Theta (A)		deg	31.0 to 35.0	32.3	Pass
Time of Maximum Theta (A)		msec	44.0 to 52.0	44.2	Pass
Maximum Theta (B)		deg	27.81 to 30.31	29.71	Pass
Time of Maximum Theta (B)		msec	44.0 to 52.0	47.0	Pass
			Overall Results		Pass

Laboratory Technician

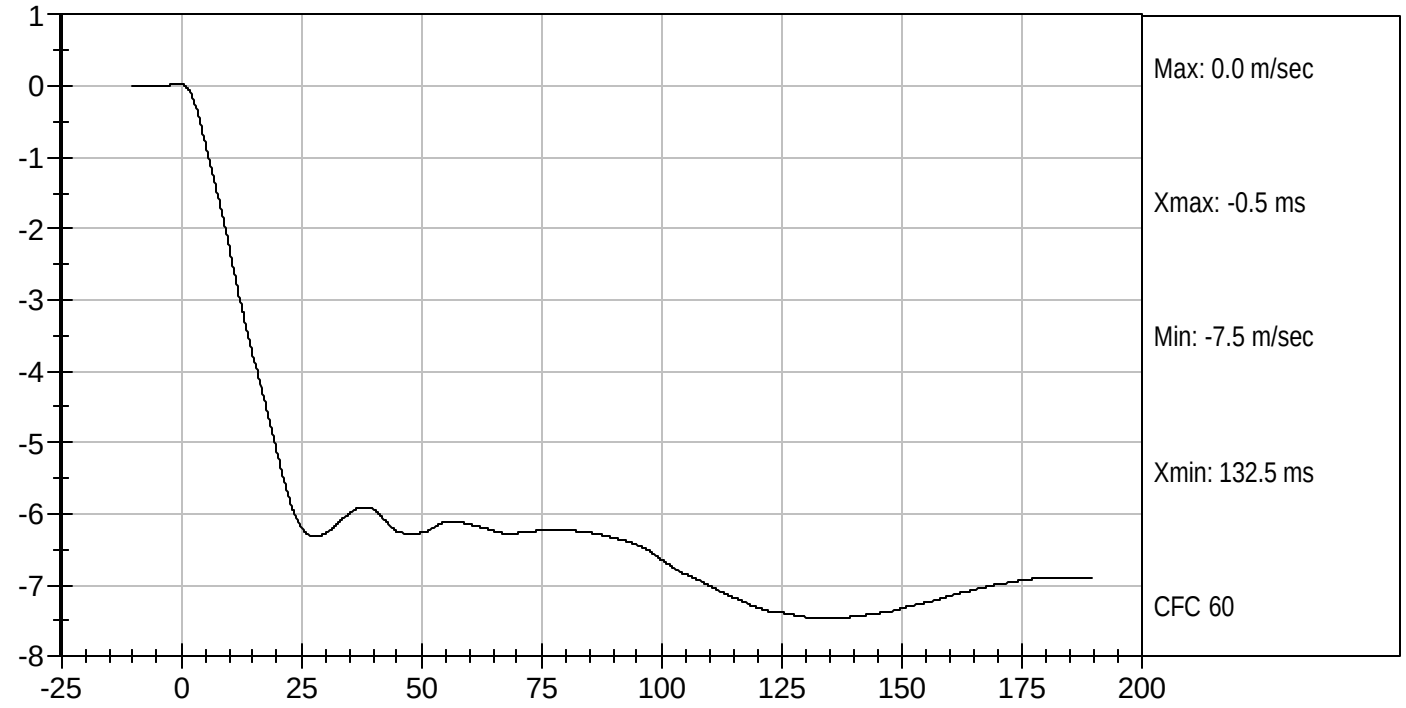
08/12/2005
Test Date

David Winkelbauer
Approved By

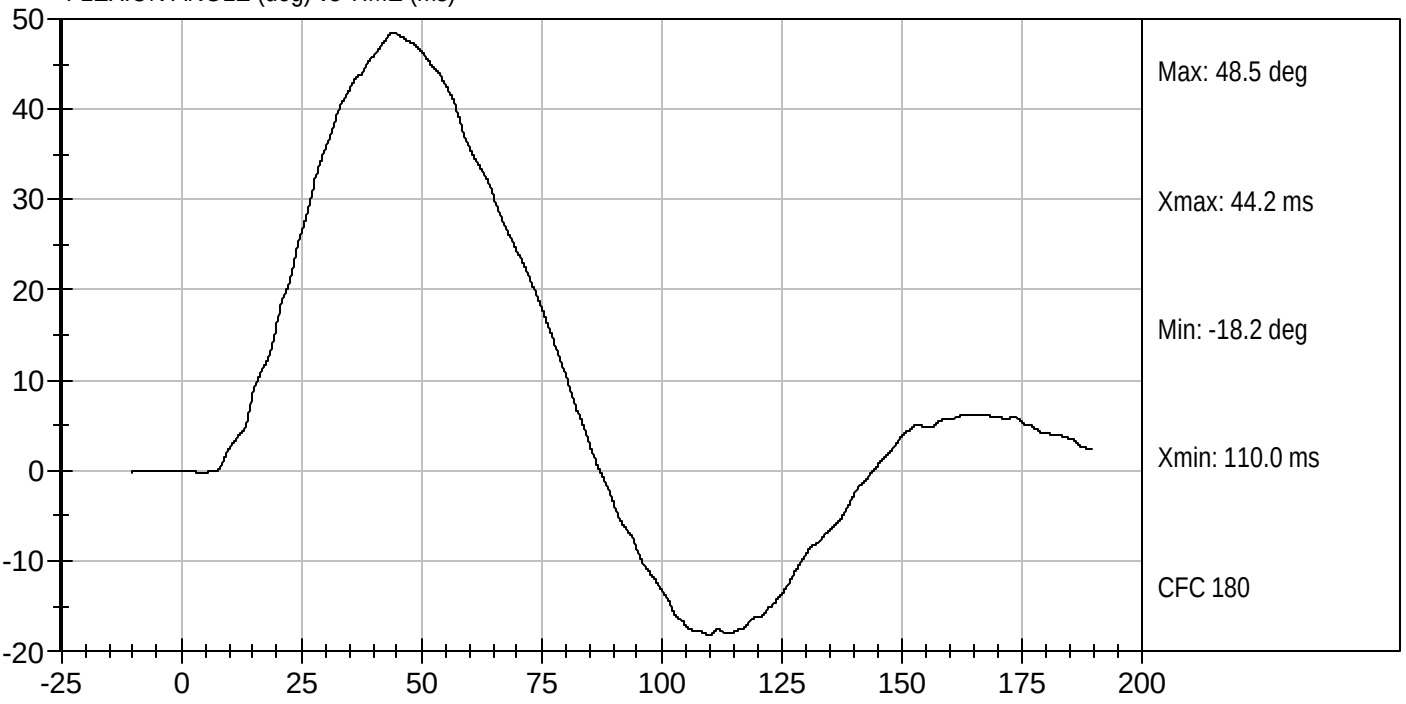
Test Desc: Lumbar Bending
Componet ID: D052268

Test Date: 08/12/2005
Velocity: 20.02 ft/s, 6.10 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)

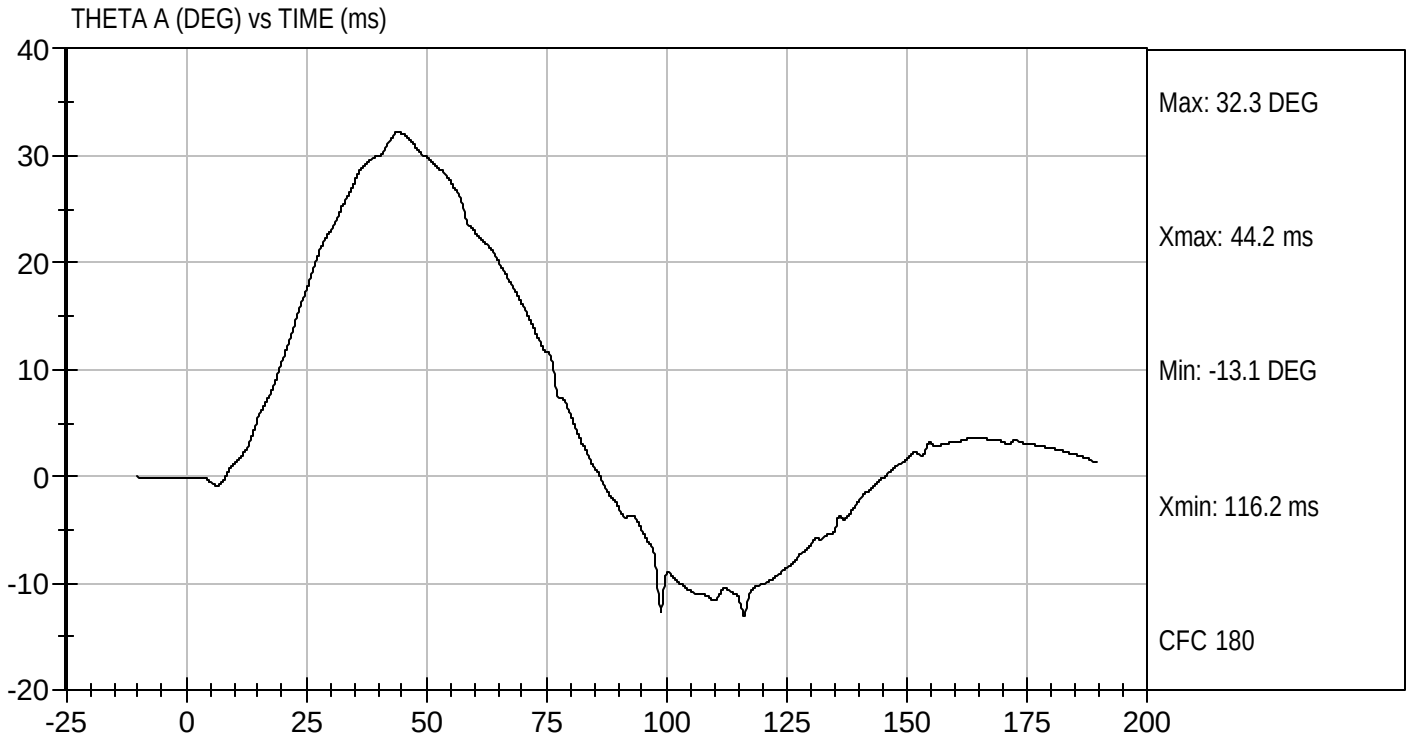


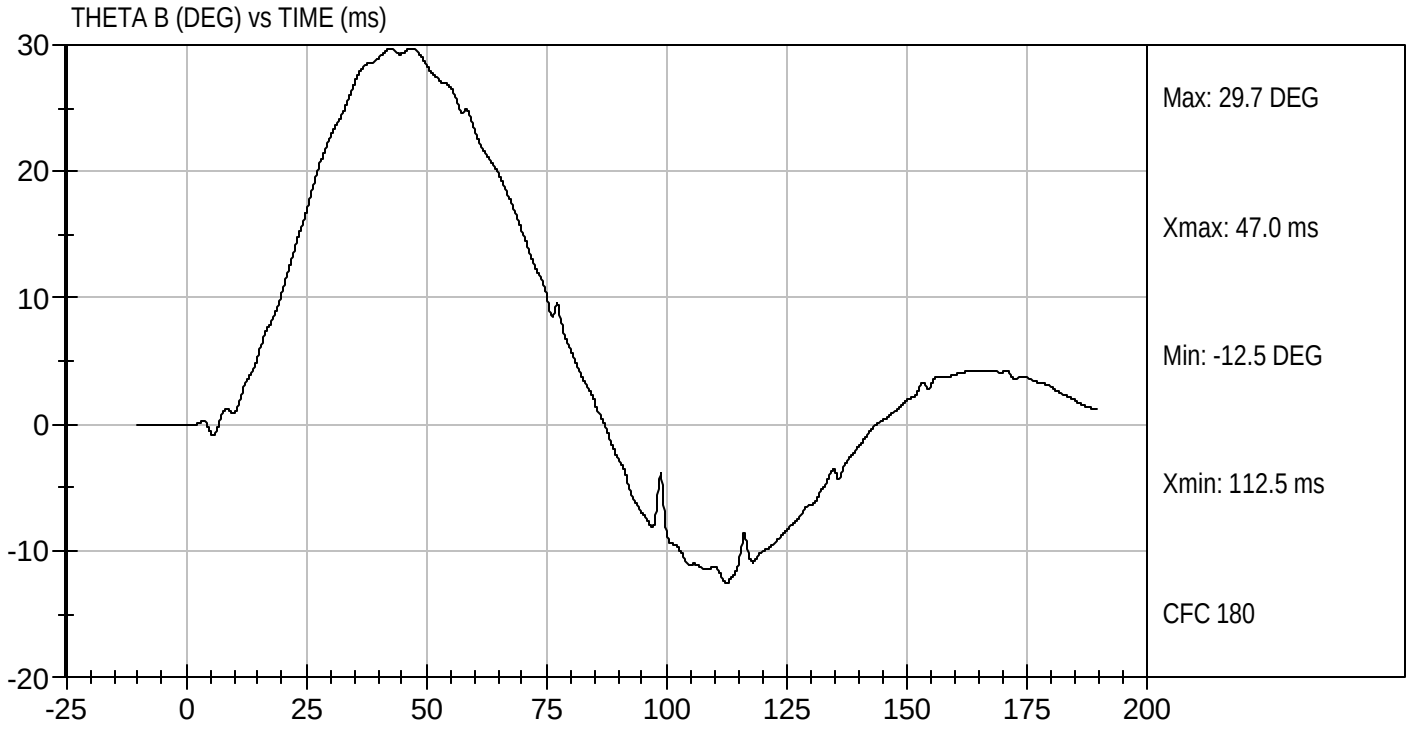
FLEXION ANGLE (deg) vs TIME (ms)



Test Desc: Lumbar Bending
Componet ID: D052268

Test Date: 08/12/2005
Velocity: 20.02 ft/s, 6.10 m/s





MGA RESEARCH CORPORATION

PELVIS TEST

EUROSID 2 DUMMY

ATD Serial No: 010 **Test I.D:** D052269

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.0 to 22.0	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Speed	m/s	4.20 to 4.40	4.30	Pass
Maximum Impactor Force	kN	4.40 to 5.40	5.15	Pass
Time of Maximum Impactor Force	msec	10.30 to 15.50	14.70	Pass
Maximum Pubic Force	kN	1.04 to 1.64	1.33	Pass
Time of Maximum Pubic Force	msec	9.90 to 15.90	15.80	Pass
		Overall Test Results		Pass

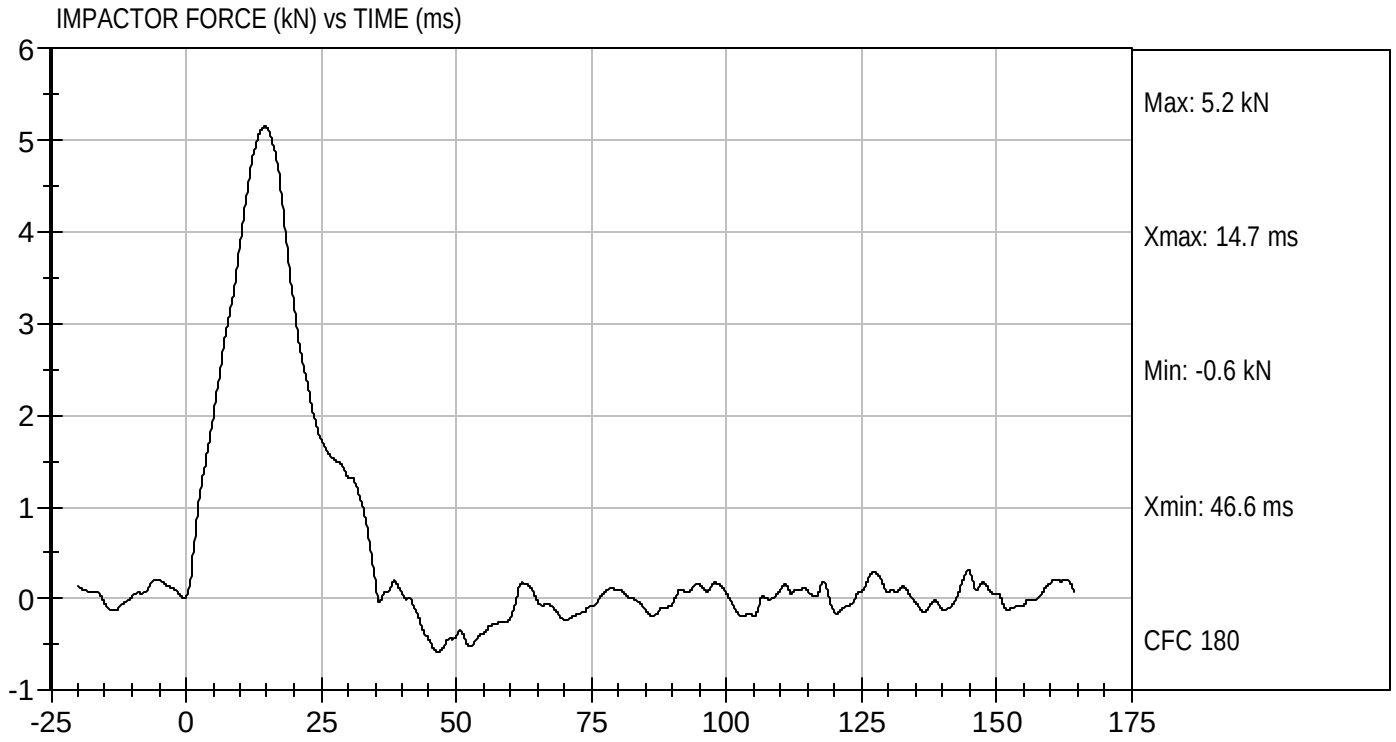
Joe Fleck
Laboratory Technician

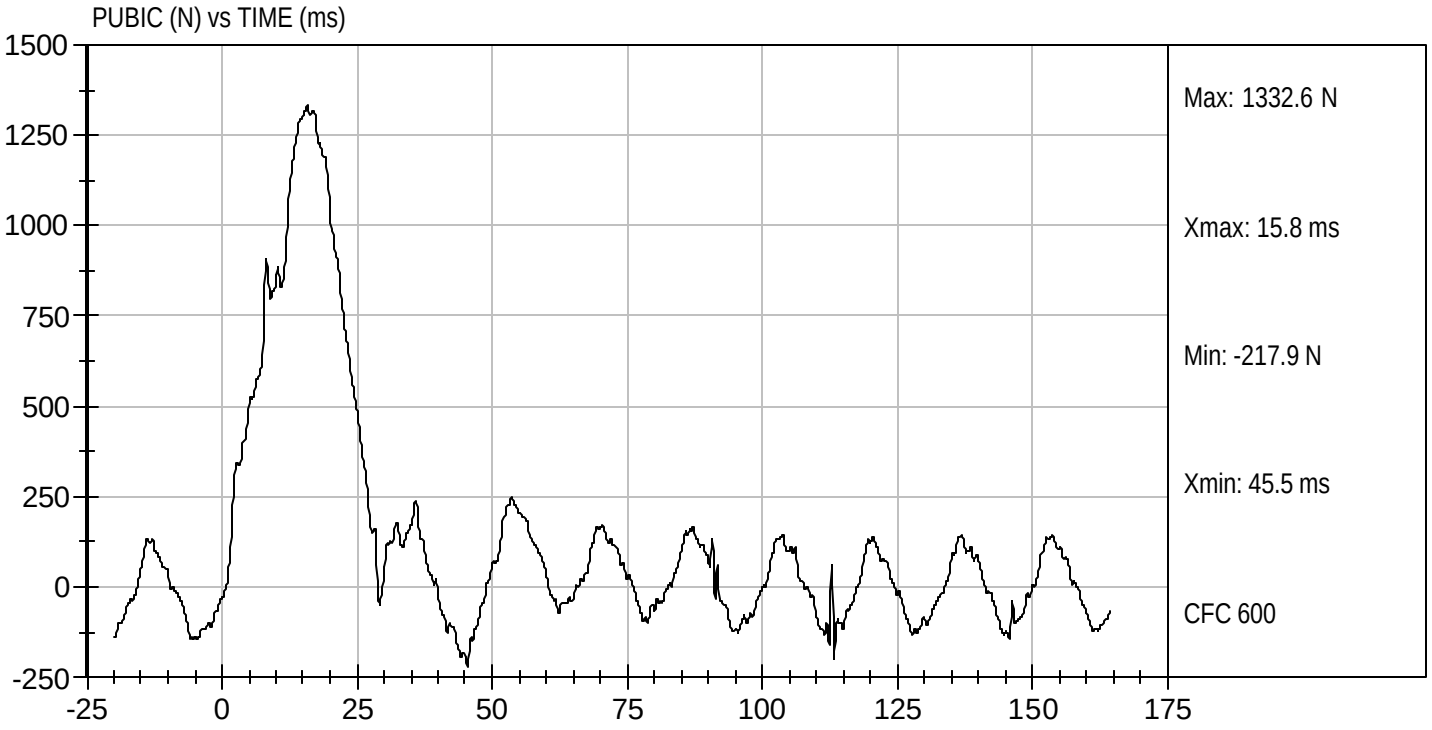
08/10/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Pelvis Impact
Componet ID: D052269

Test Date: 08/10/2005
Velocity: 14.11 ft/s, 4.3 m/s





APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY CALIBRATION DATA

	INSTRUMENTS FOR LEFT FRONT DUMMY ES-2RE: 009		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X Accelerometer	P24154	Endevco	7/29/05
Head Y Accelerometer	AKAA6	Endevco	7/29/05
Head Z Accelerometer	ALBA7	Endevco	7/29/05
Head Y - Front	ALCR0	Endevco	7/29/05
Head Z - Front	P21352	Endevco	7/29/05
Head X – Left	P24261	Endevco	7/29/05
Head Z – Left	AGTM2	Endevco	7/29/05
Head X – Upper	J13535	Endevco	7/29/05
Head Y – Upper	AH097	Endevco	7/29/05
Upper Neck Load Cell	105	FTSS	9/27/05
Lower Neck Load Cell	110	FTSS	9/27/05
Shoulder Load Cell	119	FTSS	9/24/05
T12 Load Cell	103	FTSS	9/24/04
Upper Spine X	P22694	Endevco	7/29/05
Upper Spine Y	P22084	Endevco	7/29/05
Upper Spine Z	P24226	Endevco	7/29/05
Lower Spine X	A27-Z07	Entran	7/29/05
Lower Spine Y	A12-A11	Entran	7/29/05
Lower Spine Z	A27-Z19	Entran	7/29/05
Torso Load Cell	102	FTSS	9/29/04
Upper Rib Y	AJ9P7	Endevco	7/29/05
Mid Rib Y	AP2C4	Endevco	7/29/05
Lower Rib Y	P22107	Endevco	7/29/05
Rib Displacement	009	Honeywell	7/26/05
Front Abdomen FY	ABG122FY	FTSS	9/30/04
Mid Abdomen FY	ABG123FY	FTSS	9/30/04
Rear Abdomen FY	ABG124FY	FTSS	9/30/04
Pubic Symphysis FY	PG115FY	FTSS	9/24/04
Pelvis X	AGP20	Endevco	7/29/05
Pelvis Y	AM751	Endevco	7/29/05
Pelvis Z	AKAC4	Endevco	7/29/05
Right Femur Load Cell	135	FTSS	9/28/04
Left Femur Load Cell	136	FTSS	9/28/05
Lumbar Load Cell	104	FTSS	9/27/04

DUMMY CALIBRATION DATA

	INSTRUMENTS FOR LEFT REAR DUMMY ES-2RE: 010		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X Accelerometer	J12425	Endevco	7/28/05
Head Y Accelerometer	J12462	Endevco	7/28/05
Head Z Accelerometer	J14006	Endevco	7/28/05
Head Y - Front	04J14-J10	Entran	5/24/05
Head Z - Front	04J14-J16	Entran	5/24/05
Head X – Left	AP0G2	Endevco	4/12/05
Head Z – Left	P22454	Endevco	7/07/05
Head X – Upper	ALB87	Endevco	7/06/05
Head Y – Upper	A28-H04	Entran	4/12/05
Upper Neck Load Cell	106	FTSS	9/23/05
Lower Neck Load Cell	111	FTSS	9/23/05
Shoulder Load Cell	120	FTSS	9/29/05
T12 Load Cell	102	FTSS	9/24/05
Upper Spine X	P22652	Endevco	7/28/05
Upper Spine Y	P22150	Endevco	7/28/05
Upper Spine Z	AJ417	Endevco	7/28/05
Lower Spine X	AMR94	Endevco	4/27/05
Lower Spine Y	AN8P9	Endevco	4/27/05
Lower Spine Z	AMP95	Endevco	4/27/05
Torso Load Cell	104	FTSS	9/29/04
Upper Rib Y	AHTT2	Endevco	7/07/05
Mid Rib Y	J26-H13	Entran	7/06/05
Lower Rib Y	AC9B7	Endevco	4/27/05
Rib Displacement	010	Honeywell	7/26/05
Front Abdomen FY	ABG119FY	FTSS	9/30/04
Mid Abdomen FY	ABG120FY	FTSS	9/30/04
Rear Abdomen FY	ABG121FY	FTSS	9/30/04
Pubic Symphysis FY	PG113FY	FTSS	9/24/04
Pelvis X	P22180	Endevco	7/07/05
Pelvis Y	P22805	Endevco	7/07/05
Pelvis Z	P22190	Endevco	7/07/05
Right Femur Load Cell	137	FTSS	9/28/04
Left Femur Load Cell	136	FTSS	9/20/05
Lumbar Load Cell	105	FTSS	9/27/04

VEHICLE INSTRUMENTS CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Mid A-Post Y	B26-Z14	Entran	3/17/05
Left Lower A-Post Y	C15-L23	Entran	4/22/05
Left Mid B-Post Y	F04-R22	Entran	3/17/05
Left Lower B-Post Y	B26-Z12	Entran	3/17/05
RR Occupant Compartment Y	D03-Z26	Entran	4/22/05
Driver Seat Track Y	L18-N15	Entran	3/09/05
Right Front Sill X	C29-L11	Entran	4/28/05
Right Front Sill Y	D03-Z19	Entran	4/25/05
Right Front Sill Z	C21-G40	Entran	4/28/05
Right Rear Sill X	B19-Z04	Entran	3/09/05
Right Rear Sill Y	C21-G01	Entran	4/28/05
Right Rear Sill Z	B19-Z15	Entran	3/09/05
Left Rear Sill Y	B16-Z03	Entran	3/03/05
Left Front Sill Y	C15-L03	Entran	4/22/05
Floorpan @ Rear Axle X	B28-Z03	Entran	3/17/05
Floorpan @ Rear Axle Y	A29-B06	Entran	3/17/05
Floorpan @ Rear Axle Z	C21-G15	Entran	4/22/05
Vehicle CG X	C06-L19	Entran	3/24/05
Vehicle CG Y	C04-L10	Entran	3/24/05
Vehicle CG Z	C06-L16	Entran	3/24/05
Left Front Door @ Pelvis	B19-Z07	Entran	3/03/05
Left Front Door @ Arm	B19-Z12	Entran	3/03/05
Left Front Door @ Knee	B16-Z10	Entran	3/03/05
Left Front Door @ Mid Rib	B16-Z04	Entran	3/03/05
Left Rear Door @ Pelvis	D01-Z16	Entran	4/25/05
Left Rear Door @ Arm	C29-L21	Entran	4/28/05
Left Rear Door @ Knee	C29-L28	Entran	4/28/05
Left Rear Door @ Mid Rib	C29-L15	Entran	4/28/05
Upper Engine X	F04-R23	Entran	3/17/05
Upper Engine Y	C06-L11	Entran	3/24/05
Firewall Y	B26-Z10	Entran	3/17/05