

REPORT NUMBER: TO12-MGA-2003-006

**FULL SCALE SIDE IMPACT TESTS OF BASELINE VEHICLES
Task Order T0008 / RFP 0012**

**Oblique Rigid Pole
SID IIs With Floating Rib Guides**

**TOYOTA MOTOR MANUFACTURING
2003 TOYOTA CAMRY
NHTSA NUMBER: R31522**

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



TEST DATE: March 28, 2003

FINAL REPORT SUBMITTED: August 15, 2003

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

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

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof.

Prepared by: Jeff Lewandowski
Jeff Lewandowski, Project Engineer

Reviewed by: David Winkelbauer
David Winkelbauer, Project Engineer

Approval Date: April 11, 2003

Technicians: Wayne Dahlke
Jordan Haynes
Erik Nelson
Chris Novak
Eric Peschman

Photographic: Tammy Brausch
Chris Kulis

Instrumentation/
Calibration: Jamie Aide
Tim Michnay

Secretary: Cyndy Kline

FINAL REPORT ACCEPTED BY:

Accepted By: _____
Contract Technical Manager

Acceptance Date: _____

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Test Procedure	1
2	Summary of Side Impact Test	2
3	Side Impact Dummy (SID IIs) and Test Vehicle Data	5
4	Occupant and Vehicle Information	11

<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	6
2	Test Vehicle Tire Information	9
3	Post Test Observations	10
4	Vehicle Pre-Test and Post-Test Measurements	12
5	SID IIs Clearance Dimensions	13
6	Vehicle Side Measurements	14
7	Vehicle Exterior Crush Profiles	15
8	Vehicle Damage Profile Distances	17
9	Vehicle Accelerometer Locations and Data Summary	18
10	High Speed Camera Locations and Data	21

<u>Appendix</u>		
A	Photographs	A
B	Vehicle and Dummy Response Data Traces	B
C	Dummy Configuration and Performance Verification Data	C
D	Test Equipment List and Calibration Information	D
E	Dummy Peak Responses	E

SECTION 1
PURPOSE AND TEST PROCEDURE

This Side Impact test is conducted as part of Contract No. DTRS57-98-D-00041, RFP 12, Task Order 8, sponsored by the U.S. Department of Transportation, Volpe National Transportation System Center. The purpose of this test is to evaluate the responses of the SID IIs with floating rib guides in a 2003 Toyota Camry, when subjected to a rigid pole side impact at 285 degrees.

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

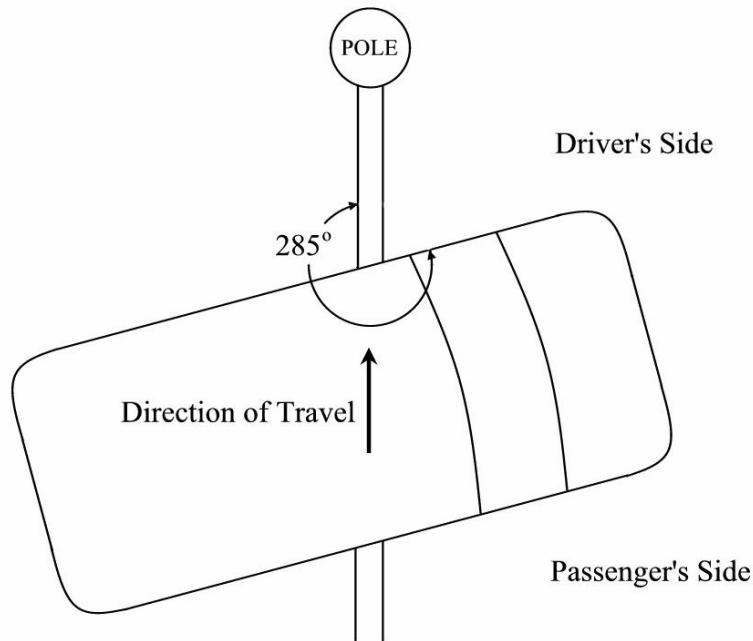
SECTION 2

SUMMARY OF SIDE IMPACT TEST

A rigid pole side impact test at 285 degrees was performed on a 2003 Toyota Camry. The subject vehicle was towed into a rigid pole at a velocity of 31.5 km/h. The weight of the vehicle as tested was 1605.7 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on March 28, 2003. Pre- and post-test photographs of the test vehicle and the dummies are included in Appendix A.

One SID IIS side impact dummy with floating rib guides was placed in the left front designated seating position according to instructions specified in the FMVSS 208 Laboratory Test Procedure (TP208-12), Appendix G which is dated January 14, 2003. The side impact event was documented by ten high speed cameras. Camera locations and other pertinent camera information can be found in this report.

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



SECTION 2...continued
SUMMARY OF SIDE IMPACT TEST

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

Rib Deflection (mm) CFC 180	
Upper Thorax Rib	-36.4
Mid Thorax Rib	-30.1
Lower Thorax Rib	-27.6
Upper Abdominal Rib	-42.1
Lower Abdominal Rib	-41.0
Rib Deflection Rate (m/sec) CFC 180	
Upper Thorax Rib	-3.3
Mid Thorax Rib	-3.3
Lower Thorax Rib	-2.4
Upper Abdominal Rib	-4.1
Lower Abdominal Rib	-4.0
Viscous Criteria CFC 180	
Upper Thorax Rib	0.4
Mid Thorax Rib	0.4
Lower Thorax Rib	0.3
Upper Abdominal Rib	0.6
Lower Abdominal Rib	-0.6

Abdominal Forces (N) CFC 600	
Left Acetabulum Force	1165.4
Left Ilium Crest Force	4654.3
Right Ilium Crest Force	789.3
Pubic Symphysis Force	-721.7
Sum of Left Acetabulum and Left Ilium	5724.7

HIC 15		Left Front
	T1 (msec)	57.2
	T2 (msec)	58.3
	T2 – T1 (msec)	1.1
	HIC	8706

FIR Filtered	Left Front
Upper Thorax Rib Y (g's)	61.9
Mid Thorax Rib Y (g's)	74.3
Lower Thorax Rib Y (g's)	89.9
Upper Abdominal Rib Y (g's)	90.6
Lower Abdominal Rib Y (g's)	80.6
Upper Spine Y (g's)	67.1
Lower Spine Y (g's)	76.0
Pelvis Y (g's)	71.6

TEST NOTES

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

X – Test Speed * Sine 15 Degrees

Y – Test Speed * Cosine 15 Degrees

The SID IIs (033) was fitted with floating rib guides. The SID IIs weight with instrumentation was 54.4kg (120lbs). Target test weight calculations were performed using this value.

The seat side airbag did not deploy during the pole impact event.

The curtain side airbag did not deploy during the pole impact event.

Partial data was collected for the following channels:

Driver Upper Neck FY

Driver Upper Neck FZ

Driver Left Femur FZ

Right Rear Sill Z

SECTION 3
SIDE IMPACT DUMMY (SID IIs) AND TEST VEHICLE DATA

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

TEST VEHICLE INFORMATION

Make	Toyota
Model	Camry
Body Style	4 Door
VIN	4T1BE30K43U180332
Color	Blue
Odometer Reading (mile)	97
Transmission	4 Speed Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2.4
Engine Placement	Lateral

TEST VEHICLE OPTIONS

Front Airbag	Yes
Side Airbags	Seat / Curtain
Power Windows	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
Anti-lock Brakes	No
AM/FM/CD	Yes
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing	GVWR (kg)	1920
Date of Manufacture	02/03	GAWR Front (kg)	1210
		GAWR Rear (kg)	1210

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	200	200
Cold Pressure (kPa)	200	200
Recommended Tire Size	P215/60R16	P215/60R16
Tire Size on Vehicle	P215/60R16	P215/60R16
Tire Manufacturer	Michelin	Michelin

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				408.2
Cargo Wt. (RCLW) (kg)				68.0

DATA SHEET NO. 1... (continued)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2003 Toyota CamryTest Date: March 28, 2003**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	445.9	306.6		490.8	325.2	
Right	kg	434.5	305.3		478.5	311.2	
Ratio	%	59.0	41.0		60.4	39.6	
Totals	kg	880.4	611.9	1492.3	969.3	636.4	1605.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1492.3
Weight of SID IIs Side Impact Dummy	kg	54.4
Rated Cargo/Luggage Weight (RCLW)	kg	68.0
Calculated Vehicle Target Weight (TVTW)	kg	1614.7

TEST VEHICLE ATTITUDES

	Unit	As Delivered	Fully Loaded	Ready for Test
Right Door Sill Angle	Deg	0.6 ND	0.3 ND	0.3 ND
Left Door Sill Angle	Deg	0.6 ND	0.4 ND	0.4 ND
Front Bumper Angle	Deg	0.1 LD	0.0	0.0
Rear Bumper Angle	Deg	0.2 RD	0.0	0.0

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

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2710
Total Vehicle Length at Left Side	mm	4145
Total Vehicle Length at Centerline	mm	4812
Total Vehicle Length at Right Side	mm	4145
Total Vehicle Width	mm	1798
Weight of Ballast in Cargo Area	kg	0.0
Amount of Water in Fuel Tank	liters	30.3

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Target Impact Point Aft of Front Axle	mm	1089
Actual Impact Point Aft of Front Axle	mm	1097

DATA SHEET NO. 1... (continued)

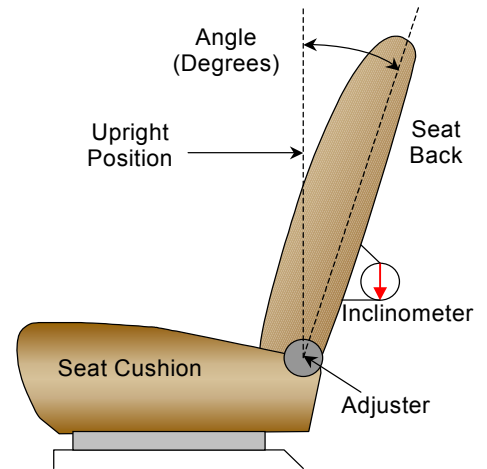
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

SID II's RIDING POSITION

Driver seat back angle: 6.7 ° on head restraint



FRONT SEAT ASSEMBLY

SEAT FORE/AFT POSITIONS

The driver's seat is electronically operated.

Driver seat fore/aft total travel: 240 mm

Driver seat fore/aft position: Full forward

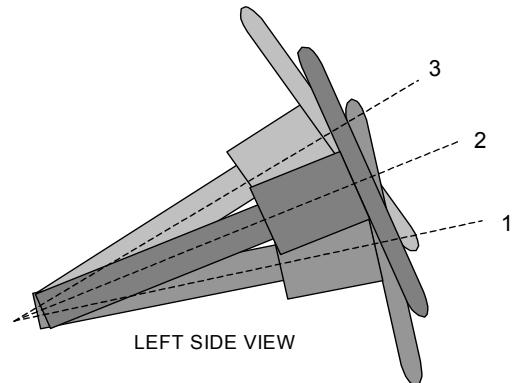
SEAT BELT UPPER ANCHORAGE

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

STEERING COLUMN ADJUSTMENT

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

Steering column position: 25.1°



STEERING COLUMN ASSEMBLY

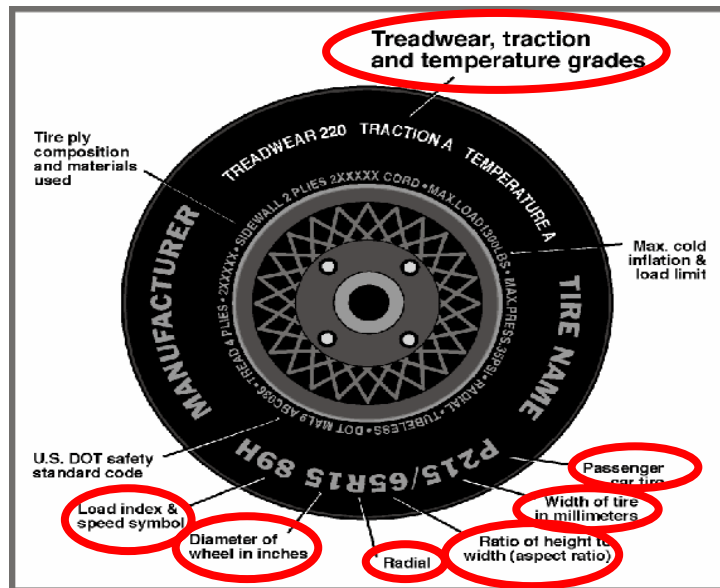
DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

Vehicle Year	2003	Vehicle Make	Toyota
VIN	4T1BE30K43U180332	Vehicle Model	Camry



	Front	Rear
Tire Manufacturer	Michelin	Michelin
Tire Name	Energy	Energy
Tire Type	Radial Touring	Radial Touring
Tire Width (mm)	215	215
Ratio of Height to Width (aspect ratio)	60	60
Radial	Yes	Yes
Wheel Diameter	16	16
Load Index & Speed Symbol	94V	94V
Treadwear	400	400
Traction Grade	A	A
Temperature Grade	A	A

DATA SHEET NO. 3
POST TEST OBSERVATIONS

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Left Front
Dummy Type	SID IIS/033
Head Contact	Pole, head restraint
Upper Torso Contact	Door trim panel
Lower Torso Contact	Door trim panel
Left Knee Contact	Lower door trim panel
Right Knee Contact	Left knee

POST TEST DOOR OPENING

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

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No failures
Sill Separation	None
Windshield Damage	Left side shattered
Window Damage	Left side windows down for test
Other Notable Effects	None

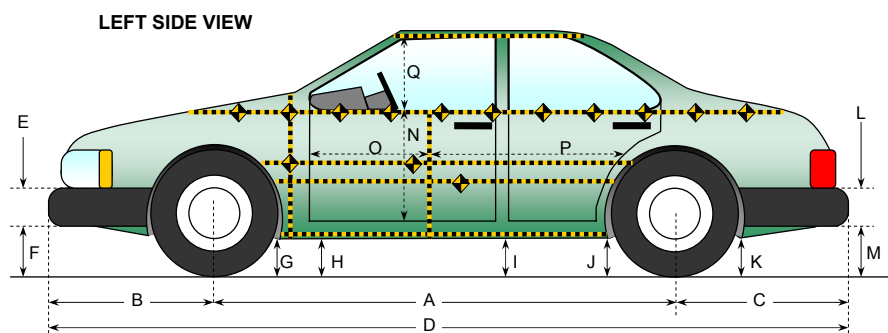
AIRBAG DEPLOYMENT

	Driver
Front	No
Side	No
Curtain	No

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

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003



All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2710	2585	125
B	Front Axle to FSOV	950	923	27
C	Rear Axle to RSOV	1152	1125	27
D	Total Length at Centerline	4812	4633	179
E	Front Bumper Thickness	215	215	0
F	Front Bumper Bottom to Ground	510	555	-45
G	Sill Height at Front Wheel Well	306	294	12
H	Sill Height at Front Door Leading Edge	320	315	5
I	Sill Height at "B" Pillar	330	345	-15
J1	Sill Height at Rear Wheel Well	327	335	-8
J2	Pinch Weld Height at Rear Wheel Well	334	339	-5
K	Sill Height Aft of Rear Wheel Well	414	411	3
L	Rear Bumper Thickness	276	276	0
M	Rear Bumper Bottom to Ground	545	535	10
N	Sill Height to Window Bottom Sill	716	715	1
O	Front Door Leading Edge to Impact CL	882	852	30
P	Rear Door Trailing Edge to Impact CL	1148	1178	-30
Q	Front Window Opening	440	400	40
R	Right Side Length	4145	4190	-45
S	Left Side Length	4145	4004	141
T	Vehicle Width at "B" Post	1798	1627	171

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5

SID IIs CLEARANCE DIMENSIONS

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

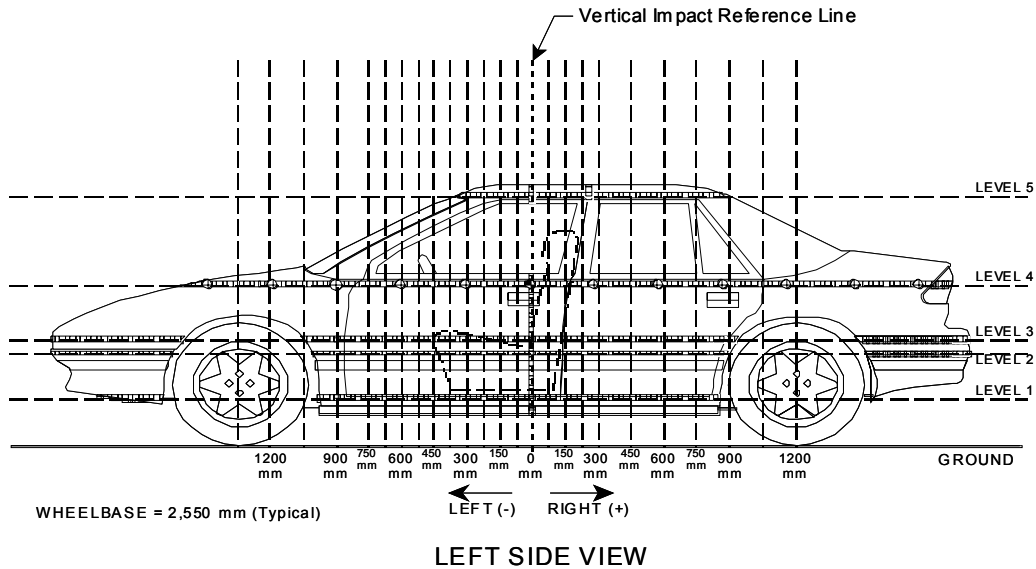
AA	Ankle to Ankle	Taken between the center points of both ankles, after the feet are placed	290
AD	Arm to Door	Horizontal measurement taken from the center point of the elbow to the first contact point of the door panel	177
HA	Head to A pillar	Horizontal measurement taken from the center of the head's outboard CG target to the A pillar	395
HCM	Hub to Chest	Minimum horizontal distance measured from the hub to the dummy's chest	138
HD	H point to Door	Horizontal measurement taken from the H point hole to the first contact point of the door panel	164
HH	Head to Header	Taken from center point between eyes to header directly in front of dummy	220
HR	Head to Roof	Taken from the center of the outboard target to the roof edge (not the upper edge of the car door), perpendicular to the long axis of the car. If a tape measure is held from the target and extends below the roof, the point to measure is at the low edge of the roof line, which will make contact with the tape measure	210
HS	Head to Side Window	Taken from the center of the outboard target to the side window, measured horizontally and perpendicular to the long axis of the car. In cases where the window is not fully up, a flat bar should be placed across the window opening to simulate the position of the window.	300
HW	Head to Windshield	Taken from the center point between the dummy's eyes to the point on the windshield directly level with the dummy's forehead.	480
KDL	Knee to Dash Left	Taken from the knee pivot point to the point on the dash that is directly level with the center of the knee.	128
KK	Knee to Knee	With the legs in a vertical plane after the feet are placed, the measurement is taken from outside flange to outside flange.	270
NAS	Neck Angle Seated	Taken from the neck when the dummy is seated across two of the "vertebral discs" of the neck.	4.5
NR	Nose to Rim	Taken from the tip of the nose to the steering wheel rim at the 12 o'clock position.	203
PA	Pelvic Angle	Taken by placing an inclinometer on the H point bar.	20.1
RA	Rim to Abd	Taken from the point where the bottom of the chest jacket and the pelvic structure meet to the steering wheel rim at the 6 o'clock position	26
SA	Seat Back Angle	Taken on head restraint post.	6.7
SCH	Steering Wheel to Chest	Horizontal measurement taken from the center of the steering wheel to the dummy's chest.	138
SCR	Steering Wheel to Chest	Taken from the center of the steering wheel to the top of the rib guide.	149
SHH	Striker to H point Horizontal	Taken from the H point to the driver door striker.	341
SHV	Striker to H point Vertical	Taken from the H point to the driver door striker. Value is negative if the striker is above the H point and positive if the striker is below the H point.	197
SK	Striker to Knee	Taken from the center point of the knee to the striker.	765
SKA	Striker to Knee Angle	Taken on top of the tape measure while it is extended from the center point of the knee to the striker.	12.4

DATA SHEET NO. 6 **VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

PRETEST AND POST TEST EXTERIOR PROFILE MEASUREMENTS



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

Level	Measurement Description	Height Above Ground
5	Window	1533
4	Window Sill	1081
3	Mid Door	778
2	Occupant H-Point	651
1	Sill Top	430

DATA SHEET NO. 7
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500				345					355					10	
-1350				319					329					10	
-1200				299					309					10	
-1050				287					301					14	
-900				278					287					9	
-750			204	274				219	282				15	8	
-675	235	208	204	272		249	223	218	282		14	15	14	10	
-600	235	209	205	270		246	265	242	250		11	56	37	-20	
-525	237	210	204	269		328	298	278	284		91	88	74	15	
-450	237	210	204	267		360	326	313	321		123	116	109	54	
-375	238	210	204	266		395	360	356	362		157	150	152	96	
-300	238	210	203	265		428	400	403	407		190	190	200	142	
-225	238	210	203	265		460	443	448	453		222	233	245	188	
-150	239	210	202	265		492	492	498	499		253	282	296	234	
-75	240	210	203	266		537	542	548	549		297	332	345	283	
0	241	210	203	266		592	594	592	599		351	384	389	333	
75	242	210	203	267	507	609	613	615	622	665	367	403	412	355	158
150	242	211	203	267	502	585	586	598	608	658	343	375	395	341	156
225	242	211	203	267	502	529	539	553	562	644	287	328	350	295	142
300	243	211	203	268	502	492	499	494	507	630	249	288	291	239	128
375	243	212	204	268	502	451	442	434	456	614	208	230	230	188	112
450	243	213	204	268	502	412	389	380	413	602	169	176	176	145	100
525	245	213	204	269	504	373	343	334	400	584	128	130	130	131	80
600	245	214	204	269	506	360	334	326	395	577	115	120	122	126	71
675	244	214	204	269	508	345	324	319	389	570	101	110	115	120	62
825	243	217	205	272	511	313	301	299	375	555	70	84	94	103	44
975	231	218	207	274	514	273	276	280	353	537	42	58	73	79	23
1125	235	220	209	277	520	246	254	255	337	527	11	34	46	60	7
1275		211	210	279	529		217	233	320	531		6	23	41	2
1425			208	283				205	299				-3	16	
1575			203	287				216	277				13	-10	
1725			205	292				217	303				12	11	
1875			217	297				227	304				10	7	
2025			232	307				239	312				7	5	
2175			245	316				250	317				5	1	
2325			260	329				263	329				3	0	
2475			278	343				283	338				5	-5	

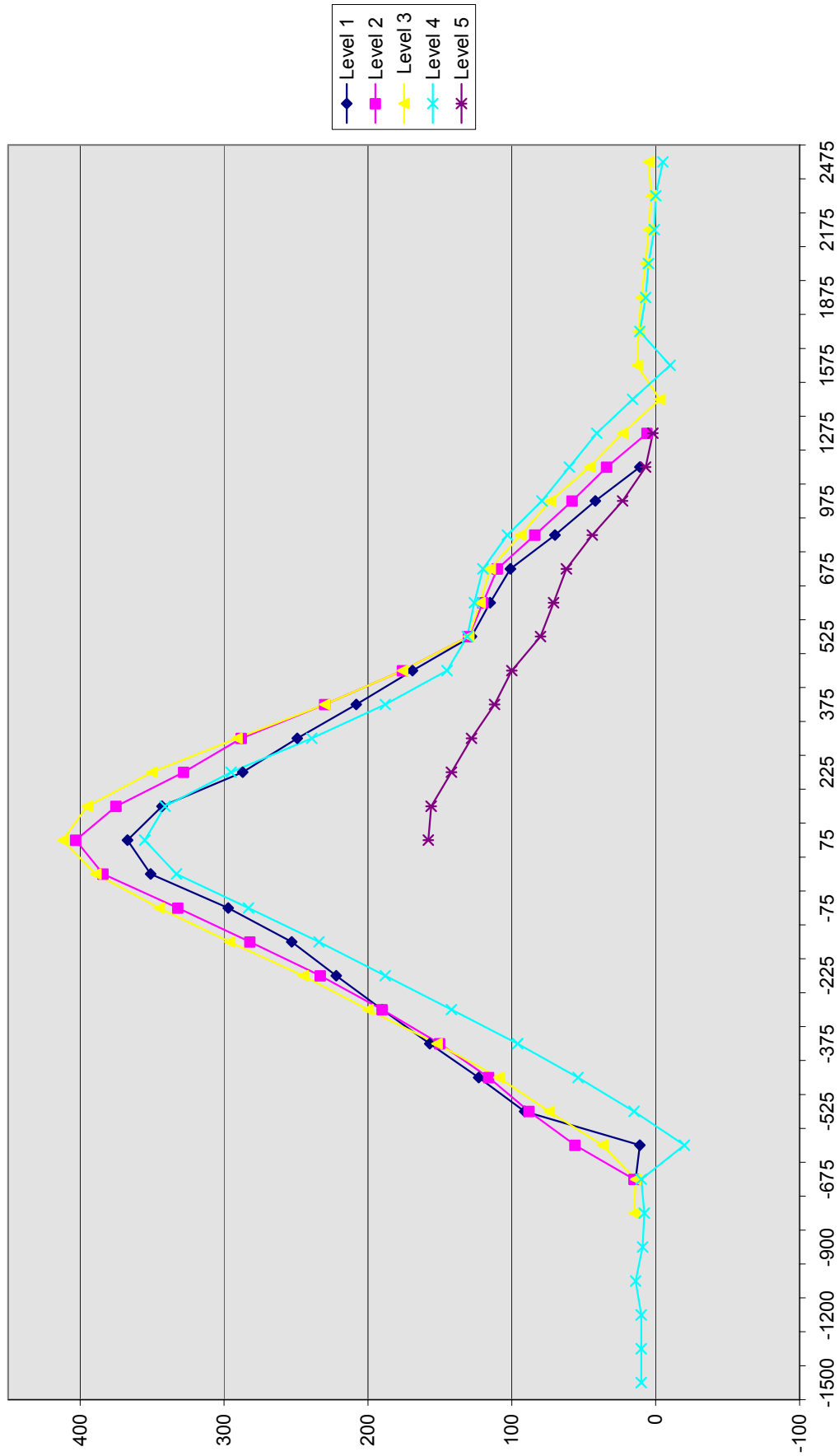
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body. Measurements are in mm.

DATA SHEET NO. 7... (continued)
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

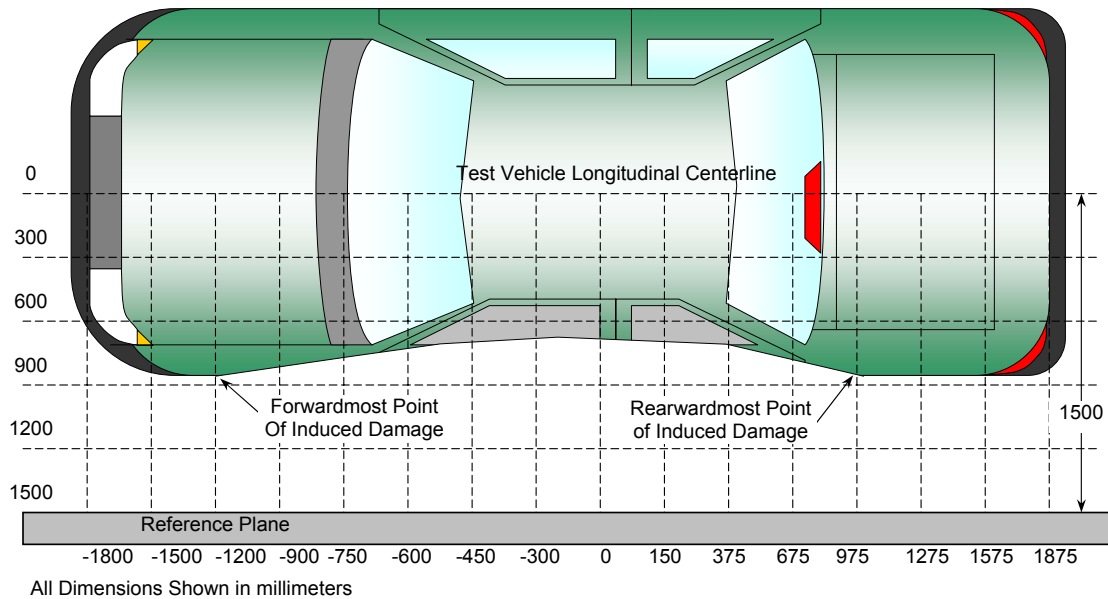


Measurement in mm.

DATA SHEET NO. 8
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003



TOP VIEW

Damage Profile Distances

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2025 mm	4	343	350	7
2	1263 mm	3	205	257	52
3	508 mm	4	273	431	158
4	95 mm	4	267	737	470
5	-734 mm	3	204	358	154
6	-1500 mm	4	348	380	32

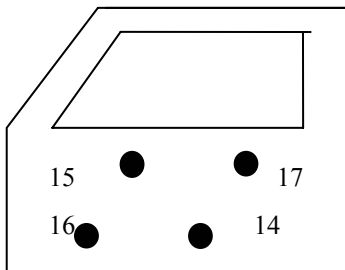
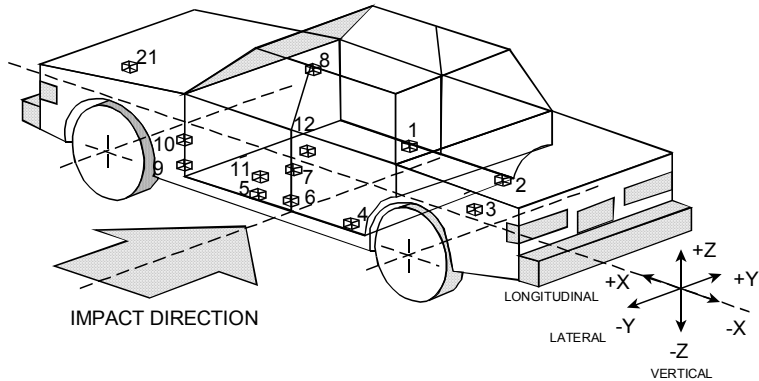
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body.

DATA SHEET NO. 9
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003



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

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

DATA SHEET NO. 9... (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Long (X) Maximums (g's) (CFC 60)		Lat. (Y) Maximums (g's) (CFC 60)		Vert. (Z) Maximums (g's) (CFC 60)		Resultant (g's) (CFC 60)
		Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Max.
1	Right Side Sill at Front Seat	2.2	3.7	12.8	0.7	2.9	5.1	12.9
2	Right Side Sill at Rear Seat **	2.5	3.0	11.6	1.9	27.3	5.9	
3	Rear Floorpan Above Axle	5.0	3.7	11.8	1.2	3.9	5.6	12.5
4	Left Side Sill at Rear Door			30.2	0.7			
5	Left Side Sill at Front Door			59.6	32.2			
6	Left Lower B-Post			33.9	1.8			
7	Left Mid B-Post			25.1	1.5			
8	Left Upper B-Post*							
9	Left Lower A-Post			17.1	1.9			
10	Left Mid A-Post			17.8	0.8			
11	Driver Left Seat Track			82.4	30.2			
12	Vehicle CG	2.7	6.7	23.8	0.5	17.1	9.5	29.4
13	Left A-Post at Roof*							
14	Left Front Door at Pelvis***							
15	Left Front Door at Arm			185.6	43.4			
16	Left Front Door at Knee			82.3	39.8			
17	Left Front Door at Rib			74.0	26.9			
19	Left Driver Seat Frame *							
20	Right Driver Seat Frame *							
21	Lower Center Radiator Support	3.0	7.8	11.6	2.3	7.7	8.3	11.8

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

*= Not used to avoid interference with restraint system.

**=No valid Z data collected after 30 msec

***=Questionable data after 15 msec

DATA SHEET NO. 9... (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003

VEHICLE ACCELEROMETER COORDINATES

Loc. No.	Description	Coordinates (mm)		
		X	Y	Z
1	Right Side Sill at Front Seat	2440	730	224
2	Right Side Sill at Rear Seat	1885	730	240
3	Rear Floorpan Above Axle	1080	0	555
4	Left Side Sill at Rear Door	2045	-684	355
5	Left Side Sill at Front Door	2802	-684	325
6	Left Lower B-Post	2216	-726	465
7	Left Mid B-Post	2235	-750	1004
8	Left Upper B-Post *			
9	Left Lower A-Post	3307	-735	470
10	Left Mid A-Post	3382	-808	890
11	Driver Left Seat Track	2250	-540	425
12	Vehicle CG	2651	0	405
13	Left A-Pillar @ Roof *			
14	Left Door @ Pelvis	2613	-770	745
15	Left Door @ Arm	2740	-785	910
16	Left Door @ Knee	2949	-790	657
17	Left Door @ Rib	2554	-790	890
19	Left Driver Seat Frame *			
20	Right Driver Seat Frame *			
21	Lower Center Radiator Support	4496	0	245

Sign Convention X – Rear Bumper (+ forward)

Y – Vehicle Centerline (+ to right)

Z – Ground Plane (+ up)

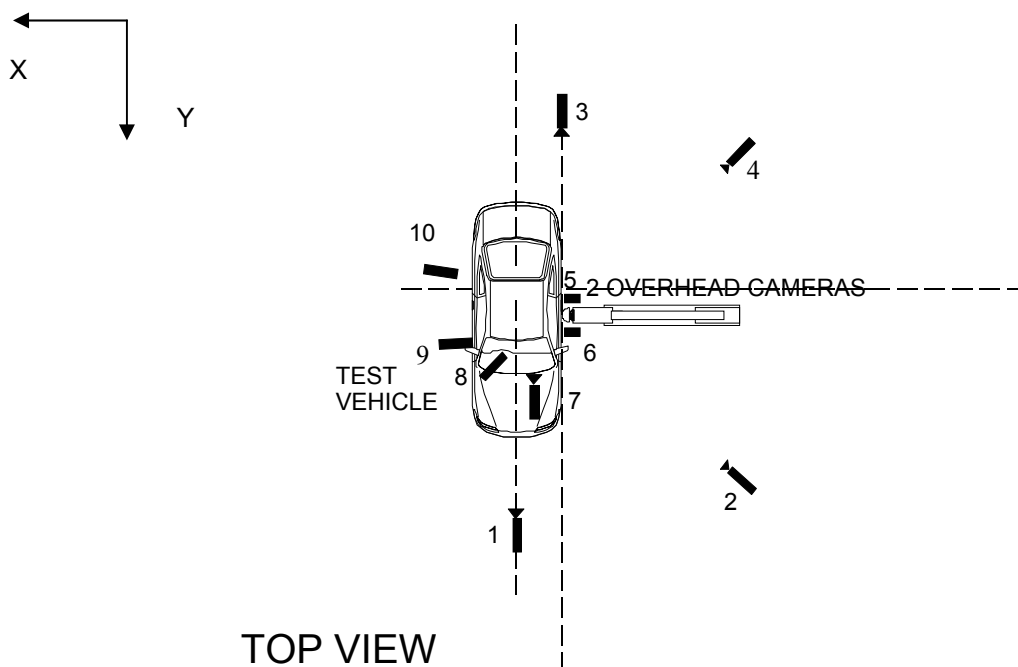
* = Not used to avoid interference with restraint system.

DATA SHEET NO. 10

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2003 Toyota Camry

Test Date: March 28, 2003



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Front Ground Level	750	8700	1570	25	797
2	Front Angle	-2450	3330	1310	35	1026
3	Rear Ground Level	540	-9670	1590	25	1000
4	Rear Angle	-2450	-5210	1300	35	1042
5	Overhead View	160	0	5000	8	1036
6	Overhead View, Close-up	0	0	5000	13	1026
7	Onboard Hood				13	513
8	Onboard Hip				13	513
9	Onboard Perp.				13	521
10	Onboard B-Post				13	524

Reference Points

X - + Forward of Impact

Y - + Right of Impact

Z - + Up from Ground

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 1.	Pre-Test Front View of Test Vehicle	A-1
Photo No. 2.	Post-Test Front View of Test Vehicle	A-2
Photo No. 3.	Pre-Test Rear View of Test Vehicle	A-3
Photo No. 4.	Post-Test Rear View of Test Vehicle	A-4
Photo No. 5.	Pre-Test Left Side View of Test Vehicle	A-5
Photo No. 6.	Post-Test Left Side View of Test Vehicle	A-6
Photo No. 7.	Pre-Test Left $\frac{3}{4}$ Front View of Test Vehicle	A-7
Photo No. 8.	Post-Test Left $\frac{3}{4}$ Front View of Test Vehicle	A-8
Photo No. 9.	Pre-Test Left $\frac{3}{4}$ Rear View of Test Vehicle	A-9
Photo No. 10.	Post-Test Left $\frac{3}{4}$ Rear View of Test Vehicle	A-10
Photo No. 11.	Pre-Test Vehicle Positioned Against Pole (left side)	A-11
Photo No. 12.	Post-Test Pole and Vehicle (left side)	A-12
Photo No. 13.	Pre-Test Vehicle Positioned Against Pole (right side)	A-13
Photo No. 14.	Post-Test Pole and Vehicle (right side)	A-14
Photo No. 15.	Pre-Test Vehicle Positioned Against Pole Overhead View	A-15
Photo No. 16.	Post-Test Pole and Vehicle Overhead View	A-16
Photo No. 17.	Pre-Test Driver Seat Position	A-17
Photo No. 18.	Pre-Test Driver Dummy Left Side View (Door open)	A-18
Photo No. 19.	Pre-Test Driver Dummy Left Side View	A-19
Photo No. 20.	Post-Test Driver Dummy Left Side View	A-20
Photo No. 21.	Pre-Test Driver Dummy Right Side View	A-21
Photo No. 22.	Post-Test Driver Dummy Right Side View	A-22
Photo No. 23.	Pre-Test Driver Shoulder and Door Top View	A-23
Photo No. 24.	Post-Test Driver Shoulder and Door Top View	A-24
Photo No. 25.	Post-Test Driver Dummy Contact	A-25
Photo No. 26.	Post-Test Driver Dummy Lower Body Contact	A-26
Photo No. 27.	Pre-Test Impact Point on Vehicle	A-27
Photo No. 28.	Post-Test Impact Point on Vehicle	A-28
Photo No. 29.	Post-Test Dummy Head Contact	A-29
Photo No. 30.	Dummy Head Contact With Pole	A-30
Photo No. 31.	Impact	A-31



Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



Pre-Test Rear View of Test Vehicle



Post-Test Rear View of Test Vehicle

A-5.



Pre-Test Left Side View of Test Vehicle



Post-Test Left Side View of Test Vehicle



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



Post-Test Left $\frac{3}{4}$ Front View of Test Vehicle



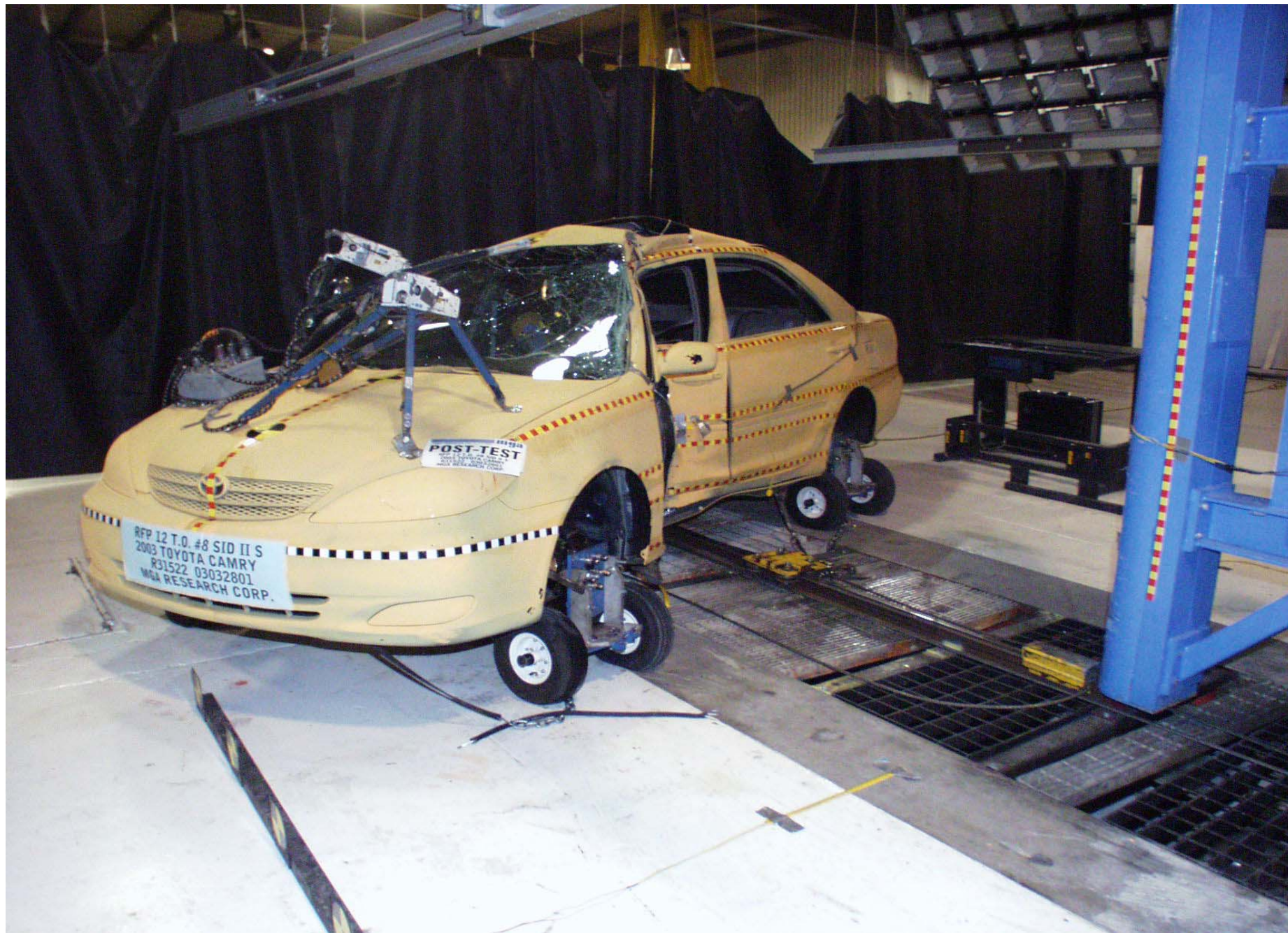
Pre-Test Left $\frac{3}{4}$ Rear View of Test Vehicle



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



Pre-Test Vehicle Positioned Against Pole (left side)



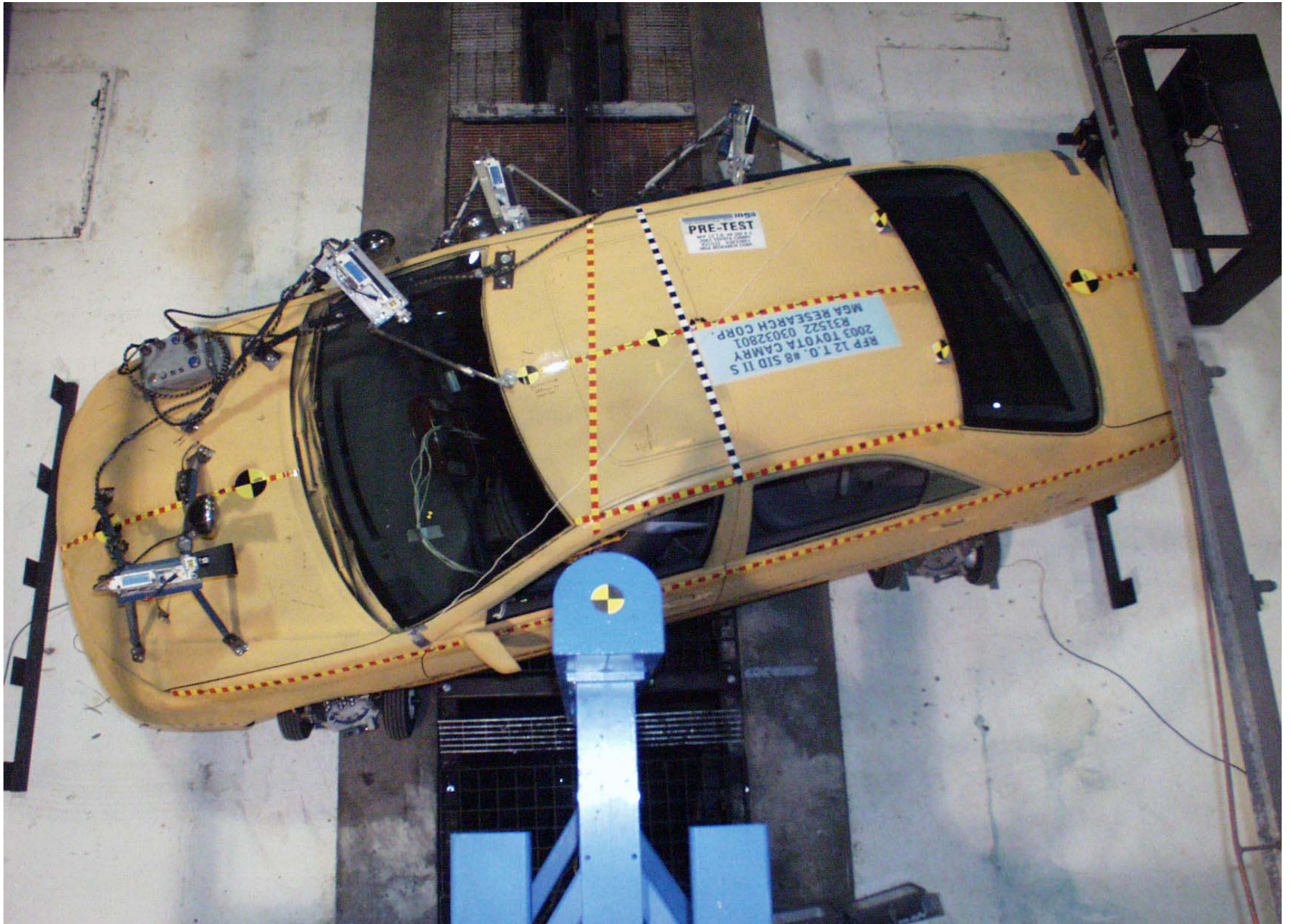
Post-Test Pole and Vehicle (left side)



Pre-Test Vehicle Positioned Against Pole (right side)



Post-Test Pole and Vehicle (right side)



Pre-Test Vehicle Positioned Against Pole Overhead View



Post-Test Pole and Vehicle Overhead View



Pre-Test Driver Seat Position



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



Pre-Test Driver Dummy Left Side View



Post-Test Driver Dummy Left Side View



Pre-Test Driver Dummy Right Side View



Post-Test Driver Dummy Right Side View



Pre-Test Driver Shoulder and Door Top View



Post-Test Driver Shoulder and Door Top View



Post-Test Driver Dummy Contact



Post-Test Driver Dummy Lower Body Contact



Pre-Test Impact Point on Vehicle



Post-Test Impact Point on Vehicle



Post-Test Dummy Head Contact



Dummy Head Contact With Pole



Impact

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

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

The correct initial velocities should be:

X – Test Speed * Sine 15 Degrees

Y – Test Speed * Cosine 15 Degrees

Figure No. 1.	Driver Head X Acceleration vs. Time	B-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	B-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	B-1
Figure No. 5.	Driver Head X Velocity vs. Time	B-2
Figure No. 6.	Driver Head Y Velocity vs. Time	B-2
Figure No. 7.	Driver Head Z Velocity vs. Time	B-2
Figure No. 8.	Driver Upper Neck Force X vs. Time	B-3
Figure No. 9.	Driver Upper Neck Force Y vs. Time	B-3
Figure No. 10.	Driver Upper Neck Force Z vs. Time	B-3
Figure No. 11.	Driver Upper Neck Force Resultant vs. Time	B-3
Figure No. 12.	Driver Upper Neck Moment X vs. Time	B-4
Figure No. 13.	Driver Upper Neck Moment Y vs. Time	B-4
Figure No. 14.	Driver Upper Neck Moment Z vs. Time	B-4
Figure No. 15.	Driver Upper Neck Moment Resultant vs. Time	B-4
Figure No. 16.	Driver Shoulder X Acceleration vs. Time (CFC 1000)	B-5
Figure No. 17.	Driver Shoulder Y Acceleration vs. Time (CFC 1000)	B-5
Figure No. 18.	Driver Shoulder Z Acceleration vs. Time (CFC 1000)	B-5
Figure No. 19.	Driver Shoulder Resultant Acceleration vs. Time (CFC 1000)	B-5
Figure No. 20.	Driver Shoulder X Acceleration vs. Time (CFC 180)	B-6
Figure No. 21.	Driver Shoulder Y Acceleration vs. Time (CFC 180)	B-6
Figure No. 22.	Driver Shoulder Z Acceleration vs. Time (CFC 180)	B-6
Figure No. 23.	Driver Shoulder Resultant Acceleration vs. Time (CFC 180)	B-6
Figure No. 24.	Driver Shoulder X Velocity vs. Time	B-7
Figure No. 25.	Driver Shoulder Y Velocity vs. Time	B-7
Figure No. 26.	Driver Shoulder Z Velocity vs. Time	B-7
Figure No. 27.	Driver Shoulder Force X vs. Time (CFC 1000)	B-8

Figure No. 28.	Driver Shoulder Force Y vs. Time (CFC 1000)	B-8
Figure No. 29.	Driver Shoulder Force Z vs. Time (CFC 1000)	B-8
Figure No. 30.	Driver Shoulder Force X vs. Time (CFC 600)	B-9
Figure No. 31.	Driver Shoulder Force Y vs. Time (CFC 600)	B-9
Figure No. 32.	Driver Shoulder Force Z vs. Time (CFC 600)	B-9
Figure No. 33.	Driver Upper Arm X Acceleration vs. Time (CFC 1000)	B-10
Figure No. 34.	Driver Upper Arm Y Acceleration vs. Time (CFC 1000)	B-10
Figure No. 35.	Driver Upper Arm Z Acceleration vs. Time (CFC 1000)	B-10
Figure No. 36.	Driver Upper Arm Resultant Acceleration vs. Time (CFC 1000)	B-10
Figure No. 37.	Driver Upper Arm X Acceleration vs. Time (CFC 180)	B-11
Figure No. 38.	Driver Upper Arm Y Acceleration vs. Time (CFC 180)	B-11
Figure No. 39.	Driver Upper Arm Z Acceleration vs. Time (CFC 180)	B-11
Figure No. 40.	Driver Upper Arm Resultant Acceleration vs. Time (CFC 180)	B-11
Figure No. 41.	Driver Upper Arm X Velocity vs. Time (CFC 180)	B-12
Figure No. 42.	Driver Upper Arm Y Velocity vs. Time (CFC 180)	B-12
Figure No. 43.	Driver Upper Arm Z Velocity vs. Time (CFC 180)	B-12
Figure No. 44.	Driver Upper Spine X Acceleration vs. Time	B-13
Figure No. 45.	Driver Upper Spine Y Acceleration vs. Time	B-13
Figure No. 46.	Driver Upper Spine Z Acceleration vs. Time	B-13
Figure No. 47.	Driver Upper Spine Resultant Acceleration vs. Time	B-13
Figure No. 48.	Driver Upper Spine X Velocity vs. Time	B-14
Figure No. 49.	Driver Upper Spine Y Velocity vs. Time	B-14
Figure No. 50.	Driver Upper Spine Z Velocity vs. Time	B-14
Figure No. 51.	Driver Lower Spine X Acceleration vs. Time	B-15
Figure No. 52.	Driver Lower Spine Y Acceleration vs. Time	B-15
Figure No. 53.	Driver Lower Spine Z Acceleration vs. Time	B-15
Figure No. 54.	Driver Lower Spine Resultant Acceleration vs. Time	B-15
Figure No. 55.	Driver Lower Spine X Velocity vs. Time	B-16
Figure No. 56.	Driver Lower Spine Y Velocity vs. Time	B-16
Figure No. 57.	Driver Lower Spine Z Velocity vs. Time	B-16
Figure No. 58.	Driver Upper Thorax Rib Y Acceleration vs. Time (CFC 1000)	B-17

Figure No. 59.	Driver Mid Thorax Rib Y Acceleration vs. Time (CFC 1000)	B-17
Figure No. 60.	Driver Lower Thorax Rib Y Acceleration vs. Time (CFC 1000)	B-17
Figure No. 61.	Driver Upper Thorax Rib Y Acceleration vs. Time (CFC 180)	B-18
Figure No. 62.	Driver Mid Thorax Rib Y Acceleration vs. Time (CFC 180)	B-18
Figure No. 63.	Driver Lower Thorax Rib Y Acceleration vs. Time (CFC 180)	B-18
Figure No. 64.	Driver Upper Thorax Rib Y Velocity vs. Time (CFC 180)	B-19
Figure No. 65.	Driver Mid Thorax Rib Y Velocity vs. Time (CFC 180)	B-19
Figure No. 66.	Driver Lower Thorax Rib Y Velocity vs. Time (CFC 180)	B-19
Figure No. 67.	Driver Upper Abdominal Rib Y Acceleration vs. Time (CFC 1000)	B-20
Figure No. 68.	Driver Lower Abdominal Rib Y Acceleration vs. Time (CFC 1000)	B-20
Figure No. 69.	Driver Upper Abdominal Rib Y Acceleration vs. Time (CFC 180)	B-20
Figure No. 70.	Driver Lower Abdominal Rib Y Acceleration vs. Time (CFC 180)	B-20
Figure No. 71.	Driver Upper Abdominal Rib Y Velocity vs. Time	B-21
Figure No. 72.	Driver Lower Abdominal Rib Y Velocity vs. Time	B-21
Figure No. 73.	Driver Mid Thorax Rib X Acceleration vs. Time (CFC 1000)	B-22
Figure No. 74.	Driver Upper Abdominal Rib X Acceleration vs. Time (CFC 1000)	B-22
Figure No. 75.	Driver T4 X Acceleration vs. Time (CFC 1000)	B-22
Figure No. 76.	Driver Mid Thorax Rib X Acceleration vs. Time (CFC 180)	B-23
Figure No. 77.	Driver Upper Abdominal Rib X Acceleration vs. Time (CFC 180)	B-23
Figure No. 78.	Driver T4 X Acceleration vs. Time (CFC 180)	B-23
Figure No. 79.	Driver Mid Thorax Rib X Velocity vs. Time (CFC 180)	B-24
Figure No. 80.	Driver Upper Abdominal Rib X Velocity vs. Time (CFC 180)	B-24
Figure No. 81.	Driver T4 X Velocity vs. Time (CFC 180)	B-24
Figure No. 82.	Driver Lumbar Force X vs. Time	B-25
Figure No. 83.	Driver Lumbar Force Y vs. Time	B-25
Figure No. 84.	Driver Lumbar Force Z vs. Time	B-25
Figure No. 85.	Driver Lumbar Force Resultant vs. Time	B-25
Figure No. 86.	Driver Lumbar Moment X vs. Time	B-26
Figure No. 87.	Driver Lumbar Moment Y vs. Time	B-26
Figure No. 88.	Driver Lumbar Moment Z vs. Time	B-26
Figure No. 89.	Driver Lumbar Moment Resultant vs. Time	B-26

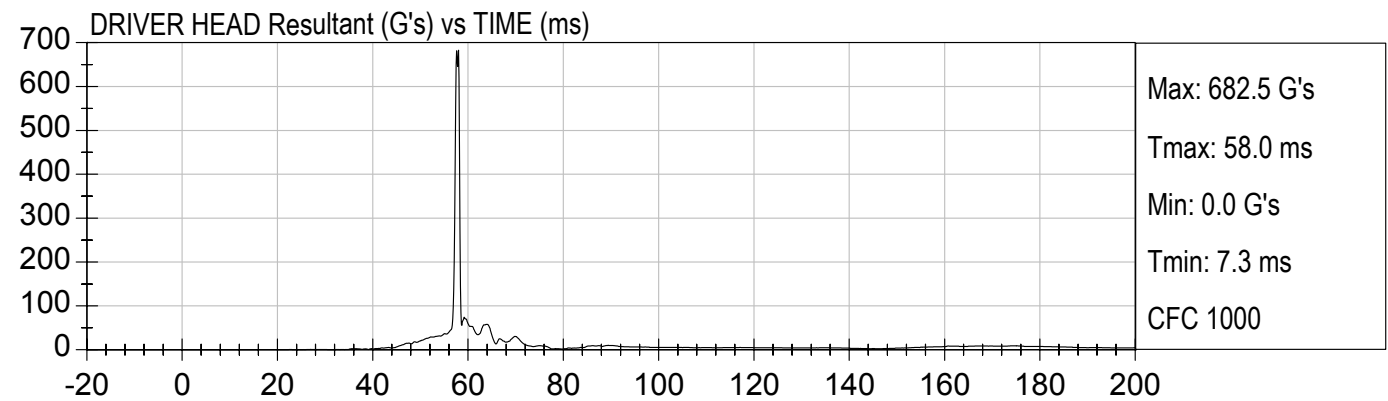
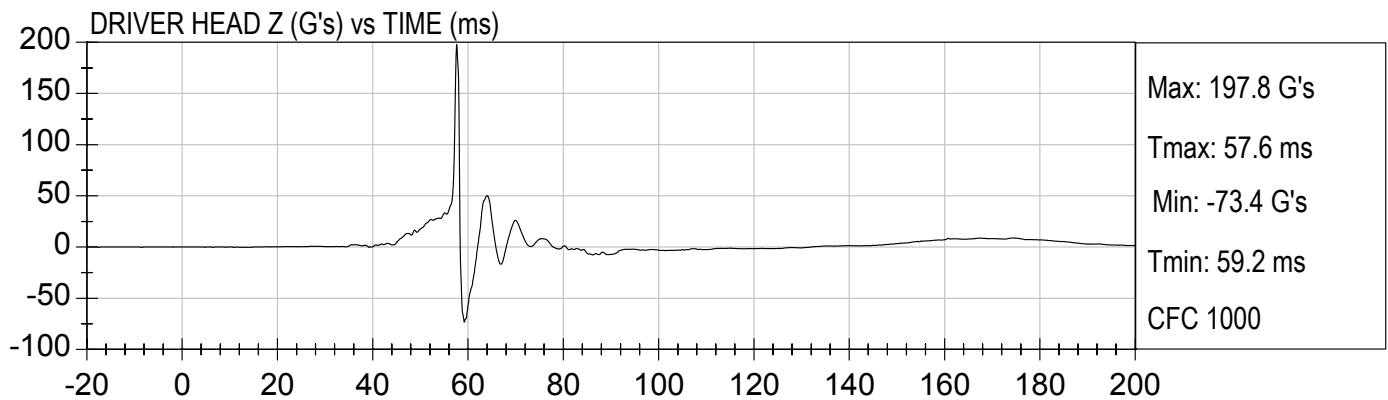
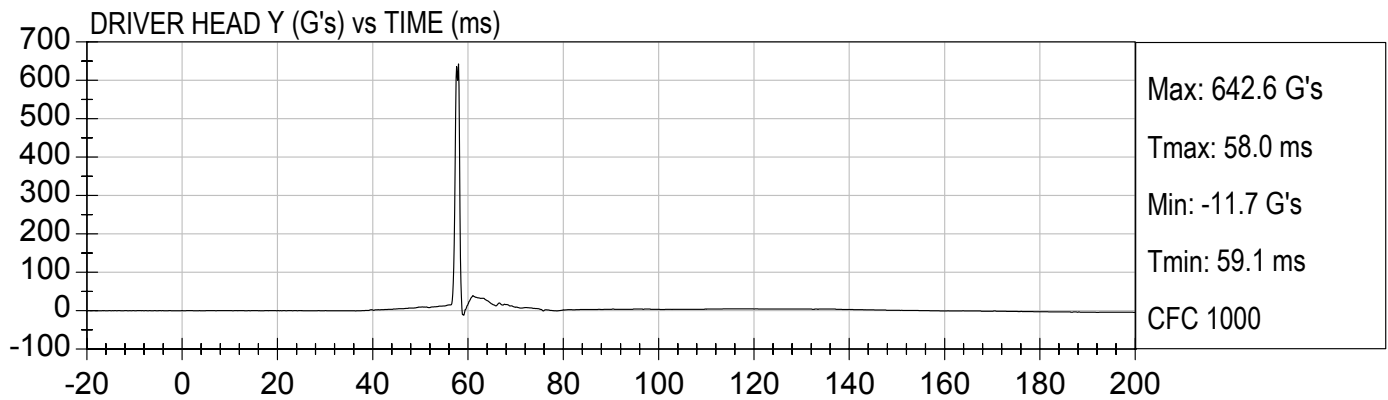
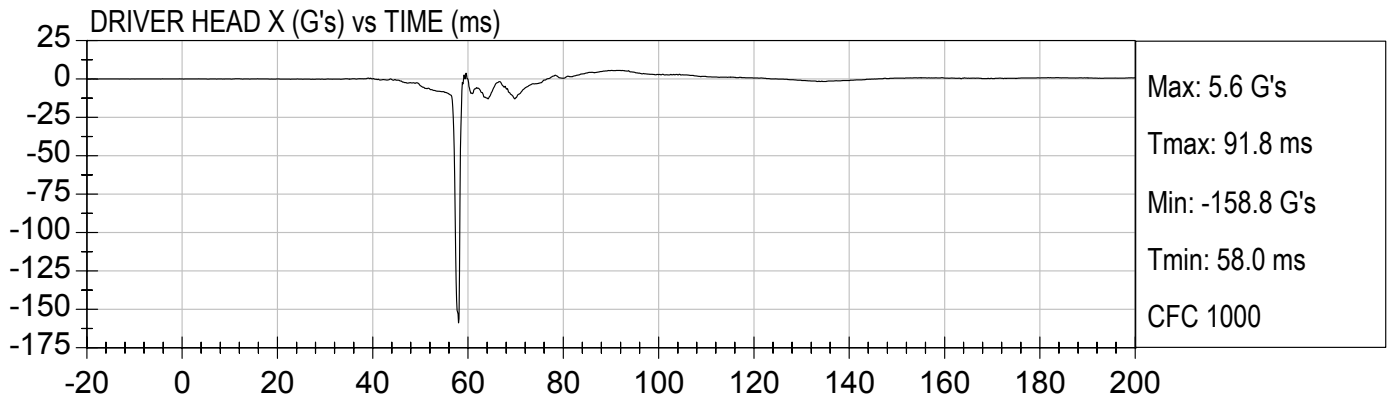
Figure No. 90.	Driver Pelvis X Acceleration vs. Time	B-27
Figure No. 91.	Driver Pelvis Y Acceleration vs. Time	B-27
Figure No. 92.	Driver Pelvis Z Acceleration vs. Time	B-27
Figure No. 93.	Driver Pelvis Resultant Acceleration vs. Time	B-27
Figure No. 94.	Driver Pelvis X Velocity vs. Time	B-28
Figure No. 95.	Driver Pelvis Y Velocity vs. Time	B-28
Figure No. 96.	Driver Pelvis Z Velocity vs. Time	B-28
Figure No. 97.	Driver Left Femur Force X vs. Time	B-29
Figure No. 98.	Driver Left Femur Force Y vs. Time	B-29
Figure No. 99.	Driver Left Femur Force Z vs. Time	B-29
Figure No. 100.	Driver Left Femur Moment X vs. Time	B-30
Figure No. 101.	Driver Left Femur Moment Y vs. Time	B-30
Figure No. 102.	Driver Left Femur Moment Z vs. Time	B-30
Figure No. 103.	Driver Left Femur Moment Resultant vs. Time	B-30
Figure No. 104.	Driver Right Femur Force X vs. Time	B-31
Figure No. 105.	Driver Right Femur Force Y vs. Time	B-31
Figure No. 106.	Driver Right Femur Force Z vs. Time	B-31
Figure No. 107.	Driver Right Femur Force Resultant vs. Time	B-31
Figure No. 108.	Driver Right Femur Moment X vs. Time	B-32
Figure No. 109.	Driver Right Femur Moment Y vs. Time	B-32
Figure No. 110.	Driver Right Femur Moment Z vs. Time	B-32
Figure No. 111.	Driver Right Femur Moment Resultant vs. Time	B-32
Figure No. 112.	Driver Left Acetabulum Force Y vs. Time (CFC 1000)	B-33
Figure No. 113.	Driver Left Ilium Crest Force Y vs. Time (CFC 1000)	B-33
Figure No. 114.	Driver Right Ilium Crest Force Y vs. Time (CFC 1000)	B-33
Figure No. 115.	Driver Pubic Symphysis Force Y vs. Time (CFC 1000)	B-33
Figure No. 116.	Driver Left Acetabulum Force Y vs. Time (CFC 600)	B-34
Figure No. 117.	Driver Left Ilium Crest Force Y vs. Time (CFC 600)	B-34
Figure No. 118.	Driver Right Ilium Crest Force Y vs. Time (CFC 600)	B-34
Figure No. 119.	Driver Pubic Symphysis Force Y vs. Time (CFC 600)	B-34
Figure No. 120.	Driver Arm Contact vs. Time	B-35

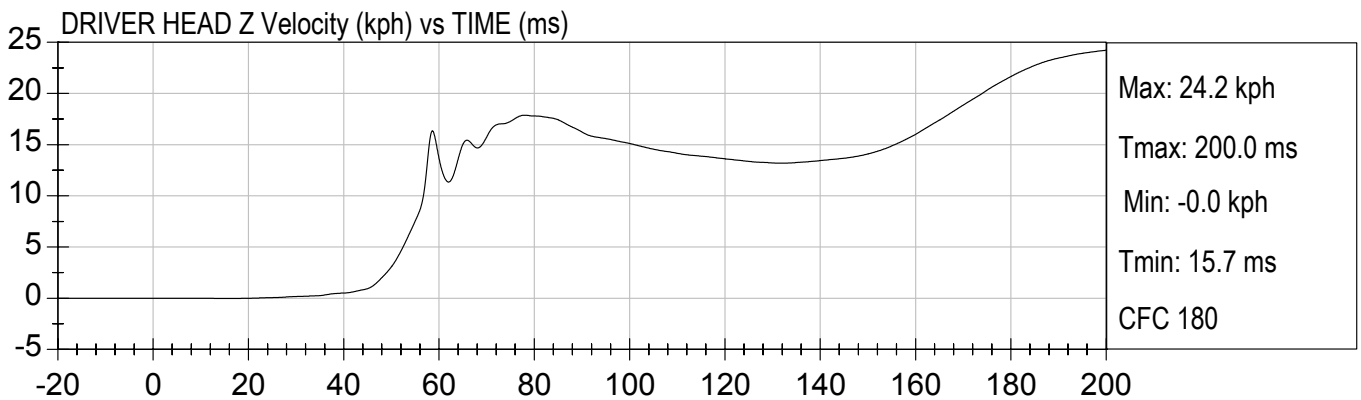
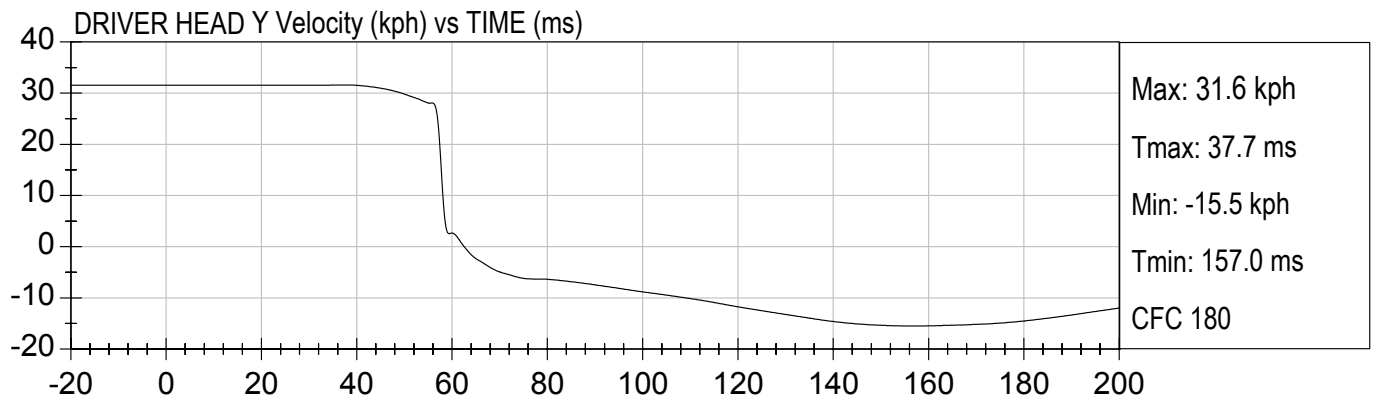
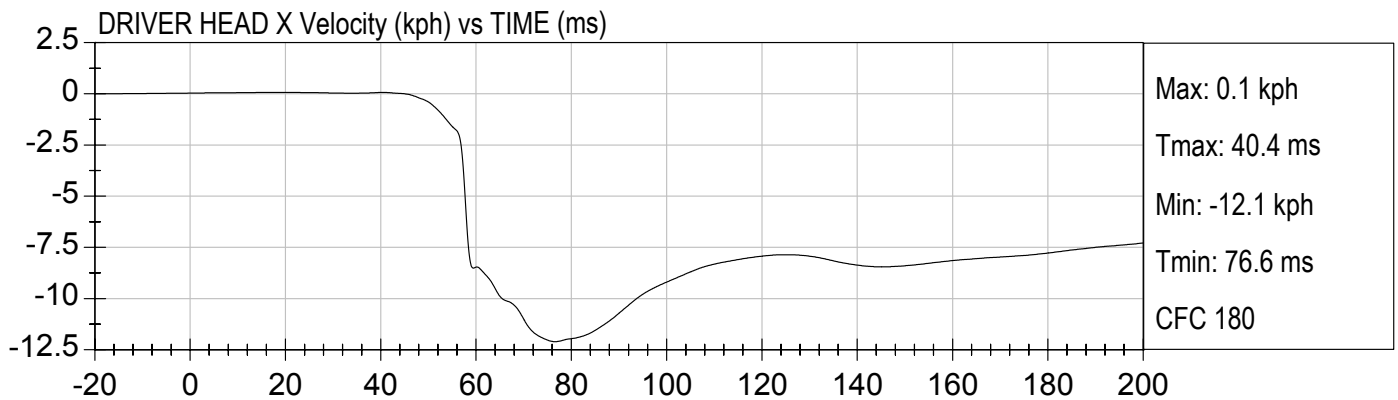
Figure No. 121.	Driver Ribs Contact vs. Time	B-35
Figure No. 122.	Driver Pelvis Contact vs. Time	B-35
Figure No. 123.	Driver Shoulder DY vs. Time (CFC 180)	B-36
Figure No. 124.	Shoulder – Deflection Rate vs. Time (CFC 180)	B-36
Figure No. 125.	Shoulder – VC vs. Time (CFC 180)	B-36
Figure No. 126.	Driver Upper Thorax Rib DY vs. Time (CFC 180)	B-37
Figure No. 127.	Driver Upper Thorax Rib Deflection Rate vs. Time (CFC 180)	B-37
Figure No. 128.	Driver Upper Thorax Rib VC vs. Time (CFC 180)	B-37
Figure No. 129.	Driver Mid Thorax Rib DY vs. Time (CFC 180)	B-38
Figure No. 130.	Driver Mid Thorax Rib Deflection Rate vs. Time (CFC 180)	B-38
Figure No. 131.	Driver Mid Thorax Rib VC vs. Time (CFC 180)	B-38
Figure No. 132.	Driver Lower Thorax Rib DY vs. Time (CFC 180)	B-39
Figure No. 133.	Driver Lower Thorax Rib Deflection Rate vs. Time (CFC 180)	B-39
Figure No. 134.	Driver Lower Thorax Rib VC vs. Time (CFC 180)	B-39
Figure No. 135.	Driver Upper Abdominal Rib DY vs. Time (CFC 180)	B-40
Figure No. 136.	Driver Upper Abdominal Rib Deflection Rate vs. Time (CFC 180)	B-40
Figure No. 137.	Driver Upper Abdominal Rib VC vs. Time (CFC 180)	B-40
Figure No. 138.	Driver Lower Abdominal Rib DY vs. Time (CFC 180)	B-41
Figure No. 139.	Driver Lower Abdominal Rib Deflection Rate vs. Time (CFC 180)	B-41
Figure No. 140.	Driver Lower Abdominal Rib VC vs. Time (CFC 180)	B-41
Figure No. 141.	Driver Shoulder DY vs. Time (CFC 1000)	B-42
Figure No. 142.	Driver Upper Thorax Rib DY vs. Time (CFC 1000)	B-42
Figure No. 143.	Driver Mid Thorax Rib DY vs. Time (CFC 1000)	B-42
Figure No. 144.	Driver Lower Thorax Rib DY vs. Time (CFC 1000)	B-42
Figure No. 145.	Driver Upper Abdominal Rib DY vs. Time (CFC 1000)	B-43
Figure No. 146.	Driver Lower Abdominal Rib DY vs. Time (CFC 1000)	B-43
Figure No. 147.	Lateral Pelvic Force vs. Time (CFC 1000)	B-44
Figure No. 148.	Driver Left Acetabulum Force Y vs. Time (CFC 1000)	B-44
Figure No. 149.	Driver Left Ilium Crest Force Y vs. Time (CFC 1000)	B-44
Figure No. 150.	Lateral Pelvic Force vs. Time (CFC 600)	B-45
Figure No. 151.	Driver Left Acetabulum Force Y vs. Time (CFC 600)	B-45

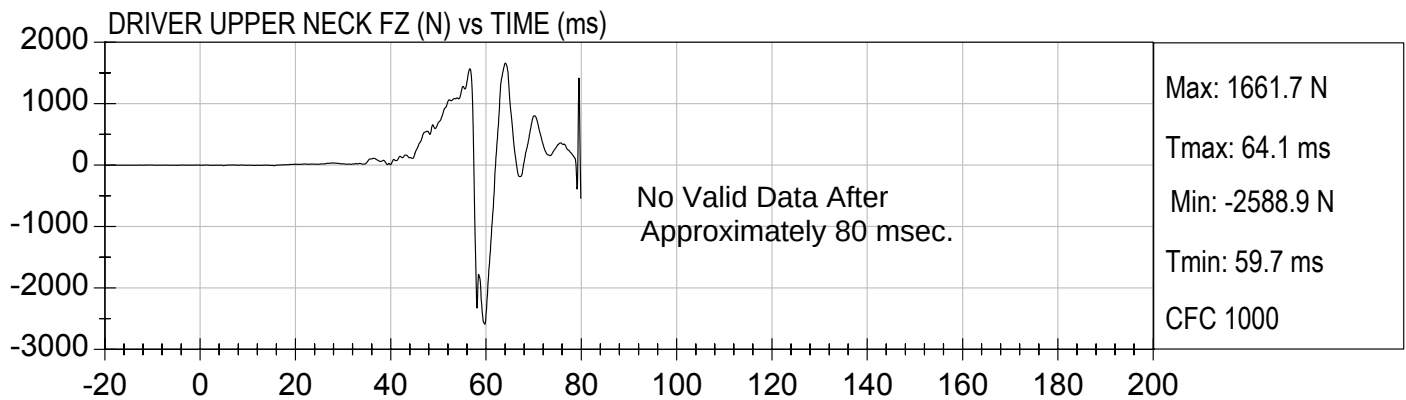
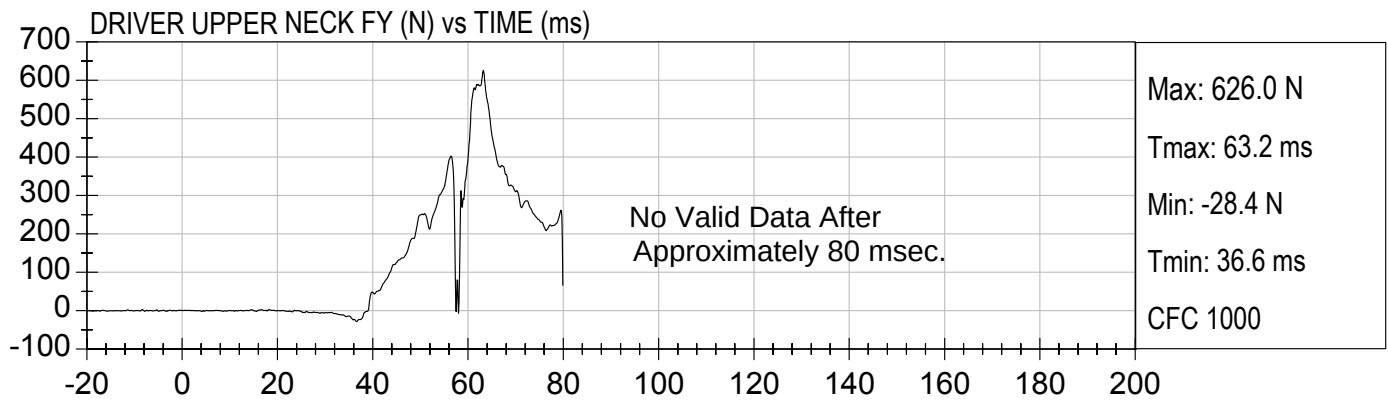
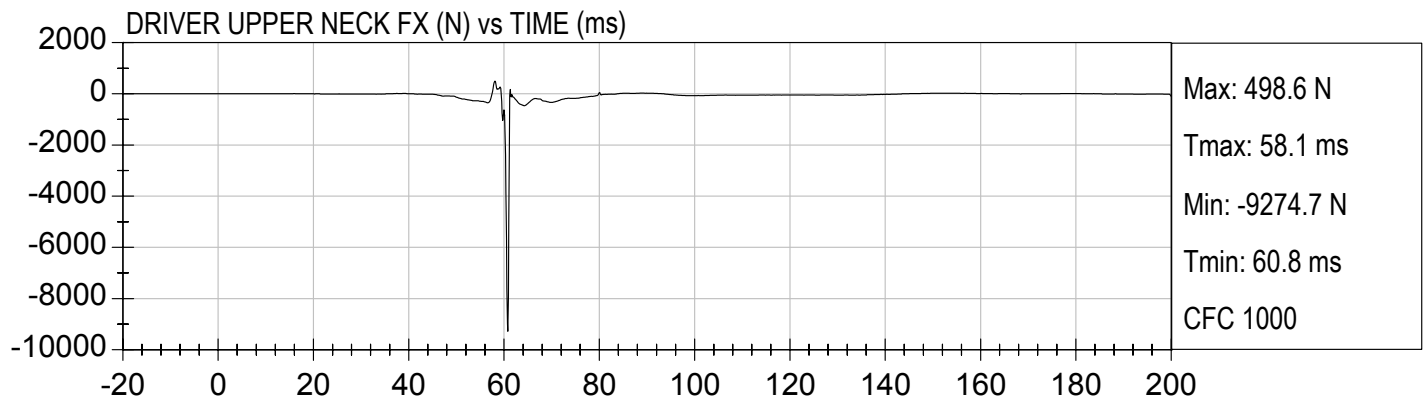
Figure No. 152.	Driver Left Ilium Crest Force Y vs. Time (CFC 600)	B-45
Figure No. 153.	Right Front Sill X Acceleration vs. Time	B-46
Figure No. 154.	Right Front Sill Y Acceleration vs. Time	B-46
Figure No. 155.	Right Front Sill Z Acceleration vs. Time	B-46
Figure No. 156.	Right Front Sill Resultant vs. Time	B-46
Figure No. 157.	Right Front Sill X Velocity vs. Time	B-47
Figure No. 158.	Right Front Sill Y Velocity vs. Time	B-47
Figure No. 159.	Right Front Sill Z Velocity vs. Time	B-47
Figure No. 160.	Right Rear Sill X Acceleration vs. Time	B-48
Figure No. 161.	Right Rear Sill Y Acceleration vs. Time	B-48
Figure No. 162.	Right Rear Sill Z Acceleration vs. Time	B-48
Figure No. 163.	Right Rear Sill X Velocity vs. Time	B-49
Figure No. 164.	Right Rear Sill Y Velocity vs. Time	B-49
Figure No. 165.	Right Rear Sill Z Velocity vs. Time	B-49
Figure No. 166.	Left Front Sill Y Acceleration vs. Time	B-50
Figure No. 167.	Left Front Sill Y Velocity vs. Time	B-50
Figure No. 168.	Left Rear Sill Y Acceleration vs. Time	B-50
Figure No. 169.	Left Rear Sill Y Velocity vs. Time	B-50
Figure No. 170.	Left Lower A-Post Y Acceleration vs. Time	B-51
Figure No. 171.	Left Lower A-Post Y Velocity vs. Time	B-51
Figure No. 172.	Left Mid A-Post Y Acceleration vs. Time	B-51
Figure No. 173.	Left Mid A-Post Y Velocity vs. Time	B-51
Figure No. 174.	Left Lower B-Post Y Acceleration vs. Time	B-52
Figure No. 175.	Left Lower B-Post Y Velocity vs. Time	B-52
Figure No. 176.	Left Mid B-Post Y Acceleration vs. Time	B-52
Figure No. 177.	Left Mid B-Post Y Velocity vs. Time	B-52
Figure No. 178.	Driver Seat Track Y Acceleration vs. Time	B-53
Figure No. 179.	Driver Seat Track Y Velocity vs. Time	B-53
Figure No. 180.	Vehicle CG X Acceleration vs. Time	B-54
Figure No. 181.	Vehicle CG Y Acceleration vs. Time	B-54
Figure No. 182.	Vehicle CG Z Acceleration vs. Time	B-54

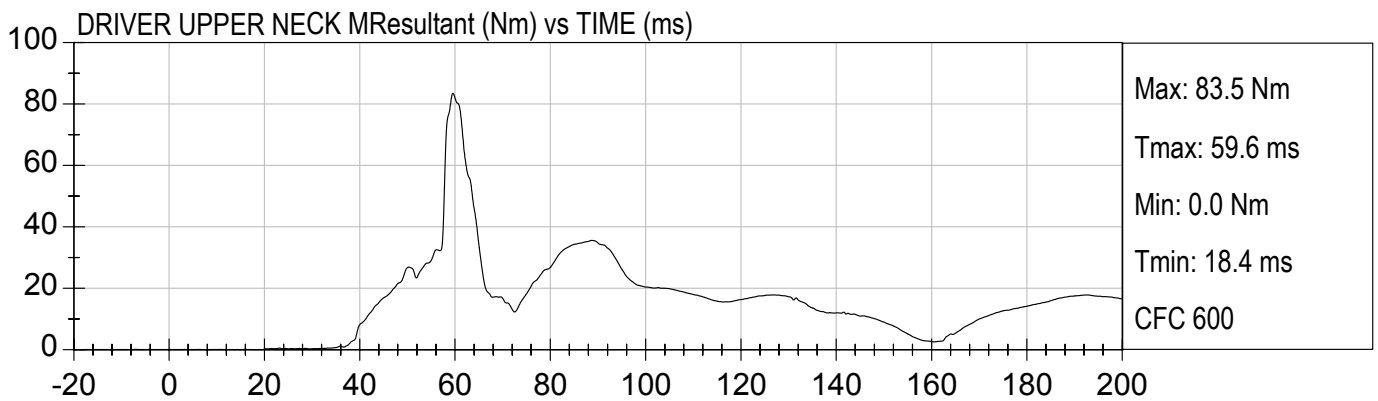
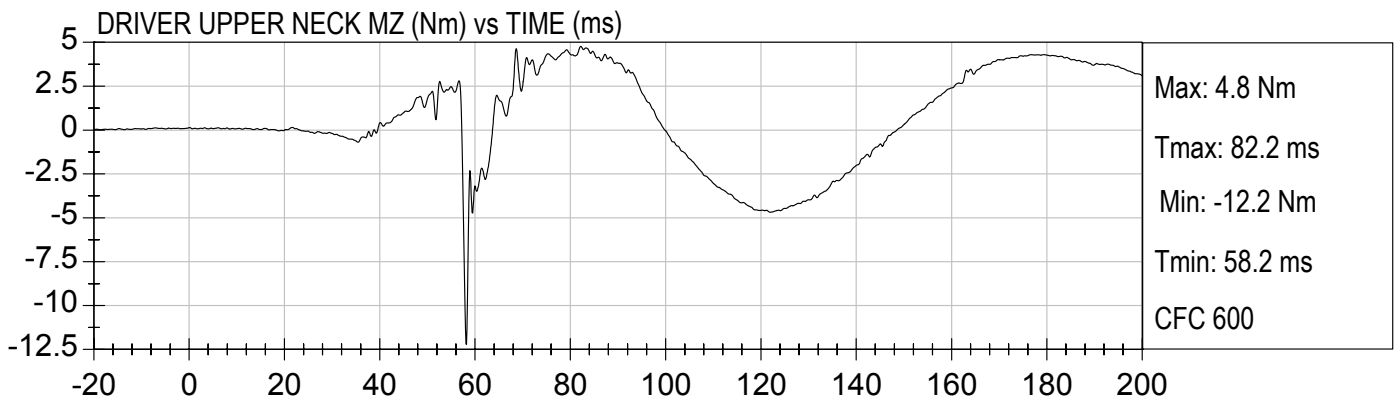
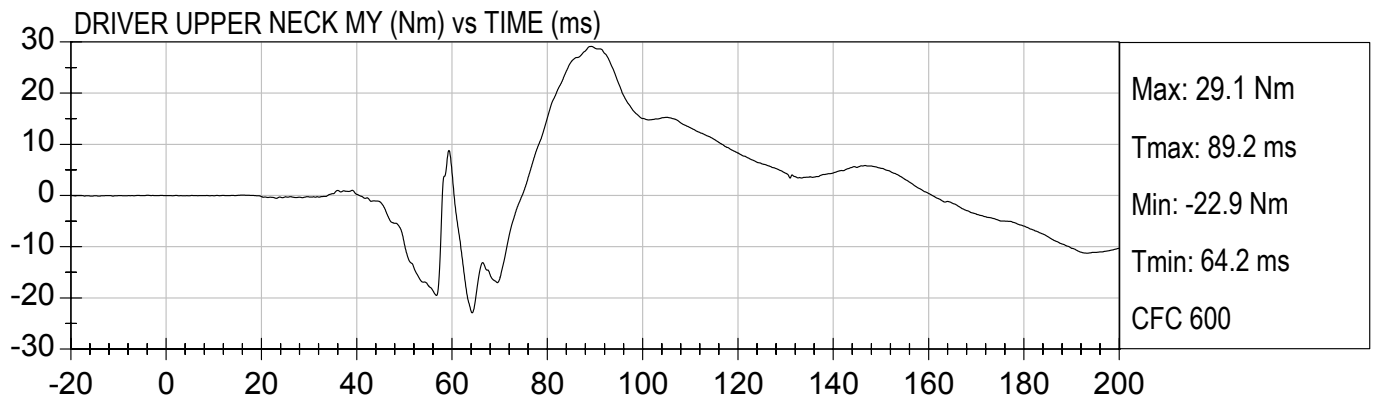
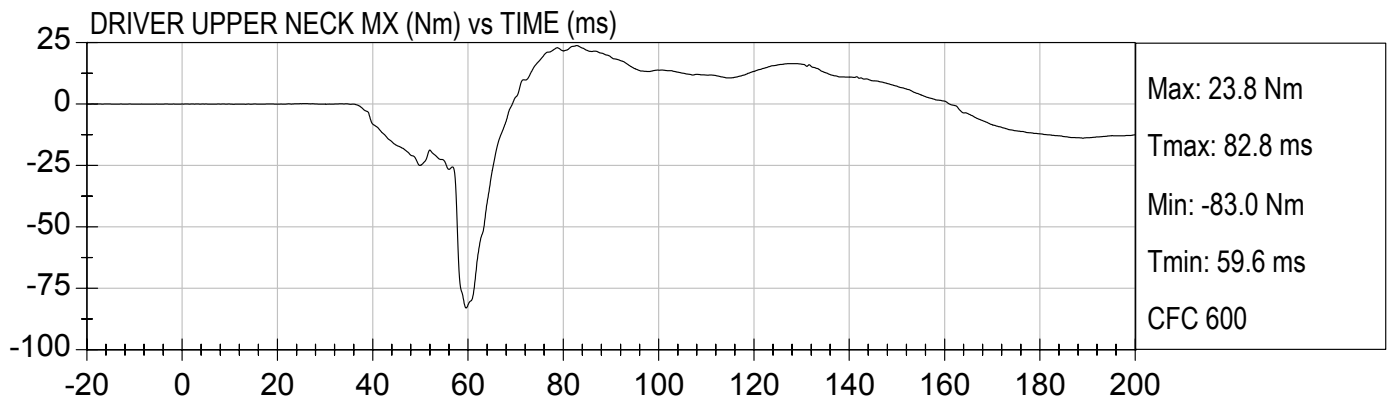
Figure No. 183.	Vehicle CG Resultant Acceleration vs. Time	B-54
Figure No. 184.	Vehicle CG X Velocity vs. Time	B-55
Figure No. 185.	Vehicle CG Y Velocity vs. Time	B-55
Figure No. 186.	Vehicle CG Z Velocity vs. Time	B-55
Figure No. 187.	Left Front Door @ Arm Acceleration vs. Time	B-56
Figure No. 188.	Left Front Door @ Rib Acceleration vs. Time	B-56
Figure No. 189.	Left Front Door @ Pelvis Acceleration vs. Time	B-56
Figure No. 190.	Left Front Door @ Arm Velocity vs. Time	B-57
Figure No. 191.	Left Front Door @ Rib Velocity vs. Time	B-57
Figure No. 192.	Left Front Door @ Pelvis Velocity vs. Time	B-57
Figure No. 193.	Left Front Door @ Knee Velocity vs. Time	B-57
Figure No. 194.	LC Radiator Support X Acceleration vs. Time	B-58
Figure No. 195.	LC Radiator Support Y Acceleration vs. Time	B-58
Figure No. 196.	LC Radiator Support Z Acceleration vs. Time	B-58
Figure No. 197.	LC Radiator Support Resultant Acceleration vs. Time	B-58
Figure No. 198.	LC Radiator Support X Velocity vs. Time	B-59
Figure No. 199.	LC Radiator Support Y Velocity vs. Time	B-59
Figure No. 200.	LC Radiator Support Z Velocity vs. Time	B-59
Figure No. 201.	Floorpan @ Rear Axle X Acceleration vs. Time	B-60
Figure No. 202.	Floorpan @ Rear Axle Y Acceleration vs. Time	B-60
Figure No. 203.	Floorpan @ Rear Axle Z Acceleration vs. Time	B-60
Figure No. 204.	Floorpan @ Rear Axle Resultant Acceleration vs. Time	B-60
Figure No. 205.	Floorpan @ Rear Axle X Velocity vs. Time	B-61
Figure No. 206.	Floorpan @ Rear Axle Y Velocity vs. Time	B-61
Figure No. 207.	Floorpan @ Rear Axle Z Velocity vs. Time	B-61
Figure No. 208.	Driver Upper Spine X Acceleration vs. Time (FIR 100)	B-62
Figure No. 209.	Driver Upper Spine Y Acceleration vs. Time (FIR 100)	B-62
Figure No. 210.	Driver Upper Spine Z Acceleration vs. Time (FIR 100)	B-62
Figure No. 211.	Driver Lower Spine X Acceleration vs. Time (FIR 100)	B-63
Figure No. 212.	Driver Lower Spine Y Acceleration vs. Time (FIR 100)	B-63
Figure No. 213.	Driver Lower Spine Z Acceleration vs. Time (FIR 100)	B-63

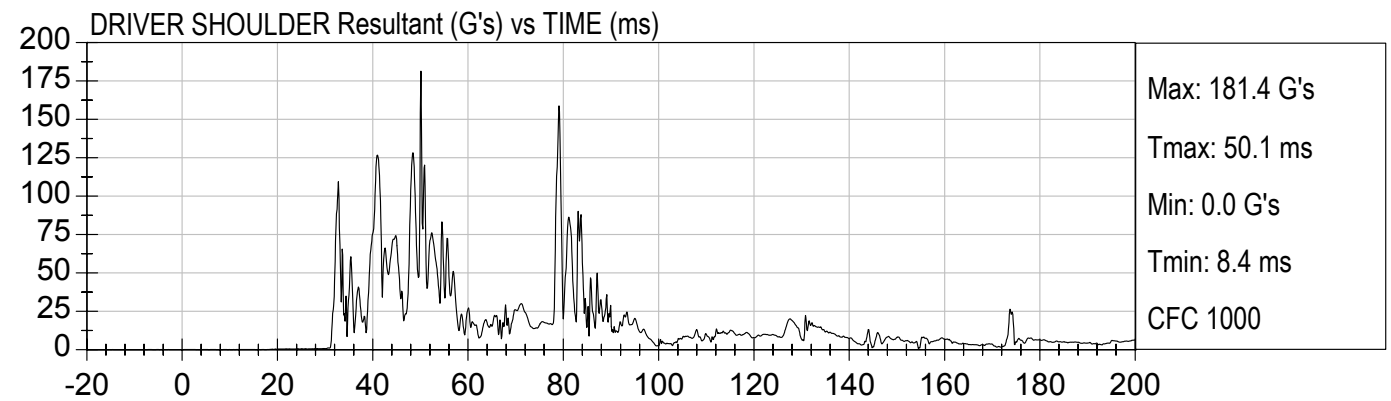
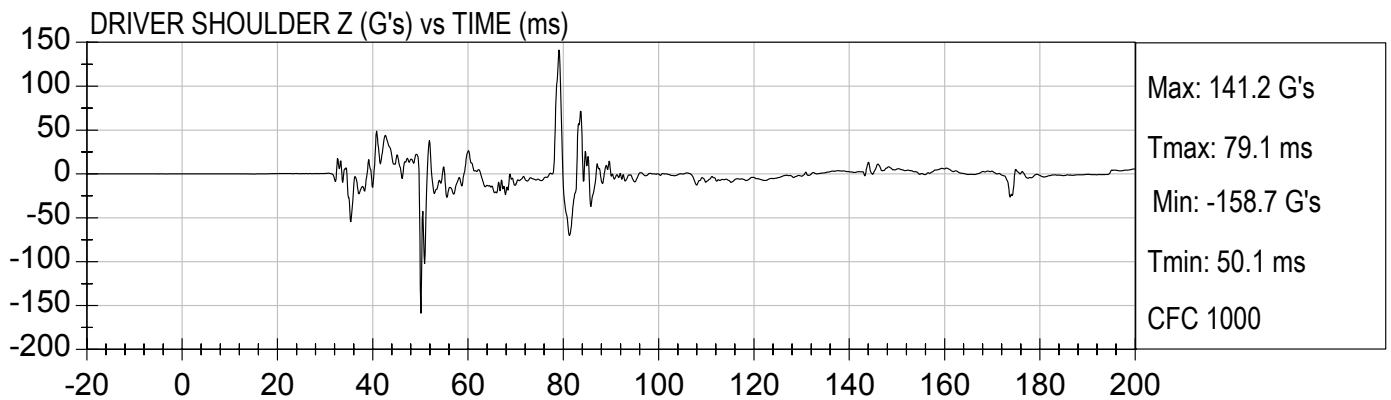
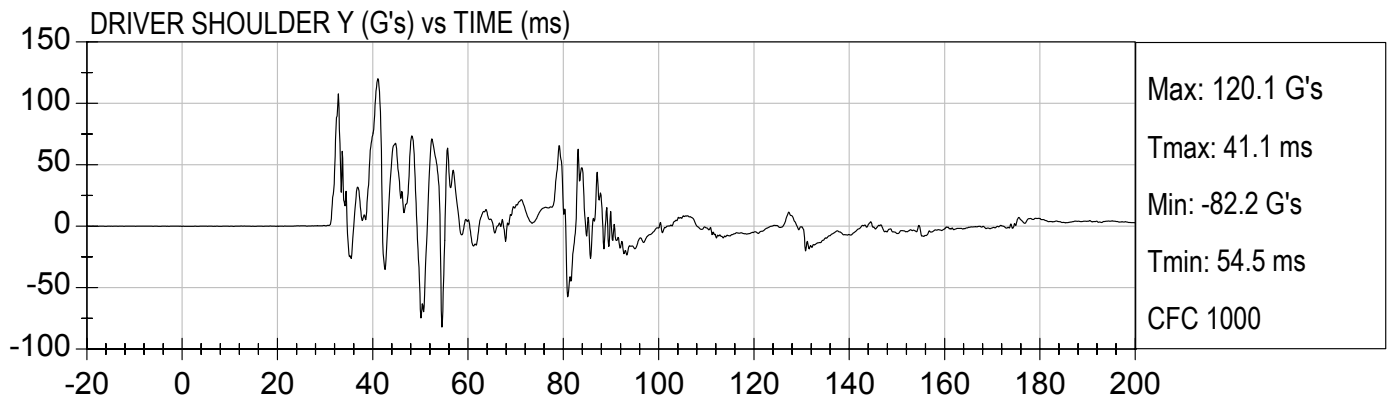
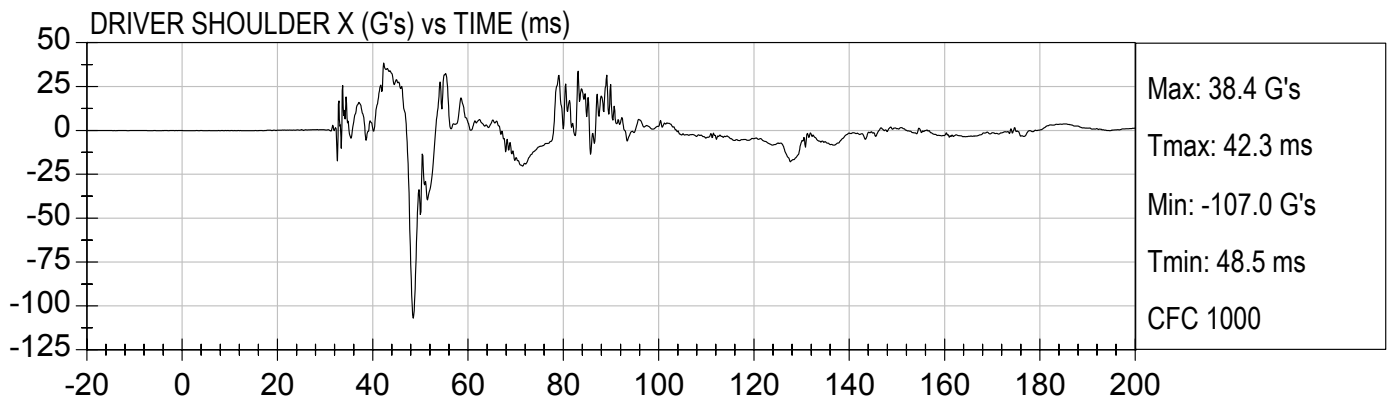
Figure No. 214.	Driver Pelvis X Acceleration vs. Time (FIR 100)	B-64
Figure No. 215.	Driver Pelvis Y Acceleration vs. Time (FIR 100)	B-64
Figure No. 216.	Driver Pelvis Z Acceleration vs. Time (FIR 100)	B-64
Figure No. 217.	Driver Upper Thorax Rib Y Acceleration vs. Time (FIR 100)	B-65
Figure No. 218.	Driver Mid Thorax Rib Y Acceleration vs. Time (FIR 100)	B-65
Figure No. 219.	Driver Lower Thorax Rib Y Acceleration vs. Time (FIR 100)	B-65
Figure No. 220.	Driver Upper Abdominal Rib Y Acceleration vs. Time (FIR 100)	B-66
Figure No. 221.	Driver Lower Abdominal Rib Y Acceleration vs. Time (FIR 100)	B-66
Figure No. 222.	Front Rib to Rib Guide 1 vs. Time	B-67
Figure No. 223.	Front Rib to Rib Guide 2 vs. Time	B-67
Figure No. 224.	Front Rib to Rib Guide 3 vs. Time	B-67
Figure No. 225.	Front Rib to Rib Guide 4 vs. Time	B-67
Figure No. 226.	Rear Rib to Rib Guide 1 vs. Time	B-68
Figure No. 227.	Rear Rib to Rib Guide 2 vs. Time	B-68
Figure No. 228.	Rear Rib to Rib Guide 3 vs. Time	B-68
Figure No. 229.	Rear Rib to Rib Guide 4 vs. Time	B-68
Figure No. 230.	Front Rib to Rib Guide 5 vs. Time	B-69
Figure No. 231.	Rear Rib to Rib Guide 5 vs. Time	B-69
Figure No. 232.	Front Rib to Stop 1 vs. Time	B-70
Figure No. 233.	Front Rib to Stop 2 vs. Time	B-70
Figure No. 234.	Front Rib to Stop 3 vs. Time	B-70
Figure No. 235.	Front Rib to Stop 4 vs. Time	B-70
Figure No. 236.	Front Rib to Stop 5 vs. Time	B-71
Figure No. 237.	Rear Rib to Stop 1 vs. Time	B-72
Figure No. 238.	Rear Rib to Stop 2 vs. Time	B-72
Figure No. 239.	Rear Rib to Stop 3 vs. Time	B-72
Figure No. 240.	Rear Rib to Stop 4 vs. Time	B-72
Figure No. 241.	Rear Rib to Stop 5 vs. Time	B-73

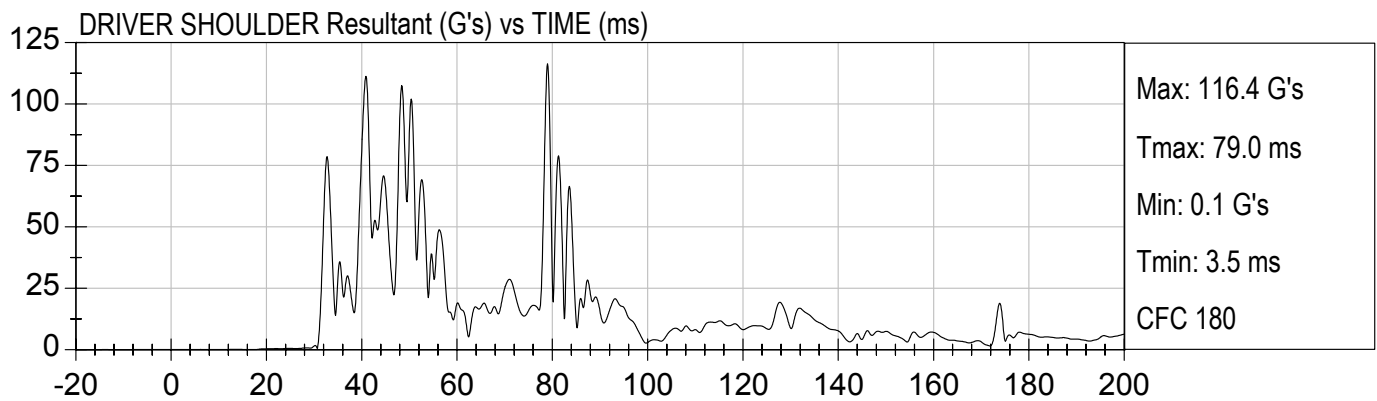
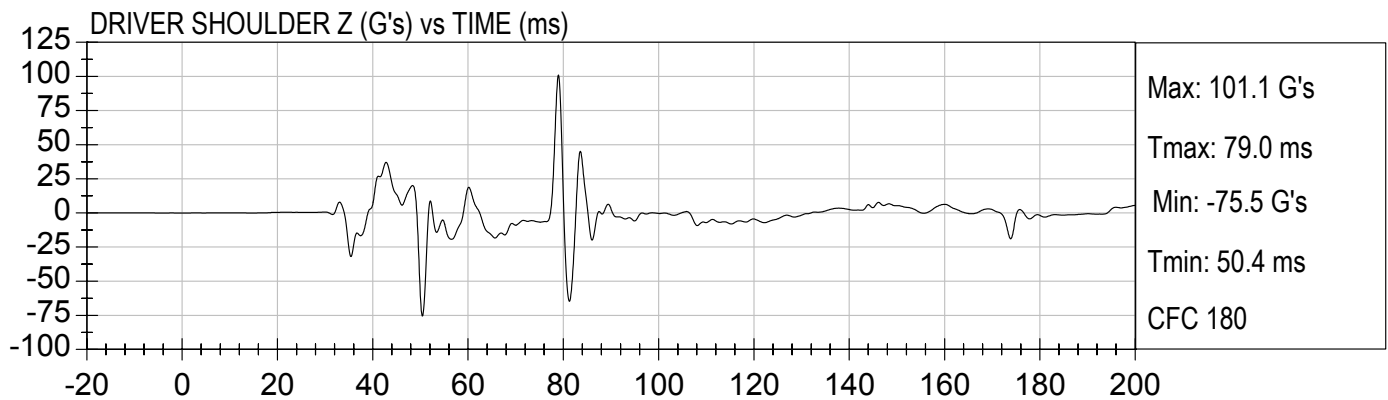
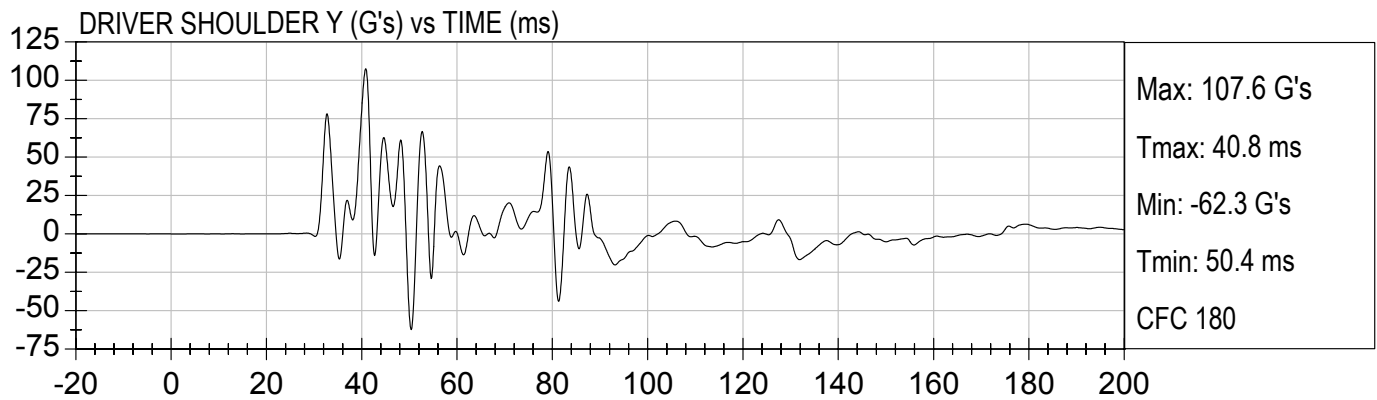
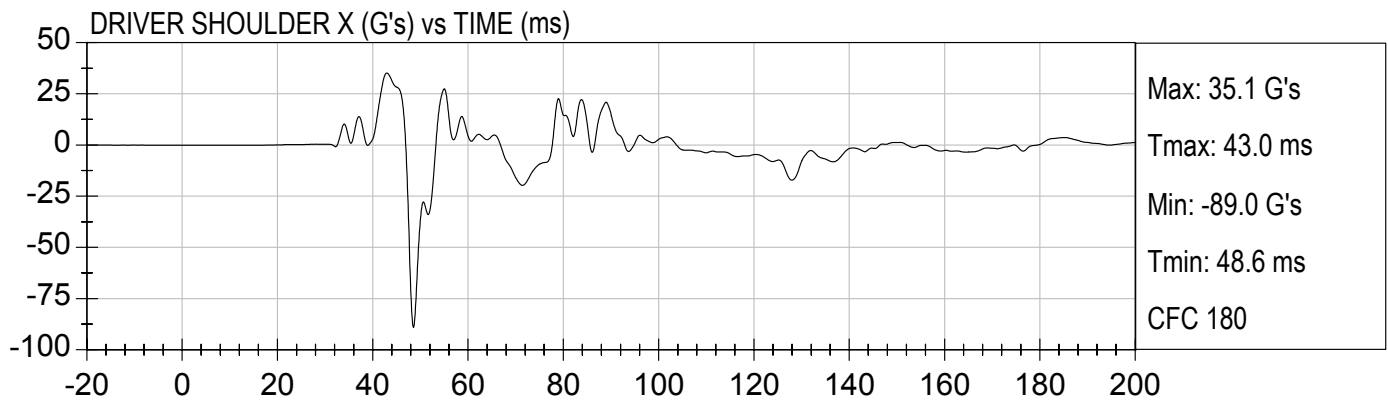


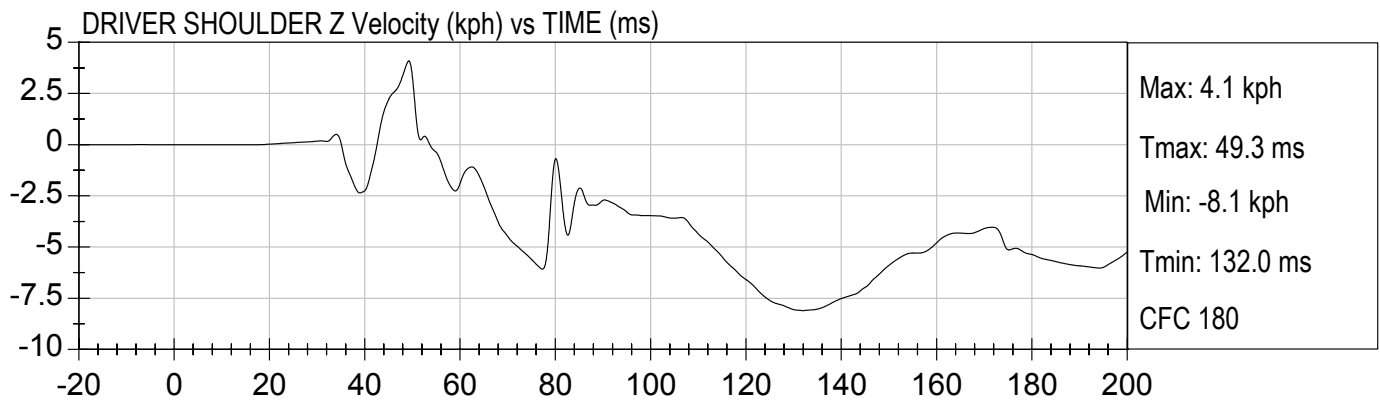
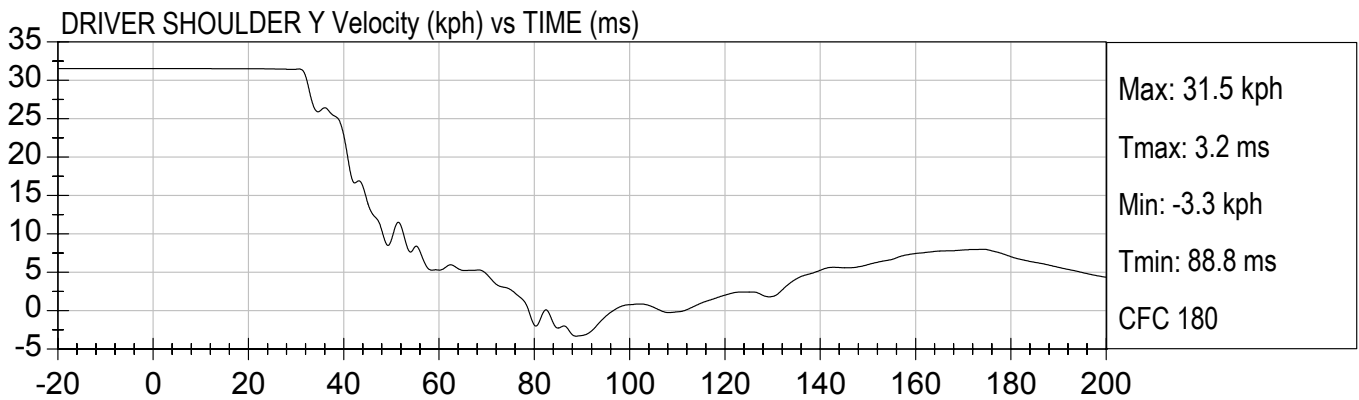
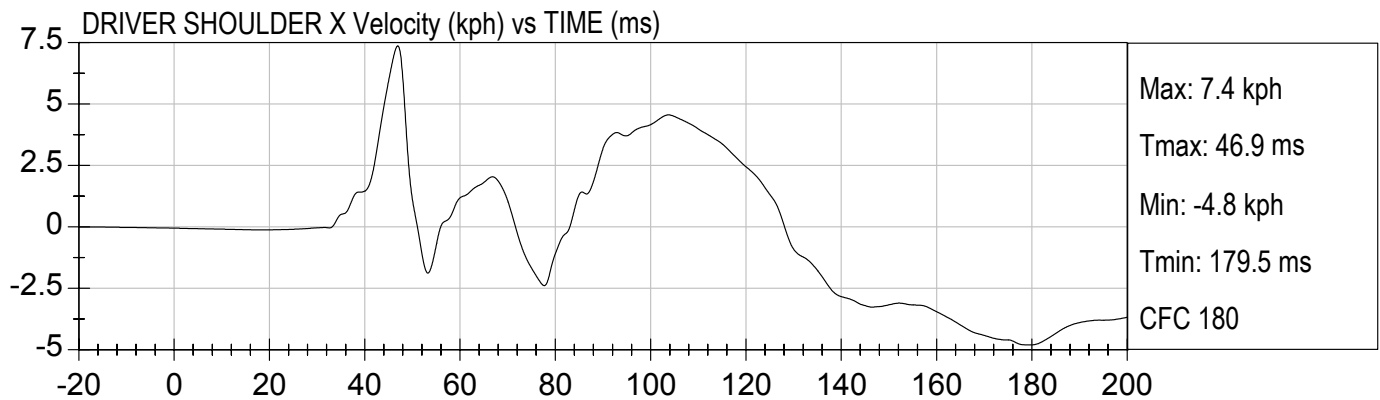


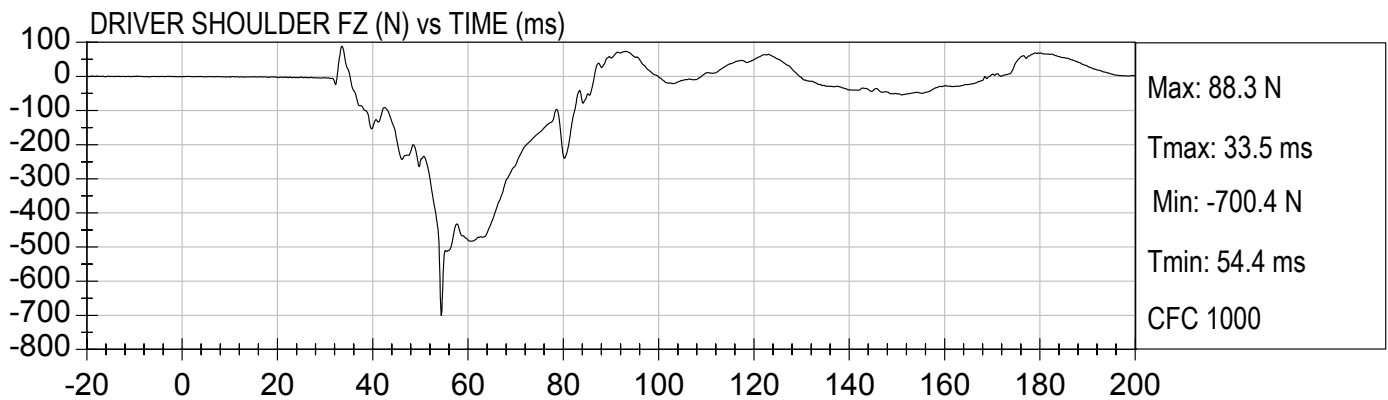
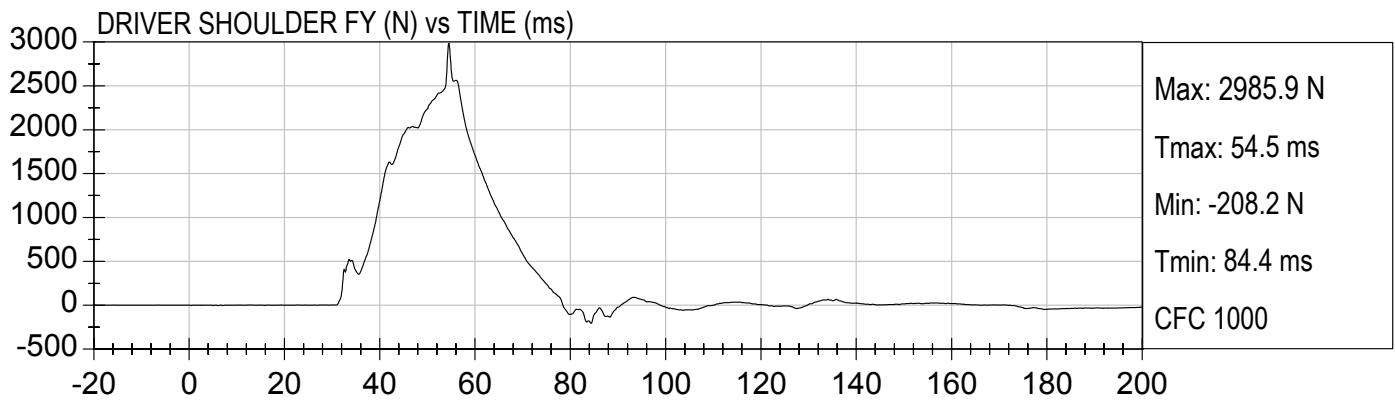
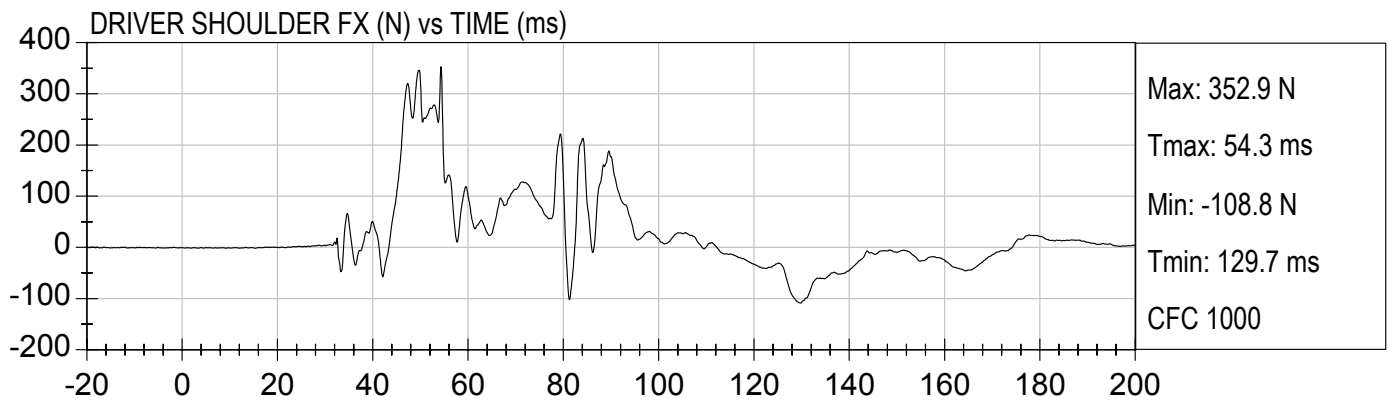


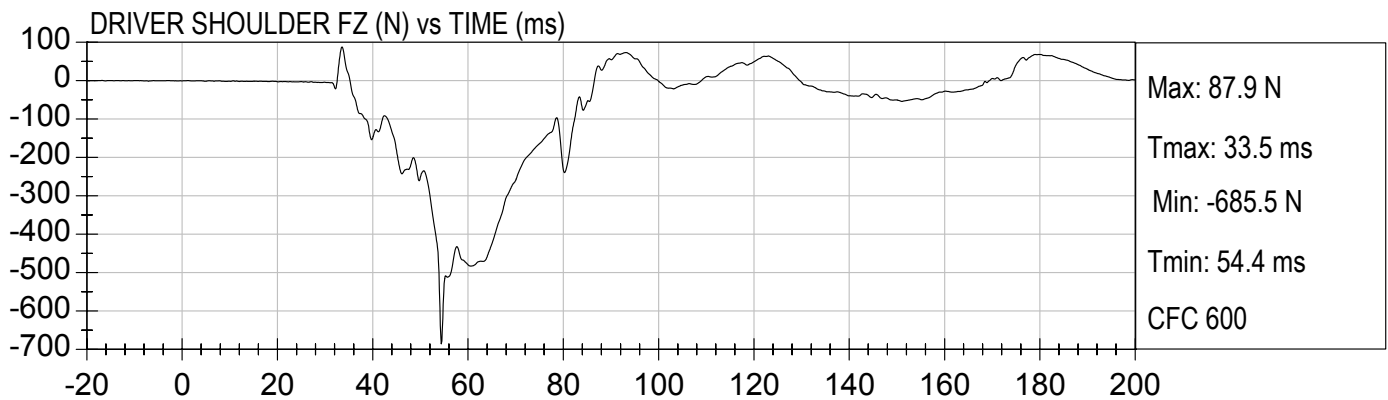
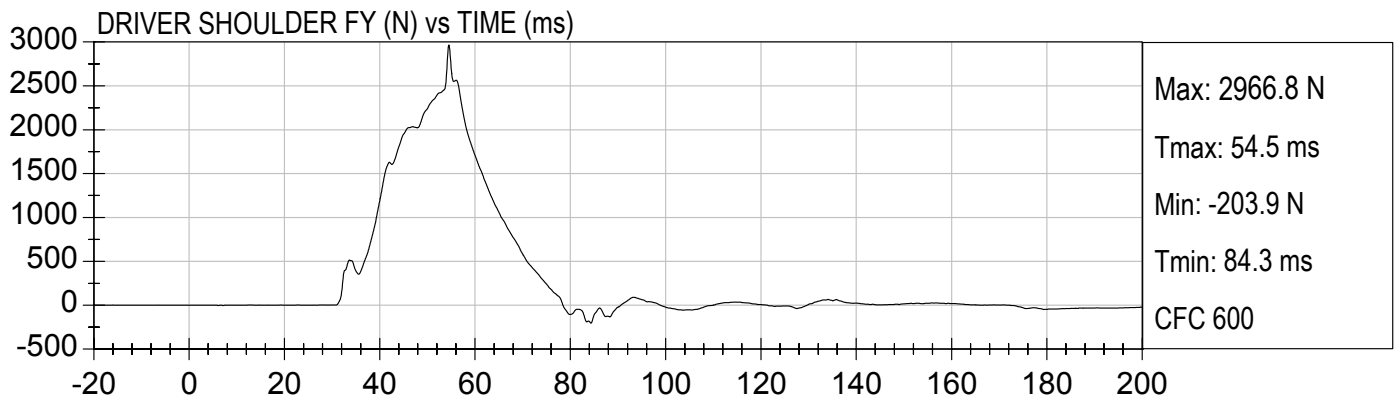
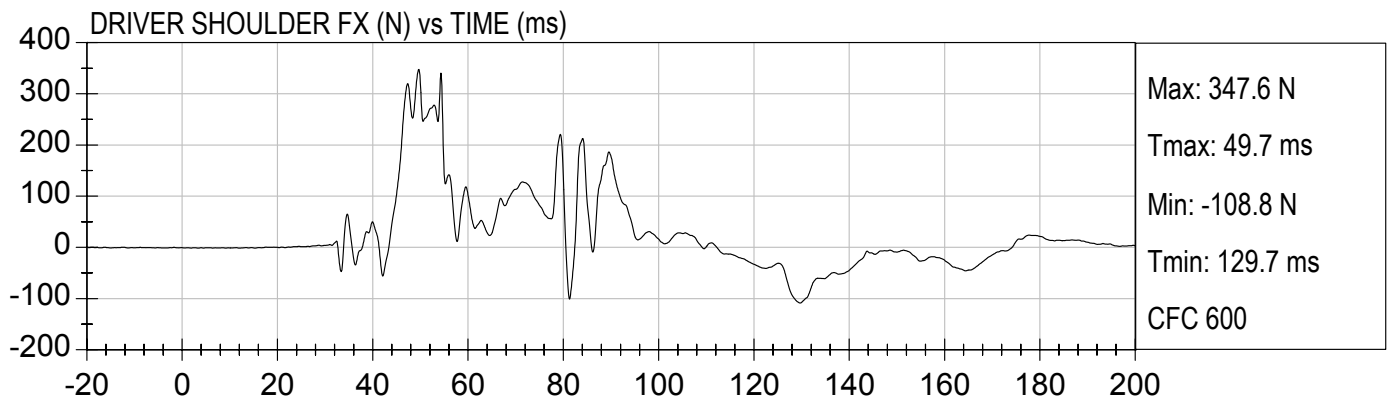


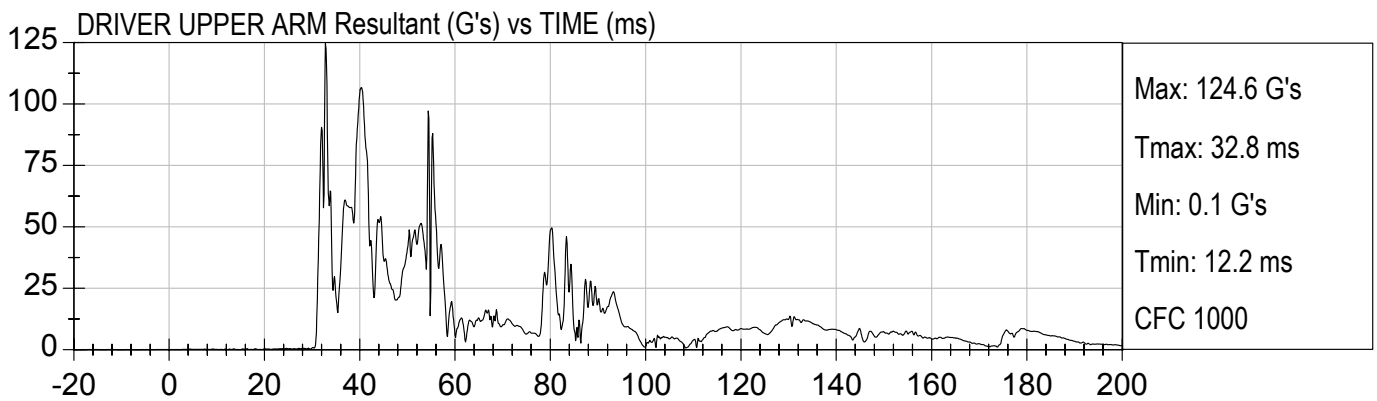
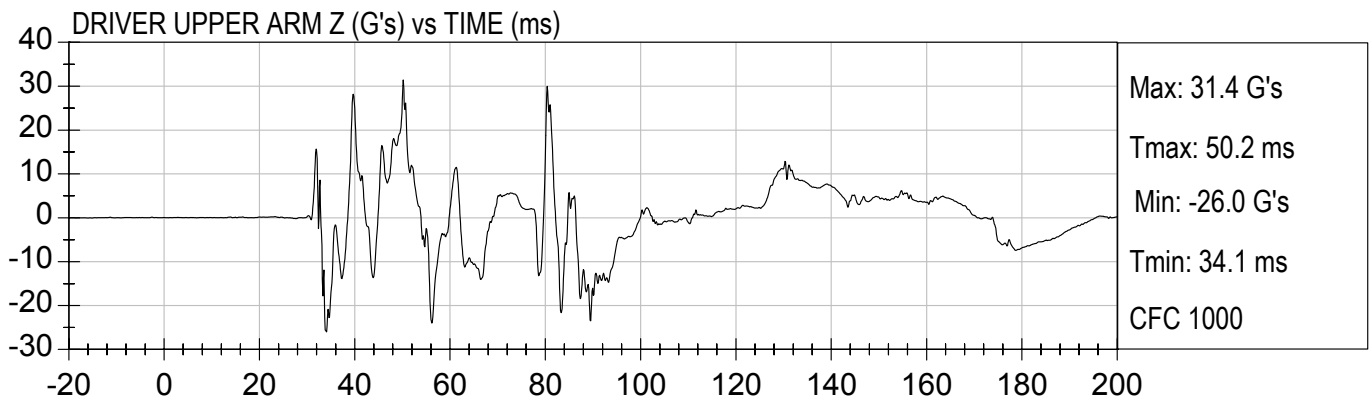
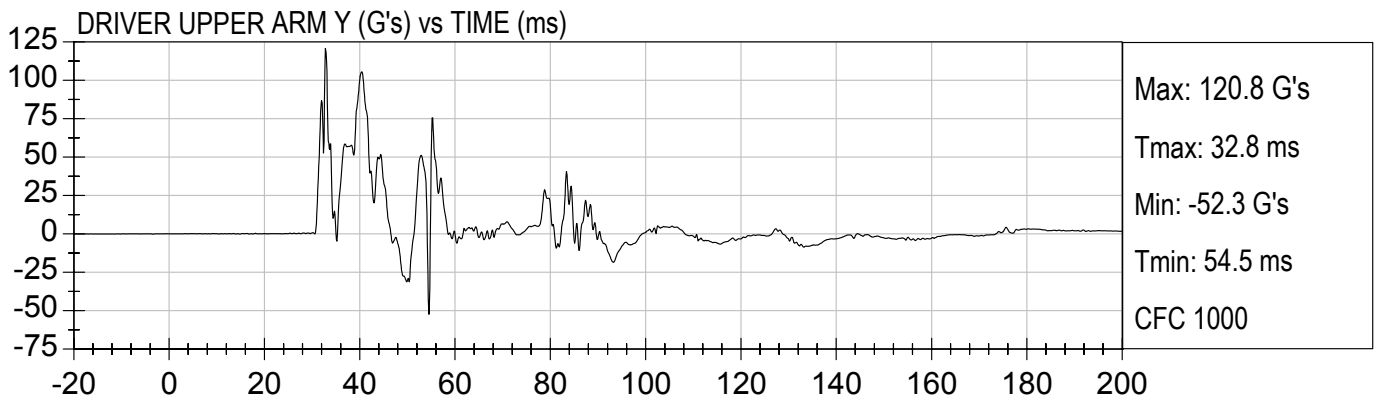
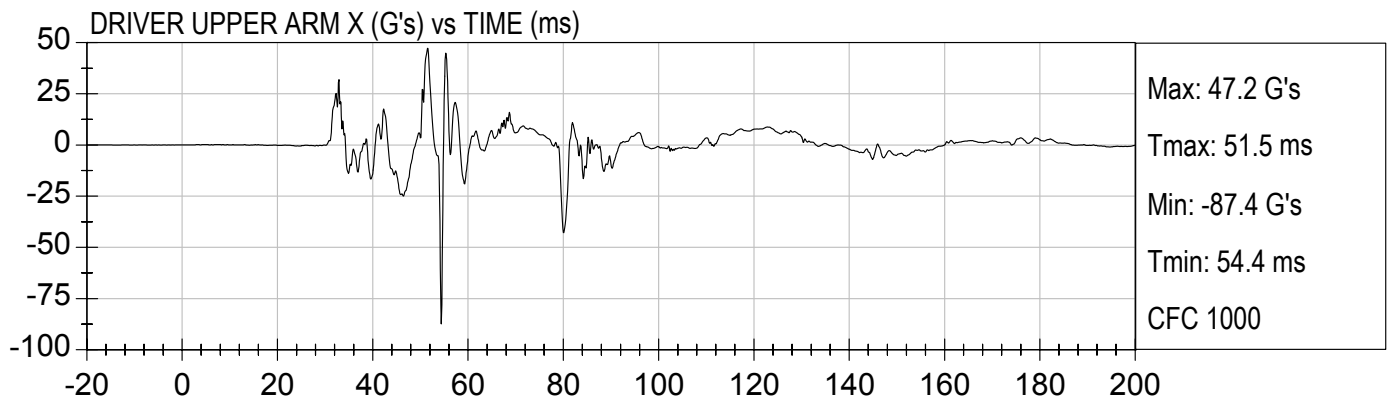


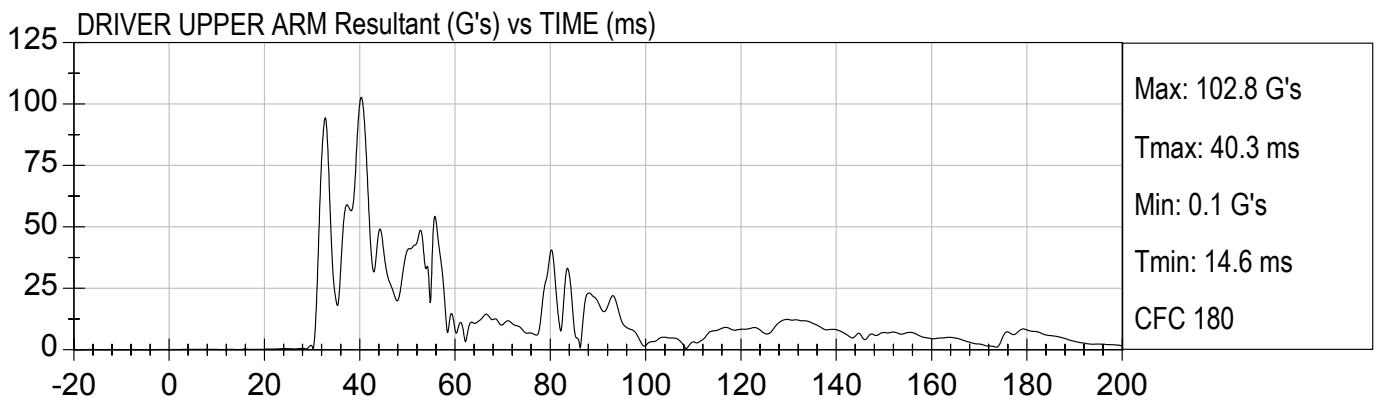
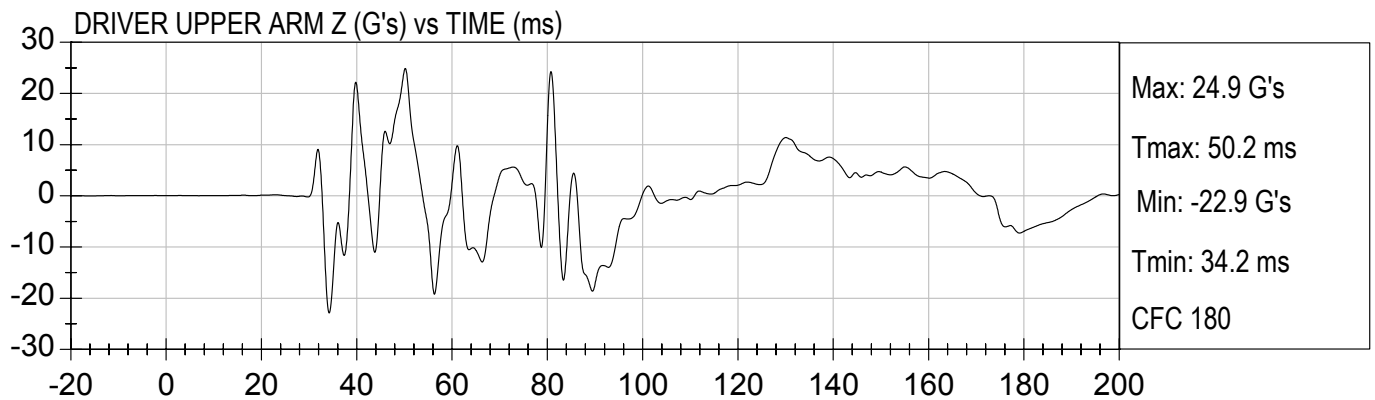
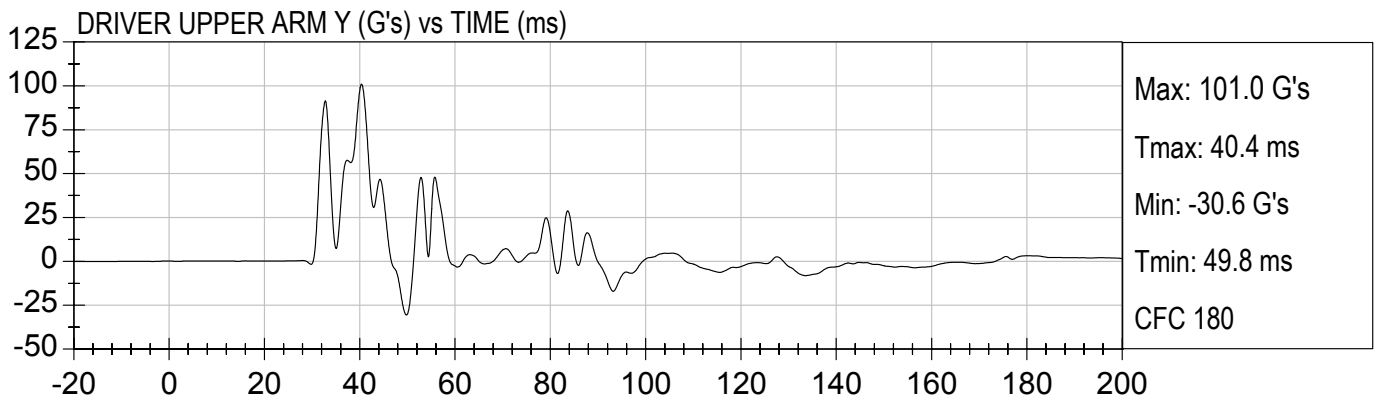
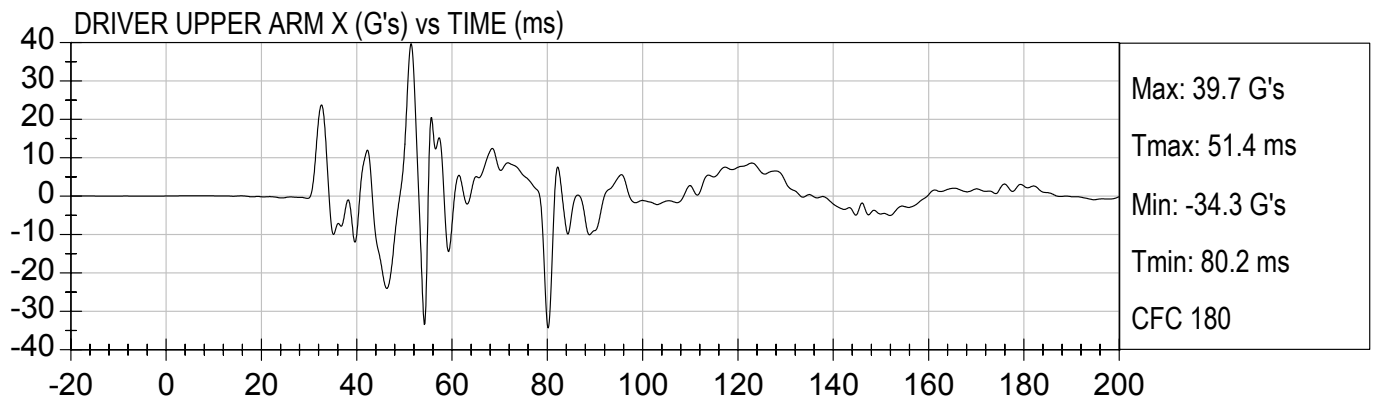






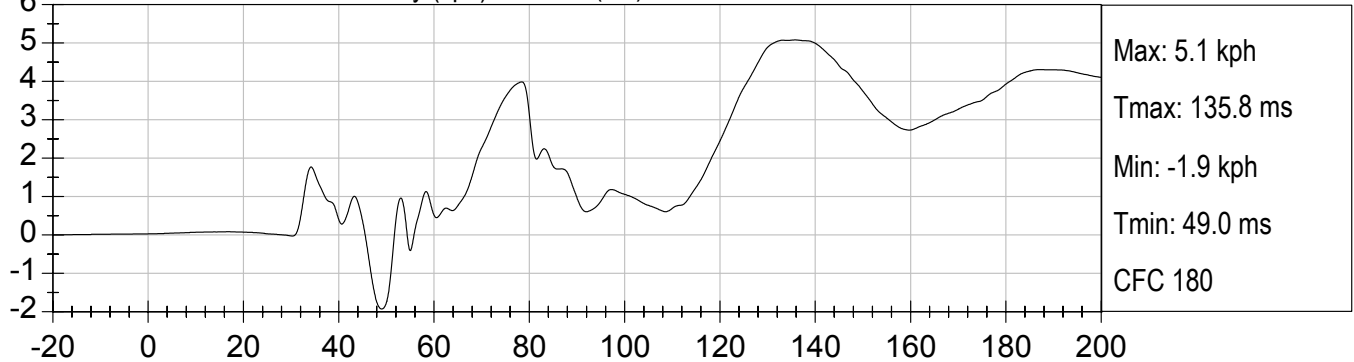




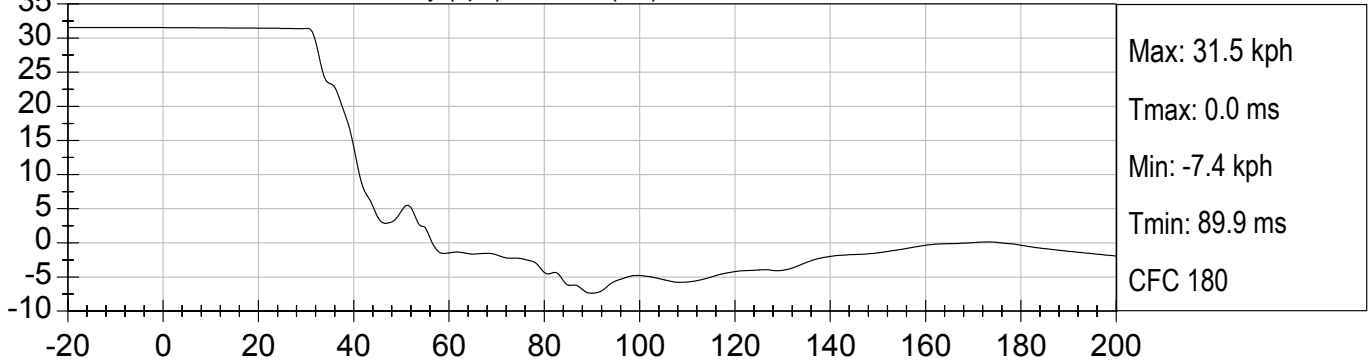




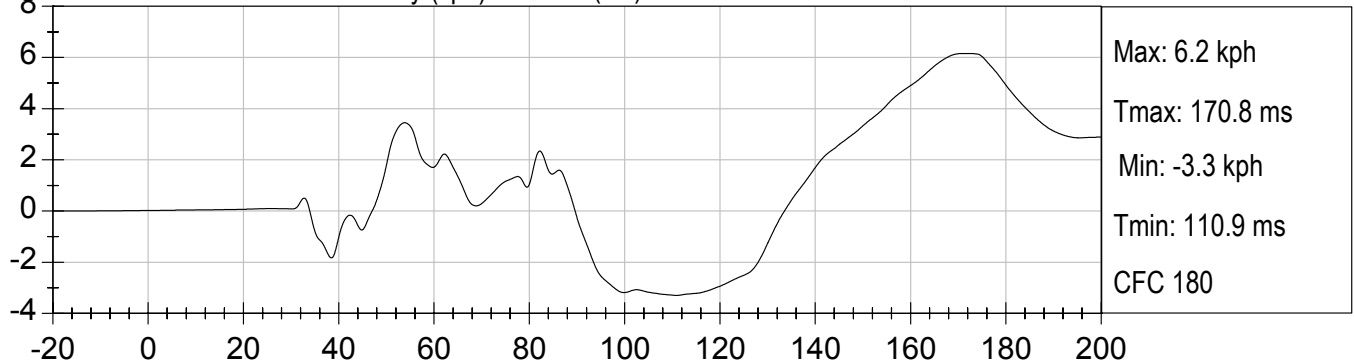
DRIVER UPPER ARM X Velocity (kph) vs TIME (ms)

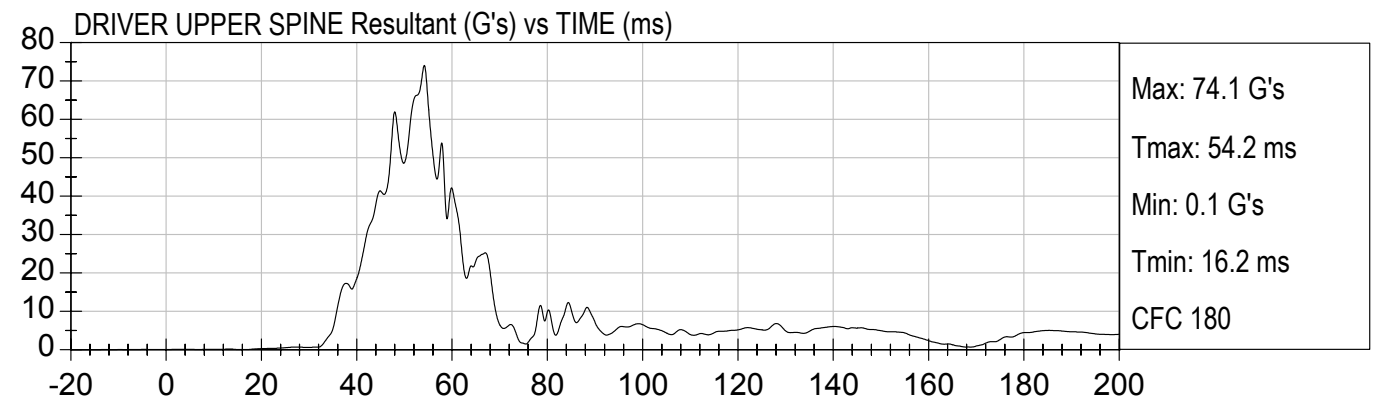
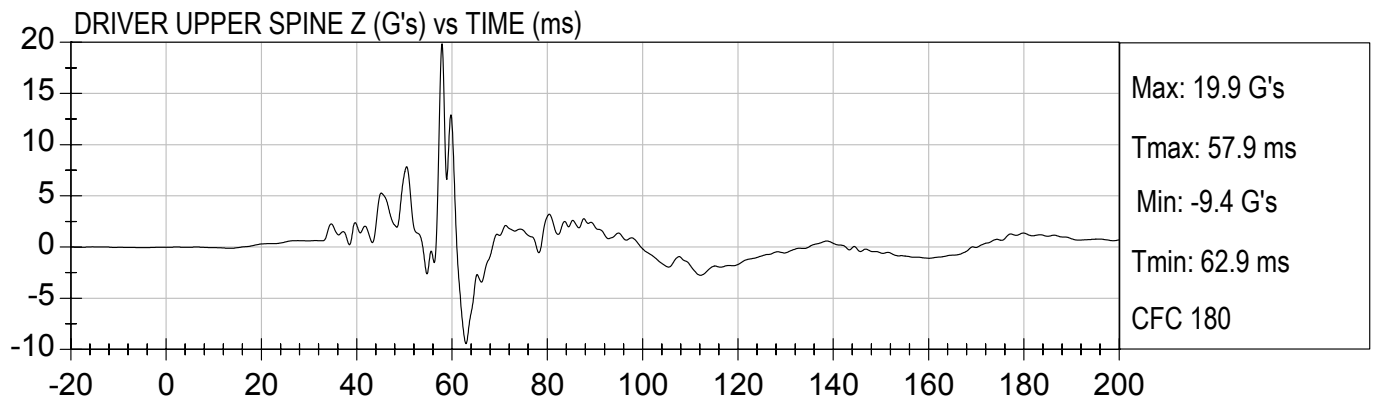
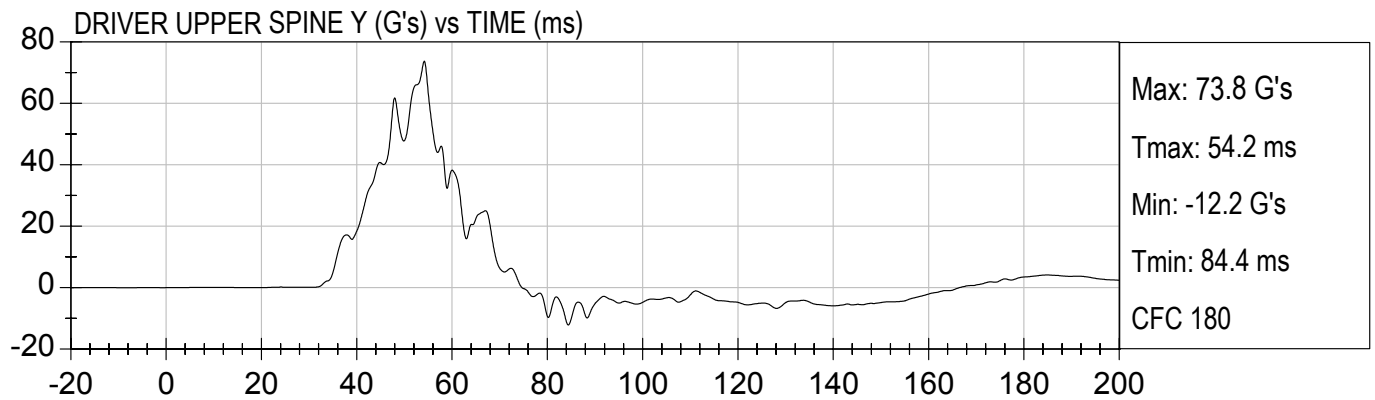
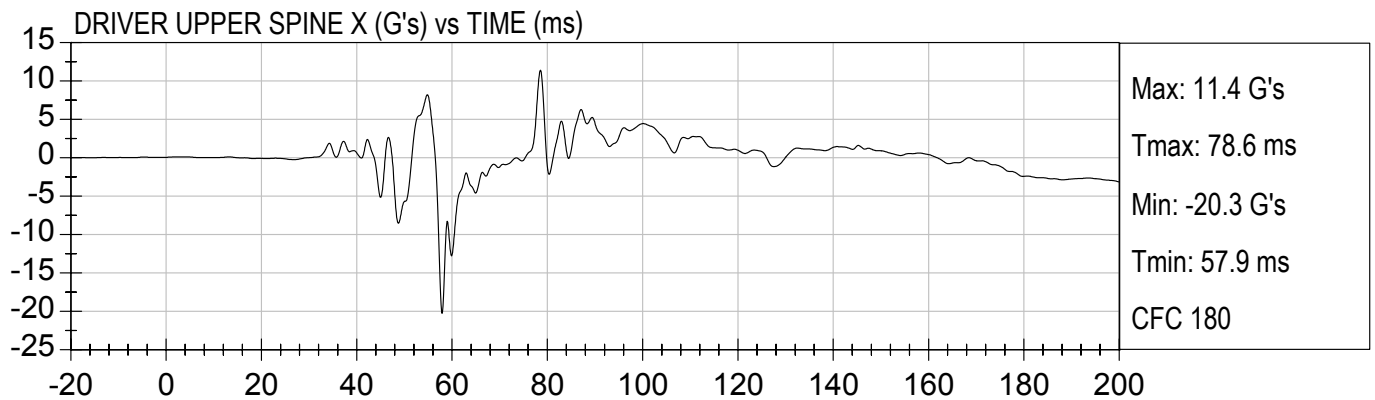


DRIVER UPPER ARM Y Velocity (kph) vs TIME (ms)



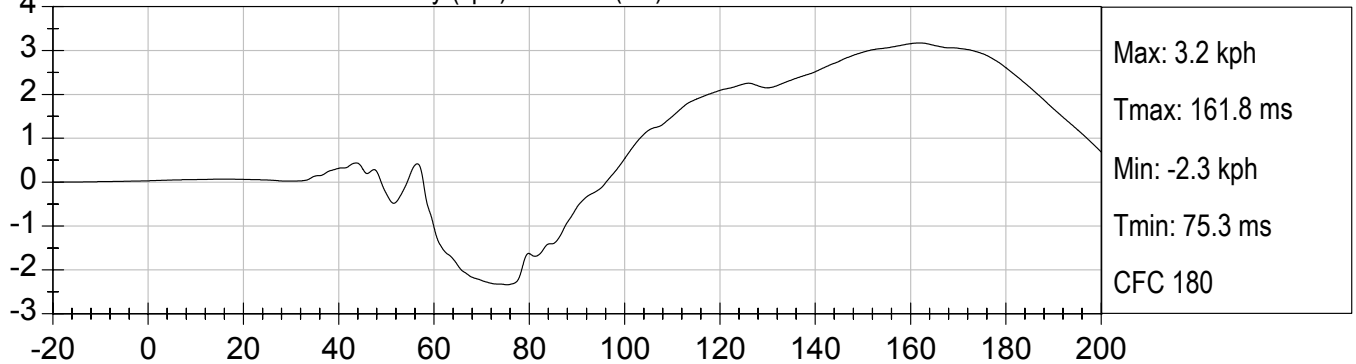
DRIVER UPPER ARM Z Velocity (kph) vs TIME (ms)



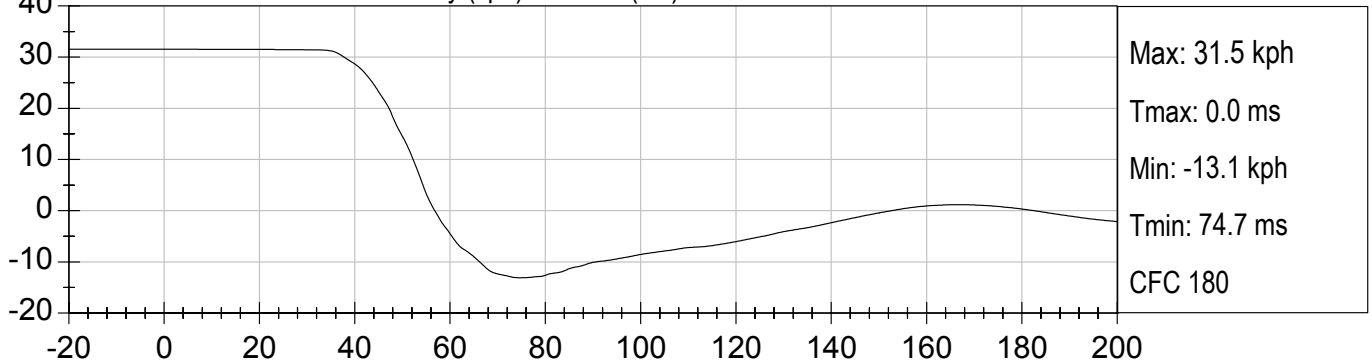




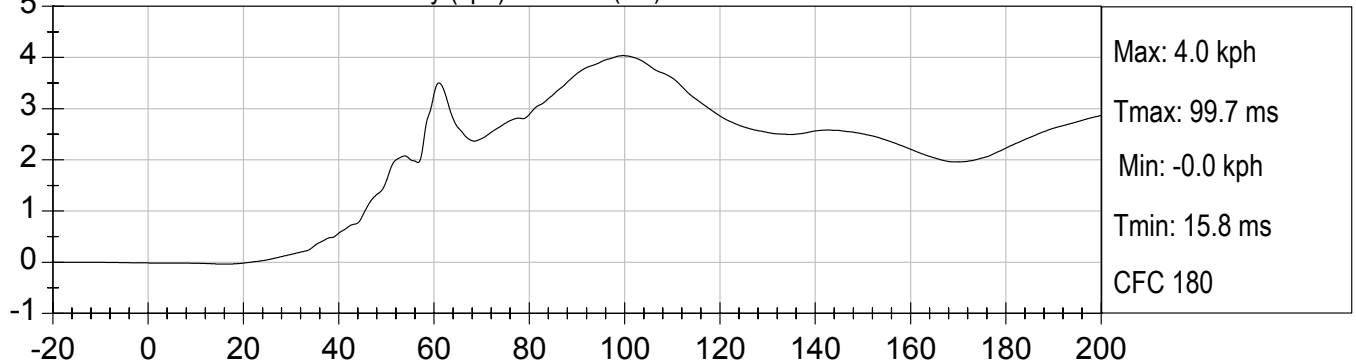
DRIVER UPPER SPINE X Velocity (kph) vs TIME (ms)

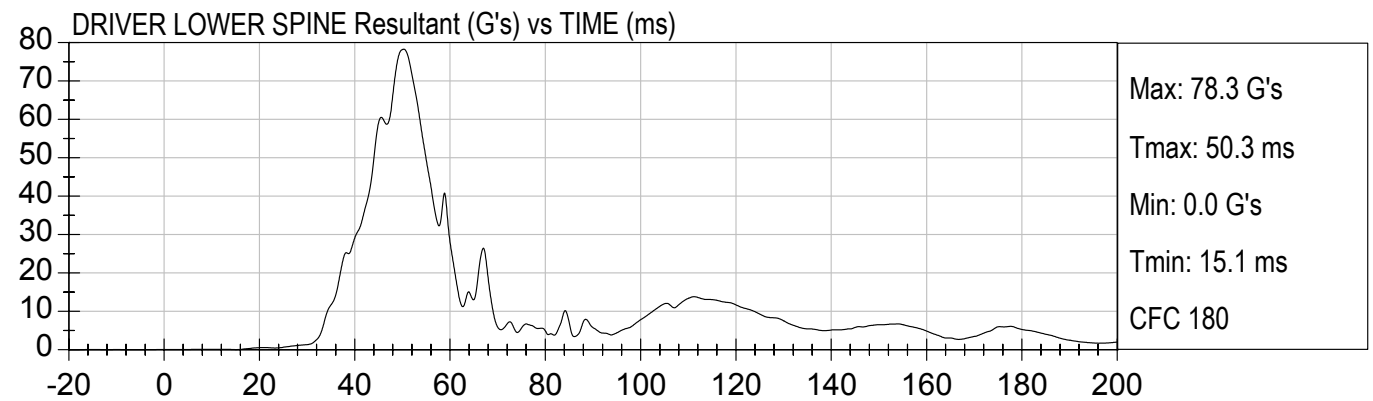
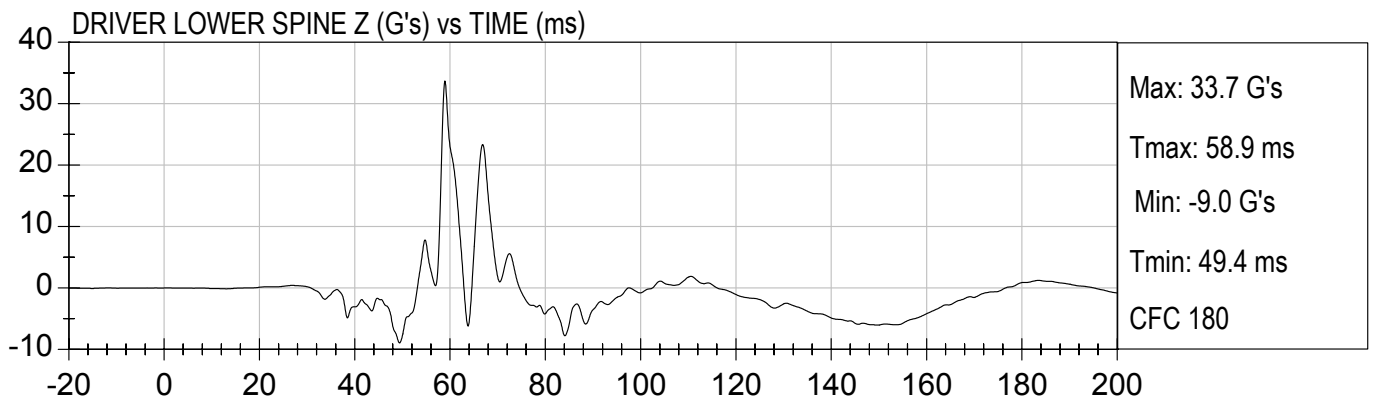
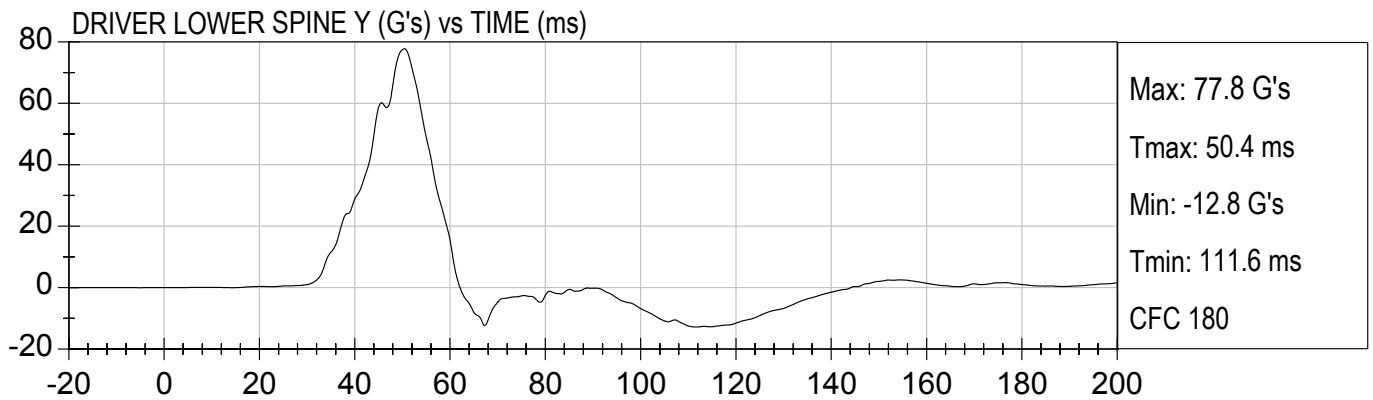
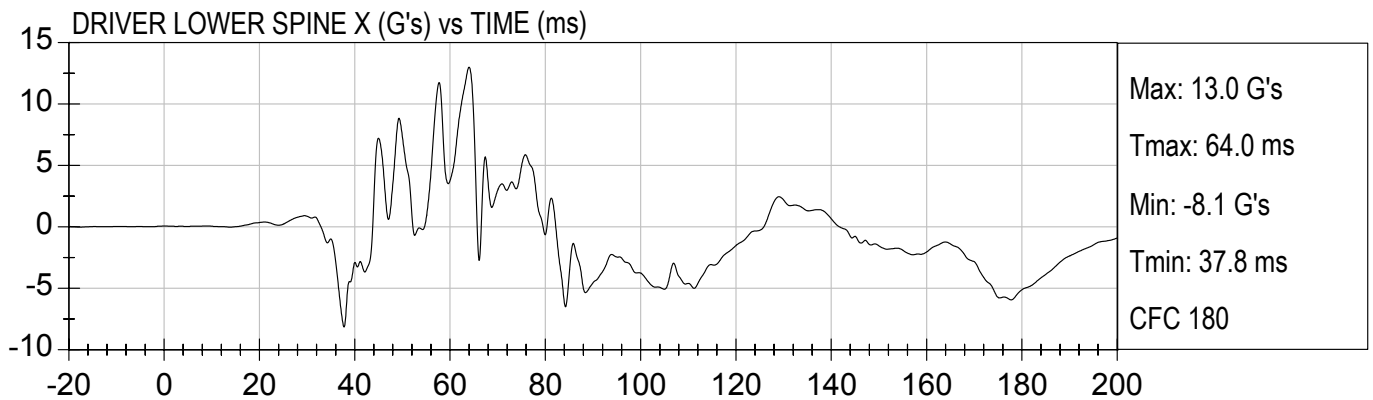


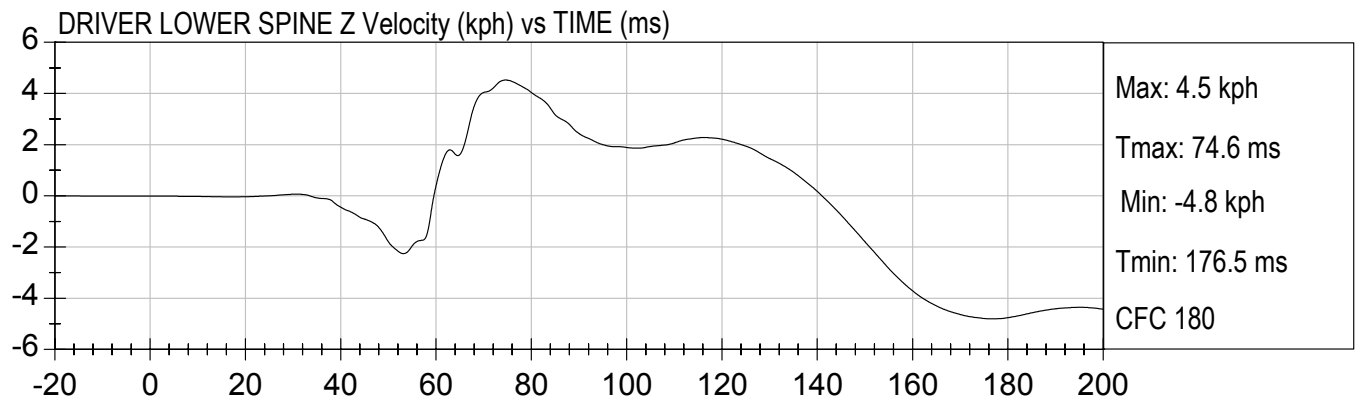
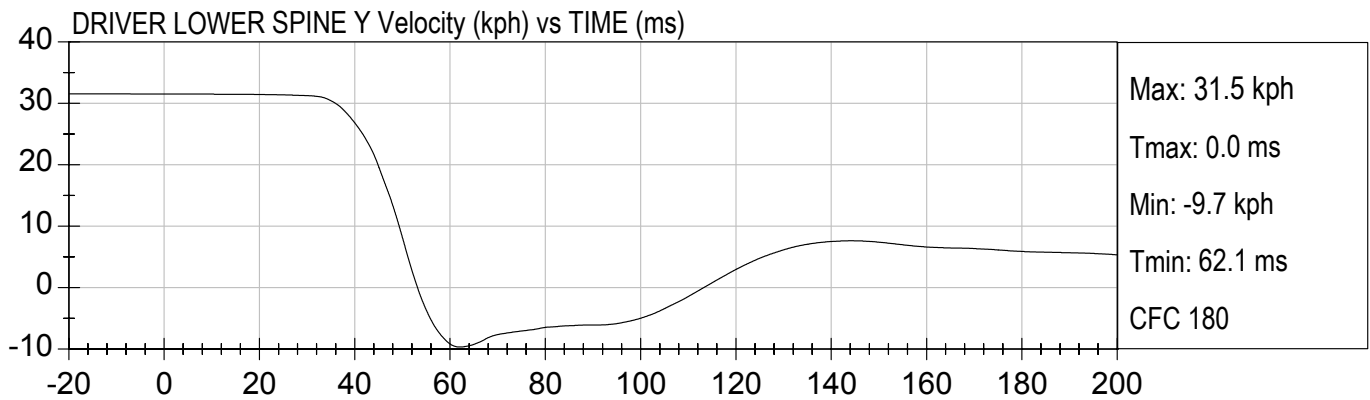
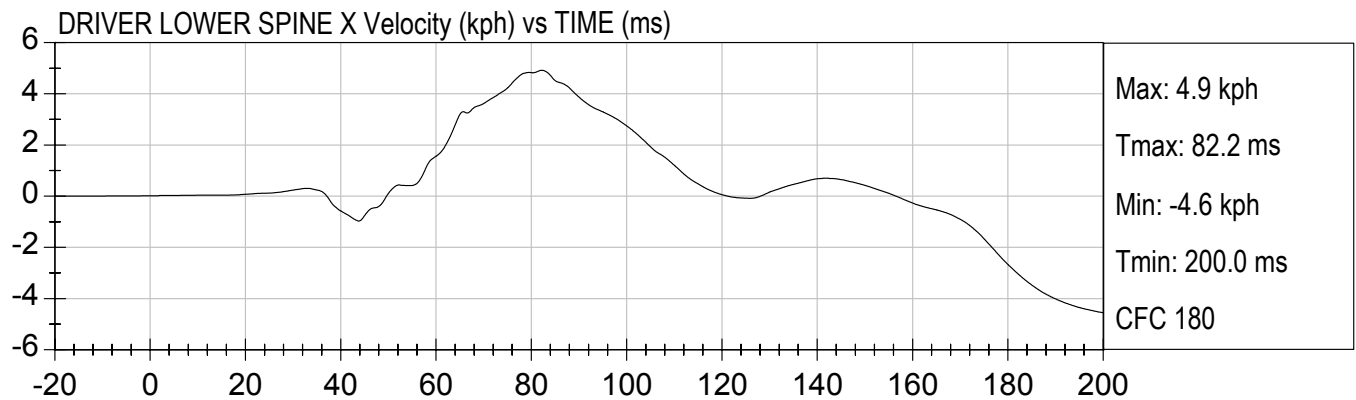
DRIVER UPPER SPINE Y Velocity (kph) vs TIME (ms)

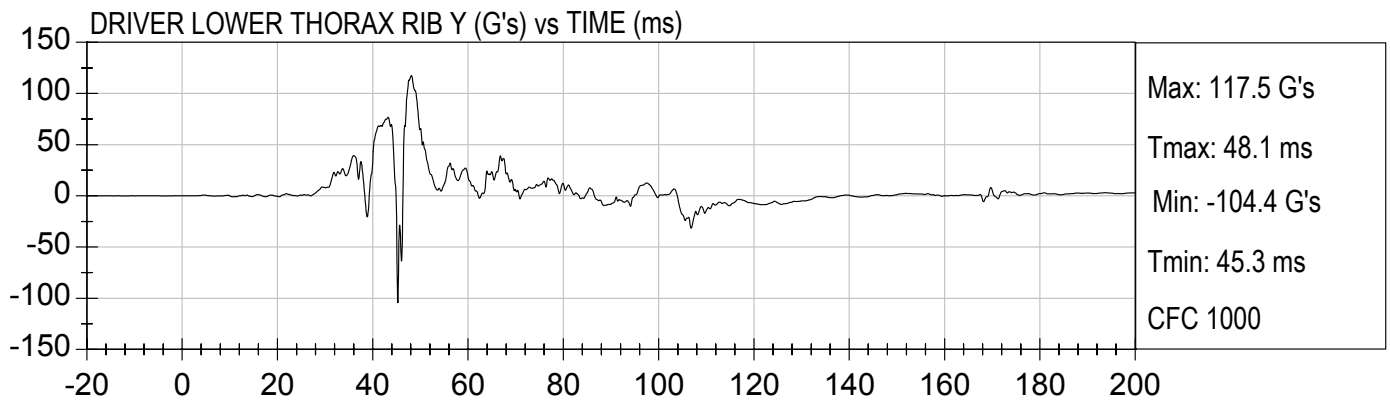
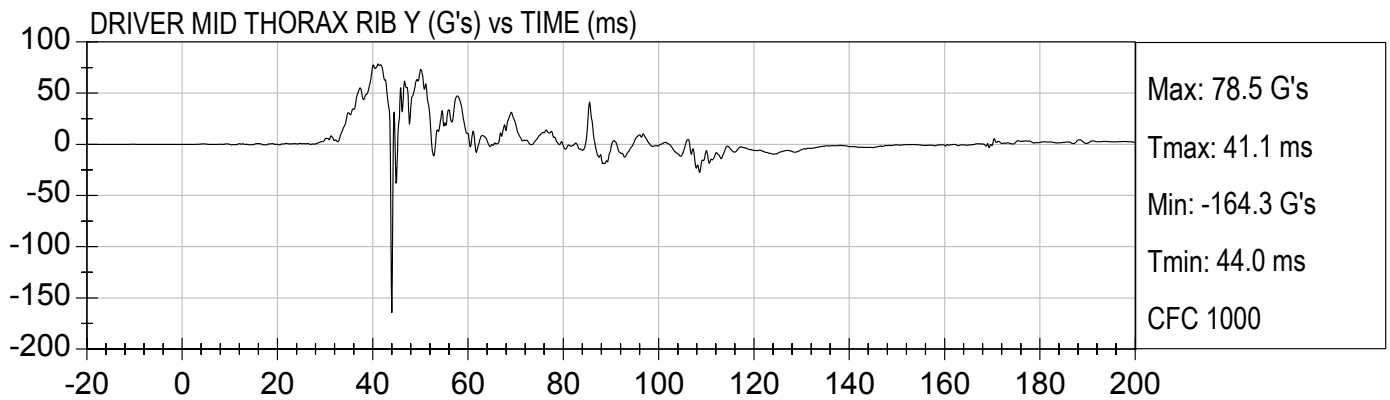
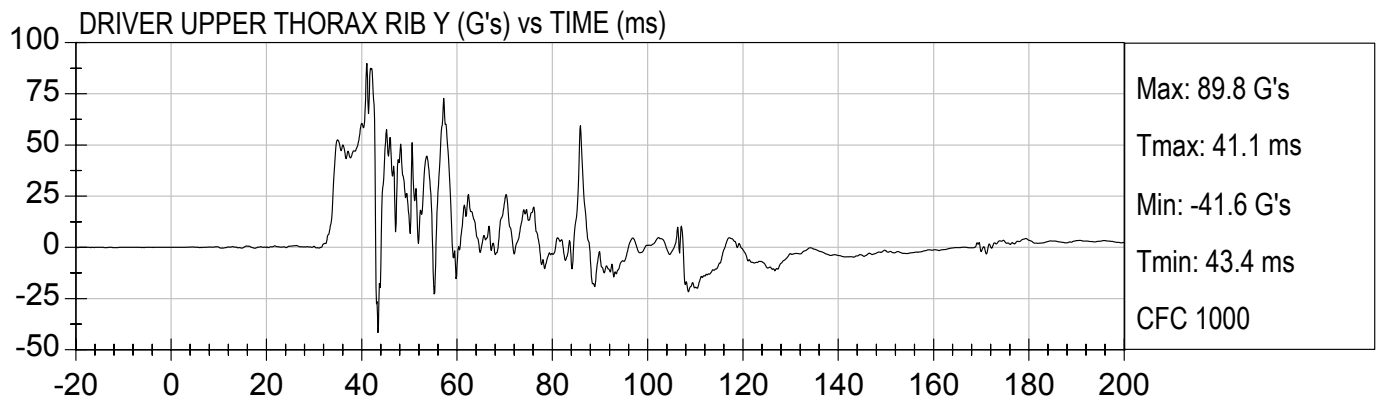


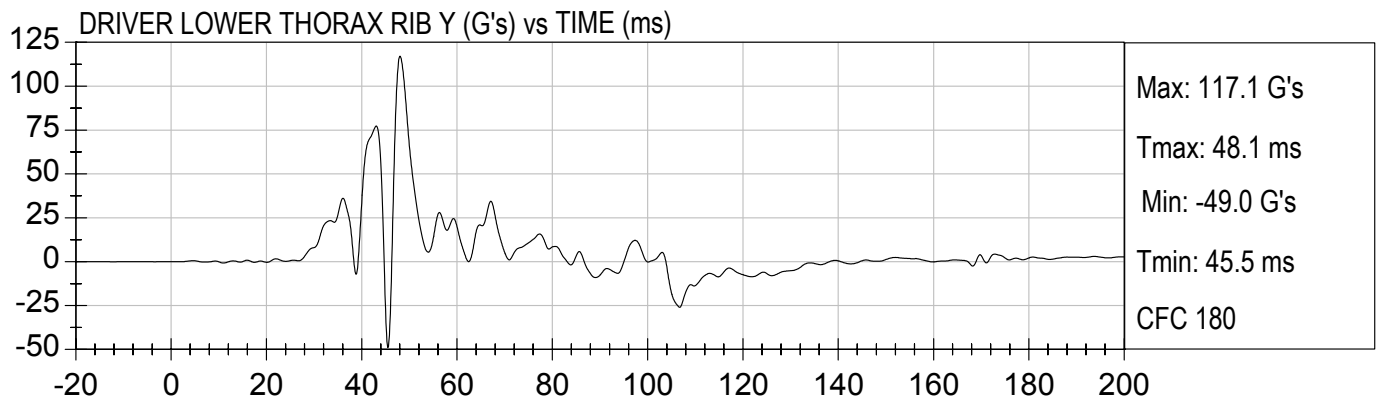
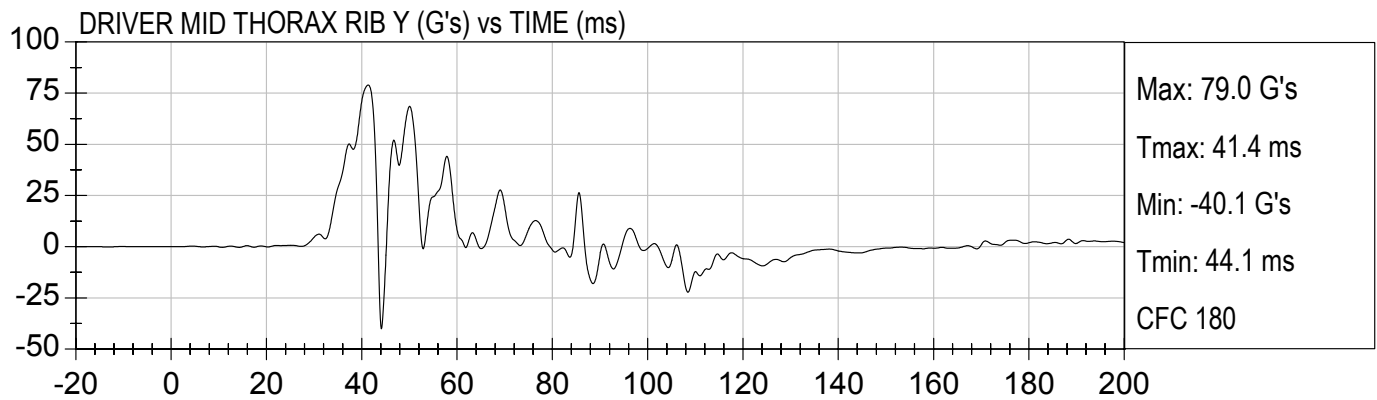
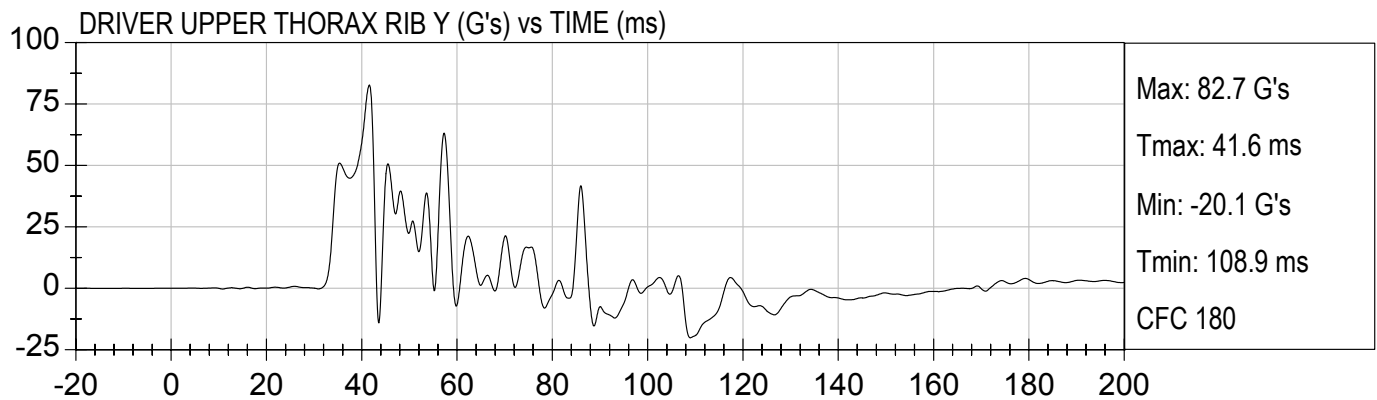
DRIVER UPPER SPINE Z Velocity (kph) vs TIME (ms)

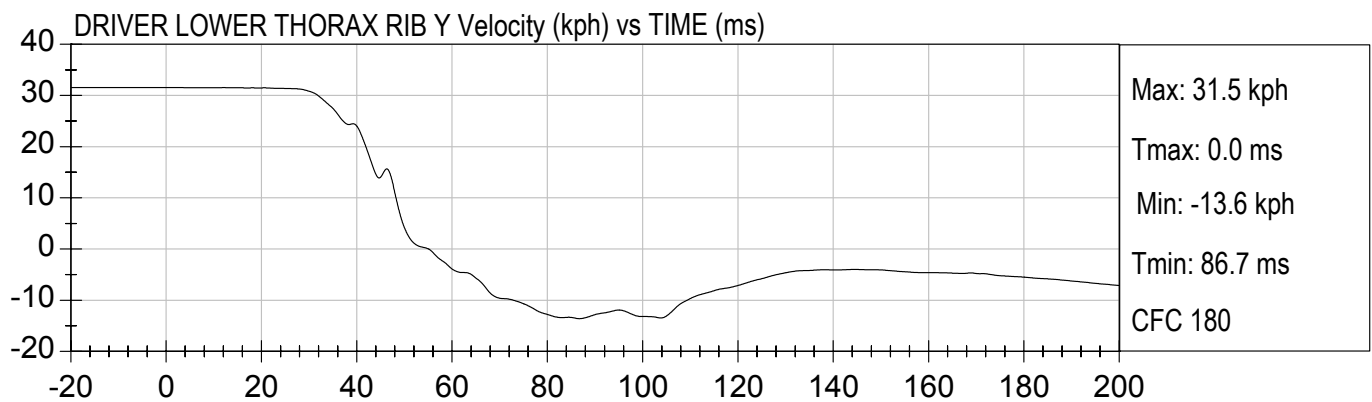
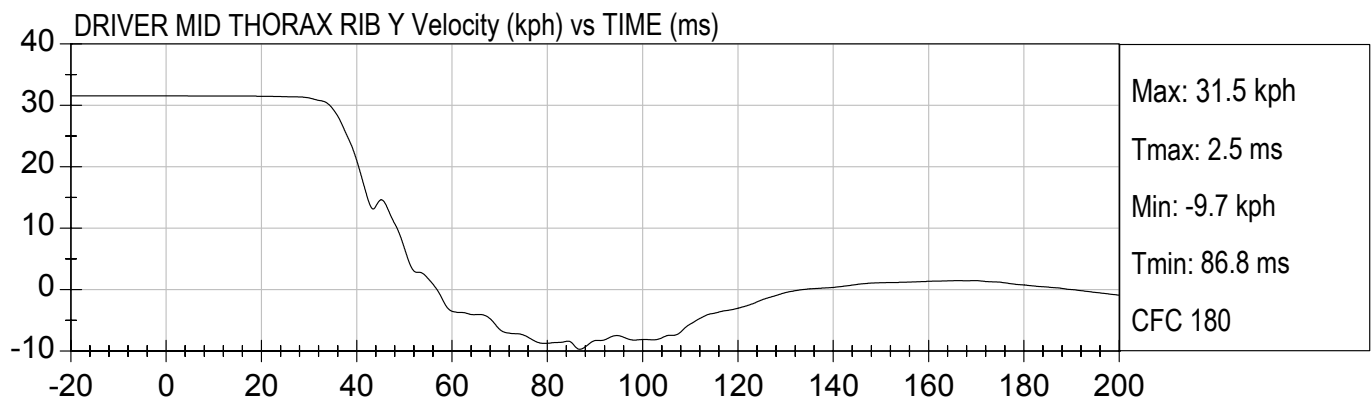
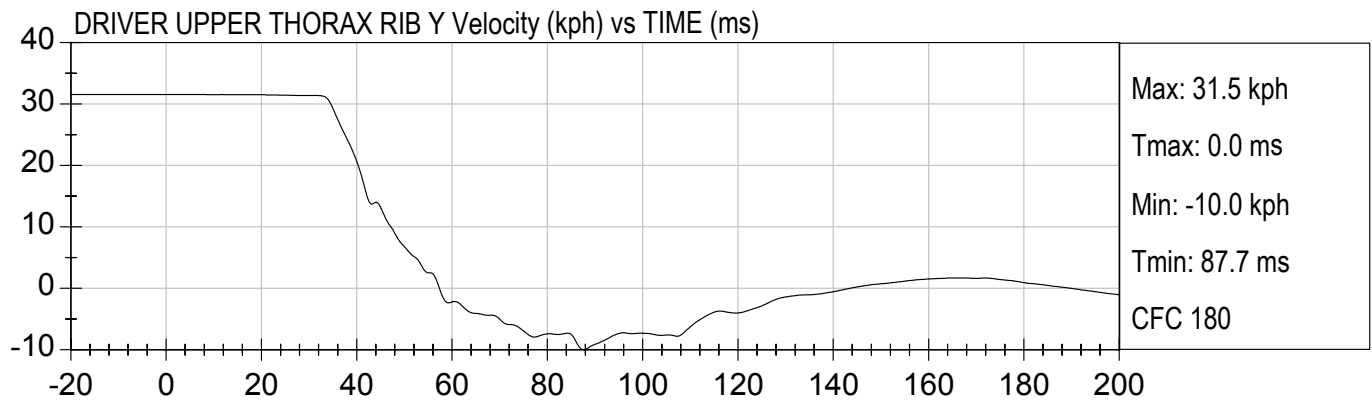


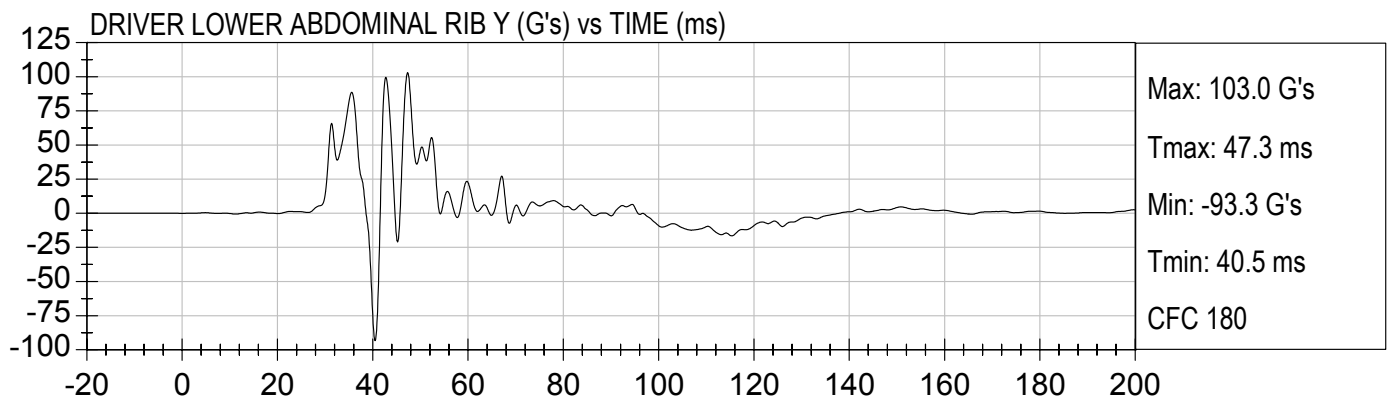
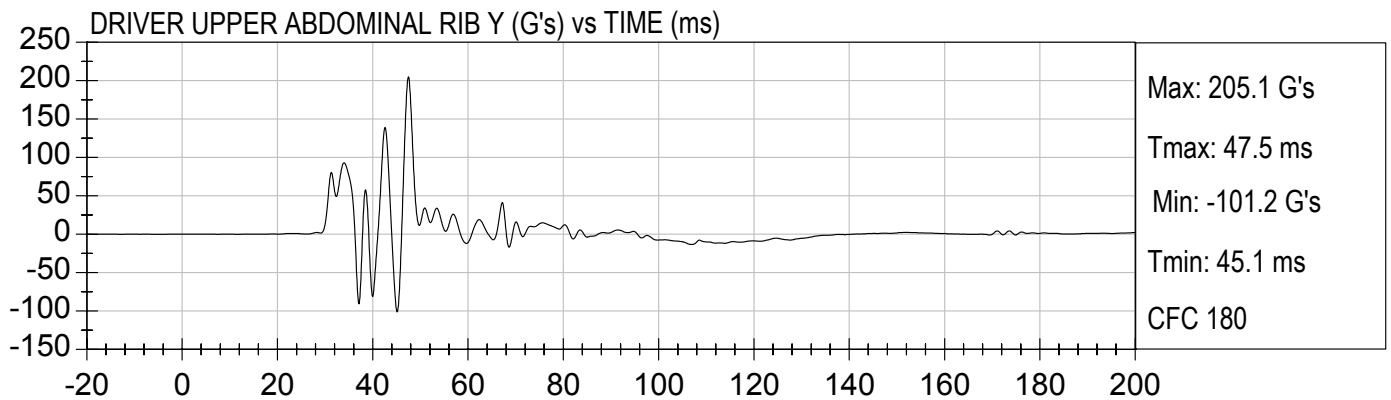
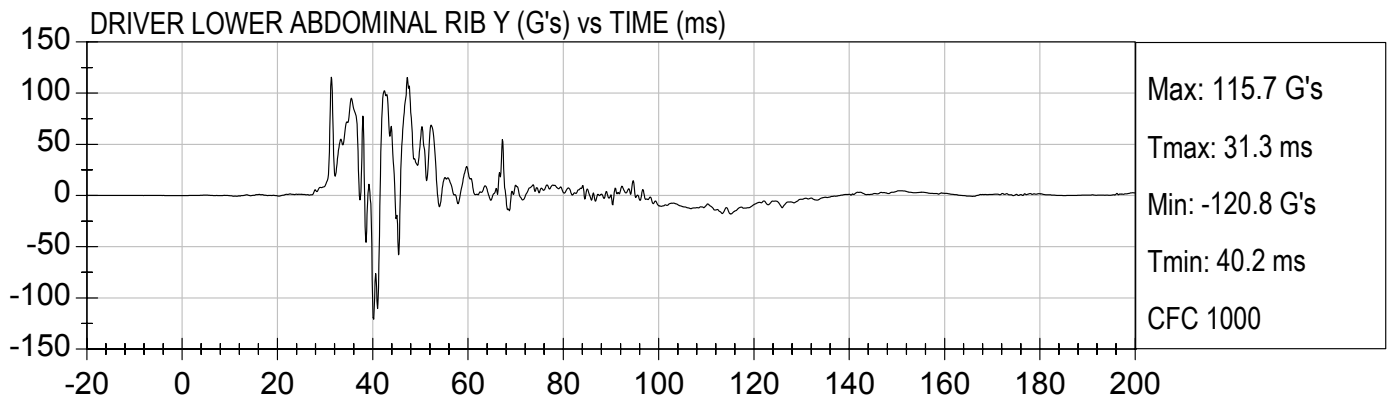
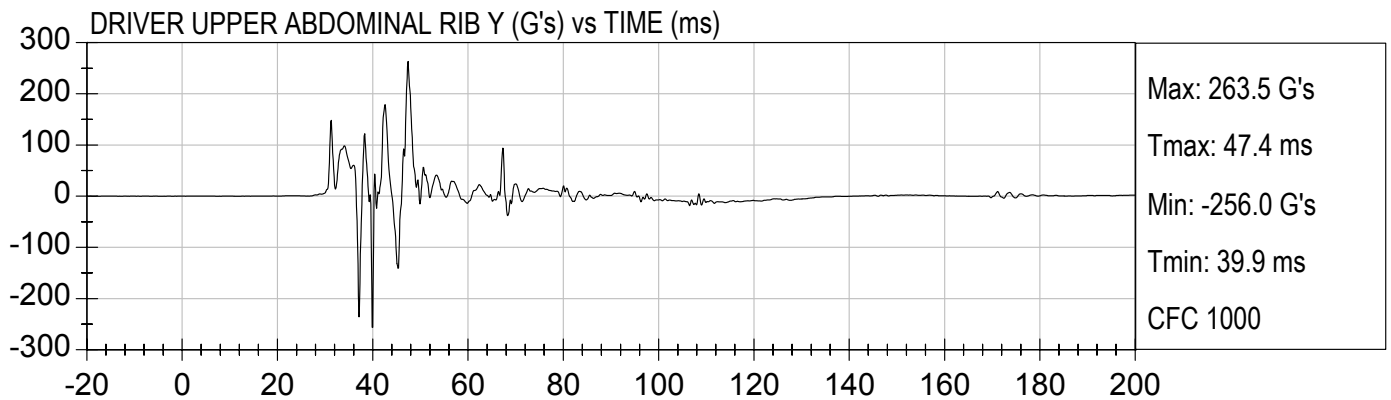


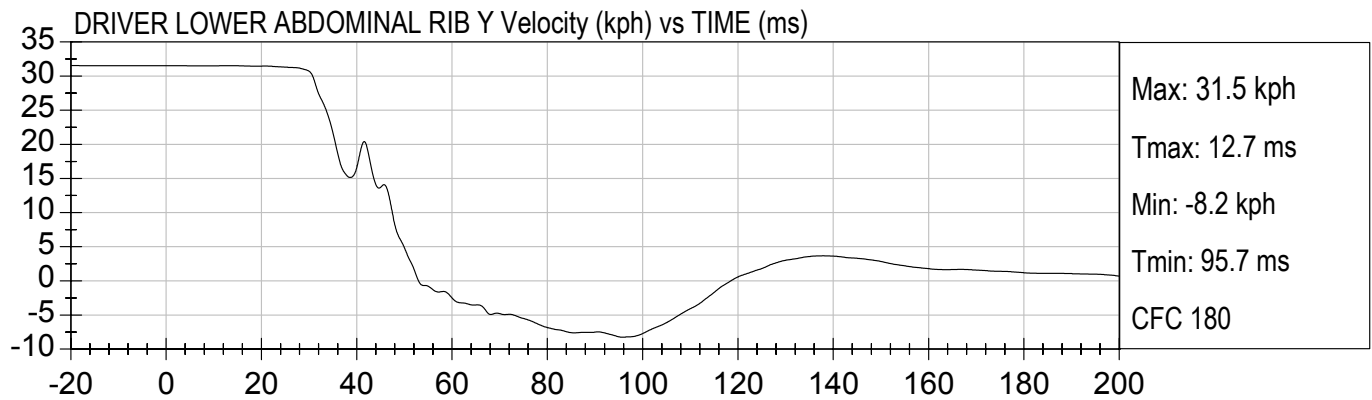
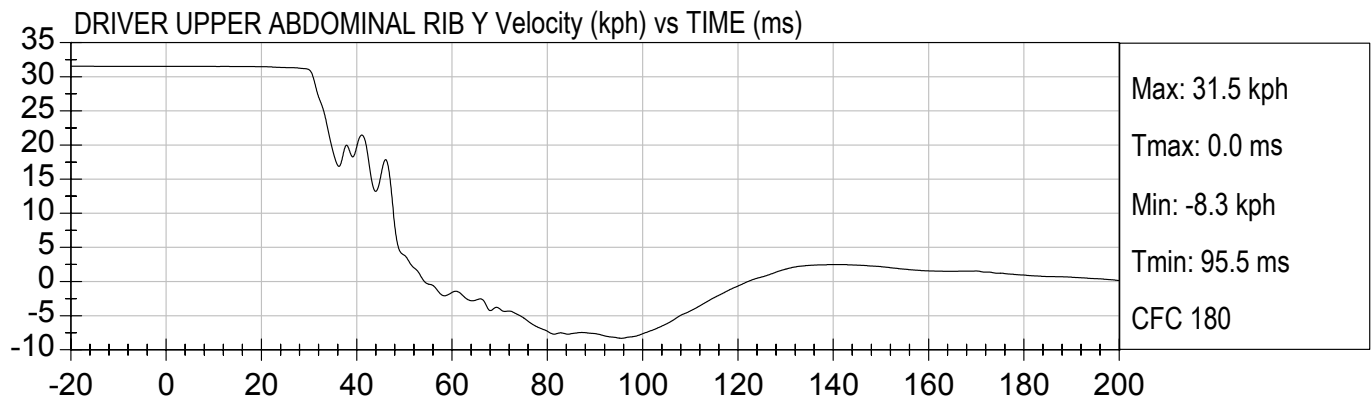






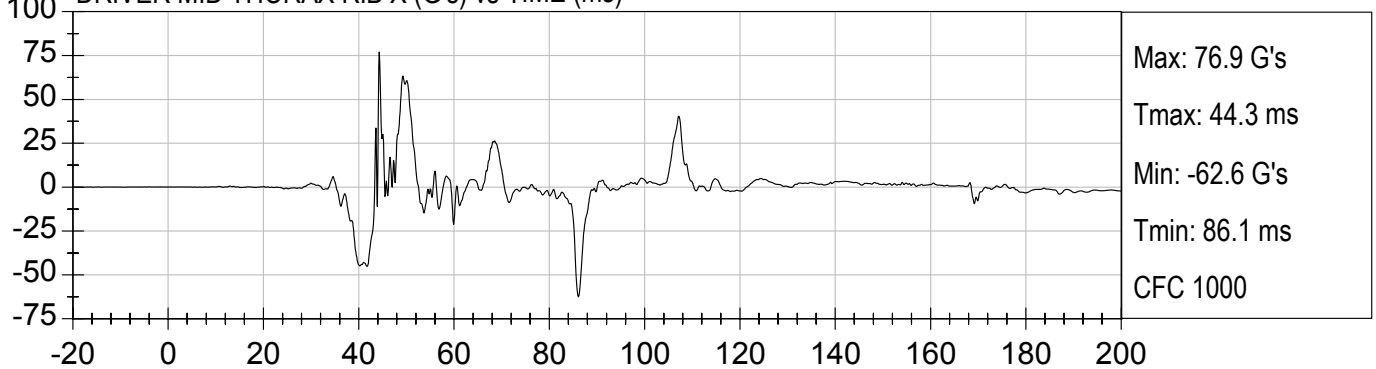




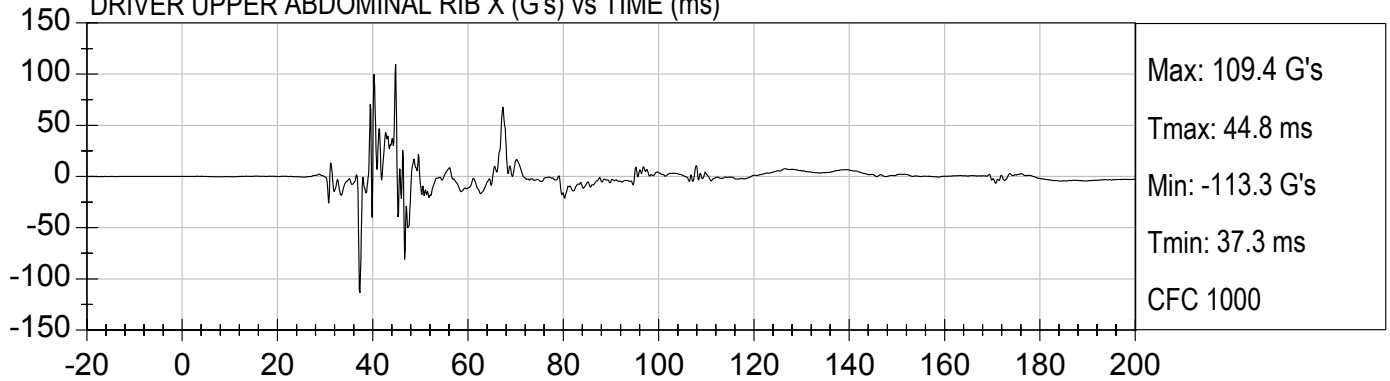




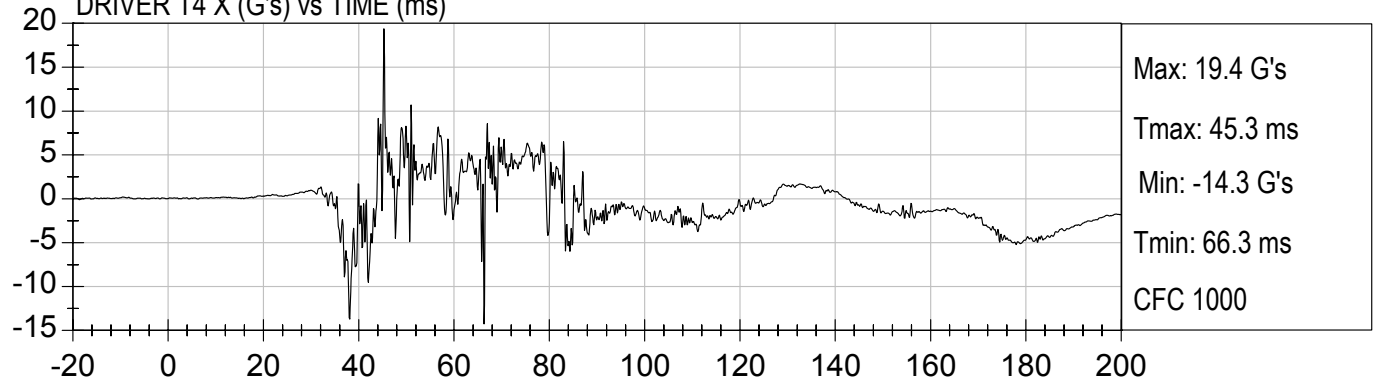
DRIVER MID THORAX RIB X (G's) vs TIME (ms)

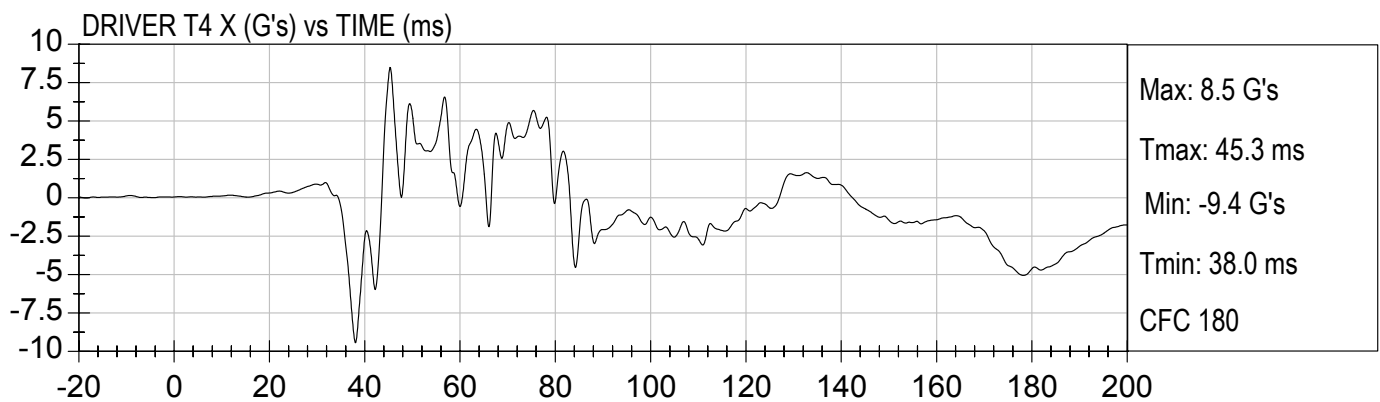
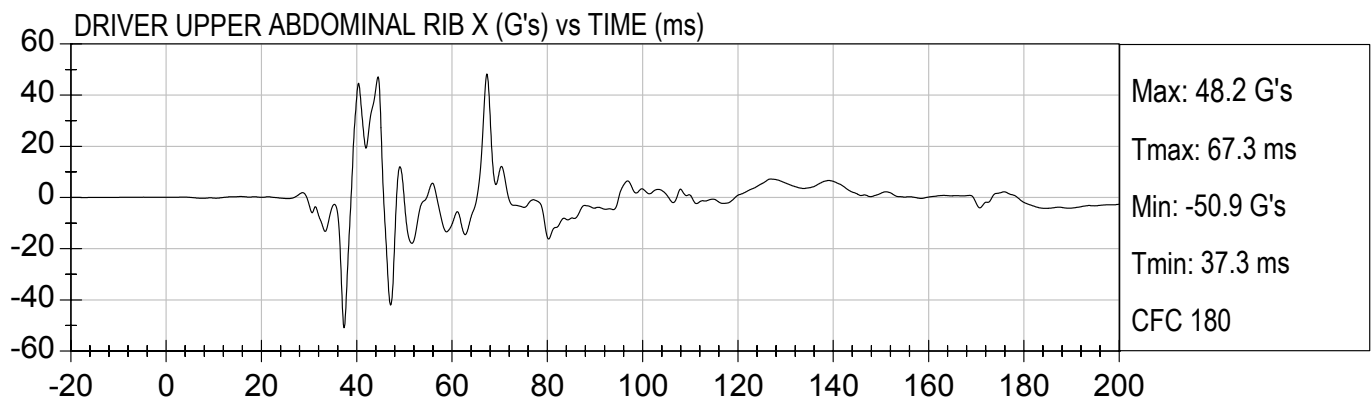
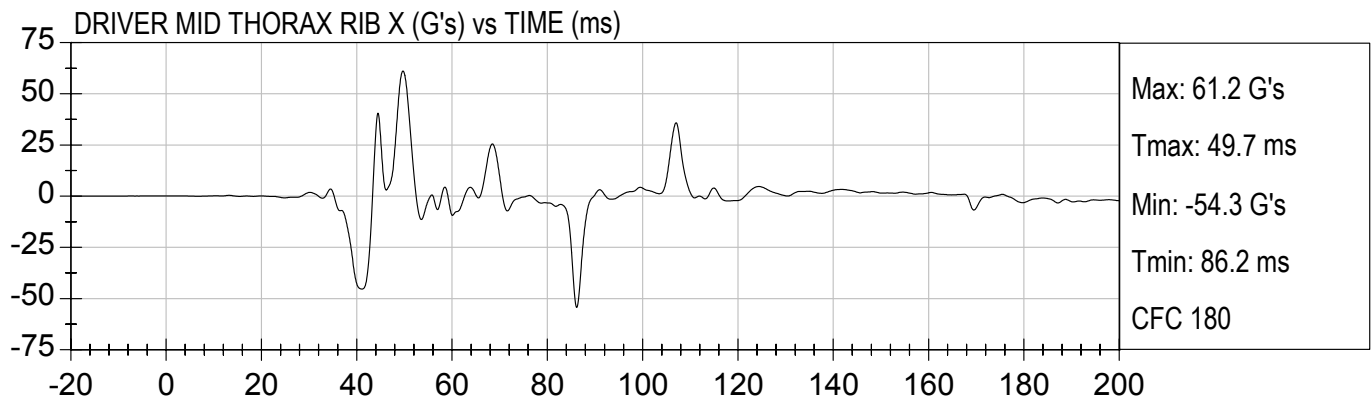


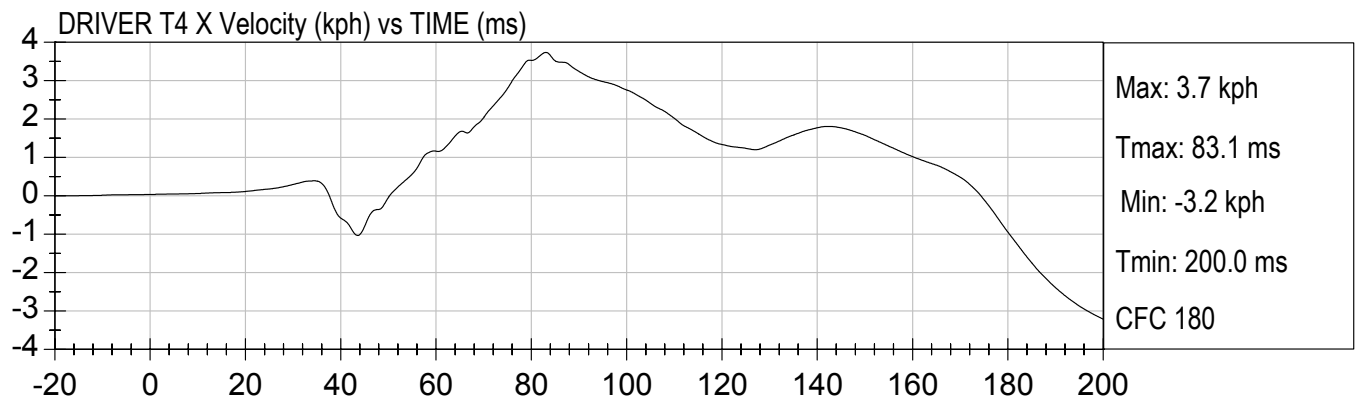
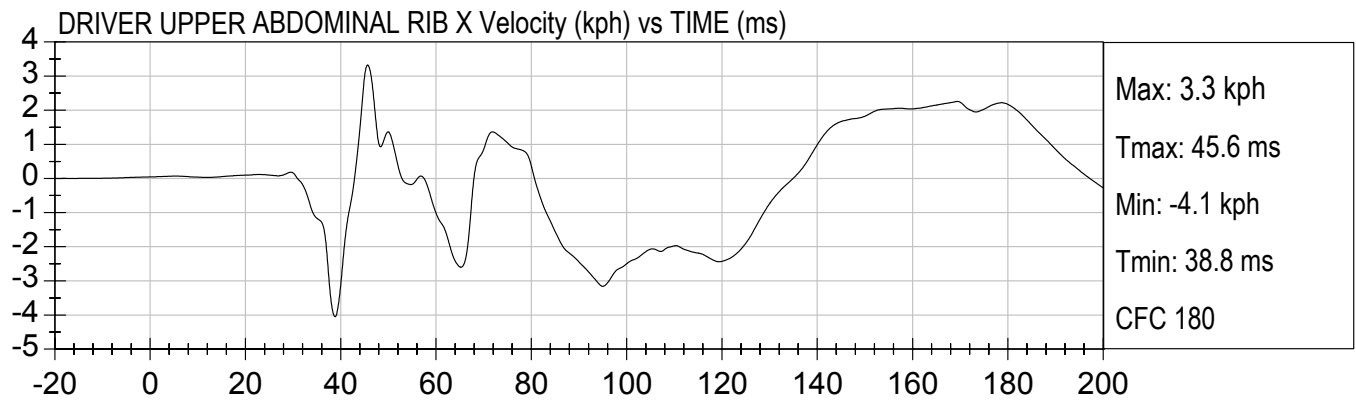
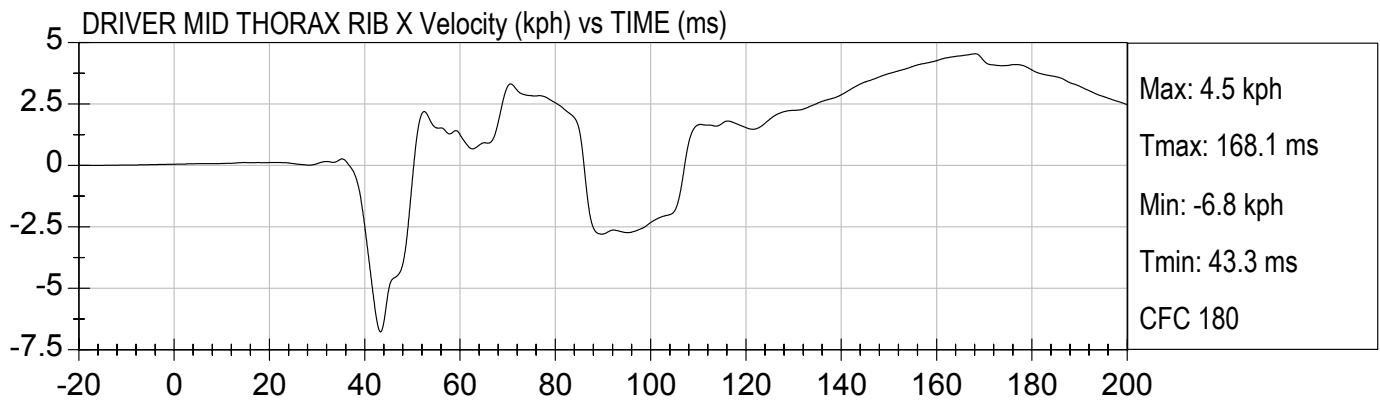
DRIVER UPPER ABDOMINAL RIB X (G's) vs TIME (ms)



DRIVER T4 X (G's) vs TIME (ms)

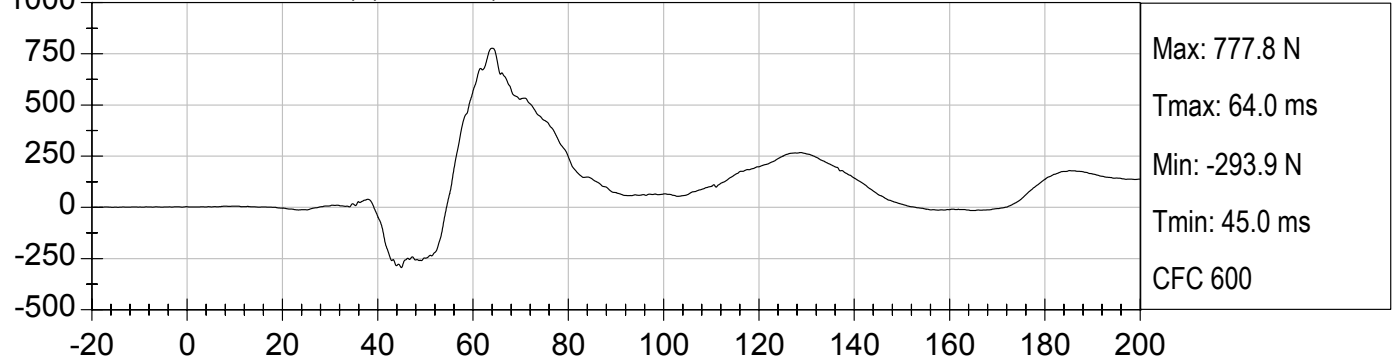




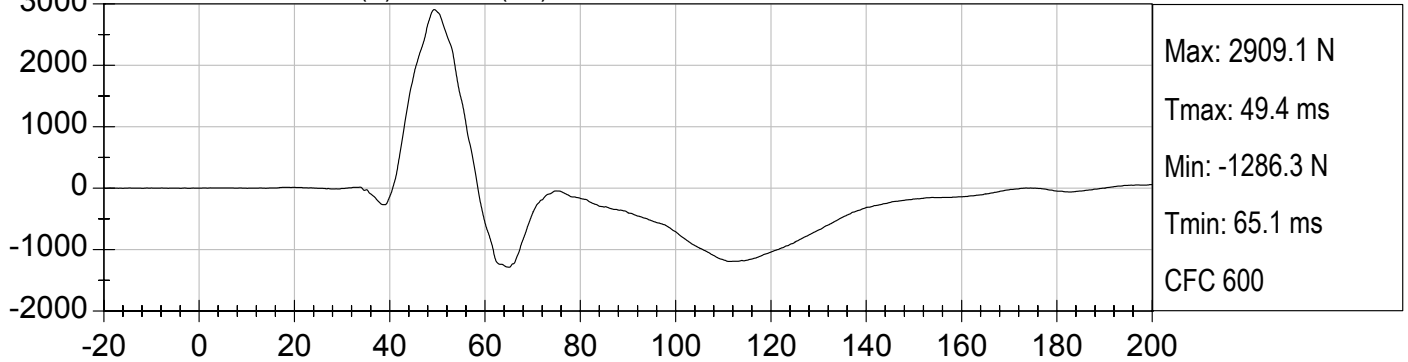




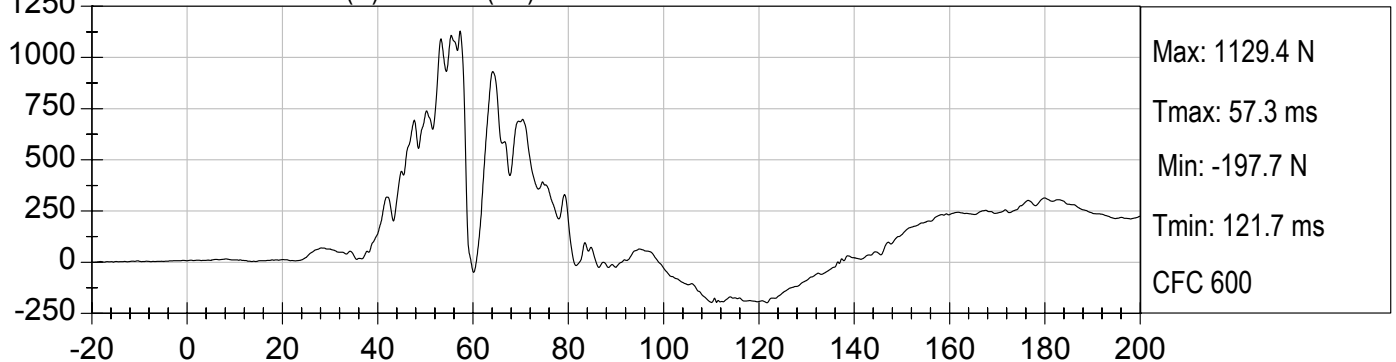
DRIVER LUMBAR FX (N) vs TIME (ms)



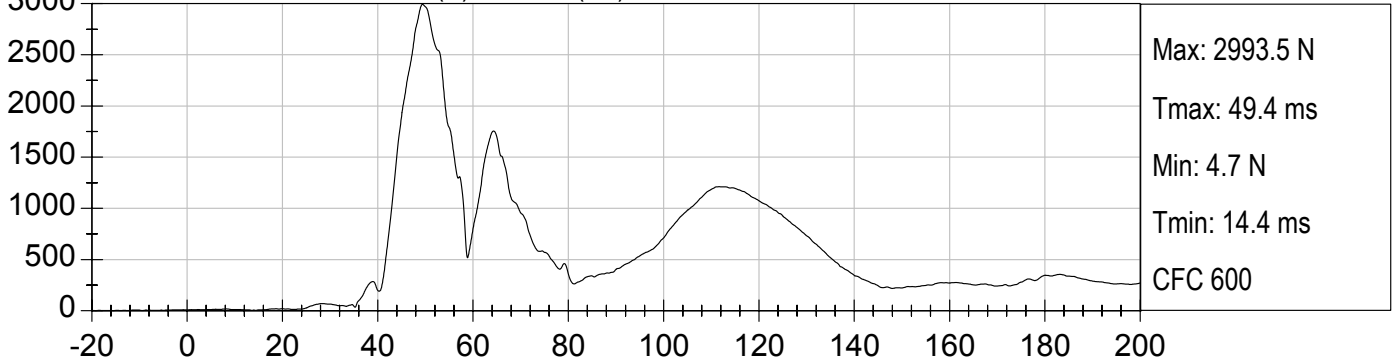
DRIVER LUMBAR FY (N) vs TIME (ms)



DRIVER LUMBAR FZ (N) vs TIME (ms)

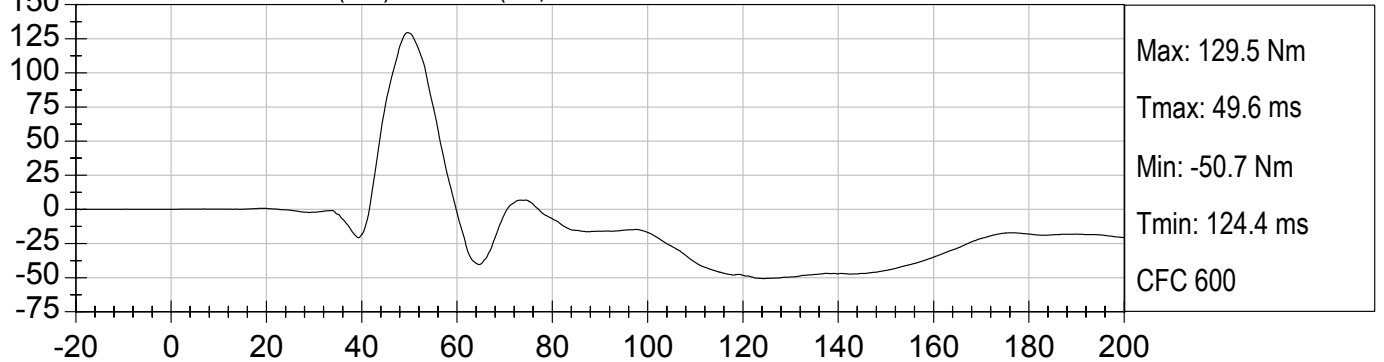


DRIVER LUMBAR FResultant (N) vs TIME (ms)

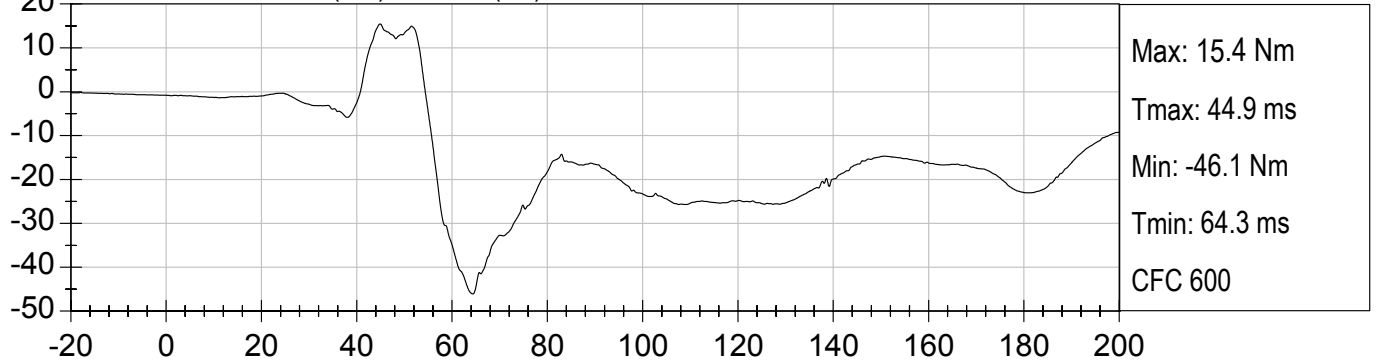




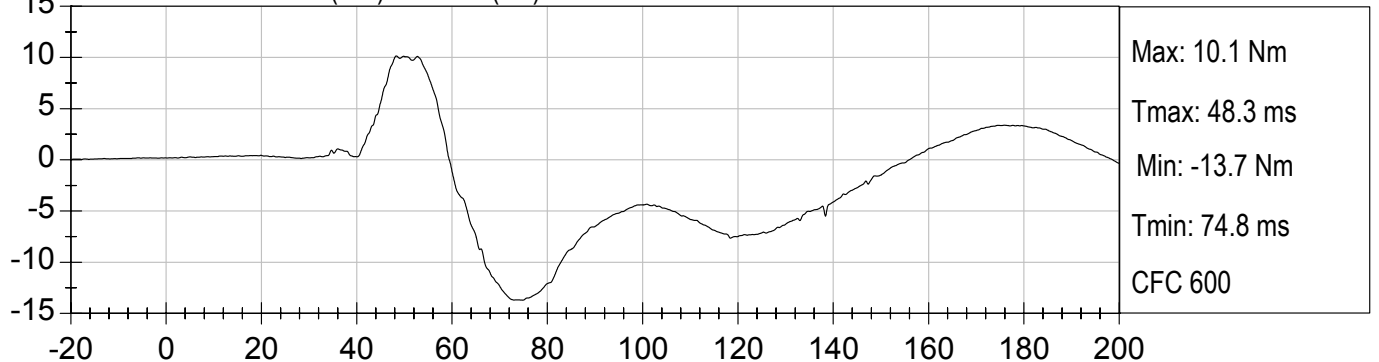
DRIVER LUMBAR MX (Nm) vs TIME (ms)



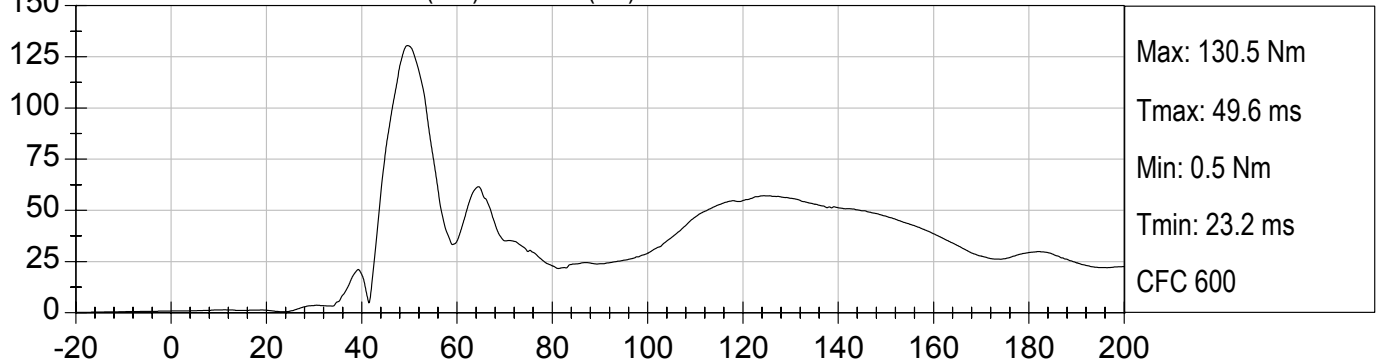
DRIVER LUMBAR MY (Nm) vs TIME (ms)

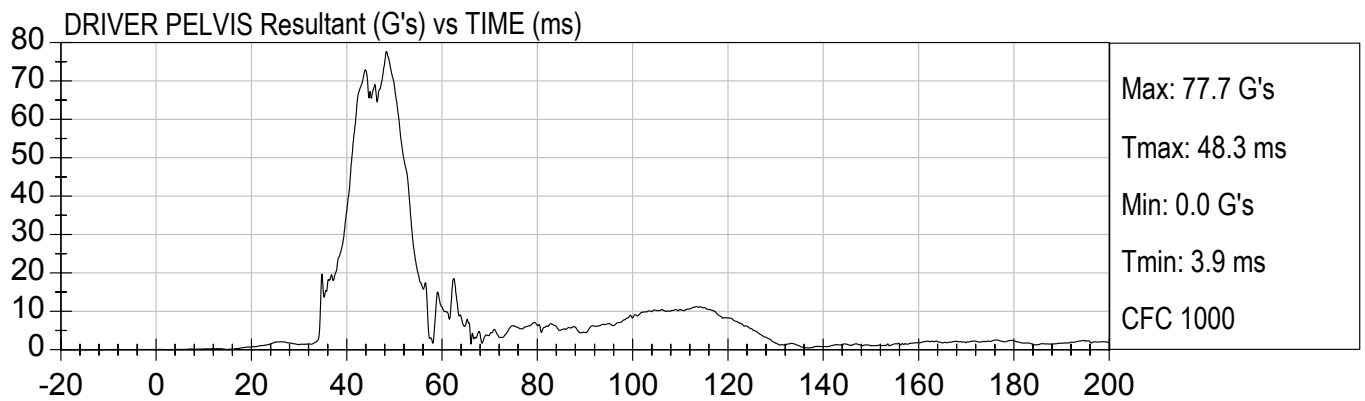
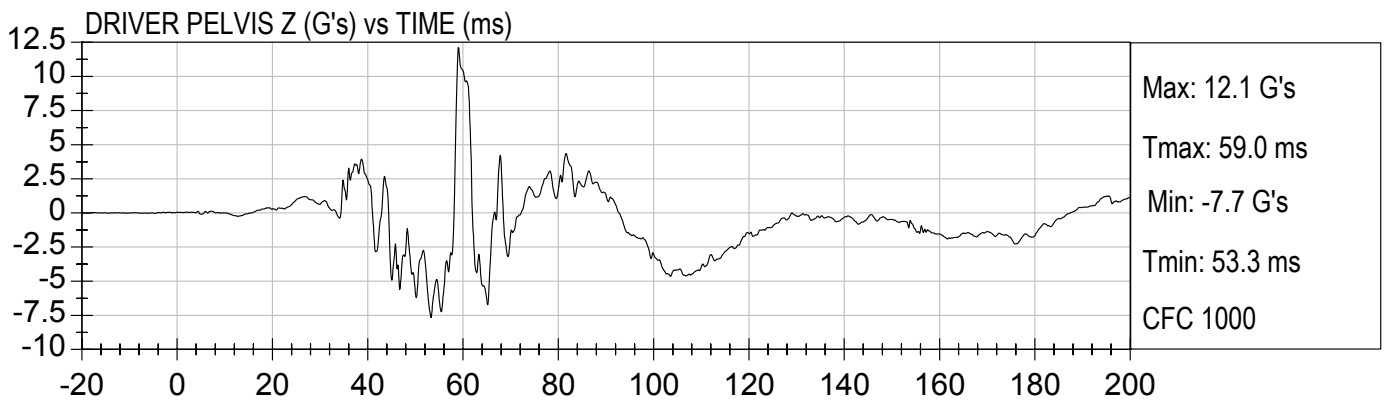
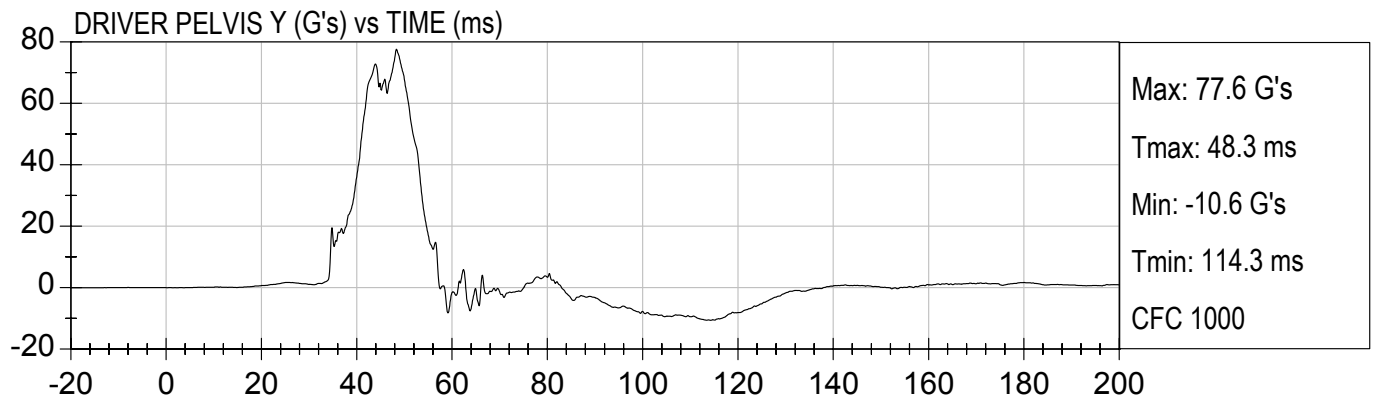
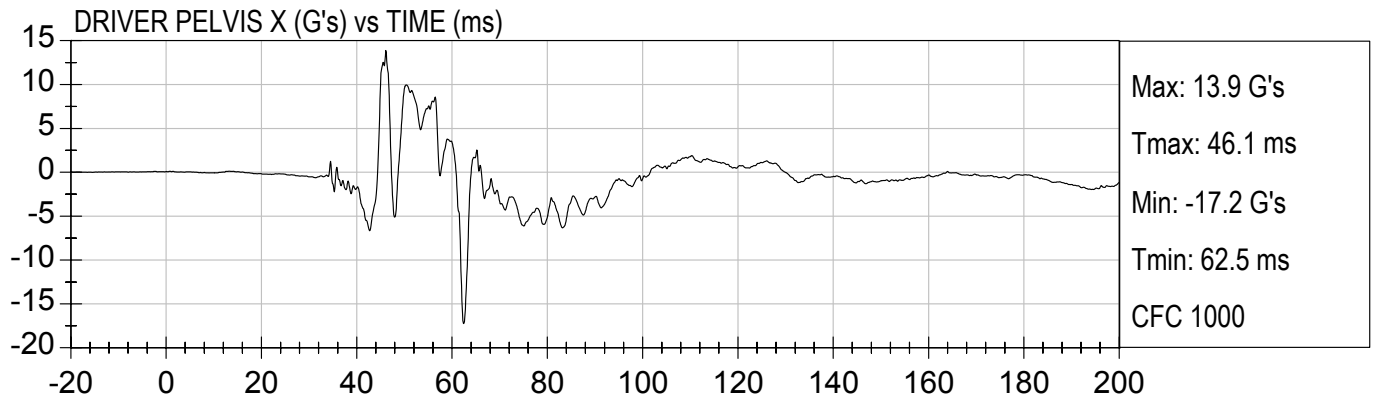


DRIVER LUMBAR MZ (Nm) vs TIME (ms)



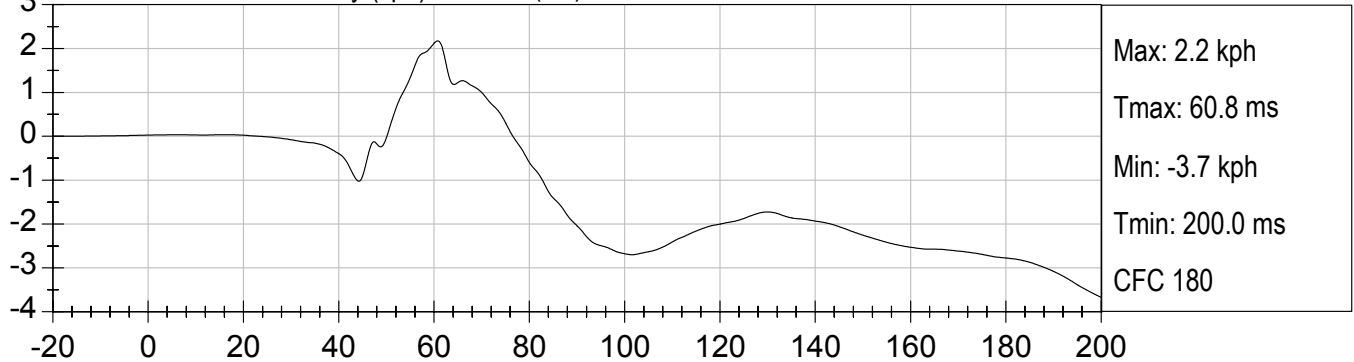
DRIVER LUMBAR MResultant (Nm) vs TIME (ms)



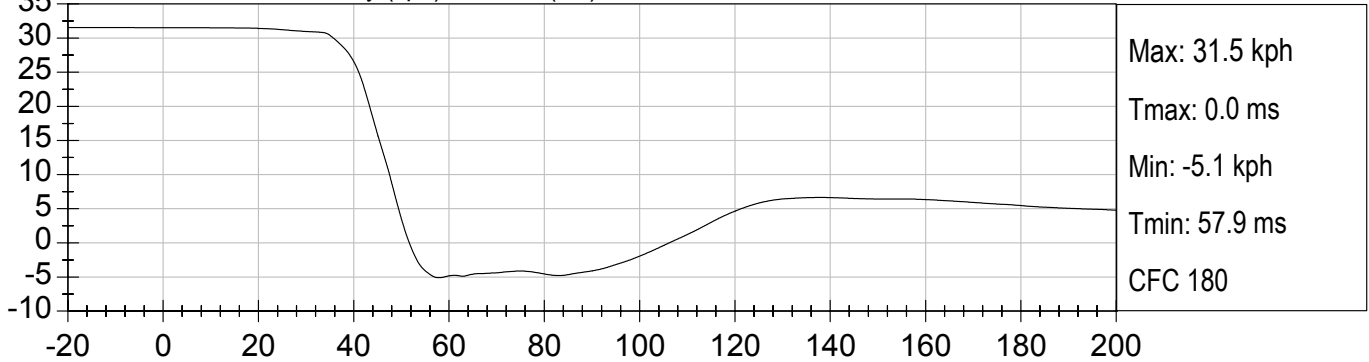




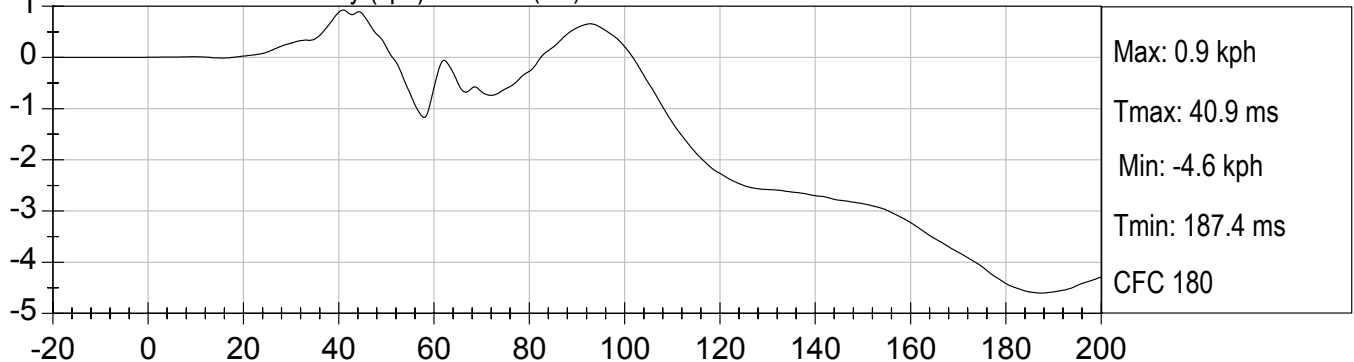
DRIVER PELVIS X Velocity (kph) vs TIME (ms)

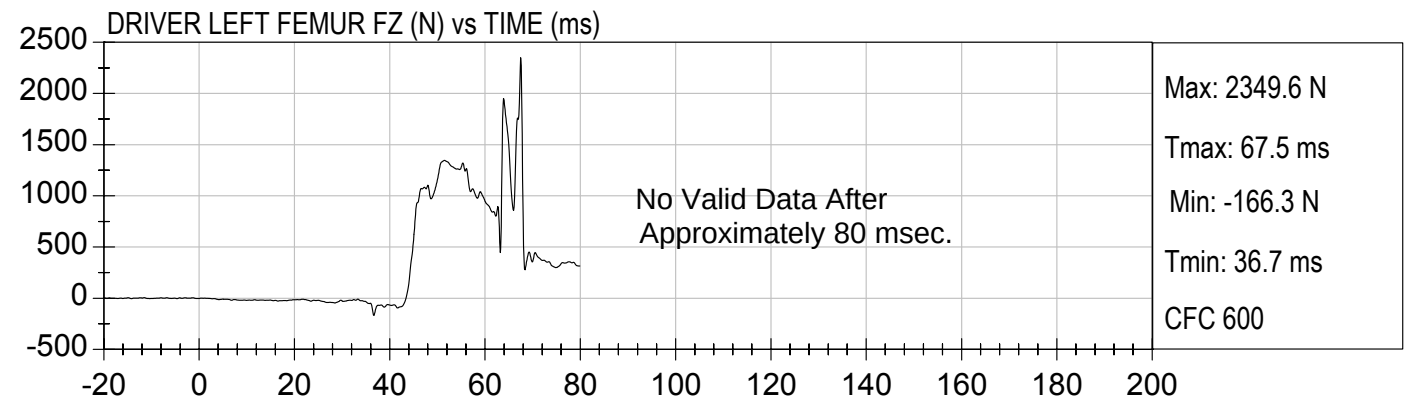
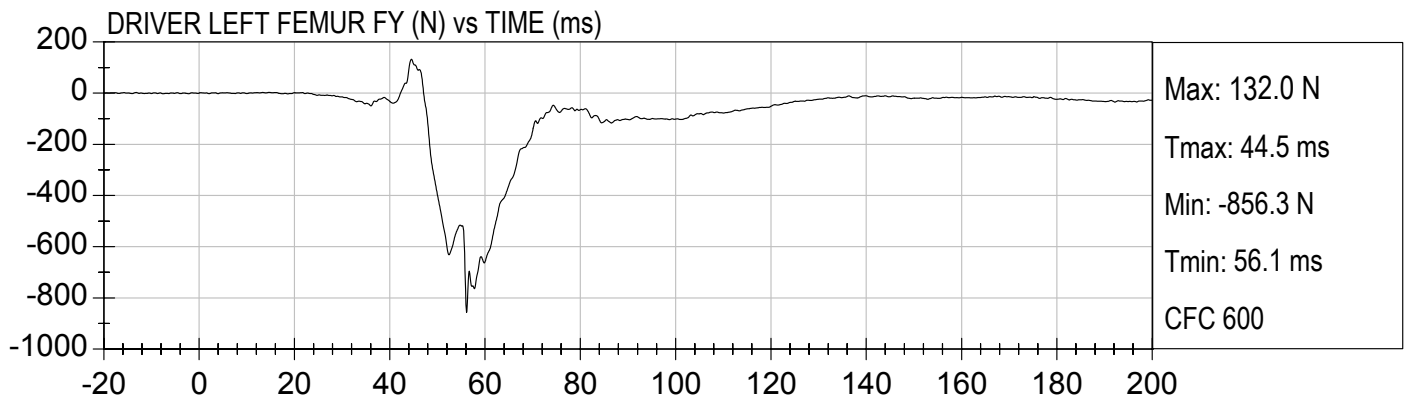
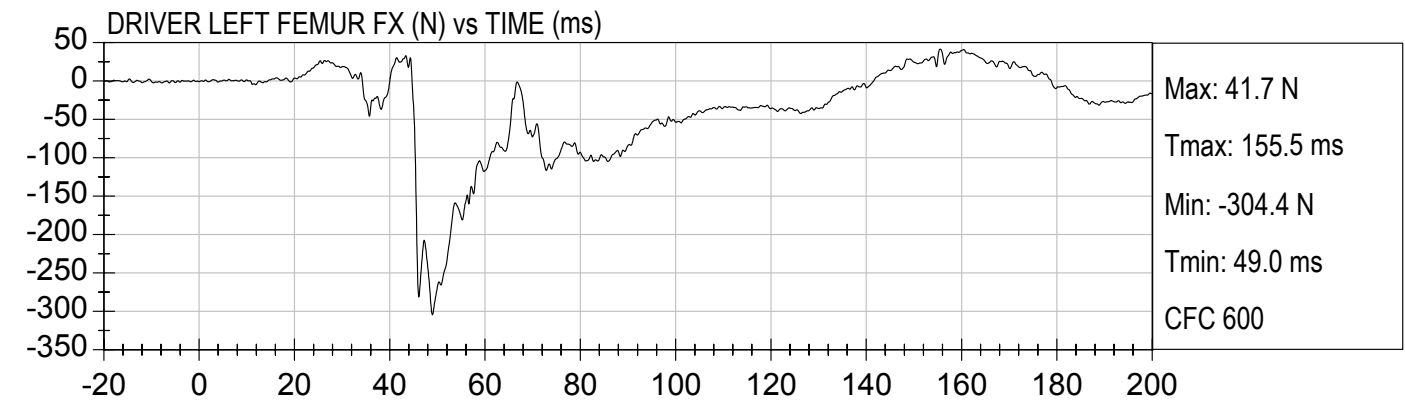


DRIVER PELVIS Y Velocity (kph) vs TIME (ms)



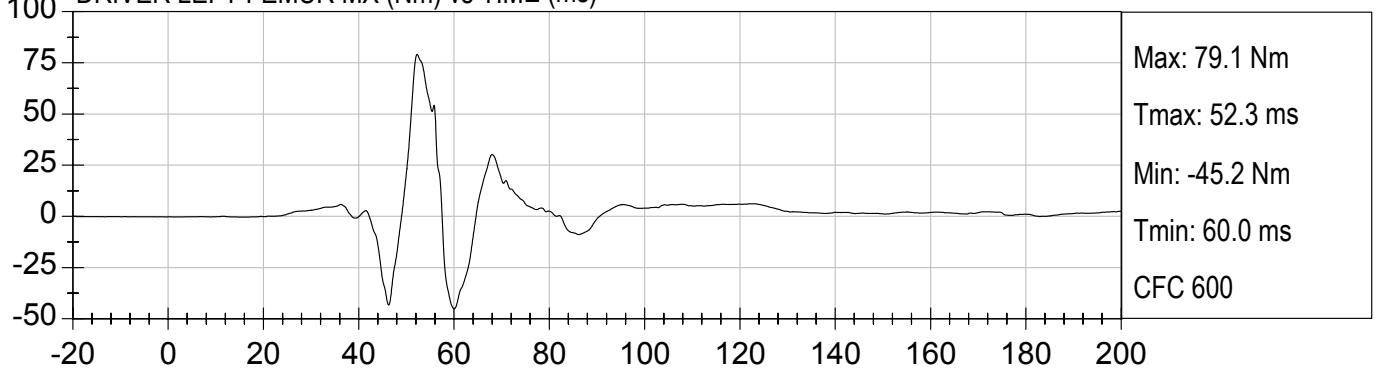
DRIVER PELVIS Z Velocity (kph) vs TIME (ms)



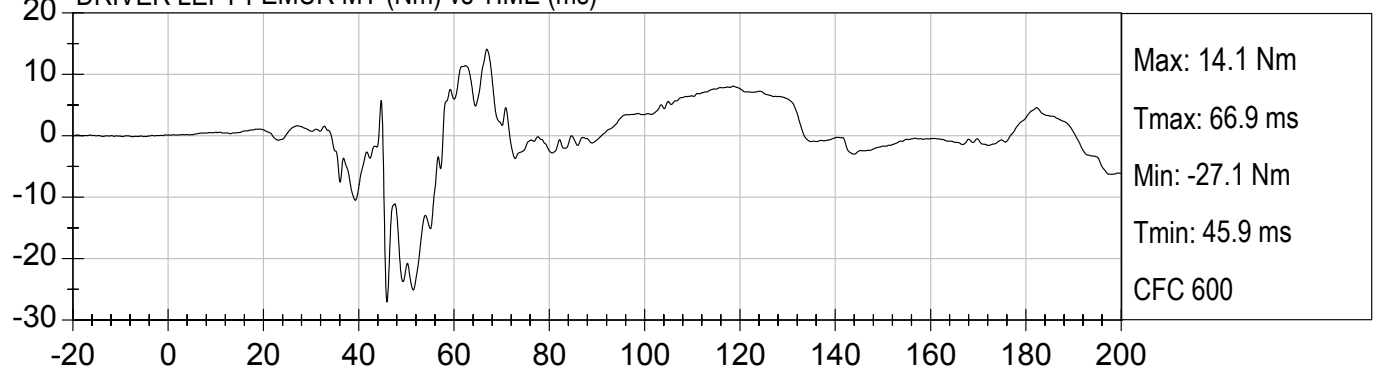




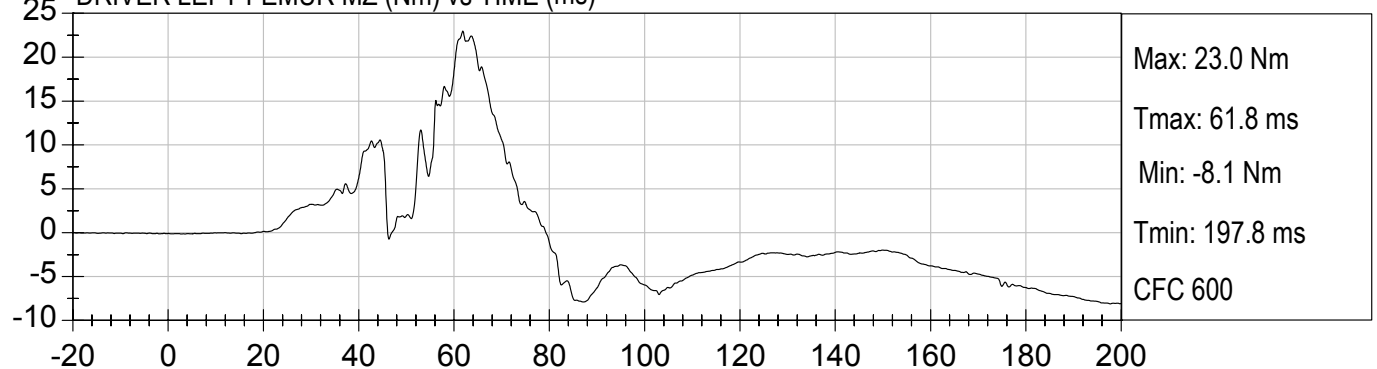
DRIVER LEFT FEMUR MX (Nm) vs TIME (ms)



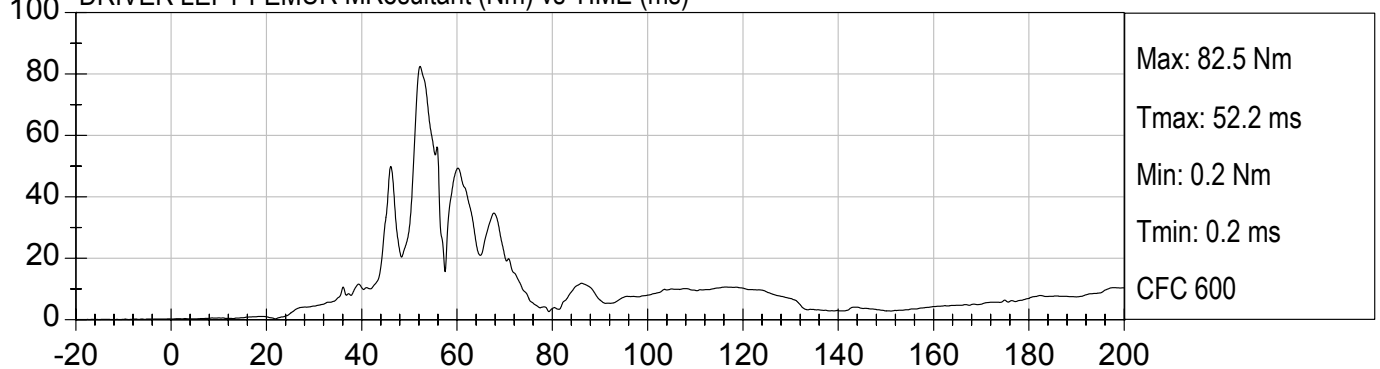
DRIVER LEFT FEMUR MY (Nm) vs TIME (ms)

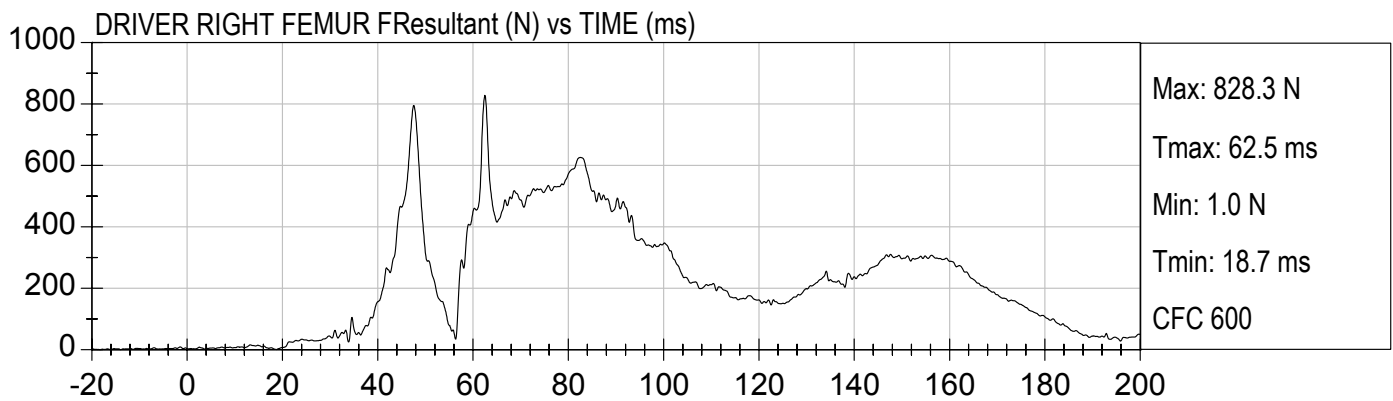
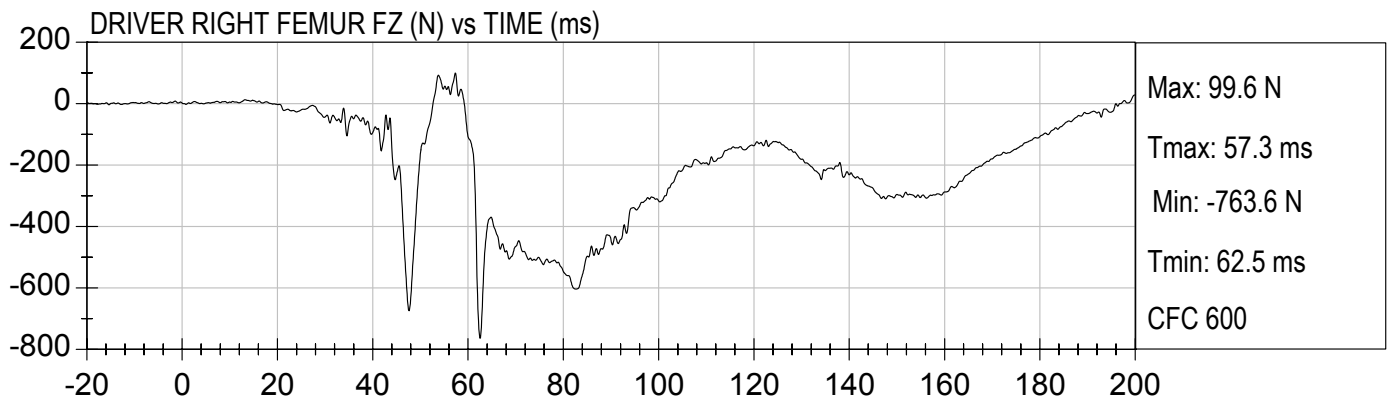
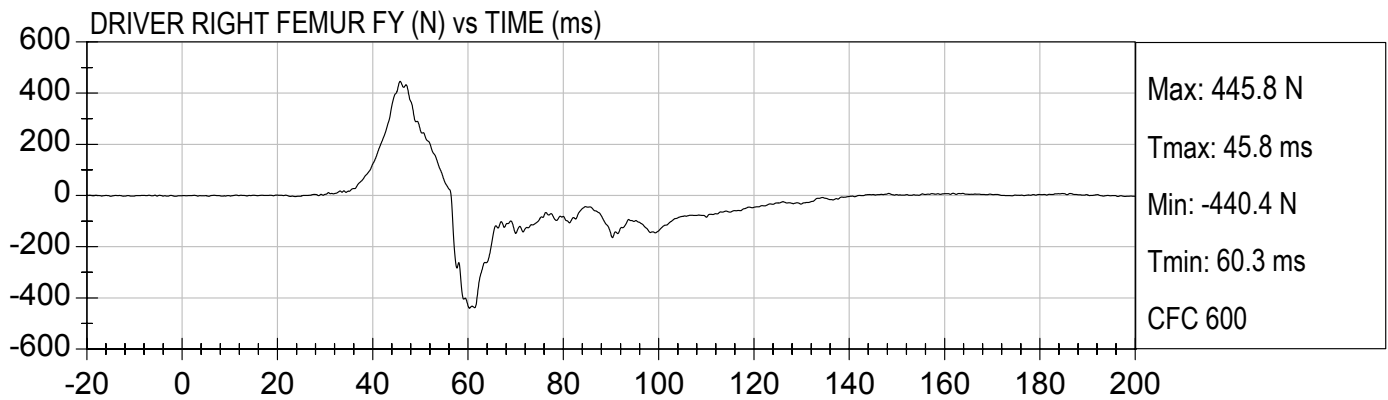
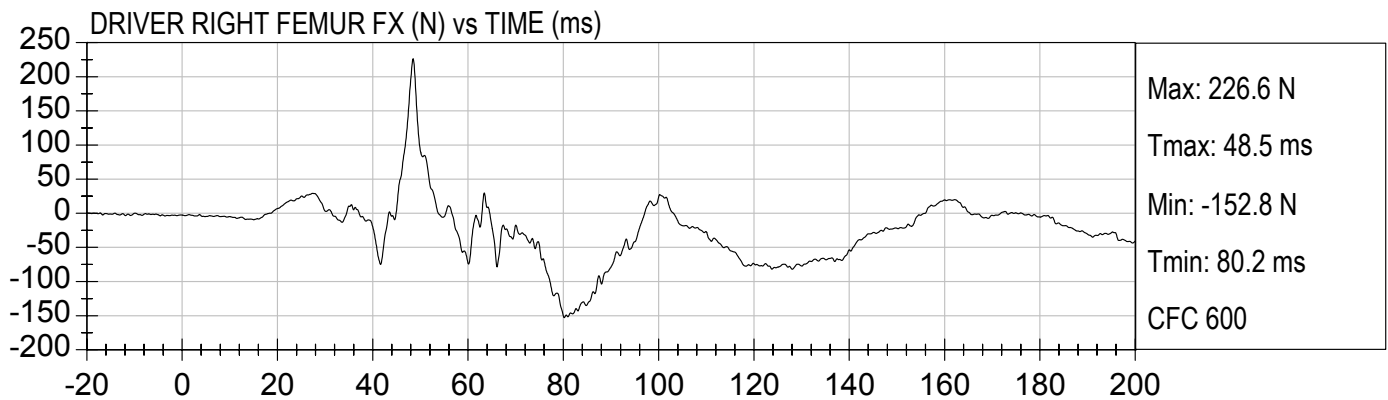


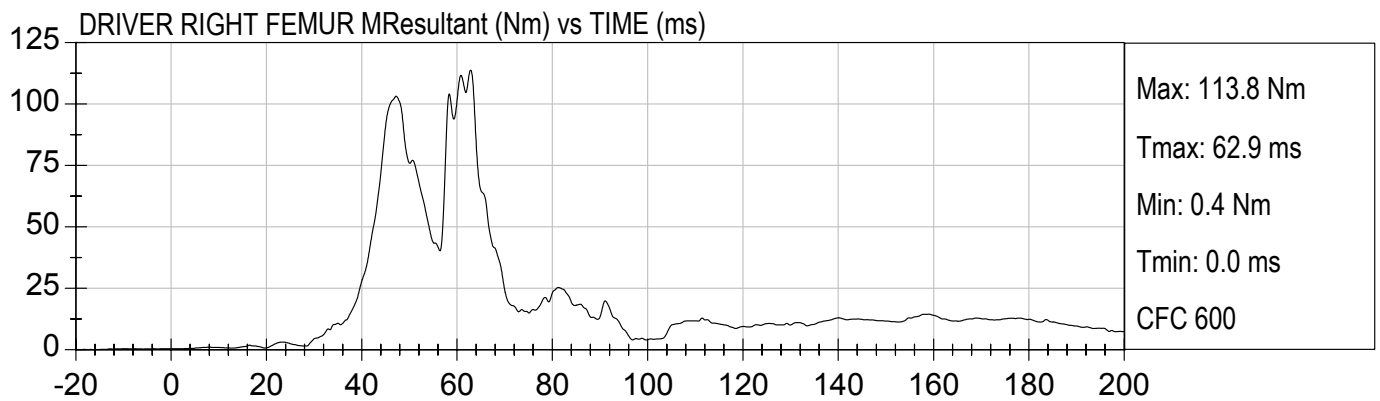
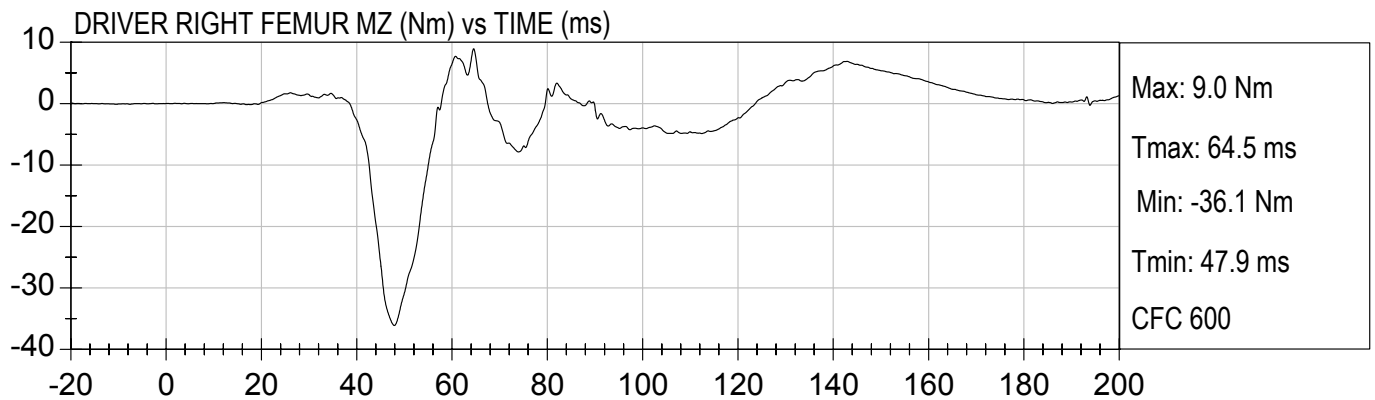
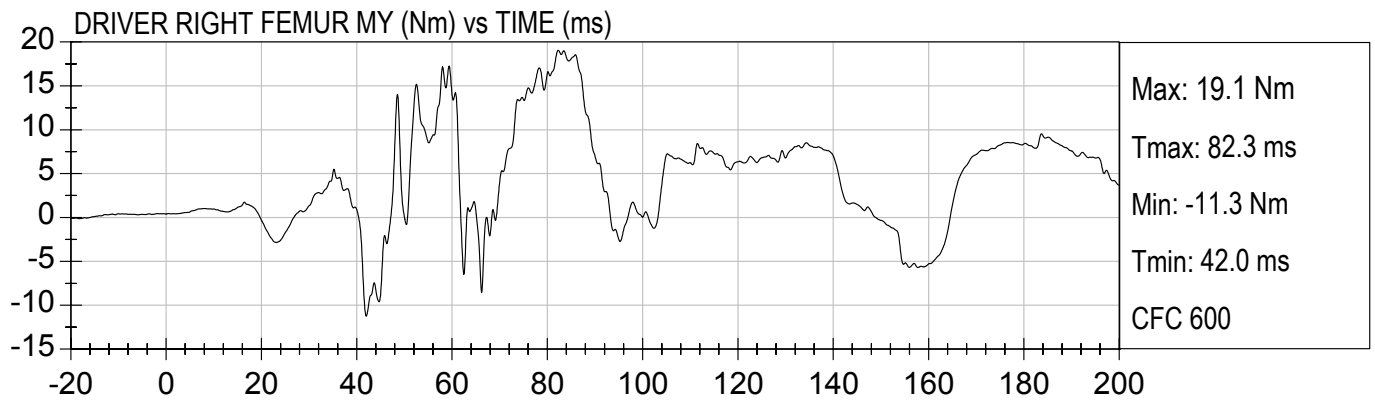
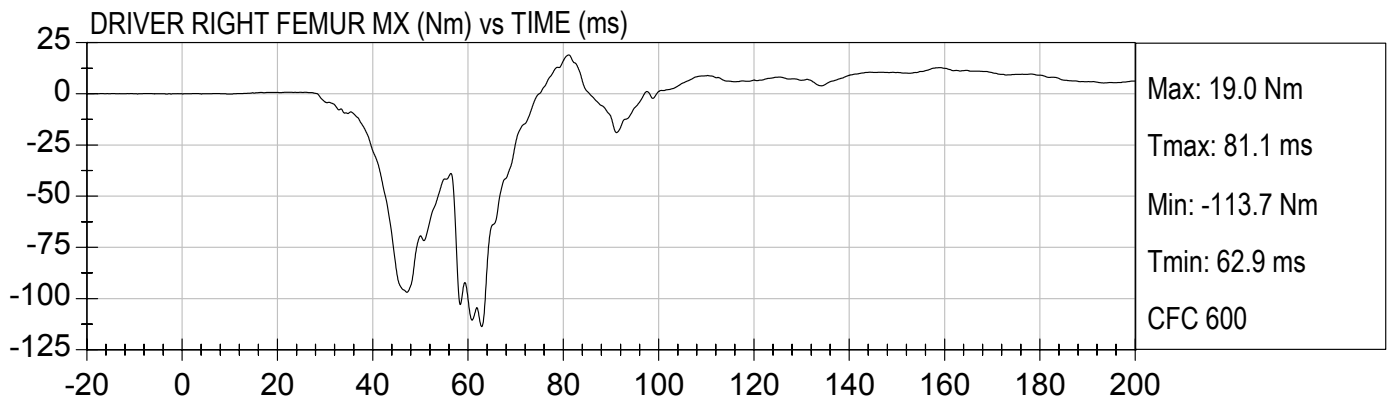
DRIVER LEFT FEMUR MZ (Nm) vs TIME (ms)



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

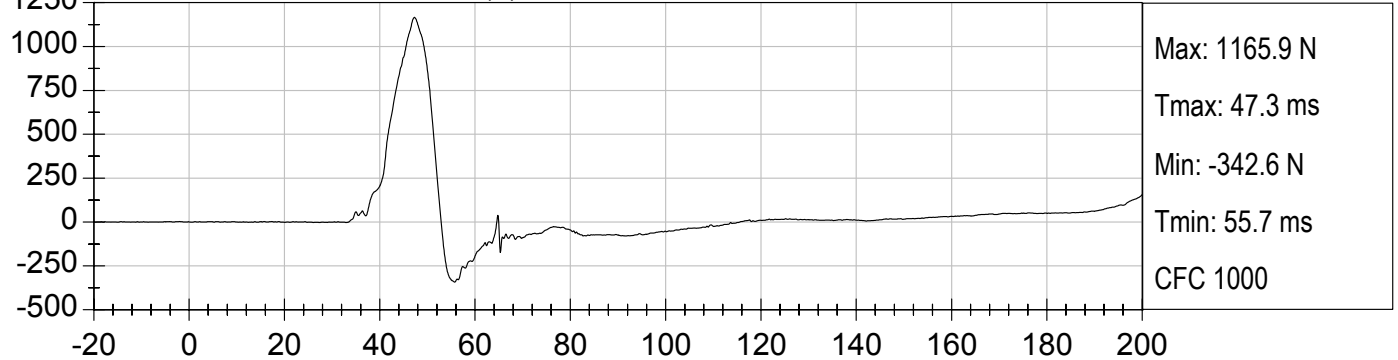




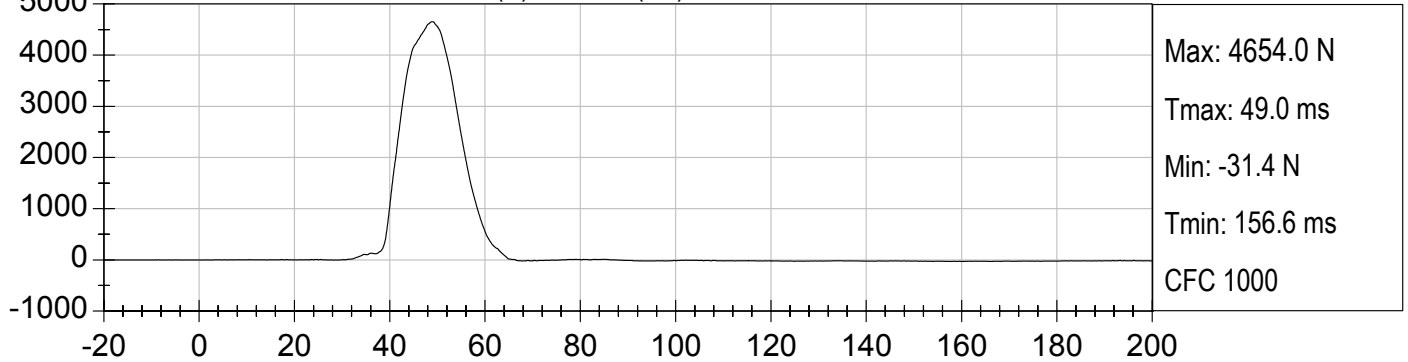




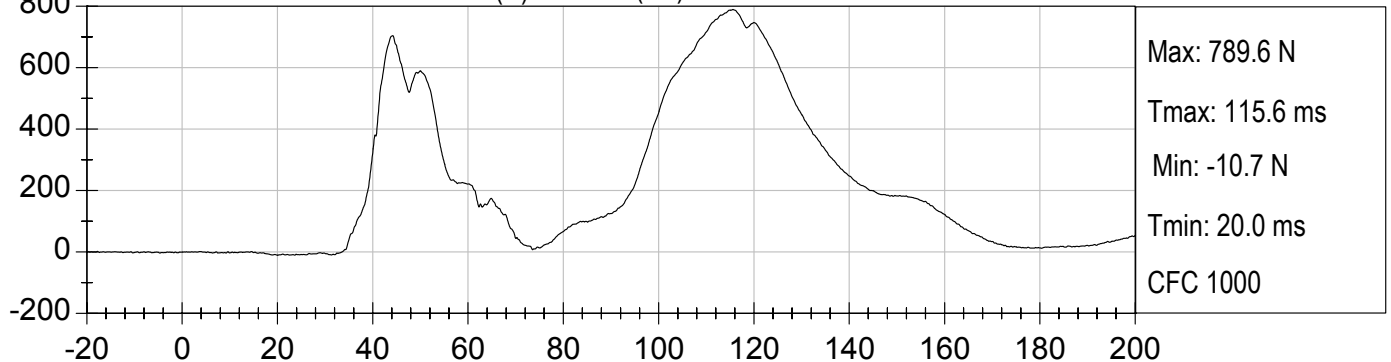
DRIVER LEFT ACETABULUM FY (N) vs TIME (ms)



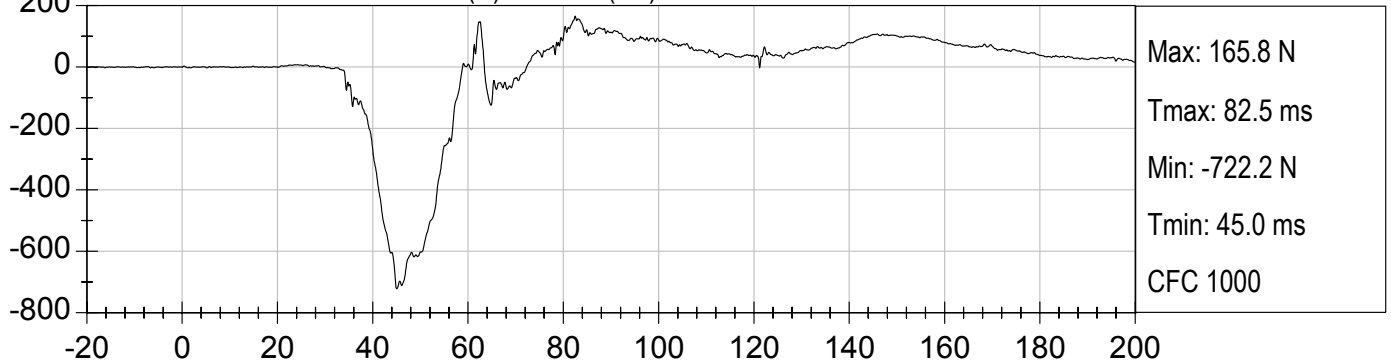
DRIVER LEFT ILLIUM CREST FY (N) vs TIME (ms)



DRIVER RIGHT ILLIUM CREST FY (N) vs TIME (ms)

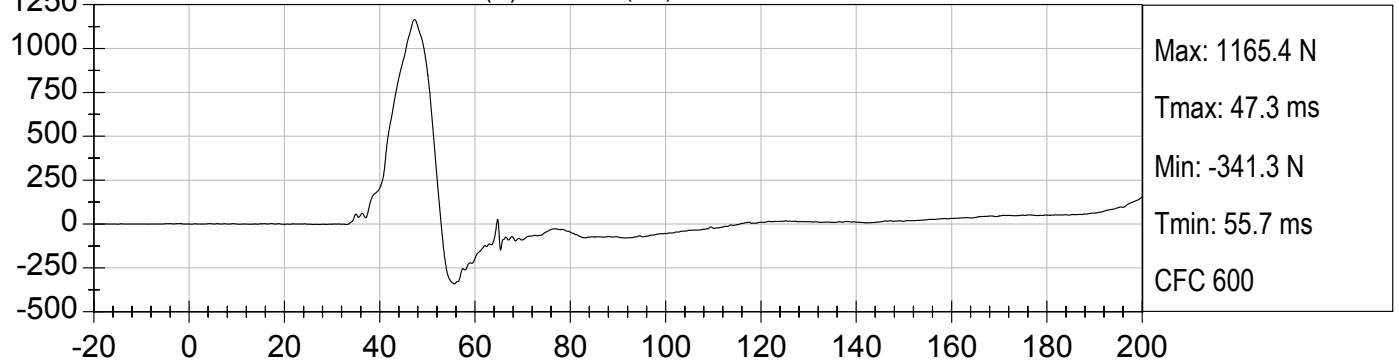


DRIVER PUBIC SYMPHYSIS FY (N) vs TIME (ms)

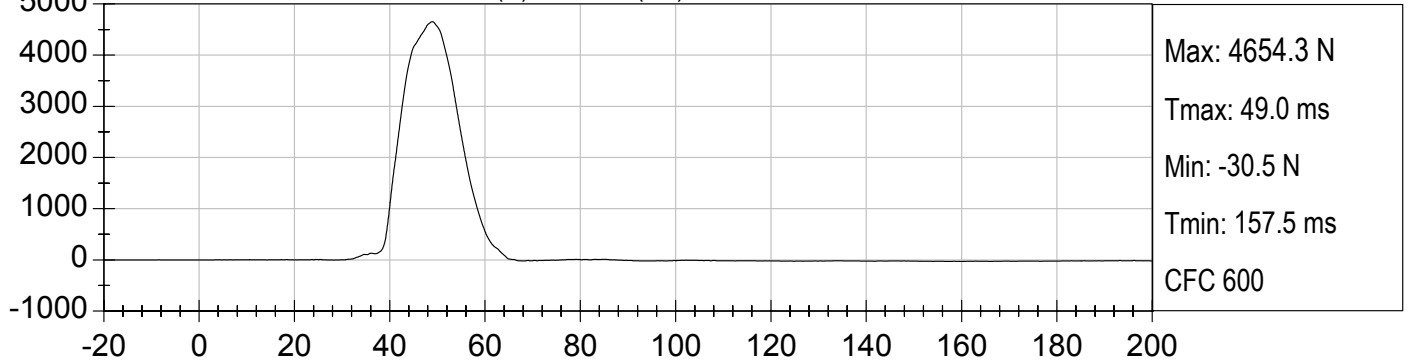




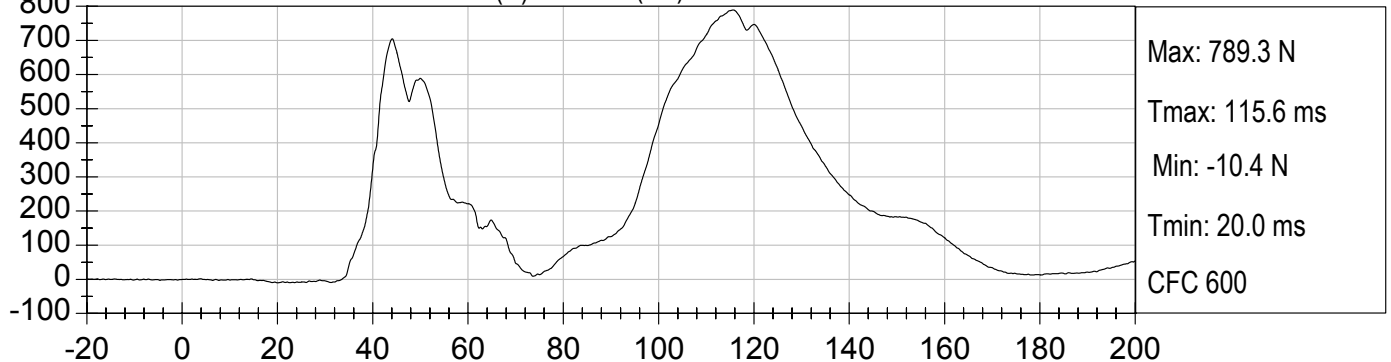
DRIVER LEFT ACETABULUM FY (N) vs TIME (ms)



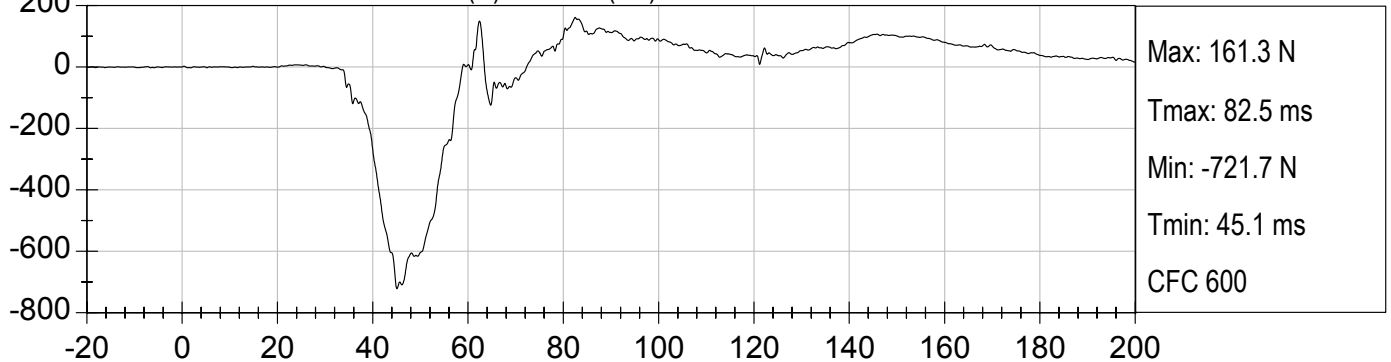
DRIVER LEFT ILLIUM CREST FY (N) vs TIME (ms)

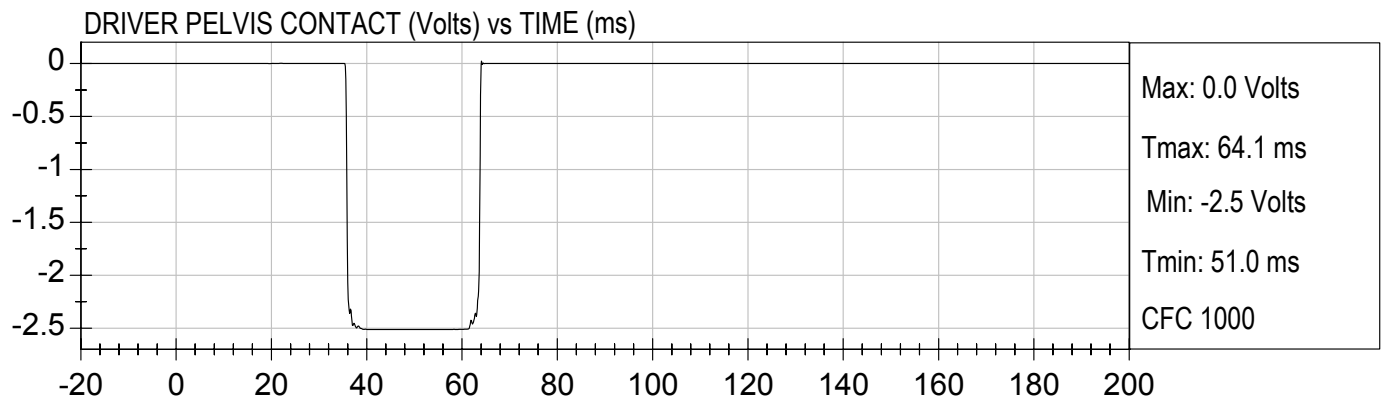
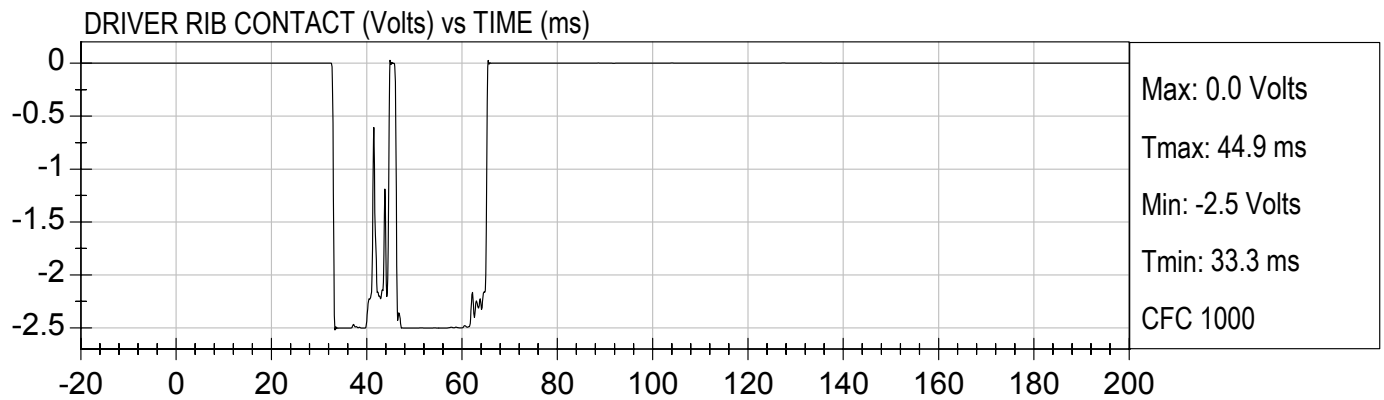
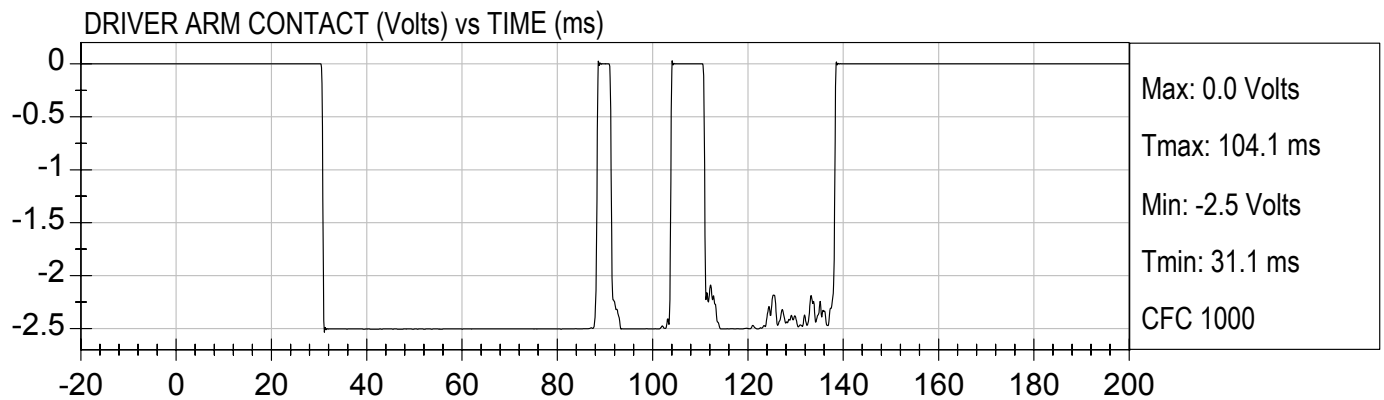


DRIVER RIGHT ILLIUM CREST FY (N) vs TIME (ms)



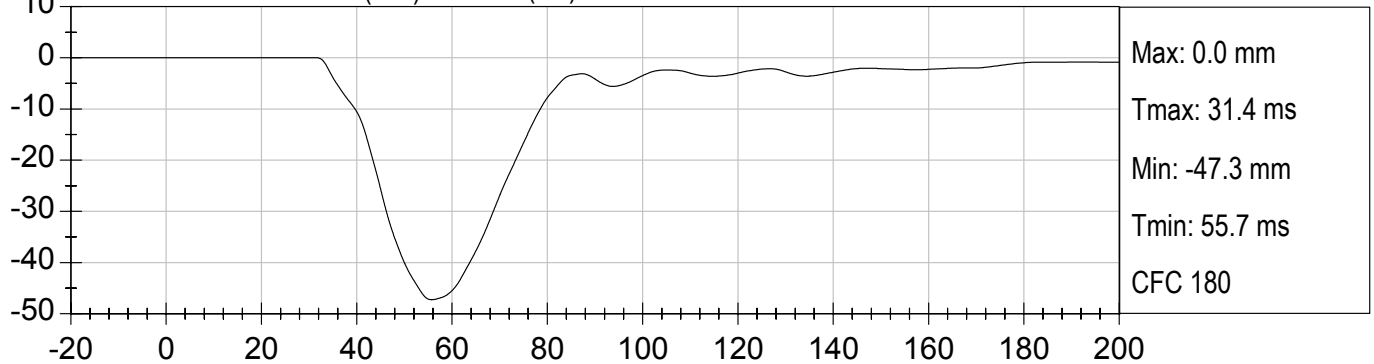
DRIVER PUBIC SYMPHYSIS FY (N) vs TIME (ms)



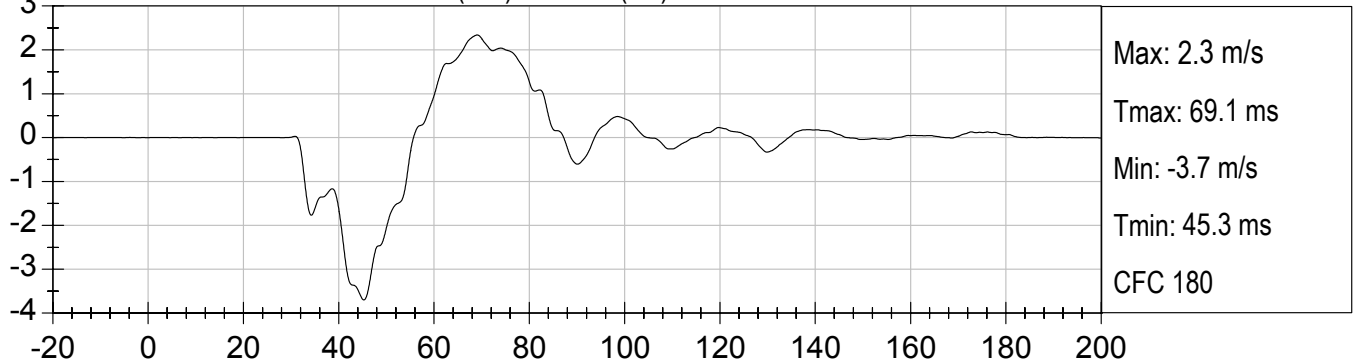




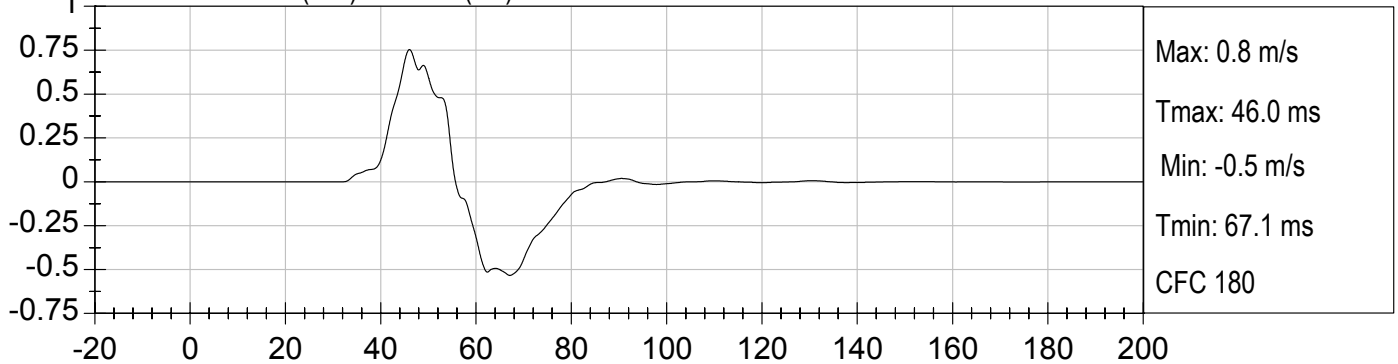
DRIVER SHOULDER DY (mm) vs TIME (ms)

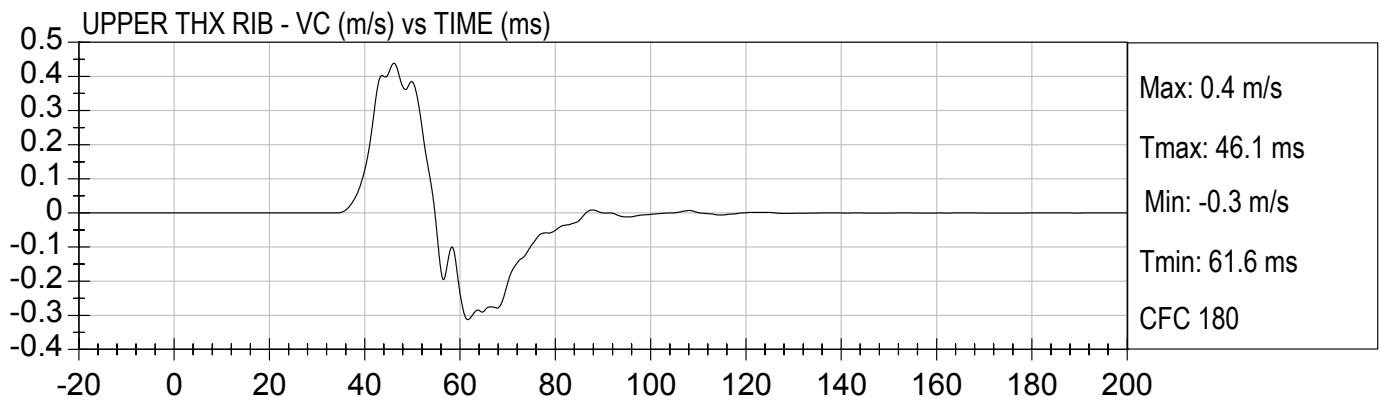
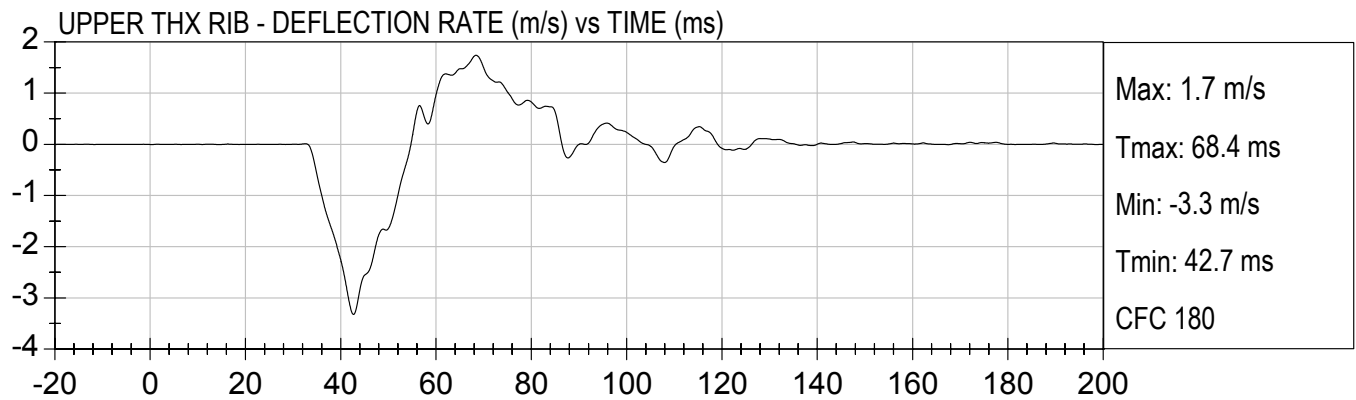
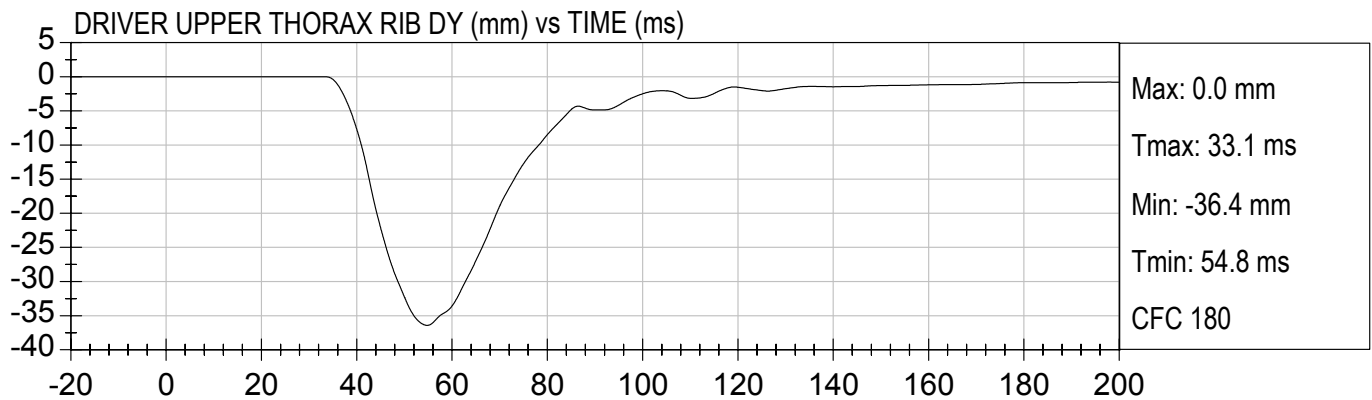


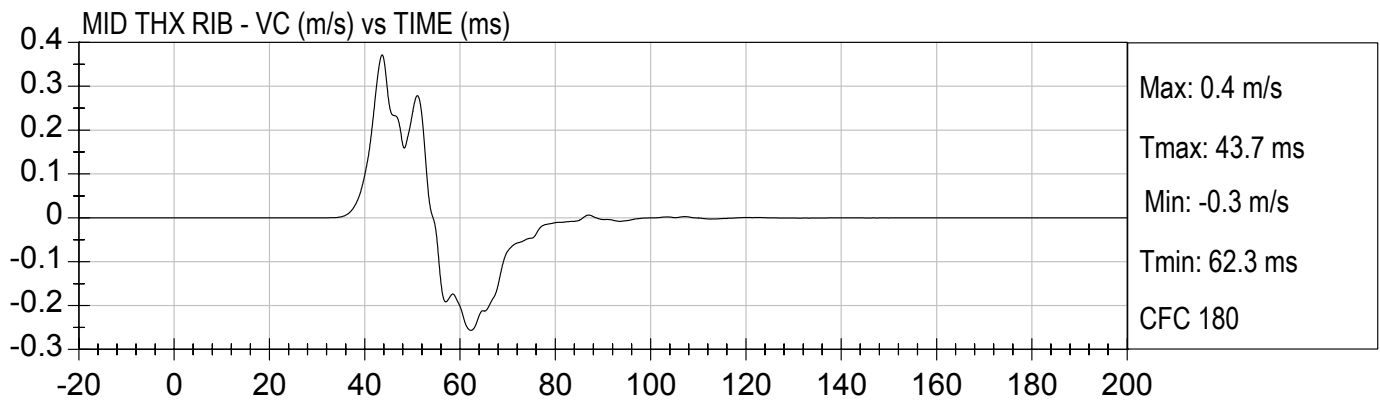
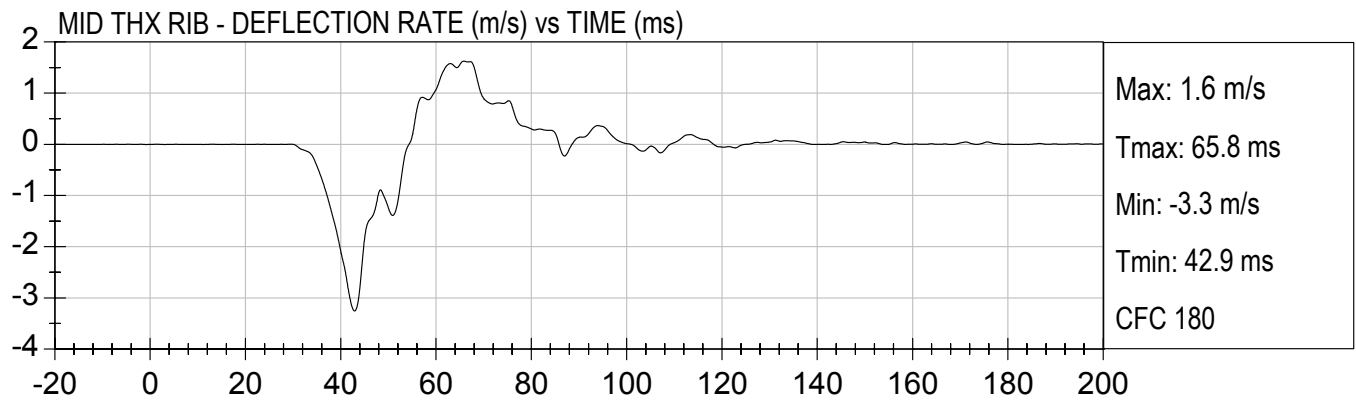
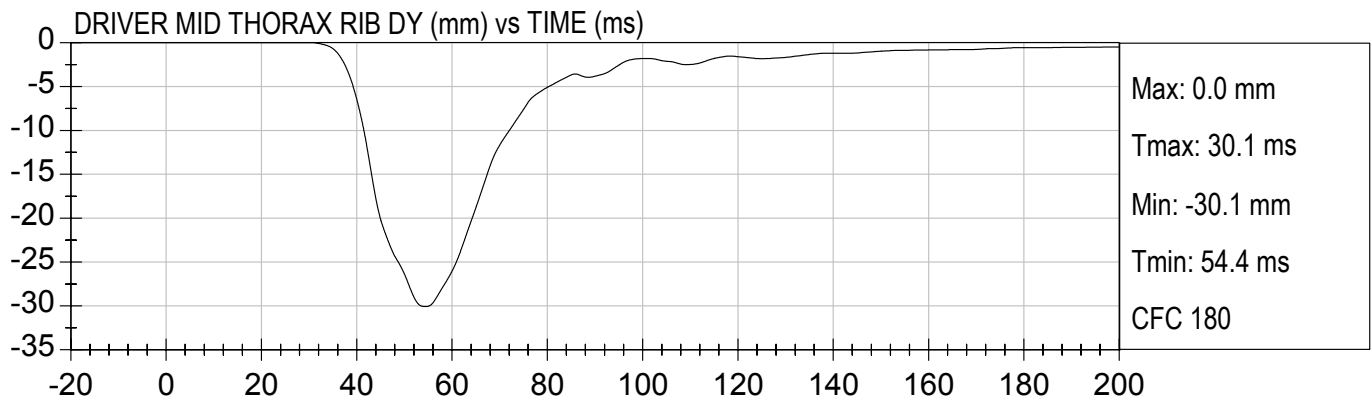
SHOULDER - DEFLECTION RATE (m/s) vs TIME (ms)

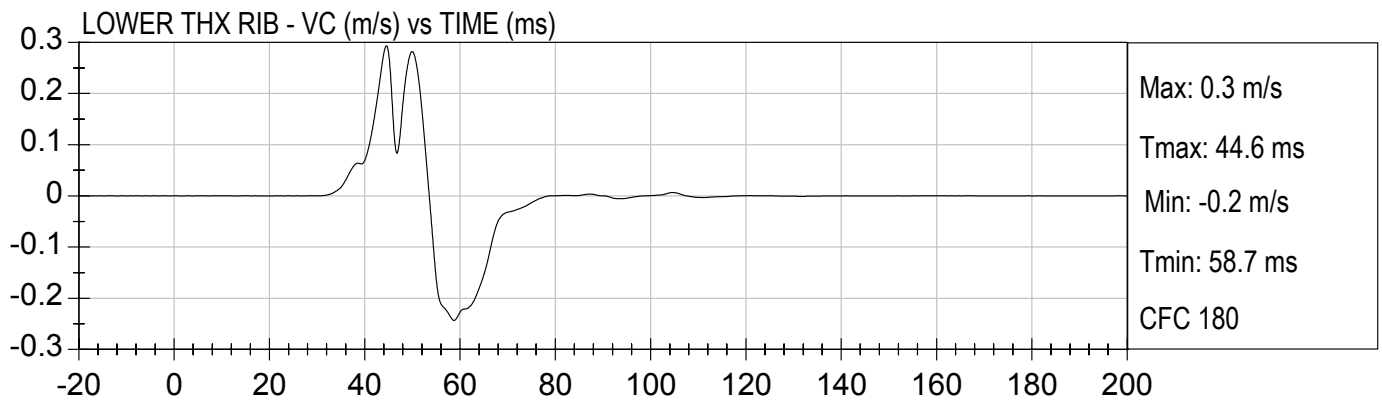
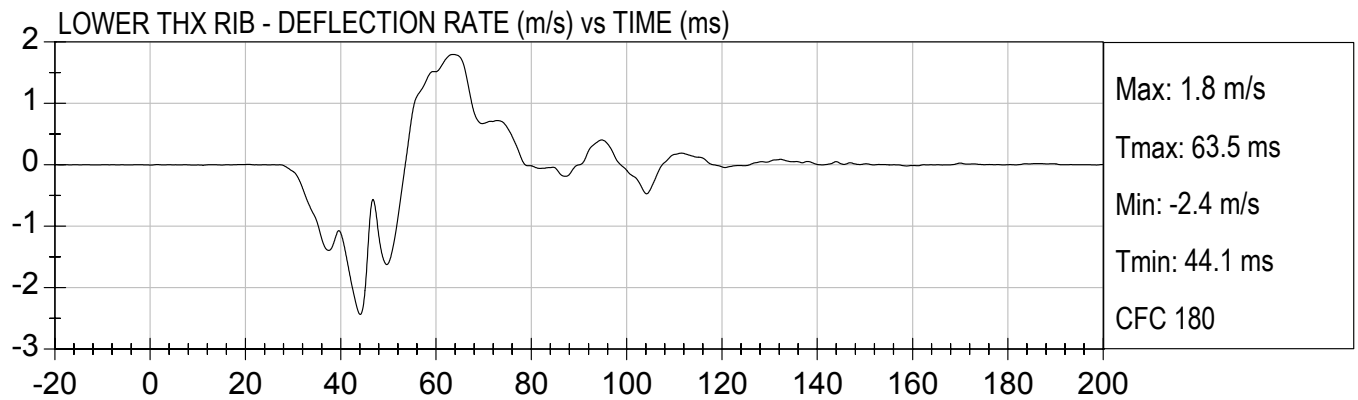
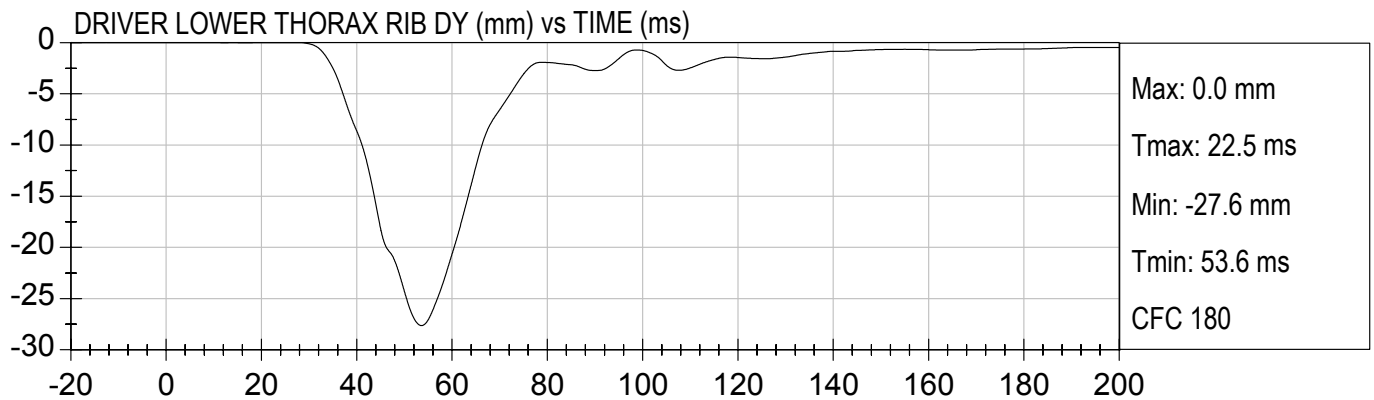


SHOULDER - VC (m/s) vs TIME (ms)



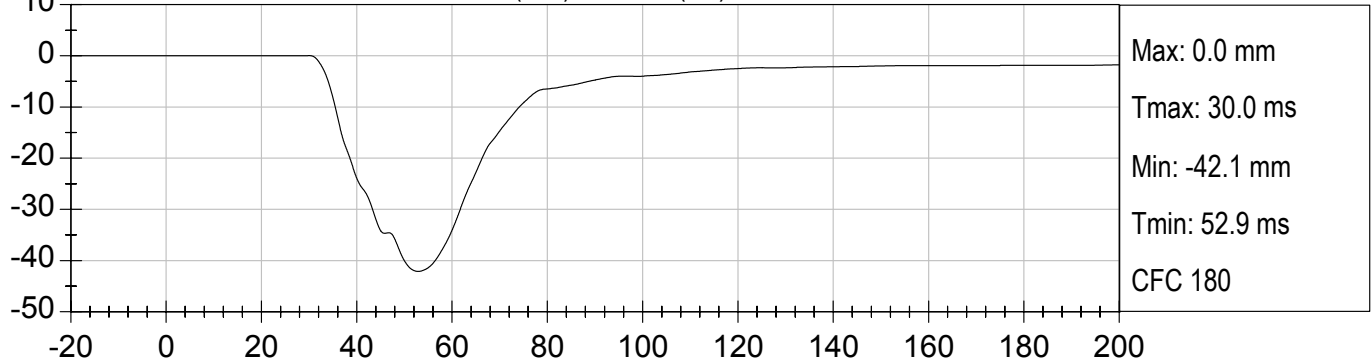




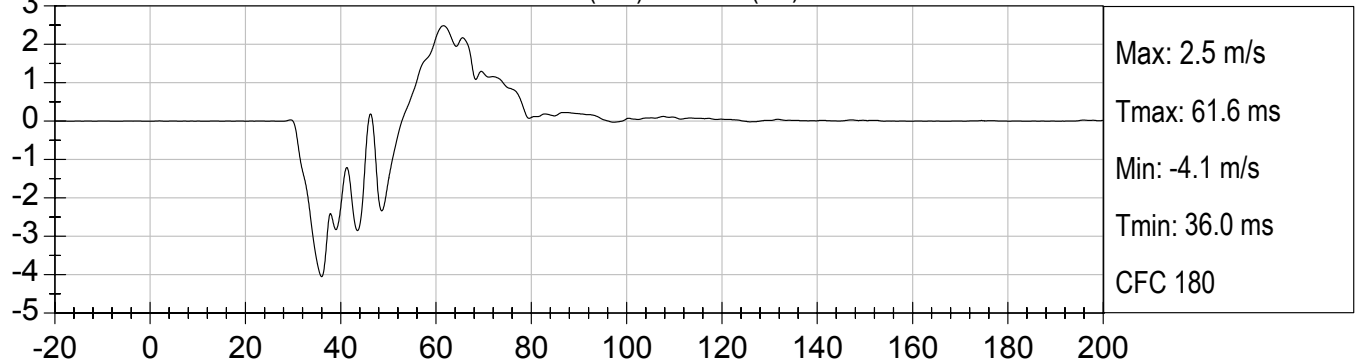




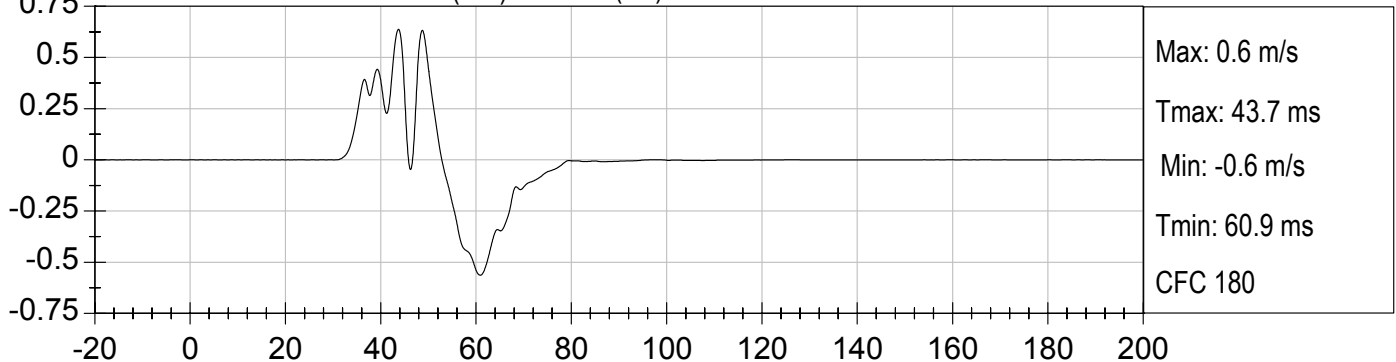
DRIVER UPPER ABDOMINAL RIB DY (mm) vs TIME (ms)

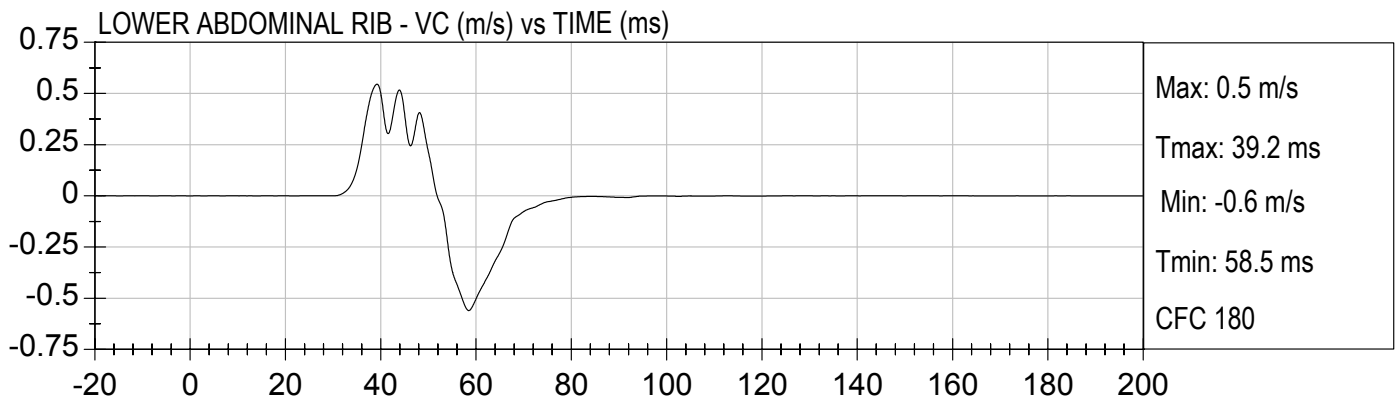
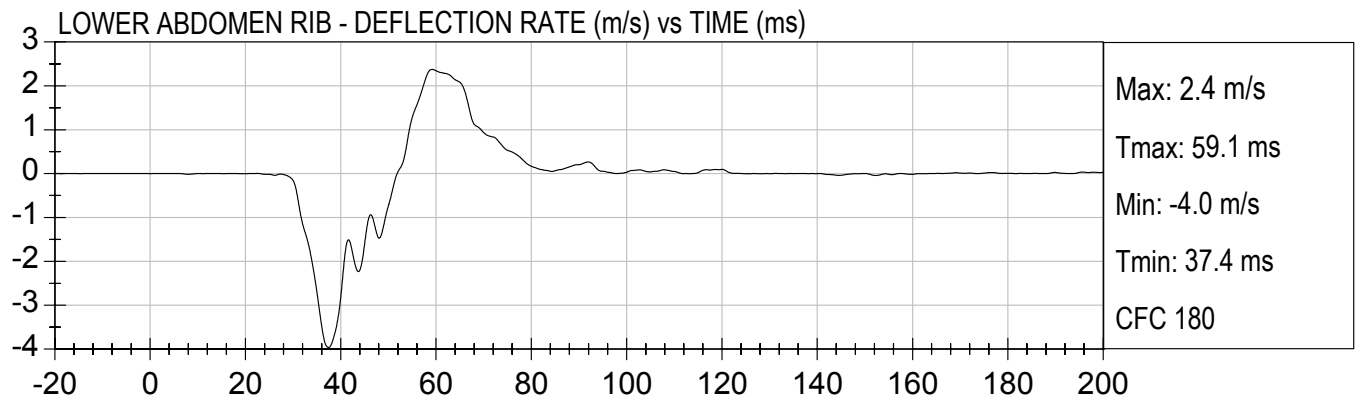
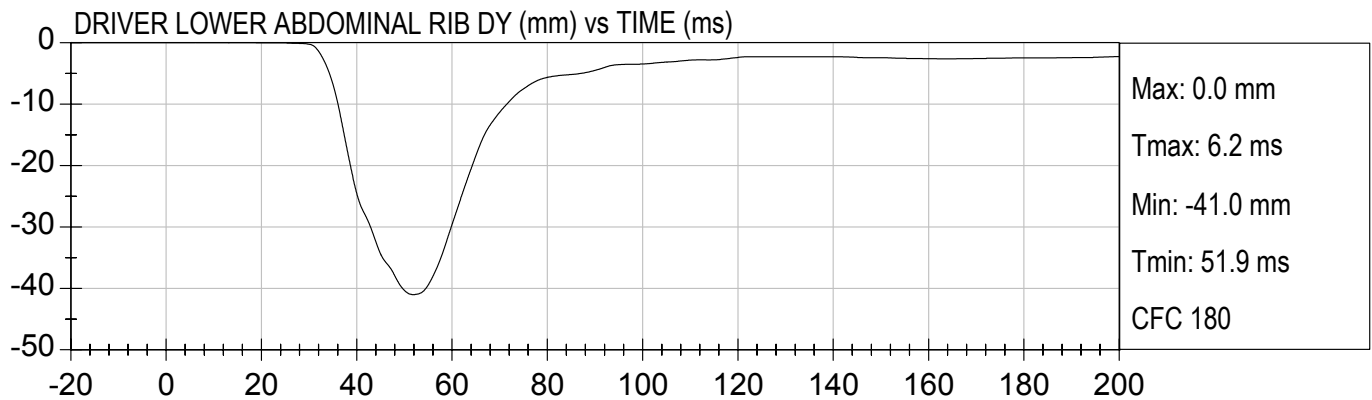


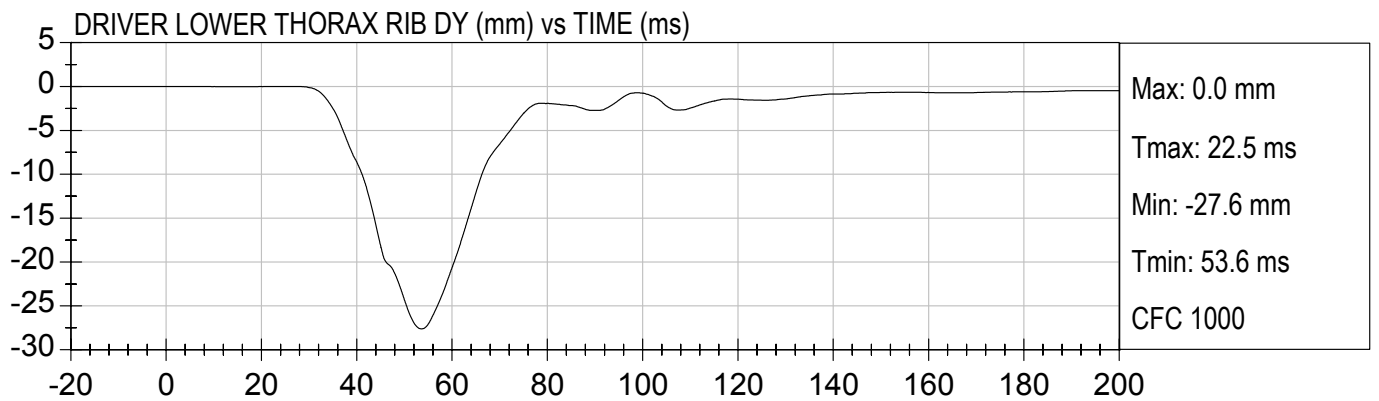
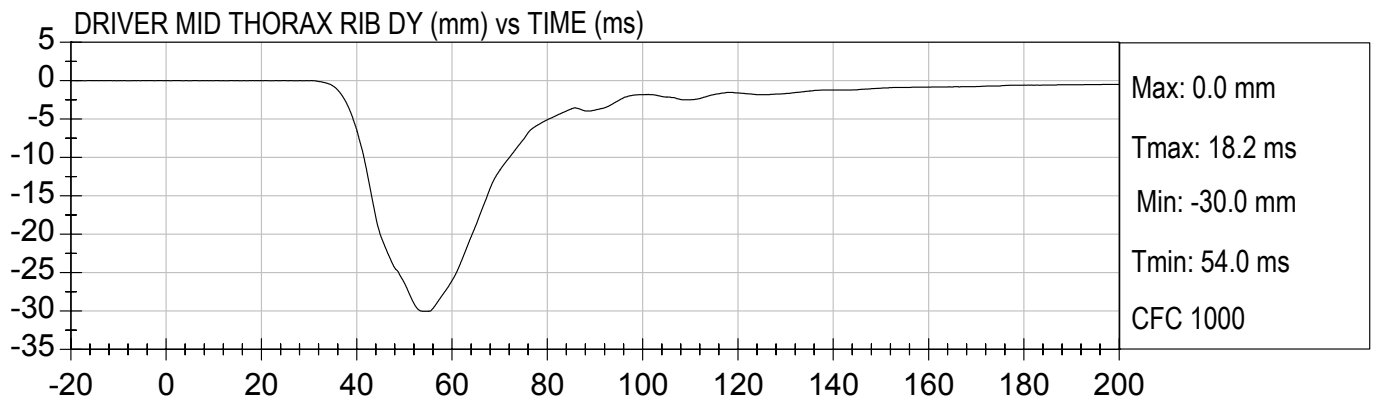
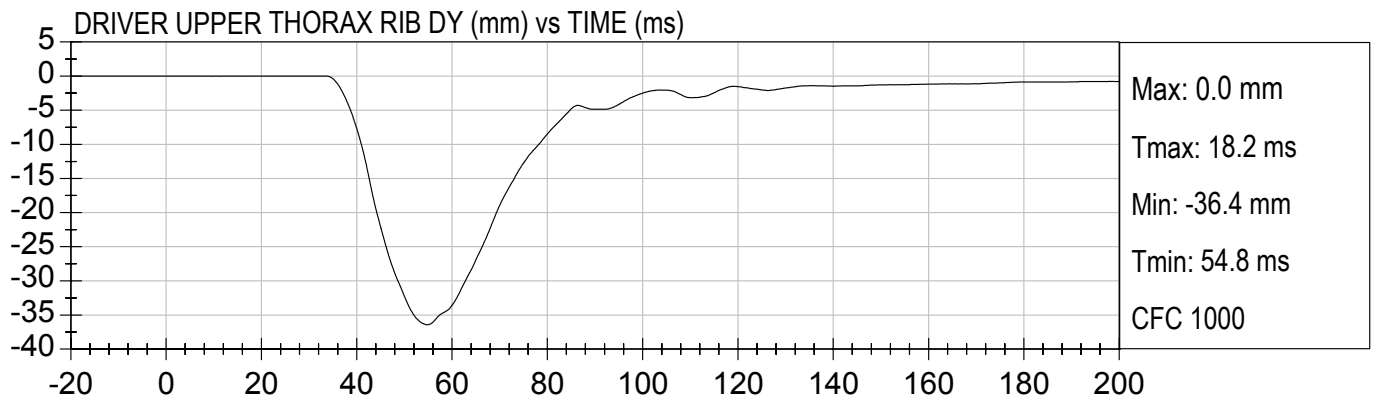
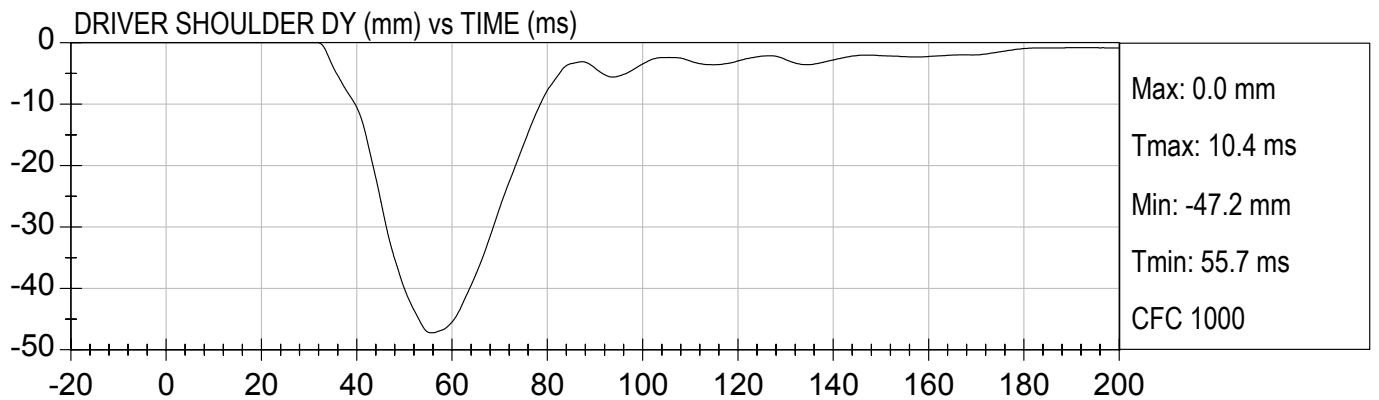
UPPER ABDOMEN RIB - DEFLECTION RATE (m/s) vs TIME (ms)

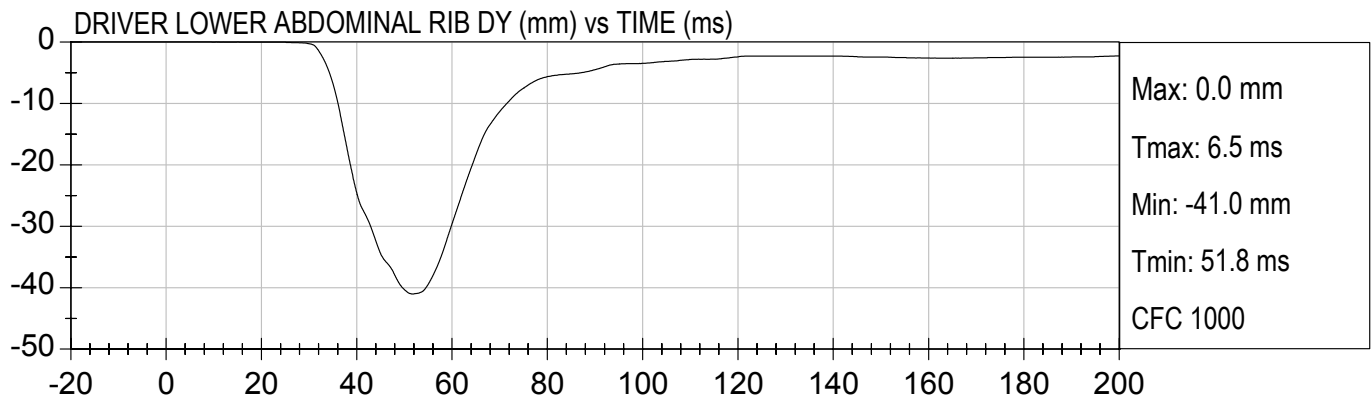
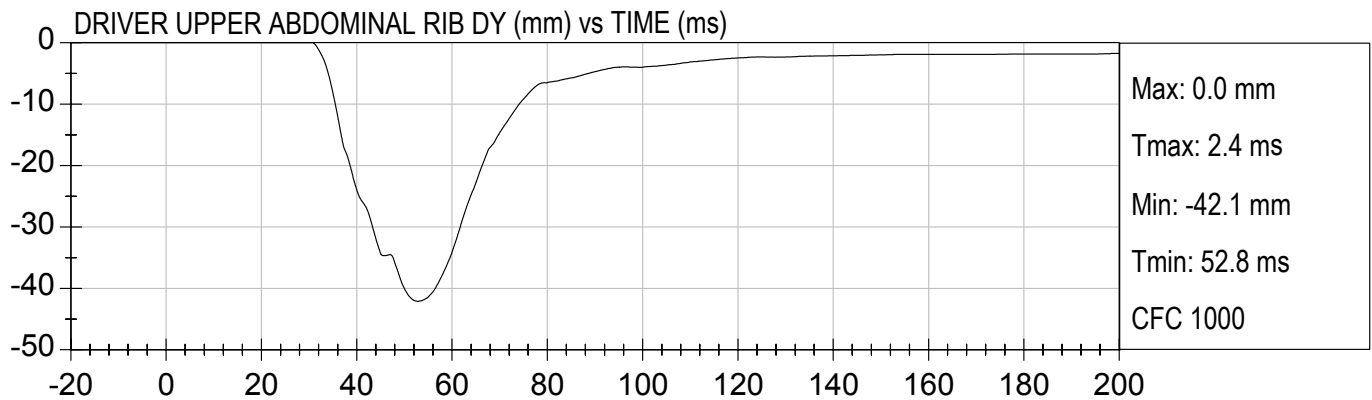


UPPER ABDOMINAL RIB - VC (m/s) vs TIME (ms)



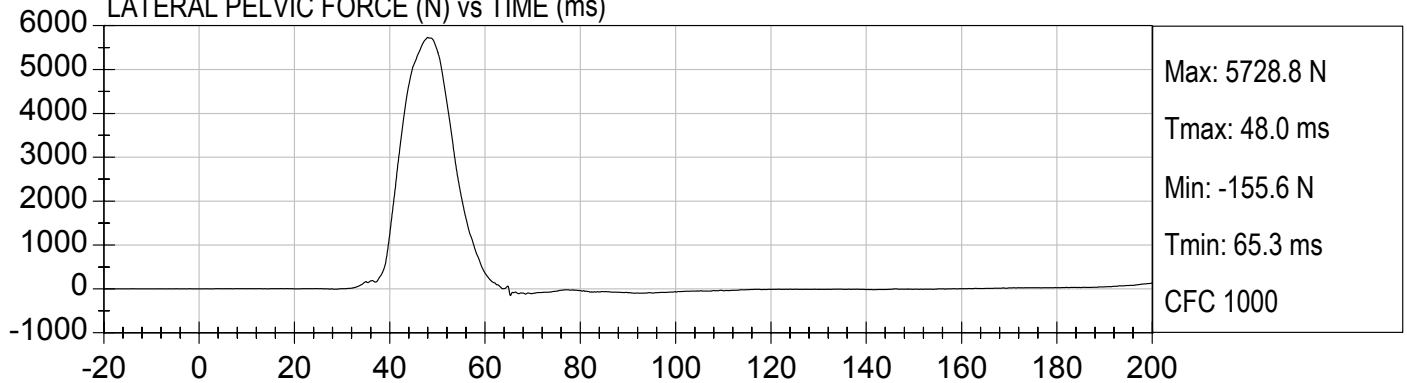




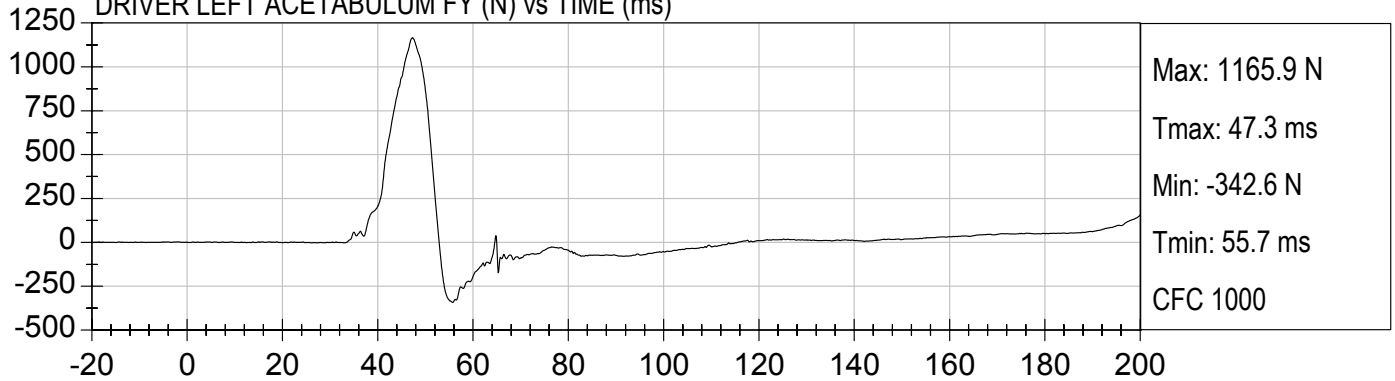




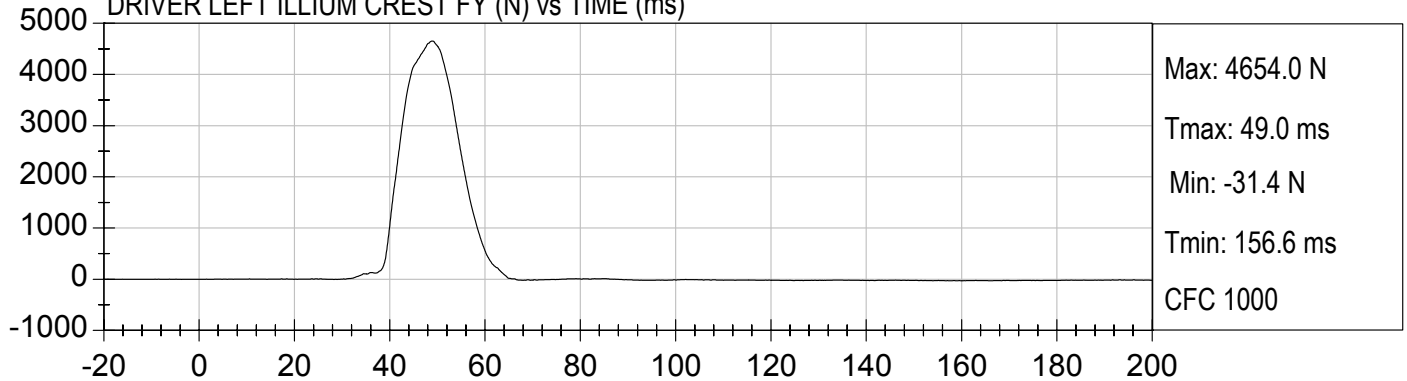
LATERAL PELVIC FORCE (N) vs TIME (ms)

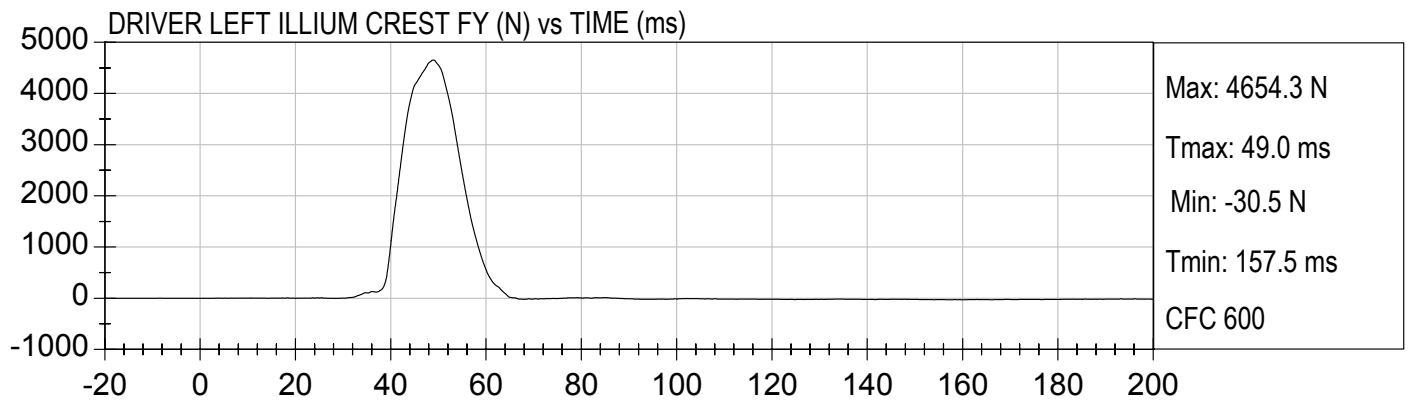
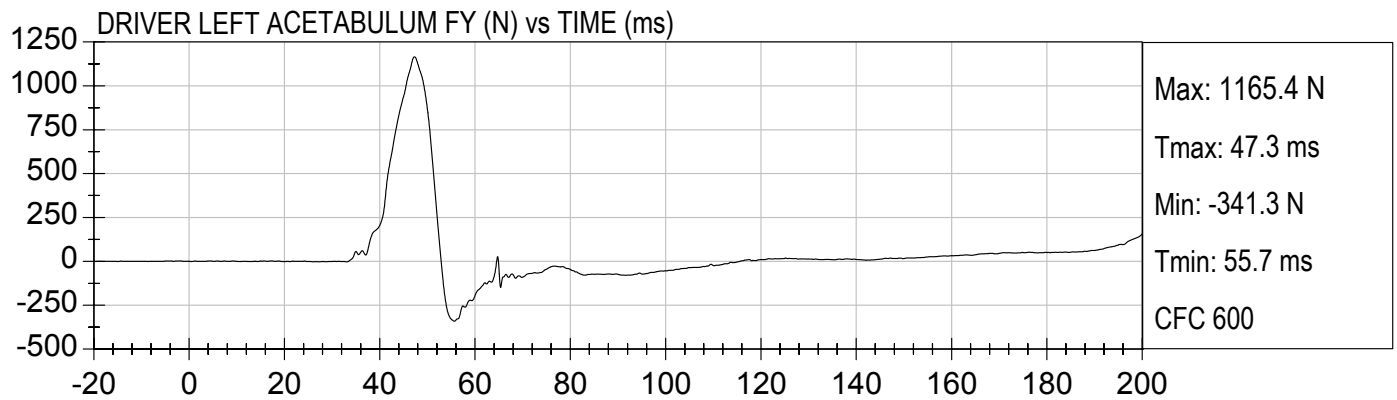
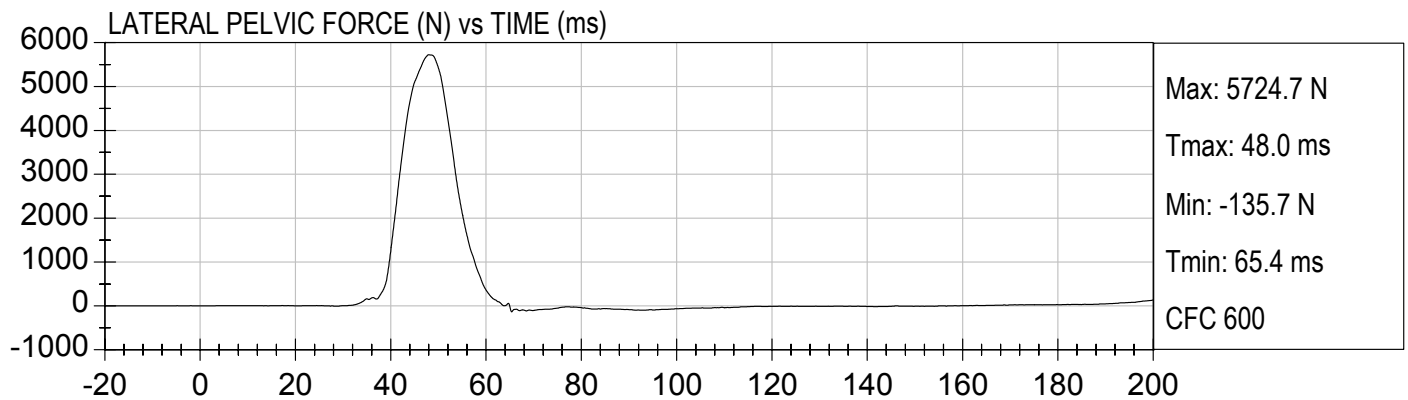


DRIVER LEFT ACETABULUM FY (N) vs TIME (ms)



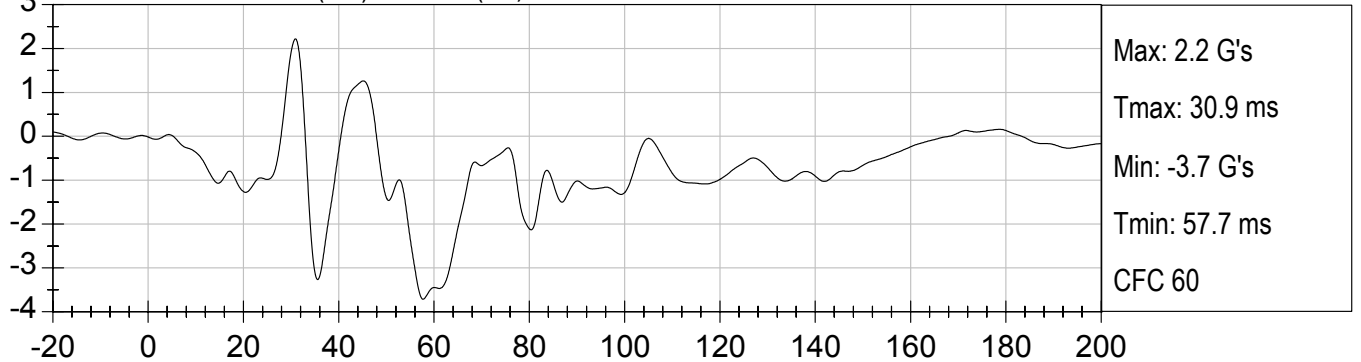
DRIVER LEFT ILLIUM CREST FY (N) vs TIME (ms)



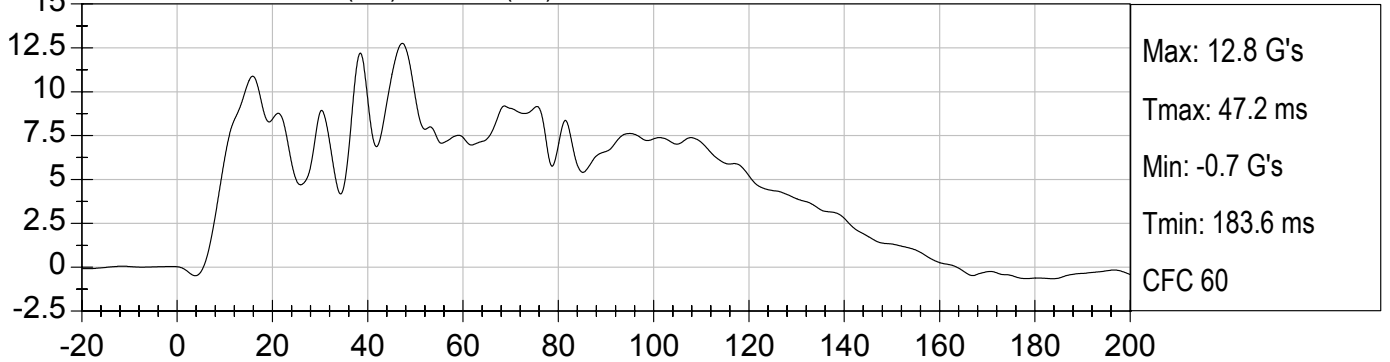




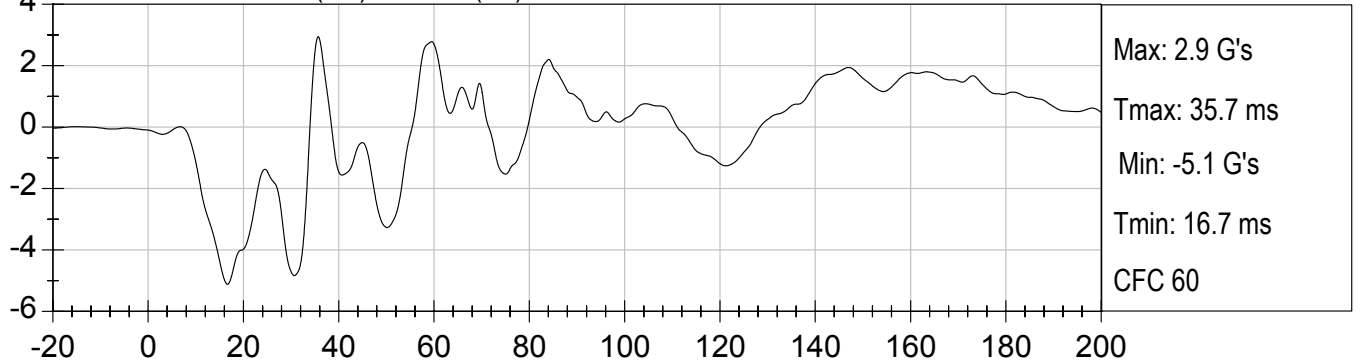
RIGHT FRONT SILL X (G's) vs TIME (ms)



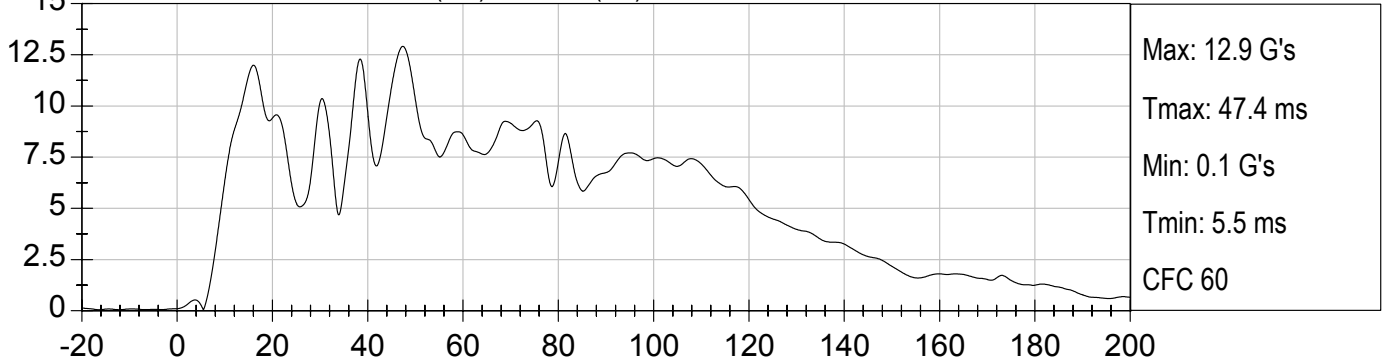
RIGHT FRONT SILL Y (G's) vs TIME (ms)



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

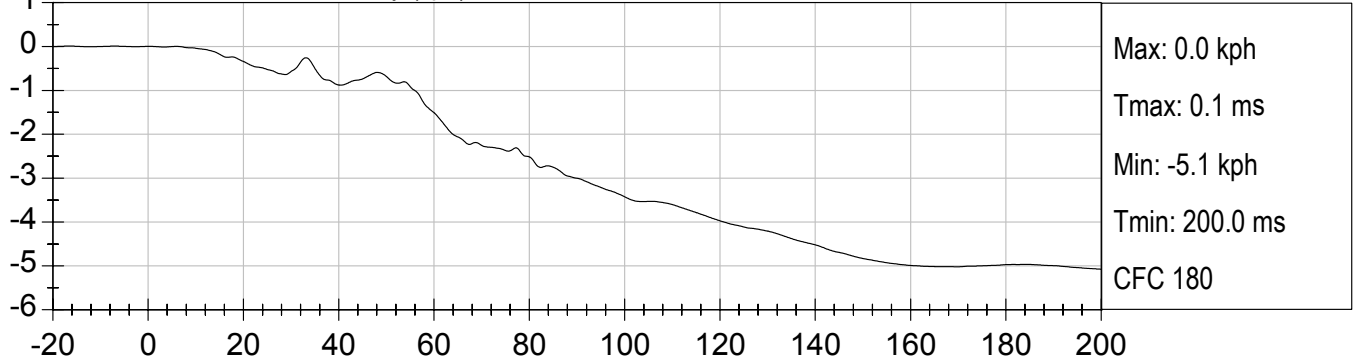


RIGHT FRONT SILL Resultant (G's) vs TIME (ms)

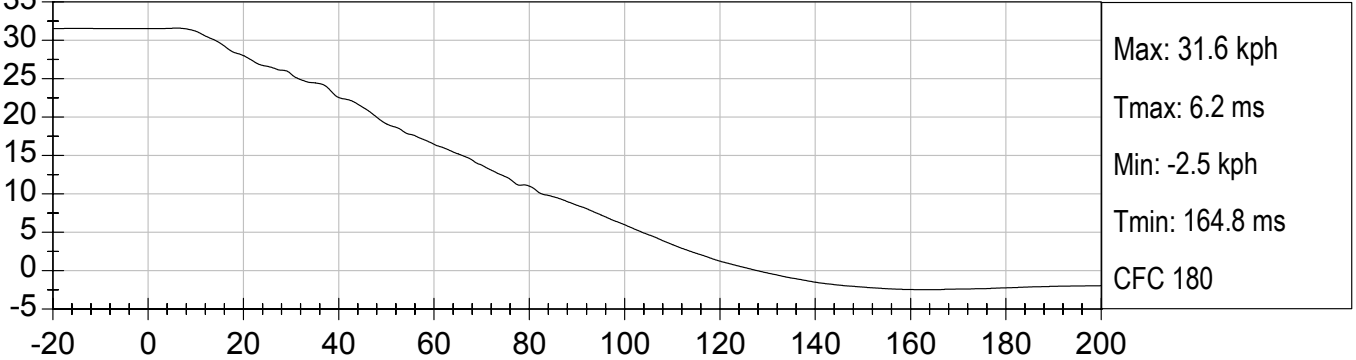




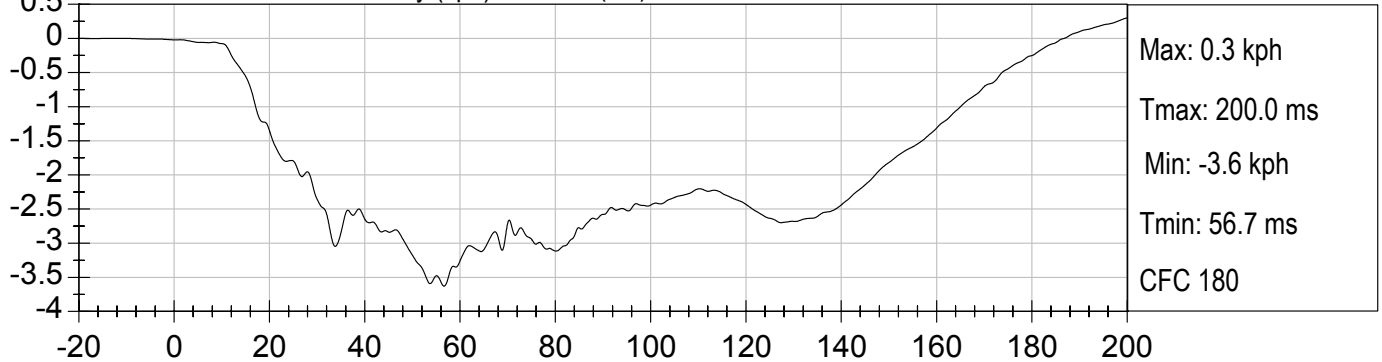
1 RIGHT FRONT SILL X Velocity (kph) vs TIME (ms)



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

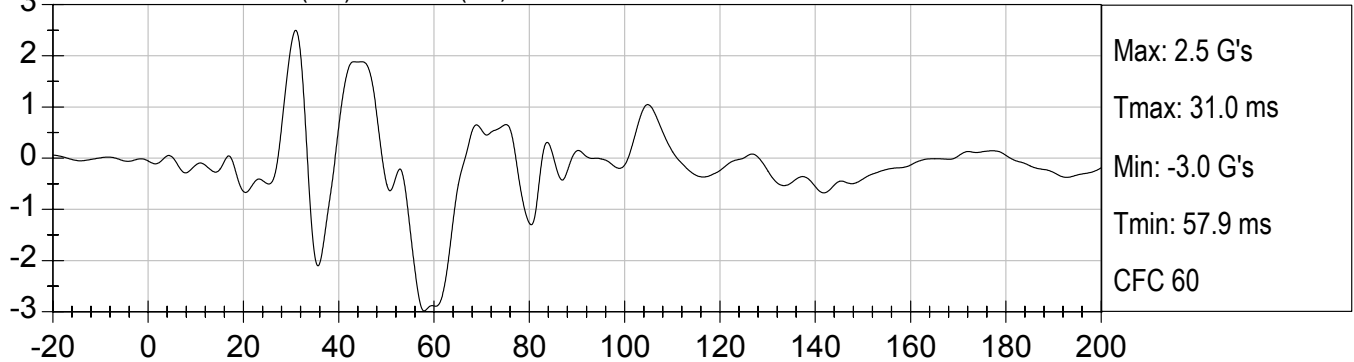


RIGHT FRONT SILL Z Velocity (kph) vs TIME (ms)

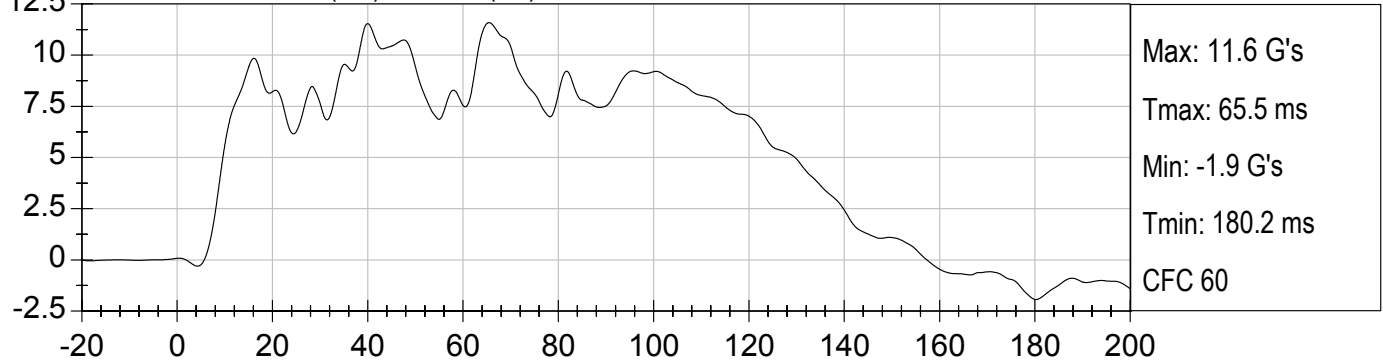




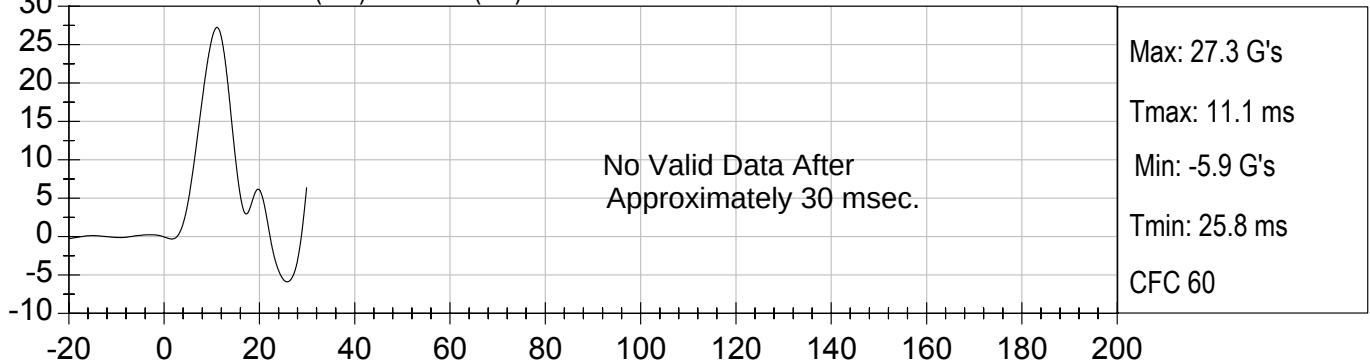
RIGHT REAR SILL X (G's) vs TIME (ms)

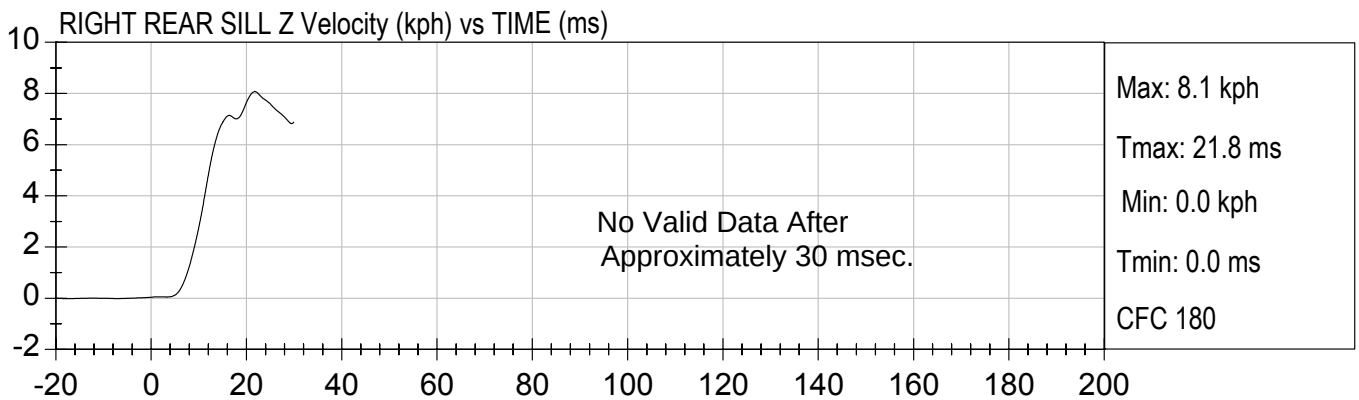
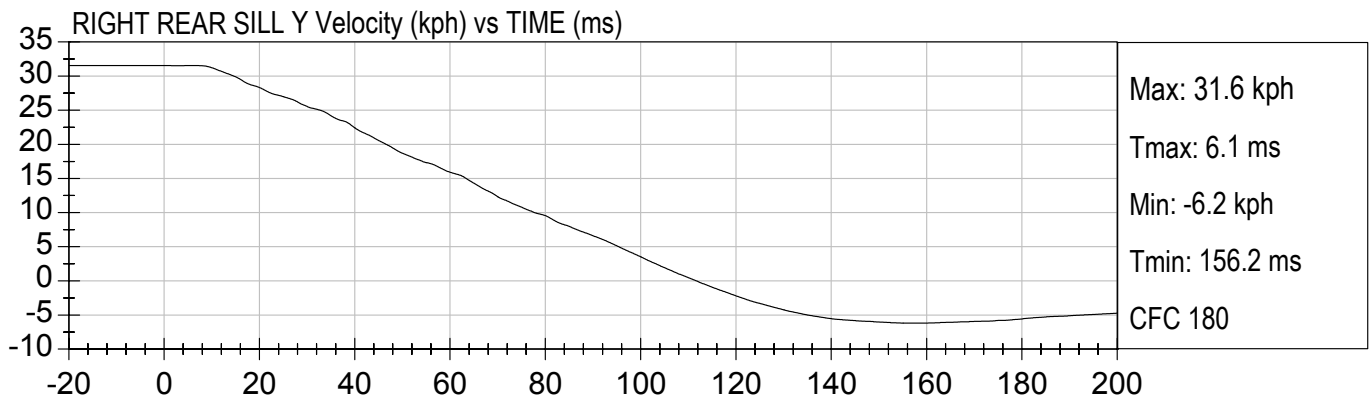
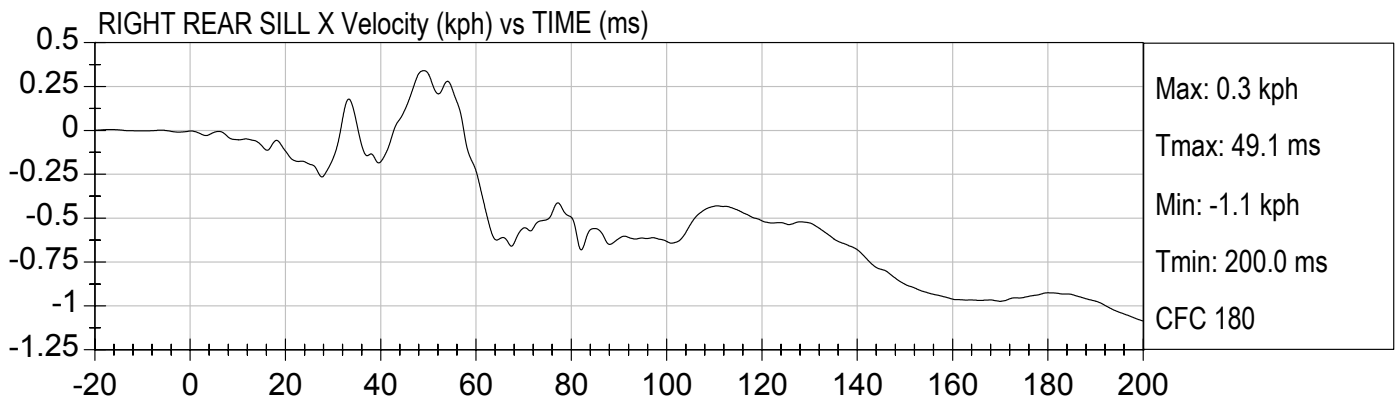


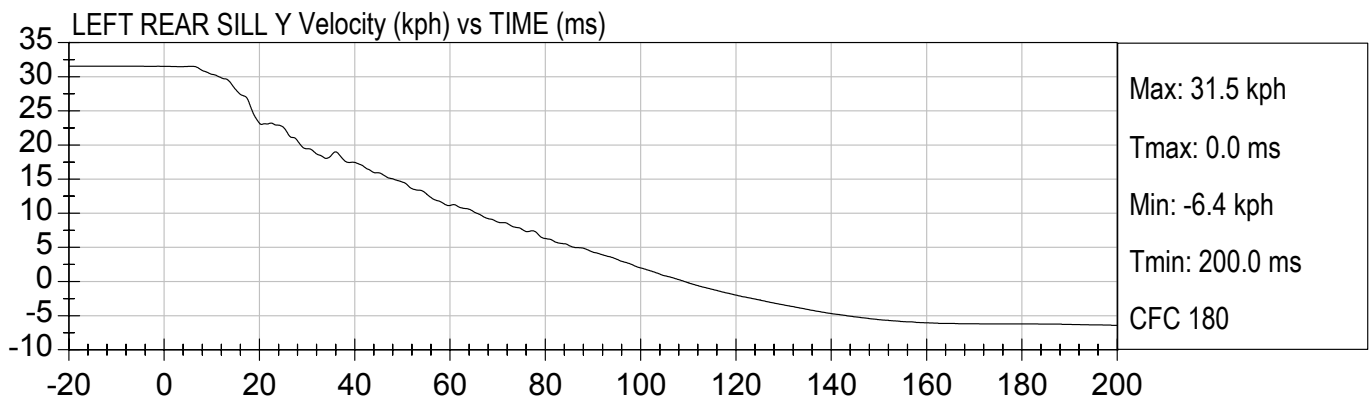
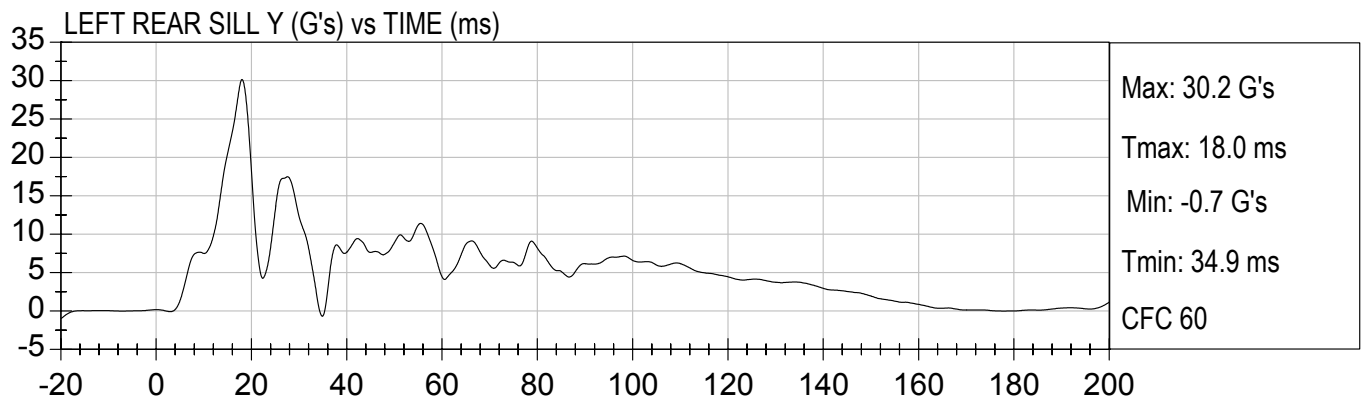
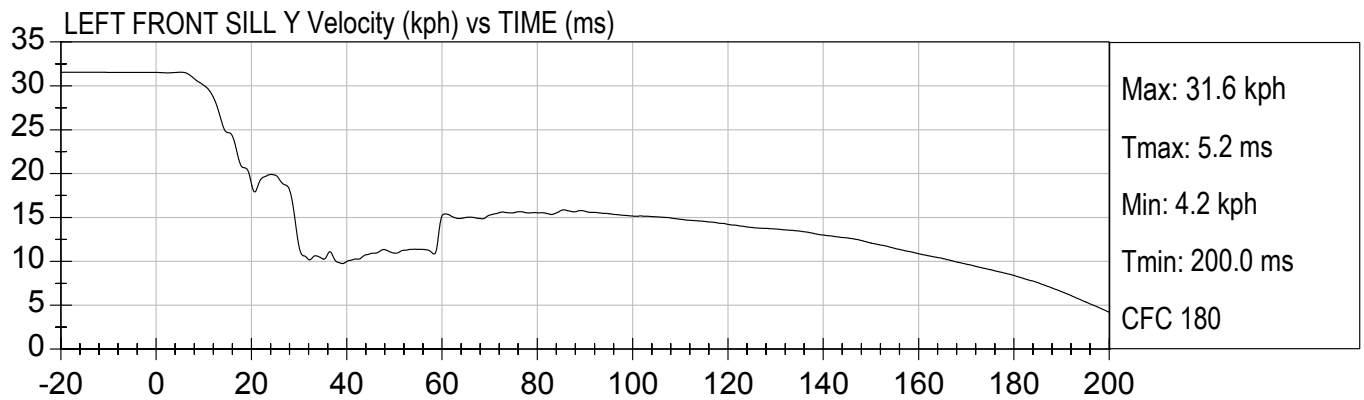
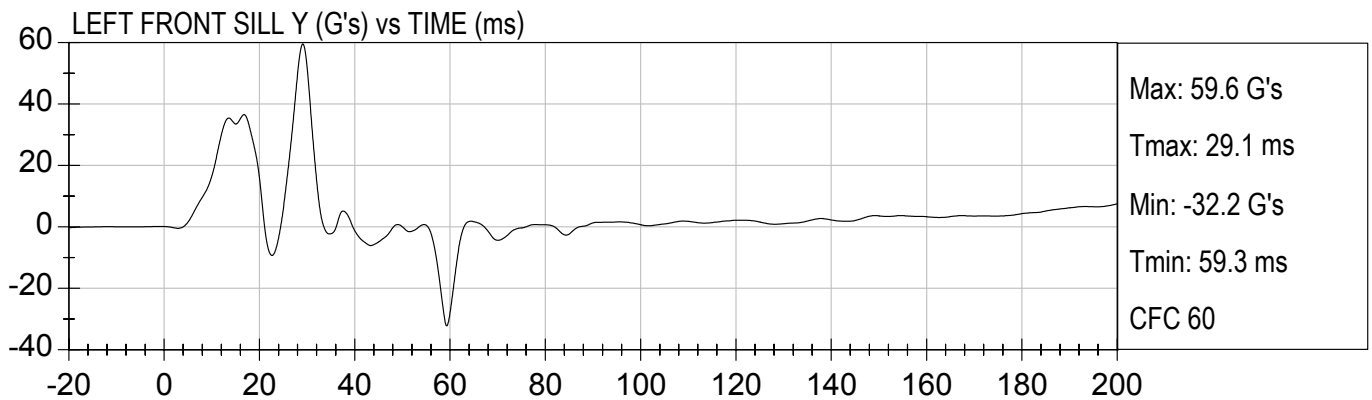
RIGHT REAR SILL Y (G's) vs TIME (ms)



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

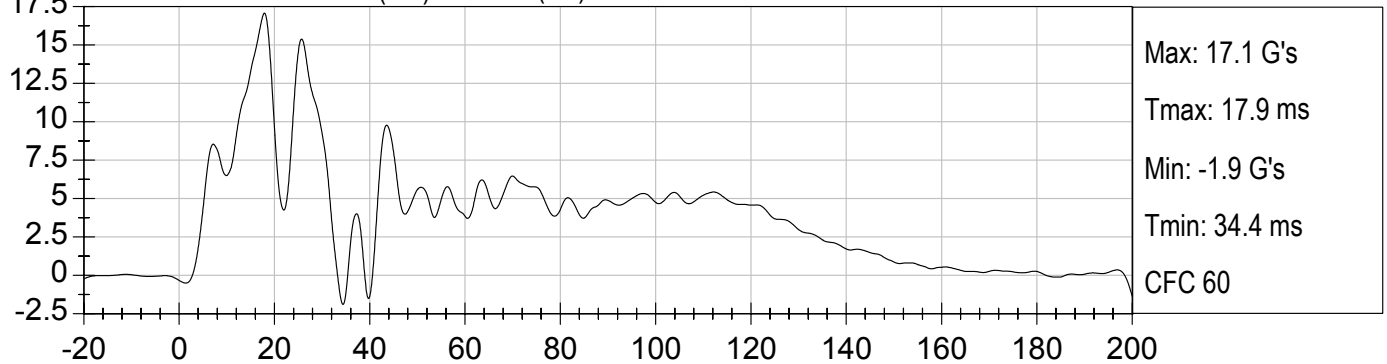




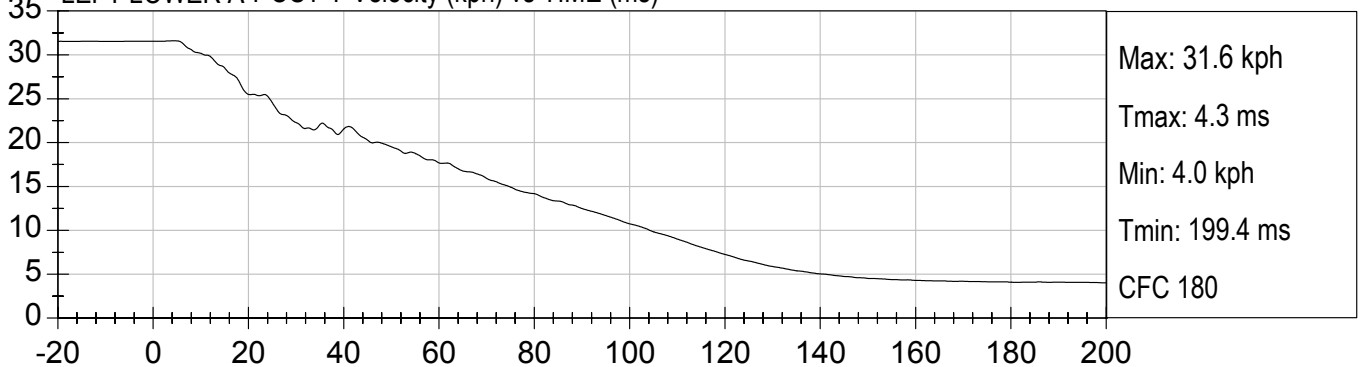




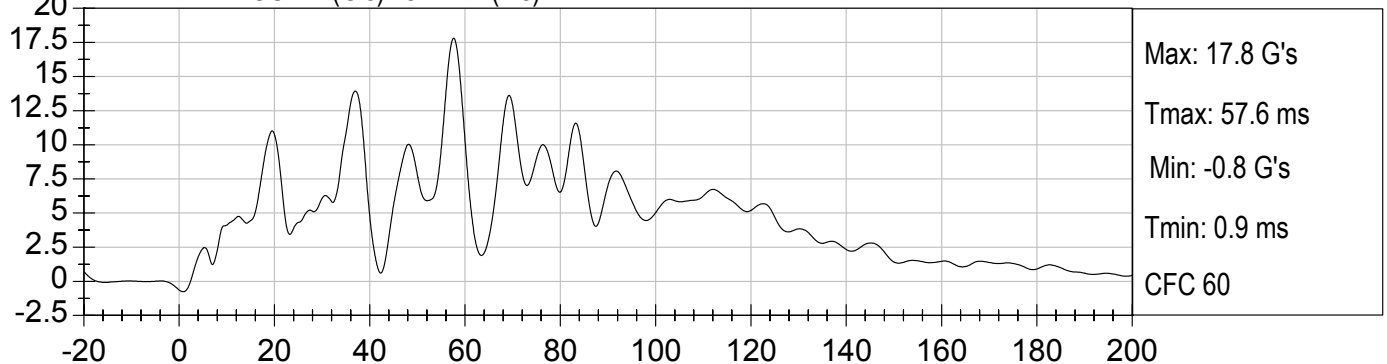
LEFT LOWER A-POST Y (G's) vs TIME (ms)



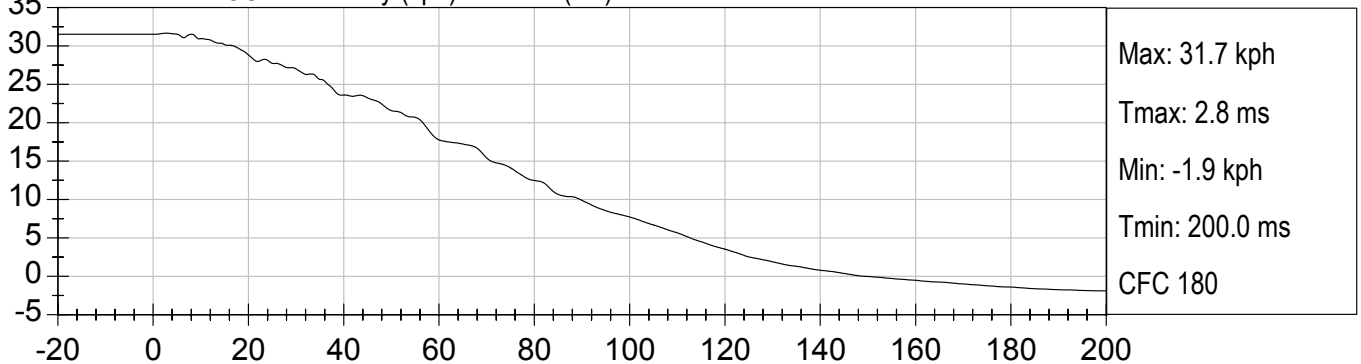
LEFT LOWER A-POST Y Velocity (kph) vs TIME (ms)



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

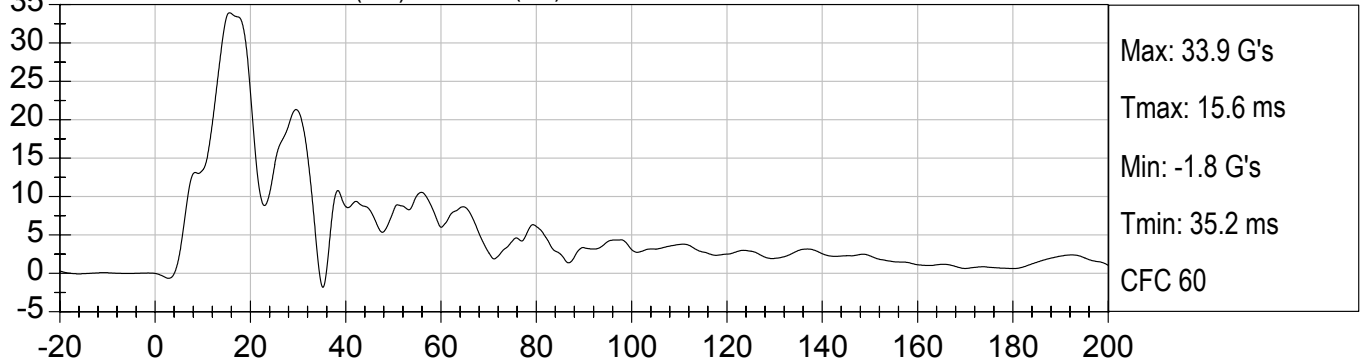


LEFT MID A-POST Y Velocity (kph) vs TIME (ms)

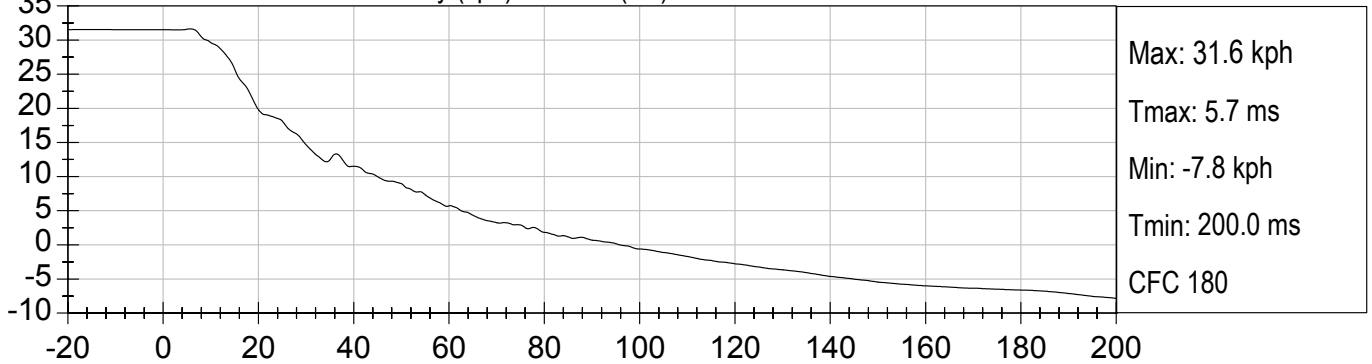




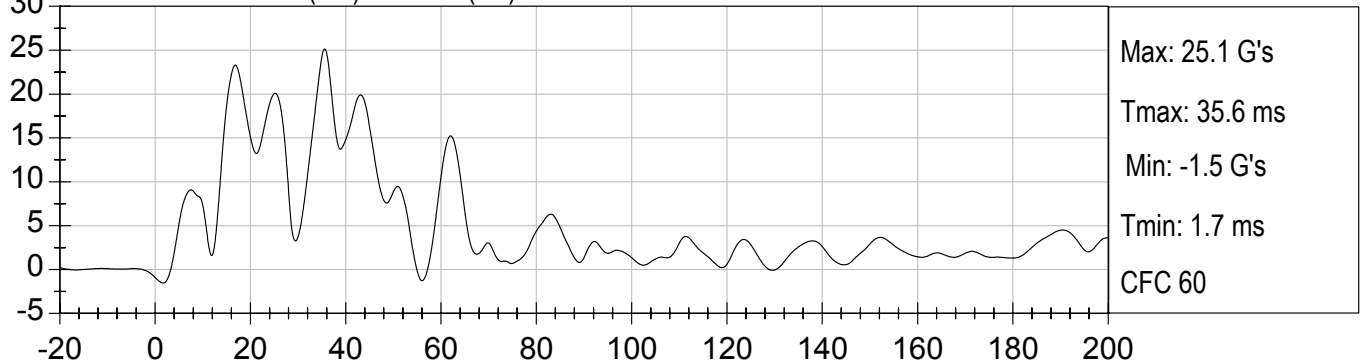
LEFT LOWER B-POST Y (G's) vs TIME (ms)



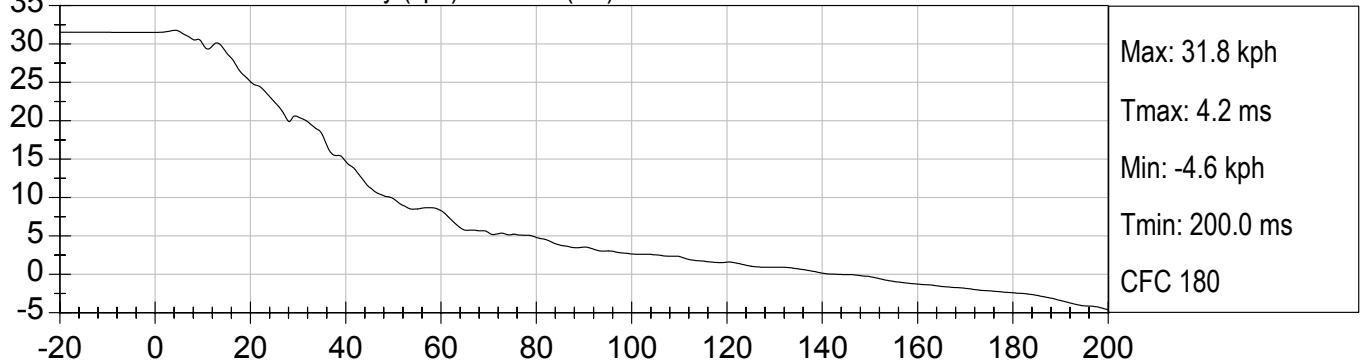
LEFT LOWER B-POST Y Velocity (kph) vs TIME (ms)



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

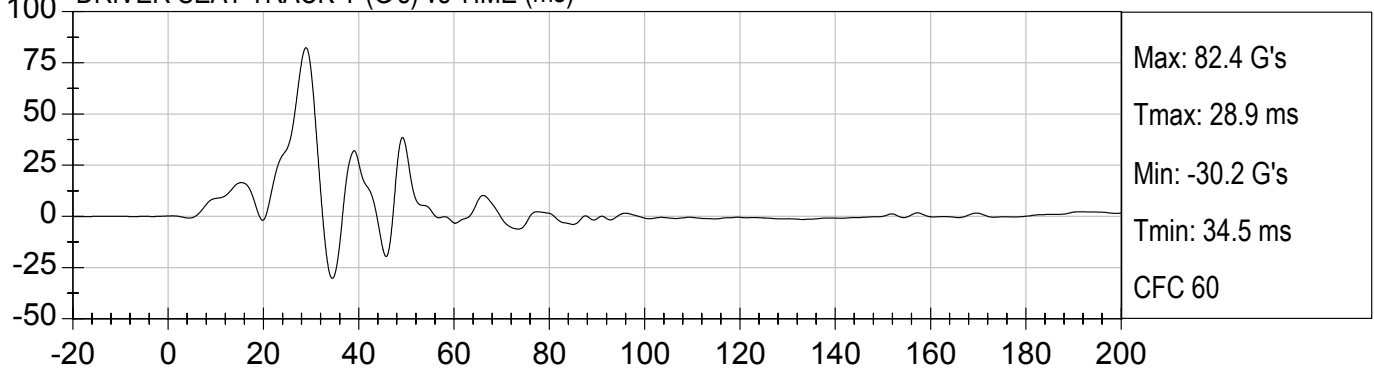


LEFT MID B-POST Y Velocity (kph) vs TIME (ms)

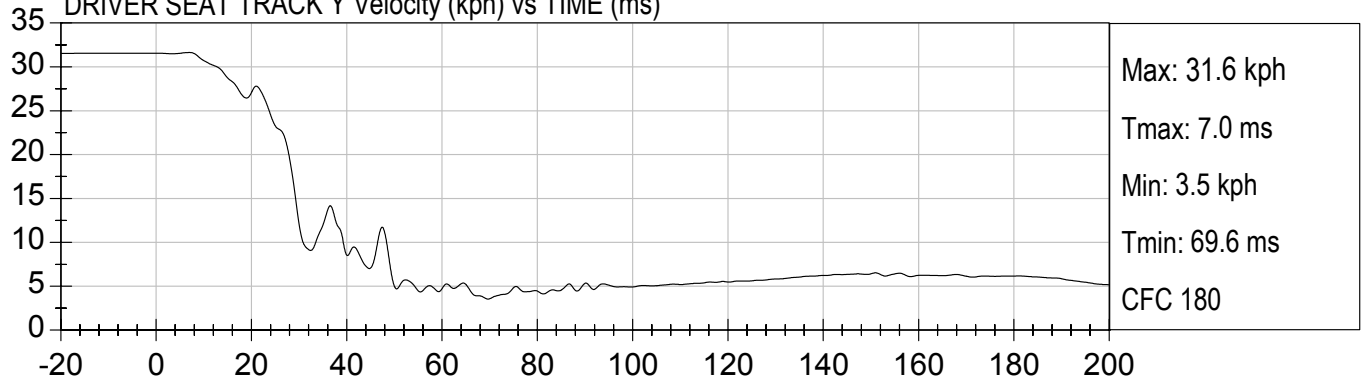




DRIVER SEAT TRACK Y (G's) vs TIME (ms)

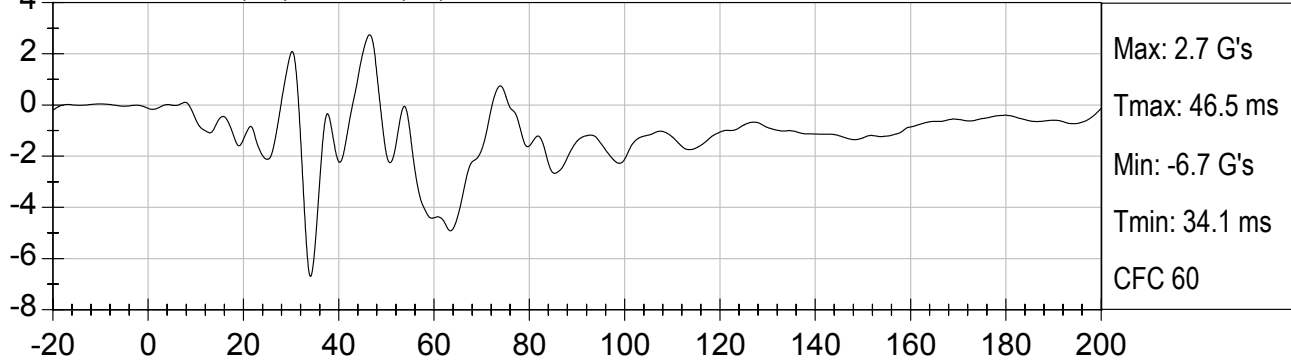


DRIVER SEAT TRACK Y Velocity (kph) vs TIME (ms)

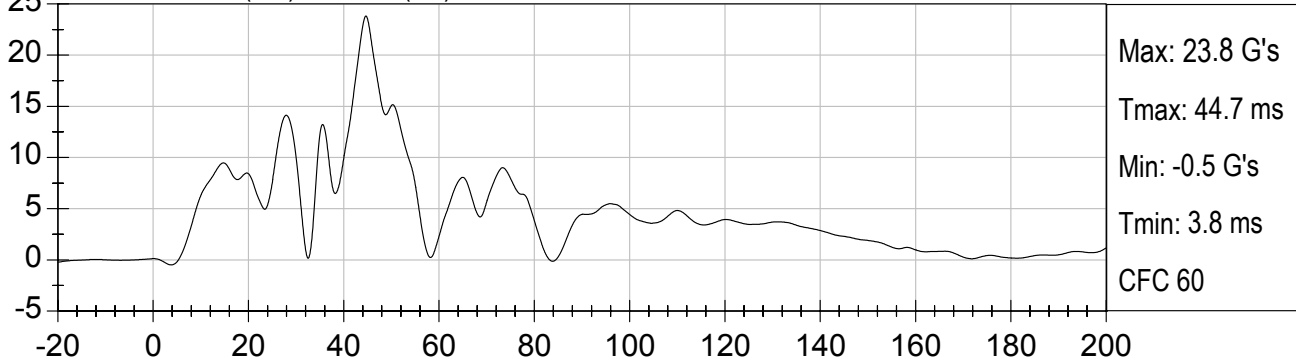




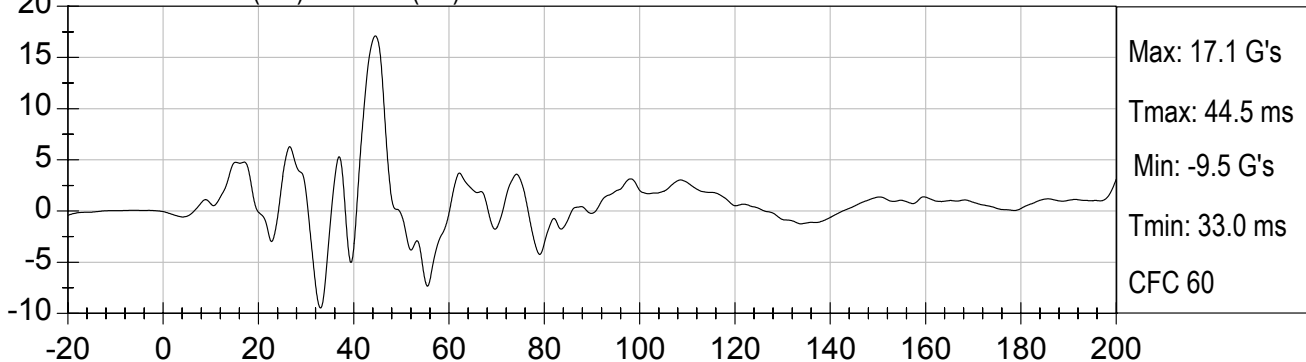
VEHICLE CG X (G's) vs TIME (ms)



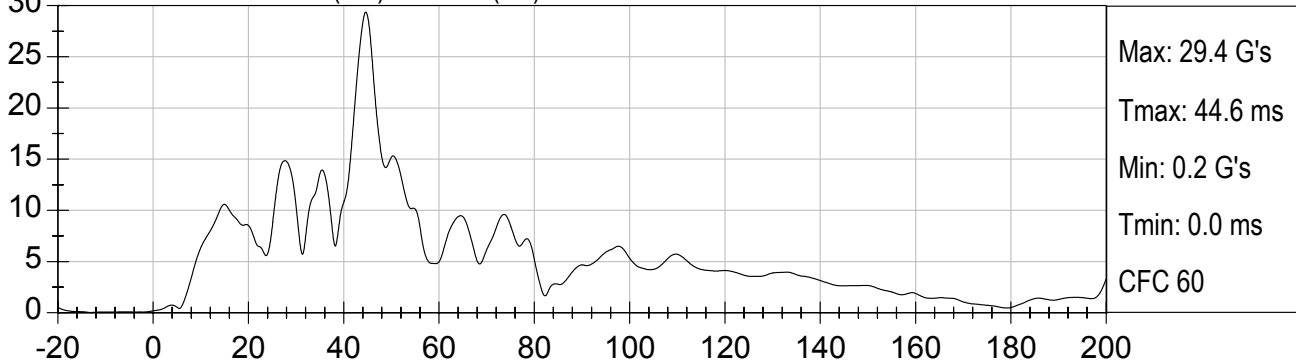
VEHICLE CG Y (G's) vs TIME (ms)

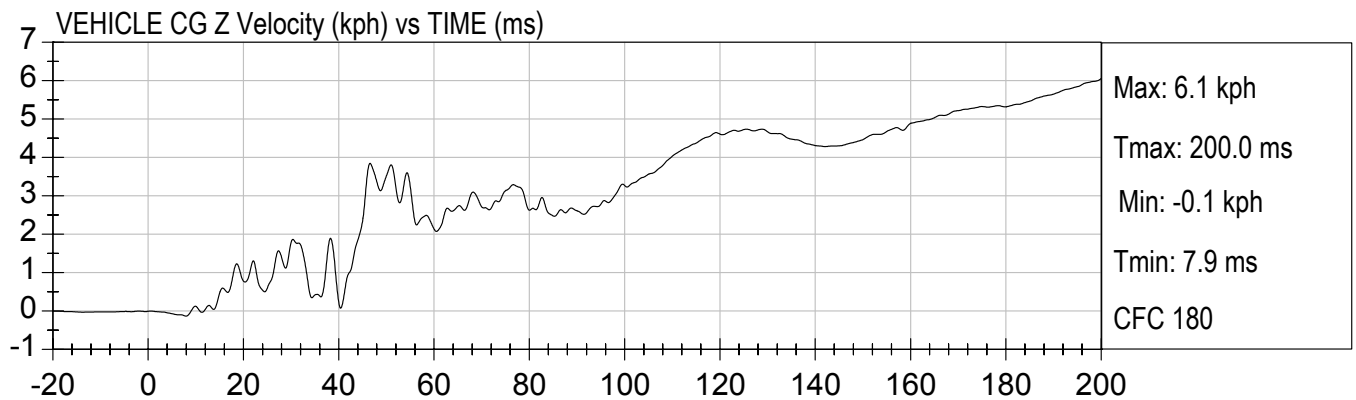
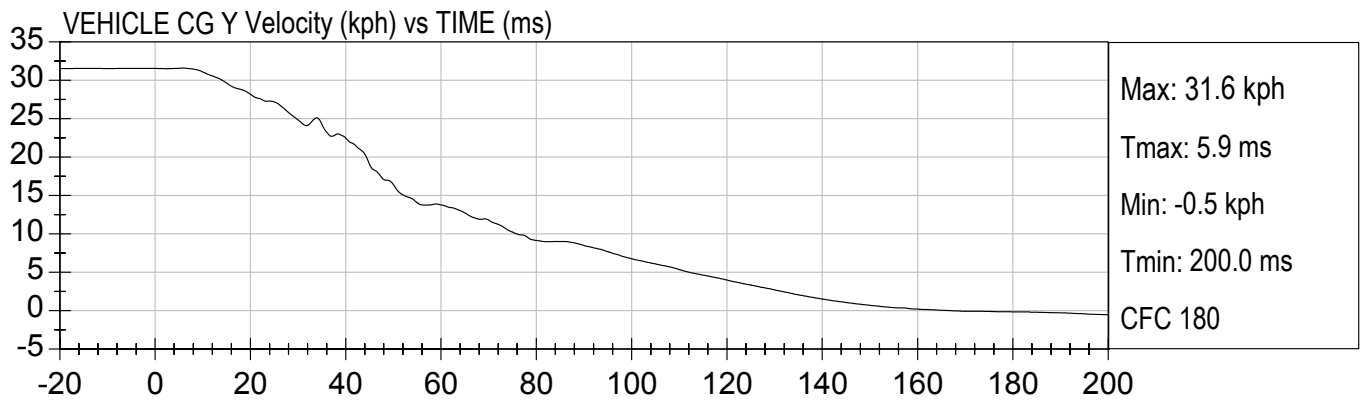
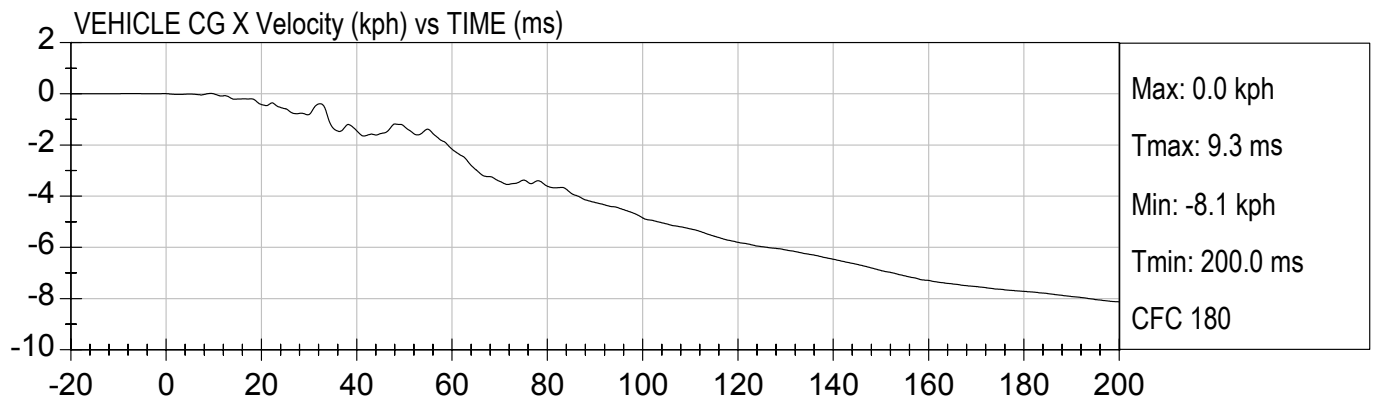


VEHICLE CG Z (G's) vs TIME (ms)



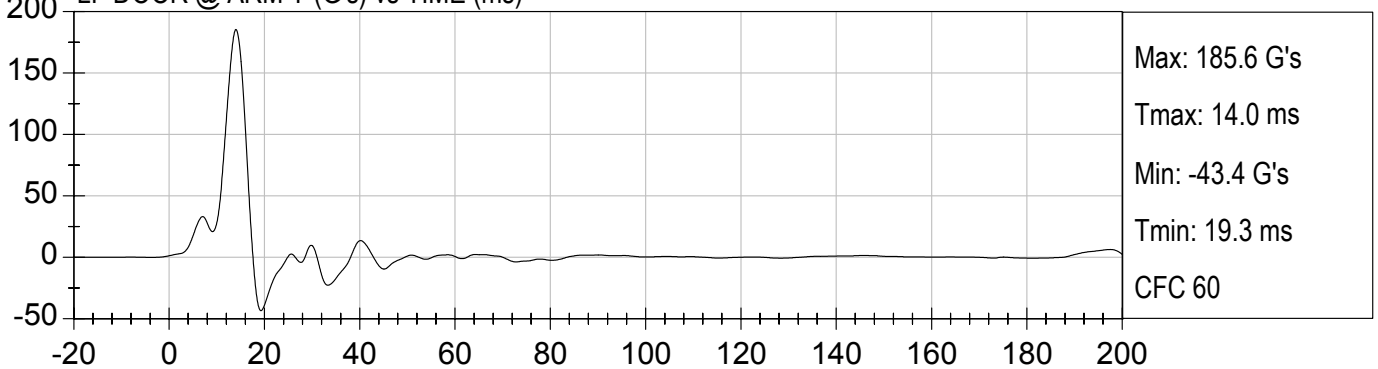
VEHICLE CG Resultant (G's) vs TIME (ms)



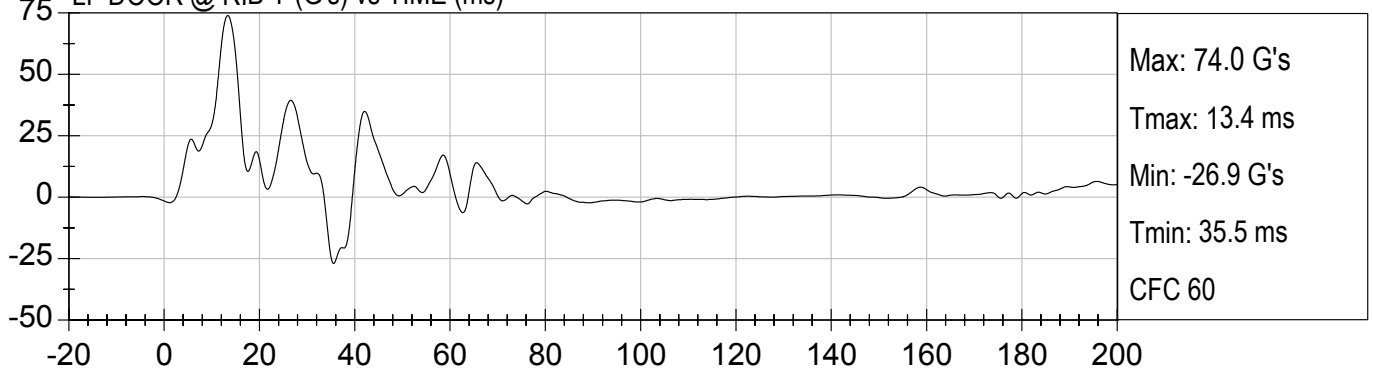




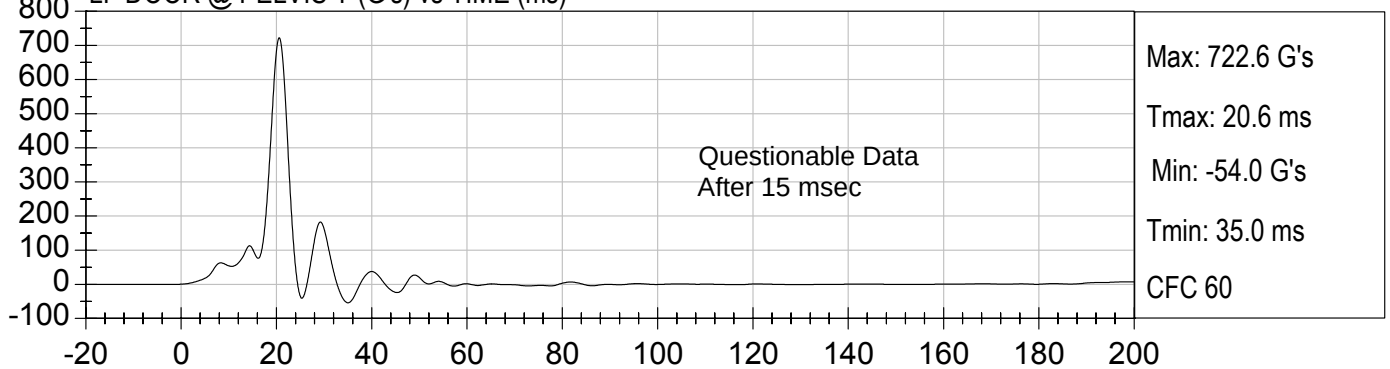
LF DOOR @ ARM Y (G's) vs TIME (ms)



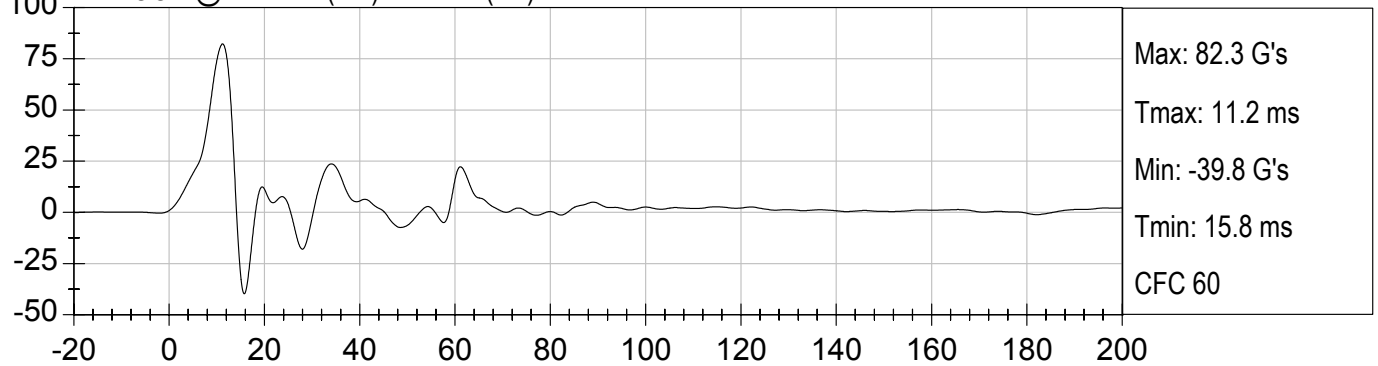
LF DOOR @ RIB Y (G's) vs TIME (ms)

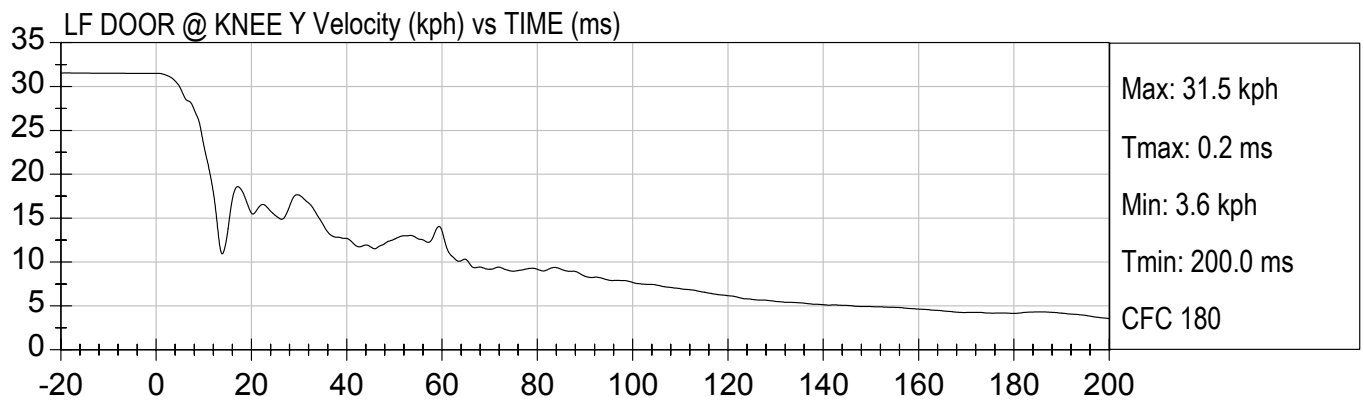
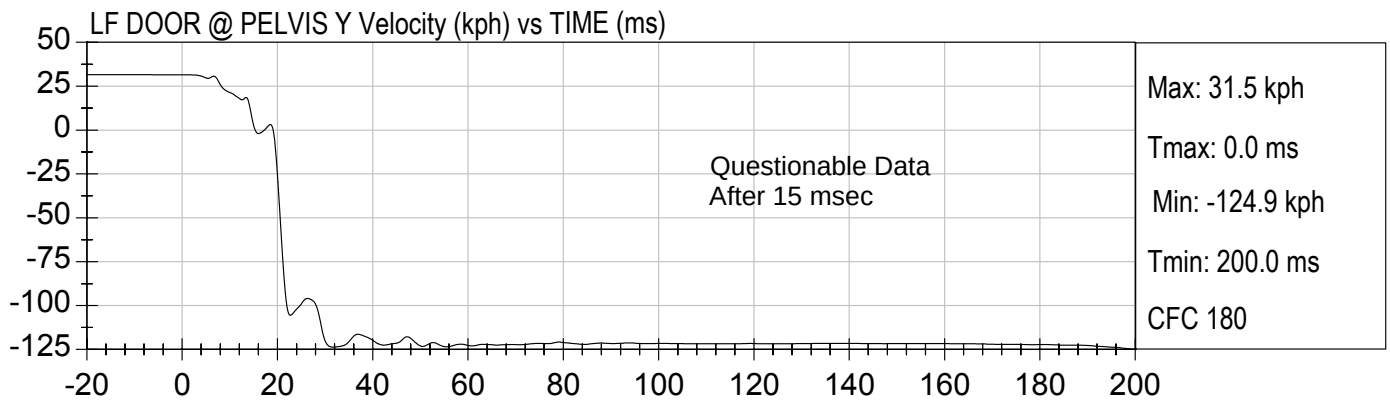
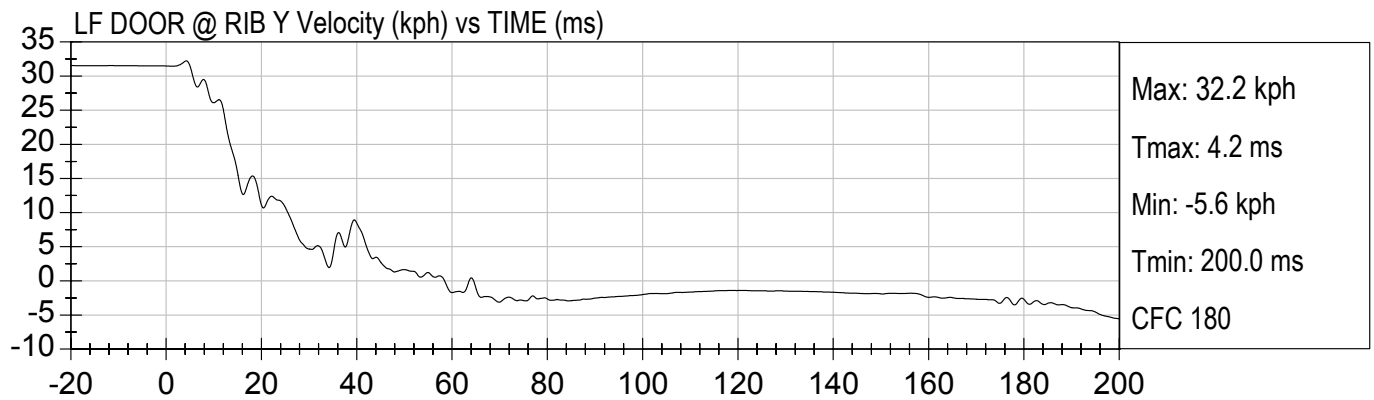
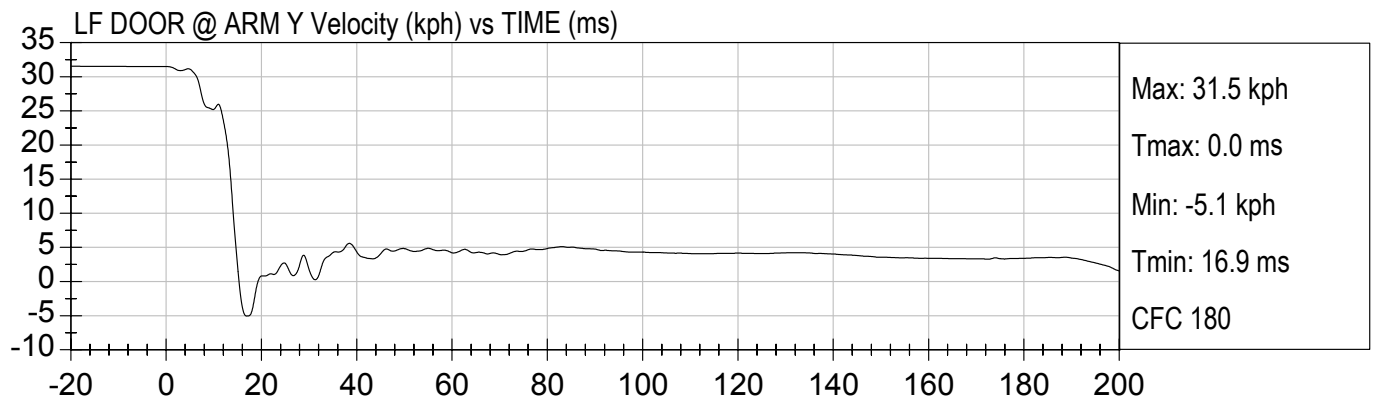


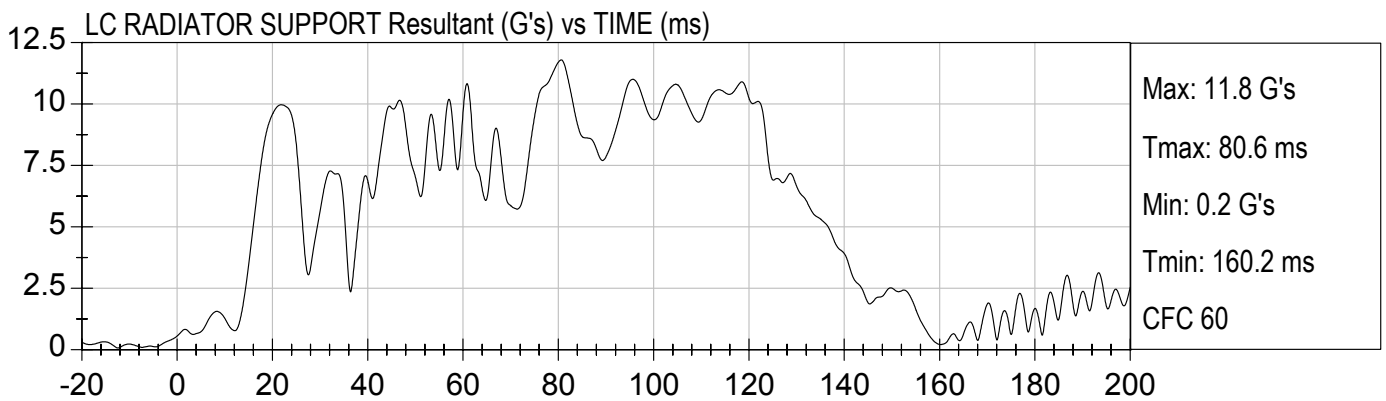
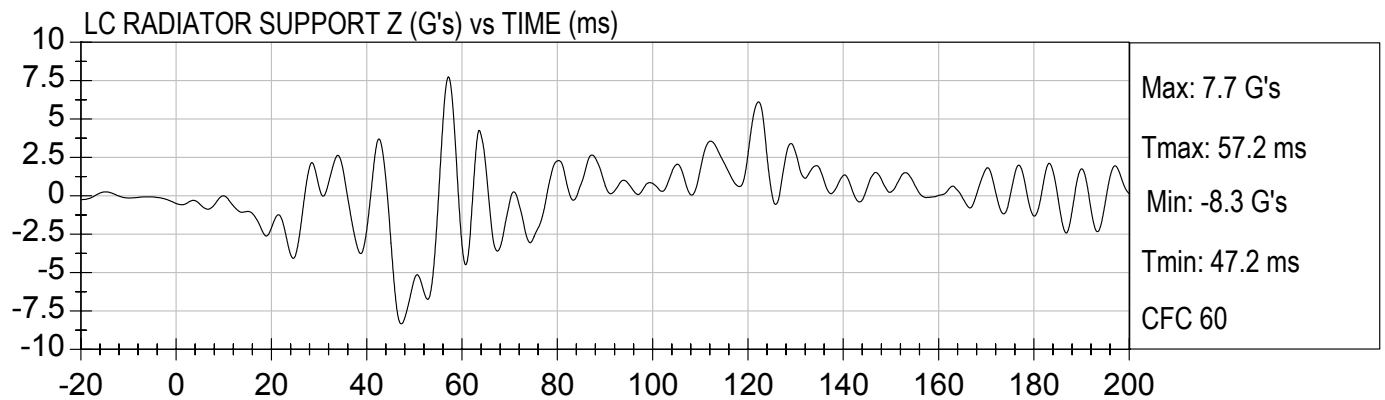
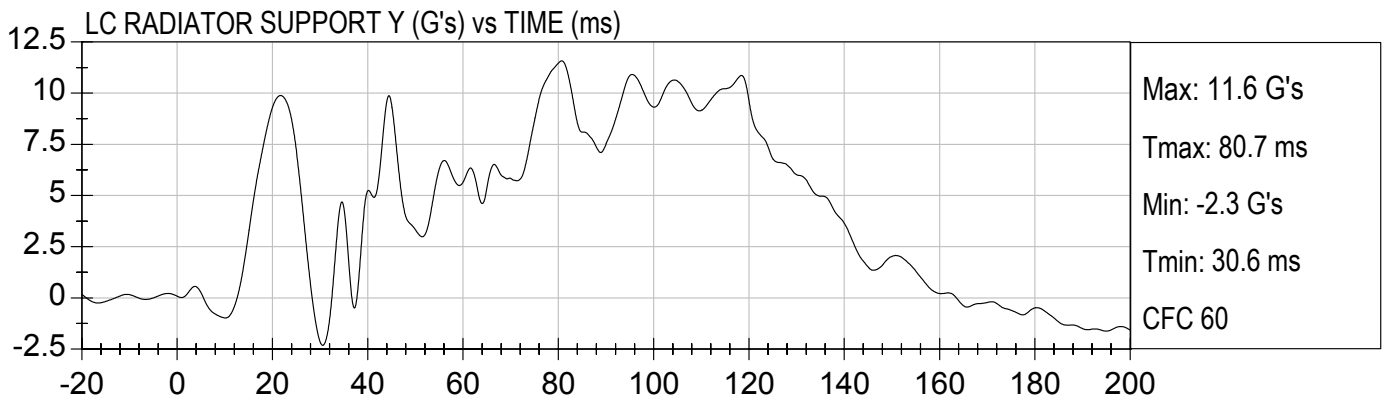
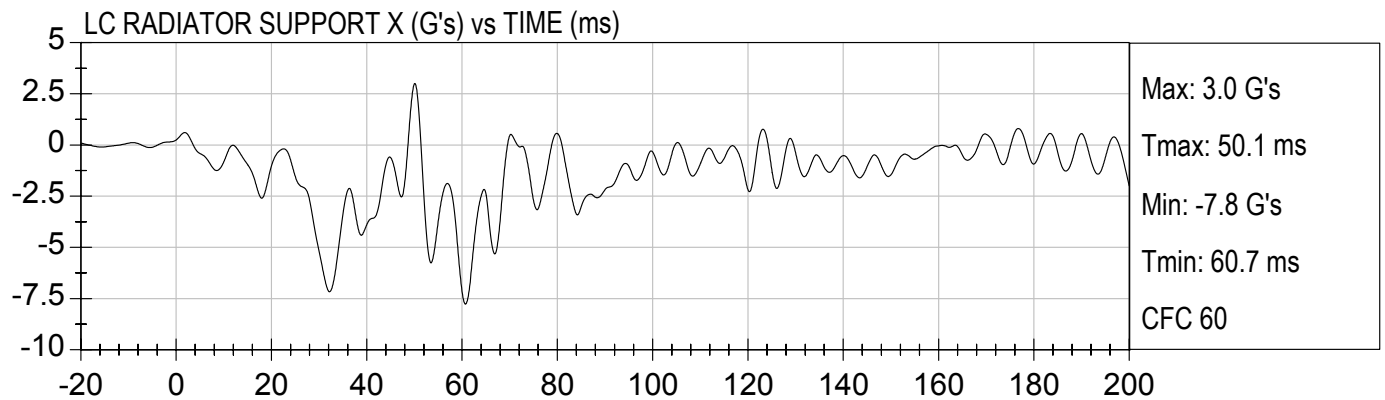
LF DOOR @ PELVIS Y (G's) vs TIME (ms)

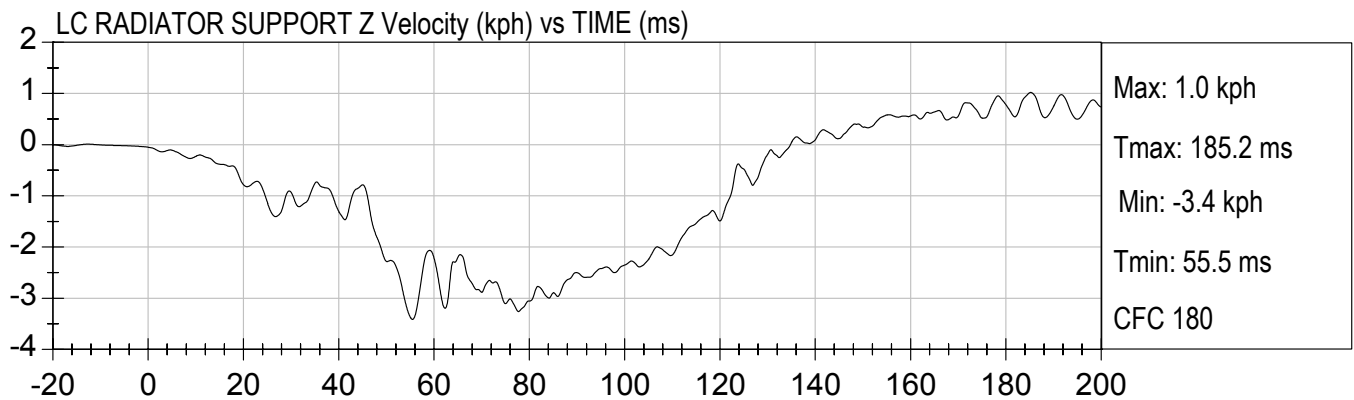
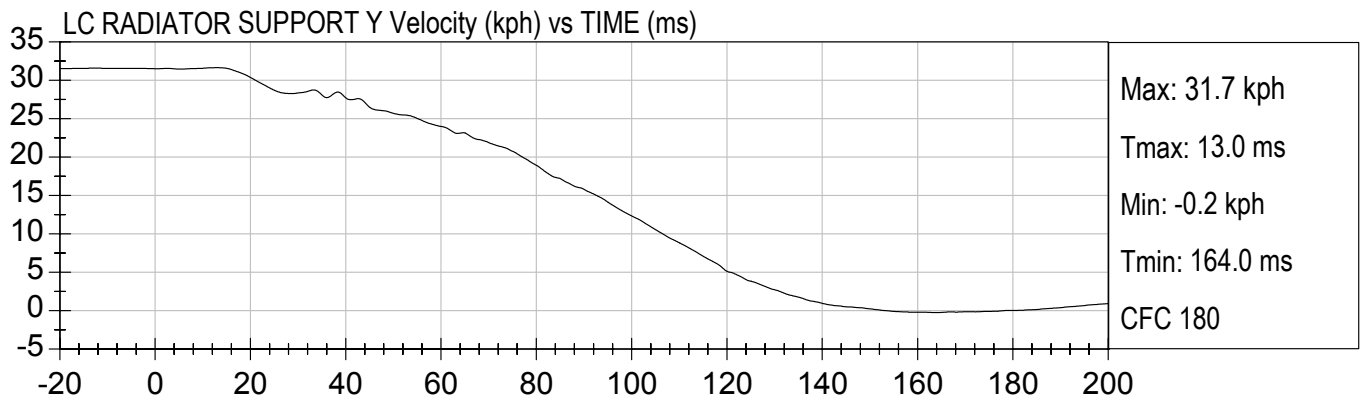
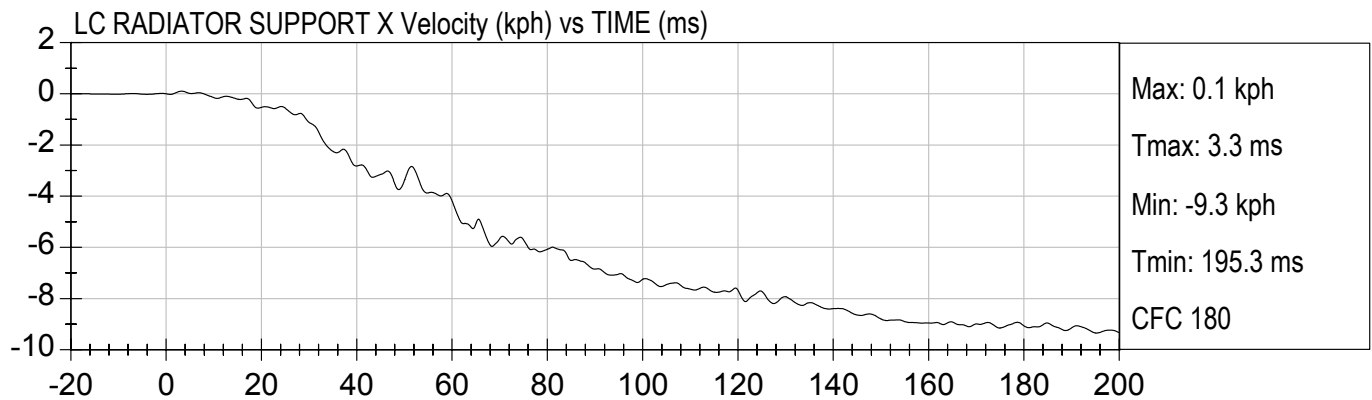


LF DOOR @ KNEE Y (G's) vs TIME (ms)



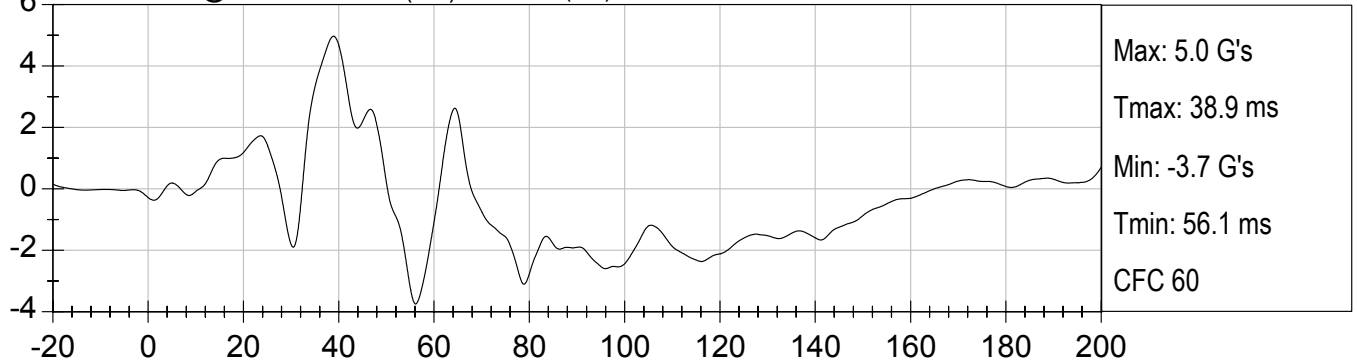




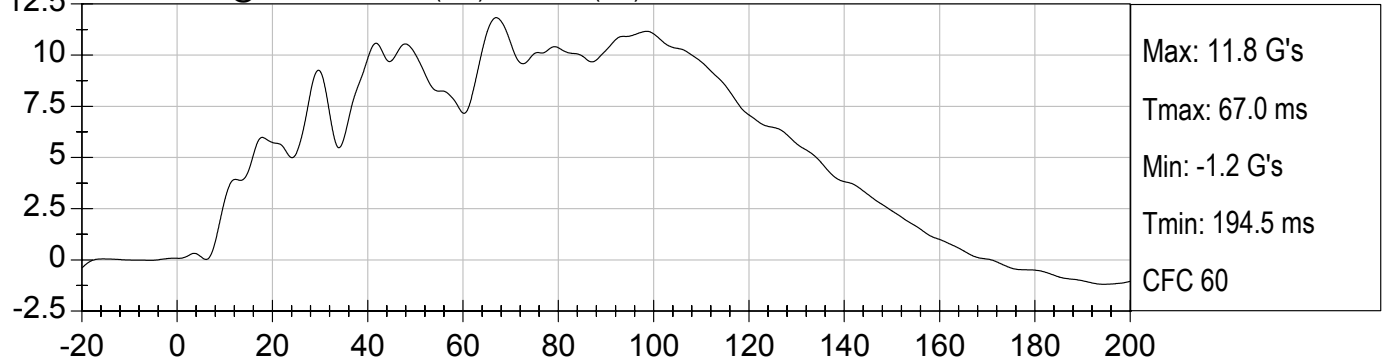




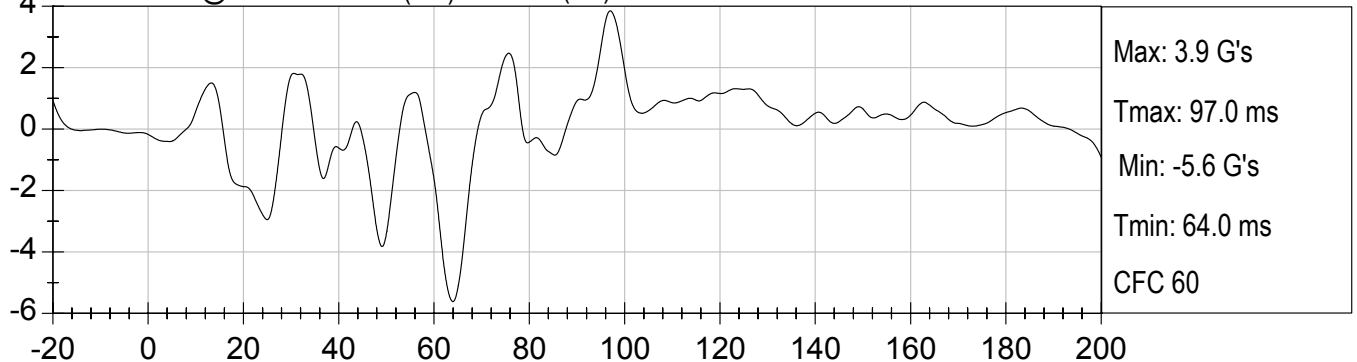
FLOORPAN @ REAR AXLE X (G's) vs TIME (ms)



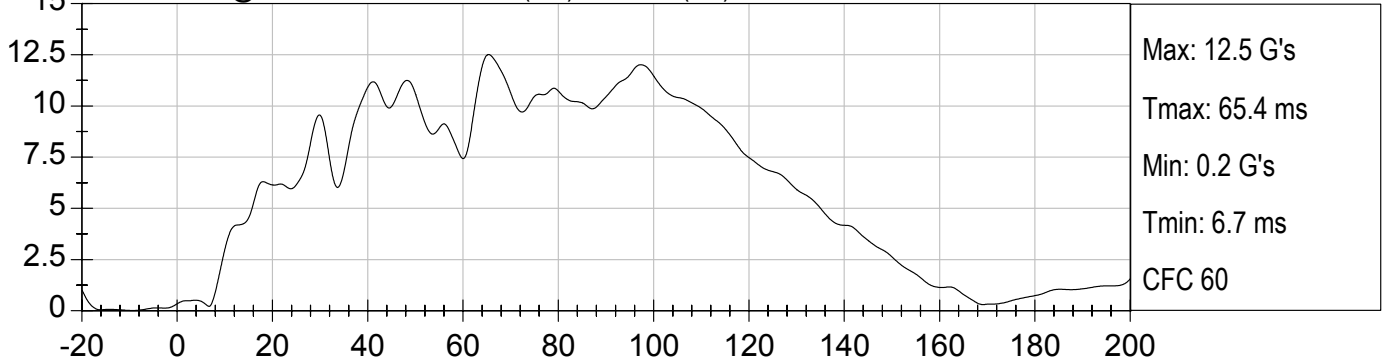
FLOORPAN @ REAR AXLE Y (G's) vs TIME (ms)



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

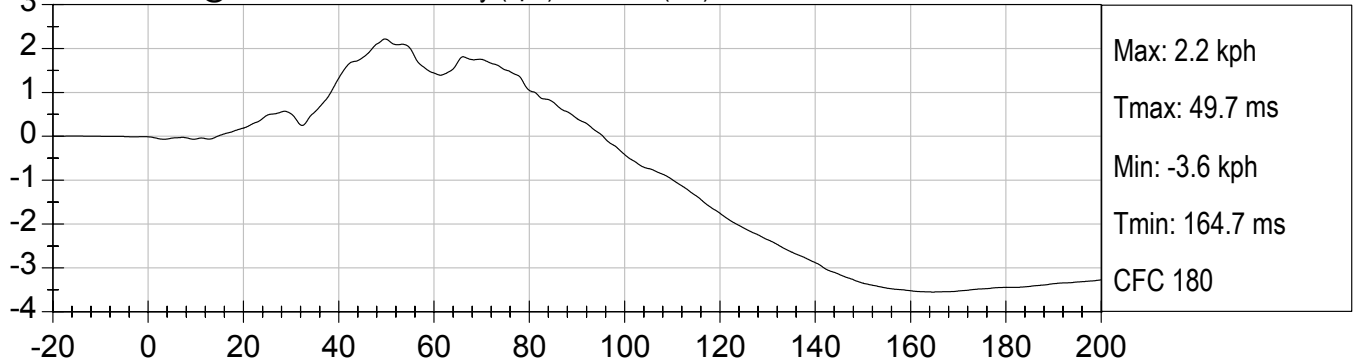


FLOORPAN @ REAR AXLE Resultant (G's) vs TIME (ms)

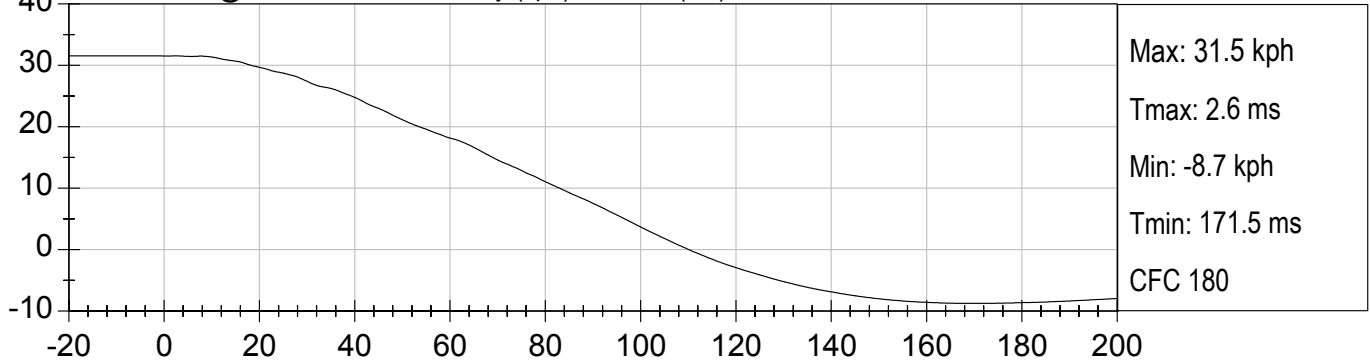




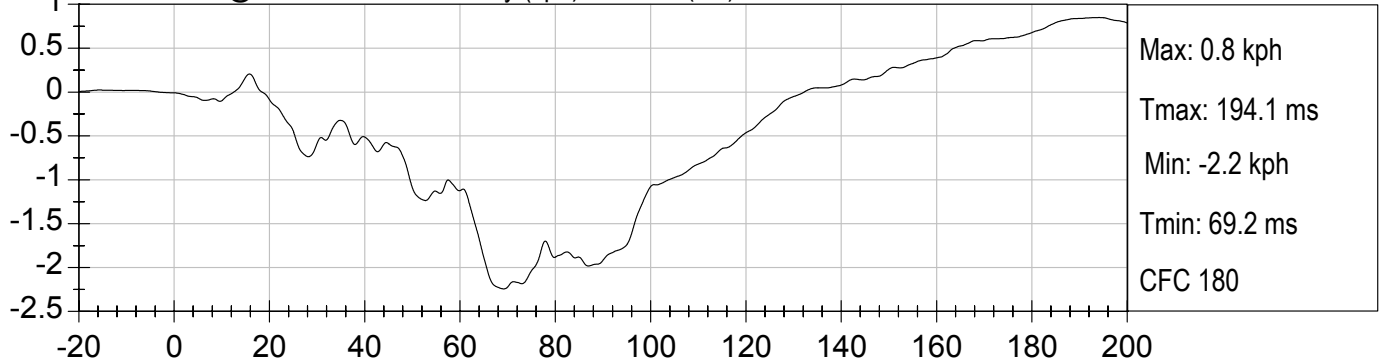
FLOORPAN @ REAR AXLE X Velocity (kph) vs TIME (ms)

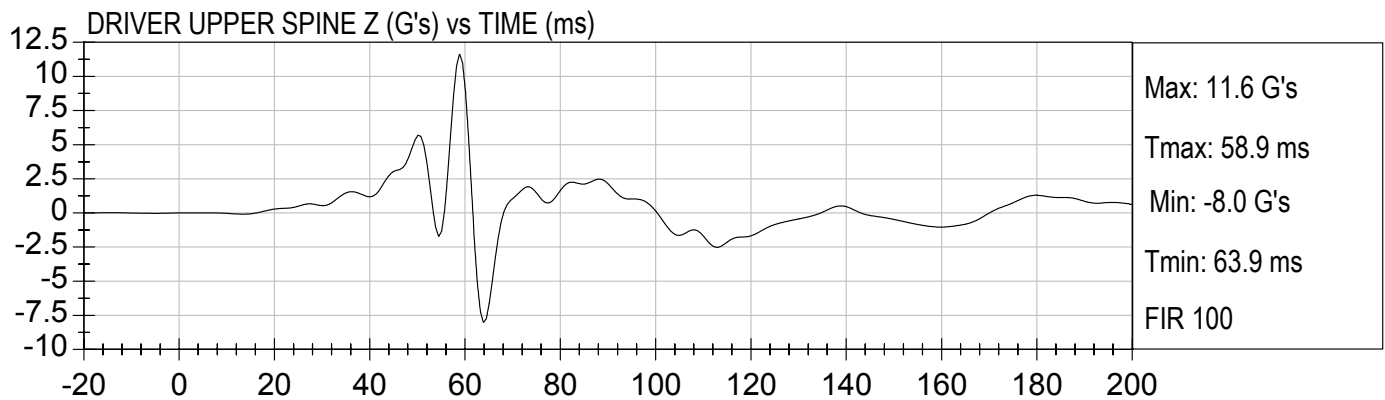
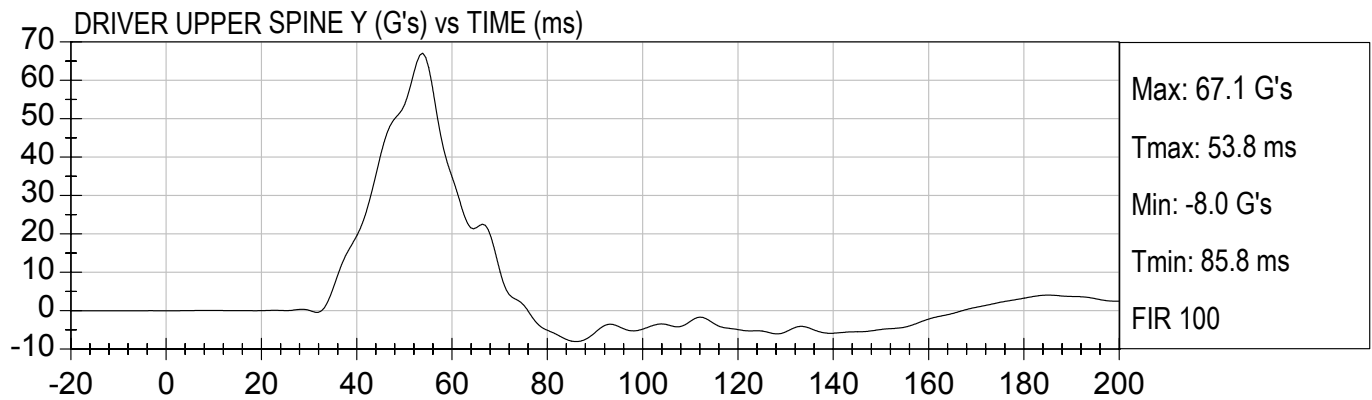
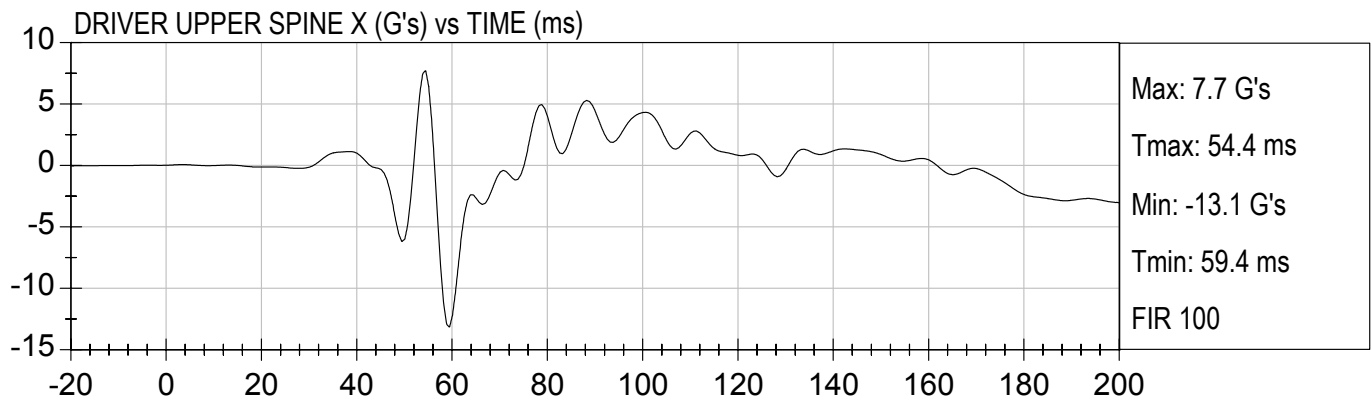


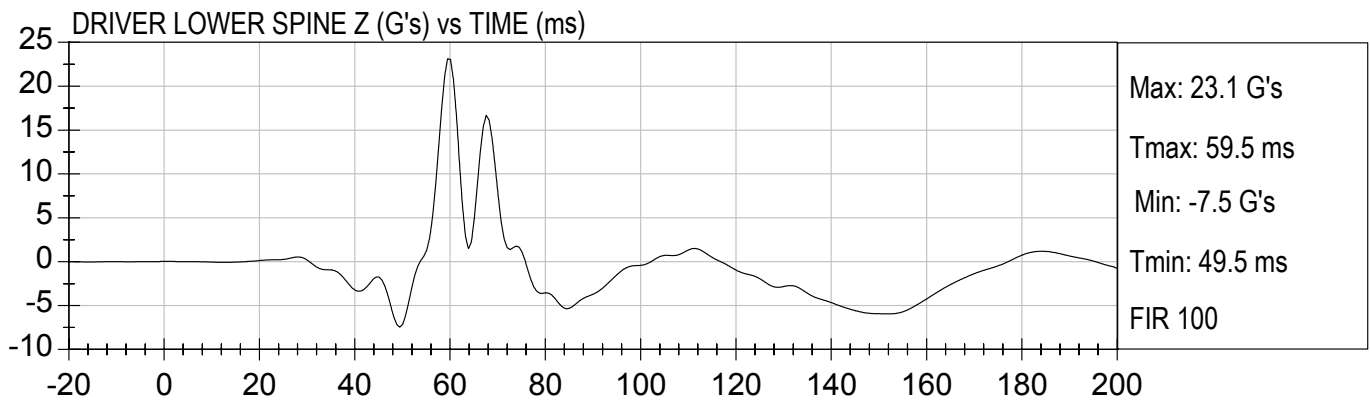
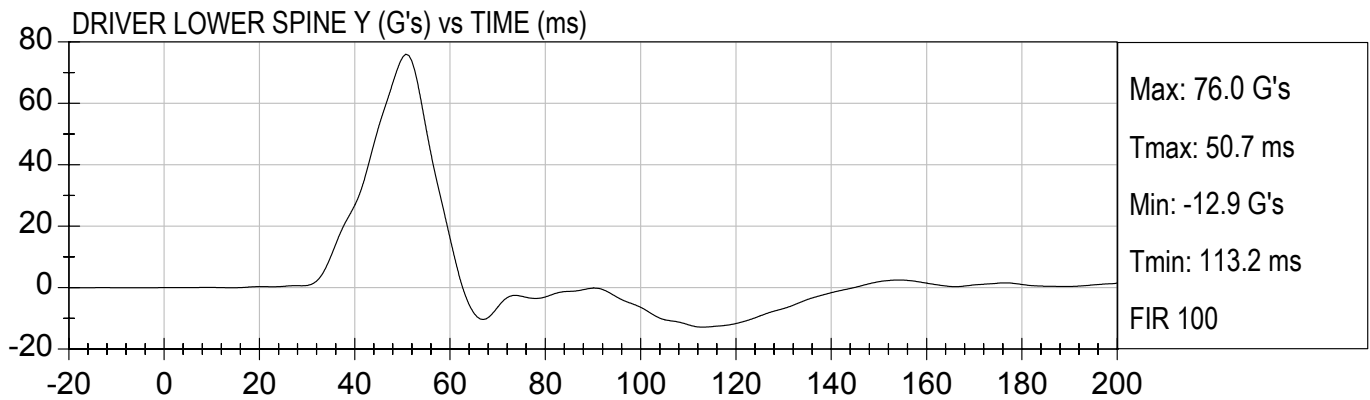
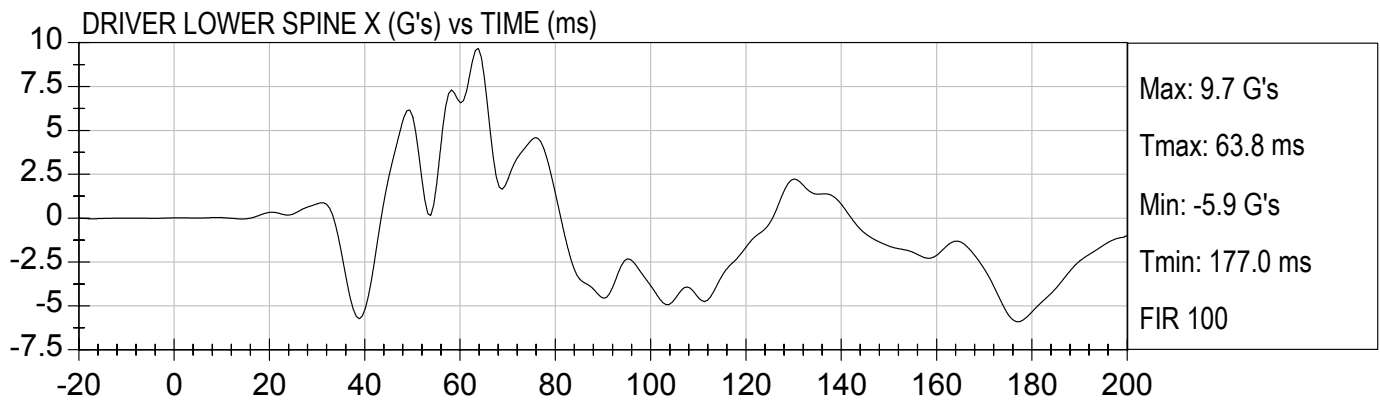
FLOORPAN @ REAR AXLE Y Velocity (kph) vs TIME (ms)

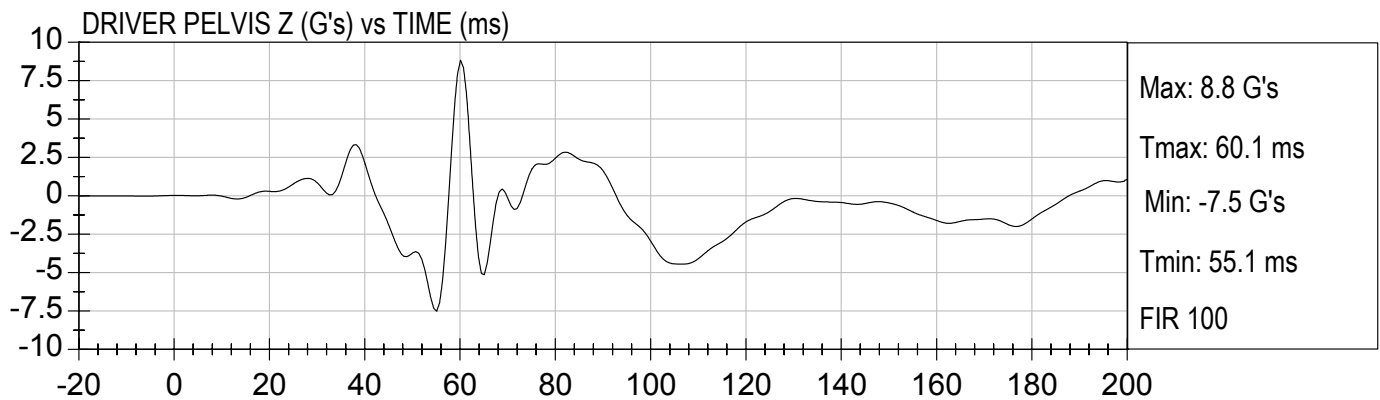
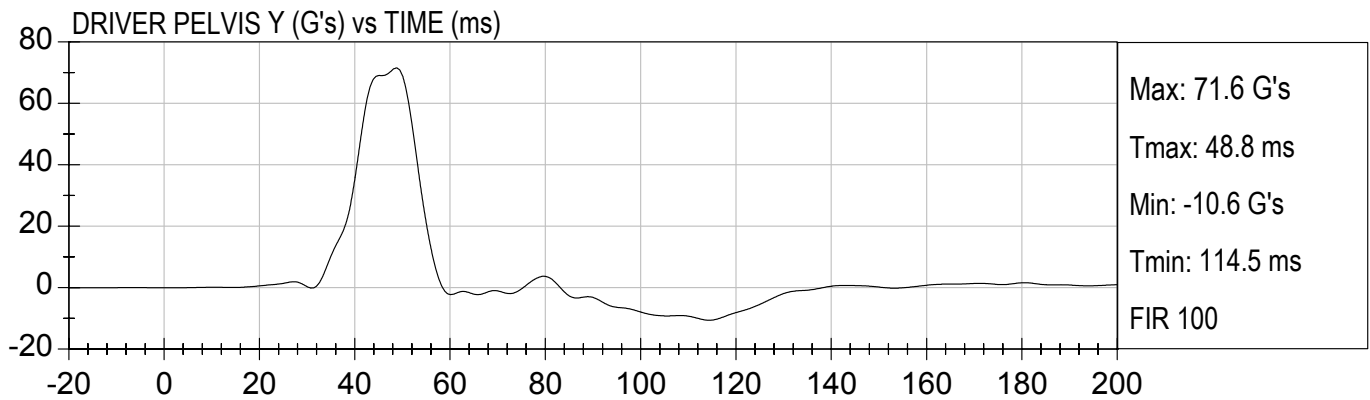
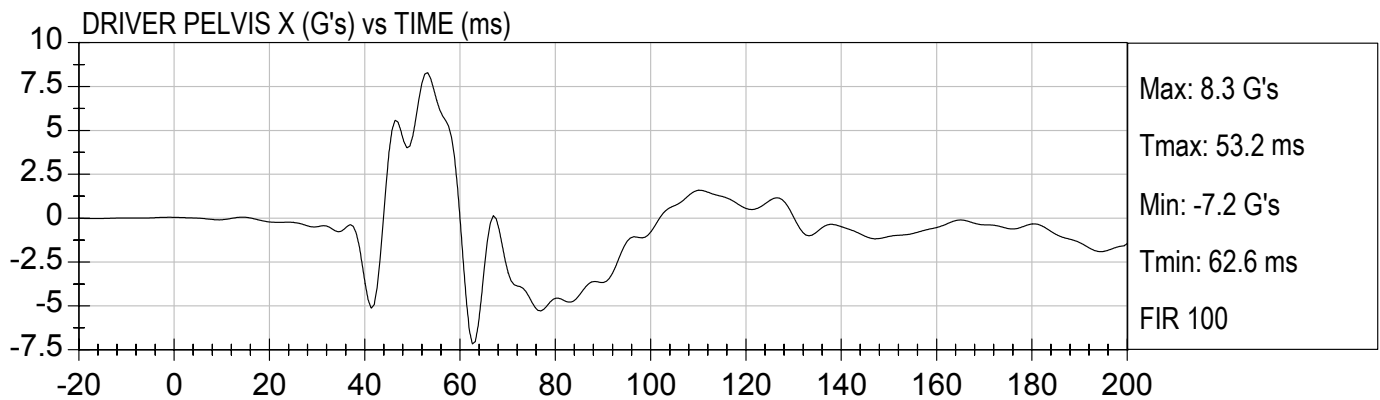


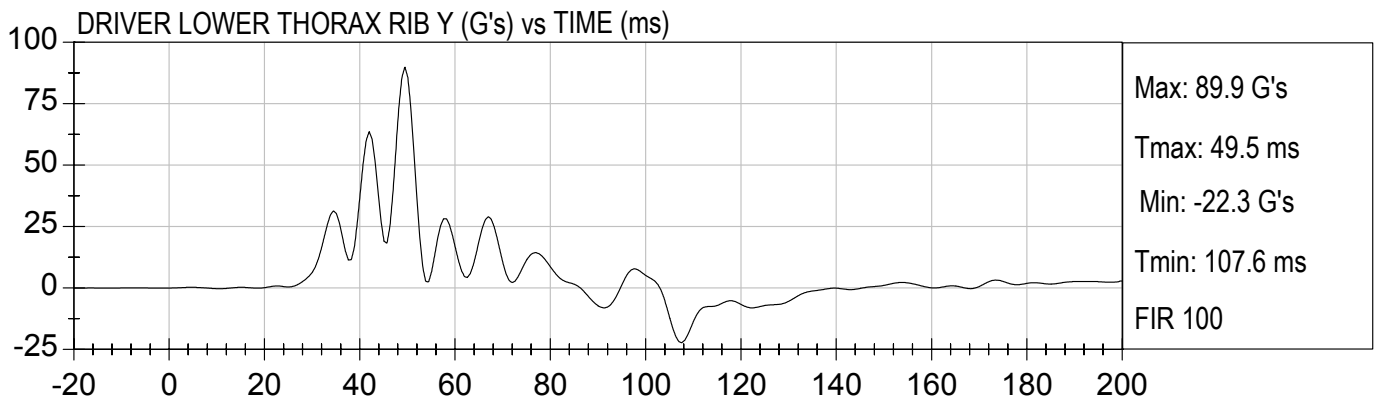
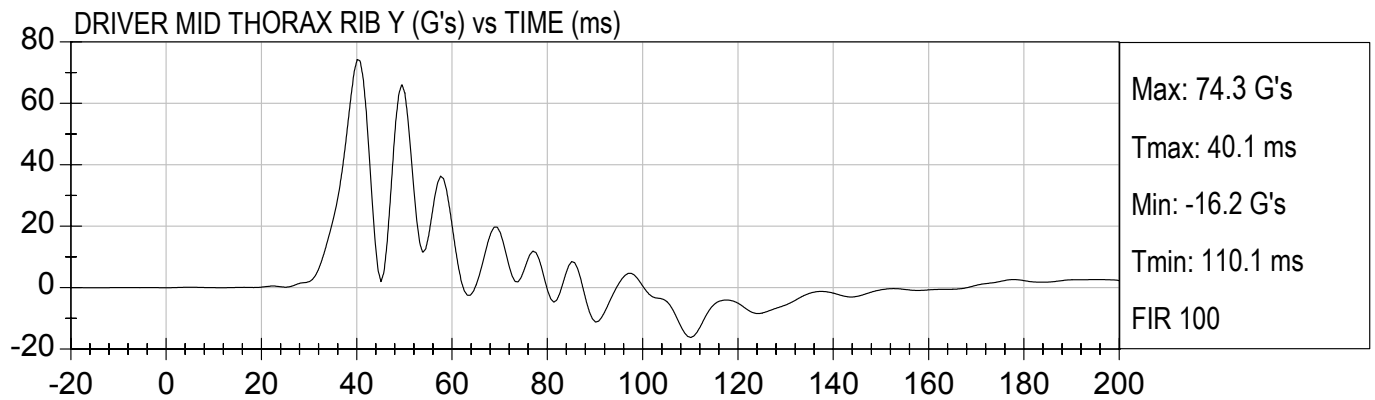
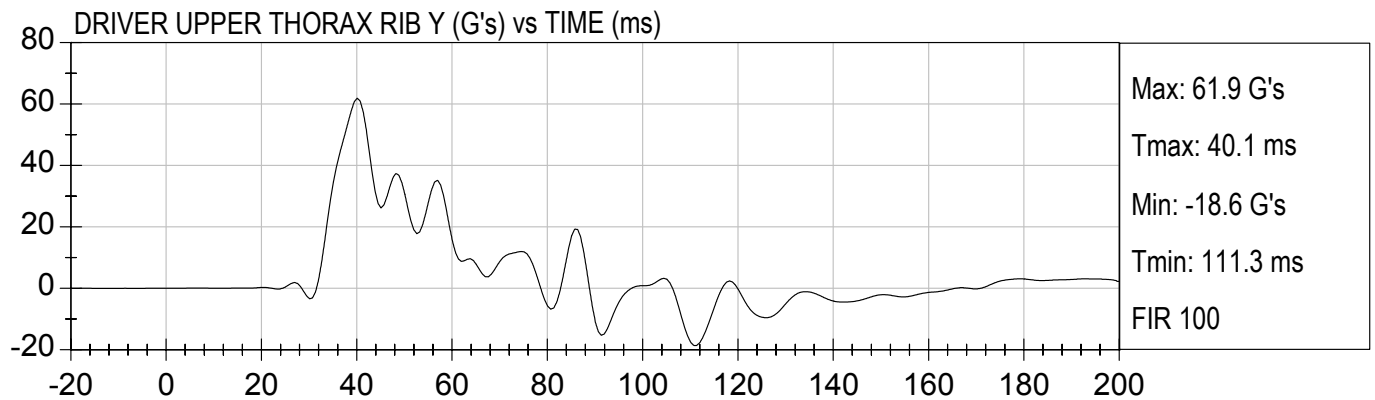
FLOORPAN @ REAR AXLE Z Velocity (kph) vs TIME (ms)





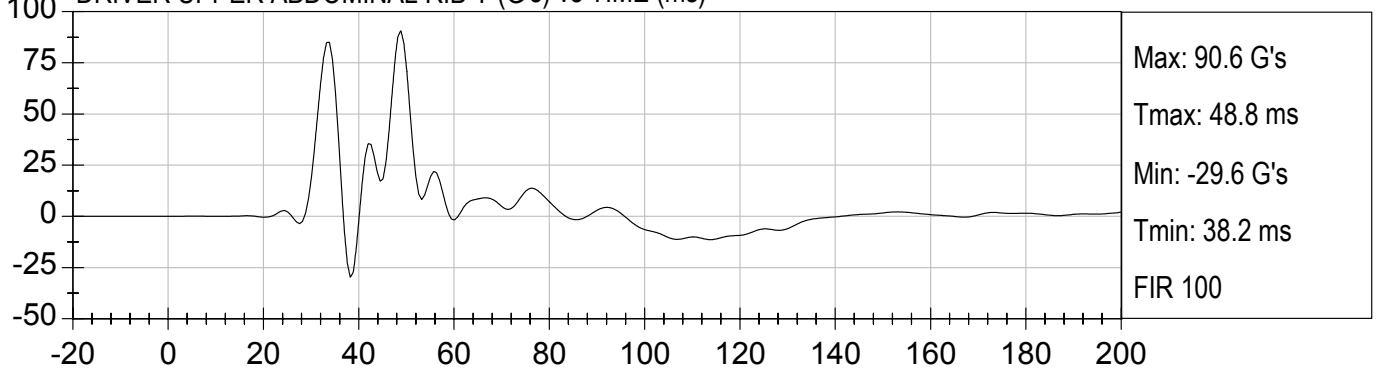




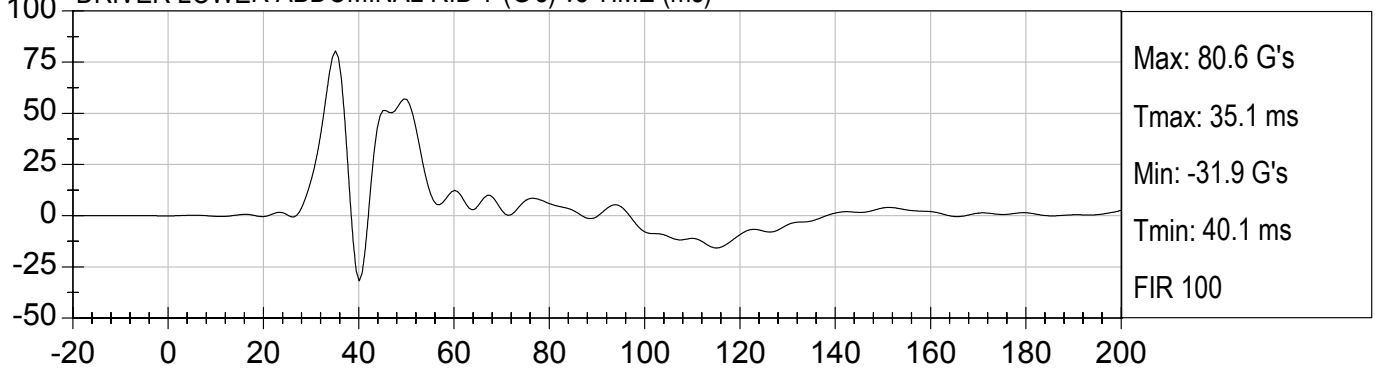


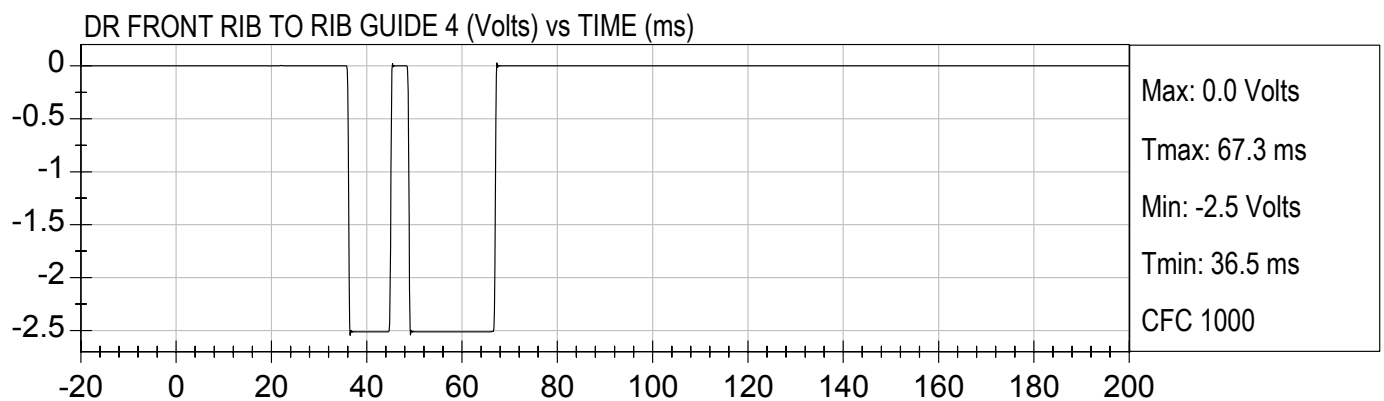
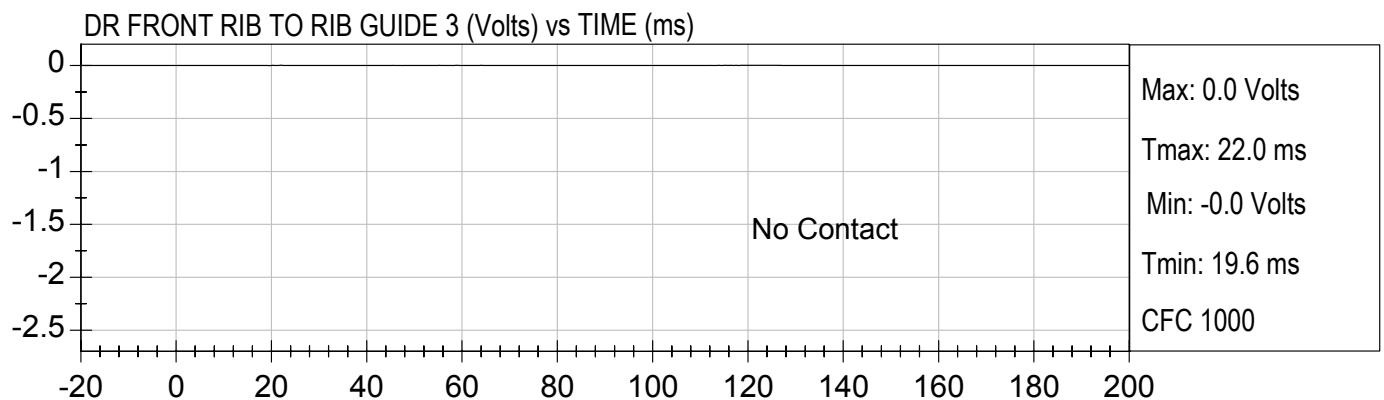
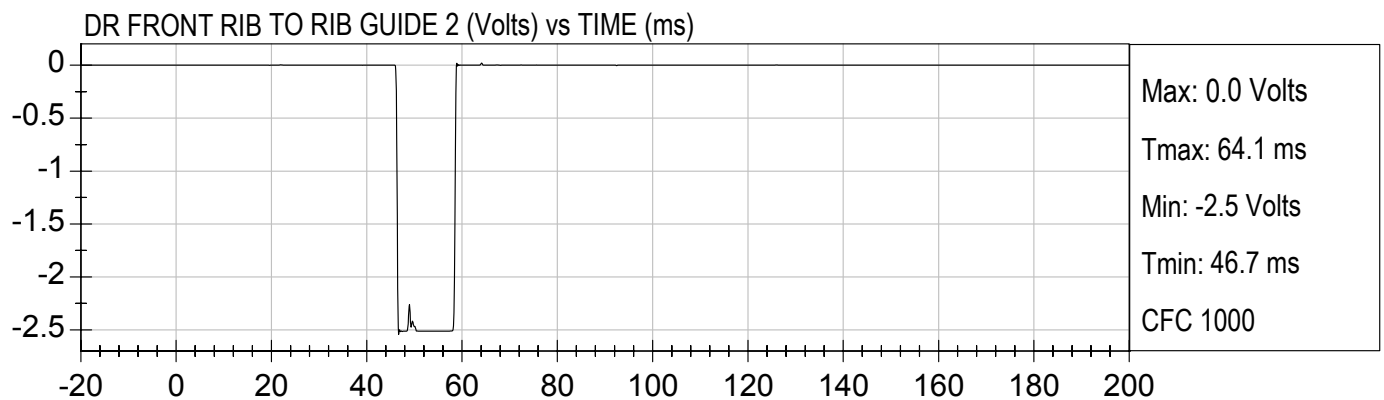
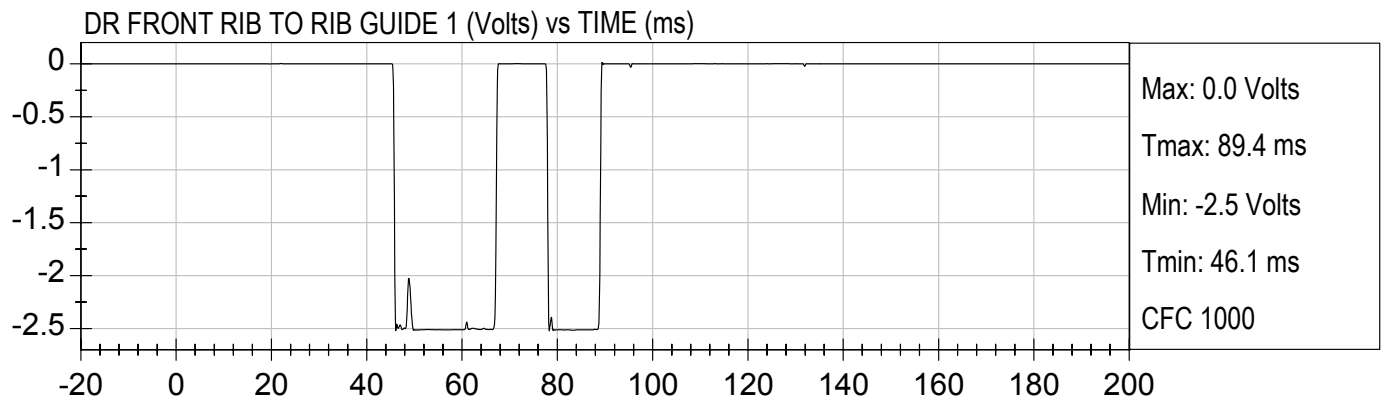


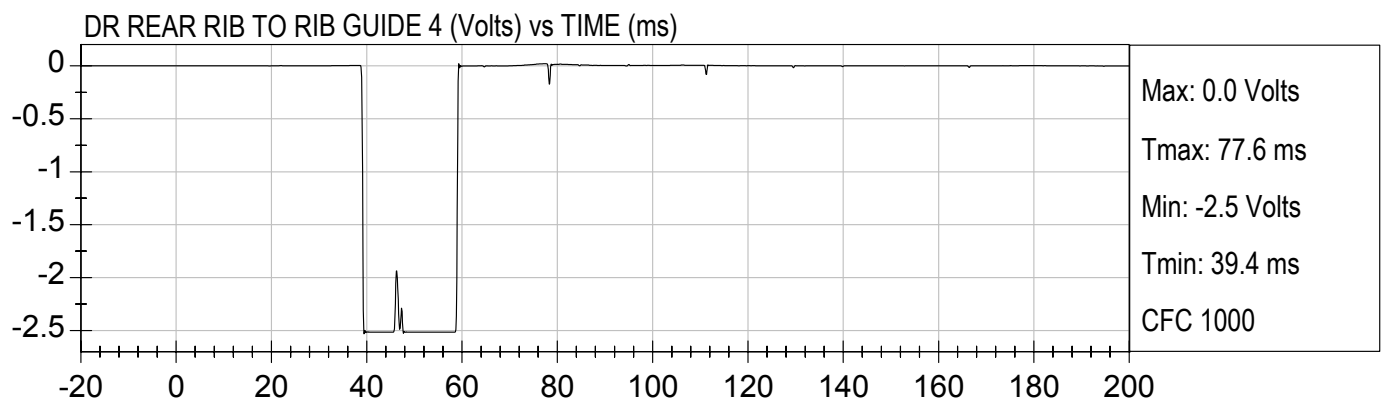
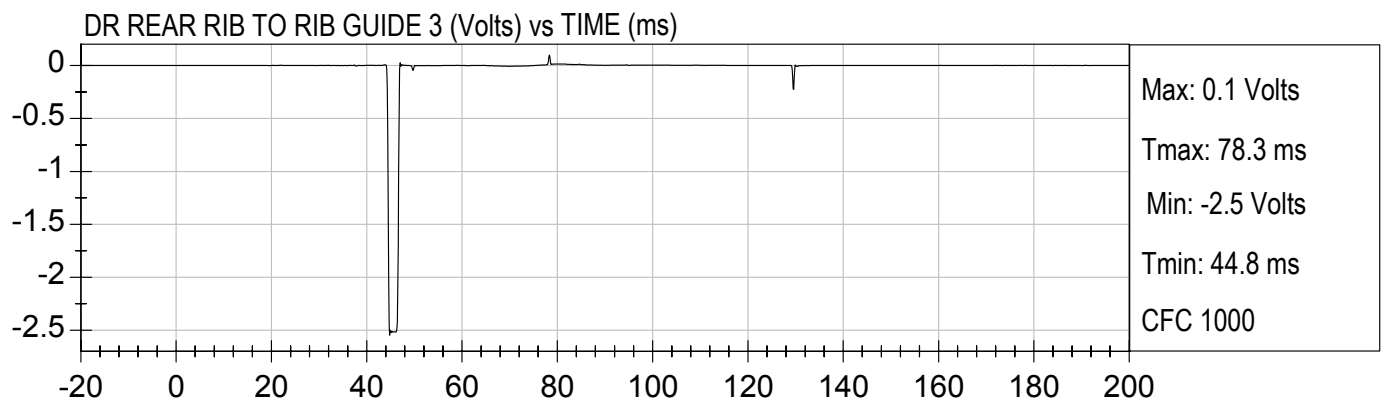
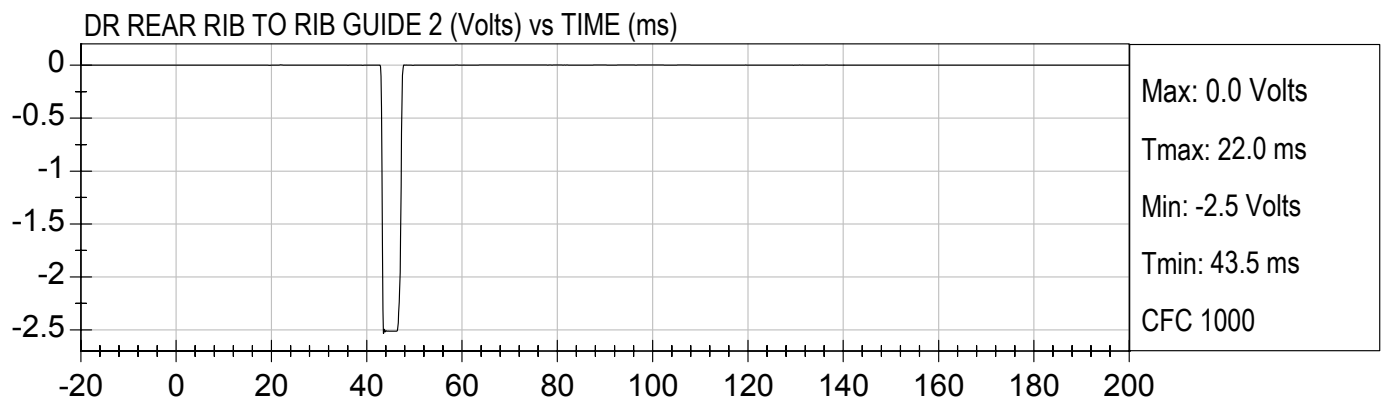
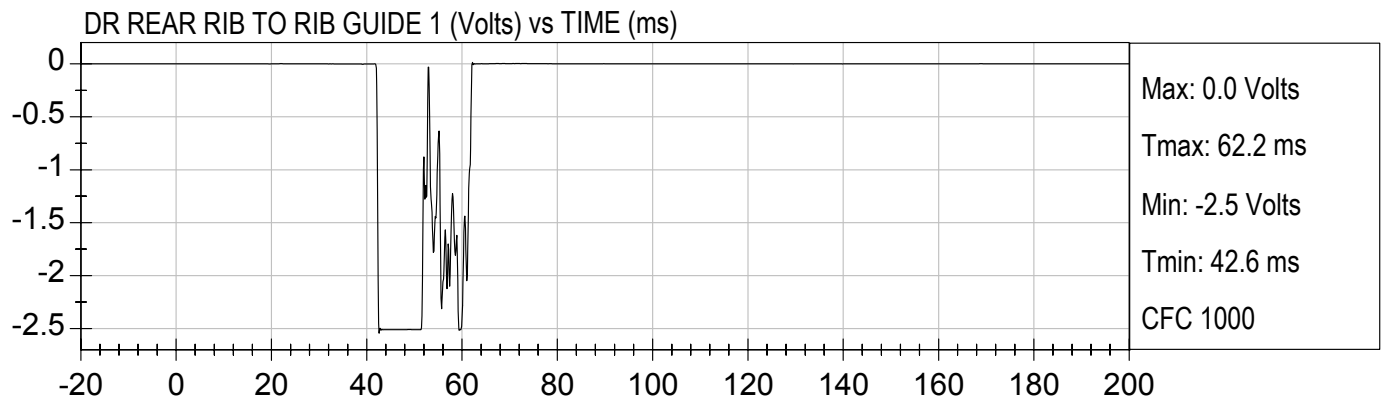
DRIVER UPPER ABDOMINAL RIB Y (G's) vs TIME (ms)

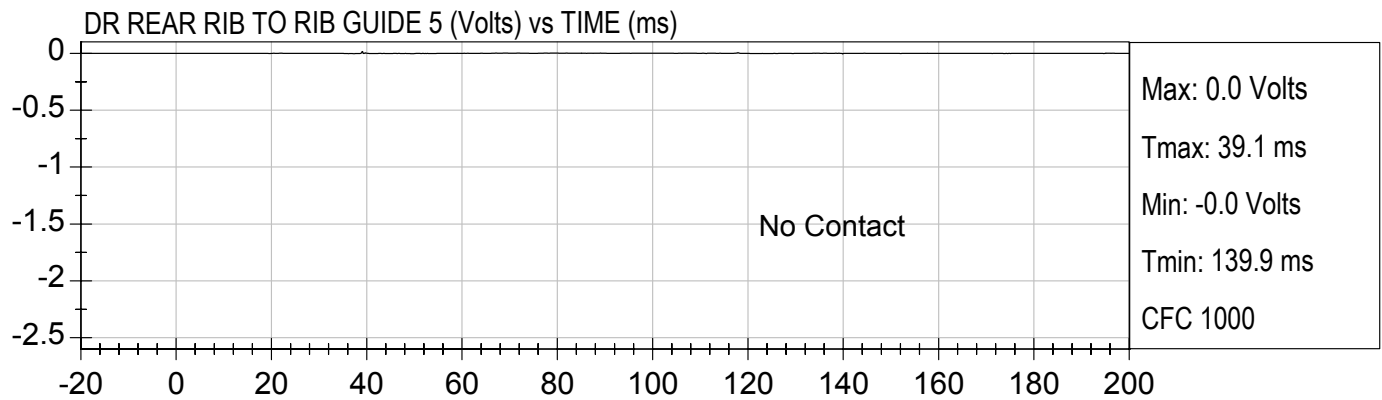
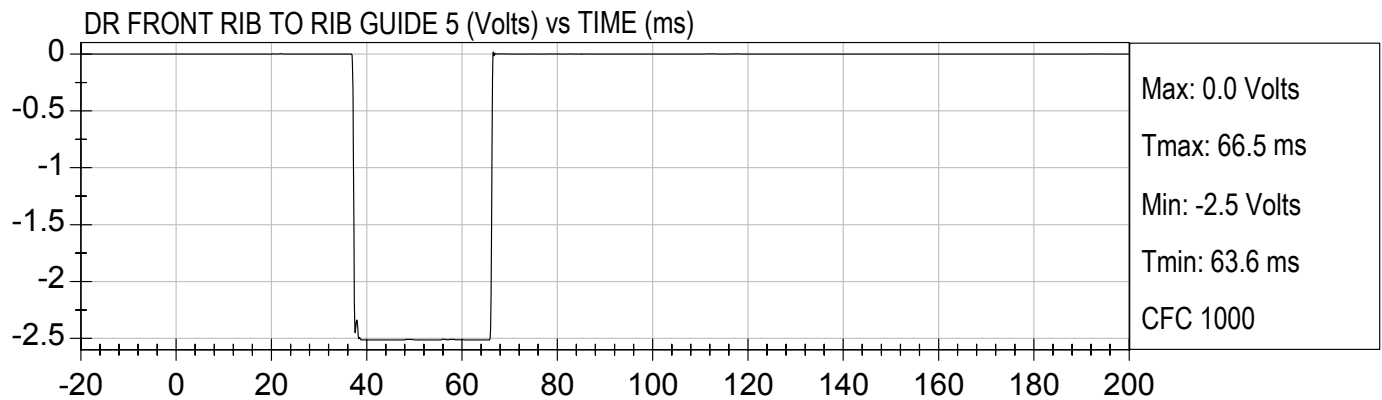


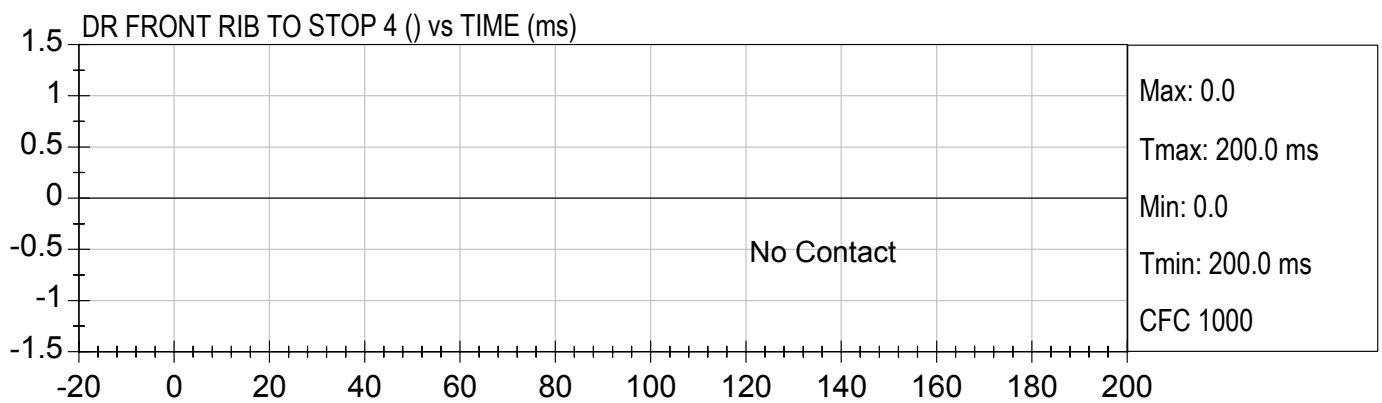
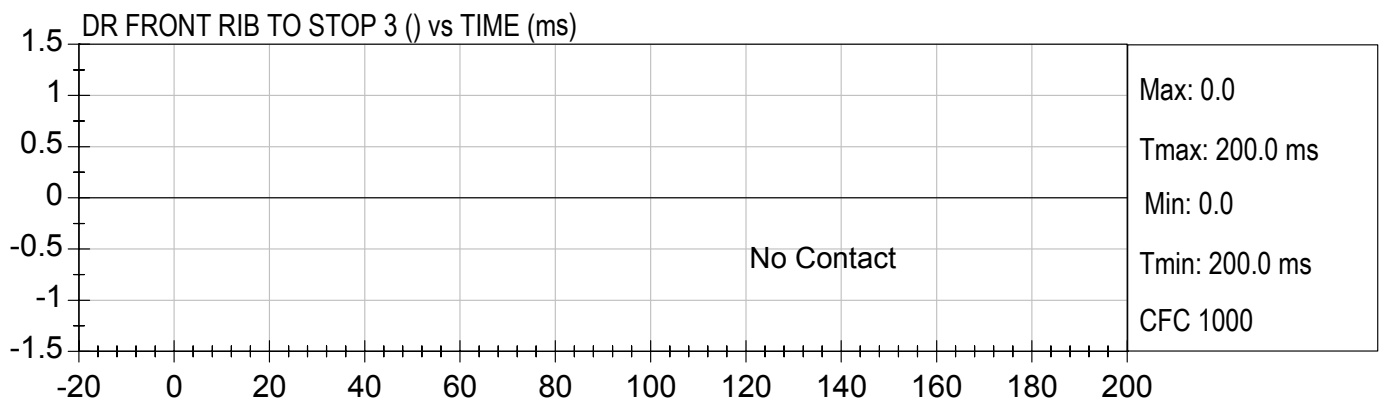
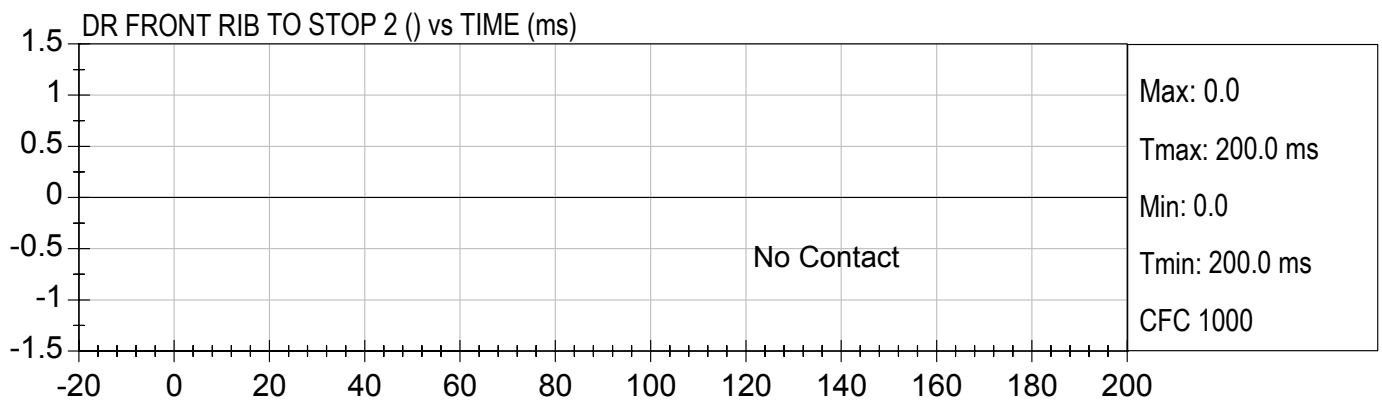
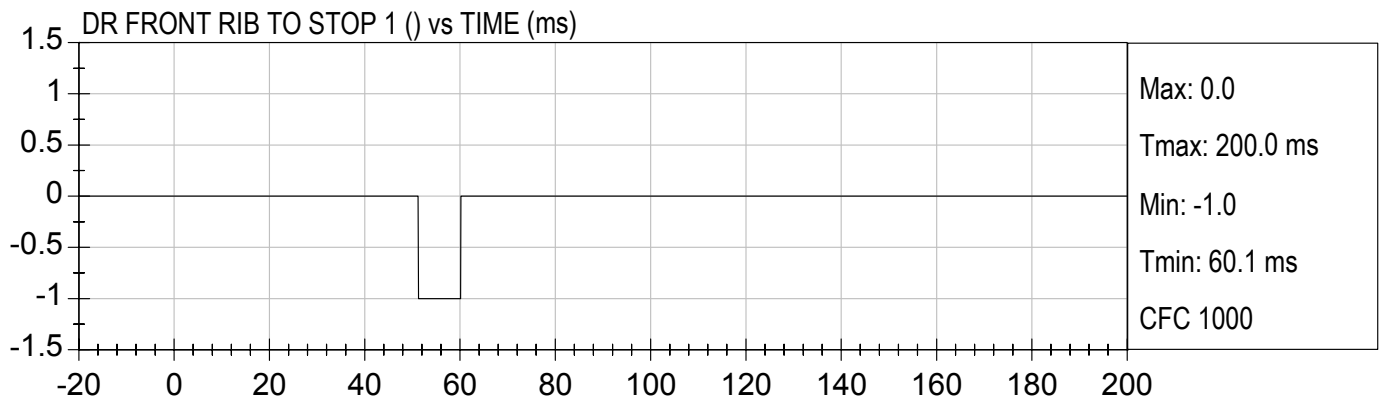
DRIVER LOWER ABDOMINAL RIB Y (G's) vs TIME (ms)







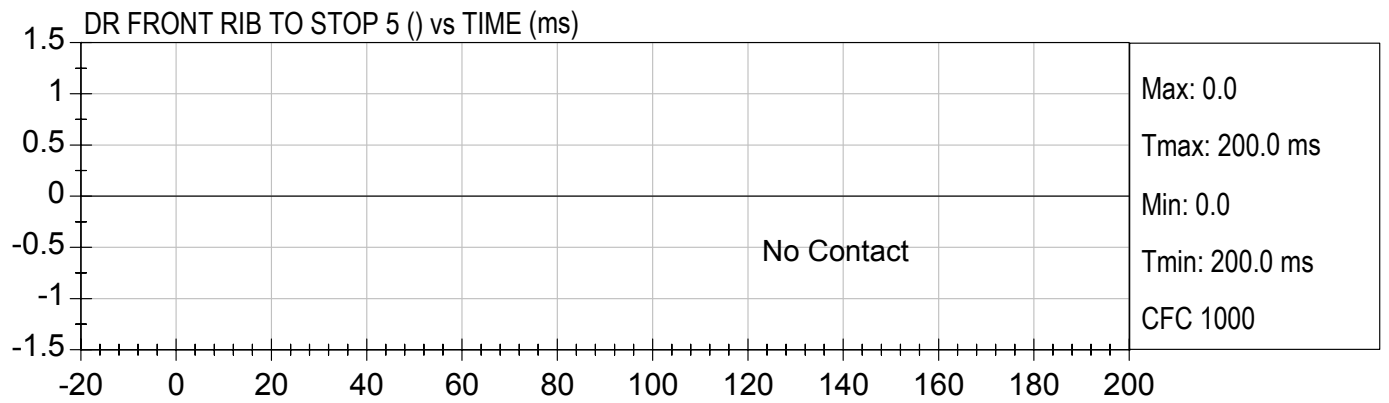


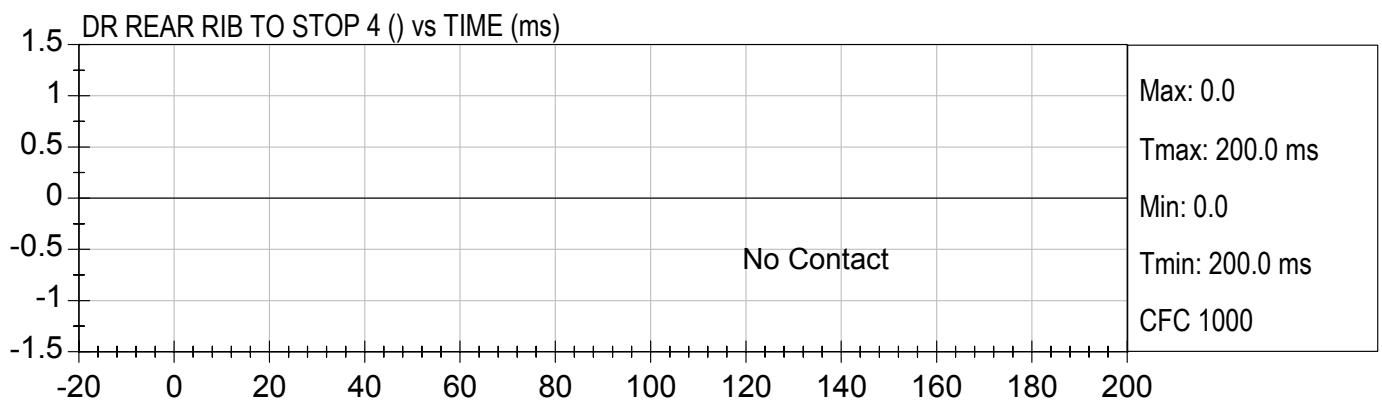
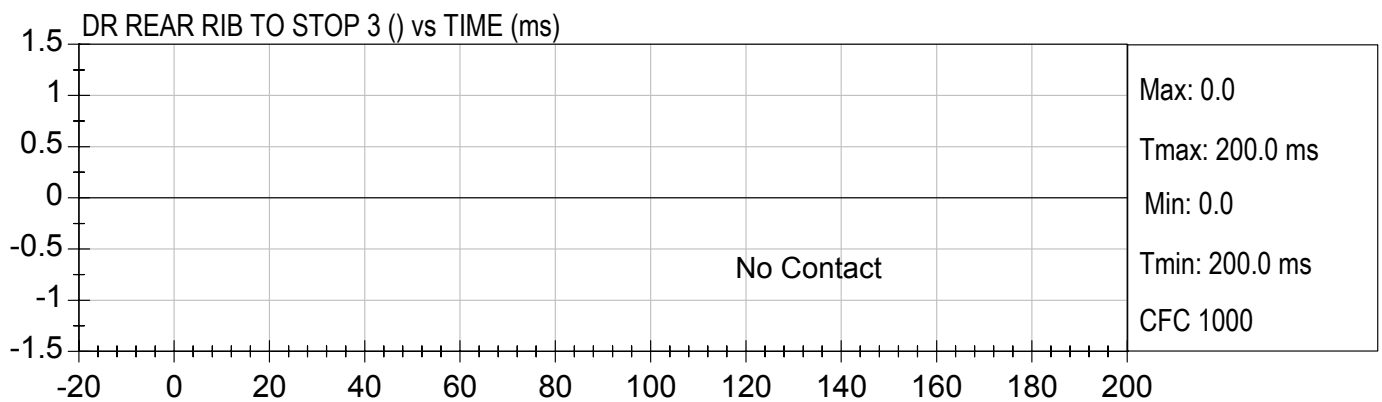
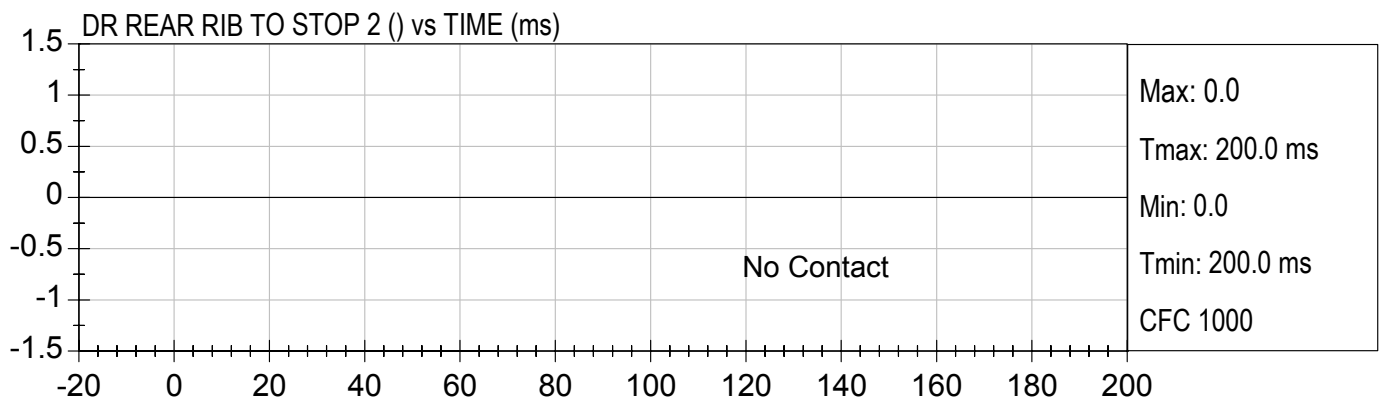
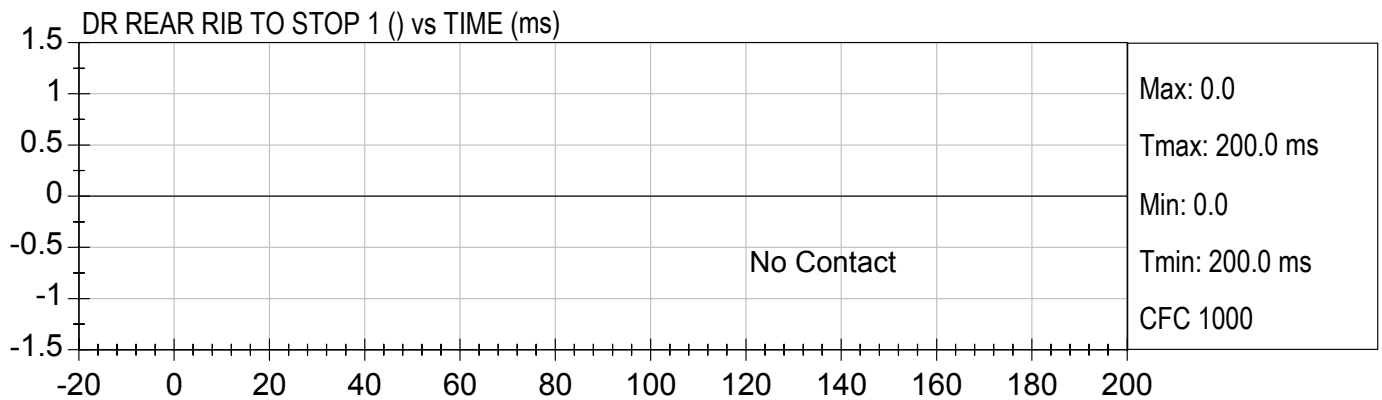


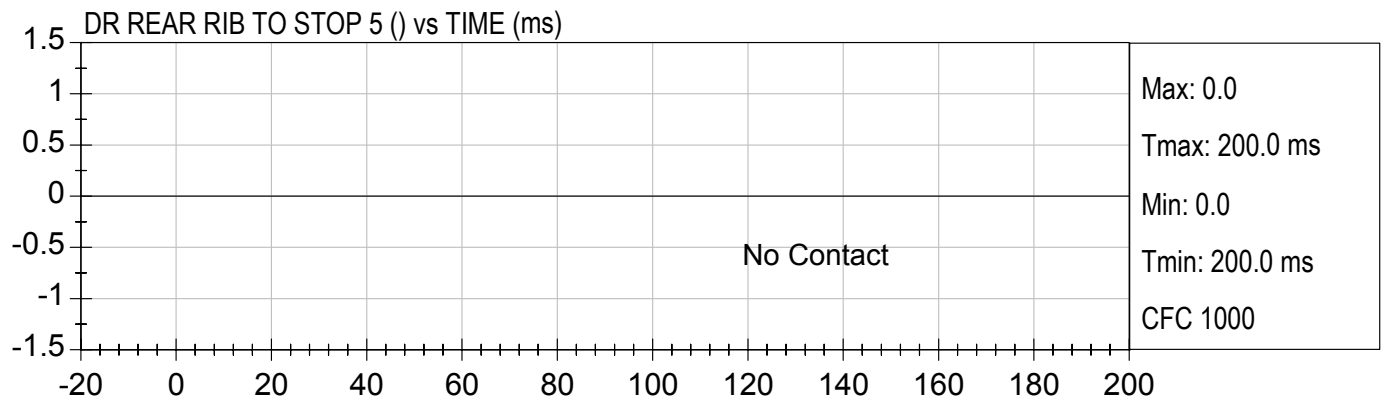


OBLIQUE RIGID POLE IMPACT
2003 TOYOTA CAMRY R31522

Test Date: 3/28/2003
Speed: 19.6 mph (31.5 km/h)







APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CERTIFICATION DATA

Dummy Serial Number: 033

Calibration Test Results Summary

Dummy Serial Number: 033

Pre-Test Calibration

Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck did not pass all impact test requirements.
Shoulder Impact Test:	The shoulder passed all impact test requirements.
Thorax (with arm) Test:	The thorax passed all impact test requirements.
Thorax (without arm) Test:	The thorax passed all impact test requirements.
Abdomen Impact Test:	The abdomen did not pass all impact test requirements.
Pelvis Test:	The pelvis passed all impact test requirements.

MGA RESEARCH CORPORATION
HEAD DROP TEST
SID IIs DUMMY

Date: 3/27/03
Dummy Serial Number: 033
Test Number: D03521/D03531

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03521</u>	<u>D03531</u>
Temperature (°C)	18.9° – 25.6°	21.4	21.6
Humidity	10% - 70%	27	25
Resultant Accel	115 - 145 g's	121	116
Peak Longitudinal Accel	(-15) – (+ 15) g's	5	4

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

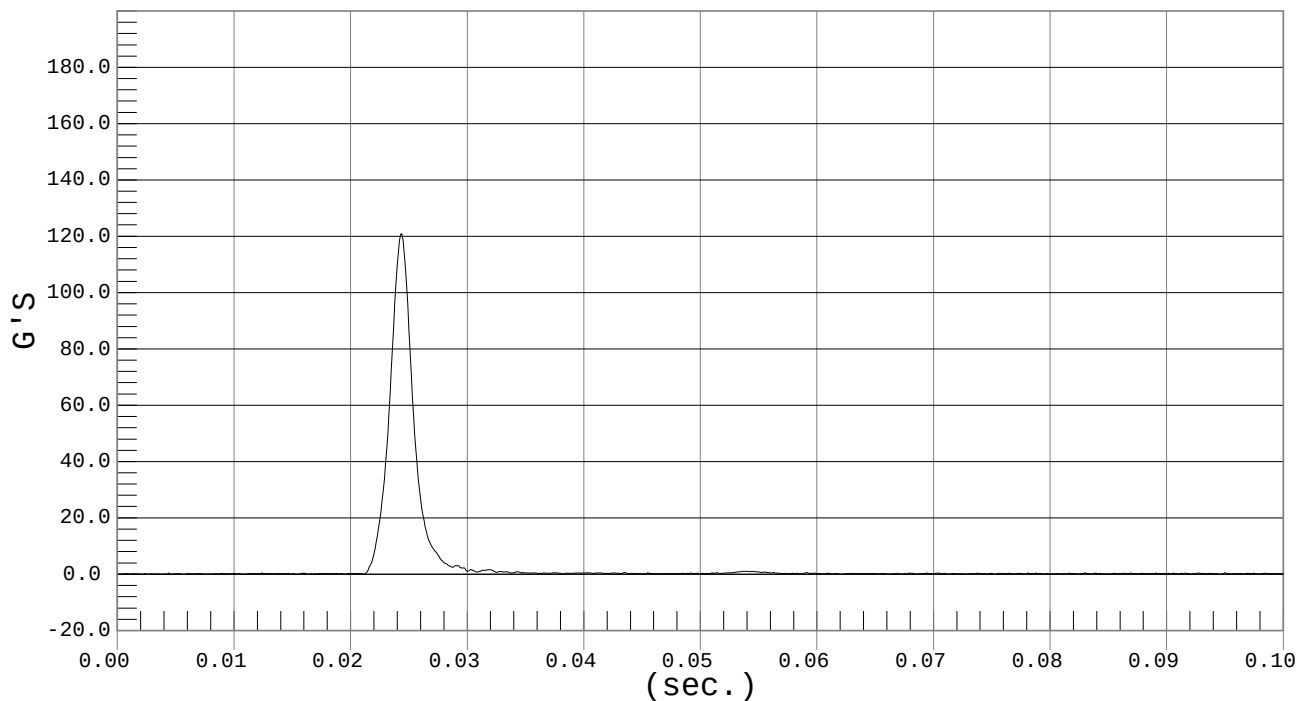


PEAK RESULTANT ACCELERATION

Test Desc.: Head Drop
Component: Dummy #033

Test Date: 03-27-03
Speed: 0.0 fps, 0.00 M/s

Ymin = .02 G'S @ 0.0001 sec., Ymax = 120.86 G'S @ 0.0243 sec.

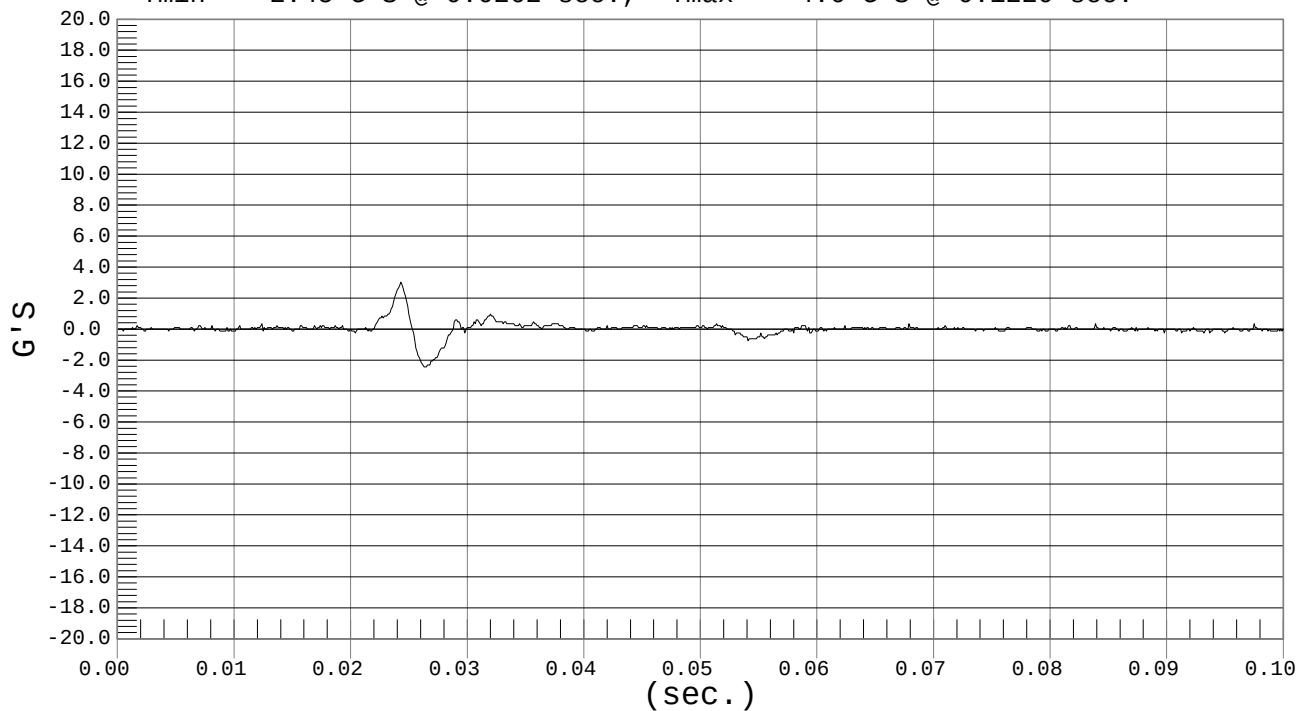


PEAK LONGITUDINAL ACCELARATION

Test Desc.: Head Drop
Component: Dummy #033

Test Date: 03-27-03
Speed: 0.0 fps, 0.00 M/s

Ymin = -2.45 G'S @ 0.0262 sec., Ymax = 4.6 G'S @ 0.1220 sec.



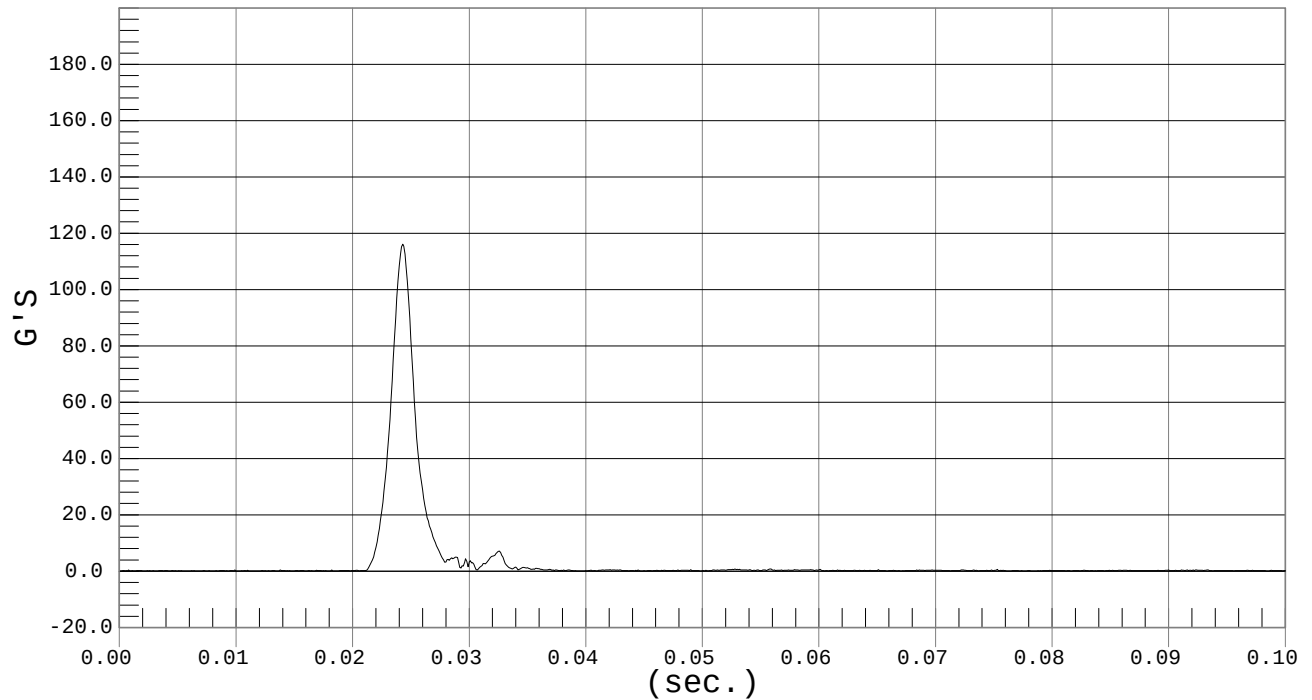


PEAK RESULTANT ACCELERATION

Test Desc.: Head Drop
Component: Dummy #033

Test Date: 03-27-03
Speed: 0.0 fps, 0.00 M/s

Ymin = .06 G'S @ 0.0019 sec., Ymax = 116.08 G'S @ 0.0242 sec.

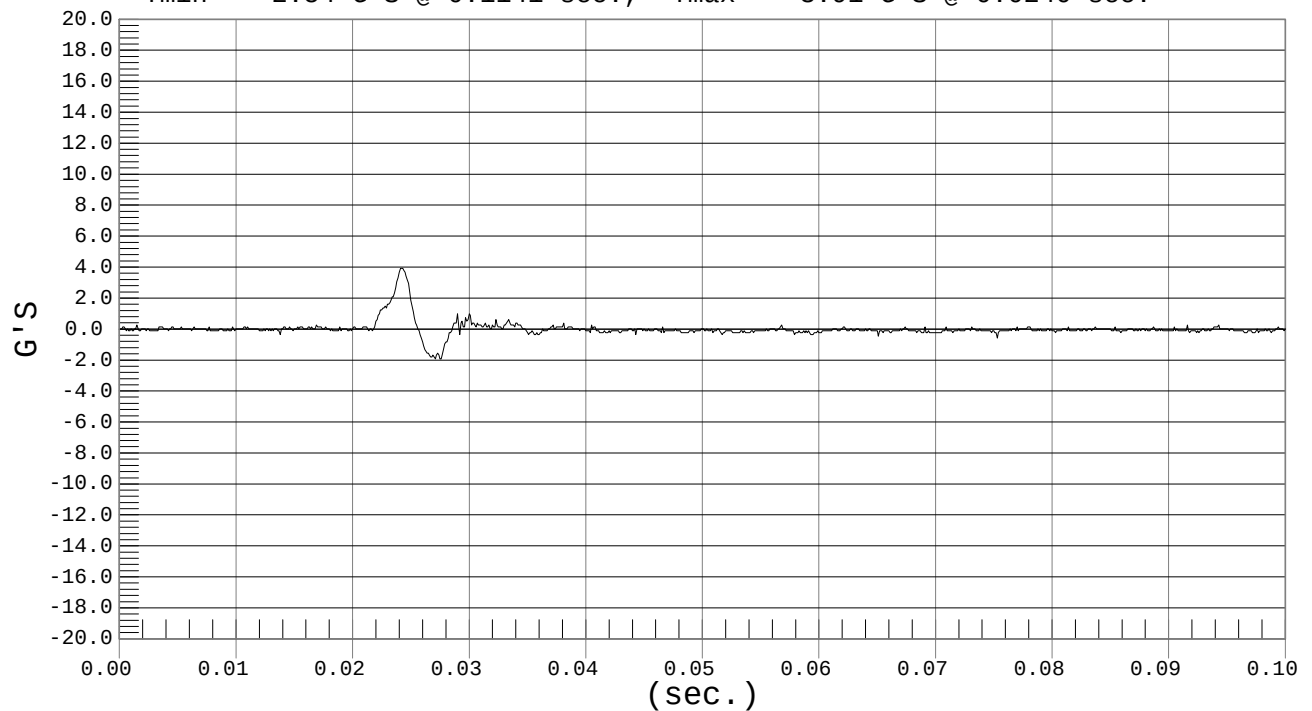


PEAK LONGITUDINAL ACCELARATION

Test Desc.: Head Drop
Component: Dummy #033

Test Date: 03-27-03
Speed: 0.0 fps, 0.00 M/s

Ymin = -2.54 G'S @ 0.1141 sec., Ymax = 3.91 G'S @ 0.0240 sec.



MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID IIs DUMMY

Date: 3/27/03
Dummy Serial Number: 033
Test Number: D03522/D03532

TEST PARAMETER		SPECIFICATION	TEST RESULTS	
			<u>D03522</u>	<u>D03532</u>
Temperature (°C)		20.8° – 22.2°	21.4	21.5
Humidity		10% - 70%	27	26
Impact Velocity (m/s)		5.51-5.63	5.57	5.55
Delta Velocity (m/s)	10 ms	2.10-2.70	2.21	2.45
	15 ms	3.00-3.80	3.34	3.59
	20 ms	4.20-5.20	4.51	4.73
	25-60 ms	5.00-6.40	5.65	5.72
Peak D-Plane Rotation (deg)		72-82	74	76
Decay Time of D-Plane Rotation Peak to Zero Degree (ms)		60-83	66	69
Peak Occipital Condyle Moment (Nm)		(-43) – (-36)	-43	*-43.3
Time at 10 or -10 Nm after Peak Moment (ms)		90 – 98	90	90
Time of last Moment Peak to Max Rotation (ms)		<14	6	10
Front Pot Peak Rotation (deg)		59 – 72	58*	60
Time of Front Pot Peak Rotation (ms)		61 – 73	64	64
Rear Pot Peak Rotation (deg)		47 – 56	*46.64	49
Time of Rear Pot Peak Rotation (ms)		62 – 73	*61	*61

*TEST DOES NOT MEET SPECIFICATIONS

Technician: _____

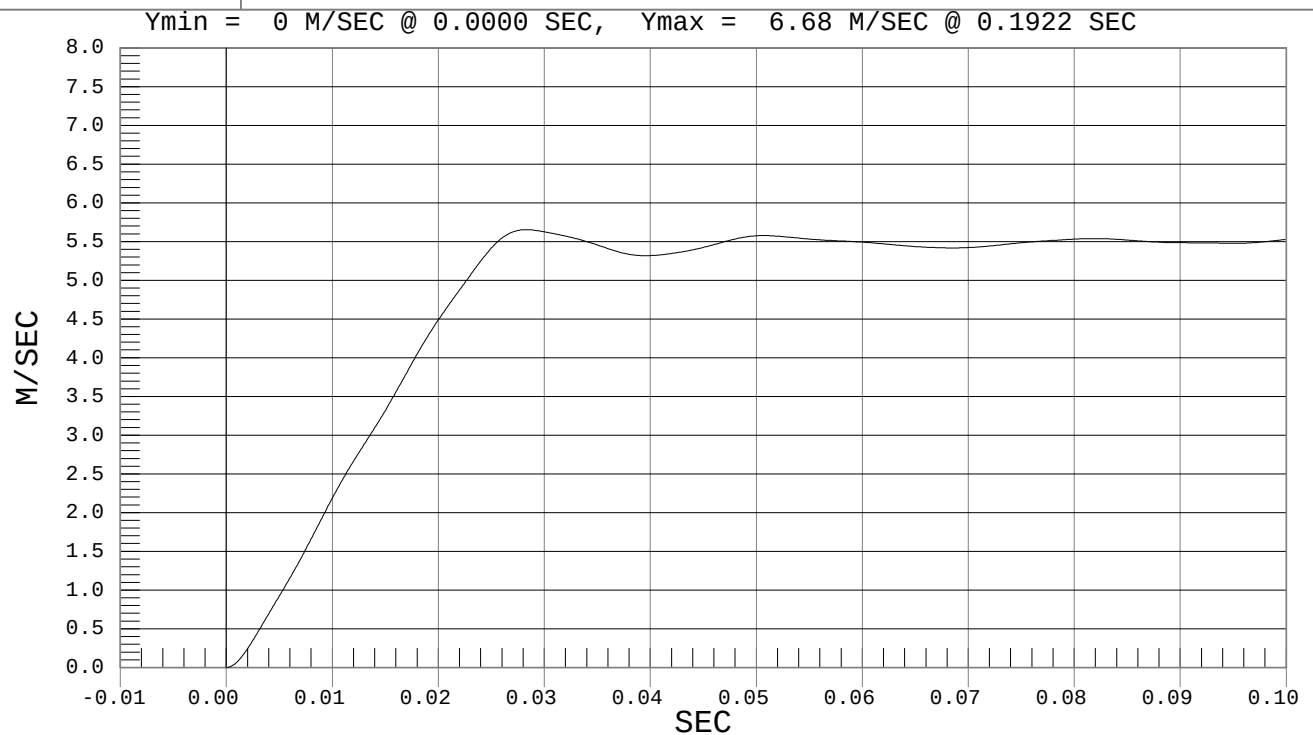
Approved By: _____



PENDULUM DECELERATION

Test Desc.: Neck Bending
Component: Dummy #033

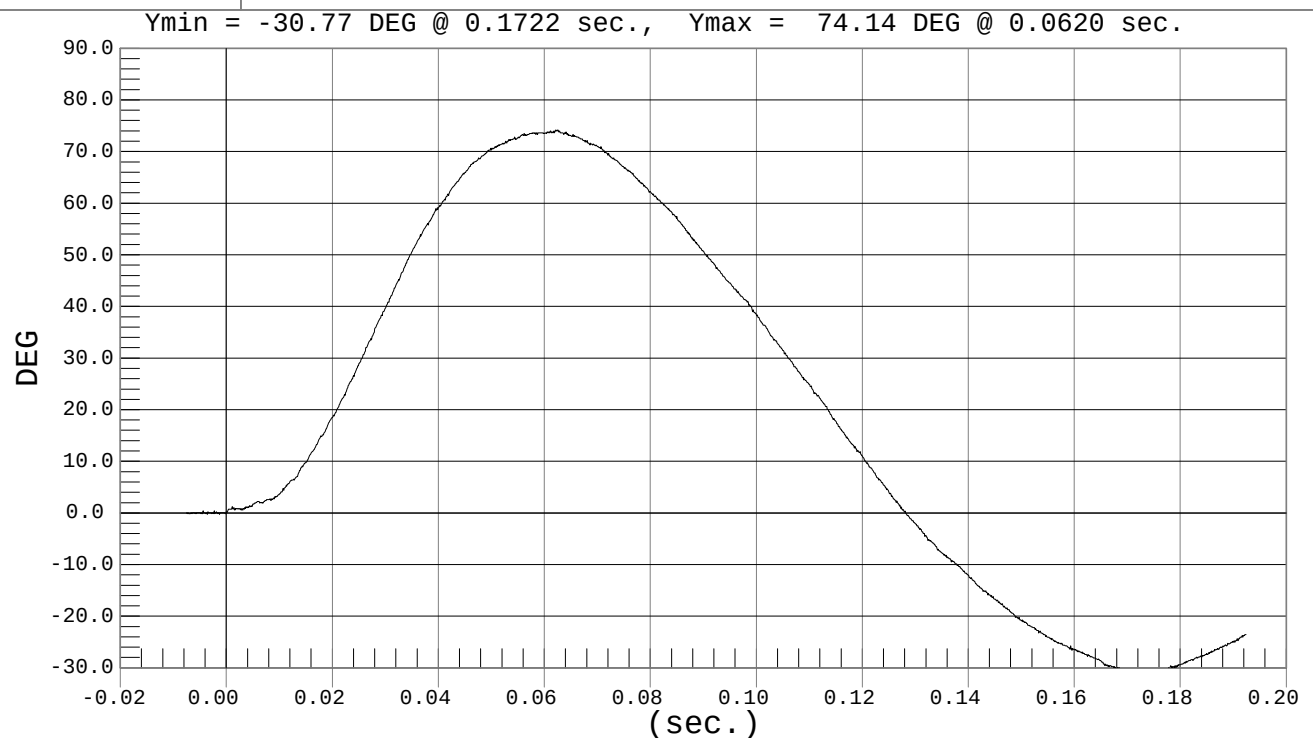
Test Date: 03-27-03
Speed: 18.3 fps, 5.57 M/s



FLEXION ANGLE

Test Desc.: Neck Bending
Component: Dummy #033

Test Date: 03-27-03
Speed: 18.3 fps, 5.57 M/s



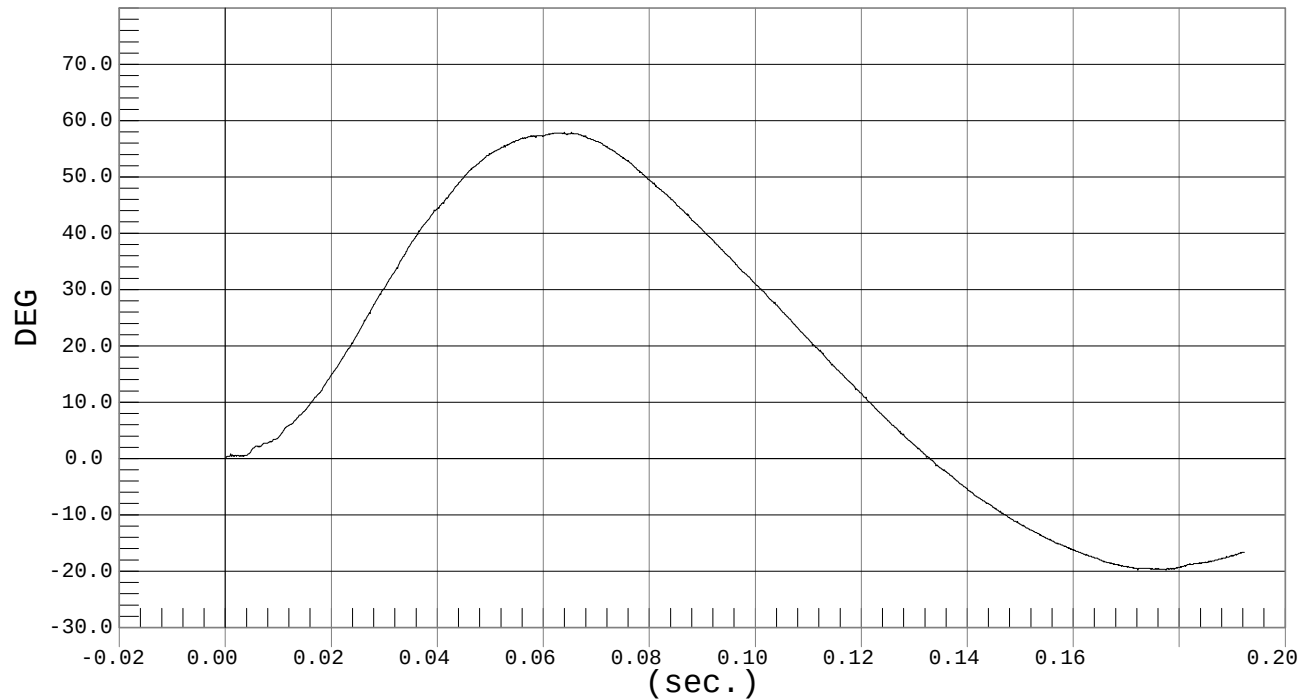


Test Desc.: Neck Bending
Component: Dummy #033

FRONT

Test Date: 03-27-03
Speed: 18.3 fps, 5.57 M/s

Ymin = -19.83 DEG @ 0.1721 sec., Ymax = 57.97 DEG @ 0.0639 sec.

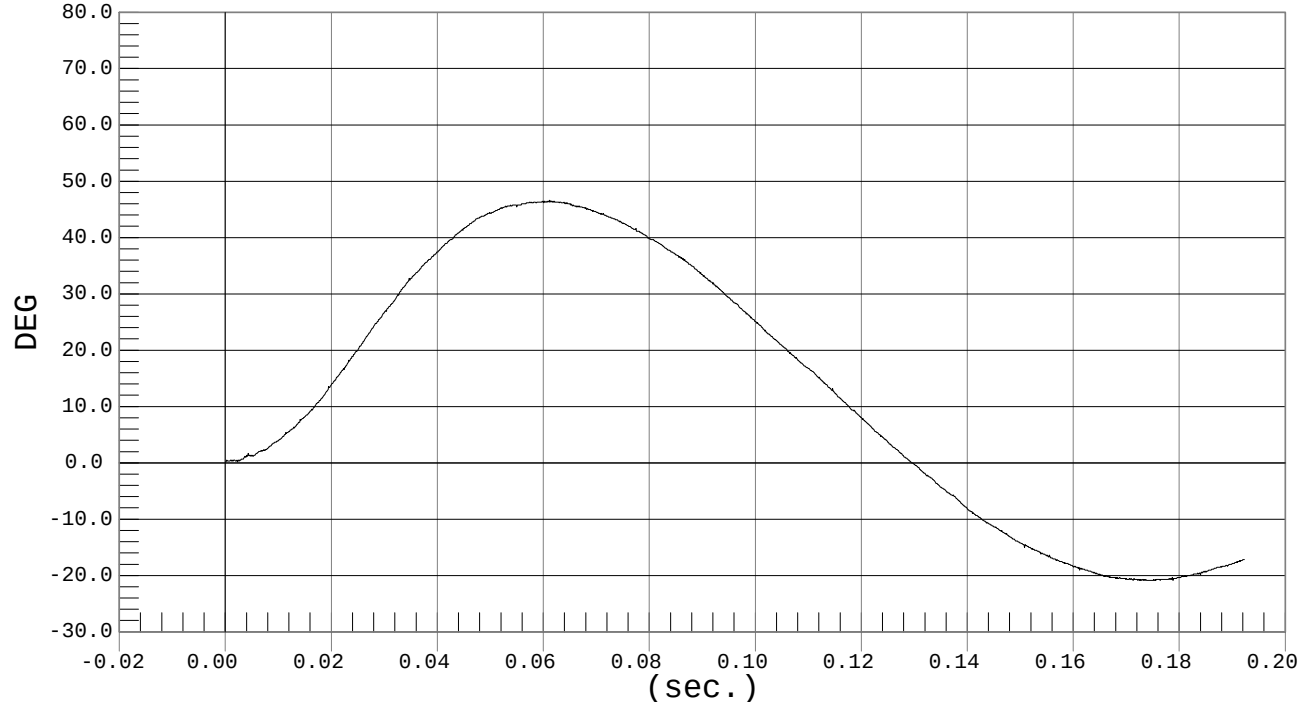


Test Desc.: Neck Bending
Component: Dummy #033

REAR

Test Date: 03-27-03
Speed: 18.3 fps, 5.57 M/s

Ymin = -20.88 DEG @ 0.1712 sec., Ymax = 46.64 DEG @ 0.0611 sec.



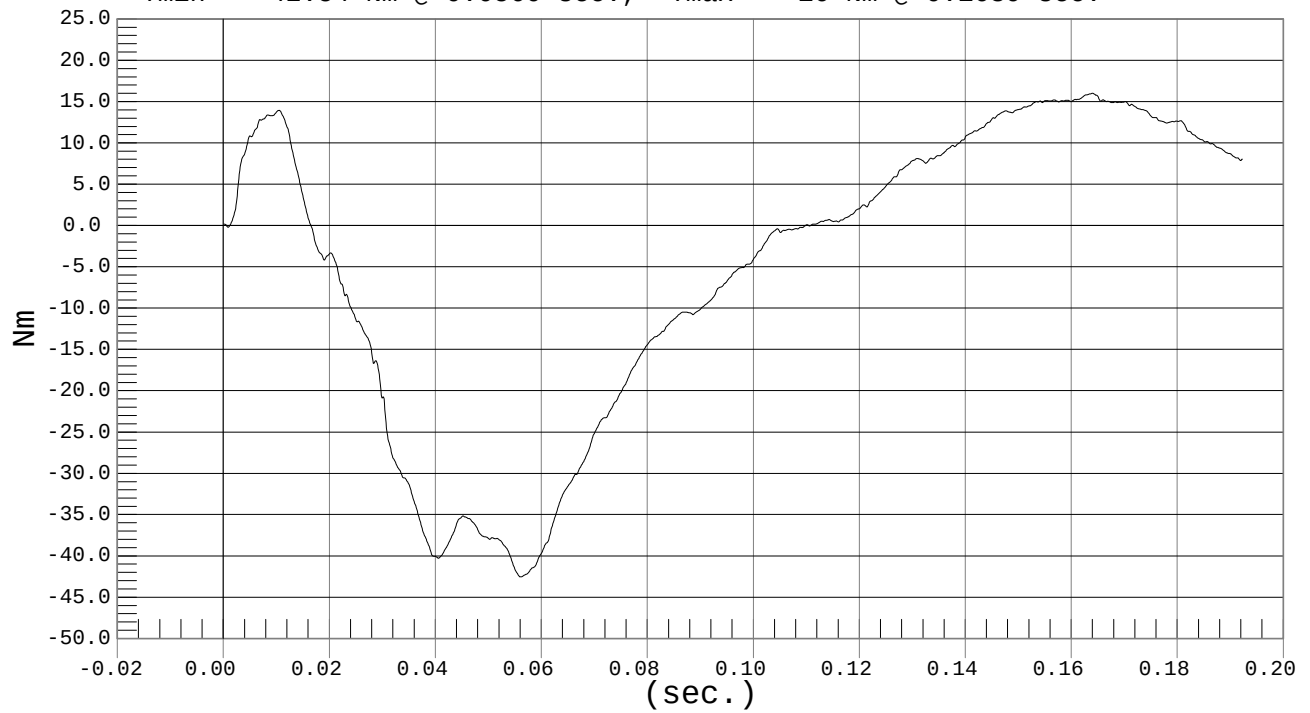


Test Desc.: Neck Bending
Component: Dummy #033

OCCIPITAL MOMENT

Test Date: 03-27-03
Speed: 18.3 fps, 5.57 M/s

Ymin = -42.54 Nm @ 0.0560 sec., Ymax = 16 Nm @ 0.1639 sec.

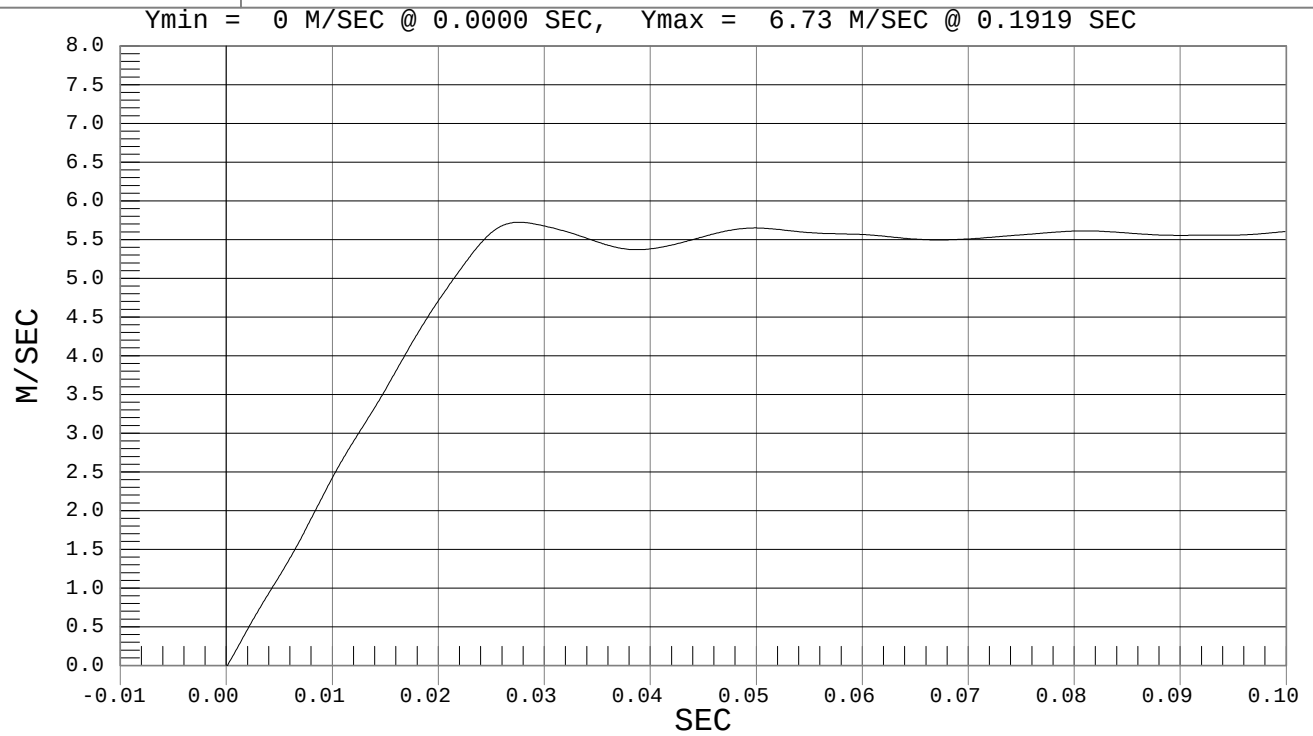




PENDULUM DECELERATION

Test Desc.: Neck Bending
Component: Dummy #033

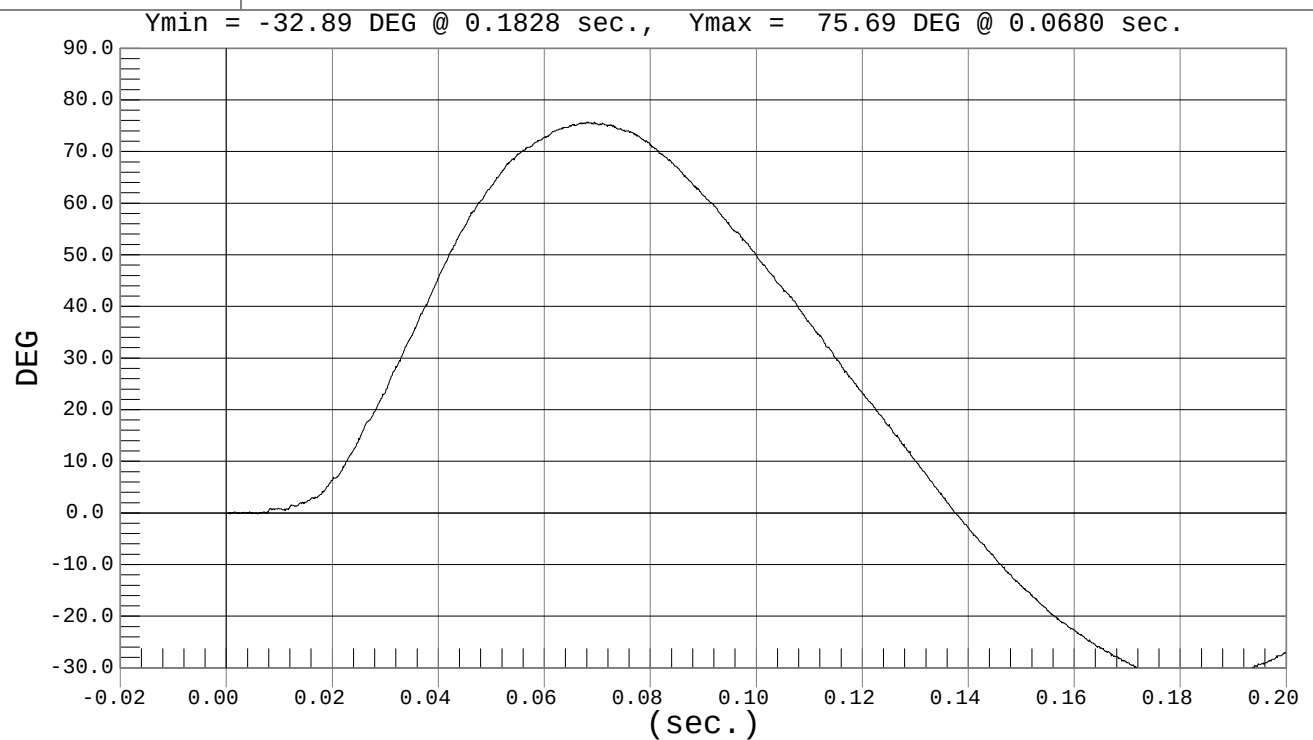
Test Date: 03-27-03
Speed: 18.2 fps, 5.55 M/s



FLEXION ANGLE

Test Desc.: Neck Bending
Component: Dummy #033

Test Date: 03-27-03
Speed: 18.2 fps, 5.55 M/s



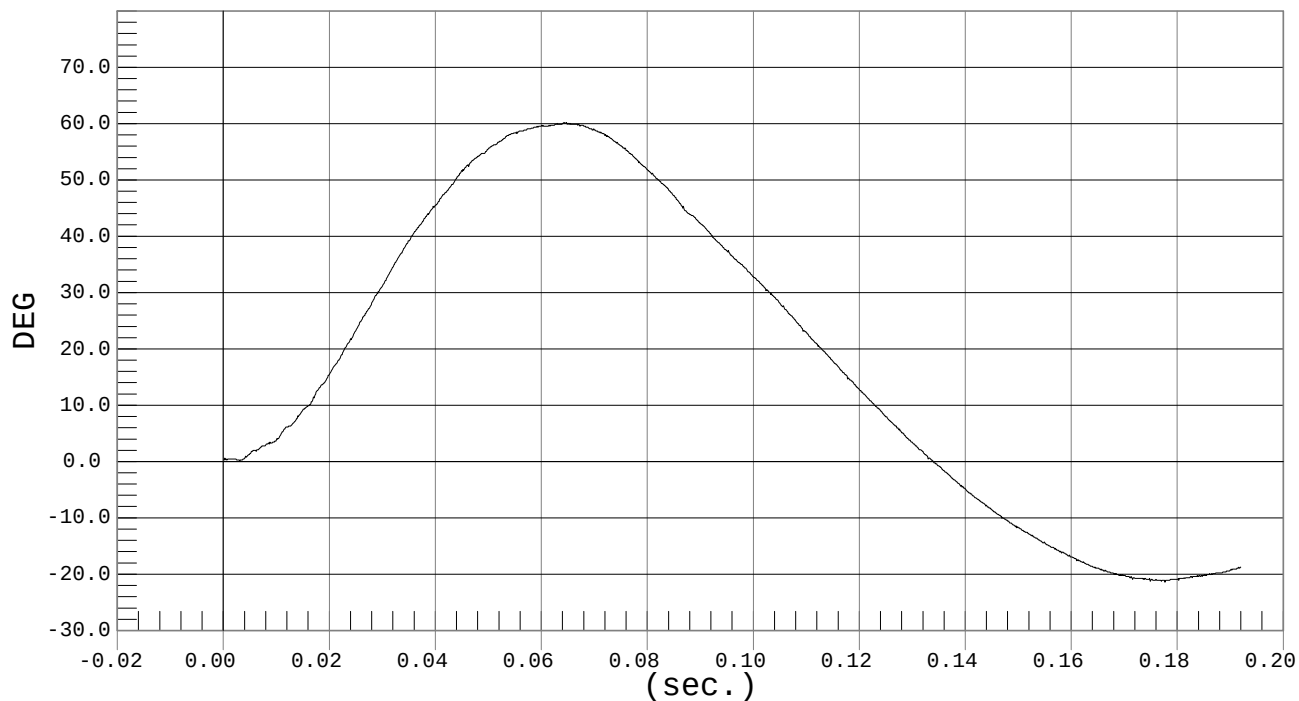


Test Desc.: Neck Bending
Component: Dummy #033

FRONT

Test Date: 03-27-03
Speed: 18.2 fps, 5.55 M/s

Ymin = -21.43 DEG @ 0.1776 sec., Ymax = 60.21 DEG @ 0.0642 sec.

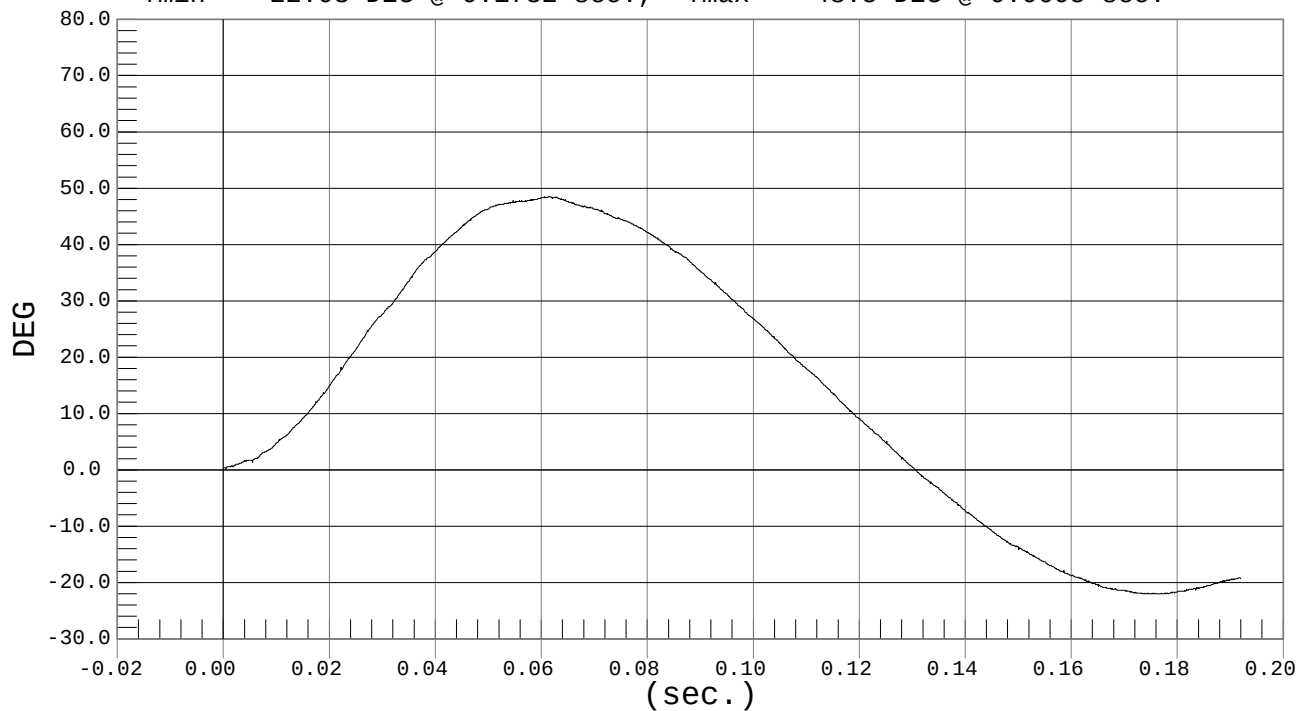


Test Desc.: Neck Bending
Component: Dummy #033

REAR

Test Date: 03-27-03
Speed: 18.2 fps, 5.55 M/s

Ymin = -22.03 DEG @ 0.1732 sec., Ymax = 48.5 DEG @ 0.0605 sec.



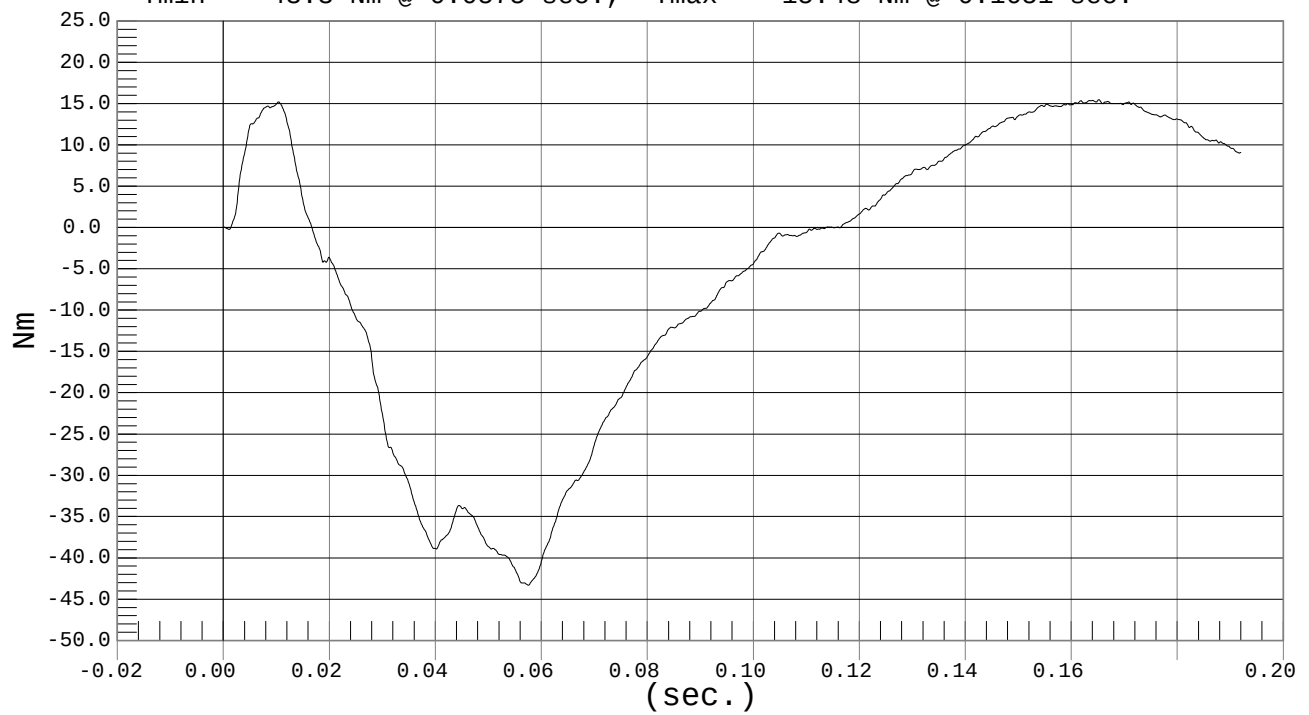


Test Desc.: Neck Bending
Component: Dummy #033

OCCIPITAL MOMENT

Test Date: 03-27-03
Speed: 18.2 fps, 5.55 M/s

Ymin = -43.3 Nm @ 0.0575 sec., Ymax = 15.48 Nm @ 0.1651 sec.



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID IIs DUMMY

Date: 3/26/03
Dummy Serial Number: 033
Test Number: D03523/D03533

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03523</u>	<u>D03533</u>
Temperature (°C)	20.8° – 22.2°	22.1	21.4
Humidity	10% - 70%	26	25
Impact Velocity	4.41 - 4.59 m/s	4.51	4.48
Probe Force	1.6 - 2.4 kN	2.2	2.3
Shoulder Displacement	27-39 mm	33	33

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

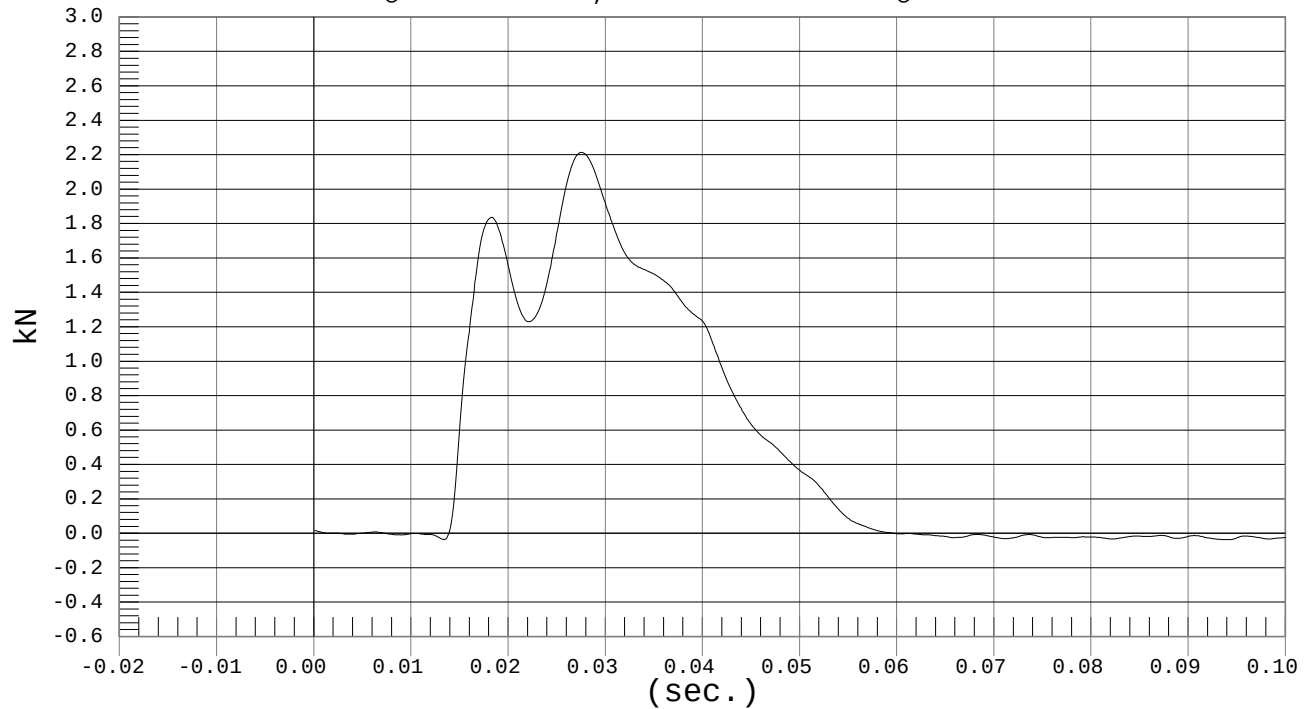


PROBE FORCE

Test Desc.: Shgoulder Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.05 kN @ 0.1259 sec., Ymax = 2.21 kN @ 0.0275 sec.

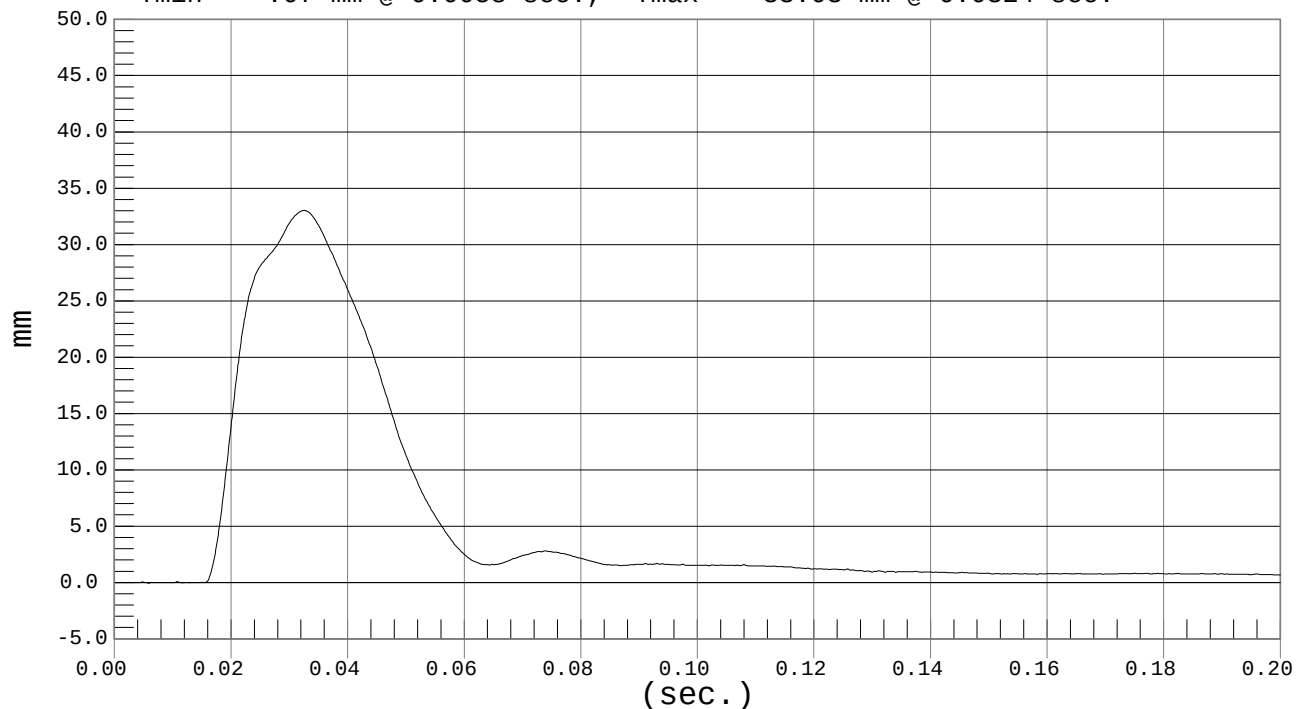


SHOULDER DISPLACEMENT

Test Desc.: Shgoulder Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.07 mm @ 0.0058 sec., Ymax = 33.03 mm @ 0.0324 sec.



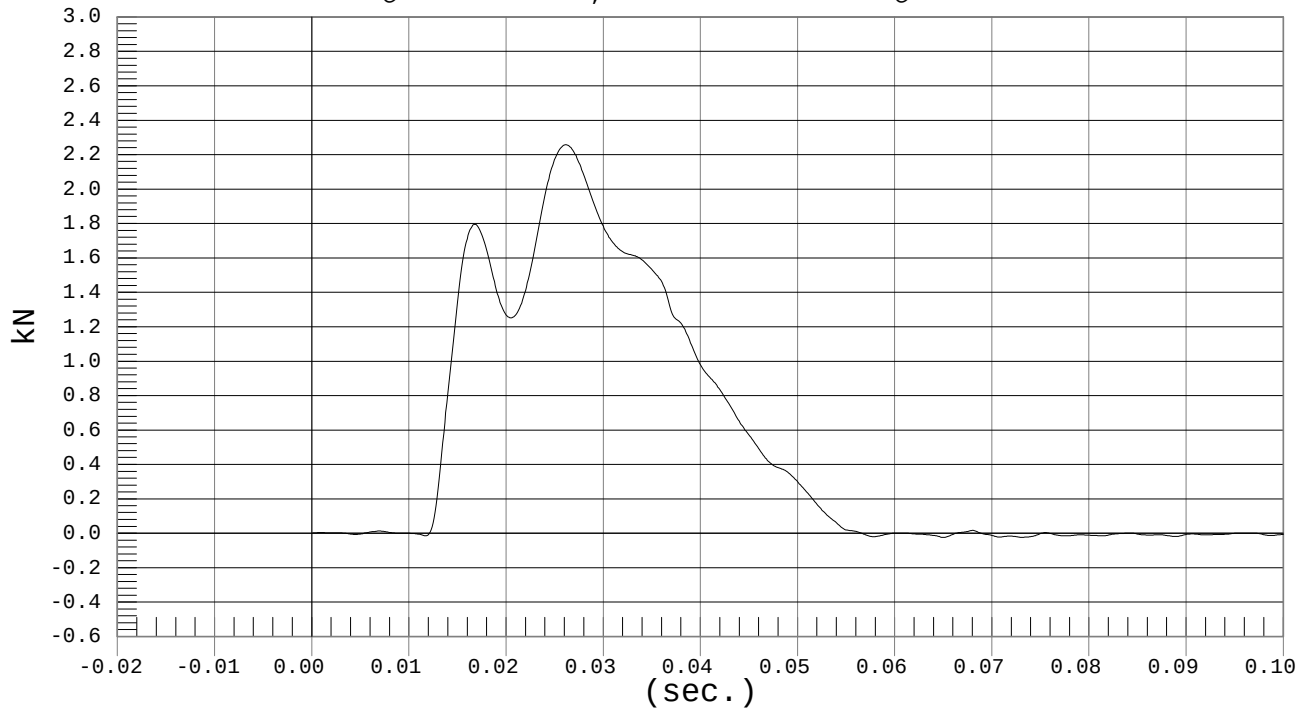


PROBE FORCE

Test Desc.: Shoulder Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.7 fps, 4.48 M/s

Ymin = -.05 kN @ 0.1587 sec., Ymax = 2.26 kN @ 0.0261 sec.

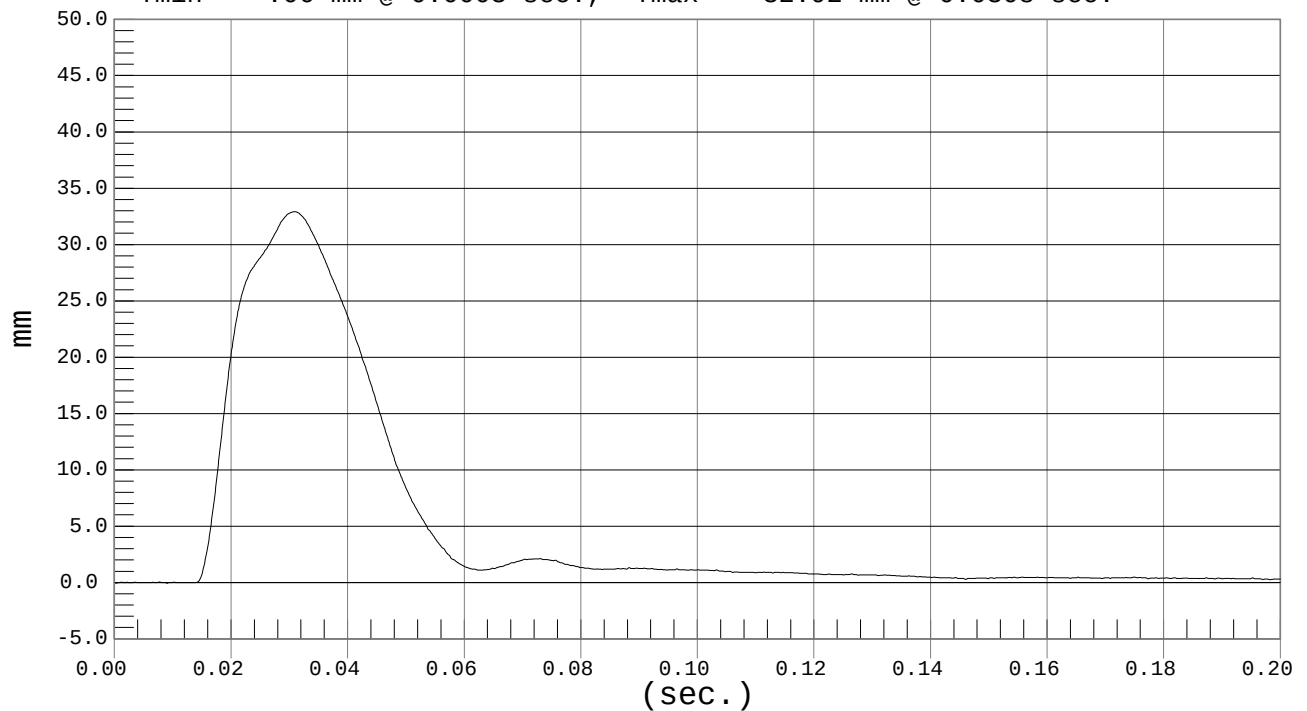


SHOULDER DISPLACEMENT

Test Desc.: Shoulder Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.7 fps, 4.48 M/s

Ymin = -.06 mm @ 0.0003 sec., Ymax = 32.92 mm @ 0.0308 sec.



MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TESTS
SID IIs DUMMY

Date: 3/26/03
Dummy Serial Number: 033
Test Number: D03524/D03534

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03524</u>	<u>D03534</u>
Temperature (°C)	20.8° – 22.2°	22.0	21.3
Humidity	10% - 70%	26	26
Impact Velocity	6.57 - 6.84 m/s	6.77	6.75
Probe Force	4.1 – 4.7 kN	4.7	4.7
Upper Spine Acceleration	34 – 48 g's	42	42
Lower Spine Acceleration	31 - 36 g's	34	35
Upper Rib Displacement	23 - 35 mm	29	30
Middle Rib Displacement	29 - 44 mm	33	32
Lower Rib Displacement	33 - 40 mm	37	33
Shoulder Displacement	30 - 42 mm	34	39

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By:_____

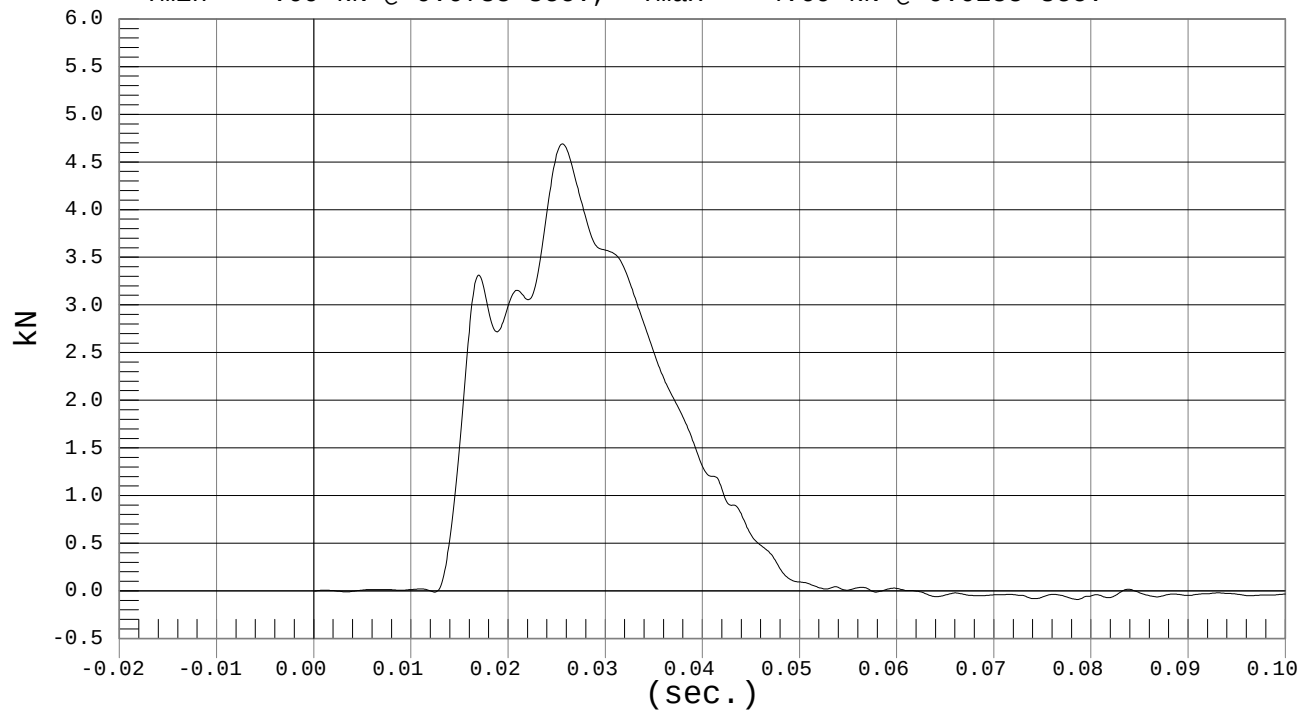


PROBE FORCE

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.09 kN @ 0.0785 sec., Ymax = 4.69 kN @ 0.0255 sec.



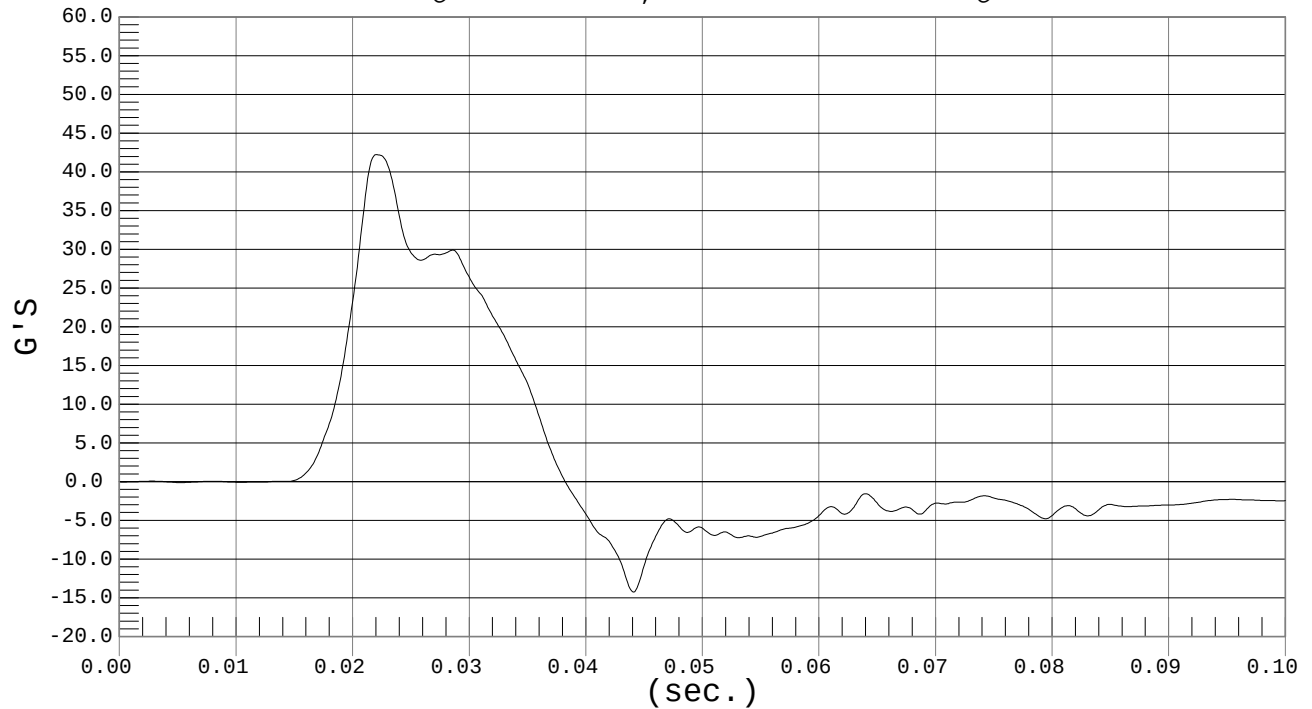


UPPER SPINE ACCELERATION

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -14.26 G'S @ 0.0440 sec., Ymax = 42.22 G'S @ 0.0220 sec.

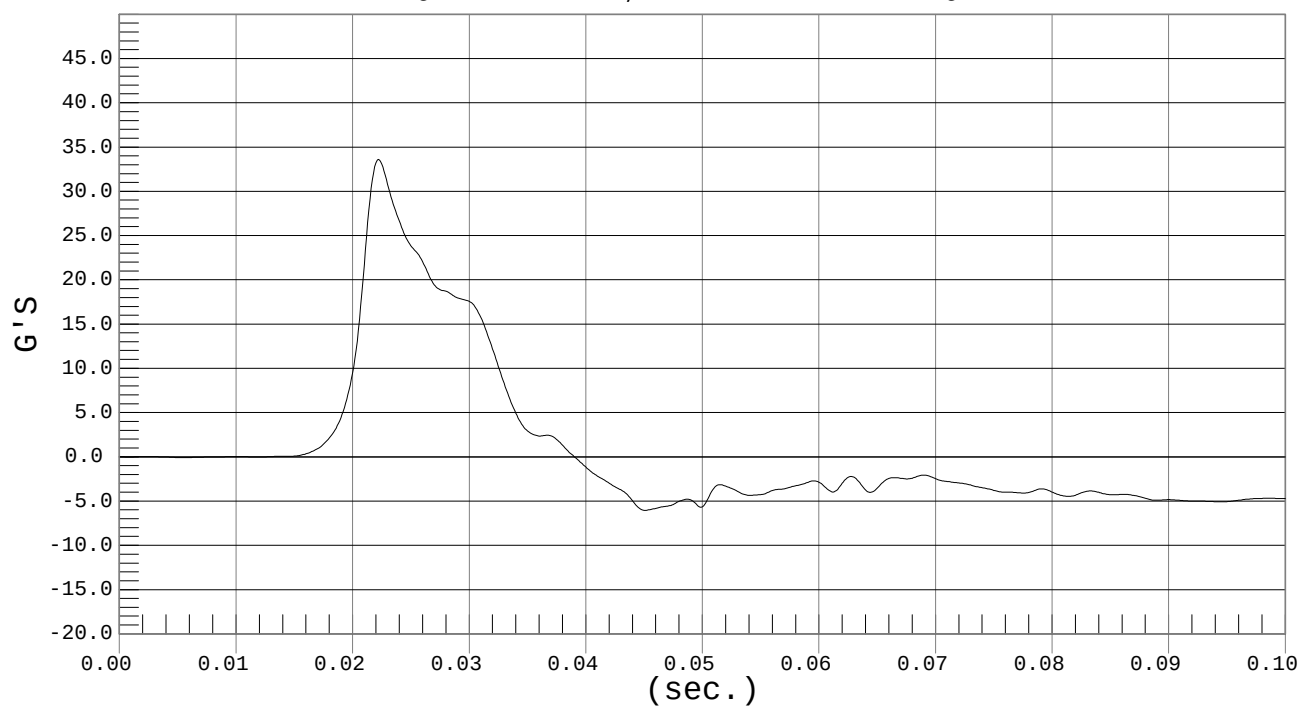


LOWER SPINE ACCELERATION

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -6.05 G'S @ 0.0450 sec., Ymax = 33.6 G'S @ 0.0221 sec.



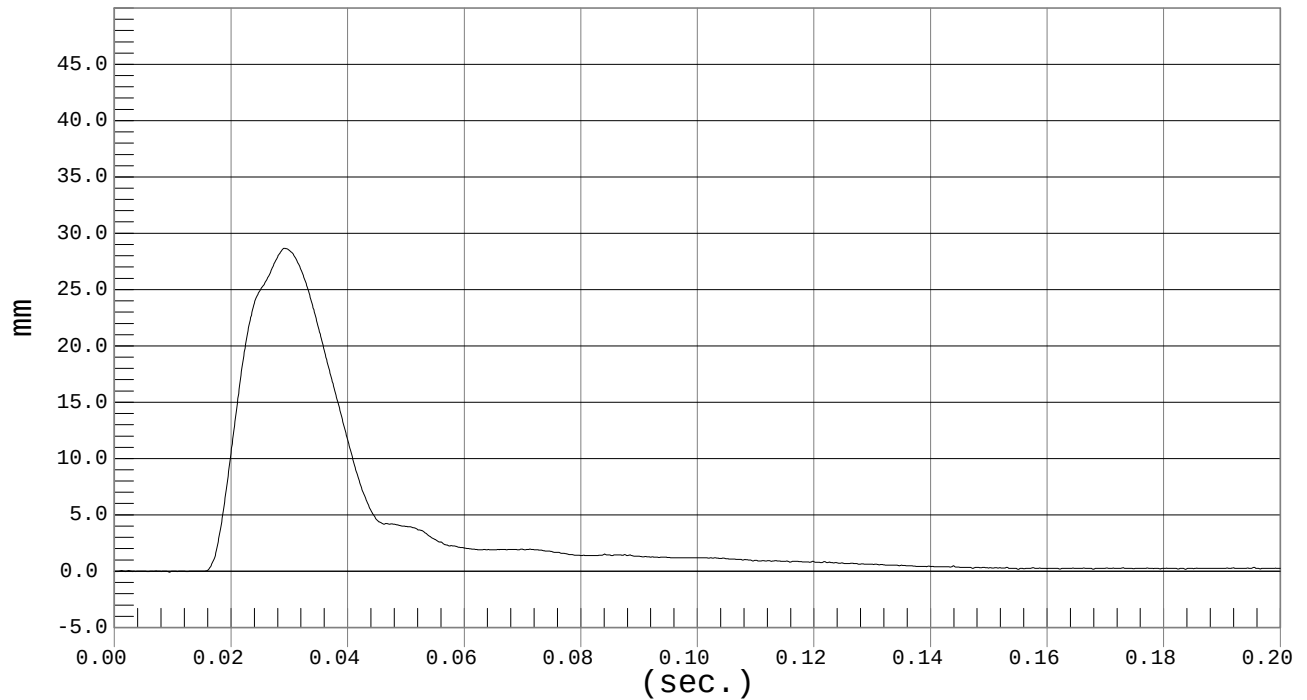


UPPER RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.09 mm @ 0.0093 sec., Ymax = 28.67 mm @ 0.0290 sec.

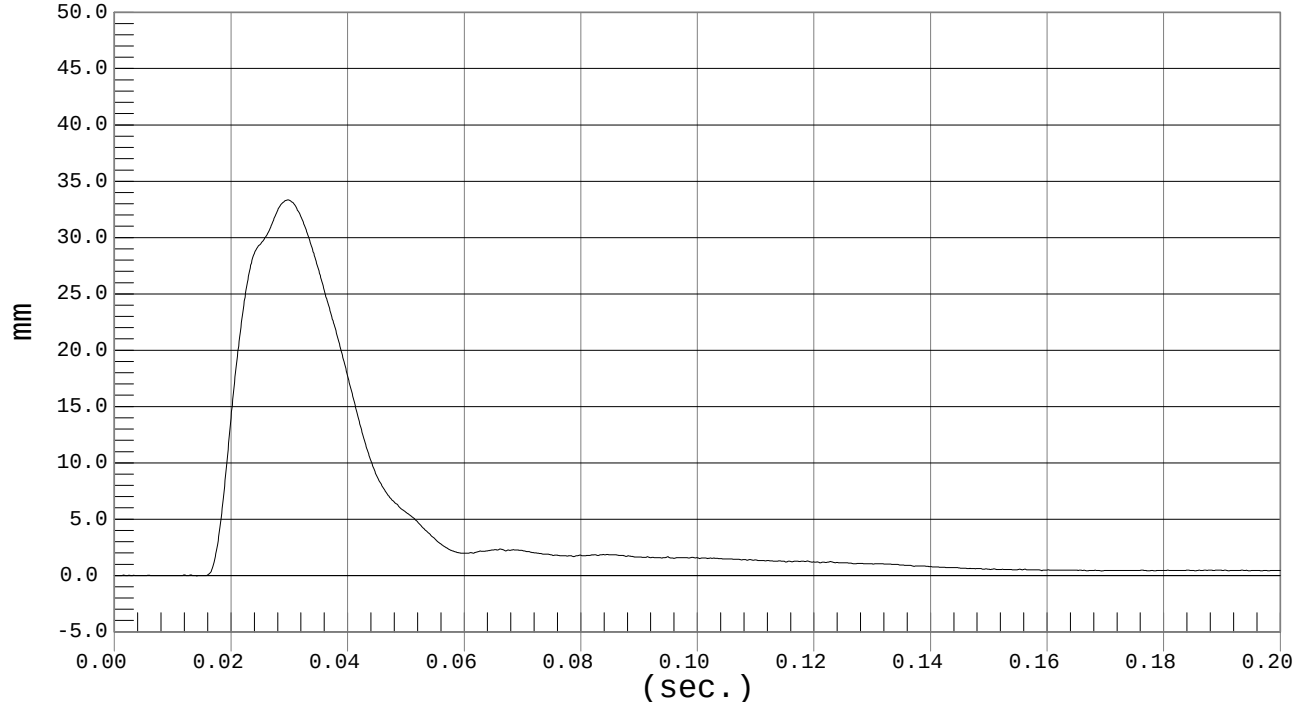


MIDDLE RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.03 mm @ 0.0141 sec., Ymax = 33.34 mm @ 0.0297 sec.



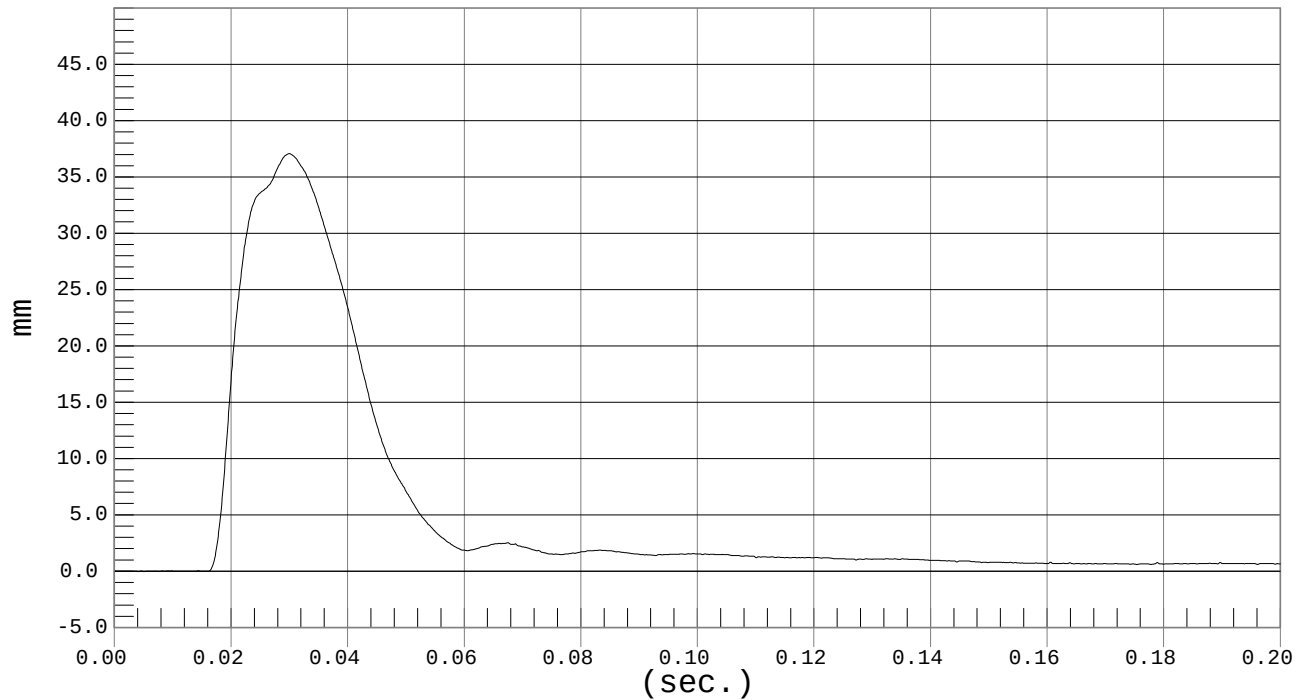


LOWER RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.05 mm @ 0.0041 sec., Ymax = 37.08 mm @ 0.0299 sec.

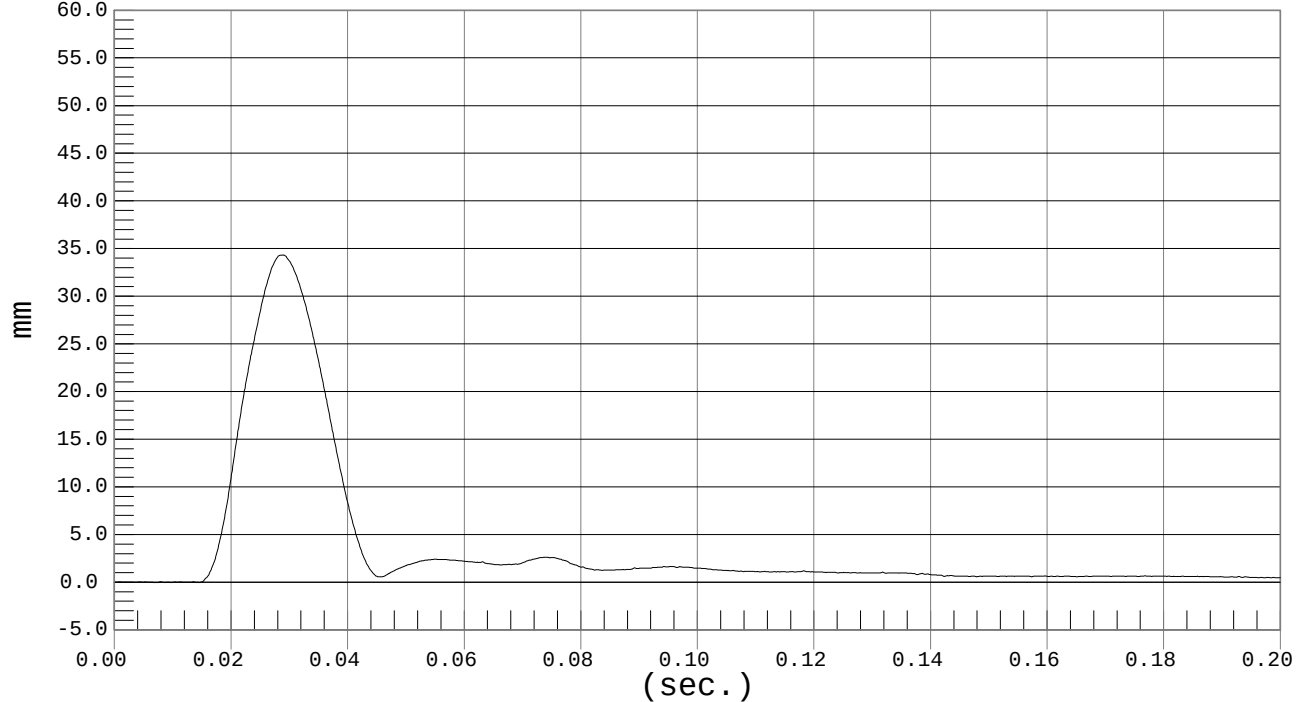


SHOULDER DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.05 mm @ 0.0069 sec., Ymax = 34.32 mm @ 0.0288 sec.



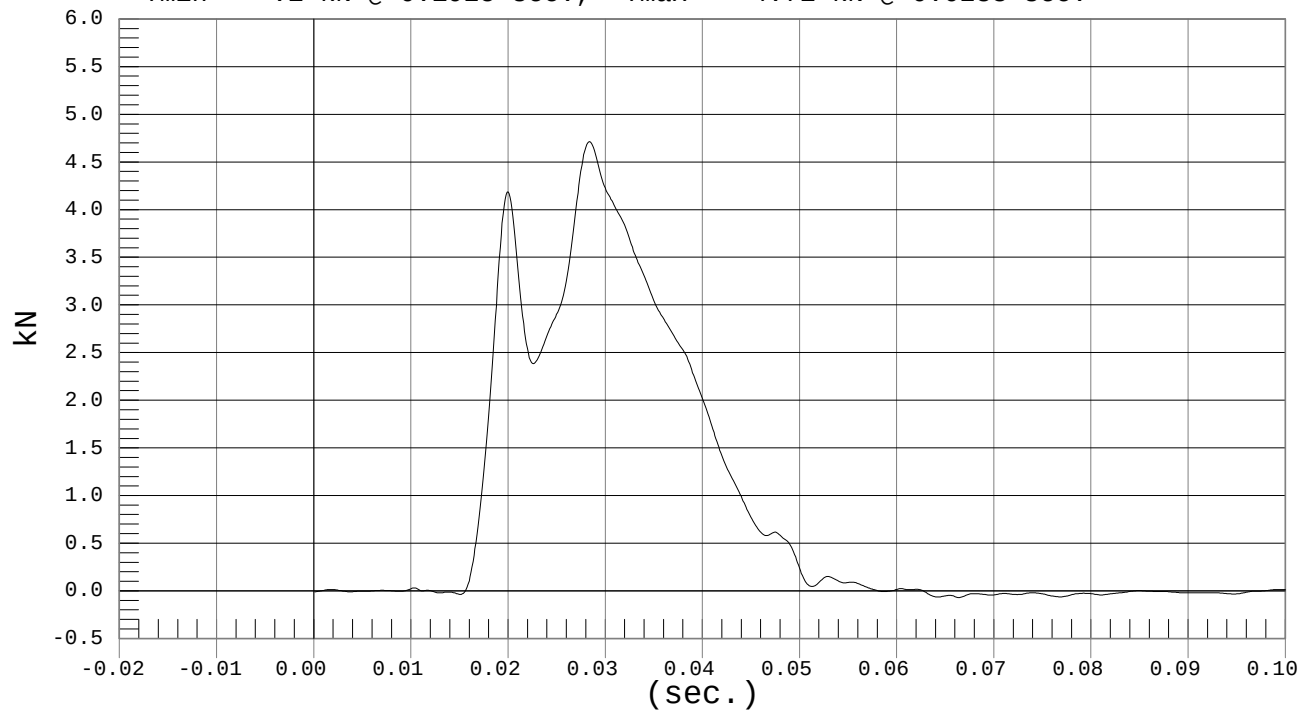


PROBE FORCE

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.1 fps, 6.75 M/s

Ymin = -.1 kN @ 0.1925 sec., Ymax = 4.71 kN @ 0.0283 sec.



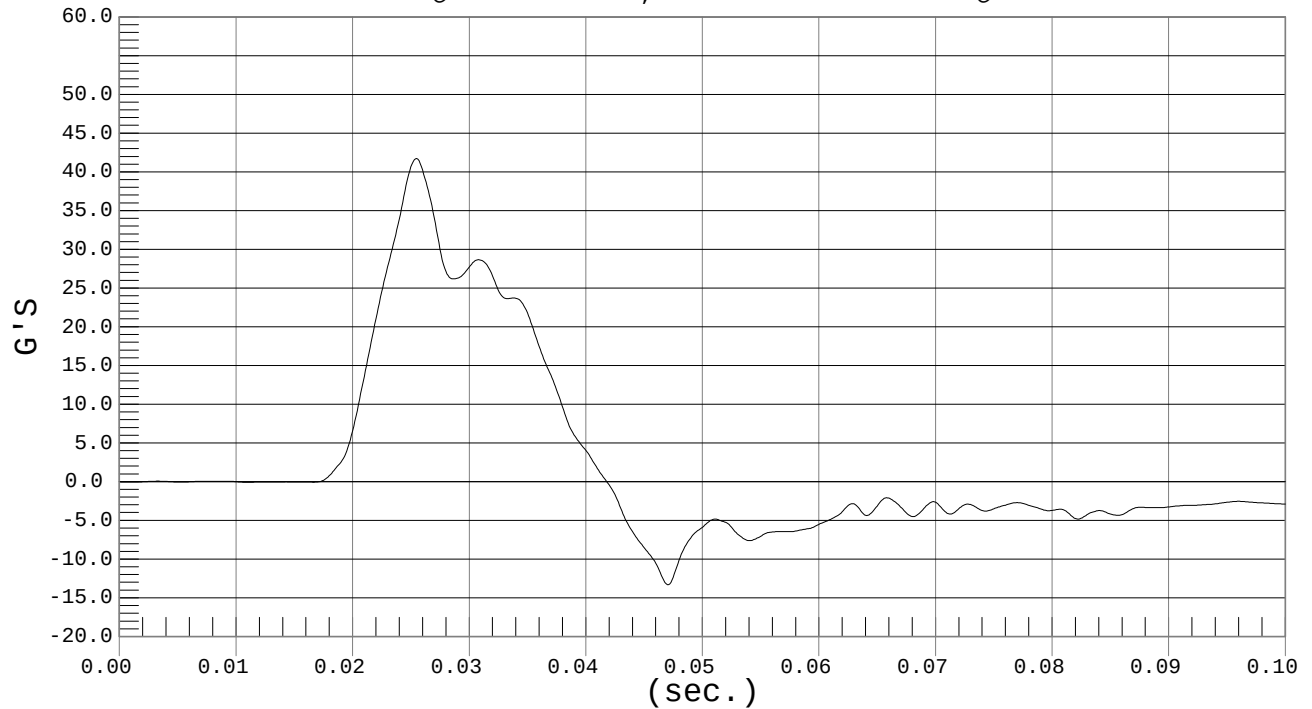


UPPER SPINE ACCELERATION

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.1 fps, 6.75 M/s

Ymin = -13.32 G'S @ 0.0470 sec., Ymax = 41.72 G'S @ 0.0254 sec.

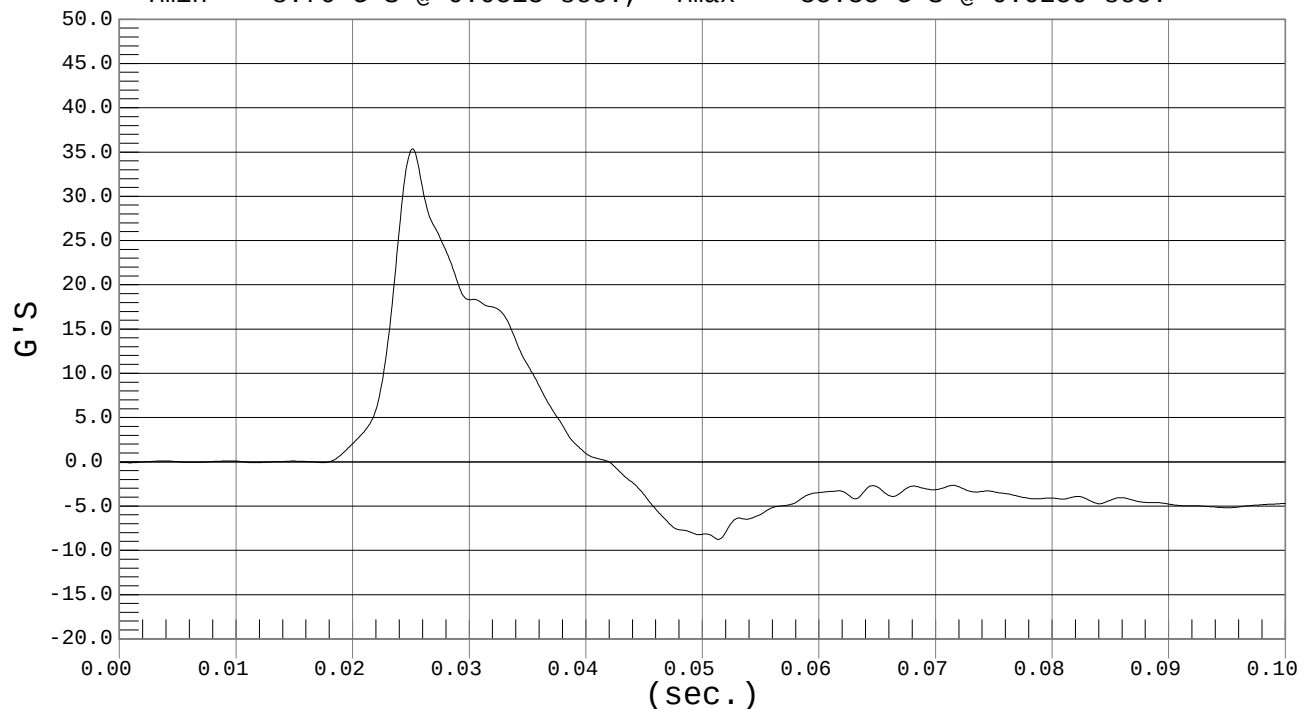


LOWER SPINE ACCELERATION

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.1 fps, 6.75 M/s

Ymin = -8.76 G'S @ 0.0513 sec., Ymax = 35.35 G'S @ 0.0250 sec.



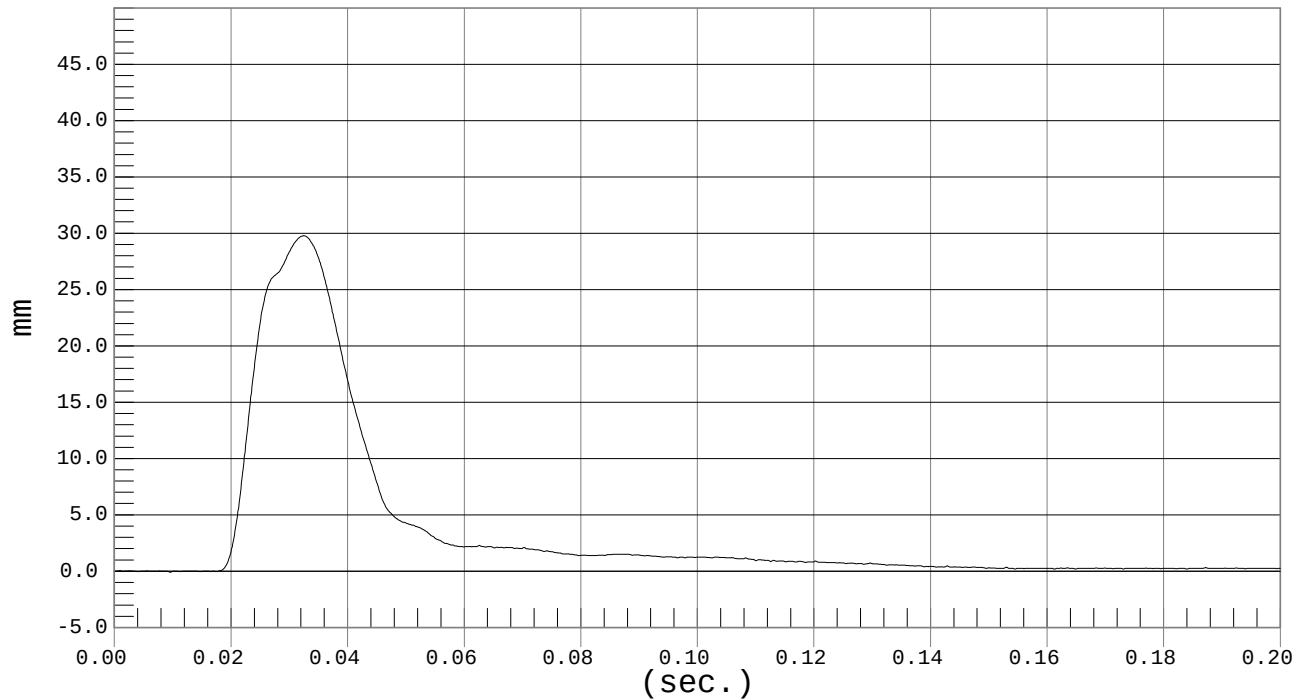


UPPER RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.1 fps, 6.75 M/s

Ymin = -.1 mm @ 0.0095 sec., Ymax = 29.78 mm @ 0.0324 sec.

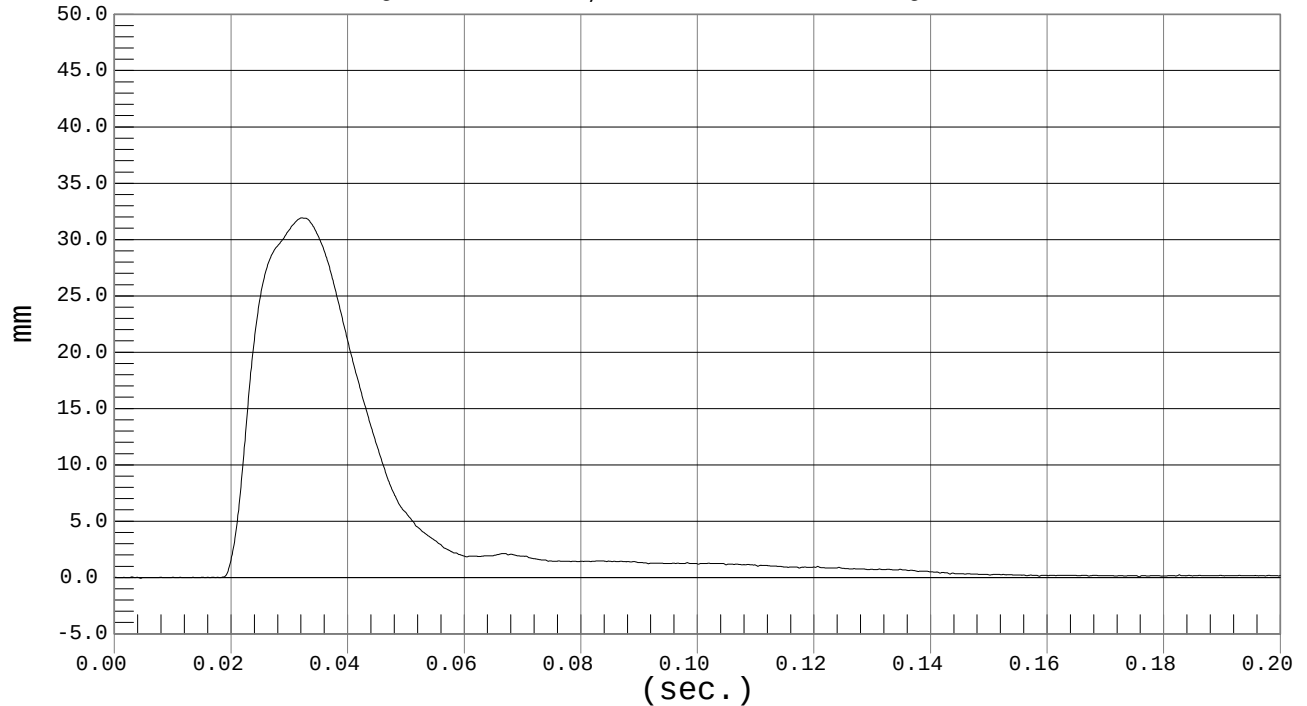


MIDDLE RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.1 fps, 6.75 M/s

Ymin = -.07 mm @ 0.0044 sec., Ymax = 31.92 mm @ 0.0320 sec.



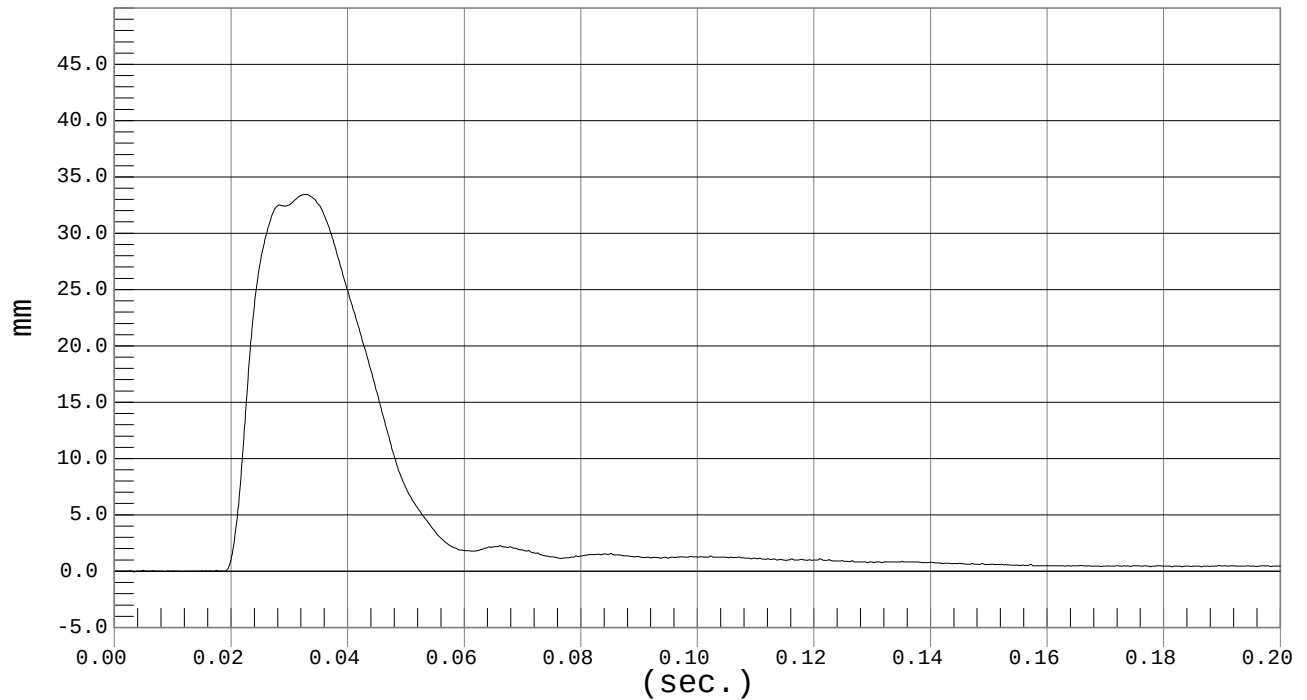


LOWER RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.1 fps, 6.75 M/s

Ymin = -.07 mm @ 0.0033 sec., Ymax = 33.44 mm @ 0.0329 sec.

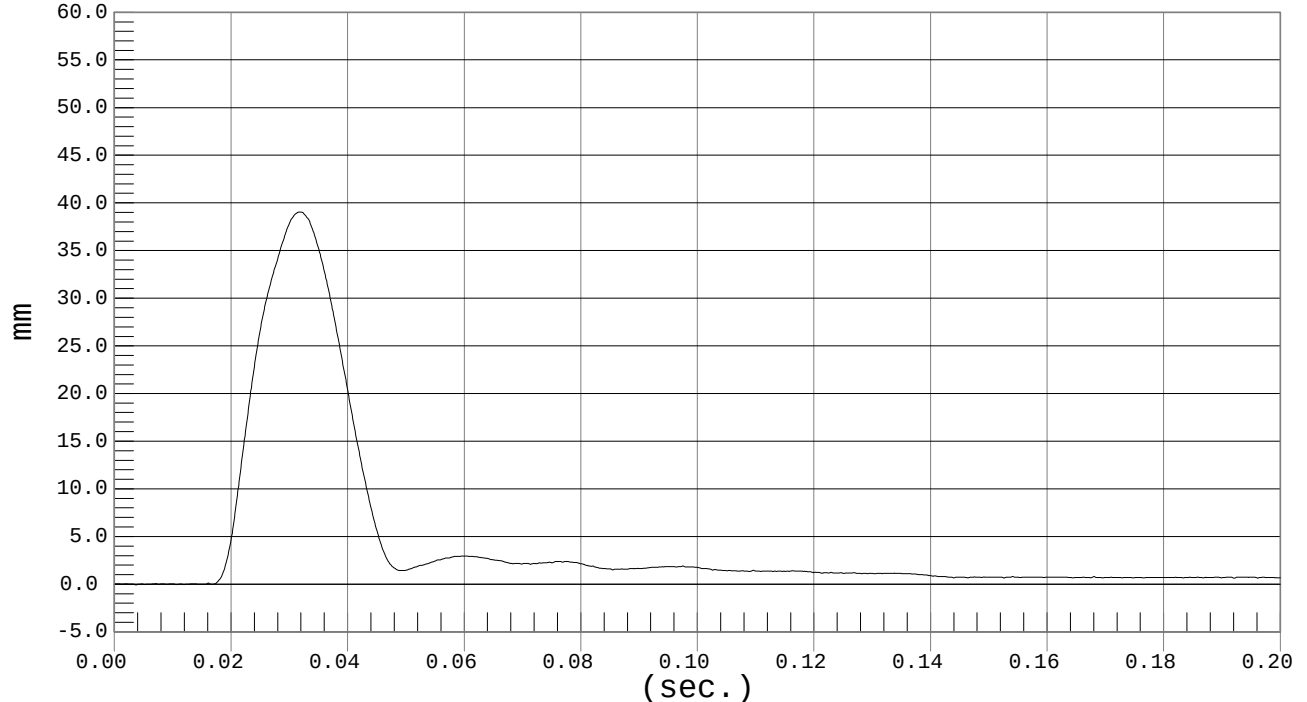


SHOULDER DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.1 fps, 6.75 M/s

Ymin = -.09 mm @ 0.0036 sec., Ymax = 39.05 mm @ 0.0318 sec.



MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TESTS
SID IIs DUMMY

Date: 3/26/03

Dummy Serial Number: 033

Test Number: D03525/D03535

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03525</u>	<u>D03535</u>
Temperature (°C)	20.8° – 22.2°	21.8	21.3
Humidity	10% - 70%	25	26
Impact Velocity	4.2 - 4.4m/s	4.3	4.3
Probe Force	1.8 - 2.3 kN	2.2	2.1
Upper Spine Acceleration	13 - 18 g's	14	14
Lower Spine Acceleration	8 - 13 g's	10	10
Upper Rib Displacement	32 - 41 mm	33	38
Middle Rib Displacement	40 - 51 mm	41	41
Lower Rib Displacement	34 - 47 mm	43	37

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

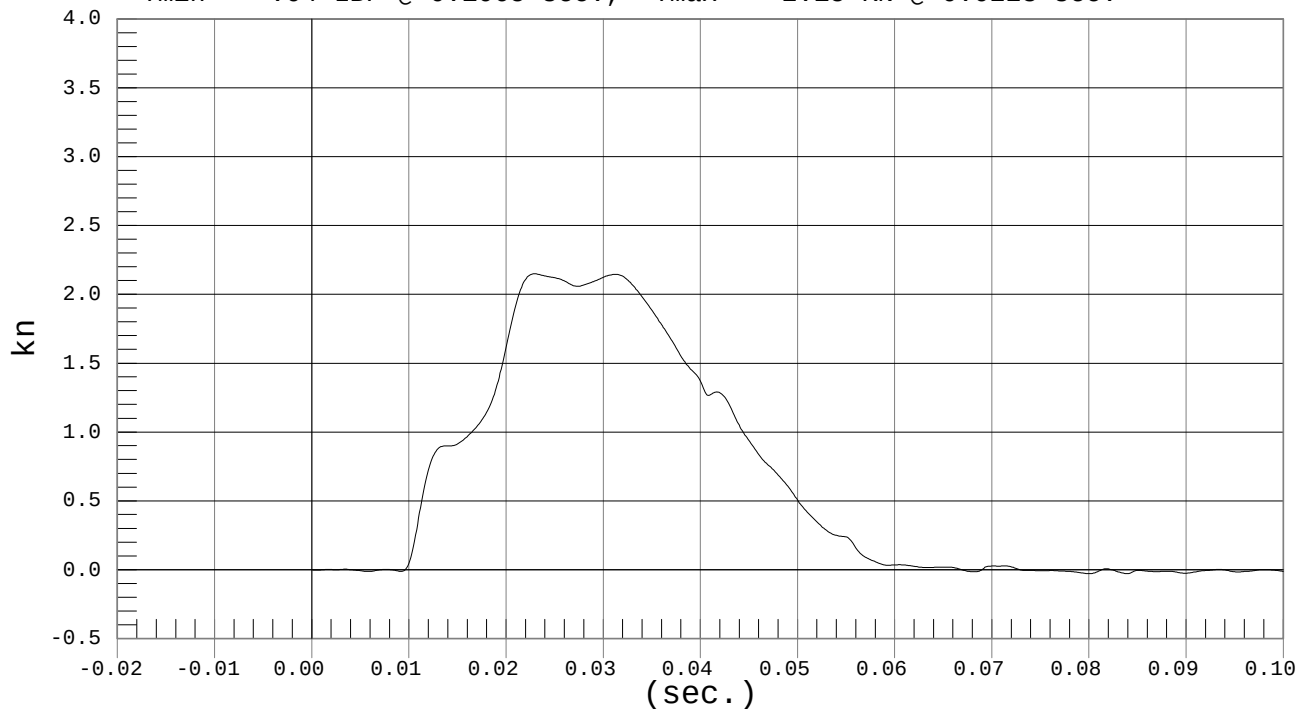


PROBE FORCE

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.0 fps, 4.27 M/s

Ymin = -.04 LBF @ 0.1065 sec., Ymax = 2.15 KN @ 0.0228 sec.

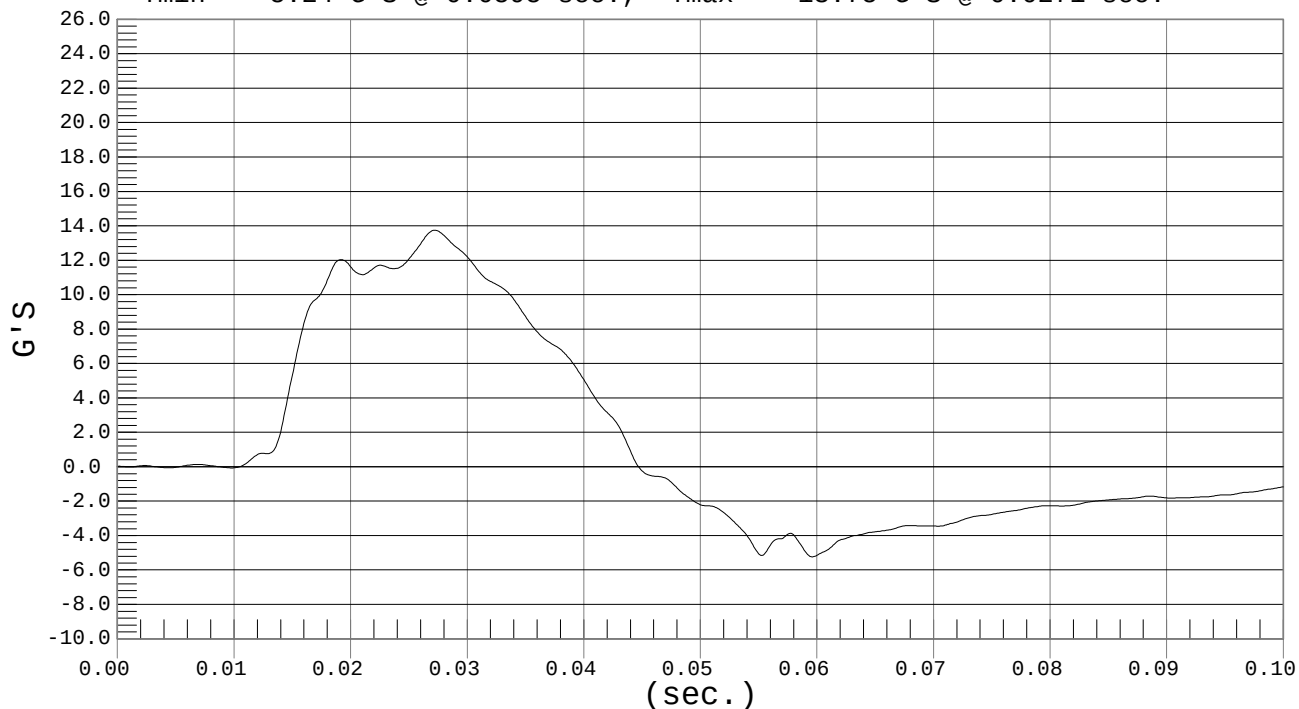


UPPER SPINE ACCELERATION

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.0 fps, 4.27 M/s

Ymin = -5.24 G'S @ 0.0595 sec., Ymax = 13.75 G'S @ 0.0271 sec.



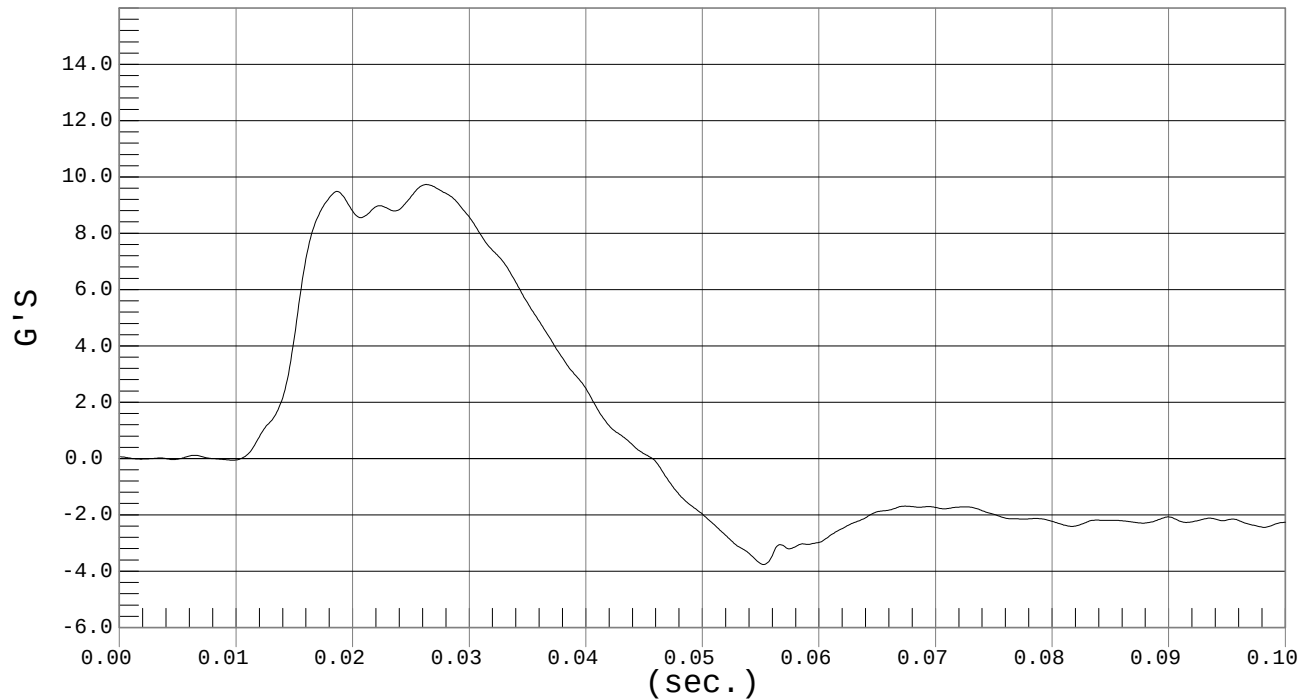


LOWER SPINE ACCELERATION

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.0 fps, 4.27 M/s

Ymin = -3.76 G'S @ 0.0551 sec., Ymax = 9.73 G'S @ 0.0262 sec.

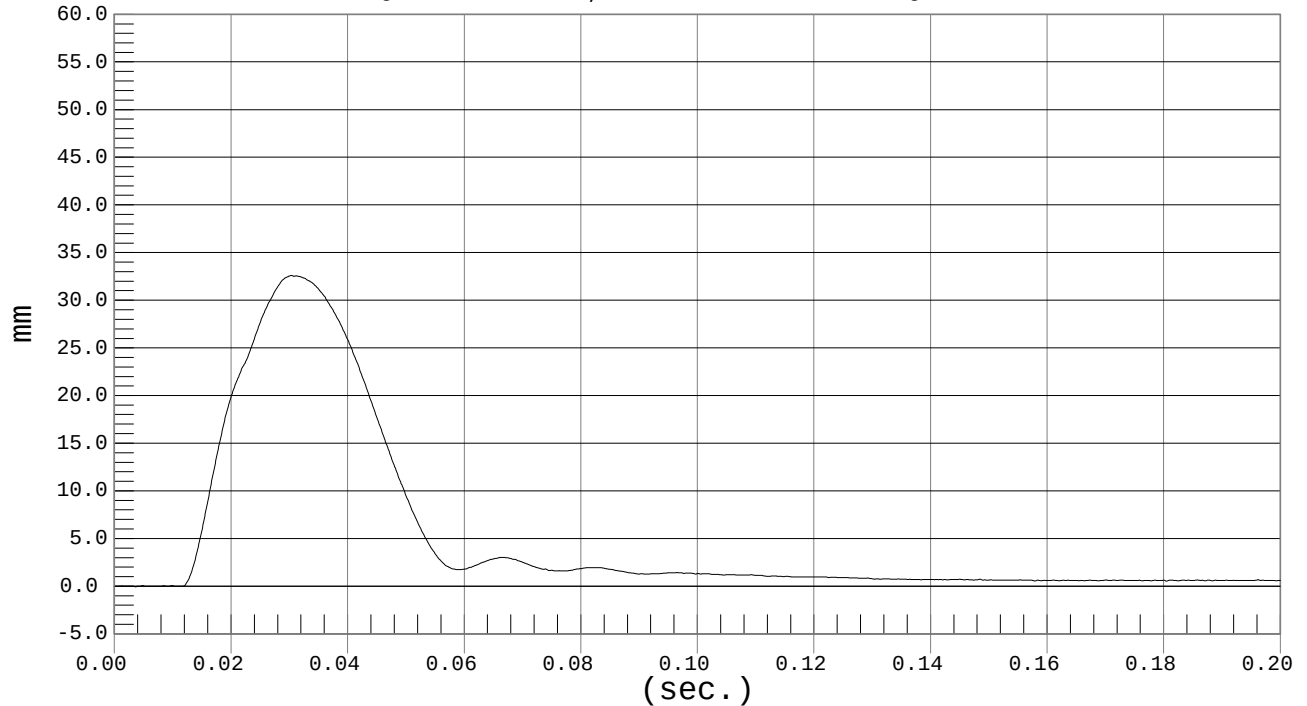


UPPER RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.0 fps, 4.27 M/s

Ymin = -.07 mm @ 0.0035 sec., Ymax = 32.59 mm @ 0.0303 sec.



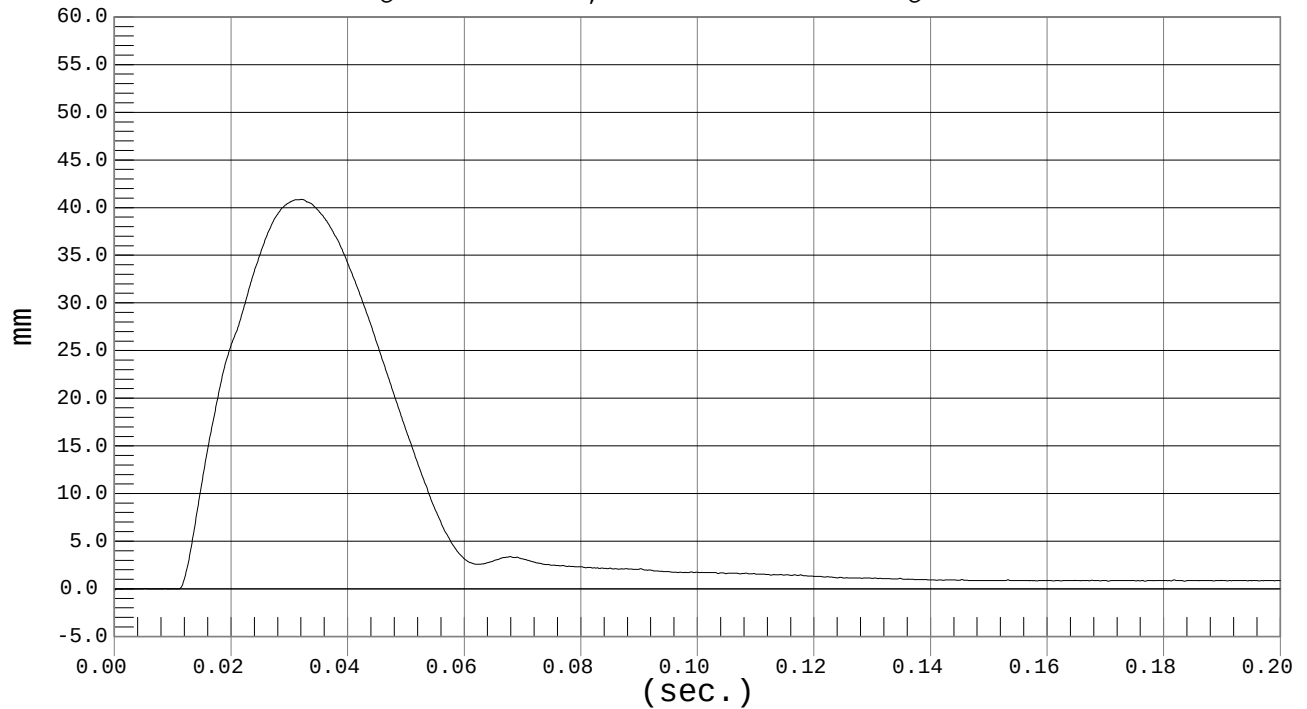


MIDDLE RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.0 fps, 4.27 M/s

Ymin = -.12 mm @ 0.0000 sec., Ymax = 40.87 mm @ 0.0320 sec.

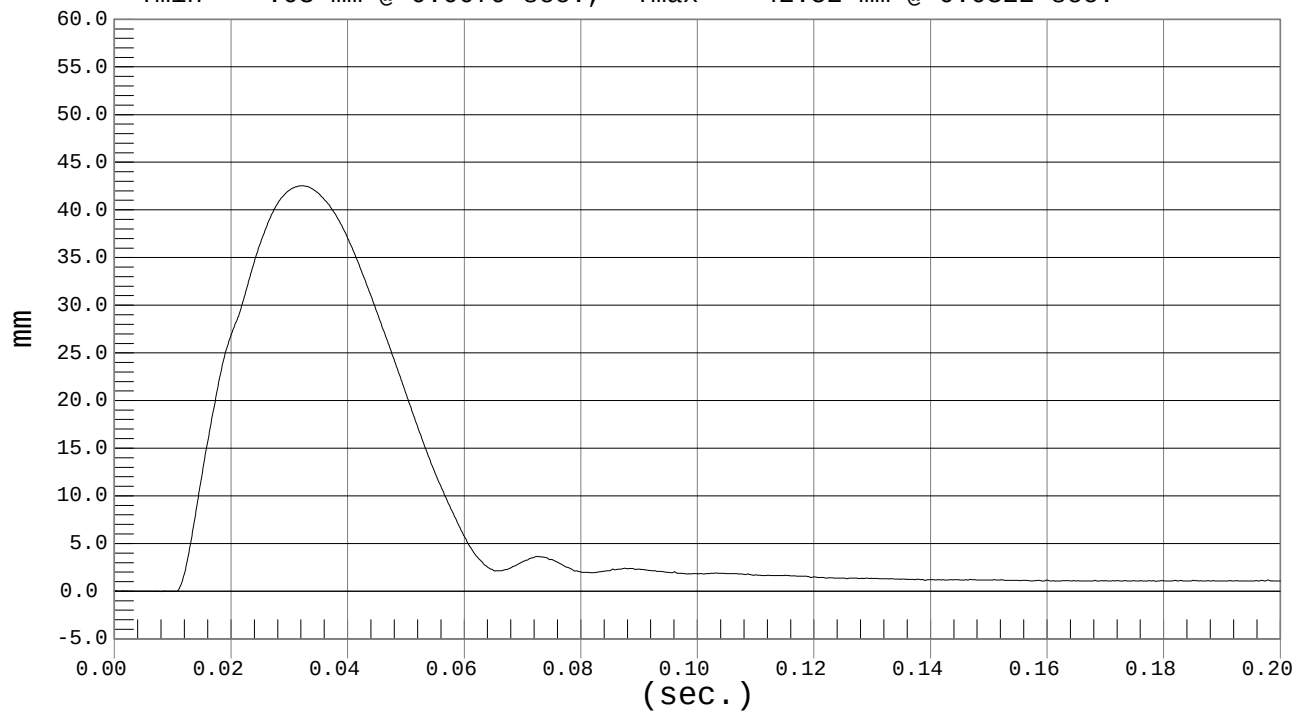


LOWER RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.0 fps, 4.27 M/s

Ymin = -.03 mm @ 0.0079 sec., Ymax = 42.52 mm @ 0.0322 sec.



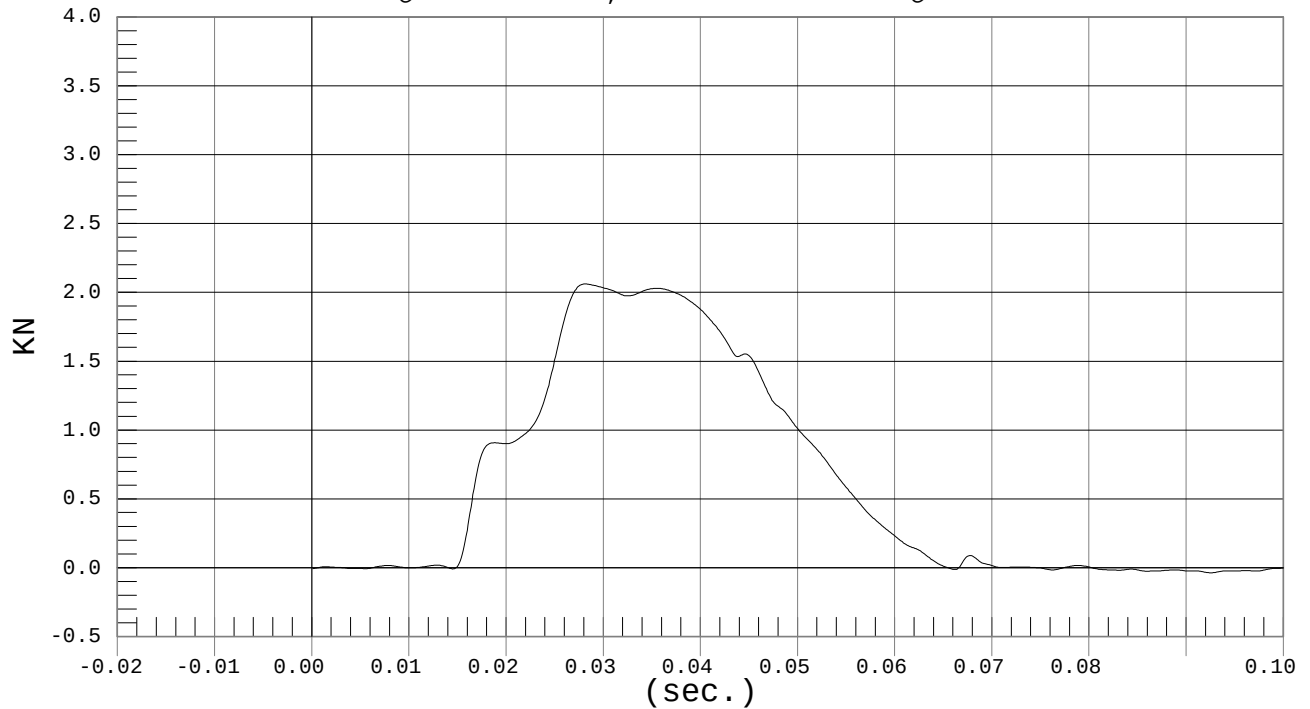


PROBE FORCE

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.1 fps, 4.29 M/s

Ymin = -.04 LBF @ 0.1930 sec., Ymax = 2.06 KN @ 0.0280 sec.

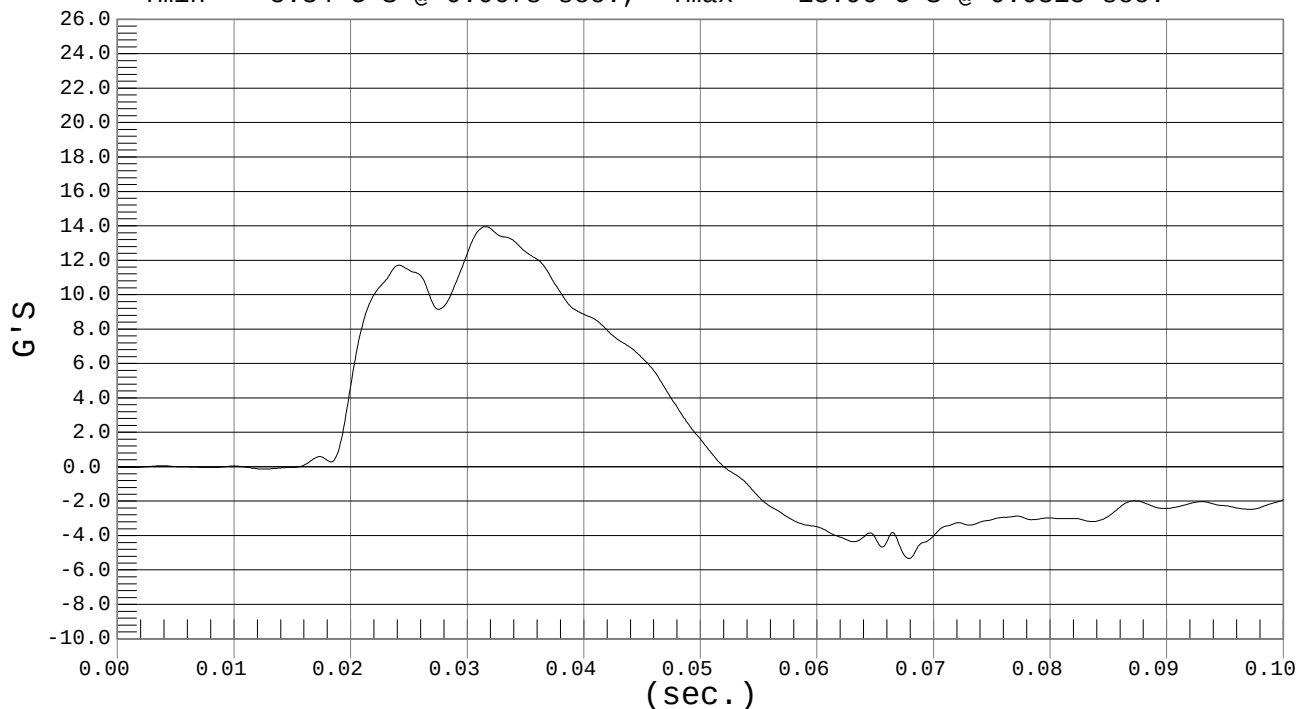


UPPER SPINE ACCELERATION

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.1 fps, 4.29 M/s

Ymin = -5.34 G'S @ 0.0678 sec., Ymax = 13.96 G'S @ 0.0315 sec.



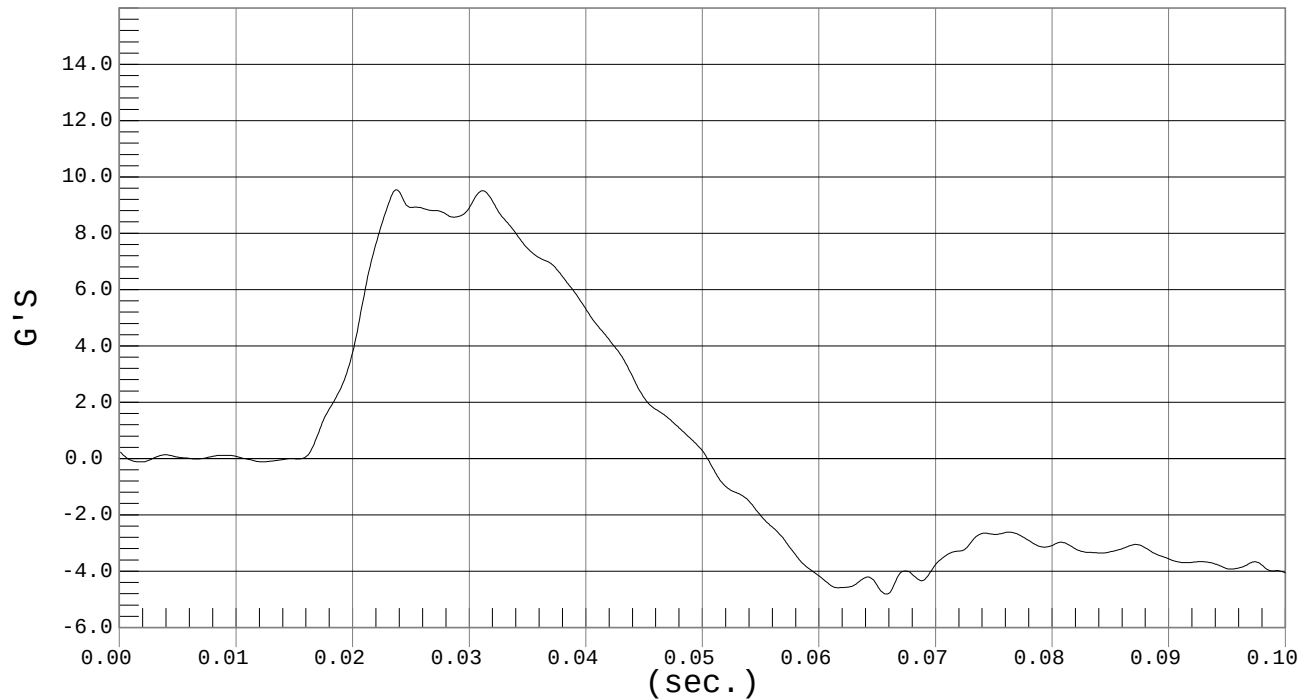


LOWER SPINE ACCELERATION

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.1 fps, 4.29 M/s

Ymin = -4.81 G'S @ 0.0657 sec., Ymax = 9.55 G'S @ 0.0237 sec.

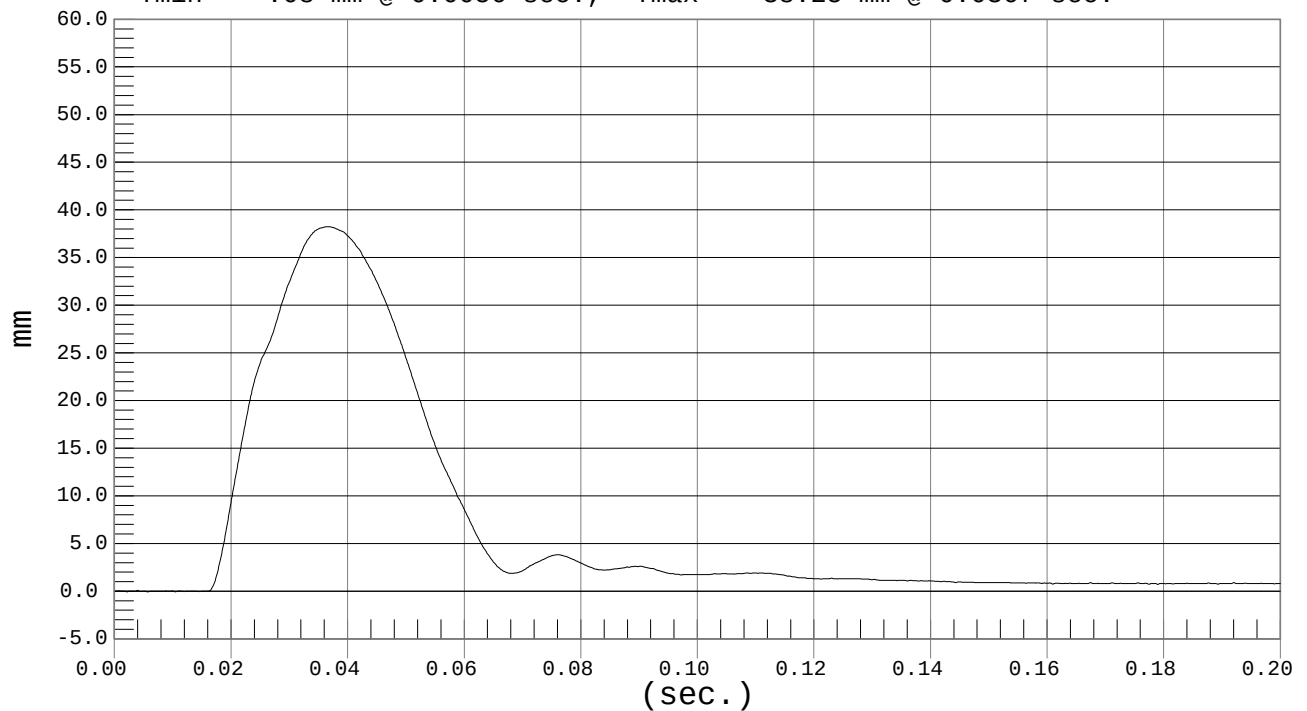


UPPER RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.1 fps, 4.29 M/s

Ymin = -.08 mm @ 0.0056 sec., Ymax = 38.25 mm @ 0.0367 sec.



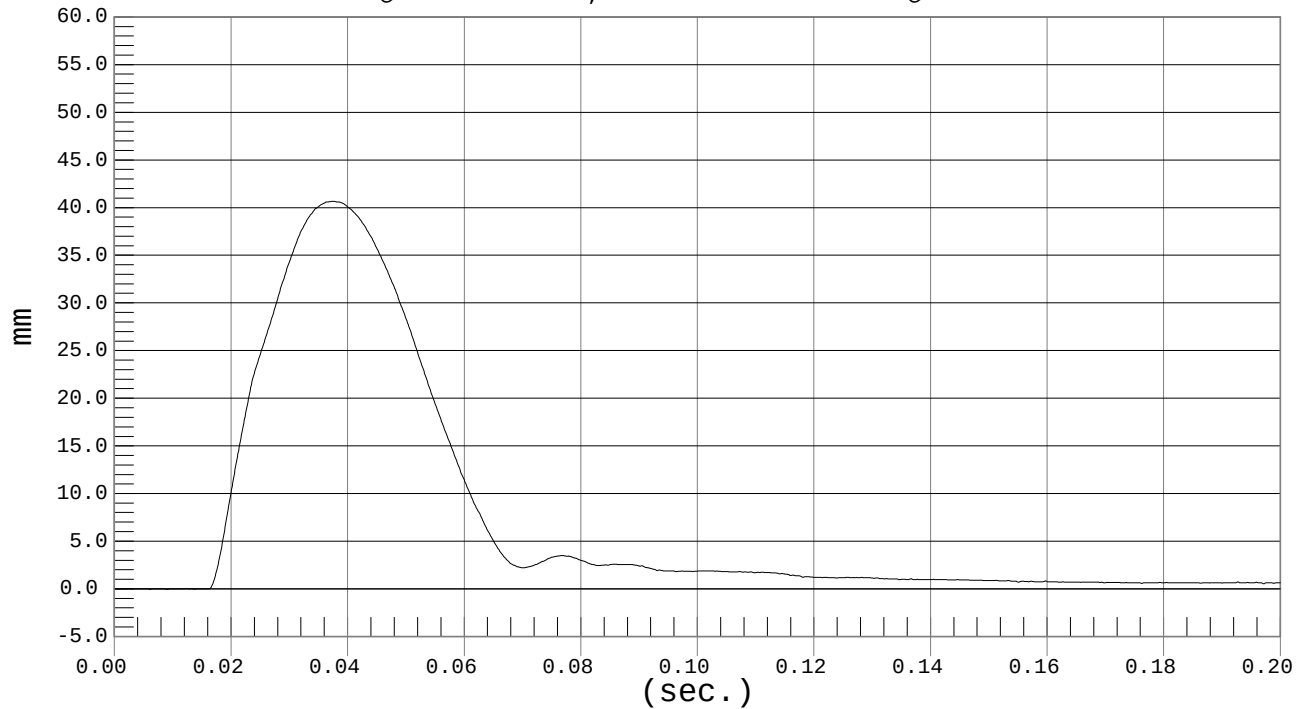


MIDDLE RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.1 fps, 4.29 M/s

Ymin = -.07 mm @ 0.0089 sec., Ymax = 40.65 mm @ 0.0375 sec.

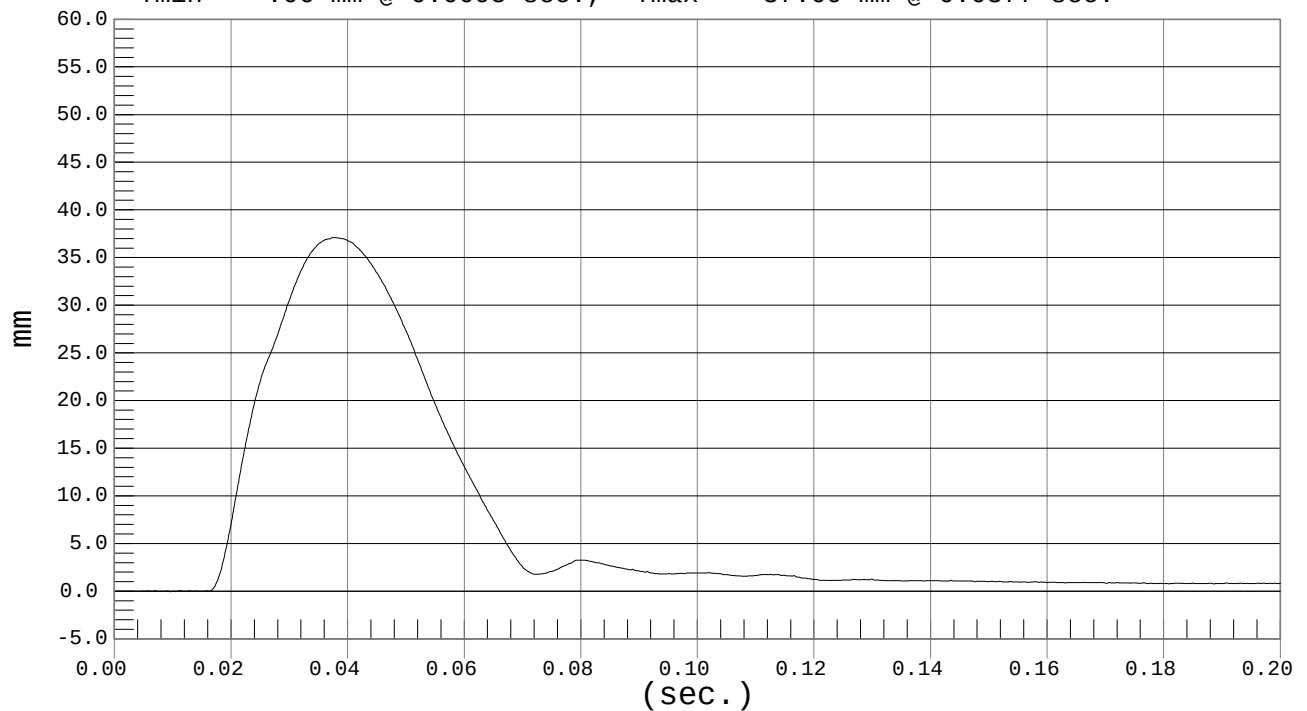


LOWER RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.1 fps, 4.29 M/s

Ymin = -.06 mm @ 0.0095 sec., Ymax = 37.09 mm @ 0.0377 sec.



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID IIs DUMMY

Date: 3/26/03
Dummy Serial Number: 033
Test Number: D03526/D03536

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03526</u>	<u>D03536</u>
Temperature (°C)	20.8° – 22.2°	21.8	21.3
Humidity	10% - 70%	25	25
Impact Velocity	4.41 - 4.59 m/s	4.50	4.51
Probe Force	1.3 - 1.9 kN	1.7	1.7
Upper Spine Acceleration	5 - 9 g's	7	7
Lower Spine Acceleration	10 - 12 g's	*14	*14
Upper Rib Displacement	44 - 55 mm	47	47
Middle Rib Displacement	44 - 56 mm	43	45

*TEST DOES NOT MEET SPECIFICATIONS

Technician: _____

Approved By: _____

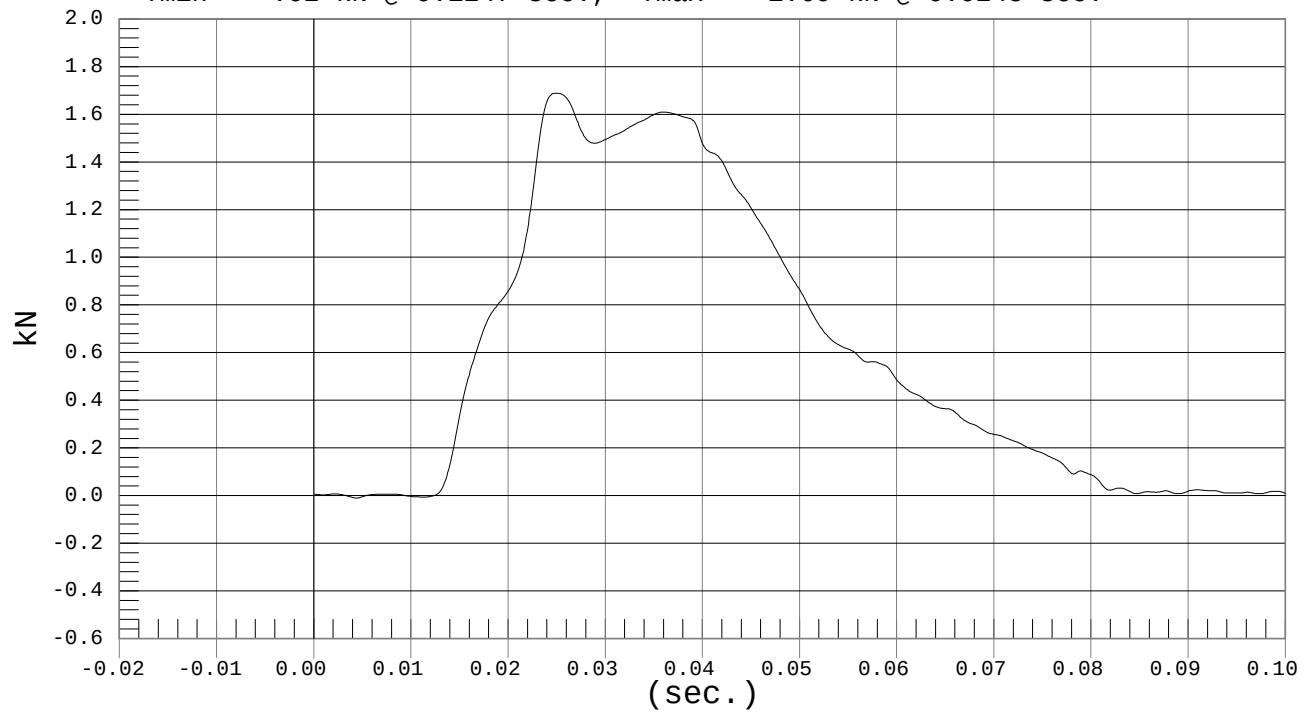


PROBE FORCE

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.50 M/s

Ymin = -.02 kN @ 0.1247 sec., Ymax = 1.69 kN @ 0.0248 sec.



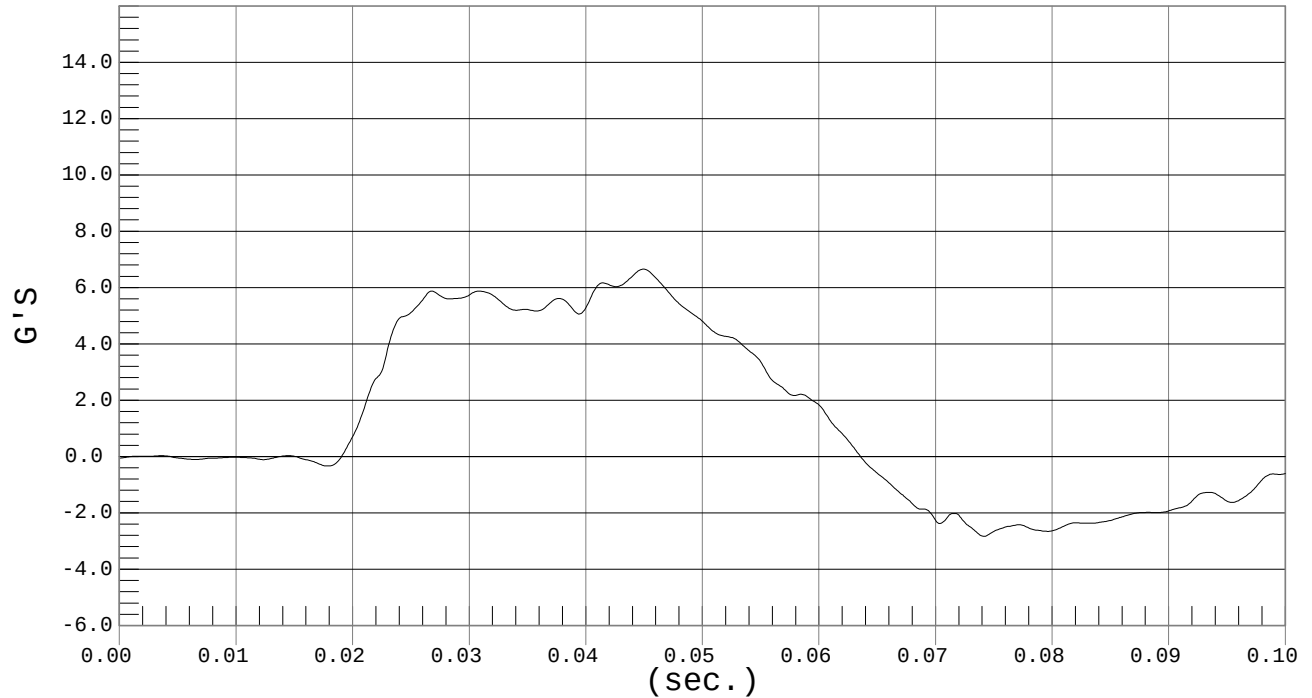


UPPER SPINE ACCELERATION

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.50 M/s

Ymin = -2.83 G'S @ 0.0741 sec., Ymax = 6.65 G'S @ 0.0449 sec.

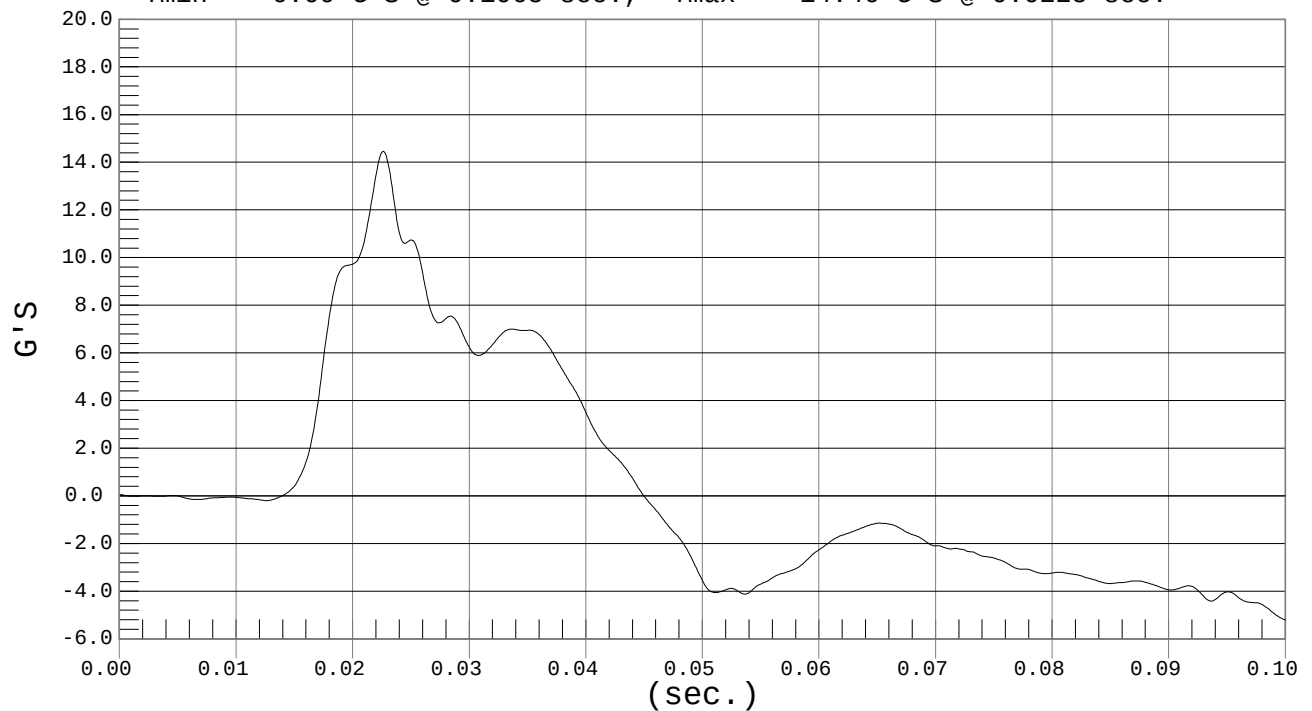


LOWER SPINE ACCELERATION

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.50 M/s

Ymin = -6.09 G'S @ 0.1065 sec., Ymax = 14.46 G'S @ 0.0225 sec.



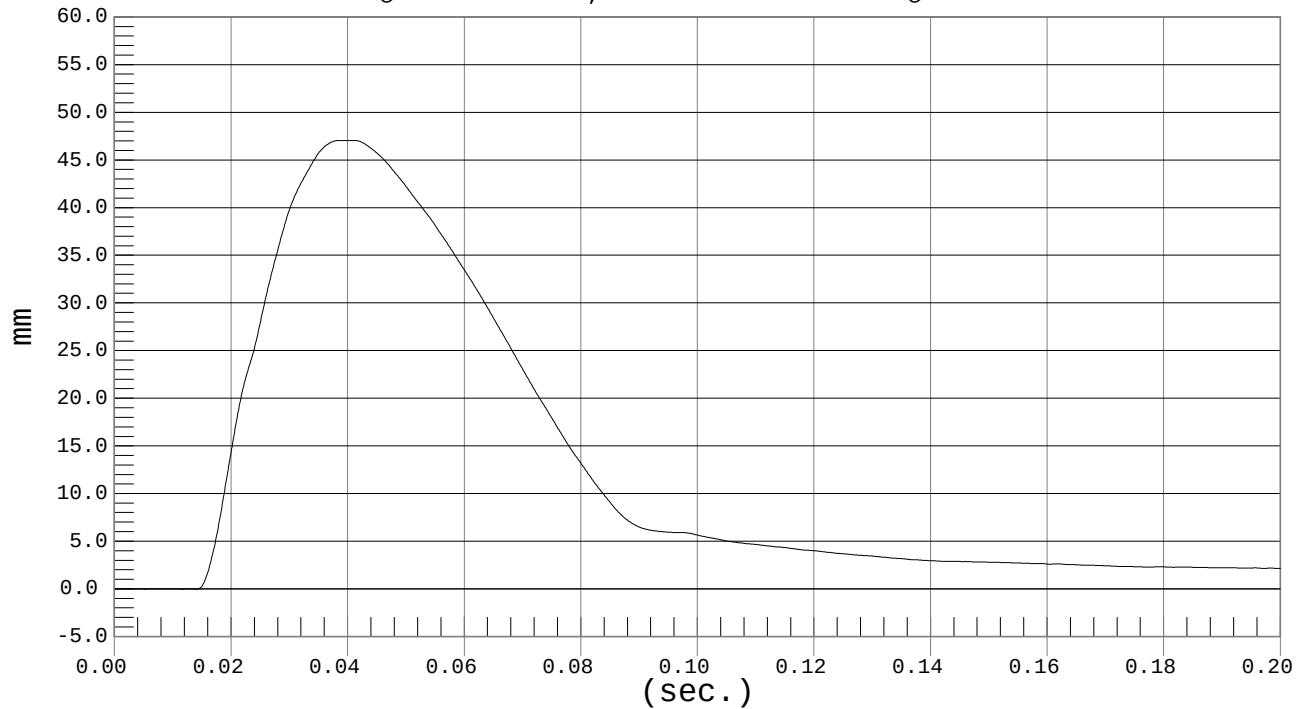


UPPER RIB DISPLACEMENT

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.50 M/s

Ymin = -.03 mm @ 0.0139 sec., Ymax = 47.05 mm @ 0.0407 sec.

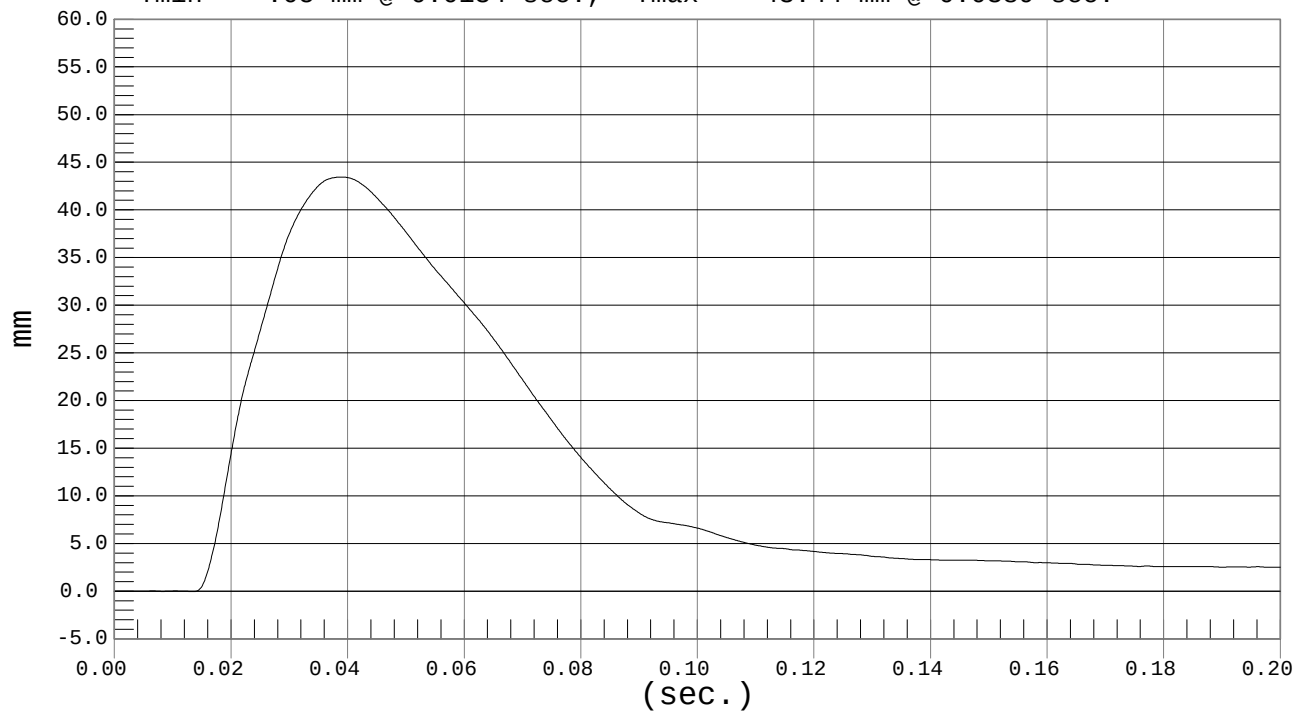


LOWER RIB DISPLACEMENT

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.50 M/s

Ymin = -.05 mm @ 0.0134 sec., Ymax = 43.44 mm @ 0.0389 sec.



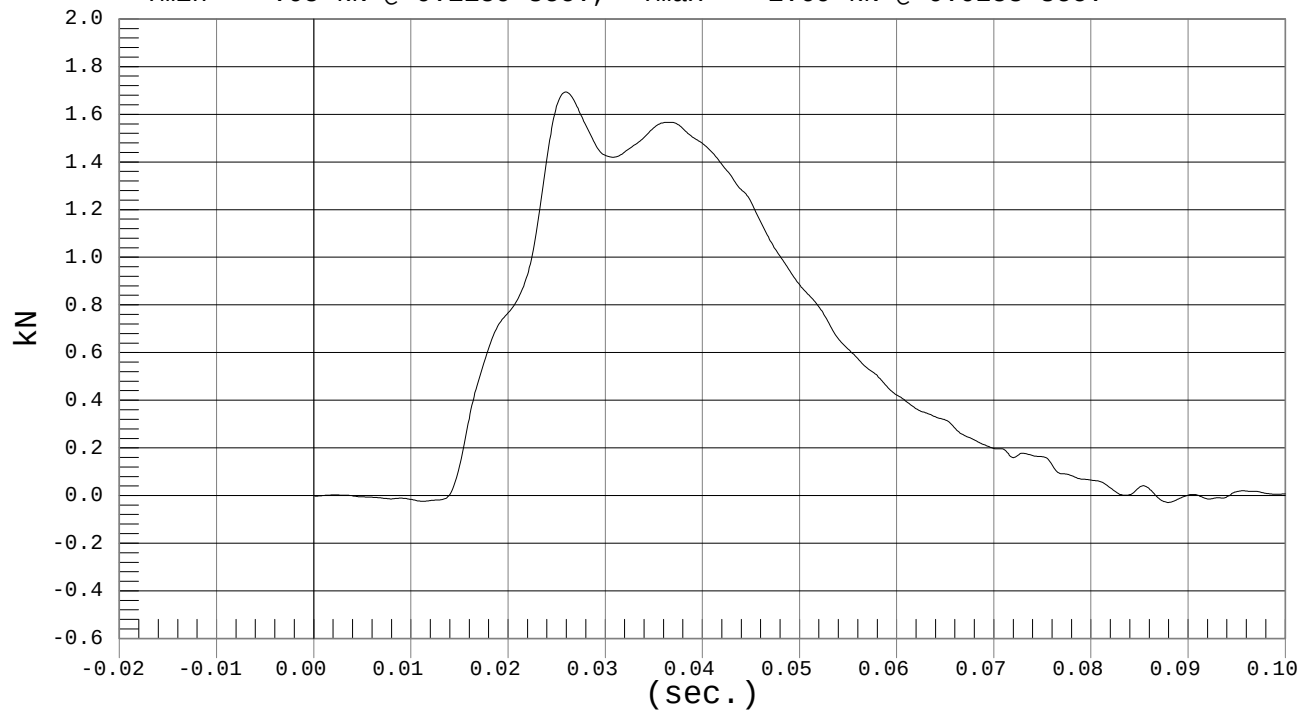


PROBE FORCE

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.05 kN @ 0.1159 sec., Ymax = 1.69 kN @ 0.0258 sec.



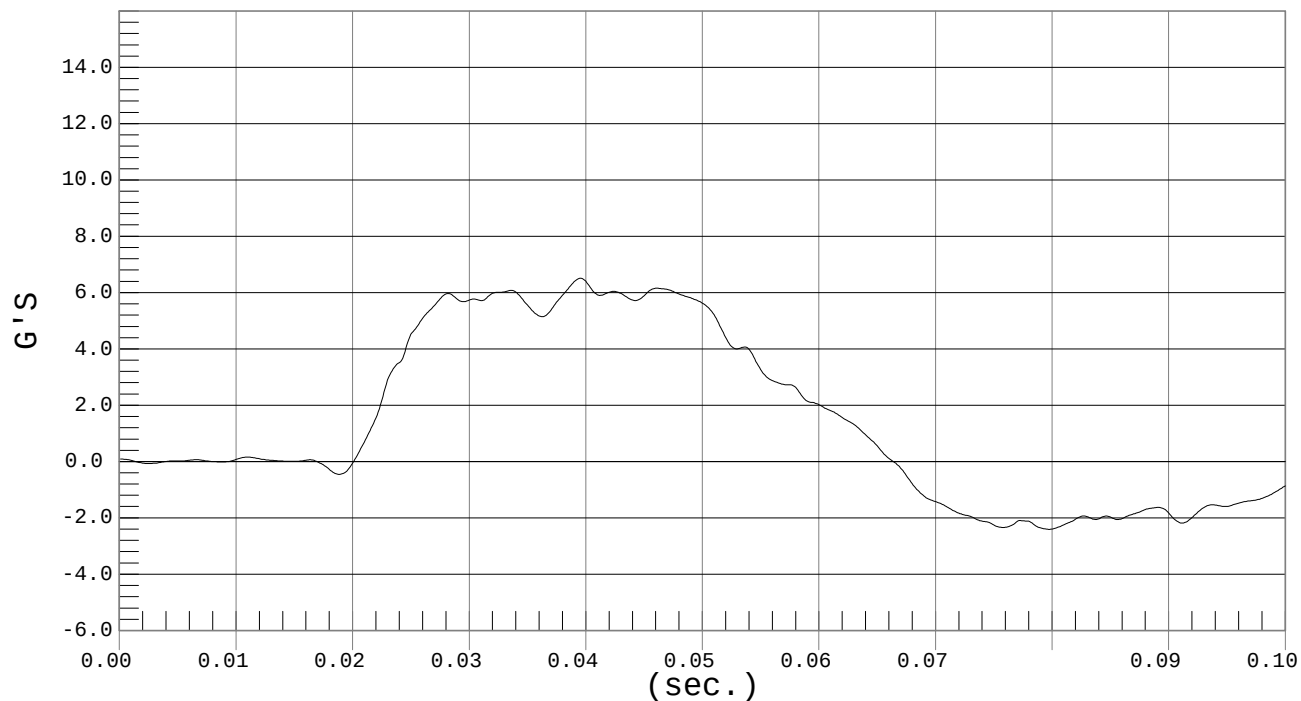


UPPER SPINE ACCELERATION

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -2.41 G'S @ 0.0796 sec., Ymax = 6.51 G'S @ 0.0394 sec.

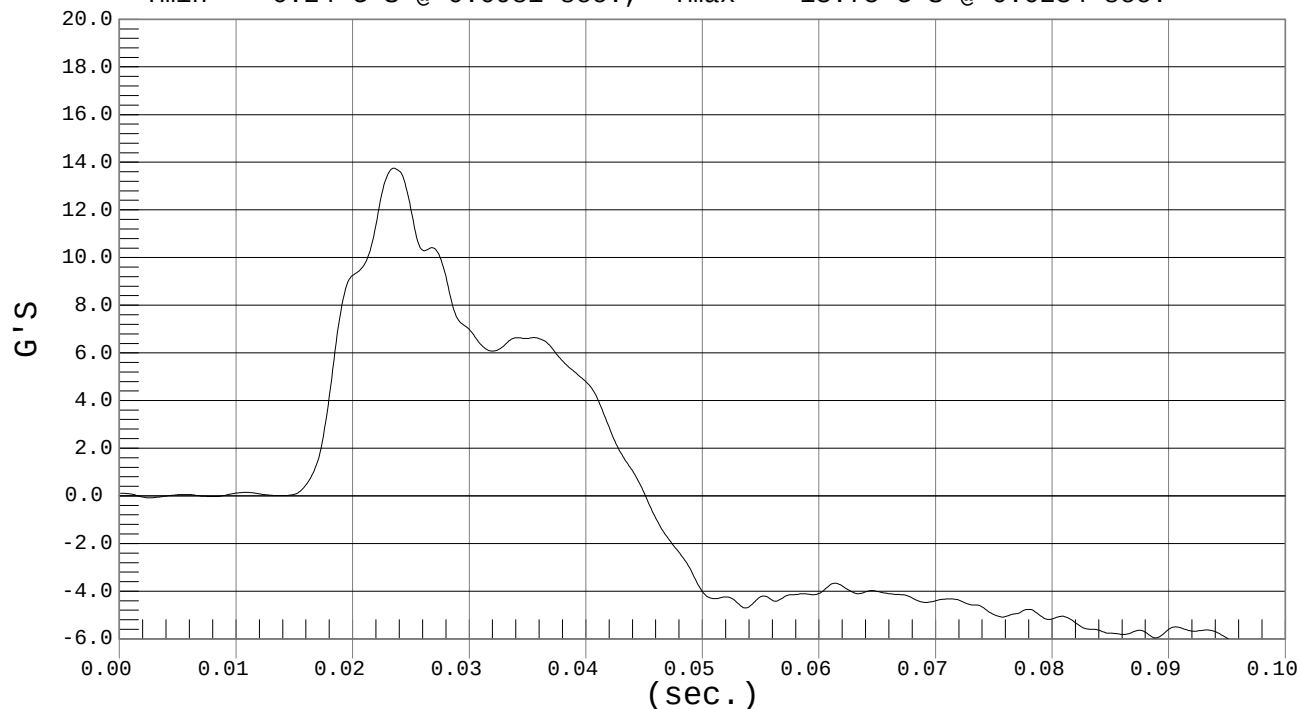


LOWER SPINE ACCELERATION

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -6.24 G'S @ 0.0981 sec., Ymax = 13.75 G'S @ 0.0234 sec.



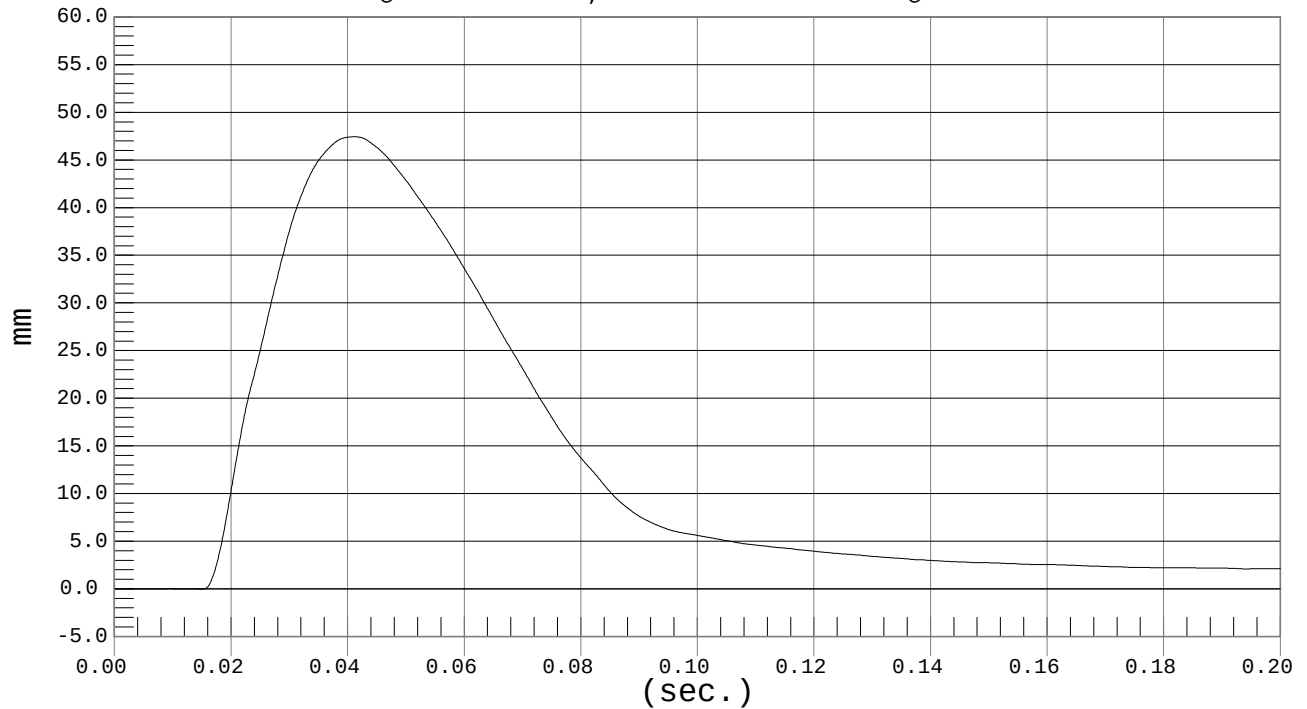


UPPER RIB DISPLACEMENT

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.03 mm @ 0.0149 sec., Ymax = 47.43 mm @ 0.0410 sec.

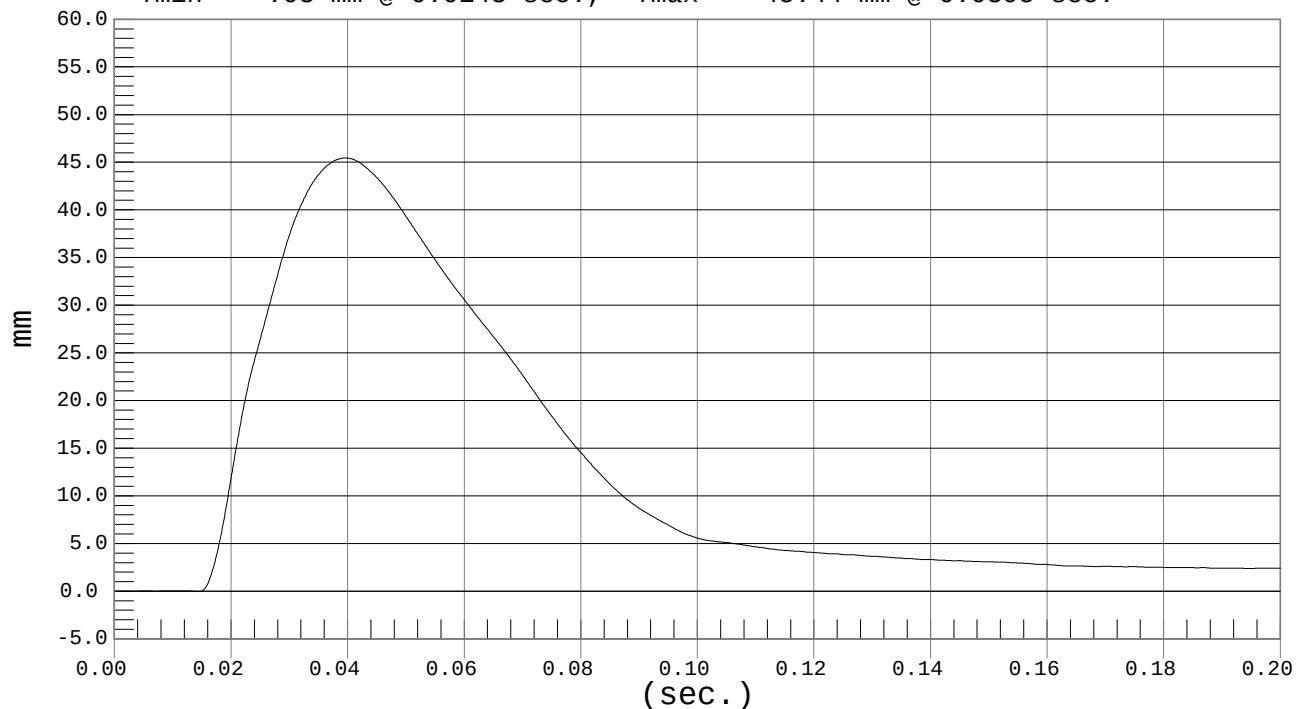


LOWER RIB DISPLACEMENT

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.03 mm @ 0.0143 sec., Ymax = 45.44 mm @ 0.0395 sec.



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID IIs DUMMY

Date: 3/26/03
Dummy Serial Number: 033
Test Number: D03529/D03539

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03529</u>	<u>D03539</u>
Temperature (°C)	20.8° – 22.2°	21.6	21.4
Humidity	10% - 70%	25	25
Impact Velocity	6.57 - 6.84 m/s	6.71	6.75
Probe Force	5.0 - 7.2 kN	5.6	6.0
Pelvis G's	46 - 60 g's	49	48

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

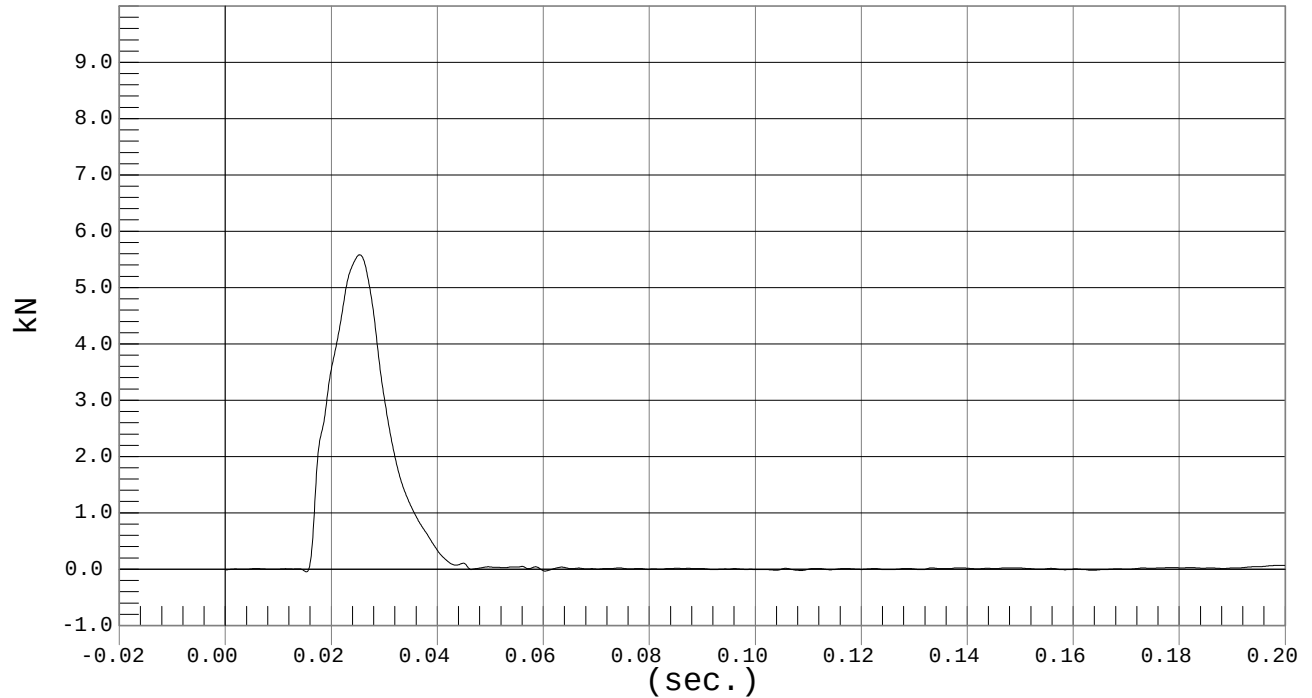


IMPACTOR FORCE

Test Desc.: Pelvis Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.0 fps, 6.71 M/s

Ymin = -.05 kN @ 0.0152 sec., Ymax = 5.58 kN @ 0.0252 sec.

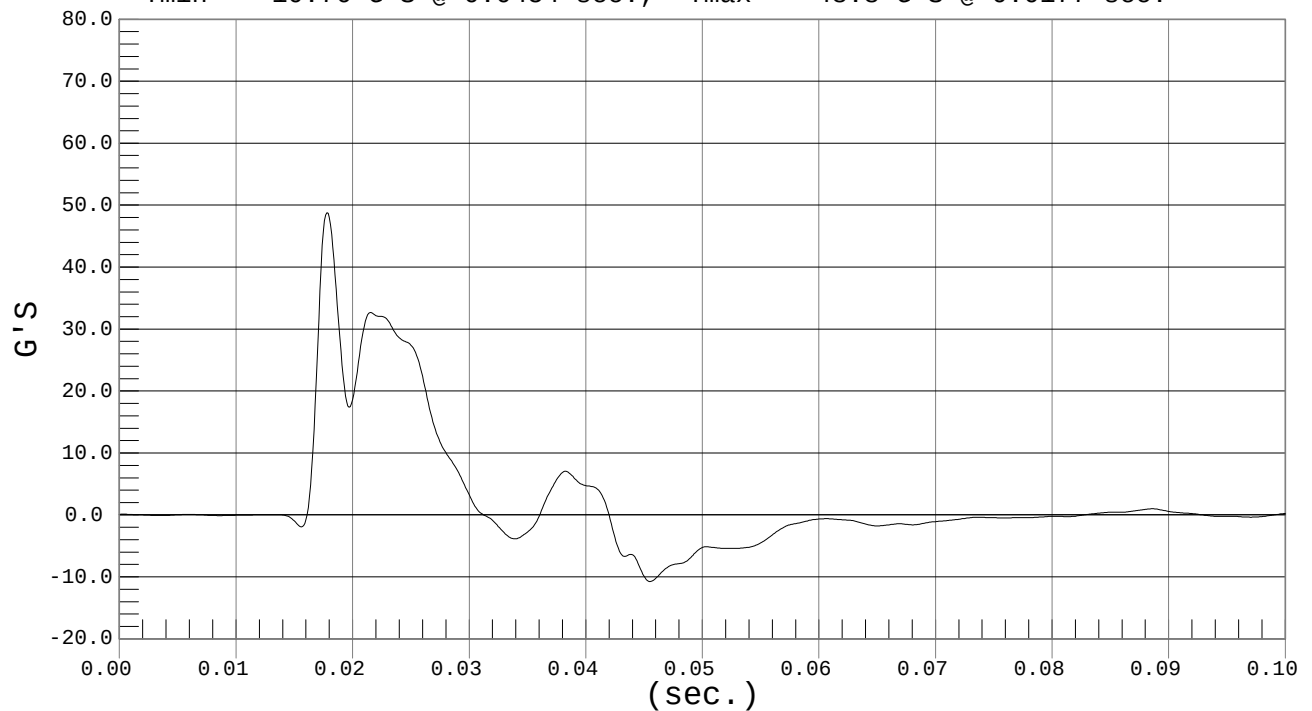


PELVIS ACCELERATION

Test Desc.: Pelvis Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.0 fps, 6.71 M/s

Ymin = -10.76 G'S @ 0.0454 sec., Ymax = 48.8 G'S @ 0.0177 sec.



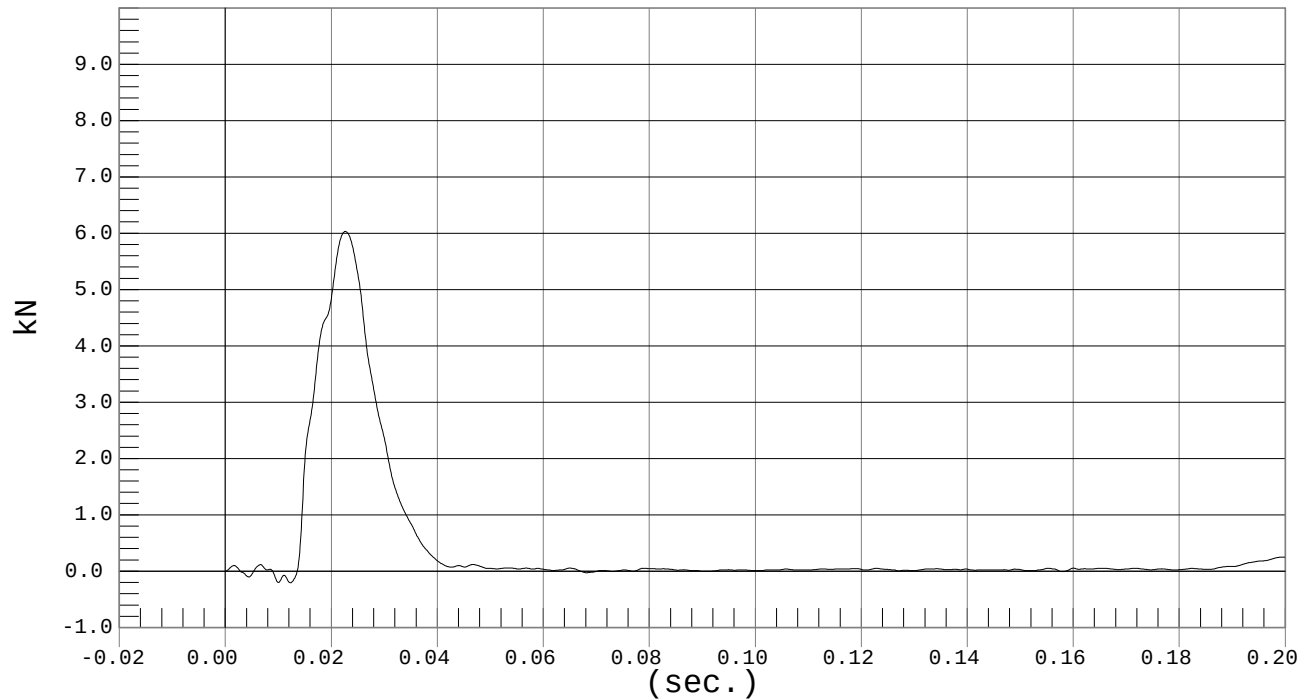


IMPACTOR FORCE

Test Desc.: Pelvis Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.75 M/s

Ymin = -.2 kN @ 0.0122 sec., Ymax = 6.03 kN @ 0.0225 sec.

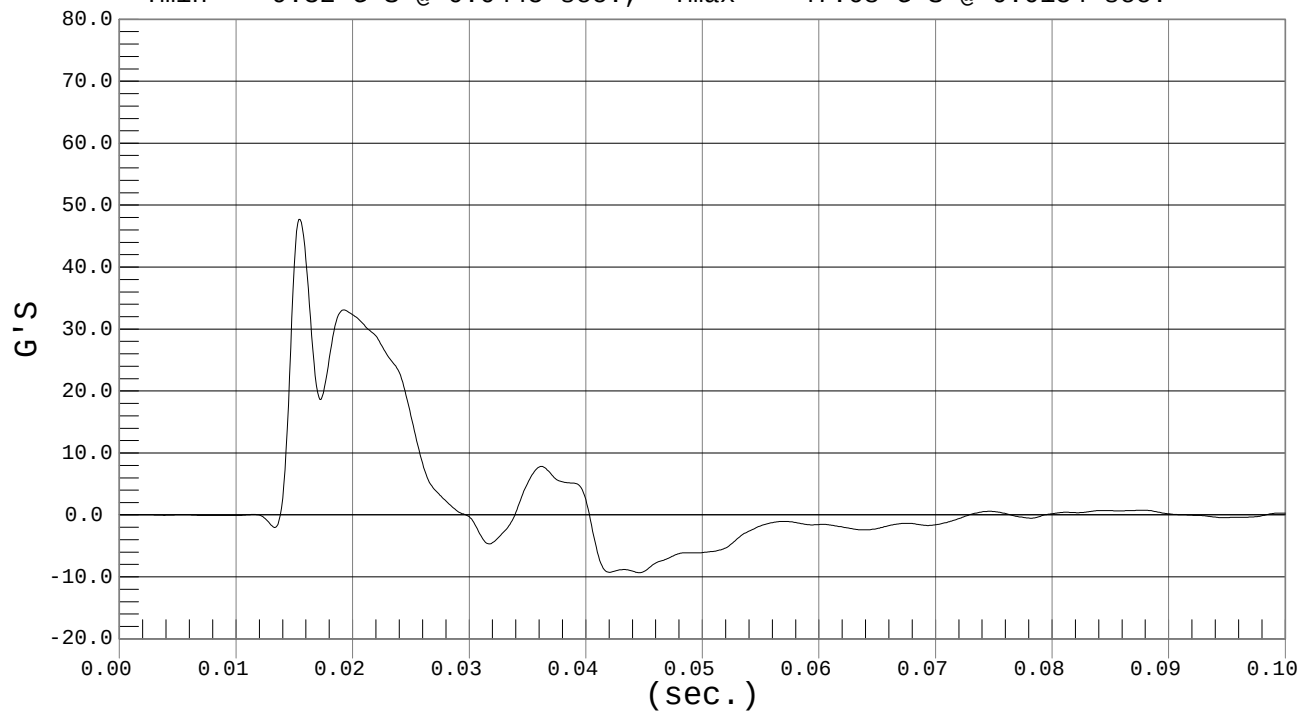


PELVIS ACCELERATION

Test Desc.: Pelvis Impact
Component: Dummy #033

Test Date: 03-26-03
Speed: 22.2 fps, 6.75 M/s

Ymin = -9.32 G'S @ 0.0445 sec., Ymax = 47.68 G'S @ 0.0154 sec.



CERTIFICATION DATA

Dummy Serial Number: 33

Calibration Test Results Summary

Dummy Serial Number: 033

Post-Test Calibration

Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck did not pass all impact test requirements.
Shoulder Impact Test:	The shoulder passed all impact test requirements.
Thorax (with arm) Test:	The thorax passed all impact test requirements.
Thorax (without arm) Test:	The thorax passed all impact test requirements.
Abdomen Impact Test:	The abdomen did not pass all impact test requirements.
Pelvis Test:	The pelvis passed all impact test requirements.

MGA RESEARCH CORPORATION
HEAD DROP TEST
SID IIs DUMMY

Date: 4/3/03
Dummy Serial Number: 033
Test Number: D03581/D03591

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03581</u>	<u>D03591</u>
Temperature (°C)	18.9° – 25.6°	21.1	21.1
Humidity	10% - 70%	30	30
Resultant Accel	115 - 145 g's	117	118
Peak Longitudinal Accel	(-15) – (+ 15) g's	12	-7

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

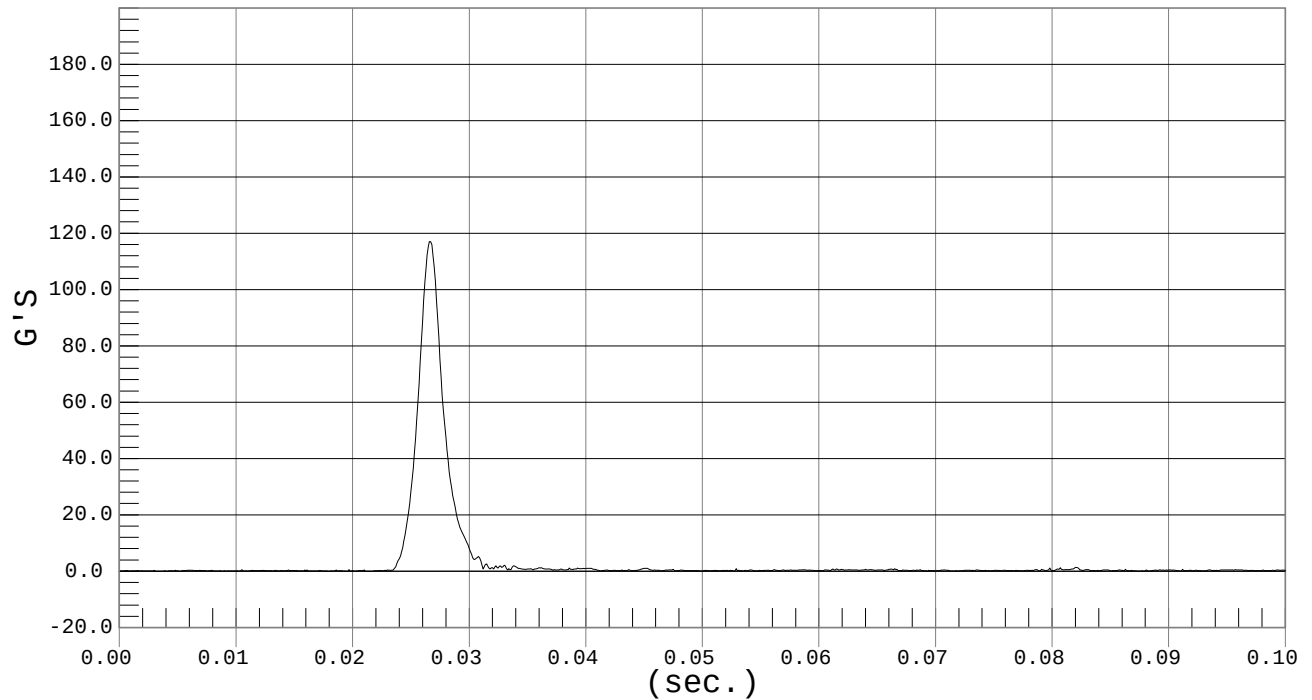


PEAK RESULTANT ACCELERATION

Test Desc.: Head Drop
Component: Dummy #033

Test Date: 04-03-03
Speed: 0.0 fps, 0.00 M/s

Ymin = .03 G'S @ 0.0008 sec., Ymax = 117.02 G'S @ 0.0265 sec.

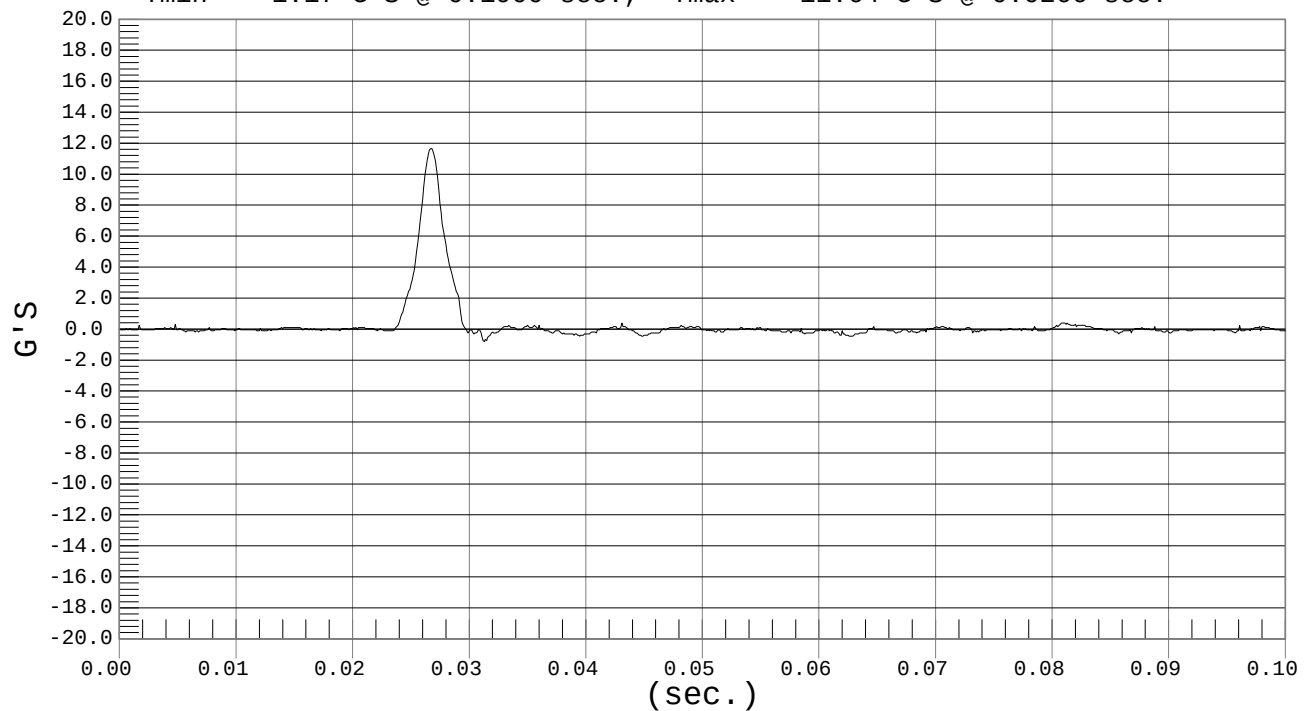


PEAK LONGITUDINAL ACCELARATION

Test Desc.: Head Drop
Component: Dummy #033

Test Date: 04-03-03
Speed: 0.0 fps, 0.00 M/s

Ymin = -1.17 G'S @ 0.1900 sec., Ymax = 11.64 G'S @ 0.0266 sec.



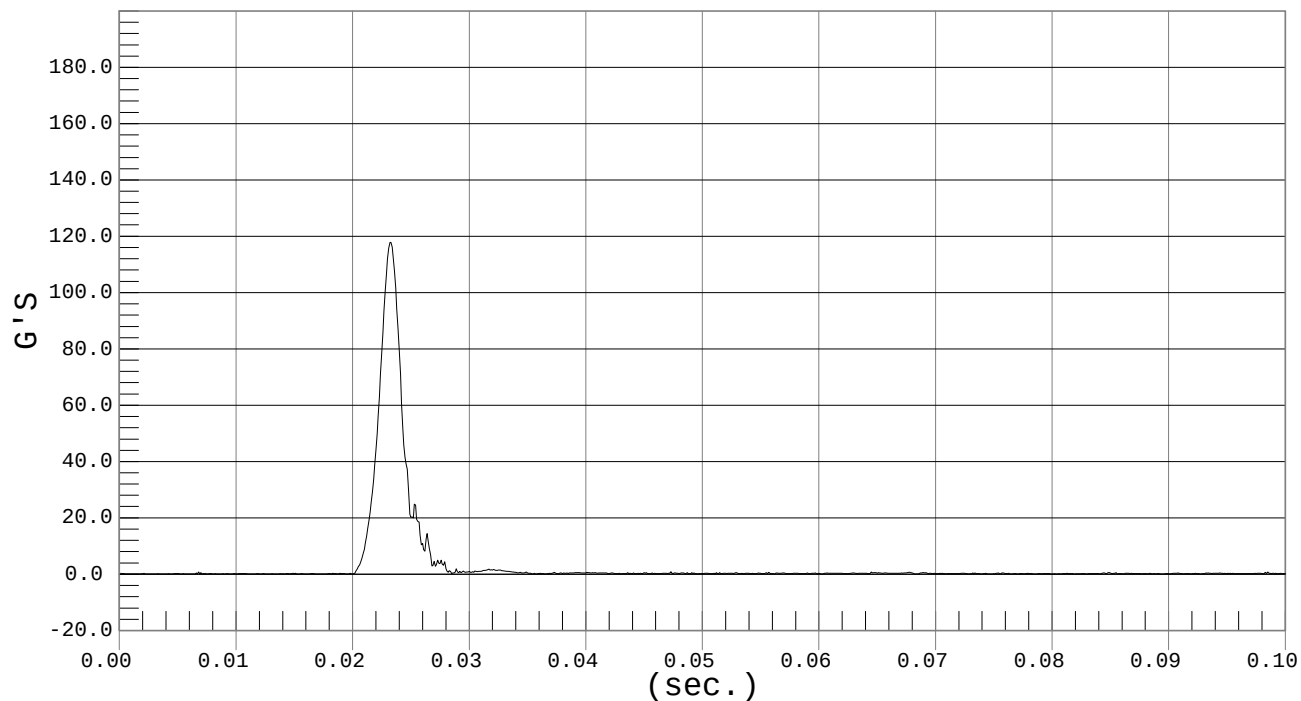


PEAK RESULTANT ACCELERATION

Test Desc.: Head Drop
Component: Dummy #033

Test Date: 04-03-03
Speed: 0.0 fps, 0.00 M/s

Ymin = .05 G'S @ 0.0005 sec., Ymax = 117.82 G'S @ 0.0232 sec.

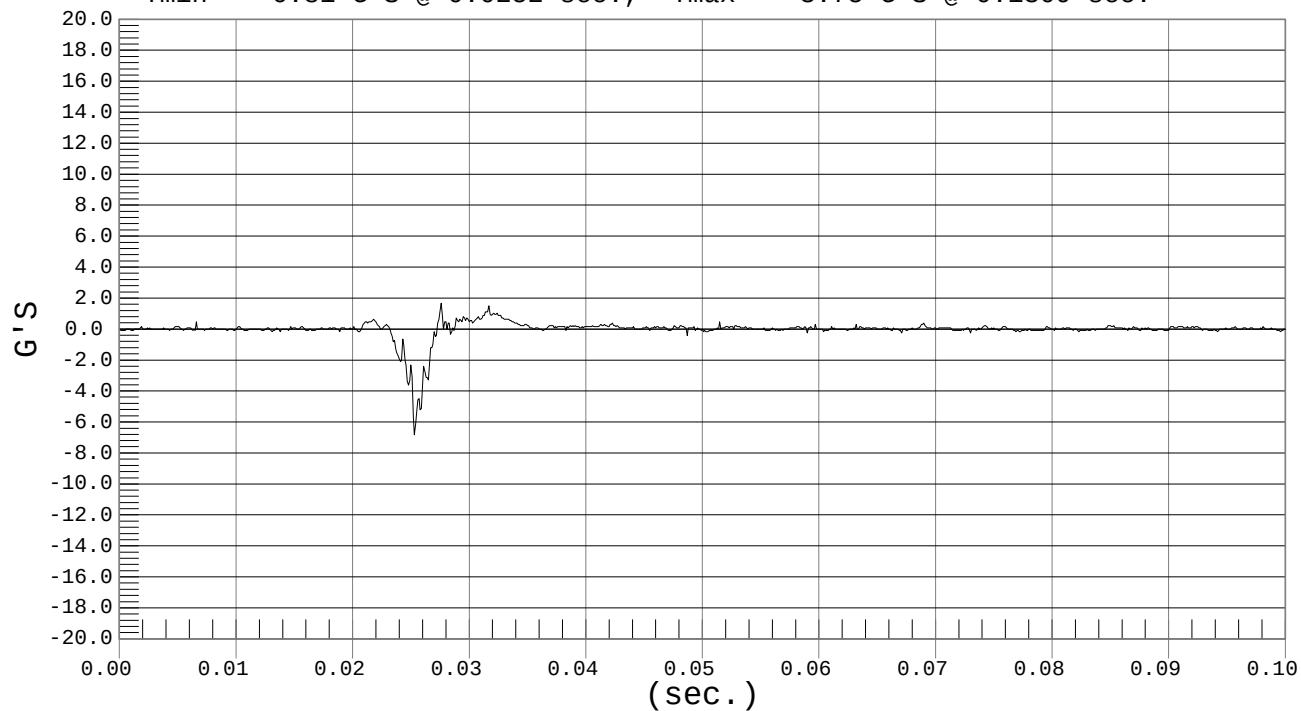


PEAK LONGITUDINAL ACCELARATION

Test Desc.: Head Drop

Test Date: 04-03-03

Ymin = -6.81 G'S @ 0.0252 sec., Ymax = 3.75 G'S @ 0.1309 sec.



MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID IIs DUMMY

Date: 4/3/03
Dummy Serial Number: 033
Test Number: D03582/D03592

TEST PARAMETER		SPECIFICATION	TEST RESULTS	
			<u>D03582</u>	<u>D03592</u>
Temperature (°C)		20.8° – 22.2°	21.0	21.0
Humidity		10% - 70%	30	30
Impact Velocity (m/s)		5.51-5.63	5.60	5.58
Delta Velocity (m/s)	10 ms	2.10-2.70	2.30	2.33
	15 ms	3.00-3.80	3.46	3.52
	20 ms	4.20-5.20	4.67	4.75
	25-60 ms	5.00-6.40	5.70	5.52
Peak D-Plane Rotation (deg)		72-82	76	74
Decay Time of D-Plane Rotation Peak to Zero Degree (ms)		60-83	67	69
Peak Occipital Condyle Moment (Nm)		(-43) – (-36)	-45	-44
Time at 10 or -10 Nm after Peak Moment (ms)		90 – 98	91	90
Time of last Moment Peak to Max Rotation (ms)		<14	4	3
Front Pot Peak Rotation (deg)		59 – 72	61	60
Time of Front Pot Peak Rotation (ms)		61 – 73	63	63
Rear Pot Peak Rotation (deg)		47 – 56	49	49
Time of Rear Pot Peak Rotation (ms)		62 – 73	*60	*59

*TEST DOES NOT MEET SPECIFICATIONS

Technician: _____

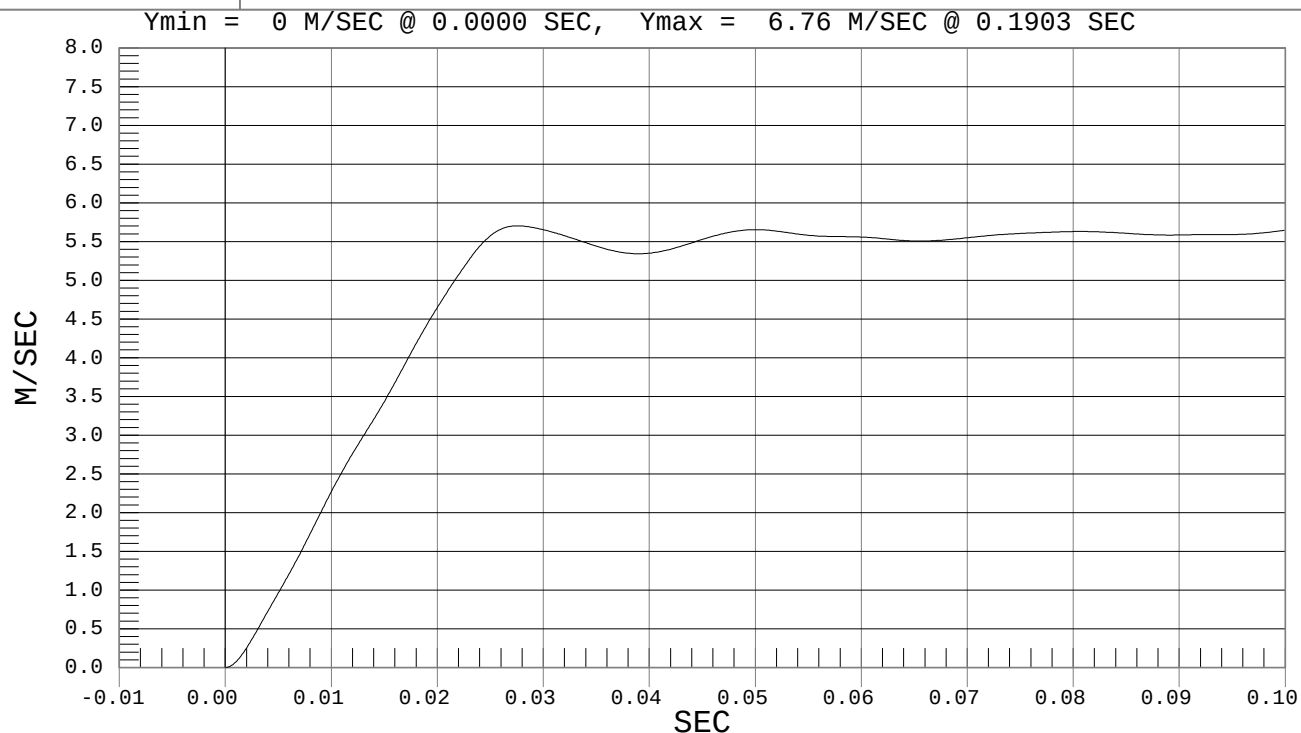
Approved By: _____



PENDULUM DECELERATION

Test Desc.: Neck Bending
Component: Dummy #033

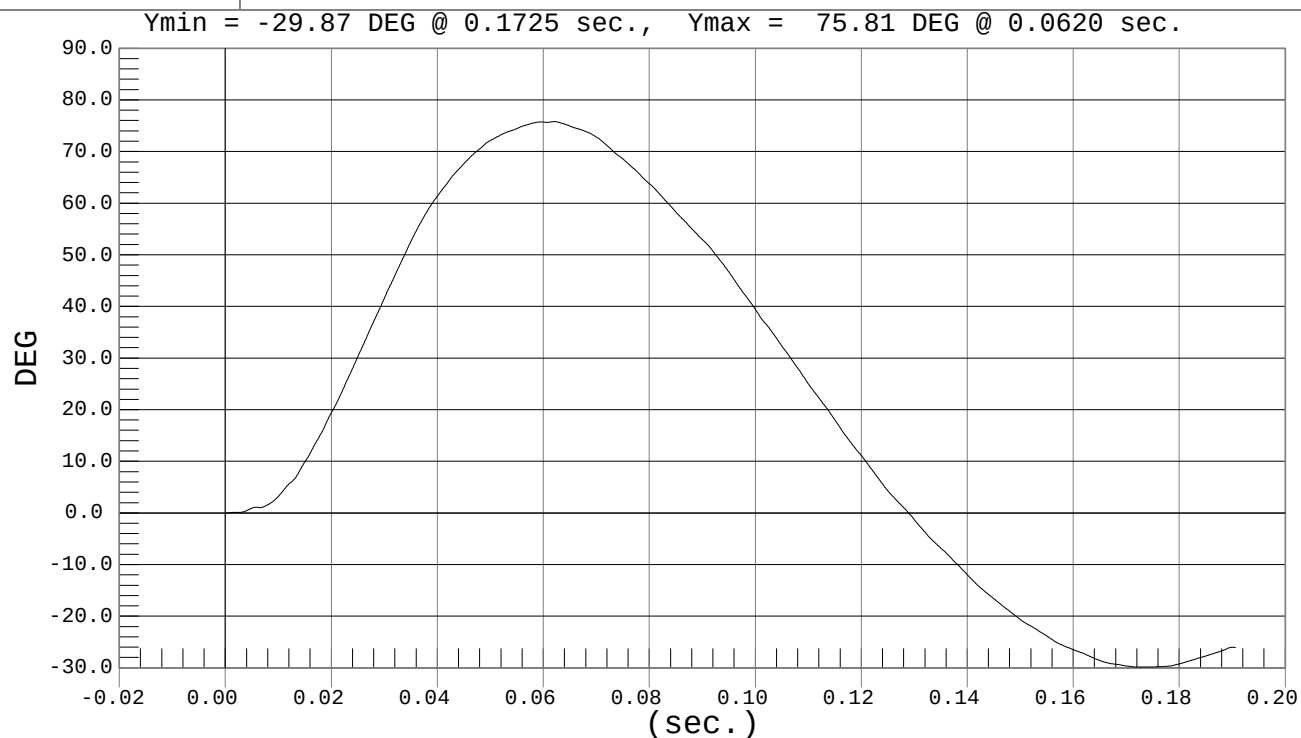
Test Date: 04-03-03
Speed: 18.4 fps, 5.60 M/s



FLEXION ANGLE

Test Desc.: Neck Bending
Component: Dummy #033

Test Date: 04-03-03
Speed: 18.4 fps, 5.60 M/s



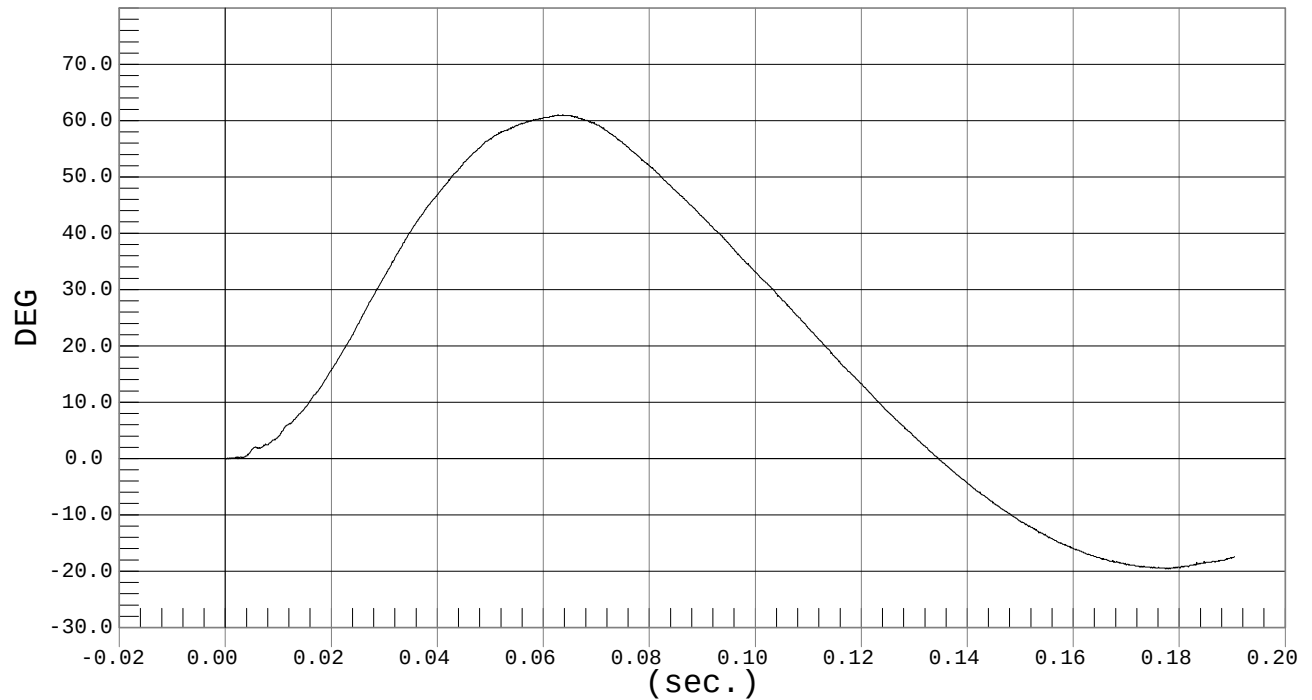


Test Desc.: Neck Bending
Component: Dummy #033

FRONT

Test Date: 04-03-03
Speed: 18.4 fps, 5.60 M/s

Ymin = -19.59 DEG @ 0.1773 sec., Ymax = 61.05 DEG @ 0.0627 sec.

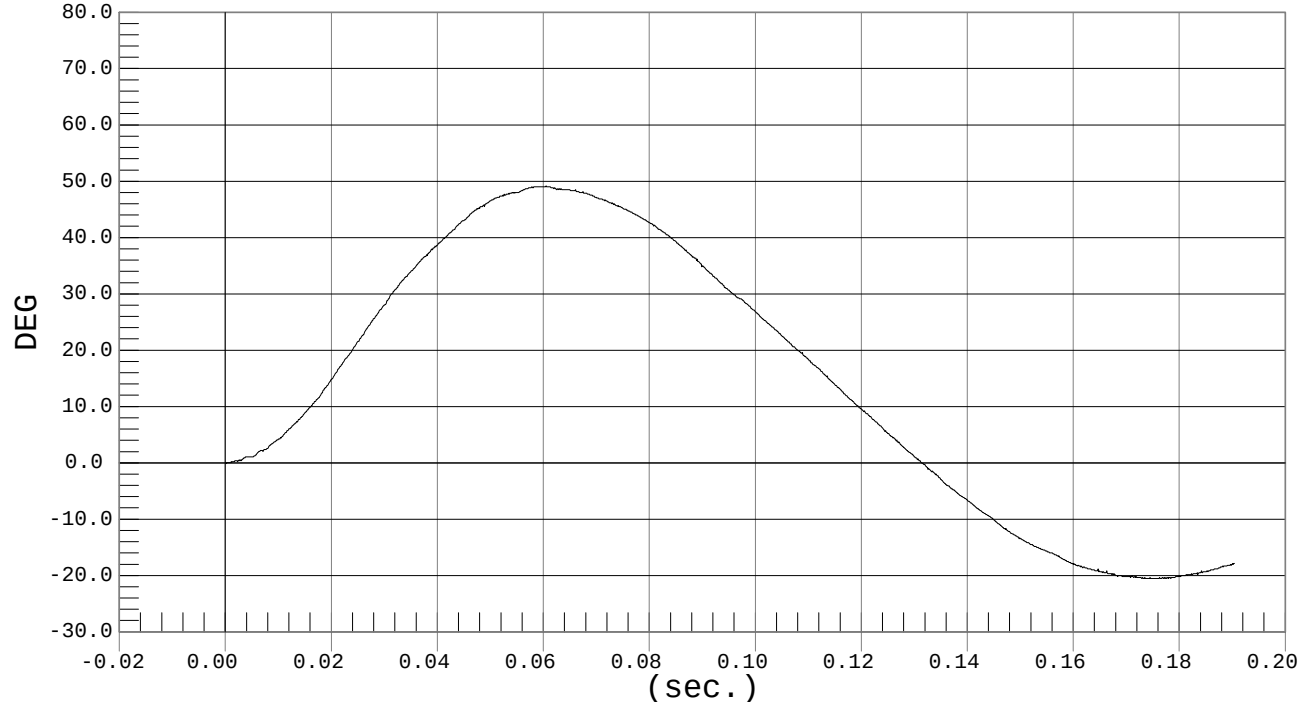


Test Desc.: Neck Bending
Component: Dummy #033

REAR

Test Date: 04-03-03
Speed: 18.4 fps, 5.60 M/s

Ymin = -20.51 DEG @ 0.1728 sec., Ymax = 49.18 DEG @ 0.0604 sec.



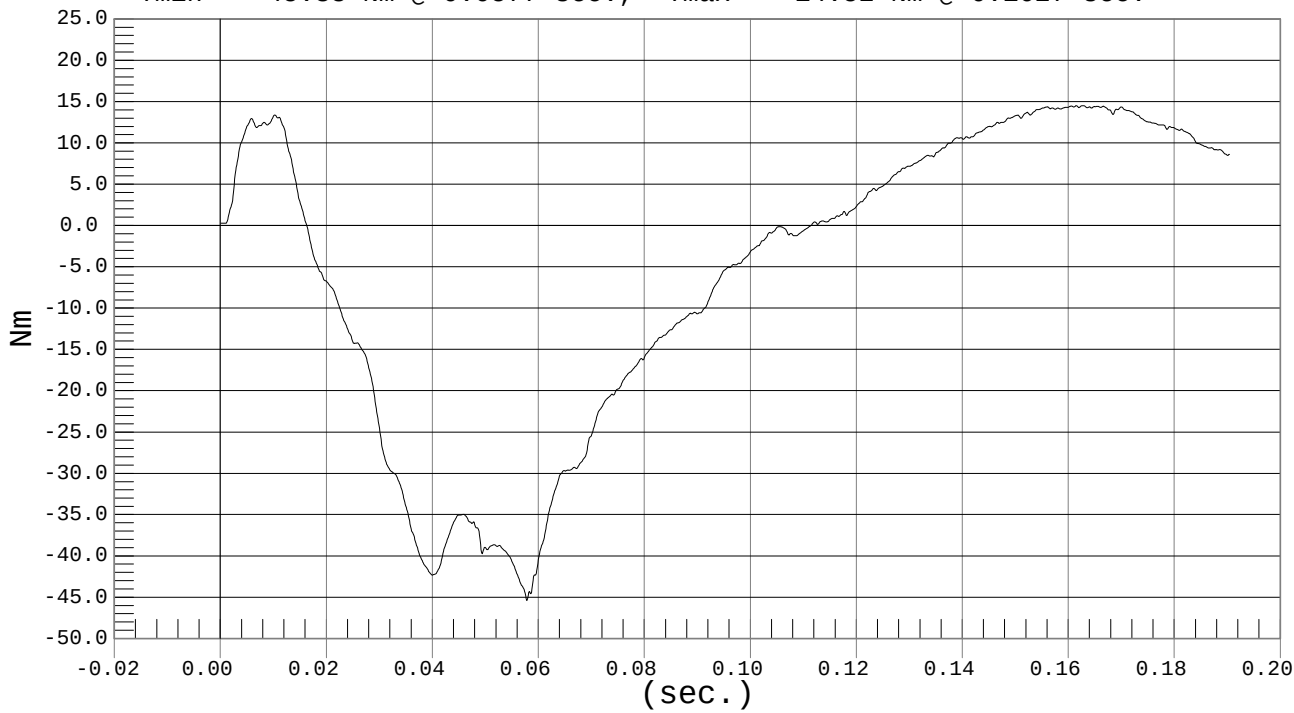


OCCIPITAL MOMENT

Test Desc.: Neck Bending
Component: Dummy #033

Test Date: 04-03-03
Speed: 18.4 fps, 5.60 M/s

Ymin = -45.38 Nm @ 0.0577 sec., Ymax = 14.52 Nm @ 0.1627 sec.

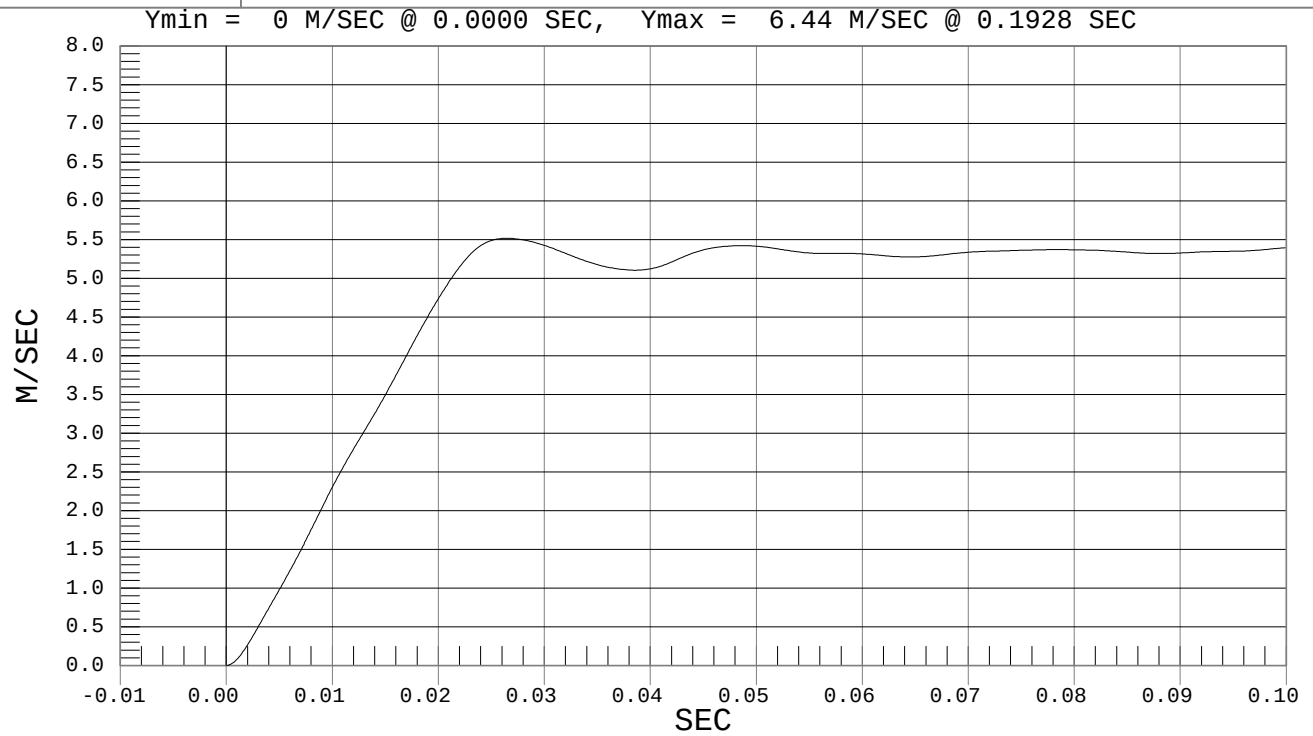




PENDULUM DECELERATION

Test Desc.: Neck Bending
Component: Dummy #033

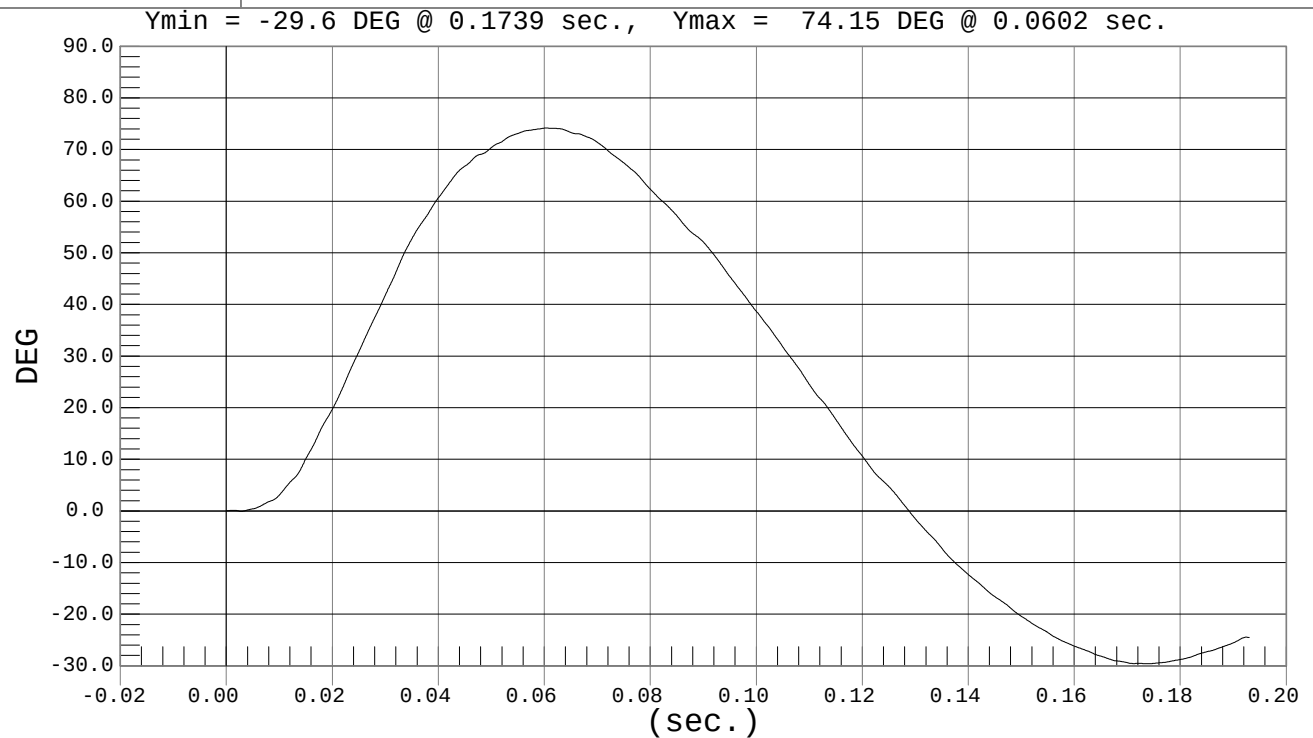
Test Date: 04-03-03
Speed: 18.3 fps, 5.58 M/s



FLEXION ANGLE

Test Desc.: Neck Bending
Component: Dummy #033

Test Date: 04-03-03
Speed: 18.3 fps, 5.58 M/s



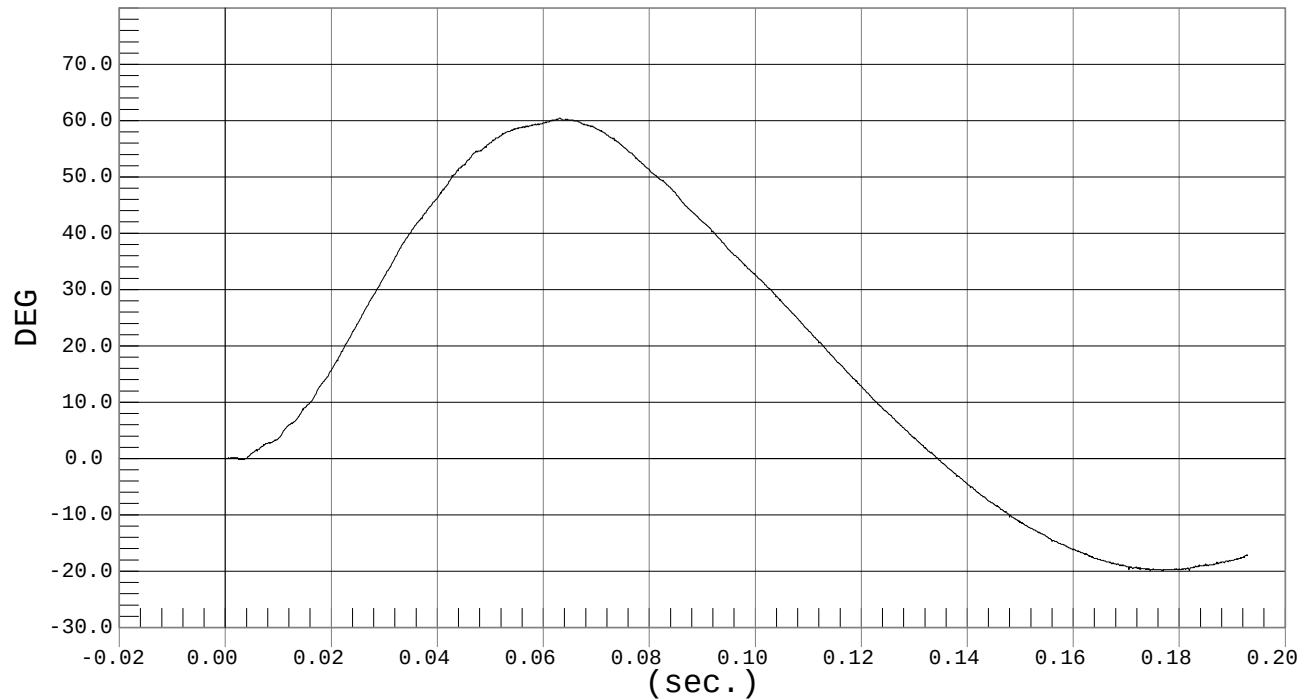


Test Desc.: Neck Bending

FRONT

Test Date: 04-03-03

Ymin = -19.88 DEG @ 0.1744 sec., Ymax = 60.42 DEG @ 0.0629 sec.

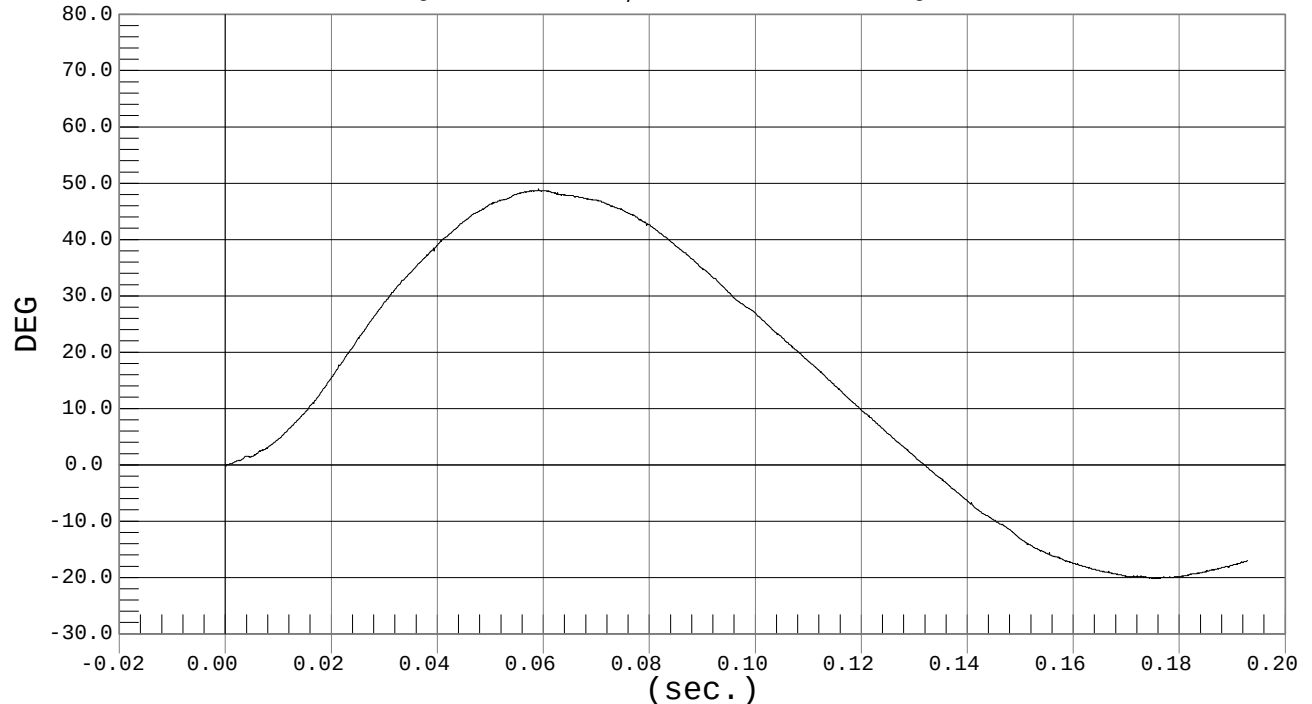


Test Desc.: Neck Bending
Component: Dummy #033

REAR

Test Date: 04-03-03
Speed: 18.3 fps, 5.58 M/s

Ymin = -20.2 DEG @ 0.1743 sec., Ymax = 49 DEG @ 0.0590 sec.



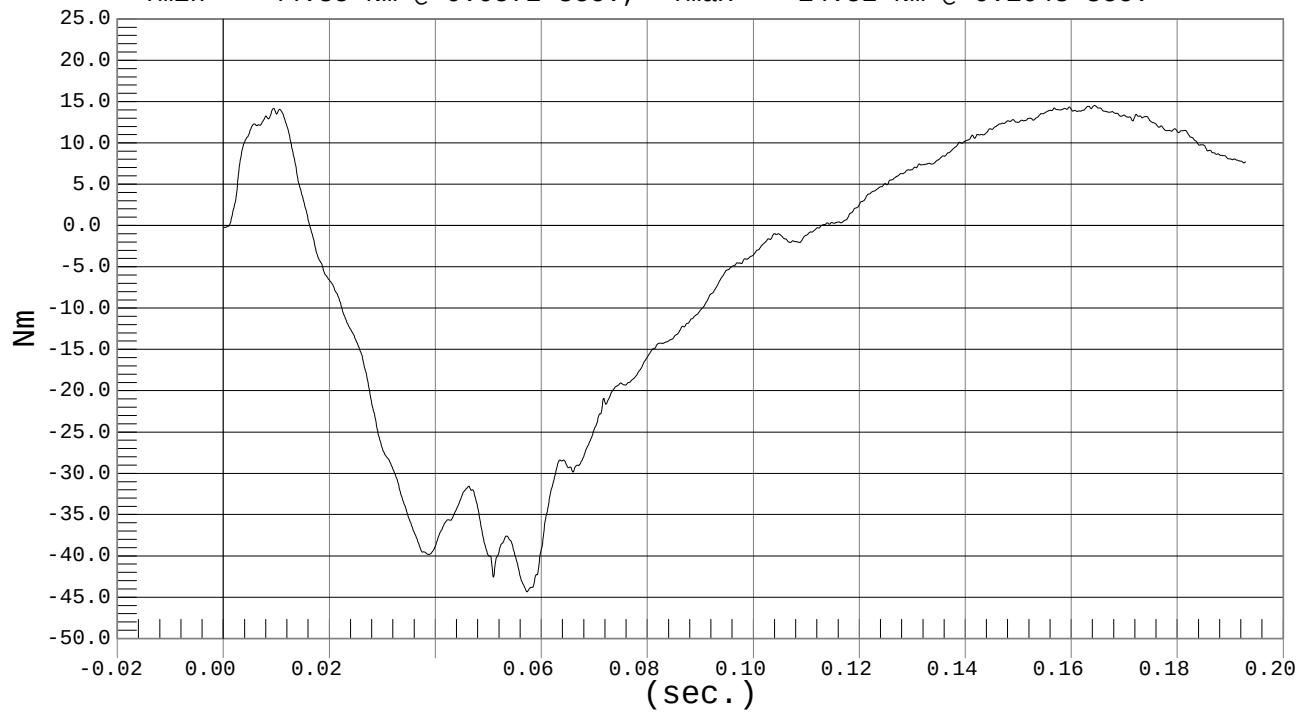


Test Desc.: Neck Bending
Component: Dummy #033

OCCIPITAL MOMENT

Test Date: 04-03-03
Speed: 18.3 fps, 5.58 M/s

Ymin = -44.35 Nm @ 0.0572 sec., Ymax = 14.52 Nm @ 0.1643 sec.



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID IIs DUMMY

Date: 4/2/03
Dummy Serial Number: 033
Test Number: D03583/D03593

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03583</u>	<u>D03593</u>
Temperature (°C)	20.8° – 22.2°	20.9	21.4
Humidity	10% - 70%	30	30
Impact Velocity	4.41 - 4.59 m/s	4.48	4.51
Probe Force	1.6 - 2.4 kN	2.3	2.3
Shoulder Displacement	27-39 mm	33	33

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

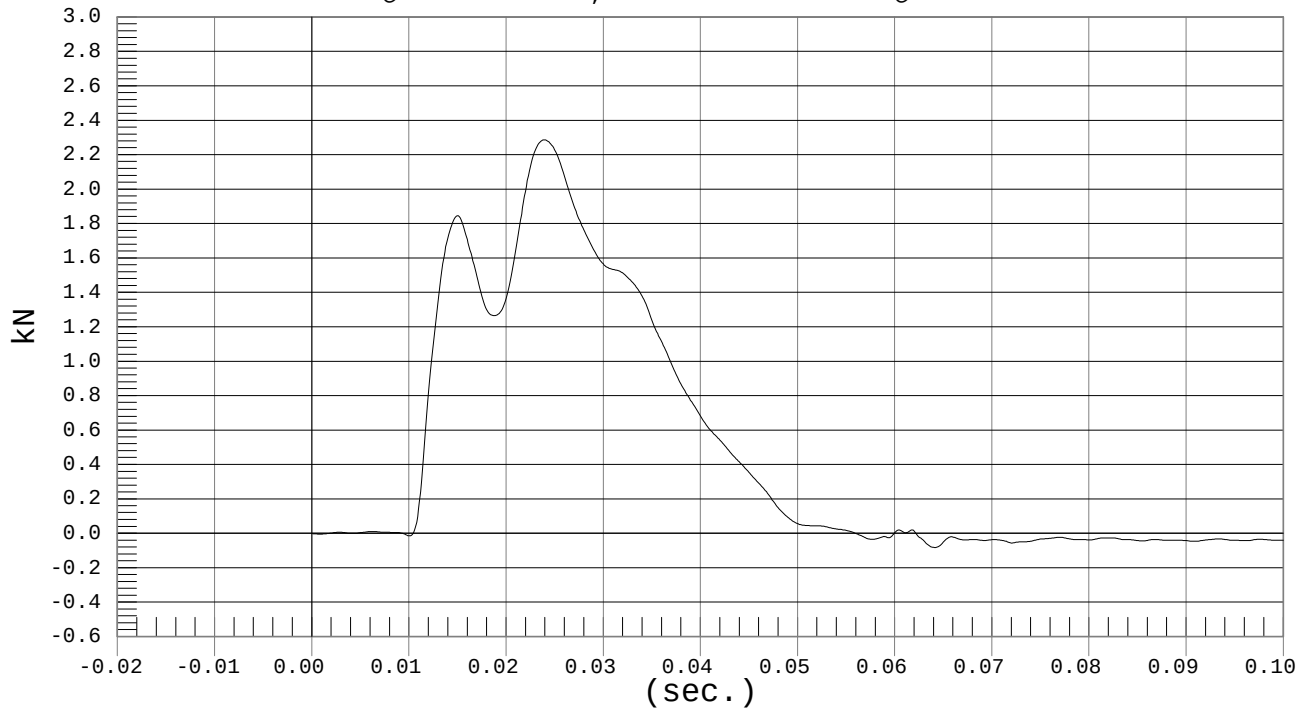


PROBE FORCE

Test Desc.: Shoulder Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.7 fps, 4.48 M/s

Ymin = -.08 kN @ 0.0640 sec., Ymax = 2.29 kN @ 0.0238 sec.

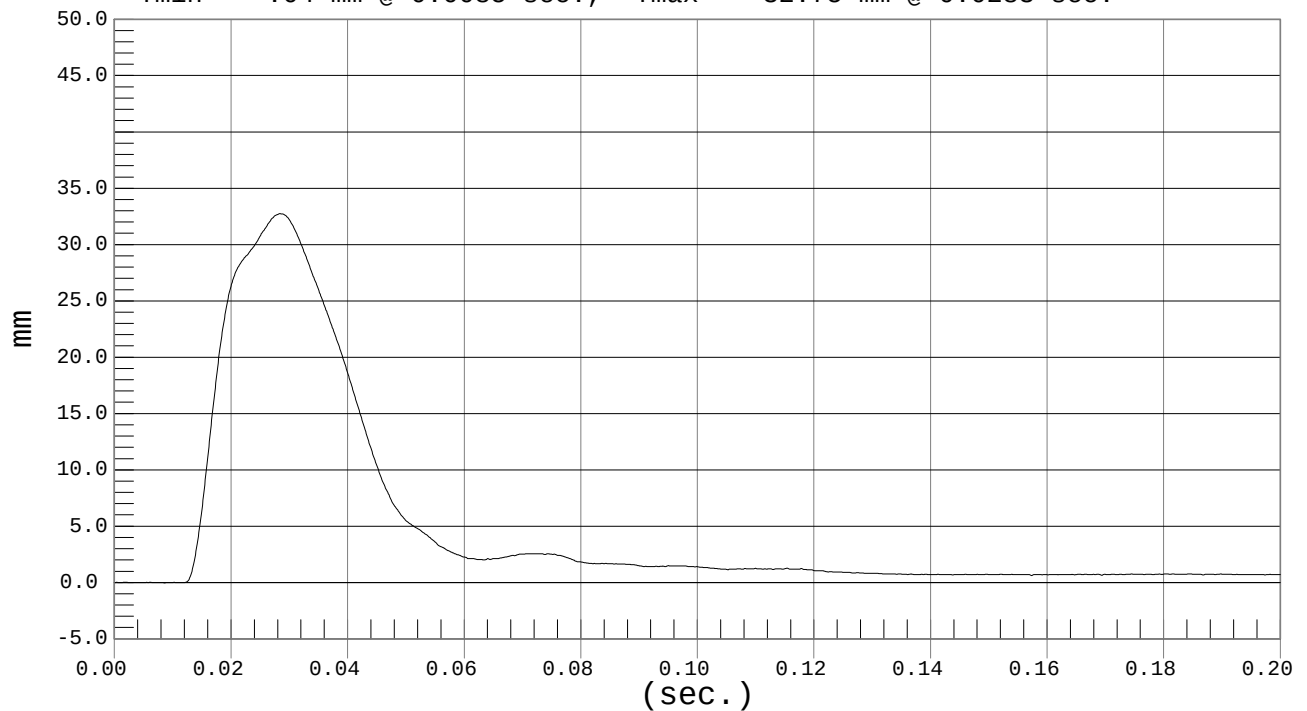


SHOULDER DISPLACEMENT

Test Desc.: Shoulder Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.7 fps, 4.48 M/s

Ymin = -.04 mm @ 0.0085 sec., Ymax = 32.75 mm @ 0.0283 sec.



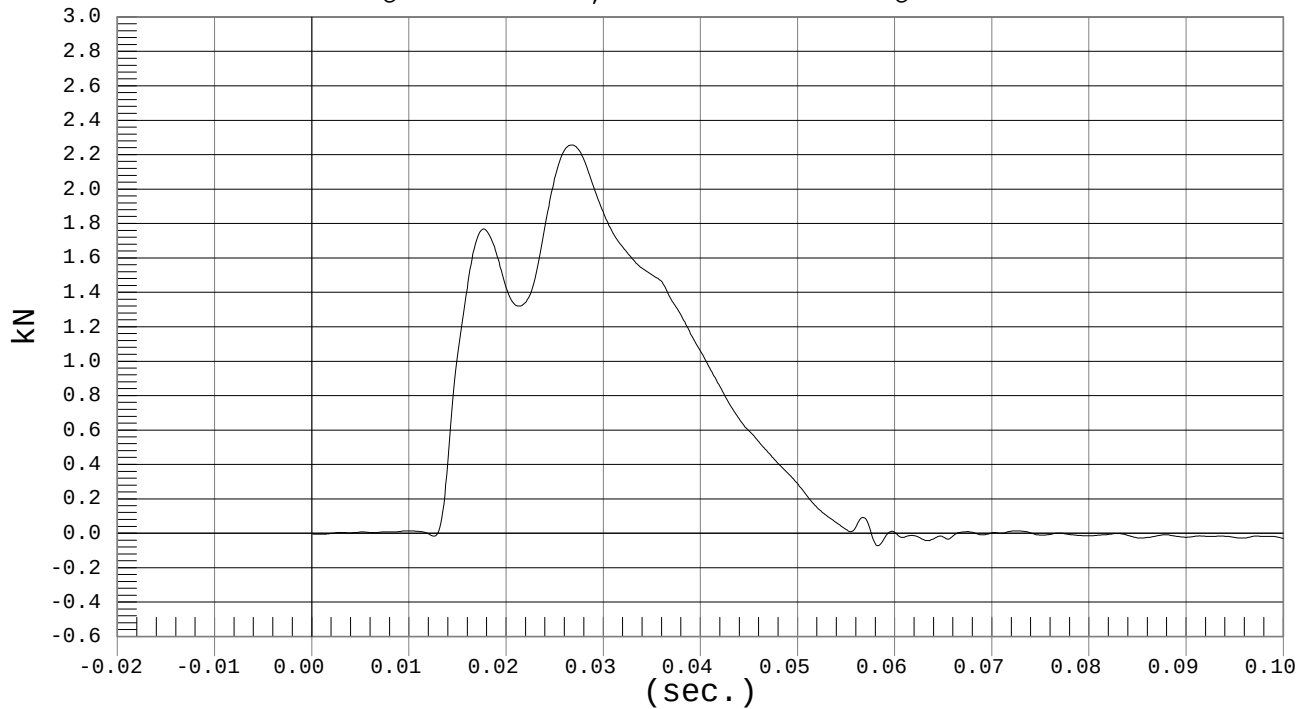


PROBE FORCE

Test Desc.: Shoulder Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.07 kN @ 0.0582 sec., Ymax = 2.26 kN @ 0.0267 sec.

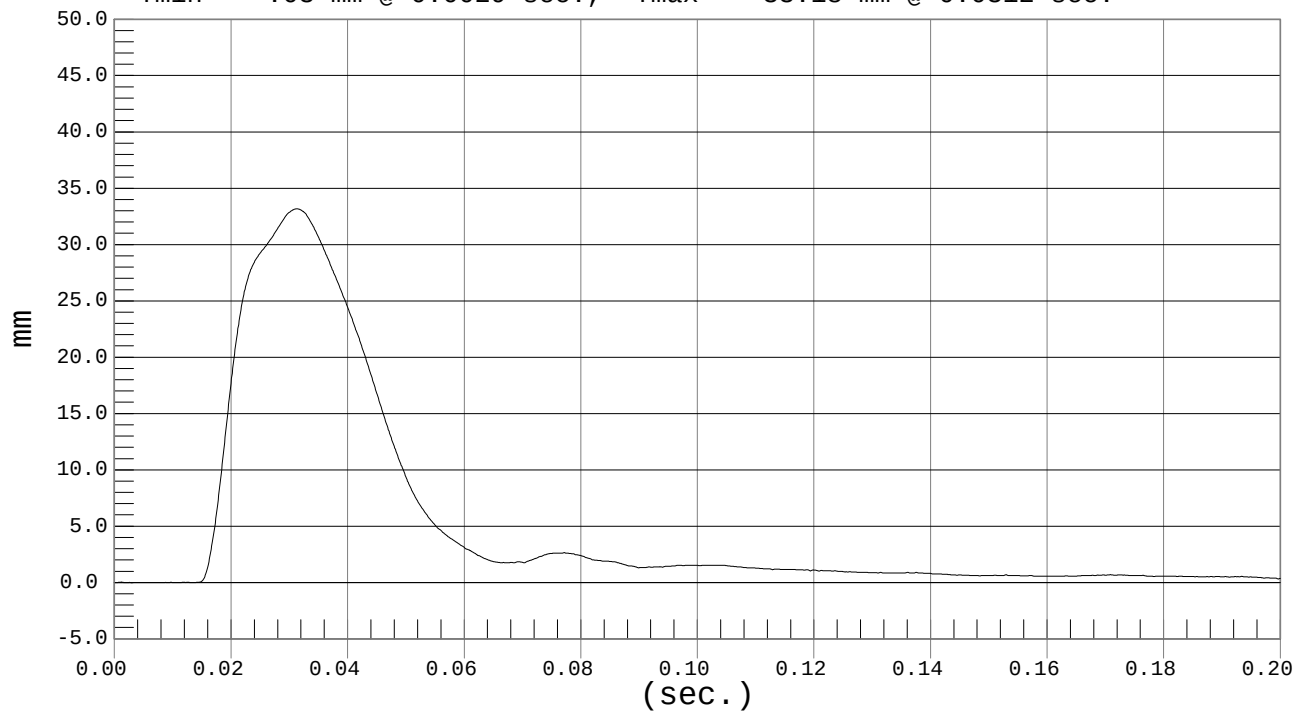


SHOULDER DISPLACEMENT

Test Desc.: Shoulder Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.03 mm @ 0.0029 sec., Ymax = 33.18 mm @ 0.0312 sec.



MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TESTS
SID IIs DUMMY

Date: 4/2/03
Dummy Serial Number: 033
Test Number: D03584/D03594

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03584</u>	<u>D03594</u>
Temperature (°C)	20.8° – 22.2°	21.0	21.4
Humidity	10% - 70%	30	30
Impact Velocity	6.57 - 6.84 m/s	6.77	6.74
Probe Force	4.1 – 4.7 kN	4.7	4.6
Upper Spine Acceleration	34 – 48 g's	44	41
Lower Spine Acceleration	31 - 36 g's	36	34
Upper Rib Displacement	23 - 35 mm	30	30
Middle Rib Displacement	29 - 44 mm	34	34
Lower Rib Displacement	33 - 40 mm	37	37
Shoulder Displacement	30 - 42 mm	*21	36

*TEST DOES NOT MEET SPECIFICATIONS

Technician: _____

Approved By: _____

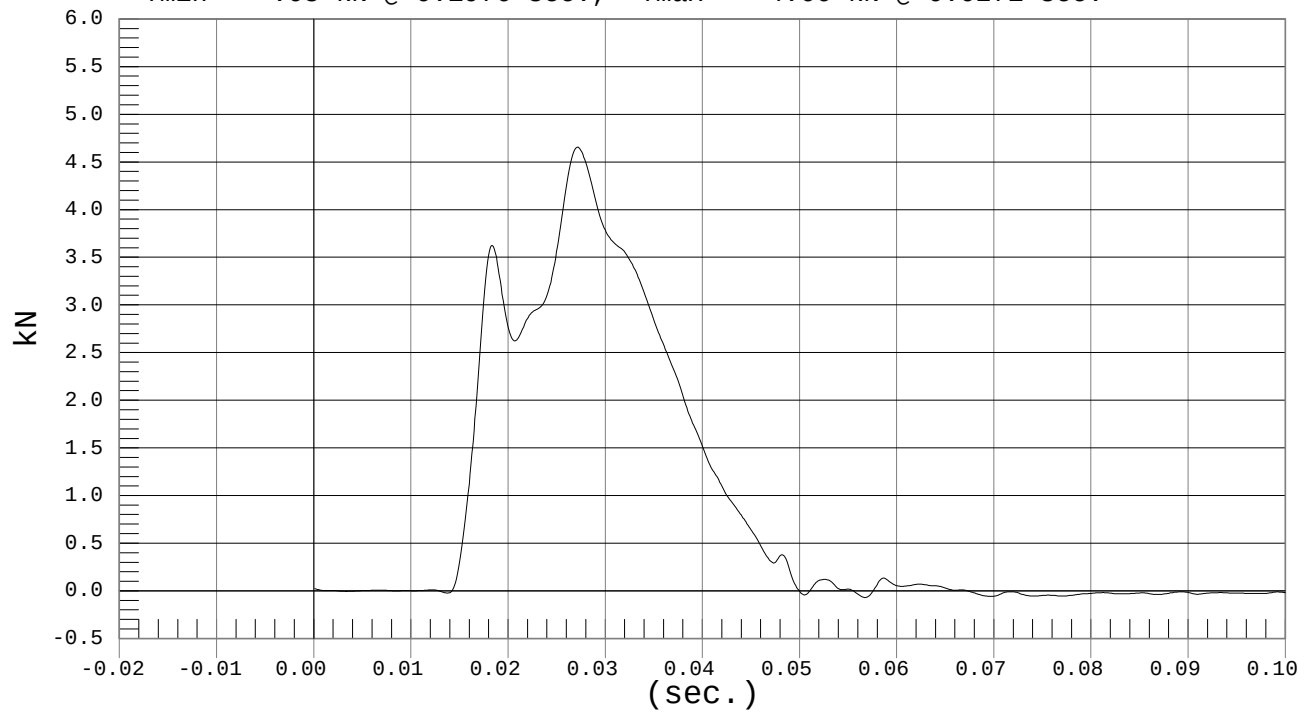


PROBE FORCE

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.08 kN @ 0.1976 sec., Ymax = 4.66 kN @ 0.0271 sec.



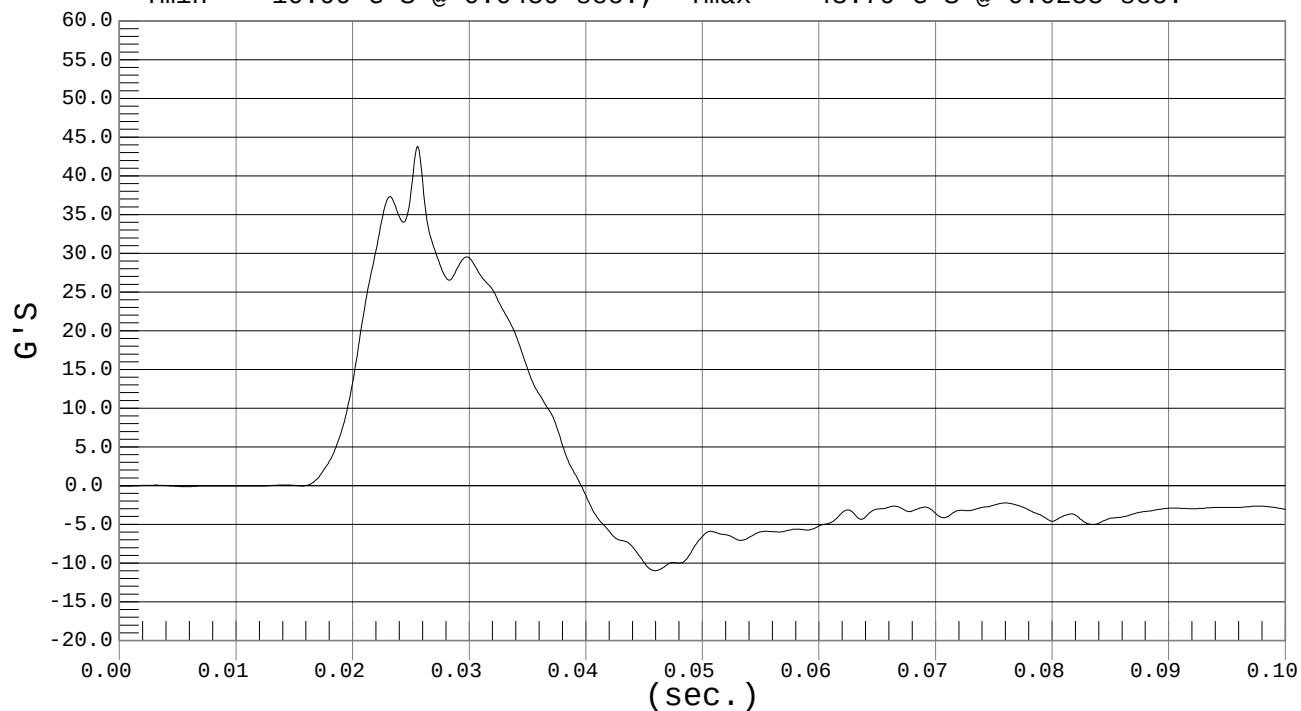


UPPER SPINE ACCELERATION

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -10.99 G'S @ 0.0459 sec., Ymax = 43.79 G'S @ 0.0255 sec.

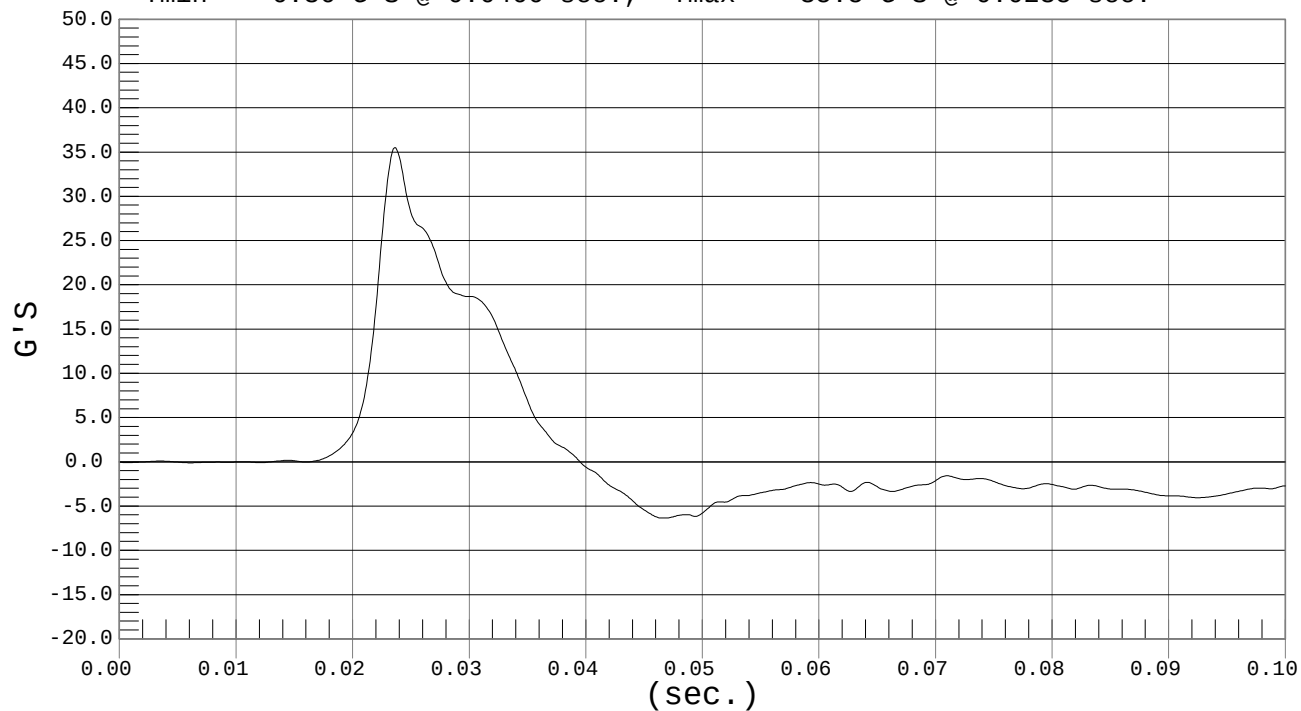


LOWER SPINE ACCELERATION

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -6.36 G'S @ 0.0466 sec., Ymax = 35.5 G'S @ 0.0235 sec.



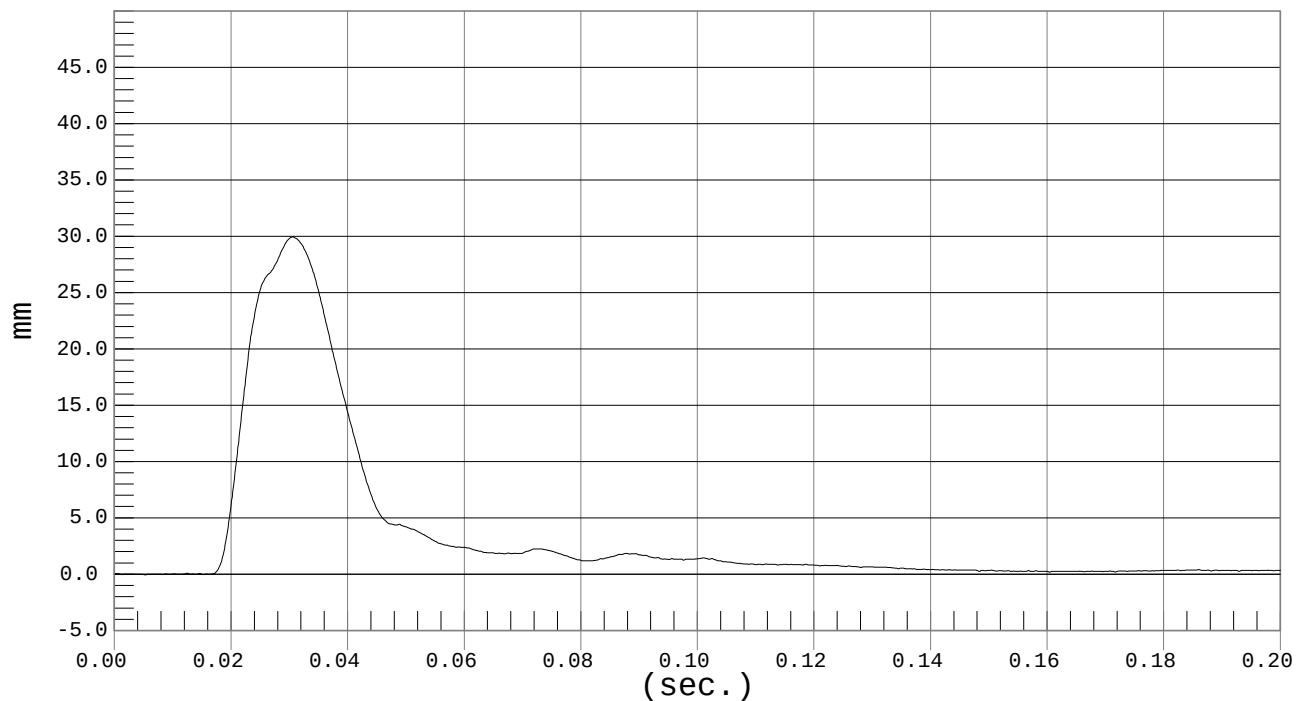


UPPER RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.07 mm @ 0.0052 sec., Ymax = 29.93 mm @ 0.0305 sec.

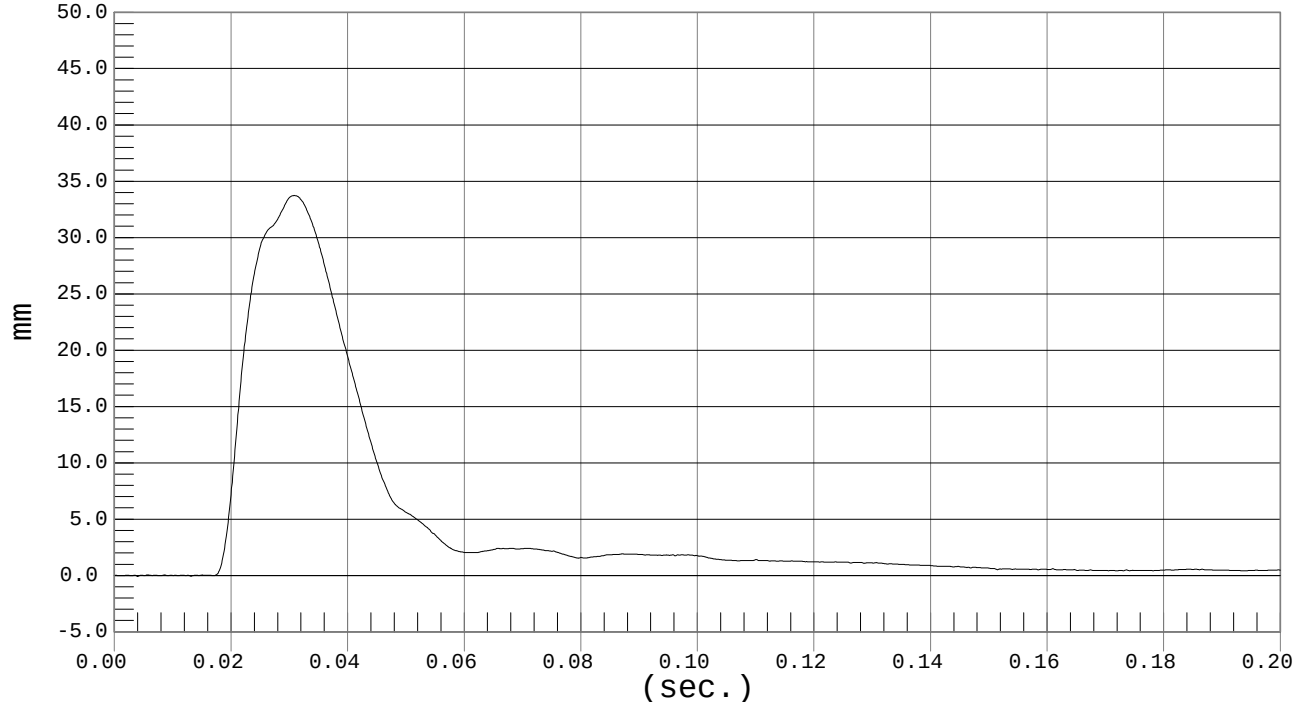


MIDDLE RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.08 mm @ 0.0039 sec., Ymax = 33.74 mm @ 0.0308 sec.



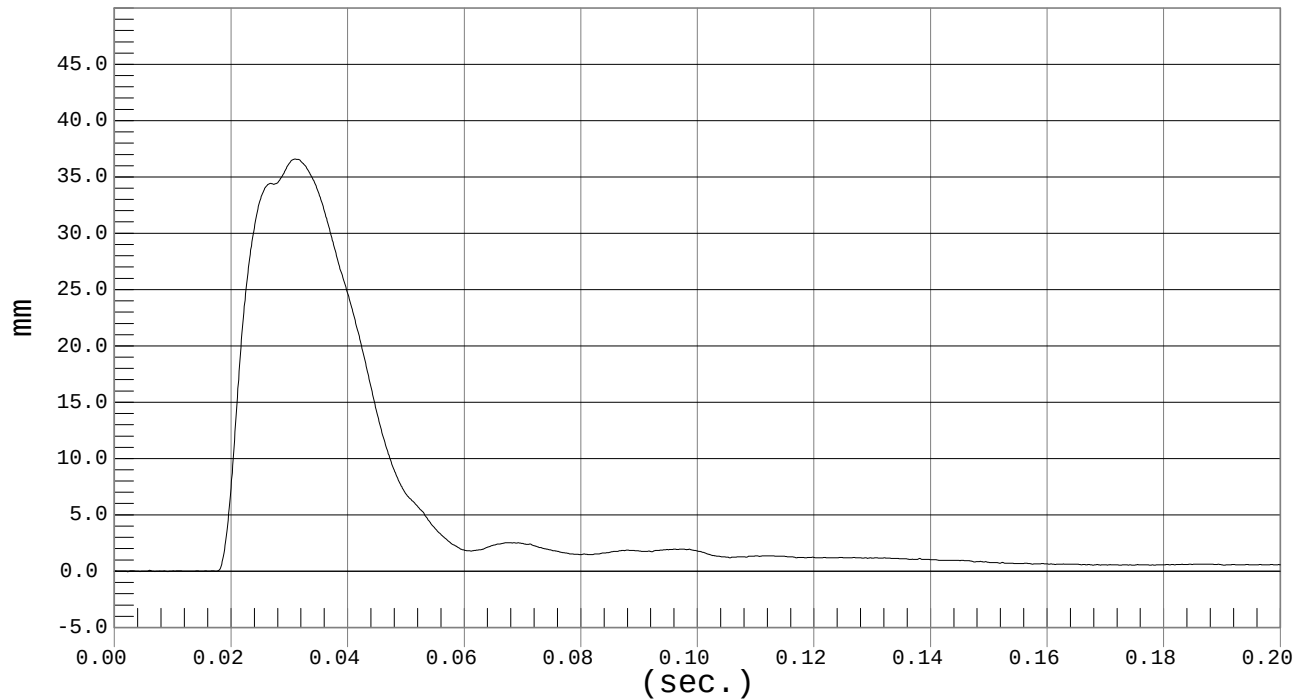


LOWER RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.06 mm @ 0.0022 sec., Ymax = 36.58 mm @ 0.0309 sec.

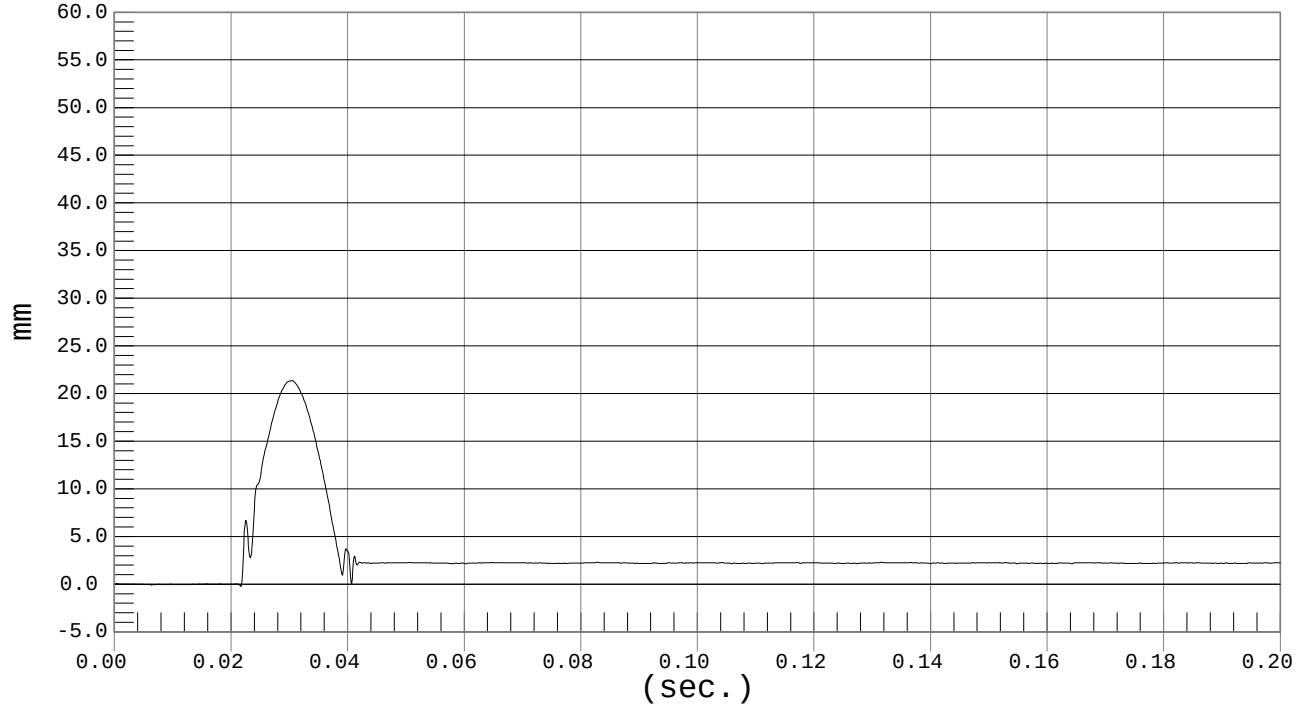


SHOULDER DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.77 M/s

Ymin = -.23 mm @ 0.0216 sec., Ymax = 21.35 mm @ 0.0304 sec.



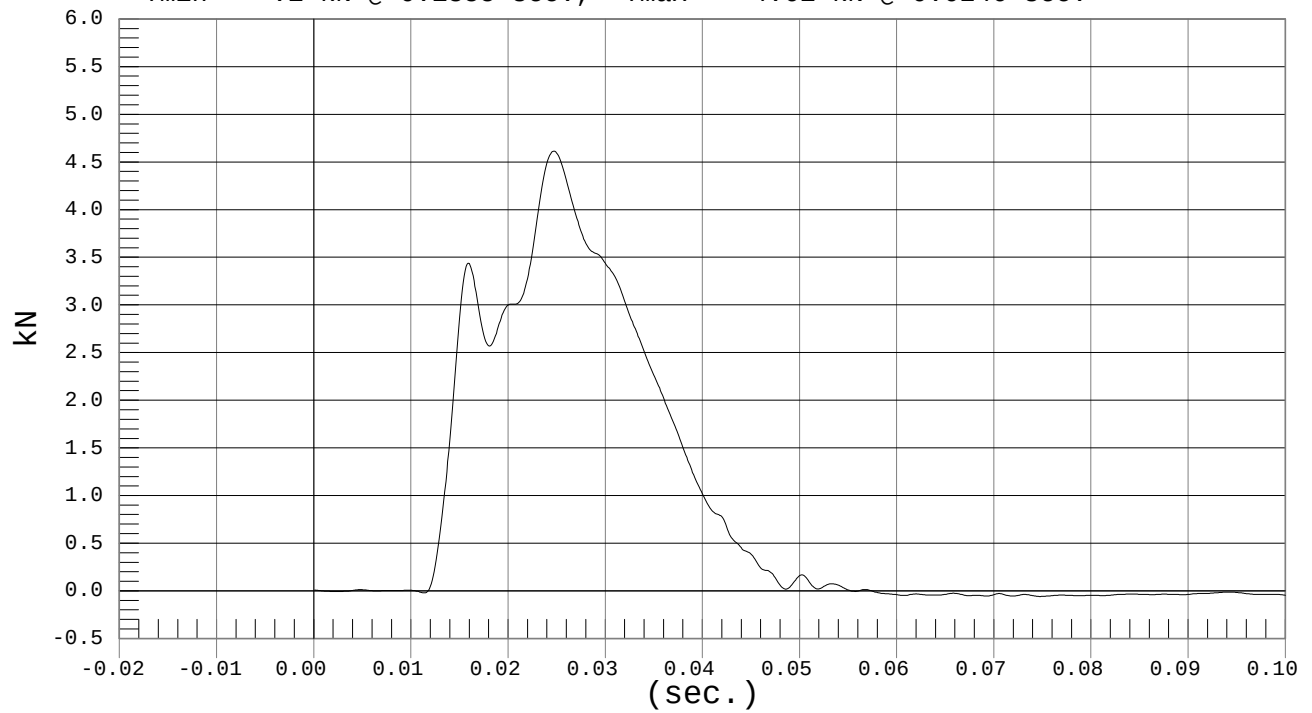


PROBE FORCE

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.74 M/s

Ymin = -.1 kN @ 0.1855 sec., Ymax = 4.61 kN @ 0.0246 sec.



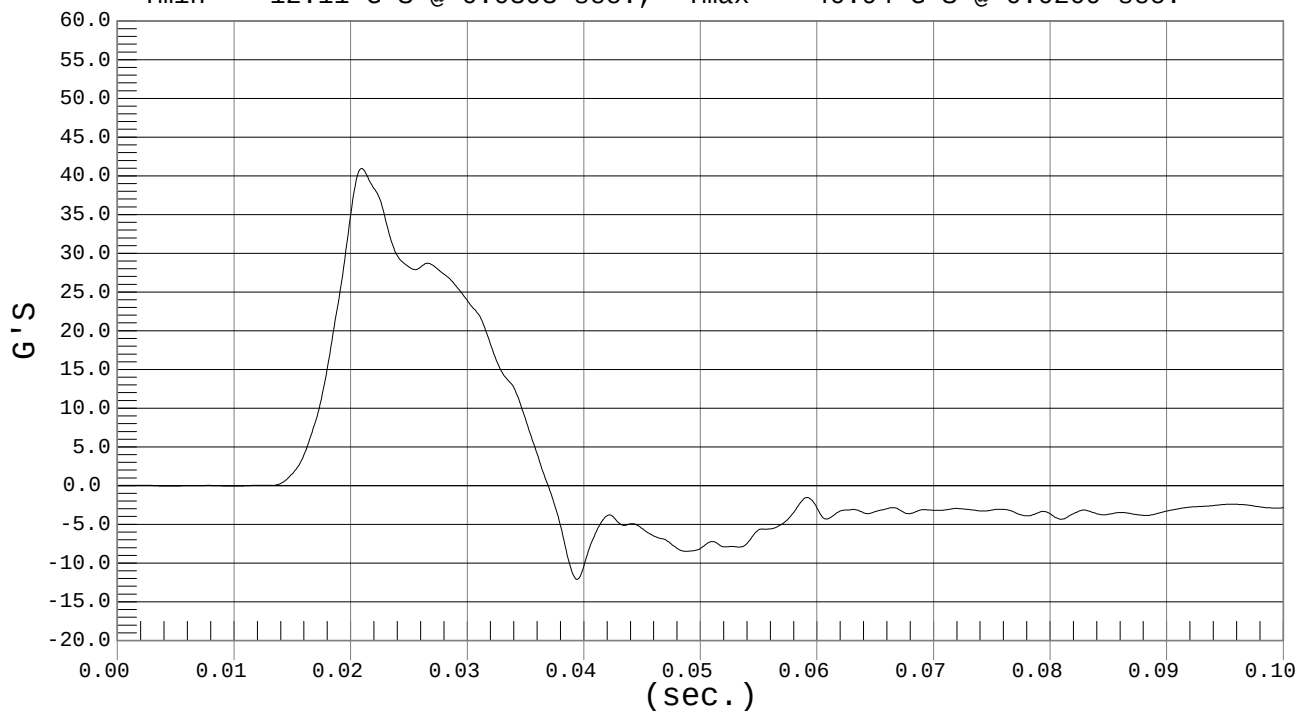


UPPER SPINE ACCELERATION

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.74 M/s

Ymin = -12.11 G'S @ 0.0393 sec., Ymax = 40.94 G'S @ 0.0209 sec.

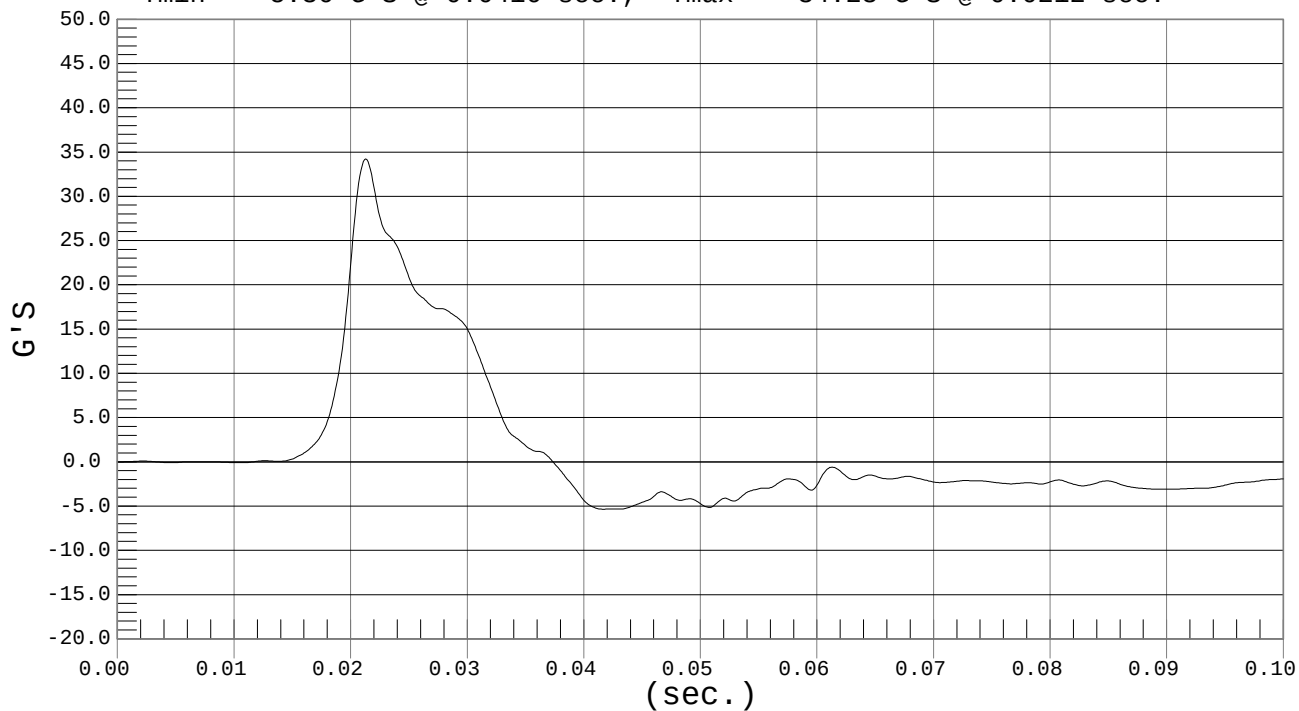


LOWER SPINE ACCELERATION

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.74 M/s

Ymin = -5.36 G'S @ 0.0416 sec., Ymax = 34.23 G'S @ 0.0212 sec.



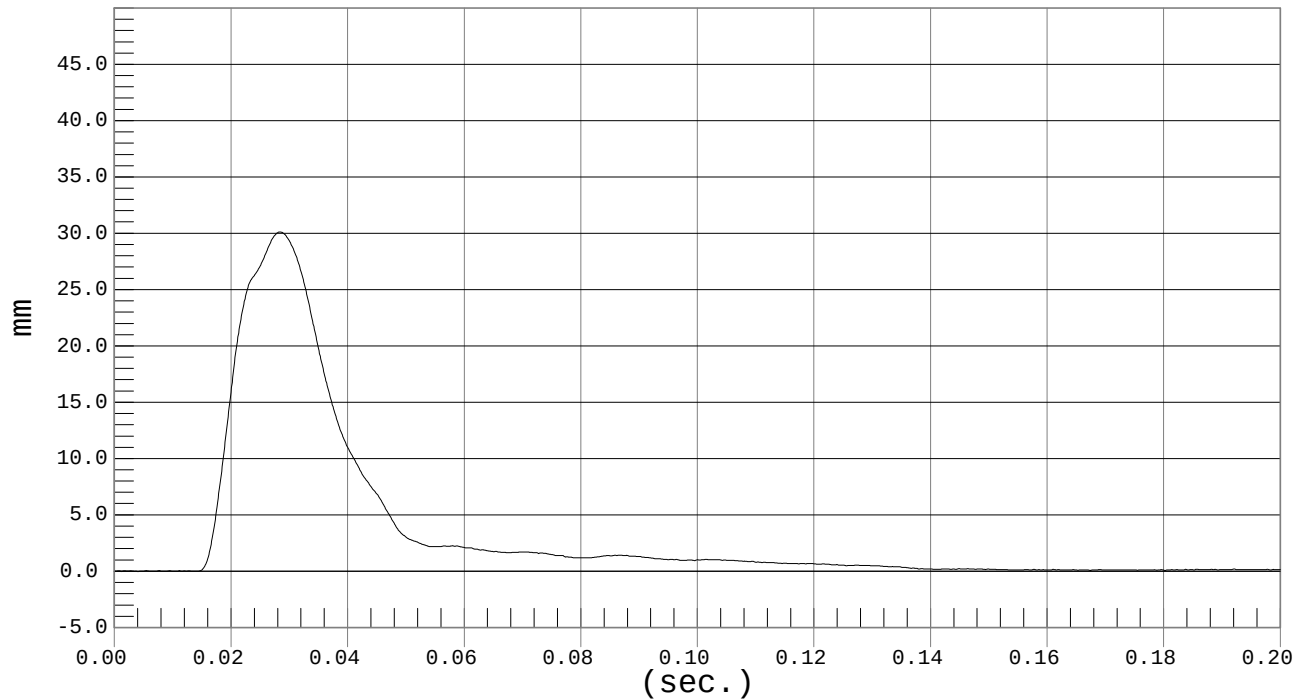


UPPER RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.74 M/s

Ymin = -.02 mm @ 0.0040 sec., Ymax = 30.12 mm @ 0.0284 sec.

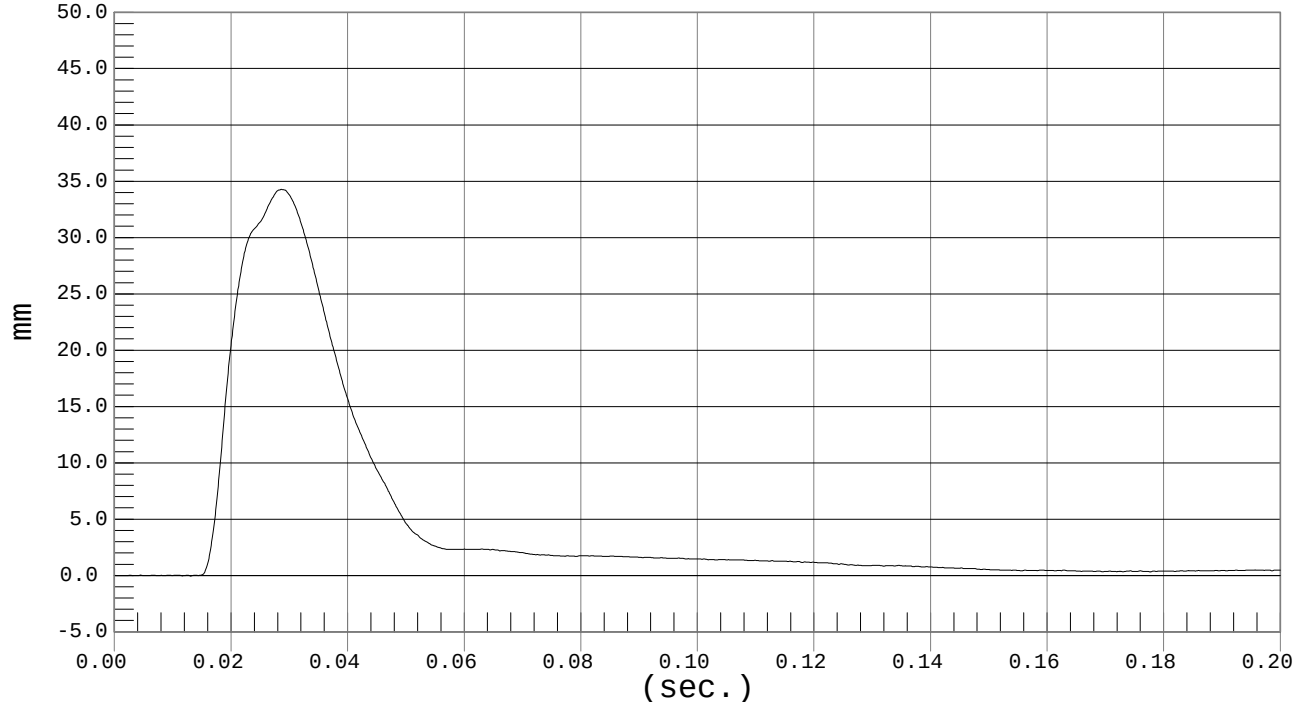


MIDDLE RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.74 M/s

Ymin = -.05 mm @ 0.0130 sec., Ymax = 34.27 mm @ 0.0286 sec.



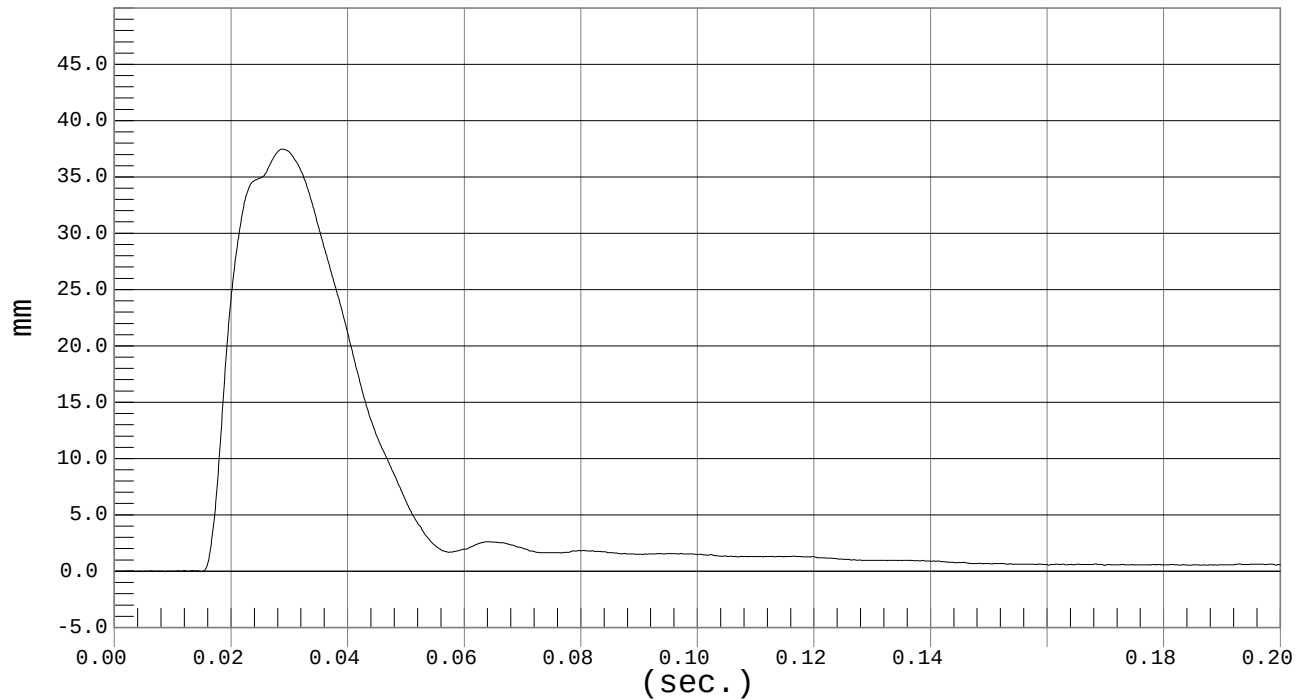


LOWER RIB DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.74 M/s

Ymin = -.04 mm @ 0.0147 sec., Ymax = 37.48 mm @ 0.0287 sec.

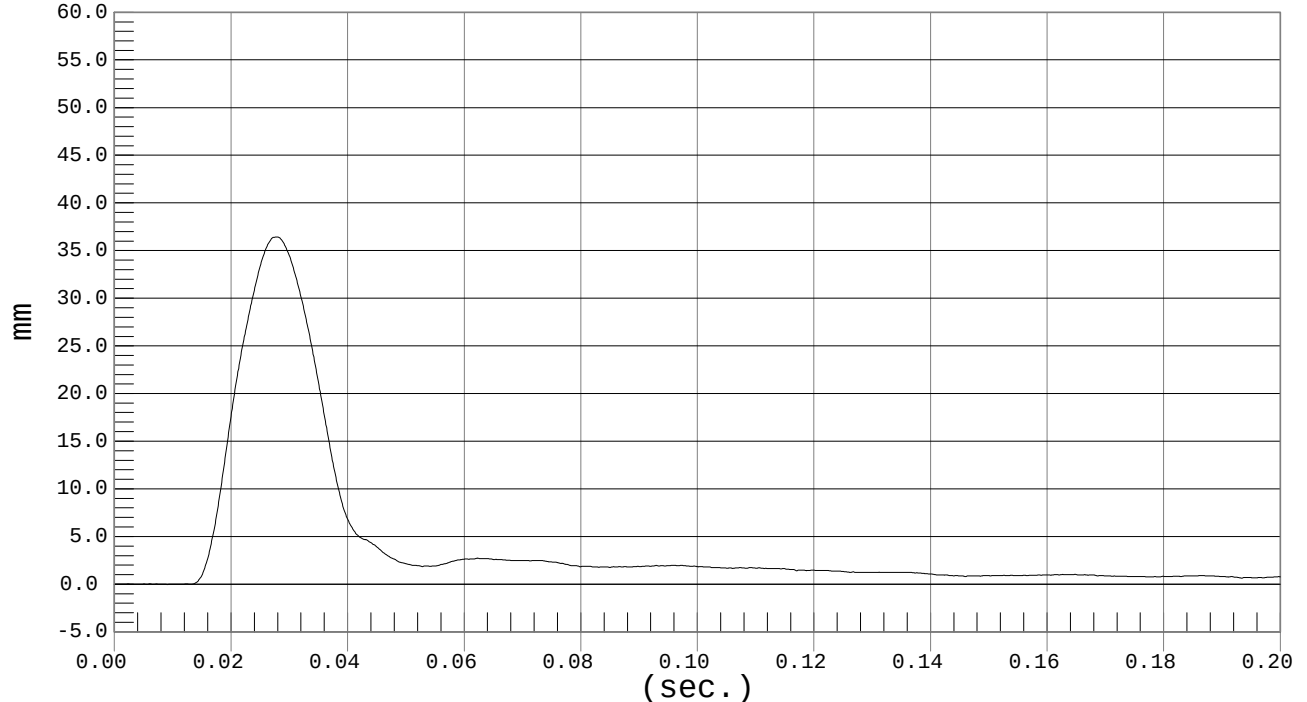


SHOULDER DISPLACEMENT

Test Desc.: Thorax With Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.74 M/s

Ymin = -.03 mm @ 0.0090 sec., Ymax = 36.44 mm @ 0.0278 sec.



MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TESTS
SID IIs DUMMY

Date: 4/3/03
Dummy Serial Number: 033
Test Number: D03585/D03595

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03585</u>	<u>D03595</u>
Temperature (°C)	20.8° – 22.2°	21.0	21.0
Humidity	10% - 70%	30	29
Impact Velocity	4.2 - 4.4m/s	4.3	4.2
Probe Force	1.8 - 2.3 kN	2.1	2.1
Upper Spine Acceleration	13 - 18 g's	14	14
Lower Spine Acceleration	8 - 13 g's	9	10
Upper Rib Displacement	32 - 41 mm	41	37
Middle Rib Displacement	40 - 51 mm	44	43
Lower Rib Displacement	34 - 47 mm	38	42

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

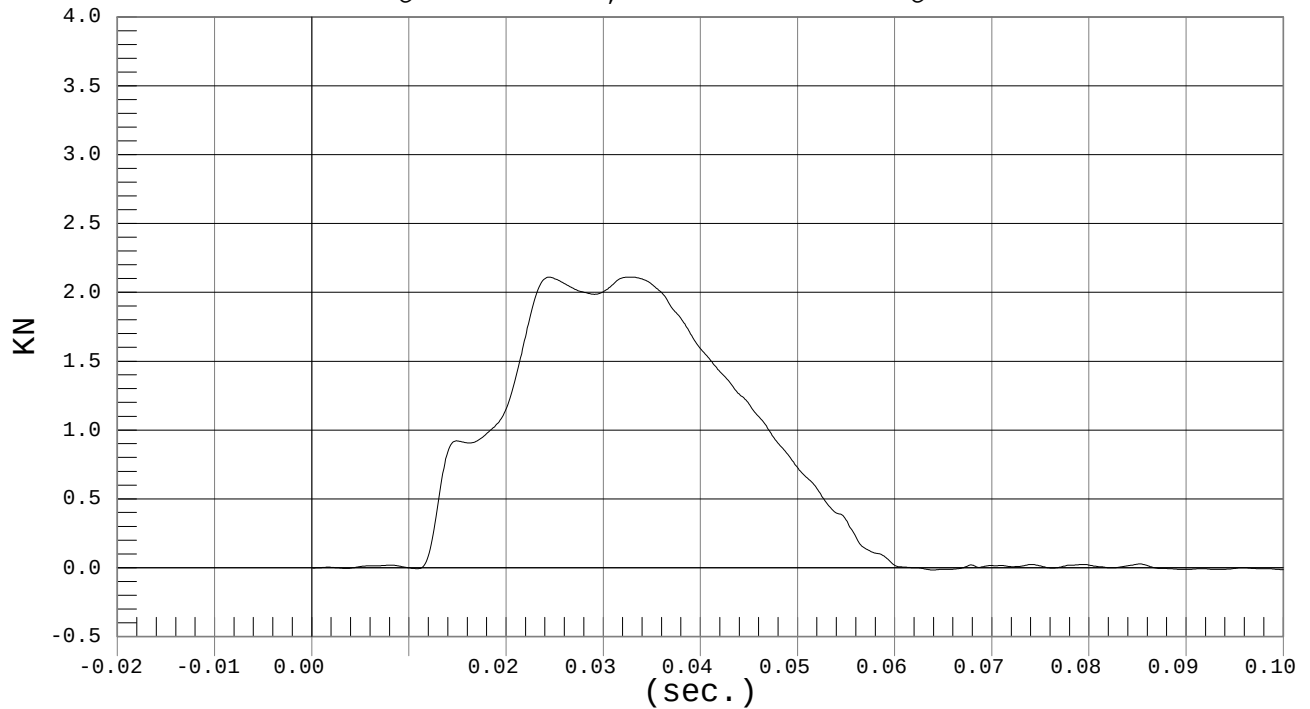


PROBE FORCE

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.0 fps, 4.28 M/s

Ymin = -.06 LBF @ 0.1941 sec., Ymax = 2.11 KN @ 0.0243 sec.

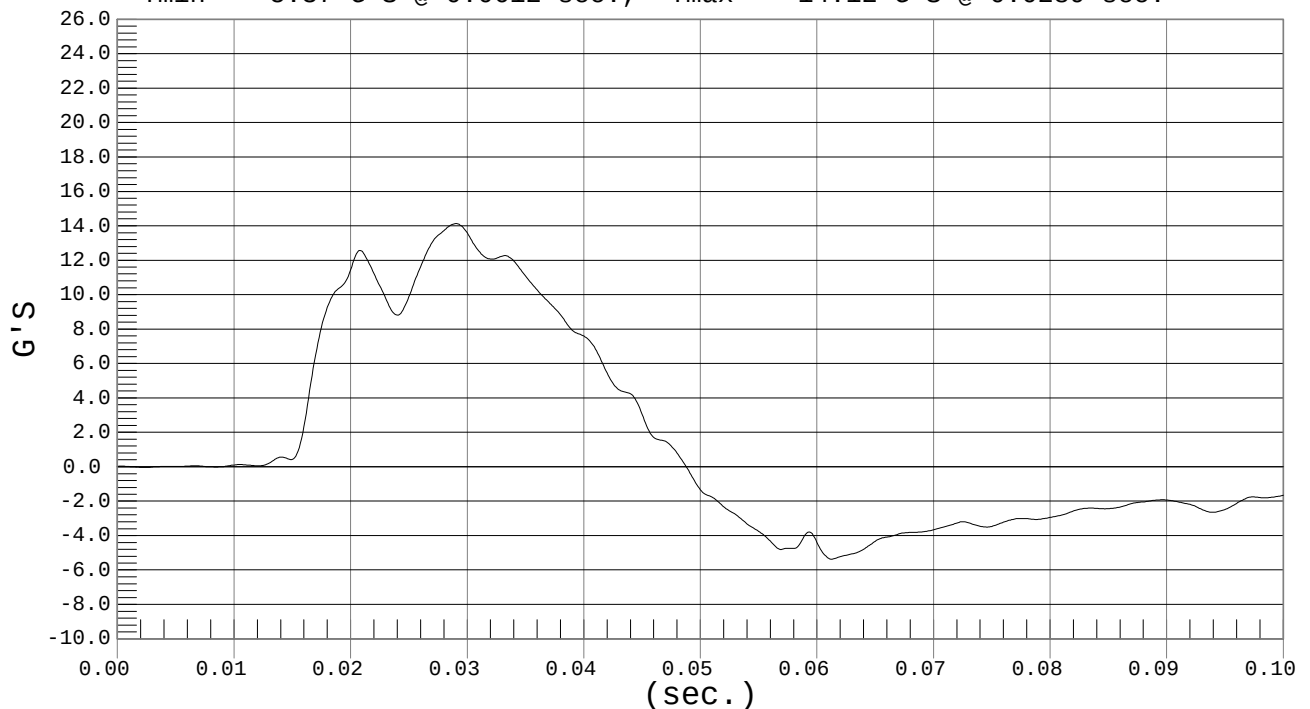


UPPER SPINE ACCELERATION

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.0 fps, 4.28 M/s

Ymin = -5.37 G'S @ 0.0612 sec., Ymax = 14.12 G'S @ 0.0289 sec.



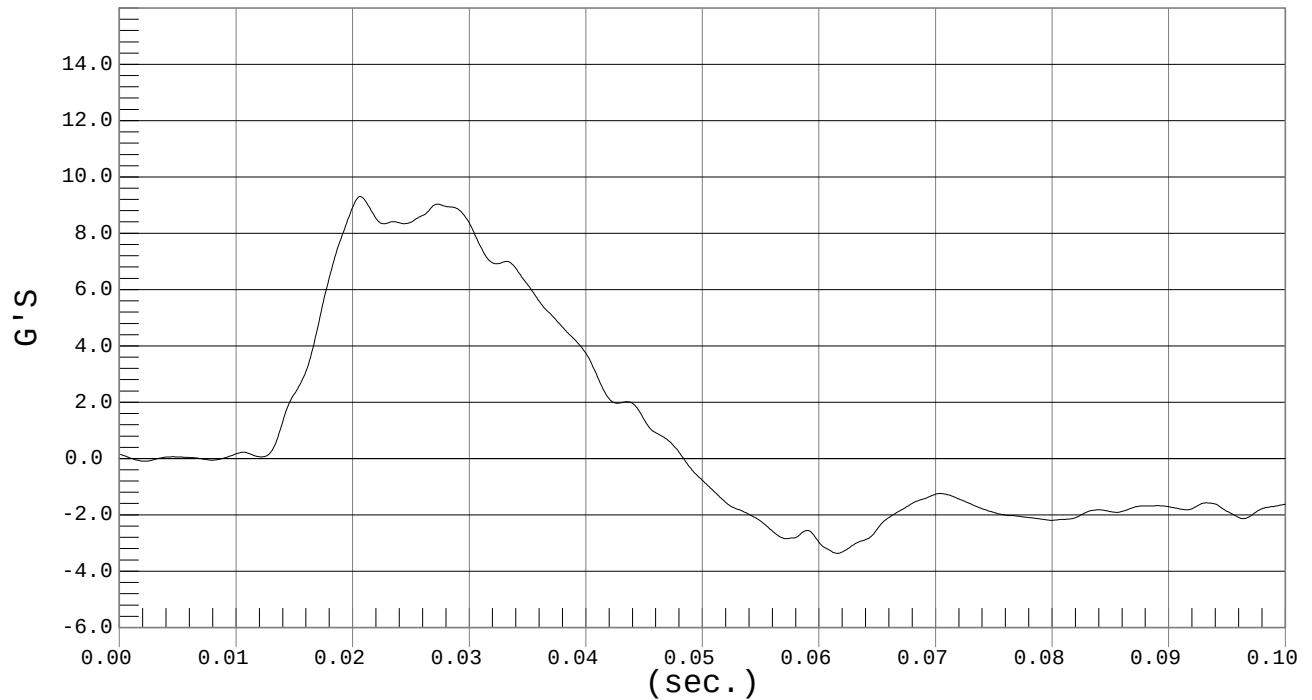


LOWER SPINE ACCELERATION

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.0 fps, 4.28 M/s

Ymin = -3.37 G'S @ 0.0615 sec., Ymax = 9.3 G'S @ 0.0205 sec.

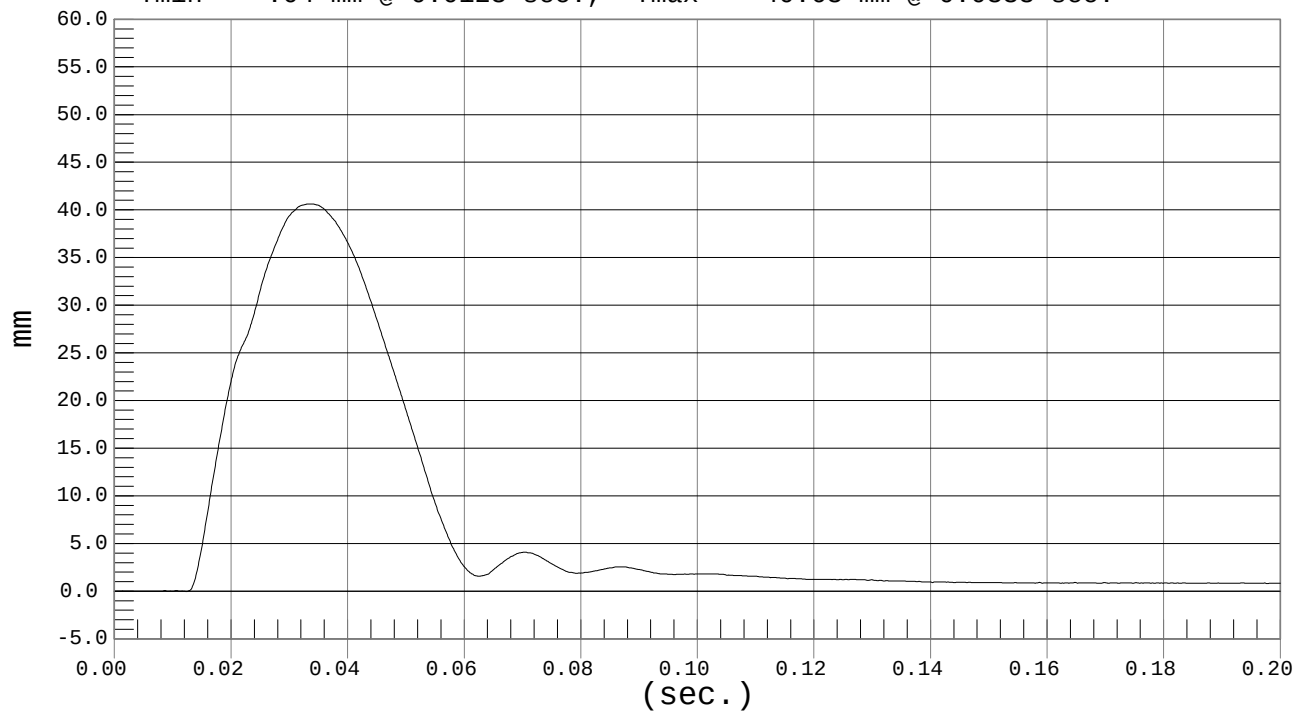


UPPER RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.0 fps, 4.28 M/s

Ymin = -.04 mm @ 0.0123 sec., Ymax = 40.63 mm @ 0.0333 sec.



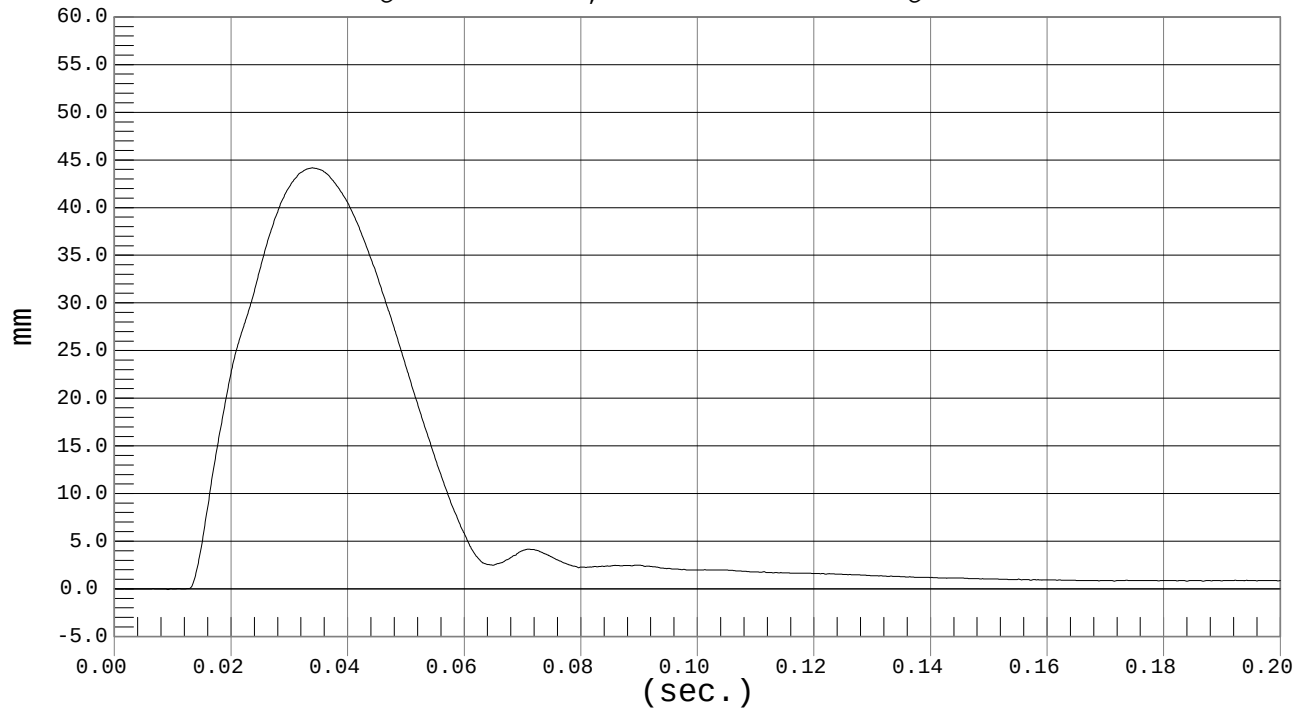


MIDDLE RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.0 fps, 4.28 M/s

Ymin = -.07 mm @ 0.0091 sec., Ymax = 44.17 mm @ 0.0339 sec.

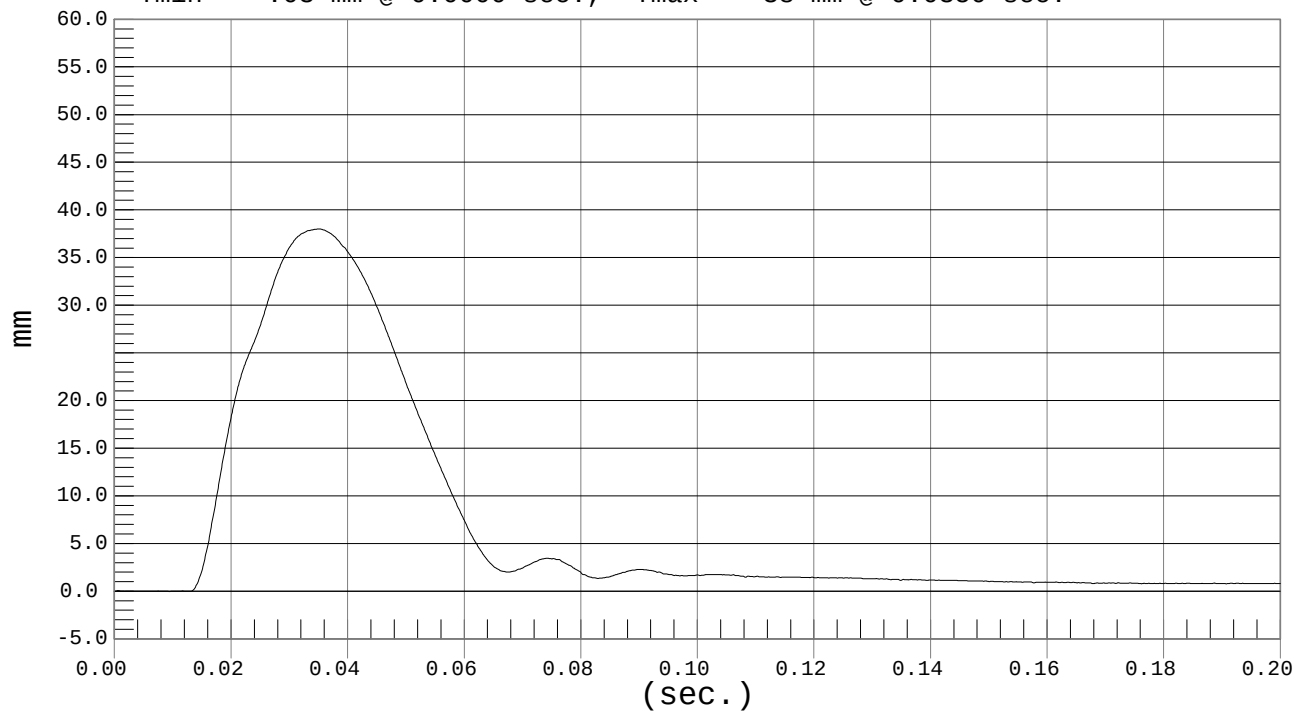


LOWER RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.0 fps, 4.28 M/s

Ymin = -.03 mm @ 0.0000 sec., Ymax = 38 mm @ 0.0350 sec.



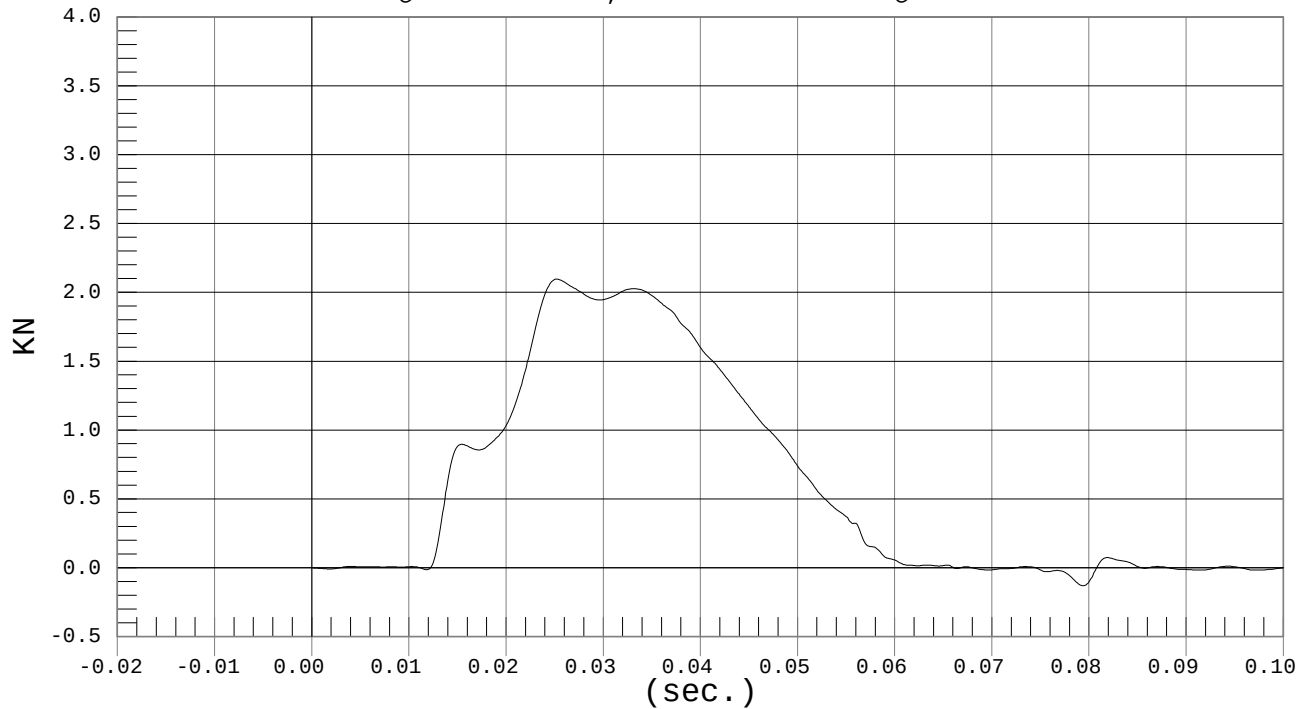


PROBE FORCE

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 138.8 fps, 42.31 M/s

Ymin = -.13 LBF @ 0.0793 sec., Ymax = 2.1 KN @ 0.0251 sec.

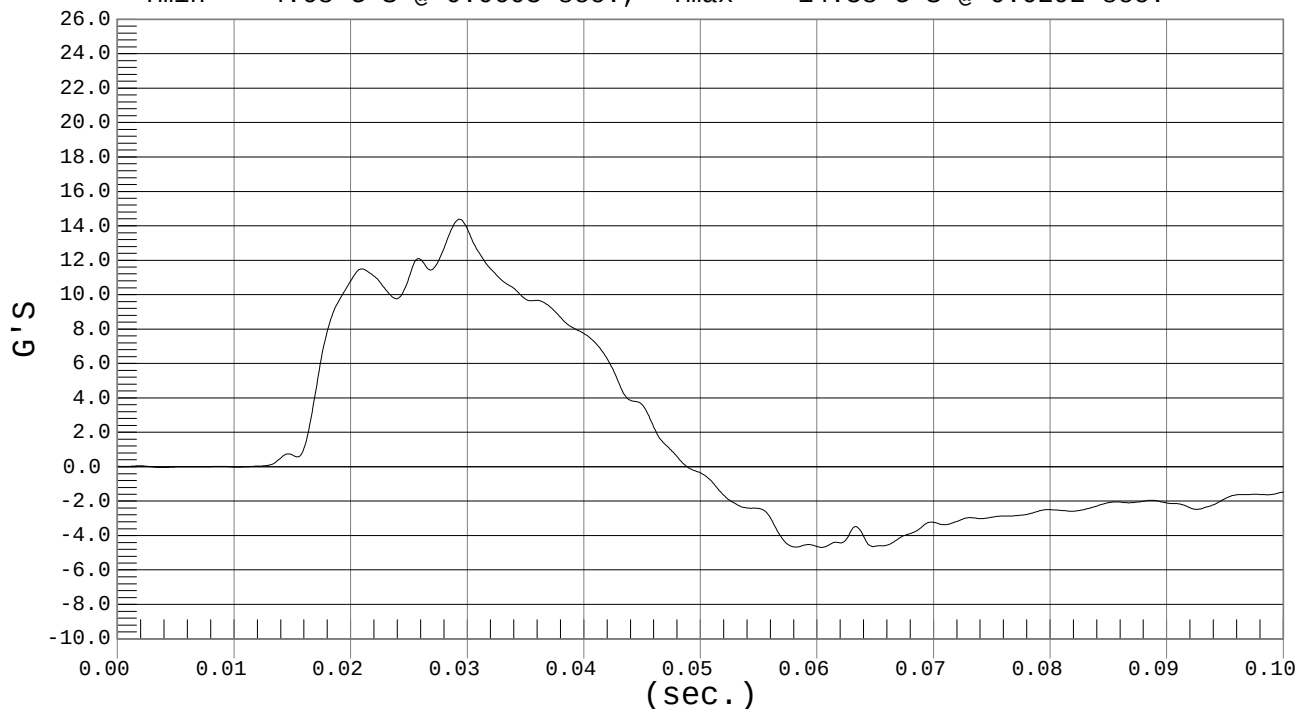


UPPER SPINE ACCELERATION

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 138.8 fps, 42.31 M/s

Ymin = -4.68 G'S @ 0.0603 sec., Ymax = 14.38 G'S @ 0.0292 sec.



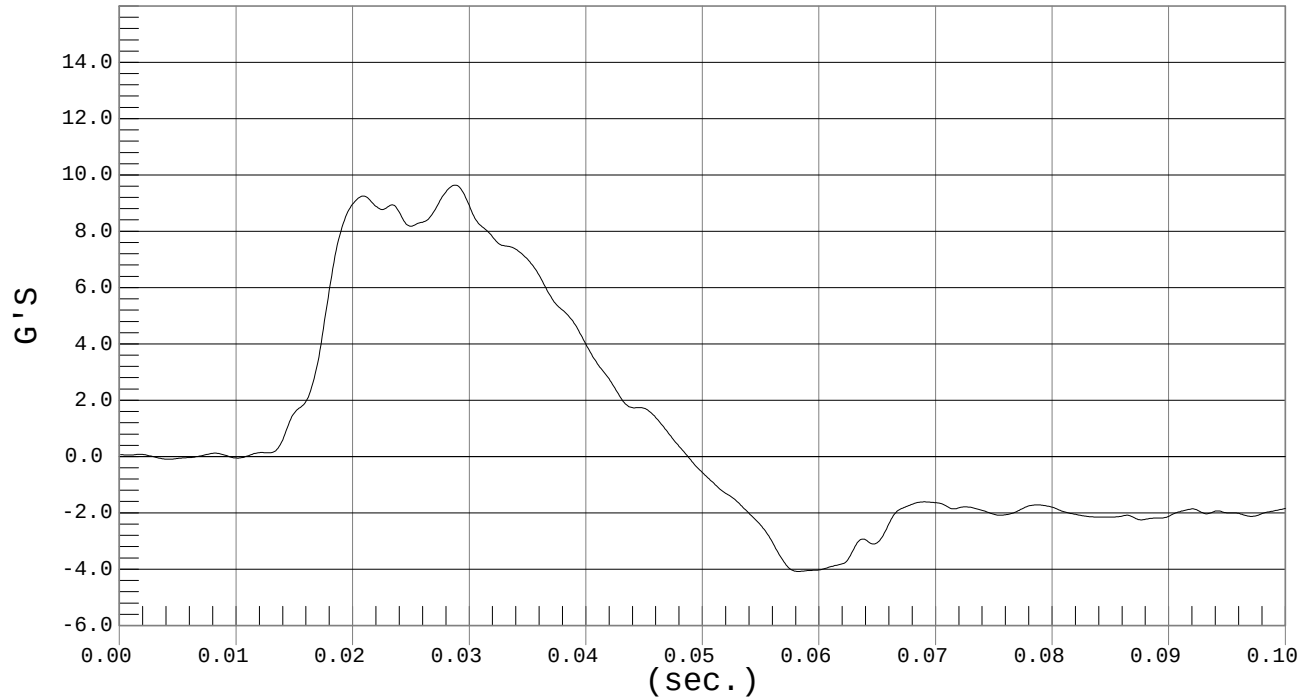


LOWER SPINE ACCELERATION

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 138.8 fps, 42.31 M/s

Ymin = -4.08 G'S @ 0.0581 sec., Ymax = 9.64 G'S @ 0.0287 sec.

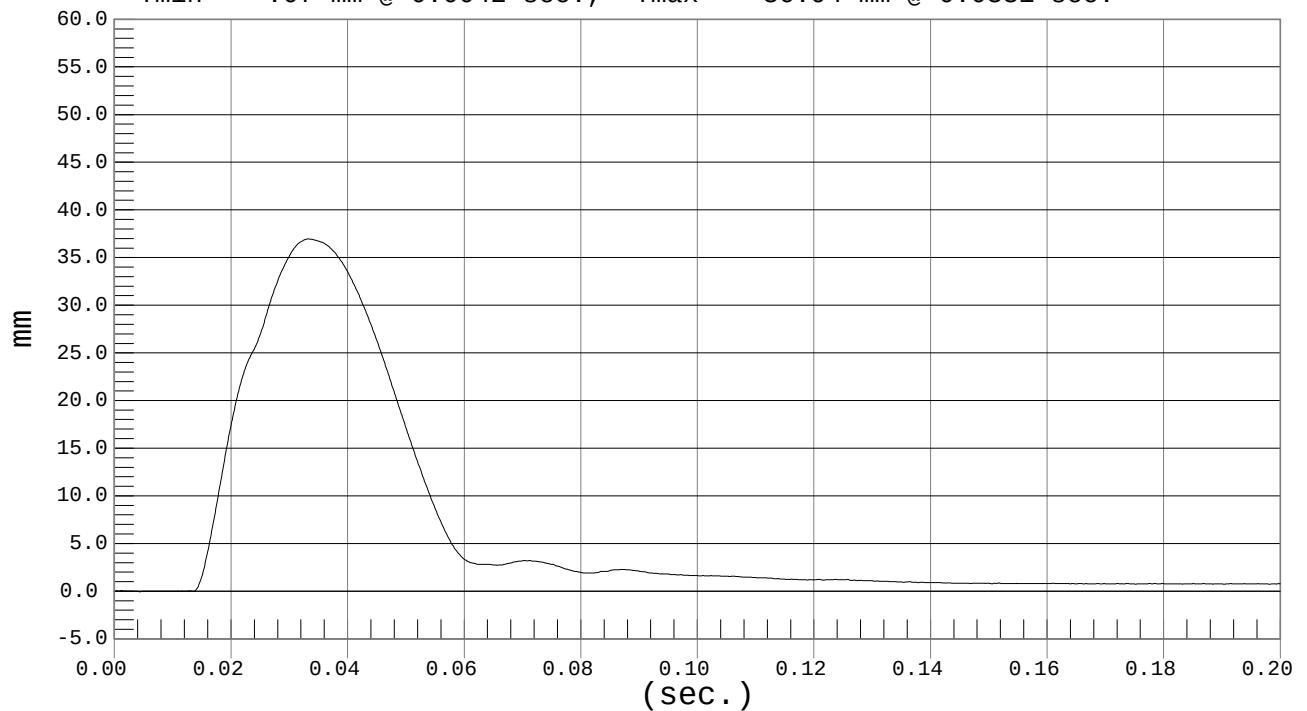


UPPER RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 138.8 fps, 42.31 M/s

Ymin = -.07 mm @ 0.0042 sec., Ymax = 36.94 mm @ 0.0331 sec.



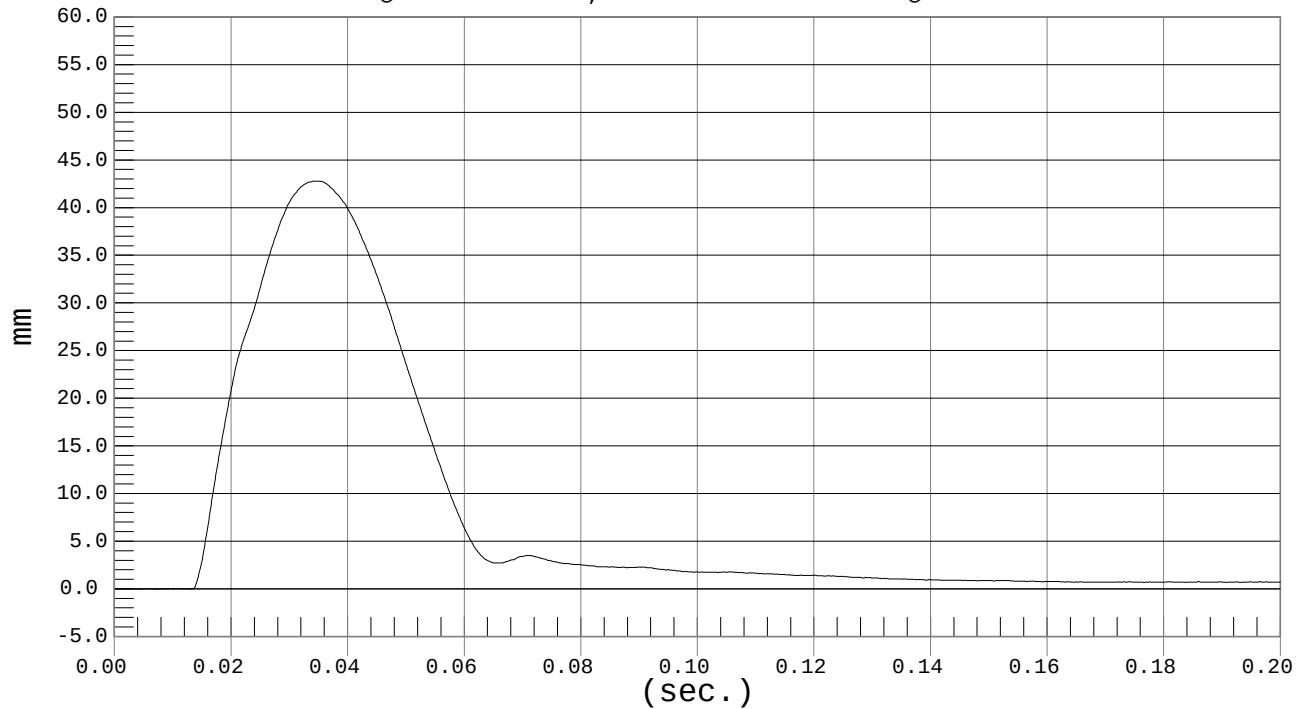


MIDDLE RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 138.8 fps, 42.31 M/s

Ymin = -.05 mm @ 0.0071 sec., Ymax = 42.77 mm @ 0.0345 sec.

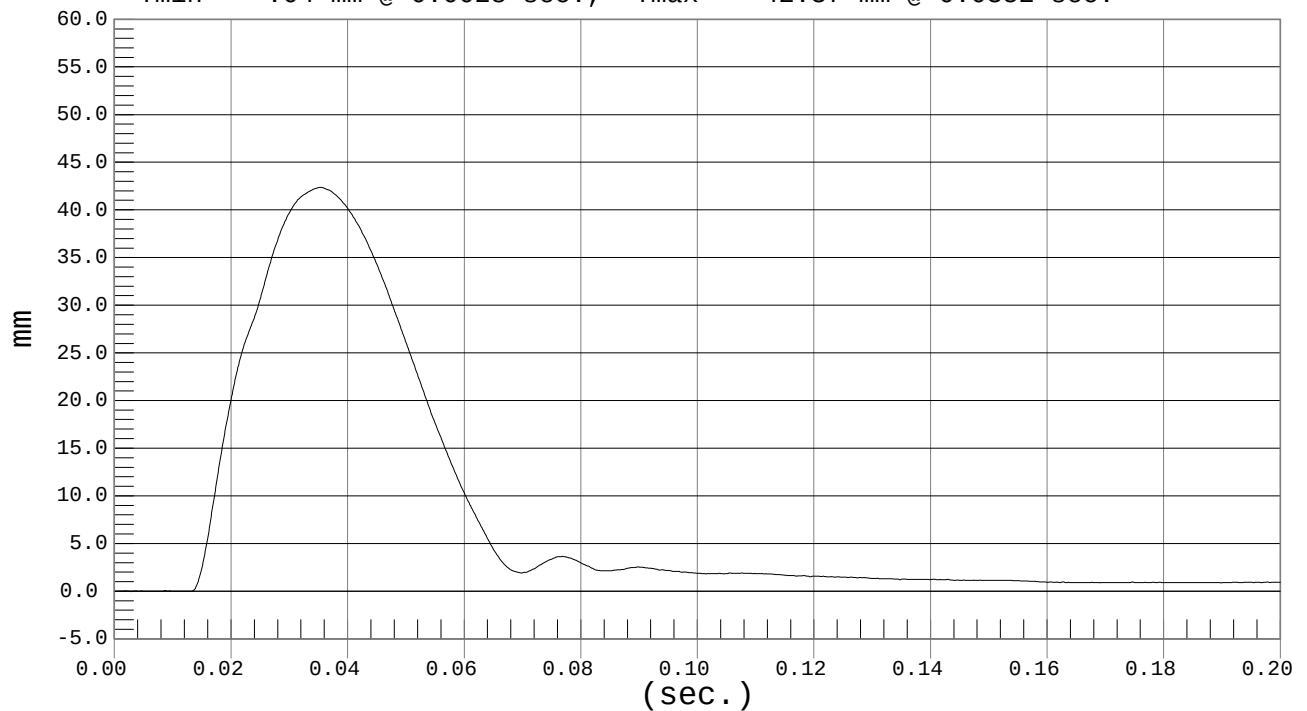


LOWER RIB DISPLACEMENT

Test Desc.: Thorax Without Arm
Component: Dummy #033

Test Date: 04-02-03
Speed: 138.8 fps, 42.31 M/s

Ymin = -.04 mm @ 0.0028 sec., Ymax = 42.37 mm @ 0.0352 sec.



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID IIs DUMMY

Date: 4/2/03
Dummy Serial Number: 033
Test Number: D03586/D03596

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03586</u>	<u>D03595</u>
Temperature (°C)	20.8° – 22.2°	21.1	21.0
Humidity	10% - 70%	30	29
Impact Velocity	4.41 - 4.59 m/s	4.51	4.51
Probe Force	1.3 - 1.9 kN	1.7	1.7
Upper Spine Acceleration	5 - 9 g's	7	7
Lower Spine Acceleration	10 - 12 g's	*14	*14
Upper Rib Displacement	44 - 55 mm	49	51
Middle Rib Displacement	44 - 56 mm	45	46

*TEST DOES NOT MEET SPECIFICATIONS

Technician: _____

Approved By: _____

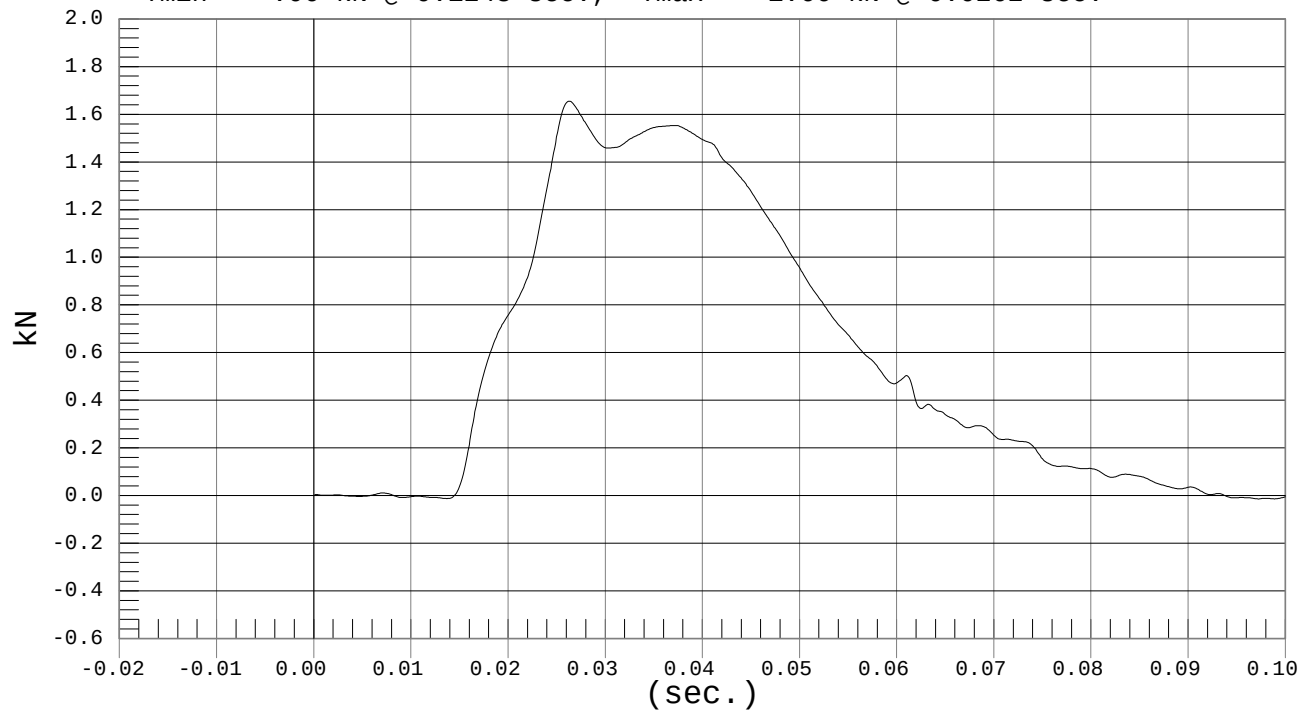


PROBE FORCE

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.06 kN @ 0.1243 sec., Ymax = 1.66 kN @ 0.0262 sec.



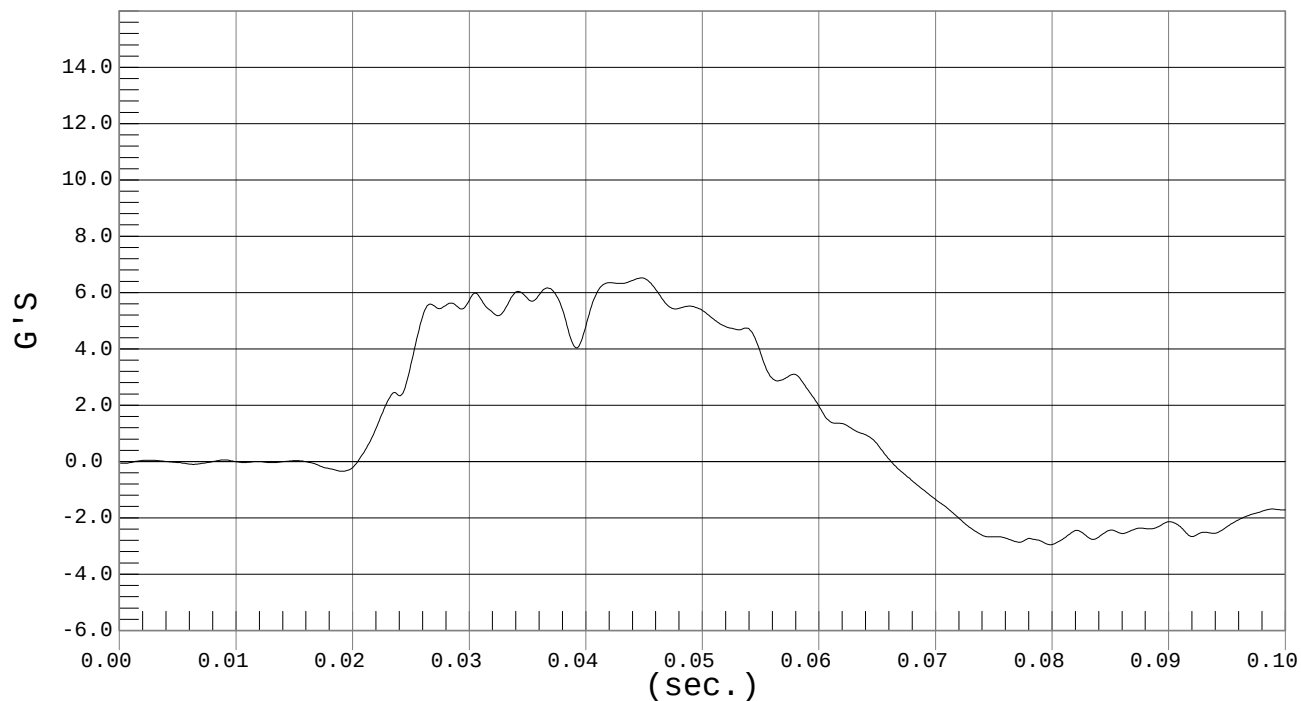


UPPER SPINE ACCELERATION

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -2.95 G'S @ 0.0797 sec., Ymax = 6.52 G'S @ 0.0447 sec.

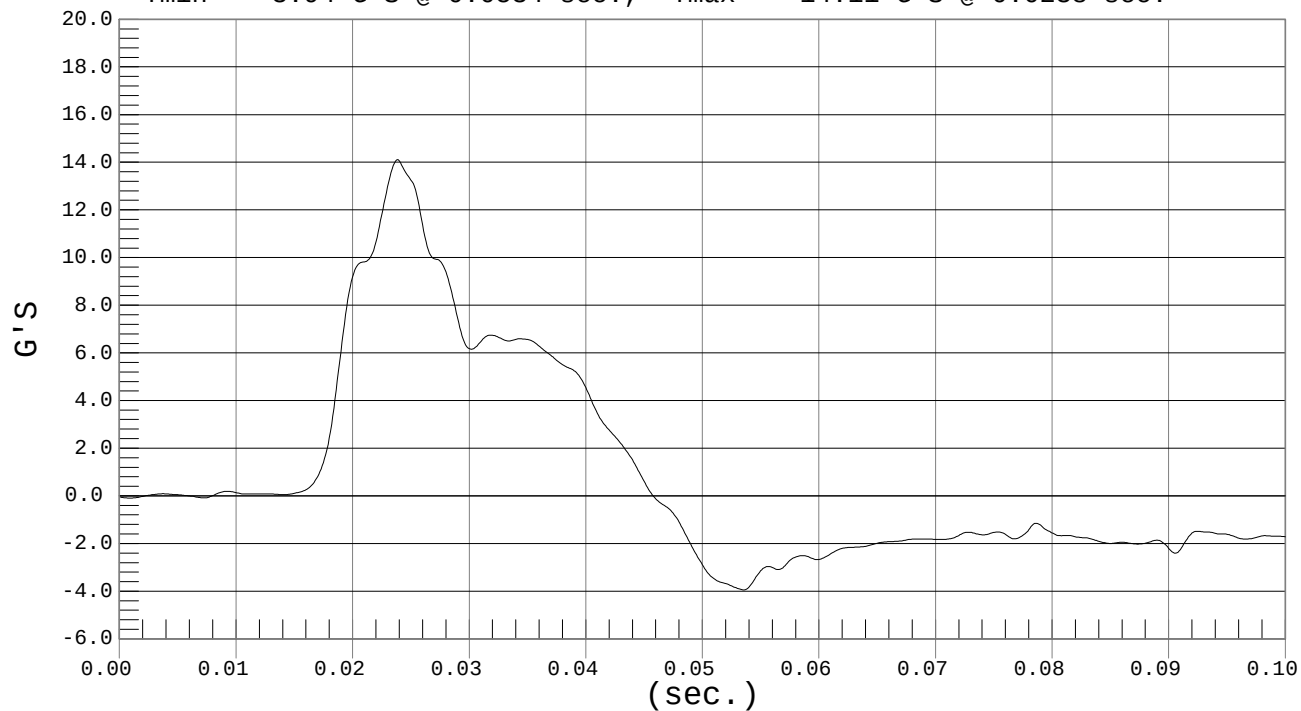


LOWER SPINE ACCELERATION

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -3.94 G'S @ 0.0534 sec., Ymax = 14.11 G'S @ 0.0238 sec.



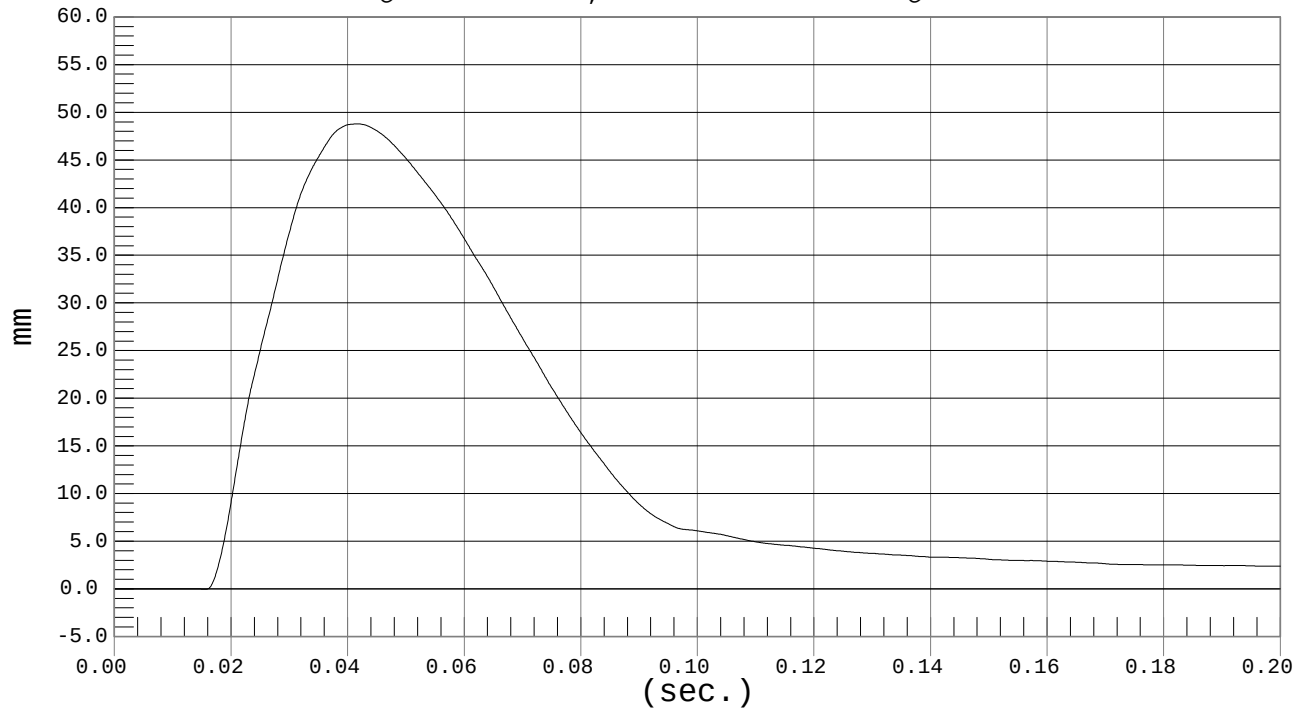


UPPER RIB DISPLACEMENT

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.05 mm @ 0.0155 sec., Ymax = 48.78 mm @ 0.0416 sec.

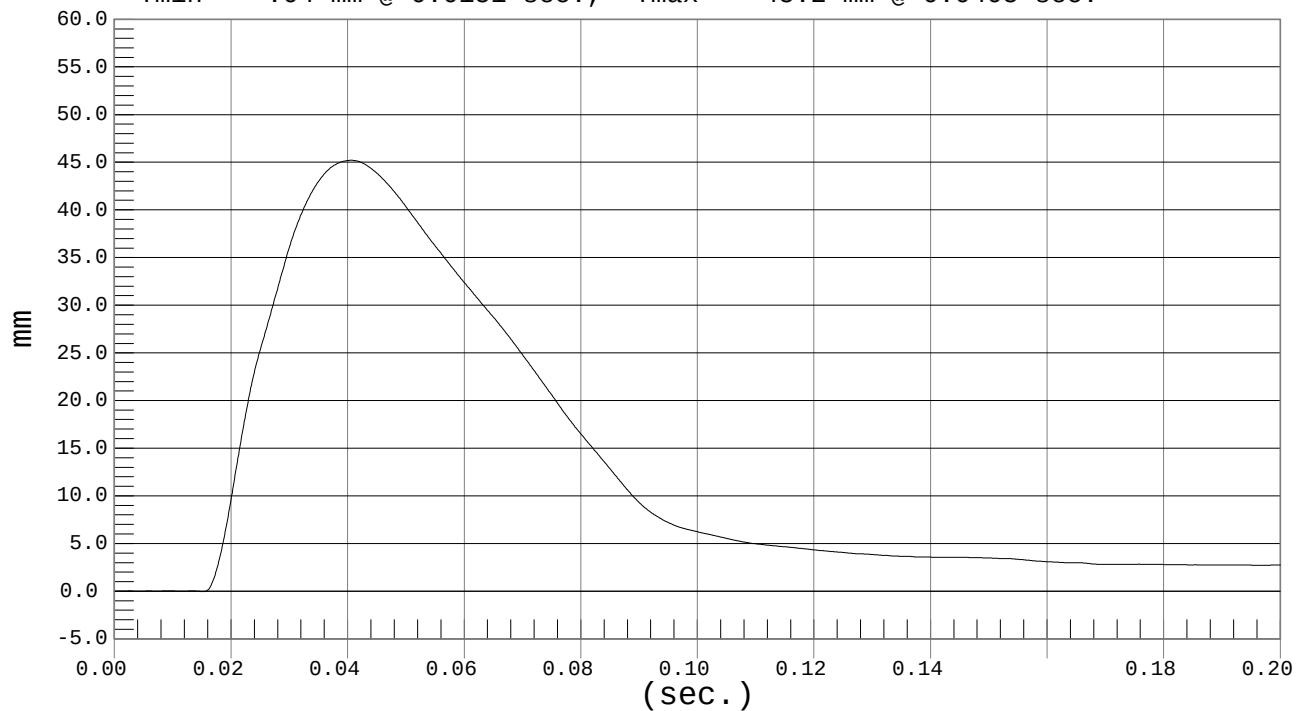


LOWER RIB DISPLACEMENT

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.04 mm @ 0.0151 sec., Ymax = 45.2 mm @ 0.0405 sec.



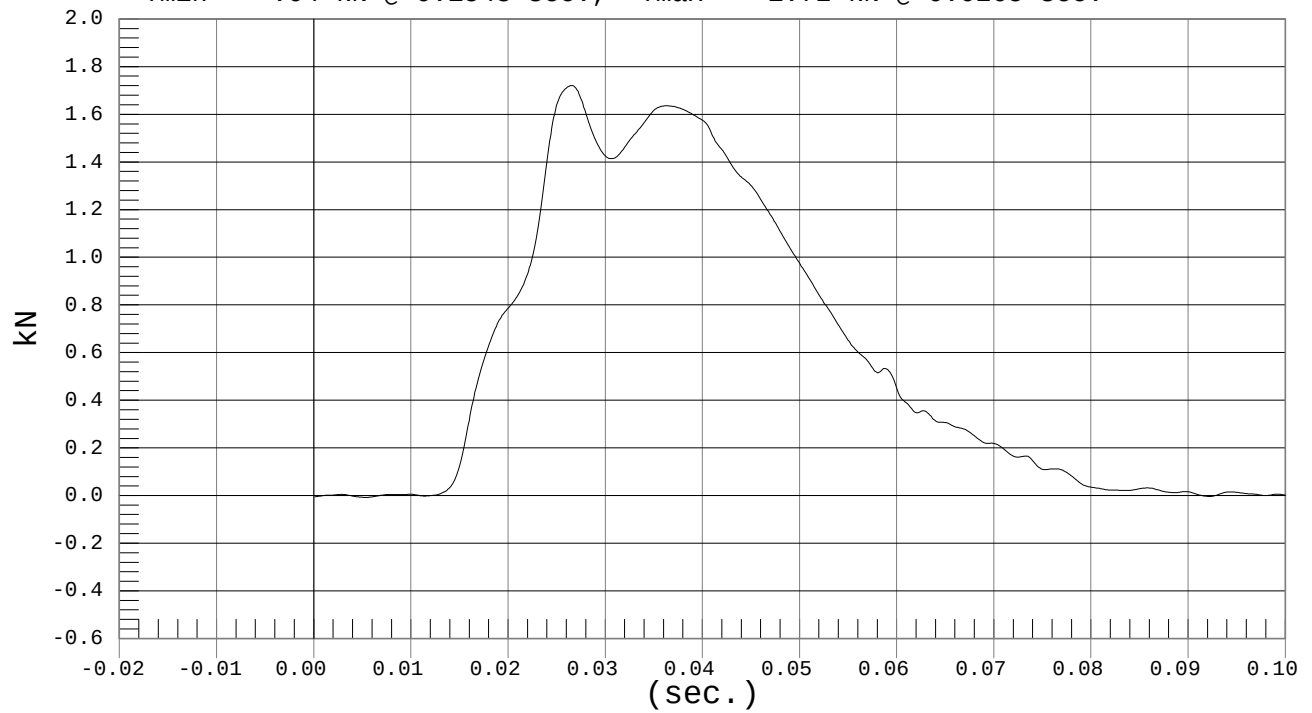


PROBE FORCE

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.04 kN @ 0.1548 sec., Ymax = 1.72 kN @ 0.0265 sec.



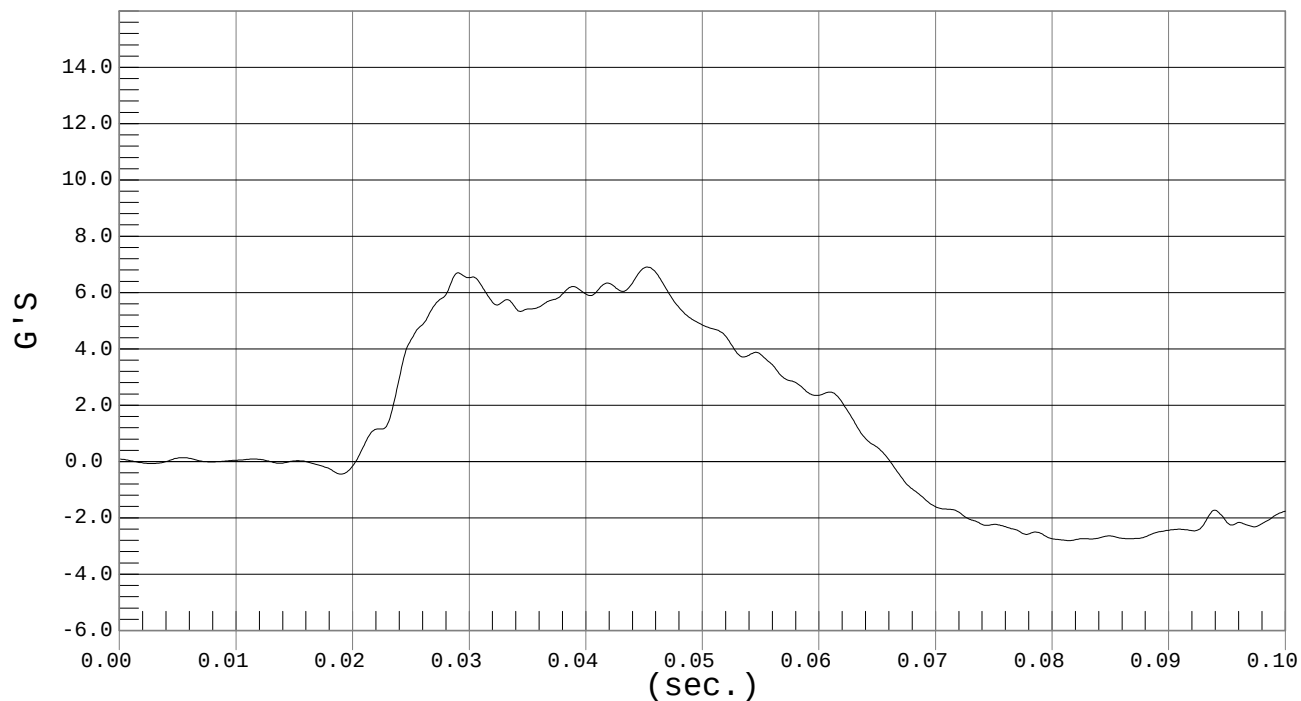


UPPER SPINE ACCELERATION

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -2.81 G'S @ 0.0814 sec., Ymax = 6.91 G'S @ 0.0452 sec.

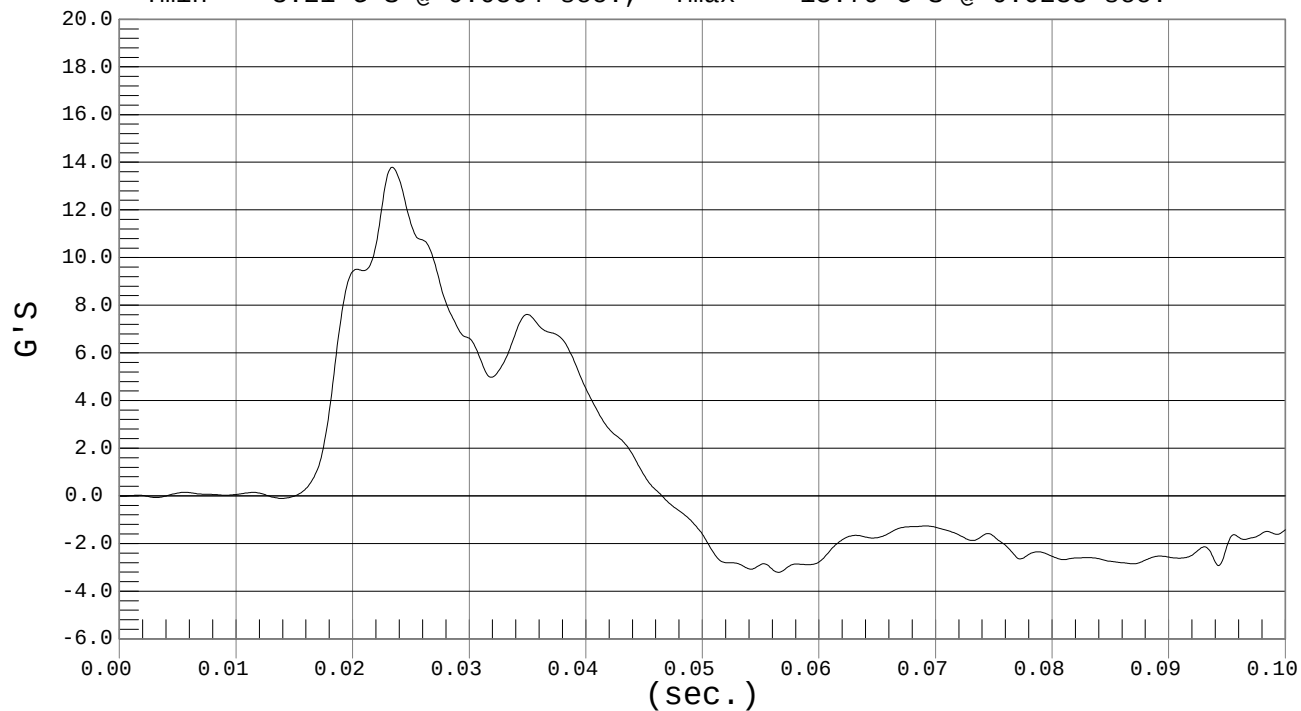


LOWER SPINE ACCELERATION

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -3.21 G'S @ 0.0564 sec., Ymax = 13.79 G'S @ 0.0233 sec.



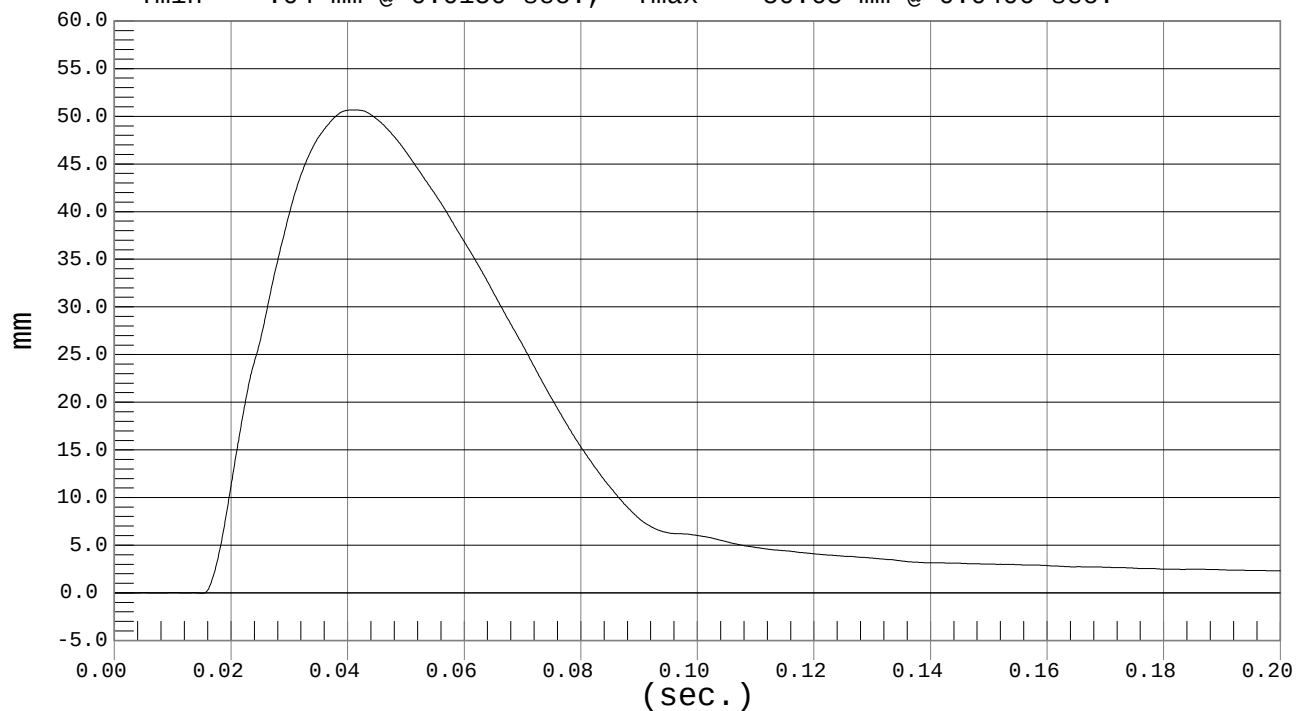


UPPER RIB DISPLACEMENT

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.04 mm @ 0.0150 sec., Ymax = 50.65 mm @ 0.0406 sec.

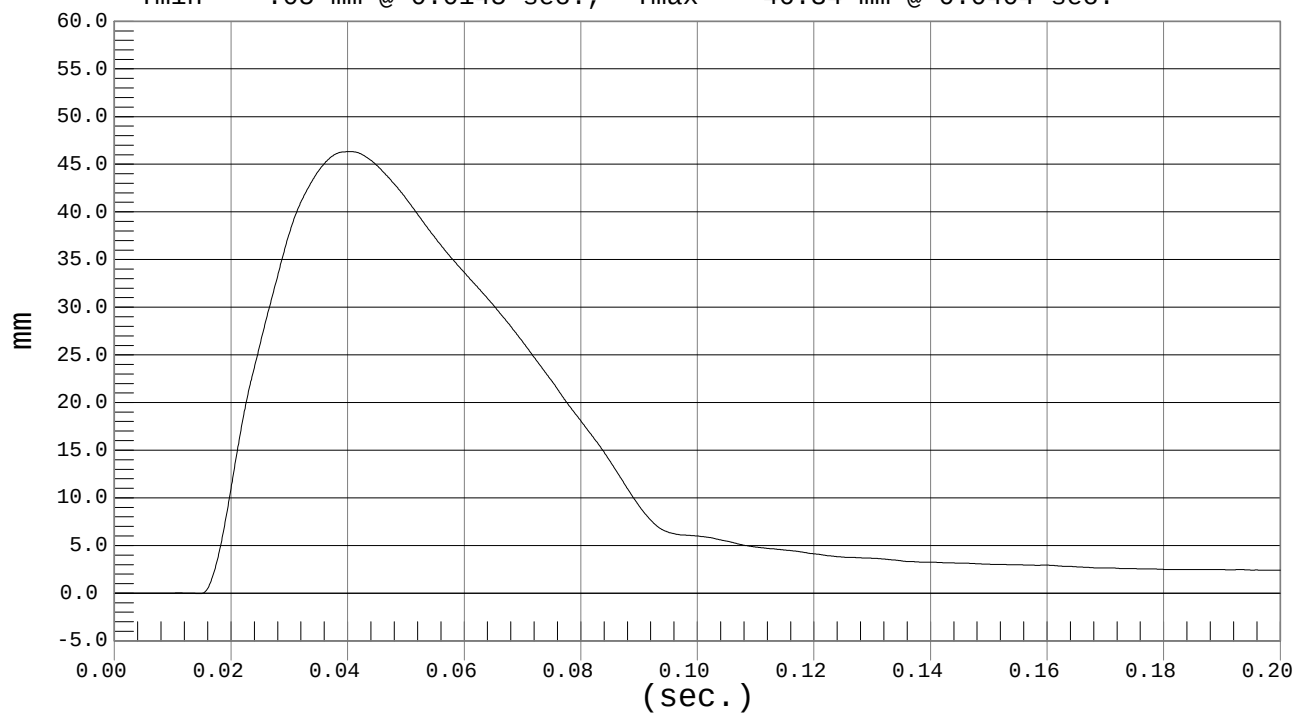


LOWER RIB DISPLACEMENT

Test Desc.: Abdomen Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 14.8 fps, 4.51 M/s

Ymin = -.05 mm @ 0.0145 sec., Ymax = 46.34 mm @ 0.0404 sec.



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID IIs DUMMY

Date: 4/2/03
Dummy Serial Number: 033
Test Number: D03589/D03599

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
		<u>D03589</u>	<u>D03599</u>
Temperature (°C)	20.8° – 22.2°	21.0	20.9
Humidity	10% - 70%	30	28
Impact Velocity	6.57 - 6.84 m/s	6.76	6.73
Probe Force	5.0 - 7.2 kN	5.7	5.7
Pelvis G's	46 - 60 g's	50	48

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

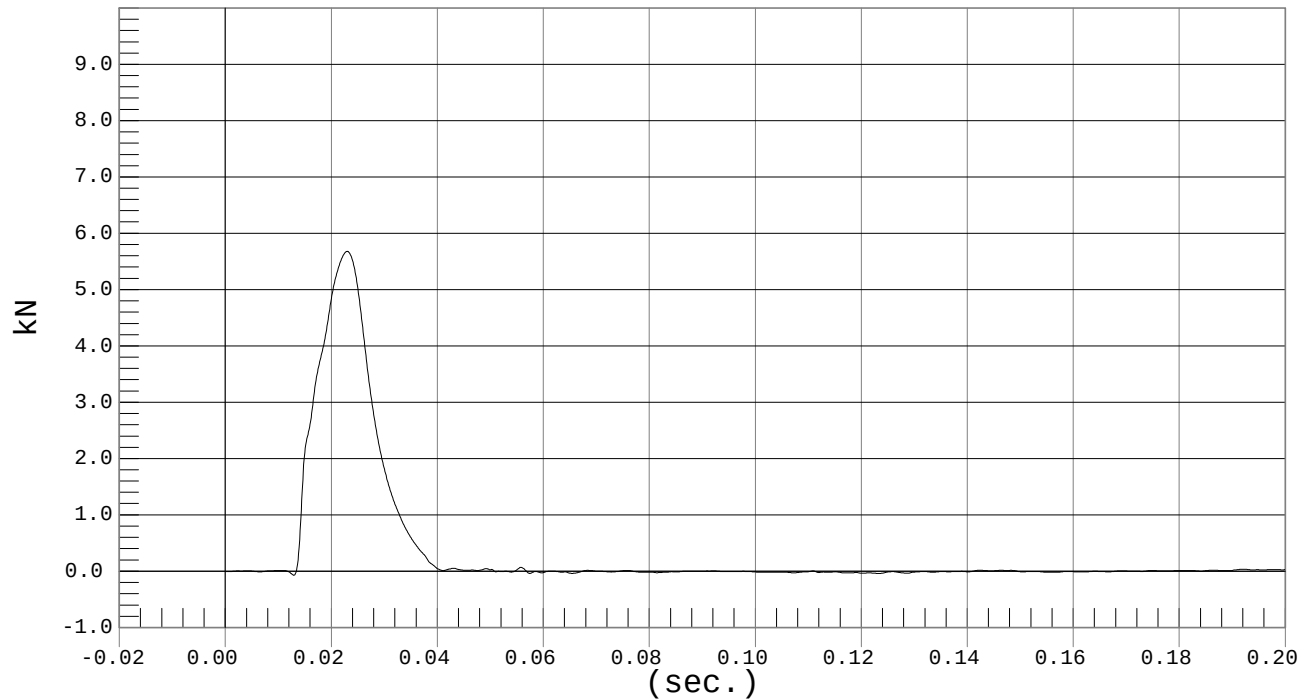


IMPACTOR FORCE

Test Desc.: Pelvis Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.76 M/s

Ymin = -.07 kN @ 0.0128 sec., Ymax = 5.68 kN @ 0.0229 sec.

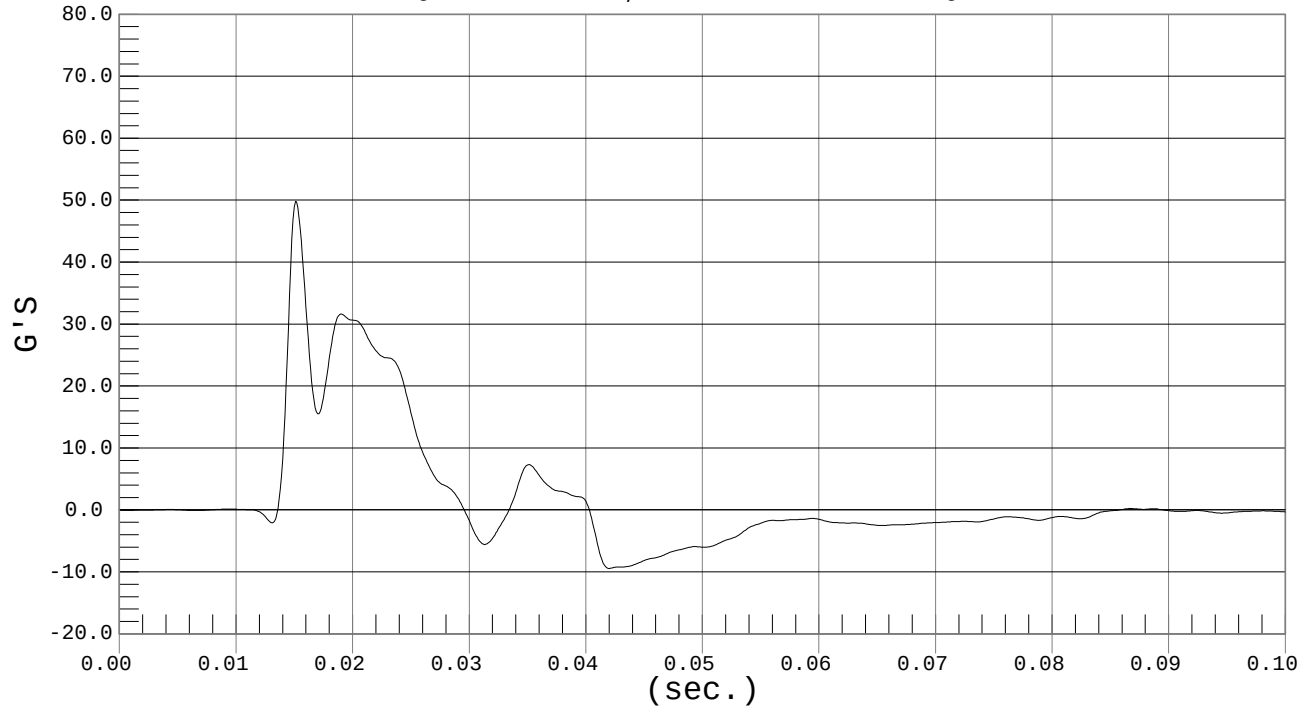


PELVIS ACCELERATION

Test Desc.: Pelvis Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.2 fps, 6.76 M/s

Ymin = -9.46 G'S @ 0.0419 sec., Ymax = 49.8 G'S @ 0.0150 sec.



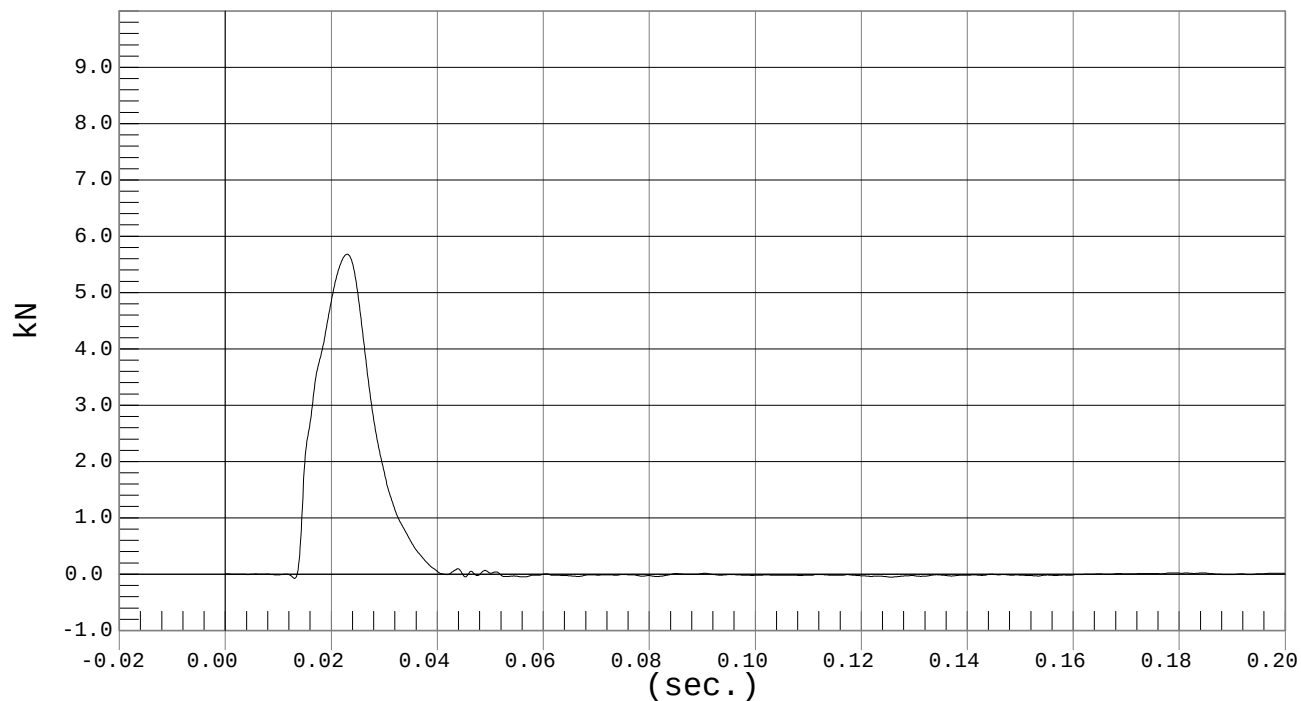


IMPACTOR FORCE

Test Desc.: Pelvis Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.73 M/s

Ymin = -.07 kN @ 0.0130 sec., Ymax = 5.68 kN @ 0.0229 sec.

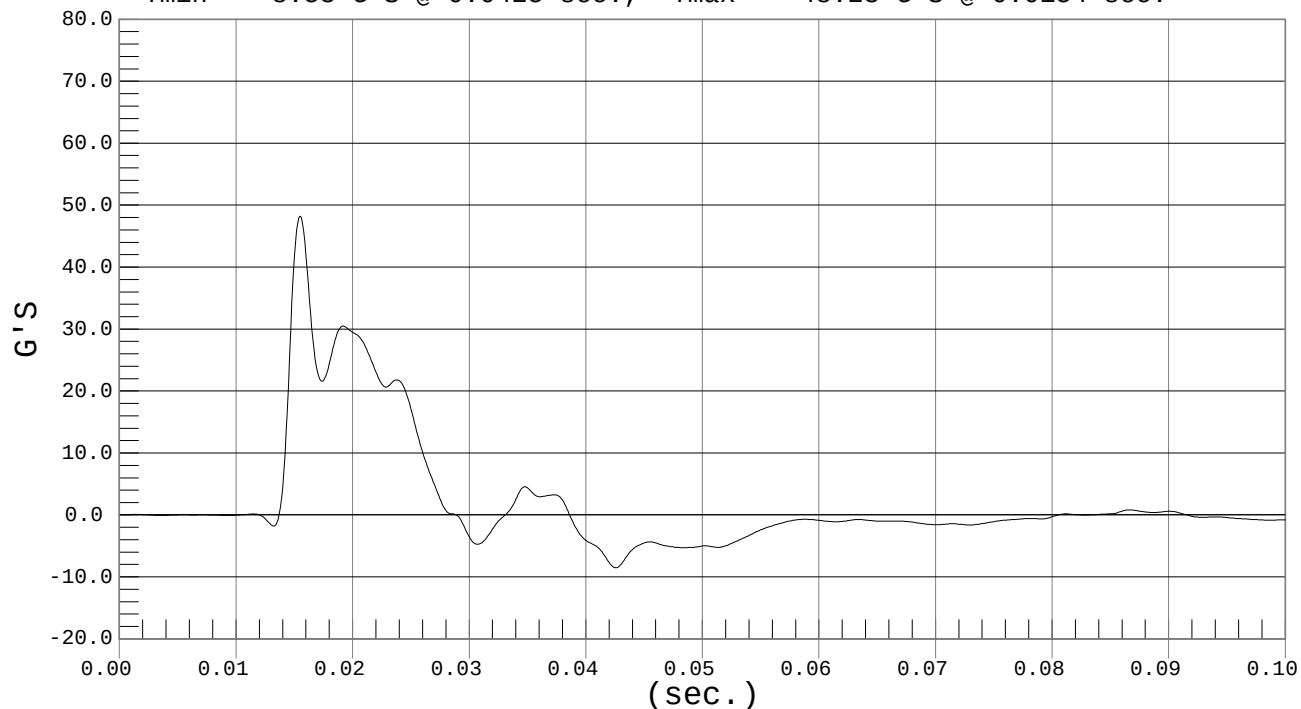


PELVIS ACCELERATION

Test Desc.: Pelvis Impact
Component: Dummy #033

Test Date: 04-02-03
Speed: 22.1 fps, 6.73 M/s

Ymin = -8.53 G'S @ 0.0425 sec., Ymax = 48.23 G'S @ 0.0154 sec.



APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY CALIBRATION DATA

	INSTRUMENTS FOR LEFT FRONT DUMMY SID IIS: 033		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X Accelerometer	P17858	Endevco	1/10/03
Head Y Accelerometer	P12566	Endevco	1/10/03
Head Z Accelerometer	P15638	Endevco	10/8/02
Driver Upper Neck Load Cell	N304FX	FTSS	6/14/02
Driver Upper Arm X	B02A25-N01	Entran	1/9/03
Driver Upper Arm Y	02A16-A13	Entran	1/9/03`
Driver Upper Arm Z	B02A25-N04	Entran	1/9/03
Driver Shoulder X	P17848	Endevco	1/10/03
Driver Shoulder Y	P16336	Endevco	1/10/03
Driver Shoulder Z	P16225	Endevco	1/10/03
Driver Shoulder Load Cell	S101FX	FTSS	6/25/02
Driver Upper Thorax Rib Y	01J02-F07	Entran	1/8/03
Driver Mid Thorax Rib Y	B02A18-N03	Entran	1/8/03
Driver Mid Thorax Rib X	AHT13	Endevro	1/24/03
Driver Lower Thorax Rib Y	P15951	Endevco	1/10/03
Driver Upper Abdominal Rib Y	99H30-Z07	Entran	1/9/03
Driver Upper Abdominal Rib X	APY16	Endevco	1/30/03
Driver Lower Abdominal Rib Y	01J02-F12	Entran	1/9/03
Driver T4 X	AGTY1	Endevco	1/8/03
Driver Shoulder DY	020SHD	Honeywell	1/13/03
Driver Upper Thorax Rib DY	020RB1	Honeywell	1/13/03
Driver Mid Thorax Rib DY	020RB2	Honeywell	1/13/03
Driver Lower Thorax Rib DY	020RB3	Honeywell	1/13/03
Driver Upper Abdominal Rib DY	020RB4	Honeywell	1/13/03
Driver Lower Abdominal Rib DY	020RB5	Honeywell	1/13/03
Driver Upper Spine X	B02A09-F04	Entran	1/9/03
Driver Upper Spine Y	01G25-N18	Entran	1/9/03
Driver Upper Spine Z	02A16-A12	Entran	1/9/03
Driver Lower Spine X	02A16-A03	Entran	1/9/03
Driver Lower Spine Y	B02A18-N14	Entran	1/9/03
Driver Lower Spine Z	02A04-A24	Entran	1/9/03
Driver Lumbar FY	L104FY	FTSS	5/10/02
Driver Lumbar FZ	L104FZ	FTSS	8/15/02
Driver Lumbar MX	L104MX	FTSS	8/15/02
Driver Lumbar MY	L104MY	FTSS	6/24/02
Driver Lumbar MZ	L104MZ	FTSS	6/24/02
Driver Left Acetabulum FY	AC111FY	FTSS	6/25/02
Driver Left Ilium Crest FY	IW113FY	FTSS	6/25/02
Driver Right Ilium Crest FY	IW115FY	FTSS	6/25/02
Pubic Symphysis FY	P106FY	FTSS	6/24/02
Driver Right Femur Load Cell	F109FX	FTSS	1/20/03
Driver Left Femur Load Cell	F107FX	FTSS	1/20/03

DUMMY CALIBRATION DATA

	INSTRUMENTS FOR FRONT DUMMY SID IIS: 033 CONT'D		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Pelvis X Accelerometer	B02A25-N05	Entran	1/9/03
Pelvis Y Accelerometer	B02A18-N13	Entran	1/9/03
Pelvis Z Accelerometer	02A18-N03	Entran	1/9/03

VEHICLE INSTRUMENTS CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Mid A-Post Y	H01-N31	Entran	11/19/02
Left Lower A-Post Y	K21-N31	Entran	10/9/02
Left Mid B-Post Y	H01-N13	Entran	10/30/02
Left Lower B-Post Y	E03-H14	Entran	10/8/02
Floorpan @ Rear Axle X	A08-M09	Entran	2/24/03
Floorpan @ Rear Axle Y	A08-N02	Entran	2/24/03
Floorpan @ Rear Axle Z	A08-M05	Entran	2/24/03
Driver Seat Track Y	H01-N24	Entran	10/30/02
Right Front Sill X	E10-F20	Entran	1/30/03
Right Front Sill Y	A08-M08	Entran	2/24/03
Right Front Sill Z	A08-M01	Entran	2/24/03
Right Rear Sill X	A08-A11	Entran	10/7/02
Right Rear Sill Y	F04-N08	Entran	10/18/02
Right Rear Sill Z	L23-A05	Entran	11/19/02
Left Rear Sill Y	H14-N08	Entran	10/7/02
Left Front Sill Y	I25-F15	Entran	1/16/03
Vehicle CG X	L12-F01	Entran	2/24/03
Vehicle CG Y	A08-M10	Entran	2/24/03
Vehicle CG Z	L12-F06	Entran	2/24/03
Left Front Door @ Pelvis	H07-F07	Entran	1/16/03
Left Front Door @ Arm	D11-F16	Entran	1/30/03
Left Front Door @ Knee	H01-N14	Entran	10/31/02
Left Front Door @ Rib	99F15A	Entran	1/16/03
Lower Center Radiator Support X	H01-N26	Entran	11/19/02
Lower Center Radiator Support Y	99F216	Entran	10/31/02
Lower Center Radiator Support Z	I12-F10	Entran	2/14/03

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

APPENDIX E
DUMMY PEAK RESPONSES

SID IIs PEAK RESPONSE TABLE

Location	Peak Values				
				Driver (033) Floating Rib Guide	
	Class	Axis	Units	Peak	Time
Head	1000	X	G	-158.8	58.0
	1000	Y	G	642.6	58.0
	1000	Z	G	197.8	57.6
	1000	RES	G	682.5	58.0
Head Injury Criteria (HIC 15)				8706	
t1				57.2	
t2				58.3	
Head Injury Criteria (HIC 36)				8706	
t1				57.2	
t2				58.3	
Upper Neck Force	1000	X	N	-9274.7	60.8
	1000	Y	N	626.0	63.2
	1000	Z	N	-2588.9	59.7
	1000	RES	N	NO DATA	
Upper Neck Moment	600	X	Nm	-83.0	59.6
	600	Y	Nm	29.1	89.2
	600	Z	Nm	-12.2	58.2
	600	RES	Nm	83.5	59.6
Shoulder G's	180	X	G	-89.0	48.6
	180	Y	G	107.6	40.8
	180	Z	G	101.1	79.0
	180	RES	G	116.4	79.0
Shoulder Force	600	X	N	347.6	49.7
	600	Y	N	2966.8	54.5
	600	Z	N	-685.5	54.4

SID IIs PEAK RESPONSE TABLE (CONTINUED)

Location	Peak Values				
				Driver (033) Floating Rib Guide	
	Class	Axis	Units	Peak	Time
Upper Arm	180	X	G	39.7	51.4
	180	Y	G	101.0	40.4
	180	Z	G	24.9	50.2
	180	RES	G	102.8	40.3
Upper Spine	180	X	G	-20.3	57.9
	180	Y	G	73.8	54.2
	180	Z	G	19.9	57.9
	180	RES	G	74.1	54.2
Upper Thorax Rib	180	Y	G	82.7	41.6
Mid Thorax Rib	180	Y	G	79.0	41.4
Lower Thorax Rib	180	Y	G	117.1	48.1
Upper Abdominal Rib	180	Y	G	205.1	47.5
Lower Abdominal Rib	180	Y	G	103.0	47.3
Shoulder Deflection	180	Y	mm	-47.3	55.7
Upper Thorax Deflection	180	Y	mm	-36.4	54.8
Middle Thorax Deflection	180	Y	mm	-30.1	54.4
Lower Thorax Deflection	180	Y	mm	-27.6	53.6
Upper Abdominal Rib Deflection	180	Y	mm	-42.1	52.9
Lower Abdominal Rib Deflection	180	Y	mm	-41.0	51.9
Shoulder Deflection Rate	180	Y	m/s	-3.7	45.3
Upper Thorax Deflection Rate	180	Y	m/s	-3.3	42.7
Middle Thorax Deflection Rate	180	Y	m/s	-3.3	42.9
Lower Thorax Deflection Rate	180	Y	m/s	-2.4	44.1
Upper Abdominal Rib Deflection Rate	180	Y	m/s	-4.1	36.0

SID IIs PEAK RESPONSE TABLE (CONTINUED)

Location	Peak Values				
				Driver (033) Floating Rib Guide	
	Class	Axis	Units	Peak	Time
Lower Abdominal Rib Deflection Rate	180	Y	m/s	-4.0	37.4
Shoulder VC	180	Y	m/s	0.8	46.0
Upper Thorax Rib VC	180	Y	m/s	0.4	46.1
Mid Thorax Rib VC	180	Y	m/s	0.4	43.7
Lower Thorax Rib VC	180	Y	m/s	0.3	44.6
Upper Abdominal Rib VC	180	Y	m/s	0.6	43.7
Lower Abdominal Rib VC	180	Y	m/s	-0.6	58.5
Lower Spine	180	X	G	13.0	64.0
	180	Y	G	77.8	50.4
	180	Z	G	33.7	58.9
	180	RES	G	78.3	50.3
Lumbar Force	600	X	N	777.8	64.0
	600	Y	N	2909.1	49.4
	600	Z	N	1129.4	57.3
Lumbar Moment	600	X	Nm	129.5	49.6
	600	Y	Nm	-46.1	64.3
	600	Z	Nm	-13.7	74.8
Left Acetabulum Force	600	Y	N	1165.4	47.3
Left Ilium Crest Force	600	Y	N	4654.3	49.0
Sum of Left Acetabulum & Left Ilium Crest	600	Y	N	5724.7	48.0
Right Ilium Crest Force	600	Y	N	789.3	115.6
Pubic Symphysis Force	600	Y	N	-721.7	45.1

SID IIs PEAK RESPONSE TABLE (CONTINUED)

Location	Peak Values				
				Driver (033) Floating Rib Guide	
	Class	Axis	Units	Peak	Time
Right Femur Force	600	X	N	226.6	48.5
	600	Y	N	445.8	45.8
	600	Z	N	-763.6	62.5
	600	RES	N	828.3	62.5
Right Femur Moment	600	X	Nm	-113.7	62.9
	600	Y	Nm	19.1	82.3
	600	Z	Nm	-36.1	47.9
	600	RES	Nm	113.8	62.9
Left Femur Force	600	X	N	-304.4	49.0
	600	Y	N	-856.3	56.1
	600	Z	N	2349.6	67.5
	600	RES	N	NO DATA	
Left Femur Moment	600	X	Nm	79.1	52.3
	600	Y	Nm	-27.1	45.9
	600	Z	Nm	23.0	61.8
	600	RES	Nm	82.5	52.2
Pelvis	1000	X	G	-17.2	62.5
	1000	Y	G	77.6	48.3
	1000	Z	G	12.1	59.0

SID IIs PEAK RESPONSE TABLE (CONTINUED)

Location	Peak Values				
				Driver (033) Floating Rib Guide	
	Class	Axis	Units	Peak	Time
Upper Spine	(FIR)	Y	G	67.1	53.8
Lower Spine	(FIR)	Y	G	76.0	50.7
Upper Thorax Rib	(FIR)	Y	G	61.9	40.1
Mid Thorax Rib	(FIR)	Y	G	74.3	40.1
Lower Thorax Rib	(FIR)	Y	G	89.9	49.5
Upper Abdominal Rib	(FIR)	Y	G	90.6	48.8
Lower Abdominal Rib	(FIR)	Y	G	80.6	35.1
Pelvis	(FIR)	Y	G	71.6	48.8