REPORT NUMBER: 201-MGA-2009-003

SAFETY COMPLIANCE TESTING FOR FMVSS 201
RIGID POLE SIDE IMPACT TEST

FORD MOTOR COMPANY
2009 FORD FLEX SE FWD
NHTSA NUMBER: C90210

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

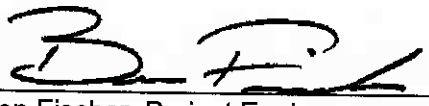
TEST DATE: March 13, 2009

REPORT DATE: June 17, 2009

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVENUE, SE
WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-06-C-00030.

Prepared by:  Date: June 17, 2009
Ben Fischer, Project Engineer

Reviewed by: David Winkelbauer Date: June 17, 2009
David Winkelbauer, Director of Operations

FINAL REPORT ACCEPTED BY:

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COTR, Side Impact

_____
Date of Acceptance

Technical Report Documentation Page

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15. Supplementary Notes		

16. Abstract

A rigid pole side impact test was conducted on a 2009 Ford Flex SE FWD in accordance with FMVSS 201, "Occupant Protection in Interior Impact", S6.2(b)(3) and the Office of Vehicle Safety Compliance Test Procedure No. TP-201P-02 "Rigid Pole Side Impact Test". The test was conducted at MGA Research Corporation in Burlington, Wisconsin on March 13, 2009.

The impact velocity of the vehicle was 28.2 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 21°C. The post-test maximum crush was 386 mm at level 3. The test vehicle's occupant performance is as follows:

	REQUIREMENT	DRIVER
HIC	≤ 1000	407

The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

17. Key Words Compliance Testing Rigid Pole Side Impact Test FMVSS 201	18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, (NPO-230) 1200 New Jersey Avenue, SE Washington, D.C. 20590	
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SECTION 1
PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This rigid pole side impact test is conducted as part of the FY' 2009 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. DTNH22-06-C-00030. The purpose of this test was to evaluate occupant protection in interior impact in a 2009 Ford Flex SE FWD manufactured by Ford Motor Company.

1.2 TEST PROCEDURE

The rigid pole side impact test was conducted in accordance with the current National Highway Traffic Safety Administration (NHTSA), Office of Vehicle Safety Compliance (OVSC), laboratory test procedure TP-201P-02, dated October 21, 2001 and the corresponding MGA Research Corporation Test Procedure MGA-NHTSA8. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

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

SECTION 2
SUMMARY OF RIGID POLE SIDE IMPACT TEST

2.1 SUMMARY OF RIGID POLE SIDE IMPACT TEST

A rigid pole side impact test was performed on a 2009 Ford Flex SE FWD. The subject vehicle was towed into a rigid pole at a velocity of 28.2 km/h. The specified impact velocity range is from 27.2 to 28.8 km/h. The test vehicle was positioned 90° to the line of forward motion. The weight of the vehicle as tested was 2142.8 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on March 13, 2009.

One (1) real-time motion picture camera and eleven (11) high-speed motion picture cameras were used to document the impact event. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and SID/HIII can be found in Appendix A. One SID/HIII was placed in the left front outboard designated seating position according to instructions specified in the TP-201P-02 dated October 21, 2001. The SID/HIII was instrumented in the following locations:

- Head Center of Gravity (CG) tri-axial accelerometers (X, Y, and Z axis)
- Upper Neck 6 channel load cell (X, Y, Z force and moment)
- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)

The test vehicle was instrumented with eighteen (18) structural accelerometers. All data channels were recorded with a fully self contained on-board DTS TDAS Pro. The data was digitally sampled at 10,000 samples per second and processed per Section 12.2 of the OVSC Test Procedure.

2.2 GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 386 mm at level 3, at the vertical impact line. The driver SID/HIII, Serial No. 036, was calibrated just prior to this test. The SID/HIII's injury criteria are summarized as follows:

Measurements	Units	Driver
HIC		407
TTI*	G's	43.6
Pelvis*	G's	47.4
Neck Force X*	N	-466
Neck Force Y*	N	-479
Neck Force Z*	N	427
Neck Moment X*	Nm	-60.7
Neck Moment Y*	Nm	-39.5
Neck Moment Z*	Nm	38.3

* For Information Purposes Only

Test summaries and post-test observations are presented in Section 3. The vehicle, camera, and occupant measurements are presented in Section 4. Appendix A contains the still photograph prints. Appendix B contains the SID/HIII and vehicle data traces. Appendix C contains the SID/HIII's configuration and performance verification data. Appendix D contains the calibration information data.

TEST NOTES

The following channels were not used in this test:

Driver Door Lower
Driver Door Mid
Driver Door Upper

The right front passenger frontal airbag deployed

SECTION 3

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

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	English Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressure	lbf/in^2	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	=(tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

*Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009

TEST VEHICLE INFORMATION

Make	Ford
Model	Flex
Body Style	MPV
NHTSA No.	C90210
VIN	2FMDK51C99BA66118
Color	Brilliant Silver Metallic
Delivery Date	2/9/2009
Odometer Reading (mile)	82.3
Dealer	Boucher Fleet Group
Transmission	Automatic
Final Drive	Front
Number of Cylinders	6
Engine Displacement (L)	3.5
Engine Placement	Lateral

TEST VEHICLE OPTIONS

Front Airbag	Yes
Side Airbags	Yes
Power Windows	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
AM/FM/CD	Yes
Anti-theft System	Yes
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Company
Date of Manufacture	01/09

GVWR (kg)	2708
GAWR Front (kg)	1311
GAWR Rear (kg)	1420

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	240	240
Cold Pressure (kPa)	240	240
Recommended Tire Size	P235/60R18	P235/60R18
Tire Size on Vehicle	P235/60R18	P235/60R18
Tire Manufacturer	Goodyear	Goodyear

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	Bench	
Number Of Occupants	2	3	2	7
Capacity Wt. (VCW) (kg)				526
Cargo Wt. (RCLW) (kg)				50

DATA SHEET NO. 1... (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P
NHTSA No. C90210
Test Date: March 13, 2009

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	573.8	448.2		603.7	487.2	
Right	kg	553.8	445.4		577.9	474.0	
Ratio	%	55.8	44.2		55.1	44.9	
Totals	kg	1127.6	893.6	2021.2	1181.6	961.2	2142.8

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2021.2
Weight of SID/HIII Side Impact Dummy	kg	80.7
Rated Cargo/Luggage Weight (RCLW)	kg	50
Calculated Vehicle Target Weight (TVTW)	kg	2151.9

TEST VEHICLE ATTITUDES

	Units	As Delivered	Fully Loaded	Ready For Test
Right Front	mm	798	794	855
Left Front	mm	797	789	850
Right Rear	mm	836	824	894
Left Rear	mm	833	820	892
Right Door Sill Angle	deg	0.7 ND	0.6 ND	0.6 ND
Left Door Sill Angle	deg	1.0 ND	0.8 ND	0.9 ND
Front Bumper Angle	deg	0.2 RD	0.1 RD	0.1 RD
Rear Bumper Angle	deg	0.0	0.1 LD	0.1 LD

ND = NOSE DOWN, NU = NOSE UP, BD = BACK DOWN, LD = LEFT DOWN, RD = RIGHT DOWN, RU = RIGHT UP

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2987
Total Vehicle Length at Left Side	mm	4180
Total Vehicle Length at Centerline	mm	5087
Total Vehicle Length at Right Side	mm	4180
Total Vehicle Width at B-Post	mm	1903
Weight of Ballast in Cargo Area	kg	0
Amount of Stoddard Solvent in Fuel Tank	liters	65.1

DATA SHEET NO. 1... (Continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009

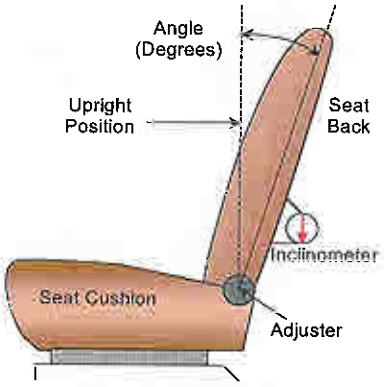
TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Target Impact Point Aft of Front Axle	mm	1390
Actual Impact Point Aft of Front Axle	mm	1386

NORMAL DESIGN RIDING POSITION

The driver's seat back is positioned to the manufacturer's designated angle. The procedure for the seat is as follows: Measure seatback angle and set at 19.8 degrees.

Initial driver seat back angle: 18.9 degrees
Final driver seat back angle: 14.9 degrees



FRONT SEAT ASSEMBLY

SEAT FORE/AFT POSITIONS

Initial Seat position: 170 mm of 340 mm
Final Seat position: 141 mm of 340 mm

SEAT BELT UPPER ANCHORAGE

The test vehicle is equipped with adjustable "D" ring anchorage for the driver's seat position. The driver's "D" ring anchorage was placed in the uppermost position.

DATA SHEET NO. 1... (continued)

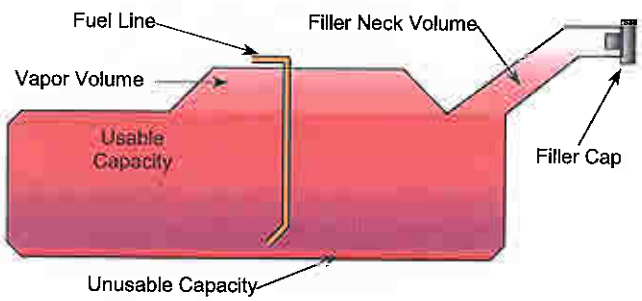
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P
NHTSA No. C90210
Test Date: March 13, 2009

FUEL TANK CAPACITY DATA

The "Usable Capacity" of the standard equipment fuel tank is: 70.4 liters
The "Usable Capacity" of any optional equipment fuel tank is: N/A liters
92-94% of "Usable Capacity" for certification to FMVSS 301 requirements: 64.8 – 66.2 liters
Actual amount of Stoddard solvent added to vehicle for certification test 65.1 liters

The vehicle is equipped with electric fuel pump. The electric fuel pump operates for 2 seconds to pressurize the fuel system following the actuation of ignition. If no attempt has been made to start the engine within 2 seconds following ignition actuation the fuel pump will shut off. The fuel pump operates continuously while engine is running.

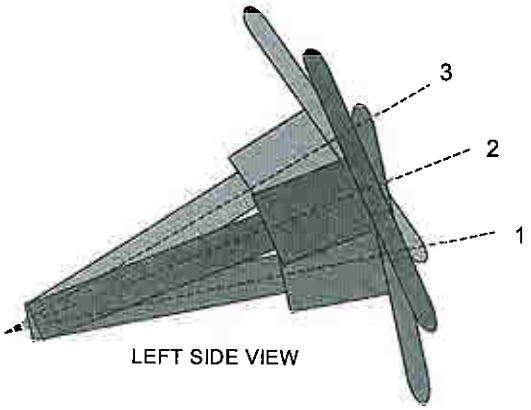


VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes, when it is moved through its full range of motion.

The steering column was placed in 3rd detent with the upper most defined as 0.



STEERING COLUMN ASSEMBLY

DATA SHEET NO. 2

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	573.8	448.2		603.7	487.2	
Right	kg	553.8	445.4		577.9	474.0	
Weight Ratio	%	55.8	44.2		55.1	44.9	
Totals	kg	1127.6	893.6	2021.2	1181.6	961.2	2142.8

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measured Parameter	Units	Maximum Crush	Above Ground
Level 1	Sill Top Height	mm	358	295
Level 2	Occupant H-Point	mm	379	643
Level 3	Mid Door	mm	386	722
Level 4	Window Sill	mm	334	1110
Level 5	Window Top	mm	195	1595
N/A	Maximum Penetration	mm	386	722

INSTRUMENTATION

SID/HIII Instrumentation	17
Vehicle Structure Accelerometers	18
Total	35

HIGH SPEED CAMERAS

Onboard Vehicle	3
Offboard Vehicle	8
Total	11

IMPACT POINT DATA

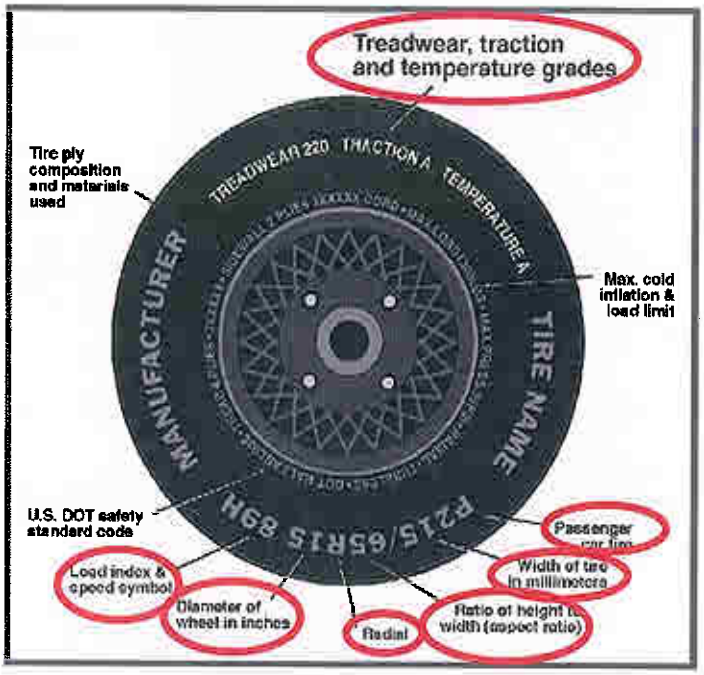
Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 38	4 forward

DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P
NHTSA No. C90210
Test Date: March 13, 2009

Vehicle Year	2009	Vehicle Make	Ford
VIN	2FMDK51C99BA66118	Vehicle Model	Flex SE



	Front	Rear
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Assurance	Assurance
Tire Type	P	P
Tire Width (mm)	235	235
Ratio of Height to Width (aspect ratio)	60	60
Radial	R	R
Wheel Diameter	18	18
Load Index & Speed Symbol	102T	102T
Treadwear	700	700
Traction Grade	A	A
Temperature Grade	B	B

DATA SHEET NO. 4

POST TEST OBSERVATIONS

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P
NHTSA No. C90210
Test Date: March 13, 2009

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Left Front Seating Position
Dummy Type / Serial No.	SID/HIII / 036
Head Contact	Curtain Airbag, Headrest
Upper Torso Contact	Side Airbag
Lower Torso Contact	Door Panel
Left Knee Contact	Door Panel
Right Knee Contact	Left Knee

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	Door remained closed and latched	Door remained closed and latched
Right Side Door Opening	Door remained closed and latched	Door remained closed and latched
Seat Movement	0	0
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

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

AIRBAG DEPLOYMENT

	Driver
Front	No
Side	Yes
Curtain	Yes

ARMREST LOCATION AND SEAT CRUSH

	Driver
Front Armrest (from bottom of window)	264
Front Seat Back Crush	61
Front Seat Cushion Crush	53

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5

SID/HIII INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P
NHTSA No. C90210
Test Date: March 13, 2009

THORAX AND PELVIS PEAK ACCELERATIONS (FIR 100 Filtered)

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Upper Rib (LUR)	Y	G's	46.5	50	-20.4	125
Upper Rib (LUR) (R)	Y	G's	46.5	50	-54.9	125
Lower Rib (LLR)	Y	G's	41.3	52	-29.1	124
Lower Rib (LLR) (R)	Y	G's	41.1	51	-19.8	124
Lower Spine (T_{12})	Y	G's	40.6	49	-10.9	110
Lower Spine (T_{12}) (R)	Y	G's	40.7	48	-11.2	111
Pelvis (PEV)	Y	G's	47.4	45	-6.7	103
Pelvis (PEV) (R)	Y	G's	47.1	45	-6.6	103

THORACIC TRAUMA INDEX (TTI) AND PELVIC ACCELERATION (FIR 100 Filtered)

Location	Driver			
	LUR	T_{12}	TTI(g)	PEV(g)
Rib, Spine, and Pelvis	46.5	40.6	43.6	47.4
Rib, Spine, and Pelvis (R)	46.6	40.7	43.7	47.1

UPPER NECK FORCES AND MOMENTS (SAE CLASS 1000/600 Filtered)

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Neck Force	X	N	103	197	-466	67
Neck Force	Y	N	167	60	-479	159
Neck Force	Z	N	427	142	-258	69
Neck Moment	X	Nm	29.4	129	-60.7	60
Neck Moment	Y	Nm	21.1	94	-39.5	68
Neck Moment	Z	Nm	38.3	69	-14.4	111

HEAD CG PEAK ACCELERATIONS (SAE CLASS 1000 Filtered)

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Head CG	X	G's	7.9	223	-14.8	66
Head CG	Y	G's	64.6	61	-11.7	164
Head CG	Z	G's	9.5	142	-3.8	65
Head CG Resultant		G's	65.7	61		

HEAD INJURY CRITERIA (SAE CLASS 1000 Filtered)

Location	Driver		
	HIC	T1	T2
Head CG Resultant	407	50.3	71.7

Positive Acceleration Polarities: (Conforms to SAE J211)
Longitudinal (X) = + Forward
Lateral (Y) = + Right
Vertical (Z) = + Down

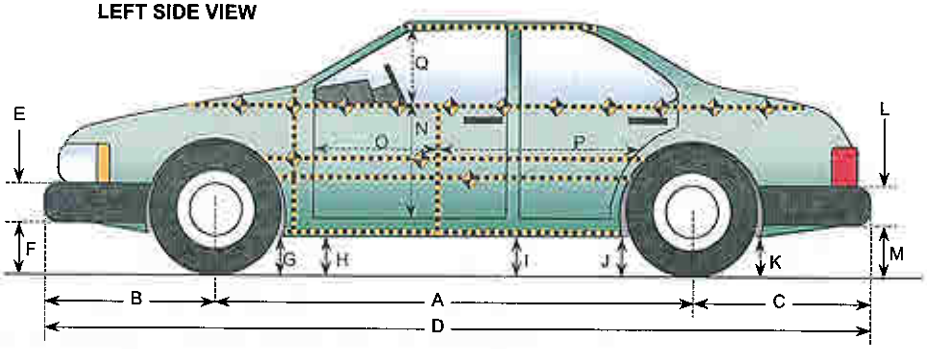
DATA SHEET NO. 6

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009

LEFT SIDE VIEW



All Measurements in mm

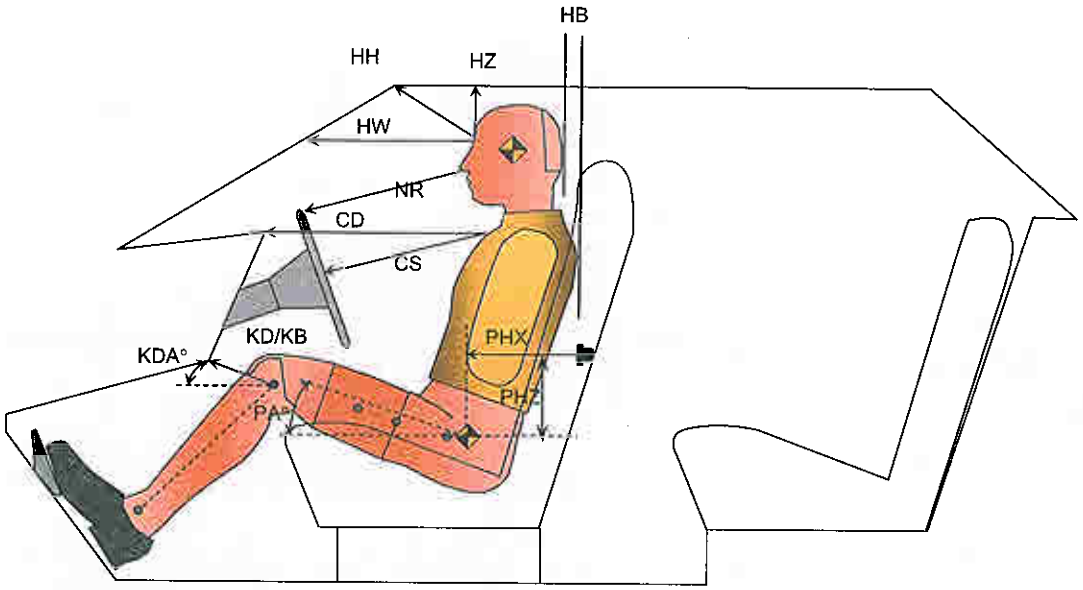
Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2987	2993	-6
B	Front Axle to FSOV	975	1017	-42
C	Rear Axle to RSOV	1125	1038	87
D	Total Length at Centerline	5087	5048	39
E	Front Bumper Thickness	216	216	0
F	Front Bumper Bottom to Ground	515	520	-5
G	Sill Height at Front Wheel Well	220	250	-30
H	Sill Height at Front Door Leading Edge	228	265	-37
I	Sill Height at "B" Pillar	229	270	-41
J1	Sill Height at Rear Wheel Well	236	315	-79
J2	Pinch Weld Height at Rear Wheel Well	231	320	-89
K	Sill Height Aft of Rear Wheel Well	378	388	-10
L	Rear Bumper Thickness	186	186	0
M	Rear Bumper Bottom to Ground	519	521	-2
N	Sill Height to Window Bottom Sill	842	843	-1
O	Front Door Leading Edge to Impact CL	882	865	17
P	Rear Door Trailing Edge to Impact CL	1260	1293	-33
Q	Front Window Opening	460	430	30
R	Right Side Length	4180	4198	-18
S	Left Side Length	4180	4082	98
T	Vehicle Width at "B" Post	1903	1736	167

DATA SHEET NO. 7

SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009



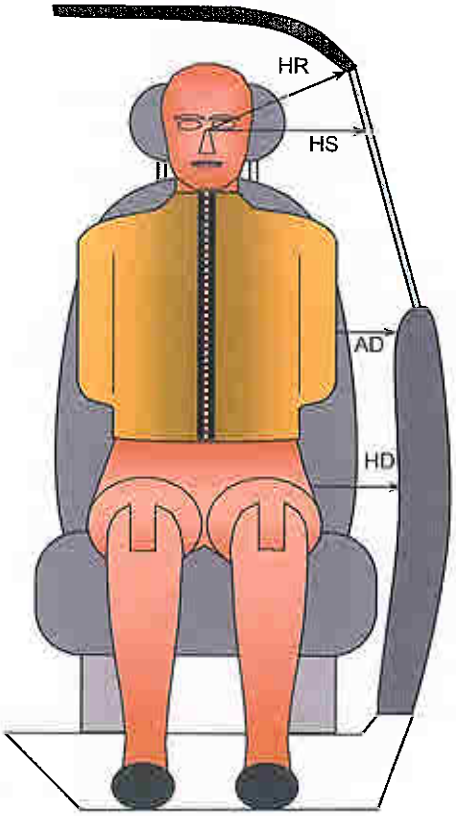
Driver Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	482	
HW	Head to Windshield	684	
HZ	Head to Roof	270	
NR	Nose to Rim	386	
CD	Chest to Dash	505	
CS	Chest to Steering Wheel	298	
KDL	Left Knee to Dash	130	14.4
KDR	Right Knee to Dash	140	15.0
PA	Pelvic Angle		24.2
PHX	H-Point to Striker (X-Axis)	272	
PHZ	H-Point to Striker (Z-Axis)	182	
HB	Head to Seatback Clearance	51	

DATA SHEET NO. 8

SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009



FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	300
HS	Head to Side Window	mm	390
AD	Arm to Door	mm	111
HD	H-Point to Door	mm	177

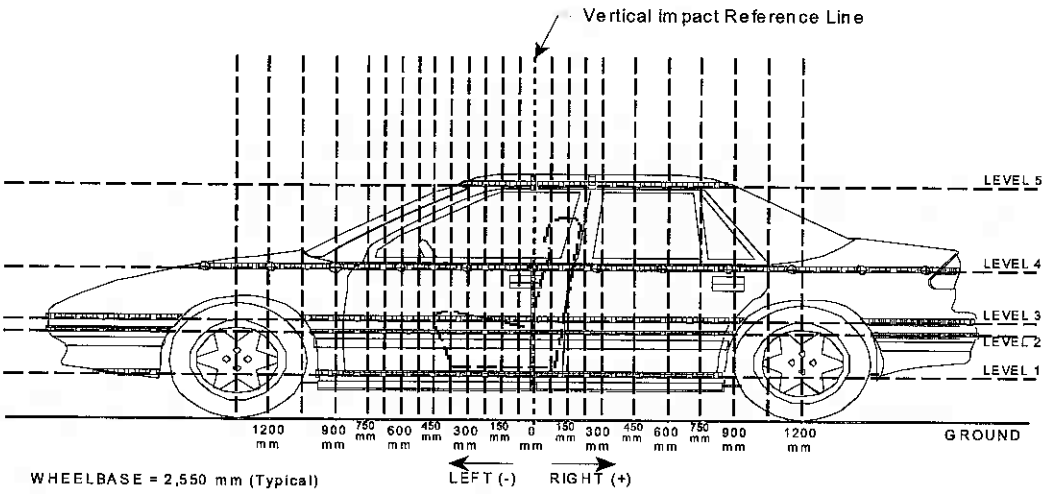
DATA SHEET NO. 9

VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009

PRETEST AND POST TEST EXTERIOR PROFILE MEASUREMENTS



LEFT SIDE VIEW

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

Level	Measurement Description	Units	Height Above Ground
5	Window	mm	1595
4	Window Sill	mm	1110
3	Mid Door	mm	722
2	Occupant H-Point	mm	643
1	Sill Top	mm	295

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1650				298					299					1	
-1500				284					285					1	
-1350				268					280					12	
-1200				254					273					19	
-1050		137	136	238			152	149	262			15	13	24	
-900	165	156	156	230		182	168	166	238		17	12	10	8	
-825	162	156	155	227		171	160	159	226		9	4	4	-1	
-750	161	155	153	223		194	180	182	238		33	25	29	15	
-675	160	154	152	220		211	205	205	246		51	51	53	26	
-600	160	154	151	215		235	230	234	274		75	76	83	59	
-525	159	153	151	214		254	256	257	304		95	103	106	90	
-450	159	152	149	210		277	288	293	335		118	136	144	125	
-375	158	151	148	211	288	308	325	330	379	437	150	174	182	168	49
-300	158	150	148	212	384	349	360	366	382	459	191	210	218	170	75
-225	158	150	148	209	380	391	405	405	444	483	233	255	257	235	103
-150	158	150	148	208	378	457	465	467	483	520	299	315	319	275	142
-75	158	150	147	208	376	499	512	514	524	551	341	362	367	316	175
-0	159	150	147	210	376	517	529	533	544	571	358	379	386	334	195
75	159	149	148	208	376	493	502	503	512	550	334	353	355	304	174
150	159	149	148	209	376	435	445	443	452	545	276	296	295	243	169
225	160	150	149	208	375	378	373	373	400	531	218	223	224	192	156
300	159	150	149	211	375	303	306	308	370	511	144	156	159	159	136
375	159	151	149	211	374	285	288	288	353	496	126	137	139	142	122
450	160	152	149	212	374	268	272	269	342	482	108	120	120	130	108
525	161	152	151	215	375	253	255	253	328	470	92	103	102	113	95
600	163	153	152	214	375	236	238	235	267	458	72	85	83	53	83
750	165	155	154	216	377	201	200	198	290	434	36	45	44	74	57
900	168	158	155	217	379	167	160	162	269	413	-1	2	7	52	34
1050	172	160	159	221	381	140	159	131	252	399	-32	-1	-28	31	18
1200		148	152	226	384		143	124	231	390		-5	-28	5	6
1350			145	230	388			145	217	390			0	-13	2
1500				235	392				237	392				2	0

Reference plane is parallel to test vehicle longitudinal centerline

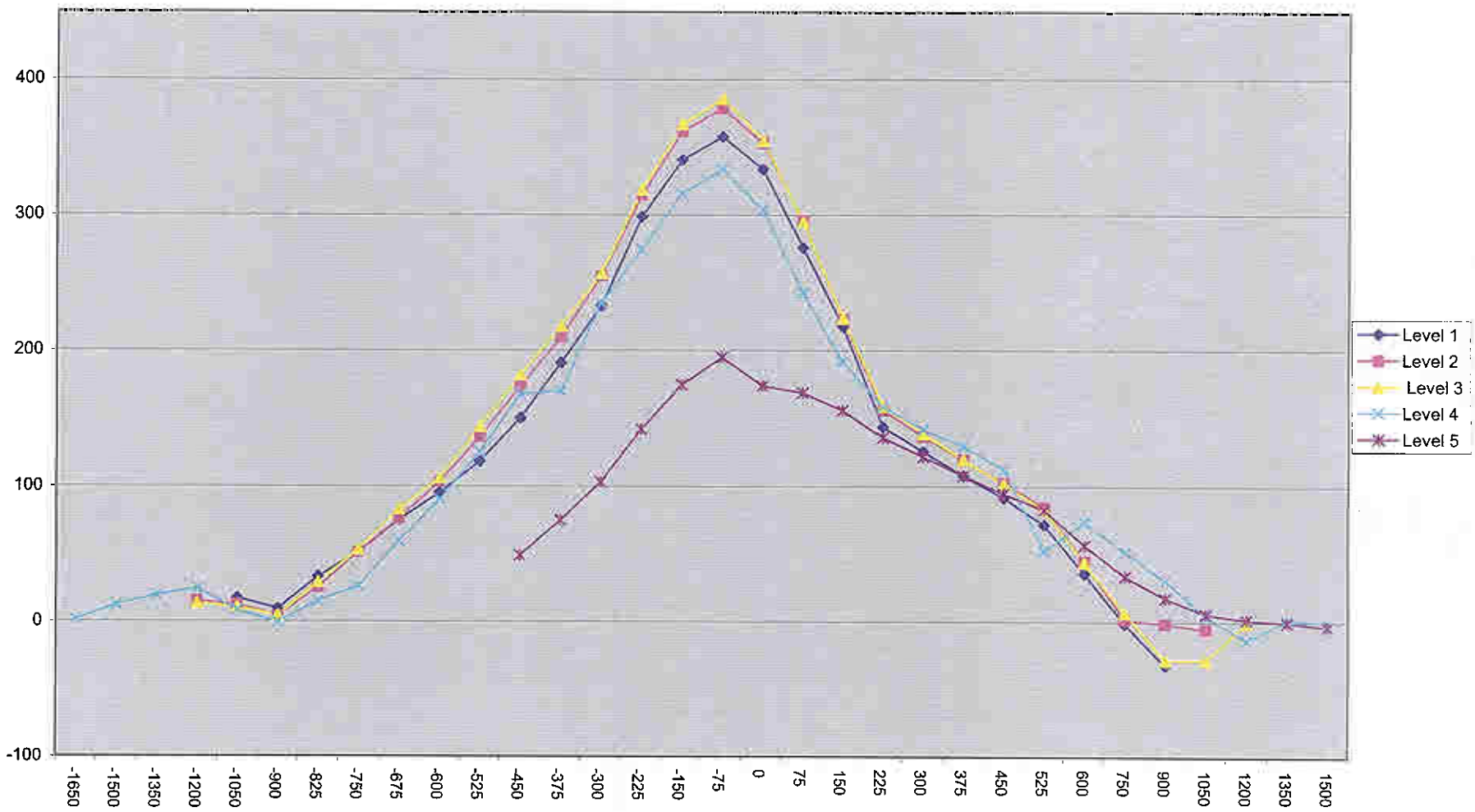
Units = mm

Given dimensions = Reference plane to car body

DATA SHEET NO. 10... (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P
NHTSA No. C90210
Test Date: March 13, 2009

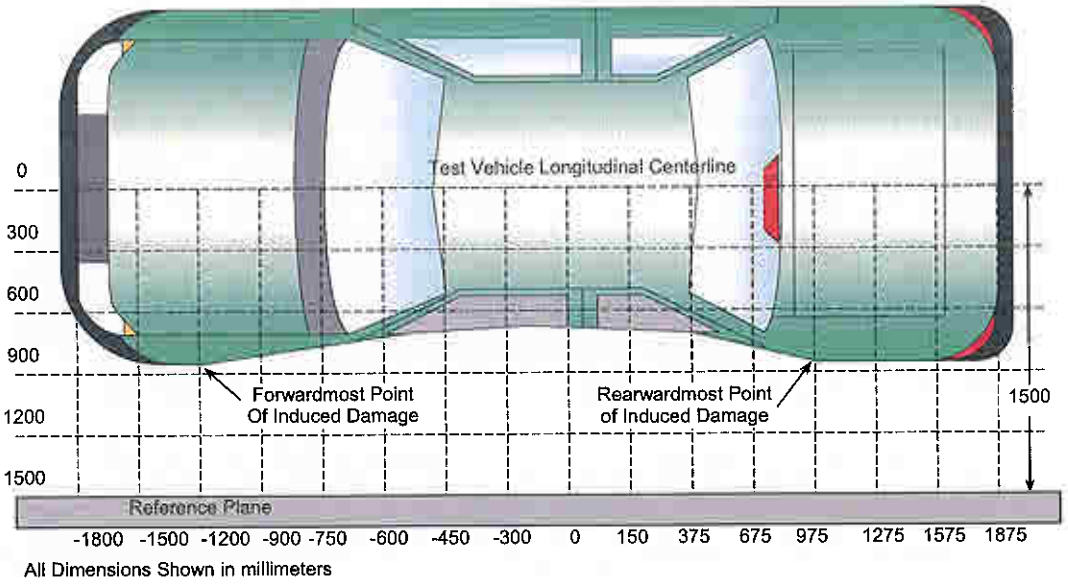


DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009



TOP VIEW

Damage Profile Distances

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	1500	4	235	237	2
2	870	4	217	273	56
3	250	3	149	351	202
4	-390	3	148	322	174
5	-1020	4	236	256	20
6	-1650	4	298	299	1

Reference plane is parallel to test vehicle longitudinal centerline

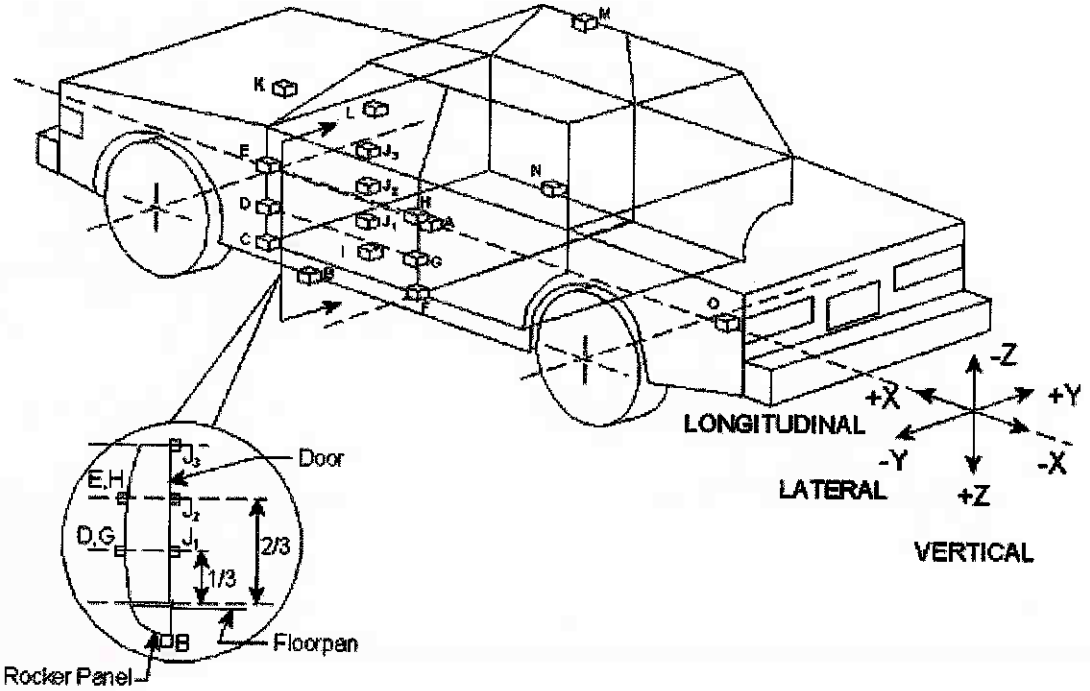
Given dimensions = Reference plane to car body

DATA SHEET NO. 12

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009



No.	Location
A	Vehicle CG
B	Left Floor Sill
C	A Pillar Sill
D	A Pillar Low
E	A Pillar Mid
F	B Pillar Sill
G	B Pillar Low
H	B Pillar Mid
I	Driver Seat

No.	Location
J1	Driver Door Lower / Knee
J2	Driver Door Mid / Pelvis
J3	Driver Door Upper / Rib
K	Engine
L	Firewall
M	Right Roof
N	Right Floor Sill
O	Rear Deck

DATA SHEET NO. 12... (continued)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2009 Ford Flex SE FWD NHTSA No. C90210
Test Program: FMVSS 201P Test Date: March 13, 2009

VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Peak Values (G's)				
		Axis	Max	Time	Min	Time
A	Vehicle CG	X	10.0	114	-15.7	103
		Y	51.7	26	-41.9	30
		Z	26.4	35	-16.8	75
		RES	52.5	26		
B	Left Floor	Y	20.9	84	-7.9	88
C	A Pillar Sill	Y	24.7	84	-7.1	88
D	A Pillar Low	Y	15.4	84	-0.8	4
E	A Pillar Mid	Y	16.0	42	-1.8	3
F	B Pillar Sill	Y	39.3	23	-2.6	14
G	B Pillar Low	Y	53.4	21	-8.7	14
H	B Pillar Mid	Y	61.8	21	-14.9	14
I	Driver Seat	Y	79.9	30	-18.9	47
J1	Driver Door Lower / Knee	Y				
J2	Driver Door Mid / Pelvis	Y				
J3	Driver Door Upper / Rib	Y				
K	Engine	X	9.2	89	-10.8	42
		Y	11.7	49	-2.0	216
L	Firewall	Y	12.4	85	-1.1	274
M	Right Roof	Y	25.2	38	-11.5	48
N	Right Floor Sill	Y	18.3	44	-10.5	32
O	Rear Deck	X	6.0	26	-4.5	20
		Y	10.4	49	-1.1	196

Positive Acceleration Polarities: Longitudinal (X) = + Forward
(Conforms to SAE J211) Lateral (Y) = + Right
Vertical (Z) = + Down

DATA SHEET NO. 12... (continued)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2009 Ford Flex SE FWD NHTSA No. C90210
Test Program: FMVSS 201P Test Date: March 13, 2009

VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)			
		Axis	Pre-Test	Post-Test	Difference
A	Vehicle CG	X	2788	2785	-3
		Y	0	0	0
		Z	460	468	-8
B	Left Floor Sill	X	3288	3293	5
		Y	-760	-742	18
		Z	245	253	-8
C	A Pillar Sill	X	3610	3531	-79
		Y	-760	-752	8
		Z	225	253	-28
D	A Pillar Low	X	3533	3392	-141
		Y	-712	-703	9
		Z	523	532	-9
E	A Pillar Mid	X	3540	3434	-106
		Y	-833	-725	108
		Z	917	935	-18
F	B Pillar Sill	X	2463	2453	-10
		Y	-760	-555	205
		Z	260	255	5
G	B Pillar Low	X	2434	2461	27
		Y	-742	-625	117
		Z	560	575	-15
H	B Pillar Mid	X	2433	2473	40
		Y	-738	-629	109
		Z	835	852	-17
I	Driver Seat	X	2646	2659	13
		Y	-592	-495	97
		Z	520	438	-82
J1	Driver Door Lower / Knee				
J2	Driver Door Mid / Pelvis				
J3	Driver Door Upper / Rib				
K	Engine	X	4258	4165	-93
		Y	0	0	0
		Z	928	949	-21
L	Firewall	X	3988	3979	-9
		Y	0	0	0
		Z	946	958	-12
M	Right Roof	X	2584	2605	21
		Y	650	652	2
		Z	1669	1685	-16
N	Right Floor	X	2800	2805	5
		Y	760	253	507
		Z	255	265	-10
O	Rear Deck	X	920	922	2
		Y	0	0	0
		Z	494	497	-3

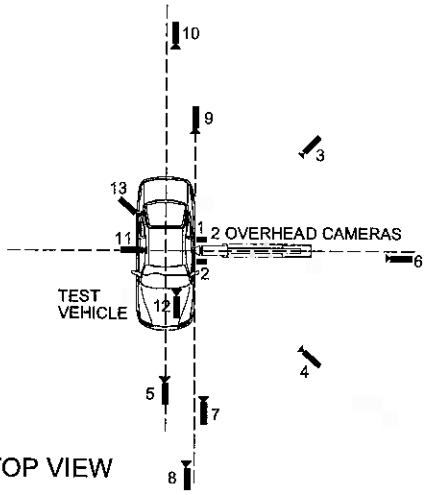
Ref. Points: X-Rear of Vehicle (+ forward); Y-Vehicle Centerline (+ to right); Z-Ground Plane (+ down)

DATA SHEET NO. 13

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009



TOP VIEW

No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Overall	380	0	5050	14	1000
2	Overhead Close-Up	25	-120	5050	50	1000
3	Left Side 45° Rearward Pole View	-2385	3985	1345	20	1000
4	Right Side 45° Forward Pole View	-2285	-3895	1310	20	1000
5	Real Time				13	24
6*	Left Side Rear Pole View					
7	Front Ground Level Vehicle/Pole Impact	280	-1200	1620	35	1000
8	Front Ground Level Vehicle Roof Targets and Vehicle/Pole Impact	35	-1595	1365	24	1000
9	Rear Ground Level Vehicle/Pole Impact	-75	1715	1375	24	1000
10	Rear Ground Level	260	1220	1630	50	1000
11	Test Vehicle Onboard Driver Side View				8	1000
12	Test Vehicle Onboard Driver Front View				12.5	1000
13	Test Vehicle Onboard Driver ¾ Rear View				8	1000

Reference Points X - + Forward of Impact
Y - + Right of Impact
Z - + Ground Plane Down

* Camera 6 was not used for this test.

DATA SHEET NO. 14

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Vehicle: 2009 Ford Flex SE FWD NHTSA No. C90210
Test Program: FMVSS 201P Test Date: March 13, 2009

Test Time: 10:10 AM Temperature at Time of Impact: 21°C

Stoddard Solvent Spillage Measurements

A. From impact until vehicle motion ceases: 0
(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0
(Maximum allowable = 5 ounces)

C. For the following 25 minutes: 0
(Maximum allowable = 1 oz./minute)

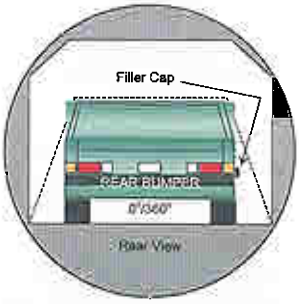
D. Spillage Details: None

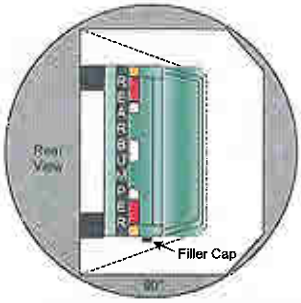
DATA SHEET NO. 15

FMVSS 301 STATIC ROLLOVER DATA SHEET

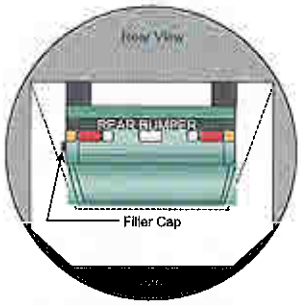
Test Vehicle: 2009 Ford Flex SE FWD
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009

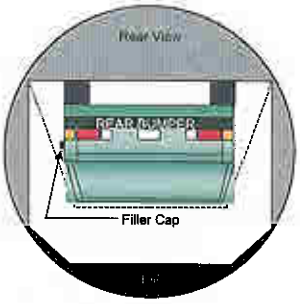




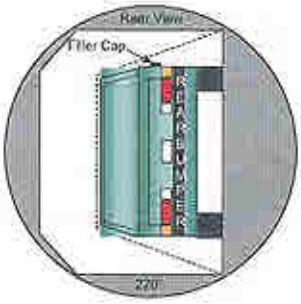
0° to 90°

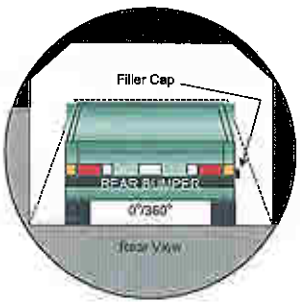


90° to 180°



180° to 270°





270° to 360°

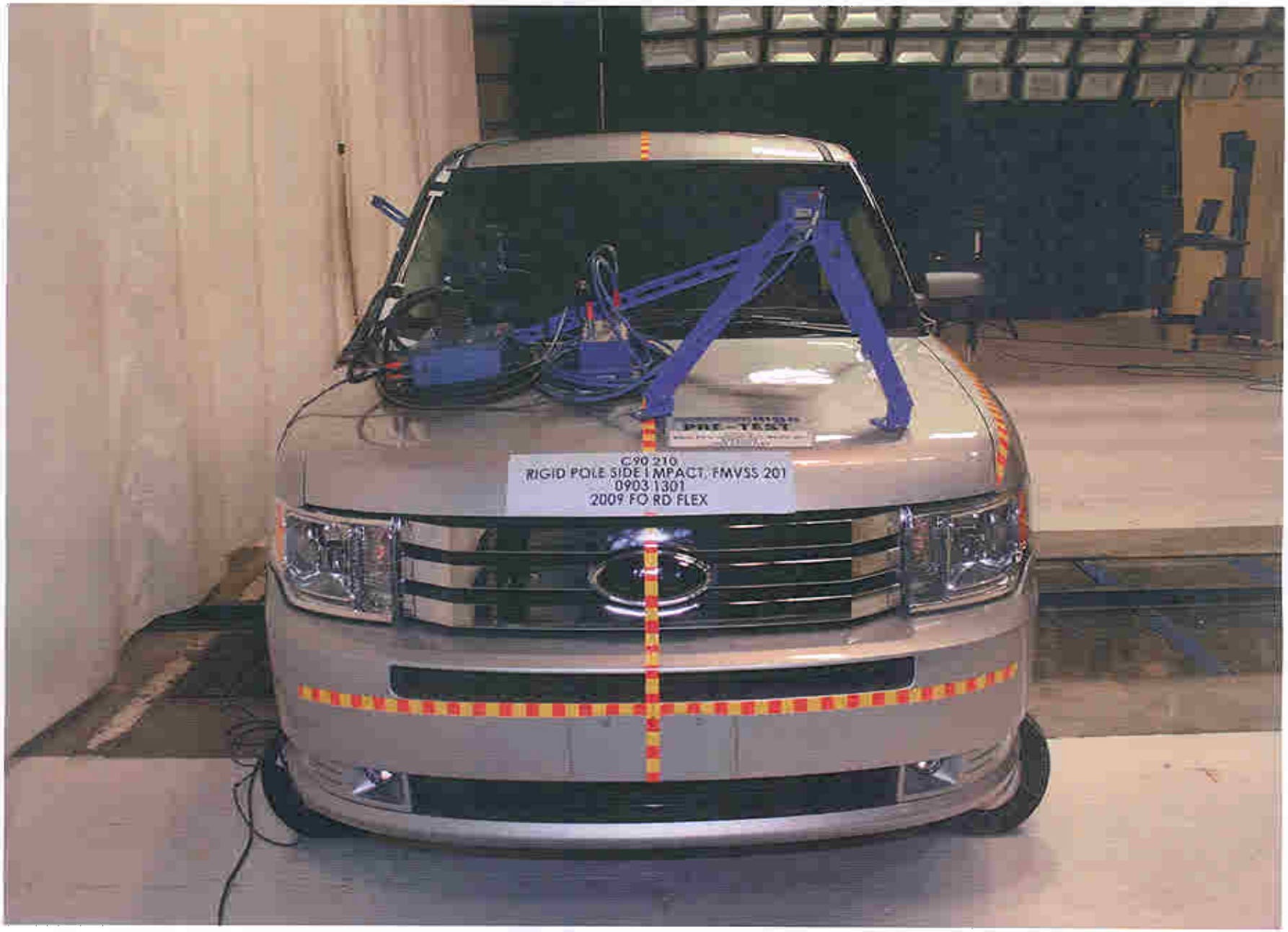
1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent Spillage locations: None

Rollover Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	122	300	0
90° to 180°	116	300	0
180° to 270°	110	300	0
270° to 360°	117	300	0

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS



Pre-Test Front View of Test Vehicle

Post-Test Front View of Test Vehicle

Pre-Test Rear View of Test Vehicle

Post-Test Rear View of Test Vehicle

Pre-Test Left Side View of Test Vehicle

Post-Test Left Side View of Test Vehicle

Pre-Test Right Side View of Test Vehicle

Post-Test Right Side View of Test Vehicle

Pre-Test Left Rear Three-Quarter View

Post-Test Left Rear Three-Quarter View

Pre-Test Left Front Three-Quarter View

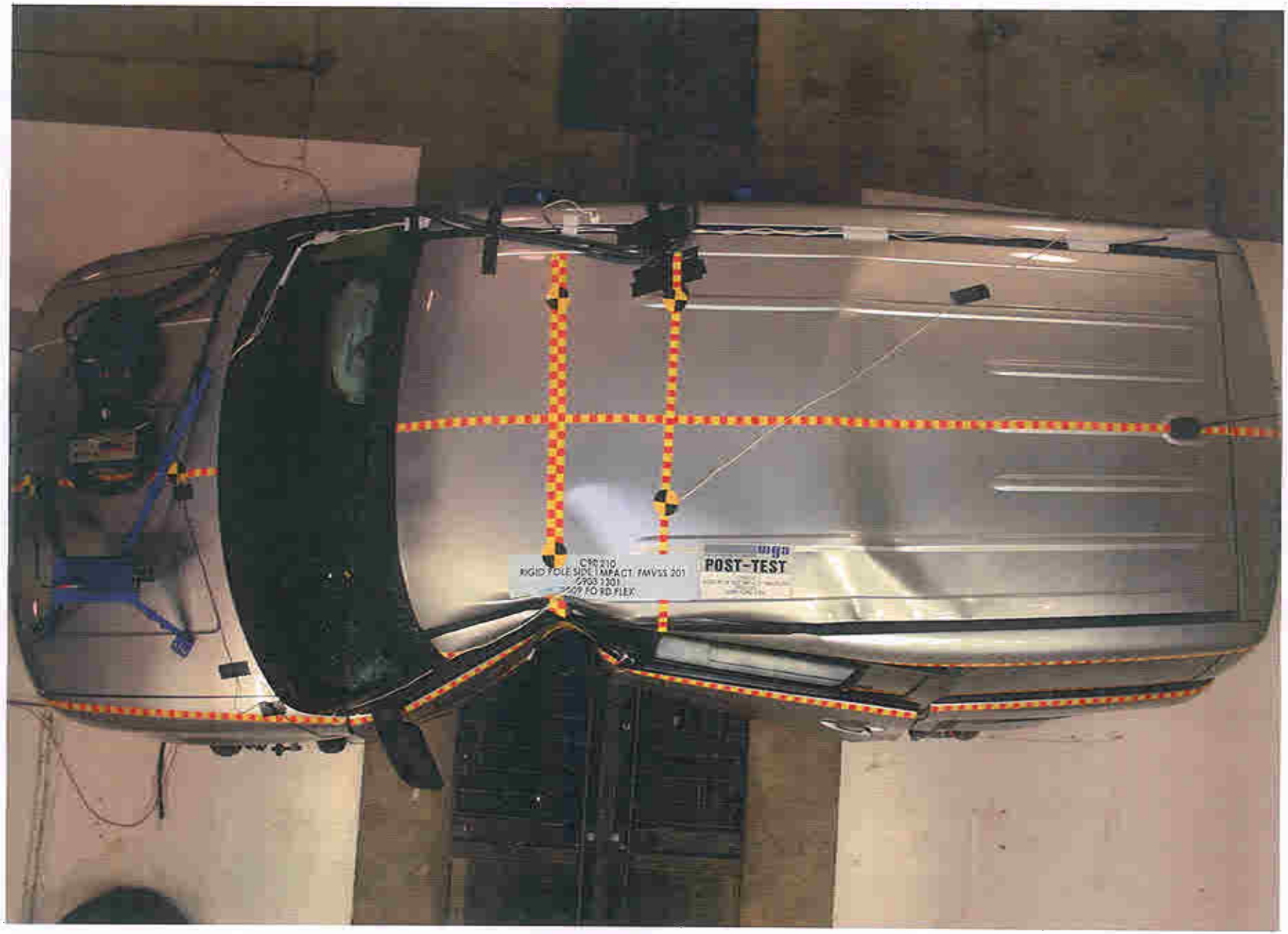
Post-Test Left Front Three-Quarter View

Post-Test Right Rear Three-Quarter View

Pre-Test Right Front Three-Quarter View

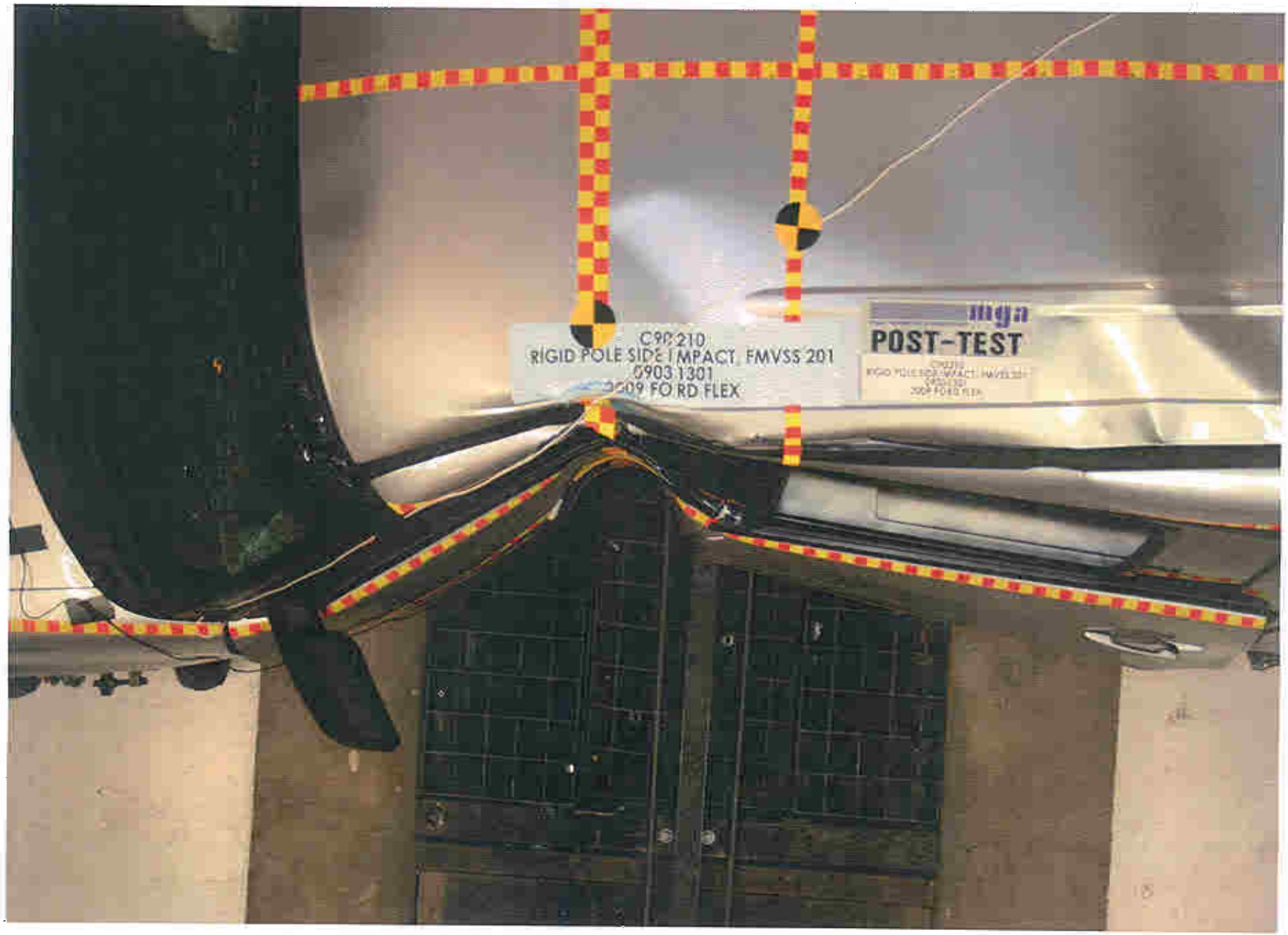
Post-Test Right Front Three-Quarter View

Pre-Test Overhead View of Test Vehicle

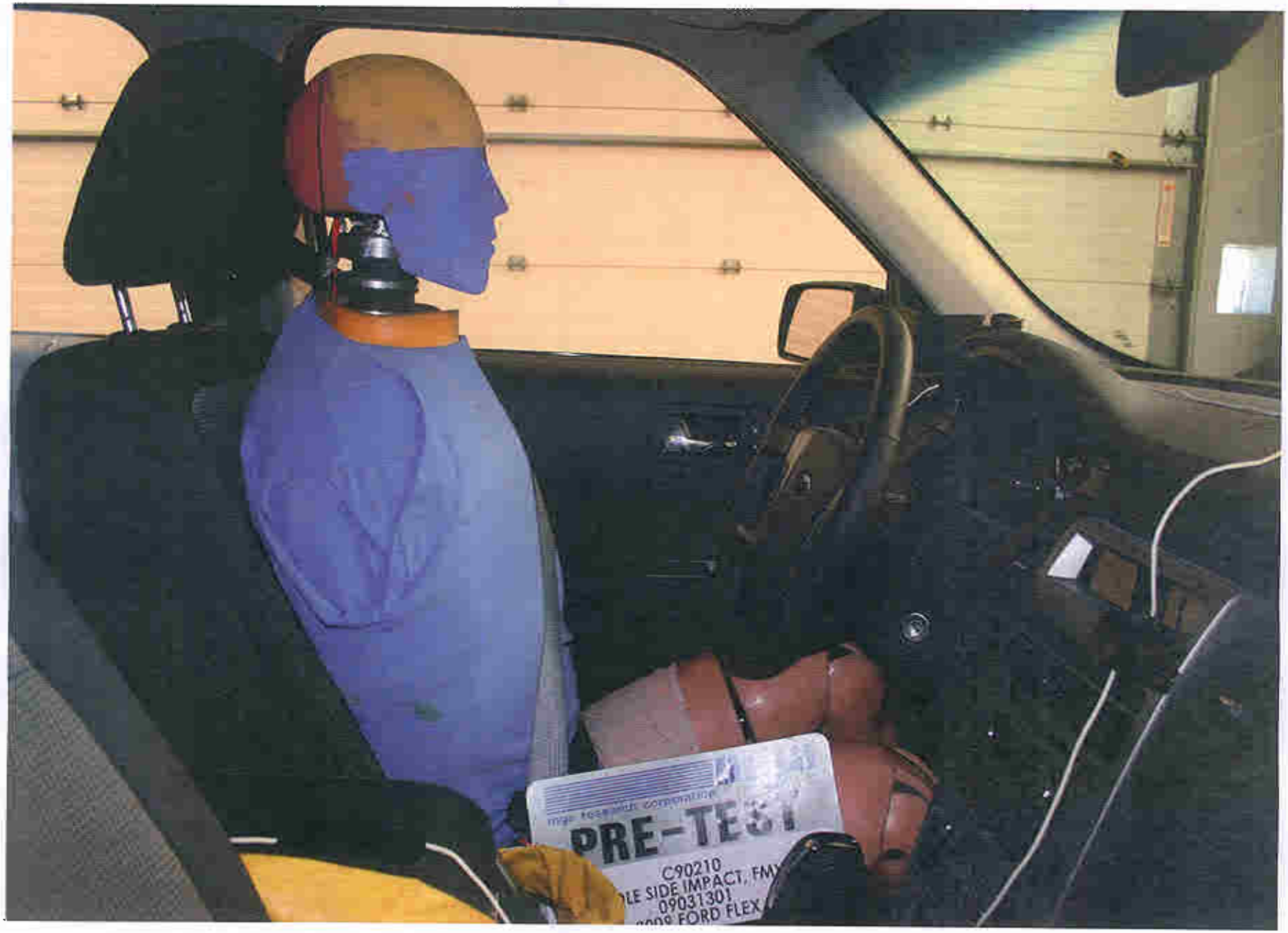


Post-Test Overhead View of Test Vehicle

Pre-Test Overhead View of Test Vehicle (Closeup)



Post-Test Overhead View of Test Vehicle (Closeup)



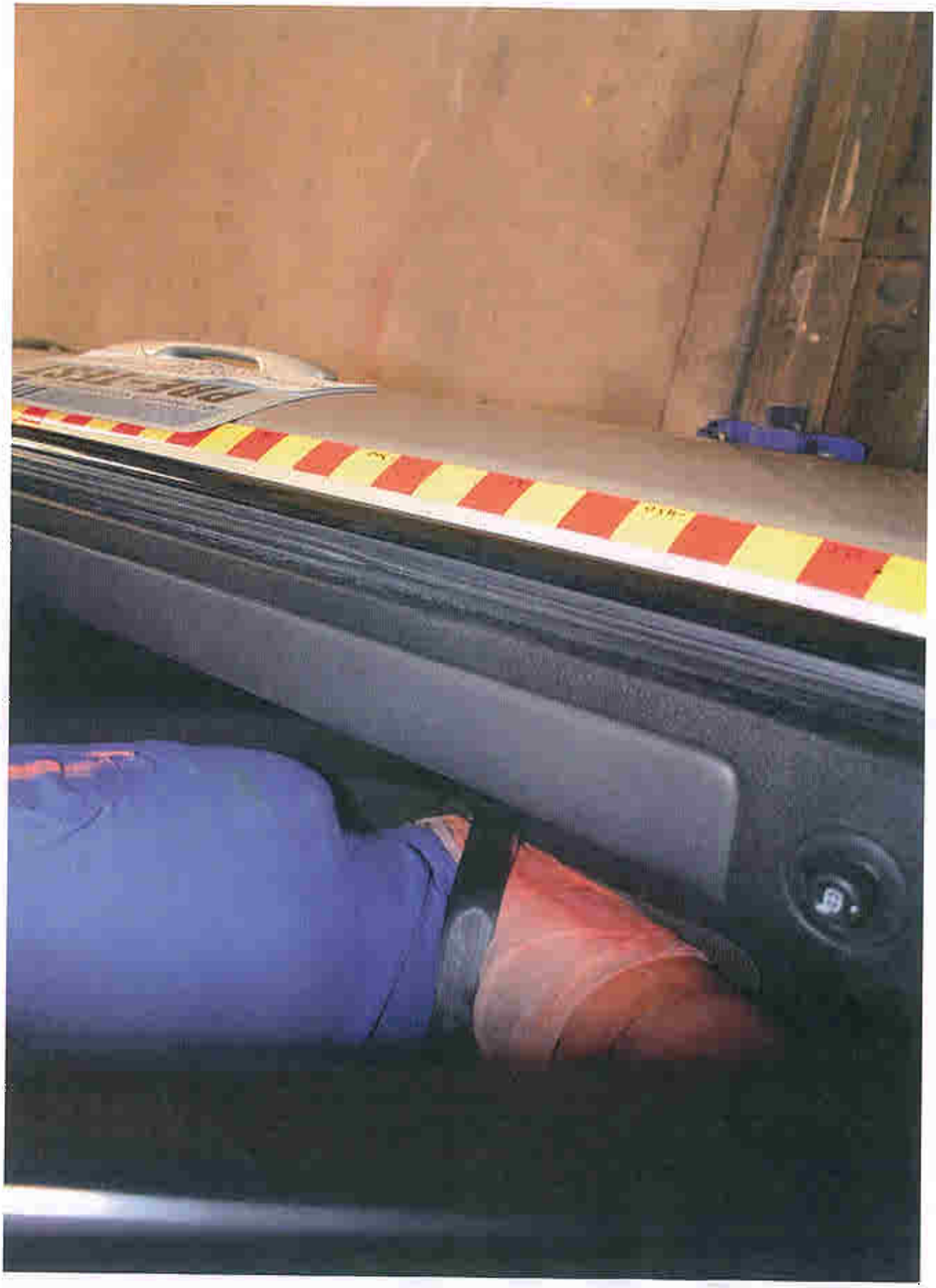
Pre-Test Driver Dummy Right Side View

Post-Test Driver Dummy Right Side View

Pre-Test Driver Dummy Left Side View

Post-Test Driver Dummy Left Side View

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

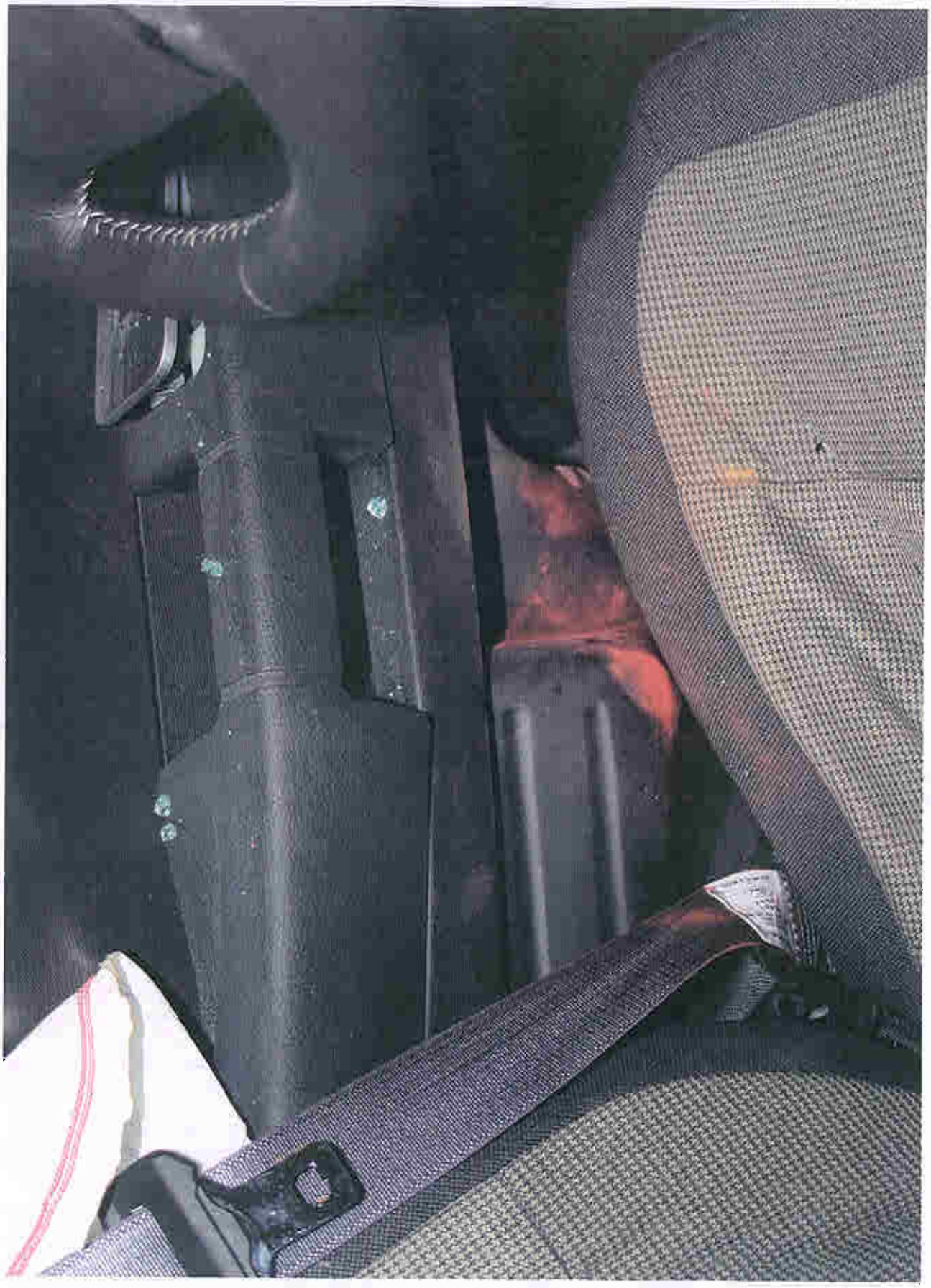


Pre-Test Driver Dummy Shoulder and Door Top View

Post-Test Driver Dummy Head Contact (CAB)

Post-Test Driver Dummy Head Contact (Headrest)

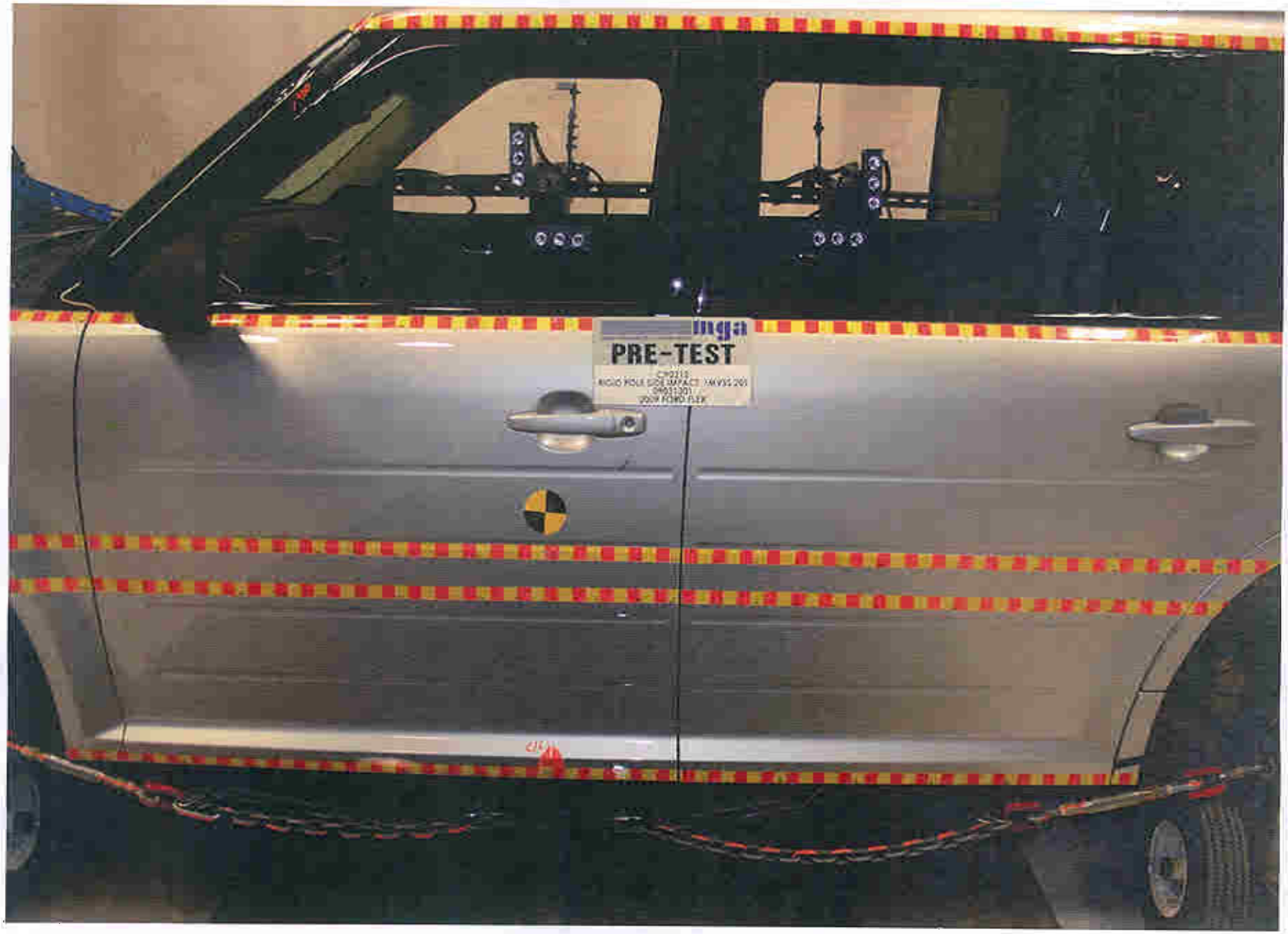
Post-Test Driver Dummy Upper Thorax Contact



Post-Test Driver Dummy Lower Thorax Contact

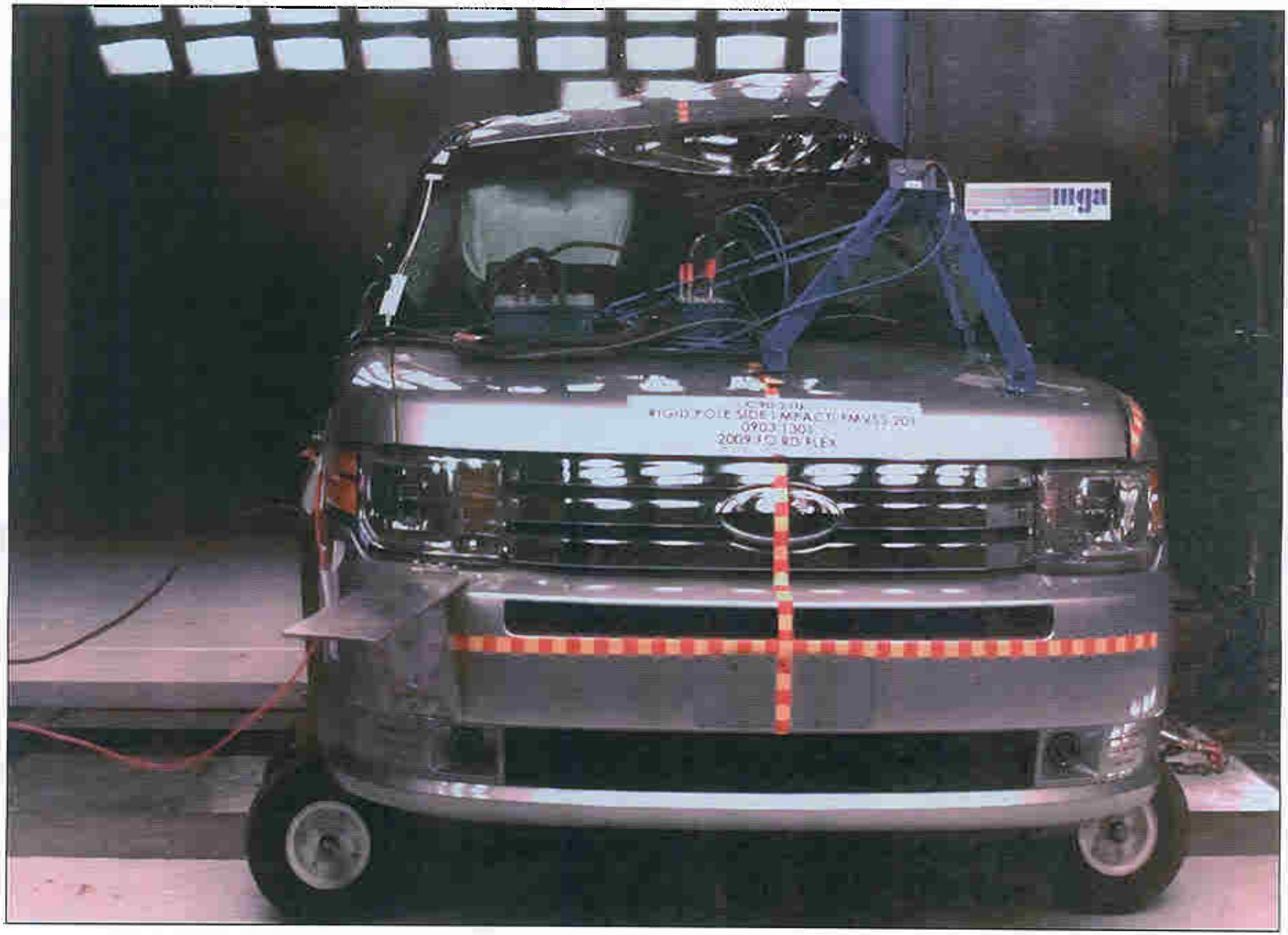
Post-Test Driver Dummy Contact

Post-Test Impact Point on Vehicle



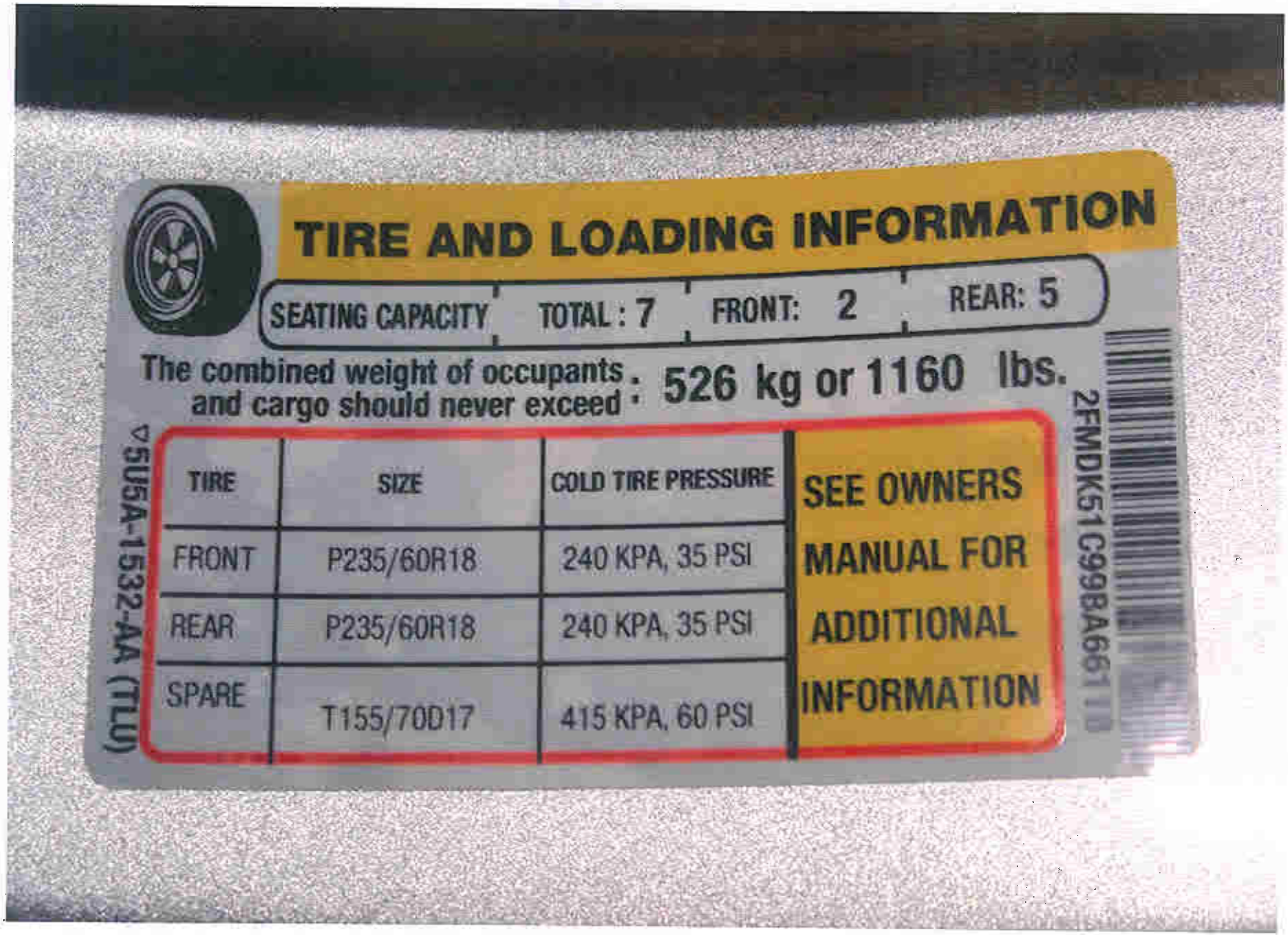
Pre-Test Impact Zone Close-up View

Post-Test Impact Zone Close-up View



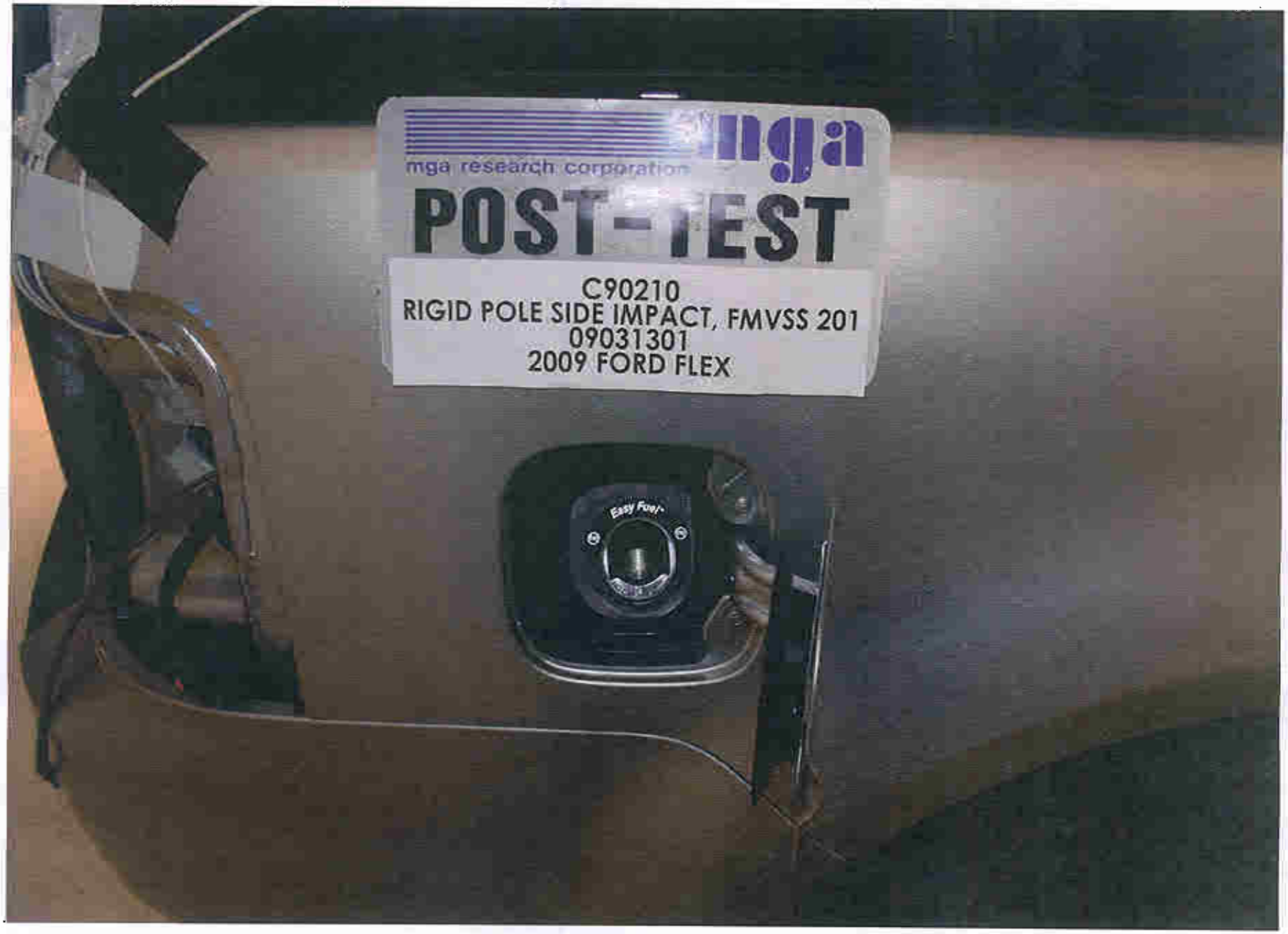
Vehicle Impact

Vehicle Certification Label



Tire Placard

Pre-Test Fuel Filler Cap

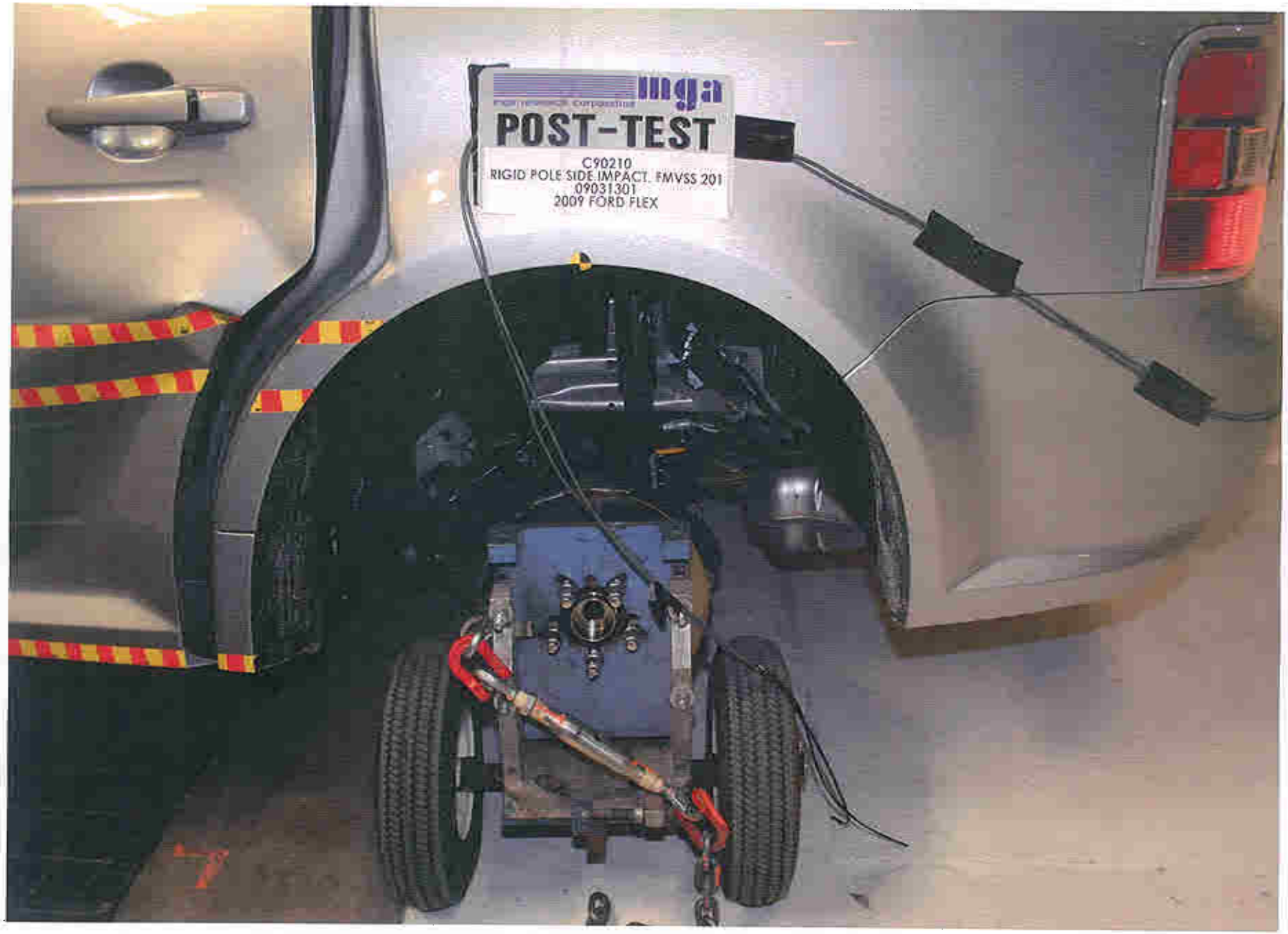


Post-Test Fuel Filler Cap

Pre-Test Left Front Wheel Dolly

Post-Test Left Front Wheel Dolly

Pre-Test Left Rear Wheel Dolly



Post-Test Left Rear Wheel Dolly

Pre-Test Right Front Wheel Dolly

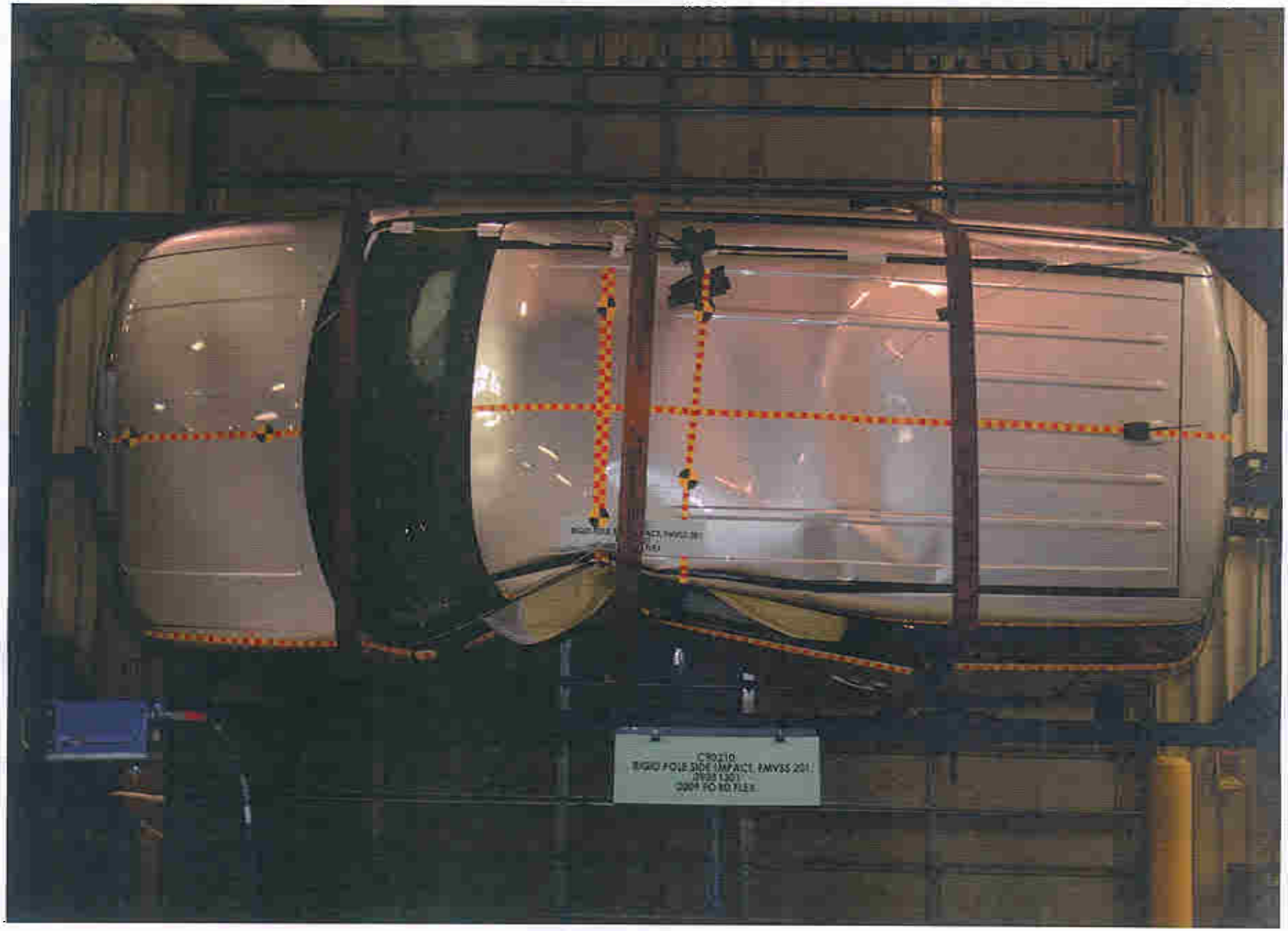
Post-Test Right Front Wheel Dolly

Pre-Test Right Rear Wheel Dolly

Post-Test Right Rear Wheel Dolly

Rollover 90 Degrees

Rollover 180 Degrees



Rollover 270 Degrees

Rollover 360 Degrees

APPENDIX B

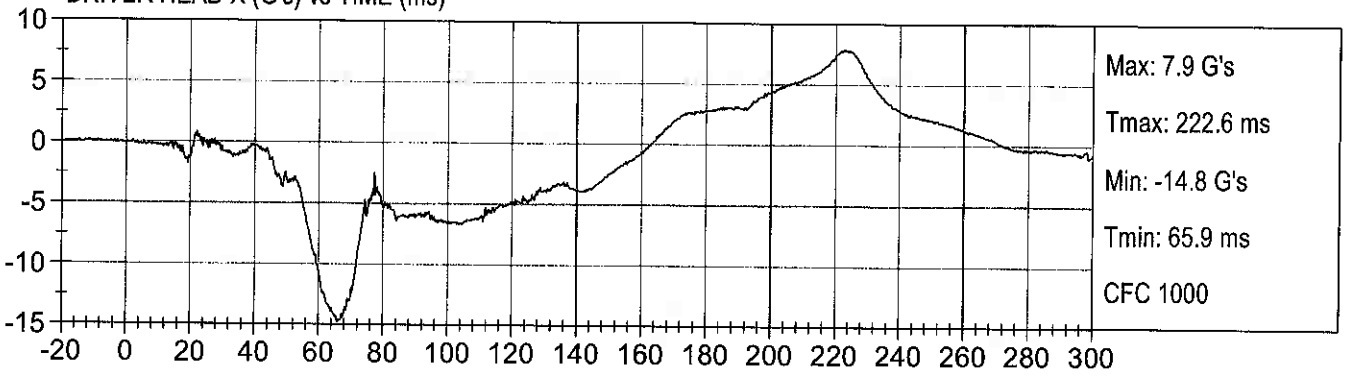
SID/HIII AND VEHICLE RESPONSE DATA

TABLE OF DATA PLOTS

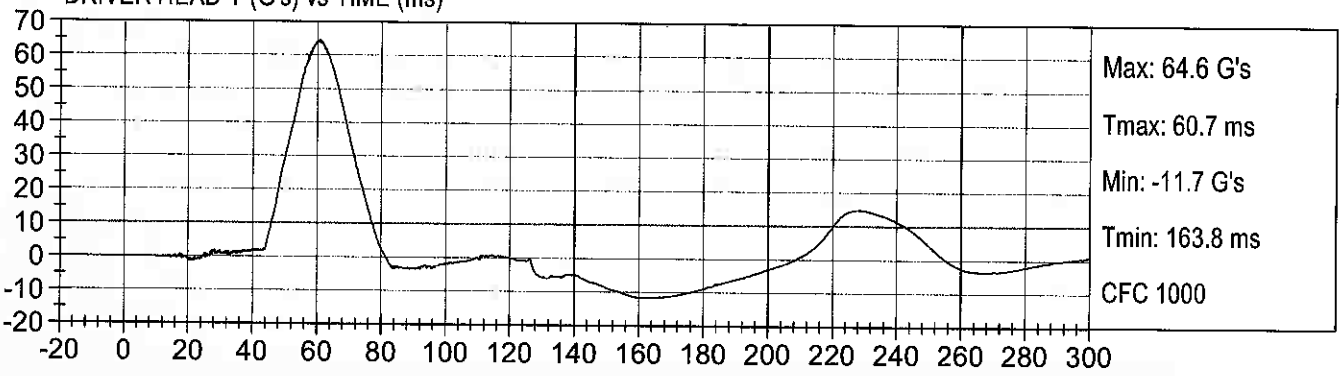
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

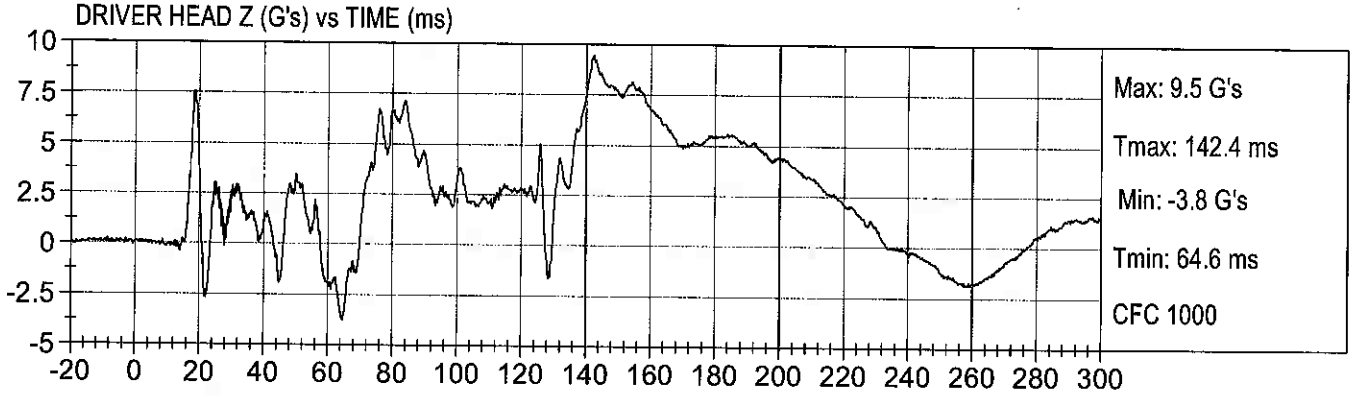
DRIVER HEAD X (G's) vs TIME (ms)



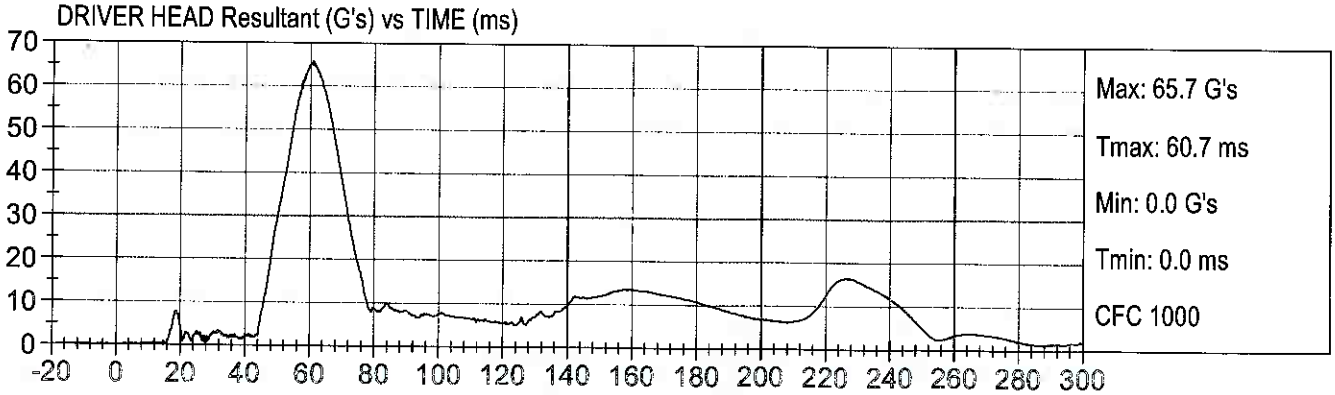
DRIVER HEAD Y (G's) vs TIME (ms)



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



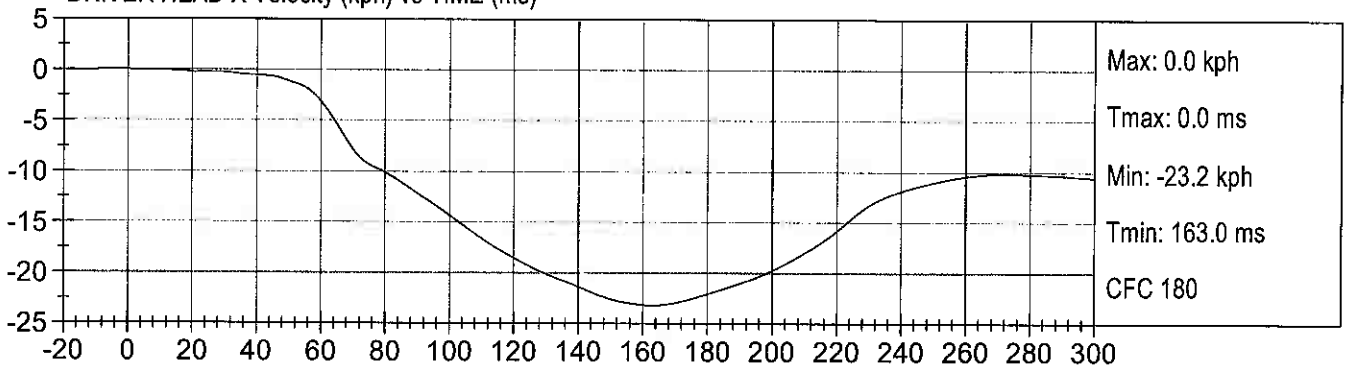
DRIVER HEAD Resultant (G's) vs TIME (ms)



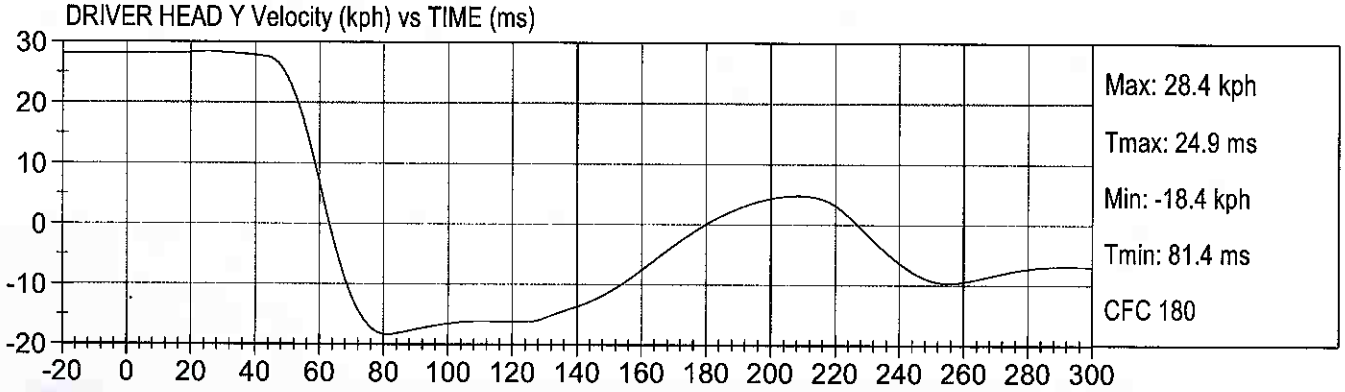
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

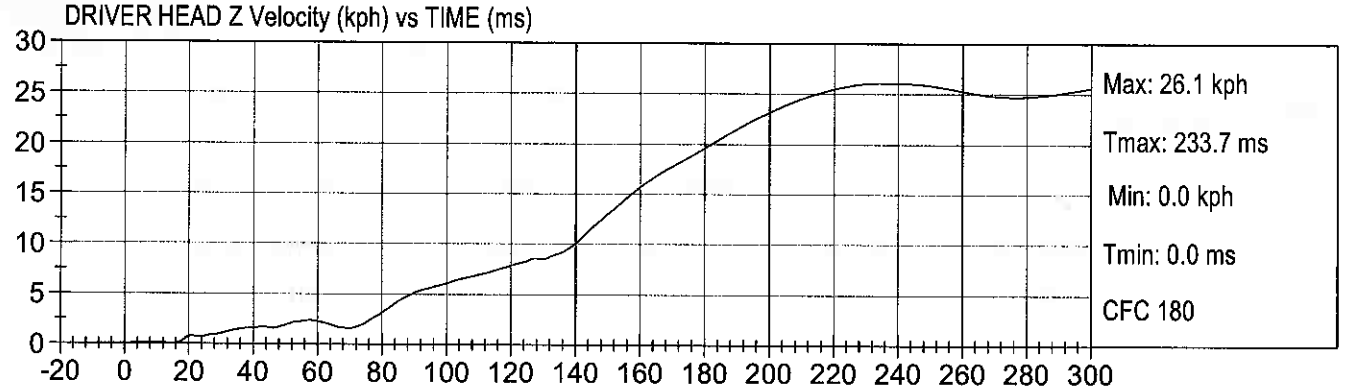
DRIVER HEAD X Velocity (kph) vs TIME (ms)



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



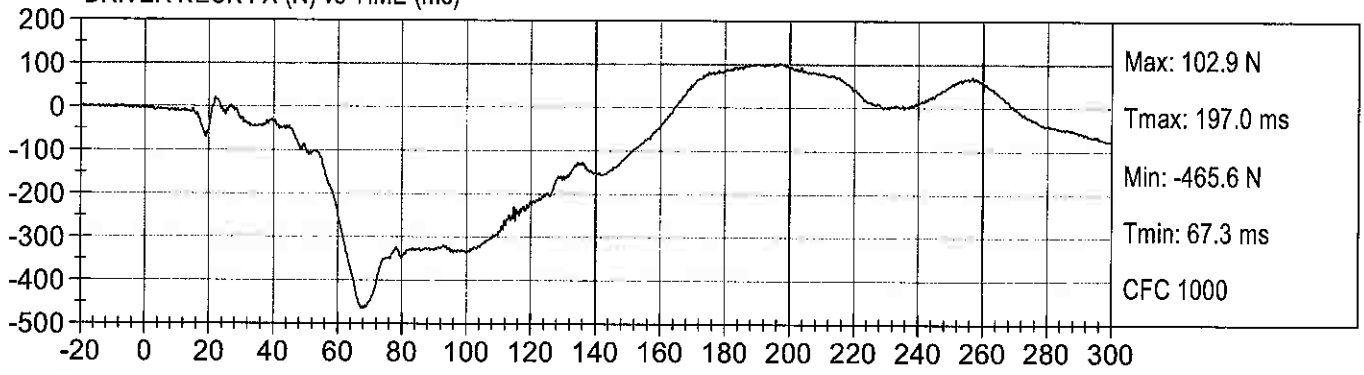
DRIVER HEAD Z Velocity (kph) vs TIME (ms)



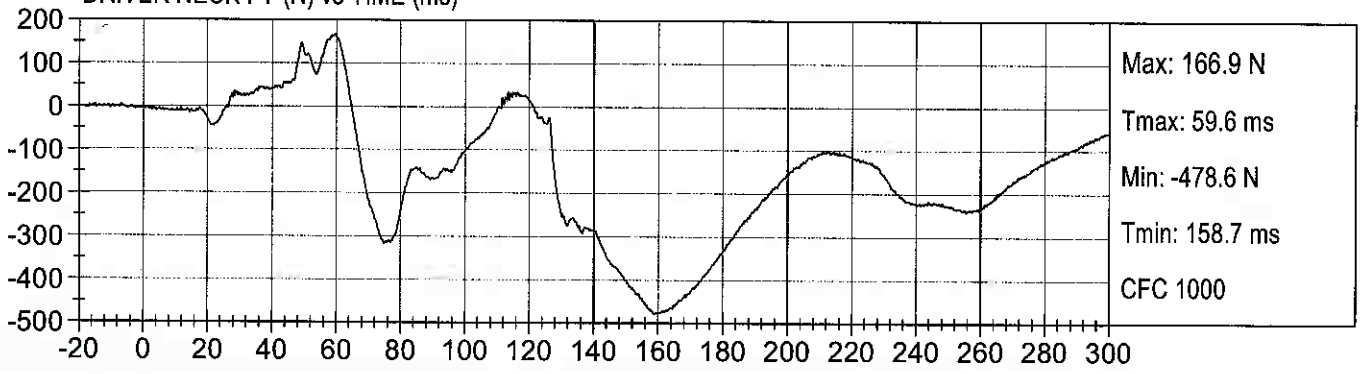
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

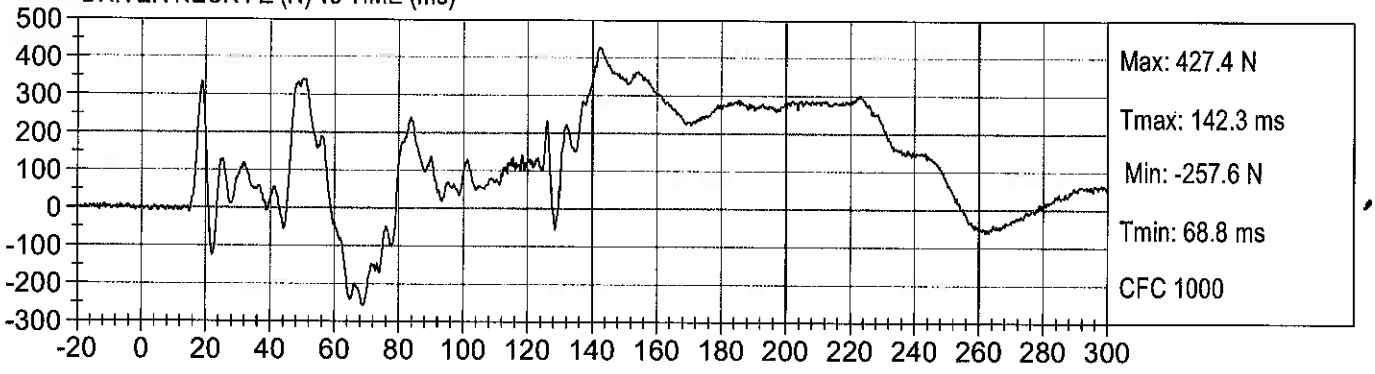
DRIVER NECK FX (N) vs TIME (ms)



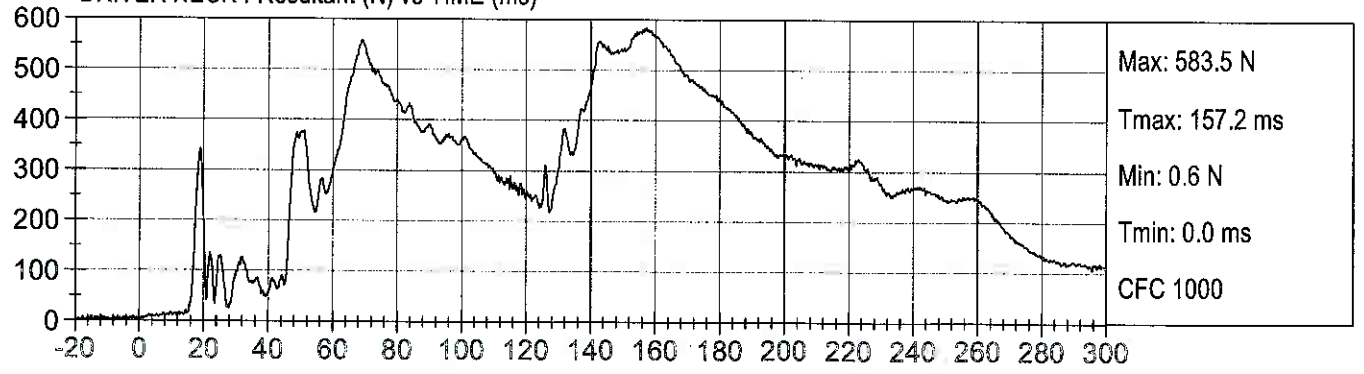
DRIVER NECK FY (N) vs TIME (ms)



DRIVER NECK FZ (N) vs TIME (ms)



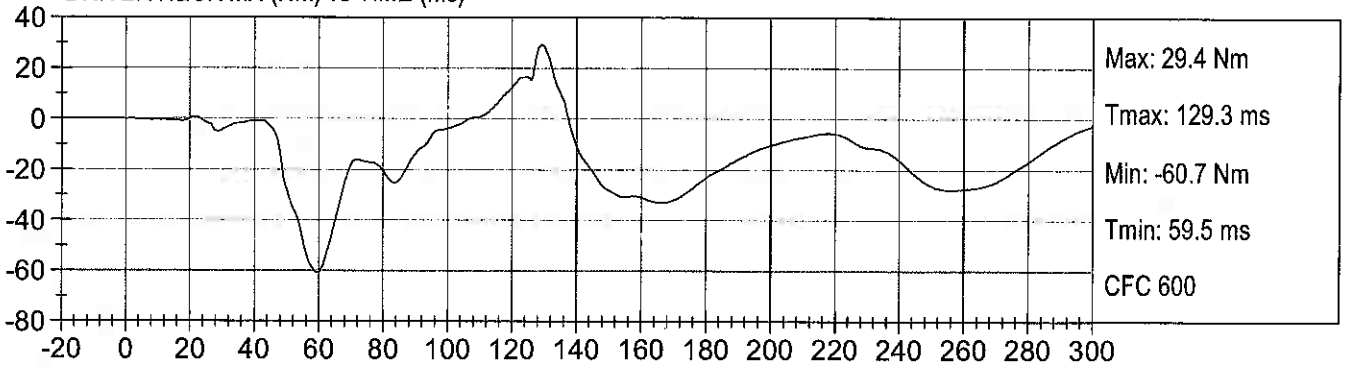
DRIVER NECK FResultant (N) vs TIME (ms)



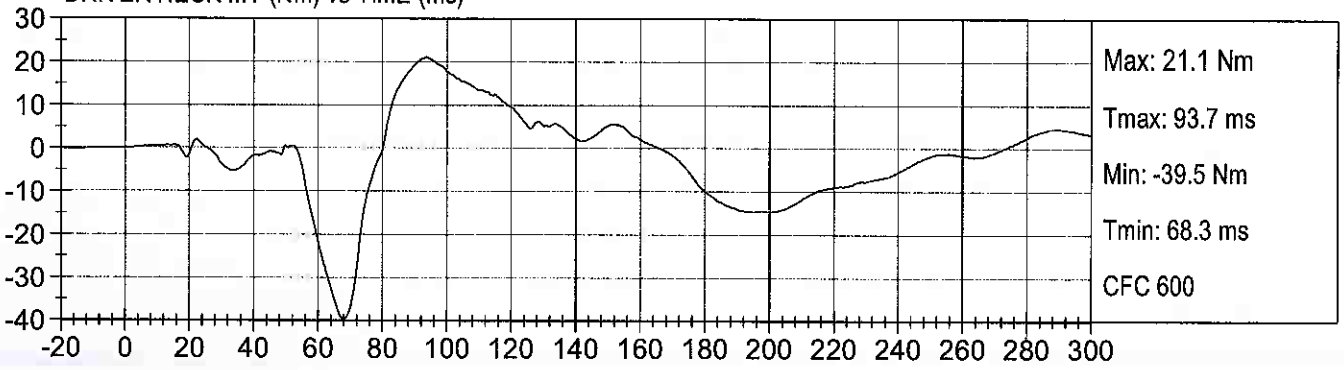
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

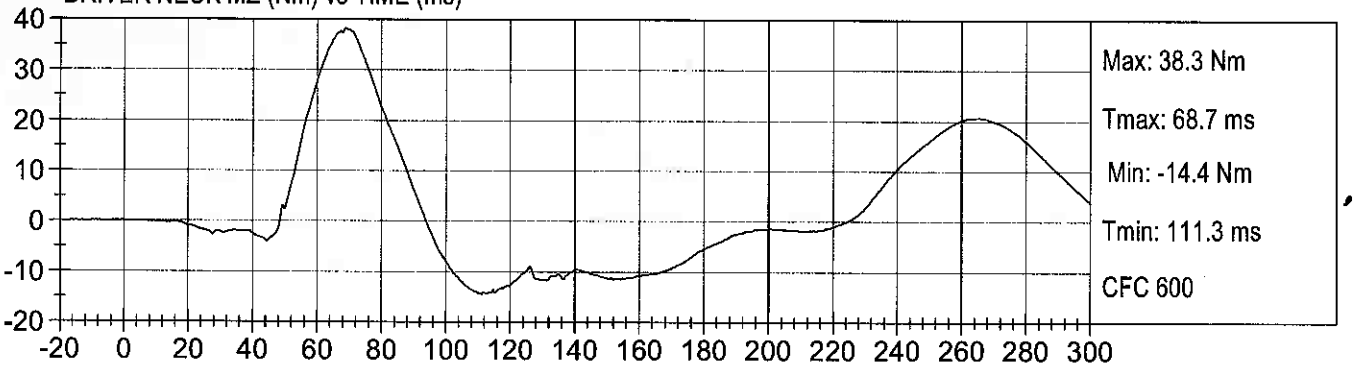
DRIVER NECK MX (Nm) vs TIME (ms)



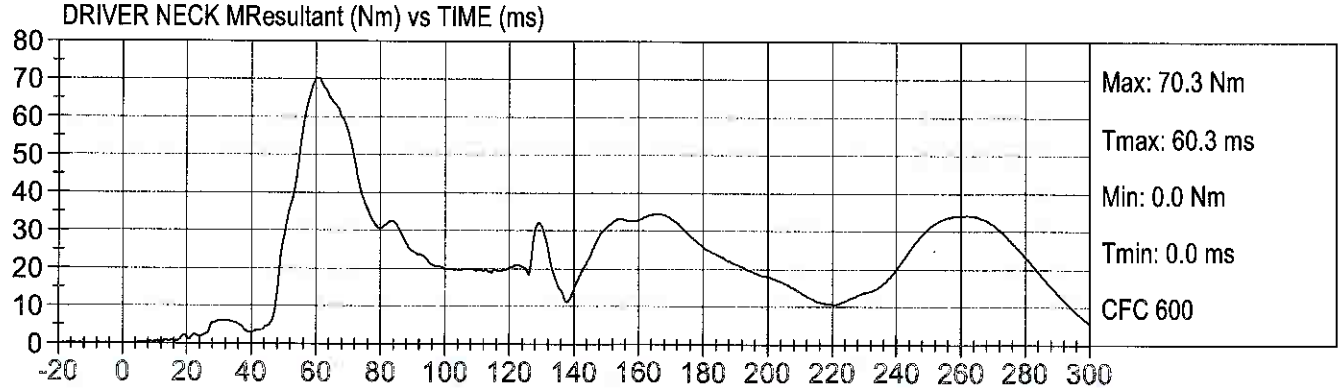
DRIVER NECK MY (Nm) vs TIME (ms)



DRIVER NECK MZ (Nm) vs TIME (ms)

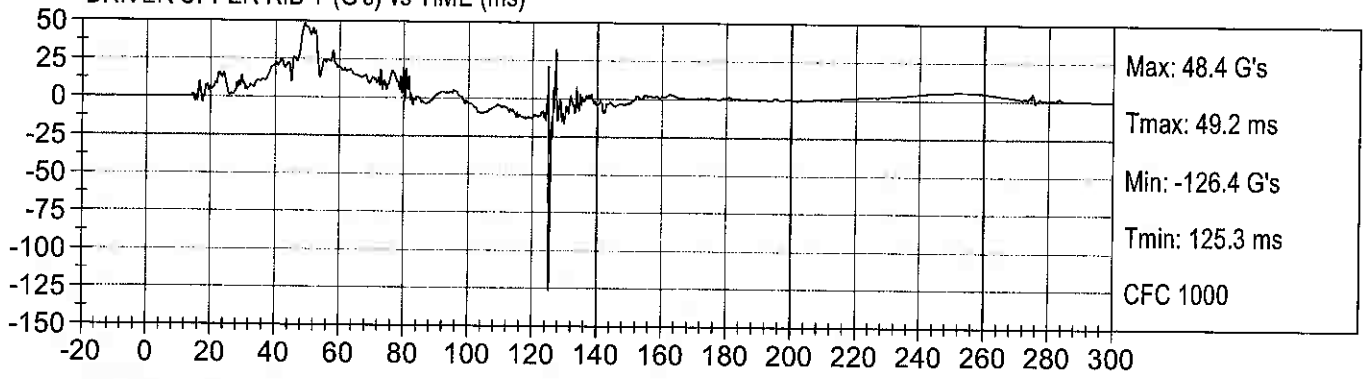


DRIVER NECK MResultant (Nm) vs TIME (ms)

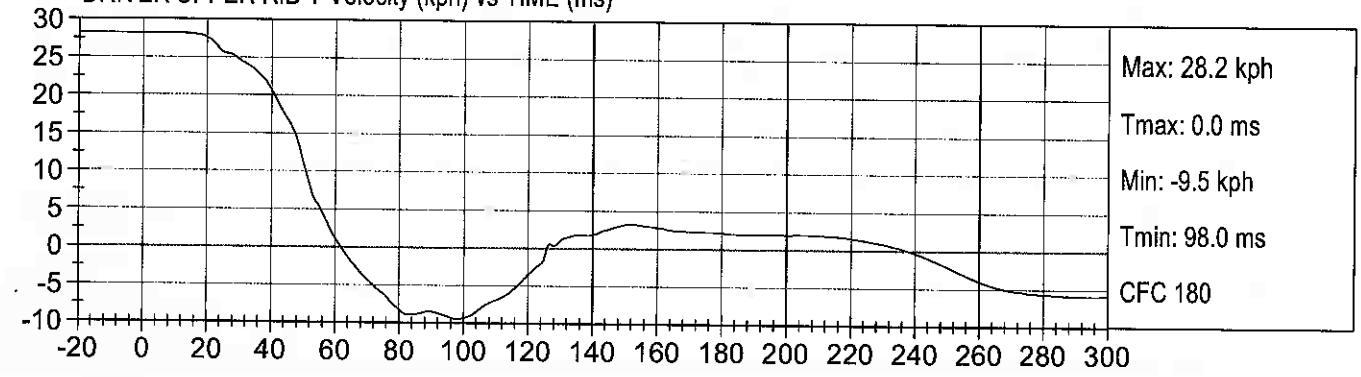


FMVSS 201 RIGID POLE
2009 FORD FLEX C90210
Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

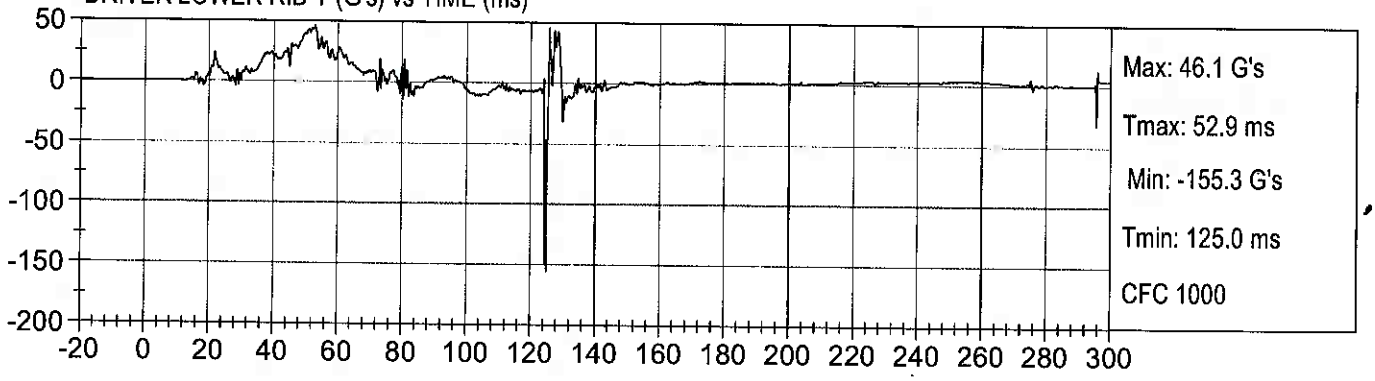
DRIVER UPPER RIB Y (G's) vs TIME (ms)



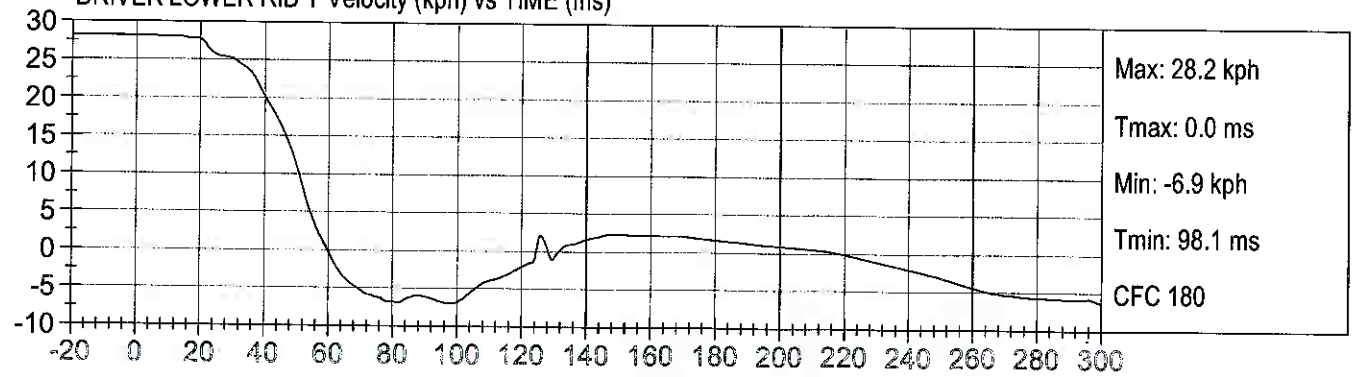
DRIVER UPPER RIB Y Velocity (kph) vs TIME (ms)



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



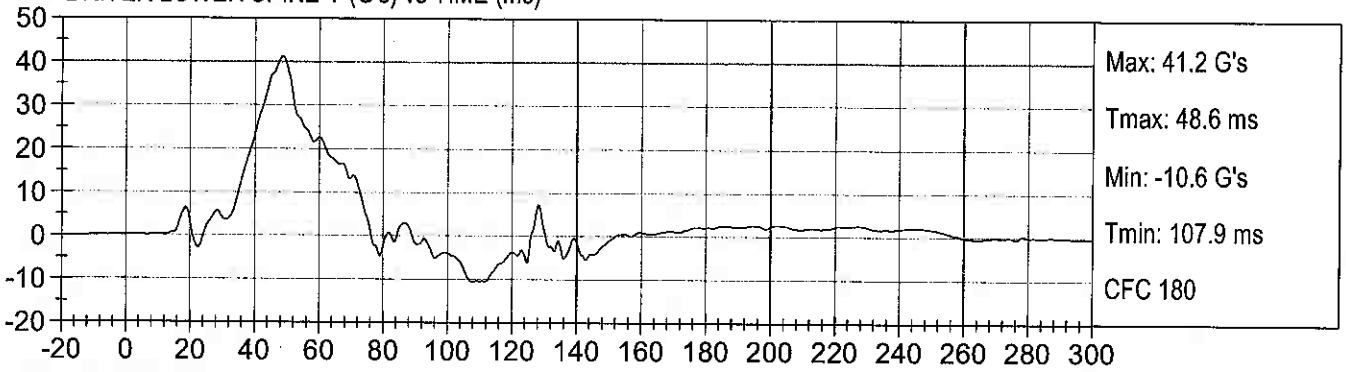
DRIVER LOWER RIB Y Velocity (kph) vs TIME (ms)



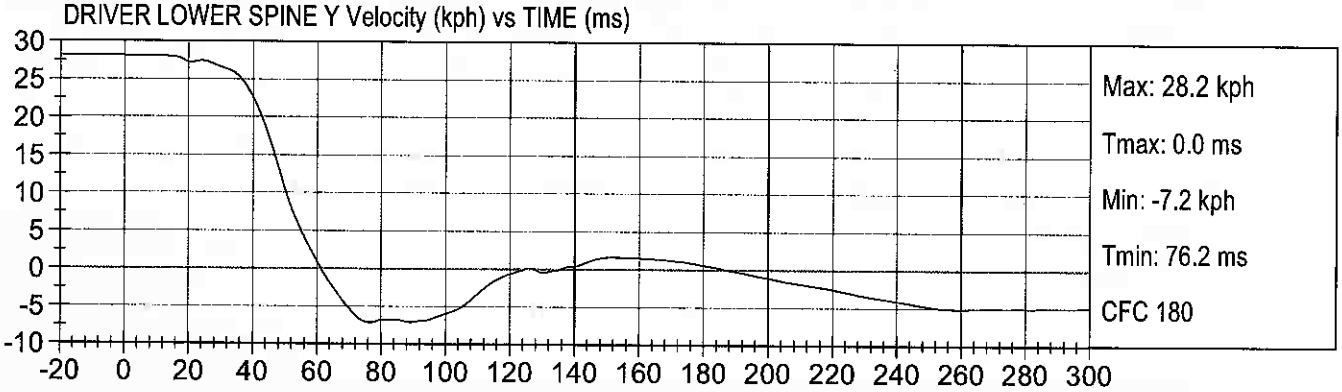
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

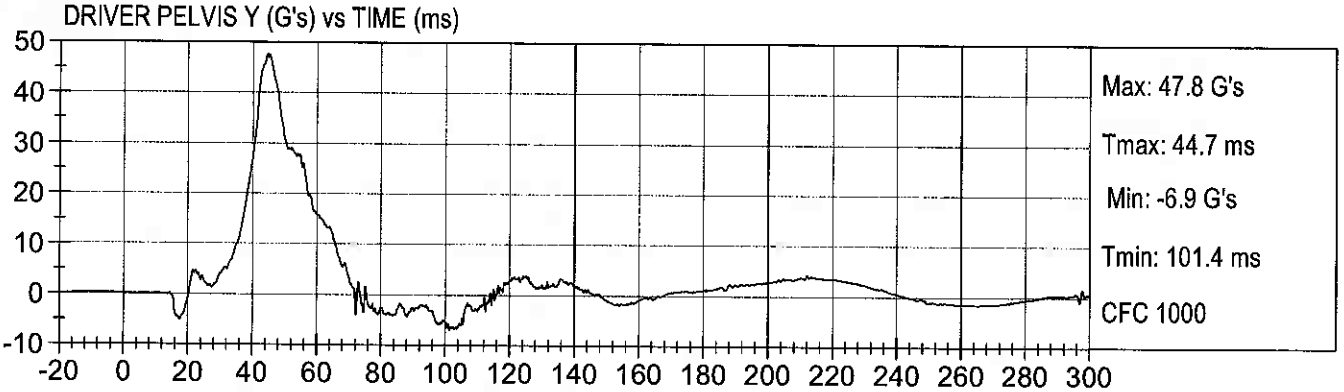
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



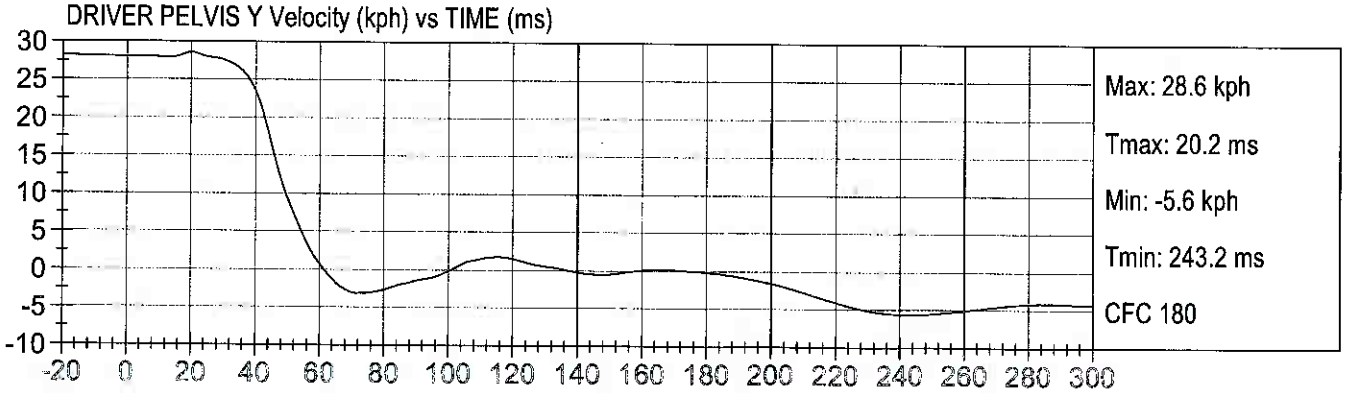
DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)



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



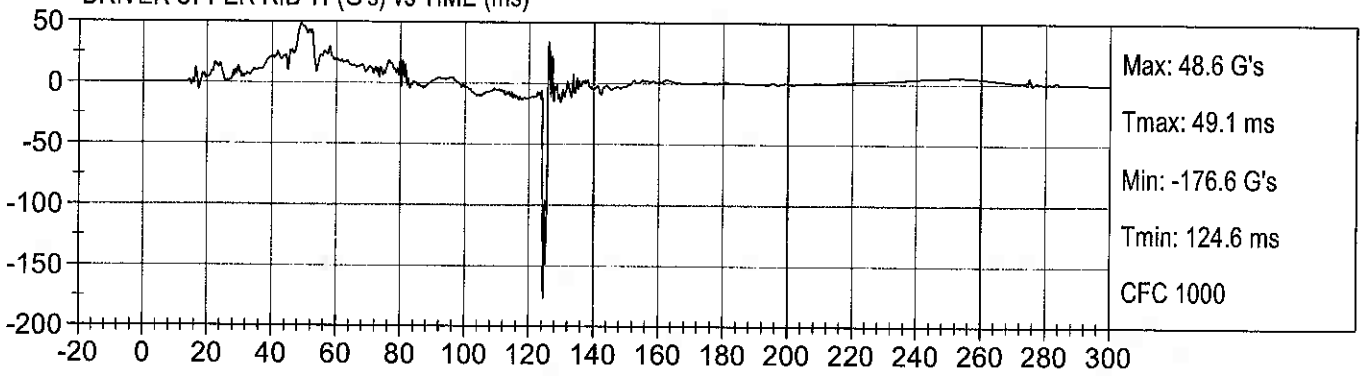
DRIVER PELVIS Y Velocity (kph) vs TIME (ms)



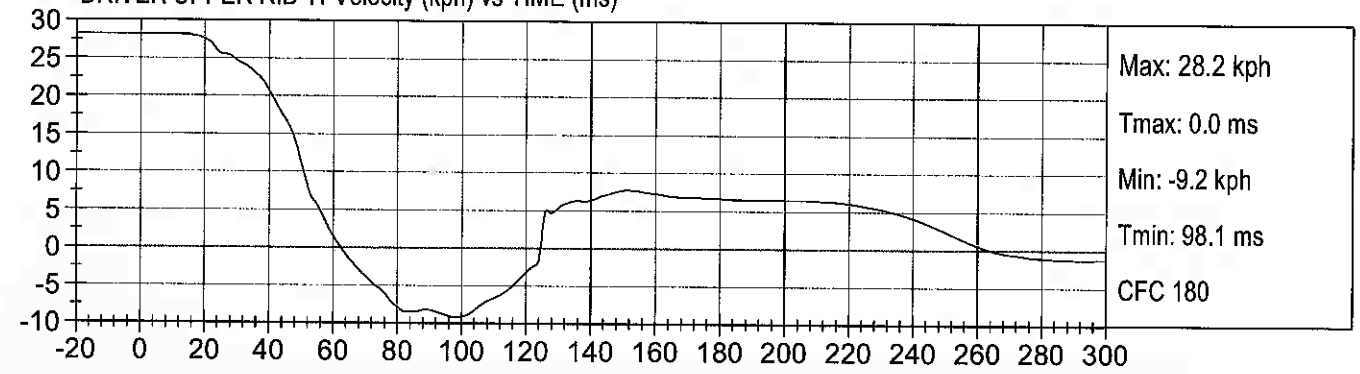
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

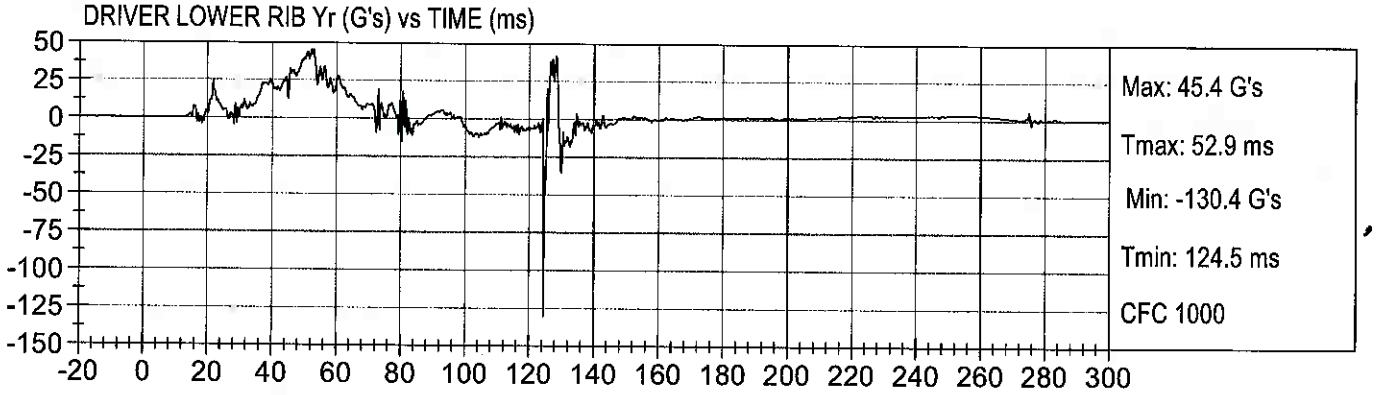
DRIVER UPPER RIB Yr (G's) vs TIME (ms)



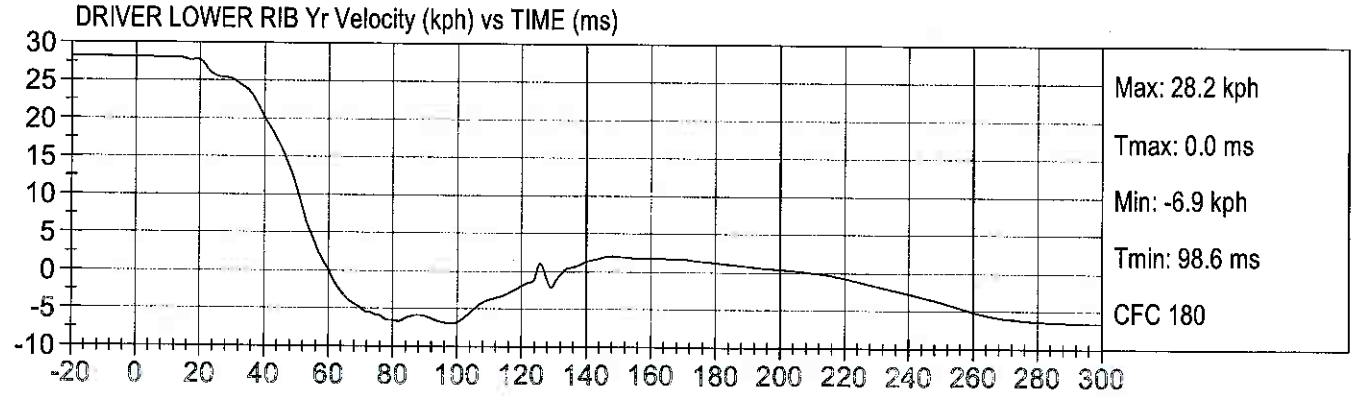
DRIVER UPPER RIB Yr Velocity (kph) vs TIME (ms)



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



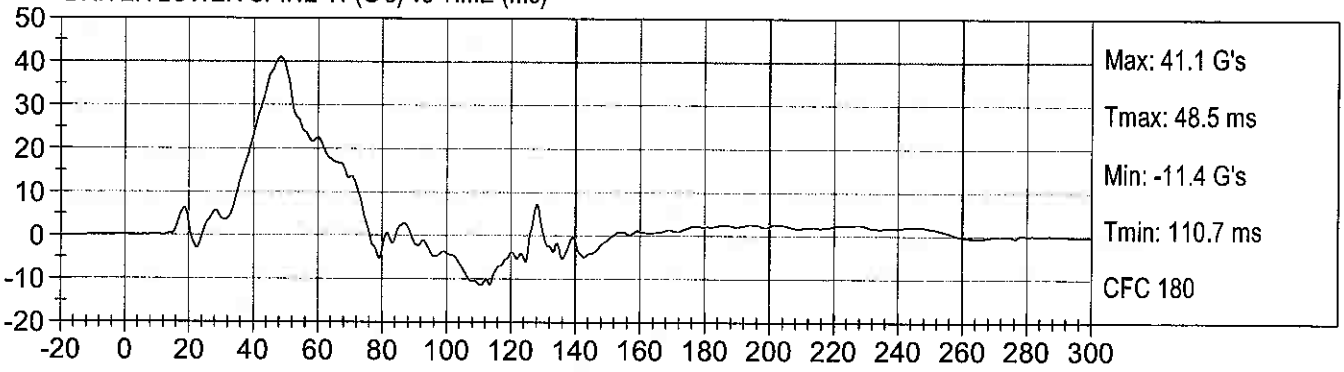
DRIVER LOWER RIB Yr Velocity (kph) vs TIME (ms)



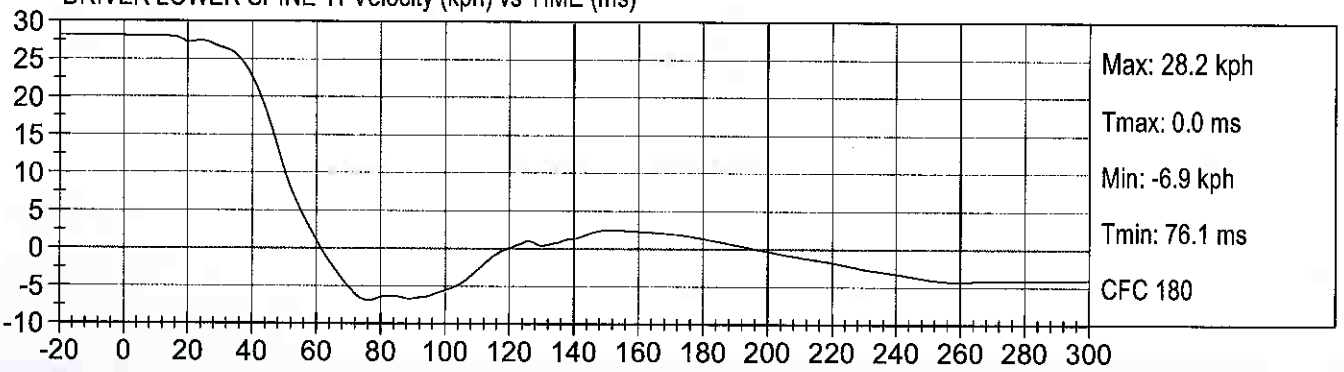
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

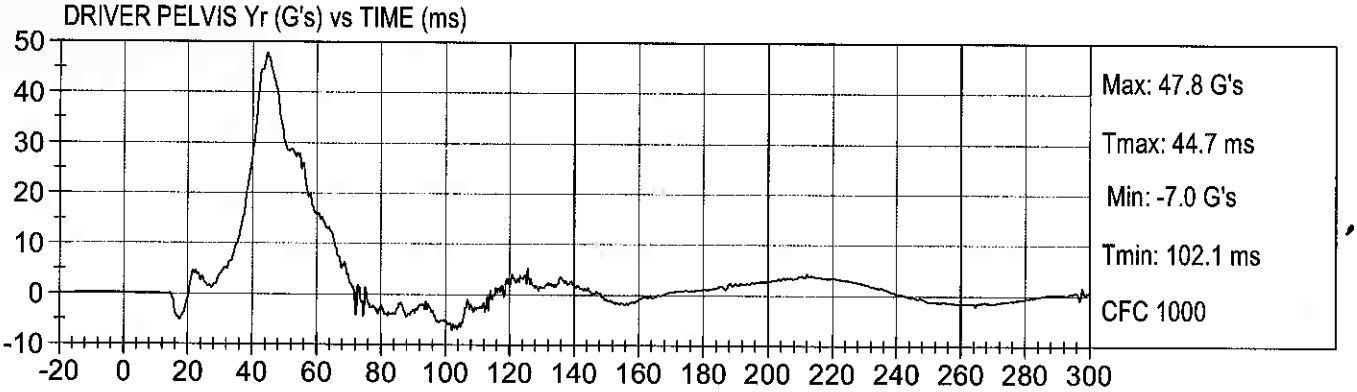
DRIVER LOWER SPINE Yr (G's) vs TIME (ms)



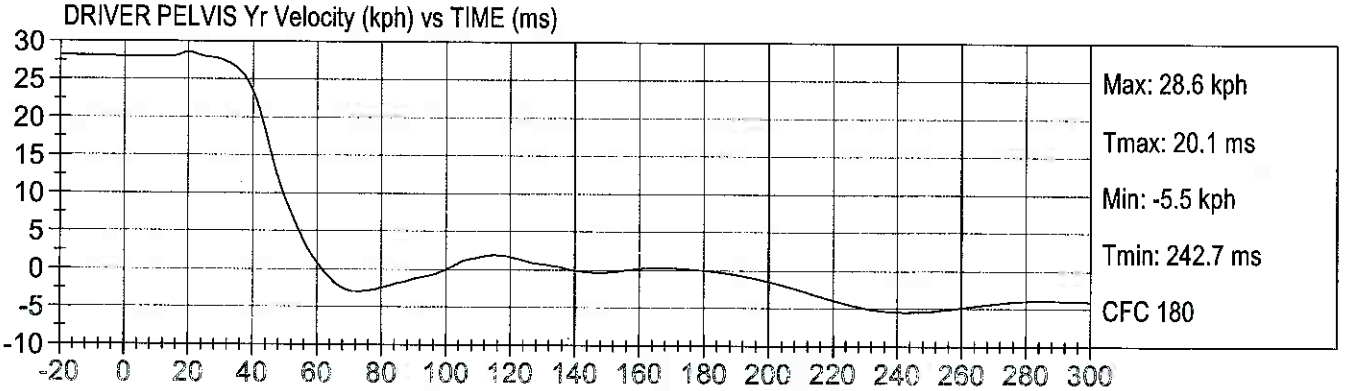
DRIVER LOWER SPINE Yr Velocity (kph) vs TIME (ms)



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



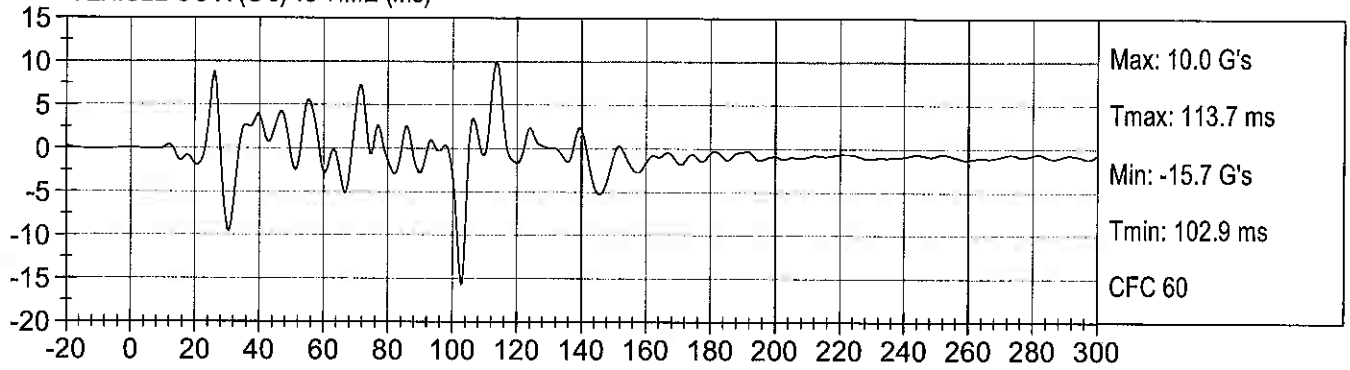
DRIVER PELVIS Yr Velocity (kph) vs TIME (ms)



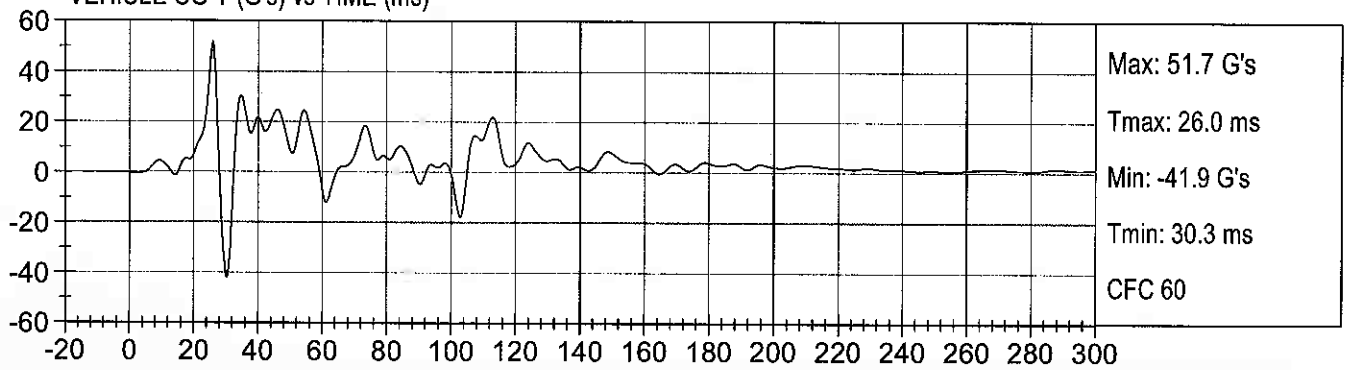
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

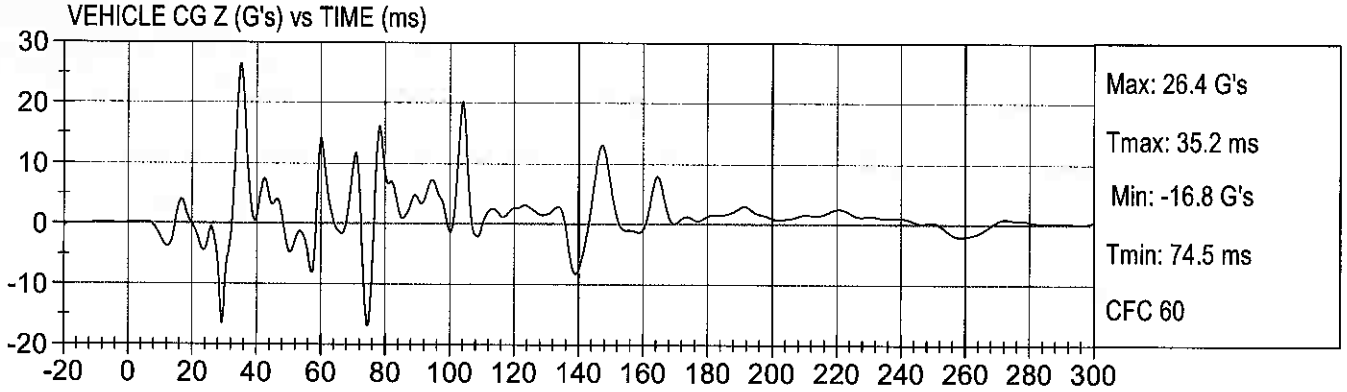
VEHICLE CG X (G's) vs TIME (ms)



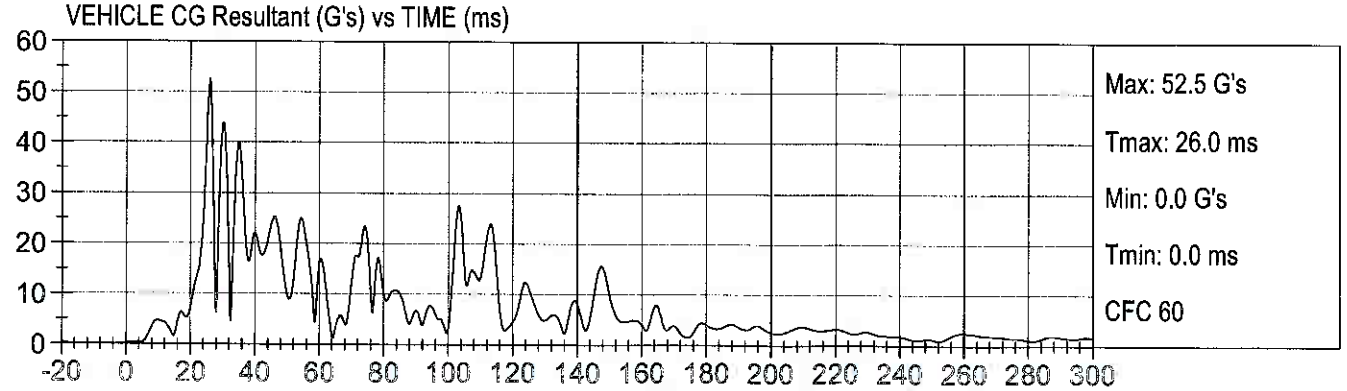
VEHICLE CG Y (G's) vs TIME (ms)

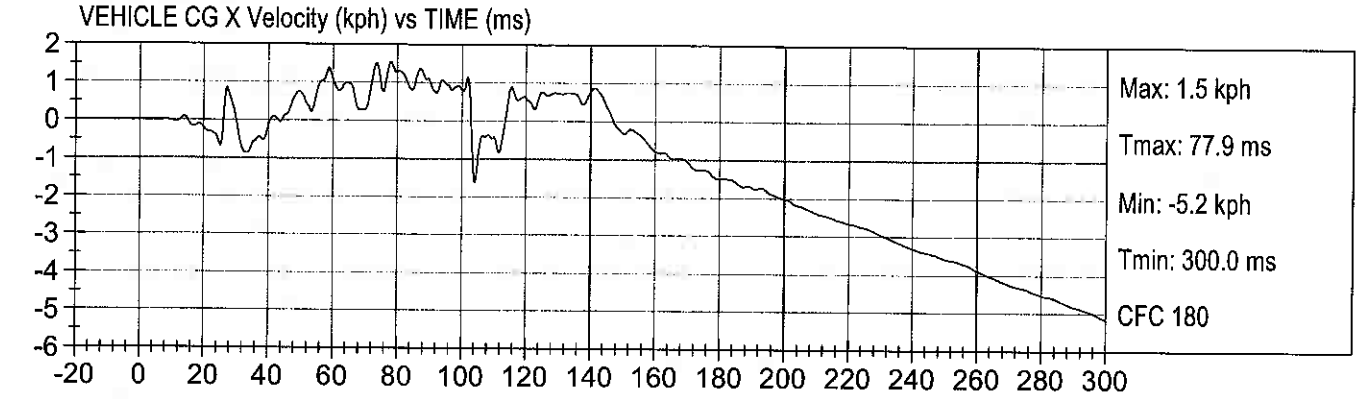


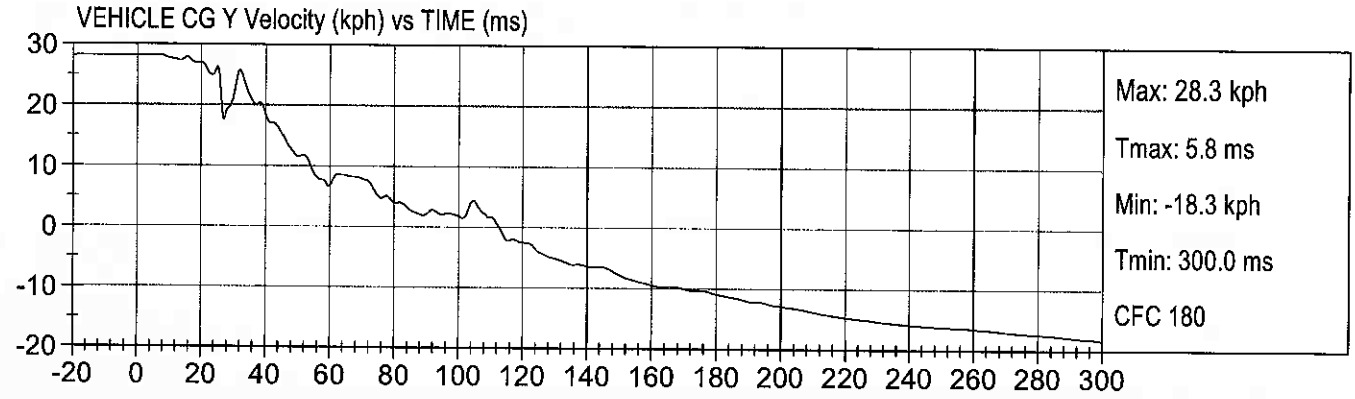
VEHICLE CG Z (G's) vs TIME (ms)

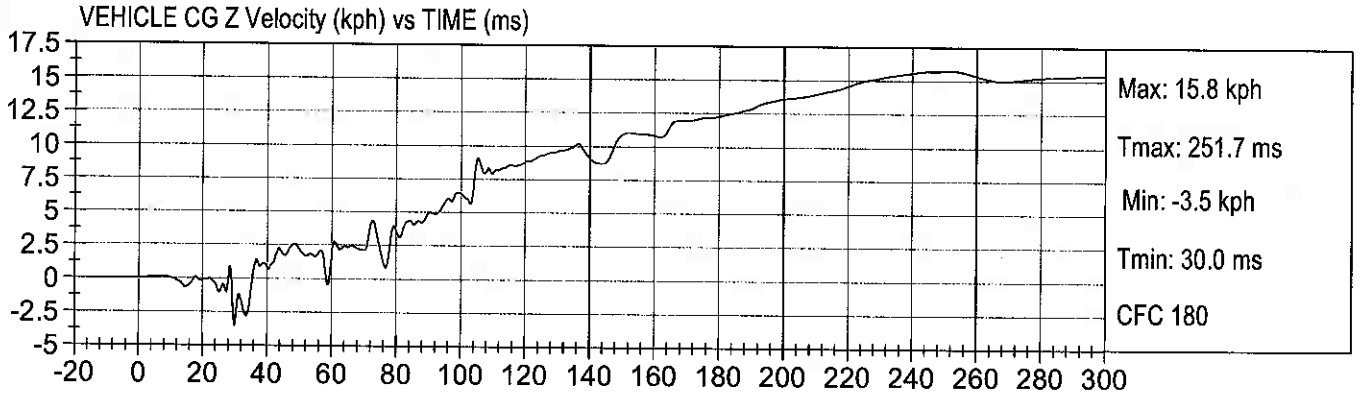


VEHICLE CG Resultant (G's) vs TIME (ms)




VEHICLE CG X Velocity (kph) vs TIME (ms)
2
1
0
-1
-2
-3
-4
-5
-6
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.5 kph
Tmax: 77.9 ms
Min: -5.2 kph
Tmin: 300.0 ms
CFC 180

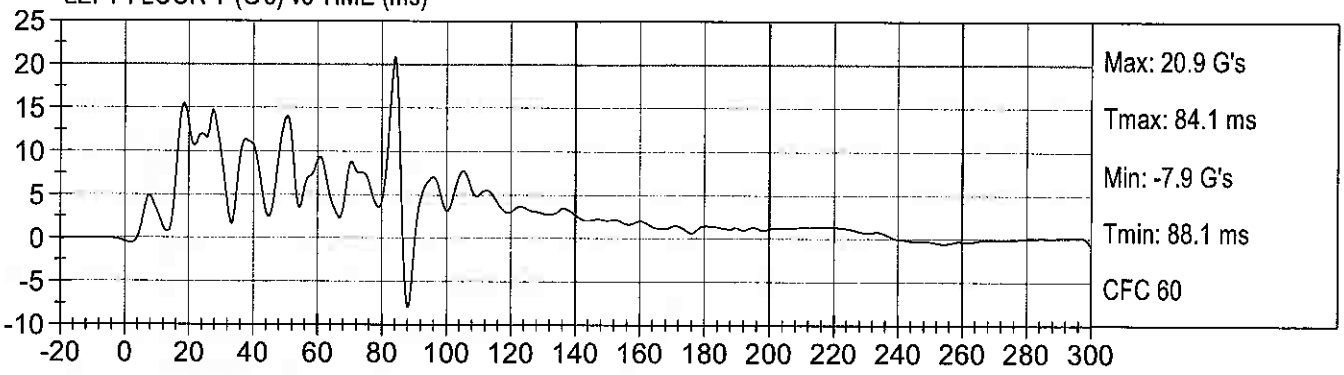

VEHICLE CG Y Velocity (kph) vs TIME (ms)
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 28.3 kph
Tmax: 5.8 ms
Min: -18.3 kph
Tmin: 300.0 ms
CFC 180


VEHICLE CG Z Velocity (kph) vs TIME (ms)
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 15.8 kph
Tmax: 251.7 ms
Min: -3.5 kph
Tmin: 30.0 ms
CFC 180

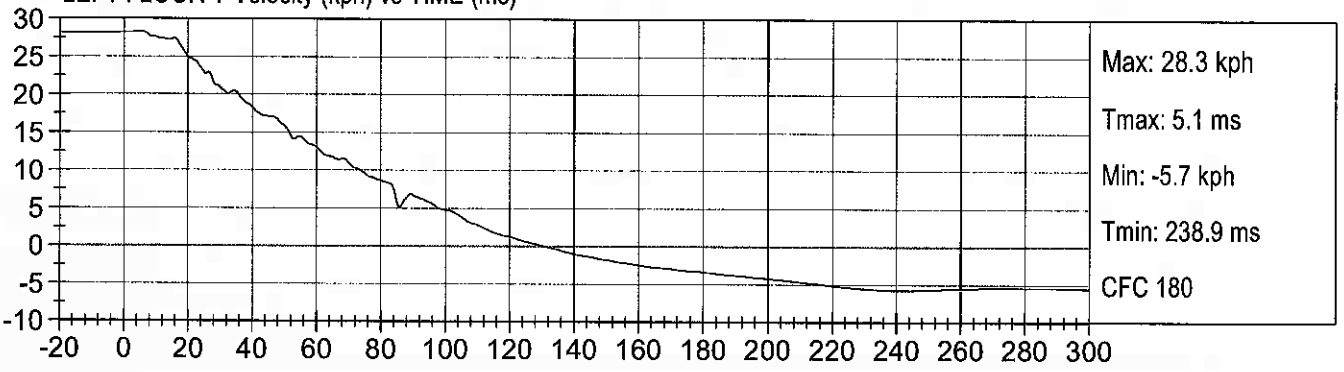
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

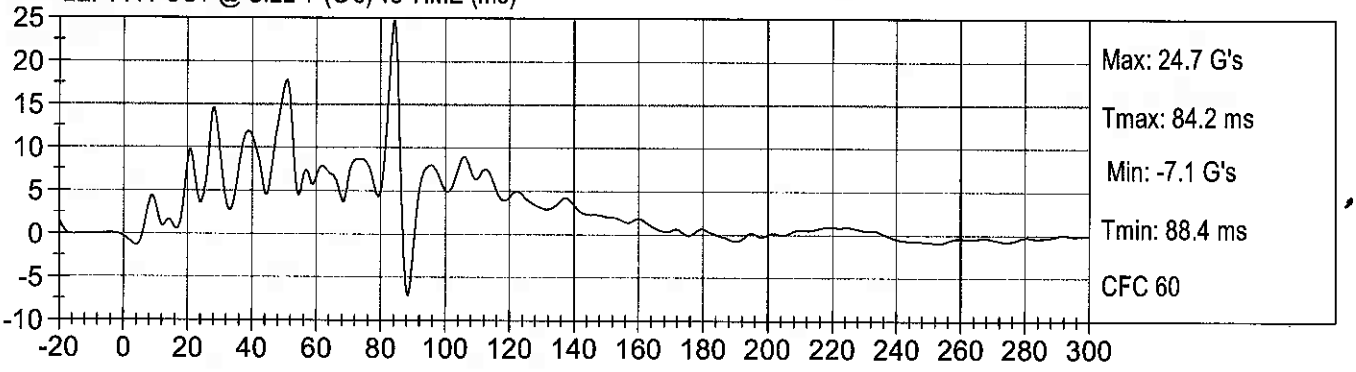
LEFT FLOOR Y (G's) vs TIME (ms)



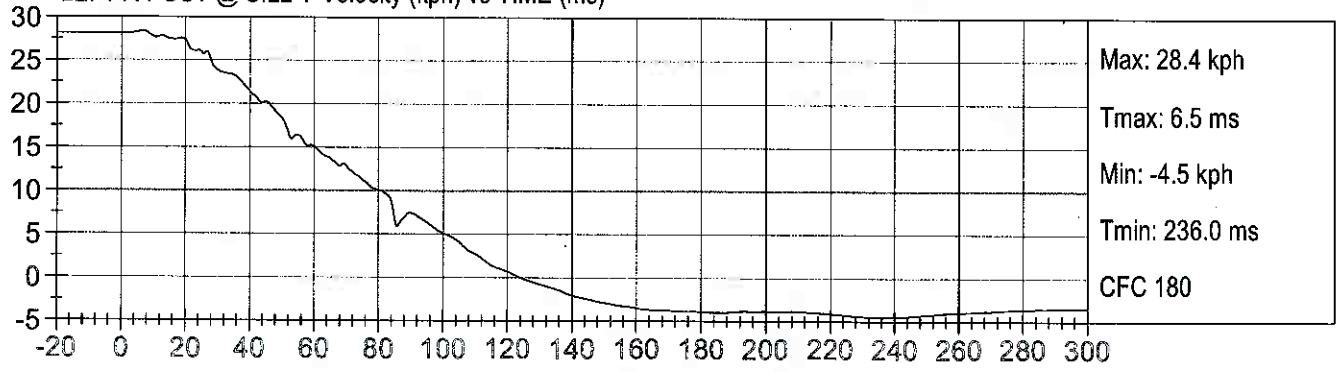
LEFT FLOOR Y Velocity (kph) vs TIME (ms)



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



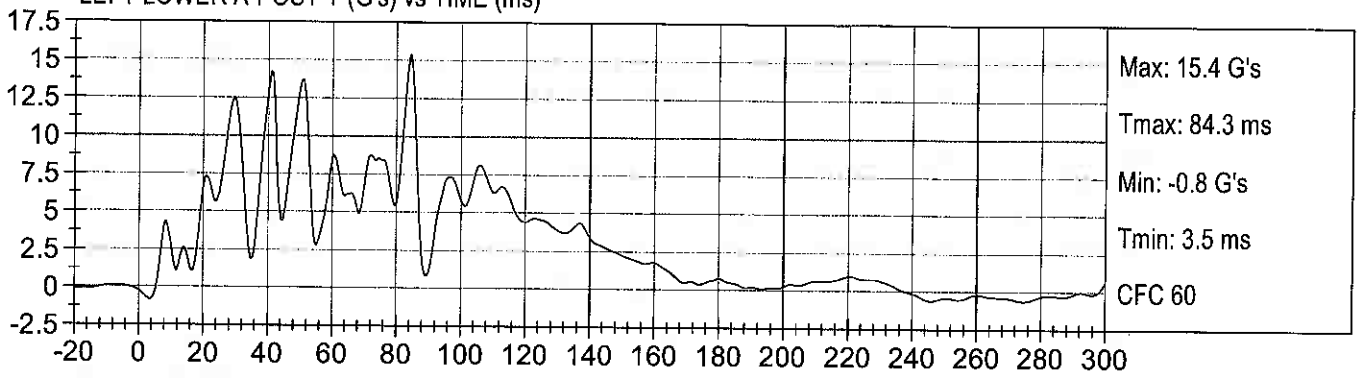
LEFT A-POST @ SILL Y Velocity (kph) vs TIME (ms)



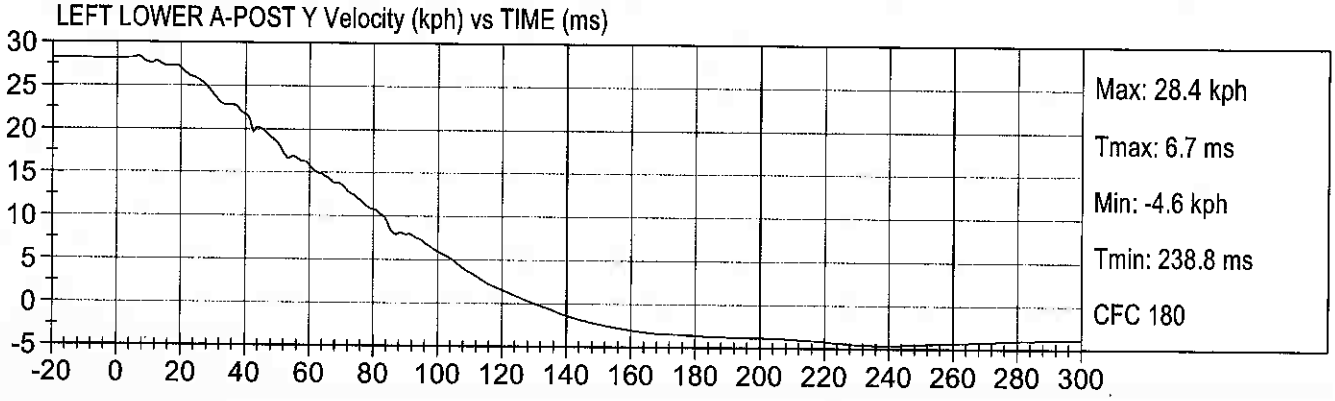
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

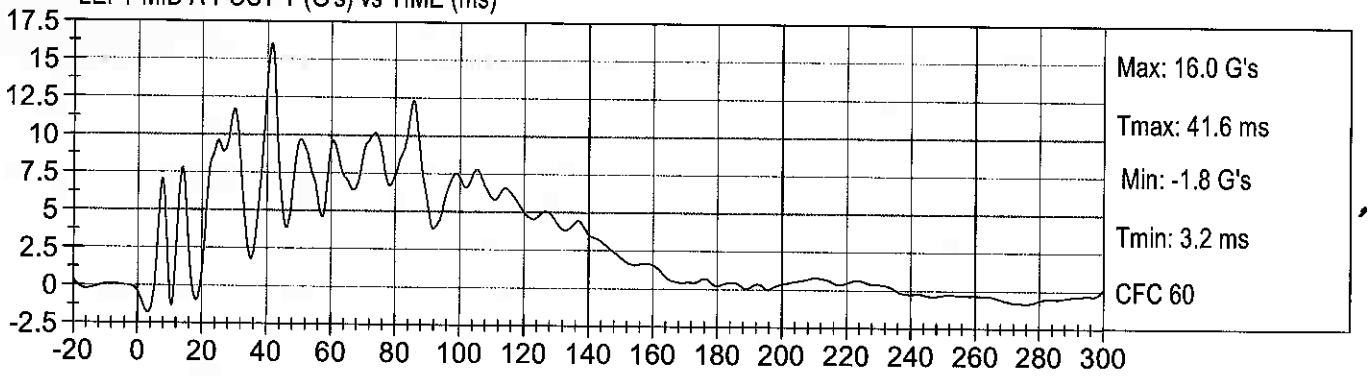
LEFT LOWER A-POST Y (G's) vs TIME (ms)



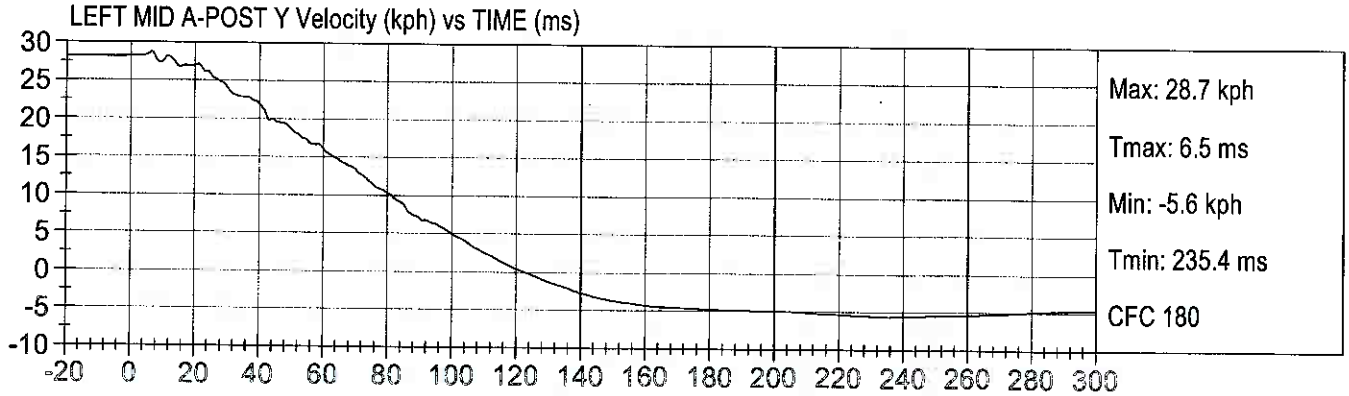
LEFT LOWER A-POST Y Velocity (kph) vs TIME (ms)



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



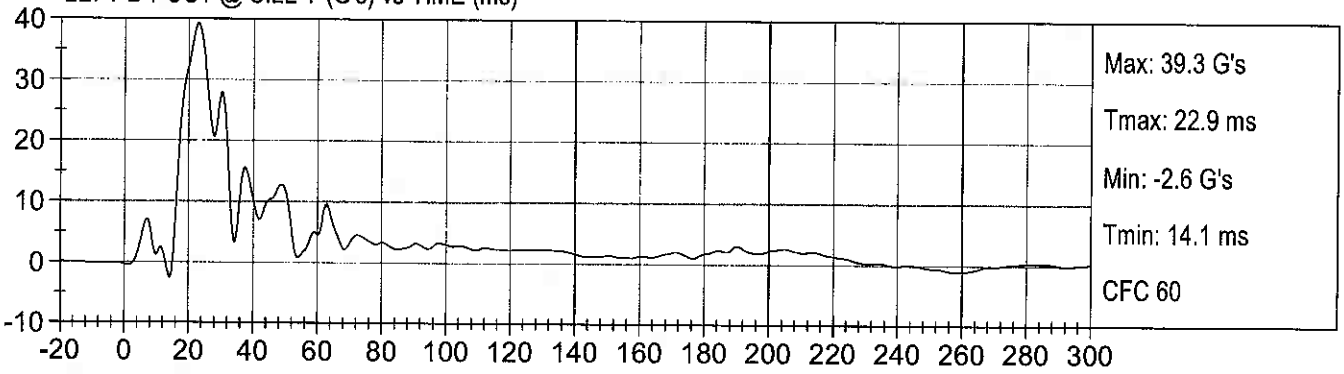
LEFT MID A-POST Y Velocity (kph) vs TIME (ms)



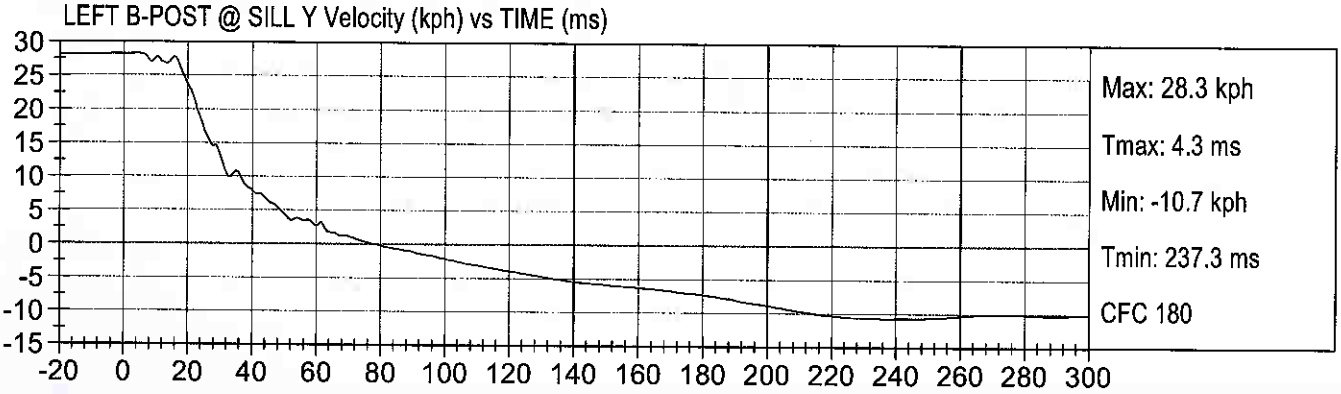
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

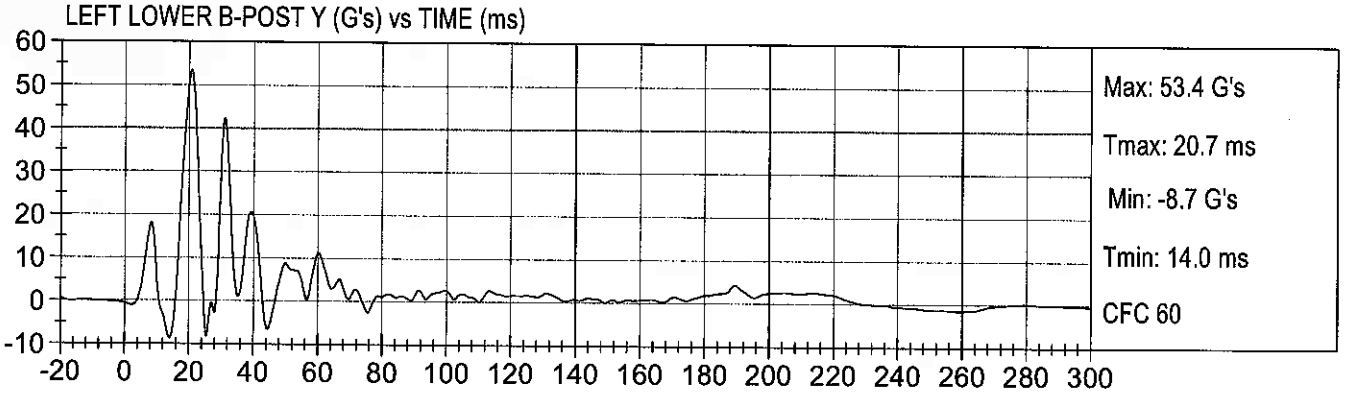
LEFT B-POST @ SILL Y (G's) vs TIME (ms)



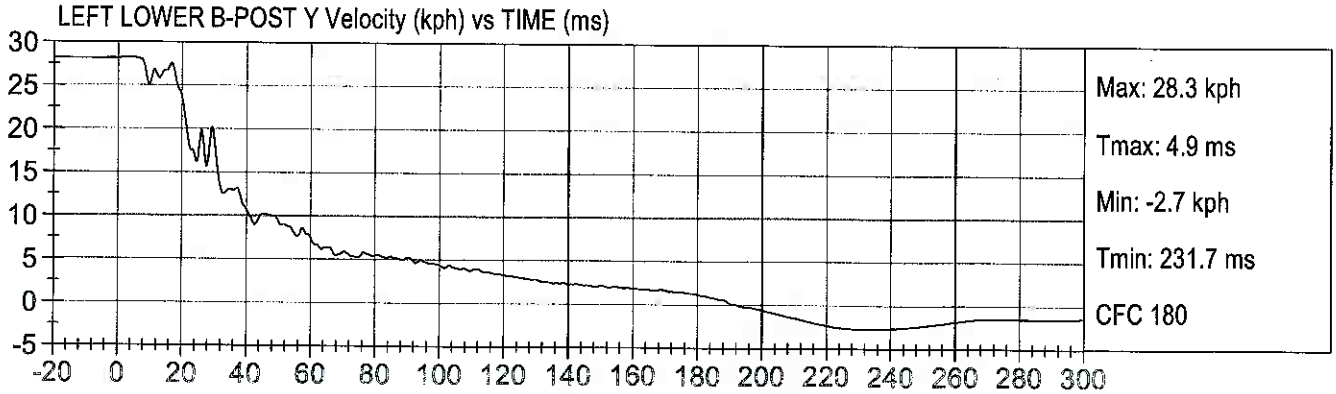
LEFT B-POST @ SILL Y Velocity (kph) vs TIME (ms)



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



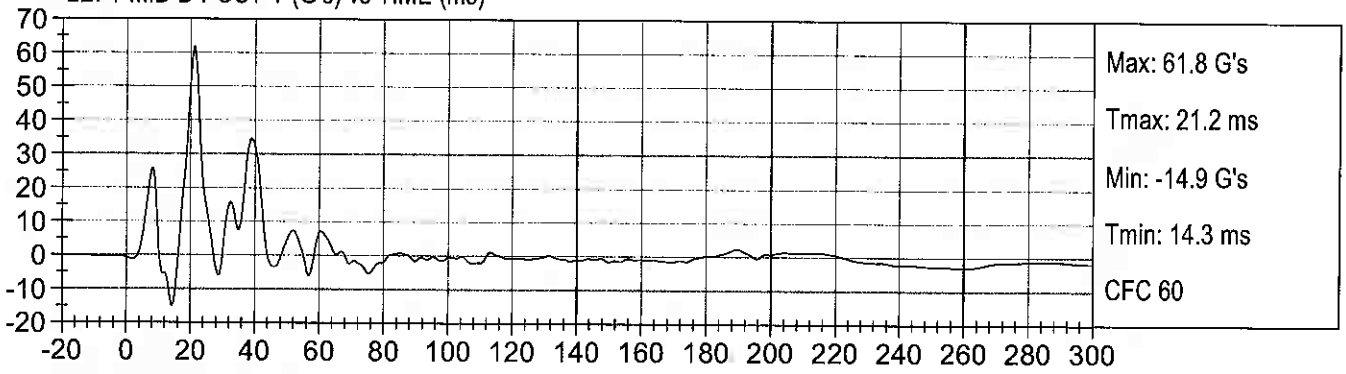
LEFT LOWER B-POST Y Velocity (kph) vs TIME (ms)



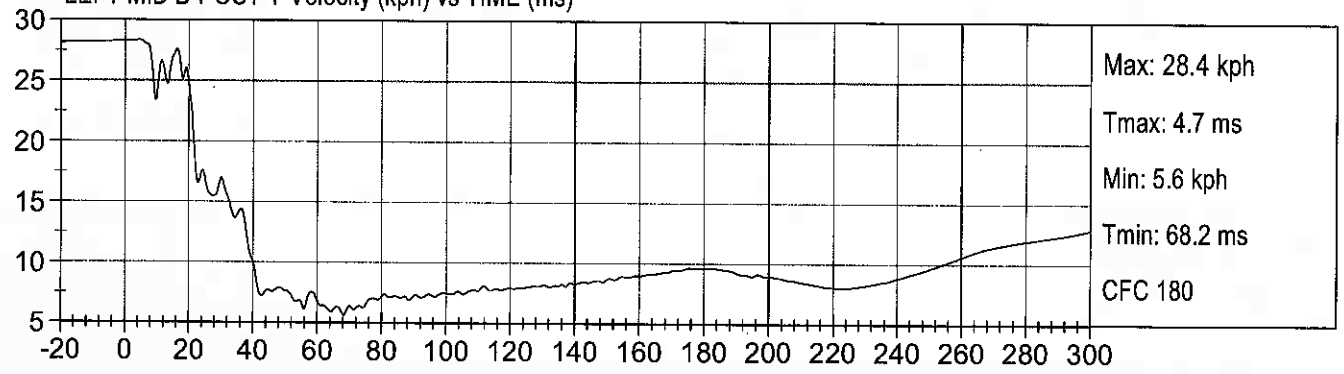
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

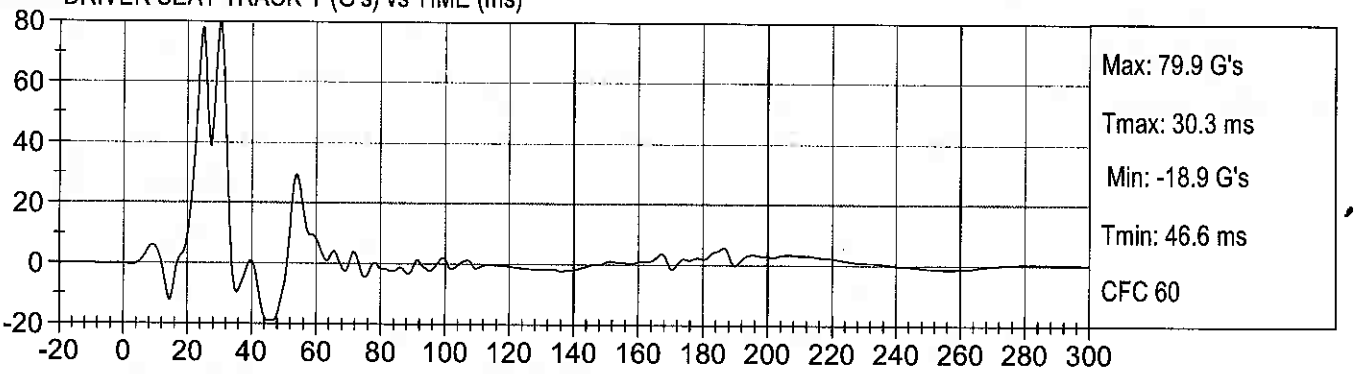
LEFT MID B-POST Y (G's) vs TIME (ms)



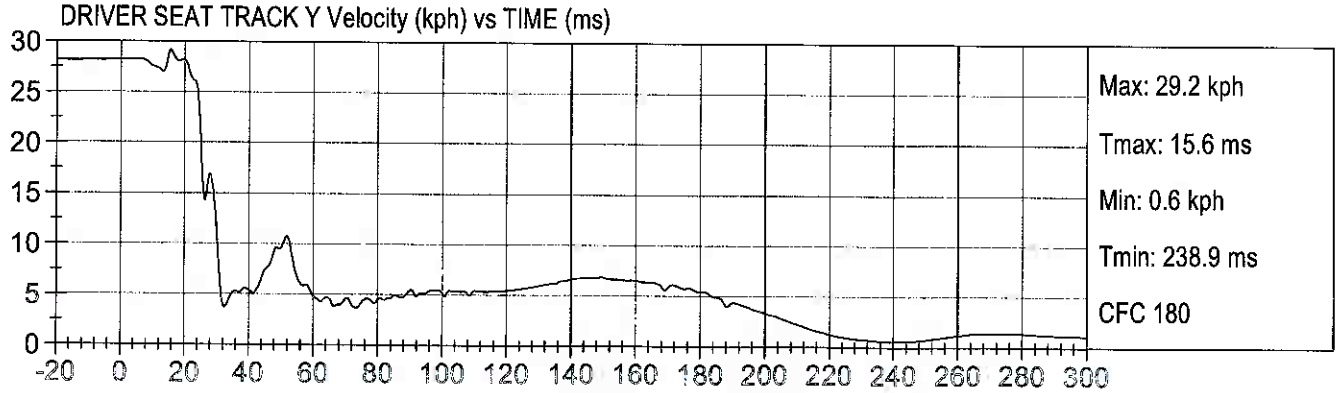
LEFT MID B-POST Y Velocity (kph) vs TIME (ms)

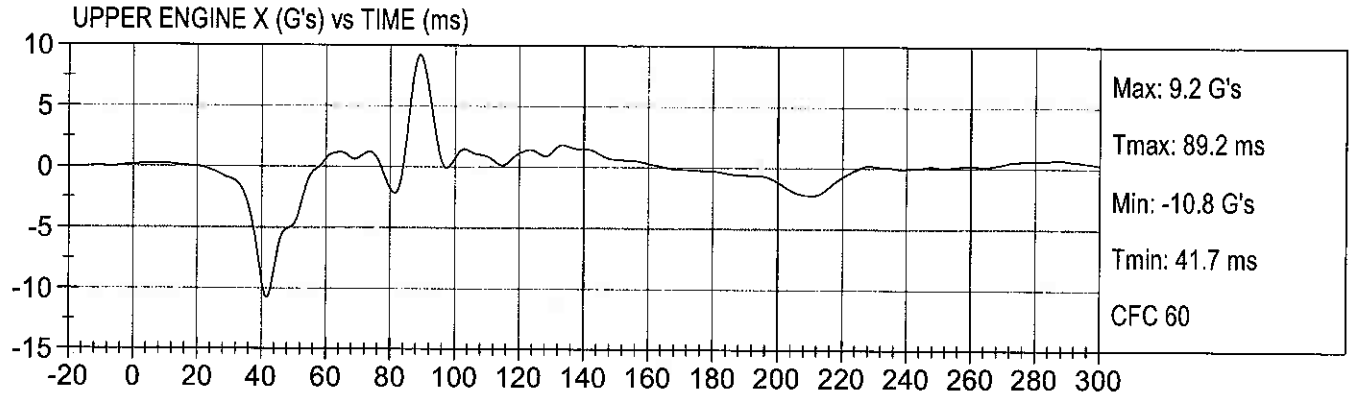


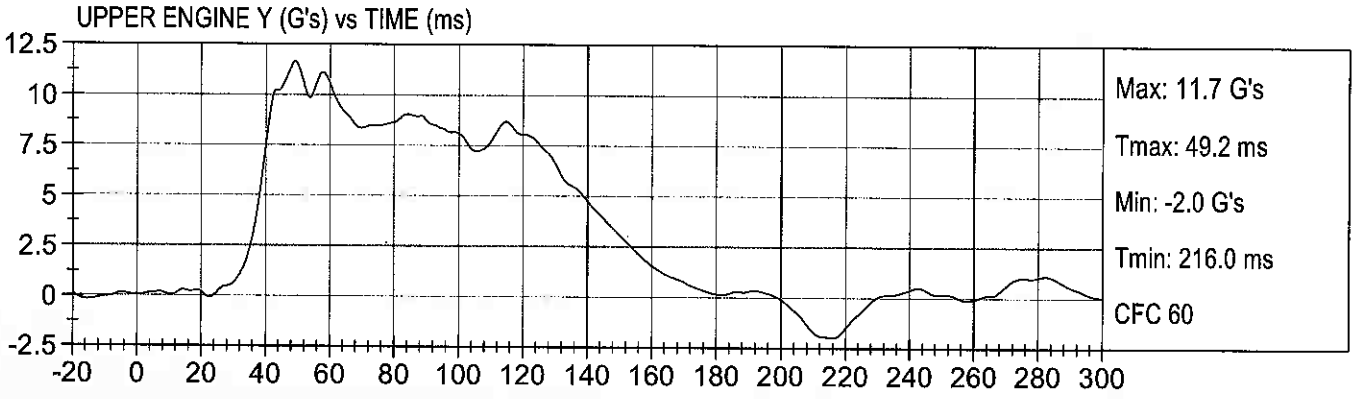
DRIVER SEAT TRACK Y (G's) vs TIME (ms)

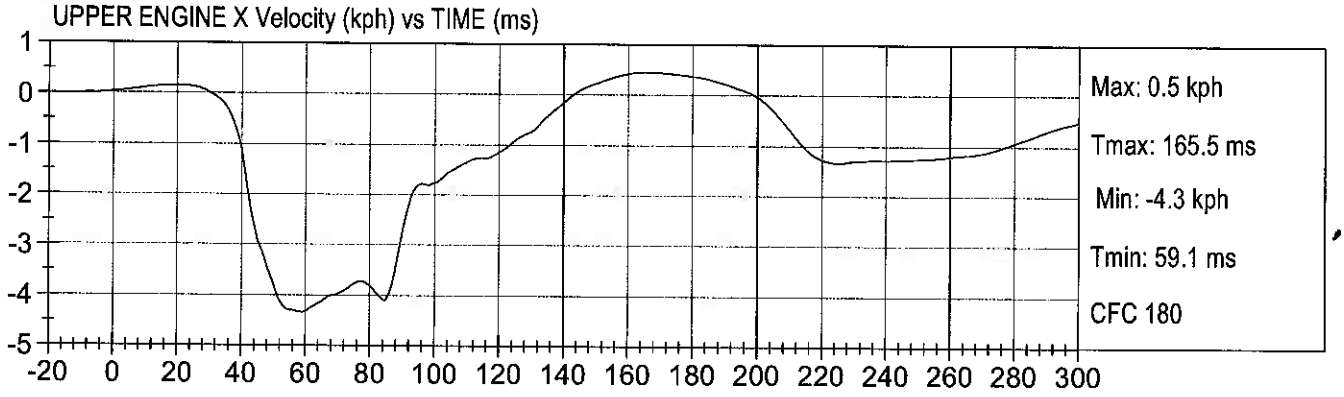


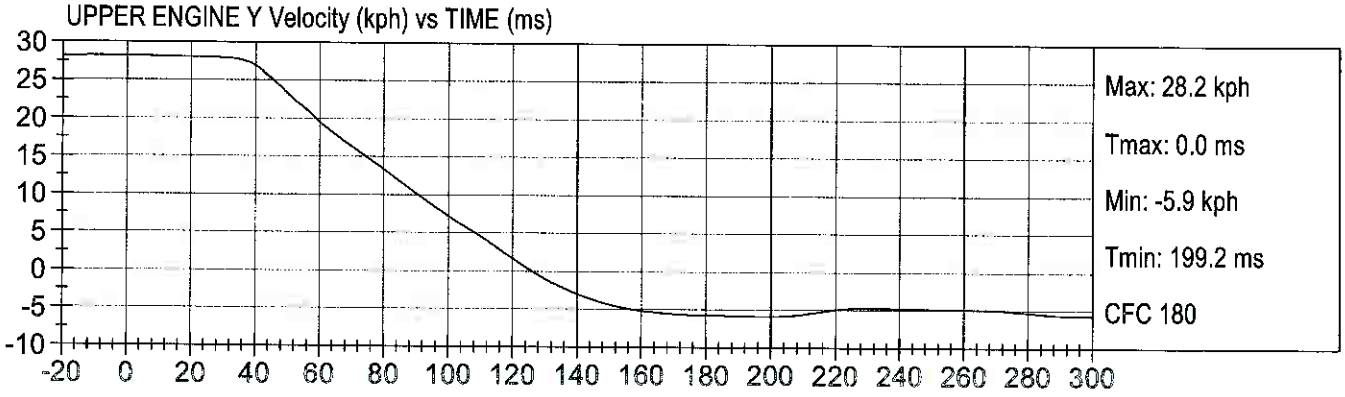
DRIVER SEAT TRACK Y Velocity (kph) vs TIME (ms)




UPPER ENGINE X (G's) vs TIME (ms)
10
5
0
-5
-10
-15
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 9.2 G's
Tmax: 89.2 ms
Min: -10.8 G's
Tmin: 41.7 ms
CFC 60


UPPER ENGINE Y (G's) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 11.7 G's
Tmax: 49.2 ms
Min: -2.0 G's
Tmin: 216.0 ms
CFC 60

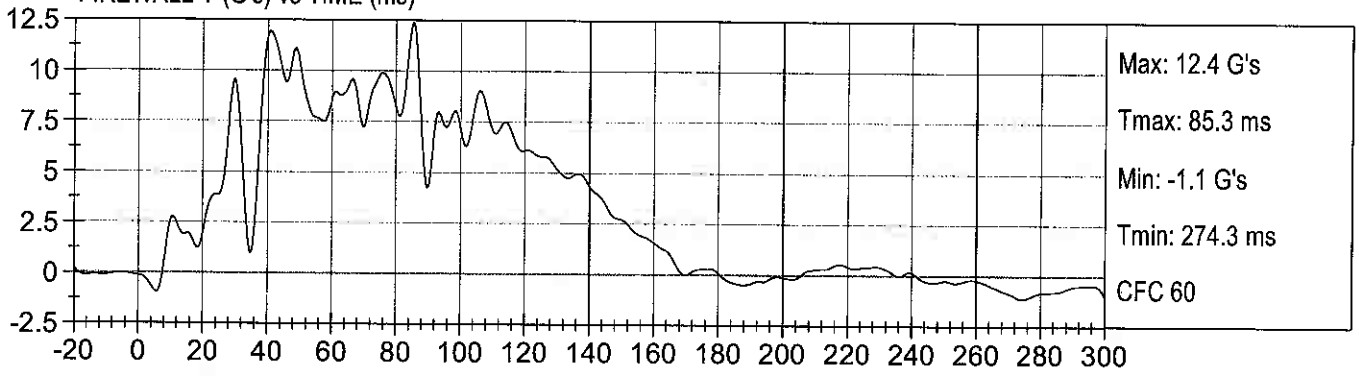

UPPER ENGINE X Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.5 kph
Tmax: 165.5 ms
Min: -4.3 kph
Tmin: 59.1 ms
CFC 180


UPPER ENGINE Y Velocity (kph) vs TIME (ms)
30
25
20
15
10
5
0
-5
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 28.2 kph
Tmax: 0.0 ms
Min: -5.9 kph
Tmin: 199.2 ms
CFC 180

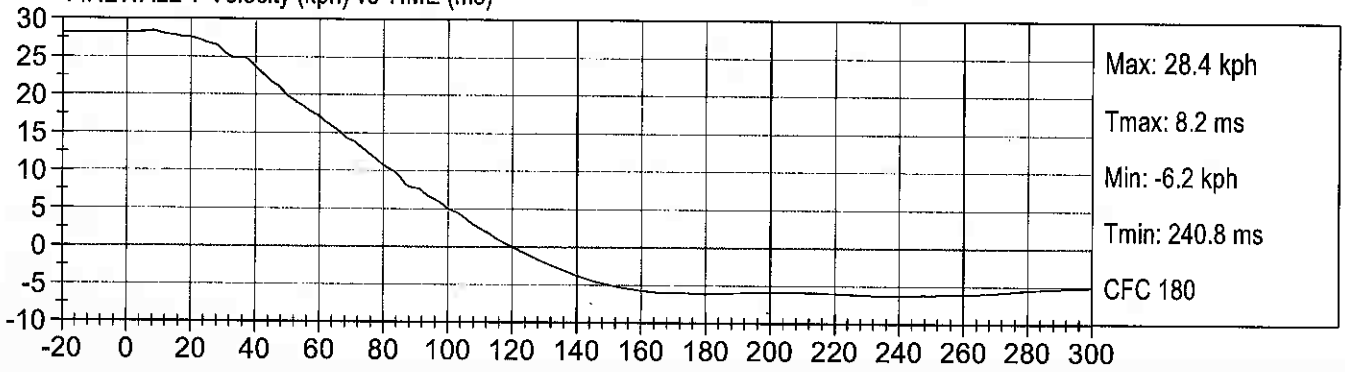
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

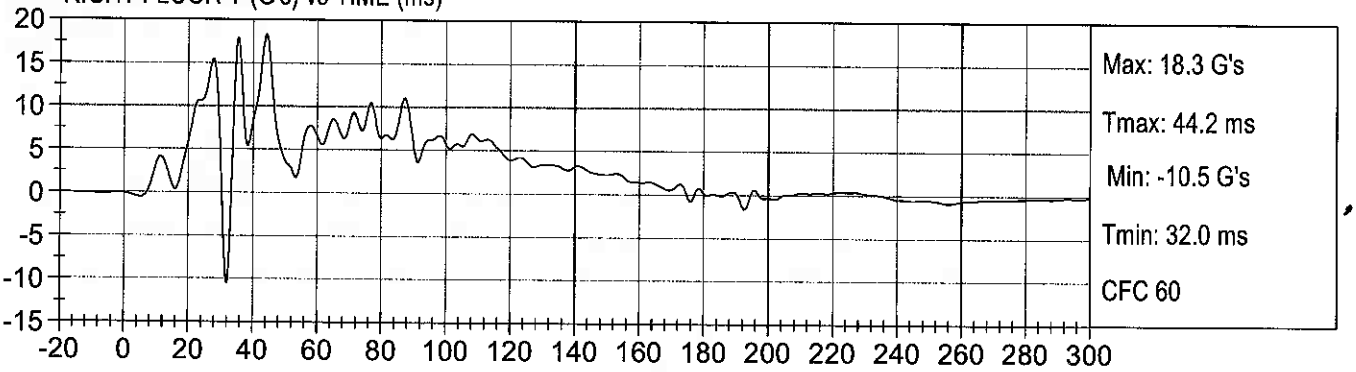
FIREWALL Y (G's) vs TIME (ms)



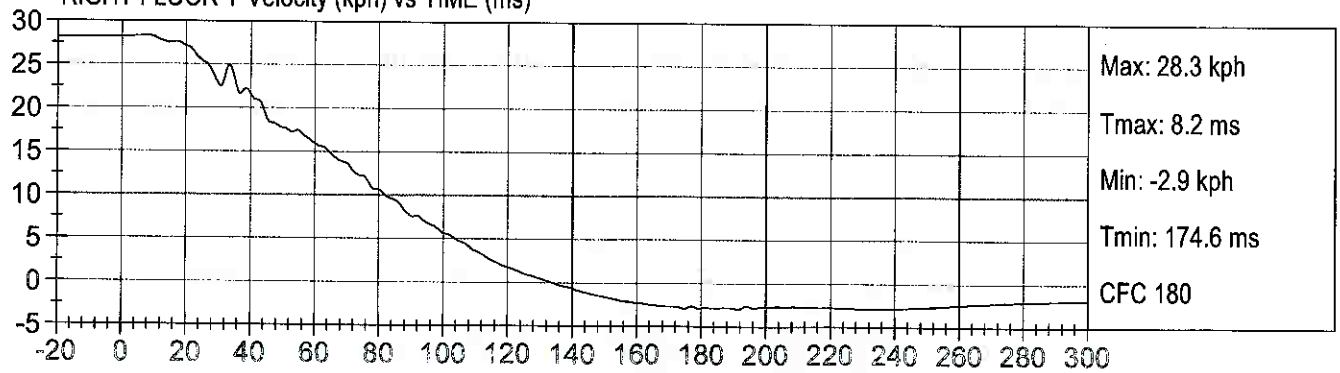
FIREWALL Y Velocity (kph) vs TIME (ms)



RIGHT FLOOR Y (G's) vs TIME (ms)



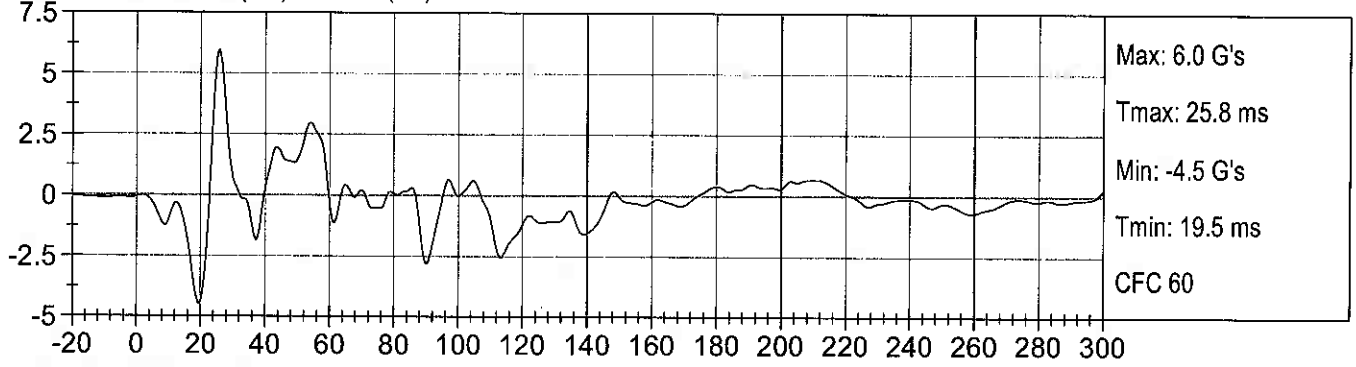
RIGHT FLOOR Y Velocity (kph) vs TIME (ms)



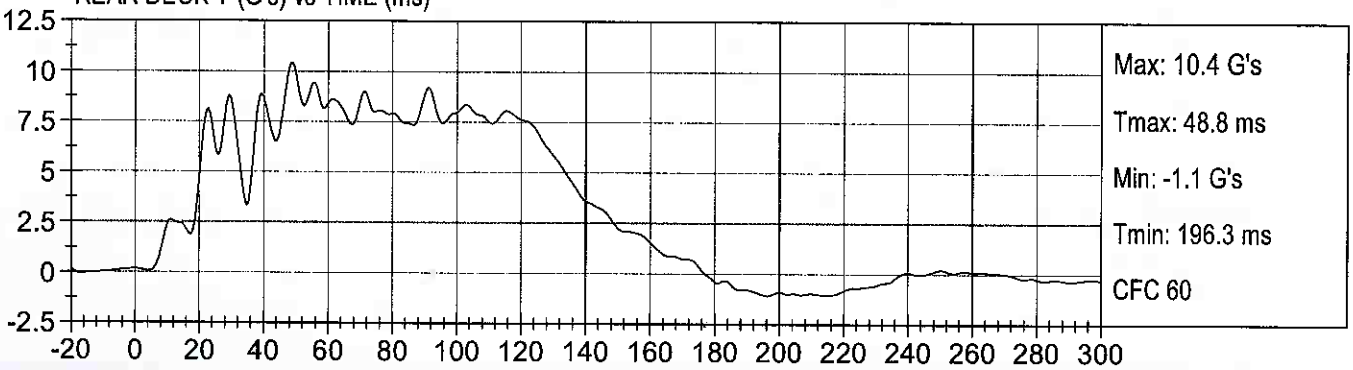
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

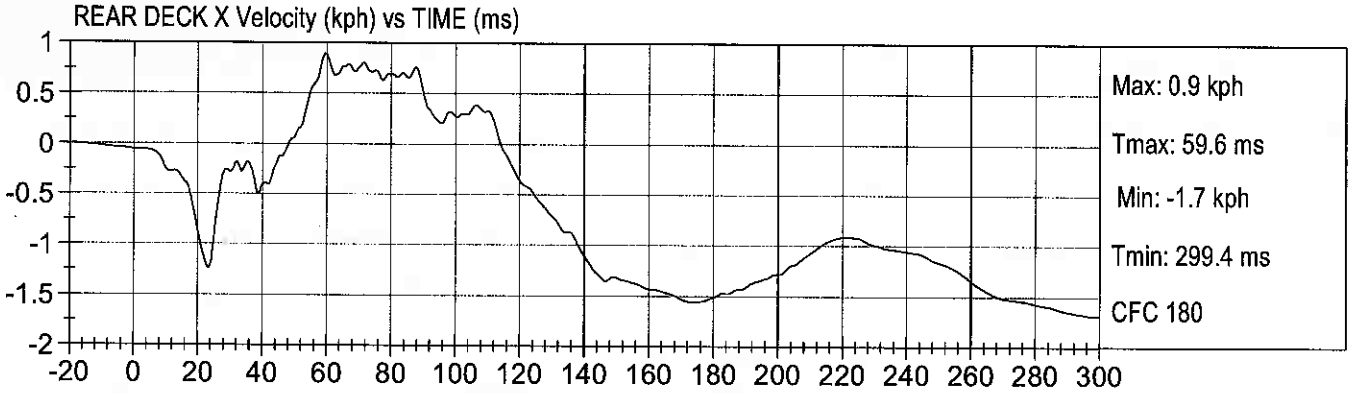
REAR DECK X (G's) vs TIME (ms)



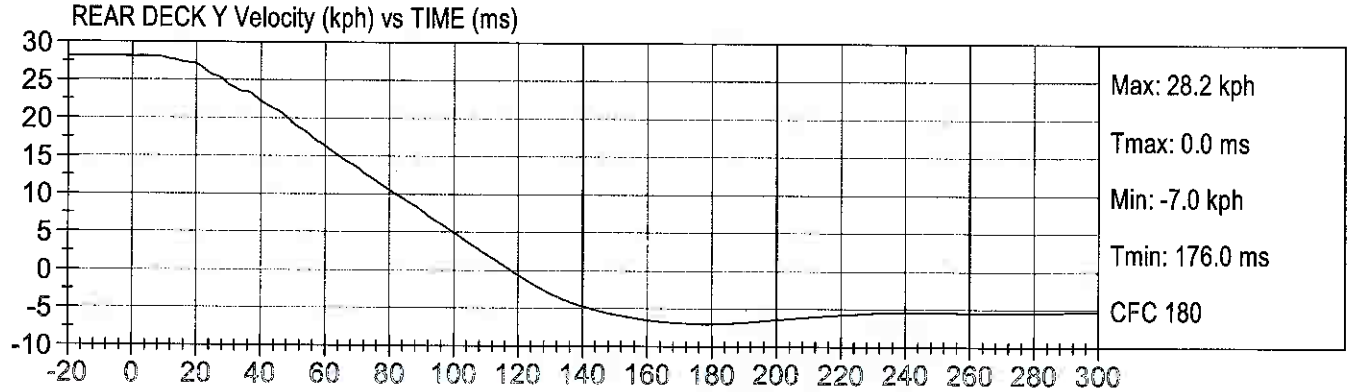
REAR DECK Y (G's) vs TIME (ms)



REAR DECK X Velocity (kph) vs TIME (ms)



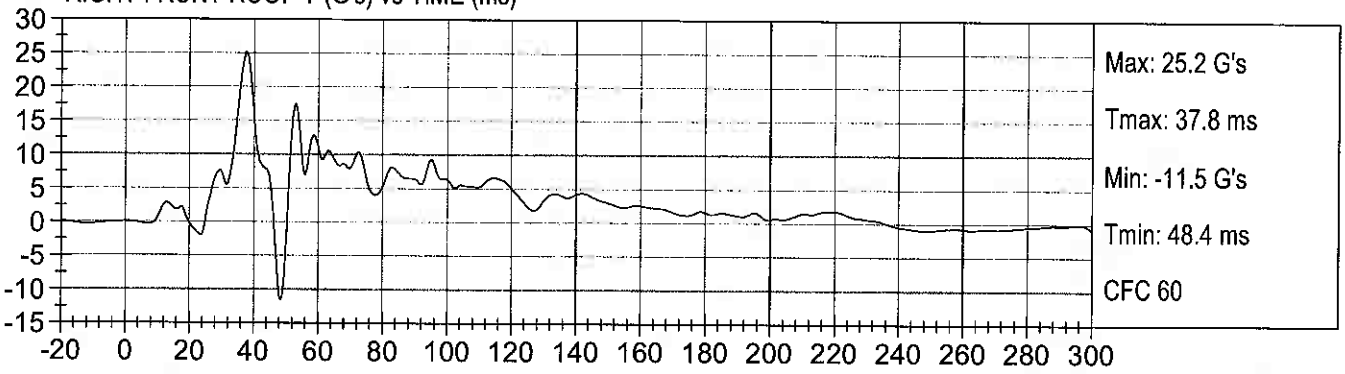
REAR DECK Y Velocity (kph) vs TIME (ms)



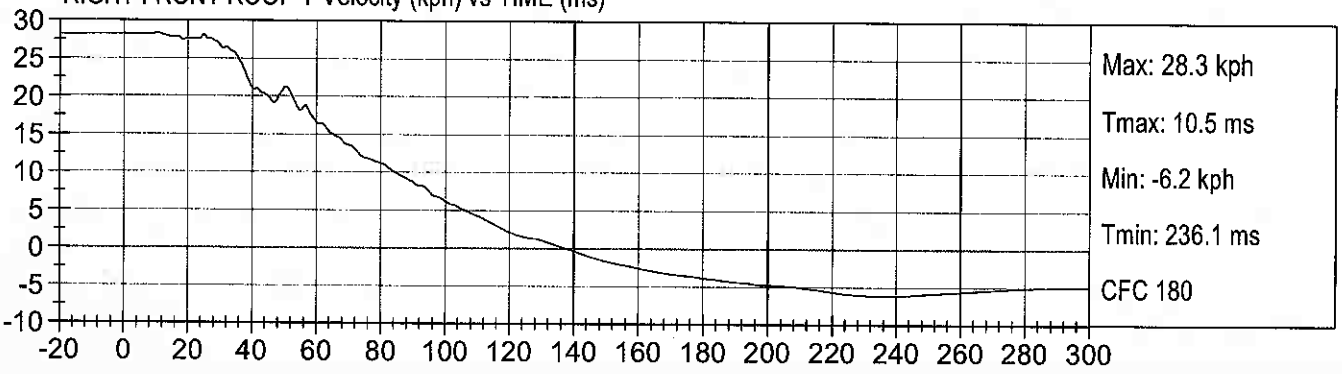
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

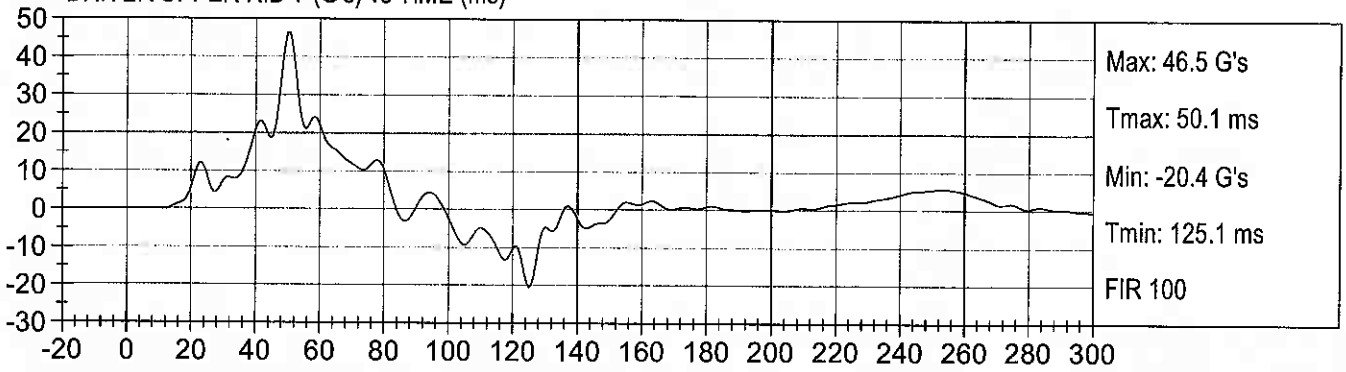
RIGHT FRONT ROOF Y (G's) vs TIME (ms)



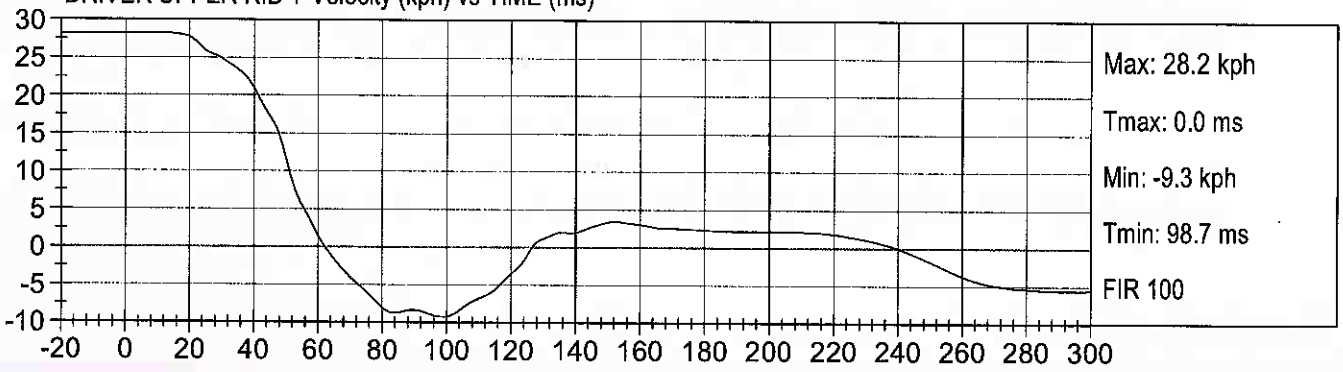
RIGHT FRONT ROOF Y Velocity (kph) vs TIME (ms)



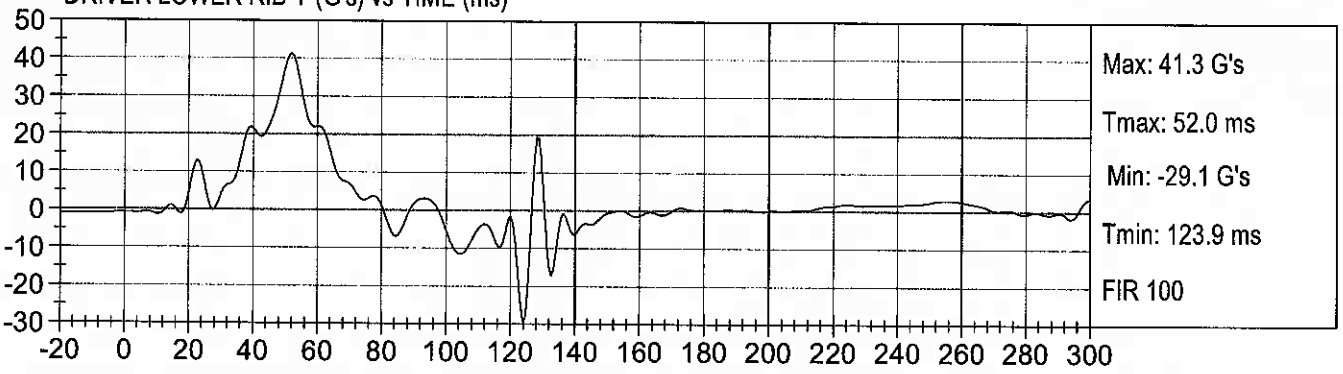
DRIVER UPPER RIB Y (G's) vs TIME (ms)



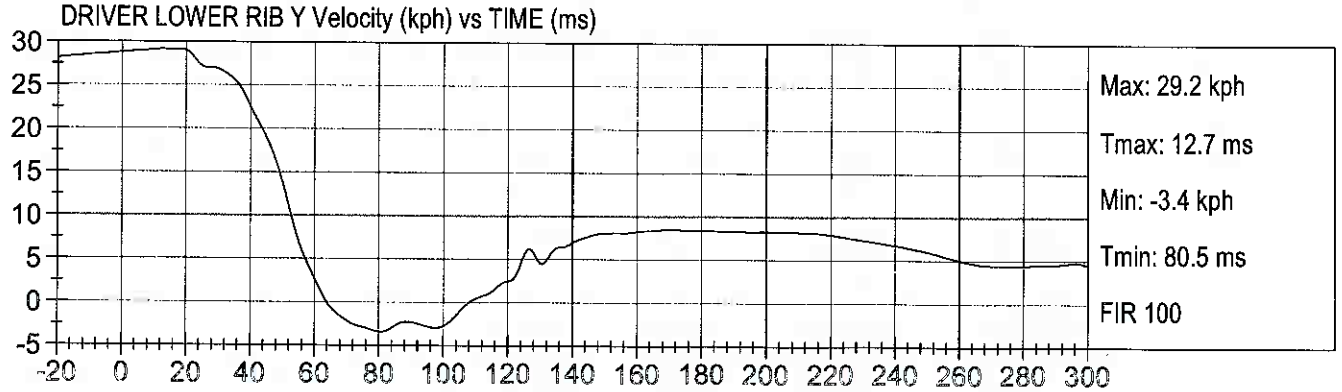
DRIVER UPPER RIB Y Velocity (kph) vs TIME (ms)



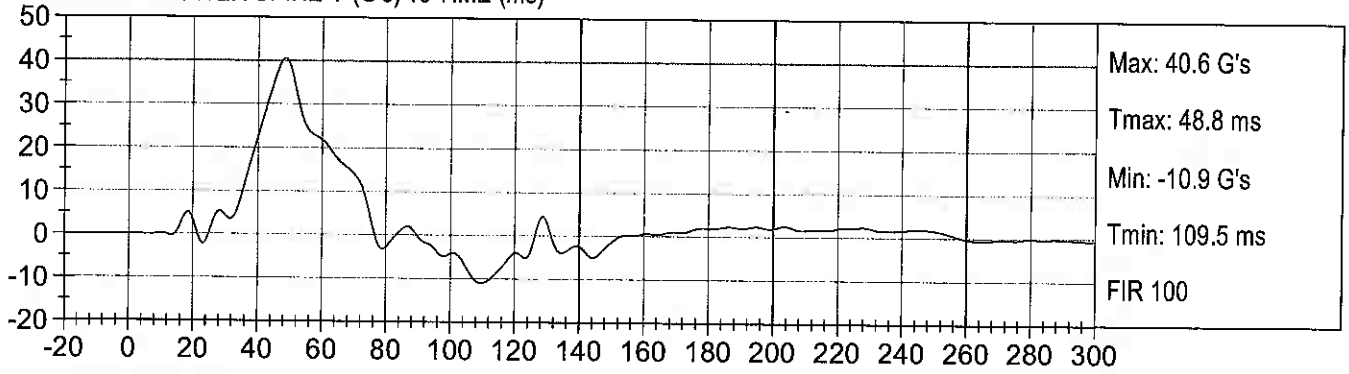
DRIVER LOWER RIB Y (G's) vs TIME (ms)



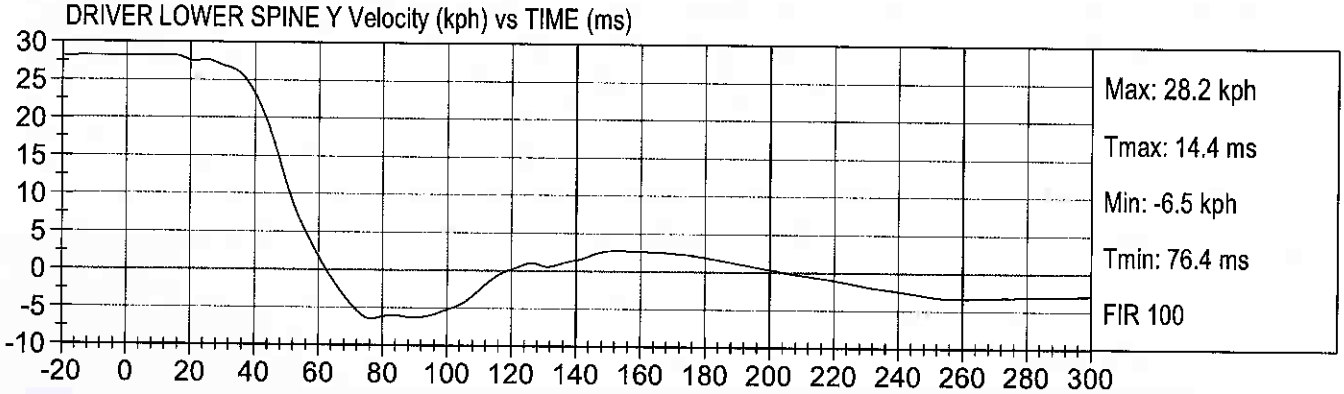
DRIVER LOWER RIB Y Velocity (kph) vs TIME (ms)



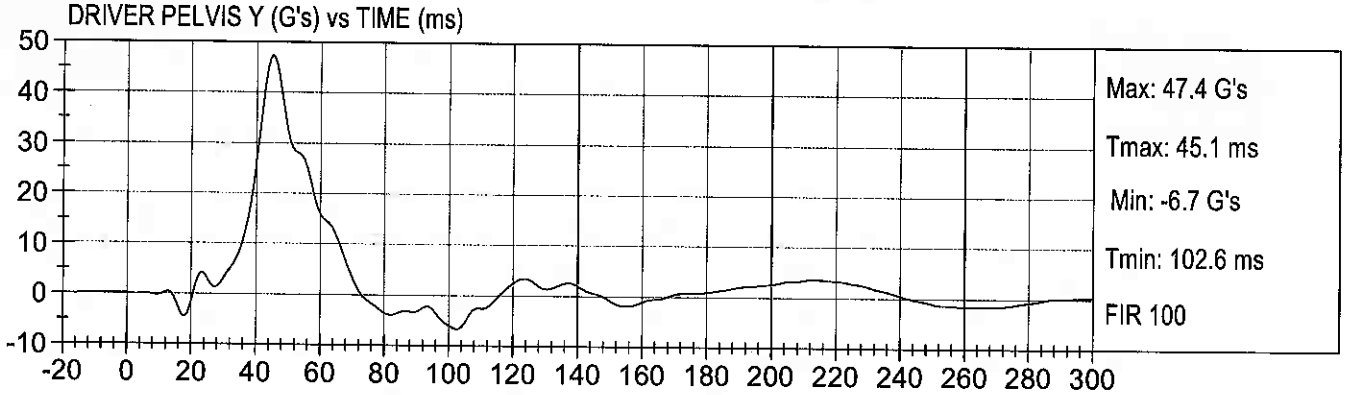
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



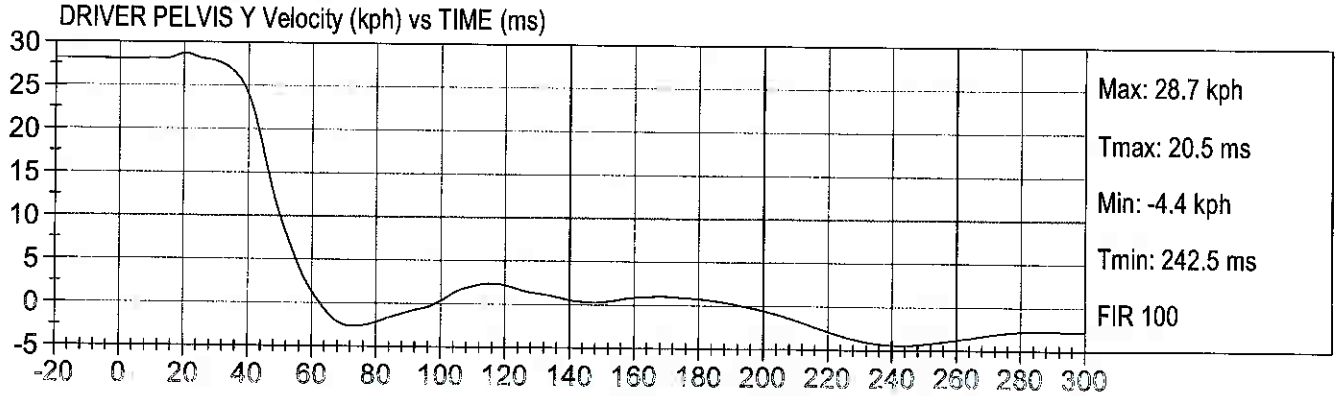
DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)



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



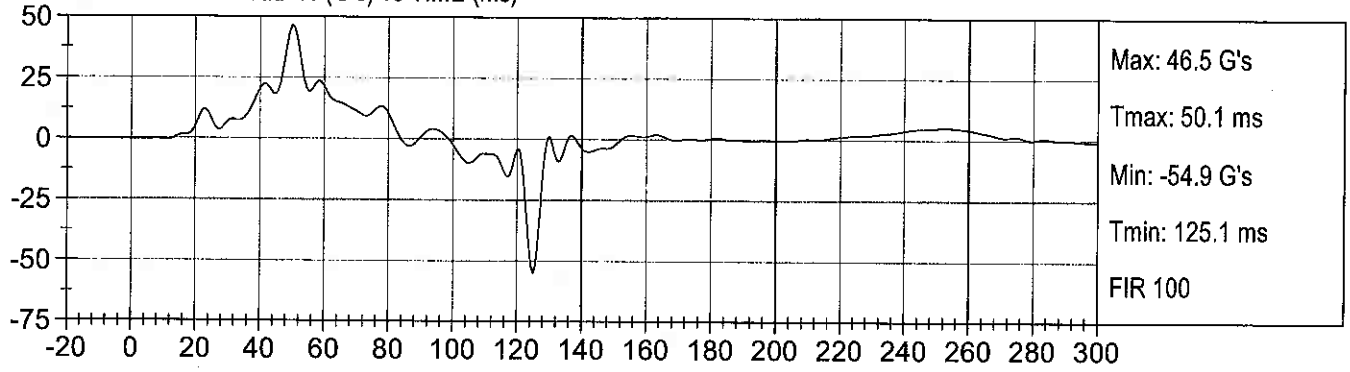
DRIVER PELVIS Y Velocity (kph) vs TIME (ms)



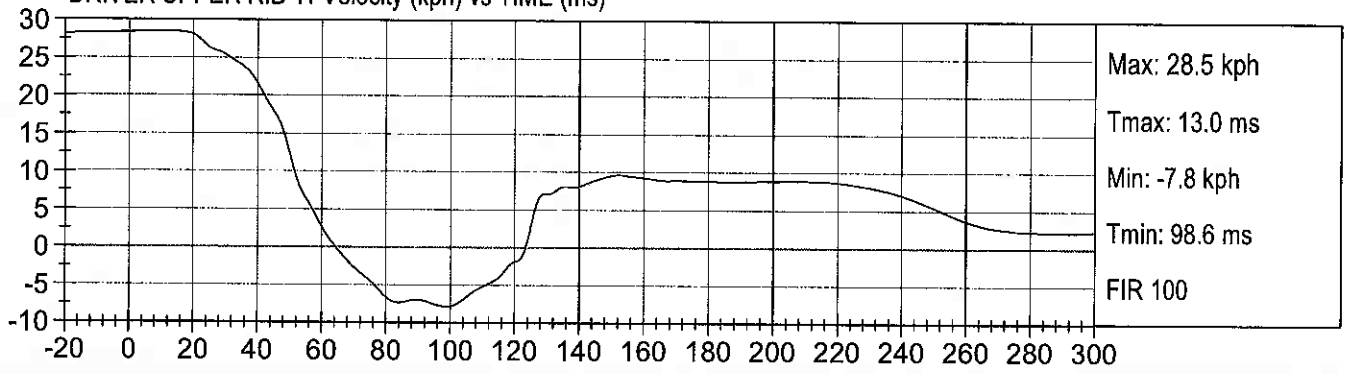
FMVSS 201 RIGID POLE
2009 FORD FLEX C90210

Test Date: 03/13/2009
Speed: 17.5 mph (28.2 km/h)

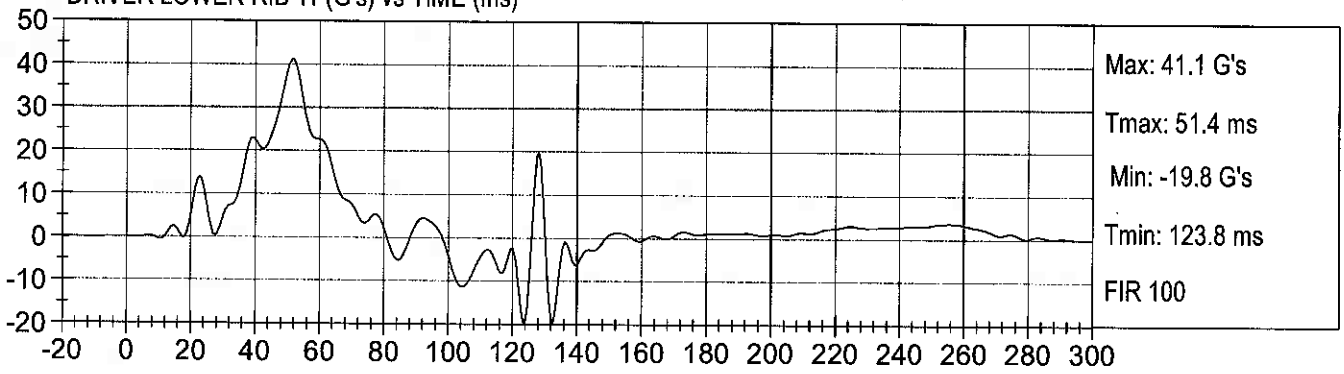
DRIVER UPPER RIB Yr (G's) vs TIME (ms)



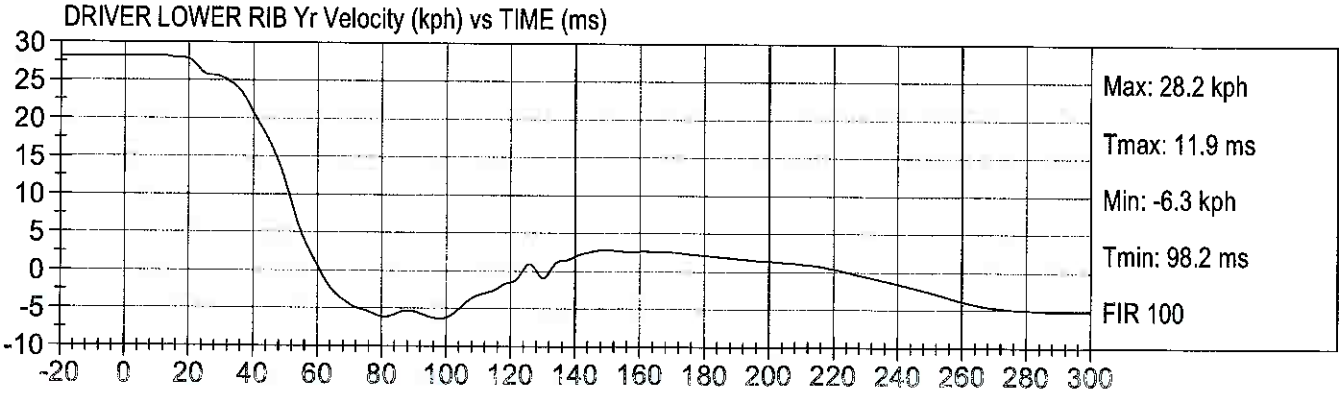
DRIVER UPPER RIB Yr Velocity (kph) vs TIME (ms)



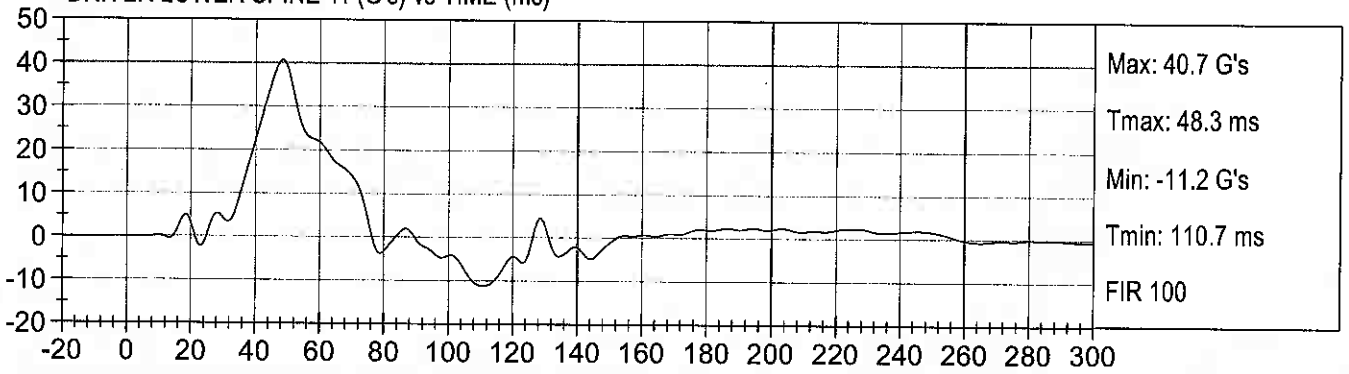
DRIVER LOWER RIB Yr (G's) vs TIME (ms)



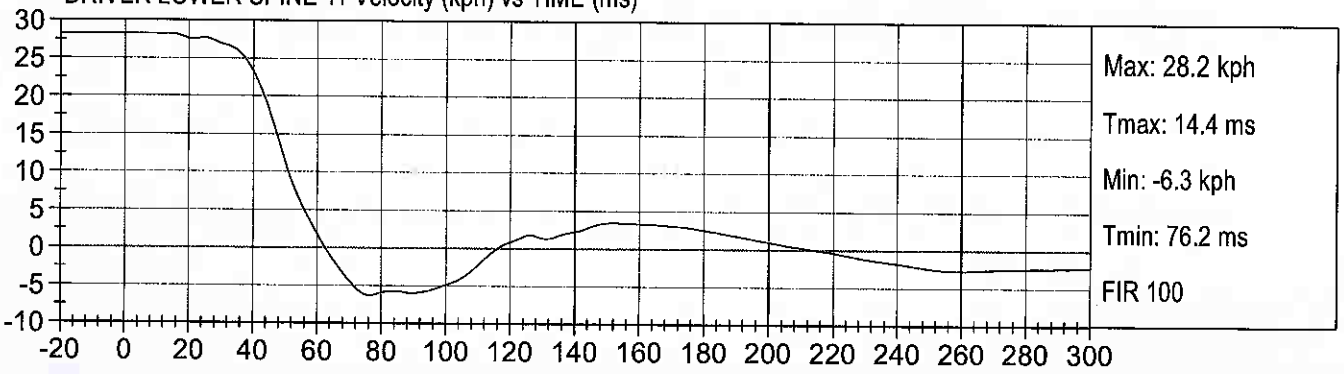
DRIVER LOWER RIB Yr Velocity (kph) vs TIME (ms)



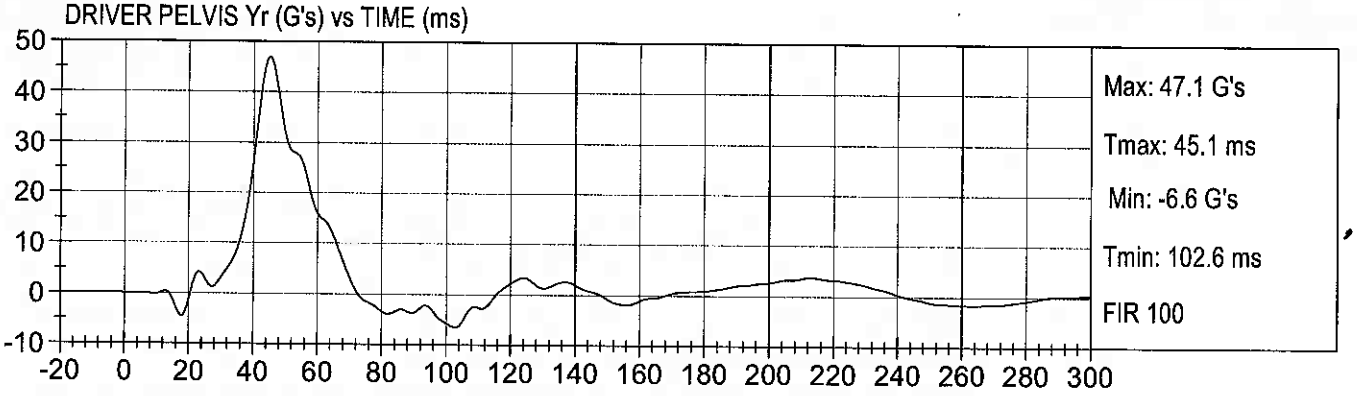
DRIVER LOWER SPINE Yr (G's) vs TIME (ms)



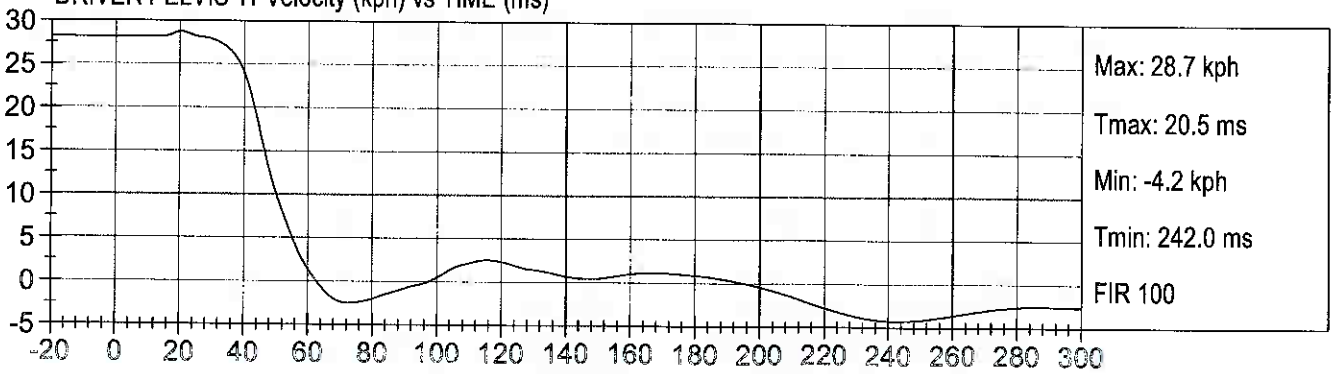
DRIVER LOWER SPINE Yr Velocity (kph) vs TIME (ms)



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



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



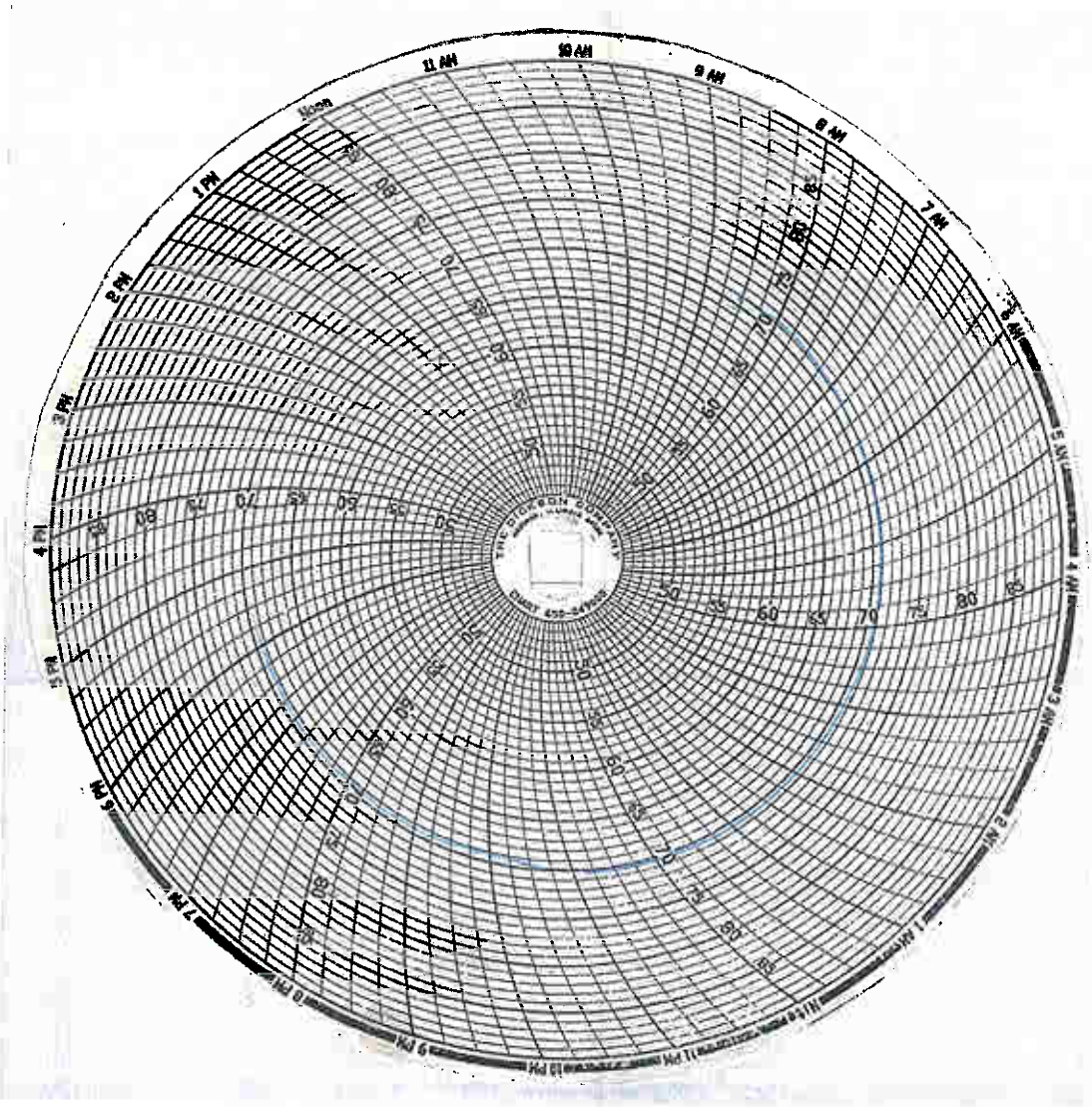
APPENDIX C

SID/HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Vehicle and Dummy Temperature

Test Vehicle: 2009 Ford Flex
Test Program: FMVSS 201P

NHTSA No. C90210
Test Date: March 13, 2009



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

ATD Serial No: 036 **Test I.D:** D09471

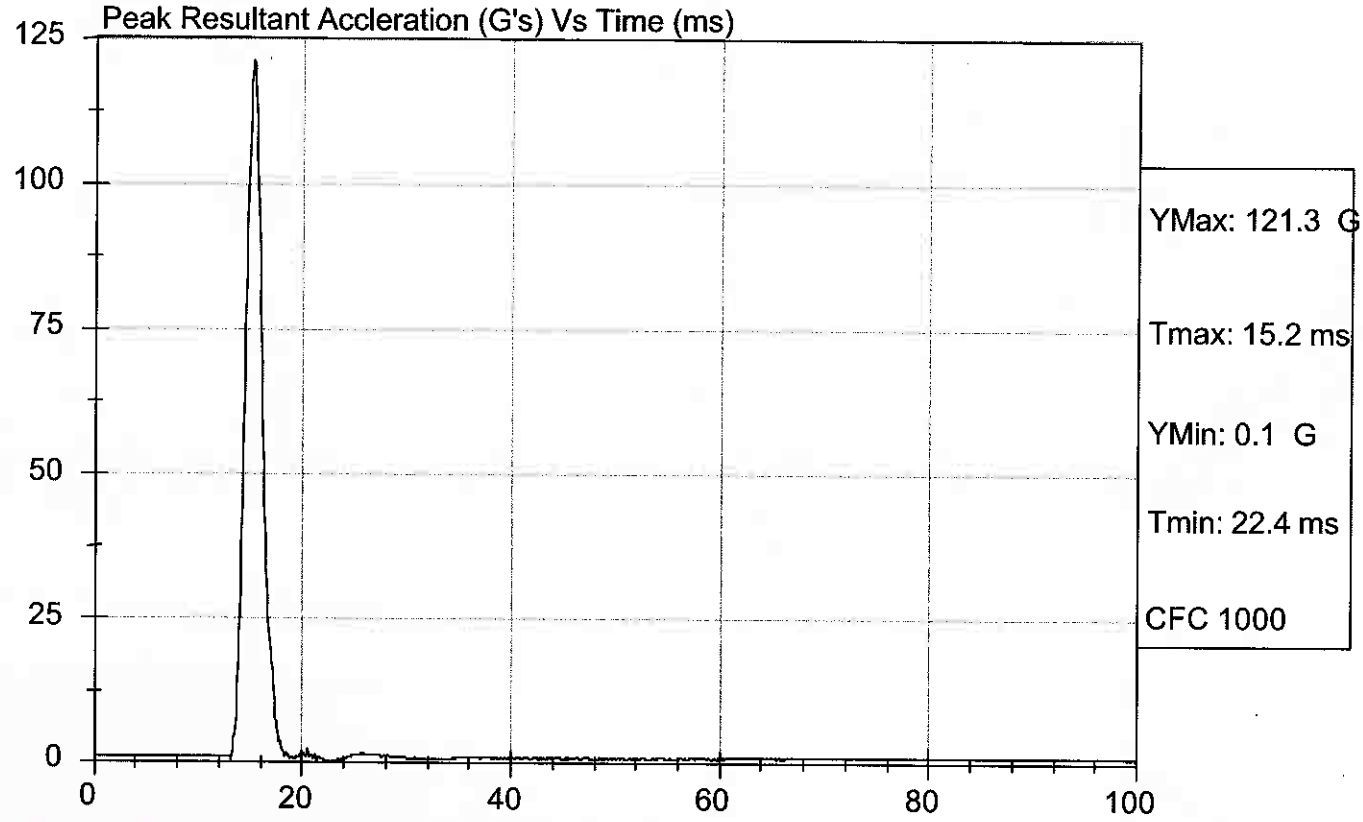
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.2	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	120 to 150	121	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-7	Pass
		Overall Test Results		Pass

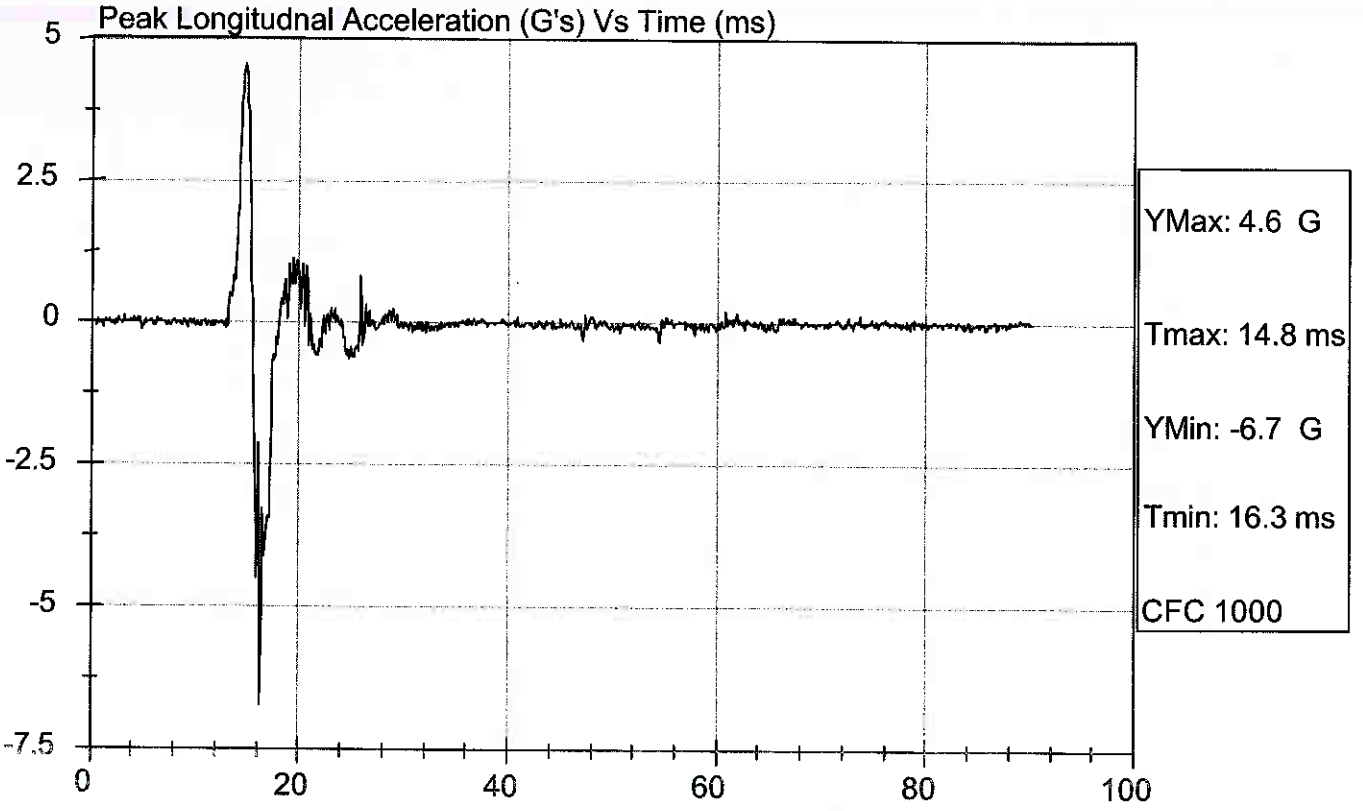
Tim Brady
Laboratory Technician

3/11/09
Test Date

David Winkelbauer
Approved By

inga	Test Description: Head Drop	Test Date: 3/11/09
	Component: D09471	Speed: 0 ft/s, 0 m/s





SID/HIII Calibration Data Sheet

Side Impact Dummy

Thorax Impact Test

ATD Serial No: 036 **Test I.D:** D09472

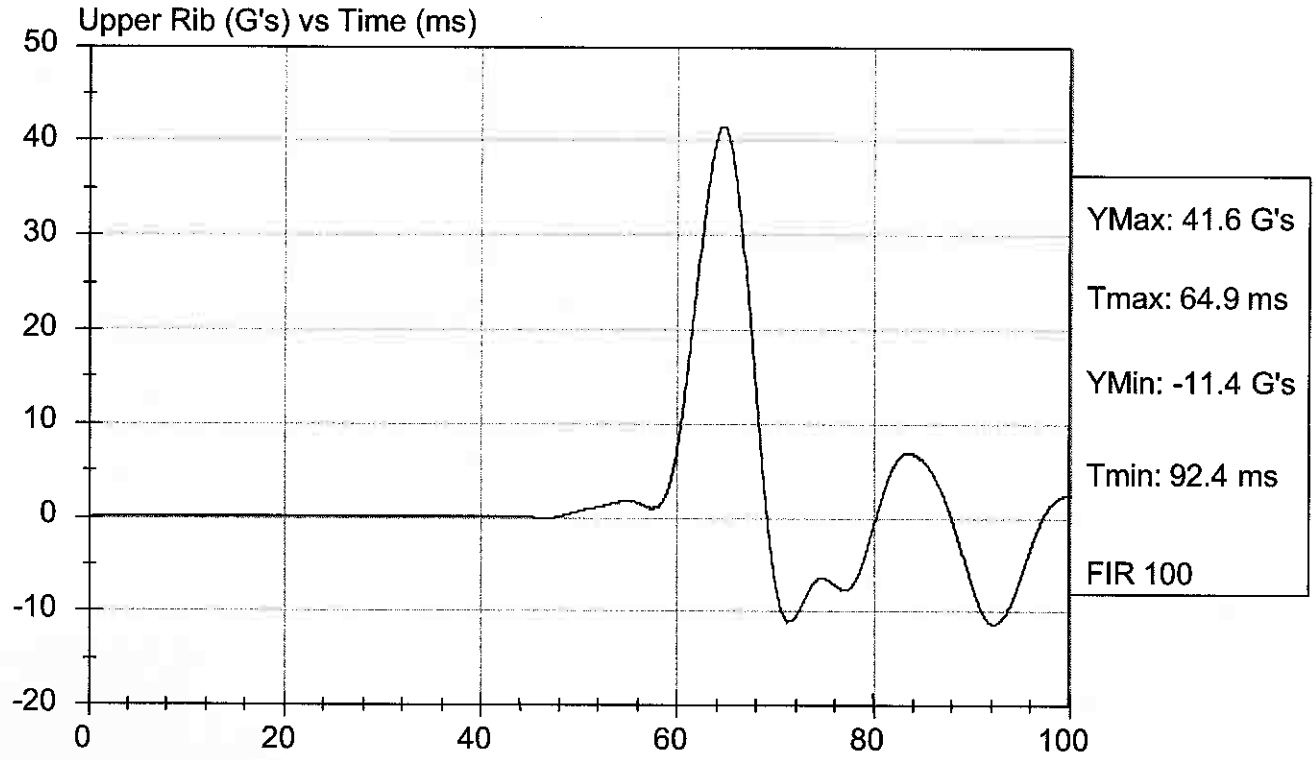
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	4.21 - 4.33	4.23	Pass
Upper Rib	G's	37 - 46	42	Pass
Lower Rib	G's	37 - 46	41	Pass
Lower Spine	G's	15 - 22	18	Pass
		Overall Test Results		Pass

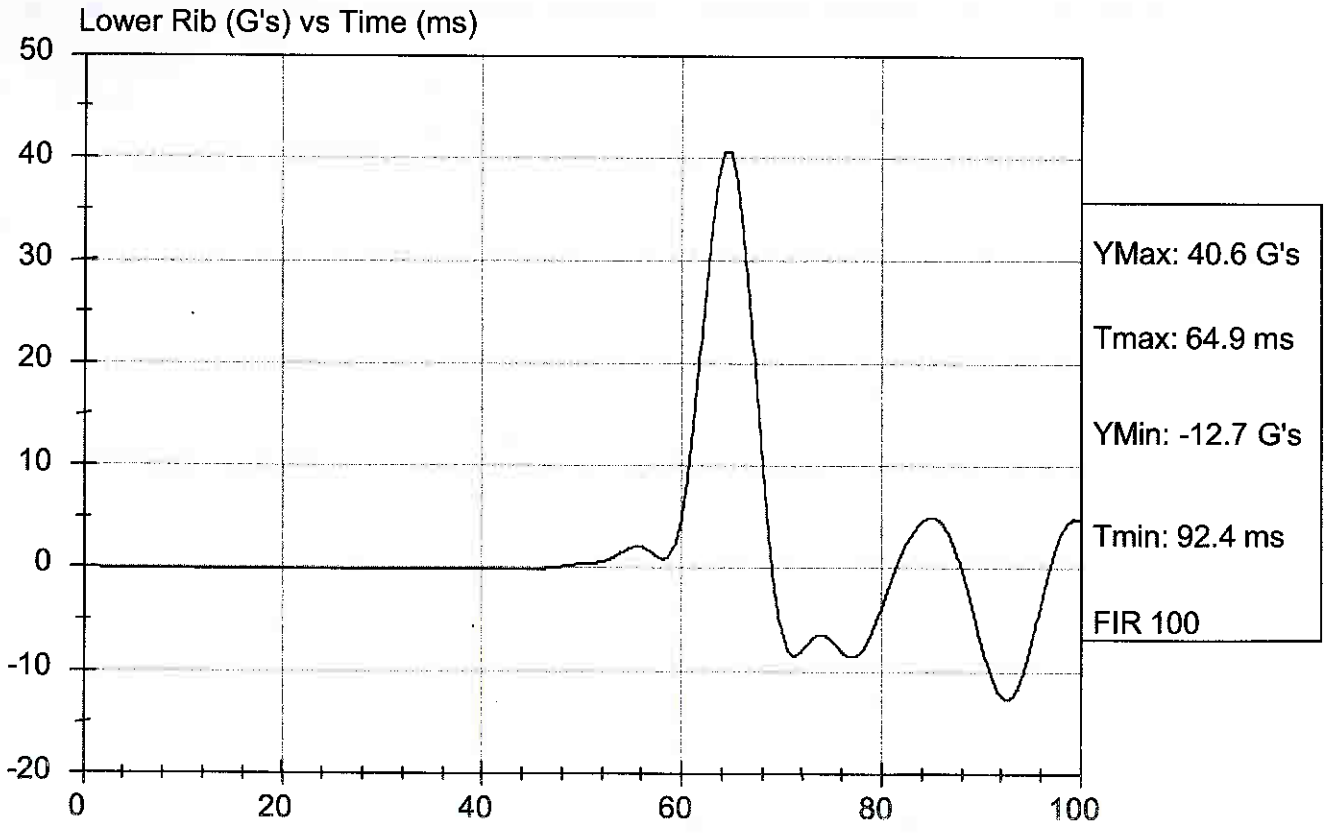
Laboratory Technician

3/11/09
Test Date

David Winkelbauer
Approved By

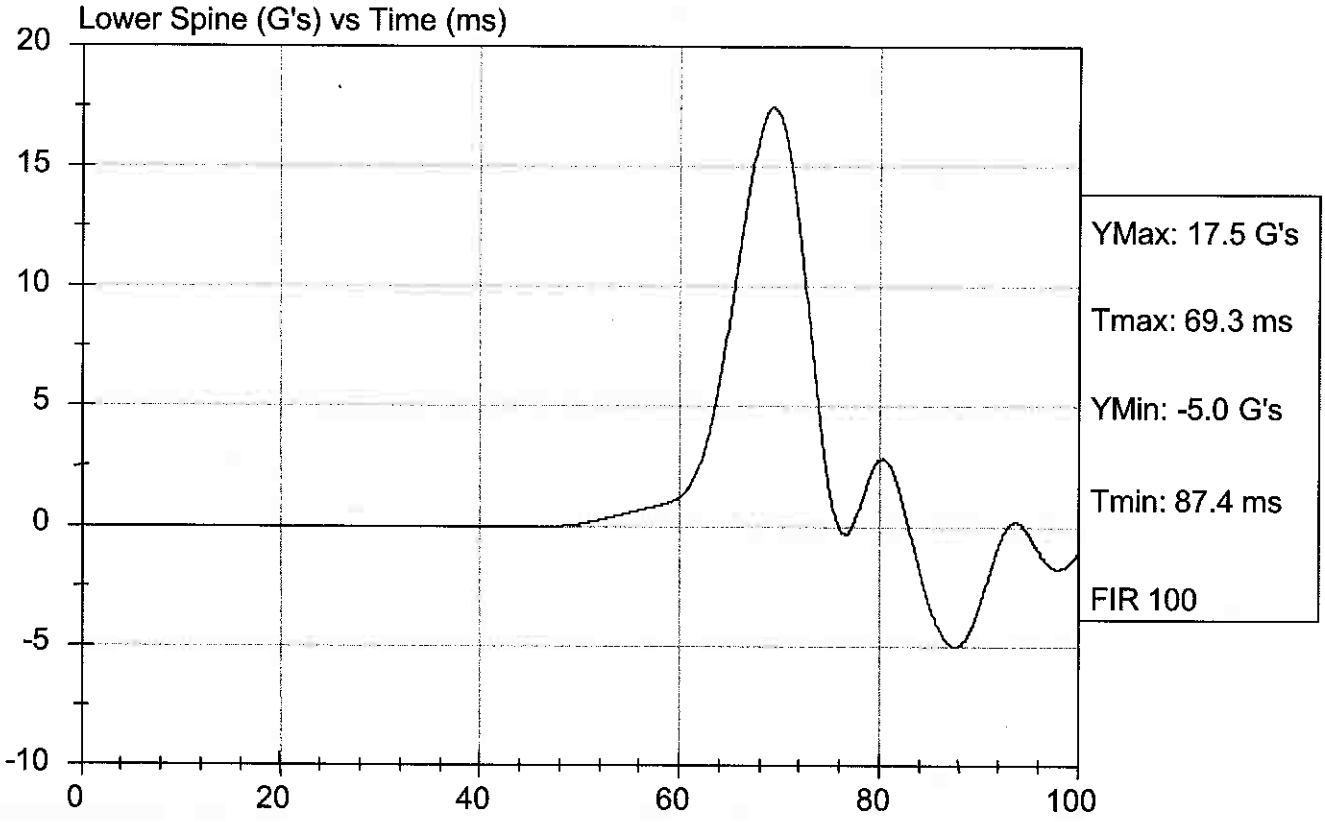
inga	Test Desc: Thorax Impact Component ID: D09472	Test Date: 3/11/09 Speed: 13.9 ft/s, 4.23 m/s





Test Desc: Thorax Impact
Component ID: D09472

Test Date: 3/11/09
Speed: 13.9 ft/s, 4.23 m/s



SID/HIII Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Test

ATD Serial No: 036 **Test I.D:** D09473

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	4.21 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	42	Pass
		Overall Test Results		Pass

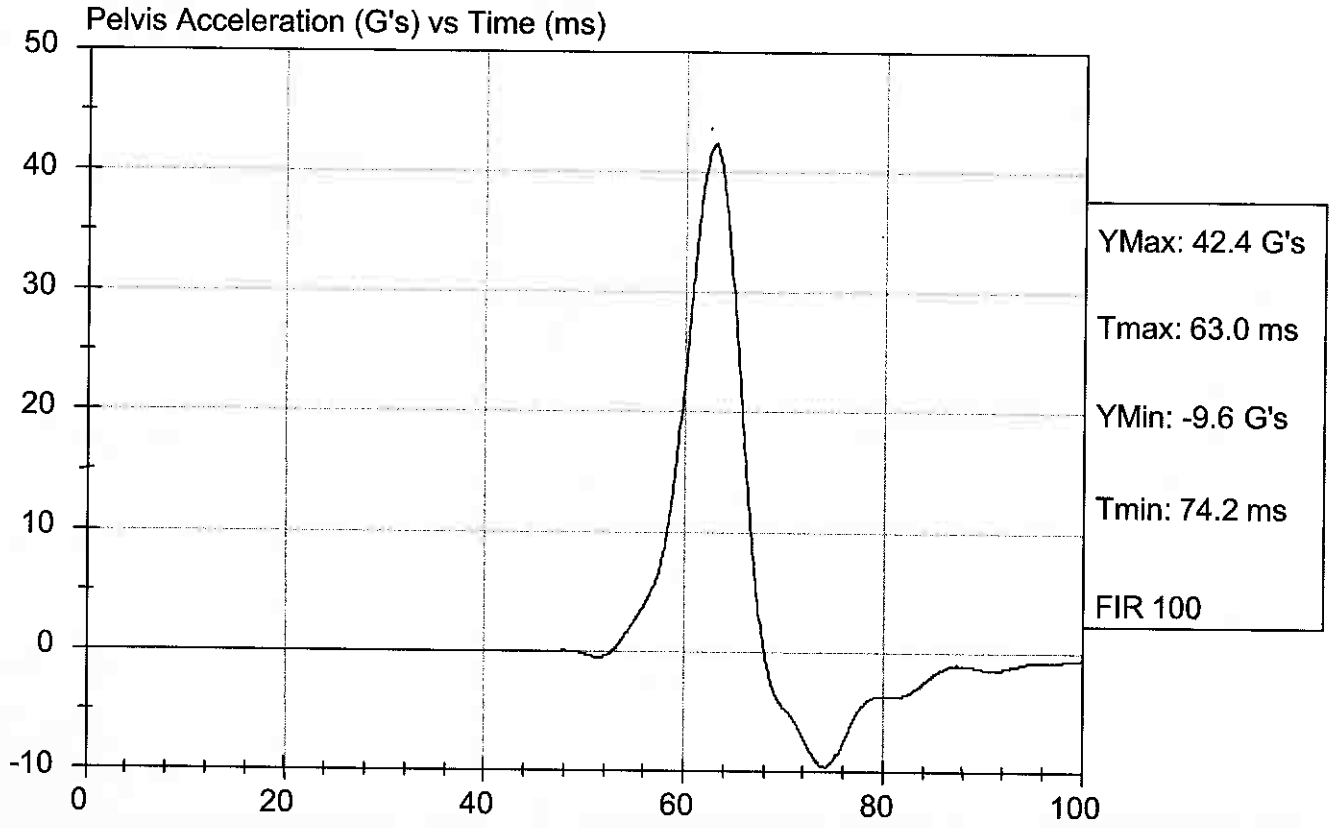
Laboratory Technician

3/11/09
Test Date

David Winkelbauer
Approved By

Test Desc: Pelvis Impact
Component ID: D09473

Test Date: 3/11/09
Speed: 14.1 ft/s, 4.30 m/s



SID/HIII Calibration Data Sheet

Side Impact Dummy

Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 036 **Test I.D:** D09474

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Force At 12.7 mm	N	104 -162	114	Pass
Force At 19 mm	N	163 - 222	172	Pass
Force At 25.4 mm	N	222 - 280	245	Pass
Force At 33 mm	N	325 - 391	345	Pass
		Overall Test Results		Pass

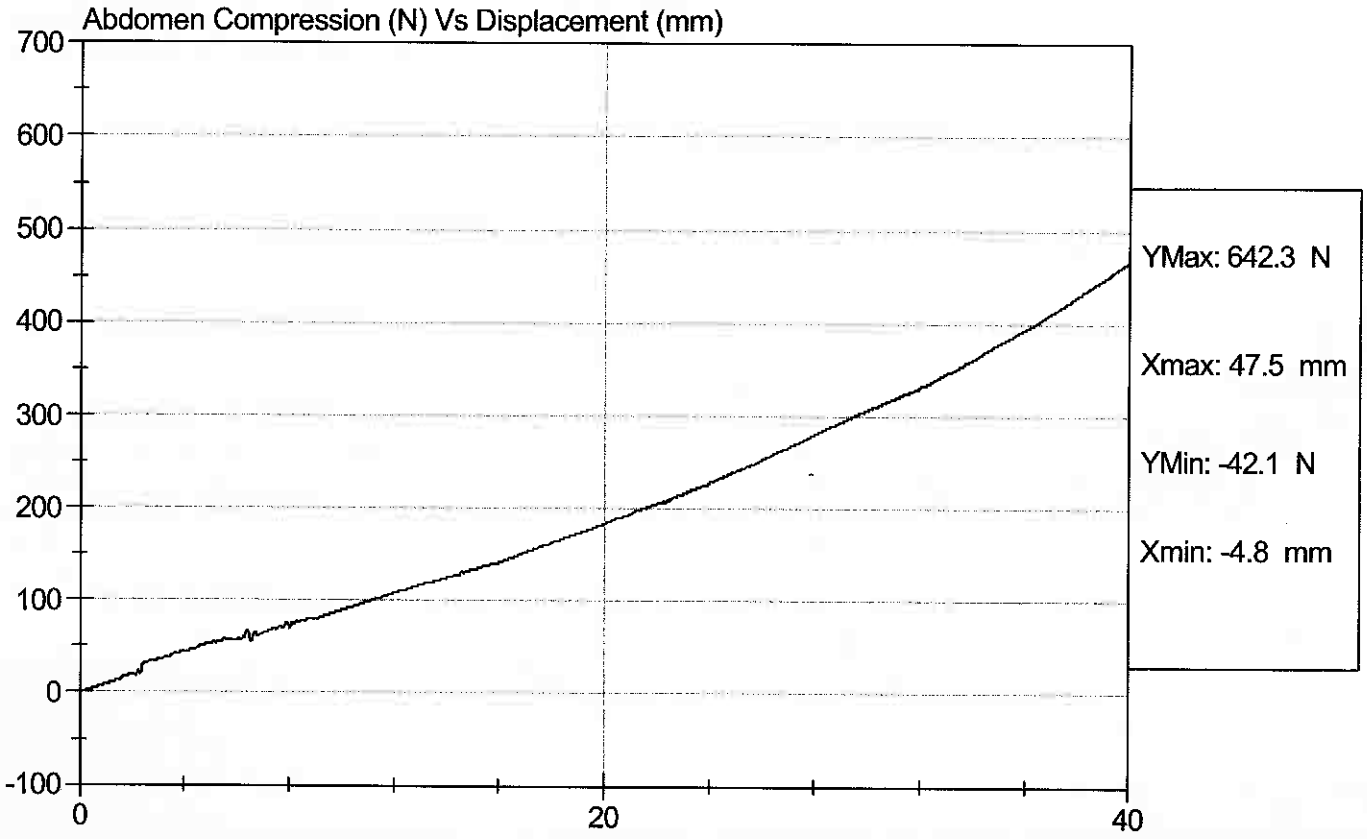
Laboratory Technician

3/11/09
Test Date

David Winkelbauer
Approved By

Test Description: Abdomen Compression Test Date: 3/11/09

Component: D09474 Speed: 0 ft/sec, 0 m/s



SID/HIII Calibration Data Sheet

Side Impact Dummy

Lumbar Flexion Calibration

ATD Serial No: 036 **Test I.D:** D09475

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	138.8	Pass
Force At 30 deg	N	151.2 - 204.6	180.3	Pass
Force At 40 deg	N	204.6 - 258.0	252.0	Pass
Return Angle	Deg	12 Maximum	6	Pass
		Overall Test Results		Pass

Laboratory Technician

3/11/09
Test Date

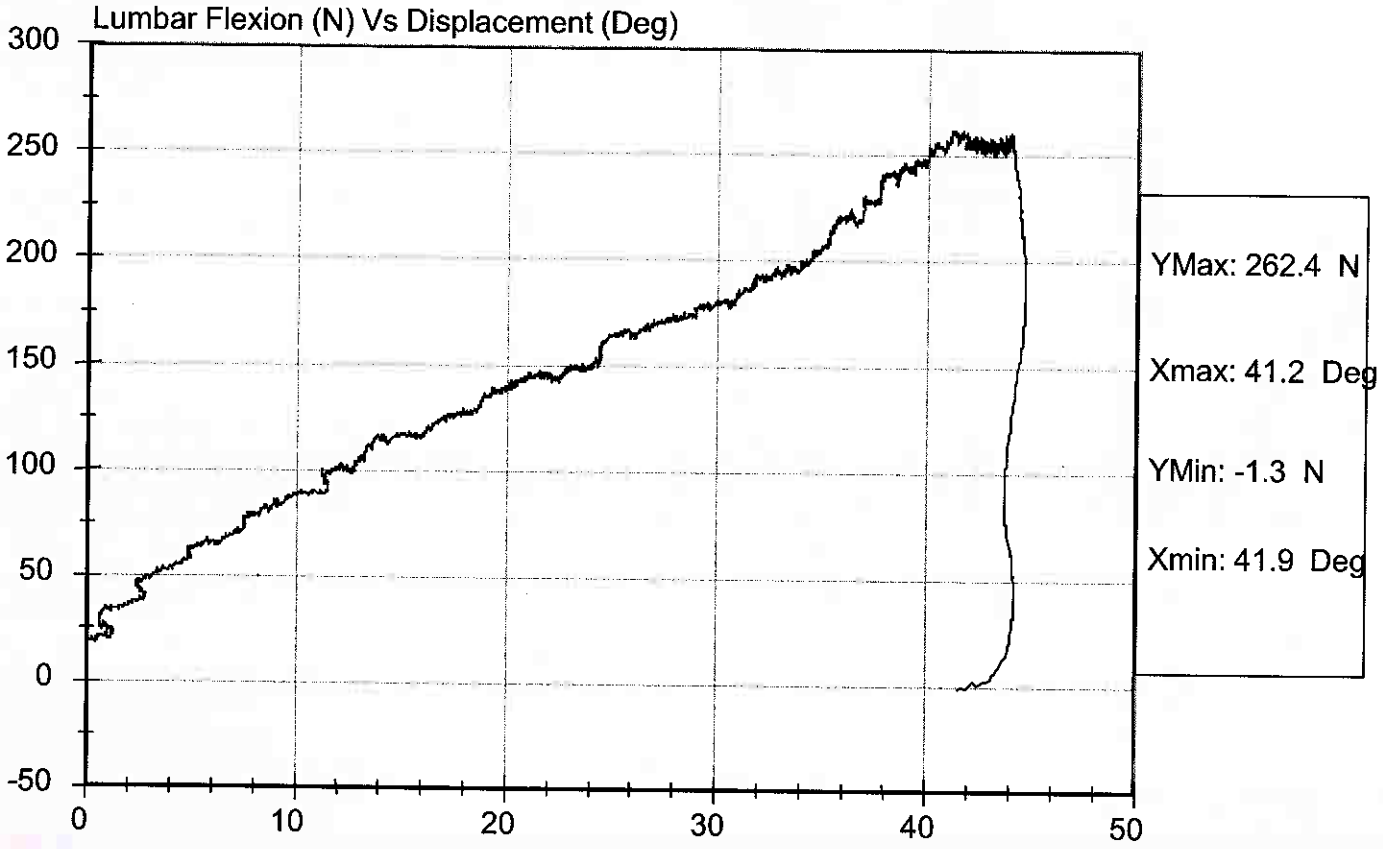
David Winkelbauer
Approved By

Test Description: Lumbar Flexion

Test Date: 3/11/09

Component: D09475

Speed: 0 ft/s, 0 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Neck Pendulum Test

ATD Serial No: 036 **Test I.D:** D09479

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Impact Velocity		m/s	6.89 to 7.13	7.05	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	2.51	Pass
	20 ms	m/s	4.12 to 5.10	4.80	Pass
	30 ms	m/s	5.73 to 7.01	6.55	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.85	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	70	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	74	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	58	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	13	Pass

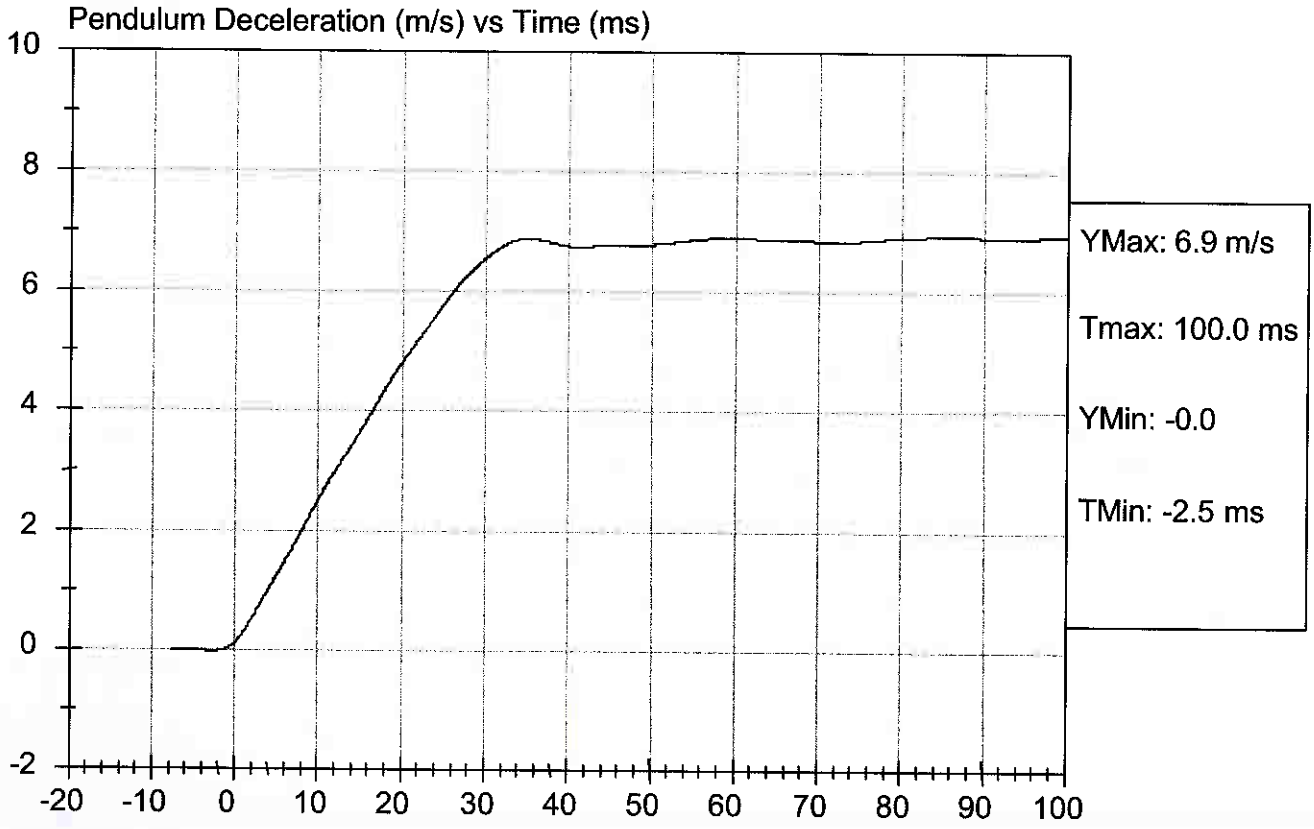
Laboratory Technician

3/11/09
Test Date

David Winkelbauer
Approved By

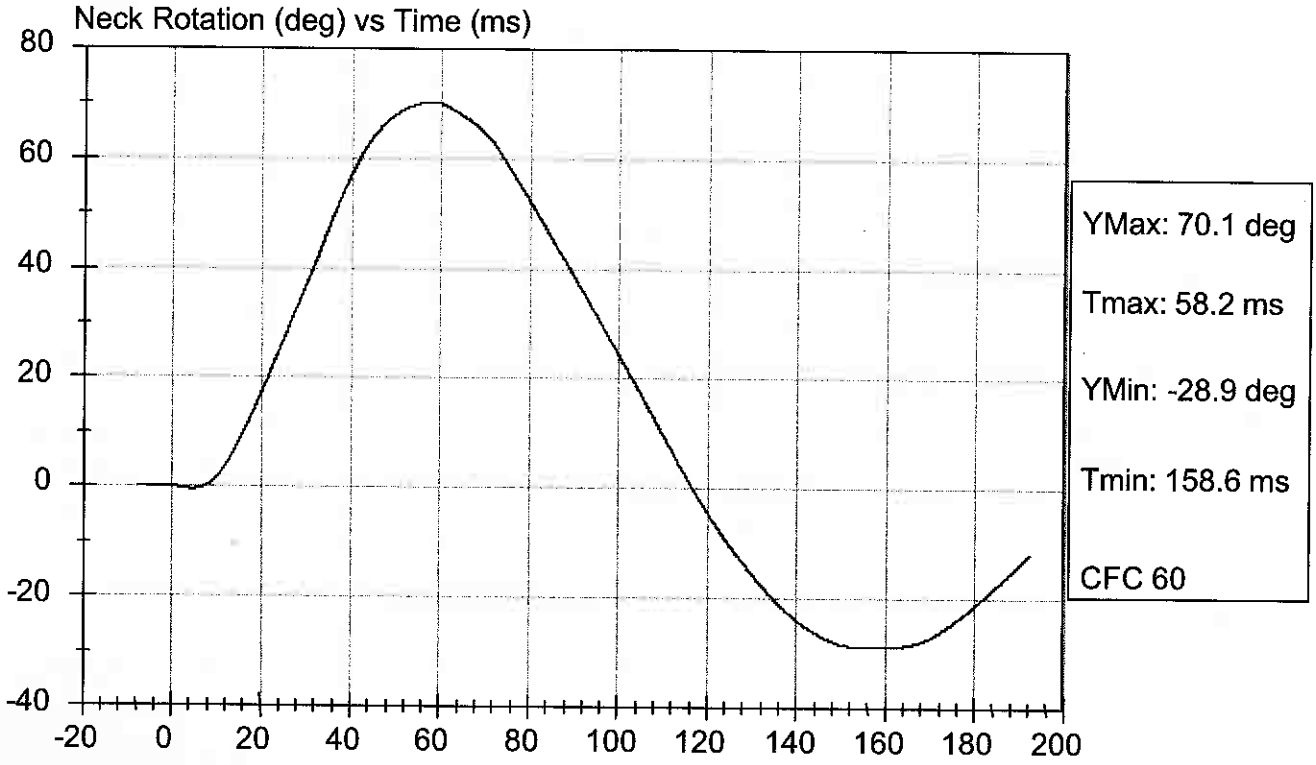
Test Desc: Neck Bending
Component ID: D09479

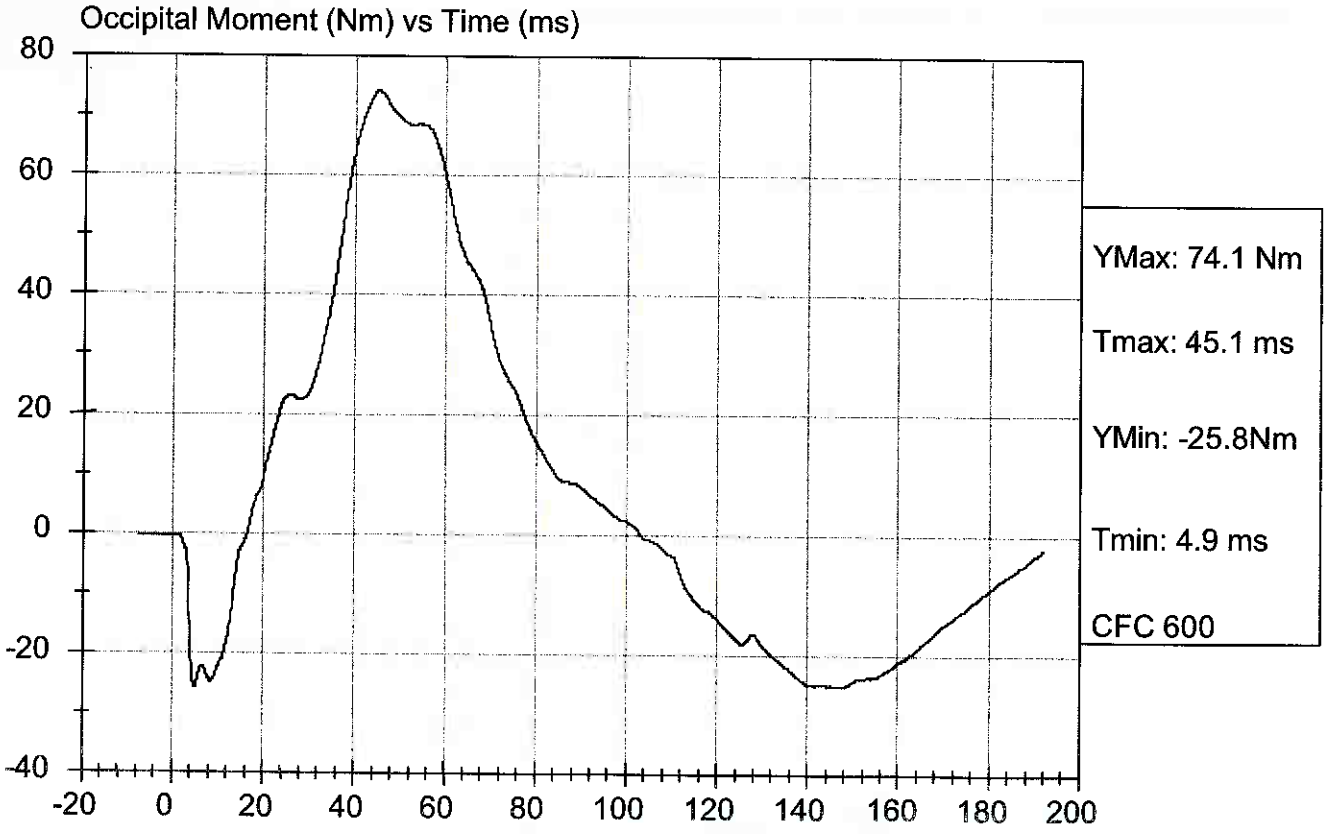
Test Date: 3/11/09
Speed: 23.1 ft/s, 7.05 m/s



Test Desc: Neck Bending
Component ID: D09479

Test Date: 3/11/09
Speed: 23.12 ft/s, 7.05 m/s





SID/HIII Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration (Lateral)

ATD Serial No: 036 **Test I.D:** D09551

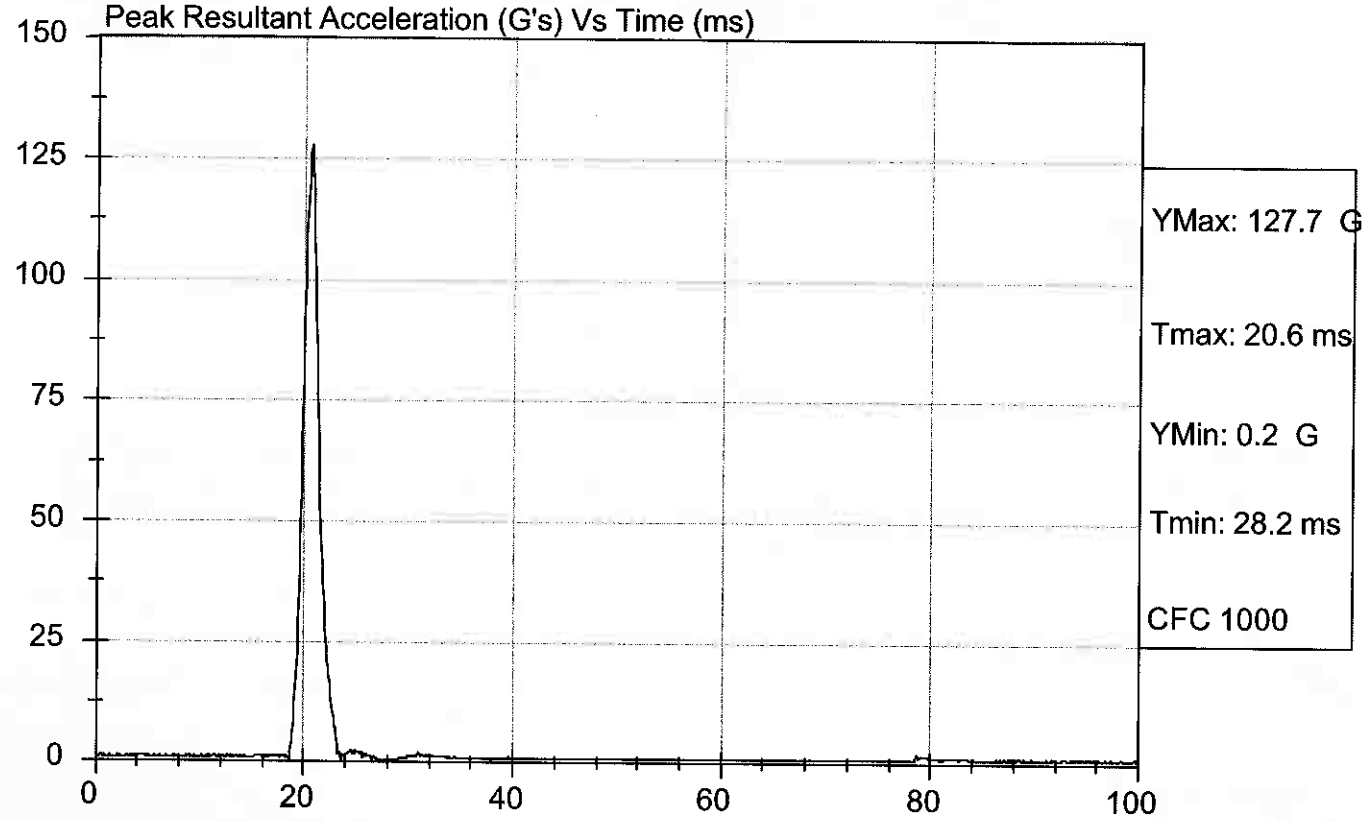
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Peak Resultant Acceleration	G's	120 to 150	128	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-9.4	Pass
		Overall Test Results		Pass

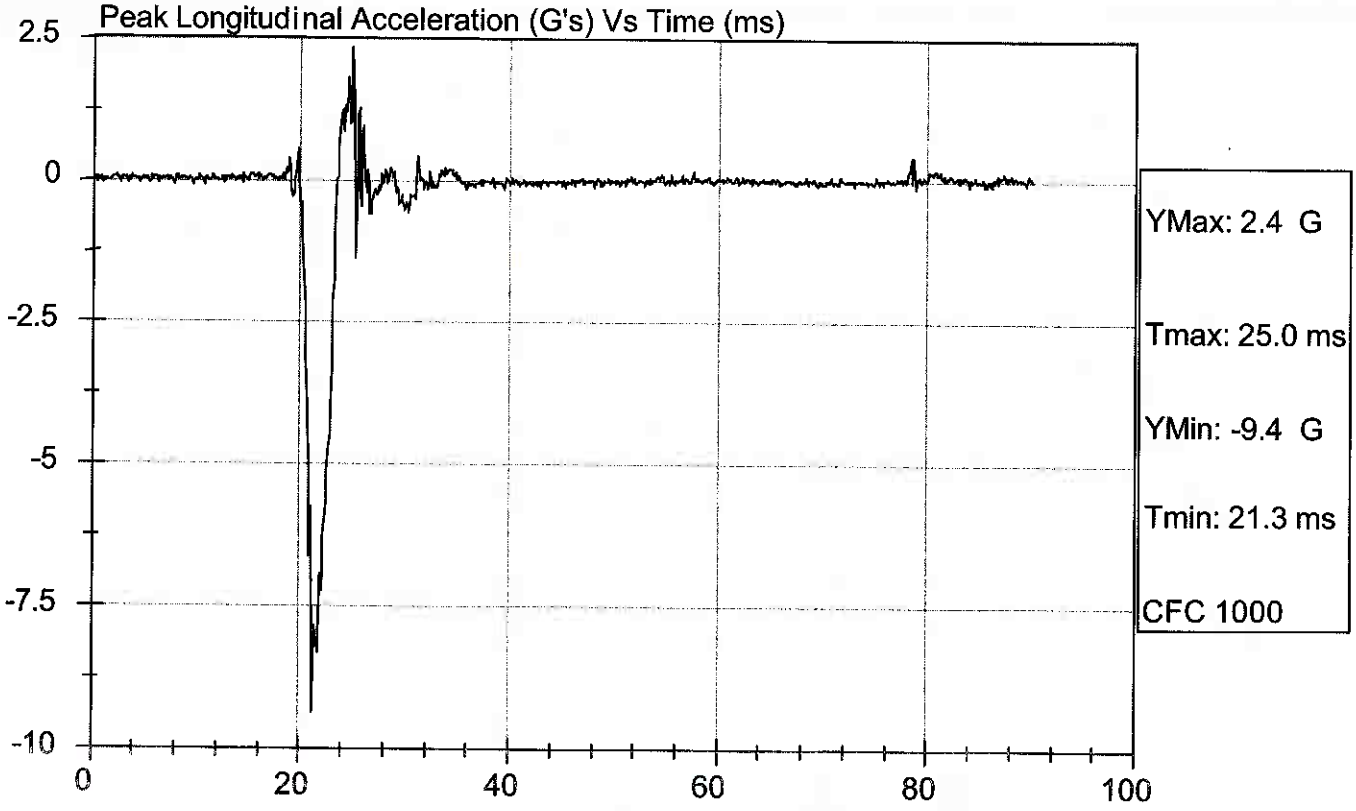
Laboratory Technician

3/18/09
Test Date

David Winkelbauer
Approved By

	Test Description: Head Drop	Test Date: 3/18/09
	Component: D09551	Speed: 0 ft/s, 0 m/s





SID/HIII Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 036 **Test I.D:** D09552

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Velocity	m/s	4.21 - 4.33	4.23	Pass
Upper Rib	G's	37 - 46	39	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	18	Pass
		Overall Test Results		Pass

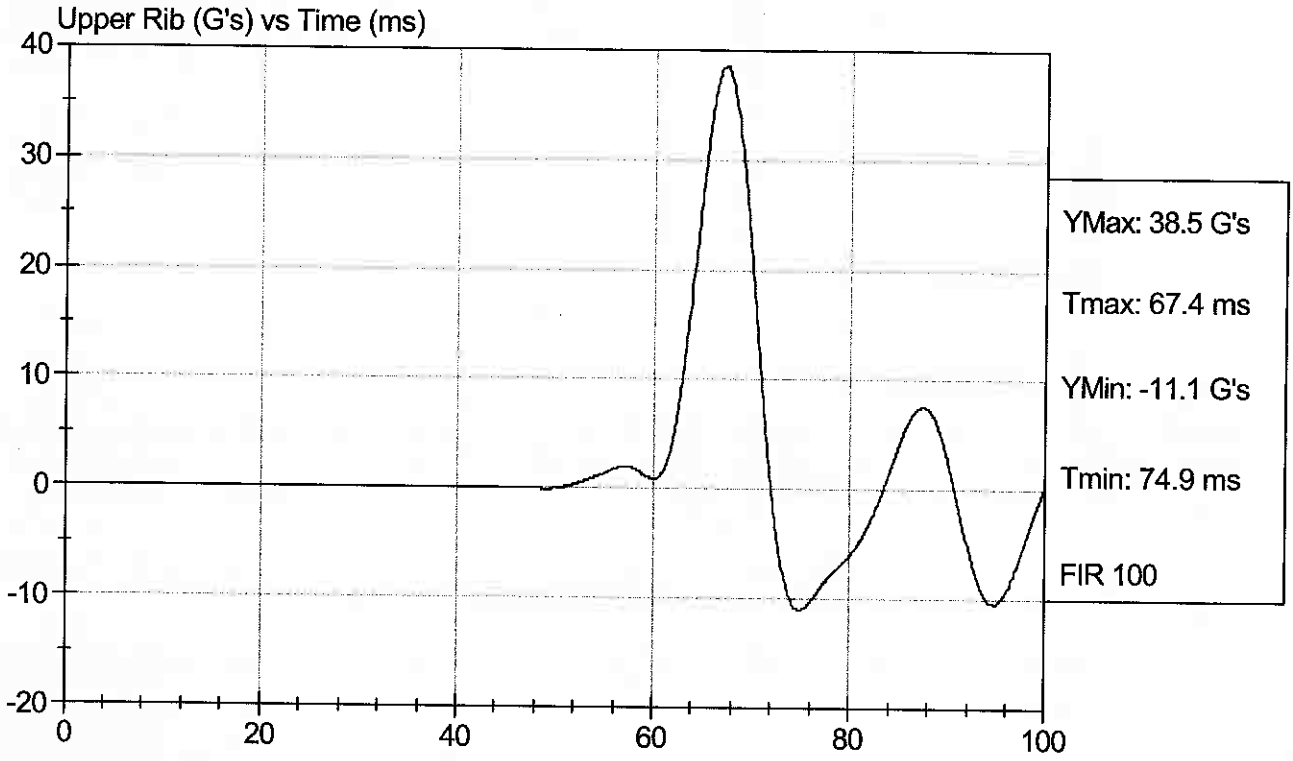
Laboratory Technician

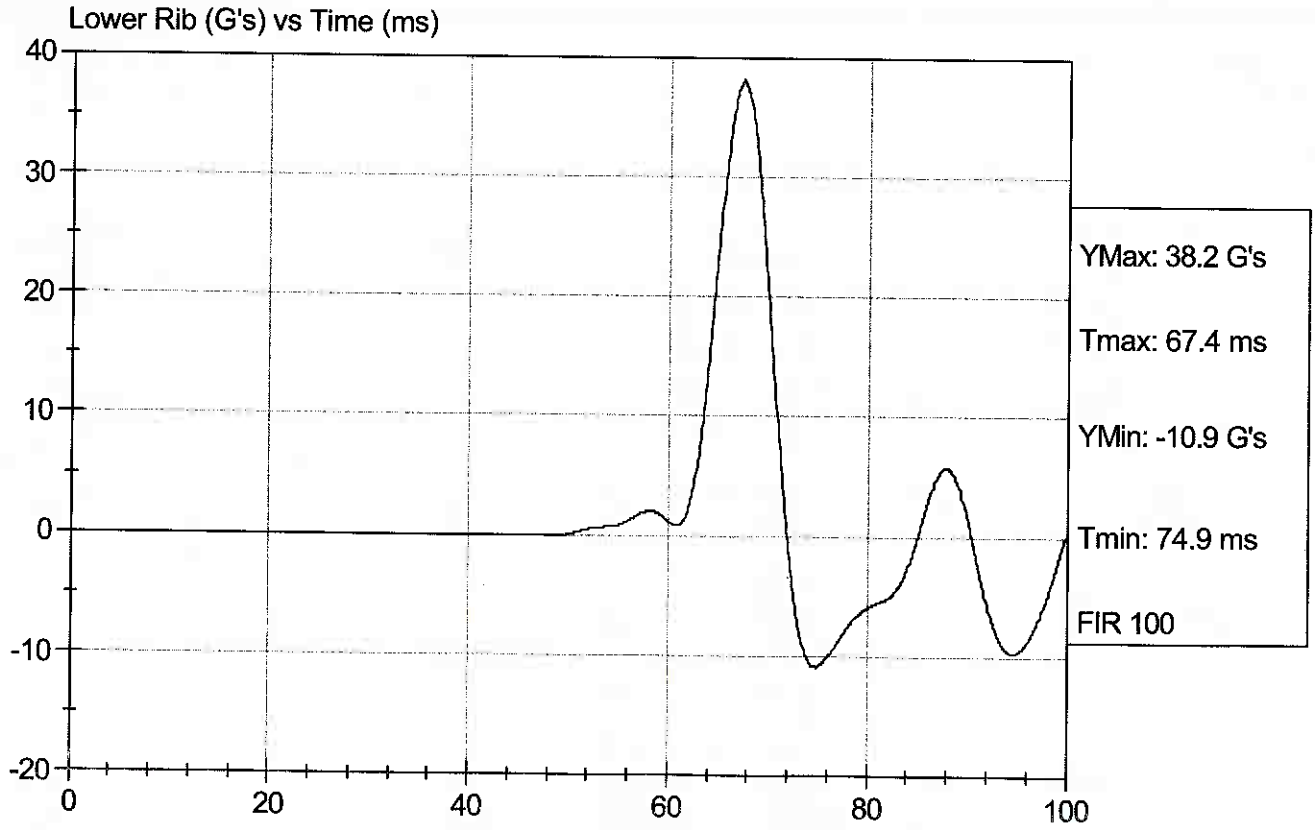
3/18/09
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D09552

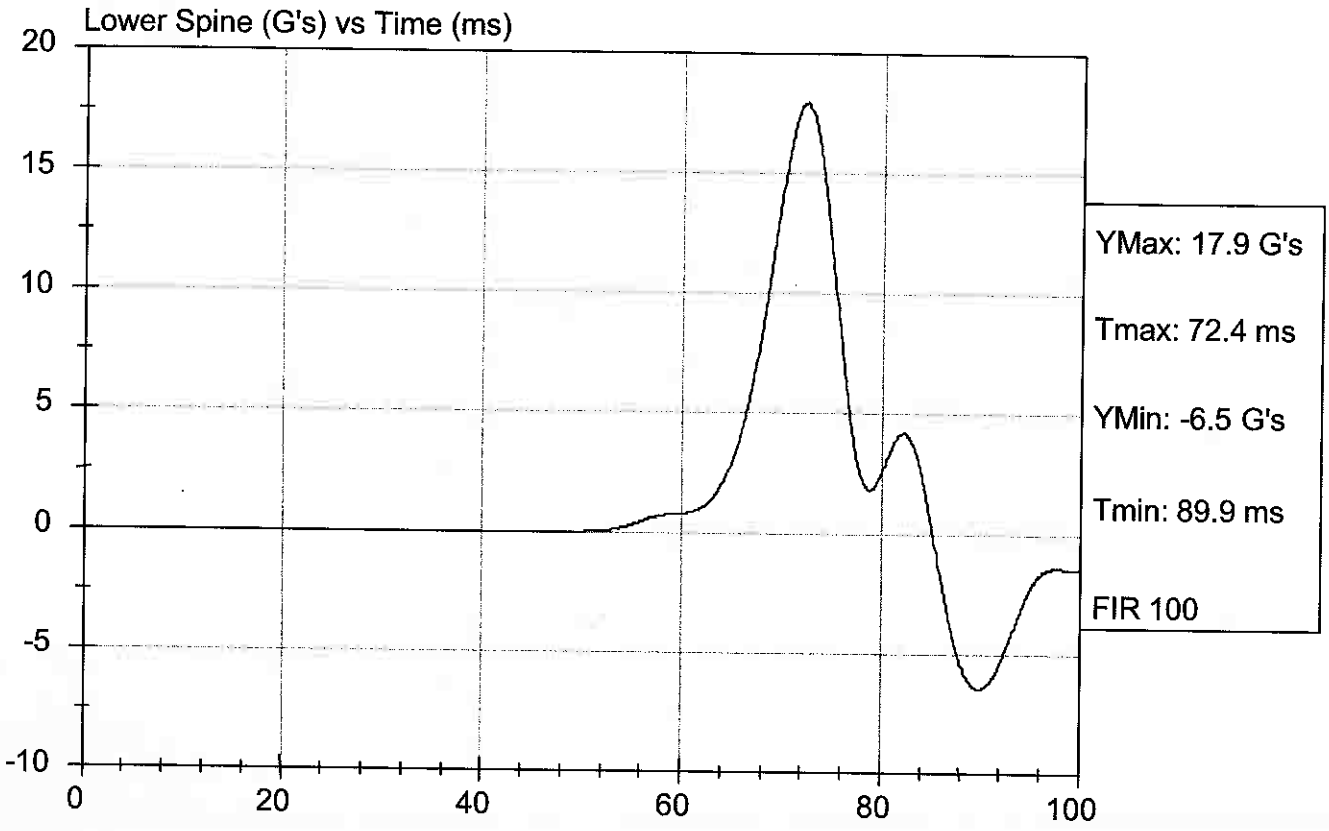
Test Date: 3/18/09
Speed: 13.89 ft/sec, 4.23 m/s





Test Desc: Thorax Impact
Component ID: D09552

Test Date: 3/18/09
Speed: 13.89 ft/sec, 4.23 m/s



SID/HIII Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Test

ATD Serial No: 036 **Test I.D:** D09553

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Probe Velocity	m/s	4.21 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	40	Pass
		Overall Test Results		Pass

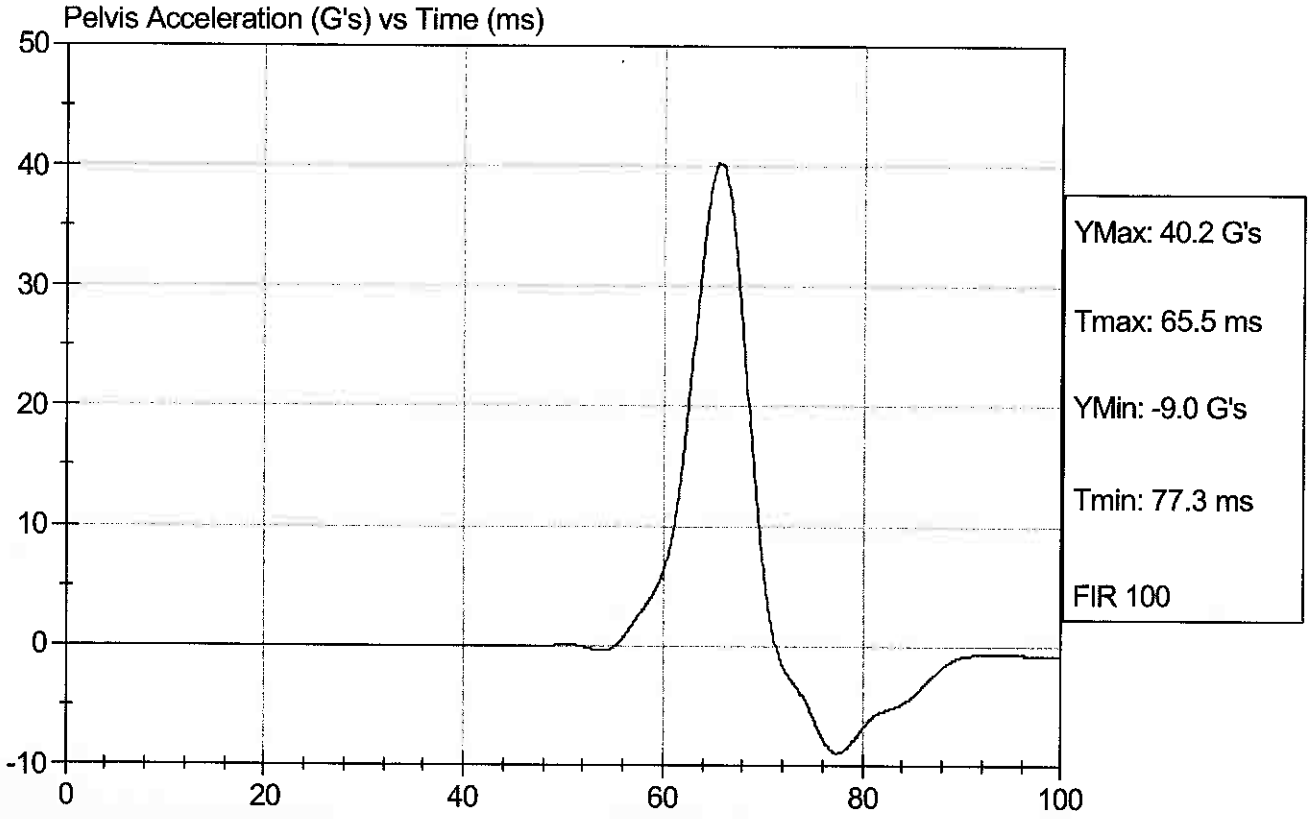
Laboratory Technician

3/18/09
Test Date

David Winkelbauer
Approved By

Test Desc: Pelvis Impact
Component ID: D09553

Test Date: 3/18/09
Speed: 14.12 ft/sec, 4.30 m/s



SID Calibration Data Sheet

Side Impact Dummy

Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 036 **Test I.D:** D09554

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Force At 12.7 mm	N	104 -162	144	Pass
Force At 19 mm	N	163 - 222	197	Pass
Force At 25.4 mm	N	222 - 280	262	Pass
Force At 33 mm	N	325 - 391	365	Pass
		Overall Test Results		Pass

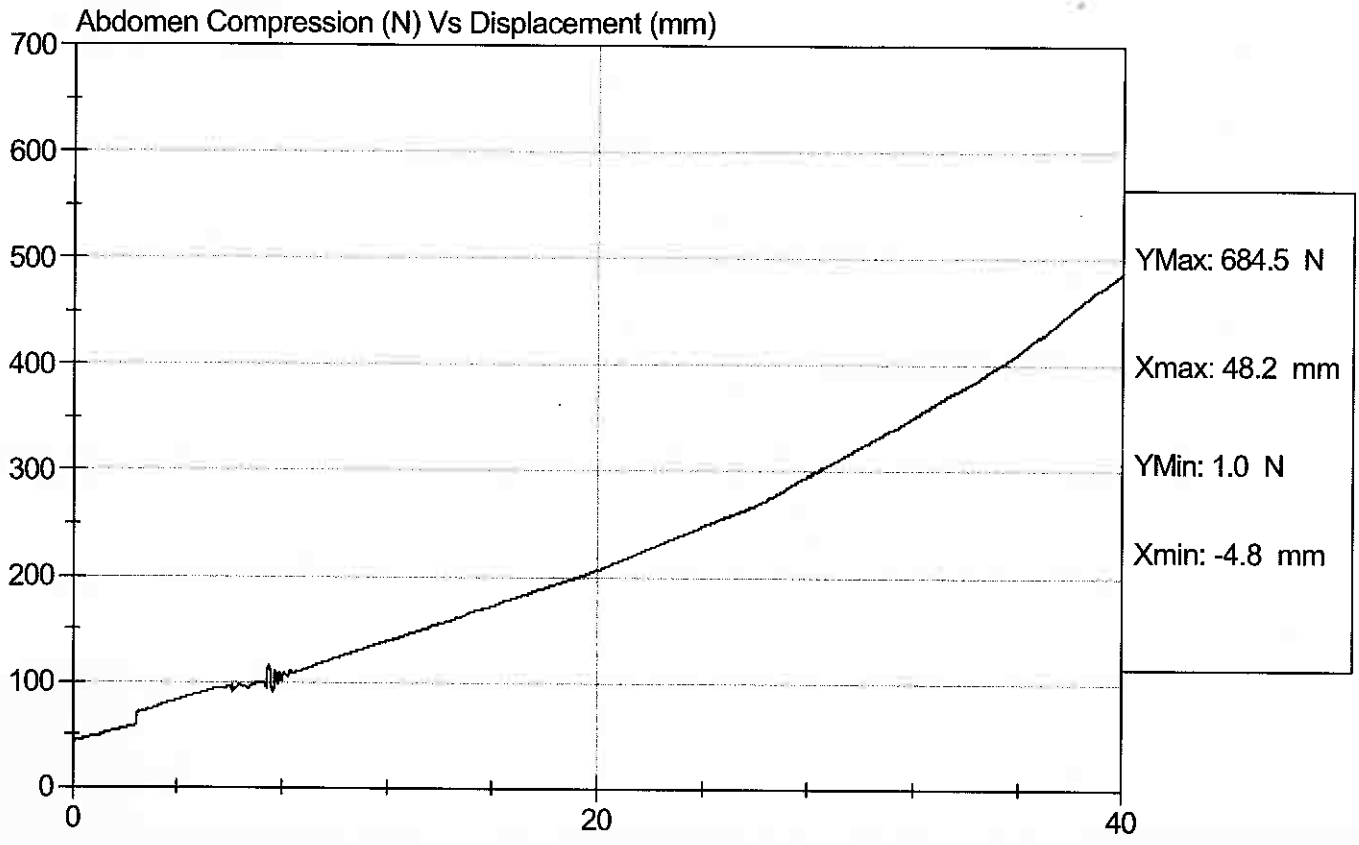
Tim Brady
Laboratory Technician

3/18/09
Test Date

David Winkelbauer
Approved By

Test Description: Abdomen Compression | Test Date: 3/18/09

Component: D09554 | Speed: 0 ft/sec, 0 m/s



SID Calibration Data Sheet

Side Impact Dummy

Lumbar Flexion Calibration

ATD Serial No: 036 **Test I.D:** D09555

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	129.9	Pass
Force At 30 deg	N	151.2 - 204.6	188.3	Pass
Force At 40 deg	N	204.6 - 258.0	252.4	Pass
Return Angle	Deg	12 Maximum	5	Pass
		Overall Test Results		Pass

Laboratory Technician

3/18/09
Test Date

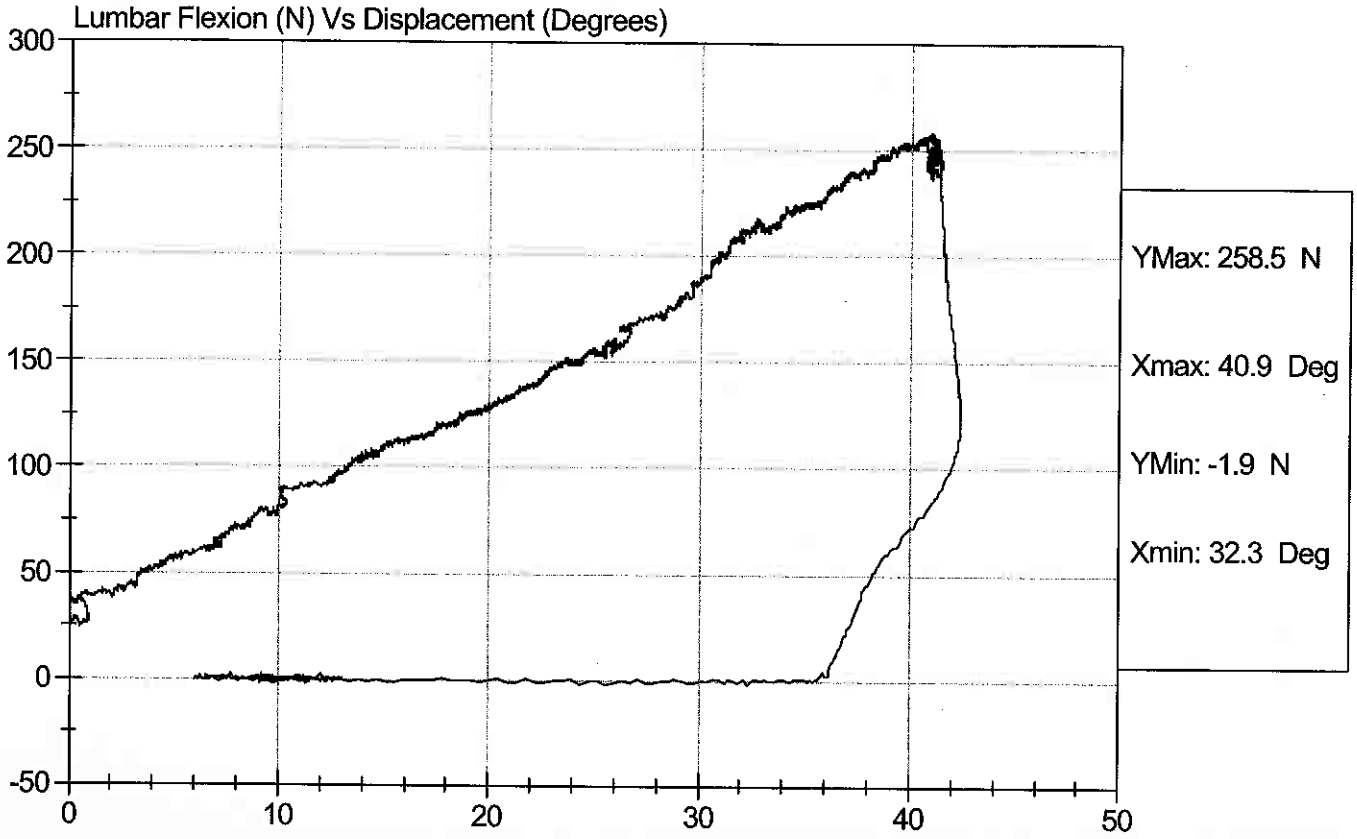
David Winkelbauer
Approved By

Test Description: Lumbar Flexion

Test Date: 3/18/09

Component: D09555

Speed: 0 ft/sec, 0 m/s



SID/HIII Calibration Data Sheet

Side Impact Dummy

Neck Pendulum Test

ATD Serial No: 036 **Test I.D:** D09559

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	2.24	Pass
	20 ms	m/s	4.12 to 5.10	4.54	Pass
	30 ms	m/s	5.73 to 7.01	6.37	Pass
	40 to 70 ms	m/s	6.27 to 7.64	7.00	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	68	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	74	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	58	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	12	Pass

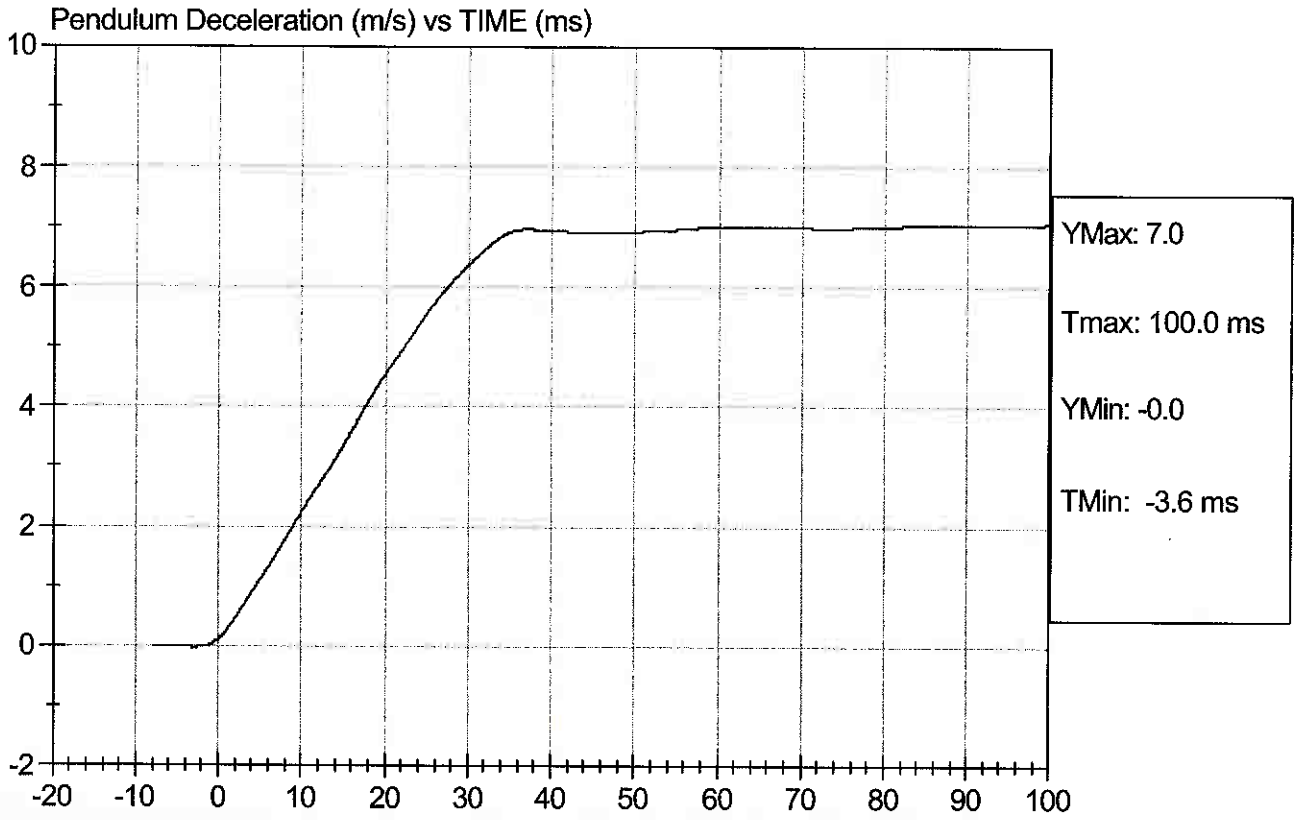
Tim Brady
Laboratory Technician

3/18/09
Test Date

David Winkelbauer
Approved By

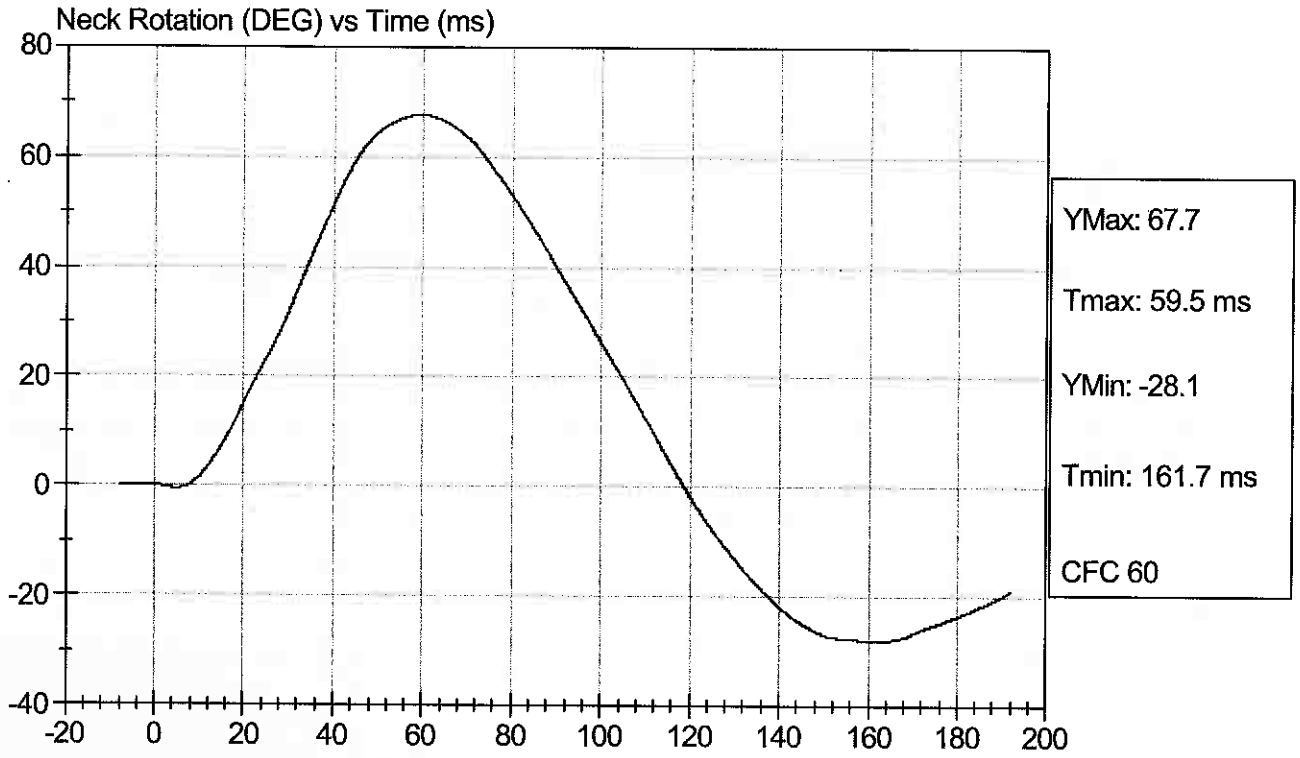
Test Desc: Neck Bending
Component ID: D09559

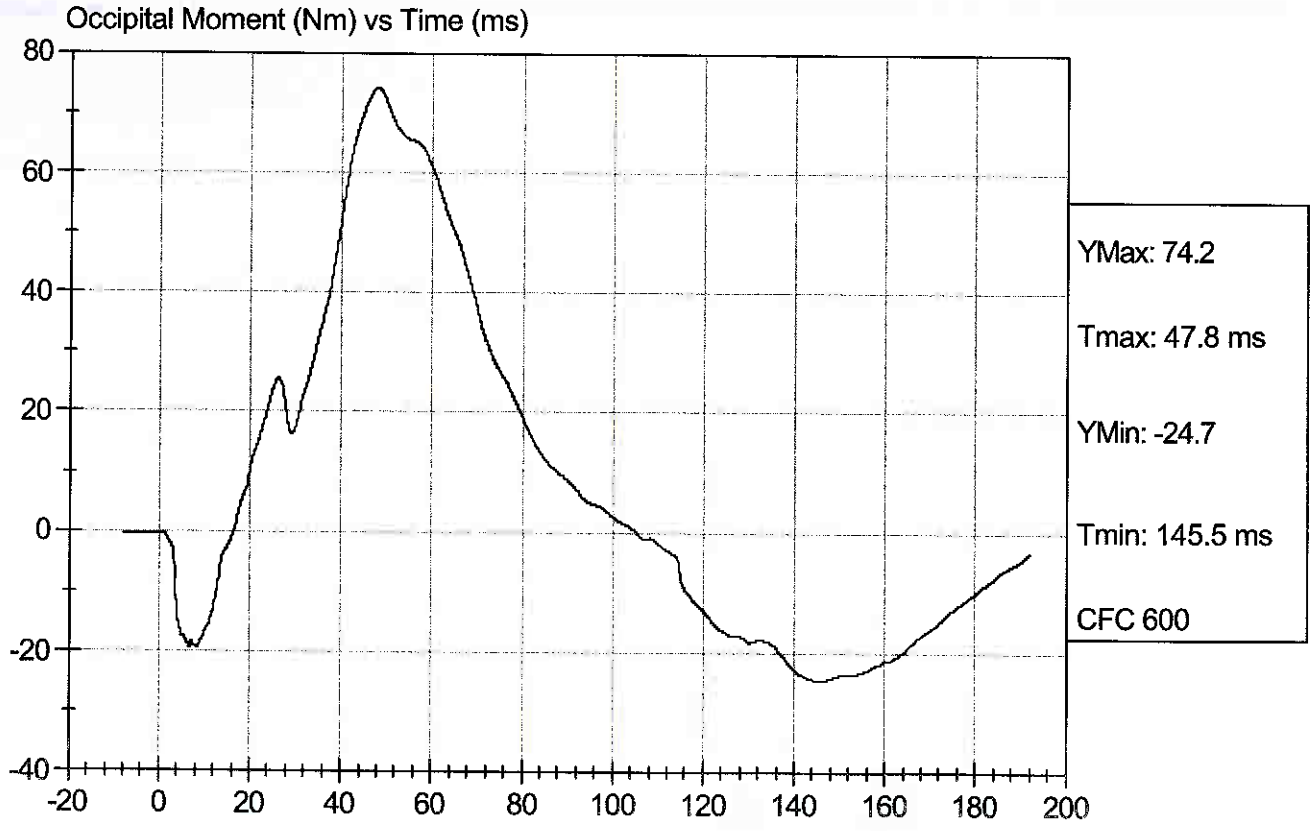
Test Date: 3/18/09
Speed: 23.15 ft/sec, 7.06 m/s



Test Desc: Neck Bending
Component ID: D09559

Test Date: 3/18/09
Speed: 23.15 ft/sec, 7.06 m/s





APPENDIX D

CALIBRATION INFORMATION DATA

DUMMY AND VEHICLE CALIBRATION DATA

	INSTRUMENTS FOR DRIVER S/N 037		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head CG X	AGH74	Endevco	2/23/2009
Head CG Y	C13046	Endevco	2/23/2009
Head CG Z	C10686	Endevco	2/23/2009
Neck Load Cell	650	Denton	11/21/2008
Upper Rib Y	P47096	Endevco	2/11/2009
Lower Rib Y	P52171	Endevco	2/11/2009
Lower Spine Y	P59301	Endevco	2/11/2009
Pelvis Y	P47093	Endevco	2/11/2009
Upper Rib Redundant Y	P47106	Endevco	2/11/2009
Lower Rib Redundant Y	P52170	Endevco	2/11/2009
Lower Spine Redundant Y	P59303	Endevco	2/11/2009
Pelvis Redundant Y	P47094	Endevco	2/11/2009

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Vehicle CG X	D12-X09	Entran	9/11/2008
Vehicle CG Y	D12-X10	Entran	9/11/2008
Vehicle CG Z	D12-X08	Entran	9/11/2008
Left Floor Y	C29-N11	Entran	10/7/2008
Left A-Post @ Sill Y	G29-X42	Entran	1/13/2009
Left Lower A-Post Y	I20-J10	Entran	11/12/2008
Left Mid A-Post Y	A22-R05	Entran	10/7/2008
Left B-Post @ Sill Y	G02-L07	Entran	1/13/2009
Left Lower B-Post Y	P22084	Endevco	11/13/2008
Left Mid B-Post Y	J07-H23	Entran	11/12/2008
Driver Seat Track Y	ET21155	Entran	2/18/2009
Upper Engine X	E20-R04	Entran	2/16/2009
Upper Engine Y	D12-X02	Entran	2/16/2009
Firewall Y	F17-Y02	Entran	12/13/2008
Right Front Roof Y	D12-X24	Entran	2/16/2009
Right Floor Y	C25-Z24	Entran	2/16/2009
Rear Deck X	ET21164	Entran	2/18/2009
Rear Deck Y	ET21159	Entran	2/18/2009