

REPORT NUMBER: NCAP-MGA-2010-008

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

**FORD MOTOR COMPANY
2010 FORD TAURUS 4-DR SEDAN
NHTSA NUMBER: MA0215**

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



Test Date: October 26, 2009

Final Report Date: November 18, 2009

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
1200 NEW JERSEY AVENUE, SE, ROOM W43-410
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-D-00028.

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Prepared by: Joe Fleck Date: 11/18/2009
Joe Fleck, Project Engineer

Reviewed by: David Winkelbauer Date: 11/18/2009
David Winkelbauer, Director of Operations

Technical Report Documentation Page

1. Report No. NCAP-MGA-2010-008	2. Government Accession No.	3. Recipient's Catalog No.																										
4. Title and Subtitle Final Report of New Car Assessment Program Testing of a 2010 Ford Taurus 4-Dr Sedan NHTSA No.: MA0215		5. Report Date November 18, 2009																										
		6. Performing Organization Code MGA																										
7. Author(s) Joe Fleck, Project Engineer David Winkelbauer, Director of Operations		8. Performing Organization Report No. NCAP-MGA-2010-008																										
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																										
		11. Contract or Grant No. DTNH22-06-D-00028																										
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 1200 New Jersey Ave, SE, Room W43-410, NVS-111 Washington, D.C. 20590		13. Type of Report and Period Covered Final Report 10/26/2009 to 11/18/2009																										
		14. Sponsoring Agency Code NVS-111																										
15. Supplementary Notes																												
16. Abstract A frontal barrier impact was conducted on a 2010 Ford Taurus 4-Dr Sedan at MGA Research Corporation on October 26, 2009. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.5 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum post test static crush is 576 mm located at the vehicle's centerline. The test vehicle is equipped with a 3-point continuous belt system and an airbag in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows: <table style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;"><u>Measurement Description</u></th> <th style="text-align: left;"><u>Units</u></th> <th style="text-align: left;"><u>Threshold</u></th> <th style="text-align: left;"><u>Driver ATD</u></th> <th style="text-align: left;"><u>Pass. ATD</u></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>374</td> <td>379*</td> </tr> <tr> <td>Max. Thorax Accel. (3ms Clip)</td> <td>G's</td> <td>60</td> <td>43</td> <td>36</td> </tr> <tr> <td>Left Femur Force</td> <td>Newton</td> <td>10009</td> <td>-1577</td> <td>-1389</td> </tr> <tr> <td>Right Femur Force</td> <td>Newton</td> <td>10009</td> <td>-1441</td> <td>-3472</td> </tr> </tbody> </table>				<u>Measurement Description</u>	<u>Units</u>	<u>Threshold</u>	<u>Driver ATD</u>	<u>Pass. ATD</u>	Head Injury Criteria (HIC ₃₆)	N/A	1000	374	379*	Max. Thorax Accel. (3ms Clip)	G's	60	43	36	Left Femur Force	Newton	10009	-1577	-1389	Right Femur Force	Newton	10009	-1441	-3472
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17. Key Words 56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2010 Ford Taurus 4-Dr Sedan NHTSA No: MA0215		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, 1200 New Jersey Ave, SE Washington, D.C. 20590																										
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 121	22. Price																									

TABLE OF CONTENTS

<u>Section</u>		<u>Page No</u>
1	Purpose and Summary of the Test	1
2	Occupant and Vehicle Information / Data Sheets	3

<u>Data Sheet No.</u>		<u>Page No.</u>
1	Crash Test Summary	3
2	General Test and Vehicle Parameter Data	4
3	Test Vehicle Tire Information	6
4	Test Vehicle Information	7
5	Dummy Positioning in Vehicle	9
6	Seat Belt Positioning Data	11
7	Vehicle Accelerometer Locations	12
8	Summary of FMVSS 212 and FMVSS 219 (Partial) Data	13
9	Summary of FMVSS 301 Data	14
10	Vehicle Measurements	15
11	Camera Locations	18
12	Photographic Reference Target Locations	20
13	Vehicle Intrusion Measurements	21
14	Load Cell Locations on Fixed Barrier	24
15	Accident Investigation Division Data	25
16	Dummy/Vehicle Temperature Stabilization Chart	26

<u>Appendix</u>		
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Calibration Data	C

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-D-00028. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact in excess of the current 48.3 kph requirements.

SUMMARY

A load cell barrier was impacted by a 2010 Ford Taurus 4-Dr Sedan at a velocity of 56.5 kph. The test was performed at MGA Research Corporation on October 26, 2009. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and fourteen high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometer, upper neck transducers, right/left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 066) and right-front passenger (position 2) ATD (Serial No. 065) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 102 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy head, chest, and femur response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 576 mm and both the driver and passenger side door remained closed and latched during the impact event and were operable after the impact.

The driver's head and chest contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee bolster. The passenger's head and chest contacted the airbag. The passenger's knees contacted the glove box and frontal airbag.

The occupant data is summarized below:

ATD position	HIC	T ¹	T ²	Clip (g)	T ¹	T ²	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	374	58.8	94.8	43	58.7	61.7	-27	-1577	-1441
Passenger	379*	62.1	95.0	36	65.0	68.3	-25	-1389	-3472

The test data can be found on the NHTSA website at www.nhtsa.dot.gov.

TEST NOTES

There was no valid data collected for:

Driver Neck Force Y after 30 msec.

Passenger Neck Moment Z after 105 msec.

Barrier Force – Upper Right – Load cell does not return to zero

Barrier Force – Lower Center – Load cell does not return to zero

* Redundant Passenger Head X was used to calculate HIC.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	None	None
Seat Back Failure	None	None
Glazing Damage	None	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	3410
Center	mm	3341
Right Side	mm	3390
Average	mm	3380

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	780	770
Lap belt length as measured on ATD	mm	510	510
Remainder of belt on reel	mm	1010	1020
Total belt length for continuous webbing systems	mm	2300	2300

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

TEST VEHICLE INFORMATION

Manufacturer	Ford
Model	Taurus
Body Style	Sedan
NHTSA No.	MA0215
VIN	1FAHP2HW7AG108035
Color	Tuxedo Black Metallic
Delivery Date	9/28/2009
Odometer Reading (mile)	210
Dealer	Boucher Fleet Group
Transmission	Automatic
Final Drive	AWD
Number of Cylinders	6
Engine Displacement (L)	3.5
Engine Placement	Lateral
Automatic Door Lock (ADL)	Yes
Owners Manual Details Instructions on Disabling ADLs	Yes
Bucket Seats	Yes

TEST VEHICLE OPTIONS

Front Airbag	Yes
Driver Side Curtain Airbag	Yes
Driver Side Torso Airbag	Yes
Driver Knee Airbag	No
Passenger Side Curtain Airbag	Yes
Passenger Side Torso Airbag	Yes
Passenger Knee Airbag	No
Force Limiter	Yes
Pretensioner	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Anti-lock Brakes	Yes
Traction Control	Yes
All Wheel Drive	Yes
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Company
Date of Manufacture	08/09

GVWR (kg)	2477
GAWR Front (kg)	1315
GAWR Rear (kg)	1198

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				430
Cargo Wt. (RCLW) (kg)				90

DATA SHEET NO. 2... (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	566.1	383.3		595.6	469.9	
Right	kg	546.1	383.3		581.1	470.8	
Ratio	%	59.2	40.8		55.6	44.4	
Totals	kg	1112.2	766.6	1878.8	1176.7	940.7	2117.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1878.8
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	90
Calculated Vehicle Target Weight (TVTW)	kg	2124.8

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	755	756	777	778	1171
As Tested	mm	746	744	748	750	1275
Post Test	mm	840	756	767	725	

Vehicle Wheelbase (mm): 2870

Weight of Ballast secured in trunk (kg): 70.3

Vehicle Components Removed: Spare tire, trunk trim, right rear taillight

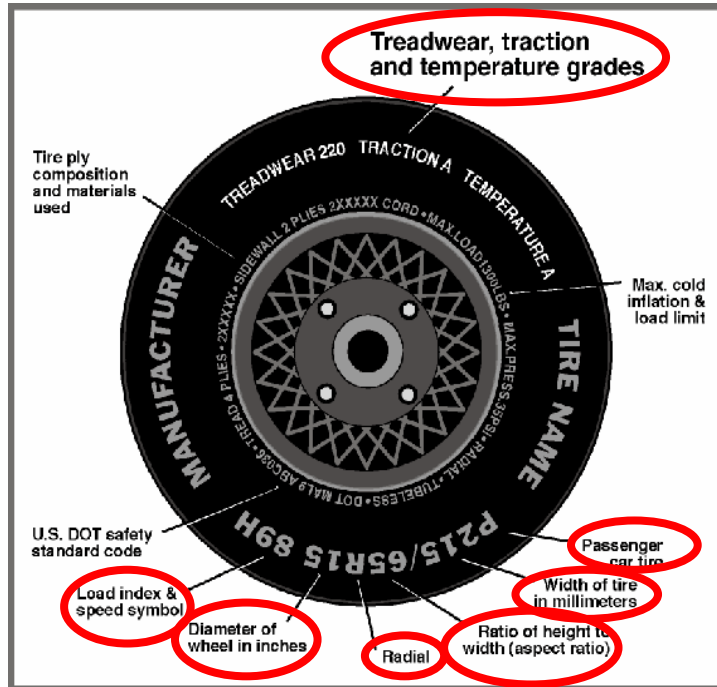
Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
Test Date: 10/26/2009



DATA FROM TIRE AND TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P235/55R18	P235/55R18
Tire Size on Vehicle	P235/55R18	P235/55R18
Tire Manufacturer	Michelin	Michelin
Tire Name	Pilot	Pilot
Tire Type	P	P
Tire Width (mm)	235	235
Ratio of Height to Width (aspect ratio)	55	55
Radial	R	R
Wheel Diameter	18	18
Load Index & Speed Symbol	99H	99H
Treadwear	300	300
Traction Grade	A	A
Temperature Grade	A	A

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
Test Program: 35mph Frontal Impact

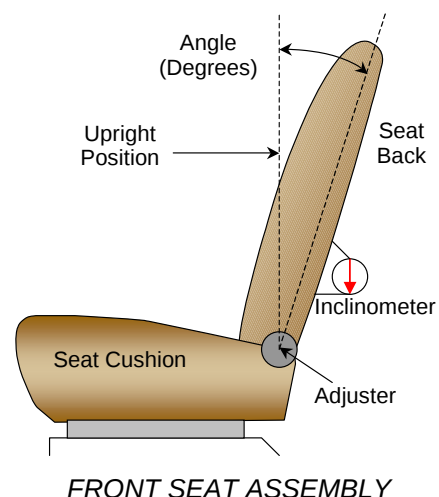
NHTSA No.: MA0215
Test Date: 10/26/2009

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle/detent. The procedure is as follows: Set the driver and passenger seat back at 22 degrees relative to the rocker sill and 13 inches above the back pivot point on the rear inboard seat frame.

Driver seat back angle: 22.3 degrees

Passenger seat back angle: 22.4 degrees

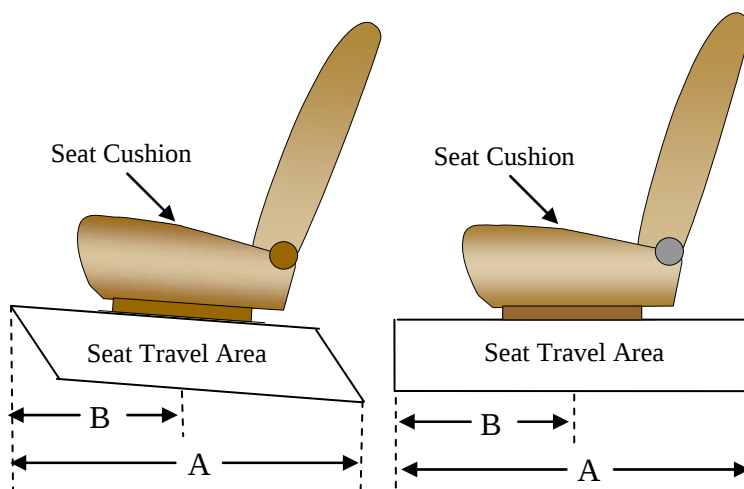


SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	335 mm	167.5 mm
Passenger Seat	254 mm	127 mm

ADJUSTABLE D-RING POSITION

The driver and passenger D-rings were set in the uppermost position.



DATA SHEET NO. 4...(CONTINUED)

TEST VEHICLE INFORMATION

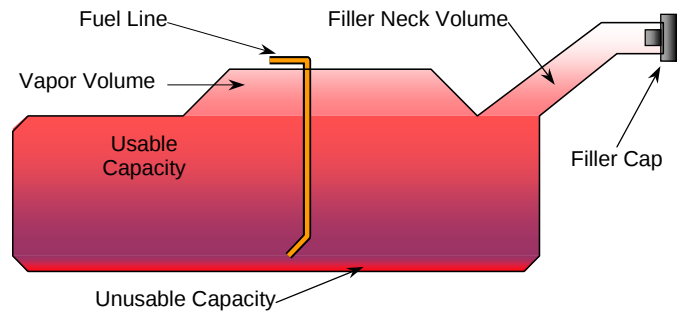
Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
Test Date: 10/26/2009

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	71.9
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	66.2 to 67.6
Actual Amount of Solvent used	67.0
1/3 of Usable Capacity	24.0

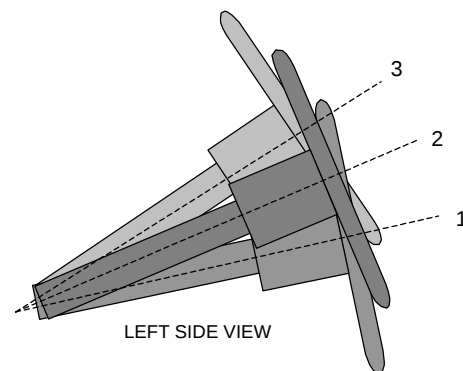
The test vehicle is equipped with an electric fuel pump. The electric fuel pump operates for 2 seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within 2 seconds following ignition actuation the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls the fuel pump is deactivated. Also, a fuel pump shut-off switch is provided, designed to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude.



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 moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1	100	63.0
Geometric center position No. 2	125	66.0
Uppermost position No. 3	150	69.0

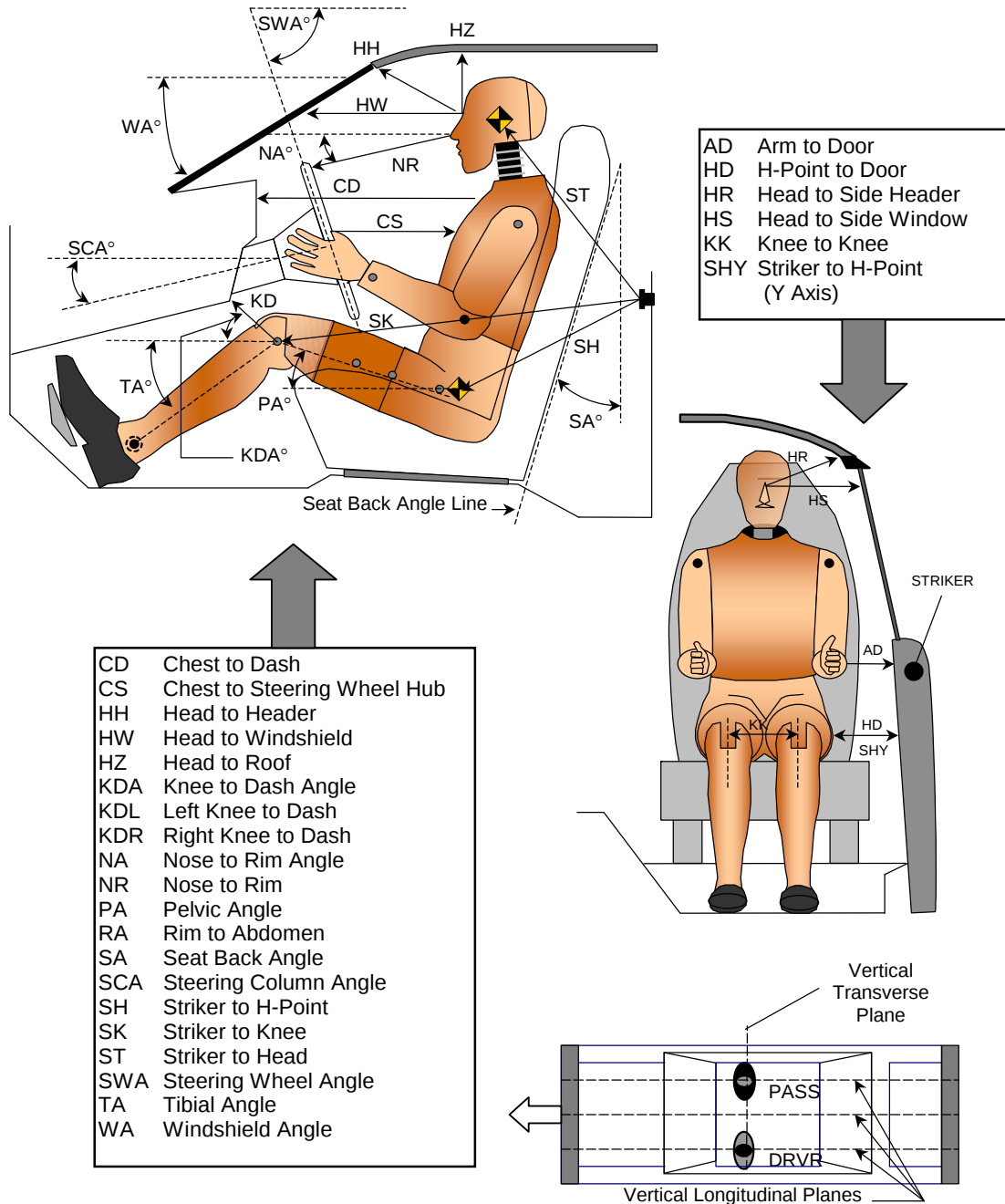
DATA SHEET NO. 5

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET NO. 5... (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

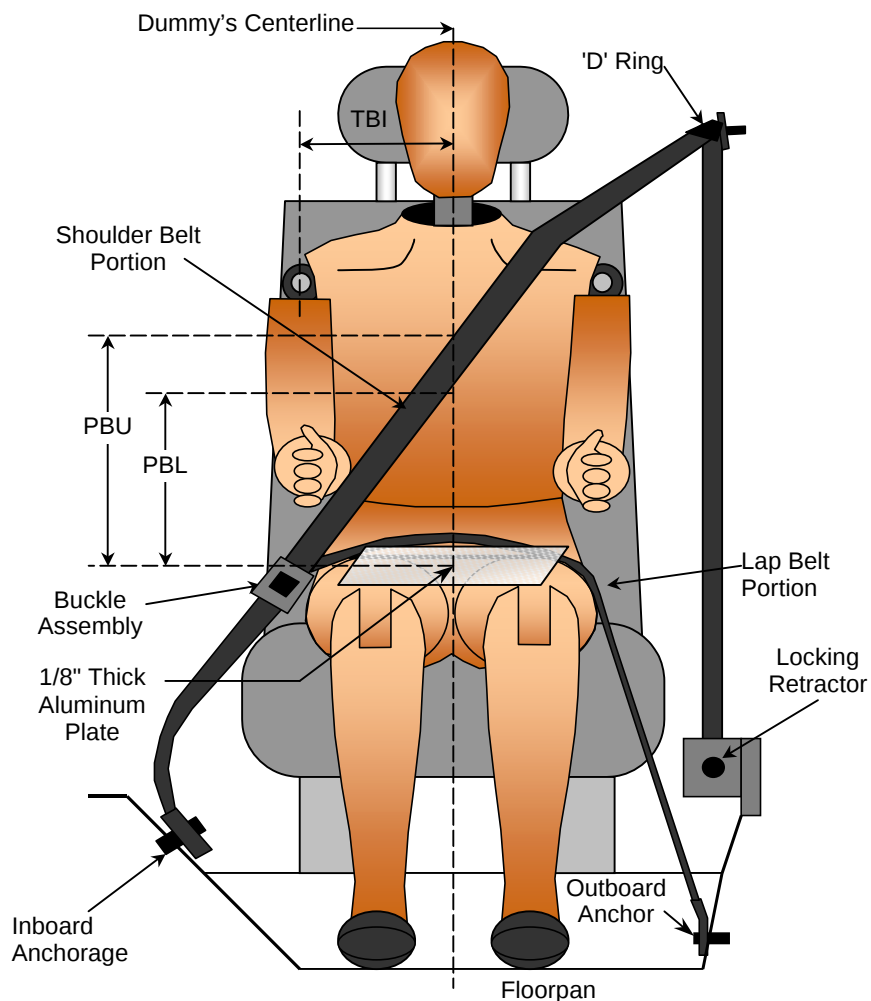
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		25.0		
SWA	Steering Wheel Angle		66.0		
SCA	Steering Column Angle		24.0		
SA	Seat Back Angle (headrest post)		22.3		22.4
HZ	Head to Roof (Z)	225	90	226	90
HH	Head to Header	405	18.9	412	26.3
HW	Head to Windshield	738	0	752	0
HR	Head to Side Header (Y)	220		225	
NR	Nose to Rim	400	8.0		
CD	Chest to Dash	576		477	
CS	Chest to Steering Hub	333	7.1		
RA	Rim to Abdomen	193	0		
KDL	Left Knee to Dash	153	31.3	157	
KDR	Right Knee to Dash	145		154	24.0
PA	Pelvic Angle		24.3		24.6
TA	Tibia Angle		51.4		50.2
KK	Knee to Knee (Y)	305		265	
SK	Striker to Knee	577	99.9	575	94.9
ST	Striker to Head	483	4.8	486	6.5
SH	Striker to H-Point	239	129.4	233	128.3
SHY	Striker to H-Point (Y)	288		283	
HS	Head to Side Window	362		358	
HD	H-Point to Door (Y)	152		146	
AD	Arm to Door (Y)	133		65	
AA	Ankle to Ankle	320		240	

DATA SHEET NO. 6 **SEAT BELT POSITIONING DATA**

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	320	320
PBL - To surface of reference to belt lower edge	mm	230	230

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

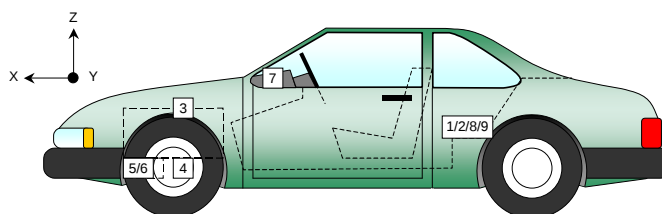
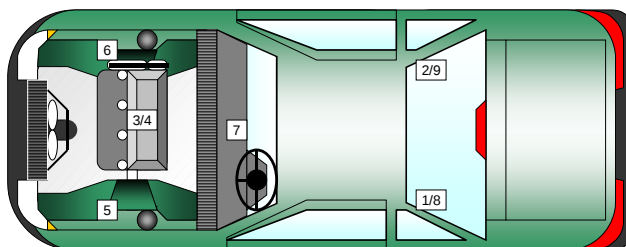
Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	2057	-400	-482
2	Right Rear X-Member X	2057	400	-480
3	Engine Top X	4231	18	-928
4	Engine Bottom X	4305	58	-218
5	Left Brake Caliper X	4199	-720	-244
6	Right Brake Caliper X	4199	720	-244
7	Instrument Panel X			
8	Left Rear X-Member Z	2057	-400	-482
9	Right Rear X-Member Z	2057	400	-480

Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)



DATA SHEET NO. 8

SUMMARY OF FMVSS 212 AND FMVSS 219 (Partial) DATA

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

Windshield Mounting Details:

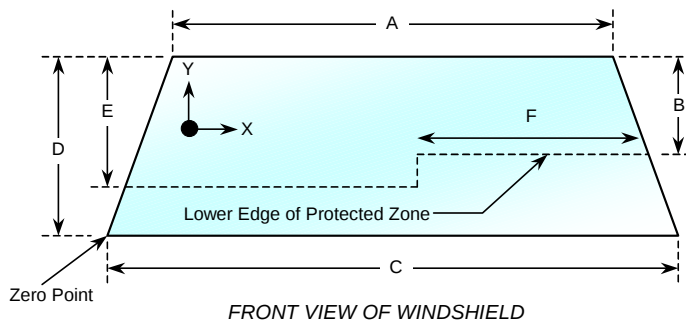
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2148	2148	100
Right Side	2148	2148	100
Total	4296	4296	100



Item	Units	Value
A	mm	1260
B	mm	430
C	mm	1624
D	mm	706
E	mm	431
F	mm	646

AREA OF PROTECTED ZONE FAILURES - NONE

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

DATA SHEET NO. 9 **SUMMARY OF FMVSS 301 DATA**

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

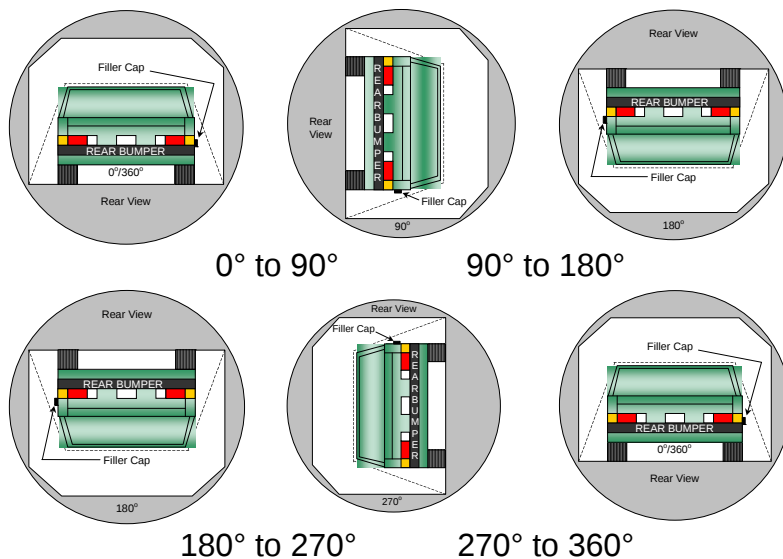
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 12:25 pm

Stoddard Solvent Spillage Measurements

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

FMVSS 301 STATIC ROLLOVER DATA



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage locations:

None

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	117	300	0
90° to 180°	117	300	0
180° to 270°	112	300	0
270° to 360°	118	300	0

DATA SHEET NO. 10
VEHICLE MEASUREMENTS

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
Test Date: 10/26/2009

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	5111	4535	576
2	RSOV to front of engine	mm	4556	4410	146
3	RSOV to firewall centerline	mm	3943	3920	23
4	RSOV to leading edge of right door	mm	3510	3520	-10
5	RSOV to leading edge of left door	mm	3511	3518	-7
6	RSOV to lower leading edge of right door	mm	3512	3502	10
7	RSOV to lower leading edge of left door	mm	3514	3511	3
8	RSOV to upper leading edge of right door	mm	2415	2421	-6
9	RSOV to upper leading edge of left door	mm	2414	2420	-6
10	RSOV to lower trailing edge of right door	mm	2494	2484	10
11	RSOV to lower trailing edge of left door	mm	2494	2490	4
12	RSOV to bottom of right 'A' pillar	mm	3530	3536	-6
13	RSOV to bottom of left 'A' pillar	mm	3533	3535	-2
14	RSOV to firewall on right side	mm	3888	3869	19
15	RSOV to firewall on left side	mm	3906	3875	31
16	RSOV to steering column	mm	3053	3044	9
17	Center of steering column to left 'A' pillar	mm	390	412	-22
18	Center of steering column to headlining	mm	441	475	-34
19	RSOV to right side of front bumper	mm	4887	4521	366
20	RSOV to left side of front bumper	mm	4887	4475	412
21	Length of engine block	mm	495	495	0
RD	RSOV to right side of dash panel	mm	3207	3210	-3
CD	RSOV to center of dash panel	mm	3277	3280	-3
LD	RSOV to left side of dash panel	mm	3212	3221	-9

DATA SHEET NO. 10... (continued)

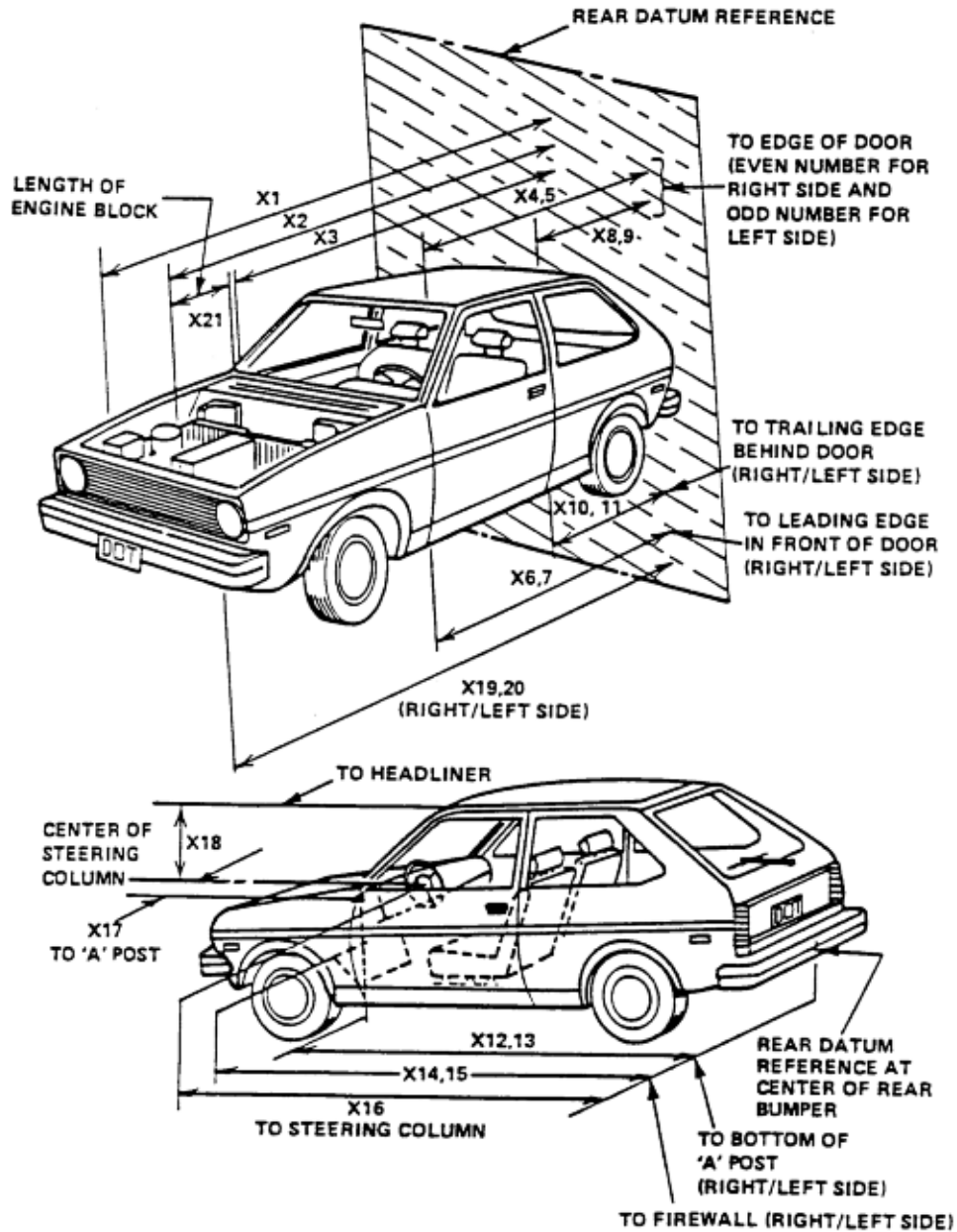
VEHICLE MEASUREMENTS

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan

NHTSA No.: MA0215

Test Program: 35mph Frontal Impact

Test Date: 10/26/2009



DATA SHEET NO. 10... (continued)**VEHICLE MEASUREMENTS**Test Vehicle: 2010 Ford Taurus 4-Dr SedanTest Program: 35mph Frontal ImpactNHTSA No.: MA0215Test Date: 10/26/2009**Target Vehicle Structural Measurement**

	Elements	Pre-Test (mm)
1	Total Length	5111
2	Total Width	1934
3	Bumper Top Height	557
4	Bumper Bottom Height	404
5	Longitudinal Member Top Height	629
6	Distance between Longitudinal Members	1243
7	Longitudinal Member Width	115
8	Engine Top Height	928
9	Engine Bottom Height	218
10	Engine and gearbox width	876
11	Front bumper-engine distance	556
12	Front shock absorber fixing height	980
13	Bonnet leading edge height	822
14	Front shock absorber fixing width	1265
15	Front bumper – front axle distance	1033
16	Front axle – a pillar distance	534
17	A-pillar – B-pillar distance	1080
18	B-Pillar – rear axle distance	1272
19	B-pillar – C-pillar distance	1052
20	Roof sill bottom height	1408
21	Roof sill top height	1447
22	Floor sill bottom height	221
23	Floor sill top height	369

DATA SHEET NO. 11
CAMERA LOCATIONS

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
Test Date: 10/26/2009

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	1020	-5235	-1050	24	1000
3	Steering Column Top	845	-5680	-1280	25	1000
4	Steering Column Bottom	825	-5630	-850	25	1000
5	Driver Close-up	1540	-6470	-1475	35	1000
6	Driver Angle	5260	-5270	-1845	50	1000
7	On board Driver Side					
8	On board Passenger Side					
9	Right Overall	2045	6745	-1220	20	1000
10	Right Passenger Half	1090	5150	-1050	24	1000
11	Right Close-up	1525	6460	-1470	35	1000
12	Right Angle	5320	5165	-1860	50	1000
13	Windshield	-285	0	-2860	12.5	1000
14	Top Driver	-135	-470	-2180	24	1000
15	Top Passenger	-110	420	-2180	24	1000
16	Pit Front	1310	0	3150	24	1000
17	Pit Rear	3290	0	3150	24	1000

***COORDINATES:**

+X = forward of impact plane
+Y = right of monorail centerline
+Z = below ground level

Cameras 7 & 8 were not used for this test.

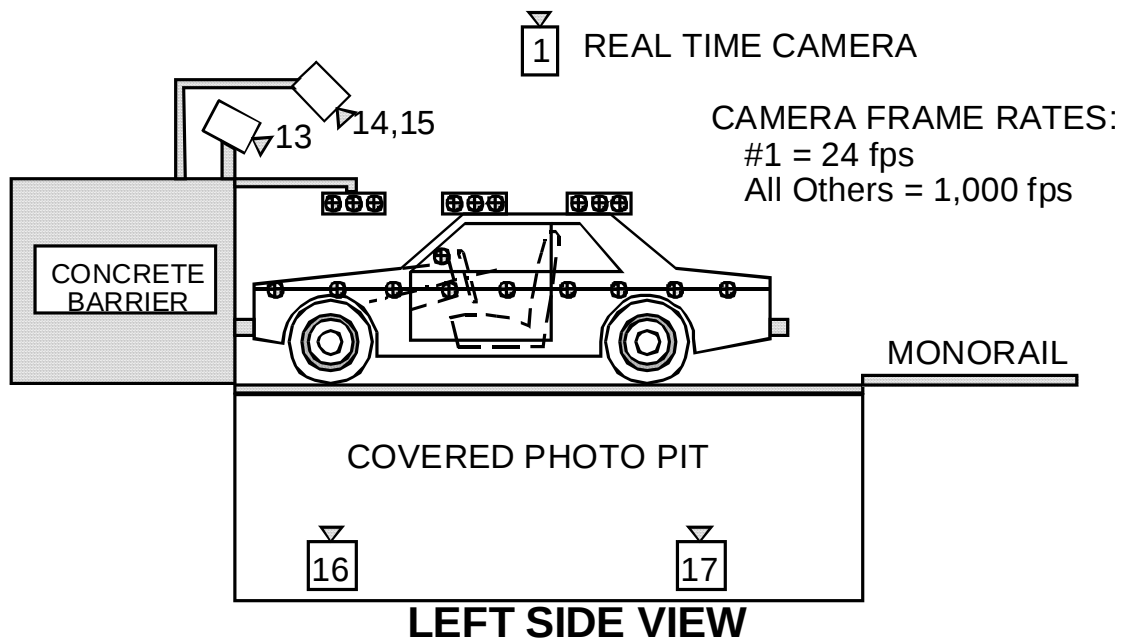
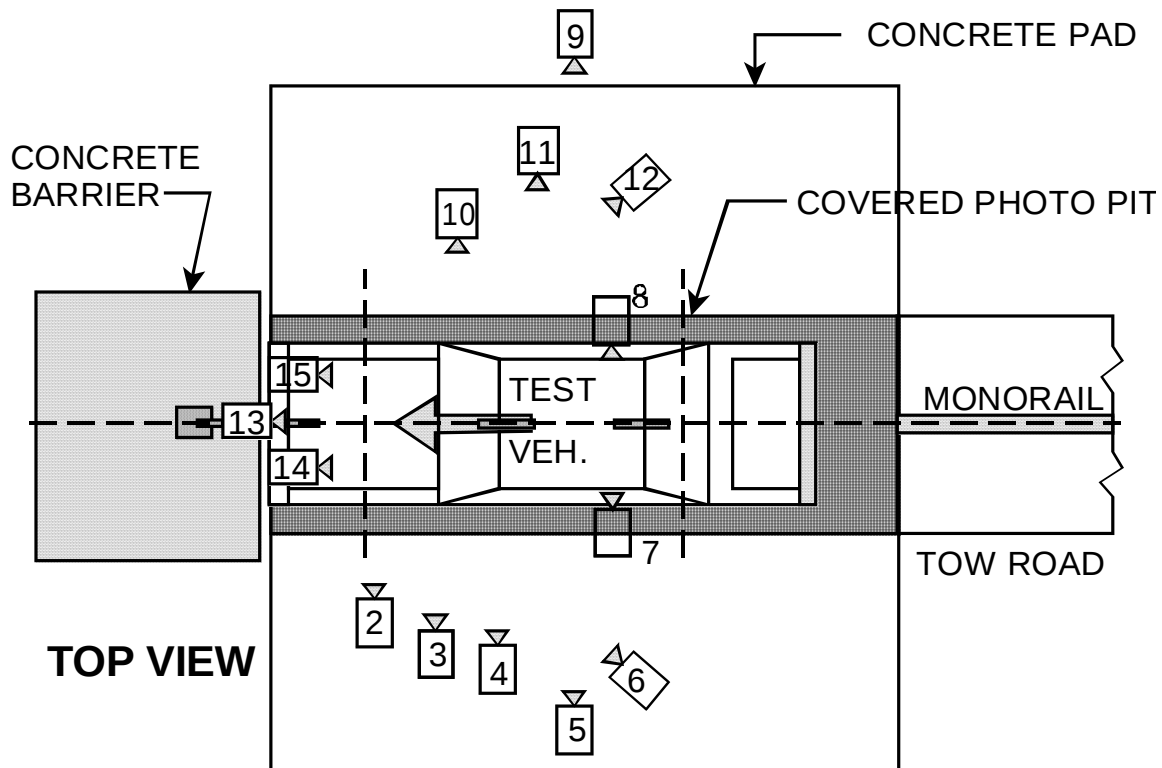
DATA SHEET NO. 11... (continued)

CAMERA LOCATIONS

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
Test Date: 10/26/2009

CAMERA POSITIONS FOR FRONTAL IMPACTS

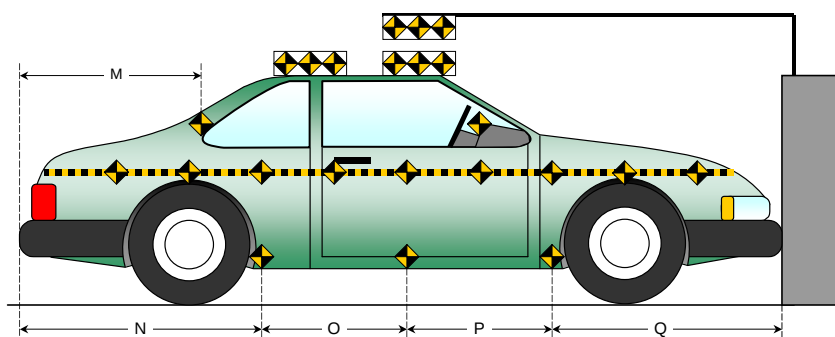
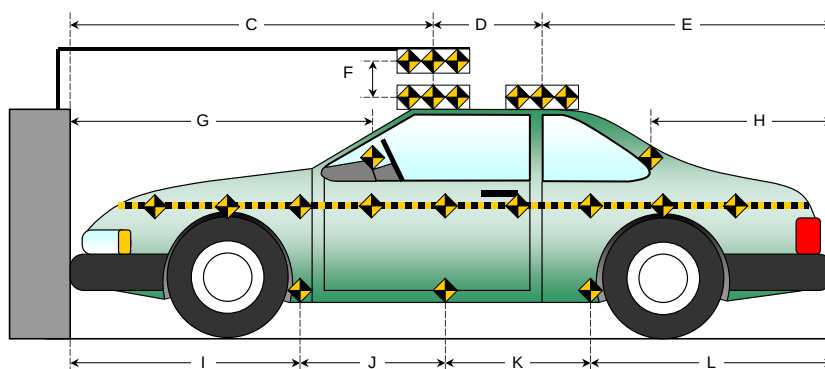
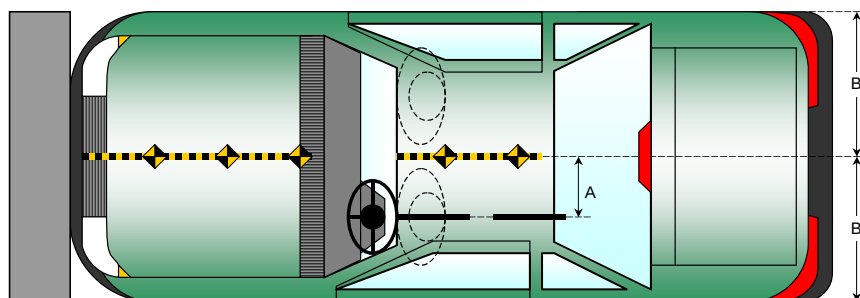


DATA SHEET NO. 12
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

Item	Value
A	385
B	967
C	2495
D	915
E	1701
F	73
G	
H	1254
I	1538
J	960
K	960
L	1653
M	1256
N	1653
O	960
P	960
Q	1538



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

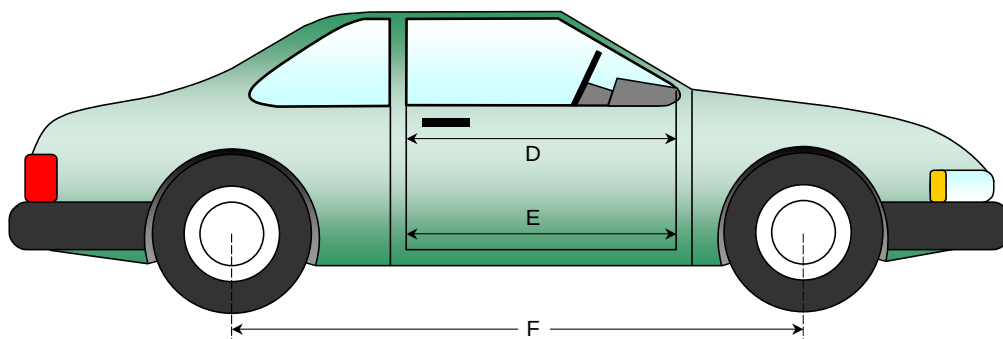
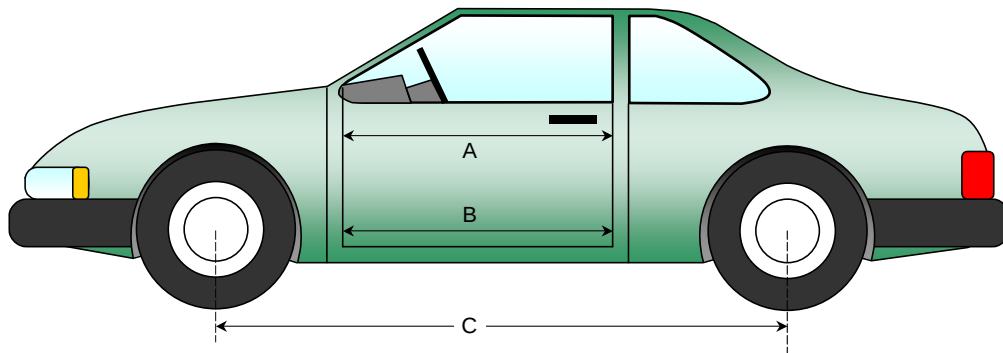
NHTSA No.: MA0215
 Test Date: 10/26/2009

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	969	966	3
B	Left Side Lower	mm	856	855	1
D	Right Side Upper	mm	969	965	4
E	Right Side Lower	mm	861	864	-3

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2870	2834	36
F	Right Side Wheelbase	mm	2870	2844	26



DATA SHEET NO. 13... (continued)
VEHICLE INTRUSION MEASUREMENTS

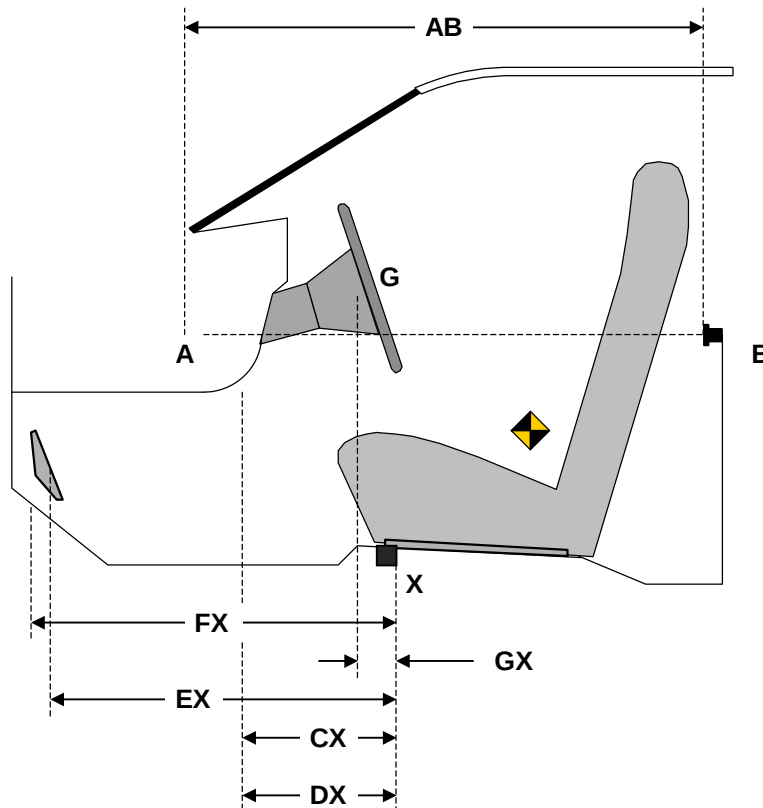
Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	742	741	1
CX	Left Knee Bolster to X	mm	285	220	65
DX	Right Knee Bolster to X	mm	290	215	75
EX	Brake Pedal to X	mm	503	441	62
FX	Foot Rest to X	mm	488	450	38
GX	Center of Steering Column Wheel Hub to X	mm	41	54	-13

X = Front of Seat Track (stationary)

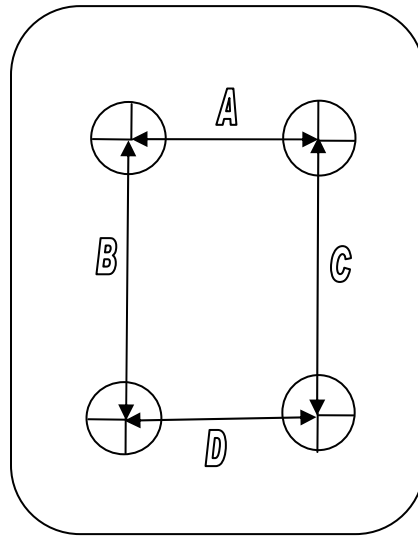


DRIVER COMPARTMENT

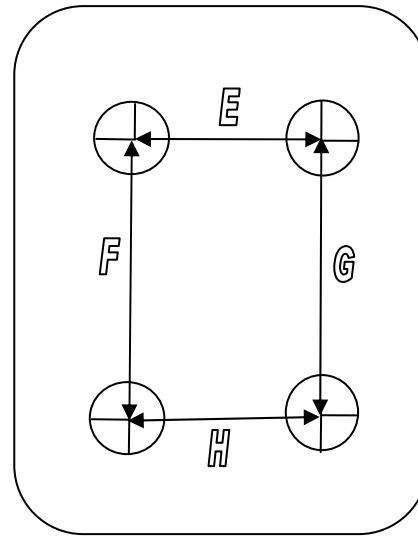
DATA SHEET NO. 13... (continued)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009



Driver



Passenger

UNDERBODY FLOORBOARD DEFORMATION

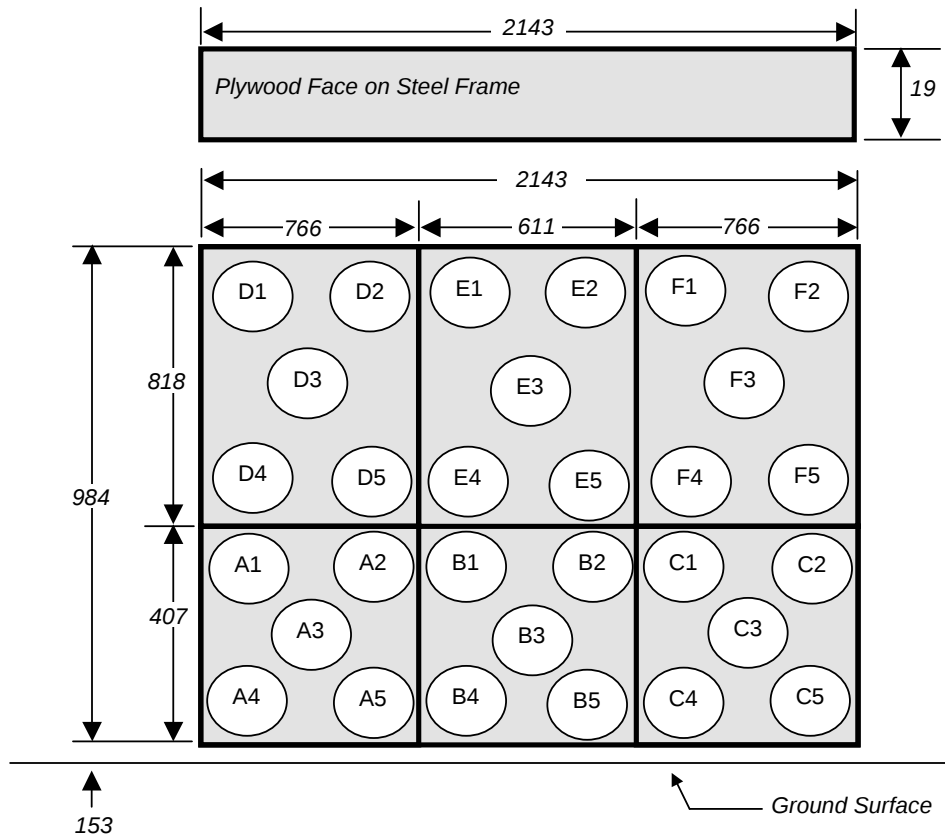
Measurement	Pre-Test	Post-Test	Difference
A	252	251	1
B	288	292	-4
C	289	291	-2
D	257	261	-4
E	172	170	2
F	306	307	-1
G	310	311	-1
H	190	195	-5

DATA SHEET NO. 14
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

30 Load Cell Rigid Barrier
Load Cell Locations on Fixed Barrier



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

6 Groups of 5 Load Cells Each

DATA SHEET NO. 15
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
 Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
 Test Date: 10/26/2009

VEHICLE INFORMATION

VIN: 1FAHP2HW7AG108035 Wheelbase (mm): 2870
 Vehicle Size Category: Sedan Test Weight (kg): 2117.4

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 12
 Cal. Procedure/Interval: MGA procedure / 6 month
 Integration Algorithm: Trapezoidal Linearity: > 99%
 Impact Velocity (km/h): 56.5
 Velocity Change (km/h): 66.5 Time of Separation (msec): 95

CRUSH PROFILE

Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
 Damage Region Length (mm): 1488 Impact Mode: Frontal

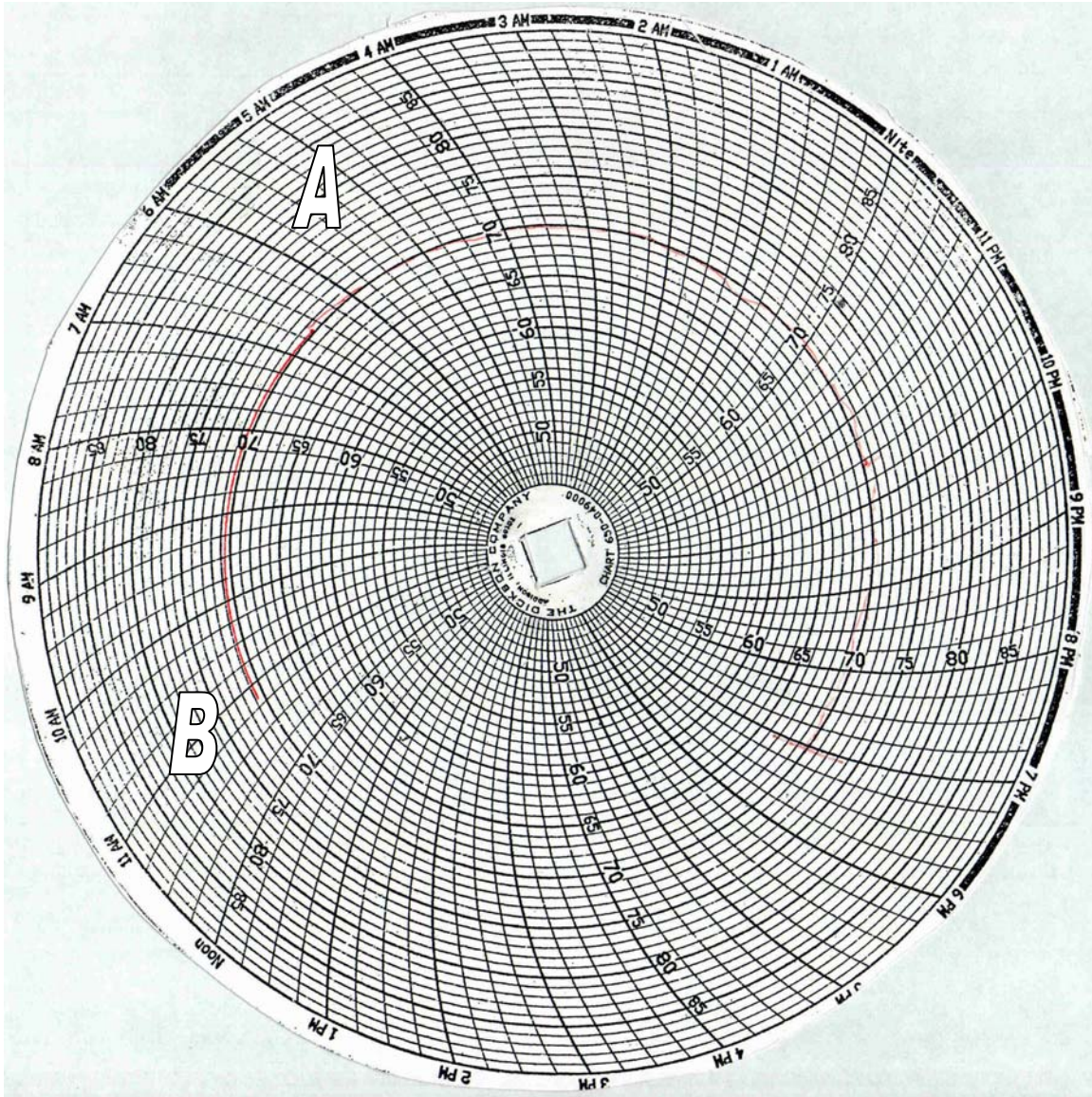
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4887	4475	412
C2	Crush zone 2 at left side	mm	5011	4510	501
C3	Crush zone 3 at left side	mm	5074	4531	543
C4	Crush zone 4 at right side	mm	5074	4526	548
C5	Crush zone 5 at right side	mm	5011	4532	479
C6	Crush zone 6 at right side	mm	4887	4521	366
L	C1 TO C6	mm	1488	1464	24

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2010 Ford Taurus 4-Dr Sedan
Test Program: 35mph Frontal Impact

NHTSA No.: MA0215
Test Date: 10/26/2009



A = Dummies installed in vehicle at 6:00 am

B = Test conducted at 12:25 pm

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 1.	Load Cell Location	A-1
Photo No. 2.	Manufacturer's Label	A-2
Photo No. 3.	Tire Placard	A-2
Photo No. 4.	Right Front $\frac{3}{4}$ View, As Received	A-3
Photo No. 5.	Left Rear $\frac{3}{4}$ View, As Received	A-3
Photo No. 6.	Pre-Test Front View	A-4
Photo No. 7.	Post-Test Front View	A-4
Photo No. 8.	Pre-Test Left Side View	A-5
Photo No. 9.	Post-Test Left Side View	A-5
Photo No. 10.	Pre-Test Right Side View	A-6
Photo No. 11.	Post-Test Right Side View	A-6
Photo No. 12.	Pre-Test Right Front $\frac{3}{4}$ View	A-7
Photo No. 13.	Post-Test Right Front $\frac{3}{4}$ View	A-7
Photo No. 14.	Pre-Test Left Rear $\frac{3}{4}$ View	A-8
Photo No. 15.	Post-Test Left Rear $\frac{3}{4}$ View	A-8
Photo No. 16.	Pre-Test Left Side $\frac{3}{4}$ View of Doors	A-9
Photo No. 17.	Post-Test Left Side $\frac{3}{4}$ View of Doors After Impact	A-9
Photo No. 18.	Pre-Test Right Side $\frac{3}{4}$ View of Doors	A-10
Photo No. 19.	Post-Test Right Side $\frac{3}{4}$ View of Doors After Impact	A-10
Photo No. 20.	Pre-Test Windshield View	A-11
Photo No. 21.	Post-Test Windshield View	A-11
Photo No. 22.	Pre-Test Engine Compartment View	A-12
Photo No. 23.	Post-Test Engine Compartment View	A-12
Photo No. 24.	Pre-Test Fuel Cap View	A-13
Photo No. 25.	Post-Test Fuel Cap View	A-13
Photo No. 26.	Pre-Test Front Underbody View	A-14
Photo No. 27.	Post-Test Front Underbody View	A-14

		<u>Page No.</u>
Photo No. 28.	Pre-Test Mid Underbody View	A-15
Photo No. 29.	Post-Test Mid Underbody View	A-16
Photo No. 30.	Post-Test Mid Underbody View	A-16
Photo No. 31.	Pre-Test Rear Underbody View	A-17
Photo No. 32.	Post-Test Rear Underbody View	A-18
Photo No. 33.	Post-Test Rear Underbody View	A-18
Photo No. 34.	Pre-Test Driver Dummy Front View (Head Position)	A-19
Photo No. 35.	Post-Test Driver Dummy Front View (Head Position)	A-19
Photo No. 36.	Pre-Test Driver Dummy (Through Window)	A-20
Photo No. 37.	Post-Test Driver Dummy (Through Window)	A-20
Photo No. 38.	Pre-Test Driver Dummy (Door Open)	A-21
Photo No. 39.	Post-Test Driver Dummy (Door Open)	A-21
Photo No. 40.	Pre-Test Driver Dummy Feet	A-22
Photo No. 41.	Post-Test Driver Dummy Feet	A-22
Photo No. 42.	Pre-Test Driver Side Knee Bolster	A-23
Photo No. 43.	Post-Test Driver Side Knee Bolster	A-23
Photo No. 44.	Pre-Test Driver Side Floor Pan	A-24
Photo No. 45.	Post-Test Driver Side Floor Pan	A-24
Photo No. 46.	Post-Test Driver Dummy Head Contact	A-25
Photo No. 47.	Post-Test Driver Dummy Knee Contact	A-25
Photo No. 48.	Post-Test Driver Dummy Airbag Contact	A-26
Photo No. 49.	Pre-Test Passenger Dummy Front View (Head Position)	A-27
Photo No. 50.	Post-Test Passenger Dummy Front View (Head Position)	A-27
Photo No. 51.	Pre-Test Passenger Dummy (Through Window)	A-28
Photo No. 52.	Post-Test Passenger Dummy (Through Window)	A-28
Photo No. 53.	Pre-Test Passenger Dummy (Door Open)	A-29
Photo No. 54.	Post-Test Passenger Dummy (Door Open)	A-29
Photo No. 55.	Pre-Test Passenger Dummy Feet	A-30

		<u>Page No.</u>
Photo No. 56.	Post-Test Passenger Dummy Feet	A-30
Photo No. 57.	Pre-Test Passenger Side Glove Box	A-31
Photo No. 58.	Post-Test Passenger Side Glove Box	A-31
Photo No. 59.	Pre-Test Passenger Side Floor Pan	A-32
Photo No. 60.	Post-Test Passenger Side Floor Pan	A-32
Photo No. 61.	Post-Test Passenger Dummy Knee Contact	A-33
Photo No. 62.	Post-Test Passenger Dummy Knee Contact w/Airbag	A-33
Photo No. 63.	Post-Test Passenger Dummy Airbag Contact	A-34
Photo No. 64.	Rollover 90 Degrees	A-35
Photo No. 65.	Rollover 180 Degrees	A-35
Photo No. 66.	Rollover 270 Degrees	A-36
Photo No. 67.	Rollover 360 Degrees	A-36
Photo No. 68.	Vehicle Impact	A-37



Load Cell Location



Manufacturer's Label



Tire Placard



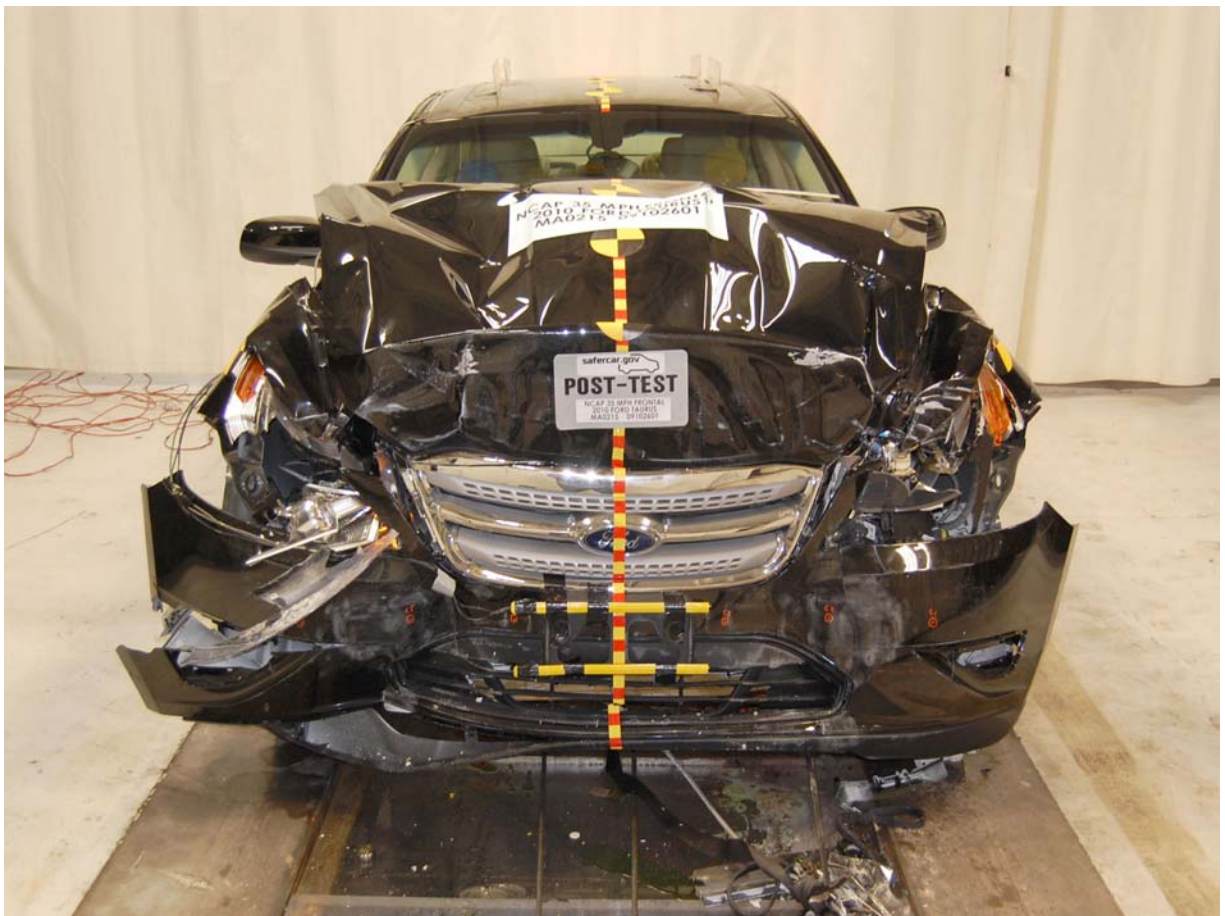
Right Front $\frac{3}{4}$ View, As Received



Left Rear $\frac{3}{4}$ View, As Received



Pre-Test Front View



Post-Test Front View



Pre-Test Left Side View



Post-Test Left Side View



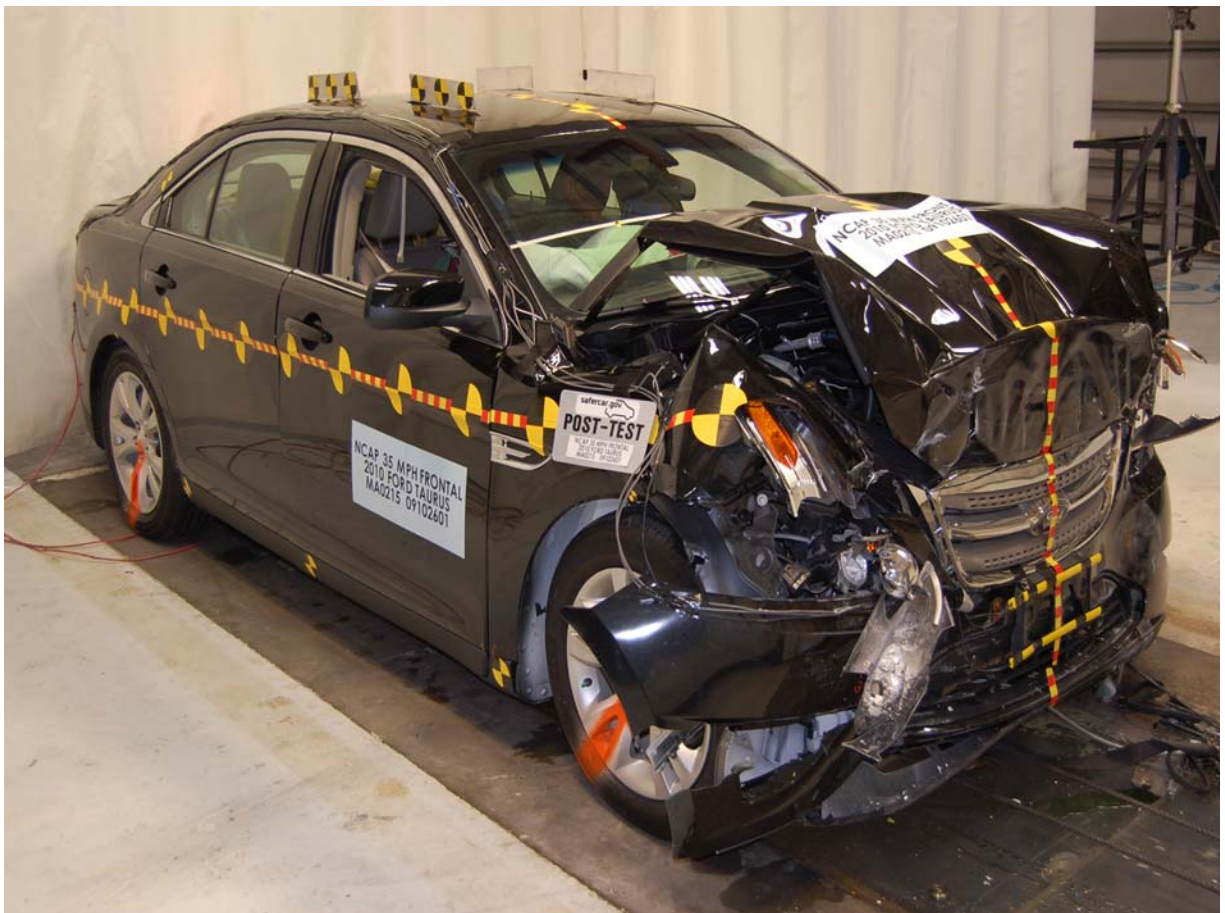
Pre-Test Right Side View



Post-Test Right Side View



Pre-Test Right Front $\frac{3}{4}$ View



Post-Test Right Front $\frac{3}{4}$ View



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



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



Pre-Test Left Side $\frac{3}{4}$ View of Doors



Post-Test Left Side $\frac{3}{4}$ View of Doors After Impact



Pre-Test Right Side ¾ View of Doors



Post-Test Right Side ¾ View of Doors After Impact



Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



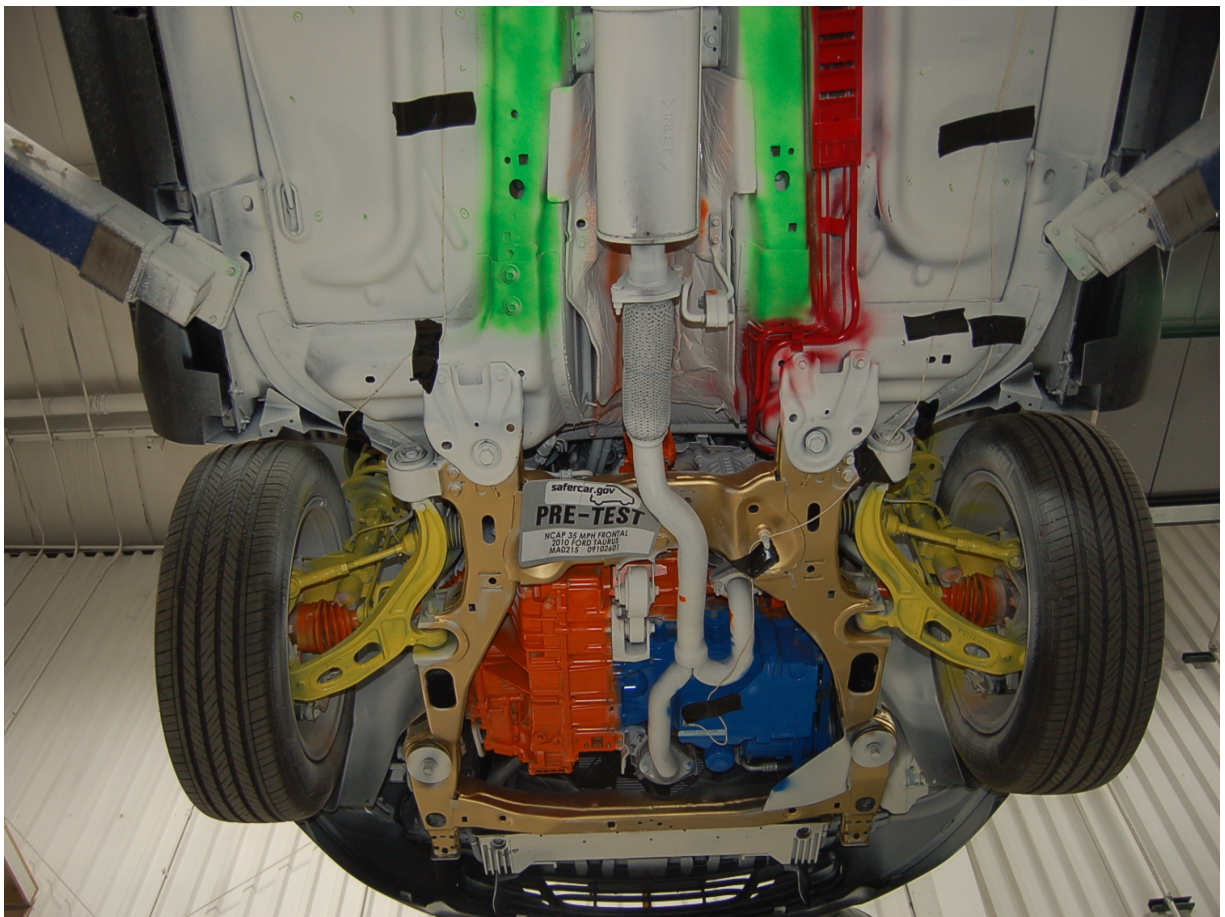
Post-Test Engine Compartment View



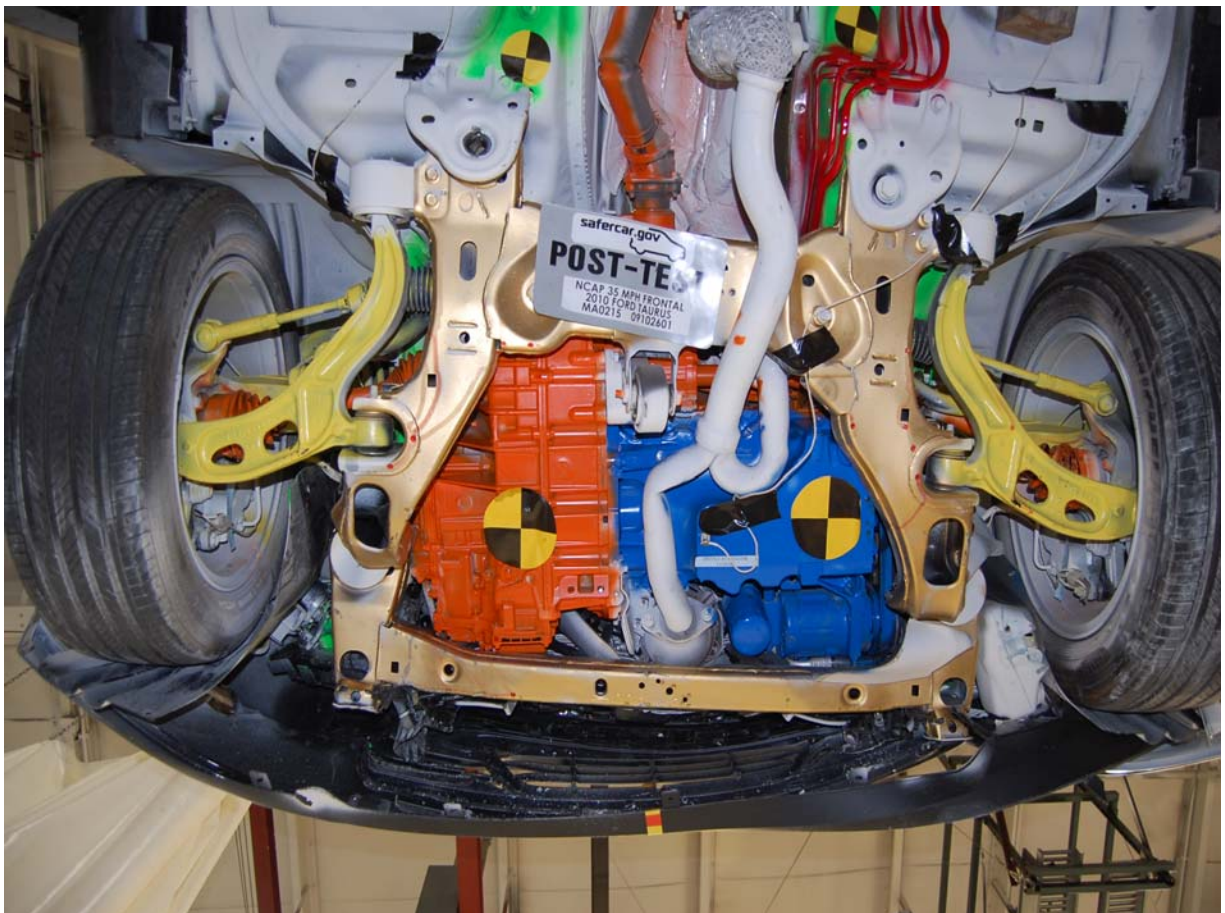
Pre-Test Fuel Cap View



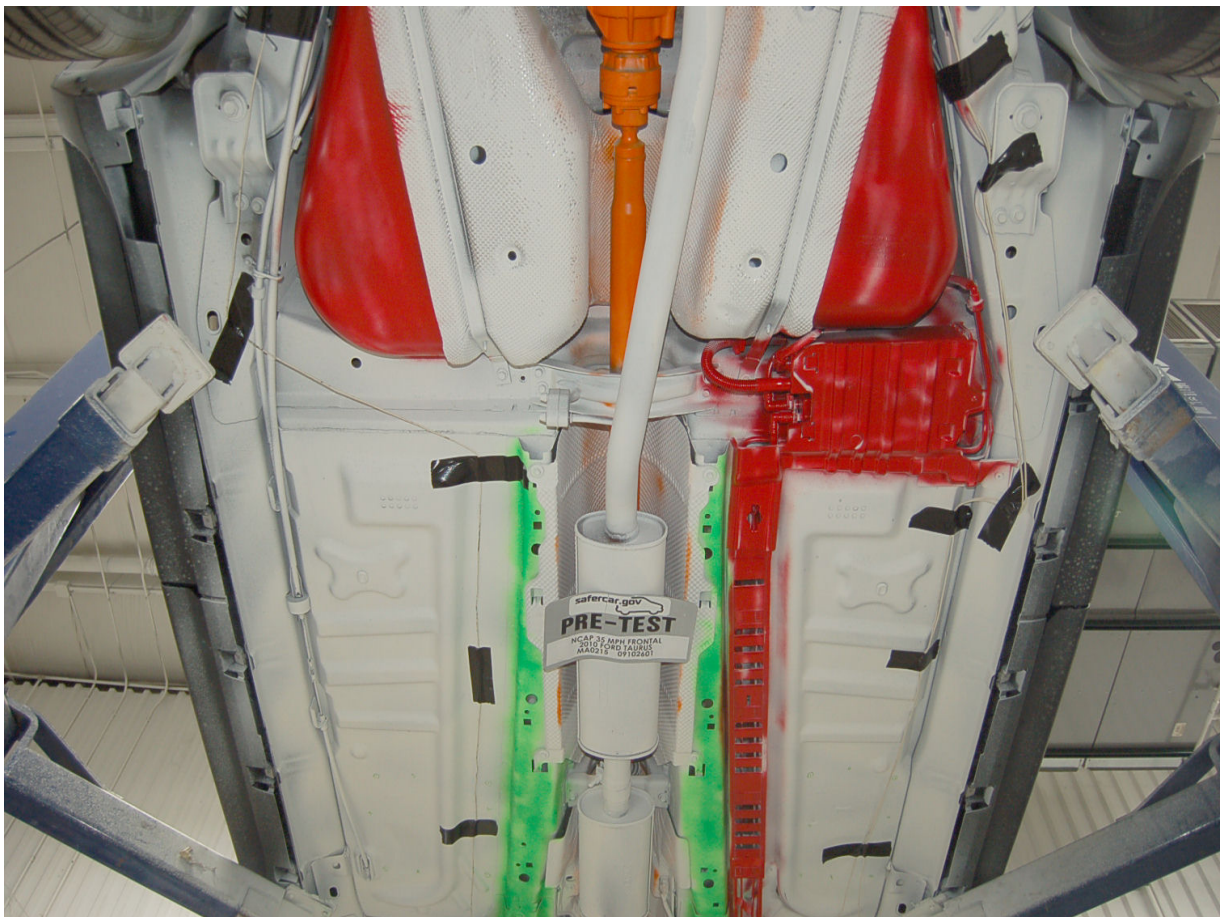
Post-Test Fuel Cap View



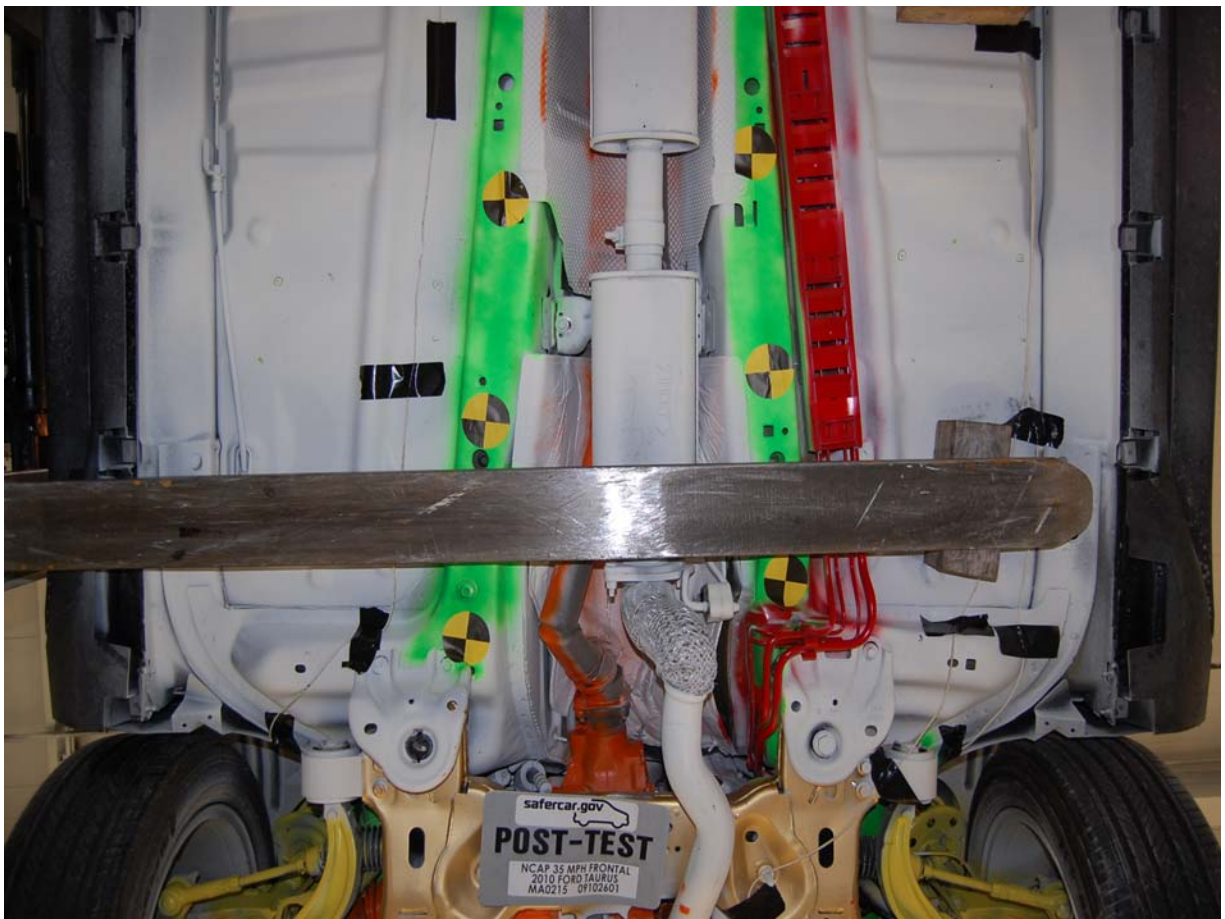
Pre-Test Front Underbody View



Post-Test Front Underbody View



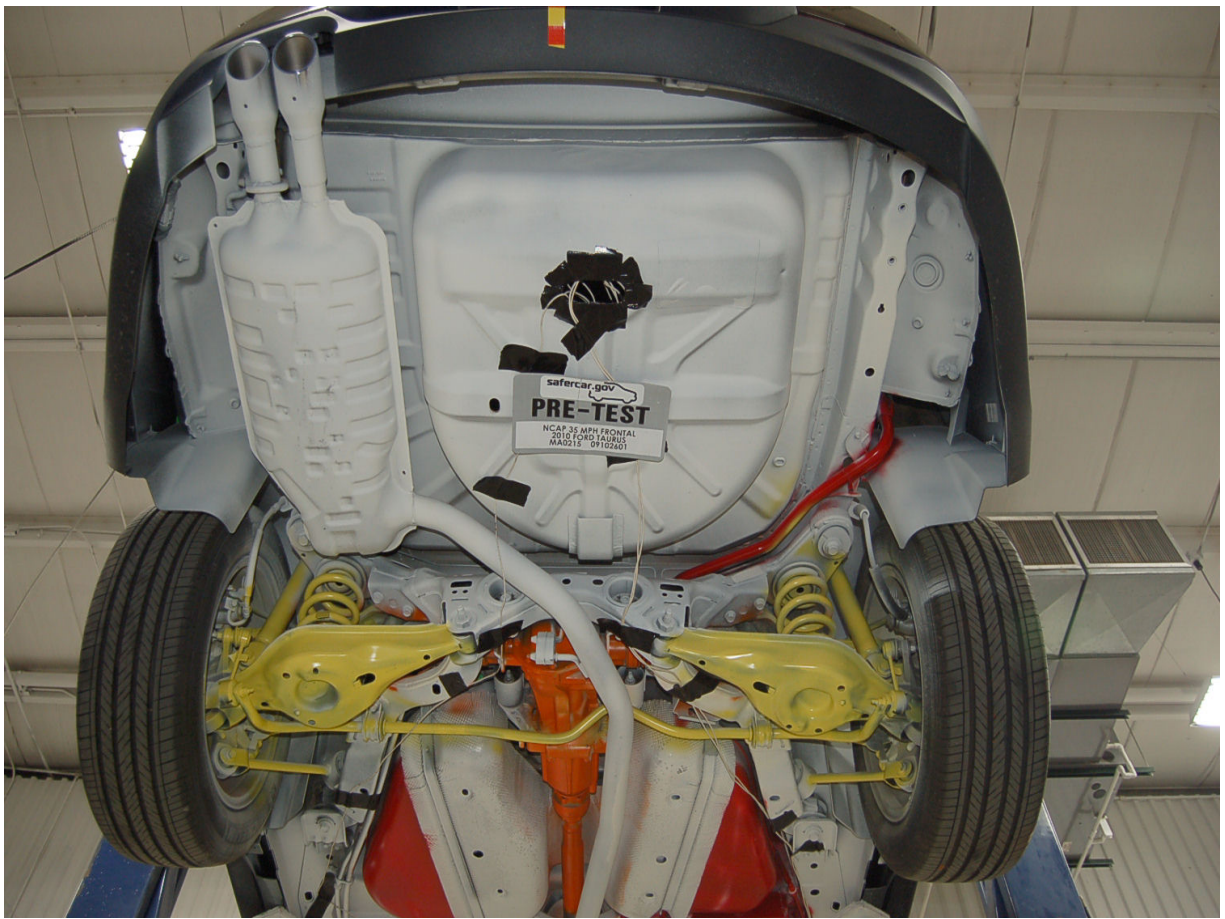
Pre-Test Mid Underbody View



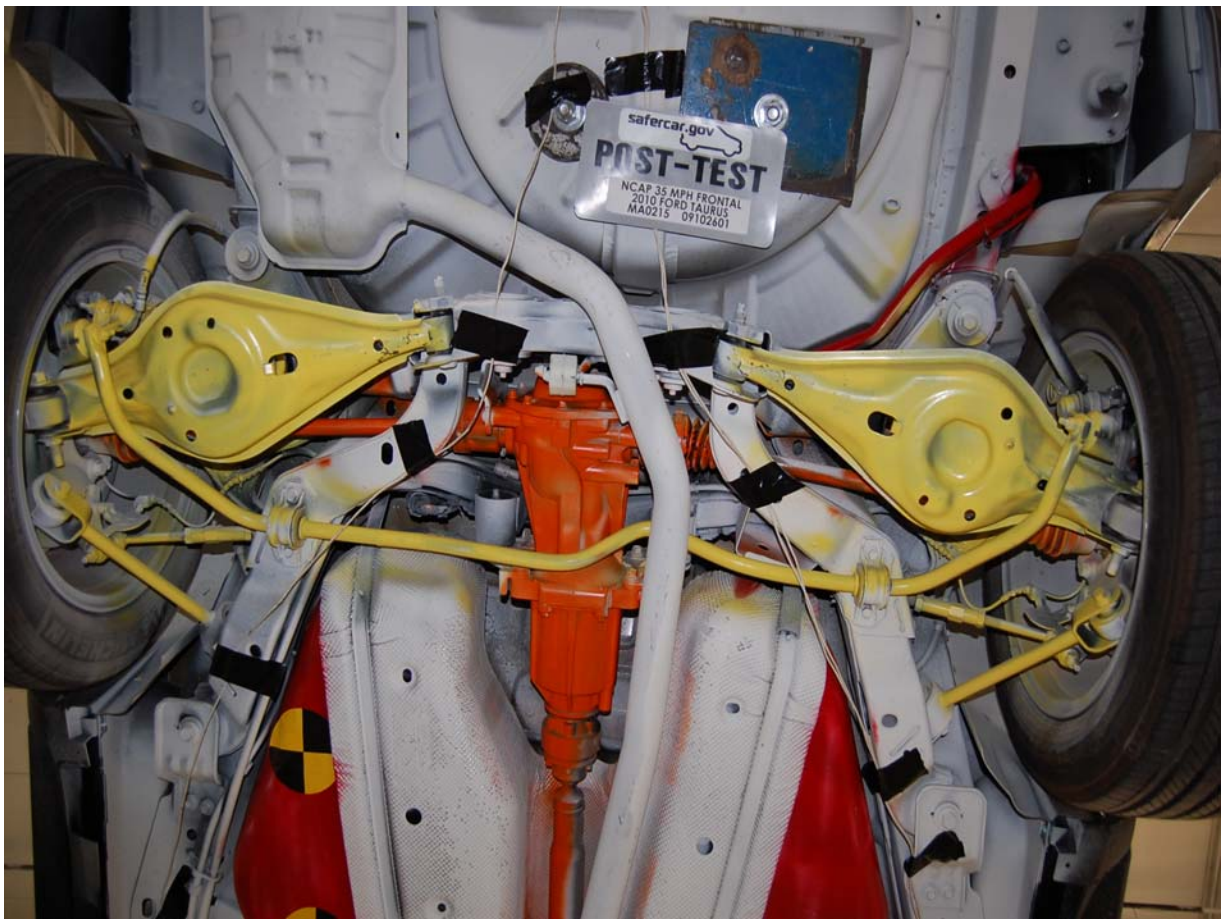
Post-Test Mid Underbody View



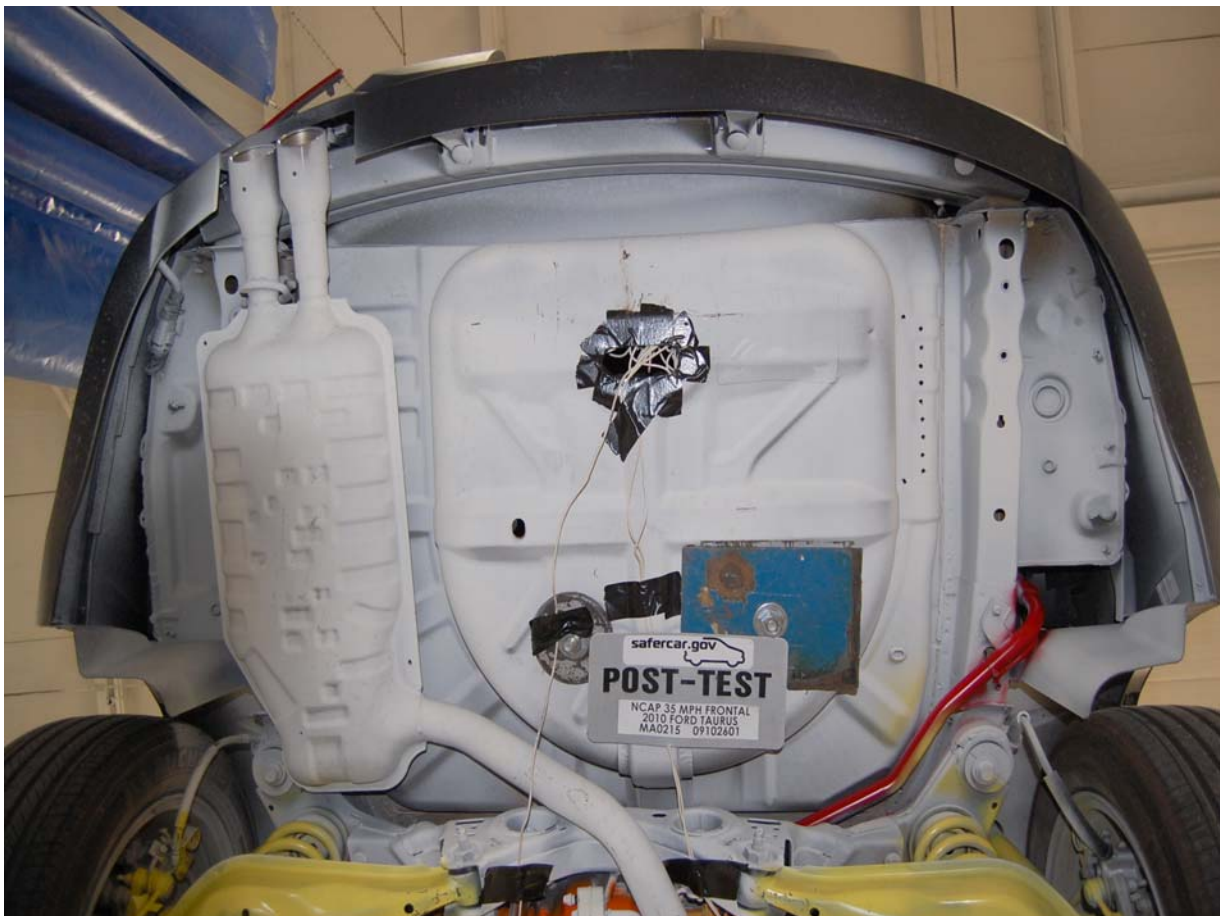
Post-Test Mid Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Driver Dummy Front View (Head Position)



Post-Test Driver Dummy Front View (Head Position)



Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy (Door Open)



Post-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet



Pre-Test Driver Side Knee Bolster



Post-Test Driver Side Knee Bolster



Pre-Test Driver Side Floor Pan



Post-Test Driver Side Floor Pan



Post-Test Driver Dummy Head Contact



Post-Test Driver Dummy Knee Contact



Post-Test Driver Dummy Airbag Contact



Pre-Test Passenger Dummy Front View (Head Position)



Post-Test Passenger Dummy Front View (Head Position)



Pre-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Through Window)



Pre-Test Passenger Dummy (Door Open)



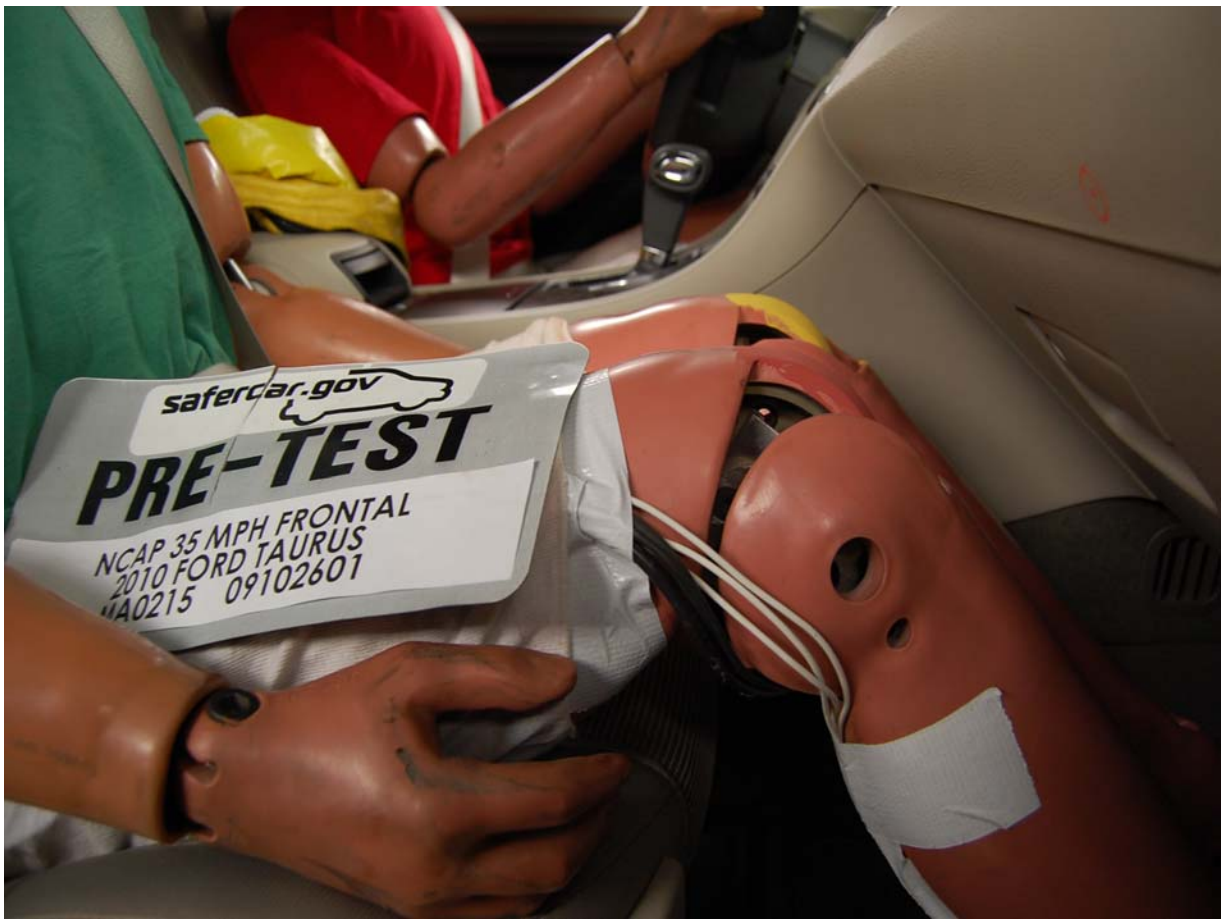
Post-Test Passenger Dummy (Door Open)



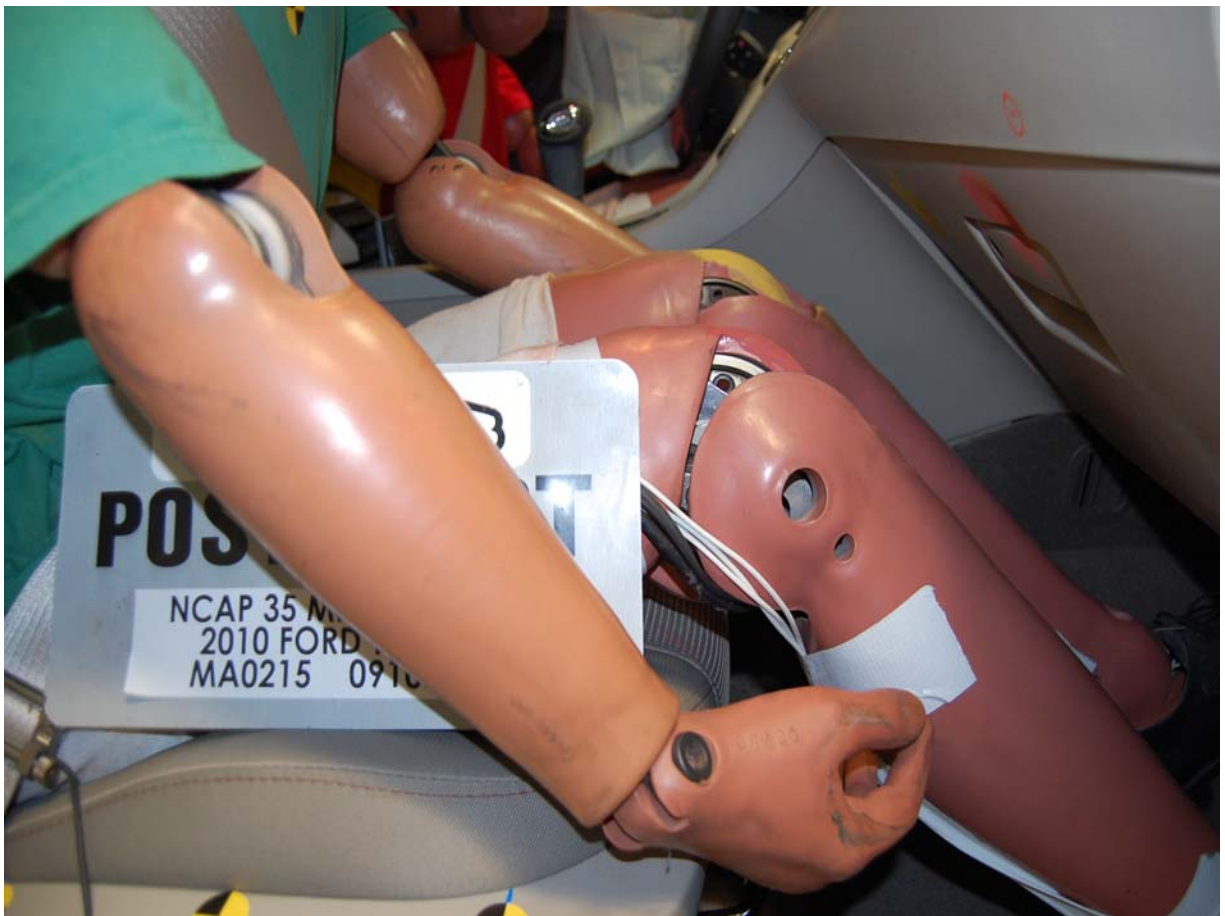
Pre-Test Passenger Dummy Feet



Post-Test Passenger Dummy Feet



Pre-Test Passenger Side Glove Box



Post-Test Passenger Side Glove Box



Pre-Test Passenger Side Floor Pan



Post-Test Passenger Side Floor Pan



Post-Test Passenger Dummy Knee Contact



Post-Test Passenger Dummy Knee Contact w/Airbag



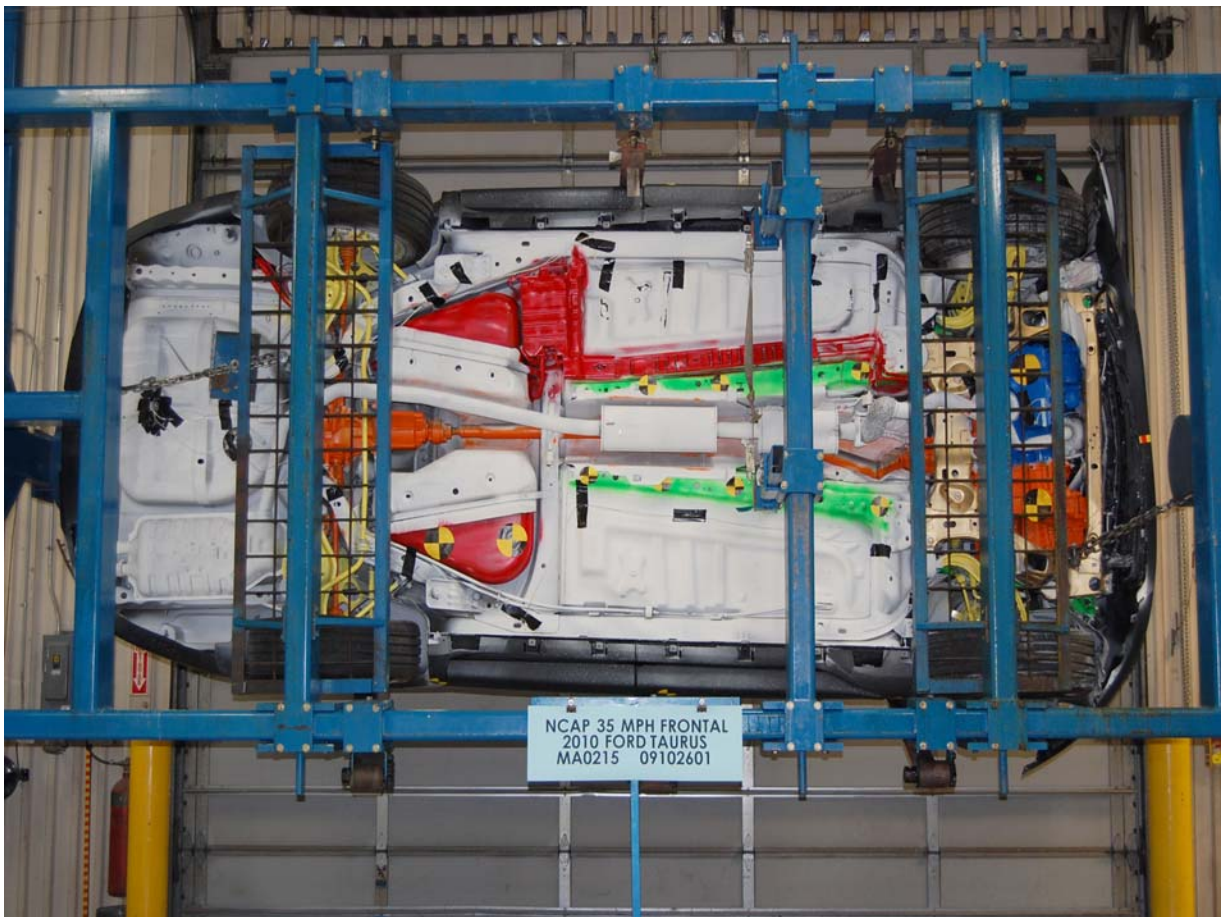
Post-Test Passenger Dummy Airbag Contact



Rollover 90 Degrees



Rollover 180 Degrees



Rollover 270 Degrees



Rollover 360 Degrees



Vehicle Impact

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in the Test Report

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 Chest X Acceleration vs. Time	B-3
Figure No. 9.	Driver Chest Y Acceleration vs. Time	B-3
Figure No. 10.	Driver Chest Z Acceleration vs. Time	B-3
Figure No. 11.	Driver Chest Resultant Acceleration vs. Time	B-3
Figure No. 12.	Driver Chest X Velocity vs. Time	B-4
Figure No. 13.	Driver Chest Y Velocity vs. Time	B-4
Figure No. 14.	Driver Chest Z Velocity vs. Time	B-4
Figure No. 15.	Driver Left Femur Force vs. Time	B-5
Figure No. 16.	Driver Right Femur Force vs. Time	B-5
Figure No. 17.	Passenger Head Xr Acceleration vs. Time	B-6
Figure No. 18.	Passenger Head Y Acceleration vs. Time	B-6
Figure No. 19.	Passenger Head Z Acceleration vs. Time	B-6
Figure No. 20.	Passenger Head Resultant Acceleration vs. Time	B-6
Figure No. 21.	Passenger Head Xr Velocity vs. Time	B-7
Figure No. 22.	Passenger Head Y Velocity vs. Time	B-7
Figure No. 23.	Passenger Head Z Velocity vs. Time	B-7
Figure No. 24.	Passenger Chest X Acceleration vs. Time	B-8
Figure No. 25.	Passenger Chest Y Acceleration vs. Time	B-8
Figure No. 26.	Passenger Chest Z Acceleration vs. Time	B-8
Figure No. 27.	Passenger Chest Resultant Acceleration vs. Time	B-8
Figure No. 28.	Passenger Chest X Velocity vs. Time	B-9

Figure No. 29.	Passenger Chest Y Velocity vs. Time	B-9
Figure No. 30.	Passenger Chest Z Velocity vs. Time	B-9
Figure No. 31.	Passenger Left Femur Force vs. Time	B-10
Figure No. 32.	Passenger Right Femur Force vs. Time	B-10

The following dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Upper Neck Force X

Driver Upper Neck Force Y

Driver Upper Neck Force Z

Driver Upper Neck Moment X

Driver Upper Neck Moment Y

Driver Upper Neck Moment Z

Driver Chest X Redundant

Driver Chest Y Redundant

Driver Chest Z Redundant

Driver Chest Displacement

Driver Pelvis X

Driver Pelvis Y

Driver Pelvis Z

Driver Lap Belt Force

Driver Shoulder Belt Force

Driver Left Upper Tibia Moment X

Driver Left Upper Tibia Moment Y

Driver Left Upper Tibia Force Z

Driver Left Lower Tibia Moment X

Driver Left Lower Tibia Moment Y

Driver Left Lower Tibia Force Z

Driver Right Upper Tibia Moment X

Driver Right Upper Tibia Moment Y

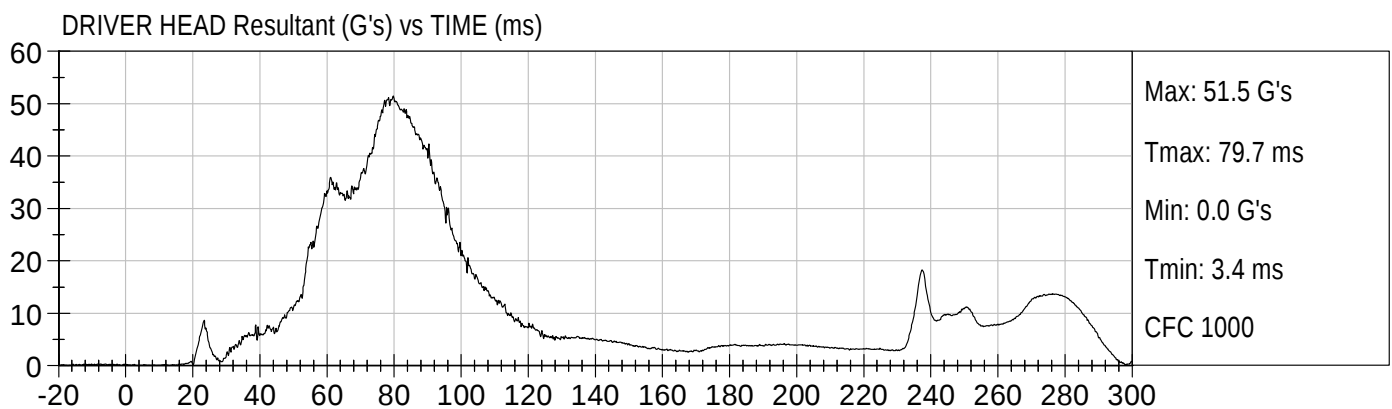
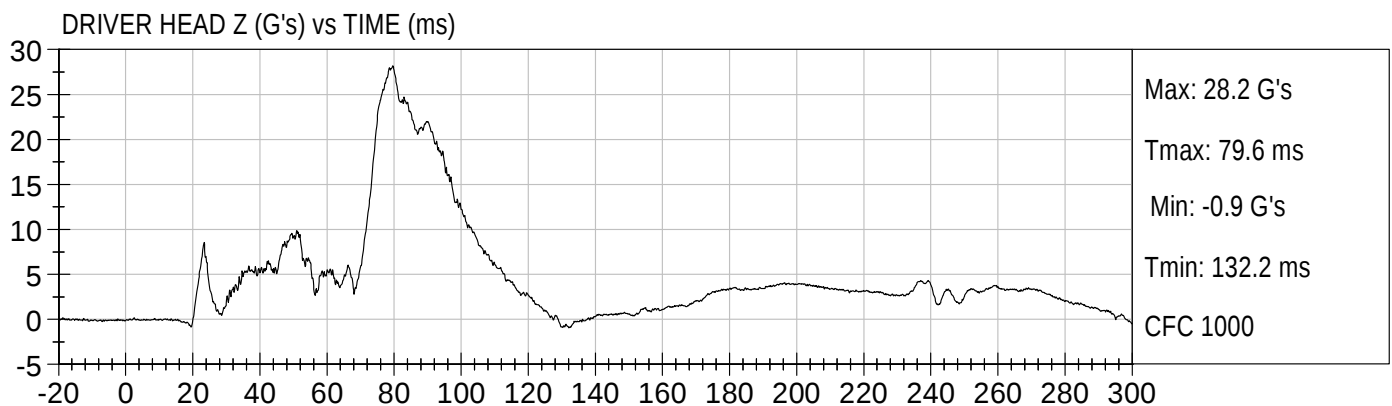
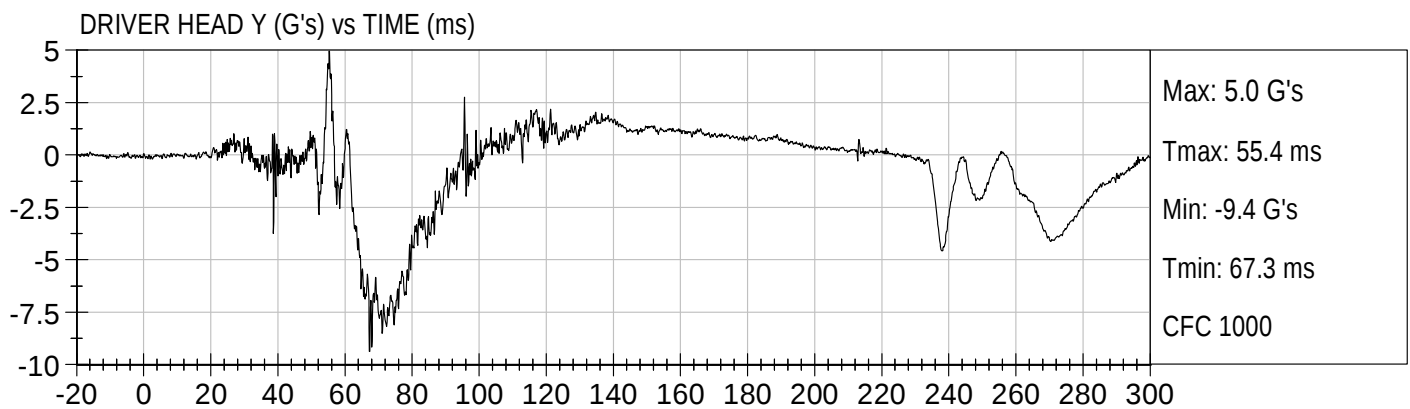
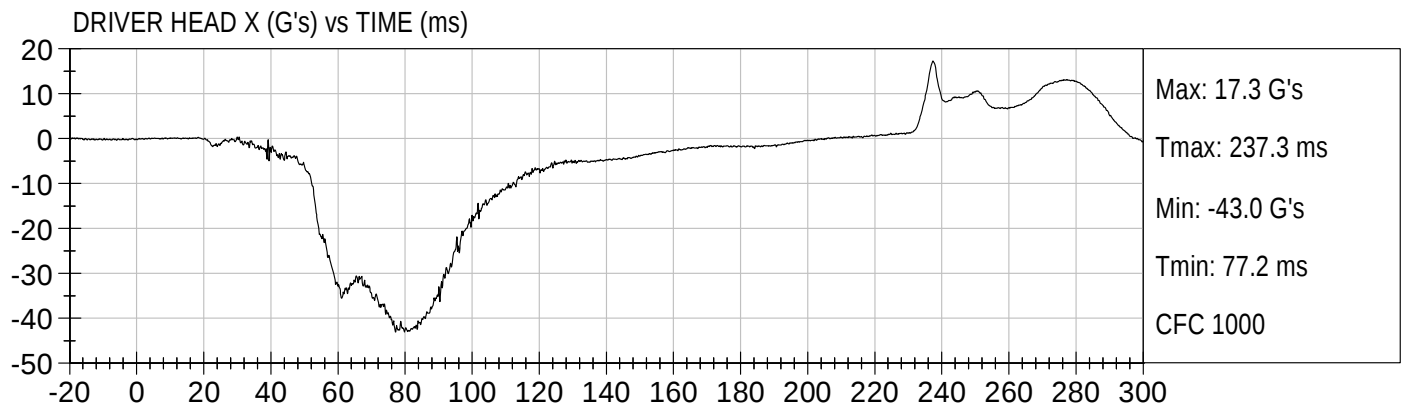
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Passenger Head X
Passenger Head Y Redundant
Passenger Head Z Redundant
Passenger Upper Neck Force X
Passenger Upper Neck Force Y
Passenger Upper Neck Force Z
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Y
Passenger Upper Neck Moment Z
Passenger Chest X Redundant
Passenger Chest Y Redundant
Passenger Chest Z Redundant
Passenger Chest Displacement
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Lap Belt Force
Passenger Shoulder Belt Force
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X

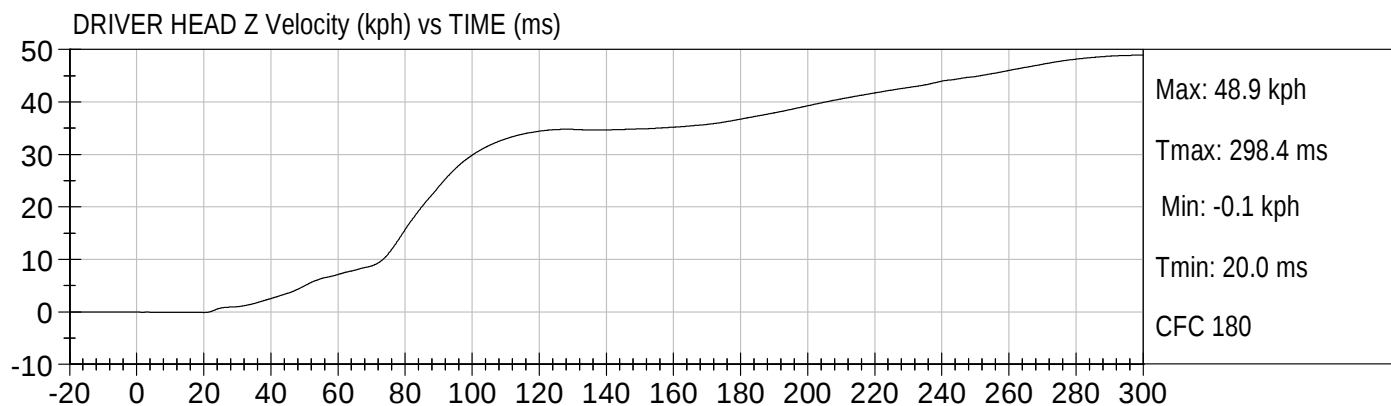
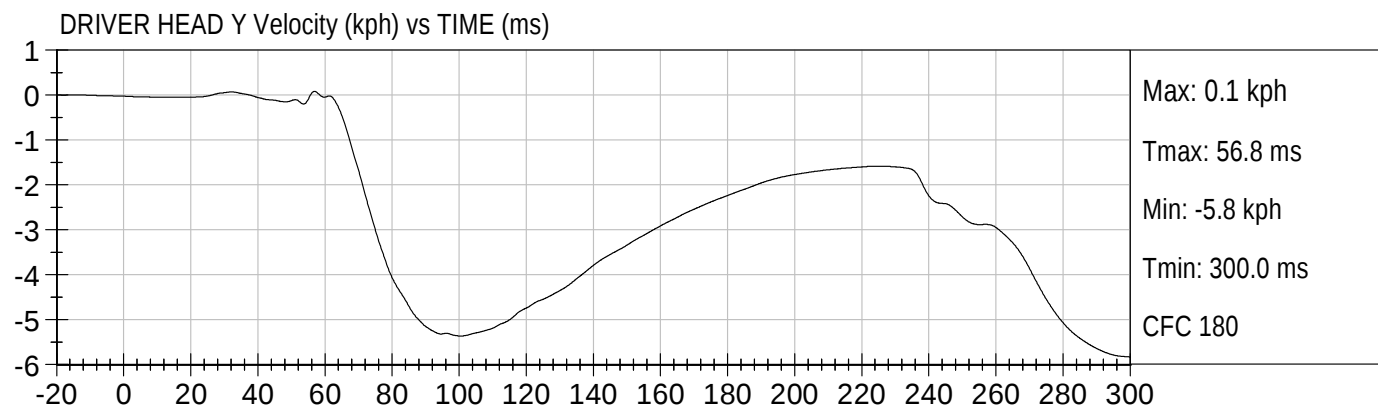
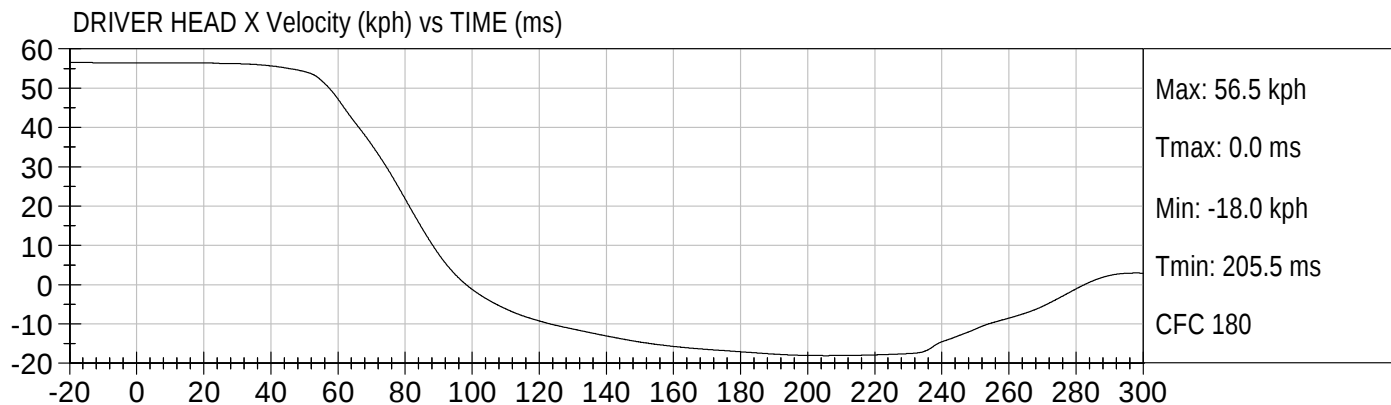
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Vehicle Engine Top X
Vehicle Engine Bottom X
Vehicle Left Brake Caliper X
Vehicle Right Brake Caliper X
Barrier Force – Upper Left
Barrier Force – Upper Center
Barrier Force – Upper Right
Barrier Force – Lower Left
Barrier Force – Lower Center
Barrier Force – Lower Right

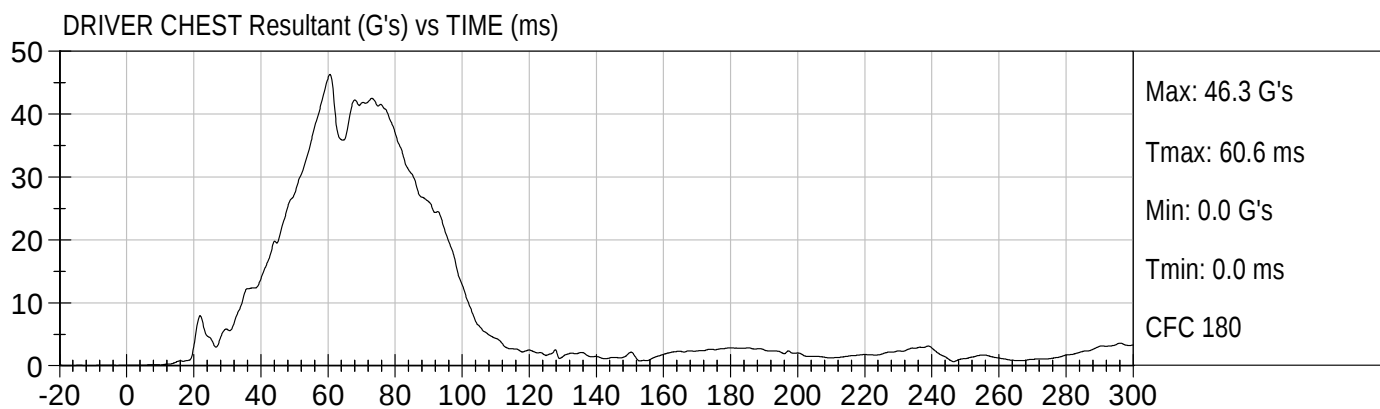
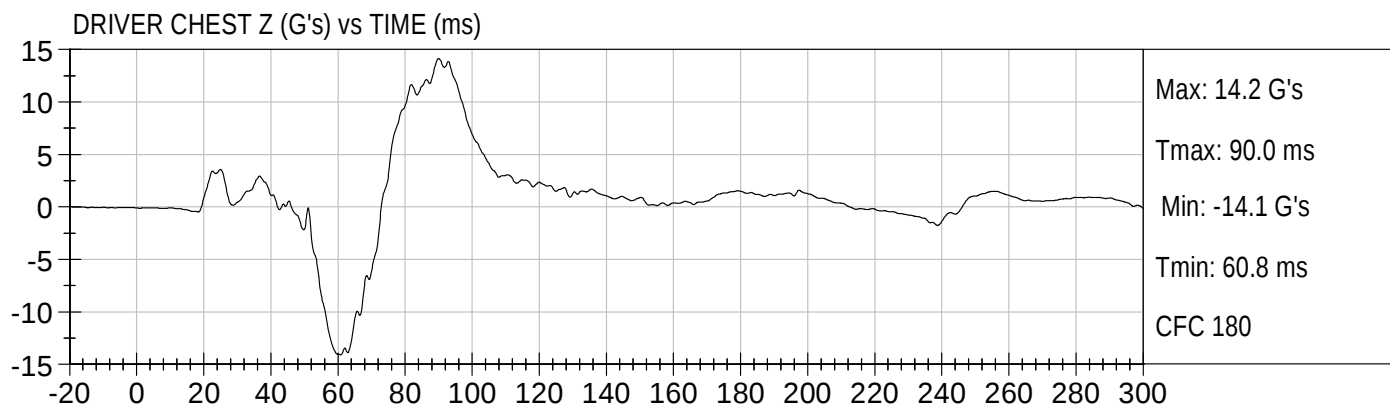
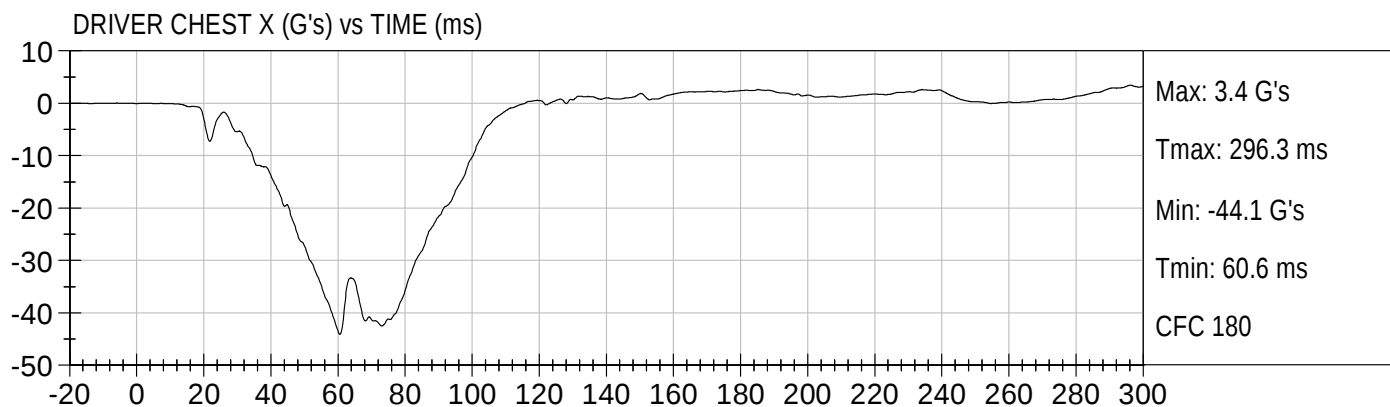


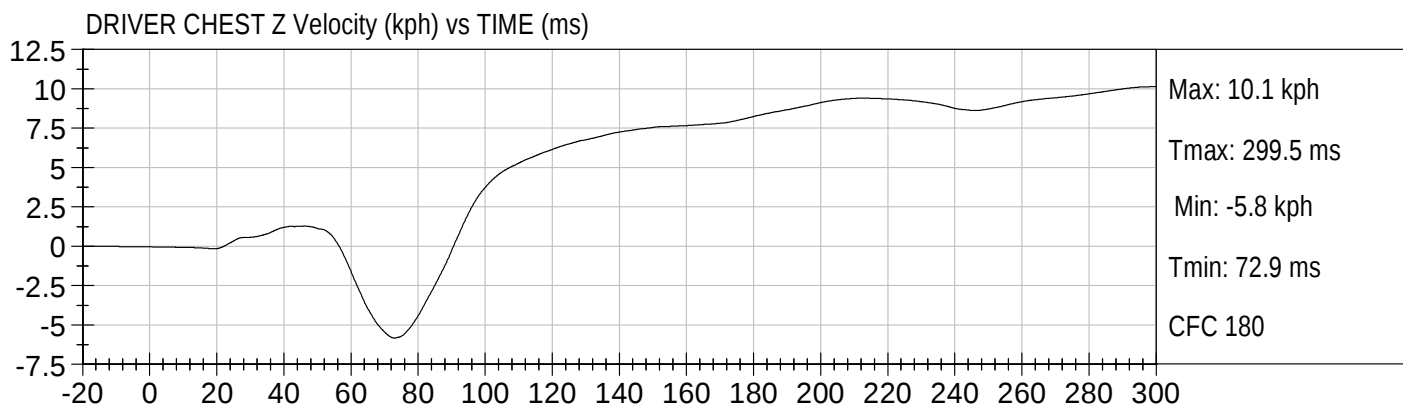
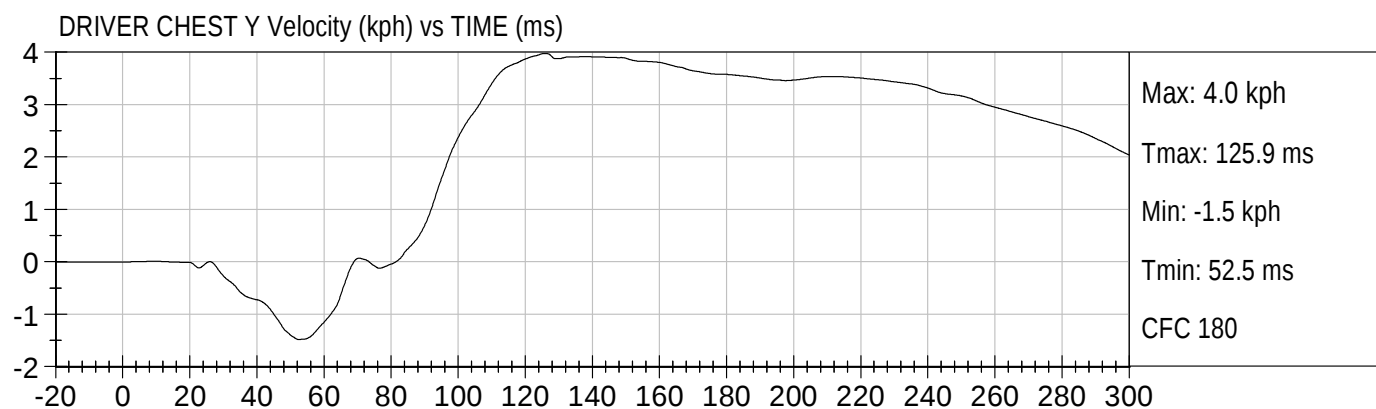
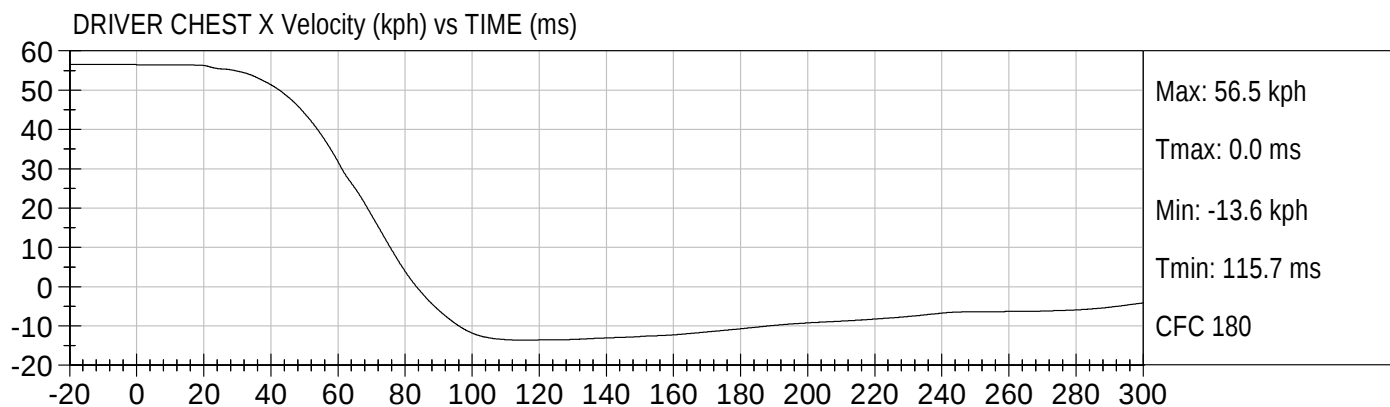
35mph NCAP Frontal
2010 Ford Taurus - MA0215

Test Date: 11/19/2009
Speed: 35.1 mph (56.5 km/h)





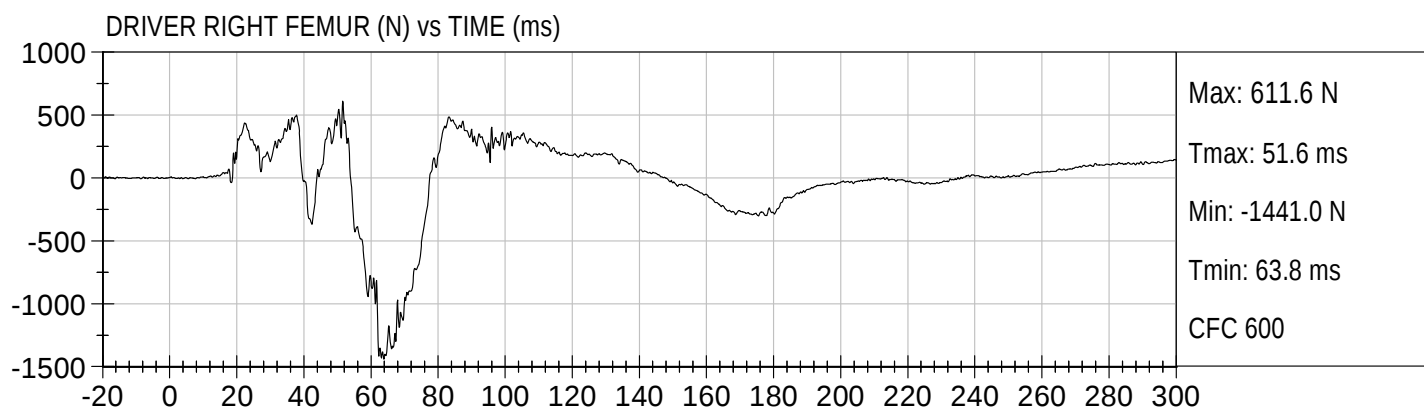
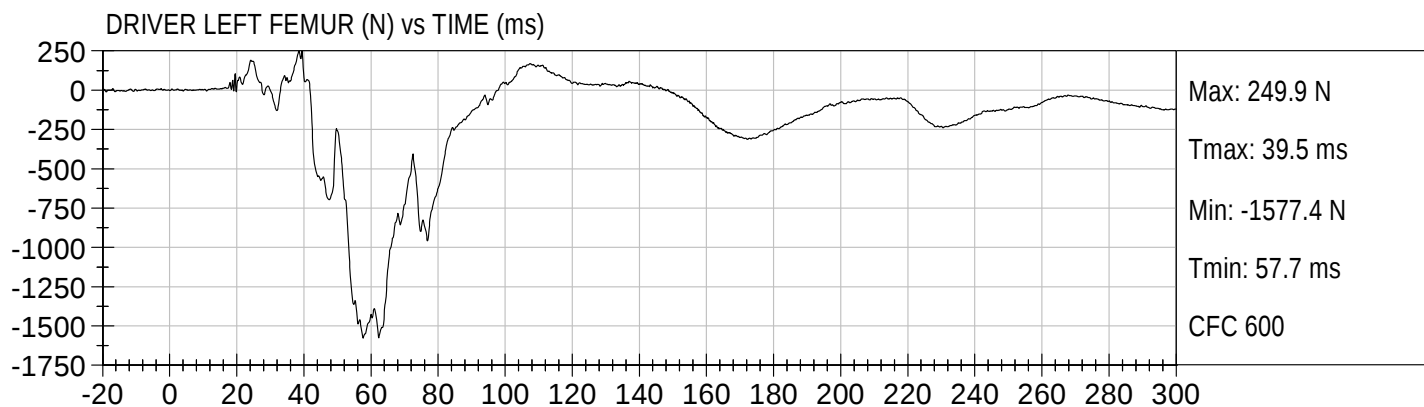






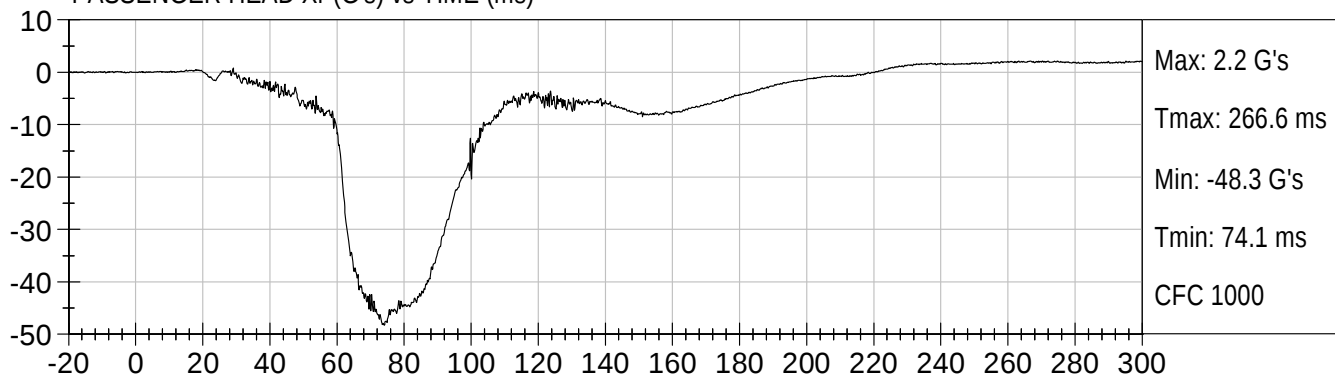
35mph NCAP Frontal
2010 Ford Taurus - MA0215

Test Date: 11/19/2009
Speed: 35.1 mph (56.5 km/h)

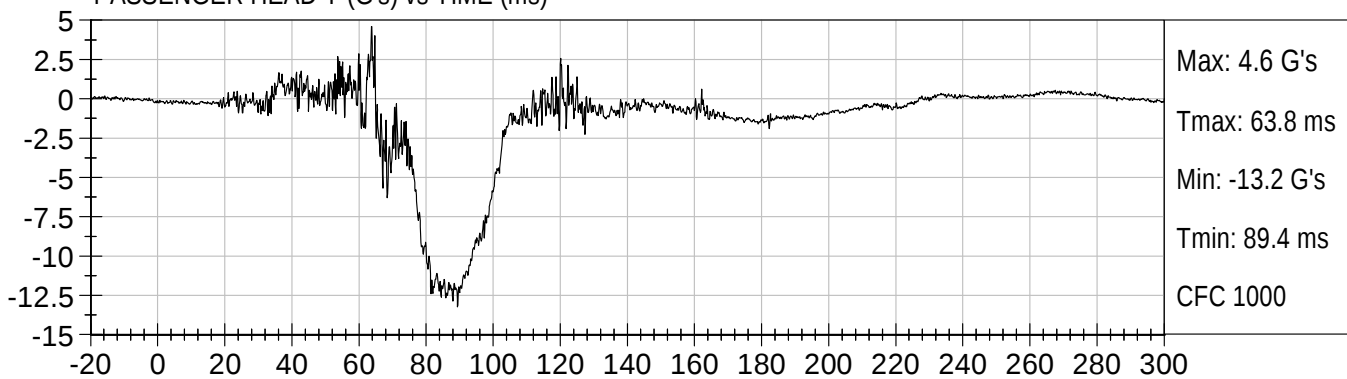




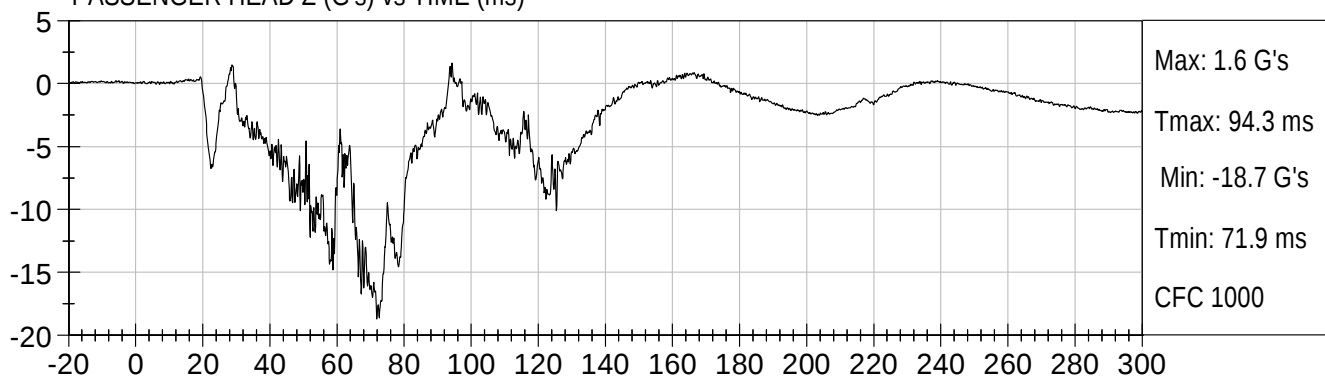
PASSENGER HEAD Xr (G's) vs TIME (ms)



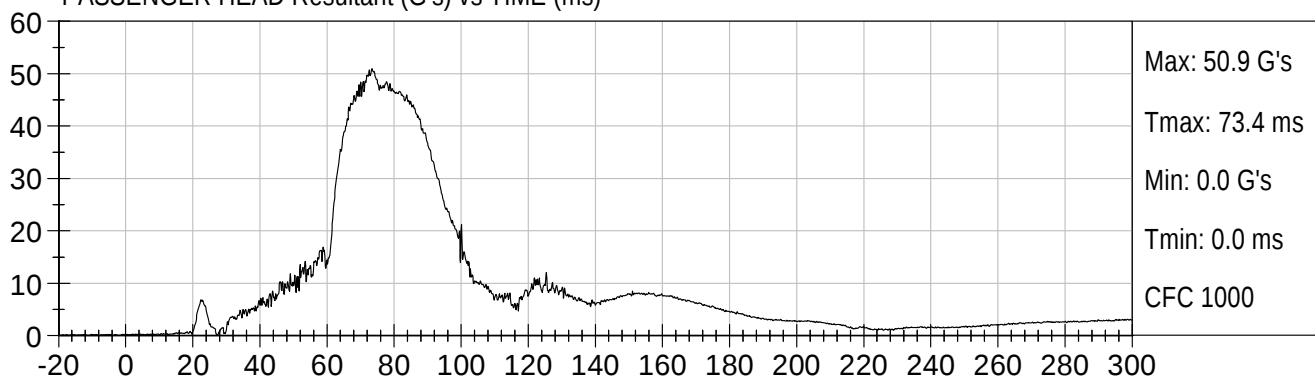
PASSENGER HEAD Y (G's) vs TIME (ms)



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

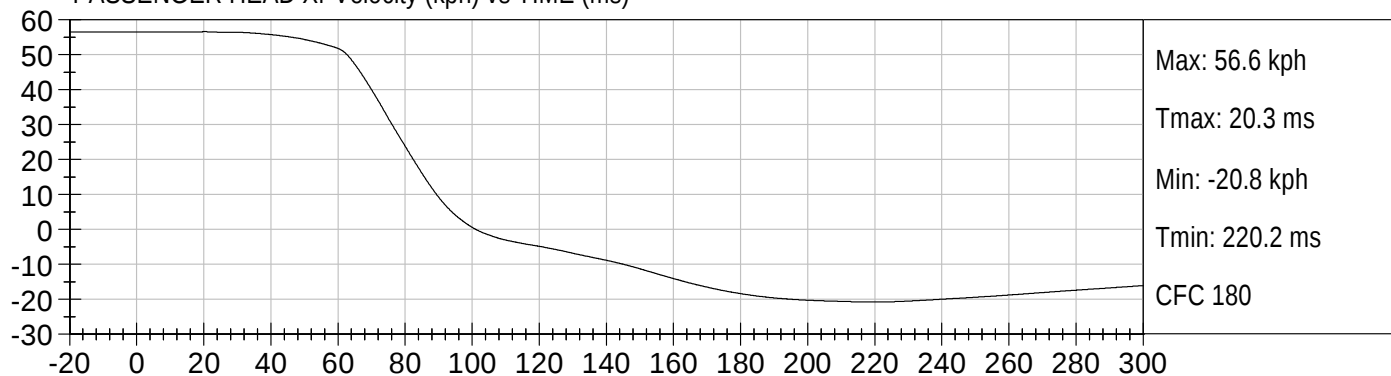


PASSENGER HEAD Resultant (G's) vs TIME (ms)

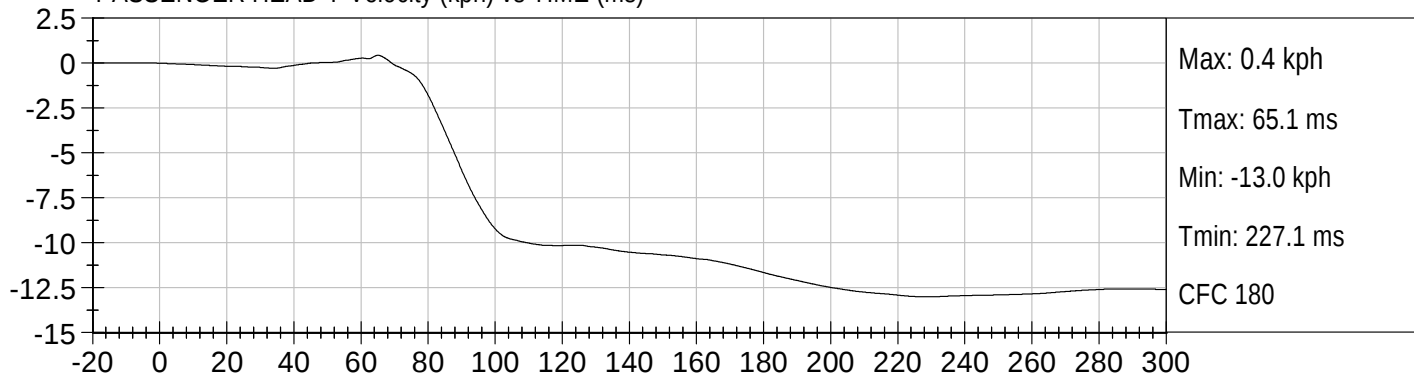




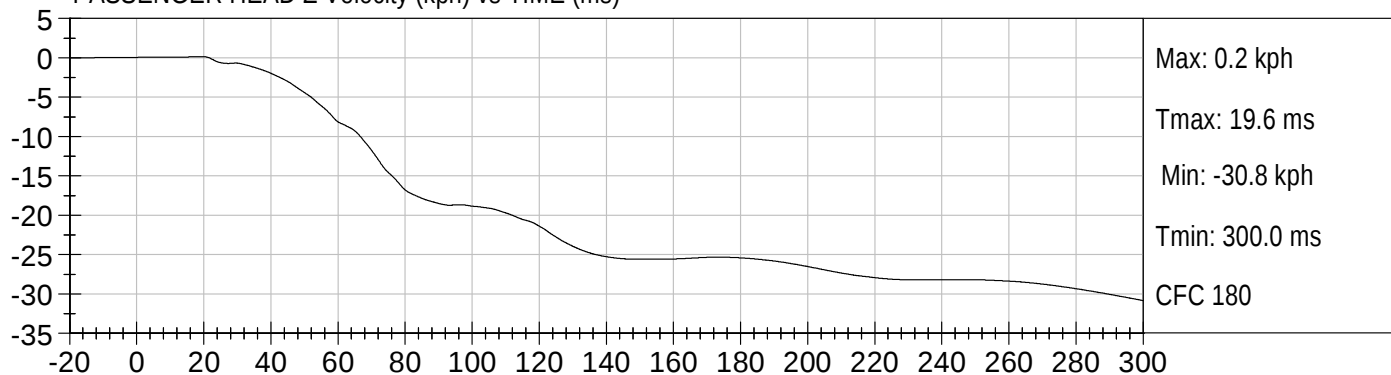
PASSENGER HEAD Xr Velocity (kph) vs TIME (ms)

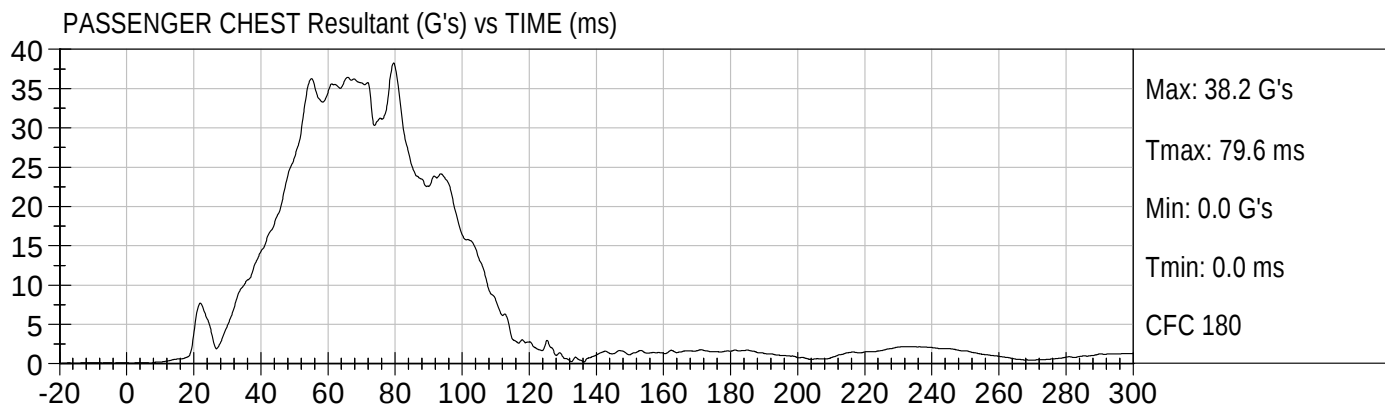
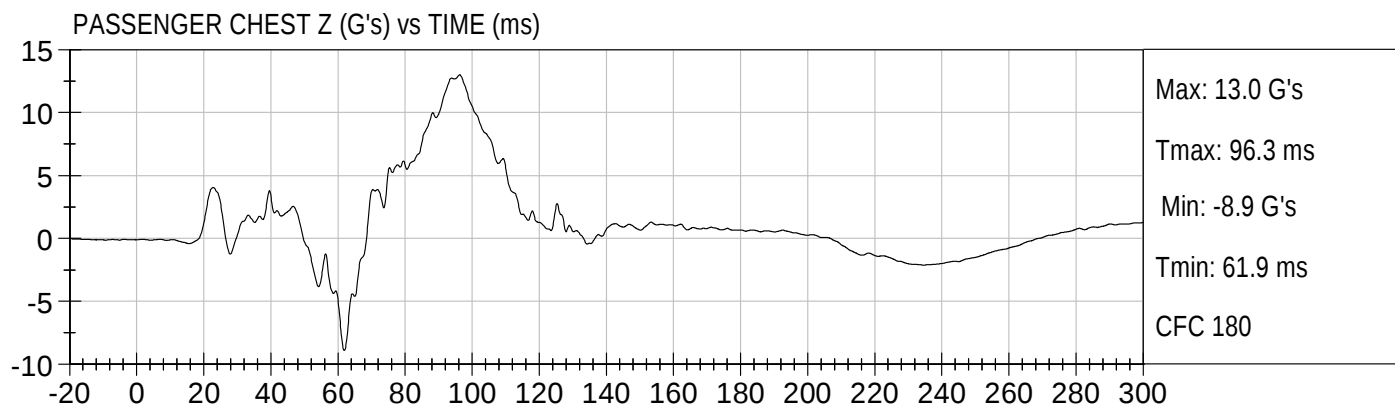
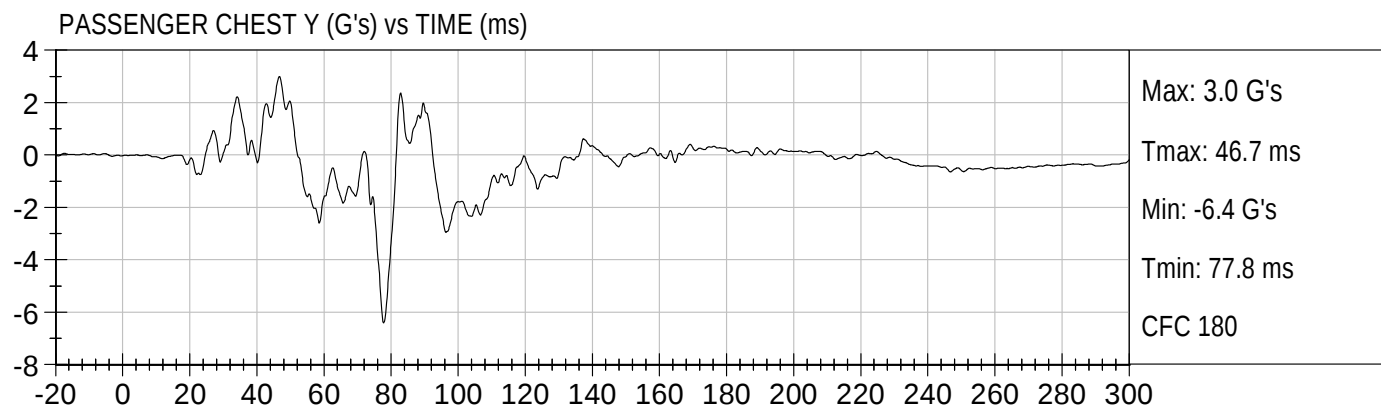
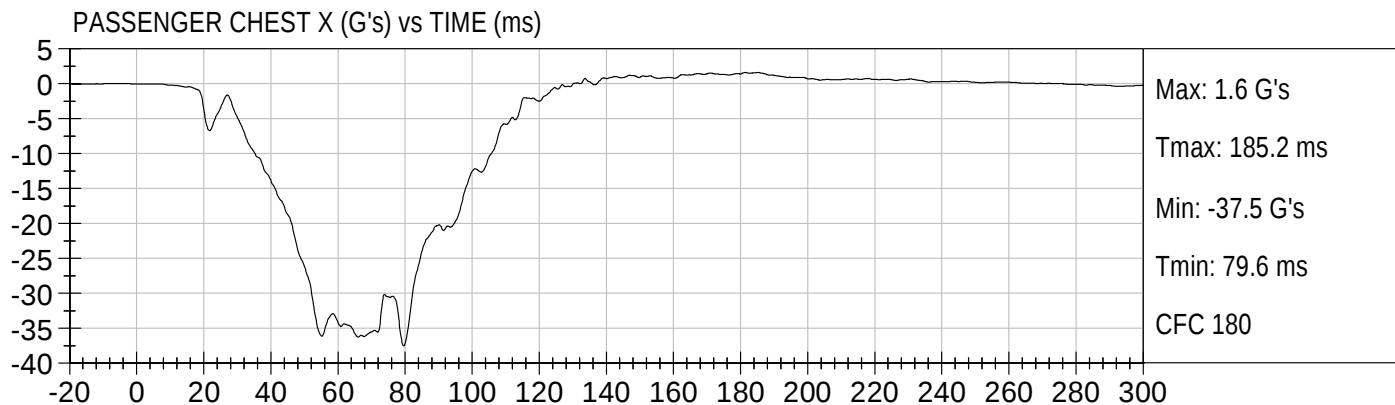


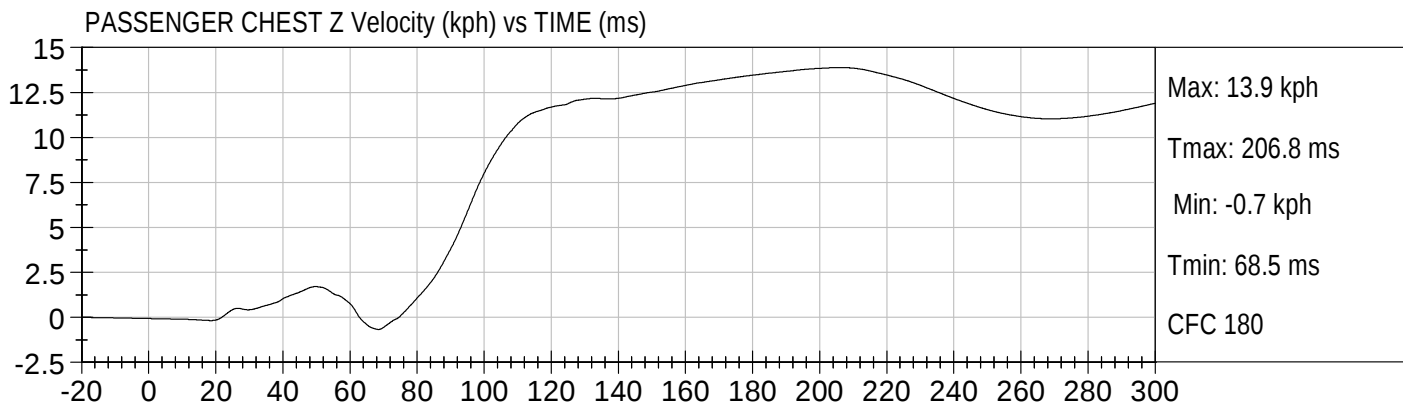
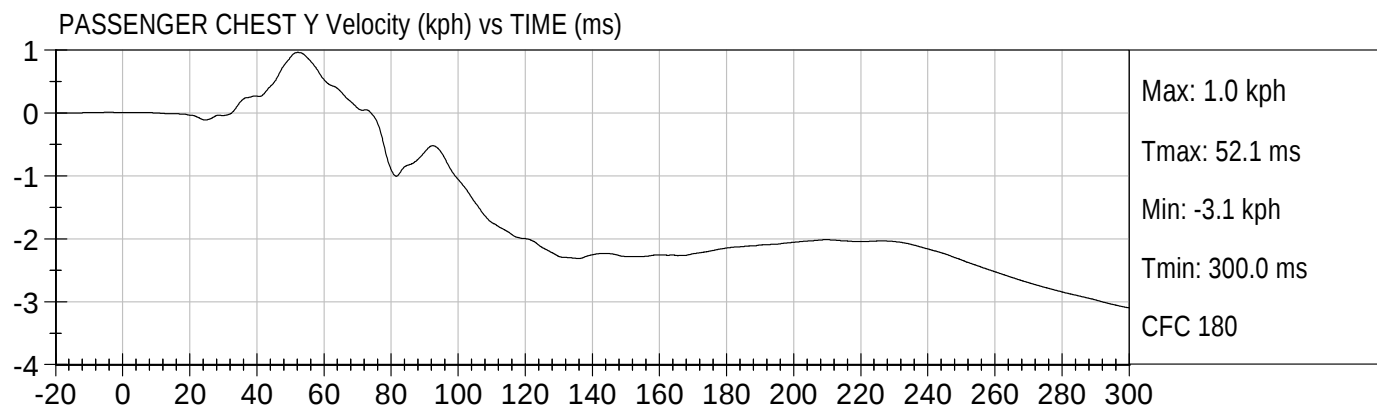
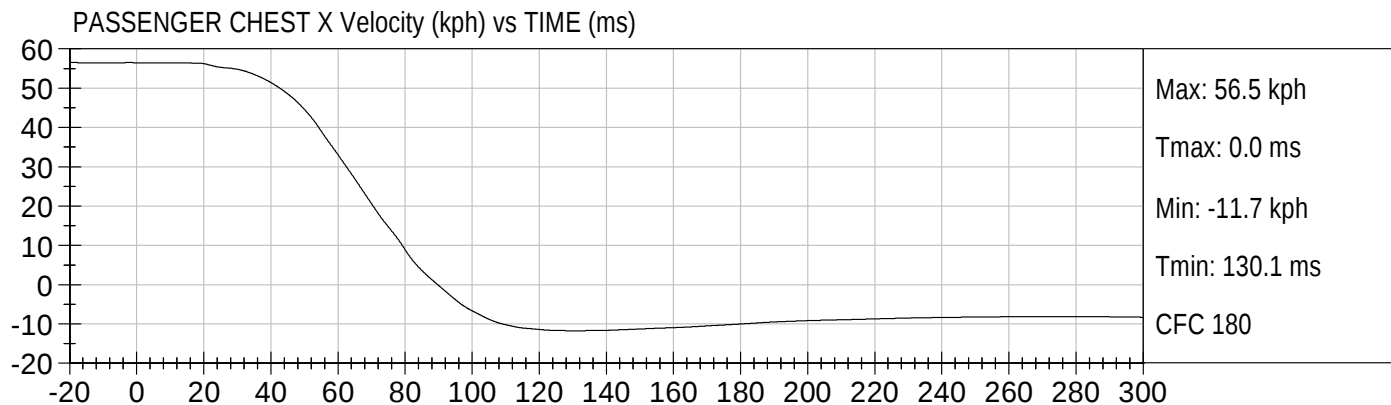
PASSENGER HEAD Y Velocity (kph) vs TIME (ms)



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



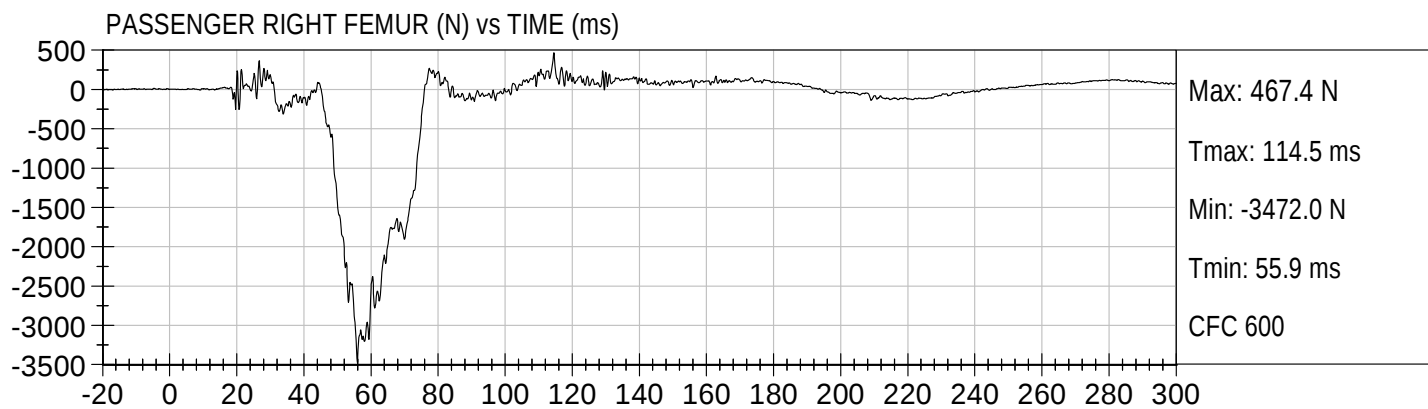
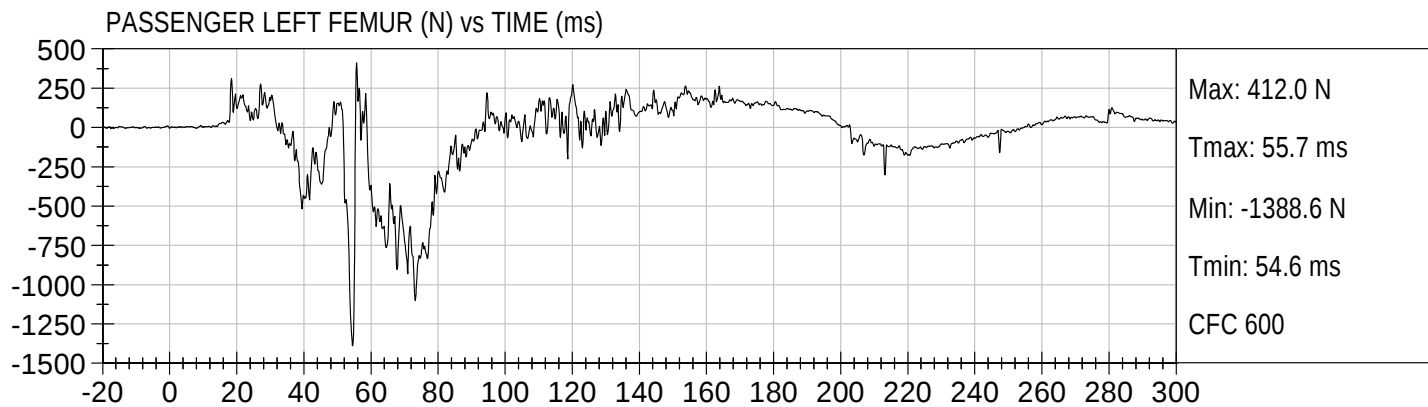






35mph NCAP Frontal
2010 Ford Taurus - MA0215

Test Date: 11/19/2009
Speed: 35.1 mph (56.5 km/h)



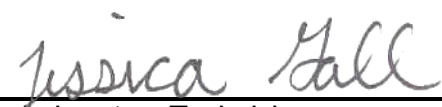
APPENDIX C
DUMMY CALIBRATION DATA

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test ID: D092651

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Peak Resultant Acceleration	G's	225 - 275	246	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-12.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

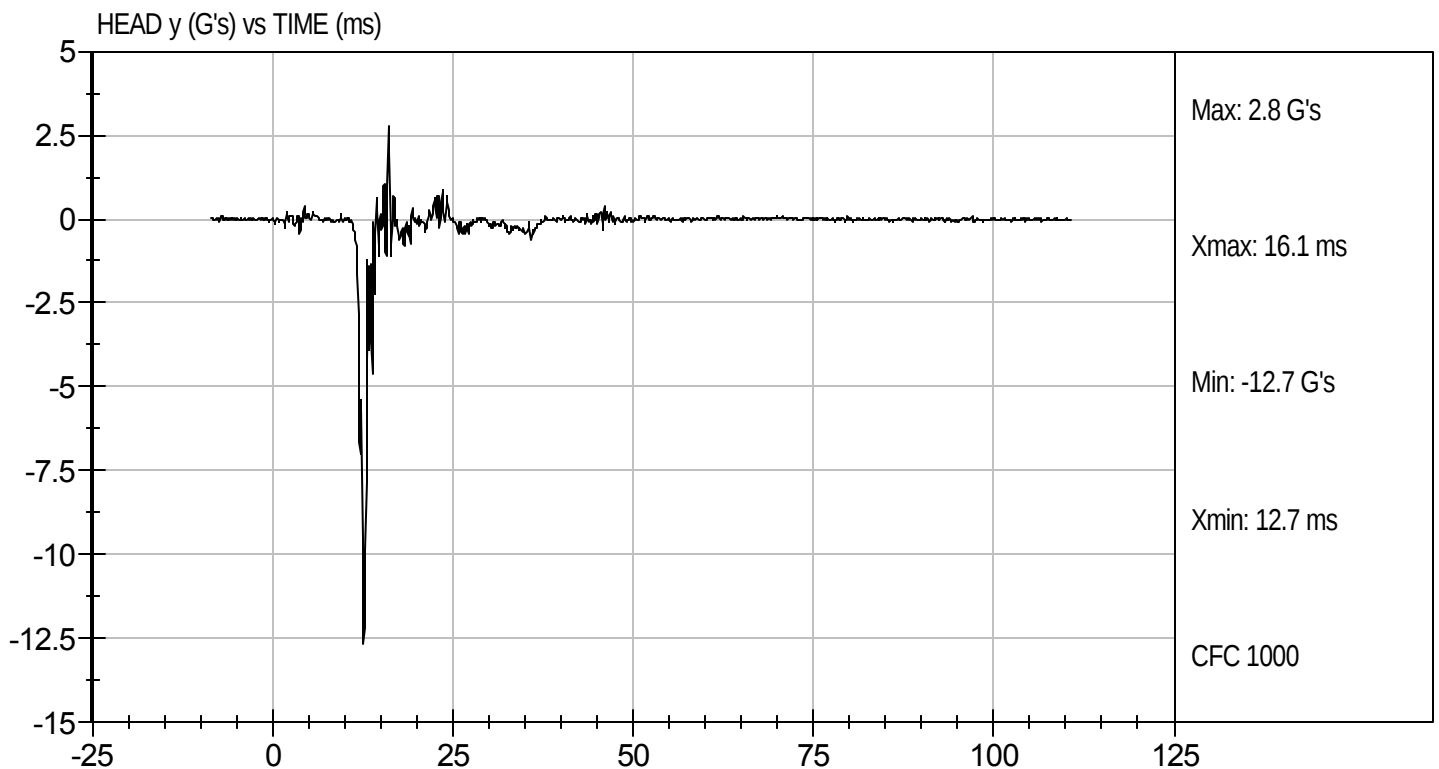
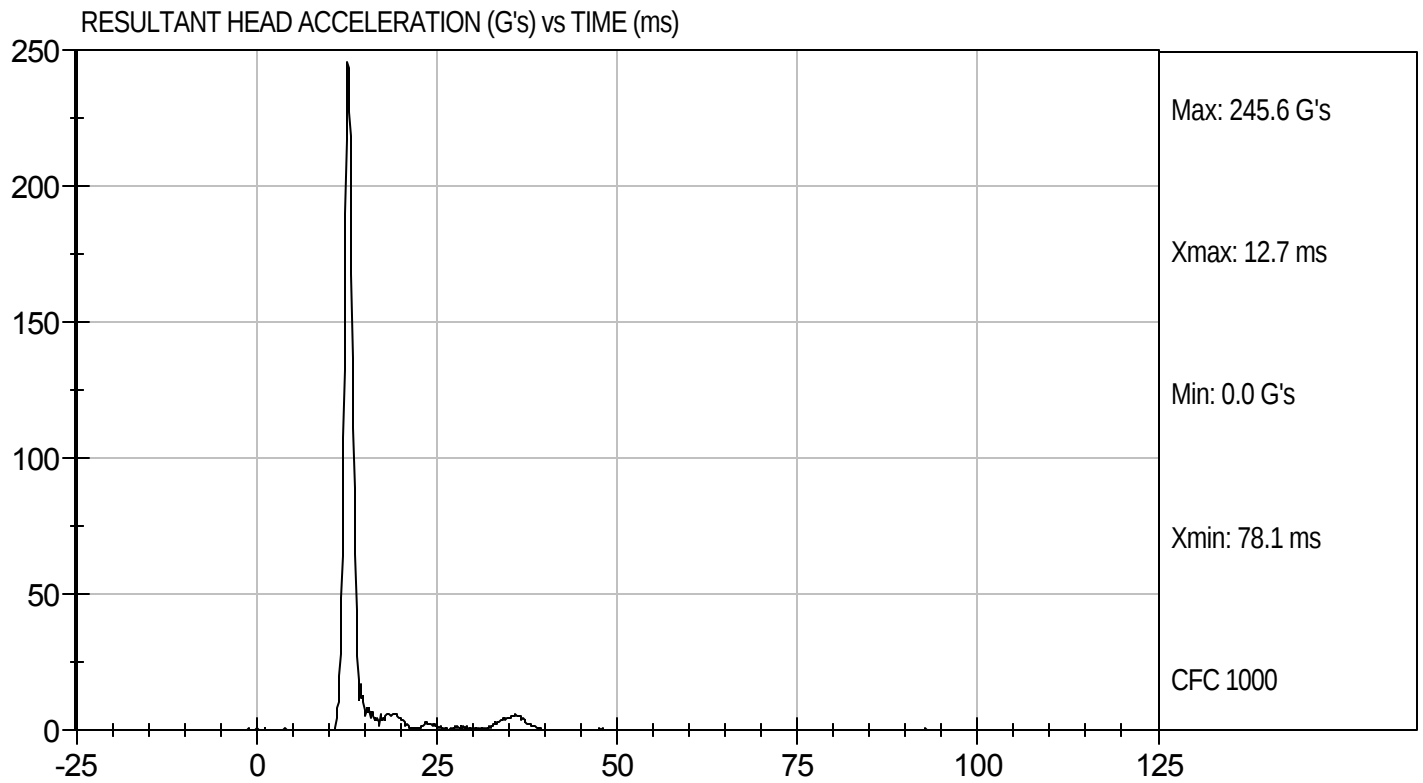
10/20/09
Test Date


Approved By



Test Desc: Head Drop
Component ID: D092651

Test Date: 10/20/09
Velocity: 0 ft/s, 0.00 m/s

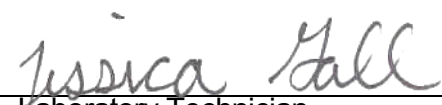


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D092652

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	45	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	22.50 to 27.50	23.74	Pass
	20 ms	m/s	17.60 to 22.60	19.07	Pass
	30 ms	m/s	12.50 to 18.50	15.34	Pass
Peak Pendulum Deceleration After 30 ms		m/s	<= 29.0	15.34	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.5	Pass
	Time	ms	57.0 to 64.0	62.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	114.0	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	98.7	Pass
	Time	ms	47.0 to 58.0	47.7	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	101.9	Pass
Overall Test Results					Pass


 Laboratory Technician

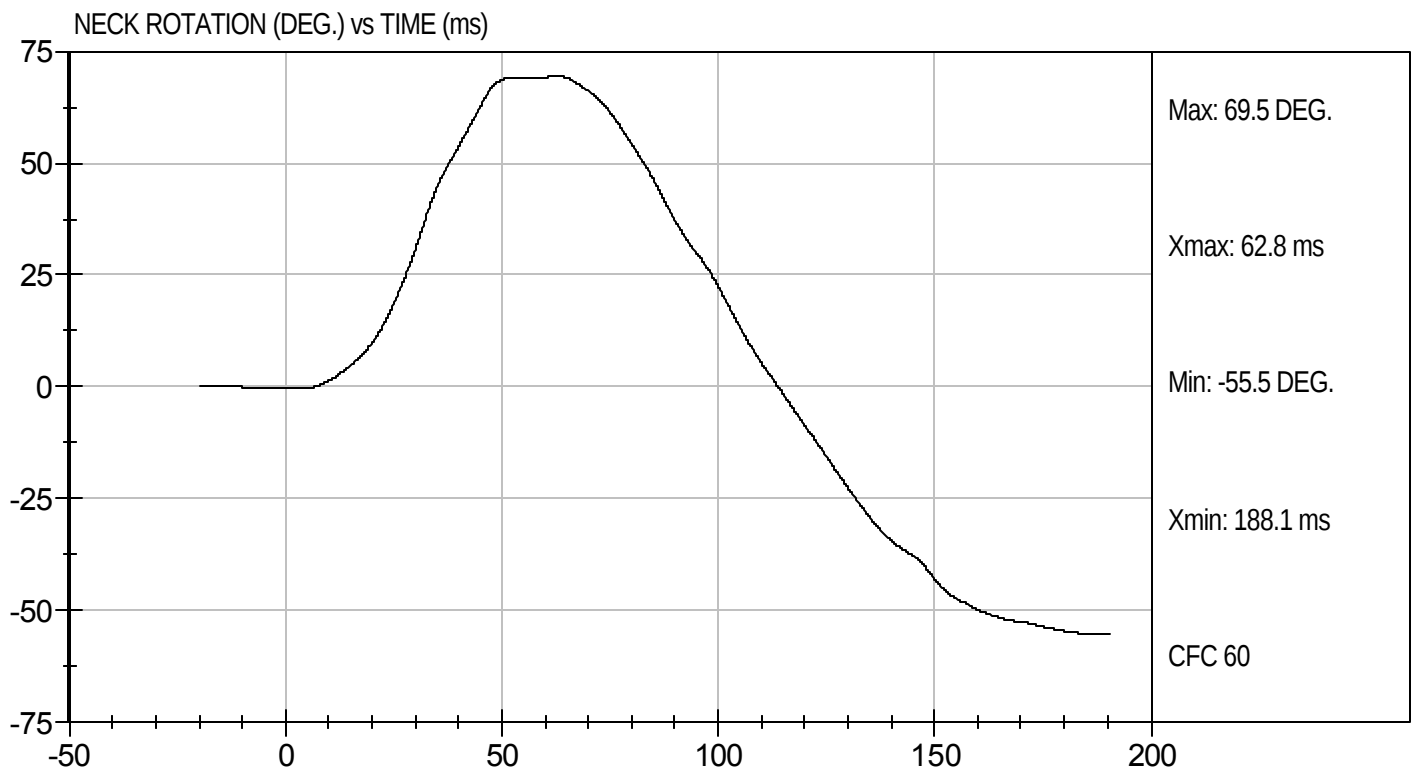
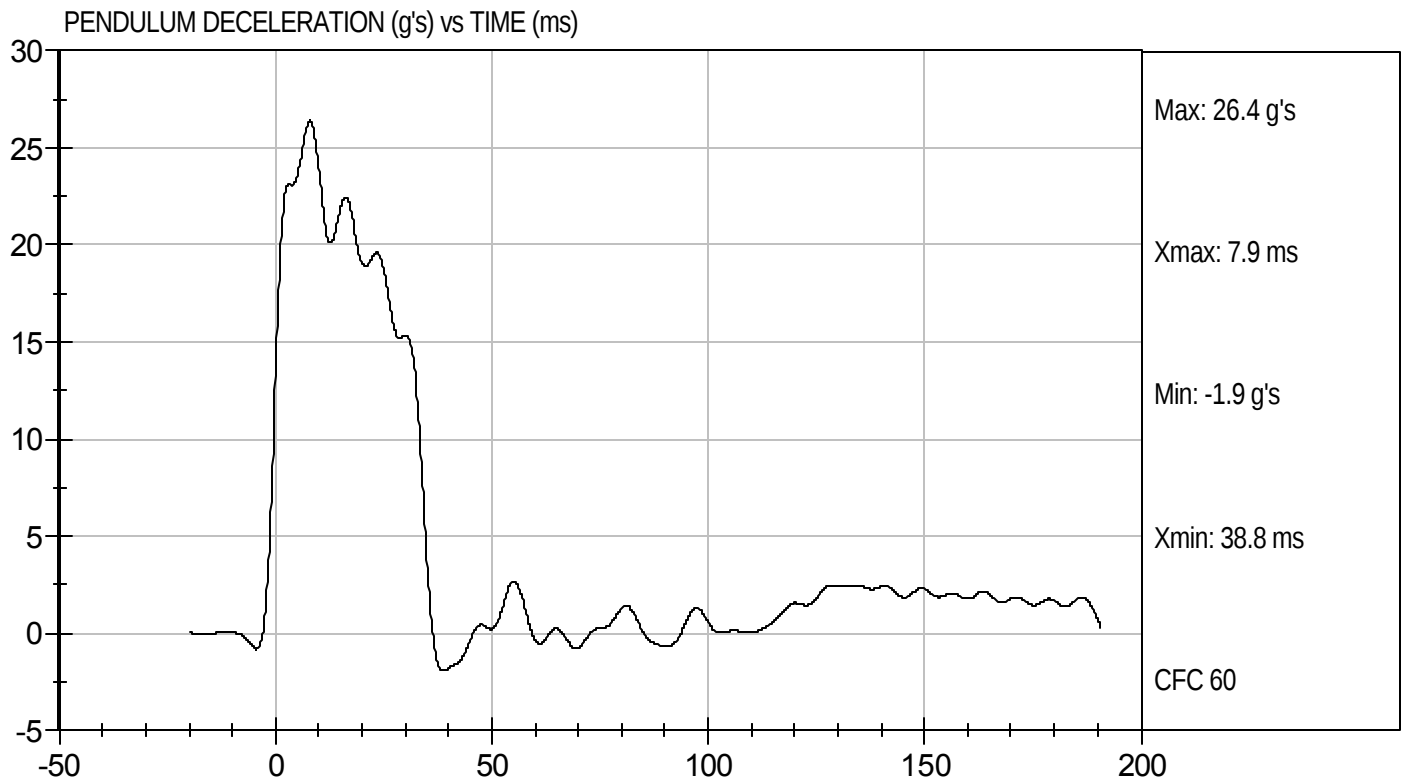
10/20/09
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D092652

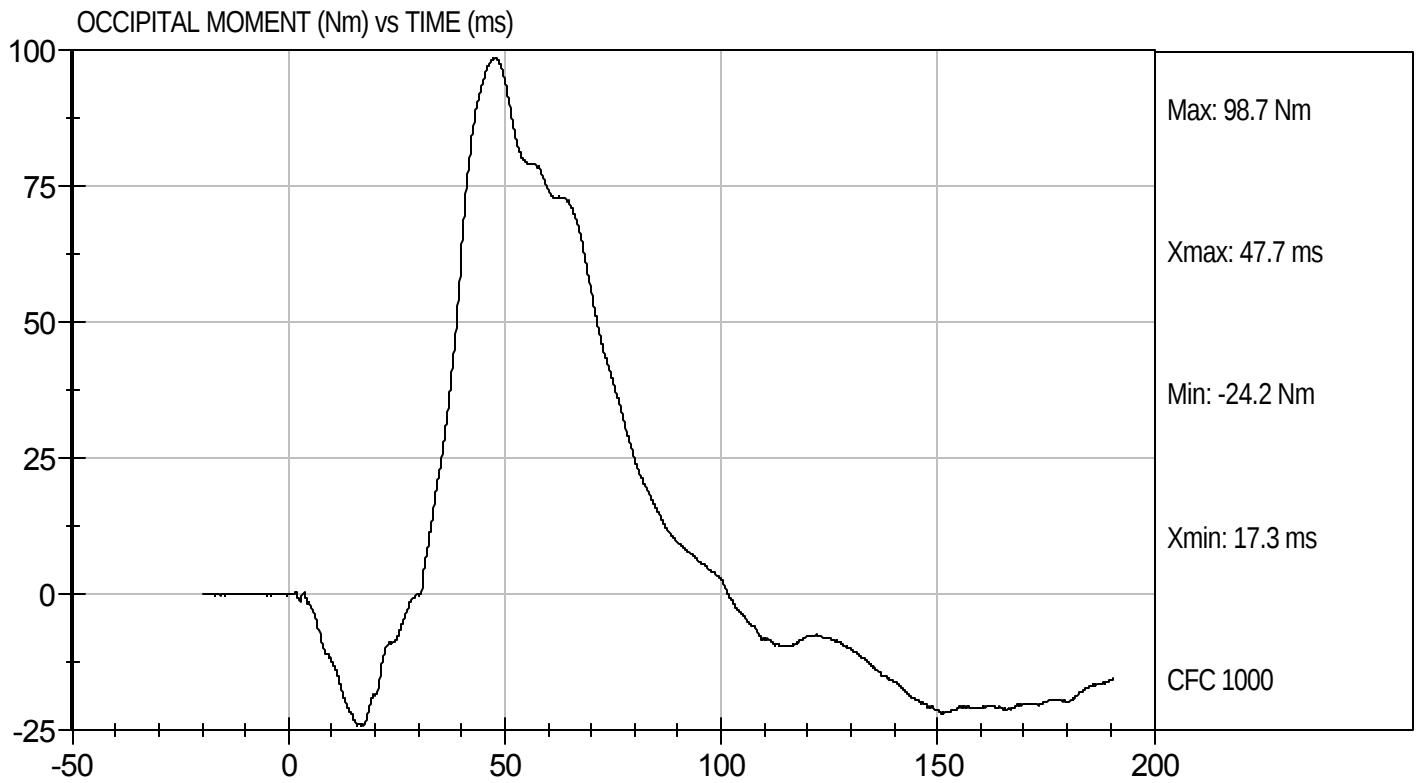
Test Date: 10/20/09
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D092652

Test Date: 10/20/09
Velocity: 23.15 ft/s, 7.06 m/s

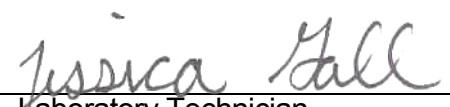


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D092653

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	45	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	m/s	17.20 to 21.20	18.47	Pass
	20 ms	m/s	14.00 to 19.00	17.53	Pass
	30 ms	m/s	11.00 to 16.00	15.20	Pass
Peak Pendulum Deceleration After 30 ms		m/s	<= 22.0	15.11	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	42.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	99.7	Pass
	Time	ms	72.0 to 82.0	76.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	155.2	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-61.7	Pass
	Time	ms	65.0 to 79.0	72.0	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	144.8	Pass
Overall Test Results					Pass


 Laboratory Technician

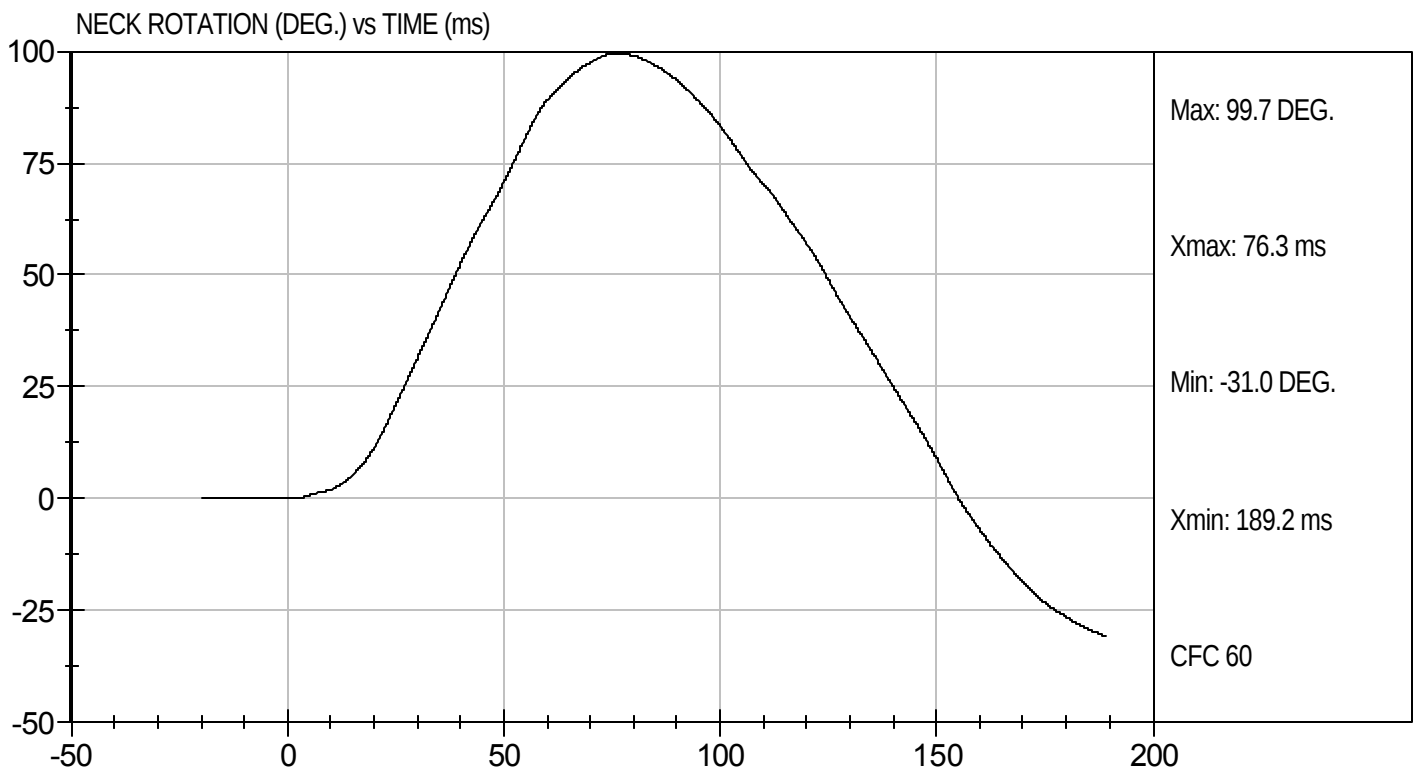
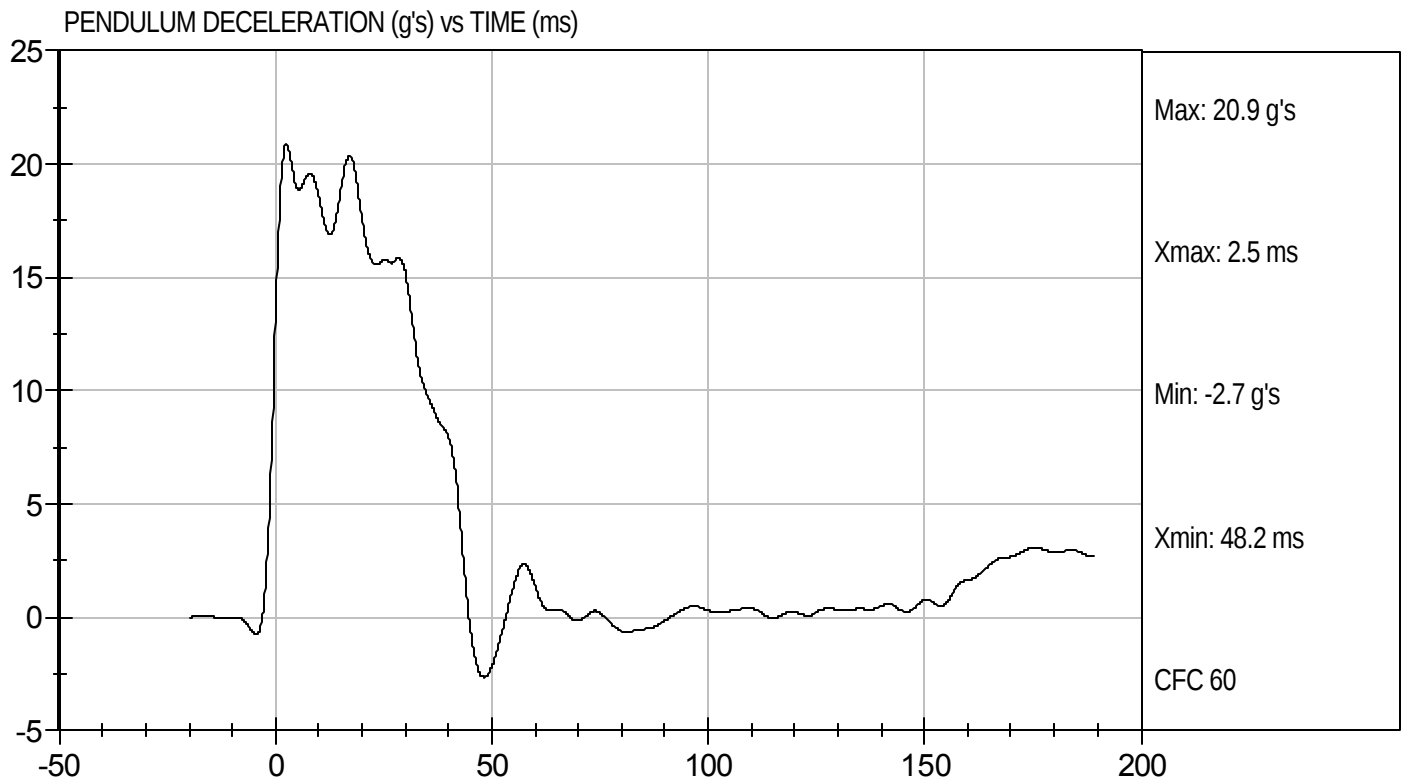
10/20/09
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D092653

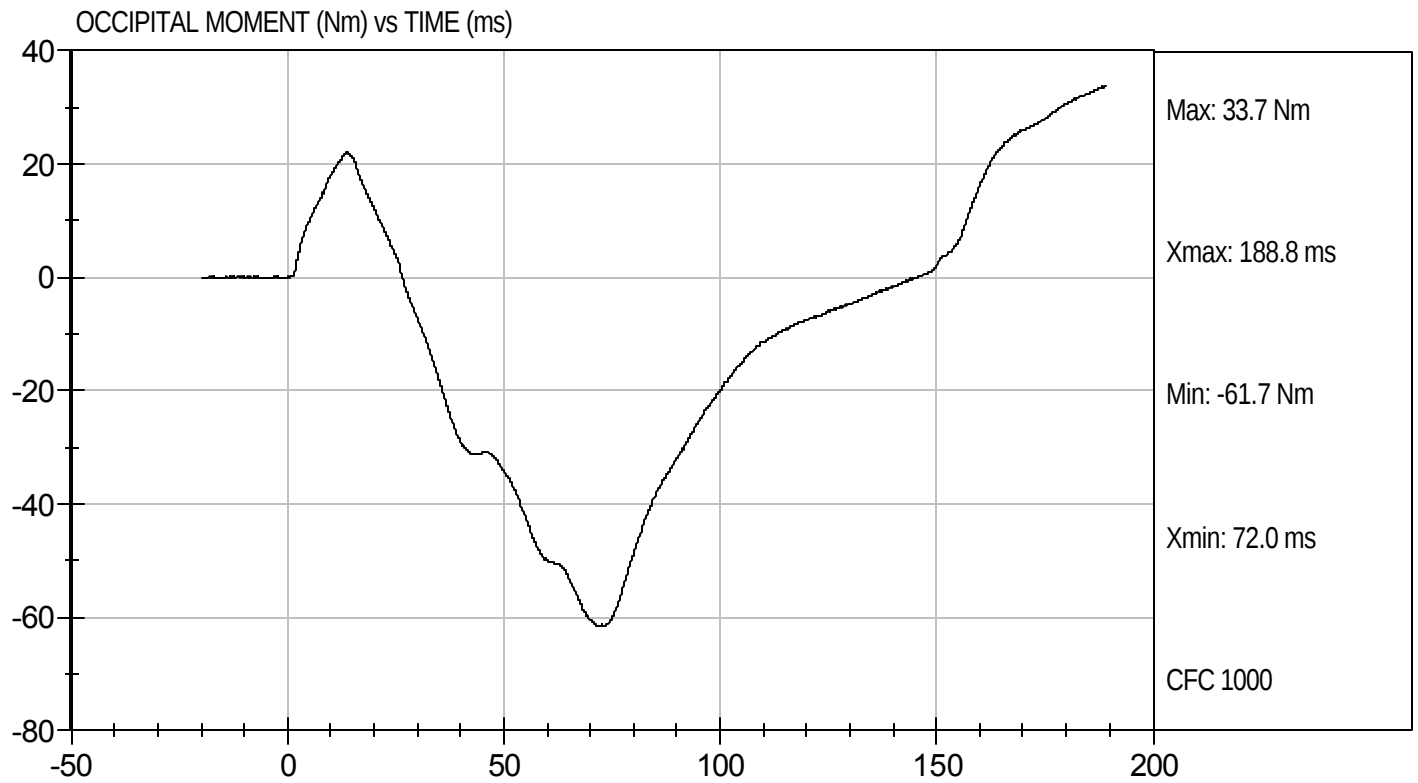
Test Date: 10/20/09
Velocity: 20.20 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D092653

Test Date: 10/20/09
Velocity: 20.20 ft/s, 6.16 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D092654

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,359	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.75	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results			Pass	


Laboratory Technician

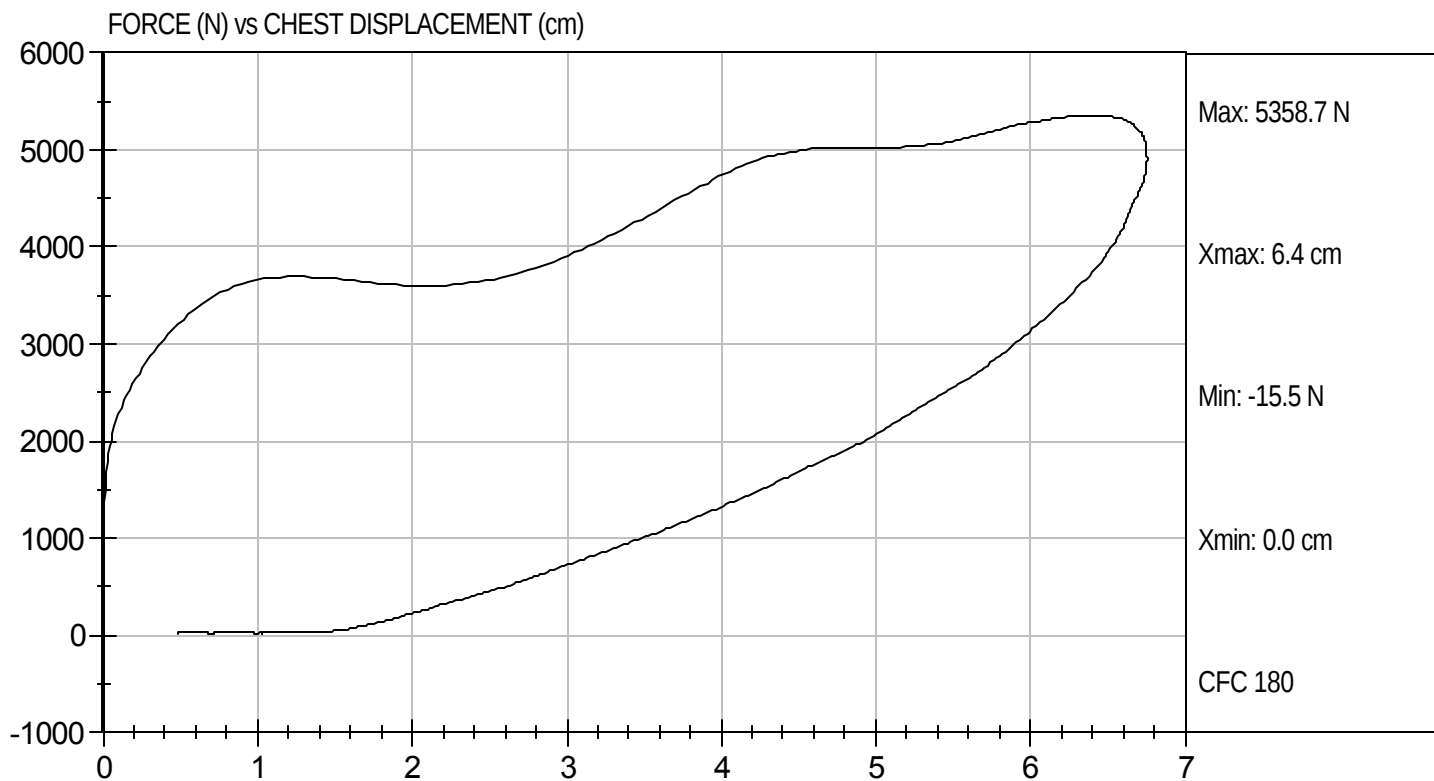
10/21/09
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D092654

Test Date: 10/21/09
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D092655

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	42	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,215	Pass
Overall Test Results				Pass



Laboratory Technician

10/20/09
Test Date

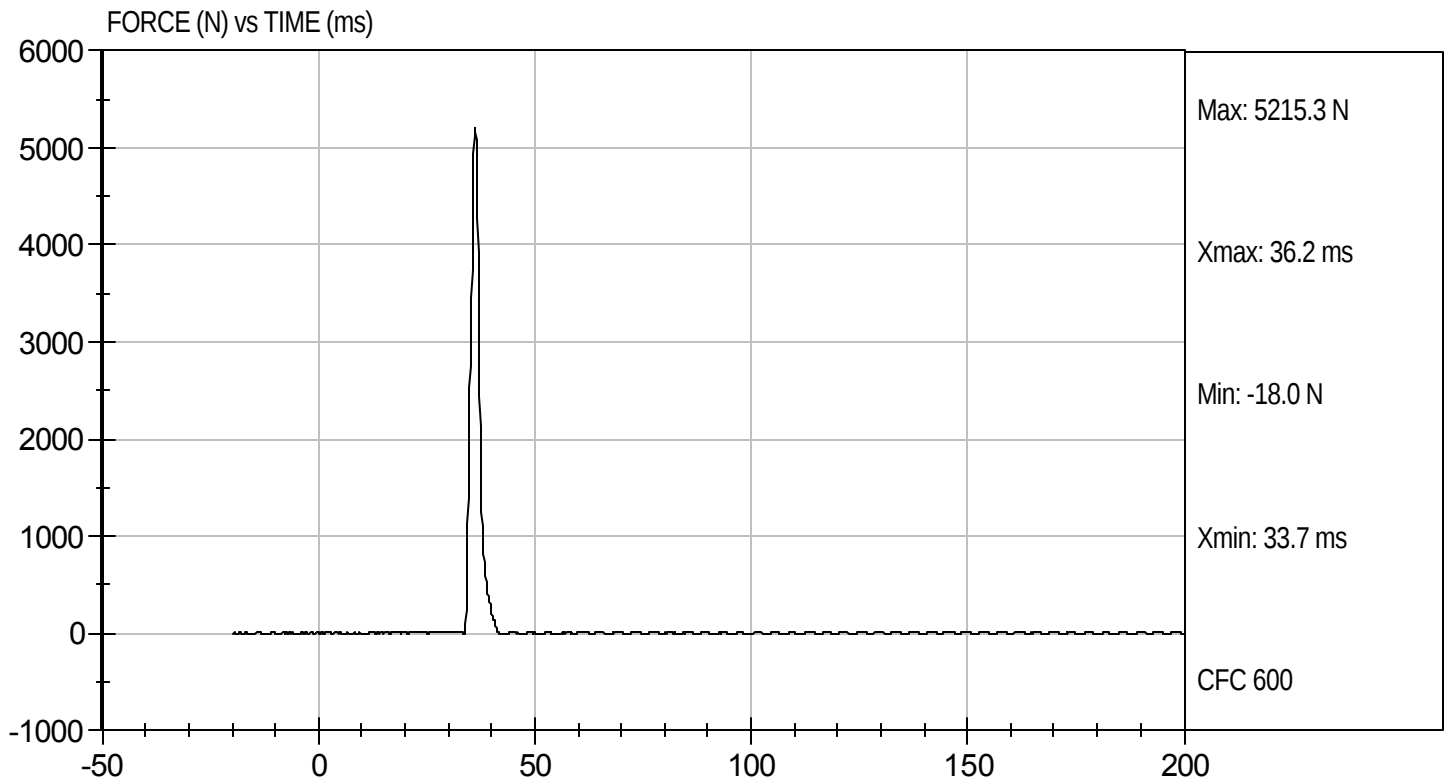


Approved By



Test Desc: Right Knee
Component ID: D092655

Test Date: 10/20/09
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D092656

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	42	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,770	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

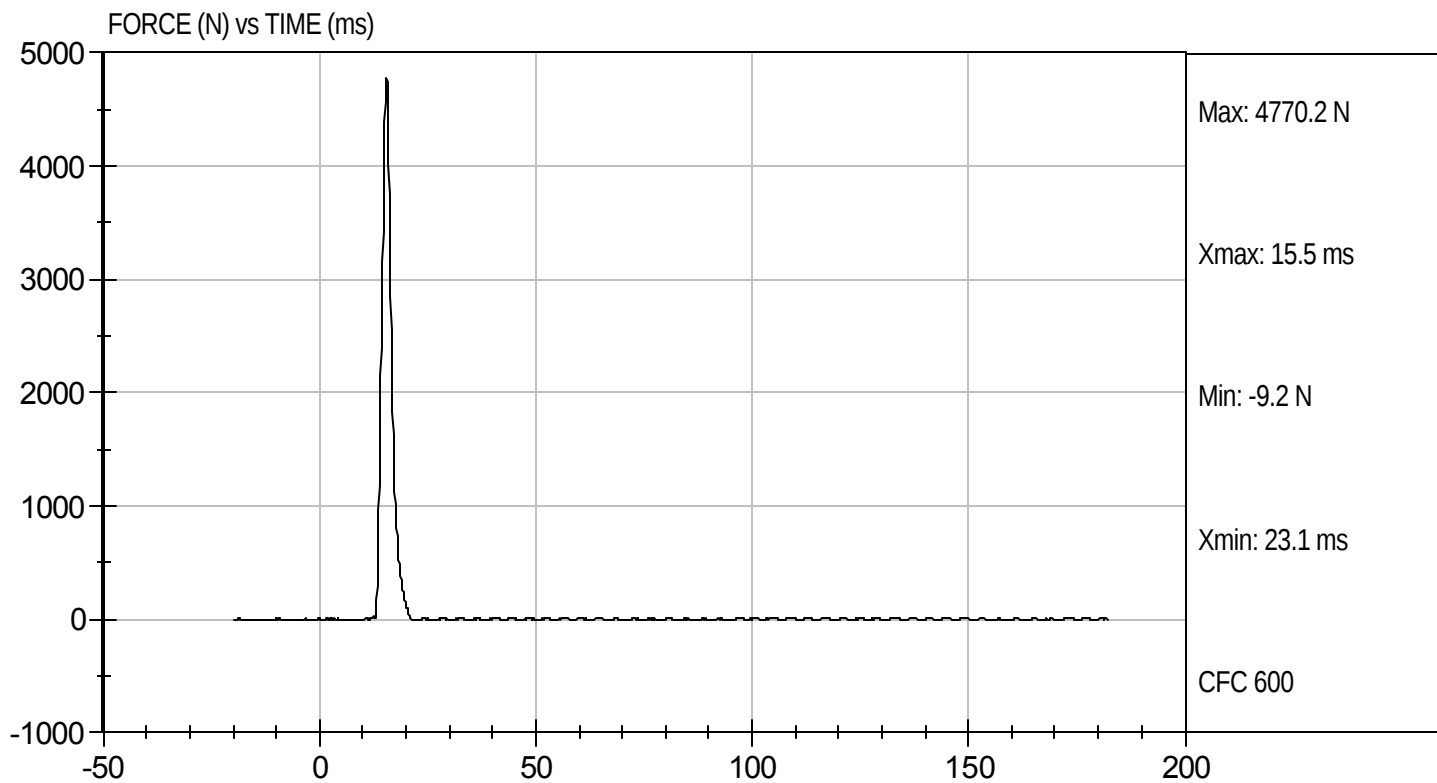
10/20/09
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D092656

Test Date: 10/20/09
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D092650

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.7	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	45	45	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	69.3	68.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	42	41	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

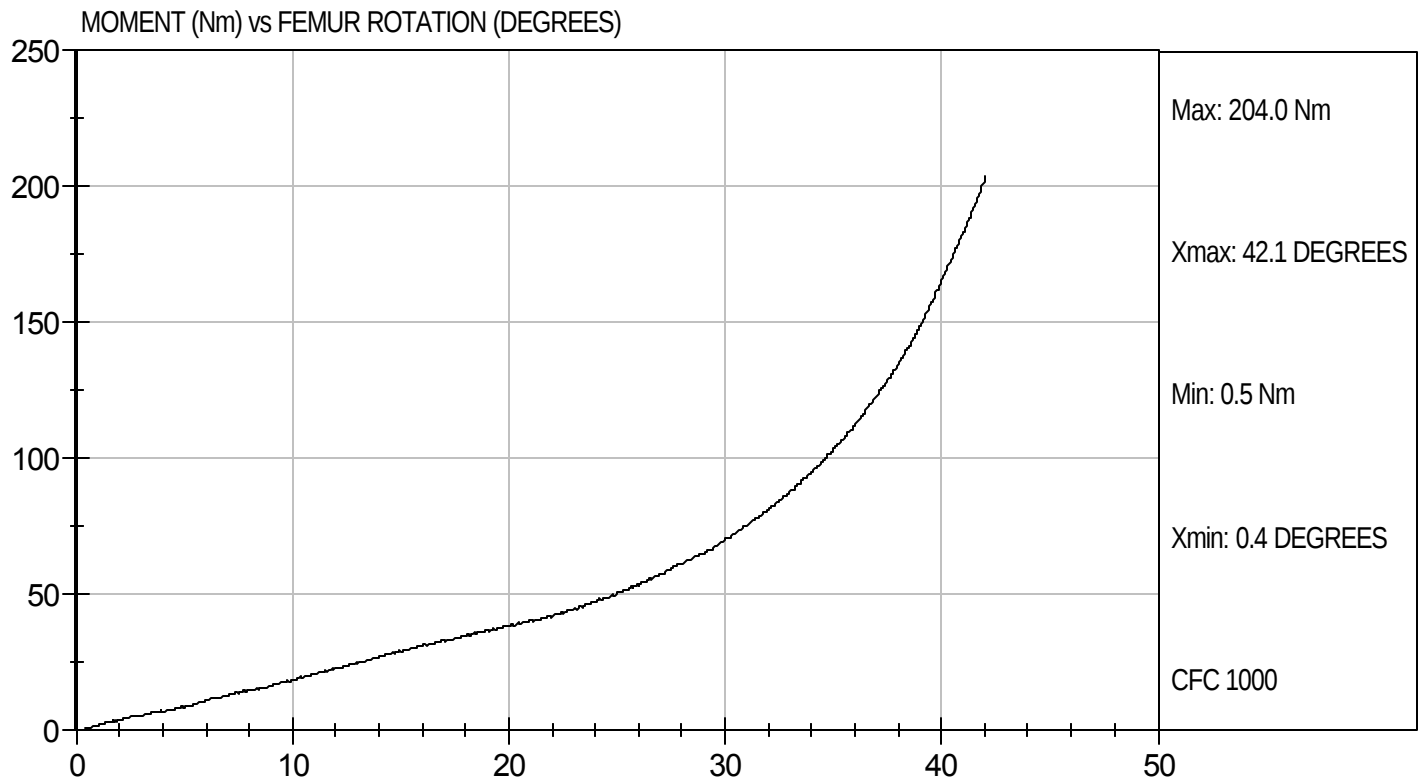
10/20/09
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D092659

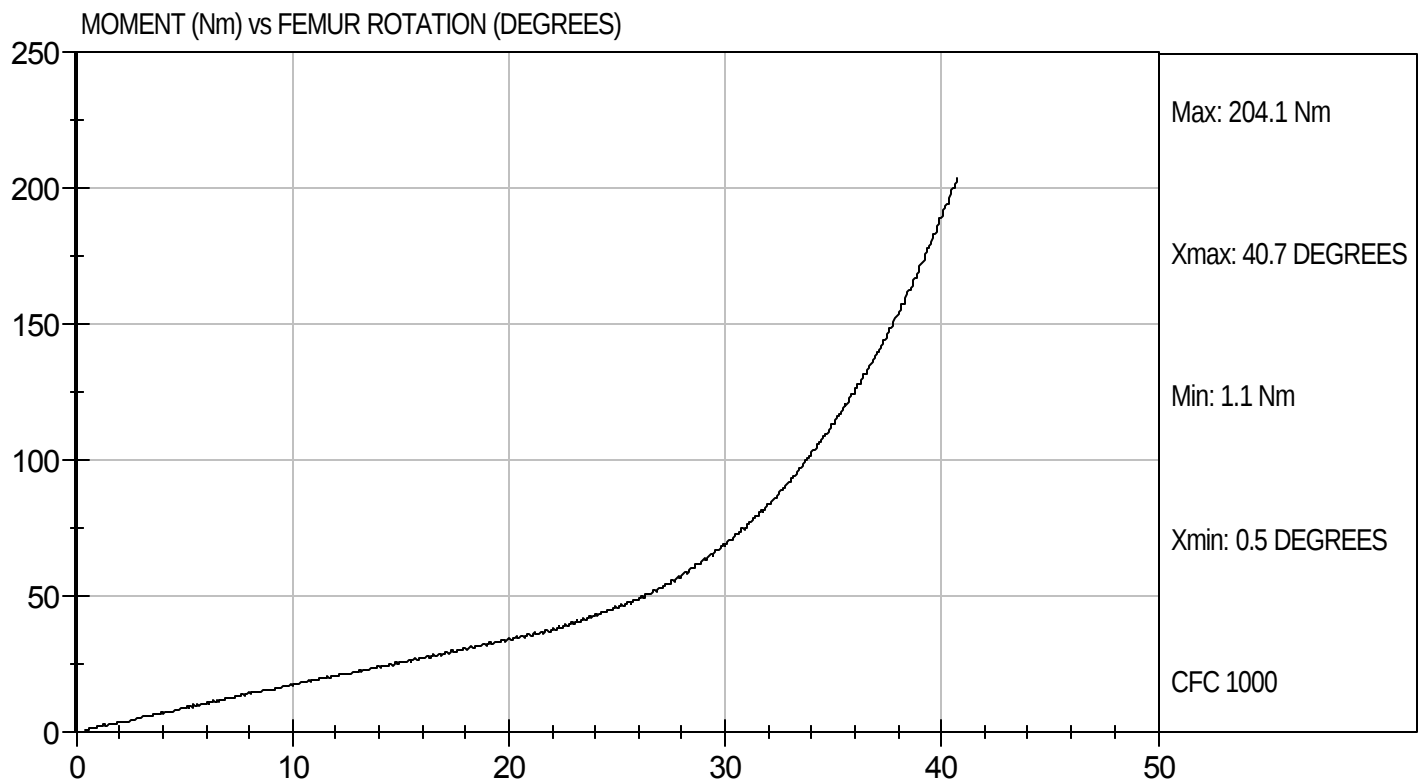
Test Date: 10/20/09
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D092650

Test Date: 10/20/09
Velocity: 0 ft/s, 0.00 m/s

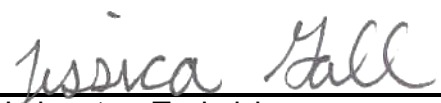


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test ID: D092641

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Peak Resultant Acceleration	G's	225 - 275	249	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-4.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

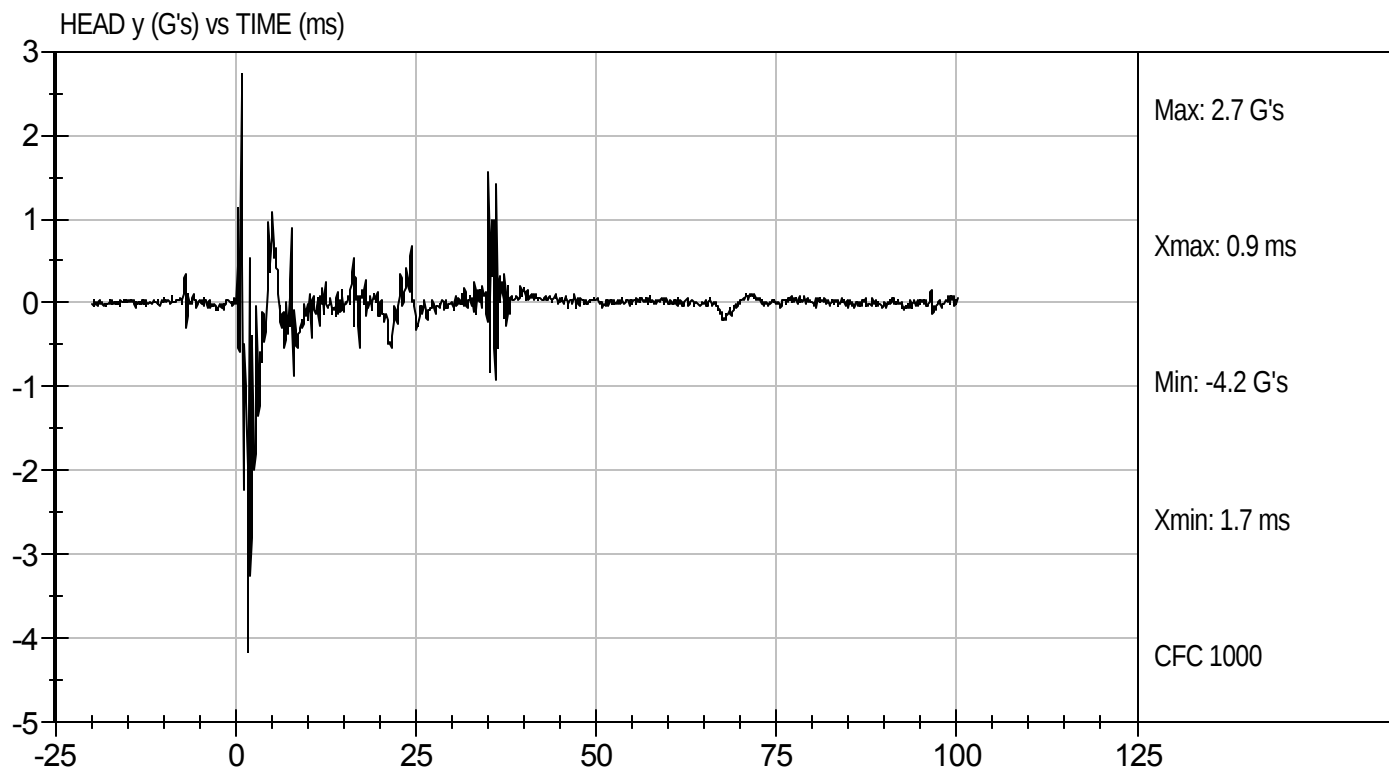
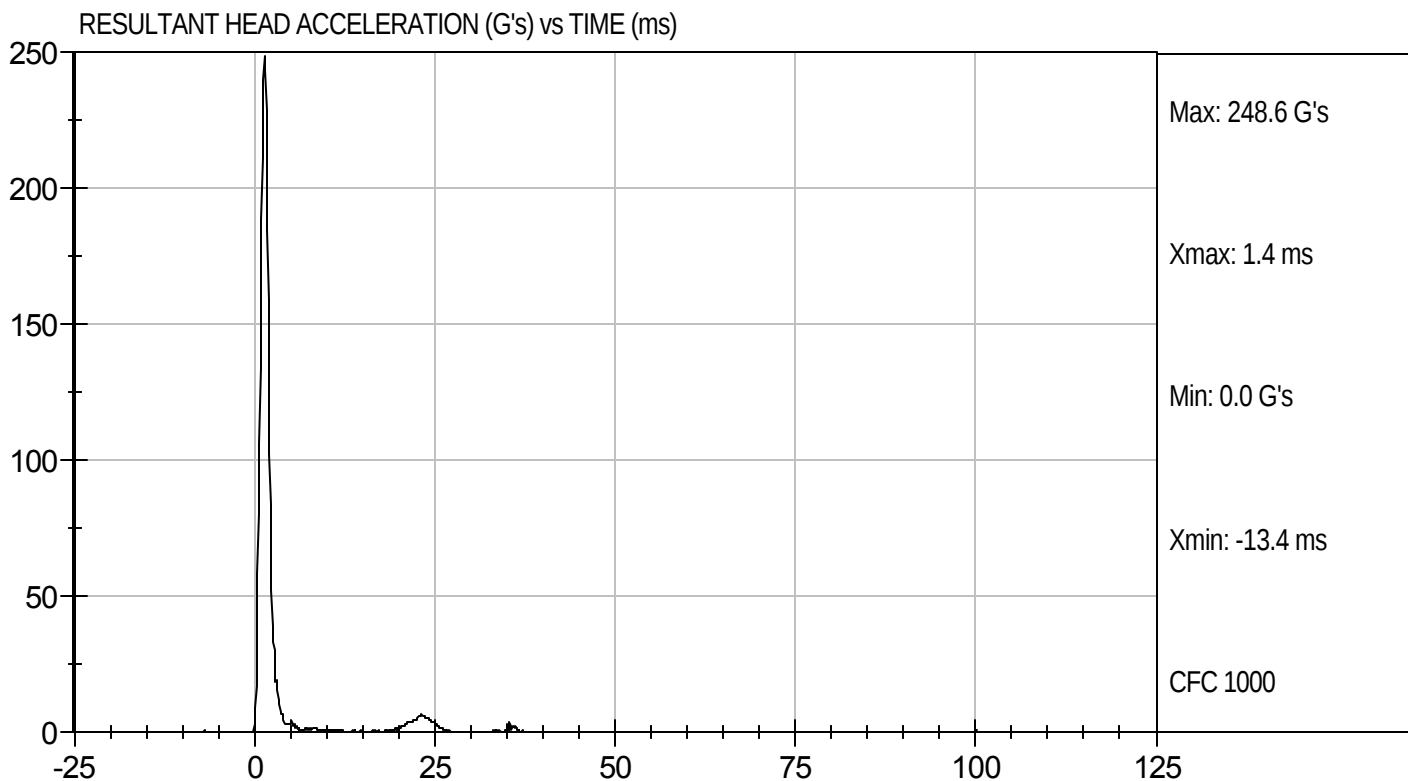
10/20/09
Test Date


Approved By



Test Desc: Head Drop
Component ID: D092641

Test Date: 10/20/09
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test I.D: D092642

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	45	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	22.50 to 27.50	23.10	Pass
	20 ms	m/s	17.60 to 22.60	20.00	Pass
	30 ms	m/s	12.50 to 18.50	13.88	Pass
Peak Pendulum Deceleration After 30 ms		m/s	<= 29.0	14.03	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.4	Pass
	Time	ms	57.0 to 64.0	63.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	116.7	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	92.1	Pass
	Time	ms	47.0 to 58.0	47.5	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.3	Pass
Overall Test Results					Pass


 Laboratory Technician

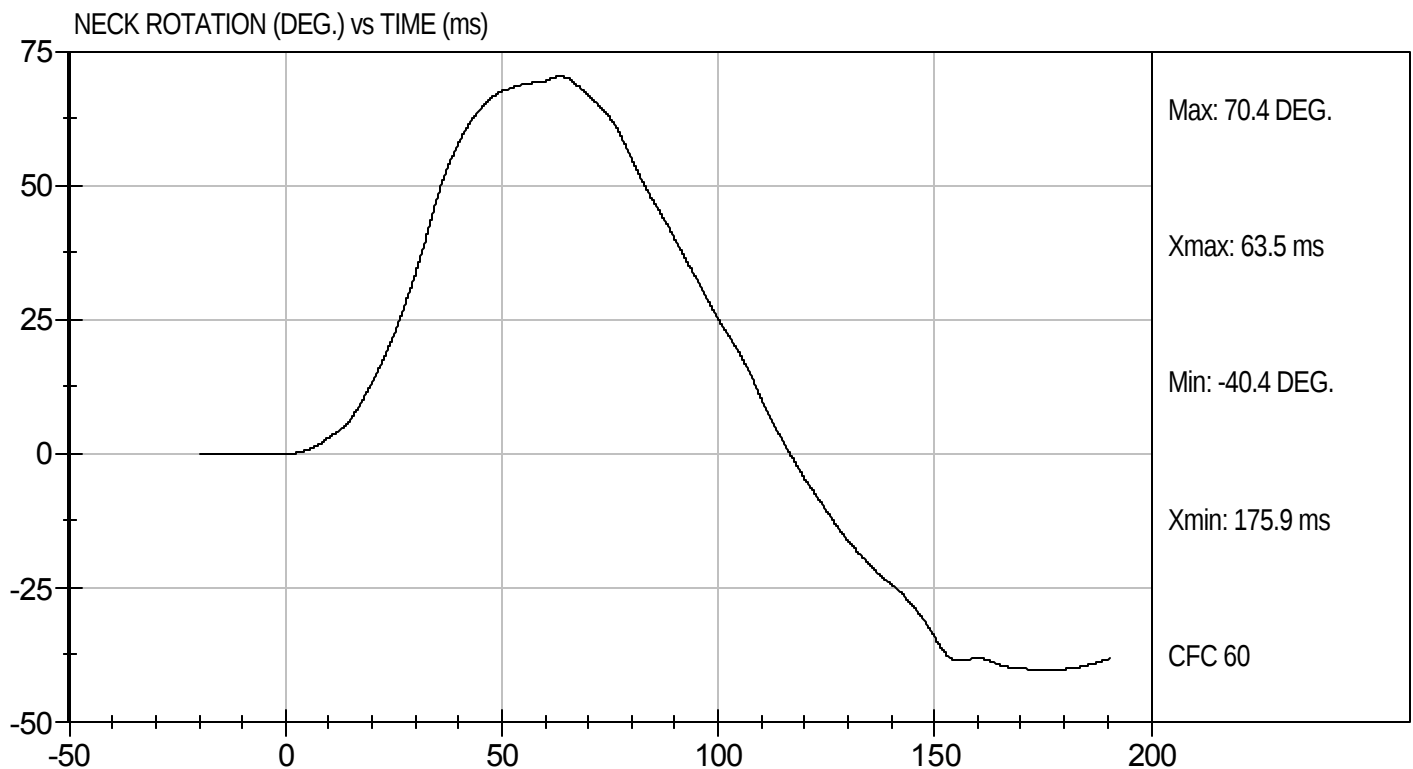
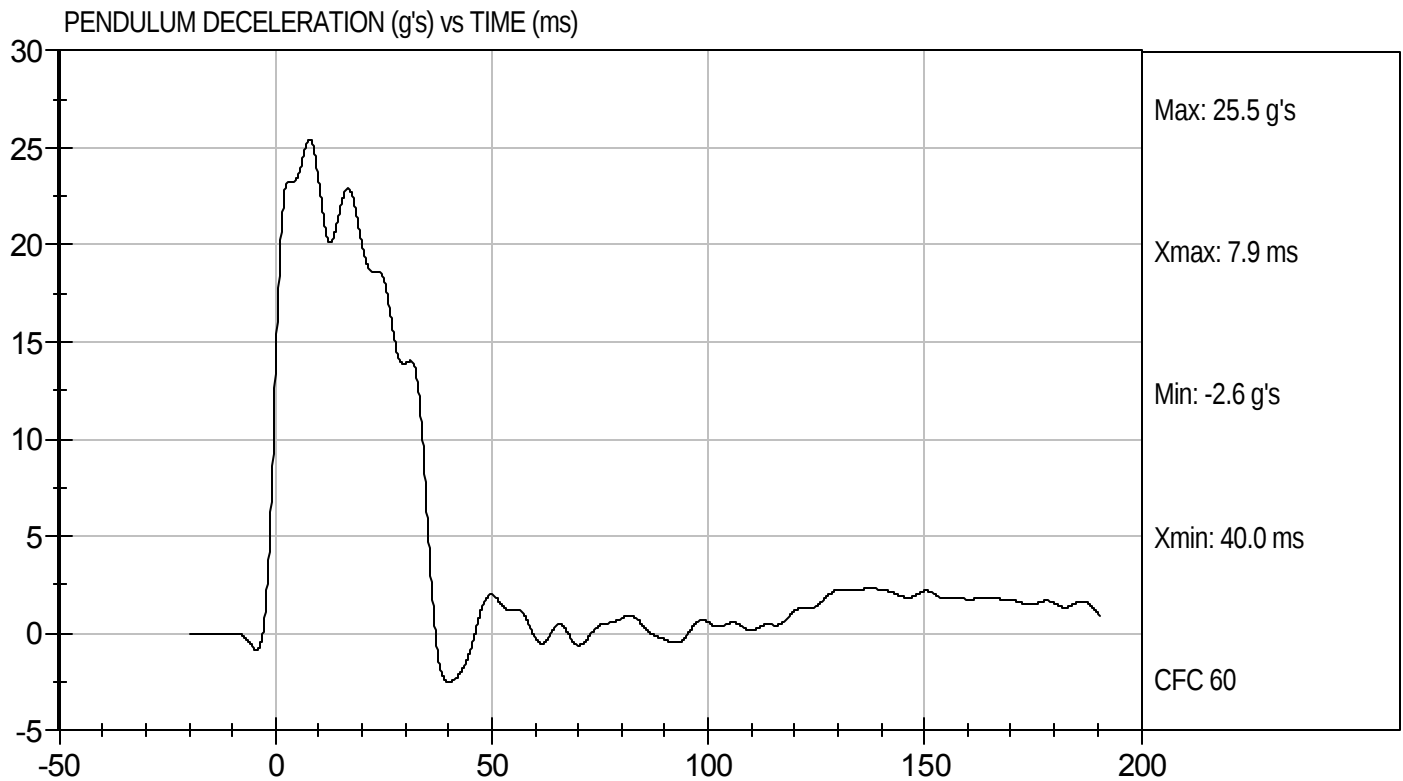
10/20/09
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D092642

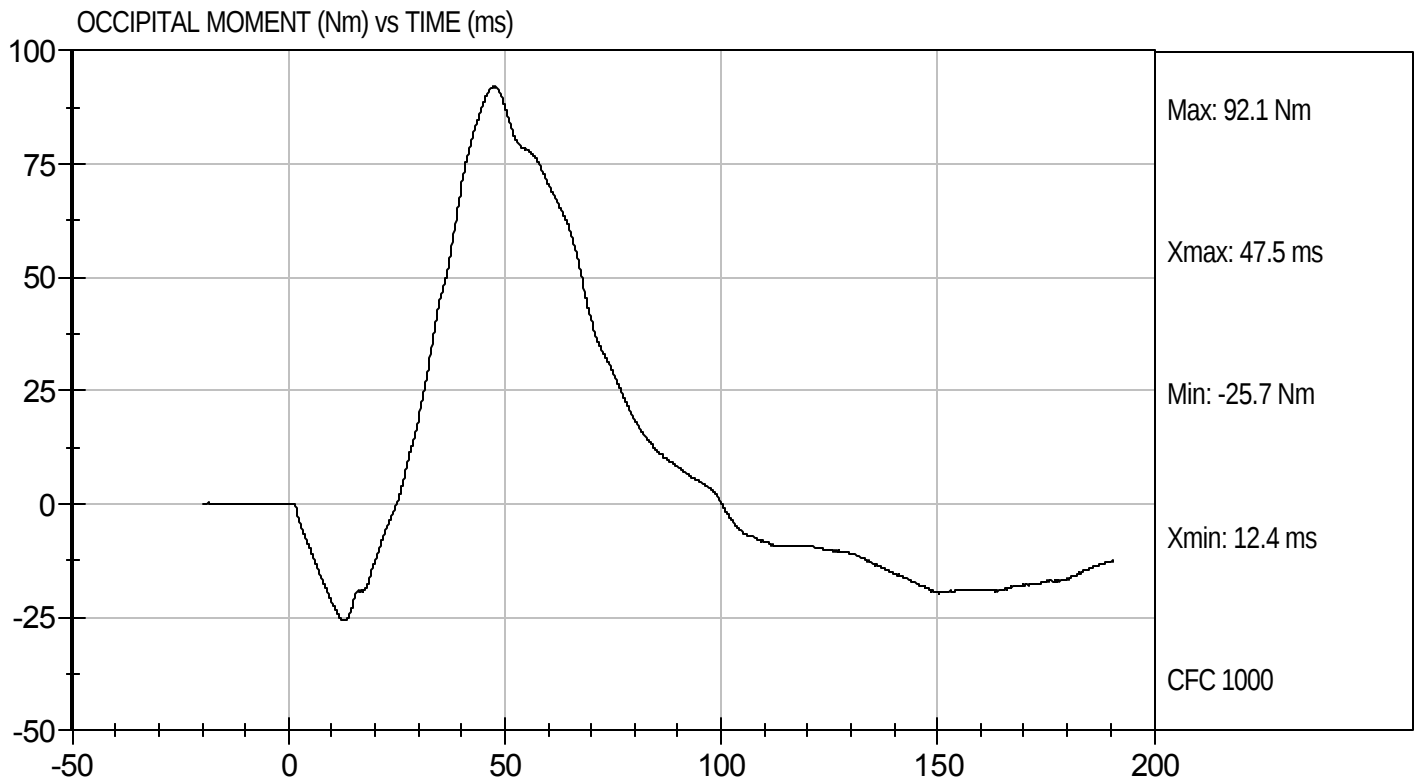
Test Date: 10/20/09
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D092642

Test Date: 10/20/09
Velocity: 23.15 ft/s, 7.06 m/s

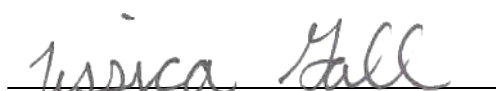


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test I.D: D092643

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	46	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	m/s	17.20 to 21.20	17.59	Pass
	20 ms	m/s	14.00 to 19.00	16.01	Pass
	30 ms	m/s	11.00 to 16.00	11.92	Pass
Peak Pendulum Deceleration After 30 ms		m/s	<= 22.0	12.89	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	93.0	Pass
	Time	ms	72.0 to 82.0	74.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	157.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.6	Pass
	Time	ms	65.0 to 79.0	70.8	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	141.4	Pass
Overall Test Results					Pass


 Laboratory Technician

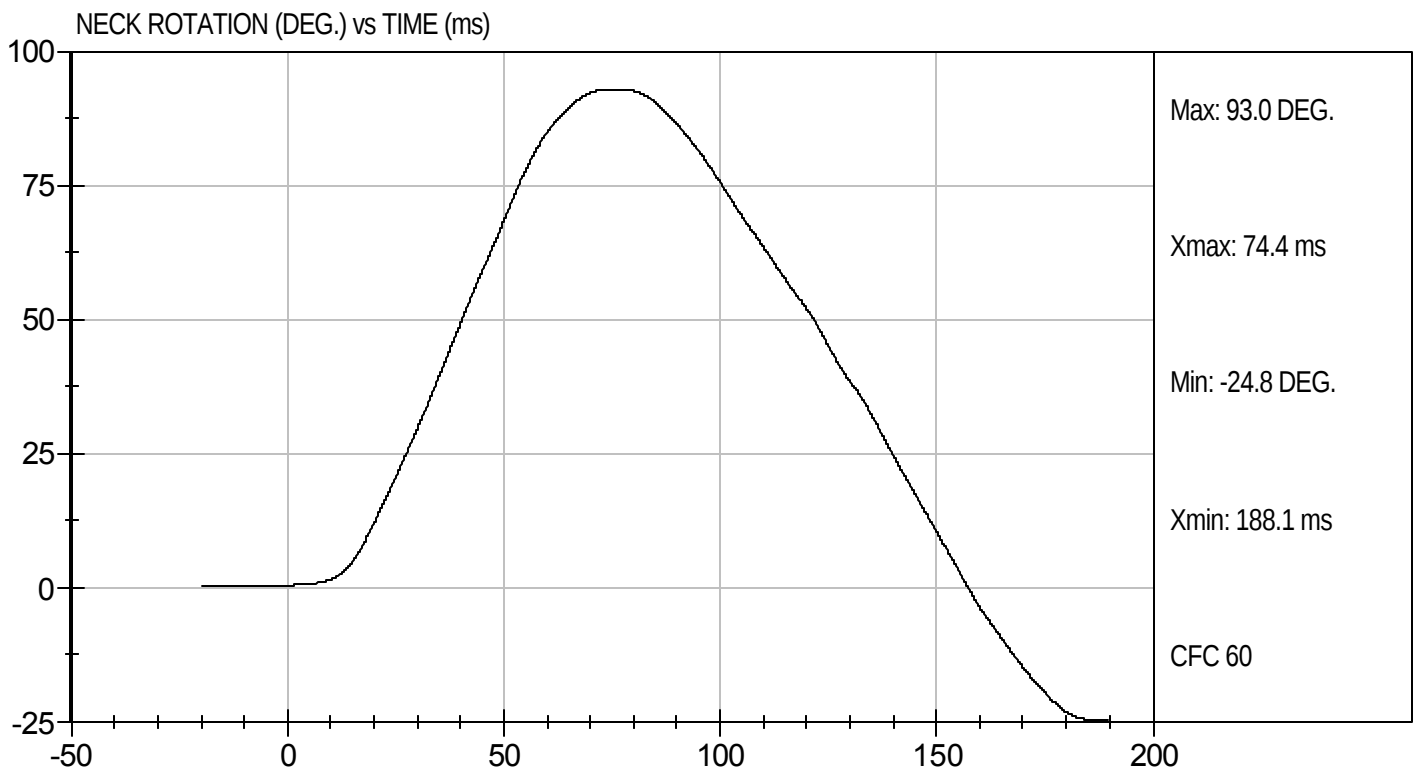
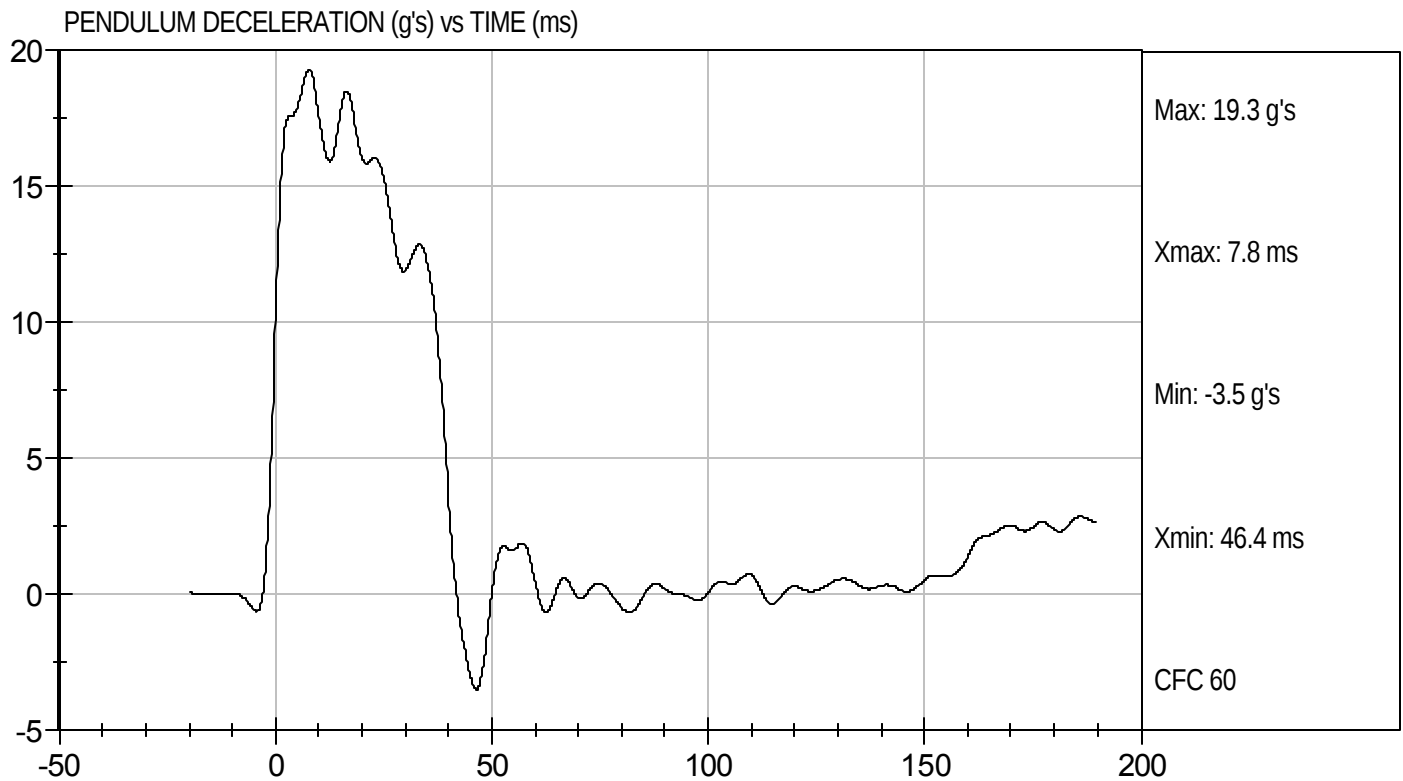
10/21/09
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D092643

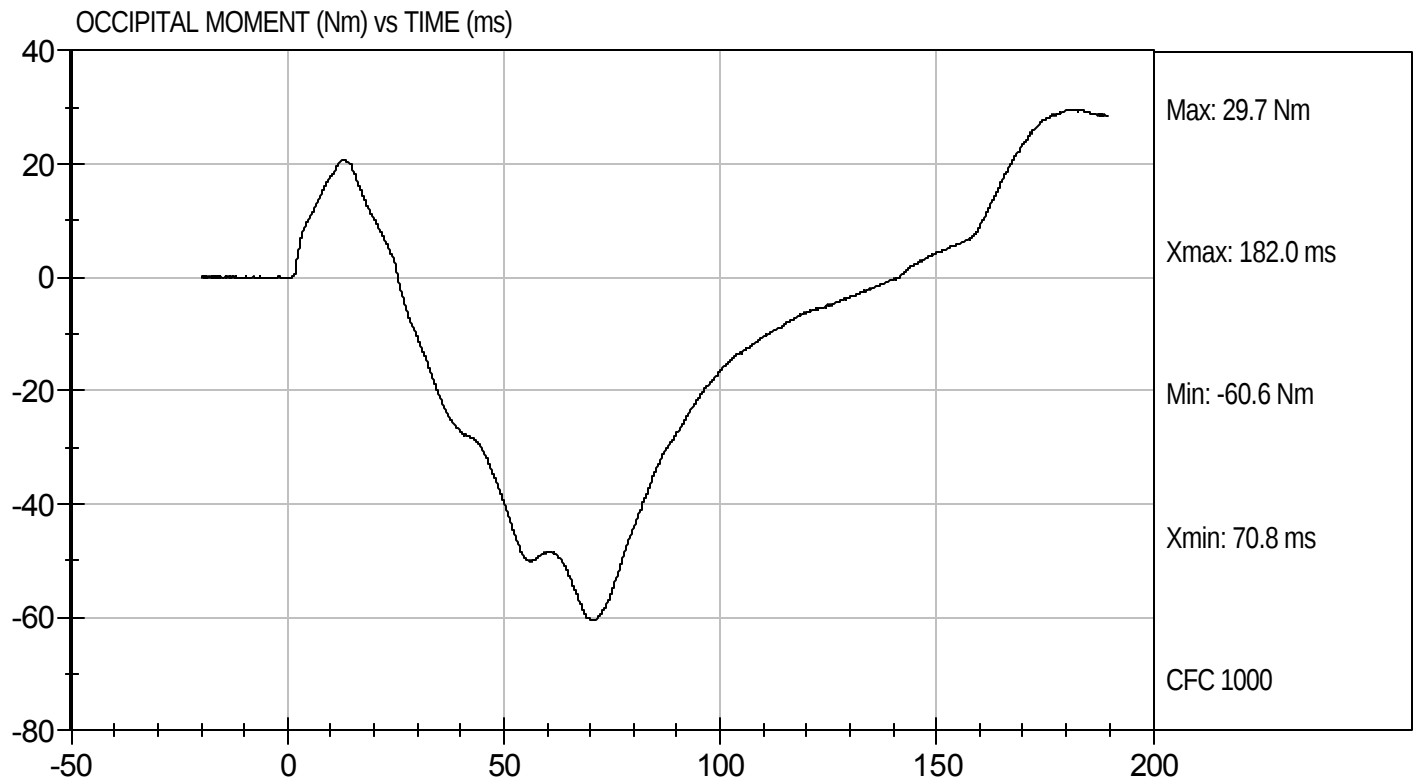
Test Date: 10/21/09
Velocity: 20.20 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D092643

Test Date: 10/21/09
Velocity: 20.20 ft/s, 6.16 m/s

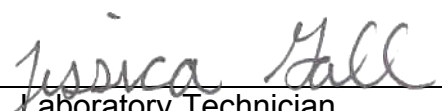


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test I.D: D092644

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,286	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.01	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	


Laboratory Technician

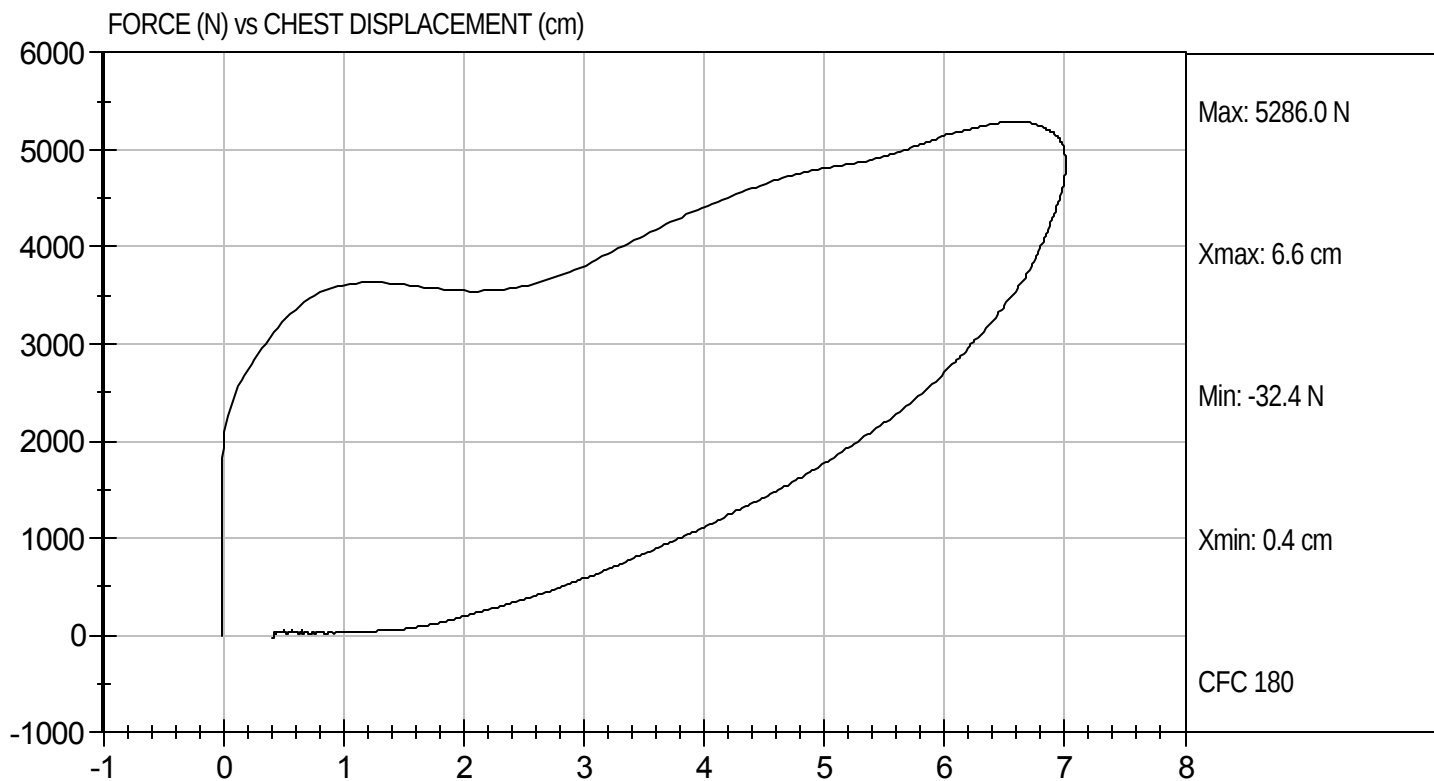
10/21/09
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D092644

Test Date: 10/21/09
Velocity: 22.22 ft/s, 6.77 m/s

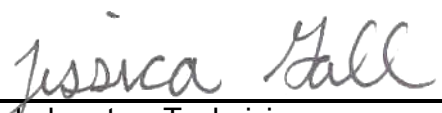


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test I.D: D092645

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	42	Pass
Probe Velocity	m/s	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,190	Pass
Overall Test Results				Pass



Laboratory Technician

10/20/09

Test Date

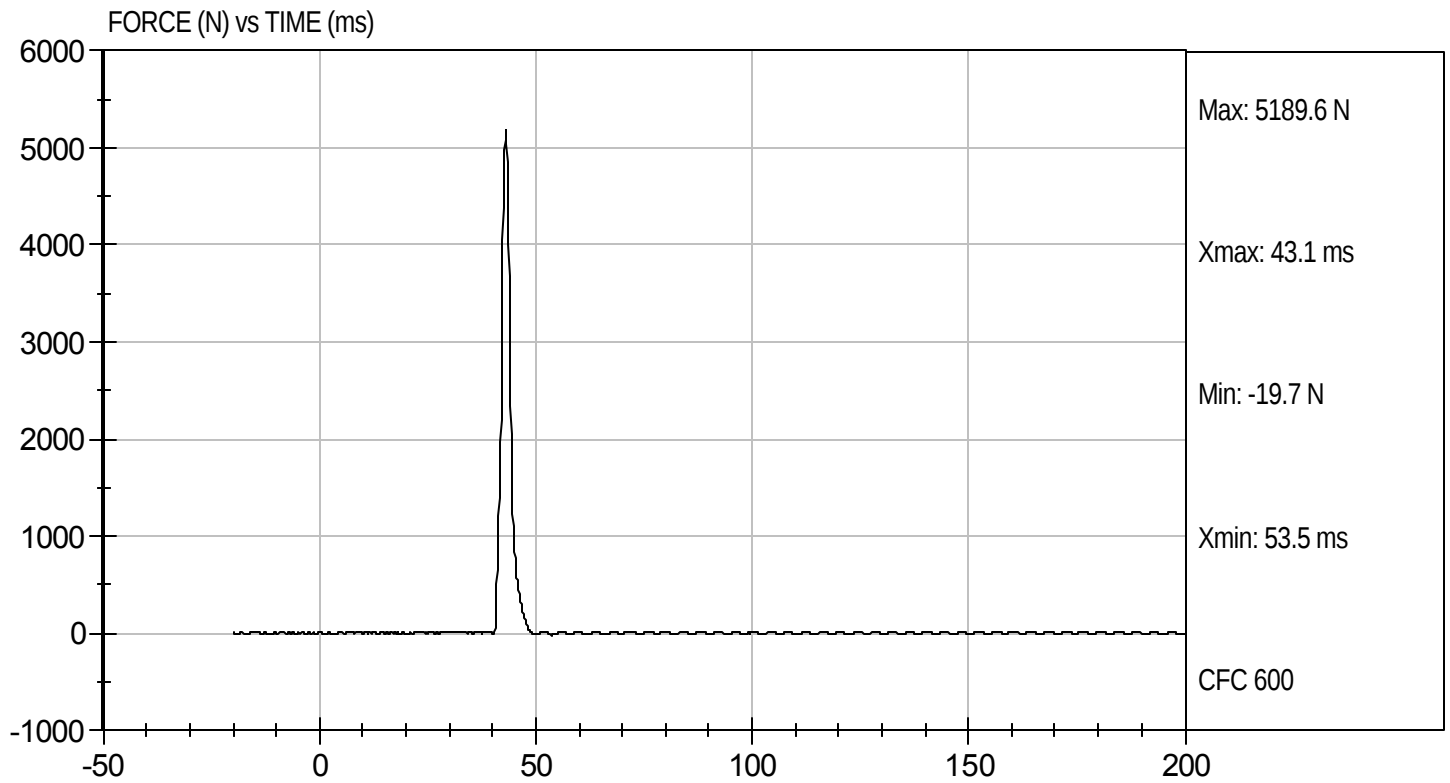


Approved By



Test Desc: Right Knee
Component ID: D092645

Test Date: 10/20/09
Velocity: 6.84 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test I.D: D092646

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	42	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,637	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

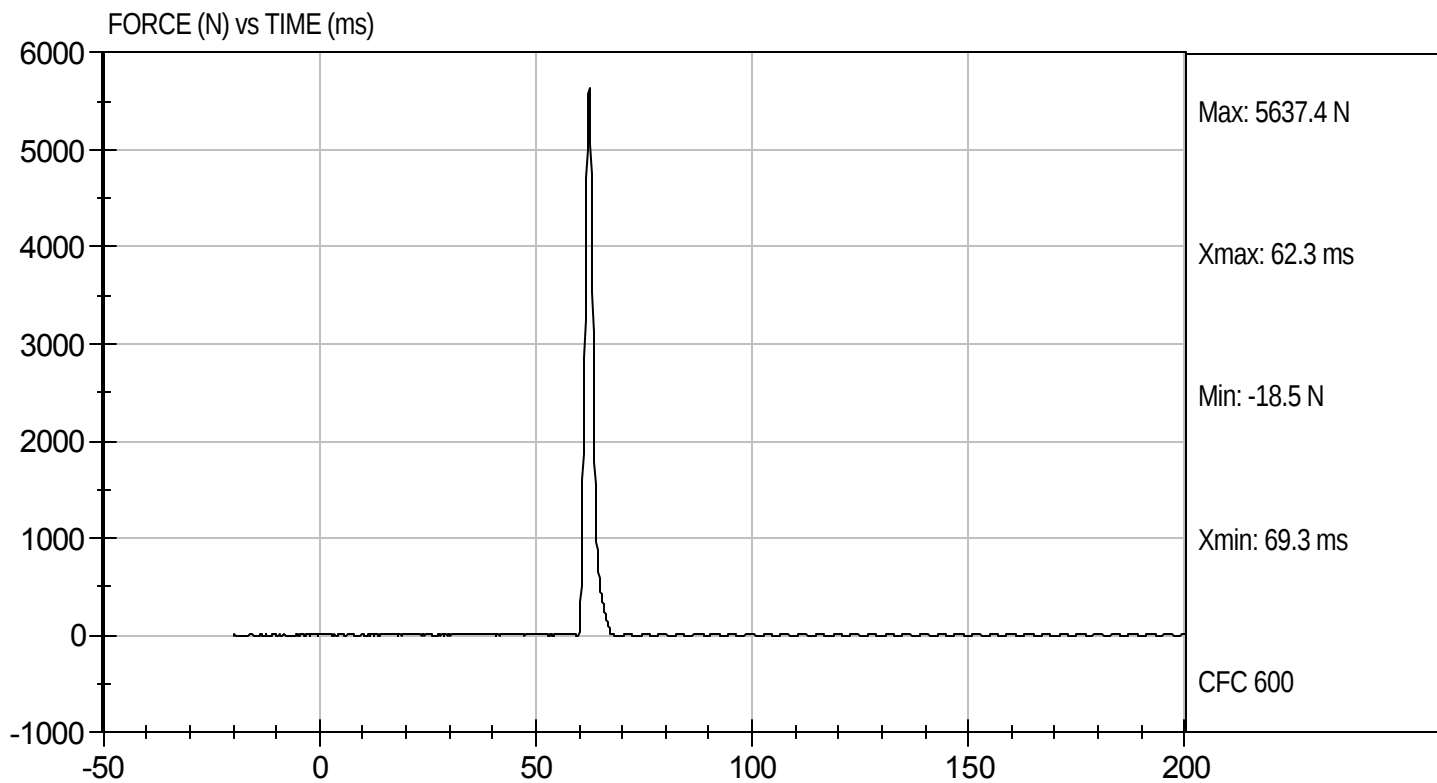
10/20/09
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D092646

Test Date: 10/20/09
Velocity: 6.94 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test I.D: D092640

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.7	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	45	45	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	58.9	57.0	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	45	42	Pass
Overall Test Results					Pass


Laboratory Technician

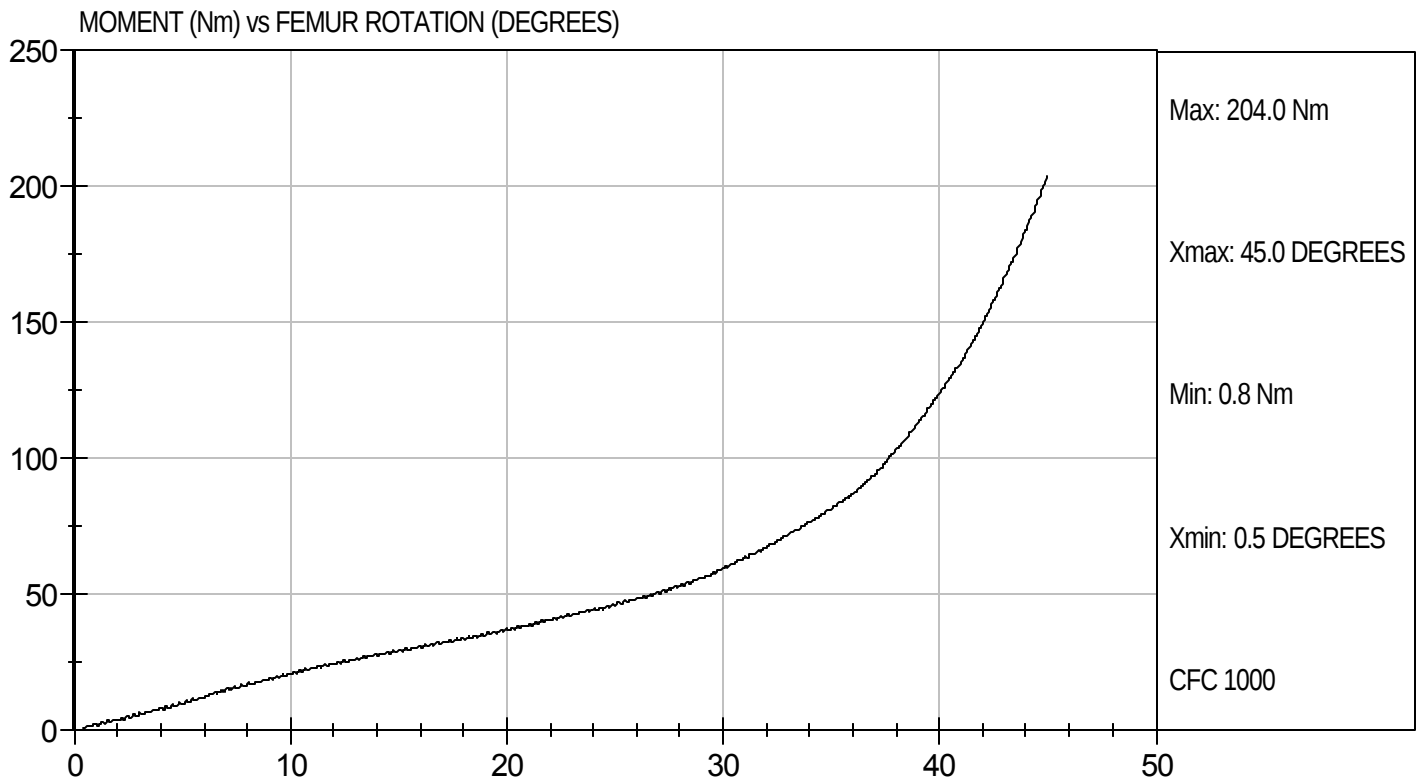
10/20/09
Test Date


Approved By



Test Desc: Hip Femur Flexion
Component ID: D092649

Test Date: 10/20/09
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D092640

Test Date: 10/20/09
Velocity: 0 ft/s, 0.00 m/s

