

REPORT NUMBER: NCAP-TRC-2007-005

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

**MITSUBISHI MOTORS CORPORATION
2008 MITSUBISHI OUTLANDER MPV
NHTSA NUMBER: M85602**

**PREPARED BY:
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Test Date: November 27, 2007

Report Date: December 12, 2007

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NVS-111
1200 NEW JERSEY AVENUE, S.E., ROOM W43-410
WASHINGTON, D.C. 20590**

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Transportation Research Center Inc.

Approval Date: 12/12/07

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

1. Report No. NCAP-TRC-2007-005	2. Government Accession No.	3. Recipient's Catalog No.																										
4. Title and Subtitle Final Report New Car Assessment Program Testing of a 2008 Mitsubishi Outlander MPV, NHTSA No.: M85602		5. Report Date December 12, 2007																										
		6. Performing Organization Code TRC Inc.																										
7. Author(s) Emad Al-Tabakha, Test Engineer Transportation Research Center Inc.		8. Performing Organization Report No. 071127																										
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		10. Work Unit No. (TRAIS)																										
		11. Contract or Grant No. DTNH22-06-D-00029																										
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 1200 New Jersey Avenue, S.E., Room W43-410 Washington, DC 20590		13. Type of Report and Period Covered Final Report November - December 2007																										
		14. Sponsoring Agency Code NVS-111																										
15. Supplemental Notes																												
16. Abstract This frontal barrier impact was conducted on a 2008 Mitsubishi Outlander at Transportation Research Center Inc. in East Liberty, Ohio, on November 27, 2007. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.4 km/h, and the ambient temperature at the barrier face at the time of impact was 22.3° C. The vehicle's post-test maximum static crush was 549 mm. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows: <table border="0"> <thead> <tr> <th></th> <th><u>Driver ATD</u></th> <th></th> <th><u>Passenger ATD</u></th> <th></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC):</td> <td><u>443</u></td> <td>g</td> <td><u>318</u></td> <td>g</td> </tr> <tr> <td>Max. Thorax Accel (3ms Clip):</td> <td><u>44.3</u></td> <td>g</td> <td><u>40.0</u></td> <td>g</td> </tr> <tr> <td>Left Femur Force:</td> <td><u>-2081</u></td> <td>N</td> <td><u>-2306</u></td> <td>N</td> </tr> <tr> <td>Right Femur Force:</td> <td><u>-2524</u></td> <td>N</td> <td><u>-2243</u></td> <td>N</td> </tr> </tbody> </table>					<u>Driver ATD</u>		<u>Passenger ATD</u>		Head Injury Criteria (HIC):	<u>443</u>	g	<u>318</u>	g	Max. Thorax Accel (3ms Clip):	<u>44.3</u>	g	<u>40.0</u>	g	Left Femur Force:	<u>-2081</u>	N	<u>-2306</u>	N	Right Femur Force:	<u>-2524</u>	N	<u>-2243</u>	N
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17. Key Words 56.4 km/h Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2008 Mitsubishi Outlander NHTSA No.: M85602		18. Distribution Statement <u>Copies of this report are available from:</u> NHTSA Technical Information Services (TIS) 1200 New Jersey Avenue, S.E., Room W43-410 Washington, DC 20590 Telephone No. (202) 366-4946 Attn: Robert Hornicle																										
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. Number of Pages 336	22. Price																									

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.4 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-D-00029. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 56.4 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

SUMMARY

A load cell barrier consisting of 36 load cells was impacted by a 2008 Mitsubishi Outlander MPV at a velocity of 56.4 kph. The test was performed at Transportation Research Center, Inc. on November 27, 2007. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

One (1) real-time camera and sixteen (16) high-speed digital cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two (2) 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 (primary and redundant), chest (primary and redundant), and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, lower leg instrumentation, and right and left foot and toe accelerometers. Seat belt load cells were also on the driver's and passenger's lap and

shoulder belts to measure dummy torso and pelvic section loading. The driver and passenger seat belts were also instrumented to measure belt spool and elongation. The driver (position 1) ATD (Serial No. 352) and the right front passenger (position 2) ATD (Serial No. 037) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 167 channels of data were recorded on an onboard data acquisition system. Appendix B contains the vehicle, load cell barrier, and dummy response data plots.

There was 66 mm 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 549 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: airbag, head restraint, and knee bolster. The passenger's visible contact points were as follows: airbag, head restraint, and glove box.

The occupant data is summarized below.

ATD Position	HIC (36)	Clip (g)	Chest Displ. (mm)	Left Femur (N)	Right Femur (N)
Driver	443	44.3	-29	-2081	-2524
Passenger	318	40.0	-27	-2306	-2243

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

TEST NOTES

The following channels did not collect valid data:

Right Rear Seat Crossmember Z

Top of Engine Block X

Instrument Panel X

Front Passenger Seat Belt Webbing Stretch

SECTION 2
OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

DATA SHEET NO. 1

CRASH TEST SUMMARY

Test Vehicle: 2008 Mitsubishi Outlander

NHTSA No.: M85602

Test Program: NCAP Frontal Impact

Test Date: 11/27/07

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.4
Test Weight	kg	1947.5
Impact Angle	degrees	0
Average Rebound	mm	--- ¹
Maximum Static Crush	mm	549

DOORING OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Closed and latched; opened without tools	Closed and latched; opened without tools
Rear Door Opening	Closed and latched; opened without tools	Closed and latched; opened without tools
Seat Track Shift (mm)	None	None
Seat Back Failure	None	None

TEST DUMMY INFORMATION

Description	Driver	Passenger
Dummy Type/Serial No.	50% Male Hybrid III No. 352	50% Male Hybrid III No. 037
Head Contact	Airbag, head restraint	Airbag, head restraint
Chest Contact	Airbag	Airbag
Abdomen Contact	Airbag	Airbag
Left Knee Contact	Knee bolster	Glove box
Right Knee Contact	Knee bolster	Glove box

MOVIE COVERAGE

Cameras	Standard
High-Speed	16
Real-Time	1
Total	17

DATA CHANNELS

Driver ATD Sensors	40
Passenger ATD Sensors	40
Belt Assessment Sensors	6
Vehicle Structure Accelerometers	9
Rigid Barrier Load Cells	36
Total	130

¹ Measurement not taken.

DATA SHEET NO. 2**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07

TEST VEHICLE INFORMATION AND OPTIONS

Make	Mitsubishi	Anti-Lock Brakes	Yes
Model	Outlander	All Wheel Drive	Yes
Body Style	MPV	Power Steering	Yes
NHTSA No.	M85602	Driver Front Airbag	Yes
VIN	JA4MT41X18Z002398	Driver Side Airbag	Yes
Color	Cool Silver Metallic	Driver Head Airbag	No
Delivery Date	11/21/2007	Driver Curtain Airbag	Yes
Odometer Reading	143 miles	Passenger Airbag	Yes
Dealer	Medina Mitsubishi	Passenger Side Airbag	Yes
Transmission	Automatic	Passenger Head Airbag	No
Final Drive	4WD	Passenger Curtain Airbag	Yes
Number of Cylinders	6	Pre-Tensioners	Yes
Engine Displacement	3.0 L	Load Limiters	Yes
Engine Placement	Transverse	Bucket Seats	Yes
Roof Rack	Yes	Air Conditioning	Yes
Sunroof/T-Top	No	AM/FM CD	Yes
Tinted Glass	Yes	Tilt Steering	Yes
Traction Control	Yes	Automatic Door Locks	No
Power Brakes	Yes	Power Windows	Yes
Front Disc	Yes	Power Seats	No
Rear Disc	Yes	Other	None

DATA FROM CERTIFICATION LABEL

Manufactured By	Mitsubishi Motors Corporation	GVWR (kg)	2350
Date of Manufacture	09/07	GAWR Front (kg)	1090
		GAWR Rear (kg)	1270

Measured Parameter	Front	Mid	Rear	Total
Type of Seats	Bucket	Split Bench	Bench	
Number Of Occupants	2	3	2	7
Capacity Wt. (VCW)				525
Cargo Wt. (RCLW) (kg)				49

DATA SHEET NO. 2 (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85602Test Program: NCAP Frontal ImpactTest Date: 11/27/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	482.0	390.2		516.4	446.0	
Right	kg	468.0	378.0		531.6	453.5	
Ratio	%	55.3	44.7		53.8	46.2	
Totals	kg	950.0	768.2	1718.2	1048.0	899.5	1947.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1718.2
Weight of 2 P572M ATDs	kg	185.4
Rated Cargo/Luggage Weight (RCLW)	kg	49.0
Calculated Vehicle Target Weight (TVTW)	kg	1952.6

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	786	788	777	785	1194
As Tested	mm	764	766	756	750	1233
Fully Loaded	mm	778	778	748	755	

GENERAL TEST VEHICLE DATA

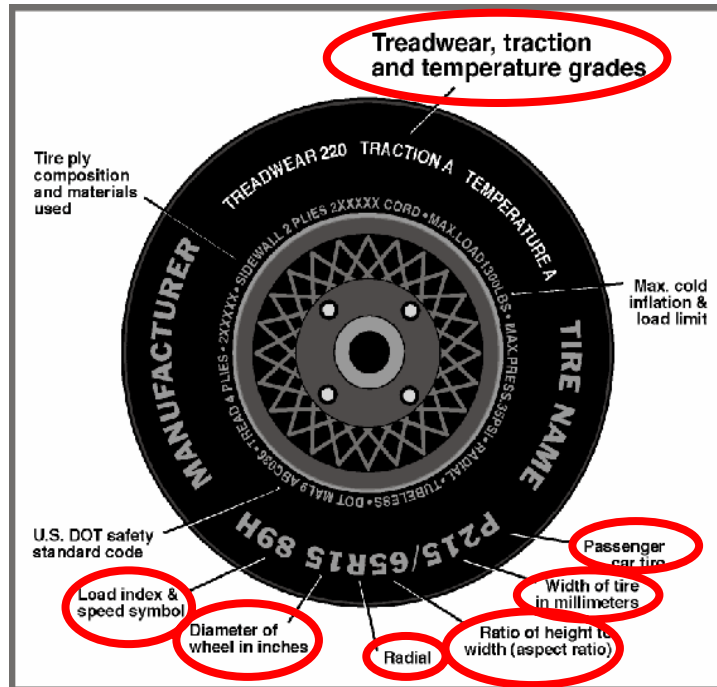
Measurement Description	Units	Value
Test Vehicle Wheelbase	mm	2670
Total Vehicle Length at Left Side	mm	4377
Total Vehicle Length at Centerline	mm	4627
Total Vehicle Length at Right Side	mm	4382
Weight of Ballast in Cargo Area	kg	0
Amount of Stoddard Solvent in Fuel Tank	liters	55.3

DATA SHEET NO. 2 (CONTINUED)

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold / Test Pressure (kPa)	220	220
Recommended Tire Size	P225/55R18	P225/55R18
Tire Size on Vehicle	P225/55R18	P225/55R18
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Eagle LS 2	Eagle LS 2
Tire Type	P	P
Tire Width (mm)	225	225
Ratio of Height to Width (aspect ratio)	55	55
Radial	R	R
Wheel Diameter	18	18
Load Index & Speed Symbol	97H	97H
Treadwear	400	400
Traction Grade	A	A
Temperature Grade	A	A

DATA SHEET NO. 3

POST-TEST IMPACT DATA

Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Frontal Impact

NHTSA No.: M85602
Test Date: 11/27/07

SPEED TRAP DATA

Measured Parameter	Units	Requirements	Value
Trap No. 1 Velocity (Primary)	km/h	55.5 to 57.1	56.4
Trap No. 2 Velocity (Redundant)	km/h	55.5 to 57.1	56.4

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4402	4094	308
Center	mm	4627	4116	511
Right Side	mm	4406	4090	316

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	--- ¹
Center	mm	--- ¹
Right Side	mm	--- ¹
Average	mm	--- ¹

¹ Measurement not recorded.

DATA SHEET NO. 4

TEST VEHICLE INFORMATION

Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Frontal Impact

NHTSA No.: M85602
Test Date: 11/27/07

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle.

Driver: Total Number of detents: 23

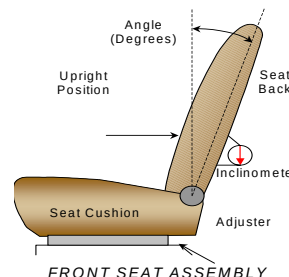
Test detent (with the forward-most detent defined as 0): 11

Passenger: Total Number of detents: 23

Test detent (with the forward-most detent defined as 0): 11

Driver seat back angle: 0.6° measured at the head restraint post

Passenger seat back angle: 0.8° measured at the head restraint post

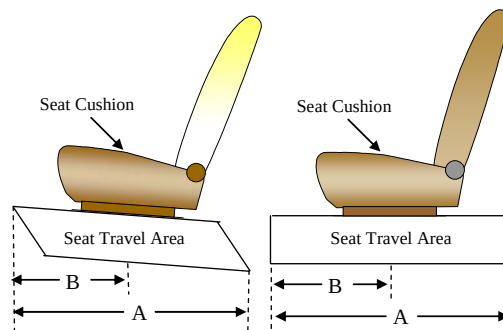


SEAT FORE/AFT POSITIONS

The total seat travel was measured from forward most position to rearmost position, irrespective of vertical seat height in those positions. The seat was set at the longitudinal mid position with vertical adjustment at the lowest position obtainable for both the driver and passenger.

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	225 mm	13
Pass. Seat	220 mm	13



SEAT BELT UPPER ANCHORAGE

	Total No. of Positions	Placed in Position No.
Driver Seat	4	2
Pass. Seat	4	2

Position number one is the uppermost adjustment position.

DATA SHEET NO. 4 (CONTINUED)

TEST VEHICLE INFORMATION

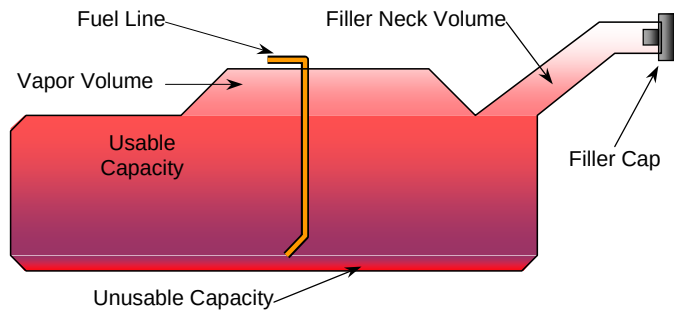
Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Frontal Impact

NHTSA No.: M85602
Test Date: 11/27/07

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	60.0
Usable Capacity used for FMVSS301	60.0
Actual Amount of Solvent used	55.3

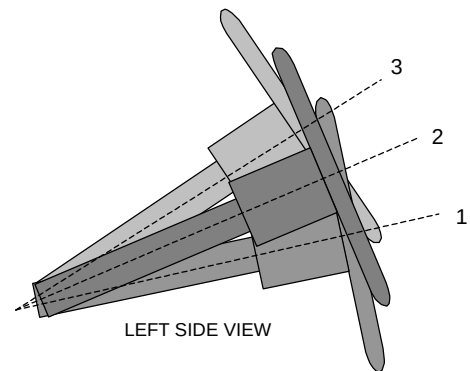
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat.



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.



LEFT SIDE VIEW

STEERING COLUMN ASSEMBLY

	Degrees	Fore/Aft Position, mm
Lowermost Position	22.2°	Fixed
Geometric Center Position	24.7°	Fixed
Uppermost Position	27.3°	Fixed

DATA SHEET NO. 5

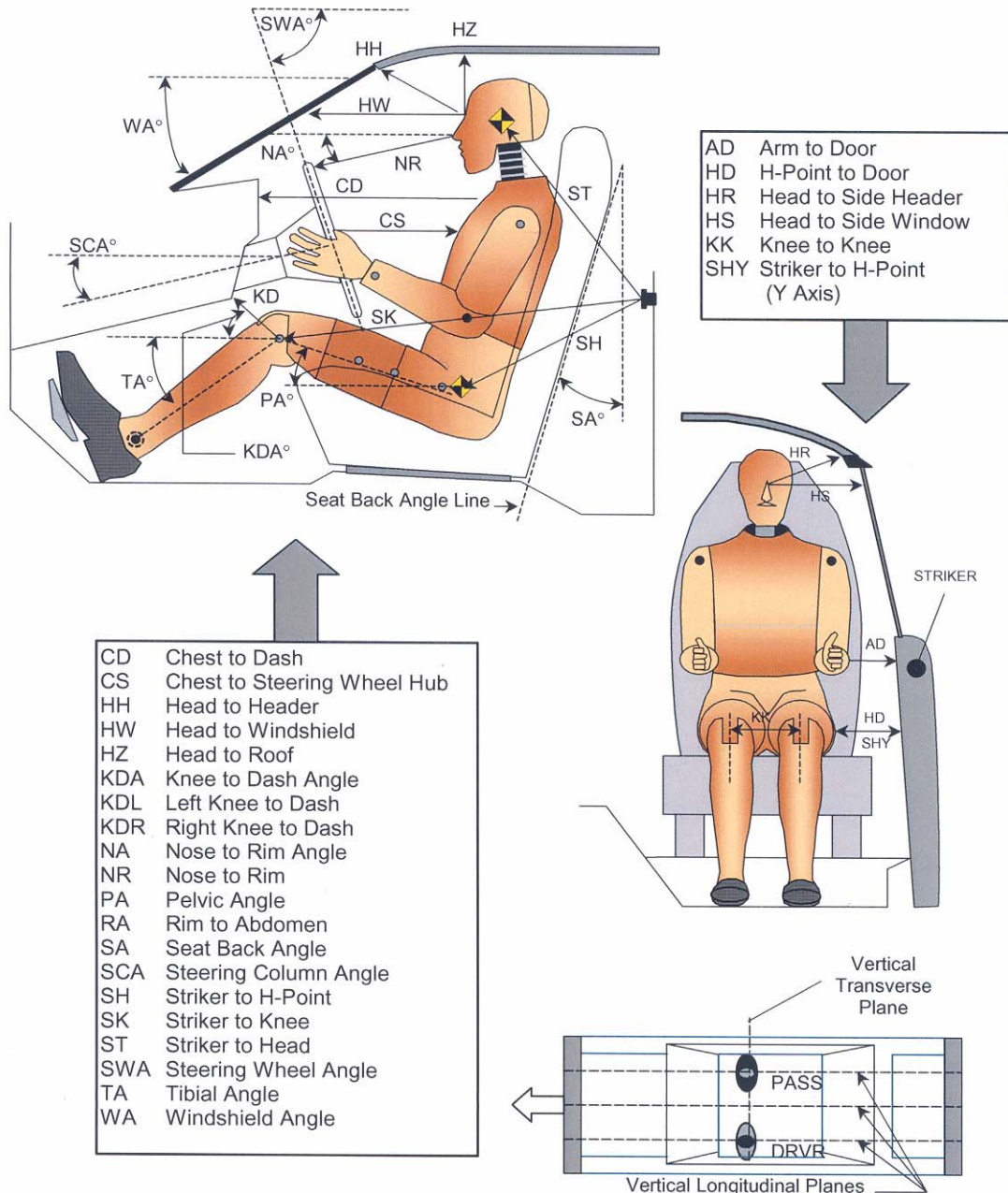
FRONT SEAT DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Mitsubishi Outlander

Test Program: NCAP Frontal Impact

NHTSA No.: M85602

Test Date: 11/27/07



DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

DATA SHEET NO. 5 (CONTINUED)

FRONT SEAT DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Mitsubishi Outlander

NHTSA No.: M85602

Test Program: NCAP Frontal Impact

Test Date: 11/27/07

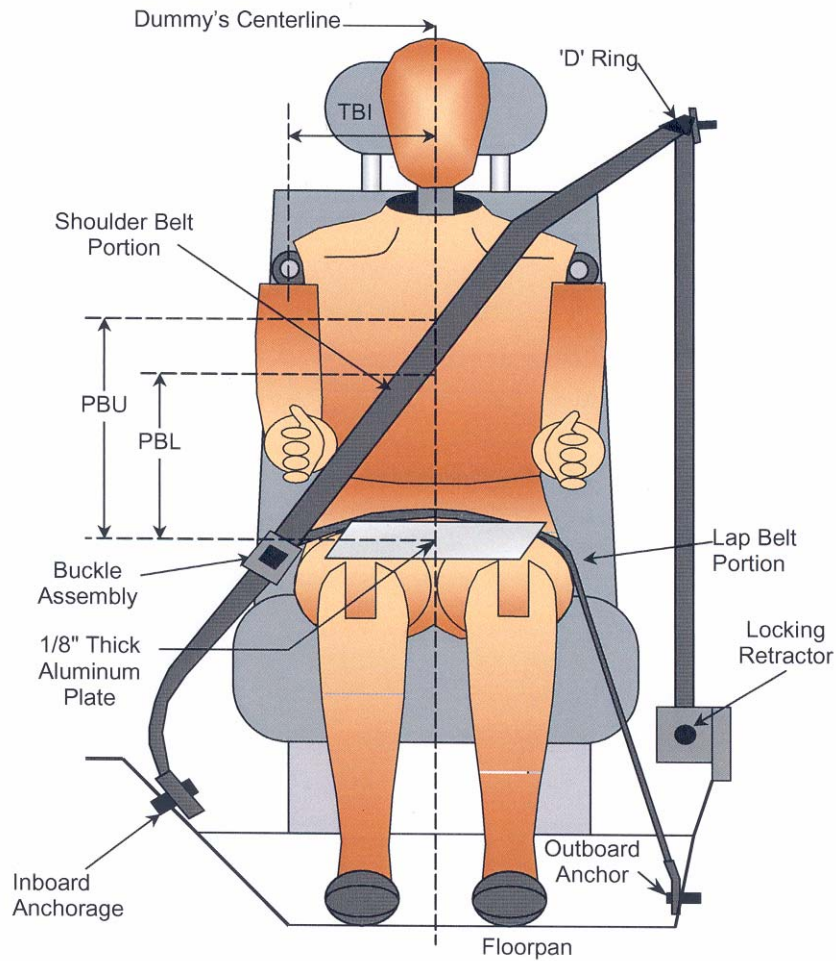
Code	Measurement Description	Driver S/N 352		Passenger S/N 037	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		29.4		
SWA	Steering Wheel Angle		24.7		
SCA	Steering Column Angle		65.3		
SA	Seat Back Angle		0.6		0.8
HZ	Head to Roof	240		210	
HW	Head to Windshield	708		725	
HH	Head to Header	437		422	
HR	Head to Side Header	255		238	
NR	Nose to Rim	423	12.8		
CD	Chest to Dash	581		507	
KDL	Left Knee to Dash	132	22.6	120	
KDR	Right Knee to Dash	113		130	25.0
PA	Pelvis Angle		24.6		22.5
TA	Tibia Angle		60.2		57.6
KK	Knee to Knee	280		240	
ST	Striker to Head	518	-75.2	561	-75.6
SK	Striker to Knee	625	-2.3	616	-2.7
SH	Striker to H-Point	274	26.2	272	29.6
SHY	Striker to H-Point (Y)	216		210	
HS	Head to Side Window	295		288	
HD	H-Point to Door	123		118	
AD	Arm to Door	120		127	

DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07



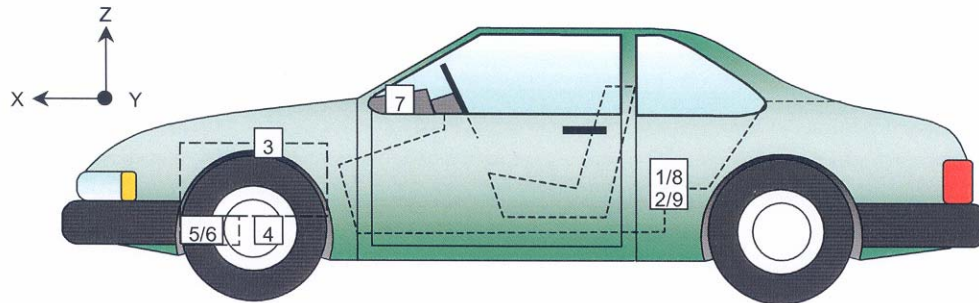
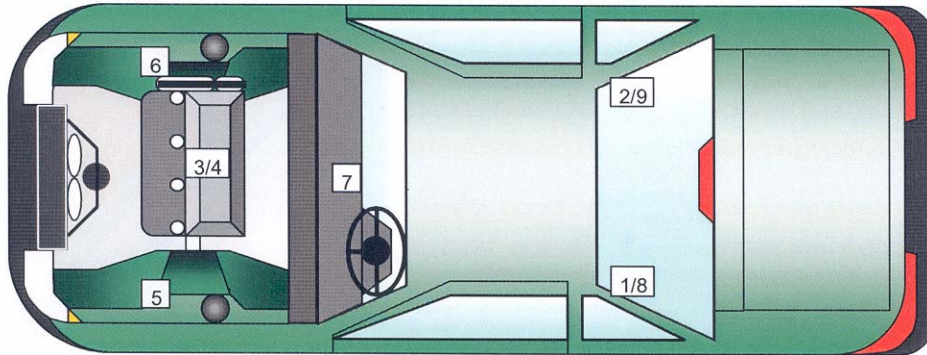
Measurement Parameter	Units	Driver S/N 037	Passenger S/N 352
PBU - Top surface of aluminum plate to belt upper edge	mm	367	340
PBL - Top surface of aluminum plate to belt lower edge	mm	275	257
Lap Belt Tension	N	N/A	N/A
Shoulder Belt Tension	N	N/A	N/A

DATA SHEET NO. 7

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Seat Crossmember	2050	670	405
2	Right Rear Seat Crossmember	2050	670	405
3	Top of Engine	4210	22	849
4	Bottom of Engine	4151	230	203
5	Left Brake Caliper	4080	680	343
6	Right Brake Caliper	4085	680	338
7	Instrument Panel	3485	0	1130
8	Left Rear Seat Crossmember	2050	670	405
18	Right Rear Seat Crossmember	2050	670	405

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

DATA SHEET NO. 8

SEAT BELT ASSESSMENT TEST DATA

Test Vehicle: 2008 Mitsubishi Outlander NHTSA No.: M85602
Test Program: NCAP Frontal Impact Test Date: 11/27/07

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
Shoulder Belt length as measured on ATD	mm	950	955
Lap Belt length as measured on ATD	mm	720	760
Shoulder Belt spool-off	mm	321	292
Total belt length for continuous webbing systems	mm	2500	2600

DATA SHEET NO. 9

SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2008 Mitsubishi Outlander

NHTSA No.: M85602

Test Program: NCAP Frontal Impact

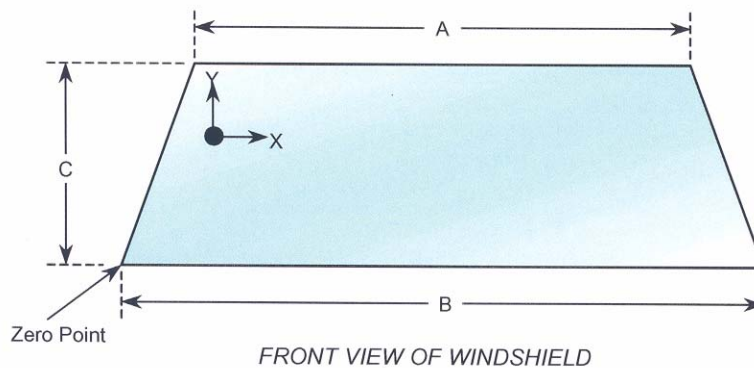
Test Date: 11/27/07

Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of the windshield for vehicles equipped with automatic restraint systems for front occupants.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2173	2173	100.0
Right Side	2173	2107	97.0
Total	4346	4280	98.5



WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1268	13
B	mm	1605	10
C-Left	mm	737	24
C-Right	mm	737	24

DATA SHEET NO. 10

WINDSHIELD ZONE INTRUSION FMVSS 214 (PARTIAL)

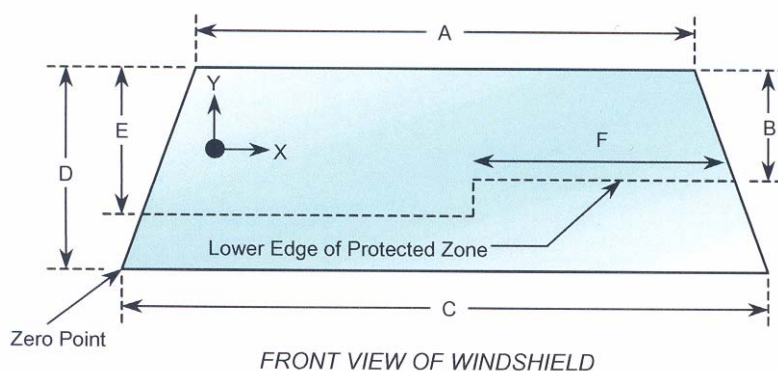
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Test Date: 11/27/07

Protected Zone Lower Edge Requirement

The lower edge of the protected zone is determined by placing a 165 mm diameter rigid sphere weighing 6.8 kg in a position such that it simultaneously contacts the inner surface of the windshield and the top of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points extend the locus line horizontally to the edges of the windshield; then draw a line on the inner surface of the windshield below and 13 mm distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 Test Data



WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	13
B	mm	530
C	mm	10
D	mm	24
E	mm	515
F	mm	240

Details of Windshield Glass Penetration Greater Than 6 mm: None

DATA SHEET NO. 11

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2008 Mitsubishi Outlander NHTSA No.: M85602
Test Program: NCAP Frontal Impact Test Date: 11/27/07

Temperature at Time of Impact: 22.3° C Test Time: 14:05

Stoddard Solvent Spillage Measurements

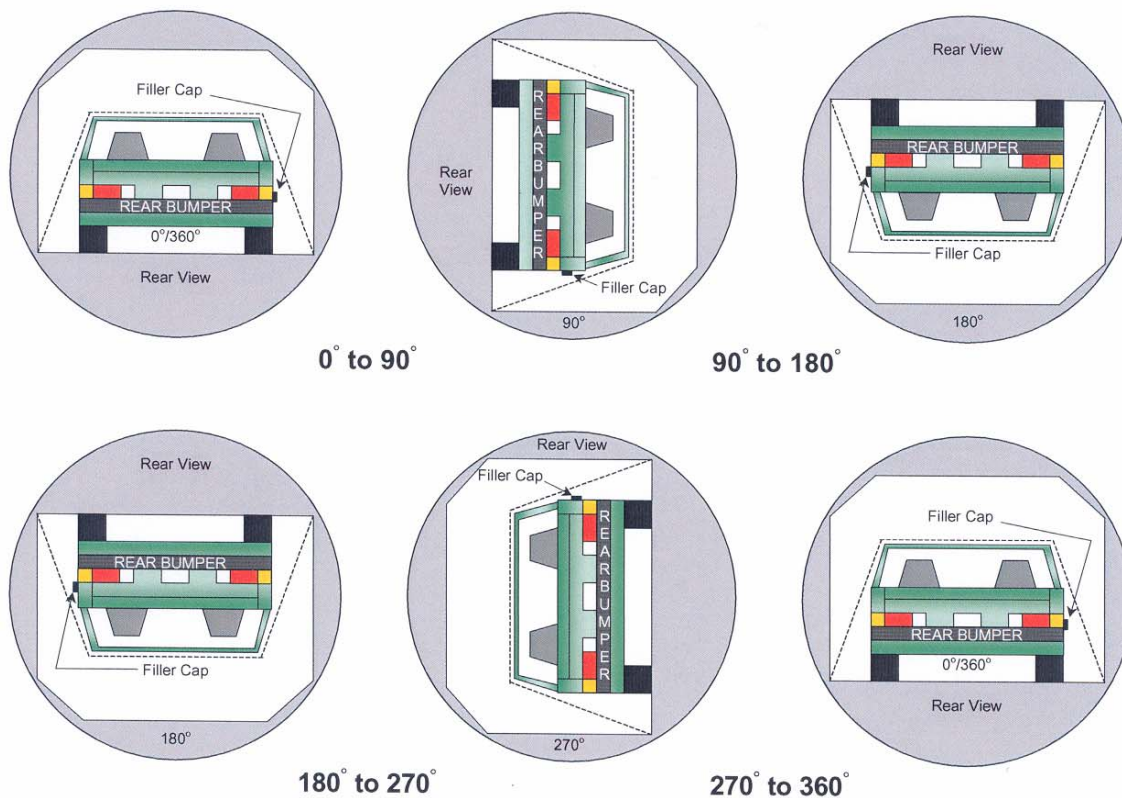
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0
(Maximum allowable = 5 ounces)
- C. For the following 25 minutes: 0
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

DATA SHEET NO. 12

FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. No solvent leakage occurred during rollover.

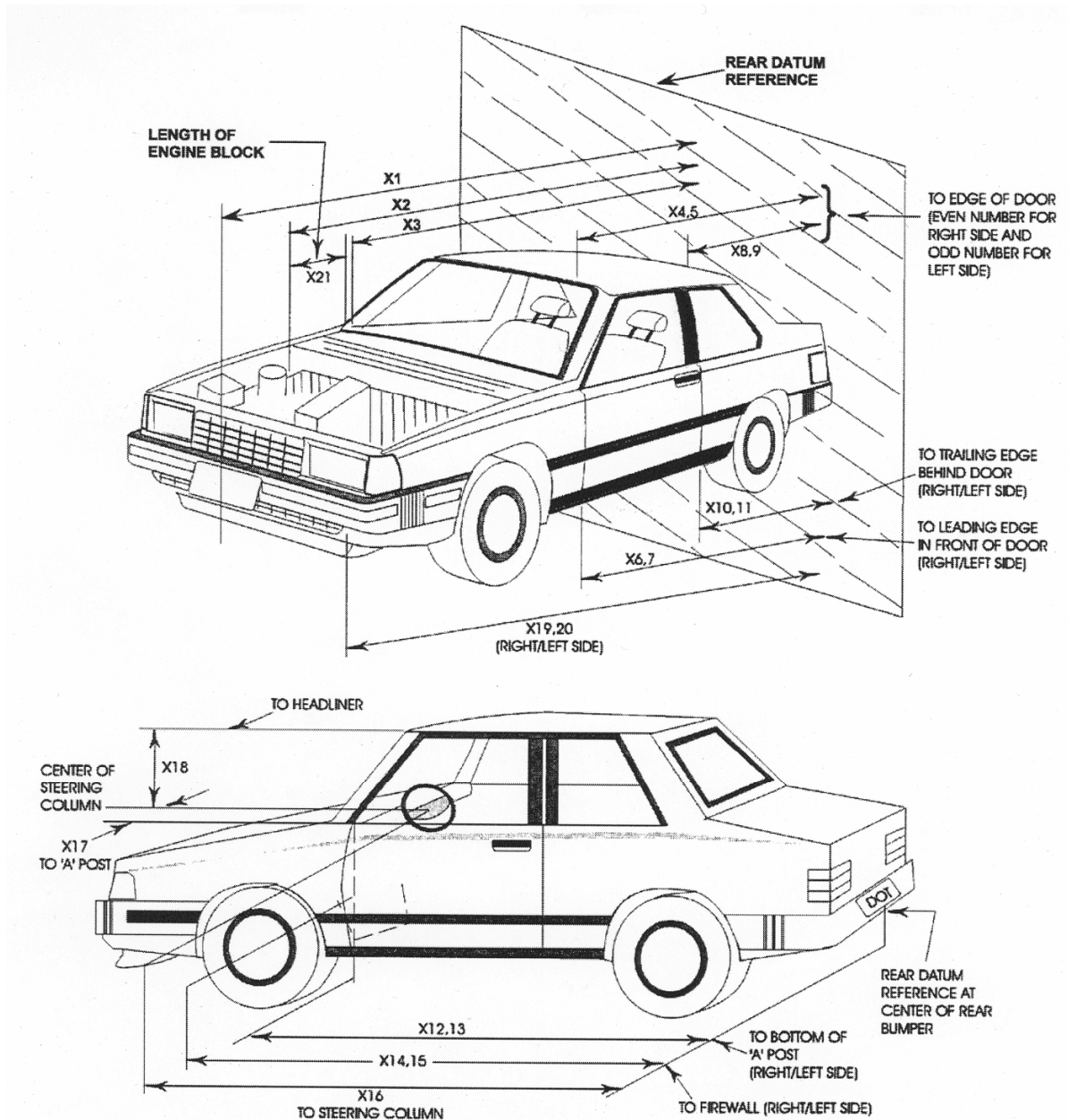
DETAILS OF STODDARD SOLVENT SPILLAGE LOCATIONS

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage Collection Time (min)	Spillage (oz.)	Spillage Collection Time (min)	Spillage (oz.)	Spillage Collection Time (min)	Spillage (oz.)
0° to 90°	60	300	First 5	0	Sixth	0	Seventh	0
90° to 180°	60	300	First 5	0	Sixth	0	Seventh	0
180° to 270°	60	300	First 5	0	Sixth	0	Seventh	0
270° to 360°	60	300	First 5	0	Sixth	0	Seventh	0

DATA SHEET NO. 13
VEHICLE MEASUREMENTS

Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Frontal Impact

NHTSA No.: M85602
Test Date: 11/27/07



DATA SHEET NO. 13 (CONTINUED)**VEHICLE MEASUREMENTS**

Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Frontal Impact

NHTSA No.: M85602
Test Date: 11/27/07

VEHICLE MEASUREMENT TABLE

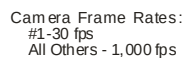
No.	Measurement Description	Pre-Test	Post-Test	Difference
X1	Total length of vehicle at centerline	4627	4116	511
X2	RSOV to front of engine block	4147	--- ¹	--- ¹
X3	RSOV to firewall	3619	--- ¹	--- ¹
X4	RSOV to upper leading edge of right door	3110	3077	33
X5	RSOV to upper leading edge of left door	3118	3074	44
X6	RSOV to lower leading edge of right door	3132	3069	63
X7	RSOV to lower leading edge of left door	3126	3050	76
X8	RSOV to upper trailing edge of right door	2082	2049	33
X9	RSOV to upper trailing edge of left door	2092	2051	41
X10	RSOV to lower trailing edge of right door	2097	2036	61
X11	RSOV to lower trailing edge of left door	2099	2034	65
X12	RSOV to bottom a "A" post on right side	3122	3078	44
X13	RSOV to bottom a "A" post on left side	3123	3059	64
X14	RSOV to firewall on right side	3542	3518	24
X15	RSOV to firewall on left side	3548	3506	42
X16	RSOV to steering wheel center	2760	2680	78
X17	Center of steering column to "A" post	348	340	8
X18	Center of steering column to headliner	490	500	-10
X19	RSOV to right side of front bumper	4382	4100	282
X20	RSOV to left side of front bumper	4377	4095	282
X21	Length of engine block	410	410	0
RD	RSOV to right side of dash panel	2927	2868	59
CD	RSOV to center of dash panel	2961	2902	59
LD	RSOV to left side of dash panel	2917	2830	87

All distance measurements are in millimeters.

¹ Measurement could not be recorded.

HIGH SPEED CAMERA LOCATIONS AND DATA

NHTSA No.: M85602
Test Date: 11/27/07



DATA SHEET NO. 14 (CONTINUED)**HIGH SPEED CAMERA LOCATIONS AND DATA**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85602Test Program: NCAP Frontal ImpactTest Date: 11/27/07**VEHICLE CAMERA MEASUREMENT TABLE**

No.	Camera View	Location (mm)			Angle (deg)	Film Plane to Head	Lens (mm)	Speed (fsp)
		X	Y	Z				
1	Real-time (Panning)						Zoom	30
2	Overall Left Side	2100	5420	980	0.1	5070	12.5	1000
3	Left Side View	400	5270	995	0.2	5330	25	1000
4	Driver and Interior View	4310	2610	1595	8.0	2890	25	1000
5	Steering Column Bottom	2930	8450	1720	3.3	8050	50	1000
6	Steering Column Top	2880	9030	2170	6.7	8610	50	1000
7	Onboard at Right Rear Dummy	3290	740	1440	14.9	840	6.5	1000
8	Overall Right Side	2410	5180	990	0.1	4750	12.5	1000
9	Right Side View	590	5370	990	1.7	5910	25	1000
10	Right Passenger View	1350	6270	1300	0.5	5290	50	1000
11	Passenger and Interior View	5140	3850	1900	11.1	3720	25	1000
12	Onboard at Left Rear Dummy	3290	710	1415	16.6	760	6.5	1000
13	Passenger Front View	0	300	2155	39.4	2650	12.5	1000
14	Driver Front View	0	300	2160	33.9	2650	12.5	1000
15	Windshield View	0	0	2130	51.5	2650	6.5	1000
16	Pit View of Engine	550	0	3340	90.0	4810	25	1000
17	Pit View of Fuel Tank	3090	0	3340	90.0	4810	12.5	1000

Reference Points: X - Impact Line

Y - MDB Left Edge Impact Point

Z - Ground Plane

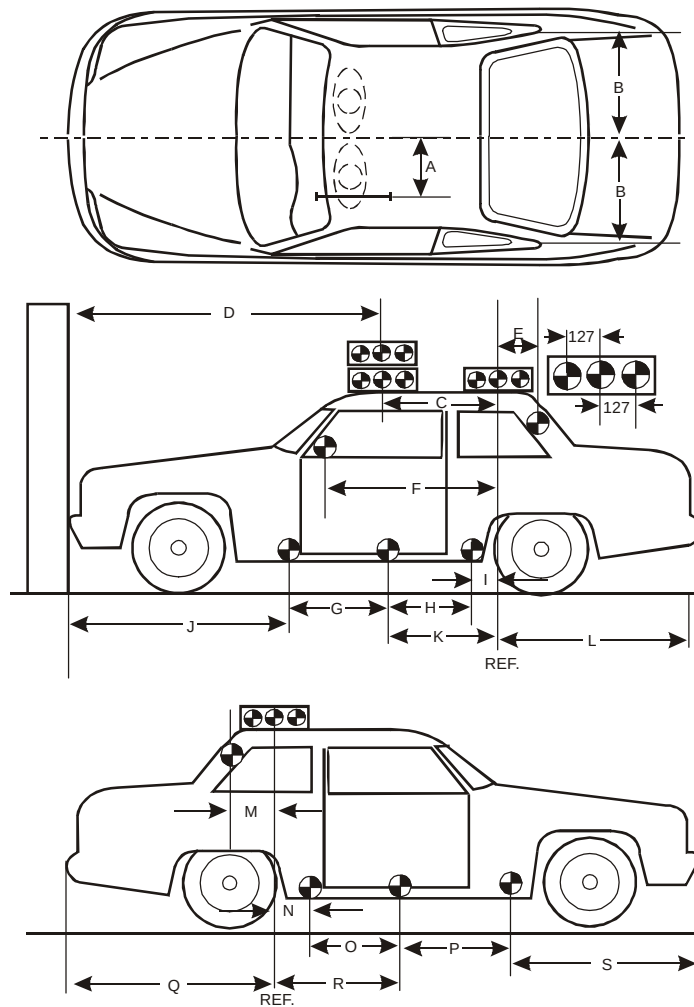
DATA SHEET NO. 15

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07

All Dimensions in (mm)	
Item	Value
A	365
B	623
C	610
D	2344
E	472
F	1292
G	845
H	860
I	-186
J	1435
K	674
L	1673
M	445
N	-156
O	864
P	850
Q	1642
R	706
S	1184



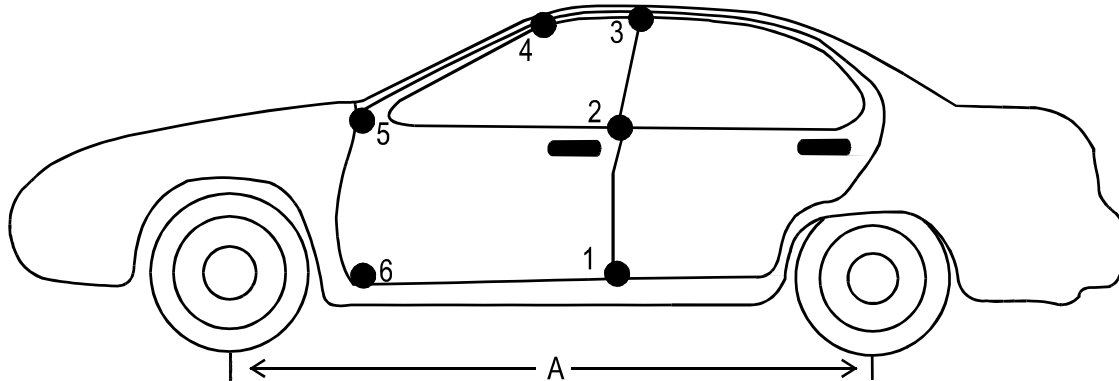
DATA SHEET NO. 16

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07

DOOR OPENING WIDTH



Driver Side

Point Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2275	-780	227	2275	-788	234	0	-8	7
2	2132	-761	-79	2133	-766	-72	1	-5	7
3	2092	-617	-791	2095	-622	-784	3	-5	7
4	2630	-656	-721	2633	-662	-715	3	-6	6
5	3128	-748	-26	3126	-762	-19	-2	-14	7
6	3072	-756	292	3071	-766	300	-1	-10	8

Passenger Side

Point Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
1	3072	767	289	3070	767	287	-2	0	-2
2	2132	765	-80	2132	764	-79	0	-1	1
3	2636	658	-724	2637	661	-727	1	3	-3
4	2086	619	-787	2086	620	-789	0	1	-2
5	3129	759	-17	3125	767	-20	-4	8	-3
6	2293	783	239	2292	782	240	-1	-1	1

Units (mm)	A = Wheelbase Left	A = Wheelbase Right
Before Test	2670	2670
After Test	2608	2599
Difference	62	71

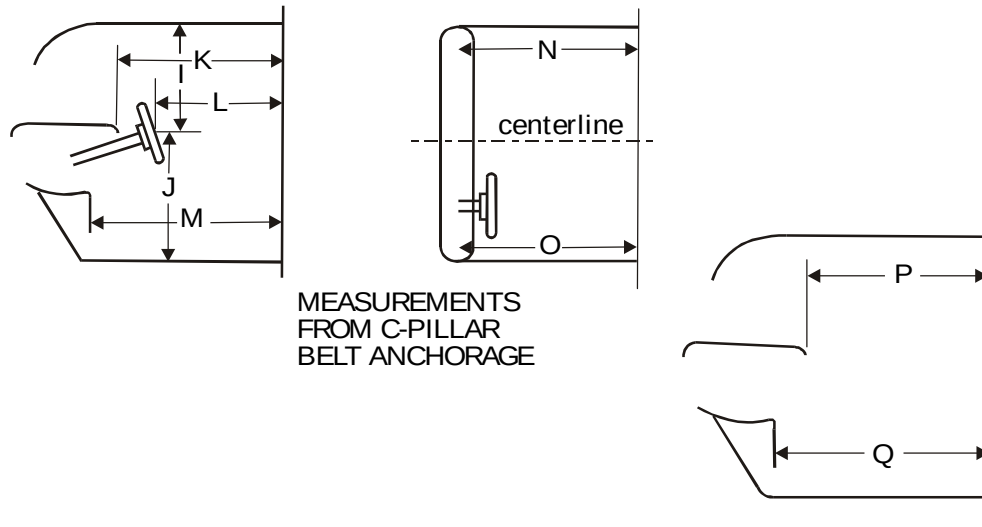
DATA SHEET NO. 16 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07

STATIC PASSENGER COMPARTMENT INTRUSION



Measurement	Pre-Test	Post-Test	Difference
I	475	537	-62
J	590	615	-25
K	1747	1755	-8
L	1568	1550	18
M	1968	1955	13
N	1832	1842	-10
O	1807	1799	8
P = K (PASS.)	1745	1755	-10
Q = M (PASS.)	1957	1955	2

All units in millimeters

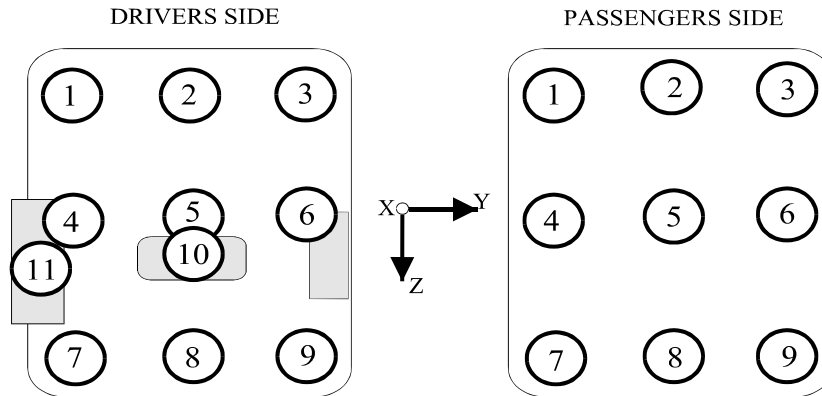
DATA SHEET NO. 16 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07

TOE PAN FLOORBOARD INTRUSION



Driver Side Toe Pan and Floorboard Measurements

Floorpan Location	X Deformation			Z Deformation		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	3260	3239	-21	335	330	-5
2	3314	3276	-38	346	331	-15
3	3306	3246	-60	350	323	-27
4	3226	3216	-10	405	404	-1
5	3231	3201	-30	393	386	-7
6	3231	3189	-42	395	387	-8
7	3144	3135	-9	441	437	-4
8	3134	3117	-17	446	453	7
9	3133	3102	-31	444	446	2
10	3171	3180	9	248	255	7
11	3161	3151	-10	327	318	-9

Passenger Side Toe Pan and Floorboard Measurements

Floorpan Location	X Deformation			Z Deformation		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	3318	3281	-37	346	316	-30
2	3319	3292	-27	333	306	-27
3	3265	3246	-19	318	301	-17
4	3226	3203	-23	401	384	-17
5	3222	3206	-16	395	380	-15
6	3249	3238	-11	384	367	-17
7	3137	3118	-19	444	437	-7
8	3134	3123	-11	444	437	-7
9	3140	3134	-6	438	429	-9

Reference: X = Rear Bumper; Z = Ground
 All units in millimeters

DATA SHEET NO. 16 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07

Bottom of Front Bumper

Pre-Test				Post-Test			Difference		
Index	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm
1	4402	-689	164	4094	-732	65	-308	-43	-99
2	4589	-424	164	4058	-419	66	-531	5	-98
3	4634	-144	161	4091	-138	76	-543	6	-85
4	4635	138	161	4086	144	76	-549	6	-85
5	4592	423	162	4047	428	61	-545	5	-101
6	4406	690	154	4091	736	42	-315	46	-112

Top of Front Bumper

Pre-Test				Post-Test			Difference		
Index	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm
1	4397	-688	50	4098	-739	-48	-299	-51	-98
2	4582	-424	72	4087	-421	-20	-495	3	-92
3	4635	-139	78	4118	-132	-1	-517	7	-79
4	4634	139	69	4116	145	-11	-518	6	-80
5	4584	423	66	4090	433	-24	-494	10	-90
6	4400	689	46	4103	738	-66	-297	49	-112

Center of Grill

Pre-Test				Post-Test			Difference		
Index	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm
1	4320	-688	-58	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹
2	4494	-422	-60	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹
3	4535	-140	-65	3990	-138	-181	-545	2	-116
4	4534	144	-67	3988	145	-185	-546	1	-118
5	4498	427	-54	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹
6	4324	687	-60	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹

Front of Hood

Pre-Test				Post-Test			Difference		
Index	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm
1	4233	-688	-168	3944	-684	-486	-289	4	-318
2	4441	-423	-134	3977	-416	-287	-464	7	-153
3	4507	-138	-135	3977	-136	-236	-530	2	-101
4	4507	144	-136	3972	143	-237	-535	-1	-101
5	4442	423	-139	3967	421	-290	-475	-2	-151
6	4233	689	-173	3938	678	-503	-295	-11	-330

¹ Measurement could not be taken

DATA SHEET NO. 17

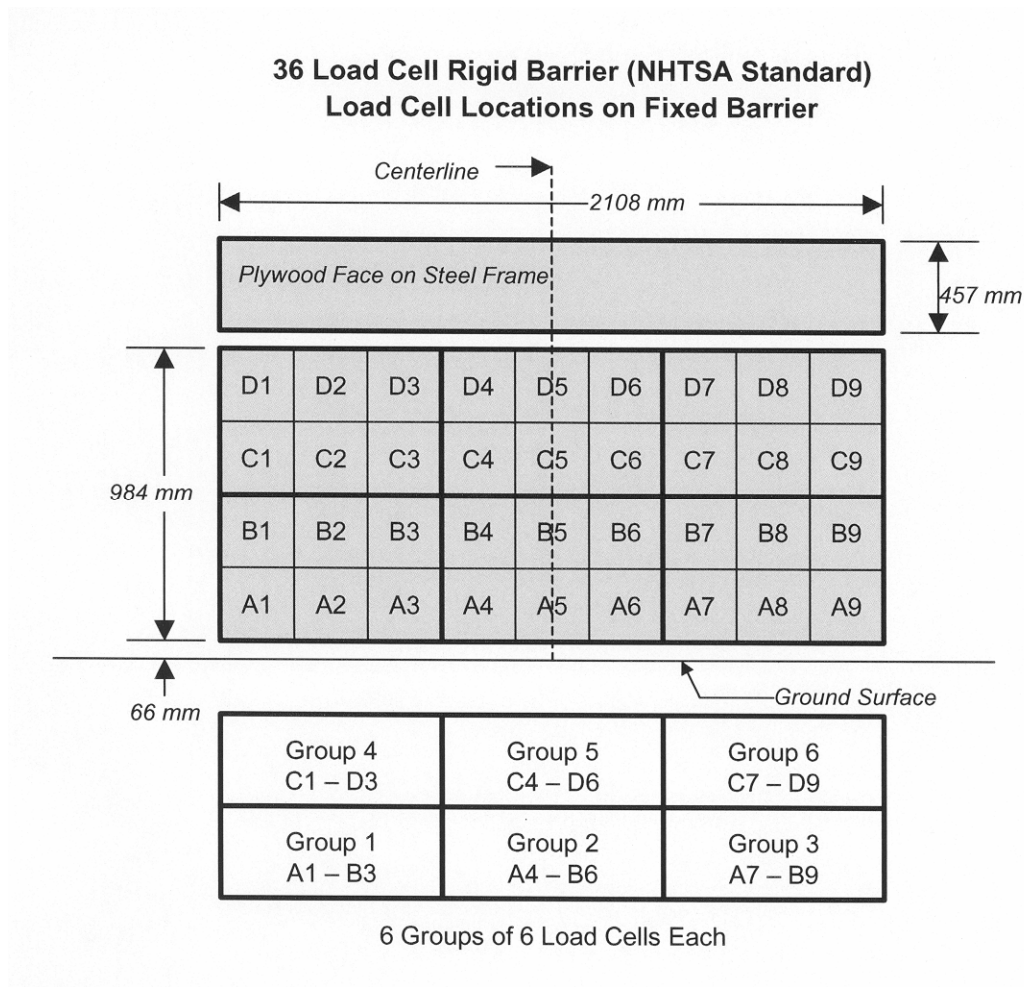
FIXED BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2008 Mitsubishi Outlander

NHTSA No.: M85602

Test Program: NCAP Frontal Impact

Test Date: 11/27/07



The following data is presented in Appendix B:

- (1) Data from 36 individual load cells
- (2) Total or Sum of 36 individual load cells
- (3) Data from 6 Groupings shown above (6 cells/group)

DATA SHEET NO. 18

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07

FOR FRONTAL BARRIER IMPACT

NHTSA Test No.: M85602 VIN: JA4MT41X18Z002398

Model Year: 2008 Build Date: 08/07 Test Date: 11/27/07

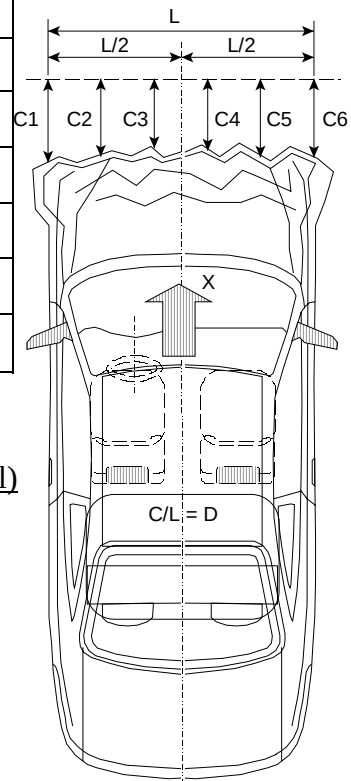
Vehicle Size Category: MVP Test Weight: 1947.5 kg

Vehicle Wheelbase: 2670 mm; Front Overhang: 948 mm; Overall Width: 1800 mm

Collision Deformation Classification (CDC) Code: 12FDEW2

Crush Depth Dimensions with Bumper

	PRE-TEST	POST-TEST	DIFFERENCE	
C1 =	4402	4094	308	mm
C2 =	4589	4058	531	mm
C3 =	4634	4091	543	mm
C4 =	4635	4086	549	mm
C5 =	4592	4047	545	mm
C6 =	4406	4090	316	mm



Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

Length of Damaged Region

L1	=	1800	mm
L2	=	900	mm
L3	=	900	mm

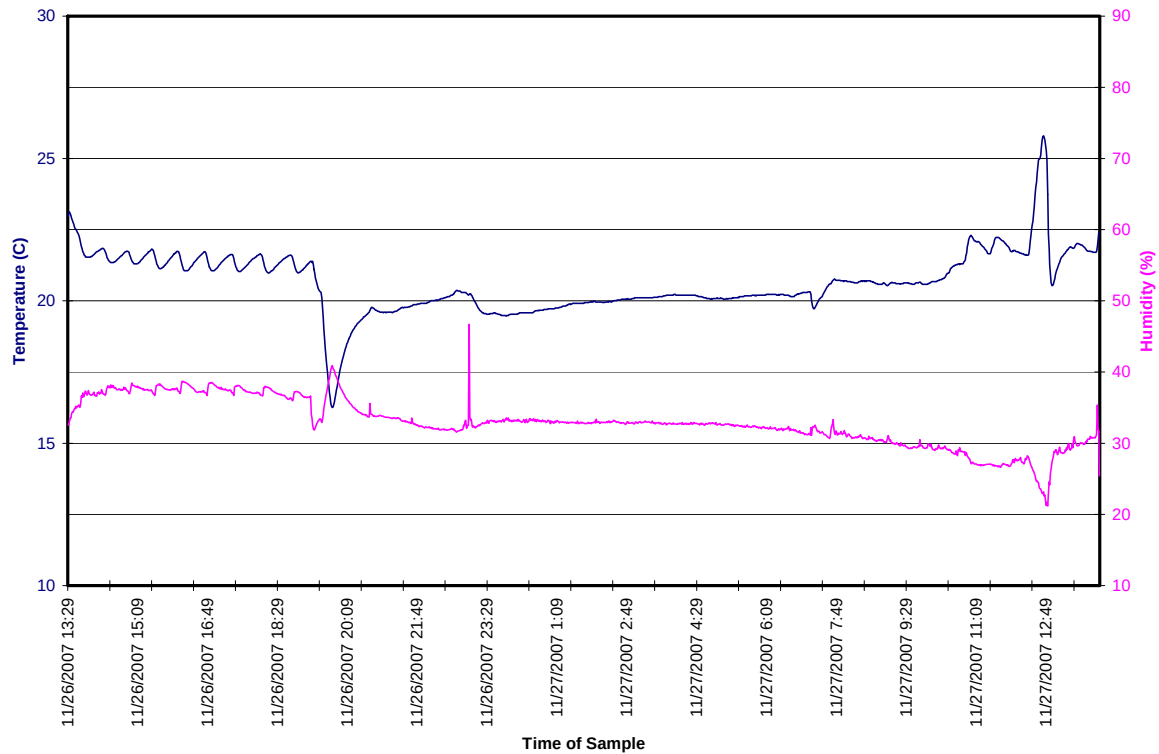
DATA SHEET NO. 19

DUMMY / VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Frontal Impact

NHTSA No.: M85602
Test Date: 11/27/07

2008 MITSUBISHI OUTLANDER AWD 35 MPH FRONTAL BARRIER IMPACT



APPENDIX A
PHOTOGRAPHS

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Figure A-115	Post-Test Right Front Passenger Floorboard - View 4	A-121
Figure A-116	Pre-Test Right Front Passenger Floorboard - View 5	A-122

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Figure A-1 Pre-Test Front View



Figure A-2 Post-Test Front View



Figure A-3 Pre-Test Left Front View



Figure A-4 Post-Test Left Front View

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Figure A-5 Pre-Test Left Side View

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Figure A-6 Post-Test Left Side View

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Figure A-7 Pre-Test Left Rear View

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Figure A-8 Post-Test Left Rear View

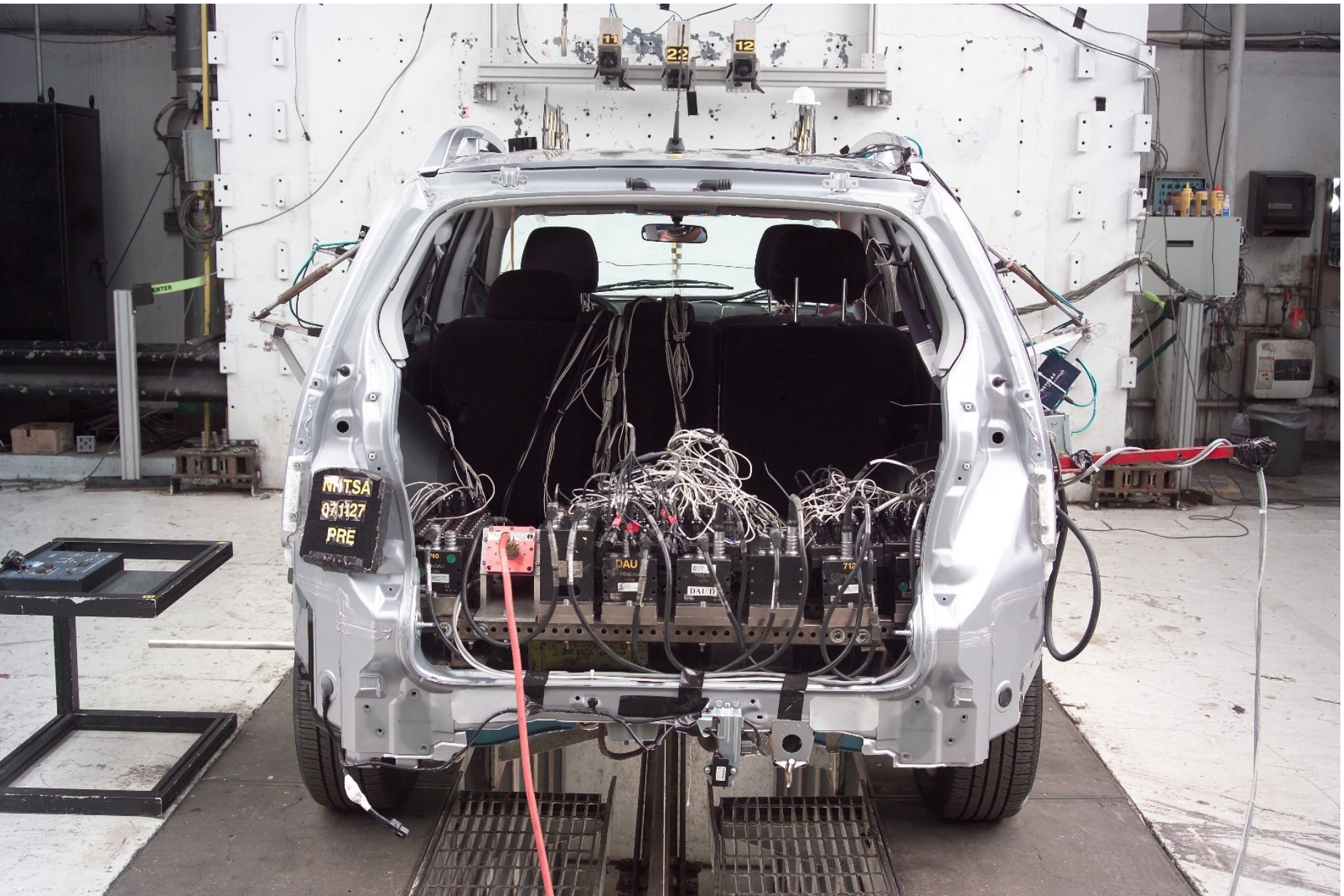


Figure A-9 Pre-Test Rear View



Figure A-10 Post-Test Rear View



Figure A-11 Pre-Test Right Rear View

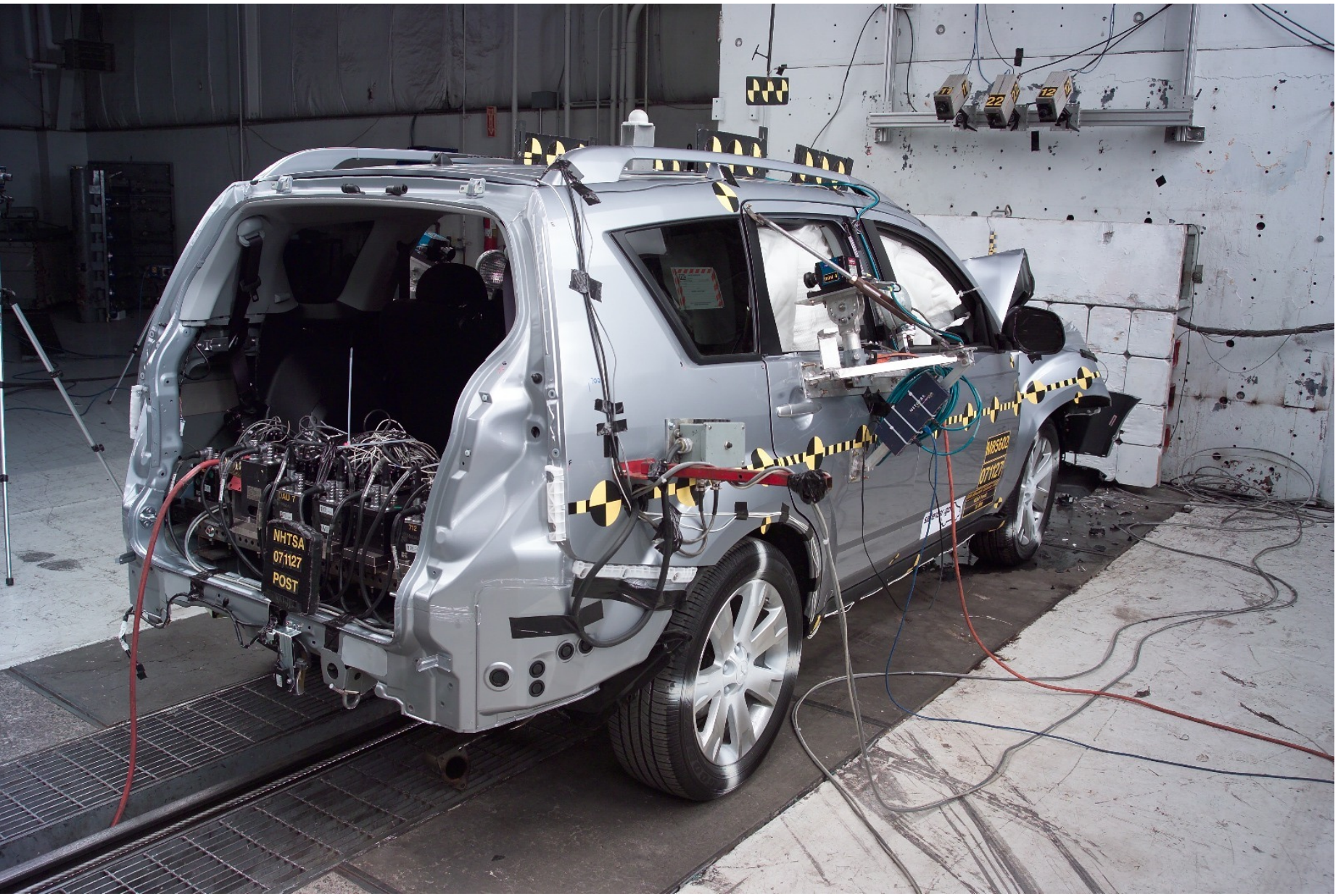


Figure A-12 Post-Test Right Rear View



Figure A-13 Pre-Test Right Side View



Figure A-14 Post-Test Right Side View



Figure A-15 Pre-Test Right Front View



Figure A-16 Post-Test Right Front View

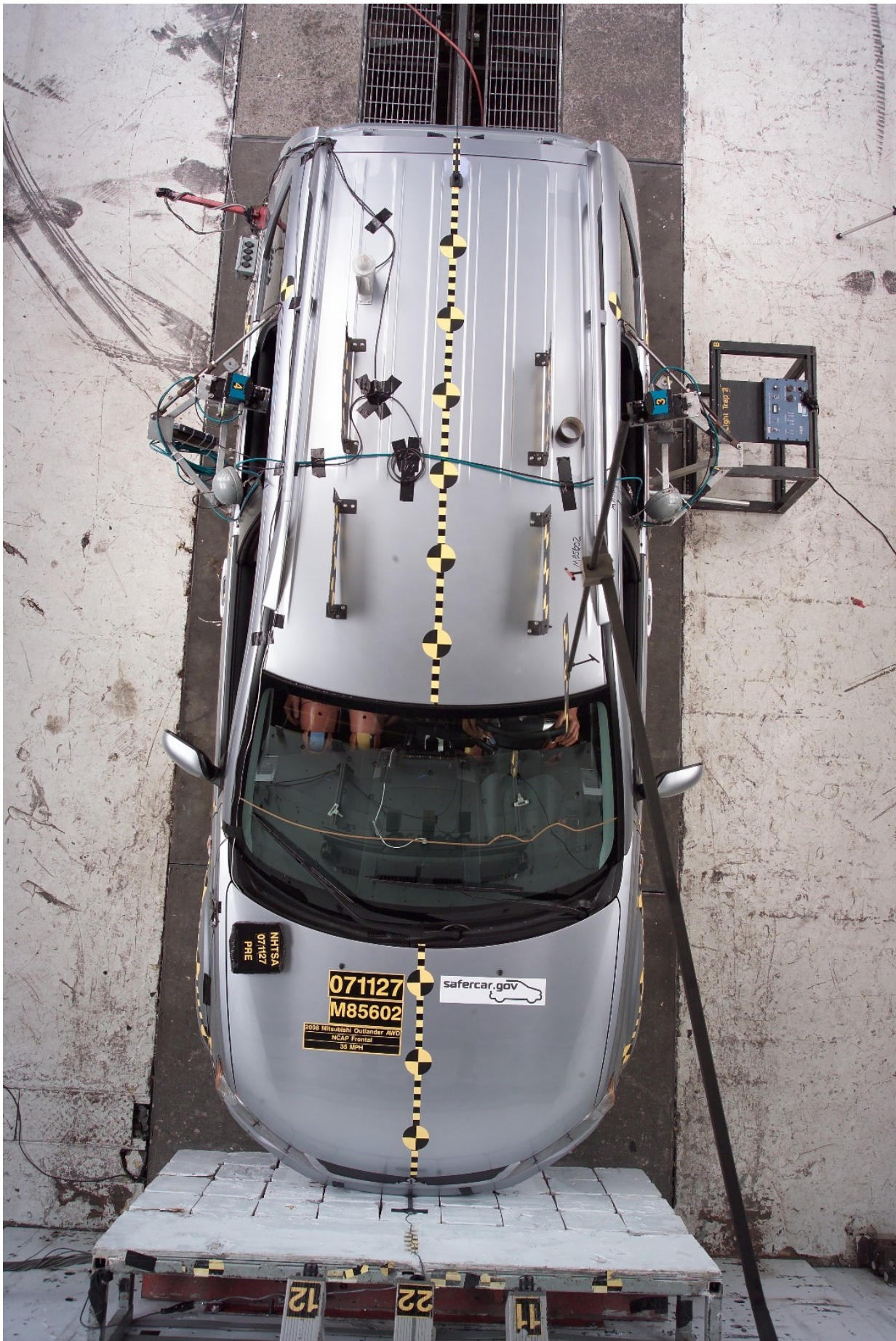


Figure A-17 Pre-Test Overhead View

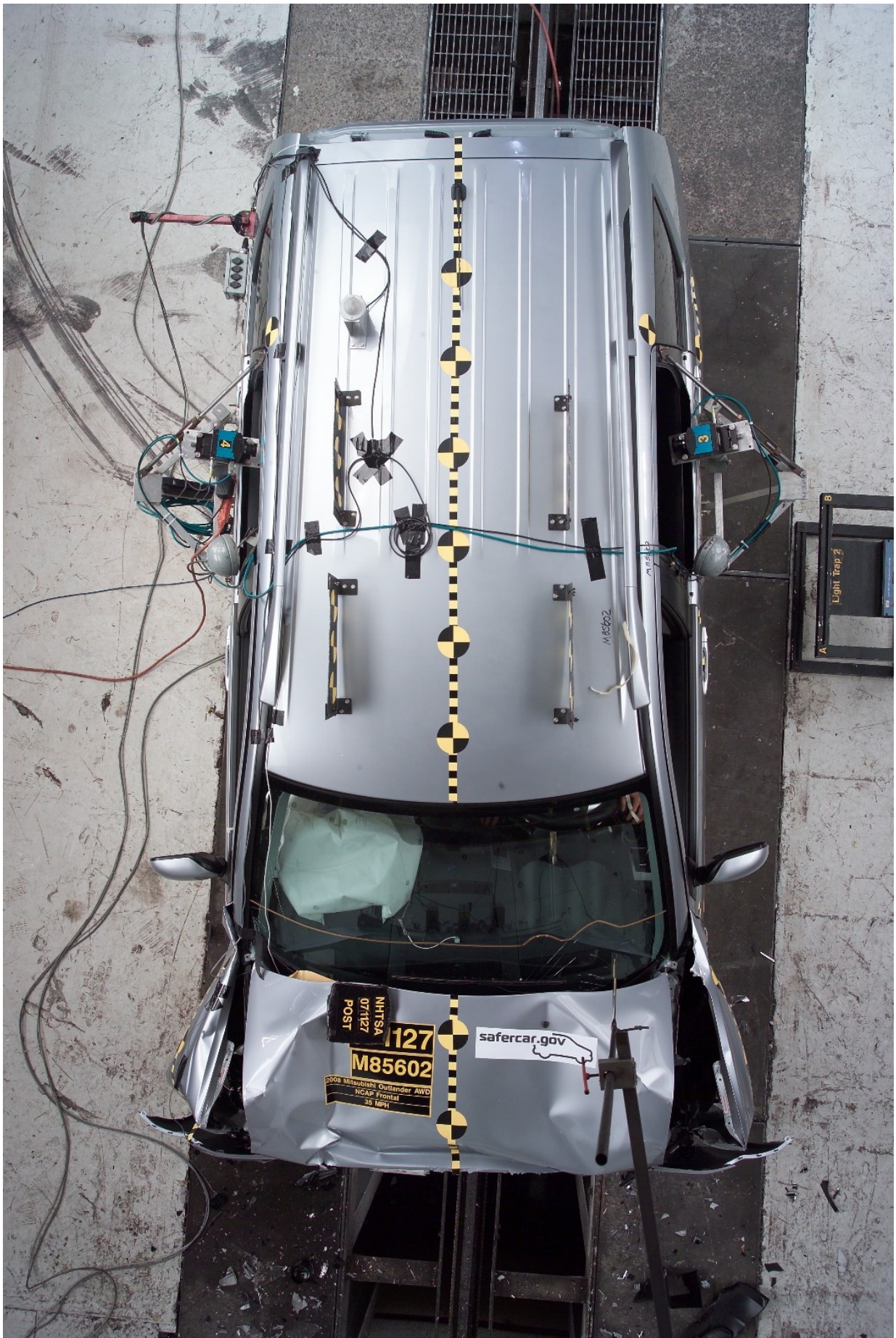


Figure A-18 Post-Test Overhead View

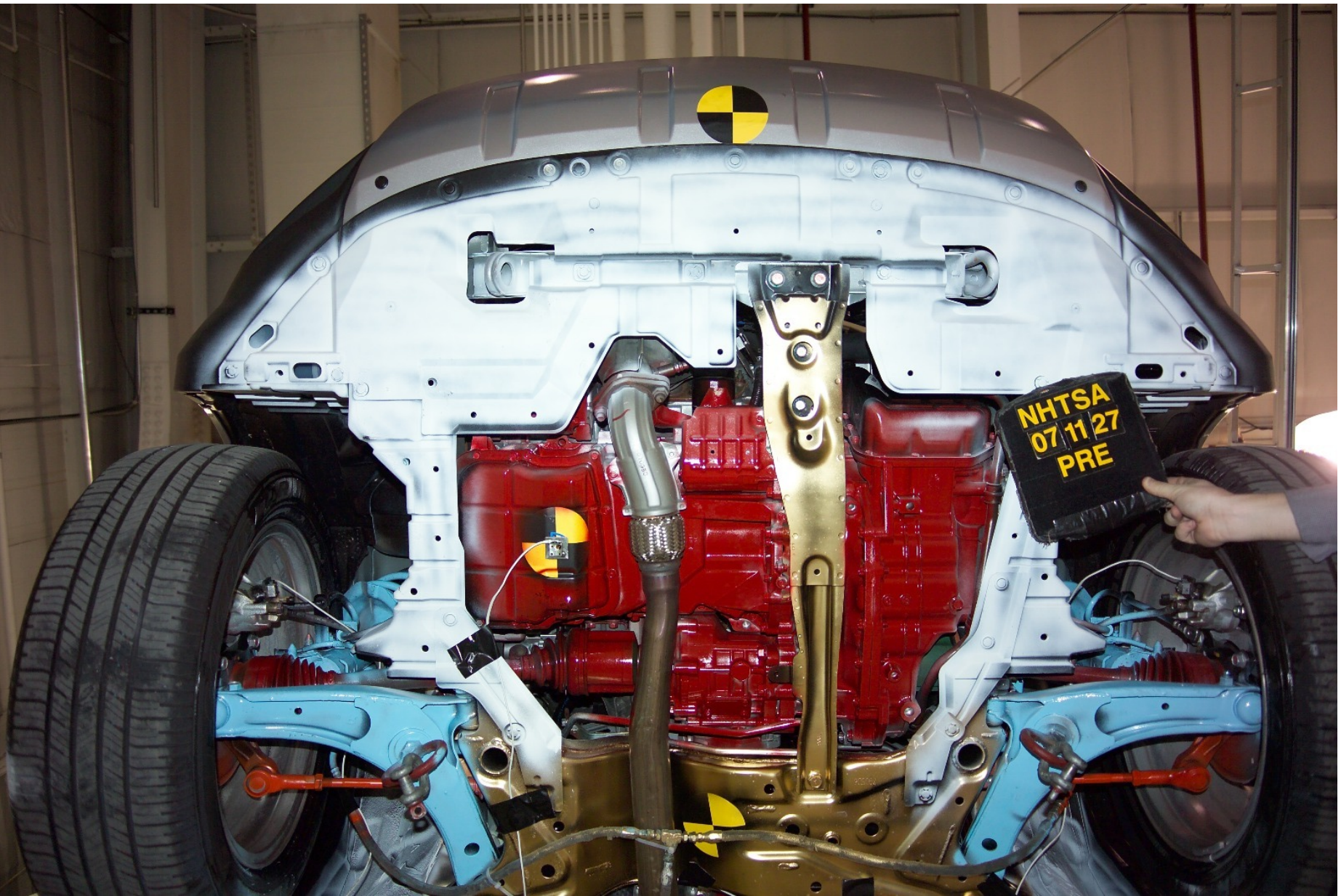


Figure A-19 Pre-Test Front Underbody View

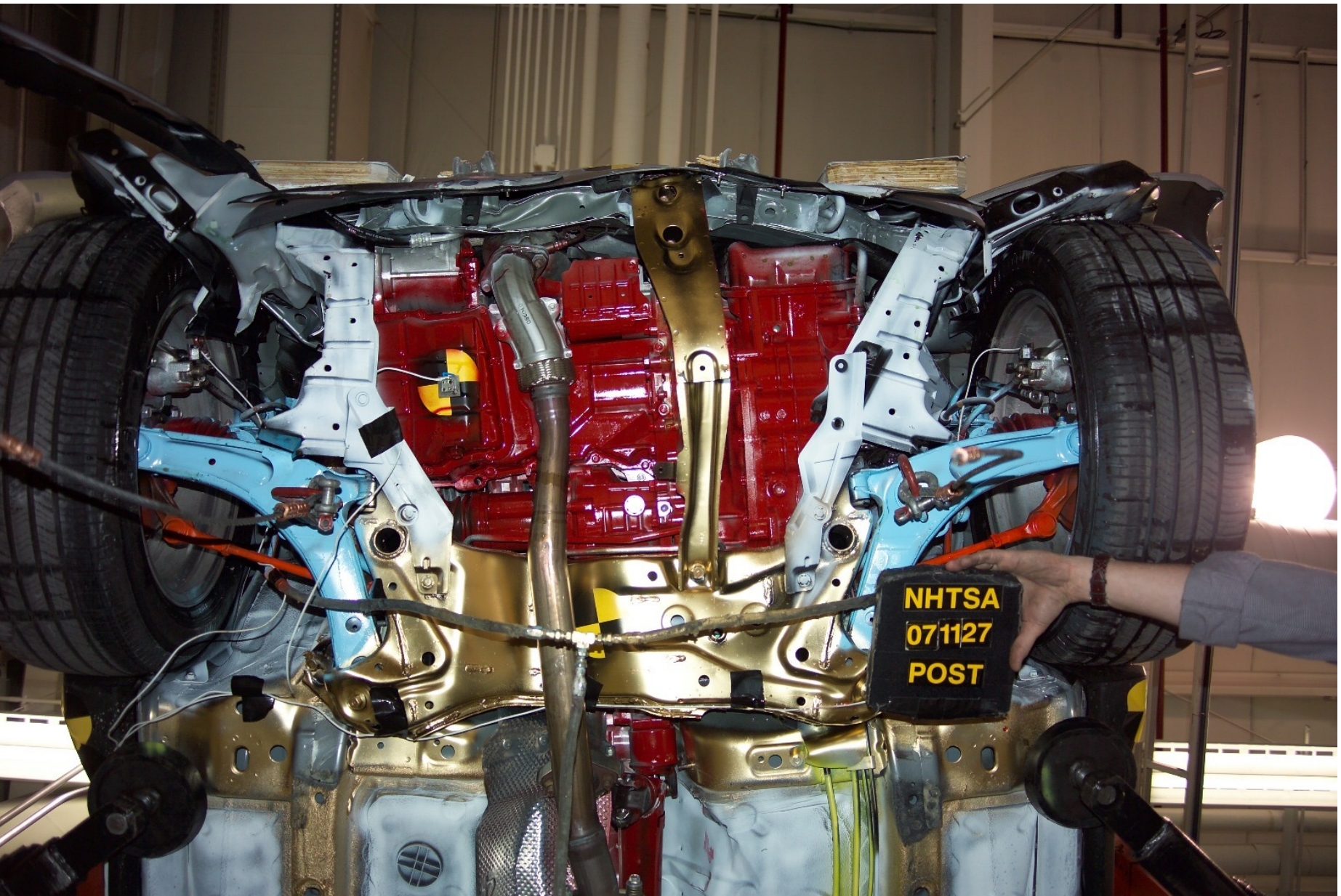


Figure A-20 Post-Test Front Underbody View

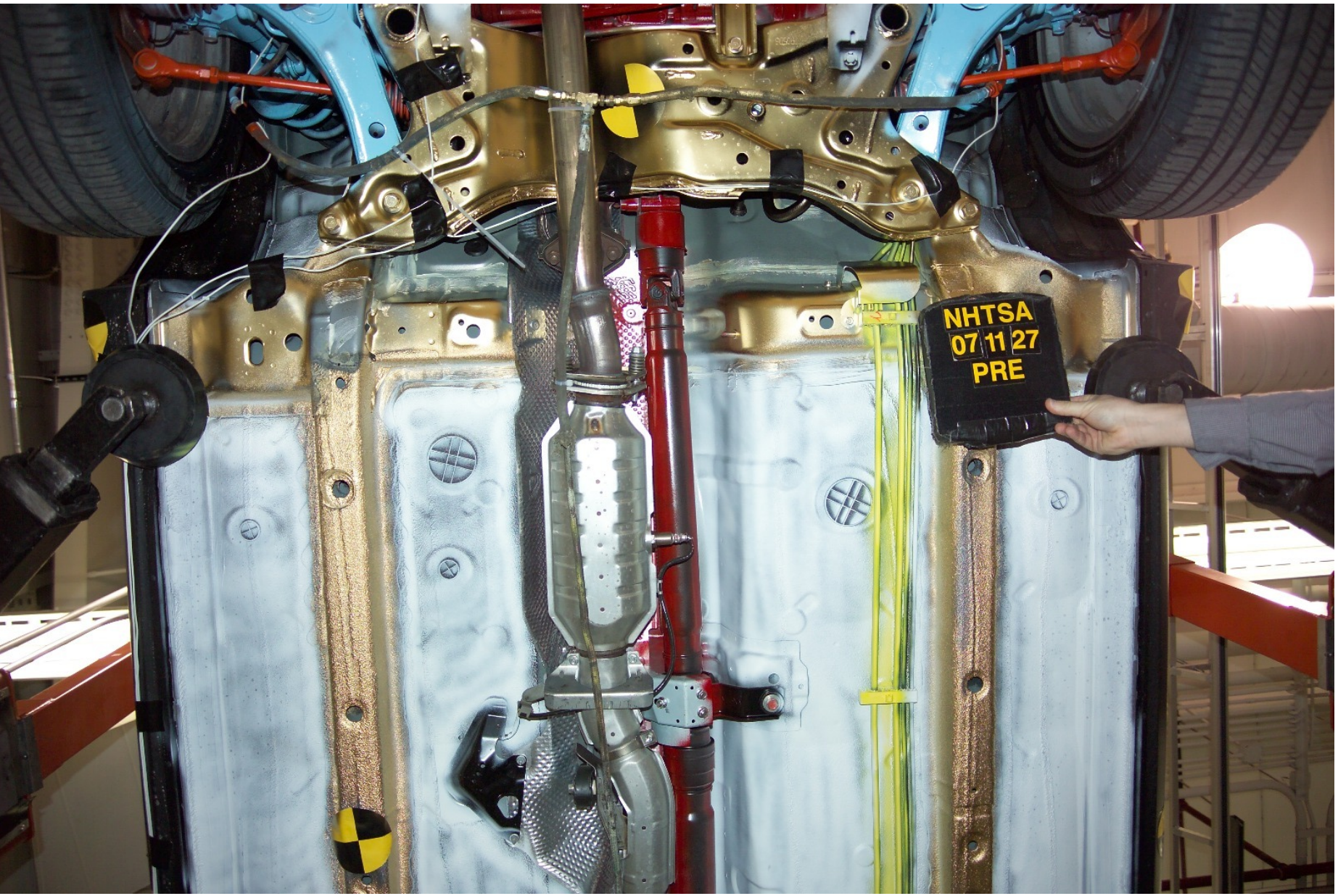


Figure A-21 Pre-Test Mid Front Underbody View



Figure A-22 Post-Test Mid Front Underbody View



Figure A-23 Pre-Test Mid Underbody View

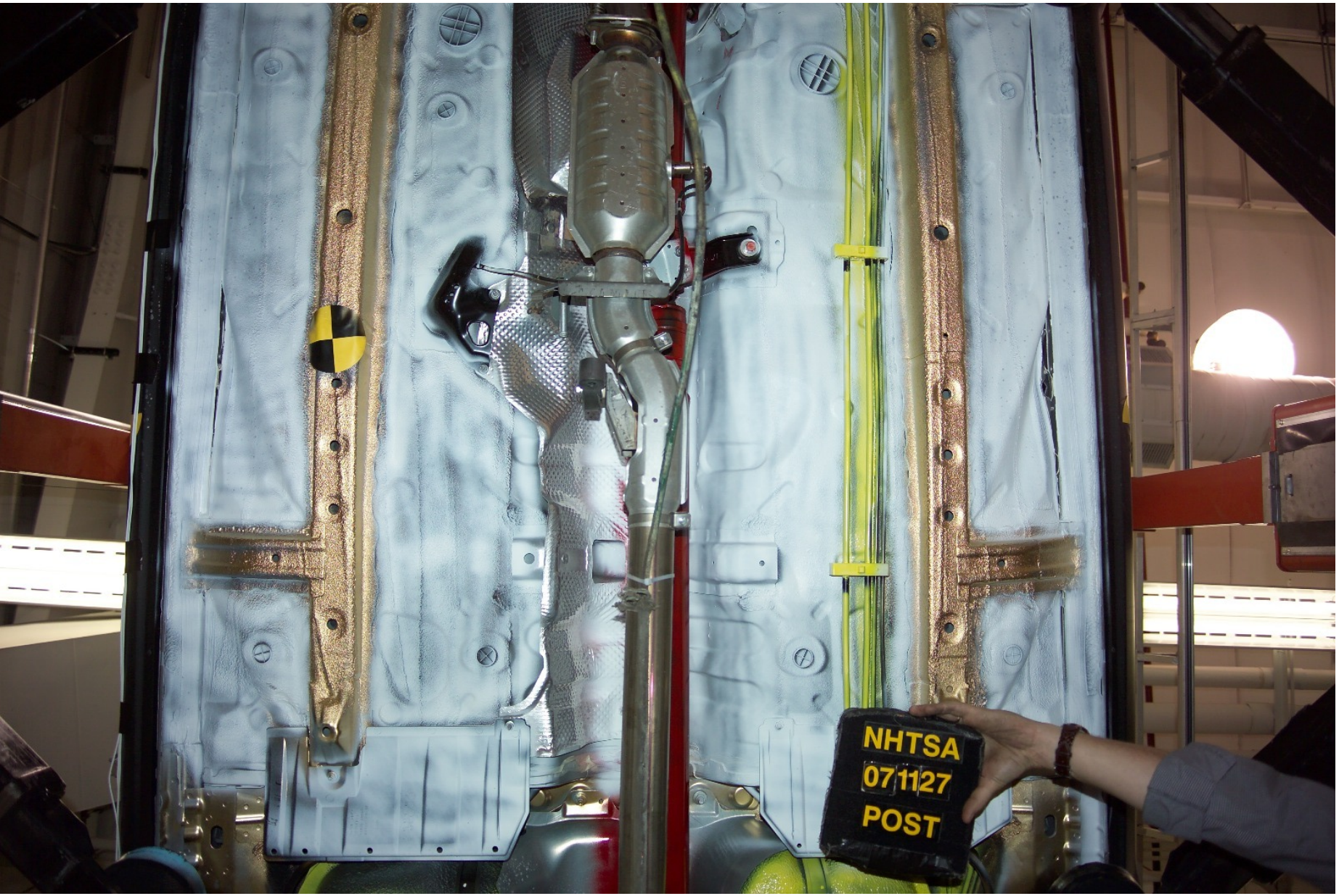


Figure A-24 Post-Test Mid Underbody View

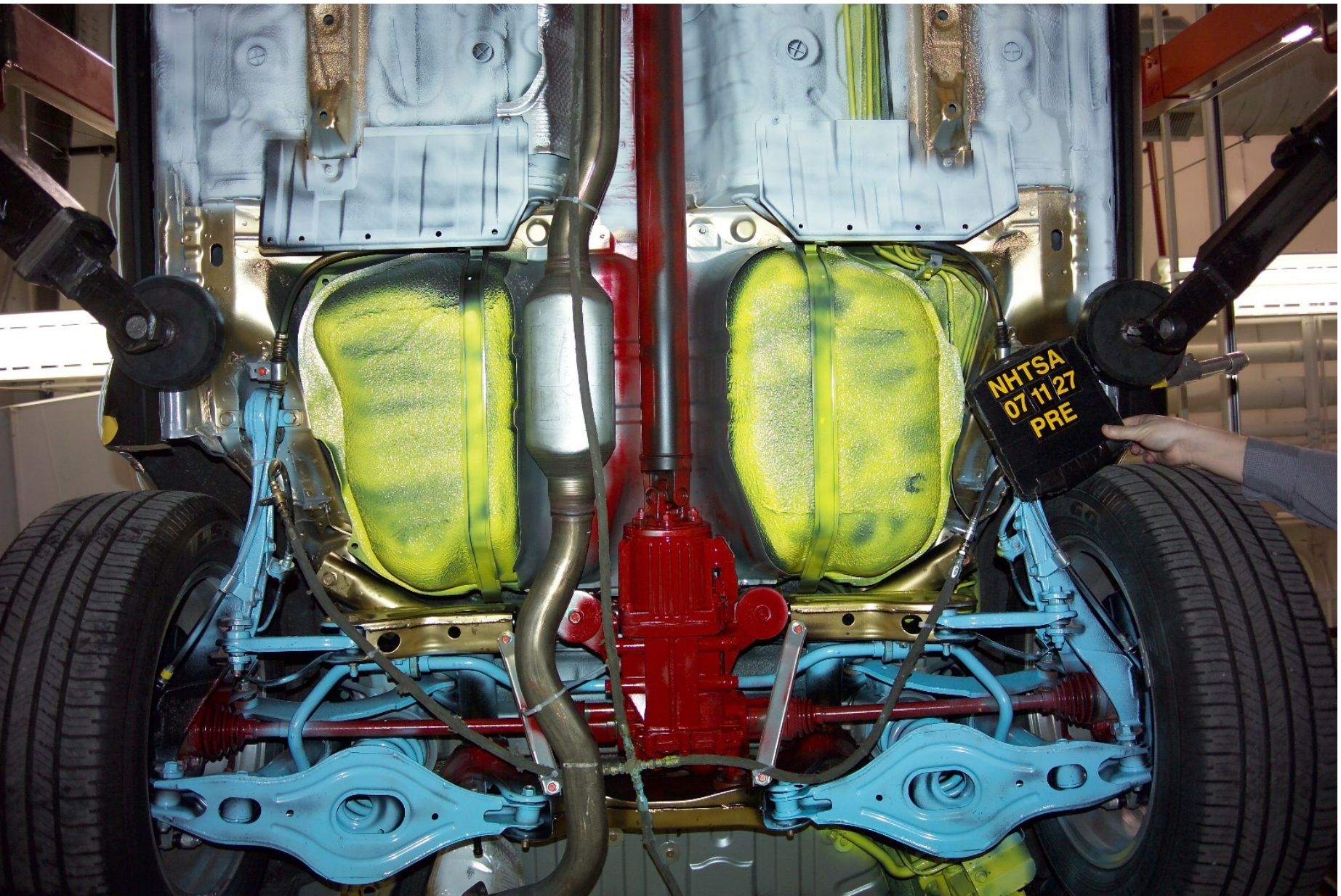


Figure A-25 Pre-Test Mid Rear Underbody View

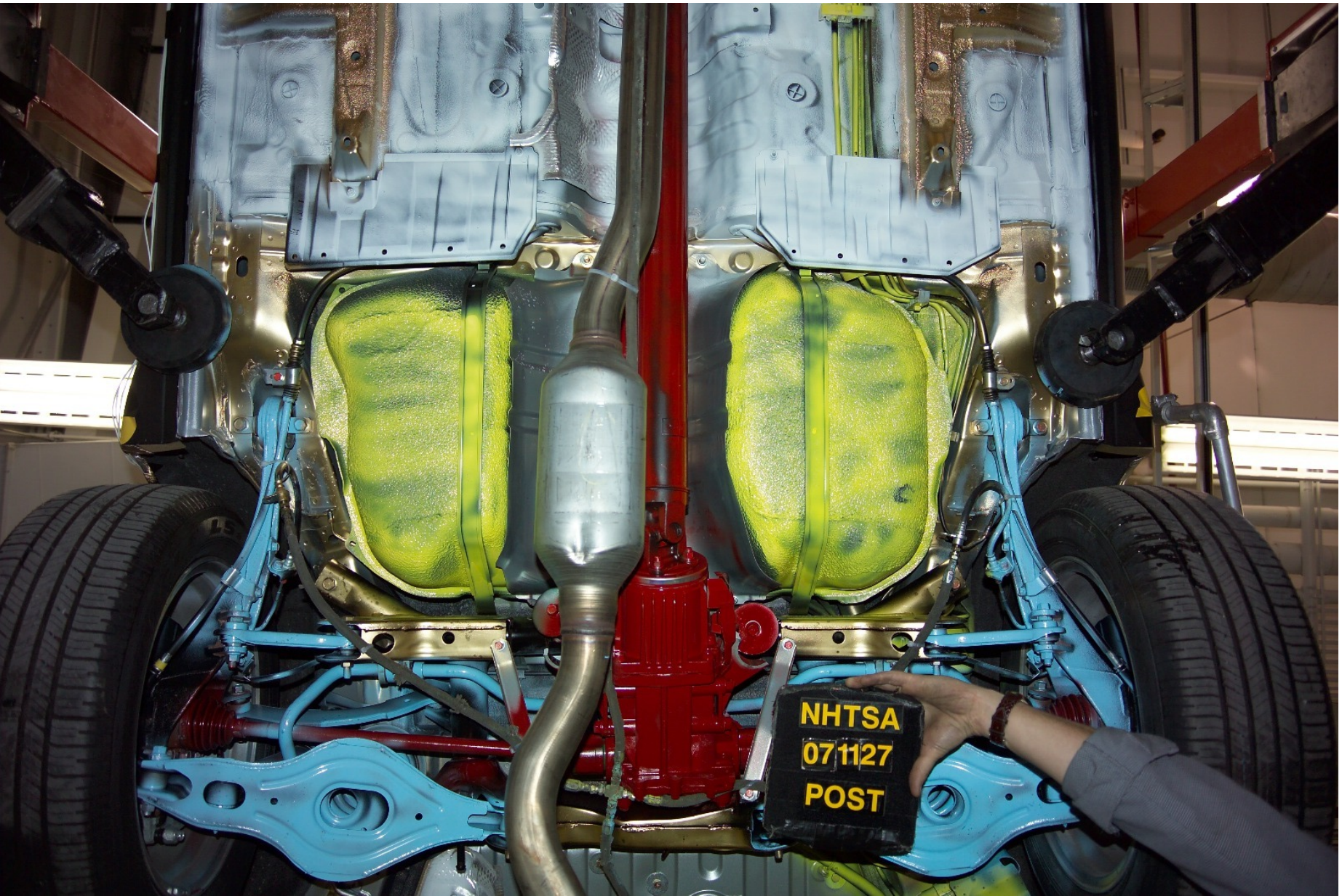


Figure A-26 Post-Test Mid Rear Underbody View

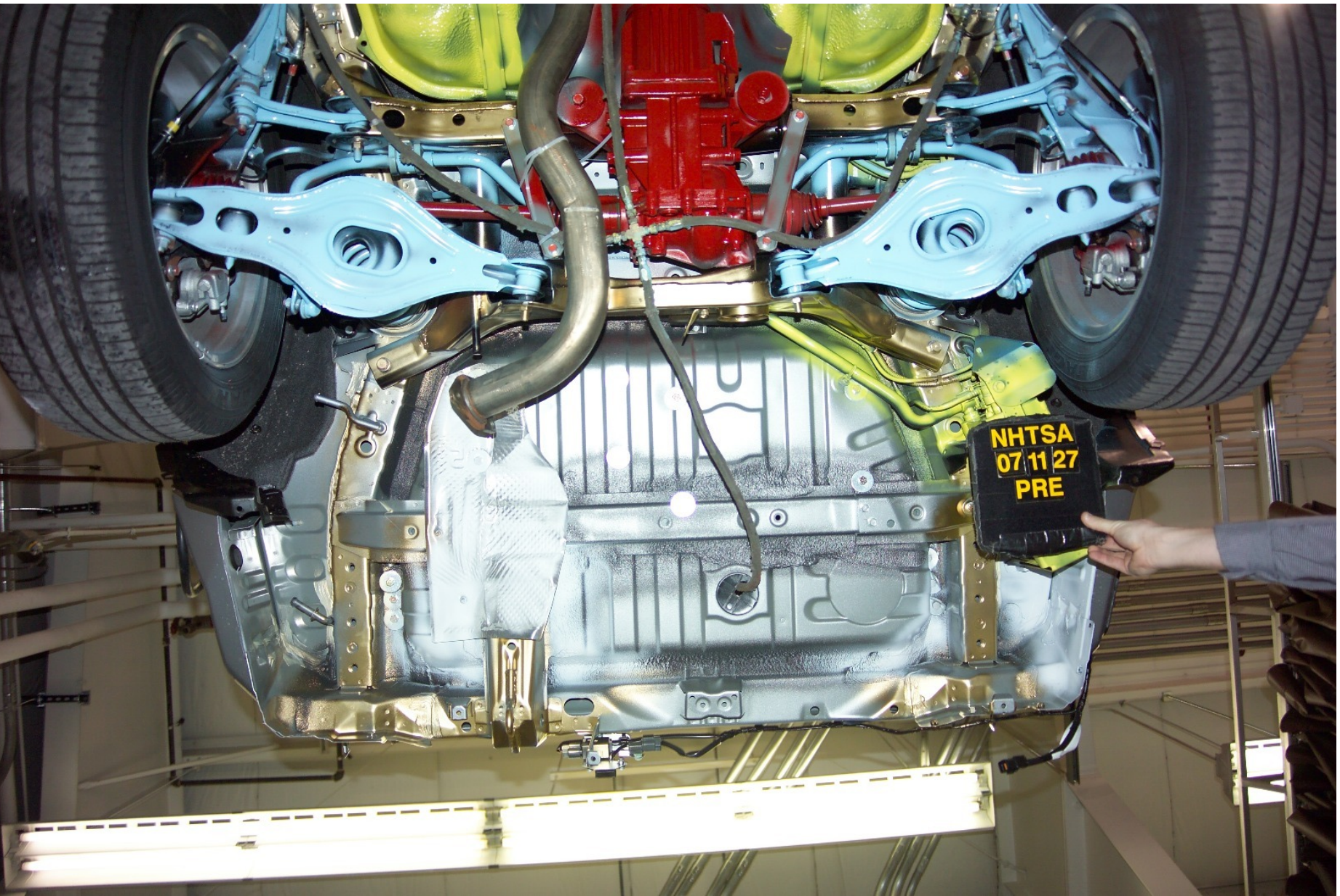


Figure A-27 Pre-Test Rear Underbody View

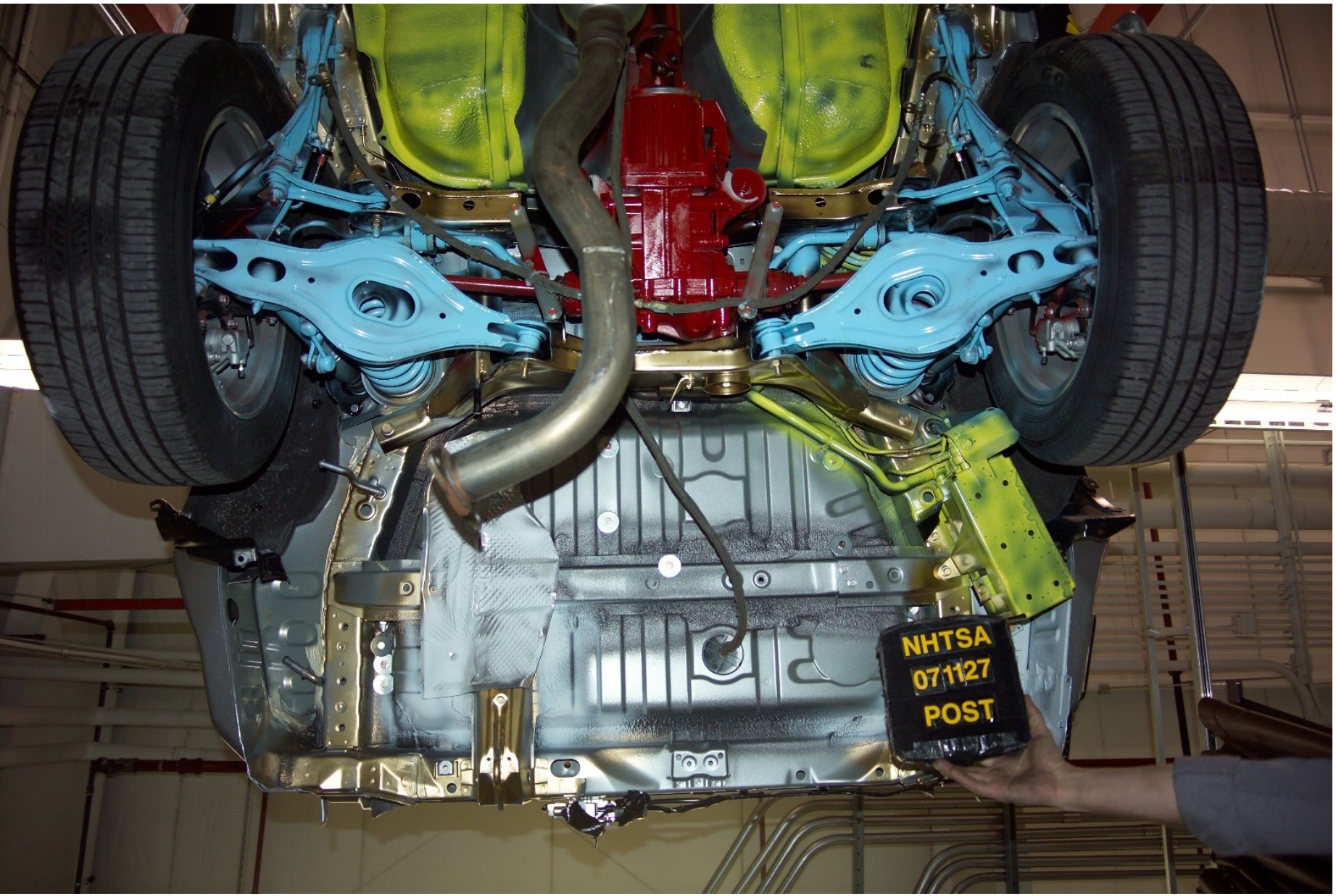


Figure A-28 Post-Test Rear Underbody View

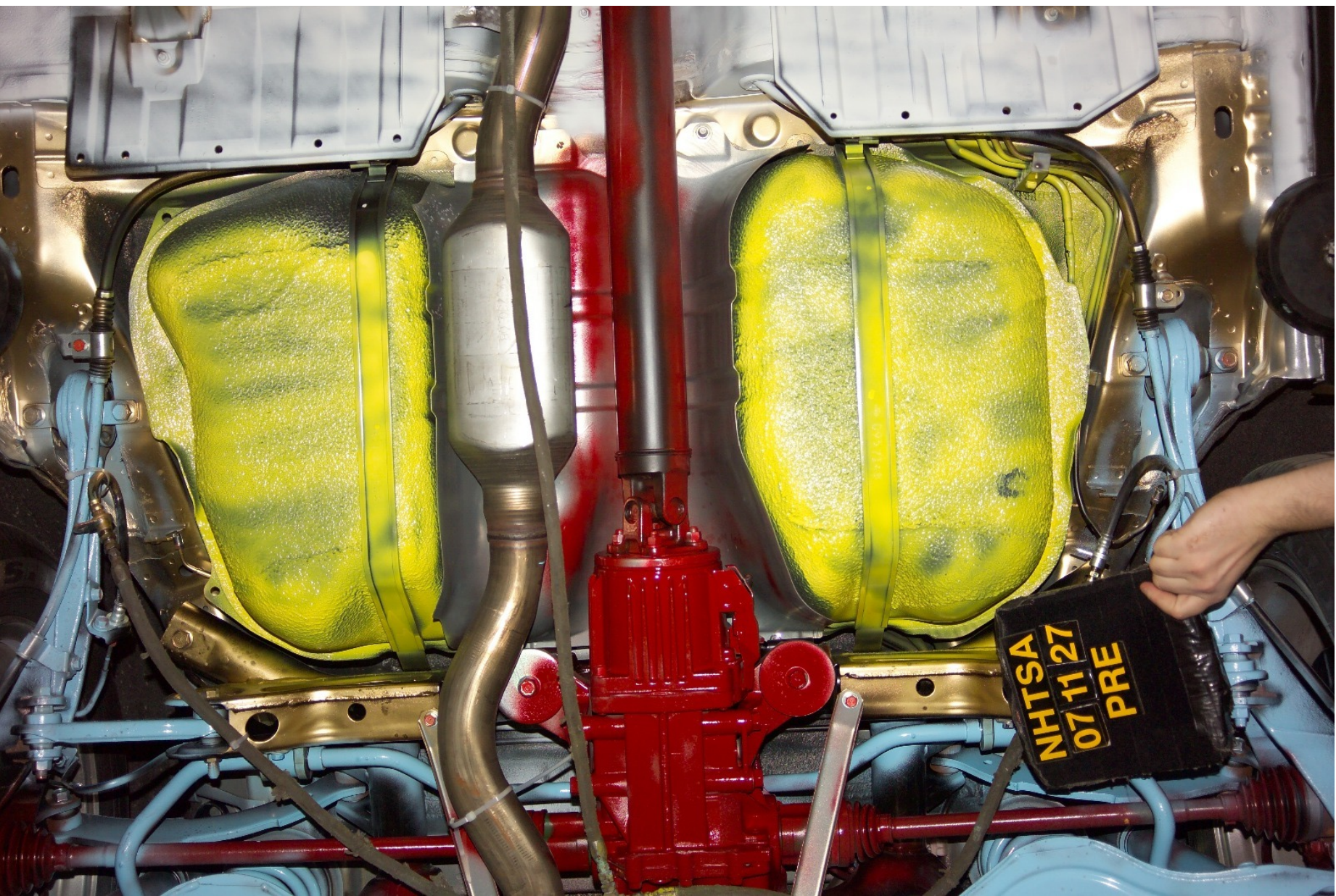


Figure A-29 Pre-Test Fuel Tank View

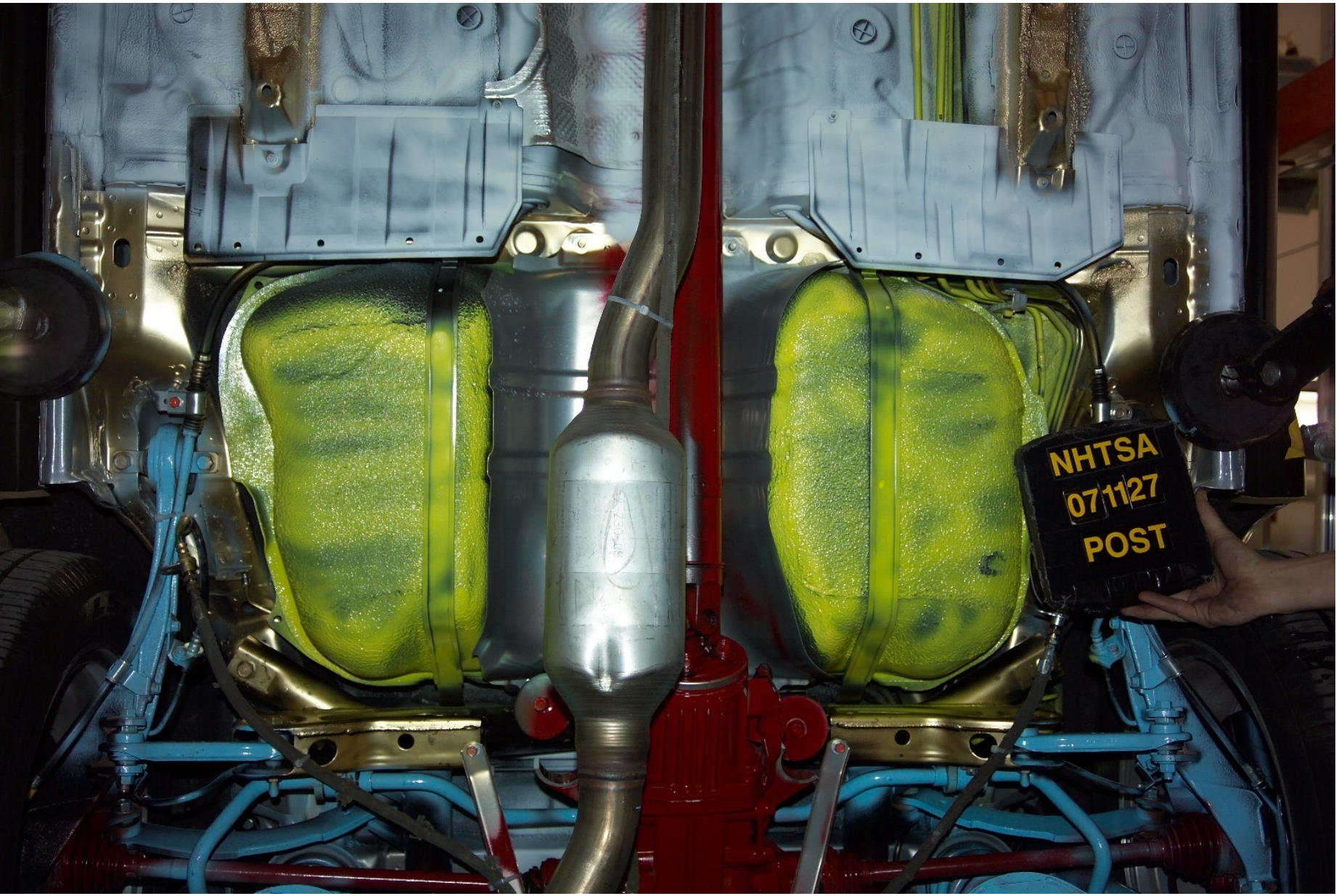


Figure A-30 Post-Test Fuel Tank View



Figure A-31 Pre-Test Fuel Filler Neck View

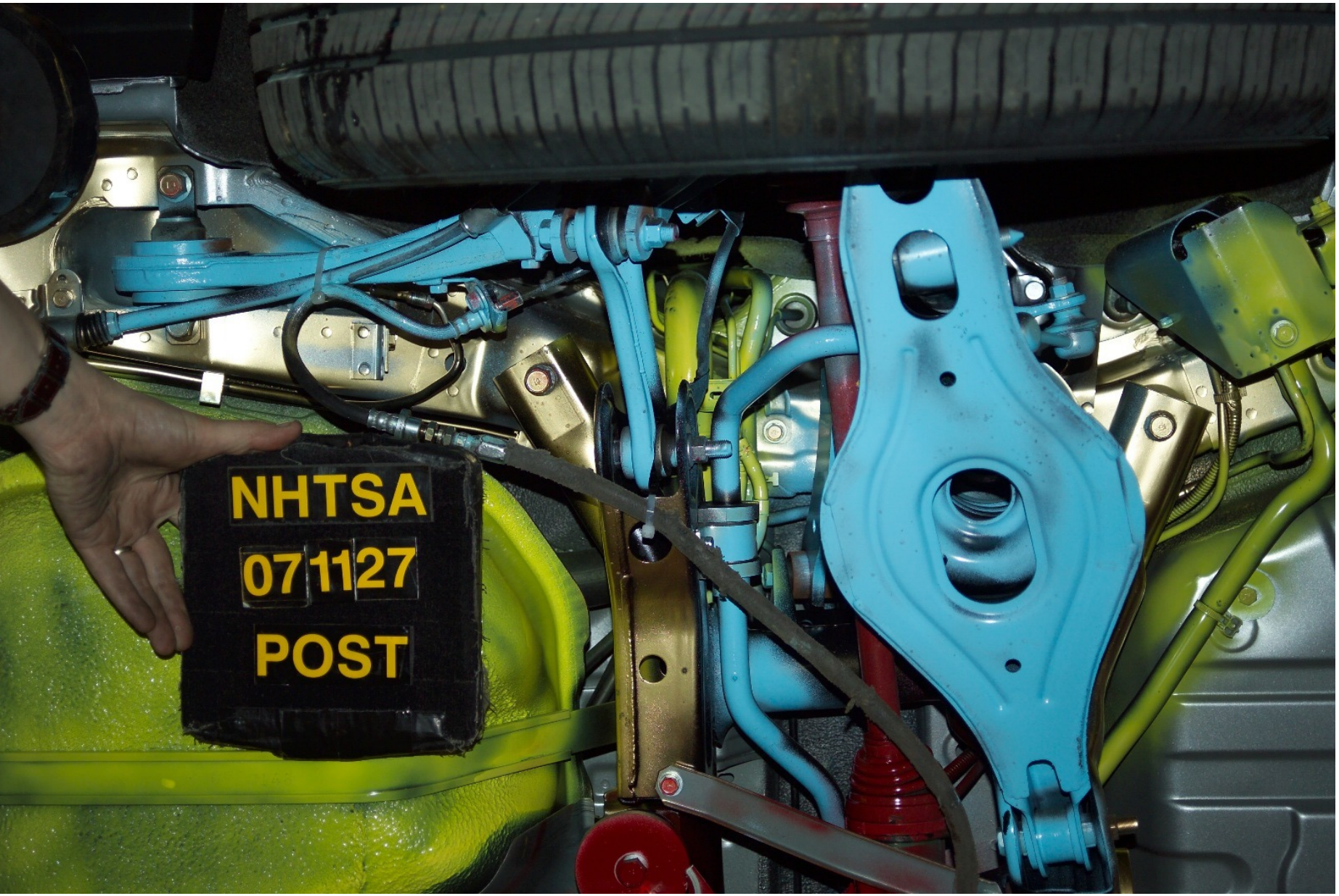


Figure A-32 Post-Test Fuel Filler Neck View



Figure A-33 Pre-Test Fuel Filler Cap View



Figure A-34 Post-Test Fuel Filler Cap View



Figure A-35 Pre-Test Engine Compartment View

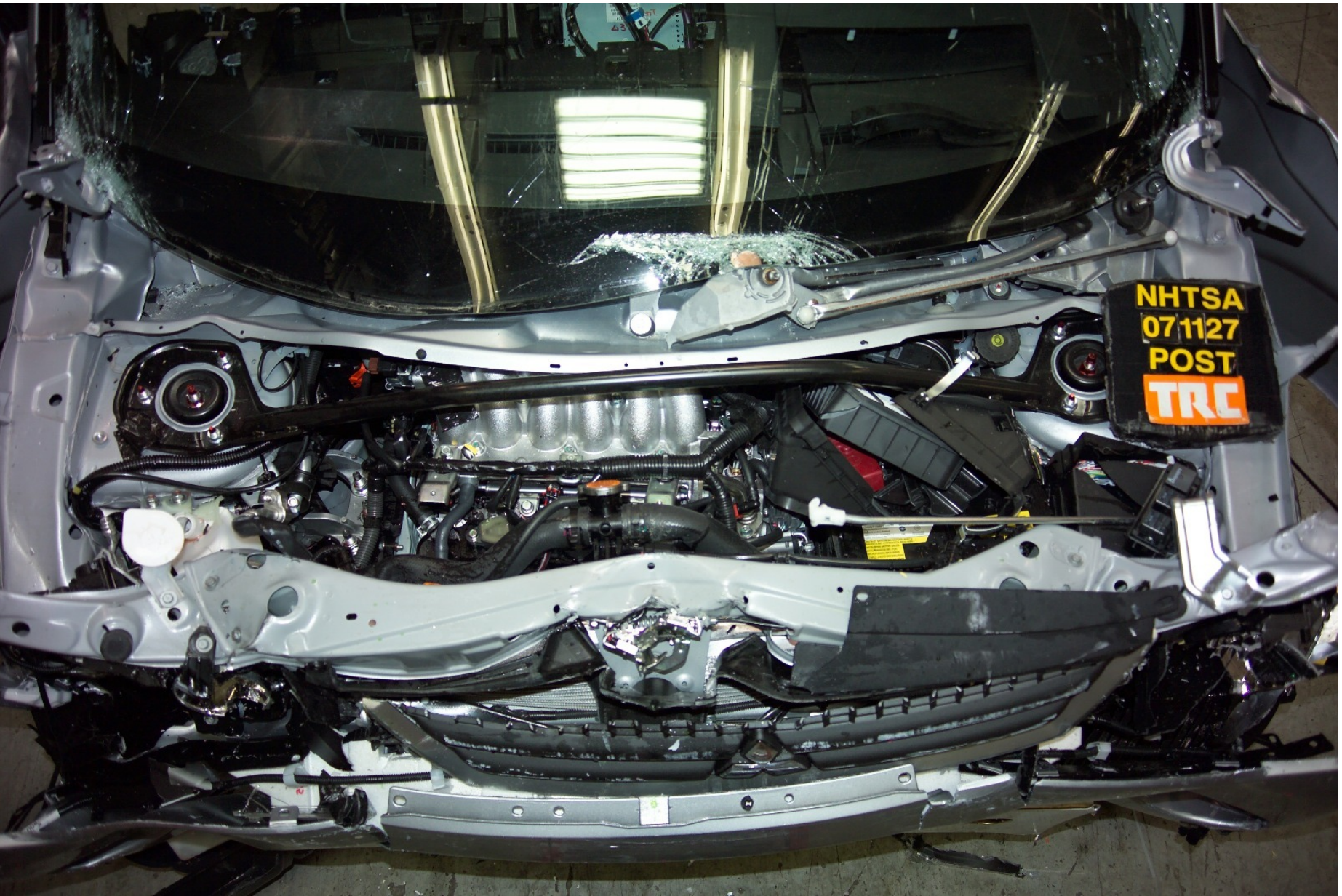


Figure A-36 Post-Test Engine Compartment View



Figure A-37 Pre-Test Windshield View



Figure A-38 Post-Test Windshield View



Figure A-39 Post-Test Windshield View without Cowl



Figure A-40 Pre-Test Windshield View - Left Side



Figure A-41 Post-Test Windshield View - Left Side

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Figure A-42 Post-Test Windshield View - Left Side without Cowl



Figure A-43 Pre-Test Windshield View - Right Side



Figure A-44 Post-Test Windshield View - Right Side



Figure A-45 Post-Test Windshield View - Right Side without Cowl



Figure A-46 Pre-Test Windshield View - Driver and Passenger Dummies



Figure A-47 Pre-Test Windshield View - Driver and Passenger Dummies



Figure A-48 Pre-Test Driver Dummy - View 1



Figure A-49 Post-Test Driver Dummy - View 1



Figure A-50 Pre-Test Driver Dummy - View 2



Figure A-51 Post-Test Driver Dummy - View 2



Figure A-52 Pre-Test Driver Dummy - View 3



Figure A-53 Post-Test Driver Dummy - View 3



Figure A-54 Pre-Test Driver Dummy - View 4

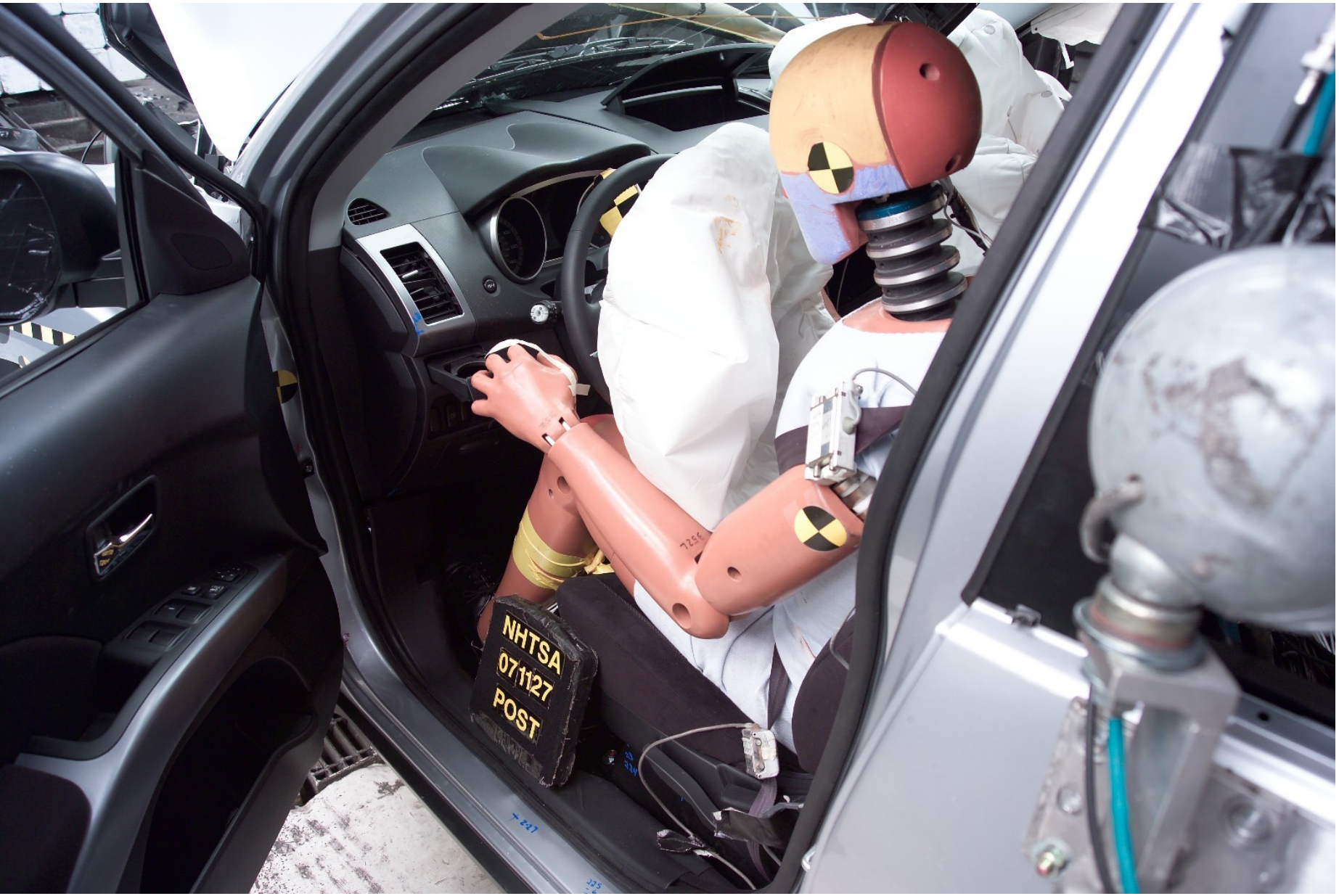


Figure A-55 Post-Test Driver Dummy - View 4

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Figure A-56 Pre-Test Driver Dummy Feet View



Figure A-57 Post-Test Driver Dummy Feet View

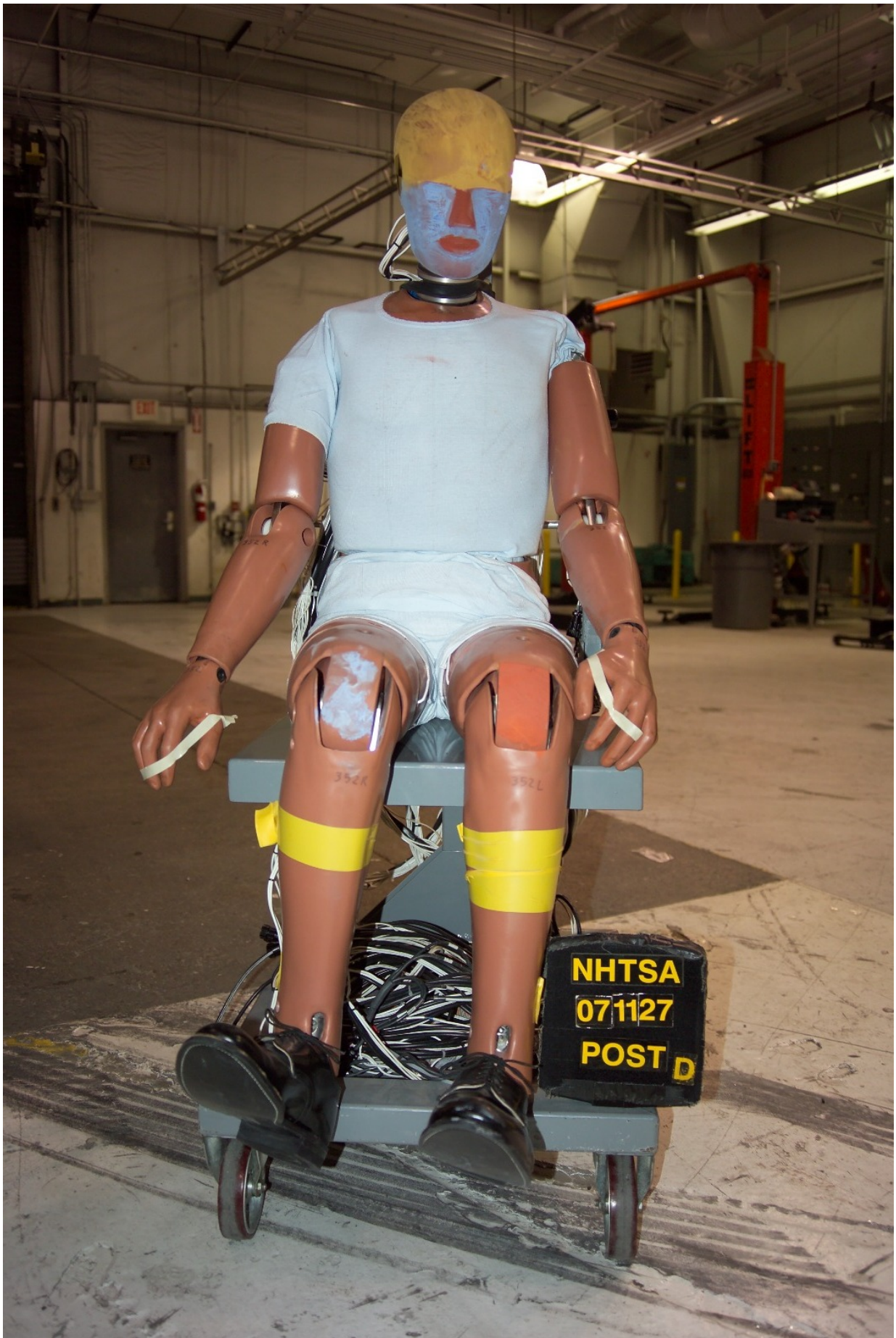


Figure A-58 Post-Test Driver Dummy Overall View



Figure A-59 Post-Test Driver Dummy Head Contact - View 1



Figure A-60 Post-Test Driver Dummy Head Contact - View 2



Figure A-61 Post-Test Driver Dummy Head Contact - View 3



Figure A-62 Post-Test Driver Dummy Knee Contact View



Figure A-63 Post-Test Driver Floorboard Deformation View



Figure A-64 Post-Test Driver Toeboard Deformation - View 1



Figure A-65 Post-Test Driver Toeboard Deformation - View 2



Figure A-66 Pre-Test Right Front Passenger Dummy - View 1



Figure A-67 Post-Test Right Front Passenger Dummy - View 1



Figure A-68 Pre-Test Right Front Passenger Dummy - View 2



Figure A-69 Post-Test Right Front Passenger Dummy - View 2

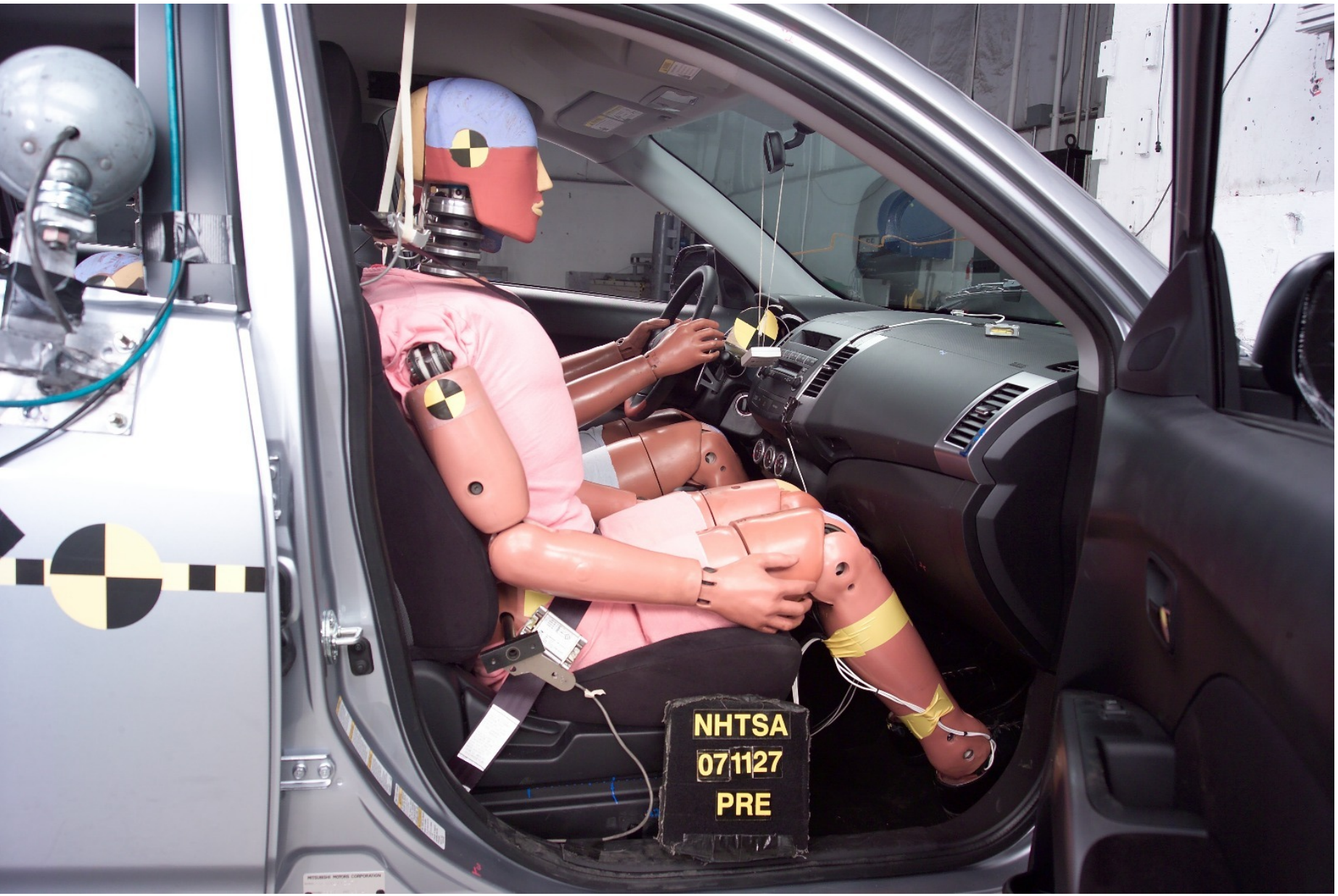


Figure A-70 Pre-Test Right Front Passenger Dummy - View 3



Figure A-71 Post-Test Right Front Passenger Dummy - View 3



Figure A-72 Pre-Test Right Front Passenger Dummy - View 4



Figure A-73 Post-Test Right Front Passenger Dummy - View 4

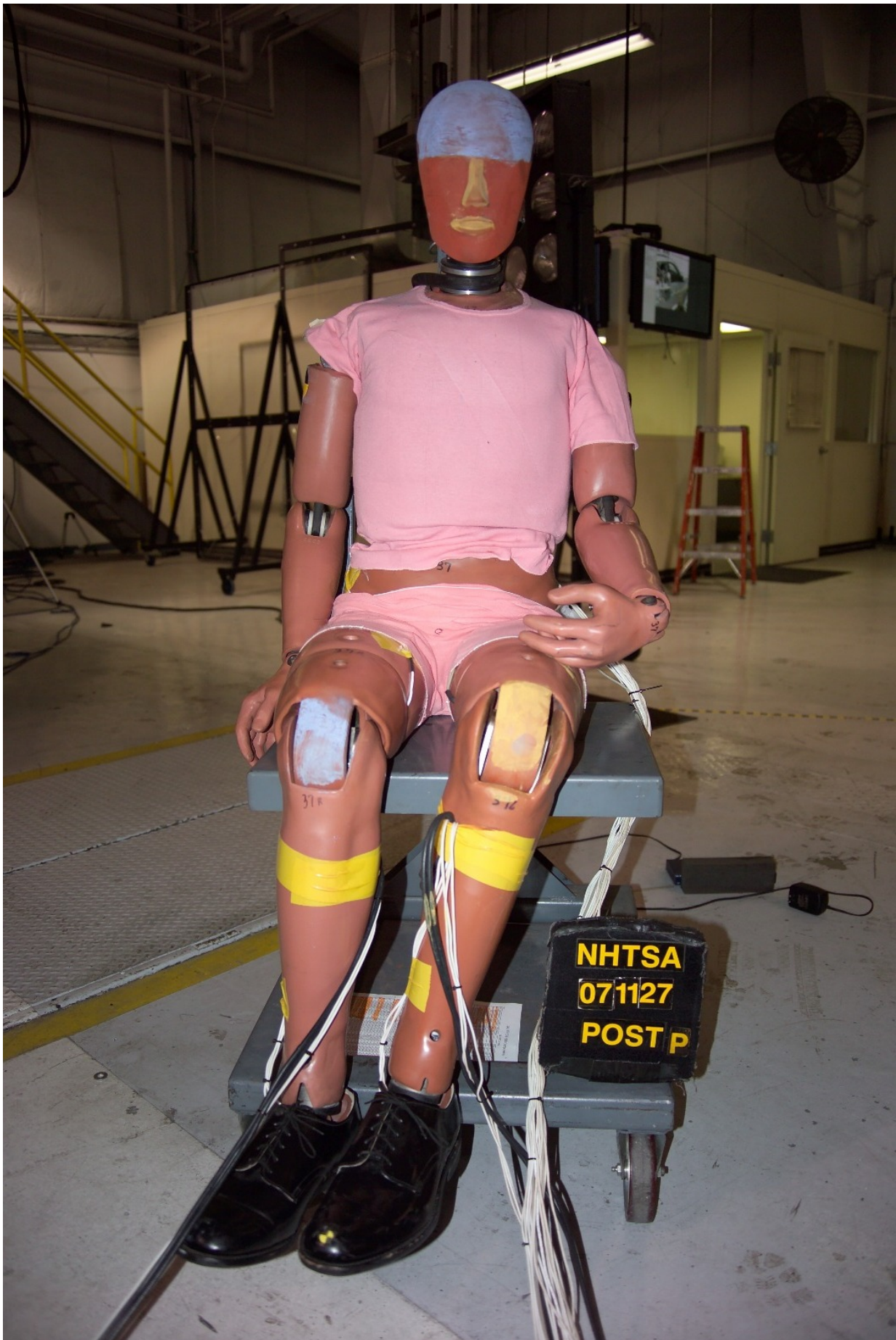


Figure A-74 Post-Test Right Front Passenger Dummy Overall View



Figure A-75 Post-Test Right Front Passenger Dummy Head Contact - View 1



Figure A-76 Post-Test Right Front Passenger Dummy Head Contact - View 2



Figure A-77 Post-Test Right Front Passenger Dummy Knee Contact View



Figure A-78 Post-Test Glove Box Damage View



Figure A-79 Post-Test Right Front Passenger Floorboard Deformation View



Figure A-80 Post-Test Right Front Passenger Toeboard Deformation View

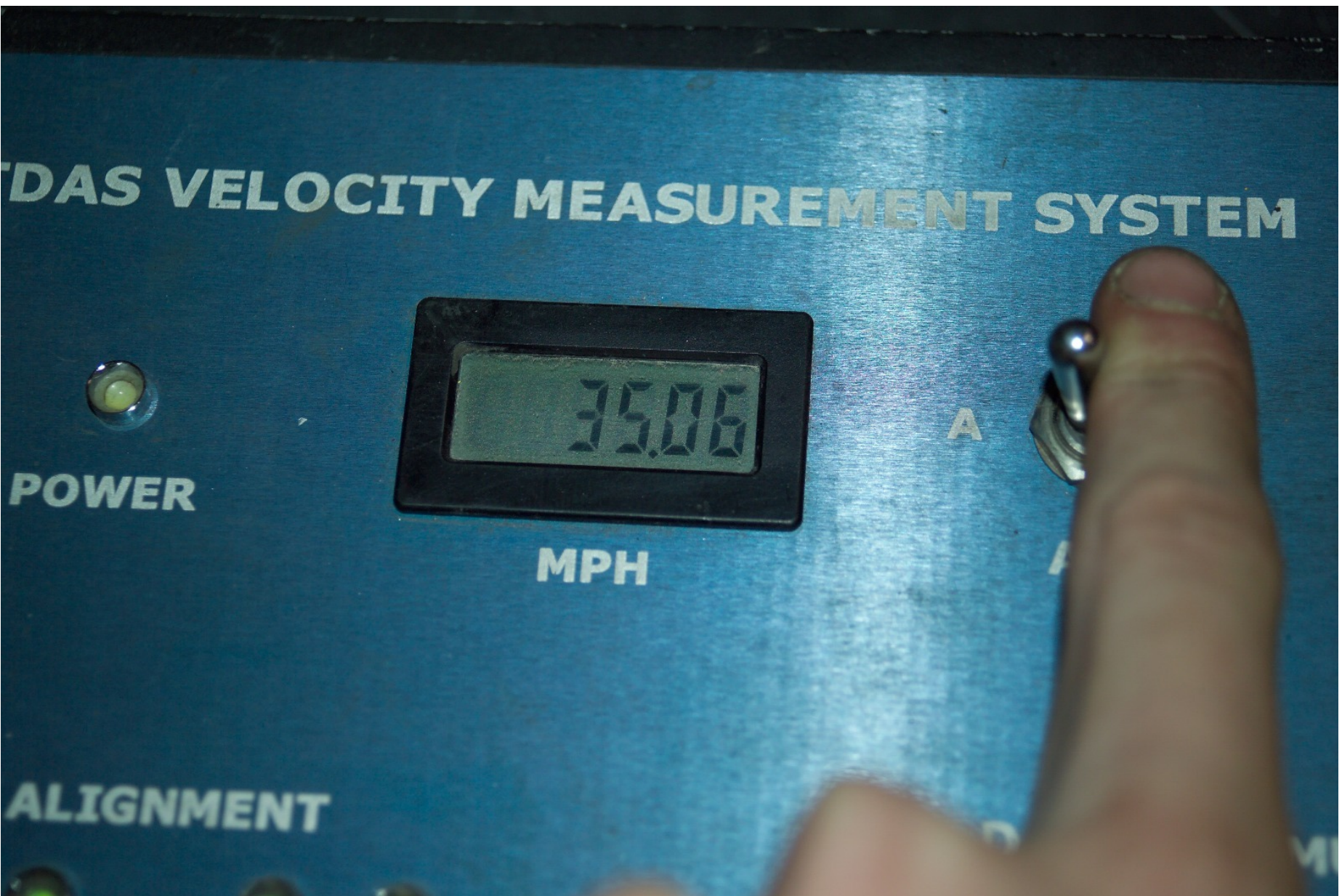


Figure A-81 Post-Test Light Trap Digital Read-Out - View 1

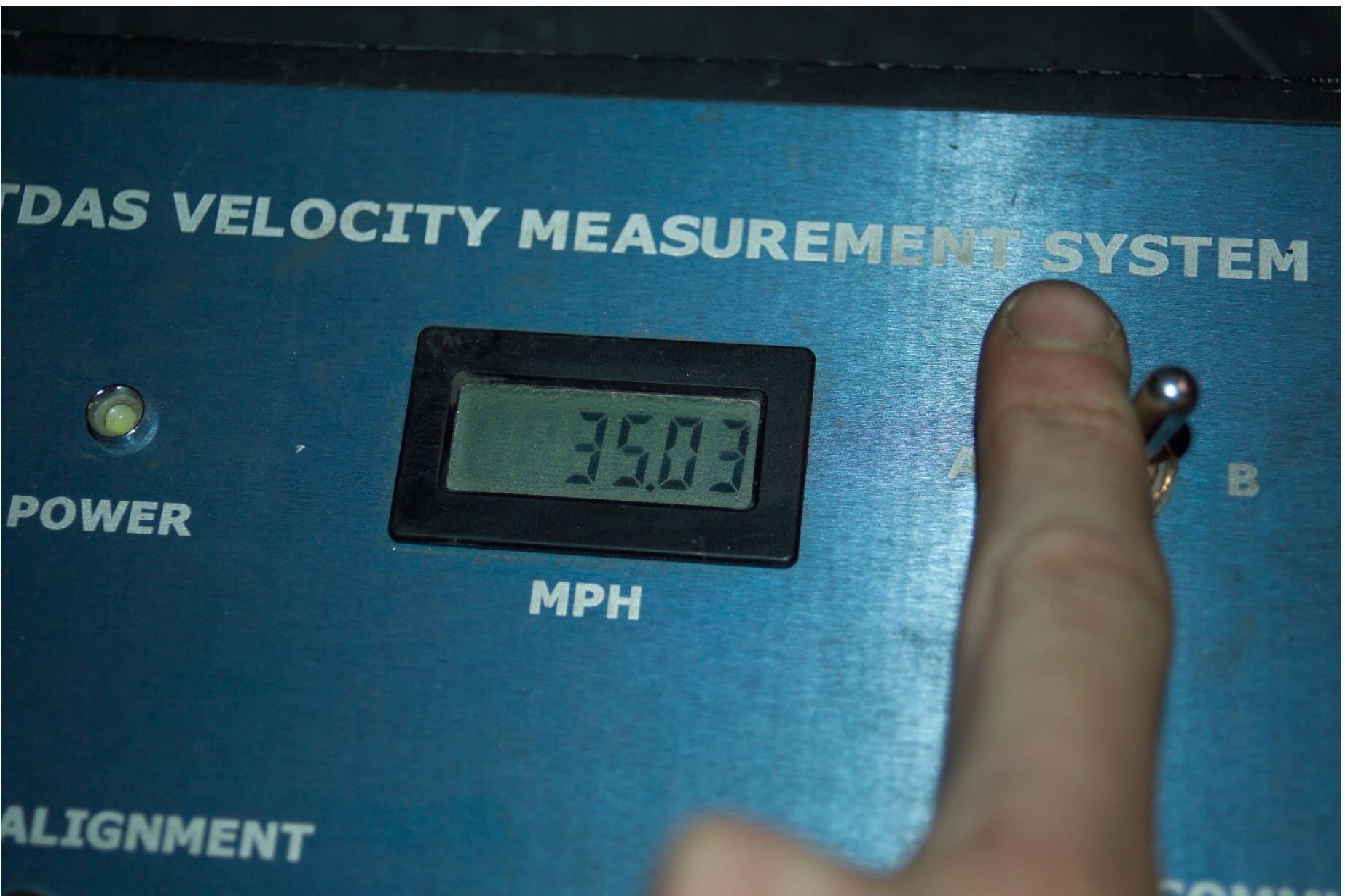


Figure A-82 Post-Test Light Trap Digital Read-Out - View 2

MFD. BY MITSUBISHI MOTORS CORPORATION

JAPAN
SEP 2007

GVWR 5181LBS/2350KG
GAWR 2403LBS/1090KG WITH P225/55R18
FR 18X7.0J RIMS AT 220KPA/32PSI COLD. TIRES
GAWR 2800LBS/1270KG WITH P225/55R18
RR 18X7.0J RIMS AT 220KPA/32PSI COLD. TIRES

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY AND THEFT
PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

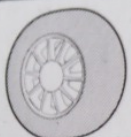
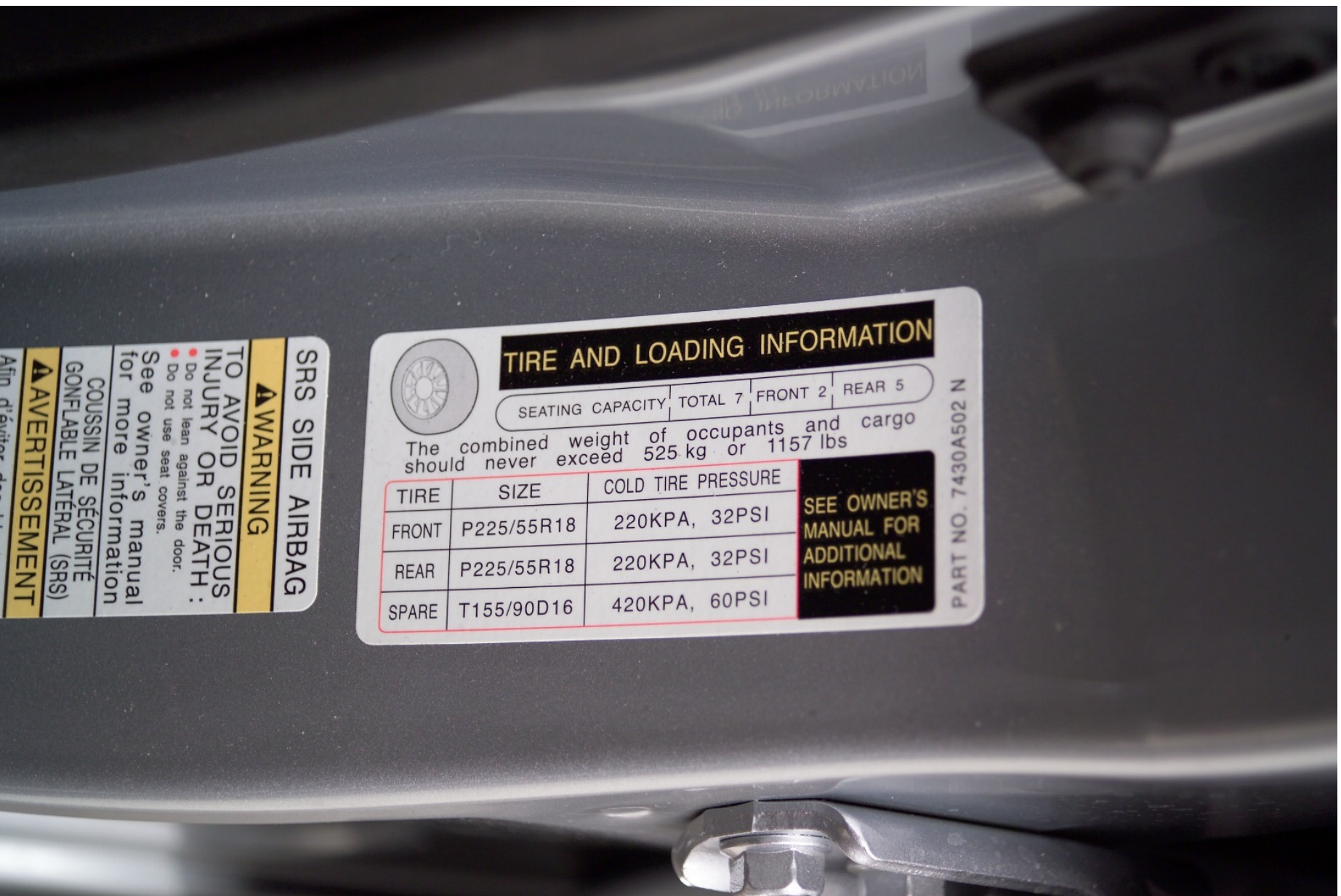


JA4MT41X18Z002398

VEHICLE TYPE:MPV

MU001370

Figure A-83 Vehicle Certification Label View



TIRE AND LOADING INFORMATION

SEATING CAPACITY TOTAL 7 FRONT 2 REAR 5

The combined weight of occupants and cargo should never exceed 525 kg or 1157 lbs

TIRE	SIZE	COLD TIRE PRESSURE
FRONT	P225/55R18	220KPA, 32PSI
REAR	P225/55R18	220KPA, 32PSI
SPARE	T155/90D16	420KPA, 60PSI

SEE OWNER'S
MANUAL FOR
ADDITIONAL
INFORMATION

PART NO. 7430A502 N

SRS SIDE AIRBAG

⚠ WARNING

TO AVOID SERIOUS
INJURY OR DEATH:

- Do not lean against the door.
- Do not use seat covers.

See owner's manual
for more information

COUSSIN DE SÉCURITÉ
GONFLABLE LATÉRAL (SRS)

⚠ AVERTISSEMENT

Align driver's seat

Figure A-84 Vehicle Tire Load Label View



Figure A-85 EMVSS 301 Rollover View at 90°

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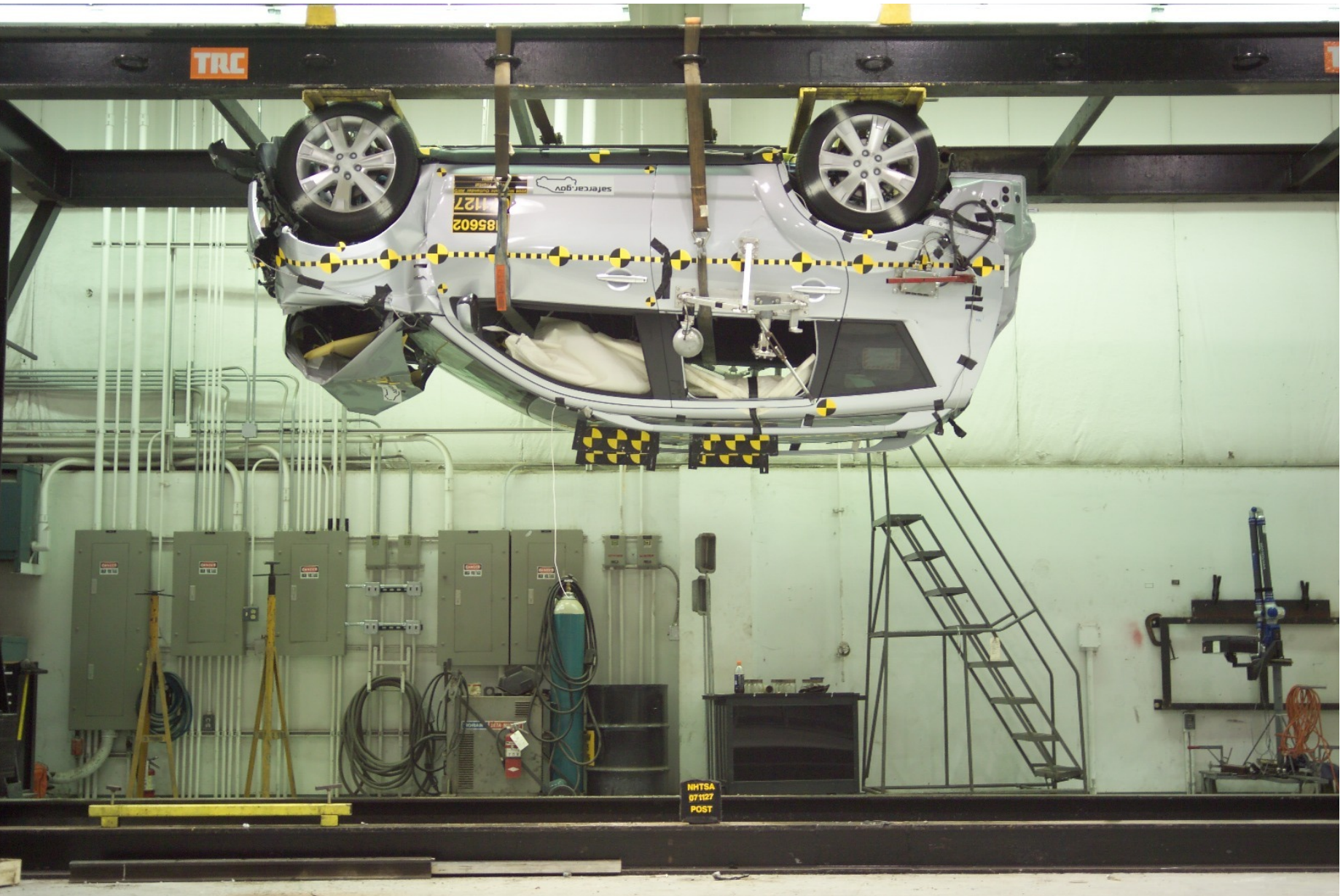


Figure A-86 FMVSS 301 Rollover View at 180°

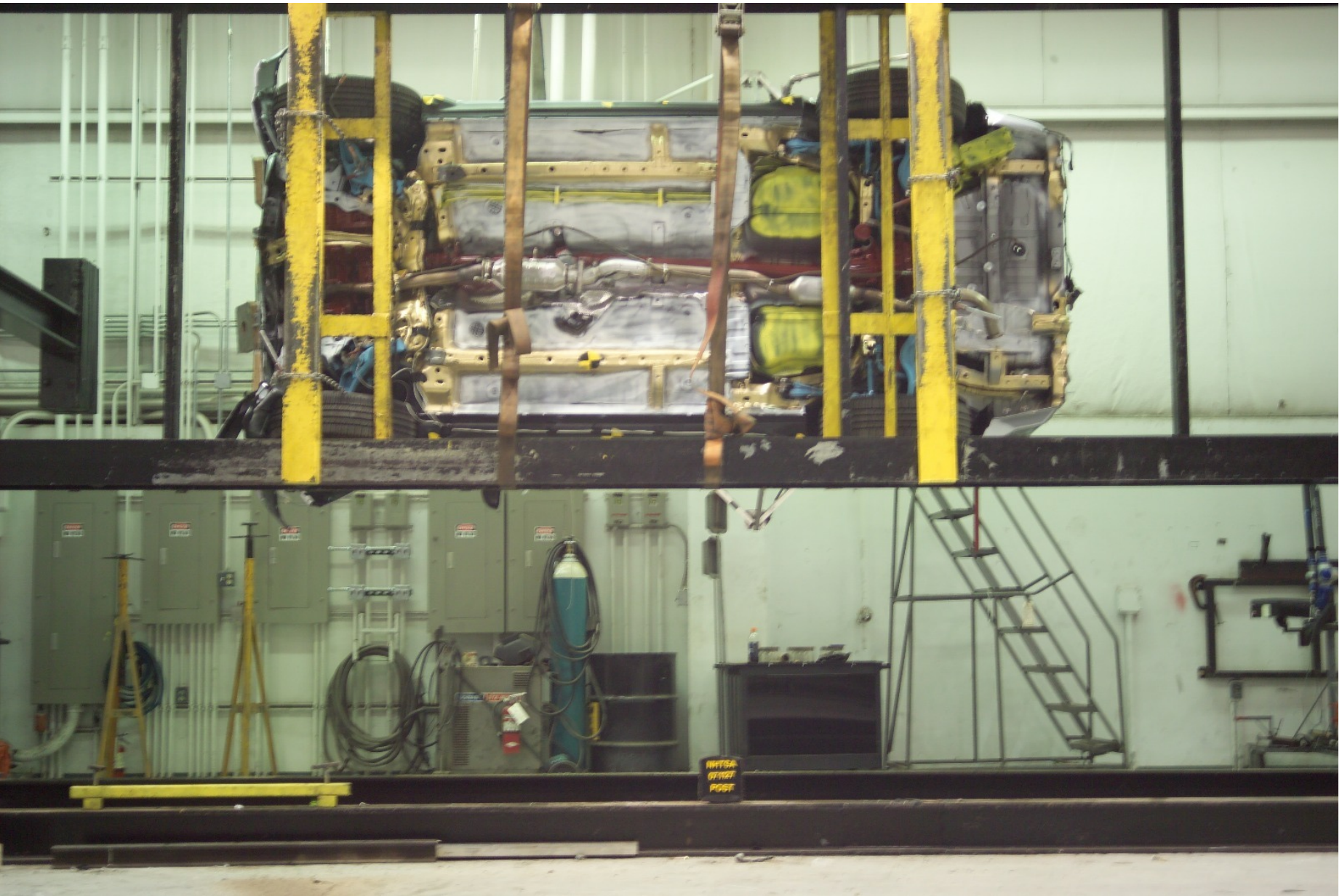


Figure A-87 FMVSS 301 Rollover View at 270°



Figure A-88 FMVSS 301 Rollover View at 360°



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Figure A-89 Pre-Test Barrier Front View

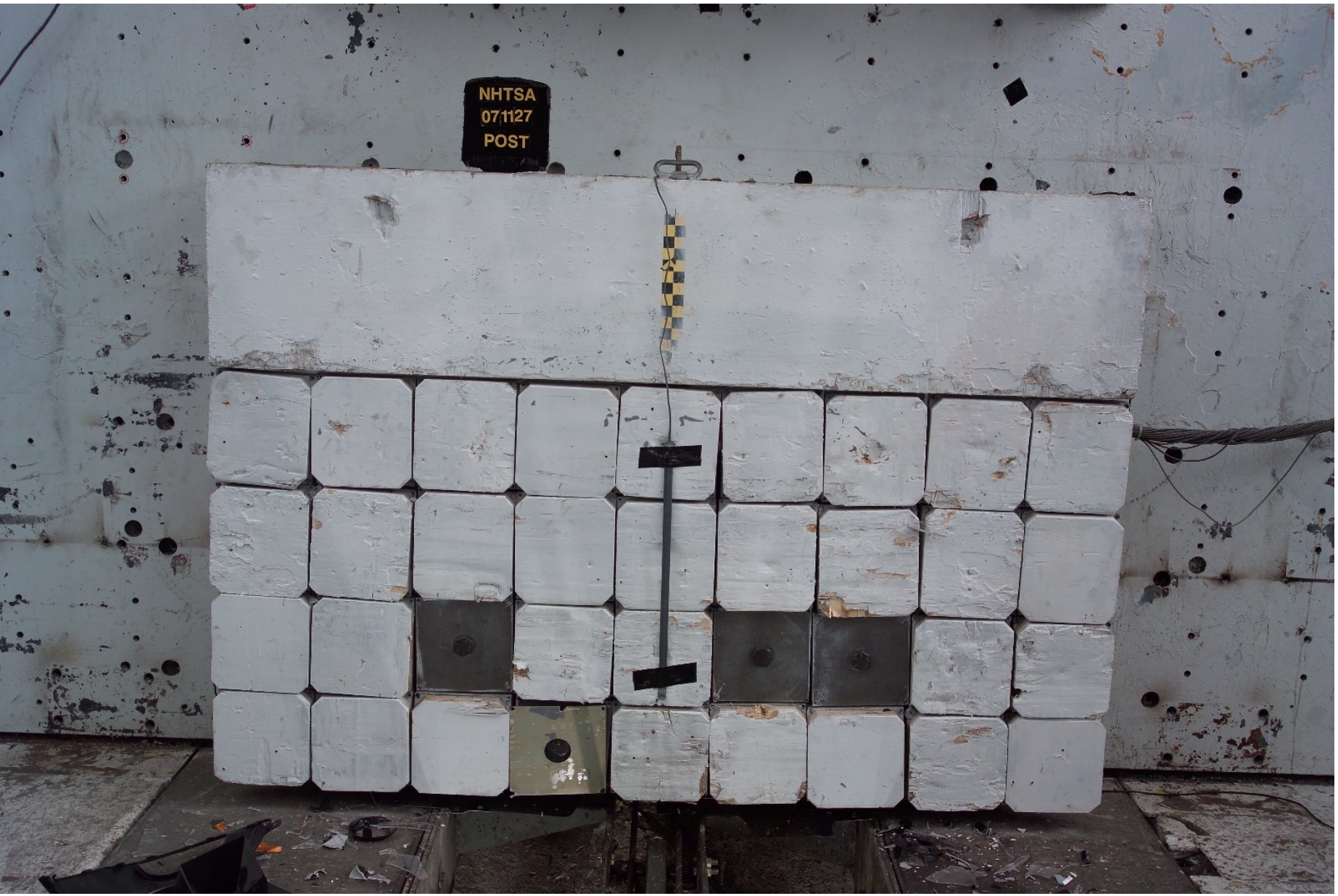


Figure A-90 Post-Test Barrier Front View



Figure A-91 Impact Event

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Figure A-92 Pre-Test Driver Floorboard - View 1



Figure A-93 Post-Test Driver Floorboard - View 1



Figure A-94 Pre-Test Driver Floorboard - View 2



Figure A-95 Post-Test Driver Floorboard - View 2



Figure A-96 Pre-Test Driver Floorboard - View 3



Figure A-97 Post-Test Driver Floorboard - View 3



Figure A-98 Pre-Test Driver Floorboard - View 4



Figure A-99 Post-Test Driver Floorboard - View 4



Figure A-100 Pre-Test Driver Floorboard - View 5



Figure A-101 Post-Test Driver Floorboard - View 5



Figure A-102 Pre-Test Driver Floorboard - View 6



Figure A-103 Post-Test Driver Floorboard - View 6



Figure A-104 Pre-Test Driver Floorboard - View 7



Figure A-105 Post-Test Driver Floorboard - View 7

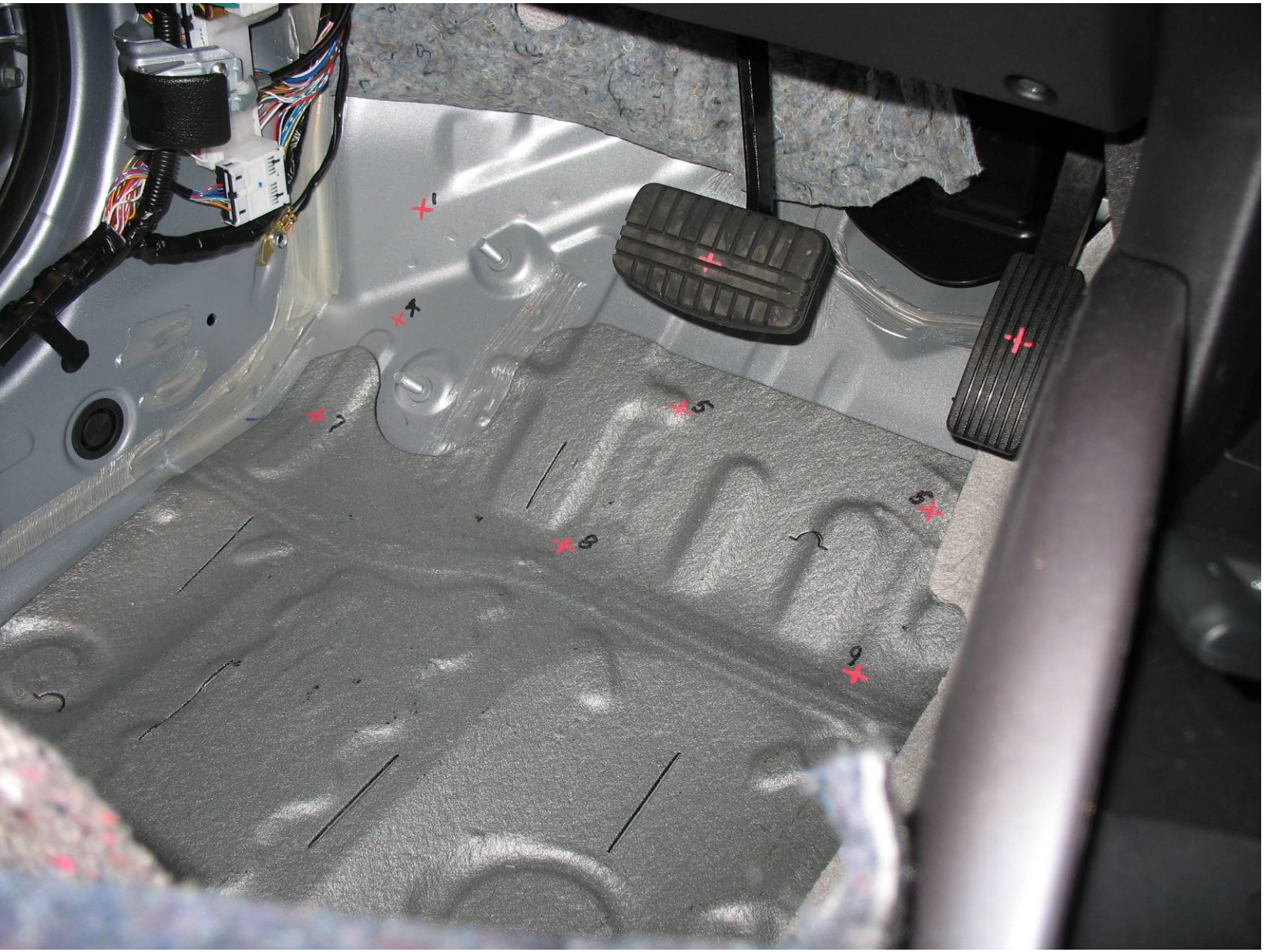


Figure A-106 Pre-Test Driver Floorboard - View 8



Figure A-107 Post-Test Driver Floorboard - View 8



Figure A-108 Pre-Test Right Front Passenger Floorboard - View 1



Figure A-109 Post-Test Right Front Passenger Floorboard - View 1



Figure A-110 Pre-Test Right Front Passenger Floorboard - View 2



Figure A-111 Post-Test Right Front Passenger Floorboard - View 2



Figure A-112 Pre-Test Right Front Passenger Floorboard - View 3



Figure A-113 Post-Test Right Front Passenger Floorboard - View 3



Figure A-114 Pre-Test Right Front Passenger Floorboard - View 4



Figure A-115 Post-Test Right Front Passenger Floorboard - View 4



Figure A-116 Pre-Test Right Front Passenger Floorboard - View 5



Figure A-117 Post-Test Right Front Passenger Floorboard - View 5



Figure A-118 Pre-Test Right Front Passenger Floorboard - View 6



Figure A-119 Post-Test Right Front Passenger Floorboard - View 6



Figure A-120 Pre-Test Right Front Passenger Floorboard - View 7



Figure A-121 Post-Test Right Front Passenger Floorboard - View 7



Figure A-122 Pre-Test Right Front Passenger Floorboard - View 8

APPENDIX B
SID/HIII, VEHICLE AND MDB RESPONSE DATA

Data Plot	LIST OF DATA PLOTS PROVIDED IN THE TEST REPORT	Page
B-1	Driver Head Primary X	B-7
B-1	Driver Head Primary Y	B-7
B-1	Driver Head Primary Z	B-7
B-1	Driver Head Resultant Primary	B-7
B-2	Driver Chest Primary X	B-8
B-2	Driver Chest Primary Y	B-8
B-2	Driver Chest Primary Z	B-8
B-2	Driver Chest Resultant Primary	B-8
B-3	Driver Left Femur Force Z	B-9
B-3	Driver Right Femur Force Z	B-9
B-4	Right Front Passenger Head Primary X	B-10
B-4	Right Front Passenger Head Primary Y	B-10
B-4	Right Front Passenger Head Primary Z	B-10
B-4	Right Front Passenger Head Resultant Primary	B-10
B-5	Right Front Passenger Chest Primary X	B-11
B-5	Right Front Passenger Chest Primary Y	B-11
B-5	Right Front Passenger Chest Primary Z	B-11
B-5	Right Front Passenger Chest Resultant	B-11
B-6	Right Front Passenger Left Femur Force Z	B-12
B-6	Right Front Passenger Right Femur Force Z	B-12

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

Data Plot	LIST OF DATA PLOTS (CONTINUED)
	Driver Head X Redundant
	Driver Head Y Redundant
	Driver Head Z Redundant
	Driver Head Resultant 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 Resultant Redundant
	Driver Chest Displacement
	Driver Pelvis X
	Driver Pelvis Y
	Driver Pelvis Z
	Driver Pelvis Resultant
	Driver Left Femur Z Force
	Driver Right Femur Z Force
	Driver Left Upper Tibia Moment X
	Driver Left Upper Tibia Moment Y
	Driver Left Lower Tibia Force Z
	Driver Left Lower Tibia Moment X
	Driver Left Lower Tibia Moment Y
	Driver Left Foot X
	Driver Left Foot Z
	Driver Left Toe Z
	Driver Right Upper Tibia Moment X
	Driver Right Upper Tibia Moment Y
	Driver Right Lower Tibia Force Z
	Driver Right Lower Tibia Moment X

Data Plot	LIST OF DATA PLOTS (CONTINUED)
-----------	--------------------------------

	Driver Right Lower Tibia Moment Y
	Driver Right Foot X
	Driver Right Foot Z
	Driver Right Toe Z
	Passenger Head X Redundant
	Passenger Head Y Redundant
	Passenger Head Z Redundant
	Passenger Head Resultant 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 Resultant Redundant
	Passenger Chest Displacement
	Passenger Pelvis X
	Passenger Pelvis Y
	Passenger Pelvis Z
	Passenger Pelvis Resultant
	Passenger Left Femur Z Force
	Passenger Right Femur Z Force
	Passenger Left Upper Tibia Moment X
	Passenger Left Upper Tibia Moment Y
	Passenger Left Lower Tibia Force Z
	Passenger Left Lower Tibia Moment X
	Passenger Left Lower Tibia Moment Y
	Passenger Left Foot X
	Passenger Left Foot Z
	Passenger Left Toe Z
	Passenger Right Upper Tibia Moment X
	Passenger Right Upper Tibia Moment Y
	Passenger Right Lower Tibia Force Z

Data Plot	LIST OF DATA PLOTS (CONTINUED)
-----------	--------------------------------

	Passenger Right Lower Tibia Moment X
	Passenger Right Lower Tibia Moment Y
	Passenger Right Foot X
	Passenger Right Foot Z
	Passenger Right Toe Z
	Vehicle Left Rear Crossmember X
	Vehicle Right Rear Crossmember X
	Vehicle Left Rear Crossmember Z
	Vehicle Right Rear Crossmember Z
	Vehicle Top of Engine Block X
	Vehicle Bottom of Engine Block X
	Vehicle Right Brake Caliper X
	Vehicle Left Brake Caliper X
	Vehicle Instrument Panel X
	Vehicle Instrument Panel Velocity
	Vehicle Instrument Panel Displacement
	Driver Lap Belt Force
	Driver Shoulder Belt Force
	Passenger Lap Belt Force
	Passenger Shoulder Belt Force
	Driver Belt Elongation
	Passenger Belt Elongation
	Barrier Load Cell A1
	Barrier Load Cell A2
	Barrier Load Cell A3
	Barrier Load Cell A4
	Barrier Load Cell A5
	Barrier Load Cell A6
	Barrier Load Cell A7
	Barrier Load Cell A8
	Barrier Load Cell A9
	Barrier Load Cell B1
	Barrier Load Cell B2
	Barrier Load Cell B3
	Barrier Load Cell B4
	Barrier Load Cell B5

Data Plot	LIST OF DATA PLOTS (CONTINUED)
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	Barrier Load Cell B7
	Barrier Load Cell B8
	Barrier Load Cell B9
	Barrier Load Cell C1
	Barrier Load Cell C2
	Barrier Load Cell C3
	Barrier Load Cell C4
	Barrier Load Cell C5
	Barrier Load Cell C6
	Barrier Load Cell C7
	Barrier Load Cell C8
	Barrier Load Cell C9
	Barrier Load Cell D1
	Barrier Load Cell D2
	Barrier Load Cell D3
	Barrier Load Cell D4
	Barrier Load Cell D5
	Barrier Load Cell D6
	Barrier Load Cell D7
	Barrier Load Cell D8
	Barrier Load Cell D9
	Barrier Load Cell Group 1 Force
	Barrier Load Cell Group 2 Force
	Barrier Load Cell Group 3 Force
	Barrier Load Cell Group 4 Force
	Barrier Load Cell Group 5 Force
	Barrier Load Cell Group 6 Force
	Barrier Load Cell Total Force

NHTSA

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Test Number: 071127 (M85602)

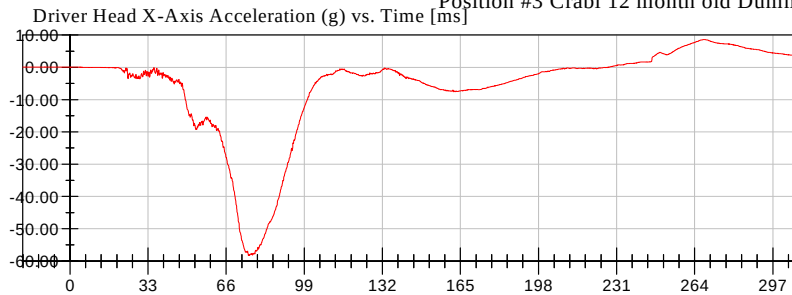
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Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



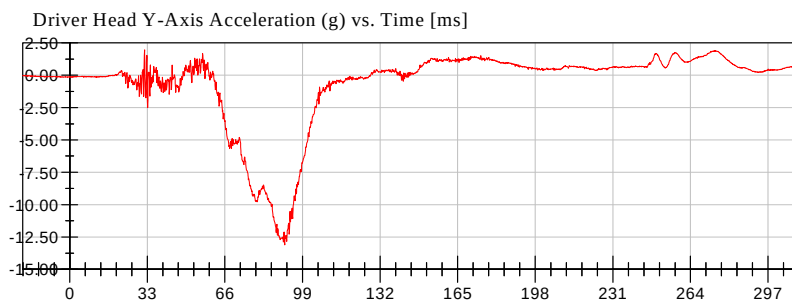
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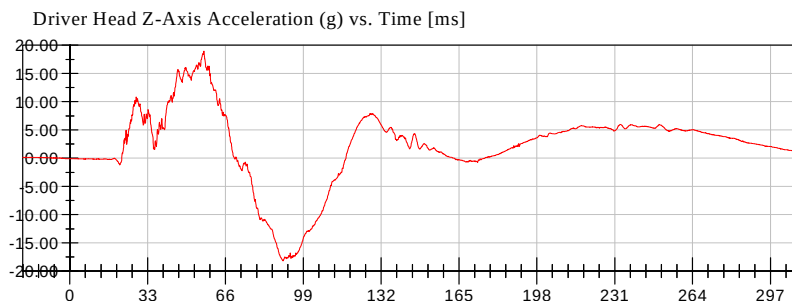
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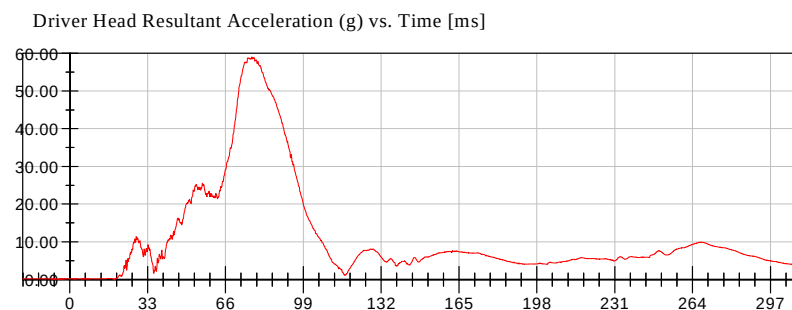
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NHTSA

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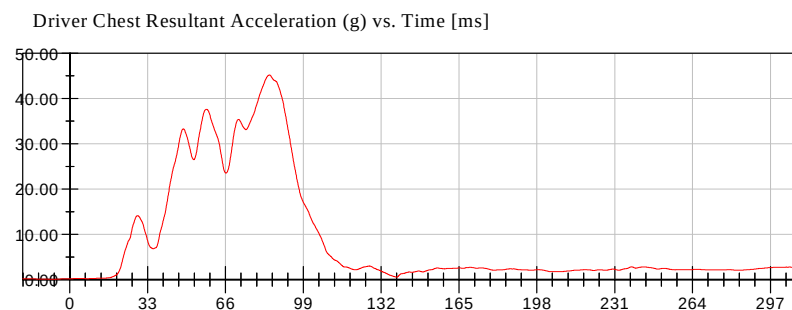
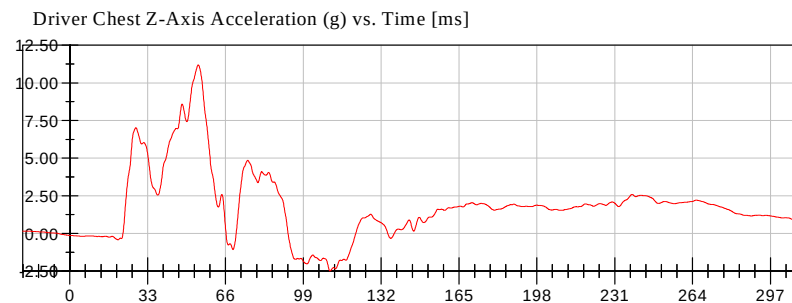
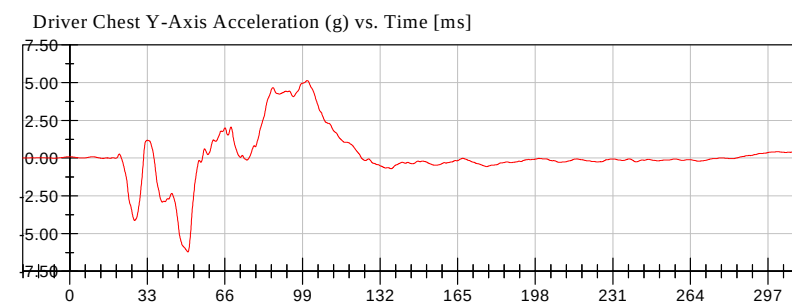
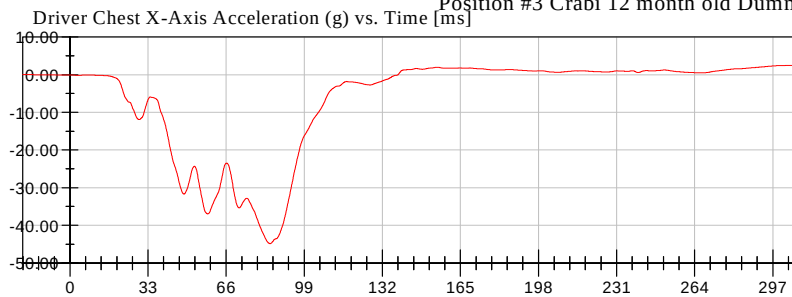
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Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

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NHTSA

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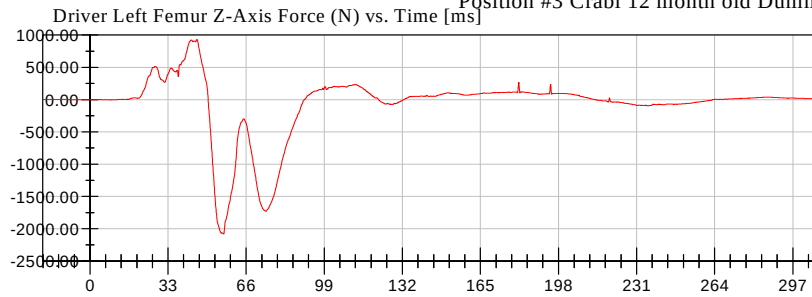
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Position #1 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



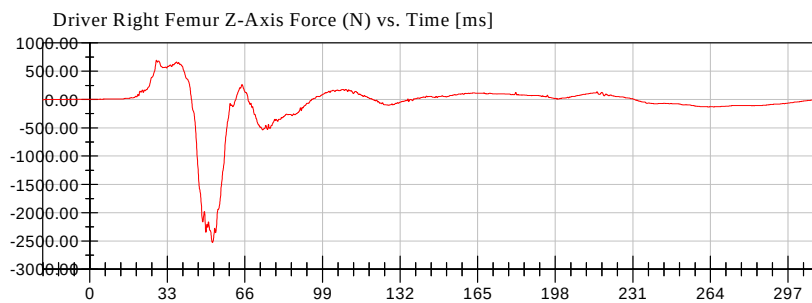
<Max>

932.87 N at 45.20 ms

<Min>

-2,080.52 N at 56.48 ms

CFC_600



<Max>

694.57 N at 28.40 ms

<Min>

-2,523.51 N at 52.24 ms

CFC_600



NHTSA

Test Lab: CTF

Test Number: 071127 (M85602)

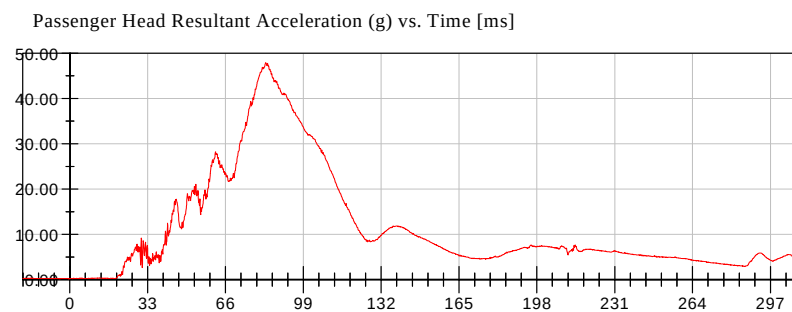
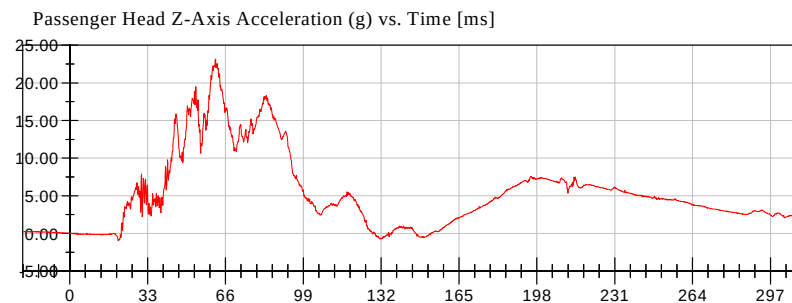
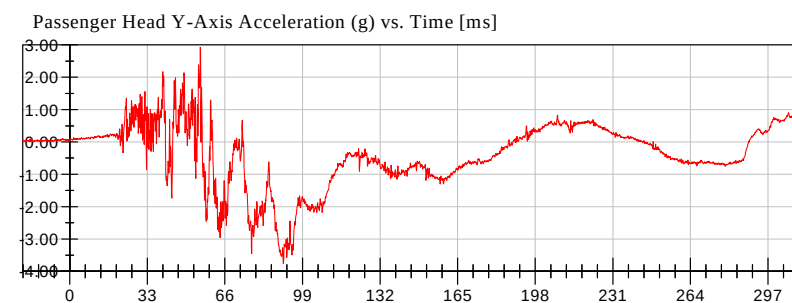
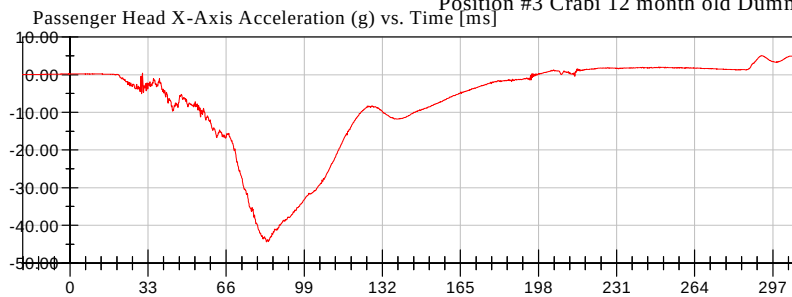
Test Date: 11/27/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



NHTSA

Test Lab: CTF

Test Number: 071127 (M85602)

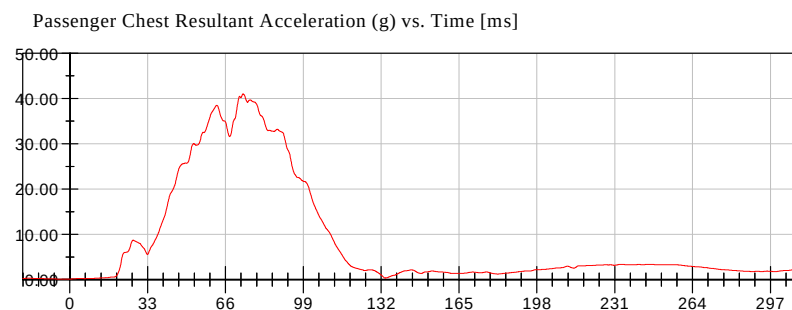
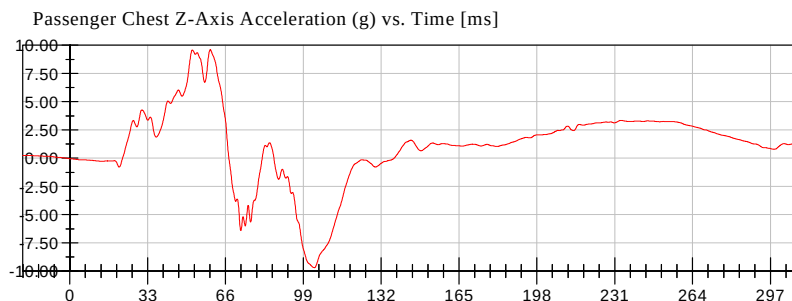
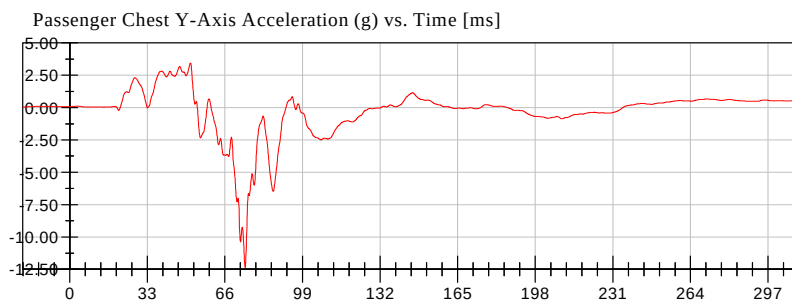
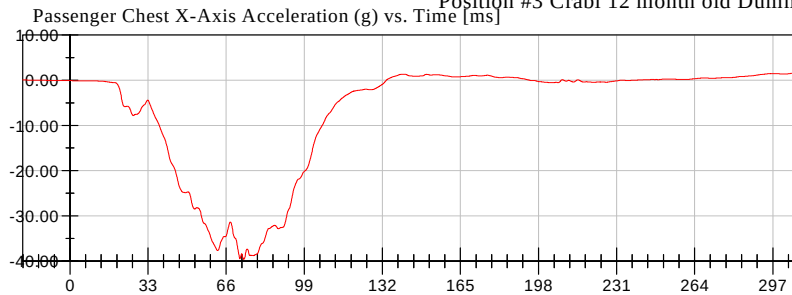
Test Date: 11/27/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



NHTSA

Test Lab: CTF

Test Number: 071127 (M85602)

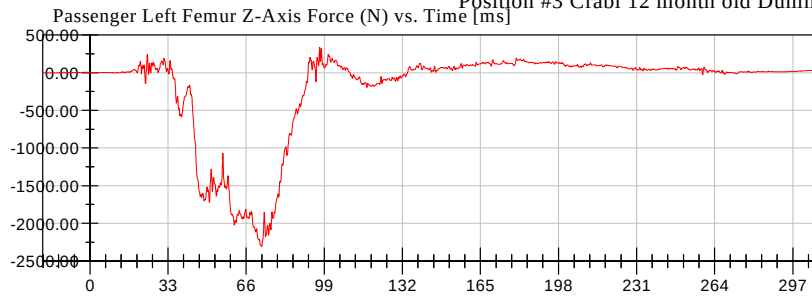
Test Date: 11/27/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



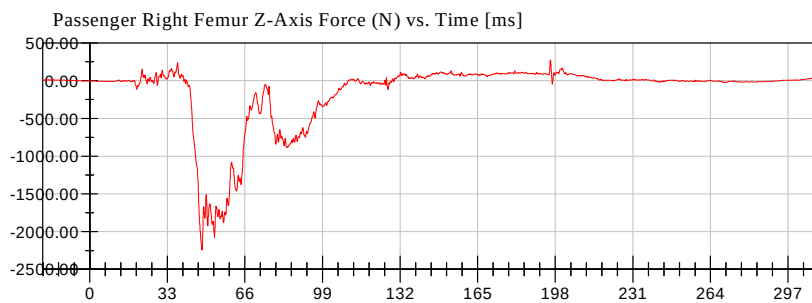
<Max>

337.83 N at 97.04 ms

<Min>

-2,306.33 N at 72.56 ms

CFC_600



<Max>

274.01 N at 195.92 ms

<Min>

-2,243.28 N at 47.84 ms

CFC_600



APPENDIX C
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID/HIII: 352

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 352
Calibration No. 03

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	887	Yes
B	Shoulder Pivot Height	505.5 - 520.7	519	Yes
C	H-Point Height	83.8 - 88.9	87	Yes
D	H-Point From Seatback	134.6 - 139.7	138	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	92	Yes
F	Thigh Clearance	139.7 - 154.9	151	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	295	Yes
H	Skull Cap To Backline	40.6 - 45.7	44	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	335	Yes
J	Elbow Rest Height	190.5 - 210.8	209	Yes
K	Buttock Knee Length	579.1 - 604.5	602	Yes
L	Popliteal Height	429.3 - 454.7	435	Yes
M	Knee Pivot Height	485.1 - 500.4	498	Yes
N	Buttock Popliteal Length	452.1 - 477.5	471	Yes
O	Chest Depth	213.4 - 228.6	220	Yes
P	Foot Length	251.5 - 266.7	260	Yes
V	Shoulder Breadth	421.6 - 436.9	425	Yes
W	Foot Breadth	91.4 - 106.7	98	Yes
Y	Chest Circumference	970.3 - 1000.8	998	Yes
Z	Waist Circumference	835.7 - 866.1	862	Yes
AA	Location For Chest Circumference	429.3 - 434.3	433	Yes
BB	Location For Waist Circumference	226.1 - 231.1	231	Yes

Comments: Partial Set

Technician



Approved



Transportation Research Center Inc.

Front Head Drop

HHH 50th Serial No. 352 Certification No. 3-2

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	251.5 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-6.3 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Technician

Rafael Bernal

Approved

Ron Stoner

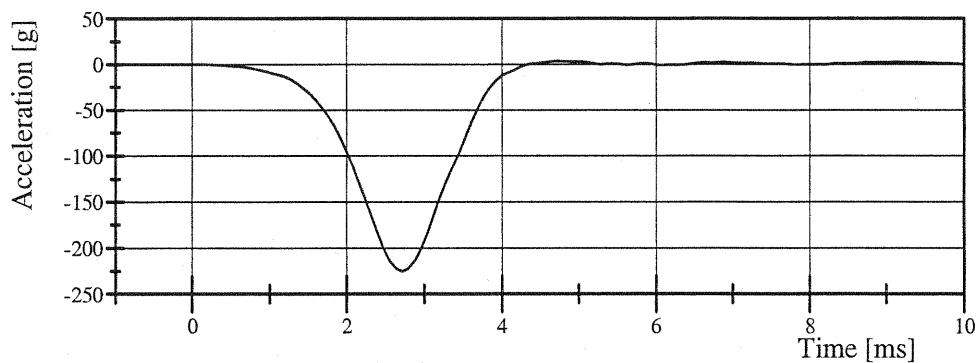
Transportation Research Center Inc.

Front Head Drop

HIII 50th Serial No. 352 Certification No. 3-2

Test Date: 9/27/2007

Head X-Axis Acceleration

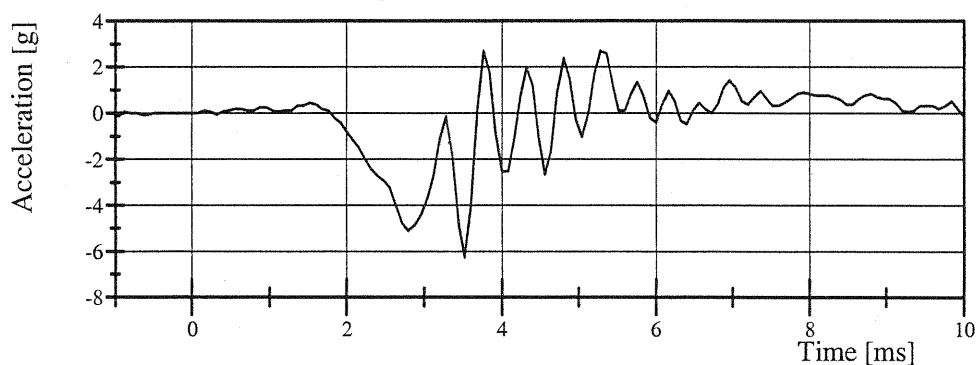


Filter Class: CFC_1000

Max: 3.8 g at 4.7 ms

Min: -225.5 g at 2.7 ms

Head Y-Axis Acceleration

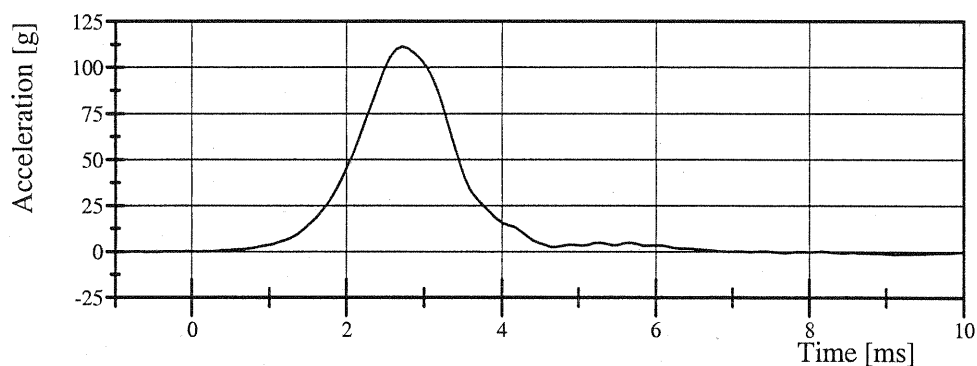


Filter Class: CFC_1000

Max: 2.7 g at 3.8 ms

Min: -6.3 g at 3.5 ms

Head Z-Axis Acceleration

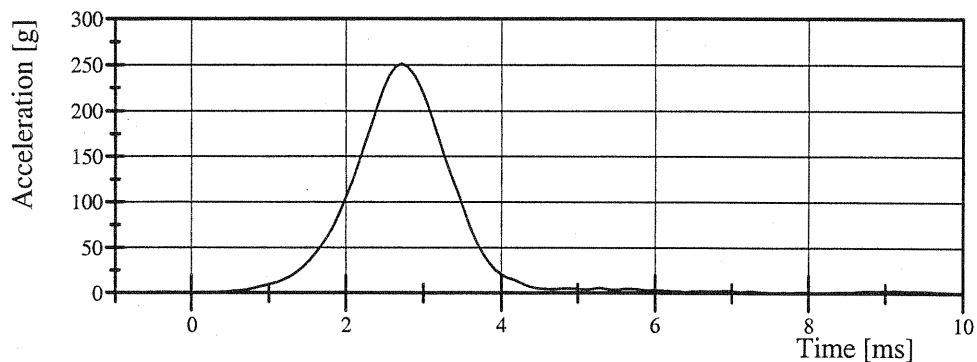


Filter Class: CFC_1000

Max: 111.4 g at 2.7 ms

Min: -1.5 g at 9.1 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 251.5 g at 2.7 ms

Min: 0.0 g at -0.8 ms

Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 352 Certification No. 3-3

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.998 m/s	Yes
Pendulum Acceleration Decay			
Crossing -5g	34 - 42 ms	37.8 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-23.01 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-21.84 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-17.62 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-17.62 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-68.7 °	Yes
Time of Peak	57 - 64 ms	58.3 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	113 - 128 ms	113.8 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	99.5 N·m	Yes
Time of Peak	47 - 58 ms	49.9 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	97 - 107 ms	100.2 ms	Yes

Test meets specifications.

Comments:

Technician

Raul Barcel

Approved

Ron Stone

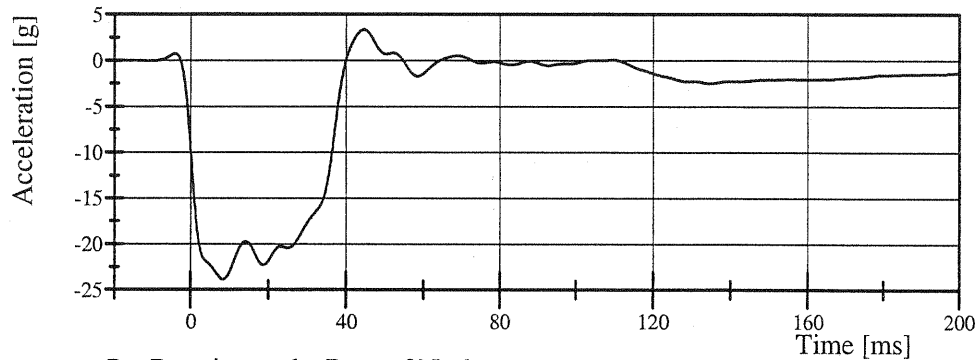
Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 352 Certification No. 3-3

Test Date: 9/27/2007

Pendulum Acceleration

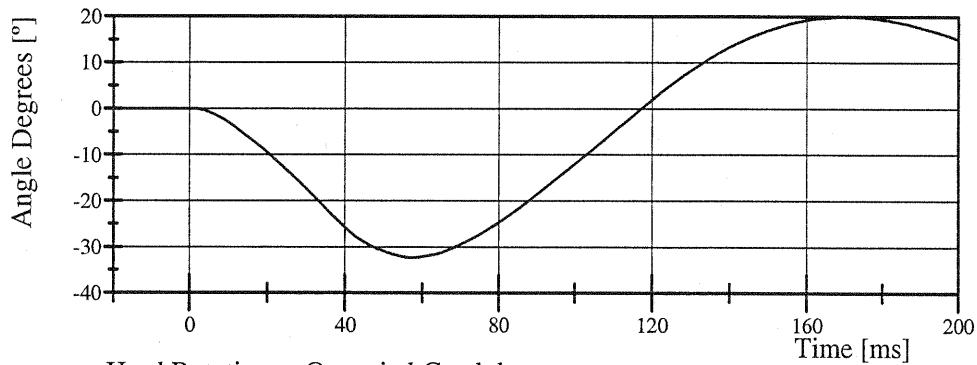


Filter Class: CFC_60

Max: 3.4 g at 44.5 ms

Min: -23.9 g at 8.3 ms

Pot Rotation at the Base of Neck

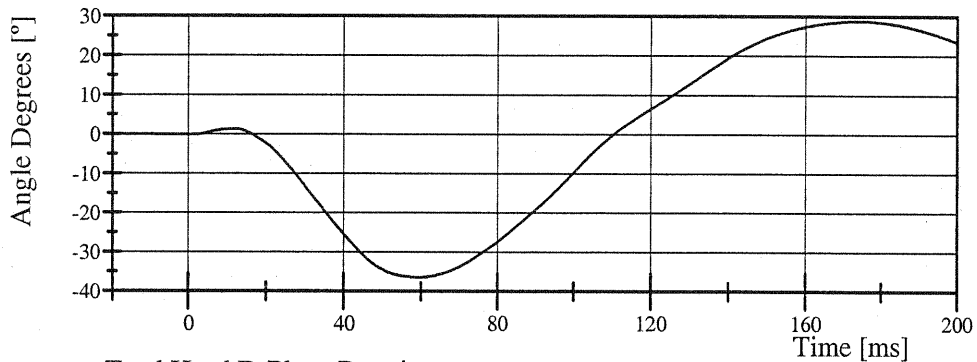


Filter Class: CFC_60

Max: 20.0 ° at 170.9 ms

Min: -32.3 ° at 57.4 ms

Head Rotation at Occypital Condyles

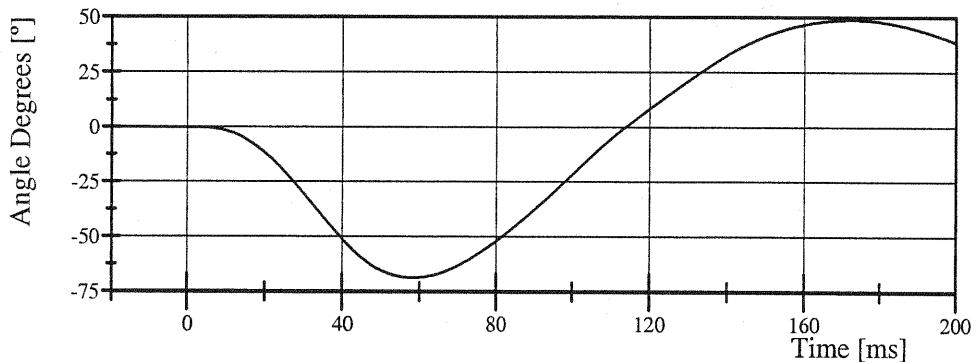


Filter Class: CFC_60

Max: 28.9 ° at 174.0 ms

Min: -36.4 ° at 59.4 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 48.8 ° at 172.6 ms

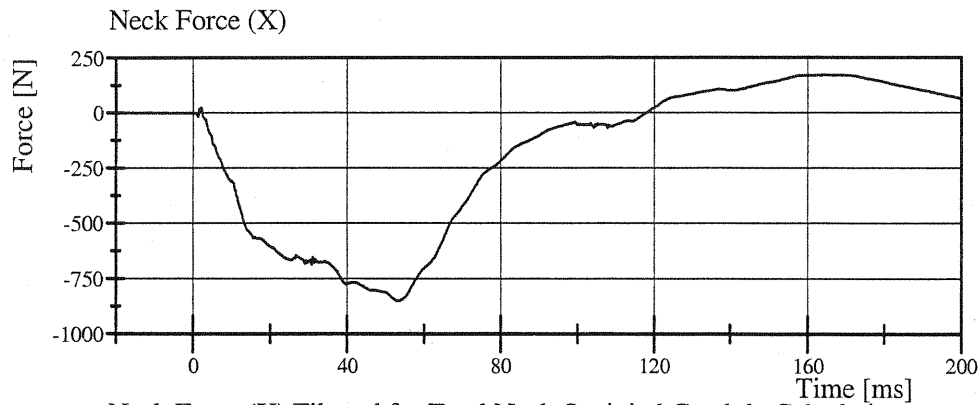
Min: -68.7 ° at 58.3 ms

Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 352 Certification No. 3-3

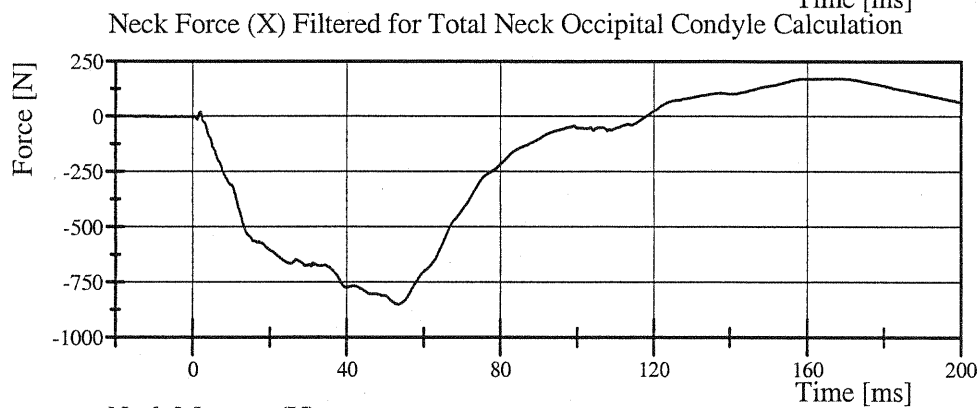
Test Date: 9/27/2007



Filter Class: CFC_1000

Max: 172.8 N at 164.1 ms

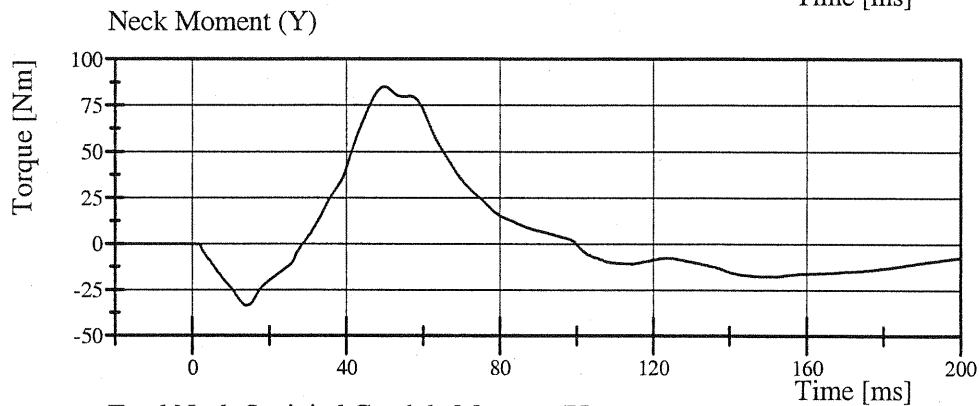
Min: -850.4 N at 53.4 ms



Filter Class: CFC_600

Max: 172.6 N at 164.2 ms

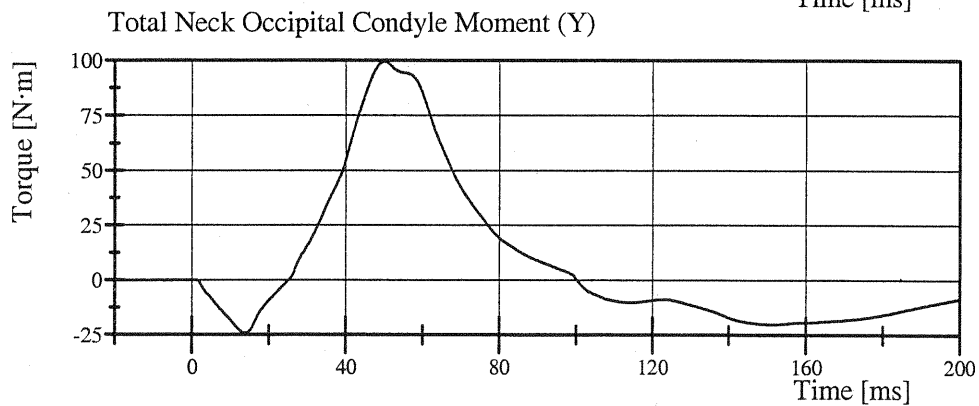
Min: -850.2 N at 53.4 ms



Filter Class: CFC_600

Max: 85.2 Nm at 49.9 ms

Min: -33.5 Nm at 14.0 ms



Filter Class: CFC_600

Max: 99.5 N·m at 49.9 ms

Min: -24.2 N·m at 13.8 ms

Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 352 Certification No. 3-1

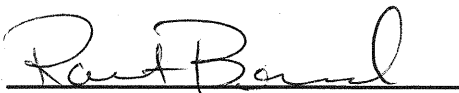
Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-6.000 m/s	Yes
Pendulum Acceleration Decay			
Crossing 5g	38 - 46 ms	38.8 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	19.13 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	17.72 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	15.03 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	15.03 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	93.3 °	Yes
Time of Peak	72 - 82 ms	76.9 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	147 - 174 ms	156.2 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-63.9 N·m	Yes
Time of Peak	65 - 79 ms	72.6 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	120 - 148 ms	141.0 ms	Yes

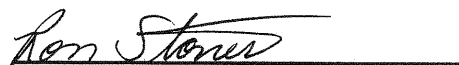
Test meets specifications.

Comments:

Technician



Approved



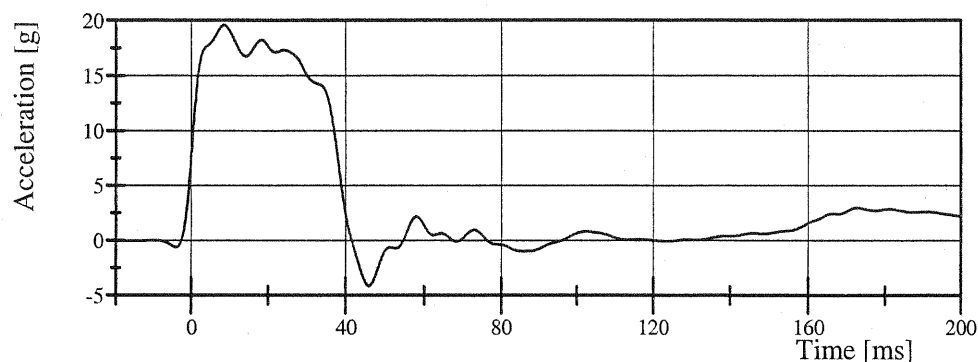
Transportation Research Center Inc.

Neck Extension

HIH 50th Serial No. 352 Certification No. 3-1

Test Date: 9/27/2007

Pendulum Acceleration

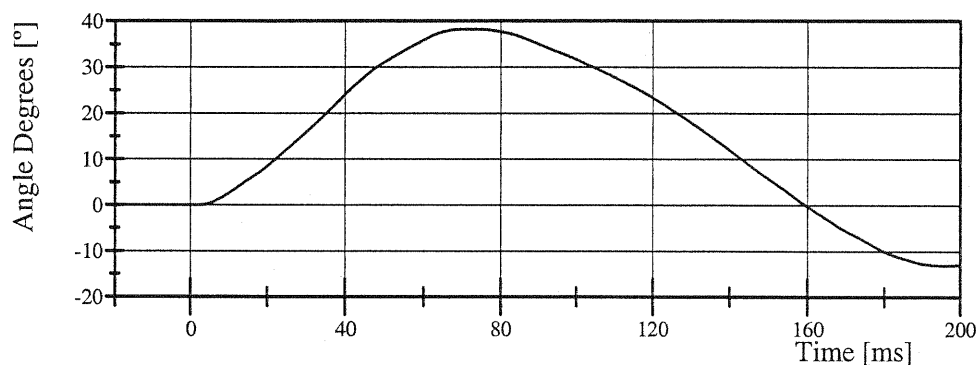


Filter Class: CFC_60

Max: 19.6 g at 8.6 ms

Min: -4.1 g at 45.8 ms

Pot Rotation at the Base of Neck

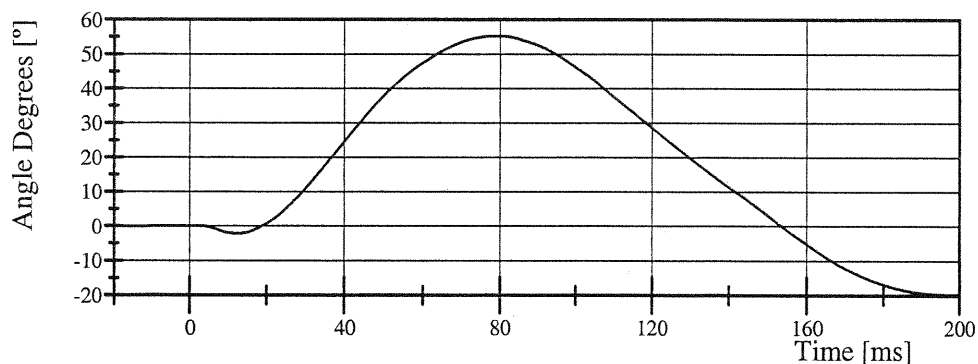


Filter Class: CFC_60

Max: 38.3 ° at 72.0 ms

Min: -13.1 ° at 196.6 ms

Head Rotation at Occypital Condyles

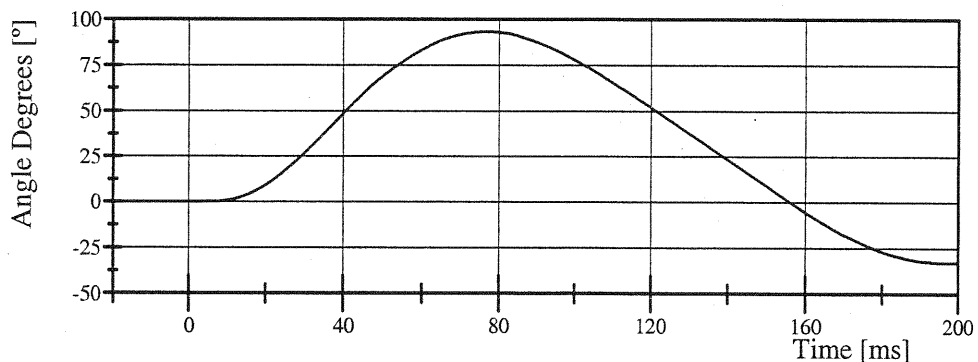


Filter Class: CFC_60

Max: 55.3 ° at 79.2 ms

Min: -19.8 ° at 198.9 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 93.3 ° at 76.9 ms

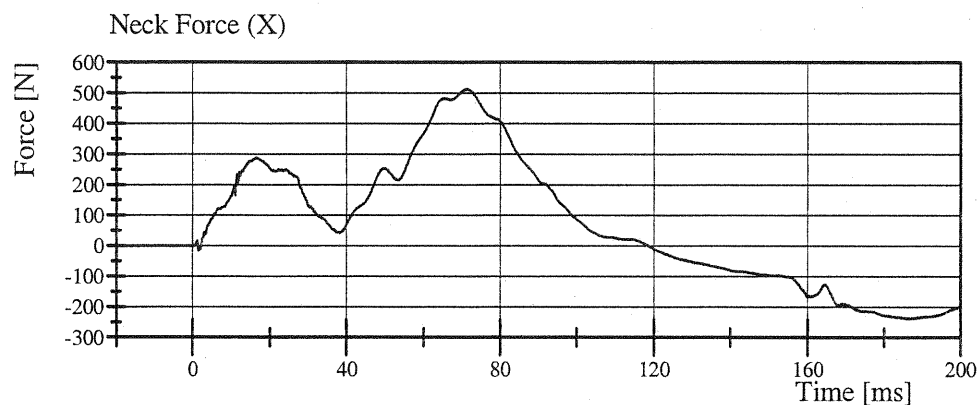
Min: -32.8 ° at 197.7 ms

Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 352 Certification No. 3-1

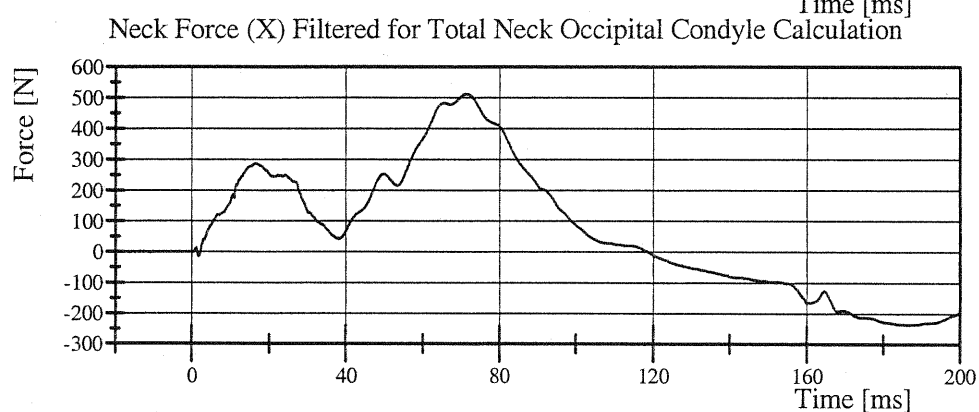
Test Date: 9/27/2007



Filter Class: CFC_1000

Max: 512.8 N at 71.4 ms

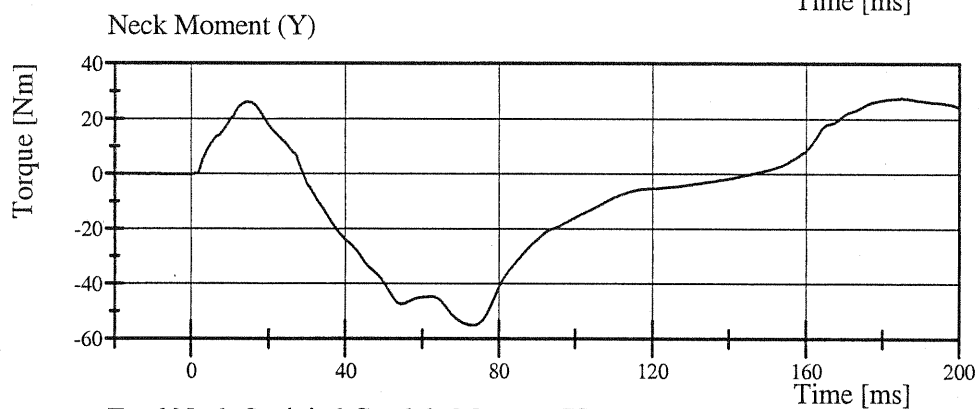
Min: -237.4 N at 186.0 ms



Filter Class: CFC_600

Max: 512.5 N at 71.4 ms

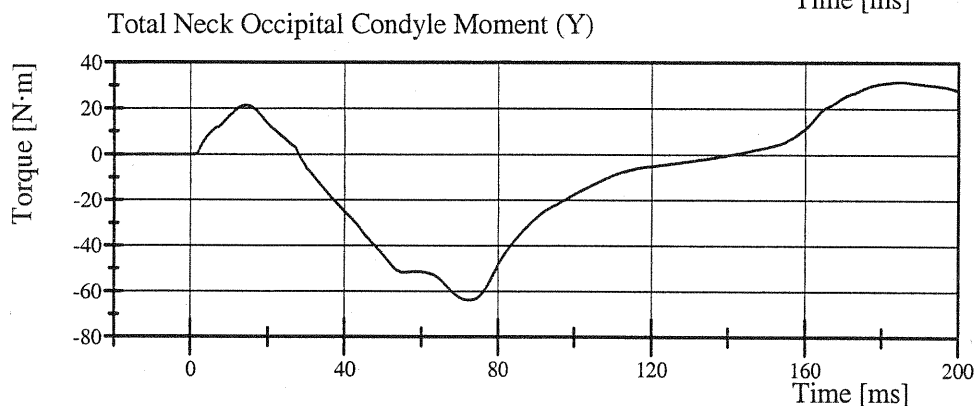
Min: -237.0 N at 186.0 ms



Filter Class: CFC_600

Max: 27.6 Nm at 184.9 ms

Min: -55.0 Nm at 72.9 ms



Filter Class: CFC_600

Max: 31.8 N·m at 185.1 ms

Min: -63.9 N·m at 72.6 ms

Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 352 Certification No. 3-1

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.611 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,486.0 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-64.80 mm	Yes
Internal Hysteresis	65 - 85 %	74.5 %	Yes

Test meets specifications.

Comments:

Technician

Rae B. Brame

Approved

Ron Stoner

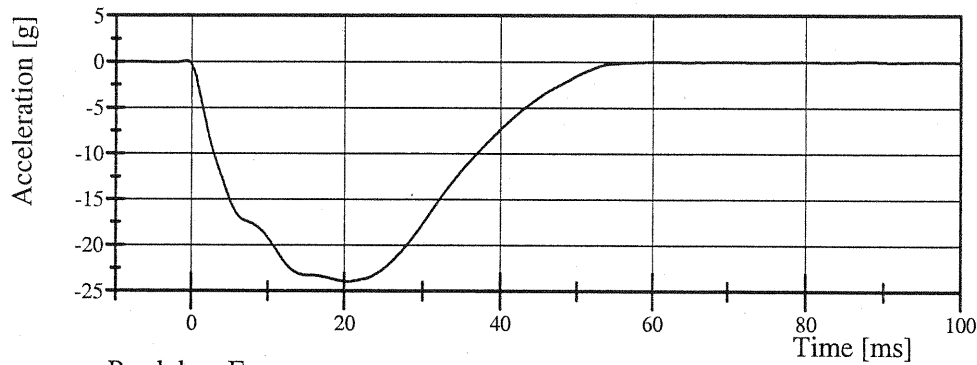
Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 352 Certification No. 3-1

Test Date: 9/27/2007

Pendulum Acceleration

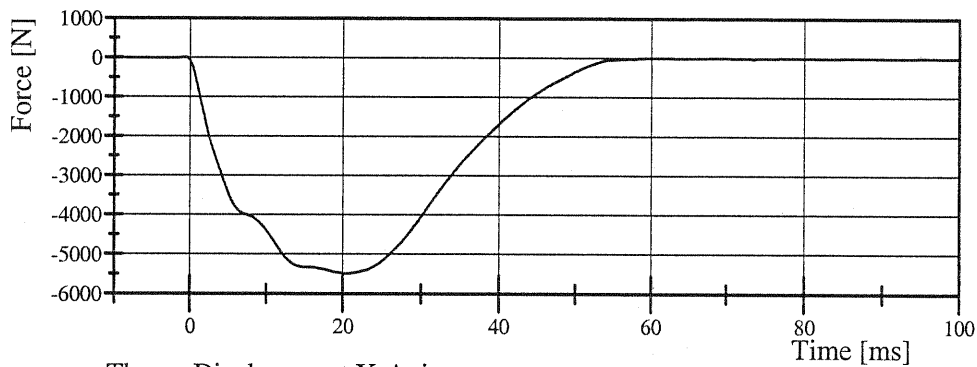


Filter Class: CFC_180

Max: 0.1 g at -0.7 ms

Min: -23.9 g at 20.6 ms

Pendulum Force

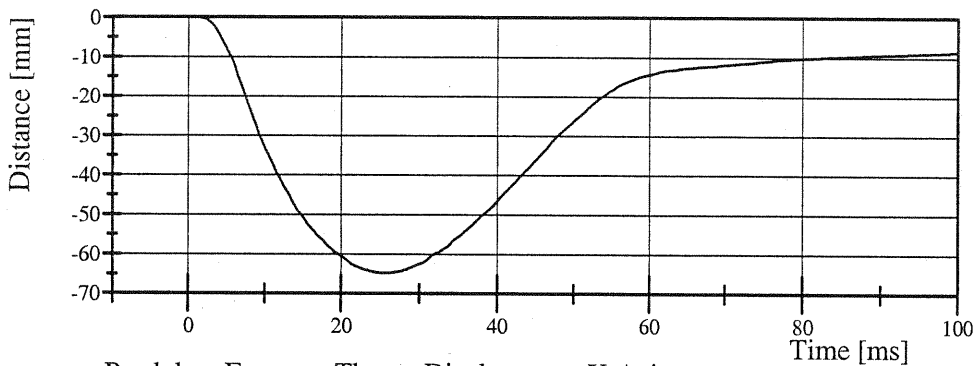


Filter Class: CFC_180

Max: 19.0 N at -0.7 ms

Min: -5,486.0 N at 20.6 ms

Thorax Displacement X-Axis

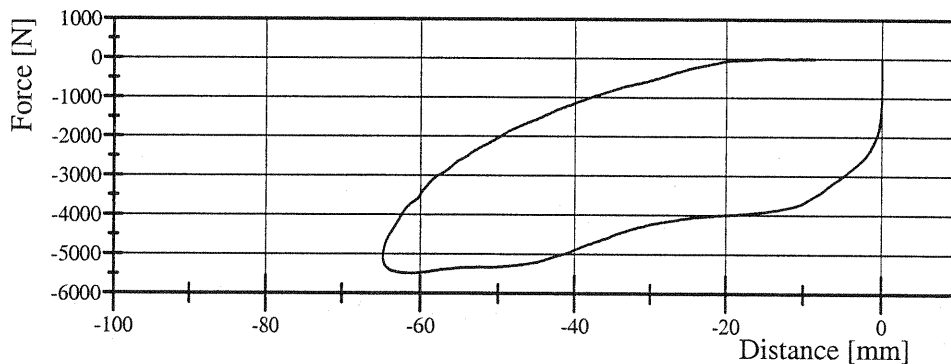


Filter Class: CFC_600

Max: 0.0 mm at 1.0 ms

Min: -64.8 mm at 25.4 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180

Max: 19.0 N at -0.0 mm

Min: -5,486.0 N at -61.5 mm

Applied Safety Technologies Corp.

Hybrid III Hip Range of Motion

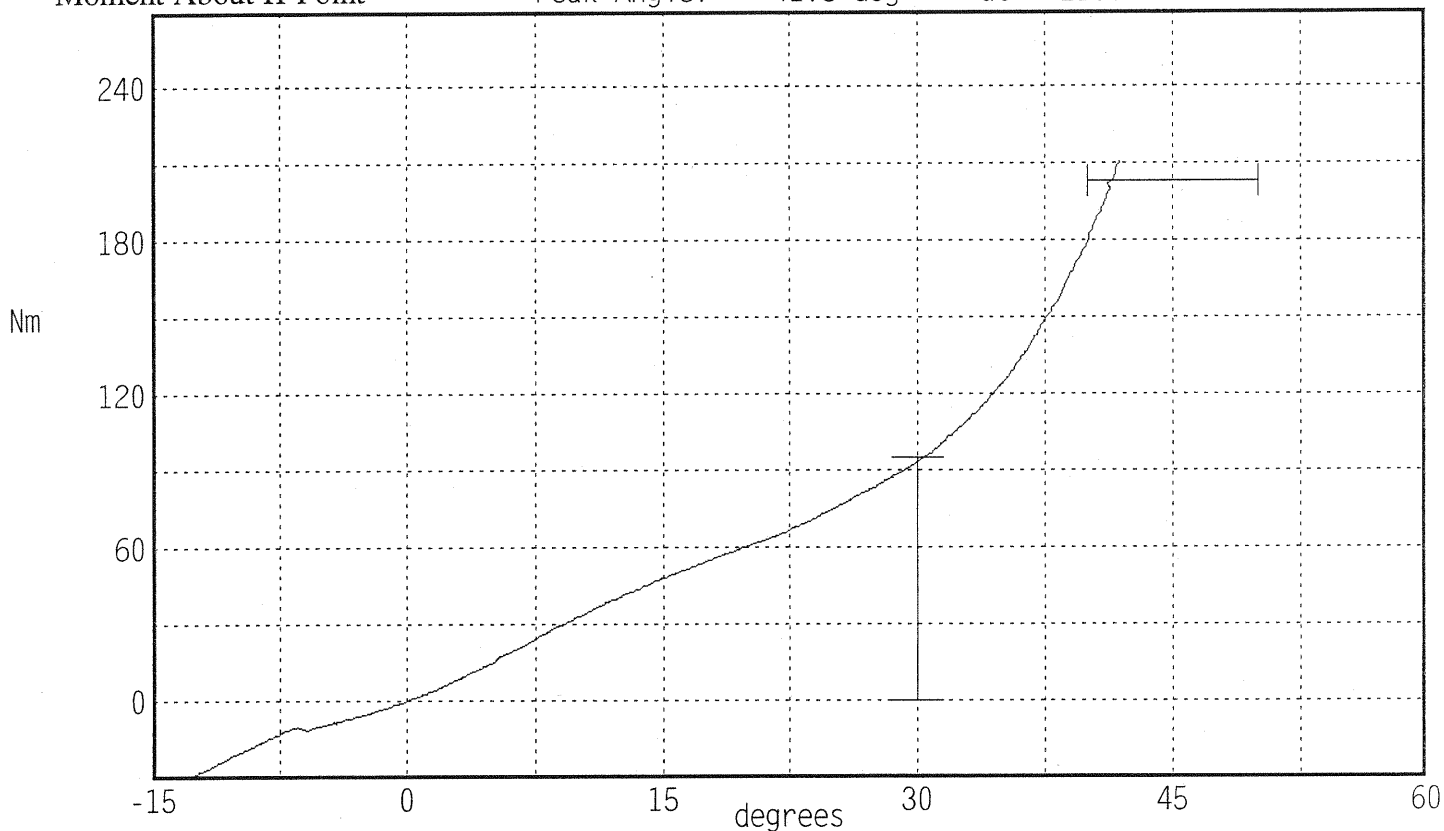
Serial Number: 352L
Test Number: 352C03
Comments:

Date: 09/27/2007
Time: 08:05

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.1 °C	Pass
Humidity	10 - 70	59 %	Pass
Moment at 30 deg	<= 94.9	93.0 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	41.4 deg	Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec	Pass

Peak Moment: 210.7 Nm at 41.8 deg
Peak Angle: 41.8 deg at 210.7 Nm

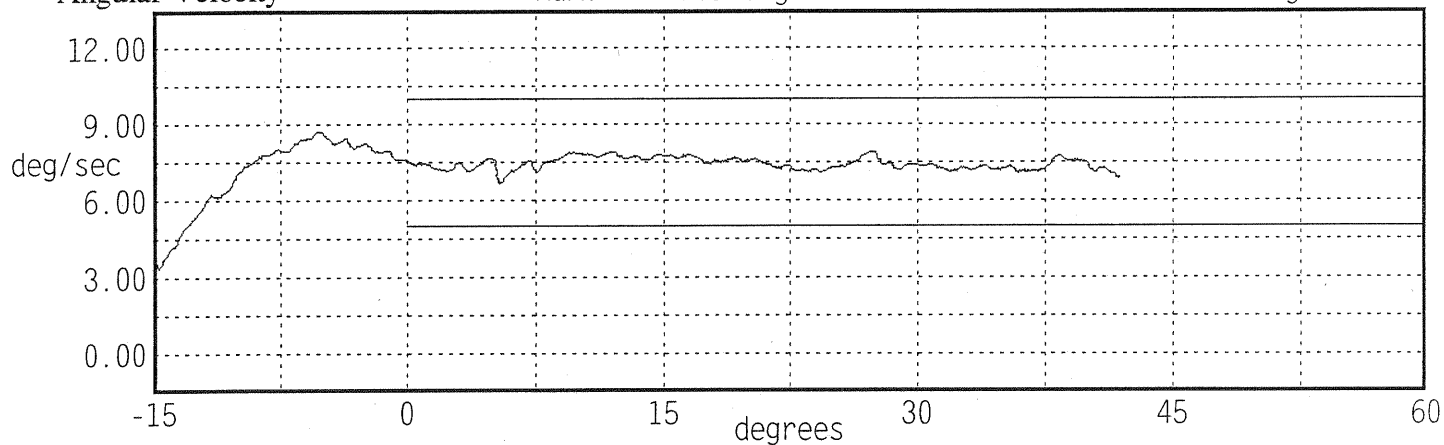
Moment About H-Point



Angular Velocity

Max: 7.9 deg/sec

Min: 6.7 deg/sec



Applied Safety Technologies Corp.

Hybrid III Hip Range of Motion

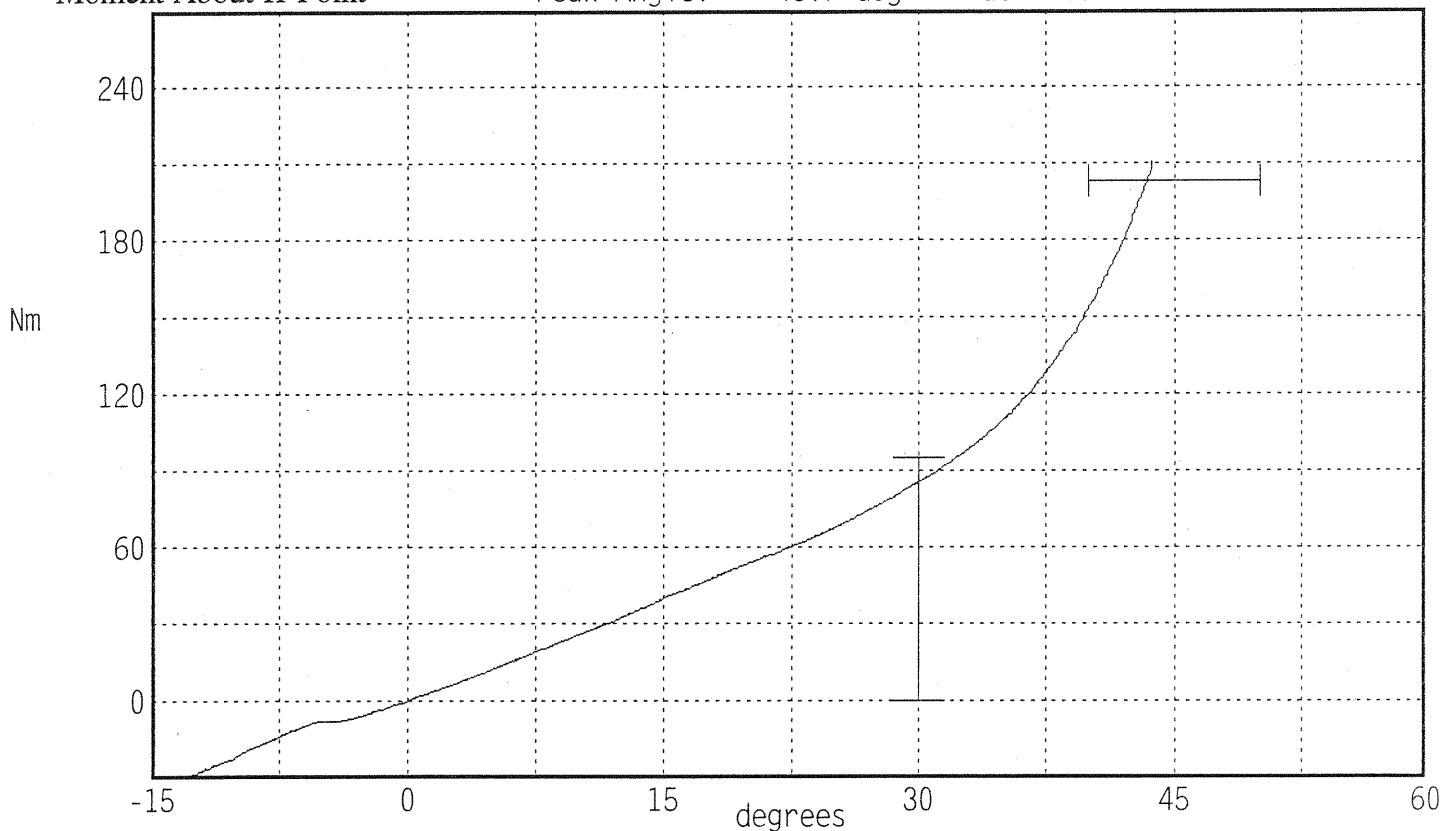
Serial Number: 352R
Test Number: 352C03
Comments:

Date: 09/27/2007
Time: 08:30

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.1 °C Pass
Humidity	10 - 70	58 % Pass
Moment at 30 deg	<= 94.9	85.9 Nm Pass
Angle at 203 Nm	40.0 - 50.0	43.5 deg Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec Pass

Peak Moment: 210.7 Nm at 43.7 deg
Peak Angle: 43.7 deg at 209.2 Nm

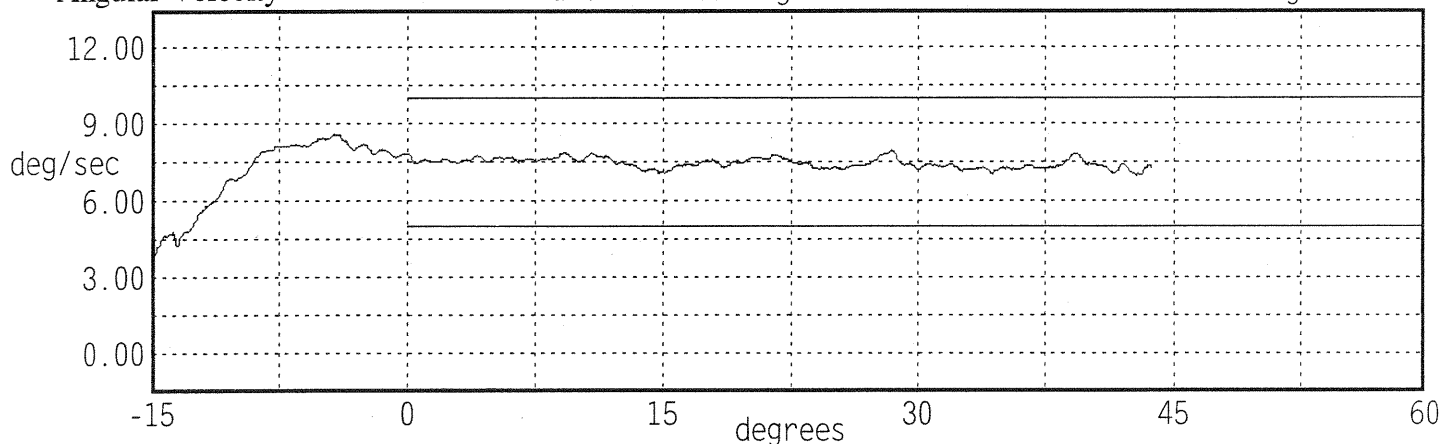
Moment About H-Point



Angular Velocity

Max: 7.9 deg/sec

Min: 7.0 deg/sec



Transportation Research Center Inc.

Left Knee Femur Response Test

HIII 50th Serial No. 352 Certification No. 3-1

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.113 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,064.73 N	Yes

Test meets specifications.

Comments:

Technician

Robert Baranek

Approved

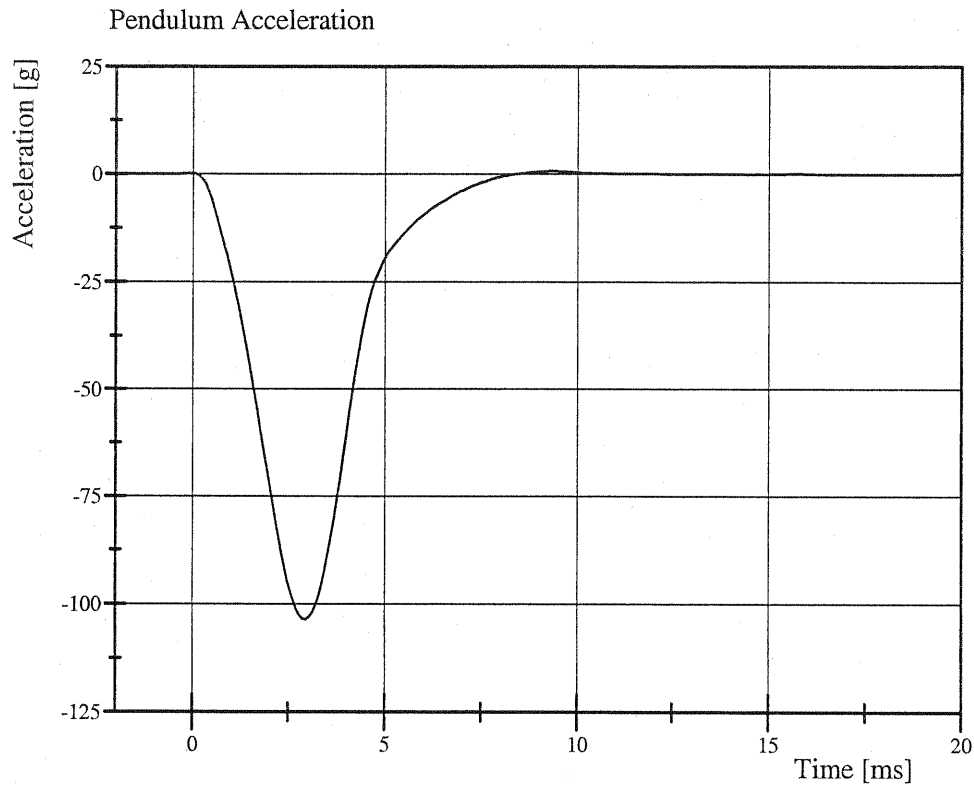
Ron Stoner

Transportation Research Center Inc.

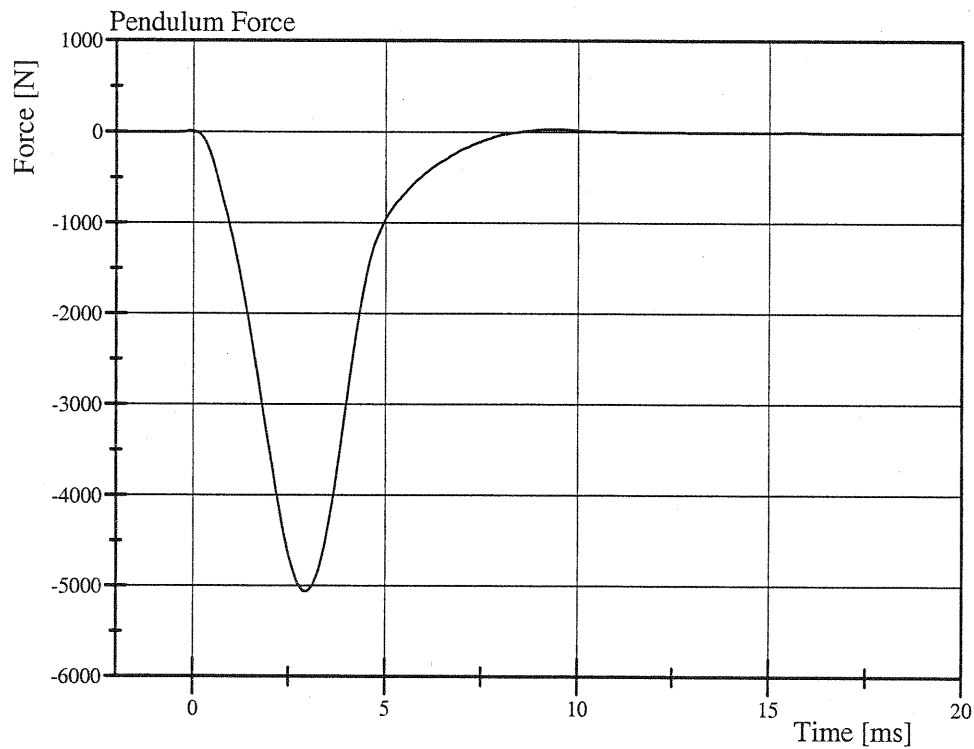
Left Knee Femur Response Test

HIII 50th Serial No. 352 Certification No. 3-1

Test Date: 9/27/2007



Filter Class: CFC_600
Max: 0.7 g at 9.4 ms
Min: -103.5 g at 3.0 ms



Filter Class: CFC_600
Max: 33.4 N at 9.4 ms
Min: -5,064.7 N at 3.0 ms

Transportation Research Center Inc.

Right Knee Femur Response Test

HIII 50th Serial No. 352 Certification No. 3-1

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.115 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,404.11 N	Yes

Test meets specifications.

Comments:

Technician

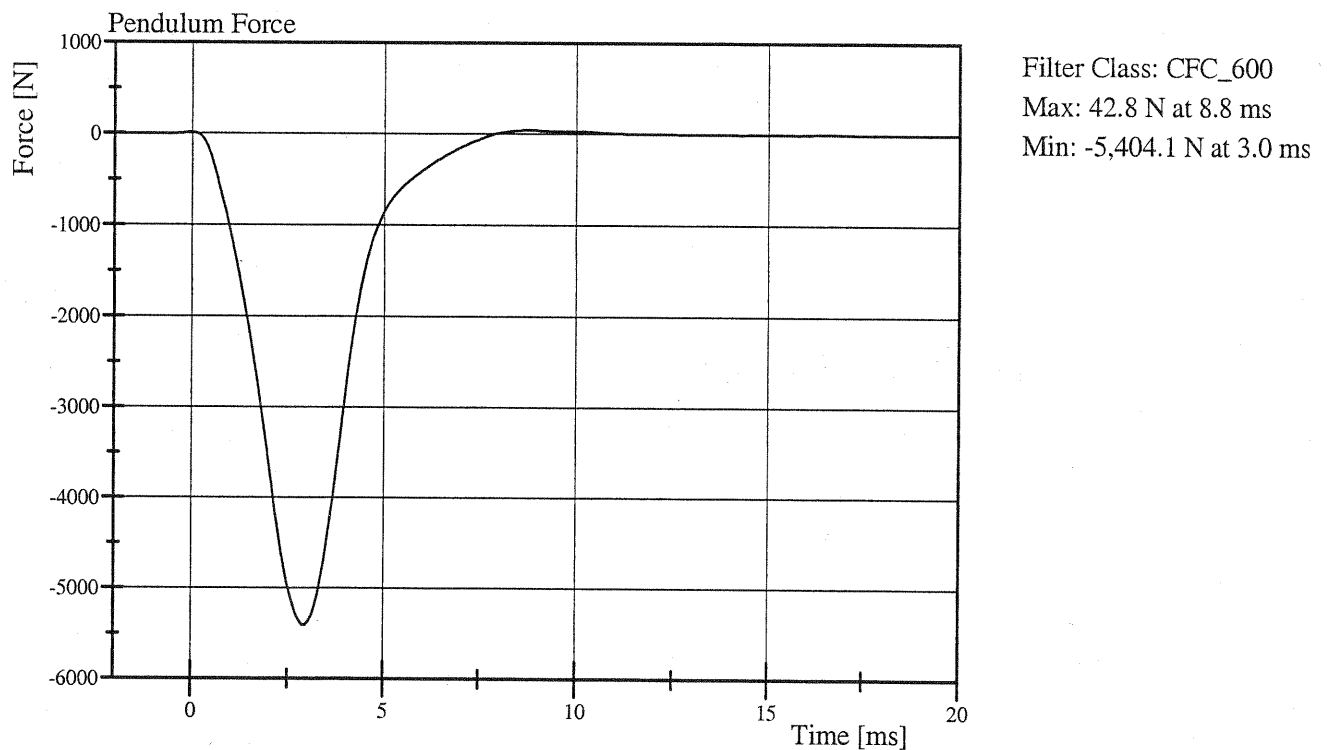
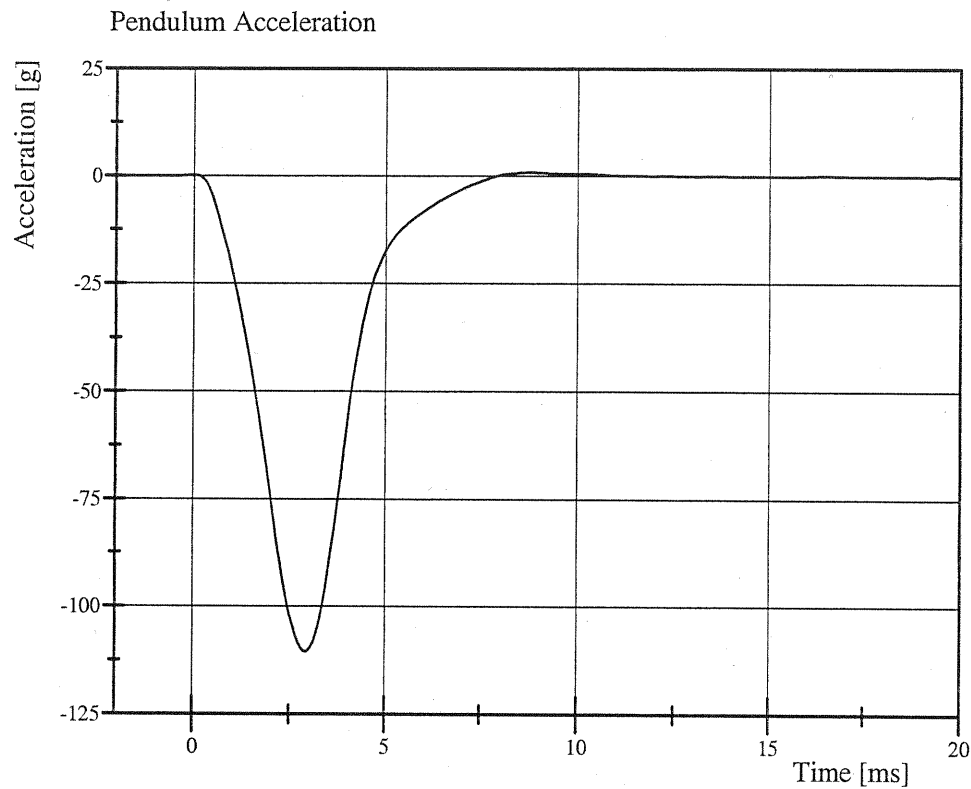
Rout Bumb

Approved

Ron Stoner

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 352 Certification No. 3-1
Test Date: 9/27/2007



CALIBRATION TEST RESULTS

PRE-TEST

SID/HIII: 037

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 37
Calibration No. 03

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	882	Yes
B	Shoulder Pivot Height	505.5 - 520.7	519	Yes
C	H-Point Height	83.8 - 88.9	87	Yes
D	H-Point From Seatback	134.6 - 139.7	138	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	92	Yes
F	Thigh Clearance	139.7 - 154.9	152	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	292	Yes
H	Skull Cap To Backline	40.6 - 45.7	43	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	340	Yes
J	Elbow Rest Height	190.5 - 210.8	195	Yes
K	Buttock Knee Length	579.1 - 604.5	600	Yes
L	Popliteal Height	429.3 - 454.7	430	Yes
M	Knee Pivot Height	485.1 - 500.4	498	Yes
N	Buttock Popliteal Length	452.1 - 477.5	469	Yes
O	Chest Depth	213.4 - 228.6	225	Yes
P	Foot Length	251.5 - 266.7	264	Yes
V	Shoulder Breadth	421.6 - 436.9	432	Yes
W	Foot Breadth	91.4 - 106.7	97	Yes
Y	Chest Circumference	970.3 - 1000.8	977	Yes
Z	Waist Circumference	835.7 - 866.1	855	Yes
AA	Location For Chest Circumference	429.3 - 434.3	431	Yes
BB	Location For Waist Circumference	226.1 - 231.1	230	Yes

Comments:

Technician

Approved

Charles W. Ball

Ron Storer

Transportation Research Center Inc.

Front Head Drop

HIII 50th Serial No. 037 Certification No. 3-1

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	252.5 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-1.8 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Charles W. Beale

Approved

Ron Stoner

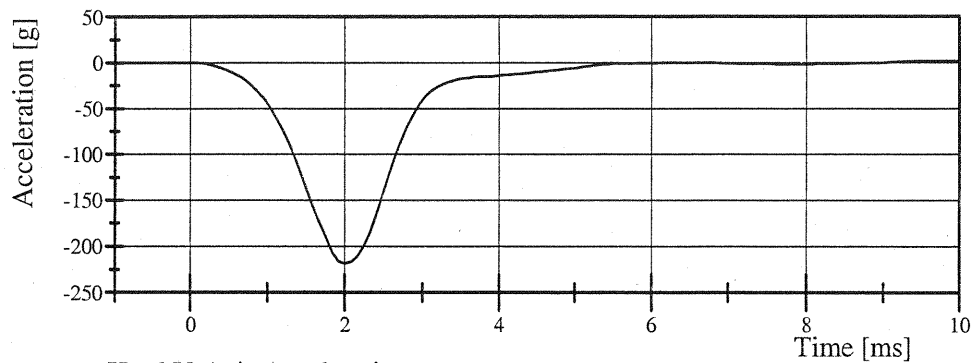
Transportation Research Center Inc.

Front Head Drop

HIH 50th Serial No. 037 Certification No. 3-1

Test Date: 9/27/2007

Head X-Axis Acceleration

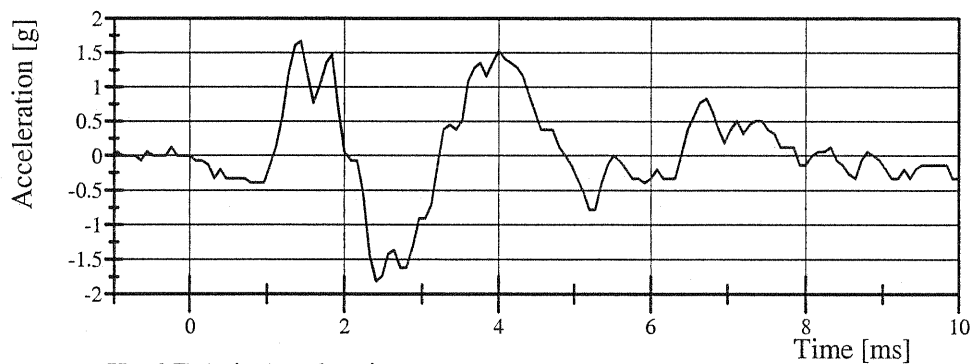


Filter Class: CFC_1000

Max: 1.9 g at 9.4 ms

Min: -219.1 g at 2.0 ms

Head Y-Axis Acceleration

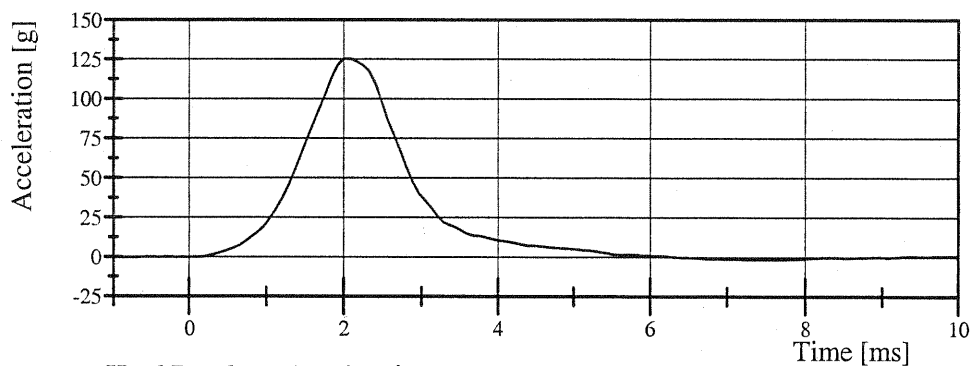


Filter Class: CFC_1000

Max: 1.7 g at 1.4 ms

Min: -1.8 g at 2.4 ms

Head Z-Axis Acceleration

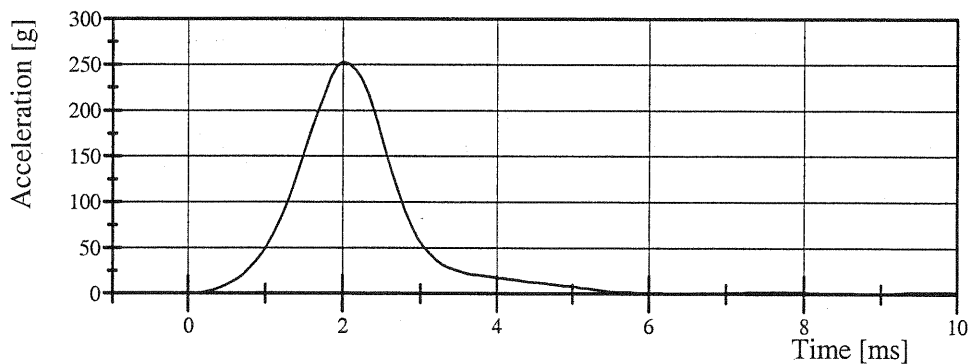


Filter Class: CFC_1000

Max: 125.4 g at 2.0 ms

Min: -1.6 g at 7.4 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 252.5 g at 2.0 ms

Min: 0.0 g at 6.4 ms

Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 3-3

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.948 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	38.9 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-23.14 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-21.79 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-15.25 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-15.25 g	Yes
Total Head D-Plane Rotation Peak	(-64) - (-78) °	-68.8 °	Yes
Time of Peak	57 - 64 ms	59.1 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	119.6 ms	Yes
Total Neck Occipital Condyles Moment Peak	88 - 108 N·m	105.3 N·m	Yes
Time of Peak	47 - 58 ms	51.0 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	98.8 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Ball

Approved

Ron Stoner

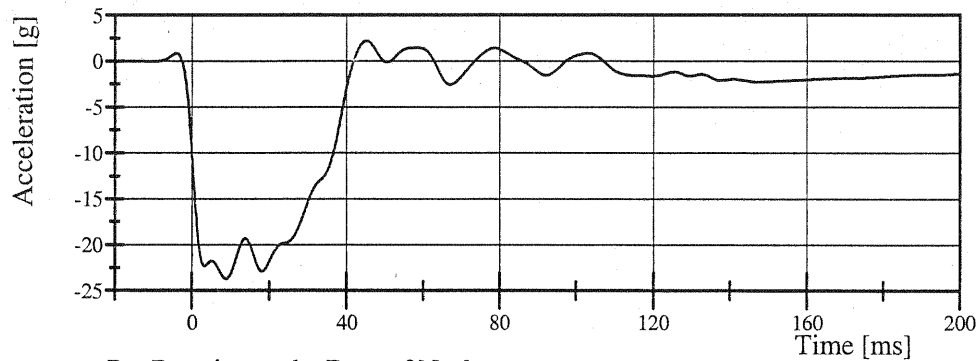
Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 3-3

Test Date: 9/27/2007

Pendulum Acceleration

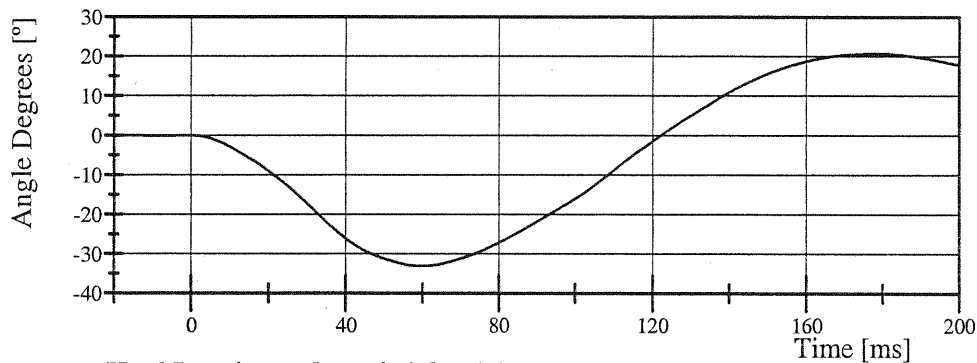


Filter Class: CFC_60

Max: 2.2 g at 45.0 ms

Min: -23.7 g at 8.8 ms

Pot Rotation at the Base of Neck

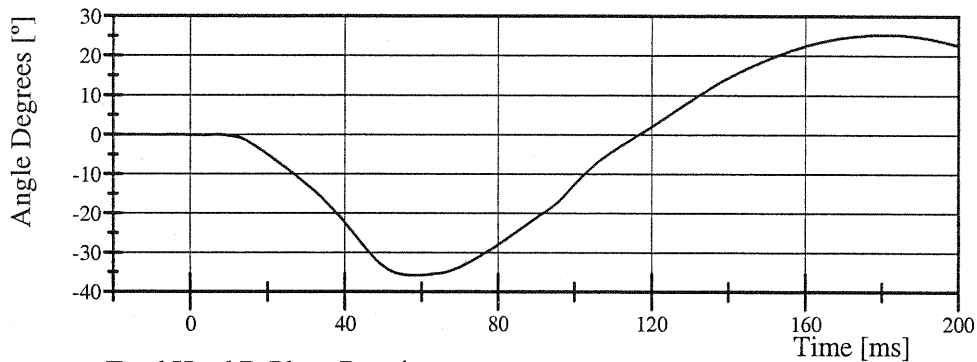


Filter Class: CFC_60

Max: 20.8 ° at 178.7 ms

Min: -33.1 ° at 59.9 ms

Head Rotation at Occypital Condyles

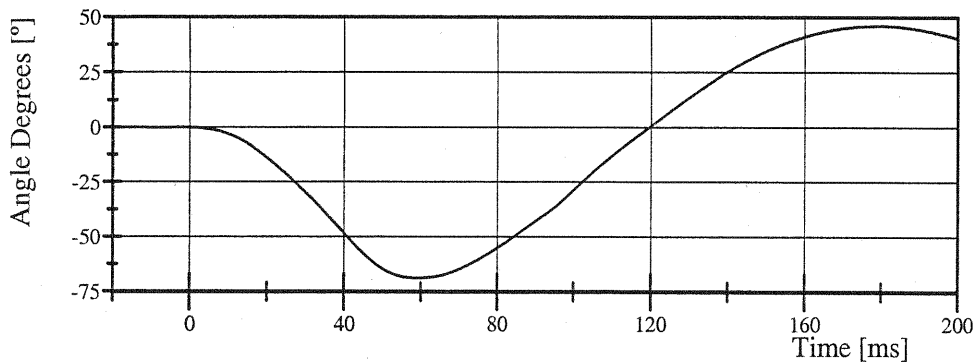


Filter Class: CFC_60

Max: 25.4 ° at 181.7 ms

Min: -35.8 ° at 58.4 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 46.1 ° at 180.0 ms

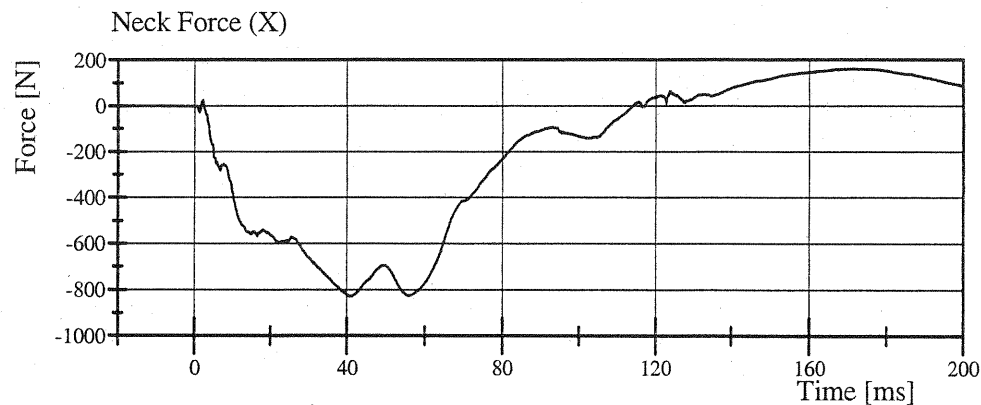
Min: -68.8 ° at 59.1 ms

Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 3-3

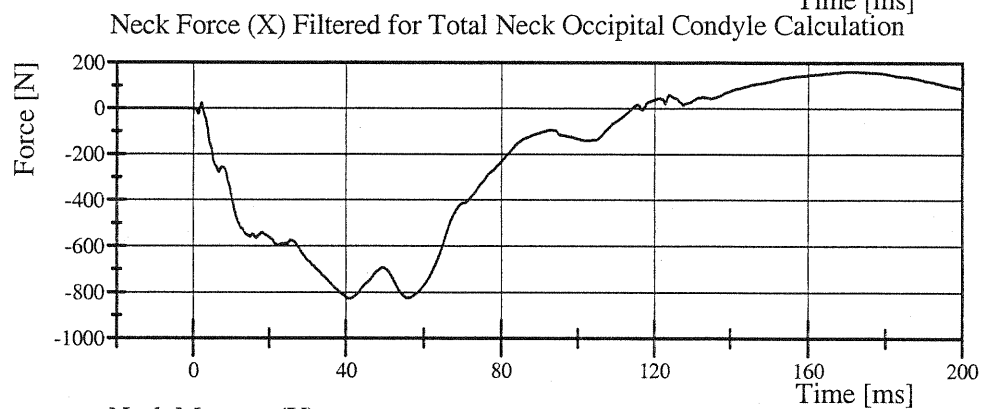
Test Date: 9/27/2007



Filter Class: CFC_1000

Max: 161.6 N at 170.9 ms

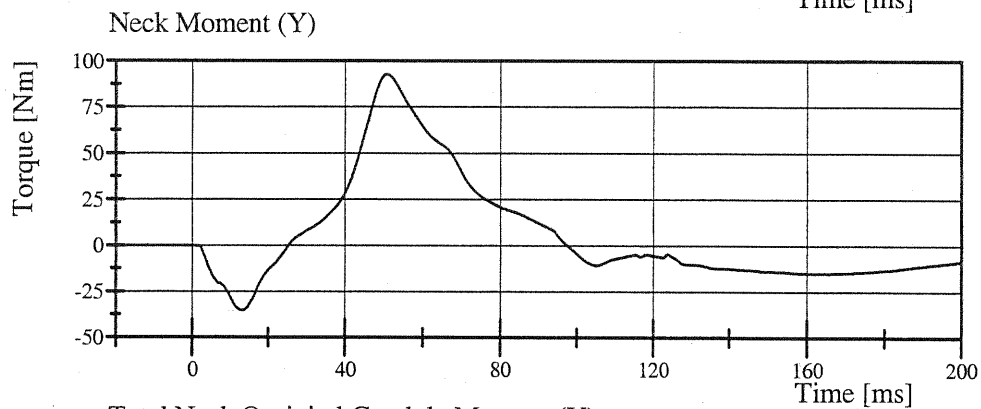
Min: -828.2 N at 40.6 ms



Filter Class: CFC_600

Max: 161.2 N at 170.1 ms

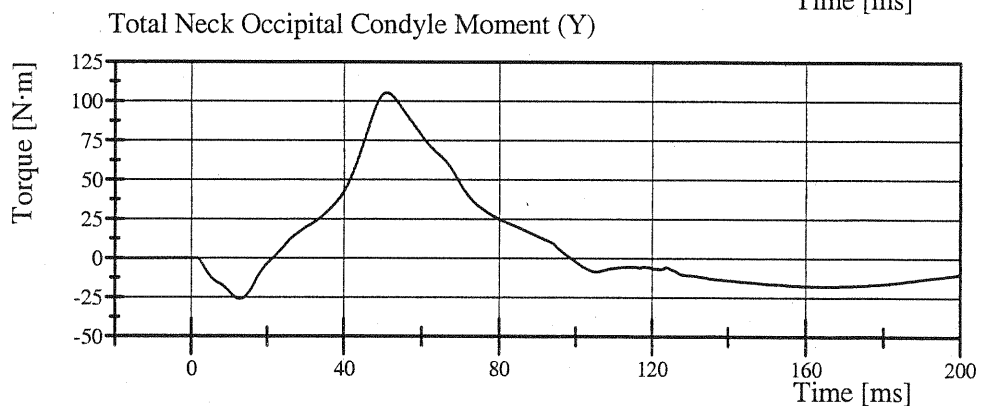
Min: -827.8 N at 40.7 ms



Filter Class: CFC_600

Max: 92.8 Nm at 50.8 ms

Min: -35.1 Nm at 13.4 ms



Filter Class: CFC_600

Max: 105.3 N·m at 51.0 ms

Min: -25.8 N·m at 12.6 ms

Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 3-1

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.984 m/s	Yes
Pendulum Acceleration Decay			
Crossing 5g	38 - 46 ms	38.4 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	18.96 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	17.53 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	15.12 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	15.12 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	96.1 °	Yes
Time of Peak	72 - 82 ms	77.6 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	147 - 174 ms	166.0 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-71.8 N·m	Yes
Time of Peak	65 - 79 ms	71.0 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	120 - 148 ms	143.6 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Ball

Approved

Ron Storer

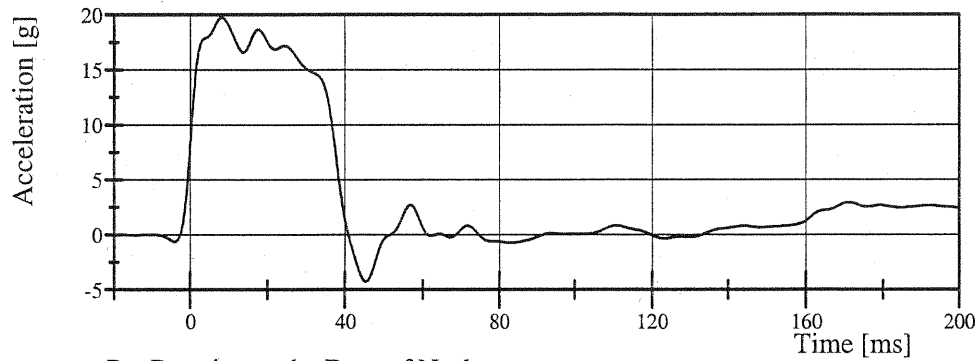
Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 3-1

Test Date: 9/27/2007

Pendulum Acceleration

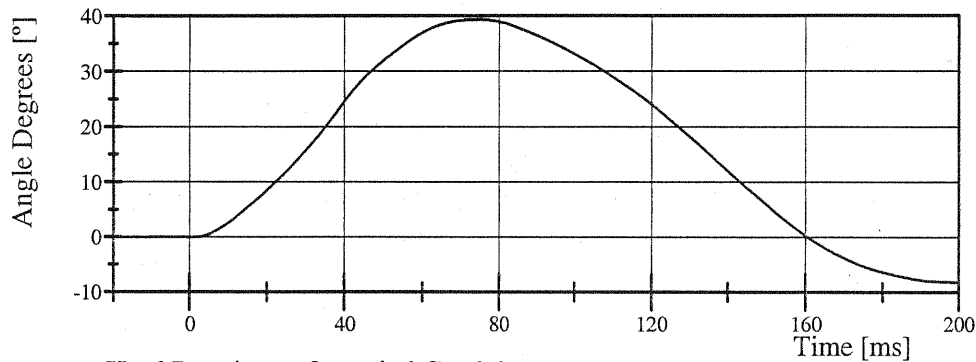


Filter Class: CFC_60

Max: 19.8 g at 8.2 ms

Min: -4.3 g at 45.3 ms

Pot Rotation at the Base of Neck

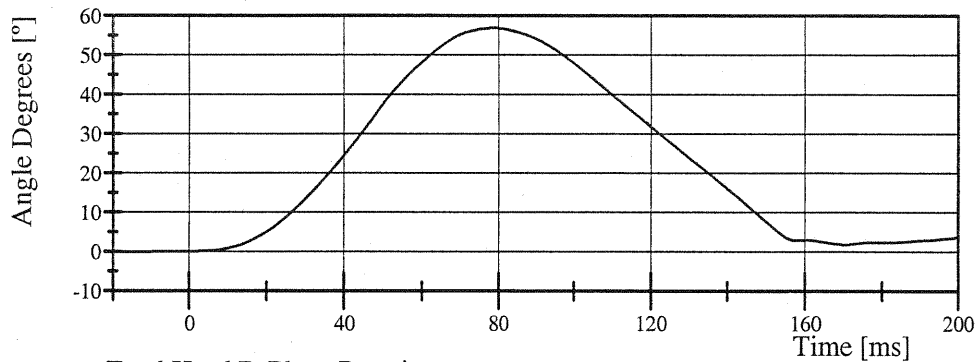


Filter Class: CFC_60

Max: 39.3 ° at 75.0 ms

Min: -8.2 ° at 199.7 ms

Head Rotation at Occipital Condyles

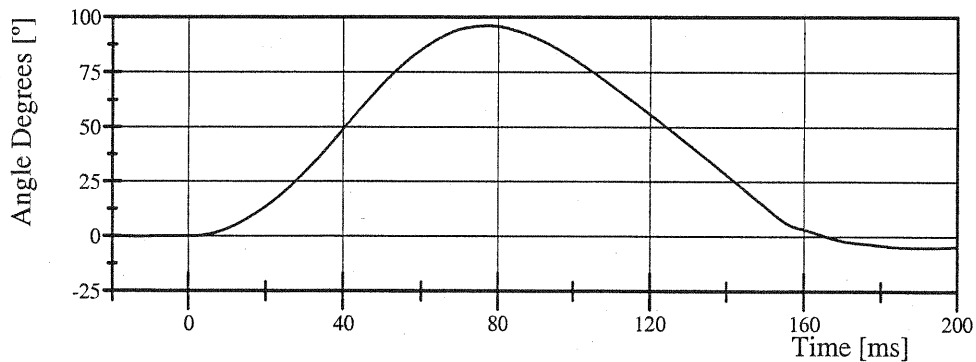


Filter Class: CFC_60

Max: 56.9 ° at 78.8 ms

Min: -0.0 ° at -20.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 96.1 ° at 77.6 ms

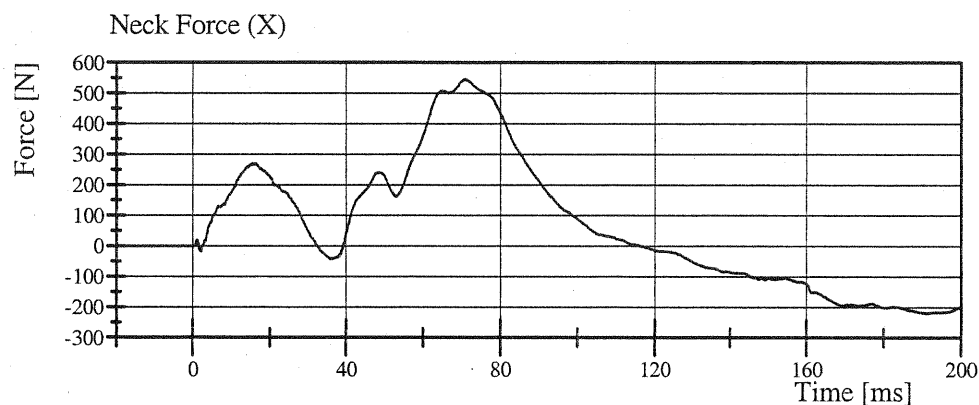
Min: -5.0 ° at 192.7 ms

Transportation Research Center Inc.

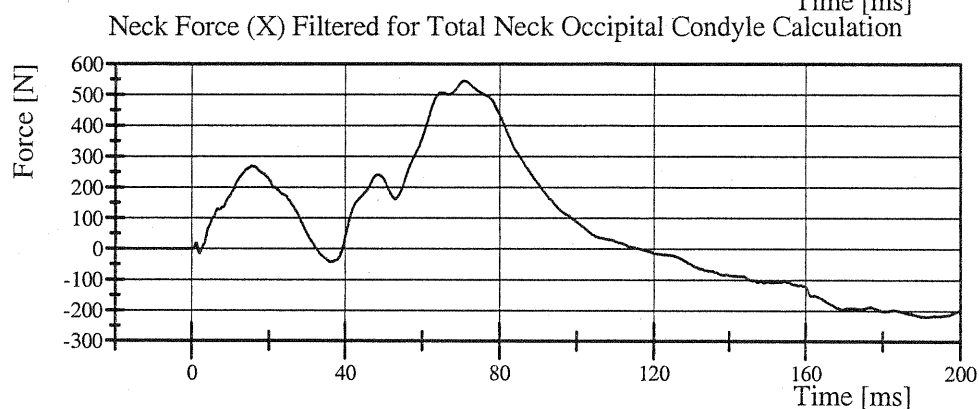
Neck Extension

HIII 50th Serial No. 037 Certification No. 3-1

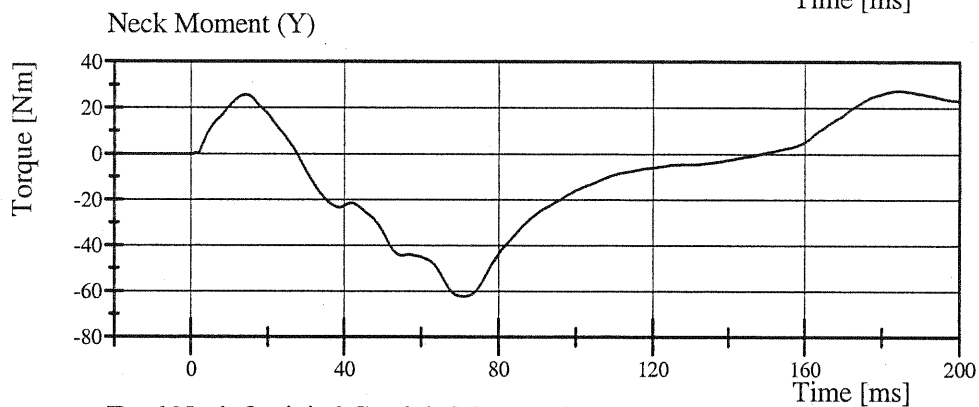
Test Date: 9/27/2007



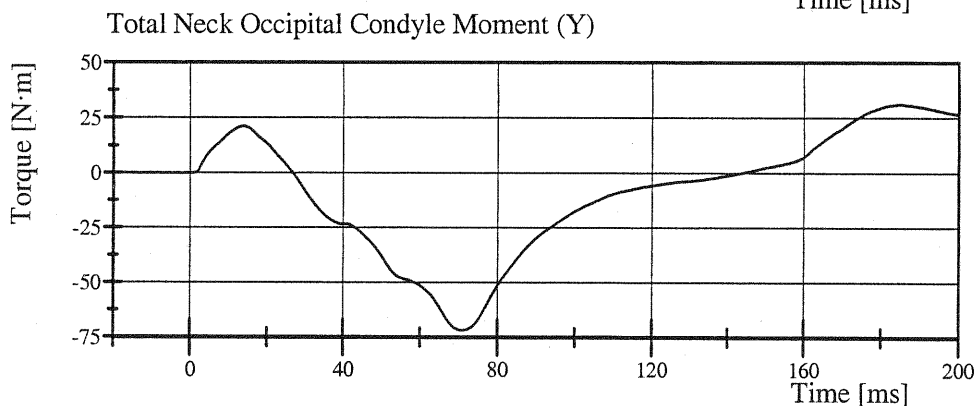
Filter Class: CFC_1000
Max: 545.8 N at 70.8 ms
Min: -220.3 N at 191.1 ms



Filter Class: CFC_600
Max: 545.4 N at 70.9 ms
Min: -219.9 N at 191.1 ms



Filter Class: CFC_600
Max: 27.6 Nm at 184.8 ms
Min: -62.2 Nm at 71.0 ms



Filter Class: CFC_600
Max: 31.1 N·m at 184.9 ms
Min: -71.8 N·m at 71.0 ms



Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 037 Certification No. 3-2

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.653 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,772.5 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-64.00 mm	Yes
Internal Hysteresis	65 - 85 %	77.1 %	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Stoner

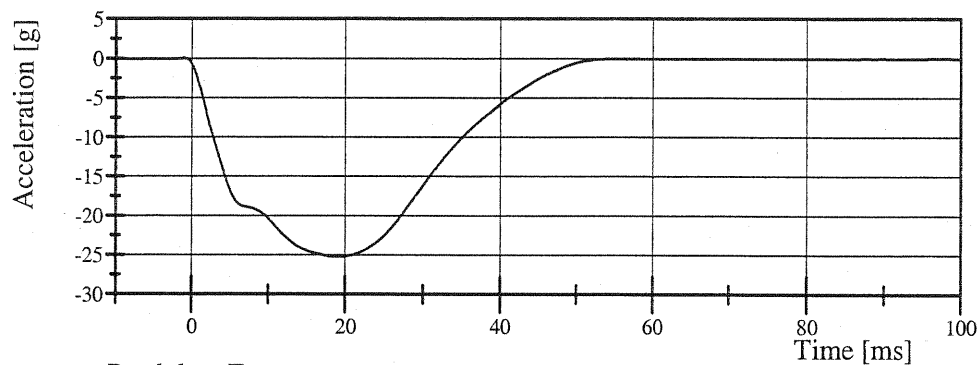
Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 037 Certification No. 3-2

Test Date: 9/27/2007

Pendulum Acceleration

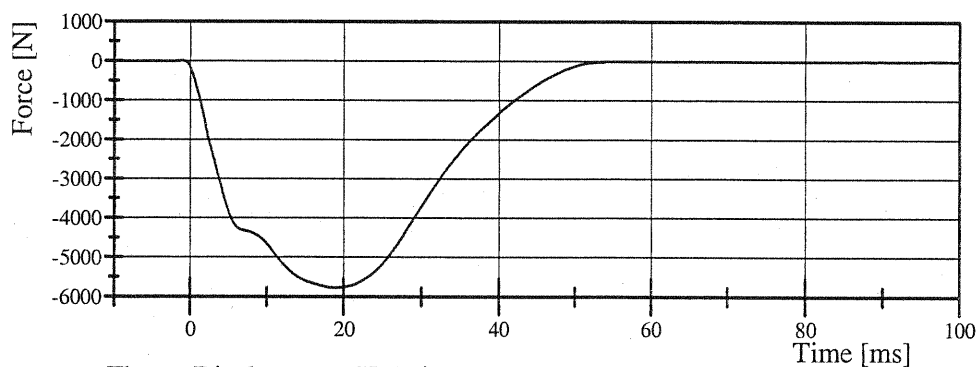


Filter Class: CFC_180

Max: 0.1 g at -1.0 ms

Min: -25.2 g at 19.0 ms

Pendulum Force

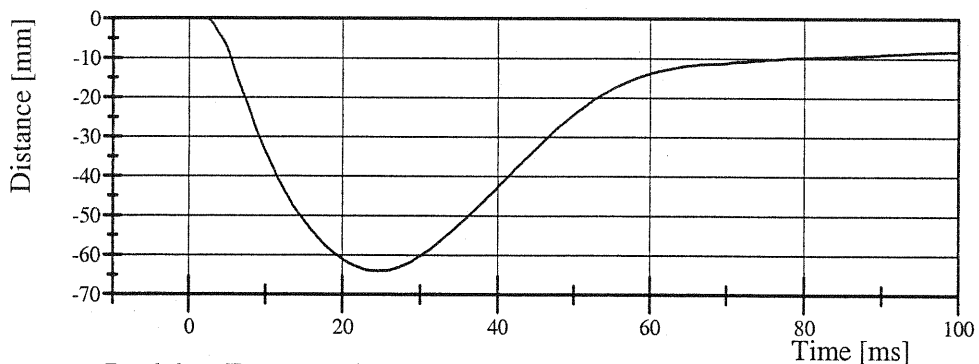


Filter Class: CFC_180

Max: 13.1 N at -1.0 ms

Min: -5,772.5 N at 19.0 ms

Thorax Displacement X-Axis

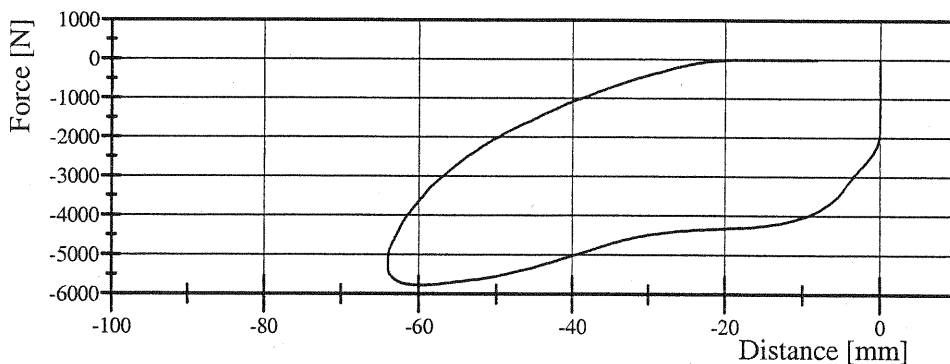


Filter Class: CFC_600

Max: 0.0 mm at -9.5 ms

Min: -64.0 mm at 24.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180

Max: 13.1 N at -0.0 mm

Min: -5,772.5 N at -59.6 mm

Applied Safety Technologies Corp.

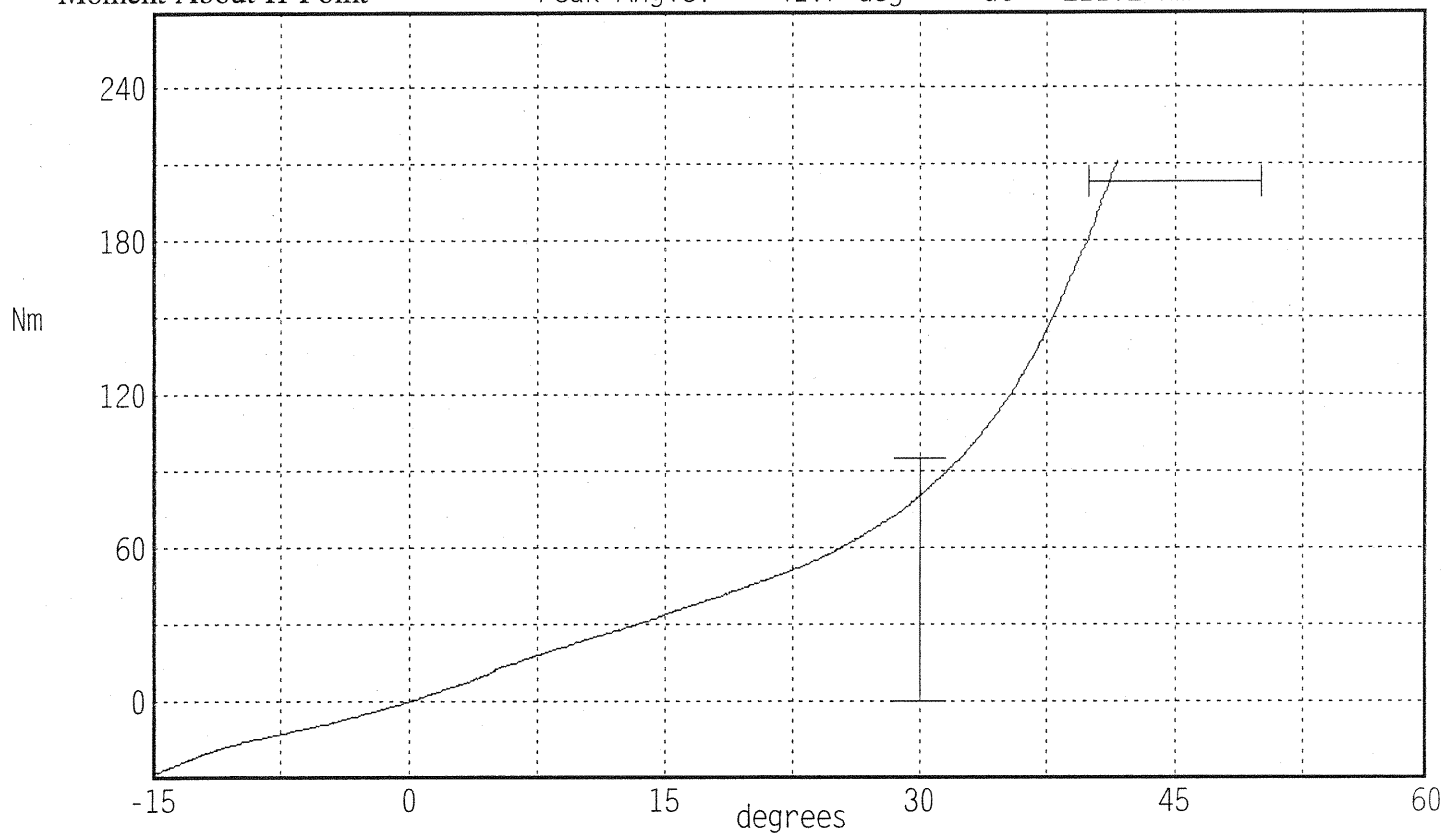
Hybrid III Hip Range of Motion

Serial Number: 037L
Test Number: 037C03
Comments:

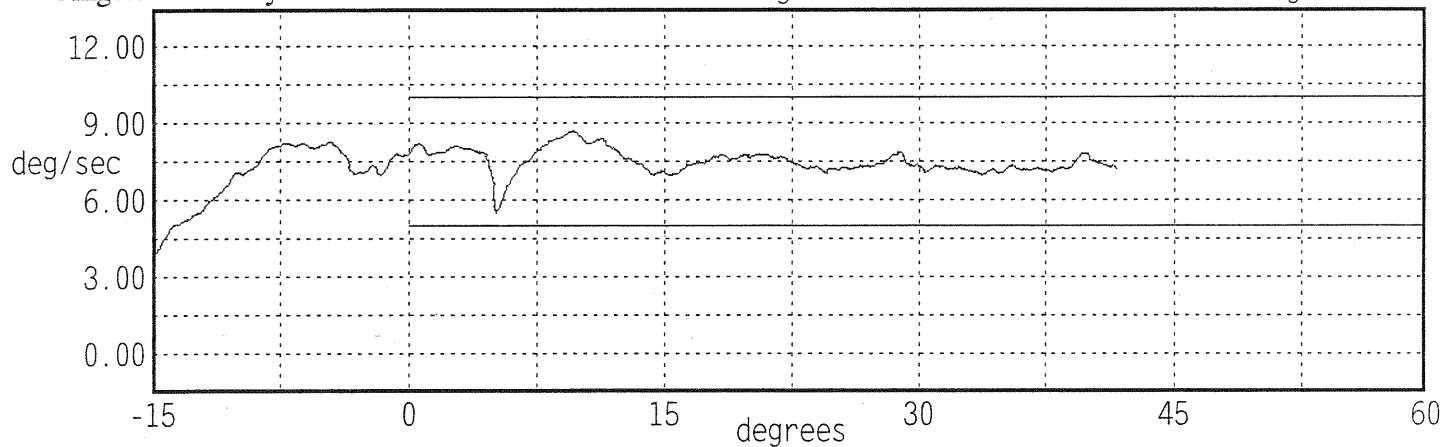
Date: 09/27/2007
Time: 10:49

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.3 °C Pass
Humidity	10 - 70	60 % Pass
Moment at 30 deg	<= 94.9	80.6 Nm Pass
Angle at 203 Nm	40.0 - 50.0	41.3 deg Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec Pass

Moment About H-Point
Peak Moment: 211.2 Nm at 41.7 deg
Peak Angle: 41.7 deg at 211.2 Nm



Angular Velocity
Max: 8.7 deg/sec
Min: 5.5 deg/sec



Applied Safety Technologies Corp.

Hybrid III Hip Range of Motion

Serial Number: 037R

Date: 09/27/2007

Test Number: 037C03

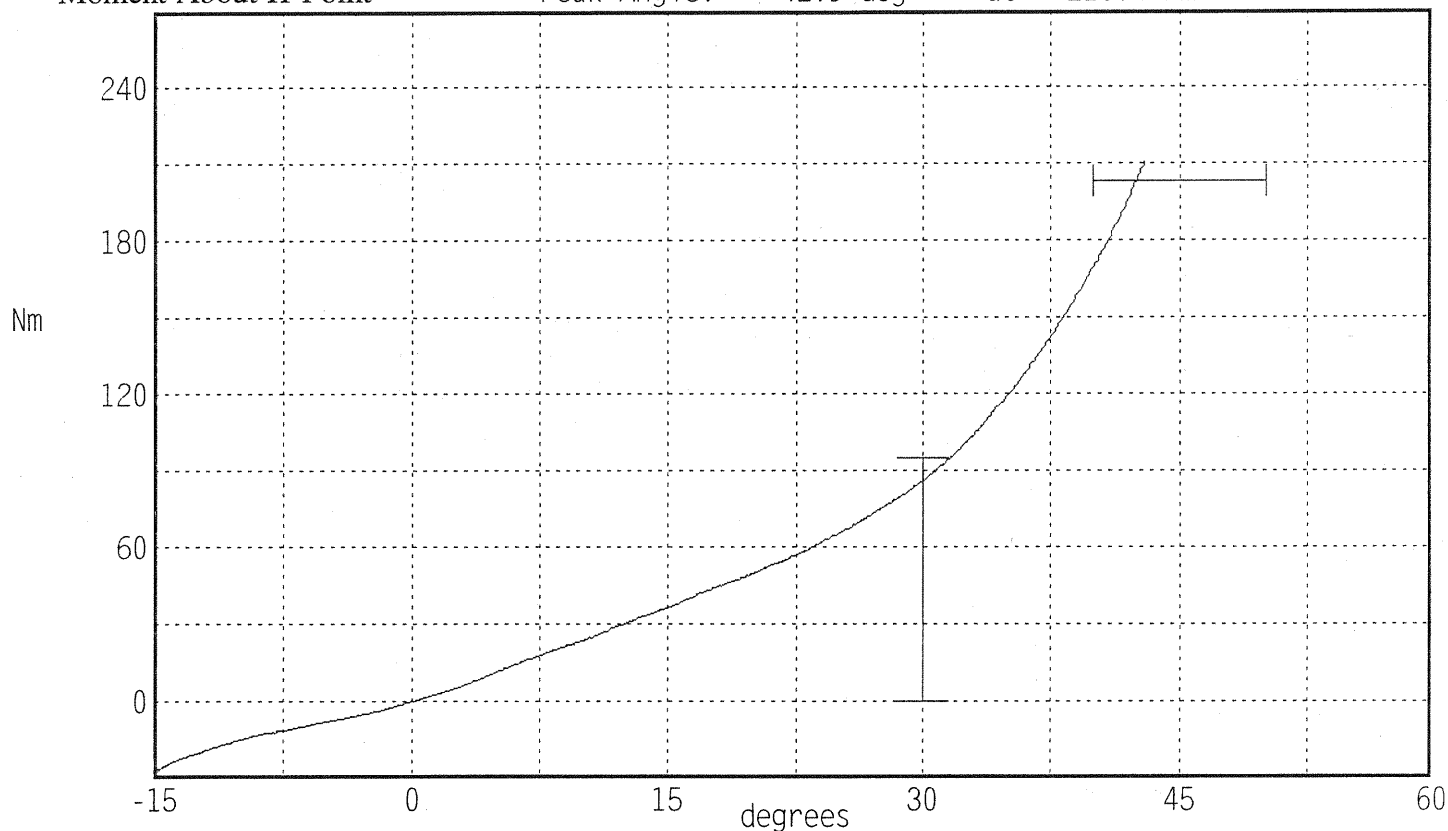
Time: 10:43

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.3 °C Pass
Humidity	10 - 70	60 % Pass
Moment at 30 deg	<= 94.9	86.1 Nm Pass
Angle at 203 Nm	40.0 - 50.0	42.5 deg Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec Pass

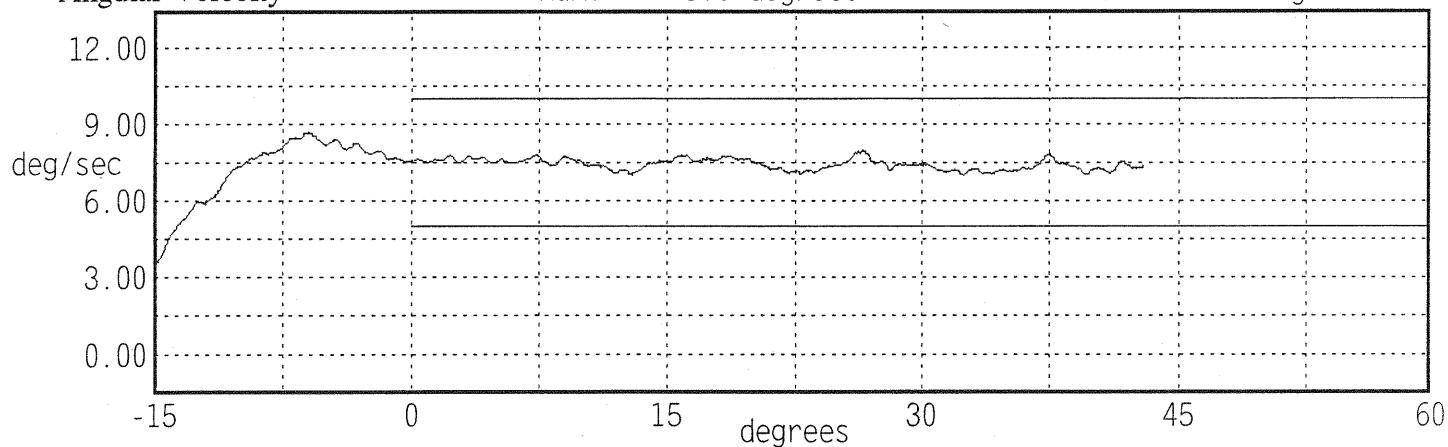
Moment About H-Point

Peak Moment:	210.4 Nm	at	42.9 deg
Peak Angle:	42.9 deg	at	210.4 Nm



Angular Velocity

Max:	8.0 deg/sec	Min:	7.0 deg/sec
------	-------------	------	-------------



Transportation Research Center Inc.

Left Knee Femur Response Test

HIII 50th Serial No. 037 Certification No. 3-3

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.086 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,291.99 N	Yes

Test meets specifications.

Comments:

Technician

Paul Baur

Approved

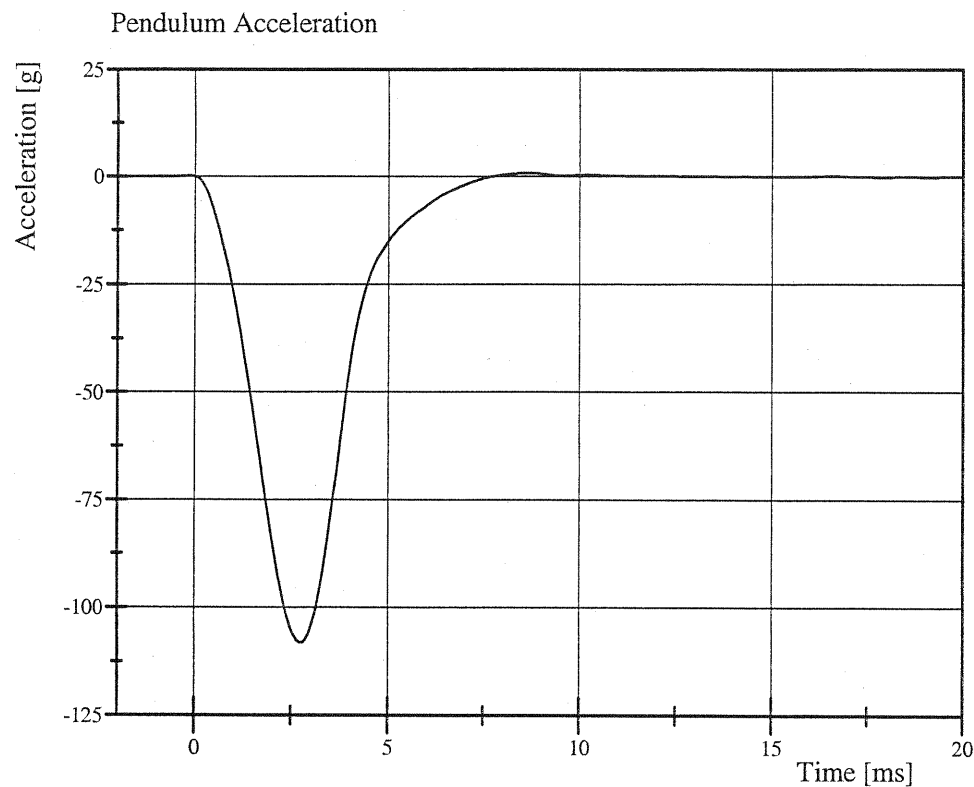
Ron Stoner

Transportation Research Center Inc.

Left Knee Femur Response Test

HIII 50th Serial No. 037 Certification No. 3-3

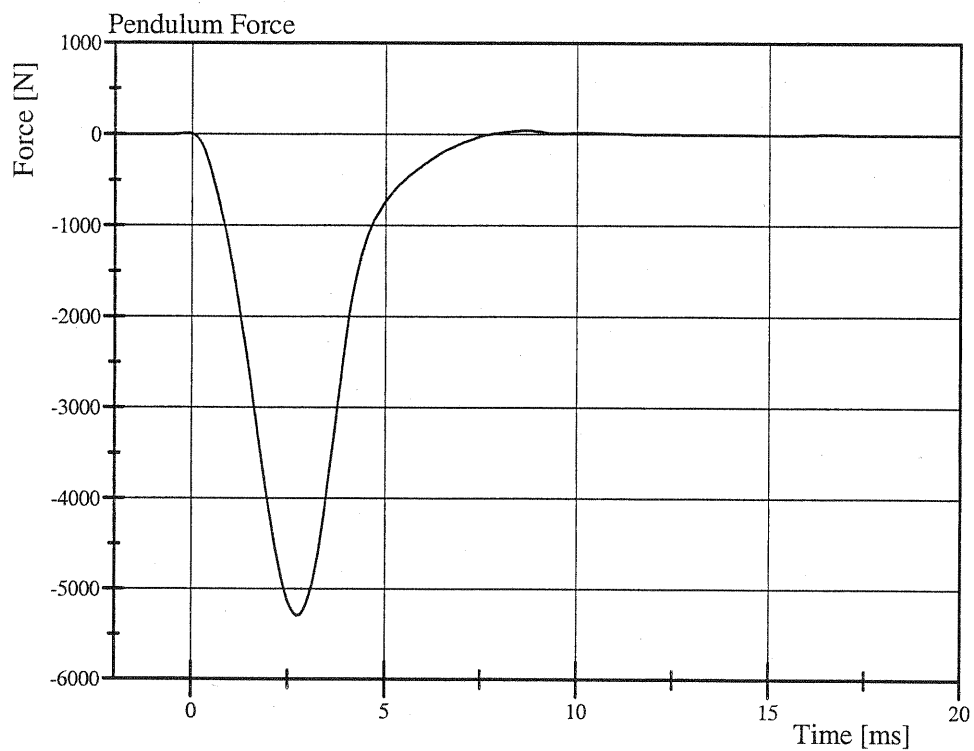
Test Date: 9/27/2007



Filter Class: CFC_600

Max: 0.8 g at 8.6 ms

Min: -108.2 g at 2.7 ms



Filter Class: CFC_600

Max: 40.9 N at 8.6 ms

Min: -5,292.0 N at 2.7 ms

Transportation Research Center Inc.

Right Knee Femur Response Test

HIII 50th Serial No. 037 Certification No. 3-1

Test Date: 9/27/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.115 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,218.70 N	Yes

Test meets specifications.

Comments:

Technician

Charles W. Beale

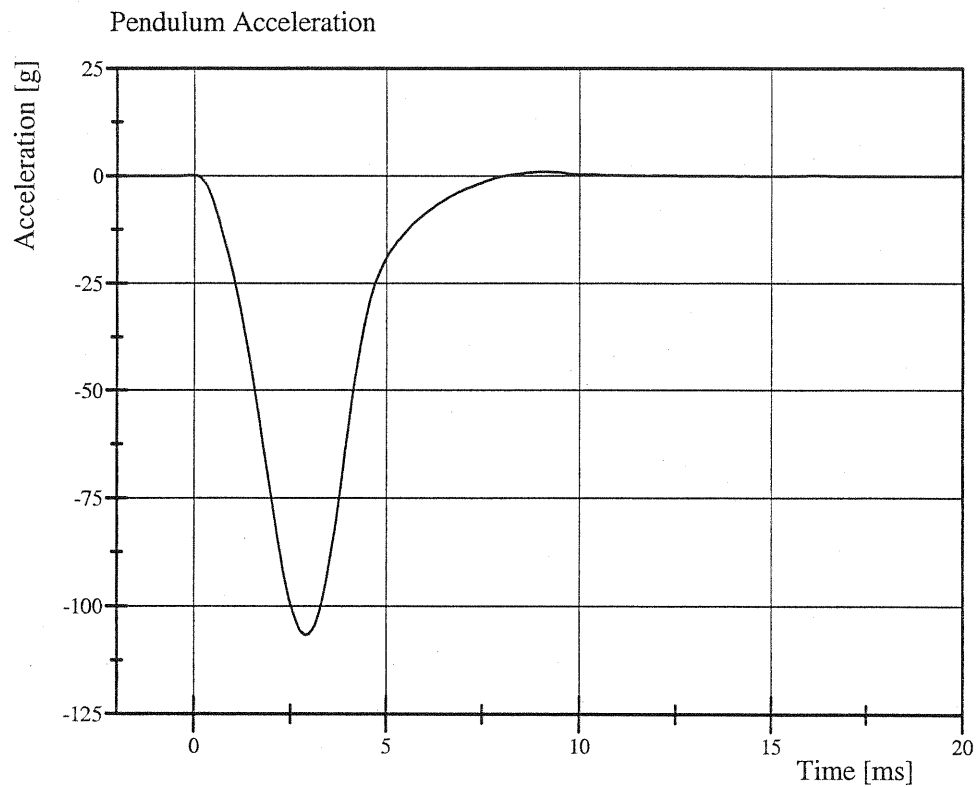
Approved

Ron Stoner

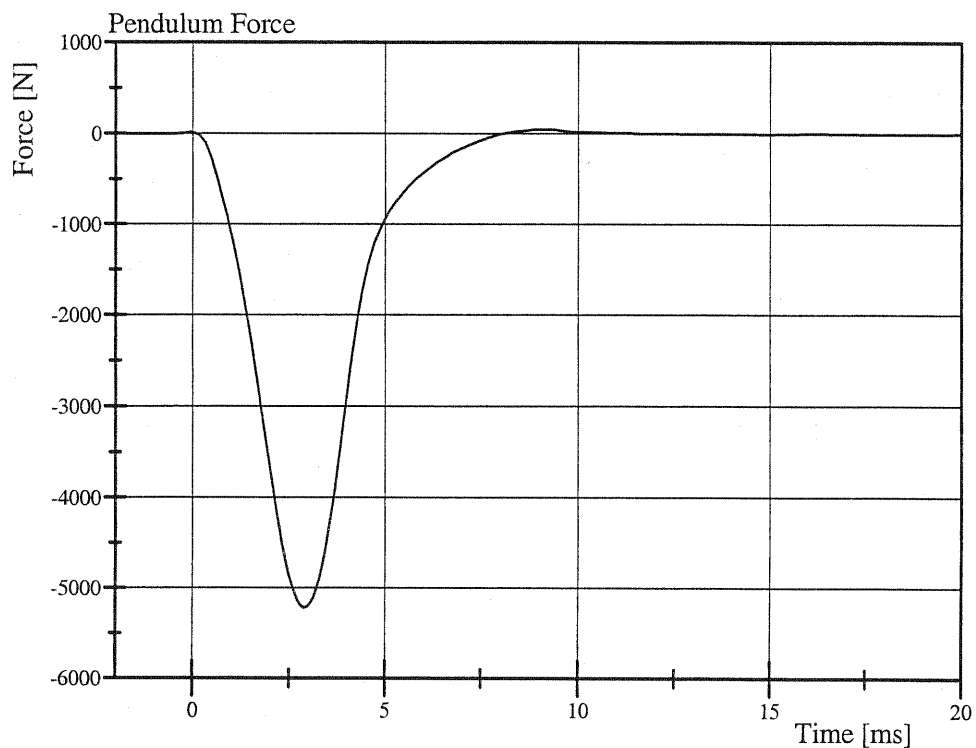


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 3-1
Test Date: 9/27/2007



Filter Class: CFC_600
Max: 1.0 g at 9.0 ms
Min: -106.7 g at 2.9 ms



Filter Class: CFC_600
Max: 47.2 N at 9.0 ms
Min: -5,218.7 N at 2.9 ms

APPENDIX D
CHILD RESTRAINT SYSTEM

REPORT NUMBER: NCAP-TRC-2007-005

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

**MITSUBISHI MOTORS CORPORATION
2008 MITSUBISHI OUTLANDER MPV
NHTSA NUMBER: M85602**

**PREPARED BY:
TRANSPORTATION RESEARCH CENTER INC.
10820 STATE ROUTE 347
P. O. BOX B-67
EAST LIBERTY, OH 43319**



Test Date: November 27, 2007

Report Date: December 12, 2007

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NVS-111
1200 NEW JERSEY AVENUE, S.E., ROOM W43-410
WASHINGTON, D.C. 20590**

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Test Performed By: Duey Thomas, Test Technician II

Report Approved By: Emad Al-Tabakha

Emad Al-Tabakha, Test Engineer

Transportation Research Center Inc.

Approval Date: 12/12/07

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

1. Report No. NCAP-TRC-2007-005	2. Government Accession No.	3. Recipient's Catalog No.													
4. Title and Subtitle Final Report of a Graco Snugride CRS Final Report of a Centre DX CRS NHTSA No.: M85602		5. Report Date December 12, 2007													
		6. Performing Organization Code TRC Inc.													
7. Author(s) Emad Al-Tabakha, Test Engineer Transportation Research Center Inc.		8. Performing Organization Report No. 071127													
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		10. Work Unit No. (TRAIS)													
		11. Contract or Grant No. DTNH22-06-D-00029													
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 1200 New Jersey Avenue, S.E., Room W43-410 Washington, DC 20590		13. Type of Report and Period Covered Final Report November - December 2007													
		14. Sponsoring Agency Code DOT/NHTSA/NRM/OCS													
15. Supplemental Notes															
16. Abstract A side impact test was conducted on one (1) CRS Graco Snugride and one (1) CRS Centre DX in conjunction with side impact NCAP testing on a 2008 Mitsubishi Outlander MPV and in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the determination of CRS crashworthiness. This test was conducted by Transportation Research Center Inc. in East Liberty, Ohio, on November 27, 2007. <table border="0" style="width: 100%;"> <tr> <td></td> <td style="text-align: center;"><u>Left Rear</u></td> <td></td> <td style="text-align: center;"><u>Right Rear</u></td> </tr> <tr> <td>Head Injury Criteria (HIC15):</td> <td style="text-align: center;"><u>304</u></td> <td style="text-align: center;">g's</td> <td style="text-align: center;"><u>370</u> g's</td> </tr> <tr> <td>3 ms Chest Clip:</td> <td style="text-align: center;"><u>38.8</u></td> <td style="text-align: center;">g's</td> <td style="text-align: center;"><u>64.7</u> g's</td> </tr> </table>					<u>Left Rear</u>		<u>Right Rear</u>	Head Injury Criteria (HIC15):	<u>304</u>	g's	<u>370</u> g's	3 ms Chest Clip:	<u>38.8</u>	g's	<u>64.7</u> g's
	<u>Left Rear</u>		<u>Right Rear</u>												
Head Injury Criteria (HIC15):	<u>304</u>	g's	<u>370</u> g's												
3 ms Chest Clip:	<u>38.8</u>	g's	<u>64.7</u> g's												
17. Key Words New Car Assessment Program (NCAP) Frontal Barrier Impact Test Final Report of a Graco Snugride CRS Final Report of a Centre DX CRS		18. Distribution Statement <u>Copies of this report are available from:</u> NHTSA Technical Information Services (TIS) 1200 New Jersey Avenue, S.E., Room W43-410 Washington, DC 20590 Telephone No. (202) 366-4946 Attn: Robert Hornicle													
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. Number of Pages 123	22. Price												

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D-4	CRABI Calibration Information	D4-1

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SECTION D1
PURPOSE AND SUMMARY OF TEST M85602

PURPOSE

The purpose of this test is to obtain CRS performance data during a 55/28 km/h frontal barrier impact NCAP Test.

The frontal barrier impact NCAP test was conducted in accordance with the Office of Crashworthiness Standards (OCS) NCAP Laboratory Test Procedure.

SUMMARY

Two 12-month old CRABIs (P3 & P4) were instrumented with head, chest, pelvis, and six-axis upper neck load cells. A tri-axial accelerometer was installed on the CRS base. The left rear (P4) CRS seat detached from the base during impact.

The left rear (P4) (Serial No. 095) and right rear (P3) (Serial No. 094) CRABIs were calibrated prior to this test. CRABI calibration information is found in Section D-4.

CHILD DUMMY VALUES		
Location	HIC15 Value	3 ms Chest Clip
CRABI (P3)	370	64.7
CRABI (P4)	304	38.8

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2008 Mitsubishi Outlander
 Test Program: NCAP Frontal Impact

NHTSA No.: M85602
 Test Date: 11/27/07

CHILD RESTRAINT SYSTEM INFORMATION

Description	Position #4 CRS	Position #3 CRS
Manufacturer	Combi	Graco Children's Products, Inc.
Model Name	Centre DX ARB	Snugride
Model No.	852084	8465DAI3
Type	Infant	Infant
Forward/Rearward	Rearward	Rearward

VISIBLE DUMMY CONTACT POINTS

Description	Position #4 CRS	Position #3 CRS
Head Contact	Left front seat back at seat back	None
Chest Contact	None	None
Abdomen Contact	None	None
Left Knee Contact	None	None
Right Knee Contact	None	None
Left Foot Contact	Left front seat back at headrest	Right rear seat back
Right Foot Contact	Left front seat back at headrest	Right rear seat back

POST-TEST DOOR OPENINGS

Description	Position #4 CRS	Position #3 CRS
Right Rear Door	Opened without tools. Remained closed during test.	Opened without tools. Remained closed during test.

CAMERAS

Description	Standard
High Speed	2
Real Time	1
Total	3

DATA CHANNELS

CRABI (P3 & P4) Sensors	30
CRS Sensors	6
Total	36

DATA SHEET NO. 2**VEHICLE PARAMETER DATA**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85602Test Program: NCAP Frontal ImpactTest Date: 11/27/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	482.0	390.2		516.4	446.0	
Right	kg	468.0	378.0		531.6	453.5	
Ratio	%	55.3	44.7		53.8	46.2	
Totals	kg	950.0	768.2	1718.2	1048.0	899.5	1947.5

TARGET TEST WEIGHT CALCULATION

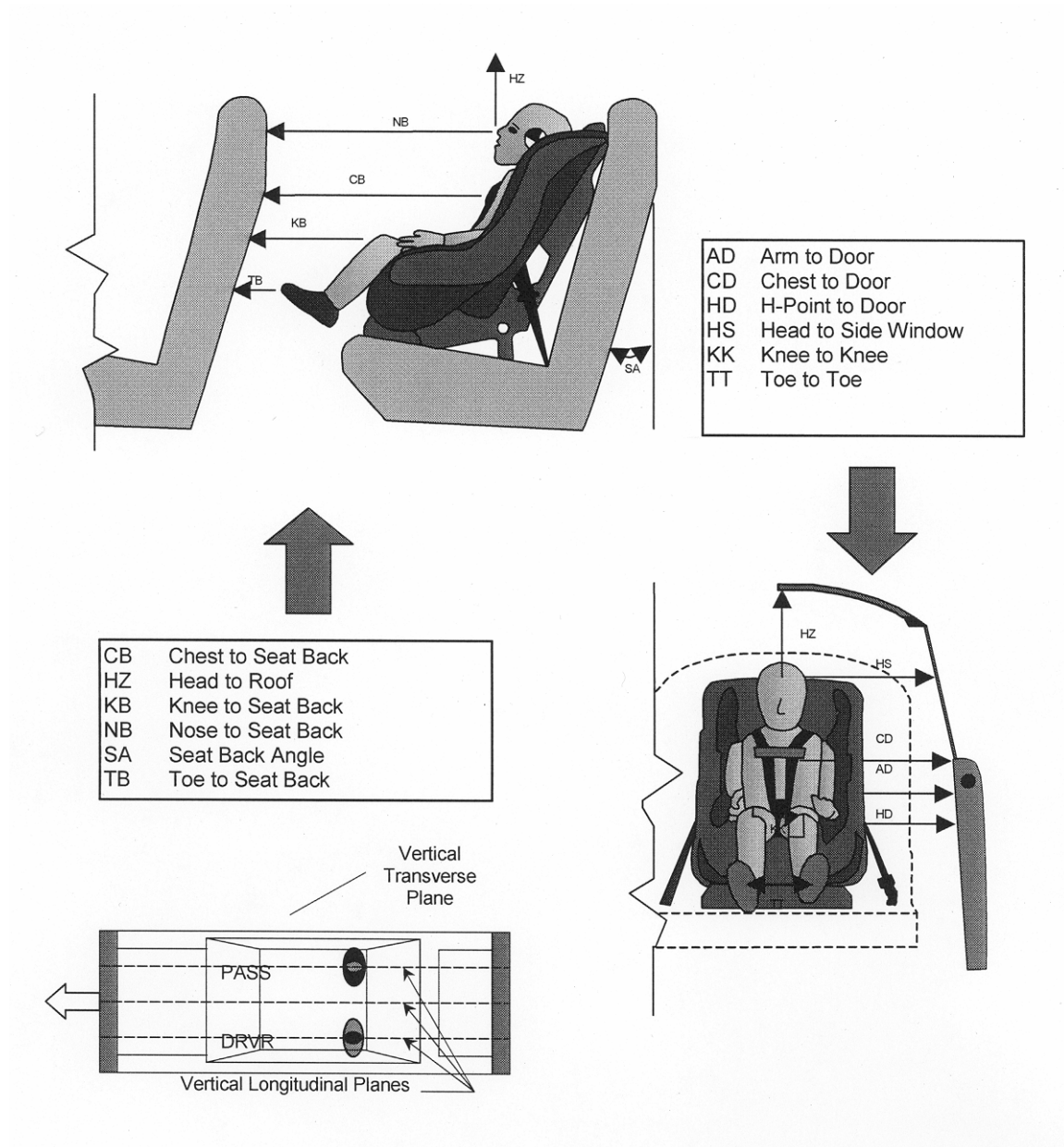
Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1718.2
Weight of 2 P572M ATDs	kg	185.4
Rated Cargo/Luggage Weight (RCLW)	kg	49.0
Calculated Vehicle Target Weight (TVTW)	kg	1952.6

DATA SHEET NO. 3

CRABI POSITIONING IN VEHICLE

Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Frontal Impact

NHTSA No.: M85602
Test Date: 11/27/07



Note: Child seat was rearward facing.

DATA SHEET NO. 3**CRABI POSITIONING IN VEHICLE, (Continued)**

Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Frontal Impact

NHTSA No.: M85602
Test Date: 11/27/07

Code	Measurement Description	P4 (Driver's Side)		P3 (Passenger's Side)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
SA	Seat Back Angle		37.6		24.5
CB	Chest to Seatback	371		455	
HZ	Head to Roof	407		425	
KB	Left Knee to Seatback	170		225	
NB	Nose to Seatback	461		528	
TB	Toe to Seatback	50		65	

DATA SHEET NO. 4**CRS PERFORMANCE DATA**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85602Test Program: NCAP Frontal ImpactTest Date: 11/27/07**CRS PERFORMANCE DATA**

Location	CRS (P4) ¹		CRS (P3)	
	Damage	Post-Test	Damage	Post-Test
Upper Tether Strap				
Upper Tether Buckle				
Upper Tether Hook				
Vehicle Upper Tether Anchor				
Lower Anchor Strap				
Lower Anchor Buckle				
Lower Anchor Hooks	No	None	No	None
Vehicle Lower CRS Anchors	No	None	No	None
5-Point Harness Connections	No	None	No	None
Cracks on CRS	No	None	No	Yes ²
Fabric Tears on CRS	No	None	No	None
Vehicle Seat Structure	No	None	No	None
Vehicle Seat Fabric Tears	No	None	No	None

¹ Seat detached from base during impact.² Front edge of base.

DATA SHEET NO. 5

CRS ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Mitsubishi Outlander

NHTSA No.: M85602

Test Program: NCAP Frontal Impact

Test Date: 11/27/07

CRS ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	CRS CG (P4)	1850	540	790
2	CRS CG (P3)	1930	520	820

Reference Points: X - From Rear Surface of Vehicle (+ forward)

Y - Vehicle Centerline (+ to right)

Z - Ground Plane (+ down)

DATA SHEET NO. 6**HIGH SPEED CAMERA LOCATIONS AND DATA**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85602Test Program: NCAP Frontal ImpactTest Date: 11/27/07**CAMERA LOCATIONS**

No.	Camera View	Location (mm)			Angle (Deg.)	Film Plane to Head	Lens (mm)	Frame Speed (fps)
		X	Y	Z				
1	Onboard at Left Rear Dummy View	3290	710	1415	16.6	760	6.5	1000
2	Onboard at Right Rear Dummy View	3290	740	1440	14.9	840	6.5	1000

Reference Points: X - Impact Line

Y - MDB Left Edge Impact Point

Z - Ground Plane

APPENDIX D2
PHOTOGRAPHS

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Figure D-1 Left Rear CRS Certification Label View - Base

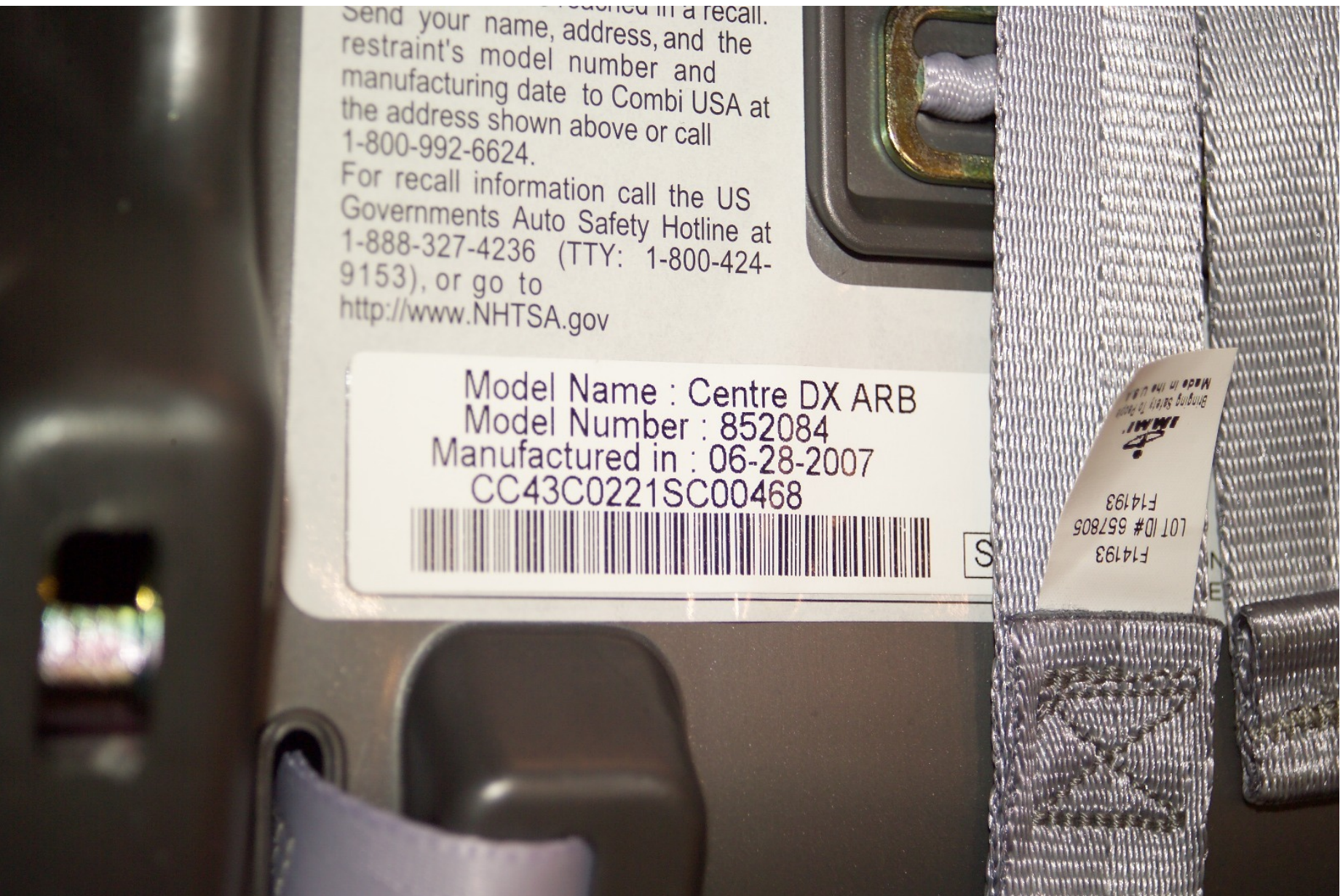


Figure D-2 Left Rear CRS Certification Label View - Child Seat



Figure D-3 Pre-Test Front View of Left Rear CRS



Figure D-4 Post-Test Front View of Left Rear CRS



Figure D-5 Pre-Test Left Side View of Left Rear CRS



Figure D-6 Post-Test Left Side View of Left Rear CRS



Figure D-7 Pre-Test Right Side View of Left Rear CRS

D2-10

071127



Figure D-8 Post-Test Right Side View of Left Rear CRS

D2-11

071127



Figure D-9 Pre-Test Front View of Left Rear Child Dummy



Figure D-10 Pre-Test Left View of Left Rear Child Dummy



Figure D-11 Post-Test Left View of Left Rear Child Dummy - View 1



Figure D-12 Post-Test Left View of Left Rear Child Dummy - View 2

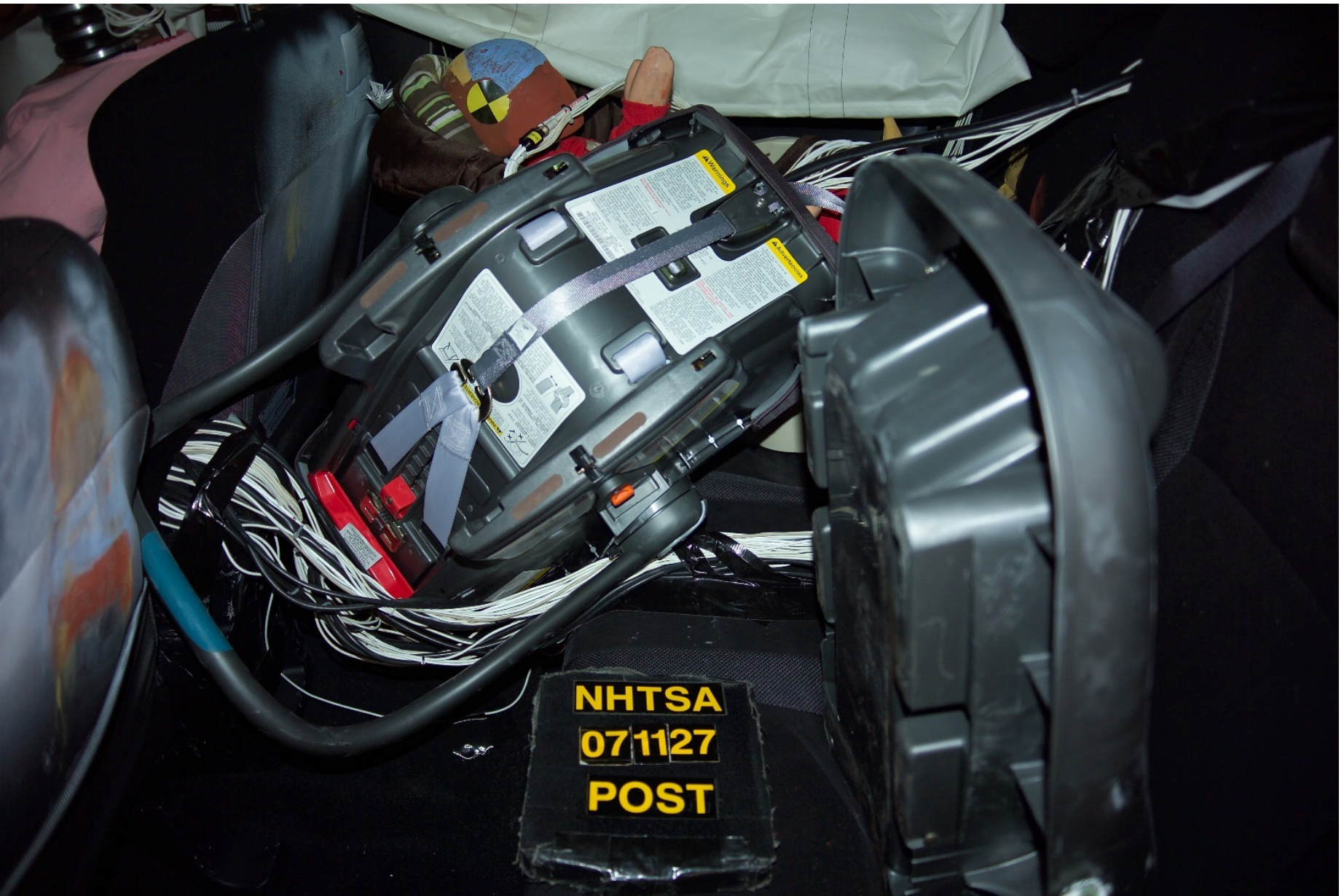


Figure D-13 Post-Test Left View of Left Rear Child Dummy - View 3



Figure D-14 Pre-Test Right View of Left Rear Child Dummy



Figure D-15 Post-Test Right View of Left Rear Child Dummy



Figure D-16 Pre-Test Distance from Driver Rear Seat to Left Rear CRS



Figure D-17 Post-Test Left Rear Child Dummy Head Contact - View 1



Figure D-18 Post-Test Left Rear Child Dummy Head Contact - View 2



Figure D-19 Post-Test Left Rear CRS Base - View 1

D2-22

071127



Figure D-20 Post-Test Left Rear CRS Base - View 2



Figure D-21 Post-Test Left Rear CRS Base - View 3



Figure D-22 Post-Test Left Rear CRS Child Seat - View 1

D2-25

071127



Figure D-23 Post-Test Left Rear CRS Child Seat - View 2

D2-26

071127

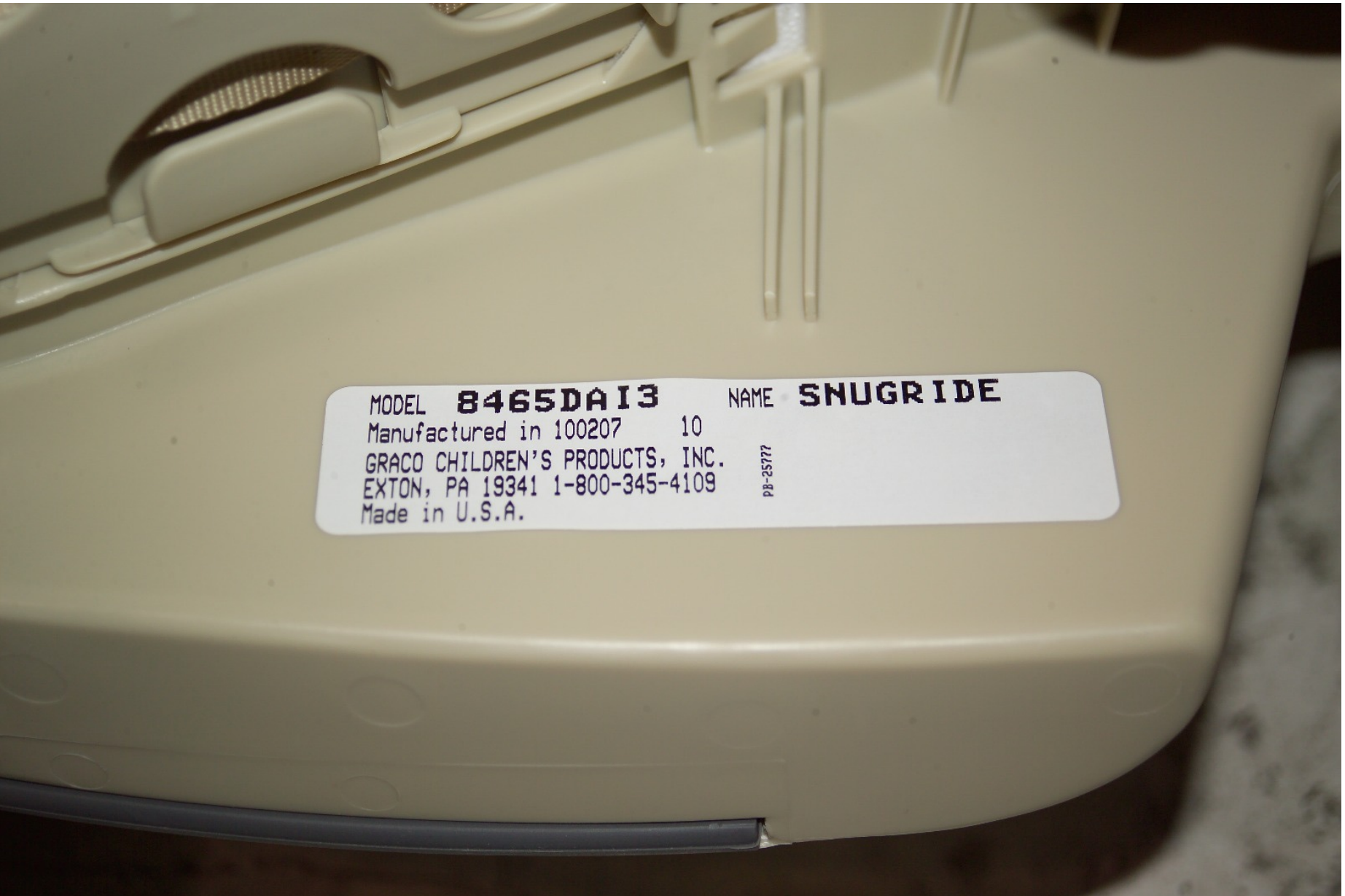


Figure D-24 Right Rear Child Restraint System Certification Label View



Figure D-25 Pre-Test Front View of Right Rear CRS

D2-28

071127



Figure D-26 Post-Test Front View of Right Rear CRS

D2-29

071127



Figure D-27 Pre-Test Left Side View of Right Rear CRS

D2-30

071127



Figure D-28 Post-Test Left Side View of Right Rear CRS



Figure D-29 Pre-Test Right Side View of Right Rear CRS

D2-32

071127



Figure D-30 Post-Test Right Side View of Right Rear CRS

D2-33

071127



Figure D-31 Pre-Test Front View of Right Rear Child Dummy



Figure D-32 Post-Test Front View of Right Rear Child Dummy



Figure D-33 Pre-Test Left View of Right Rear Child Dummy



Figure D-34 Post-Test Left View of Right Rear Child Dummy



Figure D-35 Pre-Test Right View of Right Rear Child Dummy



Figure D-36 Post-Test Right View of Right Rear Child Dummy



Figure D-37 Pre-Test Distance from Passenger Rear Seat to Right Rear CRS



Figure D-38 Post-Test Right Rear Child Dummy Head Contact View

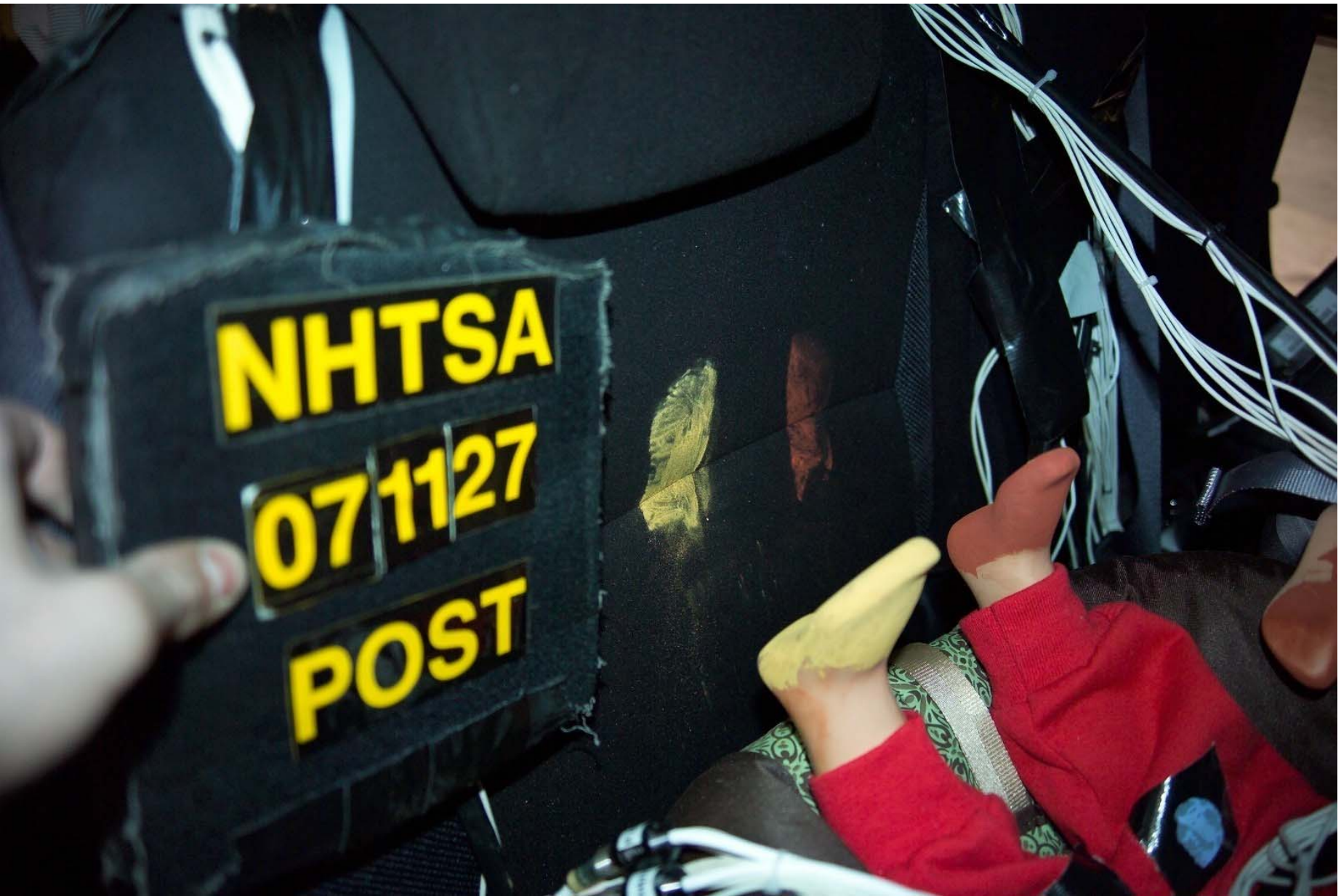


Figure D-39 Post-Test Right Rear Child Dummy Feet Contact View



Figure D-40 Post-Test Right Rear CRS Child Seat - View 1



Figure D-41 Post-Test Right Rear CRS Child Seat - View 2



Figure D-42 Post-I Test Right Rear CRS Base - View 1

D2-45

071127



Figure D-43 Post-I-Test Right Rear CRS Base -View 2



Figure D-44 Post-Test Right Rear CRS Base -View 3



Figure D-45 Post-Test Right Rear CRS Base -View 4



Figure D-46 Post-I Test Right Rear CRS Base - View 5



Figure D-47 Post-Test Right Rear CRS Base -View 6

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CRABI RESPONSE AND CRS DATA

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D3-4	Right Rear CRABI Chest Resultant	D3-6

NHTSA

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Test Number: 071127 (M85602)

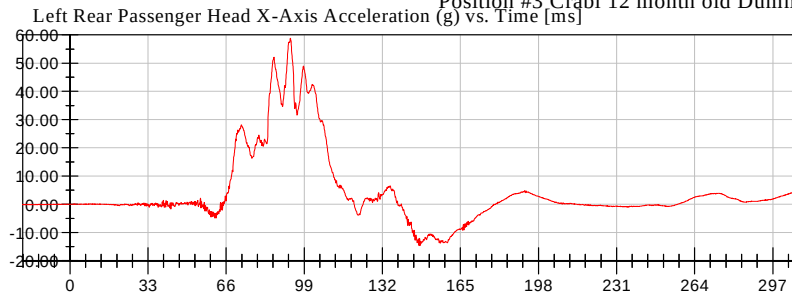
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Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



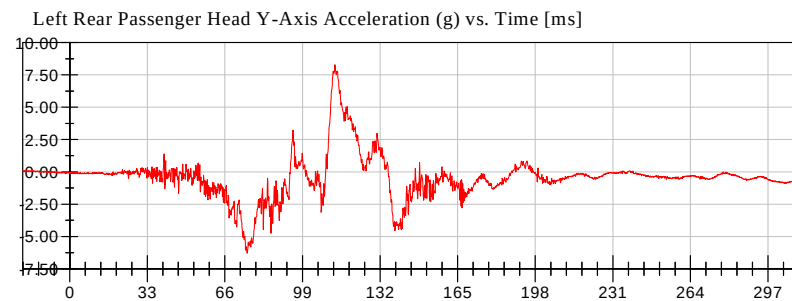
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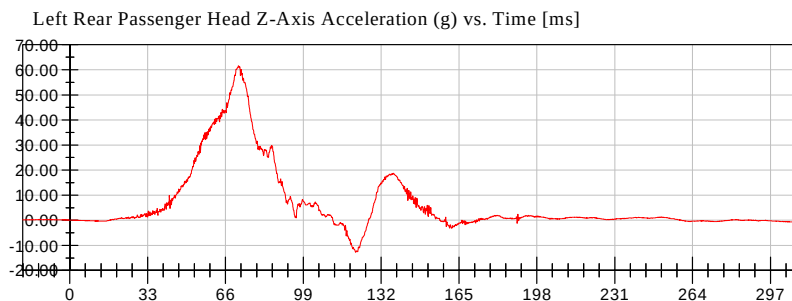
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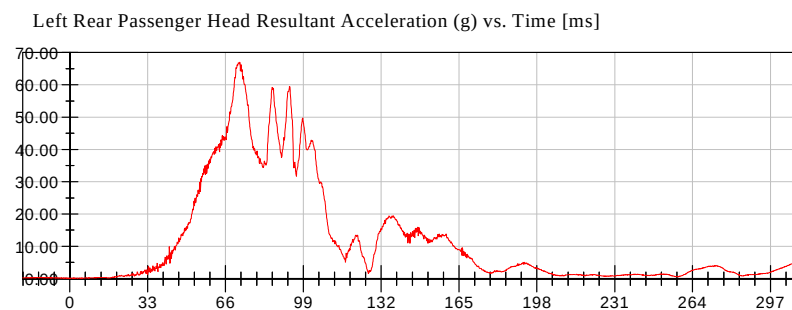
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-12.69 g at 121.20 ms

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0.07 g at 1.60 ms

CFC_1000



NHTSA

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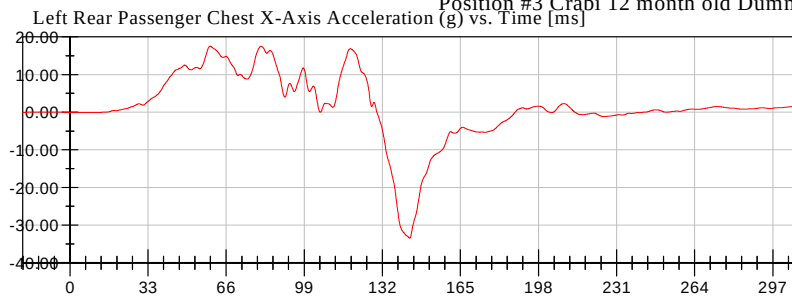
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Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



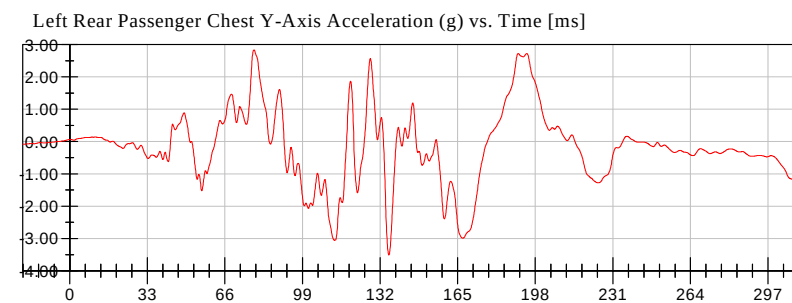
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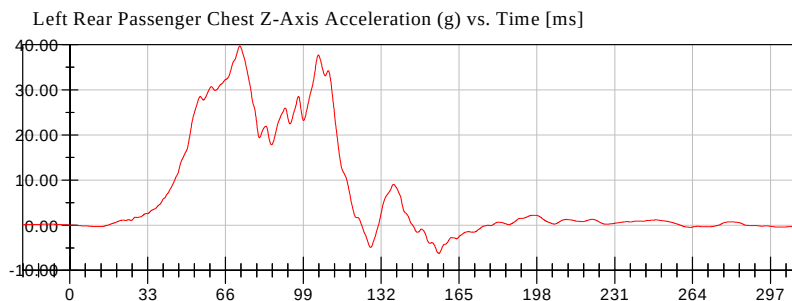
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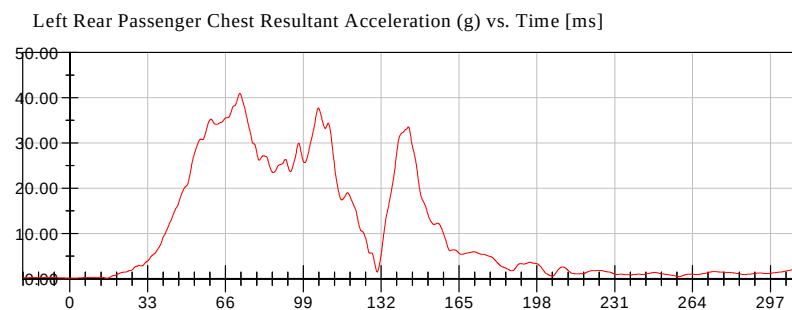
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0.08 g at 15.68 ms

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NHTSA

Test Lab: CTF

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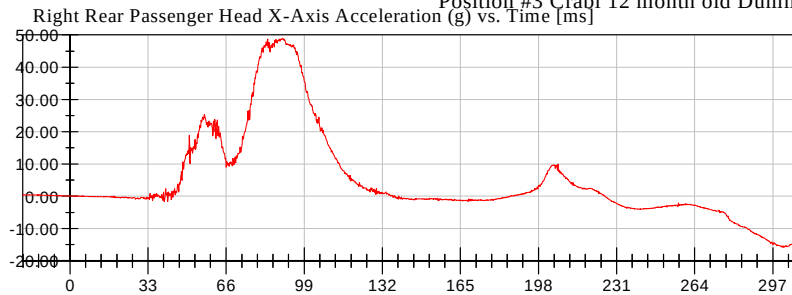
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Position #1 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



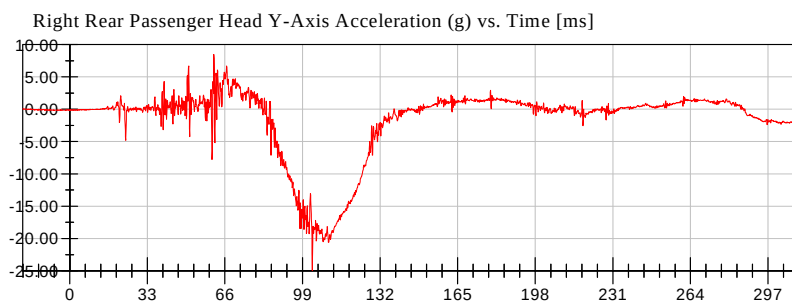
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-15.89 g at 301.68 ms

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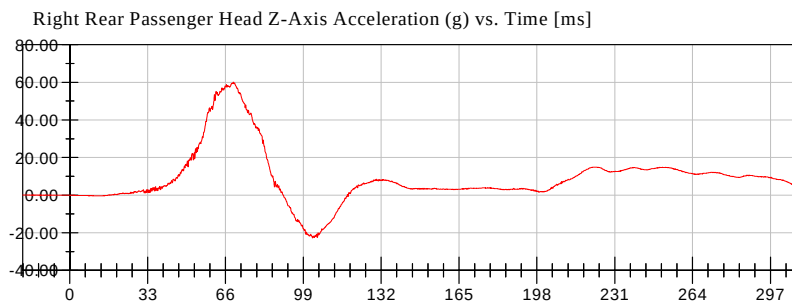
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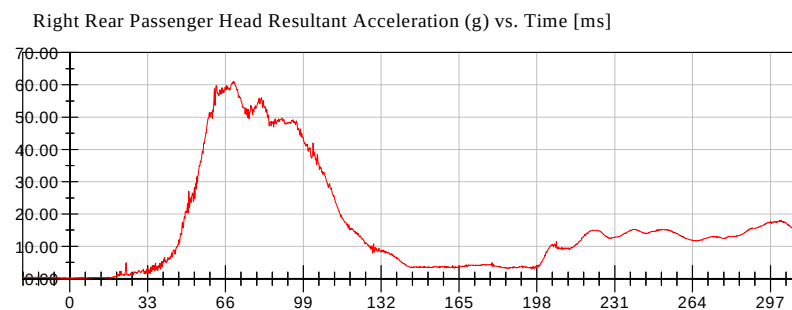
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-22.69 g at 102.96 ms

CFC_1000



<Max>

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<Min>

0.09 g at 1.52 ms

CFC_1000



NHTSA

Test Lab: CTF

Test Number: 071127 (M85602)

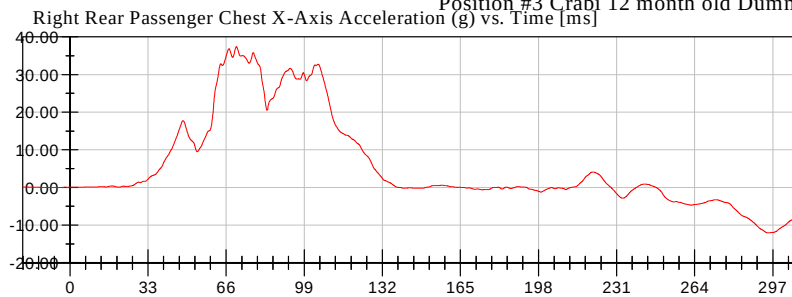
Test Date: 11/27/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #4 Crabi 12 month old Dummy (095)

Position #3 Crabi 12 month old Dummy (094)



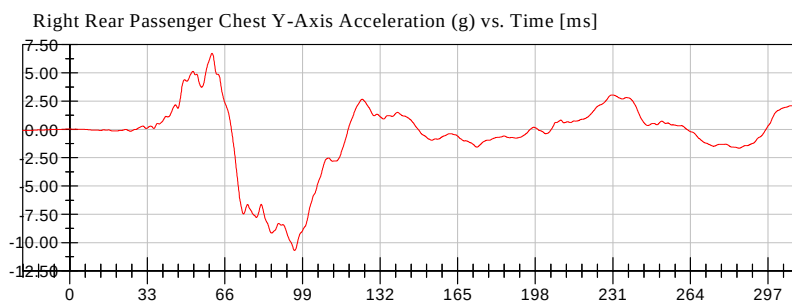
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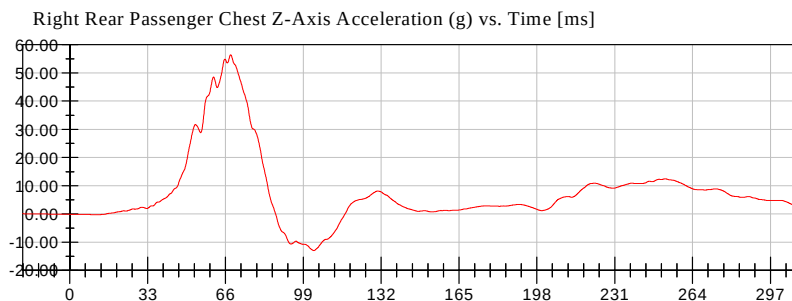
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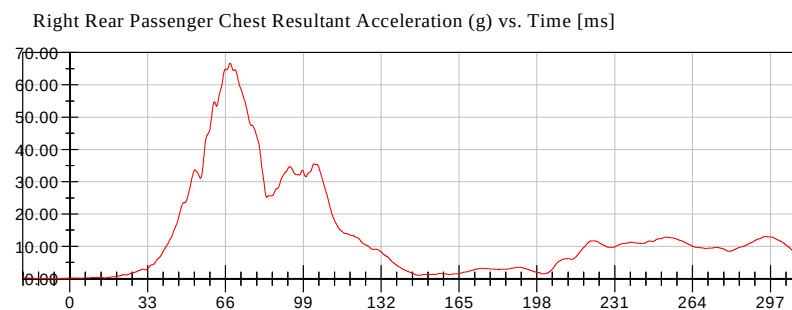
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56.43 g at 68.16 ms

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-12.95 g at 103.44 ms

CFC_180



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66.66 g at 68.00 ms

<Min>

0.02 g at -7.28 ms

CFC_180



APPENDIX D4
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST LEFT REAR

CRABI: 095

Transportation Research Center Inc.
572R CRABI 12-Month-Old Dummy
External Dimensions
Serial No. 095 Calibration No. 08
Date: 14-Nov-07

Test Parameter	Dimension	Specification	Results	Pass
Total Sitting Height	A	456.0 - 471.2 mm	470 mm	Yes
Shoulder Pivot Height	B	276.6 - 291.8 mm	287 mm	Yes
Hip Pivot Height	C	27.9 - 38.1 mm	36 mm	Yes
Hip Pivot from Backline	D	40.1 - 50.3 mm	48 mm	Yes
Shoulder Pivot from Backline	E	50.3 - 60.5 mm	55 mm	Yes
Thigh Clearance	F	63.0 - 73.2 mm	72 mm	Yes
Elbow Pivot to Fingertip	G	176.6 - 191.8 mm	186 mm	Yes
Shoulder to Elbow Pivot	I	99.1 - 114.3 mm	110 mm	Yes
Elbow Rest Height	J	150.1 - 165.3 mm	161 mm	Yes
Buttock to Knee Length	K	202.7 - 217.9 mm	210 mm	Yes
Popliteal Height (Reference to Seat)	L	138.7 - 153.9 mm	152 mm	Yes
Knee Pivot Height	M	165.1 - 180.3 mm	170 mm	Yes
Buttock Popliteal Length	N	144.8 - 160.0 mm	151 mm	Yes
Chest Depth with Jacket	O	107.5 - 122.7 mm	121 mm	Yes
Foot Length	P	92.4 - 102.6 mm	96 mm	Yes
Stature	Q	727.7 - 753.1 mm	750 mm	Yes
Buttock to Knee Pivot Length	R	178.5 - 188.7 mm	180 mm	Yes
Head Breadth	S	124.4 - 134.6 mm	125 mm	Yes
Head Depth (REF)	T	149.9 - 165.1 mm	150 mm	Yes
Hip Breadth	U	158.5 - 173.7 mm	170 mm	Yes
Shoulder Breadth	V	200.7 - 215.9 mm	210 mm	Yes
Foot Breadth	W	39.1 - 49.3 mm	44 mm	Yes
Chest Circumference with Jacket	Y	452.4 - 477.8 mm	470 mm	Yes
Waist Circumference	Z	447.0 - 472.4 mm	454 mm	Yes
Reference Location for Chest Circumference	AA	256.5 - 266.7 mm	260 mm	Yes
Reference Location for Waist Circumference	BB	106.7 - 116.9 mm	110 mm	Yes
Shoulder Height	CC	299.7 - 314.9 mm	311 mm	Yes
Chin Height	DD	289.6 - 304.8 mm	315 mm	No

Comments:

Chin height (DD) measured 300 mm with the head unsupported, and the buttocks and upper torso against the seat back.

Technician

Approved

Charles W. Bell

Ron Stoner

Transportation Research Center Inc.

Front Head Drop

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Peak Head Resultant Acceleration	100 - 120 g	109.6 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	2.9 g	Yes
Is Acceleration Curve Unimodal within 17% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Raul Borcard

Approved

Ron Stoner

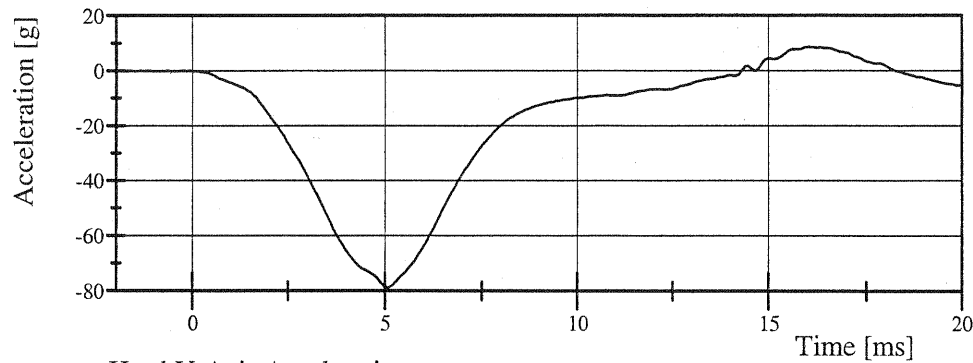
Transportation Research Center Inc.

Front Head Drop

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/12/2007

Head X-Axis Acceleration

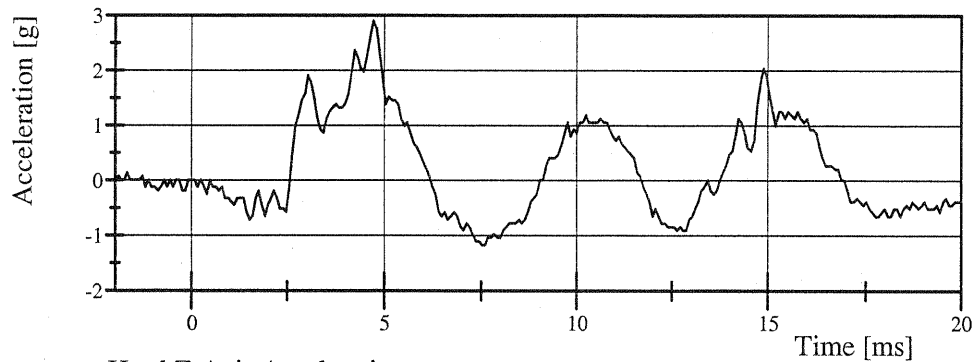


Filter Class: CFC_1000

Max: 8.7 g at 16.0 ms

Min: -78.7 g at 5.0 ms

Head Y-Axis Acceleration

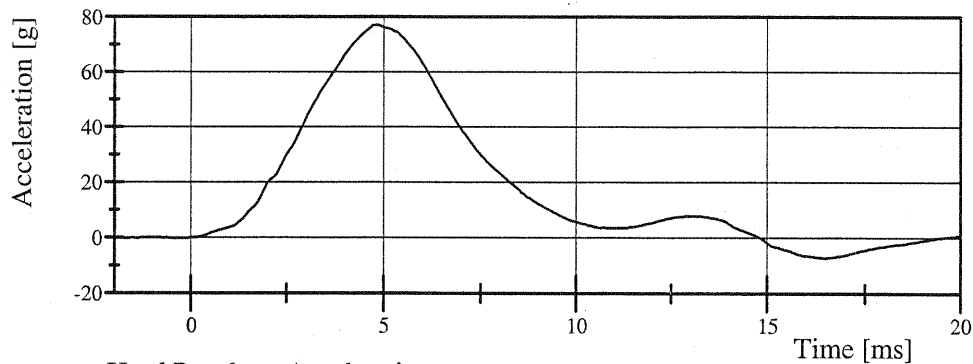


Filter Class: CFC_1000

Max: 2.9 g at 4.7 ms

Min: -1.2 g at 7.5 ms

Head Z-Axis Acceleration

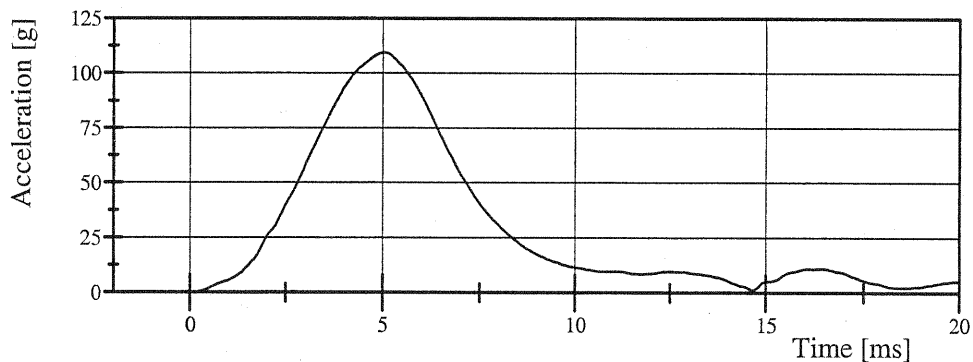


Filter Class: CFC_1000

Max: 77.1 g at 4.8 ms

Min: -7.2 g at 16.5 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 109.6 g at 5.0 ms

Min: 0.0 g at -1.8 ms

Transportation Research Center Inc.

Rear Head Drop

CRABI 12 MO Serial No. 095 Certification No. 8-6

Test Date: 11/14/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Peak Head Resultant Acceleration	55 - 71 g	61.8 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-2.1 g	Yes
Is Acceleration Curve Unimodal within 17% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

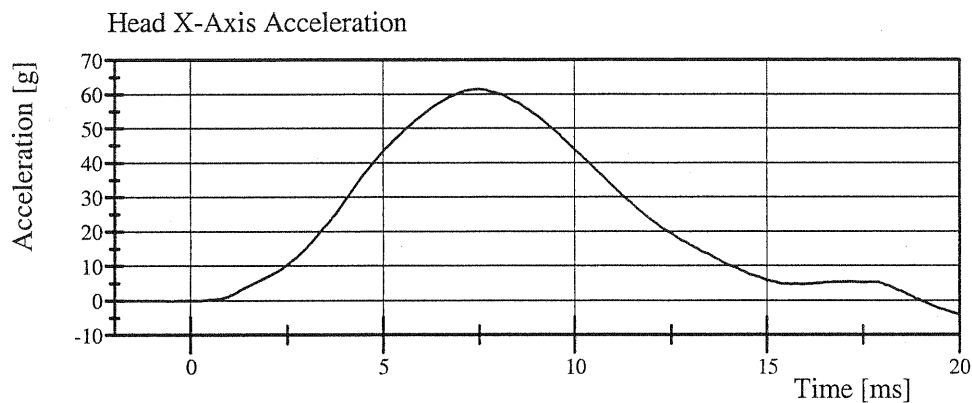
Ron Stoner

Transportation Research Center Inc.

Rear Head Drop

CRABI 12 MO Serial No. 095 Certification No. 8-6

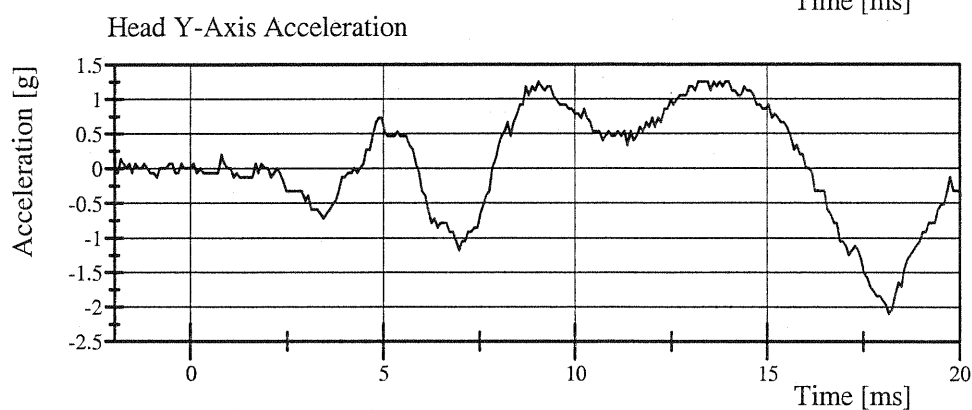
Test Date: 11/14/2007



Filter Class: CFC_1000

Max: 61.5 g at 7.5 ms

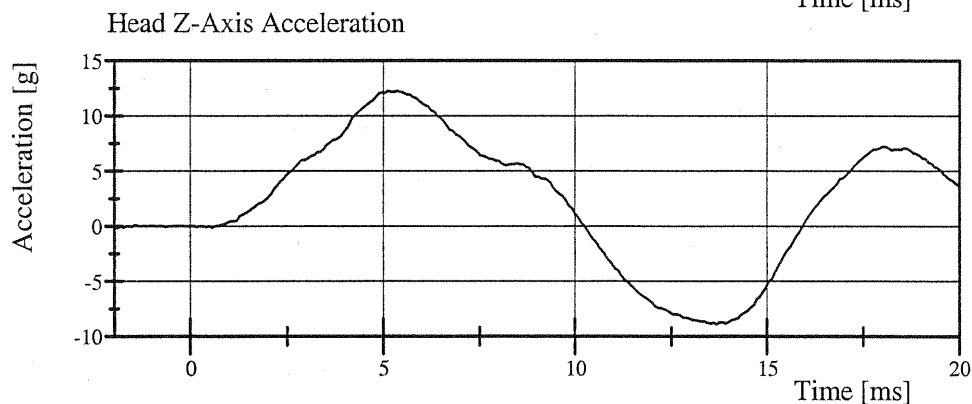
Min: -4.0 g at 20.0 ms



Filter Class: CFC_1000

Max: 1.3 g at 9.0 ms

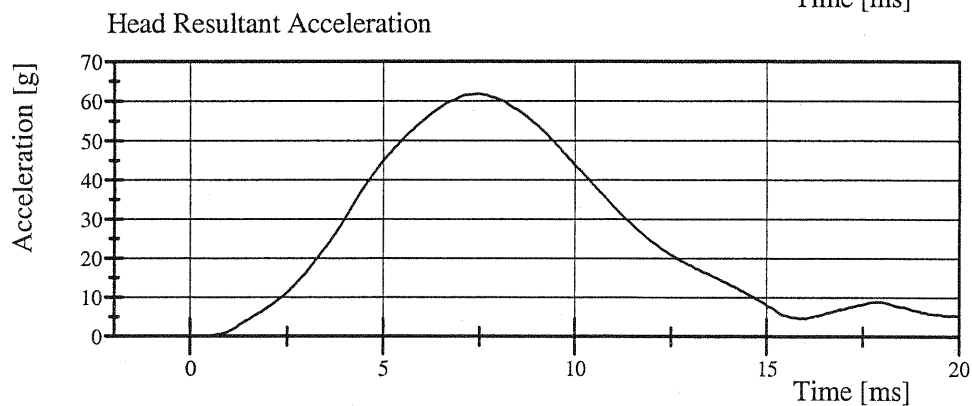
Min: -2.1 g at 18.2 ms



Filter Class: CFC_1000

Max: 12.3 g at 5.1 ms

Min: -8.9 g at 13.7 ms



Filter Class: CFC_1000

Max: 61.8 g at 7.5 ms

Min: 0.0 g at -1.7 ms

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.26 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-1.6) - (-2.3) m/s	-1.94 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-3.4) - (-4.2) m/s	-3.72 m/s	Yes
Pendulum Integrated Velocity Change at 25ms	(-4.3) - (-5.2) m/s	-4.54 m/s	Yes
Total Head D-Plane Rotation	(-75) - (-86) °	-83.5 °	Yes
Total Neck Occipital Condyles Moment	36 - 45 N·m	40.3 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 5 Nm	60 - 80 ms	76.4 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

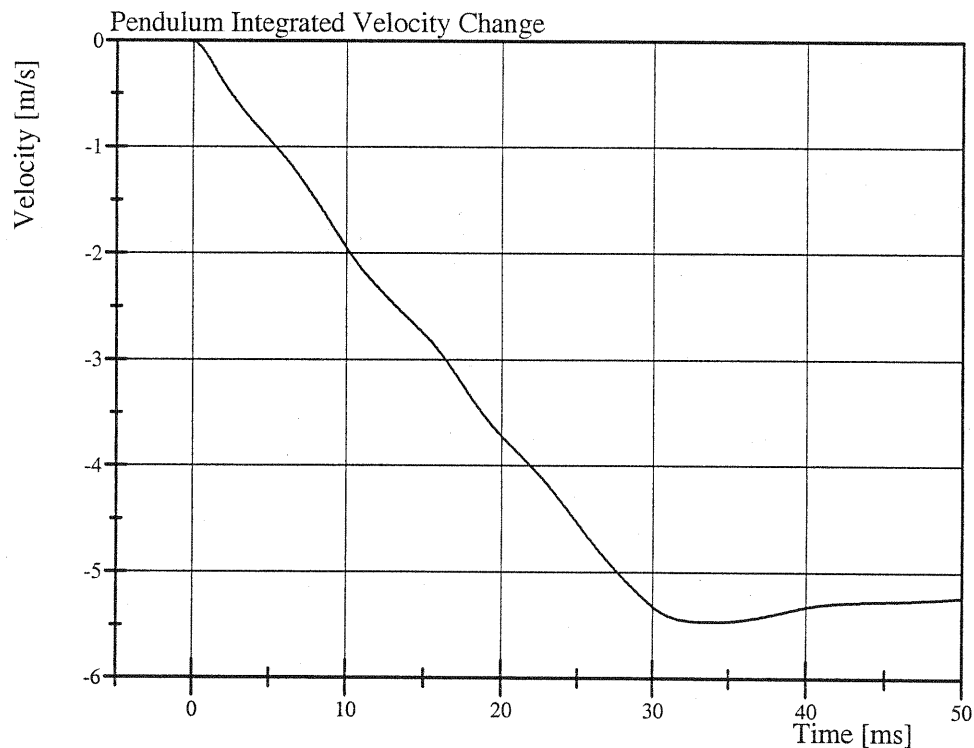
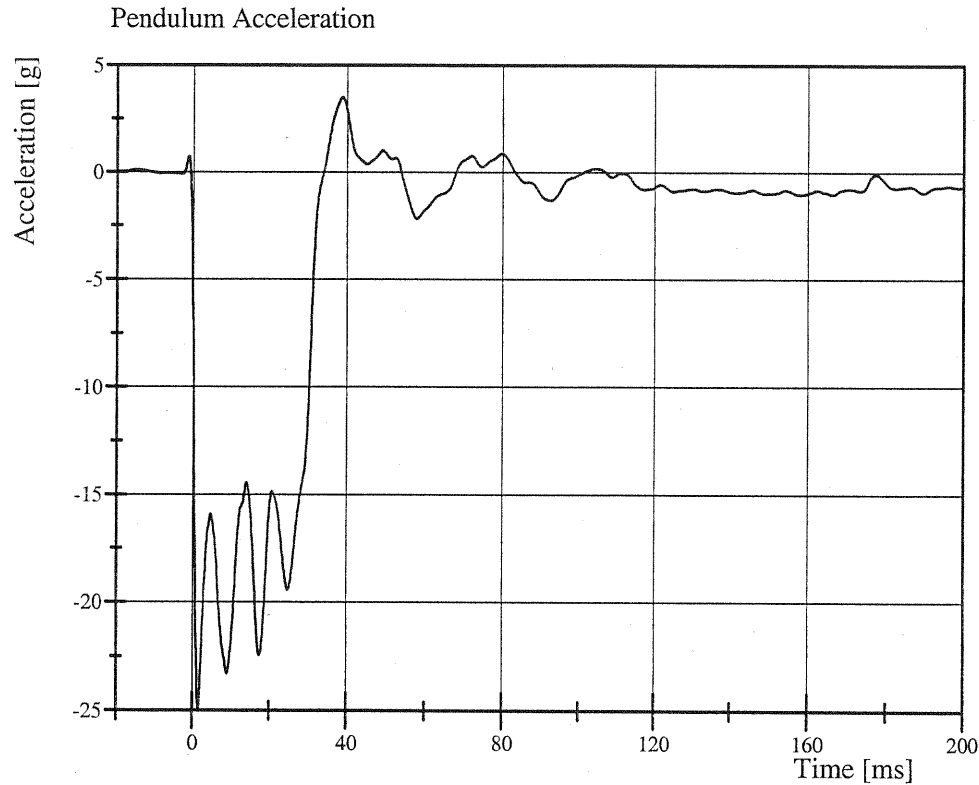
Ron Stoner

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/12/2007



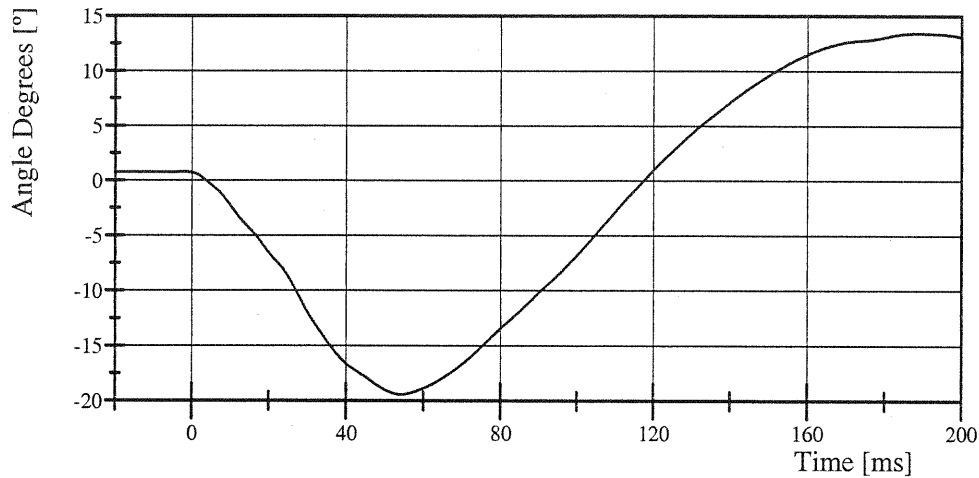
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/12/2007

Forward Pot Rotation at Base of Pendulum

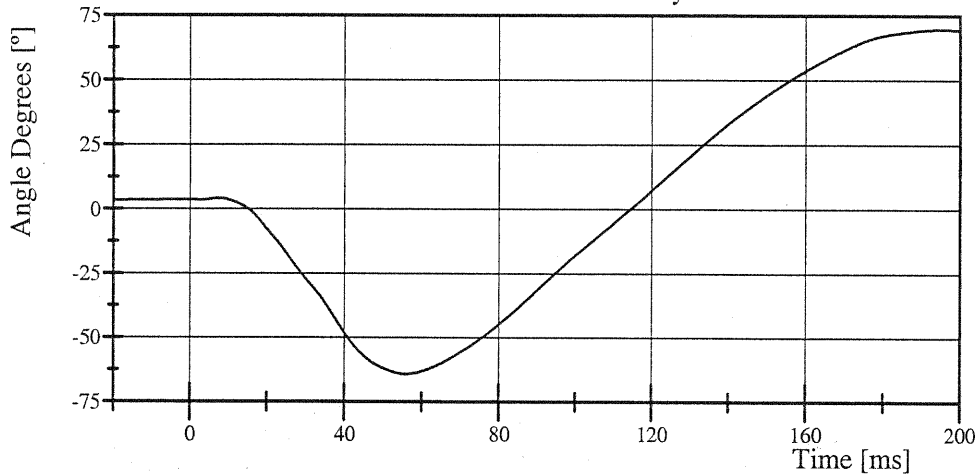


Filter Class: CFC_60

Max: 13.4 ° at 188.6 ms

Min: -19.4 ° at 54.4 ms

Center Headform Pot Rotation at Center of Gravity

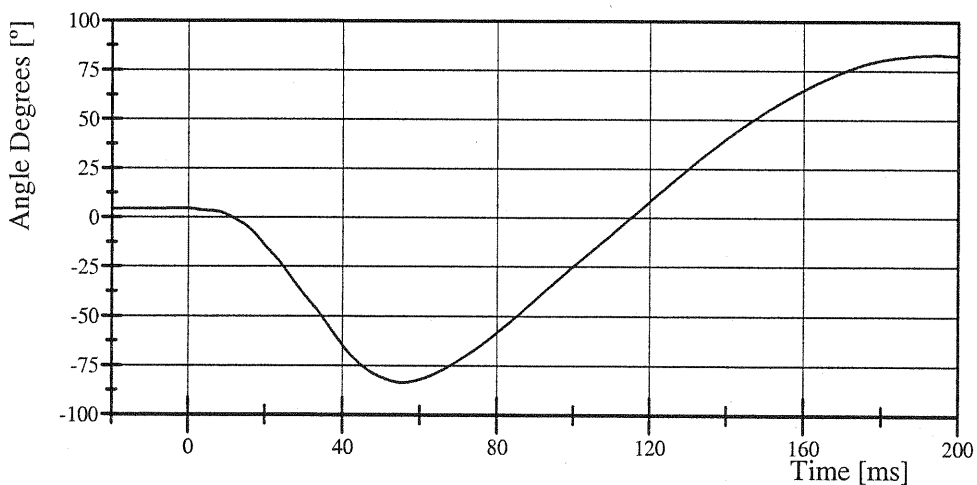


Filter Class: CFC_60

Max: 69.7 ° at 195.2 ms

Min: -64.2 ° at 56.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 83.1 ° at 194.6 ms

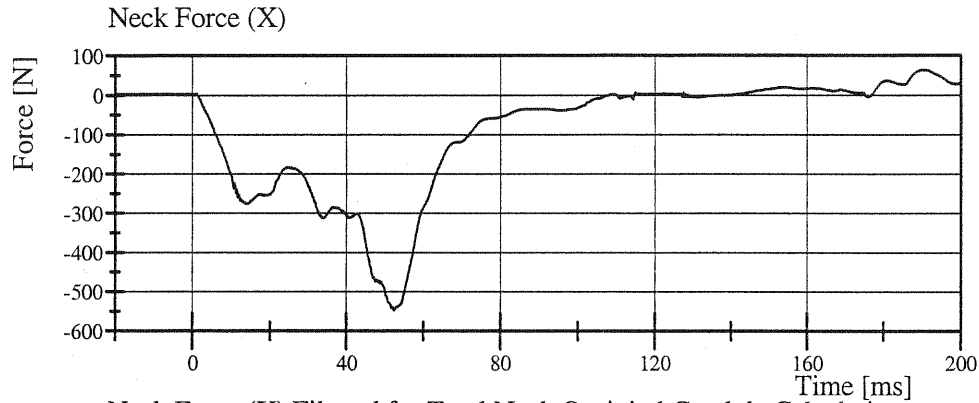
Min: -83.5 ° at 55.6 ms

Transportation Research Center Inc.

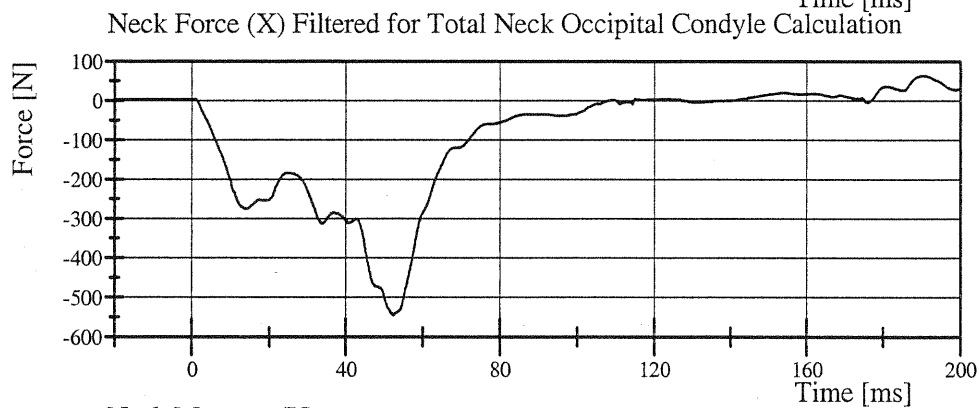
Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 8-1

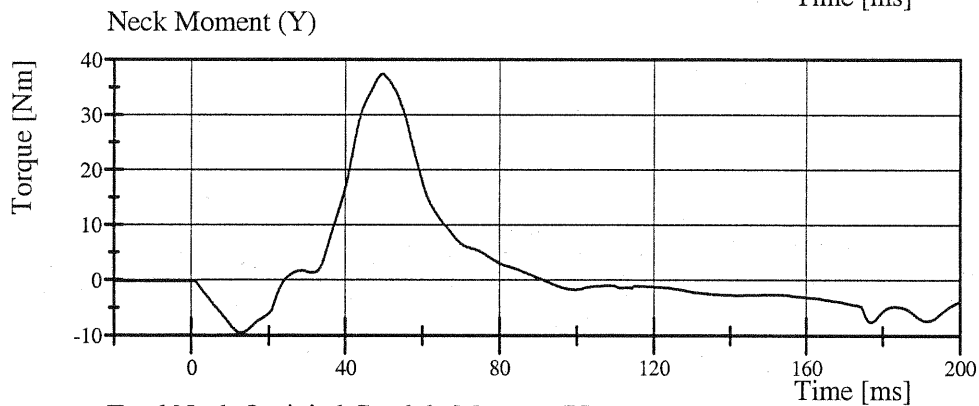
Test Date: 11/12/2007



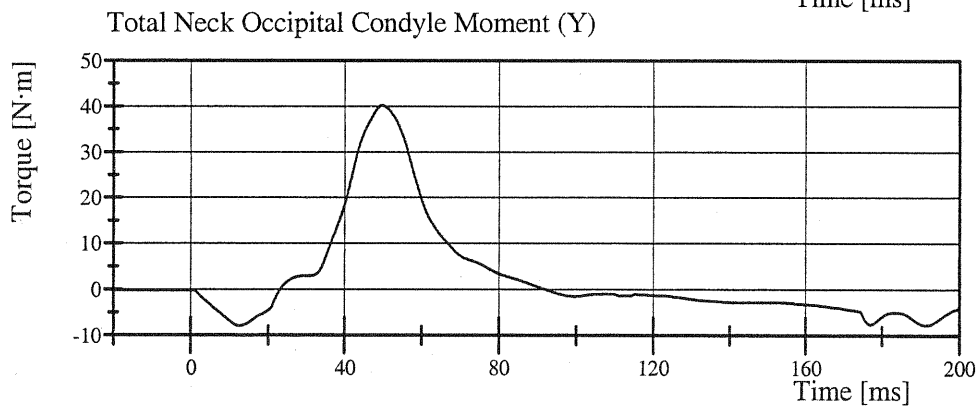
Filter Class: CFC_1000
Max: 64.0 N at 190.4 ms
Min: -546.3 N at 52.4 ms



Filter Class: CFC_600
Max: 64.0 N at 190.5 ms
Min: -545.5 N at 52.4 ms



Filter Class: CFC_600
Max: 37.4 Nm at 49.8 ms
Min: -9.5 Nm at 12.6 ms



Filter Class: CFC_600
Max: 40.3 N·m at 49.8 ms
Min: -7.9 N·m at 12.2 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Pendulum Velocity	(-2.4) - (-2.6) m/s	-2.52 m/s	Yes
Pendulum Integrated Velocity Change at 6ms	0.8 - 1.2 m/s	0.98 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 2.1 m/s	1.75 m/s	Yes
Pendulum Integrated Velocity Change at 14ms	2.2 - 2.9 m/s	2.41 m/s	Yes
Total Head D-Plane Rotation	80 - 92 °	88.2 °	Yes
Total Neck Occipital Condyles Moment (-12) - (-23) N·m		-15.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -5 Nm	76 - 90 ms	81.4 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Stone

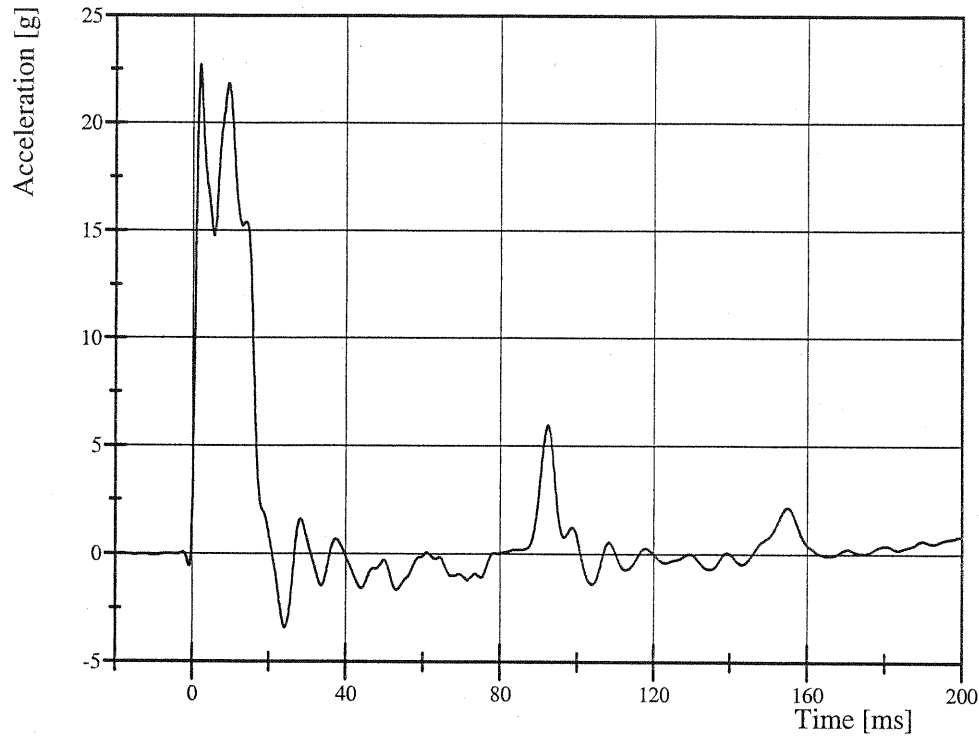
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/12/2007

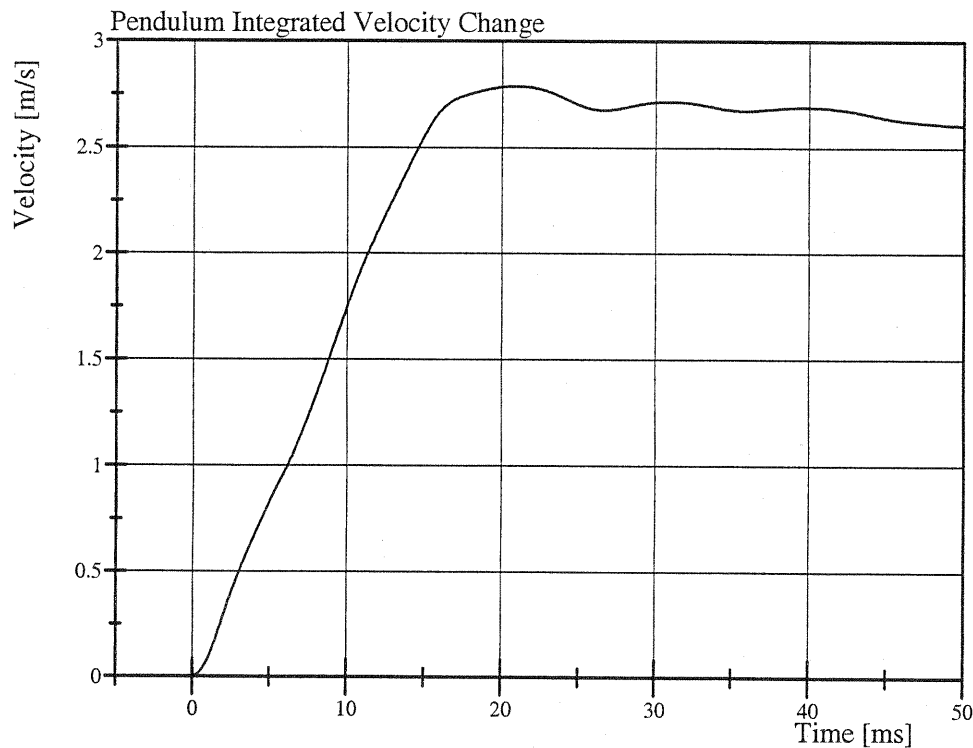
Pendulum Acceleration



Filter Class: CFC_180

Max: 22.7 g at 1.8 ms

Min: -3.4 g at 24.1 ms



Filter Class: CFC_180

Max: 2.8 m/s at 20.9 ms

Min: 0.0 m/s at 0.0 ms

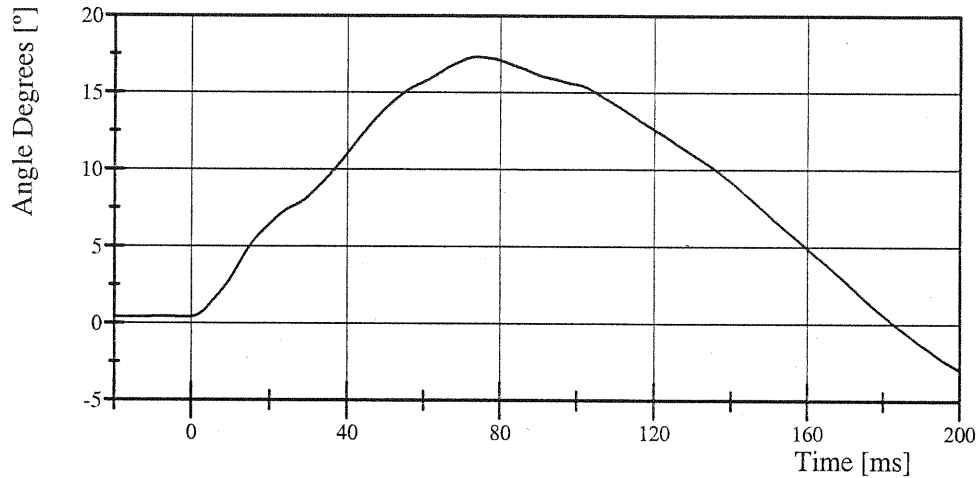
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/12/2007

Forward Pot Rotation at Base of Pendulum

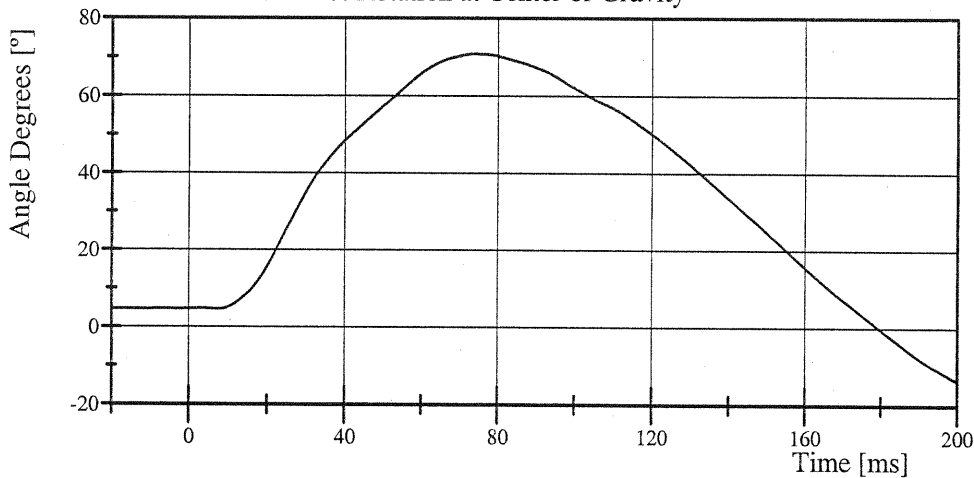


Filter Class: CFC_60

Max: 17.3 ° at 73.8 ms

Min: -3.0 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

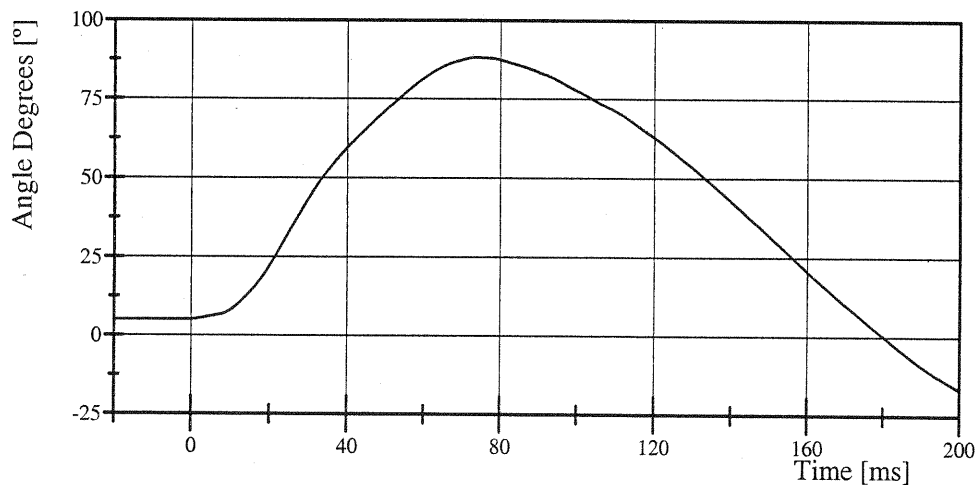


Filter Class: CFC_60

Max: 70.9 ° at 73.8 ms

Min: -13.6 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 88.2 ° at 73.8 ms

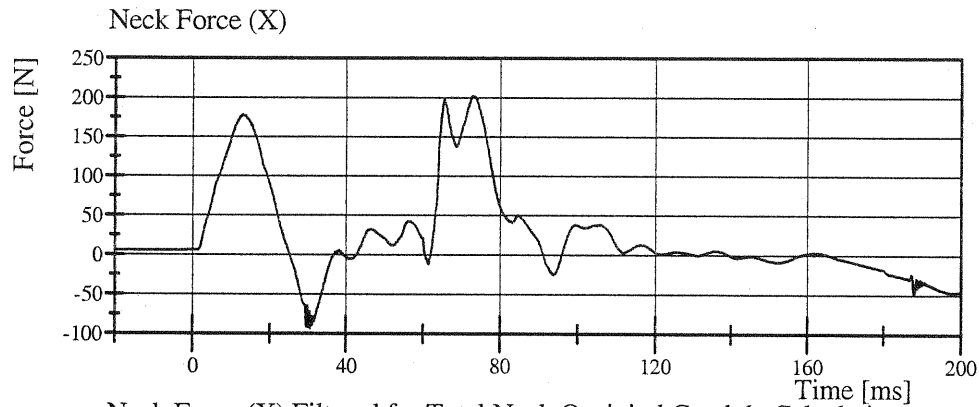
Min: -16.5 ° at 200.0 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 8-1

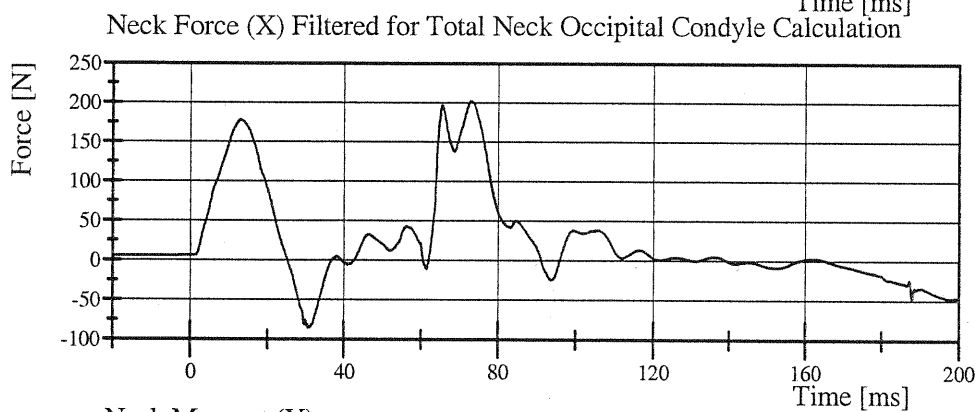
Test Date: 11/12/2007



Filter Class: CFC_1000

Max: 202.6 N at 73.0 ms

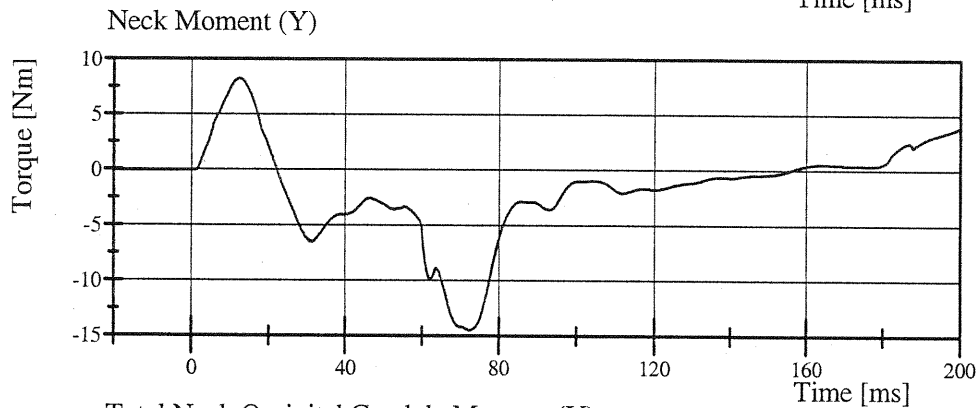
Min: -93.4 N at 30.6 ms



Filter Class: CFC_600

Max: 202.4 N at 73.0 ms

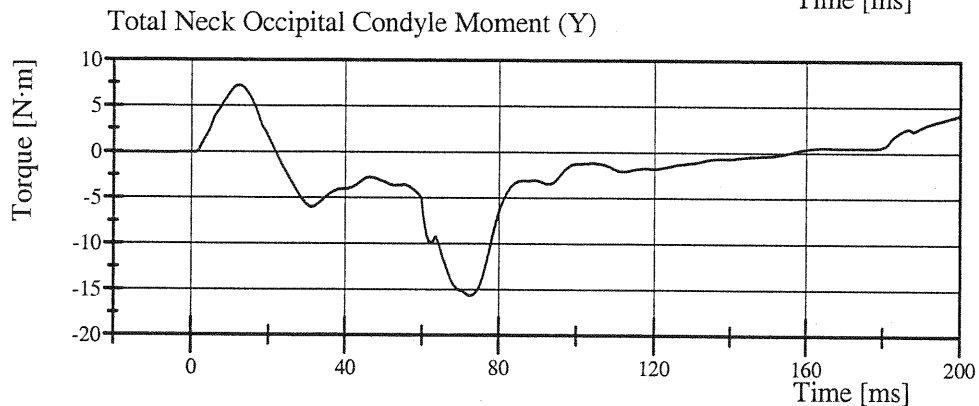
Min: -85.4 N at 30.6 ms



Filter Class: CFC_600

Max: 8.3 Nm at 12.2 ms

Min: -14.5 Nm at 72.4 ms



Filter Class: CFC_600

Max: 7.2 N·m at 12.2 ms

Min: -15.7 N·m at 72.5 ms

Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 095 Certification No. 8-1

Test Date: 11/13/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Impactor Velocity	4.9 - 5.1 m/s	5.07 m/s	Yes
Impactor Force	(-1,514) - (-1,796) N	-1,659.2 N	Yes

Test meets specifications.

Comments:

Technician

Raul Beran

Approved

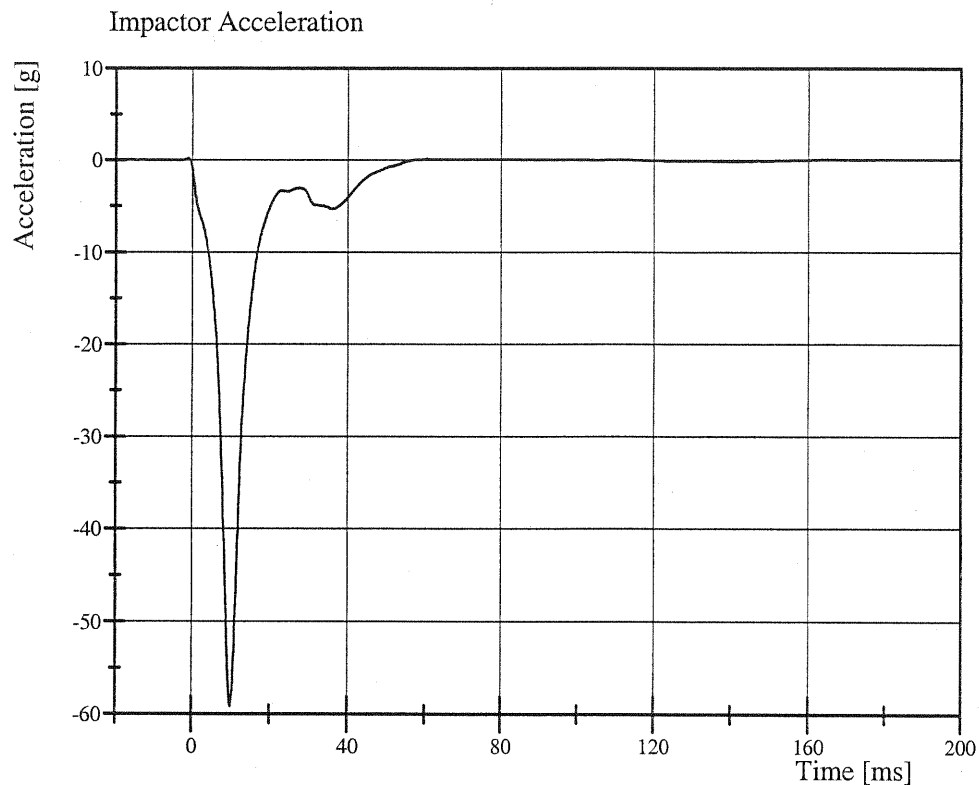
Ron Stoner

Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 095 Certification No. 8-1

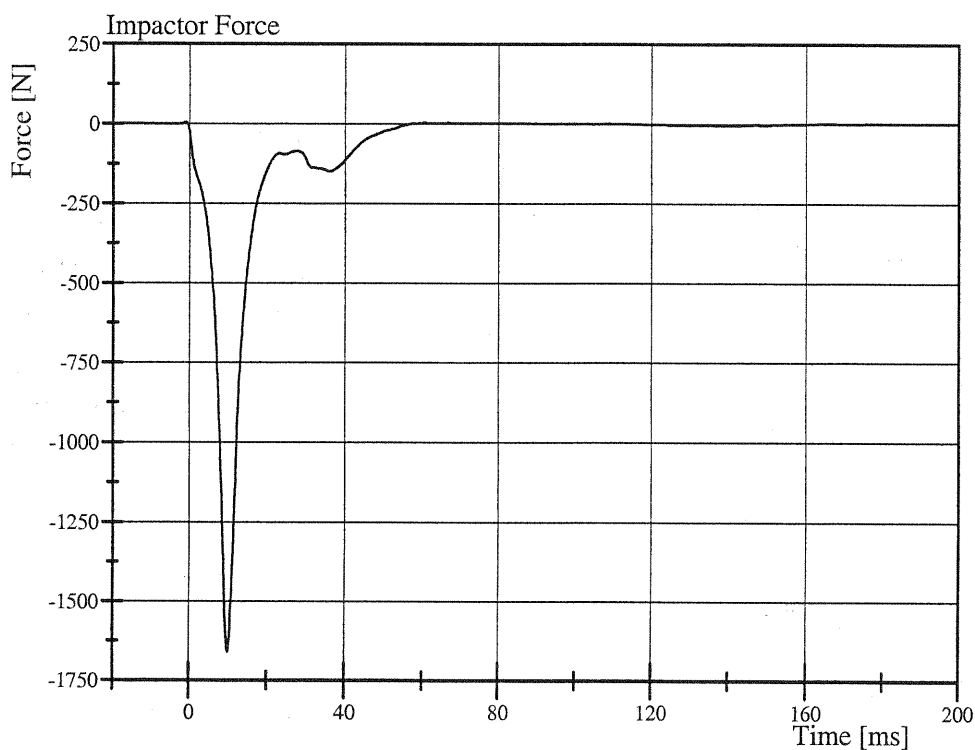
Test Date: 11/13/2007



Filter Class: CFC_180

Max: 0.1 g at -1.0 ms

Min: -59.2 g at 10.0 ms



Filter Class: CFC_180

Max: 4.0 N at -1.0 ms

Min: -1,659.2 N at 10.0 ms

CALIBRATION TEST RESULTS

POST-TEST LEFT REAR

CRABI: 095

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 9-1

Test Date: 11/29/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.27 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-1.6) - (-2.3) m/s	-1.82 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-3.4) - (-4.2) m/s	-3.52 m/s	Yes
Pendulum Integrated Velocity Change at 25ms	(-4.3) - (-5.2) m/s	-4.32 m/s	Yes
Total Head D-Plane Rotation	(-75) - (-86) °	-82.3 °	Yes
Total Neck Occipital Condyles Moment	36 - 45 N·m	39.6 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 5 Nm	60 - 80 ms	76.7 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Hall

Approved

Ron Storer

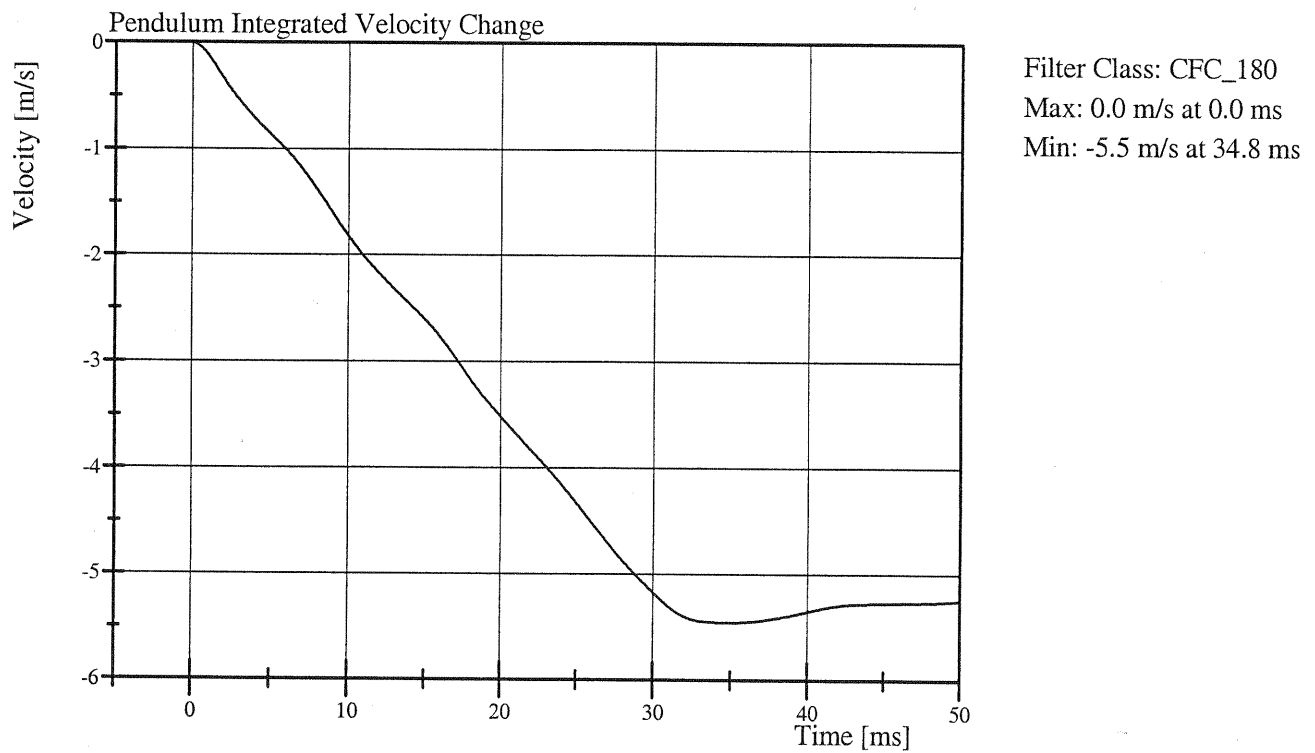
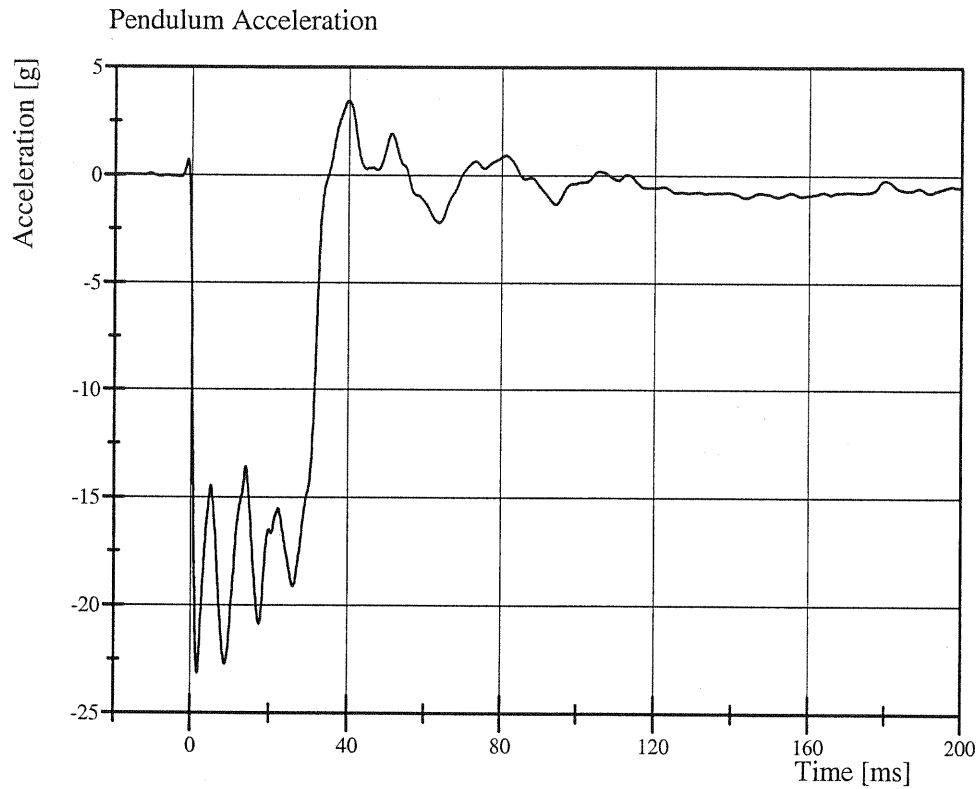


Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 9-1

Test Date: 11/29/2007



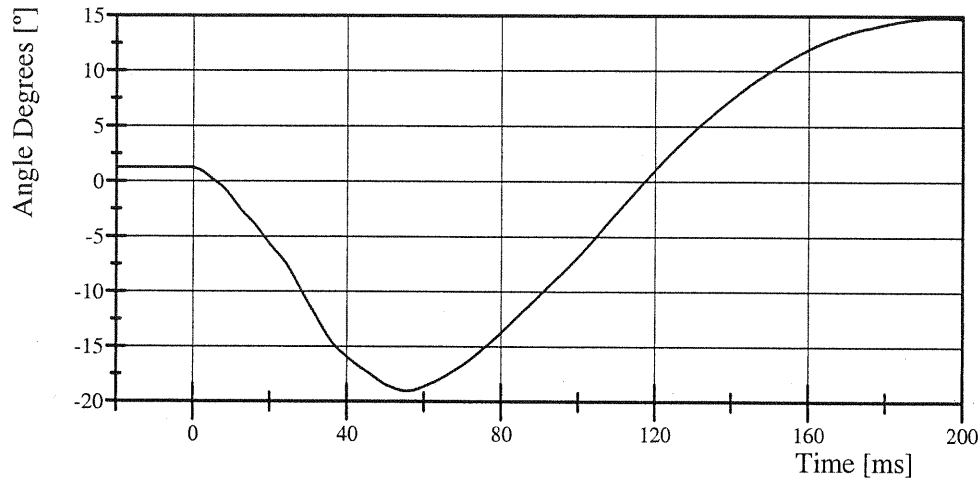
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 9-1

Test Date: 11/29/2007

Forward Pot Rotation at Base of Pendulum

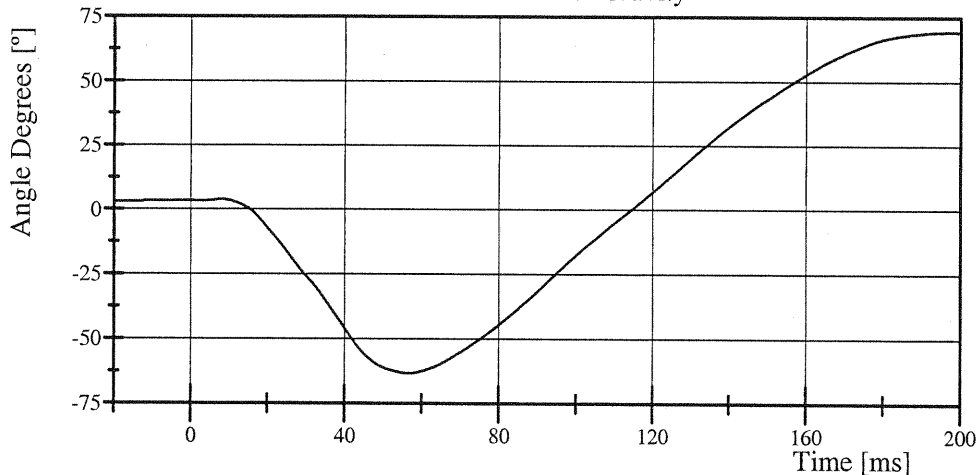


Filter Class: CFC_60

Max: 14.8 ° at 193.4 ms

Min: -19.0 ° at 55.8 ms

Center Headform Pot Rotation at Center of Gravity

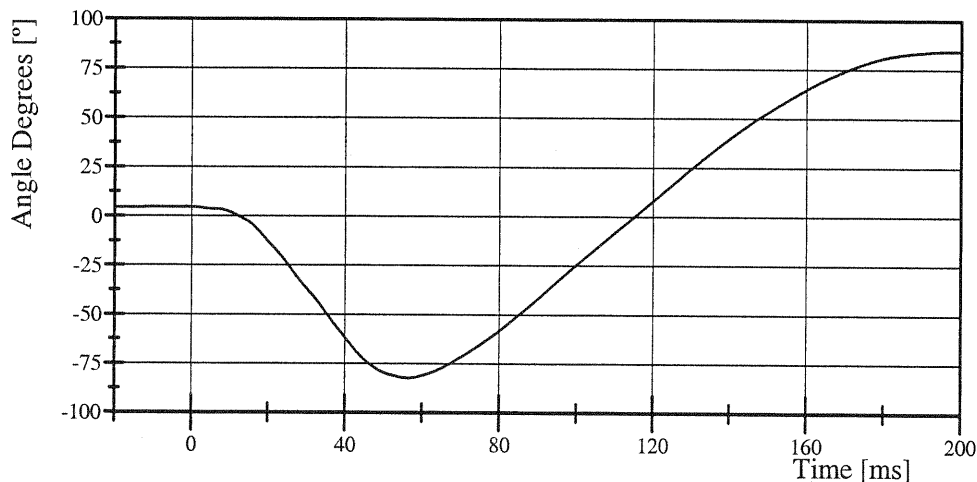


Filter Class: CFC_60

Max: 69.5 ° at 197.5 ms

Min: -63.3 ° at 56.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 84.3 ° at 197.2 ms

Min: -82.3 ° at 56.5 ms

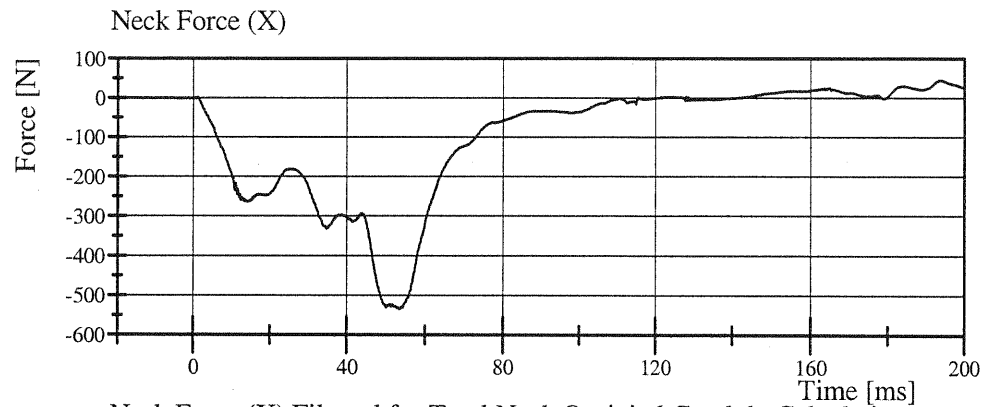


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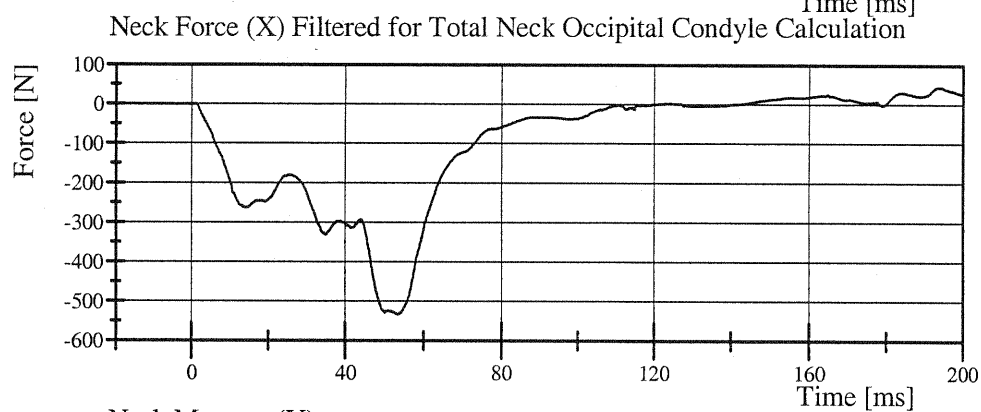
Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 9-1

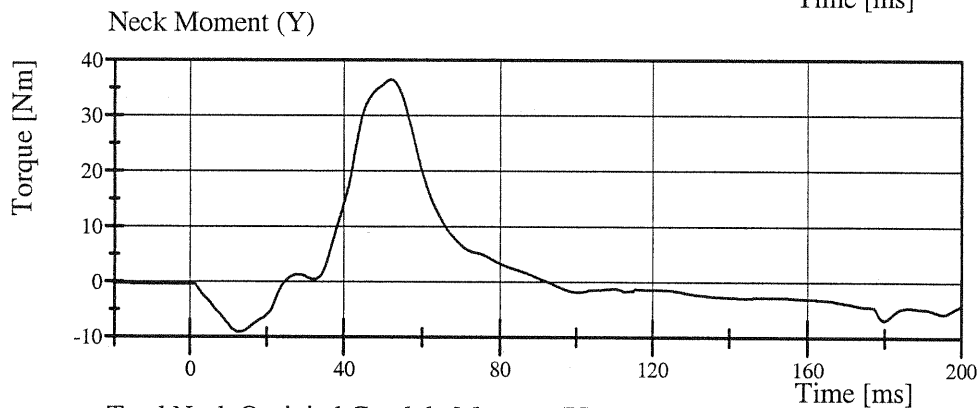
Test Date: 11/29/2007



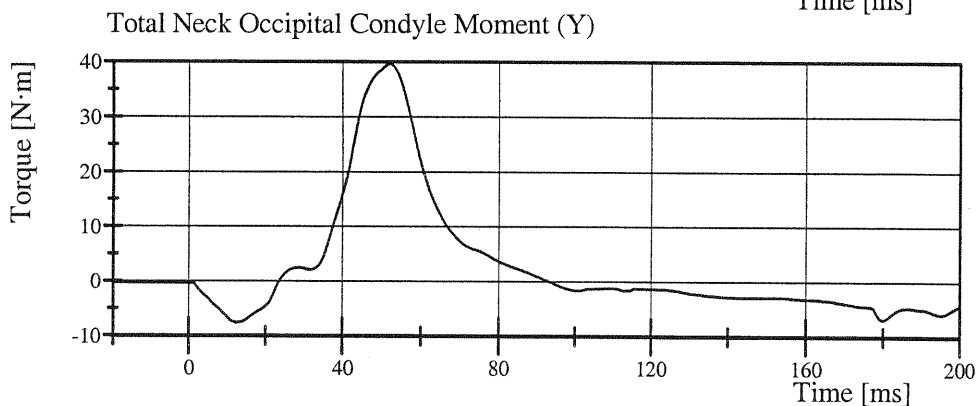
Filter Class: CFC_1000
Max: 45.0 N at 193.8 ms
Min: -534.5 N at 53.4 ms



Filter Class: CFC_600
Max: 45.0 N at 193.8 ms
Min: -533.6 N at 53.4 ms



Filter Class: CFC_600
Max: 36.5 Nm at 51.7 ms
Min: -9.1 Nm at 12.5 ms



Filter Class: CFC_600
Max: 39.6 N·m at 51.7 ms
Min: -7.6 N·m at 12.5 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 9-1

Test Date: 11/29/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	33 %	Yes
Pendulum Velocity	(-2.4) - (-2.6) m/s	-2.53 m/s	Yes
Pendulum Integrated Velocity Change at 6ms	0.8 - 1.2 m/s	0.95 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 2.1 m/s	1.71 m/s	Yes
Pendulum Integrated Velocity Change at 14ms	2.2 - 2.9 m/s	2.33 m/s	Yes
Total Head D-Plane Rotation	80 - 92 °	89.8 °	Yes
Total Neck Occipital Condyles Moment (-12) - (-23) N·m		-14.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -5 Nm	76 - 90 ms	82.7 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Ball

Approved

Ken Stone

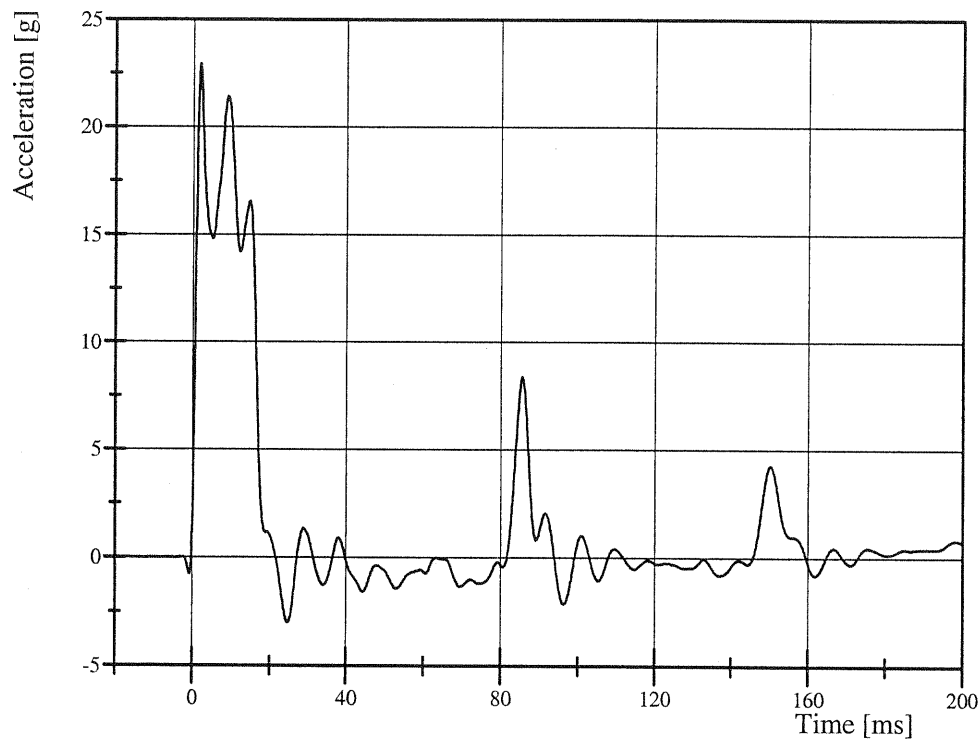
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 9-1

Test Date: 11/29/2007

Pendulum Acceleration

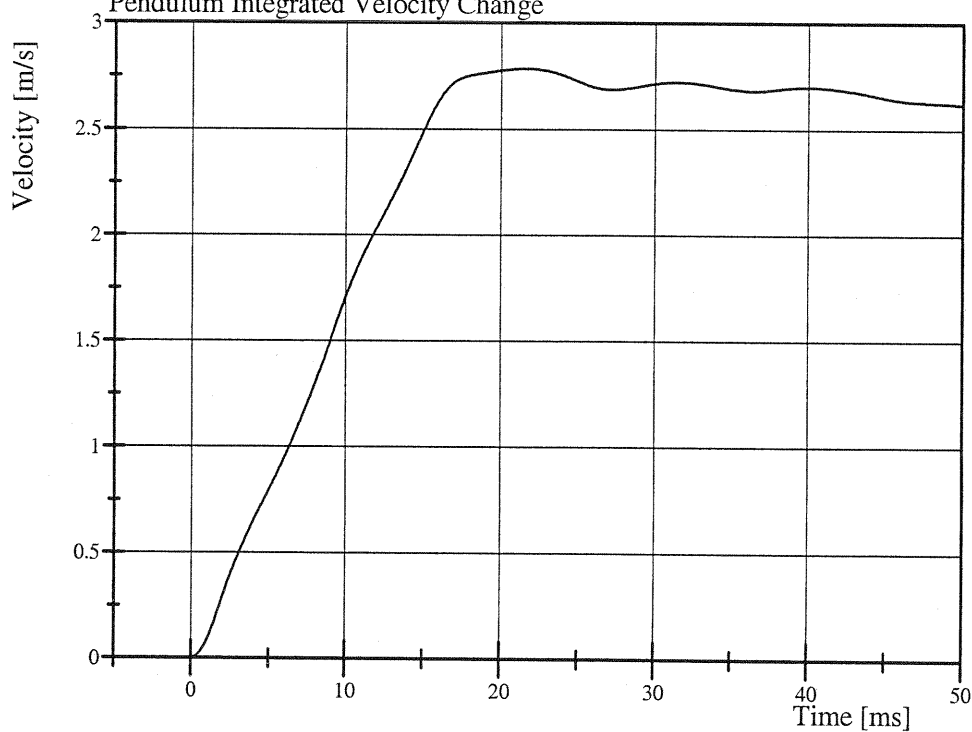


Filter Class: CFC_180

Max: 22.9 g at 1.8 ms

Min: -3.0 g at 24.7 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 2.8 m/s at 21.7 ms

Min: 0.0 m/s at 0.0 ms

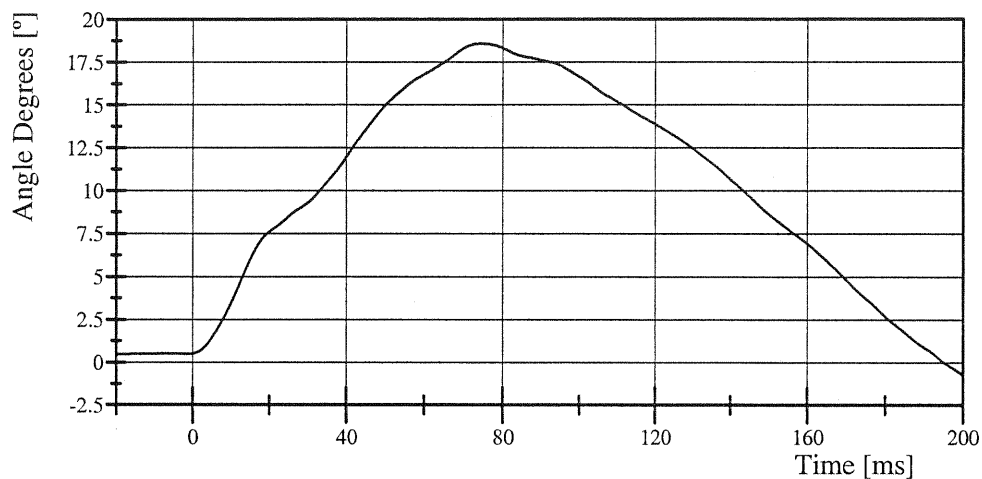
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 9-1

Test Date: 11/29/2007

Forward Pot Rotation at Base of Pendulum

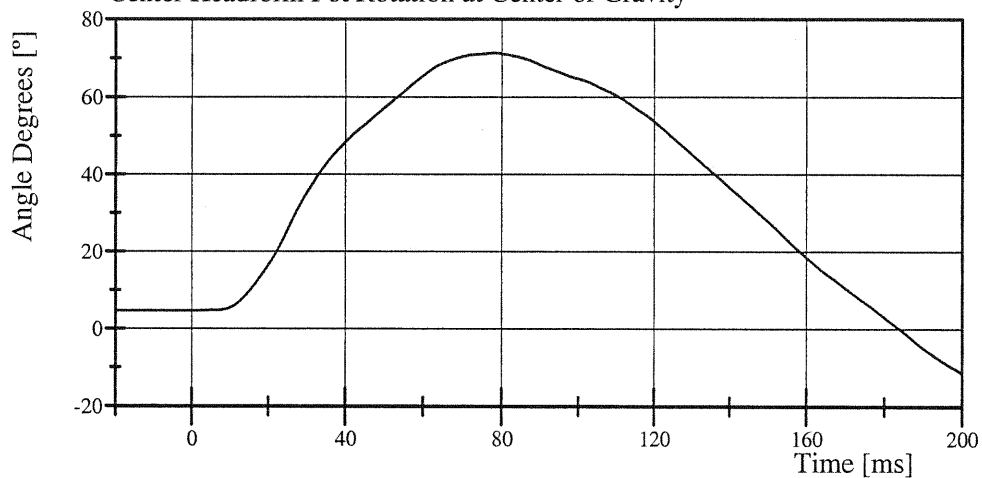


Filter Class: CFC_60

Max: 18.6 ° at 74.4 ms

Min: -0.7 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

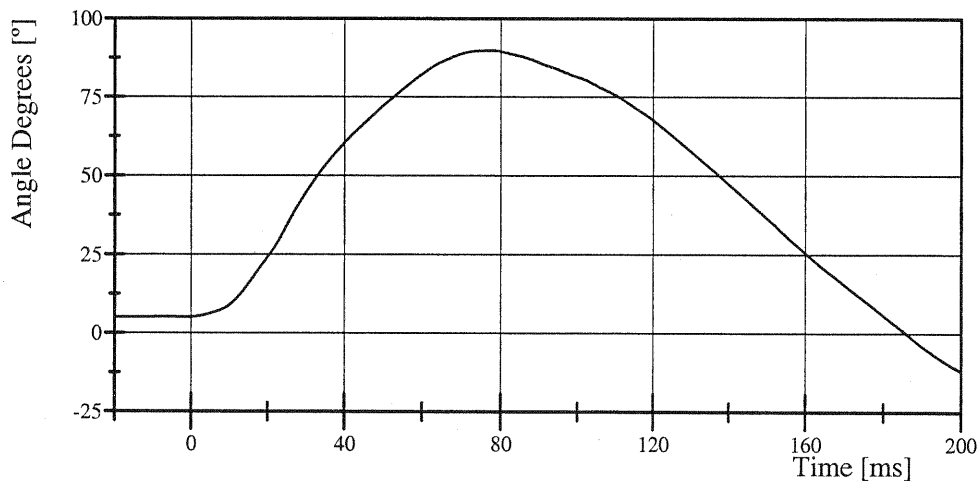


Filter Class: CFC_60

Max: 71.3 ° at 78.2 ms

Min: -11.3 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 89.8 ° at 77.4 ms

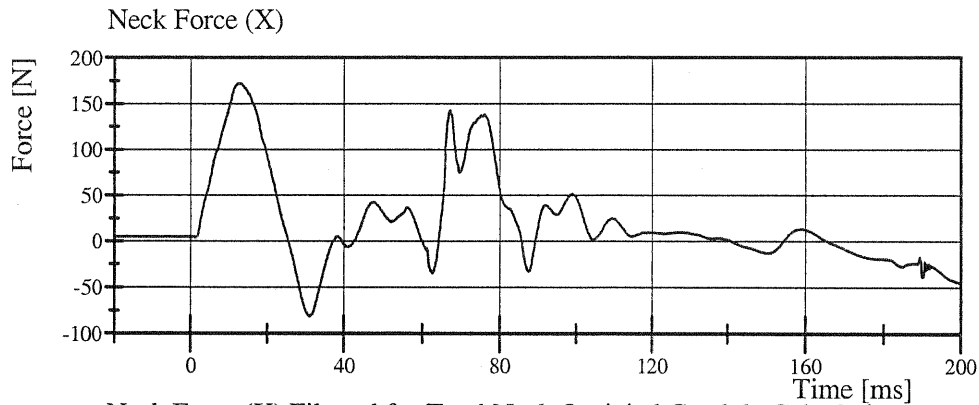
Min: -12.0 ° at 200.0 ms

Transportation Research Center Inc.

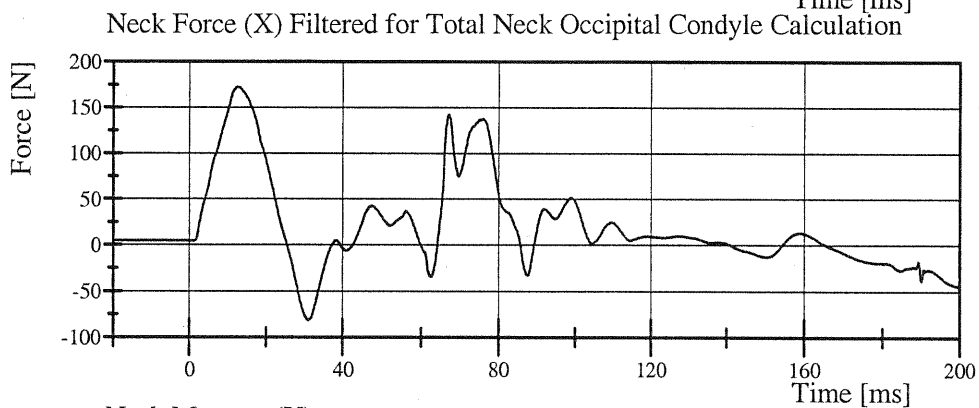
Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 9-1

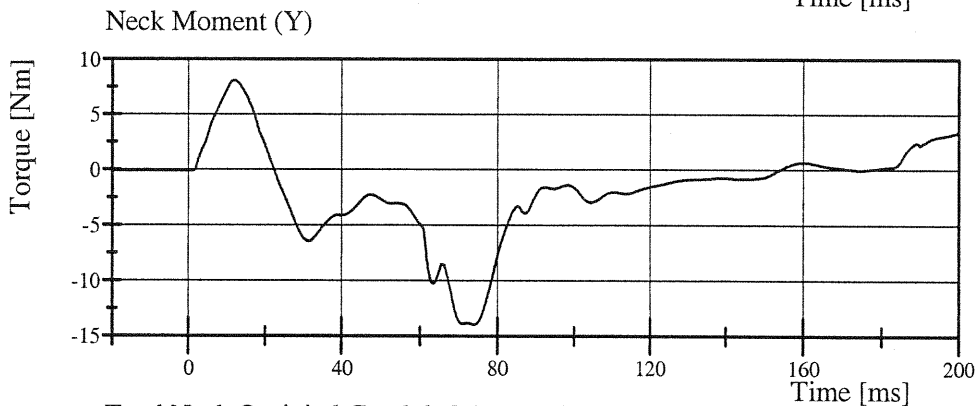
Test Date: 11/29/2007



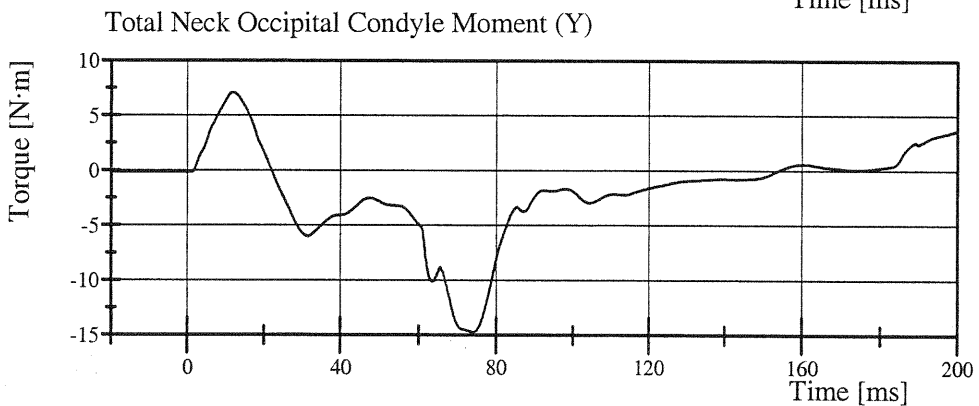
Filter Class: CFC_1000
Max: 172.4 N at 12.4 ms
Min: -81.3 N at 31.0 ms



Filter Class: CFC_600
Max: 172.2 N at 12.4 ms
Min: -81.2 N at 31.0 ms



Filter Class: CFC_600
Max: 8.1 Nm at 12.0 ms
Min: -14.0 Nm at 73.8 ms



Filter Class: CFC_600
Max: 7.1 N·m at 11.9 ms
Min: -14.7 N·m at 73.9 ms



Test Date: 11/27/07

Type: CRABI 12 month S/N: 095 Mfg.: First Technologies

Proj./Seg. No.: 20050906-1400 Test Eng: Emad Al-Tabakha

ITEM	PRE-USE	POST-USE
HEAD:		
Skull Bolts; No Wires Pinched	X	
Skull Cap – 3 Year Old Only	N/A	
Head Skin Condition	X	X
* Neck Load Cell Cables: secure, taped, and with strain relief	X	
NECK:		
*Neck Cable Torqued, Tape Installed (1.8-2.2 in-lbs.) Actual: <u>2</u>	X	
Rubber Condition	X	X
ARMS AND HANDS:		
Skin Condition	X	X
Isolation Damper Condition	X	X
THORAX:		
Front and Rear Rib Bolts, Rib Ends Position – 3 Year Old Only	N/A	
Chest Pot Arm and Ball Movement – 3 Year Old Only	N/A	X
Sternum Bolts and Sternum Bumpers Condition	X	
Jacket Condition	X	X
Abdominal Insert Condition	X	Chest foam plate ripped
Rib Damping Material and Stiffeners Condition – 3 Year Old Only	N/A	X
Rib Minimum Depth – 3 Year Old Only (#1-#2 = 4.137 & #2-#3 = 4.082)	N/A	
Accel Mount Bolts	X	
Lumbar Spine Rubber Condition	X	X
PELVIS:		
Hip Isolation Damper Condition	X	X
LEGS AND FEET:		
Leg Skin Condition	X	X
Knee Joint Function and Range of Motion	X	
Ankle Joint Function and Range of Motion	X	
Foot Condition	X	X
OTHER:		
Cleanliness	X	
Target Position	X	
Clothes and Shoes	X	
One G Joint Adjustments	X	
Verify channel s against assembly and Check connectors (intact & labeled)	X	
ATTACH TEMPERATURE LOGGER TO DUMMY / DOWNLOAD		

* Items checked during calibration; these items need checked when the dummy is used without recalibration

Pre Test Inspection Completed By: J. Clarridge Date: 11/12/07

Post Test Inspection Completed By: J. Clarridge Date: 11/28/07

CALIBRATION TEST RESULTS

PRE-TEST RIGHT REAR

CRABI: 094

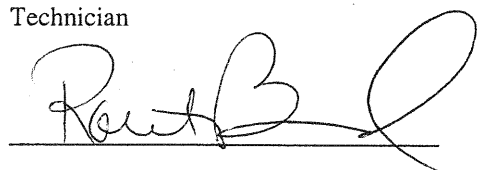
Transportation Research Center Inc.
572R CRABI 12-Month-Old Dummy
External Dimensions
Serial No. 094 Calibration No. 11
Date: 12-Nov-07

Test Parameter	Dimension	Specification	Results	Pass
Total Sitting Height	A	456.0 - 471.2 mm	469 mm	Yes
Shoulder Pivot Height	B	276.6 - 291.8 mm	285 mm	Yes
Hip Pivot Height	C	27.9 - 38.1 mm	33 mm	Yes
Hip Pivot from Backline	D	40.1 - 50.3 mm	48 mm	Yes
Shoulder Pivot from Backline	E	50.3 - 60.5 mm	54 mm	Yes
Thigh Clearance	F	63.0 - 73.2 mm	72 mm	Yes
Elbow Pivot to Fingertip	G	176.6 - 191.8 mm	180 mm	Yes
Shoulder to Elbow Pivot	I	99.1 - 114.3 mm	103 mm	Yes
Elbow Rest Height	J	150.1 - 165.3 mm	157 mm	Yes
Buttock to Knee Length	K	202.7 - 217.9 mm	206 mm	Yes
Popliteal Height (Reference to Seat)	L	138.7 - 153.9 mm	150 mm	Yes
Knee Pivot Height	M	165.1 - 180.3 mm	170 mm	Yes
Buttock Popliteal Length	N	144.8 - 160.0 mm	148 mm	Yes
Chest Depth with Jacket	O	107.5 - 122.7 mm	120 mm	Yes
Foot Length	P	92.4 - 102.6 mm	99 mm	Yes
Stature	Q	727.7 - 753.1 mm	750 mm	Yes
Buttock to Knee Pivot Length	R	178.5 - 188.7 mm	182 mm	Yes
Head Breadth	S	124.4 - 134.6 mm	126 mm	Yes
Head Depth (REF)	T	149.9 - 165.1 mm	159 mm	Yes
Hip Breadth	U	158.5 - 173.7 mm	171 mm	Yes
Shoulder Breadth	V	200.7 - 215.9 mm	211 mm	Yes
Foot Breadth	W	39.1 - 49.3 mm	44 mm	Yes
Chest Circumference with Jacket	Y	452.4 - 477.8 mm	465 mm	Yes
Waist Circumference	Z	447.0 - 472.4 mm	454 mm	Yes
Reference Location for Chest Circumference	AA	256.5 - 266.7 mm	263 mm	Yes
Reference Location for Waist Circumference	BB	106.7 - 116.9 mm	112 mm	Yes
Shoulder Height	CC	299.7 - 314.9 mm	310 mm	Yes
Chin Height	DD	289.6 - 304.8 mm	313 mm	No

Comments:

Chin height (DD) measured 302 mm with the head unsupported, and the buttocks and upper torso against the seat back.

Technician



Approved



Transportation Research Center Inc.

Front Head Drop

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Peak Head Resultant Acceleration	100 - 120 g	105.2 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	2.9 g	Yes
Is Acceleration Curve Unimodal within 17% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Raul Beran

Approved

Ron Stoner

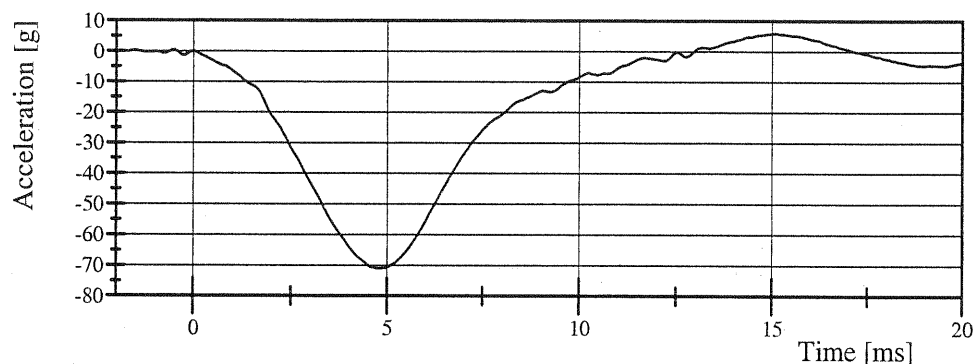
Transportation Research Center Inc.

Front Head Drop

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Head X-Axis Acceleration

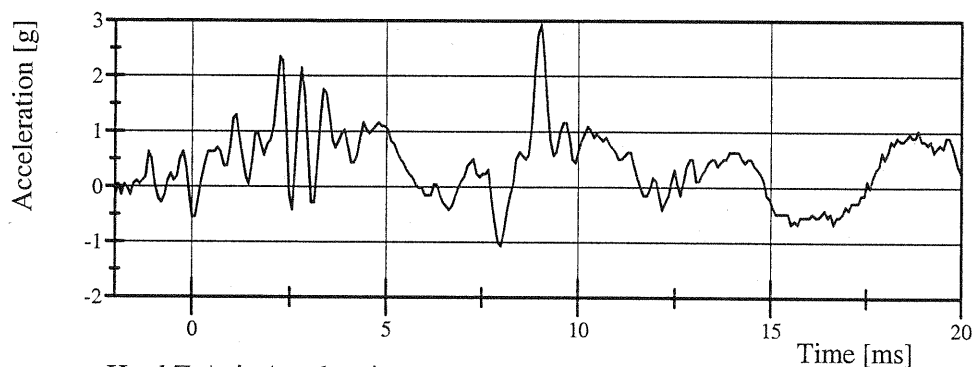


Filter Class: CFC_1000

Max: 6.0 g at 15.0 ms

Min: -71.0 g at 4.8 ms

Head Y-Axis Acceleration

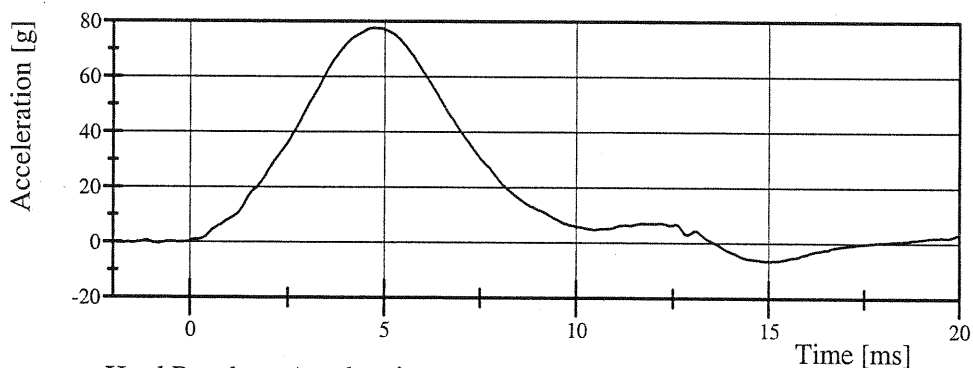


Filter Class: CFC_1000

Max: 2.9 g at 9.0 ms

Min: -1.1 g at 8.0 ms

Head Z-Axis Acceleration

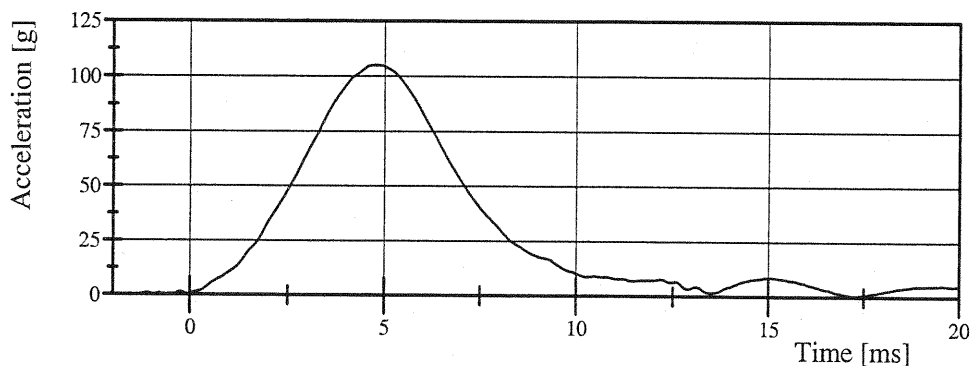


Filter Class: CFC_1000

Max: 77.7 g at 4.7 ms

Min: -6.5 g at 15.0 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 105.2 g at 4.7 ms

Min: 0.1 g at -1.7 ms

Transportation Research Center Inc.

Rear Head Drop

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Peak Head Resultant Acceleration	55 - 71 g	64.9 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-3.4 g	Yes
Is Acceleration Curve Unimodal within 17% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Rant Beran

Approved

Ron Stoner

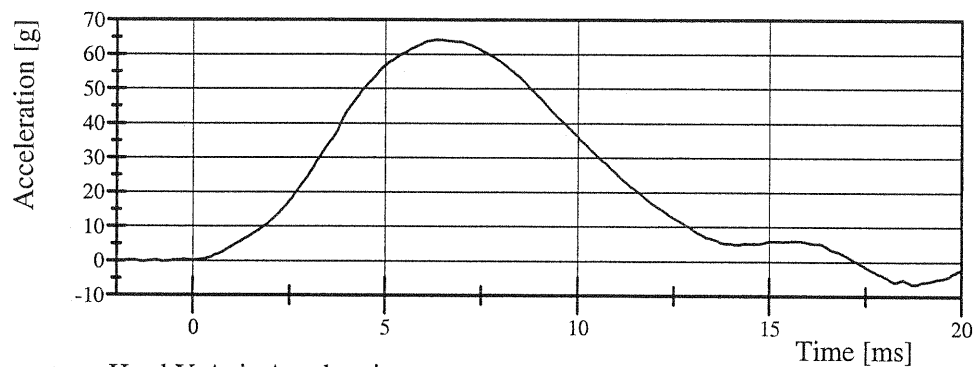
Transportation Research Center Inc.

Rear Head Drop

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Head X-Axis Acceleration

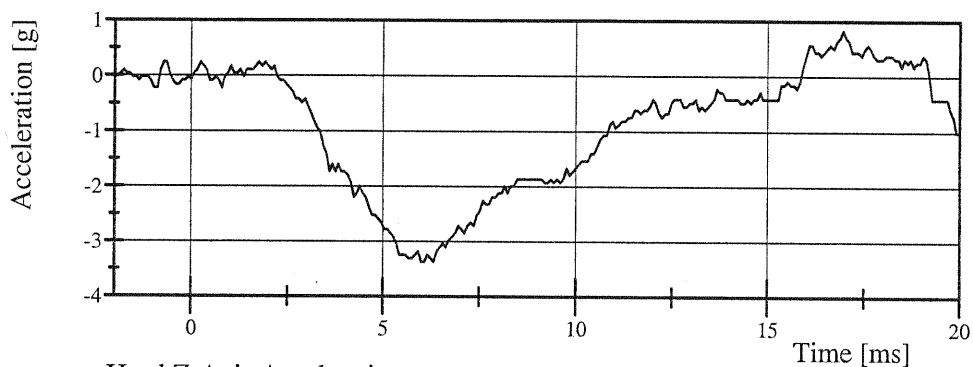


Filter Class: CFC_1000

Max: 64.2 g at 6.3 ms

Min: -6.5 g at 18.8 ms

Head Y-Axis Acceleration

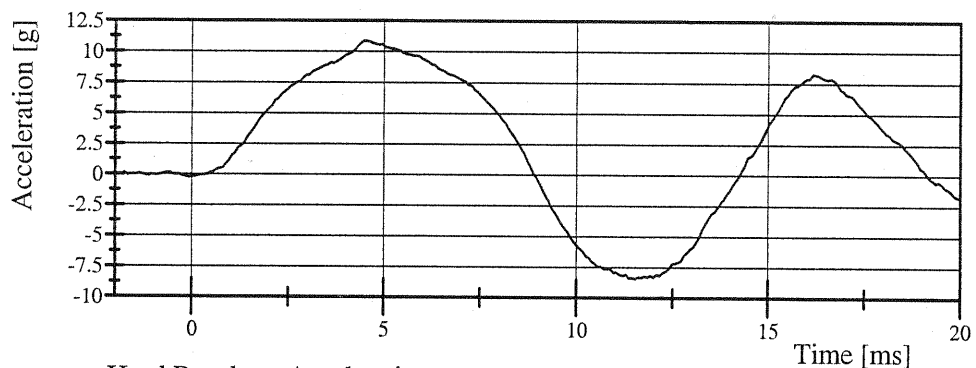


Filter Class: CFC_1000

Max: 0.8 g at 17.0 ms

Min: -3.4 g at 6.0 ms

Head Z-Axis Acceleration

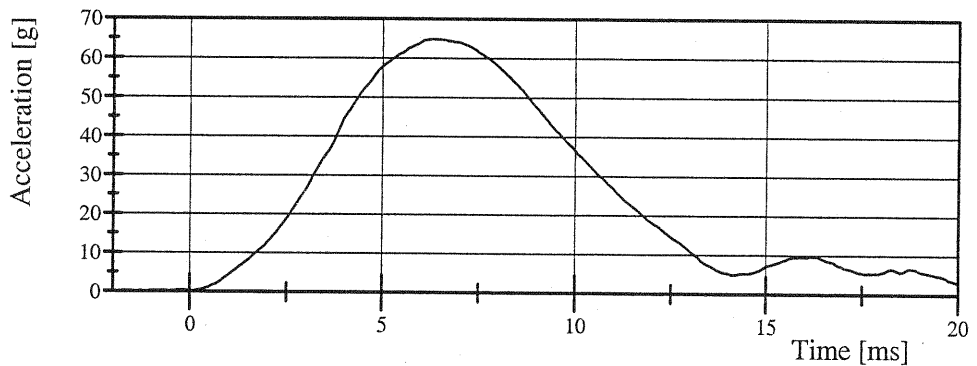


Filter Class: CFC_1000

Max: 10.9 g at 4.5 ms

Min: -8.4 g at 11.5 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 64.9 g at 6.3 ms

Min: 0.0 g at -1.9 ms

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.18 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-1.6) - (-2.3) m/s	-1.99 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-3.4) - (-4.2) m/s	-3.85 m/s	Yes
Pendulum Integrated Velocity Change at 25ms	(-4.3) - (-5.2) m/s	-4.68 m/s	Yes
Total Head D-Plane Rotation	(-75) - (-86) °	-84.1 °	Yes
Total Neck Occipital Condyles Moment	36 - 45 N·m	38.3 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 5 Nm	60 - 80 ms	75.8 ms	Yes

Test meets specifications.

Comments:

Technician

Rant B.

Approved

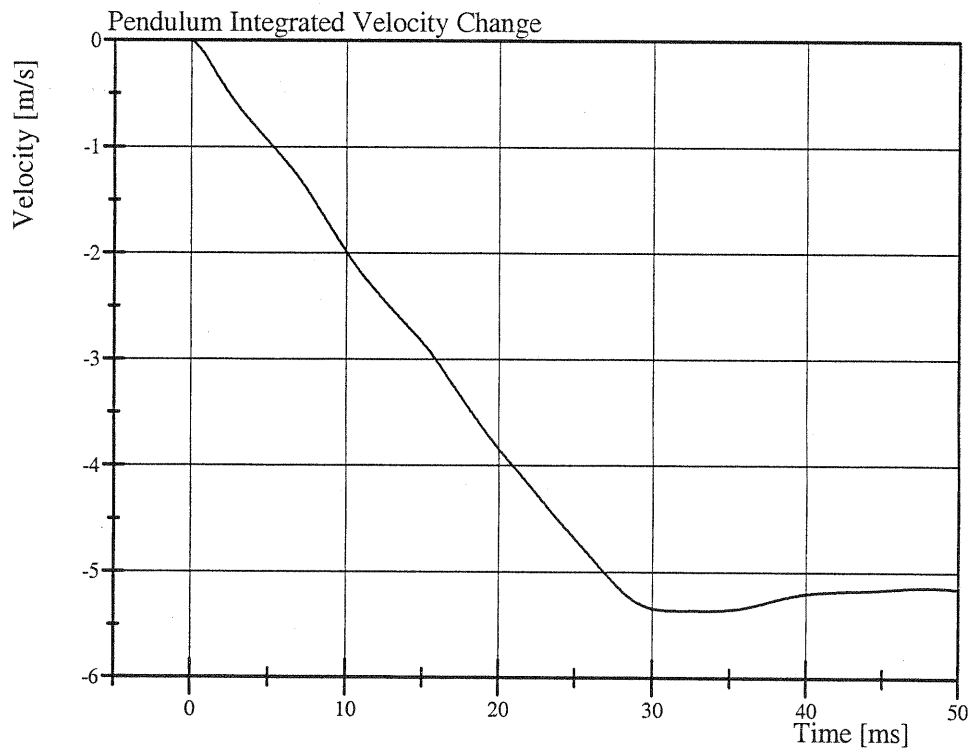
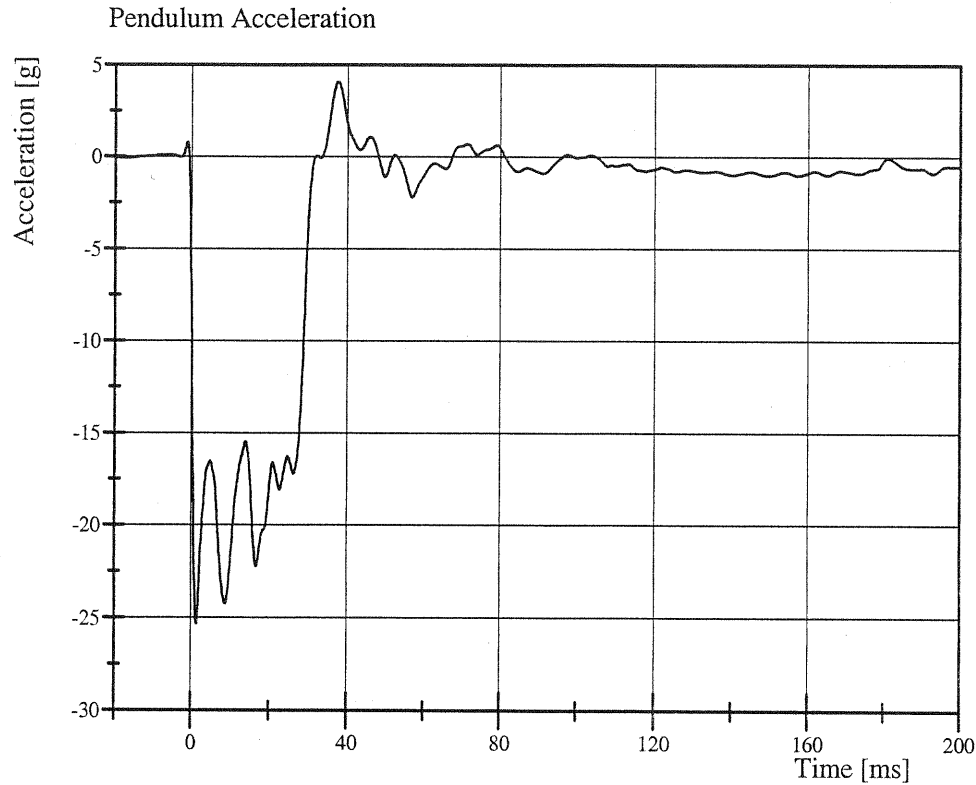
Ron Stoner

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007



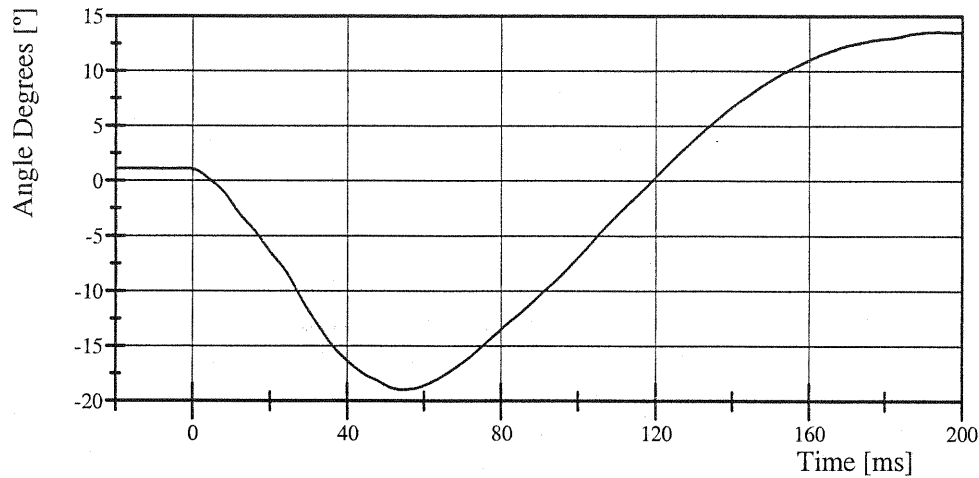
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Forward Pot Rotation at Base of Pendulum

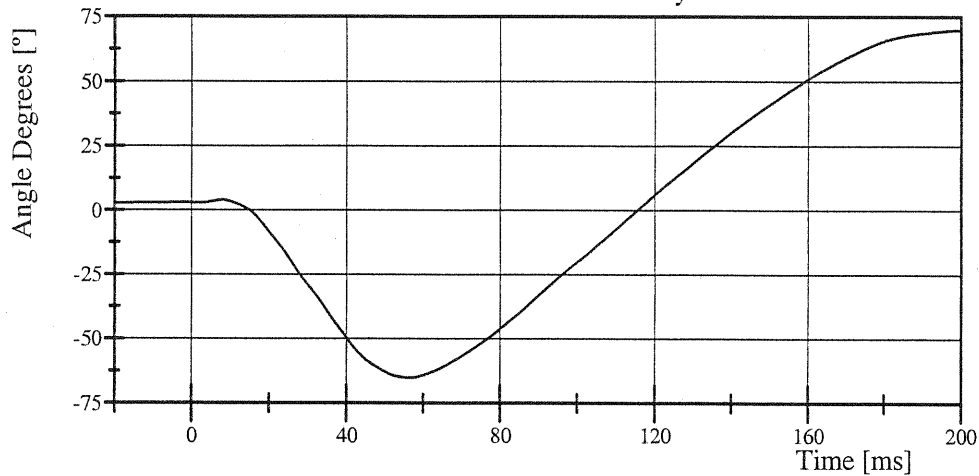


Filter Class: CFC_60

Max: 13.6 ° at 193.8 ms

Min: -18.9 ° at 54.5 ms

Center Headform Pot Rotation at Center of Gravity

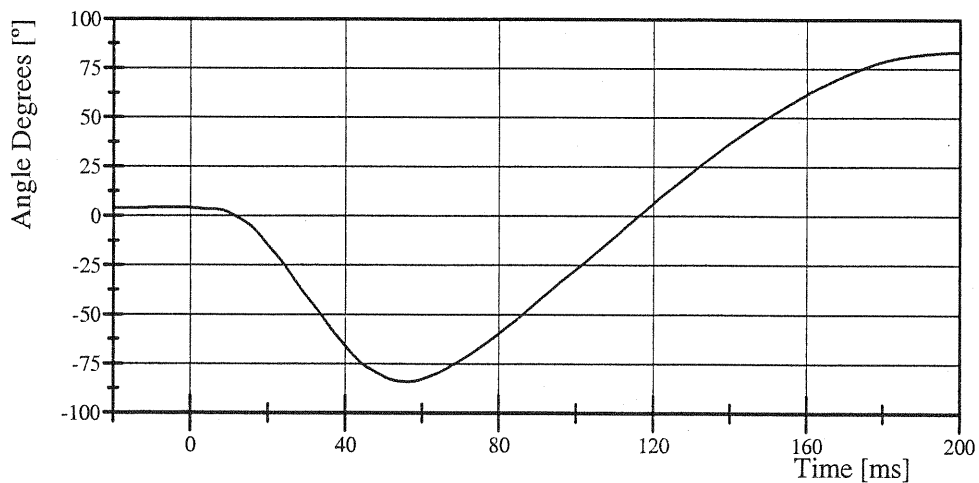


Filter Class: CFC_60

Max: 69.9 ° at 200.0 ms

Min: -65.2 ° at 56.5 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 83.4 ° at 200.0 ms

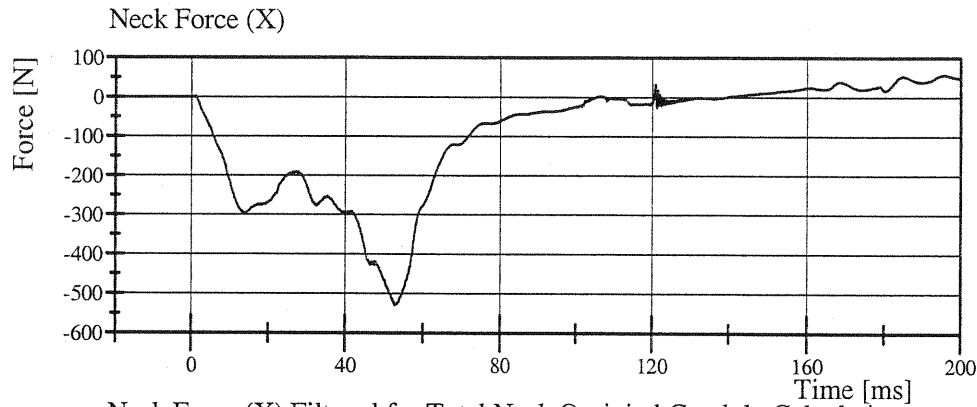
Min: -84.1 ° at 56.3 ms

Transportation Research Center Inc.

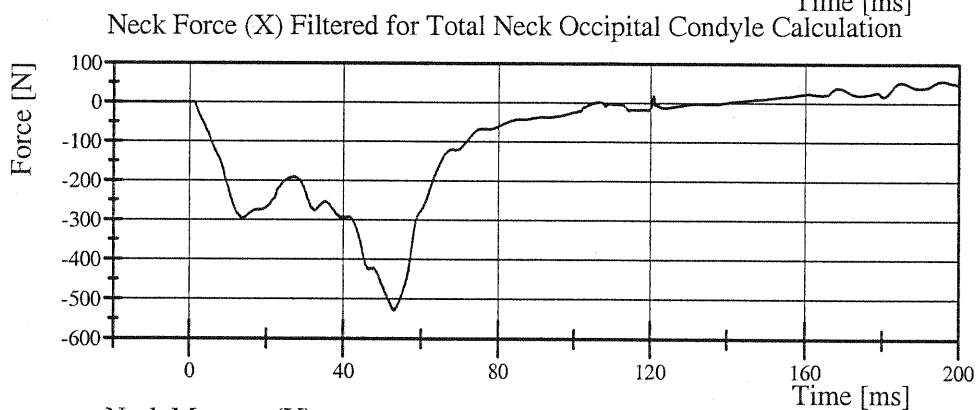
Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 11-1

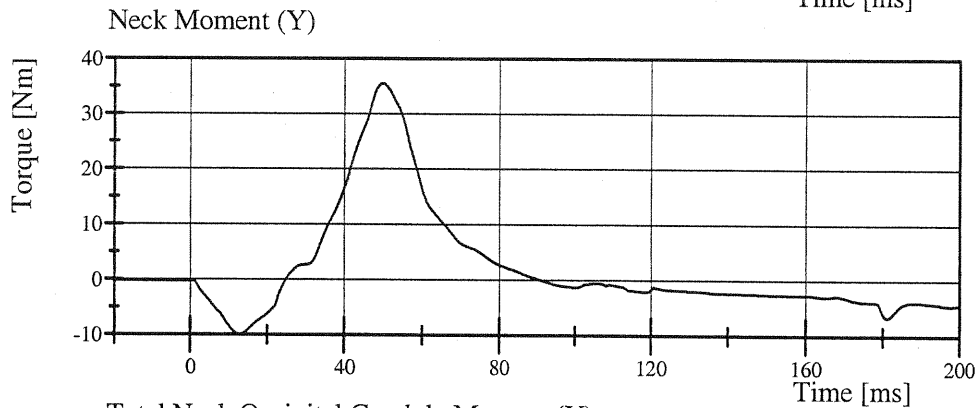
Test Date: 11/12/2007



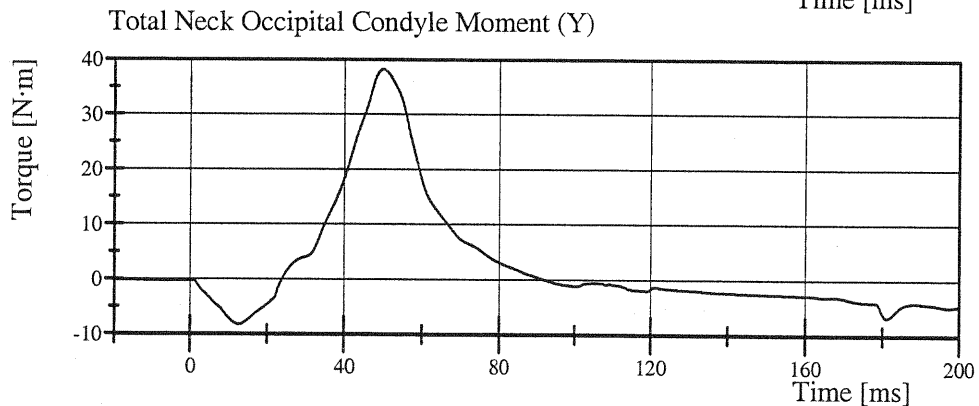
Filter Class: CFC_1000
Max: 57.4 N at 195.4 ms
Min: -528.1 N at 52.7 ms



Filter Class: CFC_600
Max: 57.4 N at 195.6 ms
Min: -527.9 N at 52.9 ms



Filter Class: CFC_600
Max: 35.5 Nm at 50.1 ms
Min: -9.9 Nm at 12.8 ms



Filter Class: CFC_600
Max: 38.3 N·m at 50.1 ms
Min: -8.2 N·m at 12.5 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Pendulum Velocity	(-2.4) - (-2.6) m/s	-2.52 m/s	Yes
Pendulum Integrated Velocity Change at 6ms	0.8 - 1.2 m/s	1.00 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 2.1 m/s	1.77 m/s	Yes
Pendulum Integrated Velocity Change at 14ms	2.2 - 2.9 m/s	2.35 m/s	Yes
Total Head D-Plane Rotation	80 - 92 °	88.7 °	Yes
Total Neck Occipital Condyles Moment (-12) - (-23) N·m		-14.5 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -5 Nm	76 - 90 ms	83.0 ms	Yes

Test meets specifications.

Comments:

Technician

Rant Barel

Approved

Ron Stoner



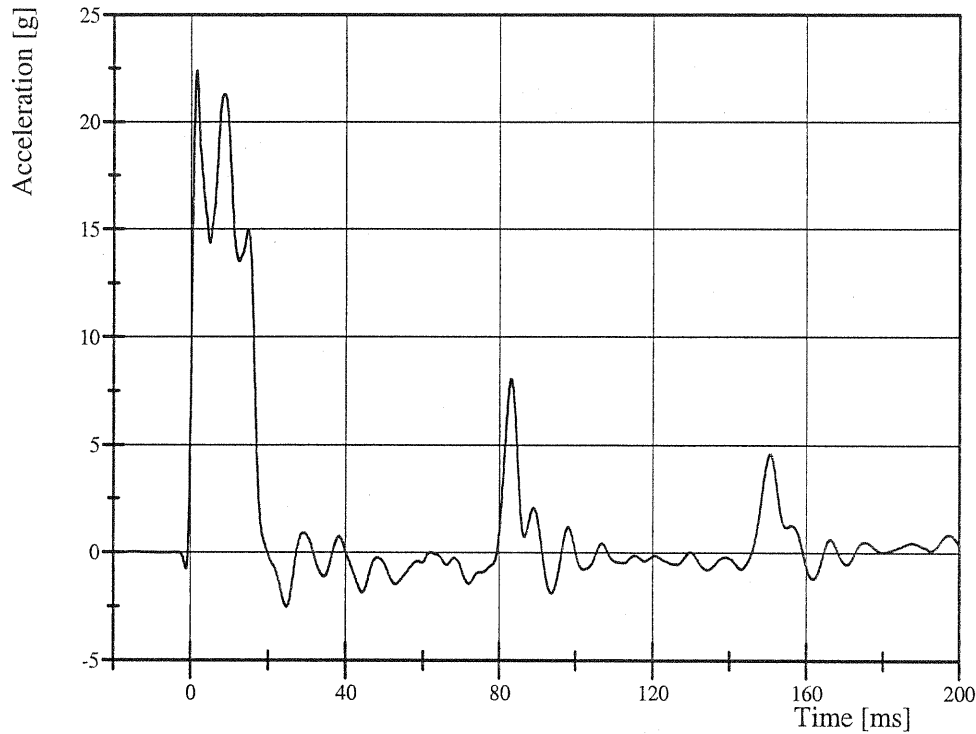
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

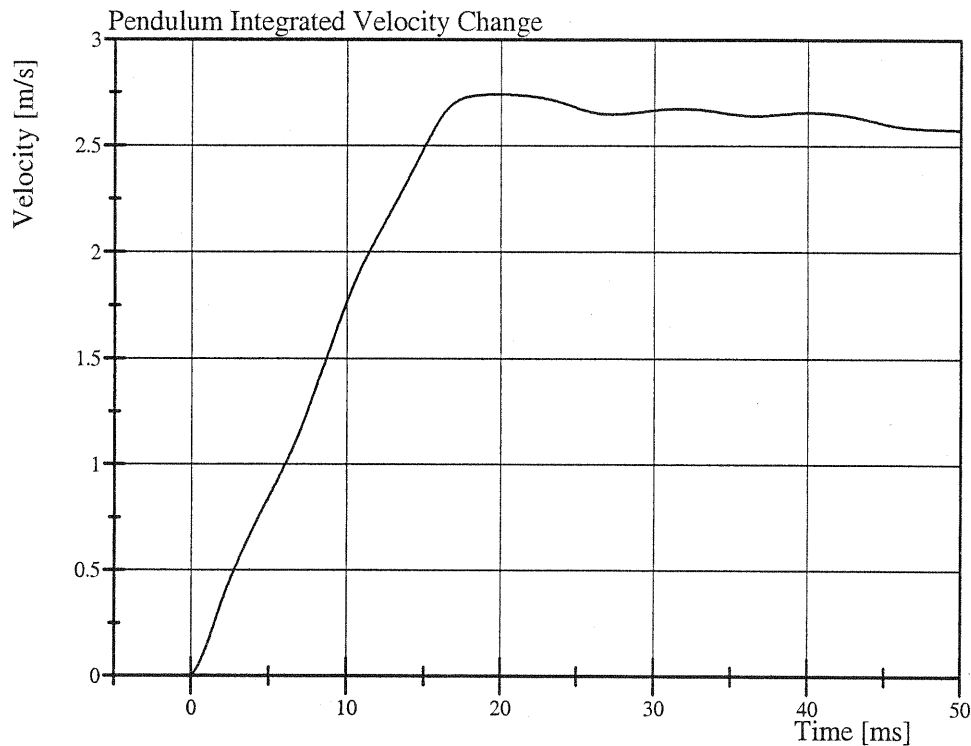
Pendulum Acceleration



Filter Class: CFC_180

Max: 22.4 g at 1.5 ms

Min: -2.5 g at 24.7 ms



Filter Class: CFC_180

Max: 2.7 m/s at 19.8 ms

Min: 0.0 m/s at 0.0 ms

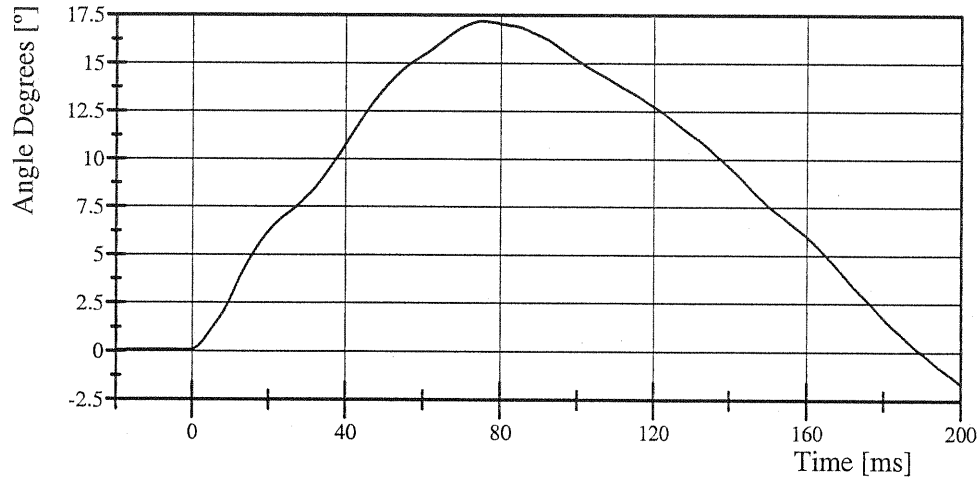
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Forward Pot Rotation at Base of Pendulum

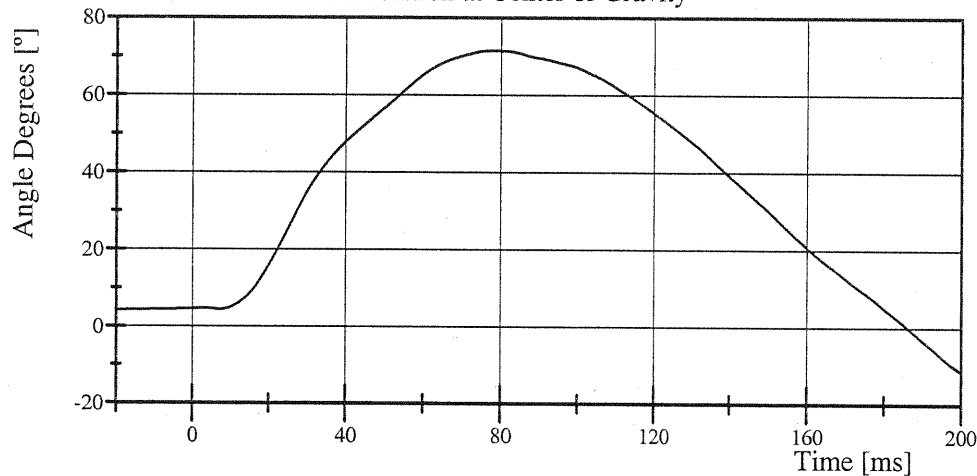


Filter Class: CFC_60

Max: 17.2 ° at 75.4 ms

Min: -1.7 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

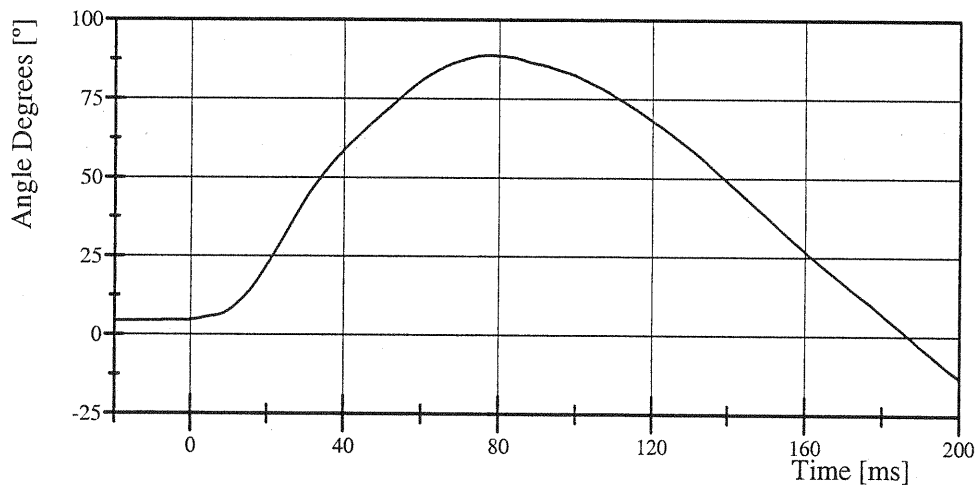


Filter Class: CFC_60

Max: 71.6 ° at 78.9 ms

Min: -11.4 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 88.7 ° at 77.7 ms

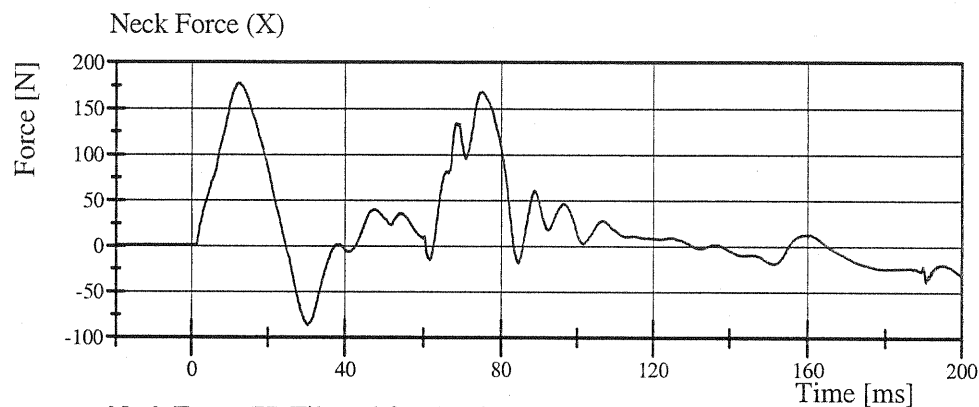
Min: -13.1 ° at 200.0 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 11-1

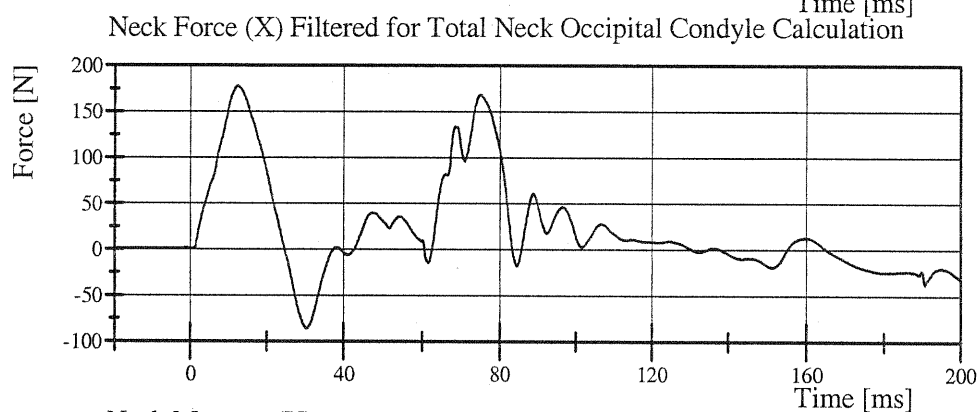
Test Date: 11/12/2007



Filter Class: CFC_1000

Max: 177.9 N at 12.3 ms

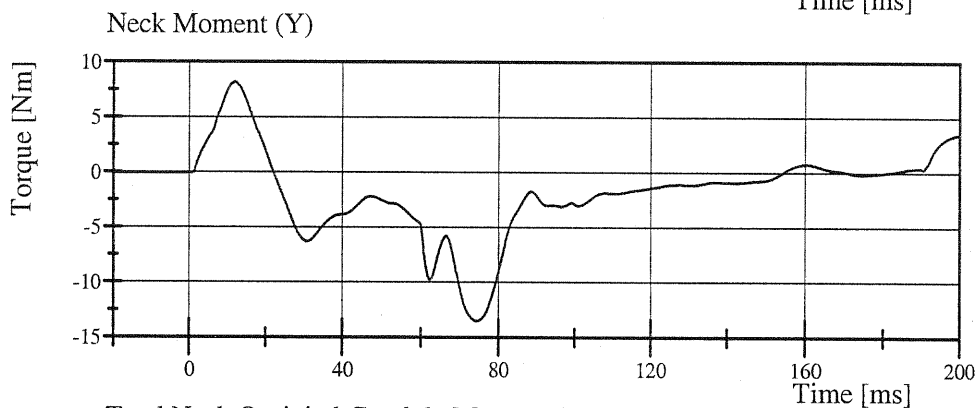
Min: -86.5 N at 30.4 ms



Filter Class: CFC_600

Max: 177.8 N at 12.3 ms

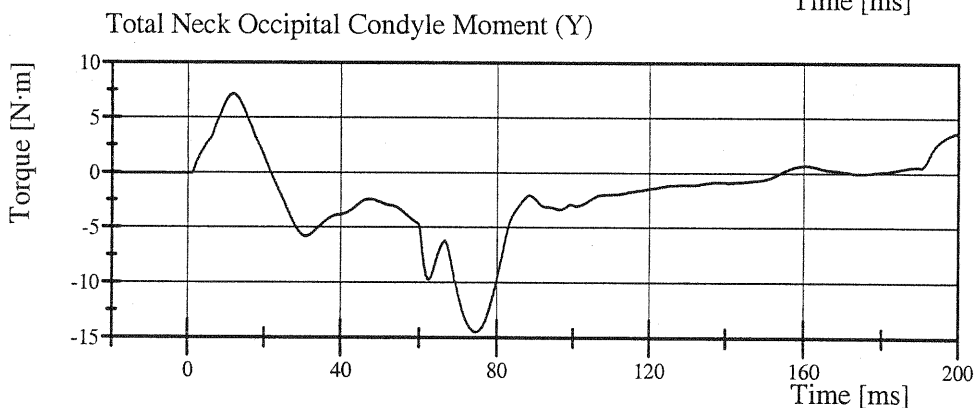
Min: -86.2 N at 30.4 ms



Filter Class: CFC_600

Max: 8.2 Nm at 11.9 ms

Min: -13.5 Nm at 74.5 ms



Filter Class: CFC_600

Max: 7.2 N·m at 11.9 ms

Min: -14.5 N·m at 74.6 ms

Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 094 Certification No. 11-1

Test Date: 11/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Impactor Velocity	4.9 - 5.1 m/s	5.07 m/s	Yes
Impactor Force	(-1,514) - (-1,796) N	-1,753.5 N	Yes

Test meets specifications.

Comments:

Technician



Approved

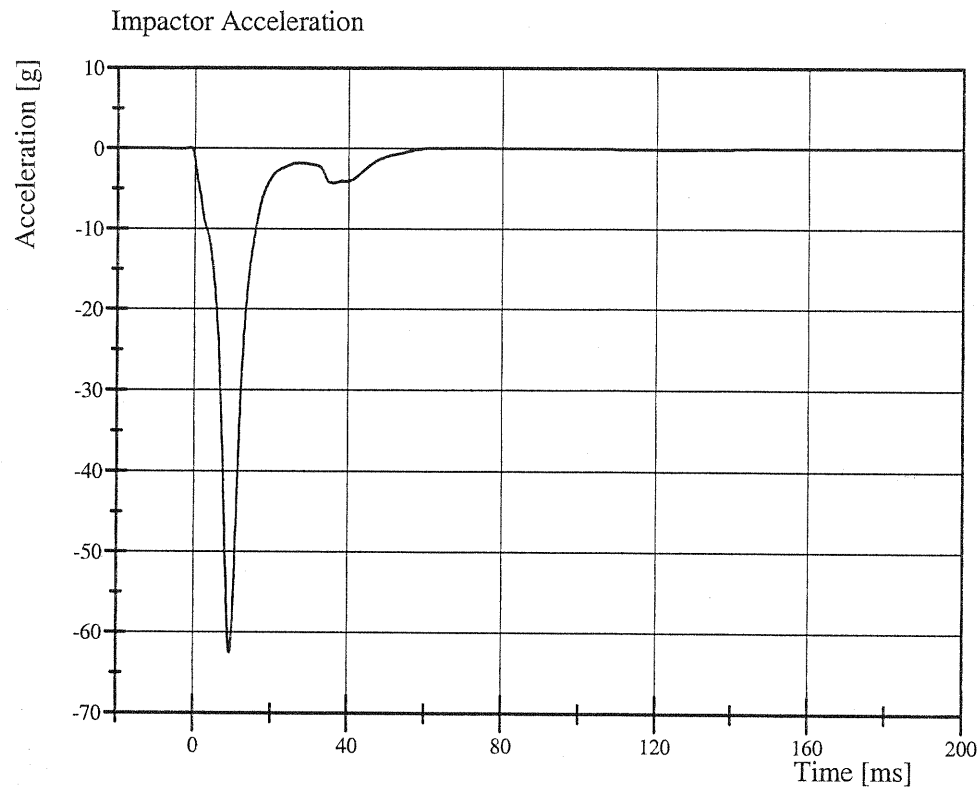


Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 094 Certification No. 11-1

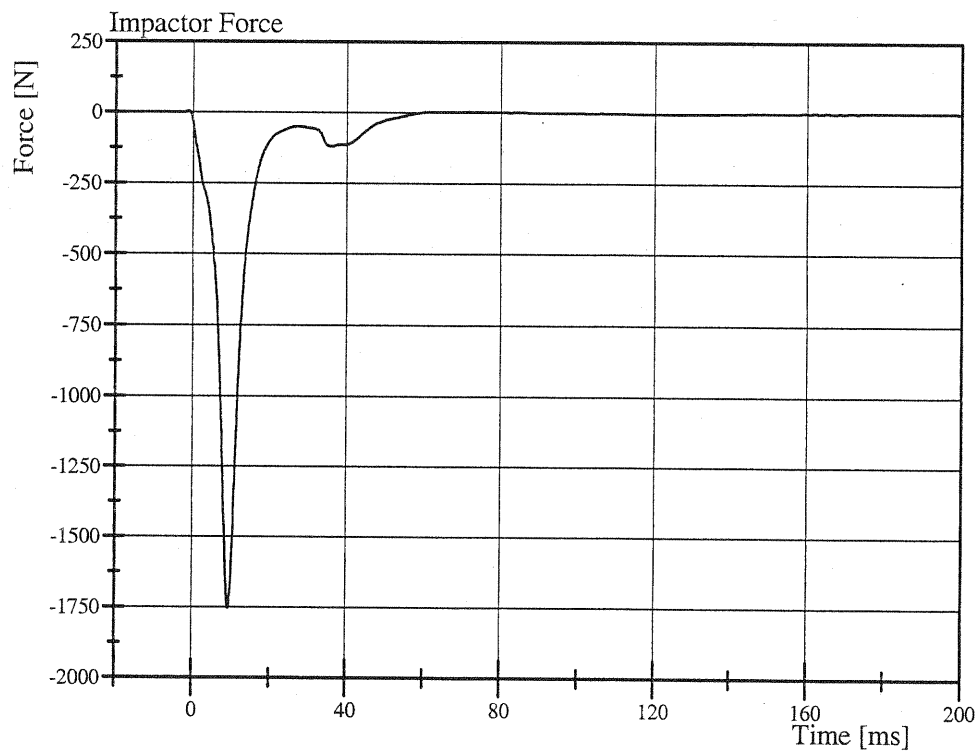
Test Date: 11/12/2007



Filter Class: CFC_180

Max: 0.1 g at -1.1 ms

Min: -62.5 g at 9.4 ms



Filter Class: CFC_180

Max: 3.1 N at -1.1 ms

Min: -1,753.5 N at 9.4 ms

CALIBRATION TEST RESULTS

POST-TEST RIGHT REAR

CRABI: 094

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 12-1

Test Date: 11/29/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.18 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-1.6) - (-2.3) m/s	-1.90 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-3.4) - (-4.2) m/s	-3.66 m/s	Yes
Pendulum Integrated Velocity Change at 25ms	(-4.3) - (-5.2) m/s	-4.44 m/s	Yes
Total Head D-Plane Rotation	(-75) - (-86) °	-84.0 °	Yes
Total Neck Occipital Condyles Moment	36 - 45 N·m	36.3 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 5 Nm	60 - 80 ms	77.0 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Ball

Approved

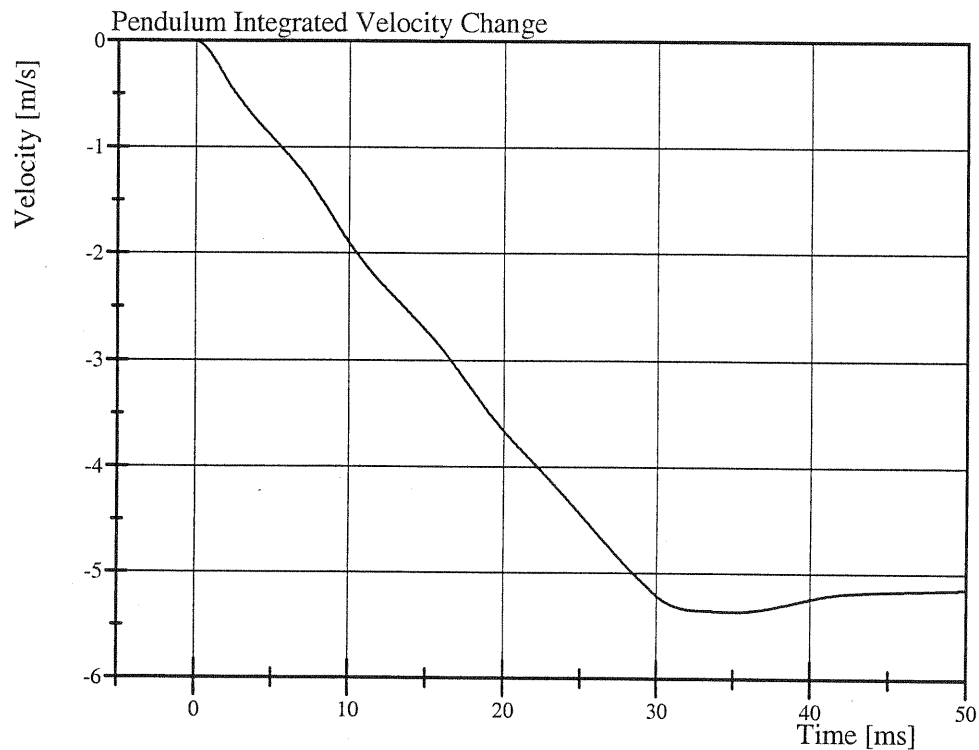
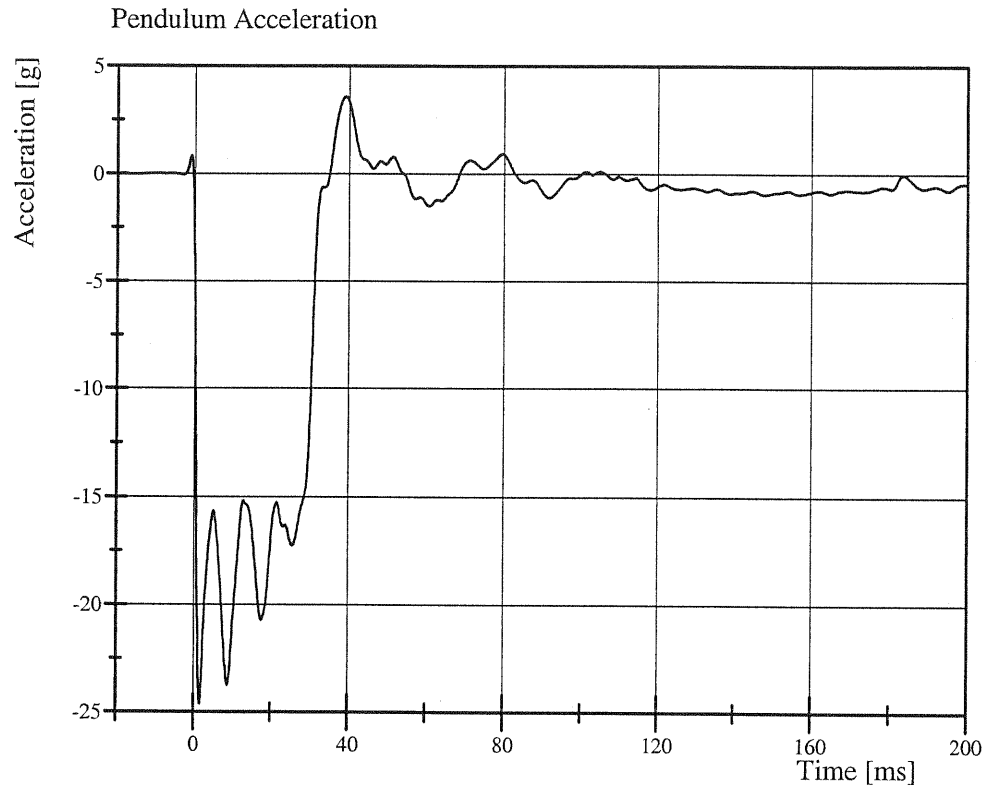
Ron Starnes

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 12-1

Test Date: 11/29/2007



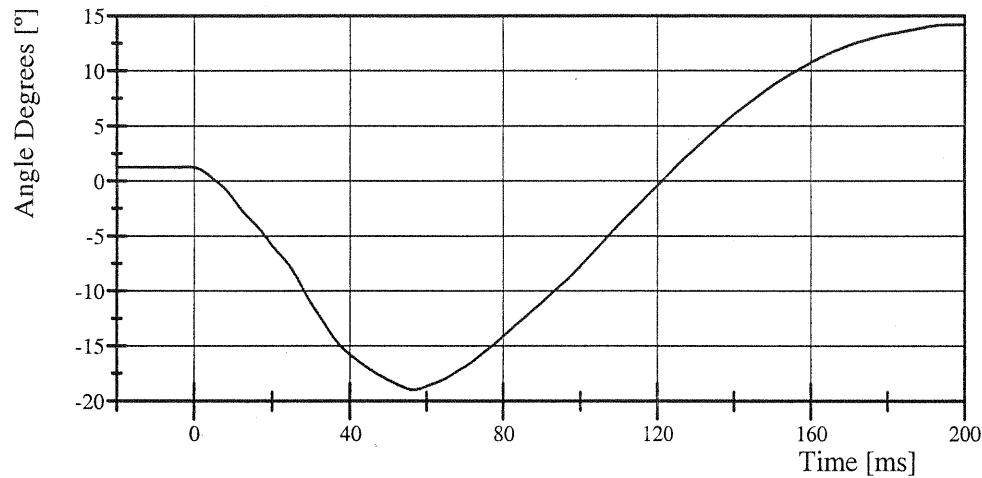
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 12-1

Test Date: 11/29/2007

Forward Pot Rotation at Base of Pendulum

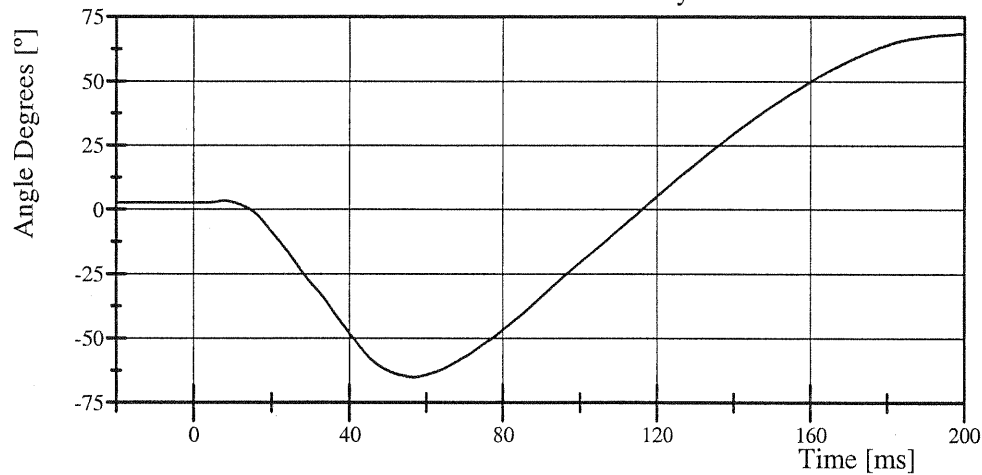


Filter Class: CFC_60

Max: 14.2 ° at 199.4 ms

Min: -19.0 ° at 56.7 ms

Center Headform Pot Rotation at Center of Gravity

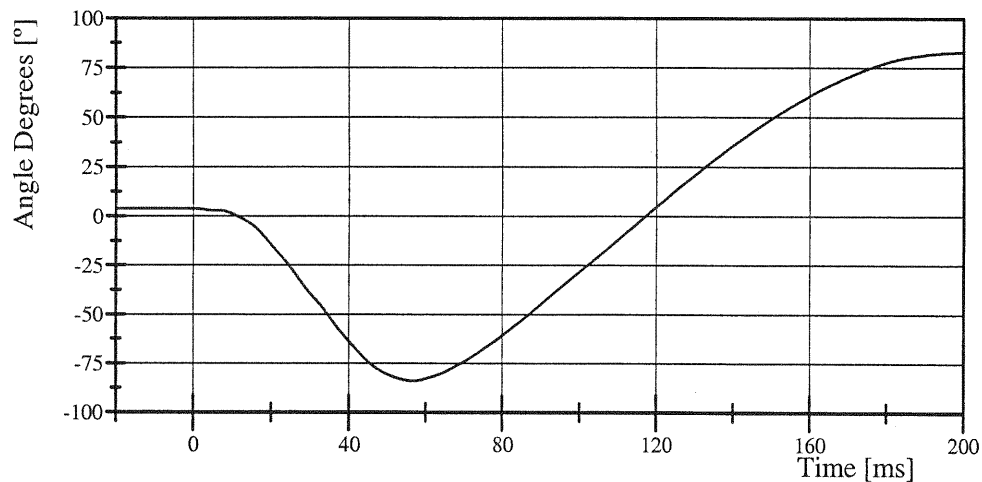


Filter Class: CFC_60

Max: 68.6 ° at 200.0 ms

Min: -65.1 ° at 56.8 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 82.8 ° at 200.0 ms

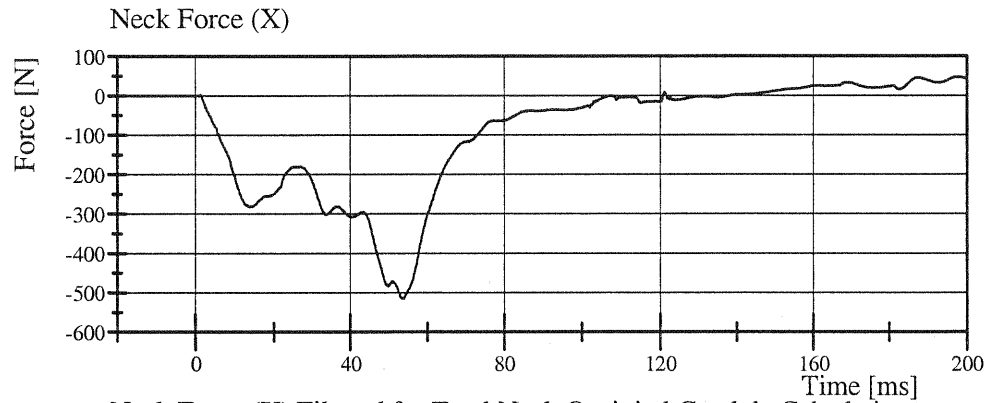
Min: -84.0 ° at 56.8 ms

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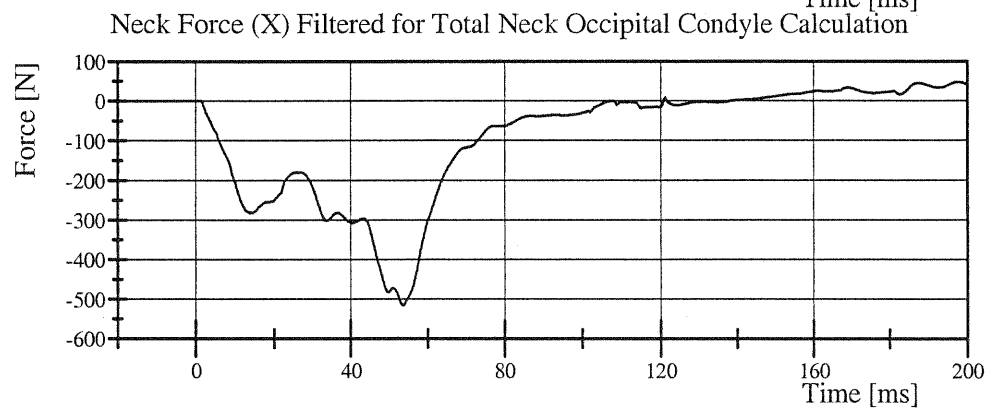
Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 12-1

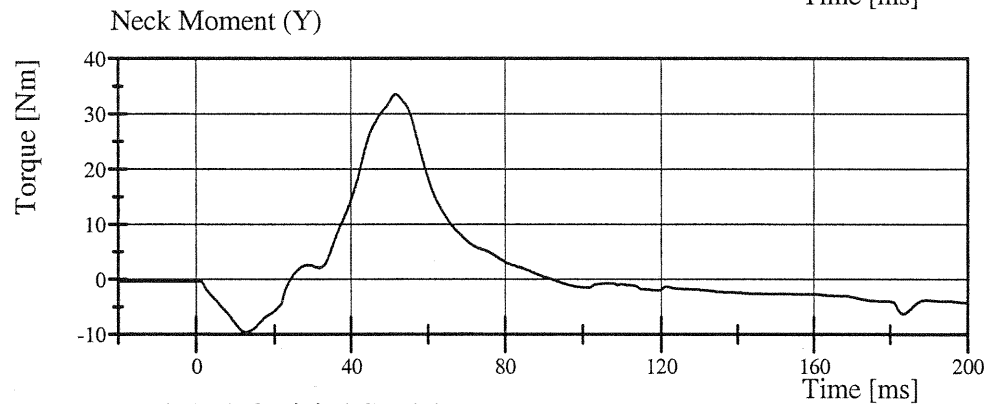
Test Date: 11/29/2007



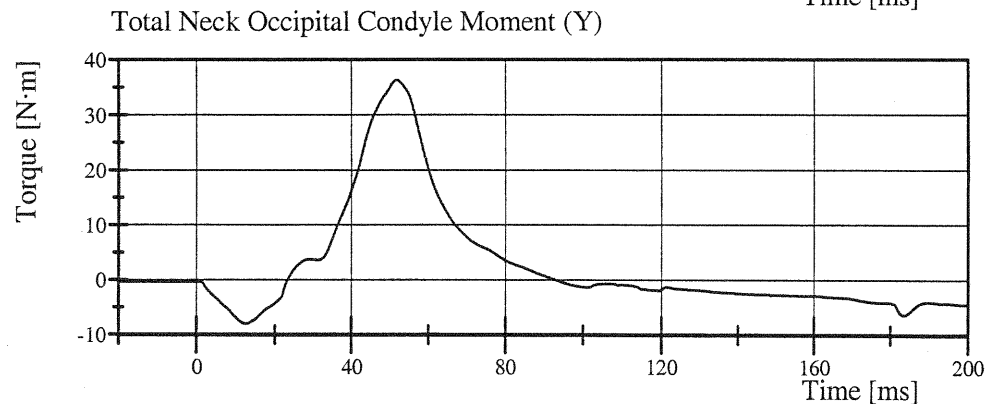
Filter Class: CFC_1000
Max: 48.0 N at 197.8 ms
Min: -514.8 N at 53.8 ms



Filter Class: CFC_600
Max: 48.0 N at 197.8 ms
Min: -514.3 N at 53.7 ms



Filter Class: CFC_600
Max: 33.5 Nm at 51.4 ms
Min: -9.6 Nm at 12.6 ms



Filter Class: CFC_600
Max: 36.3 N·m at 51.6 ms
Min: -8.0 N·m at 12.5 ms

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Neck Extension

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Test Date: 11/29/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	33 %	Yes
Pendulum Velocity	(-2.4) - (-2.6) m/s	-2.58 m/s	Yes
Pendulum Integrated Velocity Change at 6ms	0.8 - 1.2 m/s	0.95 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 2.1 m/s	1.68 m/s	Yes
Pendulum Integrated Velocity Change at 14ms	2.2 - 2.9 m/s	2.31 m/s	Yes
Total Head D-Plane Rotation	80 - 92 °	89.2 °	Yes
Total Neck Occipital Condyles Moment (-12) - (-23) N·m		-14.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -5 Nm	76 - 90 ms	82.4 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Storer

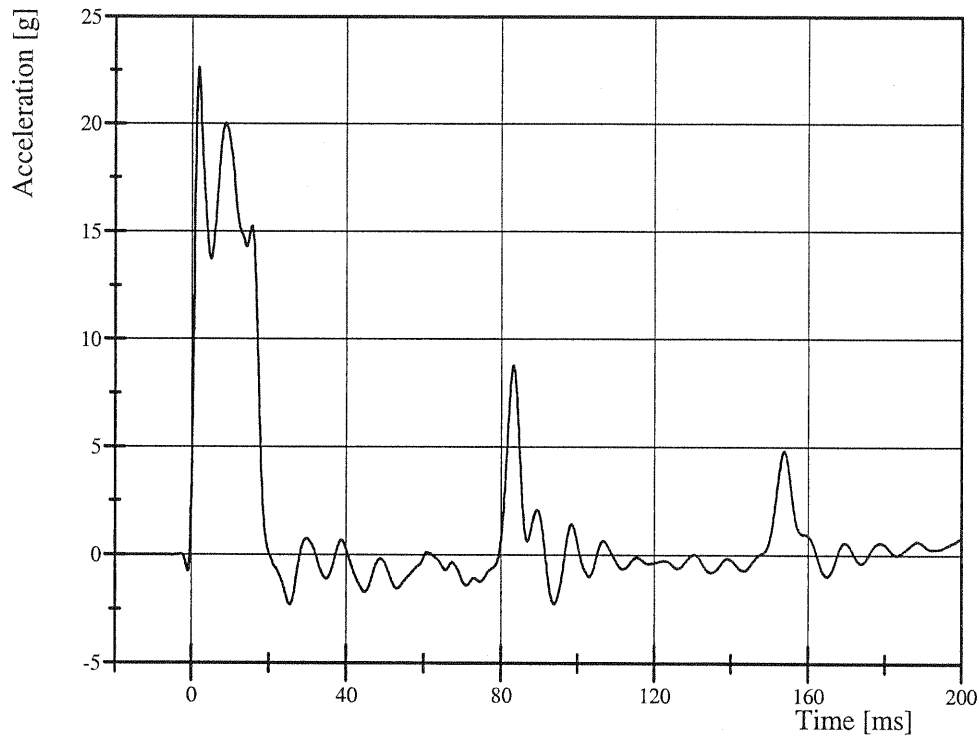
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 12-1

Test Date: 11/29/2007

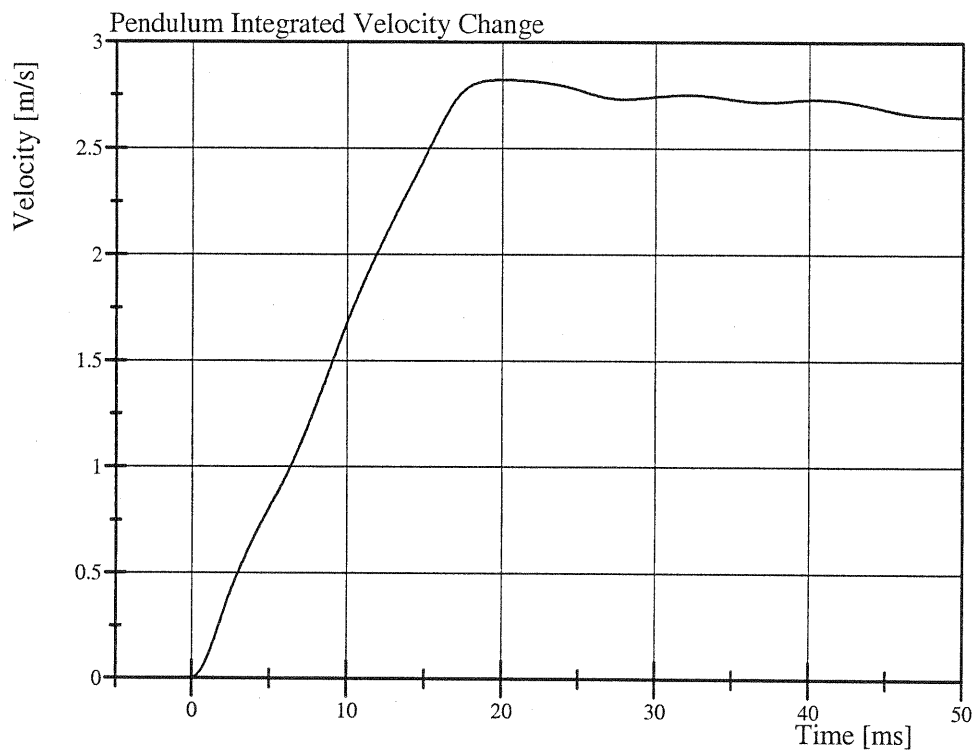
Pendulum Acceleration



Filter Class: CFC_180

Max: 22.6 g at 1.8 ms

Min: -2.3 g at 25.4 ms



Filter Class: CFC_180

Max: 2.8 m/s at 20.2 ms

Min: 0.0 m/s at 0.0 ms

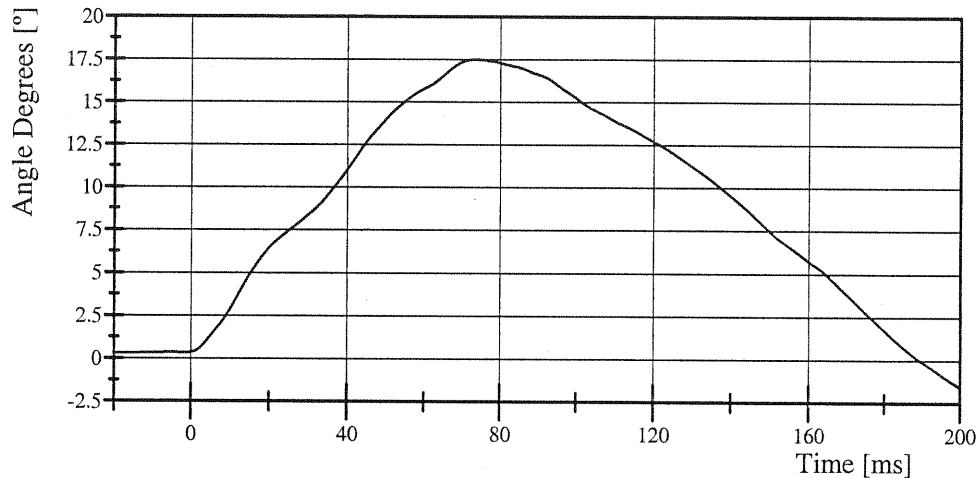
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Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 12-1

Test Date: 11/29/2007

Forward Pot Rotation at Base of Pendulum

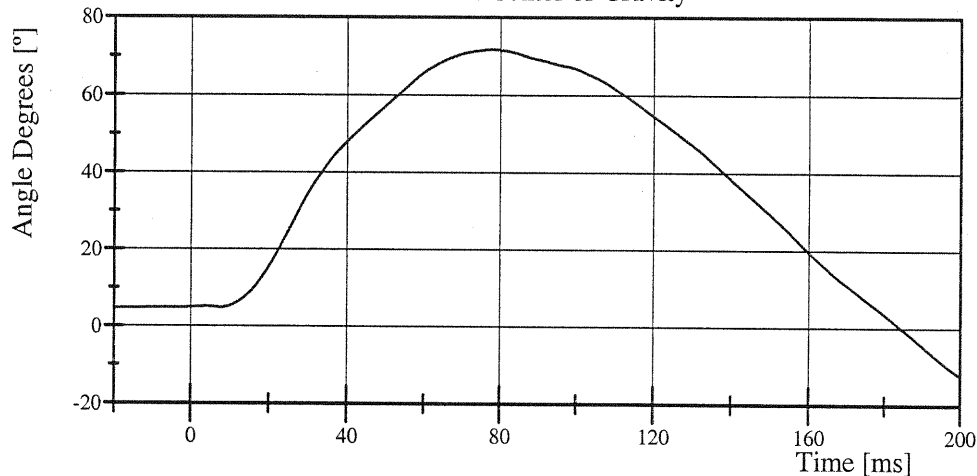


Filter Class: CFC_60

Max: 17.5 ° at 73.5 ms

Min: -1.6 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

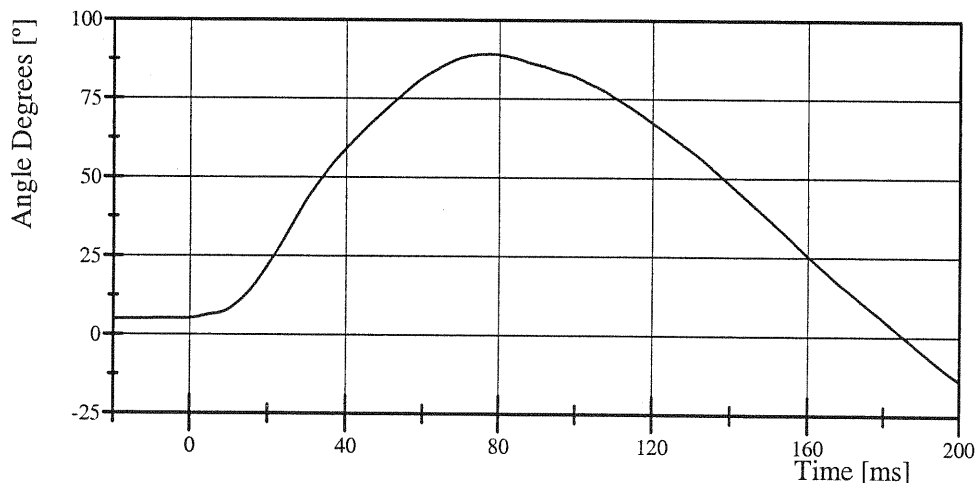


Filter Class: CFC_60

Max: 71.7 ° at 78.0 ms

Min: -12.3 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 89.2 ° at 77.4 ms

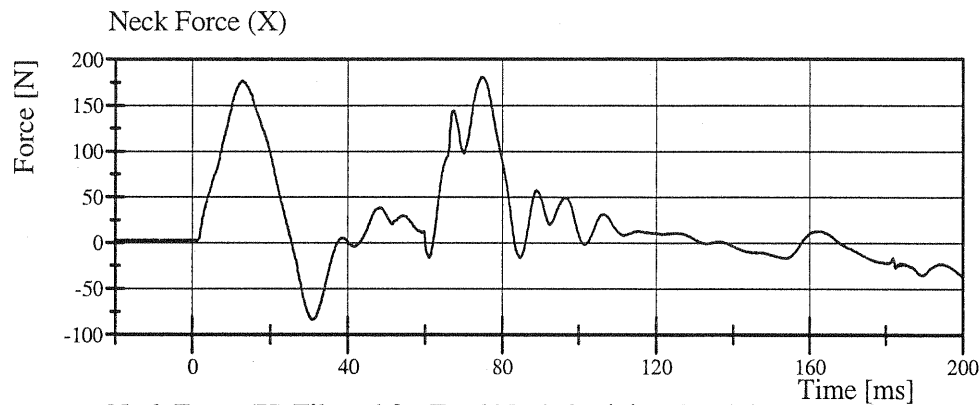
Min: -13.9 ° at 200.0 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 12-1

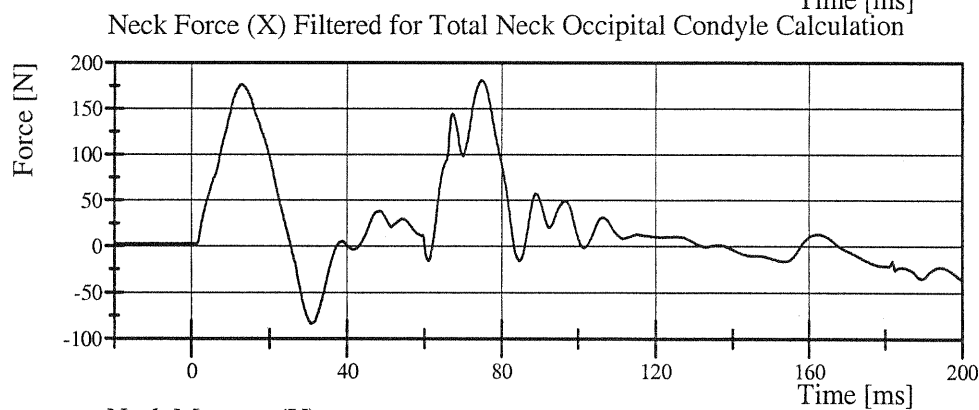
Test Date: 11/29/2007



Filter Class: CFC_1000

Max: 180.9 N at 74.6 ms

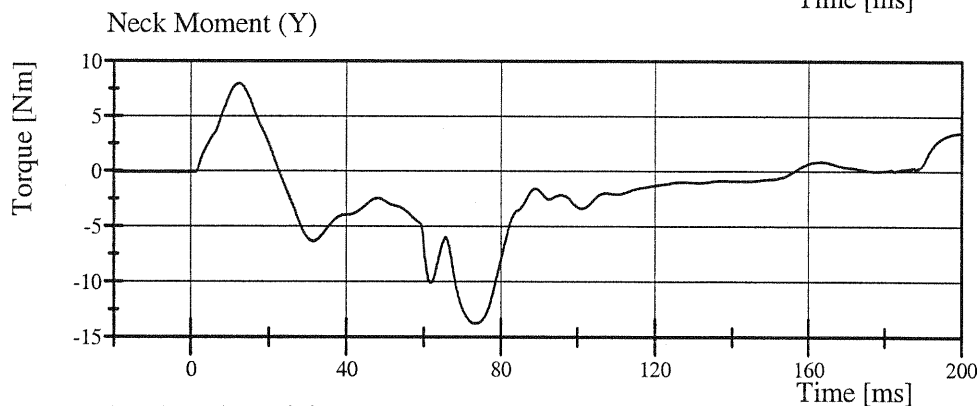
Min: -83.7 N at 30.6 ms



Filter Class: CFC_600

Max: 180.9 N at 74.7 ms

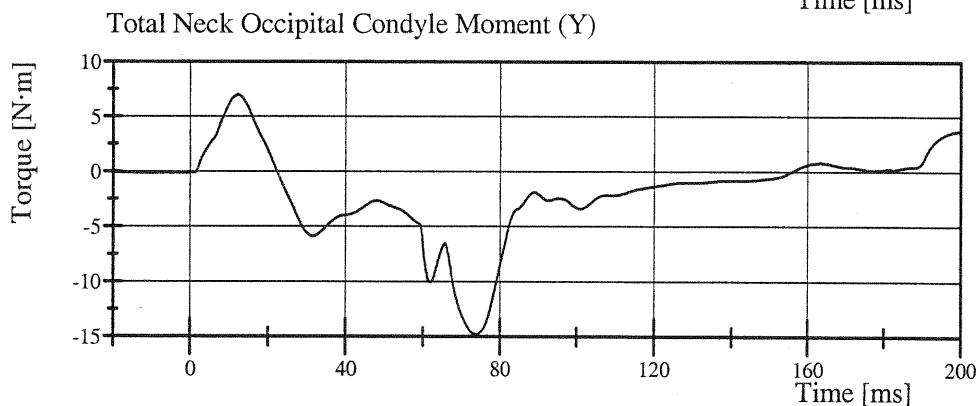
Min: -83.6 N at 30.7 ms



Filter Class: CFC_600

Max: 8.0 Nm at 12.4 ms

Min: -13.8 Nm at 73.2 ms



Filter Class: CFC_600

Max: 7.0 N·m at 12.3 ms

Min: -14.8 N·m at 74.0 ms

Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 094 Certification No. 12-1

Test Date: 11/30/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Impactor Velocity	4.9 - 5.1 m/s	5.06 m/s	Yes
Impactor Force	(-1,514) - (-1,796) N	-1,721.2 N	Yes

Test meets specifications.

Comments:

Technician

Charles W. Ball

Approved

Ron Stoner

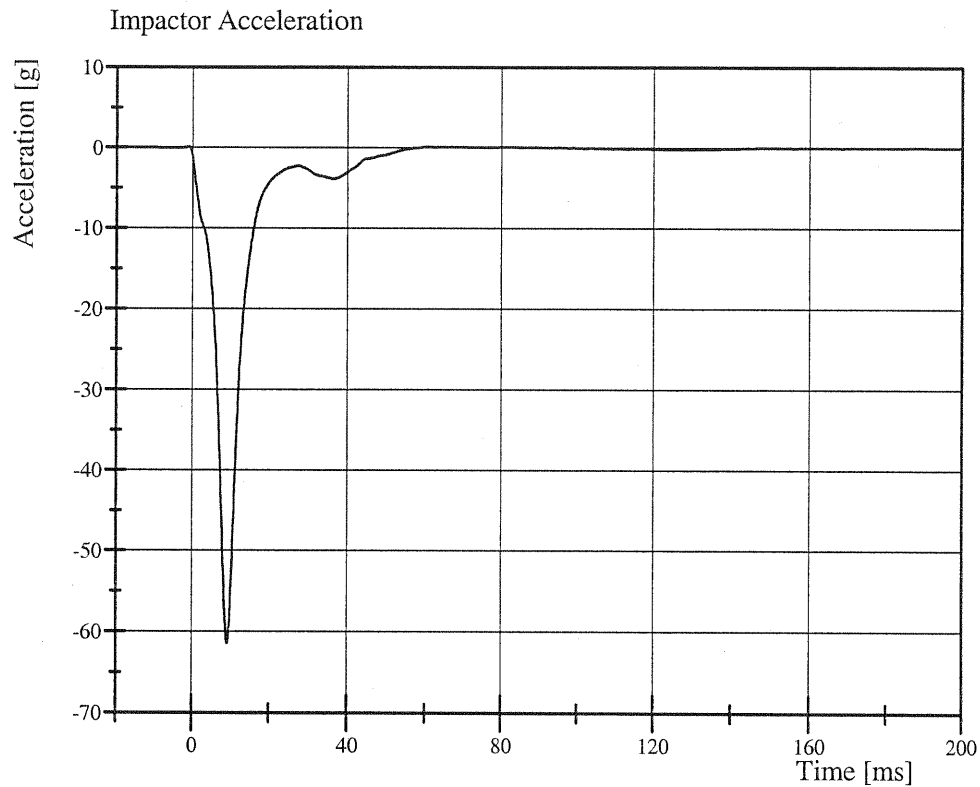


Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 094 Certification No. 12-1

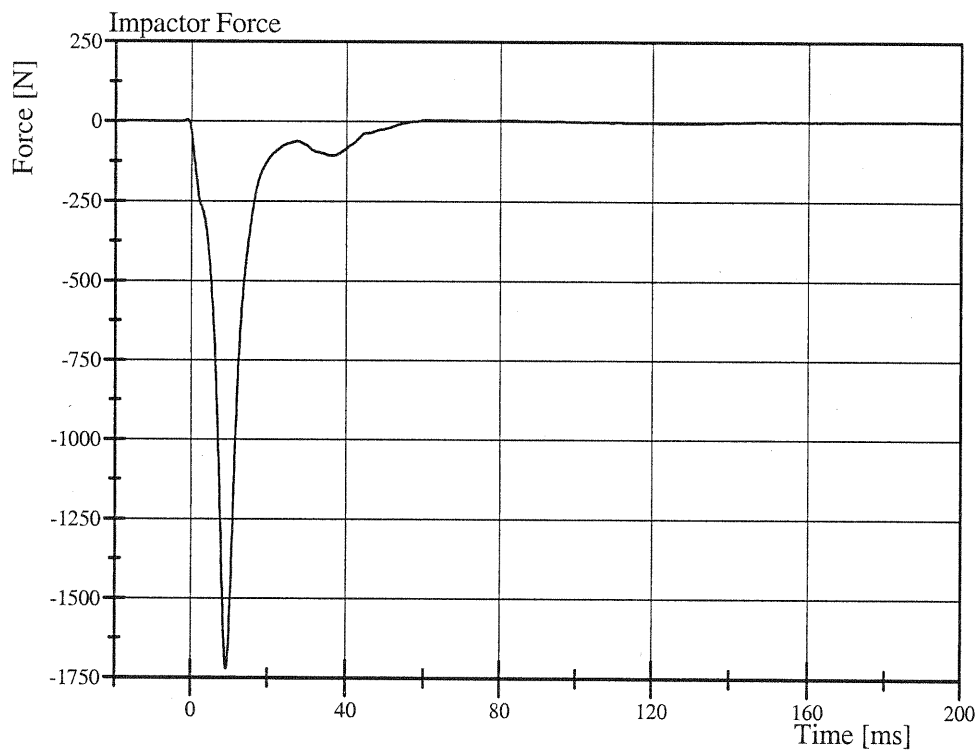
Test Date: 11/30/2007



Filter Class: CFC_180

Max: 0.2 g at 60.6 ms

Min: -61.4 g at 9.4 ms



Filter Class: CFC_180

Max: 4.6 N at 60.6 ms

Min: -1,721.2 N at 9.4 ms



Test Date: 11/27/07

Type: CRABI 12 month S/N: 094 Mfg.: First Technologies

Proj./Seg. No.: 20050906-1400 Test Eng: Emad Al-Tabakha

ITEM	PRE-USE	POST-USE
HEAD:		
Skull Bolts; No Wires Pinched	X	
Skull Cap – 3 Year Old Only	N/A	
Head Skin Condition	X	X
* Neck Load Cell Cables: secure, taped, and with strain relief	X	
NECK:		
*Neck Cable Torqued, Tape Installed (1.8-2.2 in-lbs.) Actual: <u>2</u>	X	
Rubber Condition	X	X
ARMS AND HANDS:		
Skin Condition	X	X
Isolation Damper Condition	X	X
THORAX:		
Front and Rear Rib Bolts, Rib Ends Position – 3 Year Old Only	N/A	
Chest Pot Arm and Ball Movement – 3 Year Old Only	N/A	X
Sternum Bolts and Sternum Bumpers Condition	X	
Jacket Condition	X	X
Abdominal Insert Condition	X	X
Rib Damping Material and Stiffeners Condition – 3 Year Old Only	N/A	X
Rib Minimum Depth – 3 Year Old Only (#1-#2 = 4.137 & #2-#3 = 4.082)	N/A	
Accel Mount Bolts	X	
Lumbar Spine Rubber Condition	X	X
PELVIS:		
Hip Isolation Damper Condition	X	X
LEGS AND FEET:		
Leg Skin Condition	X	X
Knee Joint Function and Range of Motion	X	
Ankle Joint Function and Range of Motion	X	
Foot Condition	X	X
OTHER:		
Cleanliness	X	
Target Position	X	
Clothes and Shoes	X	
One G Joint Adjustments	X	
Verify channel s against assembly and Check connectors (intact & labeled)	X	
ATTACH TEMPERATURE LOGGER TO DUMMY / DOWNLOAD		

* Items checked during calibration; these items need checked when the dummy is used without recalibration

Pre Test Inspection Completed By: J. Clarridge Date: 11/12/07

Post Test Inspection Completed By: J. Clarridge Date: 11/28/07