

REPORT NUMBER: NCAPSIDE-TRC-2007-004

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**MITSUBISHI MOTORS CORPORATION
2008 MITSUBISHI OUTLANDER MPV
NHTSA NUMBER: M85603**

**PREPARED BY:
TRANSPORTATION RESEARCH CENTER INC.
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Test Date: December 4, 2007

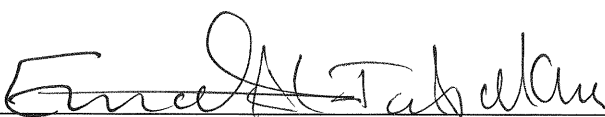
Report Date: December 17, 2007

FINAL REPORT

**PREPARED FOR:
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, D.C. 20590**

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Report Approved By: 

Emad Al-Tabakha, Test Engineer
Transportation Research Center Inc.

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

1. Report No. NCAPSIDE-TRC-2007-004	2. Government Accession No.	3. Recipient's Catalog No.																																				
4. Title and Subtitle Final Report New Car Assessment Program Side Impact Testing of a 2008 Mitsubishi Outlander MPV, NHTSA No.: M85603		5. Report Date December 17, 2007																																				
		6. Performing Organization Code TRC Inc.																																				
7. Author(s) Emad Al-Tabakha, Test Engineer Transportation Research Center Inc.		8. Performing Organization Report No. 071204																																				
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. DTNH22-03-D-02005																																				
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 December 2007																																				
		14. Sponsoring Agency Code NVS-111																																				
15. Supplemental Notes																																						
16. Abstract This 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject vehicle, a 2008 Mitsubishi Outlander MPV, to obtain new car assessment and research data indicant of FMVSS 214D performance. This test was conducted by Transportation Research Center Inc. in East Liberty, Ohio, on December 4, 2007. The impact velocity of the Moving Deformable Barrier (MDB) was 61.9 km/h, and the ambient temperature at the struck (driver's side) side of the target vehicle at the time of impact was 22.5° C. The target vehicle's post-test maximum crush was 214 mm at Level 3. The test or target vehicle's performance is given below: <table border="0"> <thead> <tr> <th></th> <th><u>Front SID HIII</u></th> <th></th> <th><u>Rear SID HIII</u></th> <th></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib Acceleration:</td> <td><u>25.0</u></td> <td>g's</td> <td><u>35.7</u></td> <td>g's</td> </tr> <tr> <td>Left Lower Rib Acceleration:</td> <td><u>23.2</u></td> <td>g's</td> <td><u>37.2</u></td> <td>g's</td> </tr> <tr> <td>Lower Spine Acceleration:</td> <td><u>28.3</u></td> <td>g's</td> <td><u>34.5</u></td> <td>g's</td> </tr> <tr> <td>Thoracic Trauma Index, (TTI):</td> <td><u>26.6</u></td> <td>g's</td> <td><u>35.8</u></td> <td>g's</td> </tr> <tr> <td>Pelvis Acceleration (PEV):</td> <td><u>44.4</u></td> <td>g's</td> <td><u>48.6</u></td> <td>g's</td> </tr> <tr> <td>Head Injury Criteria (HIC):</td> <td><u>103</u></td> <td>g's</td> <td><u>171</u></td> <td>g's</td> </tr> </tbody> </table> The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during side impact event.					<u>Front SID HIII</u>		<u>Rear SID HIII</u>		Left Upper Rib Acceleration:	<u>25.0</u>	g's	<u>35.7</u>	g's	Left Lower Rib Acceleration:	<u>23.2</u>	g's	<u>37.2</u>	g's	Lower Spine Acceleration:	<u>28.3</u>	g's	<u>34.5</u>	g's	Thoracic Trauma Index, (TTI):	<u>26.6</u>	g's	<u>35.8</u>	g's	Pelvis Acceleration (PEV):	<u>44.4</u>	g's	<u>48.6</u>	g's	Head Injury Criteria (HIC):	<u>103</u>	g's	<u>171</u>	g's
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17. Key Words New Car Assessment Program (NCAP) Side Impact Side Impact Hybrid III Dummy (SID HIII) Occupant Side Impact Protection		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																																				
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. Number of Pages 220	22. Price																																			

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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE

This side impact test was conducted as part of the FY' 2007 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-03-D-02005. The purpose of this test was to evaluate side impact protection in a 2008 Mitsubishi Outlander manufactured by Mitsubishi Motors Corporation.

TEST PROCEDURE

The side impact test was conducted in accordance with the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002 and the corresponding Transportation Research Center Inc. (TRC Inc.) procedures. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

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

SECTION 2

SUMMARY OF NCAP SIDE IMPACT TEST

A model year 2008 Mitsubishi Outlander was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.9 km/h. The specified impact velocity range is from 61.2 to 62.8 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 1860.4 kg and the test weight of the MDB was 1365.4 kg. The test was conducted at TRC Inc. in East Liberty, OH, on December 4, 2007.

One (1) real-time motion picture camera and nine (9) high-speed digital motion picture cameras were used to document the impact event. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information are documented in the data sheets. Pre-test and post-test photographs of the vehicle and Side Impact Dummy (SID/HIII) can be found in Appendix A. Two 50th percentile adult male SID/HIIIs were placed in the driver and left rear passenger designated seating positions according to instructions specified in the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002. The SID/HIIIs were instrumented in the following locations:

- Left Upper Rib (LUR) uniaxial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uniaxial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uniaxial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uniaxial accelerometer (Y-axis primary and redundant)
- Head Center of Gravity (CG) triaxial accelerometers (X, Y and Z axes primary and redundant)
- Upper Neck load cell (Fx, Fy, Fz, Mx, My, Mz)

The test vehicle was instrumented with twenty-one (21) structural accelerometers and the MDB was instrumented with five (5) accelerometers and two (2) contact switches on the bumper to compare left side to right side bumper impact timing. All data channels were recorded with a fully self-contained onboard Kayser Threde Data Acquisition System. The data was digitally sampled at 12,500 samples per second and processed per Appendix V of the Test Procedure.

GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 214 mm at level 3, 750 mm rearward of the left impact point. The driver SID/HIII, Serial No. 066, and left rear passenger SID/HIII, Serial No. 059, were calibrated prior to this test.

Appendix A contains the still photograph prints. Appendix B contains the driver SID/HIII, vehicle, and MDB response data traces. Appendix C contains the SID/HIII configuration and performance verification data.

The occupant data is summarized below:

ATD position	HIC (36)	T ¹	T ²	TTI (G's)	Peak Pelvis (G's)
Driver	103	51.0	83.3	26.6	44.4
Passenger	171	53.5	82.9	35.8	48.6

Supplemental Restraint Information

Restraint Type	Left Front (Driver)		Left Rear Passenger	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No	N/A	
Side Torso Airbag	Yes	Yes	N/A	
Side Torso/Head Airbag	N/A		N/A	
Side Head Curtain Airbag	Yes	Yes	Yes	Yes

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:

There were no anomalies for this test.

DATA SHEET NO. 1**GENERAL TEST AND VEHICLE PARAMETER DATA**

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

NHTSA No.: M85603
 Test Date: 12/04/07

TEST VEHICLE INFORMATION

Make	Mitsubishi
Model	Outlander
Body Style	MPV
NHTSA No.	M85603
VIN	JA4MS41X48Z002351
Color	Labrador Black Pearl
Delivery Date	11/21/2007
Odometer Reading	Not Available
Dealer	Medina Mitsubishi
Transmission	Automatic
Final Drive	2WD
Number of Cylinders	6
Engine Displacement	3.0 L
Engine Placement	Transverse
Air Conditioning	Yes
Power Windows	Yes
Power Seats	No
Power Door Locks	Yes

TEST VEHICLE OPTIONS

Sun Roof/T-Top	No
Roof Rack	Yes
Cruise Control	Yes
Tilt Steering	Yes
Power Steering	Yes
Rear Defroster	Yes
Anti-Lock Brakes	Yes
AM/FM CD	Yes
Keyless Entry	Yes
Tinted Glass	Yes
Driver Front Airbag	Yes
Driver Side Head Airbag	Yes
Driver Side Torso Airbag	Yes
Rear Passenger Head Airbag	No
Rear Passenger Curtain Airbag	Yes
Pretensioner	Yes
Load Limiters	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Mitsubishi Motor Co., LTD.
Date of Manufacture	9/07

GVWR (kg)	2300
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. 1 (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85603Test Program: NCAP Side ImpactTest Date: 12/04/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	468.2	371.4		517.0	448.0	
Right	kg	458.2	354.8		474.4	421.0	
Ratio	%	56.1	43.9		53.3	47.9	
Totals	kg	926.4	726.2	1652.6	991.4	869.0	1860.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1652.6
Weight of 2 P572M ATDs	kg	162.0
Rated Cargo/Luggage Weight (RCLW)	kg	49.0
Calculated Vehicle Target Weight (TVTW)	kg	1862.6

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	791	795	782	792	1173
As Tested	mm	775	779	749	759	1247
Fully Loaded	mm	775	788	748	762	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheelbase	mm	2670
Total Vehicle Length at Left Side	mm	4380
Total Vehicle Length at Centerline	mm	4640
Total Vehicle Length at Right Side	mm	4381
Weight of Ballast in Cargo Area	kg	0
Amount of Stoddard Solvent in Fuel Tank	liters	58.3

TEST VEHICLE VERTICAL IMPACT LINE DATA

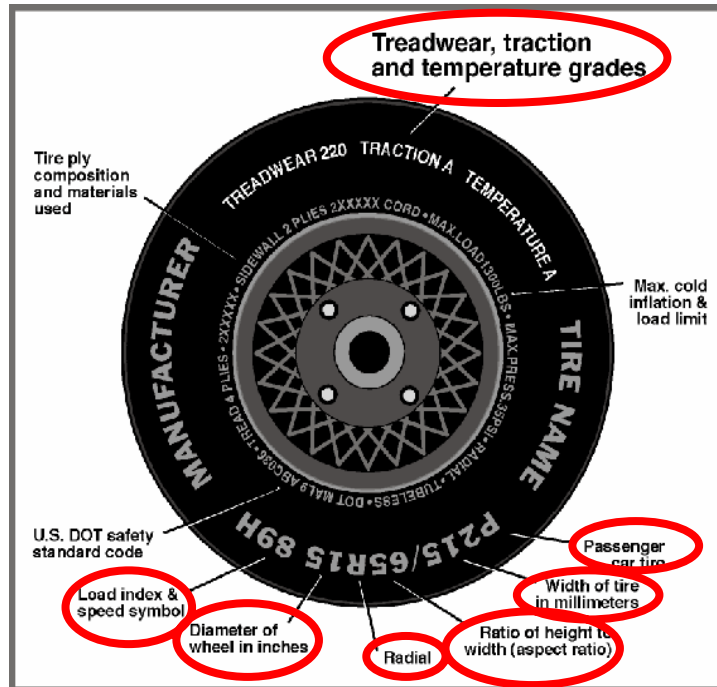
Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2670
Target Impact Point Aft of Front Axle	mm	395
Actual Impact Point Aft of Front Axle	mm	407

DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

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

NHTSA No.: M85603
 Test Date: 12/04/07



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	P255/55R18
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Eagle	Eagle
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

TEST VEHICLE INFORMATION

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

NHTSA No.: M85603
Test Date: 12/04/07

NORMAL DESIGN RIDING POSITION

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

Driver: Total Number of detents: 24

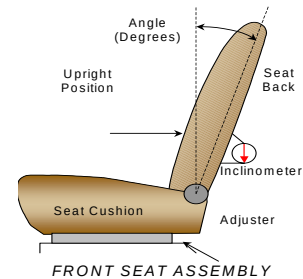
Test detent (with the forward-most detent defined as 0): 12

Left Rear Passenger: Total Number of detents: 5

Test detent (with the forward-most detent defined as 0): 3

Driver seat back angle: 0.3° measured at headrest

Left Rear Passenger seat back angle: 13.6° measured at left side of rear seat

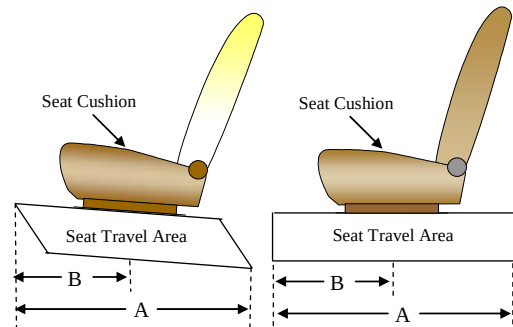


SEAT FORE/AFT POSITIONS

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	25	12
Rear Seat	5	3



SEAT BELT UPPER ANCHORAGE

	Total No. of Positions	Placed in Position No.
Driver Seat	4	2
Rear Seat	Fixed	N/A

Position number one is the uppermost adjustment position.

DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

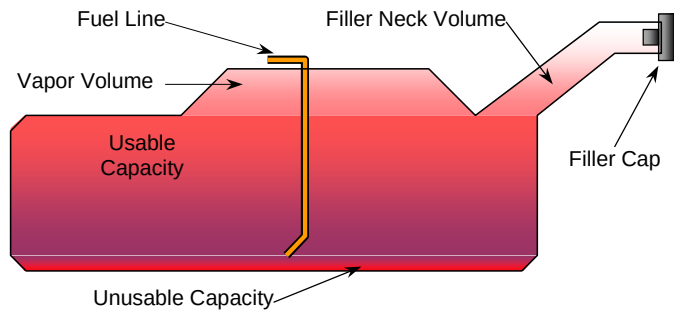
Test Vehicle: 2008 Mitsubishi Outlander
Test Program: NCAP Side Impact

NHTSA No.: M85603
Test Date: 12/04/07

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	62.8
Usable Capacity used for FMVSS301	62.8
Actual Amount of Solvent used	58.3

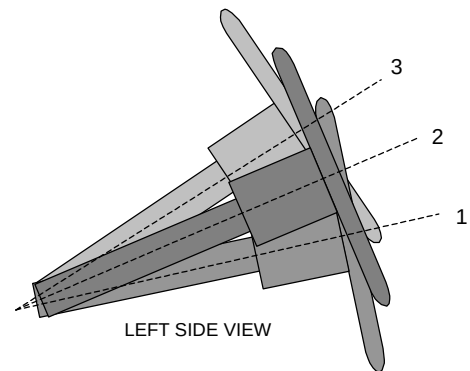
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position, mm
Lowermost Position	22.8°	Fixed
Geometric Center Position	25.4°	Fixed
Uppermost Position	27.9°	Fixed

DATA SHEET NO. 4

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2008 Mitsubishi Outlander

NHTSA No.: M85603

Test Program: NCAP Side Impact

Test Date: 12/04/07

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheel base of Framework Carriage	2591
C.G. Location aft of Front Axle	1109

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	371.4	311.0	
Right	kg	409.4	273.4	
Ratio	%	57.2	42.8	
Totals	kg	780.8	584.4	1365.2

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.9
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.8
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0

POST TEST OBSERVATIONS

MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	12 mm right
Vertical Offset	mm	+/- 20	2 mm up

DATA SHEET NO. 5**POST TEST OBSERVATIONS**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85603Test Program: NCAP Side ImpactTest Date: 12/04/07**TEST DUMMY INFORMATION AND CONTACT POINTS**

Description	Front Seat SID/HIII	Rear Seat SID/HIII
Dummy Type / Serial No.	SID/HIII / 066	SID/HIII / 059
Head Contact	Airbag	Airbag, side header
Upper Torso Contact	None	None
Lower Torso Contact	None	None
Left Knee Contact	None	None
Right Knee Contact	None	None

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Locked/Unlocked Doors	Unlocked	Unlocked
Left Side Door Opening	Jammed & Latched	Jammed & Latched
Right Side Door Opening	Closed & Latched	Closed & Latched
Seat Movement	None	None
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Did not separate from vehicle
Sill Separation	Did not separate from vehicle
Windshield Damage	None
Window Damage	Left front and left rear shattered
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

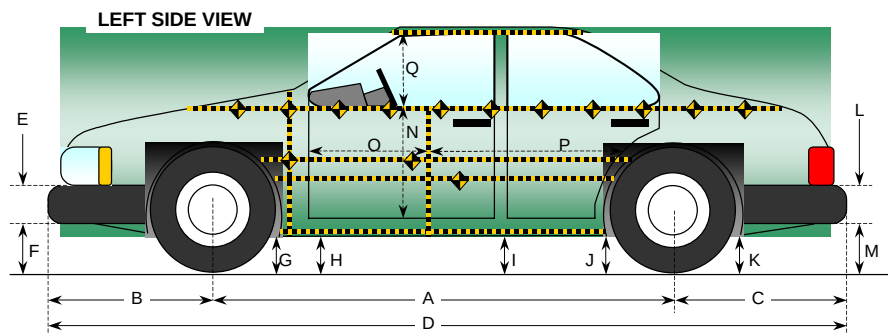
Restraint Type	Left Front (Driver) Occupant Location 01		Left Rear (Passenger) Occupant Location 04	
	Installed	Operation	Installed	Operation
Front Airbag	Yes	No	N/A	
Side Airbag	Yes	Yes	N/A	
Head Airbag	N/A		N/A	
Curtain Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	No
Seat Belt Load Limiter	Yes		No	

DATA SHEET NO. 6

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

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

NHTSA No.: M85603
 Test Date: 12/04/07



All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2670	2670	0
B	Front Axle to Front Surface of Vehicle	965	960	5
C	Rear Axle to Rear Surface of Vehicle	1005	1010	-5
D	Total Length at Centerline	4640	4640	0
E	Front Bumper Thickness	105	105	0
F	Front Bumper Bottom to Ground	590	585	5
G	Height to Front Axle	332	306	26
H	Sill Height at Front Door Leading Edge	344	--- ¹	--- ¹
I	Sill Height at "B" Pillar	341	425	-84
J1	Sill Height at Rear Wheel Well	250	265	-15
J2	Pinch Weld Height at Rear Wheel Well	347	445	-98
K	Sill Height Aft of Rear Wheel Well	365	379	-14
L	Rear Bumper Thickness	133	133	0
M	Rear Bumper Bottom to Ground	345	364	-19
N	Sill Height to Window Bottom Sill	800	692	108
O	Front Door Leading Edge to Impact CL	730	700	30
P	Rear Door Trailing Edge to Impact CL	1309	1289	20
Q	Front Window Opening	437	435	2
R	Right Side Length	4381	4380	1
S	Left Side Length	4380	4390	-10
T	Vehicle Width at "B" Post	1360	1278	82
	Vehicle Maximum Width	1800	1669	131

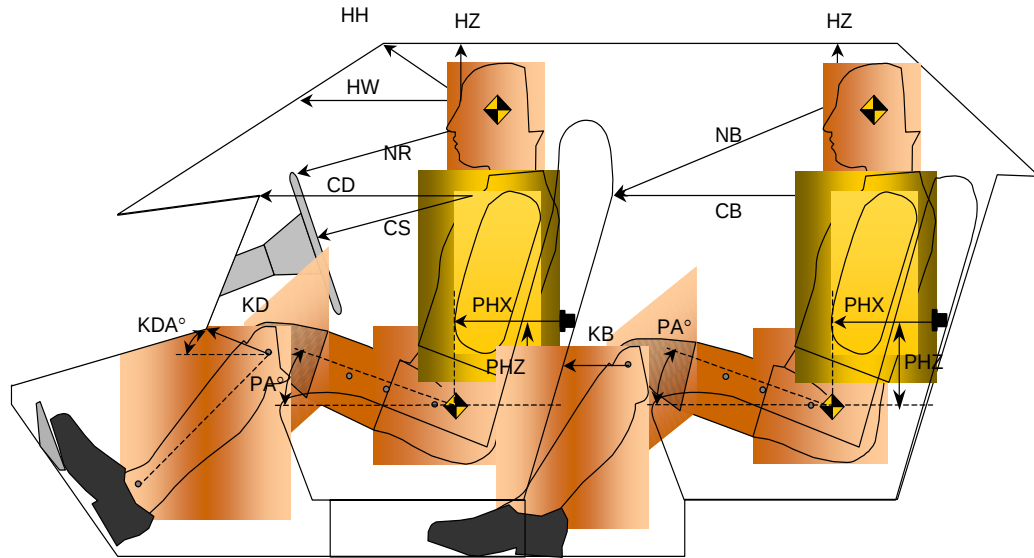
¹ Measurement point could not be located post-test.

DATA SHEET NO. 7

SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

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

NHTSA No.: M85603
 Test Date: 12/04/07



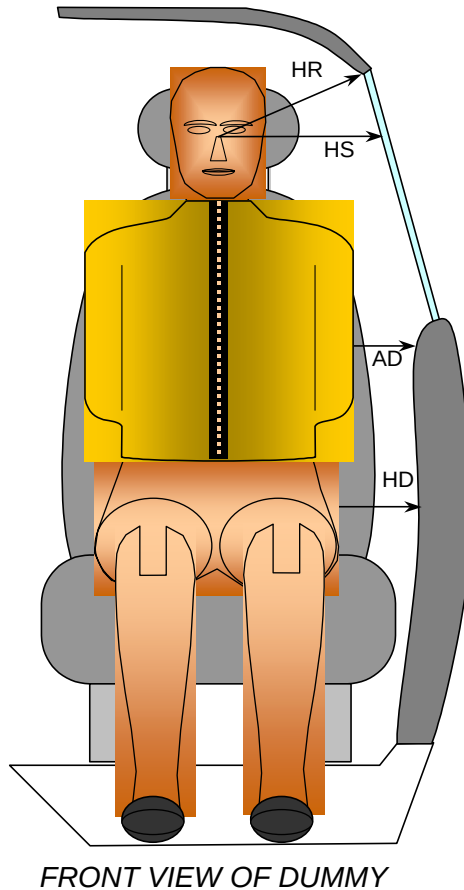
Driver Code	Pass. Code	Measurement Description	Driver S/N 066		Passenger S/N 059	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	453			
HW		Head to Windshield	697			
HZ	HZ	Head to Roof	200		177	
NR	NB	Nose to Rim/Nose to Seatback	462		682	
CD	CB	Chest to Dash or Seatback	581		601	
CS		Chest to Steering Wheel	356			
KDL	KBL	Left Knee to Dash or Seatback	63	12.0	149	14.6
KDR	KBR	Right Knee to Dash or Seatback	53	12.0	149	14.6
PA	PA	Pelvic Angle		20.4		22.9
PHX	PHX	H-Point to Striker (X-Axis)	236		237	
PHZ	PHZ	H-Point to Striker (Z-Axis)	117		171	

DATA SHEET NO. 8

SID/HIII LATERAL CLEARANCE DIMENSIONS

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

NHTSA No.: M85603
Test Date: 12/04/07



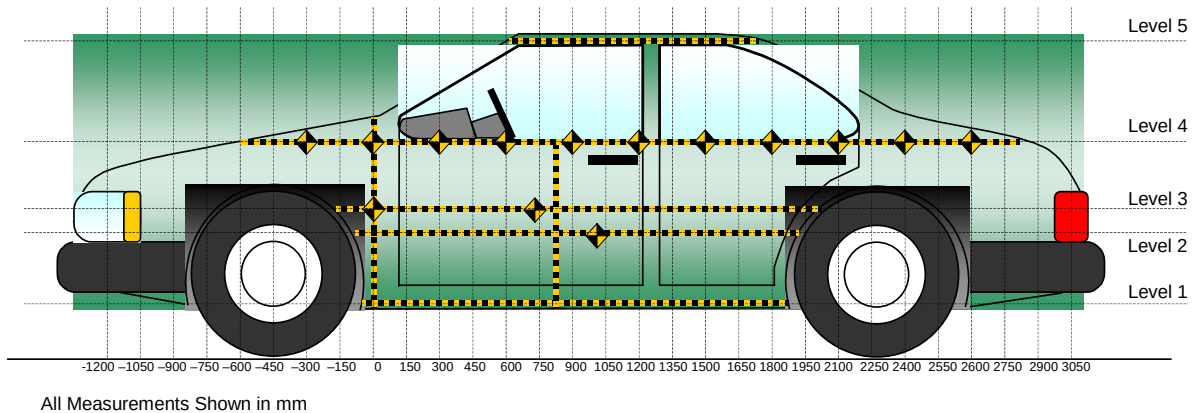
Code	Measurement Description	Units	Driver S/N 066	Passenger S/N 059
HR	Head to Side Header	mm	242	187
HS	Head to Side Window	mm	295	317
AD	Arm to Door - Lower	mm	138	122
AD	Arm to Door - Upper	mm	116	100
HD	H-Point to Door	mm	126	112

DATA SHEET NO. 9

VEHICLE SIDE MEASUREMENTS

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

NHTSA No.: M85603
Test Date: 12/04/07



LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.

All measurements below in mm.

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measurement Description	Height Above Ground
5	Window Top	1574
4	Window Sill	1046
3	Mid Door	754
2	Occupant H-Point	659
1	Sill Top	380

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES

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

NHTSA No.: M85603
Test Date: 12/04/07

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1200															
-1050															
-900															
-750			866					878					-12		
-600			893					903					-10		
-450				772					780					-8	
-300				790					797					-7	
-150			893	802				888	809				5	-7	
0		887	877	811			865	861	814			22	16	-3	
150	823	865	871	822	775	802	739	755	838	776	21	126	116	-16	-1
300	803	867	874	829	745	766	695	698	810	747	37	172	176	19	-2
450	805	870	876	836	712	756	689	678	787	714	49	181	198	49	-2
600	807	871	877	840	680	754	688	668	776	682	53	183	209	64	-2
750	809	872	878	845	654	751	690	664	781	655	58	182	214	64	-1
900	810	872	879	850	640	752	699	668	781	641	58	173	211	69	-1
1050	809	871	878	852	667	753	713	685	782	630	56	158	193	70	37
1200	808	870	878	854	627	755	720	689	767	625	53	150	189	87	2
1350	807	868	876	854	624	759	681	673	758	622	48	187	203	96	2
1500	804	866	874	853	623	765	676	672	750	622	39	190	202	103	1
1650	805	863	871	852	621	775	683	686	789	620	30	180	185	63	1
1800	842	873	868	850	621	811	744	711	806	619	31	129	157	44	2
1950		889	889	861	618		848	823	845	617		41	66	16	1
2100			896	856	618			864	864	619			32	-8	-1
2250				840	618				824	618				16	0
2400				834	613				829	614				5	-1
2550			890	826	609			882	823	610			8	3	-1
2700				816	603				813	604				3	-1

Reference plane is parallel to test vehicle longitudinal centerline.

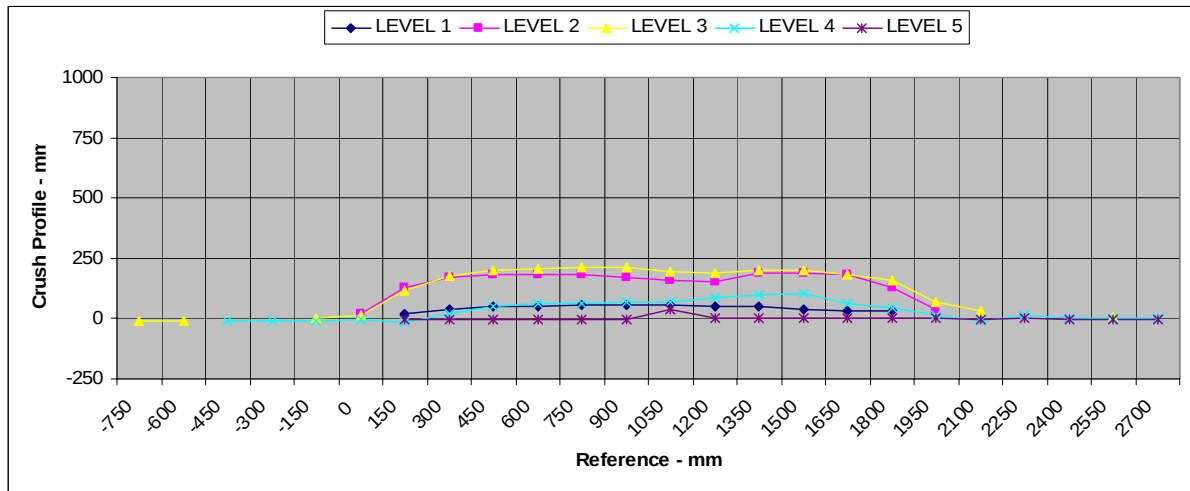
Given measurements = Reference plane to car body

DATA SHEET NO. 10 (CONTINUED)

VEHICLE EXTERIOR CRUSH PROFILES

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

NHTSA No.: M85603
 Test Date: 12/04/07



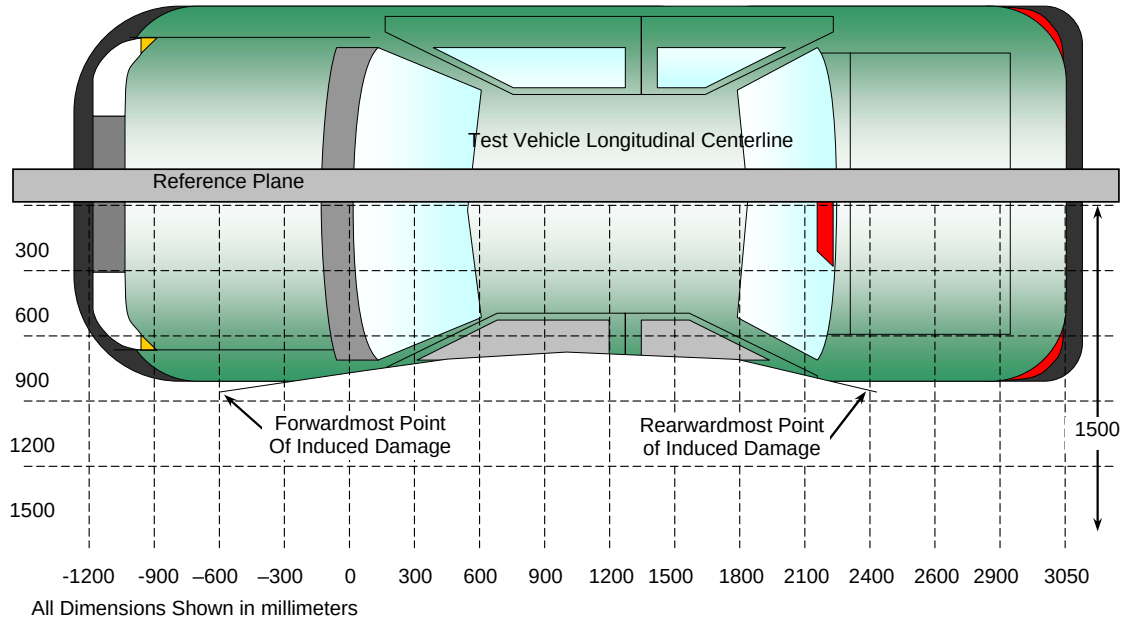
	Units	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush	mm	58	190	214	103	37
Distance from Impact	mm	900	1500	750	1500	1050

DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

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

NHTSA No.: M85603
 Test Date: 12/04/07



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	2700 mm	4	816	813	3
2	1950 mm	3	889	823	66
3	1350 mm	3	876	673	203
4	600 mm	3	877	668	209
5	0 mm	2	887	865	22
6	-750 mm	3	866	878	-12

Reference plane is parallel to test vehicle longitudinal centerline.

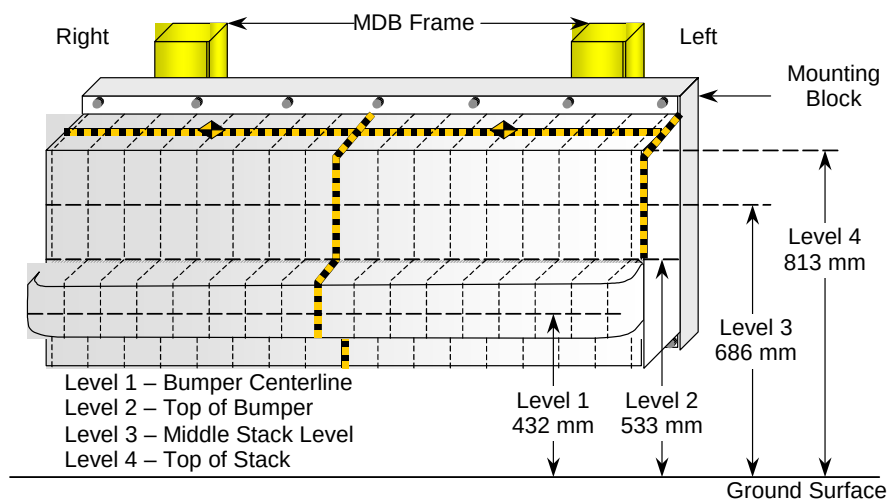
Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

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

NHTSA No.: M85603
 Test Date: 12/04/07



DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	-226	-227	-225	-223	-222	-219	-217	-216	-212	-209	-207	-206	-204	-203	-202	-208	-204
2	-97	-95	-95	-96	-96	-101	-102	-93	-83	-79	-75	-74	-73	-74	-76	-87	-114
3	-71	-60	-56	-56	-73	-105	-80	-68	-55	-44	-36	-34	-38	-48	-63	-89	-145
4	-135	-113	-100	-95	-97	-113	-104	-77	-76	-80	-73	-56	-67	-81	-101	-128	-178

All measurements are in mm

DATA SHEET NO. 13

VEHICLE ACCELEROMETER LOCATIONS

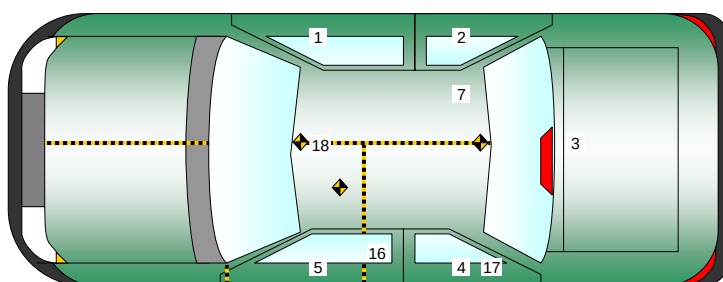
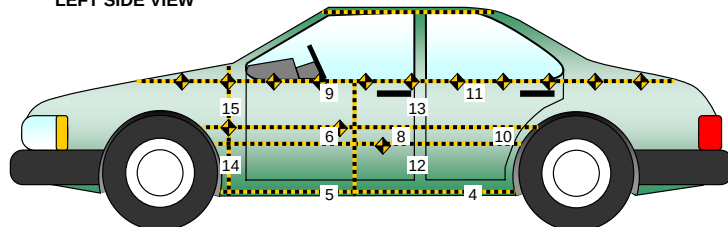
Test Vehicle: 2008 Mitsubishi Outlander

NHTSA No.: M85603

Test Program: NCAP Side Impact

Test Date: 12/04/07

LEFT SIDE VIEW



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	3325	705	395
2	Right Sill at Rear Seat	2395	660	386
3	Rear Floorpan Above Axle	1495	35	580
4	Left Sill at Rear Seat	2390	660	387
5	Left Sill at Front Seat	3308	705	365
6	Left Front Door C/L ¹			
7	Rear Occupant Compartment	2315	652	402
8	Left Front Door Mid-Rear ¹			
9	Left Front Door Upper C/L ¹			
10	Left Rear Door Mid-Rear ¹			
11	Left Rear Door Upper C/L ¹			
12	Left Lower B-Post	2637	812	475
13	Left Upper B-Post	2635	800	980
14	Left Lower A-Post	3715	820	560
15	Left Upper A-Post	3711	820	925
16	Front Seat Track	2940	575	475
17	Rear Seat Track or Structure	2040	360	555
18	Vehicle CG	2997	0	557

Reference Points: X - Test Vehicle Rear Bumper (+ forward)

Y - Test Vehicle Centerline (+ to right)

Z - Ground Plane (+ down)

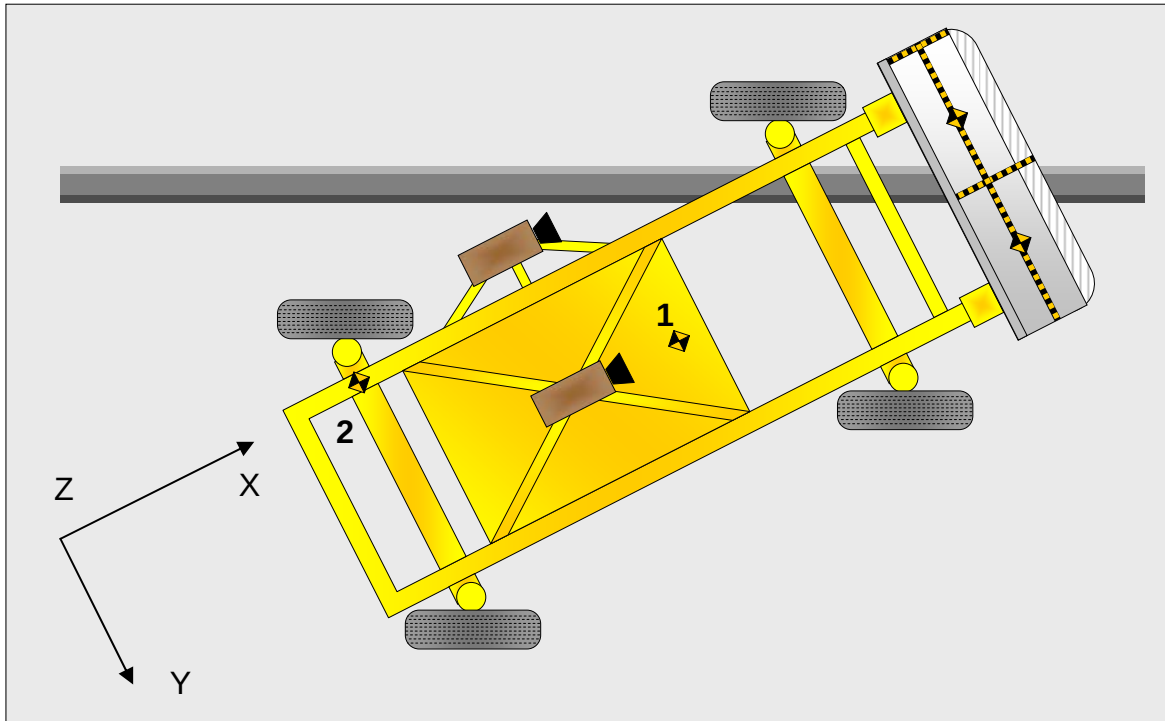
¹ Accelerometer not applicable to test mode.

DATA SHEET NO. 14

MDB ACCELEROMETER LOCATIONS

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

NHTSA No.: M85603
Test Date: 12/04/07



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	MDB CG	--- ¹	--- ¹	--- ¹
2	MDB Rear	--- ¹	--- ¹	--- ¹

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

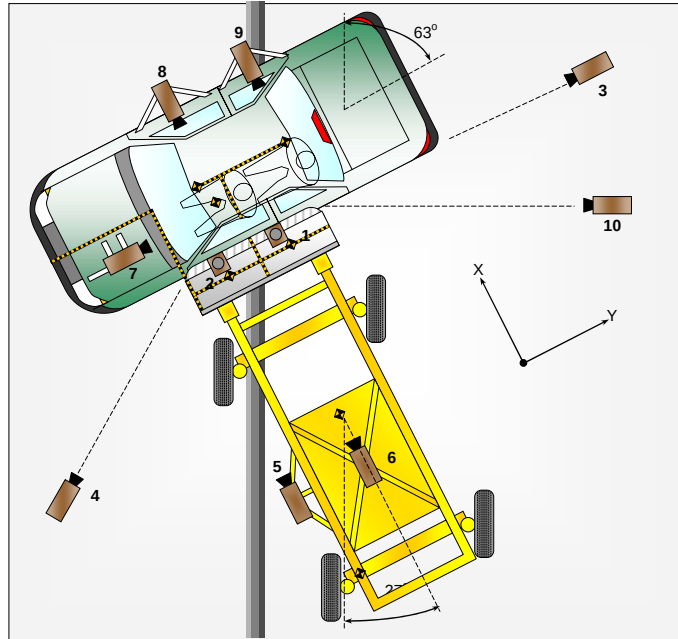
¹ Measurement not recorded.

DATA SHEET NO. 15

HIGH SPEED CAMERA LOCATIONS AND DATA

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

NHTSA No.: M85603
 Test Date: 12/04/07



No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	Overhead Overall	0	350	7000	12.5	1000
2	Overhead Close-up	0	600	7000	25	1000
3	Right Side, Ground Level, Overall	0	9770	1030	12.5	1000
4	Left Side, Ground Level, Overall	3000	5500	980	12.5	1000
5	MDB Onboard, Impact Point Close-up	1720	890	850	12.5	1000
6	MDB Onboard, Centerline of Impact	2590	0	1400	12.5	1000
7	Vehicle Onboard Front SID/HIII, Front	510	1400	1290	12.5	1000
8	Vehicle Onboard Front SID/HIII, Side	1700	160	1350	6.5	1000
9	Vehicle Onboard Rear SID/HIII, Side	1700	920	1400	6.5	1000
10	Real Time Coverage				Zoom	30

Reference Points: X - Impact Line
 Y - MDB Left Edge Impact Point
 Z - Ground Plane

DATA SHEET NO. 16

SUMMARY OF FMVSS 301 DATA

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

NHTSA No.: M85603
 Test Date: 12/04/07

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 22.5° C Test Time: 14:40

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

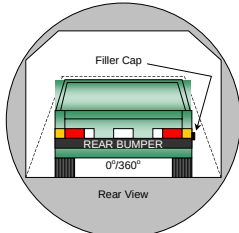
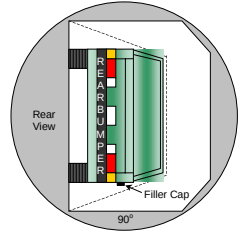
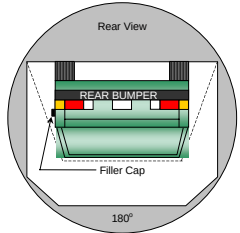
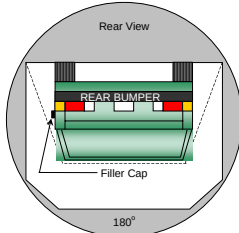
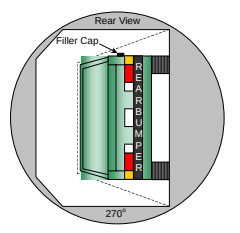
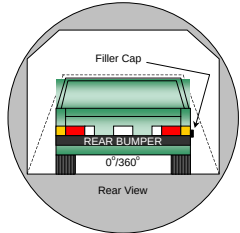
(Maximum allowable = 5 ounces)

C. For the following 25 minutes: 0

(Maximum allowable = 1 oz./minute)

D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA

			1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds. 2. The position hold time at each position is 300 seconds (minimum). 3. Details of Stoddard Solvent spillage locations: None	
0° to 90°		90° to 180°		
				
180° to 270°		270° to 360°		

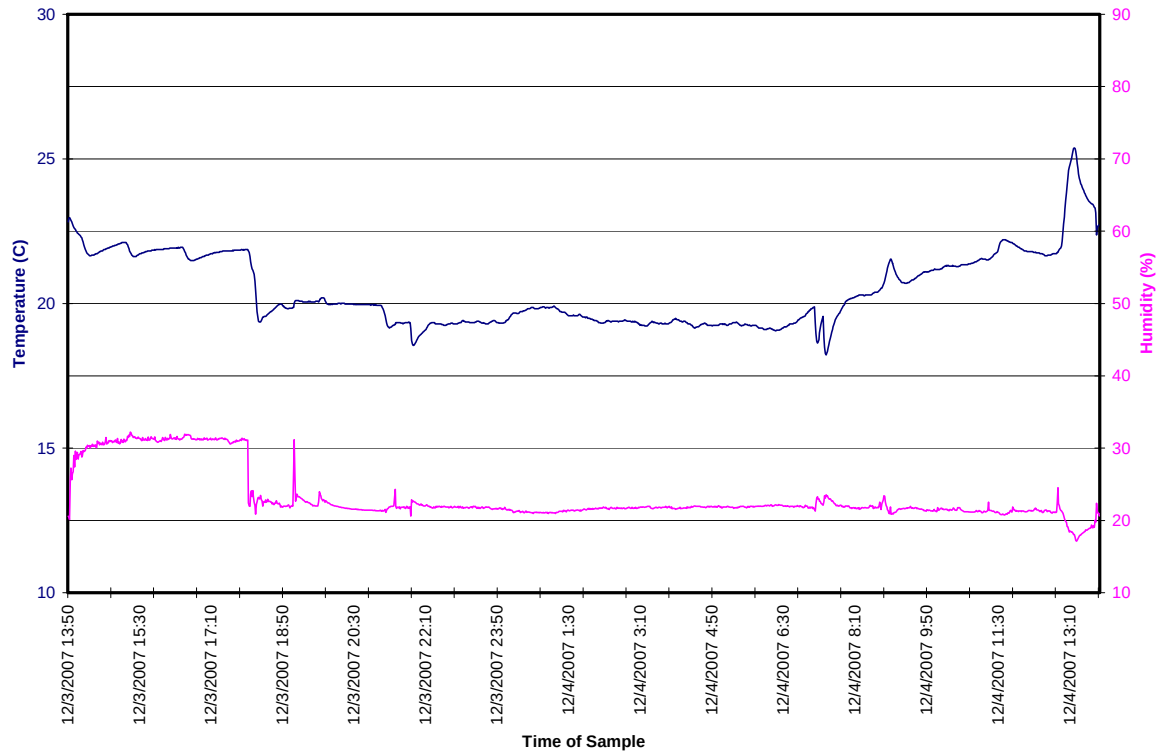
Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage Collection Time (min)	Spillage (oz.)	Spillage Collection Time (min)	Spillage (oz.)	Spillage Collection Time (min)	Spillage (oz.)
0° to 90°	120	300	First 5	0	Sixth	0	Seventh	0
90° to 180°	120	300	First 5	0	Sixth	0	Seventh	0
180° to 270°	120	300	First 5	0	Sixth	0	Seventh	0
270° to 360°	120	300	First 5	0	Sixth	0	Seventh	0

DATA SHEET NO. 17

DUMMY / VEHICLE TEMPERATURE STABILIZATION

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

NHTSA No.: M85603
Test Date: 12/04/07



APPENDIX A
PHOTOGRAPHS

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Figure A-1 Pre-Test Front View of Test Vehicle



Figure A-2 Post-Test Front View of Test Vehicle



Figure A-3 Pre-Test Left Front View of Test Vehicle with Barrier



Figure A-4 Post-Test Left Front View of Test Vehicle with Barrier



Figure A-5 Pre-Test Left Front View of Test Vehicle



Figure A-6 Post-Test Left Front View of Test Vehicle

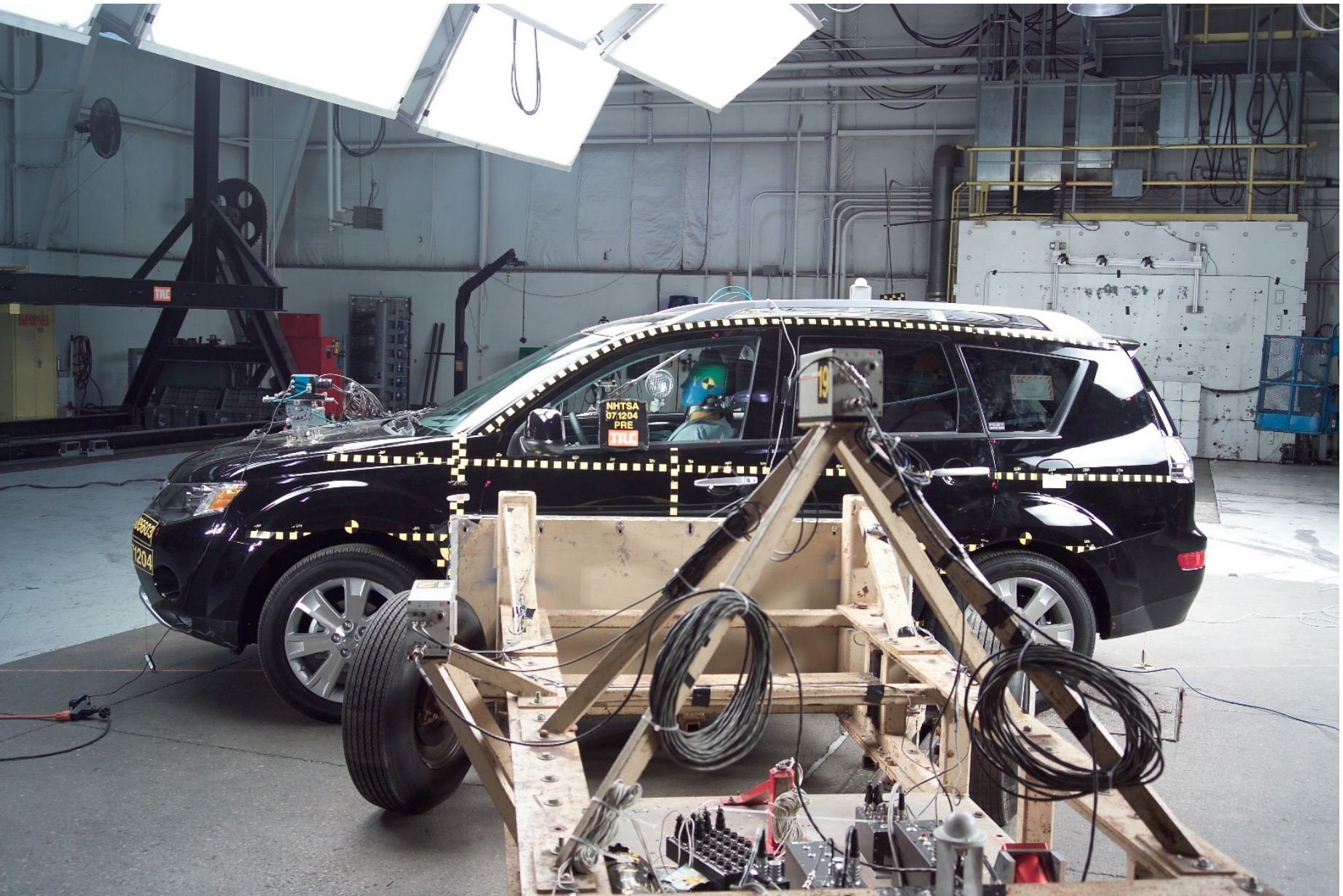


Figure A-7 Pre-Test Impacted Side View of Test Vehicle with Barrier



Figure A-8 Post-Test Impacted Side View of Test Vehicle with Barrier



Figure A-9 Pre-Test Impacted Side View of Test Vehicle



Figure A-10 Post-Test Impacted Side View of Test Vehicle



Figure A-11 Pre-Test Left Rear View of Test Vehicle with Barrier



Figure A-12 Post-Test Left Rear View of Test Vehicle with Barrier



Figure A-13 Pre-Test Left Rear View of Test Vehicle



Figure A-14 Post-Test Left Rear View of Test Vehicle



Figure A-15 Pre-Test Rear View of Test Vehicle



Figure A-16 Post-Test Rear View of Test Vehicle



Figure A-17 Pre-Test Right Rear View of Test Vehicle



Figure A-18 Post-Test Right Rear View of Test Vehicle



Figure A-19 Pre-Test Right Side View of Test Vehicle



Figure A-20 Post-Test Right Side View of Test Vehicle



Figure A-21 Pre-Test Right Front View of Test Vehicle



Figure A-22 Post-Test Right Front View of Test Vehicle

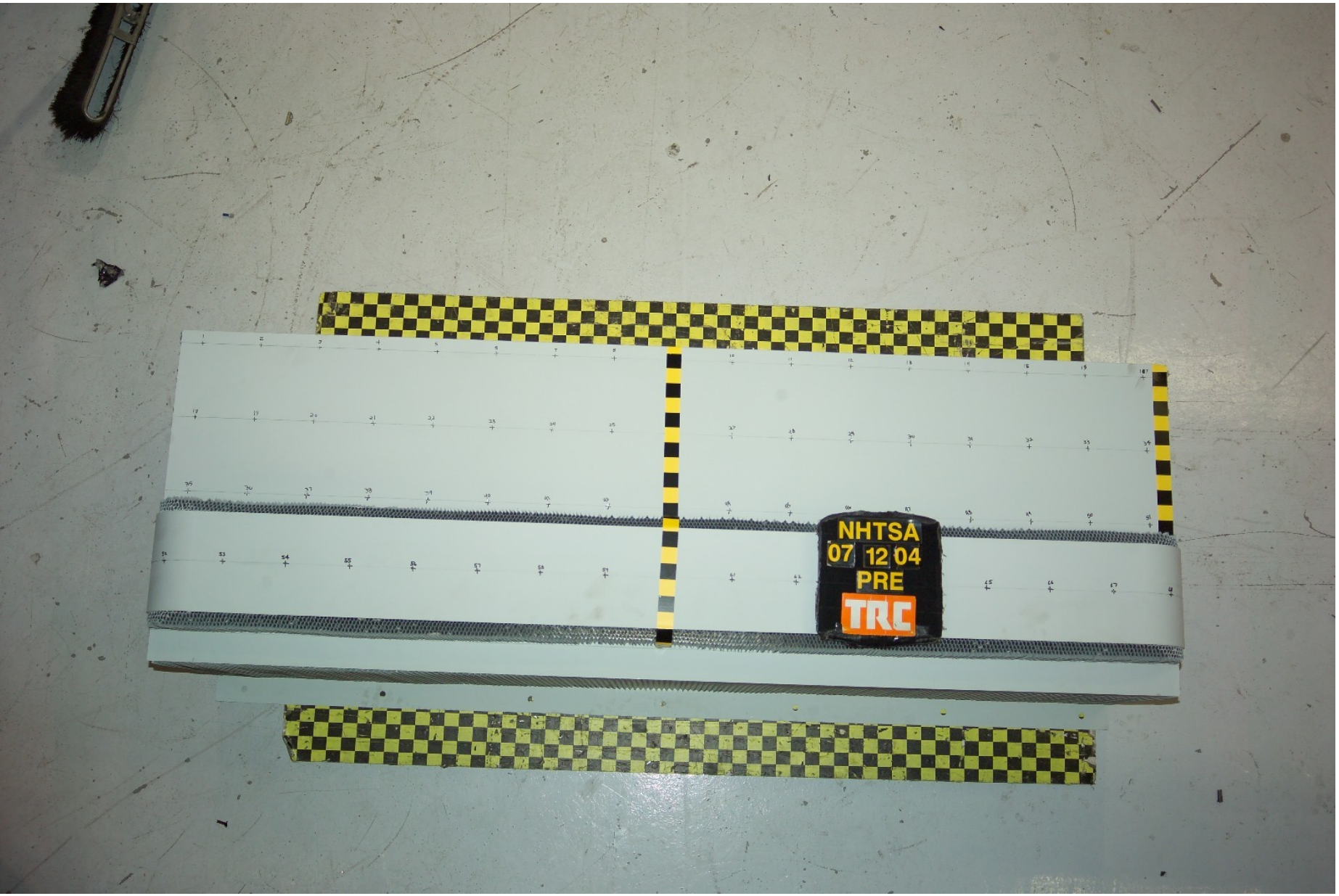


Figure A-23 Pre-Test Frontal View of Impactor Face

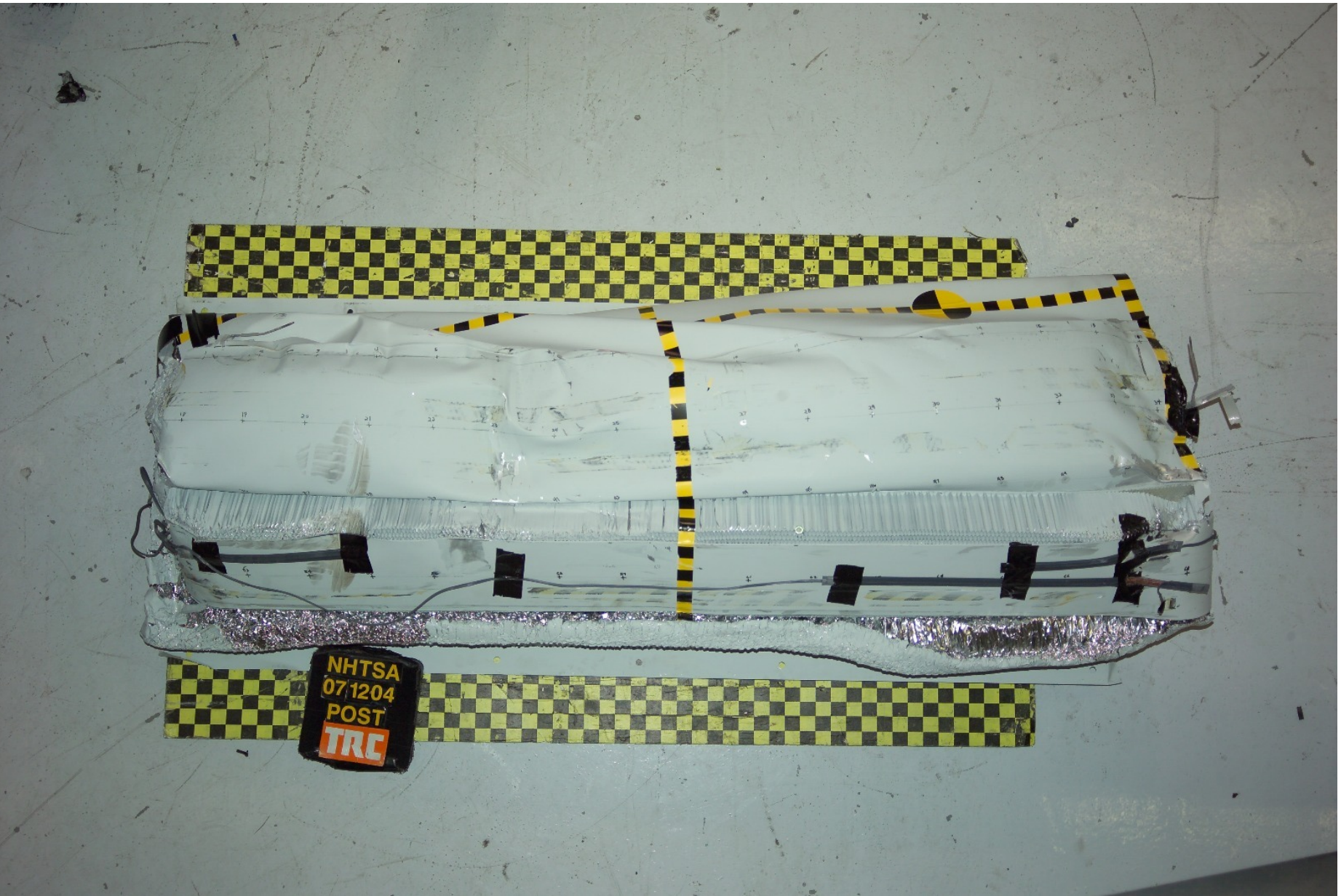


Figure A-24 Post-Test Frontal View of Impactor Face

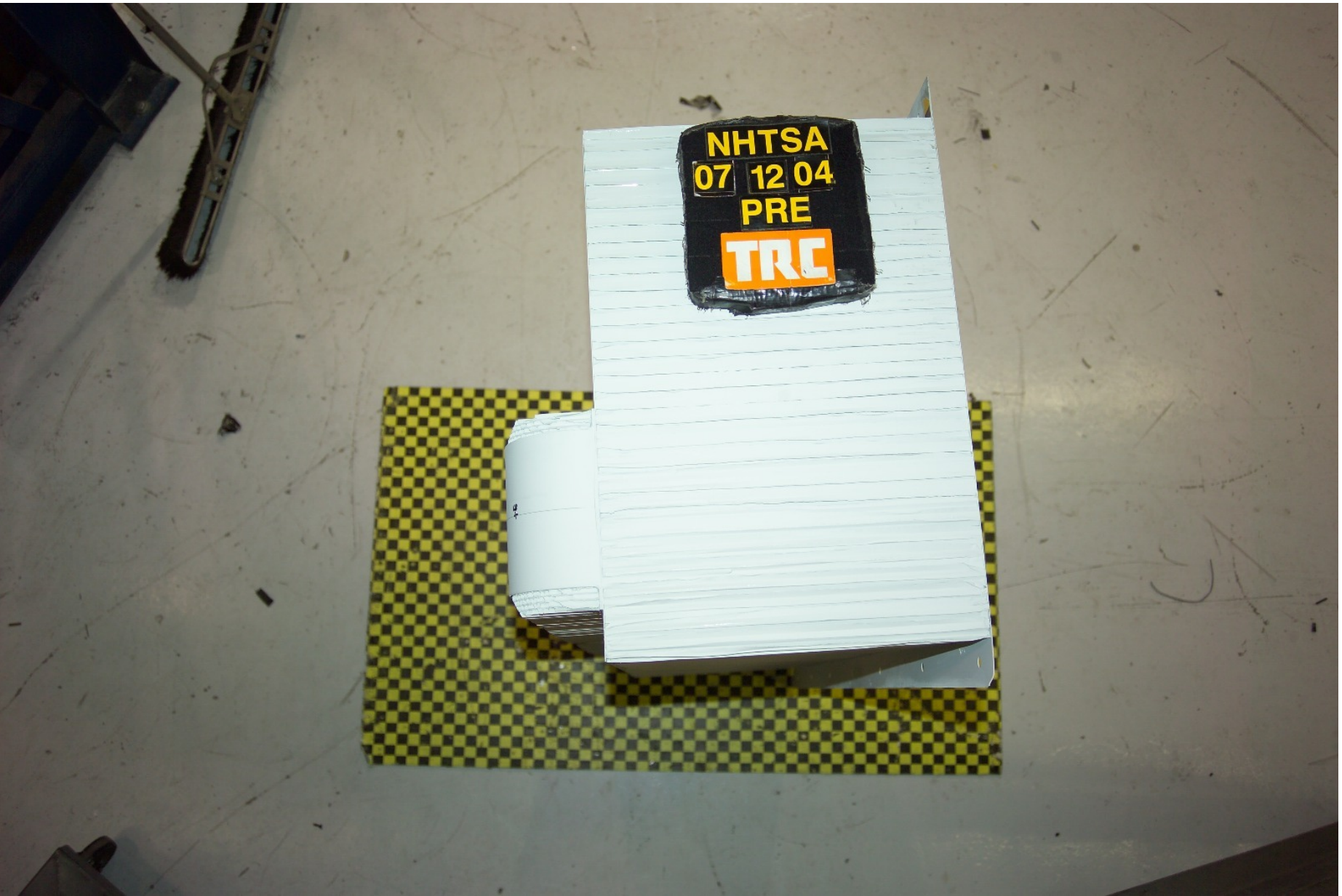


Figure A-25 Pre-Test Left Side View of Impactor Face



Figure A-26 Post-Test Left Side View of Impactor Face



Figure A-27 Pre-Test Right Side View of Impactor Face

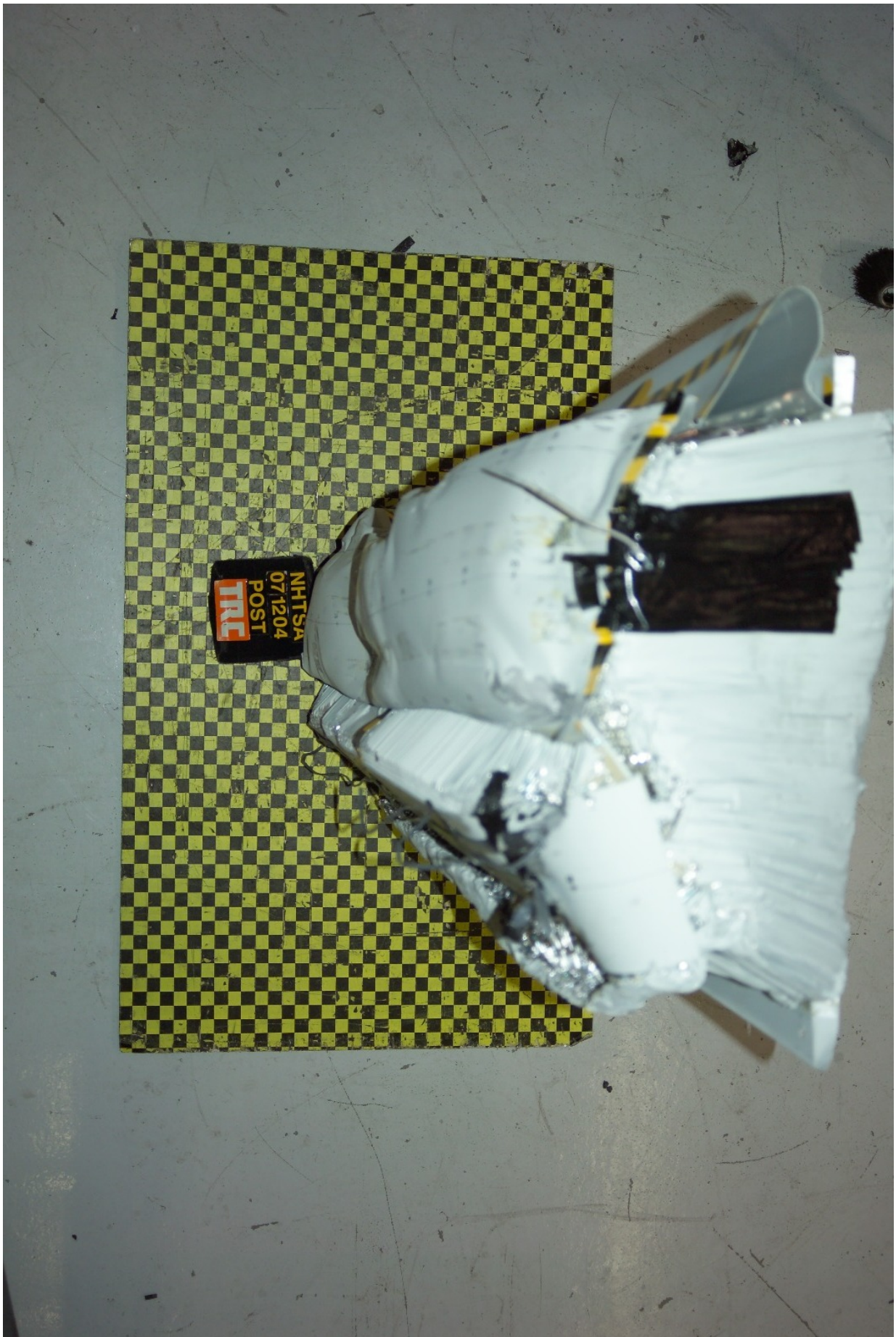


Figure A-28 Post-Test Right Side View of Impactor Face

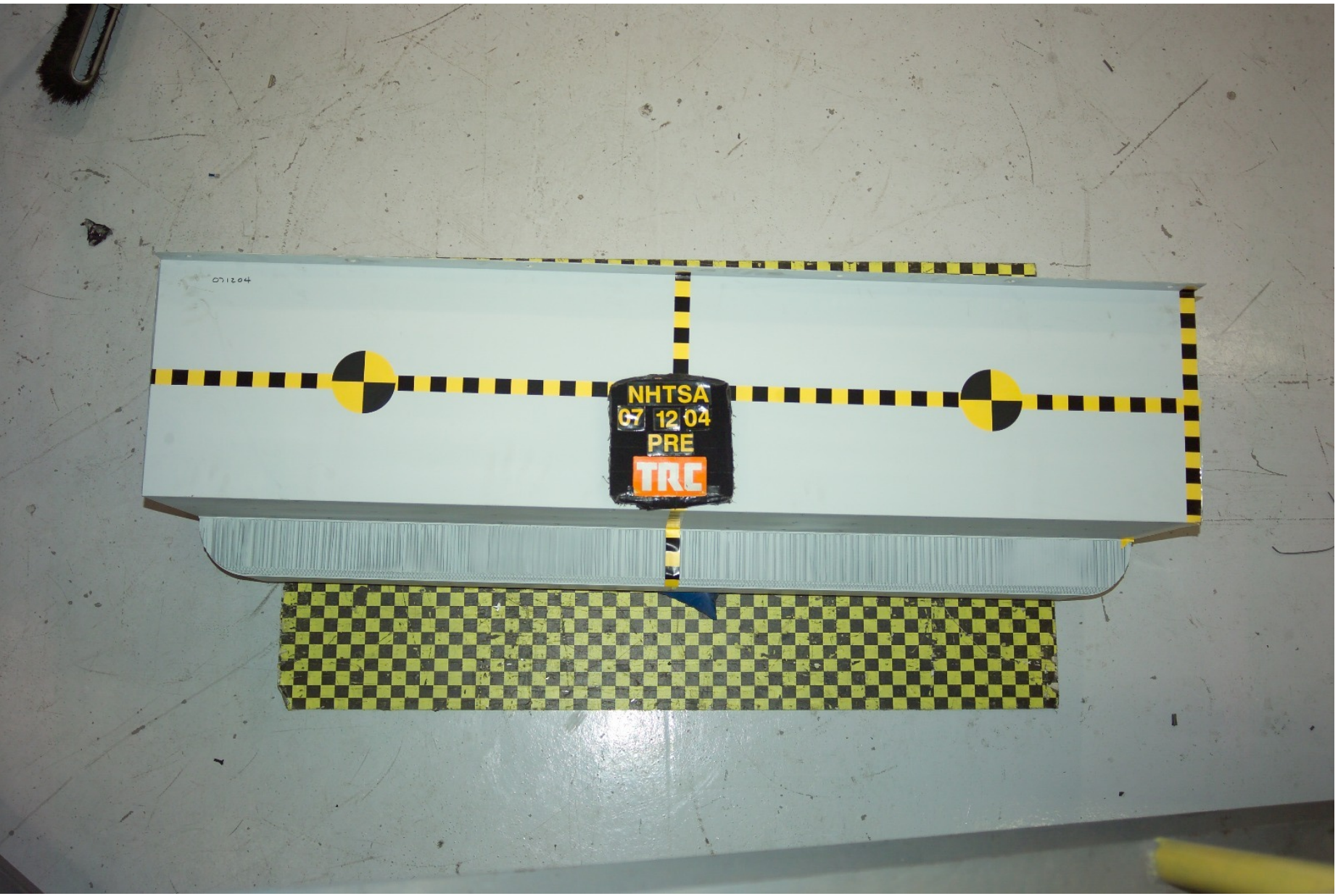


Figure A-29 Pre-Test Top View of Impactor Face

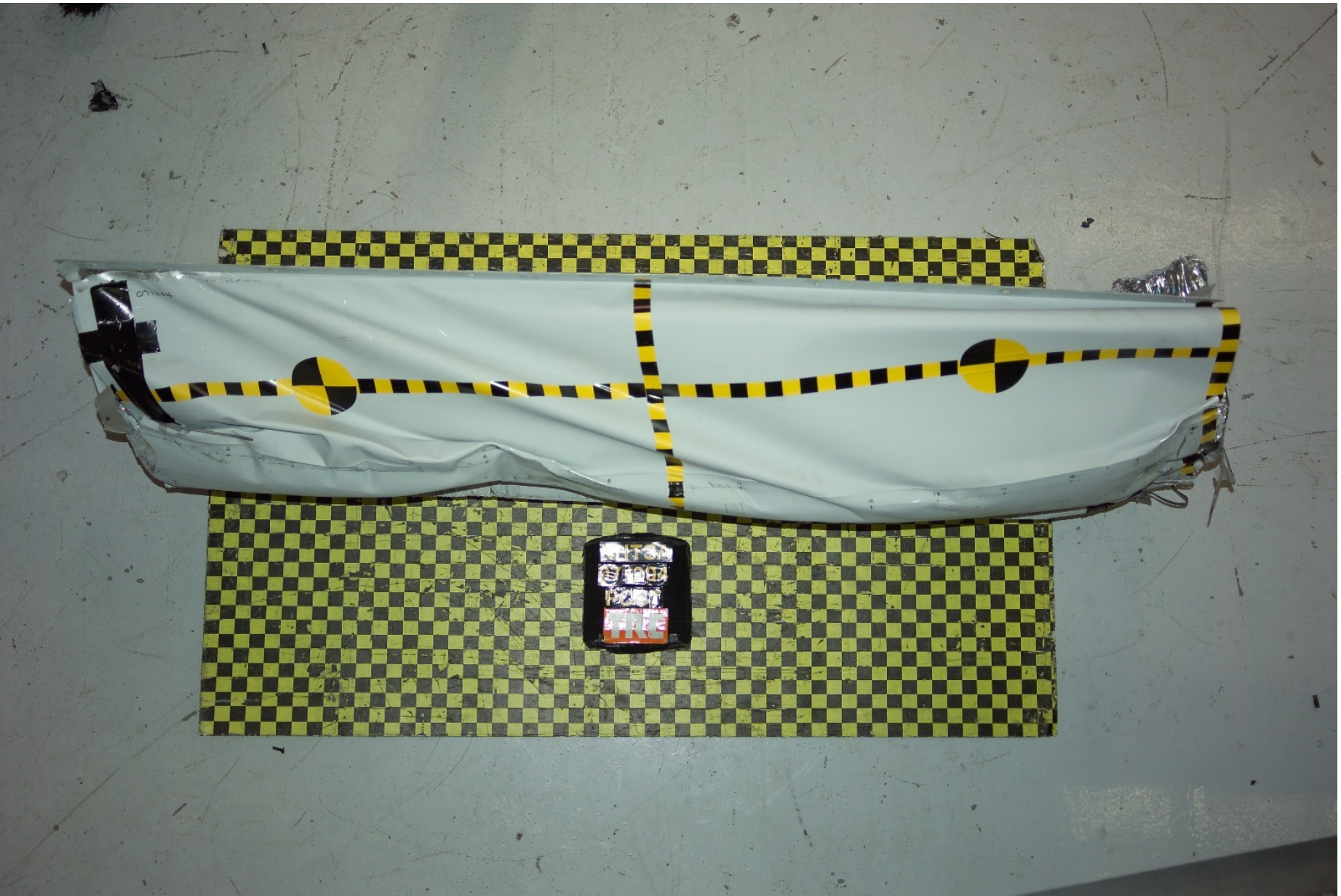


Figure A-30 Post-Test Top View of Impactor Face



Figure A-31 Pre-Test Left Side View of Impactor



Figure A-32 Post-Test Left Side View of Impactor



Figure A-33 Pre-Test Right Side View of Impactor



Figure A-34 Post-Test Right Side View of Impactor



Figure A-35 Pre-Test Top View of Impactor



Figure A-36 Post-Test Top View of Impactor

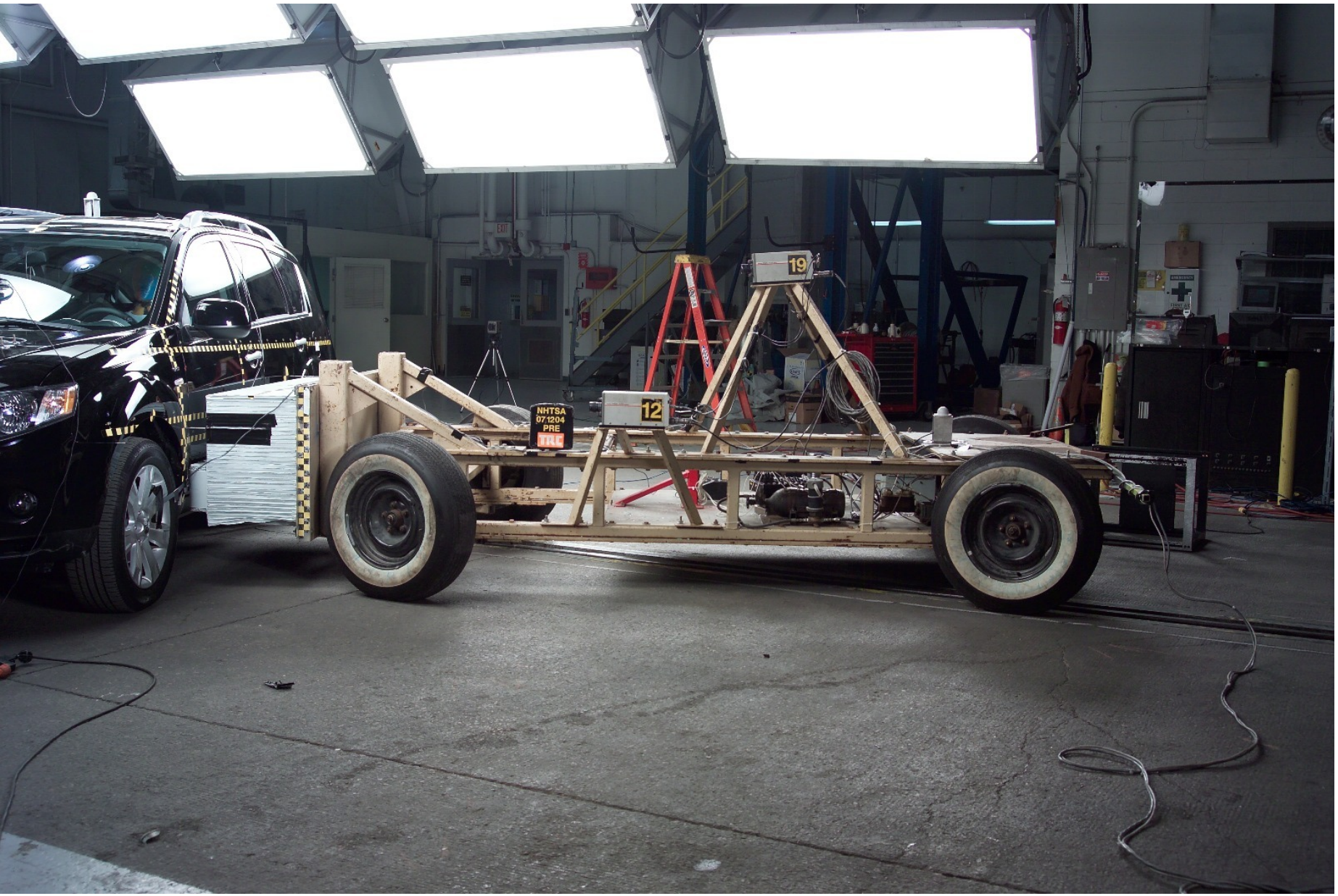
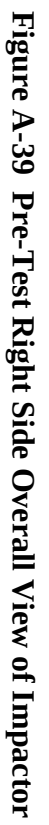


Figure A-37 Pre-Test Left Side Overall View of Impactor



Figure A-38 Post-Test Left Side Overall View of Impactor



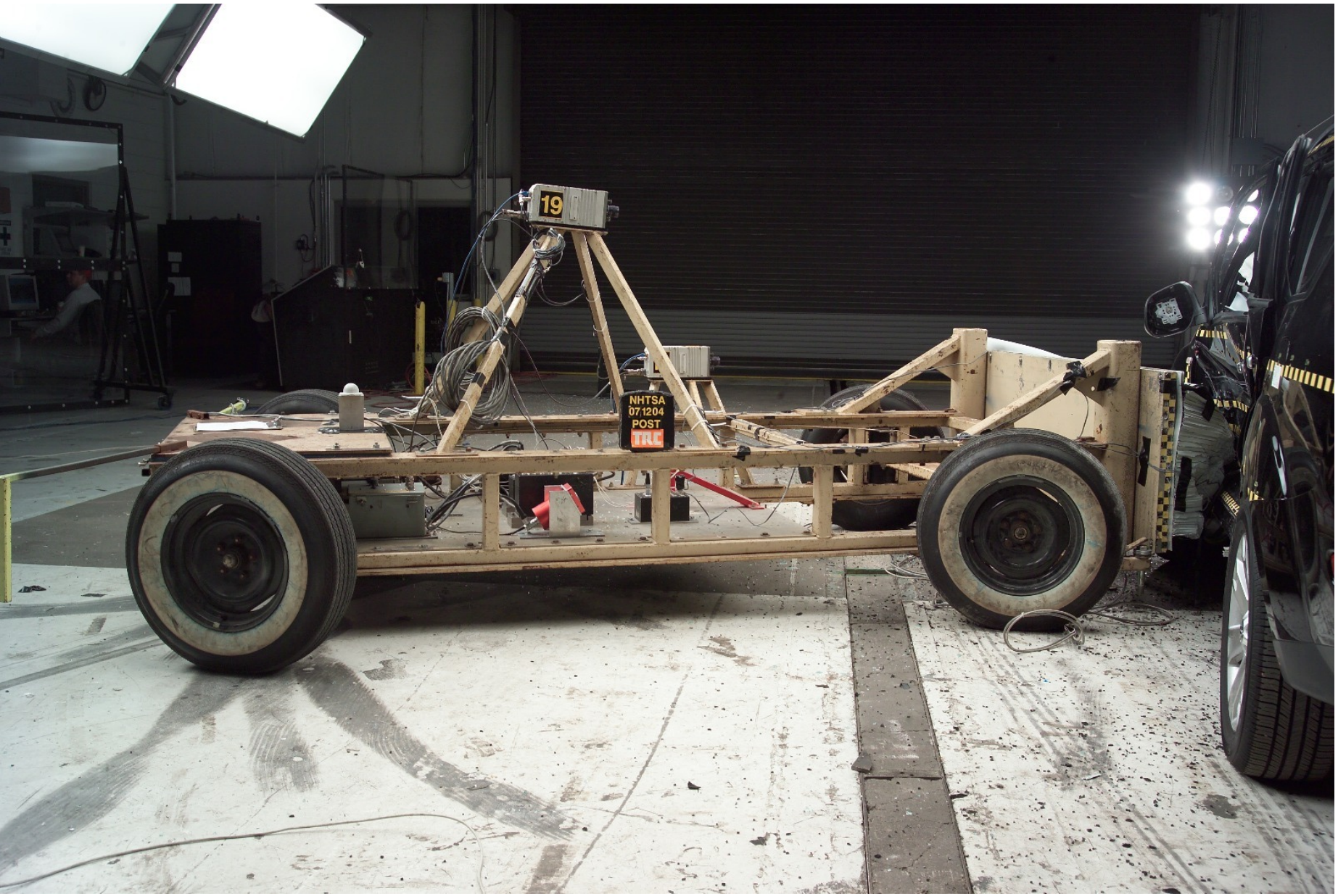


Figure A-40 Post-Test Right Side Overall View of Impactor

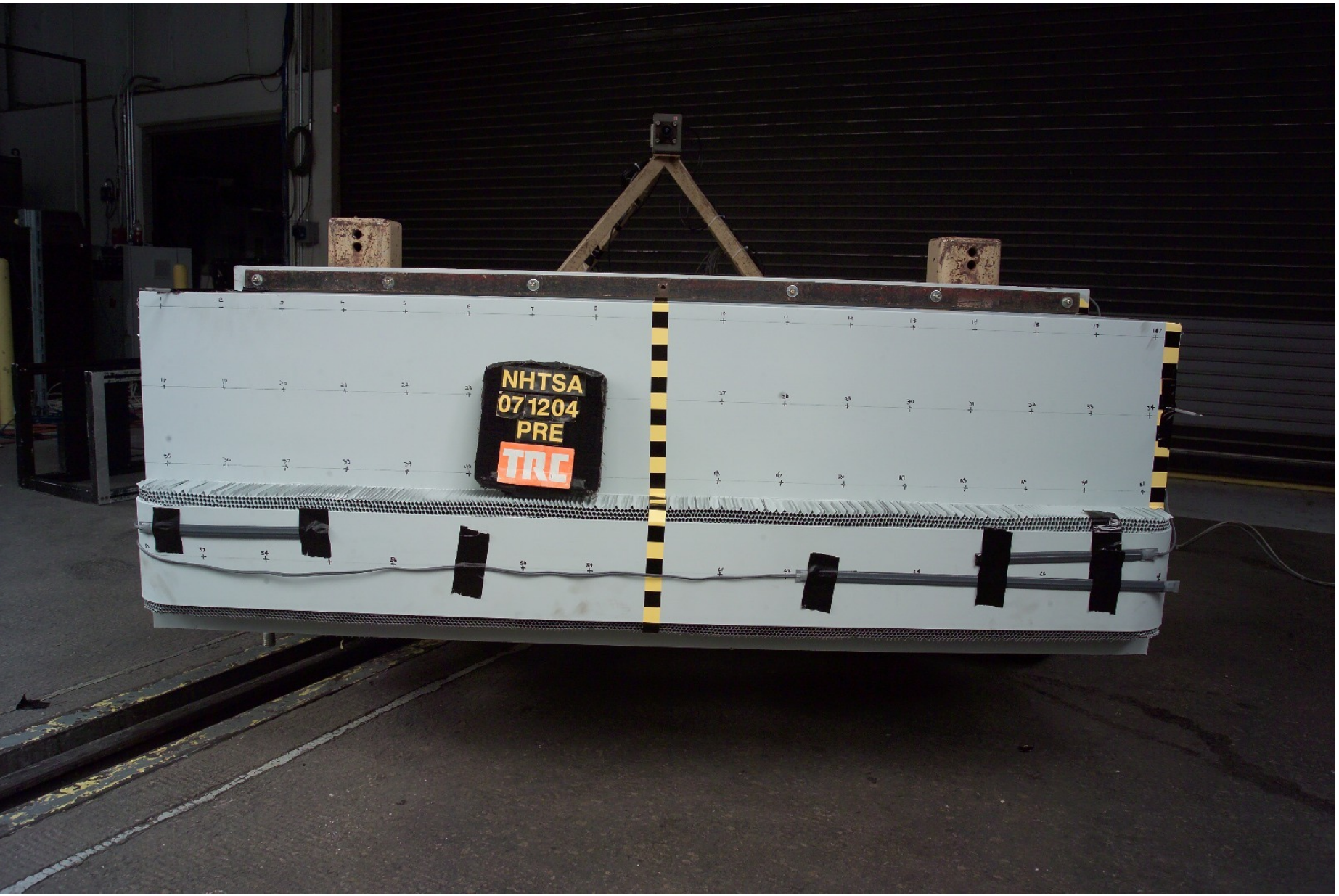


Figure A-41 Pre-Test View of MDB Showing Contact Switches in Place

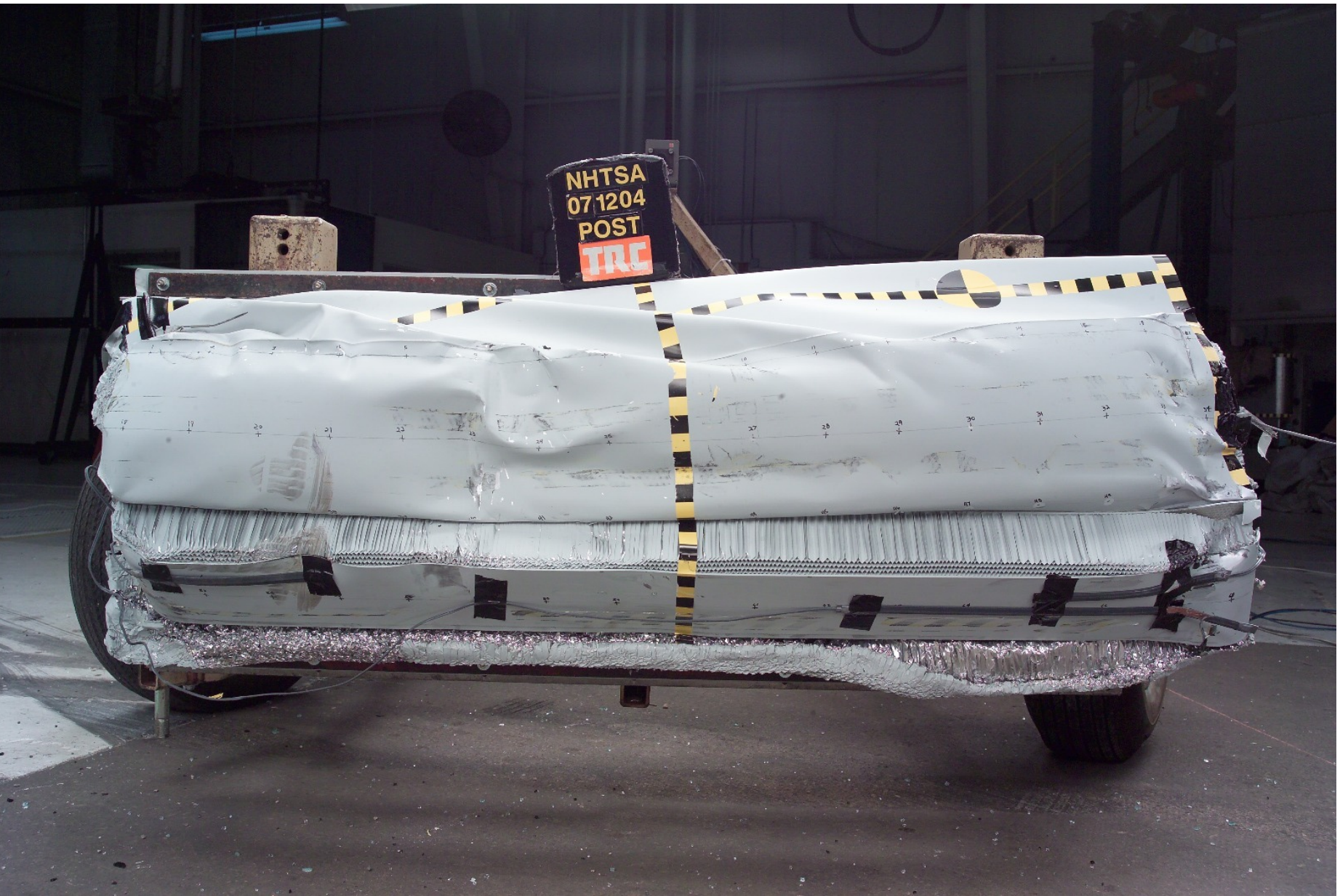


Figure A-42 Post-Test View of MDB Showing Contact Switches in Place



Figure A-43 Pre-Test Overhead View of MDB Aligned with Vehicle

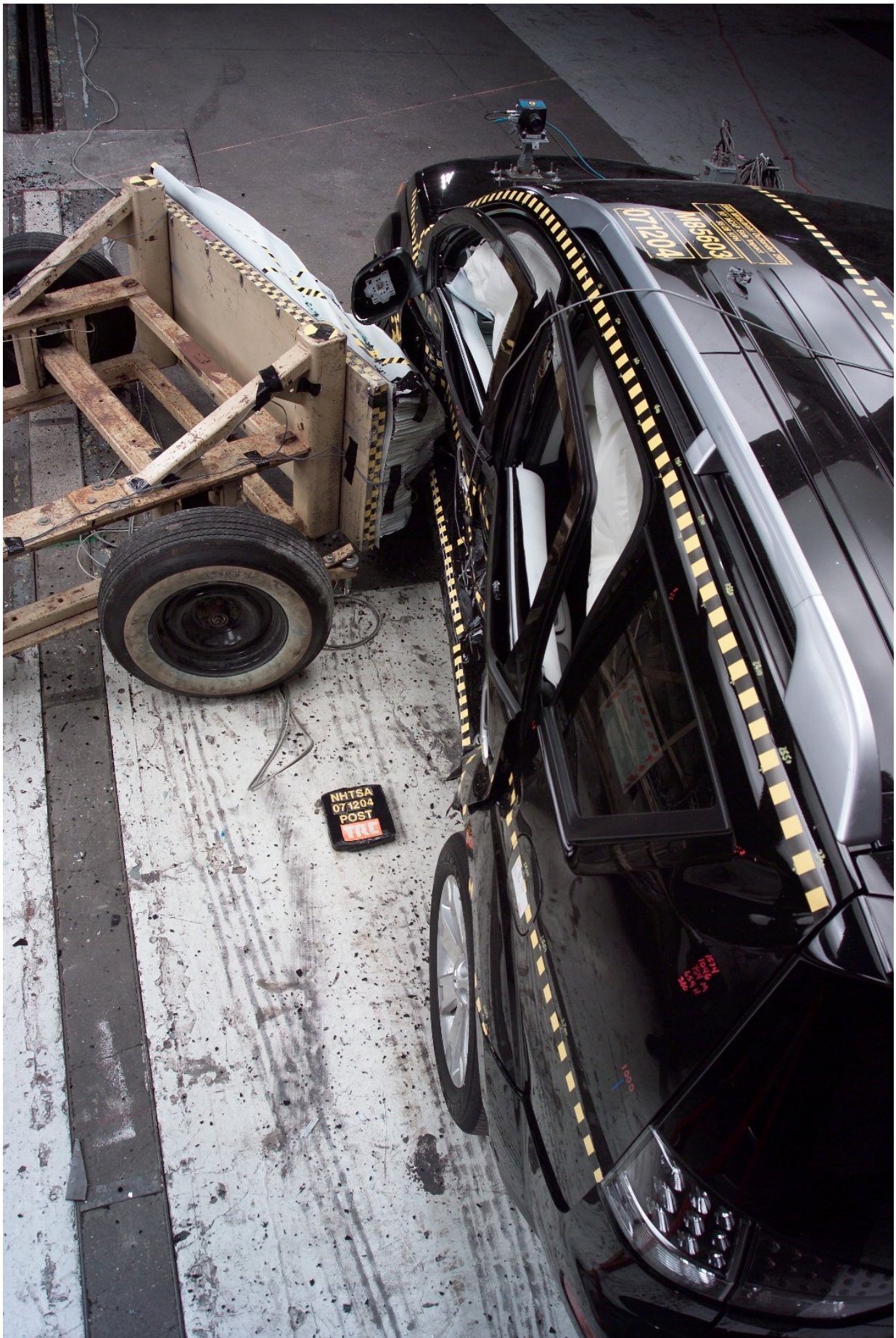


Figure A-44 Post-Test Overhead View of MDB with Vehicle



Figure A-45 Pre-Test Right Occupant Compartment View of Front SID



Figure A-46 Post-Test Right Occupant Compartment View of Front SID



Figure A-47 Pre-Test Right Occupant Compartment View of Rear SID



Figure A-48 Post-Test Right Occupant Compartment View of Rear SID



Figure A-49 Pre-Test Left View of Front SID



Figure A-50 Post-Test Left View of Front SID



Figure A-51 Pre-Test Left View of Front SID and Belt Position



Figure A-52 Pre-Test Left View of Front SID and Door Clearance



Figure A-53 Post-Test Left View of Front SID and Door Clearance



Figure A-54 Pre-Test Left View of Rear SID



Figure A-55 Post-Test Left View of Rear SID

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071204



Figure A-56 Pre-Test Left View of Rear SID and Belt Position



Figure A-57 Pre-Test Left View of Rear SID and Door Clearance



Figure A-58 Post-Test Left View of Rear SID and Door Clearance



Figure A-59 Pre-Test Interior of Front Door



Figure A-60 Post-Test Interior of Front Door Showing SID Impact Locations



Figure A-61 Post-Test Front SID Contact - View 1



Figure A-62 Post-Test Front SID Contact - View 2

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071204



Figure A-63 Pre-Test Interior of Rear Door



Figure A-64 Post-Test Interior of Rear Door Showing SID Impact Locations



Figure A-65 Post-Test Rear SID Contact - View 1



Figure A-66 Post-Test Rear SID Contact - View 2



Figure A-67 Pre-Test Left Side View of MDB with Impactor Face in Position

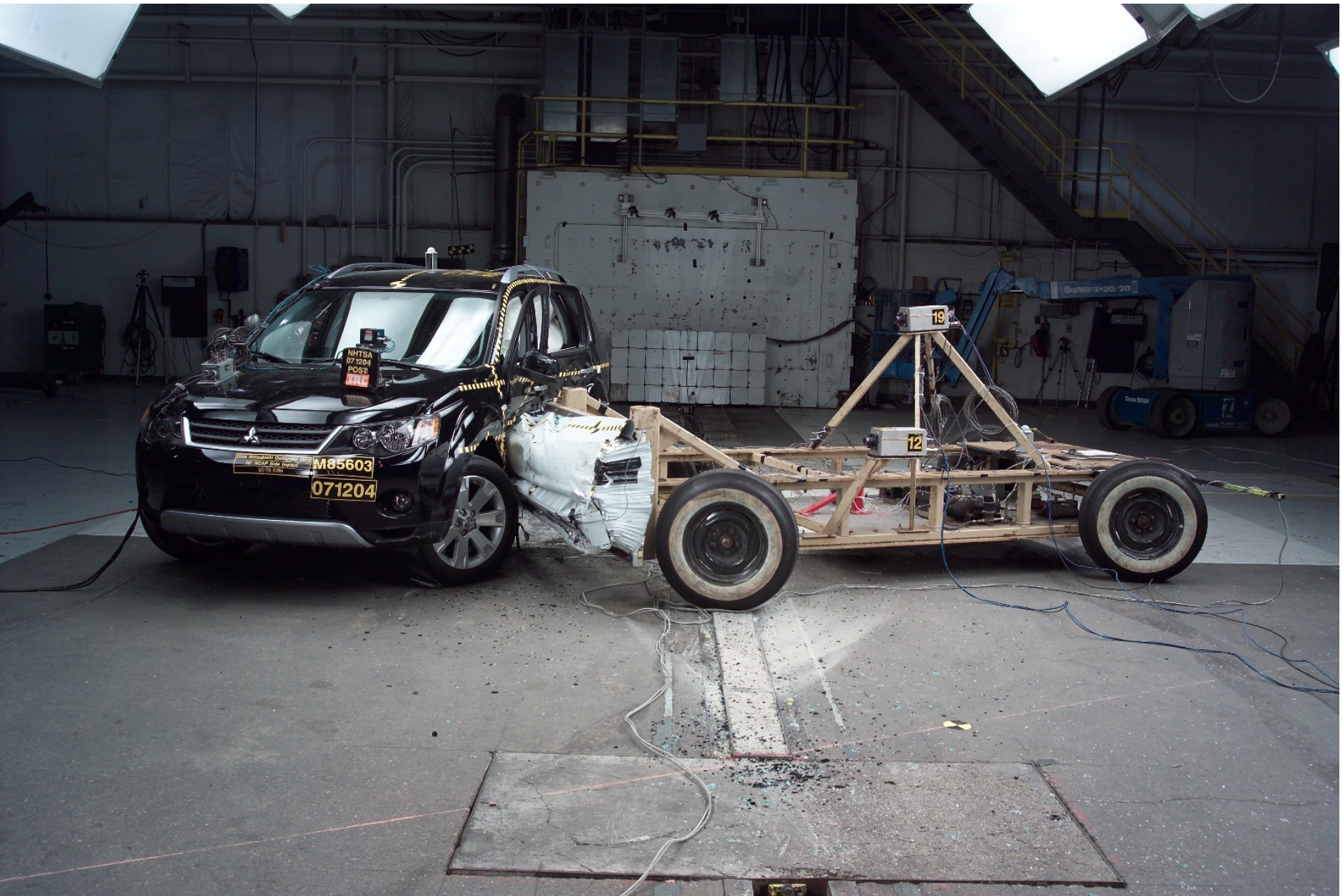


Figure A-68 Post-Test Left Side View of MDB with Impactor Face in Position



Figure A-69 Pre-Test Primary Impact Point View



Figure A-70 Post-Test Primary Impact Point View



Figure A-71 Pre-Test Right Side View of MDB with Impactor Face in Position



Figure A-72 Post-Test Right Side View of MDB with Impactor Face in Position

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071204



Figure A-73 Pre-Test Secondary Impact Point View

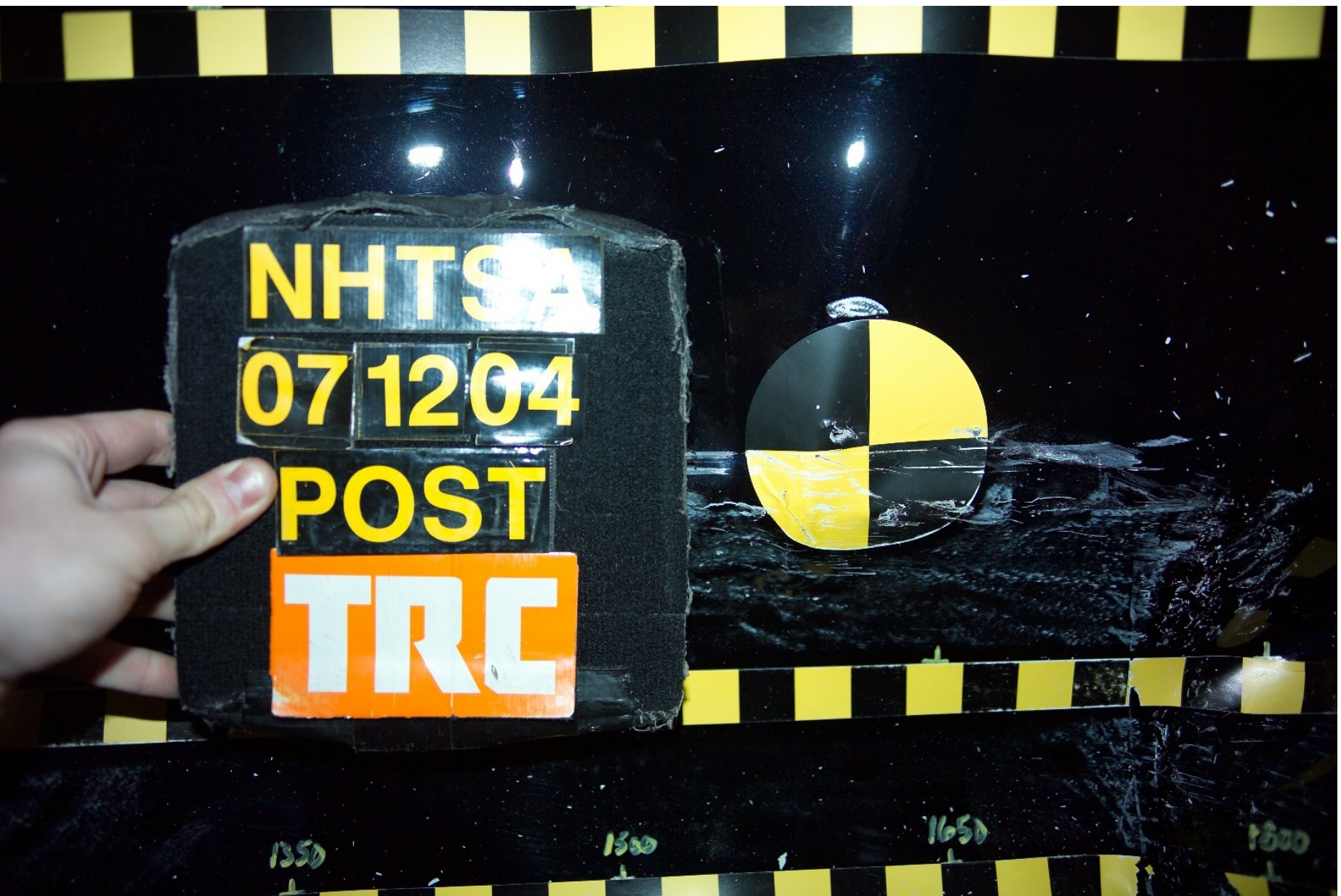


Figure A-74 Post-Test Secondary Impact Point View

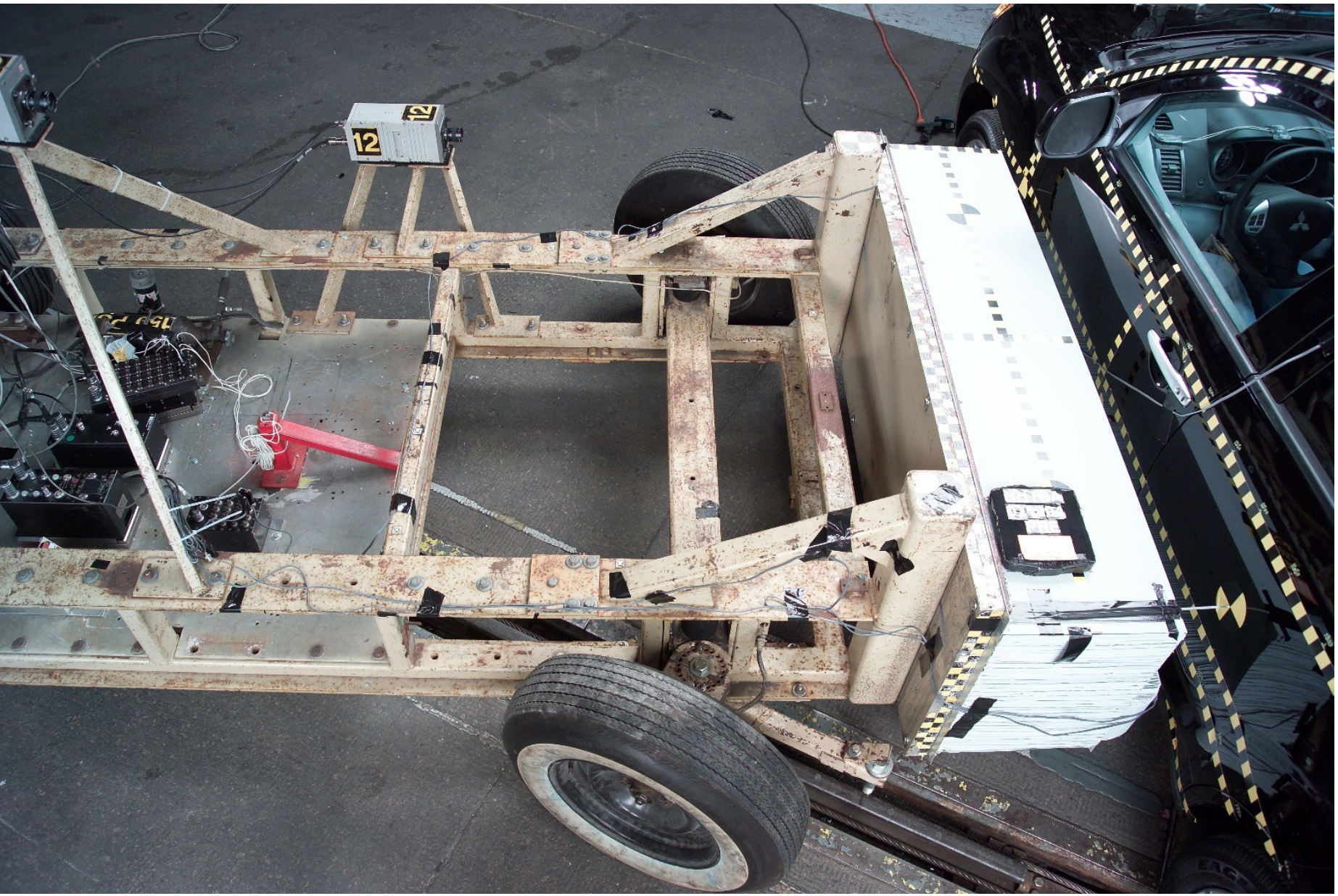


Figure A-75 Pre-Test Overhead View of MDB with Impactor Face in Position



Figure A-76 Pre-Test Vehicle Certification Label View



Figure A-77 Pre-Test Vehicle Recommended Tire Pressure Label View

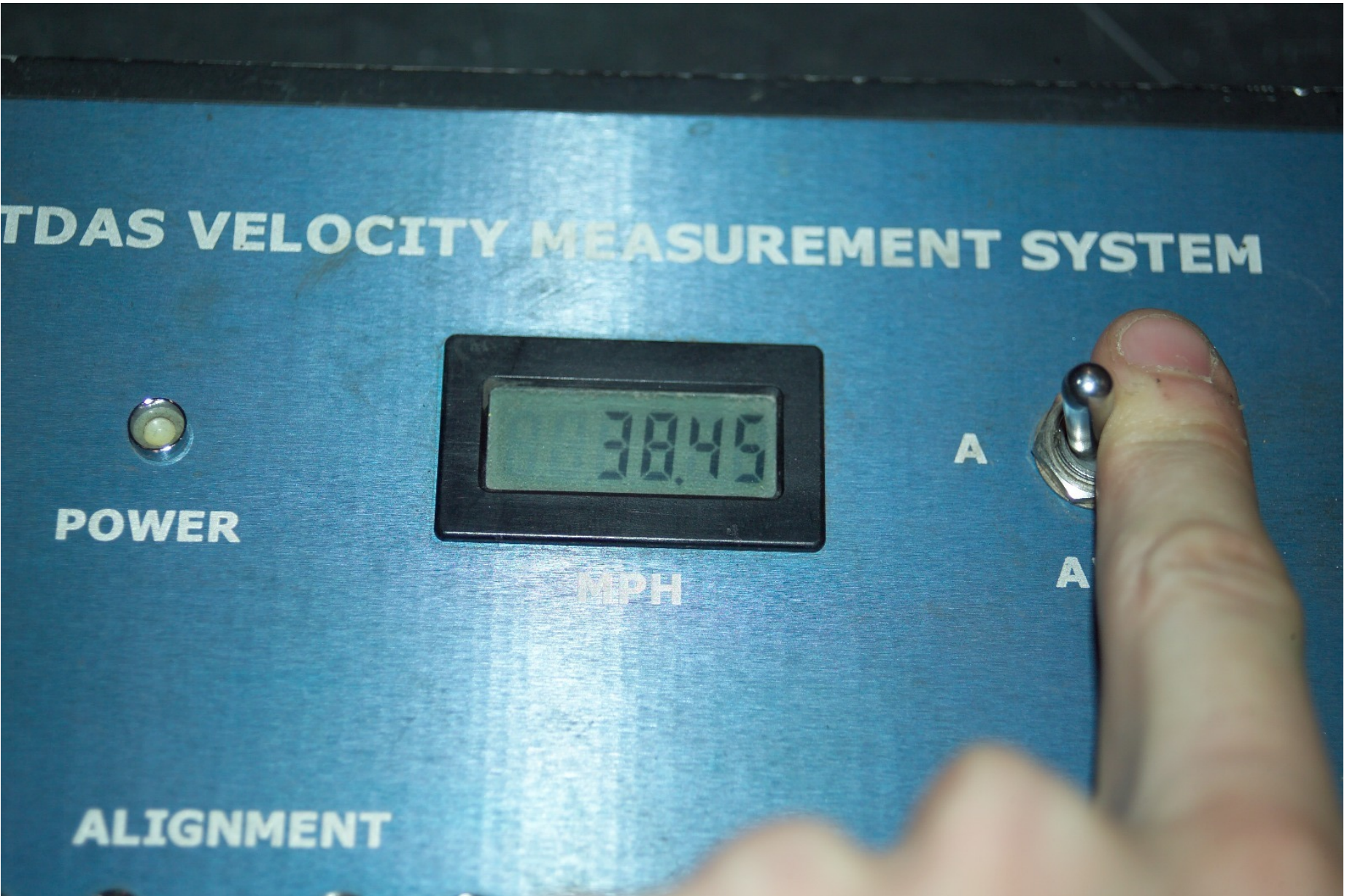


Figure A-78 Post-Test Light Trap Digital Readout - View 1

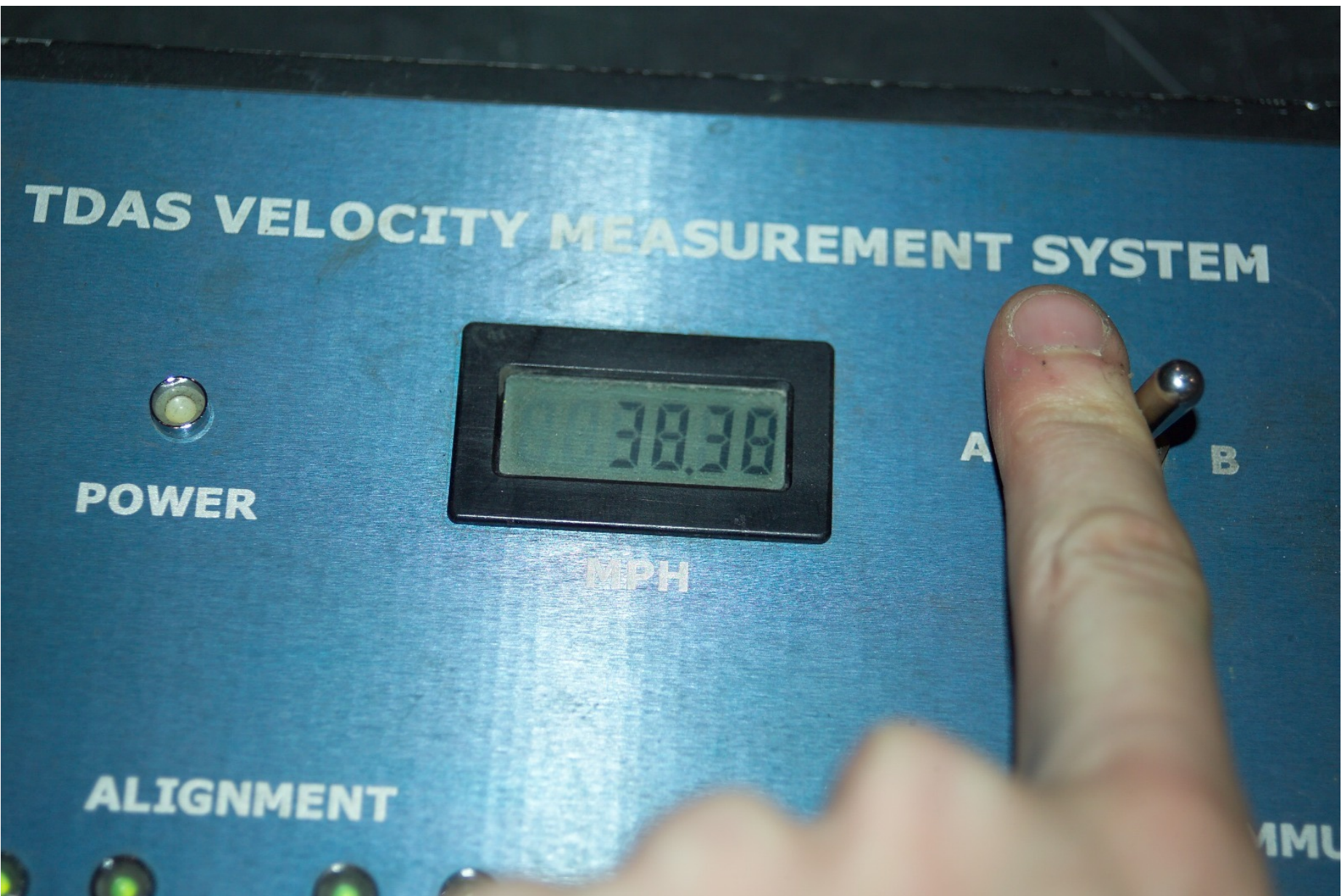


Figure A-79 Post-Test Light Trap Digital Readout - View 2



Figure A-80 Impact Event



Figure A-81 Pre-Test Fuel Cap



Figure A-82 Post-Test Fuel Cap

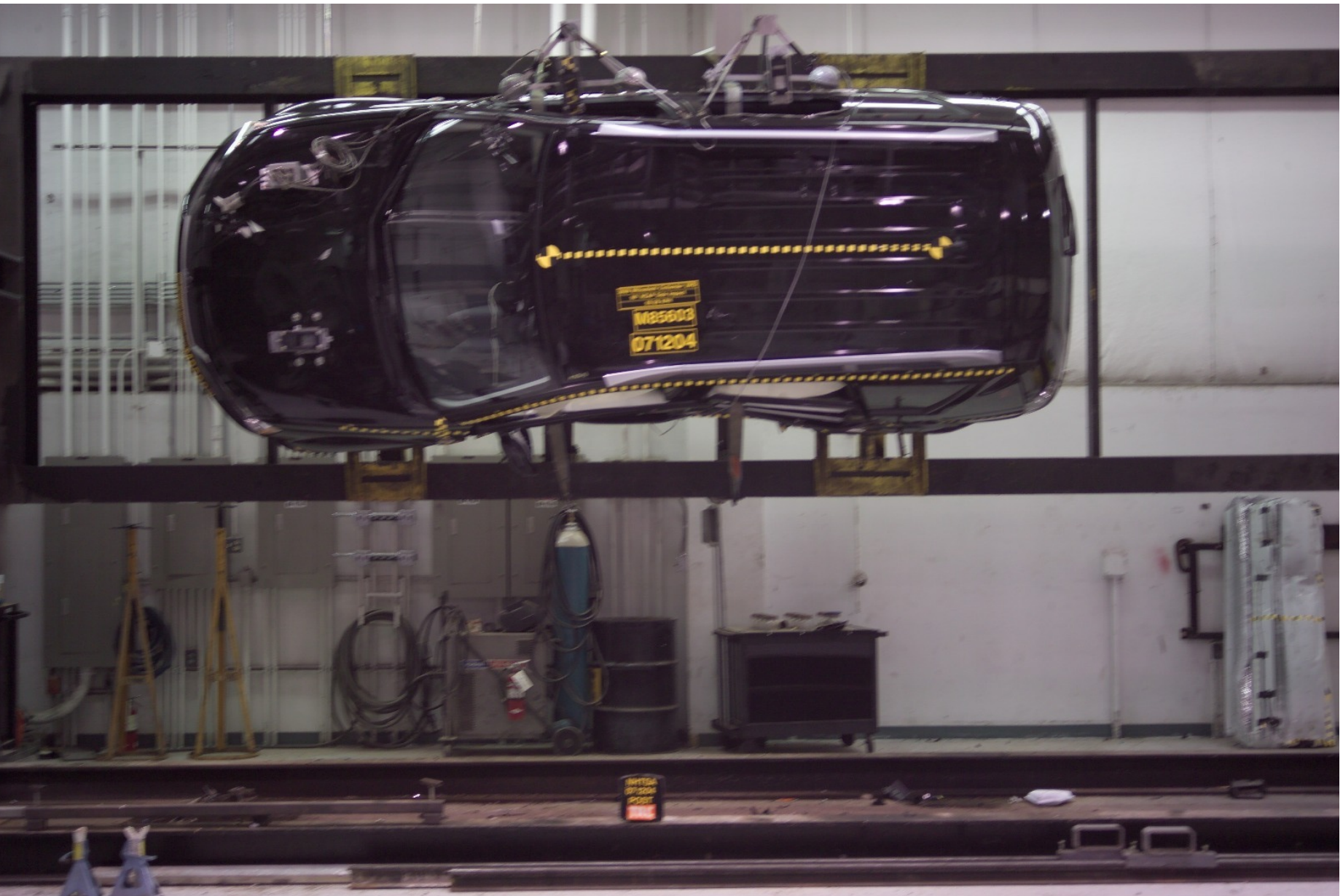


Figure A-83 EMVSS 301 Rollover View at 90°

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071204



Figure A-84 FMVSS 301 Rollover View at 180°



Figure A-85 FMVSS 301 Rollover View at 270°

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071204



Figure A-86 FMVSS 301 Rollover View at 360°



Figure A-87 Pre-Test Instrumentation View

APPENDIX B
SID/HIII, VEHICLE AND MDB RESPONSE DATA

Data Plot	LIST OF DATA PLOTS PROVIDED IN THE TEST REPORT	Page
B-1	Driver Upper Rib Primary Y	B-5
B-1	Driver Lower Rib Primary Y	B-5
B-1	Driver Lower Spine Primary Y	B-5
B-1	Driver Pelvis Primary Y	B-5
B-2	Driver Upper Rib Redundant Y	B-6
B-2	Driver Lower Rib Redundant Y	B-6
B-2	Driver Lower Spine Redundant Y	B-6
B-2	Driver Pelvis Redundant Y	B-6
B-3	Left Rear Passenger Upper Rib Primary Y	B-7
B-3	Left Rear Passenger Lower Rib Primary Y	B-7
B-3	Left Rear Passenger Lower Spine Primary Y	B-7
B-3	Left Rear Passenger Pelvis Primary Y	B-7
B-4	Left Rear Passenger Upper Rib Redundant Y	B-8
B-4	Left Rear Passenger Lower Rib Redundant Y	B-8
B-4	Left Rear Passenger Lower Spine Redundant Y	B-8
B-4	Left Rear Passenger Pelvis Redundant Y	B-8

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 Primary
	Driver Head Y Primary
	Driver Head Z Primary
	Driver Head X Redundant
	Driver Head Y Redundant
	Driver Head Z Redundant
	Driver Upper Neck Force X
	Driver Upper Neck Force Y
	Driver Upper Neck Force Z
	Driver Upper Neck Moment X
	Driver Upper Neck Moment Y
	Driver Upper Neck Moment Z
	Driver Upper Rib Redundant Y
	Driver Lower Rib Redundant Y
	Driver Lower Spine Redundant Y
	Driver Pelvis Redundant Y
	Left Rear Passenger Head X Primary
	Left Rear Passenger Head Y Primary
	Left Rear Passenger Head Z Primary
	Left Rear Passenger Head X Redundant
	Left Rear Passenger Head Y Redundant
	Left Rear Passenger Head Z Redundant
	Left Rear Passenger Upper Neck Force X
	Left Rear Passenger Upper Neck Force Y
	Left Rear Passenger Upper Neck Force Z
	Left Rear Passenger Upper Neck Moment X
	Left Rear Passenger Upper Neck Moment Y
	Left Rear Passenger Upper Neck Moment Z
	Left Rear Passenger Upper Rib Redundant Y
	Left Rear Passenger Lower Rib Redundant Y
	Left Rear Passenger Lower Spine Redundant Y
	Left Rear Passenger Pelvis Redundant Y

<u>Data Plot</u>	<u>LIST OF DATA PLOTS (CONTINUED)</u>
	Vehicle Right Sill at Front Seat X
	Vehicle Right Sill at Front Seat Y
	Vehicle Right Sill at Front Seat Z
	Vehicle Right Sill at Rear Seat X
	Vehicle Right Sill at Rear Seat Y
	Vehicle Right Sill at Rear Seat Z
	Vehicle Rear Floor Above Axle X
	Vehicle Rear Floor Above Axle Y
	Vehicle Rear Floor Above Axle Z
	Vehicle Left Sill at Front Seat Y
	Vehicle Left Sill at Rear Seat Y
	Vehicle Right Rear Occupant Compartment Y
	Vehicle A-Post Lower Y
	Vehicle A-Post Upper Y
	Vehicle B-Post Lower Y
	Vehicle B-Post Upper Y
	Vehicle Left Front Seat Track Y
	Vehicle Left Rear Seat Track Y
	Vehicle CG X
	Vehicle CG Y
	Vehicle CG Z
	MDB CG X
	MDB CG Y
	MDB CG Z
	MDB Rear X
	MDB Rear Y
	MDB Right Bumper Contact
	MDB Left Bumper Contact

NHTSA

Test Lab: CTF

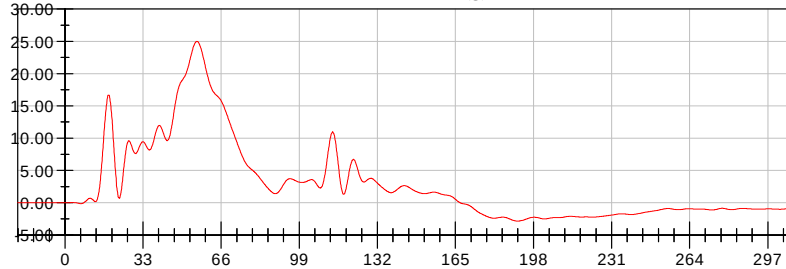
Test Number: 071204 (M85603)

Position #1 SID H3 Dummy (066)

Position #4 SID H3 Dummy (059)

Test Date: 12/04/2007

DRIVER UPPER RIB Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

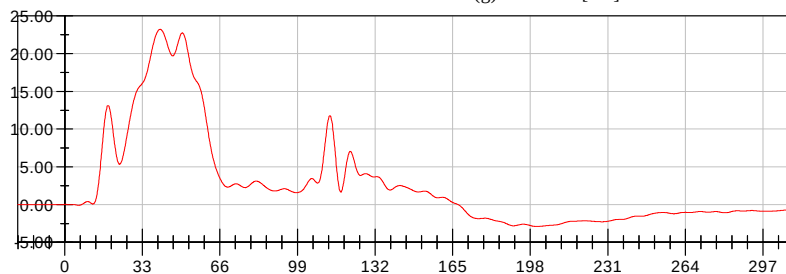
25.01 g at 55.68 ms

<Min>

-2.84 g at 191.28 ms

FIR_100

DRIVER LOWER RIB Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

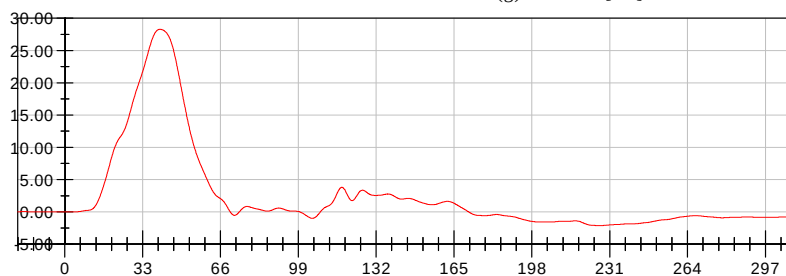
23.24 g at 40.64 ms

<Min>

-2.89 g at 200.64 ms

FIR_100

DRIVER LOWER SPINE Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

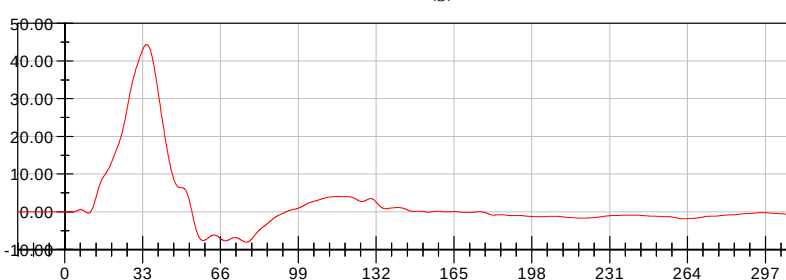
28.30 g at 40.56 ms

<Min>

-2.14 g at 226.88 ms

FIR_100

DRIVER PELVIS Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

44.37 g at 34.96 ms

<Min>

-8.05 g at 76.88 ms

FIR_100



NHTSA

Test Lab: CTF

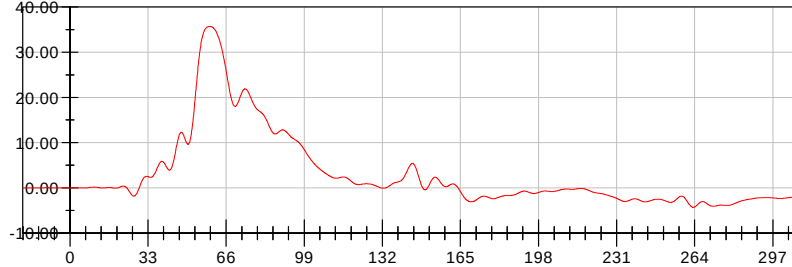
Test Number: 071204 (M85603)

Position #1 SID H3 Dummy (066)

Position #4 SID H3 Dummy (059)

Test Date: 12/04/2007

LEFT REAR PASSENGER UPPER RIB Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

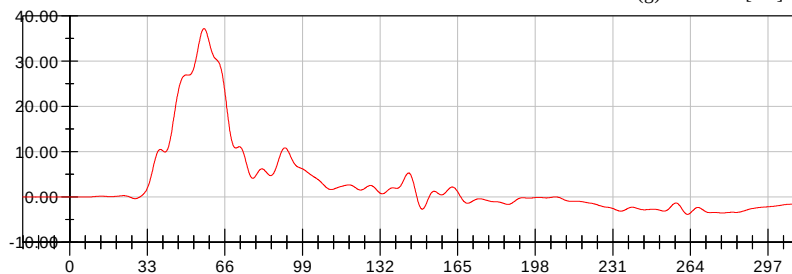
35.73 g at 59.36 ms

<Min>

-4.31 g at 263.12 ms

FIR_100

LEFT REAR PASSENGER LOWER RIB Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

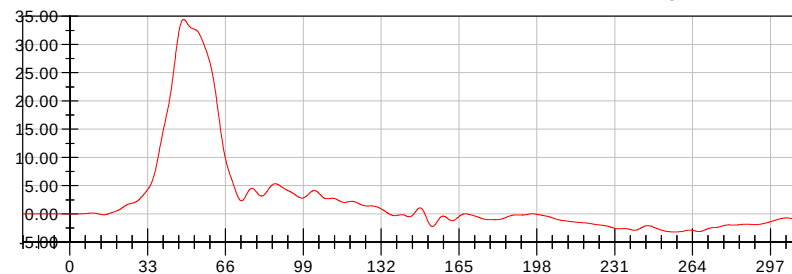
37.20 g at 56.88 ms

<Min>

-3.80 g at 262.56 ms

FIR_100

LEFT REAR PASSENGER LOWER SPINE Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

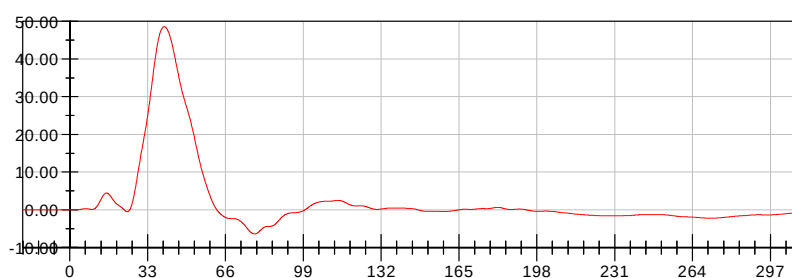
34.46 g at 48.16 ms

<Min>

-3.21 g at 256.24 ms

FIR_100

LEFT REAR PASSENGER PELVIS Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

48.63 g at 40.00 ms

<Min>

-6.41 g at 78.16 ms

FIR_100



NHTSA

Test Lab: CTF

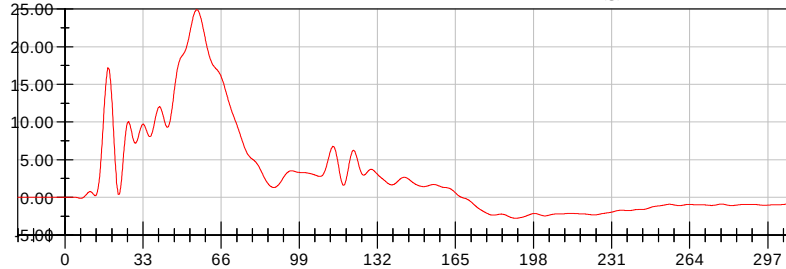
Test Number: 071204 (M85603)

Position #1 SID H3 Dummy (066)

Position #4 SID H3 Dummy (059)

Test Date: 12/04/2007

DRIVER UPPER RIB Y-AXIS REDUNDANT ACCELERATION (g) vs. Time [ms]



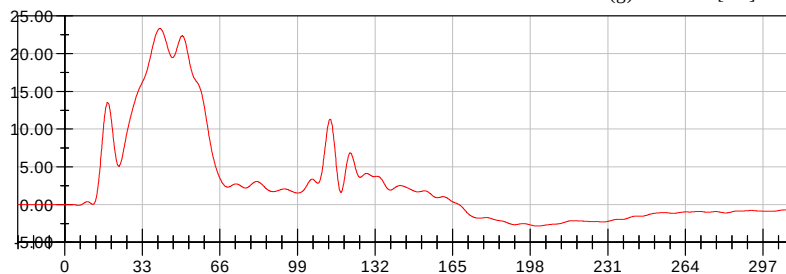
<Max>

24.94 g at 55.60 ms

<Min>

-2.78 g at 190.64 ms

DRIVER LOWER RIB Y-AXIS REDUNDANT ACCELERATION (g) vs. Time [ms]



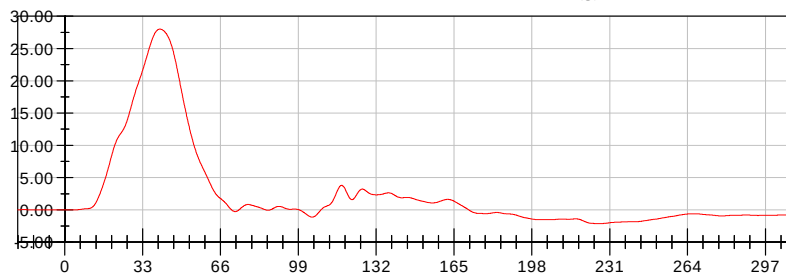
<Max>

23.33 g at 40.64 ms

<Min>

-2.83 g at 201.20 ms

DRIVER LOWER SPINE Y-AXIS REDUNDANT VELOCITY (g) vs. Time [ms]



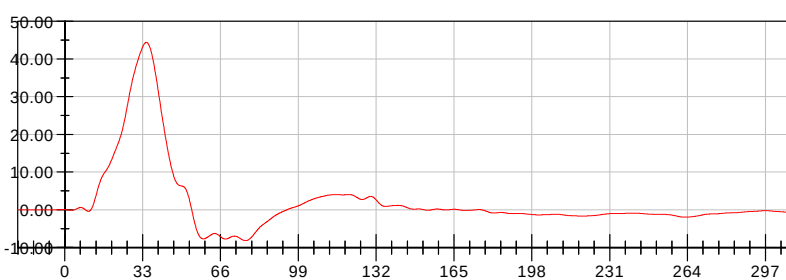
<Max>

28.01 g at 40.56 ms

<Min>

-2.14 g at 226.88 ms

DRIVER PELVIS Y-AXIS REDUNDANT ACCELERATION (g) vs. Time [ms]



<Max>

44.41 g at 34.40 ms

<Min>

-8.17 g at 76.88 ms



NHTSA

Test Lab: CTF

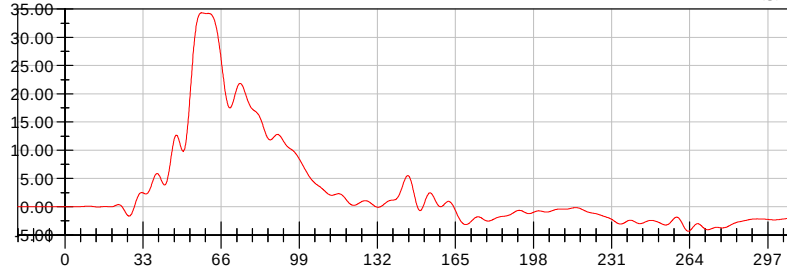
Test Number: 071204 (M85603)

Position #1 SID H3 Dummy (066)

Position #4 SID H3 Dummy (059)

Test Date: 12/04/2007

LEFT REAR PASSENGER UPPER RIB Y-AXIS REDUNDANT ACCELERATION (g) vs. Time [ms]



<Max>

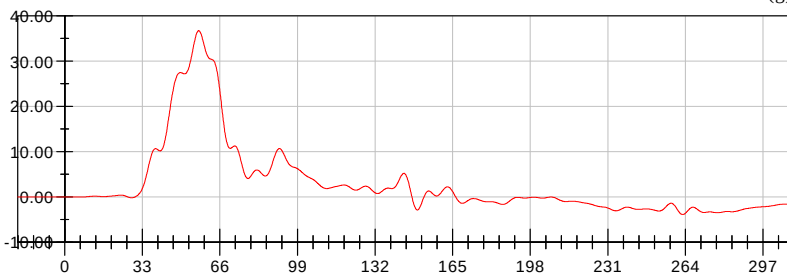
34.34 g at 57.52 ms

<Min>

-4.32 g at 263.20 ms

FIR_100

LEFT REAR PASSENGER LOWER RIB Y-AXIS REDUNDANT ACCELERATION (g) vs. Time [ms]



<Max>

36.79 g at 56.88 ms

<Min>

-3.85 g at 263.12 ms

FIR_100

LEFT REAR PASSENGER LOWER SPINE Y-AXIS REDUNDANT ACCELERATION (g) vs. Time [ms]



<Max>

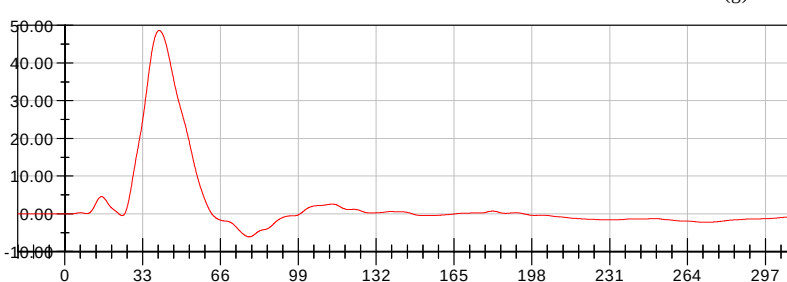
34.84 g at 48.16 ms

<Min>

-3.22 g at 255.60 ms

FIR_100

LEFT REAR PASSENGER PELVIS Y-AXIS REDUNDANT ACCELERATION (g) vs. Time [ms]



<Max>

48.69 g at 40.00 ms

<Min>

-6.12 g at 78.16 ms

FIR_100



APPENDIX C
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

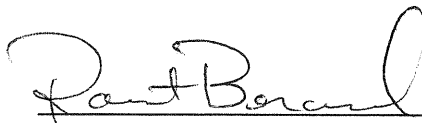
PRE-TEST

SID/HIII: 066

Transportation Research Center Inc.
572M SID/HIII Dummy
External Dimensions
Serial No. 066 Calibration No. 26

Test Parameter	Dimension	Specification	Results	Pass
Seated Height	SH	889.0 - 909.3 mm	905 mm	Yes
Rib Height	RH	501.7 - 520.7 mm	516 mm	Yes
Hip Pivot Height	HP	99.1 REF mm	99.1 mm	
Knee Pivot From Backline	KH	510.5 - 525.8 mm	525 mm	Yes
Knee Pivot From Floor	KV	490.2 - 505.5 mm	498 mm	Yes
Hip Width	HW	355.6 - 391.2 mm	370 mm	Yes
Top Rib Width From CVL	RW-1	165.1 - 180.3 mm	175 mm	Yes
Bottom Rib Width From CVL	RW-2	165.1 - 180.3 mm	175 mm	Yes
Difference Between Top & Bottom Rib Width from CVL		<= 2.5 mm	0.0 mm	Yes

Technician

_____

Approved

_____



Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 066 Certification No. 26-1

Test Date: 11/19/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Peak Head Resultant Acceleration	120 - 150 g	137.8 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-4.9 g	Yes
Is Head Resultant Acceleration Curve Unimodal Within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron. Stoner

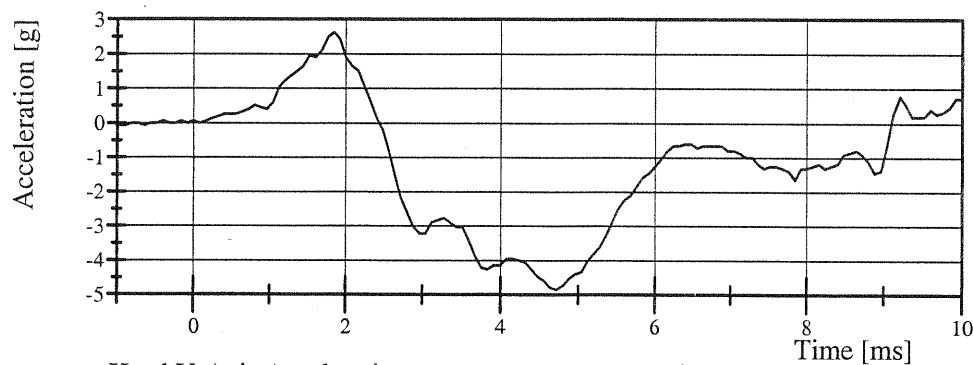
Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 066 Certification No. 26-1

Test Date: 11/19/2007

Head X-Axis Acceleration

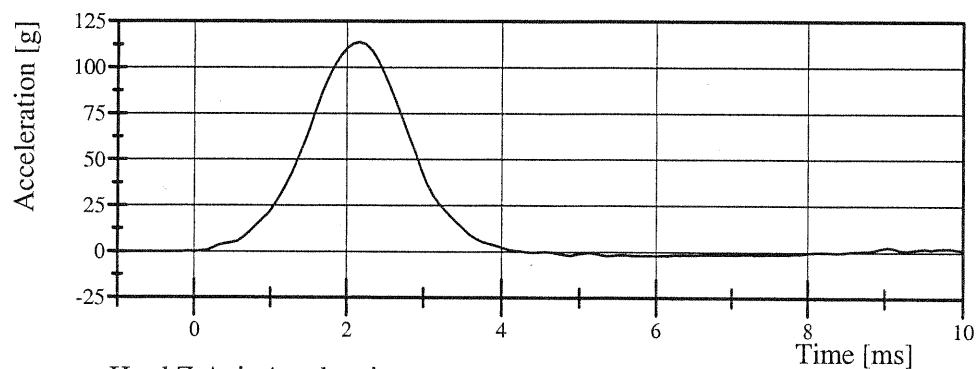


Filter Class: CFC_1000

Max: 2.6 g at 1.8 ms

Min: -4.9 g at 4.7 ms

Head Y-Axis Acceleration

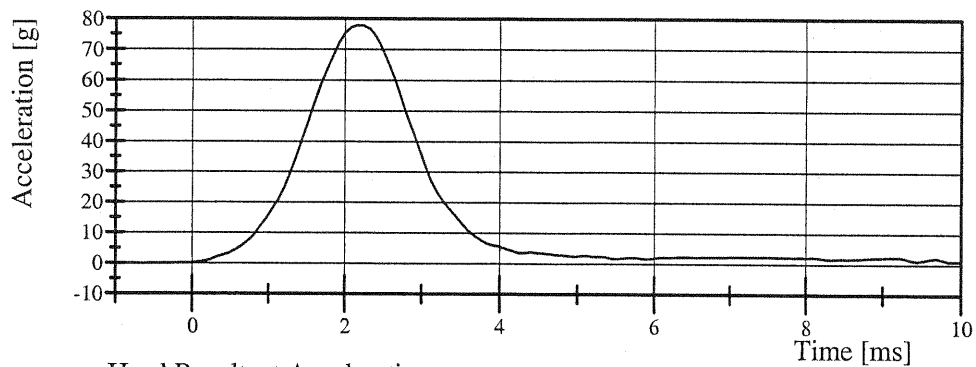


Filter Class: CFC_1000

Max: 113.7 g at 2.2 ms

Min: -2.2 g at 5.4 ms

Head Z-Axis Acceleration

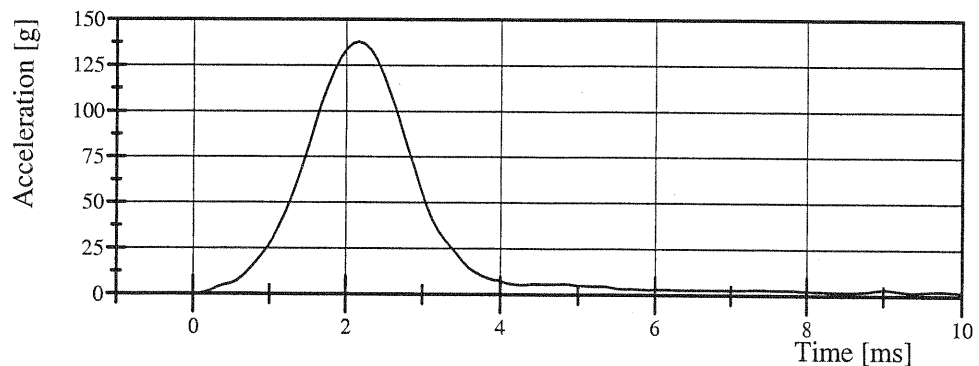


Filter Class: CFC_1000

Max: 77.9 g at 2.2 ms

Min: -0.1 g at -0.6 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 137.8 g at 2.2 ms

Min: 0.0 g at -0.6 ms

Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 26-2

Test Date: 11/19/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Pendulum Velocity	(-6.89) - (-7.13) m/s	-6.934 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	1.96 - 2.55 m/s	2.227 m/s	Yes
Pendulum Integrated Velocity Change at 20 ms	4.12 - 5.10 m/s	4.252 m/s	Yes
Pendulum Integrated Velocity Change at 30 ms	5.73 - 7.01 m/s	5.880 m/s	Yes
Pendulum Integrated Velocity Change at 40 to 70 ms	6.27 - 7.64 m/s	7.170 m/s	Yes
Total Head D-Plane Rotation	(-66) - (-82) °	-71.3 °	Yes
Total Head D-Plane Rotation Time to 0° after Peak Rotation	58 - 67 ms	61.9 ms	Yes
Total Neck Occipital Condyle Moment	73 - 88 N·m	78.2 N·m	Yes
Total Neck Occipital Condyle Moment Time to 0 N·m after Peak Moment	49 - 64 ms	49.7 ms	Yes
Time from Peak Moment to Peak Rotation	2 - 16 ms	6.8 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Storer

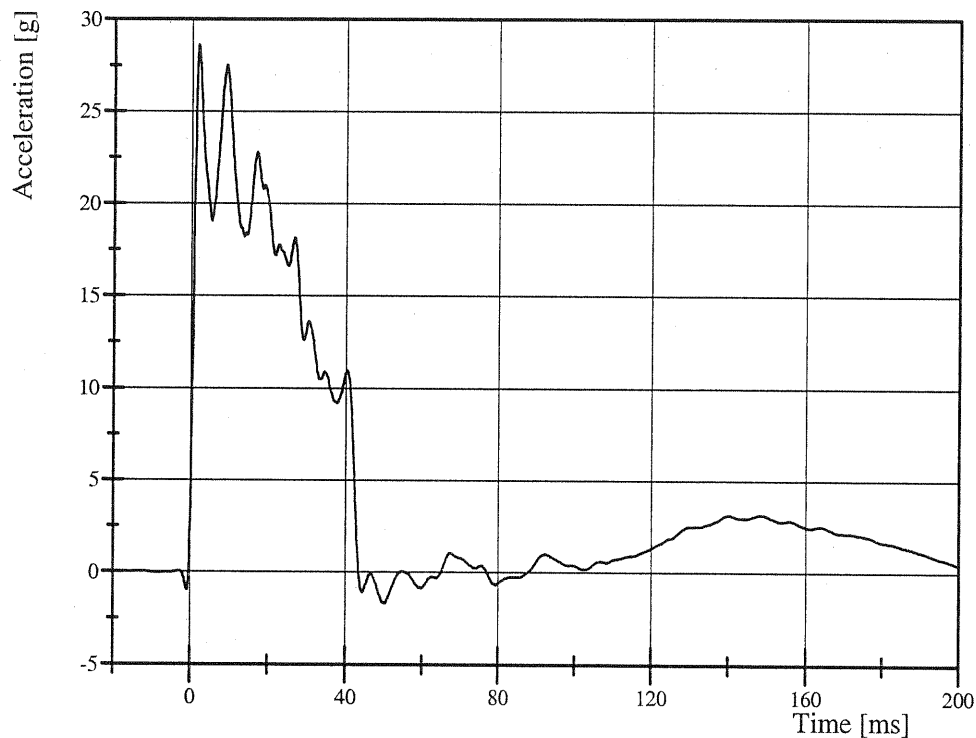
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 26-2

Test Date: 11/19/2007

Pendulum Acceleration

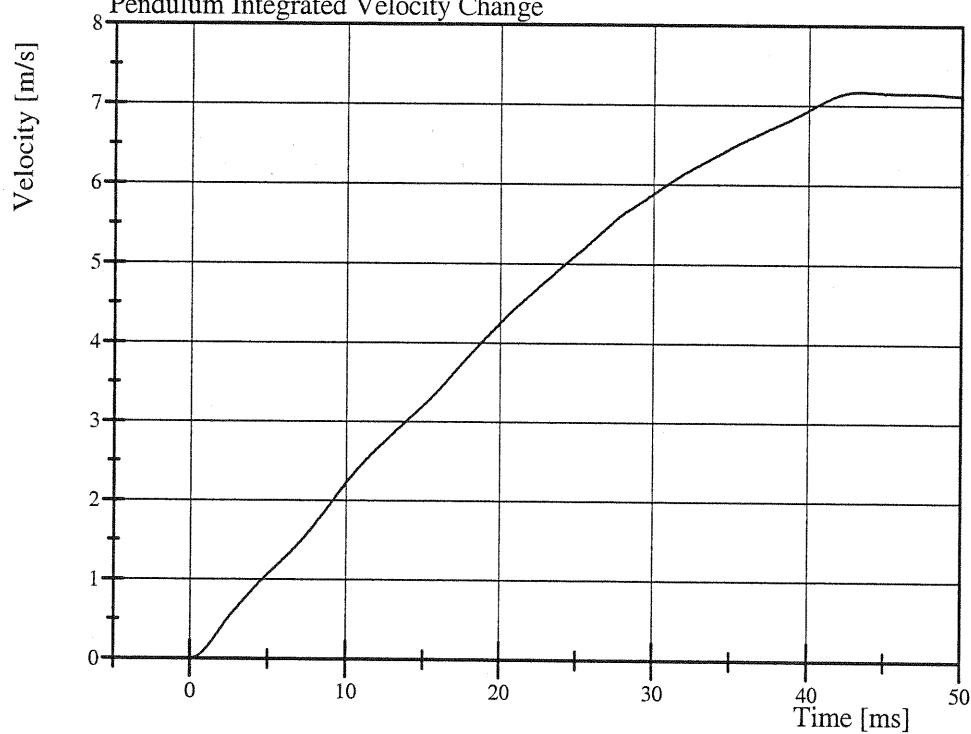


Filter Class: CFC_180

Max: 28.6 g at 1.8 ms

Min: -1.7 g at 50.2 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 7.2 m/s at 43.4 ms

Min: 0.0 m/s at 0.0 ms

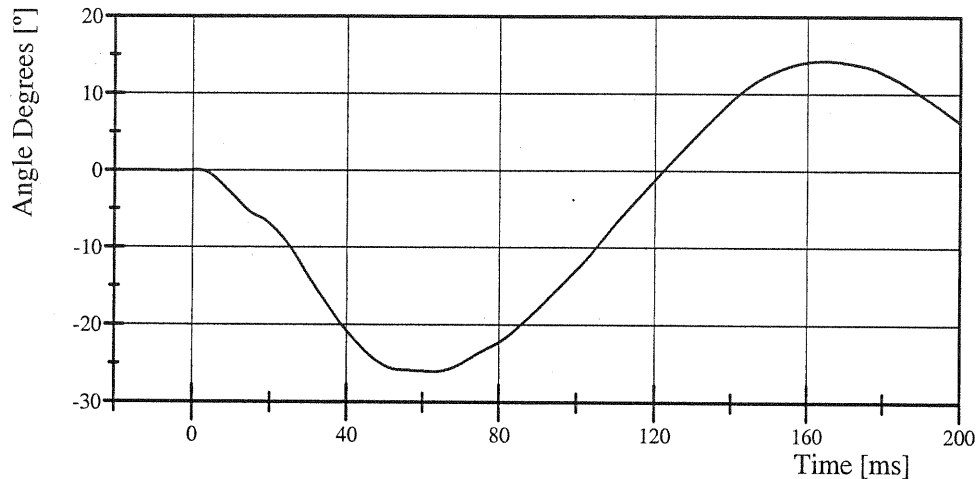
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 26-2

Test Date: 11/19/2007

Pot Rotation at the Base of Neck

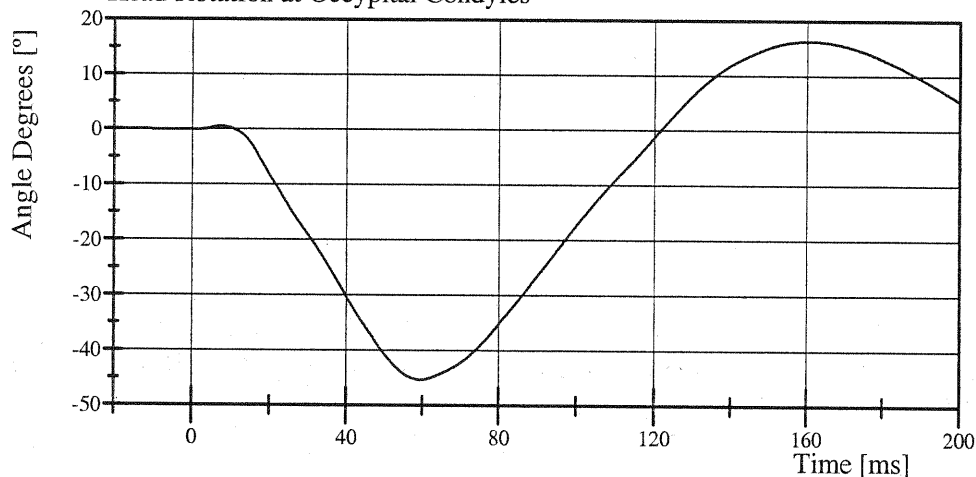


Filter Class: CFC_60

Max: 14.3 ° at 164.6 ms

Min: -26.0 ° at 63.0 ms

Head Rotation at Occypital Condyles

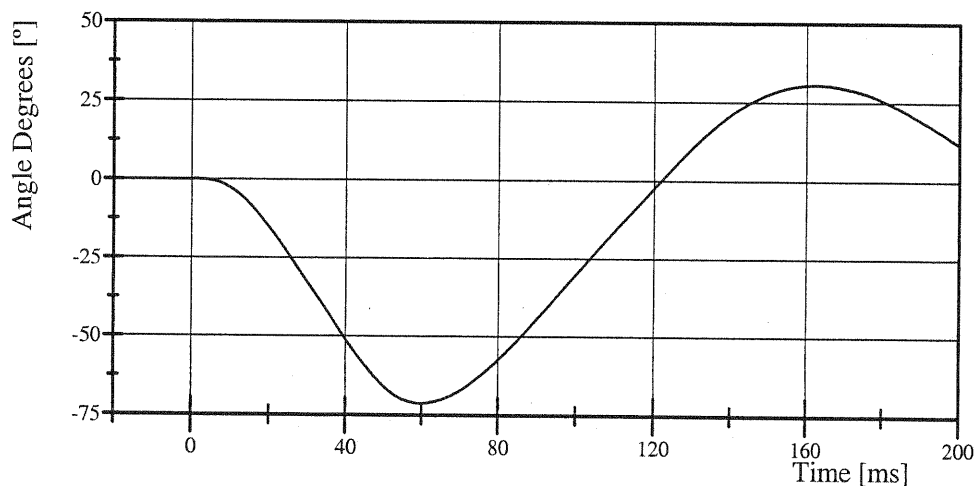


Filter Class: CFC_60

Max: 16.4 ° at 160.6 ms

Min: -45.3 ° at 59.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 30.6 ° at 162.5 ms

Min: -71.3 ° at 59.9 ms

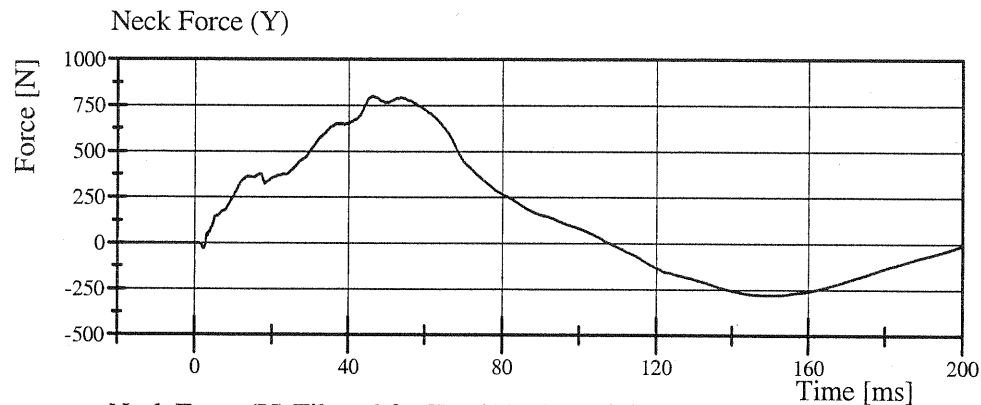


Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 26-2

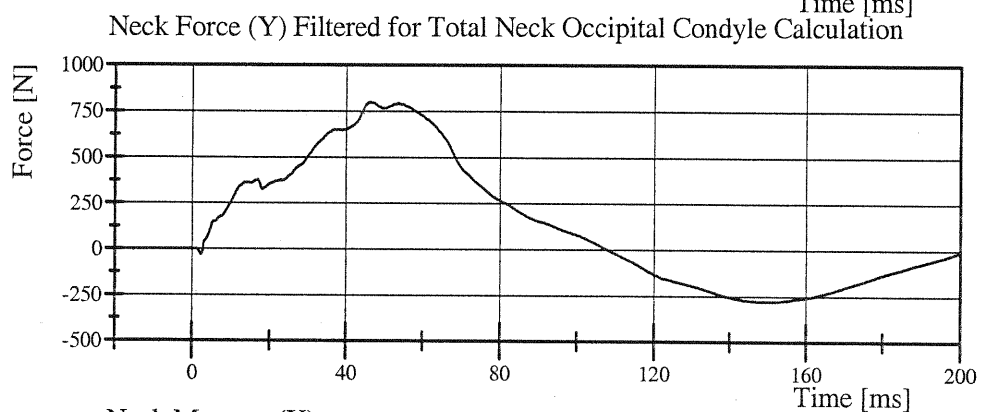
Test Date: 11/19/2007



Filter Class: CFC_1000

Max: 802.0 N at 46.2 ms

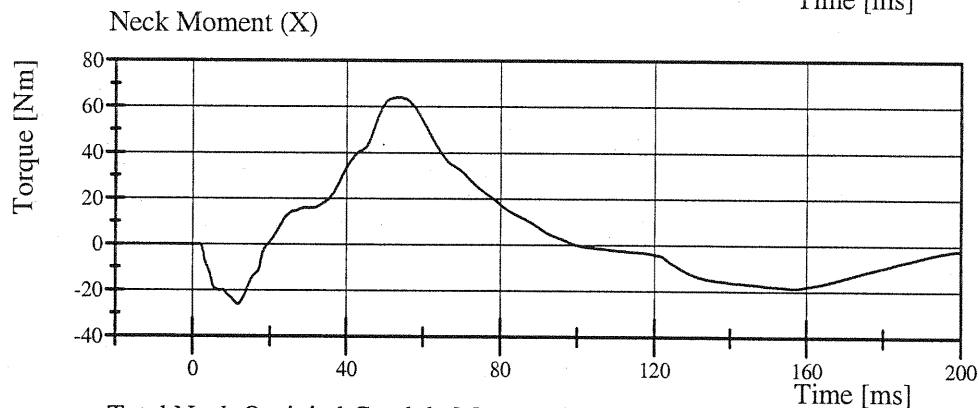
Min: -279.7 N at 150.4 ms



Filter Class: CFC_600

Max: 800.5 N at 46.3 ms

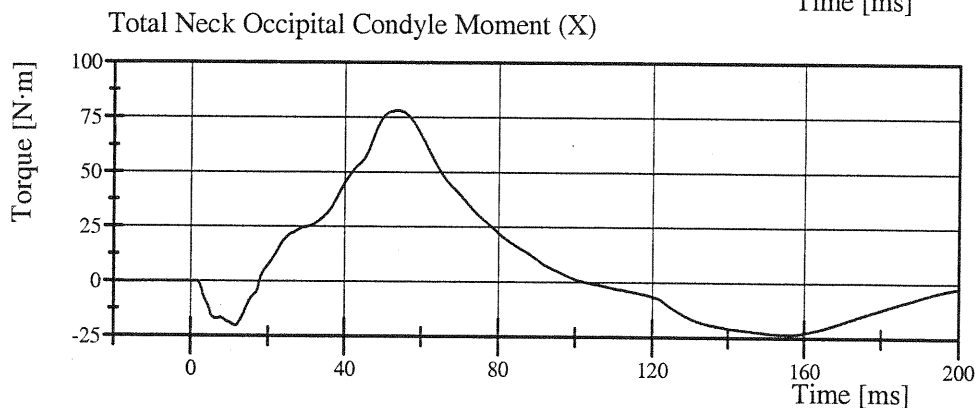
Min: -279.1 N at 149.0 ms



Filter Class: CFC_600

Max: 64.2 Nm at 53.0 ms

Min: -25.9 Nm at 11.6 ms



Filter Class: CFC_600

Max: 78.2 N·m at 53.1 ms

Min: -23.3 N·m at 156.7 ms

Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 066 Certification No. 26-3

Test Date: 11/20/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.279 m/s	Yes
Upper Rib Lateral Acceleration	37 - 46 g	45.9 g	Yes
Lower Rib Lateral Acceleration	37 - 46 g	44.6 g	Yes
Lower Spine Lateral Acceleration	15 - 22 g	21.9 g	Yes

Test meets specifications.

Comments:

Technician

Rant Berand

Approved

Ron Stoner

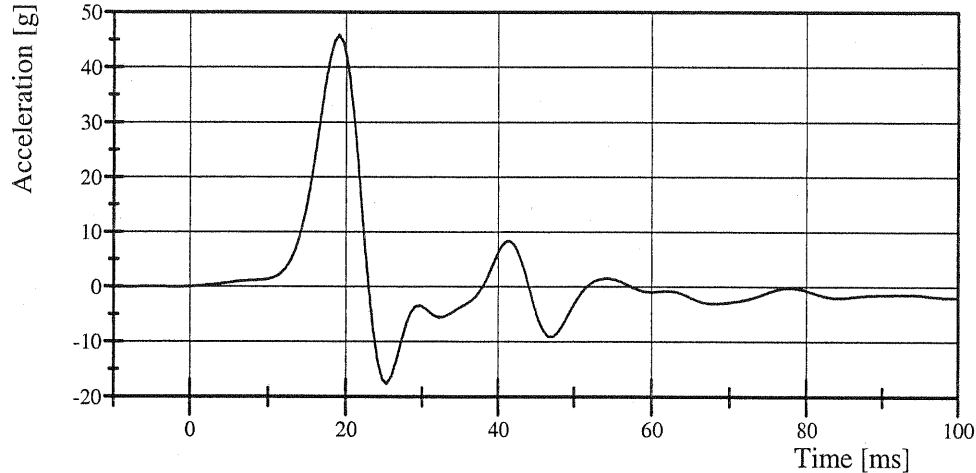
Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 066 Certification No. 26-3

Test Date: 11/20/2007

Upper Rib Acceleration (Y)

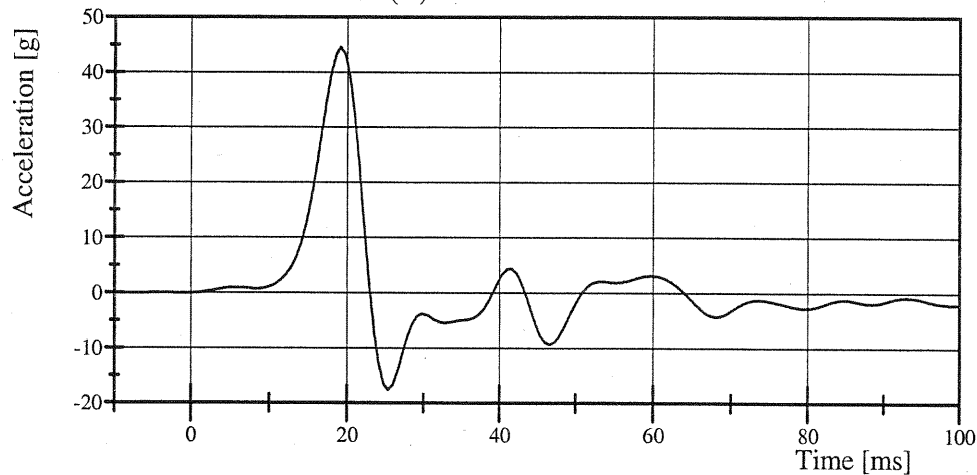


Filter Class: FIR_100

Max: 45.9 g at 19.1 ms

Min: -17.6 g at 25.4 ms

Lower Rib Acceleration (Y)

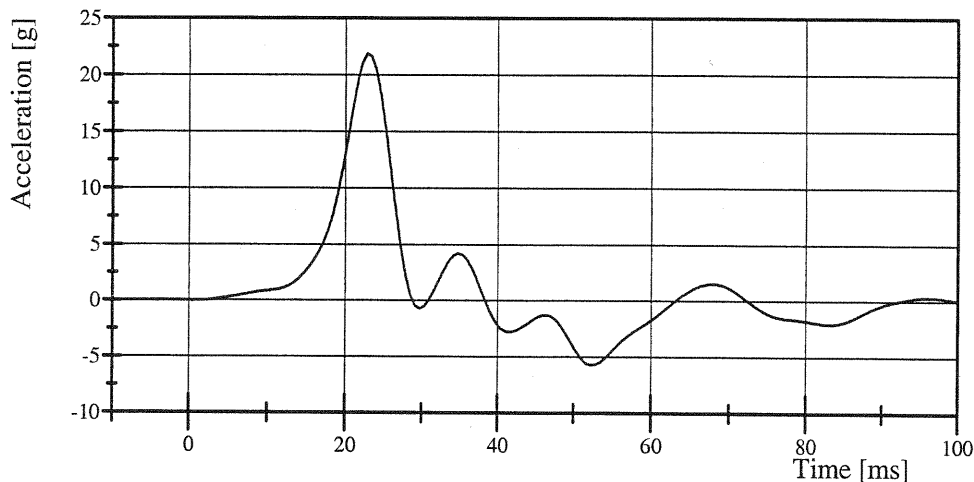


Filter Class: FIR_100

Max: 44.6 g at 19.1 ms

Min: -17.6 g at 25.4 ms

Lower Spine Acceleration (Y)



Filter Class: FIR_100

Max: 21.9 g at 22.9 ms

Min: -5.7 g at 52.2 ms

Transportation Research Center Inc.

3.05 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 066 Certification No. 23-2

Test Date: 10/2/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Maximum Force at Test Velocity	852 - 1,141 N	900.3 N	Yes
Maximum Displacement at Test Velocity	30.19 - 35.18 mm	34.115 mm	Yes

Test meets specifications.

Comments:

Actual Impactor Velocity (m/s): 3.069

Damper Setting: 5.5

Technician

Rout Berube

Approved

Ron Stoner

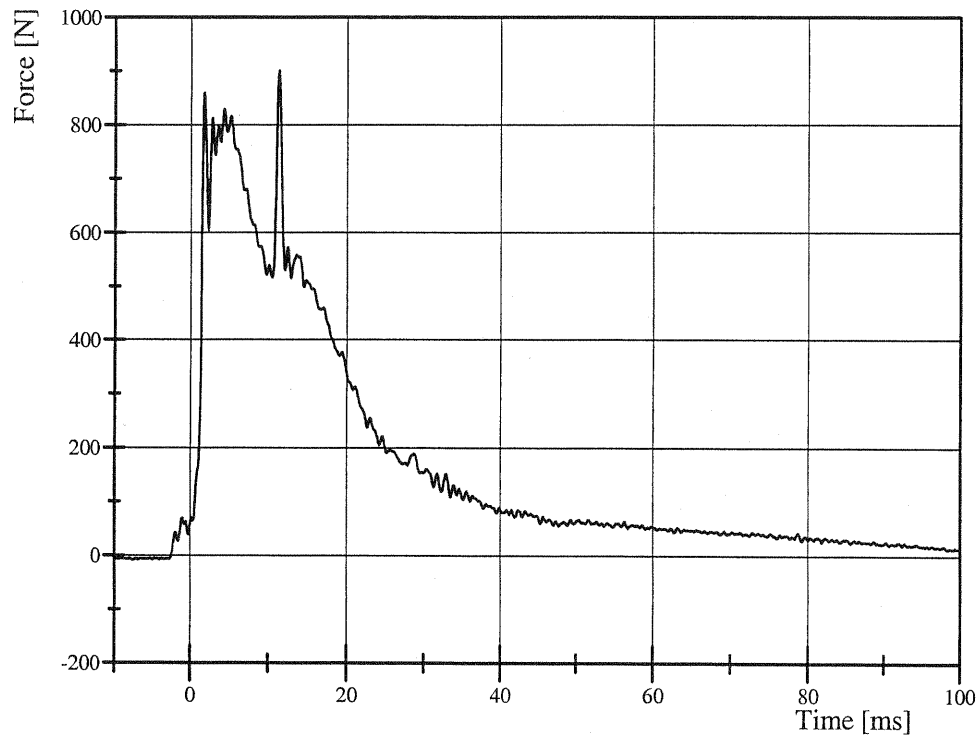
Transportation Research Center Inc.

3.05 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 066 Certification No. 23-2

Test Date: 10/2/2007

Shock Absorber Resistive Force



Filter Class: CFC_1000

Max: 900.3 N at 11.3 ms

Min: -7.9 N at -7.4 ms

Shock Absorber Displacement



Filter Class: CFC_1000

Max: 34.1 mm at 37.8 ms

Min: -0.0 mm at -0.1 ms

Transportation Research Center Inc.

4.27 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 066 Certification No. 23-7

Test Date: 10/2/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Maximum Force at Test Velocity	1,749 - 2,114 N	1,969.5 N	Yes
Maximum Displacement at Test Velocity	31.69 - 37.25 mm	36.559 mm	Yes

Test meets specifications.

Comments:

Actual Impactor Velocity (m/s): 4.283

Damper Setting: 5.5

Technician

Rout Brouil

Approved

Ron Stoner

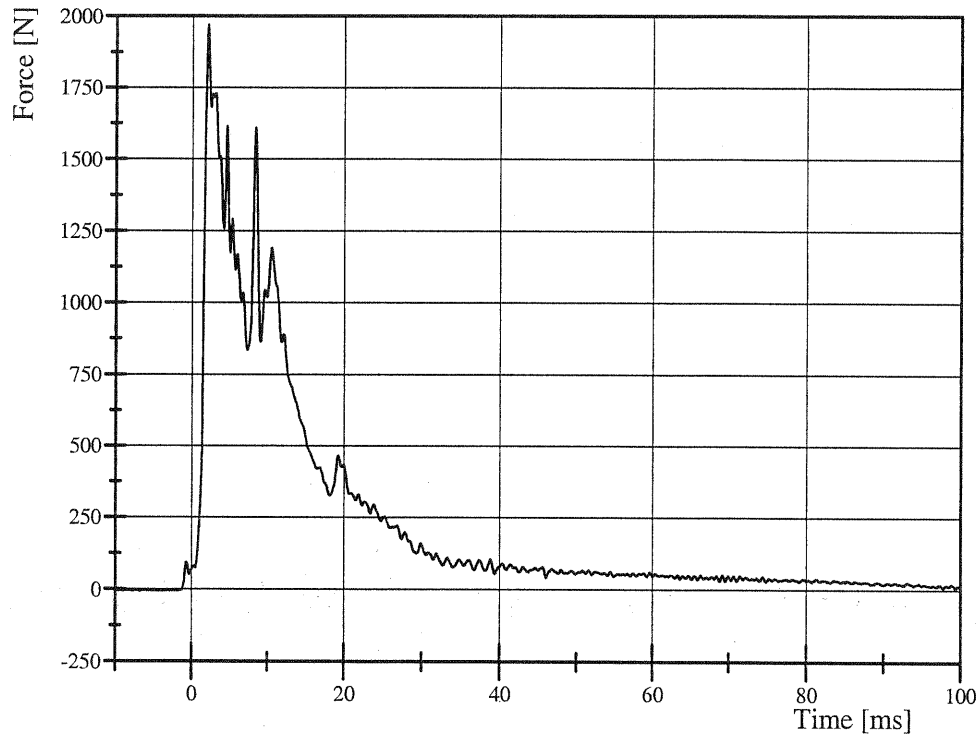
Transportation Research Center Inc.

4.27 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 066 Certification No. 23-7

Test Date: 10/2/2007

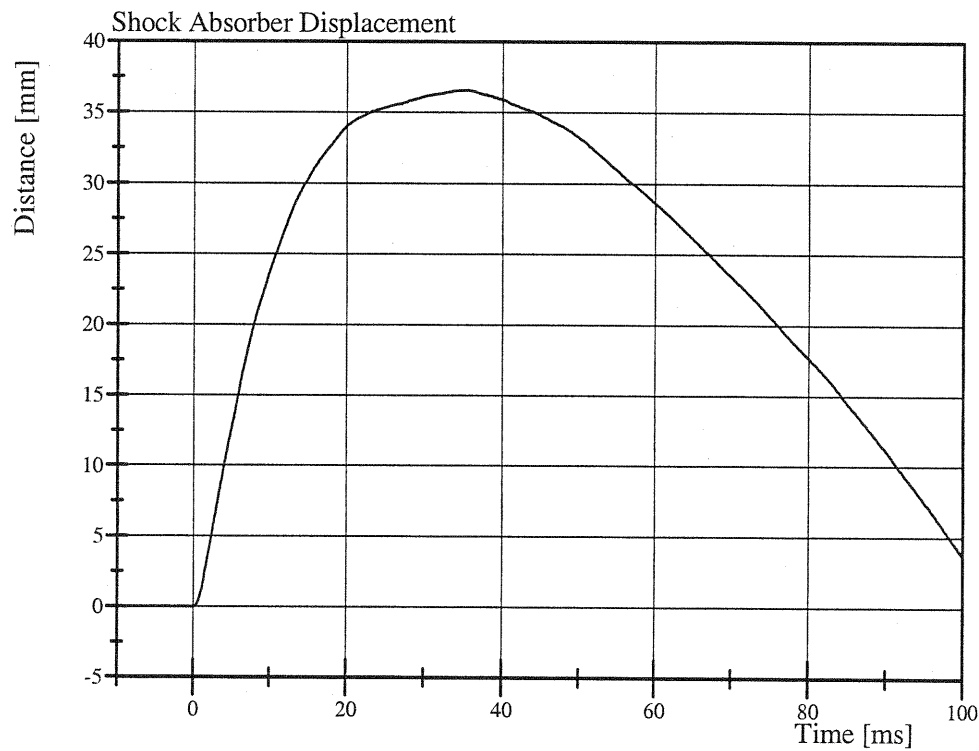
Shock Absorber Resistive Force



Filter Class: CFC_1000

Max: 1,969.5 N at 2.1 ms

Min: -6.0 N at -6.8 ms



Filter Class: CFC_1000

Max: 36.6 mm at 35.4 ms

Min: -0.0 mm at -9.7 ms

Transportation Research Center Inc.

6.10 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 066 Certification No. 23-3

Test Date: 10/1/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Maximum Force at Test Velocity	3,803 - 4,507 N	3,981.5 N	Yes
Maximum Displacement at Test Velocity	33.4 - 39.62 mm	39.422 mm	Yes

Test meets specifications.

Comments:

Actual Impactor Velocity (m/s): 6.140

Damper Setting: 5.5

Technician



Approved



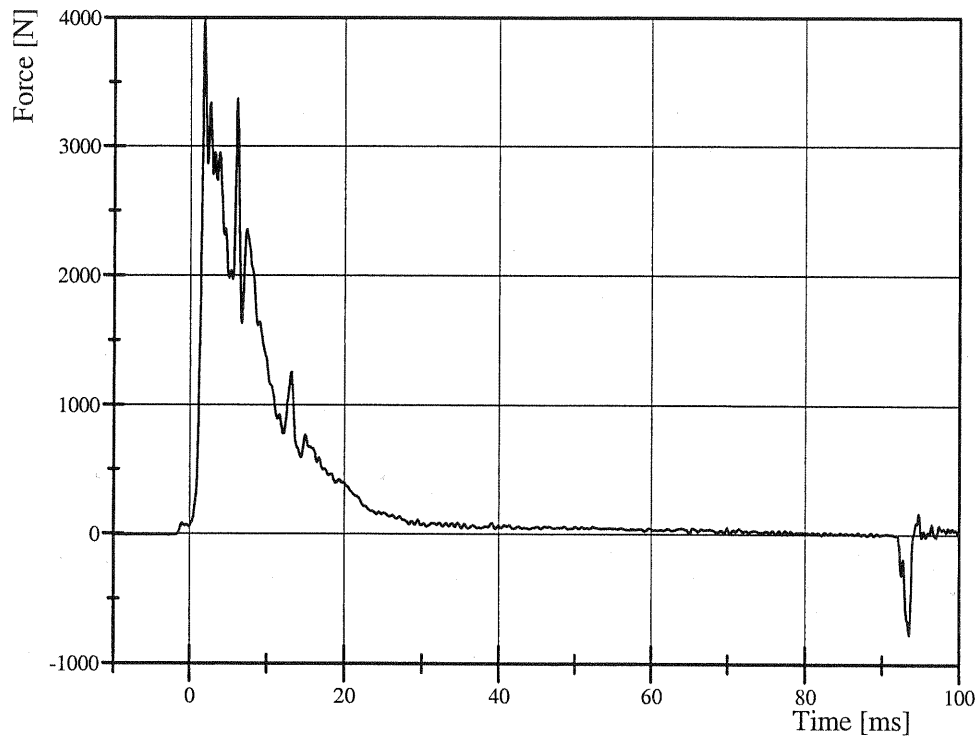
Transportation Research Center Inc.

6.10 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 066 Certification No. 23-3

Test Date: 10/1/2007

Shock Absorber Resistive Force

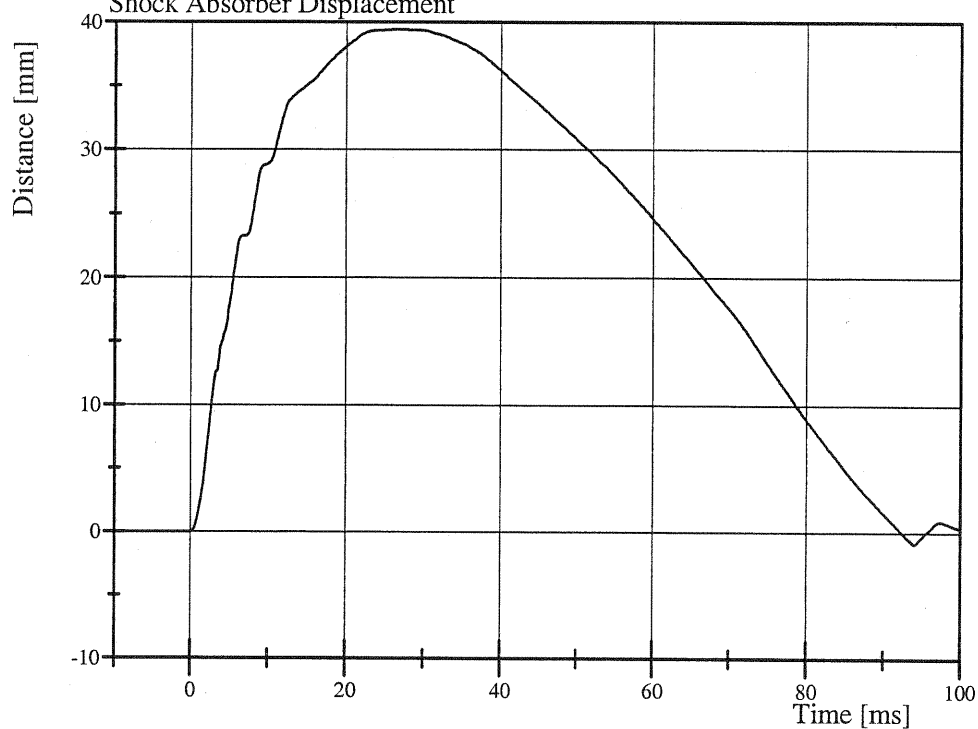


Filter Class: CFC_1000

Max: 3,981.5 N at 1.8 ms

Min: -768.5 N at 93.4 ms

Shock Absorber Displacement



Filter Class: CFC_1000

Max: 39.4 mm at 26.8 ms

Min: -0.9 mm at 93.9 ms

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 066 Certification No. 26-5

Test Date: 11/19/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Probe Force within Corridor	Yes	Yes	Yes
Probe Velocity	6.35 - 8.89 mm/s	7.718 mm/s	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

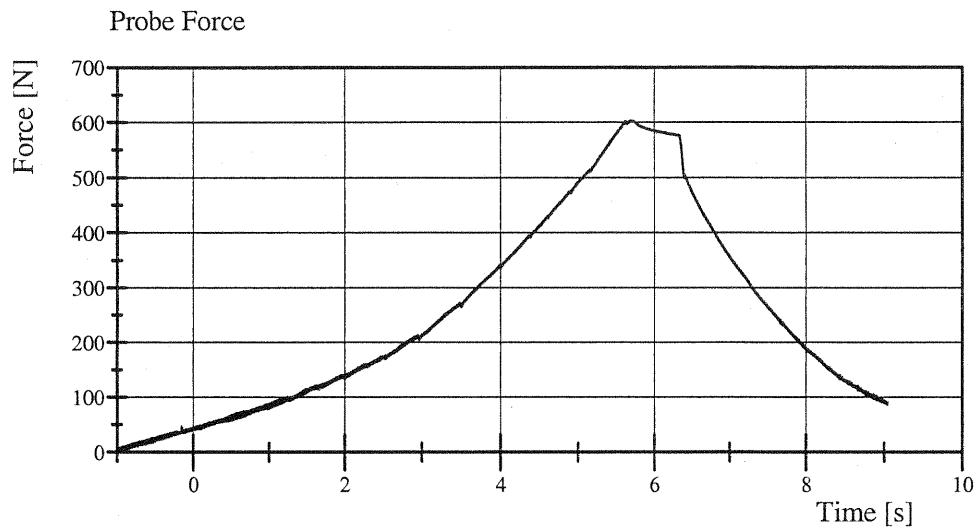
Ron Stone

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 066 Certification No. 26-5

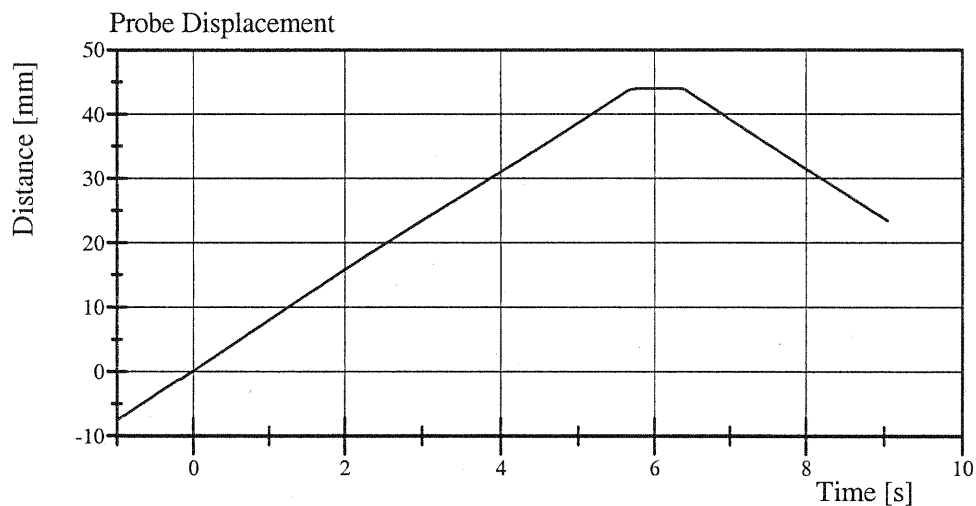
Test Date: 11/19/2007



Filter Class: CFC_600

Max: 602.5 N at 5.7 s

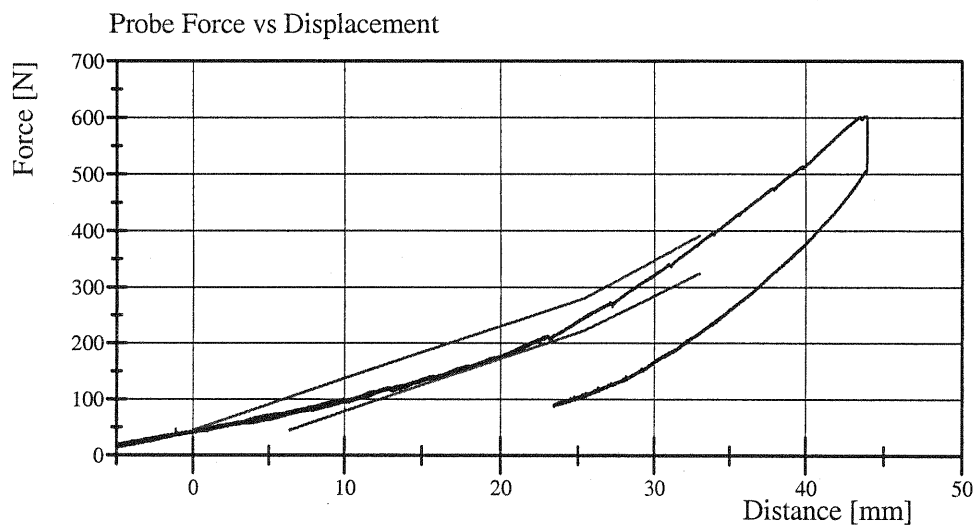
Min: 1.7 N at -1.0 s



Filter Class: CFC_180

Max: 44.0 mm at 6.4 s

Min: -7.6 mm at -1.0 s



Filter Class: CFC_600

Max: 602.5 N at 43.9 mm

Min: 1.7 N at -7.6 mm

TRANSPORTATION RESEARCH CENTER INC.

LUMBAR FLEXION TEST

SID PART 572B

CAL DATE: 07-Nov-07

TRC, INC.

TEST NO: LUFL-01

572B SN 066 TORSO FLEX CAL 26

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TIME	NA	1430
TEMPERATURE	18.9 – 25.6° C	21.2 C
RELATIVE HUMIDITY	10 – 70 %	42 %
FORCE AT 0 DEG. FLEXION	-27 – 27 N	0 N
FORCE AT 20 DEG OF FLEXION	98 – 151 N	124.5 N
FORCE AT 30 DEG OF FLEXION	151 – 205 N	186.8 N
FORCE AT 40 DEG OF FLEXION	205 – 258 N	235.7 N
NET RETURN ANGLE AFTER 3 MINUTES	< 12 °	7 °

TEST MEETS SPECIFICATIONS

TECHNICIAN

Charles W. Bell

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 066 Certification No. 26-1

Test Date: 11/20/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.286 m/s	Yes
Pelvis Lateral Acceleration Duration above 20g	3 - 7 ms	6.5 ms	Yes
Pelvis Lateral Acceleration	40 - 60 g	44.5 g	Yes
Is Acceleration Curve Unimodal Above 20g?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Raul Berand

Approved

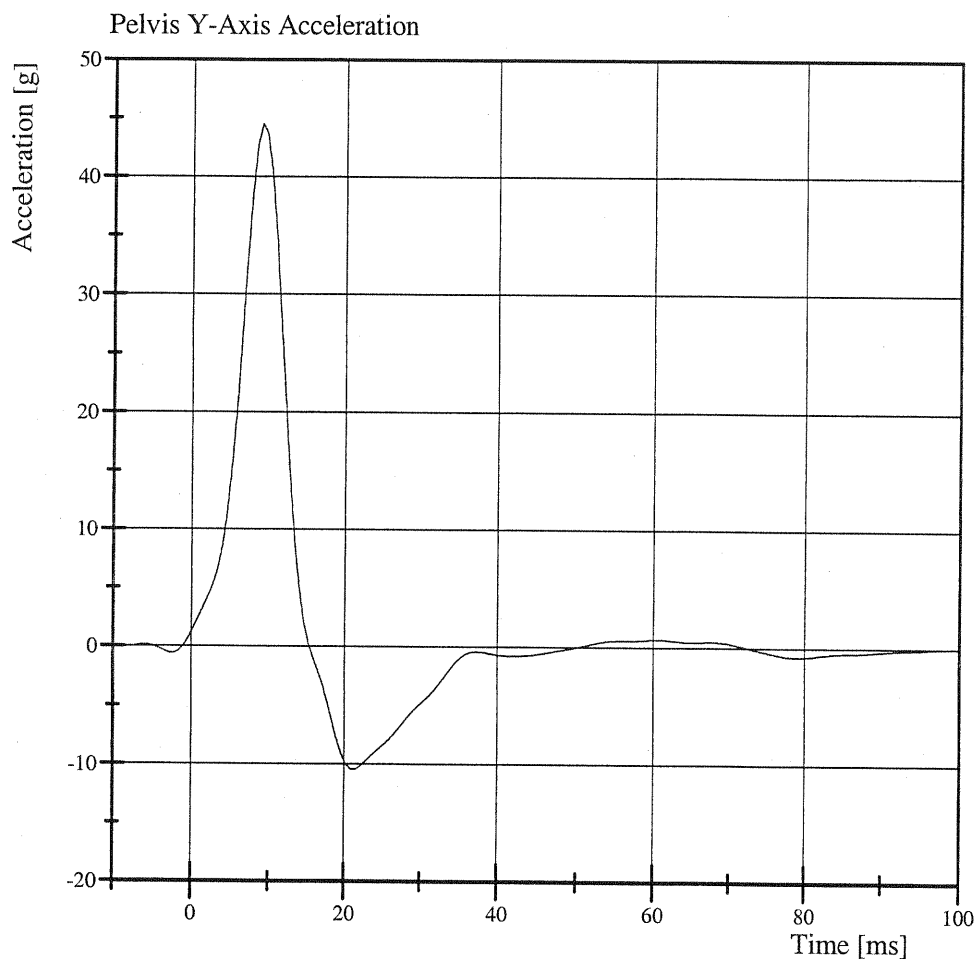
Ron Stoner

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 066 Certification No. 26-1

Test Date: 11/20/2007



Filter Class: FIR_100

Max: 44.5 g at 9.0 ms

Min: -10.4 g at 21.4 ms

CALIBRATION TEST RESULTS

PRE-TEST

SID/HIII: 059

Transportation Research Center Inc.
SID/HIII Dummy Post-Test
External Dimensions
Serial No. 059 Calibration No. 26

Test Parameter	Dimension	Specification	Results	Pass
Seated Height	SH	889.0 - 909.3 mm	906 mm	Yes
Rib Height	RH	501.7 - 520.7 mm	516 mm	Yes
Hip Pivot Height	HP	99.1 REF mm	99.1 mm	
Knee Pivot From Backline	KH	510.5 - 525.8 mm	523 mm	Yes
Knee Pivot From Floor	KV	490.2 - 505.5 mm	500 mm	Yes
Hip Width	HW	355.6 - 391.2 mm	370 mm	Yes
Top Rib Width From CVL	RW-1	165.1 - 180.3 mm	174 mm	Yes
Bottom Rib Width From CVL	RW-2	165.1 - 180.3 mm	174 mm	Yes
Difference Between Top & Bottom Rib Width from CVL		<= 2.5 mm	0.0 mm	Yes

Technician

Raul Beran

Approved

Ron Stoner



Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 059 Certification No. 26-1

Test Date: 11/19/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Peak Head Resultant Acceleration	120 - 150 g	149.0 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-5.5 g	Yes
Is Head Resultant Acceleration Curve Unimodal Within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Rand Borand

Approved

Ron Stone

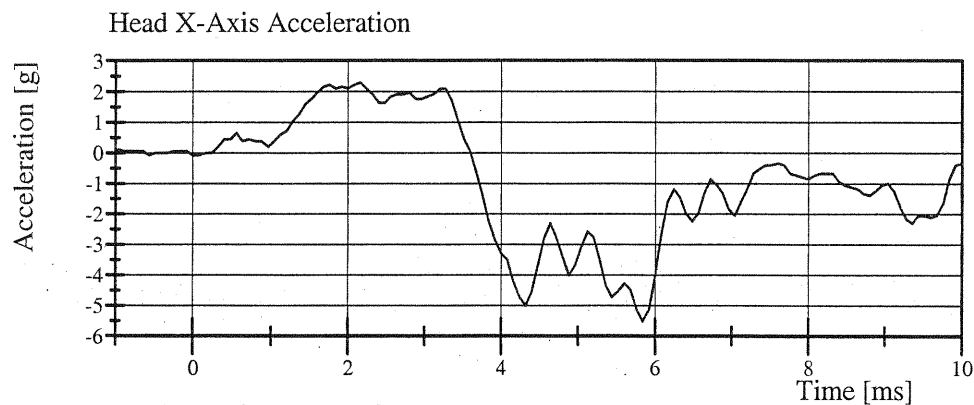


Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 059 Certification No. 26-1

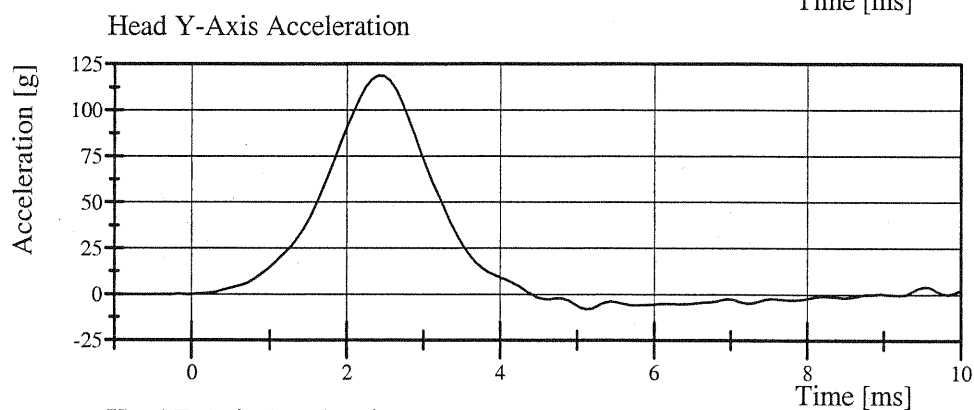
Test Date: 11/19/2007



Filter Class: CFC_1000

Max: 2.3 g at 2.2 ms

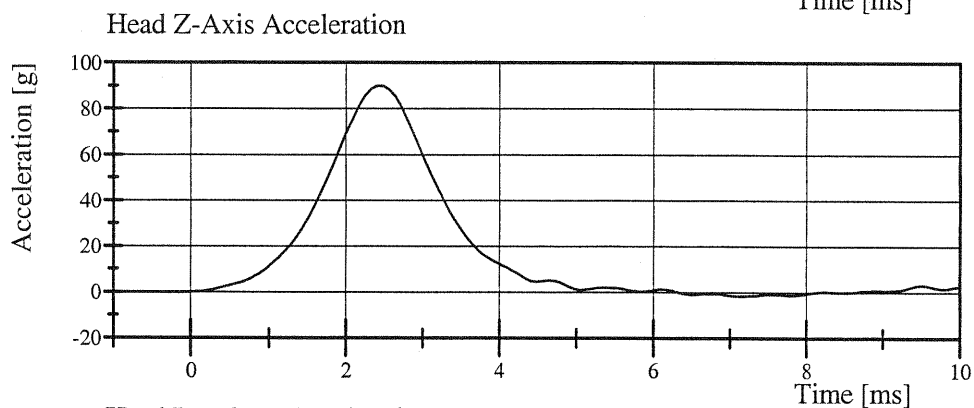
Min: -5.5 g at 5.8 ms



Filter Class: CFC_1000

Max: 118.7 g at 2.4 ms

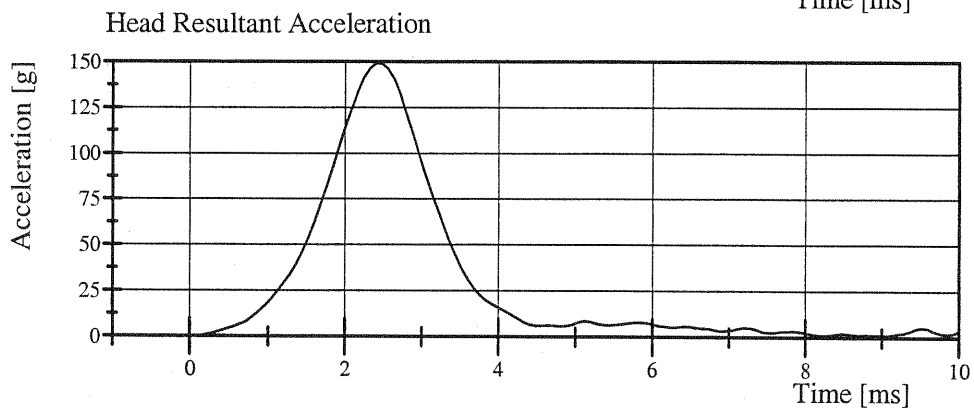
Min: -8.2 g at 5.1 ms



Filter Class: CFC_1000

Max: 90.0 g at 2.4 ms

Min: -1.7 g at 7.2 ms



Filter Class: CFC_1000

Max: 149.0 g at 2.4 ms

Min: 0.0 g at -0.3 ms

Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 26-1

Test Date: 11/19/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	(-6.89) - (-7.13) m/s	-6.948 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	1.96 - 2.55 m/s	2.231 m/s	Yes
Pendulum Integrated Velocity Change at 20 ms	4.12 - 5.10 m/s	4.455 m/s	Yes
Pendulum Integrated Velocity Change at 30 ms	5.73 - 7.01 m/s	6.196 m/s	Yes
Pendulum Integrated Velocity Change at 40 to 70 ms	6.27 - 7.64 m/s	7.186 m/s	Yes
Total Head D-Plane Rotation	(-66) - (-82) °	-71.7 °	Yes
Total Head D-Plane Rotation Time to 0° after Peak Rotation	58 - 67 ms	63.3 ms	Yes
Total Neck Occipital Condyle Moment	73 - 88 N·m	82.0 N·m	Yes
Total Neck Occipital Condyle Moment Time to 0 N·m after Peak Moment	49 - 64 ms	50.9 ms	Yes
Time from Peak Moment to Peak Rotation	2 - 16 ms	7.6 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Storer

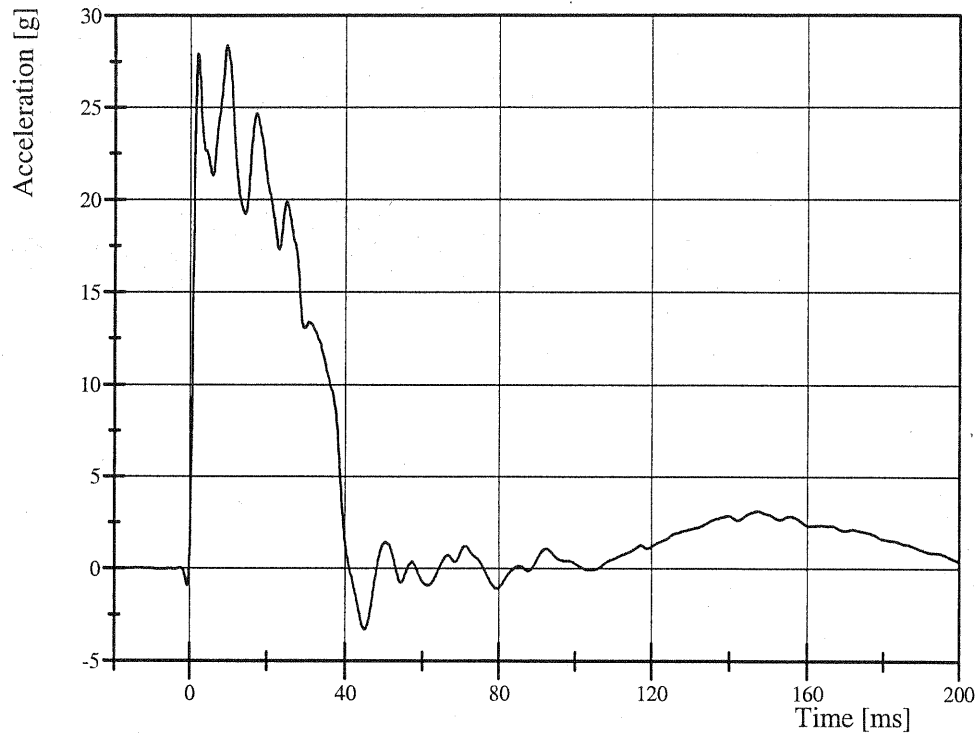
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 26-1

Test Date: 11/19/2007

Pendulum Acceleration

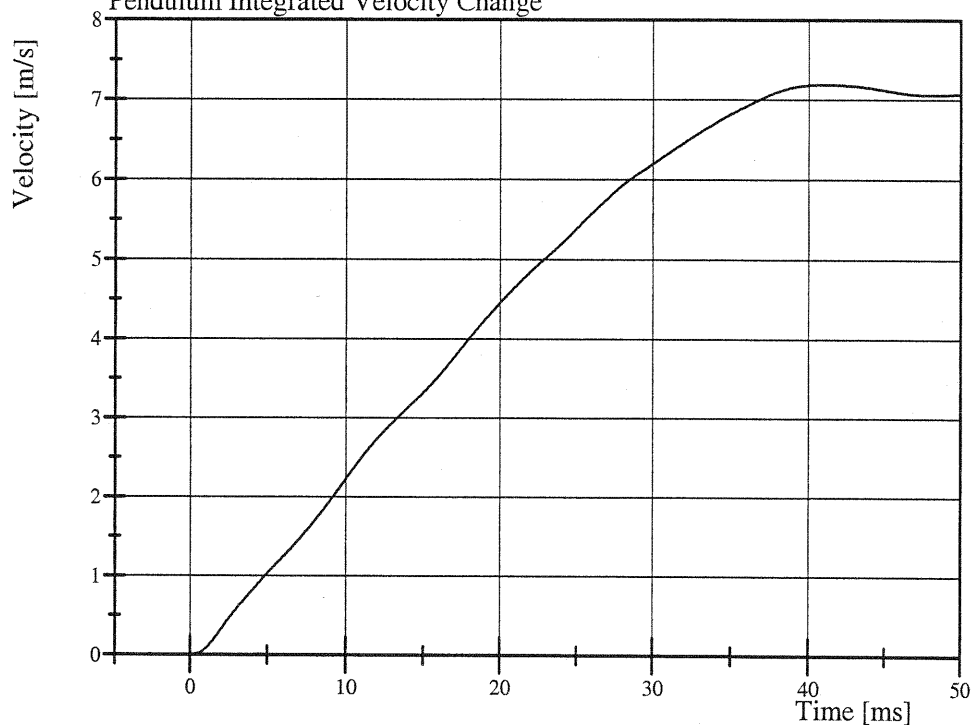


Filter Class: CFC_180

Max: 28.4 g at 9.6 ms

Min: -3.3 g at 45.1 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 7.2 m/s at 41.1 ms

Min: 0.0 m/s at 0.0 ms

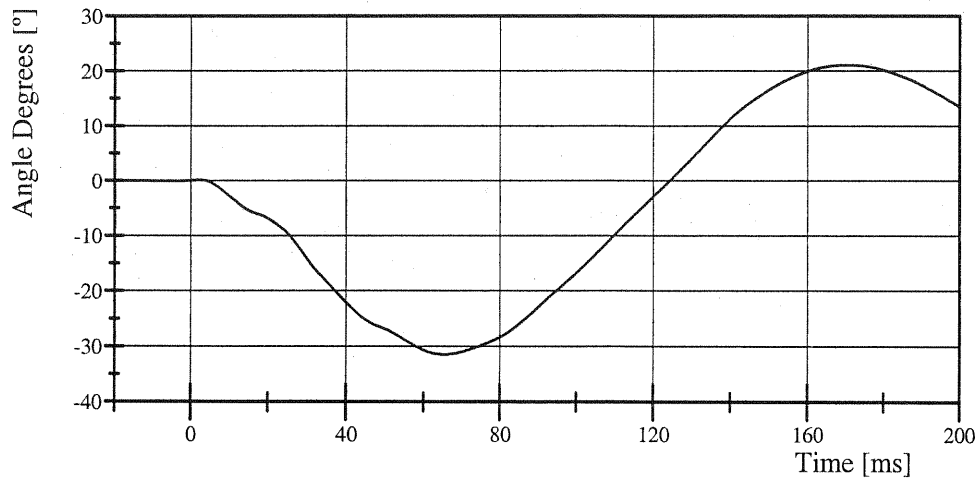
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 26-1

Test Date: 11/19/2007

Pot Rotation at the Base of Neck

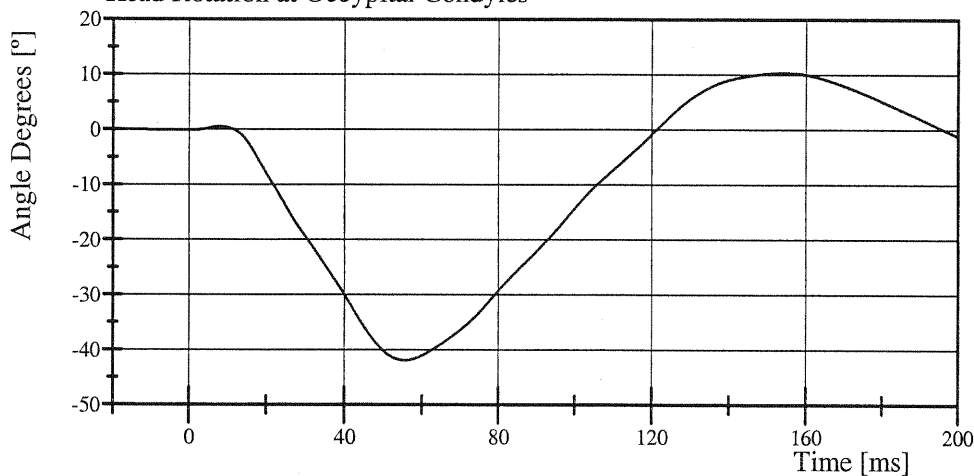


Filter Class: CFC_60

Max: 21.1 ° at 170.6 ms

Min: -31.5 ° at 65.4 ms

Head Rotation at Occypital Condyles

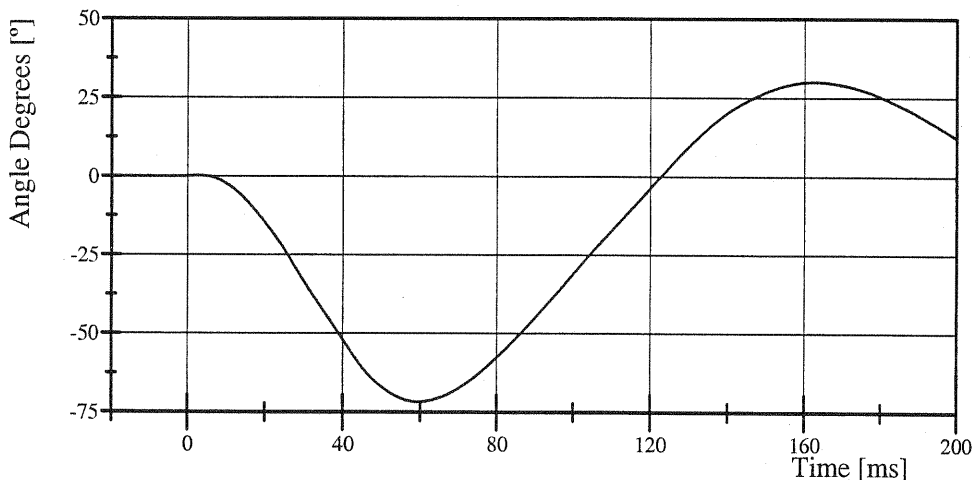


Filter Class: CFC_60

Max: 10.4 ° at 154.2 ms

Min: -41.9 ° at 55.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 30.1 ° at 162.6 ms

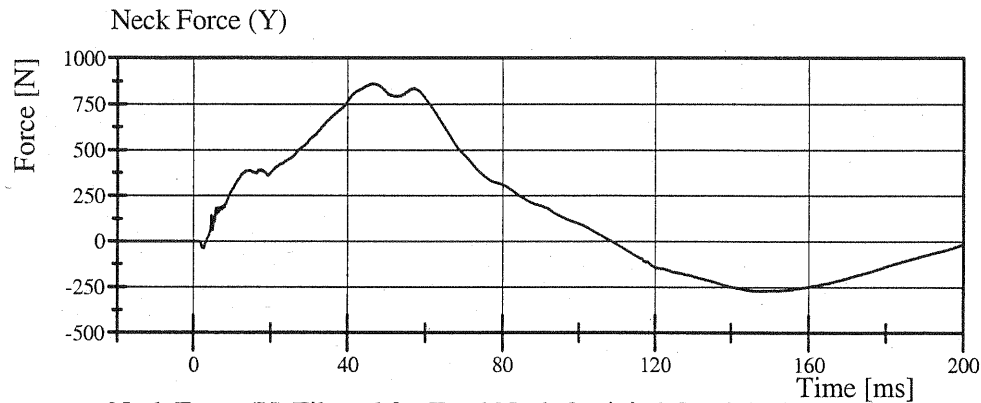
Min: -71.7 ° at 59.4 ms

Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 26-1

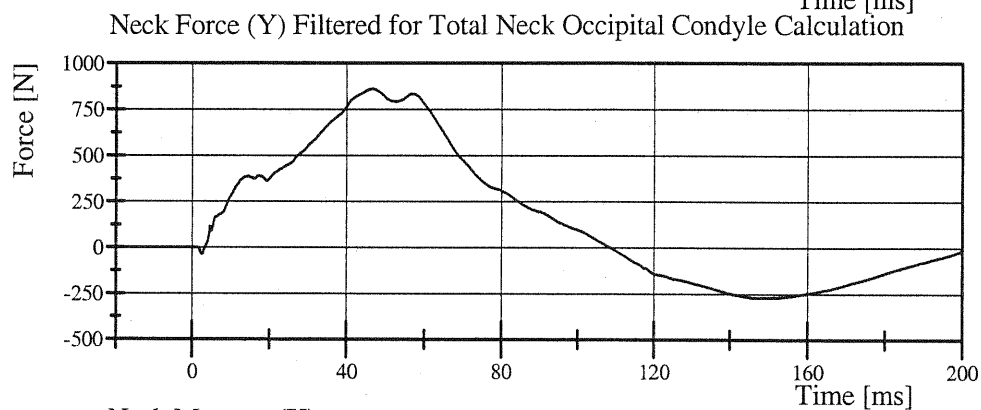
Test Date: 11/19/2007



Filter Class: CFC_1000

Max: 862.2 N at 46.7 ms

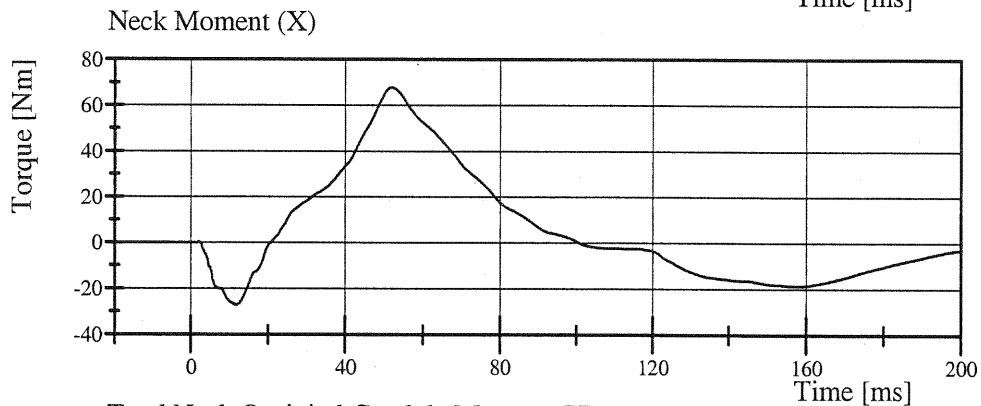
Min: -271.5 N at 147.4 ms



Filter Class: CFC_600

Max: 861.2 N at 46.6 ms

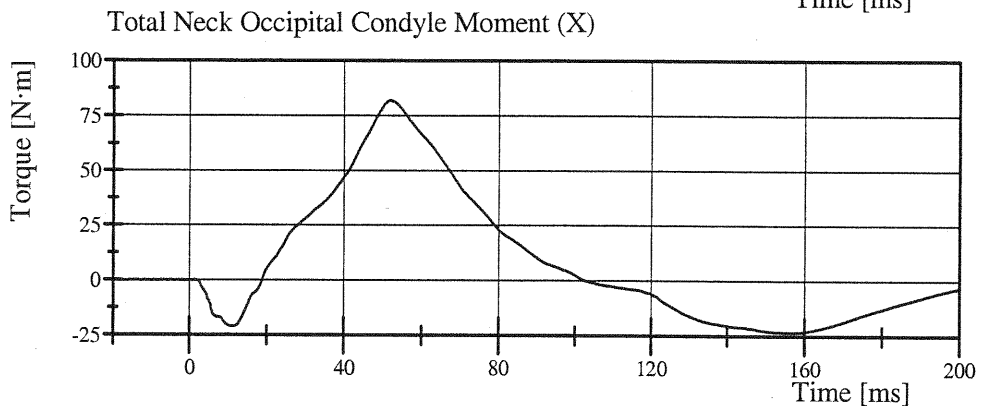
Min: -271.4 N at 147.4 ms



Filter Class: CFC_600

Max: 67.9 Nm at 51.9 ms

Min: -27.1 Nm at 11.7 ms



Filter Class: CFC_600

Max: 82.0 N·m at 51.8 ms

Min: -23.2 N·m at 157.6 ms

Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 059 Certification No. 26-2

Test Date: 11/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	34 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.286 m/s	Yes
Upper Rib Lateral Acceleration	37 - 46 g	42.4 g	Yes
Lower Rib Lateral Acceleration	37 - 46 g	40.9 g	Yes
Lower Spine Lateral Acceleration	15 - 22 g	20.2 g	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Stoner

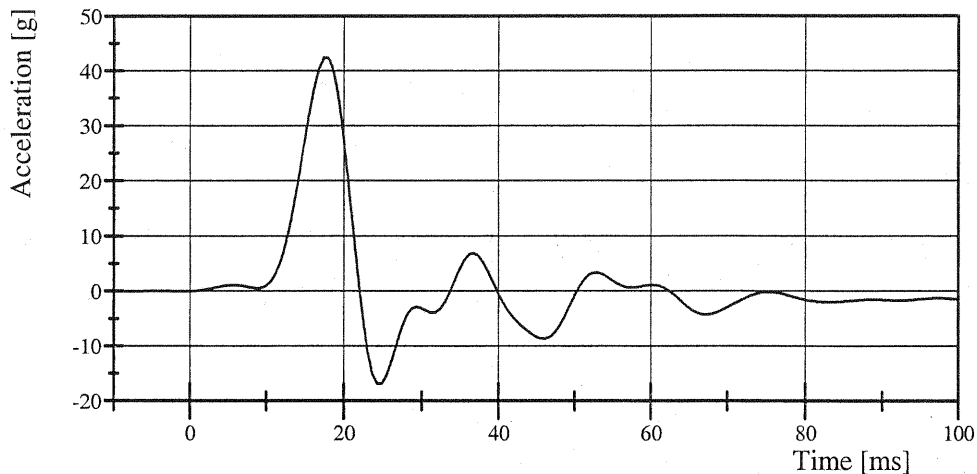
Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 059 Certification No. 26-2

Test Date: 11/16/2007

Upper Rib Acceleration (Y)

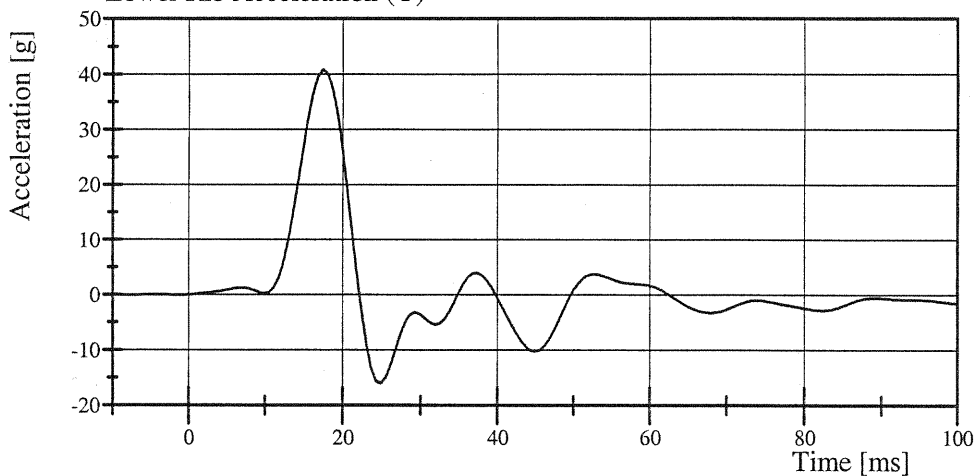


Filter Class: FIR_100

Max: 42.4 g at 17.4 ms

Min: -16.9 g at 24.3 ms

Lower Rib Acceleration (Y)

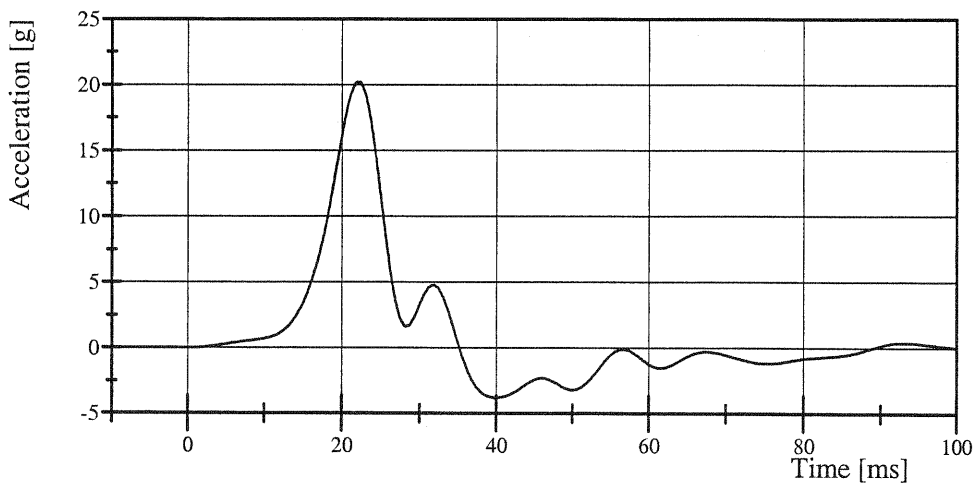


Filter Class: FIR_100

Max: 40.9 g at 17.4 ms

Min: -16.0 g at 24.9 ms

Lower Spine Acceleration (Y)



Filter Class: FIR_100

Max: 20.2 g at 22.4 ms

Min: -3.8 g at 39.9 ms

Transportation Research Center Inc.

3.05 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 059 Certification No. 23-1

Test Date: 10/1/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Maximum Force at Test Velocity	848 - 1,136 N	906.3 N	Yes
Maximum Displacement at Test Velocity	30.18 - 35.16 mm	31.319 mm	Yes

Test meets specifications.

Comments:

Actual Impactor Velocity (m/s): 3.063

Damper Setting: 5.5

Technician

Charles W. Beale

Approved

Ron Stoner



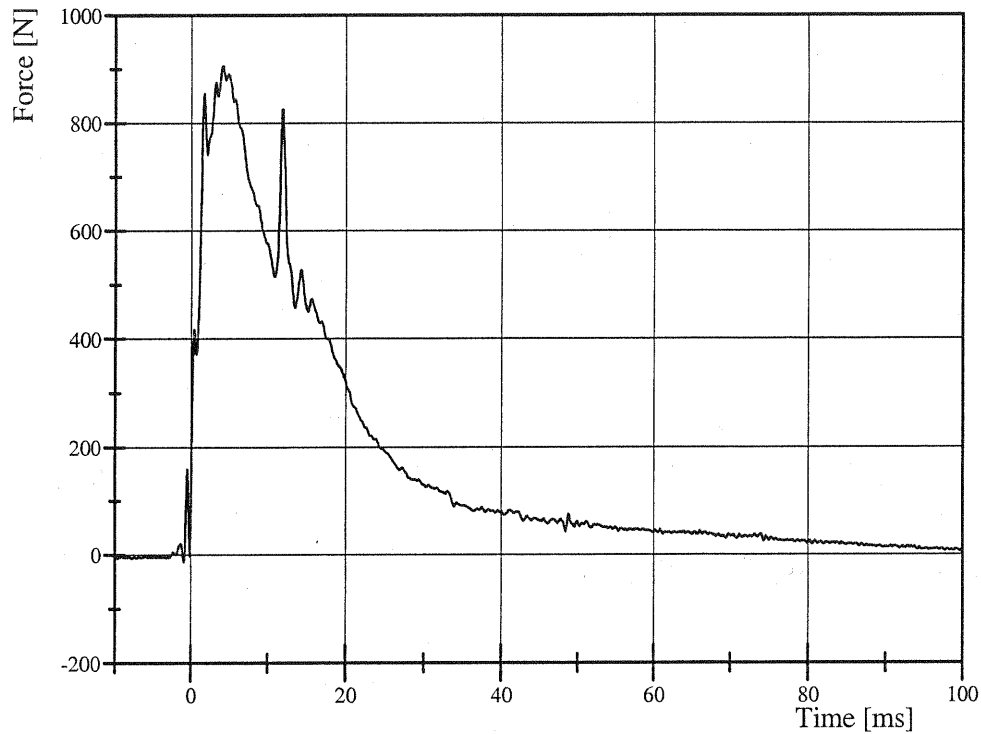
Transportation Research Center Inc.

3.05 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 059 Certification No. 23-1

Test Date: 10/1/2007

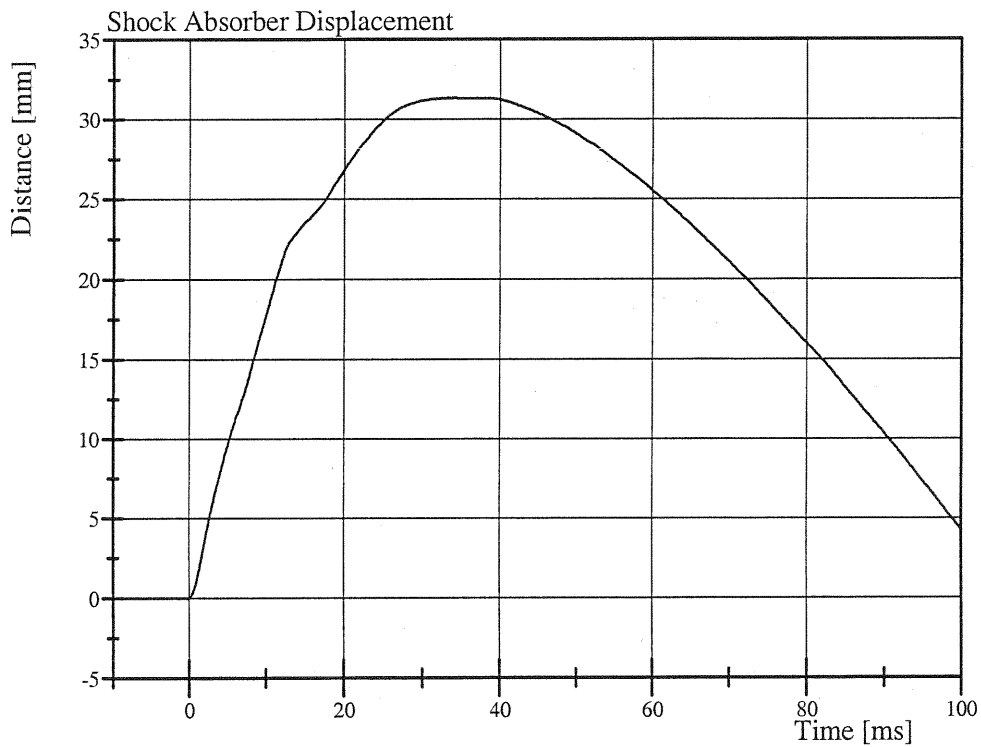
Shock Absorber Resistive Force



Filter Class: CFC_1000

Max: 906.3 N at 4.1 ms

Min: -12.9 N at -1.0 ms



Filter Class: CFC_1000

Max: 31.3 mm at 33.7 ms

Min: -0.0 mm at -8.6 ms

Transportation Research Center Inc.

4.27 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 059 Certification No. 23-1

Test Date: 10/1/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Maximum Force at Test Velocity	1,749 - 2,114 N	1,803.2 N	Yes
Maximum Displacement at Test Velocity	31.69 - 37.25 mm	34.412 mm	Yes

Test meets specifications.

Comments:

Actual Impactor Velocity (m/s): 4.283

Damper Setting: 5.5

Technician

Approved

Ron Stoner

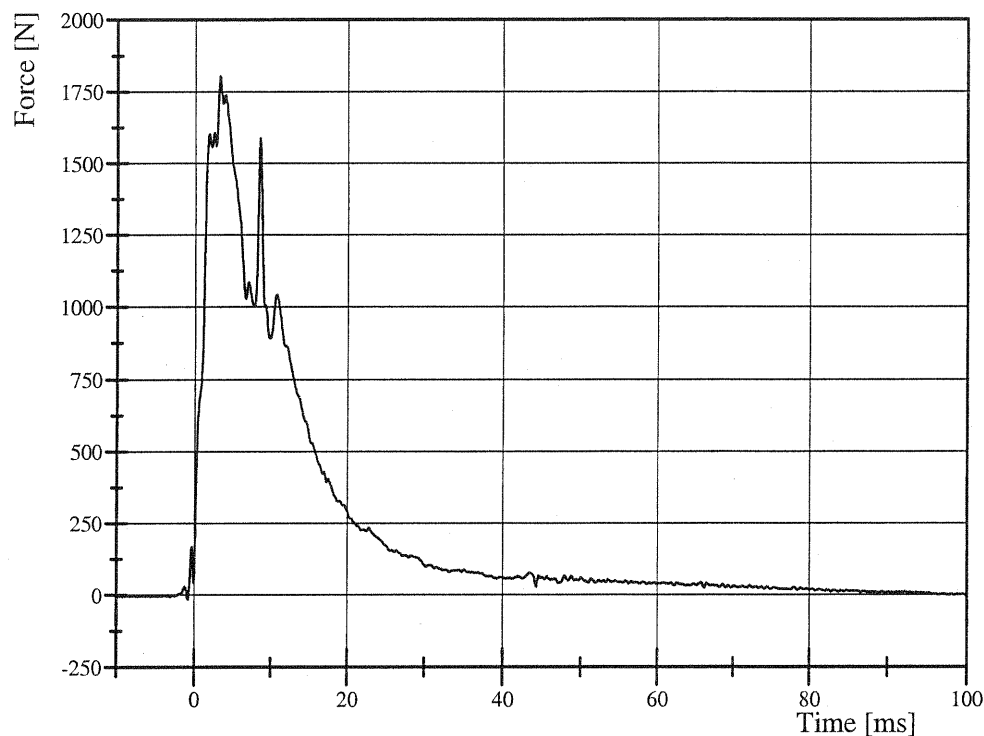
Transportation Research Center Inc.

4.27 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 059 Certification No. 23-1

Test Date: 10/1/2007

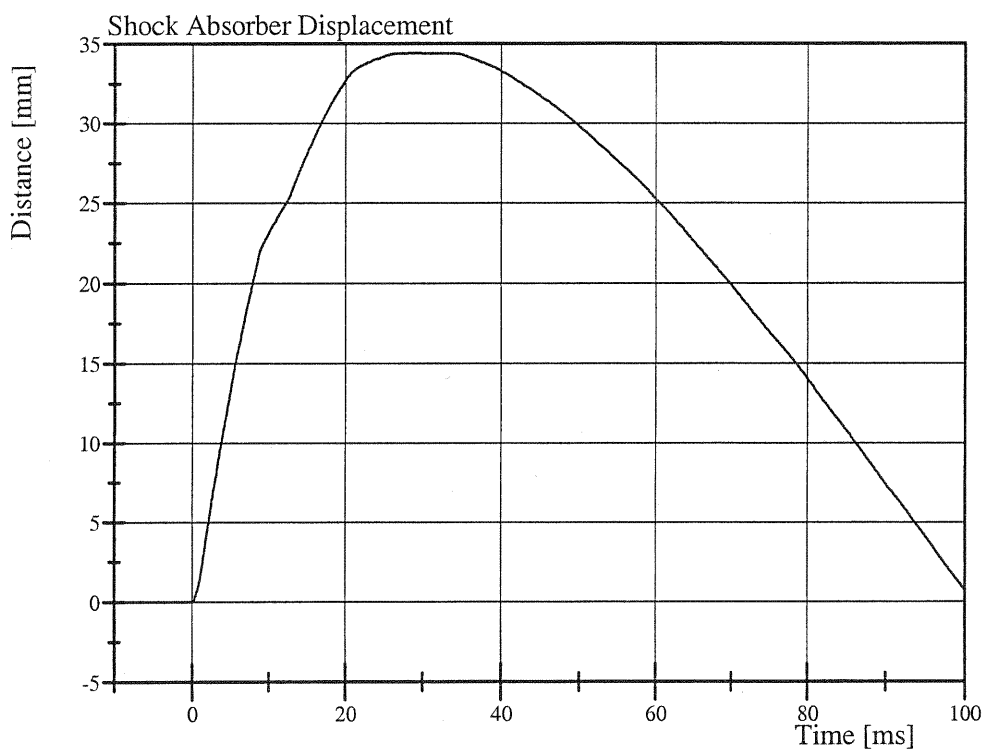
Shock Absorber Resistive Force



Filter Class: CFC_1000

Max: 1,803.2 N at 3.2 ms

Min: -14.1 N at -0.8 ms



Filter Class: CFC_1000

Max: 34.4 mm at 28.6 ms

Min: -0.0 mm at -4.6 ms

Transportation Research Center Inc.

6.10 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 059 Certification No. 23-2

Test Date: 10/1/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	46 %	Yes
Maximum Force at Test Velocity	3,810 - 4,515 N	3,926.2 N	Yes
Maximum Displacement at Test Velocity	33.4 - 39.62 mm	37.892 mm	Yes

Test meets specifications.

Comments:

Actual Impactor Velocity (m/s): 6.145

Damper Setting: 5.5

Technician

Charles W. Bell

Approved

Ron Stoner

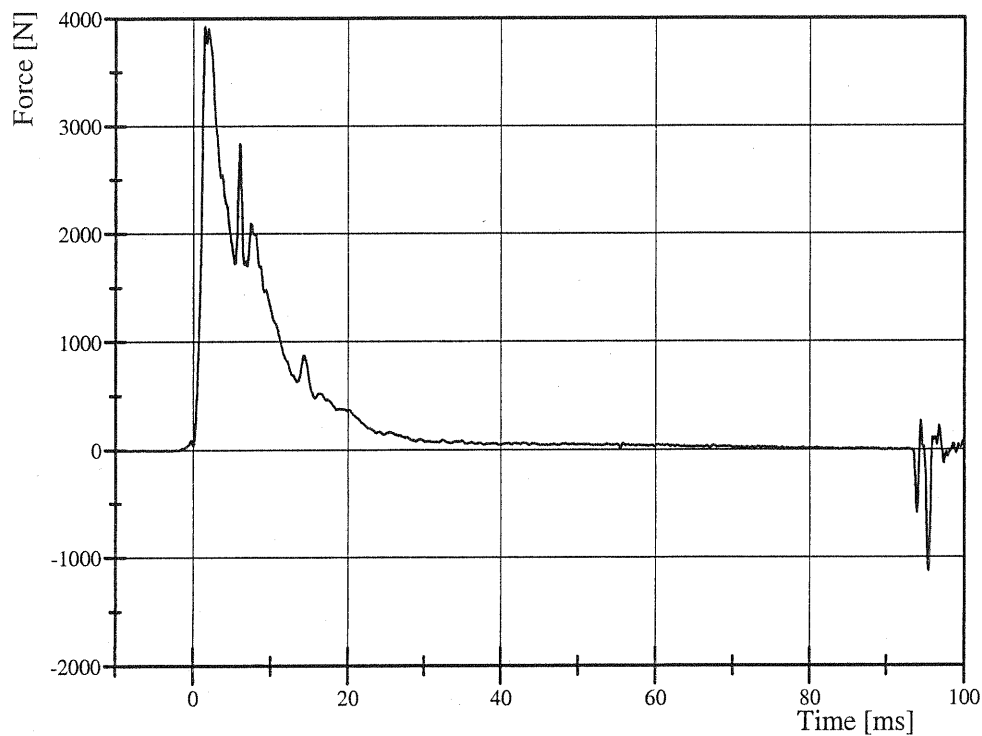
Transportation Research Center Inc.

6.10 m/s Thoracic Shock Absorber Compression

SID-HIII Serial No. 059 Certification No. 23-2

Test Date: 10/1/2007

Shock Absorber Resistive Force

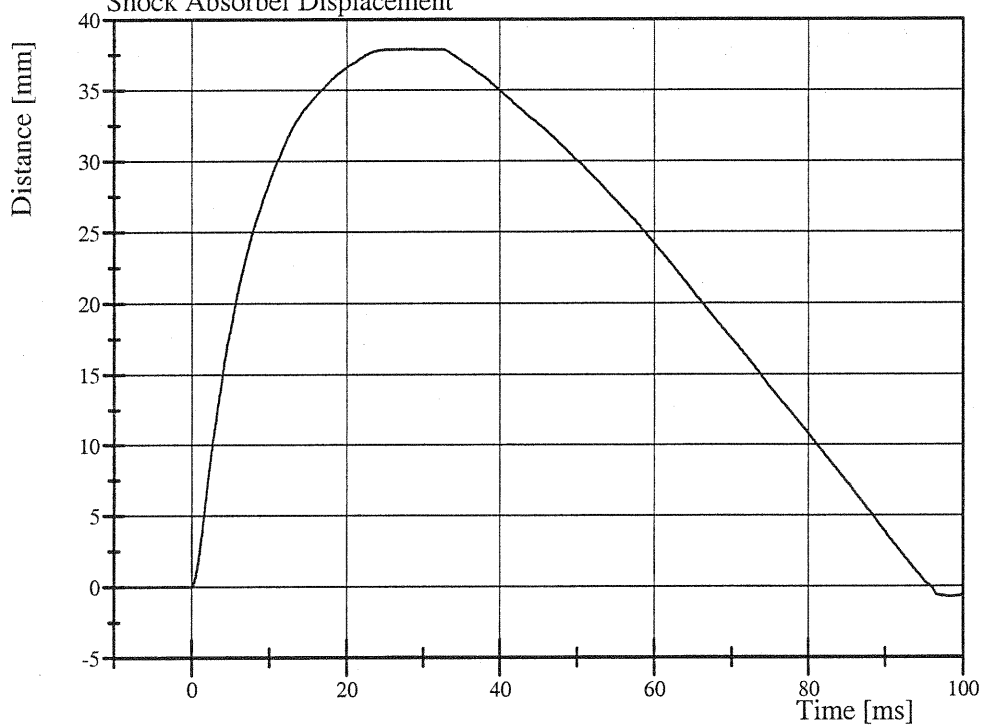


Filter Class: CFC_1000

Max: 3,926.2 N at 1.5 ms

Min: -1,125.5 N at 95.4 ms

Shock Absorber Displacement



Filter Class: CFC_1000

Max: 37.9 mm at 27.7 ms

Min: -0.7 mm at 98.4 ms

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 059 Certification No. 26-4

Test Date: 11/19/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Probe Force within Corridor	Yes	Yes	Yes
Probe Velocity	6.35 - 8.89 mm/s	7.868 mm/s	Yes

Test meets specifications.

Comments:

Technician

Raul Baranda

Approved

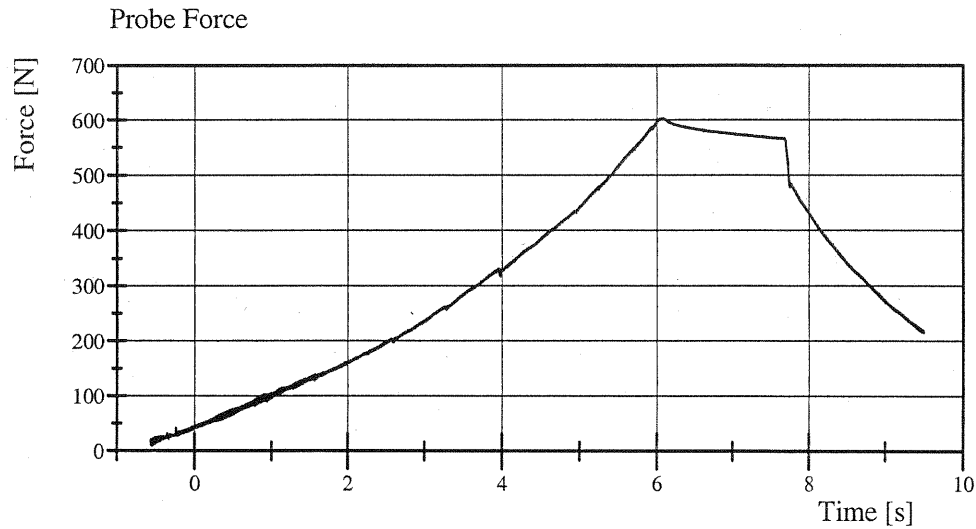
Ron Stoner

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 059 Certification No. 26-4

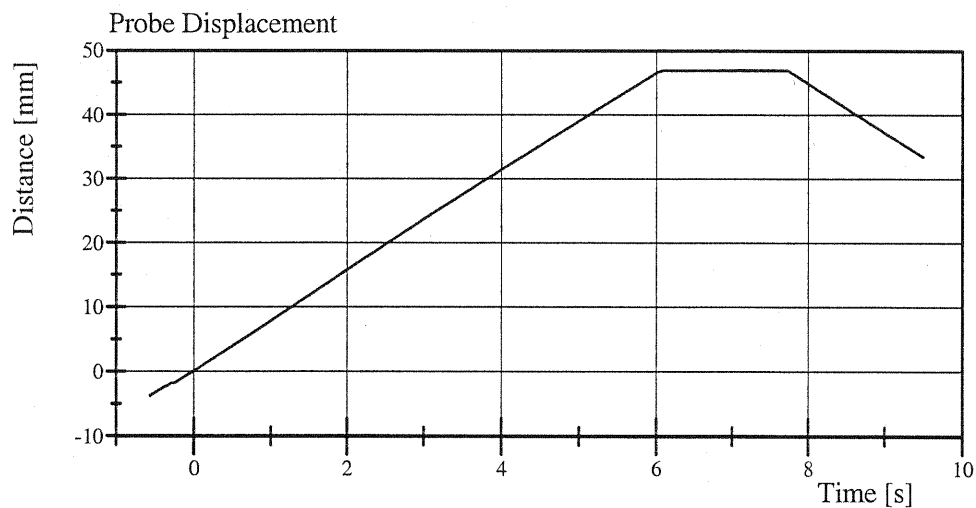
Test Date: 11/19/2007



Filter Class: CFC_600

Max: 602.6 N at 6.1 s

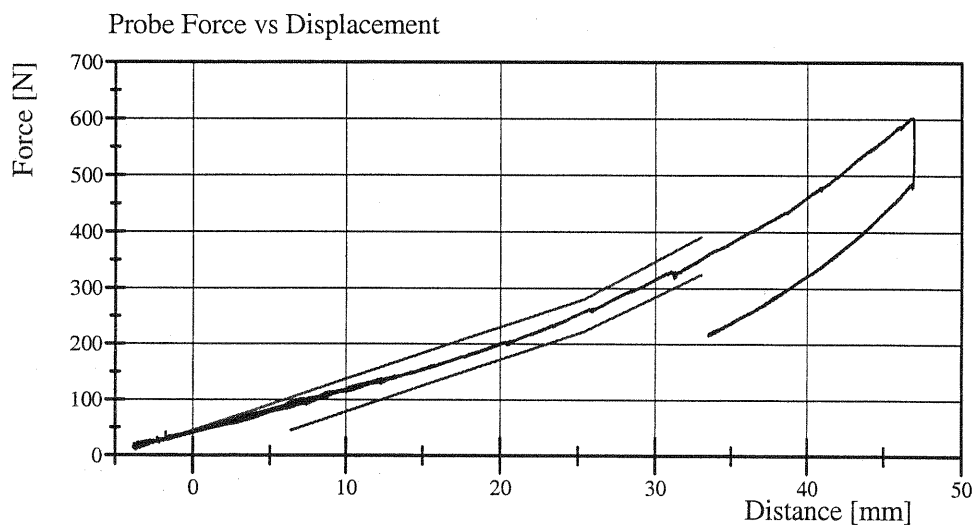
Min: 9.8 N at -0.5 s



Filter Class: CFC_180

Max: 46.9 mm at 7.4 s

Min: -3.8 mm at -0.6 s



Filter Class: CFC_600

Max: 602.6 N at 46.9 mm

Min: 9.8 N at -3.6 mm

TRANSPORTATION RESEARCH CENTER INC.

LUMBAR FLEXION TEST

SID PART 572B

CAL DATE: 19-Nov-07

TRC, INC.

TEST NO: LUFL-01

572B SN 059 TORSO FLEX CAL 26

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TIME	NA	1309
TEMPERATURE	18.9 – 25.6° C	21.4 C P
RELATIVE HUMIDITY	10 – 70 %	42 % P
FORCE AT 0 DEG. FLEXION	-27 – 27 N	0 N P
FORCE AT 20 DEG OF FLEXION	98 – 151 N	102.3 N P
FORCE AT 30 DEG OF FLEXION	151 – 205 N	160.14 N P
FORCE AT 40 DEG OF FLEXION	205 – 258 N	213.51 N P
NET RETURN ANGLE AFTER 3 MINUTES	< 12 °	5 ° P

TEST MEETS SPECIFICATIONS

TECHNICIAN

Rout Bernaldo

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 059 Certification No. 26-1

Test Date: 11/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.281 m/s	Yes
Pelvis Lateral Acceleration Duration above 20g	3 - 7 ms	6.5 ms	Yes
Pelvis Lateral Acceleration	40 - 60 g	44.0 g	Yes
Is Acceleration Curve Unimodal Above 20g?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Charles W. Hall

Approved

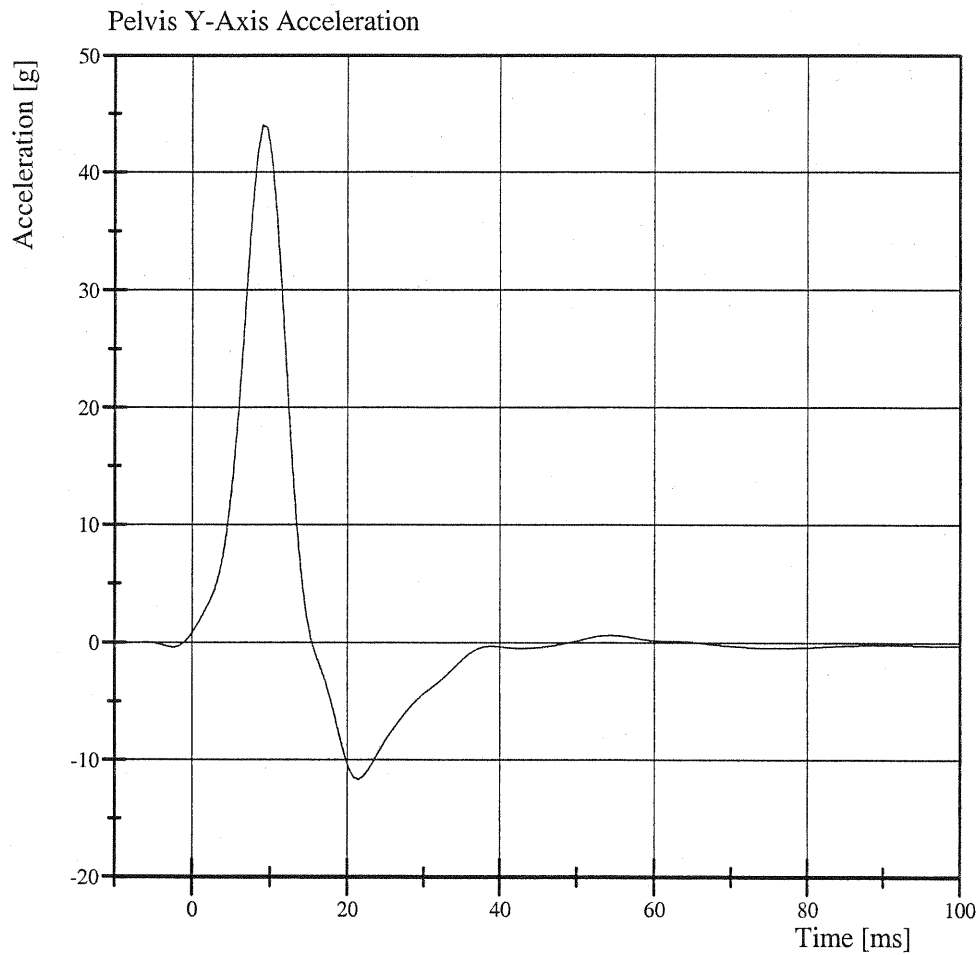
Ron Storer

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 059 Certification No. 26-1

Test Date: 11/16/2007



Filter Class: FIR_100

Max: 44.0 g at 9.0 ms

Min: -11.7 g at 21.5 ms

APPENDIX D
CHILD RESTRAINT SYSTEM

REPORT NUMBER: NCAPSIDE-TRC-2007-004

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**MITSUBISHI MOTORS CORPORATION
2008 MITSUBISHI OUTLANDER MPV
NHTSA NUMBER: M85603**

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



Test Date: December 4, 2007

Report Date: December 17, 2007

FINAL REPORT

**PREPARED FOR:
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, D.C. 20590**

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-03-D-02005. This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings, and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Test Performed By: Duey Thomas, Test Technician II

Report Approved By: _____

Emad Al-Tabakha, Test Engineer
Transportation Research Center Inc.

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

1. Report No. NCAPSIDE-TRC-2007-004	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of a Graco Snugride CRS NHTSA No.: M85603		5. Report Date December 17, 2007	
		6. Performing Organization Code TRC Inc.	
7. Author(s) Emad Al-Tabakha, Test Engineer Transportation Research Center Inc.		8. Performing Organization Report No. 071204	
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. DTNH22-03-D-02005	
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 December 2007	
		14. Sponsoring Agency Code DOT/NHTSA/NRM/OCS	
15. Supplemental Notes			
16. Abstract A side impact test was conducted on the subject CRS Graco Snugride 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 December 4, 2007. Head Injury Criteria (HIC36): 3 ms Chest Clip: <u>Right Rear</u> g's g's			
17. Key Words New Car Assessment Program (NCAP) Side Impact Side Impact Hybrid III Dummy (SID HIII) Occupant Side Impact Protection		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	
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. Number of Pages 50	22. Price

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D-3	CRABI Response and CRS Data	D3-1
D-4	CRABI Calibration Information	D4-1

<u>Data Sheet No.</u>		<u>Page No.</u>
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SECTION D1
PURPOSE AND SUMMARY OF TEST M85603

PURPOSE

The purpose of this test is to obtain CRS performance data during a 55/28 km/h 90 degree Moving Deformable Barrier Side Impact NCAP Test.

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

SUMMARY

One 12-month old CRABI (P3) was instrumented with head, chest, pelvis, and six-axis upper neck load cells. A tri-axial accelerometer was installed on the CRS base. Seat belt load cells were placed on the inboard and outboard lower tethers.

The right rear (Serial No. 095) CRABI was calibrated prior to this test. CRABI calibration information is found in Section D-4.

CHILD DUMMY VALUES		
Location	HIC36 Value	3 ms Chest Clip
CRABI (P3)	101.1	21.6

DATA SHEET NO. 1

CRASH TEST SUMMARY

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

NHTSA No.: M85603
Test Date: 12/04/07

CHILD RESTRAINT SYSTEM INFORMATION

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

VISIBLE DUMMY CONTACT POINTS

Description	Position #3 CRS
Head Contact	Right of CRS
Chest Contact	None
Abdomen Contact	None
Left Knee Contact	None
Right Knee Contact	None
Left Toe Contact	None
Right To Contact	None

POST-TEST DOOR OPENINGS

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

CAMERAS

Description	Standard
High Speed	1
Real Time	0
Total	1

DATA CHANNELS

CRABI (P3) Sensors	15
CRS Sensors	3
Total	18

DATA SHEET NO. 2**VEHICLE PARAMETER DATA**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85603Test Program: NCAP Side ImpactTest Date: 12/04/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	468.2	371.4		517.0	448.0	
Right	kg	458.2	354.8		474.4	421.0	
Ratio	%	56.1	43.9		53.3	47.9	
Totals	kg	926.4	726.2	1652.6	991.4	869.0	1860.4

TARGET TEST WEIGHT CALCULATION

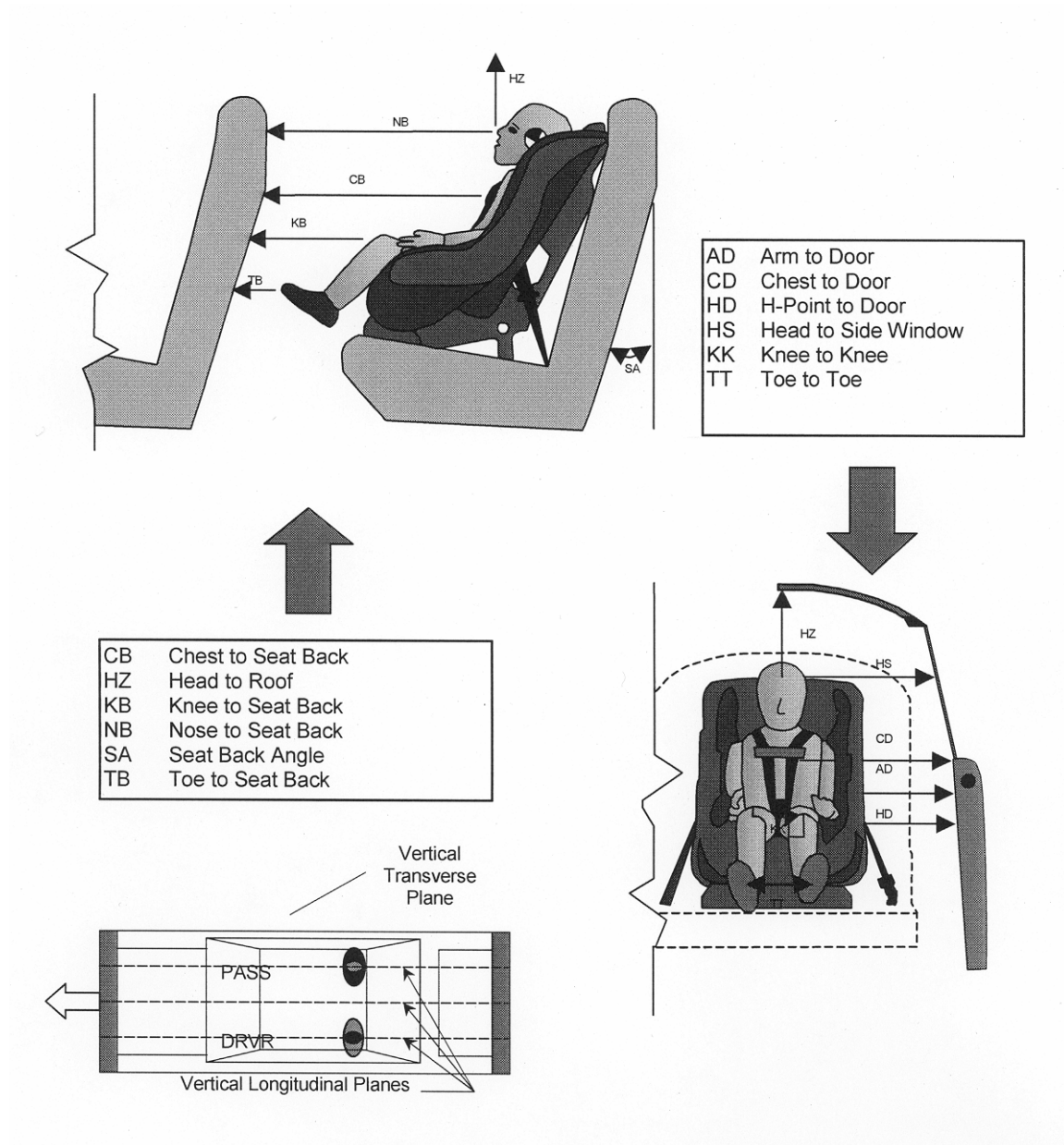
Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1652.6
Weight of 2 P572M ATDs	kg	162.0
Rated Cargo/Luggage Weight (RCLW)	kg	49.0
Calculated Vehicle Target Weight (TVTW)	kg	1862.6

DATA SHEET NO. 3

CRABI POSITIONING IN VEHICLE

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

NHTSA No.: M85603
Test Date: 12/04/07



Note: Child seat was rearward facing.

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

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

NHTSA No.: M85603
Test Date: 12/04/07

Code	Measurement Description	P3 (Passenger's Side)	
		Length (mm)	Angle (°)
SA	Seat Back Angle		33.2
HZ	Head to Roof	408	
CB	Chest to Seatback	445	
KB	Left Knee to Seatback	207	
NB	Nose to Seatback	521	
TB	Toe to Seatback	70	

DATA SHEET NO. 4**CRS PERFORMANCE DATA**Test Vehicle: 2008 Mitsubishi OutlanderNHTSA No.: M85603Test Program: NCAP Side ImpactTest Date: 12/04/07**CRS PERFORMANCE DATA**

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

DATA SHEET NO. 5

CRS ACCELEROMETER LOCATIONS

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

NHTSA No.: M85603
Test Date: 12/04/07

CRS ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	CRS CG	--- ¹	--- ¹	--- ¹

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

¹ Measurements not taken.

DATA SHEET NO. 6

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2008 Mitsubishi Outlander

NHTSA No.: M85603

Test Program: NCAP Side Impact

Test Date: 12/04/07

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	Vehicle Onboard Rear SID/HIII, Side	1700	920	-1400	6.5	1000

Reference Points: X - Impact Line

Y - MDB Left Edge Impact Point

Z - Ground Plane

APPENDIX D2
PHOTOGRAPHS

List of Photographs

<u>Figure</u>	<u>Description</u>	<u>Page</u>
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Figure D-14	Post-Test Right Rear Dummy Feet Contact View	D2-16

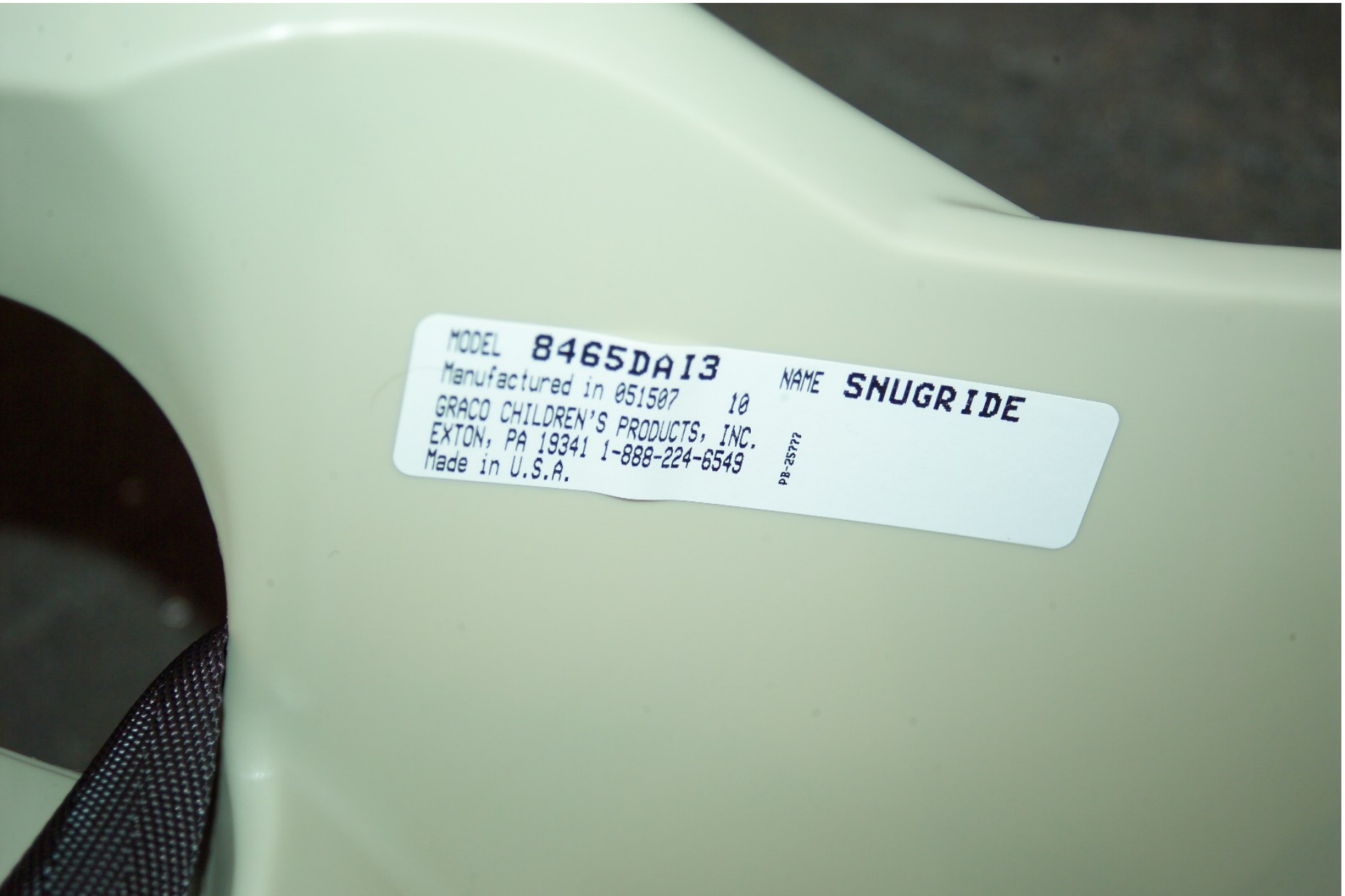


Figure D-1 Pre-Test Child Restraint Certification Label View



Figure D-2 Pre-Test Front View of Right Rear CRS



Figure D-3 Post-Test Front View of Right Rear CRS



Figure D-4 Pre-Test Left Side View of Right Rear CRS



Figure D-5 Post-Test Left Side View of Right Rear CRS



Figure D-6 Pre-Test Right Side View of Right Rear CRS



Figure D-7 Post-Test Right Side View of Right Rear CRS



Figure D-8 Pre-Test Front View of Right Rear Dummy



Figure D-9 Post-Test Front View of Right Rear Dummy



Figure D-10 Pre-Test Left Side View of Right Rear Dummy



Figure D-11 Post-Test Left Side View of Right Rear Dummy

D2-13

071204



Figure D-12 Pre-Test Right Side View of Right Rear Dummy



Figure D-13 Post-Test Right Side View of Right Rear Dummy



Figure D-14 Post-Test Right Rear Dummy Feet Contact View

APPENDIX D3
CRABI RESPONSE AND CRS DATA

<u>Data Plot</u>	<u>LIST OF DATA PLOTS PROVIDED IN THE TEST REPORT</u>	<u>Page</u>
D3-1	Right Rear CRABI Head X	D3-3
D3-1	Right Rear CRABI Head Y	D3-3
D3-1	Right Rear CRABI Head Z	D3-3
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D3-2	Right Rear CRABI Chest Z	D3-4
D3-2	Right Rear CRABI Chest Resultant	D3-4

NHTSA

Test Lab: CTF

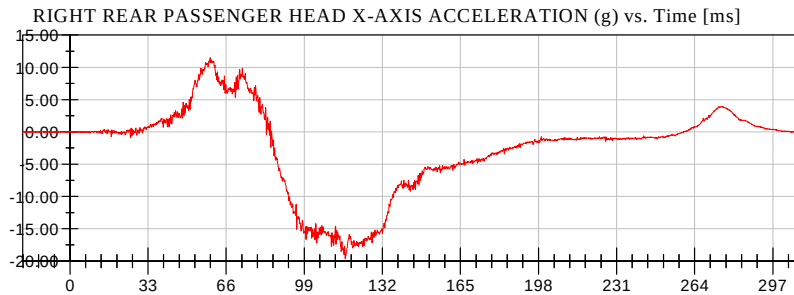
Test Number: 071204 (M85603)

Position #1 SID H3 Dummy (11SH)

Position #4 SID H3 Dummy (14SH)

Position #3 Crabi 12 month old Dummy (095)

Test Date: 12/04/2007

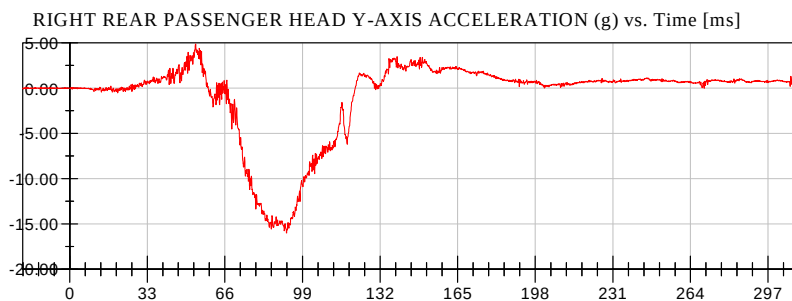


<Max>

11.50 g at 59.20 ms

<Min>

-19.64 g at 116.40 ms

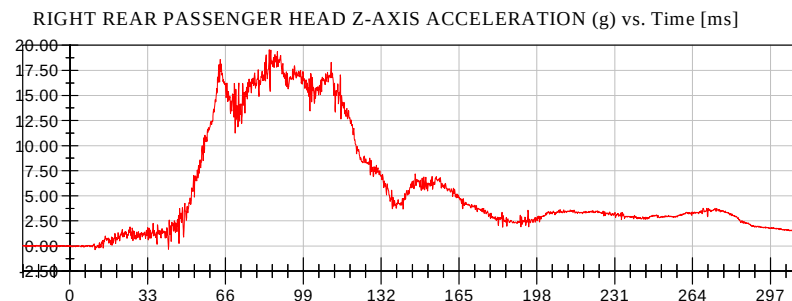


<Max>

4.90 g at 53.52 ms

<Min>

-16.00 g at 92.24 ms

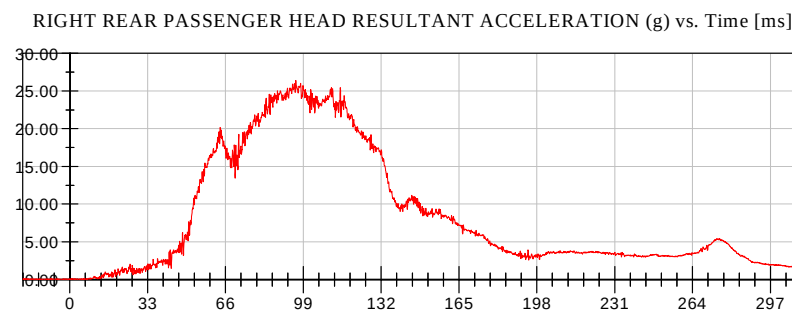


<Max>

19.55 g at 84.56 ms

<Min>

-0.39 g at 10.72 ms



<Max>

26.42 g at 95.76 ms

<Min>

0.01 g at -19.84 ms



NHTSA

Test Lab: CTF

Test Number: 071204 (M85603)

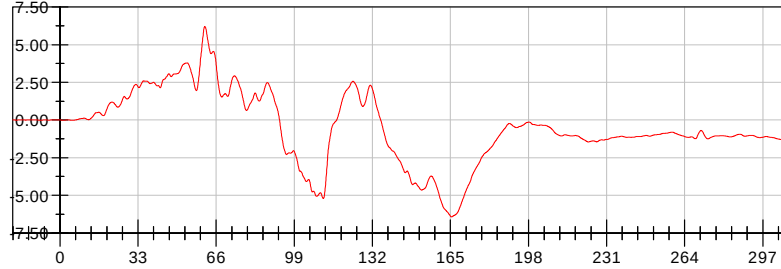
Position #1 SID H3 Dummy (11SH)

Position #4 SID H3 Dummy (14SH)

Position #3 Crabi 12 month old Dummy (095)

Test Date: 12/04/2007

RIGHT REAR PASSENGER CHEST X-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

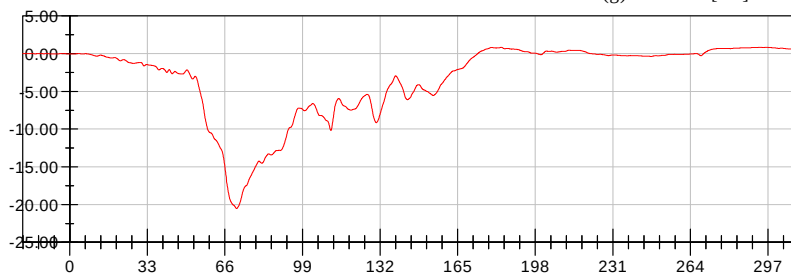
6.22 g at 61.20 ms

<Min>

-6.43 g at 165.52 ms

CFC_180

RIGHT REAR PASSENGER CHEST Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

0.85 g at 293.60 ms

<Min>

-20.50 g at 70.96 ms

CFC_180

RIGHT REAR PASSENGER CHEST Z-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

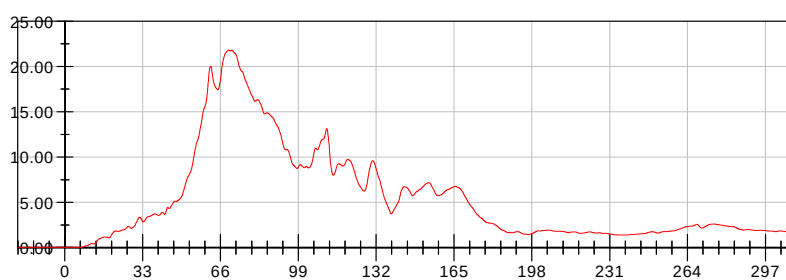
15.37 g at 61.84 ms

<Min>

-0.02 g at -2.96 ms

CFC_180

RIGHT REAR PASSENGER CHEST RESULTANT ACCELERATION (g) vs. Time [ms]



<Max>

21.82 g at 70.80 ms

<Min>

0.00 g at -4.00 ms

CFC_180



APPENDIX D4
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

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. Beall

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

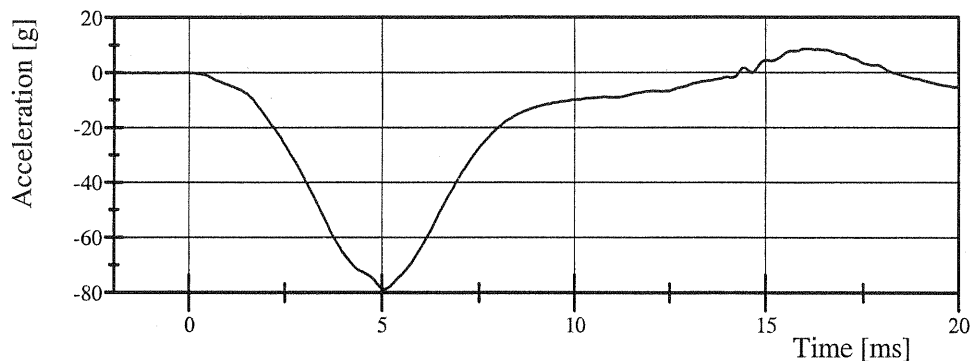
Transportation Research Center Inc.

Front Head Drop

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

Test Date: 11/12/2007

Head X-Axis Acceleration

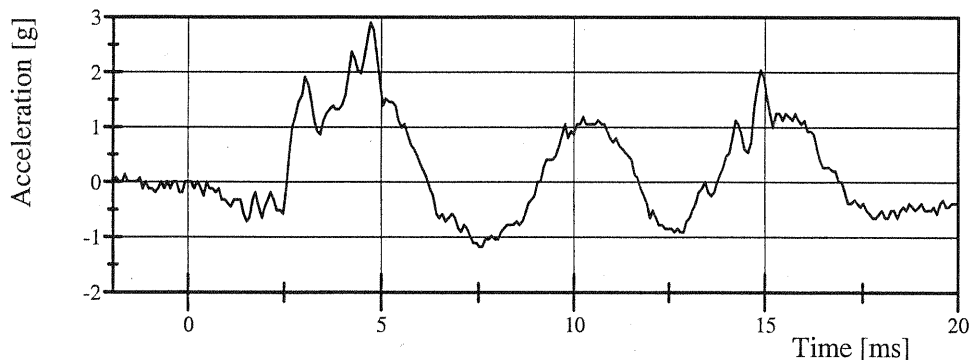


Filter Class: CFC_1000

Max: 8.7 g at 16.0 ms

Min: -78.7 g at 5.0 ms

Head Y-Axis Acceleration

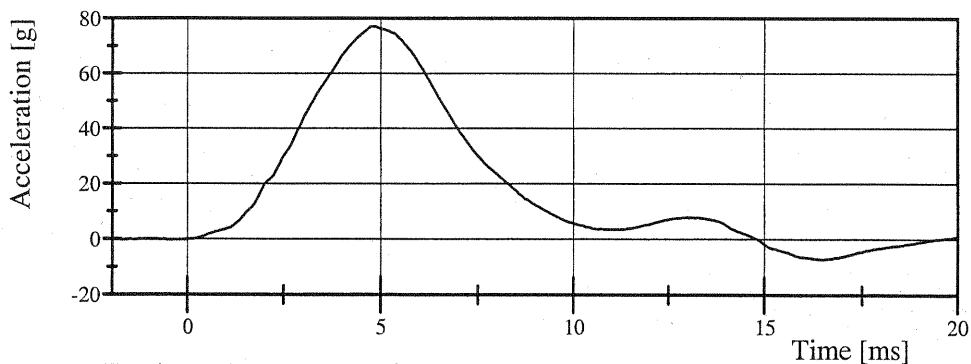


Filter Class: CFC_1000

Max: 2.9 g at 4.7 ms

Min: -1.2 g at 7.5 ms

Head Z-Axis Acceleration

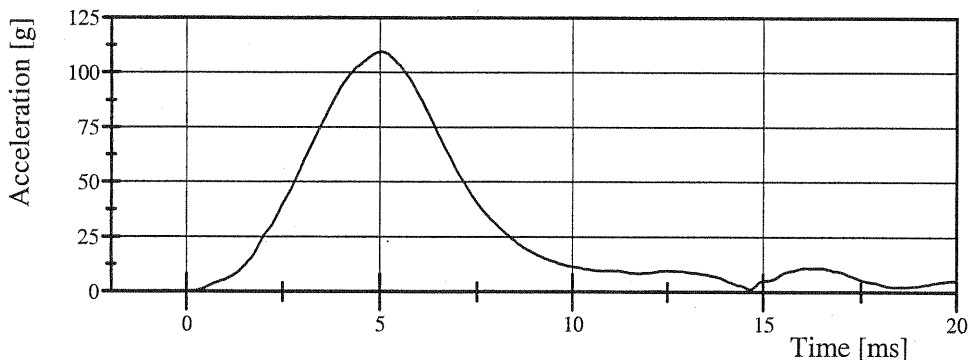


Filter Class: CFC_1000

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

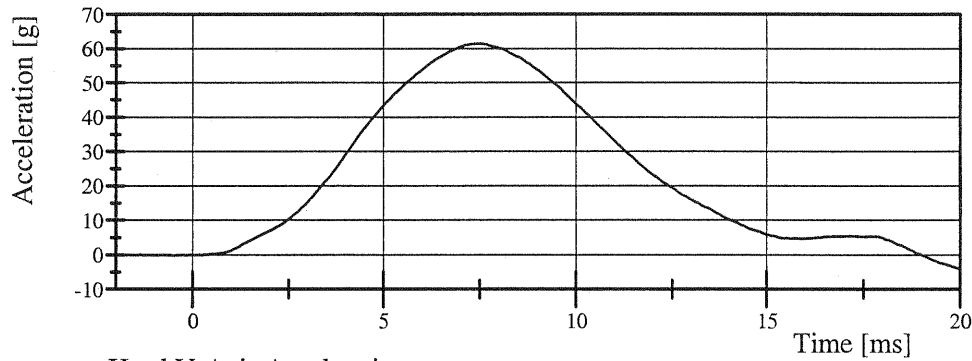
Transportation Research Center Inc.

Rear Head Drop

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

Test Date: 11/14/2007

Head X-Axis Acceleration

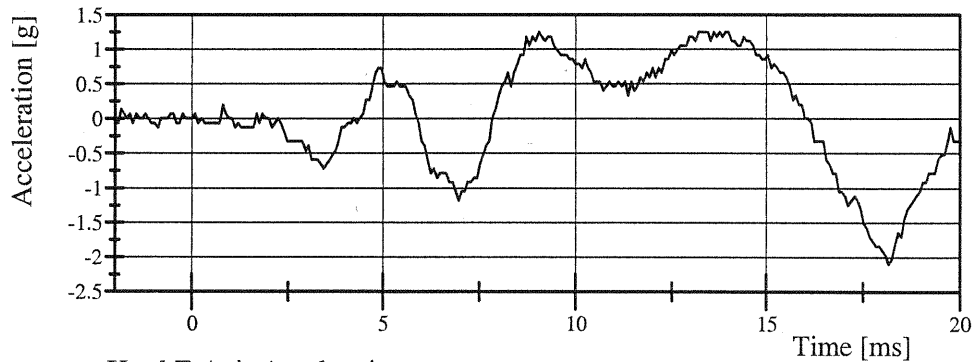


Filter Class: CFC_1000

Max: 61.5 g at 7.5 ms

Min: -4.0 g at 20.0 ms

Head Y-Axis Acceleration

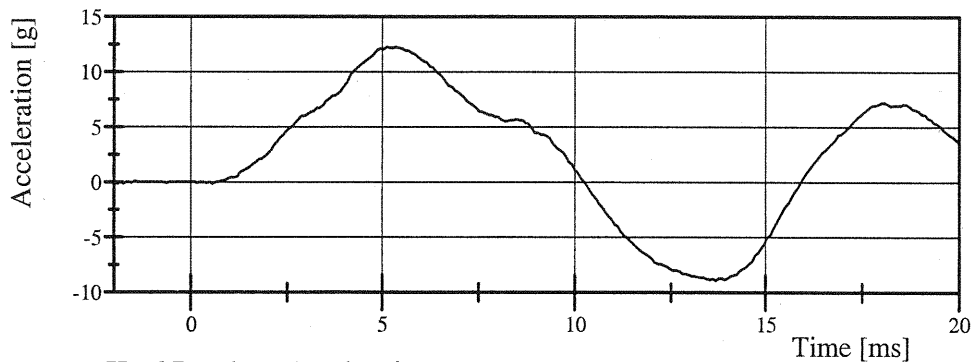


Filter Class: CFC_1000

Max: 1.3 g at 9.0 ms

Min: -2.1 g at 18.2 ms

Head Z-Axis Acceleration

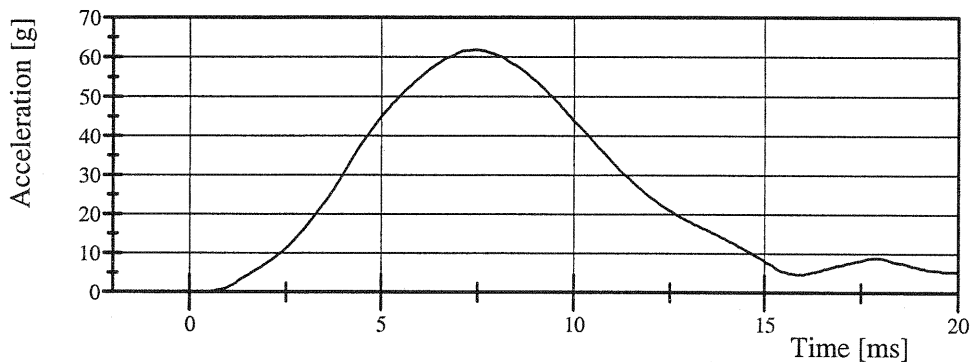


Filter Class: CFC_1000

Max: 12.3 g at 5.1 ms

Min: -8.9 g at 13.7 ms

Head Resultant Acceleration



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. 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. Bell

Approved

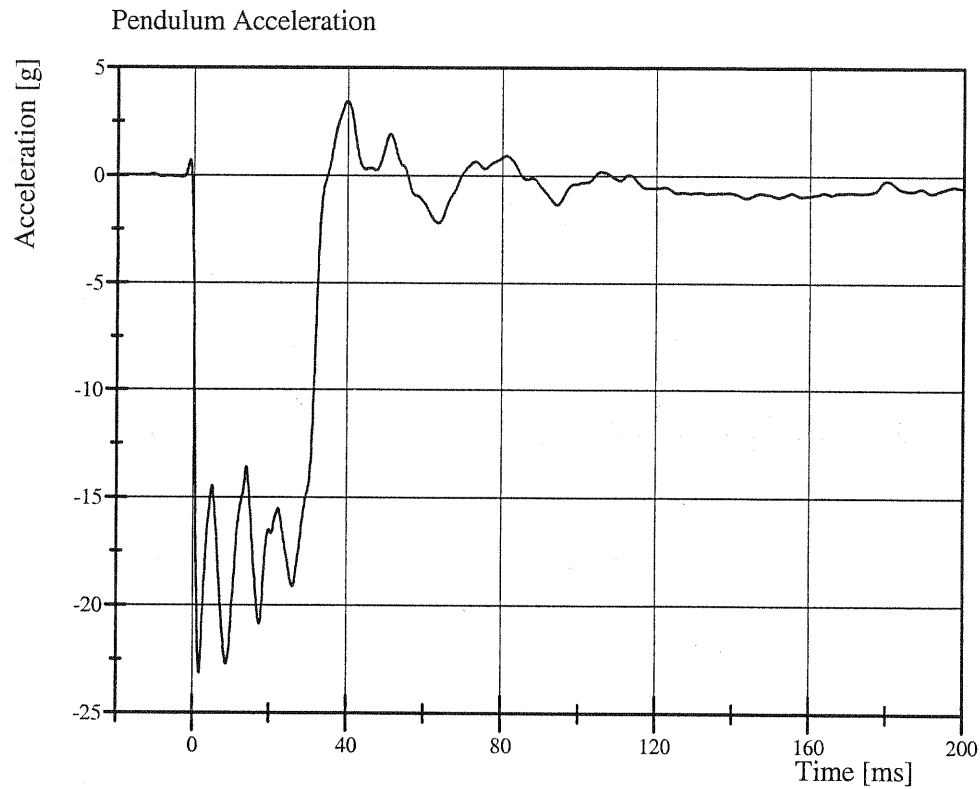
Ron Stoner

Transportation Research Center Inc.

Neck Flexion

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

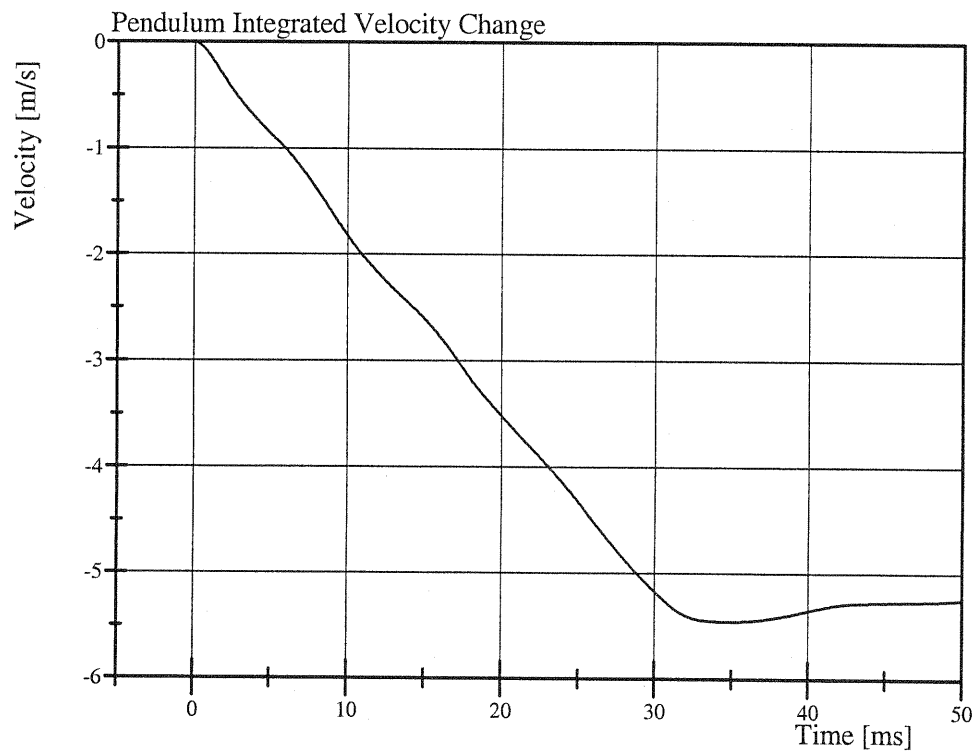
Test Date: 11/29/2007



Filter Class: CFC_180

Max: 3.4 g at 39.9 ms

Min: -23.1 g at 1.8 ms



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -5.5 m/s at 34.8 ms

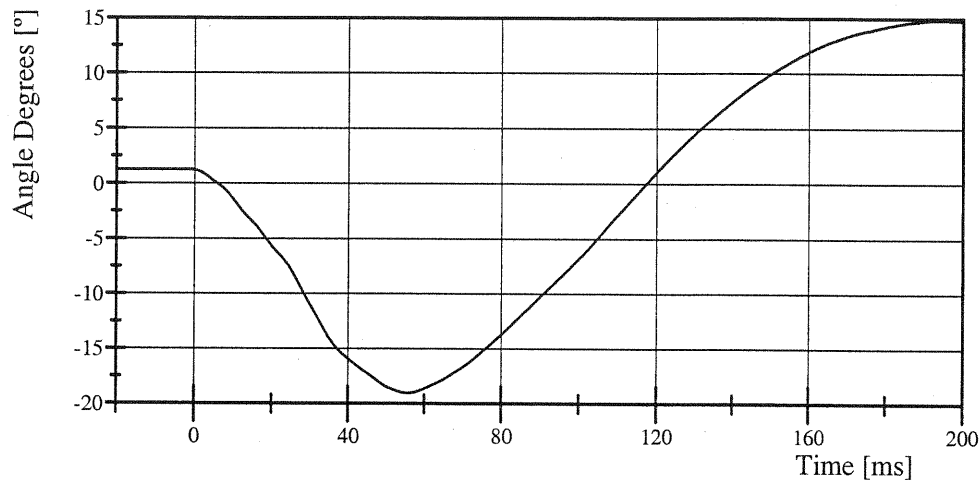
Transportation Research Center Inc.

Neck Flexion

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

Test Date: 11/29/2007

Forward Pot Rotation at Base of Pendulum

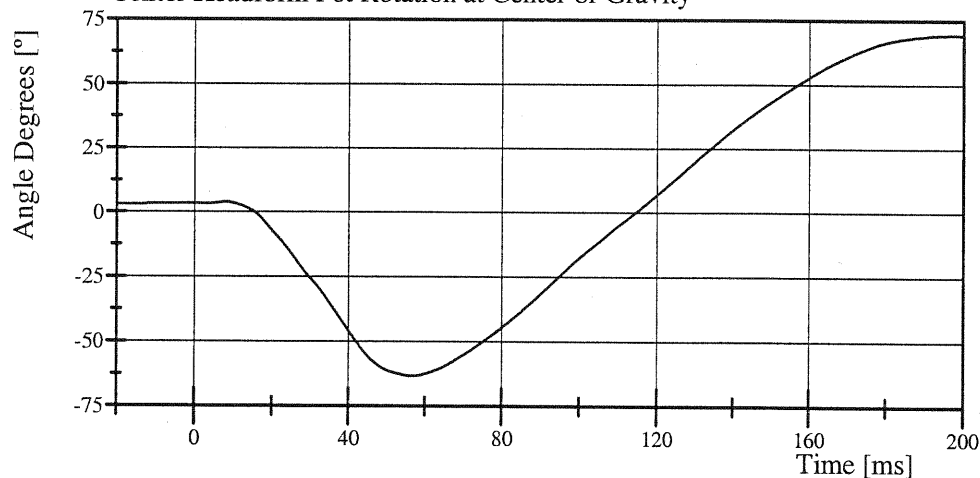


Filter Class: CFC_60

Max: 14.8 ° at 193.4 ms

Min: -19.0 ° at 55.8 ms

Center Headform Pot Rotation at Center of Gravity

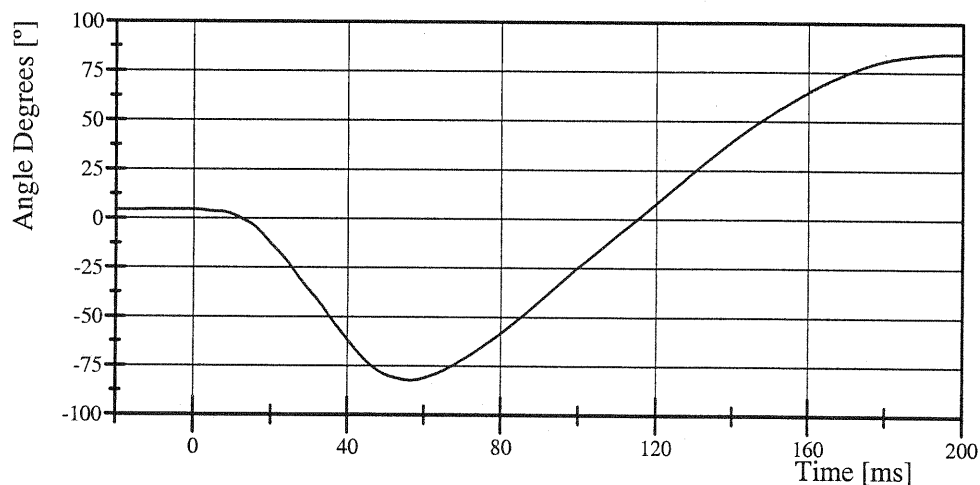


Filter Class: CFC_60

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

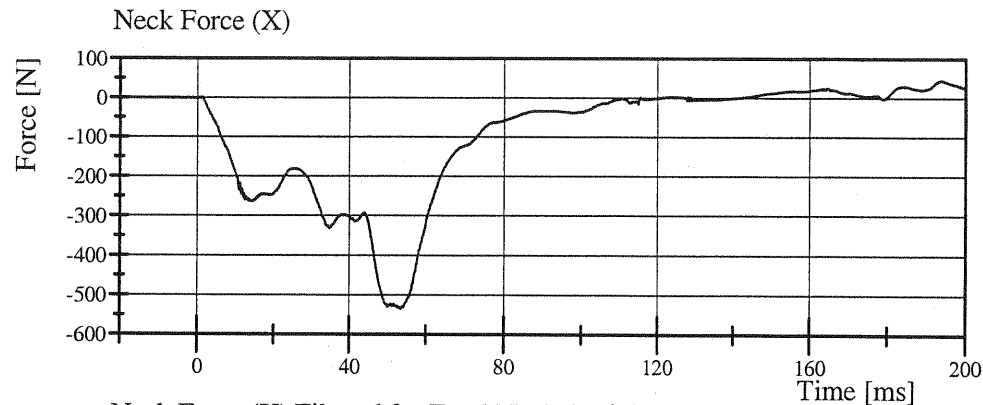
Min: -82.3 ° at 56.5 ms

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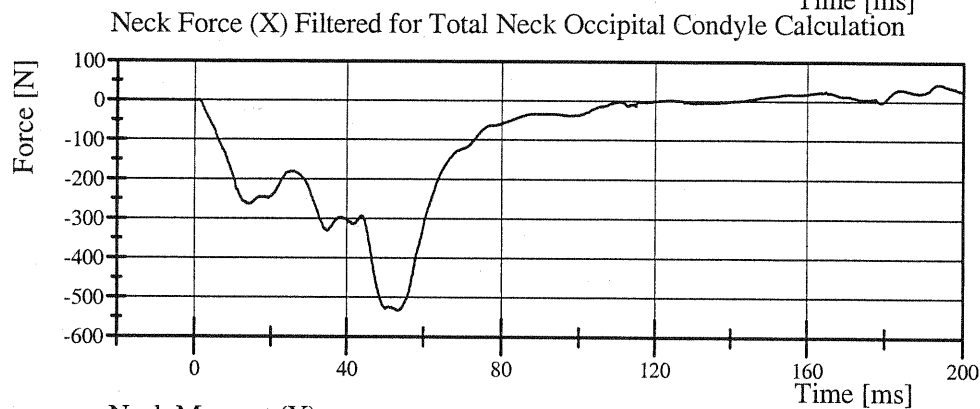
Neck Flexion

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

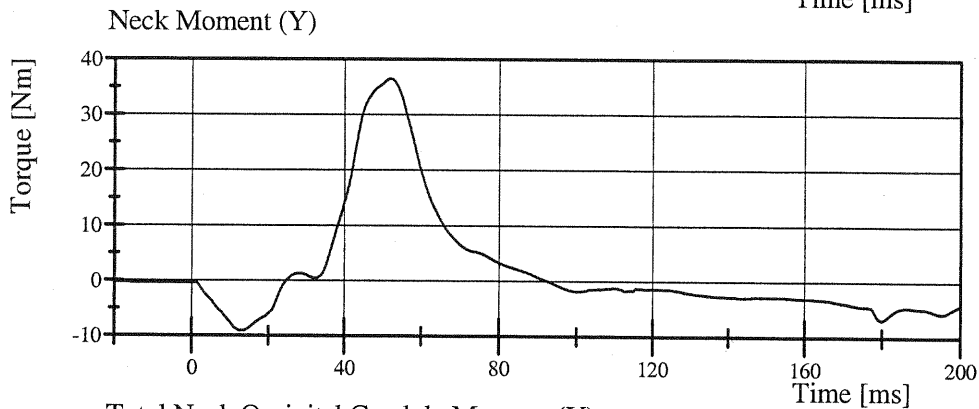
Test Date: 11/29/2007



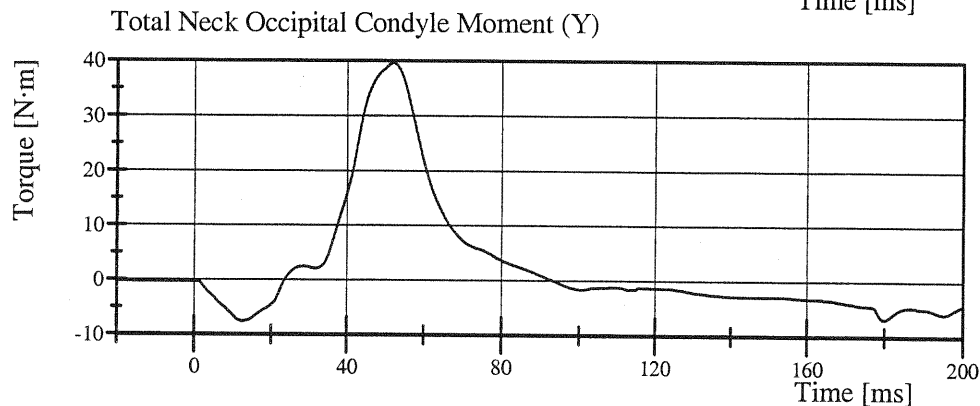
Filter Class: CFC_1000
Max: 45.0 N at 193.8 ms
Min: -534.5 N at 53.4 ms



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

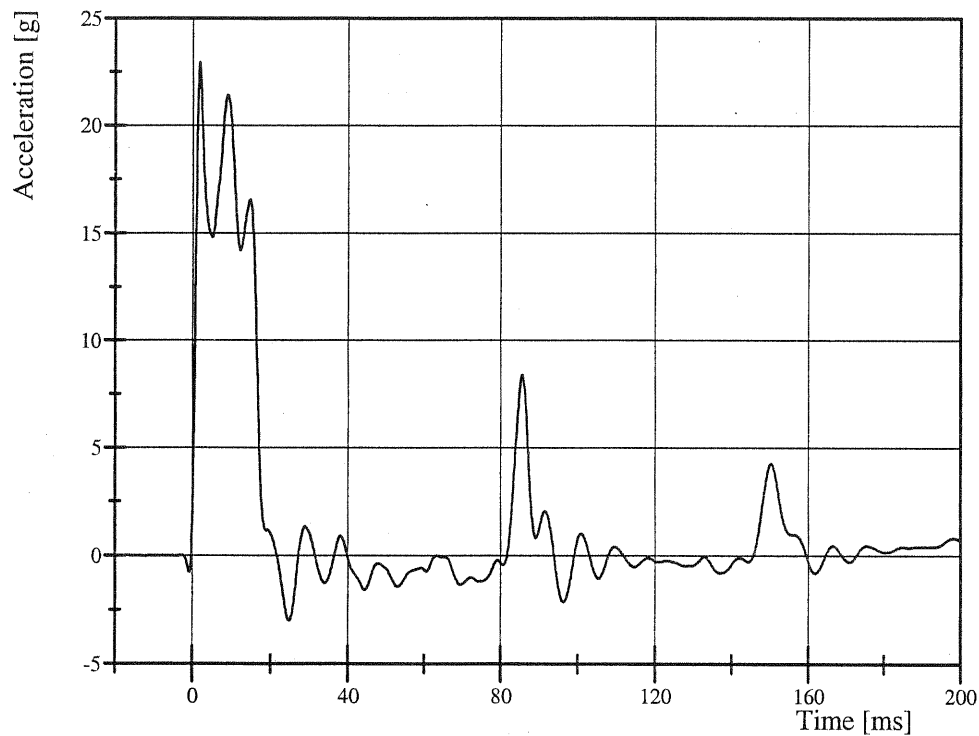
Transportation Research Center Inc.

Neck Extension

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

Test Date: 11/29/2007

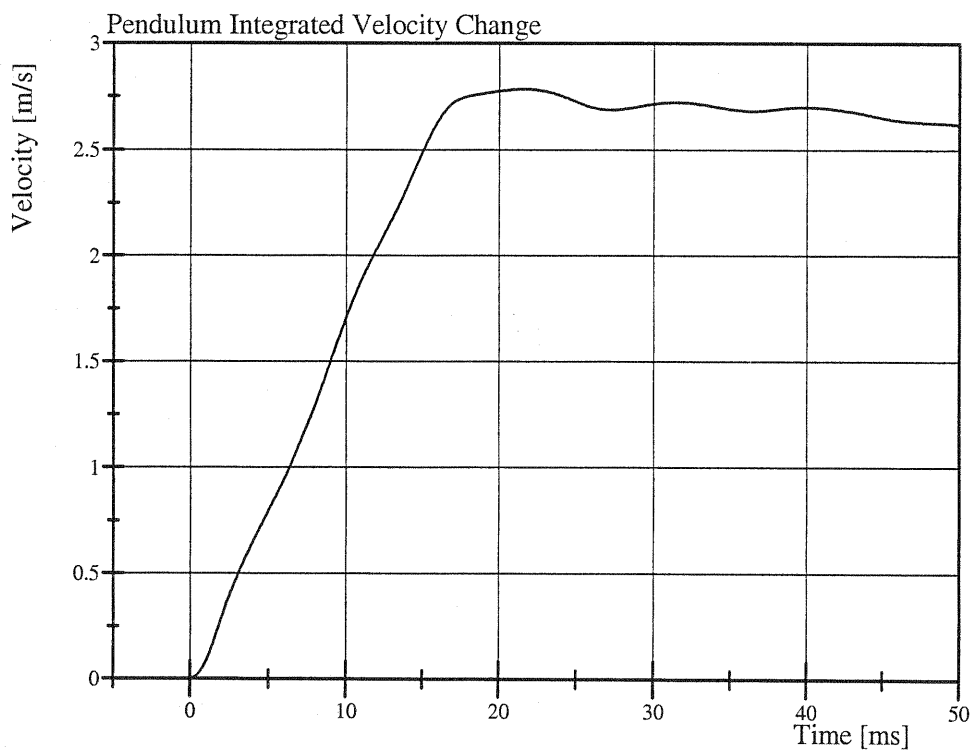
Pendulum Acceleration



Filter Class: CFC_180

Max: 22.9 g at 1.8 ms

Min: -3.0 g at 24.7 ms



Filter Class: CFC_180

Max: 2.8 m/s at 21.7 ms

Min: 0.0 m/s at 0.0 ms

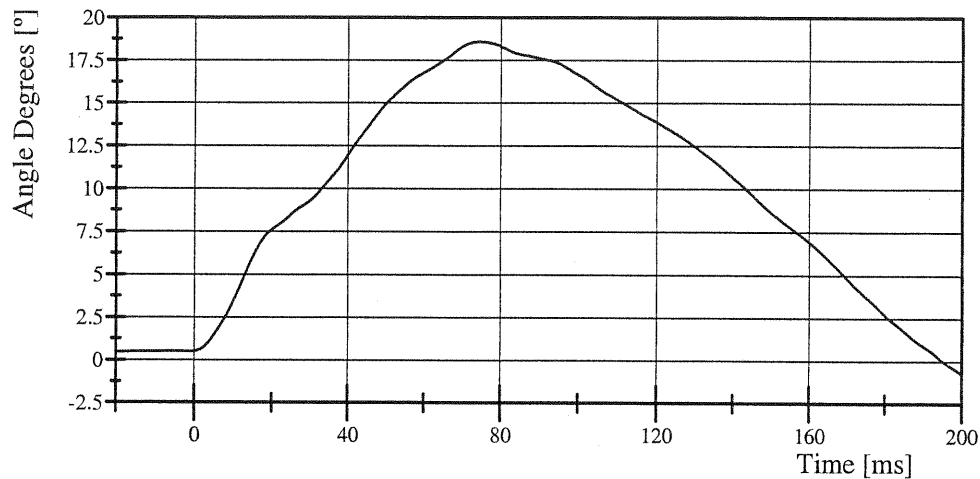
Transportation Research Center Inc.

Neck Extension

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

Test Date: 11/29/2007

Forward Pot Rotation at Base of Pendulum

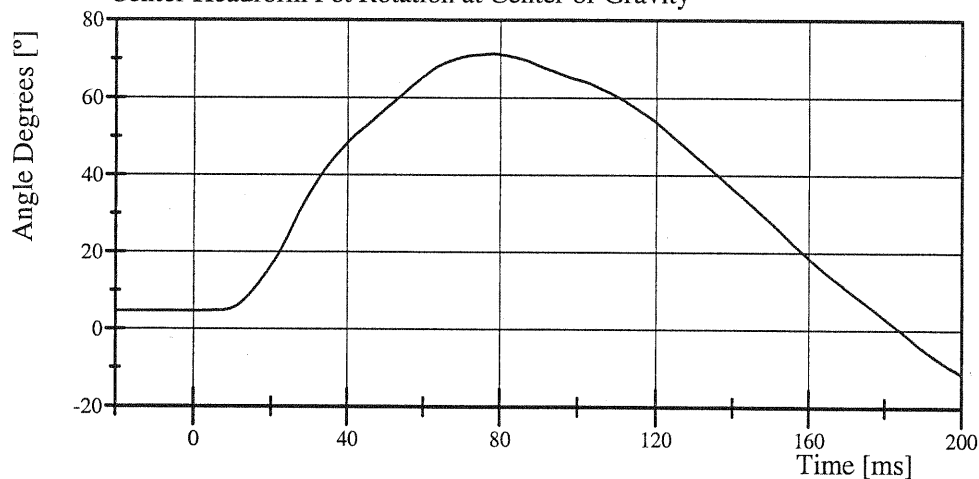


Filter Class: CFC_60

Max: 18.6 ° at 74.4 ms

Min: -0.7 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

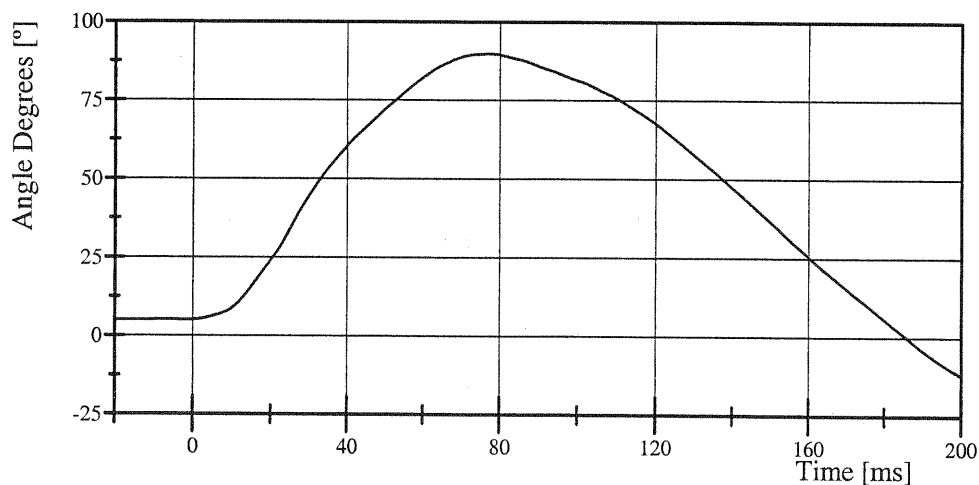


Filter Class: CFC_60

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

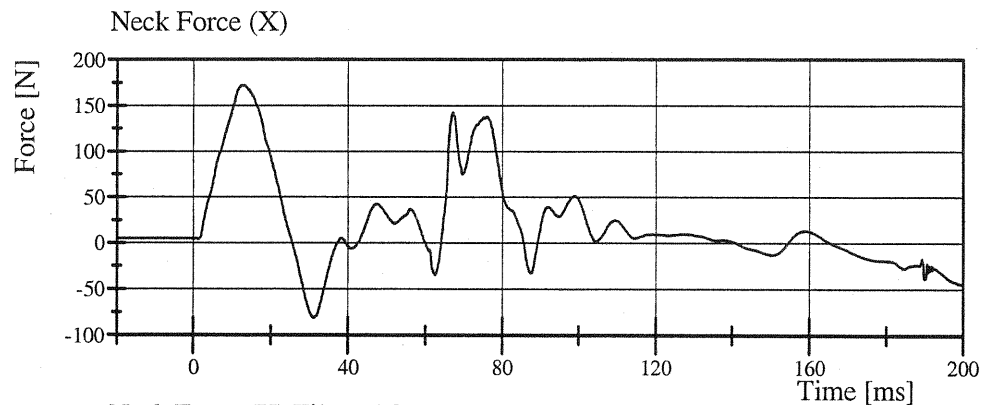
Min: -12.0 ° at 200.0 ms

Transportation Research Center Inc.

Neck Extension

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

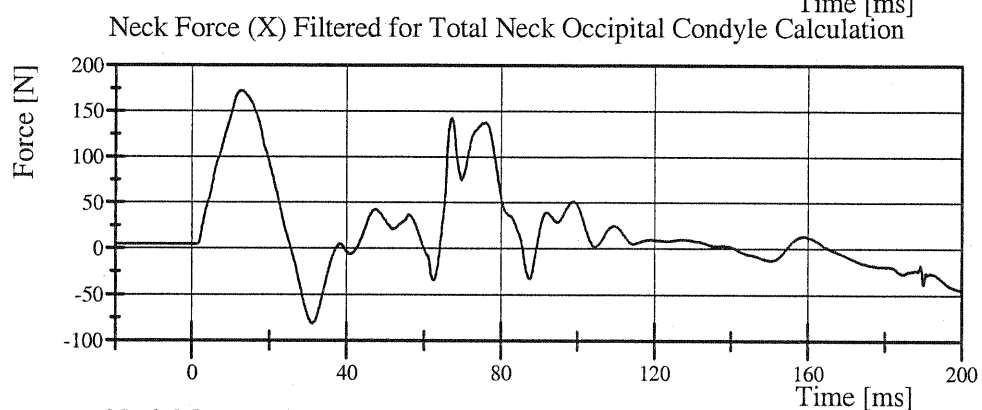
Test Date: 11/29/2007



Filter Class: CFC_1000

Max: 172.4 N at 12.4 ms

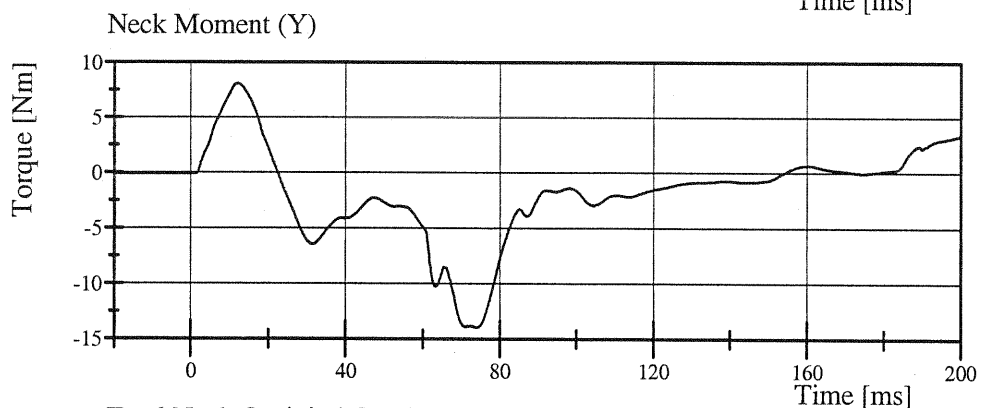
Min: -81.3 N at 31.0 ms



Filter Class: CFC_600

Max: 172.2 N at 12.4 ms

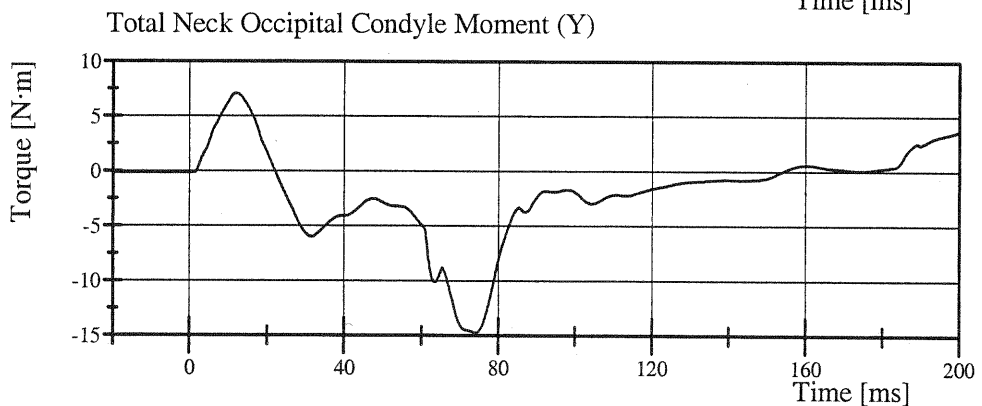
Min: -81.2 N at 31.0 ms



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

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

Ronit Baran

Approved

Ronit Baran

Transportation Research Center Inc.

Front Thorax

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

Test Date: 11/13/2007

