

REPORT NUMBER: NCAPSIDE-TRC-2007-002

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**CHRYSLER LLC
2008 JEEP LIBERTY SPORT 4X4 MPV
NHTSA NUMBER: M80310**

**PREPARED BY:
TRANSPORTATION RESEARCH CENTER INC.
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Test Date: October 30, 2007

Report Date: November 13, 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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Test Performed By: Duey Thomas, Test Technician II

Report Approved By: _____



Christopher Krouskop, Project Manager
Transportation Research Center Inc.

Approval Date: _____

11-13-07

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

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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 Jeep Liberty Sport 4x4 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 October 30, 2007. The impact velocity of the Moving Deformable Barrier (MDB) was 62.2 km/h, and the ambient temperature at the struck (driver's side) side of the target vehicle at the time of impact was 23.7° C. The target vehicle's post-test maximum crush was 226 mm at Level 3. The test or target vehicle's performance is given below (with FIR filter): <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>24.2</u></td> <td>g's</td> <td><u>24.4</u></td> <td>g's</td> </tr> <tr> <td>Left Lower Rib Acceleration:</td> <td><u>32.8</u></td> <td>g's</td> <td><u>31.4</u></td> <td>g's</td> </tr> <tr> <td>Lower Spine Acceleration:</td> <td><u>33.8</u></td> <td>g's</td> <td><u>47.0</u></td> <td>g's</td> </tr> <tr> <td>Thoracic Trauma Index, (TTI):</td> <td><u>33.3</u></td> <td>g's</td> <td><u>39.2</u></td> <td>g's</td> </tr> <tr> <td>Pelvis Acceleration (PEV):</td> <td><u>55.4</u></td> <td>g's</td> <td><u>52.6</u></td> <td>g's</td> </tr> <tr> <td>Head Injury Criteria (HIC36):</td> <td><u>47</u></td> <td>g's</td> <td><u>135</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>24.2</u>	g's	<u>24.4</u>	g's	Left Lower Rib Acceleration:	<u>32.8</u>	g's	<u>31.4</u>	g's	Lower Spine Acceleration:	<u>33.8</u>	g's	<u>47.0</u>	g's	Thoracic Trauma Index, (TTI):	<u>33.3</u>	g's	<u>39.2</u>	g's	Pelvis Acceleration (PEV):	<u>55.4</u>	g's	<u>52.6</u>	g's	Head Injury Criteria (HIC36):	<u>47</u>	g's	<u>135</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 Attn: Robert Hornicle																																				
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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 Jeep Liberty Sport manufactured by Chrysler LLC.

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 Jeep Liberty Sport 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 62.2 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 2149.4 kg and the test weight of the MDB was 1365.2 kg. The test was conducted at TRC Inc. in East Liberty, OH, on October 30, 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 226 mm at level 3, 1800 mm rearward of the left impact point. The driver SID/HIII, Serial No. 059, and left rear passenger SID/HIII, Serial No. 066, 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	47	53.3	81.6	33.3	55.4
Passenger	135	58.6	83.2	39.2	52.6

Supplemental Restraint Information

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

Left Rear Passenger Lower Rib Redundant Y
Left Lower A-Post Y

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

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07

TEST VEHICLE INFORMATION

Make	Jeep
Model	Liberty Sport
Body Style	4x4 MPV
NHTSA No.	M80310
VIN	1J8GN28K58W131928
Color	Light Graystone Pearl
Delivery Date	10/08/2007
Odometer Reading	26 miles
Dealer	Nelson Auto Group Inc.
Transmission	Automatic
Final Drive	Four wheel drive
Number of Cylinders	6
Engine Displacement	3.7 L
Engine Placement	Longitudinal
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 Curtain Airbag	Yes
Driver Side Torso Airbag	No
Rear Passenger Head Airbag	No
Rear Passenger Curtain Airbag	Yes
Pretensioner	Yes
Load Limiters	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrysler LLC
Date of Manufacture	9/07

GVWR (kg)	2541
GAWR Front (kg)	1248
GAWR Rear (kg)	1452

Measured Parameter	Front	Mid	Rear	Total
Type of Seats	Bucket	N/A	Split Bench	
Number Of Occupants	2	N/A	3	5
Capacity Wt. (VCW)				430
Cargo Wt. (RCLW) (kg)				90

DATA SHEET NO. 1 (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2008 Jeep Liberty SportNHTSA No.: M80310Test Program: NCAP Side ImpactTest Date: 10/30/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	503.8	474.4		550.4	572.0	
Right	kg	484.4	435.4		499.2	527.8	
Ratio	%	52.1	47.9		48.8	51.2	
Totals	kg	988.2	909.8	1898.0	1049.6	1099.8	2149.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1898.0
Weight of 2 P572M ATDs	kg	162.0
Rated Cargo/Luggage Weight (RCLW)	kg	90.0
Calculated Vehicle Target Weight (TVTW)	kg	2150.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	810	813	825	838	1294
As Tested	mm	798	806	797	807	1382
Fully Loaded	mm	800	814	785	805	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheelbase	mm	2700
Total Vehicle Length at Left Side	mm	4272
Total Vehicle Length at Centerline	mm	4495
Total Vehicle Length at Right Side	mm	4274
Weight of Ballast in Cargo Area	kg	0
Amount of Stoddard Solvent in Fuel Tank	liters	68.5

TEST VEHICLE VERTICAL IMPACT LINE DATA

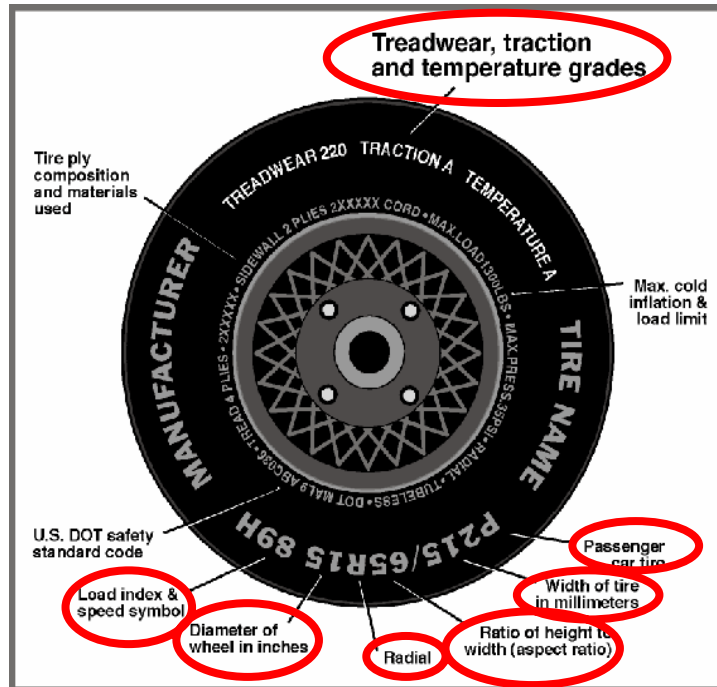
Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2700
Target Impact Point Aft of Front Axle	mm	450
Actual Impact Point Aft of Front Axle	mm	458

DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold / Test Pressure (kPa)	228	228
Recommended Tire Size	P225/75R16	P225/75R16
Tire Size on Vehicle	P225/75R16	P225/75R16
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Wrangle ST	Wrangle ST
Tire Type	P	P
Tire Width (mm)	225	225
Ratio of Height to Width (aspect ratio)	75	75
Radial	R	R
Wheel Diameter	16	16
Load Index & Speed Symbol	104S	104S
Treadwear	340	340
Traction Grade	B	B
Temperature Grade	B	B

DATA SHEET NO. 3

TEST VEHICLE INFORMATION

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07

NORMAL DESIGN RIDING POSITION

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

Driver: Total Number of detents: 24

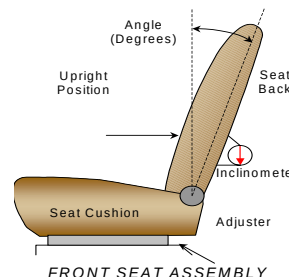
Test detent (with the forward-most detent defined as 0): 13

Passenger: Total Number of detents: Fixed

Test detent (with the forward-most detent defined as 0): N/A

Driver seat back angle: 23.4° measured for head restraint post

Passenger seat back angle: Fixed

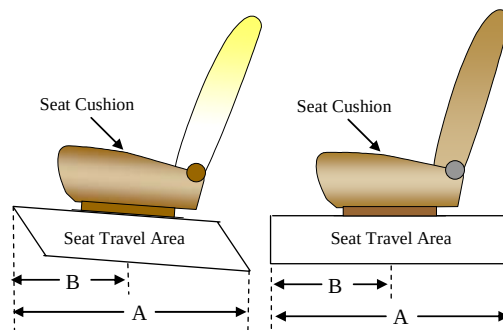


SEAT FORE/AFT POSITIONS

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	24	13
Rear Seat	Fixed	Fixed



SEAT BELT UPPER ANCHORAGE

	Total No. of Positions	Placed in Position No.
Driver Seat	5	3
Rear Seat	Fixed	N/A

Position number one is the uppermost adjustment position.

DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

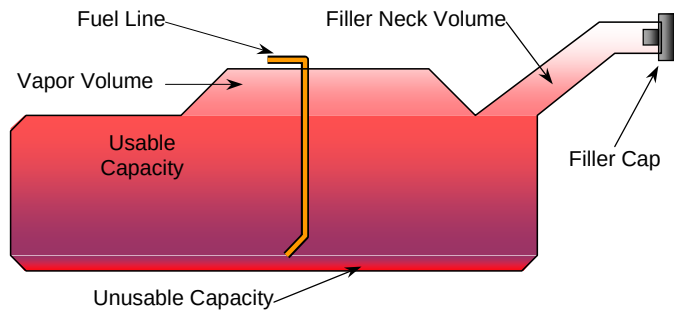
Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	73.8
Usable Capacity used for FMVSS301	73.8
Actual Amount of Solvent used	68.5

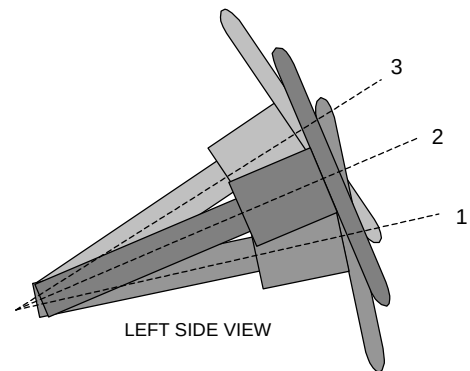
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies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



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



LEFT SIDE VIEW

STEERING COLUMN ASSEMBLY

	Degrees	Fore/Aft Position, mm
Lowermost Position	19.4°	Fixed
Geometric Center Position	23.2°	Fixed
Uppermost Position	26.4°	Fixed

DATA SHEET NO. 4

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2008 Jeep Liberty Sport

NHTSA No.: M80310

Test Program: NCAP Side Impact

Test Date: 10/30/07

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	1112

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	370.0	308.4	
Right	kg	408.6	278.2	
Ratio	%	57.0	43.0	
Totals	kg	778.6	586.6	1365.2

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.2
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.3
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	8 mm right
Vertical Offset	mm	+/- 20	10 mm up

DATA SHEET NO. 5**POST TEST OBSERVATIONS**

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID/HIII	Rear Seat SID/HIII
Dummy Type / Serial No.	SID/HIII / 059	SID/HIII / 066
Head Contact	Side header, airbag, head rest	Airbag, side header
Upper Torso Contact	Door panel, airbag	Door panel
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

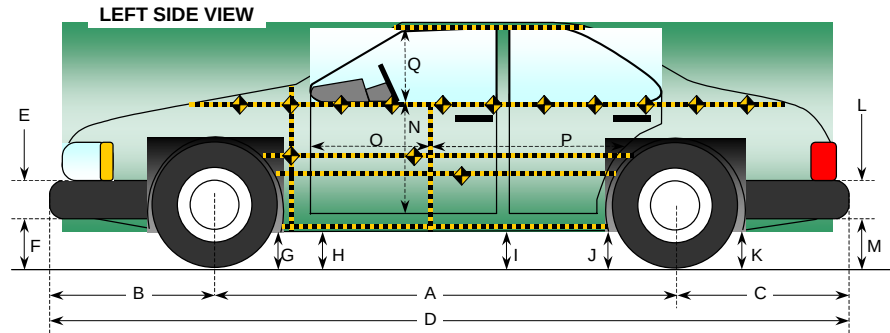
Restraint Type	Left Front (Driver) Occupant Location 01		Left Rear (Passenger) Occupant Location 04	
	Installed	Operation	Installed	Operation
Front Airbag	Yes	No	N/A	
Side Torso Airbag	Yes	Yes	N/A	
Head Airbag	N/A		N/A	
Curtain Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load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

DATA SHEET NO. 6

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07



All Measurements in mm

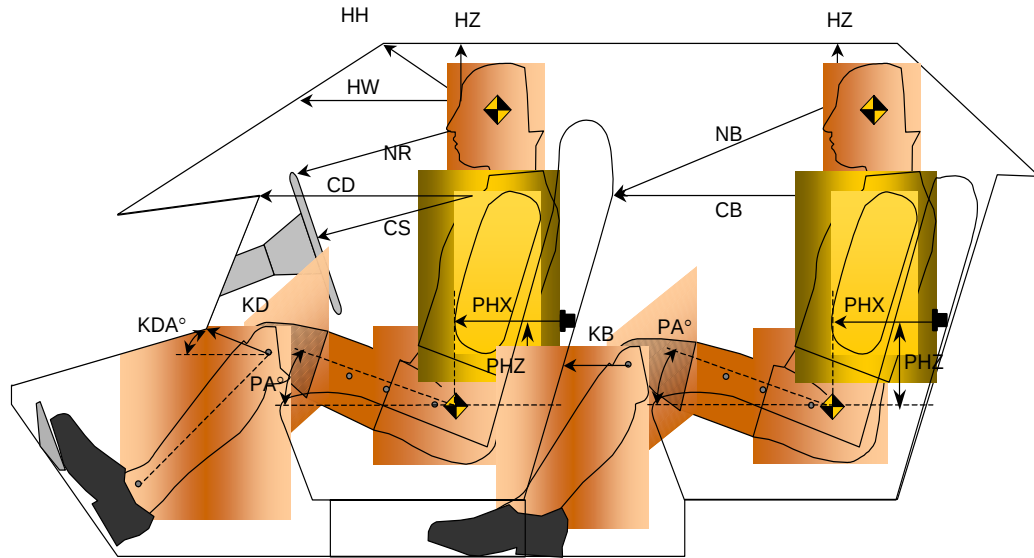
Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2700	2652	48
B	Front Axle to Front Surface of Vehicle	730	745	-15
C	Rear Axle to Rear Surface of Vehicle	1065	1050	15
D	Total Length at Centerline	4495	4493	2
E	Front Bumper Thickness	160	160	0
F	Front Bumper Bottom to Ground	462	472	-10
G	Sill Height at Front Wheel Well	350	335	15
H	Sill Height at Front Door Leading Edge	412	418	-6
I	Sill Height at "B" Pillar	425	439	-14
J1	Sill Height at Rear Wheel Well	326	425	-99
J2	Pinch Weld Height at Rear Wheel Well	421	431	-10
K	Sill Height Aft of Rear Wheel Well	245	420	-175
L	Rear Bumper Thickness	177	177	0
M	Rear Bumper Bottom to Ground	504	490	14
N	Sill Height to Window Bottom Sill	784	742	42
O	Front Door Leading Edge to Impact CL	600	618	-18
P	Rear Door Trailing Edge to Impact CL	1368	1307	61
Q	Front Window Opening	425	425	0
R	Right Side Length	4274	4293	-19
S	Left Side Length	4272	4346	-74
T	Vehicle Width at "B" Post	1322	1225	97

DATA SHEET NO. 7

SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07



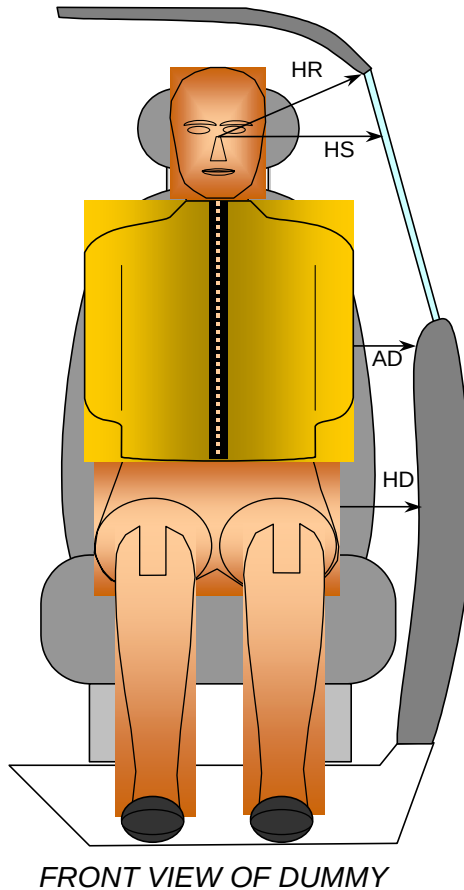
Driver Code	Pass. Code	Measurement Description	Driver S/N 059		Passenger S/N 066	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	452			
HW		Head to Windshield	544			
HZ	HZ	Head to Roof	194		242	
NR	NB	Nose to Rim/Nose to Seatback	456		600	
CD	CB	Chest to Dash or Seatback	580		535	
CS		Chest to Steering Wheel	370			
KDL	KBL	Left Knee to Dash or Seatback	95	14.5	130	22.6
KDR	KBR	Right Knee to Dash or Seatback	98	14.5	130	22.6
PA	PA	Pelvic Angle		23.3		24.4
PHX	PHX	H-Point to Striker (X-Axis)	220		230	
PHZ	PHZ	H-Point to Striker (Z-Axis)	126		252	

DATA SHEET NO. 8

SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07



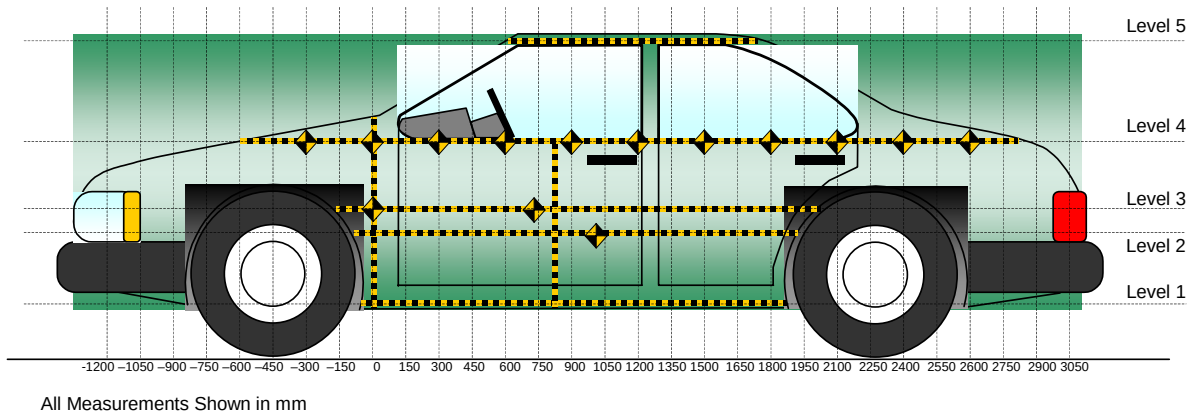
Code	Measurement Description	Units	Driver S/N 059	Passenger S/N 066
HR	Head to Side Header	mm	140	173
HS	Head to Side Window	mm	280	292
AD	Arm to Door - Lower	mm	106	81
AD	Arm to Door - Upper	mm	108	94
HD	H-Point to Door	mm	118	120

DATA SHEET NO. 9

VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07



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	1650
4	Window Sill	1135
3	Mid Door	805
2	Occupant H-Point	800
1	Sill Top	405

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1200															
-1050															
-900															
-750															
-600		897	896				912	911				-15	-16		
-450			919					928					-9		
-300															
-150			927	788				923	795				4	-7	
0		914	913	812			911	910	817			3	2	-5	
150	877	855	856	827		800	740	744	830		76	115	111	-3	
300	838	861	861	836	819	725	714	709	822	812	113	147	152	13	7
450	843	867	867	839	797	714	685	690	851	791	130	182	177	-12	6
600	848	871	872	846	761	703	677	684	837	757	144	194	188	8	3
750	852	875	876	851	719	692	674	678	828	719	160	202	197	23	0
900	855	878	878	856	695	681	668	672	816	695	173	210	207	40	1
1050	856	880	880	860	685	668	664	669	802	685	188	216	211	58	0
1200	858	882	882	863	685	655	674	676	786	684	203	208	206	77	1
1350	858	883	883	865	684	640	690	692	761	681	218	193	192	104	3
1500	858	882	882	864	681	632	676	681	775	680	226	206	202	89	1
1650	857	881	881	863	678	671	671	670	795	678	186	210	211	68	0
1800	879	877	878	861	678	749	650	652	815	677	131	226	226	46	1
1950		907	907	858	673		808	804	832	672		99	103	26	1
2100				854	671				843	671				11	0
2250			914	848	670			895	821	667			19	27	3
2400				842	665				820	665				22	0
2550				833	662				817	662				16	0
2700		891	889	822	659		880	878	813	659		11	11	9	0

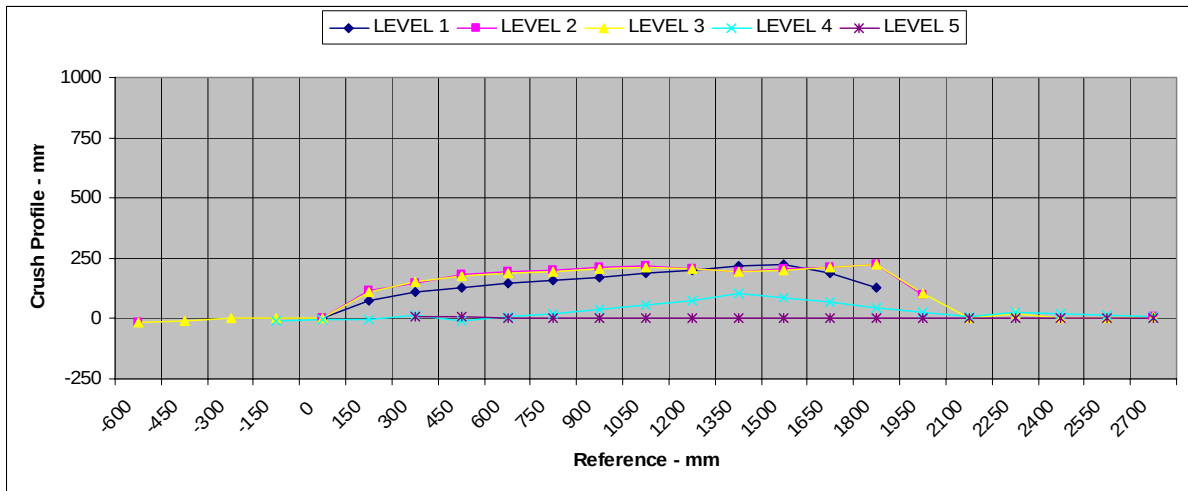
Reference plane is parallel to test vehicle longitudinal centerline.

Given measurements = Reference plane to car body

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07



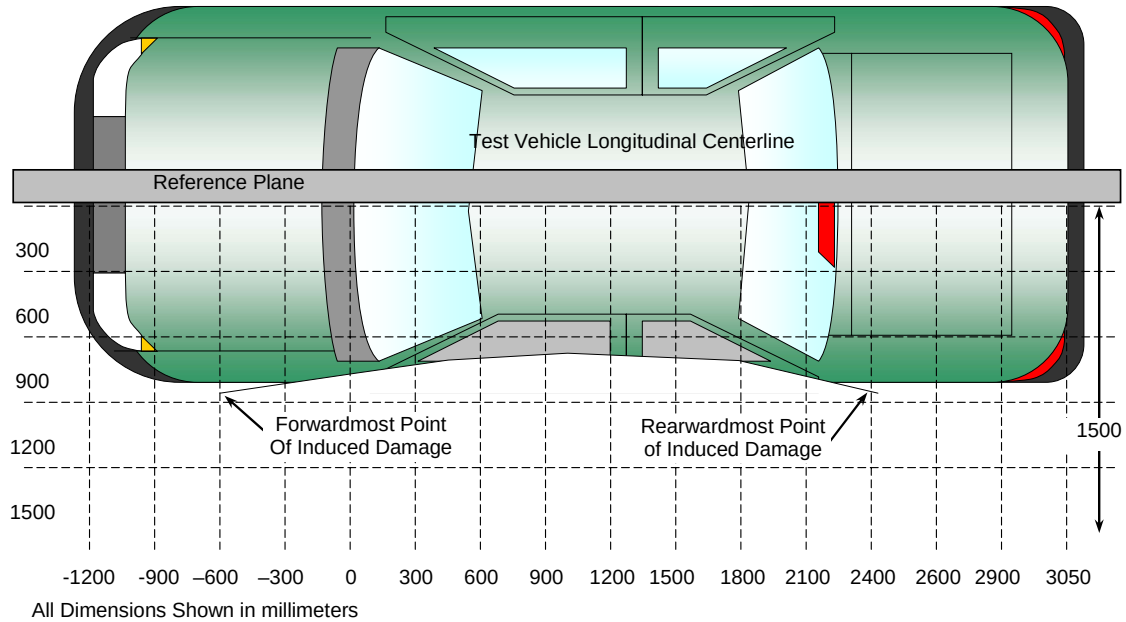
	Units	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush	mm	226	226	226	104	7
Distance from Impact	mm	1500	1800	1800	1350	300

DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	1950 mm	3	907	804	103
2	1500 mm	1	858	632	226
3	1200 mm	2	882	674	208
4	900 mm	2	878	668	210
5	600 mm	2	871	677	194
6	300 mm	3	861	709	152

Reference plane is parallel to test vehicle longitudinal centerline.

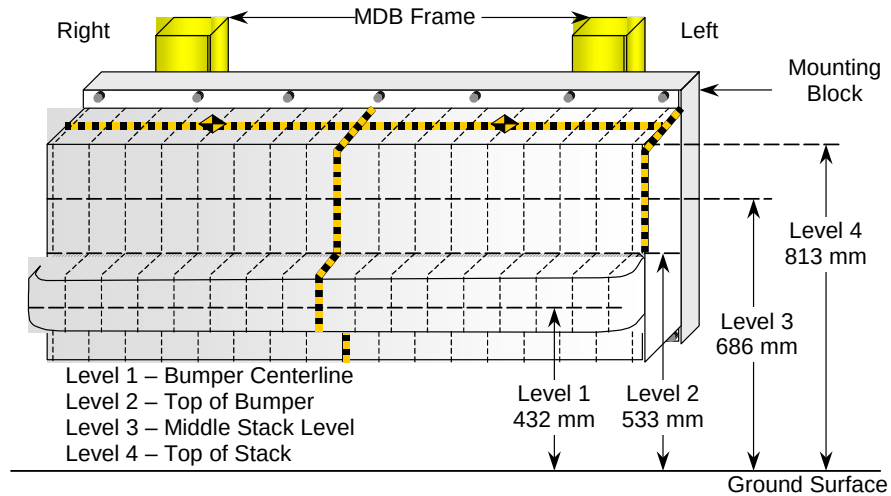
Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07



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	-236	-194	-153	-124	-112	-114	-117	-119	-121	-124	-128	-131	-134	-140	-150	-170	-184
2	-159	-140	-80	-60	-56	-57	-59	-61	-63	-66	-69	-74	-79	-83	-89	-110	-124
3	-114	-73	-60	-60	-68	-81	-61	-47	-43	-42	-42	-39	-38	-47	-79	-126	-120
4	-110	-107	-108	-111	-117	-130	-97	-94	-94	-93	-94	-96	-98	-104	-124	-144	-165

All measurements are in mm

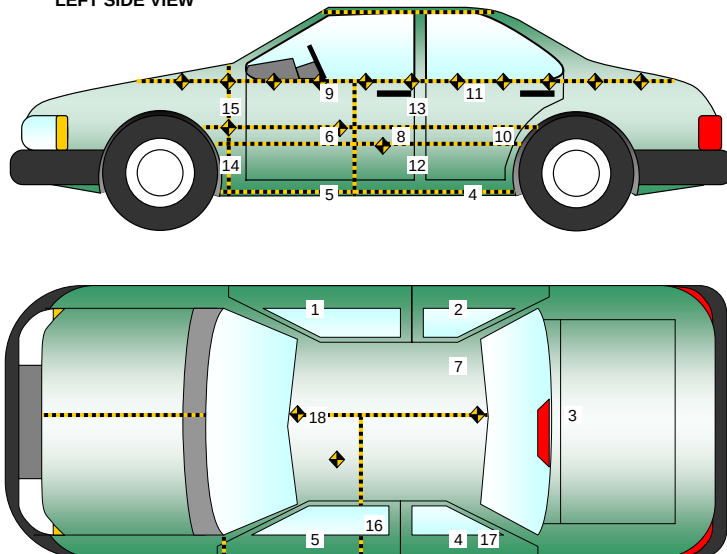
DATA SHEET NO. 13

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07

LEFT SIDE VIEW



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	3285	670	458
2	Right Sill at Rear Seat	2315	700	442
3	Rear Floorpan Above Axle	1670	0	400
4	Left Sill at Rear Seat	2315	700	533
5	Left Sill at Front Seat	3290	670	452
6	Left Front Door C/L ¹			
7	Rear Occupant Compartment	2215	540	462
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	2590	812	810
13	Left Upper B-Post	2585	805	1096
14	Left Lower A-Post	3640	780	720
15	Left Upper A-Post	3635	790	1005
16	Front Seat Track	2885	610	510
17	Rear Seat Track or Structure	2095	540	516
18	Vehicle CG	2915	0	802

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

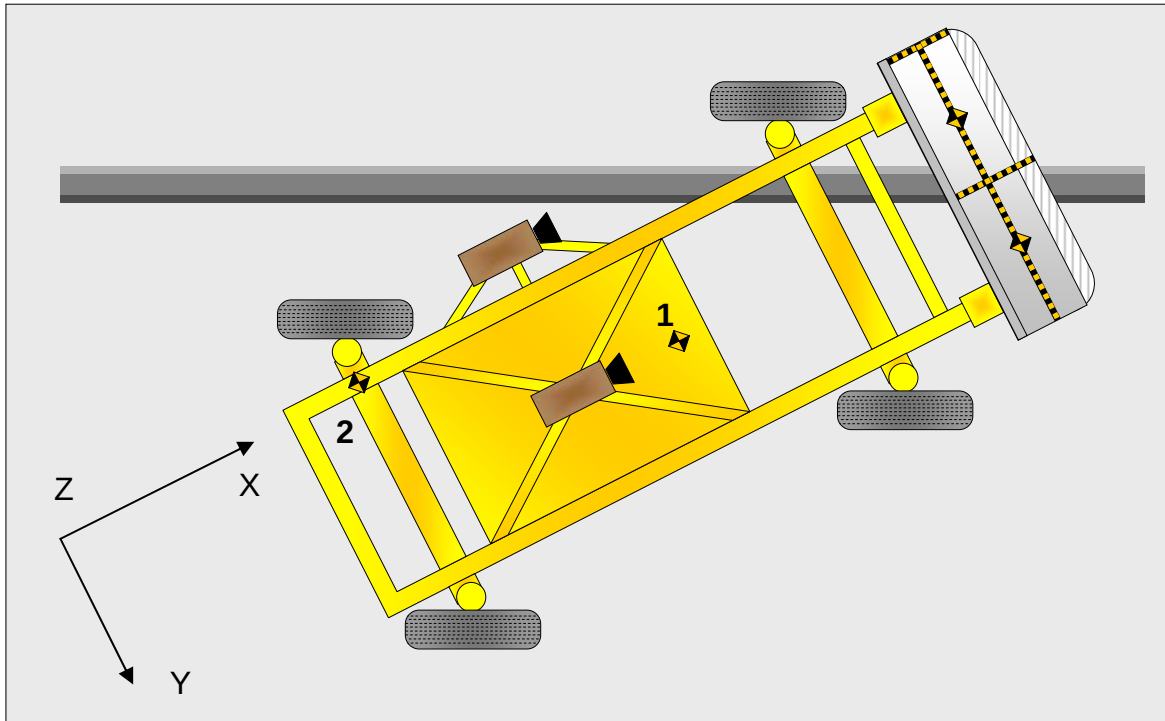
¹ Accelerometer not applicable to test mode.

DATA SHEET NO. 14

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	MDB CG	1855	0	-520
2	MDB Rear	412	-677	-625

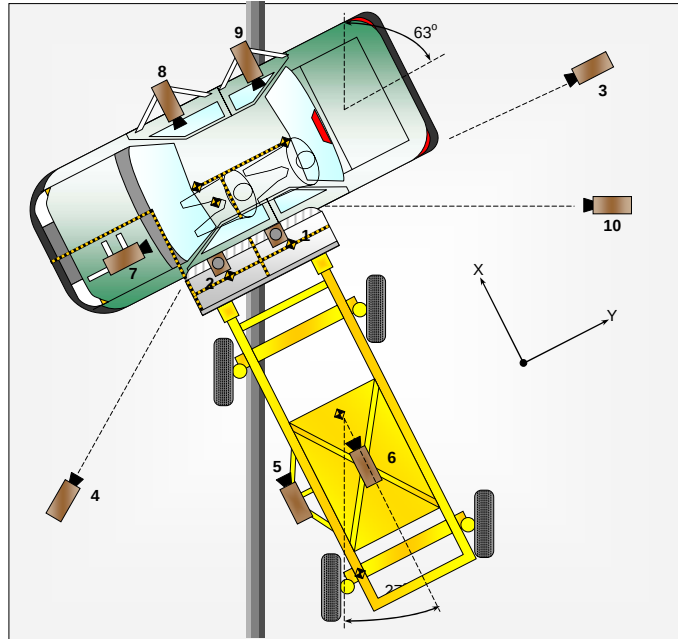
Reference Points: X - Test Vehicle Rear Bumper (+ forward)
Y - Test Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 15

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07



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	0	-1330	25	1000
4	Left Side, Ground Level, Overall	3200	5000	-1370	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	500	1400	-1470	12.5	1000
8	Vehicle Onboard Front SID/HIII, Side	1900	1900	-1350	6.5	1000
9	Vehicle Onboard Rear SID/HIII, Side	1900	1900	-1350	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 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80310
 Test Date: 10/30/07

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 23.7° C Test Time: 14:02

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

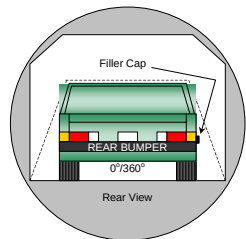
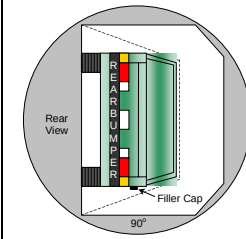
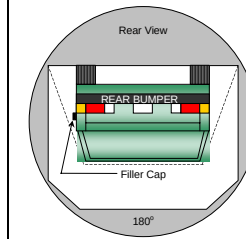
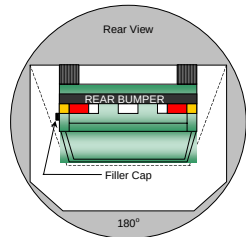
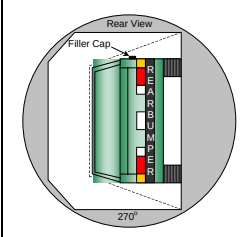
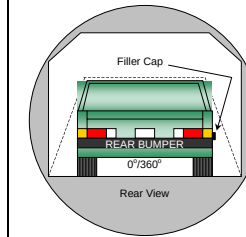
(Maximum allowable = 5 ounces)

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°			

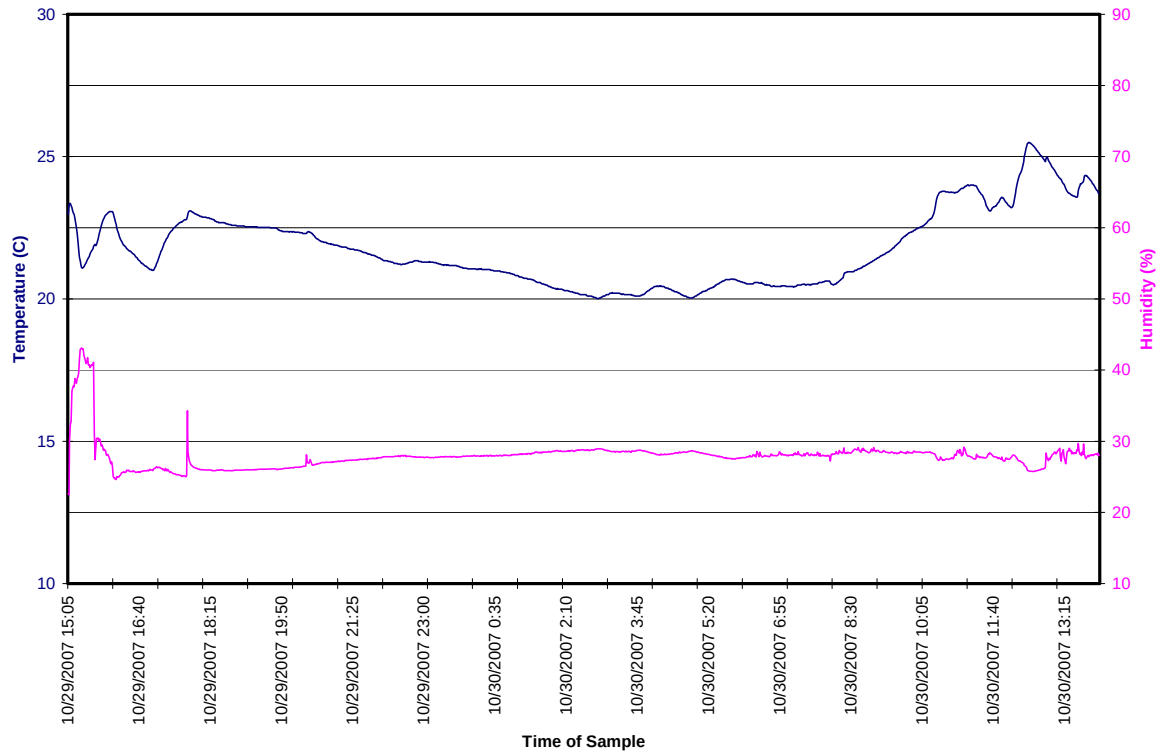
Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage Collection Time (min)	Spillage (oz.)	Spillage Collection Time (min)	Spillage (oz.)	Spillage Collection Time (min)	Spillage (oz.)
0° to 90°	120	300	First 5	0	Sixth	0	Seventh	0
90° to 180°	120	300	First 5	0	Sixth	0	Seventh	0
180° to 270°	120	300	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 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07



APPENDIX A
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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

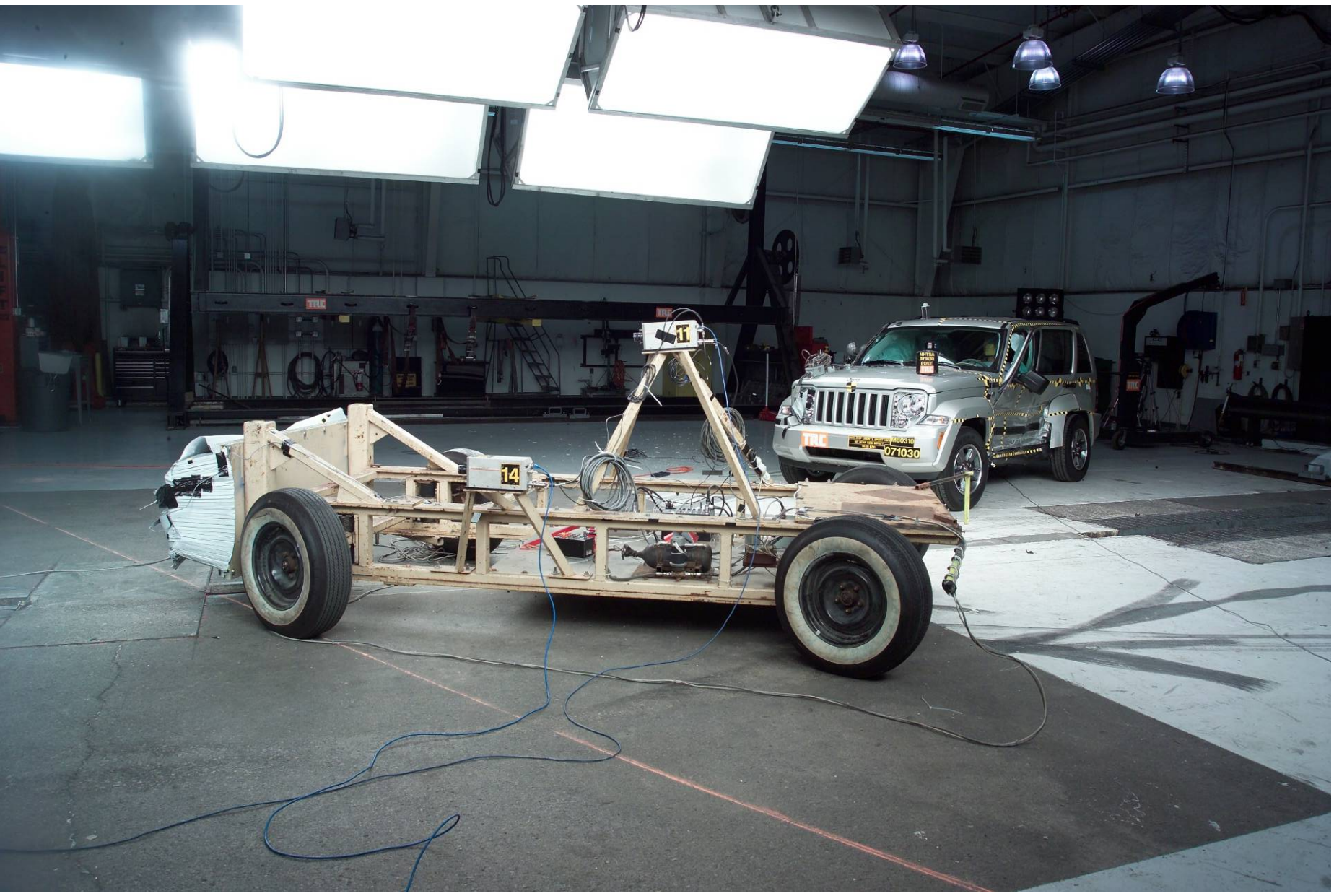


Figure A-4 Post-Test Left Front View of Test Vehicle with Barrier



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



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

A-10

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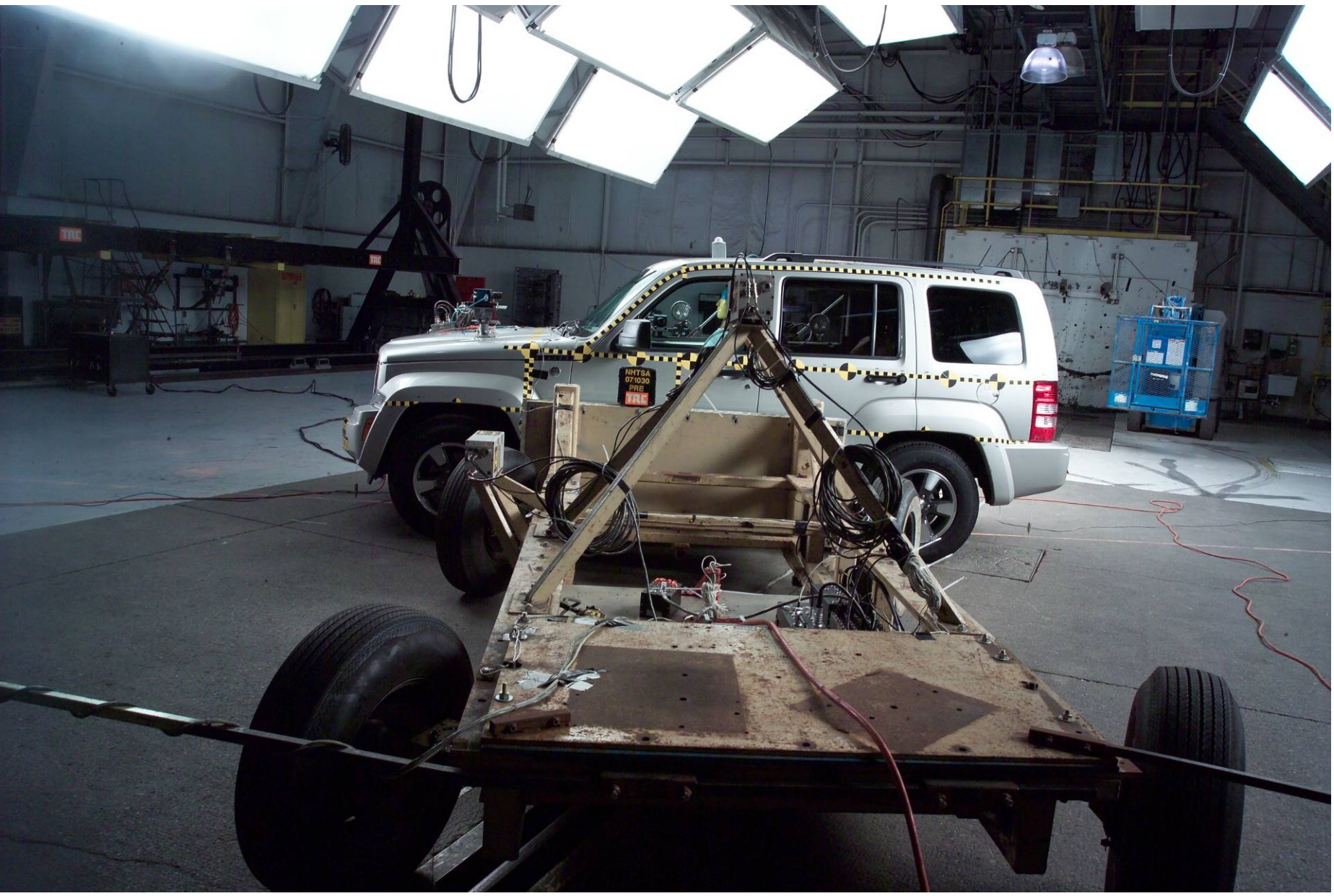


Figure A-7 Pre-Test Impacted Side View of Test Vehicle with Barrier

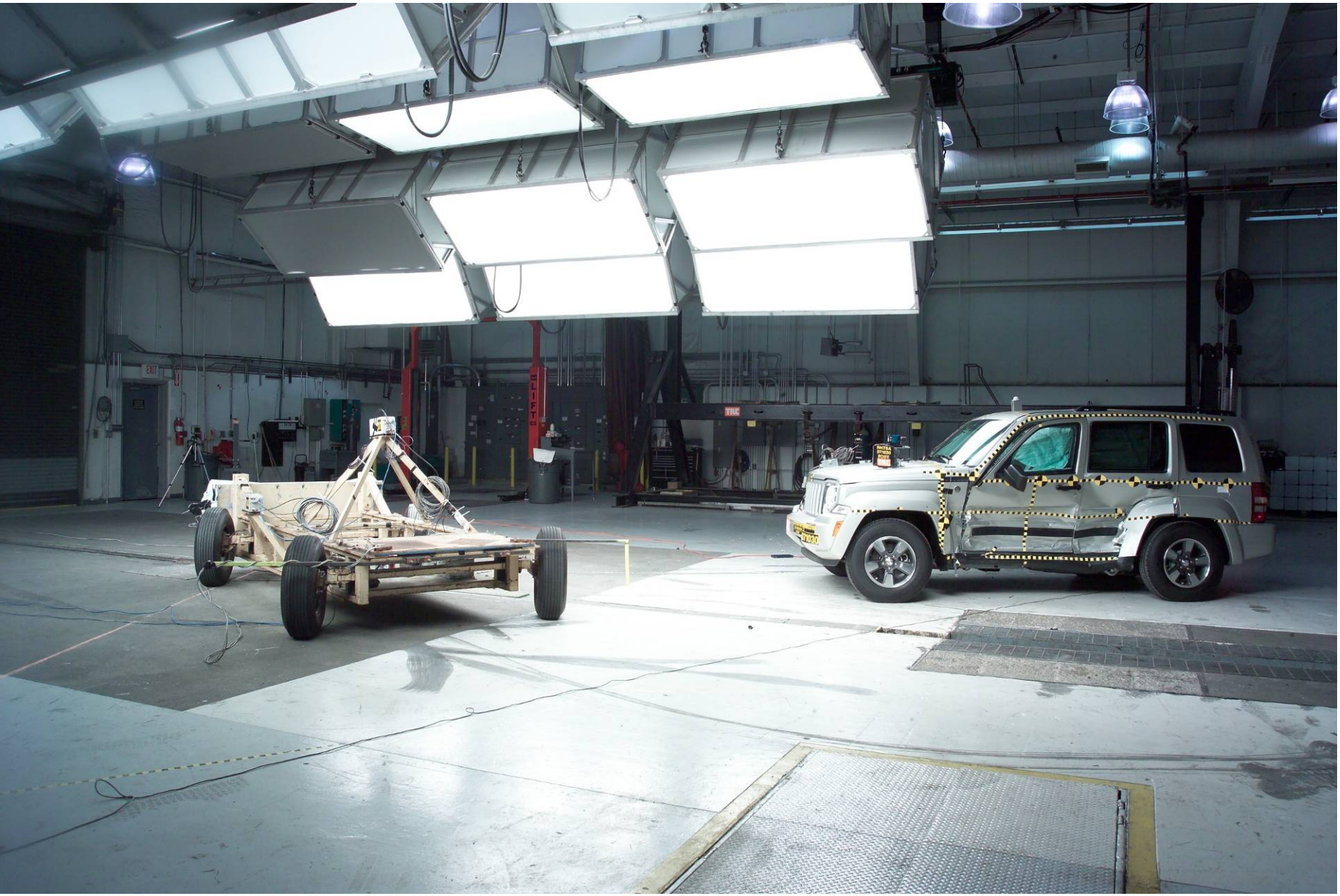


Figure A-8 Post-Test Impacted Side View of Test Vehicle with Barrier



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 Pre-Test Left Rear View of Test Vehicle



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



Figure A-14 Pre-Test Rear View of Test Vehicle



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



Figure A-17 Post-Test Right Rear View of Test Vehicle with Barrier



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



Figure A-19 Post-Test Right Rear View of Test Vehicle



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



Figure A-21 Post-Test Right Side View of Test Vehicle



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



Figure A-23 Post-Test Right Front View of Test Vehicle

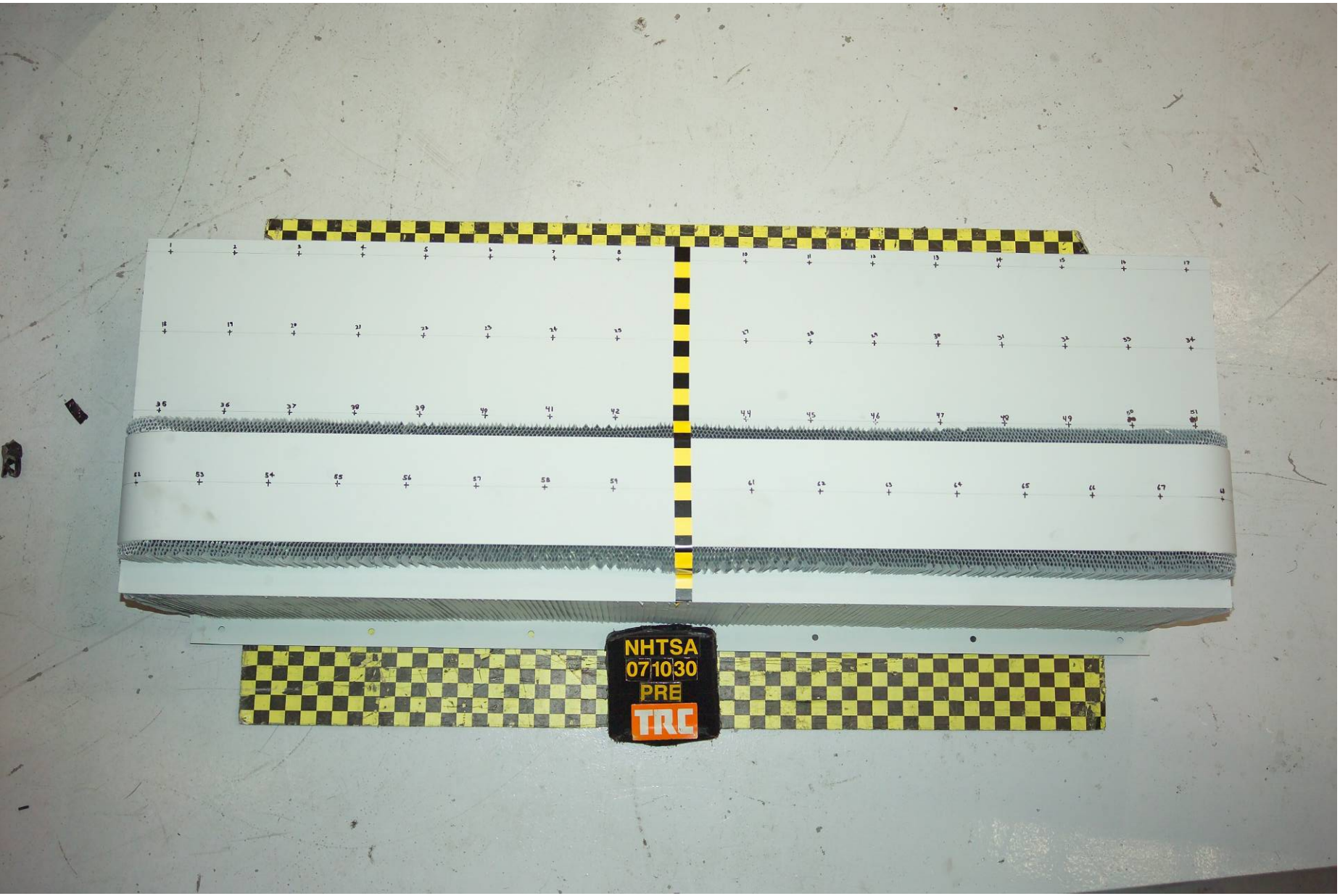


Figure A-24 Pre-Test Frontal View of Impactor Face

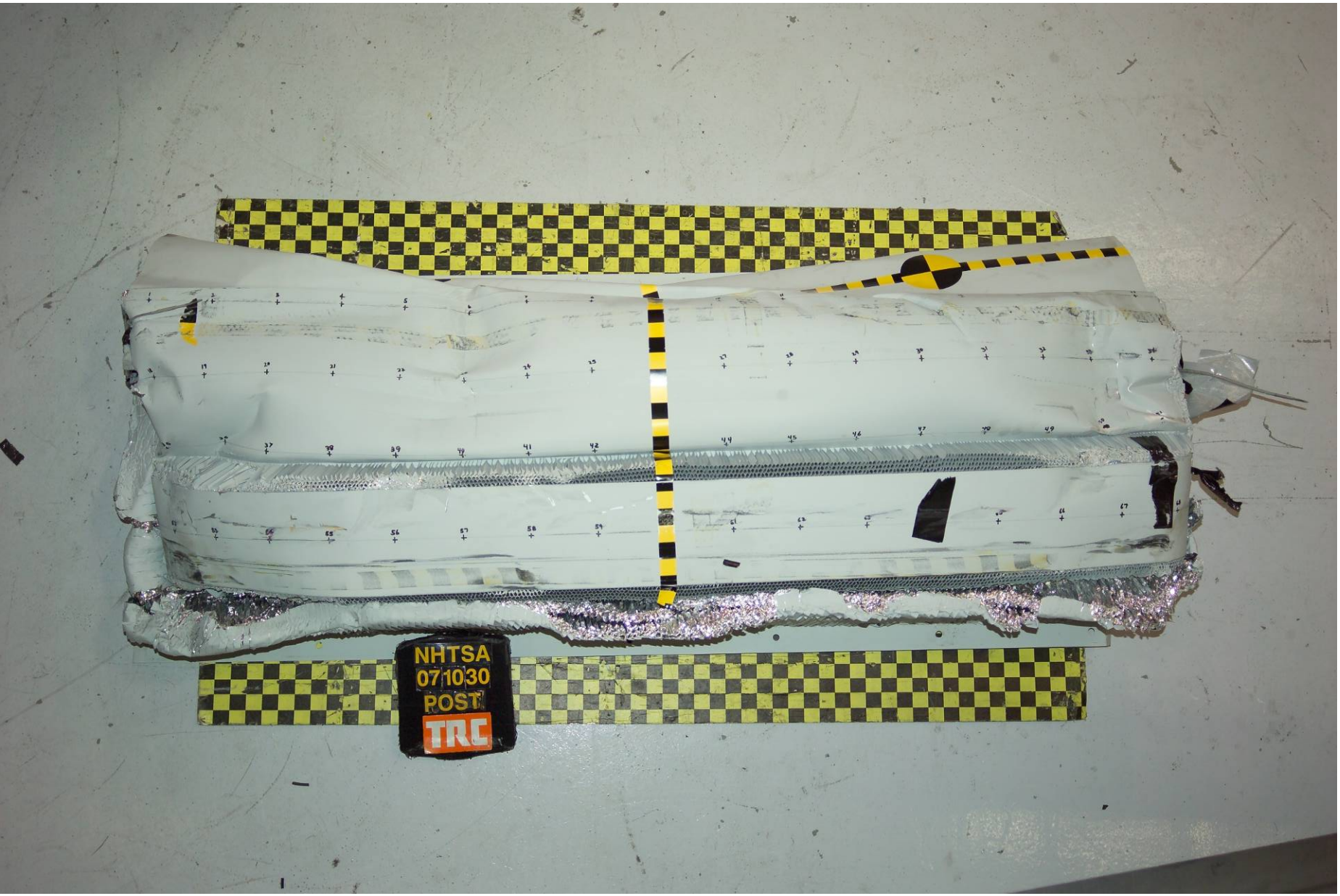


Figure A-25 Post-Test Frontal View of Impactor Face

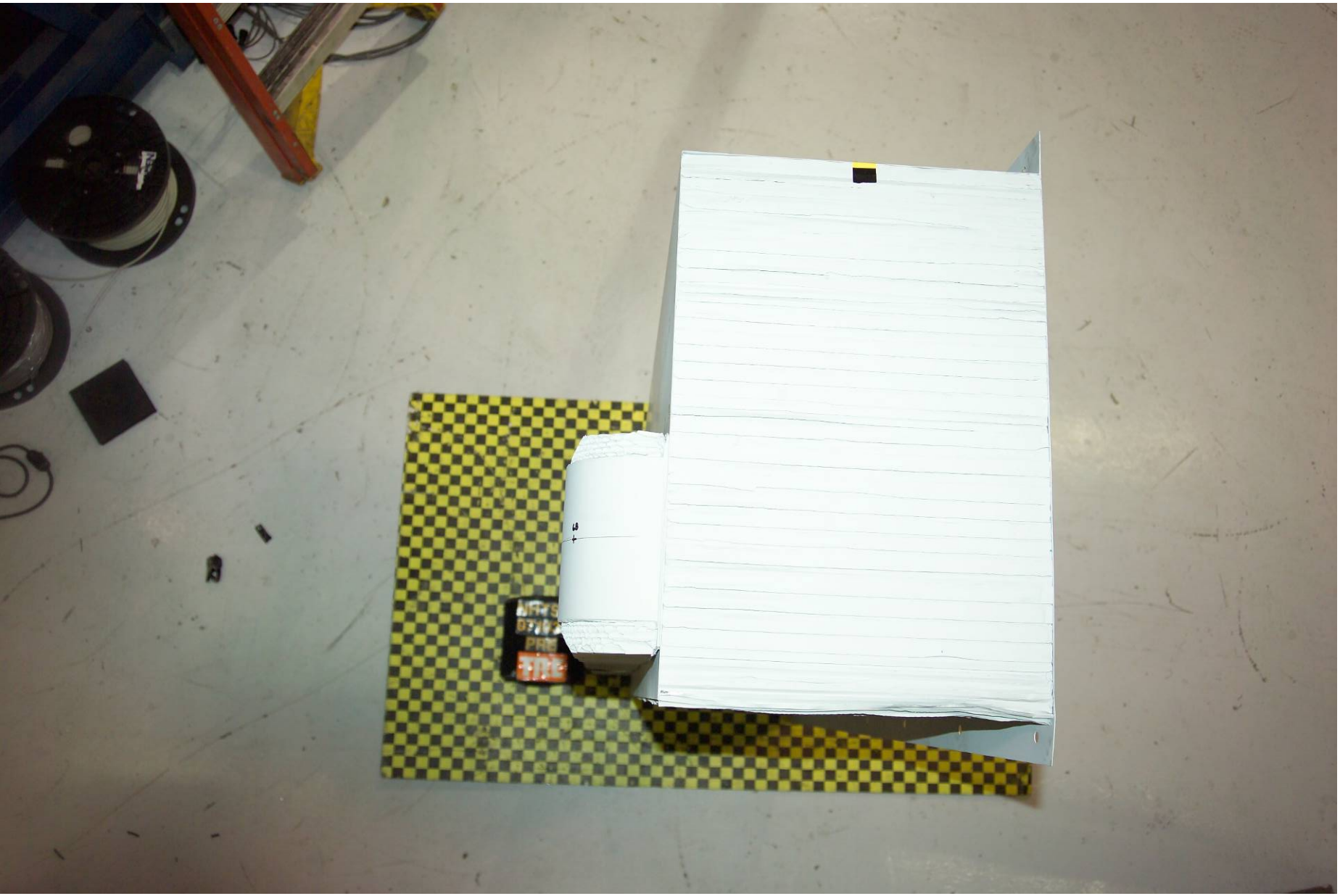


Figure A-26 Pre-Test Left Side View of Impactor Face



Figure A-27 Post-Test Left Side View of Impactor Face

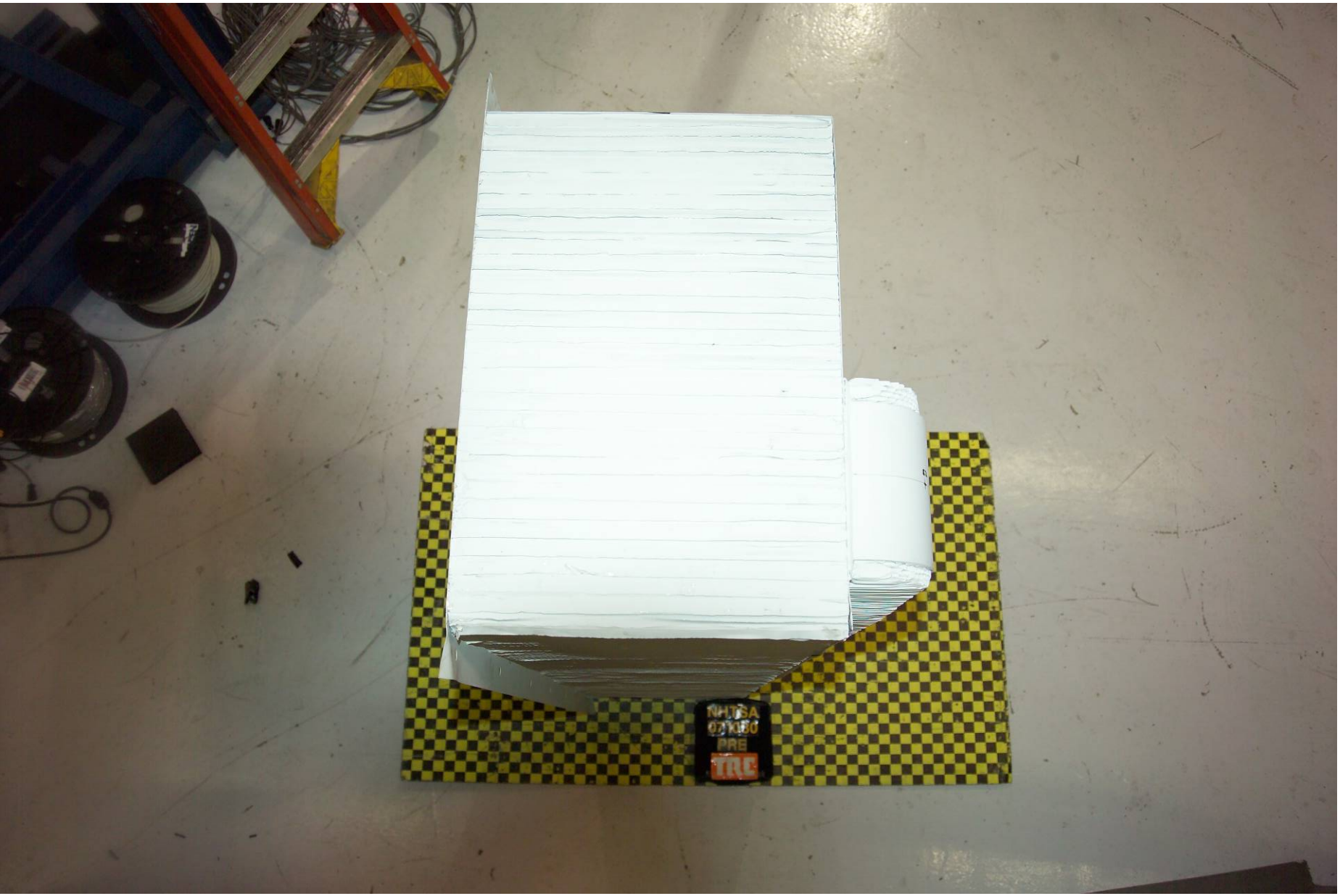


Figure A-28 Pre-Test Right Side View of Impactor Face



Figure A-29 Post-Test Right Side View of Impactor Face

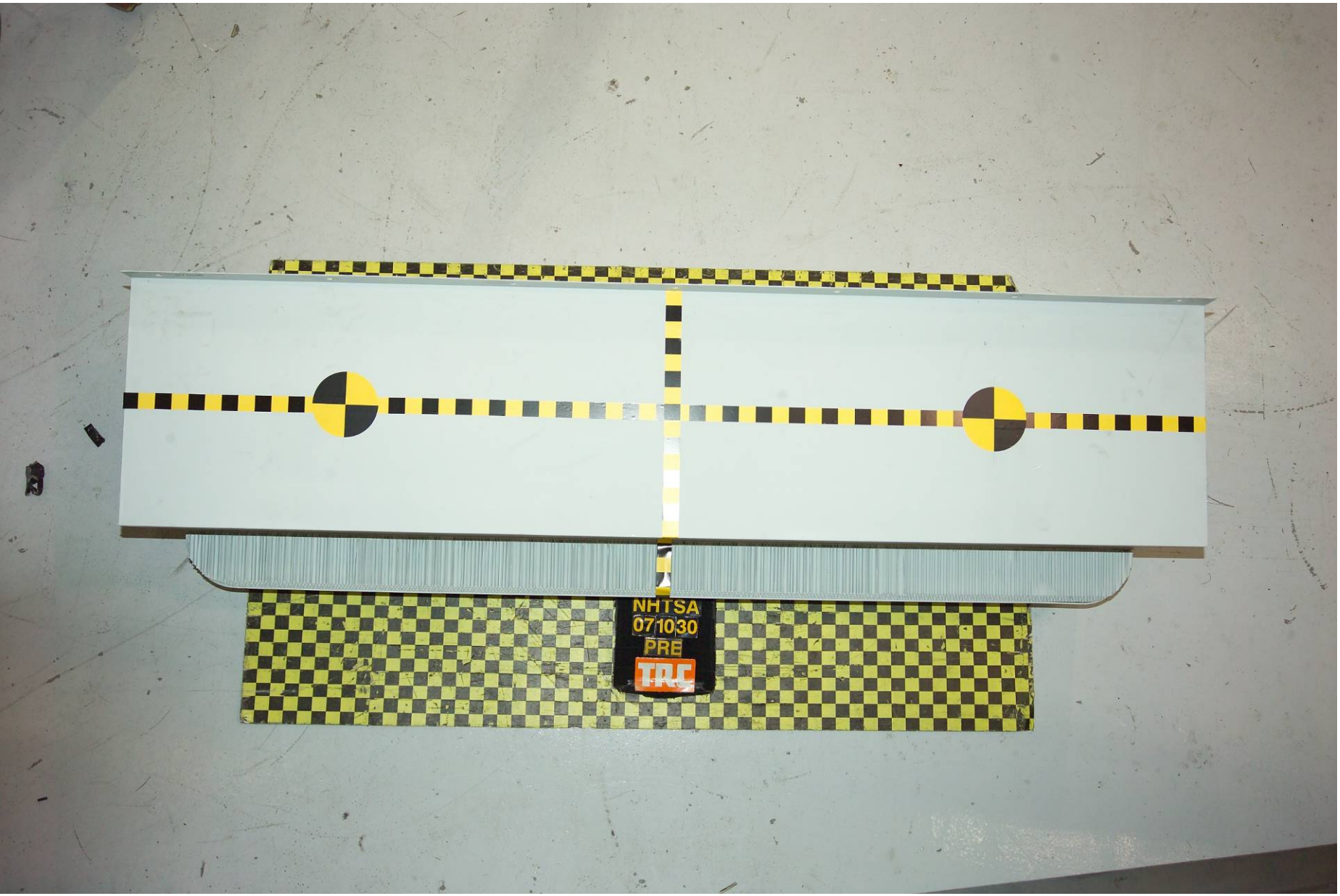


Figure A-30 Pre-Test Top View of Impactor Face

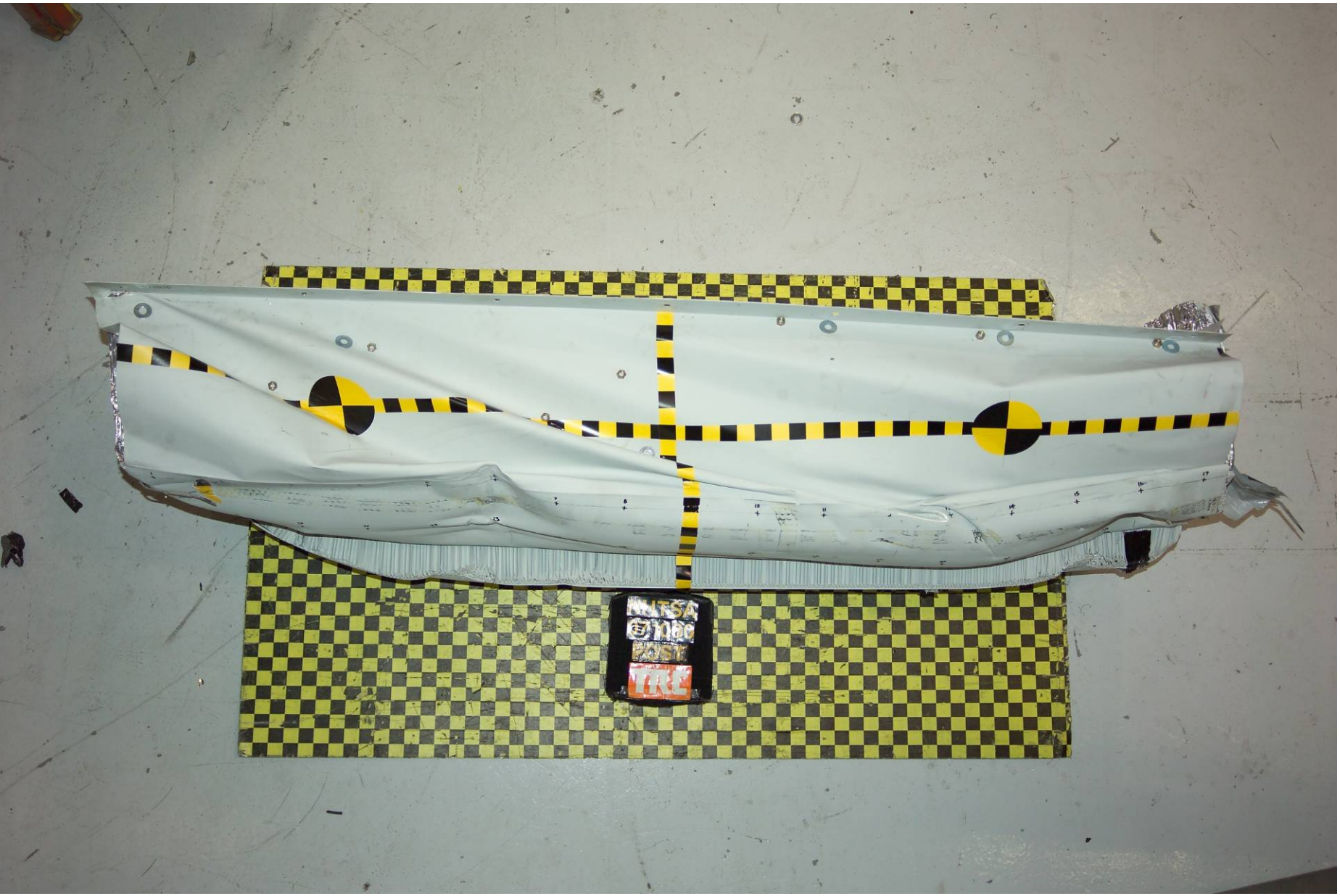


Figure A-31 Post-Test Top View of Impactor Face



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



Figure A-33 Post-Test Left Side View of Impactor



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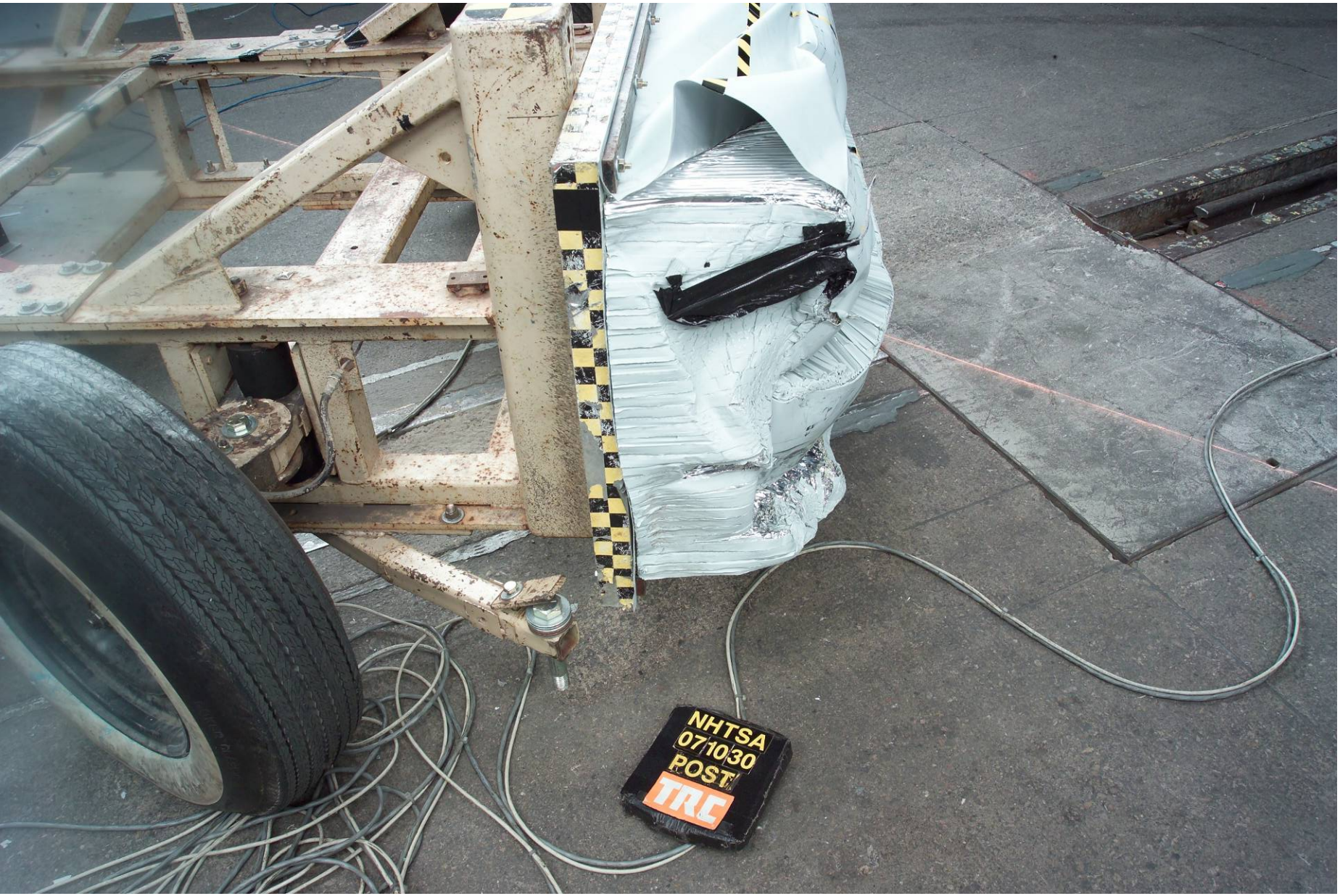


Figure A-35 Post-Test Right Side View of Impactor



Figure A-36 Pre-Test Top View of Impactor



Figure A-37 Post-Test Top View of Impactor



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

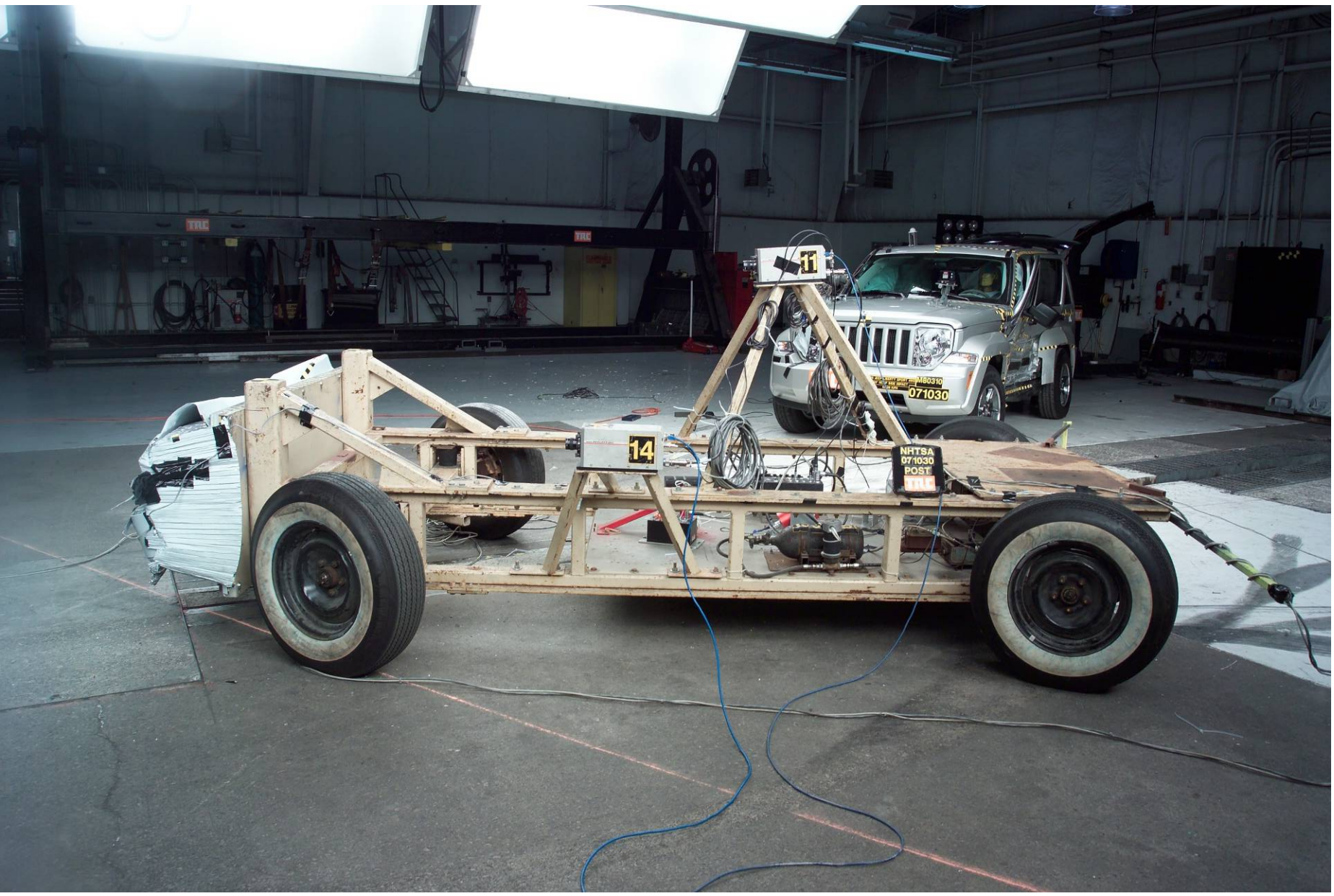


Figure A-39 Post-Test Left Side Overall View of Impactor

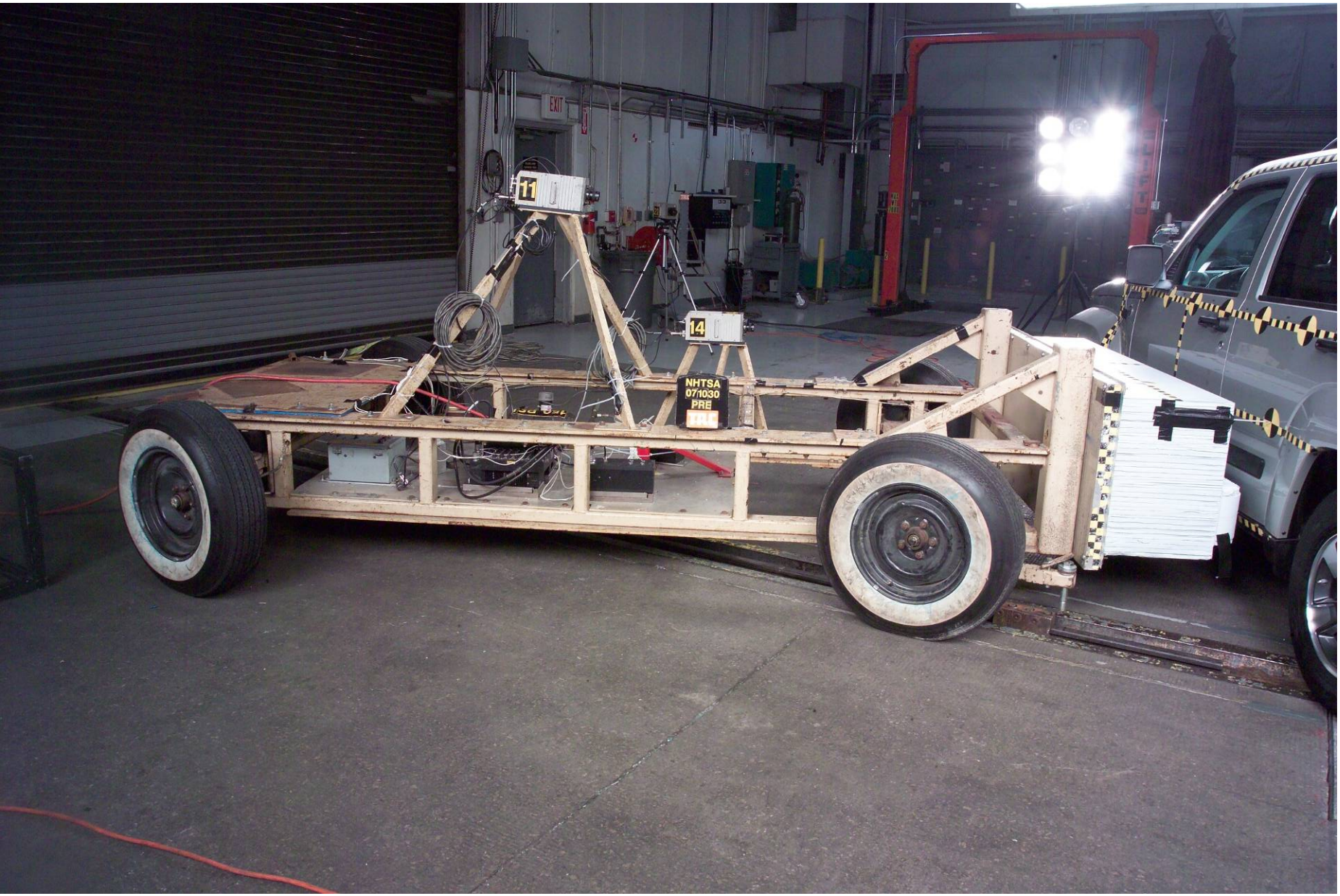


Figure A-40 Pre-Test Right Side Overall View of Impactor



Figure A-41 Post-Test Right Side Overall View of Impactor

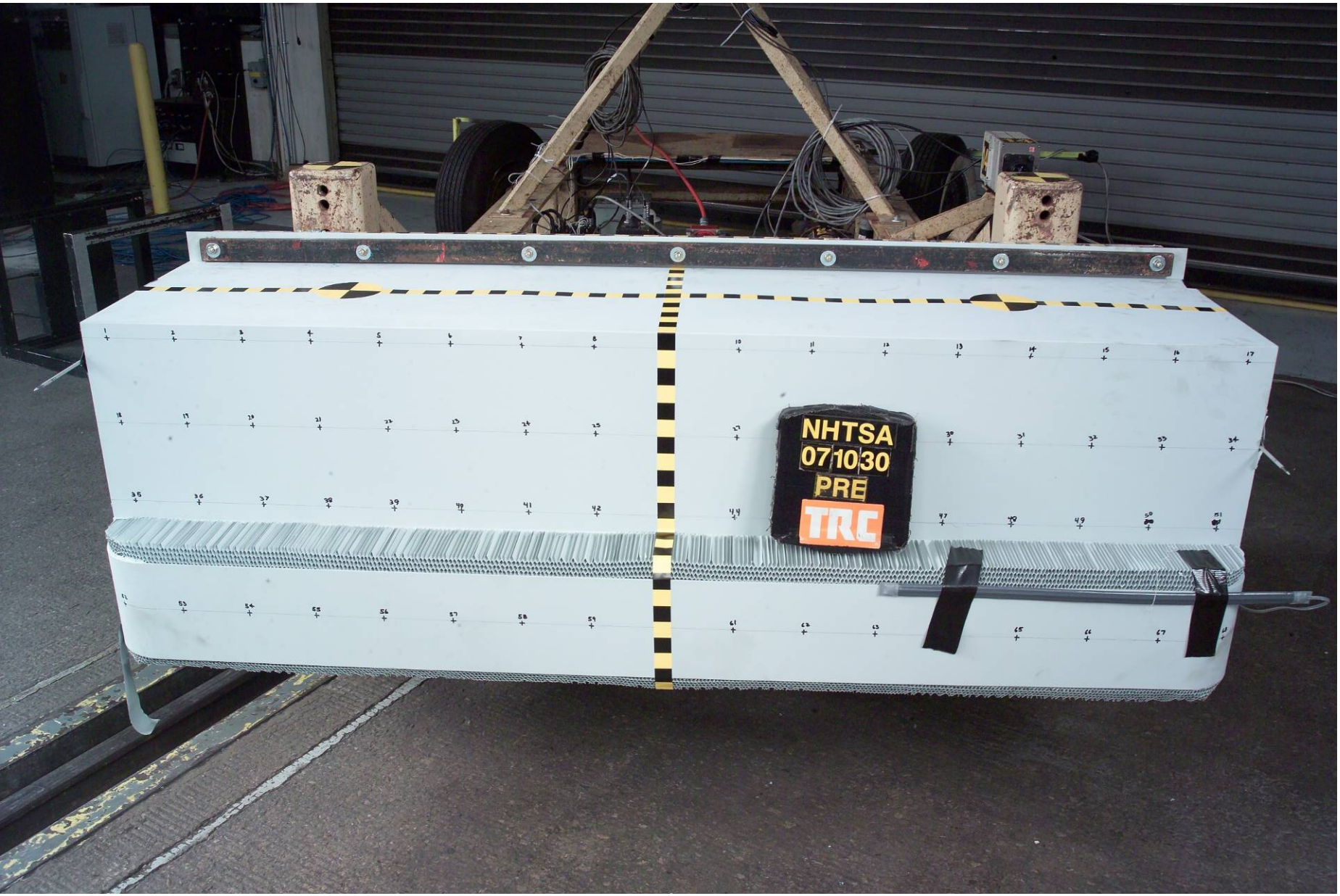


Figure A-42 Pre-Test View of MDB Showing Contact Switches in Place



Figure A-43 Post-Test View of MDB Showing Contact Switches in Place



Figure A-44 Pre-Test Overhead View of MDB Aligned with Vehicle



Figure A-45 Post-Test Overhead View of MDB with Vehicle



Figure A-46 Pre-Test Left Occupant Compartment View of Front SID



Figure A-47 Post-Test Left Occupant Compartment View of Front SID



Figure A-48 Pre-Test Left Occupant Compartment View of Rear SID



Figure A-49 Post-Test Left Occupant Compartment View of Rear SID



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

A-54

071030



Figure A-51 Post-Test Left View of Front SID



Figure A-52 Pre-Test Left View of Front SID and Belt Position



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



Figure A-54 Post-Test Left View of Front SID and Door Clearance



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



Figure A-56 Post-Test Left View of Rear SID

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071030



Figure A-57 Pre-Test Left View of Rear SID and Belt Position



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



Figure A-59 Post-Test Left View of Rear SID and Door Clearance



071030



Figure A-61 Post-Test Interior of Front Door Showing SID Impact Locations



Figure A-62 Post-Test Front SID Contact - View 1

A-66

071030



Figure A-63 Post-Test Front SID Contact - View 2

A-67

071030



Figure A-64 Pre-Test Interior of Rear Door



Figure A-65 Post-Test Interior of Rear Door Showing SID Impact Locations



Figure A-66 Post-Test Rear SID Contact - View 1

A-70

071030



Figure A-67 Post-Test Rear SID Contact - View 2



Figure A-68 Pre-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 Pre-Test Secondary Impact Point View



Figure A-73 Post-Test Secondary Impact Point View

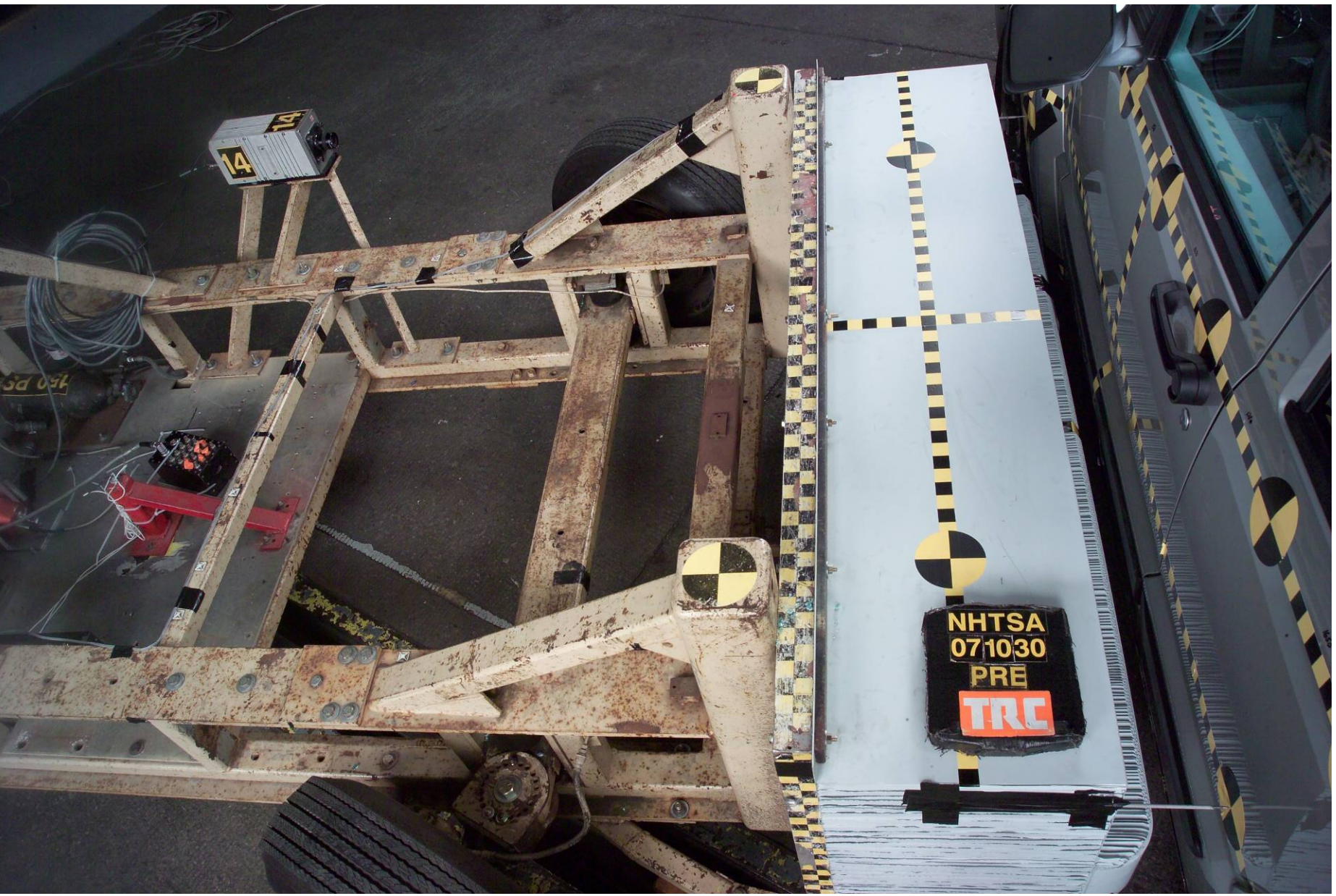


Figure A-74 Pre-Test Overhead View of MDB with Impactor Face in Position

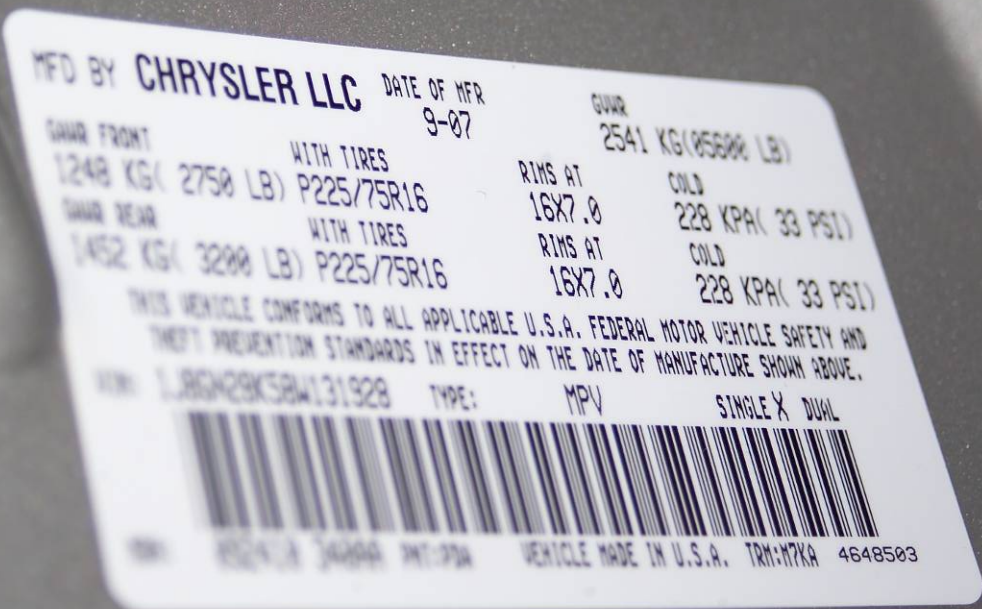


Figure A-75 Pre-Test Vehicle Certification Label View

 **TIRE AND LOADING INFORMATION**

SEATING CAPACITY – TOTAL **5** FRONT **2** REAR **3**

THE COMBINED WEIGHT OF OCCUPANTS AND CARGO SHOULD NEVER EXCEED
430 KG OR 950 LB

TIRE	FRONT	REAR	SPARE
ORIGINAL TIRE SIZE	P225/75R16	P225/75R16	T175/80D17
COLD TIRE INFLATION PRESSURE	228 kPa, 33 PSI	228 kPa, 33 PSI	428 kPa, 62 PSI

SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION  80W/13 18218

Figure A-76 Pre-Test Vehicle Recommended Tire Pressure Label View

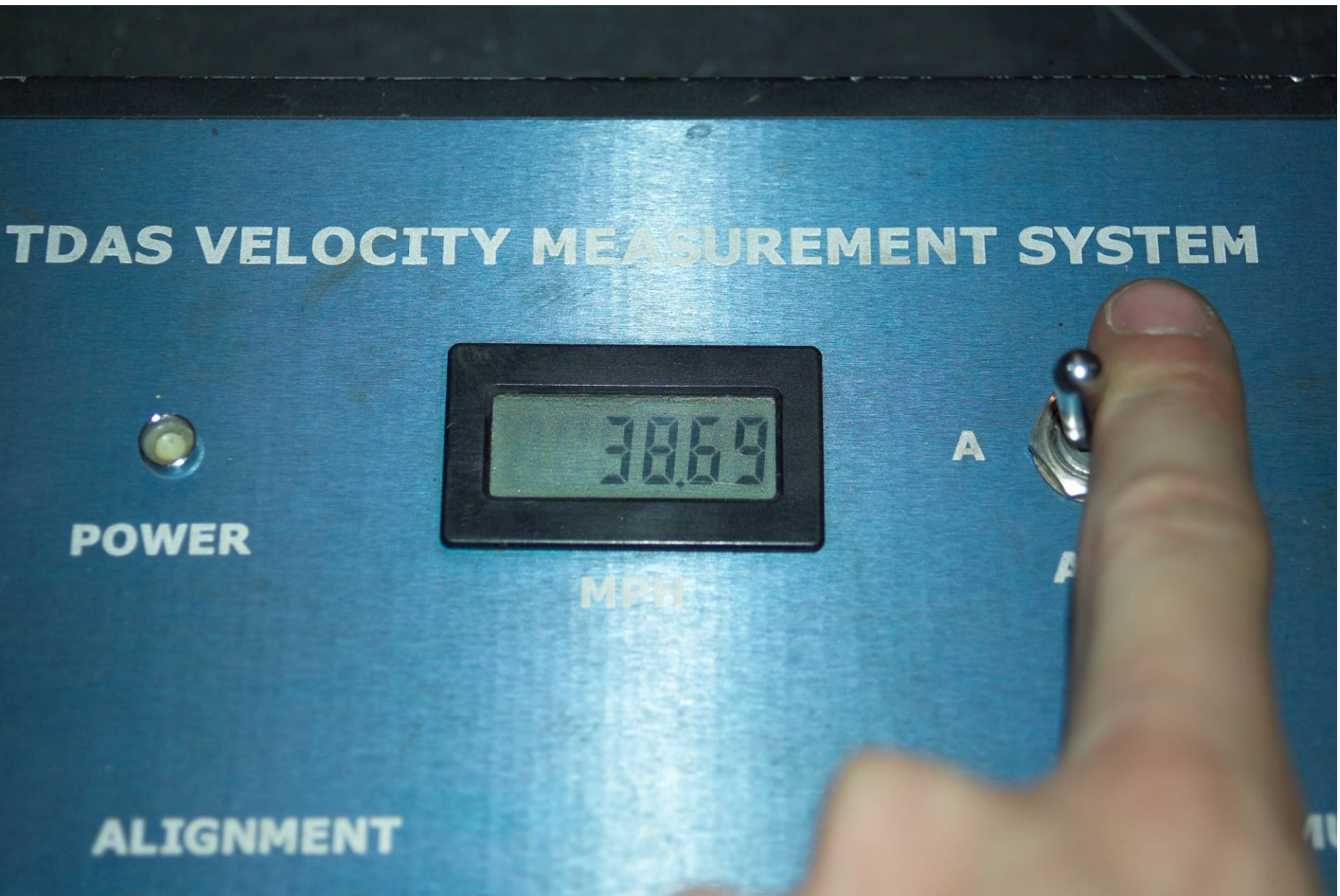


Figure A-77 Post-Test Light Trap Digital Readout - View 1



Figure A-78 Post-Test Light Trap Digital Readout - View 2



Figure A-79 Impact Event



Figure A-80 Pre-Test Fuel Cap



Figure A-81 Post-Test Fuel Cap



Figure A-82 Pre-Test Ballast View

A-86

071030

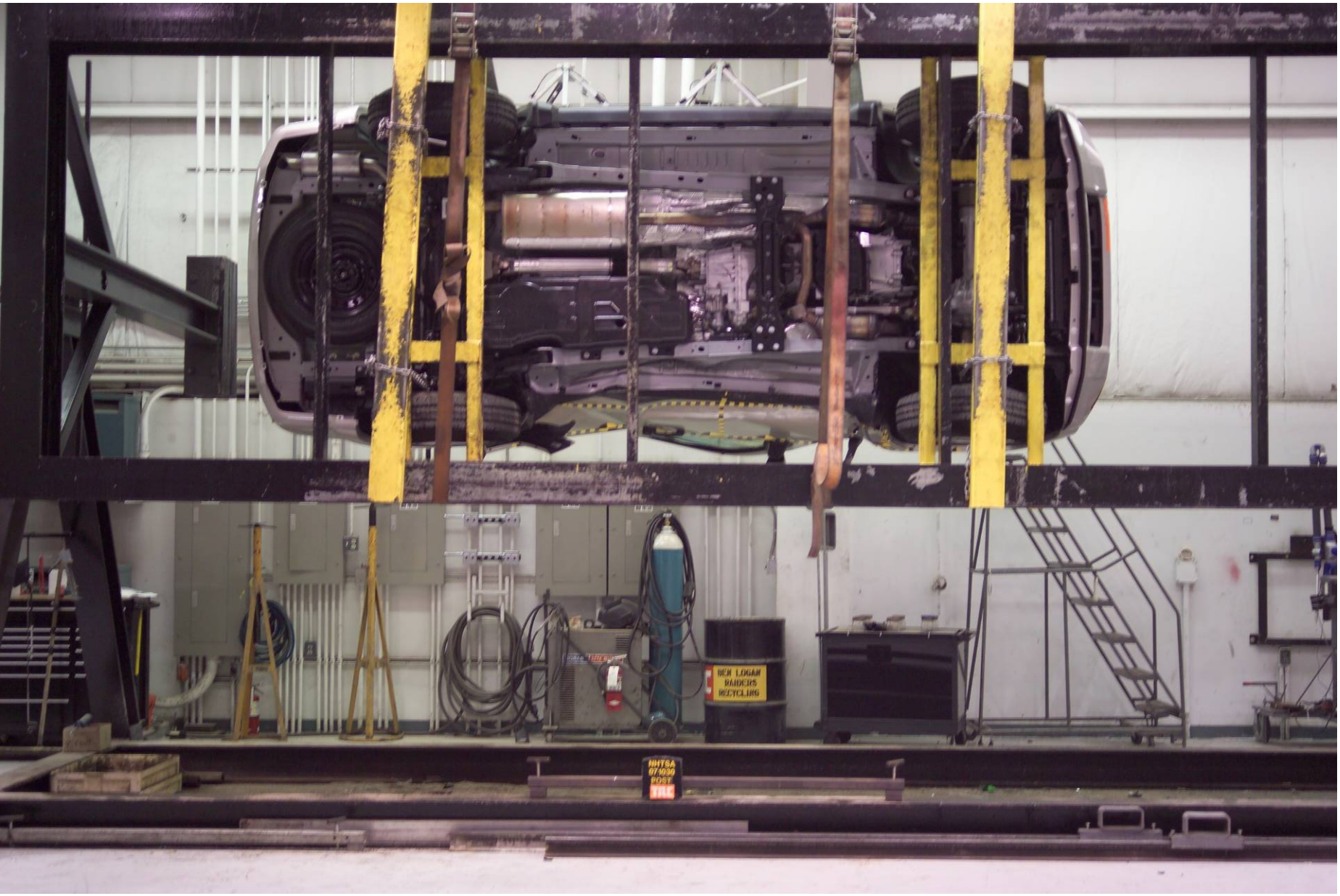


Figure A-83 FMVSS 301 Rollover View at 90°

A-87

071030



Figure A-84 FMVSS 301 Rollover View at 180°



Figure A-85 FMVSS 301 Rollover View at 270°

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071030



Figure A-86 FMVSS 301 Rollover View at 360°

A-90

071030

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: 071030 (M80310)

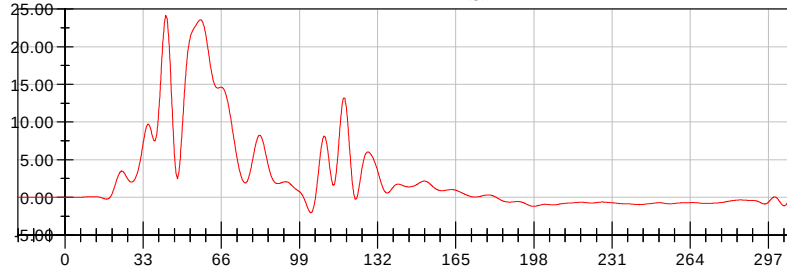
Position #1 SID H3 Dummy (059)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

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



<Max>

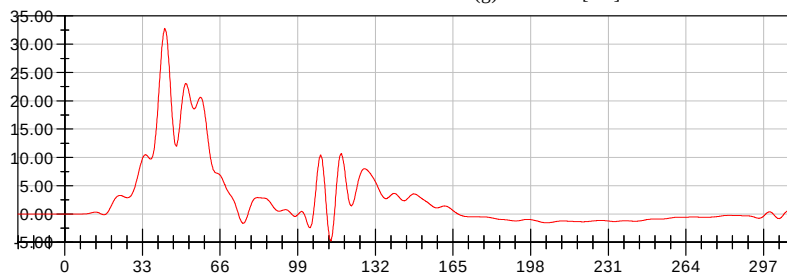
24.17 g at 42.48 ms

<Min>

-2.06 g at 103.76 ms

FIR_100

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



<Max>

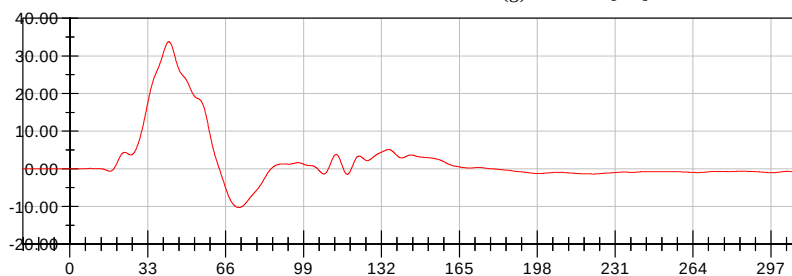
32.82 g at 42.48 ms

<Min>

-4.75 g at 113.12 ms

FIR_100

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



<Max>

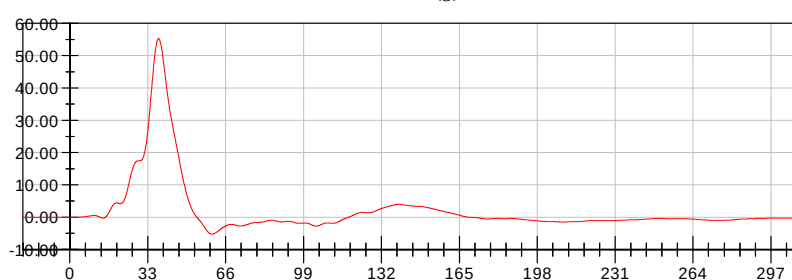
33.81 g at 41.84 ms

<Min>

-10.27 g at 71.84 ms

FIR_100

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



<Max>

55.39 g at 37.52 ms

<Min>

-5.25 g at 60.00 ms

FIR_100



NHTSA

Test Lab: CTF

Test Number: 071030 (M80310)

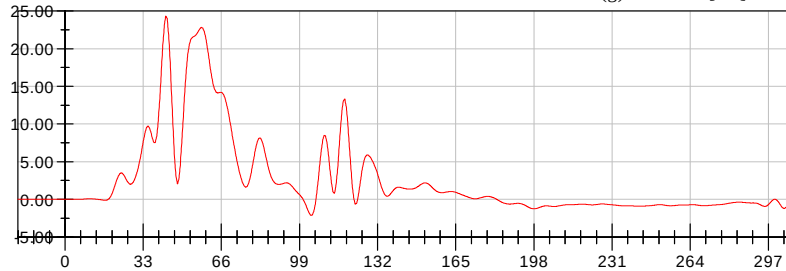
Position #1 SID H3 Dummy (059)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

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



<Max>

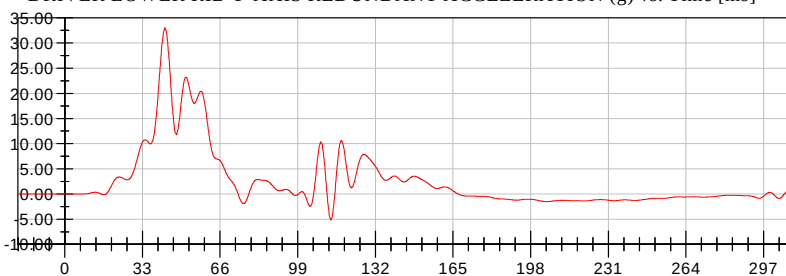
24.33 g at 42.56 ms

<Min>

-2.12 g at 103.76 ms

FIR_100

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



<Max>

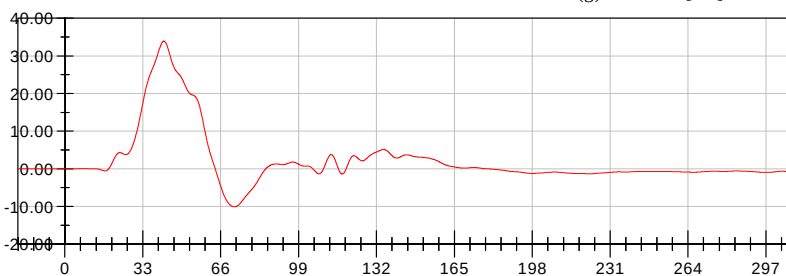
33.01 g at 42.48 ms

<Min>

-5.19 g at 113.12 ms

FIR_100

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



<Max>

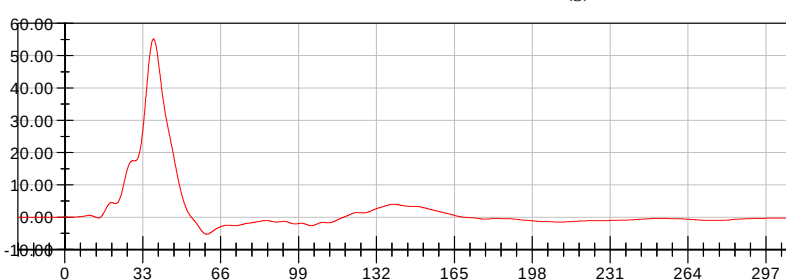
33.95 g at 41.92 ms

<Min>

-10.10 g at 71.84 ms

FIR_100

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



<Max>

55.27 g at 37.52 ms

<Min>

-5.30 g at 60.00 ms

FIR_100



NHTSA

Test Lab: CTF

Test Number: 071030 (M80310)

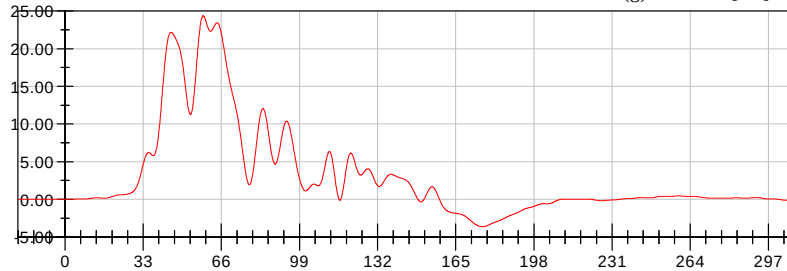
Position #1 SID H3 Dummy (059)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

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



<Max>

24.39 g at 58.16 ms

<Min>

-3.64 g at 176.24 ms

FIR_100

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



<Max>

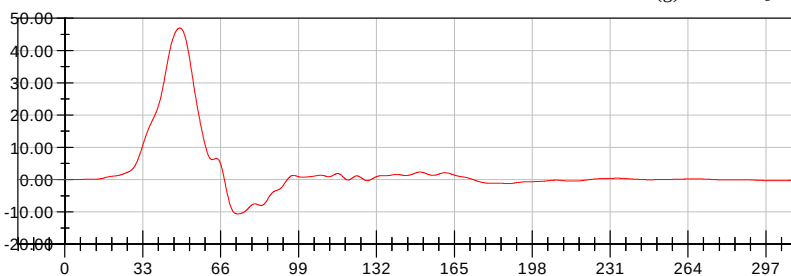
31.36 g at 45.04 ms

<Min>

-5.14 g at 73.76 ms

FIR_100

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



<Max>

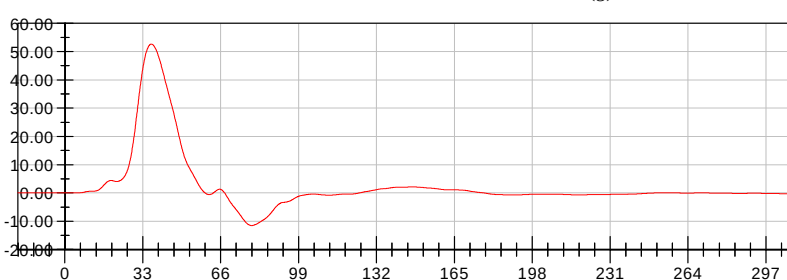
47.02 g at 48.72 ms

<Min>

-10.63 g at 73.12 ms

FIR_100

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



<Max>

52.64 g at 36.88 ms

<Min>

-11.51 g at 79.36 ms

FIR_100



NHTSA

Test Lab: CTF

Test Number: 071030 (M80310)

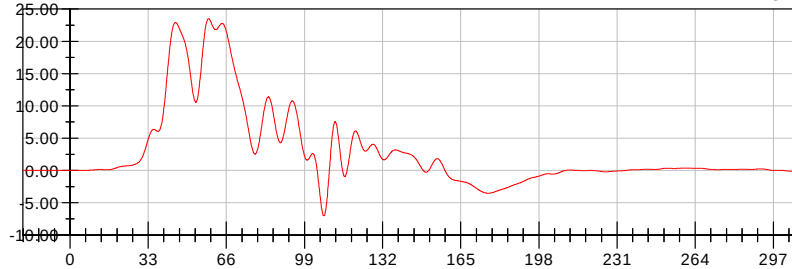
Position #1 SID H3 Dummy (059)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

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



<Max>

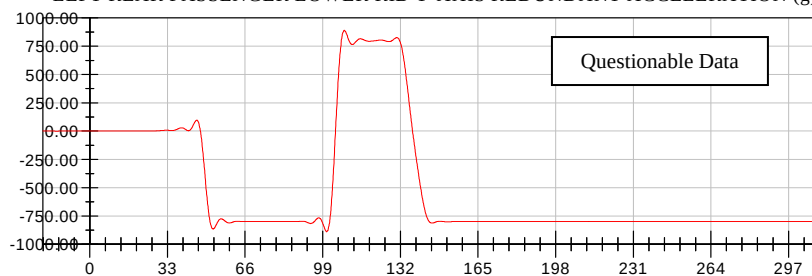
23.50 g at 58.72 ms

<Min>

-6.99 g at 107.44 ms

FIR_100

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



<Max>

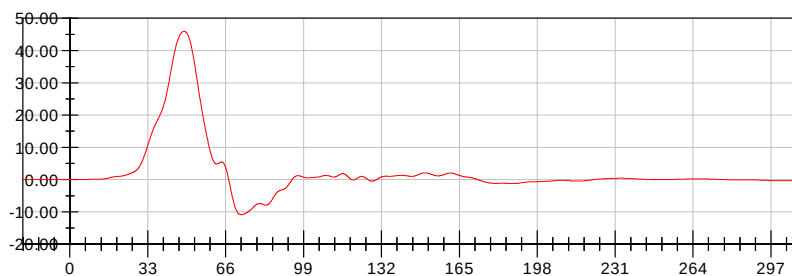
891.39 g at 108.16 ms

<Min>

-888.92 g at 100.64 ms

FIR_100

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



<Max>

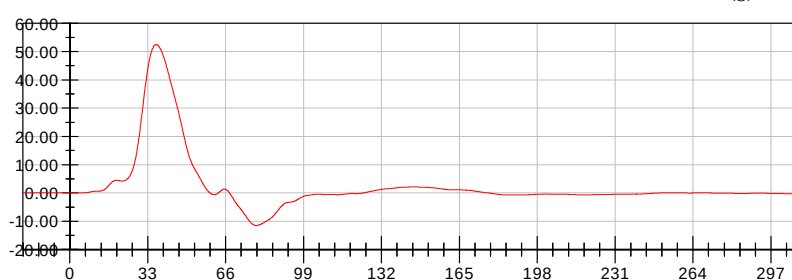
45.97 g at 48.16 ms

<Min>

-10.89 g at 72.48 ms

FIR_100

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



<Max>

52.49 g at 36.32 ms

<Min>

-11.51 g at 78.80 ms

FIR_100



APPENDIX C
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID/HIII: 059

Transportation Research Center Inc.
SID/HIII Dummy Post-Test
External Dimensions
Serial No. 059 Calibration No. 24

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	511 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	367 mm	Yes
Top Rib Width From CL	RW-1	165.1 - 180.3 mm	173 mm	Yes
Bottom Rib Width From CL	RW-2	165.1 - 180.3 mm	173 mm	Yes
Difference Between Top & Bottom Rib Width from CL		<= 2.5 mm	0.0 mm	Yes

Technician

Ronit Baran

Approved

Ron Stoner



Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 059 Certification No. 24-2

Test Date: 10/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Peak Head Resultant Acceleration	120 - 150 g	148.8 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	7.8 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

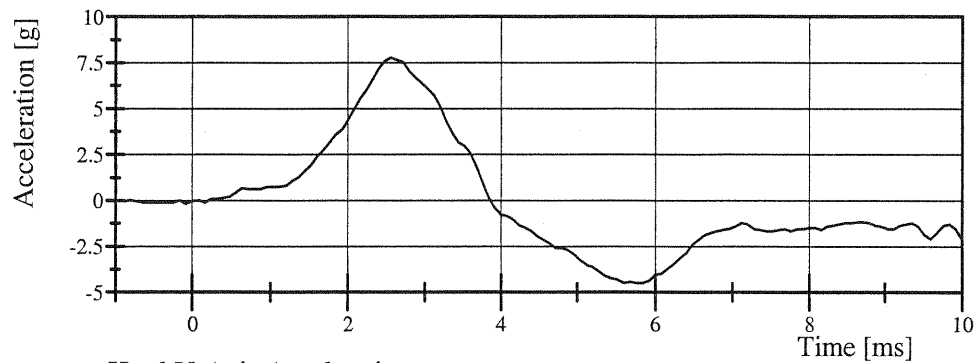
Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 059 Certification No. 24-2

Test Date: 10/12/2007

Head X-Axis Acceleration

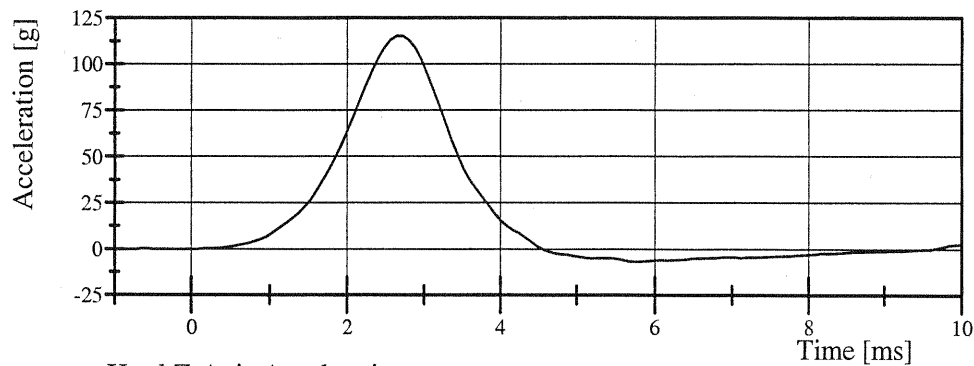


Filter Class: CFC_1000

Max: 7.8 g at 2.6 ms

Min: -4.5 g at 5.6 ms

Head Y-Axis Acceleration

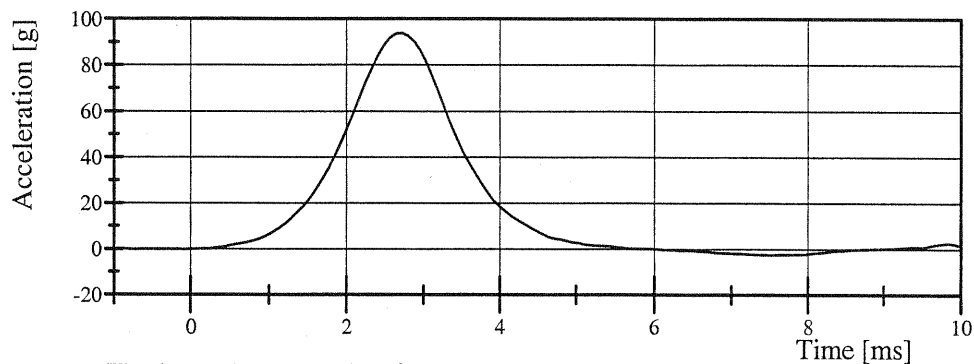


Filter Class: CFC_1000

Max: 115.2 g at 2.6 ms

Min: -6.8 g at 5.8 ms

Head Z-Axis Acceleration

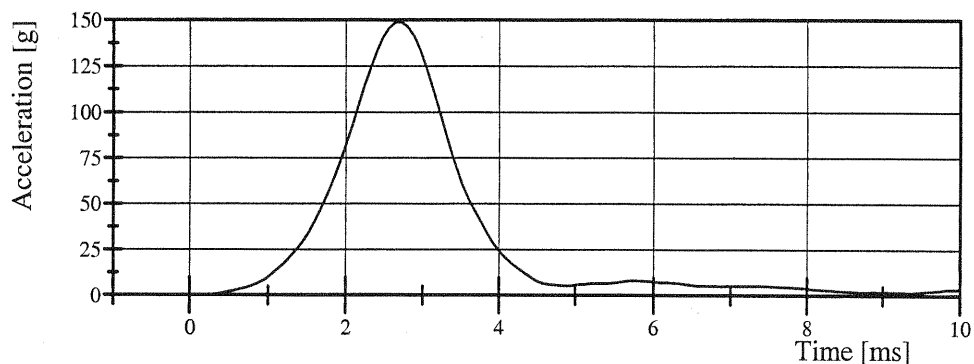


Filter Class: CFC_1000

Max: 93.9 g at 2.7 ms

Min: -2.6 g at 7.5 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 148.8 g at 2.7 ms

Min: 0.0 g at -0.8 ms

Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 24-1

Test Date: 10/12/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	45 %	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	2.284 m/s	Yes
Pendulum Integrated Velocity Change at 20 ms	4.12 - 5.10 m/s	4.525 m/s	Yes
Pendulum Integrated Velocity Change at 30 ms	5.73 - 7.01 m/s	6.501 m/s	Yes
Pendulum Integrated Velocity Change at 40 to 70 ms	6.27 - 7.64 m/s	7.172 m/s	Yes
Total Head D-Plane Rotation	(-66) - (-82) °	-72.9 °	Yes
Total Head D-Plane Rotation Time to 0° after Peak Rotation	58 - 67 ms	59.6 ms	Yes
Total Neck Occipital Condyle Moment	73 - 88 N·m	85.5 N·m	Yes
Total Neck Occipital Condyle Moment Time to 0 N·m after Peak Moment	49 - 64 ms	53.6 ms	Yes
Time from Peak Moment to Peak Rotation	2 - 16 ms	9.9 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Storer

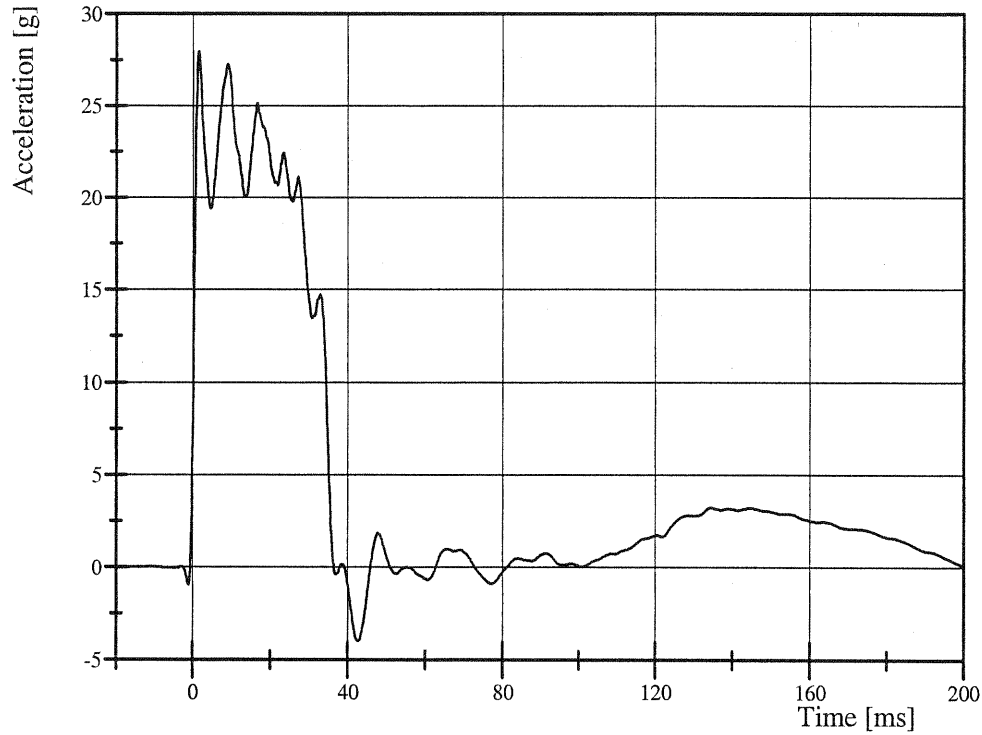
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 24-1

Test Date: 10/12/2007

Pendulum Acceleration

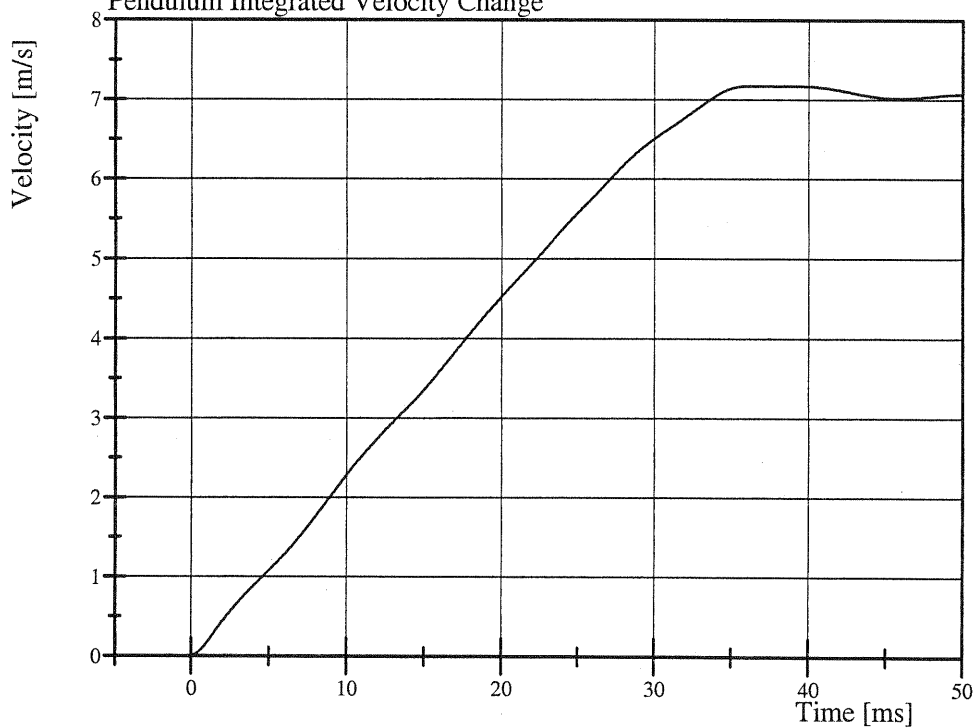


Filter Class: CFC_180

Max: 27.9 g at 1.5 ms

Min: -4.0 g at 42.8 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 7.2 m/s at 36.4 ms

Min: 0.0 m/s at 0.0 ms

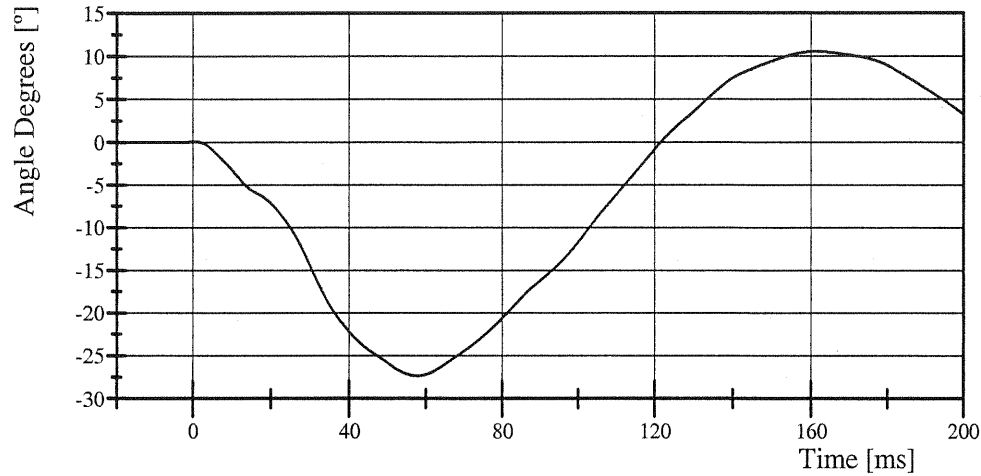
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 24-1

Test Date: 10/12/2007

Pot Rotation at the Base of Neck

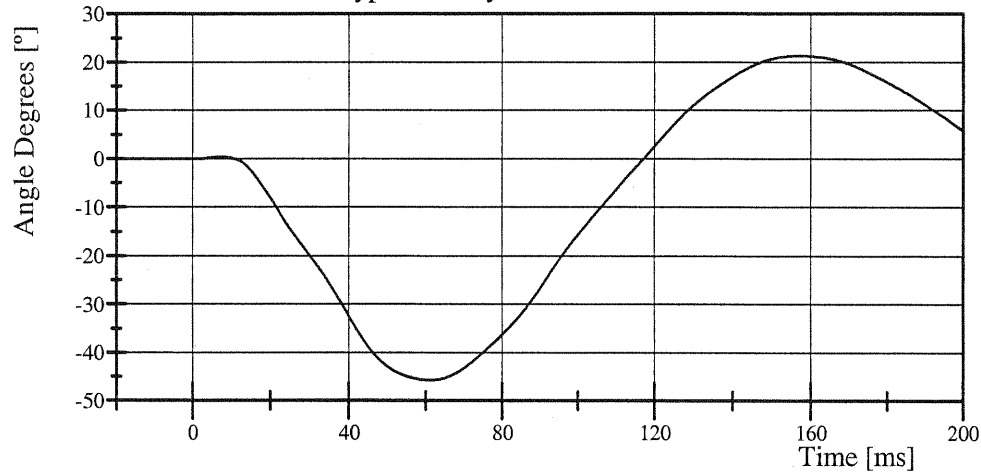


Filter Class: CFC_60

Max: 10.6 ° at 161.4 ms

Min: -27.3 ° at 57.8 ms

Head Rotation at Occypital Condyles

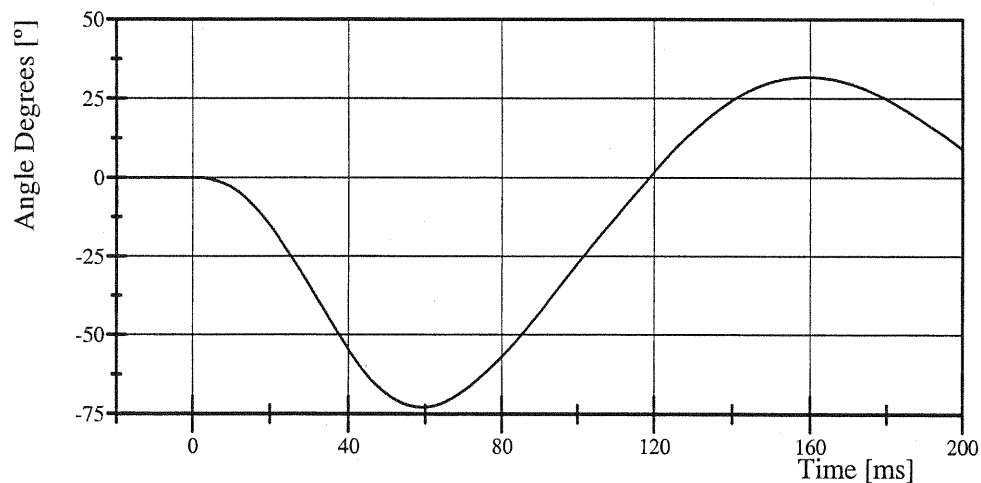


Filter Class: CFC_60

Max: 21.3 ° at 157.2 ms

Min: -45.7 ° at 61.3 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 31.8 ° at 159.2 ms

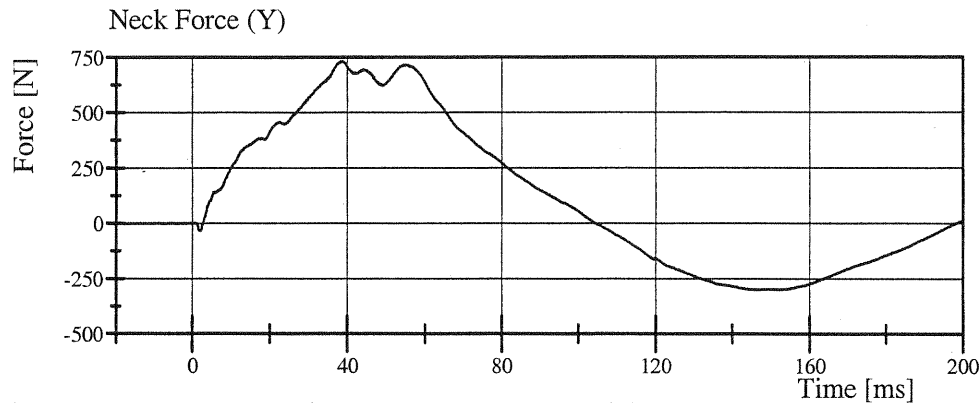
Min: -72.9 ° at 59.3 ms

Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 24-1

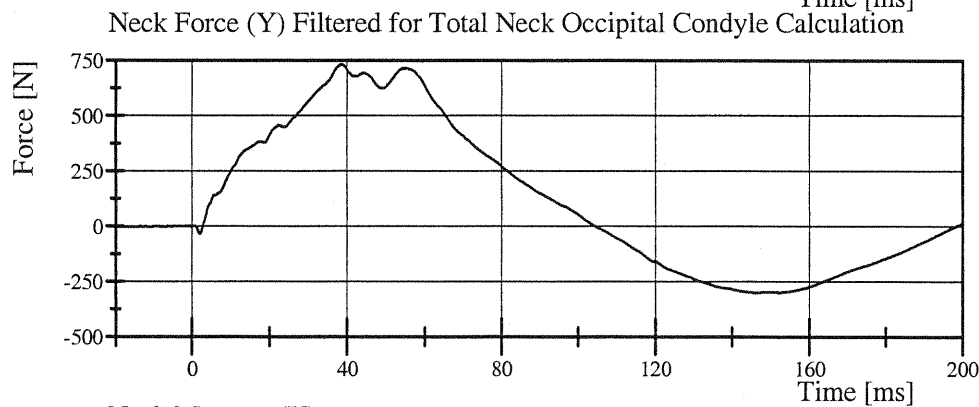
Test Date: 10/12/2007



Filter Class: CFC_1000

Max: 732.4 N at 38.7 ms

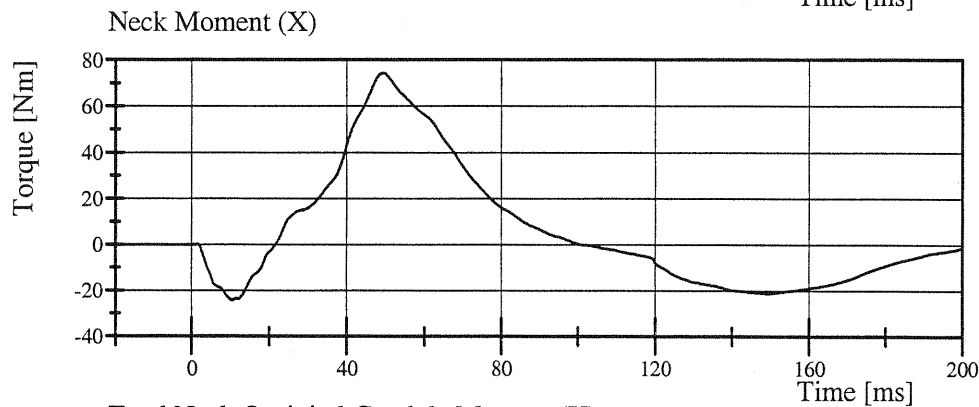
Min: -299.4 N at 147.3 ms



Filter Class: CFC_600

Max: 732.0 N at 38.6 ms

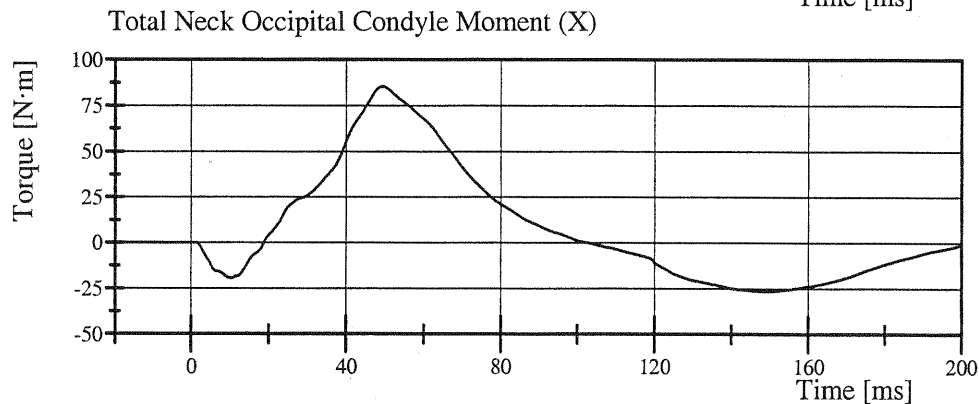
Min: -298.9 N at 147.2 ms



Filter Class: CFC_600

Max: 74.4 Nm at 49.3 ms

Min: -24.1 Nm at 10.6 ms



Filter Class: CFC_600

Max: 85.5 N·m at 49.4 ms

Min: -26.5 N·m at 149.0 ms

Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 059 Certification No. 24-1

Test Date: 10/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	61 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.279 m/s	Yes
Upper Rib Lateral Acceleration	37 - 46 g	42.7 g	Yes
Lower Rib Lateral Acceleration	37 - 46 g	41.9 g	Yes
Lower Spine Lateral Acceleration	15 - 22 g	20.7 g	Yes

Test meets specifications.

Comments:

Technician

Raul Baranale

Approved

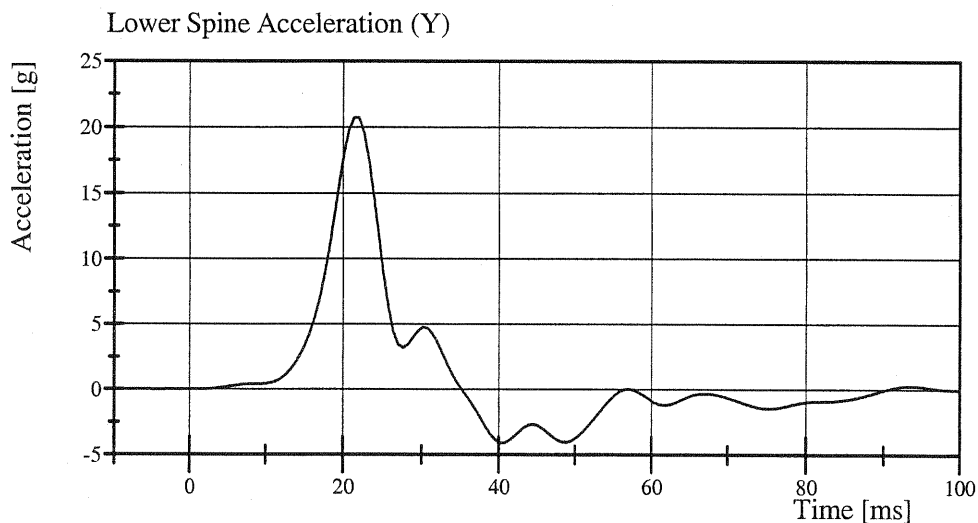
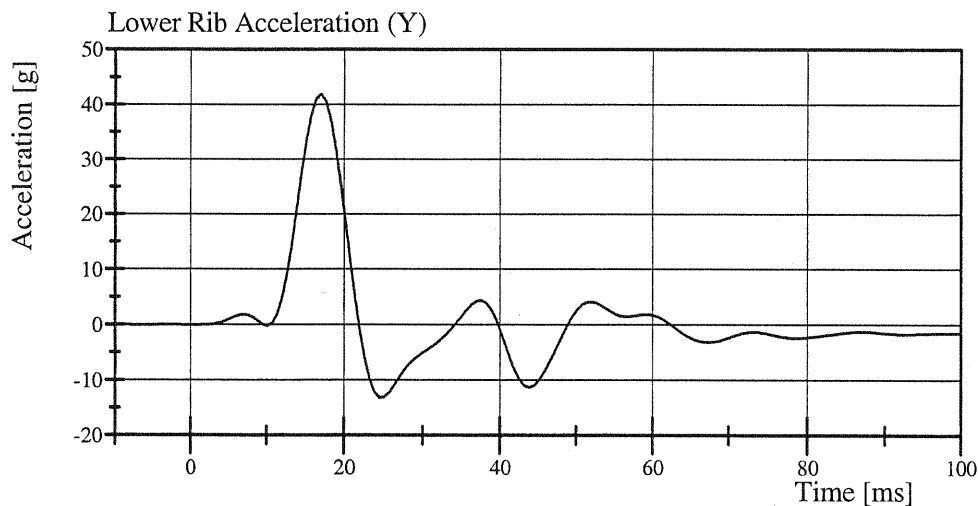
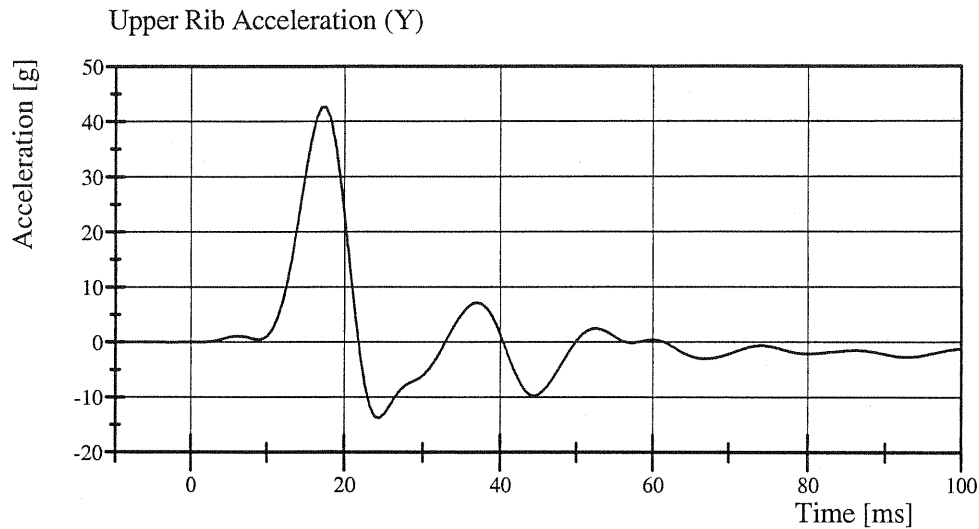
Ron Stoner

Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 059 Certification No. 24-1

Test Date: 10/16/2007



Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 059 Certification No. 24-18

Test Date: 10/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Probe Force within Corridor	Yes	Yes	Yes
Probe Velocity	6.35 - 8.89 mm/s	7.807 mm/s	Yes

Test meets specifications.

Comments:

Technician

Rant Barnd

Approved

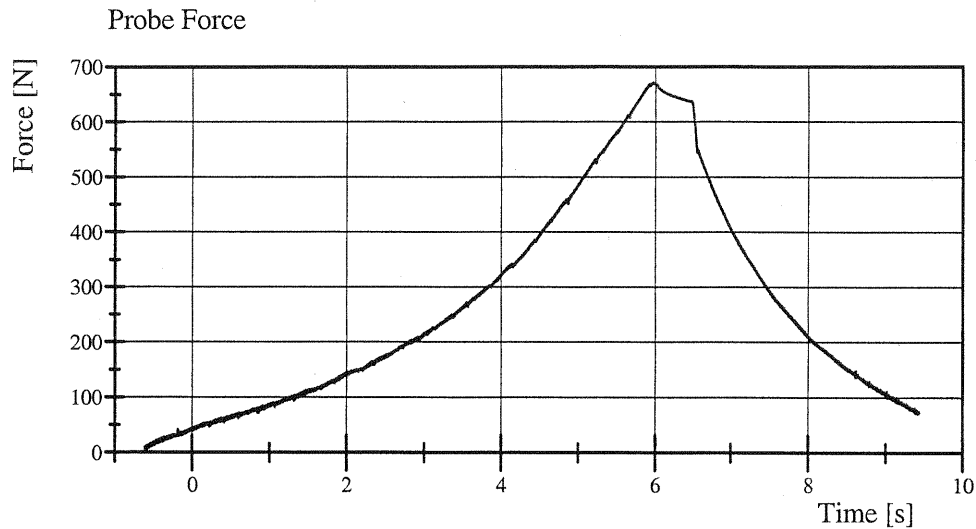
Ron Stoner

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 059 Certification No. 24-18

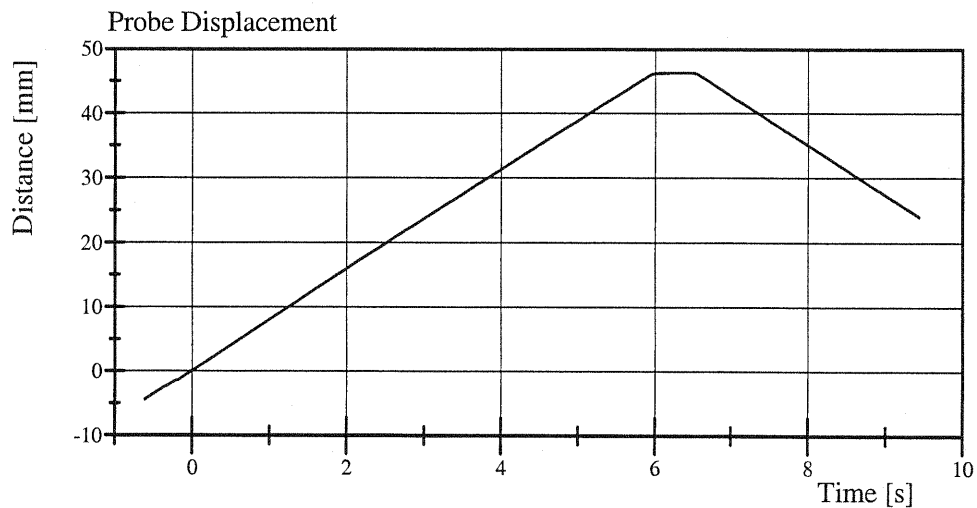
Test Date: 10/16/2007



Filter Class: CFC_600

Max: 670.3 N at 6.0 s

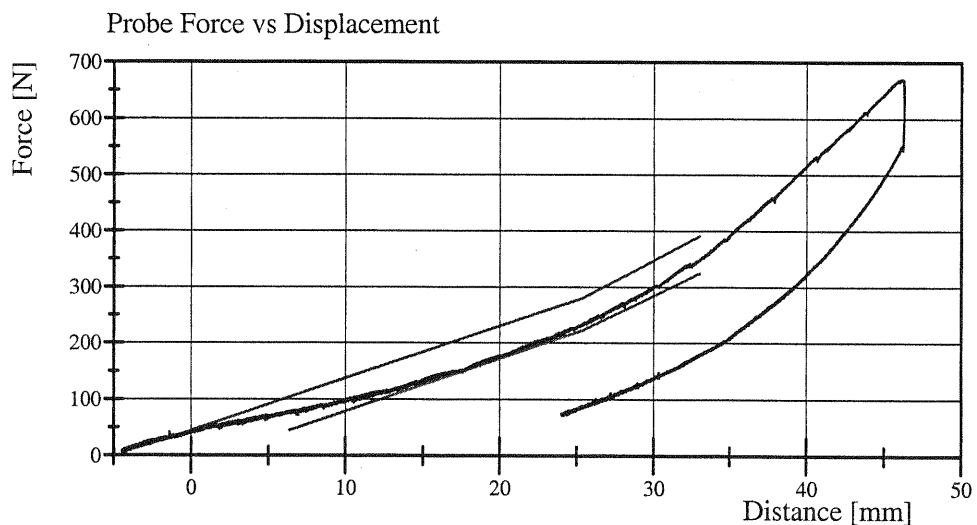
Min: 6.3 N at -0.6 s



Filter Class: CFC_180

Max: 46.3 mm at 6.5 s

Min: -4.5 mm at -0.6 s



Filter Class: CFC_600

Max: 670.3 N at 46.1 mm

Min: 6.3 N at -4.3 mm

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 059 Certification No. 24-1

Test Date: 10/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	63 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.285 m/s	Yes
Pelvis Lateral Acceleration Duration above 20g	3 - 7 ms	6.4 ms	Yes
Pelvis Lateral Acceleration	40 - 60 g	43.2 g	Yes
Is Acceleration Curve Unimodal Above 20g?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Ronald Beranides

Approved

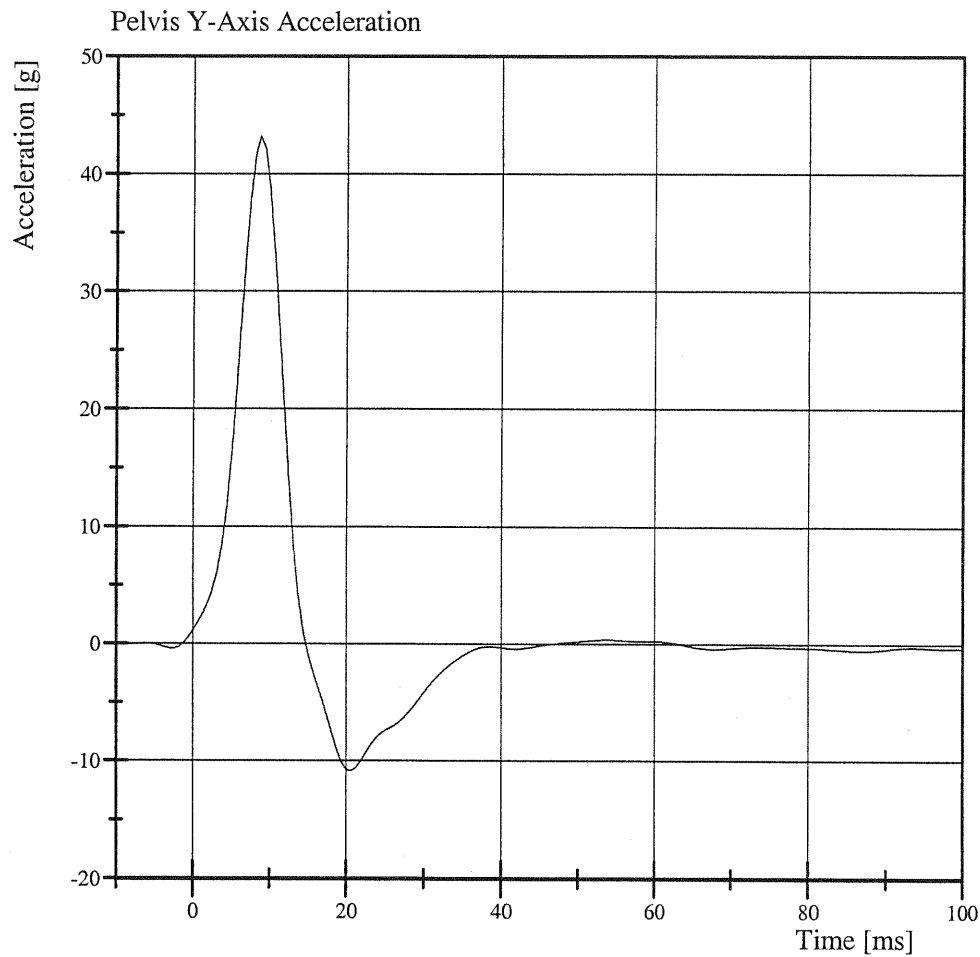
Ron Stoner

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 059 Certification No. 24-1

Test Date: 10/16/2007



Filter Class: FIR_100

Max: 43.2 g at 8.7 ms

Min: -10.9 g at 20.6 ms

TRANSPORTATION RESEARCH CENTER INC.

LUMBAR FLEXION TEST

SID PART 572B

CAL DATE: 15-Oct-07

TRC, INC.

TEST NO: LUFL-01

572B SN 059 TORSO FLEX CAL 24

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TIME	NA	850
TEMPERATURE	18.9 – 25.6° C	21.0 C
RELATIVE HUMIDITY	10 – 70 %	48 %
FORCE AT 0 DEG. FLEXION	-27 – 27 N	2.66 N
FORCE AT 20 DEG OF FLEXION	98 – 151 N	133.44 N
FORCE AT 30 DEG OF FLEXION	151 – 205 N	191.27 N
FORCE AT 40 DEG OF FLEXION	205 – 258 N	244.65 N
NET RETURN ANGLE AFTER 3 MINUTES	< 12 °	7 °

TEST MEETS SPECIFICATIONS

TECHNICIAN Charles W. Bell

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. Bell

Approved

Ron Stoner

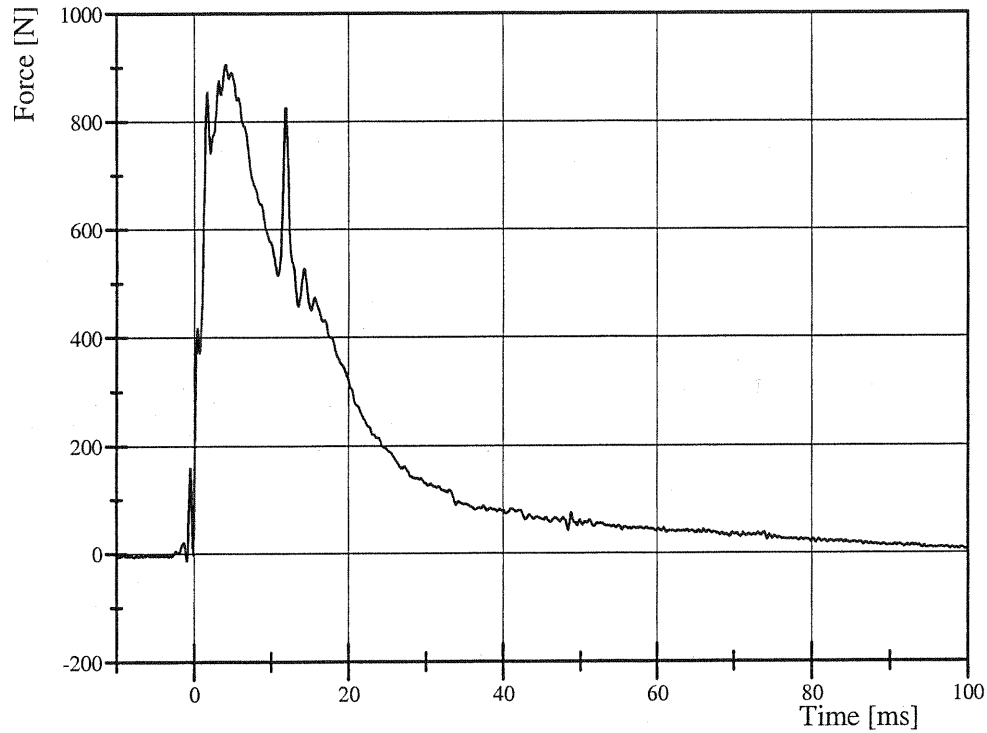
Transportation Research Center Inc.

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

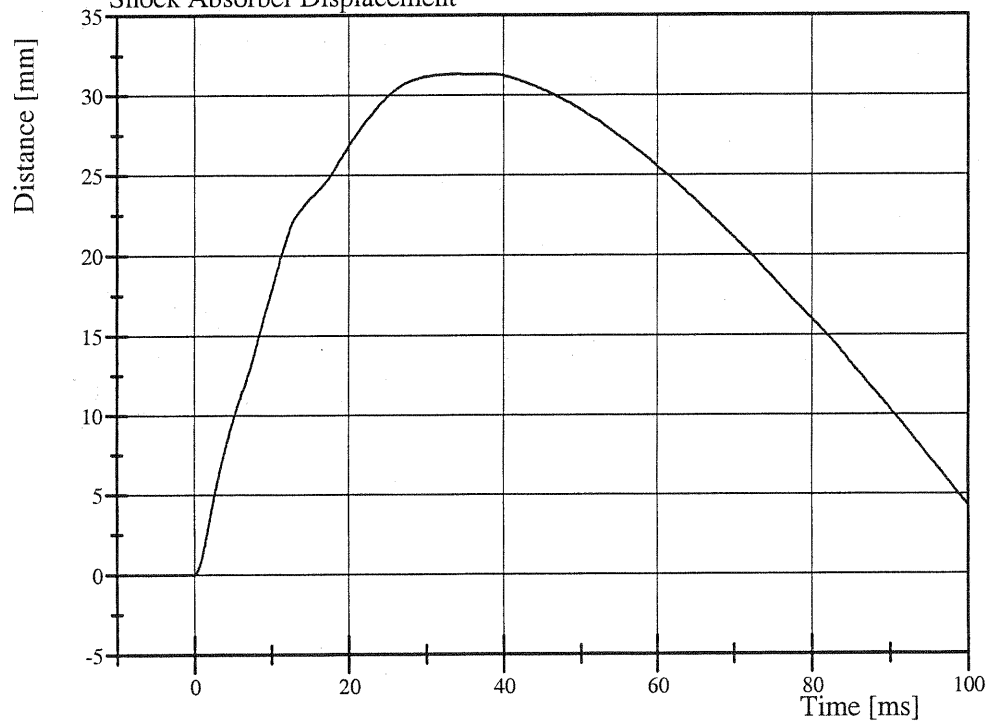


Filter Class: CFC_1000

Max: 906.3 N at 4.1 ms

Min: -12.9 N at -1.0 ms

Shock Absorber Displacement



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

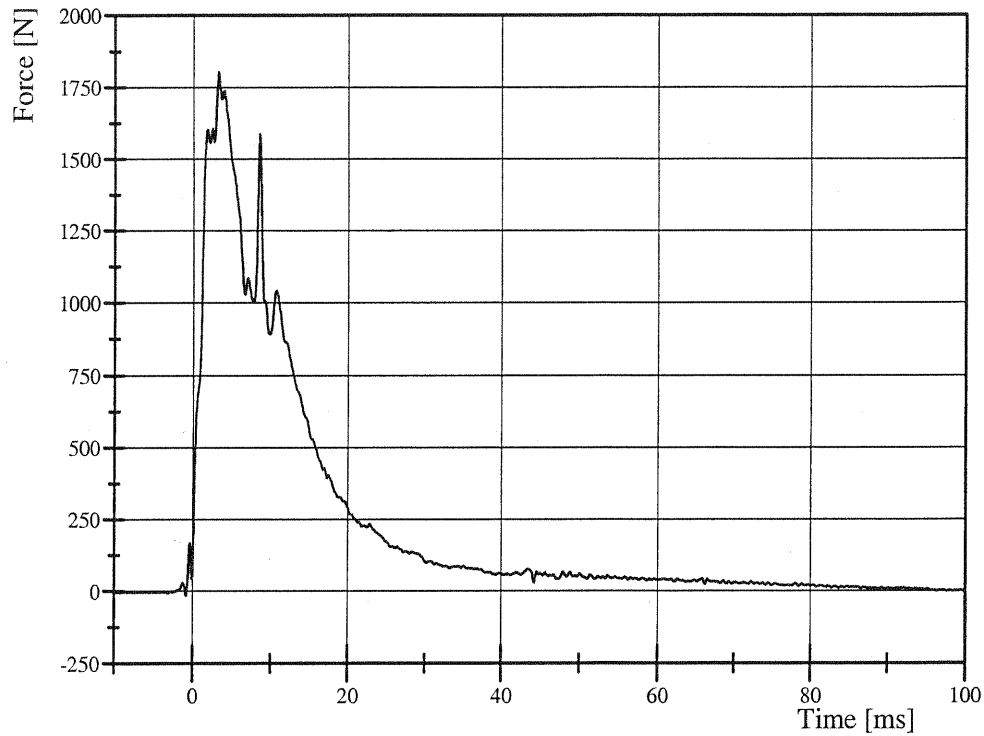
Transportation Research Center Inc.

4.27 m/s Thoracic Shock Absorber Compression

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

Test Date: 10/1/2007

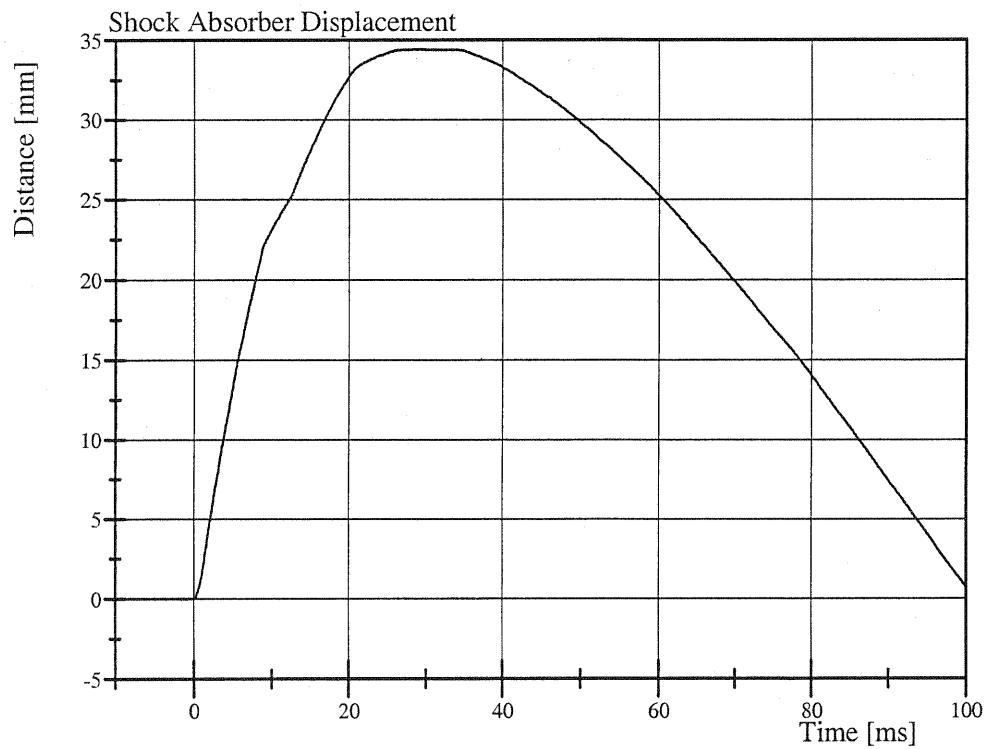
Shock Absorber Resistive Force



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 Stokes

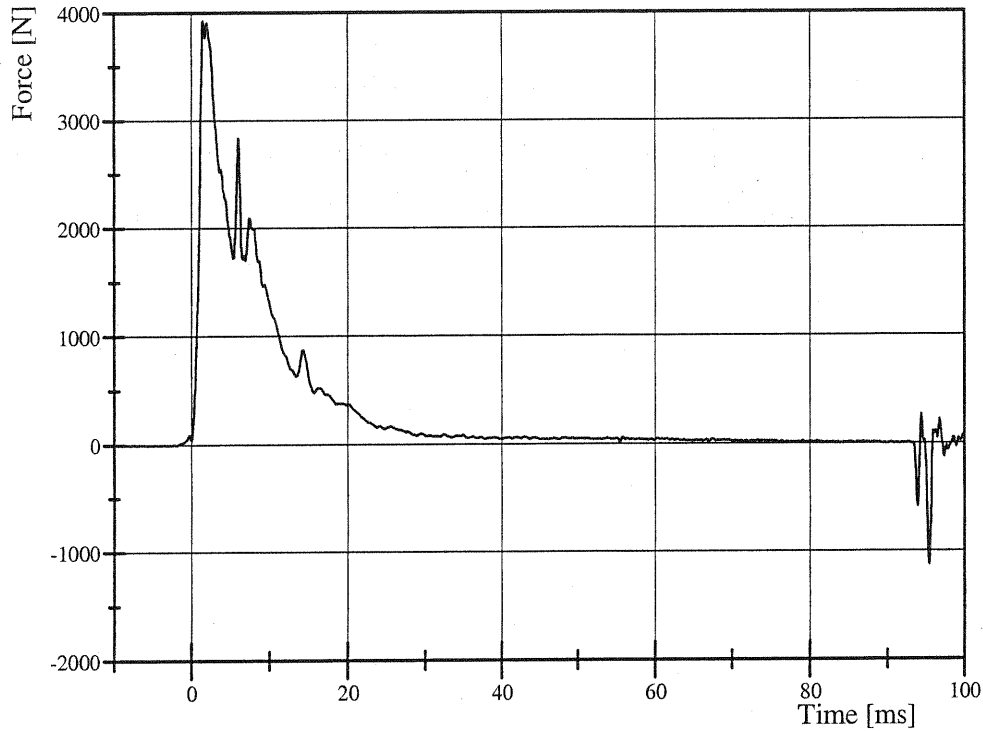
Transportation Research Center Inc.

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

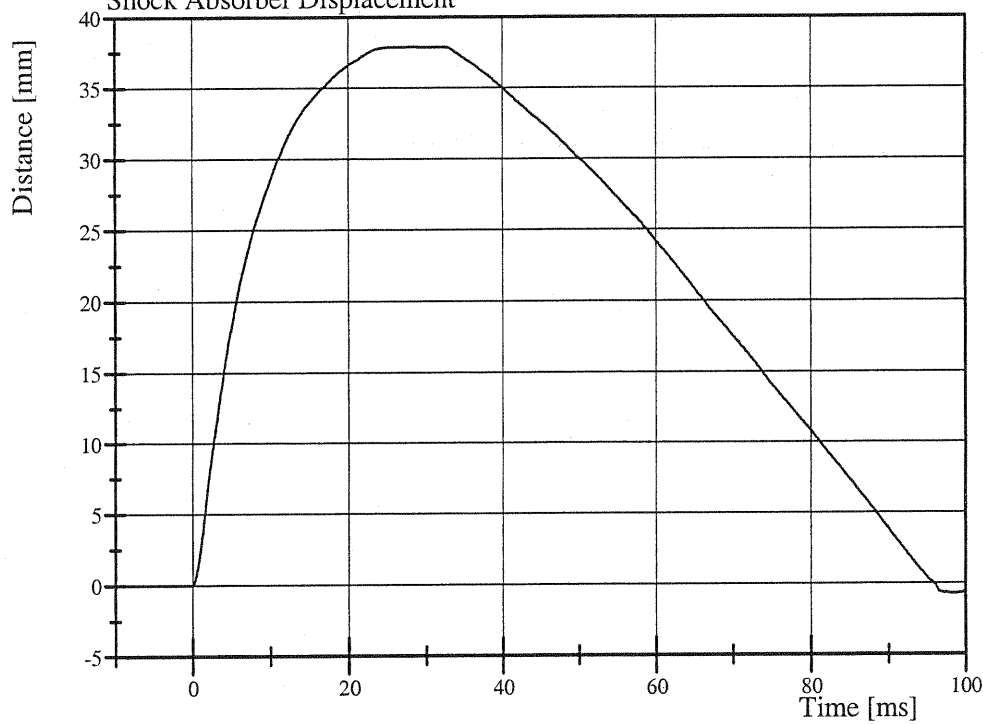


Filter Class: CFC_1000

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

CALIBRATION TEST RESULTS

POST-TEST

SID/HIII: 059

Transportation Research Center Inc.
SID/HIII Dummy Post-Test
External Dimensions
Serial No. 059 Calibration No. 25

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	515 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	369 mm	Yes
Top Rib Width From CL	RW-1	165.1 - 180.3 mm	173 mm	Yes
Bottom Rib Width From CL	RW-2	165.1 - 180.3 mm	173 mm	Yes
Difference Between Top & Bottom Rib Width from CL		<= 2.5 mm	0.0 mm	Yes

Technician

Rout Bercut

Approved

Ron Stoner



Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 059 Certification No. 25-2

Test Date: 11/5/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Peak Head Resultant Acceleration	120 - 150 g	146.1 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-5.1 g	Yes
Is Head Resultant Acceleration Curve Unimodal Within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Ravi Berand

Approved

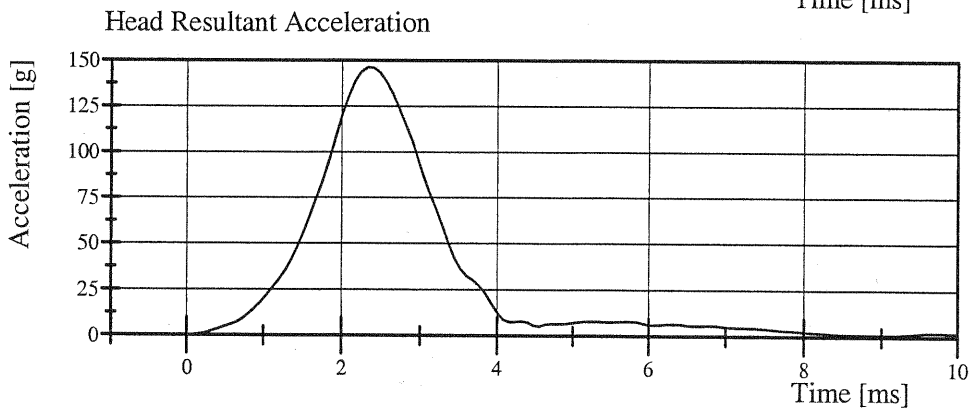
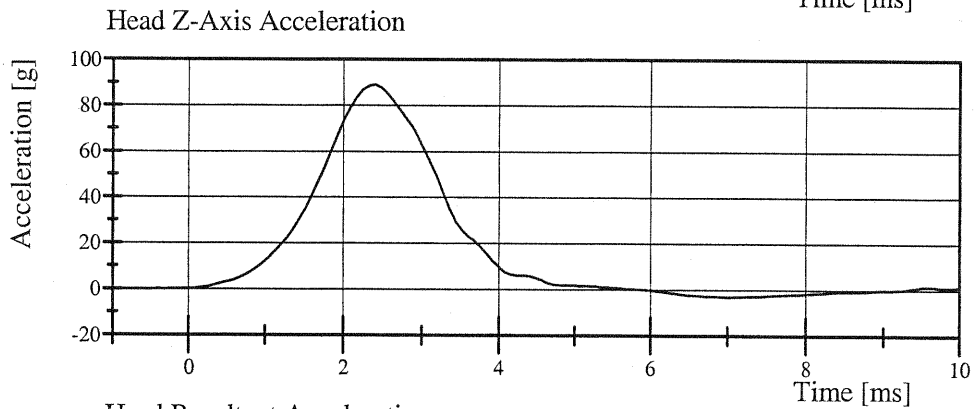
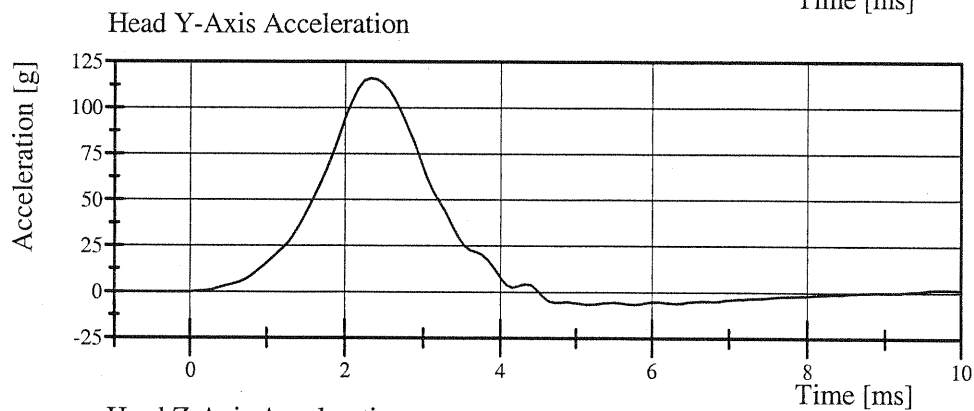
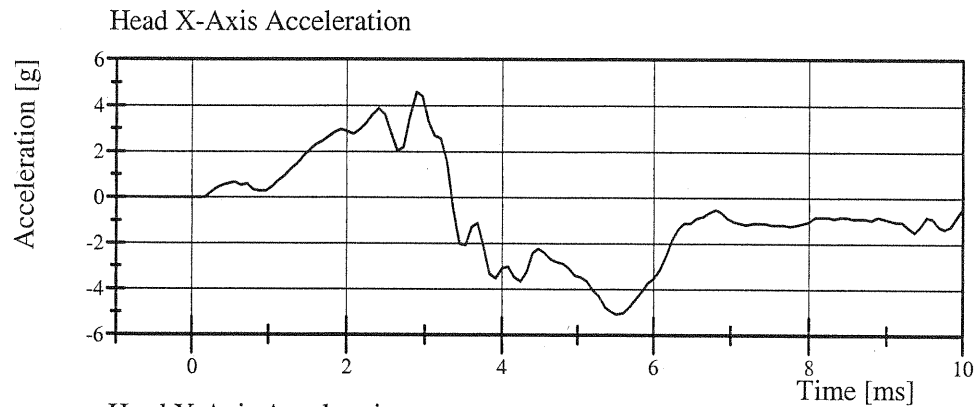
Ron Stoner

Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 059 Certification No. 25-2

Test Date: 11/5/2007



Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 25-1

Test Date: 11/2/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	(-6.89) - (-7.13) m/s	-6.941 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	1.96 - 2.55 m/s	2.430 m/s	Yes
Pendulum Integrated Velocity Change at 20 ms	4.12 - 5.10 m/s	4.844 m/s	Yes
Pendulum Integrated Velocity Change at 30 ms	5.73 - 7.01 m/s	6.806 m/s	Yes
Pendulum Integrated Velocity Change at 40 to 70 ms	6.27 - 7.64 m/s	7.220 m/s	Yes
Total Head D-Plane Rotation	(-66) - (-82) °	-72.5 °	Yes
Total Head D-Plane Rotation Time to 0° after Peak Rotation	58 - 67 ms	60.6 ms	Yes
Total Neck Occipital Condyle Moment	73 - 88 N·m	85.5 N·m	Yes
Total Neck Occipital Condyle Moment Time to 0 N·m after Peak Moment	49 - 64 ms	55.0 ms	Yes
Time from Peak Moment to Peak Rotation	2 - 16 ms	10.6 ms	Yes

Test meets specifications.

Comments:

Technician

Rand Bercich

Approved

Ron Stover

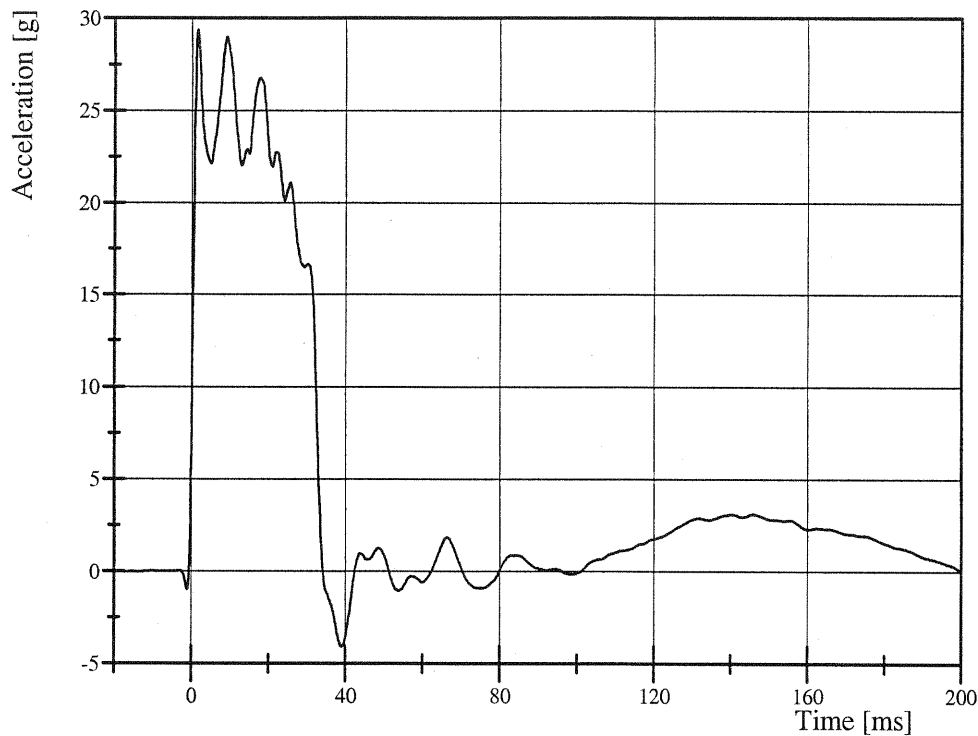
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 25-1

Test Date: 11/2/2007

Pendulum Acceleration

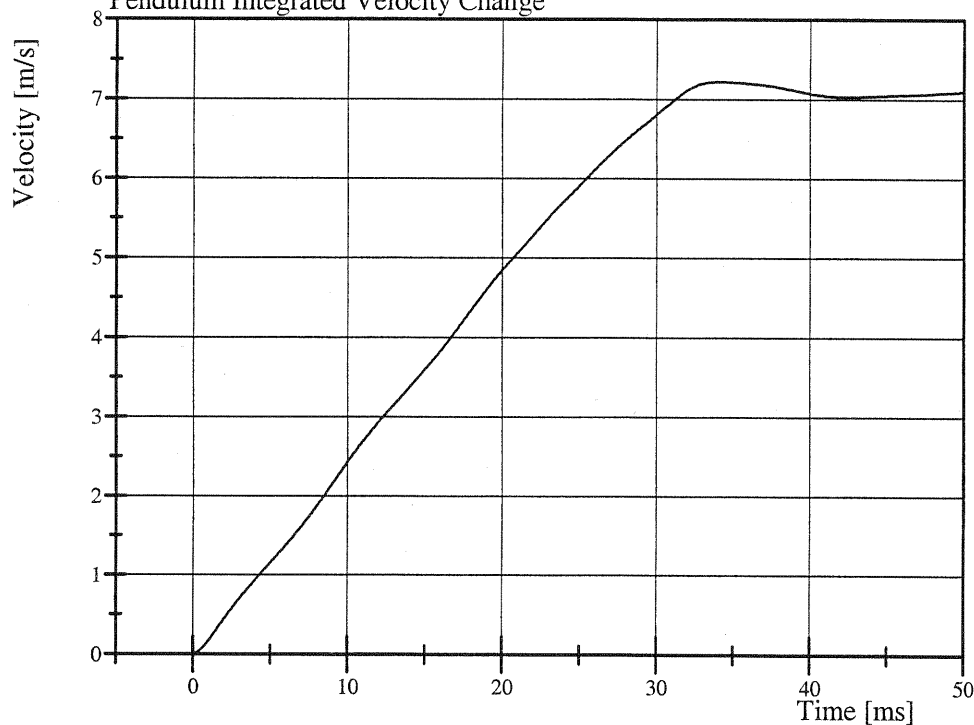


Filter Class: CFC_180

Max: 29.4 g at 1.6 ms

Min: -4.1 g at 39.0 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 7.2 m/s at 34.1 ms

Min: 0.0 m/s at 0.0 ms

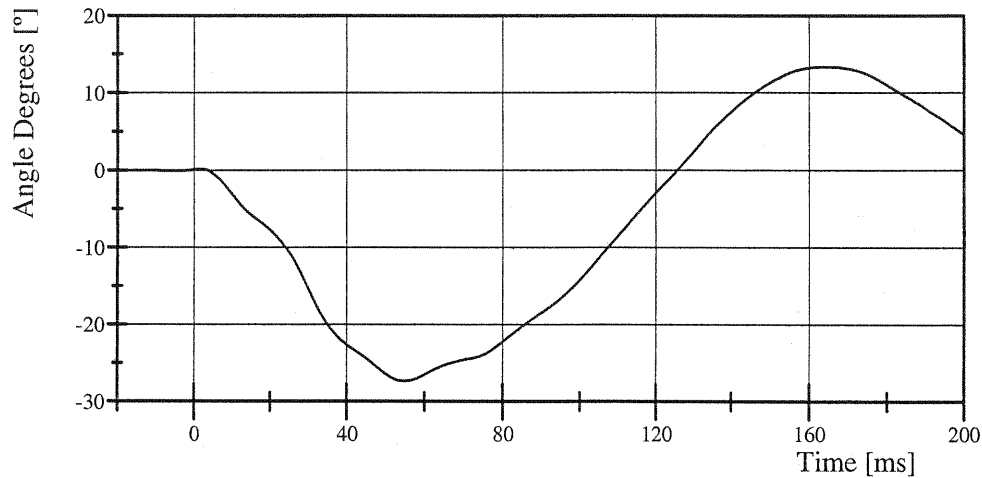
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 25-1

Test Date: 11/2/2007

Pot Rotation at the Base of Neck

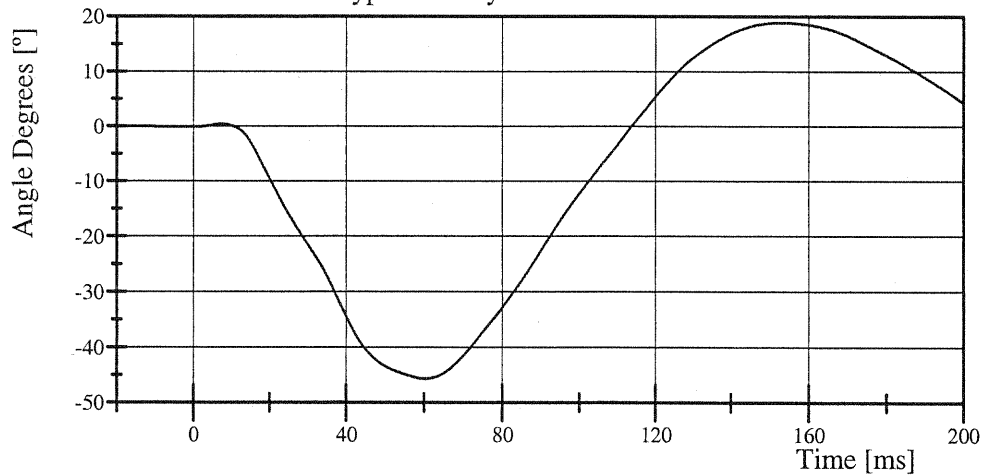


Filter Class: CFC_60

Max: 13.3 ° at 164.2 ms

Min: -27.3 ° at 55.0 ms

Head Rotation at Occypital Condyles

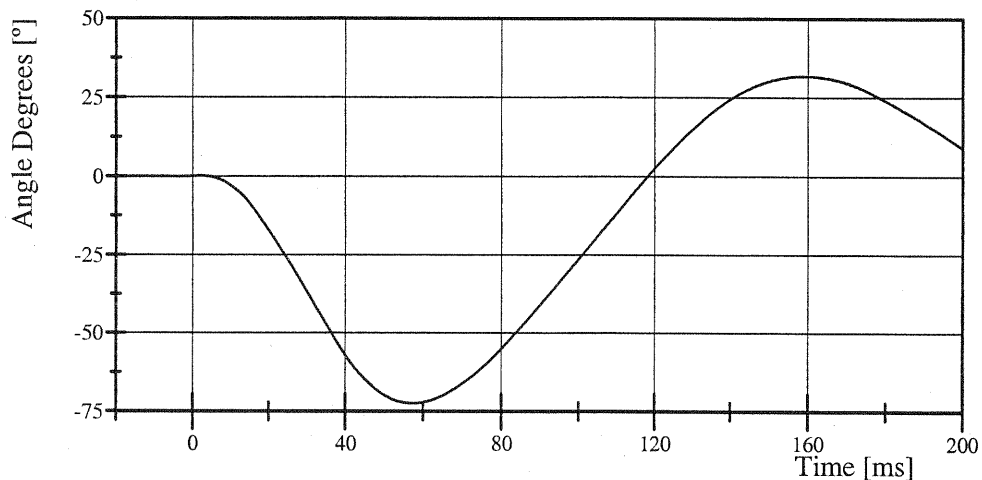


Filter Class: CFC_60

Max: 18.9 ° at 153.0 ms

Min: -45.7 ° at 60.3 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 31.8 ° at 159.0 ms

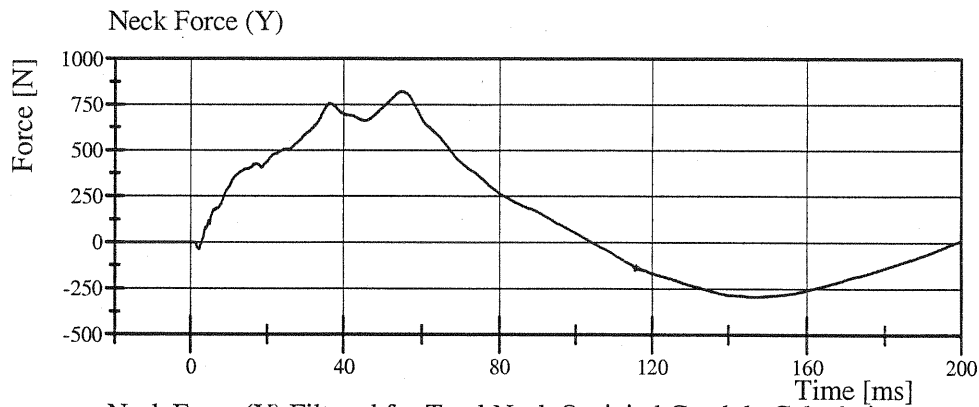
Min: -72.5 ° at 57.6 ms

Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 059 Certification No. 25-1

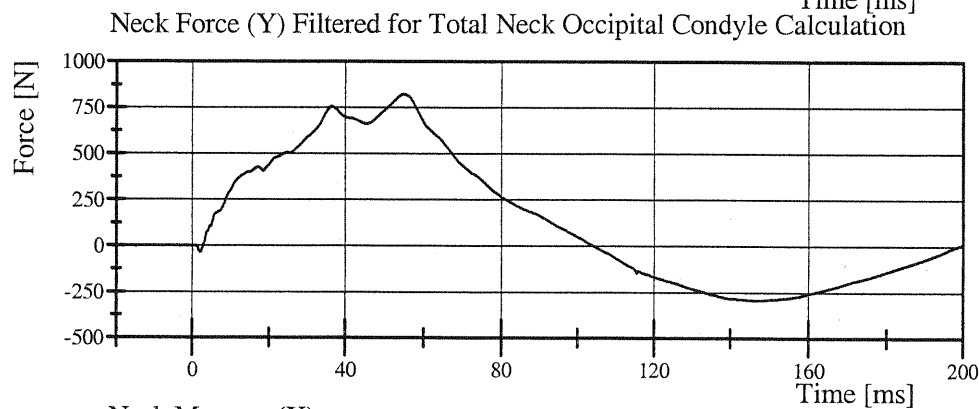
Test Date: 11/2/2007



Filter Class: CFC_1000

Max: 822.8 N at 54.6 ms

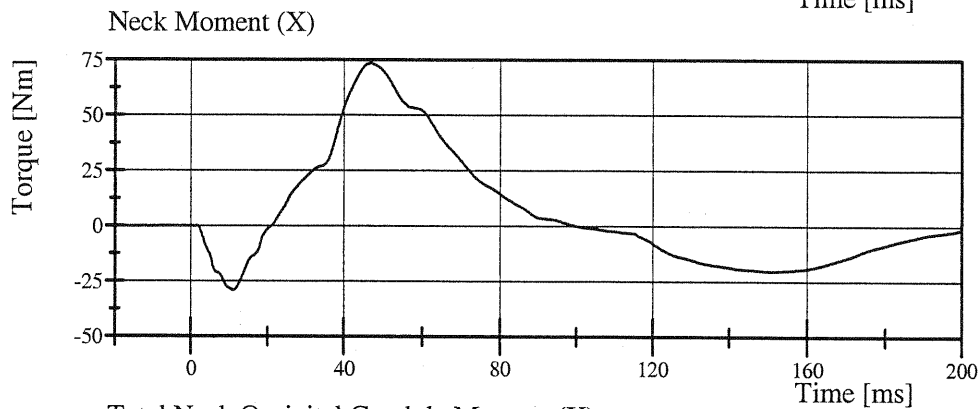
Min: -294.2 N at 146.8 ms



Filter Class: CFC_600

Max: 822.2 N at 54.7 ms

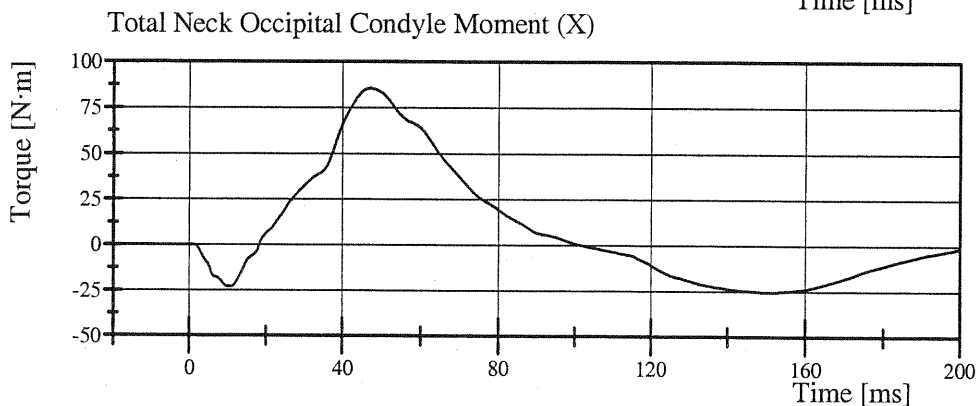
Min: -293.9 N at 146.9 ms



Filter Class: CFC_600

Max: 73.5 Nm at 46.6 ms

Min: -28.9 Nm at 11.0 ms



Filter Class: CFC_600

Max: 85.5 N·m at 47.0 ms

Min: -25.3 N·m at 150.2 ms

Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 059 Certification No. 25-1

Test Date: 11/1/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	43 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.282 m/s	Yes
Upper Rib Lateral Acceleration	37 - 46 g	39.3 g	Yes
Lower Rib Lateral Acceleration	37 - 46 g	38.7 g	Yes
Lower Spine Lateral Acceleration	15 - 22 g	19.5 g	Yes

Test meets specifications.

Comments:

Technician

Raul Boras

Approved

Ron Stone

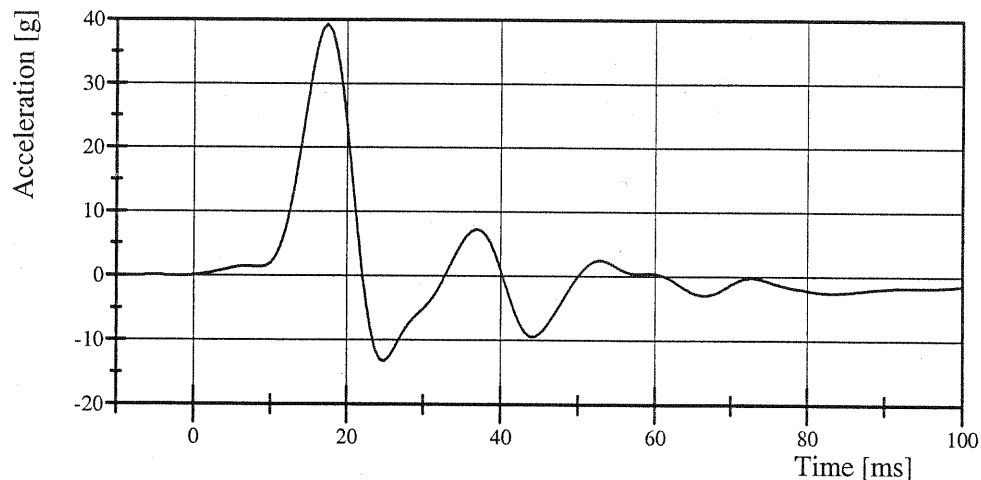
Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 059 Certification No. 25-1

Test Date: 11/1/2007

Upper Rib Acceleration (Y)

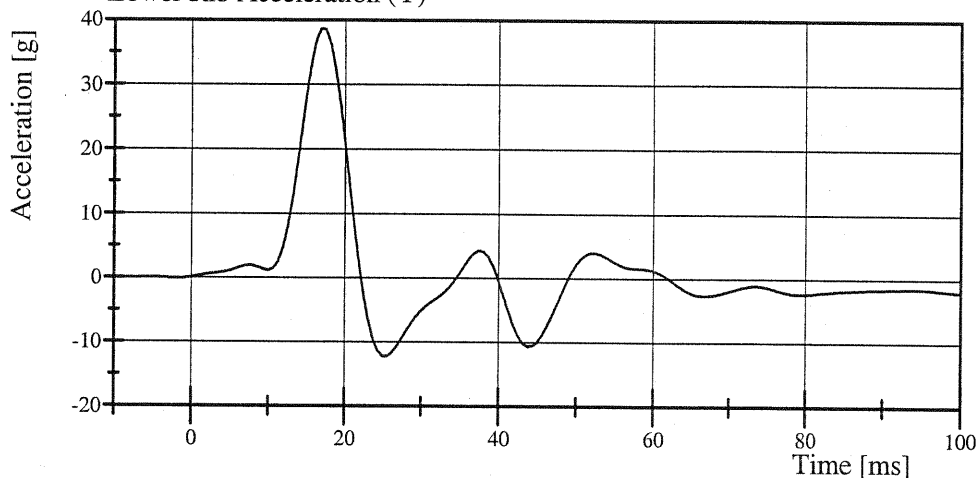


Filter Class: FIR_100

Max: 39.3 g at 17.4 ms

Min: -13.3 g at 25.0 ms

Lower Rib Acceleration (Y)

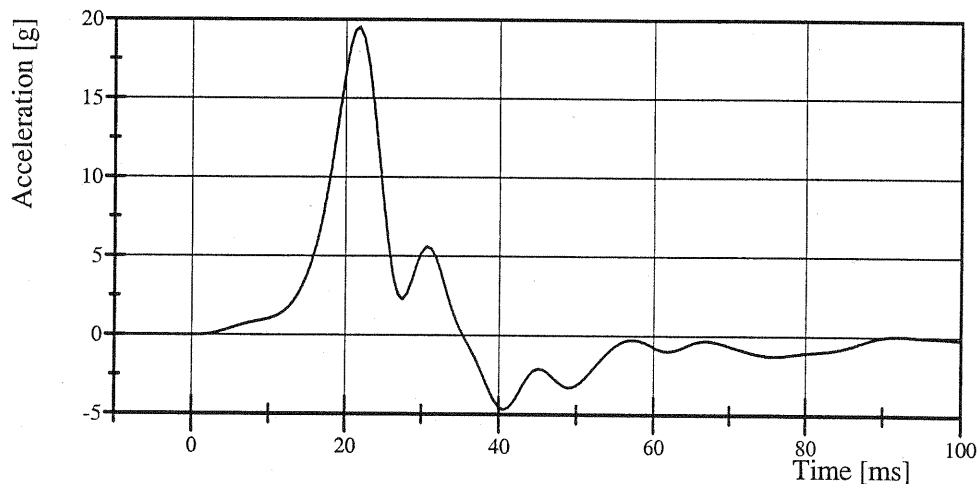


Filter Class: FIR_100

Max: 38.7 g at 16.9 ms

Min: -12.2 g at 25.5 ms

Lower Spine Acceleration (Y)



Filter Class: FIR_100

Max: 19.5 g at 21.8 ms

Min: -4.7 g at 40.6 ms

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 059 Certification No. 25-1

Test Date: 11/2/2007

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	No	No
Probe Velocity	6.35 - 8.89 mm/s	7.703 mm/s	Yes

Test does not meet specifications.

Comments:

Technician

Rant Bunch

Approved

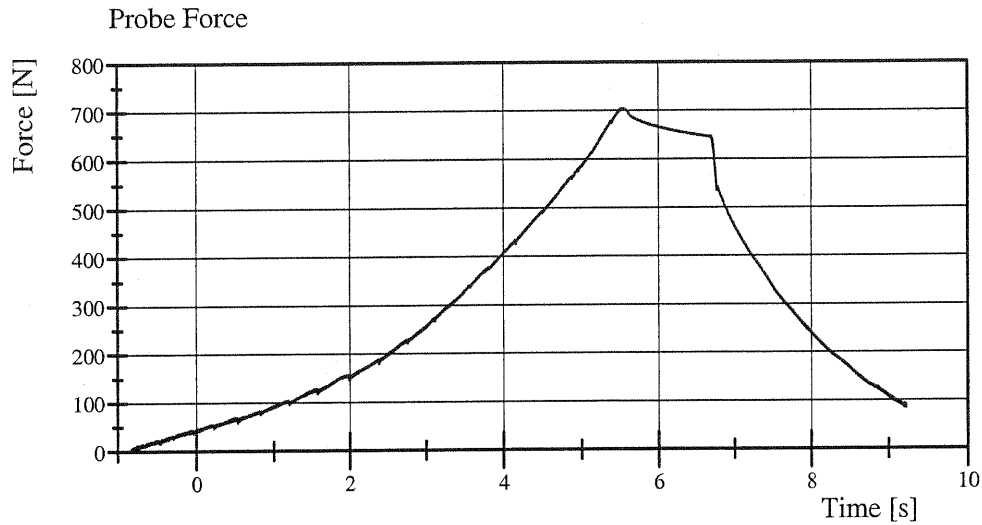
Ron Stover

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 059 Certification No. 25-1

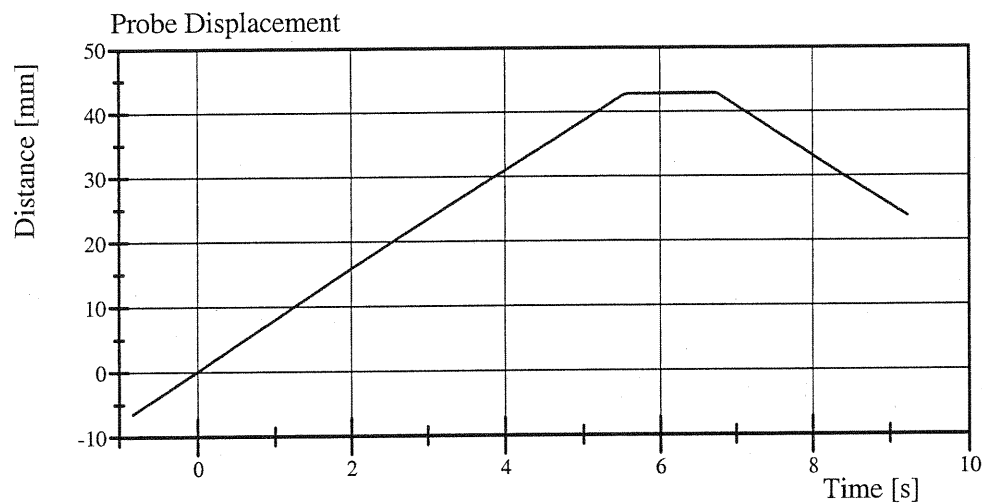
Test Date: 11/2/2007



Filter Class: CFC_600

Max: 703.8 N at 5.5 s

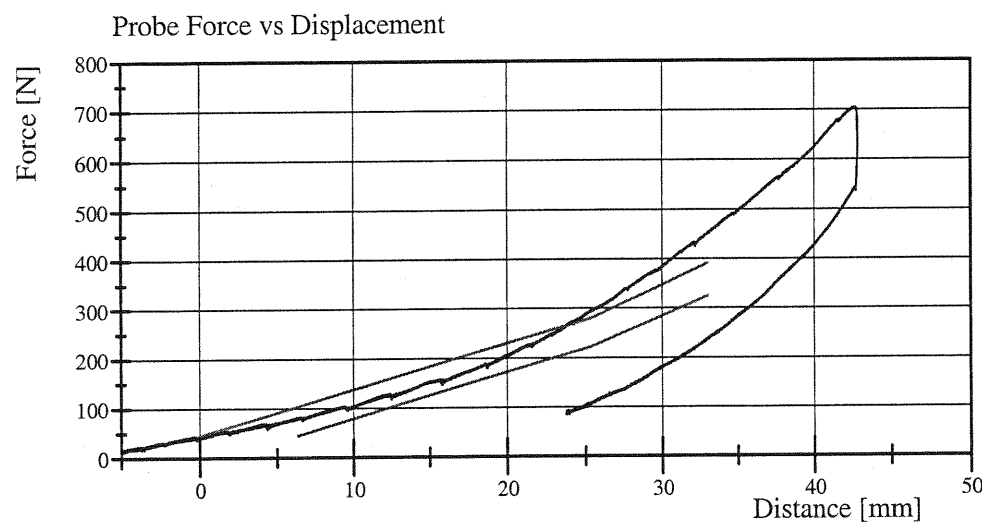
Min: 2.0 N at -0.8 s



Filter Class: CFC_180

Max: 42.9 mm at 6.7 s

Min: -6.5 mm at -0.8 s



Filter Class: CFC_600

Max: 703.8 N at 42.7 mm

Min: 2.0 N at -6.4 mm

TRANSPORTATION RESEARCH CENTER INC.

LUMBAR FLEXION TEST

SID PART 572B

CAL DATE: 06-Nov-07

TRC, INC.

TEST NO: LUFL-01

572B SN 059 TORSO FLEX CAL 25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TIME	NA	1230
TEMPERATURE	18.9 – 25.6° C	20.9 C P
RELATIVE HUMIDITY	10 – 70 %	37 % P
FORCE AT 0 DEG. FLEXION	-27 – 27 N	0 N P
FORCE AT 20 DEG OF FLEXION	98 – 151 N	102.30 N P
FORCE AT 30 DEG OF FLEXION	151 – 205 N	155.69 N P
FORCE AT 40 DEG OF FLEXION	205 – 258 N	231.30 N P
NET RETURN ANGLE AFTER 3 MINUTES	< 12 °	6 ° P

TEST MEETS SPECIFICATIONS

TECHNICIAN Robert Brand

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 059 Certification No. 25-1

Test Date: 11/1/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.283 m/s	Yes
Pelvis Lateral Acceleration Duration above 20g	3 - 7 ms	6.3 ms	Yes
Pelvis Lateral Acceleration	40 - 60 g	49.7 g	Yes
Is Acceleration Curve Unimodal Above 20g?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Ramona Barasale

Approved

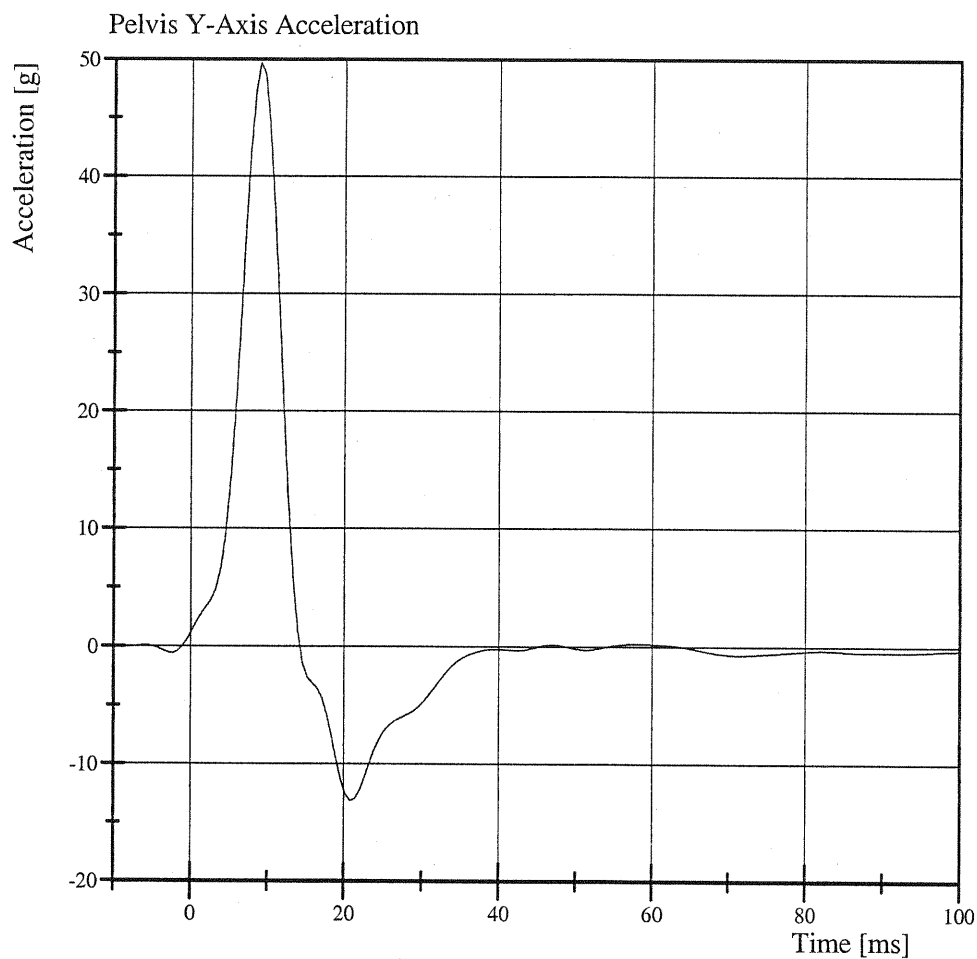
Ron Stoner

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 059 Certification No. 25-1

Test Date: 11/1/2007



Filter Class: FIR_100

Max: 49.7 g at 9.0 ms

Min: -13.1 g at 20.8 ms

CALIBRATION TEST RESULTS

PRE-TEST

SID/HIII: 066

Transportation Research Center Inc.
572M SID/HIII Dummy
External Dimensions
Serial No. 066 Calibration No. 24

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	523 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 C/L	RW-1	165.1 - 180.3 mm	174 mm	Yes
Bottom Rib Width From C/L	RW-2	165.1 - 180.3 mm	174 mm	Yes
Difference Between Top & Bottom Rib Width from C/L		<= 2.5 mm	0.0 mm	Yes

Technician

Approved

Dan Baruch

Ron Stoner



Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 066 Certification No. 24-1

Test Date: 10/15/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Peak Head Resultant Acceleration	120 - 150 g	140.3 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	9.5 g	Yes
Is Head Resultant Acceleration Curve Unimodal Within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Charles W. Deily

Approved

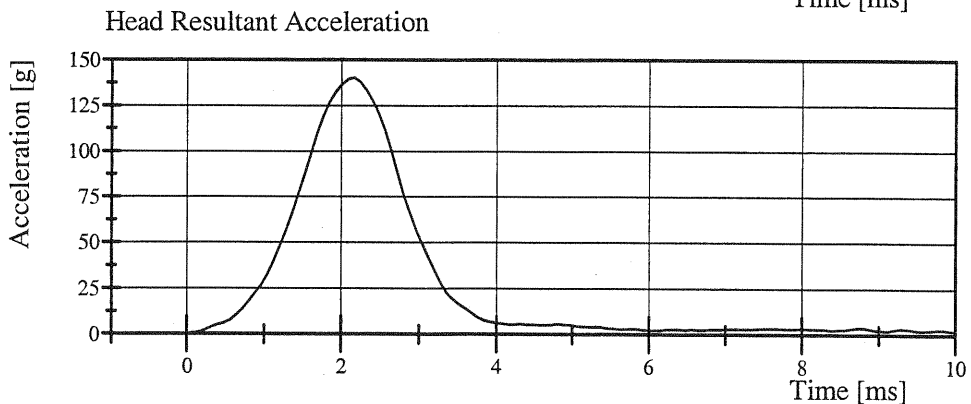
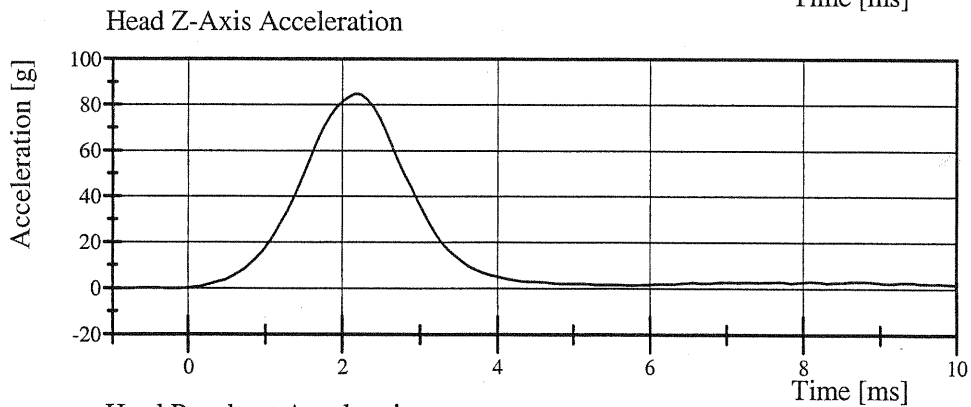
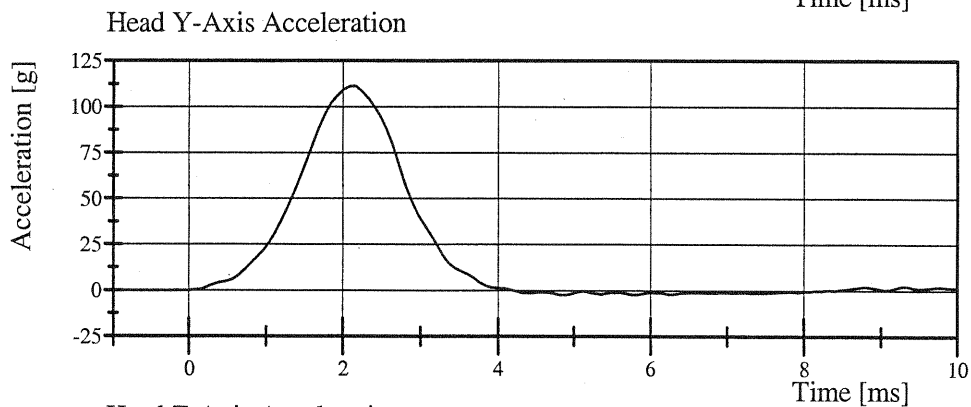
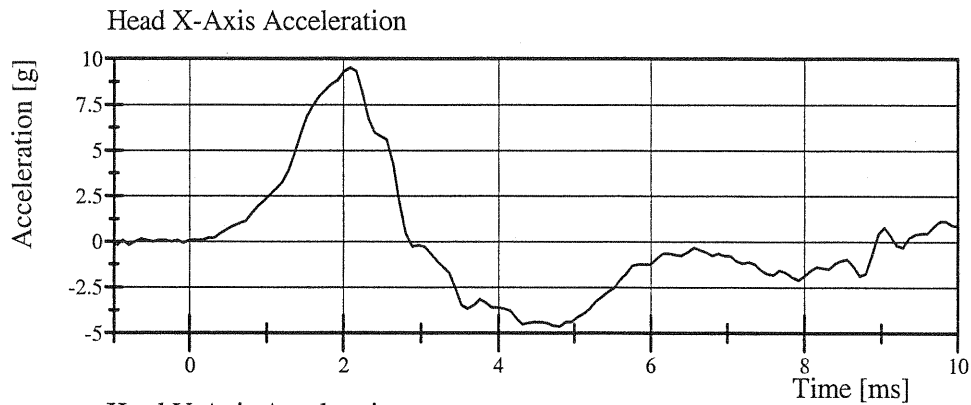
Ron Storer

Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 066 Certification No. 24-1

Test Date: 10/15/2007



Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 24-1

Test Date: 10/15/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	45 %	Yes
Pendulum Velocity	(-6.89) - (-7.13) m/s	-6.941 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	1.96 - 2.55 m/s	2.422 m/s	Yes
Pendulum Integrated Velocity Change at 20 ms	4.12 - 5.10 m/s	4.774 m/s	Yes
Pendulum Integrated Velocity Change at 30 ms	5.73 - 7.01 m/s	6.702 m/s	Yes
Pendulum Integrated Velocity Change at 40 to 70 ms	6.27 - 7.64 m/s	7.160 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	59.5 ms	Yes
Total Neck Occipital Condyle Moment	73 - 88 N·m	85.3 N·m	Yes
Total Neck Occipital Condyle Moment Time to 0 N·m after Peak Moment	49 - 64 ms	54.3 ms	Yes
Time from Peak Moment to Peak Rotation	2 - 16 ms	9.7 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Storer

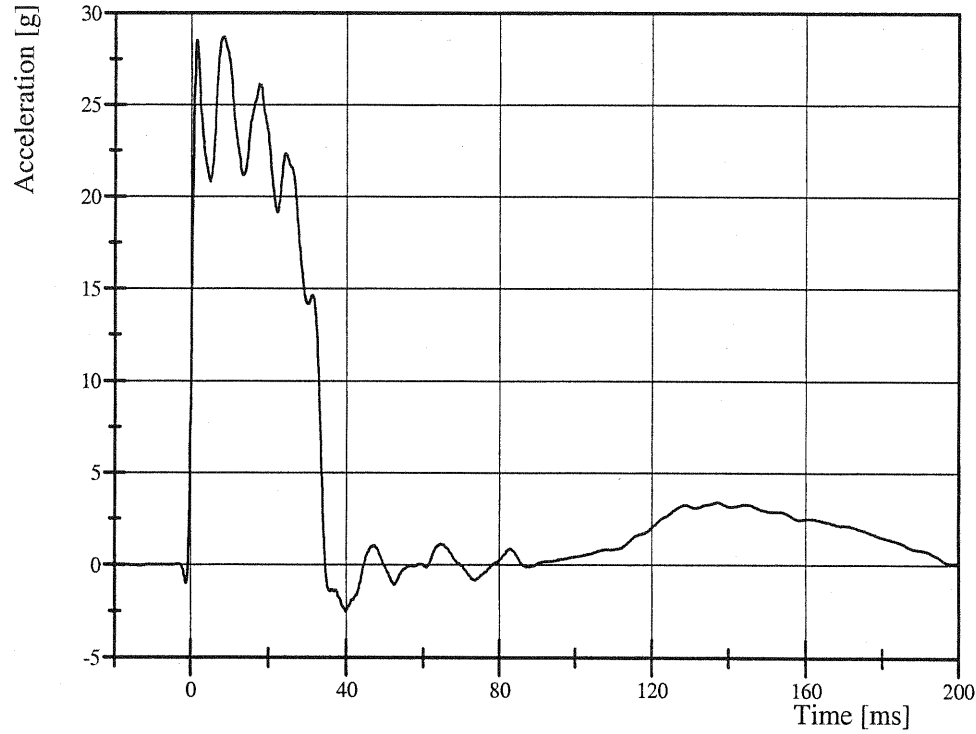
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 24-1

Test Date: 10/15/2007

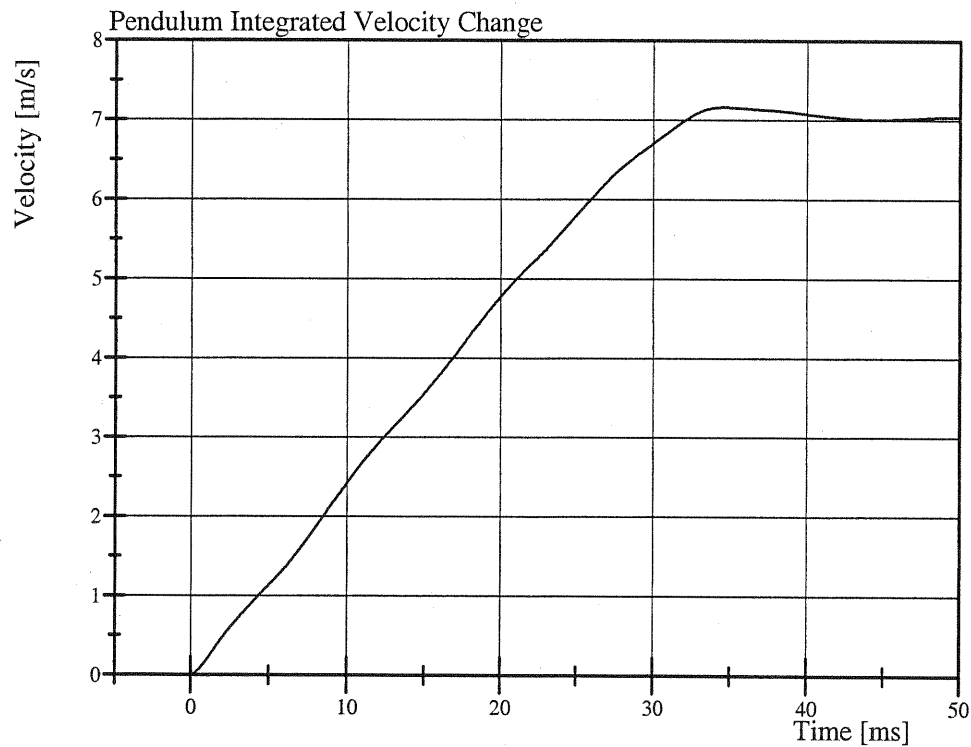
Pendulum Acceleration



Filter Class: CFC_180

Max: 28.7 g at 8.5 ms

Min: -2.5 g at 39.8 ms



Filter Class: CFC_180

Max: 7.2 m/s at 34.6 ms

Min: 0.0 m/s at 0.0 ms

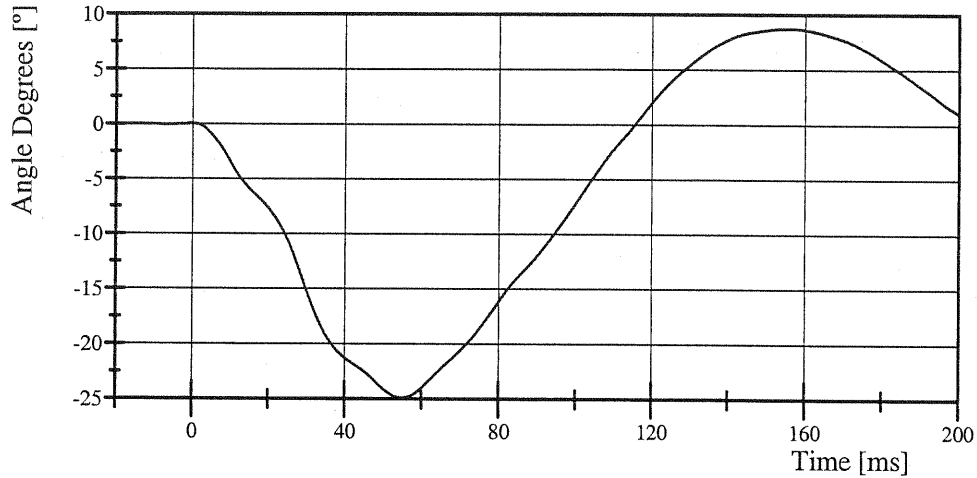
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 24-1

Test Date: 10/15/2007

Pot Rotation at the Base of Neck

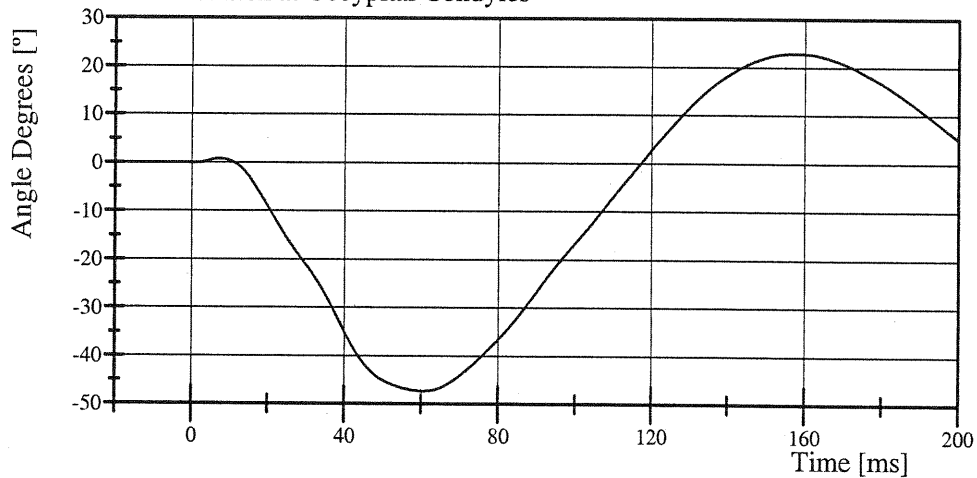


Filter Class: CFC_60

Max: 8.7 ° at 155.5 ms

Min: -24.9 ° at 55.0 ms

Head Rotation at Occipital Condyles

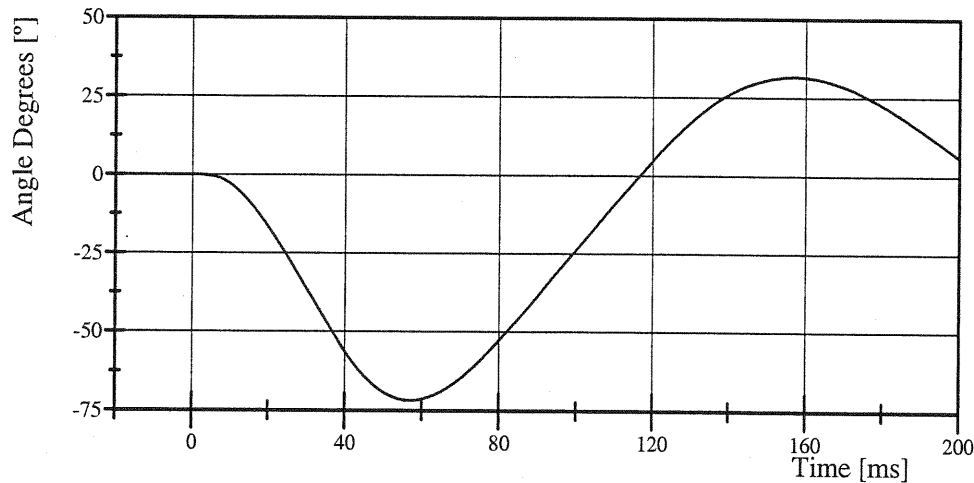


Filter Class: CFC_60

Max: 23.0 ° at 157.7 ms

Min: -47.3 ° at 60.6 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 31.7 ° at 157.0 ms

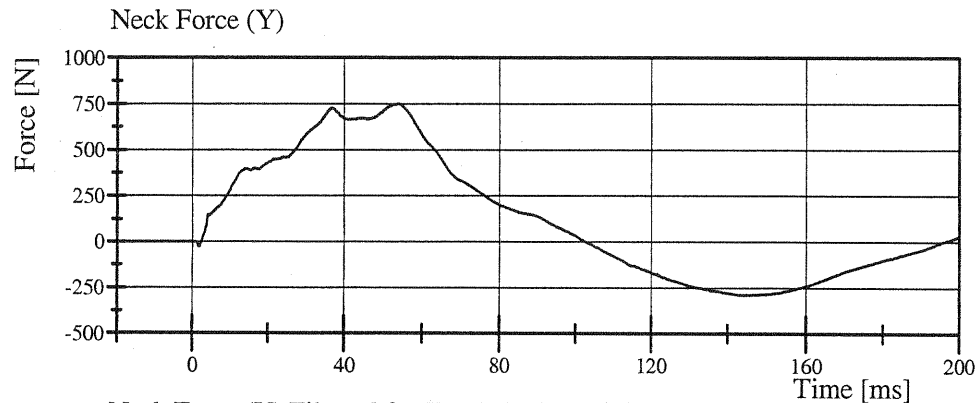
Min: -71.7 ° at 57.1 ms

Transportation Research Center Inc.

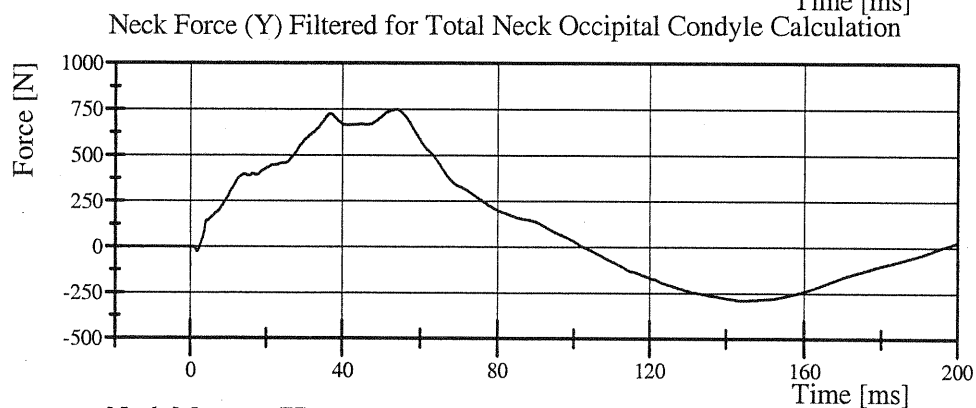
Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 24-1

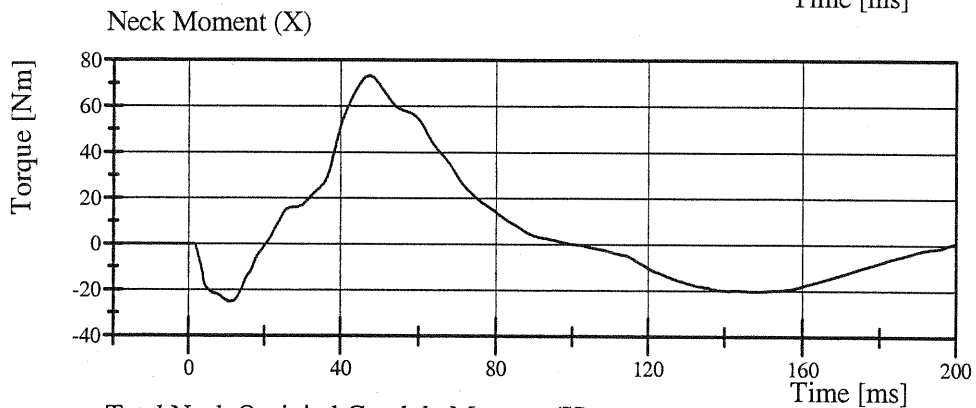
Test Date: 10/15/2007



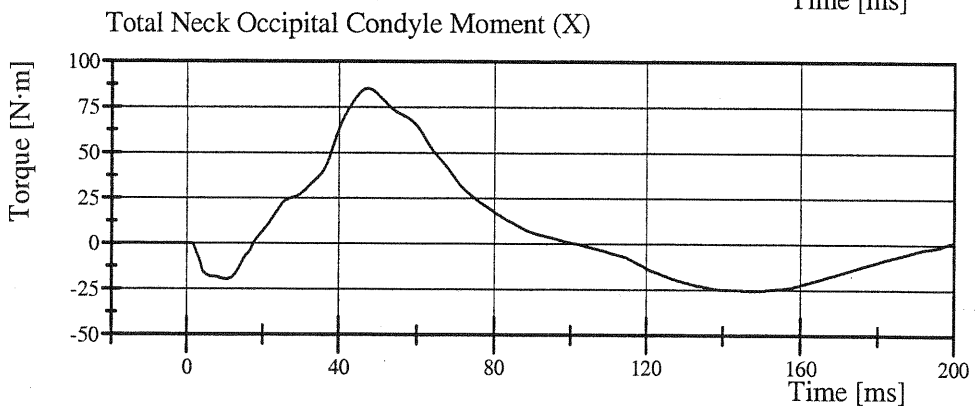
Filter Class: CFC_1000
Max: 751.0 N at 53.8 ms
Min: -289.9 N at 144.4 ms



Filter Class: CFC_600
Max: 750.6 N at 53.8 ms
Min: -289.4 N at 144.4 ms



Filter Class: CFC_600
Max: 73.4 Nm at 47.4 ms
Min: -25.1 Nm at 10.6 ms



Filter Class: CFC_600
Max: 85.3 N·m at 47.4 ms
Min: -25.5 N·m at 148.9 ms

Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 066 Certification No. 24-5

Test Date: 10/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.270 m/s	Yes
Upper Rib Lateral Acceleration	37 - 46 g	46.0 g	Yes
Lower Rib Lateral Acceleration	37 - 46 g	42.4 g	Yes
Lower Spine Lateral Acceleration	15 - 22 g	21.3 g	Yes

Test meets specifications.

Comments:

Technician

Rand Boranish

Approved

Ron Stoner

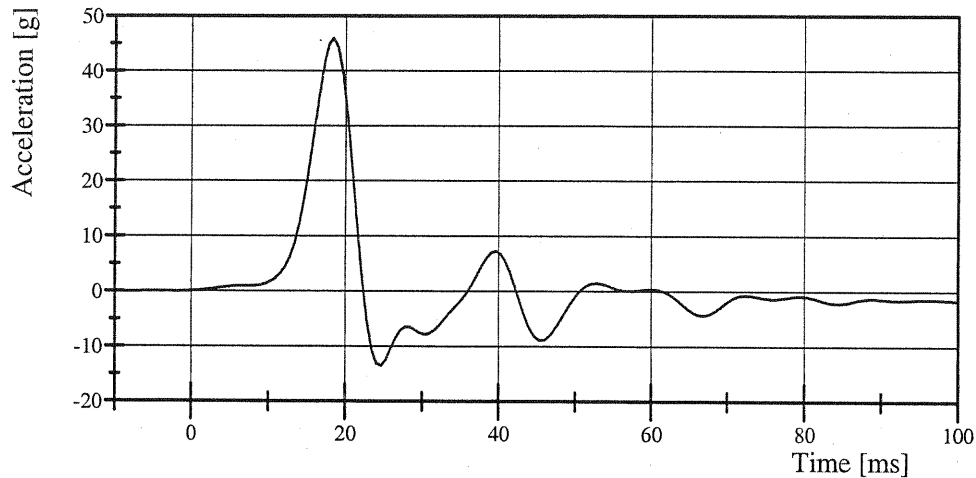
Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 066 Certification No. 24-5

Test Date: 10/16/2007

Upper Rib Acceleration (Y)

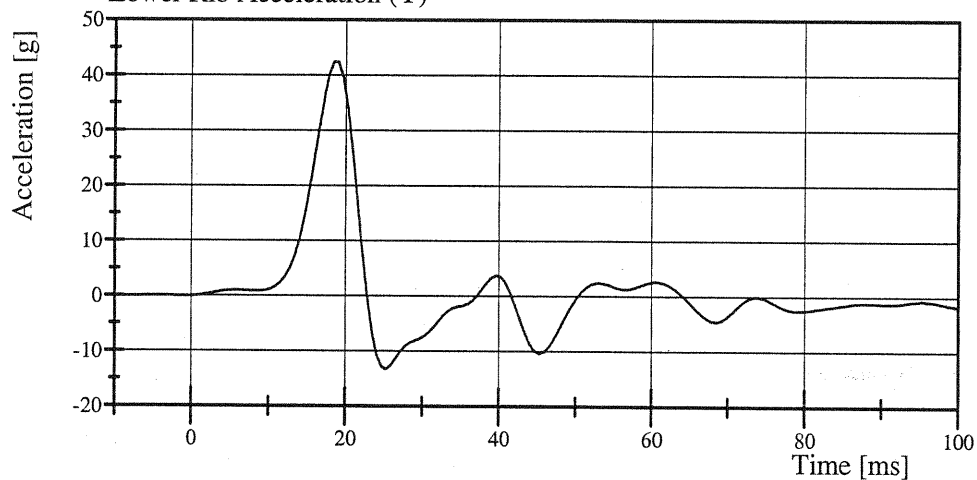


Filter Class: FIR_100

Max: 46.0 g at 18.4 ms

Min: -13.5 g at 24.6 ms

Lower Rib Acceleration (Y)

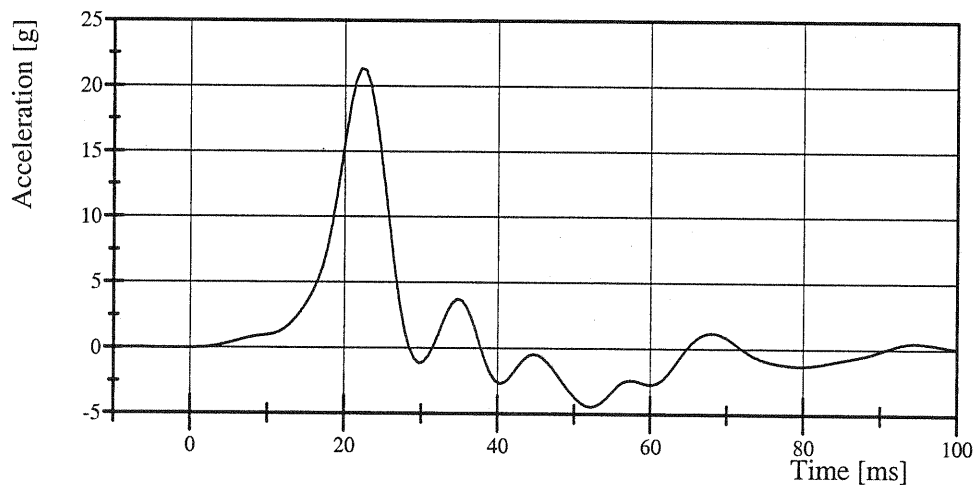


Filter Class: FIR_100

Max: 42.4 g at 18.5 ms

Min: -13.3 g at 25.3 ms

Lower Spine Acceleration (Y)



Filter Class: FIR_100

Max: 21.3 g at 22.2 ms

Min: -4.4 g at 52.2 ms

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 066 Certification No. 24-1

Test Date: 10/15/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.284 m/s	Yes
Pelvis Lateral Acceleration Duration above 20g	3 - 7 ms	6.1 ms	Yes
Pelvis Lateral Acceleration	40 - 60 g	47.6 g	Yes
Is Acceleration Curve Unimodal Above 20g?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Rand Band

Approved

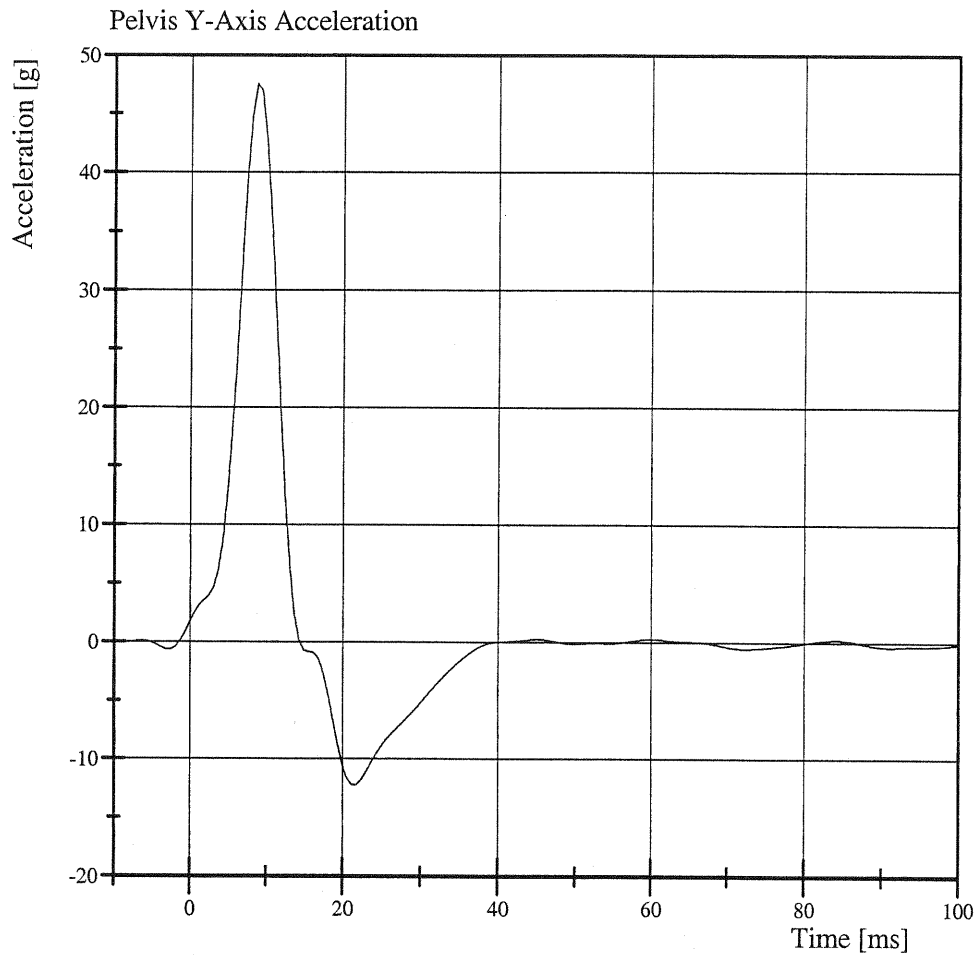
Ron Stoner

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 066 Certification No. 24-1

Test Date: 10/15/2007



Filter Class: FIR_100

Max: 47.6 g at 8.6 ms

Min: -12.2 g at 21.8 ms

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 066 Certification No. 24-2

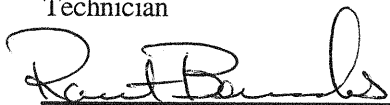
Test Date: 10/15/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Probe Force within Corridor	Yes	Yes	Yes
Probe Velocity	6.35 - 8.89 mm/s	7.742 mm/s	Yes

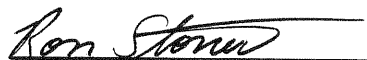
Test meets specifications.

Comments:

Technician



Approved

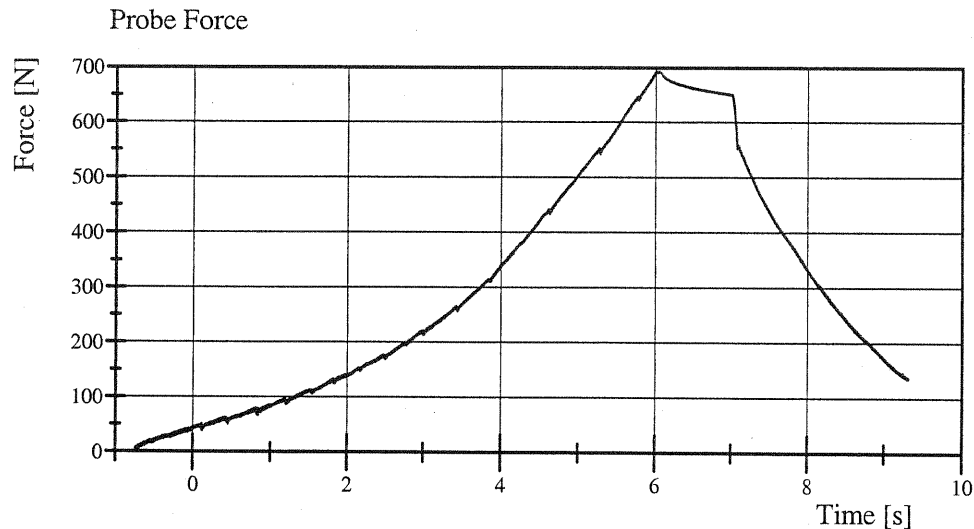


Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 066 Certification No. 24-2

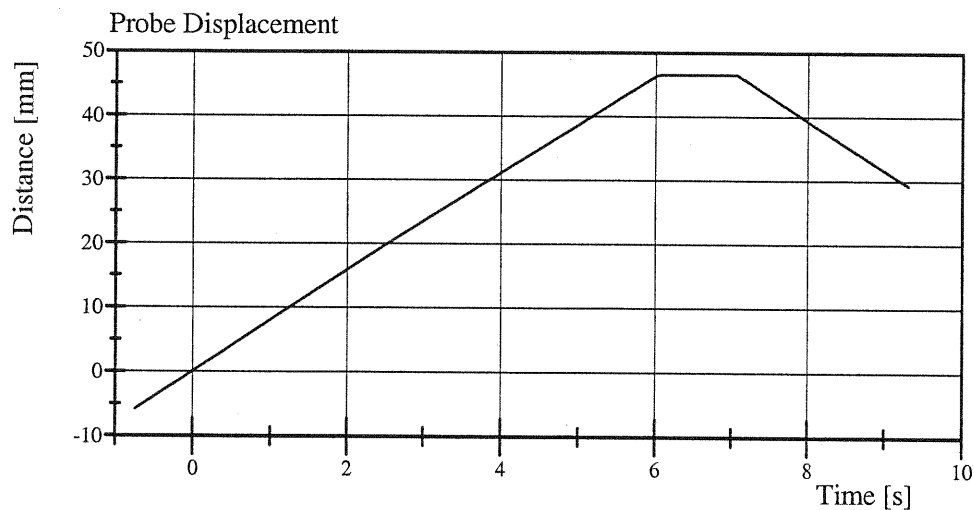
Test Date: 10/15/2007



Filter Class: CFC_600

Max: 692.1 N at 6.0 s

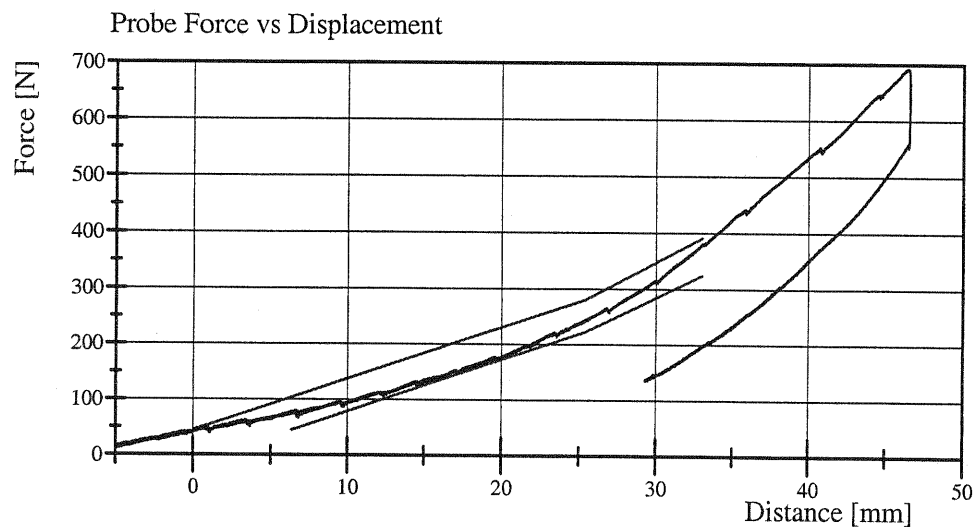
Min: 4.6 N at -0.7 s



Filter Class: CFC_180

Max: 46.6 mm at 7.0 s

Min: -5.8 mm at -0.7 s



Filter Class: CFC_600

Max: 692.1 N at 46.5 mm

Min: 4.6 N at -5.7 mm

TRANSPORTATION RESEARCH CENTER INC.

LUMBAR FLEXION TEST

SID PART 572B

CAL DATE: 15-Oct-07

TRC, INC.

TEST NO: LUFL-01

572B SN 066 TORSO FLEX CAL 24

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TIME	NA	1010
TEMPERATURE	18.9 – 25.6° C	21.0 C
RELATIVE HUMIDITY	10 – 70 %	46 %
FORCE AT 0 DEG. FLEXION	-27 – 27 N	0.44 N
FORCE AT 20 DEG OF FLEXION	98 – 151 N	120.10 N
FORCE AT 30 DEG OF FLEXION	151 – 205 N	177.92 N
FORCE AT 40 DEG OF FLEXION	205 – 258 N	226.85 N
NET RETURN ANGLE AFTER 3 MINUTES	< 12 °	7 °

TEST MEETS SPECIFICATIONS

TECHNICIAN Charles W. Baly

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

Ron Stoner

Approved

Ron Stoner

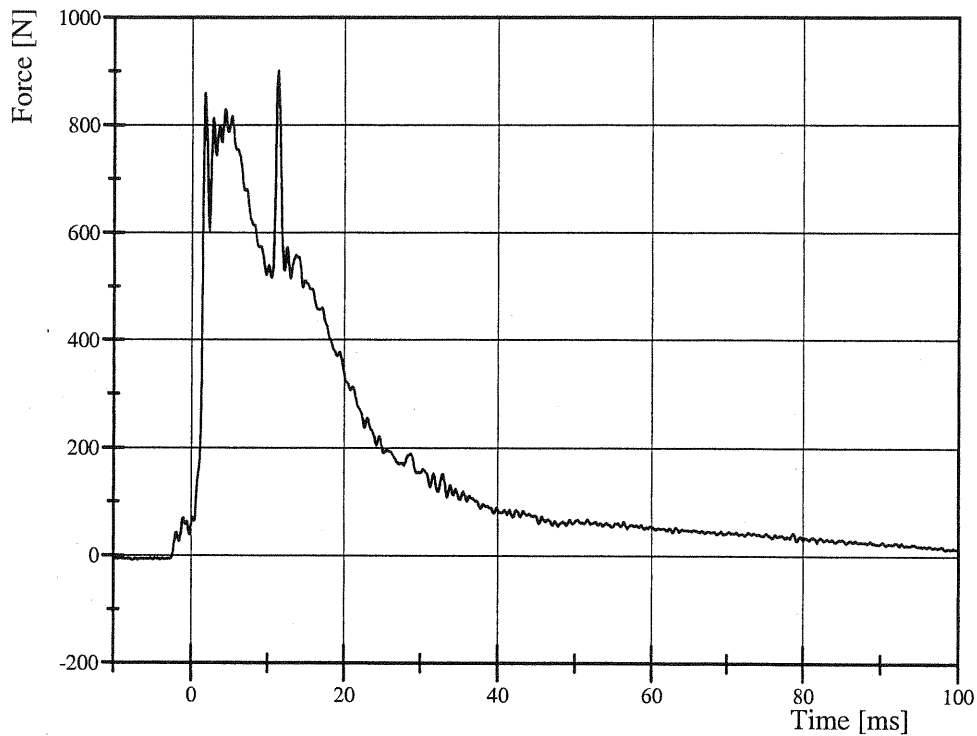
Transportation Research Center Inc.

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

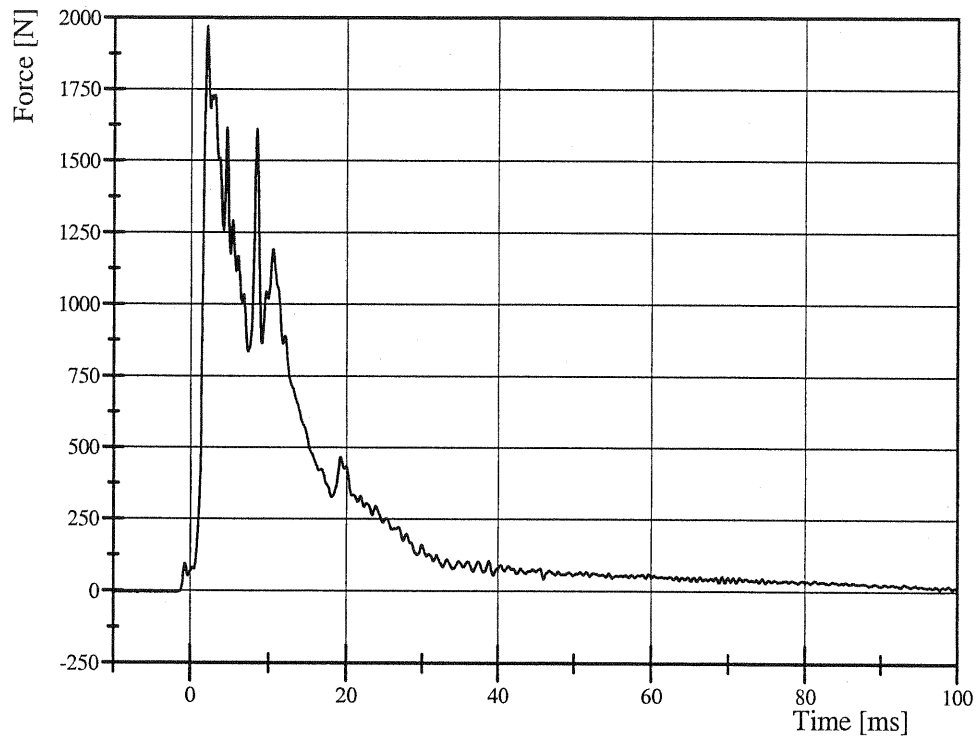
Transportation Research Center Inc.

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

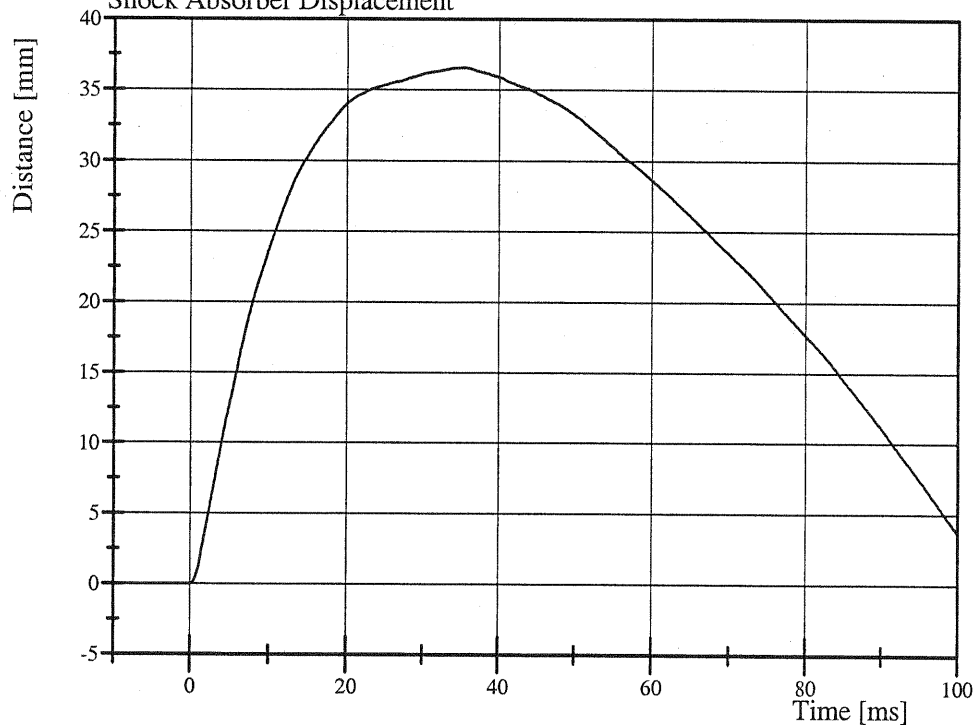


Filter Class: CFC_1000

Max: 1,969.5 N at 2.1 ms

Min: -6.0 N at -6.8 ms

Shock Absorber Displacement



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

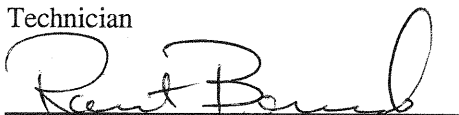
Test meets specifications.

Comments:

Actual Impactor Velocity (m/s): 6.140

Damper Setting: 5.5

Technician



Approved



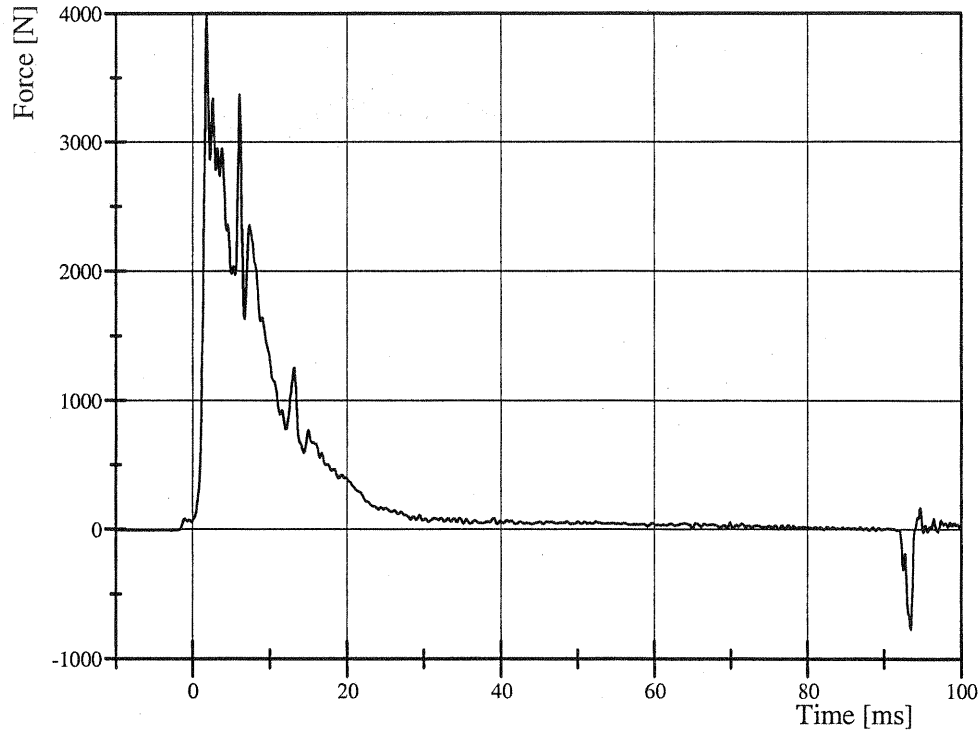
Transportation Research Center Inc.

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

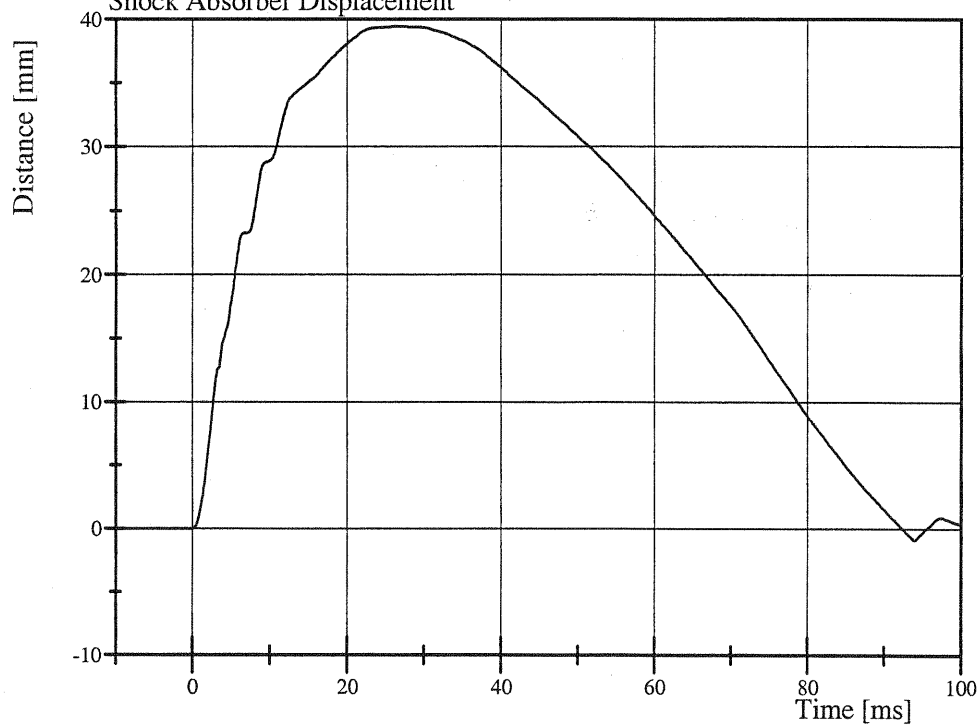


Filter Class: CFC_1000

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

CALIBRATION TEST RESULTS

POST-TEST

SID/HIII: 066

Transportation Research Center Inc.
572M SID/HIII Dummy
External Dimensions
Serial No. 066 Calibration No. 25

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	515 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	371 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 Bernal

Approved

Ron Stoner



Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 066 Certification No. 25-3

Test Date: 11/2/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Peak Head Resultant Acceleration	120 - 150 g	137.4 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-5.2 g	Yes
Is Head Resultant Acceleration Curve Unimodal Within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Rand Bernal

Approved

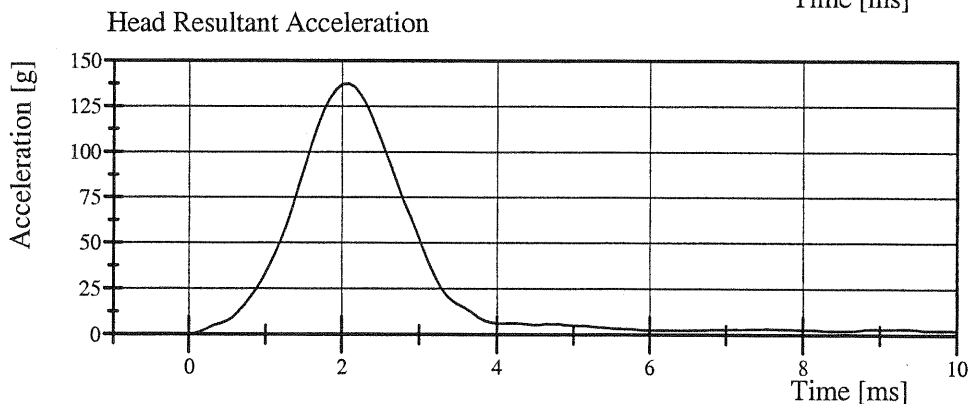
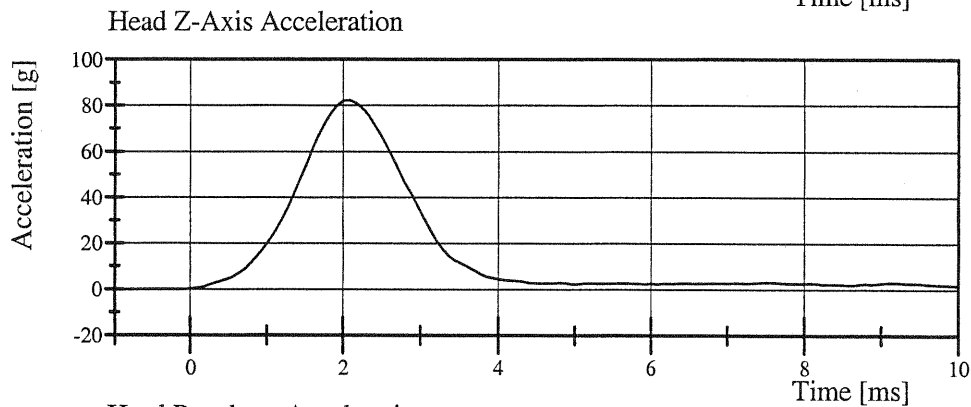
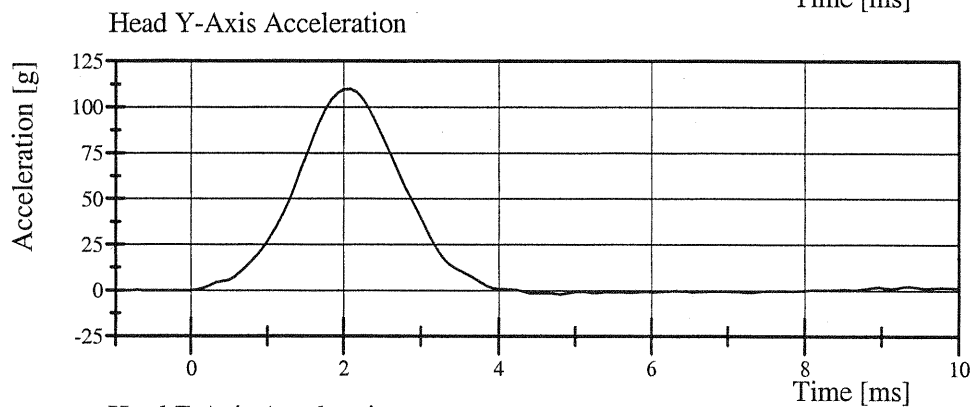
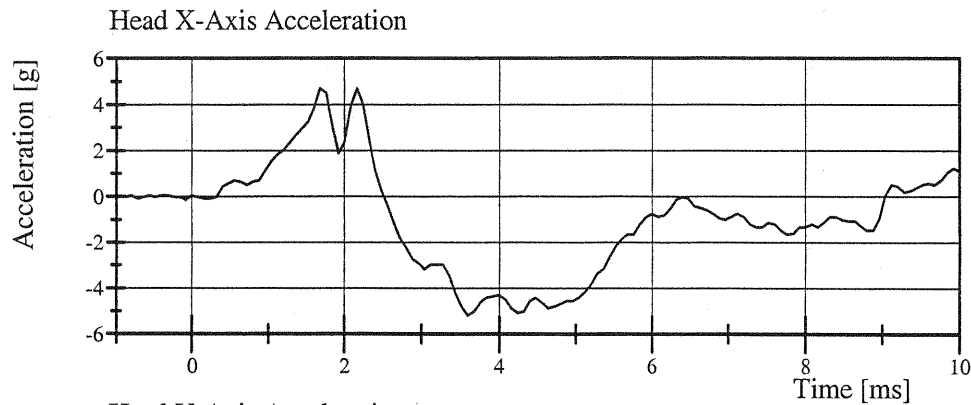
Ron Stoner

Transportation Research Center Inc.

Left Lateral Head Drop

SID-HIII Serial No. 066 Certification No. 25-3

Test Date: 11/2/2007



Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 25-1

Test Date: 11/2/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Pendulum Velocity	(-6.89) - (-7.13) m/s	-6.941 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	1.96 - 2.55 m/s	2.341 m/s	Yes
Pendulum Integrated Velocity Change at 20 ms	4.12 - 5.10 m/s	4.728 m/s	Yes
Pendulum Integrated Velocity Change at 30 ms	5.73 - 7.01 m/s	6.781 m/s	Yes
Pendulum Integrated Velocity Change at 40 to 70 ms	6.27 - 7.64 m/s	7.197 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	58.1 ms	Yes
Total Neck Occipital Condyle Moment	73 - 88 N·m	87.7 N·m	Yes
Total Neck Occipital Condyle Moment Time to 0 N·m after Peak Moment	49 - 64 ms	54.5 ms	Yes
Time from Peak Moment to Peak Rotation	2 - 16 ms	10.7 ms	Yes

Test meets specifications.

Comments:

Technician

Raul Beras

Approved

Ron Storus

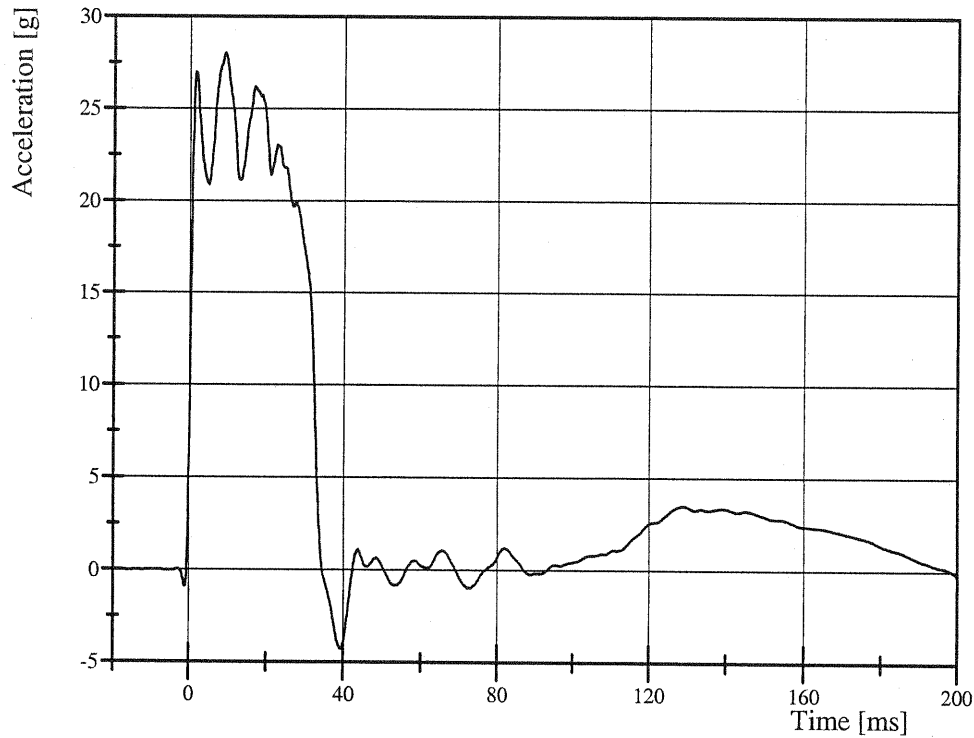
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 25-1

Test Date: 11/2/2007

Pendulum Acceleration

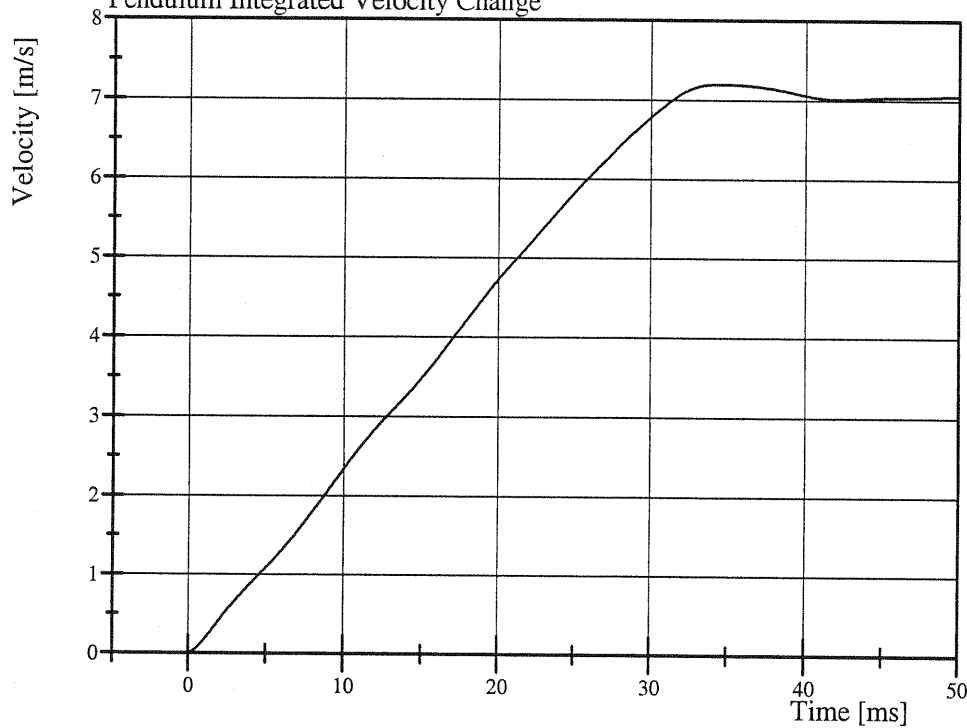


Filter Class: CFC_180

Max: 28.0 g at 9.1 ms

Min: -4.3 g at 39.4 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 7.2 m/s at 34.5 ms

Min: 0.0 m/s at 0.0 ms

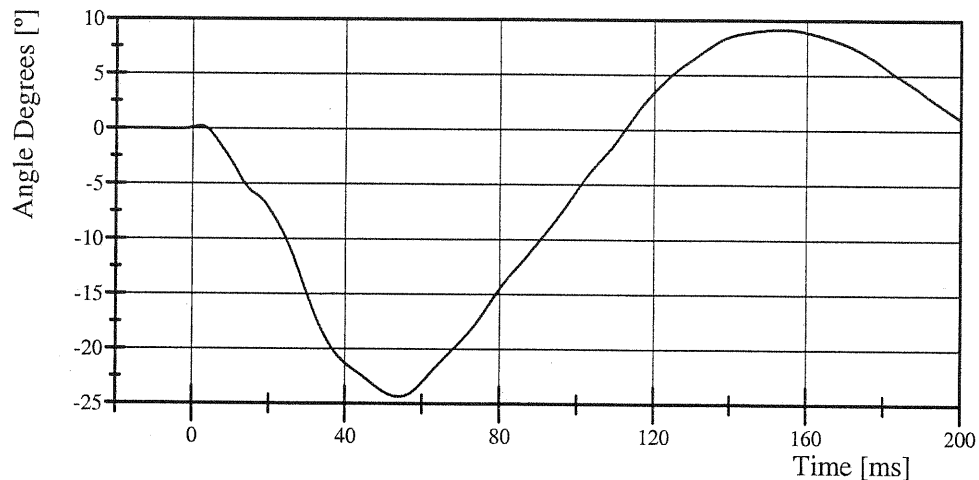
Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 25-1

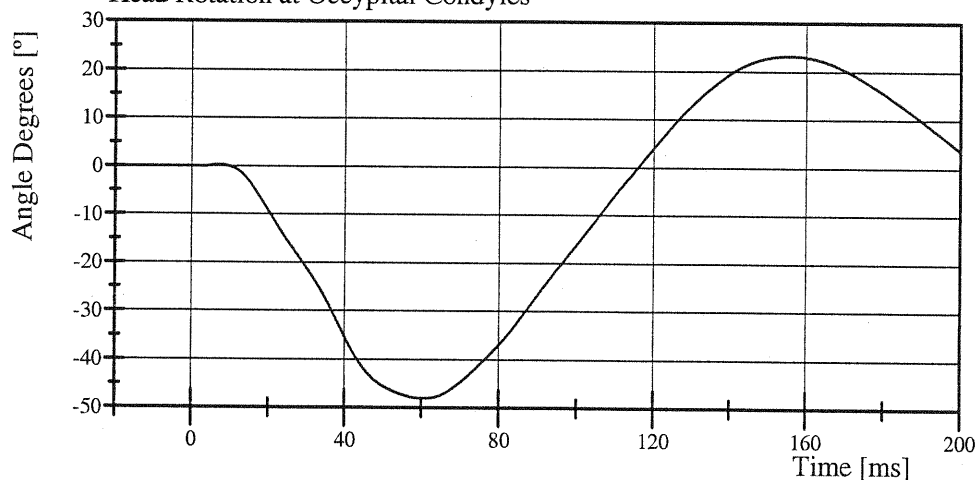
Test Date: 11/2/2007

Pot Rotation at the Base of Neck



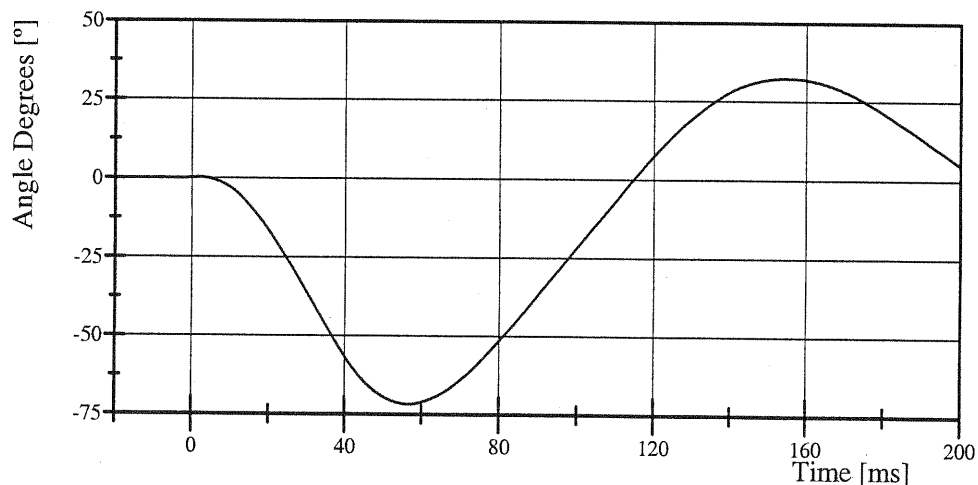
Filter Class: CFC_60
Max: 9.2 ° at 153.9 ms
Min: -24.3 ° at 54.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 23.3 ° at 155.7 ms
Min: -48.0 ° at 60.6 ms

Total Head D-Plane Rotation



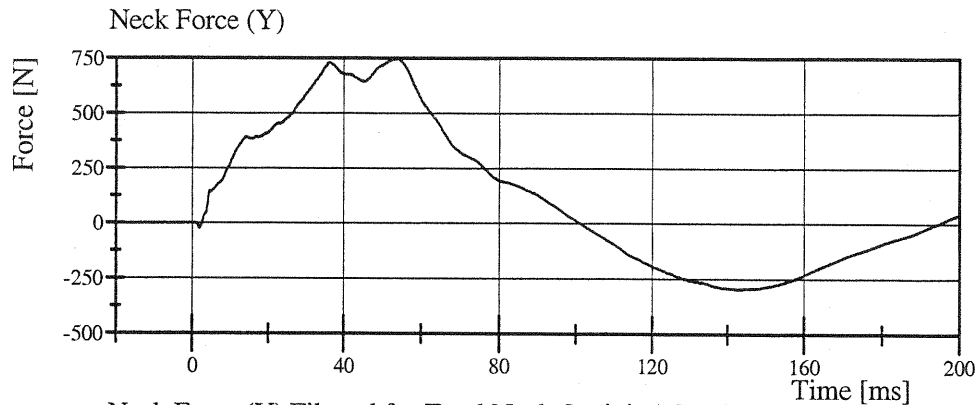
Filter Class: CFC_60
Max: 32.4 ° at 155.1 ms
Min: -71.7 ° at 56.7 ms

Transportation Research Center Inc.

Left Lateral Neck

SID-HIII Serial No. 066 Certification No. 25-1

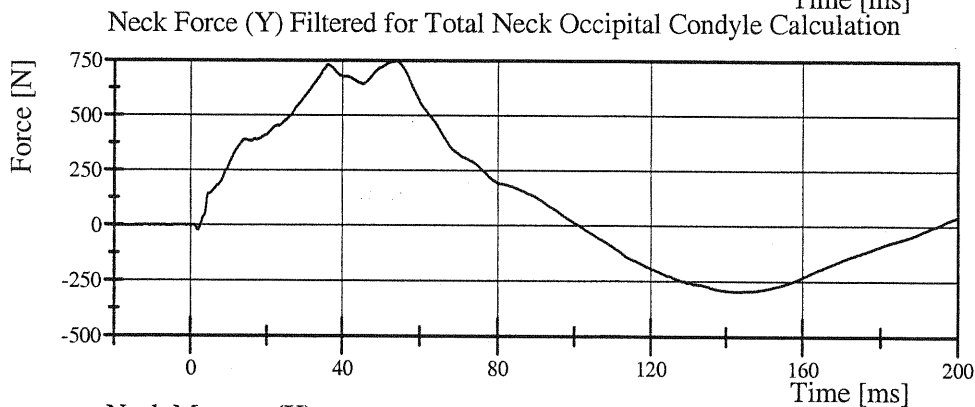
Test Date: 11/2/2007



Filter Class: CFC_1000

Max: 749.9 N at 53.9 ms

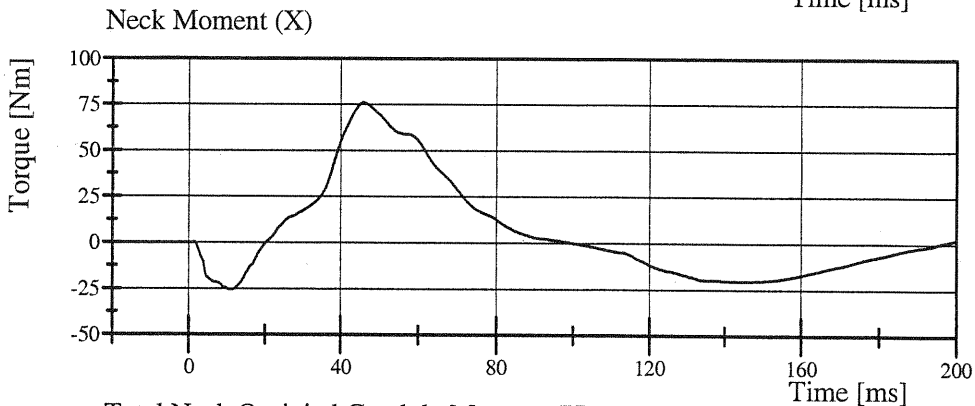
Min: -295.7 N at 142.6 ms



Filter Class: CFC_600

Max: 749.7 N at 54.0 ms

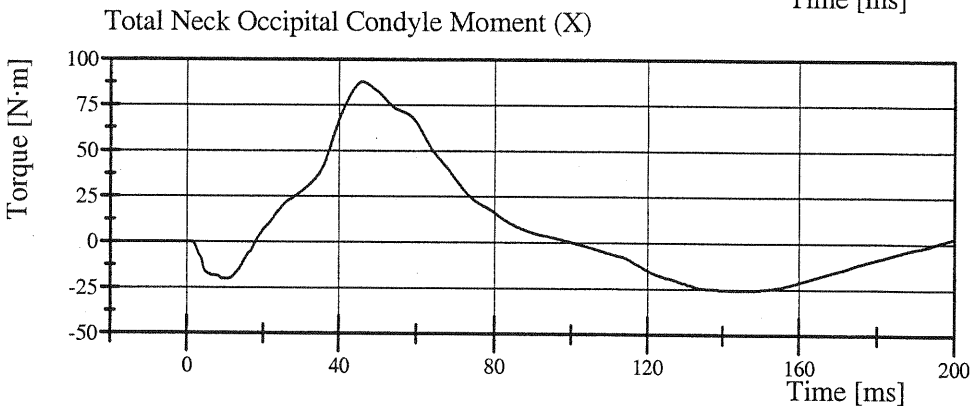
Min: -295.4 N at 142.7 ms



Filter Class: CFC_600

Max: 76.1 Nm at 45.8 ms

Min: -25.6 Nm at 11.2 ms



Filter Class: CFC_600

Max: 87.7 N·m at 46.0 ms

Min: -25.6 N·m at 144.4 ms

Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 066 Certification No. 25-1

Test Date: 11/1/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.270 m/s	Yes
Upper Rib Lateral Acceleration	37 - 46 g	43.9 g	Yes
Lower Rib Lateral Acceleration	37 - 46 g	41.7 g	Yes
Lower Spine Lateral Acceleration	15 - 22 g	21.5 g	Yes

Test meets specifications.

Comments:

Technician

Rent Bercus

Approved

Ron Stone

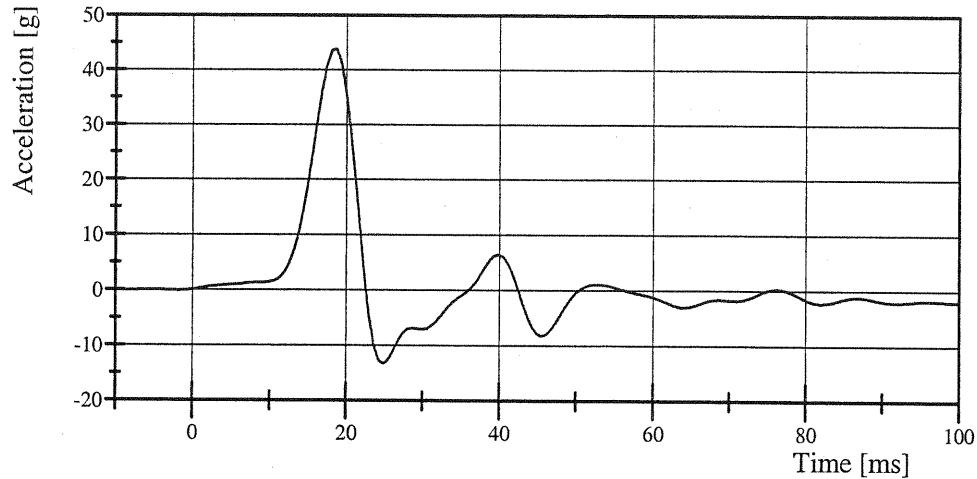
Transportation Research Center Inc.

Left Lateral Thorax

SID-HIII Serial No. 066 Certification No. 25-1

Test Date: 11/1/2007

Upper Rib Acceleration (Y)

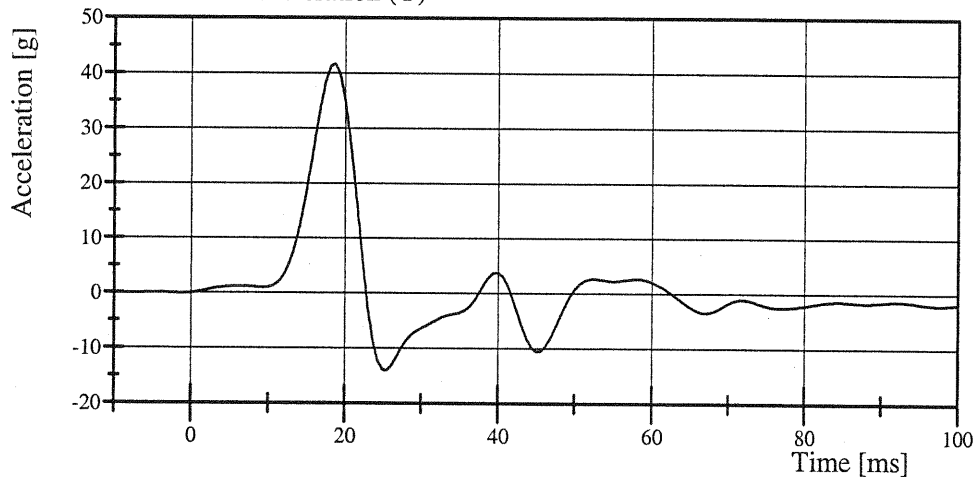


Filter Class: FIR_100

Max: 43.9 g at 18.6 ms

Min: -13.3 g at 25.0 ms

Lower Rib Acceleration (Y)

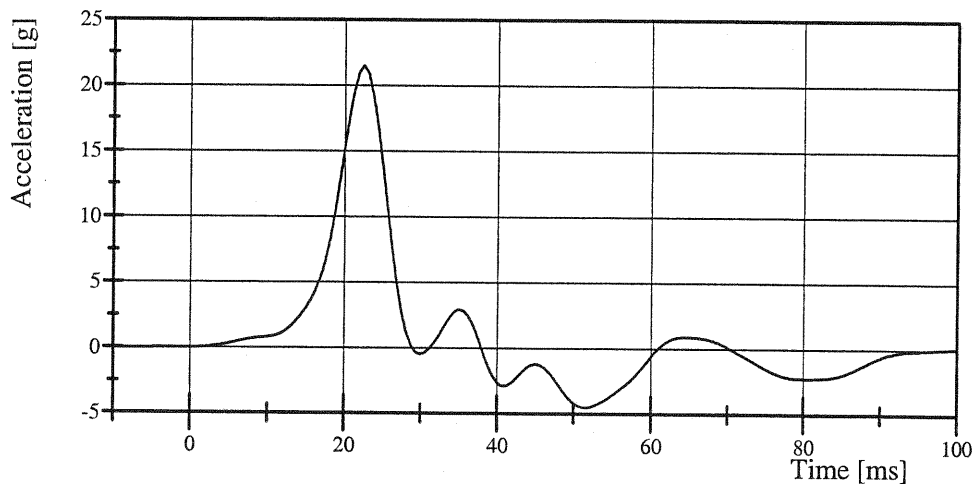


Filter Class: FIR_100

Max: 41.7 g at 18.6 ms

Min: -14.0 g at 25.5 ms

Lower Spine Acceleration (Y)



Filter Class: FIR_100

Max: 21.5 g at 22.4 ms

Min: -4.5 g at 51.8 ms

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 066 Certification No. 25-1

Test Date: 11/1/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Impactor Velocity	4.27 - 4.33 m/s	4.281 m/s	Yes
Pelvis Lateral Acceleration Duration above 20g	3 - 7 ms	6.3 ms	Yes
Pelvis Lateral Acceleration	40 - 60 g	45.7 g	Yes
Is Acceleration Curve Unimodal Above 20g?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Rant Beraud

Approved

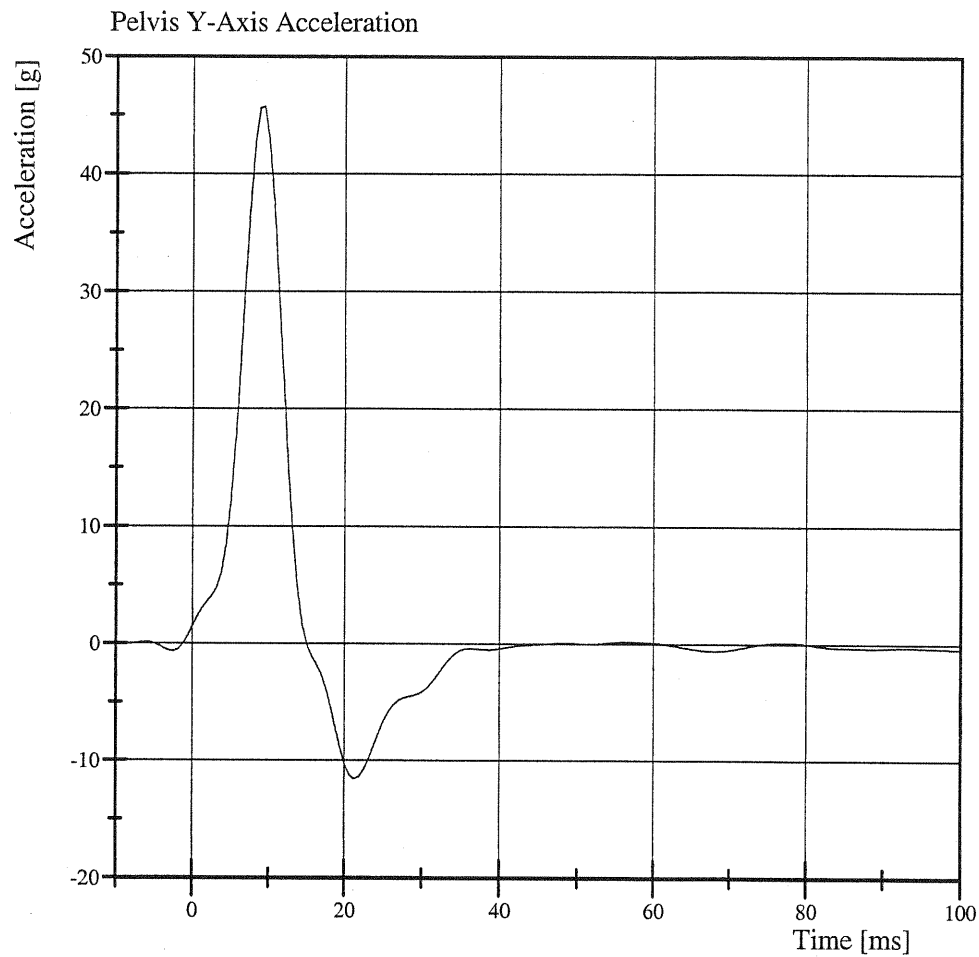
Ron Stoney

Transportation Research Center Inc.

Left Lateral Pelvis

SID-HIII Serial No. 066 Certification No. 25-1

Test Date: 11/1/2007



Filter Class: FIR_100

Max: 45.7 g at 9.4 ms

Min: -11.6 g at 21.3 ms

TRANSPORTATION RESEARCH CENTER INC.

LUMBAR FLEXION TEST

SID PART 572B

CAL DATE: 02-Nov-07

TRC, INC.

TEST NO: LUFL-01

572B SN 066 TORSO FLEX CAL 25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TIME	NA	1030
TEMPERATURE	18.9 – 25.6° C	21.4 C
RELATIVE HUMIDITY	10 – 70 %	39 %
FORCE AT 0 DEG. FLEXION	-27 – 27 N	0 N
FORCE AT 20 DEG OF FLEXION	98 – 151 N	124.55 N
FORCE AT 30 DEG OF FLEXION	151 – 205 N	177.92 N
FORCE AT 40 DEG OF FLEXION	205 – 258 N	235.75 N
NET RETURN ANGLE AFTER 3 MINUTES	< 12 °	7 °

TEST MEETS SPECIFICATIONS

TECHNICIAN Rod Barrios

Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 066 Certification No. 25-2

Test Date: 11/2/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Probe Force within Corridor	Yes	Yes	Yes
Probe Velocity	6.35 - 8.89 mm/s	7.732 mm/s	Yes

Test meets specifications.

Comments:

Technician

Raul Baranda

Approved

Ron Stoner

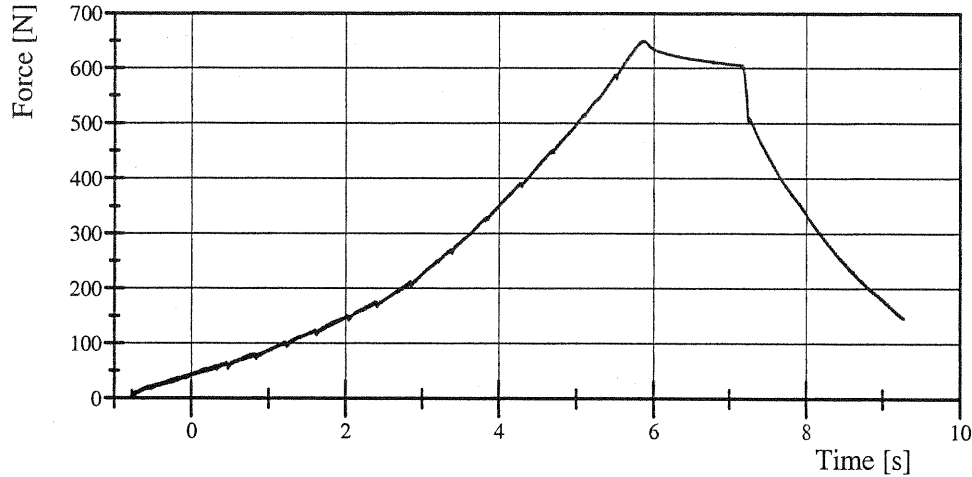
Transportation Research Center Inc.

Abdomen Compression

SID-HIII Serial No. 066 Certification No. 25-2

Test Date: 11/2/2007

Probe Force

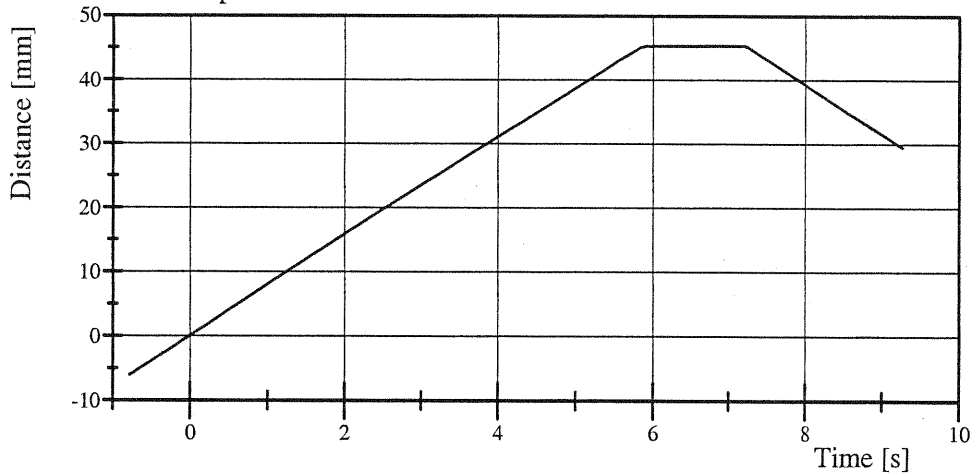


Filter Class: CFC_600

Max: 649.4 N at 5.9 s

Min: 3.2 N at -0.8 s

Probe Displacement

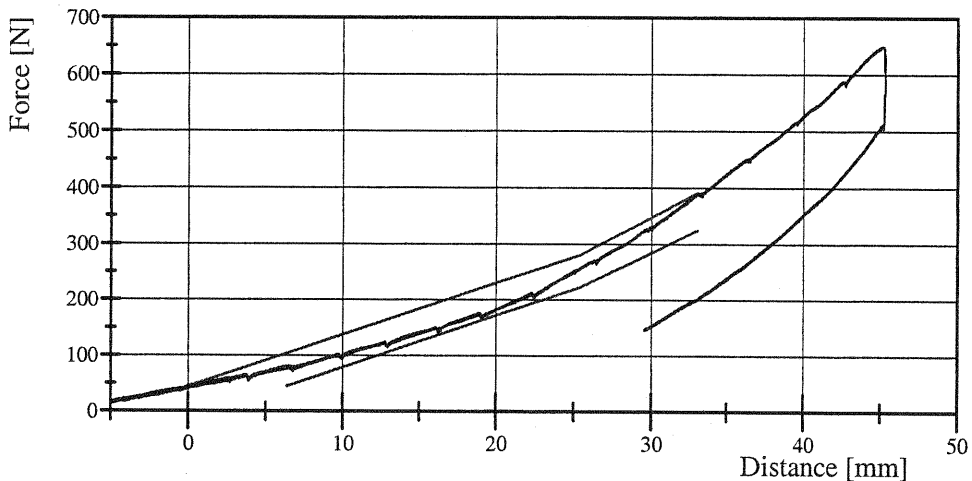


Filter Class: CFC_180

Max: 45.3 mm at 7.2 s

Min: -6.0 mm at -0.8 s

Probe Force vs Displacement



Filter Class: CFC_600

Max: 649.4 N at 45.1 mm

Min: 3.2 N at -6.0 mm

APPENDIX D
CHILD RESTRAINT SYSTEM

REPORT NUMBER: NCAPSIDE-TRC-2007-002

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**CHRYSLER LLC
2008 JEEP LIBERTY SPORT 4X4 MPV
NHTSA NUMBER: M80310**

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



Test Date: October 30, 2007

Report Date: November 13, 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: _____



Christopher Krouskop, Project Manager
Transportation Research Center Inc.

Approval Date: _____

11-13-07

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

1. Report No. NCAPSIDE-TRC-2007-002	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Final Report of a Graco Snugride CRS NHTSA No.: M80310	5. Report Date November 13, 2007	6. Performing Organization Code TRC Inc.
	8. Performing Organization Report No. 071030	
7. Author(s) Christopher Krouskop, Project Manger Transportation Research Center Inc.	10. Work Unit No. (TRAIS)	
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319	11. Contract or Grant No. DTNH22-03-D-02005	
	13. Type of Report and Period Covered Final Report October - November 2007	
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	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 Jeep Liberty Sport 4x4 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 October 30, 2007. Head Injury Criteria (HIC15): 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 Attn: Robert Hornicle	
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. Number of Pages 52
		22. Price

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SECTION D1
PURPOSE AND SUMMARY OF TEST M80310

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. 094) CRABI was calibrated prior to this test. CRABI calibration information is found in Section D-4.

CHILD DUMMY VALUES		
Location	HIC15 Value	3 ms Chest Clip
CRABI (P3)	30.1	14.9

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07

CHILD RESTRAINT SYSTEM INFORMATION

Description	Position #3 CRS
Manufacturer	Graco Children's Products, Inc.
Model Name	Snugride
Model No.	8465GIS3
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 Jeep Liberty SportNHTSA No.: M80310Test Program: NCAP Side ImpactTest Date: 10/30/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	503.8	474.4		550.4	572.0	
Right	kg	484.4	435.4		499.2	527.8	
Ratio	%	52.1	47.9		48.8	51.2	
Totals	kg	988.2	909.8	1898.0	1049.6	1099.8	2149.4

TARGET TEST WEIGHT CALCULATION

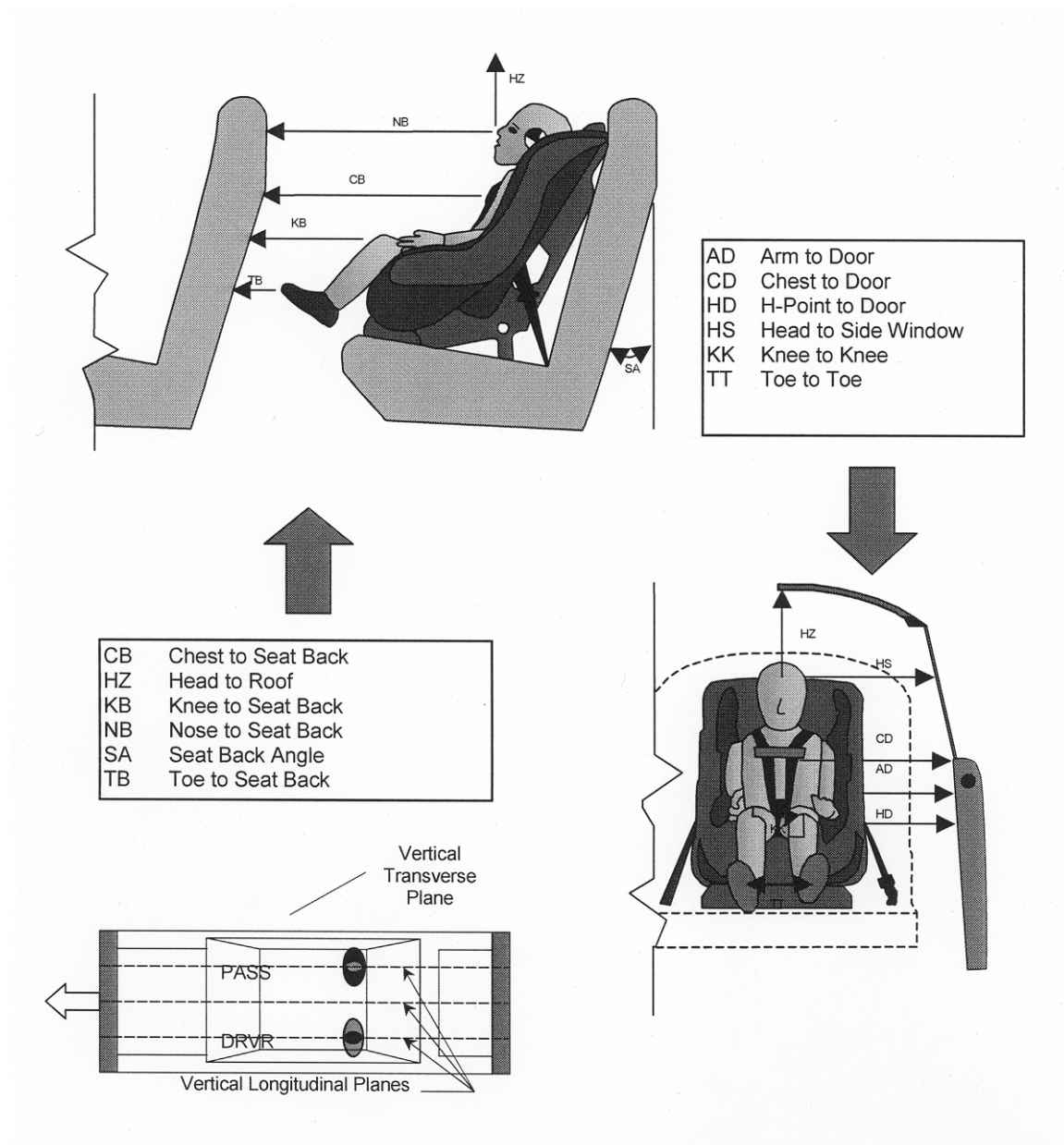
Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1898.0
Weight of 2 P572M ATDs	kg	162.0
Rated Cargo/Luggage Weight (RCLW)	kg	90.0
Calculated Vehicle Target Weight (TVTW)	kg	2150.0

DATA SHEET NO. 3

CRABI POSITIONING IN VEHICLE

Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07



Note: Child seat was rearward facing.

DATA SHEET NO. 3

CRABI POSITIONING IN VEHICLE, (Continued)

Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07

Code	Measurement Description	P3 (Passenger's Side)	
		Length (mm)	Angle (°)
SA	Seat Back Angle		33.9
HZ	Head to Roof	411	
CB	Chest to Seatback	470	
KB	Left Knee to Seatback	198	
NB	Nose to Seatback	543	
TB	Toe to Seatback	85	

DATA SHEET NO. 4**CRS PERFORMANCE DATA**

Test Vehicle: 2008 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07

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 Jeep Liberty Sport
Test Program: NCAP Side Impact

NHTSA No.: M80310
Test Date: 10/30/07

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 Jeep Liberty Sport

NHTSA No.: M80310

Test Program: NCAP Side Impact

Test Date: 10/30/07

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	Vehicle Onboard Rear SID/HIII, Side	1900	1900	-1350	6.5	1000

Reference Points: X - Impact Line

Y - MDB Left Edge Impact Point

Z - Ground Plane

APPENDIX D2
PHOTOGRAPHS

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MODEL 8465GIS3 NAME SNUGRIDE
Manufactured in 082907 10
GRACO CHILDREN'S PRODUCTS, INC.
EXTON, PA 19341 1-800-345-4109
Made in U.S.A. PB-25777

Figure D2-1 Pre-Test Child Restraint Certification Label View



Figure D2-2 Pre-Test Front View of Right Rear CRS

D2-4

071030



Figure D2-3 Post-Test Front View of Right Rear CRS



Figure D2-4 Pre-Test Left Side View of Right Rear CRS

D2-6

071030



Figure D2-5 Post-Test Left Side View of Right Rear CRS

D2-7

071030



Figure D2-6 Pre-Test Right Side View of Right Rear CRS

D2-8

071030



Figure D2-7 Post-Test Right Side View of Right Rear CRS



Figure D2-8 Pre-Test Front View of Right Rear Dummy



Figure D2-9 Post-Test Front View of Right Rear Dummy



Figure D2-10 Pre-Test Left Side View of Right Rear Dummy

D2-12

071030



Figure D2-11 Post-Test Left Side View of Right Rear Dummy



Figure D2-12 Pre-Test Right Side View of Right Rear Dummy

D2-14

071030



Figure D2-13 Post-Test Right Side View of Right Rear Dummy

D2-15

071030



Figure D2-14 Post-Test Right Rear Child Dummy Head Contact View

D2-16

071030

APPENDIX D3
CRABI RESPONSE AND CRS DATA

Data Plot	LIST OF DATA PLOTS PROVIDED IN THE TEST REPORT	Page
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D3-5	Right Rear CRABI Pelvis Resultant	D3-7
D3-6	Right Rear Child Seat CG X	D3-8
D3-6	Right Rear Child Seat CG Y	D3-8
D3-6	Right Rear Child Seat CG Z	D3-8
D3-6	Right Rear Child Seat CG Resultant	D3-8

NHTSA

Test Lab: CTF

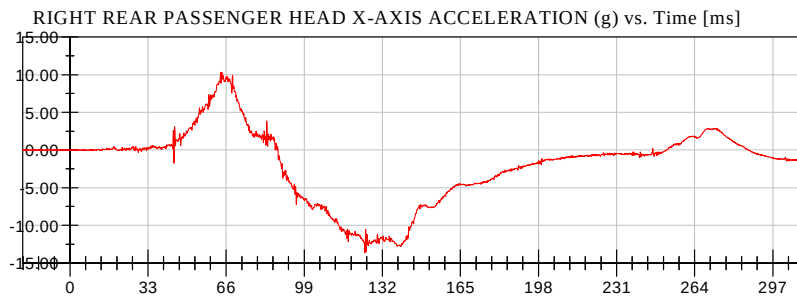
Test Number: 071030 (M80310)

Position #1 SID H3 Dummy (056)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

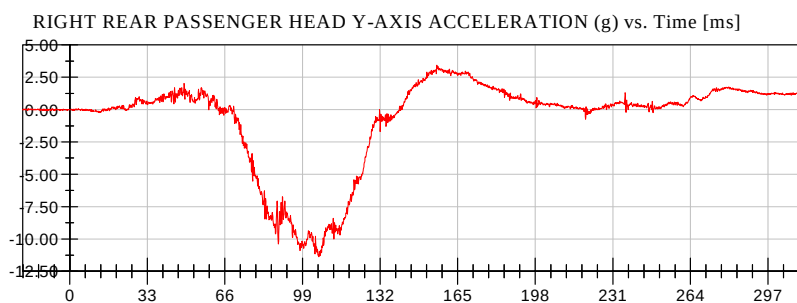


<Max>

10.33 g at 64.16 ms

<Min>

-13.63 g at 124.72 ms

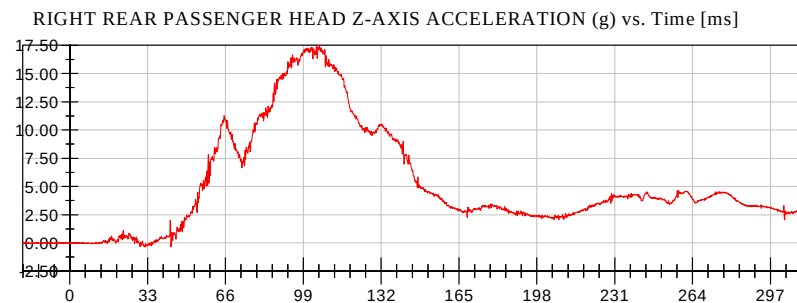


<Max>

3.44 g at 156.16 ms

<Min>

-11.38 g at 106.00 ms

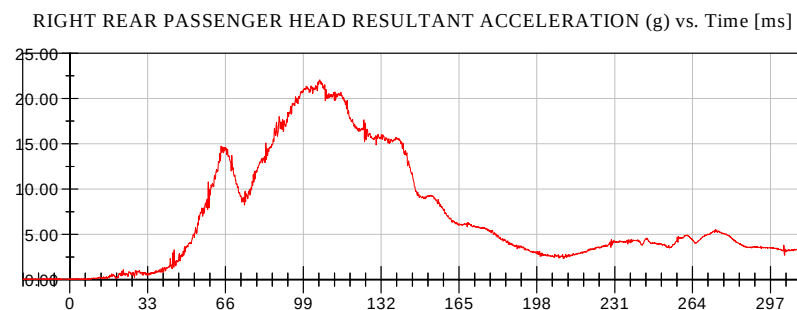


<Max>

17.50 g at 104.64 ms

<Min>

-0.37 g at 31.84 ms



<Max>

22.06 g at 106.00 ms

<Min>

0.02 g at -18.96 ms



NHTSA

Test Lab: CTF

Test Number: 071030 (M80310)

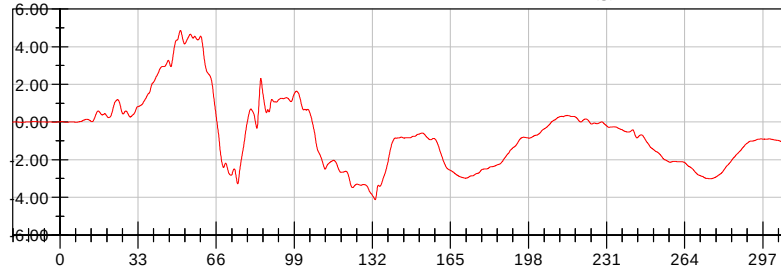
Position #1 SID H3 Dummy (056)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

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



<Max>

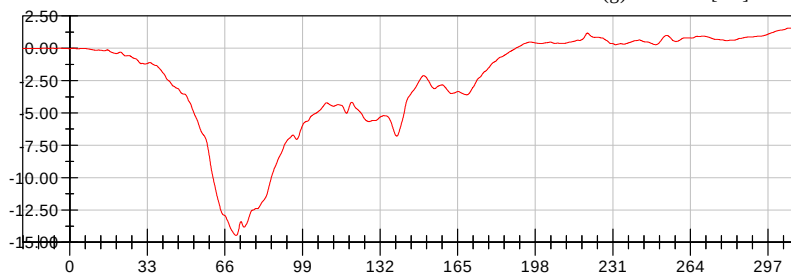
4.87 g at 50.88 ms

<Min>

-4.12 g at 133.20 ms

CFC_180

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



<Max>

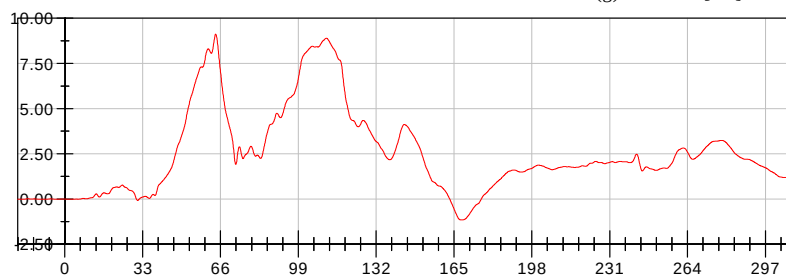
1.66 g at 310.00 ms

<Min>

-14.47 g at 70.80 ms

CFC_180

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



<Max>

9.12 g at 64.00 ms

<Min>

-1.16 g at 168.00 ms

CFC_180

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



<Max>

15.56 g at 64.32 ms

<Min>

0.00 g at -4.96 ms

CFC_180



NHTSA

Test Lab: CTF

Test Number: 071030 (M80310)

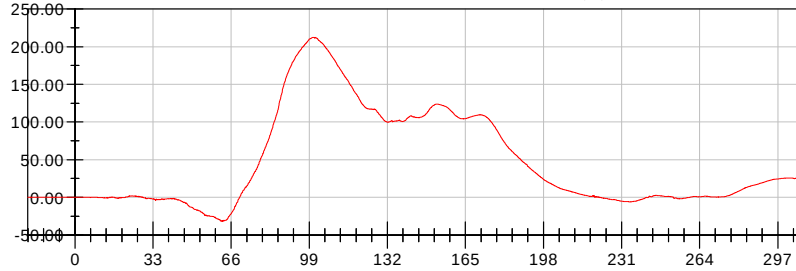
Position #1 SID H3 Dummy (056)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

RIGHT REAR PASSENGER NECK X-AXIS SHEAR FORCE (N) vs. Time [ms]



<Max>

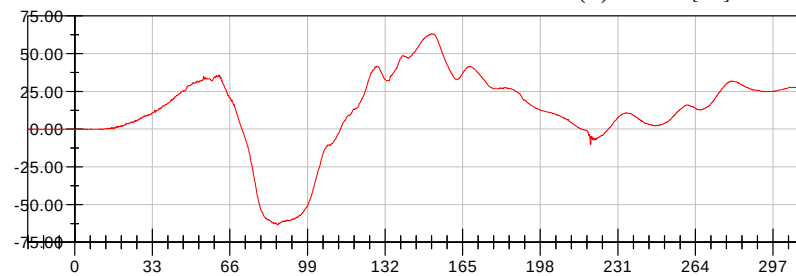
212.67 N at 100.56 ms

<Min>

-31.98 N at 62.00 ms

CFC_1000

RIGHT REAR PASSENGER NECK Y-AXIS SHEAR FORCE (N) vs. Time [ms]



<Max>

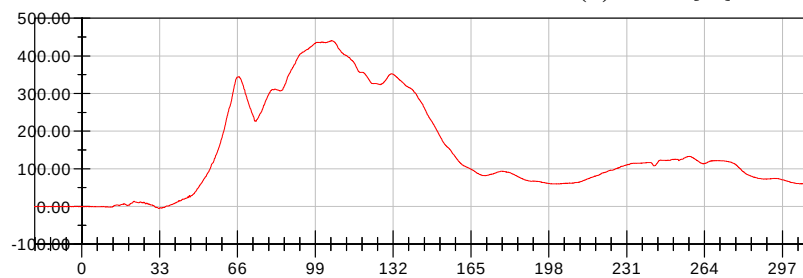
63.16 N at 151.60 ms

<Min>

-63.38 N at 86.32 ms

CFC_1000

RIGHT REAR PASSENGER NECK Z-AXIS AXIAL FORCE (N) vs. Time [ms]



<Max>

440.76 N at 105.92 ms

<Min>

-5.09 N at 32.56 ms

CFC_1000



NHTSA

Test Lab: CTF

Test Number: 071030 (M80310)

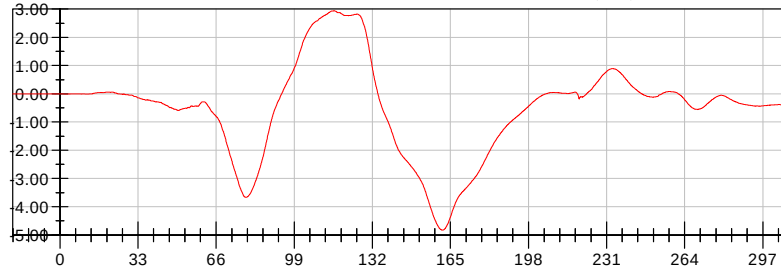
Position #1 SID H3 Dummy (056)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

RIGHT REAR PASSENGER NECK MOMENT ABOUT X AXIS (Nm) vs. Time [ms]



<Max>

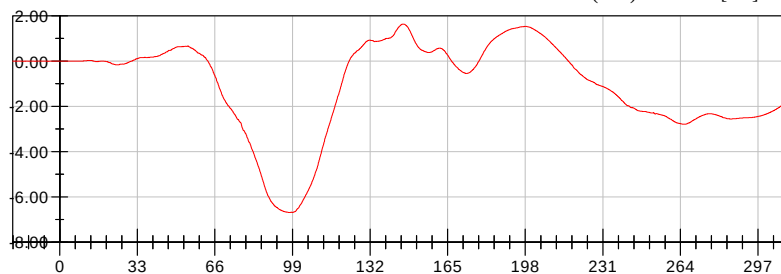
2.95 Nm at 115.92 ms

<Min>

-4.82 Nm at 161.76 ms

CFC_600

RIGHT REAR PASSENGER NECK MOMENT ABOUT Y AXIS (Nm) vs. Time [ms]



<Max>

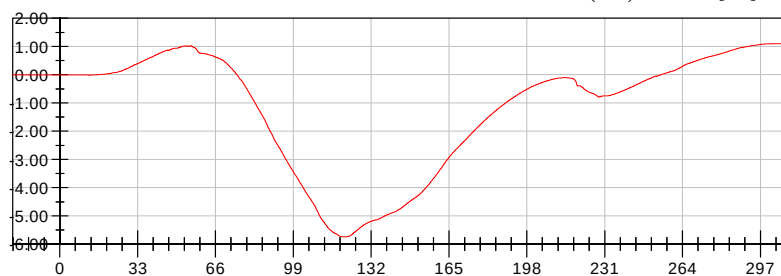
1.64 Nm at 146.08 ms

<Min>

-6.68 Nm at 98.00 ms

CFC_600

RIGHT REAR PASSENGER NECK MOMENT ABOUT Z AXIS (Nm) vs. Time [ms]



<Max>

1.11 Nm at 305.84 ms

<Min>

-5.74 Nm at 120.40 ms

CFC_600



NHTSA

Test Lab: CTF

Test Number: 071030 (M80310)

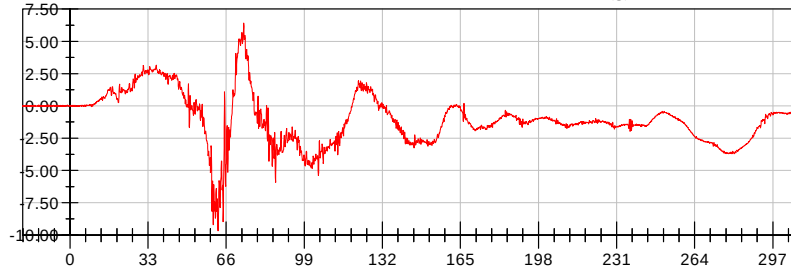
Position #1 SID H3 Dummy (056)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

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



<Max>

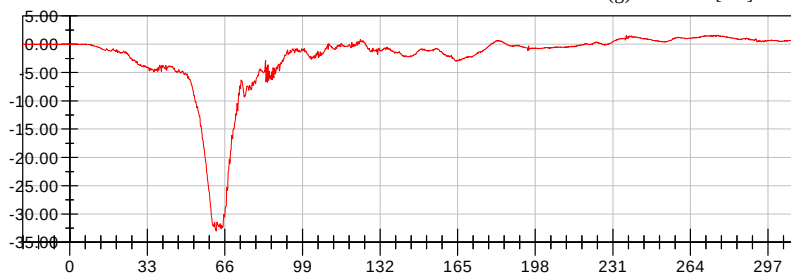
6.43 g at 73.44 ms

<Min>

-9.68 g at 62.56 ms

CFC_1000

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



<Max>

1.61 g at 275.36 ms

<Min>

-32.99 g at 62.24 ms

CFC_1000

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



<Max>

7.19 g at 56.32 ms

<Min>

-3.71 g at 166.96 ms

CFC_1000

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



<Max>

34.14 g at 62.16 ms

<Min>

0.01 g at -19.36 ms

CFC_1000



NHTSA

Test Lab: CTF

Test Number: 071030 (M80310)

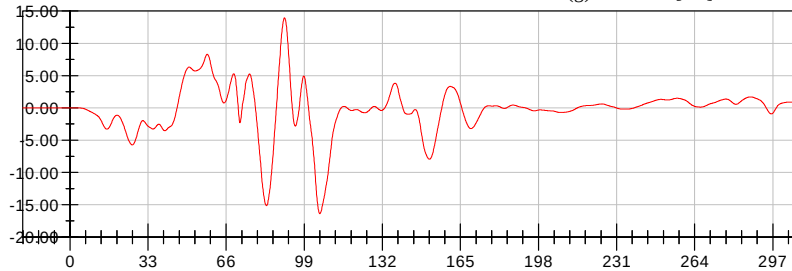
Position #1 SID H3 Dummy (056)

Position #4 SID H3 Dummy (066)

Position #3 Crabi 12 month old Dummy (094)

Test Date: 10/30/2007

RIGHT REAR CHILD SEAT CG X-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

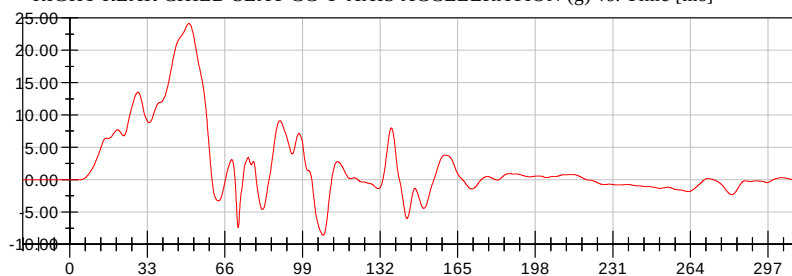
13.96 g at 90.64 ms

<Min>

-16.38 g at 105.60 ms

CFC_60

RIGHT REAR CHILD SEAT CG Y-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

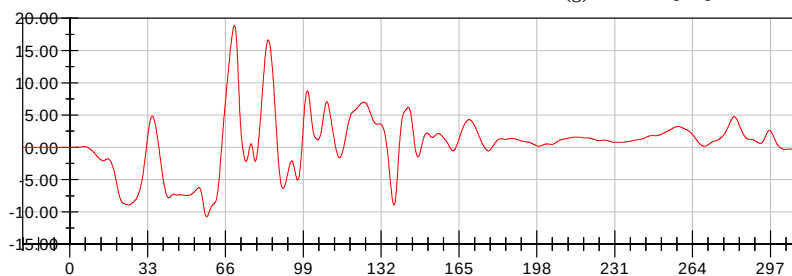
24.12 g at 50.72 ms

<Min>

-8.58 g at 107.76 ms

CFC_60

RIGHT REAR CHILD SEAT CG Z-AXIS ACCELERATION (g) vs. Time [ms]



<Max>

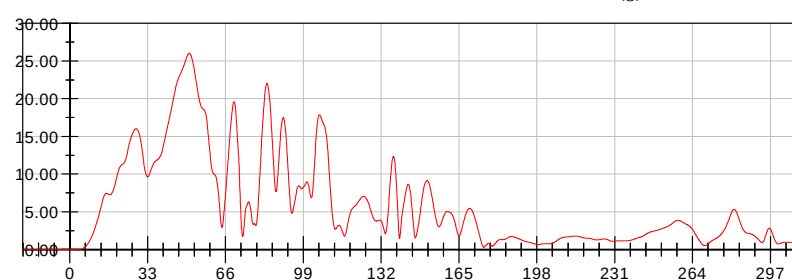
18.86 g at 69.76 ms

<Min>

-10.76 g at 58.00 ms

CFC_60

RIGHT REAR CHILD SEAT CG RESULTANT ACCELERATION (g) vs. Time [ms]



<Max>

26.01 g at 50.64 ms

<Min>

0.00 g at -14.96 ms

CFC_60



APPENDIX D4
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

CRABI: 094

Transportation Research Center Inc.
572R CRABI 12-Month-Old Dummy
External Dimensions
Serial No. 094 Calibration No. 09
Date: 18-Oct-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	285 mm	Yes
Hip Pivot Height	C	27.9 - 38.1 mm	32 mm	Yes
Hip Pivot from Backline	D	40.1 - 50.3 mm	47 mm	Yes
Shoulder Pivot from Backline	E	50.3 - 60.5 mm	56 mm	Yes
Thigh Clearance	F	63.0 - 73.2 mm	72 mm	Yes
Elbow Pivot to Fingertip	G	176.6 - 191.8 mm	180 mm	Yes
Shoulder to Elbow Pivot	I	99.1 - 114.3 mm	103 mm	Yes
Elbow Rest Height	J	150.1 - 165.3 mm	156 mm	Yes
Buttock to Knee Length	K	202.7 - 217.9 mm	206 mm	Yes
Popliteal Height (Reference to Seat)	L	138.7 - 153.9 mm	150 mm	Yes
Knee Pivot Height	M	165.1 - 180.3 mm	170 mm	Yes
Buttock Popliteal Length	N	144.8 - 160.0 mm	148 mm	Yes
Chest Depth with Jacket	O	107.5 - 122.7 mm	121 mm	Yes
Foot Length	P	92.4 - 102.6 mm	99 mm	Yes
Stature	Q	727.7 - 753.1 mm	750 mm	Yes
Buttock to Knee Pivot Length	R	178.5 - 188.7 mm	182 mm	Yes
Head Breadth	S	124.4 - 134.6 mm	126 mm	Yes
Head Depth (REF)	T	149.9 - 165.1 mm	159 mm	Yes
Hip Breadth	U	158.5 - 173.7 mm	171 mm	Yes
Shoulder Breadth	V	200.7 - 215.9 mm	211 mm	Yes
Foot Breadth	W	39.1 - 49.3 mm	44 mm	Yes
Chest Circumference with Jacket	Y	452.4 - 477.8 mm	465 mm	Yes
Waist Circumference	Z	447.0 - 472.4 mm	454 mm	Yes
Reference Location for Chest Circumference	AA	256.5 - 266.7 mm	263 mm	Yes
Reference Location for Waist Circumference	BB	106.7 - 116.9 mm	112 mm	Yes
Shoulder Height	CC	299.7 - 314.9 mm	310 mm	Yes
Chin Height	DD	289.6 - 304.8 mm	313 mm	No

Comments:

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

Technician

Approved

Rout Banda

Ron Storer

Transportation Research Center Inc.

Front Head Drop

CRABI 12 MO Serial No. 094 Certification No. 9-1

Test Date: 10/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Peak Head Resultant Acceleration	100 - 120 g	108.6 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	2.8 g	Yes
Is Acceleration Curve Unimodal within 17% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Ron Beranish

Approved

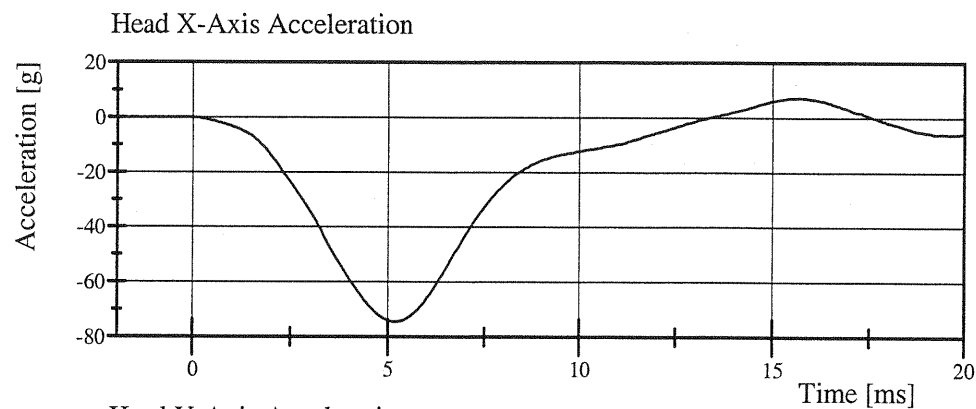
Ron Stoner

Transportation Research Center Inc.

Front Head Drop

CRABI 12 MO Serial No. 094 Certification No. 9-1

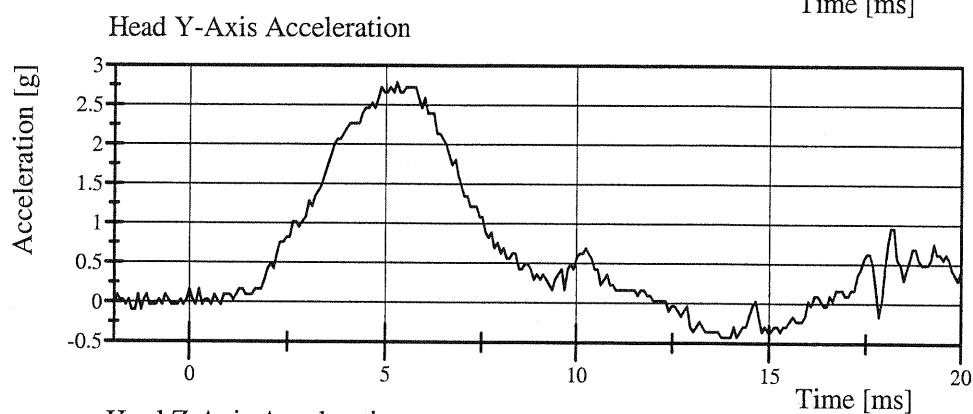
Test Date: 10/16/2007



Filter Class: CFC_1000

Max: 7.4 g at 15.7 ms

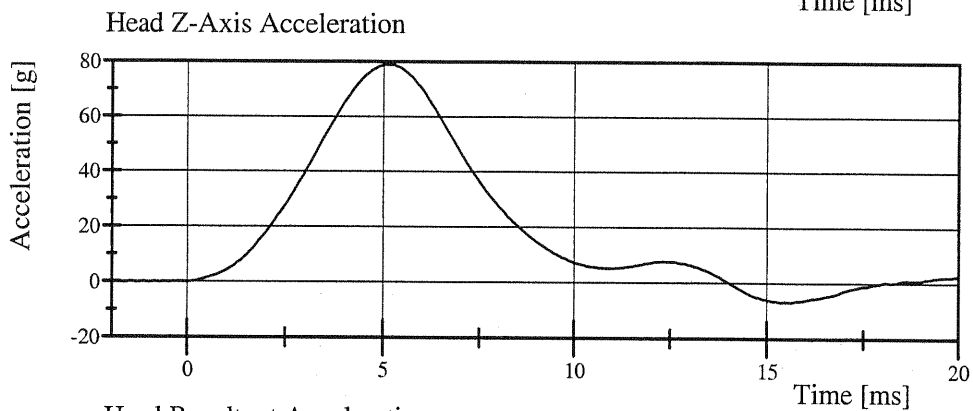
Min: -74.4 g at 5.1 ms



Filter Class: CFC_1000

Max: 2.8 g at 5.3 ms

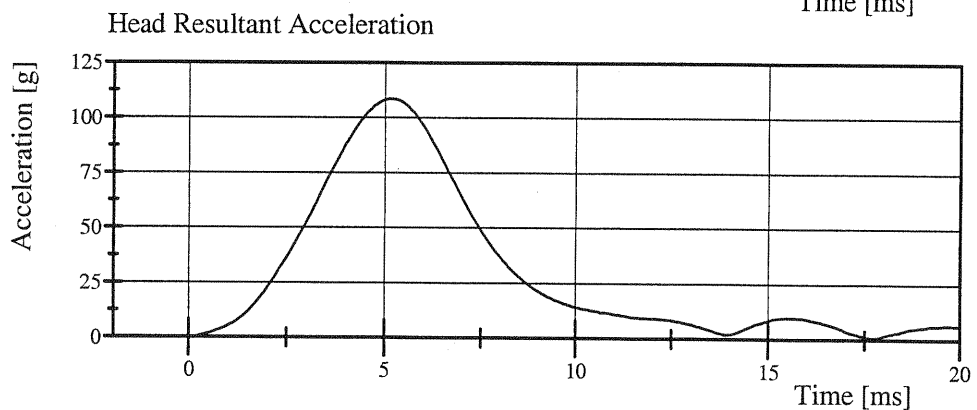
Min: -0.4 g at 13.8 ms



Filter Class: CFC_1000

Max: 79.0 g at 5.1 ms

Min: -6.7 g at 15.4 ms



Filter Class: CFC_1000

Max: 108.6 g at 5.1 ms

Min: 0.0 g at -0.4 ms

Transportation Research Center Inc.

Rear Head Drop

CRABI 12 MO Serial No. 094 Certification No. 9-2

Test Date: 10/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Peak Head Resultant Acceleration	55 - 71 g	69.3 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-1.5 g	Yes
Is Acceleration Curve Unimodal within 17% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Storer

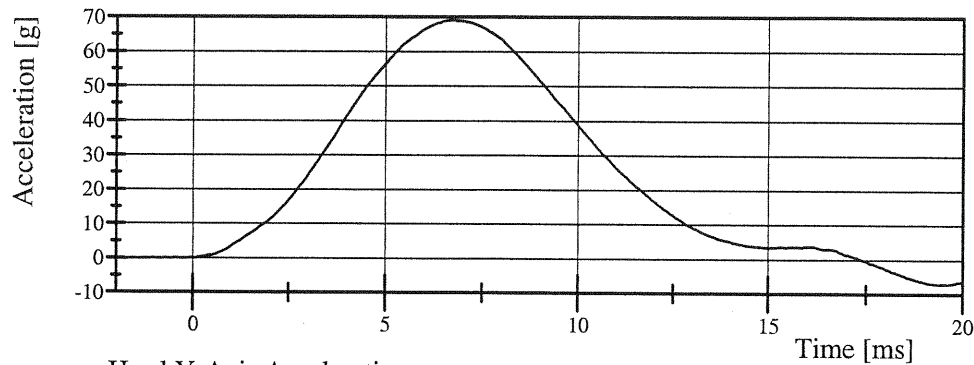
Transportation Research Center Inc.

Rear Head Drop

CRABI 12 MO Serial No. 094 Certification No. 9-2

Test Date: 10/16/2007

Head X-Axis Acceleration

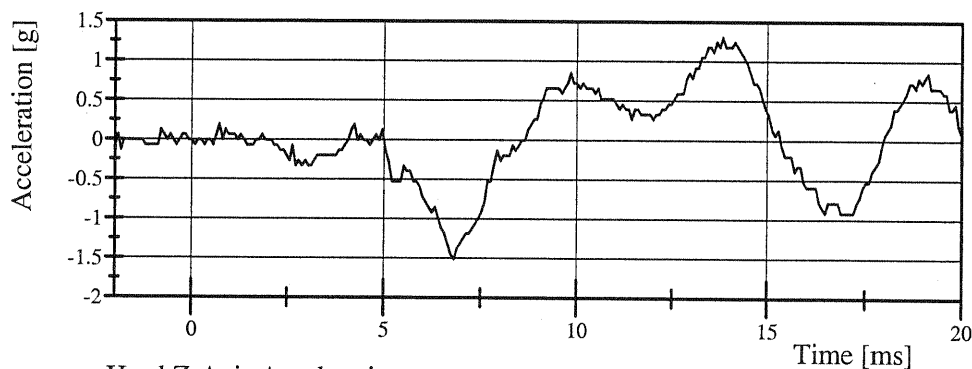


Filter Class: CFC_1000

Max: 69.2 g at 6.7 ms

Min: -7.1 g at 19.4 ms

Head Y-Axis Acceleration

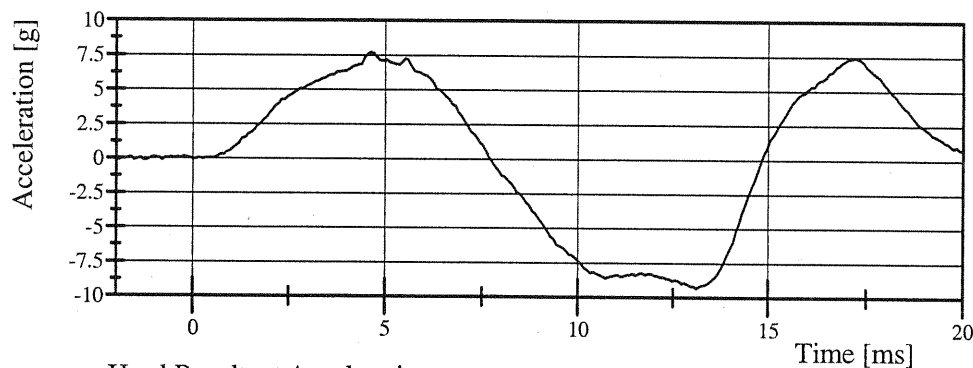


Filter Class: CFC_1000

Max: 1.3 g at 13.8 ms

Min: -1.5 g at 6.8 ms

Head Z-Axis Acceleration

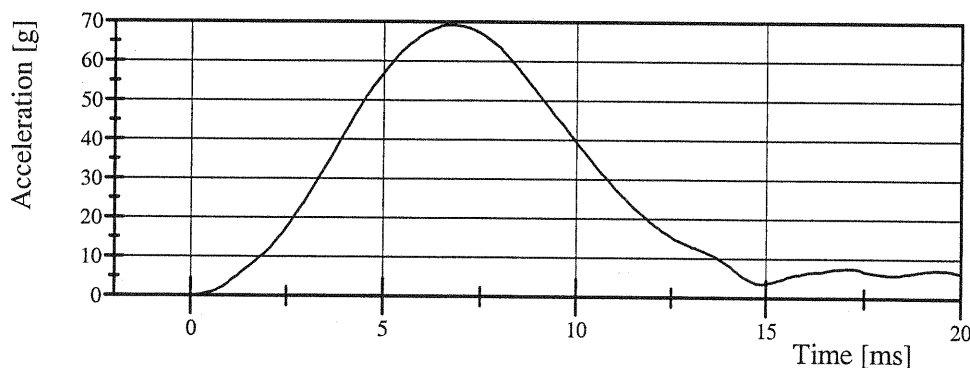


Filter Class: CFC_1000

Max: 7.7 g at 4.6 ms

Min: -9.3 g at 13.1 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 69.3 g at 6.7 ms

Min: 0.1 g at -0.6 ms

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 10-1

Test Date: 10/29/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.18 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-1.6) - (-2.3) m/s	-2.06 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-3.4) - (-4.2) m/s	-3.97 m/s	Yes
Pendulum Integrated Velocity Change at 25ms	(-4.3) - (-5.2) m/s	-4.86 m/s	Yes
Total Head D-Plane Rotation	(-75) - (-86) °	-83.8 °	Yes
Total Neck Occipital Condyles Moment	36 - 45 N·m	37.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 5 Nm	60 - 80 ms	75.4 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Baly

Approved

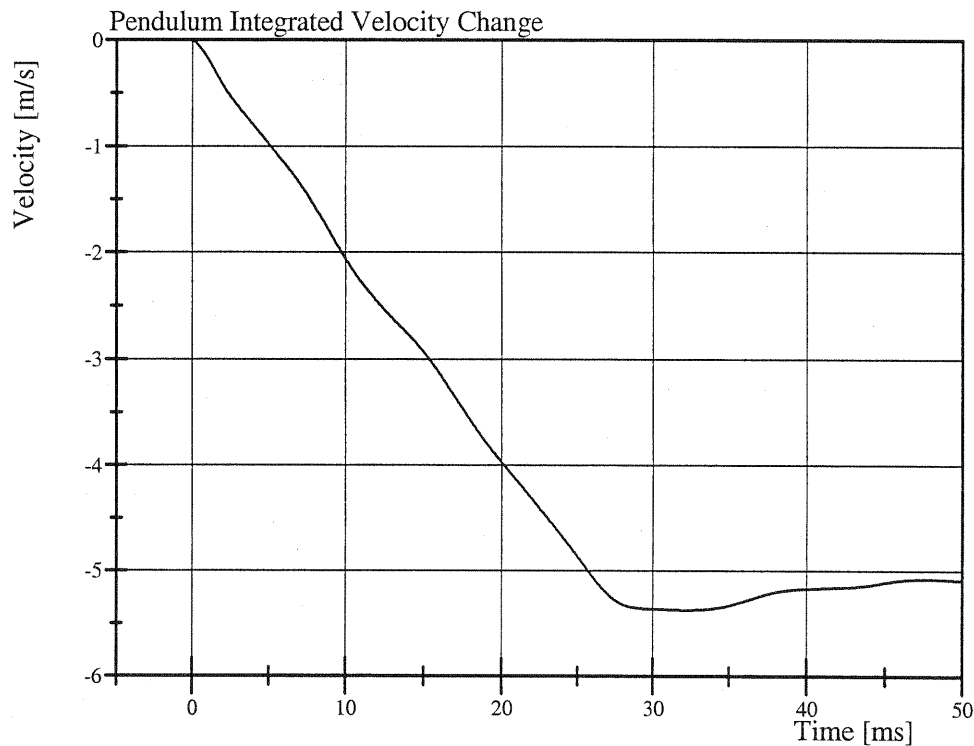
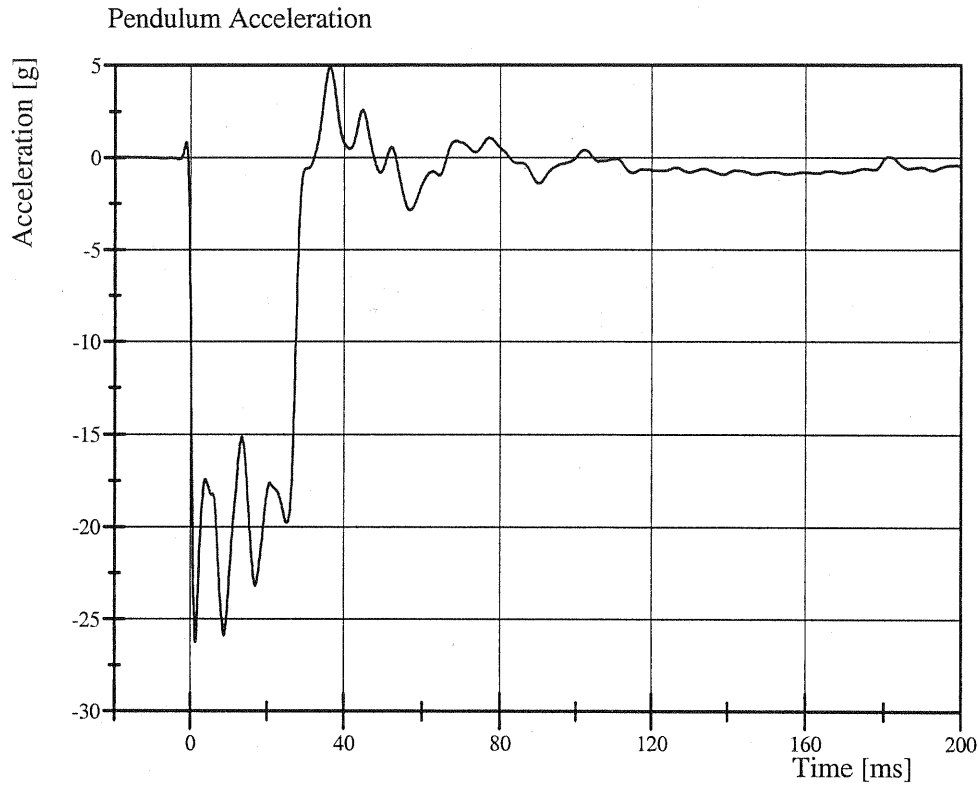
Ron Storer

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 10-1

Test Date: 10/29/2007



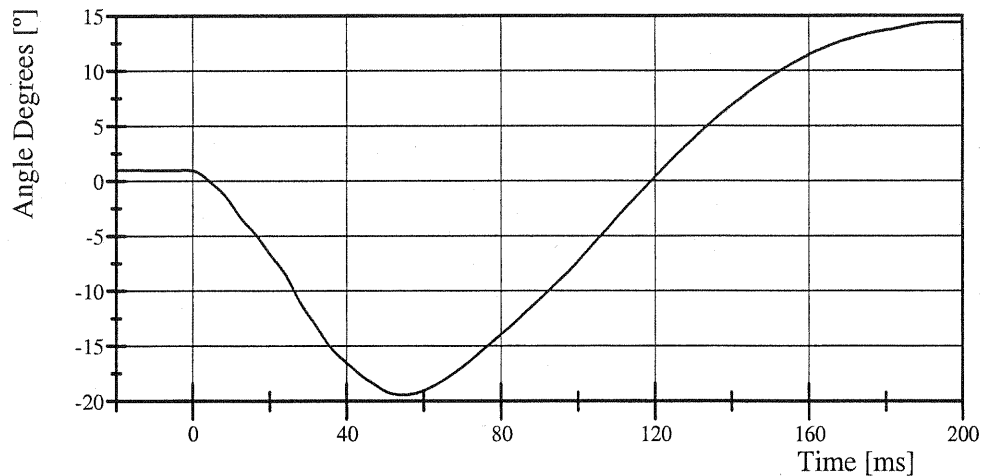
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 10-1

Test Date: 10/29/2007

Forward Pot Rotation at Base of Pendulum

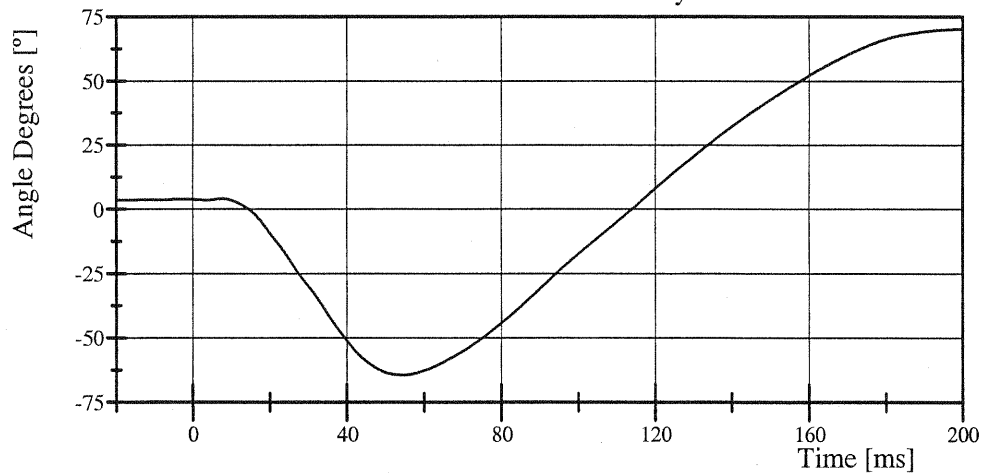


Filter Class: CFC_60

Max: 14.4 ° at 196.2 ms

Min: -19.4 ° at 54.6 ms

Center Headform Pot Rotation at Center of Gravity

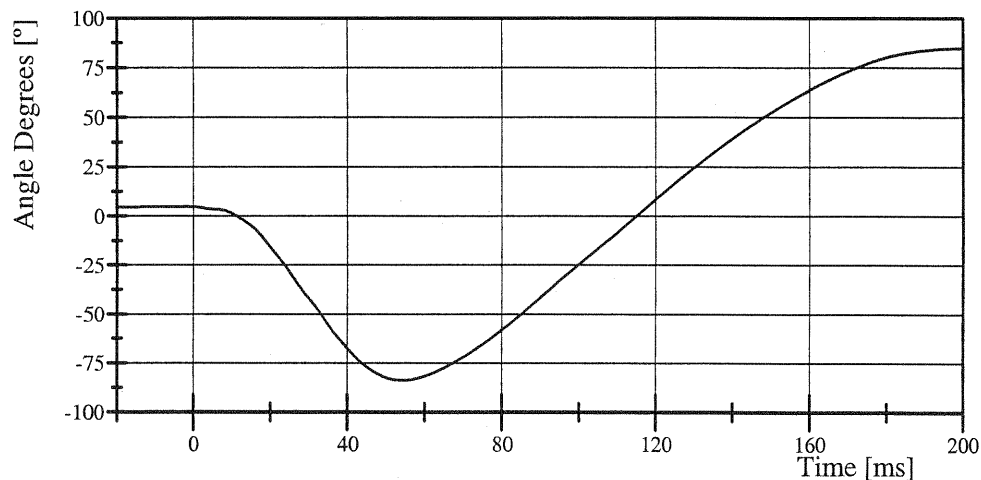


Filter Class: CFC_60

Max: 70.4 ° at 200.0 ms

Min: -64.3 ° at 54.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 84.8 ° at 200.0 ms

Min: -83.8 ° at 54.7 ms

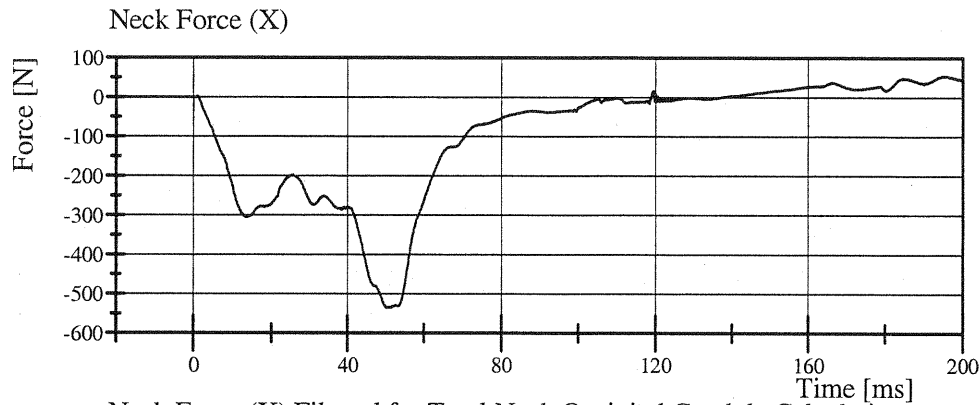


Transportation Research Center Inc.

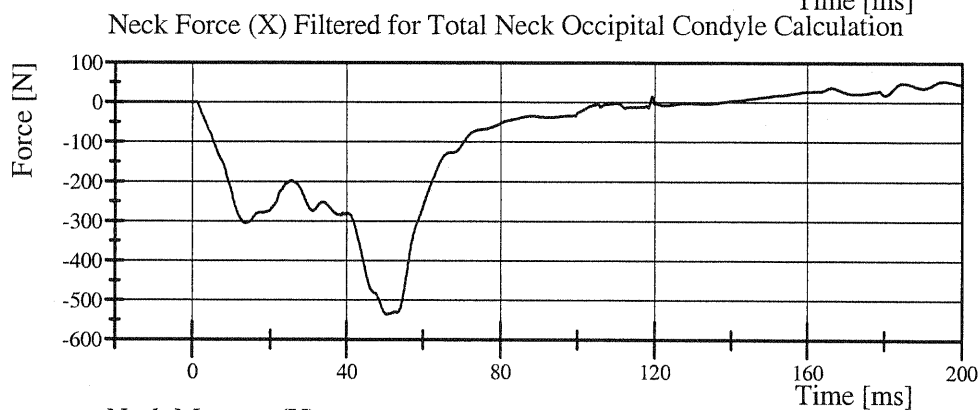
Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 10-1

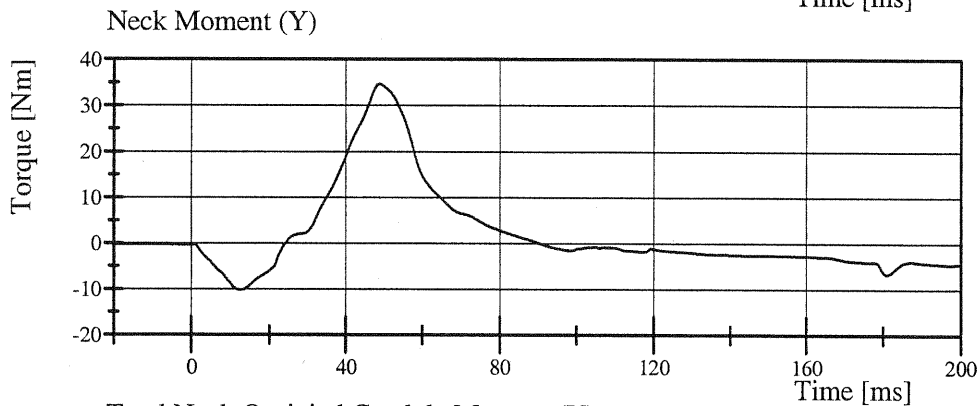
Test Date: 10/29/2007



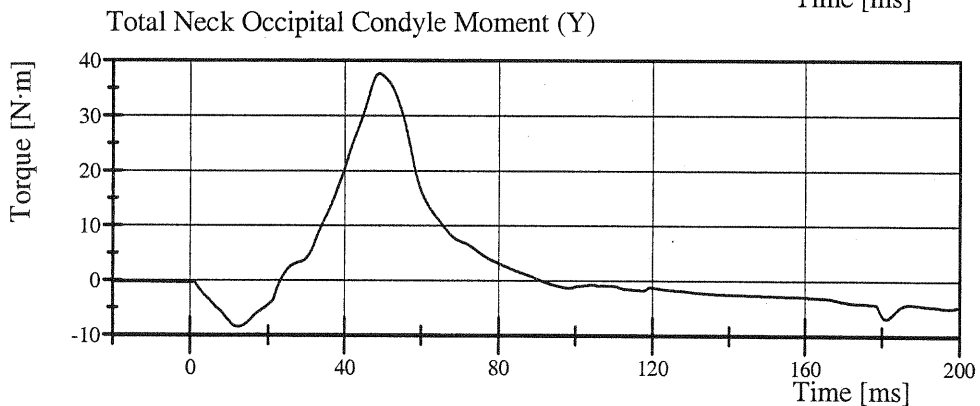
Filter Class: CFC_1000
Max: 54.8 N at 195.8 ms
Min: -535.4 N at 50.2 ms



Filter Class: CFC_600
Max: 54.7 N at 195.8 ms
Min: -535.2 N at 50.3 ms



Filter Class: CFC_600
Max: 34.7 Nm at 48.8 ms
Min: -10.2 Nm at 12.2 ms



Filter Class: CFC_600
Max: 37.7 N·m at 49.0 ms
Min: -8.5 N·m at 12.1 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 10-1

Test Date: 10/29/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	(-2.4) - (-2.6) m/s	-2.58 m/s	Yes
Pendulum Integrated Velocity Change at 6ms	0.8 - 1.2 m/s	1.06 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 2.1 m/s	1.91 m/s	Yes
Pendulum Integrated Velocity Change at 14ms	2.2 - 2.9 m/s	2.57 m/s	Yes
Total Head D-Plane Rotation	80 - 92 °	90.3 °	Yes
Total Neck Occipital Condyles Moment (-12) - (-23) N·m		-16.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -5 Nm	76 - 90 ms	81.0 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

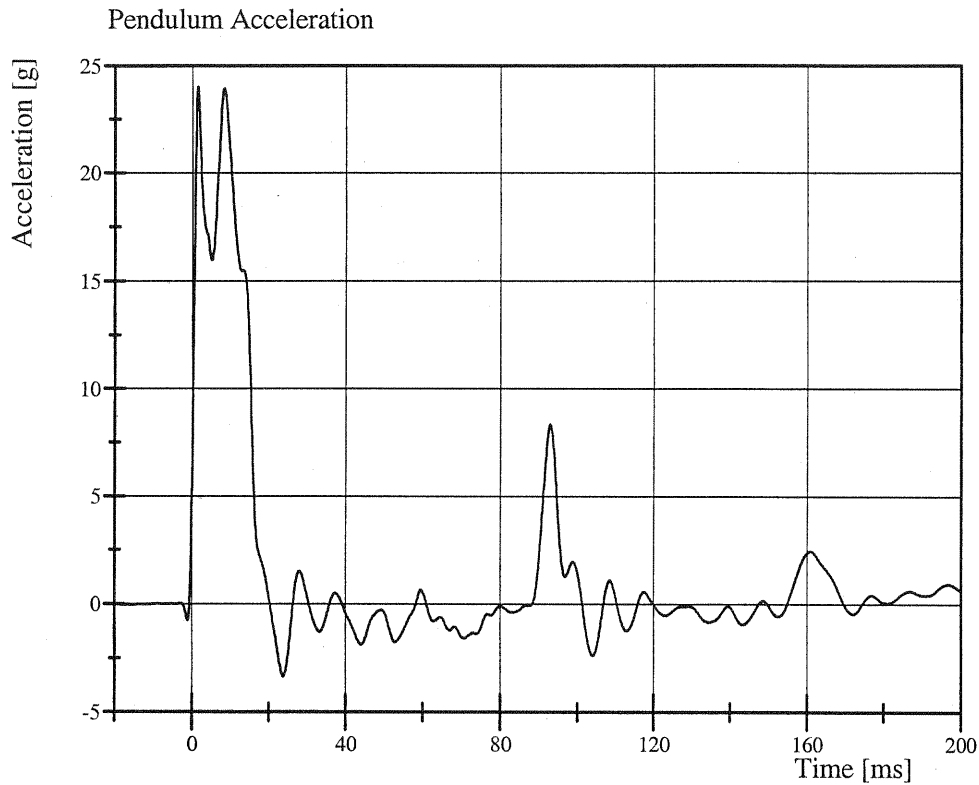
Ron Stoner

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 10-1

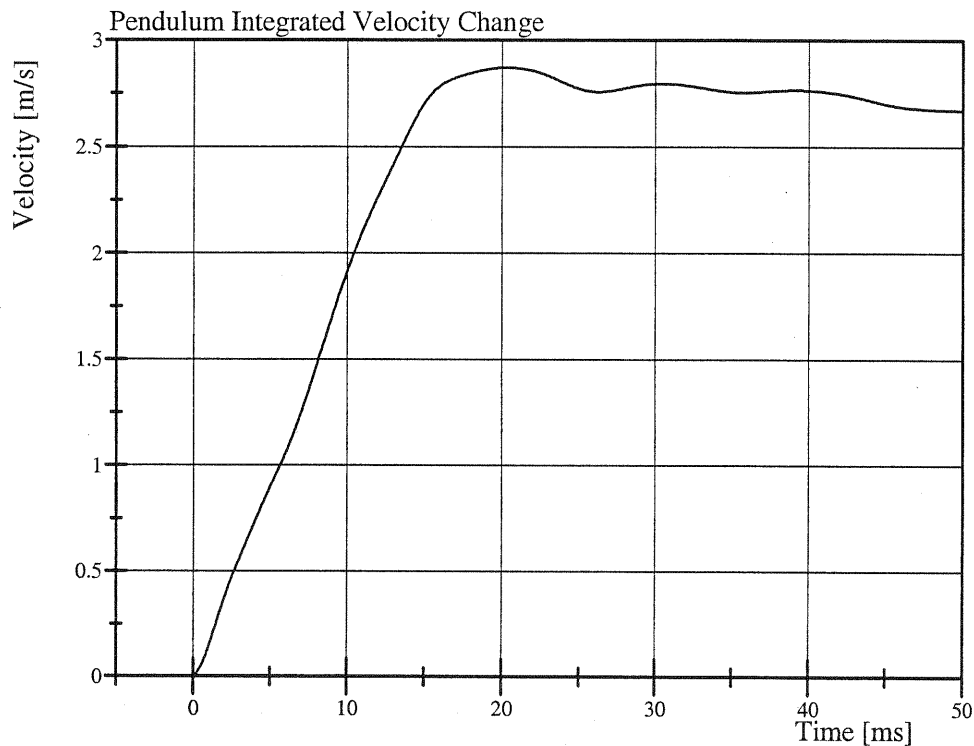
Test Date: 10/29/2007



Filter Class: CFC_180

Max: 24.0 g at 1.5 ms

Min: -3.3 g at 23.7 ms



Filter Class: CFC_180

Max: 2.9 m/s at 20.3 ms

Min: 0.0 m/s at 0.0 ms

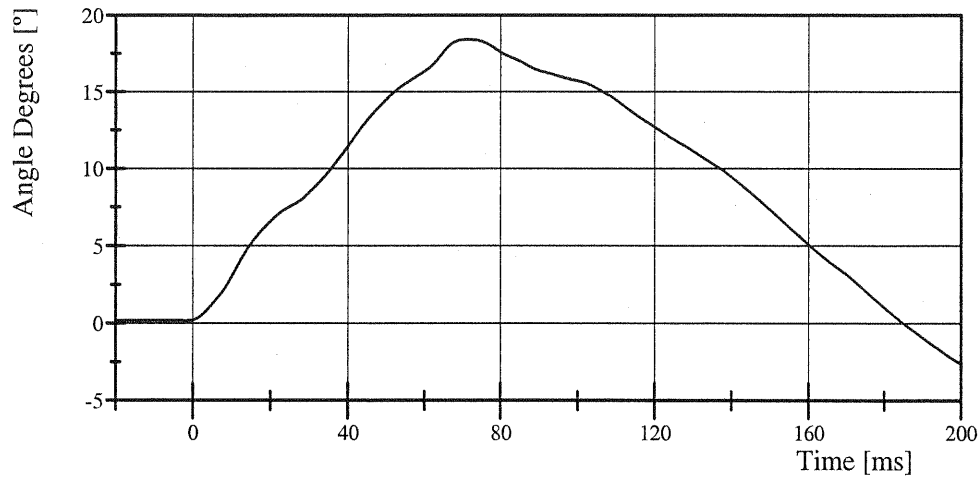
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 10-1

Test Date: 10/29/2007

Forward Pot Rotation at Base of Pendulum

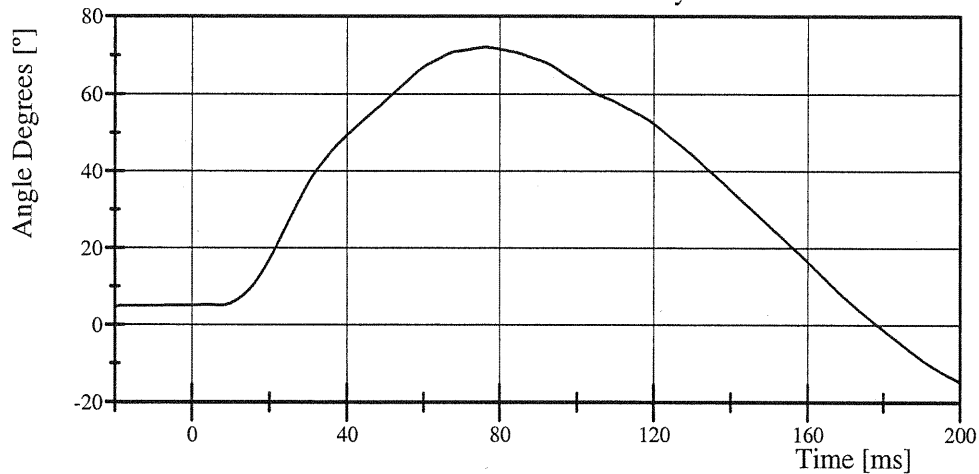


Filter Class: CFC_60

Max: 18.4 ° at 71.4 ms

Min: -2.6 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

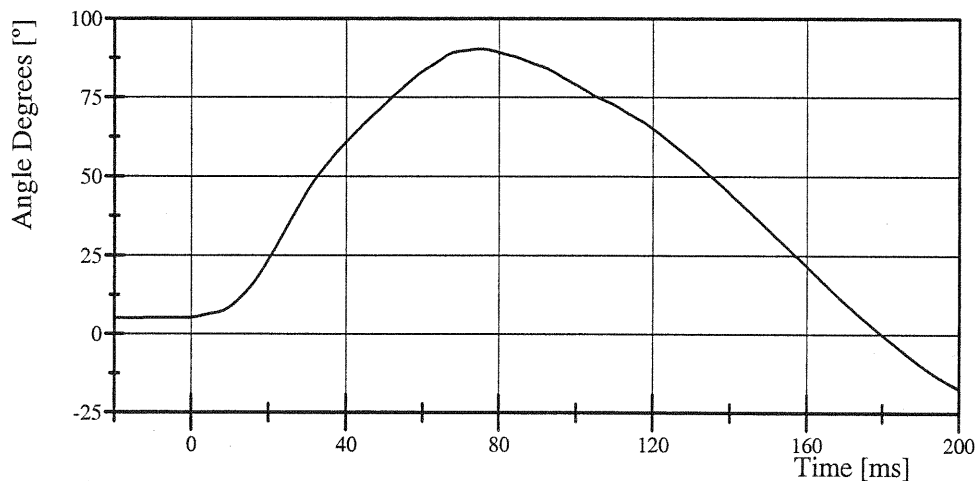


Filter Class: CFC_60

Max: 72.1 ° at 76.2 ms

Min: -14.7 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 90.3 ° at 75.2 ms

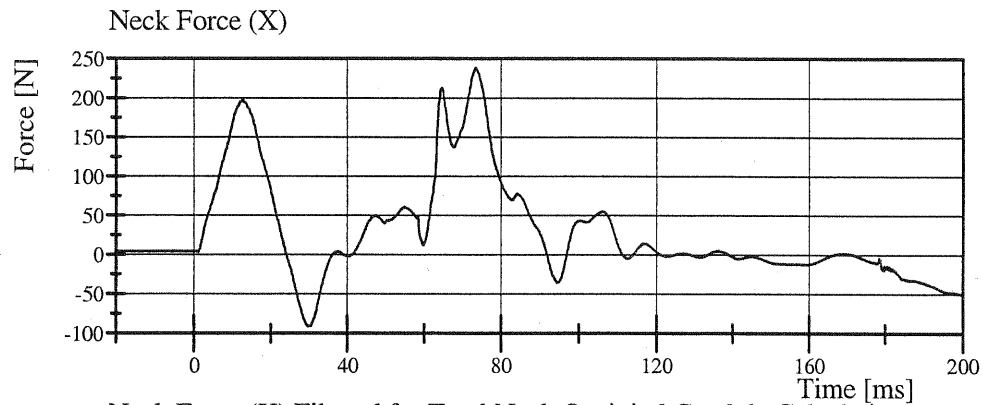
Min: -17.3 ° at 200.0 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 094 Certification No. 10-1

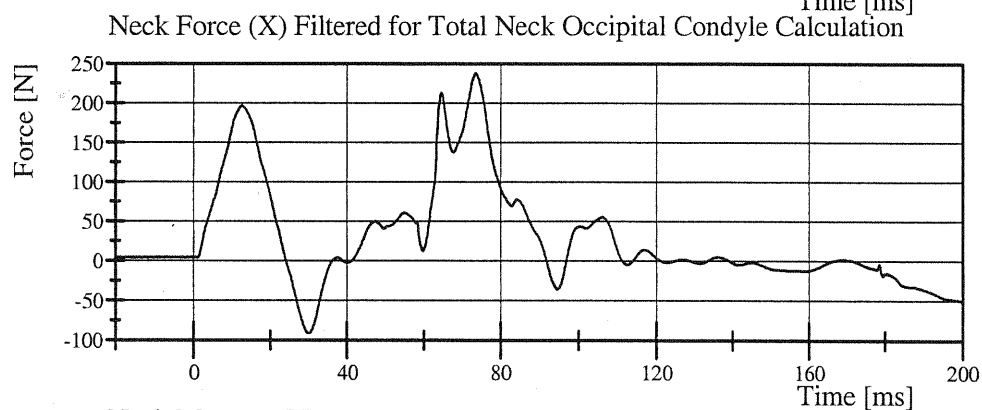
Test Date: 10/29/2007



Filter Class: CFC_1000

Max: 238.7 N at 73.5 ms

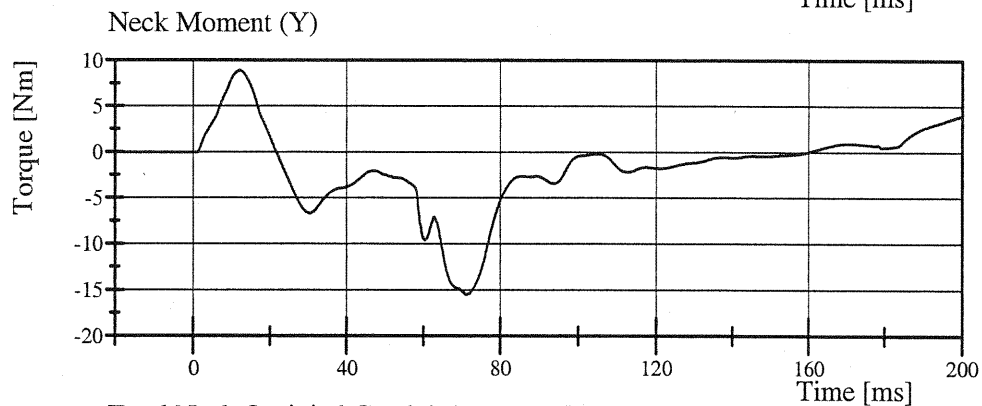
Min: -91.1 N at 29.6 ms



Filter Class: CFC_600

Max: 238.3 N at 73.5 ms

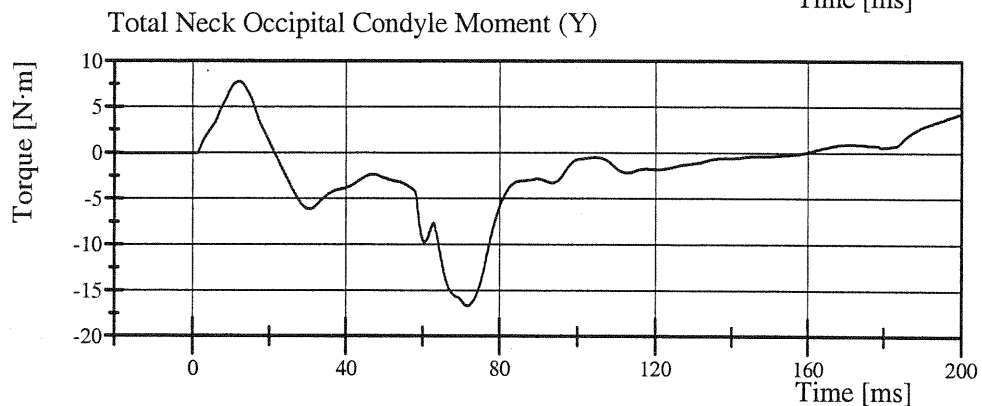
Min: -91.0 N at 29.7 ms



Filter Class: CFC_600

Max: 8.9 Nm at 11.9 ms

Min: -15.5 Nm at 71.2 ms



Filter Class: CFC_600

Max: 7.8 N·m at 11.9 ms

Min: -16.7 N·m at 72.0 ms

Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 094 Certification No. 9-1

Test Date: 10/17/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	61 %	Yes
Impactor Velocity	4.9 - 5.1 m/s	5.06 m/s	Yes
Impactor Force	(-1,514) - (-1,796) N	-1,773.1 N	Yes

Test meets specifications.

Comments:

Technician

Charles W. Hill

Approved

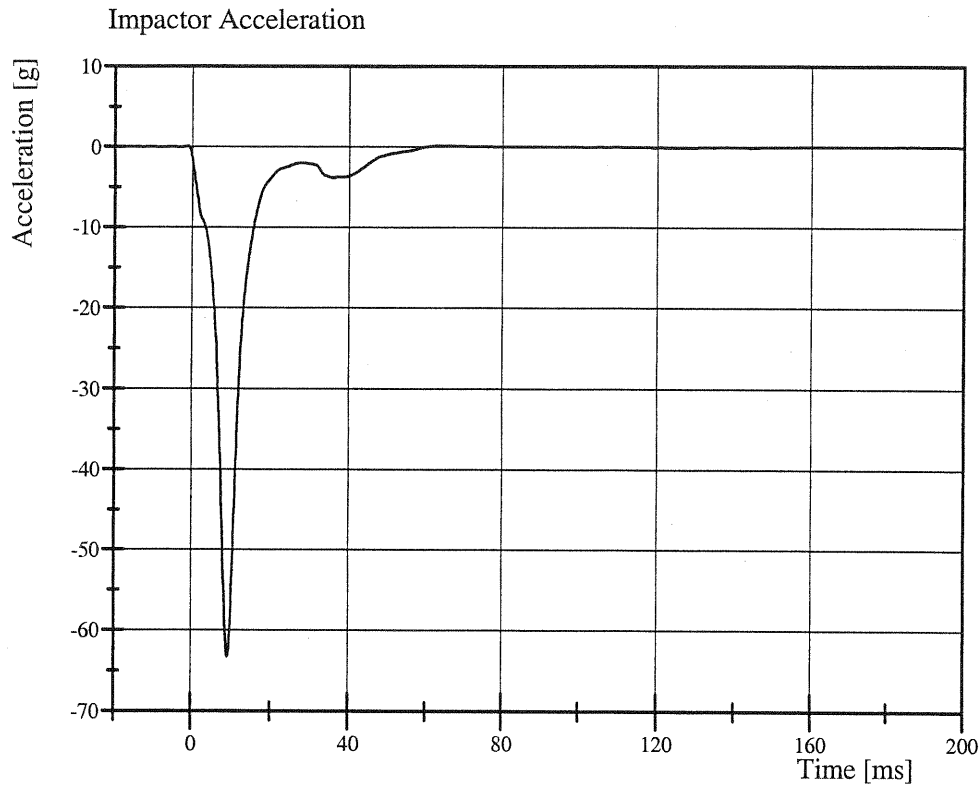
Ron Stoner

Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 094 Certification No. 9-1

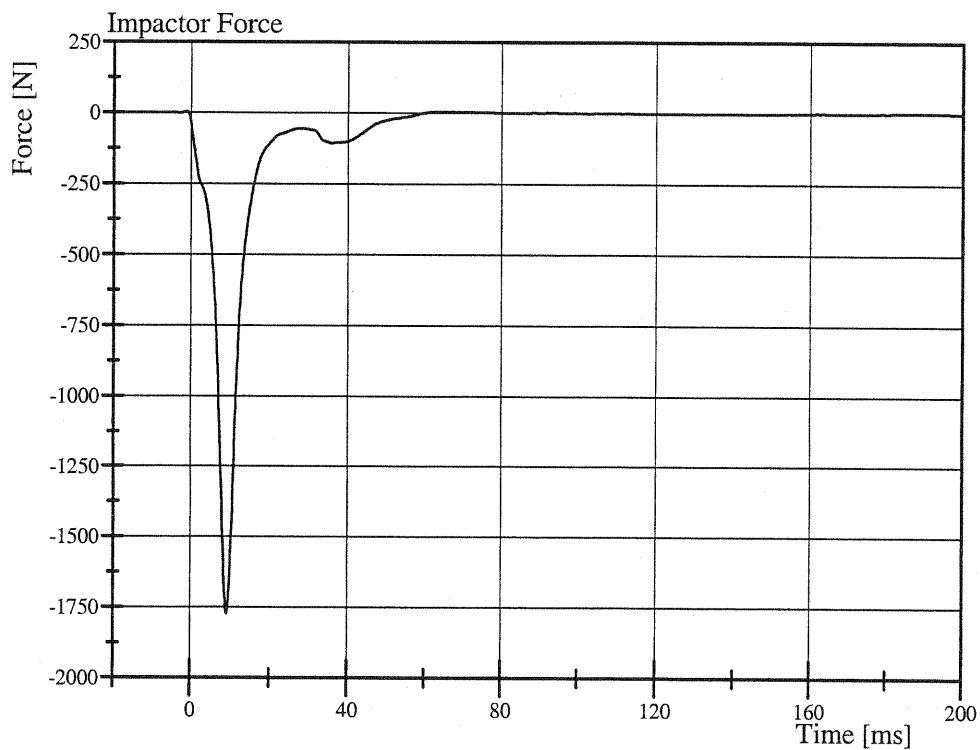
Test Date: 10/17/2007



Filter Class: CFC_180

Max: 0.2 g at 63.9 ms

Min: -63.2 g at 9.2 ms



Filter Class: CFC_180

Max: 4.7 N at 63.9 ms

Min: -1,773.1 N at 9.2 ms