

REPORT NUMBER: NCAP-TRC-2007-002

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

**CHRYSLER LLC
2008 JEEP LIBERTY SPORT 4X4 MPV
NHTSA NUMBER: M80309**

**PREPARED BY:
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Test Date: October 25, 2007

Report Date: November 7, 2007

FINAL REPORT

**PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
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Test Performed By: Jason J. Jenkins, Professional Engineer

Report Approved By: _____



Christopher Krouskop, Project Manager
Transportation Research Center Inc.

Approval Date: _____

11-7-07

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16. Abstract This frontal barrier impact was conducted on a 2008 Jeep Liberty Sport 4x4 MPV at Transportation Research Center Inc. in East Liberty, Ohio, on October 25, 2007. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.5 km/h, and the ambient temperature at the barrier face at the time of impact was 21.1° C. The vehicle's post-test maximum static crush was 428 mm. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows: <table border="0"> <thead> <tr> <th></th> <th><u>Driver ATD</u></th> <th></th> <th><u>Passenger ATD</u></th> <th></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC):</td> <td><u>426</u></td> <td>g</td> <td><u>309</u></td> <td>g</td> </tr> <tr> <td>Max. Thorax Accel (3ms Clip):</td> <td><u>34.4</u></td> <td>g</td> <td><u>33.5</u></td> <td>g</td> </tr> <tr> <td>Left Femur Force:</td> <td><u>-4652</u></td> <td>N</td> <td><u>-2418</u></td> <td>N</td> </tr> <tr> <td>Right Femur Force:</td> <td><u>No valid data</u></td> <td>N</td> <td><u>-3901</u></td> <td>N</td> </tr> </tbody> </table>					<u>Driver ATD</u>		<u>Passenger ATD</u>		Head Injury Criteria (HIC):	<u>426</u>	g	<u>309</u>	g	Max. Thorax Accel (3ms Clip):	<u>34.4</u>	g	<u>33.5</u>	g	Left Femur Force:	<u>-4652</u>	N	<u>-2418</u>	N	Right Femur Force:	<u>No valid data</u>	N	<u>-3901</u>	N
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17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)		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 SUMMARY OF TEST

PURPOSE

This 56.5 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-D-00029. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 56.5 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

SUMMARY

A load cell barrier consisting of 36 load cells was impacted by a 2008 Jeep Liberty Sport 4x4 MPV at a velocity of 56.5 kph. The test was performed at Transportation Research Center, Inc. on October 25, 2007. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

Two (2) Part 572E 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

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

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

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

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

The maximum static crush of the vehicle was 428 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

The occupant data is summarized below.

ATD Position	HIC (36)	Clip (g)	Chest Displ. (mm)	Left Femur (N)	Right Femur (N)
Driver	426	34.4	35	4,652	No valid data
Passenger	309	33.5	35	2,418	3,901

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:

Driver Right Femur Force Z
Bottom of Engine Block X
Driver Seat Belt Webbing Stretch

SECTION 2
OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

DATA SHEET NO. 1

CRASH TEST SUMMARY

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.5
Test Weight	kg	2170.3
Impact Angle	degrees	0
Average Rebound	mm	1032
Maximum Static Crush	mm	428

DOORING OPENING AND SEAT TRACK INFORMATION

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

TEST DUMMY INFORMATION

Description	Driver	Passenger
Dummy Type/Serial No.	50% Male Hybrid III No. 037	50% Male Hybrid III No. 352
Head Contact	Airbag, head restraint	Airbag, head restraint
Chest Contact	Airbag	Airbag
Abdomen Contact	None	None
Left Knee Contact	Knee bolster	Glove box
Right Knee Contact	Knee bolster	Glove box

MOVIE COVERAGE

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

DATA CHANNELS

Driver ATD Sensors	40
Passenger ATD Sensors	40
Belt Assessment Sensors	6
Vehicle Structure Accelerometers	9
Rigid Barrier Load Cells	36
Total	131

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

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07

TEST VEHICLE INFORMATION AND OPTIONS

Make	Jeep	Anti-Lock Brakes	Yes
Model	Liberty Sport	All Wheel Drive	No
Body Style	MPV	Power Steering	Yes
NHTSA No.	M80309	Driver Front Airbag	Yes
VIN	1J8GN28K48W146985	Driver Side Airbag	No
Color	Bright Silver Metallic	Driver Head Airbag	No
Delivery Date	10/08/2007	Driver Curtain Airbag	Yes
Odometer Reading	28 miles	Passenger Airbag	Yes
Dealer	Nelson Auto Group Inc.	Passenger Side Airbag	No
Transmission	Automatic	Passenger Head Airbag	No
Final Drive	Four wheel drive	Passenger Curtain Airbag	Yes
Number of Cylinders	6	Pre-Tensioners	Yes
Engine Displacement	3.7 L	Load Limiters	Yes
Engine Placement	Longitudinal	Bucket Seats	Yes
Roof Rack	Yes	Air Conditioning	Yes
Sunroof/T-Top	Yes	AM/FM CD	Yes
Tinted Glass	Yes	Tilt Steering	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Power Windows	Yes
Front Disc	Yes	Power Seats	No
Rear Disc	Yes	Other	None

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrysler LLC
Date of Manufacture	09/07

GVWR (kg)	2541.0
GAWR Front (kg)	1248.0
GAWR Rear (kg)	1452.0

Measured Parameter	Front	Mid	Rear	Total
Type of Seats	Bucket	N/A	Split Bench	
Number Of Occupants	2	0	3	5
Capacity Wt. (VCW)				430
Cargo Wt. (RCLW) (kg)				90

DATA SHEET NO. 2 (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2008 Jeep Liberty Sport 4x4NHTSA No.: M80309Test Program: NCAP Frontal ImpactTest Date: 10/25/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	505.4	474.4		544.2	563.5	
Right	kg	486.4	436.0		525.0	537.6	
Ratio	%	52.1	47.9		49.3	50.7	
Totals	kg	991.8	910.4	1902.2	1069.2	1101.1	2170.3

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1902.2
Weight of 2 P572M ATDs	kg	172.0
Rated Cargo/Luggage Weight (RCLW)	kg	90.0
Calculated Vehicle Target Weight (TVTW)	kg	2164.2

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	807	814	833	848	1292
As Tested	mm	792	797	815	811	1370
Fully Loaded	mm	798	805	805	817	

GENERAL TEST VEHICLE DATA

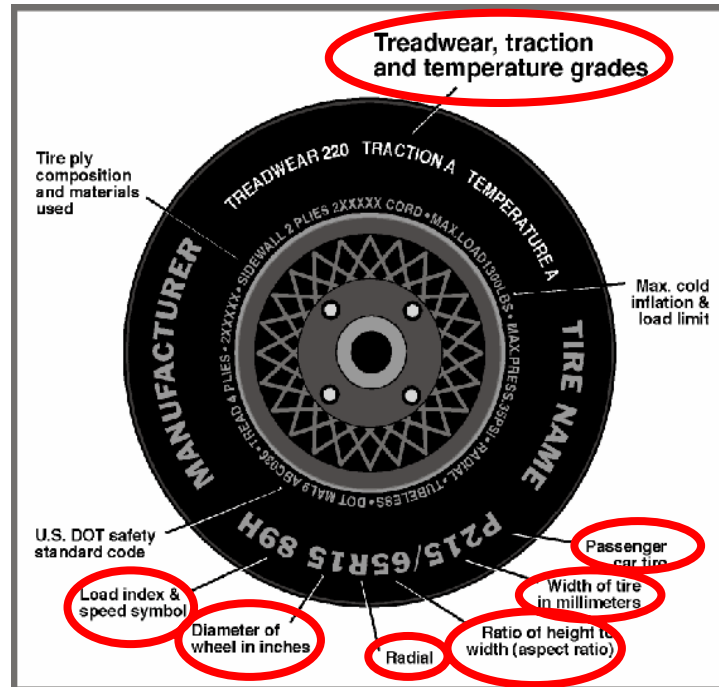
Measurement Description	Units	Value
Test Vehicle Wheelbase	mm	2700
Total Vehicle Length at Left Side	mm	4385
Total Vehicle Length at Centerline	mm	4490
Total Vehicle Length at Right Side	mm	4385
Weight of Ballast in Cargo Area	kg	0
Amount of Stoddard Solvent in Fuel Tank	liters	68.5

DATA SHEET NO. 2 (CONTINUED)

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07



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	Wrangler ST	Wrangler 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	Standard	Standard
Treadwear	340	340
Traction Grade	B	B
Temperature Grade	A	A

DATA SHEET NO. 3

POST-TEST IMPACT DATA

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

SPEED TRAP DATA

Measured Parameter	Units	Requirements	Value
Trap No. 1 Velocity (Primary)	km/h	55.5 to 57.1	56.5
Trap No. 2 Velocity (Redundant)	km/h	55.5 to 57.1	56.5

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4385	4012	373
Center	mm	4490	4062	428
Right Side	mm	4385	4152	233

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1084
Center	mm	1030
Right Side	mm	981
Average	mm	1032

DATA SHEET NO. 4

TEST VEHICLE INFORMATION

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

NORMAL DESIGN RIDING POSITION

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

Driver: Total Number of detents: 24

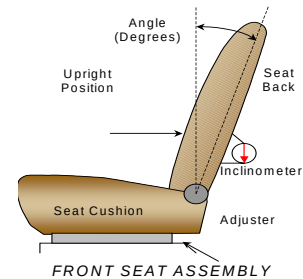
Test detent (with the forward-most detent defined as 0): 13

Passenger: Total Number of detents: 24

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

Driver seat back angle: 23.0° measured at the head restraint post

Passenger seat back angle: 23.0° measured at the head restraint post
post

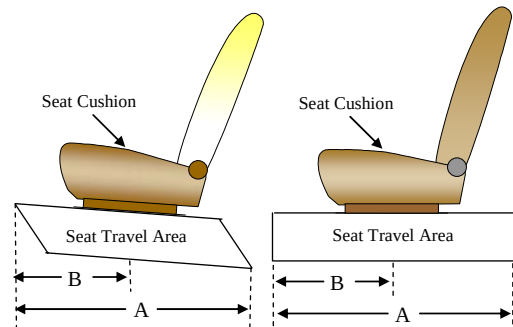


SEAT FORE/AFT POSITIONS

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

SEAT FORE/AFT POSITIONING

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



SEAT BELT UPPER ANCHORAGE

	Total No. of Positions	Placed in Position No.
Driver Seat	5	3
Pass. Seat	5	3

Position number one is the uppermost adjustment position.

DATA SHEET NO. 4 (CONTINUED)

TEST VEHICLE INFORMATION

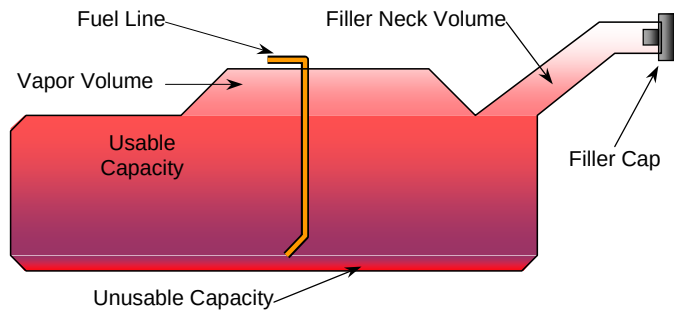
Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

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

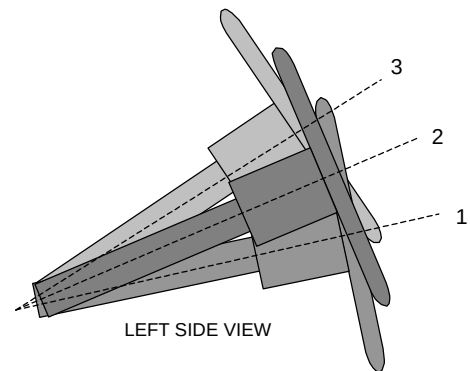
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies 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	20.0°	N/A
Geometric Center Position	23.0°	N/A
Uppermost Position	26.0°	N/A

DATA SHEET NO. 5

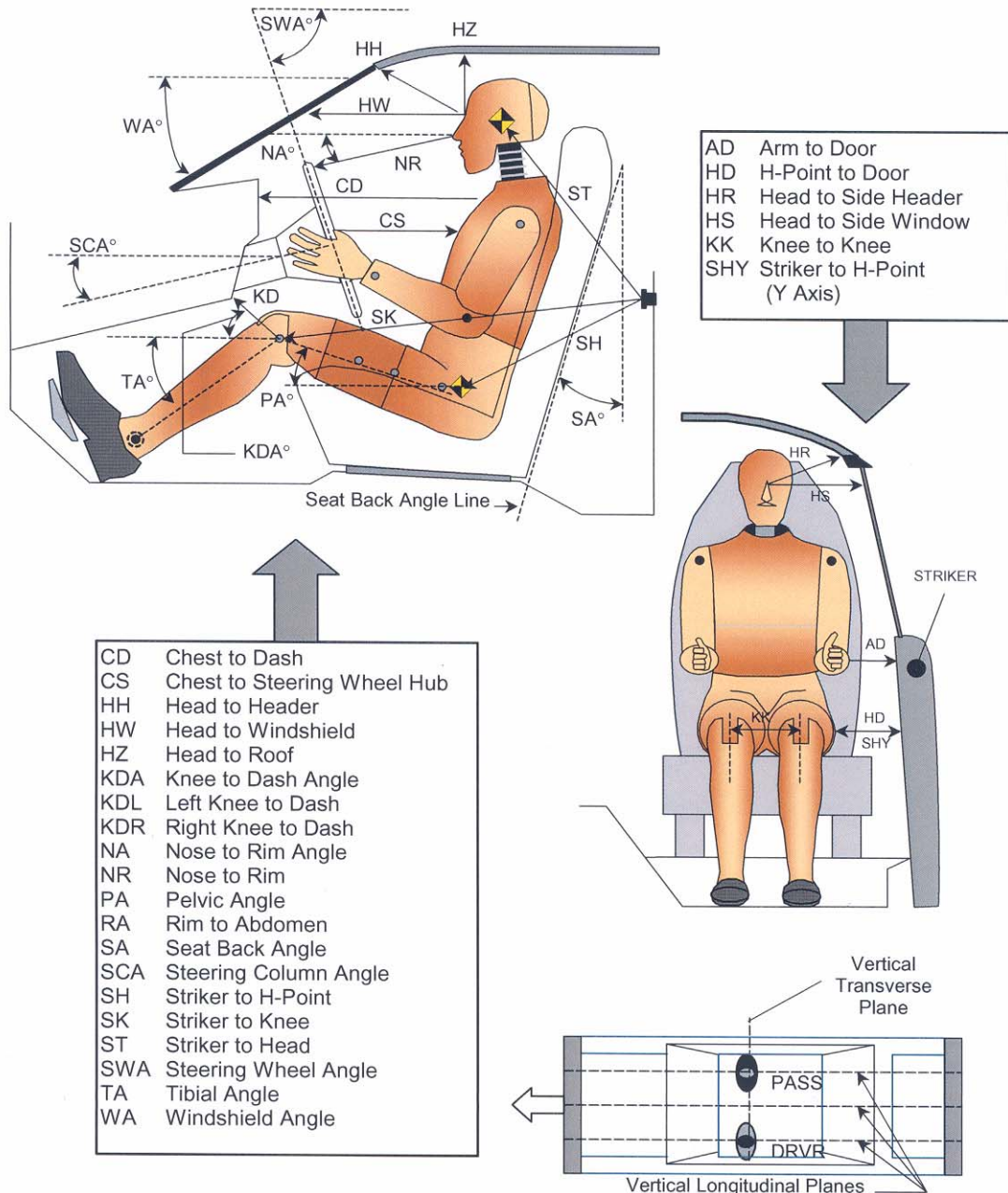
FRONT SEAT DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Jeep Liberty Sport 4x4

NHTSA No.: M80309

Test Program: NCAP Frontal Impact

Test Date: 10/25/07



DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

DATA SHEET NO. 5 (CONTINUED)

FRONT SEAT DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07

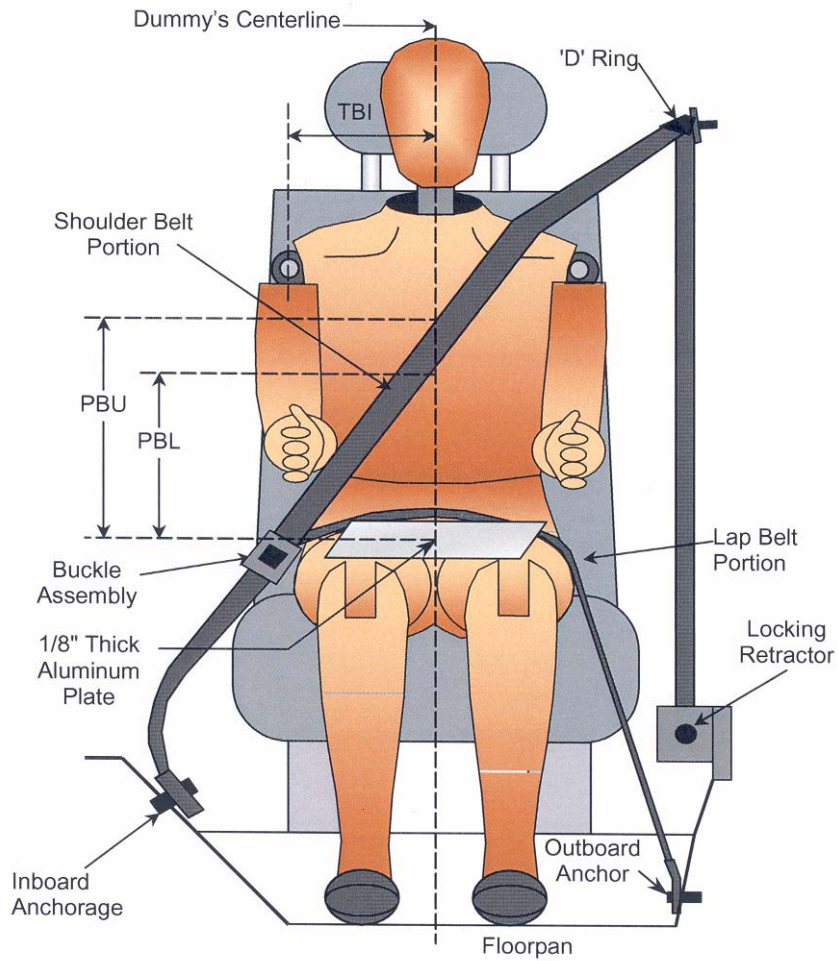
Code	Measurement Description	Driver S/N 037		Passenger S/N 352	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		43.5		
SWA	Steering Wheel Angle		66.9		
SCA	Steering Column Angle		23.1		
SA	Seat Back Angle		23.0		23.0
HZ	Head to Roof	205		195	
HW	Head to Windshield	551		558	
HH	Head to Header	423		405	
HR	Head to Side Header	205		205	
NR	Nose to Rim	393	12.6		
CD	Chest to Dash	554		470	
KDL	Left Knee to Dash	130	0	140	
KDR	Right Knee to Dash	132		140	8.2
PA	Pelvis Angle		24.1		21.8
TA	Tibia Angle		57.4		57.7
KK	Knee to Knee	278		270	
ST	Striker to Head	530	-83.0	550	-78.7
SK	Striker to Knee	675	0	630	3.8
SH	Striker to H-Point	271	27.7	268	28.8
SHY	Striker to H-Point (Y)	180		212	
HS	Head to Side Window	280		356	
HD	H-Point to Door	98		105	
AD	Arm to Door	92		108	

DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07



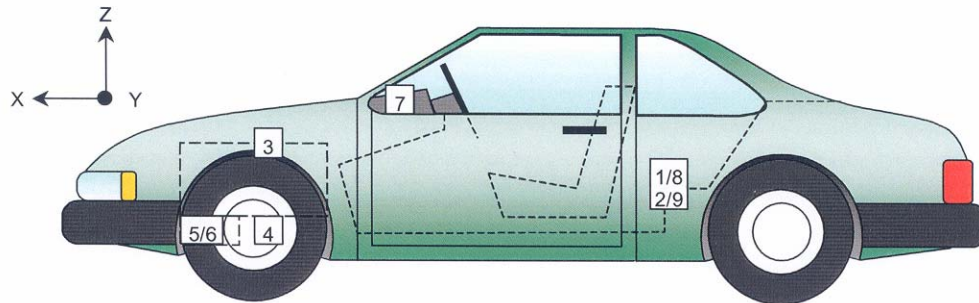
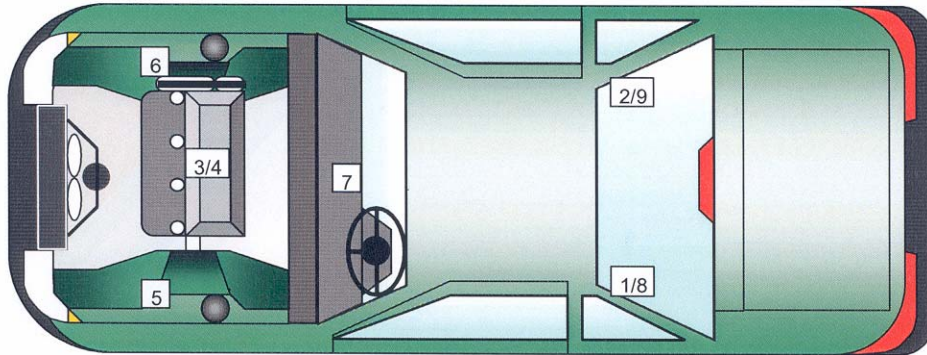
Measurement Parameter	Units	Driver S/N 037	Passenger S/N 352
PBU - Top surface of aluminum plate to belt upper edge	mm	315	340
PBL - Top surface of aluminum plate to belt lower edge	mm	237	250
Lap Belt Tension	N	N/A	N/A
Shoulder Belt Tension	N	N/A	N/A

DATA SHEET NO. 7

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Seat Crossmember	2343	590	400
2	Right Rear Seat Crossmember	2343	600	427
3	Top of Engine	4290	15	939
4	Bottom of Engine	4095	10	248
5	Left Brake Caliper	4225	668	315
6	Right Brake Caliper	4225	668	315
7	Instrument Panel	3600	0	1235
8	Left Rear Seat Crossmember	2343	590	400
18	Right Rear Seat Crossmember	2343	600	427

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

DATA SHEET NO. 8

SEAT BELT ASSESSMENT TEST DATA

Test Vehicle: 2008 Jeep Liberty Sport 4x4 NHTSA No.: M80309
Test Program: NCAP Frontal Impact Test Date: 10/25/07

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
Shoulder Belt length as measured on ATD	mm	850	850
Lap Belt length as measured on ATD	mm	590	598
Shoulder Belt spool-off	mm	N/A	N/A
Total belt length for continuous webbing systems	mm	2286	2291

DATA SHEET NO. 9

SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

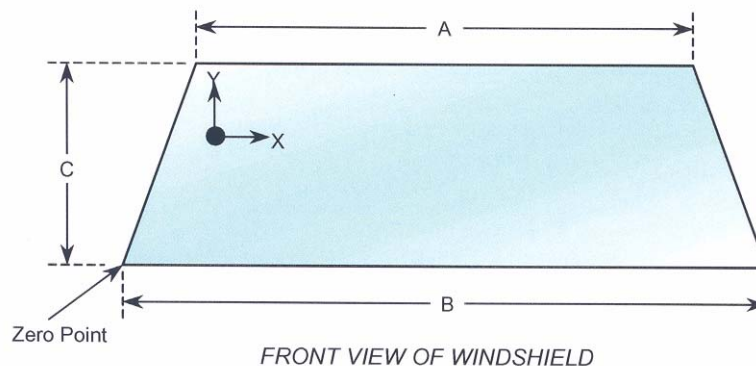
NHTSA No.: M80309
Test Date: 10/25/07

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

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

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2680.5	2680.5	100.0
Right Side	2680.5	2680.5	100.0
Total	5361	5361	100.0



WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1333	N/A
B	mm	1555	27
C-Left	mm	570	17
C-Right	mm	570	17

DATA SHEET NO. 10

WINDSHIELD ZONE INTRUSION FMVSS 214 (PARTIAL)

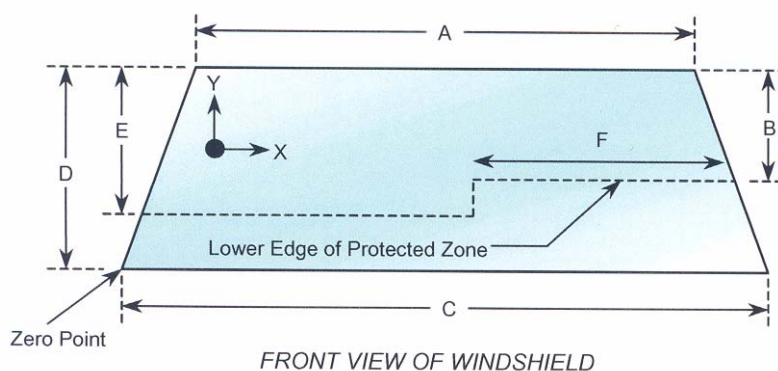
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Test Date: 10/25/07

Protected Zone Lower Edge Requirement

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

FMVSS 219 Test Data



WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	1333
B	mm	415
C	mm	1555
D	mm	570
E	mm	435
F	mm	520

Details of Windshield Glass Penetration Greater Than 6 mm: None

DATA SHEET NO. 11

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2008 Jeep Liberty Sport 4x4 NHTSA No.: M80309
Test Program: NCAP Frontal Impact Test Date: 10/25/07

Temperature at Time of Impact: 21.1° C Test Time: 19:53

Stoddard Solvent Spillage Measurements

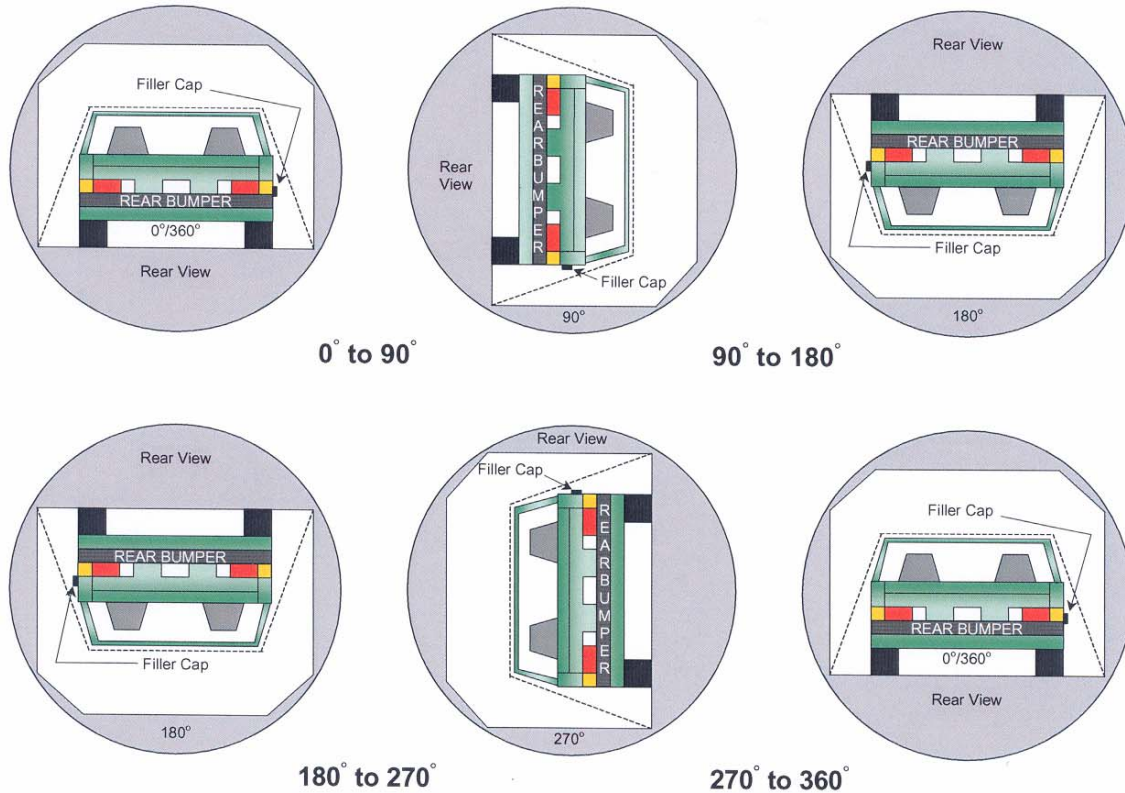
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0
(Maximum allowable = 5 ounces)
- C. For the following 25 minutes: 0
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

DATA SHEET NO. 12

FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07



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

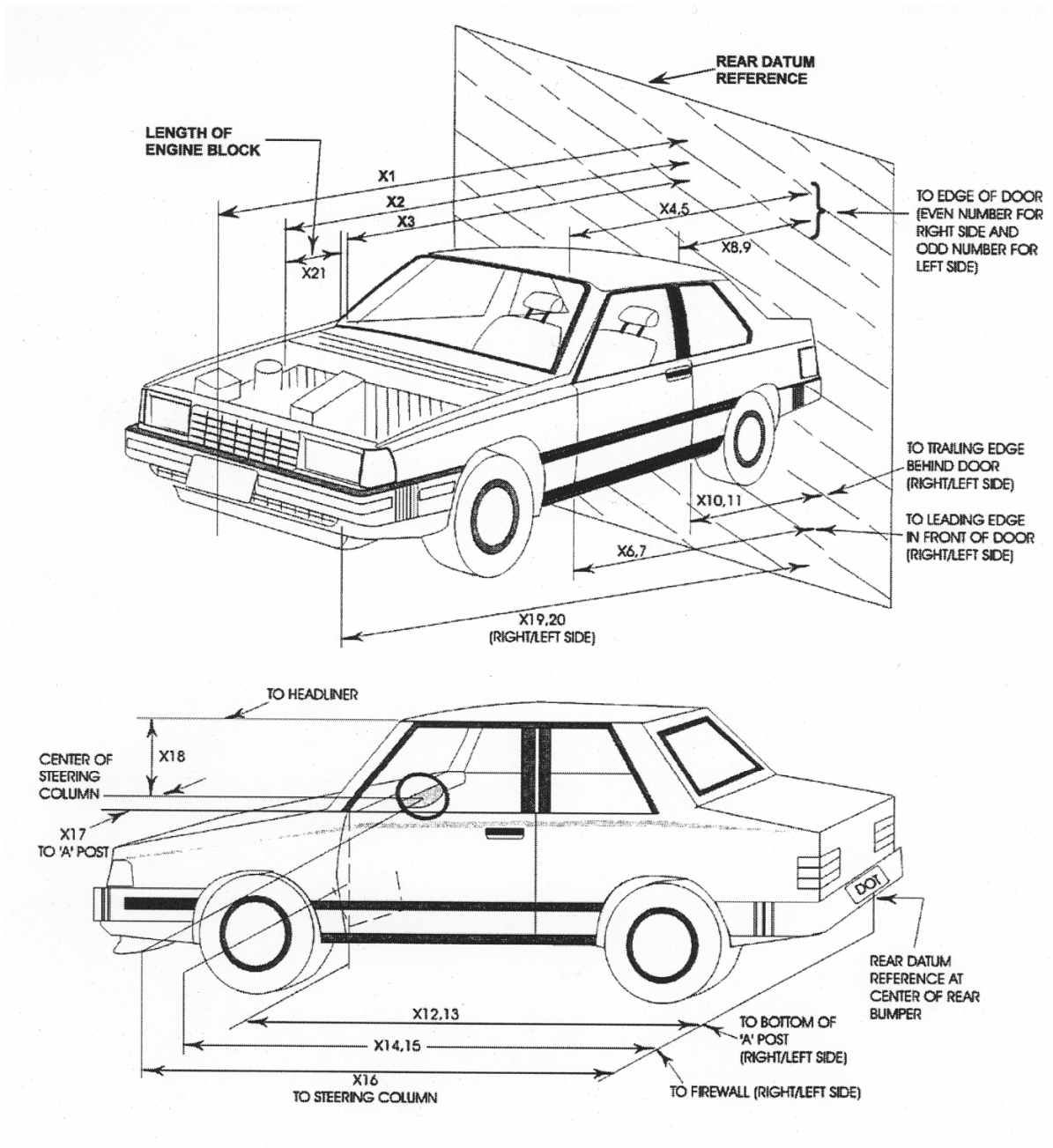
DETAILS OF STODDARD SOLVENT SPILLAGE LOCATIONS

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

DATA SHEET NO. 13
VEHICLE MEASUREMENTS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07



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

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

VEHICLE MEASUREMENT TABLE

No.	Measurement Description	Pre-Test	Post-Test	Difference
X1	Total length of vehicle at centerline	4490	4062	428
X2	RSOV to front of engine block	3868	--- ¹	--- ¹
X3	RSOV to firewall	3380	3258	122
X4	RSOV to upper leading edge of right door	3073	3076	-3
X5	RSOV to upper leading edge of left door	3070	3080	-10
X6	RSOV to lower leading edge of right door	3073	3016	57
X7	RSOV to lower leading edge of left door	3068	3030	38
X8	RSOV to upper trailing edge of right door	2060	2062	-2
X9	RSOV to upper trailing edge of left door	2055	2073	-18
X10	RSOV to lower trailing edge of right door	2073	2014	59
X11	RSOV to lower trailing edge of left door	2070	2034	36
X12	RSOV to bottom a "A" post on right side	3035	3031	4
X13	RSOV to bottom a "A" post on left side	3040	3032	8
X14	RSOV to firewall on right side	3435	3318	117
X15	RSOV to firewall on left side	3420	3462	-42
X16	RSOV to steering wheel center	2660	2675	-15
X17	Center of steering column to "A" post	355	348	7
X18	Center of steering column to headliner	470	362	108
X19	RSOV to right side of front bumper	4385	4152	233
X20	RSOV to left side of front bumper	4385	4012	373
X21	Length of engine block	500	500	0
RD	RSOV to right side of dash panel	2915	2916	-1
CD	RSOV to center of dash panel	2850	2870	-20
LD	RSOV to left side of dash panel	2905	2915	-10

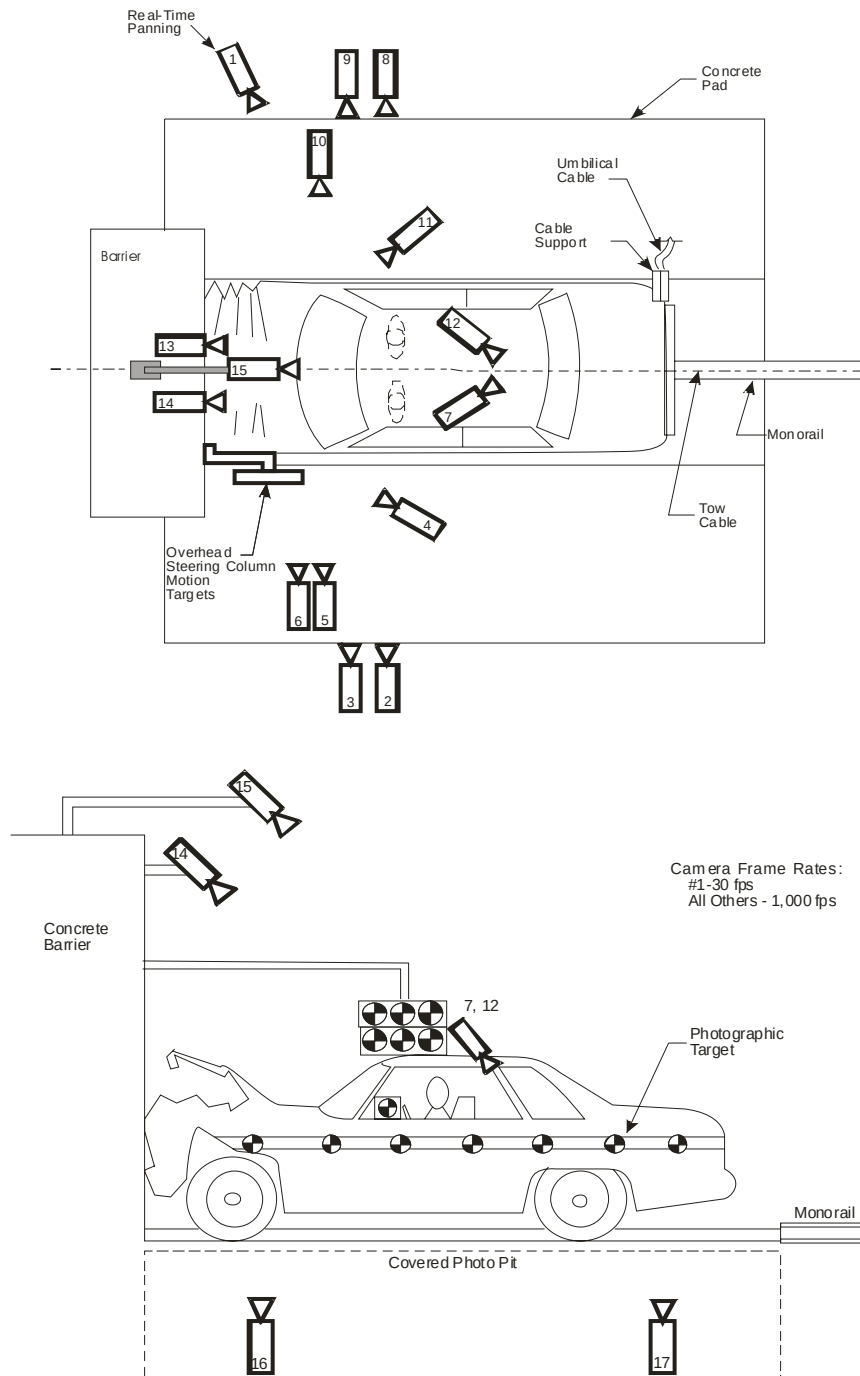
¹ Measurement not recorded.

DATA SHEET NO. 14

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07



DATA SHEET NO. 14 (CONTINUED)**HIGH SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

VEHICLE CAMERA MEASUREMENT TABLE

No.	Camera View	Location (mm)			Angle (deg)	Film Plane to Head	Lens (mm)	Speed (fsp)
		X	Y	Z				
1	Real-time (Panning)						Zoom	30
2	Overall Left Side	1980	4800	960	0.9	4330	12.5	1000
3	Left Side View	610	4650	995	3.8	4470	25	1000
4	Driver and Interior View	4030	2680	1595	8.1	2910	25	1000
5	Steering Column Bottom	1500	6030	1260	1.5	5620	25	1000
6	Steering Column Top	1720	6630	2120	9.6	6150	25	1000
7	Onboard at Right Rear Dummy	2650	800	1500	19.4	400	6.5	1000
8	Overall Right Side	2240	5650	1220	1.5	4100	12.5	1000
9	Right Side View	1070	420	975	2.1	4430	25	1000
10	Right Passenger View	1320	5420	1310	0.6	5100	50	1000
11	Passenger and Interior View	4850	3300	1980	9.0	3920	25	1000
12	Onboard at Left Rear Dummy	2680	800	1500	19.9	500	6.5	1000
13	Passenger Front View	0	2330	2120	39.1	2300	12.5	1000
14	Driver Front View	0	2330	2120	34.4	2300	12.5	1000
15	Windshield View	0	2330	2120	42.5	2300	6.5	1000
16	Pit View of Engine	550	0	3340	90.0	4810	25	1000
17	Pit View of Fuel Tank	3090	0	3340	90.0	4810	12.5	1000

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

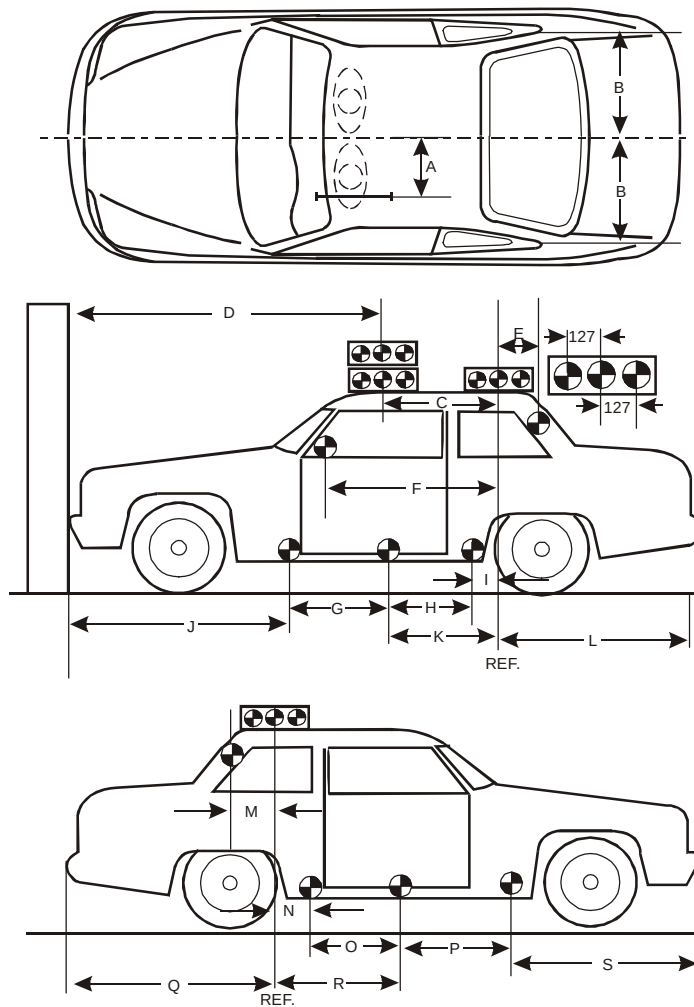
DATA SHEET NO. 15

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07

All Dimensions in (mm)	
Item	Value
A	540
B	675
C	610
D	---
E	620
F	1100
G	830
H	845
I	2155
J	5012
K	3002
L	2370
M	1765
N	2155
O	855
P	825
Q	2315
R	3010
S	5012



¹ Measurement not recorded.

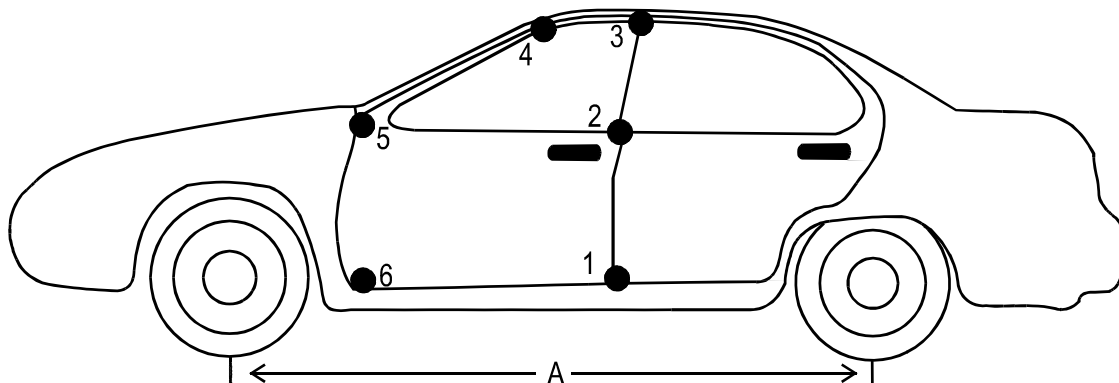
DATA SHEET NO. 16

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07

DOOR OPENING WIDTH



Driver Side

Point Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2198	-775	174	2198	-774	173	0	1	-1
2	2094	-755	-157	2093	-754	-158	-1	1	-1
3	2081	-685	-914	2081	-684	-915	0	1	-1
4	2598	-706	-838	2597	-706	-841	-1	0	-3
5	3047	-746	-149	3045	-746	-149	-2	0	0
6	3031	-756	196	3029	-756	195	-2	0	-1

Passenger Side

Point Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
1	3024	761	197	3021	766	196	-3	5	-1
2	2095	762	-158	2093	763	-158	-2	1	0
3	2601	705	-845	2601	705	-847	0	0	-2
4	2080	685	-925	2079	685	-925	-1	0	0
5	3048	747	-133	3046	750	-135	-2	3	-2
6	2196	782	161	2194	783	160	-2	1	-1

Units (mm)	A = Wheelbase Left	A = Wheelbase Right
Before Test	2700	2700
After Test	2614	2640
Difference	86	60

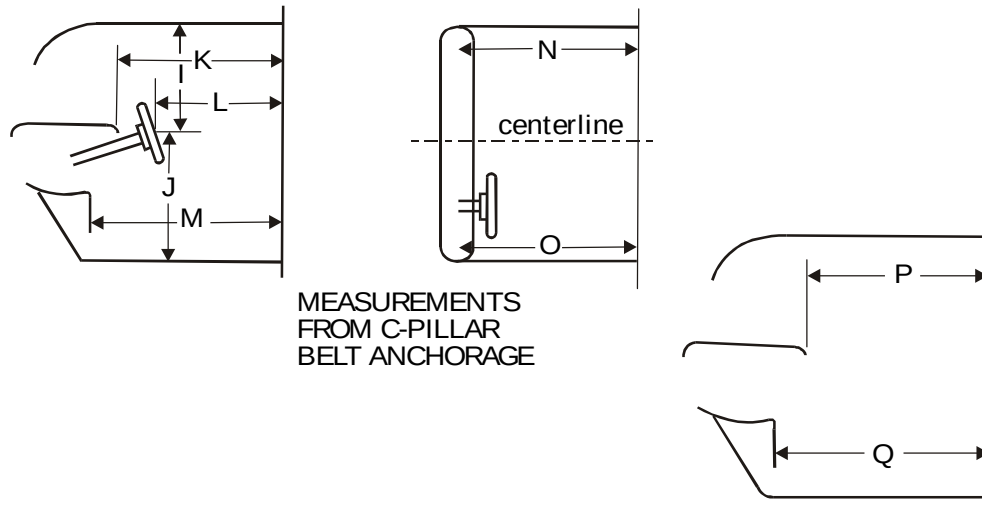
DATA SHEET NO. 16 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07

STATIC PASSENGER COMPARTMENT INTRUSION



Measurement	Pre-Test	Post-Test	Difference
I	470	390	80
J	630	750	-120
K	1773	1792	-19
L	1560	1552	8
M	1855	1825	30
N	1825	--- ¹	--- ¹
O	1770	1783	-13
P = K (PASS.)	1765	1780	-15
Q = M (PASS.)	1838	1811	27

All units in millimeters

¹ Measurement not recorded.

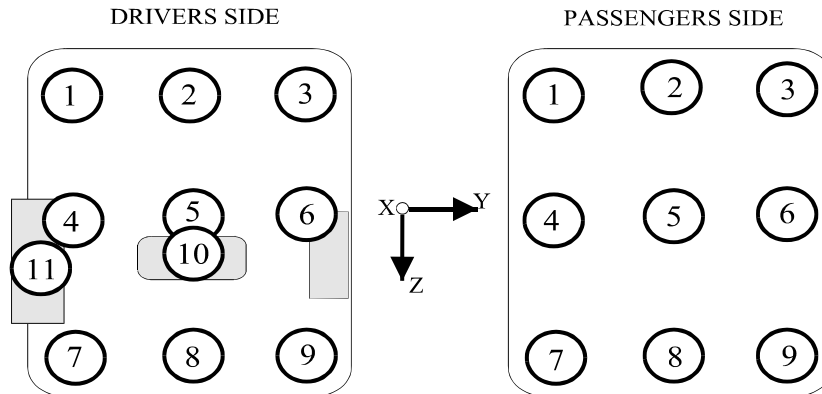
DATA SHEET NO. 16 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07

TOE PAN FLOORBOARD INTRUSION



Driver Side Toe Pan and Floorboard Measurements

Floorpan Location	X Deformation			Z Deformation		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	3323	3320	-3	186	182	-4
2	3314	3283	-31	196	180	-16
3	3289	3272	-17	194	179	-15
4	3252	3252	0	251	251	0
5	3254	3248	-6	240	236	-4
6	3225	3221	-4	245	245	0
7	3151	3151	0	305	303	-2
8	3130	3128	-2	304	307	3
9	3120	3119	-1	290	296	6
10	3118	3089	-29	122	113	-9
11	0	0	0	0	0	0

Passenger Side Toe Pan and Floorboard Measurements

Floorpan Location	X Deformation			Z Deformation		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	3291	3278	-13	180	169	-11
2	3331	3299	-32	173	163	-10
3	3326	3321	-5	162	160	-2
4	3239	3232	-7	244	238	-6
5	3257	3250	-7	233	229	-4
6	3270	3263	-7	232	227	-5
7	3133	3131	-2	295	297	2
8	3144	3141	-3	296	297	1
9	3144	3143	-1	297	296	-1

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

DATA SHEET NO. 16 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07

Bottom of Front Bumper

Pre-Test				Post-Test			Difference		
Index	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm
1	4381	-703	251	4097	-755	88	-284	-52	-163
2	4476	-387	222	4072	-428	101	-404	-41	-121
3	4488	-141	221	4118	-187	120	-370	-46	-101
4	4489	144	220	4179	91	145	-310	-53	-75
5	4477	385	215	4224	326	163	-253	-59	-52
6	4382	702	244	4207	656	220	-175	-46	-24

Top of Front Bumper

Pre-Test				Post-Test			Difference ¹		
Index	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm
1	4384	-704	105	4061	-735	-53	-323	-31	-158
2	4474	-387	113	4082	-420	-9	-392	-33	-122
3	4492	-141	114	4148	-183	17	-344	-42	-97
4	4492	143	114	4196	96	41	-296	-47	-73
5	4475	382	113	4218	334	58	-257	-48	-55
6	4386	703	98	4220	669	74	-166	-34	-24

Center of Grill

Pre-Test				Post-Test			Difference		
Index	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm
1	4225	-689	-102	3899	-719	-229	-326	-30	-127
2	4312	-389	-105	4020	-377	-301	-292	12	-196
3	4333	-143	-108	4002	-130	-302	-331	13	-194
4	4333	140	-109	3989	151	-304	-344	11	-195
5	4312	386	-115	3981	398	-312	-331	12	-197
6	4227	682	-111	3905	668	-218	-322	-14	-107

Front of Hood

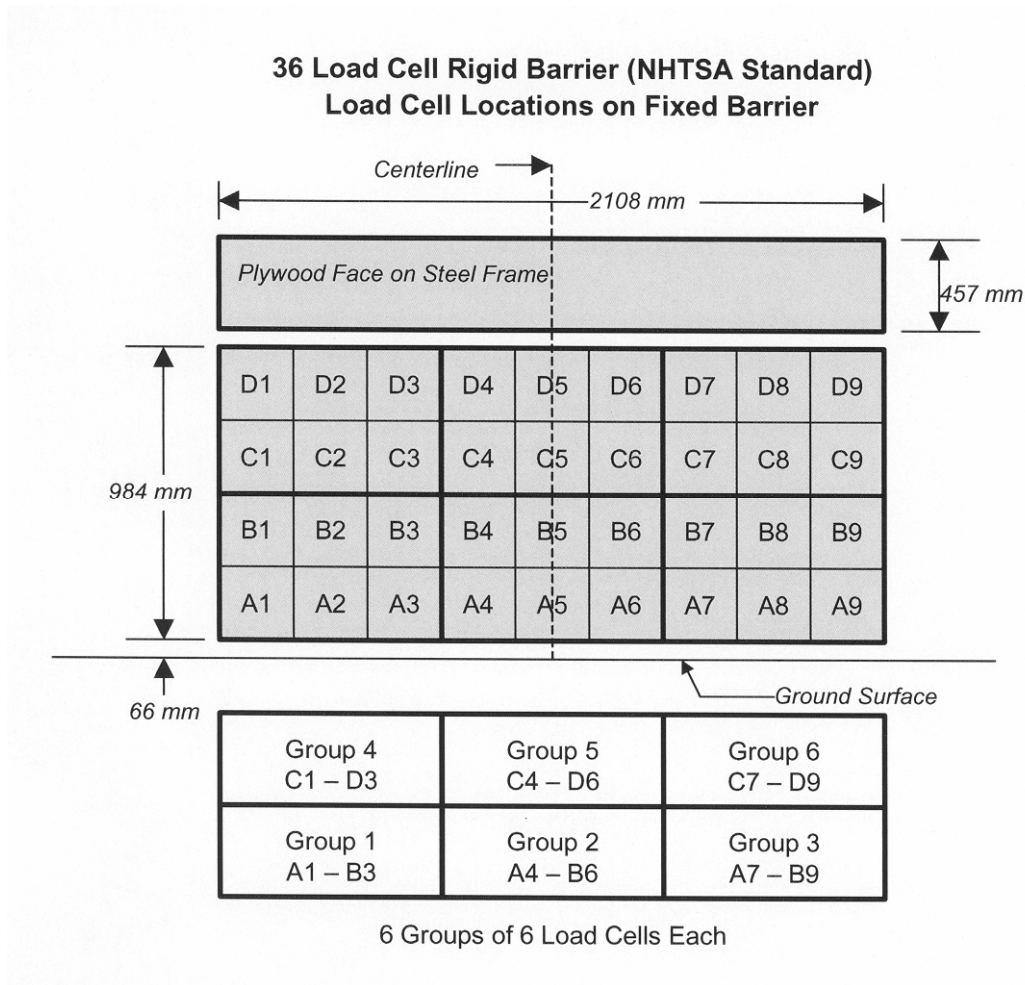
Pre-Test				Post-Test			Difference		
Index	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm	X, mm	Y, mm	Z, mm
1	4211	-705	-259	3902	-712	-587	-309	-7	-328
2	4293	-388	-280	3938	-390	-505	-355	-2	-225
3	4320	-141	-284	3936	-142	-489	-384	-1	-205
4	4320	143	-285	3926	140	-488	-394	-3	-203
5	4294	383	-285	3911	380	-503	-383	-3	-218
6	4212	701	-268	3889	708	-576	-323	7	-308

DATA SHEET NO. 17

FIXED BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07



The following data is presented in Appendix B:

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

DATA SHEET NO. 18

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2008 Jeep Liberty Sport 4x4
 Test Program: NCAP Frontal Impact

NHTSA No.: M80309
 Test Date: 10/25/07

FOR FRONTAL BARRIER IMPACT

NHTSA Test No.: M80309 VIN: 1J8GN28K48W146985

Model Year: 2008 Build Date: 09/07 Test Date: 10/25/07

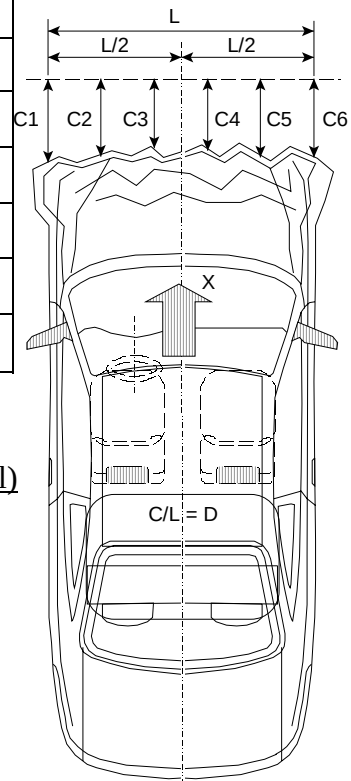
Vehicle Size Category: MVP Test Weight: 2170.3 kg

Vehicle Wheelbase: 2700 mm; Front Overhang: 770 mm; Overall Width: 1828 mm

Collision Deformation Classification (CDC) Code: 12FDEW2

Crush Depth Dimensions with Bumper

	PRE-TEST	POST-TEST	DIFFERENCE	
C1 =	4385	4012	373	mm
C2 =	4476	4073	403	mm
C3 =	4488	4117	371	mm
C4 =	4489	4179	310	mm
C5 =	4476	4218	258	mm
C6 =	4385	4152	233	mm



Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

Length of Damaged Region

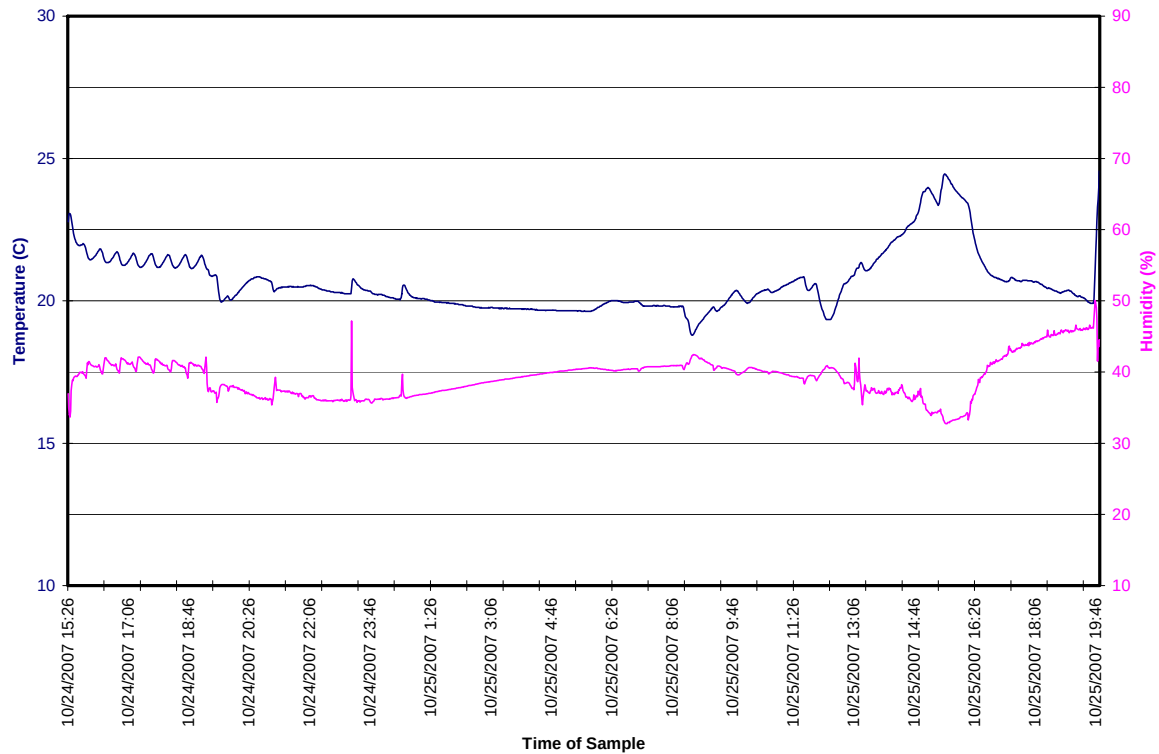
L1	=	1828	mm
L2	=	914	mm
L3	=	914	mm

DATA SHEET NO. 19

DUMMY / VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07



APPENDIX A
PHOTOGRAPHS

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Figure A-1 Pre-Test Front View

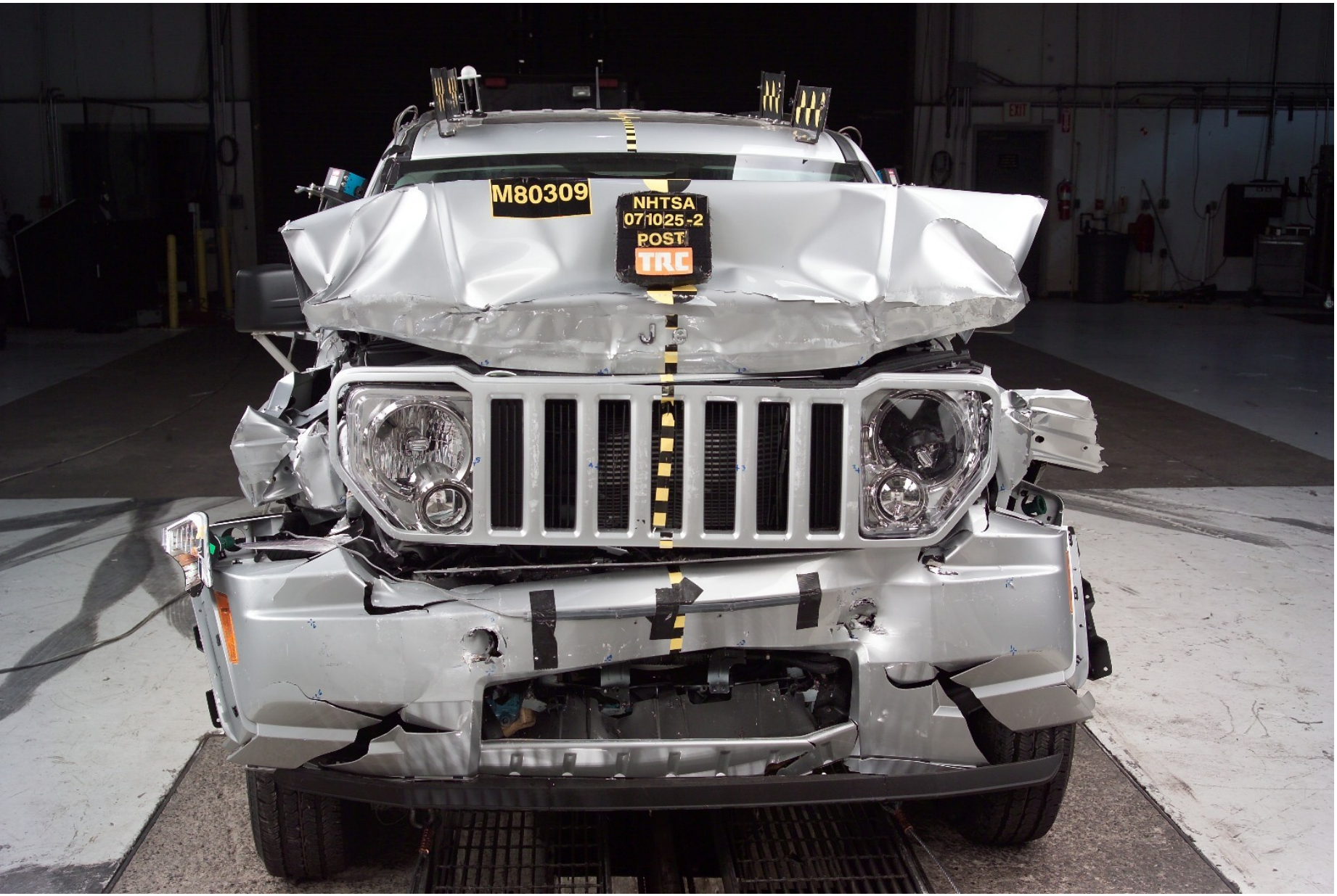


Figure A-2 Post-Test Front View



Figure A-3 Pre-Test Left Front View



Figure A-4 Post-Test Left Front View



Figure A-5 Pre-Test Left Side View



Figure A-6 Post-Test Left Side View

A-10

071025-2



Figure A-7 Pre-Test Left Rear View

A-11

071025-2



Figure A-8 Post-Test Left Rear View



Figure A-9 Pre-Test Rear View

A-13

071025-2



Figure A-10 Post-Test Rear View

A-14

071025-2



Figure A-11 Pre-Test Right Rear View

A-15

071025-2



Figure A-12 Post-Test Right Rear View

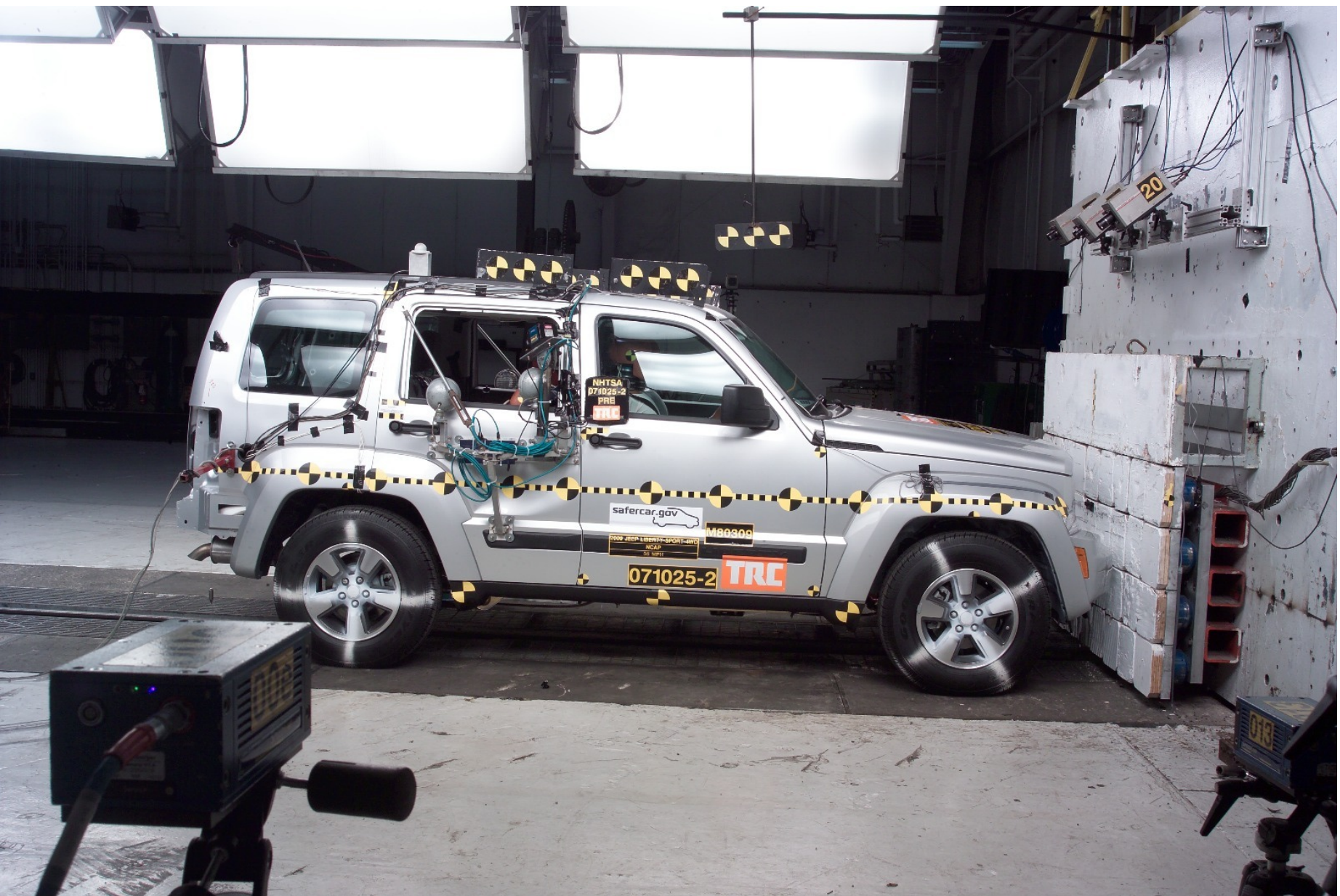


Figure A-13 Pre-Test Right Side View



Figure A-14 Post-Test Right Side View



Figure A-15 Pre-Test Right Front View



Figure A-16 Post-Test Right Front View



Figure A-17 Pre-Test Overhead View

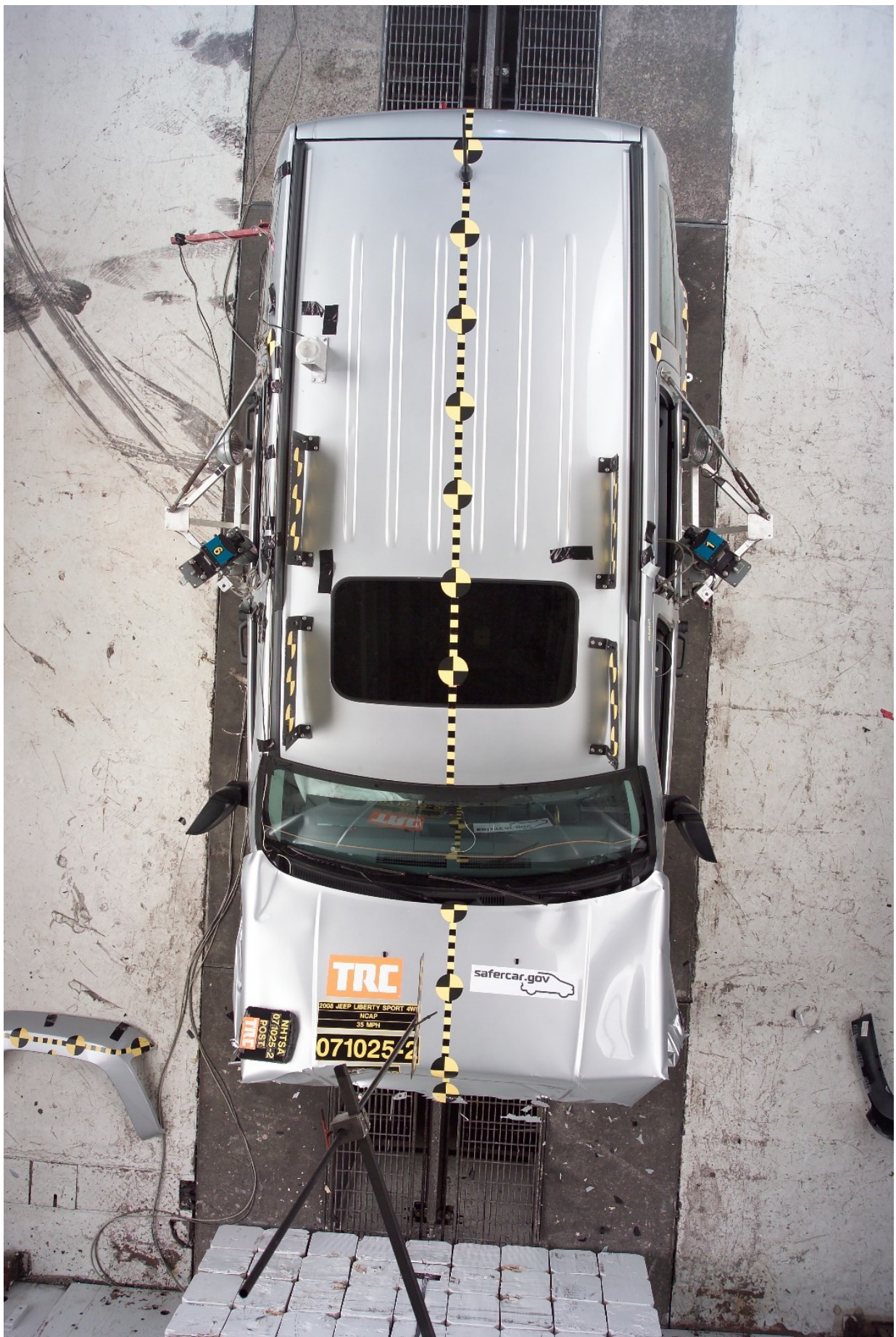


Figure A-18 Post-Test Overhead View

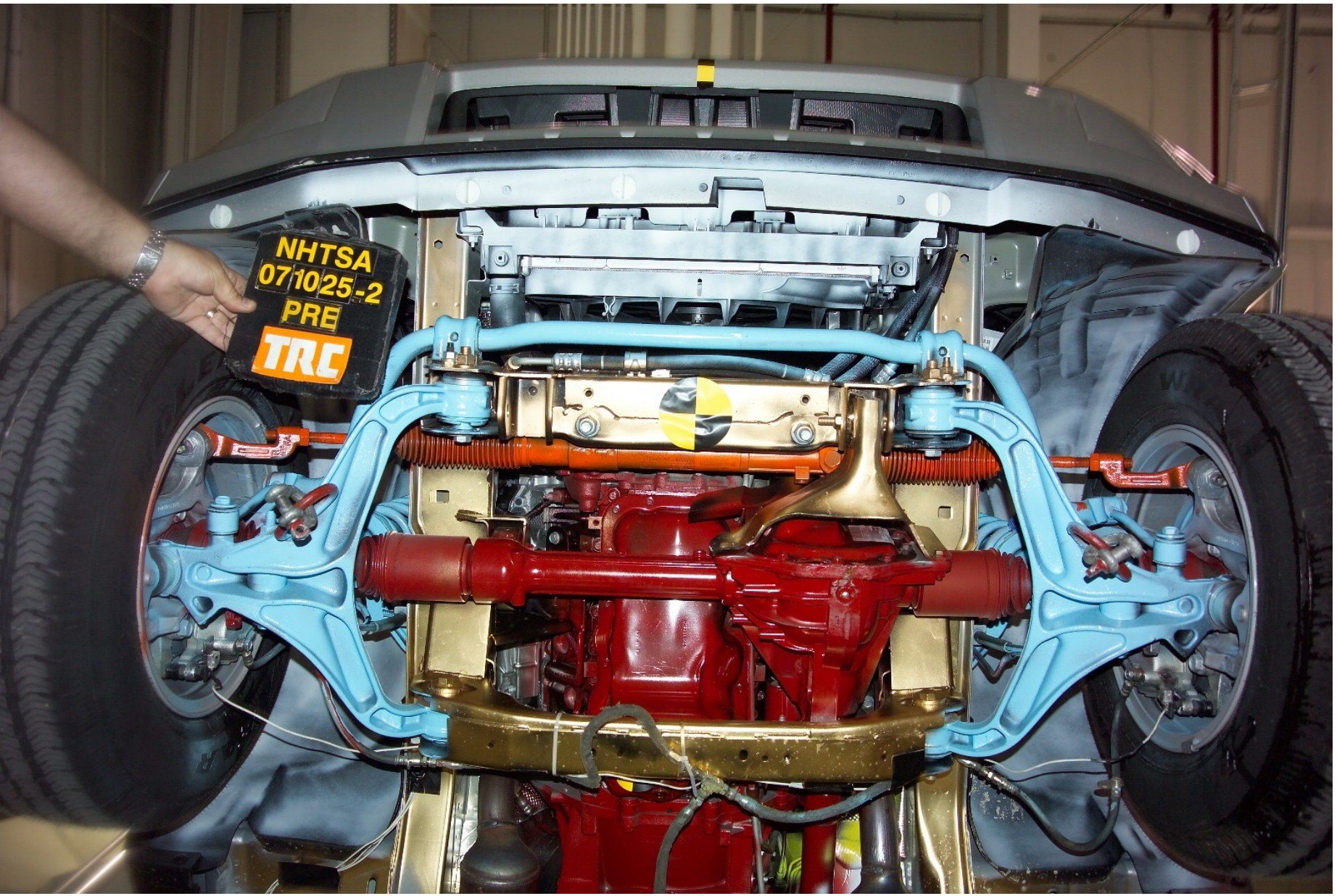


Figure A-19 Pre-Test Front Underbody View

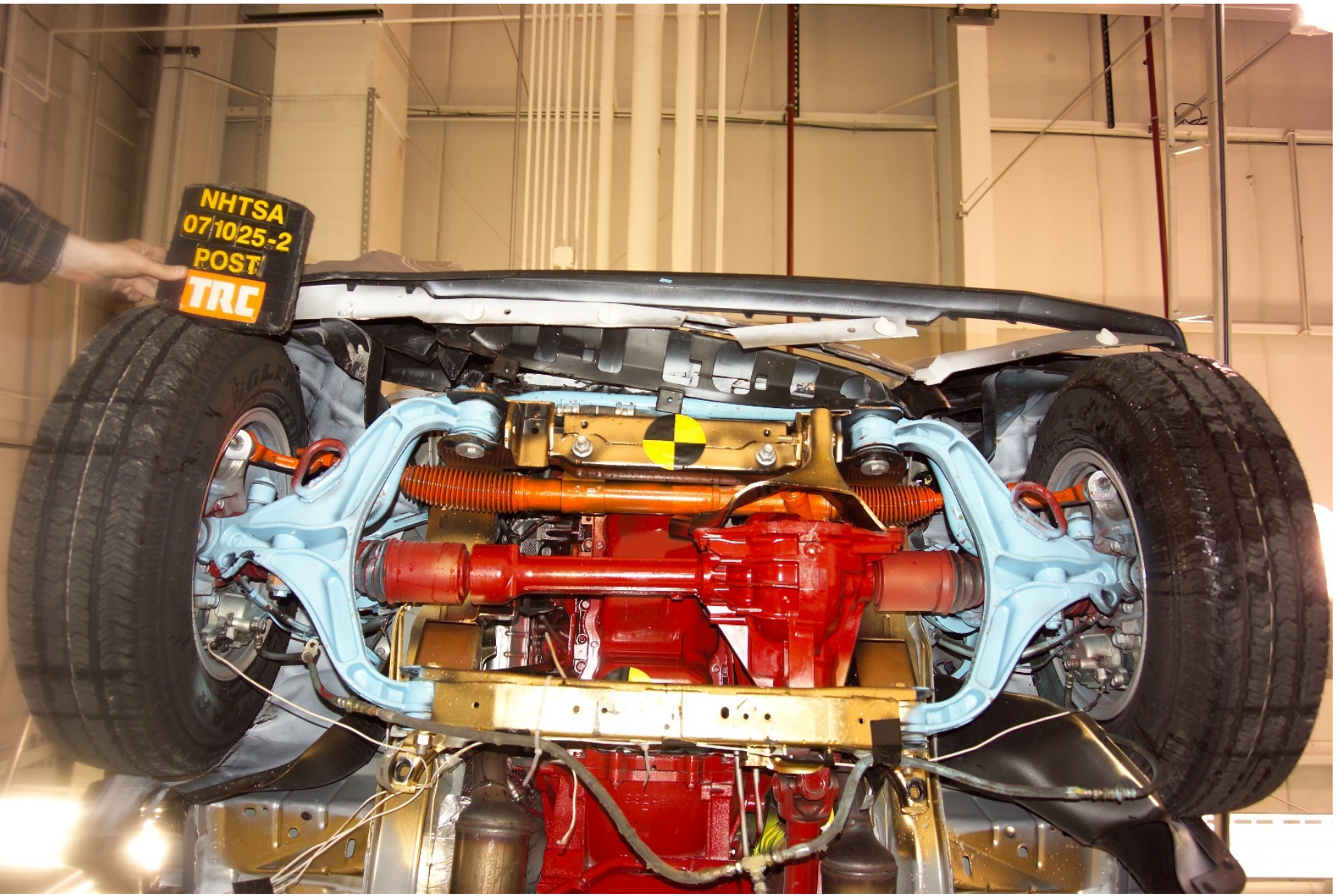


Figure A-20 Post-Test Front Underbody View

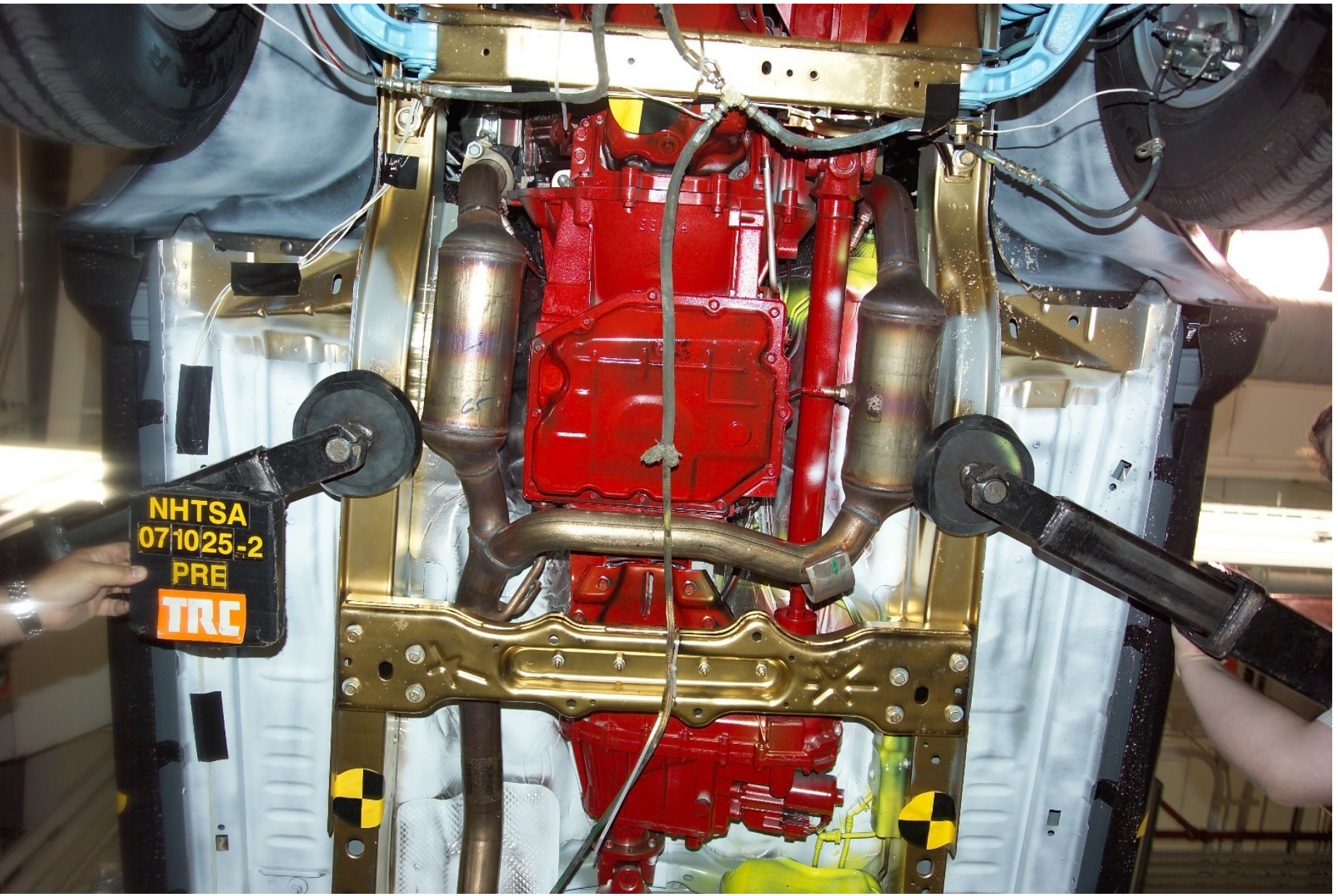


Figure A-21 Pre-Test Mid Front Underbody View

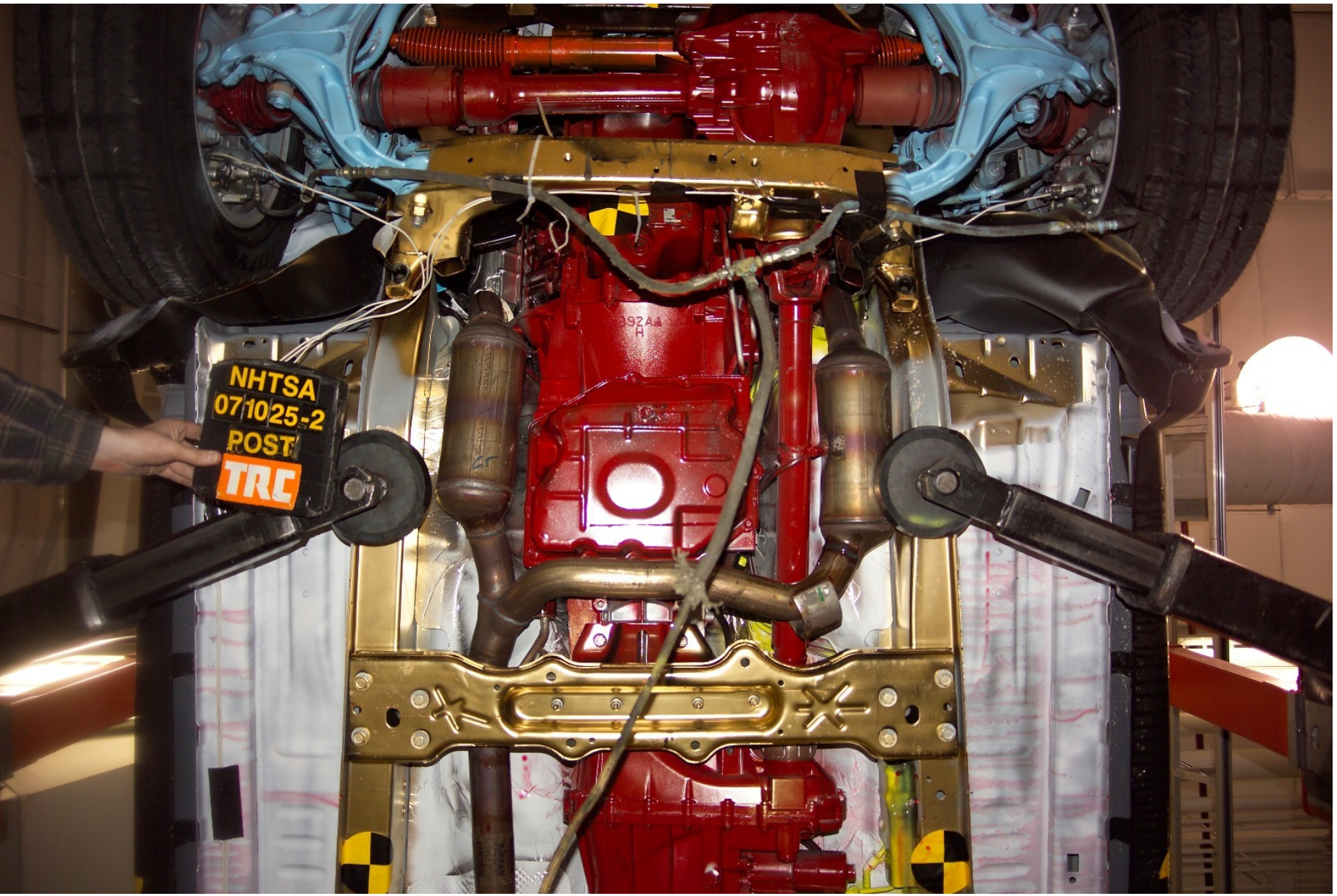


Figure A-22 Post-Test Mid Front Underbody View

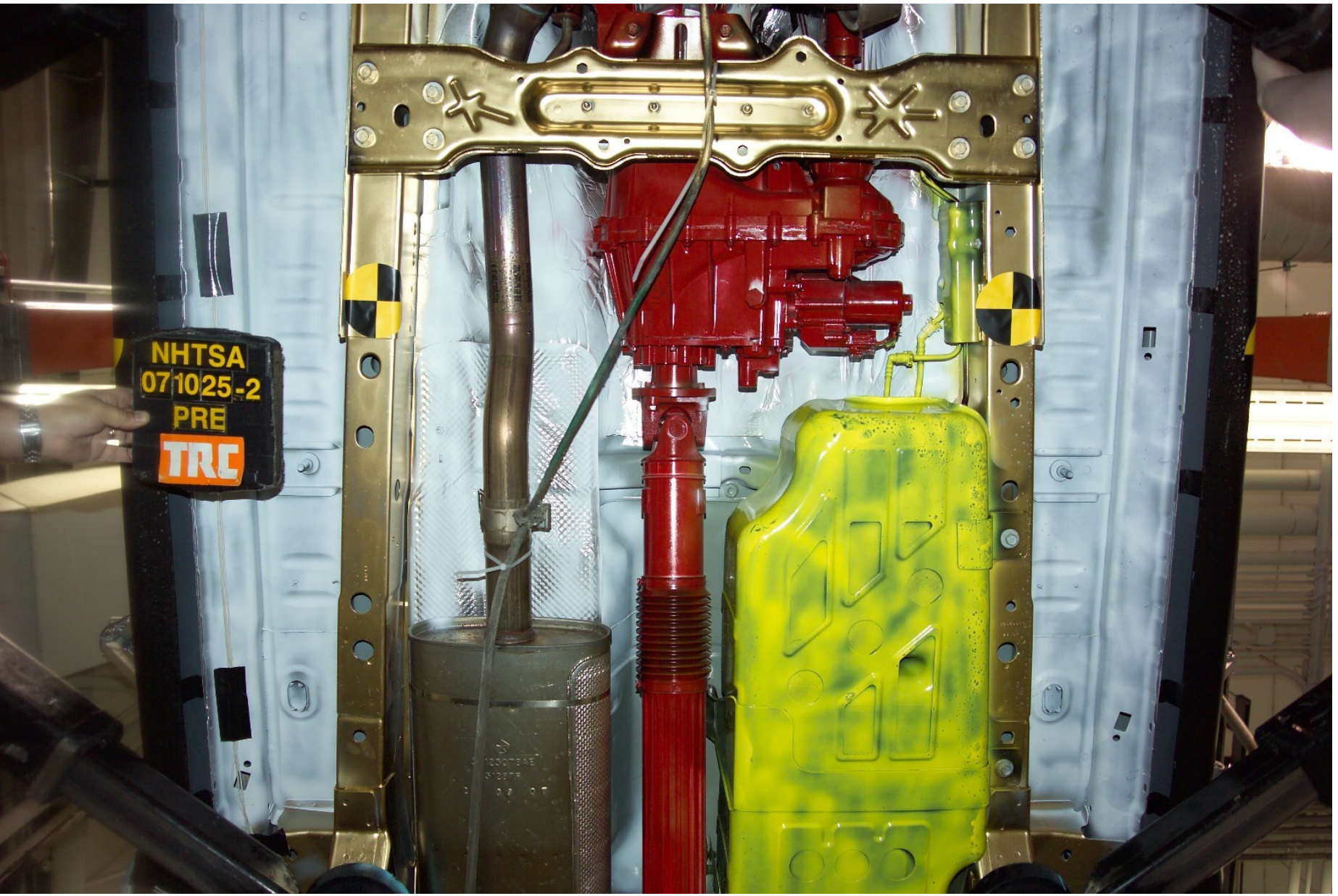


Figure A-23 Pre-Test Mid Underbody View

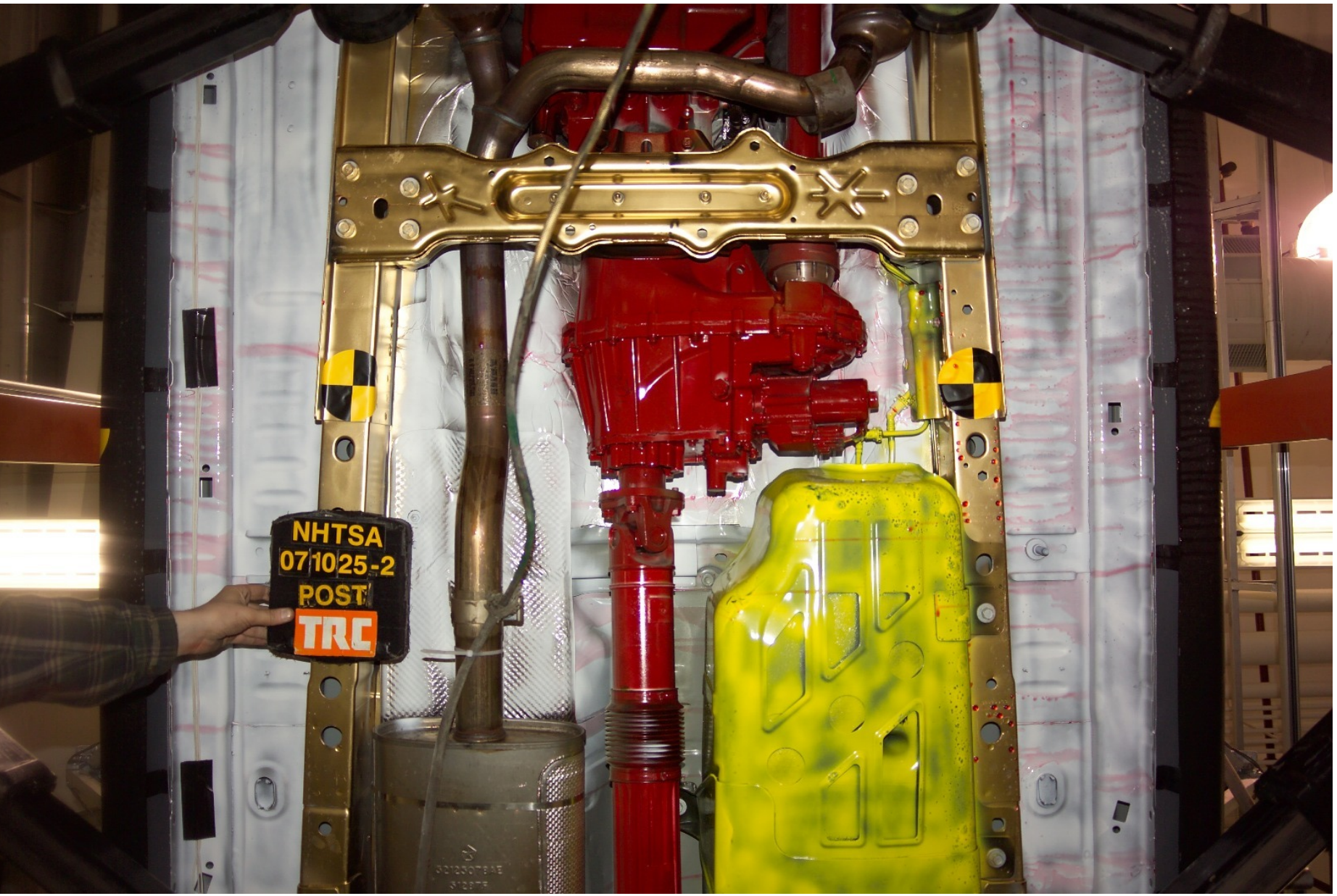


Figure A-24 Post-Test Mid Underbody View

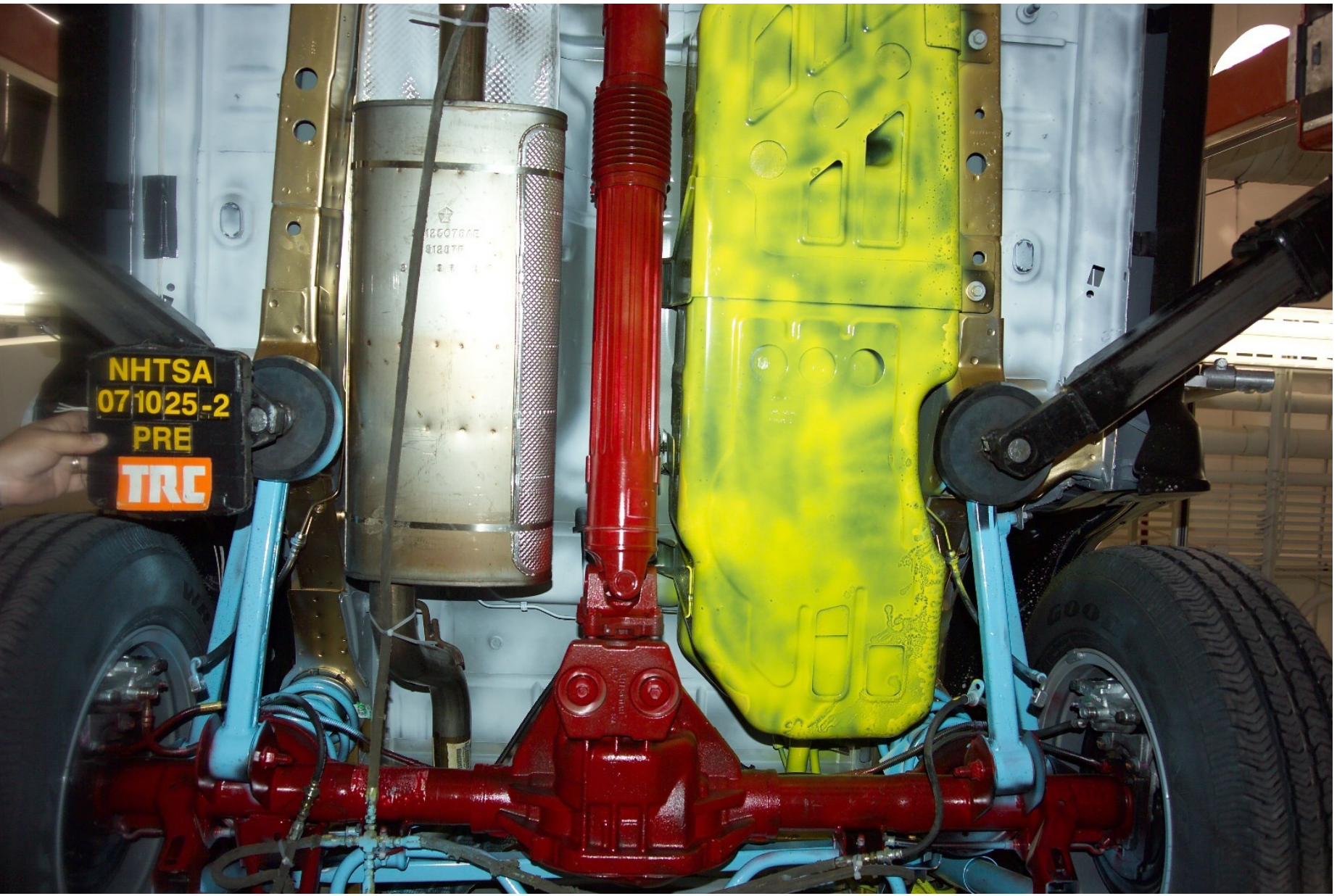


Figure A-25 Pre-Test Mid Rear Underbody View



Figure A-26 Post-Test Mid Rear Underbody View



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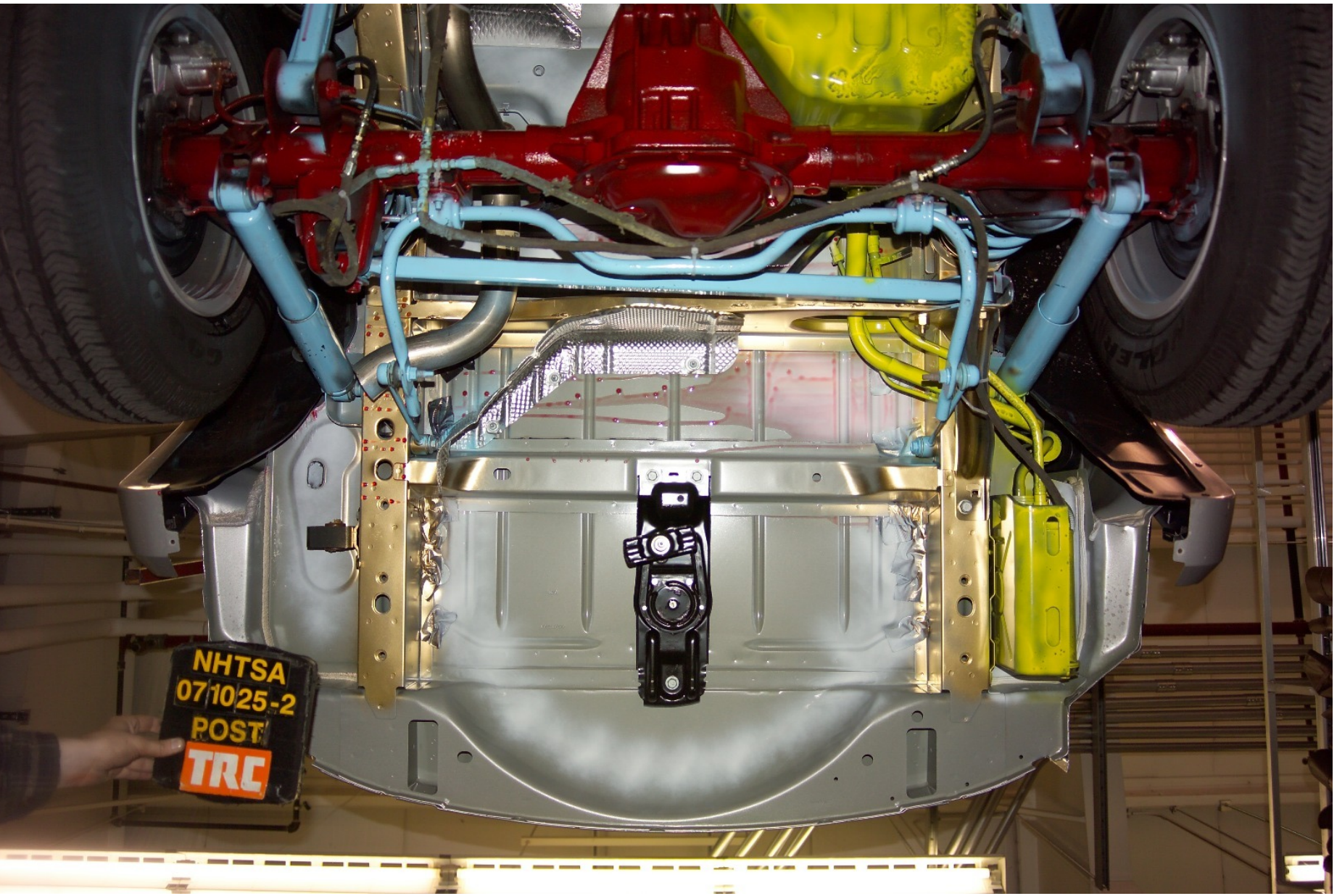


Figure A-28 Post-Test Rear Underbody View



Figure A-29 Pre-Test Fuel Tank View

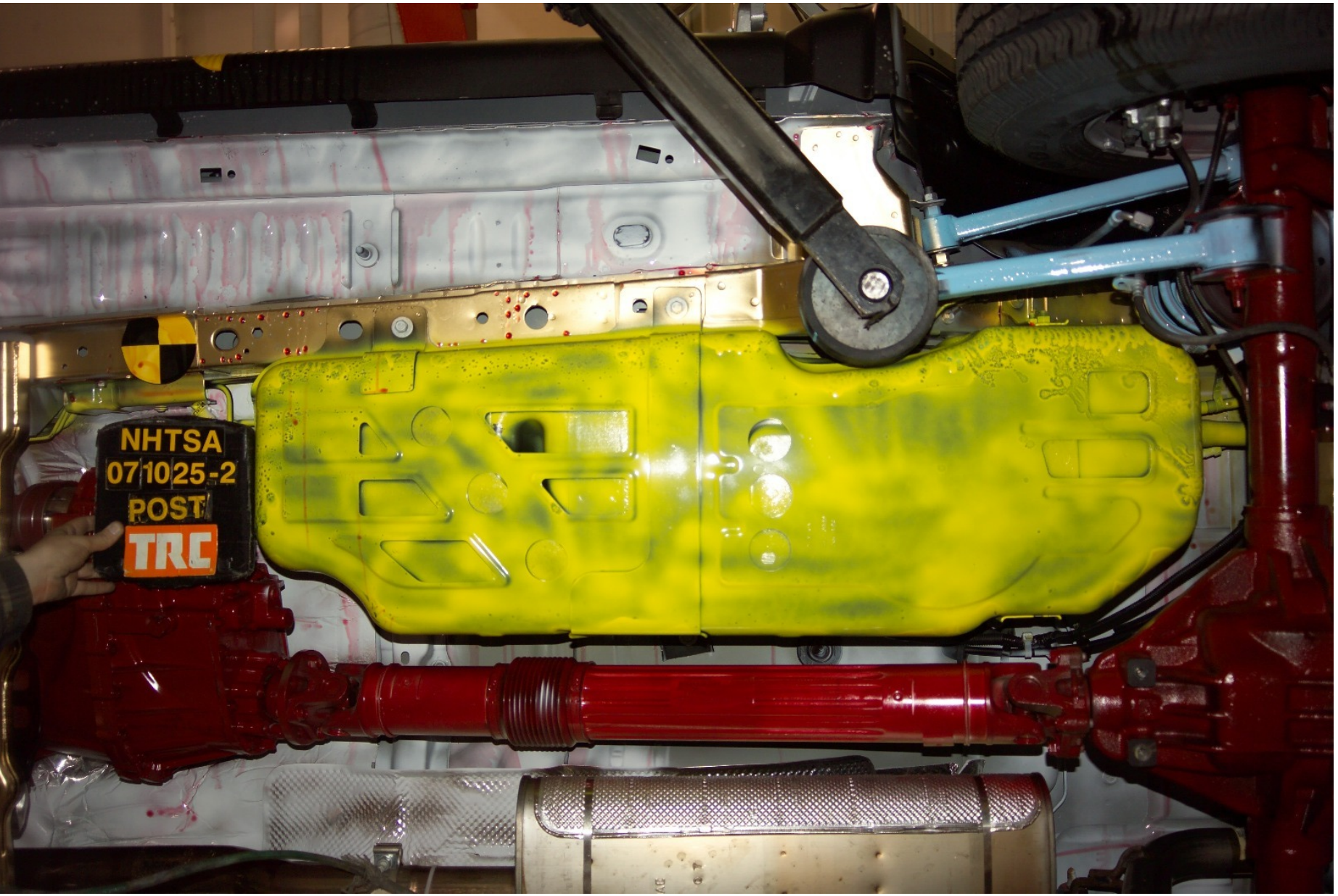


Figure A-30 Post-Test Fuel Tank View



Figure A-31 Pre-Test Fuel Filler Neck View



071025-2



Figure A-33 Pre-Test Fuel Filler Cap View



Figure A-34 Post-Test Fuel Filler Cap View



Figure A-35 Pre-Test Engine Compartment View

Photograph Not Available

Figure A-36 Post-Test Engine Compartment View



Figure A-37 Pre-Test Windshield View



Figure A-38 Post-Test Windshield View



Figure A-39 Pre-Test Driver Dummy - View 1



Figure A-40 Post-Test Driver Dummy - View 1



Figure A-41 Pre-Test Driver Dummy - View 2



Figure A-42 Post-Test Driver Dummy - View 2

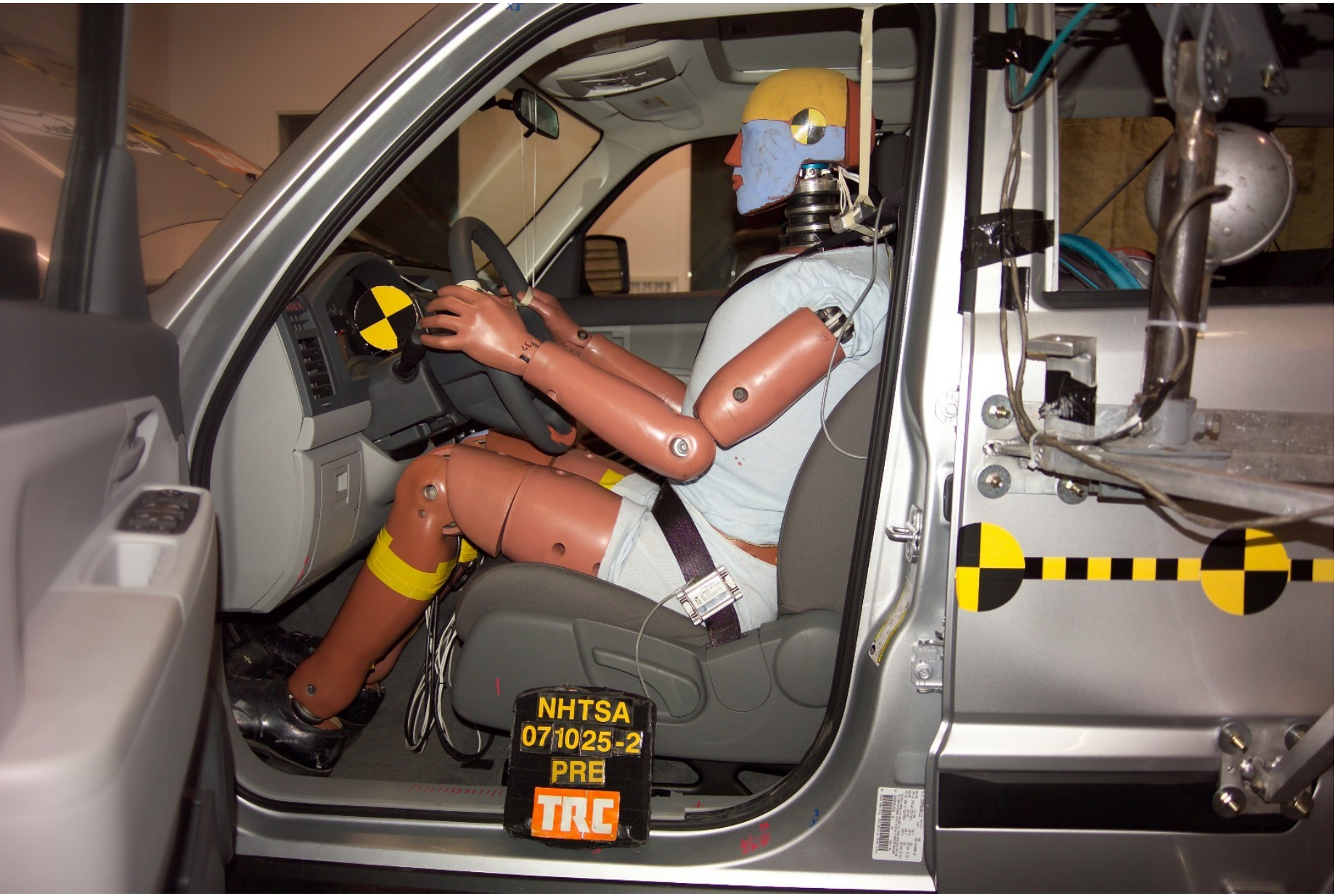


Figure A-43 Pre-Test Driver Dummy - View 3



Figure A-44 Post-Test Driver Dummy - View 3



Figure A-45 Pre-Test Driver Dummy - View 4



Figure A-46 Post-Test Driver Dummy - View 4



Figure A-47 Pre-Test Driver Knee Bolster View



Figure A-48 Post-Test Driver Knee Bolster View



Figure A-49 Pre-Test Driver Dummy Feet View



Figure A-50 Post-Test Driver Dummy Feet View



Figure A-51 Post-Test Driver Dummy Overall View



Figure A-52 Post-Test Driver Dummy Head Contact - View 1



Figure A-53 Post-Test Driver Dummy Head Contact - View 2



Figure A-54 Post-Test Driver Dummy Knee Contact - View 1



Figure A-55 Post-Test Driver Dummy Knee Contact - View 2



Figure A-56 Post-Test Driver Floorboard Deformation View



Figure A-57 Post-Test Driver Toeboard Deformation View



Figure A-58 Pre-Test Right Front Passenger Dummy - View 1

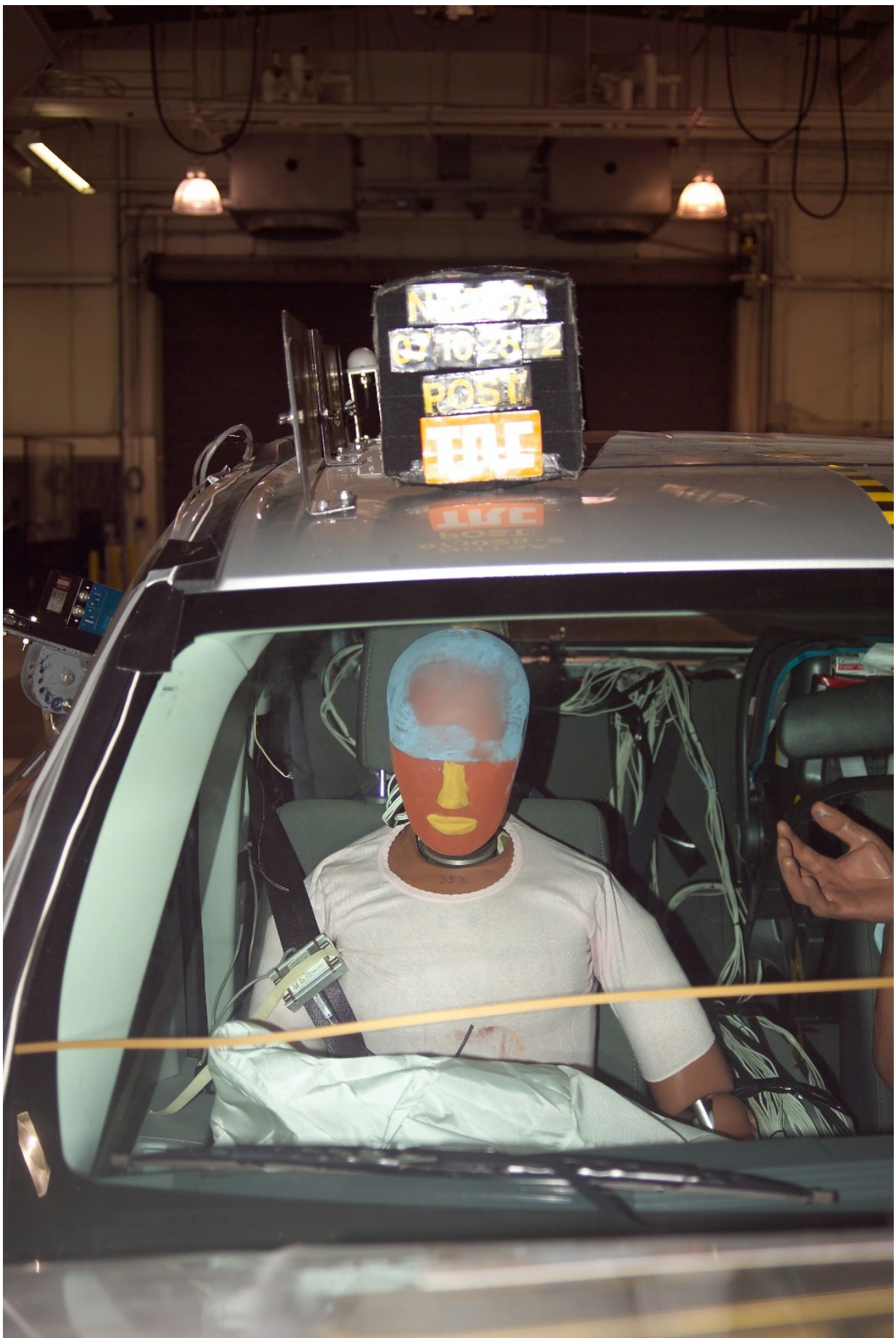


Figure A-59 Post-Test Right Front Passenger Dummy - View 1



Figure A-60 Pre-Test Right Front Passenger Dummy - View 2



Figure A-61 Post-Test Right Front Passenger Dummy - View 2



Figure A-62 Pre-Test Right Front Passenger Dummy - View 3



Figure A-63 Post-Test Right Front Passenger Dummy - View 3

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Figure A-64 Pre-Test Right Front Passenger Dummy - View 4



Figure A-65 Post-Test Right Front Passenger Dummy - View 4



Figure A-66 Post-Test Right Front Passenger Dummy Overall View



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



Figure A-68 Post-Test Right Front Passenger Dummy Head Contact - View 2



Figure A-69 Post-Test Right Front Passenger Dummy Knee Contact View



Figure A-70 Post-Test Right Front Passenger Floorboard Deformation View



Figure A-71 Post-Test Right Front Passenger Toeboard Deformation View



Figure A-72 Pre-Test Barrier Front View



Figure A-73 Post-Test Barrier Front View

MFD BY **CHRYSLER LLC** DATE OF MFR
9-07

GAWR FRONT	WITH TIRES	GAWR
1248 KG(2750 LB)	P225/75R16	2541 KG(05600 LB)
GAWR REAR	WITH TIRES	RIMS AT
1452 KG(3200 LB)	P225/75R16	16X7.0
		RIMS AT
		16X7.0
		COLD
		228 KPA(33 PSI)
		COLD
		228 KPA(33 PSI)

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

VIN: 1J8GN28K48W146985 TYPE: MPV SINGLE X DUAL

MDH: 092402 340AA PNT:PS2 VEHICLE MADE IN U.S.A. TRM:M7DA 4648503

Figure A-74 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	P225/75R16
COLD TIRE INFLATION PRESSURE	228 kPa, 33 PSI	228 kPa, 33 PSI	228 kPa, 33 PSI

SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION  8W146985

Figure A-75 Vehicle Tire Load Label View

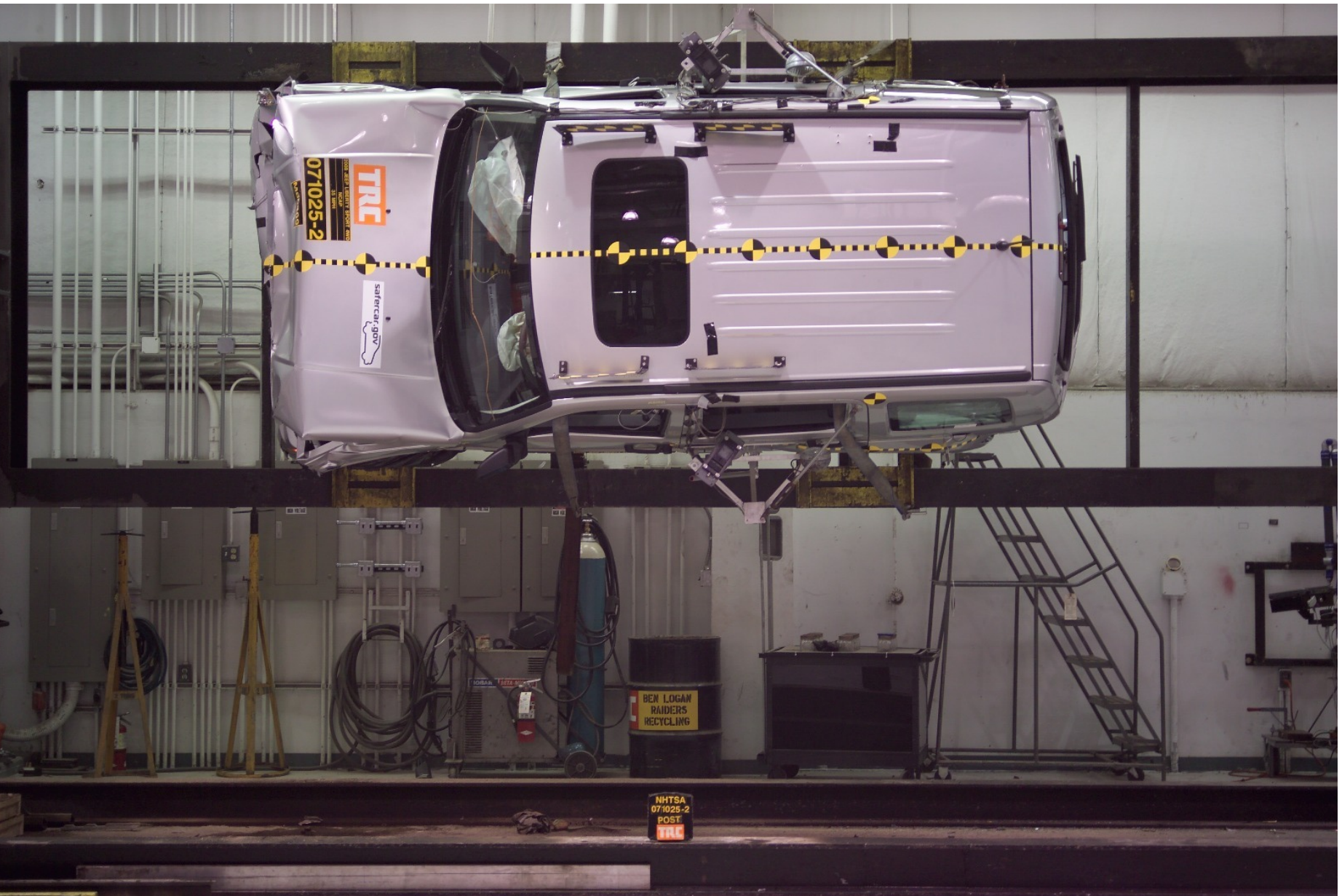


Figure A-76 FMVSS 301 Rollover View at 90°

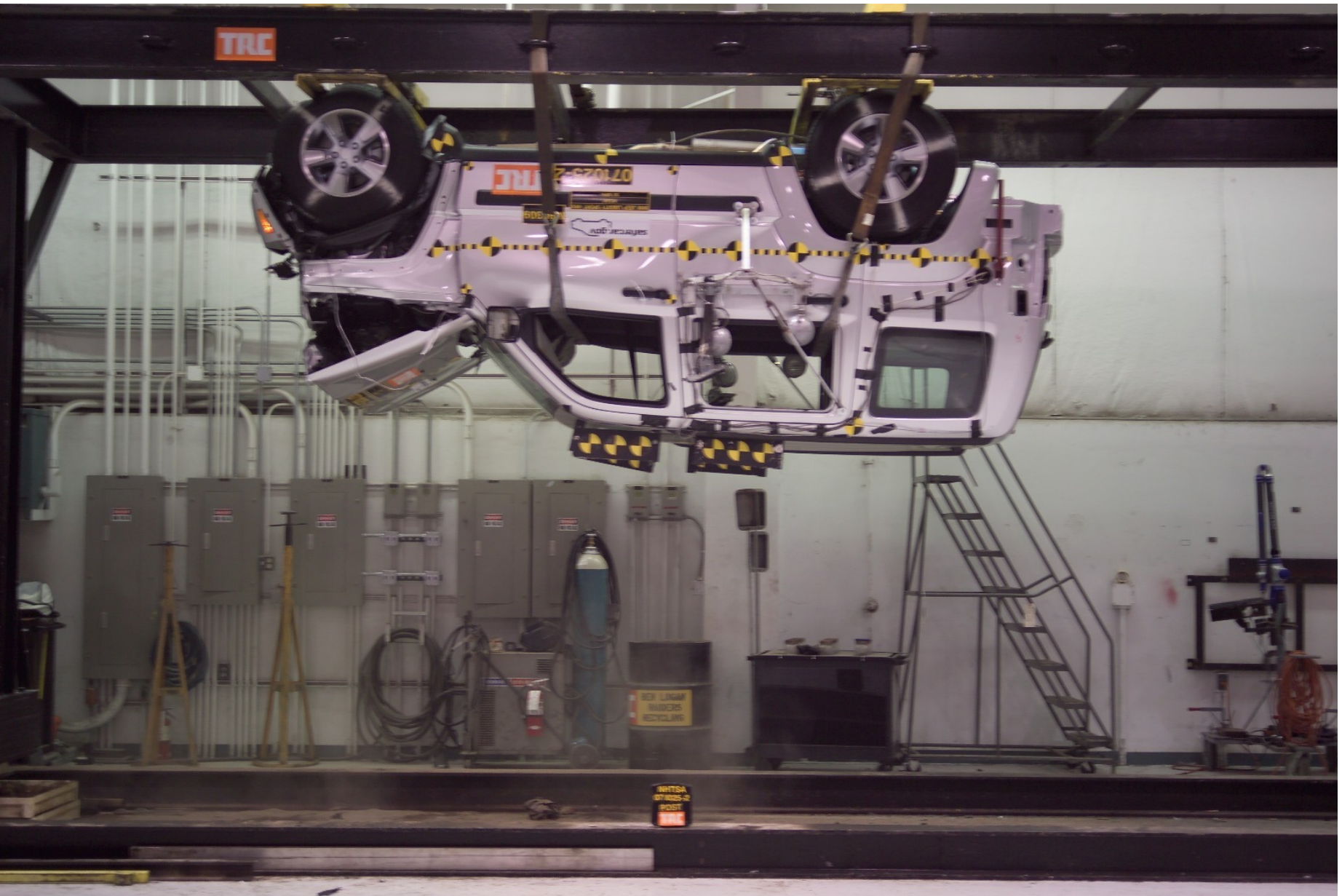


Figure A-77 FMVSS 301 Rollover View at 180°

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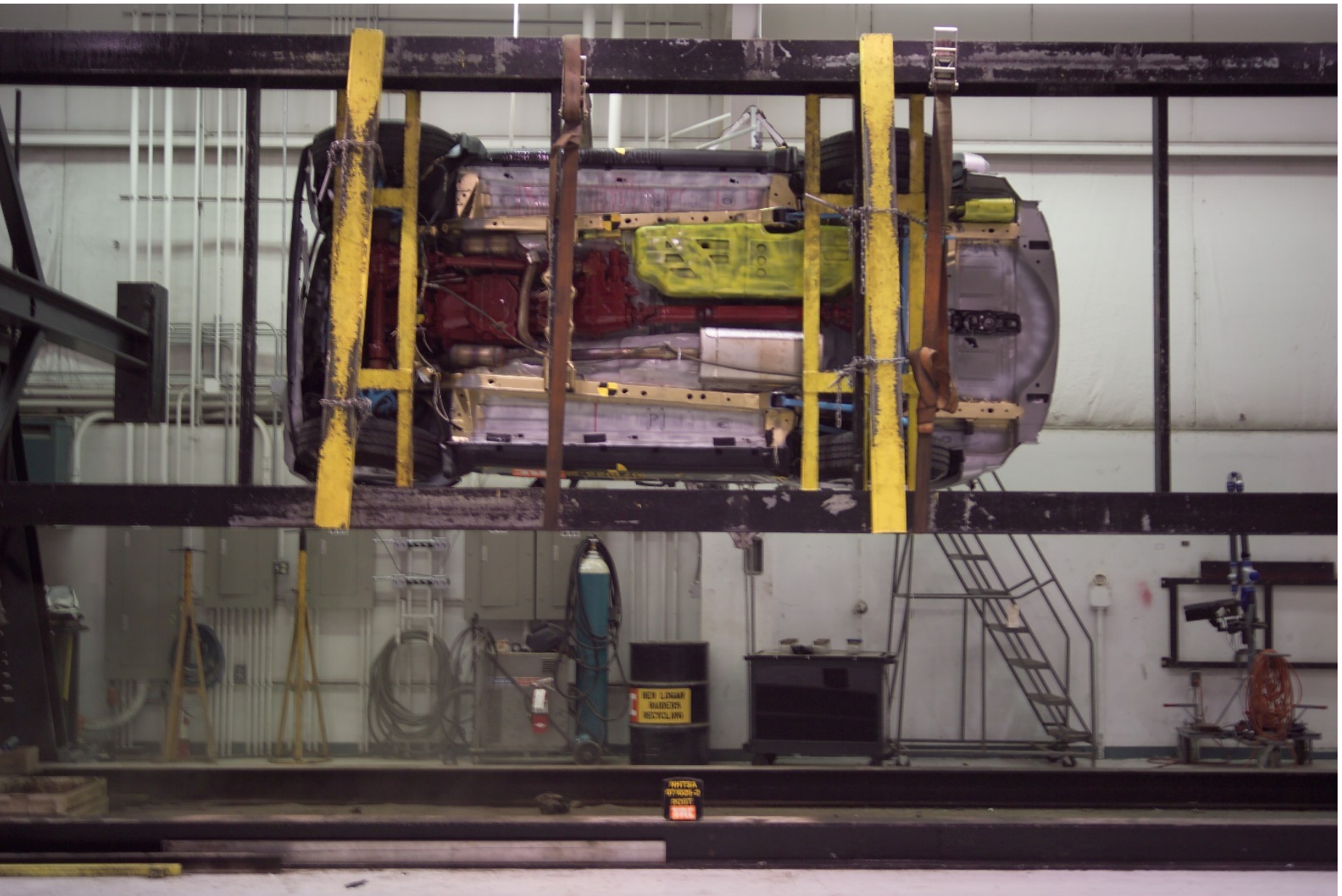


Figure A-78 FMVSS 301 Rollover View at 270°



Figure A-79 FMVSS 301 Rollover View at 360°

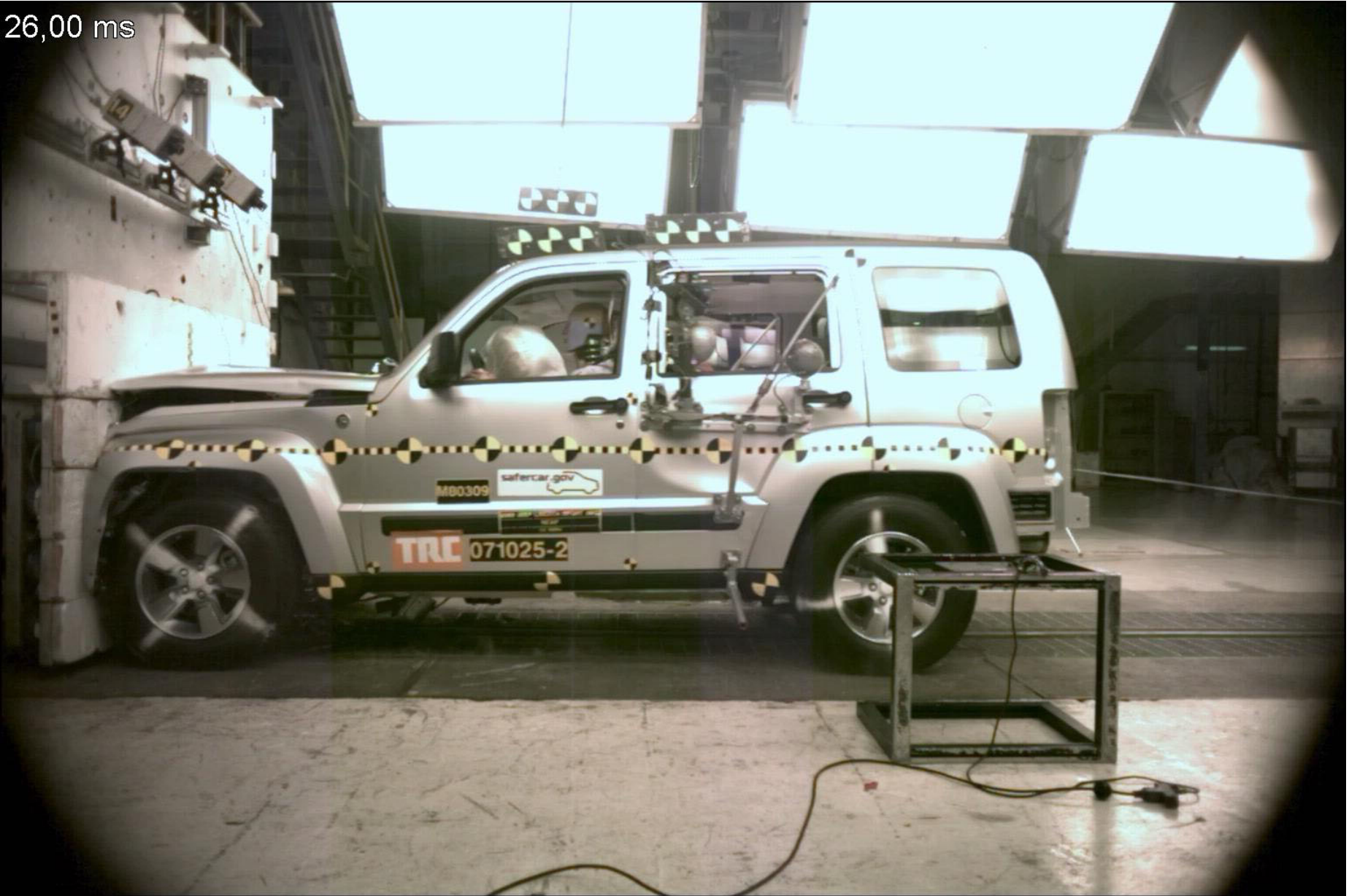


Figure A-80 Impact Event

A-84

071025-2

APPENDIX B
SID/HIII, VEHICLE AND MDB RESPONSE DATA

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

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

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

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

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

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

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

Data Plot	LIST OF DATA PLOTS (CONTINUED)
	Barrier Load Cell B6
	Barrier Load Cell B7
	Barrier Load Cell B8
	Barrier Load Cell B9
	Barrier Load Cell C1
	Barrier Load Cell C2
	Barrier Load Cell C3
	Barrier Load Cell C4
	Barrier Load Cell C5
	Barrier Load Cell C6
	Barrier Load Cell C7
	Barrier Load Cell C8
	Barrier Load Cell C9
	Barrier Load Cell D1
	Barrier Load Cell D2
	Barrier Load Cell D3
	Barrier Load Cell D4
	Barrier Load Cell D5
	Barrier Load Cell D6
	Barrier Load Cell D7
	Barrier Load Cell D8
	Barrier Load Cell D9
	Barrier Load Cell Group 1 Force
	Barrier Load Cell Group 2 Force
	Barrier Load Cell Group 3 Force
	Barrier Load Cell Group 4 Force
	Barrier Load Cell Group 5 Force
	Barrier Load Cell Group 6 Force
	Barrier Load Cell Total Force

NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

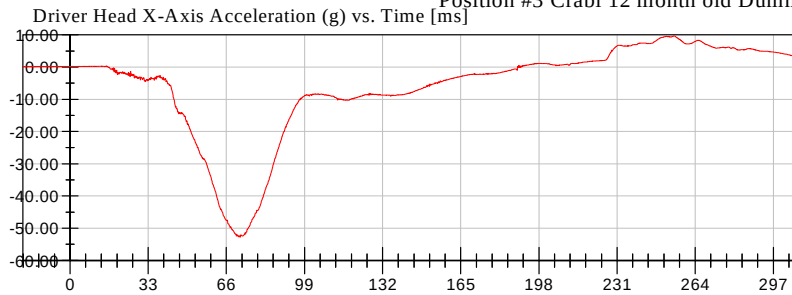
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



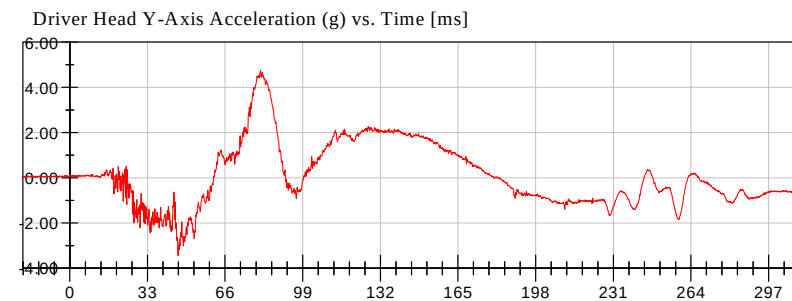
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-52.74 g at 71.84 ms

CFC_1000



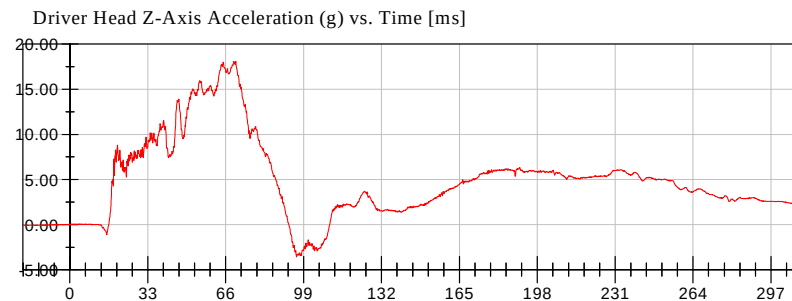
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-3.44 g at 46.00 ms

CFC_1000



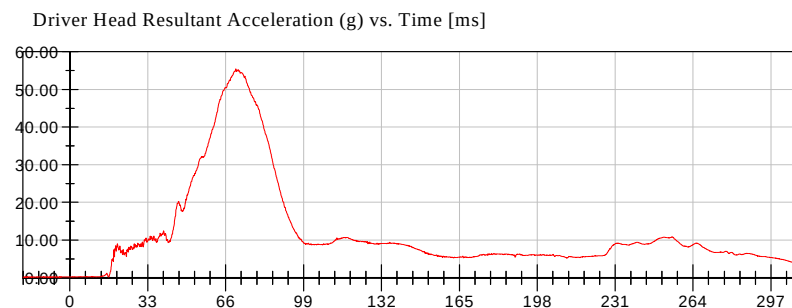
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-3.58 g at 96.00 ms

CFC_1000



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CFC_1000



NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

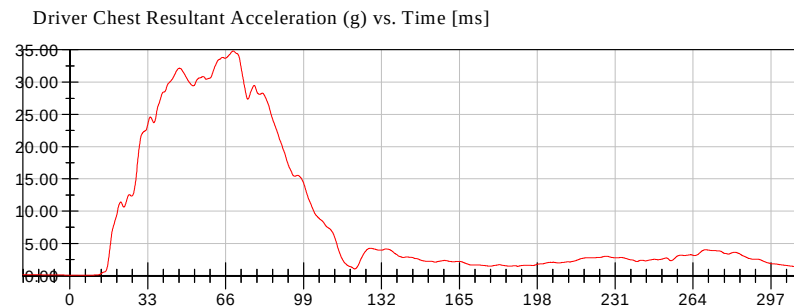
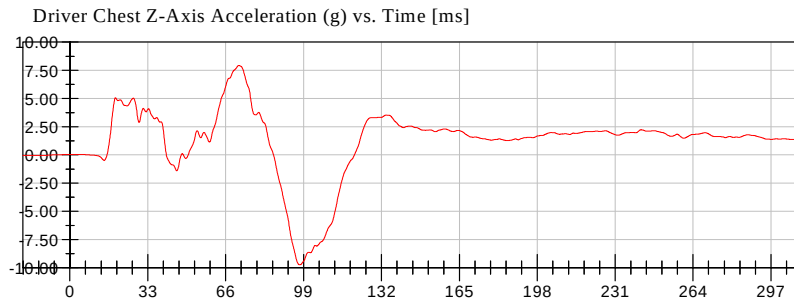
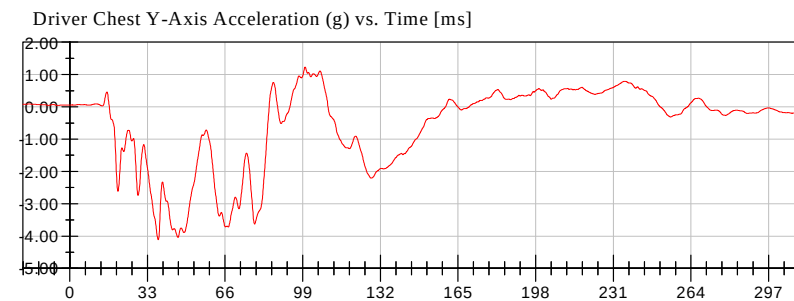
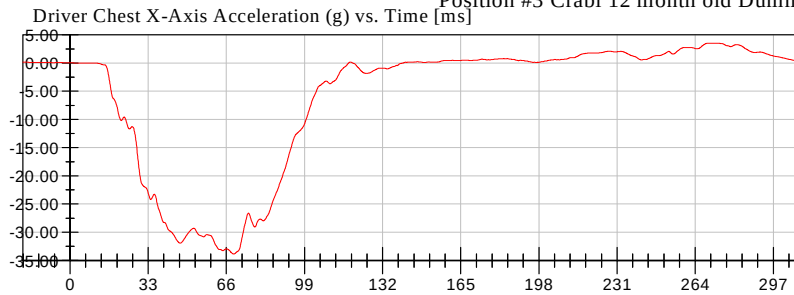
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

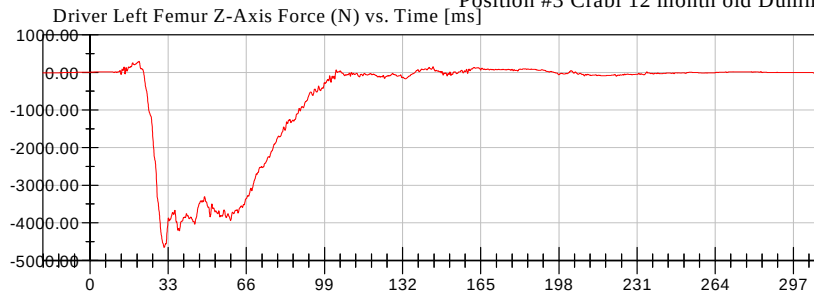
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



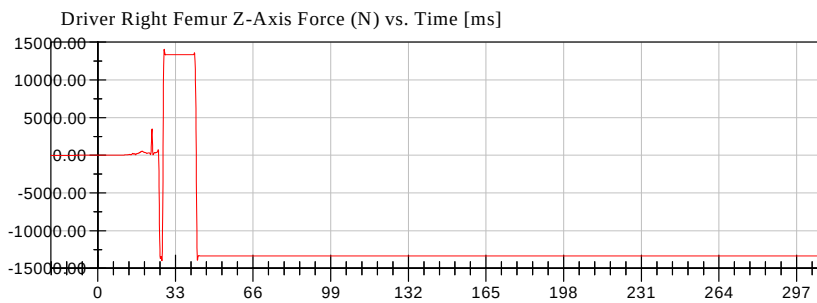
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-4,651.65 N at 31.28 ms

CFC_600



<Max>

14,066.50 N at 28.24 ms

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-13,984.53 N at 27.28 ms

CFC_600



NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

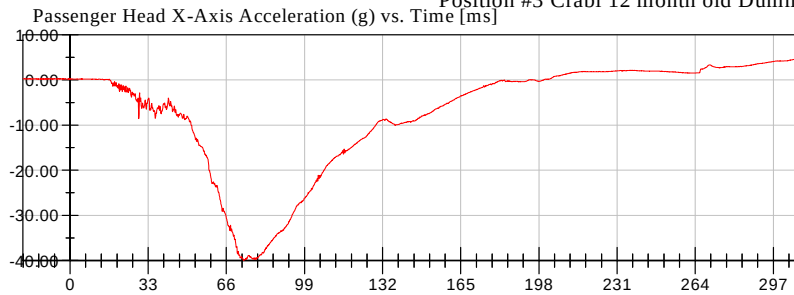
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



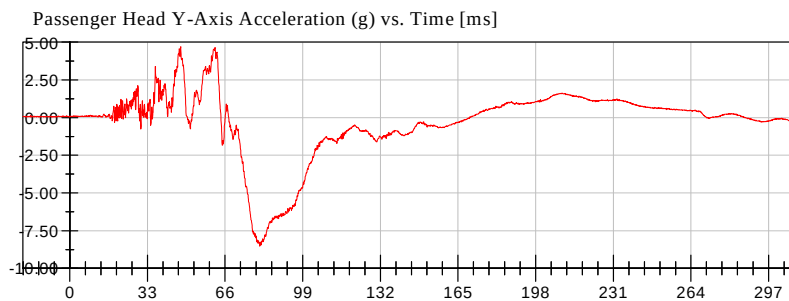
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5.56 g at 310.00 ms

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CFC_1000



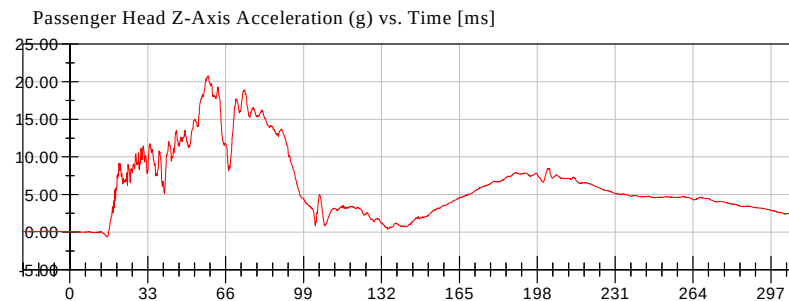
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-8.53 g at 80.80 ms

CFC_1000



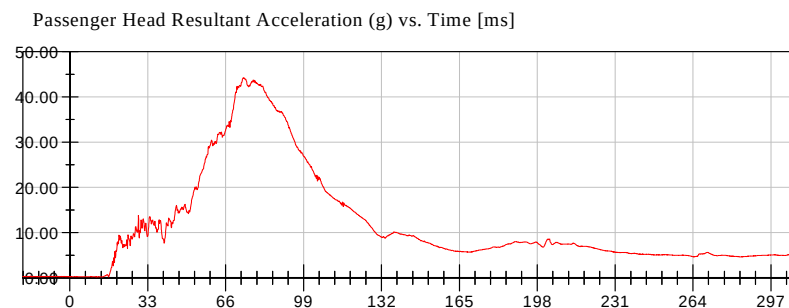
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20.81 g at 58.64 ms

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-0.66 g at 15.84 ms

CFC_1000



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44.25 g at 73.44 ms

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0.13 g at 13.04 ms

CFC_1000



NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

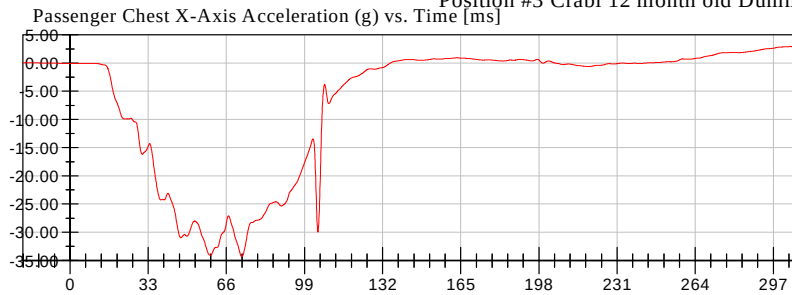
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Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



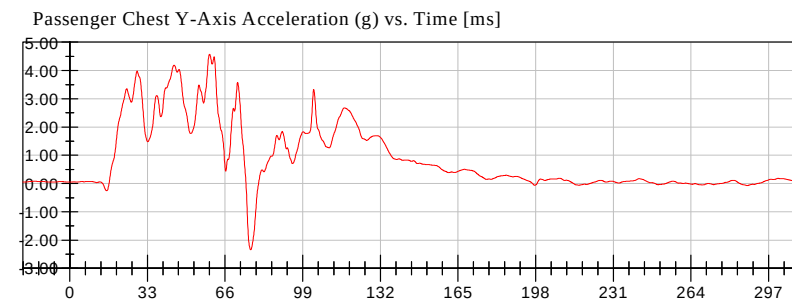
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2.93 g at 304.16 ms

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-34.30 g at 72.48 ms

CFC_180



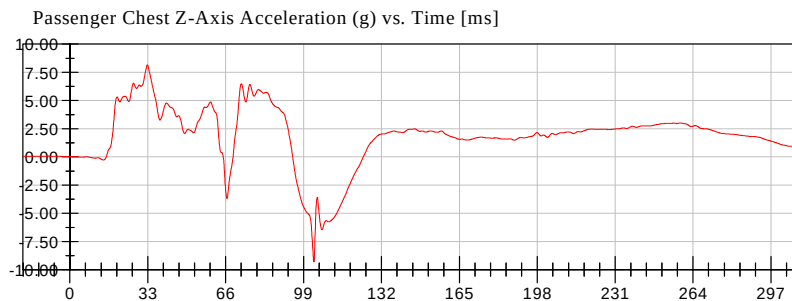
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4.57 g at 59.44 ms

<Min>

-2.34 g at 76.96 ms

CFC_180



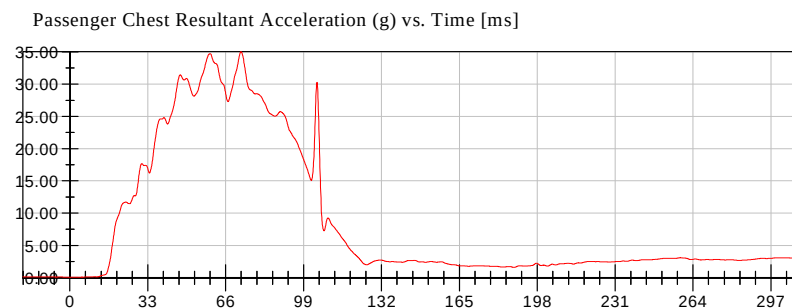
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8.17 g at 32.80 ms

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-9.30 g at 103.36 ms

CFC_180



<Max>

35.00 g at 72.48 ms

<Min>

0.07 g at -1.28 ms

CFC_180



NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

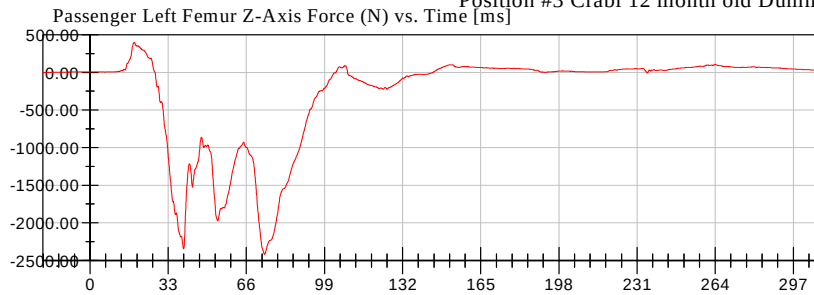
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



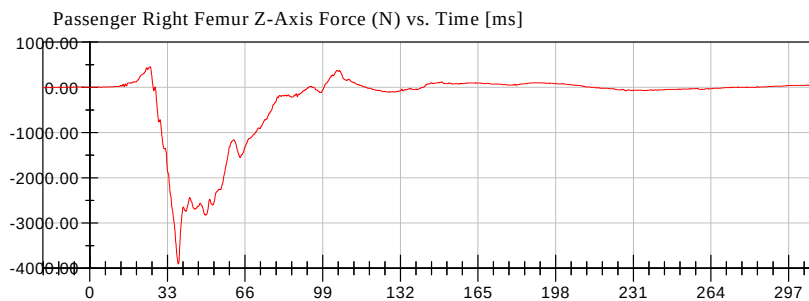
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CFC_600



<Max>

457.46 N at 25.68 ms

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-3,900.59 N at 37.68 ms

CFC_600



APPENDIX C
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID/HIII: 037

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

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

Comments:

Technician

Approved

Charles W. Ball

Ron Stoner



Transportation Research Center Inc.

Front Head Drop

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

Charles W. Beale

Approved

Ron Stoner

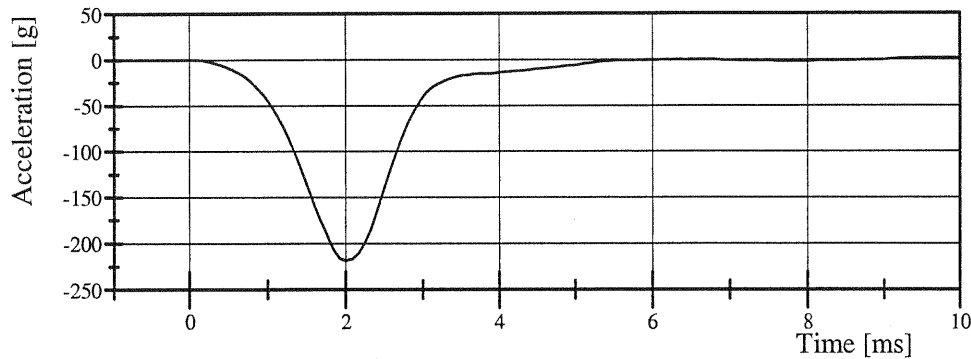
Transportation Research Center Inc.

Front Head Drop

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

Test Date: 9/27/2007

Head X-Axis Acceleration

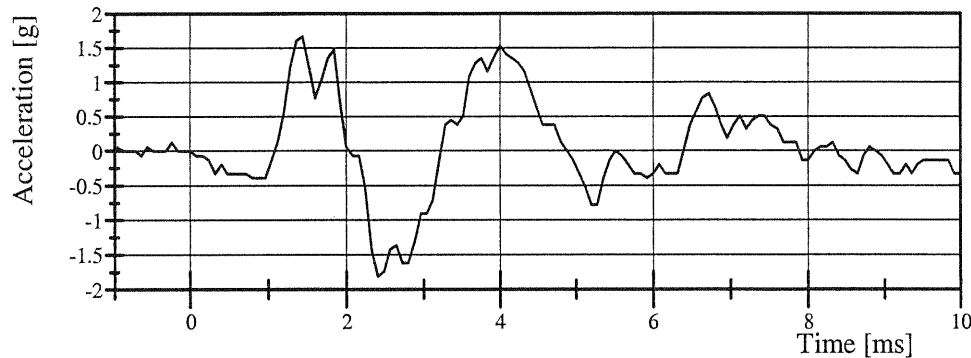


Filter Class: CFC_1000

Max: 1.9 g at 9.4 ms

Min: -219.1 g at 2.0 ms

Head Y-Axis Acceleration

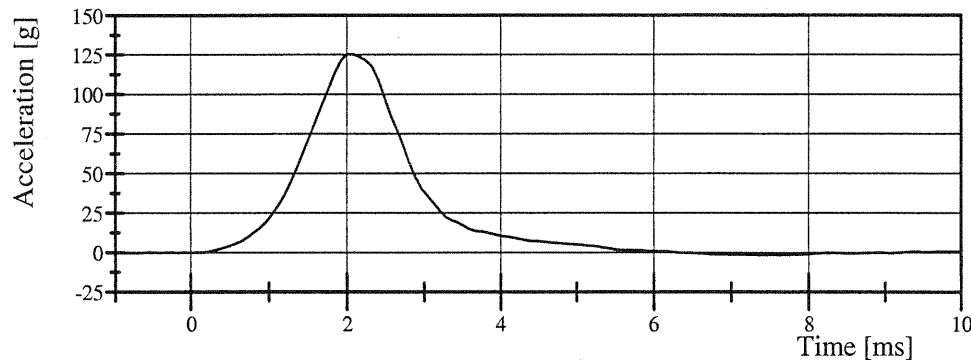


Filter Class: CFC_1000

Max: 1.7 g at 1.4 ms

Min: -1.8 g at 2.4 ms

Head Z-Axis Acceleration

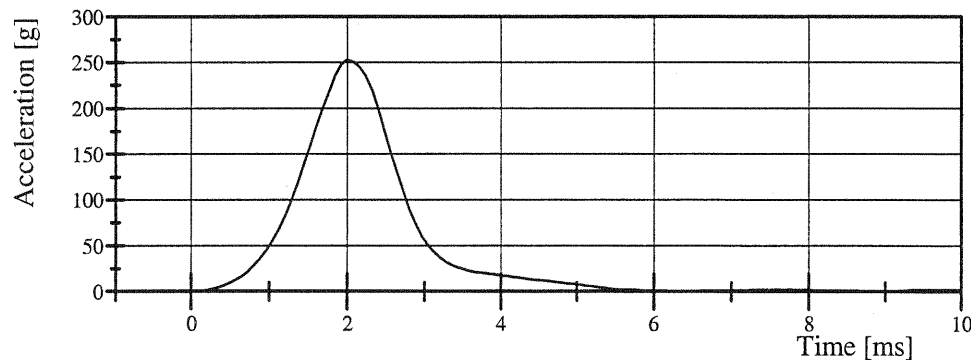


Filter Class: CFC_1000

Max: 125.4 g at 2.0 ms

Min: -1.6 g at 7.4 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 252.5 g at 2.0 ms

Min: 0.0 g at 6.4 ms

Transportation Research Center Inc.

Neck Flexion

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

Charles W. Ball

Approved

Ron Stoner

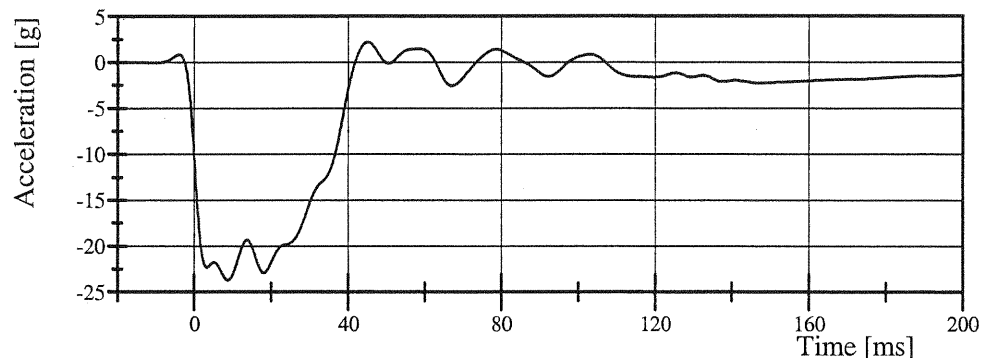
Transportation Research Center Inc.

Neck Flexion

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

Test Date: 9/27/2007

Pendulum Acceleration

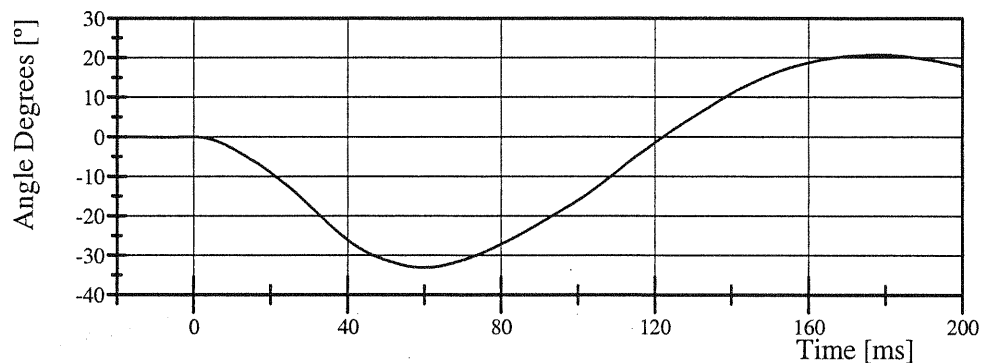


Filter Class: CFC_60

Max: 2.2 g at 45.0 ms

Min: -23.7 g at 8.8 ms

Pot Rotation at the Base of Neck

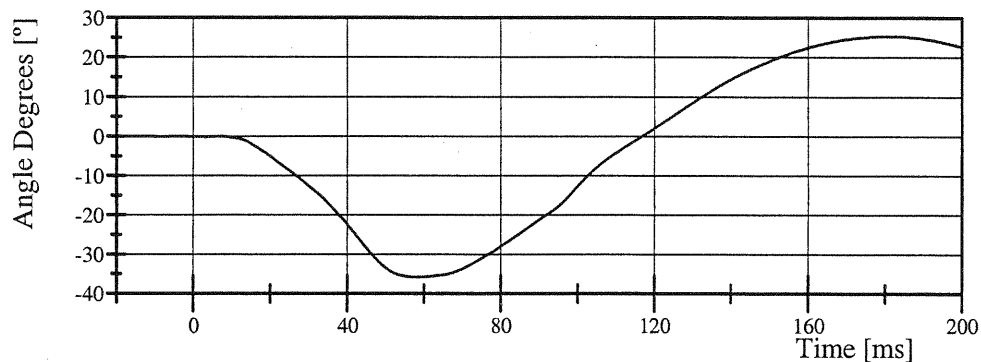


Filter Class: CFC_60

Max: 20.8 ° at 178.7 ms

Min: -33.1 ° at 59.9 ms

Head Rotation at Occypital Condyles

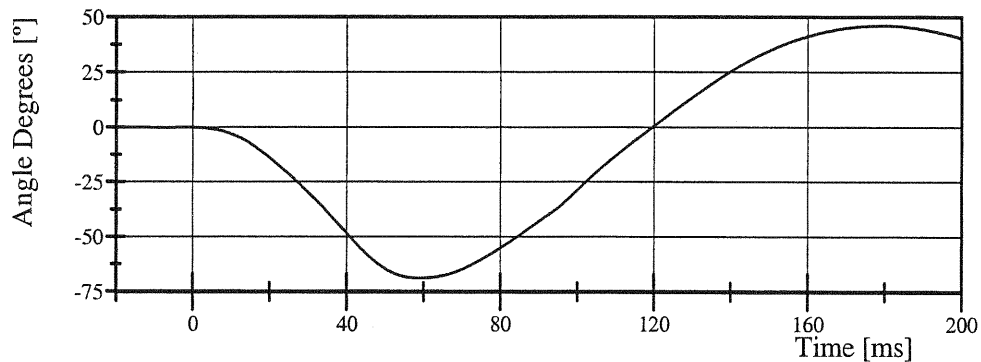


Filter Class: CFC_60

Max: 25.4 ° at 181.7 ms

Min: -35.8 ° at 58.4 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 46.1 ° at 180.0 ms

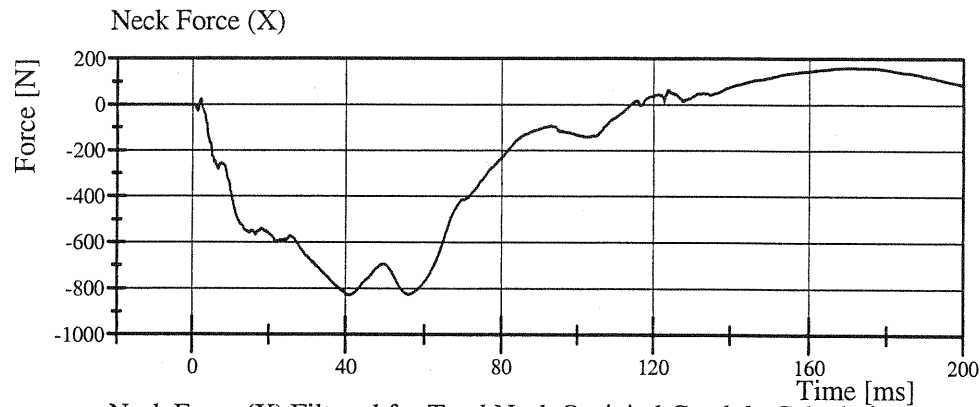
Min: -68.8 ° at 59.1 ms

Transportation Research Center Inc.

Neck Flexion

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

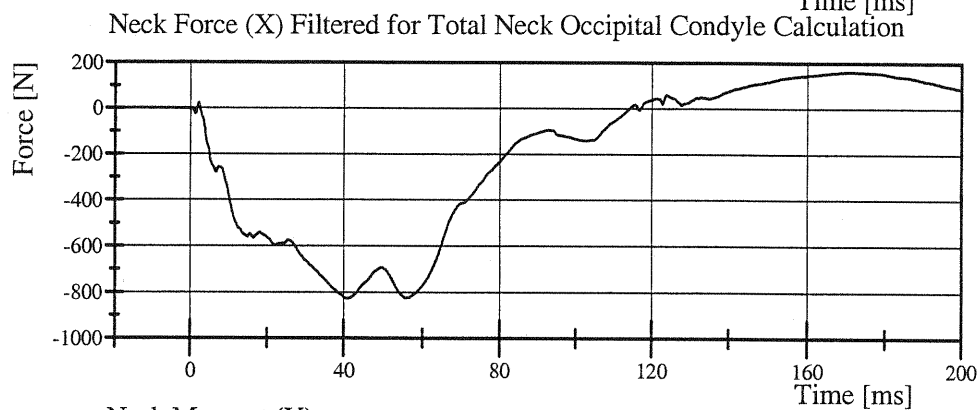
Test Date: 9/27/2007



Filter Class: CFC_1000

Max: 161.6 N at 170.9 ms

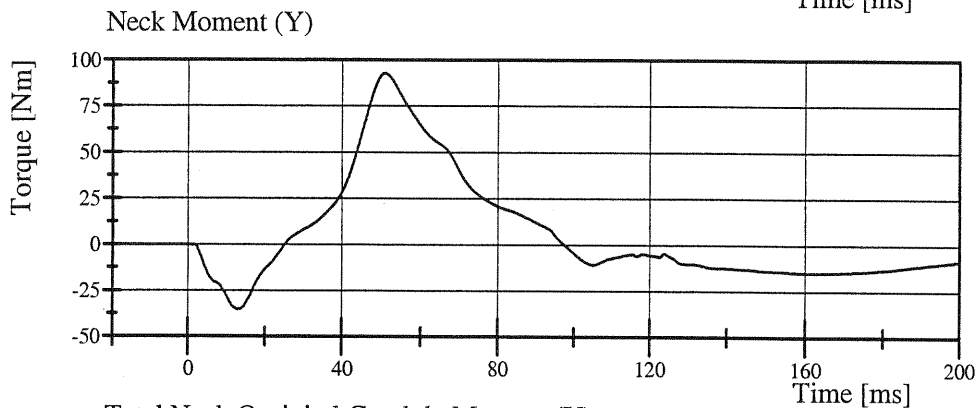
Min: -828.2 N at 40.6 ms



Filter Class: CFC_600

Max: 161.2 N at 170.1 ms

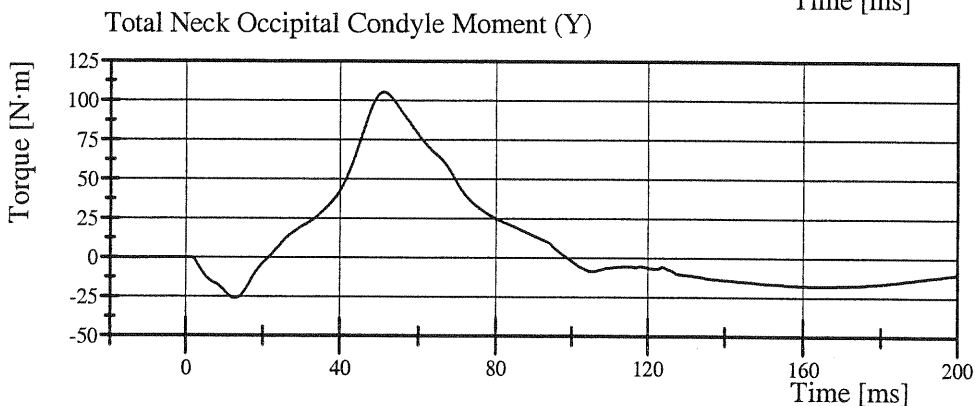
Min: -827.8 N at 40.7 ms



Filter Class: CFC_600

Max: 92.8 Nm at 50.8 ms

Min: -35.1 Nm at 13.4 ms



Filter Class: CFC_600

Max: 105.3 N·m at 51.0 ms

Min: -25.8 N·m at 12.6 ms

Transportation Research Center Inc.

Neck Extension

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

Charles W. Ball

Approved

Ron Stoner

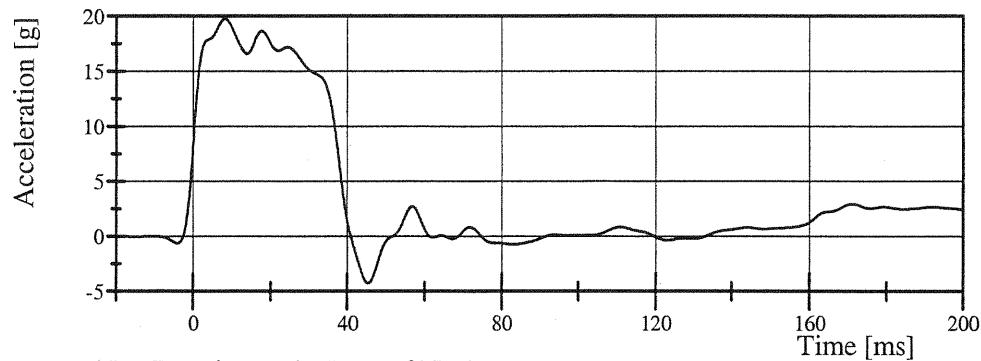
Transportation Research Center Inc.

Neck Extension

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

Test Date: 9/27/2007

Pendulum Acceleration

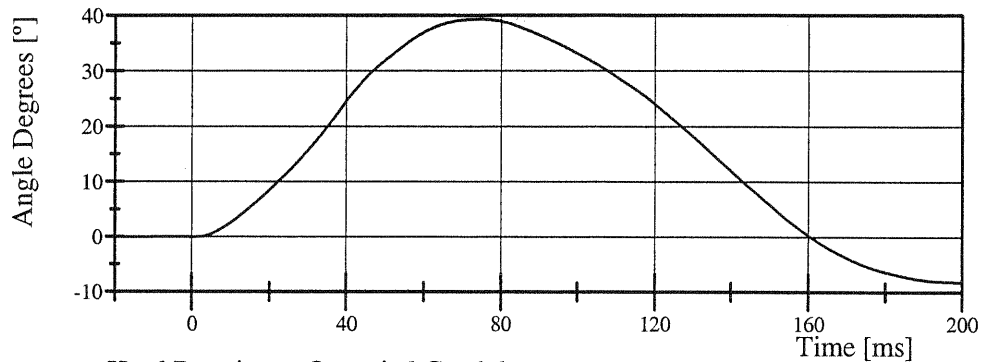


Filter Class: CFC_60

Max: 19.8 g at 8.2 ms

Min: -4.3 g at 45.3 ms

Pot Rotation at the Base of Neck

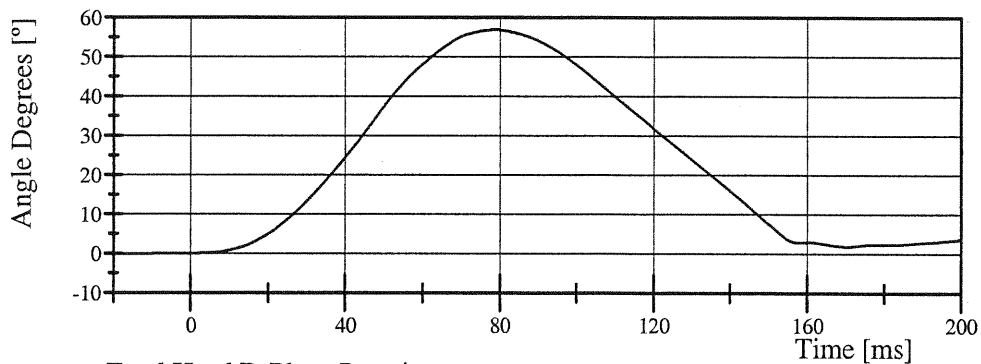


Filter Class: CFC_60

Max: 39.3 ° at 75.0 ms

Min: -8.2 ° at 199.7 ms

Head Rotation at Occypital Condyles

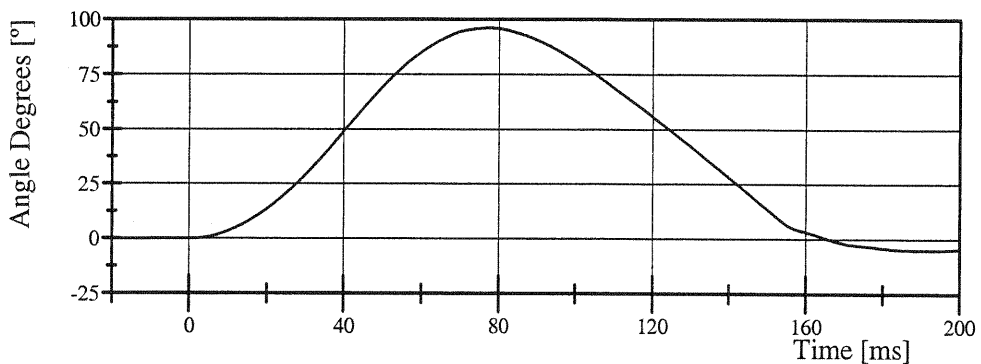


Filter Class: CFC_60

Max: 56.9 ° at 78.8 ms

Min: -0.0 ° at -20.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 96.1 ° at 77.6 ms

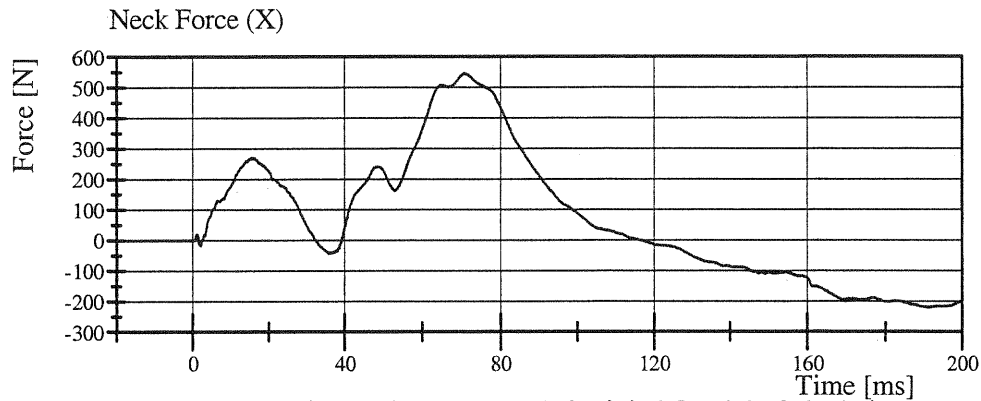
Min: -5.0 ° at 192.7 ms

Transportation Research Center Inc.

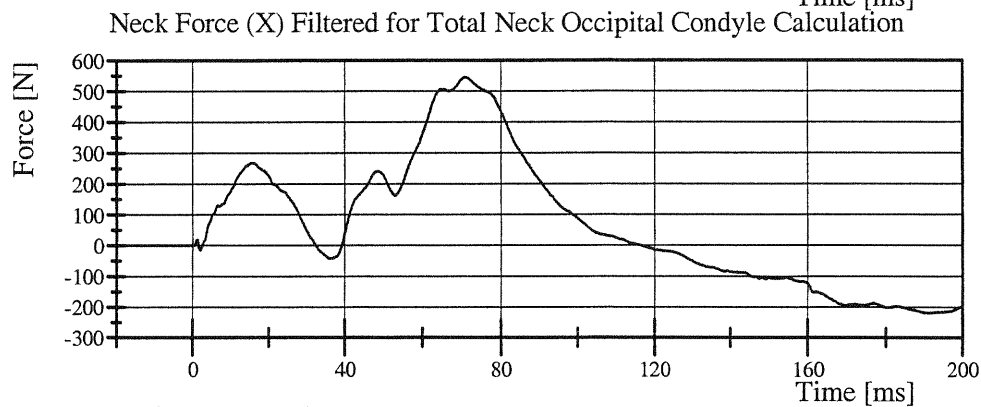
Neck Extension

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

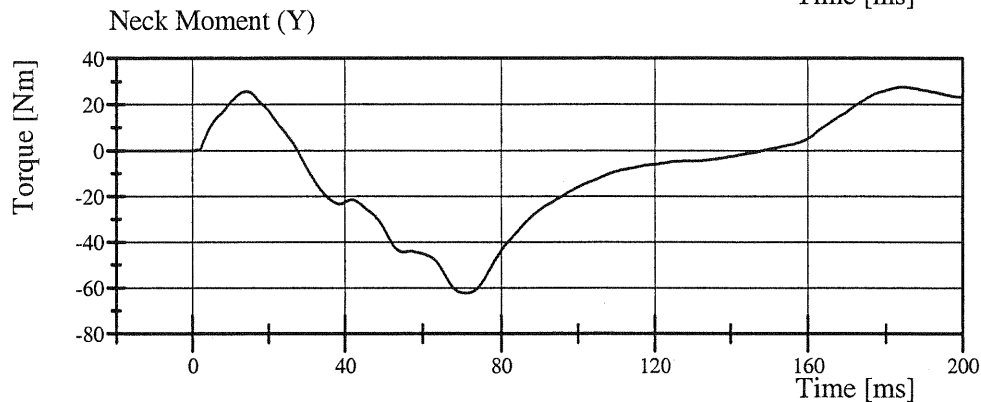
Test Date: 9/27/2007



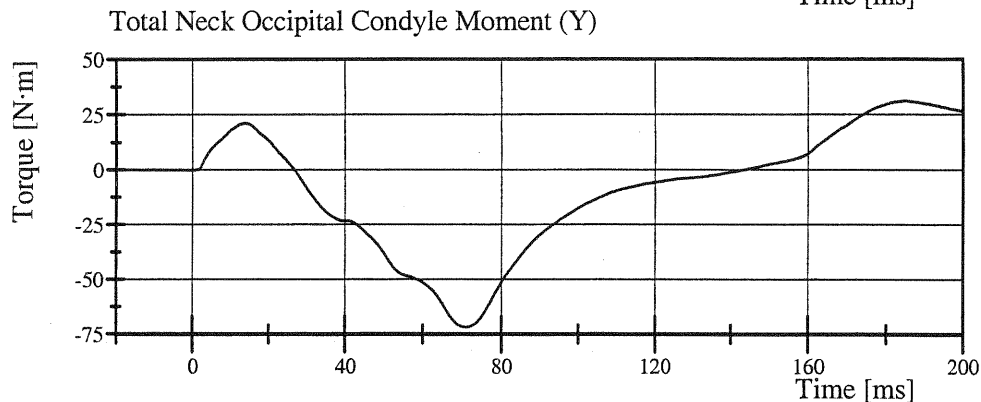
Filter Class: CFC_1000
Max: 545.8 N at 70.8 ms
Min: -220.3 N at 191.1 ms



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



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



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

Transportation Research Center Inc.

Front Thorax

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Stoner

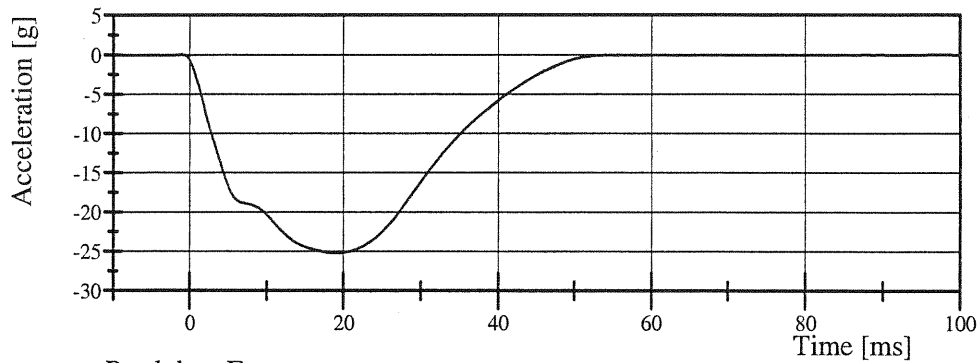
Transportation Research Center Inc.

Front Thorax

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

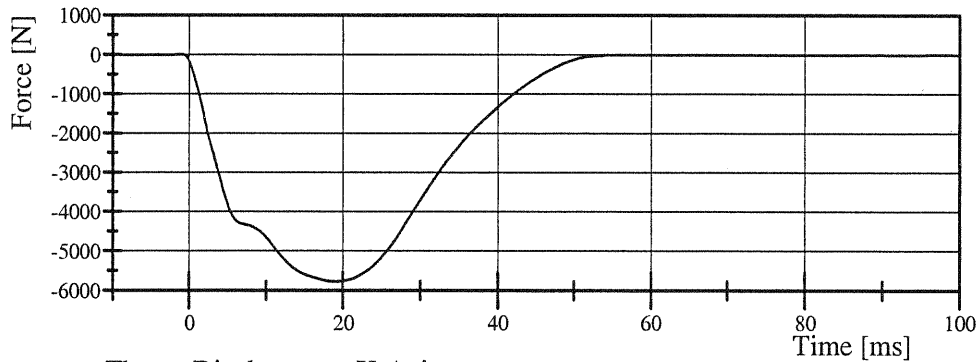
Test Date: 9/27/2007

Pendulum Acceleration



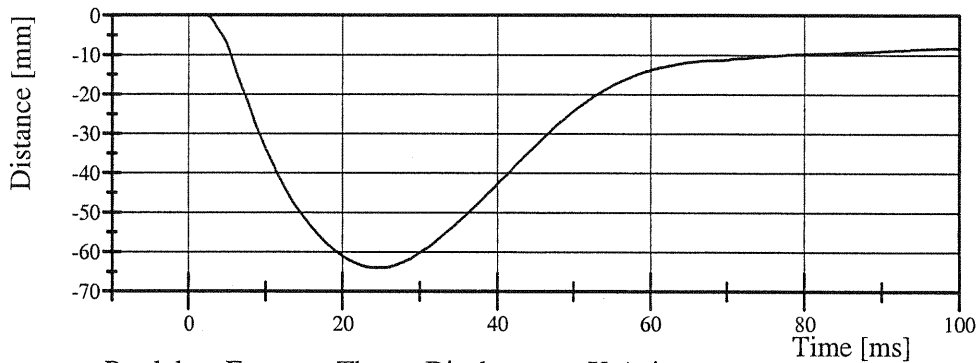
Filter Class: CFC_180
Max: 0.1 g at -1.0 ms
Min: -25.2 g at 19.0 ms

Pendulum Force



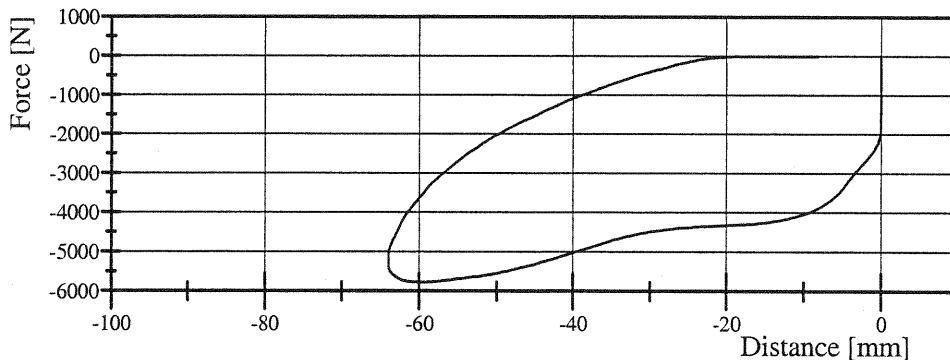
Filter Class: CFC_180
Max: 13.1 N at -1.0 ms
Min: -5,772.5 N at 19.0 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -9.5 ms
Min: -64.0 mm at 24.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 13.1 N at -0.0 mm
Min: -5,772.5 N at -59.6 mm

Applied Safety Technologies Corp.

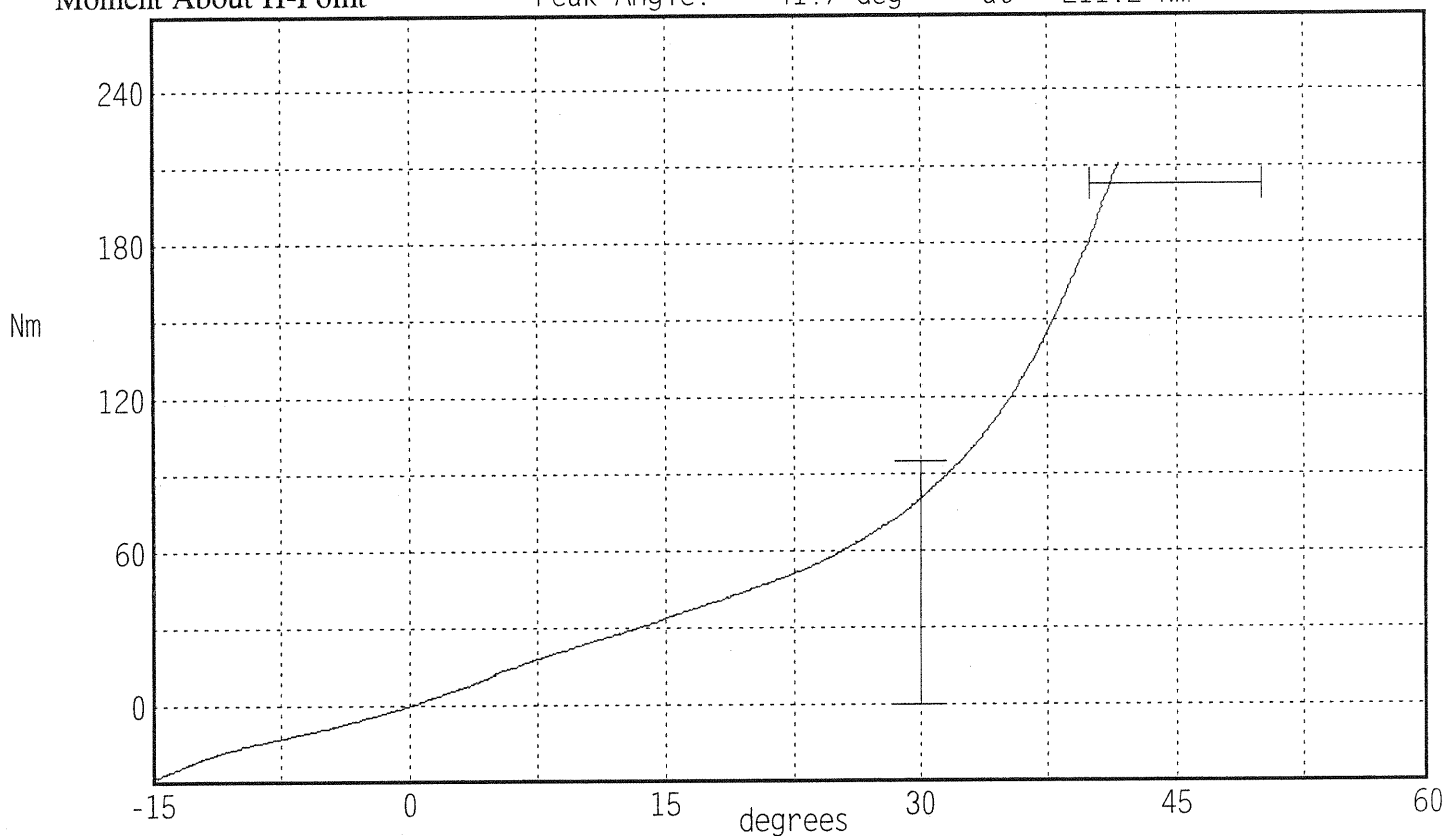
Hybrid III Hip Range of Motion

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

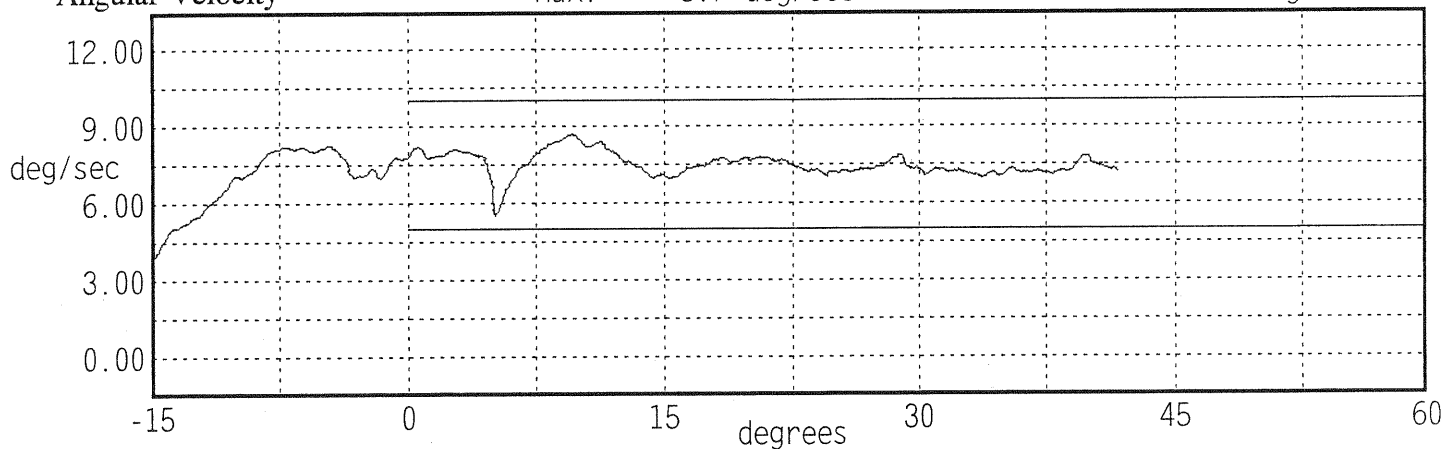
Date: 09/27/2007
Time: 10:49

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

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



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



Applied Safety Technologies Corp.

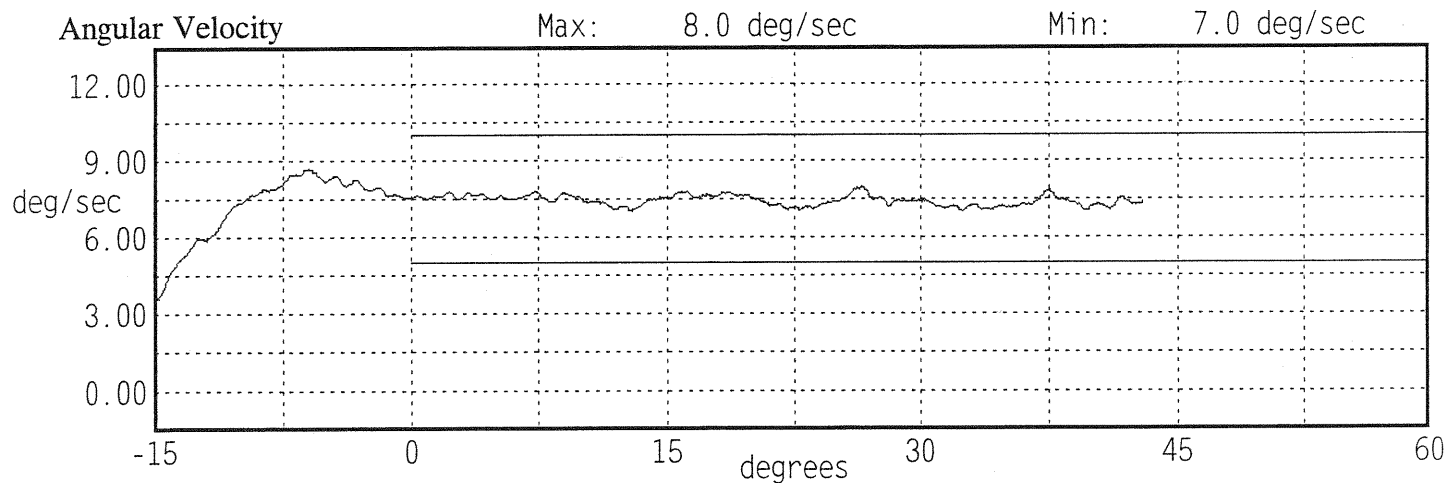
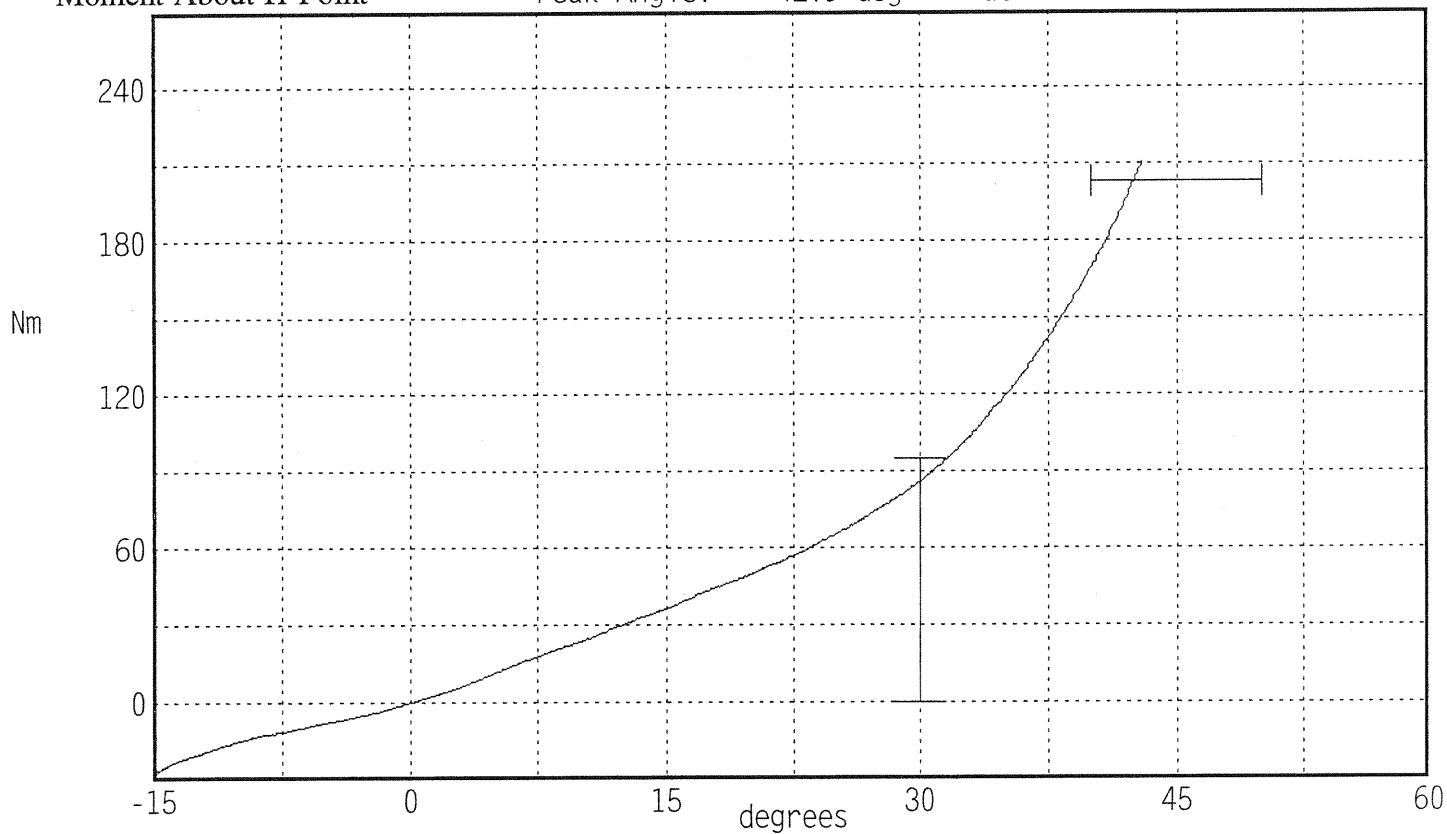
Hybrid III Hip Range of Motion

Serial Number: 037R
Test Number: 037C03
Comments:

Date: 09/27/2007
Time: 10:43

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

Moment About H-Point
Peak Moment: 210.4 Nm at 42.9 deg
Peak Angle: 42.9 deg at 210.4 Nm



Transportation Research Center Inc.

Left Knee Femur Response Test

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

Paul Baul

Approved

Don Stone

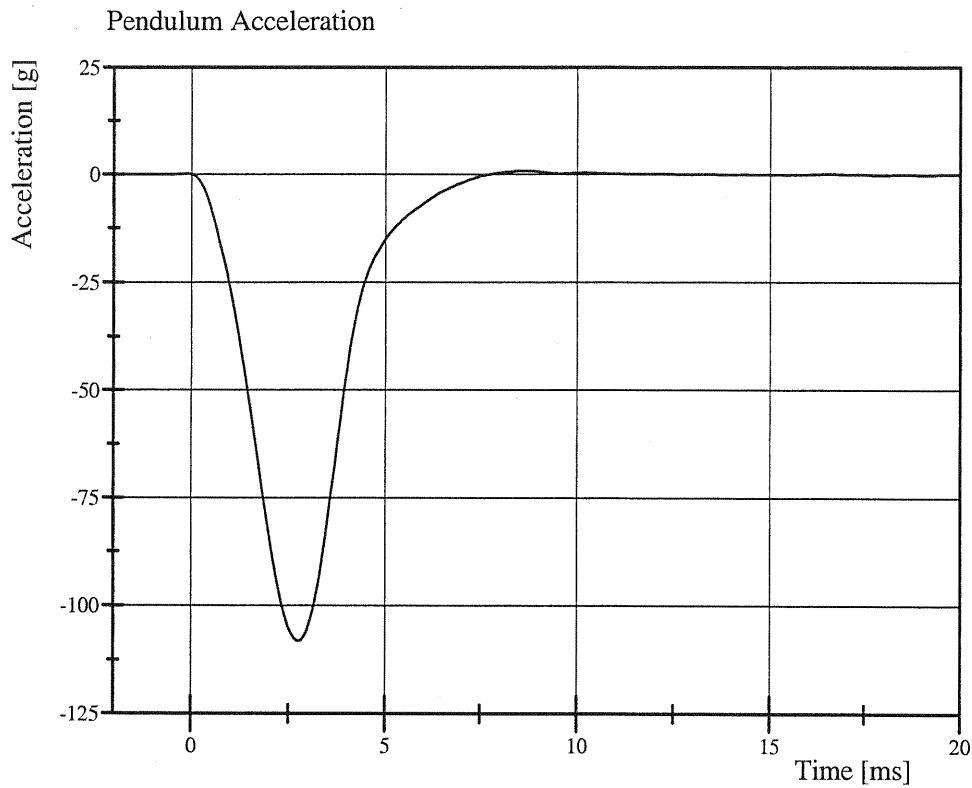


Transportation Research Center Inc.

Left Knee Femur Response Test

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

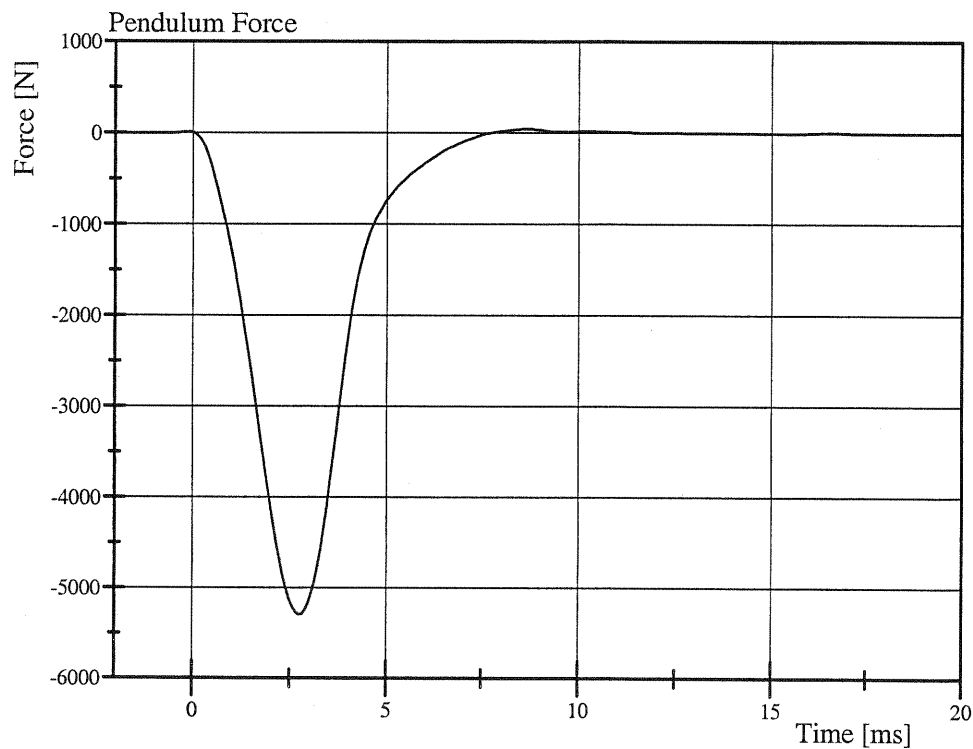
Test Date: 9/27/2007



Filter Class: CFC_600

Max: 0.8 g at 8.6 ms

Min: -108.2 g at 2.7 ms



Filter Class: CFC_600

Max: 40.9 N at 8.6 ms

Min: -5,292.0 N at 2.7 ms

Transportation Research Center Inc.

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

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

Test meets specifications.

Comments:

Technician

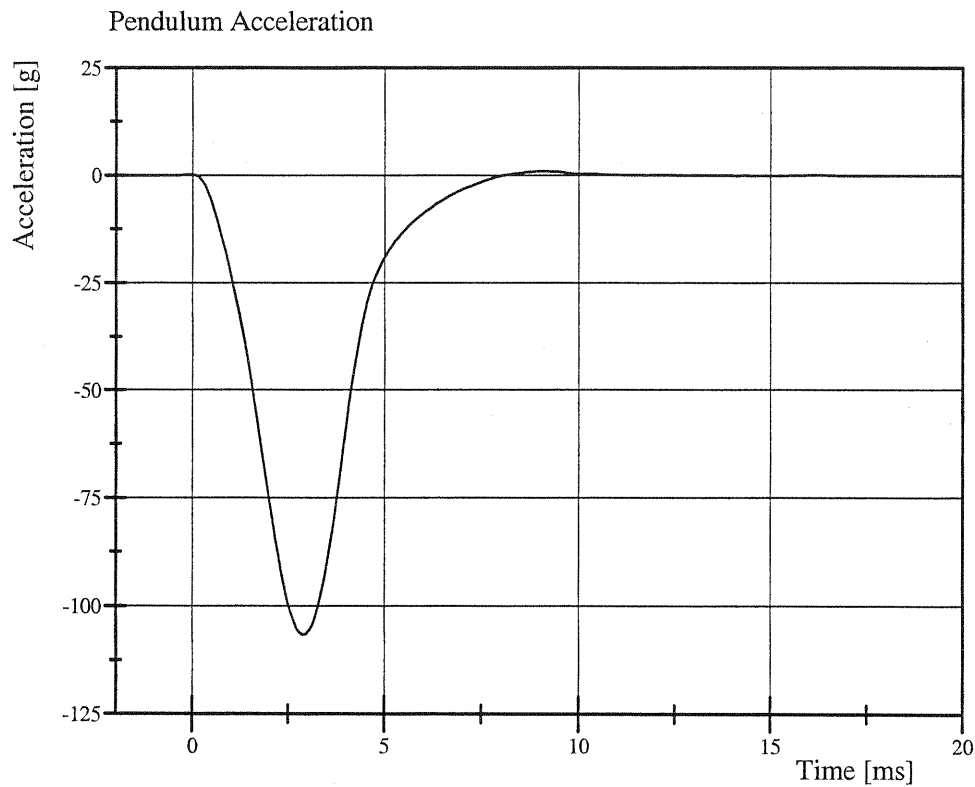
Charles W. Bell

Approved

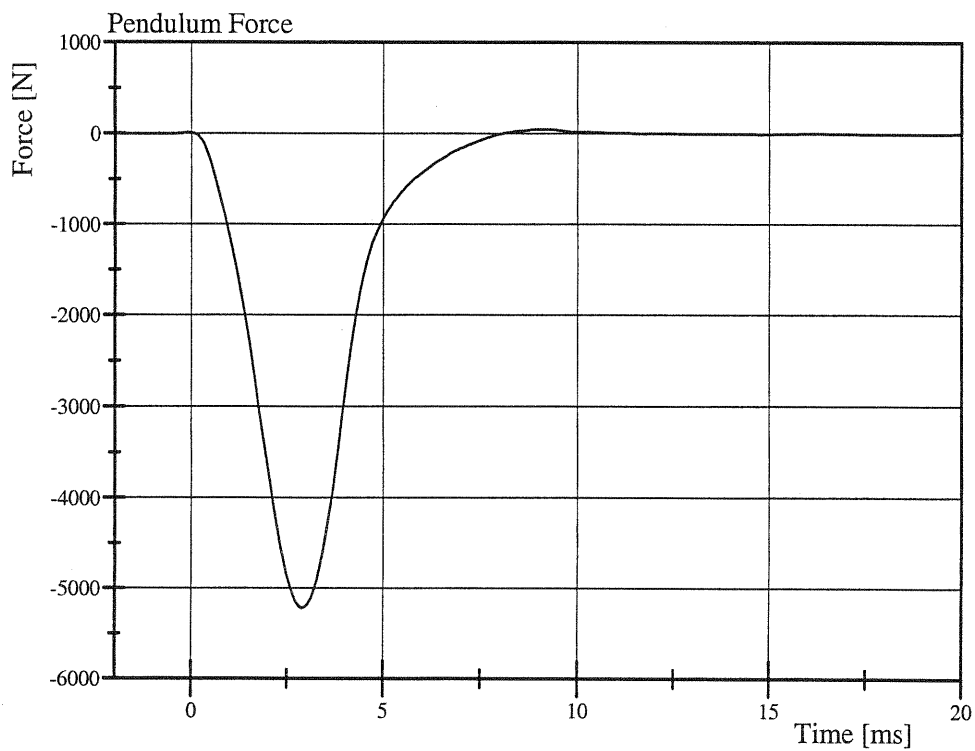
Ron Stoner

Transportation Research Center Inc.

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



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



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

CALIBRATION TEST RESULTS

PRE-TEST

SID/HIII: 352

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

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

Comments: Partial Set

Technician



Approved



Transportation Research Center Inc.

Front Head Drop

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

Technician
Raul Bernal

Approved

Ron Stoner

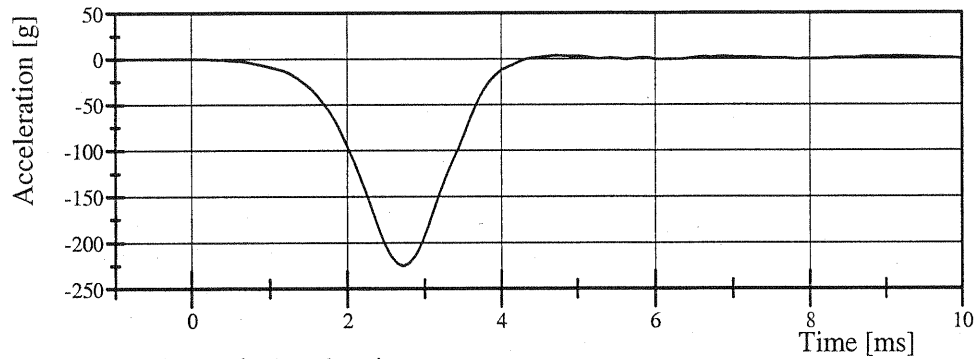
Transportation Research Center Inc.

Front Head Drop

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

Test Date: 9/27/2007

Head X-Axis Acceleration

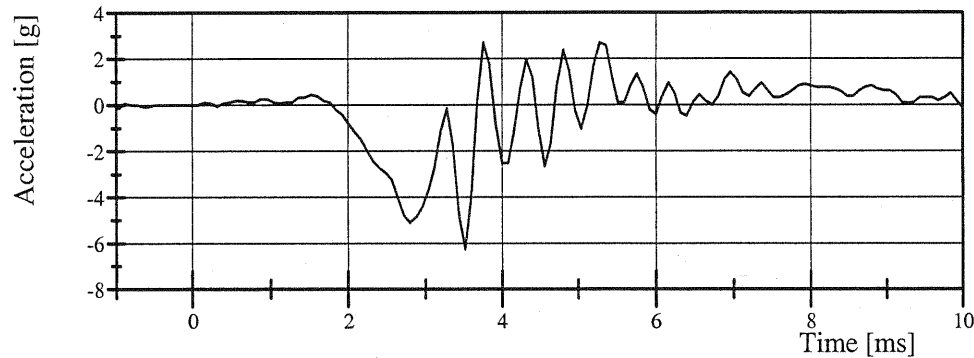


Filter Class: CFC_1000

Max: 3.8 g at 4.7 ms

Min: -225.5 g at 2.7 ms

Head Y-Axis Acceleration

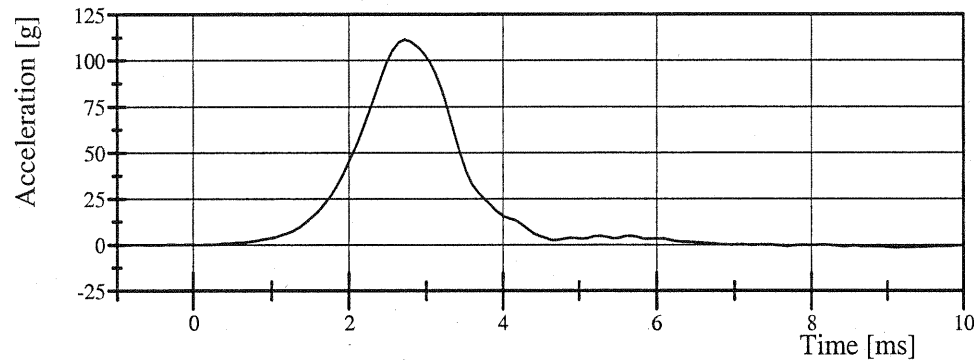


Filter Class: CFC_1000

Max: 2.7 g at 3.8 ms

Min: -6.3 g at 3.5 ms

Head Z-Axis Acceleration

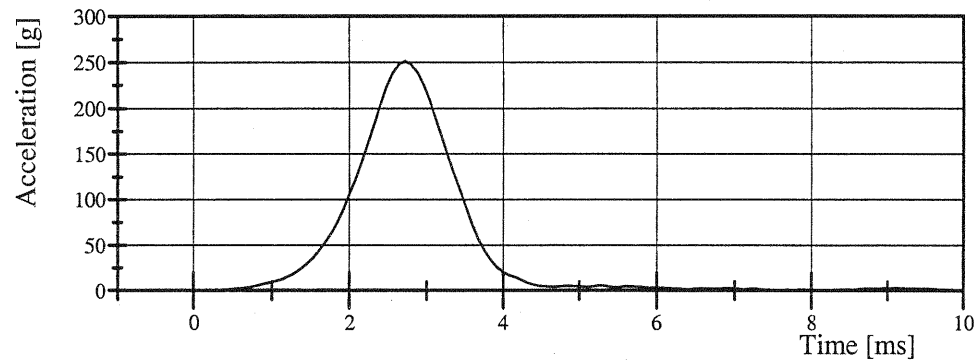


Filter Class: CFC_1000

Max: 111.4 g at 2.7 ms

Min: -1.5 g at 9.1 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 251.5 g at 2.7 ms

Min: 0.0 g at -0.8 ms

Transportation Research Center Inc.

Neck Flexion

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

Randy Broun

Approved

Ron Stoner

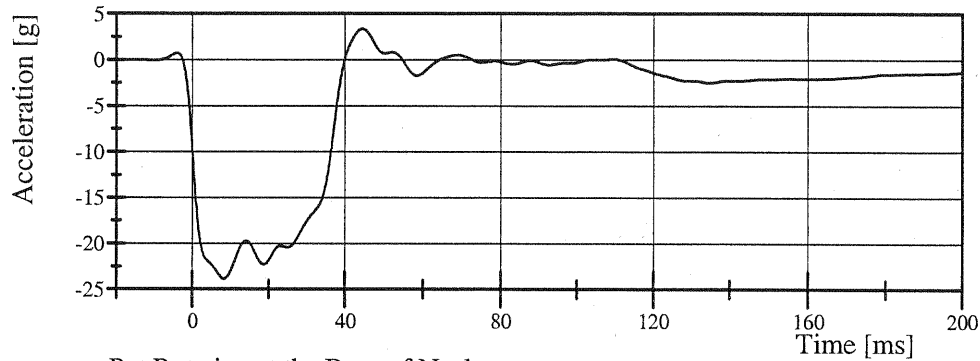
Transportation Research Center Inc.

Neck Flexion

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

Test Date: 9/27/2007

Pendulum Acceleration

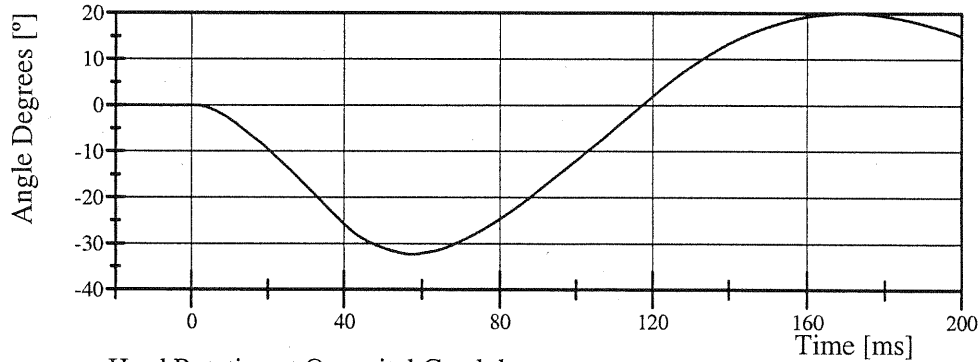


Filter Class: CFC_60

Max: 3.4 g at 44.5 ms

Min: -23.9 g at 8.3 ms

Pot Rotation at the Base of Neck

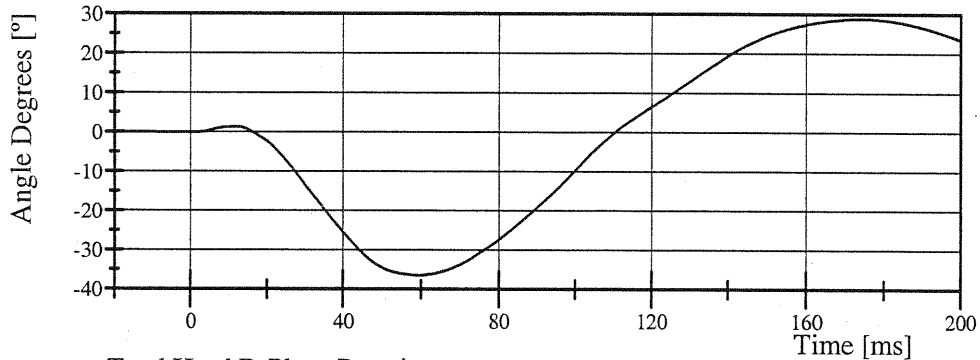


Filter Class: CFC_60

Max: 20.0 ° at 170.9 ms

Min: -32.3 ° at 57.4 ms

Head Rotation at Occypital Condyles

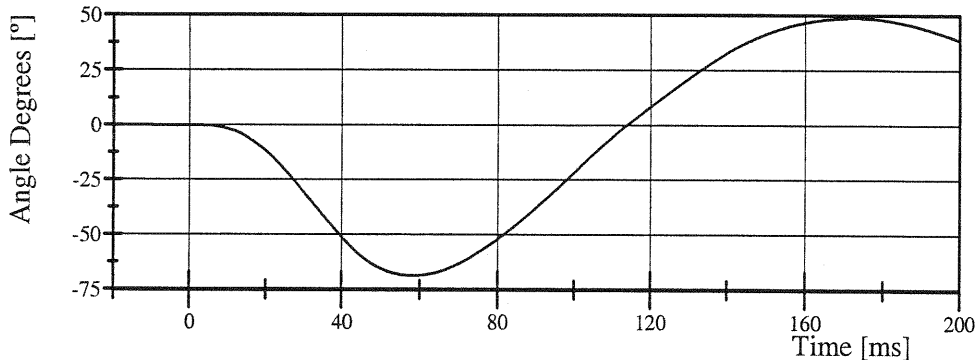


Filter Class: CFC_60

Max: 28.9 ° at 174.0 ms

Min: -36.4 ° at 59.4 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 48.8 ° at 172.6 ms

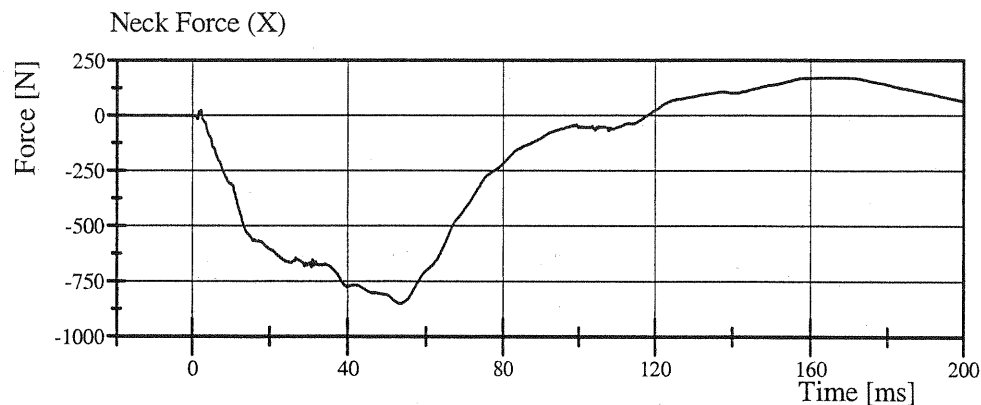
Min: -68.7 ° at 58.3 ms

Transportation Research Center Inc.

Neck Flexion

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

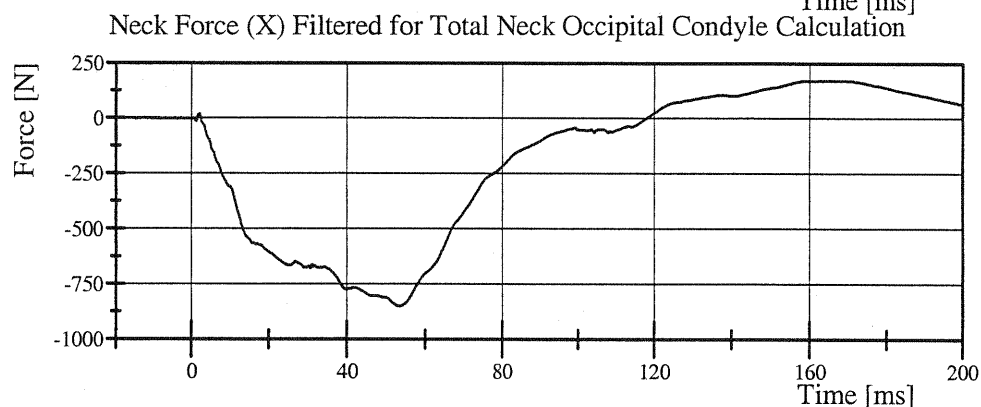
Test Date: 9/27/2007



Filter Class: CFC_1000

Max: 172.8 N at 164.1 ms

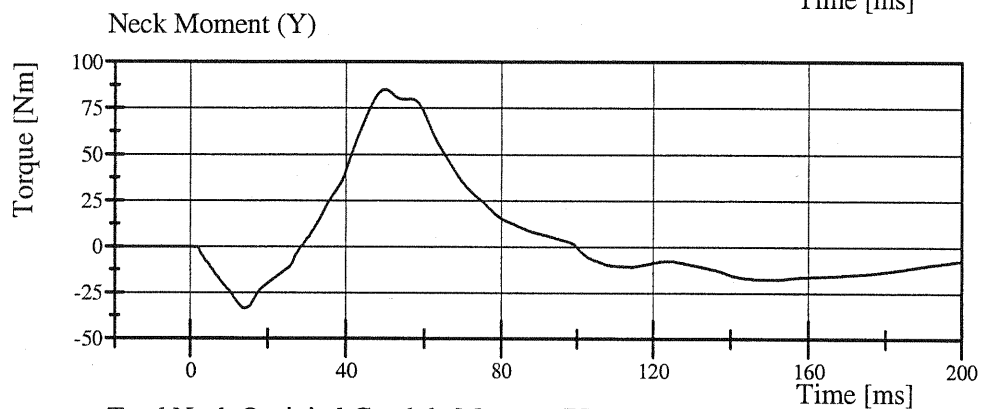
Min: -850.4 N at 53.4 ms



Filter Class: CFC_600

Max: 172.6 N at 164.2 ms

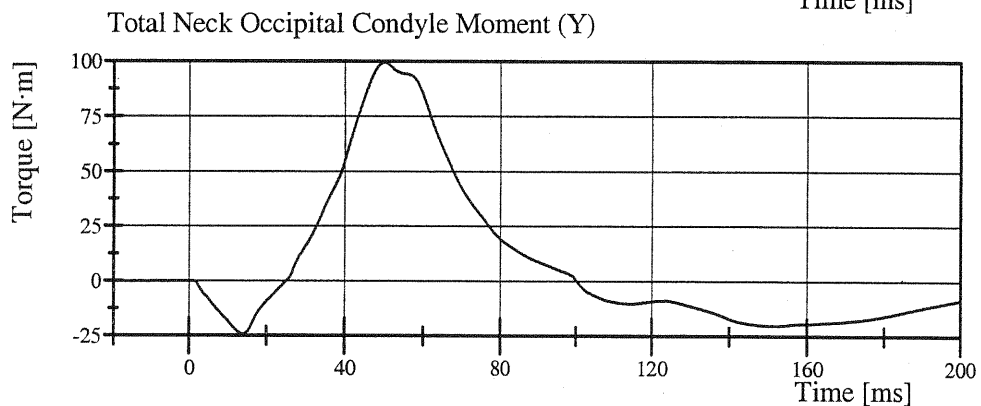
Min: -850.2 N at 53.4 ms



Filter Class: CFC_600

Max: 85.2 Nm at 49.9 ms

Min: -33.5 Nm at 14.0 ms



Filter Class: CFC_600

Max: 99.5 N·m at 49.9 ms

Min: -24.2 N·m at 13.8 ms

Transportation Research Center Inc.

Neck Extension

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

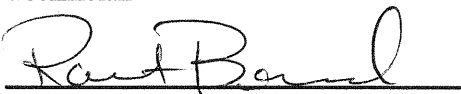
Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician



Approved

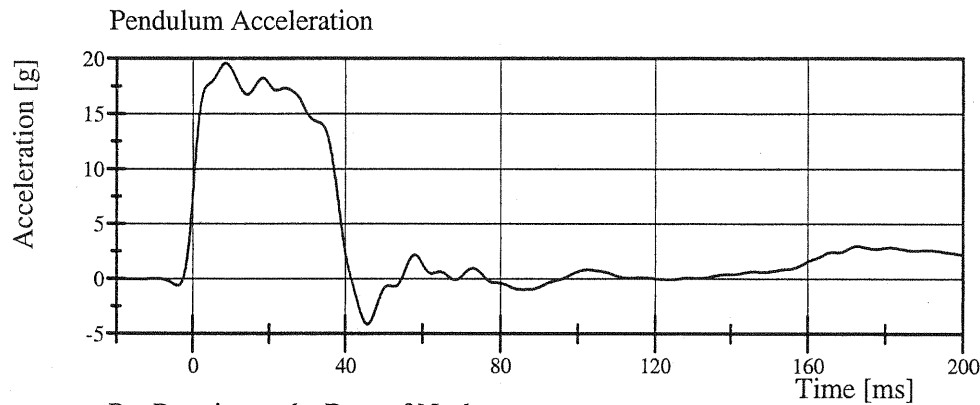


Transportation Research Center Inc.

Neck Extension

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

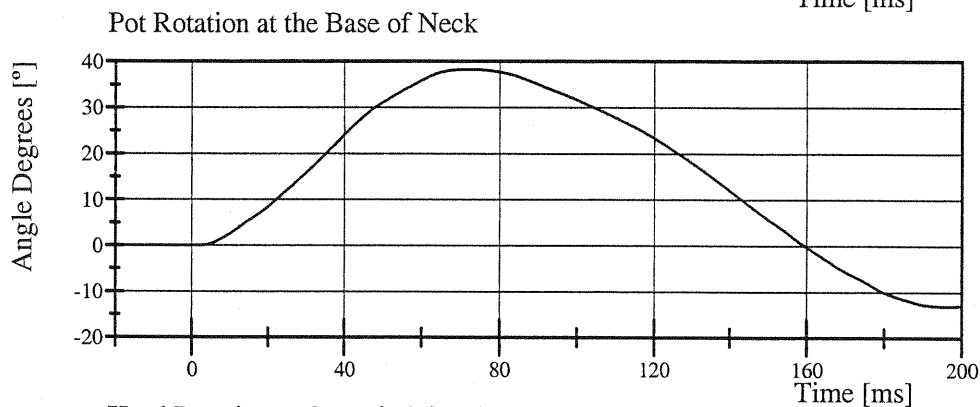
Test Date: 9/27/2007



Filter Class: CFC_60

Max: 19.6 g at 8.6 ms

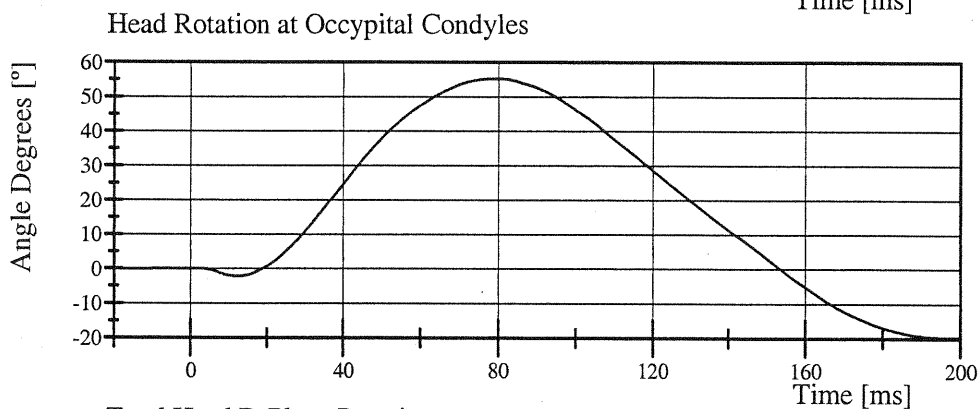
Min: -4.1 g at 45.8 ms



Filter Class: CFC_60

Max: 38.3 ° at 72.0 ms

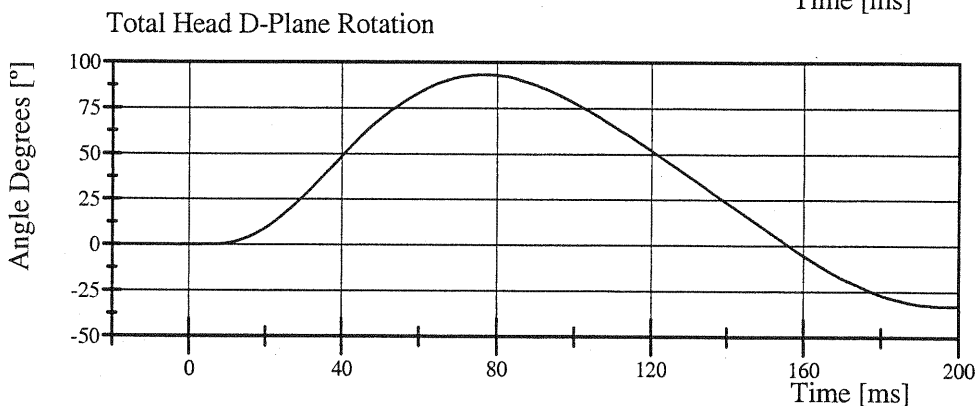
Min: -13.1 ° at 196.6 ms



Filter Class: CFC_60

Max: 55.3 ° at 79.2 ms

Min: -19.8 ° at 198.9 ms



Filter Class: CFC_60

Max: 93.3 ° at 76.9 ms

Min: -32.8 ° at 197.7 ms

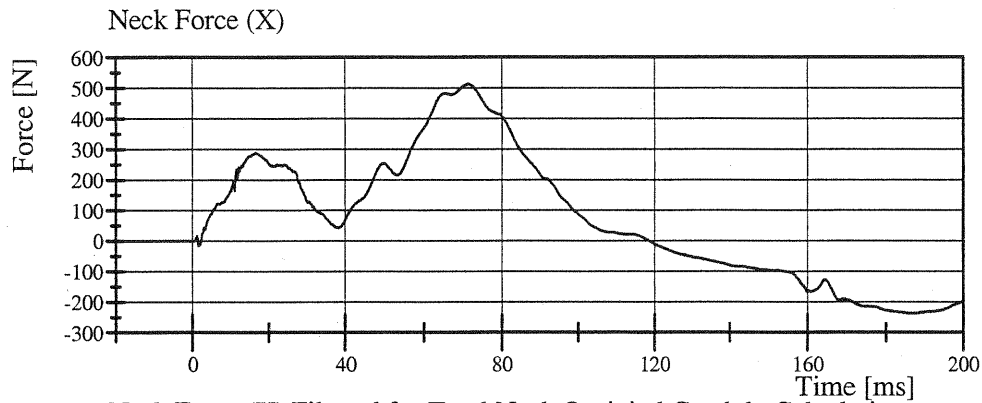


Transportation Research Center Inc.

Neck Extension

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

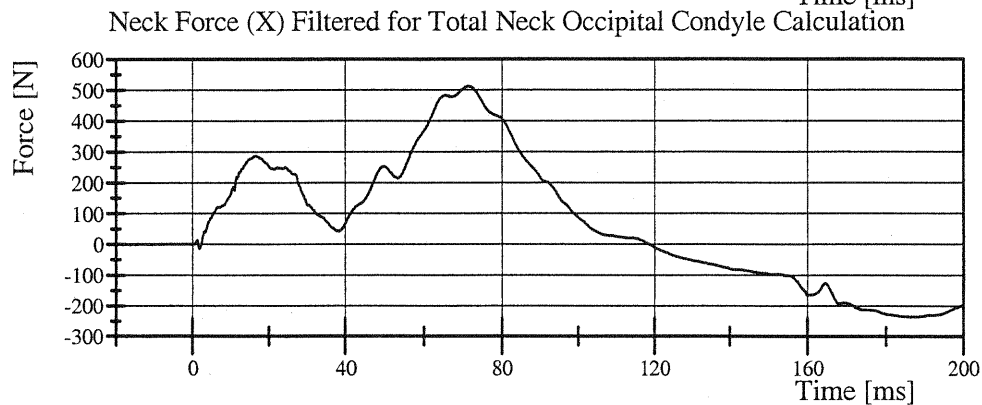
Test Date: 9/27/2007



Filter Class: CFC_1000

Max: 512.8 N at 71.4 ms

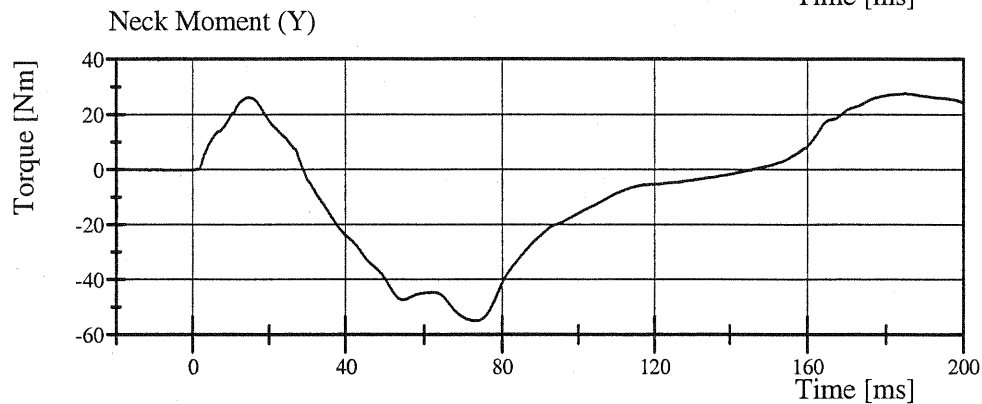
Min: -237.4 N at 186.0 ms



Filter Class: CFC_600

Max: 512.5 N at 71.4 ms

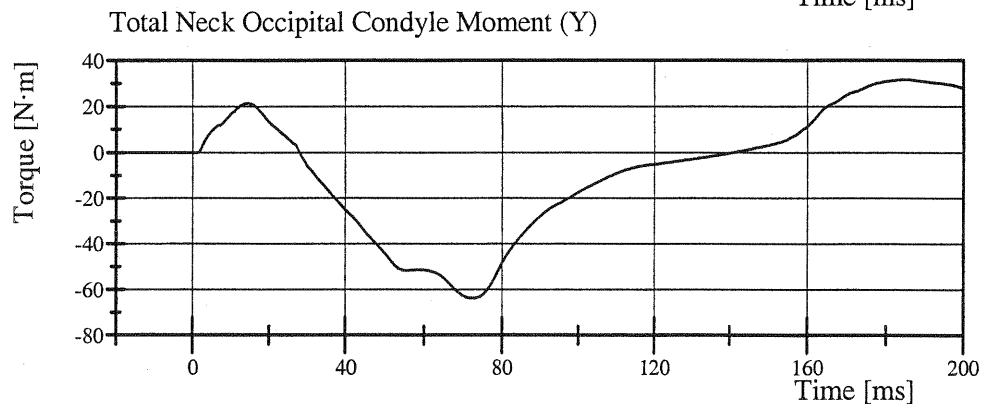
Min: -237.0 N at 186.0 ms



Filter Class: CFC_600

Max: 27.6 Nm at 184.9 ms

Min: -55.0 Nm at 72.9 ms



Filter Class: CFC_600

Max: 31.8 N·m at 185.1 ms

Min: -63.9 N·m at 72.6 ms

Transportation Research Center Inc.

Front Thorax

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

Raeel B. B. B.

Approved

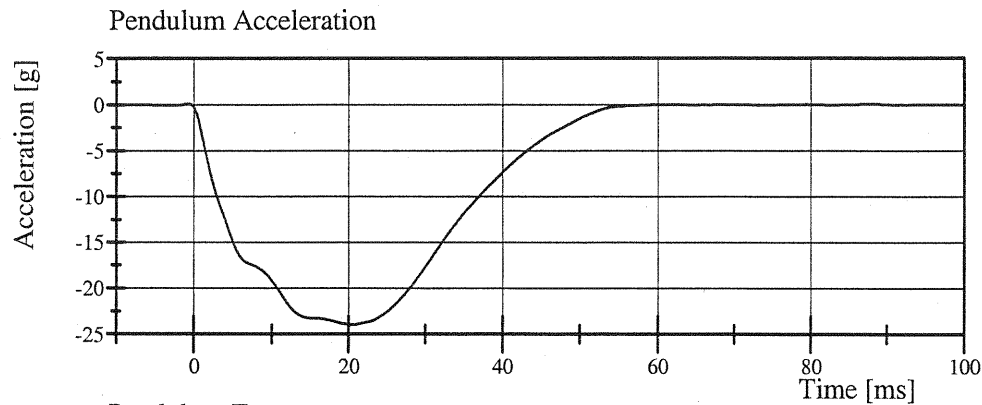
Ron Stoner

Transportation Research Center Inc.

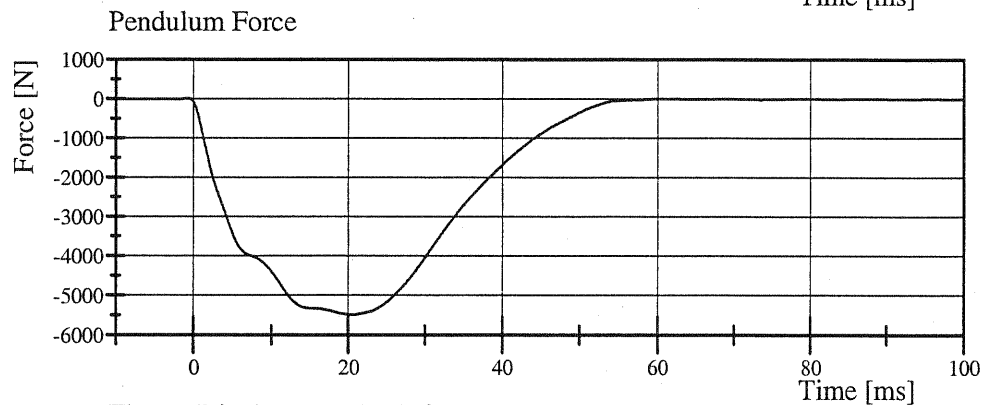
Front Thorax

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

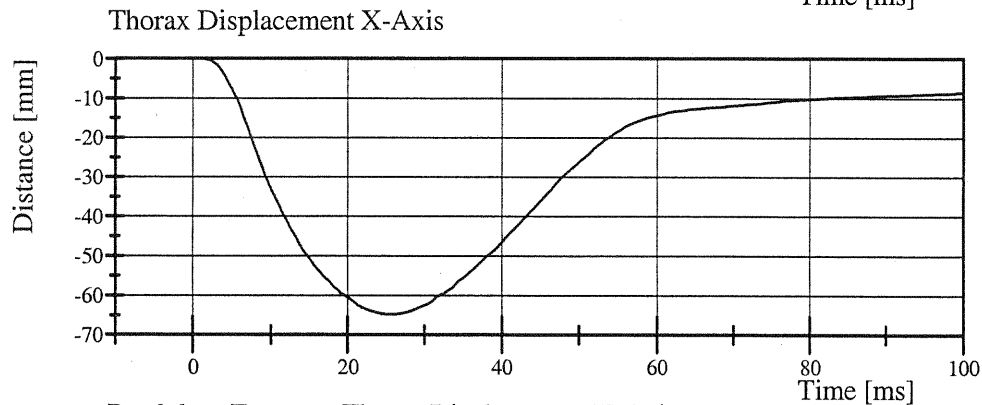
Test Date: 9/27/2007



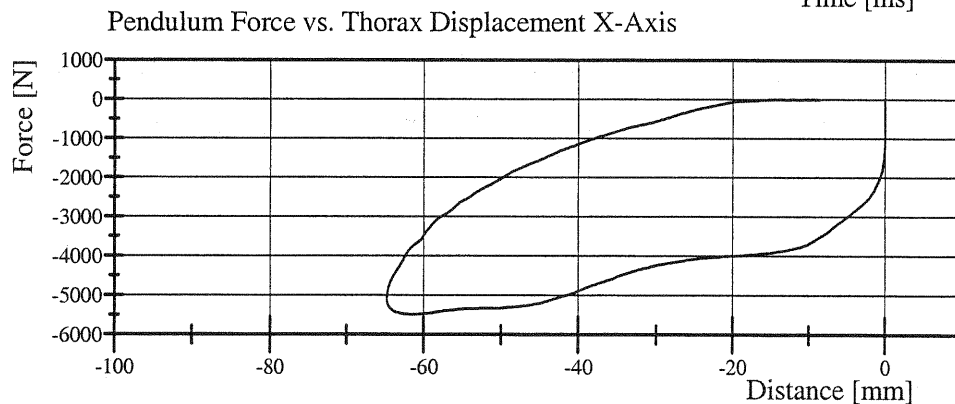
Filter Class: CFC_180
Max: 0.1 g at -0.7 ms
Min: -23.9 g at 20.6 ms



Filter Class: CFC_180
Max: 19.0 N at -0.7 ms
Min: -5,486.0 N at 20.6 ms



Filter Class: CFC_600
Max: 0.0 mm at 1.0 ms
Min: -64.8 mm at 25.4 ms



Filter Class: CFC_180
Max: 19.0 N at -0.0 mm
Min: -5,486.0 N at -61.5 mm

Applied Safety Technologies Corp.

Hybrid III Hip Range of Motion

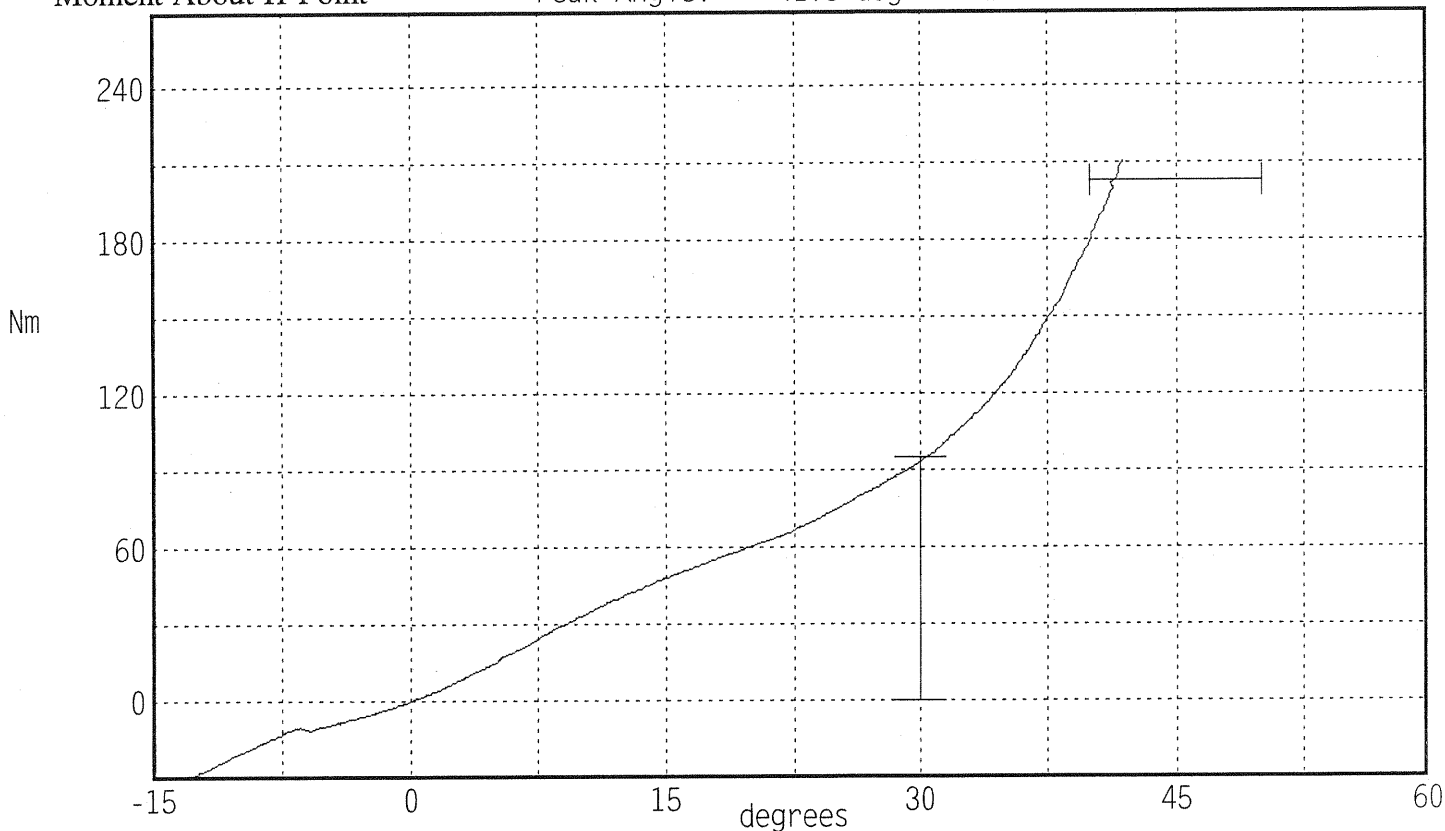
Serial Number: 352L
Test Number: 352C03
Comments:

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

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

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

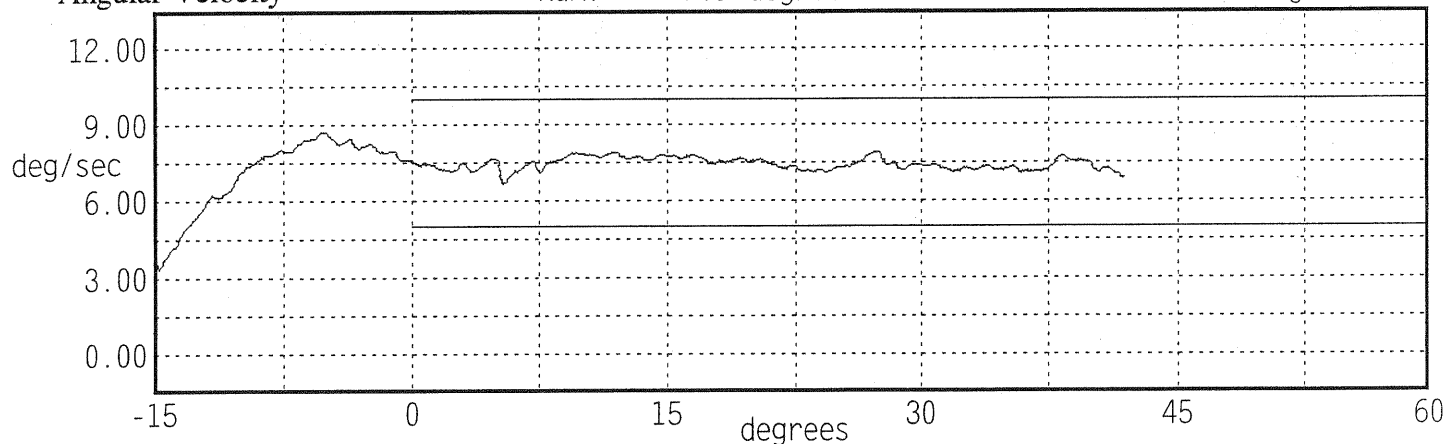
Moment About H-Point



Angular Velocity

Max: 7.9 deg/sec

Min: 6.7 deg/sec



Applied Safety Technologies Corp.

Hybrid III Hip Range of Motion

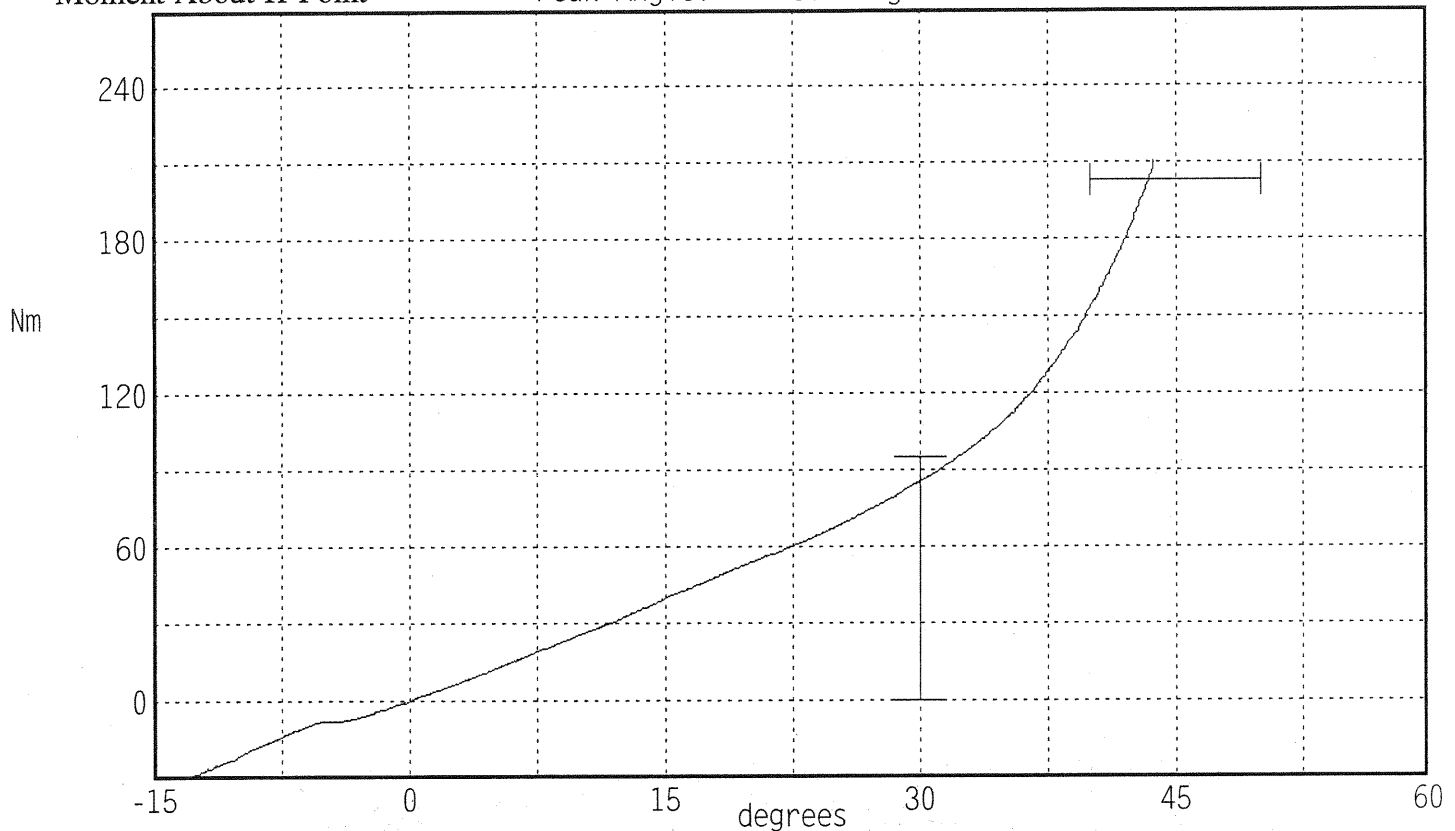
Serial Number: 352R
Test Number: 352C03
Comments:

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

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

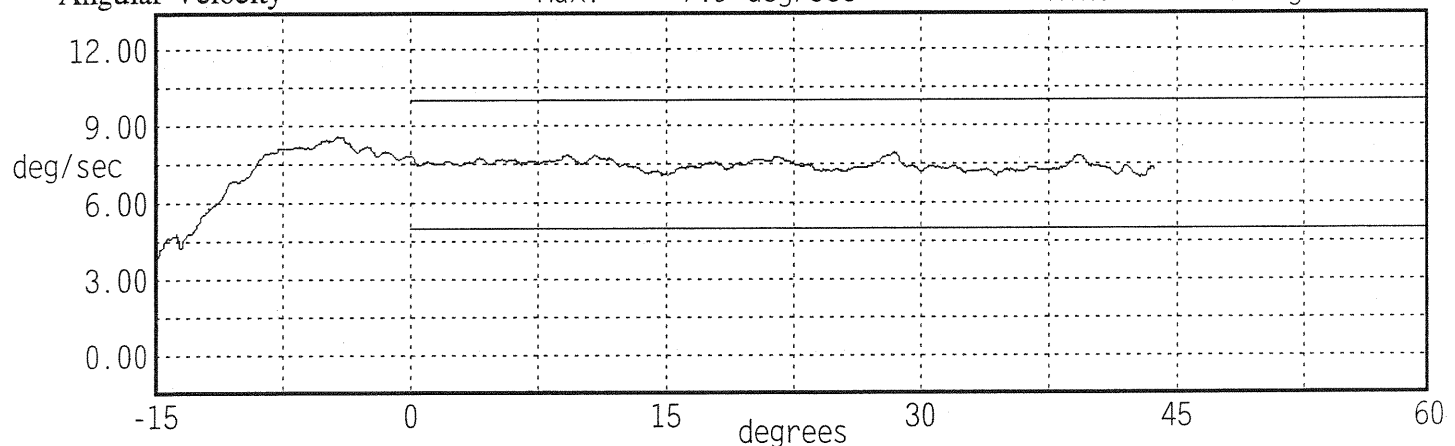
Peak Moment: 210.7 Nm at 43.7 deg
Peak Angle: 43.7 deg at 209.2 Nm

Moment About H-Point



Angular Velocity

Max: 7.9 deg/sec Min: 7.0 deg/sec



Transportation Research Center Inc.

Left Knee Femur Response Test

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

Test Date: 9/27/2007

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

Test meets specifications.

Comments:

Technician

David Baranick

Approved

Ron Stoner

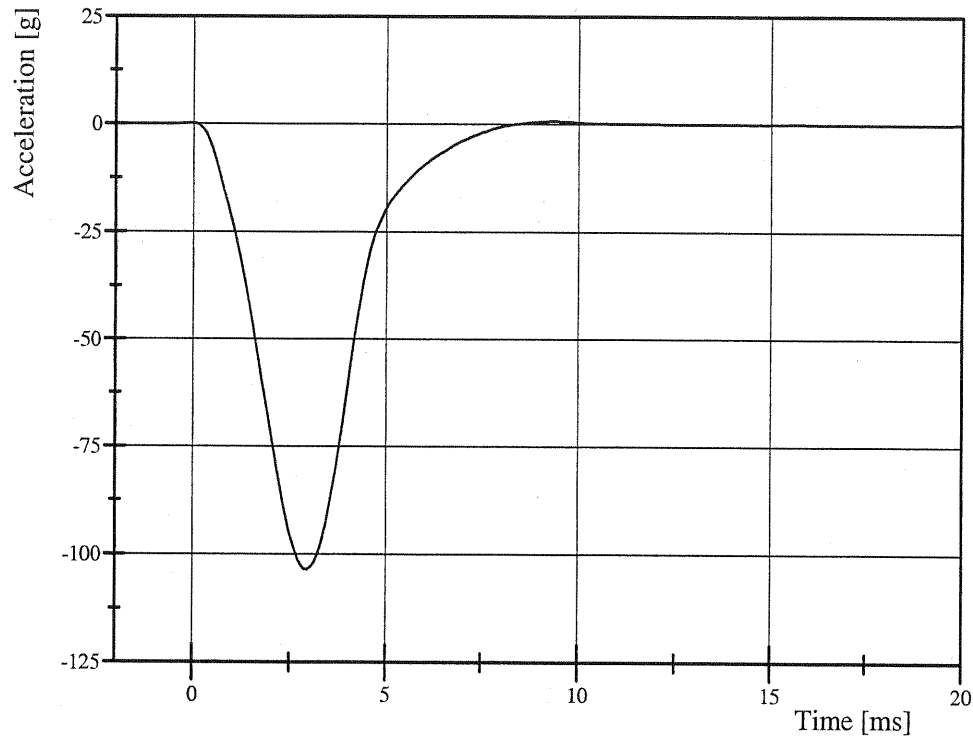
Transportation Research Center Inc.

Left Knee Femur Response Test

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

Test Date: 9/27/2007

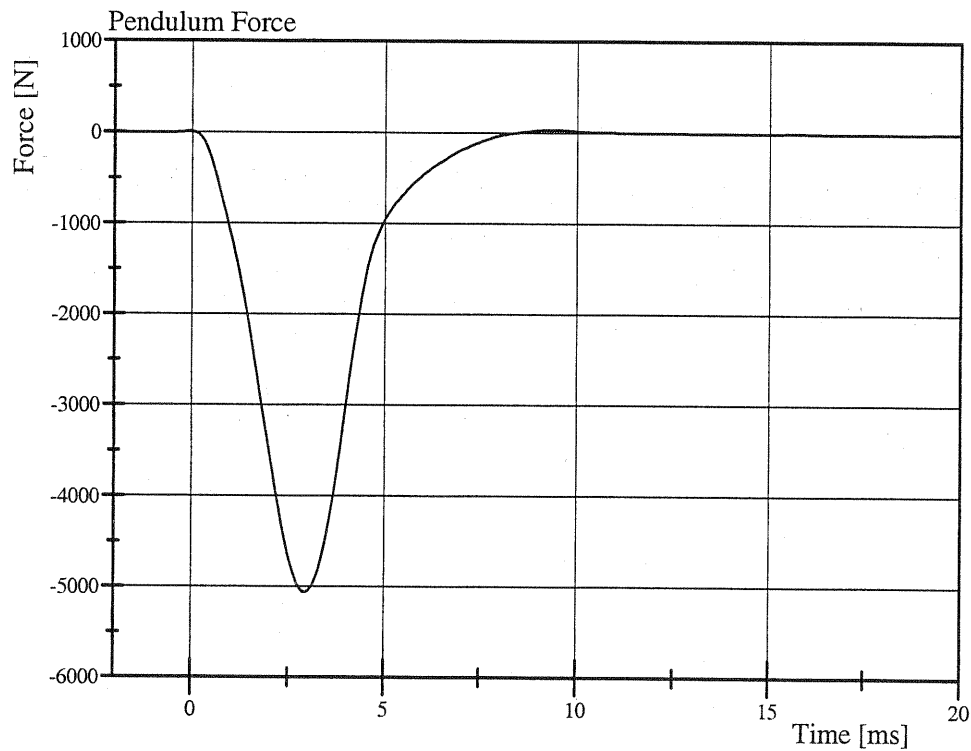
Pendulum Acceleration



Filter Class: CFC_600

Max: 0.7 g at 9.4 ms

Min: -103.5 g at 3.0 ms



Filter Class: CFC_600

Max: 33.4 N at 9.4 ms

Min: -5,064.7 N at 3.0 ms

Transportation Research Center Inc.

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

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

Test meets specifications.

Comments:

Technician

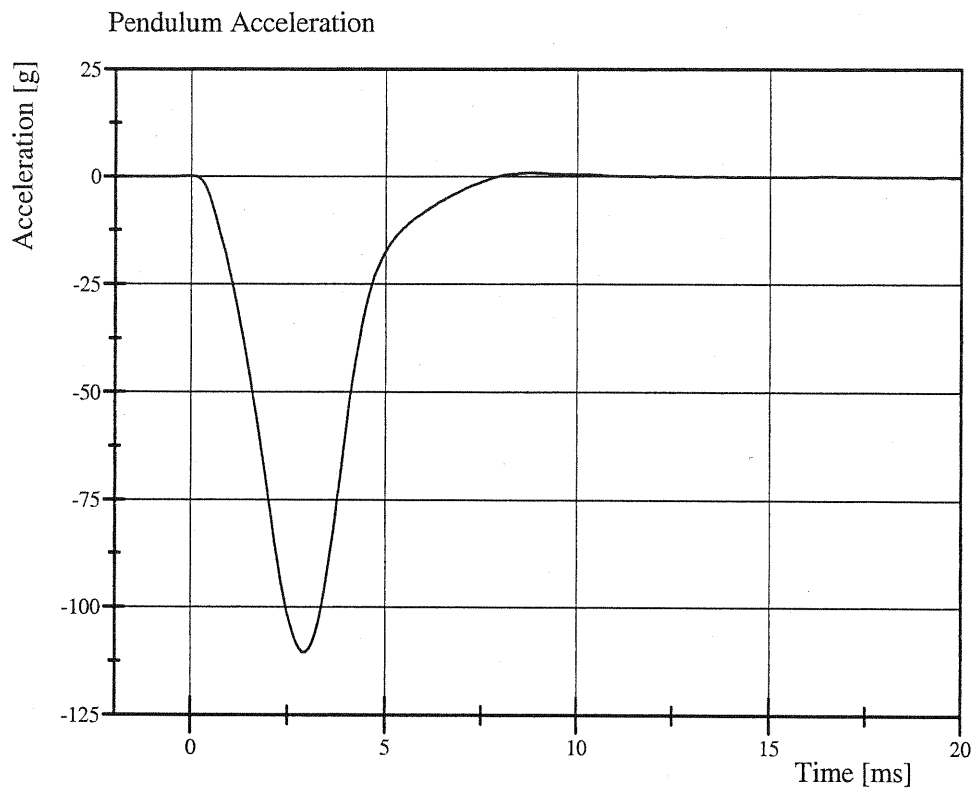
Rout Bumb

Approved

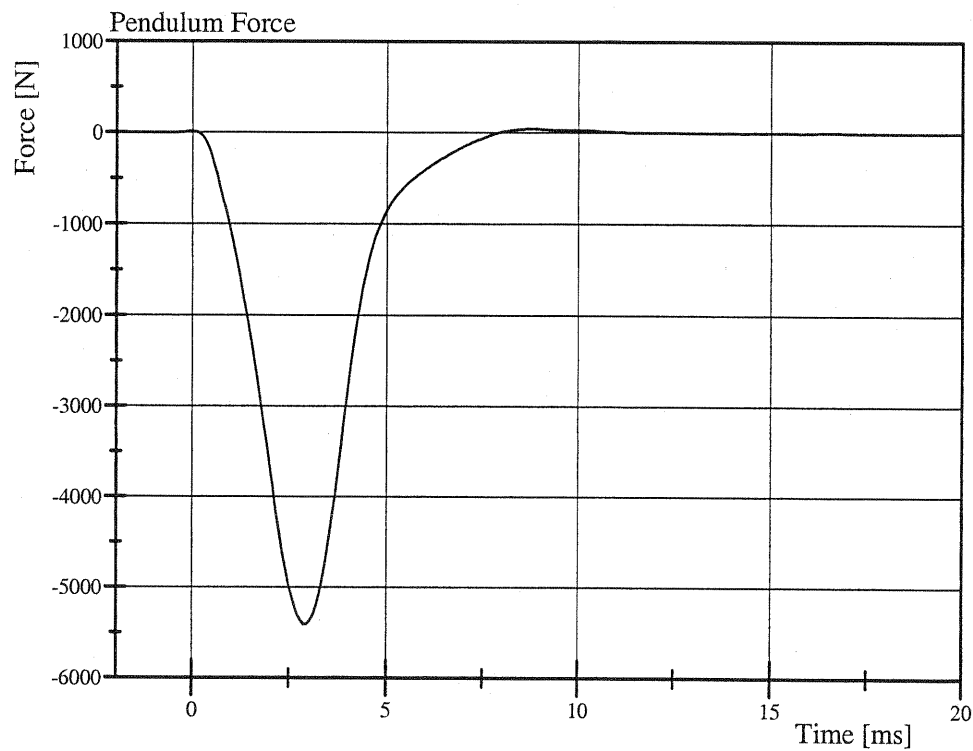
Ron Stoner

Transportation Research Center Inc.

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



Filter Class: CFC_600
Max: 0.9 g at 8.8 ms
Min: -110.4 g at 3.0 ms



Filter Class: CFC_600
Max: 42.8 N at 8.8 ms
Min: -5,404.1 N at 3.0 ms

APPENDIX D
CHILD RESTRAINT SYSTEM

REPORT NUMBER: NCAP-TRC-2007-002

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

**CHRYSLER LLC
2008 JEEP LIBERTY SPORT 4X4 MPV
NHTSA NUMBER: M80309**

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



Test Date: October 25, 2007

Report Date: November 7, 2007

FINAL REPORT

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

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-06-D-00029. 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: Jason J. Jenkins, Professional Engineer

Report Approved By: _____



Christopher Krouskop, Project Manager
Transportation Research Center Inc.

Approval Date: _____

11-7-07

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

1. Report No. NCAP-TRC-2007-002	2. Government Accession No.	3. Recipient's Catalog No.													
4. Title and Subtitle Final Report of a Graco Snugride CRS Final Report of a Combi Centre DX CRS NHTSA No.: M80309		5. Report Date November 7, 2007													
		6. Performing Organization Code TRC Inc.													
7. Author(s) Christopher Krouskop, Project Manager Transportation Research Center Inc.		8. Performing Organization Report No. 071025-2													
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		10. Work Unit No. (TRAIS)													
		11. Contract or Grant No. DTNH22-06-D-00029													
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 1200 New Jersey Avenue, S.E., Room W43-410 Washington, DC 20590		13. Type of Report and Period Covered Final Report September - October 2007													
		14. Sponsoring Agency Code DOT/NHTSA/NRM/OCS													
15. Supplemental Notes															
16. Abstract A side impact test was conducted on one (1) CRS Graco Snugride and one (1) CRS Safety 1st Starter 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 25, 2007. <table border="0" style="width: 100%;"> <tr> <td></td> <td style="text-align: center;"><u>Left Rear</u></td> <td></td> <td style="text-align: center;"><u>Right Rear</u></td> </tr> <tr> <td>Head Injury Criteria (HIC15):</td> <td style="text-align: center;"><u>526.3</u></td> <td style="text-align: center;">g's</td> <td style="text-align: center;"><u>429.7</u> g's</td> </tr> <tr> <td>3 ms Chest Clip:</td> <td style="text-align: center;"><u>52.3</u></td> <td style="text-align: center;">g's</td> <td style="text-align: center;"><u>47.2</u> g's</td> </tr> </table>					<u>Left Rear</u>		<u>Right Rear</u>	Head Injury Criteria (HIC15):	<u>526.3</u>	g's	<u>429.7</u> g's	3 ms Chest Clip:	<u>52.3</u>	g's	<u>47.2</u> g's
	<u>Left Rear</u>		<u>Right Rear</u>												
Head Injury Criteria (HIC15):	<u>526.3</u>	g's	<u>429.7</u> g's												
3 ms Chest Clip:	<u>52.3</u>	g's	<u>47.2</u> g's												
17. Key Words New Car Assessment Program (NCAP) Frontal Barrier Impact Test Final Report of a Graco Snugride CRS Final Report of a Combi Centre DX CRS		18. Distribution Statement <u>Copies of this report are available from:</u> NHTSA Technical Information Services (TIS) 1200 New Jersey Avenue, S.E., Room W43-410 Washington, DC 20590 Telephone No. (202) 366-4946 Attn: Robert Hornicle													
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. Number of Pages 97	22. Price												

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SECTION D1
PURPOSE AND SUMMARY OF TEST M85309

PURPOSE

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

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

SUMMARY

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

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

CHILD DUMMY VALUES		
Location	HIC15 Value	3 ms Chest Clip
CRABI (P3)	429.7	47.2
CRABI (P4)	526.3	52.3

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

CHILD RESTRAINT SYSTEM INFORMATION

Description	Position #4 CRS	Position #3 CRS
Manufacturer	Combi	Graco Children's Products, Inc.
Model Name	Centre DX	Snugride
Model No.	852084	8643PWC3
Type	Infant	Infant
Forward/Rearward	Rearward	Rearward

VISIBLE DUMMY CONTACT POINTS

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

POST-TEST DOOR OPENINGS

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

CAMERAS

Description	Standard
High Speed	2
Real Time	1
Total	3

DATA CHANNELS

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

DATA SHEET NO. 2**VEHICLE PARAMETER DATA**Test Vehicle: 2008 Jeep Liberty Sport 4x4NHTSA No.: M80309Test Program: NCAP Frontal ImpactTest Date: 10/25/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	505.4	474.4		544.2	563.5	
Right	kg	486.4	436.0		525.0	537.6	
Ratio	%	52.1	47.9		49.3	50.7	
Totals	kg	991.8	910.4	1902.2	1069.2	1101.1	2170.3

TARGET TEST WEIGHT CALCULATION

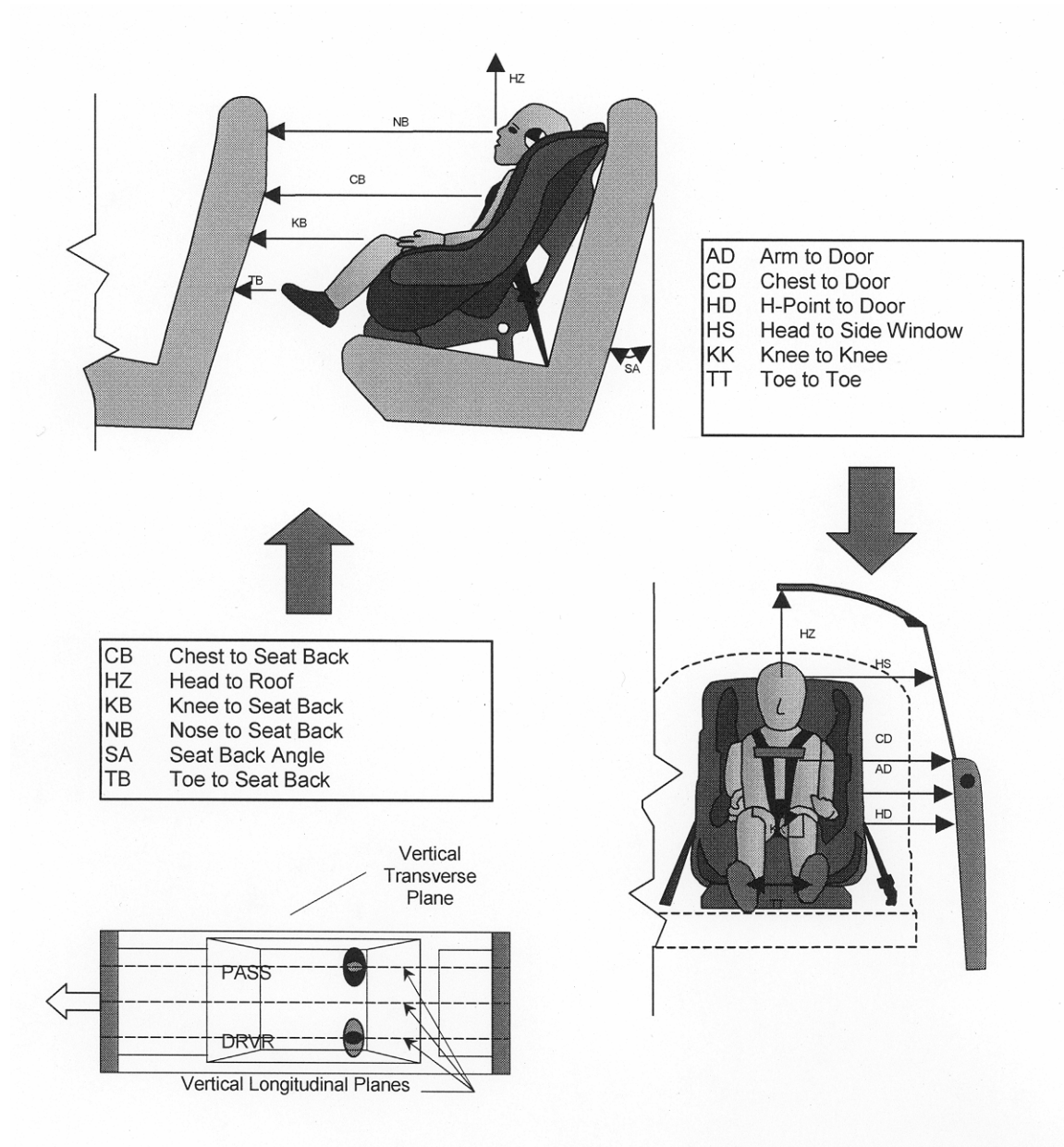
Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1902.2
Weight of 2 P572M ATDs	kg	172.0
Rated Cargo/Luggage Weight (RCLW)	kg	90.0
Calculated Vehicle Target Weight (TVTW)	kg	2164.2

DATA SHEET NO. 3

CRABI POSITIONING IN VEHICLE

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07



Note: Child seat was rearward facing.

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

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

Code	Measurement Description	P4 (Driver's Side)		P3 (Passenger's Side)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
SA	Seat Back Angle		23.3		23.3
AD	Arm to Door	146		233	
CD	Chest to Door	355		329	
HD	H-Point to Door	325		293	
HS	Head to Side Window	385		360	
KK	Knee to Knee	100		100	
TT	Toe to Toe	90		90	
CB	Chest to Seatback	383		413	
HZ	Head to Roof	385		373	
KB	Left Knee to Seatback	210		240	
NB	Nose to Seatback	488		503	
TB	Toe to Seatback	65		65	

DATA SHEET NO. 4**CRS PERFORMANCE DATA**Test Vehicle: 2008 Jeep Liberty Sport 4x4NHTSA No.: M80309Test Program: NCAP Frontal ImpactTest Date: 10/25/07**CRS PERFORMANCE DATA**

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

DATA SHEET NO. 5

CRS ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Jeep Liberty Sport 4x4
Test Program: NCAP Frontal Impact

NHTSA No.: M80309
Test Date: 10/25/07

CRS ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	CRS CG (P4)	2280	480	910
2	CRS CG (P3)	2285	560	915

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

DATA SHEET NO. 6**HIGH SPEED CAMERA LOCATIONS AND DATA**Test Vehicle: 2008 Jeep Liberty Sport 4x4NHTSA No.: M80309Test Program: NCAP Frontal ImpactTest Date: 10/25/07**CAMERA LOCATIONS**

No.	Camera View	Location (mm)			Angle (Deg.)	Film Plane to Head	Lens (mm)	Frame Speed (fps)
		X	Y	Z				
1	Onboard at Right Rear Dummy View	2650	800	1500	19.4	400	6.5	1000
2	Onboard at Left Rear Dummy View	2680	800	1500	19.9	500	6.5	1000

Reference Points: X - Impact Line

Y - MDB Left Edge Impact Point

Z - Ground Plane

APPENDIX D2
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

<u>FIGURE</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
Figure D-1	Left Rear Child Restraint System Certification Label View	D2-3
Figure D-2	Post-Test Front View of Left Rear CRS	D2-4
Figure D-3	Post-Test Left Side View of Left Rear CRS	D2-5
Figure D-4	Post-Test Right Side View of Left Rear CRS	D2-6
Figure D-5	Pre-Test Front View of Left Rear Child Dummy	D2-7
Figure D-6	Post-Test Front View of Left Rear Child Dummy	D2-8
Figure D-7	Pre-Test Left View of Left Rear Child Dummy	D2-9
Figure D-8	Post-Test Left View of Left Rear Child Dummy	D2-10
Figure D-9	Pre-Test Right View of Left Rear Child Dummy	D2-11
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Figure D-20	Post-Test Left View of Right Rear Child Dummy	D2-22
Figure D-21	Pre-Test Right View of Right Rear Child Dummy	D2-23
Figure D-22	Post-Test Right View of Right Rear Child Dummy	D2-24
Figure D-23	Post-Test Right Rear Child Dummy Head Contact View	D2-25
Figure D-24	Post-Test Right Rear Child Dummy Foot Contact View	D2-26

safety reasons. You must register this restraint to be reached in a recall. Send your name, address, and the restraint's model number and manufacturing date to Combi USA at the address shown above or call 1-800-992-6624.

For recall information call the US Governments Auto Safety Hotline at 1-888-327-4236 (TTY: 1-800-438-9153), or go to <http://www.NHTSA.gov>

Model Name : Centre DX ARB
Model Number : 852084
Manufactured in : 06-28-2007
CC43C0221SC00478



S

HINA

Figure D2-1 Left Rear Child Restraint System Certification Label View



Figure D2-2 Post-Test Front View of Left Rear CRS



Figure D2-3 Post-Test Left Side View of Left Rear CRS

D2-5

071025-2



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



Figure D2-5 Pre-Test Front View of Left Rear Child Dummy



Figure D2-6 Post-Test Front View of Left Rear Child Dummy



Figure D2-7 Pre-Test Left View of Left Rear Child Dummy



Figure D2-8 Post-Test Left View of Left Rear Child Dummy



Figure D2-9 Pre-Test Right View of Left Rear Child Dummy



Figure D2-10 Post-Test Right View of Left Rear Child Dummy



Figure D2-11 Post-Test Left Rear Child Dummy Head Contact View



Figure D2-12 Post-Test Left Rear Child Dummy Foot Contact View

D2-14

071025-2

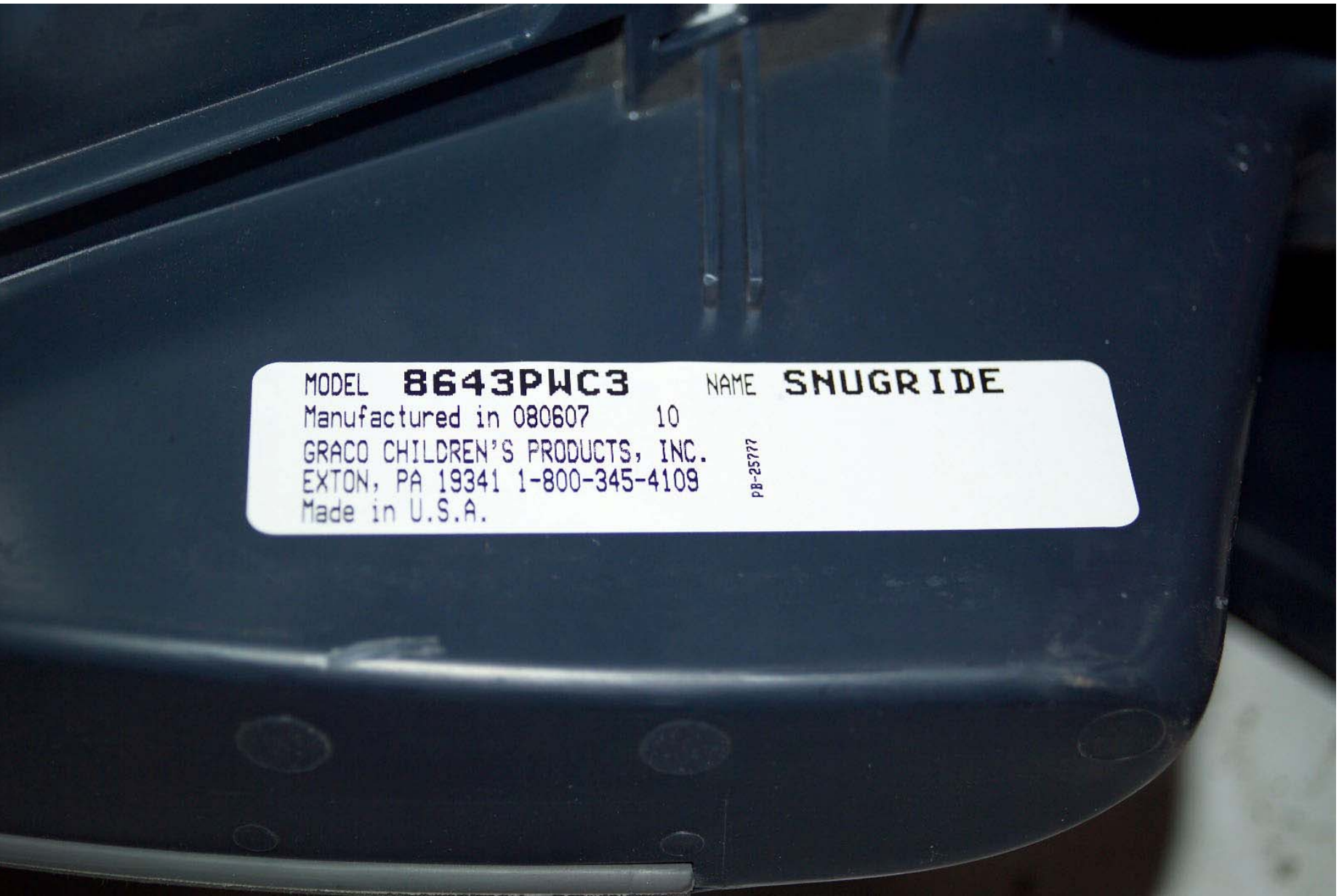


Figure D2-13 Right Rear Child Restraint System Certification Label View



Figure D2-14 Post-Test Front View of Right Rear CRS



Figure D2-15 Post-Test Left Side View of Right Rear CRS

D2-17

071025-2



Figure D2-16 Post-Test Right Side View of Right Rear CRS

D2-18

071025-2



Figure D2-17 Pre-Test Front View of Right Rear Child Dummy



Figure D2-18 Post-Test Front View of Right Rear Child Dummy



Figure D2-19 Pre-Test Left View of Right Rear Child Dummy



Figure D2-20 Post-Test Left View of Right Rear Child Dummy

D2-22

071025-2



Figure D2-21 Pre-Test Right View of Right Rear Child Dummy



Figure D2-22 Post-Test Right View of Right Rear Child Dummy



Figure D2-23 Post-Test Right Rear Child Dummy Head Contact View

D2-25

071025-2



Figure D2-24 Post-Test Right Rear Child Dummy Foot Contact View

APPENDIX D3
CRABI RESPONSE AND CRS DATA

LIST OF DATA PLOTS

Data Plot		Page
D3-1	Left Rear CRABI Head X	D3-3
D3-1	Left Rear CRABI Head Y	D3-3
D3-1	Left Rear CRABI Head Z	D3-3
D3-1	Left Rear CRABI Head Resultant	D3-3
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D3-2	Left Rear CRABI Chest Y	D3-4
D3-2	Left Rear CRABI Chest Z	D3-4
D3-2	Left Rear CRABI Chest Resultant	D3-4
D3-3	Right Rear CRABI Head X	D3-5
D3-3	Right Rear CRABI Head Y	D3-5
D3-3	Right Rear CRABI Head Z	D3-5
D3-3	Right Rear CRABI Head Resultant	D3-5
D3-4	Right Rear CRABI Chest X	D3-6
D3-4	Right Rear CRABI Chest Y	D3-6
D3-4	Right Rear CRABI Chest Z	D3-6
D3-4	Right Rear CRABI Chest Resultant	D3-6

NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

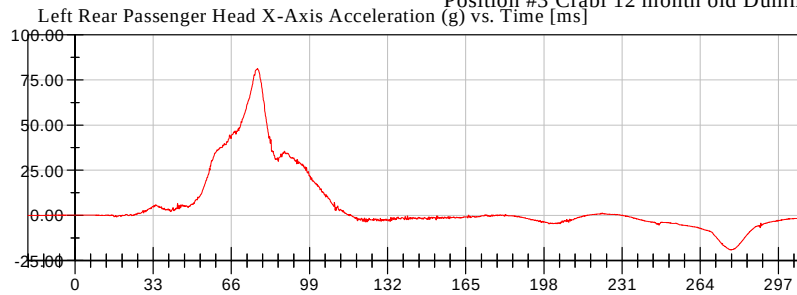
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)

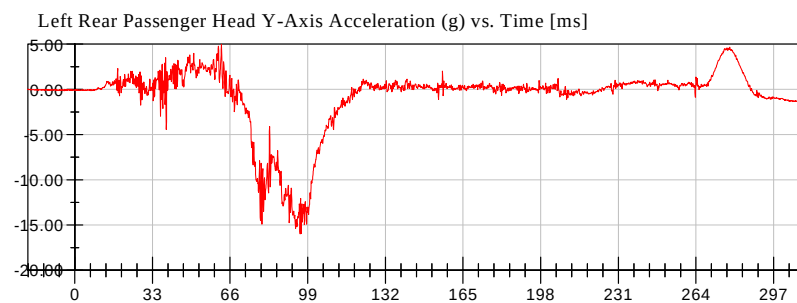


<Max>

81.35 g at 77.04 ms

<Min>

-19.18 g at 277.12 ms

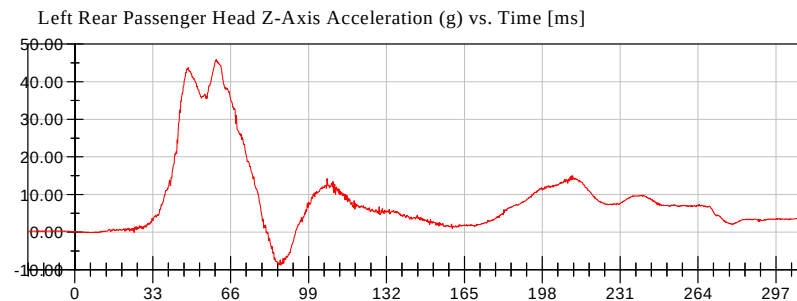


<Max>

5.00 g at 62.32 ms

<Min>

-15.95 g at 95.76 ms

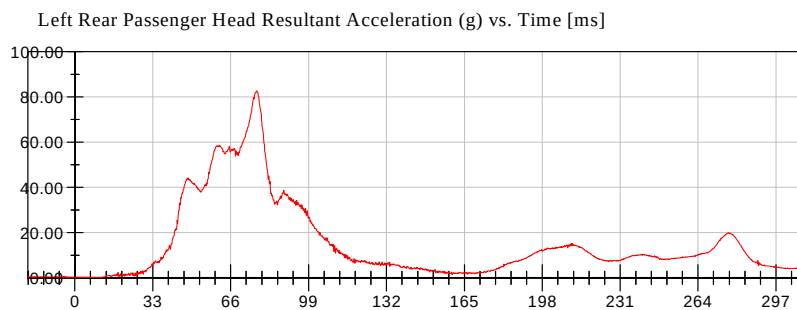


<Max>

45.92 g at 59.84 ms

<Min>

-8.77 g at 87.28 ms



<Max>

82.76 g at 77.04 ms

<Min>

0.02 g at 9.28 ms



NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

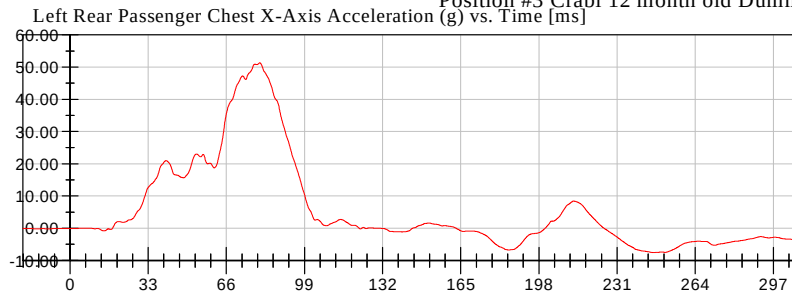
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



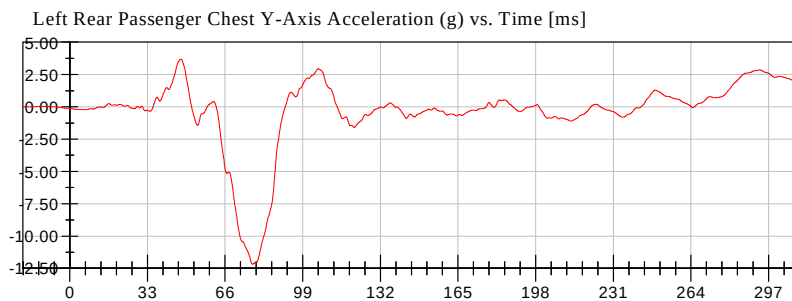
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51.36 g at 80.16 ms

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-7.52 g at 246.32 ms

CFC_180



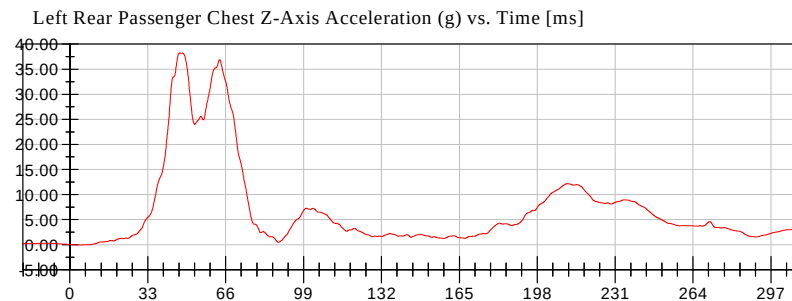
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3.69 g at 47.20 ms

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-12.18 g at 77.76 ms

CFC_180



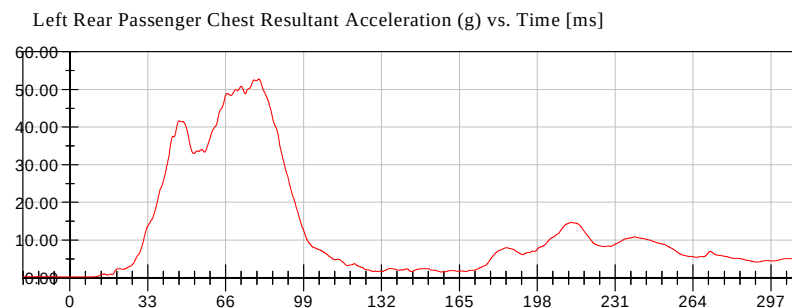
<Max>

38.27 g at 46.40 ms

<Min>

-0.04 g at 4.32 ms

CFC_180



<Max>

52.76 g at 80.08 ms

<Min>

0.16 g at 8.80 ms

CFC_180



NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

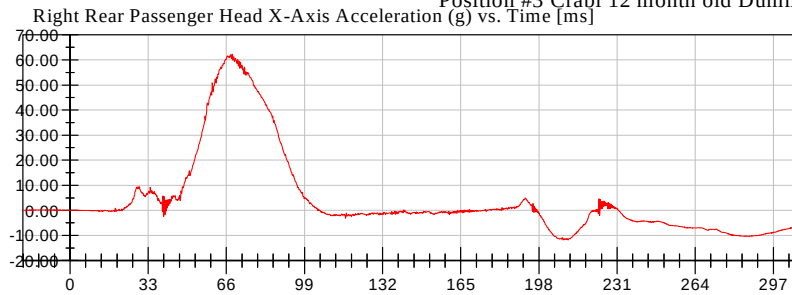
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



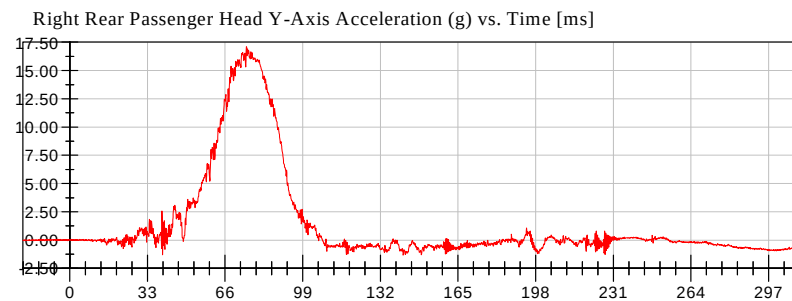
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62.28 g at 68.48 ms

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-11.86 g at 208.24 ms

CFC_1000



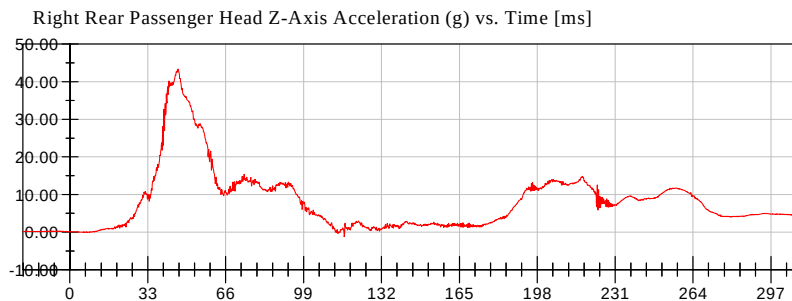
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17.10 g at 75.04 ms

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-1.31 g at 141.68 ms

CFC_1000



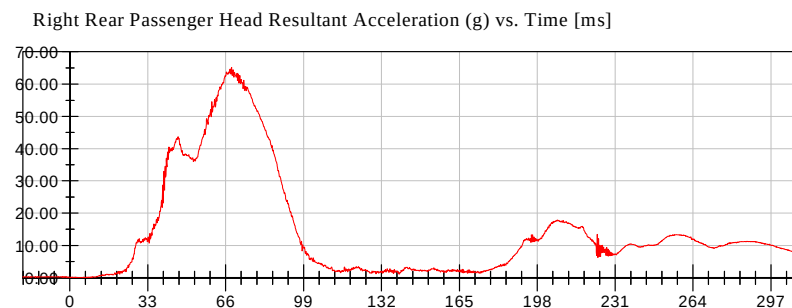
<Max>

43.40 g at 45.84 ms

<Min>

-1.23 g at 116.24 ms

CFC_1000



<Max>

65.13 g at 68.48 ms

<Min>

0.03 g at 4.56 ms

CFC_1000



NHTSA

Test Lab: CTF

Test Number: 071025-2 (M80309)

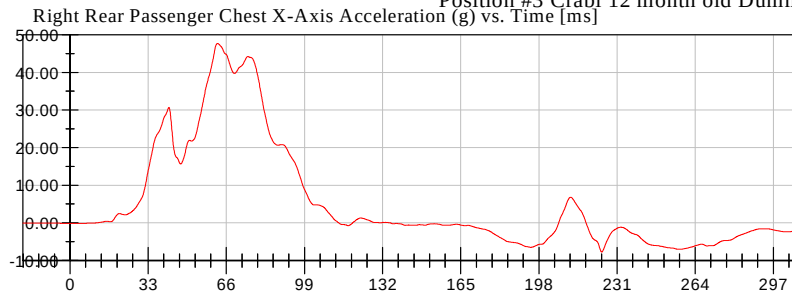
Test Date: 10/25/2007

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Position #2 Hybrid III Mid-Sized Adult Male Dummy (352)

Position #4 Crabi 12 month old Dummy (094)

Position #3 Crabi 12 month old Dummy (096)



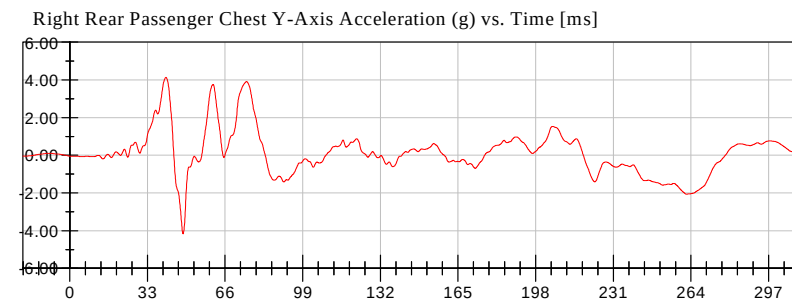
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47.71 g at 62.24 ms

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-7.79 g at 224.56 ms

CFC_180



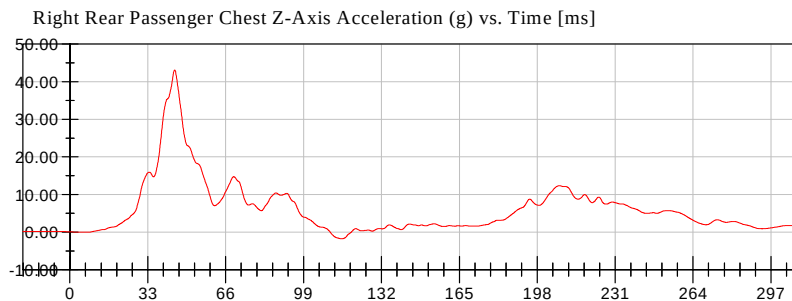
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4.14 g at 40.88 ms

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-4.17 g at 48.16 ms

CFC_180



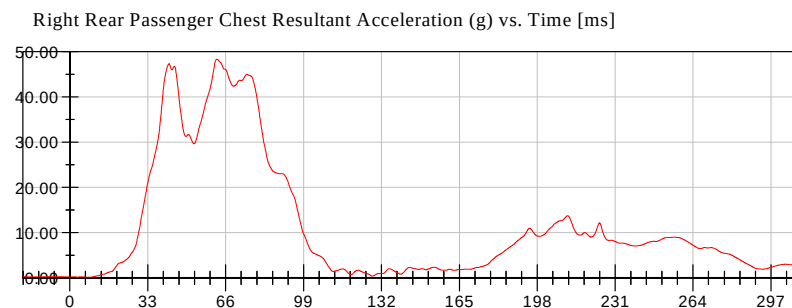
<Max>

43.13 g at 44.40 ms

<Min>

-1.76 g at 115.04 ms

CFC_180



<Max>

48.36 g at 62.24 ms

<Min>

0.10 g at 8.56 ms

CFC_180



APPENDIX D4
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST LEFT REAR

CRABI: 095

Transportation Research Center Inc.
572R CRABI 12-Month-Old Dummy
External Dimensions
Serial No. 095 Calibration No. 06
Date: 01-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	288 mm	Yes
Hip Pivot Height	C	27.9 - 38.1 mm	35 mm	Yes
Hip Pivot from Backline	D	40.1 - 50.3 mm	48 mm	Yes
Shoulder Pivot from Backline	E	50.3 - 60.5 mm	53 mm	Yes
Thigh Clearance	F	63.0 - 73.2 mm	72 mm	Yes
Elbow Pivot to Fingertip	G	176.6 - 191.8 mm	185 mm	Yes
Shoulder to Elbow Pivot	I	99.1 - 114.3 mm	110 mm	Yes
Elbow Rest Height	J	150.1 - 165.3 mm	160 mm	Yes
Buttock to Knee Length	K	202.7 - 217.9 mm	210 mm	Yes
Popliteal Height (Reference to Seat)	L	138.7 - 153.9 mm	150 mm	Yes
Knee Pivot Height	M	165.1 - 180.3 mm	170 mm	Yes
Buttock Popliteal Length	N	144.8 - 160.0 mm	151 mm	Yes
Chest Depth with Jacket	O	107.5 - 122.7 mm	120 mm	Yes
Foot Length	P	92.4 - 102.6 mm	96 mm	Yes
Stature	Q	727.7 - 753.1 mm	750 mm	Yes
Buttock to Knee Pivot Length	R	178.5 - 188.7 mm	180 mm	Yes
Head Breadth	S	124.4 - 134.6 mm	125 mm	Yes
Head Depth (REF)	T	149.9 - 165.1 mm	150 mm	Yes
Hip Breadth	U	158.5 - 173.7 mm	171 mm	Yes
Shoulder Breadth	V	200.7 - 215.9 mm	210 mm	Yes
Foot Breadth	W	39.1 - 49.3 mm	44 mm	Yes
Chest Circumference with Jacket	Y	452.4 - 477.8 mm	471 mm	Yes
Waist Circumference	Z	447.0 - 472.4 mm	452 mm	Yes
Reference Location for Chest Circumference	AA	256.5 - 266.7 mm	260 mm	Yes
Reference Location for Waist Circumference	BB	106.7 - 116.9 mm	110 mm	Yes
Shoulder Height	CC	299.7 - 314.9 mm	311 mm	Yes
Chin Height	DD	289.6 - 304.8 mm	315 mm	No

Comments:

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

Technician

Approved

Charles W. Hall

Ron Stover

Transportation Research Center Inc.

Front Head Drop

CRABI 12 MO Serial No. 095 Certification No. 6-1

Test Date: 9/28/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Peak Head Resultant Acceleration	100 - 120 g	104.8 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

Rant Baruch

Approved

Ron Stoner

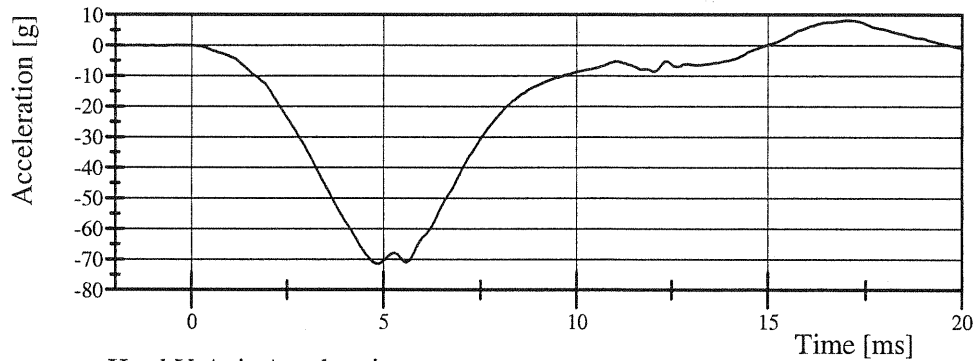
Transportation Research Center Inc.

Front Head Drop

CRABI 12 MO Serial No. 095 Certification No. 6-1

Test Date: 9/28/2007

Head X-Axis Acceleration

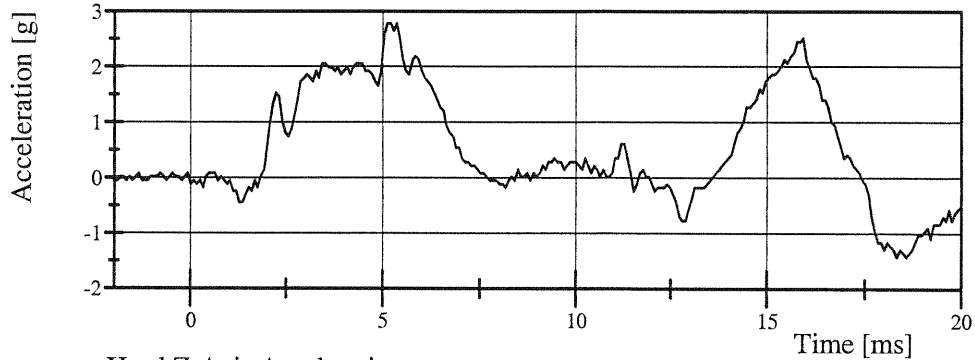


Filter Class: CFC_1000

Max: 8.2 g at 17.0 ms

Min: -71.5 g at 4.9 ms

Head Y-Axis Acceleration

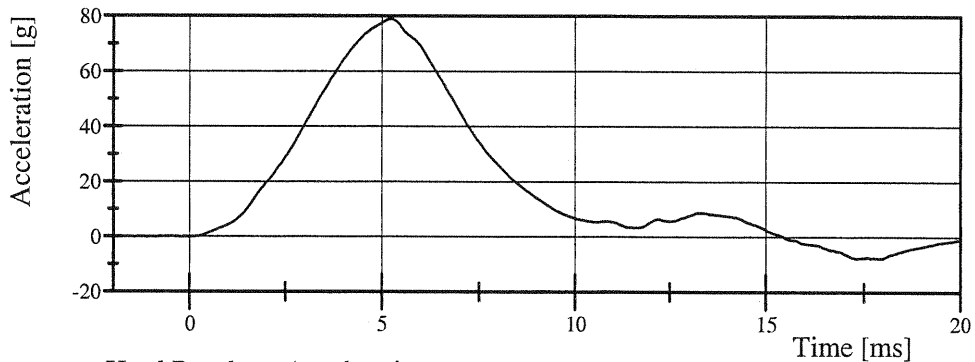


Filter Class: CFC_1000

Max: 2.8 g at 5.1 ms

Min: -1.4 g at 18.3 ms

Head Z-Axis Acceleration

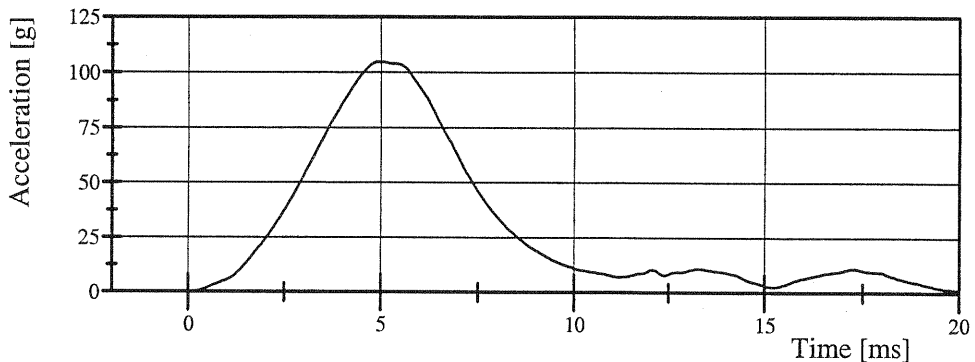


Filter Class: CFC_1000

Max: 78.9 g at 5.2 ms

Min: -7.6 g at 17.3 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 104.8 g at 5.0 ms

Min: 0.0 g at -1.0 ms

Transportation Research Center Inc.

Rear Head Drop

CRABI 12 MO Serial No. 095 Certification No. 6-1

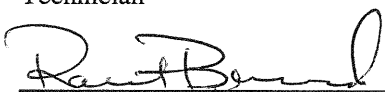
Test Date: 9/28/2007

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Peak Head Resultant Acceleration	55 - 71 g	64.8 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-2.0 g	Yes
Is Acceleration Curve Unimodal within 17% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician



Approved



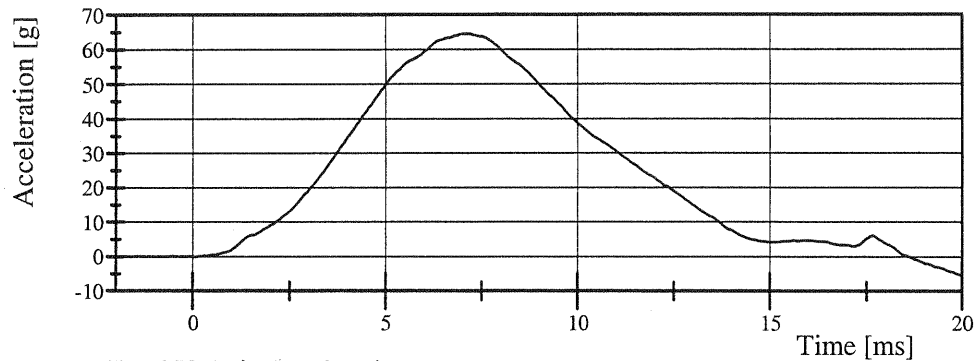
Transportation Research Center Inc.

Rear Head Drop

CRABI 12 MO Serial No. 095 Certification No. 6-1

Test Date: 9/28/2007

Head X-Axis Acceleration

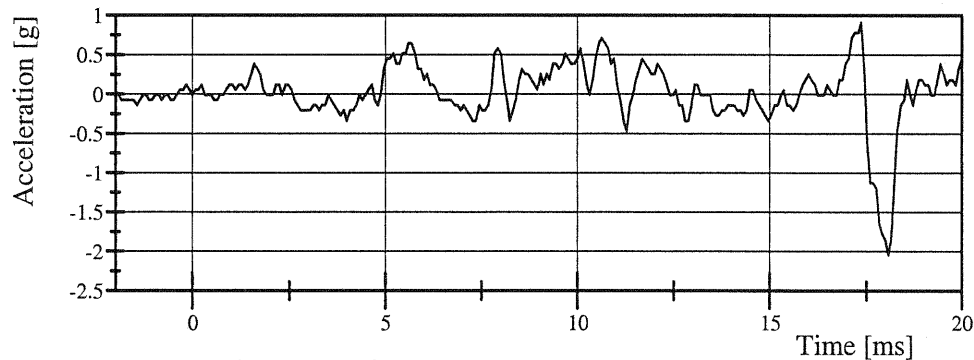


Filter Class: CFC_1000

Max: 64.6 g at 7.0 ms

Min: -5.3 g at 20.0 ms

Head Y-Axis Acceleration

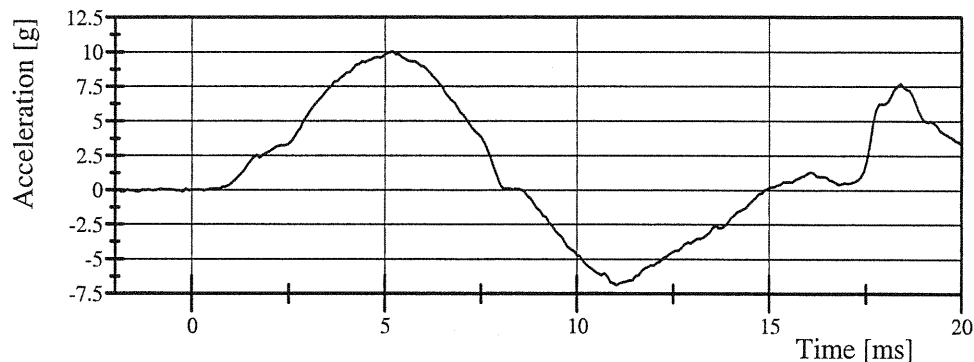


Filter Class: CFC_1000

Max: 0.9 g at 17.4 ms

Min: -2.0 g at 18.1 ms

Head Z-Axis Acceleration

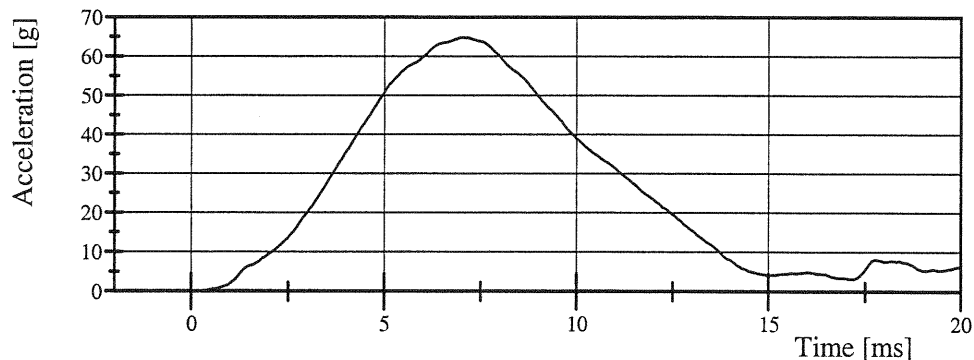


Filter Class: CFC_1000

Max: 10.0 g at 5.2 ms

Min: -6.9 g at 11.0 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 64.8 g at 7.0 ms

Min: 0.0 g at -0.9 ms

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 6-5

Test Date: 9/28/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	51 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.26 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-1.6) - (-2.3) m/s	-1.97 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-3.4) - (-4.2) m/s	-3.92 m/s	Yes
Pendulum Integrated Velocity Change at 25ms	(-4.3) - (-5.2) m/s	-4.82 m/s	Yes
Total Head D-Plane Rotation	(-75) - (-86) °	-80.5 °	Yes
Total Neck Occipital Condyles Moment	36 - 45 N·m	43.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 5 Nm	60 - 80 ms	74.4 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Dally

Approved

Ron Starnes

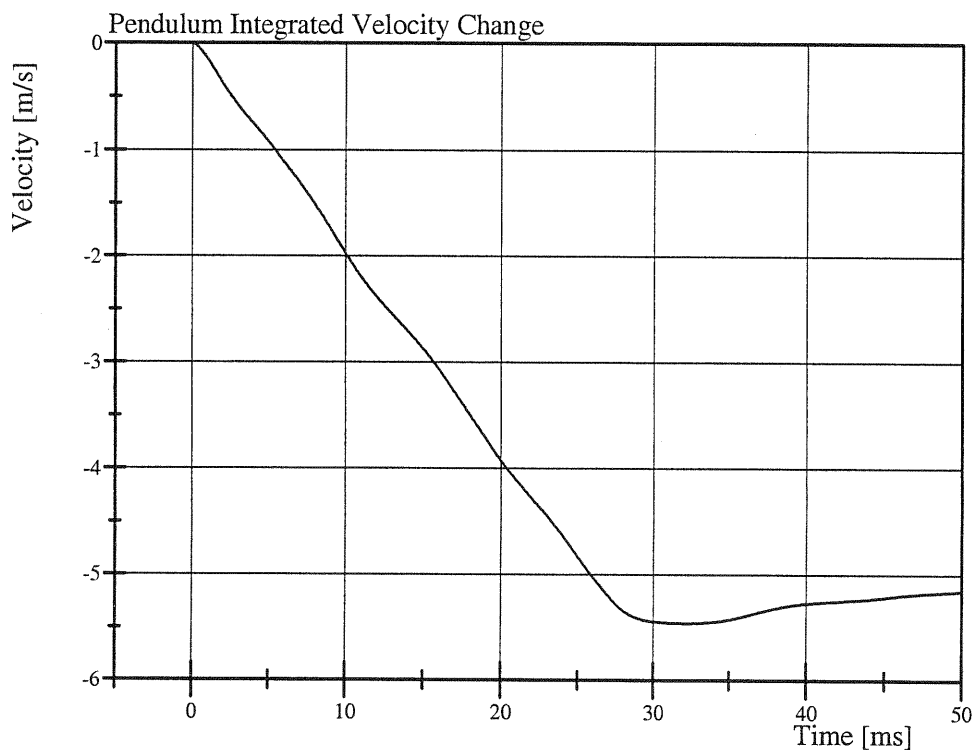
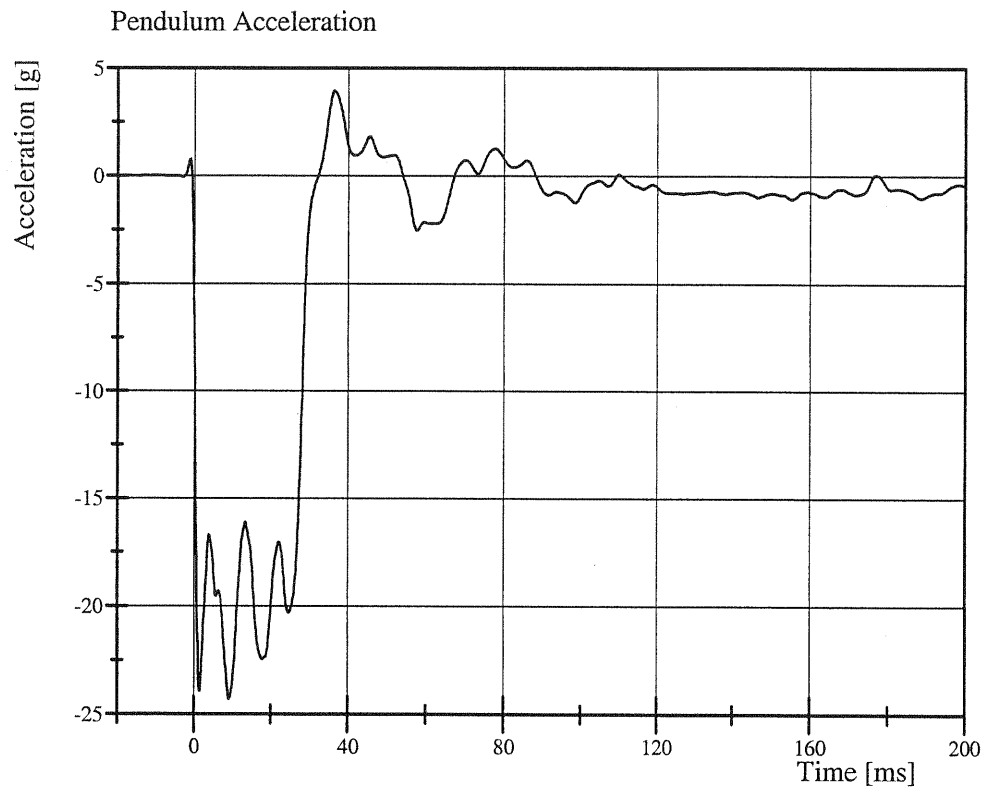


Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 6-5

Test Date: 9/28/2007



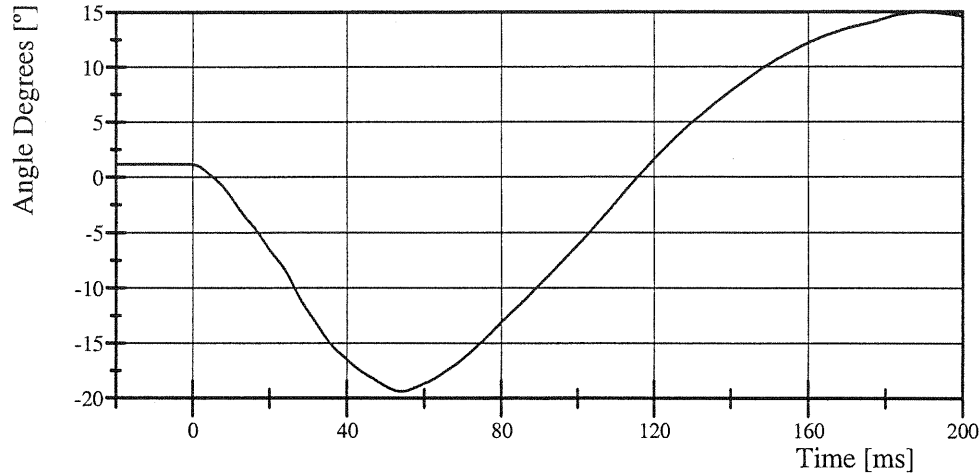
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 6-5

Test Date: 9/28/2007

Forward Pot Rotation at Base of Pendulum

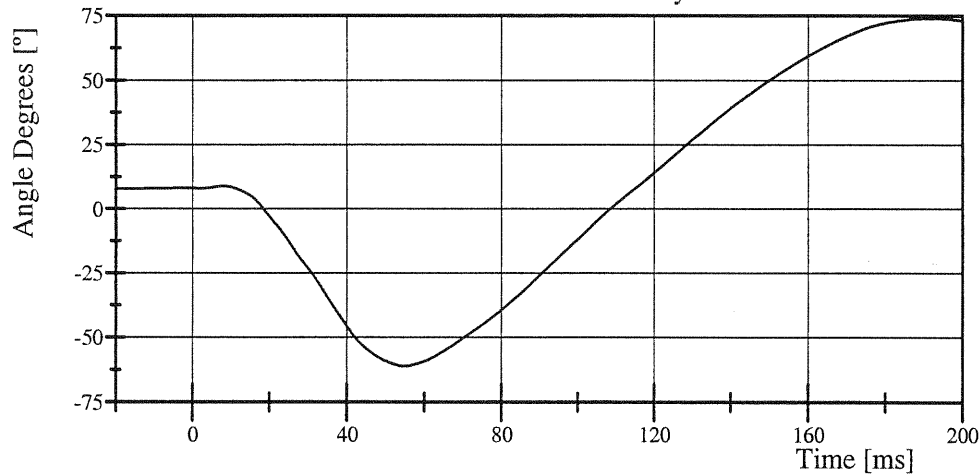


Filter Class: CFC_60

Max: 15.0 ° at 189.5 ms

Min: -19.4 ° at 54.2 ms

Center Headform Pot Rotation at Center of Gravity

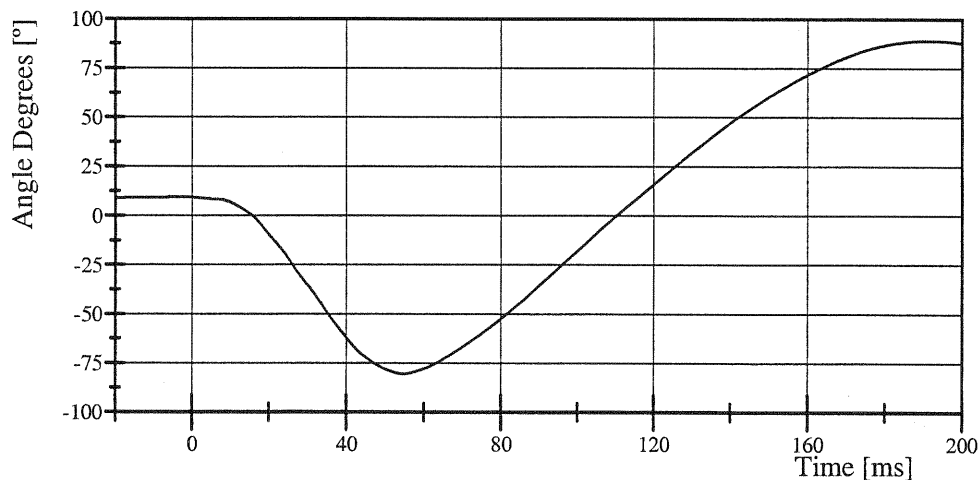


Filter Class: CFC_60

Max: 74.0 ° at 192.2 ms

Min: -61.2 ° at 55.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 89.0 ° at 191.3 ms

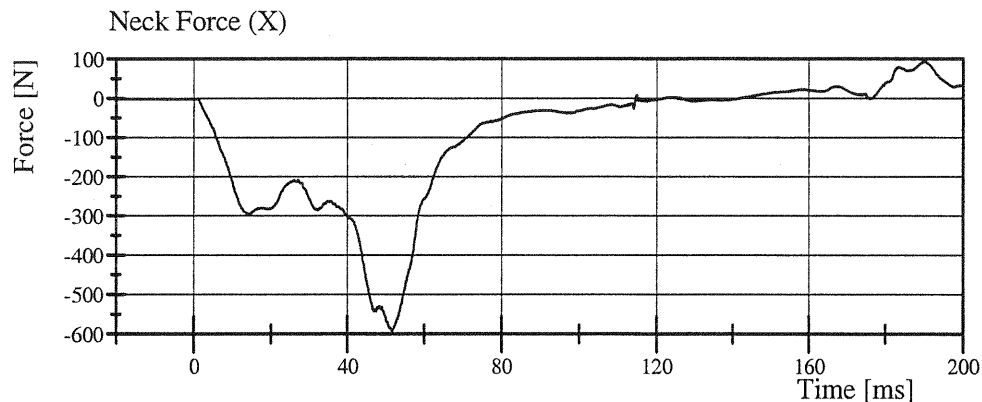
Min: -80.5 ° at 54.8 ms

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 6-5

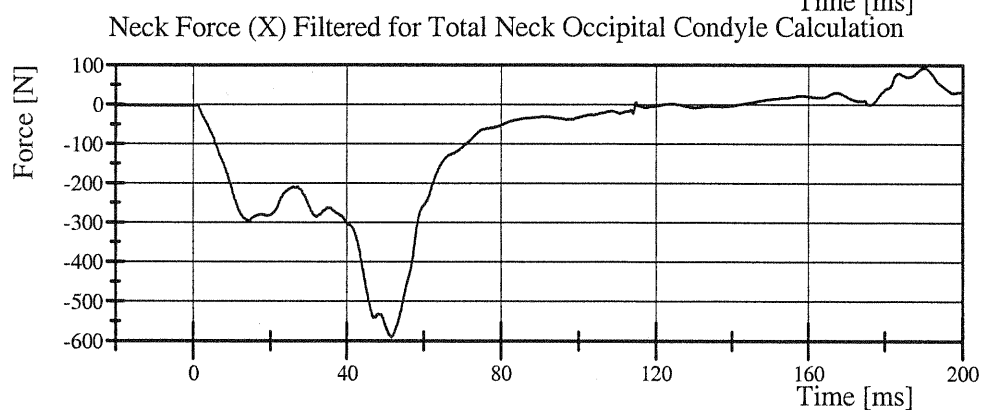
Test Date: 9/28/2007



Filter Class: CFC_1000

Max: 93.1 N at 190.0 ms

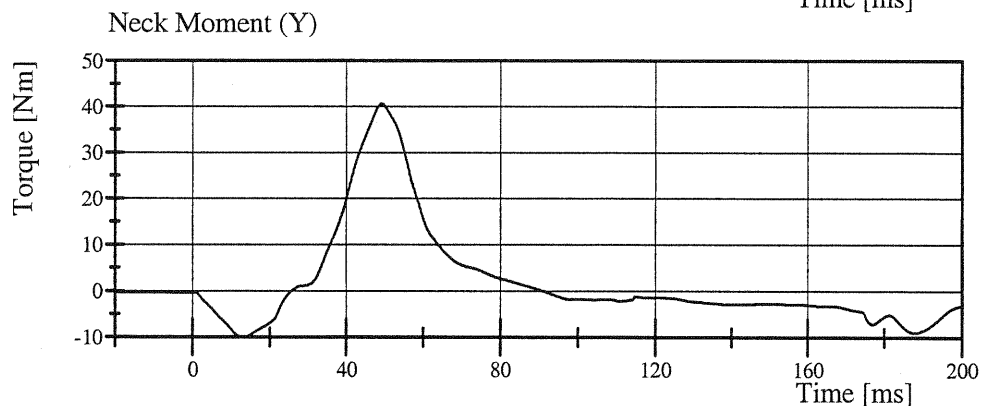
Min: -592.9 N at 51.6 ms



Filter Class: CFC_600

Max: 93.1 N at 190.2 ms

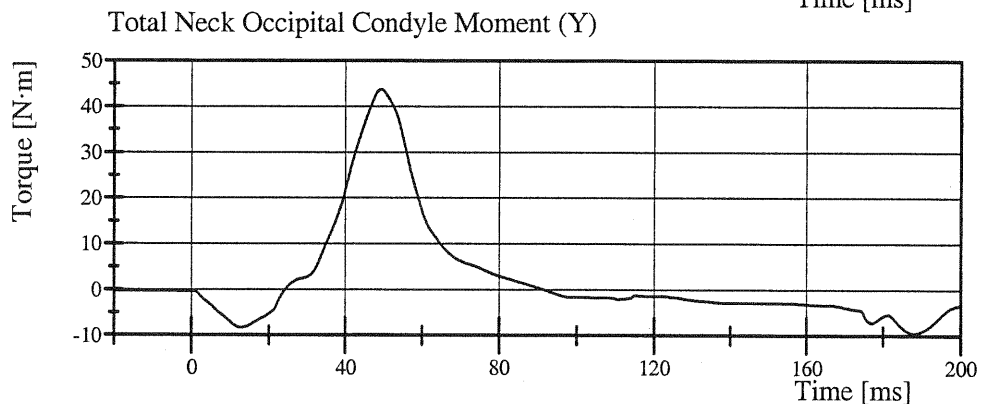
Min: -590.9 N at 51.6 ms



Filter Class: CFC_600

Max: 40.7 Nm at 49.1 ms

Min: -10.0 Nm at 13.0 ms



Filter Class: CFC_600

Max: 43.8 N·m at 49.1 ms

Min: -9.4 N·m at 188.1 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 6-4

Test Date: 9/28/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Pendulum Velocity	(-2.4) - (-2.6) m/s	-2.53 m/s	Yes
Pendulum Integrated Velocity Change at 6ms	0.8 - 1.2 m/s	1.09 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 2.1 m/s	1.95 m/s	Yes
Pendulum Integrated Velocity Change at 14ms	2.2 - 2.9 m/s	2.63 m/s	Yes
Total Head D-Plane Rotation	80 - 92 °	89.9 °	Yes
Total Neck Occipital Condyles Moment (-12) - (-23) N·m		-17.4 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. Ball

Approved

Ron Stoner

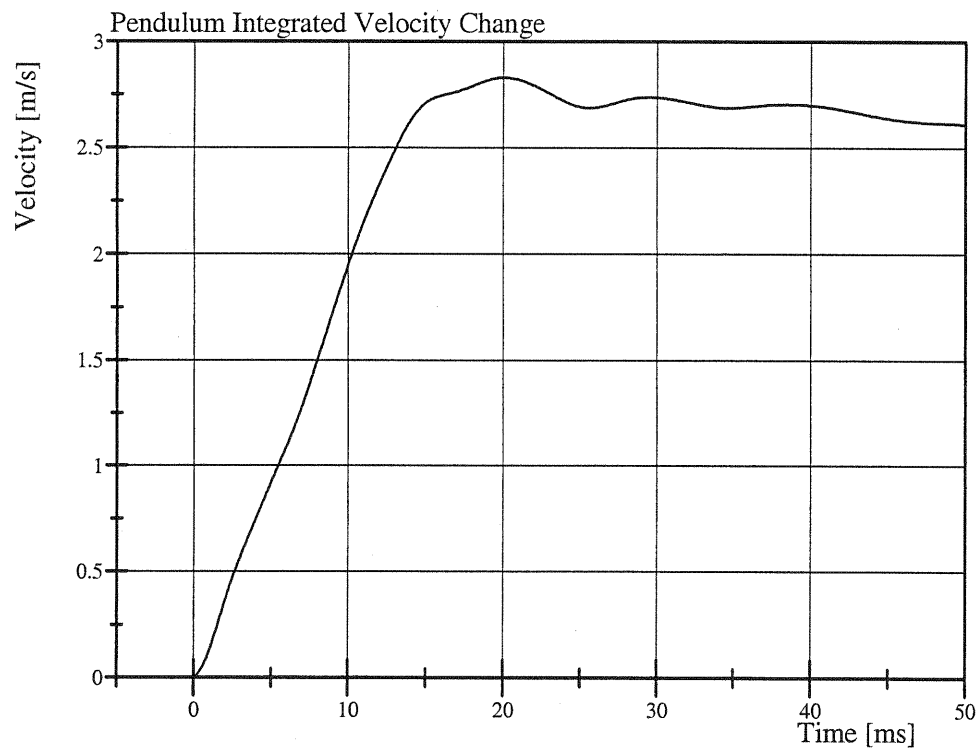
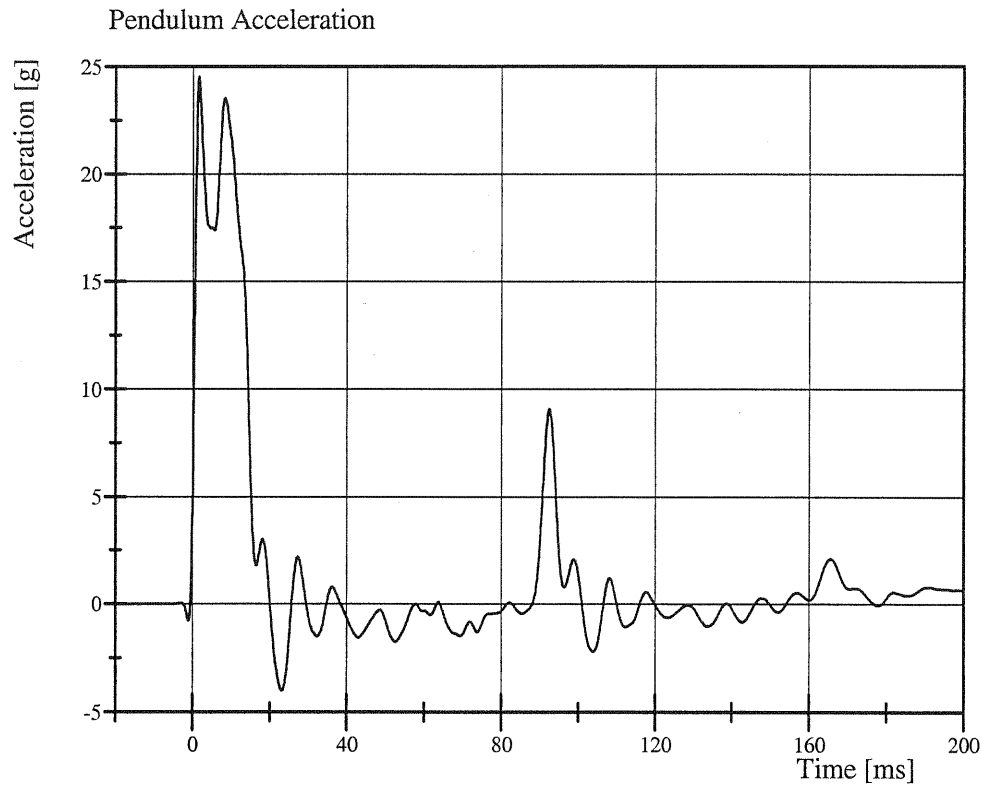


Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 6-4

Test Date: 9/28/2007



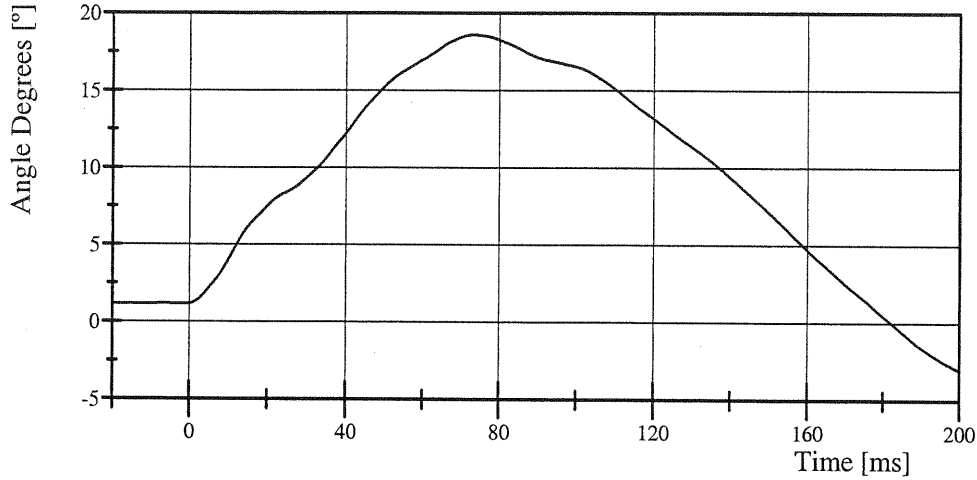
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 6-4

Test Date: 9/28/2007

Forward Pot Rotation at Base of Pendulum

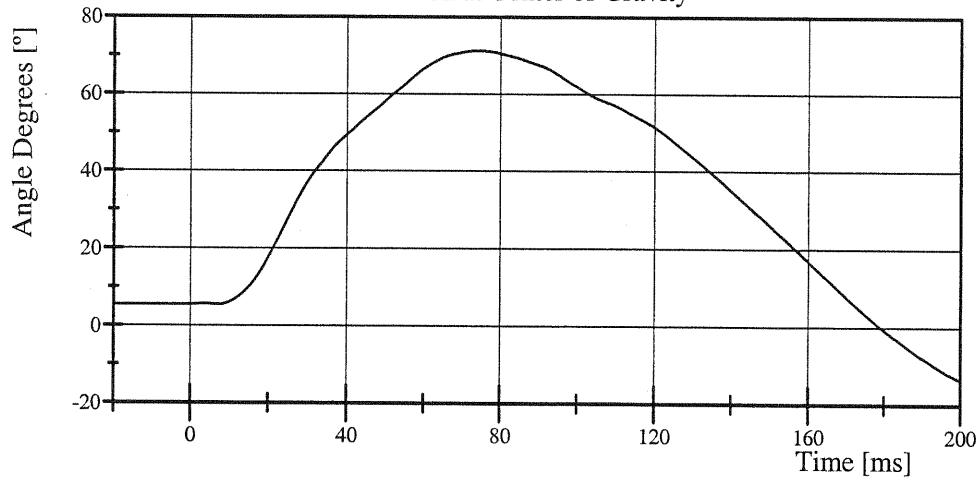


Filter Class: CFC_60

Max: 18.6 ° at 73.3 ms

Min: -3.0 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

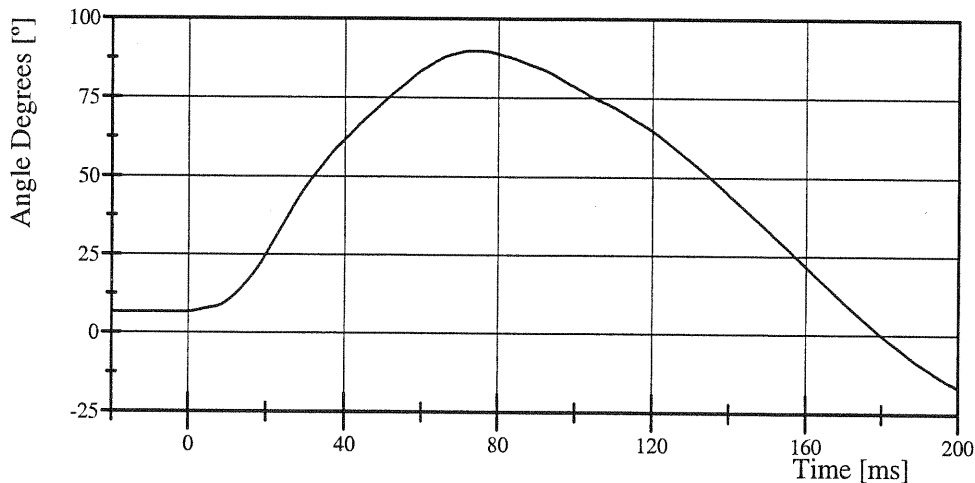


Filter Class: CFC_60

Max: 71.3 ° at 73.5 ms

Min: -13.5 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 89.9 ° at 73.4 ms

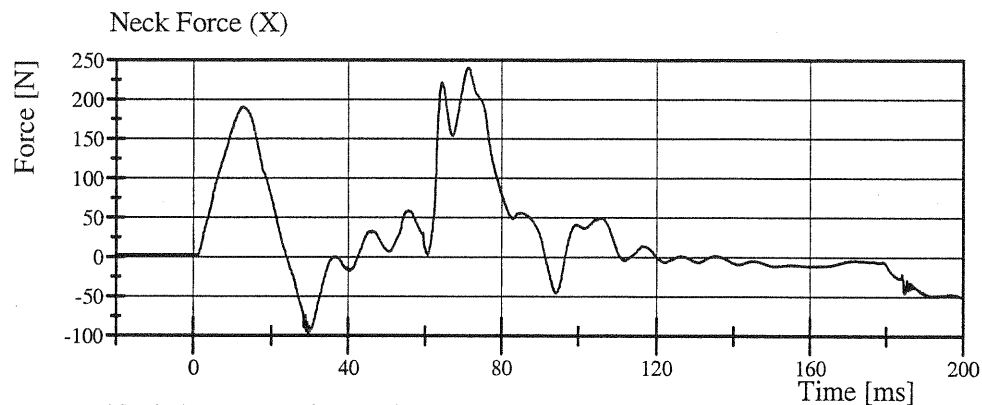
Min: -16.6 ° at 200.0 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 6-4

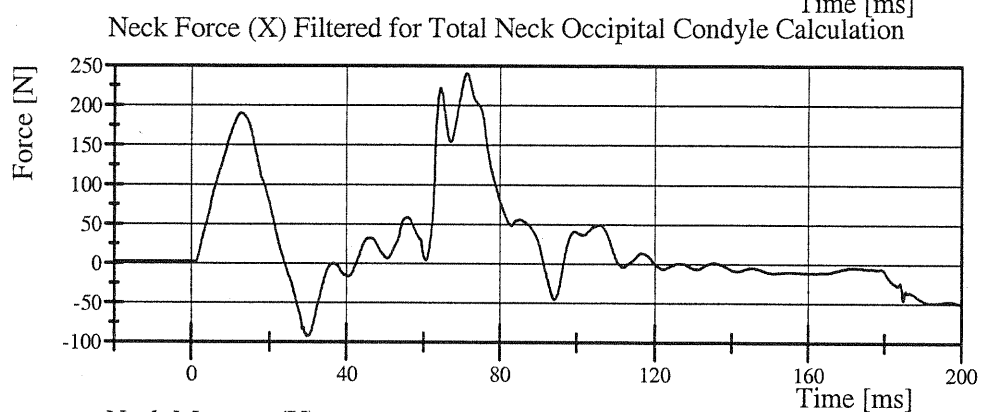
Test Date: 9/28/2007



Filter Class: CFC_1000

Max: 240.1 N at 71.4 ms

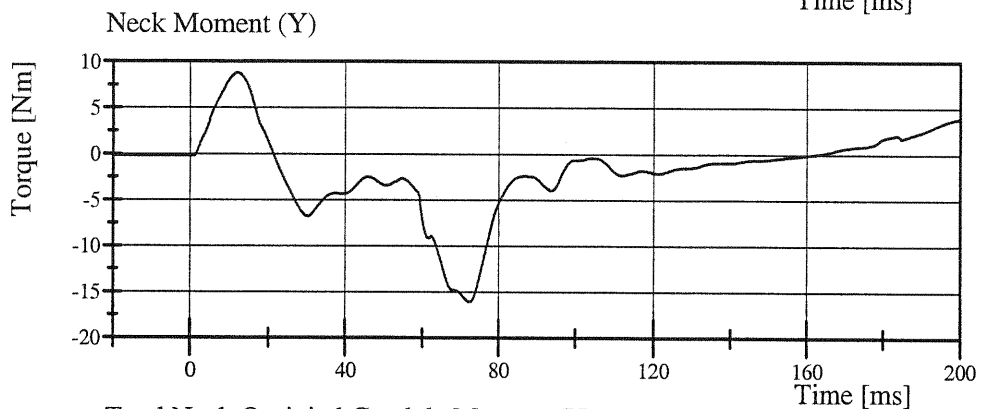
Min: -96.5 N at 29.5 ms



Filter Class: CFC_600

Max: 240.3 N at 71.3 ms

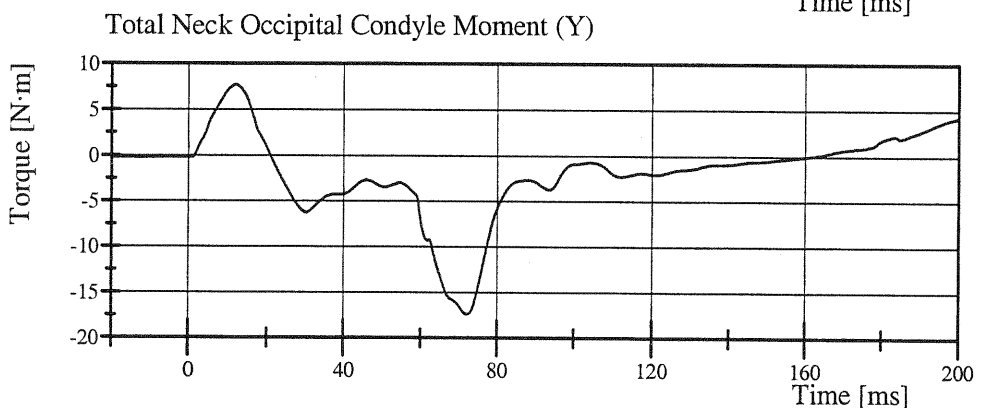
Min: -92.3 N at 29.5 ms



Filter Class: CFC_600

Max: 8.8 Nm at 12.0 ms

Min: -16.0 Nm at 72.3 ms



Filter Class: CFC_600

Max: 7.7 N·m at 11.9 ms

Min: -17.4 N·m at 72.1 ms

Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 095 Certification No. 6-1

Test Date: 9/28/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	46 %	Yes
Impactor Velocity	4.9 - 5.1 m/s	5.07 m/s	Yes
Impactor Force	(-1,514) - (-1,796) N	-1,595.0 N	Yes

Test meets specifications.

Comments:

Technician

Rant Barul

Approved

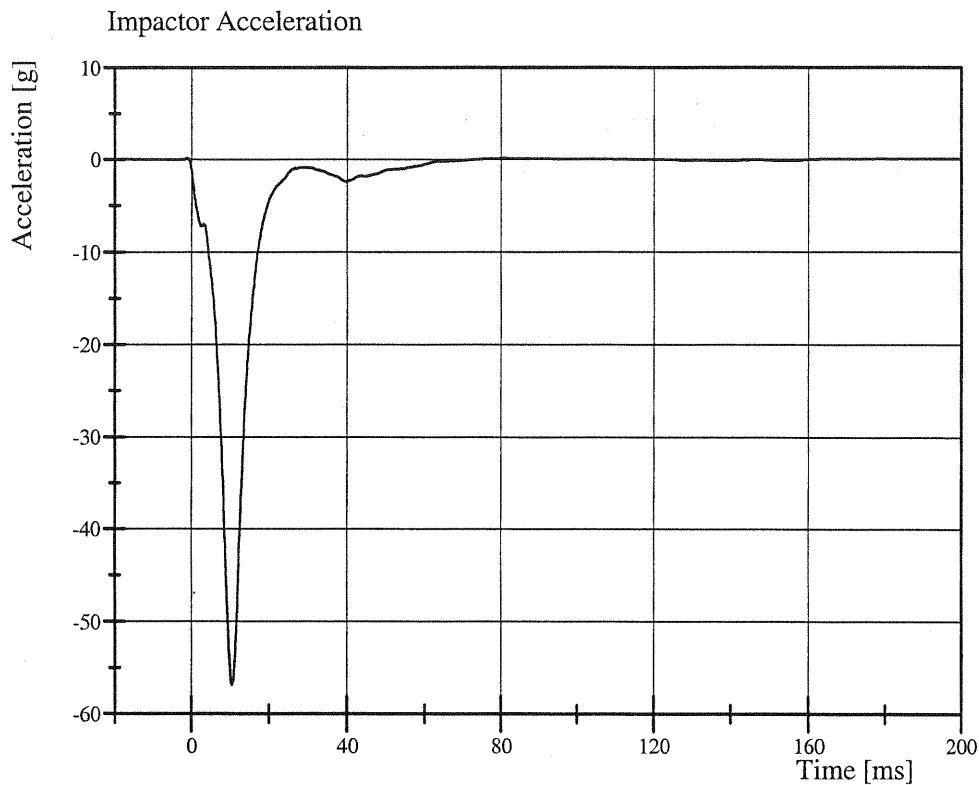
Ron Storer

Transportation Research Center Inc.

Front Thorax

CRABI 12 MO Serial No. 095 Certification No. 6-1

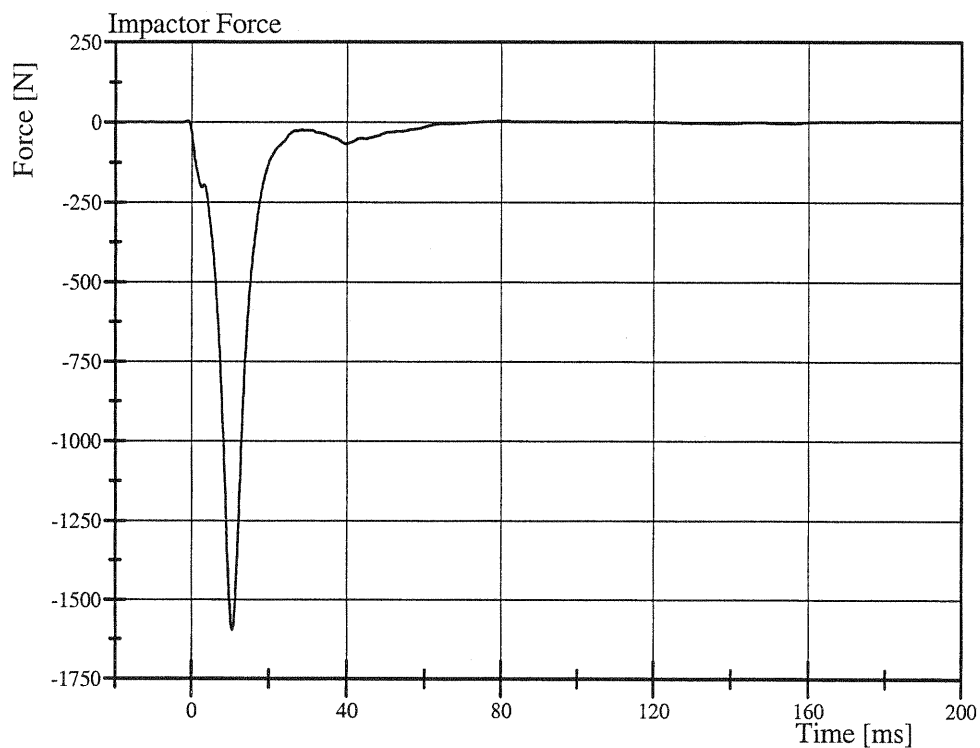
Test Date: 9/28/2007



Filter Class: CFC_180

Max: 0.1 g at -1.0 ms

Min: -56.9 g at 10.6 ms



Filter Class: CFC_180

Max: 3.7 N at -1.0 ms

Min: -1,595.0 N at 10.6 ms

CALIBRATION TEST RESULTS

POST-TEST LEFT REAR

CRABI: 095

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 7-1

Test Date: 10/29/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.26 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-1.6) - (-2.3) m/s	-2.03 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-3.4) - (-4.2) m/s	-3.90 m/s	Yes
Pendulum Integrated Velocity Change at 25ms	(-4.3) - (-5.2) m/s	-4.75 m/s	Yes
Total Head D-Plane Rotation	(-75) - (-86) °	-80.9 °	Yes
Total Neck Occipital Condyles Moment	36 - 45 N·m	42.1 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 5 Nm	60 - 80 ms	75.0 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Stoner



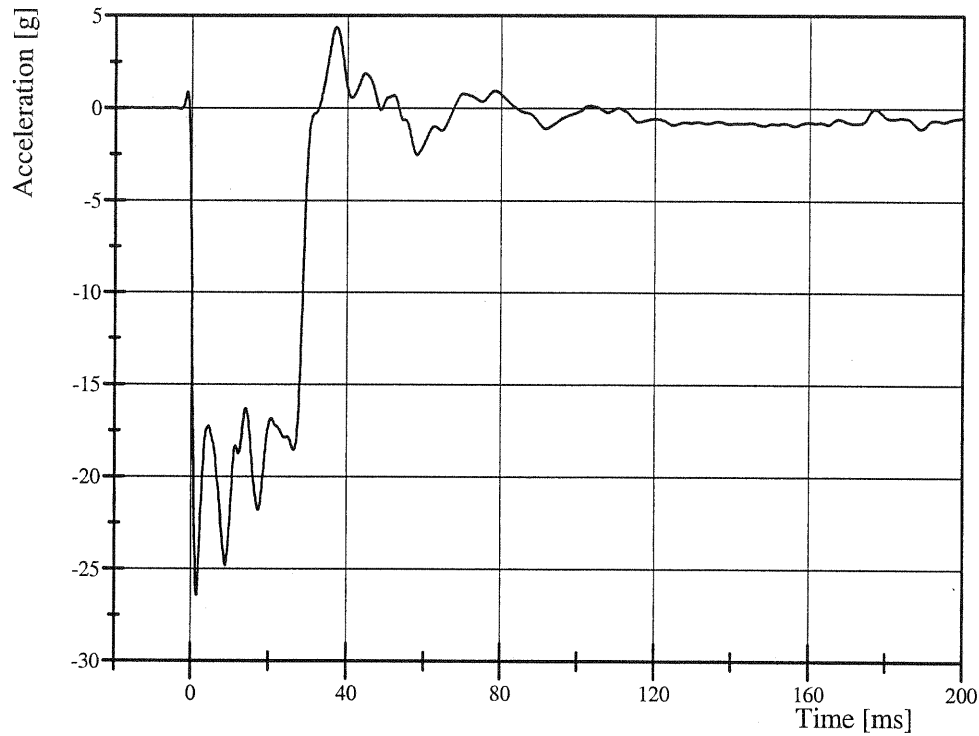
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 7-1

Test Date: 10/29/2007

Pendulum Acceleration

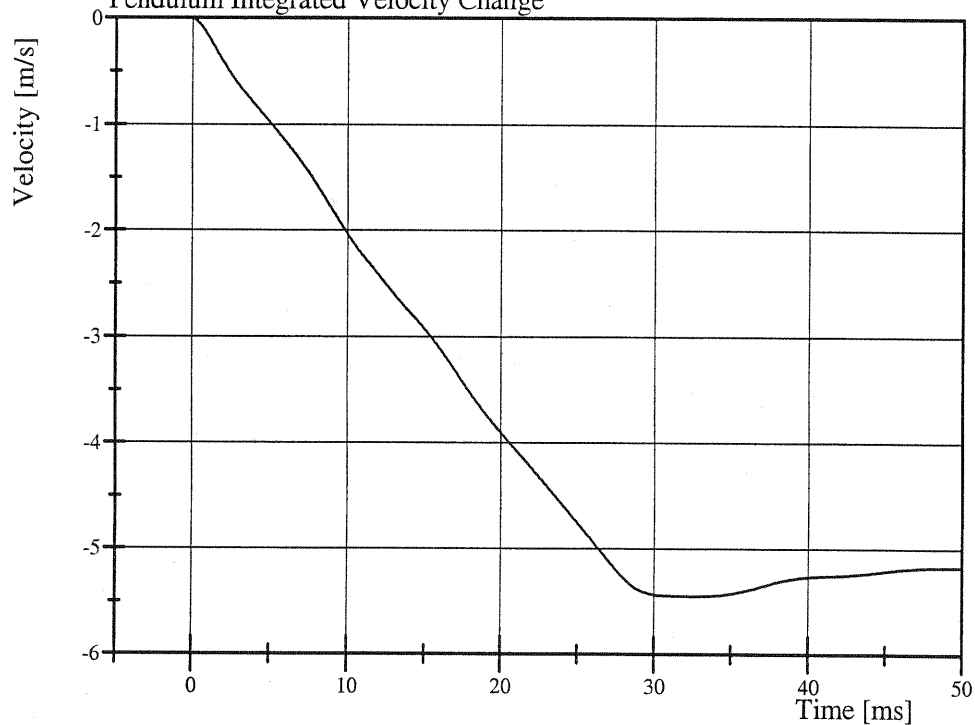


Filter Class: CFC_180

Max: 4.4 g at 37.0 ms

Min: -26.4 g at 1.4 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -5.5 m/s at 32.7 ms

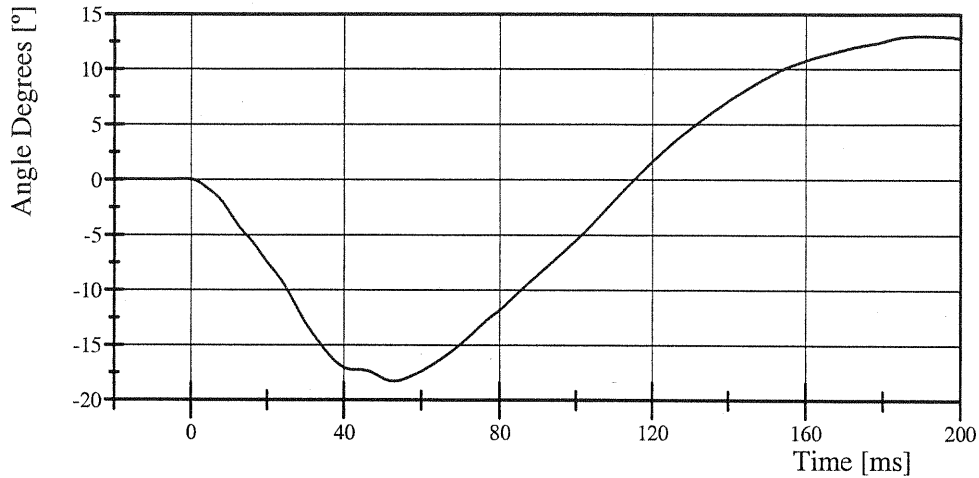
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 7-1

Test Date: 10/29/2007

Forward Pot Rotation at Base of Pendulum

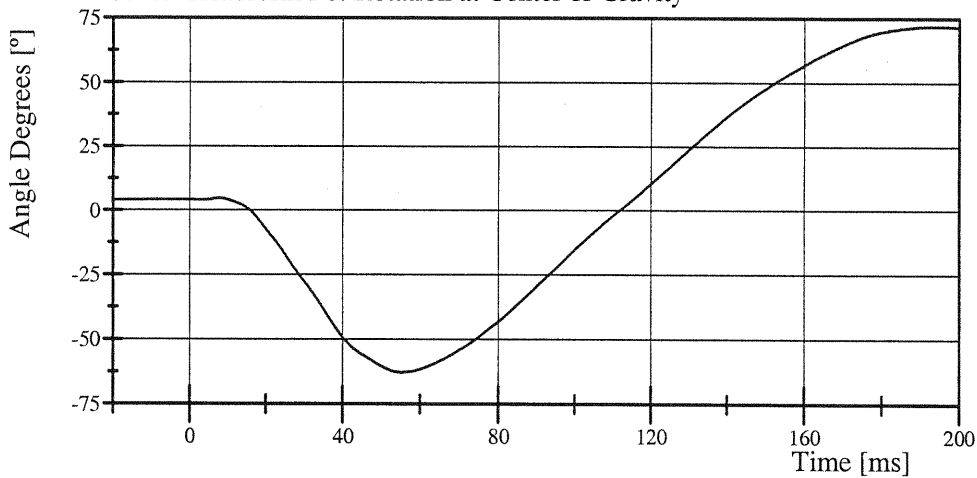


Filter Class: CFC_60

Max: 13.0 ° at 190.2 ms

Min: -18.3 ° at 53.0 ms

Center Headform Pot Rotation at Center of Gravity

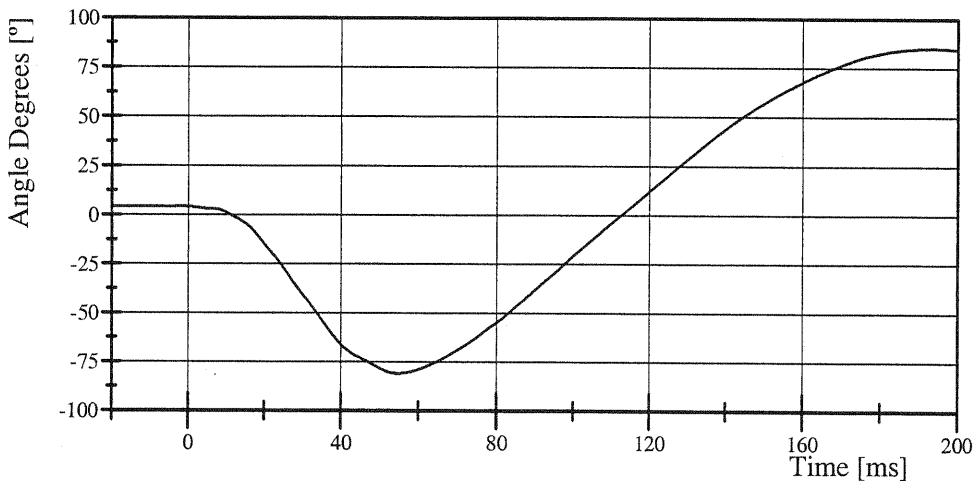


Filter Class: CFC_60

Max: 72.1 ° at 194.5 ms

Min: -62.8 ° at 55.3 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 85.1 ° at 194.0 ms

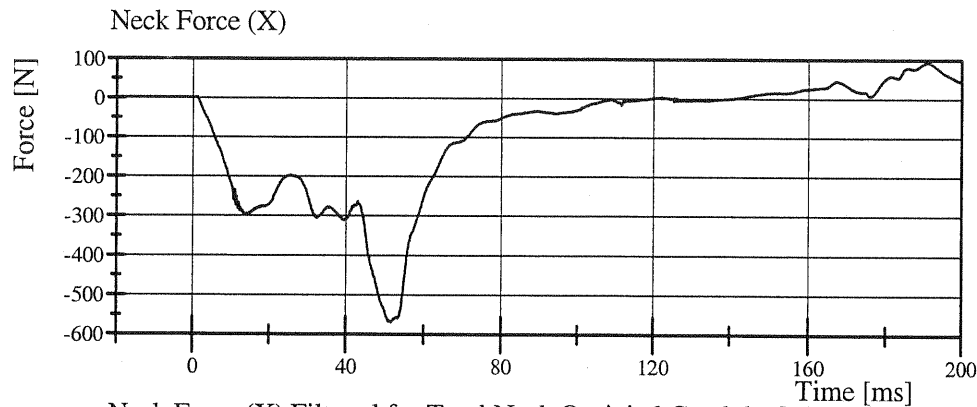
Min: -80.9 ° at 54.7 ms

Transportation Research Center Inc.

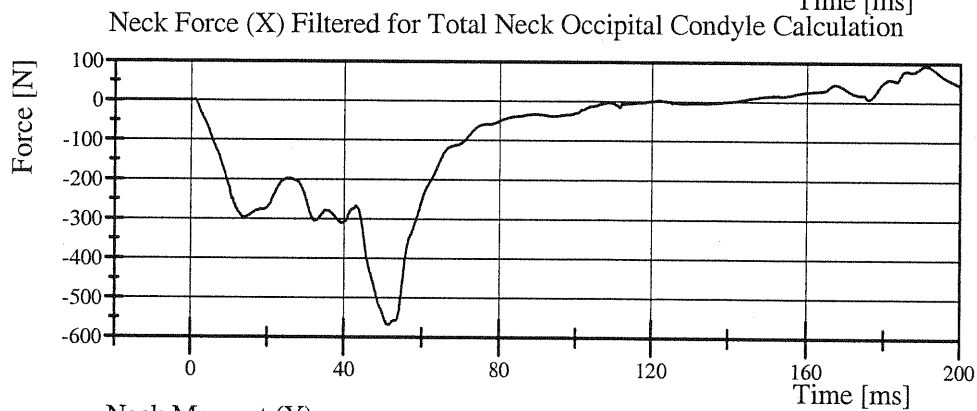
Neck Flexion

CRABI 12 MO Serial No. 095 Certification No. 7-1

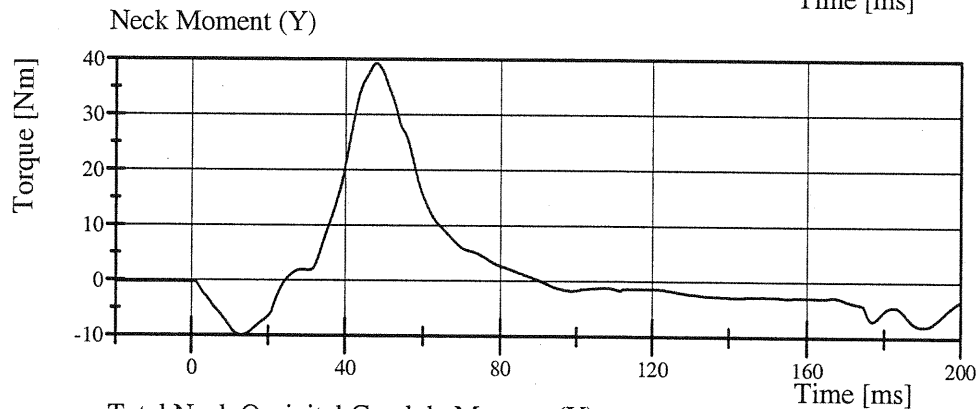
Test Date: 10/29/2007



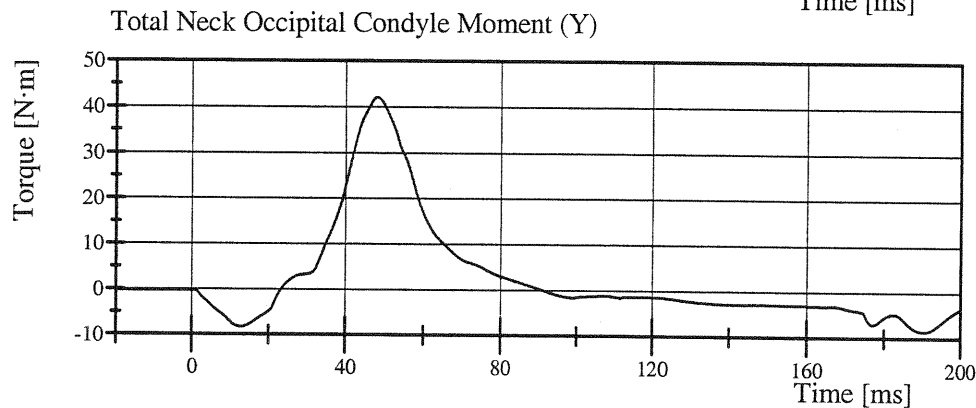
Filter Class: CFC_1000
Max: 93.8 N at 191.1 ms
Min: -568.2 N at 51.6 ms



Filter Class: CFC_600
Max: 93.7 N at 191.0 ms
Min: -567.7 N at 51.5 ms



Filter Class: CFC_600
Max: 39.3 Nm at 47.7 ms
Min: -10.0 Nm at 13.3 ms



Filter Class: CFC_600
Max: 42.1 N·m at 48.1 ms
Min: -8.5 N·m at 190.4 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 7-1

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 %	41 %	Yes
Pendulum Velocity	(-2.4) - (-2.6) m/s	-2.52 m/s	Yes
Pendulum Integrated Velocity Change at 6ms	0.8 - 1.2 m/s	0.99 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 2.1 m/s	1.77 m/s	Yes
Pendulum Integrated Velocity Change at 14ms	2.2 - 2.9 m/s	2.46 m/s	Yes
Total Head D-Plane Rotation	80 - 92 °	87.8 °	Yes
Total Neck Occipital Condyles Moment (-12) - (-23) N·m		-16.2 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -5 Nm	76 - 90 ms	82.5 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Stone

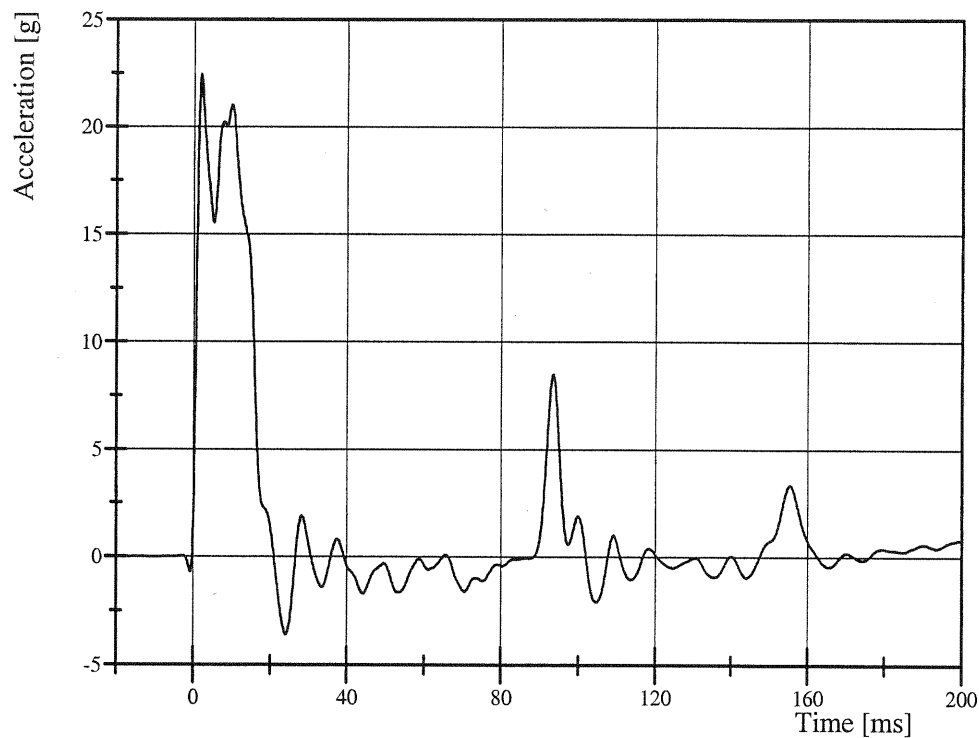
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 7-1

Test Date: 10/29/2007

Pendulum Acceleration

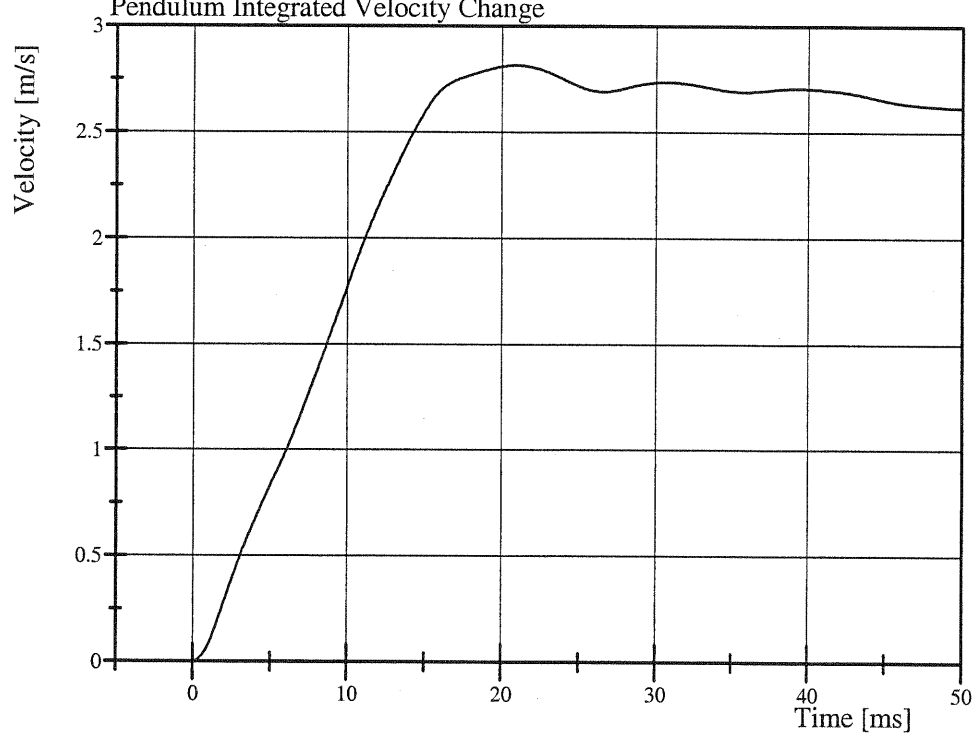


Filter Class: CFC_180

Max: 22.4 g at 1.9 ms

Min: -3.6 g at 24.1 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 2.8 m/s at 21.0 ms

Min: 0.0 m/s at 0.0 ms

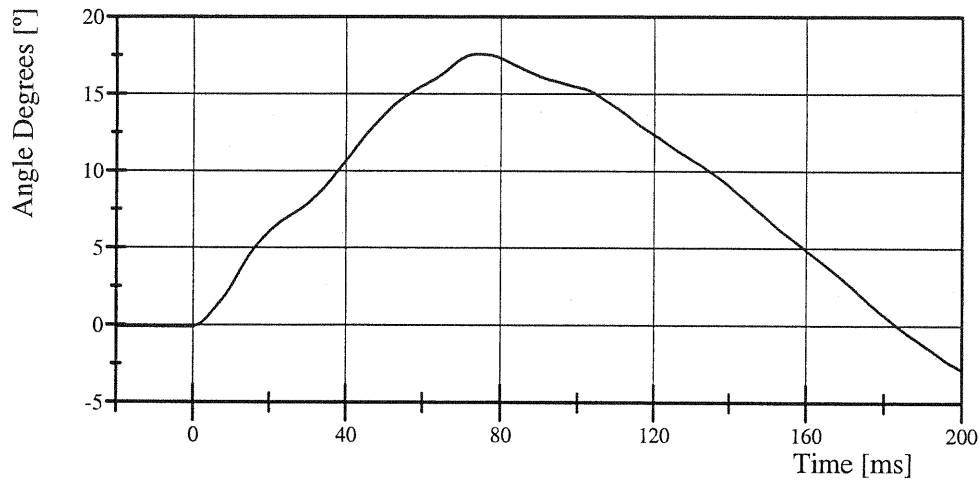
Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 7-1

Test Date: 10/29/2007

Forward Pot Rotation at Base of Pendulum

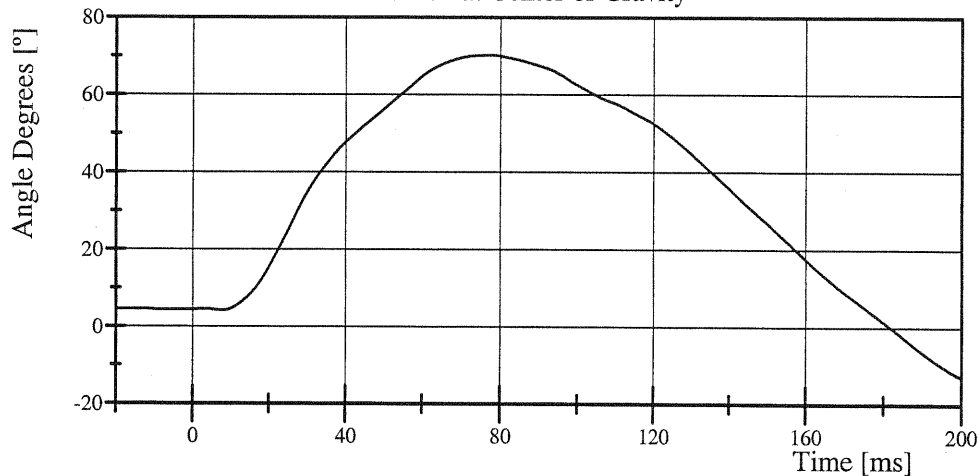


Filter Class: CFC_60

Max: 17.6 ° at 74.2 ms

Min: -2.8 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

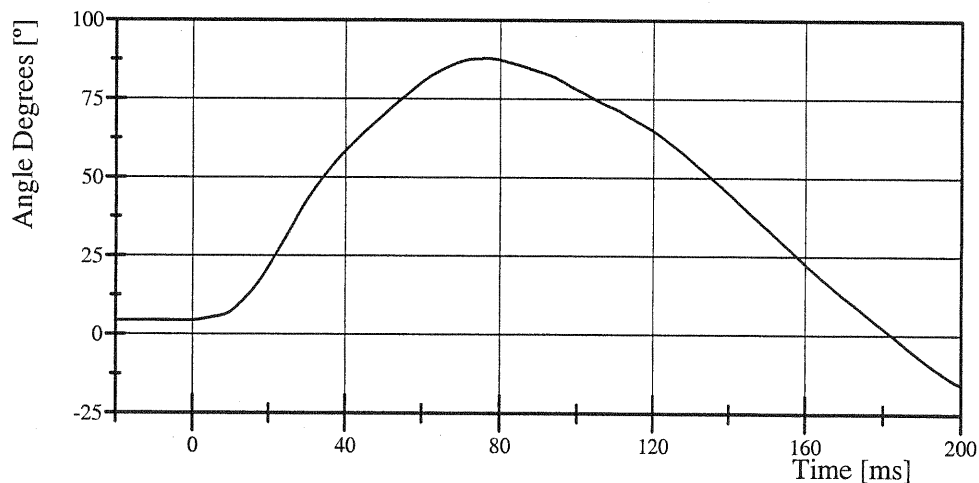


Filter Class: CFC_60

Max: 70.3 ° at 77.4 ms

Min: -12.9 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 87.8 ° at 76.9 ms

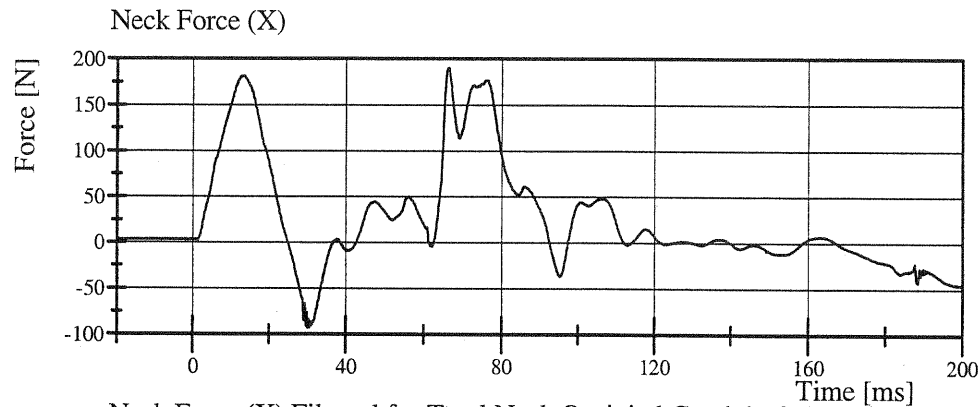
Min: -15.7 ° at 200.0 ms

Transportation Research Center Inc.

Neck Extension

CRABI 12 MO Serial No. 095 Certification No. 7-1

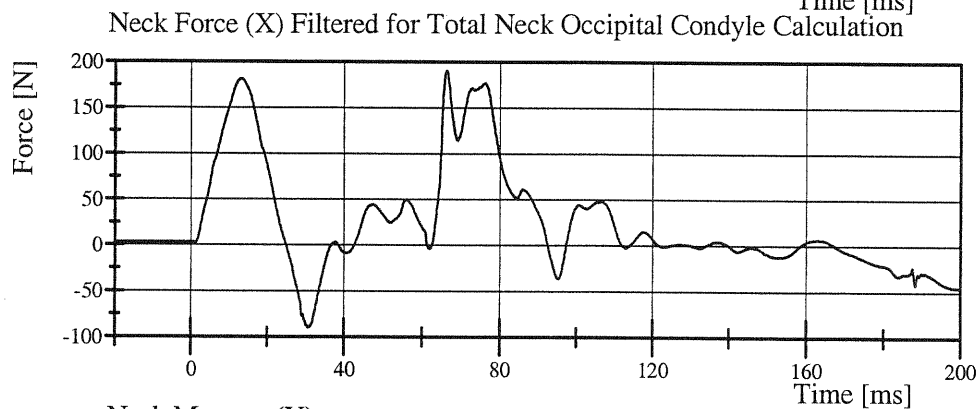
Test Date: 10/29/2007



Filter Class: CFC_1000

Max: 190.2 N at 66.5 ms

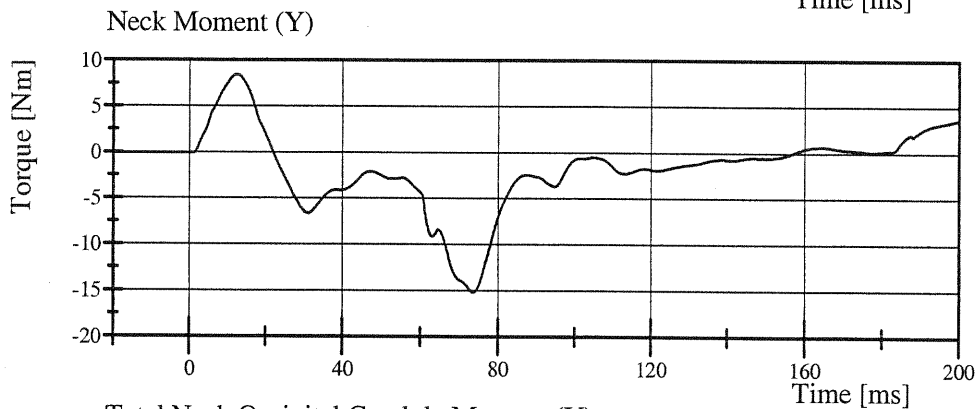
Min: -92.9 N at 30.1 ms



Filter Class: CFC_600

Max: 190.5 N at 66.3 ms

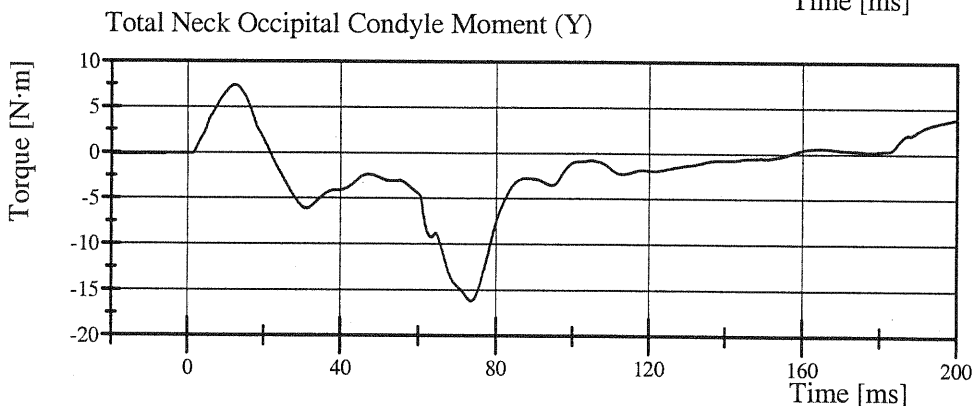
Min: -89.8 N at 30.6 ms



Filter Class: CFC_600

Max: 8.4 Nm at 12.3 ms

Min: -15.2 Nm at 73.6 ms



Filter Class: CFC_600

Max: 7.4 N·m at 12.2 ms

Min: -16.2 N·m at 73.6 ms



Test Date: 10/25/07

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

Proj./Seg. No.: 20050906-1200 Test Eng: Emad Al-Tabakha

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

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

Pre Test Inspection Completed By: J. Clarridge Date: 10/24/07

Post Test Inspection Completed By: J. Clarridge Date: 10/26/07

CALIBRATION TEST RESULTS

PRE-TEST RIGHT REAR

CRABI: 094

Transportation Research Center Inc.
572R CRABI 12-Month-Old Dummy
External Dimensions
Serial No. 094 Calibration No. 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

Ronit Ben-David

Ronit Ben-David

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

Rout Beranish

Approved

Ron Stoner

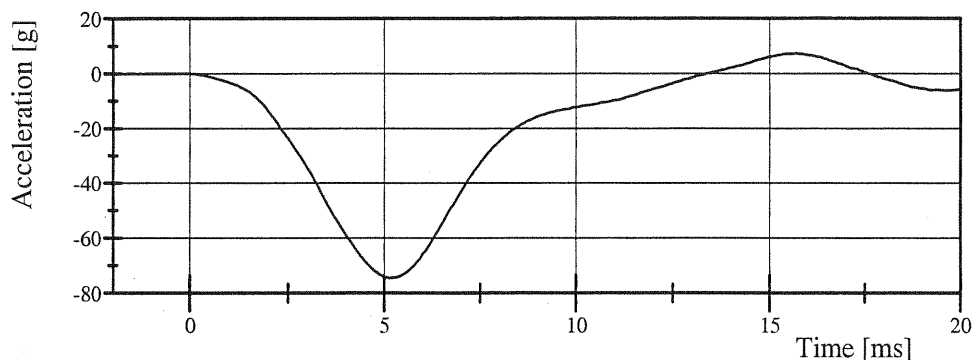
Transportation Research Center Inc.

Front Head Drop

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

Test Date: 10/16/2007

Head X-Axis Acceleration



Filter Class: CFC_1000

Max: 7.4 g at 15.7 ms

Min: -74.4 g at 5.1 ms

Head Y-Axis Acceleration

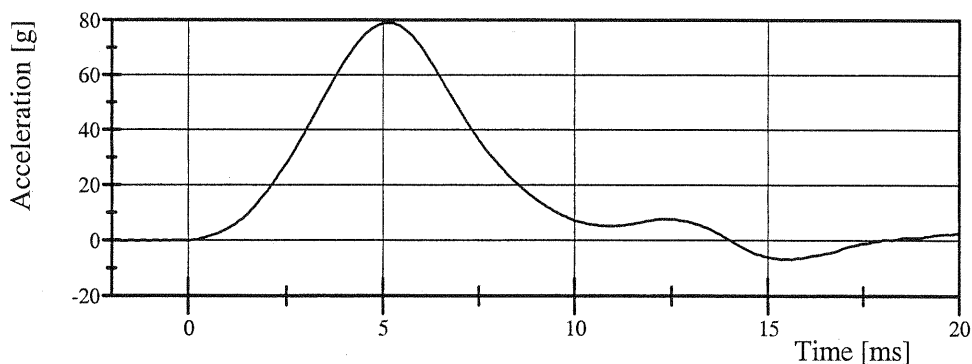


Filter Class: CFC_1000

Max: 2.8 g at 5.3 ms

Min: -0.4 g at 13.8 ms

Head Z-Axis Acceleration

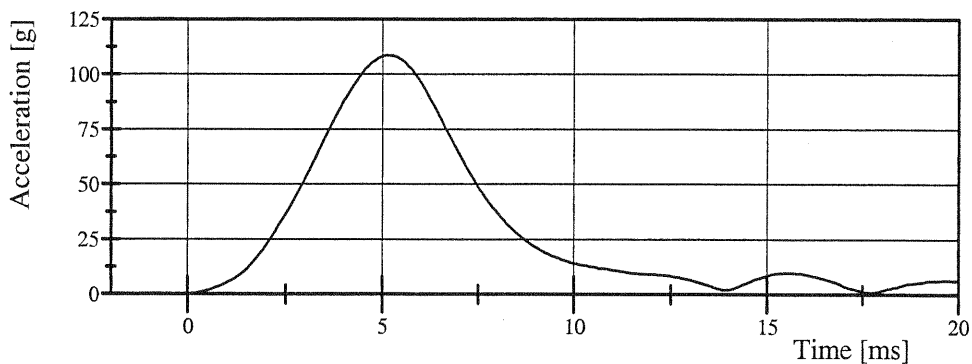


Filter Class: CFC_1000

Max: 79.0 g at 5.1 ms

Min: -6.7 g at 15.4 ms

Head Resultant Acceleration



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. Hall

Approved

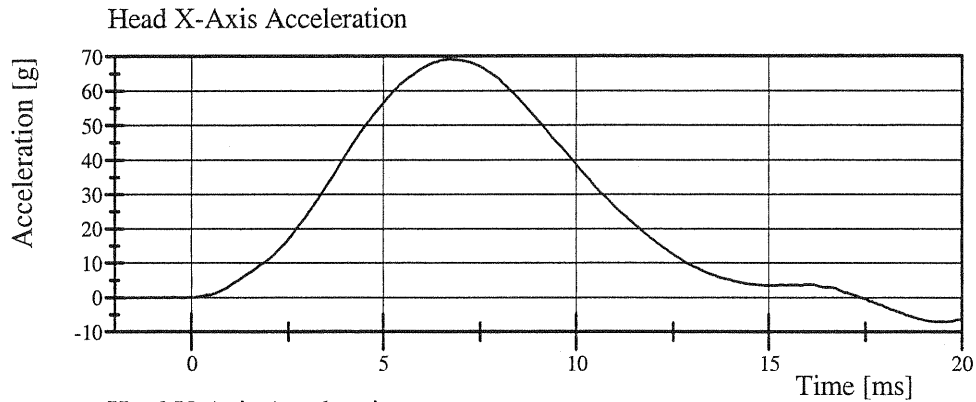
Ron Stover

Transportation Research Center Inc.

Rear Head Drop

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

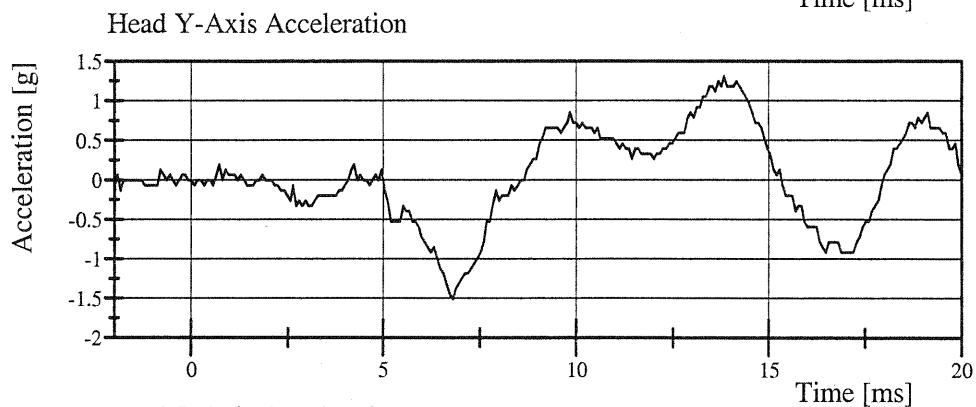
Test Date: 10/16/2007



Filter Class: CFC_1000

Max: 69.2 g at 6.7 ms

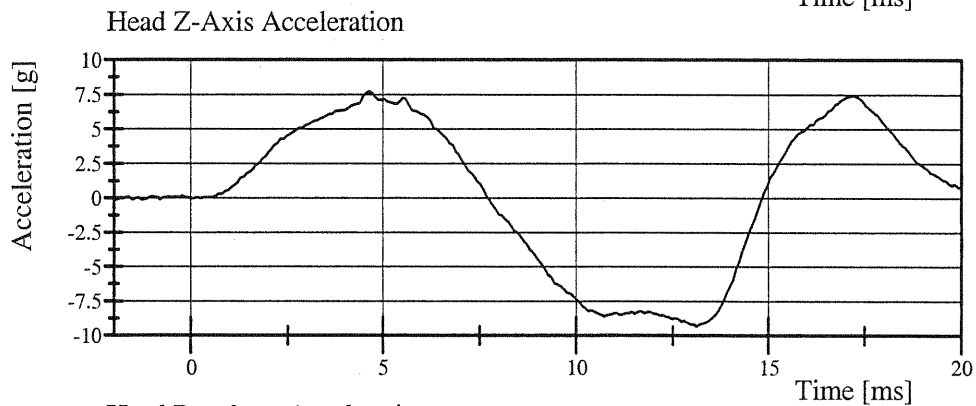
Min: -7.1 g at 19.4 ms



Filter Class: CFC_1000

Max: 1.3 g at 13.8 ms

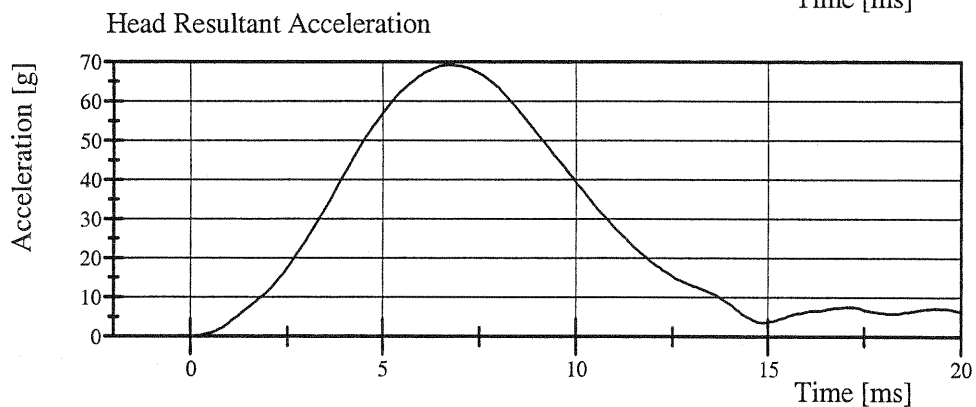
Min: -1.5 g at 6.8 ms



Filter Class: CFC_1000

Max: 7.7 g at 4.6 ms

Min: -9.3 g at 13.1 ms



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. 9-4

Test Date: 10/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.19 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-1.6) - (-2.3) m/s	-2.03 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-3.4) - (-4.2) m/s	-3.96 m/s	Yes
Pendulum Integrated Velocity Change at 25ms	(-4.3) - (-5.2) m/s	-4.82 m/s	Yes
Total Head D-Plane Rotation	(-75) - (-86) °	-85.0 °	Yes
Total Neck Occipital Condyles Moment	36 - 45 N·m	40.6 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 5 Nm	60 - 80 ms	75.0 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Ball

Approved

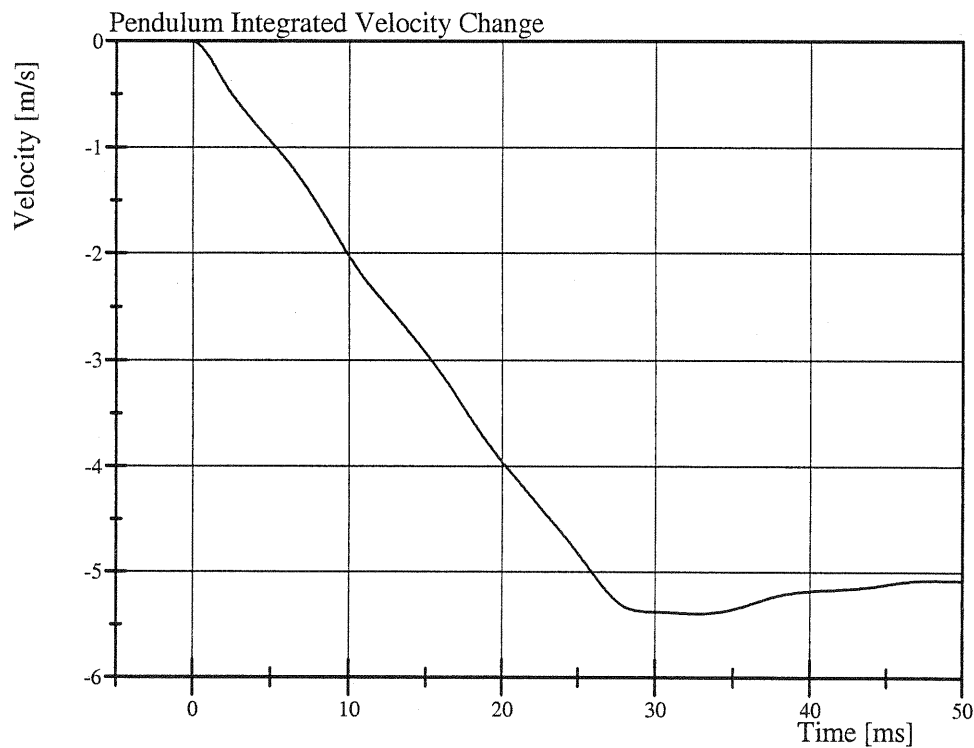
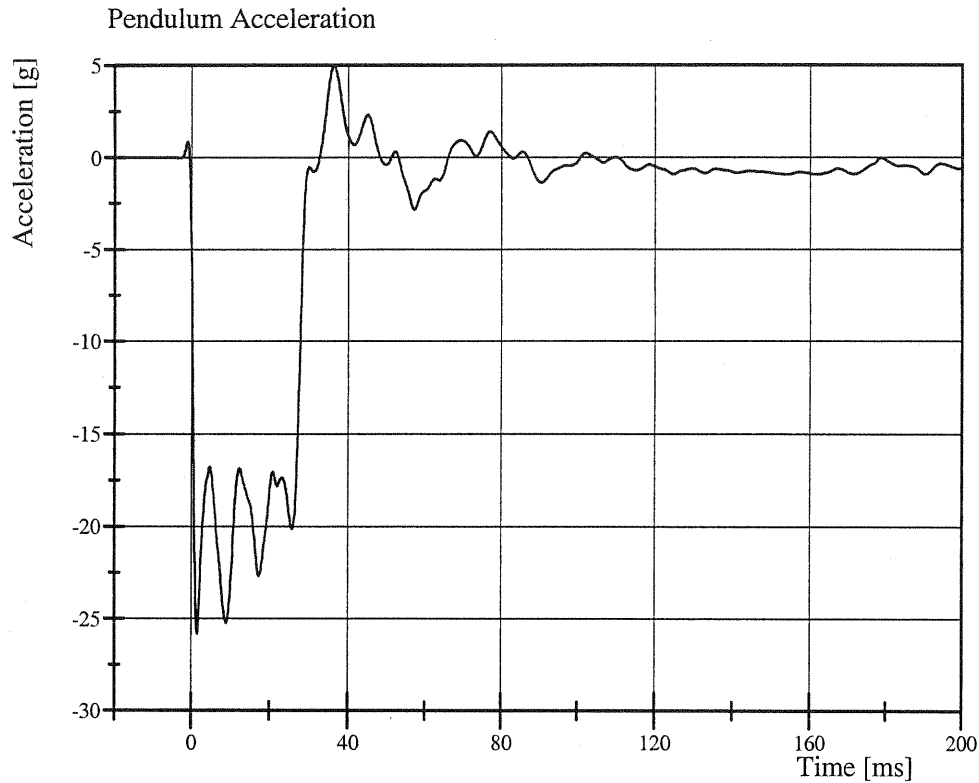
Ron Storn

Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 9-4

Test Date: 10/16/2007



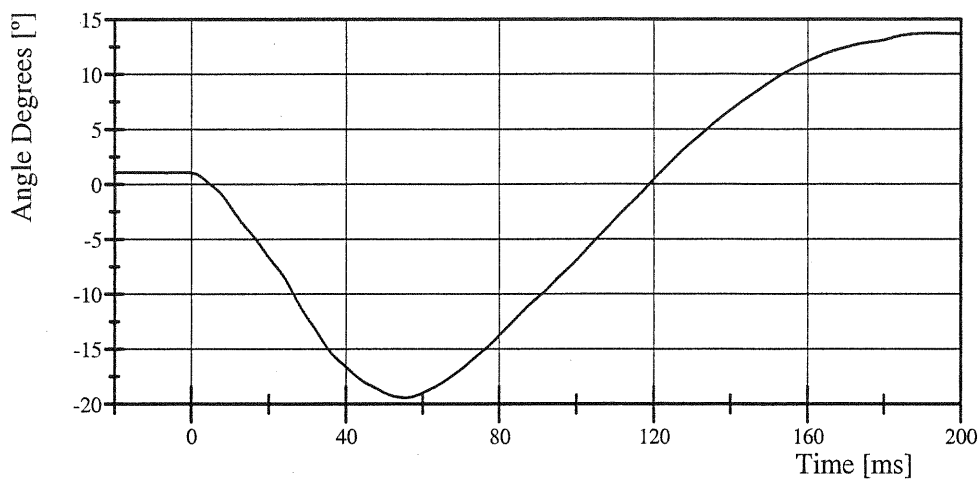
Transportation Research Center Inc.

Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 9-4

Test Date: 10/16/2007

Forward Pot Rotation at Base of Pendulum

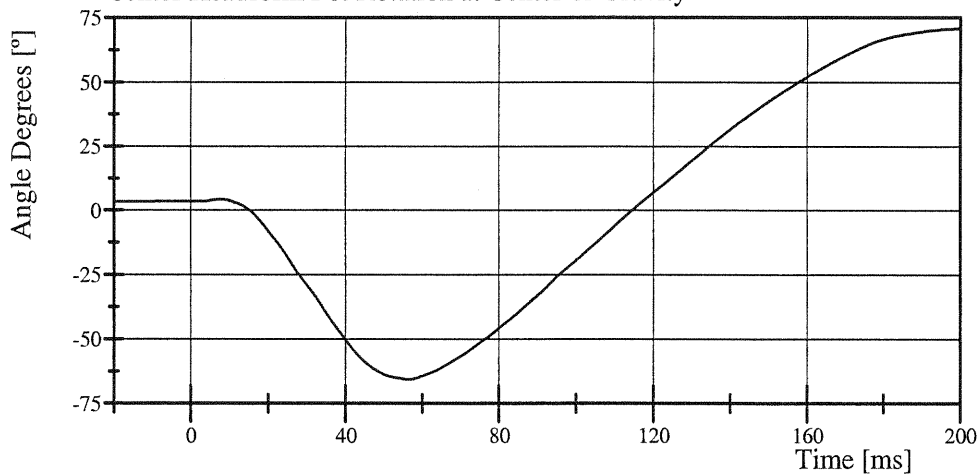


Filter Class: CFC_60

Max: 13.7 ° at 192.5 ms

Min: -19.4 ° at 55.4 ms

Center Headform Pot Rotation at Center of Gravity

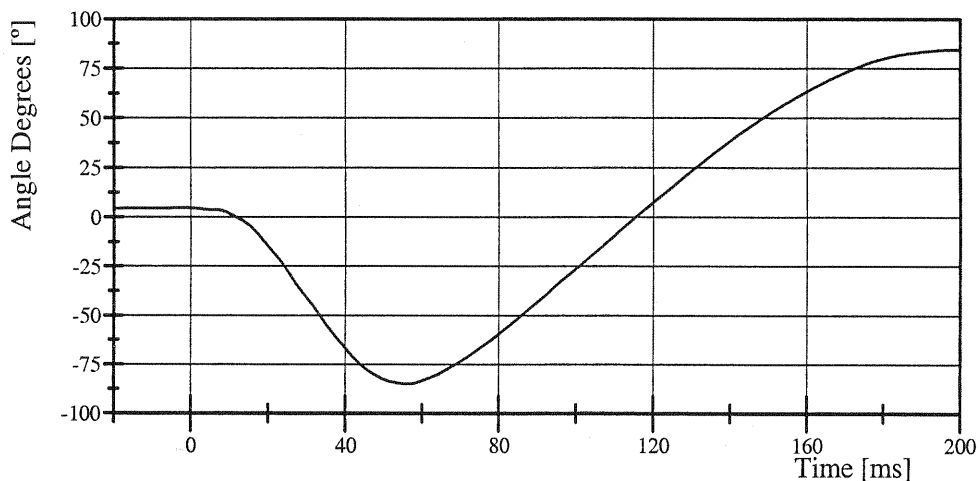


Filter Class: CFC_60

Max: 70.8 ° at 200.0 ms

Min: -65.6 ° at 56.5 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 84.4 ° at 199.7 ms

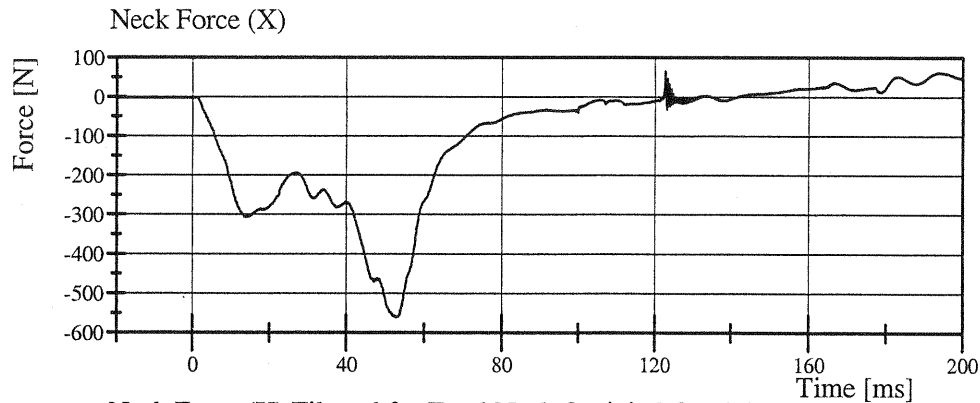
Min: -85.0 ° at 56.3 ms

Transportation Research Center Inc.

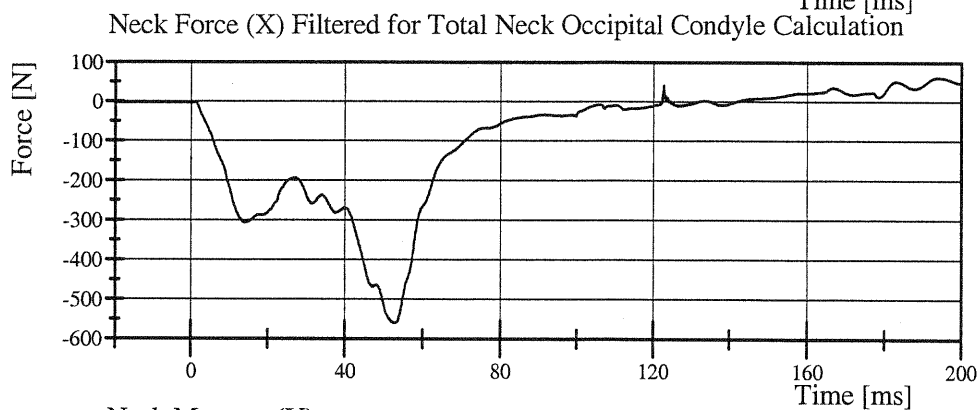
Neck Flexion

CRABI 12 MO Serial No. 094 Certification No. 9-4

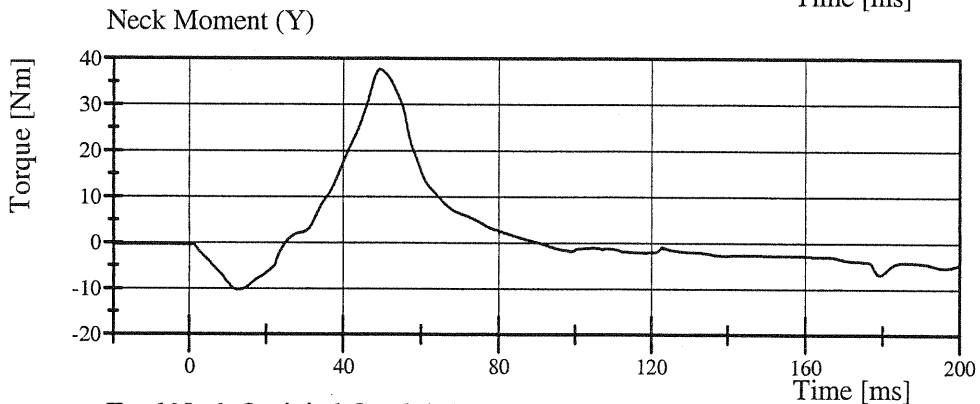
Test Date: 10/16/2007



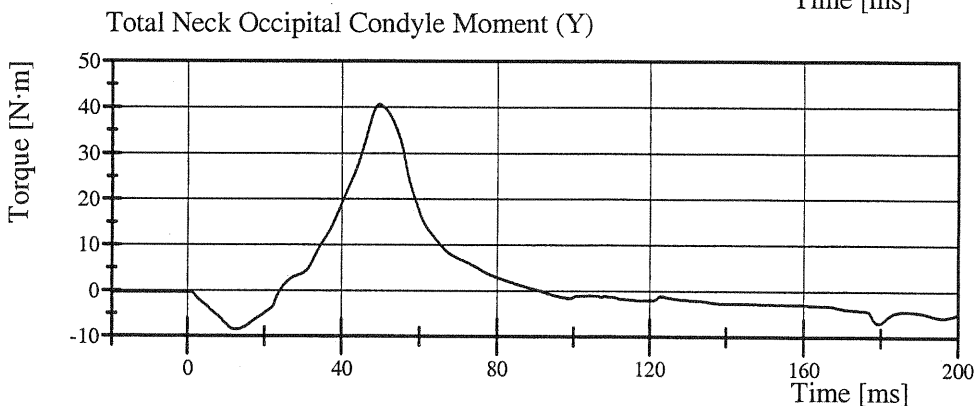
Filter Class: CFC_1000
Max: 65.3 N at 122.8 ms
Min: -560.5 N at 52.8 ms



Filter Class: CFC_600
Max: 62.3 N at 193.8 ms
Min: -559.8 N at 52.8 ms



Filter Class: CFC_600
Max: 37.7 Nm at 49.4 ms
Min: -10.2 Nm at 12.5 ms



Filter Class: CFC_600
Max: 40.6 N·m at 49.4 ms
Min: -8.5 N·m at 12.3 ms

Transportation Research Center Inc.

Neck Extension

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

Test Date: 10/16/2007

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Pendulum Velocity	(-2.4) - (-2.6) m/s	-2.57 m/s	Yes
Pendulum Integrated Velocity Change at 6ms	0.8 - 1.2 m/s	1.03 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 2.1 m/s	1.81 m/s	Yes
Pendulum Integrated Velocity Change at 14ms	2.2 - 2.9 m/s	2.43 m/s	Yes
Total Head D-Plane Rotation	80 - 92 °	90.2 °	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	82.6 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Storn

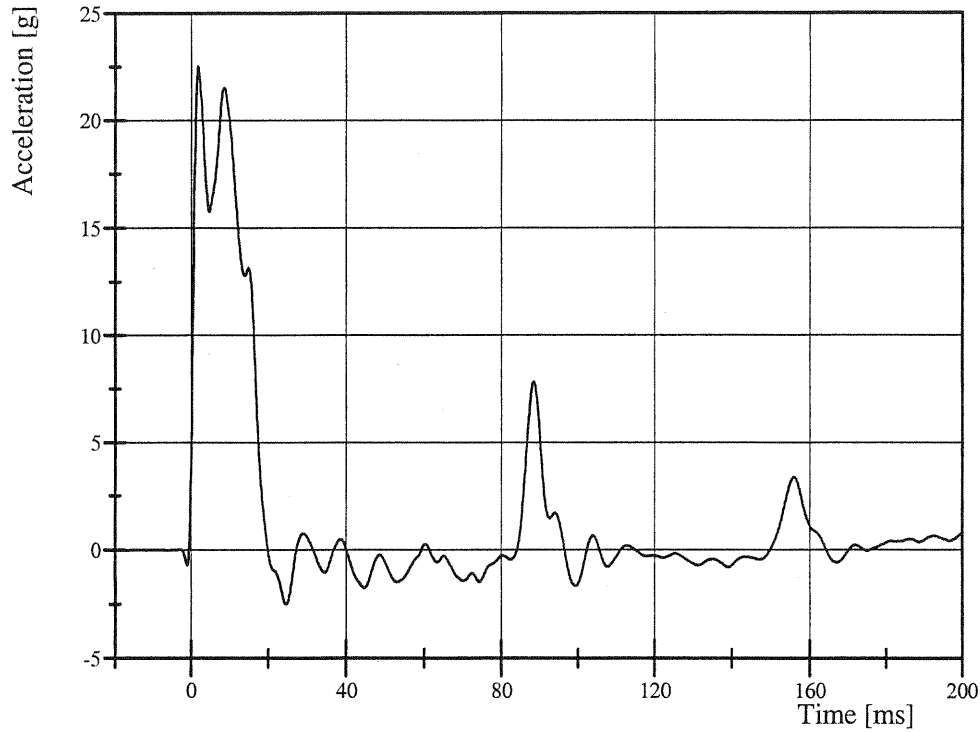
Transportation Research Center Inc.

Neck Extension

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

Test Date: 10/16/2007

Pendulum Acceleration

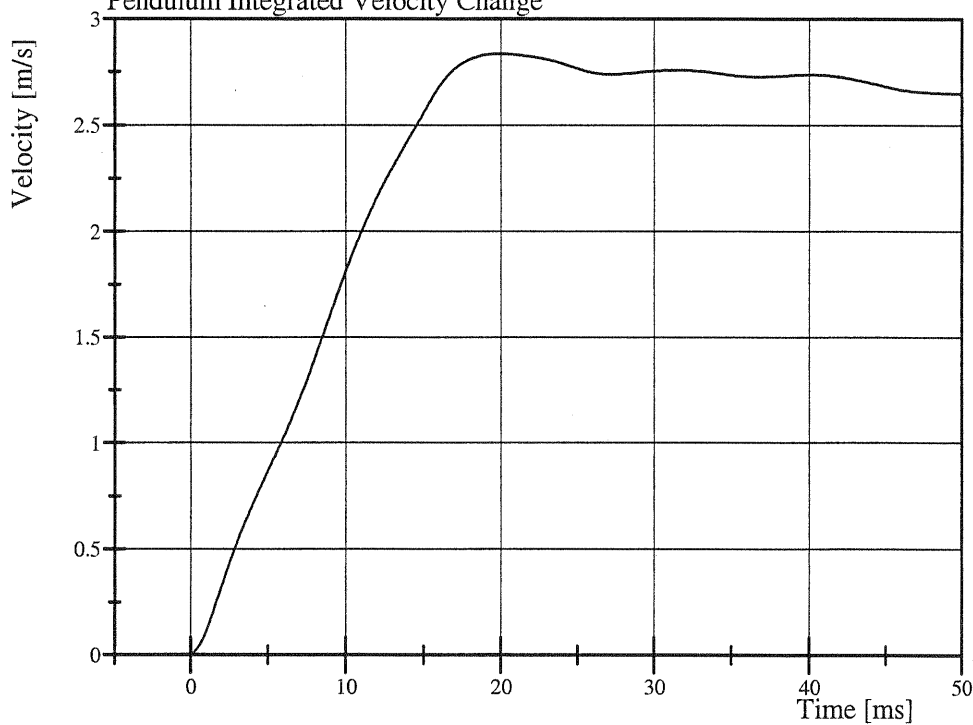


Filter Class: CFC_180

Max: 22.5 g at 1.8 ms

Min: -2.5 g at 24.5 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 2.8 m/s at 19.9 ms

Min: 0.0 m/s at 0.0 ms

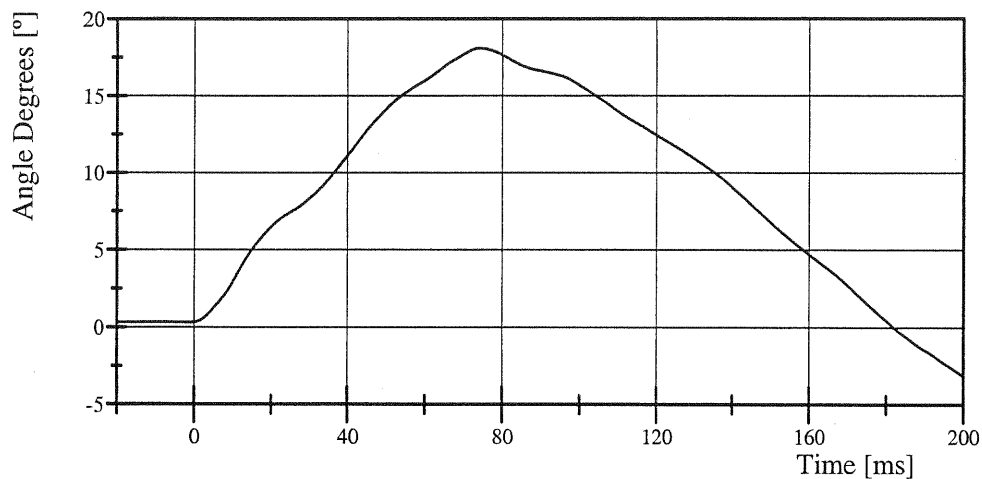
Transportation Research Center Inc.

Neck Extension

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

Test Date: 10/16/2007

Forward Pot Rotation at Base of Pendulum

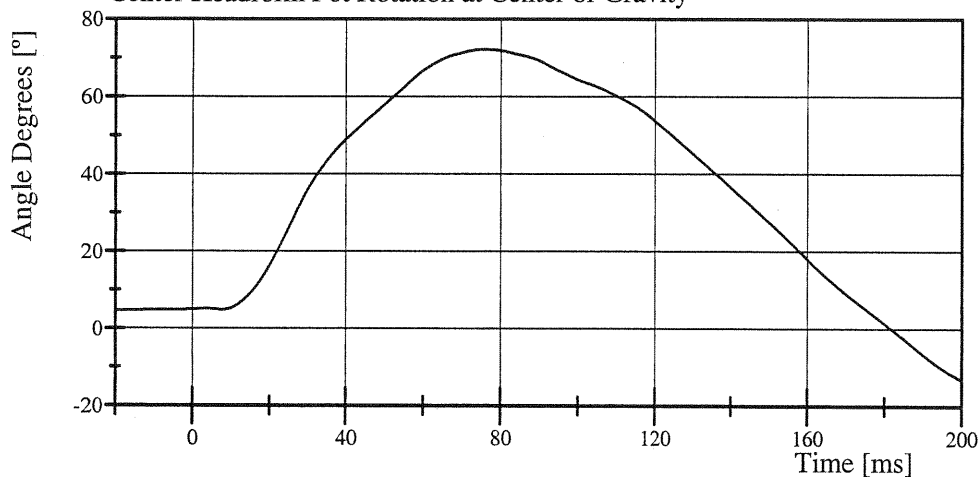


Filter Class: CFC_60

Max: 18.1 ° at 74.3 ms

Min: -3.1 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

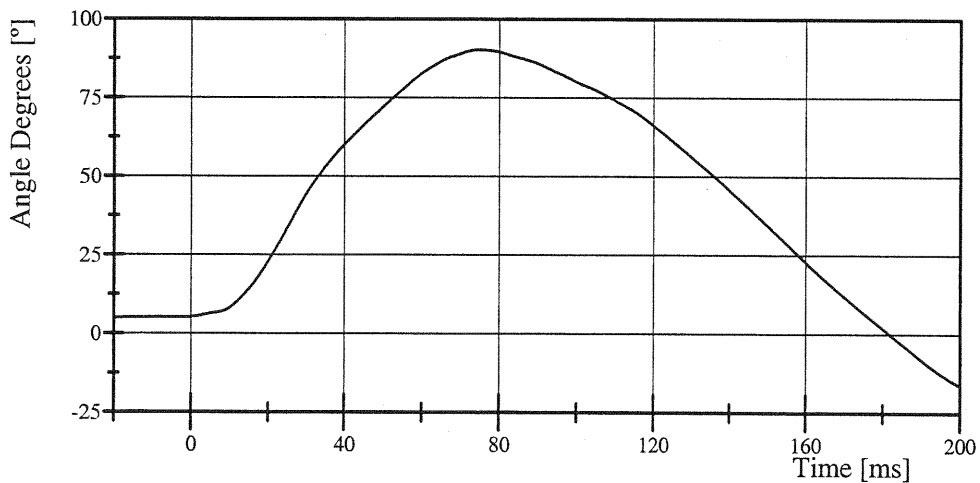


Filter Class: CFC_60

Max: 72.2 ° at 75.4 ms

Min: -13.2 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 90.2 ° at 74.8 ms

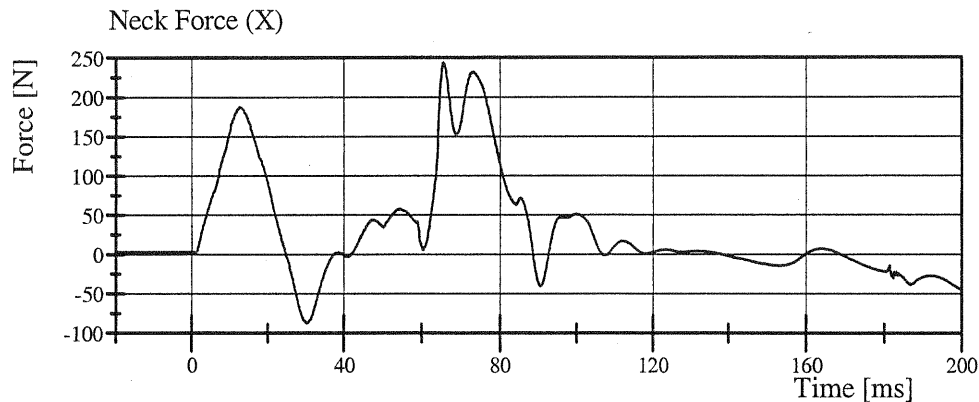
Min: -16.3 ° at 200.0 ms

Transportation Research Center Inc.

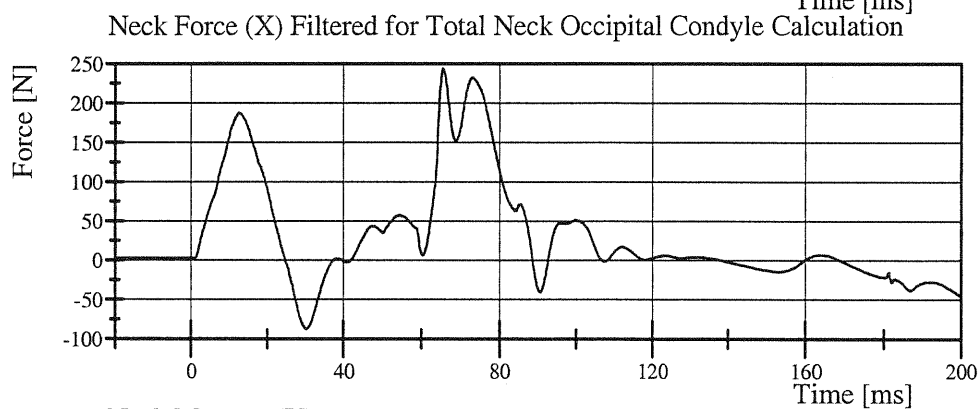
Neck Extension

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

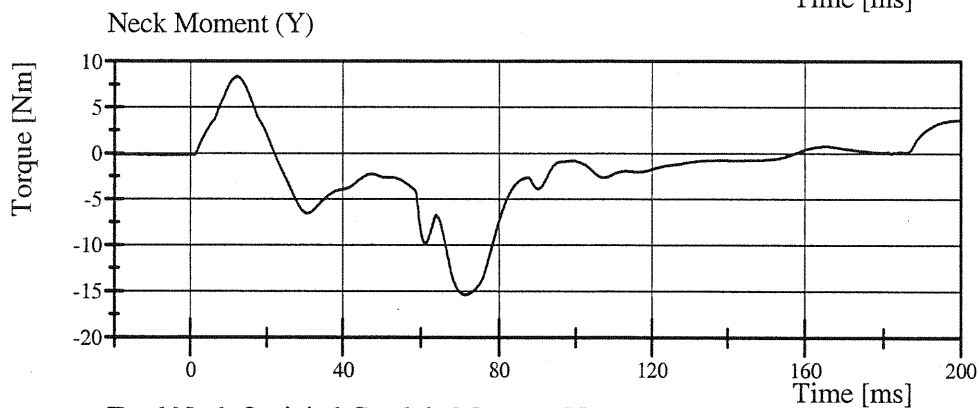
Test Date: 10/16/2007



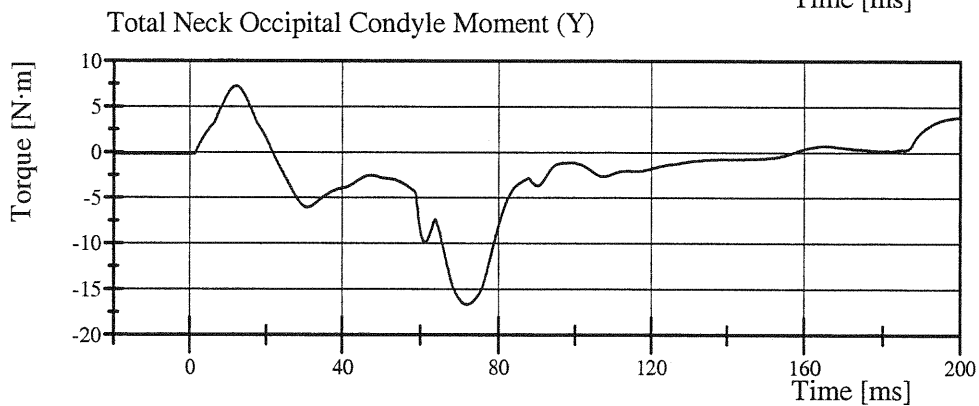
Filter Class: CFC_1000
Max: 243.7 N at 65.5 ms
Min: -87.4 N at 30.3 ms



Filter Class: CFC_600
Max: 243.7 N at 65.6 ms
Min: -87.3 N at 30.3 ms



Filter Class: CFC_600
Max: 8.4 Nm at 12.2 ms
Min: -15.4 Nm at 71.4 ms



Filter Class: CFC_600
Max: 7.3 N·m at 12.2 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

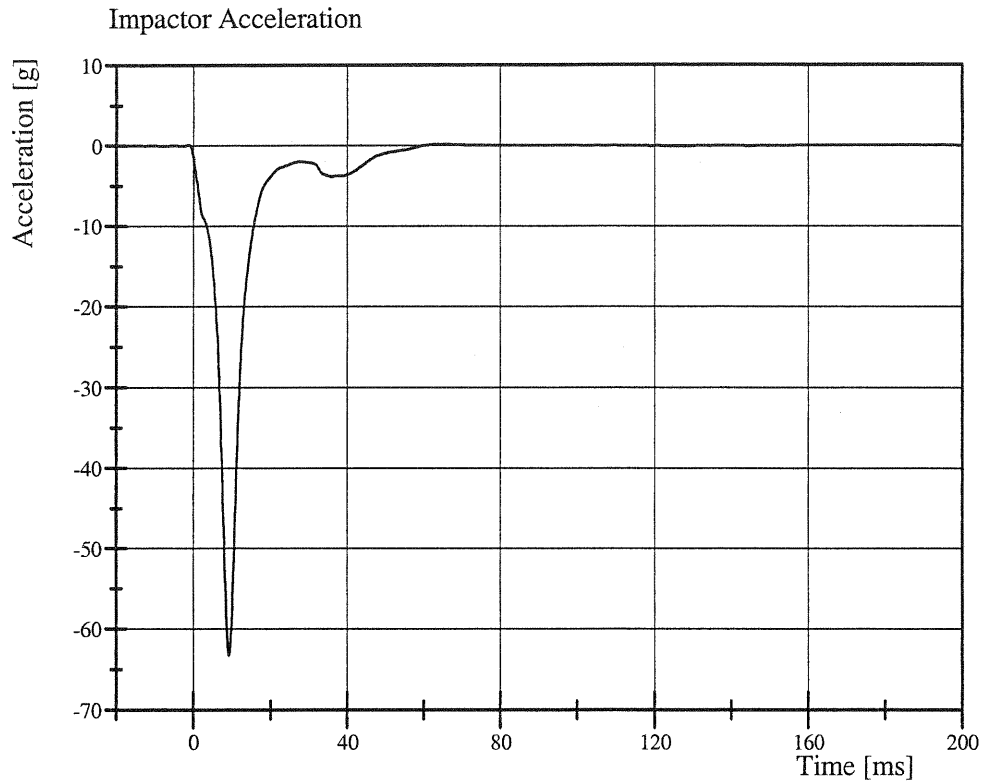
Ron Stoner

Transportation Research Center Inc.

Front Thorax

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

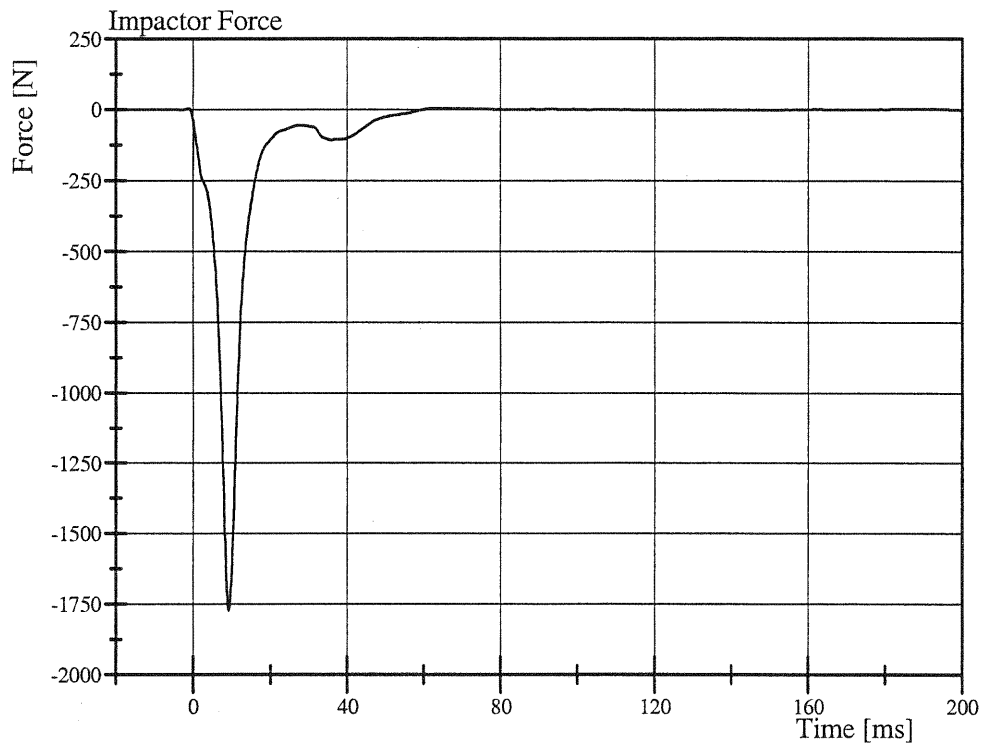
Test Date: 10/17/2007



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

CALIBRATION TEST RESULTS

POST-TEST RIGHT REAR

CRABI: 094

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

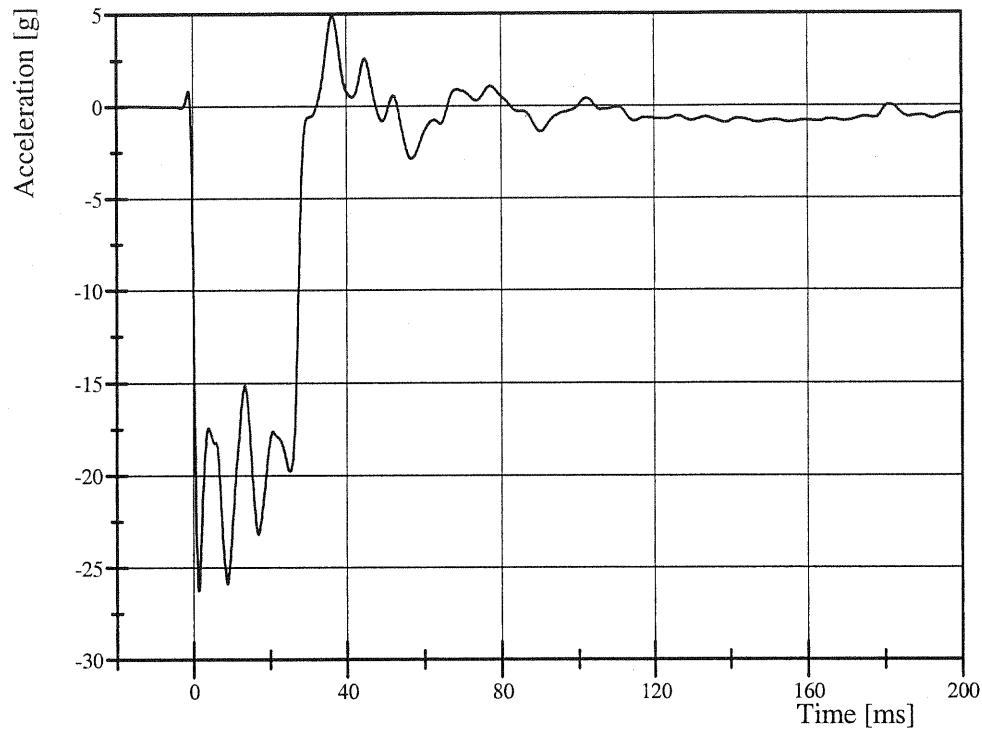
Transportation Research Center Inc.

Neck Flexion

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

Test Date: 10/29/2007

Pendulum Acceleration

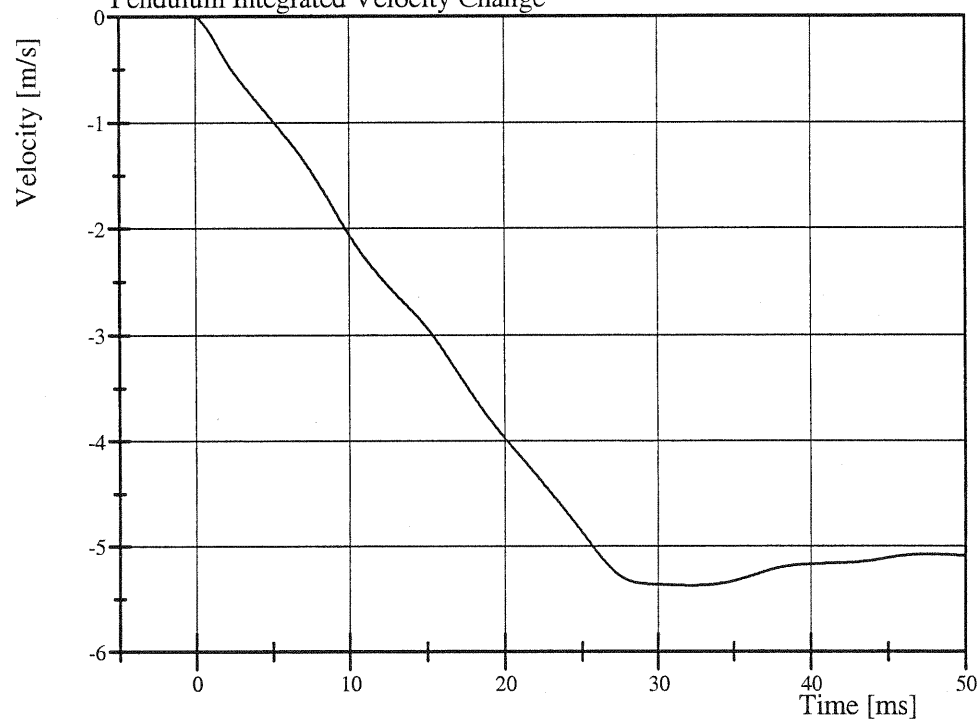


Filter Class: CFC_180

Max: 4.9 g at 36.3 ms

Min: -26.2 g at 1.4 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -5.4 m/s at 32.2 ms

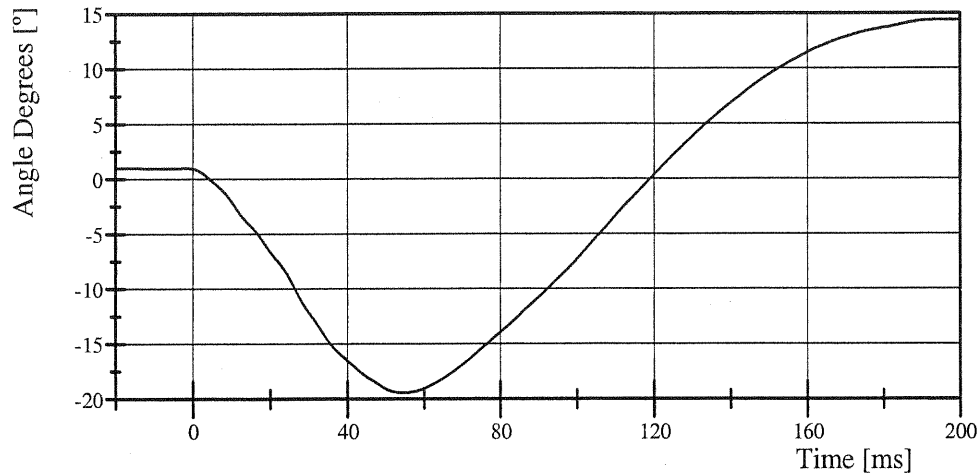
Transportation Research Center Inc.

Neck Flexion

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

Test Date: 10/29/2007

Forward Pot Rotation at Base of Pendulum

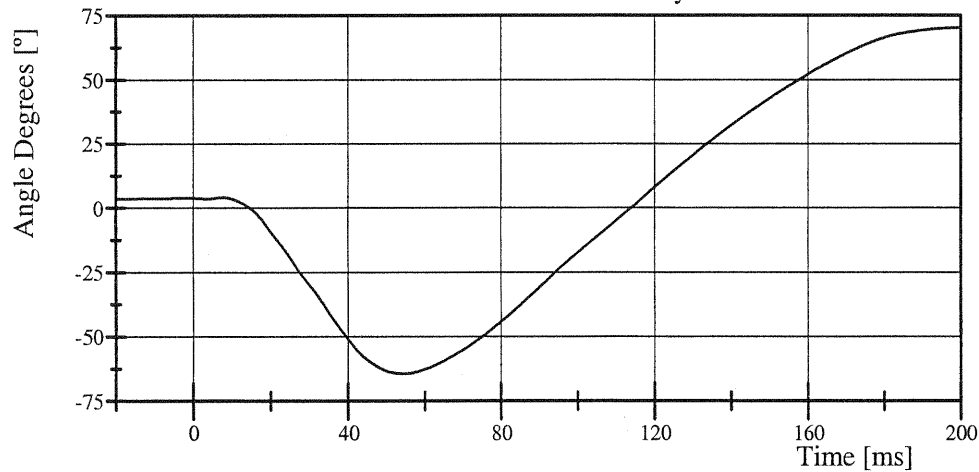


Filter Class: CFC_60

Max: 14.4 ° at 196.2 ms

Min: -19.4 ° at 54.6 ms

Center Headform Pot Rotation at Center of Gravity

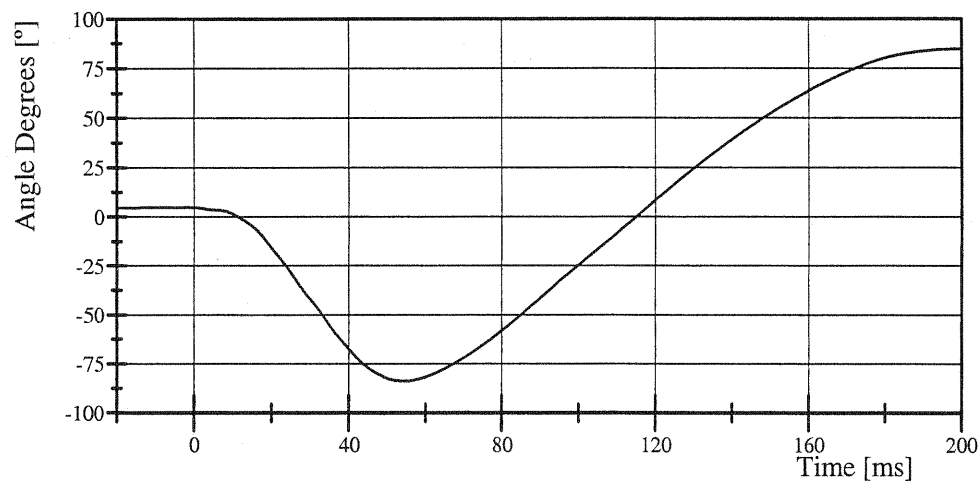


Filter Class: CFC_60

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

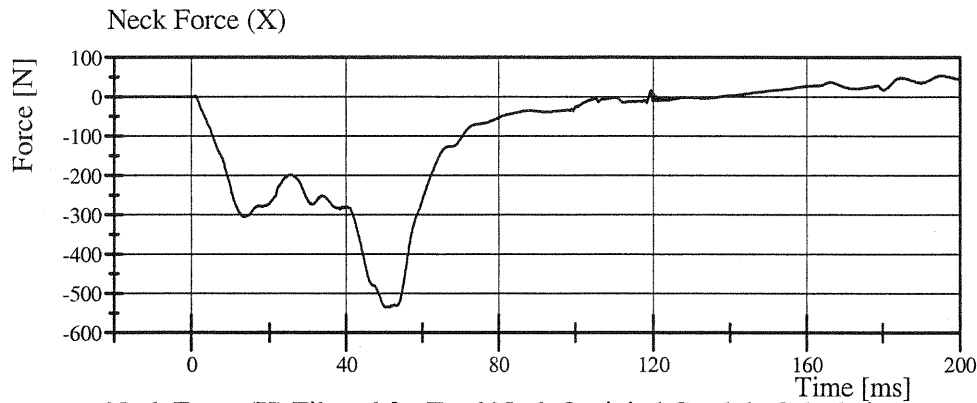
Min: -83.8 ° at 54.7 ms

Transportation Research Center Inc.

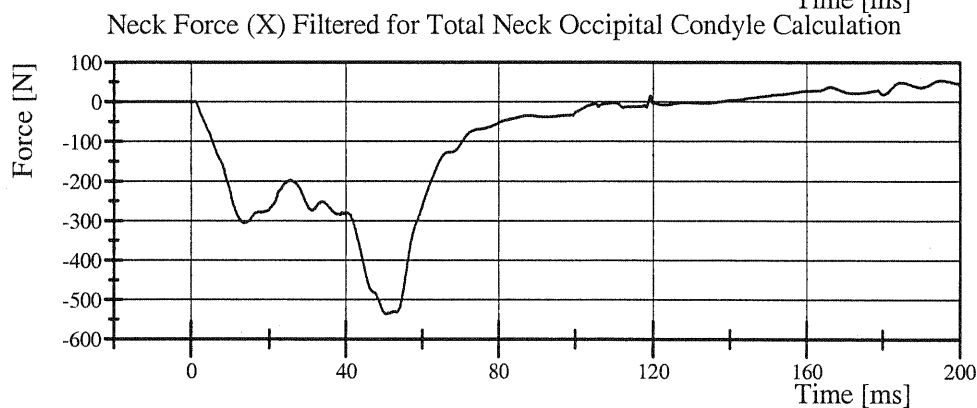
Neck Flexion

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

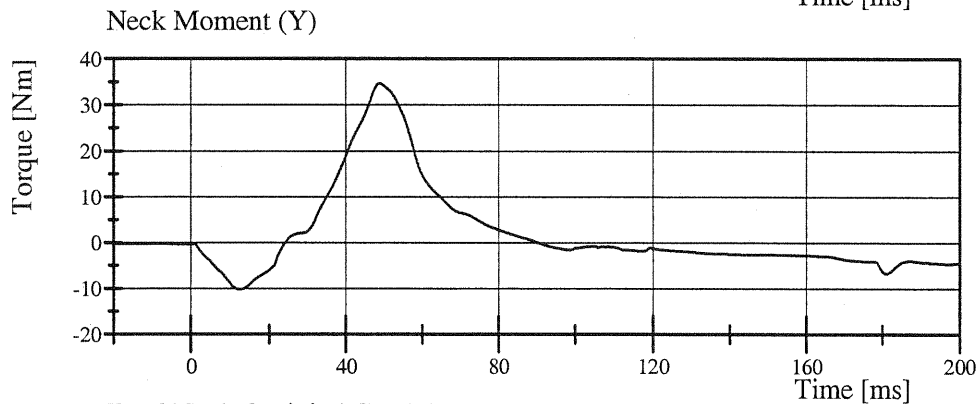
Test Date: 10/29/2007



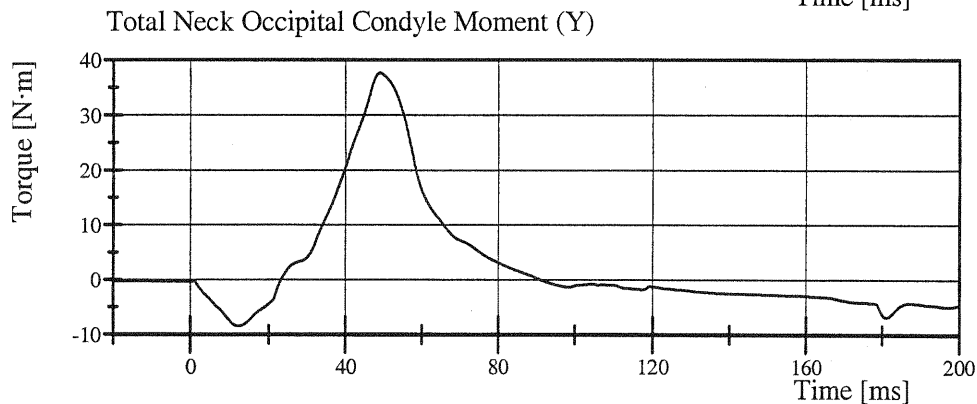
Filter Class: CFC_1000
Max: 54.8 N at 195.8 ms
Min: -535.4 N at 50.2 ms



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

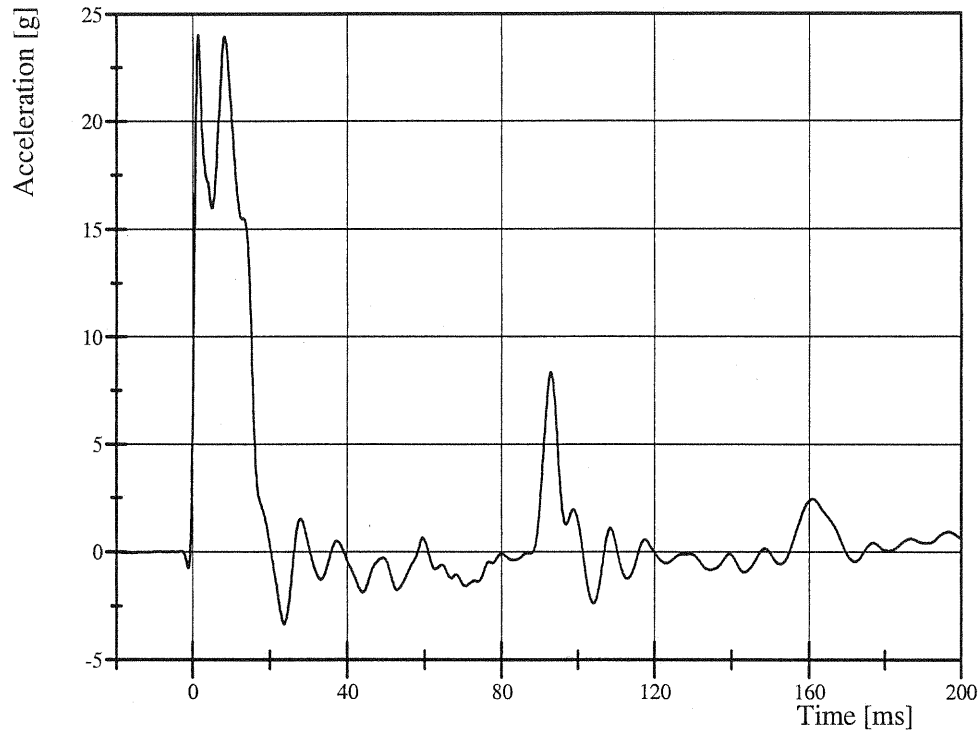
Transportation Research Center Inc.

Neck Extension

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

Test Date: 10/29/2007

Pendulum Acceleration

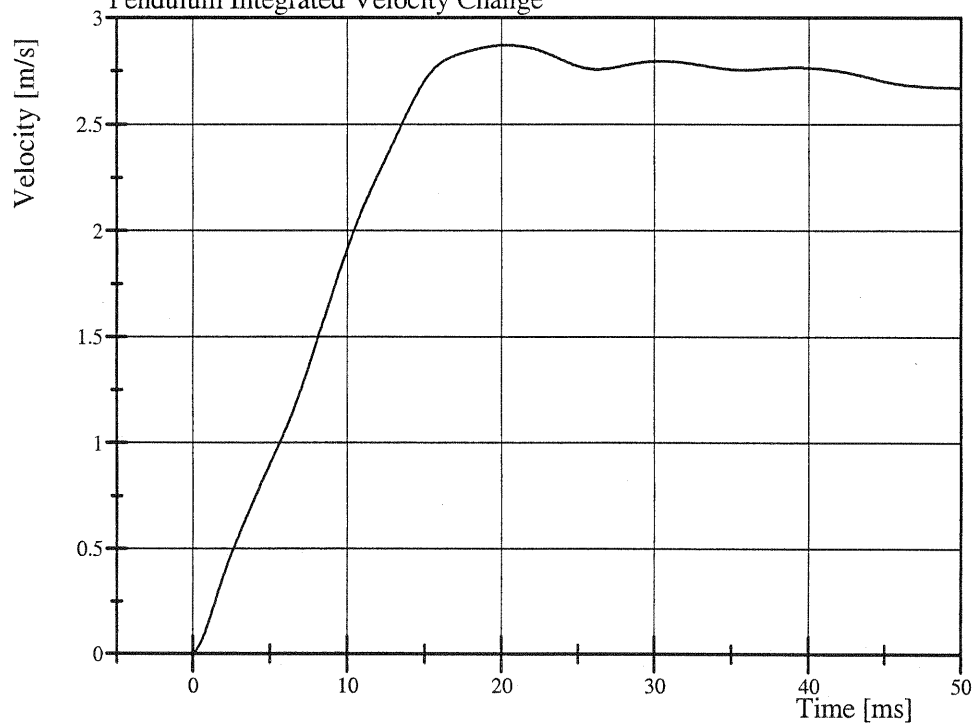


Filter Class: CFC_180

Max: 24.0 g at 1.5 ms

Min: -3.3 g at 23.7 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180

Max: 2.9 m/s at 20.3 ms

Min: 0.0 m/s at 0.0 ms

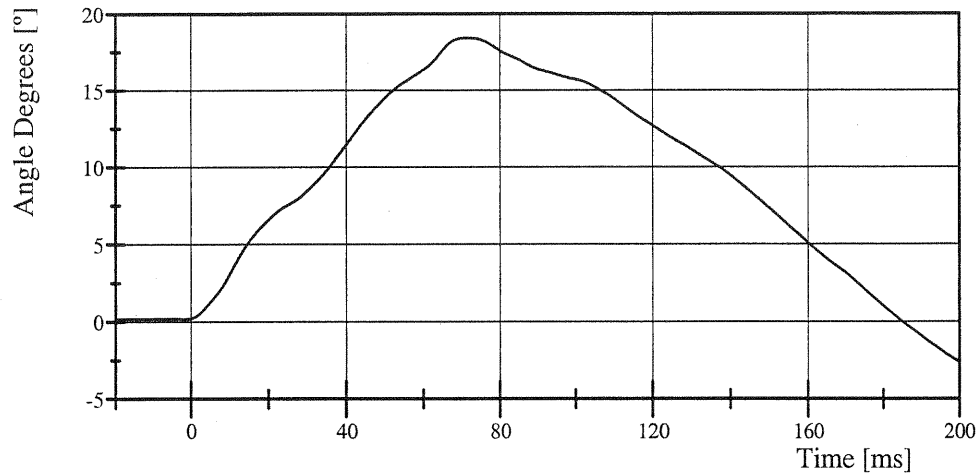
Transportation Research Center Inc.

Neck Extension

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

Test Date: 10/29/2007

Forward Pot Rotation at Base of Pendulum

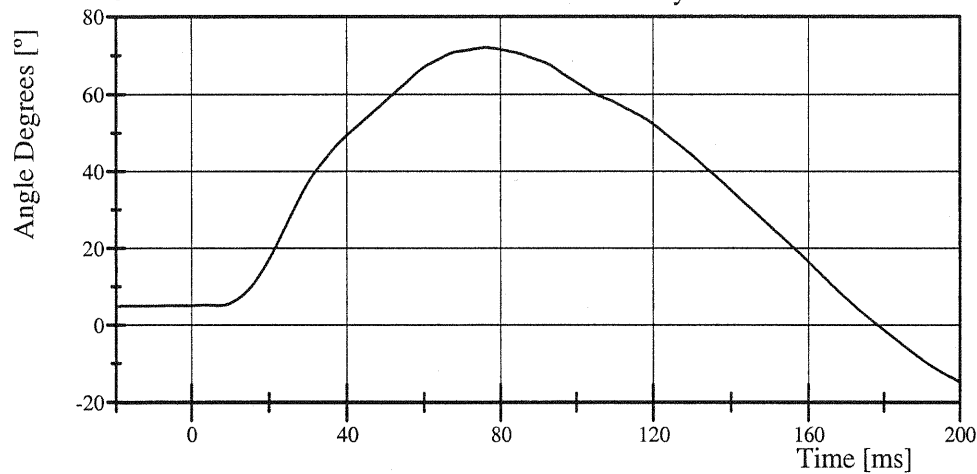


Filter Class: CFC_60

Max: 18.4 ° at 71.4 ms

Min: -2.6 ° at 200.0 ms

Center Headform Pot Rotation at Center of Gravity

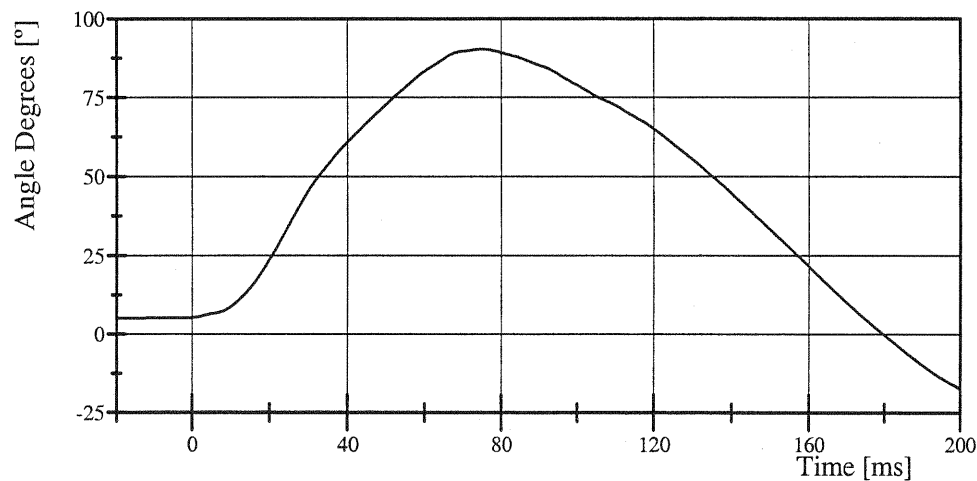


Filter Class: CFC_60

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

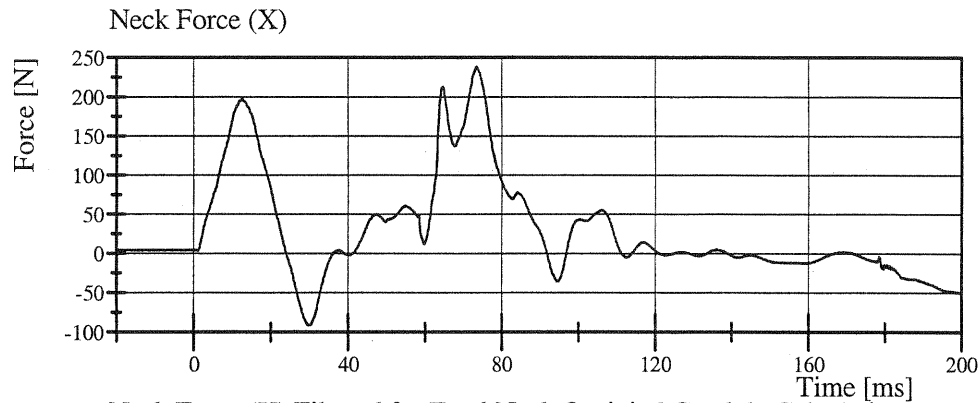
Min: -17.3 ° at 200.0 ms

Transportation Research Center Inc.

Neck Extension

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

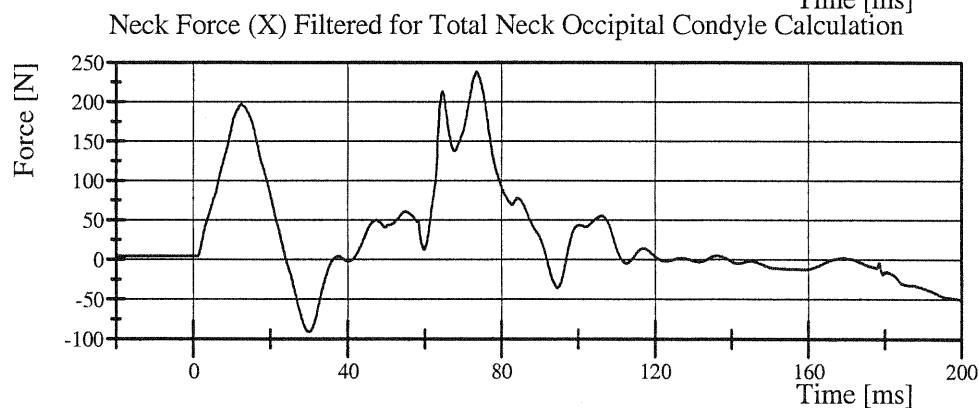
Test Date: 10/29/2007



Filter Class: CFC_1000

Max: 238.7 N at 73.5 ms

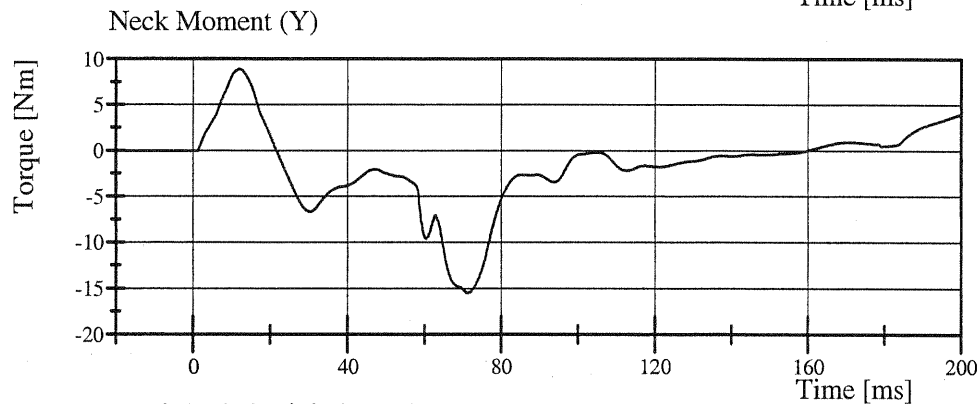
Min: -91.1 N at 29.6 ms



Filter Class: CFC_600

Max: 238.3 N at 73.5 ms

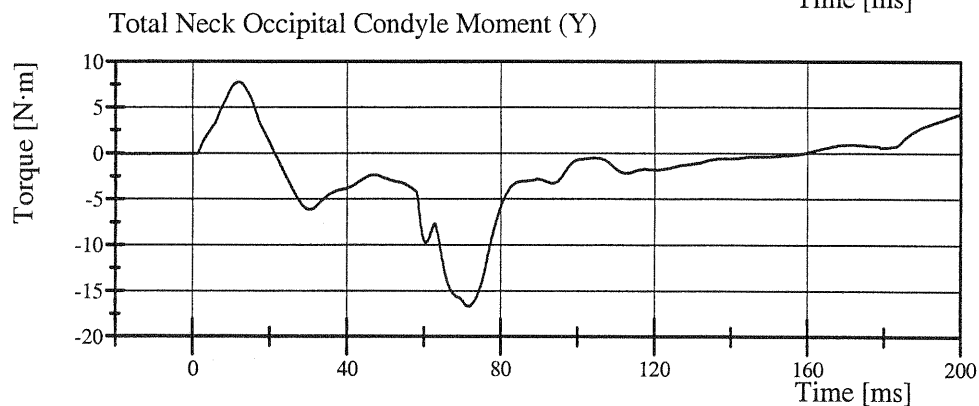
Min: -91.0 N at 29.7 ms



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



Test Date: 10/25/07

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

Proj./Seg. No.: 20050906-1200 Test Eng: Emad Al-Tabakha

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

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

Pre Test Inspection Completed By: J. Clarridge Date: 10/24/07

Post Test Inspection Completed By: J. Clarridge Date: 10/26/07