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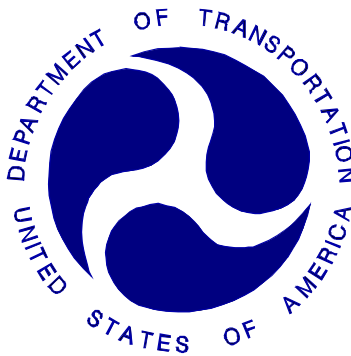
**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

MERCEDES-BENZ U.S. INTL., INC.
2006 MERCEDES-BENZ ML350
MPV

NHTSA NUMBER: E65000

CALSPAN TEST NUMBER: 8642-NCAP-63

CALSPAN CORPORATION
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August 30, 2005

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Rulemaking
Office of Crashworthiness Standards
Mail Code: NVS-111
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16. Abstract A frontal load cell barrier test of a 2006 Mercedes-Benz ML350 MPV was performed at Calspan Corporation's crash test facility in Buffalo, New York, on August 30, 2005. The impact velocity was 56.49 kph and the temperature at the barrier face was 21.0°C. The maximum post-test vehicle crush was 549 mm. The test vehicle was equipped with 3-point restraint systems, knee bolsters, and airbags at both the driver and right outboard passenger seating positions. With respect to FMVSS 208 "Occupant Crash Protection - Injury Criteria" both the driver and passenger appeared to comply with head, chest, and femur requirements. The occupant injury criteria summary is as follows:					
Measurement Description		Units	Threshold	Driver (142)	Passenger (150)
Head Injury Criteria (HIC - 36 ms)		-	1000	399.1	322.6
Maximum Thorax Acceleration (3 ms Clip)		g's	60 g's	45.4	39.7
Chest Displacement		mm	-76 mm	-33.9	-27.6
Left Femur Force		Newtons	-10000 N	-3691.2	-4906.5
Right Femur Force		Newtons	-10000 N	-3841.7	-4787.5
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SECTION 1

PURPOSE AND SUMMARY OF TEST

1.1 PURPOSE

This 56.49 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. DTNH22-01-D-32005. 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 56.49 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

1.2 TEST PROCEDURE

This 56.49 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) New Car Assessment Program (NCAP) Laboratory Indicant Test Procedure, dated December 1999. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion (Partial)"; and FMVSS 301 "Fuel System Integrity" performance. Procedures for receiving, inspection testing and reporting of test results are described in the test procedures and are not repeated in this report.

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

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

Both ATDs were fully instrumented with nine accelerometer array heads, chest and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 142) and the right-front passenger (position 2) ATD (Serial No.150) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The vehicle, occupant, camera and measurement data are presented in Section 2. Appendix A contains the still photograph prints. The 196 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Appendix C contains the dummy calibration data and Appendix D contains the transducer calibration dates.

1.3 SUMMARY OF FRONTAL BARRIER IMPACT TEST

A load cell barrier consisting of 36 load cells was impacted by a 2006 Mercedes-Benz ML350 MPV at a velocity of 56.49 kph. The test was performed at Calspan on August 30, 2005. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The occupant data is summarized below.

ATD	HIC	T ₁	T ₂	Clip (g)	T ₁	T ₂	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	399.1	68.1	104.1	45.4	83.2	86.2	-33.9	-3691.2	-3841.7
Passenger	322.6	76.3	112.3	39.7	79.6	82.6	-27.6	-4906.5	-4787.5

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

TEST NOTES	
Data Channel	Anomalies
V1P2 Right Lower Tibia Mx	Transducer Cable Failed
V1P2 Left Foot Aft Ax	Transducer Failed
V1P2 Left Foot Aft Az	Questionable Data After 74 ms
V1P2 Left Foot Fore Az	Questionable Data After 74 ms
V1P3 Upper Neck Fy	Spikes in Data
V1P3 Upper Neck Mx	Channel Failed at 59 ms
V1P3 Upper Neck My	Data Spike at 60 ms
V1P3 Upper Neck Mz	Data Spike at 60 ms
V1P3 Lumbar Mz	Questionable Data: 77-87 ms
V1P4 Pelvic x	Questionable Data
V1 Right Rear #2x	Wire Cut at 67 ms
V1 Engine Top #3x	Wire Cut at 62 ms

SECTION 2
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
CRASH TEST SUMMARY

Vehicle NHTSA No.: E65000 Test Mode: 56.3 kph Frontal Barrier
 Test Date: August 30, 2005 Time: 16:02 Temperature: 21.0 °C
 Vehicle Make/Model/Body Style: 2006 Mercedes-Benz ML350 MPV
 Vehicle Test Weight: 2431.0 kg Impact Velocity: 56.49 kph (55.5 – 57.1 kph)
 Vehicle/Barrier Impact Angle: 0 ° Max Static Crush: 549 mm

ATD INFORMATION AND VISIBLE CONTACT POINTS

	DRIVER	PASSENGER
ATD Type:	Part 572E	Part 572E
Restraint System:	Seatbelt with shoulder pretensioner and force limiter, head restraint, airbag, knee bolster	Seatbelt with shoulder pretensioner and force limiter, head restraint, airbag, knee bolster
Head Contact:	The face to the center of the airbag and the back of the head to the center and outboard edge of the head restraint	The face to center of the airbag and the back of the head to outboard half of the head restraint
Abdomen Contact:	None	None
Chest Contact:	Chest to the airbag	Chest to the airbag
Left Knee Contact:	Knee bolster	Left half of the glove compartment door
Right Knee Contact:	Knee bolster	Center of the glove compartment door

DOOR OPENING, SEAT TRACK AND GLAZING INFORMATION

Description	Driver Side	Passenger Side
Door Lock Status	Unlocked	Unlocked
Front Door Opening	Closed, latched and operable without tools	Closed, latched and operable without tools
Rear Door Opening	Closed, latched and operable without tools	Closed, latched and operable without tools
Front Seat Track Shift (mm)	5	3
Front Seat Back Failure	None	None
Glazing Damage	None	
Hatch/Other Door Opening	Rear Hatch: Closed, latched and operable without tools	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Left Side (mm)	Center (mm)	Right Side (mm)	Average (mm)
Value	499	500	536	512

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	852	865
Lap belt length as measured on ATD	mm	575	570
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems	mm	1472	1435

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2006 Mercedes-Benz ML350 MPV

NHTSA No. : E65000 ; VIN: 4JGBB86E76A031264 ; Color: Black

Engine Data: 6 cylinders; - CID; 3.6 Liters; - cc

Placement: X Longitudinal or In-Line; - Transverse or Lateral

Transmission Data: 7 Speeds; - Manual; X Automatic; X Overdrive

Final Drive: - Rear Wheel Drive; - Front Wheel Drive; X Four Wheel Drive

AUTOMATIC DOOR LOCKS:

Is test vehicle equipped with Automatic Door Locks (ADLs)? X Yes; - No;

Does vehicle owner's manual describe how to deactivate ADLs? X Yes; - No; - N/A

DEALER AND DELIVERY INFORMATION:

Date Received: 08/23/2005 ; Odometer Reading 35.4 km

Selling Dealer: Great Lakes Motor Corp., Mercedes-Benz of Buffalo

Dealer Address: Williamsville NY, 14221

TEST VEHICLE OPTIONS:

X AC; X Power Steering; X Power Brakes; X Power Locks; X Power Seats

X ABS; X Tilt Wheel; X Stability Control X Traction Control X Anti-Theft

SAFETY BELT FEATURES:

Driver: X Pretensioner (Lap); X Load Limiter; X Adjustable Anchorage

Passenger: X Pretensioner (Lap); X Load Limiter; X Adjustable Anchorage

AIRBAG FEATURES:

Position	Frontal	Knee Bolster	Side Torso	Side Head/Torso Combination	Side Curtain
Driver:	Yes	No	Yes	No	No
Passenger:	Yes	No	Yes	No	No
Rear Passenger:	No	N/A	No	No	No

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Mercedes-Benz U.S. Intl., Inc.

Date of Manufacture 08/05

GVWR: 1335 kg; GAWR: 1495 kg FRONT; 2830 kg REAR

VEHICLE CAPACITY DATA:

Type of Front Seats: - Bench; X Bucket; - Split Bench

Number of Occupants: 2 Front; 3 Rear; 5 Total

Vehicle Capacity Weight (VCW) = 530 kg

No. of Occupants x 68.04 kg = 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = 189.8 kg *

* Maximum RCLW of 1361.1 kg used for target weight calculation.

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

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	568.0	587.0	53.7	1155.0
Rear =	509.0	486.0	46.3	995.0
Total Delivered Weight (UDW) =				2150.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	2150.0	kg
Rated Cargo/Luggage Weight (RCLW) =	136.1	kg
Weight of 2 p.572 Dummies @ 76 each =	152	kg
TARGET TEST WEIGHT =	2438.1	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 129.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	607.5	624.5	50.7	1232.0
Rear =	606.0	593.0	49.3	1199.0
Total Vehicle Test Weight (ATW) =				2431.0

Weight of Ballast Secured in Vehicle Trunk Area¹ = 6 kg

Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

	Left Front	Right Front	Left Rear	Right Rear	CG ²
AS DELIVERED:	855	899	856	897	1350.4
FULLY LOADED:	845	856	845	856	-
AS TESTED:	846	862	847	858	1439.2

Vehicle's Wheel Base: 2918 mm

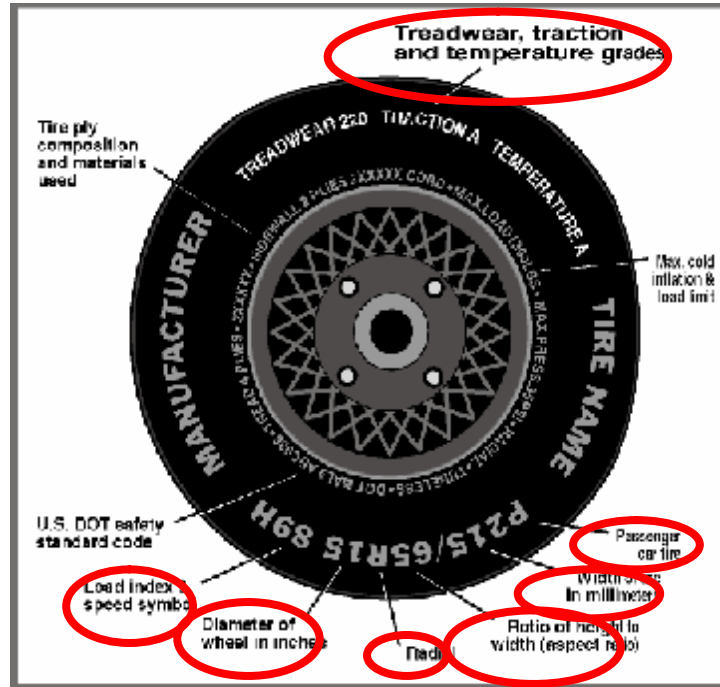
¹Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

²Rearward of the front axle centerline.

DATA SHEET NO. 3
TEST VEHICLE TIRE INFORMATION

Vehicle Year/Make/Model/Body Style: 2006 Mercedes-Benz ML350 MPV

NHTSA Test No.: E65000 Test Date: August 30, 2005



Measured Parameter	Front	Rear
Maximum Tire Pressure (from sidewall - kPa)	350	350
Cold Pressure (from tire placard - kPa)*	220	270
Recommended Tire Size (from tire placard)	P235/65R17 104H	P235/65R17 104H
Tire size on Vehicle	P235/65R17 104H	P235/65R17 104H
Tire Manufacturer	Michelin	Michelin
Tire Name	XSE	XSE
Tire Type	P	P
Tire Width (mm)	235	235
Ratio of Height to Width (aspect ratio)	65	65
Radial	R	R
Wheel Diameter	17	17
Load Index & Speed Symbol	104H	104H
Treadwear	440	440
Traction Grade	A	A
Temperature Grade	A	A

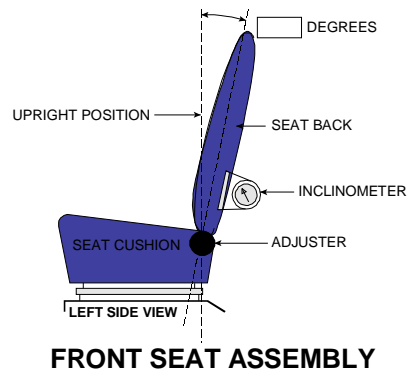
*Tire pressure used for test

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 2006 Vehicle Model: Mercedes-Benz ML350 Body Style : MPV

1. NOMINAL DESIGN RIDING POSITION:
for adjustable driver and passenger seat backs.
Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



Seat back angle for driver's seat: 25.3

Measurement instructions: Seat back was positioned at 25.3 degrees when measured at the centerline of the seat back plastic cover (21.9 degrees rearward from the forward-most locking position).

Seat back angle for passenger's seat: 23.5

Measurement instructions: Seat back was positioned at 25.3 degrees when measured at the centerline of the seat back plastic cover (21.9 degrees rearward from the forward-most locking position).

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Seat was positioned at the mid-position of its absolute fore/aft travel and full down.

Positioning of the passenger's seat: Seat was positioned at the mid-position of its absolute fore/aft travel and full down.

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 95 liters

B. "Usable Capacity" of the optional equipment fuel tank is - liters

C. "Usable Capacity" of the vehicle(s) used for certification testing to requirements of FMVSS 301 = 87.4 to 89.3 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 89 liters

3.3 One-Third of Useable Capacity = 31.7 liters

3.4 Is vehicle equipped with electric fuel pump? Yes- X ; No- -

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

Fuel pump operated briefly when the ignition is placed on and continuously while the engine is running.

DATA SHEET NO. 4
TEST VEHICLE INFORMATION (cont.)

4. STEERING COLUMN ADJUSTMENTS:

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions: Steering column was placed in the mid-telescope, mid-tilt position.

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: The adjustable upper anchorage was placed in detent 1, where the uppermost detent is defined as 0.

6. AUTOMATIC DOOR LOCKS: Is test vehicle equipped with ADLs? X Yes; - No;

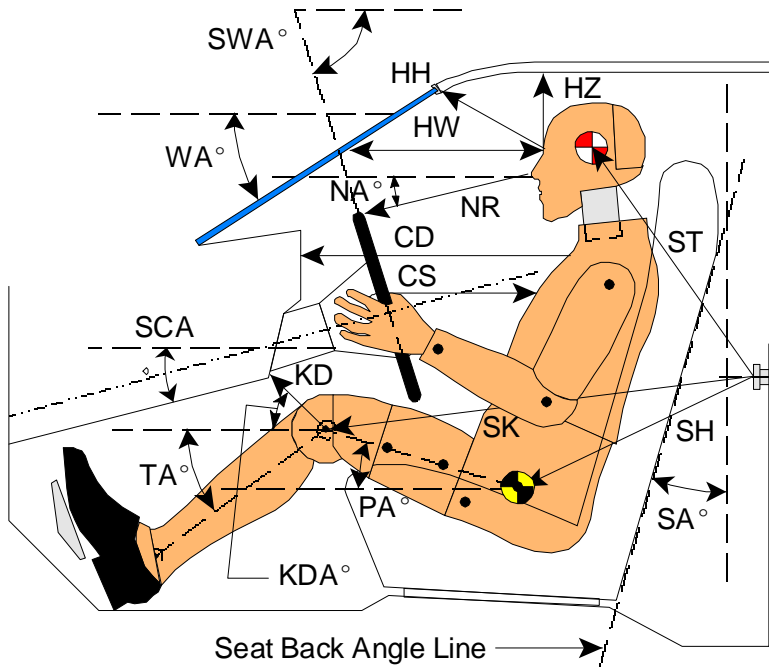
Does vehicle owner's manual describe how to deactivate ADLs? X Yes; - No; - N/A

Comments: The test was performed with the ADLs deactivated and the doors unlocked.

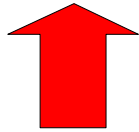
DATA SHEET NO. 5

FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE

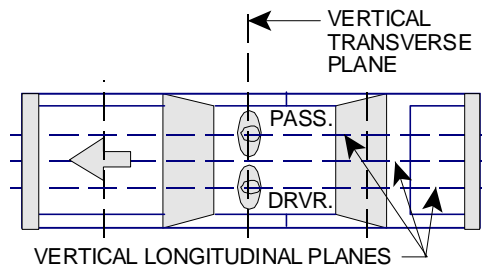
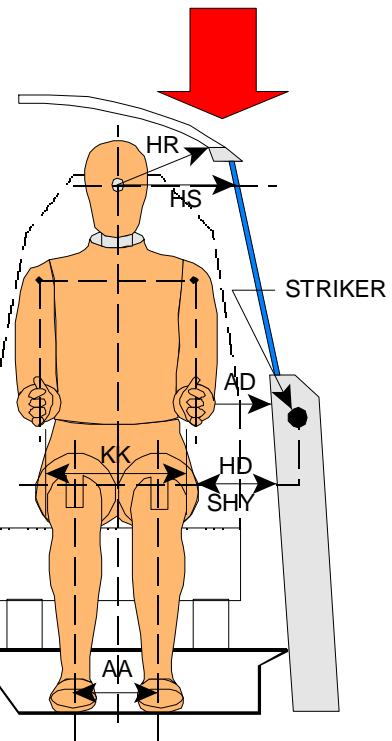
DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



- AD - Arm to Door
- HD - H-Point to Door
- HR - Head to Side Header
- HS - Head to Side Window
- KK - Knee to Knee
- AA - Ankle to Ankle
- SHY- Striker to H-Point (Y Direction)



- CD - Chest to Dash
- CS - Steering Wheel to Chest
- HH - Head to Header
- HW - Head to Windshield
- HZ - Head to Roof
- KDA - Knee to Dash Angle
- KDL- Left Knee to Dash
- KDR - Right Knee to Dash
- NA - Nose to Rim Angle
- NR - Nose to Rim
- PA - Pelvic Angle
- RA - Rim to Abdomen
- SA - Seat Back Angle
- SCA - Steering Column Angle
- SH - Striker to H-Point
- SK - Striker to Knee
- ST - Striker to Head
- SWA- Steering Wheel Angle
- TA - Tibial Angle
- WA - Windshield Angle



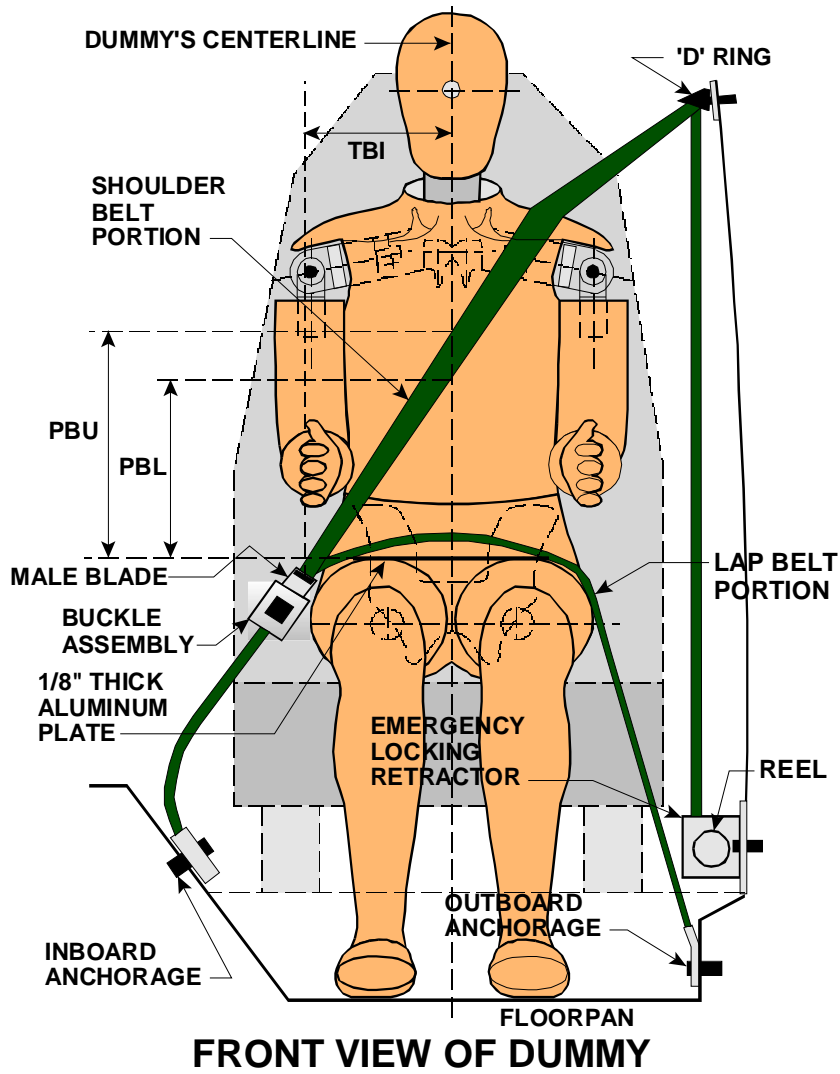
DATA SHEET NO. 5
FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE (cont.)

	DRIVER (Serial #142)			PASS. (Serial #150)		
WA ^o	30.1 deg.			N/A		
SWA ^o	68.6 deg.			N/A		
SCA ^o	21.4 deg.			N/A		
SA ^o	25.3 deg.			25.3 deg.		
HZ	230			219		
HH	404			395		
HW	760			720		
HR	261			257		
NR	408	Angle	6 deg.	N/A		
CD	550			542		
CS	328			N/A		
RA	211			N/A		
KDL	189	Angle (KDA)	34 deg.	160		
KDR	163			175	Angle (KDA)	36 deg.
PA ^o	22.5 deg.			24.0 deg.		
TA ^o	41.2 deg.			44.0 deg.		
KK	382			318		
AA	300			202		
ST	523	Angle	4 deg.	535	Angle	7 deg.
SK	565	Angle	95 deg.	570	Angle	92 deg.
SH	225	Angle	127 deg.	223	Angle	123 deg.
SHY	240			236		
HS	366			365		
HD	194			182		
AD	112			128		

Dimensions in millimeters

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

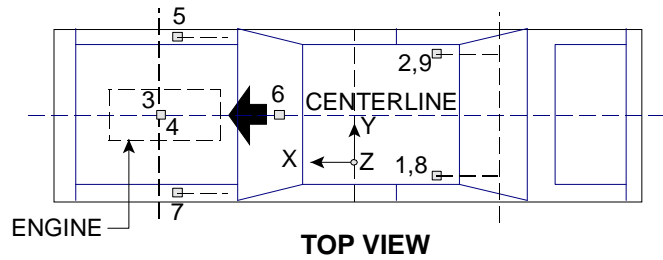
SEAT BELT POSITIONING DATA



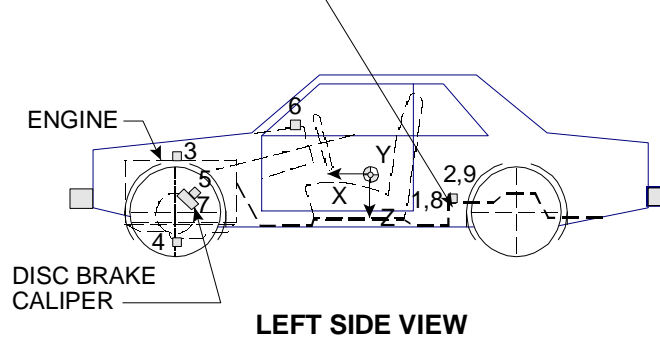
	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	330	338
PBL-- Top surface of alum. plate to belt lower edge	250	252
LAP BELT TENSION	10 N	10 N
SHOULDER BELT TENSION	Retractor	Retractor

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

**VEHICLE ACCELEROMETER LOCATION
AND DATA SUMMARY**



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



No.	LOCATION	PRE-TEST LENGTH (mm)		
		X	Y	Z
1	Left Rear Seat Cross Member X	1682	-651	-349
2	Right Rear Seat Cross Member X	1682	651	-349
3	Top of Engine Block	4066	-170	-975
4	Bottom of Engine	3692	20	-383
5	Disc Brake Caliper @ Right Side	3861	583	-278
6	Instrument Panel	2836	0	-871
7	Disc Brake Caliper @Left Side	3863	-583	-277
8	Left Rear Seat Cross Member Z	1682	-651	-349
9	Right Rear Seat Cross Member Z	1682	651	-349

X – From rear surface of vehicle (+ forward)

Y – From vehicle centerline (+ right)

Z – From ground plane (+ up)

DATA SHEET NO.8
SUMMARY OF FMVSS 212 and FMVSS 219 (Partial) DATA

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

Windshield is bonded in place and covered with a 25 mm molding.

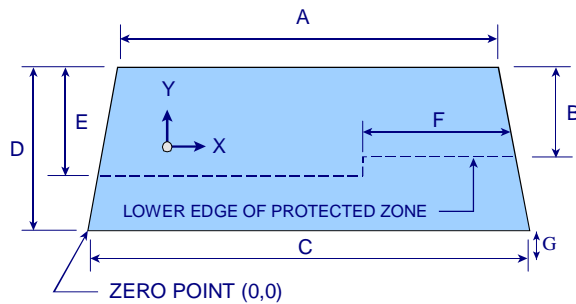
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test 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,

Temperature of windshield molding during test: 21.0°C.

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		% OF RETENTION
	PRE-TEST (mm)	POST-TEST (mm)	
RIGHT SIDE	2332.5	2332.5	100.0%
LEFT SIDE	2332.5	2332.5	100.0%
TOTAL	4665	4665	100.0%



DIMENSIONS (mm)	
A	1325
B	577
C	1600
D	870
E	563
F	530
G	25

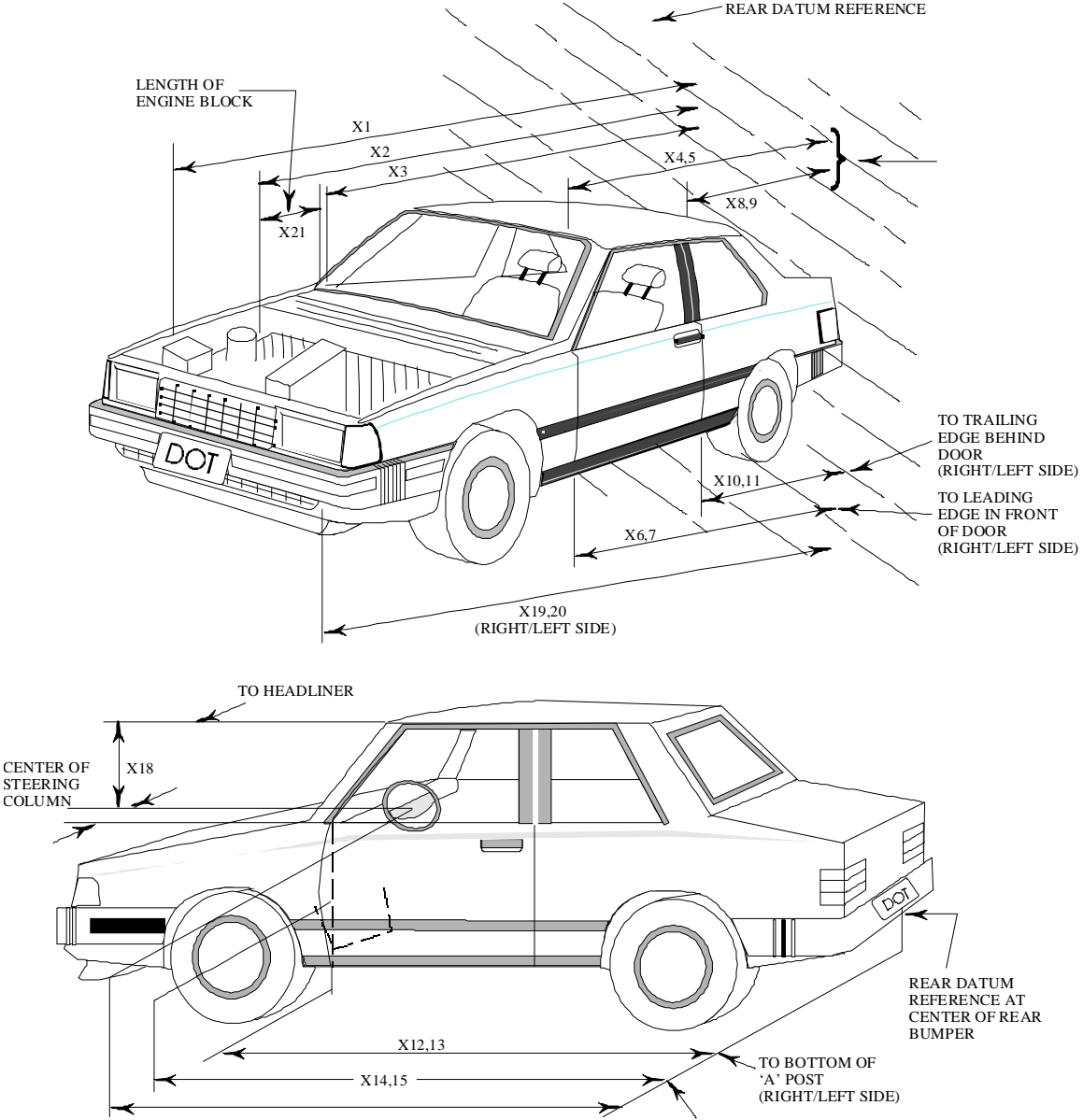
FRONT VIEW OF WINDSHIELD

FAILURE DETAILS: None

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm:

	COORDINATES	
	X	Y
1.	-	-
2.	-	-
3.	-	-
4.	-	-

DATA SHEET NO. 10
TEST VEHICLE MEASUREMENTS



DATA SHEET NO.10
VEHICLE MEASUREMENTS (cont.)

NHTSA TEST No.: E65000 TEST DATE: August 30, 2005
 VEHICLE MAKE/MODEL: 2006 Mercedes-Benz ML350 MPV

No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	4781	4259	522
X2	Rear Surface of Vehicle to Front of Engine	4152	4026	126
X3	Rear Surface of Vehicle to Firewall	3540	3535	5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3302	3299	3
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3301	3299	2
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3275	3271	4
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3272	3271	1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2171	2167	4
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2170	2168	2
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2182	2178	4
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2182	2180	2
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3228	3224	4
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3227	3226	1
X14	Rear Surface of Vehicle to Firewall, Right Side	3484	3482	2
X15	Rear Surface of Vehicle to Firewall, Left Side	3484	3485	-1
X16	Rear Surface of Vehicle to Steering Column	2775	2861	-86
X17	Center of Steering Column to "A" Post	286	285	1
X18	Center of Steering Column to Headliner	430	433	-3
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4674	4202	472
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4675	4305	370
X21	Length of Engine Block	626	626	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	3000	2997	3
CD	Rear Surface of Vehicle to Center of Dash Panel	2936	2937	-1
LD	Rear Surface of Vehicle to Left Side of Dash Panel	3000	3000	0

All Dimensions in mm

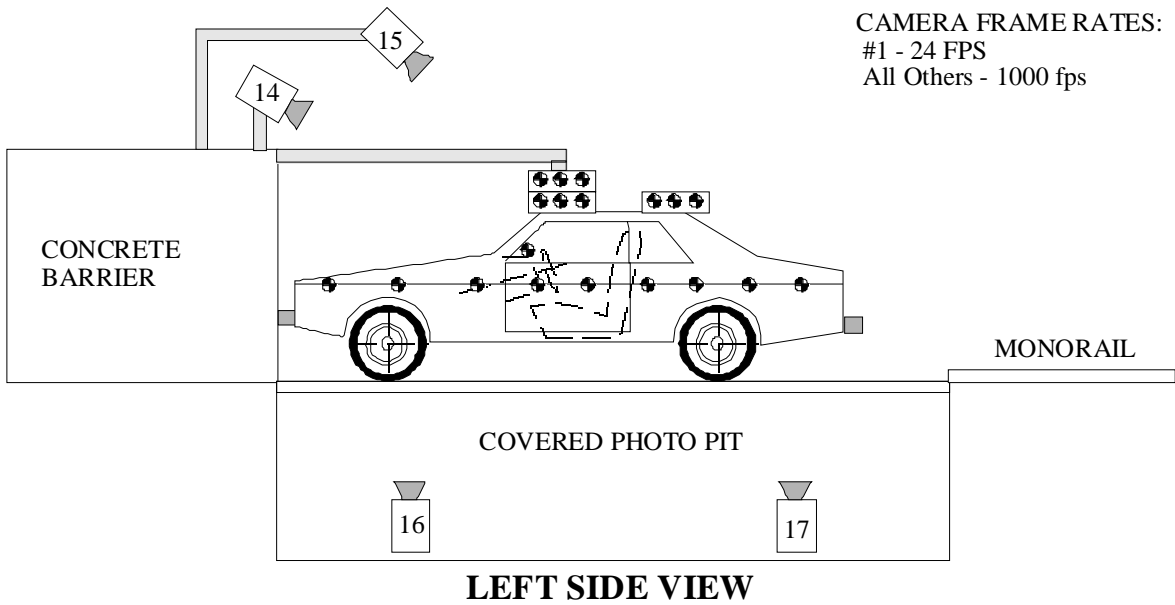
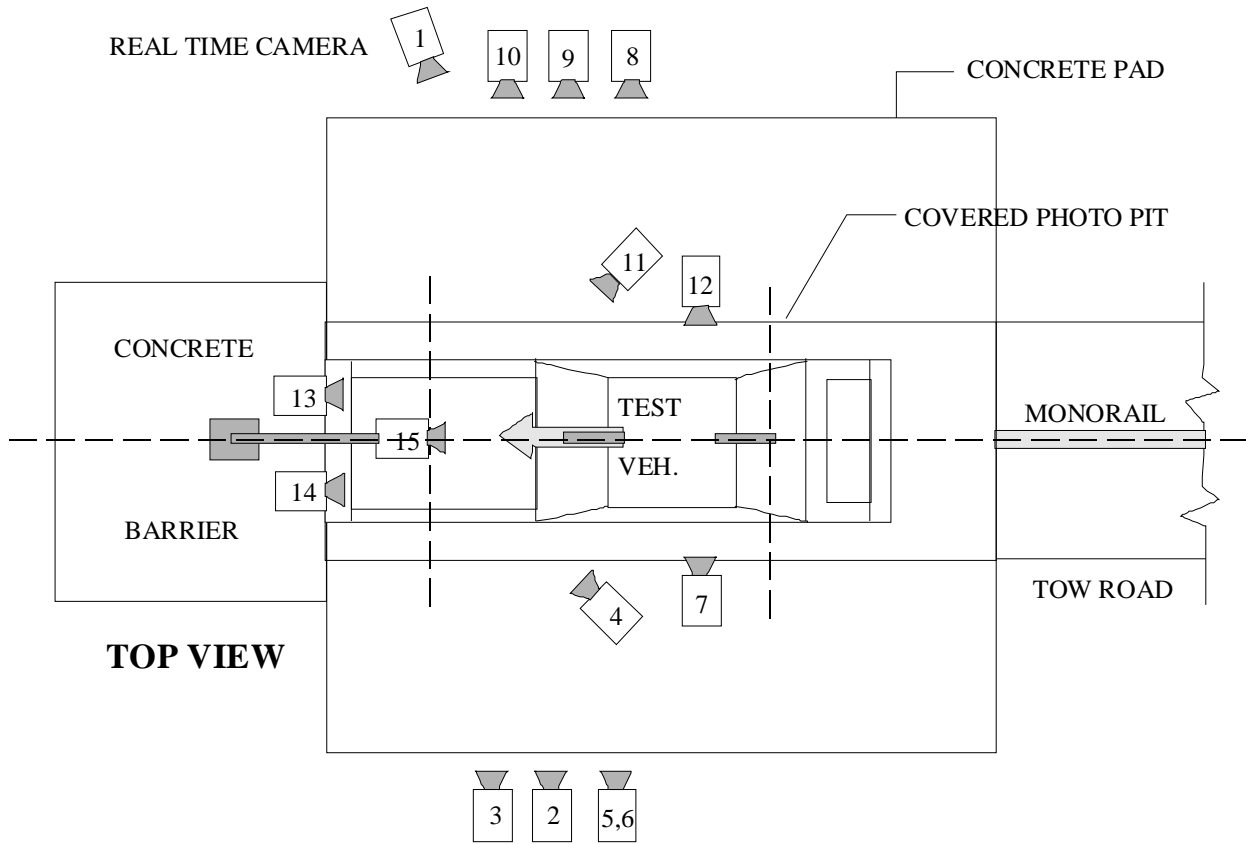
DATA SHEET NO.10
VEHICLE MEASUREMENTS (cont.)

NHTSA TEST No.: E65000 TEST DATE: August 30, 2005
 VEHICLE MAKE/MODEL: 2006 Mercedes-Benz ML350 MPV

TARGET VEHICLE STRUCTURAL MEASUREMENTS

	Elements	Pre-Test (mm)
1	Total length	4781
2	Total Width	1930 (max), 1884 (at B-pillar)
3	Bumper Top Height	590
4	Bumper Bottom Height	410
5	Longitudinal Member Top Height	NA
6	Distance Between Longitudinal Members	NA
7	Longitudinal Member Width	NA
8	Engine top height	980
9	Engine bottom height	380
10	Engine and gearbox width	NA
11	Front bumper-engine distance	629
12	Front shock absorber fixing height	NA
13	Bonnet leading edge height	840
14	Front shock absorber fixing width	NA
15	Front bumper – front axle distance	863
16	Front axle – A pillar distance	521
17	A-pillar – B pillar distance	1104 (at floor sill); 1120 (at beltline)
18	B-pillar – rear axle distance	2170
19	B-pillar – C Pillar distance	641 (at floor sill); 1104 (at beltline)
20	Roof sill bottom height	1641
21	Roof sill top height	1716
22	Floor sill bottom height	290
23	Floor sill top height	425

DATA SHEET NO.11
HIGH-SPEED CAMERA LOCATIONS



CAMERA FRAME RATES:
#1 - 24 FPS
All Others - 1000 fps

DATA SHEET NO.11
HIGH-SPEED CAMERA LOCATIONS (cont.)

NHTSA Test No.: E65000 Vehicle: 2006 Mercedes-Benz ML350 MPV

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE (deg)**	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	30
2	Overall Left Side	7316	1660	1085	-2	6926	24	1000
3	Left Side View	9829	1075	1090	-1	9439	50	1000
4	Driver and Interior View	7576	2910	2035	-8	-	35	500
5	Steering Column (Bottom)	7660	2045	1170	-2	7270	25	1000
6	Steering Column (Top)	7660	2045	1780	-7	7270	25	1000
7	Left CRS Lateral View	3055	3030	2250	-23	-	28	500
8	Overall Right Side	6876	2090	1120	-2	7216	12.5	500
9	Right Side View	9654	1205	1245	-3	9994	50	1000
10	Right Passenger View	8250	1697	1380	-2	8590	35	1000
11	Passenger and Interior View	8125	2725	2010	-7	-	35	500
12	Right CRS Lateral View	3120	3020	2160	-23	-	28	500
13	Passenger Front View	620	-92	1987	-28	-	13	500
14	Driver Front View	620	-92	1987	-28	-	13	500
15	Windshield View	0	-530	3374	-47	-	13	500
16	Pit View of Engine	0	615	-3048	90	-	13	500
17	Pit View of Fuel Tank	0		-3048	90	-	13	500

*X = film plane to monorail centerline ** = referenced to horizontal plane

Y = film plane to impact location N.T. indicates No Timing

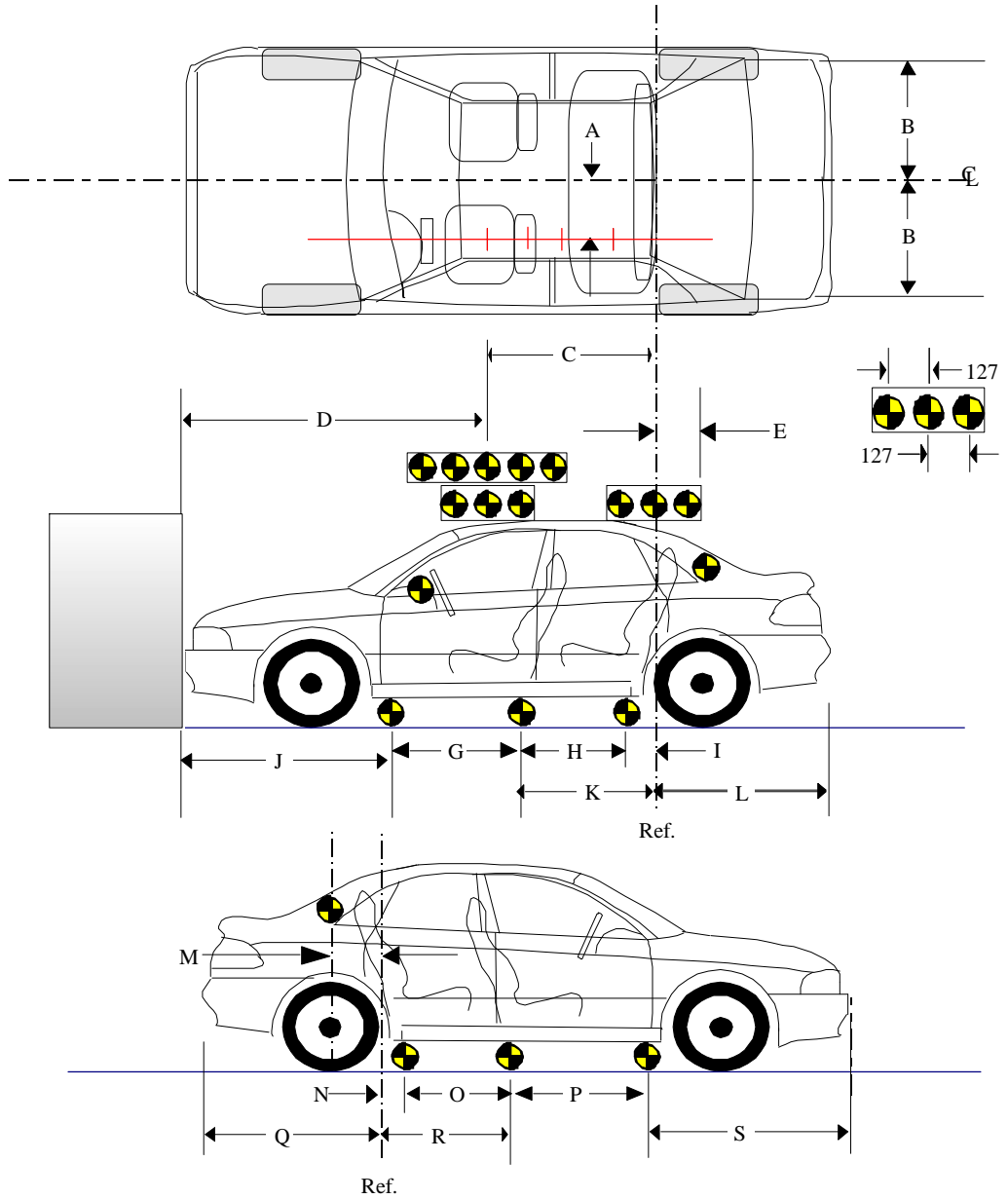
Z = film plane to ground

DATA SHEET NO. 12
VEHICLE REFERENCE PHOTO TARGET LOCATIONS

NHTSA Test No.: E65000 Vehicle: 2006 Mercedes-Benz ML350 MPV

(Dimensions in millimeters)

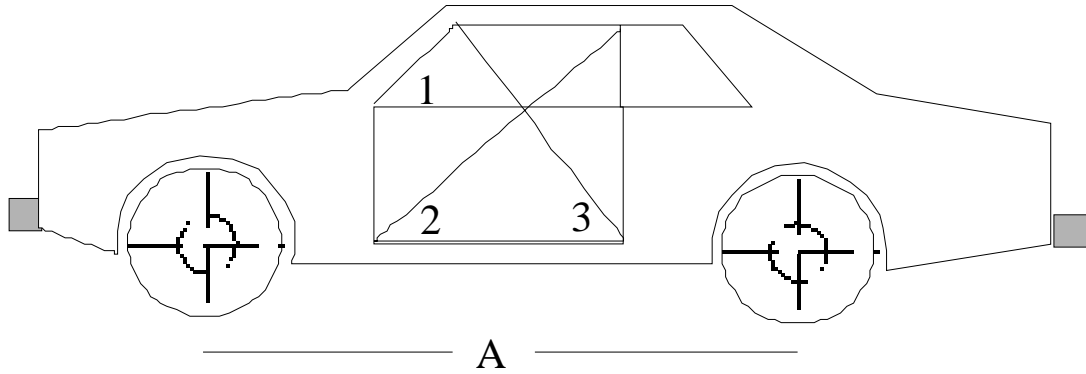
A	416
B	730
C	1222
D	2200
E	337
F	1580
G	939
H	944
I	139
J	1385
K	1083
L	1375
M	348
N	143
O	945
P	935
Q	1374
R	1088
S	1385



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

NHTSA Test No.: E65000 Vehicle: 2006 Mercedes-Benz ML350 MPV

DOOR OPENING WIDTH AND WHEELBASE MEASUREMENTS



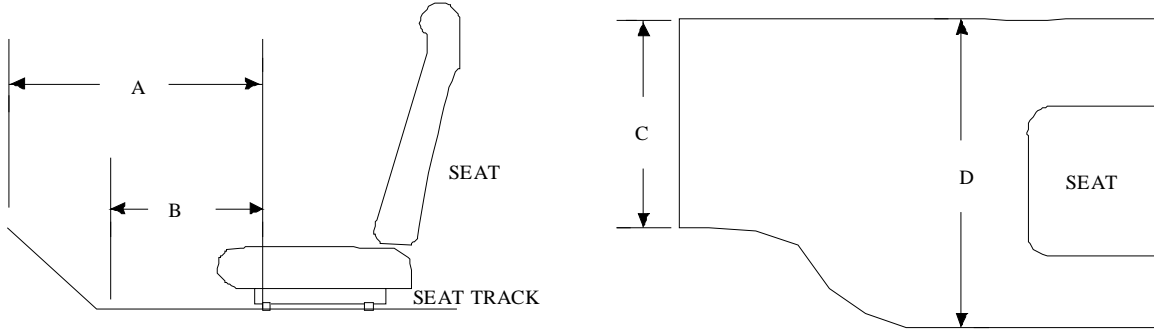
UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	934	1556	1096	934	1553	1082
AFTER TEST	934	1555	1097	934	1552	1083
DIFFERENCE	0	1	-1	0	1	-1

UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	2918	2918
AFTER TEST	2789	2786
DIFFERENCE	129	132

DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont)

NHTSA Test No.: E65000 Vehicle: 2006 Mercedes-Benz ML350 MPV

STATIC FOOTWELL DEFORMATION



DRIVER

Measurement	Pre-Test	Post-Test	Difference
A	805	771	34
B	569	559	10
C	419	421	-2
D	370	366	4

PASSENGER

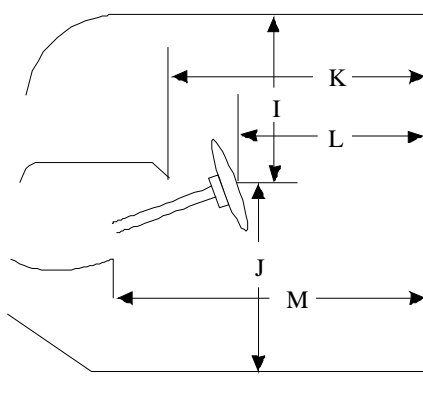
Measurement	Pre-Test	Post-Test	Difference
A	775	748	27
B	559	557	2
C	424	422	2
D	415	415	0

Units = mm

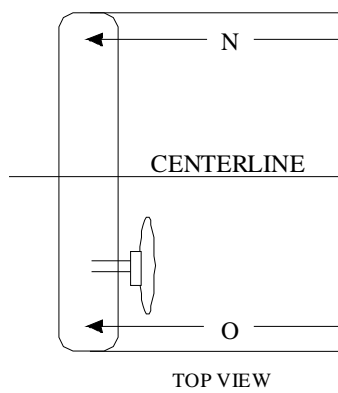
DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont.)

NHTSA Test No.: E65000 Vehicle: 2006 Mercedes-Benz ML350 MPV

STATIC PASSENGER COMPARTMENT INTRUSION

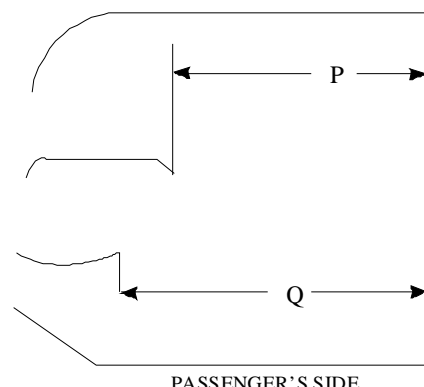


DRIVER'S SIDE



TOP VIEW

MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



PASSENGER'S SIDE

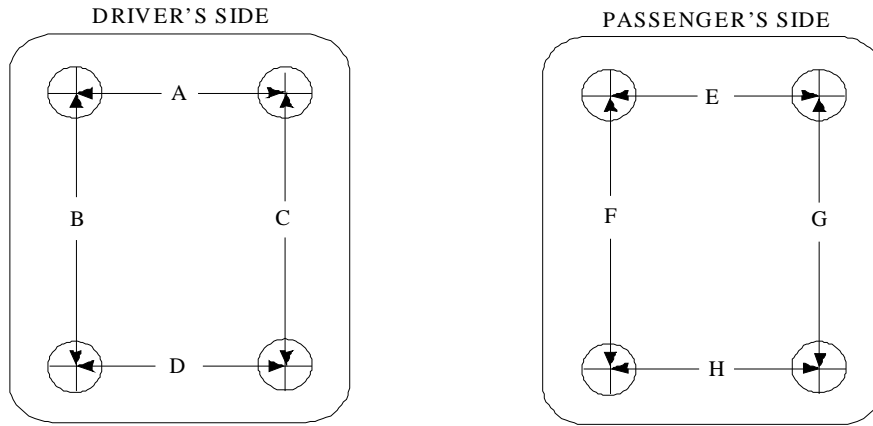
Measurement	Pre-Test	Post-Test	Difference
I	430	433	-3
J	708	717	-9
K	1950	1956	-6
L	1753	1838	-85
M	2043	2039	4
N	1989	1986	3
O	1978	1977	1
P = K (PASS.)	2053	2051	2
Q = M (PASS.)	2003	1995	8

Units = mm

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

NHTSA Test No.: E65000 Vehicle: 2006 Mercedes-Benz ML350 MPV

FLOORBOARD DEFORMATION



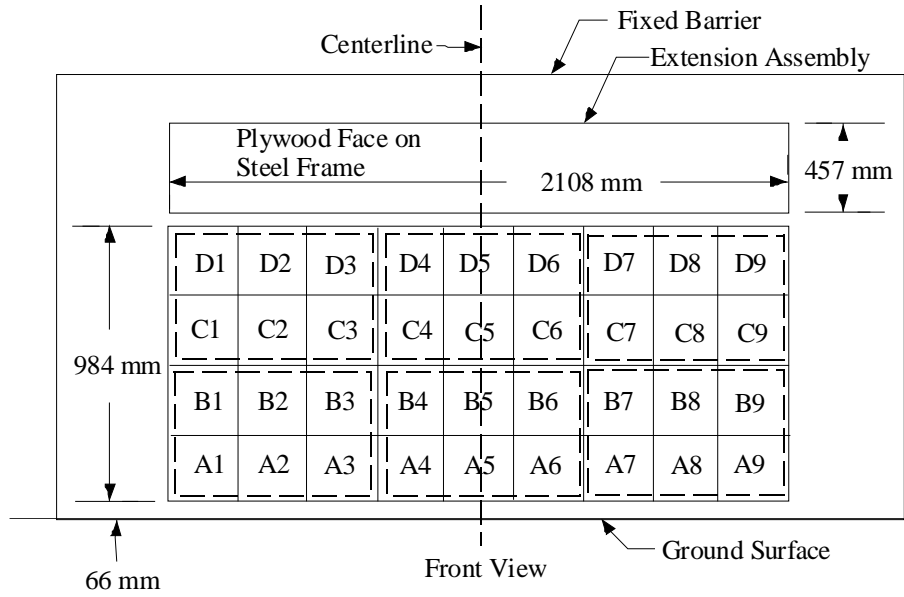
TOP VIEW THROUGH FLOOR PAN

Measurement	Pre-Test	Post-Test	Difference
A	419	421	-2
B	398	399	-1
C	422	424	-2
D	370	366	4
E	424	422	2
F	282	279	3
G	259	258	1
H	415	415	0

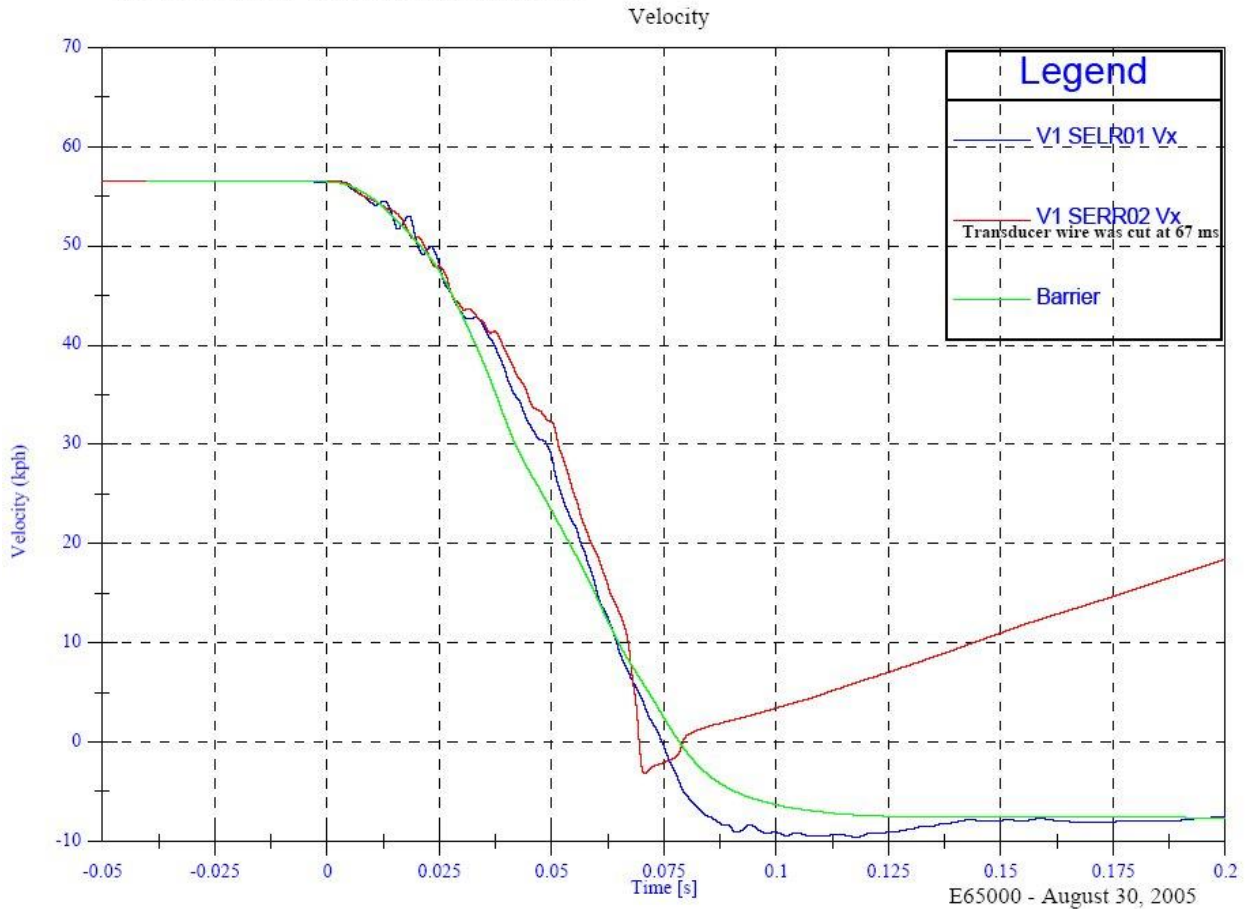
Units = mm

DATA SHEET NO.14
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells
4 Rows
9 Columns



2006 NCAP Test 3 2006 Mercedes-Benz ML350



DATA SHEET NO. 15
ACCIDENT INVESTIGATION DIVISION DATA

FOR FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Mercedes-Benz ML350 MPV

NHTSA Test No.: E65000 VIN: 4JGBB86E76A031264

Model Year: 2006 Build Date: 08/05 Test Date: August 30, 2005

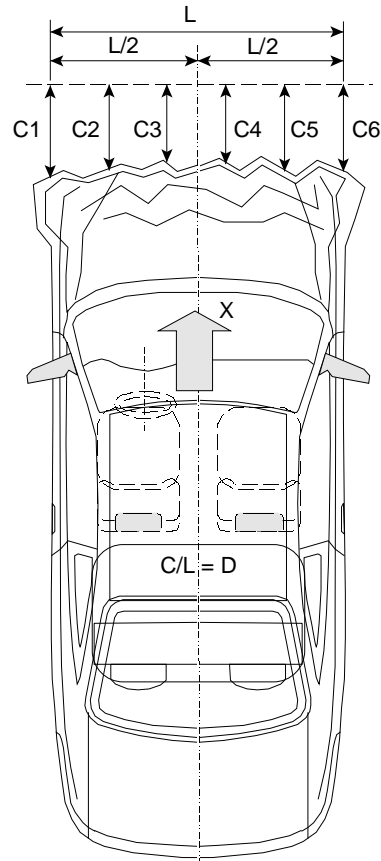
Vehicle Size Category: MPV Test Weight: 2431.0 kg

Vehicle Wheelbase: 2918 mm; Front Overhang: 863 mm; Overall Width: 1930 mm

Collision Deformation Classification (CDC) Code: 12FDEW3

Crush Depth Dimensions

	PRE (mm)	POST (mm)	DIFF (mm)
C1 =	4572	4273	299
C2 =	4701	4306	395
C3 =	4767	4278	489
C4 =	4767	4218	549
C5 =	4699	4173	526
C6 =	4572	4256	316



Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

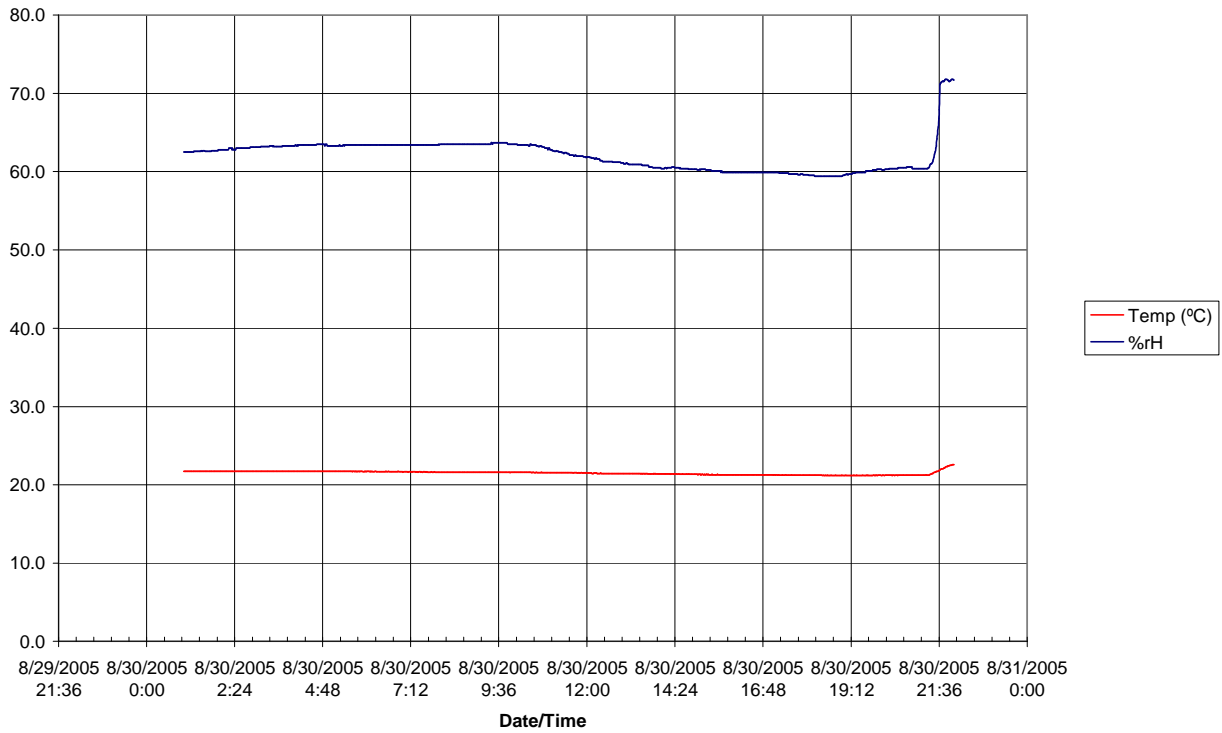
Length of Damaged Region:

L1=	<u>1601</u>	mm
L2=	<u>800.5</u>	mm
L5=	<u>320.2</u>	mm

DATA SHEET NO.16
VEHICLE AND DUMMY TEMPERATURE STABILIZATION CHART

NHTSA Test No.: E65000 Vehicle: 2006 Mercedes-Benz ML350 MPV

Mercedes-Benz ML350 E65000 Environmental Conditions



APPENDIX A
PHOTOGRAPHS

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Figure A-1: Load Cell Locations



Figure A-2: Vehicle Certification Placard



Figure A-3: Vehicle Tire Placard



Figure A-4: Right Front, As Received



Figure A-5: Left Rear, As Received



Figure A-6: Pre-Test Front View



Figure A-7: Post-Test Front View



Figure A-8: Pre-Test Left Side View



Figure A-9: Post-Test Left Side View



Figure A-10: Pre-Test Right Side View



Figure A-11: Post-Test Right Side View



Figure A-12: Pre-Test Right Front Three-Quarter View



Figure A-13: Post-Test Right Front Three-Quarter View



Figure A-14: Pre-Test Left Rear Three-Quarter View



Figure A-15: Post-Test Left Rear Three-Quarter View



Figure A-16: Left Rear Three-Quarter View of Doors After Impact



Figure A-17: Right Rear Three-Quarter View of Doors After Impact



Figure A-18: Pre-Test Windshield View



Figure A-19: Post-Test Windshield View

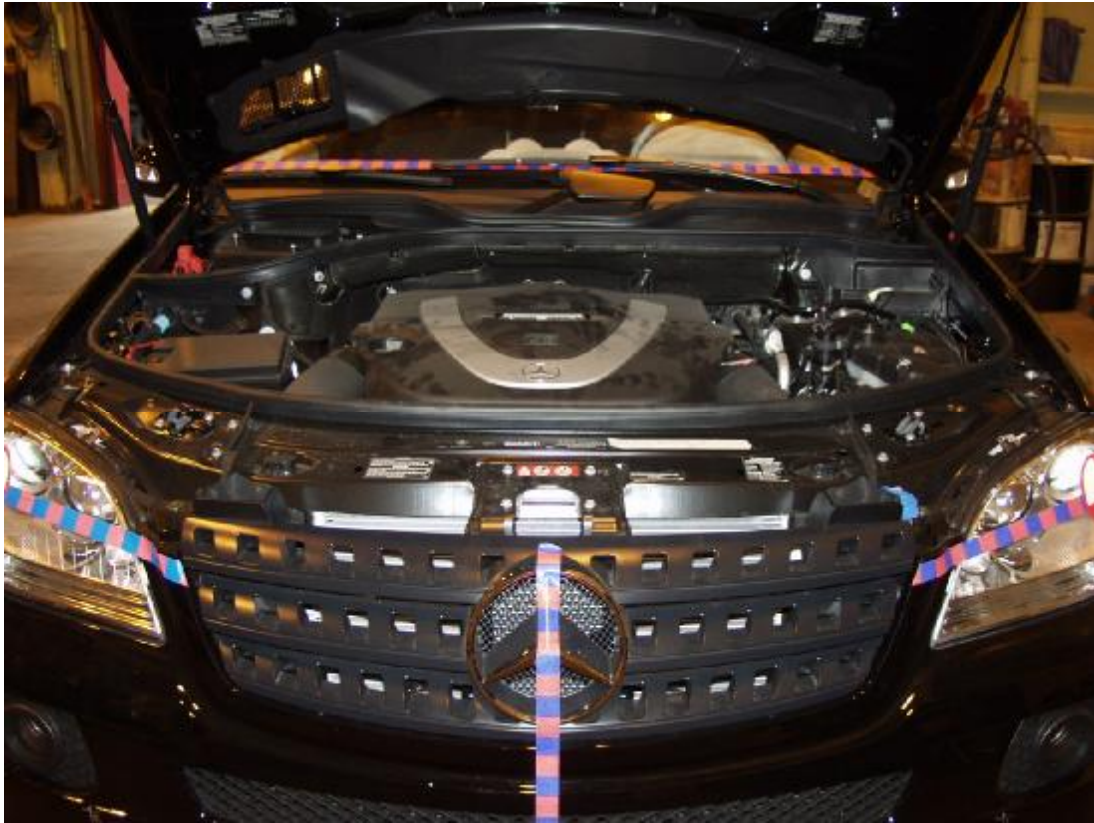


Figure A-20: Pre-Test Engine Compartment View



Figure A-21: Post-Test Engine Compartment View



Figure A-22: Pre-Test Fuel Cap View



Figure A-23: Post-Test Fuel Cap View



Figure A-24: Pre-Test Front Underbody View



Figure A-25: Post-Test Front Underbody View



Figure A-26: Pre-Test Mid Underbody View



Figure A-27: Post-Test Mid Underbody View



Figure A-28: Pre-Test Rear Underbody View



Figure A-29: Post-Test Rear Underbody View



Figure A-30: Pre-Test Driver Head Location



Figure A-31: Post-Test Driver Head Location



Figure A-32: Pre-Test Driver Position View



Figure A-33: Post-Test Driver Position View



Figure A-34: Pre-Test Driver and Interior View



Figure A-35: Post-Test Driver and Interior View



Figure A-36: Pre-Test Driver Feet View



Figure A-37: Post-Test Driver Feet View



Figure A-38: Pre-Test Driver Knee Bolster View



Figure A-39: Post-Test Driver Knee Bolster View



Figure A-40: Pre-Test Driver Floor Pan View



Figure A-41: Post-Test Driver Floor Pan View



Figure A-42: Post-Test Driver Head View



Figure A-43: Post-Test Driver Contact to Airbag



Figure A-44: Pre-Test Passenger Head Location



Figure A-45: Post-Test Passenger Head Location



Figure A-46: Pre-Test Passenger Position View



Figure A-47: Post-Test Passenger Position View



Figure A-48: Pre-Test Passenger and Interior View



Figure A-49: Post-Test Passenger and Interior View



Figure A-50: Pre-Test Passenger Feet View



Figure A-51: Post-Test Passenger Feet View



Figure A-52: Pre-Test Passenger Knee Bolster View



Figure A-53: Post-Test Passenger Knee Bolster View



Figure A-54: Pre-Test Passenger Floor Pan View



Figure A-55: Post-Test Passenger Floor Pan View



Figure A-56: Post-Test Passenger Head View



Figure A-57: Post-Test Passenger Contact to Airbag

Not Applicable

Figure A-58: Rollover View - 90°

Not Applicable

Figure A-59: Rollover View - 180°

Not Applicable

Figure A-60: Rollover View - 270°

Not Applicable

Figure A-61: Rollover View - 360°



Figure A-62: Impact View

APPENDIX B

DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA

**Hybrid III Dummy Sign Conventions
Load Cells and Special Transducers**

Transducer	SAE Sign Convention (positive unless noted)
Upper Neck Load Cell	Fx Head rearward Fy Head left Fz Neck in tension Mx Left ear to left shoulder My Chin to chest (flexion) Mz Chin to left shoulder (look left)
Chest Displacement Potentiometer	Compression is negative
Pelvic Load Cell (Lower Lumbar)	Fx Chest rearward Fy Chest left Fz Spine in tension
Femur Load Cell	Compression is negative
Upper Tibia Load Cell (right and left leg)	Mx Support tibia at ends, load left side center My Support tibia at ends, load front (shin) center
Lower Tibia Load Cell (right and left leg)	Fz Tibia in tension Mx Support tibia at ends, load left side center My Support tibia at ends, load front (shin) center

DATA CHANNEL FILTER CLASS SUMMARY

NHTSA TEST NO. E65000

DATA TYPE	SAE FILTER CLASS (Hz)
Dummy Head Accelerations	1000
Dummy Chest Accelerations	180
Dummy Chest Displacements	600
Dummy Femur Forces	600
Dummy Belt Loads	60
Dummy Belt Displacements	180
Dummy Neck Forces	1000
Dummy Neck Moments	600
Vehicle Accelerations	60
Vehicle Velocity Integrations	180
Vehicle Displacement Integrations	180
Load Cell Barrier Forces	60

Table of Data Plots

PLOT	PLOT NAME[UNITS, CHANNEL FILTER CLASS]	PAGE
1	V1P1 Head CG x [g, CFC_1000]	B-8
2	V1P1 Head CG y [g, CFC_1000]	B-8
3	V1P1 Head CG z [g, CFC_1000]	B-8
4	V1P1 Head CG Resultant [g, CFC_1000]	B-8
5	V1P1 Chest x [g, CFC_180]	B-9
6	V1P1 Chest y [g, CFC_180]	B-9
7	V1P1 Chest z [g, CFC_180]	B-9
8	V1P1 Chest Resultant [g, CFC_180]	B-9
9	V1P1 Chest Compression x [mm, CFC_600]	B-10
10	V1P1 Left Femur z [N, CFC_600]	B-11
11	V1P1 Right Femur z [N, CFC_600]	B-11
12	V1P2 Head CG x [g, CFC_1000]	B-12
13	V1P2 Head CG y [g, CFC_1000]	B-12
14	V1P2 Head CG z [g, CFC_1000]	B-12
15	V1P2 Head CG Resultant [g, CFC_1000]	B-12
16	V1P2 Chest x [g, CFC_180]	B-13
17	V1P2 Chest y [g, CFC_180]	B-13
18	V1P2 Chest z [g, CFC_180]	B-13
19	V1P2 Chest Resultant [g, CFC_180]	B-13
20	V1P2 Chest Compression x [mm, CFC_600]	B-14
21	V1P2 Left Femur z [N, CFC_600]	B-15
22	V1P2 Right Femur z [N, CFC_600]	B-15

The following dummy, vehicle and load cell response data can be found in the research and development section of the NHTSA website at: www.nhtsa.dot.gov

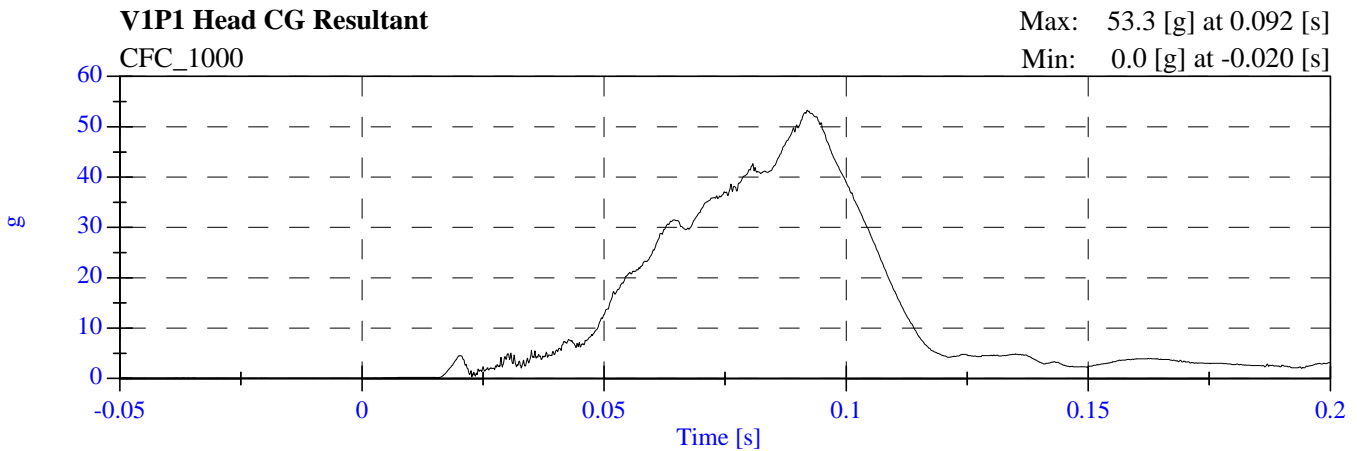
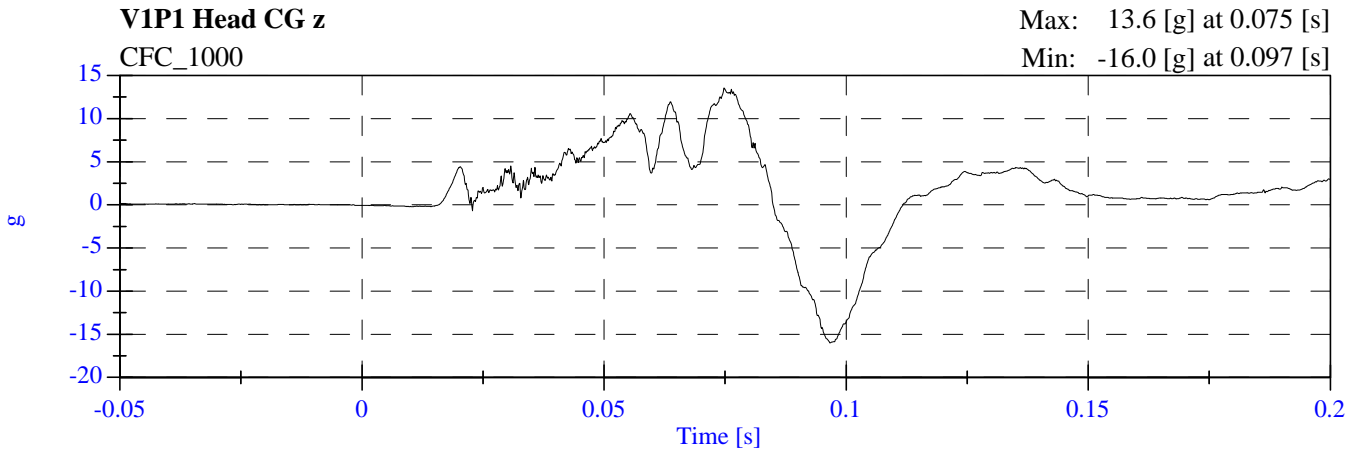
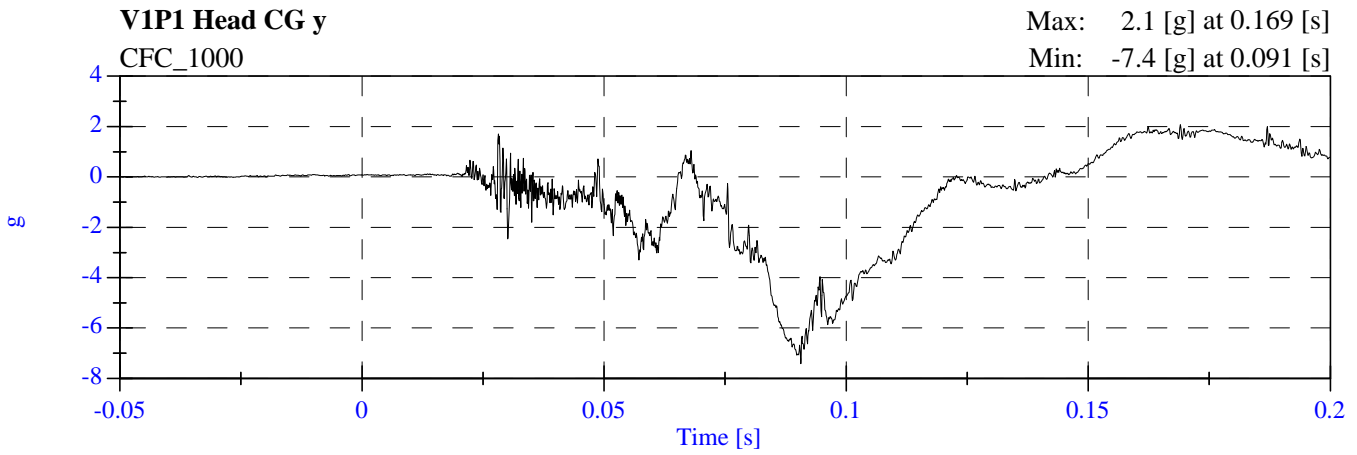
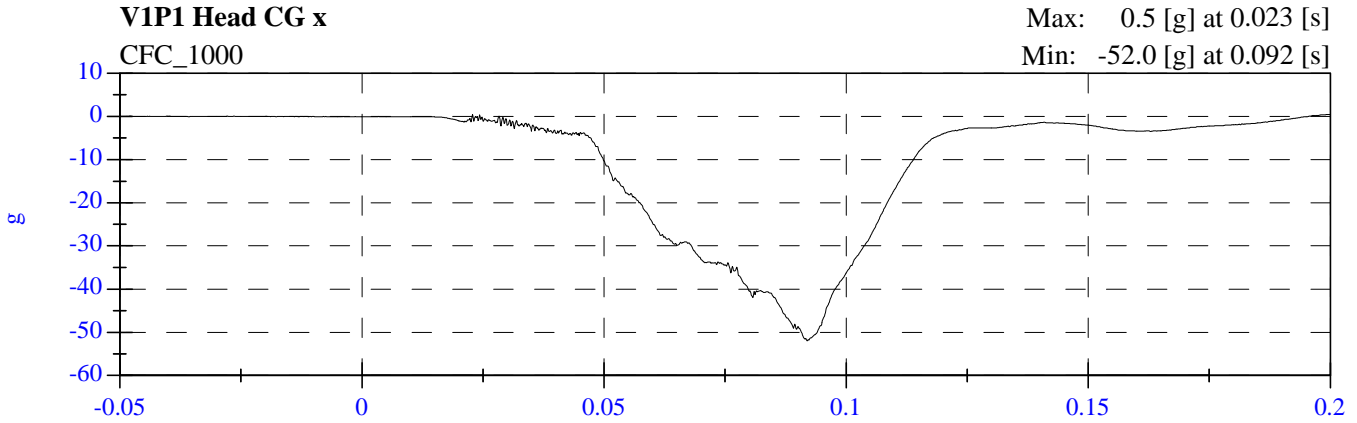
V1P1 Head 9 Array X Arm Ay	V1P3 Head Ax
V1P1 Head 9 Array X Arm Az	V1P3 Head Ay
V1P1 Head 9 Array Y Arm Ax	V1P3 Head Az
V1P1 Head 9 Array Y Arm Az	V1P3 Upper Neck Fx
V1P1 Head 9 Array Z Arm Ax	V1P3 Upper Neck Fy
V1P1 Head 9 Array Z Arm Ay	V1P3 Upper Neck Fz
V1P1 Head CG Ax	V1P3 Upper Neck Mx
V1P1 Head CG Ay	V1P3 Upper Neck My
V1P1 Head CG Az	V1P3 Upper Neck Mz
V1P1 Head CG Red Ax	V1P3 Left Clavicle Fx
V1P1 Head CG Red Ay	V1P3 Left Clavicle Fz
V1P1 Head CG Red Az	V1P3 Right Clavicle Fx
V1P1 Upper Neck Fx	V1P3 Right Clavicle Fz
V1P1 Upper Neck Fy	V1P3 Chest Ax
V1P1 Upper Neck Fz	V1P3 Chest Ay
V1P1 Upper Neck Mx	V1P3 Chest Az
V1P1 Upper Neck My	V1P3 Chest Displacement
V1P1 Upper Neck Mz	V1P3 Lumbar Fx
V1P1 Chest Ax	V1P3 Lumbar Fy
V1P1 Chest Ay	V1P3 Lumbar Fz
V1P1 Chest Az	V1P3 Lumbar Mx
V1P1 Chest Red Ax	V1P3 Lumbar My
V1P1 Chest Red Ay	V1P3 Lumbar Mz
V1P1 Chest Red Az	V1P3 Pelvic Ax
V1P1 Chest Compression	V1P3 Pelvic Ay
V1P1 Pelvic Ax	V1P3 Pelvic Az
V1P1 Pelvic Ay	V1P3 Left Lower ASIS Fx
V1P1 Pelvic Az	V1P3 Left Upper ASIS Fx
V1P1 Left Femur Fz	V1P3 Right Lower ASIS Fx
V1P1 Right Femur Fz	V1P3 Right Upper ASIS Fx
V1P1 Left Upper Tibia Mx	V1P3 Lap Belt F
V1P1 Left Upper Tibia My	V1P3 Torso Belt F
V1P1 Left Lower Tibia Fz	V1P4 Head Ax
V1P1 Left Lower Tibia Mx	V1P4 Head Ay
V1P1 Left Lower Tibia My	V1P4 Head Az
V1P1 Right Upper Tibia Fz	V1P4 Upper Neck Fx
V1P1 Right Upper Tibia Mx	V1P4 Upper Neck Fy
V1P1 Right Upper Tibia My	V1P4 Upper Neck Fz
V1P1 Right Lower Tibia Mx	V1P4 Upper Neck Mx
V1P1 Right Lower Tibia My	V1P4 Upper Neck My
V1P1 Left Foot Aft Ax	V1P4 Upper Neck Mz
V1P1 Left Foot Aft Az	V1P4 Left Clavicle Fx
V1P1 Left Foot Fore Az	V1P4 Left Clavicle Fz
V1P1 Right Foot Aft Ax	V1P4 Right Clavicle Fx
V1P1 Right Foot Aft Az	V1P4 Right Clavicle Fz
V1P1 Right Foot Fore z	V1P4 Chest Ax
V1P2 Head 9 Array X Arm Ay	V1P4 Chest Ay

V1P2 Head 9 Array X Arm Az	V1P4 Chest Az
V1P2 Head 9 Array Y Arm Ax	V1P4 Chest Compression
V1P2 Head 9 Array Y Arm Az	V1P4 Lumbar Fx
V1P2 Head 9 Array Z Arm Ax	V1P4 Lumbar Fy
V1P2 Head 9 Array Z Arm Ay	V1P4 Lumbar Fz
V1P2 Head CG Ax	V1P4 Lumbar Mx
V1P2 Head CG Ay	V1P4 Lumbar My
V1P2 Head CG Az	V1P4 Lumbar Mz
V1P2 Head CG Red Ax	V1P4 Pelvic Ax
V1P2 Head CG Red Ay	V1P4 Pelvic Ay
V1P2 Head CG Red Az	V1P4 Pelvic Az
V1P2 Upper Neck Fx	V1P4 Left Lower ASIS Fx
V1P2 Upper Neck Fy	V1P4 Left Upper ASIS Fx
V1P2 Upper Neck Fz	V1P4 Right Lower ASIS Fx
V1P2 Upper Neck Mx	V1P4 Right Upper ASIS Fx
V1P2 Upper Neck My	V1P4 Lap Belt F
V1P2 Upper Neck Mz	V1P4 Torso Belt F
V1P2 Chest Ax	V1 Left Rear #1 Ax
V1P2 Chest Ay	V1 Right Rear #2 Ax
V1P2 Chest Az	V1 Engine Top #3 Ax
V1P2 Chest Red Ax	V1 Instrument Panel #6 Ax
V1P2 Chest Red Ay	
V1P2 Chest Red Az	
V1P2 Chest Compression	
V1P2 Pelvic Ax	
V1P2 Pelvic Ay	
V1P2 Pelvic Az	
V1P2 Left Femur Fz	
V1P2 Right Femur Fz	
V1P2 Left Upper Tibia Fz	
V1P2 Left Upper Tibia Mx	
V1P2 Left Upper Tibia My	
V1P2 Left Lower Tibia Mx	
V1P2 Left Lower Tibia My	
V1P2 Right Upper Tibia Mx	
V1P2 Right Upper Tibia My	
V1P2 Right Lower Tibia Fz	
V1P2 Right Lower Tibia Mx	
V1P2 Right Lower Tibia My	
V1P2 Left Foot Aft Ax	
V1P2 Left Foot Aft Az	
V1P2 Left Foot Fore Az	
V1P2 Right Foot Aft Ax	
V1P2 Right Foot Aft Az	
V1P2 Right Foot Fore Az	
Barrier Load Cell A1 Fx	
Barrier Load Cell A2 Fx	
Barrier Load Cell A3 Fx	
Barrier Load Cell A4 Fx	

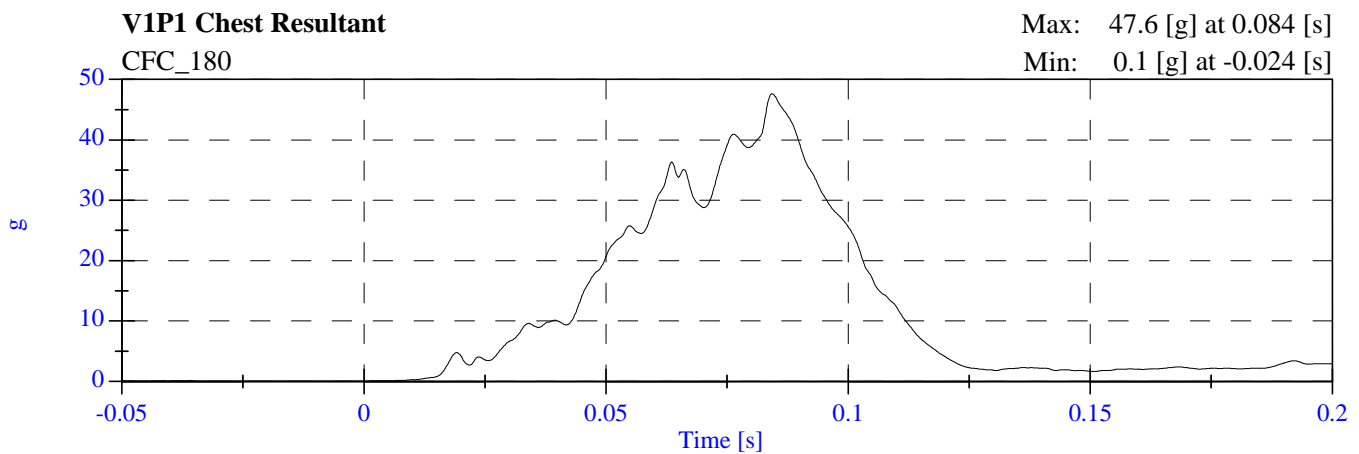
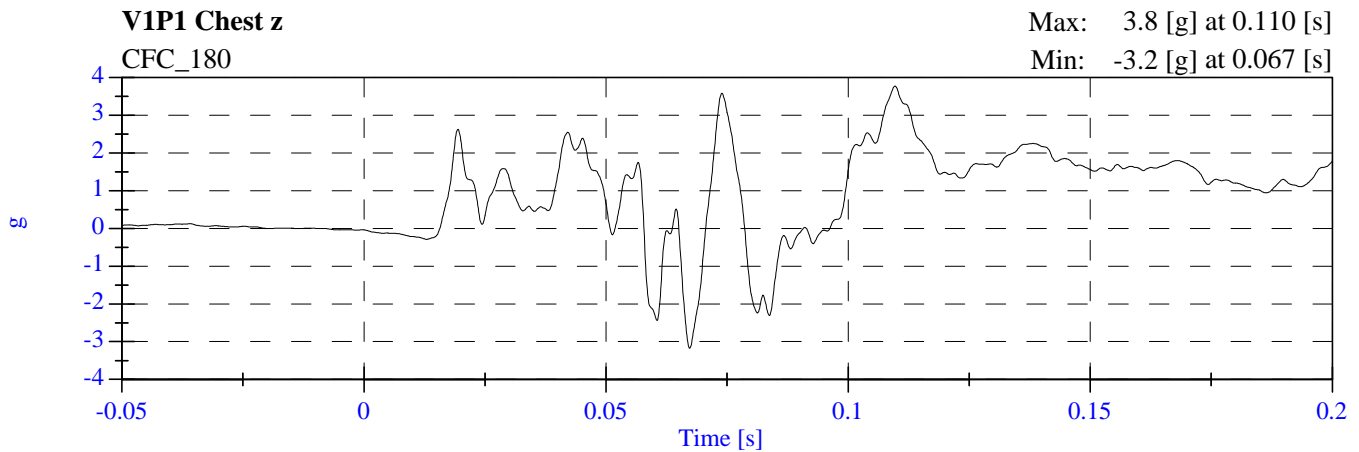
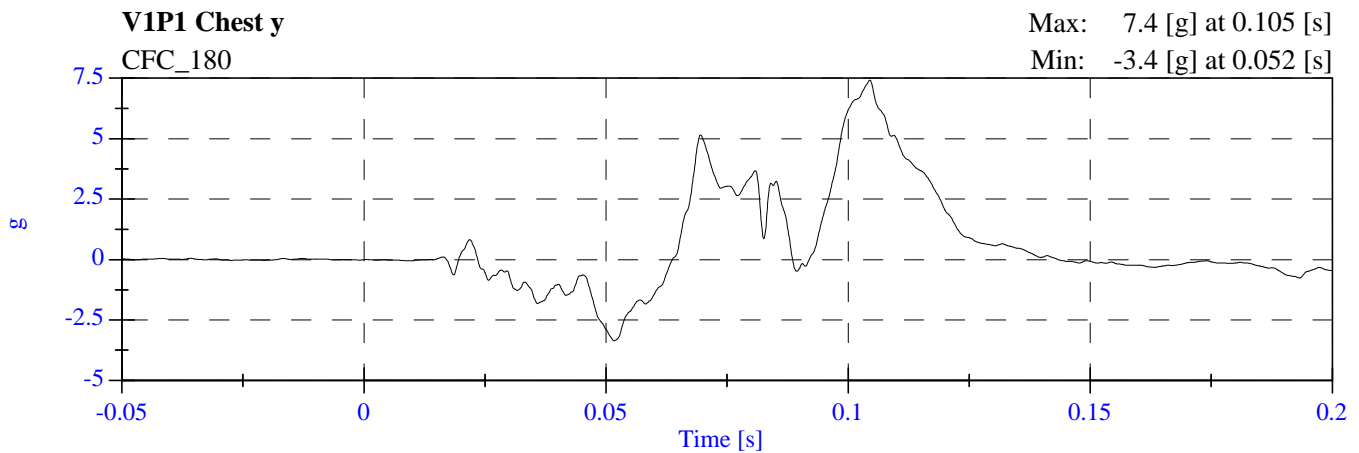
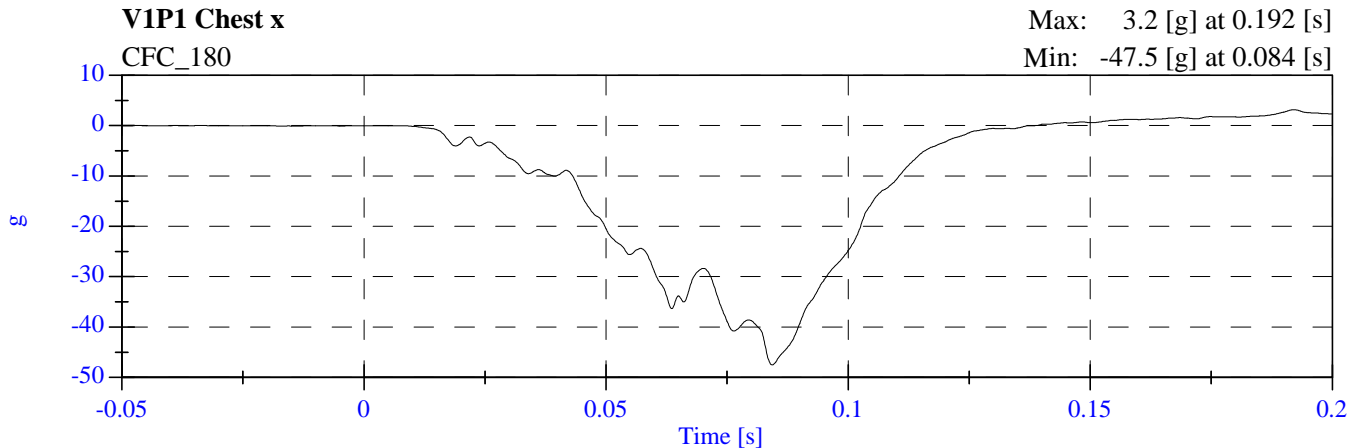
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Barrier Load Cell A8 Fx	
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Barrier Load Cell B2 Fx	
Barrier Load Cell B3 Fx	
Barrier Load Cell B4 Fx	
Barrier Load Cell B5 Fx	
Barrier Load Cell B6 Fx	
Barrier Load Cell B7 Fx	
Barrier Load Cell B8 Fx	
Barrier Load Cell B9 Fx	
Barrier Load Cell C1 Fx	
Barrier Load Cell C2 Fx	
Barrier Load Cell C3 Fx	
Barrier Load Cell C4 Fx	
Barrier Load Cell C5 Fx	
Barrier Load Cell C6 Fx	
Barrier Load Cell C7 Fx	
Barrier Load Cell C8 Fx	
Barrier Load Cell C9 Fx	
Barrier Load Cell D1 Fx	
Barrier Load Cell D2 Fx	
Barrier Load Cell D3 Fx	
Barrier Load Cell D4 Fx	
Barrier Load Cell D5 Fx	
Barrier Load Cell D6 Fx	
Barrier Load Cell D7 Fx	
Barrier Load Cell D8 Fx	
Barrier Load Cell D9 Fx	

TEST NOTES	
Data Channel	Anomalies
V1P2 Right Lower Tibia Mx	Transducer Cable Failed
V1P2 Left Foot Aft Ax	Transducer Failed
V1P2 Left Foot Aft Az	Questionable Data After 74 ms
V1P2 Left Foot Fore Az	Questionable Data After 74 ms
V1P3 Upper Neck Fy	Spikes in Data
V1P3 Upper Neck Mx	Channel Failed at 59 ms
V1P3 Upper Neck My	Data Spike at 60 ms
V1P3 Upper Neck Mz	Data Spike at 60 ms
V1P3 Lumbar Mz	Questionable Data: 77-87 ms
V1P4 Pelvic x	Questionable Data
V1 Right Rear #2x	Wire Cut at 67 ms
V1 Engine Top #3x	Wire Cut at 62 ms

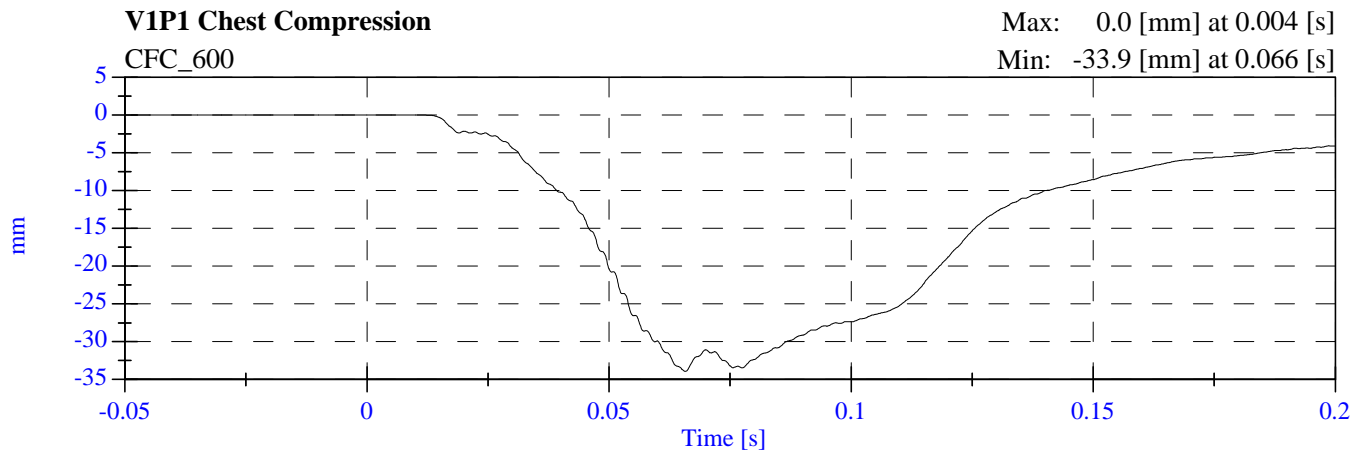
2006 NCAP Test 3 - 2006 Mercedes-Benz ML350 E65000 - August 30, 2005



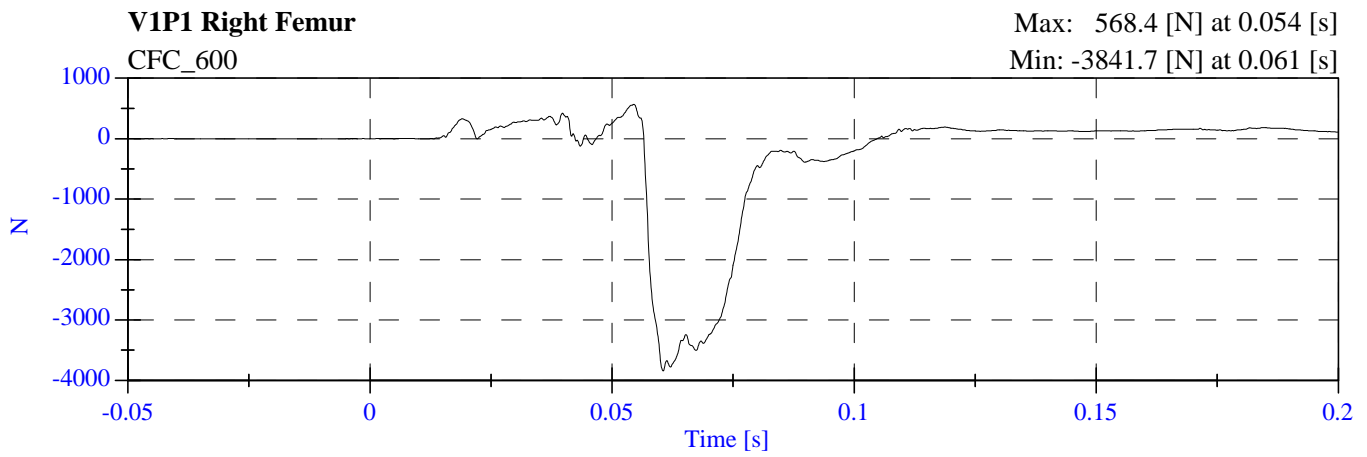
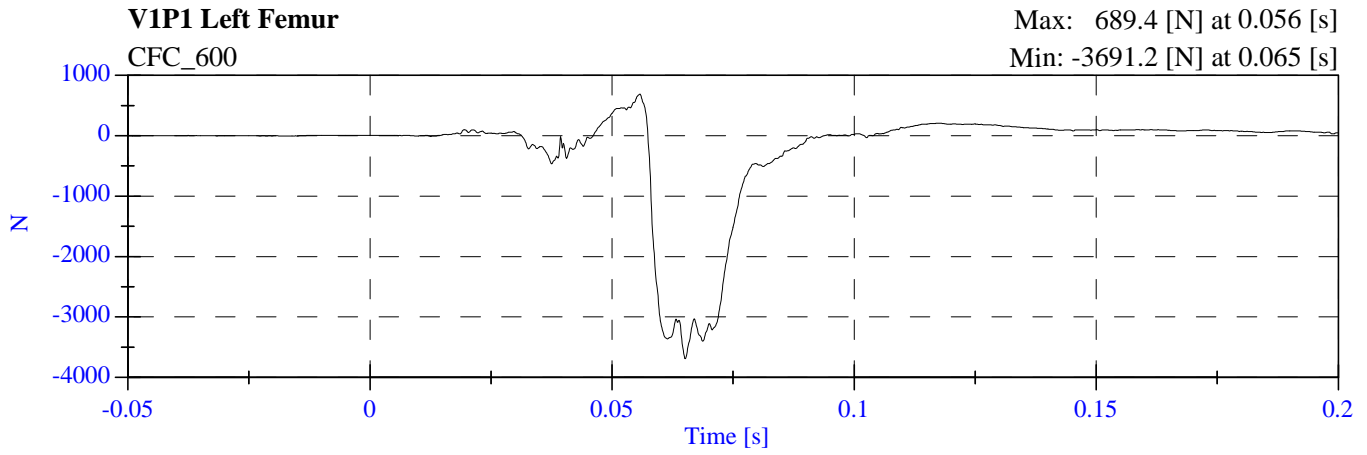
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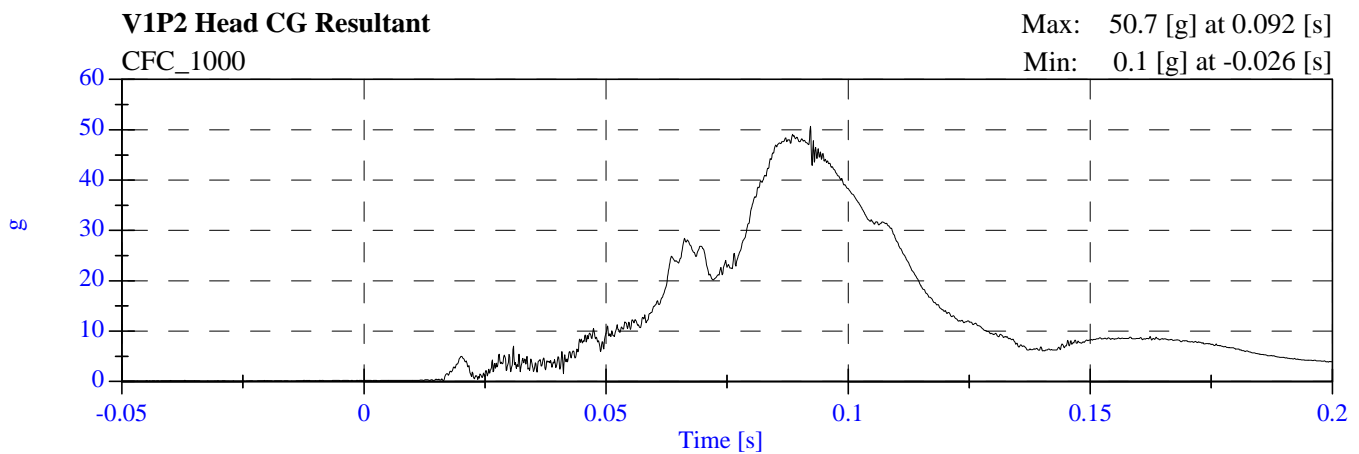
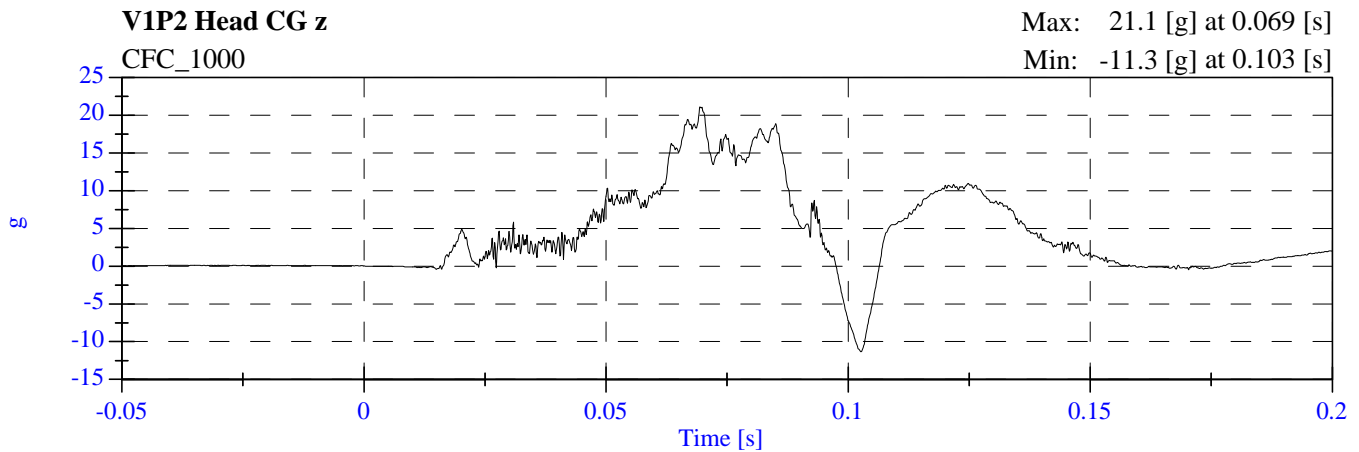
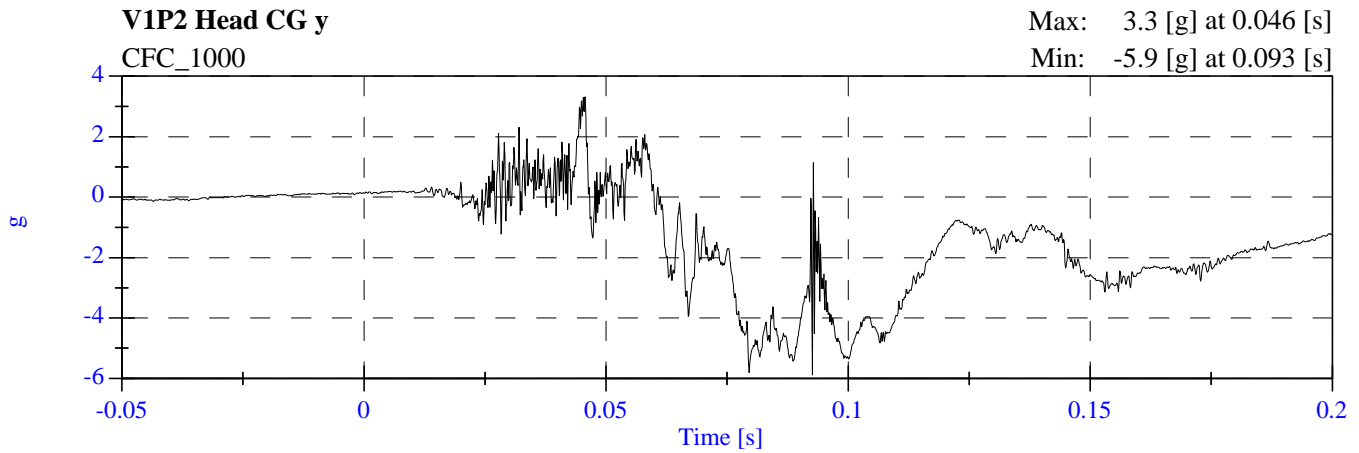
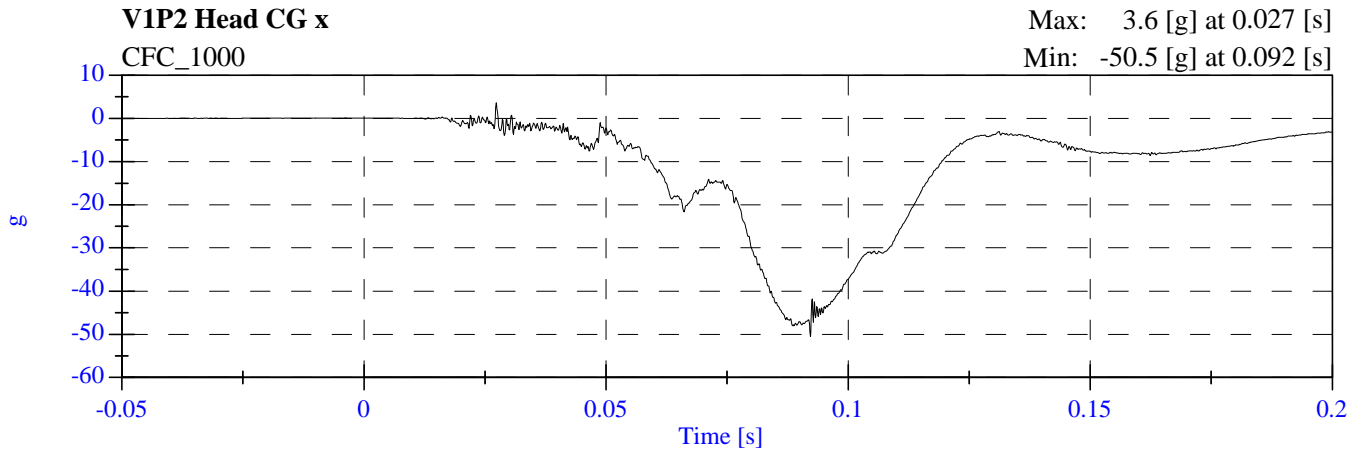
2006 NCAP Test 3 - 2006 Mercedes-Benz ML350 E65000 - August 30, 2005



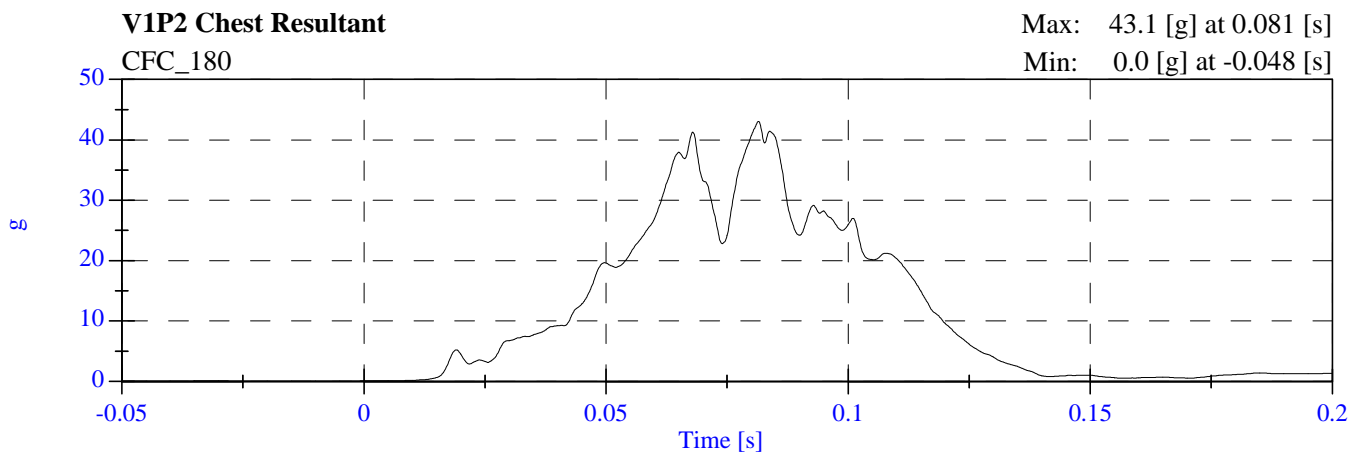
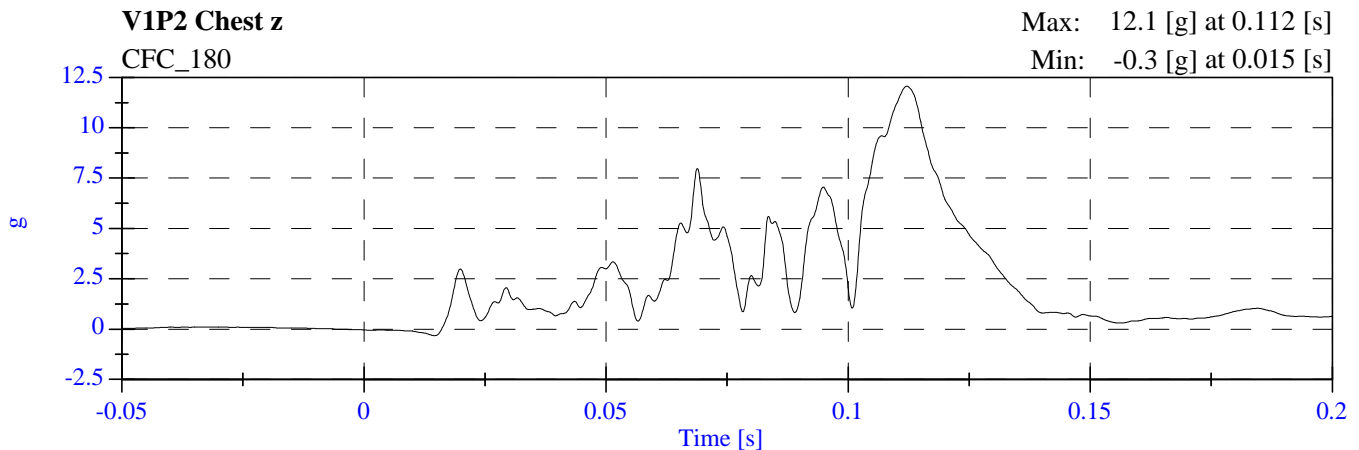
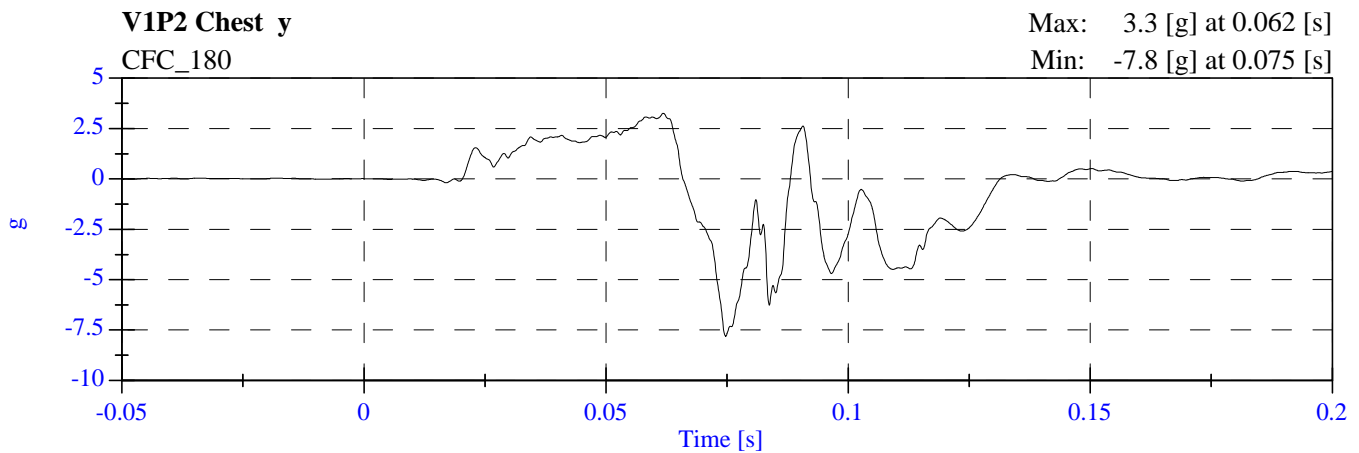
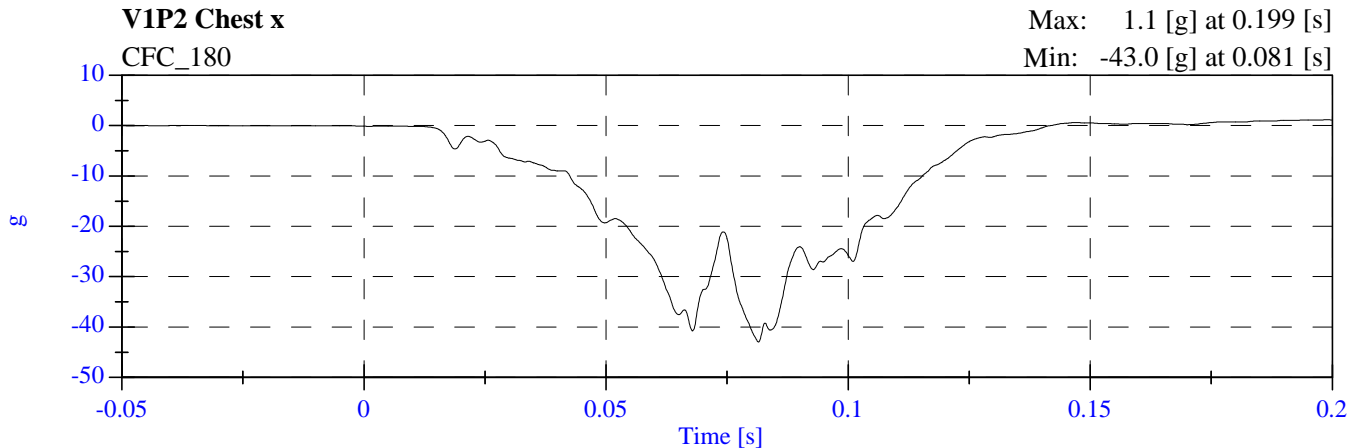
2006 NCAP Test 3 - 2006 Mercedes-Benz ML350 E65000 - August 30, 2005



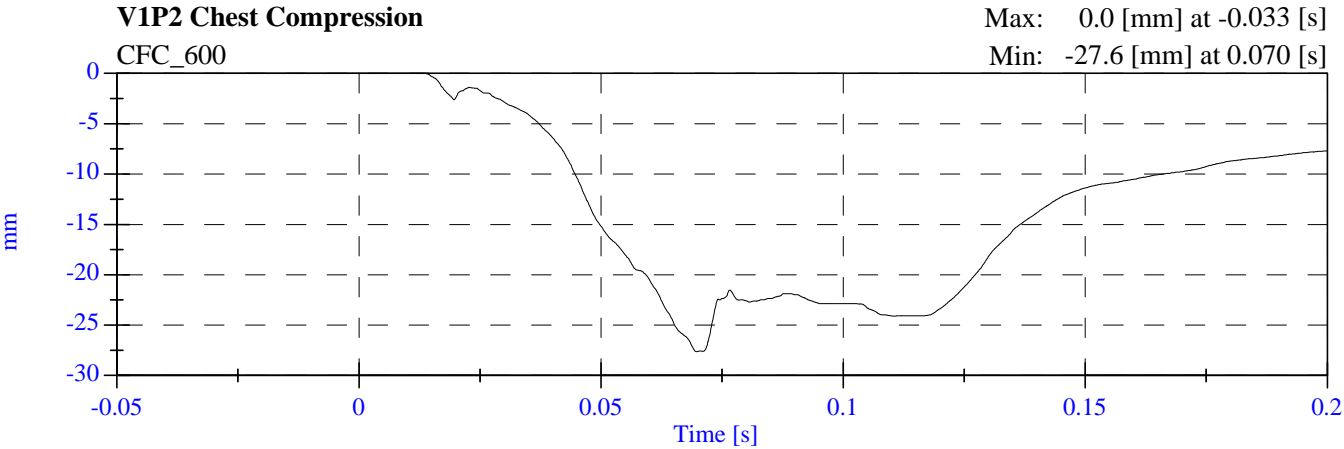
2006 NCAP Test 3 - 2006 Mercedes-Benz ML350 E65000 - August 30, 2005



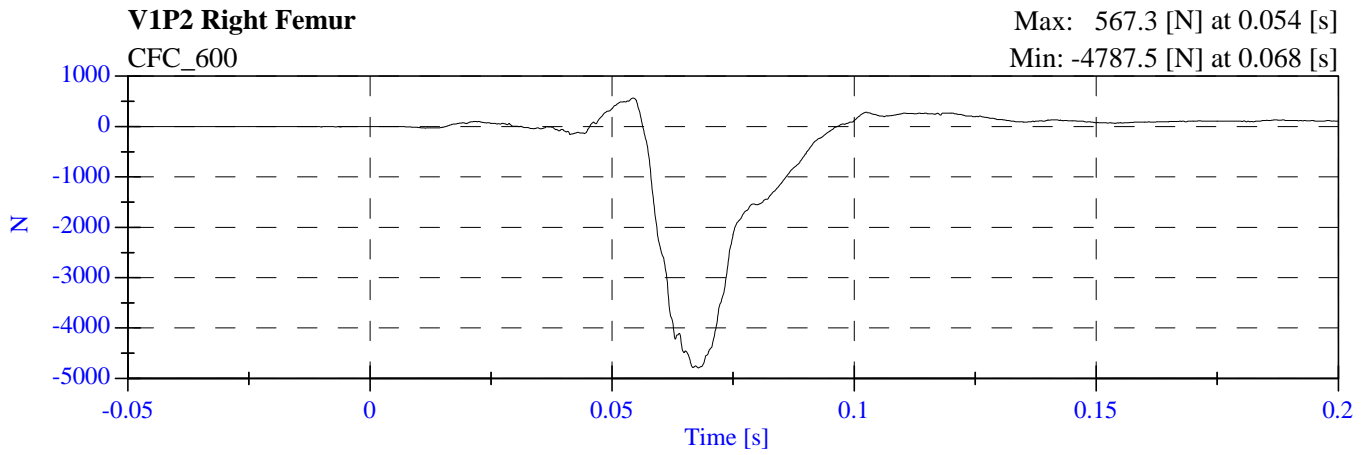
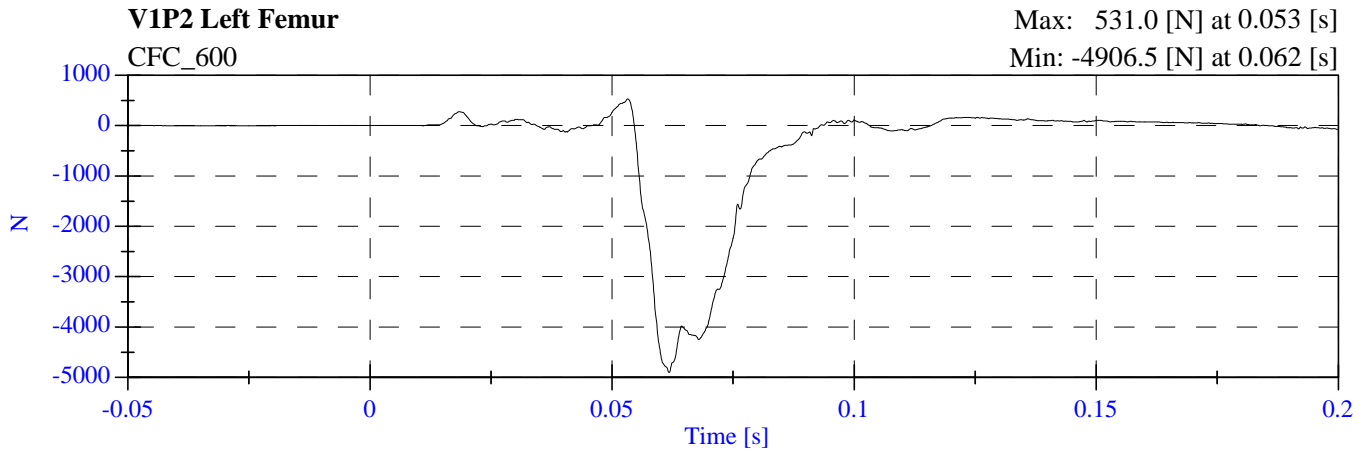
2006 NCAP Test 3 - 2006 Mercedes-Benz ML350 E65000 - August 30, 2005



**2006 NCAP Test 3 - 2006 Mercedes-Benz ML350
E65000 - August 30, 2005**



2006 NCAP Test 3 - 2006 Mercedes-Benz ML350 E65000 - August 30, 2005



APPENDIX C

**PART 572B/E DUMMY CONFIGURATION
AND PERFORMANCE VERIFICATION DATA SHEETS**

Appendix C contains the results from certification tests performed on the 50th percentile male anthropomorphic test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Volume 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan. A summary of the test results, and Part 572 specifications are included in this Appendix.

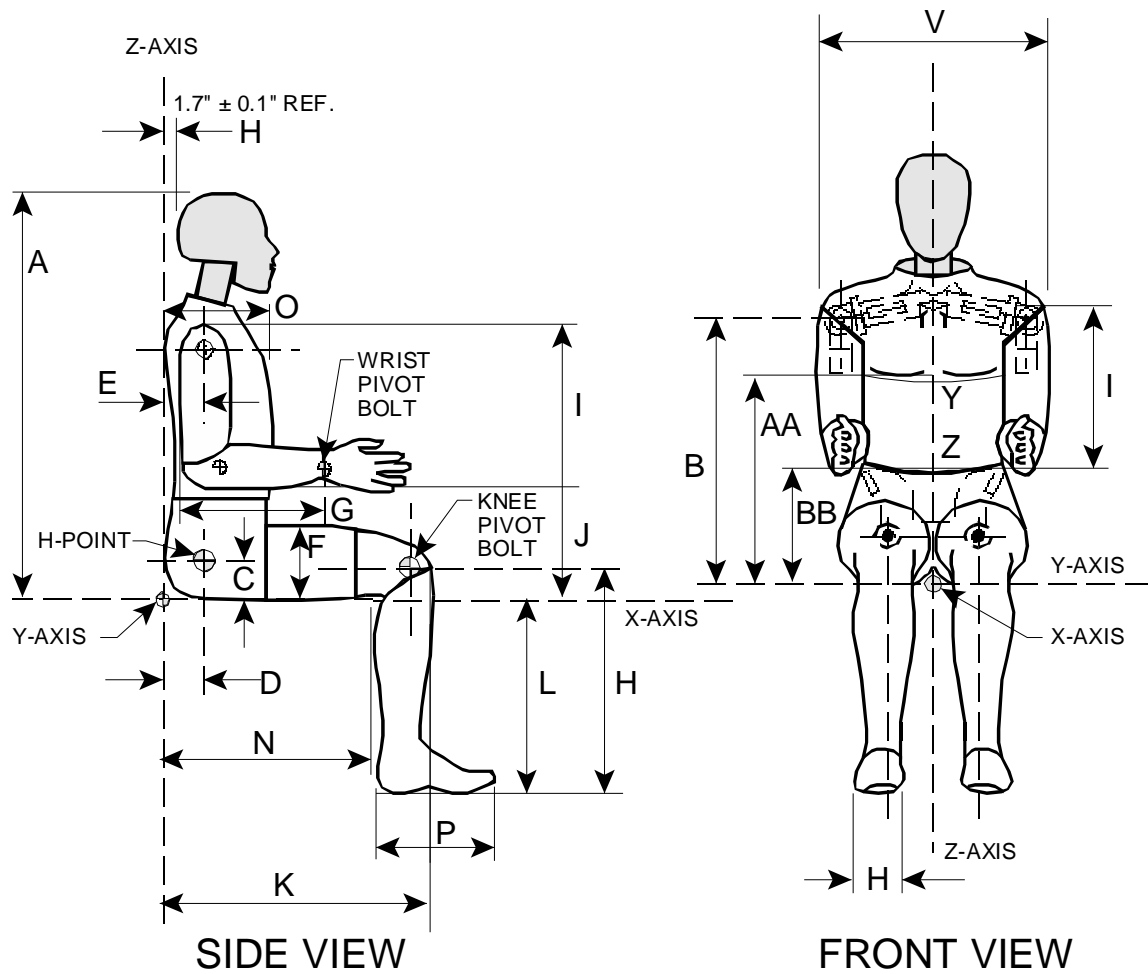
Dummy serial numbers and certification dates are:

<u>Position No./Location</u>	<u>Serial No.</u>	<u>Completion Date</u>
#1/Driver	142	August 3, 2005
#2/Right Front Passenger	150	August 3, 2005

Electronic Test Equipment

The complement of signal conditioning, recording and display equipment, in conjunction with dummy certification testing, can be found in New Car Assessment and Standards Inducant Testing Final Report No. 6525-V-1.

EXTERNAL DIMENSIONS SPECIFICATIONS



NOTE: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude. (REF: S572.31(A)(6))

PART 572E
HEAD DROP TEST

Dummy Serial Number 142
Sequential Test Number 1.3
Date August 1, 2005
Workfile 142H1 08-01-05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	30.00
Peak Resultant Acceleration	225-275 G's	262.25
Peak Lateral Acceleration	15 G's Max	1.85
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	142	
Sequential Test Number	1.3	
Date	August 2, 2005	6 Axis Neck Transducer
Workfile	142 NF1 08-02-05	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.11
Relative Humidity	10% - 70%	36.00
Impact Velocity	6.89 – 7.13 m/s	6.99
Pendulum Deceleration 10 ms	22.50 - 27.50 G's	22.69
20 ms	17.60 - 22.60 G's	22.29
30 ms	12.50 - 18.50 G's	15.57
Max Pendulum G's Above 30 ms	29 G's Max	15.57
Deceleration - Time Curve Decay Time to 5 G's	34 - 42 ms	39.20
D Plane Rotation Max	64 - 78 Deg	71.66
Time	57 - 64 ms	58.10
Moment About Occipital Max	88.13 – 108.47 N-m	99.43
Condyle Time	47 - 58 ms	52.50
Rotation Angle - Time Curve Decay Time to Zero	113 - 128 ms	117.90
Positive Moment - Time Curve Decay Time to Zero	97 - 107 ms	100.00

Remarks:

Laboratory Technician: _____ B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	142	
Sequential Test Number	1.3	
Date	August 2, 2005	6 Axis Neck Transducer
Workfile	142 NE 08-02-05	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.11
Relative Humidity		10% - 70%	36.00
Impact Velocity		5.94 – 6.19 m/s	6.02
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	18.48
	20 ms	14.00 - 19.00 G's	18.54
	30 ms	11.00 - 16.00 G's	14.37
Max Pendulum G's Above 30 ms		22 G's Max	14.37
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	43.40
D Plane Rotation	Max	81 - 106 Deg	90.71
	Time	72 - 82 ms	76.70
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-70.63
	Time	65 - 79 ms	71.60
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	158.10
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	141.70

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 142
Sequential Test Number 1.3
Date August 2, 2005
Workfile 142T 08-02-05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	35.00
Pendulum Velocity	6.58 – 6.83 m/s	6.69
Maximum Deflection	64.52 – 72.64 mm	65.46
Maximum Resistive Force	5159.9 – 5893.9 N	5495.01
Internal Hysteresis	69 - 85 %	76.09

Remarks:

Laboratory Technician:

_____ B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 142
 Sequential Test Number 1.3
 Date August 2, 2005
 Workfile 142LF/RF 08-02-05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.11
Relative Humidity	10% - 70%	35.00
Probe Velocity	2.07 – 2.13 m/s	2.13
Peak Knee Impact Force	4715.1 – 5782.7 N	5384.96
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	21.11
Relative Humidity	10% - 70%	35.00
Probe Velocity	2.07 – 2.13 m/s	2.13
Peak Knee Impact Force	4715.1 – 5782.7 N	5209.31

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 142
 Sequential Test Number 1.3
 Date August 3, 2005

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			
Relative Humidity			
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Total Sitting Height	A	34.6 - 35.0 in	35.0
Shoulder Pivot Height	B	19.9 - 20.5 in	20.4
H-Point Height	C	3.3 - 3.5 in	3.5
H-Point from Backline	D	5.3 - 5.5 in	5.3
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.7
Thigh Clearance	F	5.5 - 6.1 in	6.0
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.5
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.5
Elbow Rest Height	J	7.5 - 8.3 in	8.25
Buttock Knee Length	K	22.8 - 23.8 in	23.5
Popliteal Height	L	16.9 - 17.9 in	17.75
Knee Pivot Height	M	19.1 - 19.7 in	19.25
Buttock Popliteal Length	N	17.8 - 18.8 in	18.75
Chest Depth	O	8.4 - 9.0 in	9.0
Foot Length	P	9.9 - 10.5 in	10.25
Shoulder Breadth	V	16.6 - 17.2 in	16.9
Foot Breadth	W	3.6 - 4.2 in	4.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	38.75
Waist Circumference	Z	32.9 - 34.1 in	33.0

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
HEAD DROP TEST

Dummy Serial Number 150
Sequential Test Number 1.3
Date July 27, 2005
Workfile 150H1 07-27-05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	28.00
Peak Resultant Acceleration	225-275 G's	261.91
Peak Lateral Acceleration	15 G's Max	1.40
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	150	
Sequential Test Number	1.3	
Date	August 2, 2005	6 Axis Neck Transducer
Workfile	150NF1 08-02-05	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.11
Relative Humidity	10% - 70%	35.00
Impact Velocity	6.89 – 7.13 m/s	7.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's
	20 ms	17.60 - 22.60 G's
	30 ms	12.50 - 18.50 G's
Max Pendulum G's Above 30 ms	29 G's Max	14.68
Deceleration - Time Curve Decay Time to 5 G's	34 - 42 ms	42.00
D Plane Rotation	Max	64 - 78 Deg
	Time	57 - 64 ms
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m
	Time	47 - 58 ms
Rotation Angle - Time Curve Decay Time to Zero	113 - 128 ms	117.70
Positive Moment - Time Curve Decay Time to Zero	97 - 107 ms	100.40

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	150	
Sequential Test Number	1.3	
Date	August 2, 2005	6 Axis Neck Transducer
Workfile	150NE 08-02-05	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.11
Relative Humidity		10% - 70%	35.00
Impact Velocity		5.94 – 6.19 m/s	6.00
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	19.39
	20 ms	14.00 - 19.00 G's	18.85
	30 ms	11.00 - 16.00 G's	14.91
Max Pendulum G's Above 30 ms		22 G's Max	14.91
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	38.00
D Plane Rotation	Max	81 - 106 Deg	94.22
	Time	72 - 82 ms	72.80
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-72.41
	Time	65 - 79 ms	68.90
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	153.40
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	135.00

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 150
Sequential Test Number 1.3
Date August 3, 2005
Workfile 150T 08-02-05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	35.00
Pendulum Velocity	6.58 – 6.83 m/s	6.71
Maximum Deflection	64.52 – 72.64 mm	65.00
Maximum Resistive Force	5159.9 – 5893.9 N	5542.36
Internal Hysteresis	69 - 85 %	75.09

Remarks:

Laboratory Technician:

_____ B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 150
 Sequential Test Number 1.3
 Date August 2, 2005
 Workfile 150LF/RF 08-02-05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	35.00
Probe Velocity	2.07 – 2.13 m/s	2.13
Peak Knee Impact Force	4715.1 – 5782.7 N	5205.9
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	35.00
Probe Velocity	2.07 – 2.13 m/s	2.13
Peak Knee Impact Force	4715.1 – 5782.7 N	5281.41

Remarks:

Laboratory Technician:

_____ B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 150
Sequential Test Number 1.3
Date August 3, 2005

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70.0
Relative Humidity			35.0
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Total Sitting Height	A	34.6 - 35.0 in	34.8
Shoulder Pivot Height	B	19.9 - 20.5 in	20.1
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.5
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.7
Thigh Clearance	F	5.5 - 6.1 in	6.0
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.5
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.2
Elbow Rest Height	J	7.5 - 8.3 in	8.1
Buttock Knee Length	K	22.8 - 23.8 in	23.5
Popliteal Height	L	16.9 - 17.9 in	17.8
Knee Pivot Height	M	19.1 - 19.7 in	19.5
Buttock Popliteal Length	N	17.8 - 18.8 in	18.4
Chest Depth	O	8.4 - 9.0 in	9.0
Foot Length	P	9.9 - 10.5 in	10.2
Shoulder Breadth	V	16.6 - 17.2 in	16.9
Foot Breadth	W	3.6 - 4.2 in	4.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	39.0
Waist Circumference	Z	32.9 - 34.1 in	34.0

Remarks:

Laboratory Technician:

B. Swiecicki

APPENDIX D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 142)	Manufacturer	Serial #	Calibration		
			Last	Next	
Head 9 Array	X Arm Y	ENDEVCO	AC-J35933	14-Jul-05	12-Jan-06
	X Arm Z	ENDEVCO	AC-J36038	13-Jul-05	11-Jan-06
	Y Arm X	ENDEVCO	AC-J36605	14-Jul-05	12-Jan-06
	Y Arm Z	ENDEVCO	AC-J21907	13-Jul-05	11-Jan-06
	Z Arm X	ENDEVCO	AC-J19843	13-Jul-05	11-Jan-06
	Z Arm Y	ENDEVCO	AC-AJ507	13-Jul-05	11-Jan-06
Head	X	ENDEVCO	AC-J14189	13-Jul-05	11-Jan-06
	Y	ENDEVCO	AC-J20125	13-Jul-05	11-Jan-06
	Z	ENDEVCO	AC-J36744	14-Jul-05	12-Jan-06
Head	X (R)	ENDEVCO	AC-J21989	14-Jul-05	12-Jan-06
	Y (R)	ENDEVCO	AC-J35921	13-Jul-05	11-Jan-06
	Z (R)	ENDEVCO	AC-ACCY2	13-Jul-05	11-Jan-06
Neck Load Cell	X	DENTON	LC-297FX	13-Jul-05	11-Jan-06
	Y	DENTON	LC-297FY	13-Jul-05	11-Jan-06
	Z	DENTON	LC-297FZ	13-Jul-05	11-Jan-06
Neck Moment	X	DENTON	LC-297MX	13-Jul-05	11-Jan-06
	Y	DENTON	LC-297MY	13-Jul-05	11-Jan-06
	Z	DENTON	LC-297MZ	13-Jul-05	11-Jan-06
Chest	X	ENDEVCO	AC-AC9F9	13-Jul-05	11-Jan-06
	Y	ENDEVCO	AC-P16194	14-Jul-05	12-Jan-06
	Z	ENDEVCO	AC-J14688	13-Jul-05	11-Jan-06
Chest	X (R)	ENDEVCO	AC-AAK48	13-Jul-05	11-Jan-06
	Y (R)	ENDEVCO	AC-AAKB1	14-Jul-05	12-Jan-06
	Z (R)	ENDEVCO	AC-J27517	14-Jul-05	12-Jan-06
Chest Deflection	X	SERVO	DS-142	28-Jun-05	27-Dec-05
Pelvic	X	ENDEVCO	AC-AJ5R0	18-Jul-05	16-Jan-06
	Y	ENDEVCO	AC-J22036	14-Jul-05	12-Jan-06
	Z	ENDEVCO	AC-J17649	13-Jul-05	11-Jan-06

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 142)	Manufacturer	Serial #	Calibration	
			Last	Next
Left Femur Load Cell Fz	DENTON	LC-729	20-Dec-04	20-Jun-05
Right Femur Load Cell Fz	GSE	LC-631	16-Dec-04	16-Jun-05
Left Upper Tibia	Fz	-	-	-
	Mx	DENTON	LC-266MX	24-Jun-05
	My	DENTON	LC-266MY	24-Jun-05
Left Lower Tibia	Fz	DENTON	LC-179FZ	22-Jun-05
	Mx	DENTON	LC-179MX	22-Jun-05
	My	DENTON	LC-179MY	22-Jun-05
Right Upper Tibia	Fz	DENTON	LC-265FZ	28-Jun-05
	Mx	DENTON	LC-265MX	28-Jun-05
	My	DENTON	LC-265MY	28-Jun-05
Right Lower Tibia	Fz	-	-	-
	Mx	DENTON	LC-178MX	28-Jun-05
	My	DENTON	LC-178MY	28-Jun-05
Left Foot Rear	X	ENTRAN	AC-02I02I05-F06	15-Jul-05
	Z	ENTRAN	AC-01G18-F14	15-Jul-05
Left Foot Front	Z	ENTRAN	AC-99H30-Z13	18-Jul-05
Right Foot Rear	X	ENTRAN	AC-02I20I16-A13	15-Jul-05
	Z	ENTRAN	AC-03D03D16-F01	15-Jul-05
Right Foot Front	Z	ENTRAN	AC-00L20-A15	24-Aug-05
Lap Belt Load Cell	-	-	-	-
Shoulder Belt Load Cell	-	-	-	-
Belt Stretch Transducer	-	-	-	-

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 150)	Manufacturer	Serial #	Calibration		
			Last	Next	
Head 9 Array	X Arm Y	ENDEVCO	AC-J27470	13-Jul-05	11-Jan-06
	X Arm Z	ENDEVCO	AC-J36741	13-Jul-05	11-Jan-06
	Y Arm X	ENDEVCO	AC-J20027	14-Jul-05	12-Jan-06
	Y Arm Z	ENDEVCO	AC-J21988	15-Jul-05	13-Jan-06
	Z Arm X	ENDEVCO	AC-AAKC6	13-Jul-05	11-Jan-06
	Z Arm Y	ENDEVCO	AC-AAKD0	13-Jul-05	11-Jan-06
Head	X	ENDEVCO	AC-J20061	13-Jul-05	11-Jan-06
	Y	ENDEVCO	AC-AJ4F8	13-Jul-05	11-Jan-06
	Z	ENDEVCO	AC-AHRW5	14-Jul-05	12-Jan-06
Head	X (R)	ENDEVCO	AC-AJ7Y4	13-Jul-05	11-Jan-06
	Y (R)	ENDEVCO	AC-AJ454	13-Jul-05	11-Jan-06
	Z (R)	ENDEVCO	AC-J19563	13-Jul-05	11-Jan-06
Neck Load Cell	X	DENTON	LC-157FX	14-Jul-05	12-Jan-06
	Y	DENTON	LC-157FY	14-Jul-05	12-Jan-06
	Z	DENTON	LC-157FZ	14-Jul-05	12-Jan-06
Neck Moment	X	DENTON	LC-157MX	14-Jul-05	12-Jan-06
	Y	DENTON	LC-157MY	14-Jul-05	12-Jan-06
	Z	DENTON	LC-157MZ	14-Jul-05	12-Jan-06
Chest	X	ENDEVCO	AC-J20580	14-Jul-05	12-Jan-06
	Y	ENDEVCO	AC-J20018	13-Jul-05	11-Jan-06
	Z	ENDEVCO	AC-J20569	14-Jul-05	12-Jan-06
Chest	X (R)	ENDEVCO	AC-J21963	14-Jul-05	12-Jan-06
	Y (R)	ENDEVCO	AC-P16755	14-Jul-05	12-Jan-06
	Z (R)	ENDEVCO	AC-J14667	14-Jul-05	12-Jan-06
Chest Deflection	X	SERVO	DS-150	23-Jun-05	22-Dec-05
Pelvic	X	ENDEVCO	AC-J34378	13-Jul-05	11-Jan-06
	Y	ENDEVCO	AC-J23757	14-Jul-05	12-Jan-06
	Z	ENDEVCO	AC-J27513	14-Jul-05	12-Jan-06

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 150)	Manufacturer	Serial #	Calibration		
			Last	Next	
Left Femur Load Cell Fz	DENTON	LC-261	02-Jul-05	31-Dec-05	
Right Femur Load Cell Fz	DENTON	LC-264	02-Jul-05	31-Dec-05	
Left Upper Tibia	Fz	DENTON	LC-263FZ	29-Jun-05	28-Dec-05
	Mx	DENTON	LC-263MX	29-Jun-05	28-Dec-05
	My	DENTON	LC-263MY	28-Jun-05	27-Dec-05
Left Lower Tibia	Fz	-	-	-	-
	Mx	DENTON	LC-174MX	28-Jun-05	27-Dec-05
	My	DENTON	LC-174MY	28-Jun-05	27-Dec-05
Right Upper Tibia	Fz	-	-	-	-
	Mx	DENTON	LC-274MX	02-Jul-05	31-Dec-05
	My	DENTON	LC-274MY	02-Jul-05	31-Dec-05
Right Lower Tibia	Fz	DENTON	LC-185FZ	03-May-05	01-Nov-05
	Mx	DENTON	LC-185MX	28-Jun-05	27-Dec-05
	My	DENTON	LC-185MY	28-Jun-05	27-Dec-05
Left Foot Rear	X	ENDEVCO	AC-J19223	14-Jul-05	12-Jan-06
	Z	ENDEVCO	AC-J20083	14-Jul-05	12-Jan-06
Left Foot Front	Z	ENTRAN	AC-04J04J07-M02	14-Jul-05	12-Jan-06
Right Foot Rear	X	ENDEVCO	AC-J27496	13-Jul-05	11-Jan-06
	Z	ENDEVCO	AC-J35747	13-Jul-05	11-Jan-06
Right Foot Front	Z	ENDEVCO	AC-J36723	13-Jul-05	11-Jan-06
Lap Belt Load Cell	-	-	-	-	
Shoulder Belt Load Cell	-	-	-	-	
Belt Stretch Transducer	-	-	-	-	

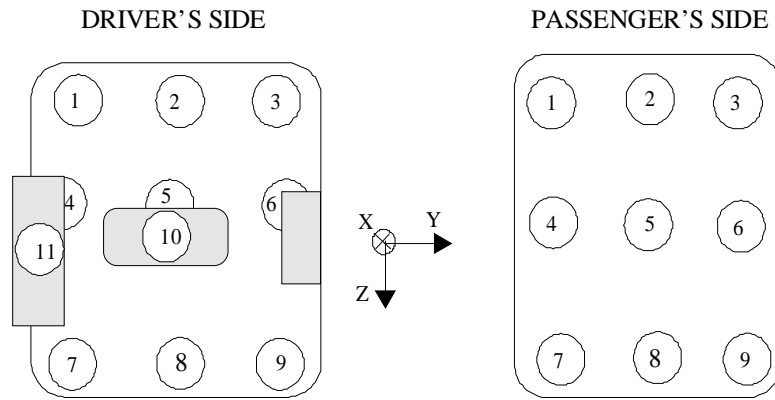
INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(Six Month Calibration Minimum)

	Manufacturer	Serial #	Calibration	
			Last	Next
Left Seat Rear Crossmember X	GS SENSORS	AC-9440-032	28-Apr-05	27-Oct-05
Right Rear Seat Crossmember X	ICS	AC-FGP50	28-Apr-05	27-Oct-05
Top of Engine	GS SENSORS	AC-9440-006	20-Jul-05	18-Jan-06
Bottom of Engine	-	-	-	-
Right Disc Brake Caliper	-	-	-	-
Instrument Panel	ICS	AC-8084-014	23-Mar-05	21-Sep-05
Left Disc Brake Caliper	-	-	-	-
Left Seat Rear Crossmember Z	-	-	-	-
Right Seat Rear Crossmember Z	-	-	-	-

APPENDIX E

VEHICLE INTERIOR INTRUSION MEASUREMENTS

TOE-PAN INTRUSION



Driver Side Toe-pan Measurements

Toe-pan Location	X Deformation (mm)			Z Deformation (mm)		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	3459	3441	18	-665	-671	6
2	3498	3463	35	-652	-662	10
3	3439	3407	32	-670	-674	4
4	3354	3345	9	-559	-562	3
5	3388	3369	19	-558	-567	9
6	3355	3331	24	-554	-570	16
7	3234	3230	4	-468	-459	-9
8	3262	3251	11	-476	-472	-4
9	3225	3221	4	-471	-457	-14
10	3272	3235	37	-650	-663	13
11	3309	3301	8	-558	-551	-7

Passenger Side Toe-pan Measurements

Toe-pan Location	X Deformation (mm)			Z Deformation (mm)		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	3461	3426	35	-696	-714	18
2	3466	3438	28	-690	-707	17
3	3438	3420	18	-706	-714	8
4	3371	3352	19	-576	-598	22
5	3373	3362	11	-576	-590	14
6	3376	3370	6	-575	-584	9
7	3251	3240	11	-491	-502	11
8	3249	3247	2	-488	-487	-1
9	3252	3254	-2	-487	-481	-6

Reference: SAE: X = Rear Bumper (Positive: forward); Z = Ground (Positive: up)

REPORT NUMBER: CAL-06-03

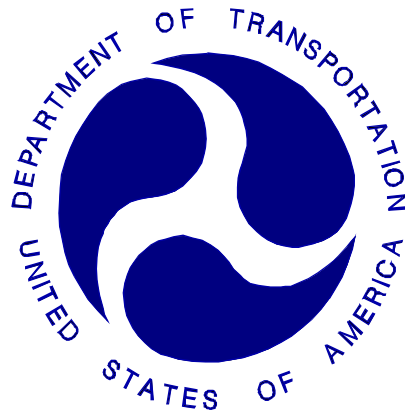
**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

GRACO TURBOBOOSTER HIGH BACK BOOSTER

NHTSA NUMBER: E65000

CALSPAN TEST NUMBER: 8642-NCAP-63

CALSPAN CORPORATION
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225



August 30, 2005

FINAL REPORT

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Rulemaking
Office of Crashworthiness Standards
Mail Code: NVS-111
400 Seventh Street, SW, Room No. 5311
Washington, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-01-D-32005. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Prepared By:

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Approved By:

David J. Travale, Program Manager
Transportation Sciences Center

Approval Date:

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. CAL-06-03		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of Graco TurboBooster High Back Booster NHTSA No.: E65000				5. Report Date August 30, 2005	
				6. Performing Organization Code CAL	
7. Author(s) Lawrence Q. Valvo, Project Engineer David J. Travale, Program Manager				8. Performing Organization Report No. 8642-NCAP-63	
9. Performing Organization Name and Address Calspan Corporation Transportation Sciences Center P.O. Box 400 Buffalo, New York 14225				10. Work Unit No.	
				11. Contract or Grant No. DTNH22-01-D-32005	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards Mail Code: NVS-111 400 Seventh SW, Room 5311 Washington, D.C. 20590				13. Type of Report and Period Covered Final Report August 2005 – September 2005	
				14. Sponsoring Agency Code NVS-111	
15. Supplementary Notes					
16. Abstract This CRS test was performed in conjunction with a New Car Assessment Program (NCAP) load cell barrier test. A Hybrid III 10 year old child dummy was placed in the test vehicle at Seating Position 3 (P3) and secured with the vehicle seat belt system. A CRS was not used in this position. A Hybrid III 10 year old child dummy was placed in the test vehicle at Seating Position 4 (P4) on a Graco TurboBooster High Back Booster and was secured with the vehicle seat belt system. This test was conducted at the Calspan Corporation Crash Test Facility in Buffalo, New York, on August 30, 2005.					
ATD Position		HIC 15		HIC 36	
P3 (Right Rear) (D009)		343.3		554.7	
P4 (Left Rear) (011)		343.9		506.5	
				Clip (3 ms)	
				38.7	
				39.8	
17. Key Words New Car Assessment Program (NCAP)				18. Distribution Statement <u>Copies of this report are available from:</u> National Highway Traffic Safety Administration Technical Reference Division Room 5111 (NAD-52) 400 Seventh St., S.W. Washington, D.C. 20590	
19. Security Classification of Report UNCLASSIFIED		20. Security Classification of Page UNCLASSIFIED		21. No. of Pages 65	
				22. Price	

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SECTION 1

PURPOSE AND SUMMARY OF TEST M35306

The purpose of this test was to obtain CRS performance data in a frontal impact NCAP condition. These data constitute part of the general consumer information collected by the New Car Assessment Program (NCAP).

The 56.49 kph NCAP frontal impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) NCAP Laboratory Test Procedure.

SUMMARY

Hybrid III 10 year-old child dummies were placed in the right rear (P3) and left rear (P4) test vehicle seating positions. The P3 child dummy was restrained with the vehicle seat belt system without use of a booster seat or CRS. The P4 child dummy was placed on a Graco TurboBooster high back booster seat and was restrained with the vehicle seat belt system. Both child dummies were calibrated previous to this test. Child dummy certification information is found in section 5.

The child dummies were instrumented with the following transducers:

- Head, chest, and pelvis triaxial accelerometers (Ax, Ay, and Az)
- Chest displacement transducer (Dx)
- Upper neck force and moment load cell (Fx, Fy, Fz, Mx, My and Mz)
- Left and right clavicle force load cells (Fx and Fz)
- Lumbar spine load cell (Fx, Fy, Fz, Mx, My and Mz)
- Left and right upper and lower ASIS load cells (Fx)

The right rear child dummy's HIC (15 ms) was 343.3, maximum chest deceleration over 3 ms was 38.7 g's. The left rear child dummy's HIC (15 ms) was 343.9, maximum chest deceleration over 3 ms was 39.8 g's.

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

TEST NOTES	
Data Channel	Anomalies
V1P2 Right Lower Tibia Mx	Transducer Cable Failed
V1P2 Left Foot Aft Ax	Transducer Failed
V1P2 Left Foot Aft Az	Questionable Data After 74 ms
V1P2 Left Foot Fore Az	Questionable Data After 74 ms
V1P3 Upper Neck Fy	Spikes in Data
V1P3 Upper Neck Mx	Channel Failed at 59 ms
V1P3 Upper Neck My	Data Spike at 60 ms
V1P3 Upper Neck Mz	Data Spike at 60 ms
V1P3 Lumbar Mz	Questionable Data: 77-87 ms
V1P4 Pelvic x	Questionable Data
V1 Right Rear #2x	Wire Cut at 67 ms
V1 Engine Top #3x	Wire Cut at 62 ms

SECTION 2
DATA SHEET NO. 1
CRASH TEST SUMMARY

TEST DUMMY INFORMATION:

DESCRIPTION	Position #3 CRS	Position #4 CRS
ATD Type/Serial No.	Hybrid III 10C/D009	Hybrid III 10C /011
CRS:	None	Graco TurboBooster

Number of Data Channels	64	
Number of Cameras:	1	<u>Real Time</u>
	2	<u>High Speed</u>

POST TEST DOOR OPENING

DESCRIPTION	FRONT	REAR
Left Side Doors	Closed, Latched and Operable without tools	Closed, Latched and Operable without tools
Right Side Doors	Closed, Latched and Operable without tools	Closed, Latched and Operable without tools
Hatch/Other Door	N/A	Closed, Latched and Operable without tools

POST TEST SEAT DATA

LOCATION	SEAT MOVEMENT (mm)	SEAT BACK FAILURE
P1 (Left Front)	5	None
P2 (Right Front)	3	None
P3 (Right Rear)	0	None
P4 (Left Rear)	0	None

VISIBLE DUMMY CONTACT POINTS

	Position #3 CRS	Position #4 CRS
Head Contact:	The chin to the chest and the back of the head to the outboard half of the vehicle P3 head restraint.	The chin to the chest and the back of the head to the CRS head restraint.
Upper Torso Contact:	The chin to the chest.	The chin to the chest.
Lower Torso Contact:	None	None
Left Knee Contact:	No knee contact. The left foot contacted the P2 lower seat back.	No knee contact. The left foot contacted the P1 lower seat back.
Right Knee Contact:	No knee contact. The right foot contacted the P2 lower seat back.	No knee contact. The right foot contacted the P1 lower seat back.

DATA SHEET NO. 2
CRS PARAMETER DATA

CRS: Graco TurboBooster Highback Booster

NHTSA No. E65000

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Delivered Weight of Vehicle with Maximum Fluids = 2150.0 kg (A)

AS TESTED WEIGHT OF VEHICLE

(2 P572E + 1 Hybrid III 10C + 1 Hybrid III 10C w/ CRS +CARGO + EQUIPMENT & INSTRUMENTATION):

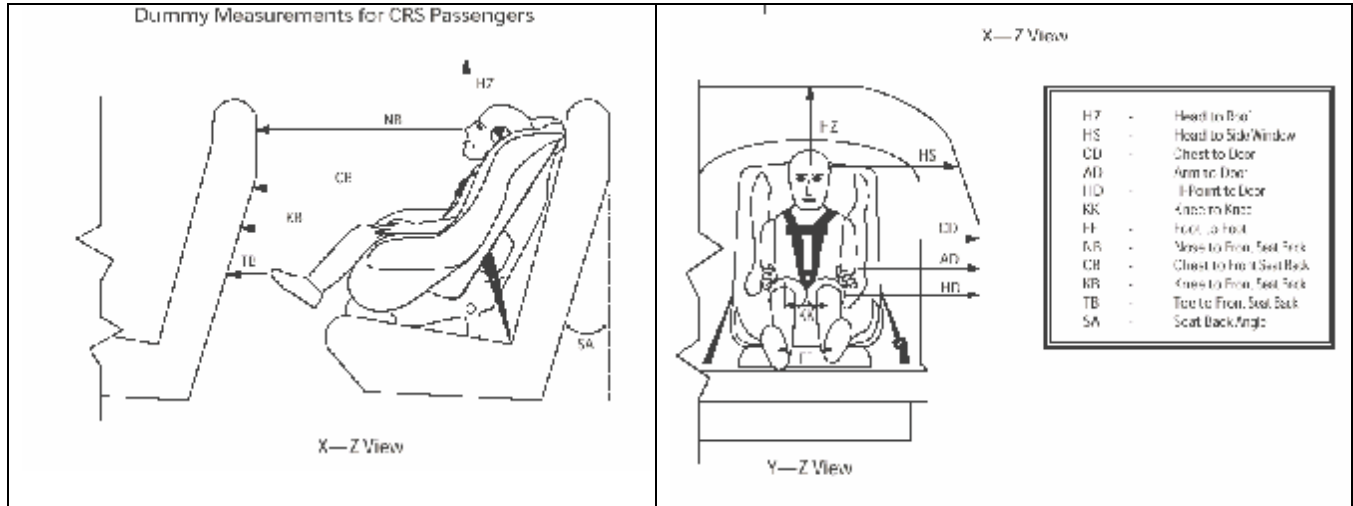
Left Front	=	<u>607.5</u>	kg	Left Rear	=	<u>606.0</u>	kg
Right Front	=	<u>624.5</u>	kg	Right Rear	=	<u>593.0</u>	kg
TOTAL FRONT	=	<u>1232.0</u>	kg	TOTAL REAR	=	<u>1199.0</u>	kg
TOTAL TEST WEIGHT	=	<u>2431.0</u>	kg				

DATA SHEET NO. 3

CHILD DUMMY POSITIONING IN VEHICLE

CRS: Graco TurboBooster Highback Booster

NHTSA No. E65000



Measurement	Pre-Test (mm)	
	P3 (ATD No. : D009)	P4 (ATD No. :011)
SA	22.1	22.1
HS	370	340
CD	351	335
AD	133	110
HD	178	172
HZ	360	230
NB	538	620
CB	583	540
KK	118	148
FF	133	150
KB – LEFT	383	325
KB – RIGHT	383	328
TB – LEFT	0	45
TB – RIGHT	0	45
Top Tether Anchor to CRS		
Angle	N/A	N/A
Length	N/A	N/A
X	N/A	N/A
Y	N/A	N/A
Z	N/A	N/A

All dimensions in mm (unless noted)

P3 – Right Rear Passenger (No CRS installed)

P4 – Left Rear Passenger

DATA SHEET NO. 4

CRS PERFORMANCE DATA

CRS: Graco TurboBooster Highback Booster

NHTSA No. E65000

POSITION #3 CRS POST-TEST INSPECTION (A CRS was not used in the P3 seating position.)

LOCATION	DAMAGE	REMARKS
Upper Tether Strap	NA	NA
Upper Tether Buckle	NA	NA
Upper Tether Hook	NA	NA
Vehicle Upper Tether Anchor	NA	NA
Lower Anchor Strap	NA	NA
Lower Anchor Buckle	NA	NA
Lower Anchor Hooks	NA	NA
Vehicle Lower CRS Anchors	NA	NA
Five Point Harness Connections	NA	NA
Cracks on CRS	NA	NA
Fabric Tears on CRS	NA	NA
Vehicle Seat Structure	NA	NA
Vehicle Seat Fabric Tears	NA	NA
Child Dummy	NA	NA

POSITION #4 CRS POST-TEST INSPECTION (Serial No. JJ 0409050819068, 040905)

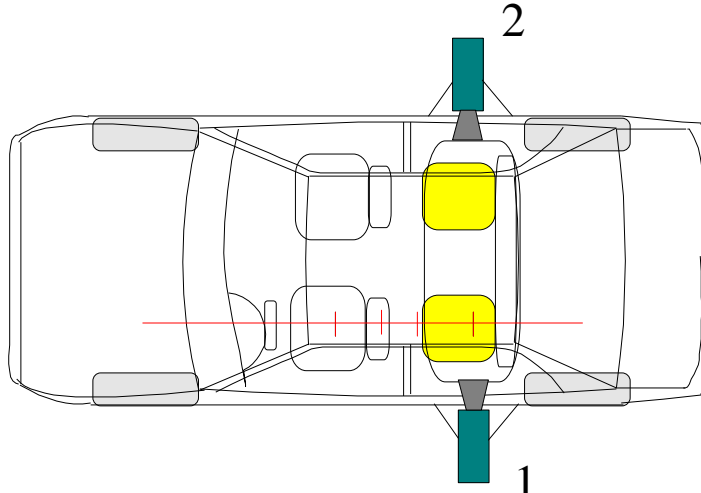
LOCATION	DAMAGE	REMARKS
Upper Tether Strap	NA	NA
Upper Tether Buckle	NA	NA
Upper Tether Hook	NA	NA
Vehicle Upper Tether Anchor	NA	NA
Lower Anchor Strap	NA	NA
Lower Anchor Buckle	NA	NA
Lower Anchor Hooks	NA	NA
Vehicle Lower CRS Anchors	NA	NA
Five Point Harness Connections	NA	NA
Cracks on CRS	No	None
Fabric Tears on CRS	No	None
Vehicle Seat Structure	No	None
Vehicle Seat Fabric Tears	No	None
Child Dummy	No	None

DATA SHEET NO. 5

CRS CAMERA DATA

CRS: Graco TurboBooster Highback Booster

NHTSA No. E65000



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left side CRS lateral view	3055	3030	2250	-23	28	500
2	Right side CRS lateral view	3120	3020	2160	-23	28	500

* Reference (from point of impact); all measurements accurate to within ± 6 mm.

- X = + Forward
- Y = + To Right
- Z = + Down

SECTION 3

PHOTOGRAPHS

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Exton, PA 19341 EE.UU. o llame al 1-800-345-4109.
Para información sobre retiradas, llame a la línea de información sobre
seguridad automotriz del gobierno de EE.UU. al 1-800-424-9393
202-366-0123 en el Distrito de Columbia). LAPB0095B

MODEL 8498SRT NAME: TurboBooster
SERIAL JJ 0409050819068
Manufactured in 040905
GRACO CHILDREN'S PRODUCTS, INC.
EXTON, PA 19341 1-888-224-6549
Made in China

LAPZ0004B

Figure 3-1: CLOSE-UP VIEW OF POSITION 4CRS LABEL



Figure 3-2: PRE-TEST FRONTAL VIEW OF POSITION 4 CRS



Figure 3-3: POST-TEST FRONTAL VIEW OF POSITION 4 CRS



Figure 3-4: PRE-TEST REAR VIEW OF POSITION 4 CRS



Figure 3-5: POST-TEST REAR VIEW OF POSITION 4 CRS



Figure 3-6: PRE-TEST LEFT SIDE VIEW OF POSITION 4 CRS



Figure 3-7: POST-TEST LEFT SIDE VIEW OF POSITION 4 CRS



Figure 3-8: PRE-TEST RIGHT SIDE VIEW OF POSITION 4 CRS



Figure 3-9: POST-TEST RIGHT SIDE VIEW OF POSITION 4 CRS



Figure 3-10: PRE-TEST POSITION 3 LEFT SIDE VIEW



Figure 3-11: POST-TEST POSITION 3 LEFT SIDE VIEW



Figure 3-12: PRE-TEST POSITION 4 LEFT SIDE VIEW



Figure 3-13: POST-TEST POSITION 4 LEFT SIDE VIEW



Figure 3-14: PRE-TEST POSITION 3 RIGHT SIDE VIEW



Figure 3-15: POST-TEST POSITION 3 RIGHT SIDE VIEW



Figure 3-16: PRE-TEST POSITION 4 RIGHT SIDE VIEW



Figure 3-17: POST-TEST POSITION 4 RIGHT SIDE VIEW



Figure 3-18: PRE-TEST POSITION 3 FRONT VIEW



Figure 3-19: POST-TEST POSITION 3 FRONT VIEW



Figure 3-20: PRE-TEST POSITION 4 FRONT VIEW



Figure 3-21: POST-TEST POSITION 4 FRONT VIEW

SECTION 4

CHILD DUMMY RESPONSE AND CRS DATA TRACES

TABLE OF DATA PLOTS

The following dummy, vehicle and load cell response data can be found in the research and development section of the NHTSA website at: www.nhtsa.dot.gov

V1P1 Head 9 Array X Arm Ay	V1P3 Head Ax
V1P1 Head 9 Array X Arm Az	V1P3 Head Ay
V1P1 Head 9 Array Y Arm Ax	V1P3 Head Az
V1P1 Head 9 Array Y Arm Az	V1P3 Upper Neck Fx
V1P1 Head 9 Array Z Arm Ax	V1P3 Upper Neck Fy
V1P1 Head 9 Array Z Arm Ay	V1P3 Upper Neck Fz
V1P1 Head CG Ax	V1P3 Upper Neck Mx
V1P1 Head CG Ay	V1P3 Upper Neck My
V1P1 Head CG Az	V1P3 Upper Neck Mz
V1P1 Head CG Red Ax	V1P3 Left Clavicle Fx
V1P1 Head CG Red Ay	V1P3 Left Clavicle Fz
V1P1 Head CG Red Az	V1P3 Right Clavicle Fx
V1P1 Upper Neck Fx	V1P3 Right Clavicle Fz
V1P1 Upper Neck Fy	V1P3 Chest Ax
V1P1 Upper Neck Fz	V1P3 Chest Ay
V1P1 Upper Neck Mx	V1P3 Chest Az
V1P1 Upper Neck My	V1P3 Chest Displacement
V1P1 Upper Neck Mz	V1P3 Lumbar Fx
V1P1 Chest Ax	V1P3 Lumbar Fy
V1P1 Chest Ay	V1P3 Lumbar Fz
V1P1 Chest Az	V1P3 Lumbar Mx
V1P1 Chest Red Ax	V1P3 Lumbar My
V1P1 Chest Red Ay	V1P3 Lumbar Mz
V1P1 Chest Red Az	V1P3 Pelvic Ax
V1P1 Chest Compression	V1P3 Pelvic Ay
V1P1 Pelvic Ax	V1P3 Pelvic Az
V1P1 Pelvic Ay	V1P3 Left Lower ASIS Fx
V1P1 Pelvic Az	V1P3 Left Upper ASIS Fx
V1P1 Left Femur Fz	V1P3 Right Lower ASIS Fx
V1P1 Right Femur Fz	V1P3 Right Upper ASIS Fx
V1P1 Left Upper Tibia Mx	V1P3 Lap Belt F
V1P1 Left Upper Tibia My	V1P3 Torso Belt F
V1P1 Left Lower Tibia Fz	V1P4 Head Ax
V1P1 Left Lower Tibia Mx	V1P4 Head Ay
V1P1 Left Lower Tibia My	V1P4 Head Az
V1P1 Right Upper Tibia Fz	V1P4 Upper Neck Fx
V1P1 Right Upper Tibia Mx	V1P4 Upper Neck Fy
V1P1 Right Upper Tibia My	V1P4 Upper Neck Fz
V1P1 Right Lower Tibia Mx	V1P4 Upper Neck Mx
V1P1 Right Lower Tibia My	V1P4 Upper Neck My
V1P1 Left Foot Aft Ax	V1P4 Upper Neck Mz
V1P1 Left Foot Aft Az	V1P4 Left Clavicle Fx
V1P1 Left Foot Fore Az	V1P4 Left Clavicle Fz
V1P1 Right Foot Aft Ax	V1P4 Right Clavicle Fx
V1P1 Right Foot Aft Az	V1P4 Right Clavicle Fz
V1P1 Right Foot Fore z	V1P4 Chest Ax
V1P2 Head 9 Array X Arm Ay	V1P4 Chest Ay
V1P2 Head 9 Array X Arm Az	V1P4 Chest Az

V1P2 Head 9 Array Y Arm Ax	V1P4 Chest Compression
V1P2 Head 9 Array Y Arm Az	V1P4 Lumbar Fx
V1P2 Head 9 Array Z Arm Ax	V1P4 Lumbar Fy
V1P2 Head 9 Array Z Arm Ay	V1P4 Lumbar Fz
V1P2 Head CG Ax	V1P4 Lumbar Mx
V1P2 Head CG Ay	V1P4 Lumbar My
V1P2 Head CG Az	V1P4 Lumbar Mz
V1P2 Head CG Red Ax	V1P4 Pelvic Ax
V1P2 Head CG Red Ay	V1P4 Pelvic Ay
V1P2 Head CG Red Az	V1P4 Pelvic Az
V1P2 Upper Neck Fx	V1P4 Left Lower ASIS Fx
V1P2 Upper Neck Fy	V1P4 Left Upper ASIS Fx
V1P2 Upper Neck Fz	V1P4 Right Lower ASIS Fx
V1P2 Upper Neck Mx	V1P4 Right Upper ASIS Fx
V1P2 Upper Neck My	V1P4 Lap Belt F
V1P2 Upper Neck Mz	V1P4 Torso Belt F
V1P2 Chest Ax	V1 Left Rear #1 Ax
V1P2 Chest Ay	V1 Right Rear #2 Ax
V1P2 Chest Az	V1 Engine Top #3 Ax
V1P2 Chest Red Ax	V1 Instrument Panel #6 Ax
V1P2 Chest Red Ay	
V1P2 Chest Red Az	
V1P2 Chest Compression	
V1P2 Pelvic Ax	
V1P2 Pelvic Ay	
V1P2 Pelvic Az	
V1P2 Left Femur Fz	
V1P2 Right Femur Fz	
V1P2 Left Upper Tibia Fz	
V1P2 Left Upper Tibia Mx	
V1P2 Left Upper Tibia My	
V1P2 Left Lower Tibia Mx	
V1P2 Left Lower Tibia My	
V1P2 Right Upper Tibia Mx	
V1P2 Right Upper Tibia My	
V1P2 Right Lower Tibia Fz	
V1P2 Right Lower Tibia Mx	
V1P2 Right Lower Tibia My	
V1P2 Left Foot Aft Ax	
V1P2 Left Foot Aft Az	
V1P2 Left Foot Fore Az	
V1P2 Right Foot Aft Ax	
V1P2 Right Foot Aft Az	
V1P2 Right Foot Fore Az	
Barrier Load Cell A1 Fx	
Barrier Load Cell A2 Fx	
Barrier Load Cell A3 Fx	
Barrier Load Cell A4 Fx	
Barrier Load Cell A5 Fx	
Barrier Load Cell A6 Fx	
Barrier Load Cell A7 Fx	
Barrier Load Cell A8 Fx	

Barrier Load Cell A9 Fx	
Barrier Load Cell B1 Fx	
Barrier Load Cell B2 Fx	
Barrier Load Cell B3 Fx	
Barrier Load Cell B4 Fx	
Barrier Load Cell B5 Fx	
Barrier Load Cell B6 Fx	
Barrier Load Cell B7 Fx	
Barrier Load Cell B8 Fx	
Barrier Load Cell B9 Fx	
Barrier Load Cell C1 Fx	
Barrier Load Cell C2 Fx	
Barrier Load Cell C3 Fx	
Barrier Load Cell C4 Fx	
Barrier Load Cell C5 Fx	
Barrier Load Cell C6 Fx	
Barrier Load Cell C7 Fx	
Barrier Load Cell C8 Fx	
Barrier Load Cell C9 Fx	
Barrier Load Cell D1 Fx	
Barrier Load Cell D2 Fx	
Barrier Load Cell D3 Fx	
Barrier Load Cell D4 Fx	
Barrier Load Cell D5 Fx	
Barrier Load Cell D6 Fx	
Barrier Load Cell D7 Fx	
Barrier Load Cell D8 Fx	
Barrier Load Cell D9 Fx	

TEST NOTES	
Data Channel	Anomalies
V1P2 Right Lower Tibia Mx	Transducer Cable Failed
V1P2 Left Foot Aft Ax	Transducer Failed
V1P2 Left Foot Aft Az	Questionable Data After 74 ms
V1P2 Left Foot Fore Az	Questionable Data After 74 ms
V1P3 Upper Neck Fy	Spikes in Data
V1P3 Upper Neck Mx	Channel Failed at 59 ms
V1P3 Upper Neck My	Data Spike at 60 ms
V1P3 Upper Neck Mz	Data Spike at 60 ms
V1P3 Lumbar Mz	Questionable Data: 77-87 ms
V1P4 Pelvic x	Questionable Data
V1 Right Rear #2x	Wire Cut at 67 ms
V1 Engine Top #3x	Wire Cut at 62 ms

SECTION 5

CHILD DUMMY CALIBRATION INFORMATION

Hybrid III 10C ATD s Serial Number D009 and Serial Number 011 were pre-test calibrated at VRTC in August, 2005. ATD Serial Number D009 did not pass the Thorax certification test requirements.

Transportation Research Center Inc.

Head Drop Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 1

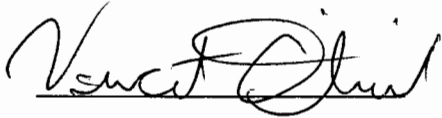
Test Date 08/18/2005

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Peak Resultant Acceleration	250 - 300 g	263.4 g	Yes
Peak Lateral Acceleration	15 g Max	11.9 g	Yes
Oscillations After Main Pulse	Less Than 10% of Peak Resultant Acceleration?	Yes	Yes

Test meets specifications.

Comments:

Technician



Approved

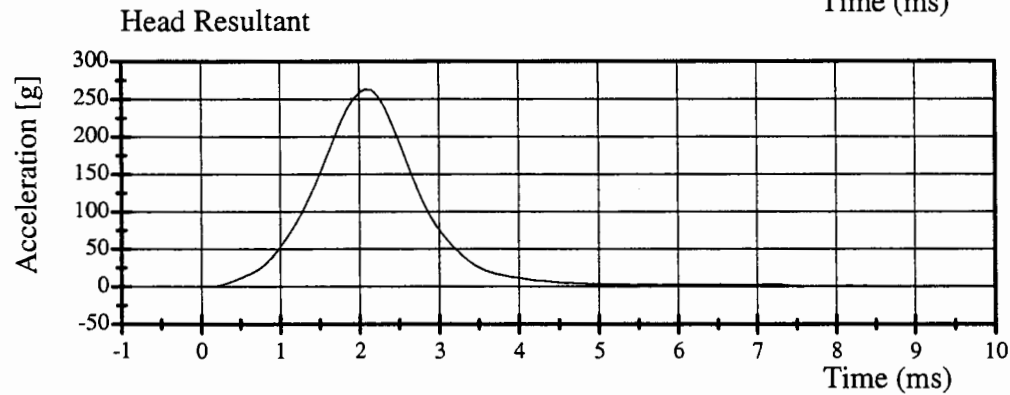
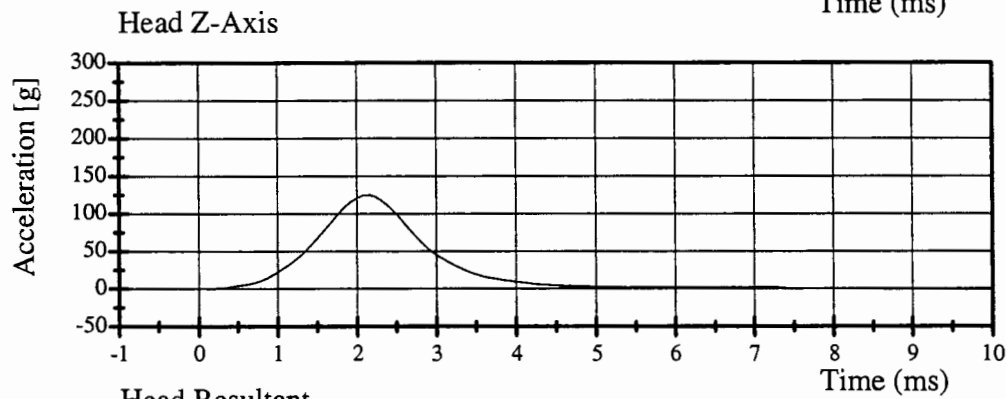
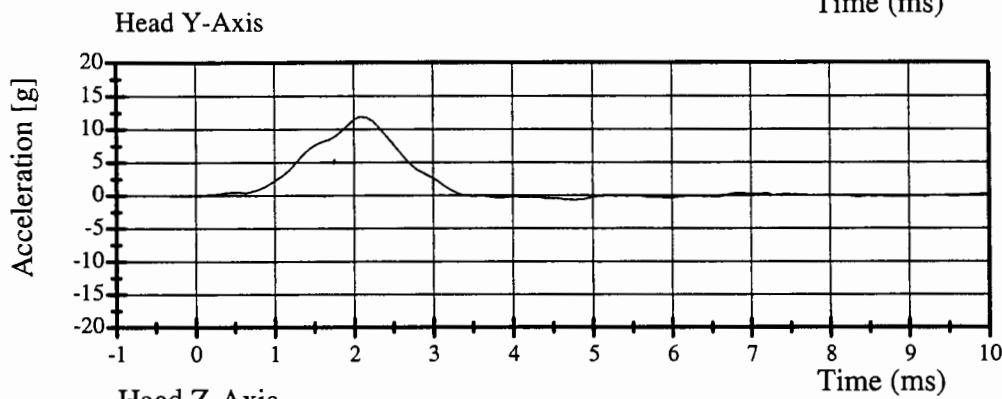
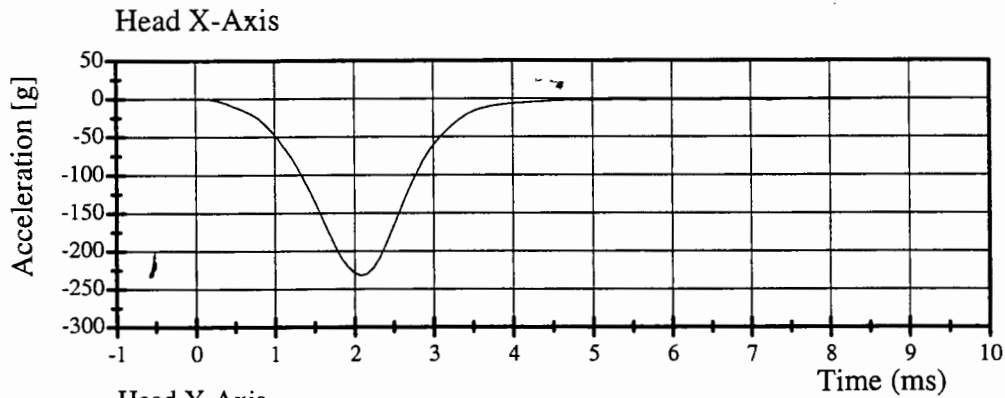


Transportation Research Center Inc.

Head Drop Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 1

Test Date 08/18/2005



Transportation Research Center Inc.

Neck Flexion Test - 6 Channel Transducer

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 1

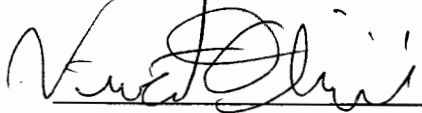
Test Date 08/18/2005

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Impact Velocity	5.98 - 6.22 m/s	6.15 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.64 - 2.04 m/s	1.81 m/s	Yes
20 ms	3.04 - 4.04 m/s	3.54 m/s	Yes
30 ms	4.45 - 5.65 m/s	5.11 m/s	Yes
Peak D Plane Rotation	74.0 - 88.0 °	85.8 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	50.0 - 62.0 N·m	52.38 N·m	Yes
Positive Moment Decay Time To 10 N·m	85 - 105 ms	98.88 ms	Yes

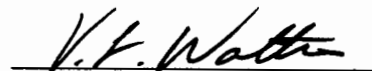
Test meets specifications.

Comments:

Technician



Approved



08.18.2005 12:51:04 1212



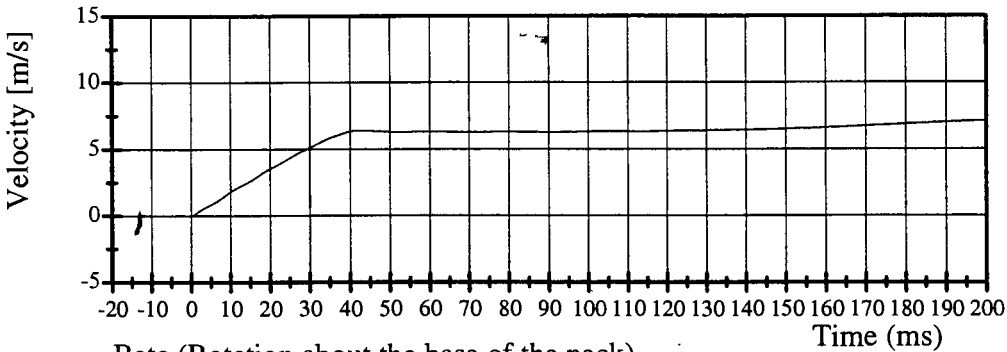
Transportation Research Center Inc.

Neck Flexion Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 1

Test Date 08/18/2005

Integrated Pendulum Velocity

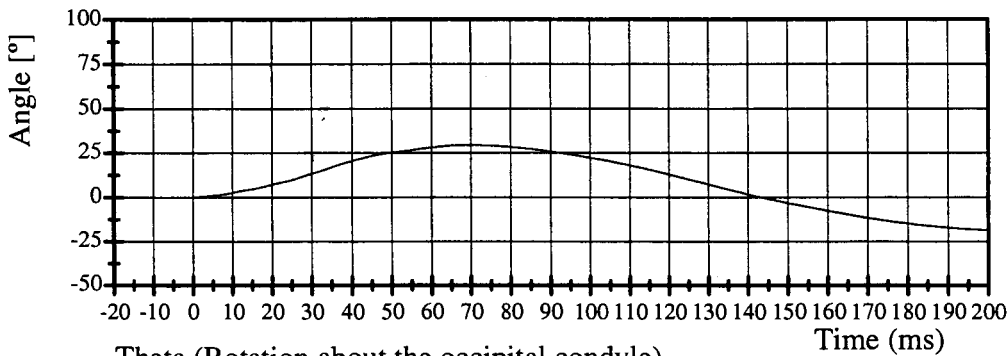


Filter Class: 180

Max: 7.86 m/s at 305.8 ms

Min: -0.02 m/s at -0.6 ms

Beta (Rotation about the base of the neck)

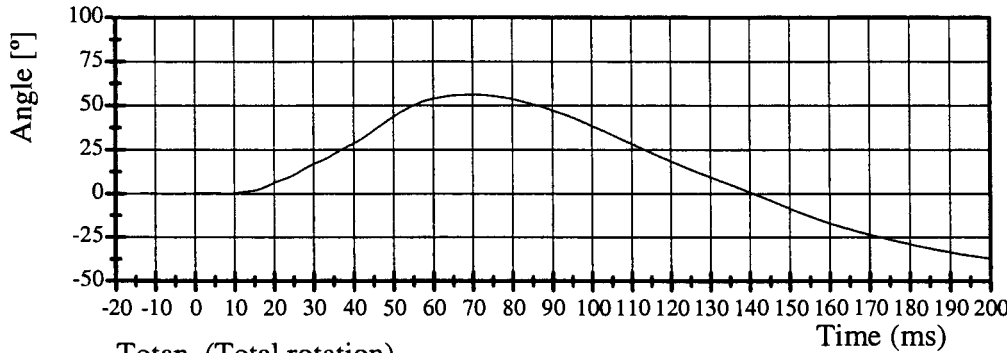


Filter Class: 60

Max: 29.5° at 69.8 ms

Min: -19.5° at 216.3 ms

Theta (Rotation about the occipital condyle)

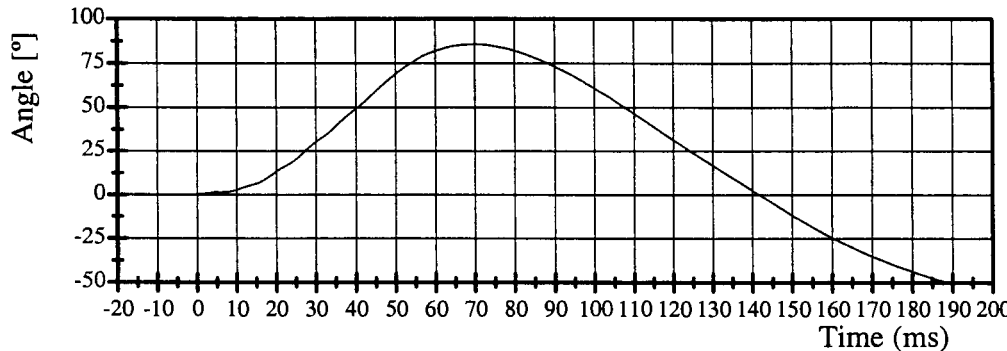


Filter Class: 60

Max: 56.3° at 70.4 ms

Min: -39.5° at 219.8 ms

Totan (Total rotation)



Filter Class: 60

Max: 85.8° at 70.2 ms

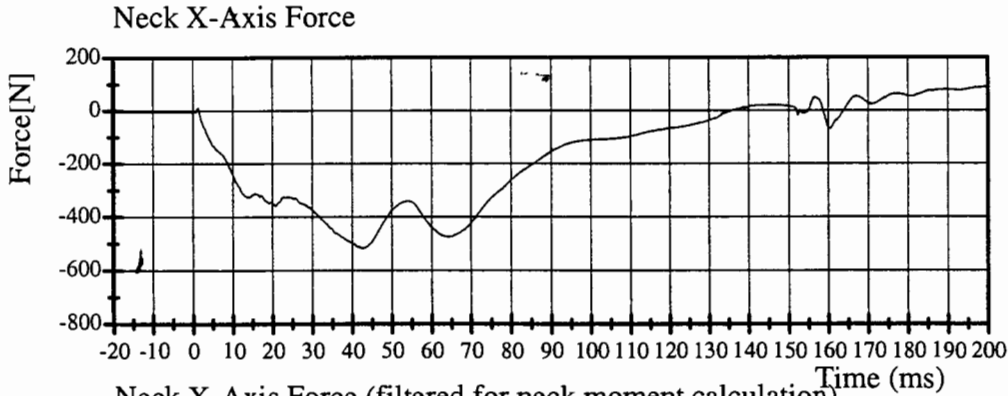
Min: -59.0° at 218.6 ms

Transportation Research Center Inc.

Neck Flexion Test

1111 10 Year Old Serial No. D009 Calibration No. 02-1

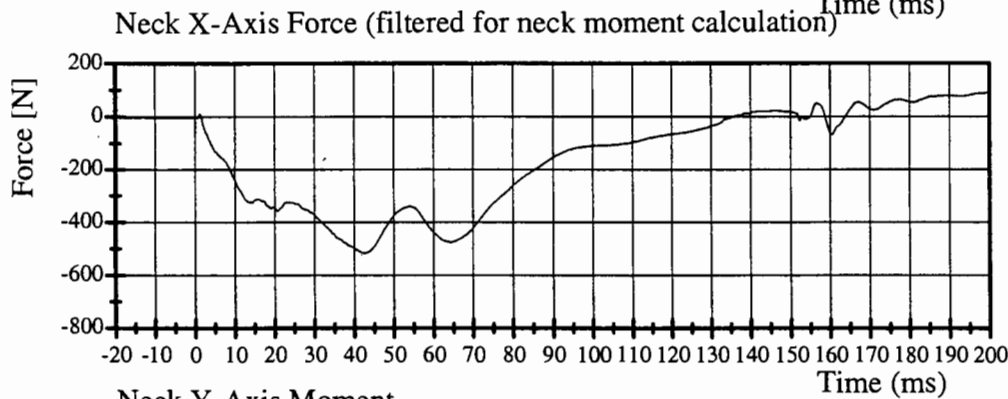
Test Date 08/18/2005



Filter Class: 1000

Max: 94.6 N at 209.3 ms

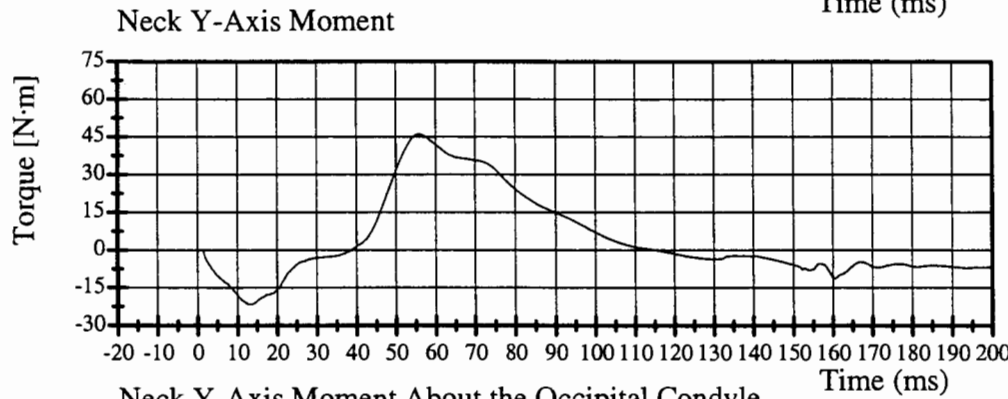
Min: -516.9 N at 42.6 ms



Filter Class: 600

Max: 94.1 N at 209.4 ms

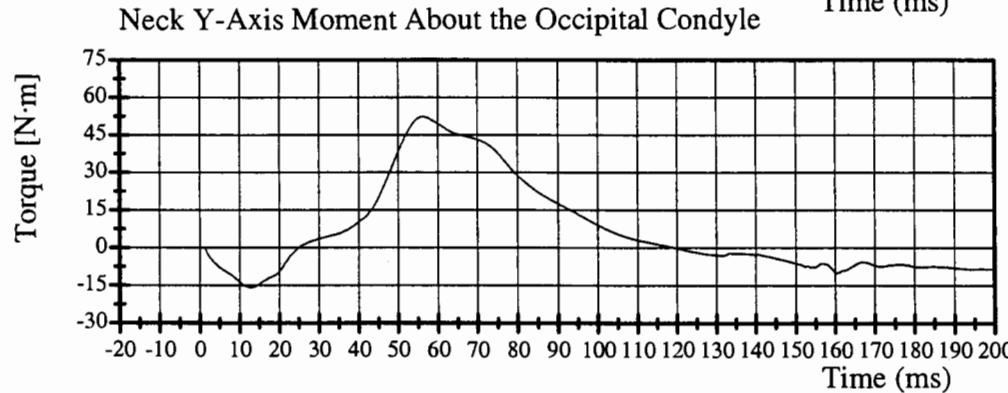
Min: -516.4 N at 42.6 ms



Filter Class: 600

Max: 46.0 N·m at 55.8 ms

Min: -21.6 N·m at 13.2 ms



Filter Class: 600

Max: 52.4 N·m at 56.3 ms

Min: -15.9 N·m at 13.1 ms

Transportation Research Center Inc.

Neck Extension Test - 6 Channel Transducer

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 2

Test Date 08/18/2005

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	51 %	Yes
Impact Velocity	4.91 - 5.15 m/s	5.04 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.59 - 1.89 m/s	1.81 m/s	Yes
20 ms	2.88 - 3.68 m/s	3.39 m/s	Yes
30 ms	4.20 - 5.20 m/s	4.83 m/s	Yes
Peak D Plane Rotation	99.0 - 114.0 °	100.6 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	(-47.0) - (-35.0) N·m	-46.41 N·m	Yes
Negative Moment Decay Time To -10 N·m	100 - 120 ms	104.88 ms	Yes

Test meets specifications.

Comments:

Technician



Approved



08.18.2005 14:29:51 796



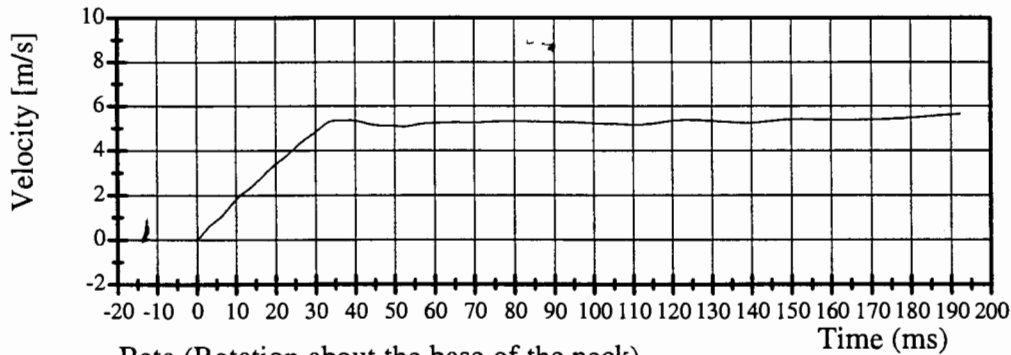
Transportation Research Center Inc.

Neck Extension Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 2

Test Date 08/18/2005

Integrated Pendulum Velocity

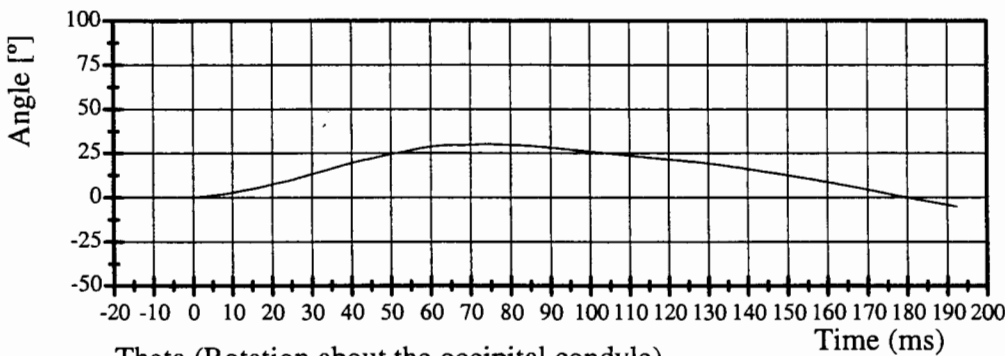


Filter Class: 180

Max: 5.7 m/s at 192.3 ms

Min: -0.0 m/s at -40.5 ms

Beta (Rotation about the base of the neck)

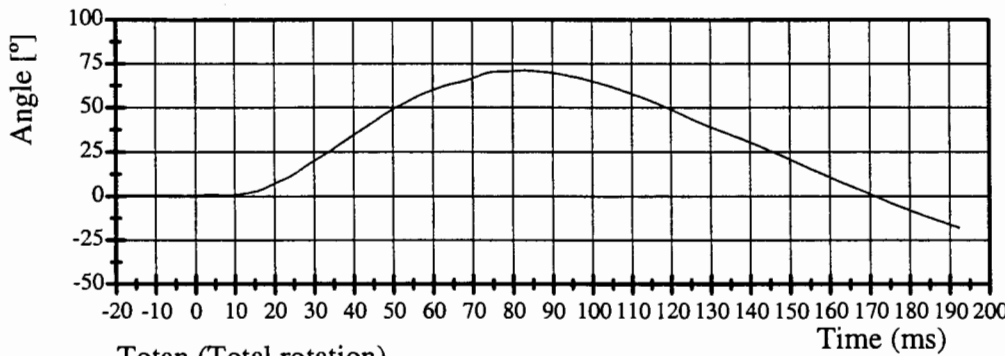


Filter Class: 60

Max: 30.2° at 74.4 ms

Min: -5.1° at 192.3 ms

Theta (Rotation about the occipital condyle)

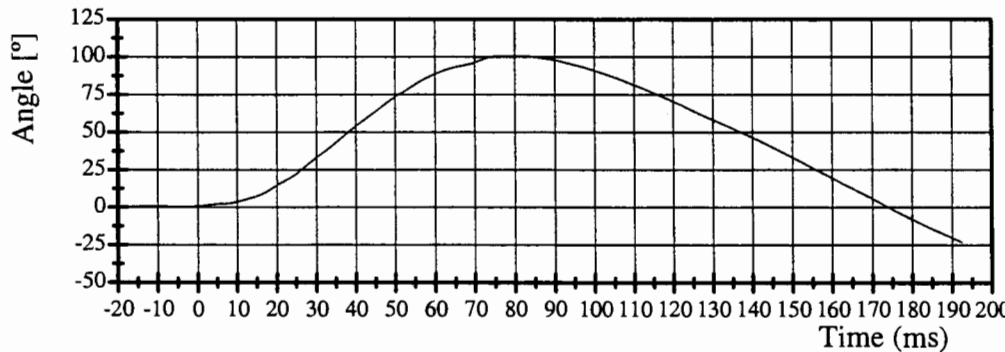


Filter Class: 60

Max: 71.1° at 82.8 ms

Min: -17.8° at 192.3 ms

Totan (Total rotation)



Filter Class: 60

Max: 100.6° at 82.0 ms

Min: -23.0° at 192.3 ms

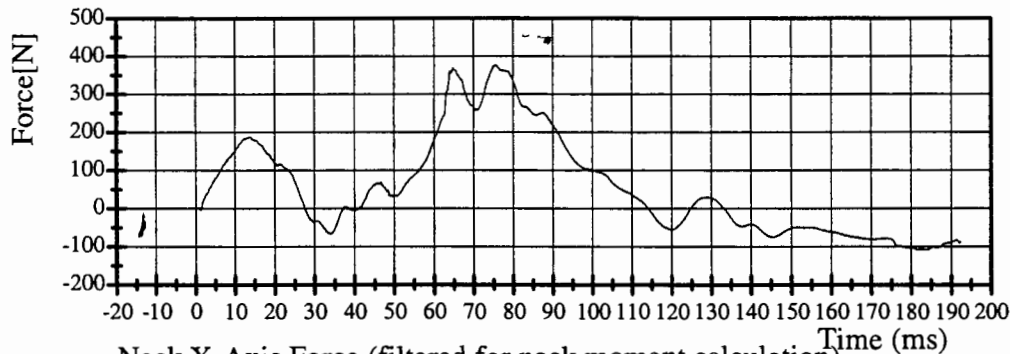
Transportation Research Center Inc.

Neck Extension Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 2

Test Date 08/18/2005

Neck X-Axis Force

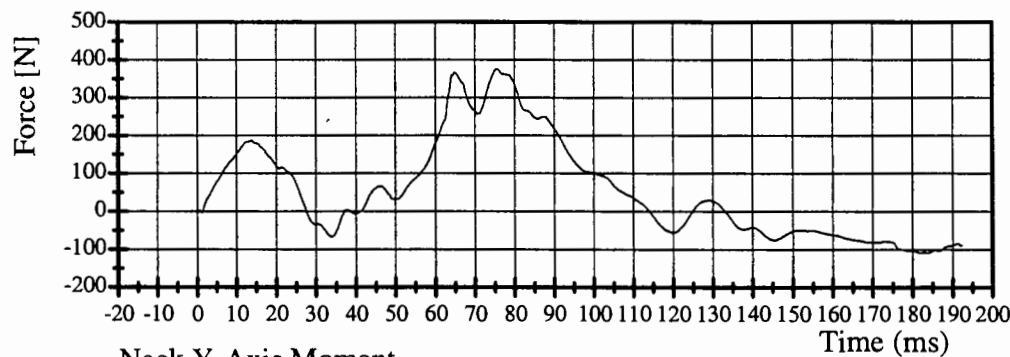


Filter Class: 1000

Max: 376.6 N at 75.5 ms

Min: -108.1 N at 181.8 ms

Neck X-Axis Force (filtered for neck moment calculation)

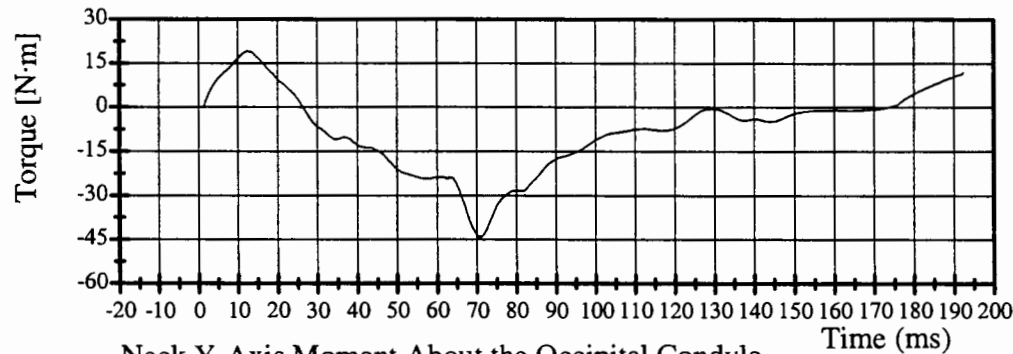


Filter Class: 600

Max: 376.3 N at 75.5 ms

Min: -107.8 N at 181.8 ms

Neck Y-Axis Moment

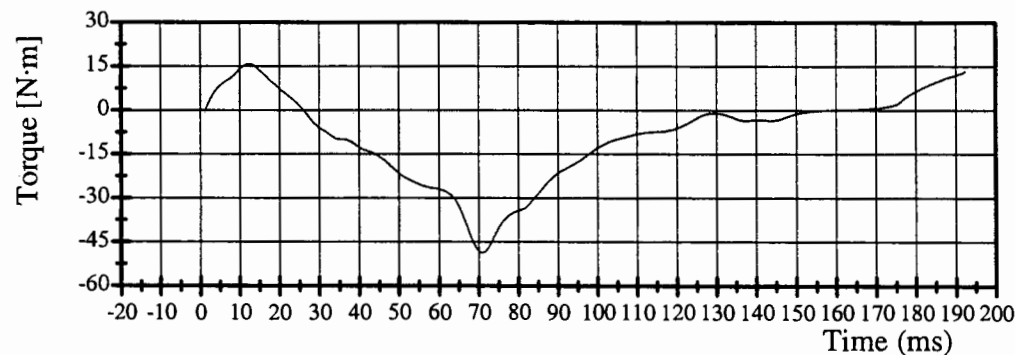


Filter Class: 600

Max: 19.1 N·m at 12.4 ms

Min: -44.1 N·m at 70.8 ms

Neck Y-Axis Moment About the Occipital Condyle



Filter Class: 600

Max: 15.8 N·m at 12.3 ms

Min: -48.7 N·m at 70.8 ms

Transportation Research Center Inc.

Thorax Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 6

Test Date 08/23/2005

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Pendulum Velocity	5.88 - 6.12 m/s	6.09 m/s	Yes
Maximum Chest Deflection	-48.5 - (-40.5) mm	-41.1 mm	Yes
Peak Impact Probe Force Within Compression Corridor	1830 - 2330 N	2380 N	No
Force Prior to Corridor*	\leq 2330 N	2443 N	No
Internal Hysteresis	69 - 85 %	79.5 %	Yes

Test does not meet specifications.

Comments:

Original ribs with new sternum slider.

* Defined per NPRM as peak force between -20 mm and -40.5 mm deflection.

Technician

Vincent Oliveri

Approved

V.H. Nelt

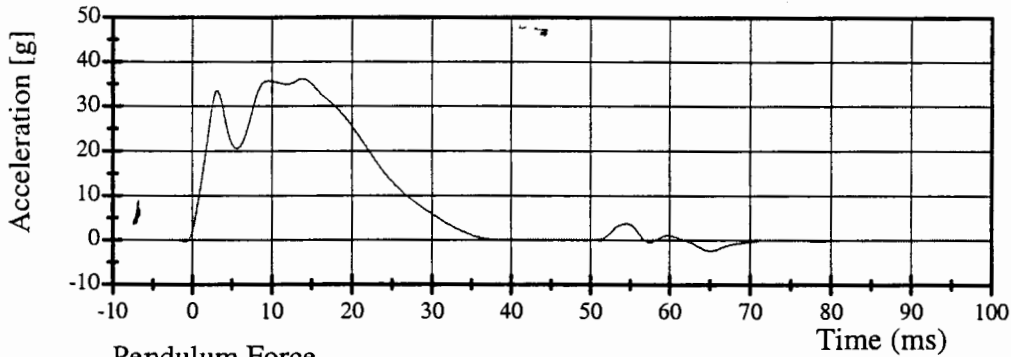
Transportation Research Center Inc.

Thorax Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 6

Test Date 08/23/2005

Pendulum Deceleration

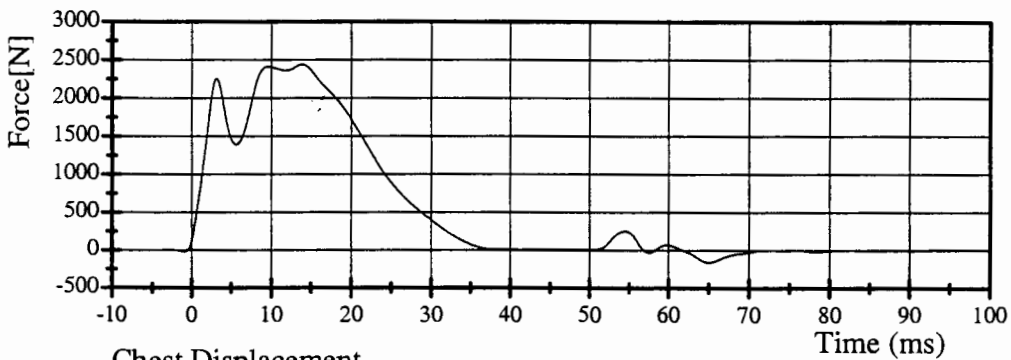


Filter Class: 180

Max: 36.2 g at 13.8 ms

Min: -2.4 g at 65.0 ms

Pendulum Force

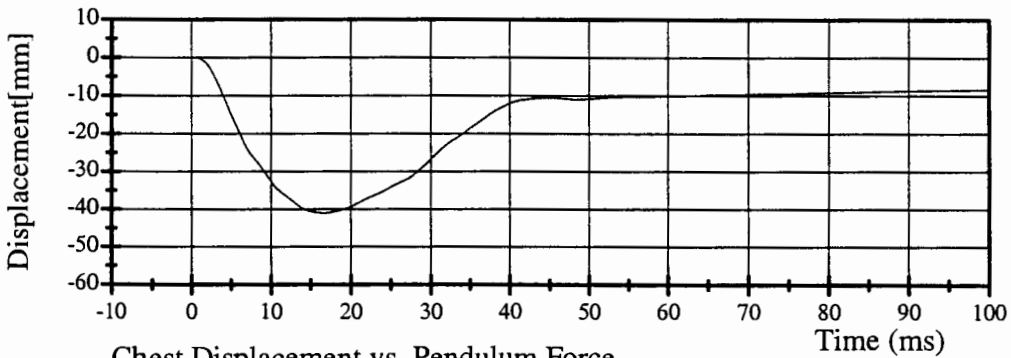


Filter Class: 180

Max: 2443.2 N at 13.8 ms

Min: -160.3 N at 65.0 ms

Chest Displacement

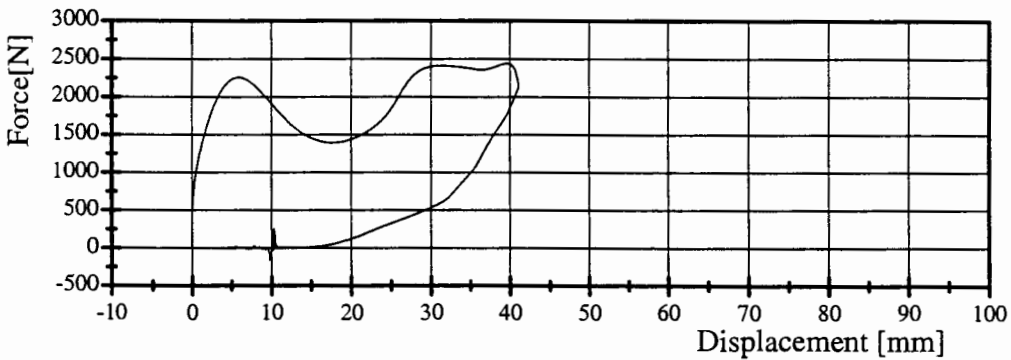


Filter Class: 180

Max: 0.0 mm at 0.2 ms

Min: -41.1 mm at 16.6 ms

Chest Displacement vs. Pendulum Force



Transportation Research Center Inc.

Thorax Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 7

Test Date 08/23/2005

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Pendulum Velocity	5.88 - 6.12 m/s	6.09 m/s	Yes
Maximum Chest Deflection	-48.5 - (-40.5) mm	-40.2 mm	No
Peak Impact Probe Force Within Compression Corridor	1830 - 2330 N	0 N	No
Force Prior to Corridor*	<= 2330 N	2537 N	No
Internal Hysteresis	69 - 85 %	78.2 %	Yes

Test does not meet specifications.

Comments:

Original ribs with new sternum slider.

* Defined per NPRM as peak force between -20 mm and -40.5 mm deflection.

Technician

Vincent Oliveri

Approved

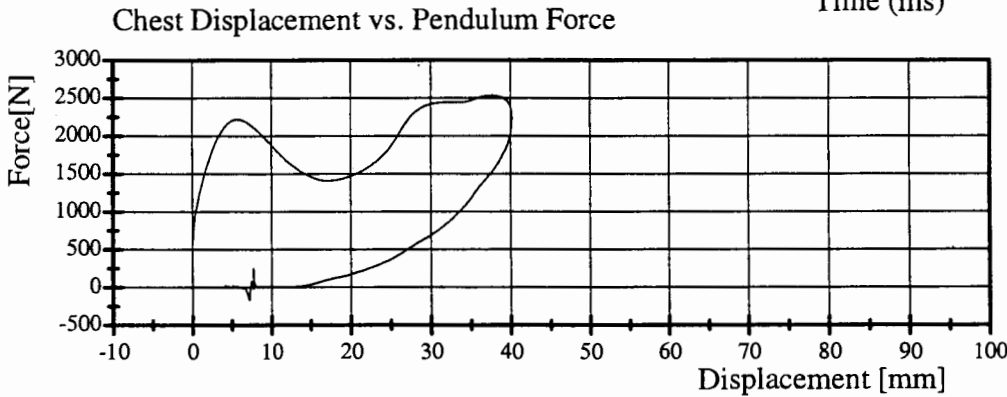
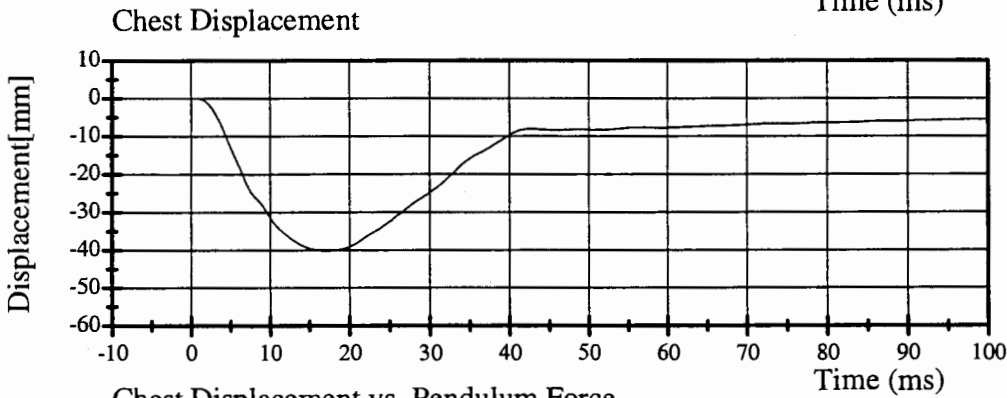
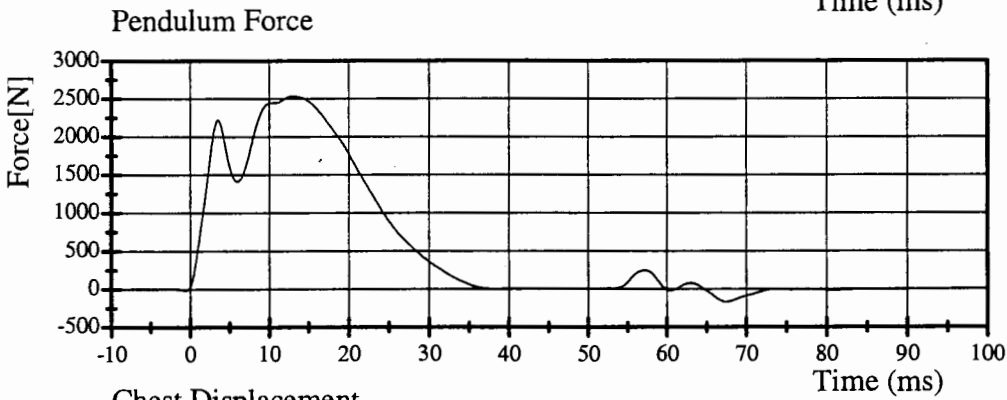
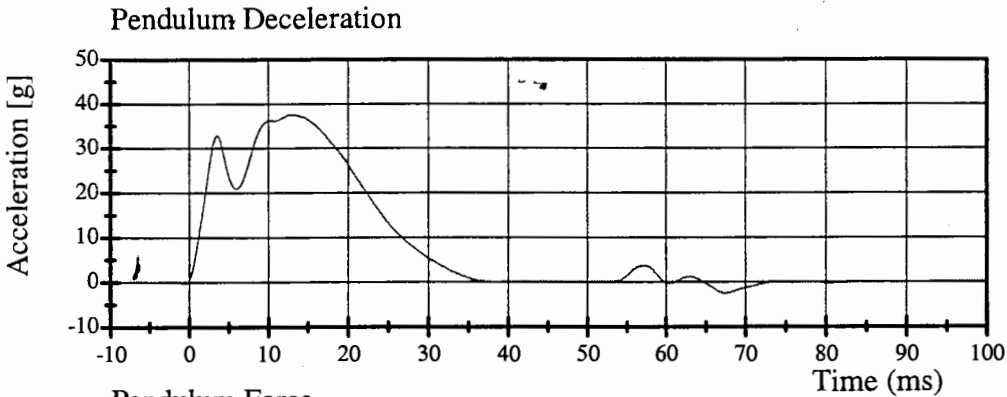
H. Watts

Transportation Research Center Inc.

Thorax Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 7

Test Date 08/23/2005



TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

HYBRID III TEN YEAR-OLD

CAL DATE: 19-Aug-05

TRC, INC.

TEST NO: D009C02TF6

SND009 TORSO FLEX CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 – 22.2° C	21.5 ° C
RELATIVE HUMIDITY	10 – 70 %	53 %
INITIAL ANGLE OF UNSUPPORTTED DUMMY	<= 20° REFERENCED TO VERTICAL	11.3 °
MAXIMUM FORCE AT 35 DEG. DURING 10 SECOND PERIOD	<i>Handwritten:</i> 180 - 240 N 190 - 240	236.5 N
RETURN ANGLE		18.7 °
DIFFERENCE BETWEEN RETURN ANGLE & INTIAL ANGLE	+/- 8 ° OF INTIAL ANGLE	7.4 °
RATE	0.5° - 1.5°/sec	1.00 °/sec

TEST MEETS SPECIFICATIONS

Comments: New Abdomen

TECHNICIAN 

Transportation Research Center Inc.

Left Knee Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 1

Test Date 08/18/2005

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	2560 - 3140 N	3077 N	Yes

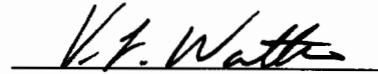
Test meets specifications.

Comments:

Technician



Approved



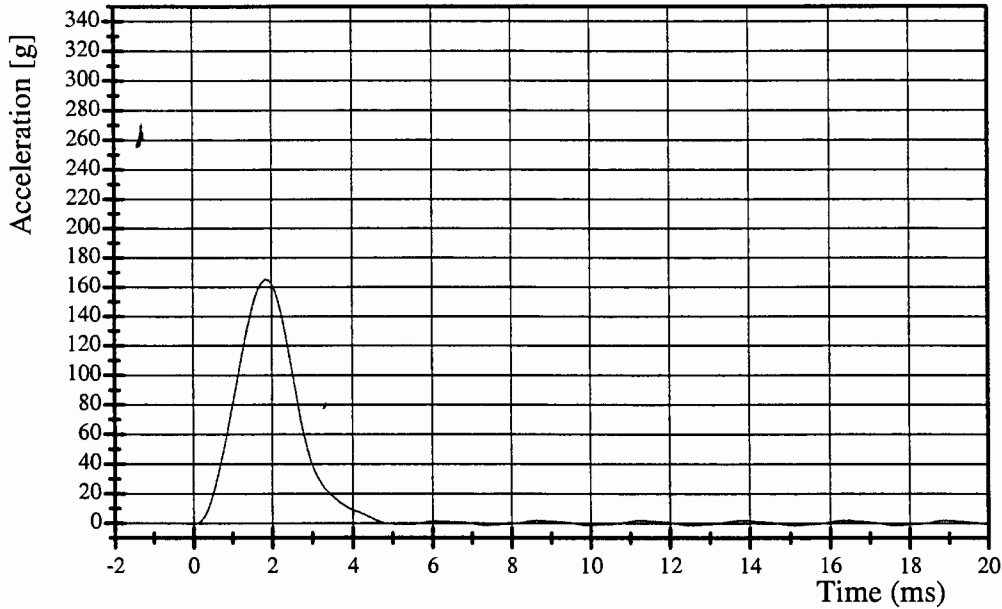
Transportation Research Center Inc.

Left Knee Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 1

Test Date 08/18/2005

Pendulum Deceleration

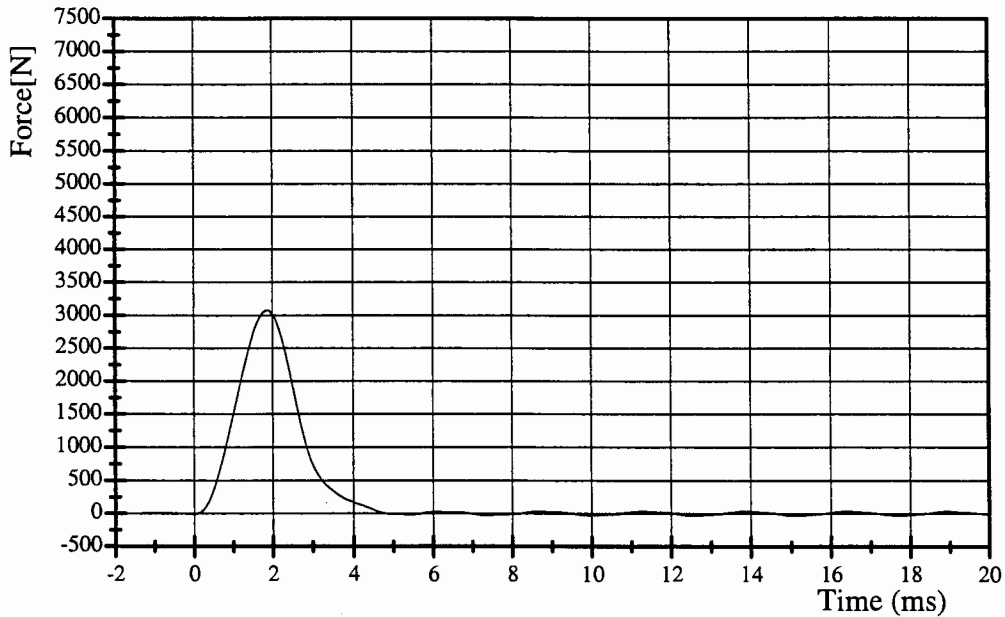


Filter Class: 600

Max: 165.2 g at 1.8 ms

Min: -1.5 g at 12.6 ms

Pendulum Force



Filter Class: 600

Max: 3077.3 N at 1.8 ms

Min: -28.3 N at 12.6 ms

Transportation Research Center Inc.

Right Knee Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 3

Test Date 08/19/2005

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.09 m/s	Yes
Maximum Pendulum Force	2560 - 3140 N	2919 N	Yes

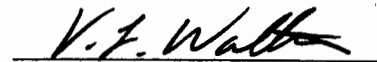
Test meets specifications.

Comments:

Technician



Approved



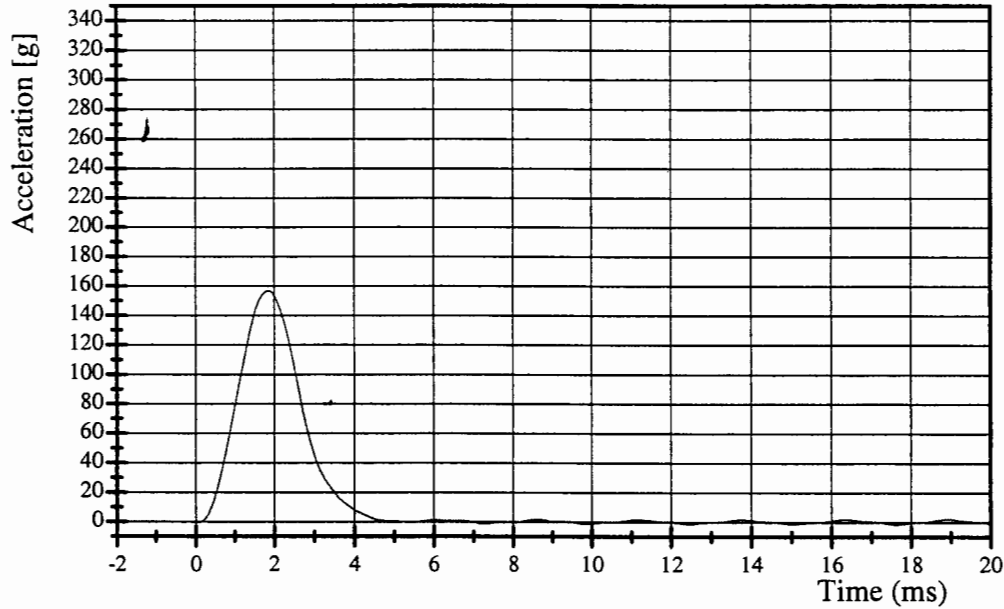
Transportation Research Center Inc.

Right Knee Test

HIII 10 Year Old Serial No. D009 Calibration No. 02 - 3

Test Date 08/19/2005

Pendulum Deceleration

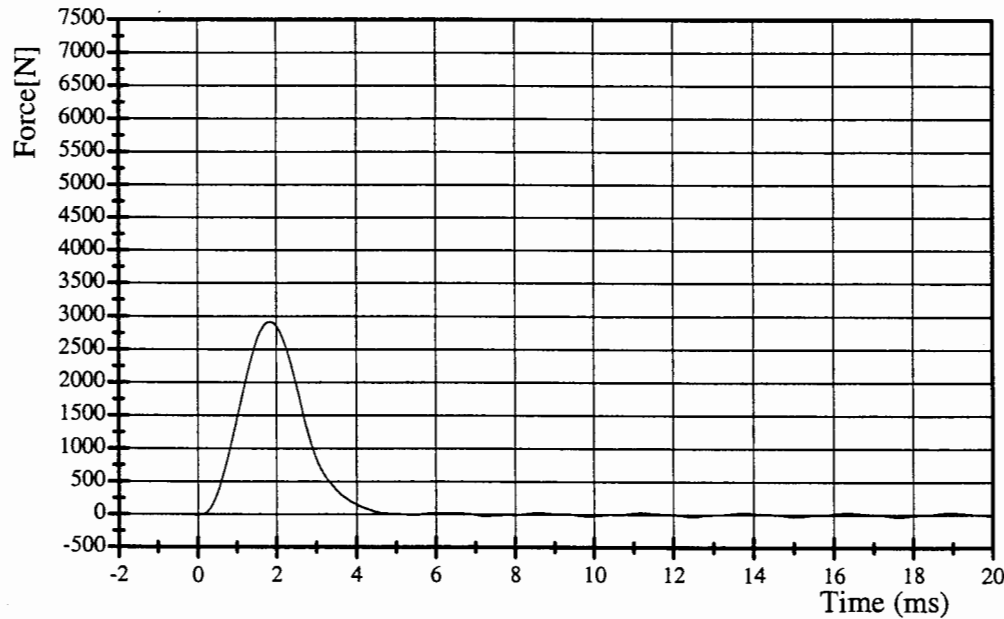


Filter Class: 600

Max: 156.6 g at 1.8 ms

Min: -1.7 g at 20.2 ms

Pendulum Force



Filter Class: 600

Max: 2918.7 N at 1.8 ms

Min: -31.7 N at 20.2 ms

Transportation Research Center Inc.

Head Drop Test

HIII 10 Year Old Serial No. 011 • Calibration No. 02 - 2


Test Date 08/19/2005

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Peak Resultant Acceleration	250 - 300 g	275.3 g	Yes
Peak Lateral Acceleration	15 g Max	5.2 g	Yes
Oscillations After Main Pulse	Less Than 10% of Peak Resultant Acceleration?	Yes	Yes

Test meets specifications.

Comments:

Technician



Approved

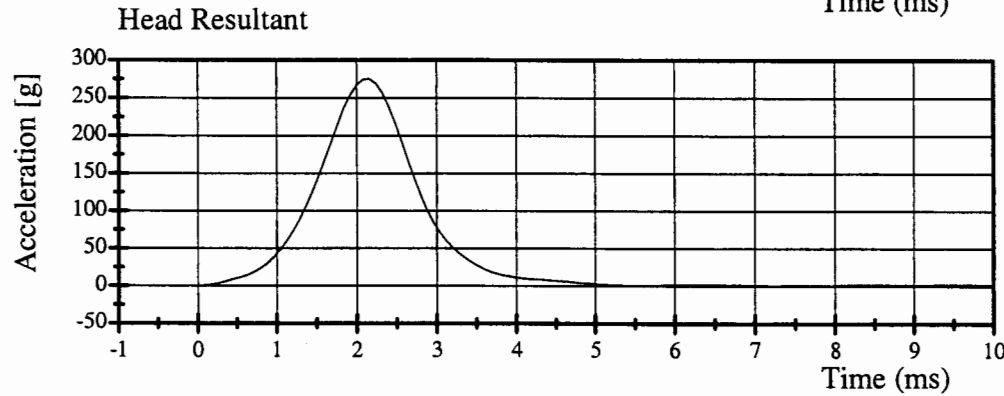
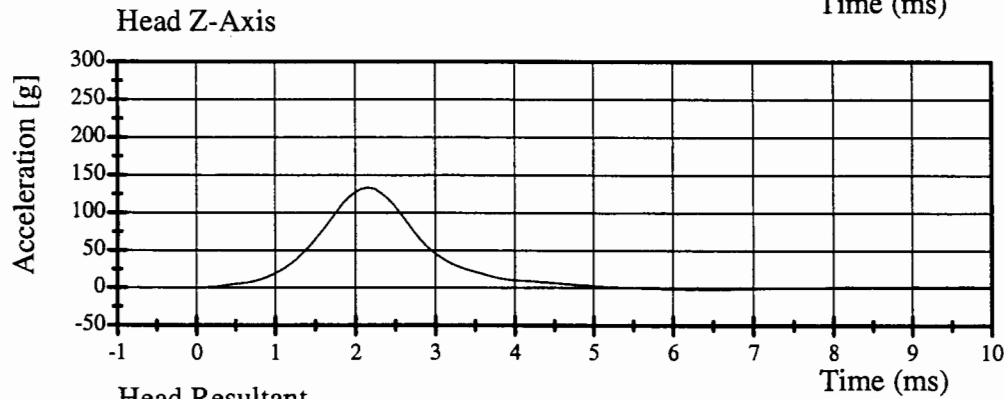
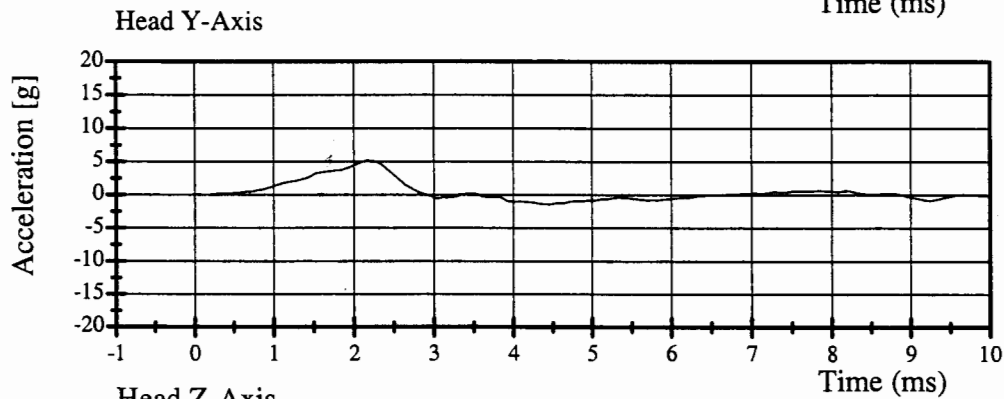
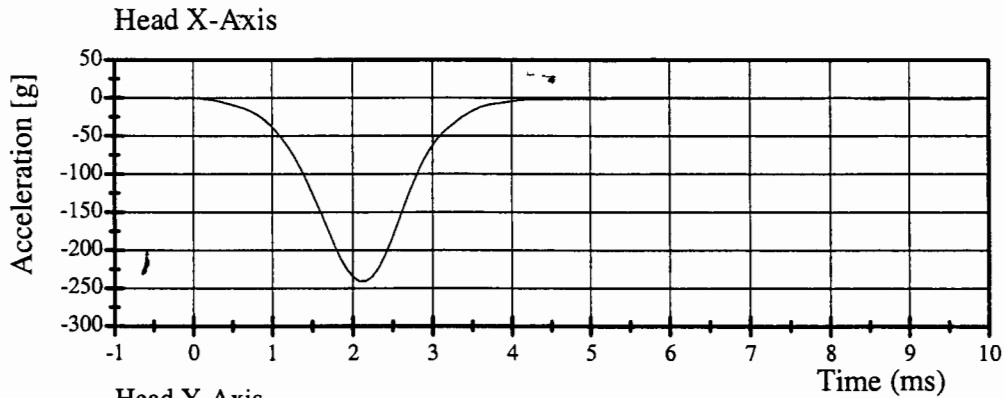


Transportation Research Center Inc.

Head Drop Test

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 2

Test Date 08/19/2005



Transportation Research Center Inc.

Neck Flexion Test - 6 Channel Transducer

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 8

Test Date 08/22/2005

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Impact Velocity	5.98 - 6.22 m/s	6.11 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.64 - 2.04 m/s	1.68 m/s	Yes
20 ms	3.04 - 4.04 m/s	3.21 m/s	Yes
30 ms	4.45 - 5.65 m/s	4.70 m/s	Yes
Peak D Plane Rotation	74.0 - 88.0 °	80.8 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	50.0 - 62.0 N·m	53.06 N·m	Yes
Positive Moment Decay Time To 10 N·m	85 - 105 ms	99.68 ms	Yes

Test meets specifications.

Comments:

Replacement neck SN 4621

Technician

Vincent DeWitt

Approved

V.F. Watts

08.23.2005 14:30:19 1216

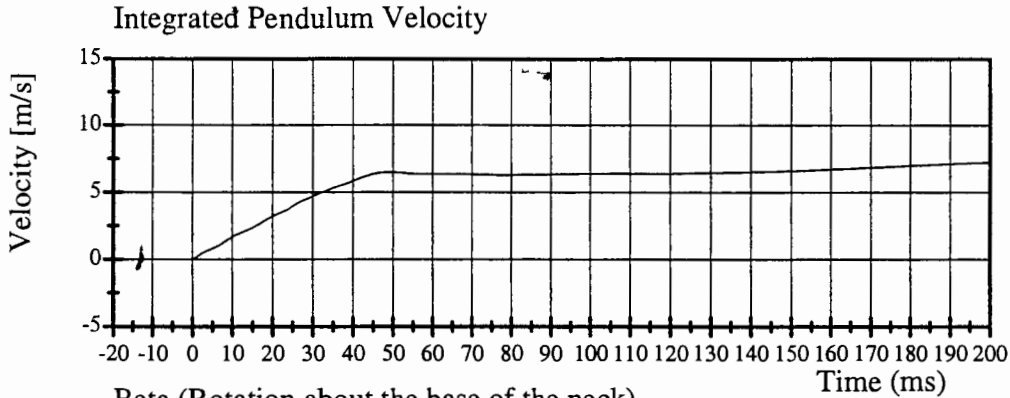


Transportation Research Center Inc.

Neck Flexion Test

HIII 10 Year Old Serial No. 011 Calibration No: 02 - 8

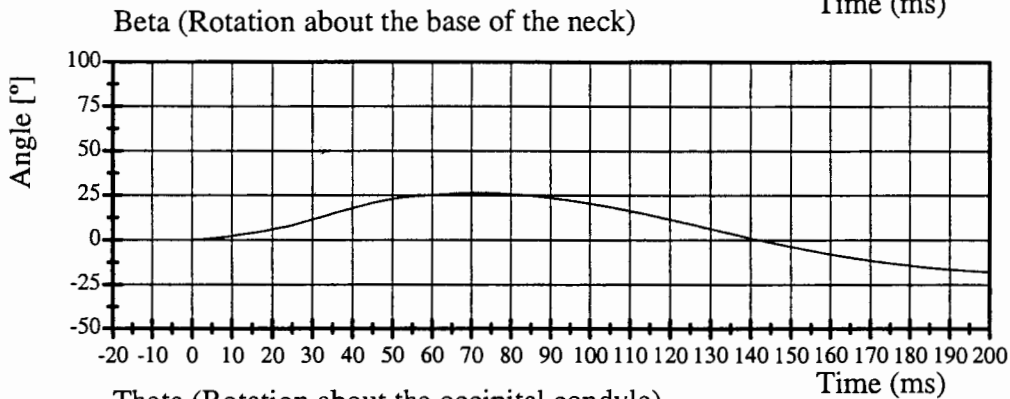
Test Date 08/22/2005



Filter Class: 180

Max: 7.98 m/s at 301.5 ms

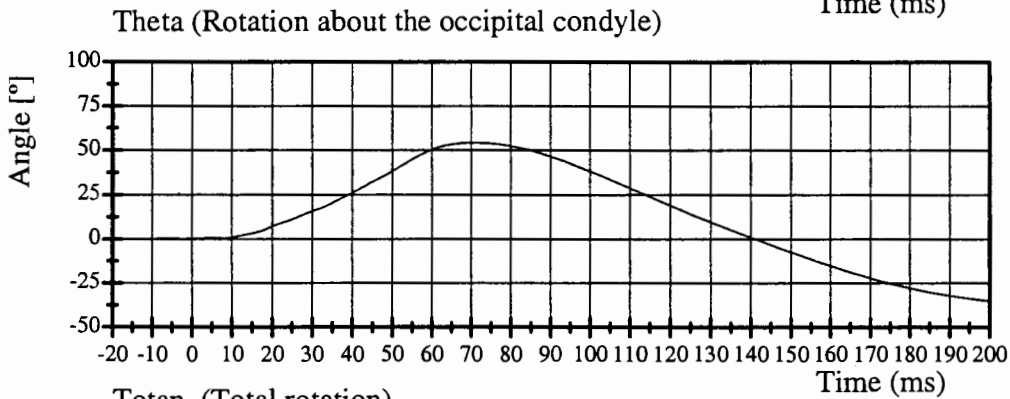
Min: -0.00 m/s at -93.5 ms



Filter Class: 60

Max: 26.6 ° at 71.5 ms

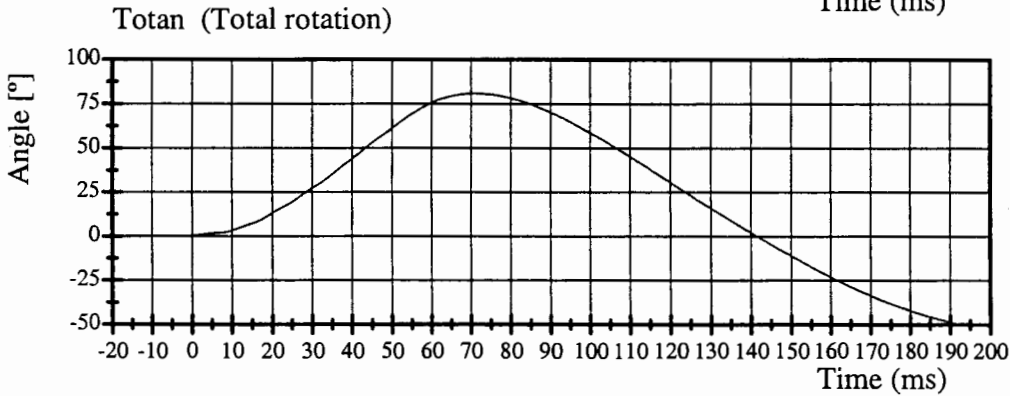
Min: -18.8 ° at 215.3 ms



Filter Class: 60

Max: 54.2 ° at 70.1 ms

Min: -37.0 ° at 215.4 ms



Filter Class: 60

Max: 80.8 ° at 70.6 ms

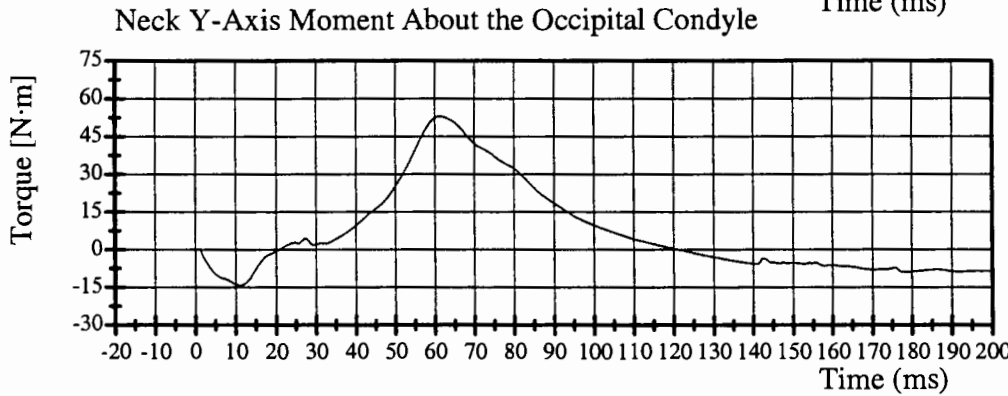
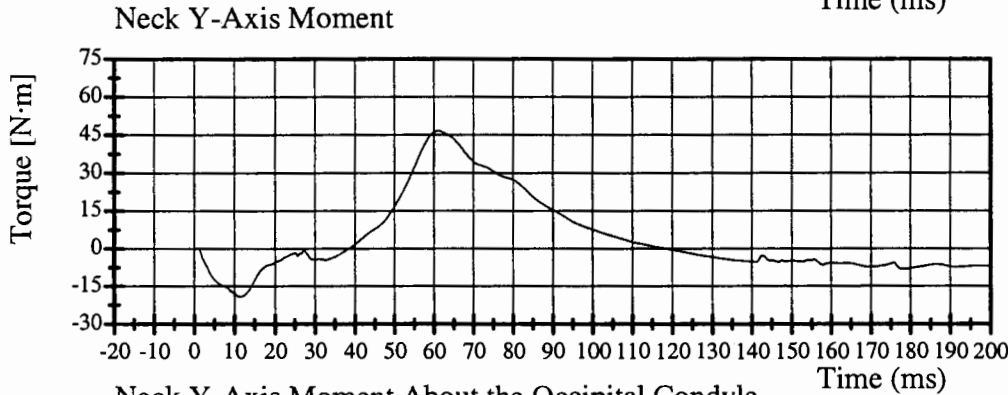
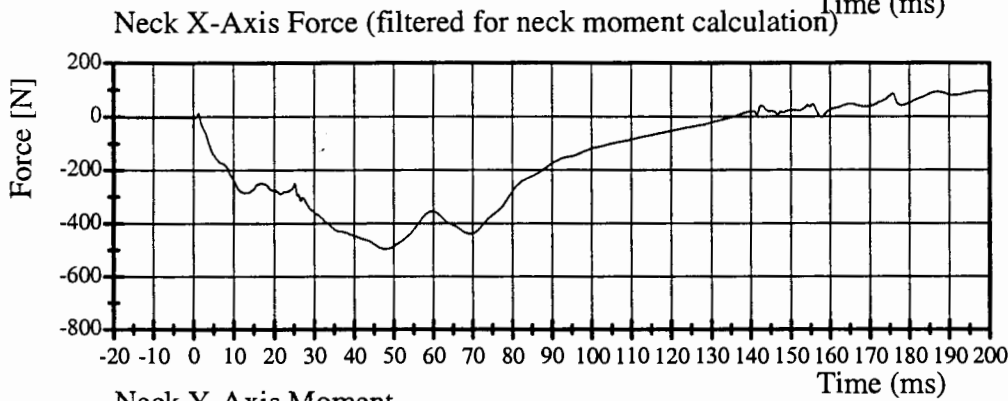
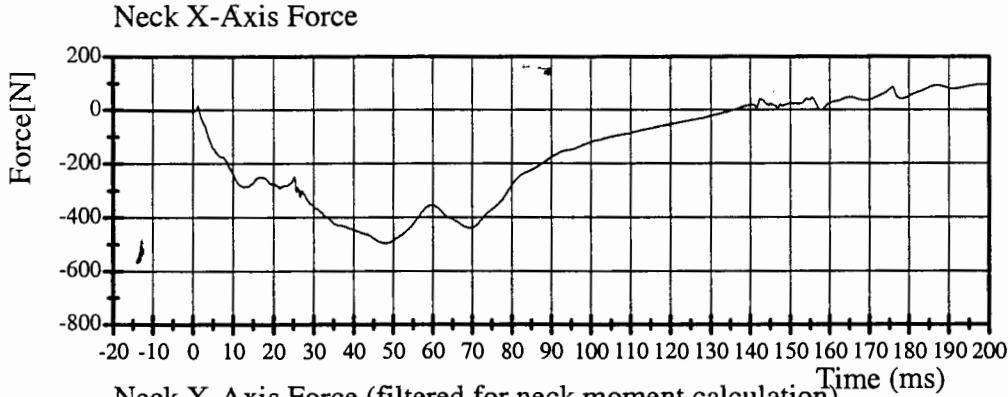
Min: -55.8 ° at 215.4 ms

Transportation Research Center Inc.

Neck Flexion Test

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 8

Test Date 08/22/2005



Transportation Research Center Inc.

Neck Extension Test - 6 Channel Transducer

IIII 10 Year Old Serial No. 011 Calibration No. 02 - 1

Test Date 08/22/2005

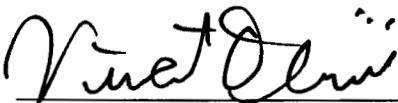
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Impact Velocity	4.91 - 5.15 m/s	5.06 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.59 - 1.89 m/s	1.62 m/s	Yes
20 ms	2.88 - 3.68 m/s	3.10 m/s	Yes
30 ms	4.20 - 5.20 m/s	4.49 m/s	Yes
Peak D Plane Rotation	99.0 - 114.0 °	104.1 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	(-47.0) - (-35.0) N·m	-40.44 N·m	Yes
Negative Moment Decay Time To -10 N·m	100 - 120 ms	110.88 ms	Yes

Test meets specifications.

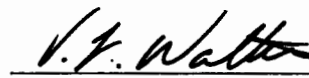
Comments:

Replacement neck SN 4621

Technician



Approved



08.23.2005 14:32:42 1344

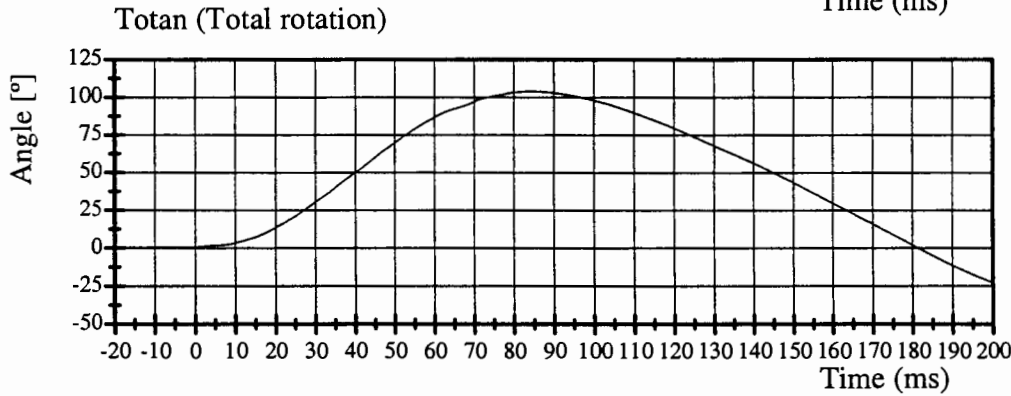
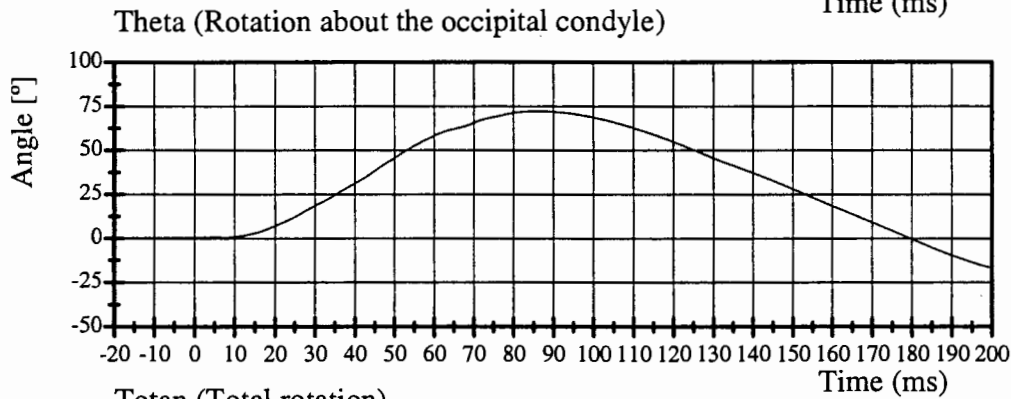
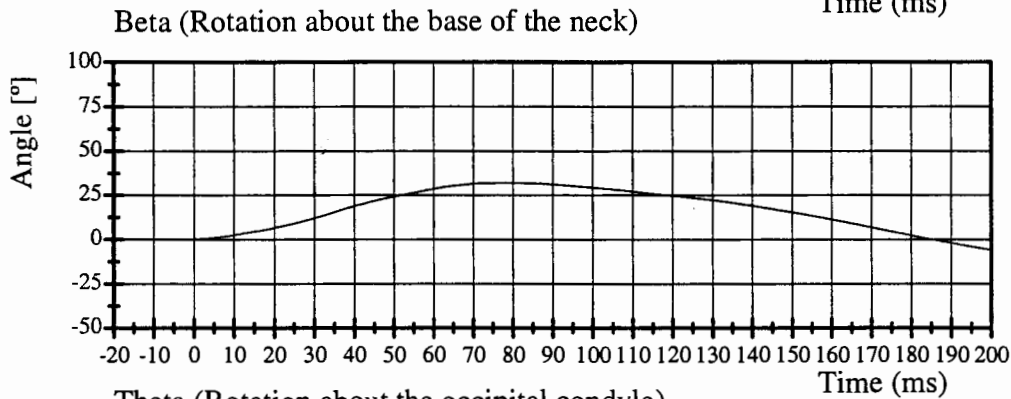
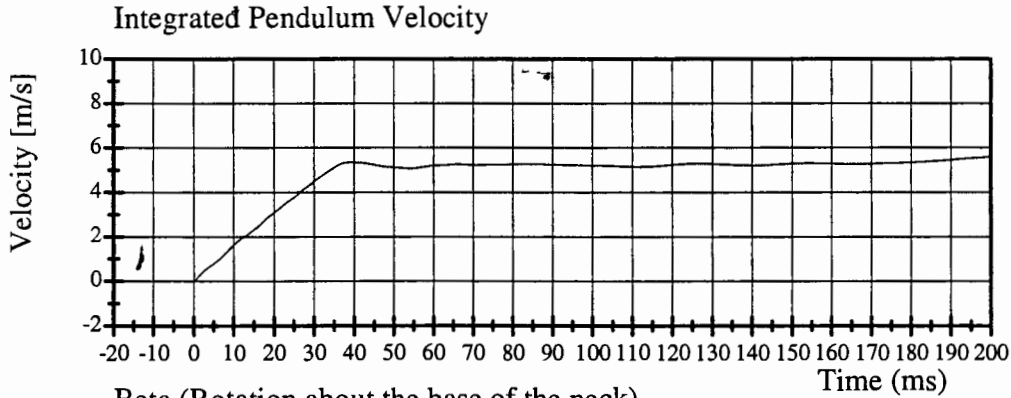


Transportation Research Center Inc.

Neck Extension Test

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 1

Test Date 08/22/2005



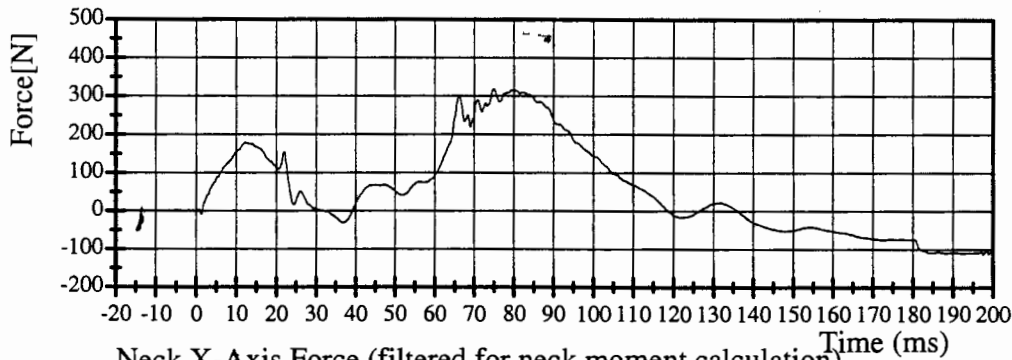
Transportation Research Center Inc.

Neck Extension Test

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 1

Test Date 08/22/2005

Neck X-Axis Force

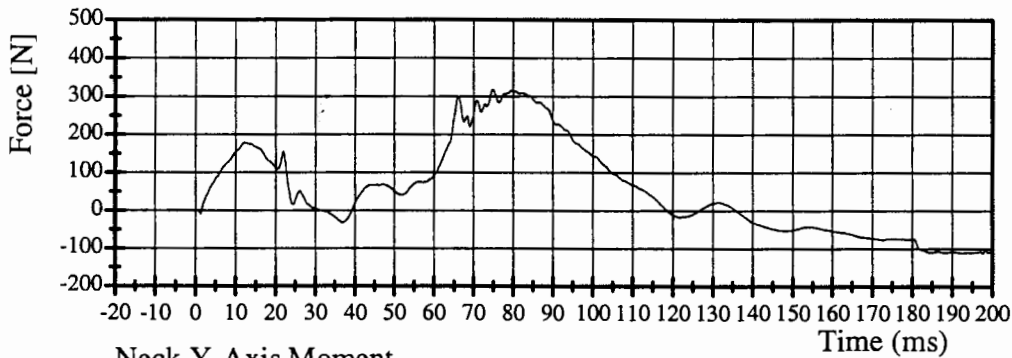


Filter Class: 1000

Max: 318.1 N at 74.8 ms

Min: -146.6 N at 209.0 ms

Neck X-Axis Force (filtered for neck moment calculation)

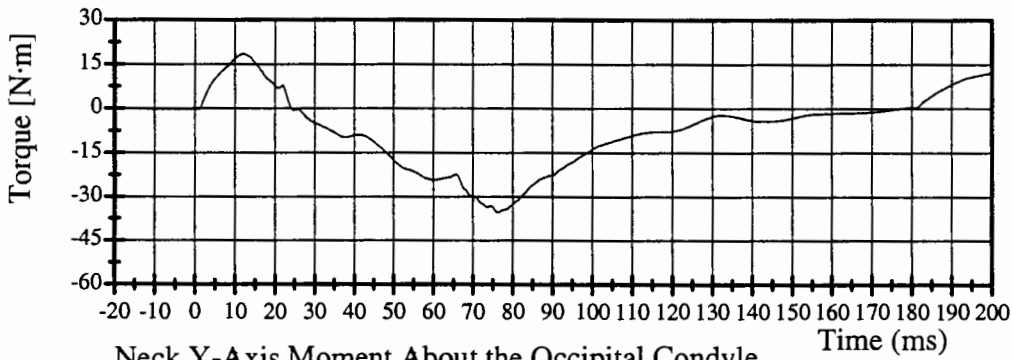


Filter Class: 600

Max: 317.9 N at 74.8 ms

Min: -144.8 N at 209.0 ms

Neck Y-Axis Moment

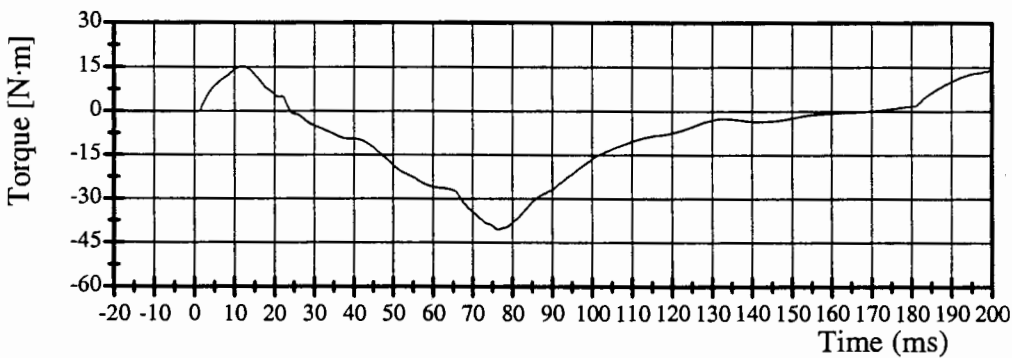


Filter Class: 600

Max: 18.5 N·m at 12.0 ms

Min: -35.4 N·m at 76.3 ms

Neck Y-Axis Moment About the Occipital Condyle



Filter Class: 600

Max: 16.8 N·m at 228.9 ms

Min: -40.4 N·m at 76.3 ms



Transportation Research Center Inc.

Thorax Test

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 1

Test Date 08/22/2005

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	51 %	Yes
Pendulum Velocity	5.88 - 6.12 m/s	6.09 m/s	Yes
Maximum Chest Deflection	-48.5 - (-40.5) mm	-43.0 mm	Yes
Peak Impact Probe Force Within Compression Corridor	1830 - 2330 N	2272 N	Yes
Force Prior to Corridor*	<= 2330 N	2276 N	Yes
Internal Hysteresis	69 - 85 %	80.2 %	Yes

Test meets specifications.

Comments:

* Defined per NPRM as peak force between -20 mm and -40.5 mm deflection.

Technician

Vincent Diuni

Approved

K.F. Walts



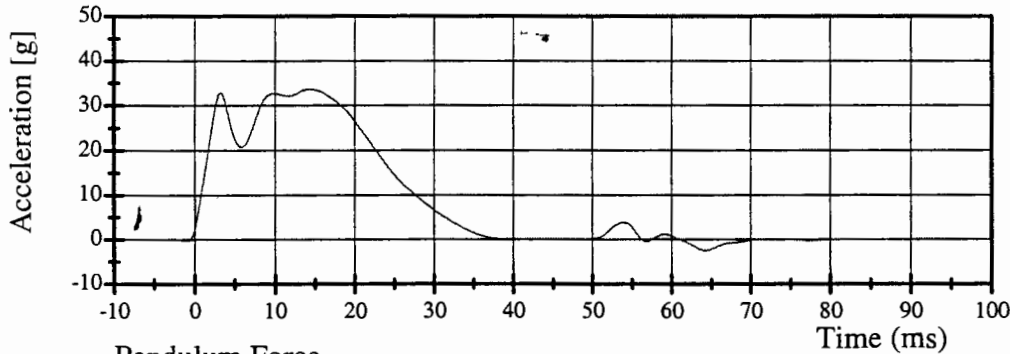
Transportation Research Center Inc.

Thorax Test

HIII 10 Year Old Serial No. 011' Calibration No. 02 - 1

Test Date 08/22/2005

Pendulum Deceleration

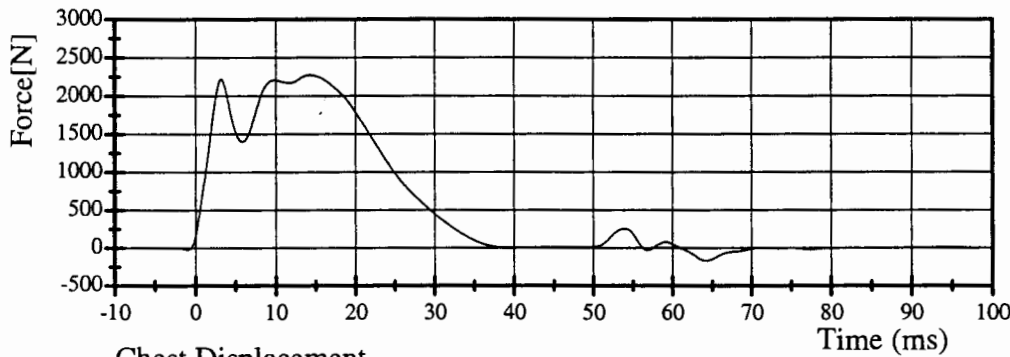


Filter Class: 180

Max: 33.7 g at 14.3 ms

Min: -2.5 g at 64.2 ms

Pendulum Force

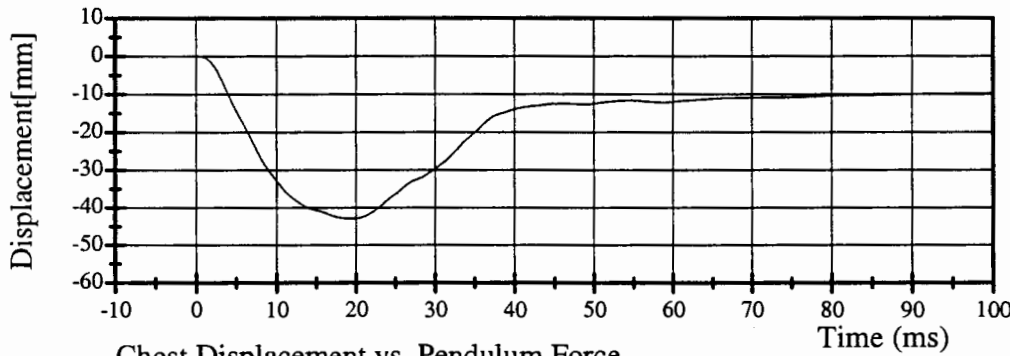


Filter Class: 180

Max: 2275.6 N at 14.3 ms

Min: -168.2 N at 64.2 ms

Chest Displacement

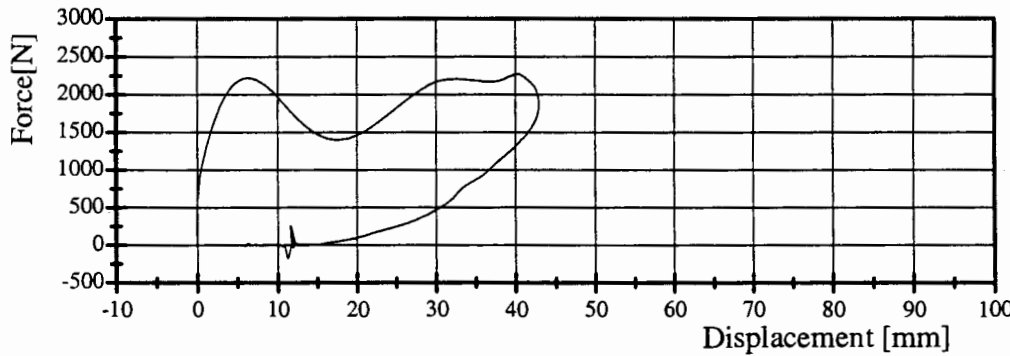


Filter Class: 180

Max: 0.1 mm at 0.2 ms

Min: -43.0 mm at 19.5 ms

Chest Displacement vs. Pendulum Force



TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

HYBRID III TEN YEAR-OLD

CAL DATE: 18-Aug-05

TRC, INC.

TEST NO: 011C02TF8

SN011 TORSO FLEX CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2° C	21.3 ° C
RELATIVE HUMIDITY	10 - 70 %	53 %
INITIAL ANGLE OF UNSUPPORTRED DUMMY	<= 20° REFERENCED TO VERTICAL	12.9 °
MAXIMUM FORCE AT 35 DEG. DURING 10 SECOND PERIOD	190 - 240 N	201.2 N
RETURN ANGLE		19.3 °
DIFFERENCE BETWEEN RETURN ANGLE & INTIAL ANGLE	+/- 8 ° OF INTIAL ANGLE	6.4 °
RATE	0.5° - 1.5°/sec	1.02 °/sec

TEST MEETS SPECIFICATIONS

Comments:

TECHNICIAN



Transportation Research Center Inc.

Left Knee Test

HIII 10 Year Old Serial No. 011 Calibration Nb. 02 - 1

Test Date 08/19/2005

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.11 m/s	Yes
Maximum Pendulum Force	2560 - 3140 N	3127 N	Yes

Test meets specifications.

Comments:

Technician



Approved



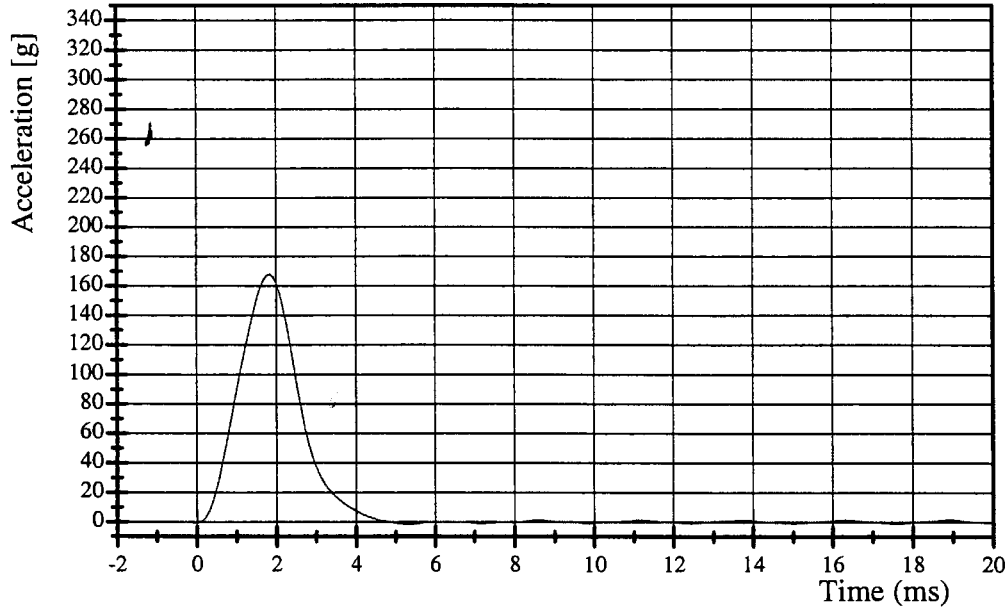
Transportation Research Center Inc.

Left Knee Test

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 1

Test Date 08/19/2005

Pendulum Deceleration

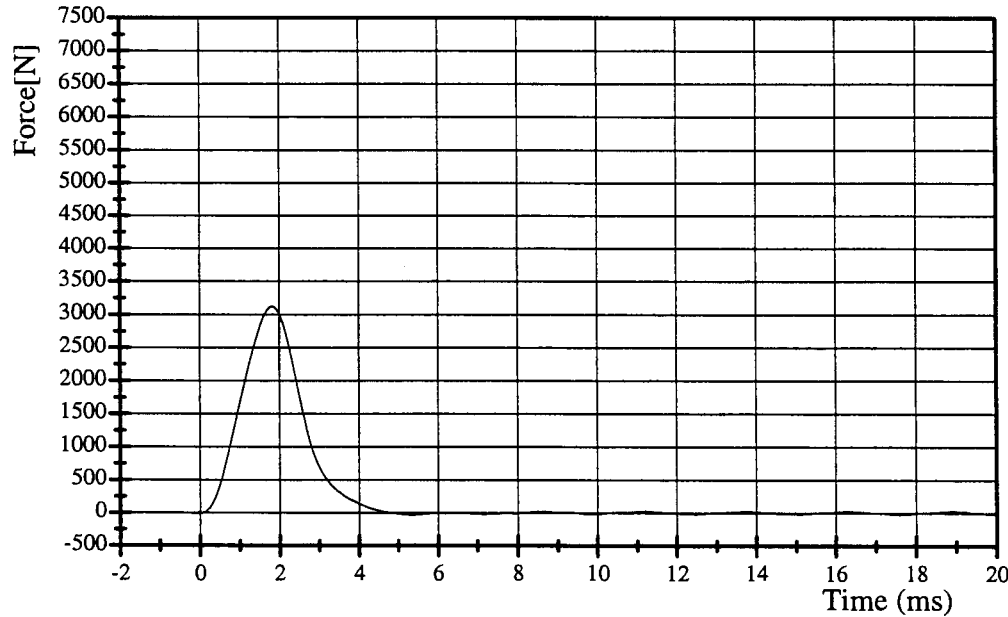


Filter Class: 600

Max: 167.8 g at 1.8 ms

Min: -1.7 g at 5.4 ms

Pendulum Force



Filter Class: 600

Max: 3127.0 N at 1.8 ms

Min: -30.9 N at 5.4 ms

Transportation Research Center Inc.

Right Knee Test

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 2

Test Date 08/19/2005

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.08 m/s	Yes
Maximum Pendulum Force	2560 - 3140 N	2904 N	Yes

Test meets specifications.

Comments:

Technician

Vic Oliveri

Approved

V.F. Watten

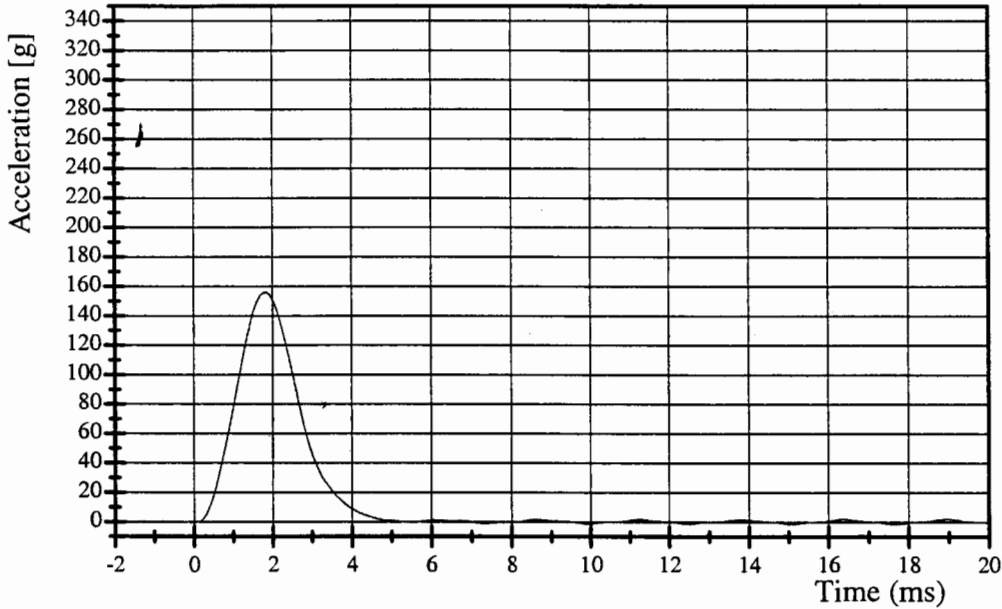
Transportation Research Center Inc.

Right Knee Test

HIII 10 Year Old Serial No. 011 Calibration No. 02 - 2

Test Date 08/19/2005

Pendulum Deceleration

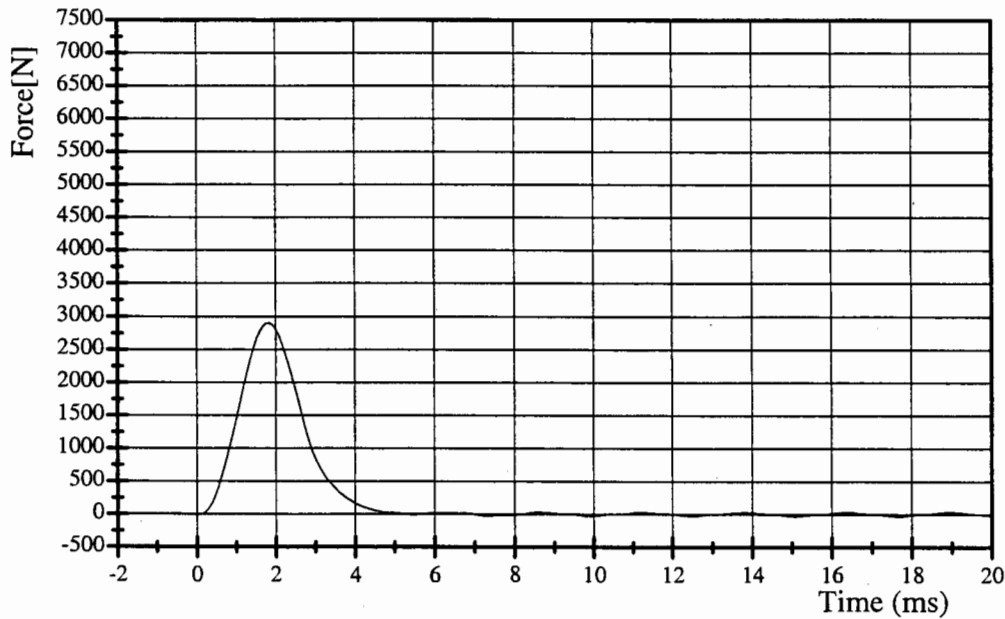


Filter Class: 600

Max: 155.9 g at 1.8 ms

Min: -1.7 g at 28.0 ms

Pendulum Force



Filter Class: 600

Max: 2904.5 N at 1.8 ms

Min: -32.0 N at 28.0 ms

SECTION 6

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

ATD NO. D009 INSTRUMENTATION

	POSITION #3 (RIGHT) CRS SERIAL NO.: NA		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD AX	AC-00L13-F10	ENTRAN	27-Jul-05
HEAD AY	AC-03E03E21-M06	ENTRAN	28-Jul-05
HEAD AZ	AC-03F03F09-N06	ENTRAN	28-Jul-05
UPPER NECK FX	LC-304FX	DENTON	05-Jul-05
UPPER NECK FY	LC-304FY	DENTON	05-Jul-05
UPPER NECK FZ	LC-304FZ	DENTON	05-Jul-05
UPPER NECK MX	LC-304MX	DENTON	05-Jul-05
UPPER NECK MY	LC-304MY	DENTON	05-Jul-05
UPPER NECK MZ	LC-304MZ	DENTON	05-Jul-05
LEFT CLAVICLE FX	LC-78FX	DENTON	02-Jul-05
LEFT CLAVICLE FZ	LC-78FZ	DENTON	02-Jul-05
RIGHT CLAVICLE FX	LC-078FX	DENTON	02-Jul-05
RIGHT CLAVICLE FZ	LC-078FZ	DENTON	02-Jul-05
CHEST X	AC-FG33J	ENDEVCO	04-Aug-05
CHEST Y	AC-AJ4Y4	ENDEVCO	24-Aug-05
CHEST Z	AC-ACC59	ENDEVCO	04-Aug-05
CHEST DISPLACEMENT	DS-009	SERVO	20-Jun-05
LUMBAR FX	LC-135FX	DENTON	02-Jul-05
LUMBAR FY	LC-135FY	DENTON	02-Jul-05
LUMBAR FZ	LC-135FZ	DENTON	02-Jul-05
LUMBAR MX	LC-135MX	DENTON	02-Jul-05
LUMBAR MY	LC-135MY	DENTON	02-Jul-05
LUMBAR MZ	LC-135MZ	DENTON	02-Jul-05
PELVIC X	AC-ACCE6	ENDEVCO	04-Aug-05
PELVIC Y	AC-AAMP6	ENDEVCO	04-Aug-05
PELVIC Z	AC-J27079	ENDEVCO	04-Aug-05
LEFT LOWER ASIS FX	LC-089LO	DENTON	02-Jul-05
LEFT UPPER ASIS FX	LC-089UP	DENTON	02-Jul-05
RIGHT LOWER ASIS FX	LC-89LO	DENTON	03-Jul-05
RIGHT UPPER ASIS FX	LC-89UP	DENTON	03-Jul-05
LAP BELT	LC-178	FIRST TECHNOLOGY	01-Oct-04
TORSO BELT	LC-173	FIRST TECHNOLOGY	01-Oct-04

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

ATD NO. 011 INSTRUMENTATION

	POSITION #4 (LEFT) CRS SERIAL NO.: JJ 0409050819068		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD AX	AC-AJ7G1	ENDEVCO	05-Aug-05
HEAD AY	AC-J20004	ENDEVCO	05-Aug-05
HEAD AZ	AC-J20084	ENDEVCO	05-Aug-05
UPPER NECK FX	LC-443FX	DENTON	27-Jun-05
UPPER NECK FY	LC-443FY	DENTON	27-Jun-05
UPPER NECK FZ	LC-443FZ	DENTON	27-Jun-05
UPPER NECK MX	LC-443MX	DENTON	27-Jun-05
UPPER NECK MY	LC-443MY	DENTON	27-Jun-05
UPPER NECK MZ	LC-443MZ	DENTON	27-Jun-05
LEFT CLAVICLE FX	LC-075LFX	DENTON	02-Jul-05
LEFT CLAVICLE FZ	LC-075LFZ	DENTON	02-Jul-05
RIGHT CLAVICLE FX	LC-075RFX	DENTON	03-Jul-05
RIGHT CLAVICLE FZ	LC-075RFZ	DENTON	03-Jul-05
CHEST X	AC-P17837	ENDEVCO	05-Aug-05
CHEST Y	AC-P17912	ENDEVCO	05-Aug-05
CHEST Z	AC-P16899	ENDEVCO	05-Aug-05
CHEST DISPLACEMENT	DS-011	SERVO	20-Jun-05
LUMBAR FX	LC-140FX	DENTON	02-Jul-05
LUMBAR FY	LC-140FY	DENTON	02-Jul-05
LUMBAR FZ	LC-140FZ	DENTON	02-Jul-05
LUMBAR MX	LC-140MX	DENTON	02-Jul-05
LUMBAR MY	LC-140MY	DENTON	02-Jul-05
LUMBAR MZ	LC-140MZ	DENTON	02-Jul-05
PELVIC X	AC-J23774	ENDEVCO	05-Aug-05
PELVIC Y	AC-AGT82	ENDEVCO	04-Aug-05
PELVIC Z	AC-J36176	ENDEVCO	05-Aug-05
LEFT LOWER ASIS FX	LC-103LLO	DENTON	02-Jul-05
LEFT UPPER ASIS FX	LC-103LUP	DENTON	02-Jul-05
RIGHT LOWER ASIS FX	LC-103RLO	DENTON	02-Jul-05
RIGHT UPPER ASIS FX	LC-103RUP	DENTON	02-Jul-05
LAP BELT	LC-175	FIRST TECHNOLOGY	01-Oct-04
TORSO BELT	LC-159	FIRST TECHNOLOGY	01-Oct-04

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

CRS INSTRUMENTATION

	CRS Accelerometers		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
P3 CRS AX	-	-	-
P3 CRS AY	-	-	-
P3 CRS AZ	-	-	-
P4 CRS AX	-	-	-
P4 CRS AY	-	-	-
P4 CRS AZ	-	-	-