REPORT NUMBER: NCAP-MGA-2006-007

NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

HONDA OF CANADA MANUFACTURING
2006 HONDA CIVIC LX 2-Door
NHTSA NUMBER: M65300

PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105

Test Date: December 13, 2005

Final Report Date: January 10, 2006

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-12005.

Prepared by: Kristin L. Ebert Date: 1/10/06
Kristin Ebert, Project Engineer

Reviewed by: David Winkelbauer Date: 1/10/06
David Winkelbauer, Facility Director

Technical Report Documentation Page

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16. Abstract

A frontal barrier impact was conducted on a 2006 Honda Civic LX 2-Door at MGA Research Corporation on December 13, 2005. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.3 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum post test static crush is 453 mm located at the right side of the vehicle. The test vehicle is equipped with a 3-point continuous belt system and an airbag in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:

Measurement Description	Units	Threshold	Driver ATD	Pass. ATD
Head Injury Criteria (HIC)	N/A	1000	355.7	354.8
Max. Thorax Accel. (3ms Clip)	G's	60	39.5	37.9
Left Femur Force	Newton	10009	-1287	-1438
Right Femur Force	Newton	10009	-1439	-2516

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-01-D-12005. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact in excess of the current 48.3 kph requirements.

SUMMARY

A load cell barrier was impacted by a 2006 Honda Civic LX 2-Door at a velocity of 56.3 kph. The test was performed at MGA Research Corporation on December 13, 2005. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and fourteen 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 head, chest and pelvis tri-axial accelerometers, chest displacement potentiometer, upper neck transducers, right/left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 066) and right-front passenger (position 2) ATD (Serial No. 065) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 96 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy head, chest, and femur response data traces.

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

The maximum static crush of the vehicle was 453 mm and both the driver and passenger side doors remained closed and latched during the impact event and were operable after the impact.

The driver's head, chest, and abdomen contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the bolster and steering column. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glove box.

The occupant data is summarized below:

ATD position	HIC	T^1	T^2	Clip (g)	T^1	T^2	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	355.7	56.8	92.8	39.5	68.5	71.5	-23.2	-1287	-1439
Passenger	354.8	72.9	108.9	37.9	85.1	88.1	-24.3	-1438	-2516

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

TEST NOTES

No valid data was collected for the following:

Driver Left Lower Tibia MX – after 60msec
Barrier Load Cells

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1

CRASH TEST SUMMARY

Test Vehicle: 2006 Honda Civic LX 2-Door
Test Program: 35mph Frontal Impact
NHTSA No.: M65300
Test Date: 12/13/2005

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None
Glazing Damage	The windshield cracked	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	823
Center	mm	800
Right Side	mm	832
Average	mm	818

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	995	964
Lap belt length as measured on ATD	mm	815	752
Remainder of belt on reel	mm	1115	1282
Total belt length for continuous webbing systems	mm	2925	2998

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2006 Honda Civic LX 2-Door
Test Program: 35mph Frontal Impact
NHTSA No.: M65300
Test Date: 12/13/2005

TEST VEHICLE INFORMATION

Manufacturer	Honda of Canada
Model	Civic LX
Body Style	2-Door Passenger Car
NHTSA No.	M65300
VIN	2HGFG116X6H512269
Color	Night Hawk Black
Delivery Date	12/2/05
Odometer Reading (mile)	83
Dealer	Wilde Honda
Transmission	Manual
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	1.8
Engine Placement	Lateral
Automatic Door Lock (ADL)	Yes
Owners Manual Details Instructions on Disabling ADLs	Yes
Bucket Seats	Yes

TEST VEHICLE OPTIONS

Front Airbag	Yes
Driver Side Curtain Airbag	Yes
Driver Side Torso Airbag	Yes
Rear Passenger Side Curtain Airbag	Yes
Rear Passenger Side Torso Airbag	No
Force Limiter	Yes
Pretensioner	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Anti-lock Brakes	Yes
Traction Control	Yes
All Wheel Drive	No
Power Seats	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Honda of Canada Manufacturing
Date of Manufacture	10/05

GVWR (kg)	1645
GAWR Front (kg)	880
GAWR Rear (kg)	775

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				385
Cargo Wt. (RCLW) (kg)				45.4

DATA SHEET NO. 2... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	360.2	243.6		406.9	292.6	
Right	kg	363.3	230.4		405.1	288.9	
Ratio	%	60.4	39.6		58.3	41.7	
Totals	kg	723.5	474.0	1197.5	812.0	581.5	1393.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1197.5
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	45.4
Calculated Vehicle Target Weight (TVTW)	kg	1398.9

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	661	665	668	675	1049
As Tested	mm	645	655	654	654	1106
Post Test	mm	750	794	638	636	

Vehicle Wheelbase (mm): 2651

Weight of Ballast secured in cargo area (kg): 104.3

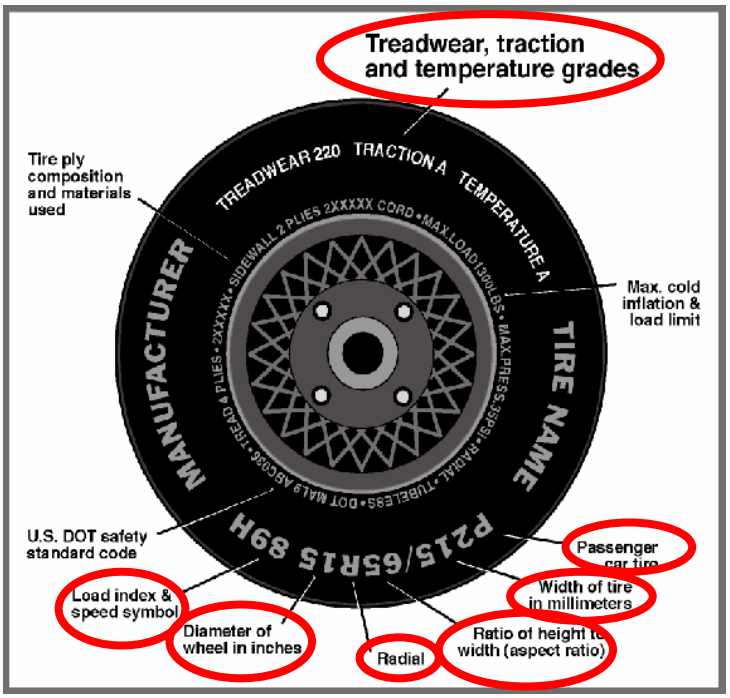
Vehicle Components Removed: Spare tire, jack and tools, trunk carpet

Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle:	2006 Honda Civic LX 2-Door	NHTSA No.:	M65300
Test Program:	35mph Frontal Impact	Test Date:	12/13/2005



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (max)	220	220
Recommended Tire Size	205/55R16	205/55R16
Tire size on Vehicle	205/55R16	205/55R16
Tire Manufacturer	Bridgestone	Bridgestone
Tire Name	Turanza	Turanza
Tire Type	M+S	M+S
Tire Width (mm)	205	205
Ratio of Height to Width (aspect ratio)	55	55
Radial	R	R
Wheel Diameter	16	16
Load Index & Speed Symbol	89H	89H
Treadwear	300	300
Traction Grade	A	A
Temperature Grade	A	A

DATA SHEET NO. 4

TEST VEHICLE INFORMATION

Test Vehicle:	2006 Honda Civic LX 2-Door	NHTSA No.:	M65300
Test Program:	35mph Frontal Impact	Test Date:	12/13/2005

NORMAL DESIGN RIDING POSITION

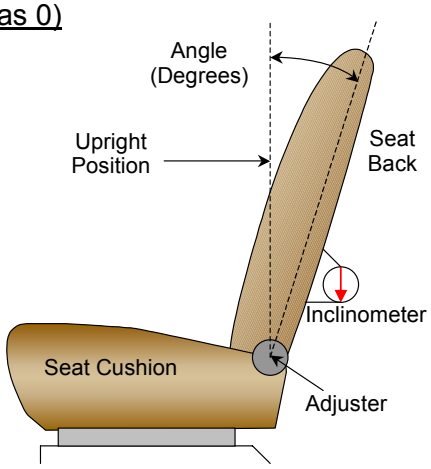
The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: Seatback angle in forward-most locking position is 4.7 degrees and the seatback angle at the test position is 12.7 degrees.

Driver seat back angle: 13.7 on headrest post, 4th detent (1st as 0)

Passenger seat back angle: 13.6 on headrest post, 4th detent (1st as 0)

SEAT FORE/AFT POSITIONING

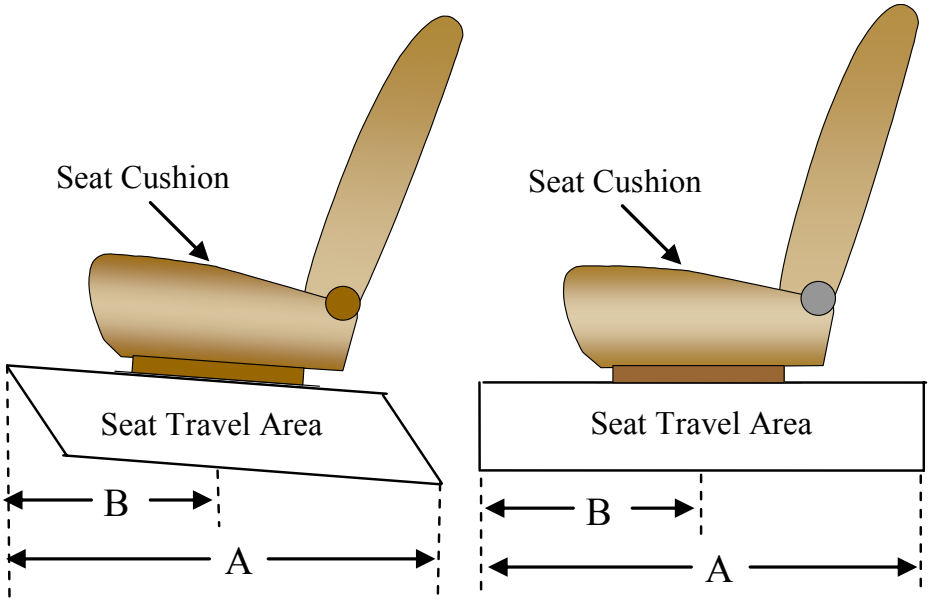
	Total Fore/Aft Travel	Placed in position #
Driver Seat	280mm/25 detents	140mm/10th detent (1st as 0)
Passenger Seat	240mm/25 detents	120mm/12th detent (1st as 0)



FRONT SEAT ASSEMBLY

ADJUSTABLE D-RING POSITION

The D-Ring was not adjustable.



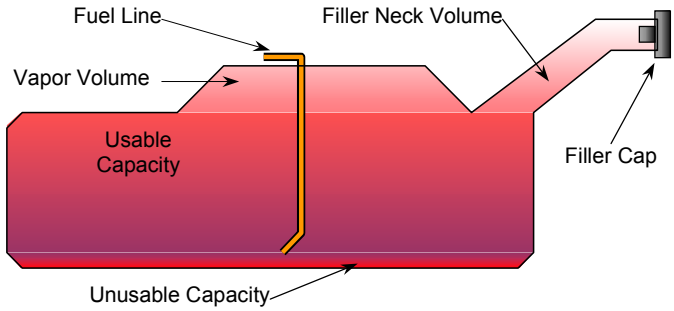
DATA SHEET NO. 4…(CONTINUED)
TEST VEHICLE INFORMATION

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	50.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	46.0 to 47.0
Actual Amount of Solvent used	46.0
1/3 of Usable Capacity	16.7

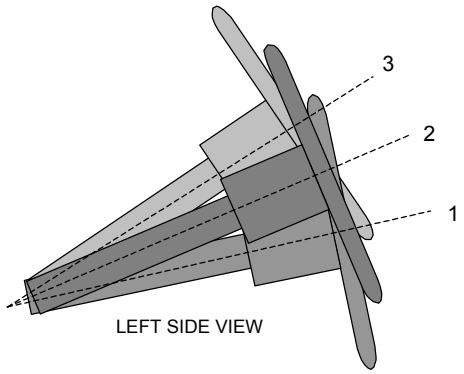
The test vehicle is equipped with an electric fuel pump. When the key is turned from the lock position to the on position, the pump will be filled up for 2 seconds and then the pressure is maintained.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

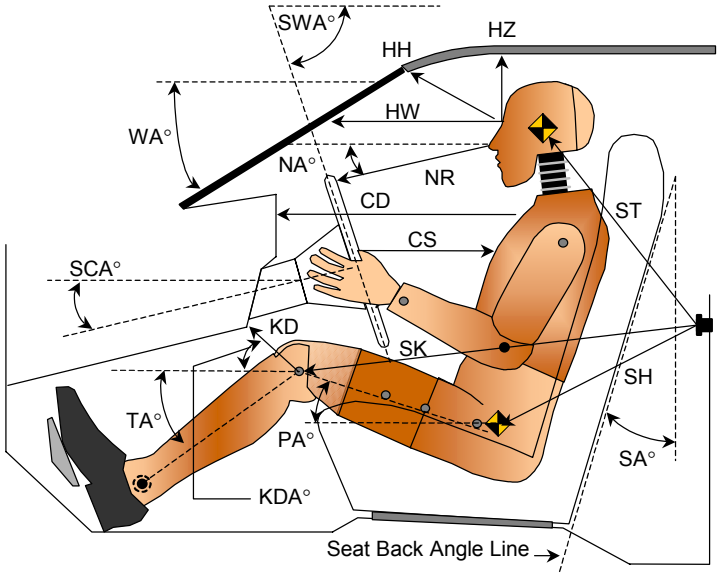
	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1	0.0	20.0
Geometric center position No. 2	17.5	22.7
Uppermost position No. 3	35.0	25.4

DATA SHEET NO. 5

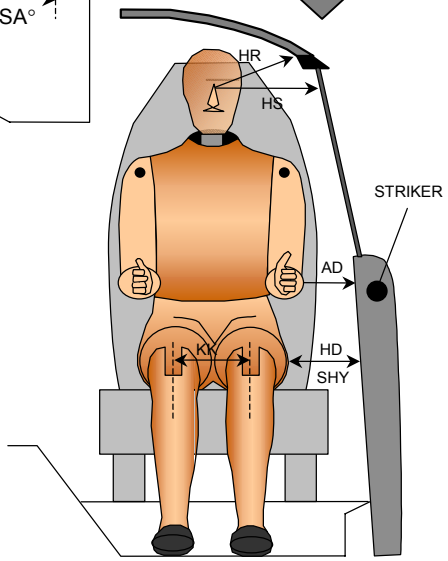
DUMMY POSITIONING IN VEHICLE

Test Vehicle:	2006 Honda Civic LX 2-Door	NHTSA No.:	M65300
Test Program:	35mph Frontal Impact	Test Date:	12/13/2005

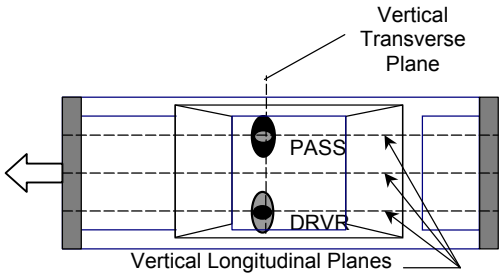
DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



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



CD	Chest to Dash
CS	Chest to Steering Wheel Hub
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... (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

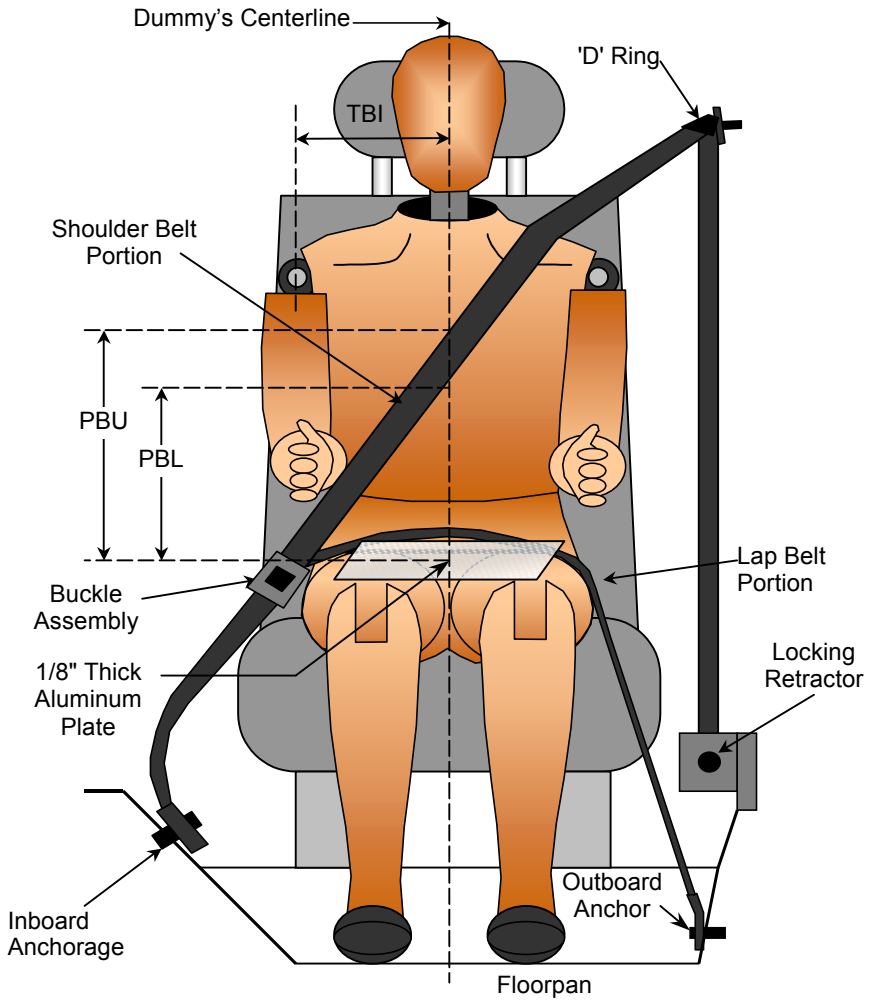
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		22.6		
SWA	Steering Wheel Angle		67.3		
SCA	Steering Column Angle		22.3		
SA	Seat Back Angle		13.7		13.6
HZ	Head to Roof (Z)	162	90.0	155	90.0
HH	Head to Header	324	19.9	334	20.8
HW	Head to Windshield	671	0.0	638	0.0
HR	Head to Side Header (Y)	215		216	
NR	Nose to Rim	405	11.0		
CD	Chest to Dash	597		529	
CS	Chest to Steering Hub	333	2.4		
RA	Rim to Abdomen	200	0.0		
KDL	Left Knee to Dash	145	26.4	146	
KDR	Right Knee to Dash	145		162	30.8
PA	Pelvic Angle		24.0		23.3
TA	Tibia Angle		44.6		40.6
KK	Knee to Knee (Y)	350		269	
SK	Striker to Knee	807	95.1	826	99.5
ST	Striker to Head	515	34.1	537	37.1
SH	Striker to H-Point	494	114.5	494	117.2
SHY	Striker to H-Point (Y)	255		255	
HS	Head to Side Window	328		312	
HD	H-Point to Door (Y)	148		154	
AD	Arm to Door (Y)	110		129	
AA	Ankle to Ankle	380		206	

DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	225	225
PBU - Top surface of reference to belt upper edge	mm	320	340
PBL - To surface of reference to belt lower edge	mm	240	250

DATA SHEET NO. 7

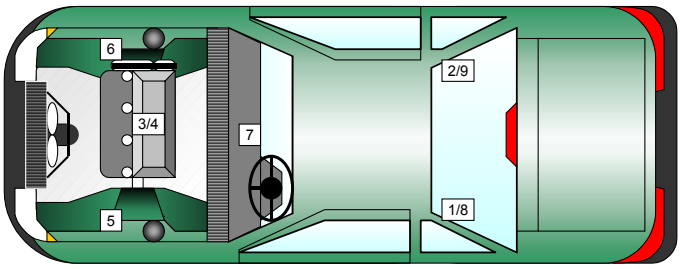
VEHICLE ACCELEROMETER LOCATIONS

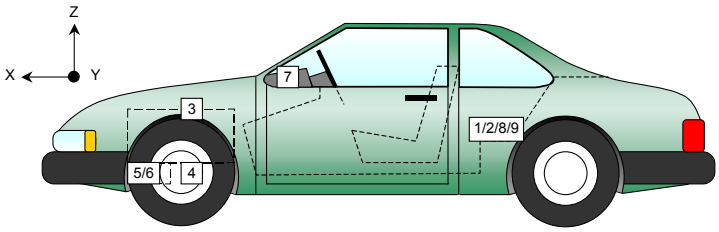
Test Vehicle: 2006 Honda Civic LX 2-Door
Test Program: 35mph Frontal Impact
NHTSA No.: M65300
Test Date: 12/13/2005

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1756	-354	302
2	Right Rear X-Member X	1758	391	312
3	Engine Top X	3706	-23	834
4	Engine Bottom X	3842	21	254
5	Left Brake Caliper X	3652	-652	229
6	Right Brake Caliper X	3656	663	225
7	Instrument Panel X			
8	Left Rear X-Member Z	1756	-354	302
9	Right Rear X-Member Z	1758	391	312

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





DATA SHEET NO. 8

SUMMARY OF FMVSS 212 AND FMVSS 219 (Partial) DATA

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

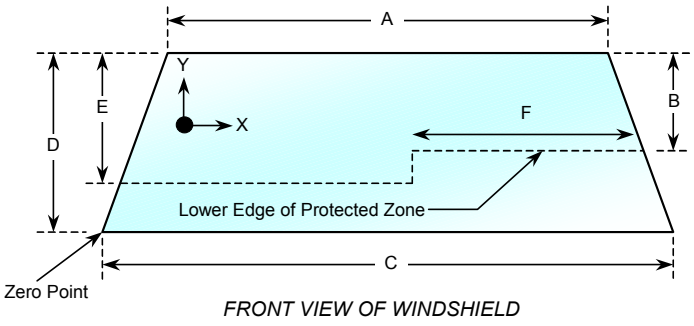
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles, which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2180	2180	100
Right Side	2180	2180	100
Total	4360	4360	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1161
B	mm	596
C	mm	1371
D	mm	914
E	mm	696
F	mm	510

AREA OF PROTECTED ZONE FAILURES - NONE

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

DATA SHEET NO. 9

SUMMARY OF FMVSS 301 DATA

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 12:42 pm

Stoddard Solvent Spillage Measurements

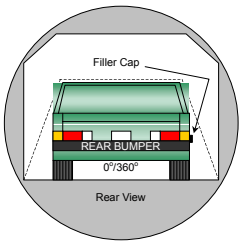
A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)

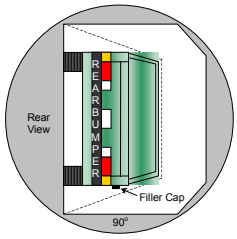
B. For the 5 minute period after motion ceases: 0 oz.
(Maximum Allowable = 5 ounces)

C. For the following 25 minutes: 0 oz.
(Maximum Allowable = 1 oz. /minute)

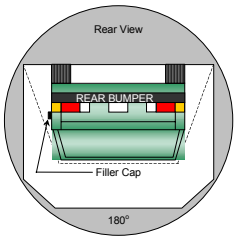
D. Spillage: None

FMVSS 301 STATIC ROLLOVER DATA

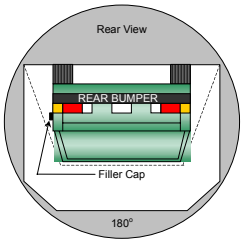




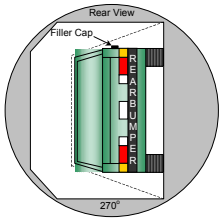
0° to 90°

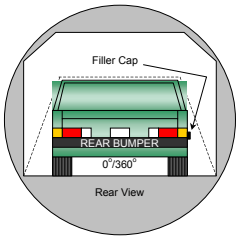


90° to 180°



180° to 270°





270° to 360°

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage locations:
None

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	173	300	0
90° to 180°	153	300	0
180° to 270°	134	300	0
270° to 360°	159	300	0

DATA SHEET NO. 10

VEHICLE MEASUREMENTS

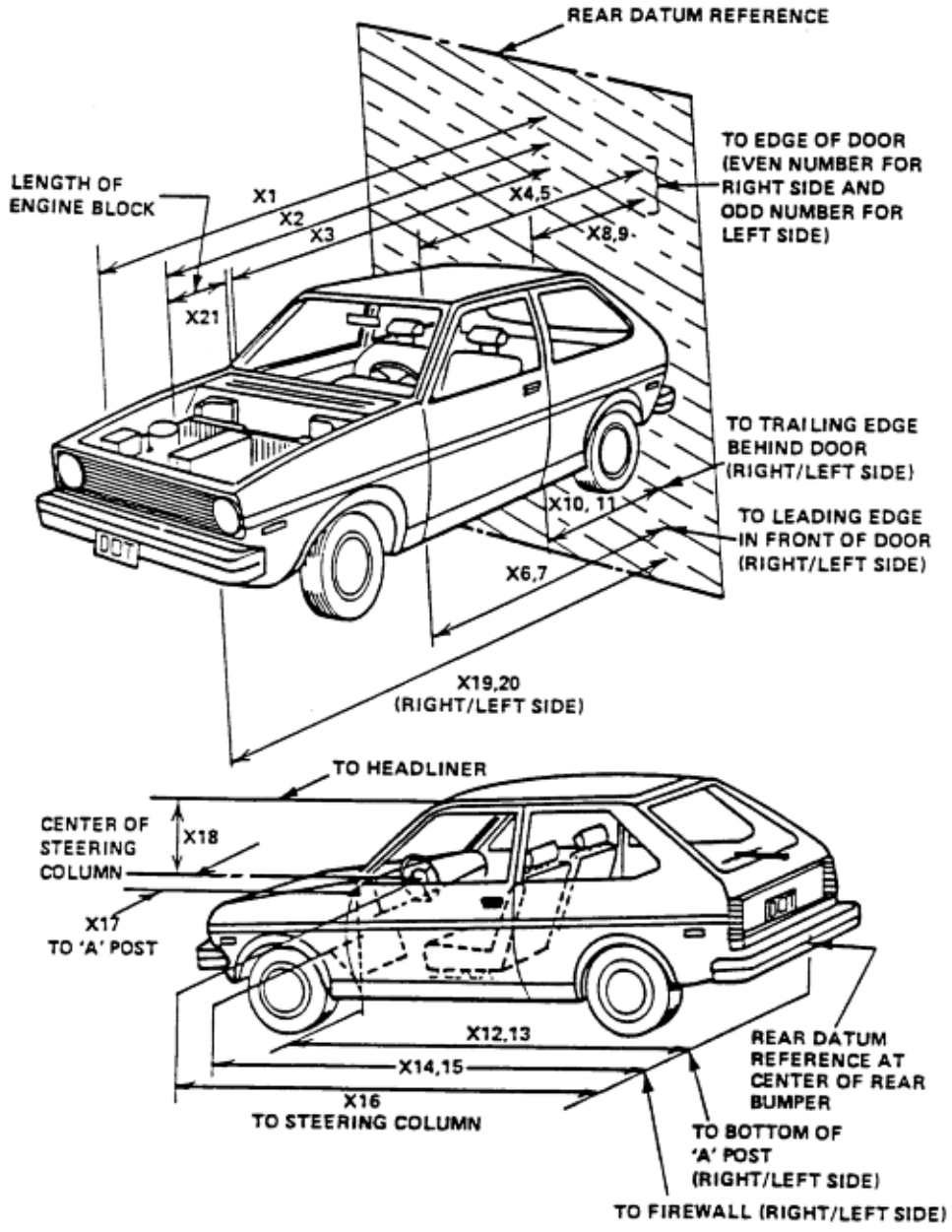
Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4421	3979	442
2	RSOV to front of engine	mm	3834	3560	274
3	RSOV to firewall centerline	mm	3681	3470	211
4	RSOV to leading edge of right door	mm	3081	3075	6
5	RSOV to leading edge of left door	mm	3079	3072	7
6	RSOV to lower leading edge of right door	mm	3069	3074	-5
7	RSOV to lower leading edge of left door	mm	3064	3067	-3
8	RSOV to upper leading edge of right door	mm	1734	1726	8
9	RSOV to upper leading edge of left door	mm	1735	1720	15
10	RSOV to lower trailing edge of right door	mm	1804	1816	-12
11	RSOV to lower trailing edge of left door	mm	1802	1806	-4
12	RSOV to bottom of right 'A' pillar	mm	3073	3022	51
13	RSOV to bottom of left 'A' pillar	mm	3069	3042	27
14	RSOV to firewall on right side	mm	3580	3412	168
15	RSOV to firewall on left side	mm	3582	3472	110
16	RSOV to steering column	mm	2584	2573	11
17	Center of steering column to left 'A' pillar	mm	364	395	-31
18	Center of steering column to headlining	mm	402	418	-16
19	RSOV to right side of front bumper	mm	4182	3908	274
20	RSOV to left side of front bumper	mm	4179	3932	247
21	Length of engine block	mm	464	464	0
RD	RSOV to right side of dash panel	mm	2726	2740	-14
CD	RSOV to center of dash panel	mm	2677	2682	-5
LD	RSOV to left side of dash panel	mm	2712	2725	-13

DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle:	2006 Honda Civic LX 2-Door	NHTSA No.:	M65300
Test Program:	35mph Frontal Impact	Test Date:	12/13/2005



DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

Target Vehicle Structural Measurement

	Elements	Pre-Test (mm)
1	Total Length	4421
2	Total Width	1742
3	Bumper Top Height	508
4	Bumper Bottom Height	420
5	Longitudinal Member Top Height	180
6	Distance between Longitudinal Members	741
7	Longitudinal Member Width	64
8	Engine Top Height	833
9	Engine Bottom Height	192
10	Engine and gearbox width	834
11	Front bumper-engine distance	297
12	Front shock absorber fixing height	859
13	Bonnet leading edge height	667
14	Front shock absorber fixing width	1143
15	Front bumper – front axle distance	871
16	Front axle – a pillar distance	468
17	A-pillar – B-pillar distance	1362
18	B-Pillar – rear axle distance	837
19	B-pillar – C-pillar distance	597
20	Roof sill bottom height	1291
21	Roof sill top height	1359
22	Floor sill bottom height	143
23	Floor sill top height	373

DATA SHEET NO. 11

CAMERA LOCATIONS

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	985	-4900	1375	24	1000
3	Steering Column Top	1685	-5480	1480	25	1000
4	Steering Column Bottom	1700	-5495	1025	25	1000
5	Driver Close-up	1930	-5780	1470	35	1000
6	Driver Angle	6705	-5700	2160	50	1000
7	On board Driver Side					
8	On board Passenger Side					
9	Right Overall	1990	7240	1460	24	1000
10	Right Passenger Half	855	4900	1465	24	1000
11	Right Close-up	1400	7195	1425	35	1000
12	Right Angle	6575	5320	2190	50	1000
13	Windshield	-285	0	2370	19	1000
14	Top Driver	-160	-425	2225	16	1000
15	Top Passenger	-170	515	2240	16	1000
16	Pit Front	960	0	-3150	24	1000
17	Pit Rear	3100	0	-3150	24	1000

*COORDINATES:

+X = forward of impact plane
+Y = right of monorail centerline
+Z = above ground level

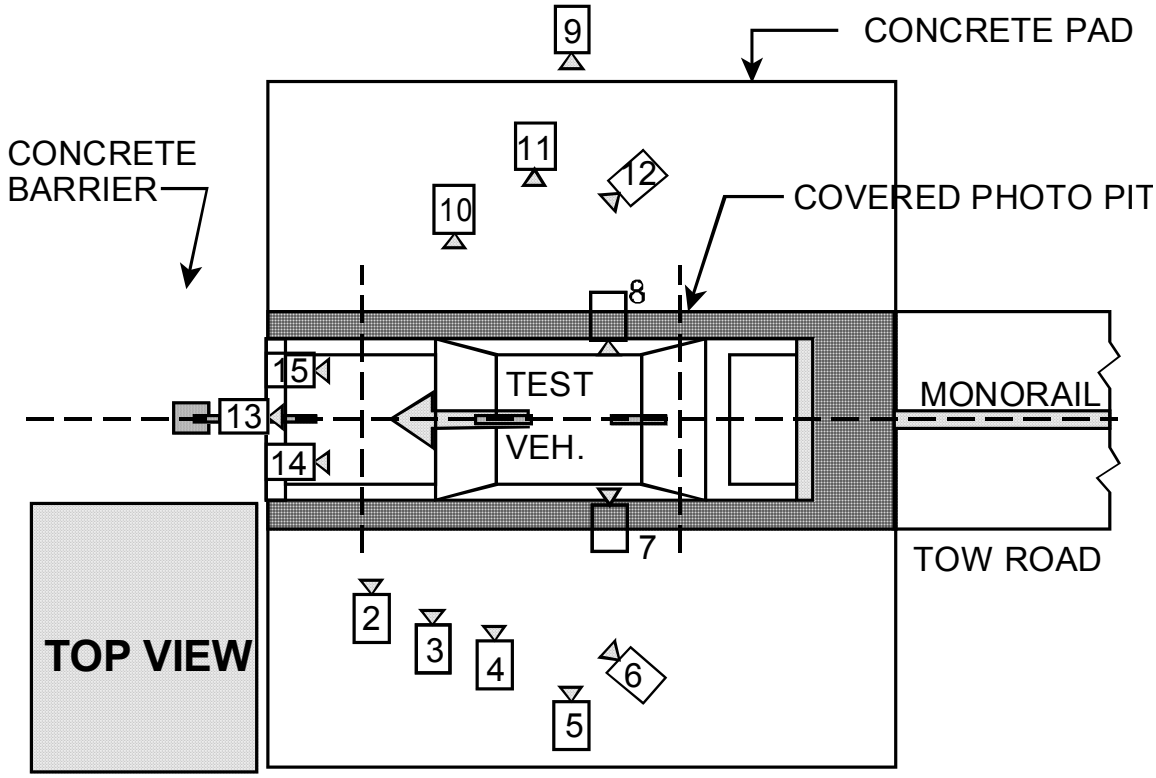
Note: Cameras 7 and 8 were not used for this test.

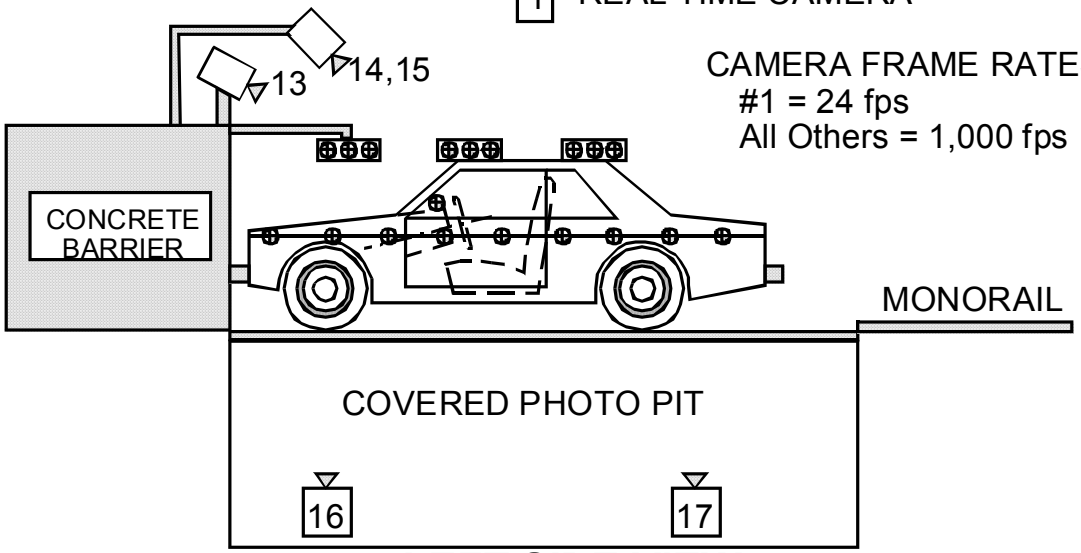
DATA SHEET NO. 11... (continued)

CAMERA LOCATIONS

Test Vehicle:	2006 Honda Civic LX 2-Door	NHTSA No.:	M65300
Test Program:	35mph Frontal Impact	Test Date:	12/13/2005

CAMERA POSITIONS FOR FRONTAL IMPACTS





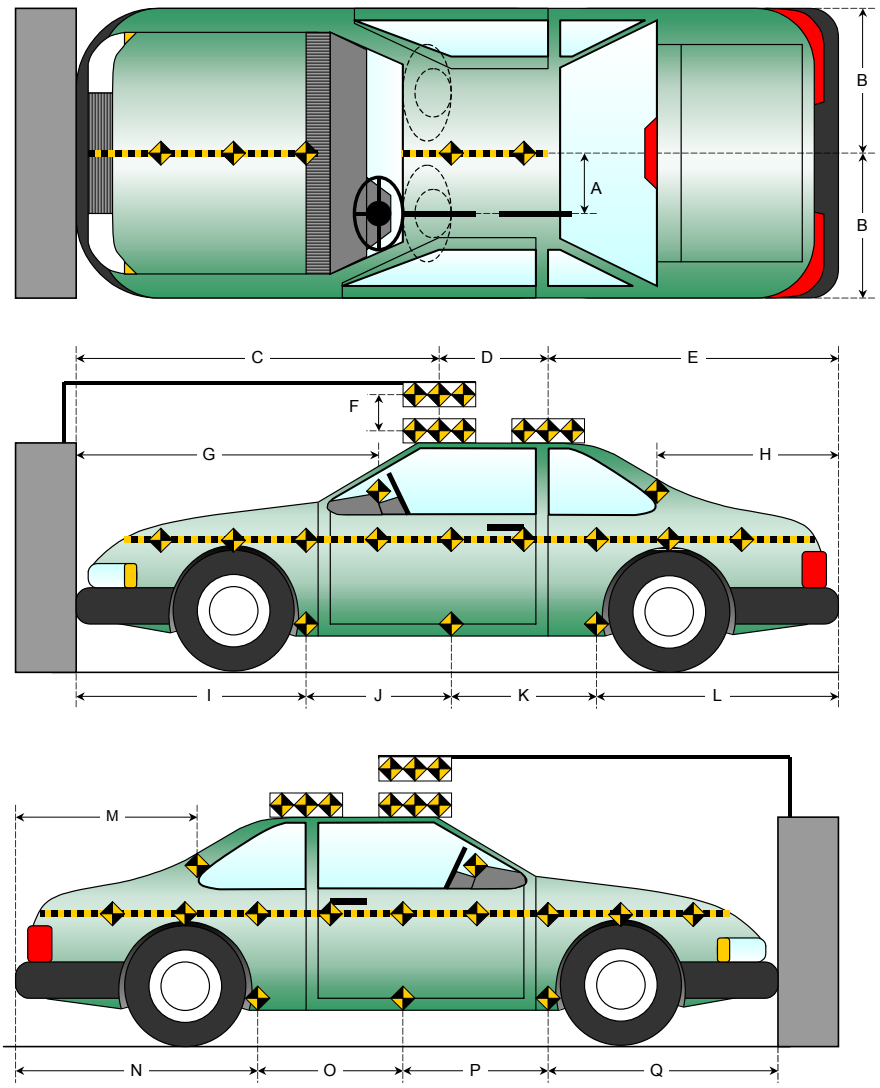
LEFT SIDE VIEW

DATA SHEET NO. 12

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2006 Honda Civic LX 2-Door
Test Program: 35mph Frontal Impact
NHTSA No.: M65300
Test Date: 12/13/2005

Item	Value
A	360
B	871
C	2231
D	310
E	1580
F	199
G	
H	1138
I	1311
J	906
K	904
L	1300
M	1137
N	1297
O	908
P	902
Q	1314



DATA SHEET NO. 13

VEHICLE INTRUSION MEASUREMENTS

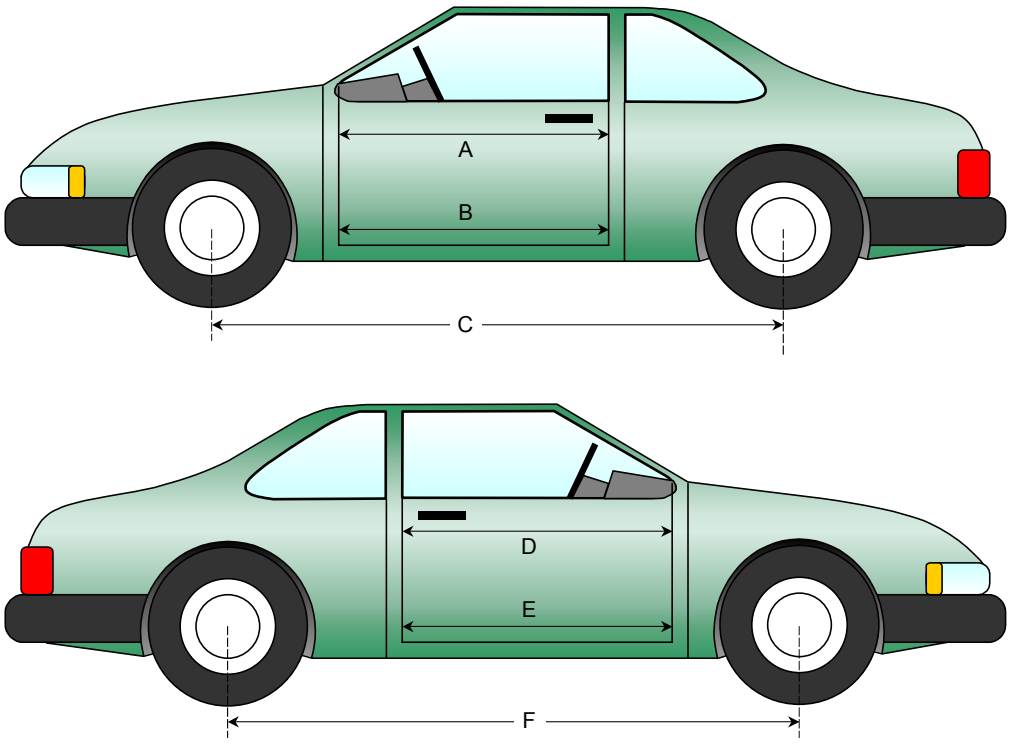
Test Vehicle: 2006 Honda Civic LX 2-Door
Test Program: 35mph Frontal Impact
NHTSA No.: M65300
Test Date: 12/13/2005

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1233	1230	3
B	Left Side Lower	mm	1179	1179	0
D	Right Side Upper	mm	1236	1236	0
E	Right Side Lower	mm	1171	1168	3

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2653	2553	100
F	Right Side Wheelbase	mm	2653	2544	109



DATA SHEET NO. 13... (continued)

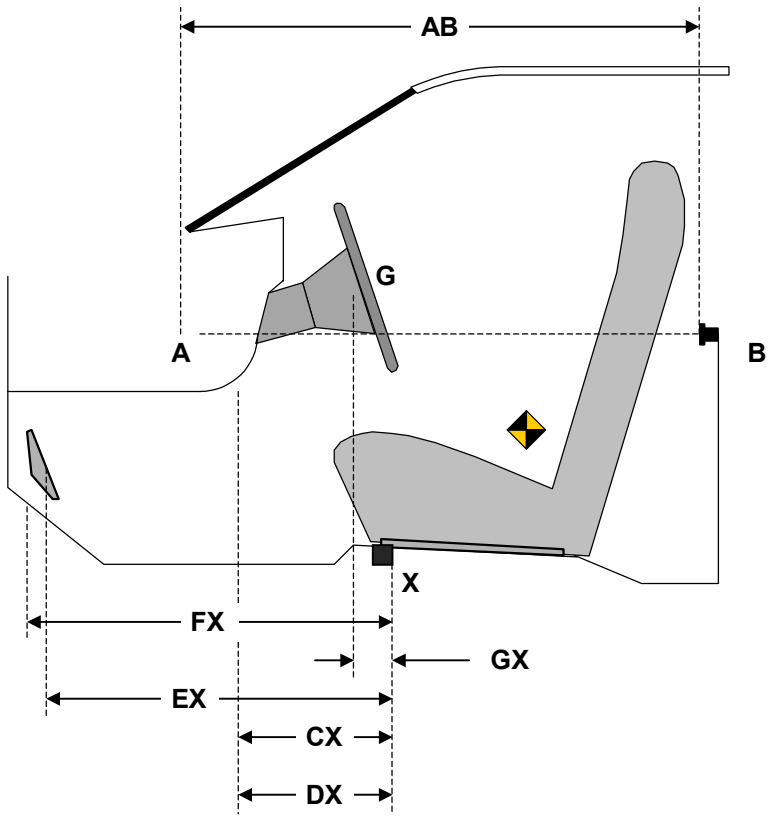
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	1081	1081	0
CX	Left Knee Bolster to X	mm	407	410	-3
DX	Right Knee Bolster to X	mm	409	400	9
EX	Brake Pedal to X	mm	625	587	38
FX	Foot Rest to X	mm	632	615	17
GX	Center of Steering Column Wheel Hub to X	mm	132	122	10

X = Front of Seat Track (stationary)

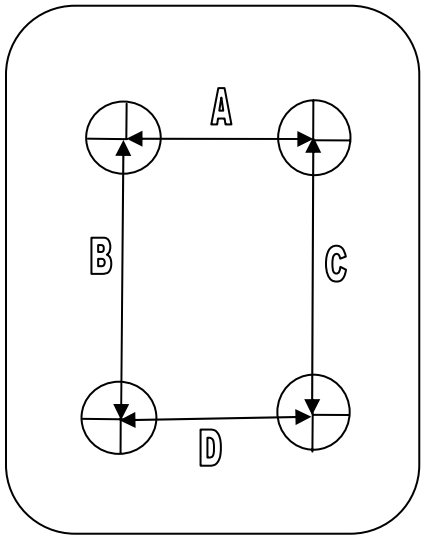


DRIVER COMPARTMENT

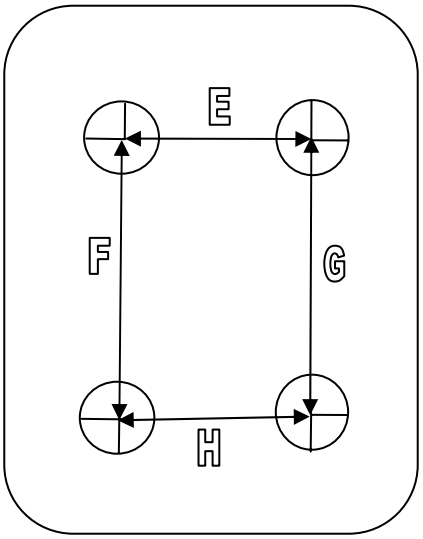
DATA SHEET NO. 13... (continued)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005



Driver



Passenger

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test	Post-Test	Difference
A	301	305	-4
B	270	270	0
C	268	260	8
D	311	319	-8
E	357	361	-4
F	307	292	15
G	319	314	5
H	364	360	4

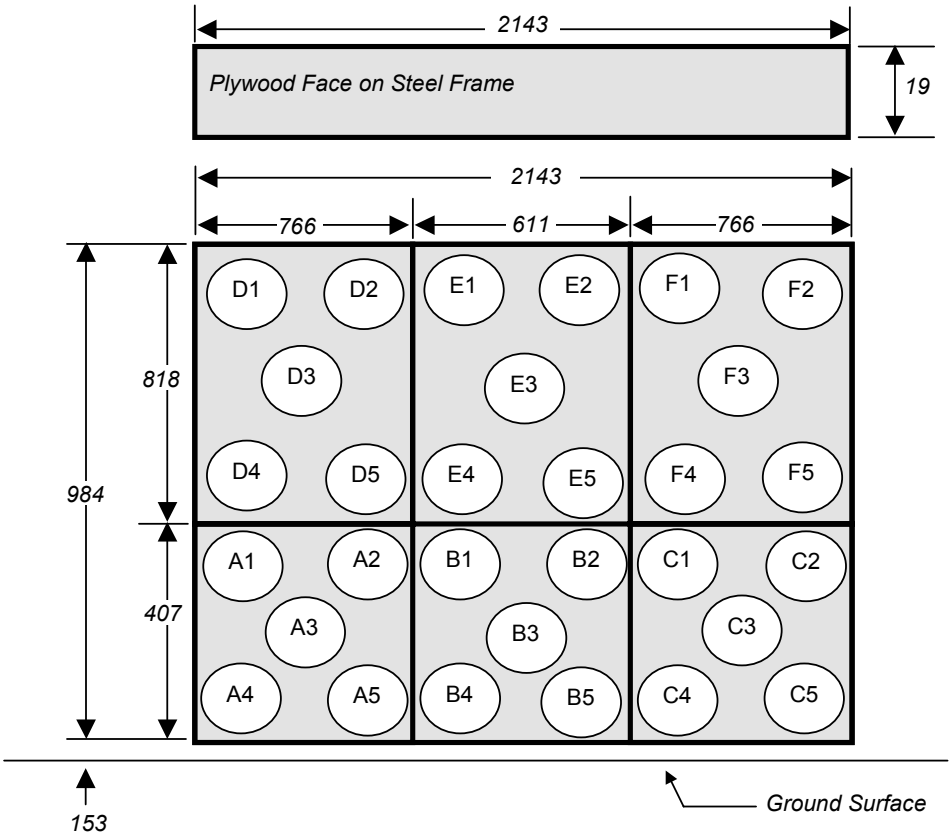
DATA SHEET NO. 14

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

30 Load Cell Rigid Barrier

Load Cell Locations on Fixed Barrier



Group 4 D1-D5	Group 5 E1-E5	Group 6 F1-F5
Group 1 A1-A5	Group 2 B1-B5	Group 3 C1-C5

6 Groups of 5 Load Cells Each

DATA SHEET NO. 15

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2006 Honda Civic LX 2-Door NHTSA No.: M65300
Test Program: 35mph Frontal Impact Test Date: 12/13/2005

VEHICLE INFORMATION

VIN: 2HGFG116X6H512269 Wheelbase (mm) : 2651
Vehicle Size Category: 2-Door Coupe Test Weight (kg) : 1393.5

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 12
Cal. Procedure/Interval: MGA procedure / 6 month
Integration Algorithm: Trapezoidal Linearity: > 99%
Impact Velocity (km/h): 56.3
Velocity Change (km/h): 66.1 Time of Separation (msec): 112

CRUSH PROFILE

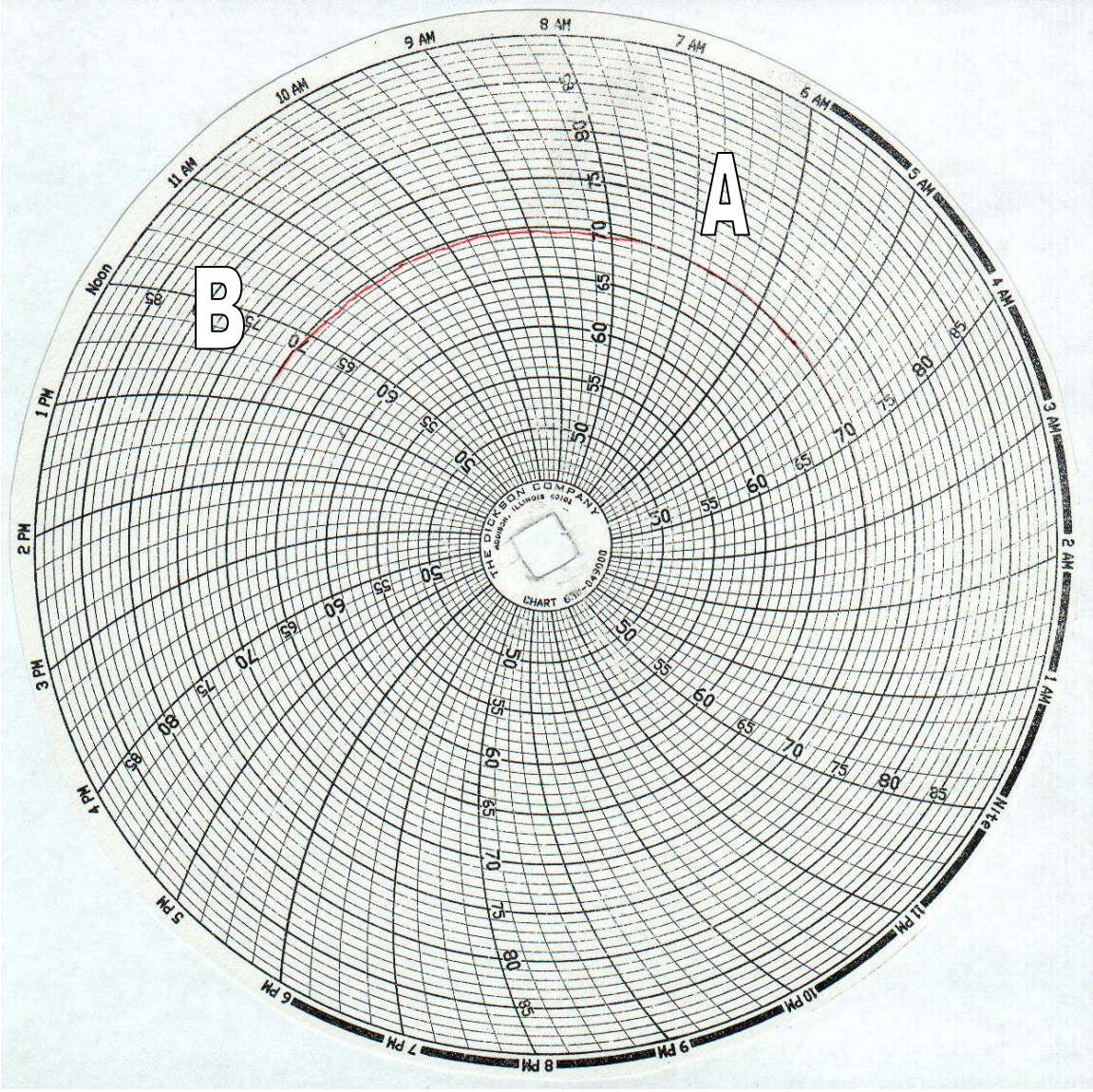
Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
Damage Region Length (mm): 1608 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4191	3932	259
C2	Crush zone 2 at left side	mm	4335	3926	409
C3	Crush zone 3 at left side	mm	4394	3960	434
C4	Crush zone 4 at right side	mm	4391	3938	453
C5	Crush zone 5 at right side	mm	4334	3915	419
C6	Crush zone 6 at right side	mm	4193	3921	272
L	C1 TO C6	mm	1608	1563	45

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle:	2006 Honda Civic LX 2-Door	NHTSA No.:	M65300
Test Program:	35mph Frontal Impact	Test Date:	12/13/2005



A = Dummies installed in vehicle at 7:00 am

B = Test conducted at 12:42 pm

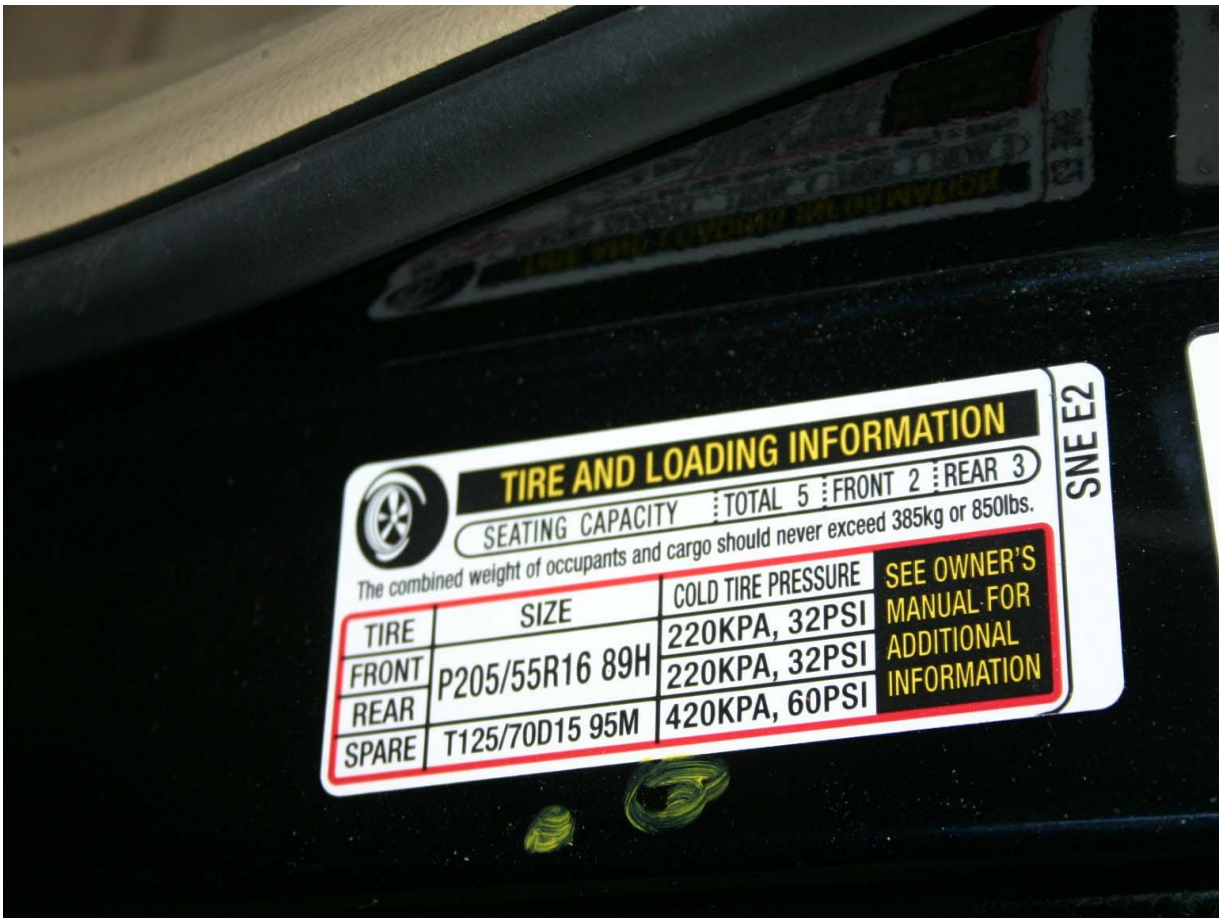
APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Load Cell Location

Manufacturer's Label

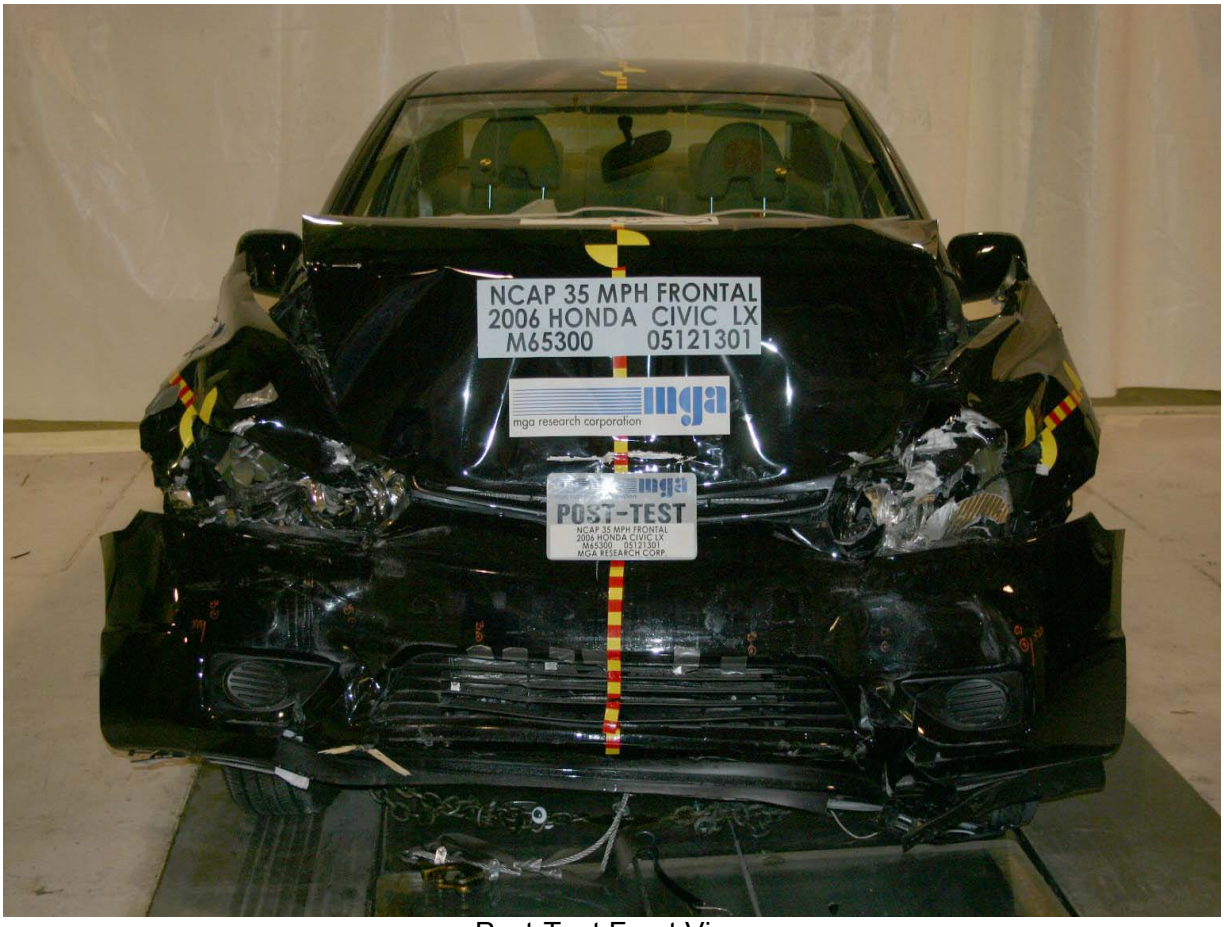


Tire Placard

Left Front ¾ View, As Received

Right Rear ¾ View, As Received

Pre-Test Front View



Post-Test Front View

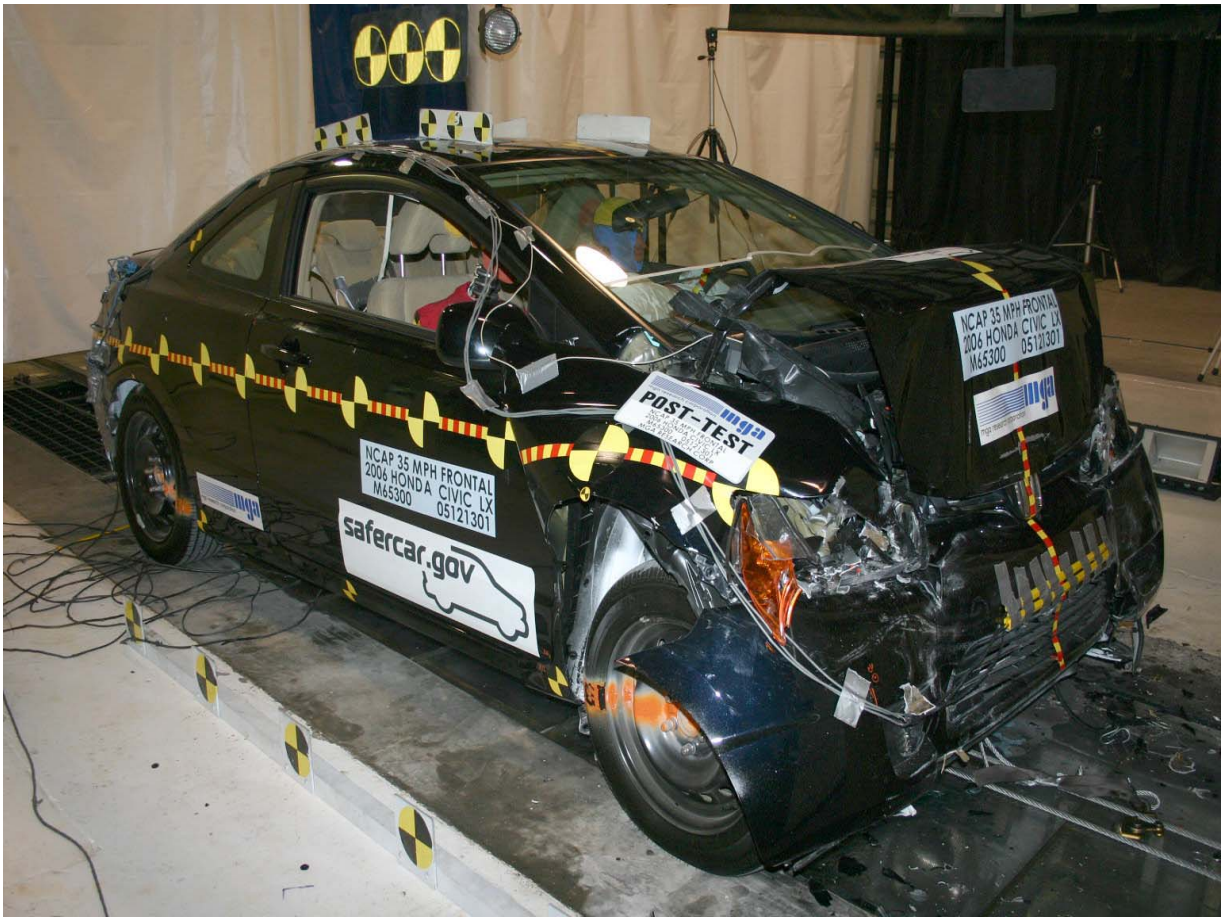
Pre-Test Left Side View

Post-Test Left Side View

Pre-Test Right Side View

Post-Test Right Side View

Pre-Test Right Front ¾ View



Post-Test Right Front ¾ View

Pre-Test Left Rear ¾ View

Post-Test Left Rear ¾ View

Pre-Test Left Side ¾ View of Doors

Post-Test Left Side ¾ View of Doors After Impact

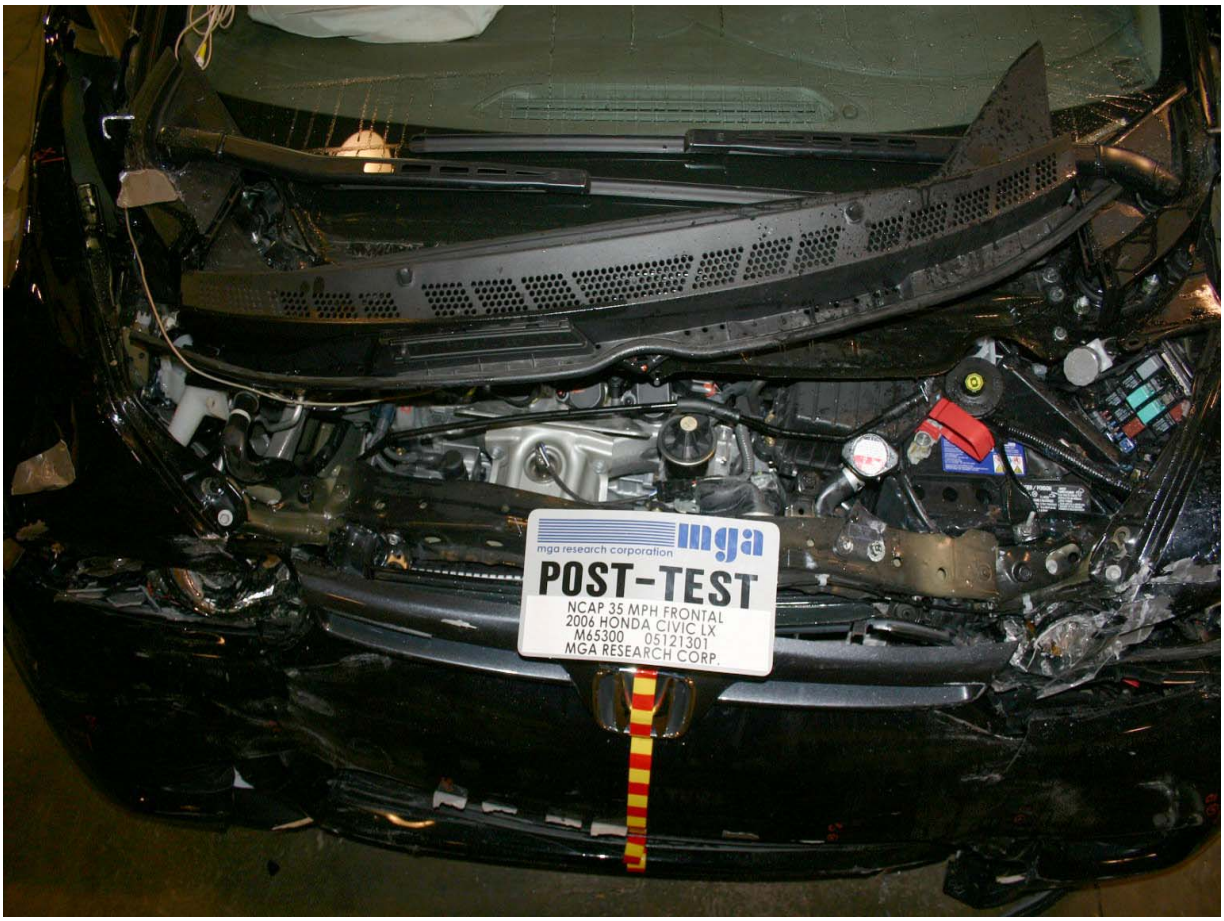
Pre-Test Right Side ¾ View of Doors

Post-Test Right Side ¾ View of Doors After Impact

Pre-Test Windshield View

Post-Test Windshield View

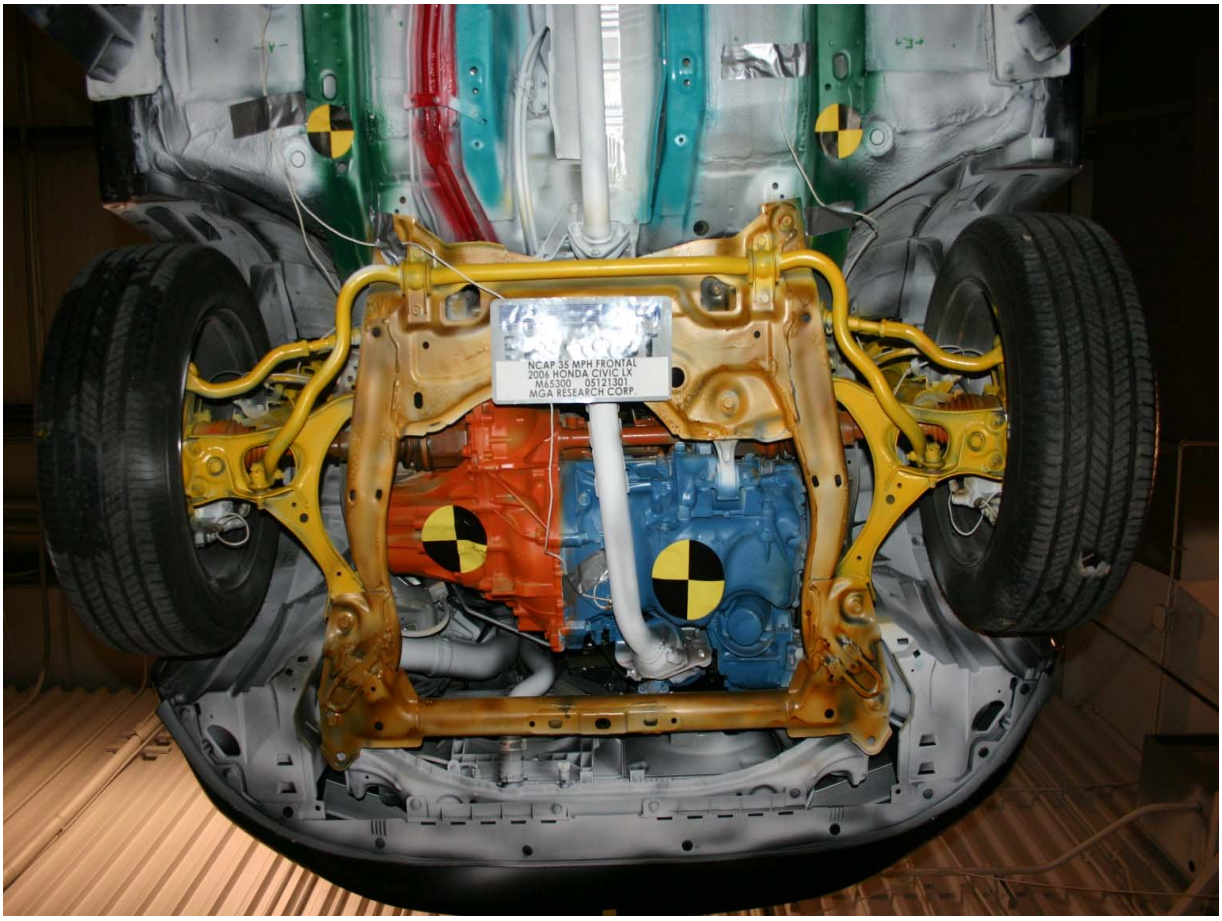
Pre-Test Engine Compartment View



Post-Test Engine Compartment View

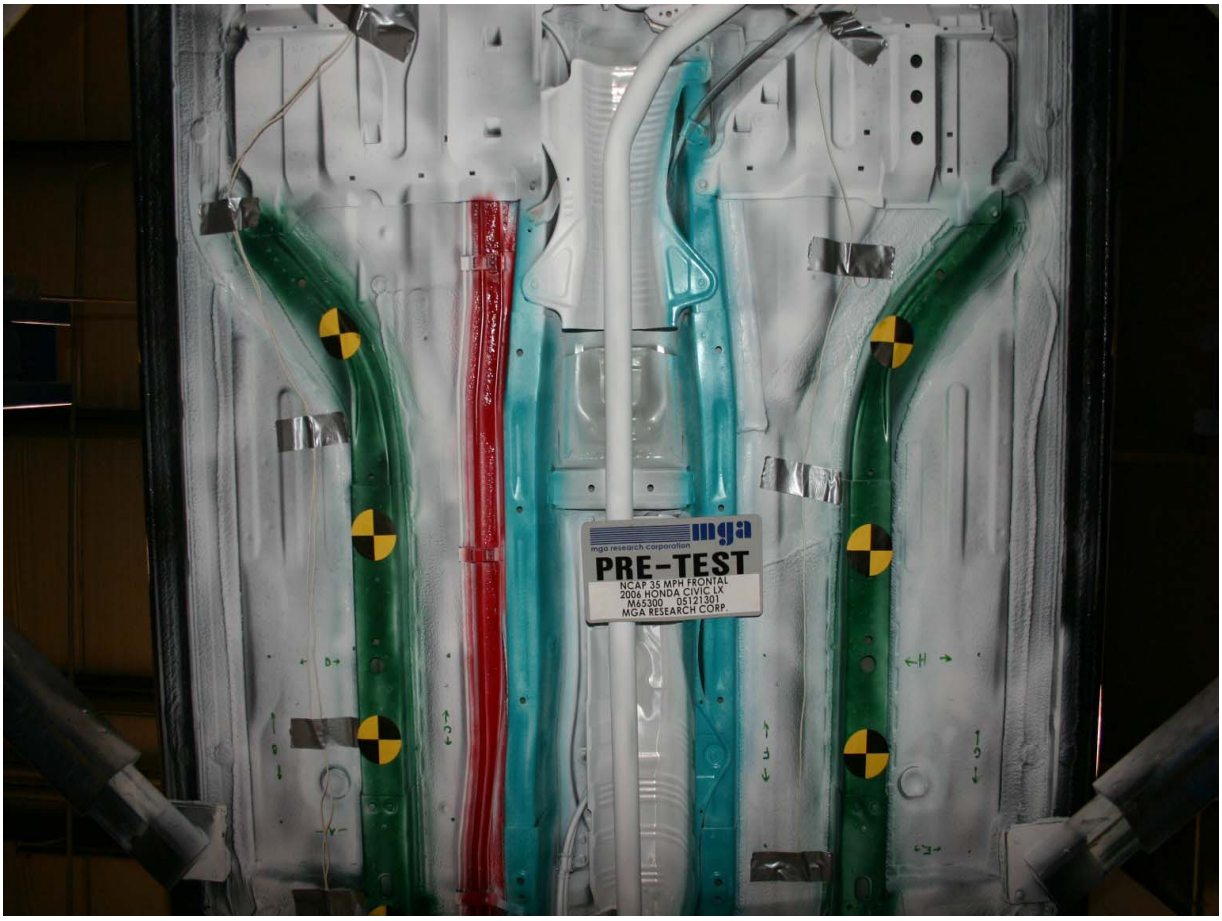
Pre-Test Fuel Cap View

Post-Test Fuel Cap View

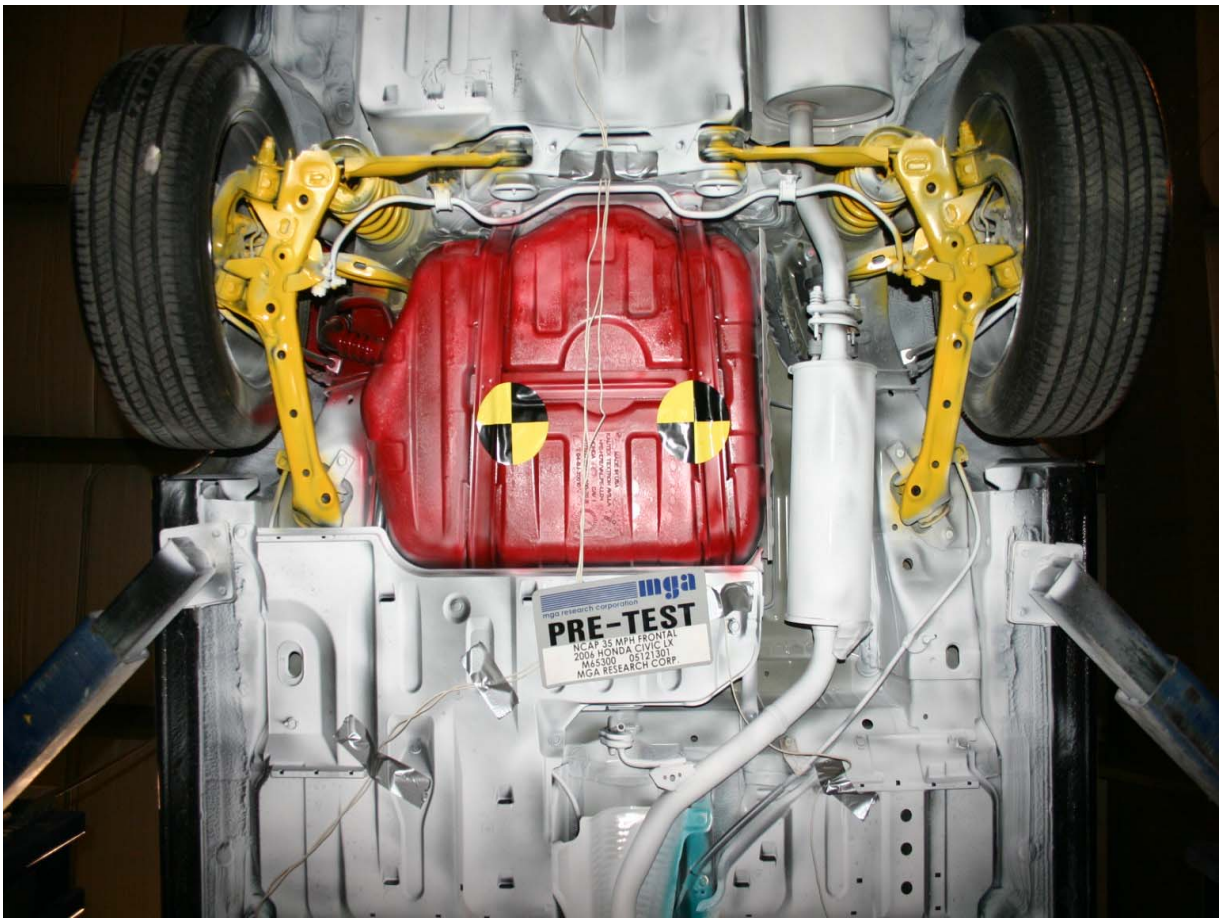


Pre-Test Front Underbody View

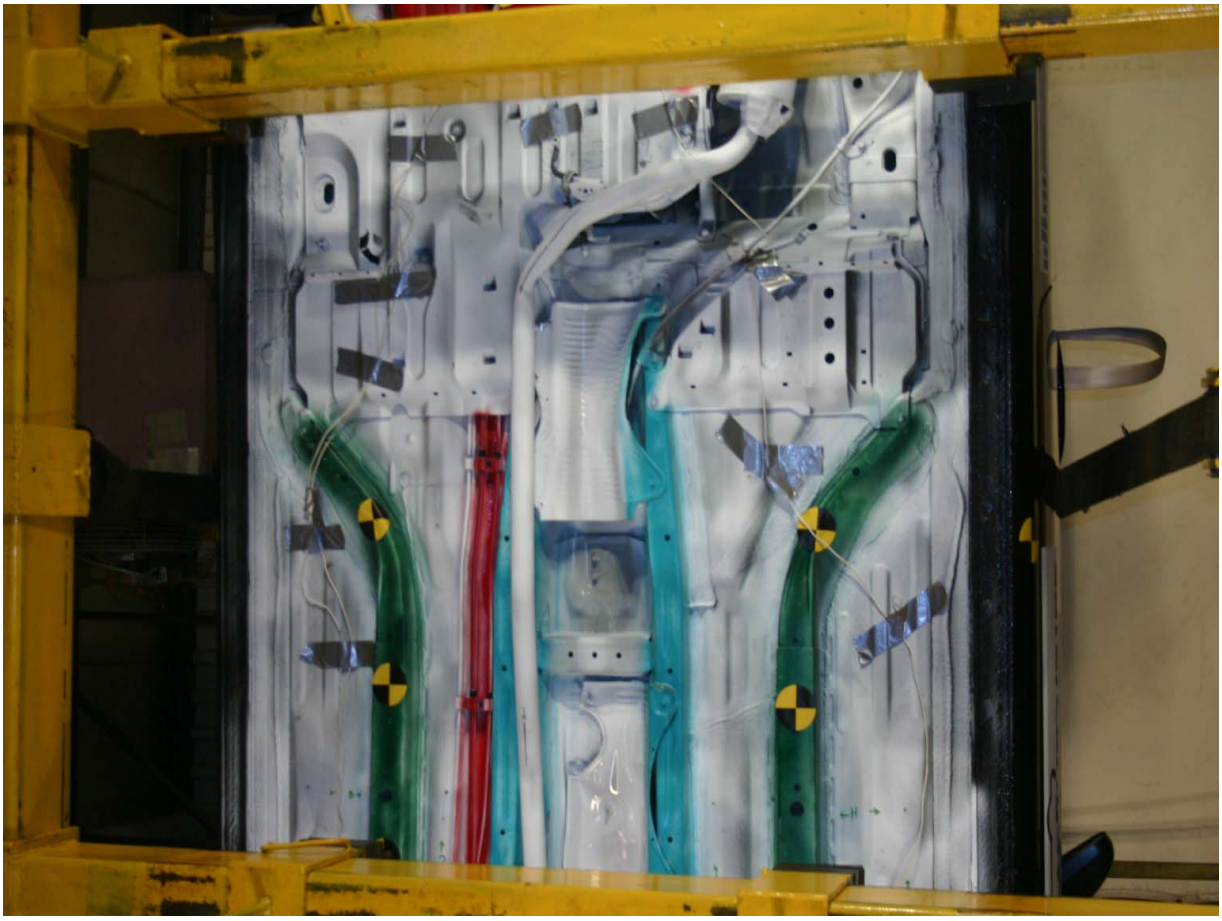

Post-Test Front Underbody View



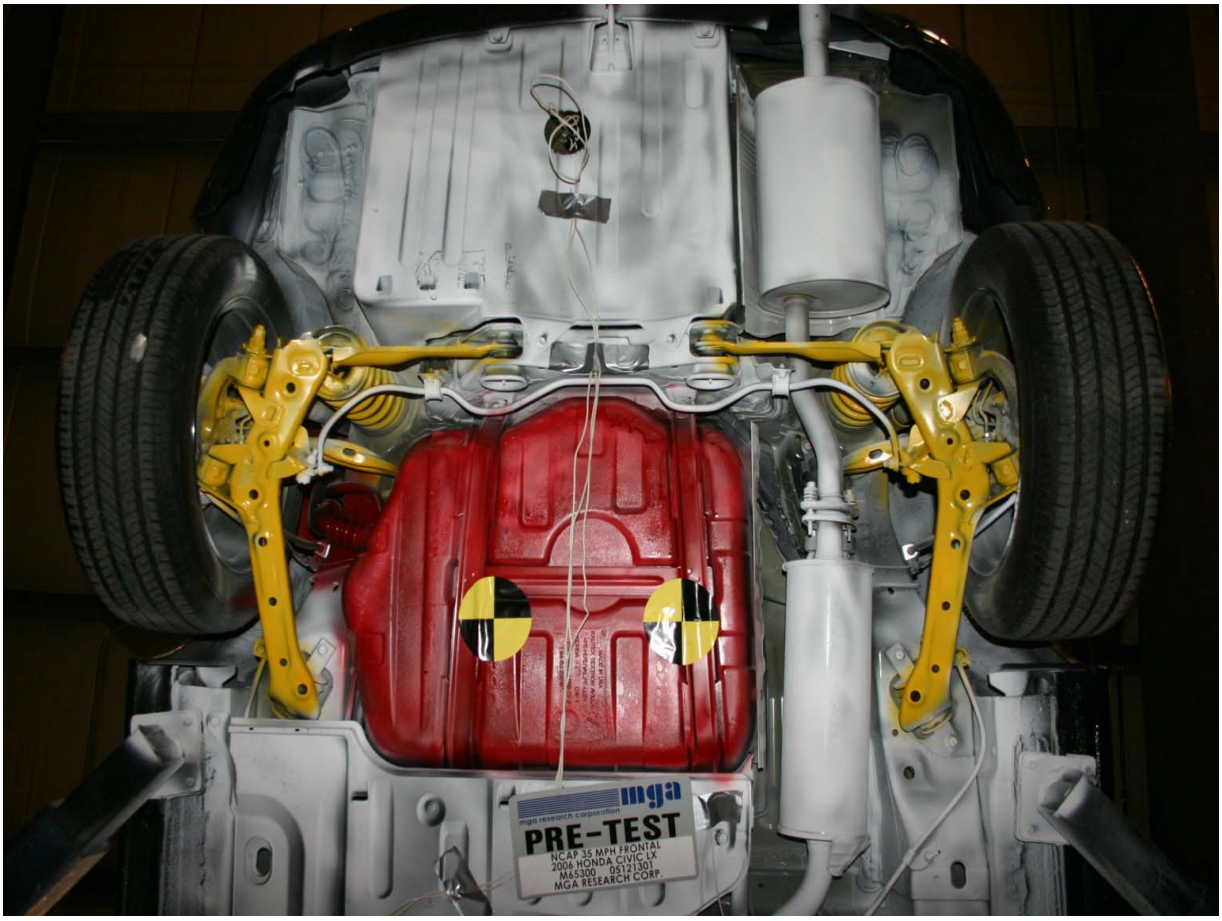
Pre-Test Front Mid Underbody View



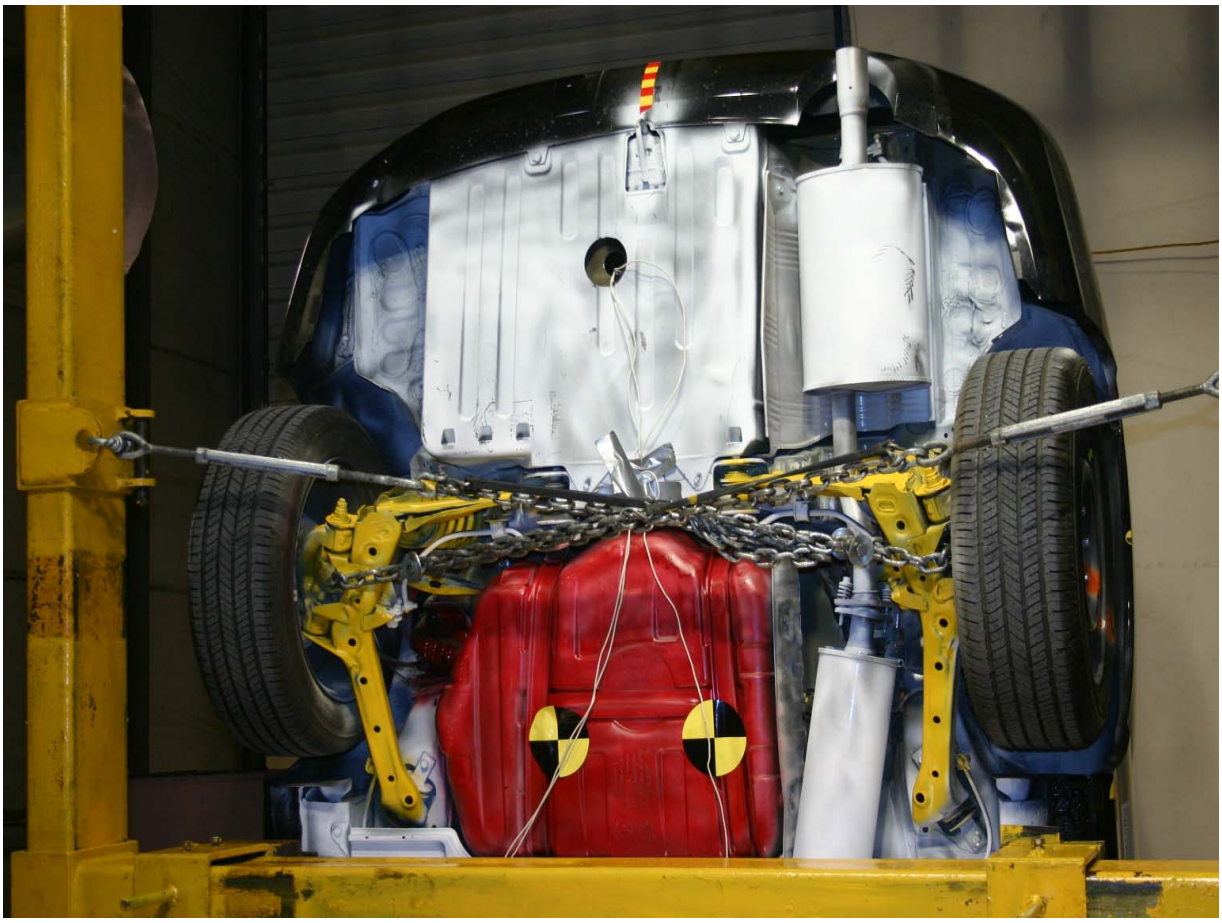
Pre-Test Rear Mid Underbody View



Post-Test Mid Underbody View



Pre-Test Rear Underbody View


Post-Test Rear Underbody View

Pre-Test Driver Dummy Front View (Head Position)

Post-Test Driver Dummy Front View (Head Position)

Pre-Test Driver Dummy (Through Window)

Post-Test Driver Dummy (Through Window)

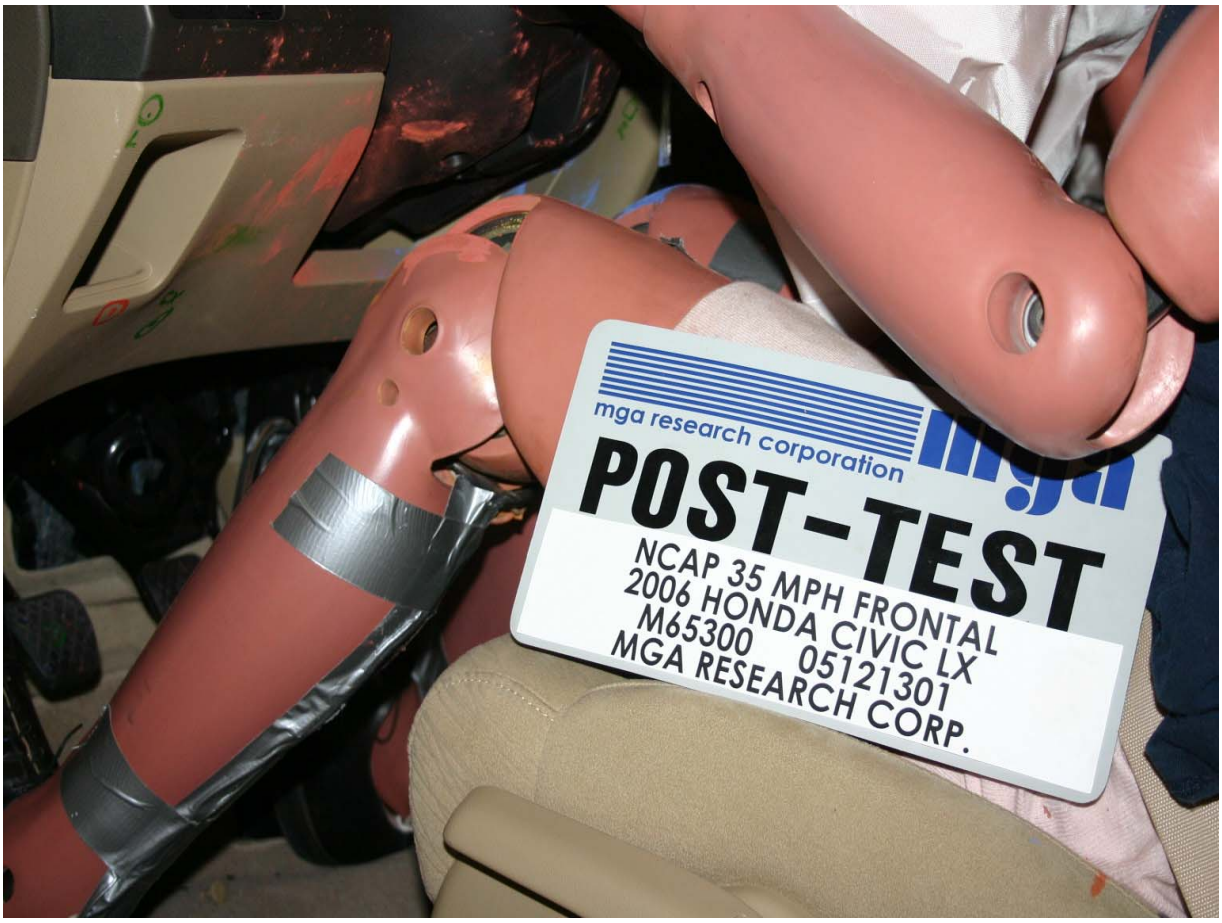
Pre-Test Driver Dummy (Door Open)

Post-Test Driver Dummy (Door Open)

Pre-Test Driver Dummy Feet

Post-Test Driver Dummy Feet

Pre-Test Driver Side Knee Bolster



Post-Test Driver Side Knee Bolster

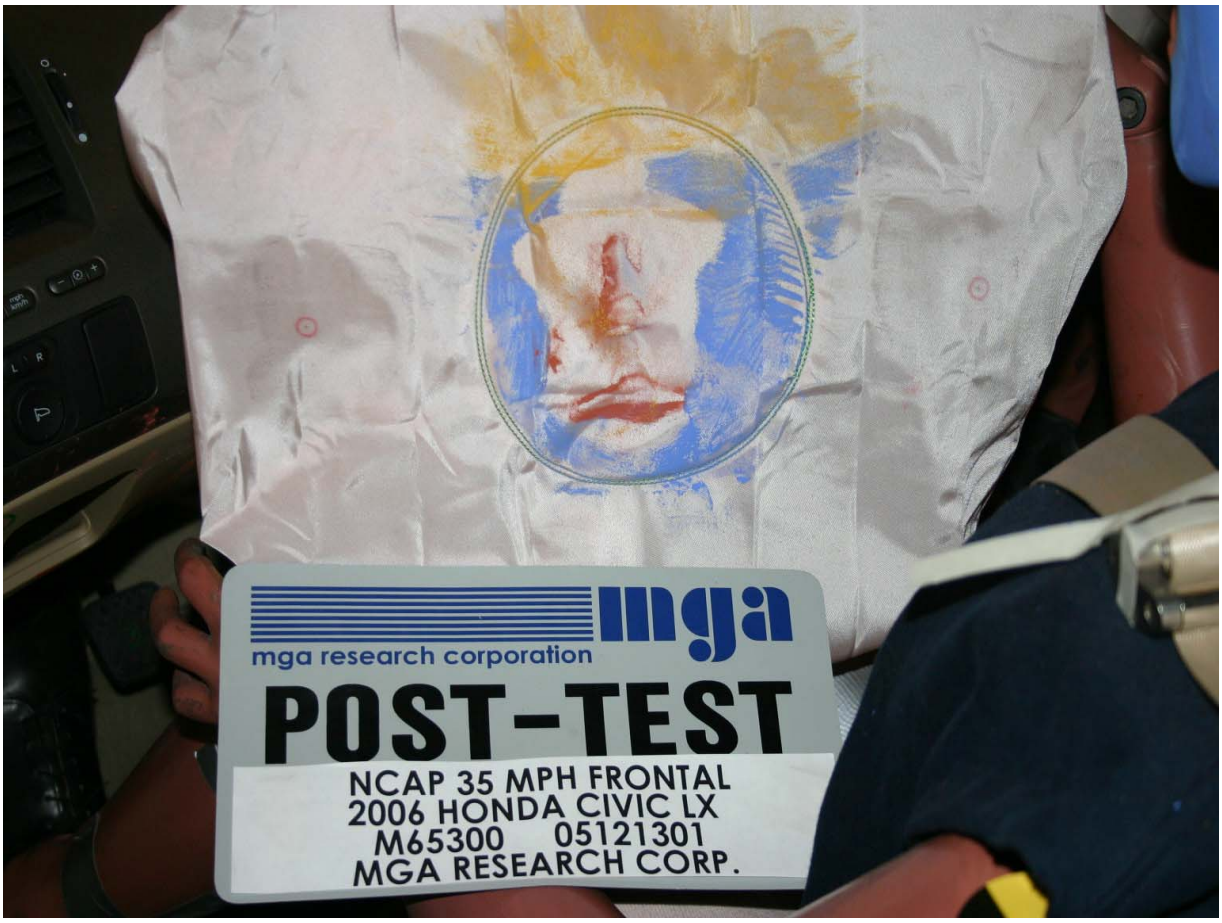
Pre-Test Driver Side Floor Pan

Post-Test Driver Side Floor Pan

Post-Test Driver Dummy Head Contact

Post-Test Driver Dummy Left Knee Contact

Post-Test Driver Dummy Right Knee Contact



Post-Test Driver Dummy Airbag Contact

Pre-Test Passenger Dummy Front View (Head Position)

Post-Test Passenger Dummy Front View (Head Position)

Pre-Test Passenger Dummy (Through Window)

Post-Test Passenger Dummy (Through Window)

Pre-Test Passenger Dummy (Door Open)

Post-Test Passenger Dummy (Door Open)

Pre-Test Passenger Dummy Feet

Post-Test Passenger Dummy Feet

Pre-Test Passenger Side Glove Box

Post-Test Passenger Side Glove Box

Pre-Test Passenger Side Floor Pan

Post-Test Passenger Side Floor Pan

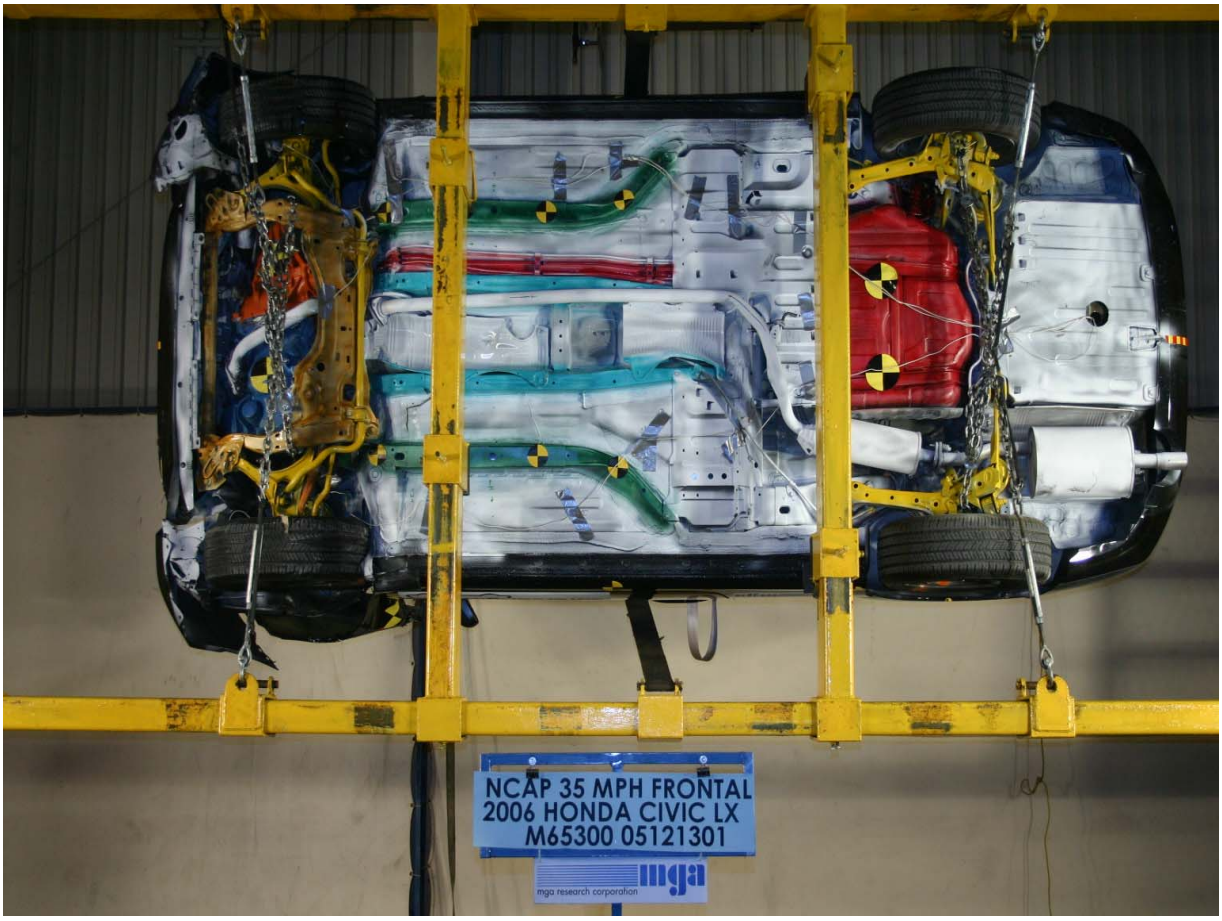
Post-Test Passenger Dummy Head Contact

Post-Test Passenger Dummy Knee Contact

Post-Test Passenger Dummy Airbag Contact

Vehicle on Rollover Device at 90 Degrees

Vehicle on Rollover Device at 180 Degrees



Vehicle on Rollover Device at 270 Degrees

Vehicle on Rollover Device at 360 Degrees

Vehicle Impact

APPENDIX B

DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

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

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Upper Neck Force X

Driver Upper Neck Force Y

Driver Upper Neck Force Z

Driver Upper Neck Moment X

Driver Upper Neck Moment Y

Driver Upper Neck Moment Z

Driver Chest X Redundant

Driver Chest Y Redundant

Driver Chest Z Redundant

Driver Chest Displacement

Driver Pelvis X

Driver Pelvis Y

Driver Pelvis Z

Driver Shoulder Belt Force

Driver Lap Belt Force

Driver Left Upper Tibia Moment X

Driver Left Upper Tibia Moment Y

Driver Left Upper Tibia Force Z

Driver Left Lower Tibia Moment X

Driver Left Lower Tibia Moment Y

Driver Left Lower Tibia Force Z

Driver Right Upper Tibia Moment X

Driver Right Upper Tibia Moment Y

Driver Right Upper Tibia Force Z

Driver Right Lower Tibia Moment X

Driver Right Lower Tibia Moment Y

Driver Right Lower Tibia Force Z

Driver Left Foot Fore Z

Driver Left Foot Aft X

Driver Left Foot Aft Z

Driver Right Foot Fore Z

Driver Right Foot Aft X

Driver Right Foot Aft Z

Passenger Head X Redundant

Passenger Head Y Redundant

Passenger Head Z Redundant

Passenger Upper Neck Force X

Passenger Upper Neck Force Y

Passenger Upper Neck Force Z

Passenger Upper Neck Moment X

Passenger Upper Neck Moment Y

Passenger Upper Neck Moment Z

Passenger Chest X Redundant

Passenger Chest Y Redundant

Passenger Chest Z Redundant

Passenger Chest Displacement

Passenger Pelvis X

Passenger Pelvis Y

Passenger Pelvis Z

Passenger Shoulder Belt Force

Passenger Lap Belt Force

Passenger Left Upper Tibia Moment X

Passenger Left Upper Tibia Moment Y

Passenger Left Upper Tibia Force Z

Passenger Left Lower Tibia Moment X

Passenger Left Lower Tibia Moment Y

Passenger Left Lower Tibia Force Z

Passenger Right Upper Tibia Moment X

Passenger Right Upper Tibia Moment Y

Passenger Right Upper Tibia Force Z

Passenger Right Lower Tibia Moment X

Passenger Right Lower Tibia Moment Y

Passenger Right Lower Tibia Force Z

Passenger Left Foot Fore Z

Passenger Left Foot Aft X

Passenger Left Foot Aft Z

Passenger Right Foot Fore Z

Passenger Right Foot Aft X

Passenger Right Foot Aft Z

Left Rear Seat Crossmember X

Left Rear Seat Crossmember Z

Right Rear Seat Crossmember X

Right Rear Seat Crossmember Z

Vehicle Engine Top X

Vehicle Engine Bottom X

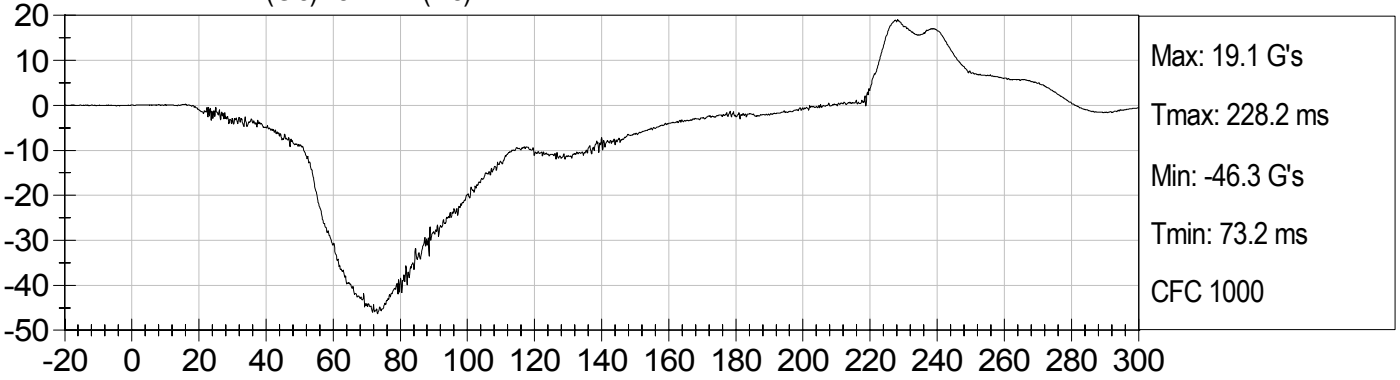
Vehicle Left Brake Caliper X

Vehicle Right Brake Caliper X

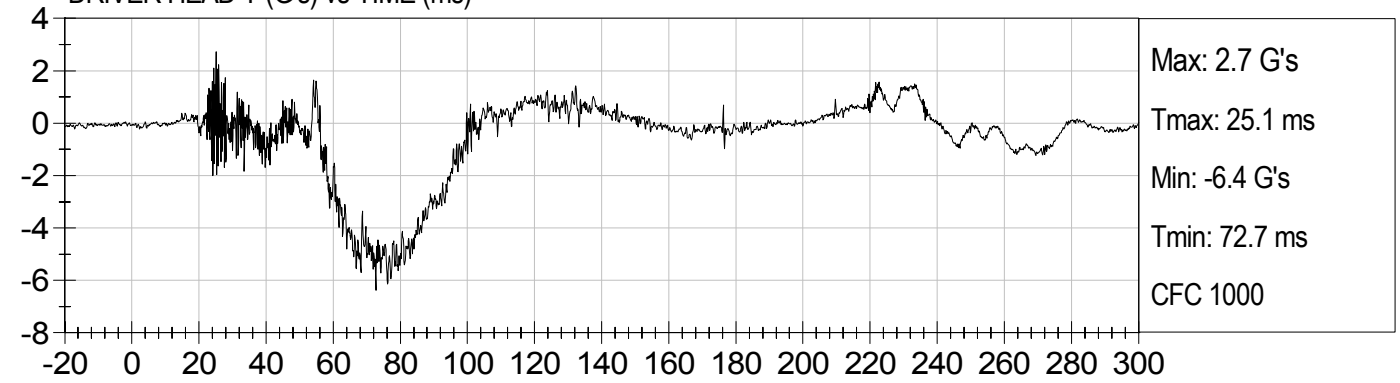
35MPH NCAP FRONTAL
2006 HONDA CIVIC LX (M65300)

Test Date: 12/13/2005
Speed: 35.0 mph (56.3 km/h)

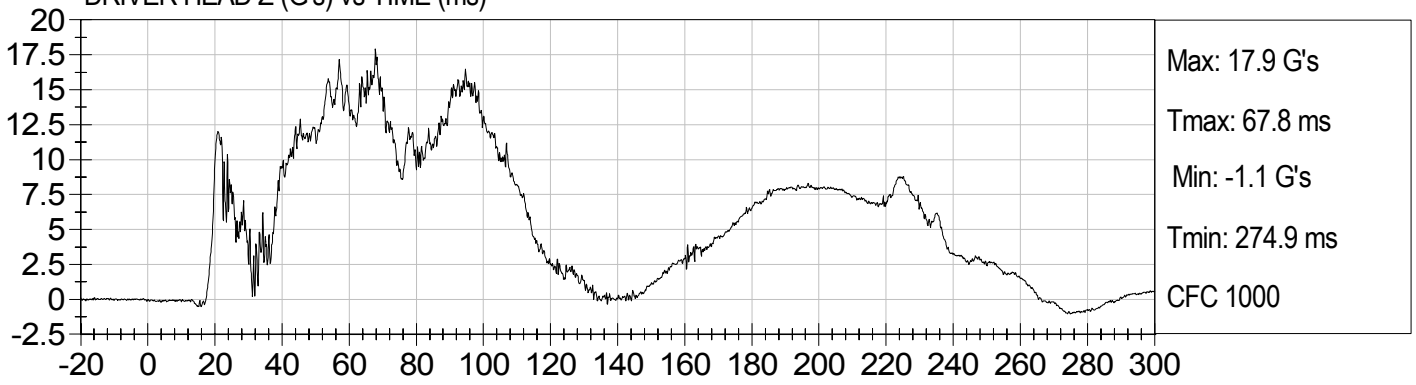
DRIVER HEAD X (G's) vs TIME (ms)



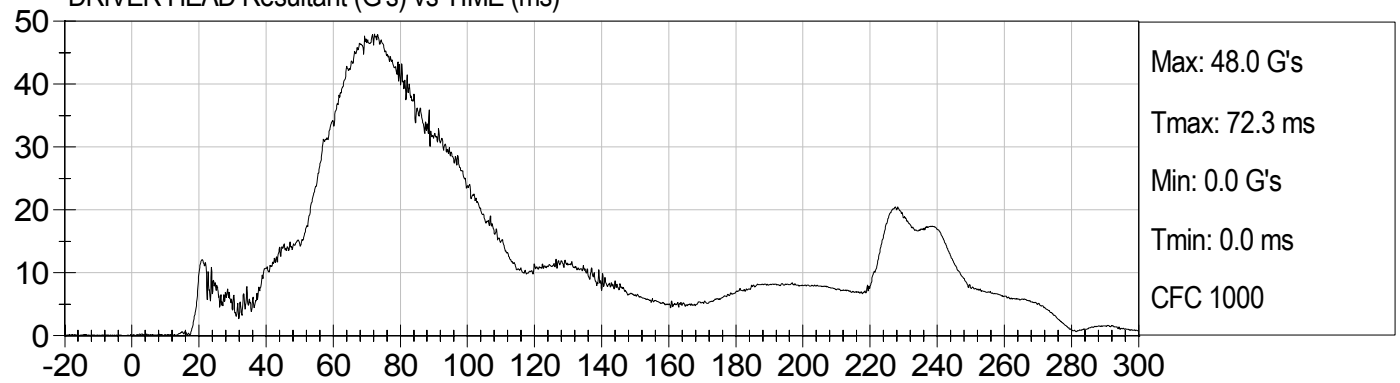
DRIVER HEAD Y (G's) vs TIME (ms)



DRIVER HEAD Z (G's) vs TIME (ms)

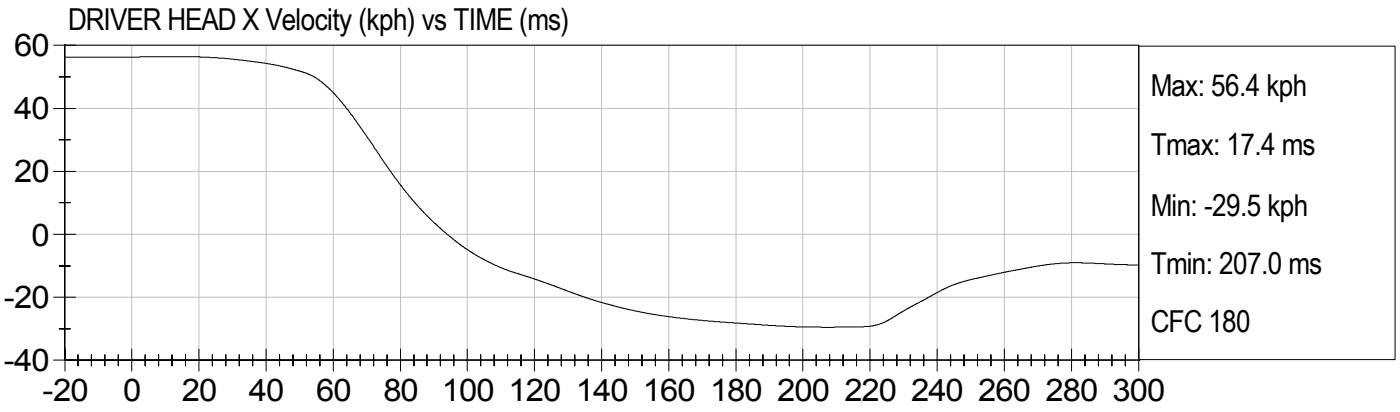


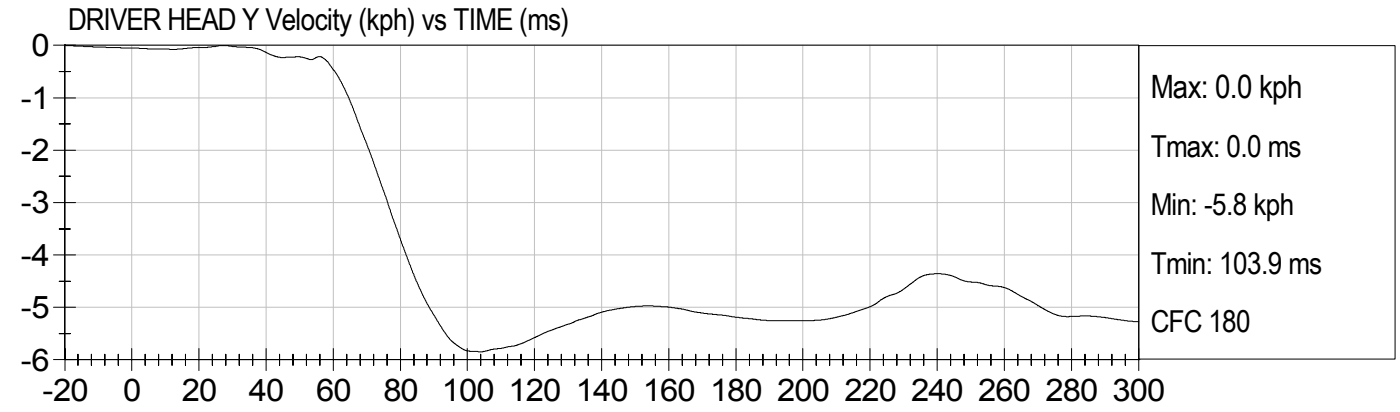
DRIVER HEAD Resultant (G's) vs TIME (ms)

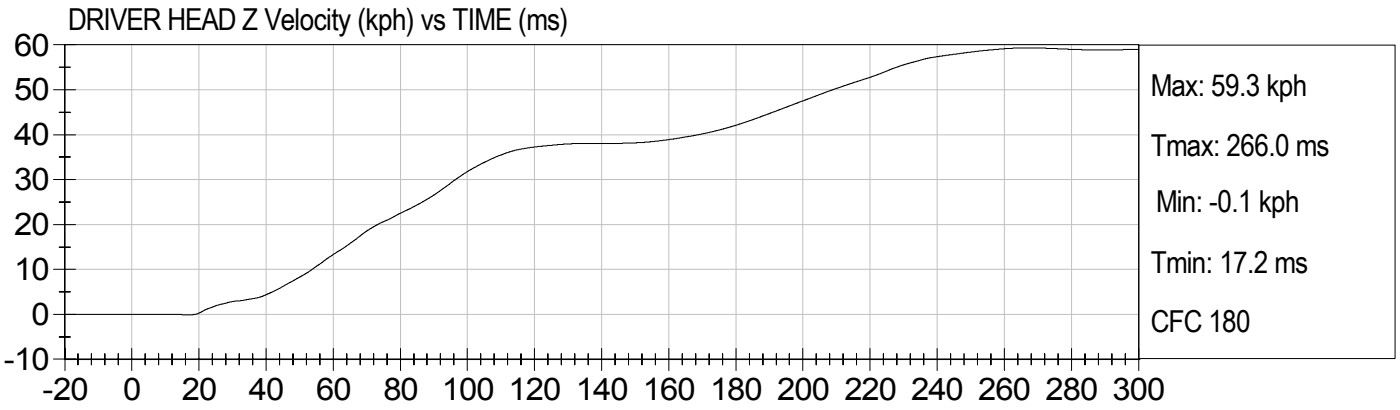


35MPH NCAP FRONTAL
2006 HONDA CIVIC LX (M65300)

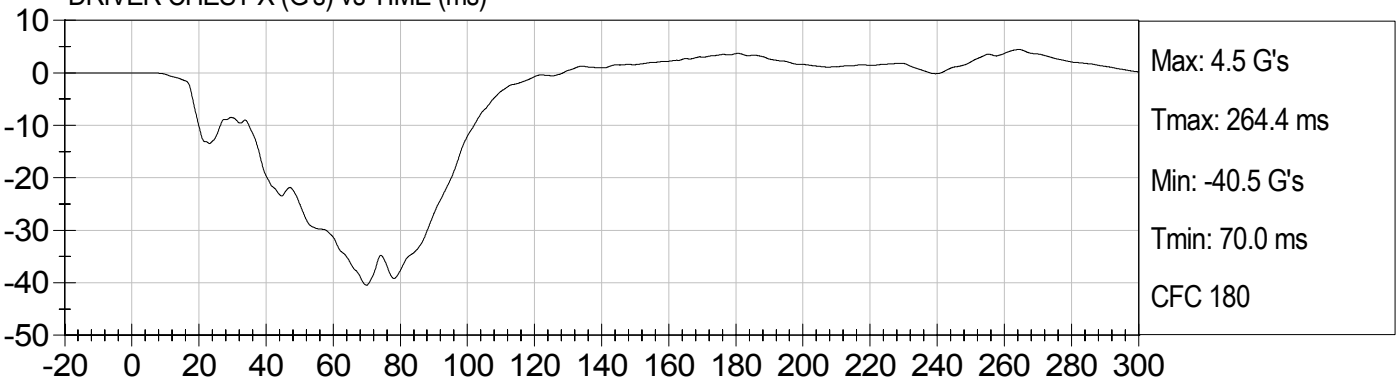
Test Date: 12/13/2005
Speed: 35.0 mph (56.3 km/h)



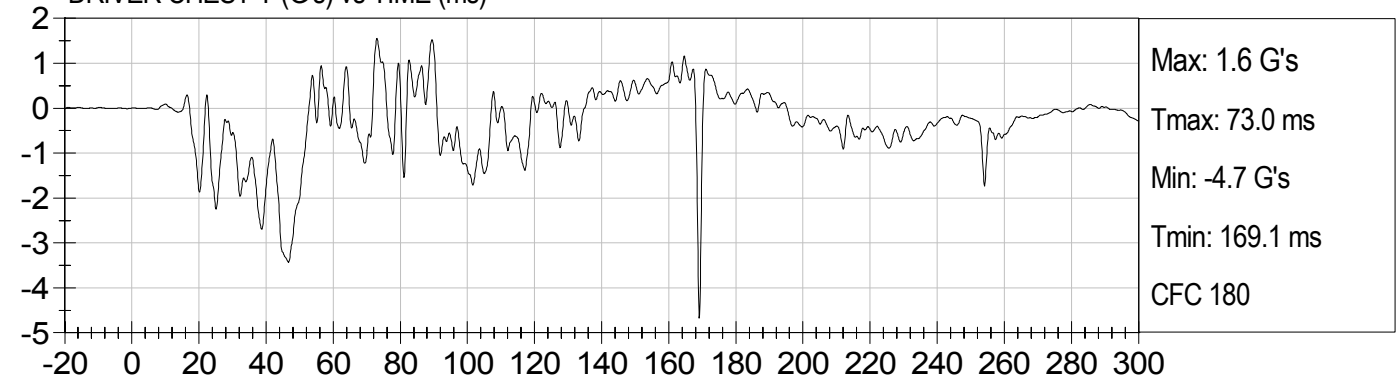




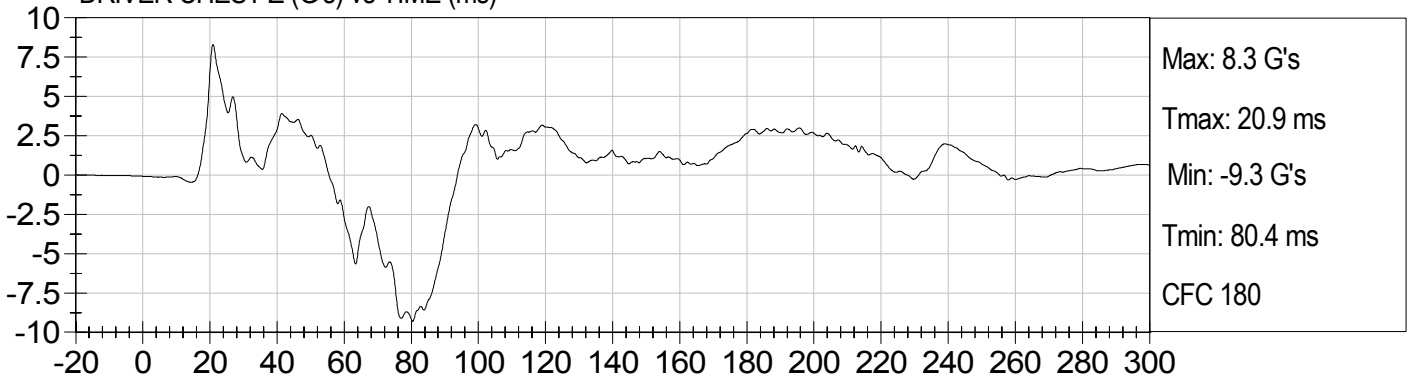
DRIVER CHEST X (G's) vs TIME (ms)



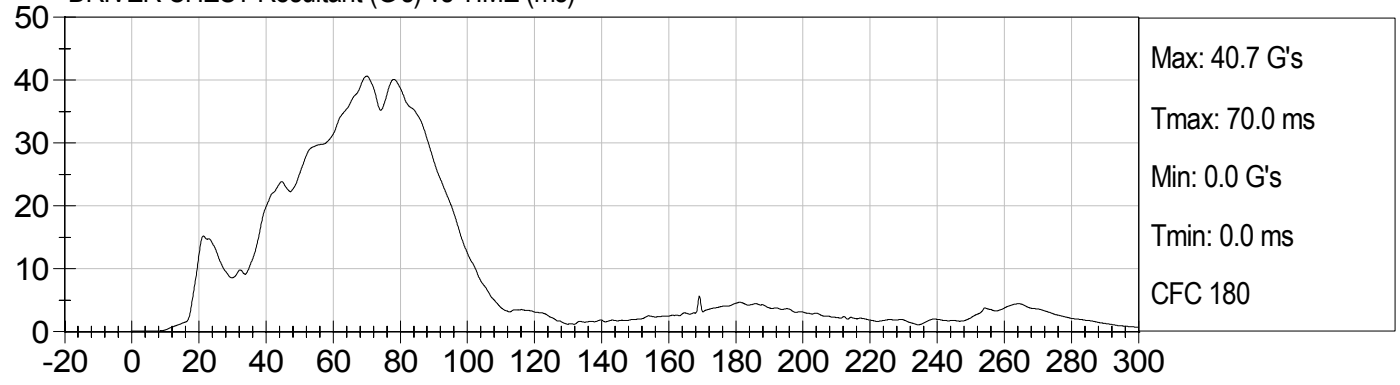
DRIVER CHEST Y (G's) vs TIME (ms)



DRIVER CHEST Z (G's) vs TIME (ms)

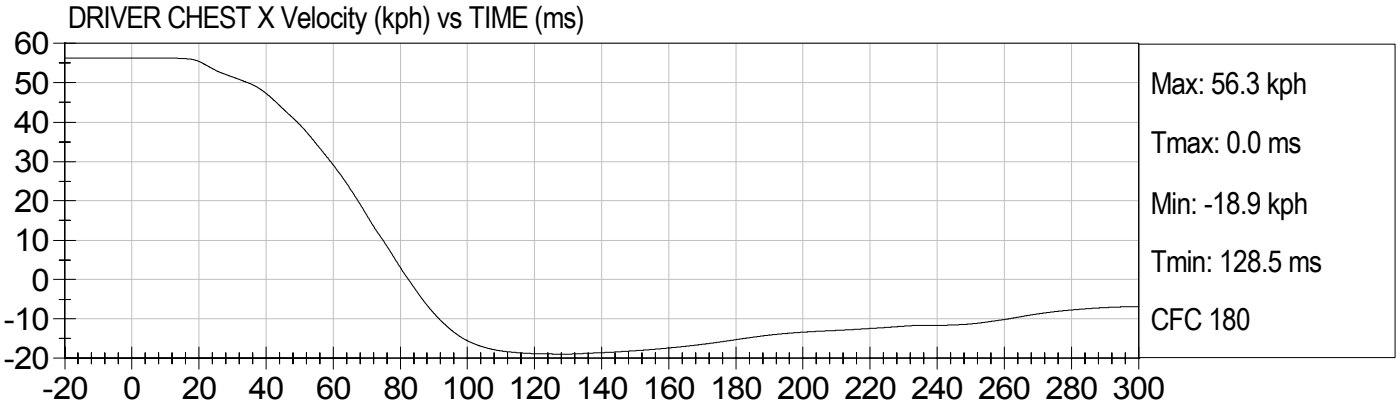


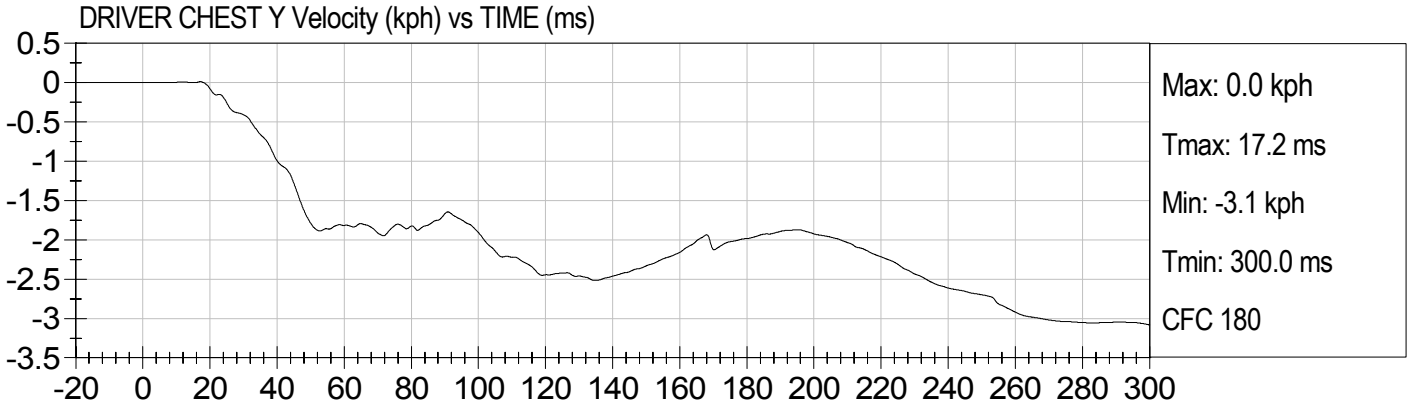
DRIVER CHEST Resultant (G's) vs TIME (ms)

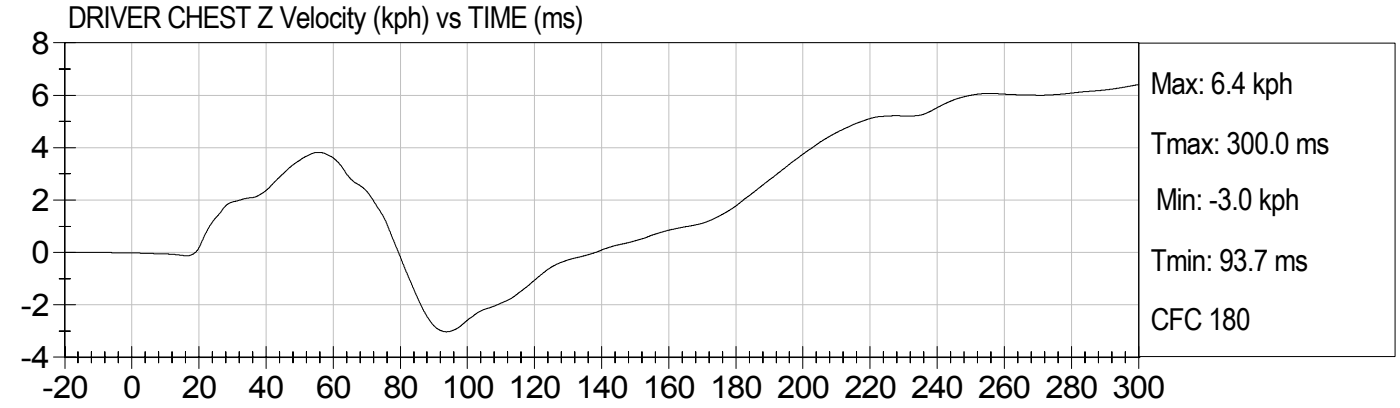


35MPH NCAP FRONTAL
2006 HONDA CIVIC LX (M65300)

Test Date: 12/13/2005
Speed: 35.0 mph (56.3 km/h)

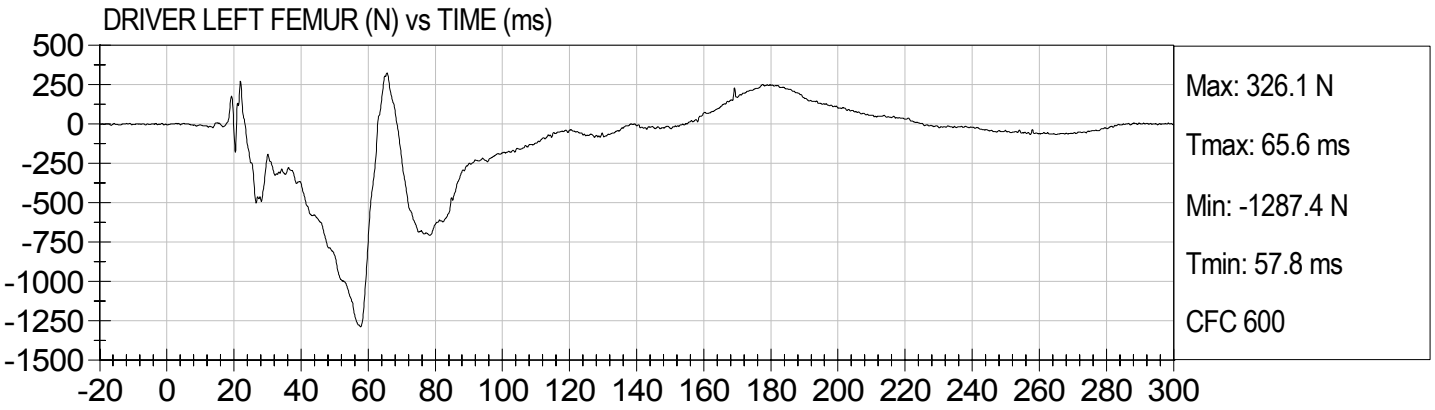


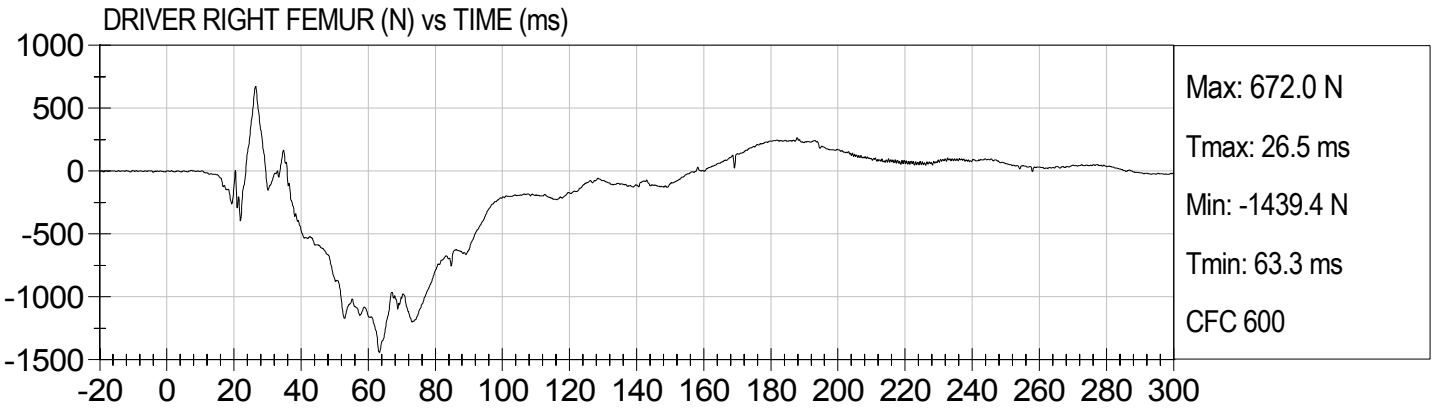




35MPH NCAP FRONTAL
2006 HONDA CIVIC LX (M65300)

Test Date: 12/13/2005
Speed: 35.0 mph (56.3 km/h)

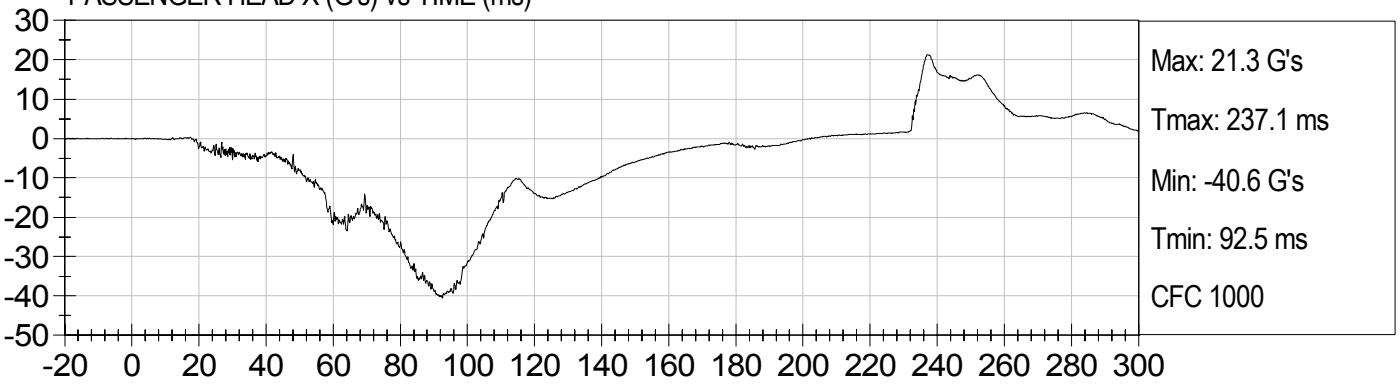




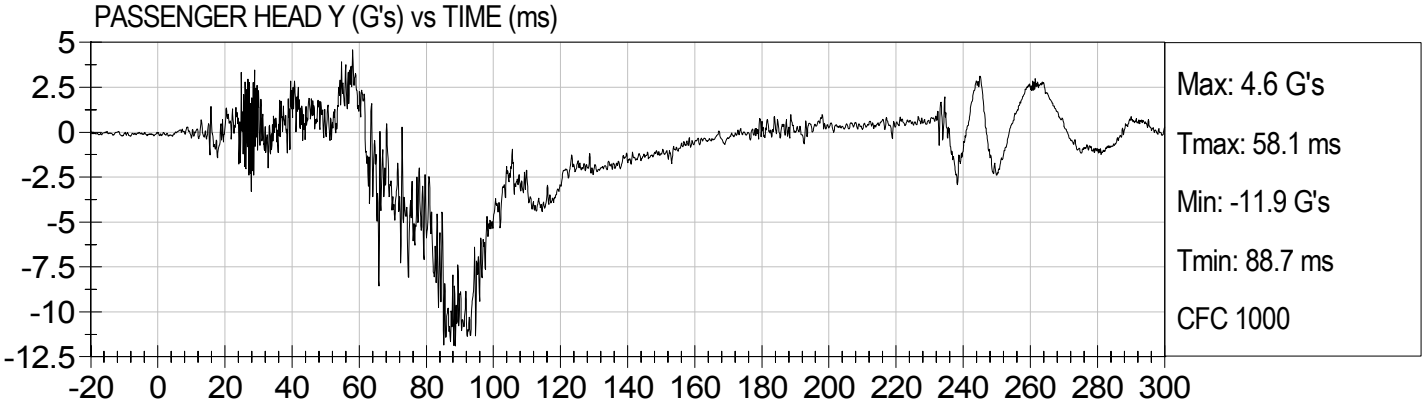
35MPH NCAP FRONTAL
2006 HONDA CIVIC LX (M65300)

Test Date: 12/13/2005
Speed: 35.0 mph (56.3 km/h)

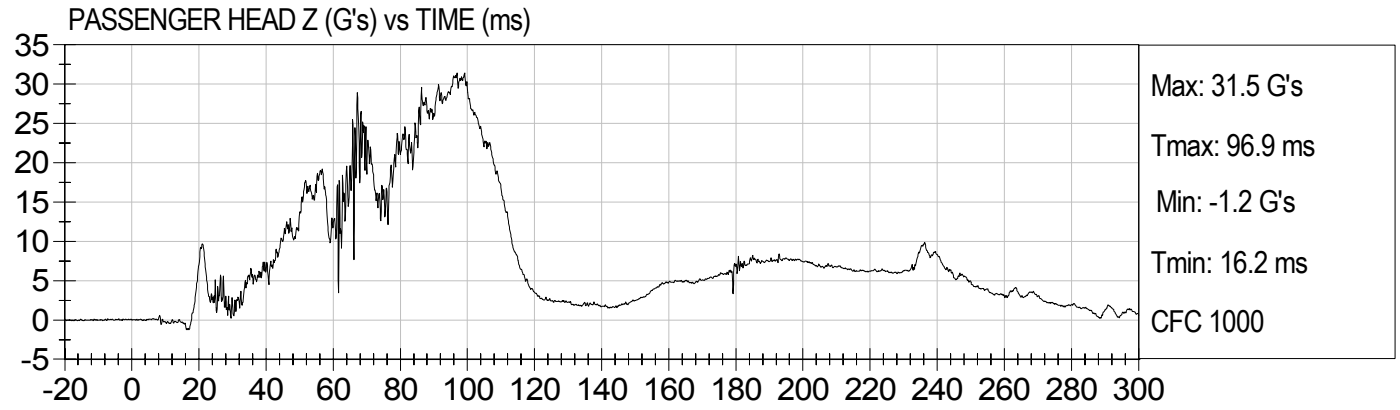
PASSENGER HEAD X (G's) vs TIME (ms)



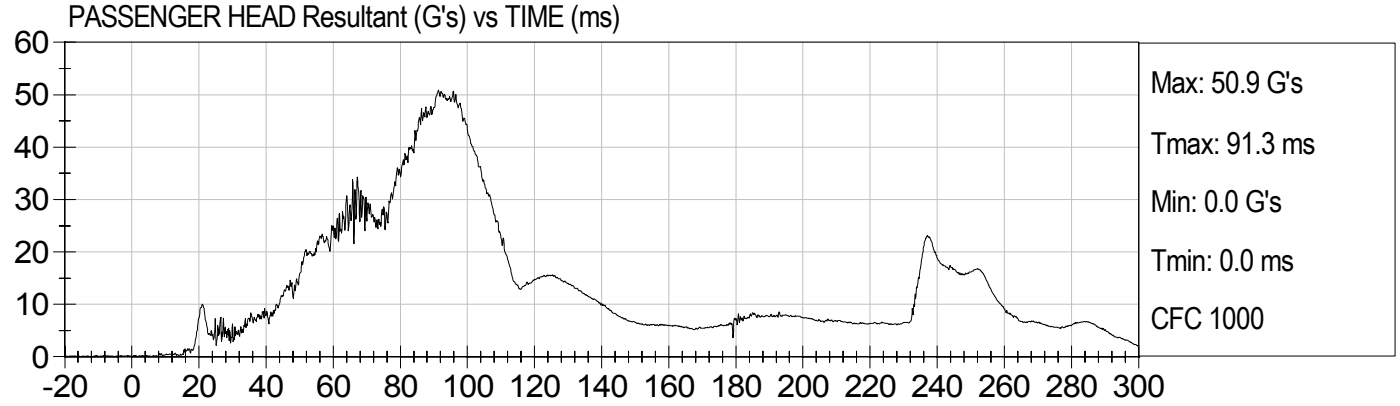
PASSENGER HEAD Y (G's) vs TIME (ms)

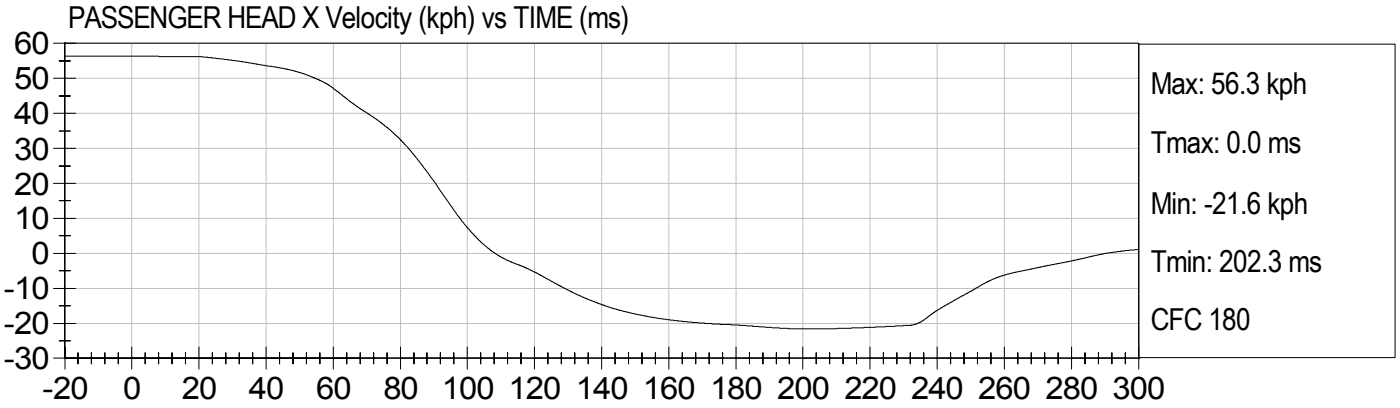


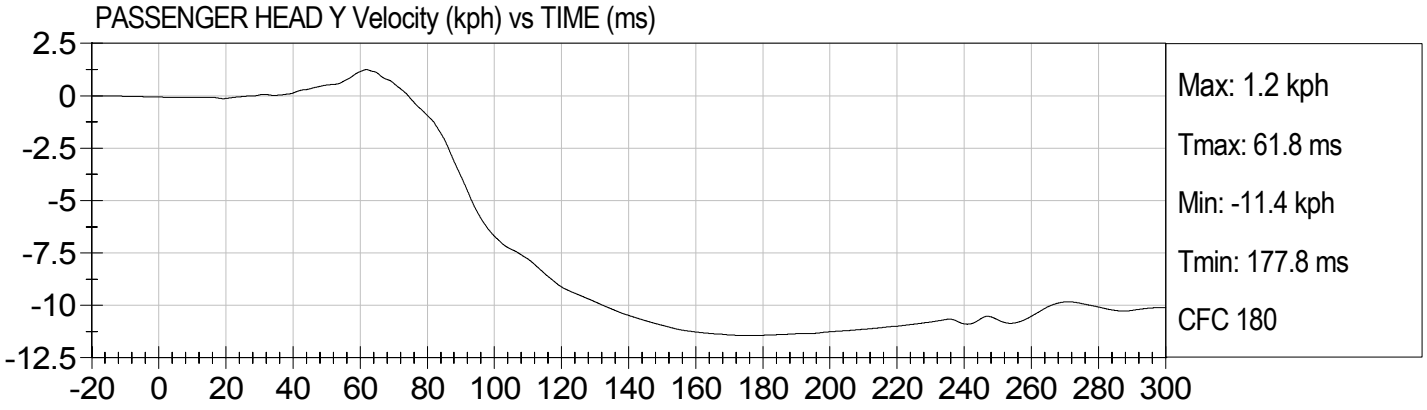
PASSENGER HEAD Z (G's) vs TIME (ms)

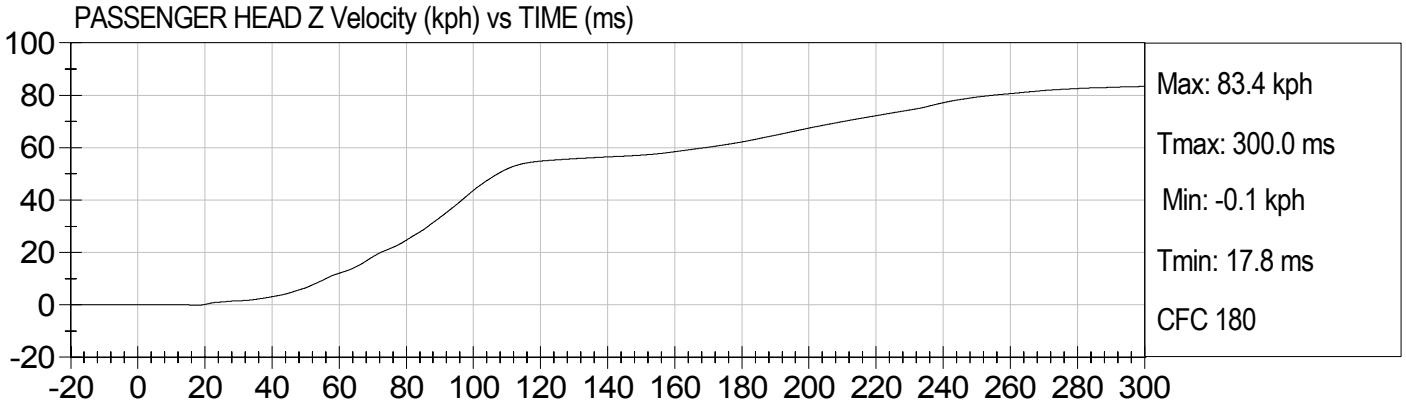


PASSENGER HEAD Resultant (G's) vs TIME (ms)




PASSENGER HEAD X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-30
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.3 kph
Tmax: 0.0 ms
Min: -21.6 kph
Tmin: 202.3 ms
CFC 180

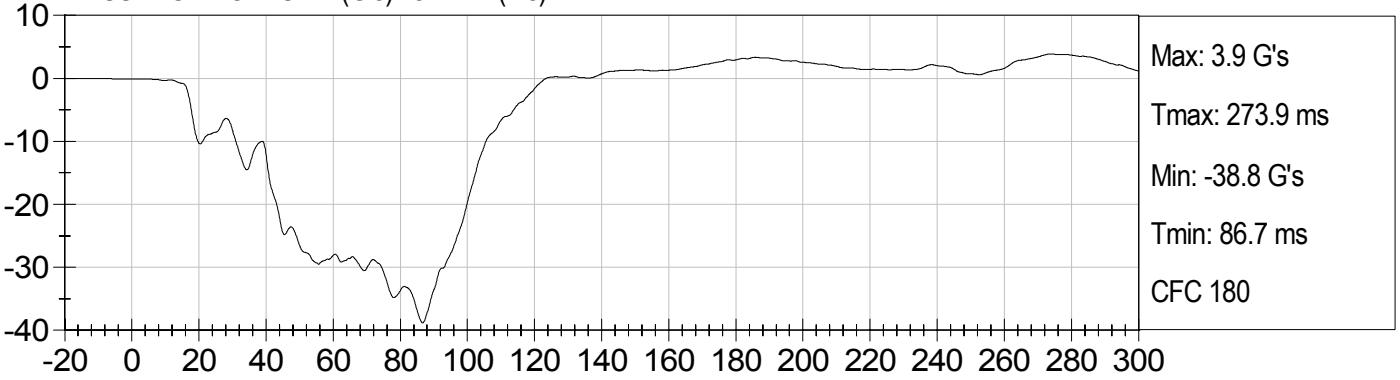

PASSENGER HEAD Y Velocity (kph) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.2 kph
Tmax: 61.8 ms
Min: -11.4 kph
Tmin: 177.8 ms
CFC 180


PASSENGER HEAD Z Velocity (kph) vs TIME (ms)
100
80
60
40
20
0
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 83.4 kph
Tmax: 300.0 ms
Min: -0.1 kph
Tmin: 17.8 ms
CFC 180

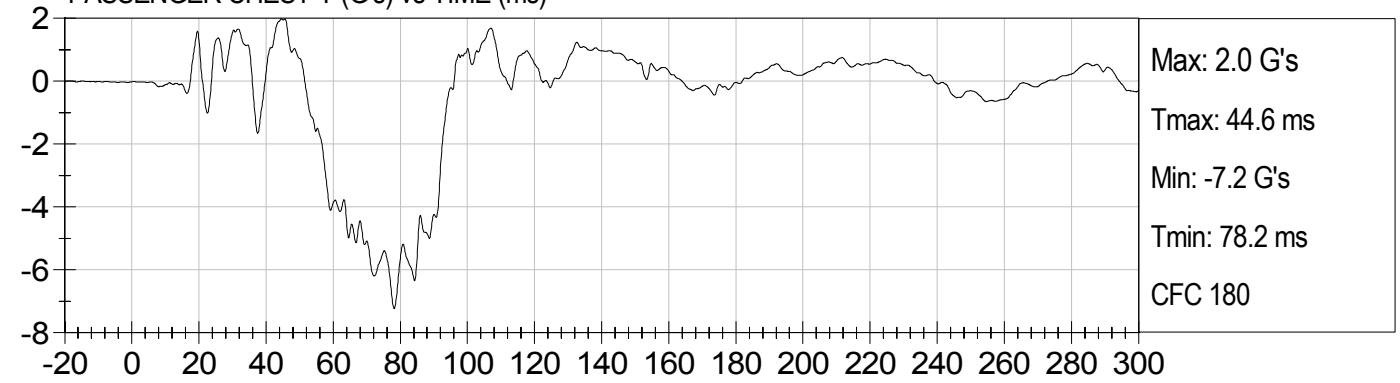
35MPH NCAP FRONTAL
2006 HONDA CIVIC LX (M65300)

Test Date: 12/13/2005
Speed: 35.0 mph (56.3 km/h)

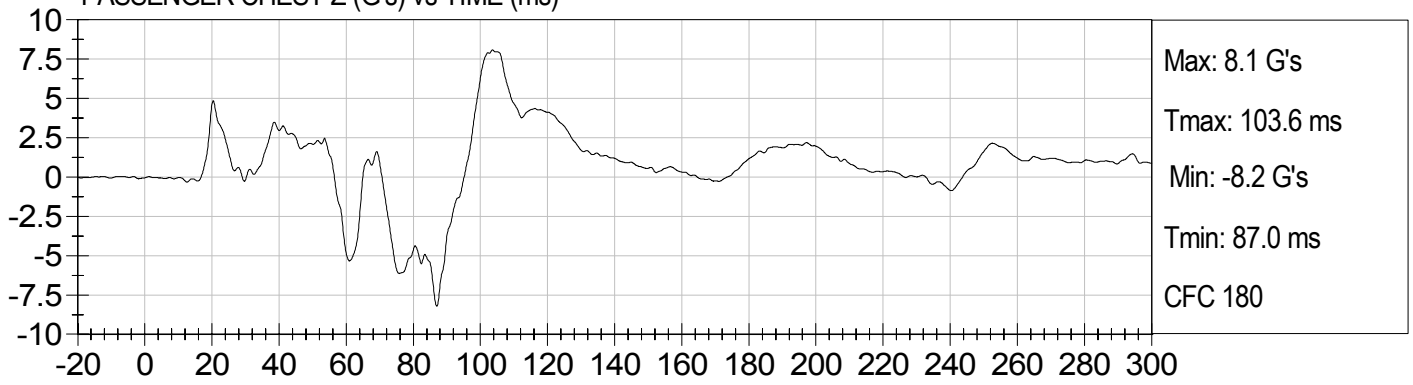
PASSENGER CHEST X (G's) vs TIME (ms)



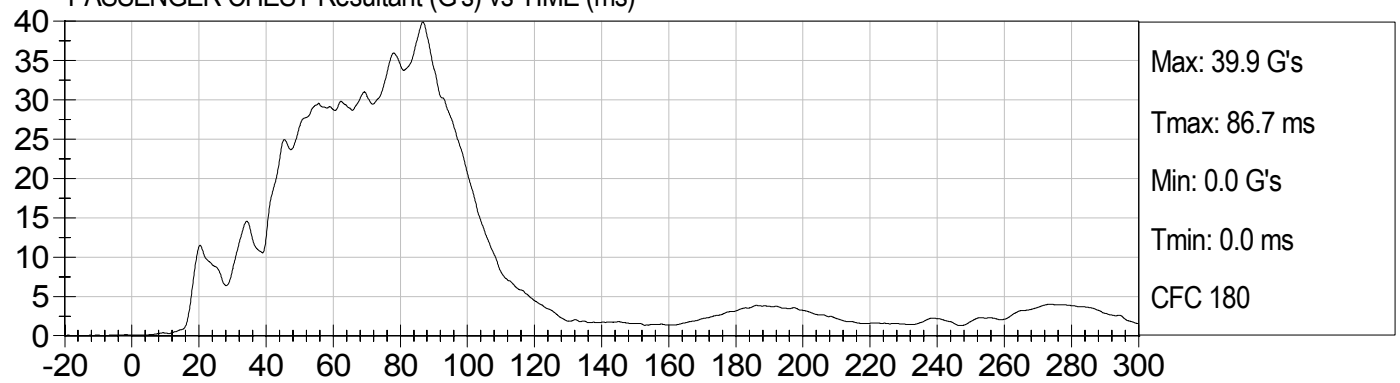
PASSENGER CHEST Y (G's) vs TIME (ms)

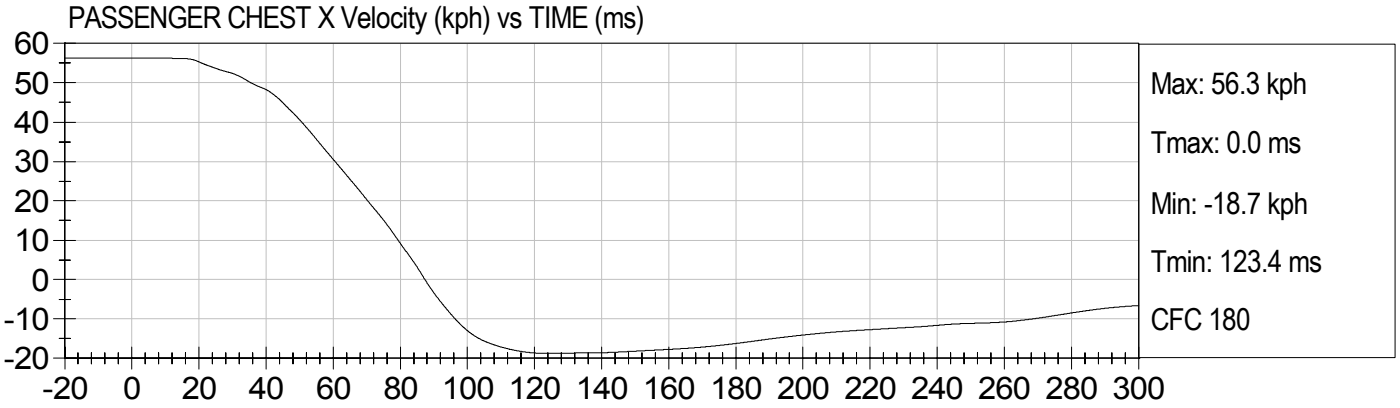


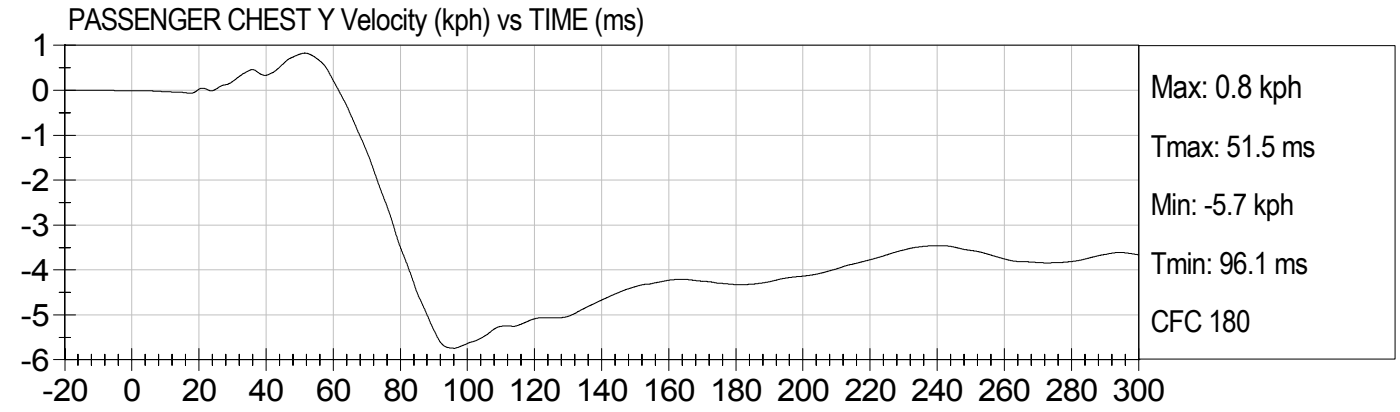
PASSENGER CHEST Z (G's) vs TIME (ms)

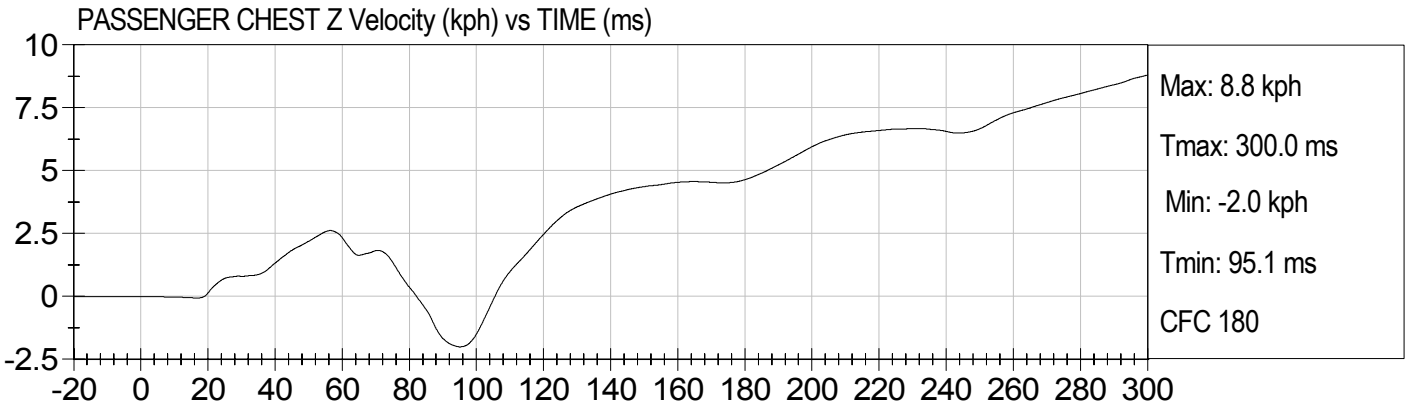


PASSENGER CHEST Resultant (G's) vs TIME (ms)



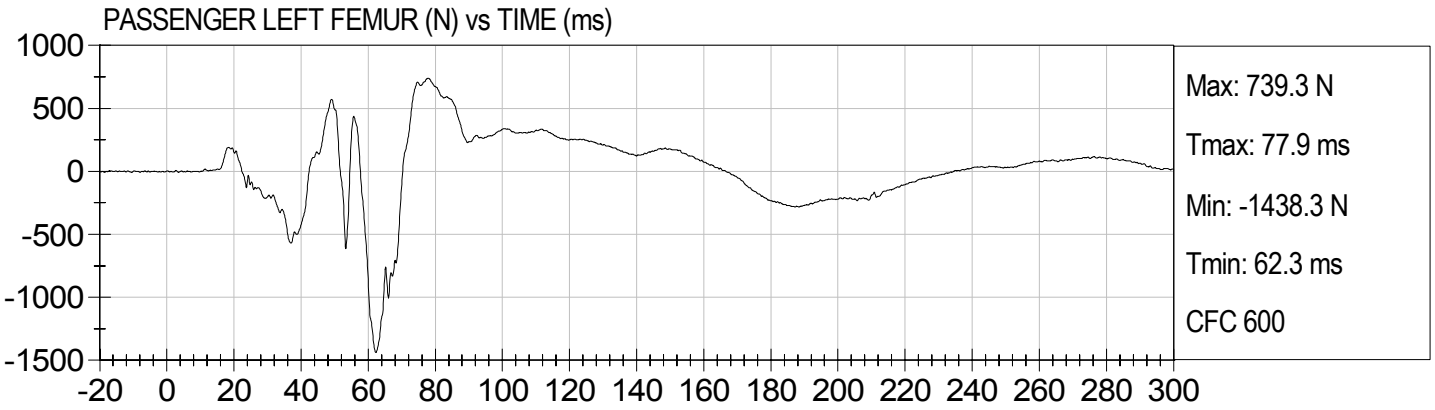

PASSENGER CHEST X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.3 kph
Tmax: 0.0 ms
Min: -18.7 kph
Tmin: 123.4 ms
CFC 180

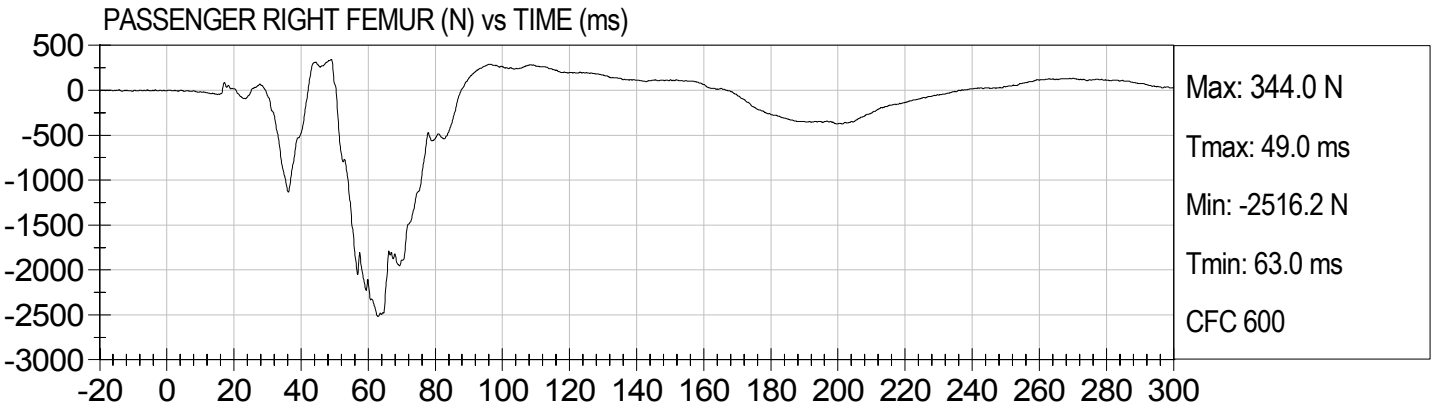

PASSENGER CHEST Y Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-5
-6
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.8 kph
Tmax: 51.5 ms
Min: -5.7 kph
Tmin: 96.1 ms
CFC 180


PASSENGER CHEST Z Velocity (kph) vs TIME (ms)
10
7.5
5
2.5
0
-2.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 8.8 kph
Tmax: 300.0 ms
Min: -2.0 kph
Tmin: 95.1 ms
CFC 180

35MPH NCAP FRONTAL
2006 HONDA CIVIC LX (M65300)

Test Date: 12/13/2005
Speed: 35.0 mph (56.3 km/h)





APPENDIX C

DUMMY CALIBRATION DATA

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test ID:** D053021

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.4	Pass
Laboratory Relative Humidity	%	10 to 70	18.0	Pass
Peak Resultant Acceleration	G's	225 - 275	260	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	11.7	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

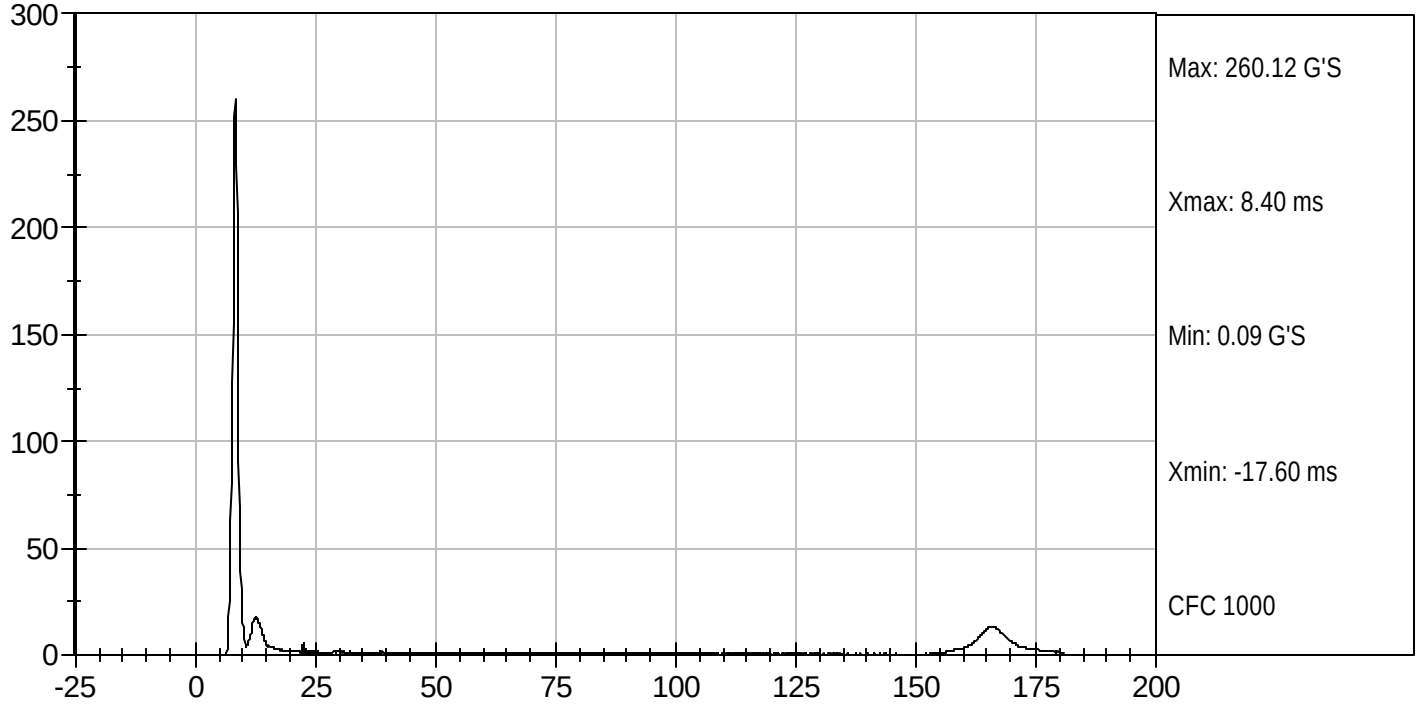
11/16/2005
Test Date

Approved By

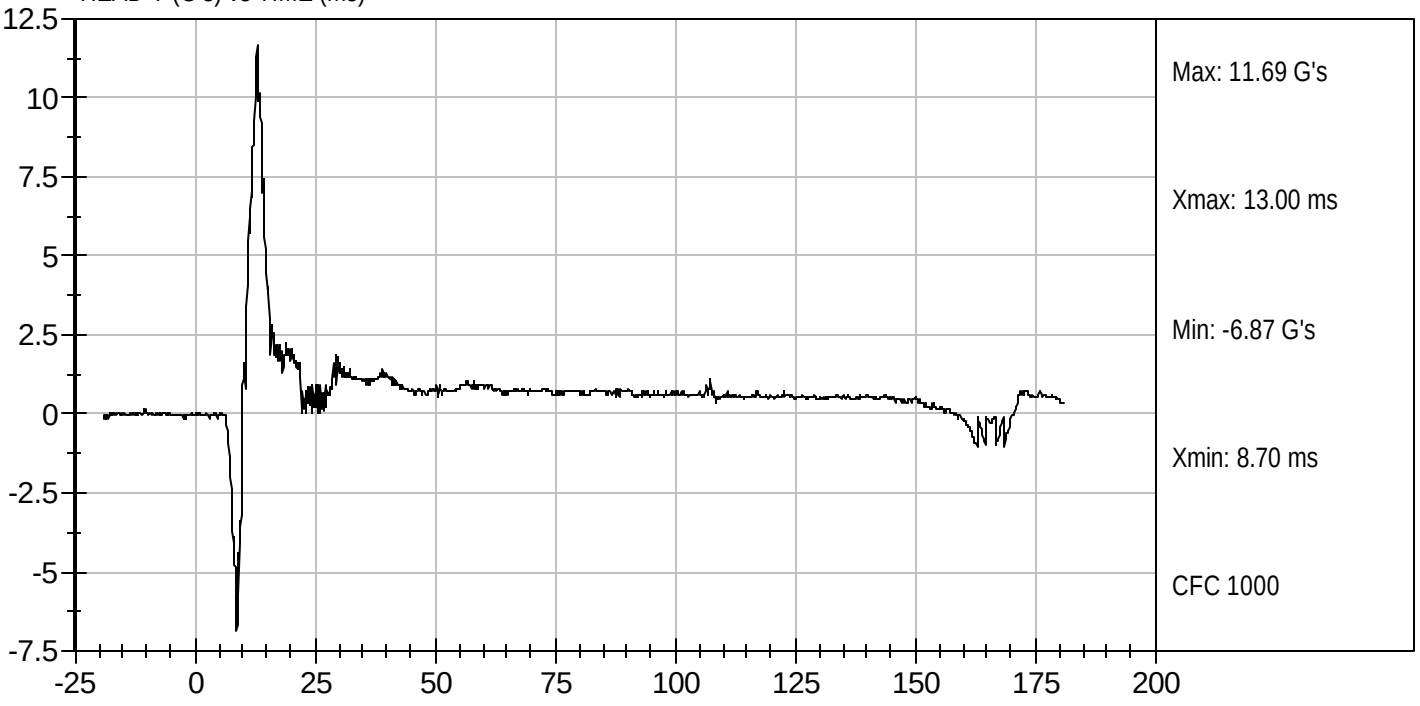
Test Desc: Head Drop
Componet ID: D053021

Test Date: 11/16/2005
Velocity: 0 ft/s, 0.00 m/s

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)



HEAD Y (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053022

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	21	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.07	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	23.65	Pass
	20 msec	G's	17.60 to 22.60	19.41	Pass
	30 msec	G's	12.50 to 18.50	14.28	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.23	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	39.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.9	Pass
	Time	msec	57.0 to 64.0	60.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	114.2	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	94.6	Pass
	Time	msec	47.0 to 58.0	52.7	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	102.1	Pass
			Overall Test Results		Pass

Laboratory Technician

11/17/2005
Test Date

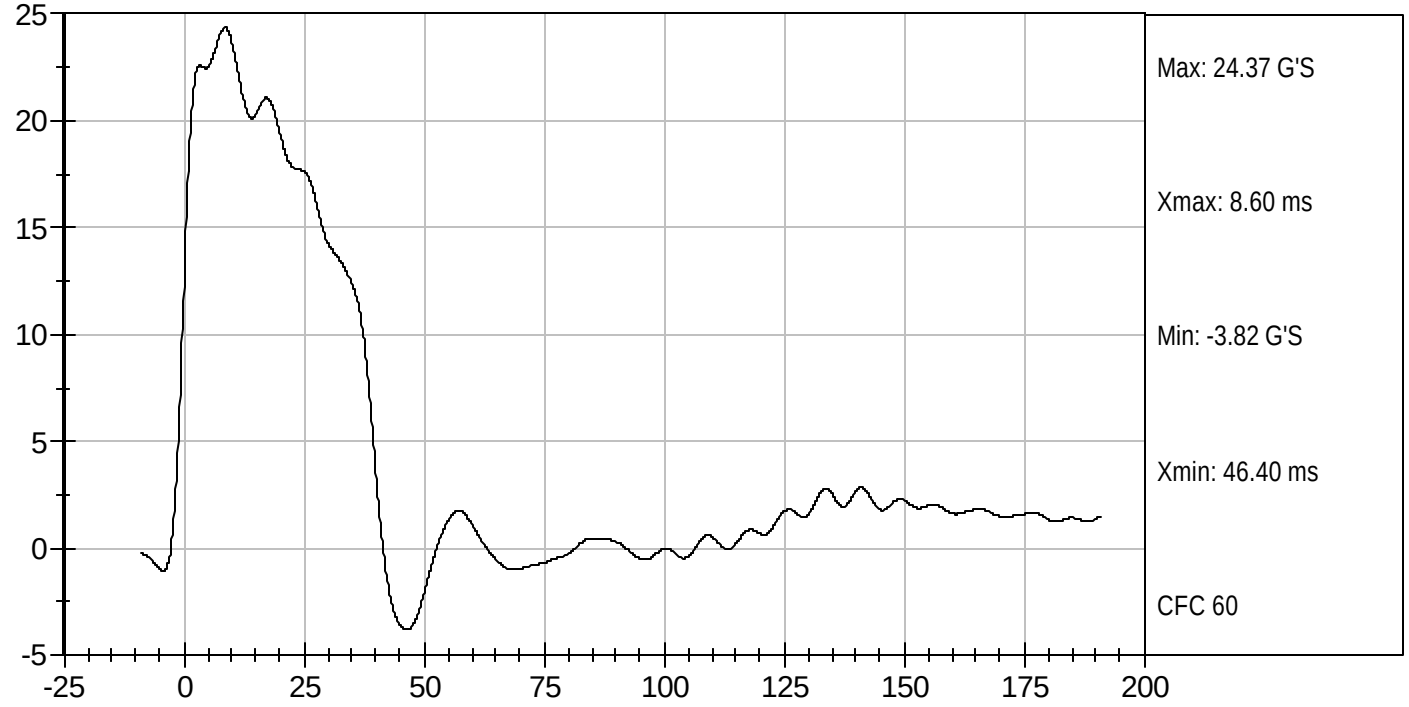
David Winkelbauer

Approved By

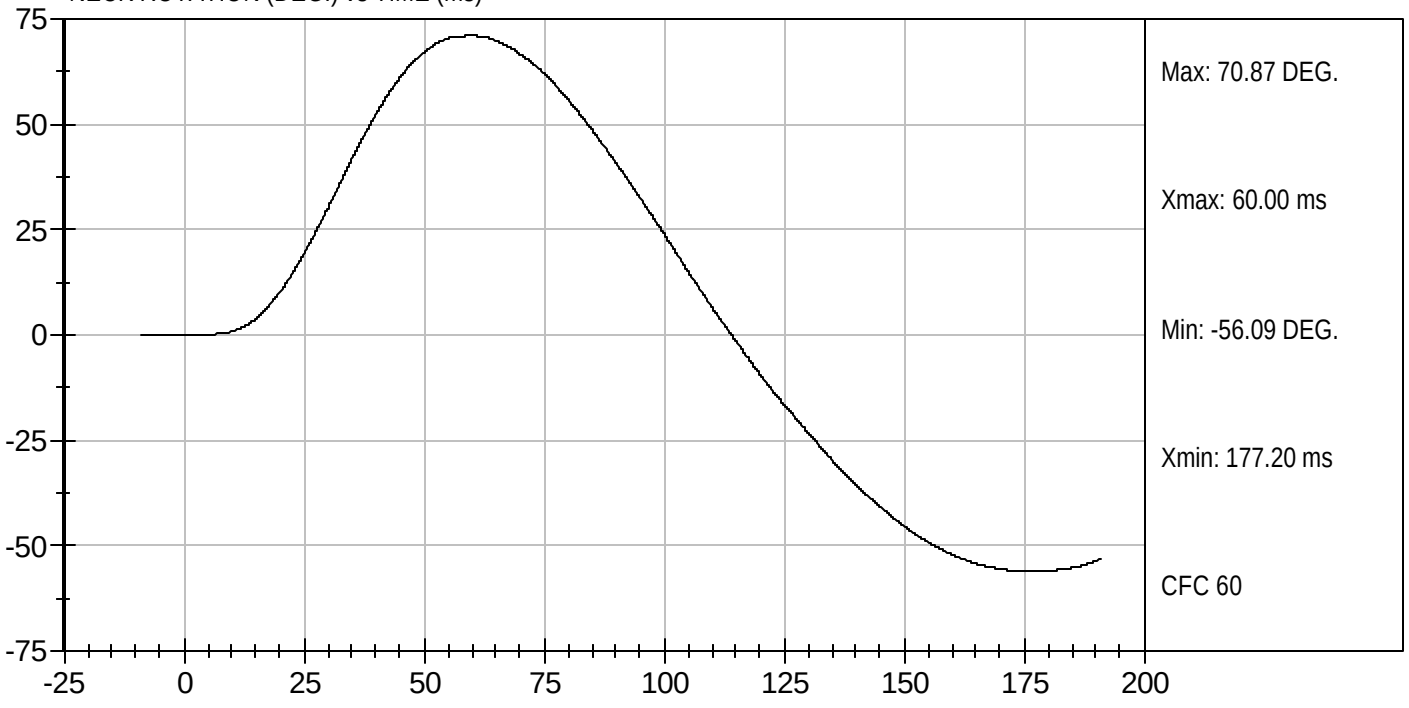
Test Desc: Neck Flexion
Componet ID: D053022

Test Date: 11/17/2005
Velocity: 23.20 ft/s, 7.07 m/s

PENDULUM DECELERATION (G'S) vs TIME (ms)

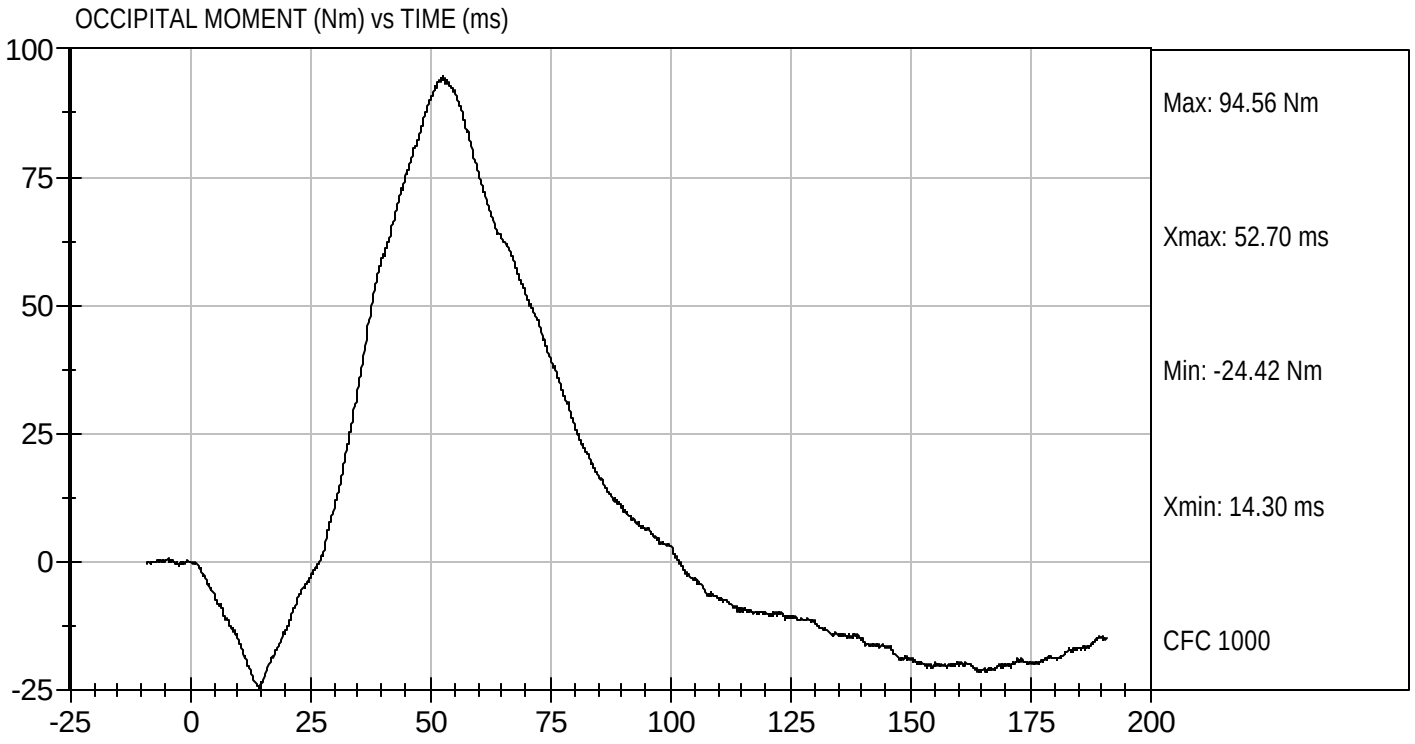


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Componet ID: D053022

Test Date: 11/17/2005
Velocity: 23.20 ft/s, 7.07 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053023

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	21	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.09	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.60	Pass
	20 msec	G's	14.00 to 19.00	16.64	Pass
	30 msec	G's	11.00 to 16.00	12.11	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.08	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	41.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	99.5	Pass
	Time	msec	72.0 to 82.0	80.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	158.3	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-64.9	Pass
	Time	msec	65.0 to 79.0	73.4	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	146.8	Pass
			Overall Test Results		Pass

Laboratory Technician

11/17/2005
Test Date

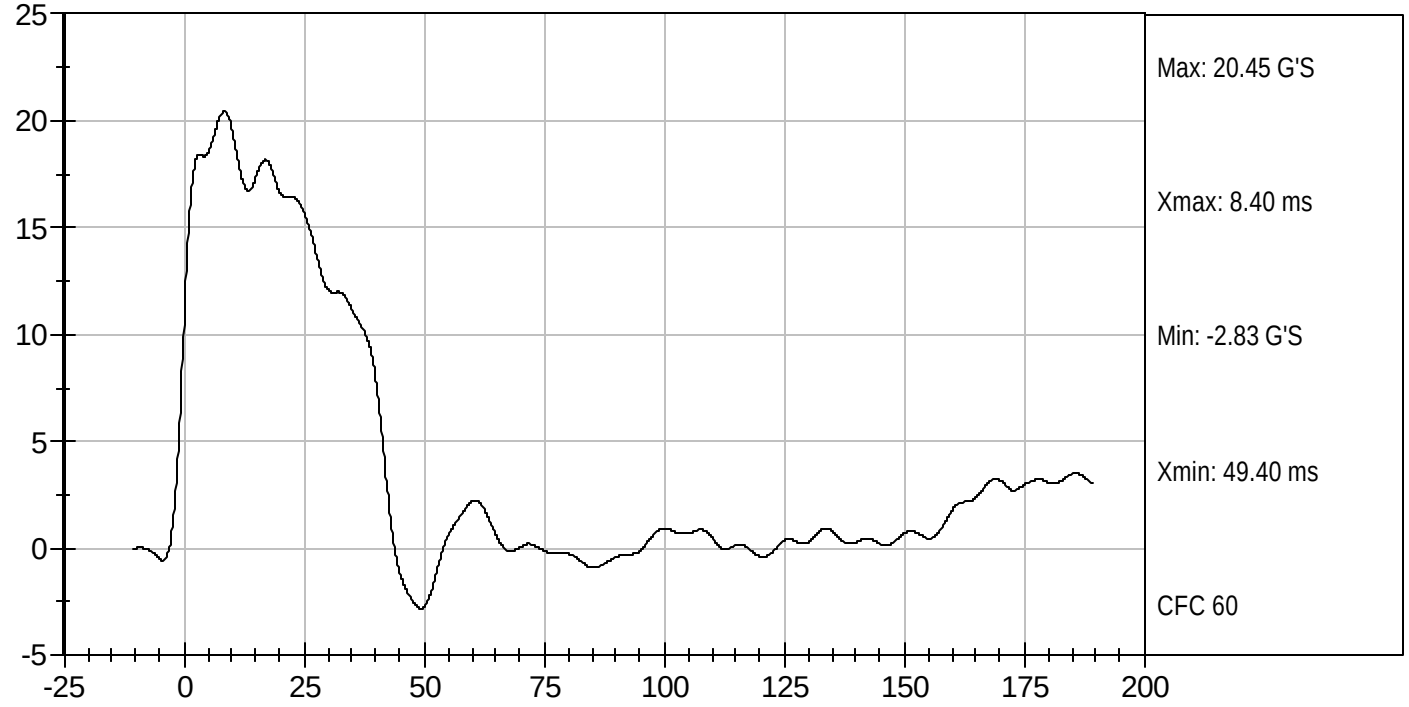
David Winkelbauer

Approved By

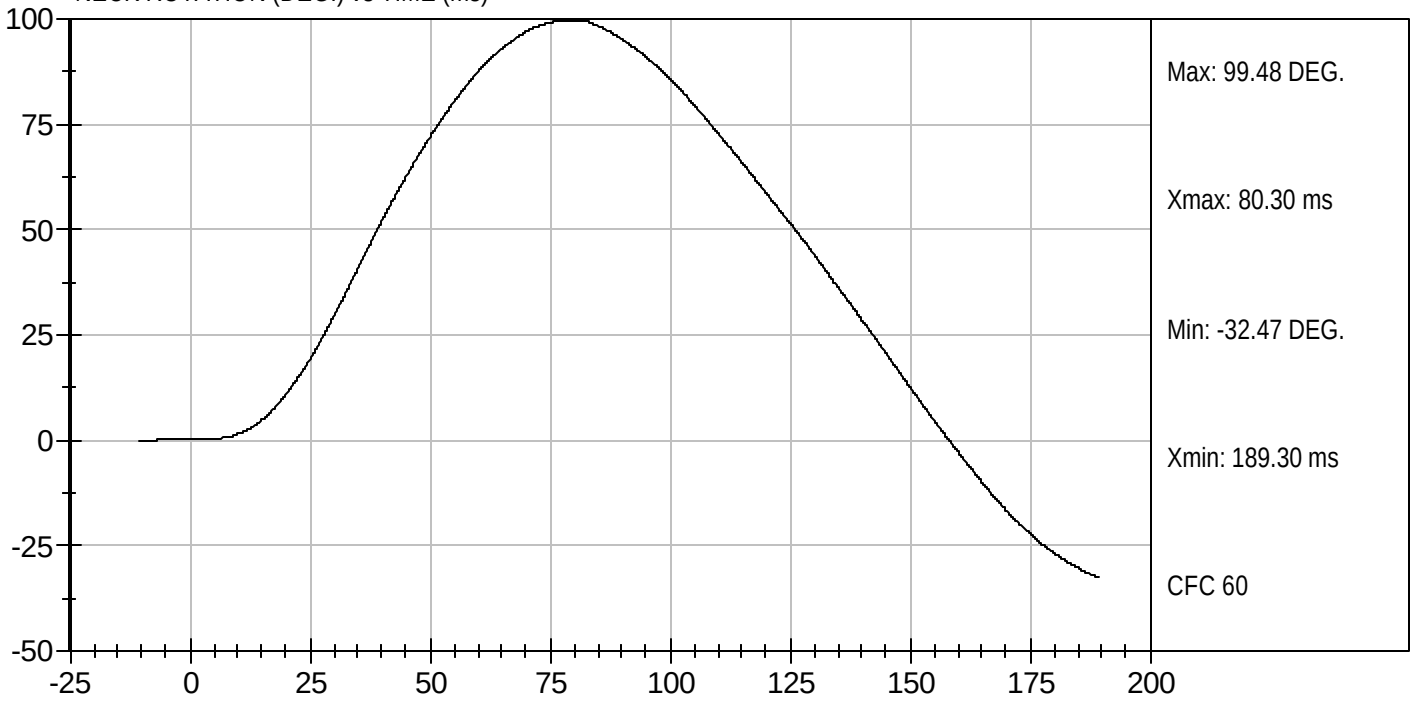
Test Desc: Neck Extension
Componet ID: D053023

Test Date: 11/17/2005
Velocity: 19.97 ft/s, 6.09 m/s

PENDULUM DECELERATION (G'S) vs TIME (ms)

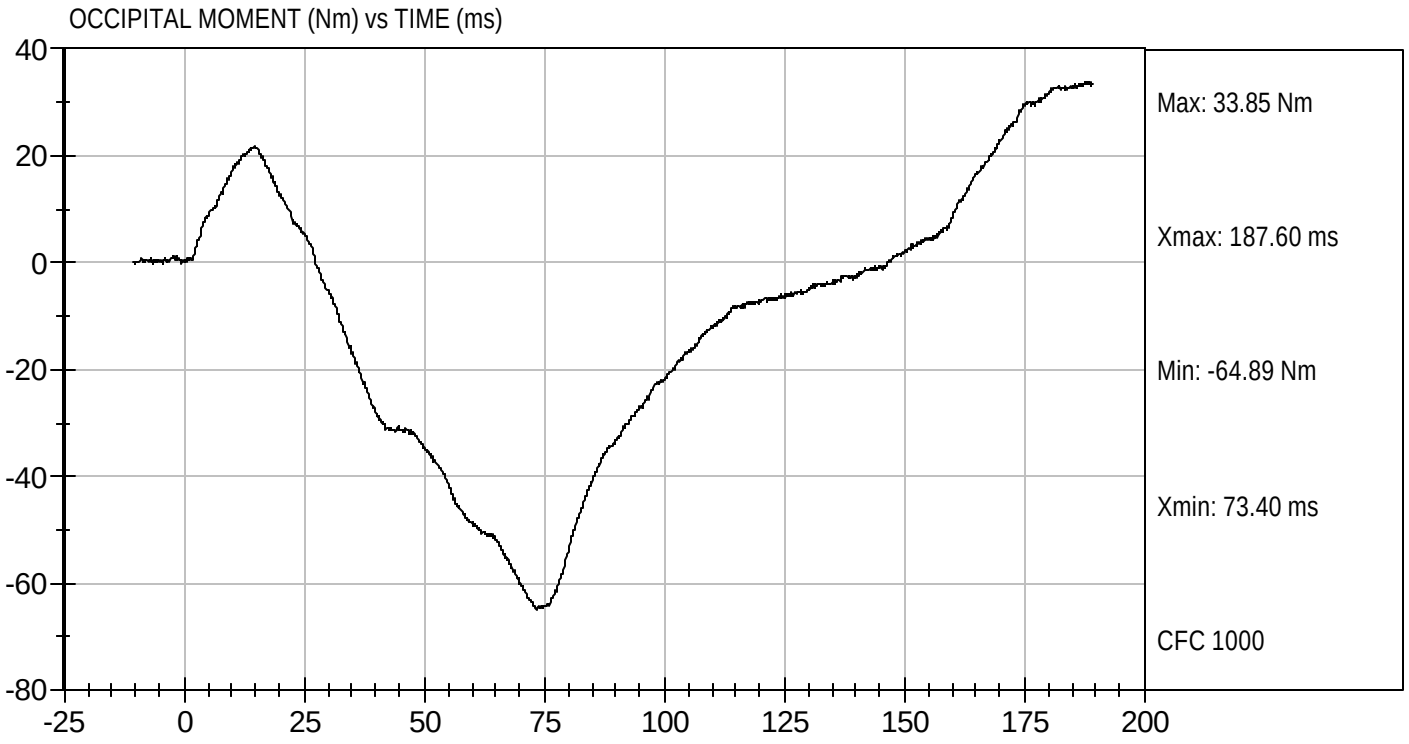


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Componet ID: D053023

Test Date: 11/17/2005
Velocity: 19.97 ft/s, 6.09 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053024

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Probe Velocity	m/s	6.58 to 6.82	6.69	Pass
Peak Probe Force	N	5159 to 5893	5,628	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.03	Pass
Internal Hysteresis	%	69 to 85	71	Pass
		Overall Test Results		Pass

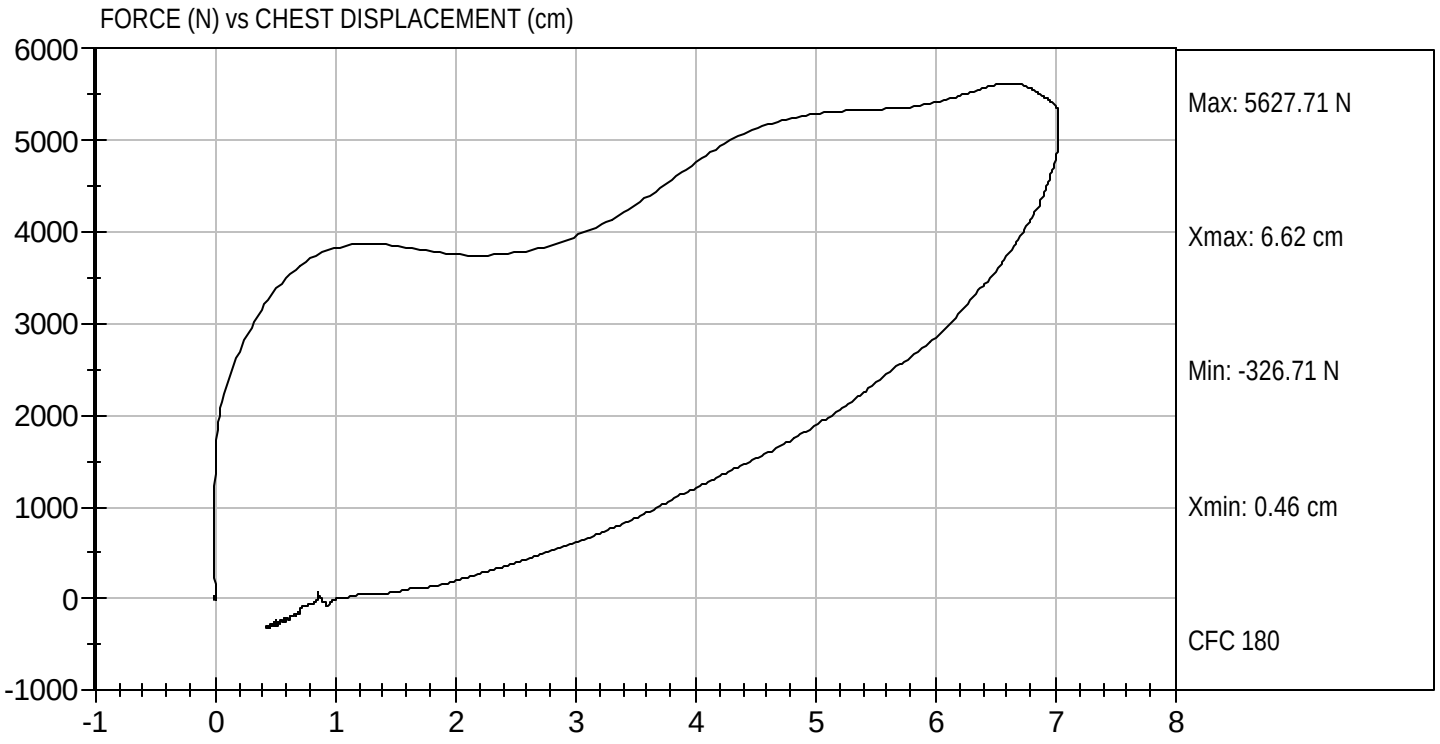
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Componet ID: D053024

Test Date: 11/17/2005
Velocity: 21.96 ft/s, 6.69 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053025

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,824	Pass
		Overall Test Results		Pass

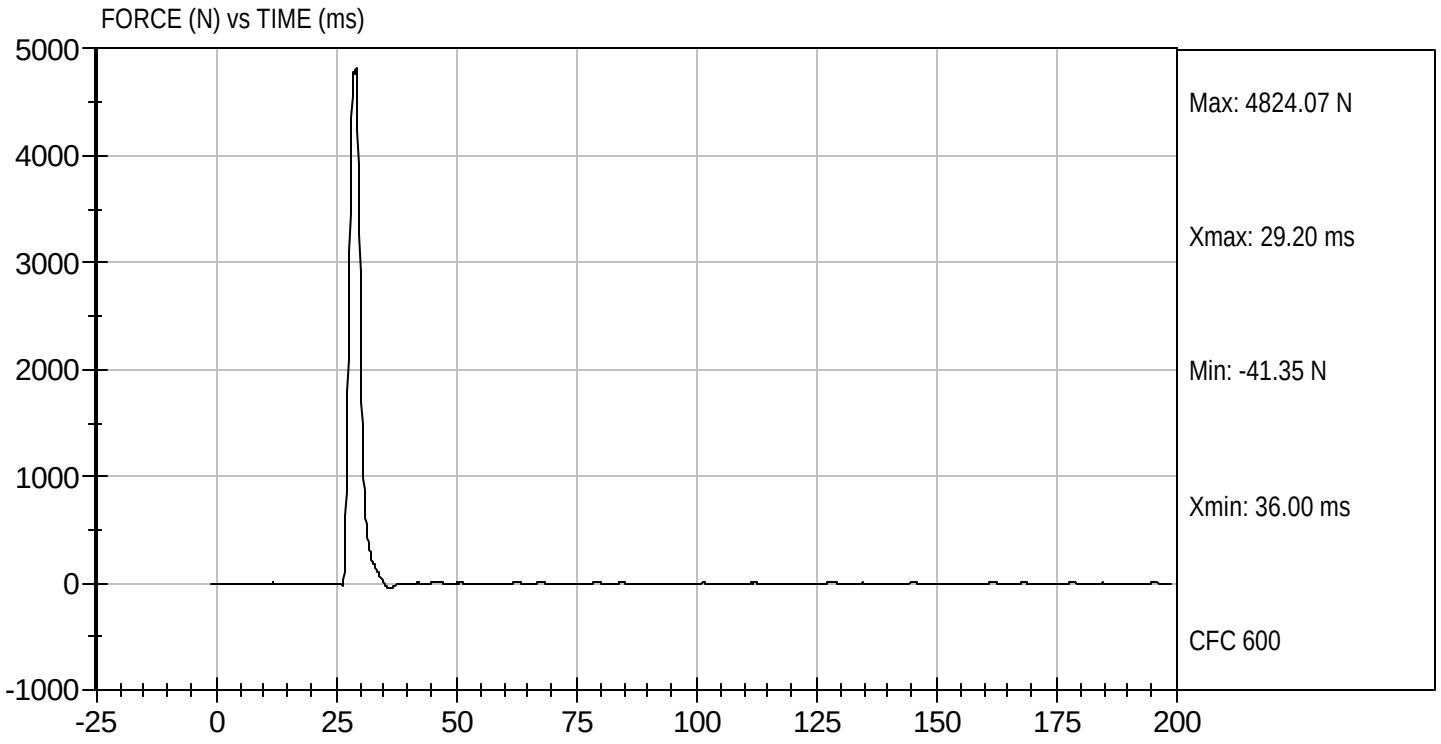
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Componet ID: D053025

Test Date: 11/17/2005
Velocity: 6.9 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053026

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,845	Pass
		Overall Test Results		Pass

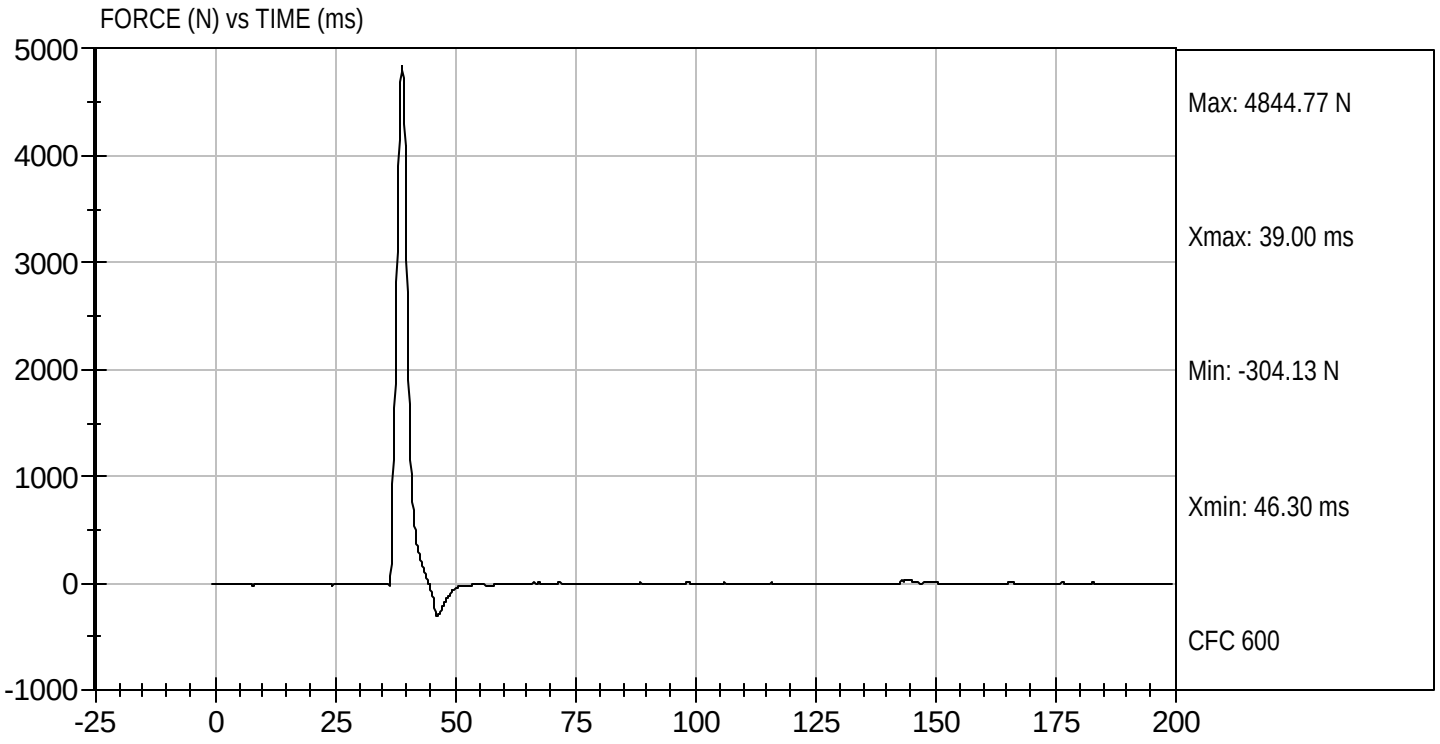
Laboratory Technician

11/17/2005
Test Date

Approved By

Test Desc: Left Knee
Componet ID: D053026

Test Date: 11/17/2005
Velocity: 6.95 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053020

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.7	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	21	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	83.6	93.6	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	44	42	Pass
		Overall Test Results			Pass

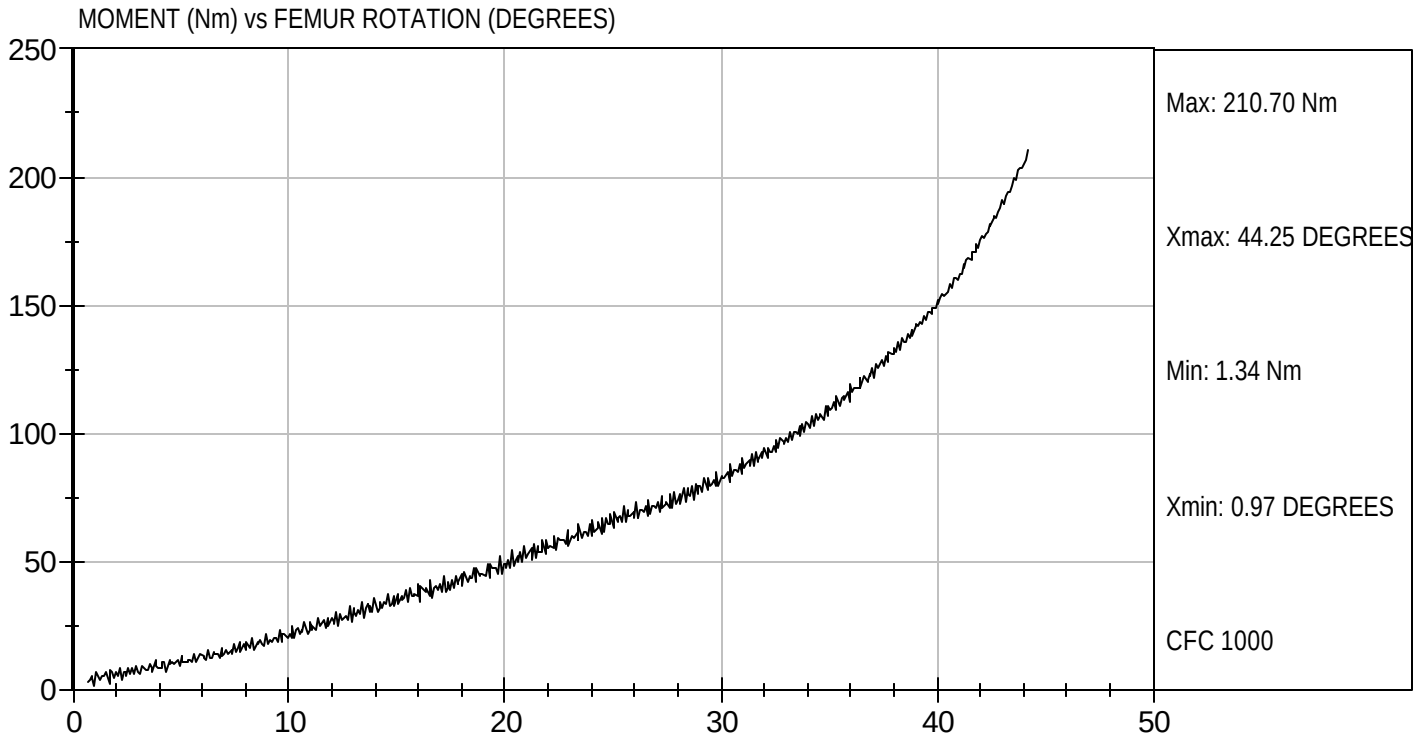
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

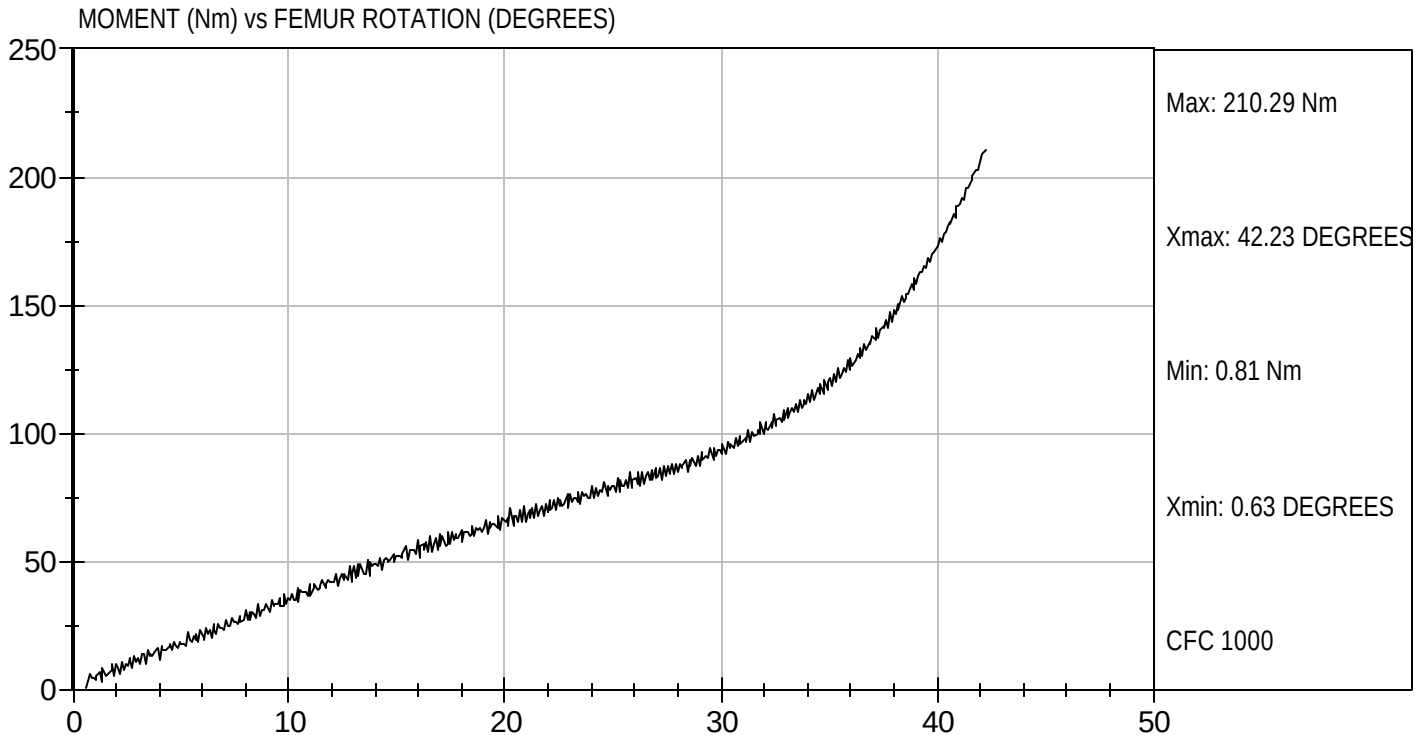
Test Desc: Hip Femur Flexion
Componet ID: D053029

Test Date: 11/17/2005
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Componet ID: D053020

Test Date: 11/17/2005
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test ID:** D053011

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.3	Pass
Laboratory Relative Humidity	%	10 to 70	18.3	Pass
Peak Resultant Acceleration	G's	225 - 275	234	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	13.3	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Tim Brady
Laboratory Technician

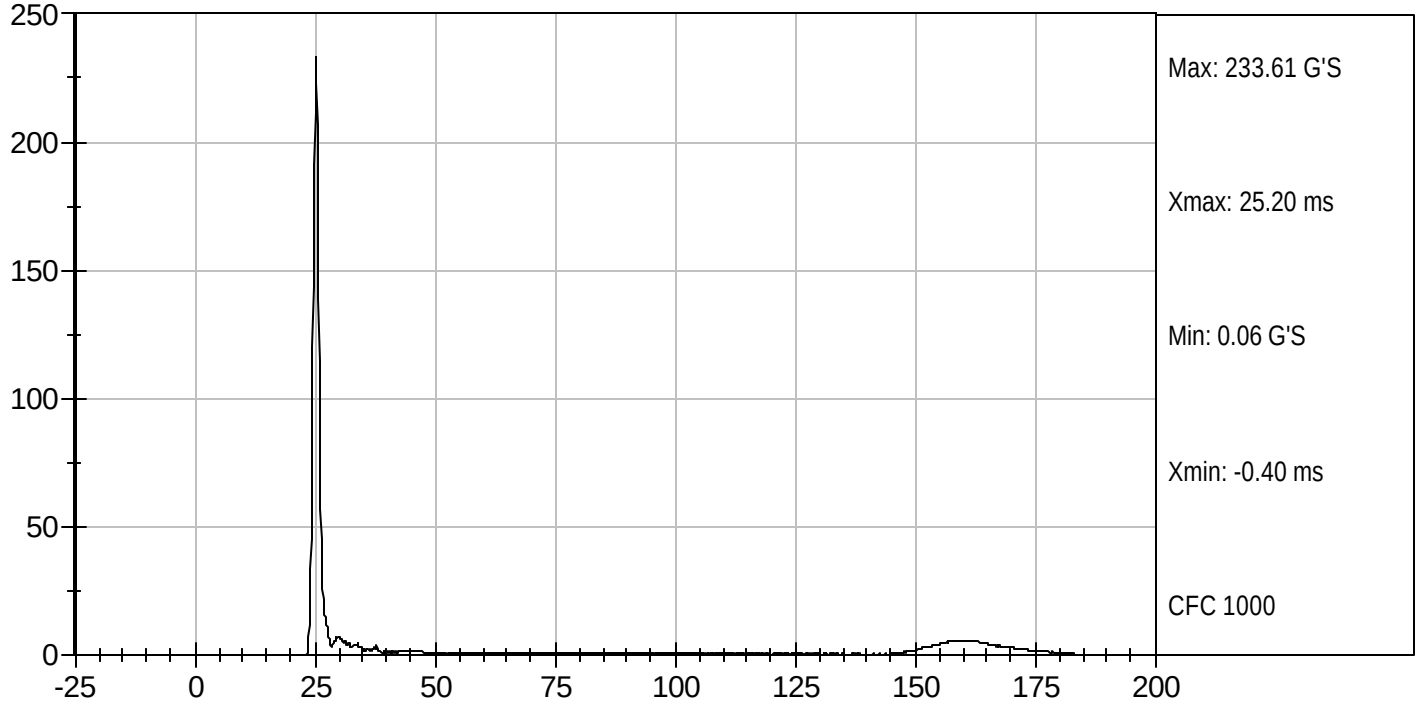
11/16/2005
Test Date

David Winkelbauer
Approved By

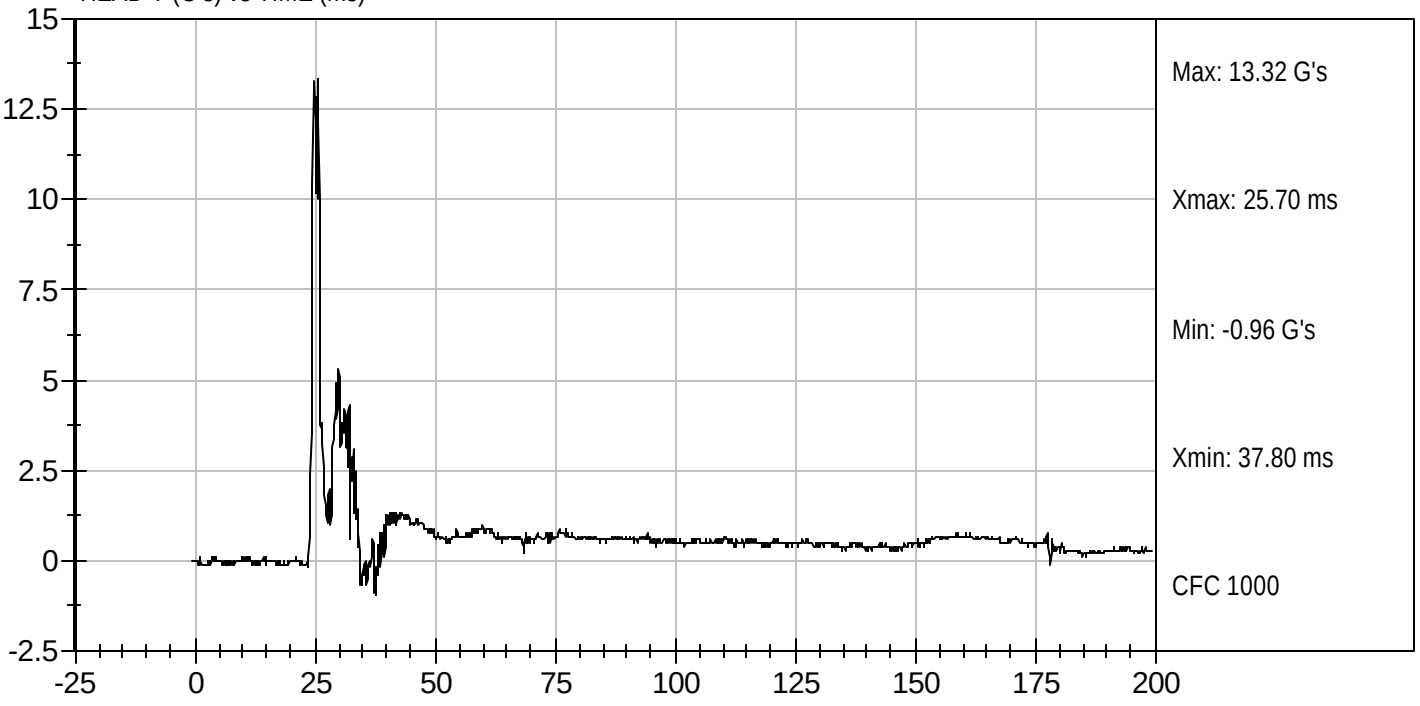
Test Desc: Head Drop
Componet ID: D053011

Test Date: 11/16/2005
Velocity: 0 ft/s, 0.00 m/s

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)



HEAD Y (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053012

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	24.59	Pass
	20 msec	G's	17.60 to 22.60	20.44	Pass
	30 msec	G's	12.50 to 18.50	15.31	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	15.26	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	36.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	71.5	Pass
	Time	msec	57.0 to 64.0	58.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.6	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	96.7	Pass
	Time	msec	47.0 to 58.0	49.9	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	103.1	Pass
			Overall Test Results		Pass

Laboratory Technician

11/16/2005
Test Date

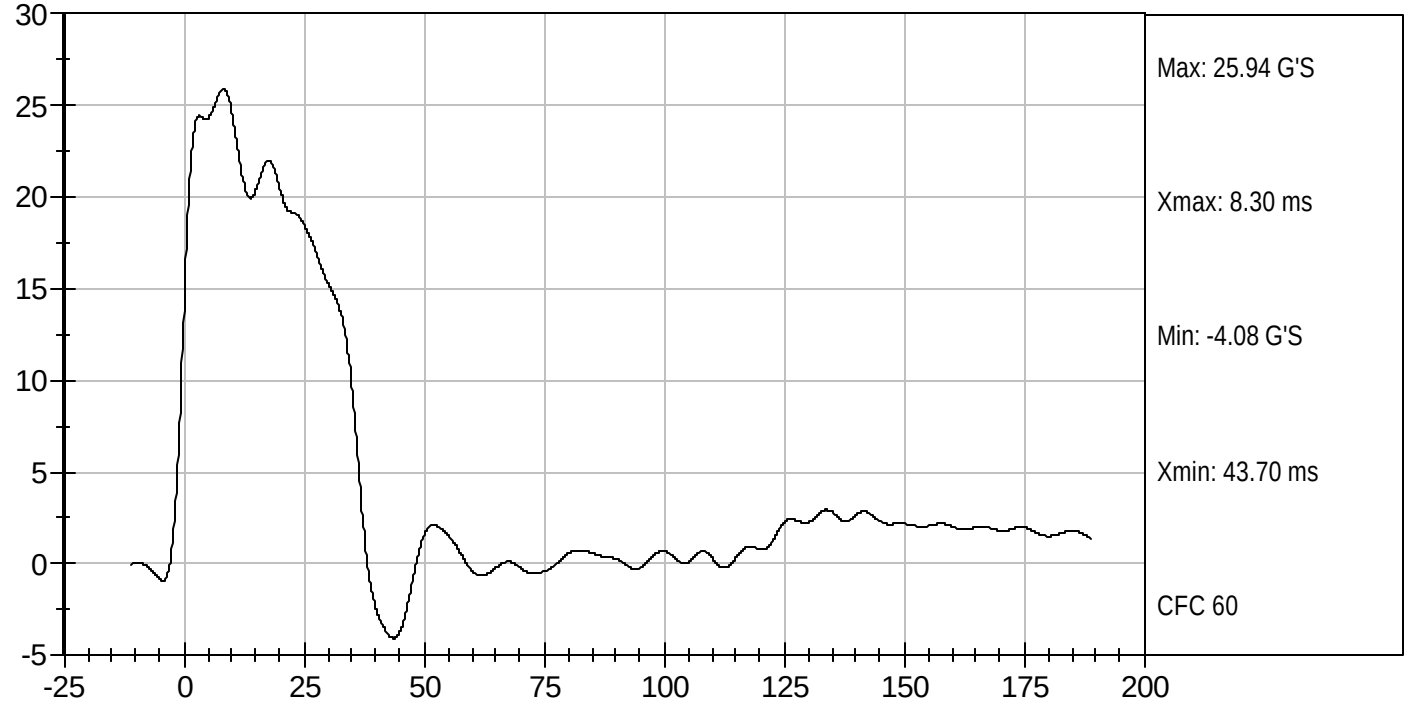
David Winkelbauer

Approved By

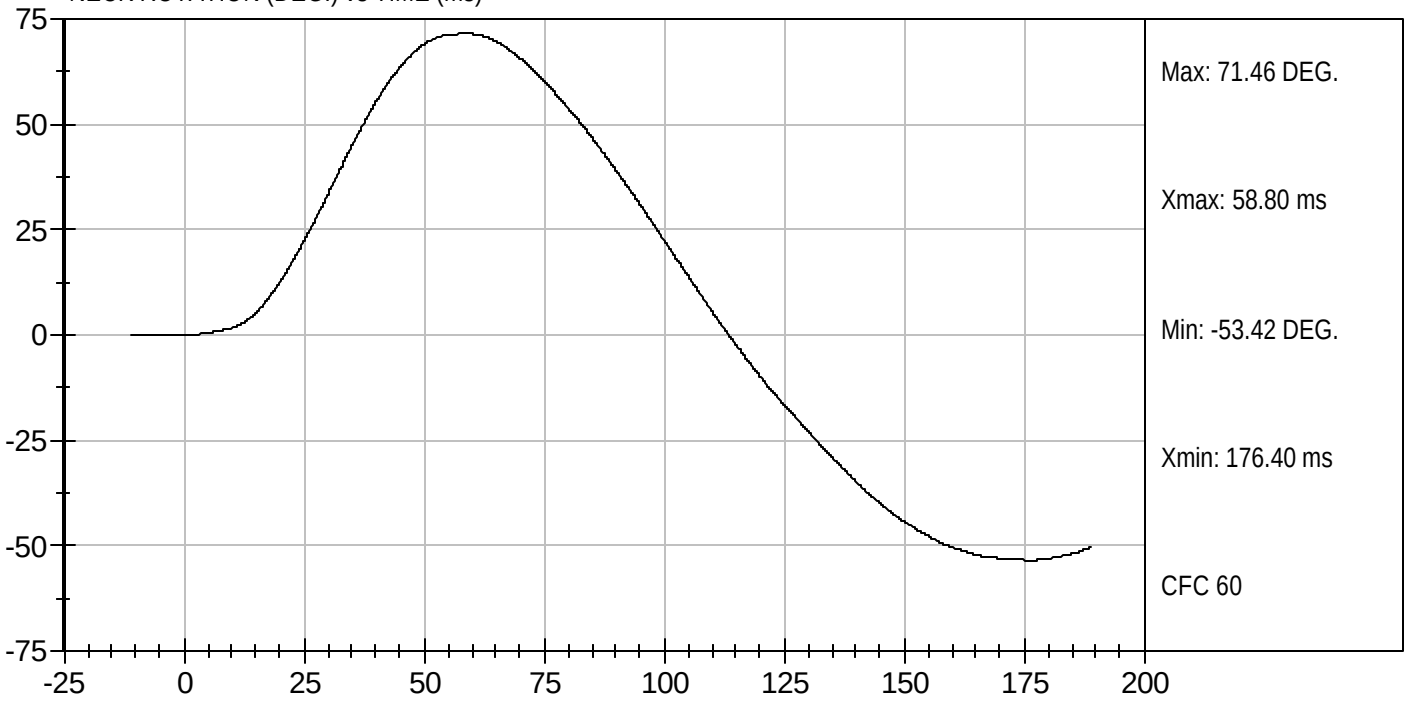
Test Desc: Neck Flexion
Componet ID: D053012

Test Date: 11/16/2005
Velocity: 23.17 ft/s, 7.06 m/s

PENDULUM DECELERATION (G'S) vs TIME (ms)

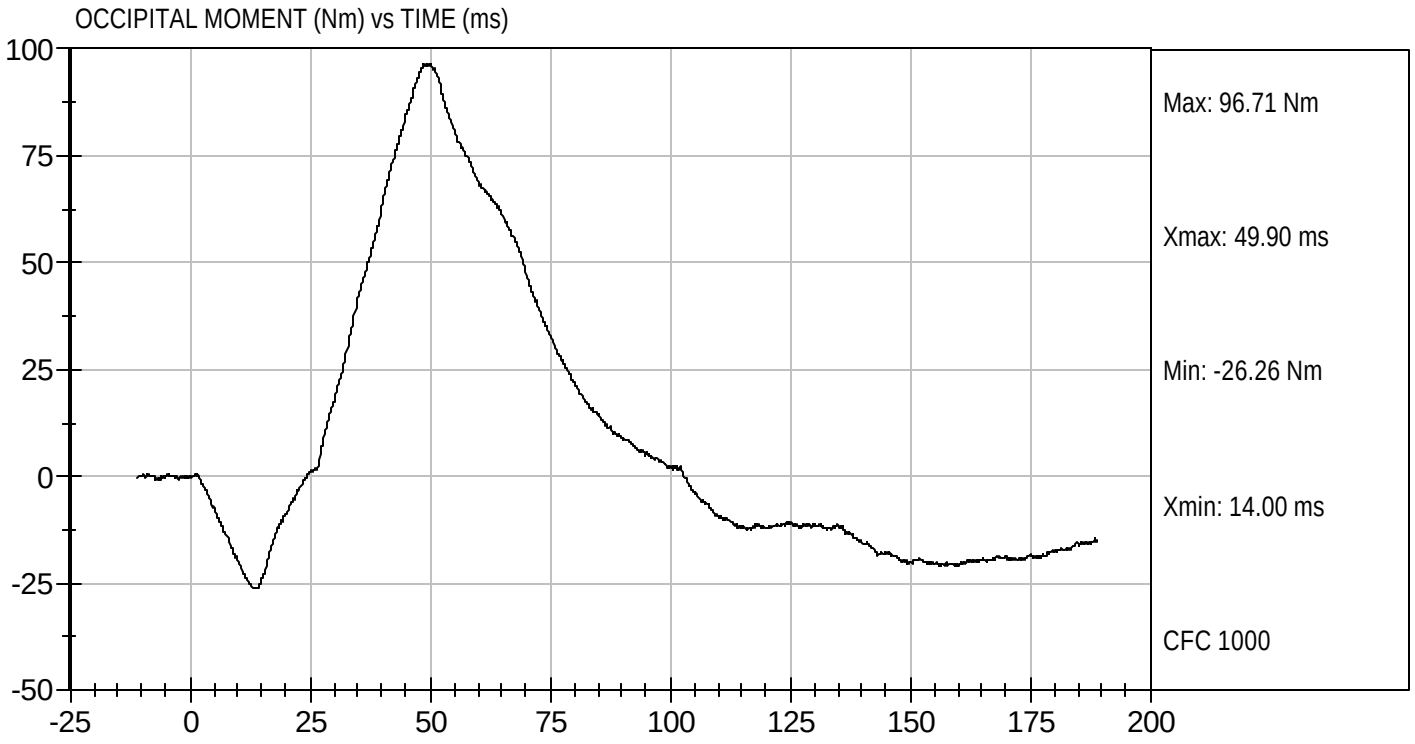


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Componet ID: D053012

Test Date: 11/16/2005
Velocity: 23.17 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053013

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.14	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	17.54	Pass
	20 msec	G's	14.00 to 19.00	15.48	Pass
	30 msec	G's	11.00 to 16.00	11.30	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	11.27	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	46.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.2	Pass
	Time	msec	72.0 to 82.0	81.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	162.1	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-59.5	Pass
	Time	msec	65.0 to 79.0	75.4	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	148.0	Pass
			Overall Test Results		Pass

Laboratory Technician

11/17/2005
Test Date

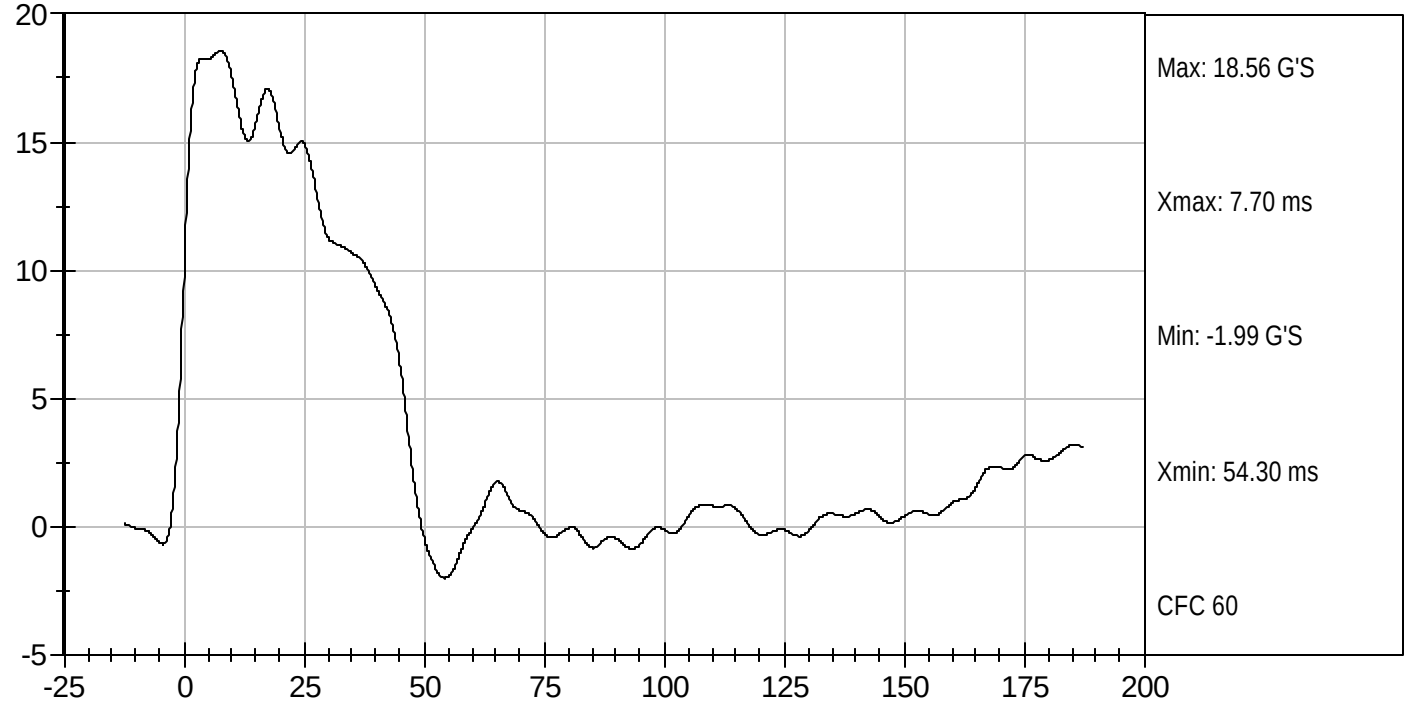
David Winkelbauer

Approved By

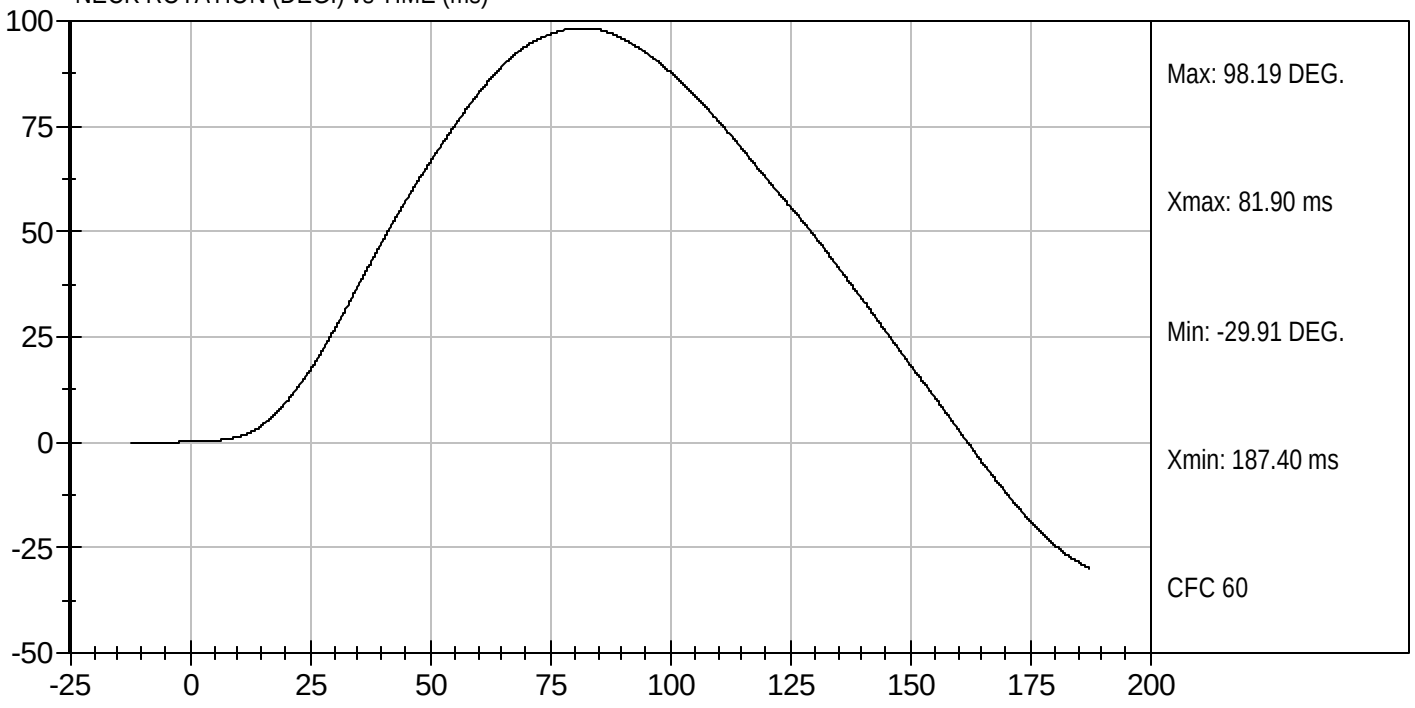
Test Desc: Neck Extension
Componet ID: D053013

Test Date: 11/17/2005
Velocity: 20.13 ft/s, 6.14 m/s

PENDULUM DECELERATION (G'S) vs TIME (ms)

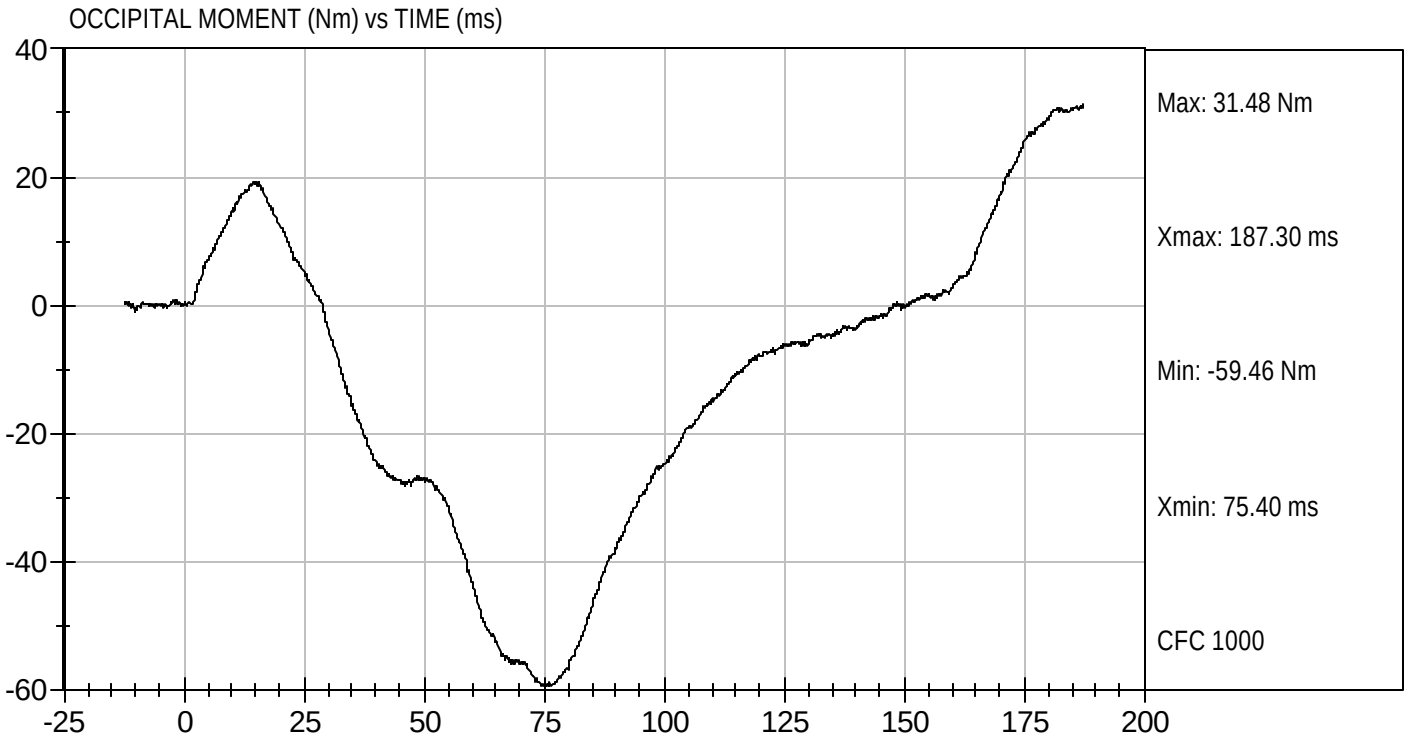


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Componet ID: D053013

Test Date: 11/17/2005
Velocity: 20.13 ft/s, 6.14 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053014

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Velocity	m/s	6.58 to 6.82	6.69	Pass
Peak Probe Force	N	5159 to 5893	5,507	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.97	Pass
Internal Hysteresis	%	69 to 85	73	Pass
		Overall Test Results		Pass

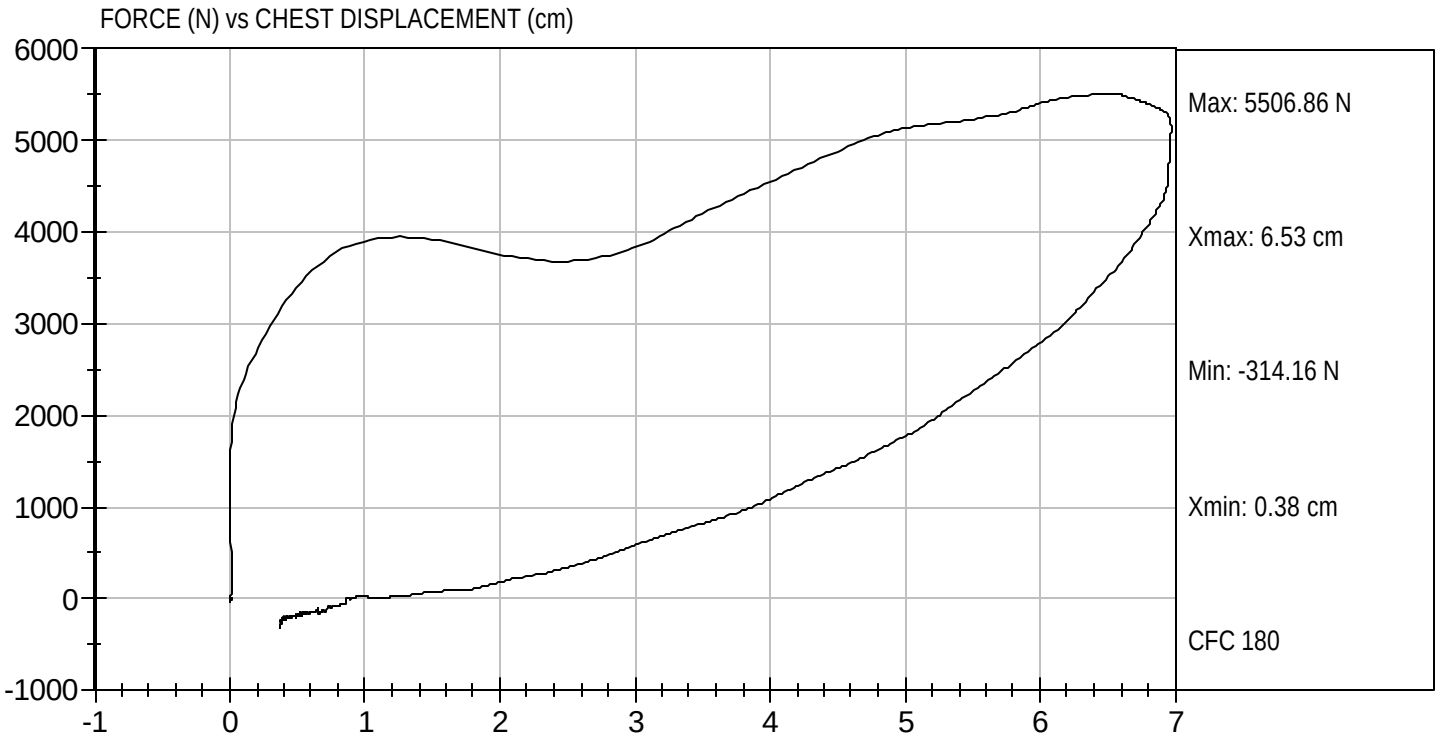
Tim Brad
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Componet ID: D053014

Test Date: 11/17/2005
Velocity: 21.95 ft/s, 6.69 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053015

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5,360	Pass
		Overall Test Results		Pass

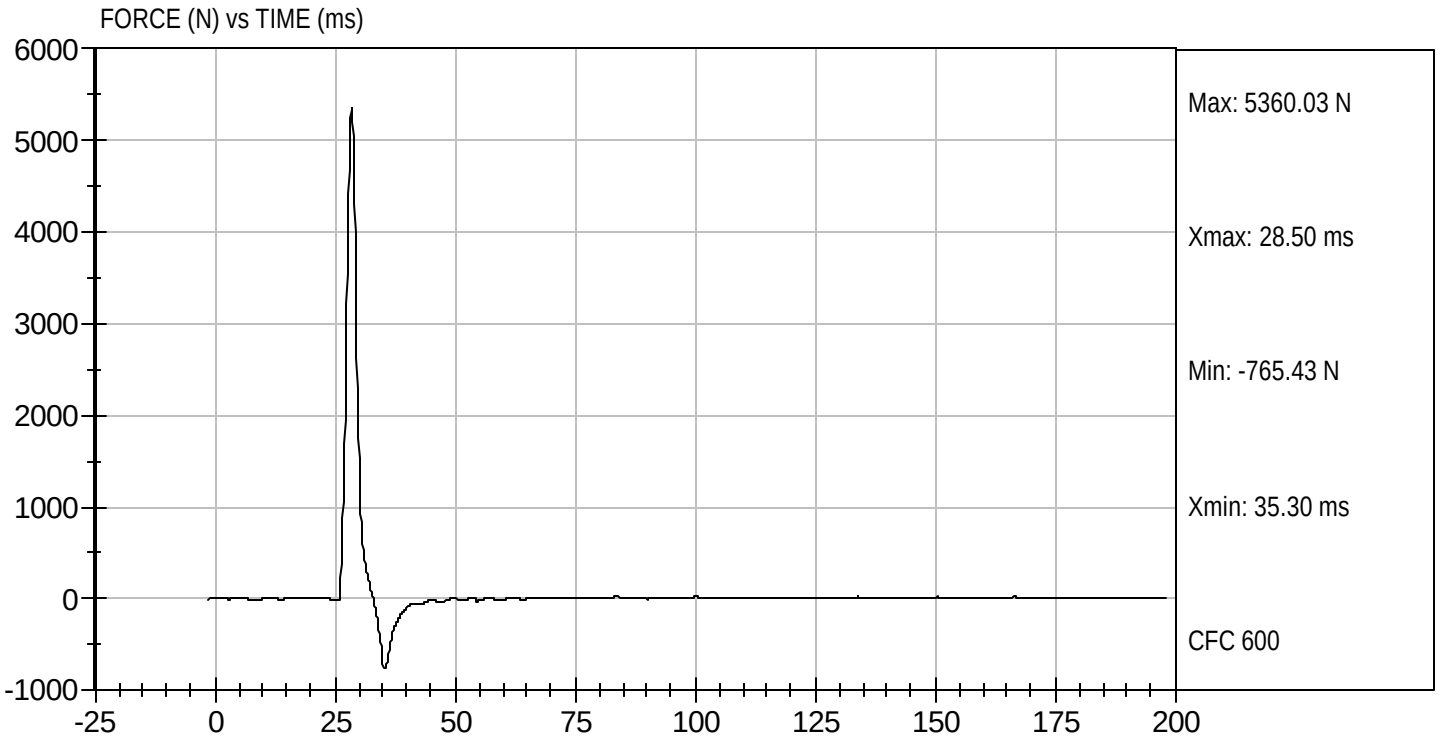
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Componet ID: D053015

Test Date: 11/17/2005
Velocity: 6.86 ft/s, 2.09 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053016

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,136	Pass
		Overall Test Results		Pass

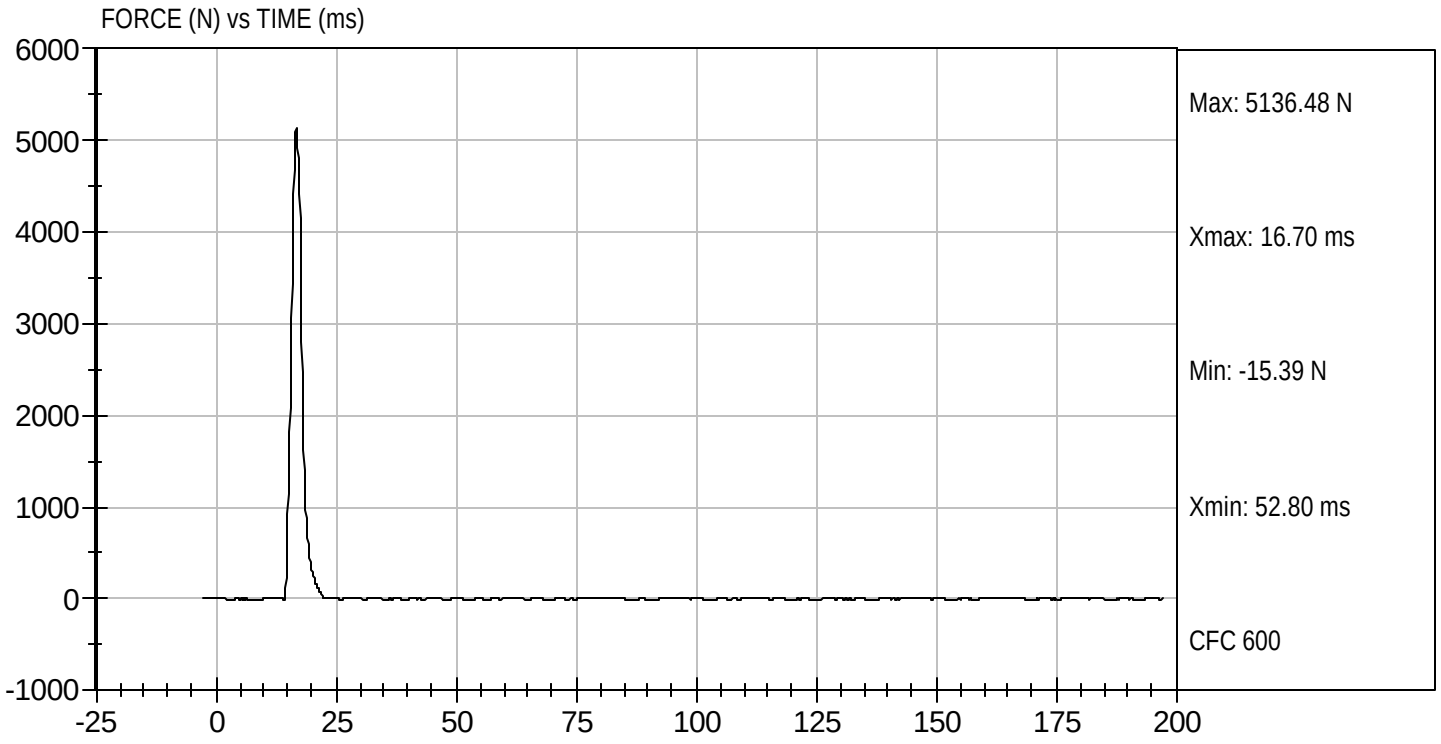
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Componet ID: D053016

Test Date: 11/17/2005
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053010

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.7	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	21	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	66.3	76.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	46	45	Pass
		Overall Test Results			Pass

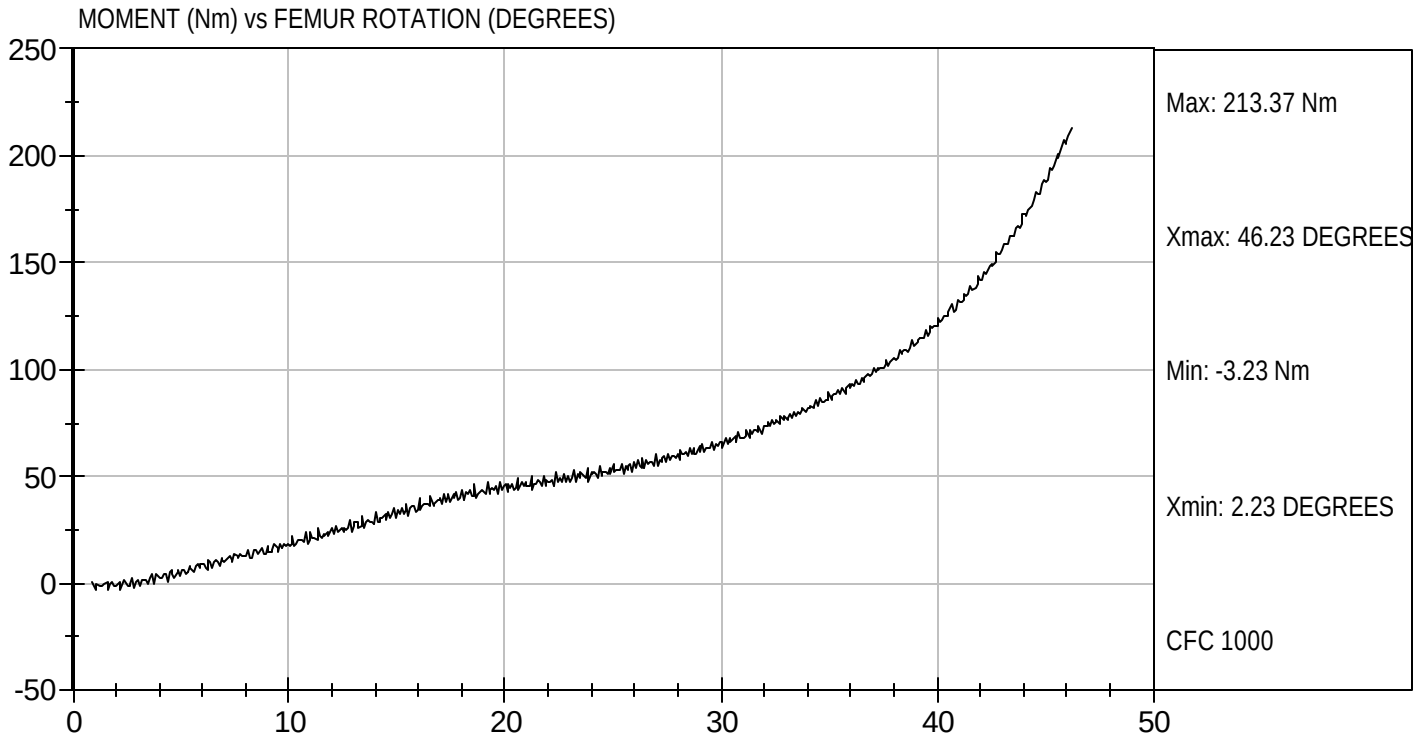
Laboratory Technician

11/17/2005
Test Date

Approved By

Test Desc: Hip Femur Flexion
Componet ID: D053019

Test Date: 11/17/2005
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Componet ID: D053010

Test Date: 11/17/2005
Velocity: 0 ft/s, 0.00 m/s