

**REPORT NUMBER TR-P26001-08-NC**

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

**GENERAL MOTORS CORPORATION  
2006 BUICK LUCERNE CX  
4-DOOR SEDAN**

**NHTSA NUMBER: M60101**

**PREPARED BY:  
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**JANUARY 24, 2006**

**FINAL REPORT**

**PREPARED FOR:  
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
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## Technical Report Documentation Page

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	<b>15. Supplementary Notes</b>			
<b>16. Abstract</b>  A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2006 Buick Lucerne CX 4-Door Sedan at Karco Engineering, LLC on 1/20/06. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 56.46 km/h. The ambient temperature at the barrier face at the time of impact is 14.0 degrees Celcius. The vehicle's maximum post-test static crush is 571 mm at the vehicle's centerline. The test vehicle is equipped with a 3-point continuous belt system and second generation supplemental airbags in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:				
<b>Measurement Description</b>	<b>Units</b>	<b>Threshold</b>	<b>Driver ATD</b>	<b>Passenger ATD</b>
Head Injury Criteria (HIC)	N/A	1000	168.8	503.4
Max. Chest Accel. (3 msec Clip)	G's	60	32.5	42.3
Left Femur Force	Newtons	10008	-2099.6	-3672.4
Right Femur Force	Newtons	10008	-1288.5	-1680.6
<b>17. Key Words</b> 56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2006 Buick Lucerne CX 4-Door Sedan NHTSA No. M60101			<b>18. Distribution of Statement</b> Copies of this report available from: NHTSA Technical Reference Division National Highway Traffic Safety Admin. 400 Seventh St., SW, Room 5108 Washington, D.C. 20590	
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**SECTION 1**  
**PURPOSE AND SUMMARY OF TEST M60101**

**1.1 PURPOSE**

This 35 mph (56.3 km/h) frontal barrier impact test is part of the New Car Assessment Program (NCAP) sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-01-D-02005. 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 30 mph (48.3 km/h) requirements.

The 35 mph (56.3 km/h) 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 July 2006. 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.

**1.2 SUMMARY**

A load cell barrier consisting of 36 load cells was impacted by a 2006 Buick Lucerne CX 4-Door Sedan at a velocity of 56.46 km/h. The test was performed at Karco Engineering, LLC on January 24, 2006.

Three (3) real-time and fourteen (14) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet number 14 (page number 24) of this report.

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

Both ATDs were fully instrumented with head (primary and redundant), chest (primary and redundant) and pelvis triaxial accelerometers, chest displacement potentiometers, six-axis upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also placed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. Also, shoulder belt spool-off was measured for the driver and passenger dummy. The driver (position 1) ATD (Serial No. 34) and the right-front passenger (position 2) ATD (Serial No. 35) were calibrated one test prior to this test.

One hundred and thirty two (132) channels of data were recorded using an on-board data acquisition system. Appendix A contains Pre and Post-Test Photographs, Appendix B contains the Dummy Response data traces and Appendix C contains the Dummy Calibration data.

There was 100 percent windshield retention and there was no intrusion into the protected zone of the windshield during the impact 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 571 at the vehicle's centerline and both the driver and the passenger side doors remained closed and latched during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver ATD's head and chest contacted the airbag and the abdomen had no contact. Both knees contacted the knee bolster.

The passenger's visible contact points were as follows: The passenger ATD's head, chest contacted the airbag and the abdomen had no contact. Both knees contacted the glove box.

Occupant injury data is contained in table below.

**OCCUPANT DATA SUMMARY**

ATD Position	HIC 36	Clip (g)	Chest Defl. (mm)	Left Femur (N)	Right Femur (N)
Driver	168.8	32.5	-26.0	-2099.6	-1288.5
Passenger	503.4	42.3	-30.3	-3672.4	-1680.6

Additional data plots for this test are available in the research and development section of the NHTSA website. The website can be found at: [www.NHTSA.Dot.Gov](http://www.NHTSA.Dot.Gov)

**SECTION 2**  
**OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan

NHTSA No.: M60101

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 1/24/06

**CONVERSION FACTORS USED IN THIS REPORT\***

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in <sup>2</sup>	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	$=(tf - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

\* Based on the Recommended Practice in SAE J916, May 85

**DATA SHEET NO. 1  
CRASH TEST SUMMARY**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan

NHTSA No.: M60101

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 1/24/06

**PRIMARY IMPACT DATA**

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.46
Test Weight	kg	1935
Impact Angle	degrees	0
Average Rebound	mm	475
Maximum Static Crush	mm	571

**DOOR OPENING AND SEAT TRACK INFORMATION**

Description	Driver	Passenger
Front Door opening	Remained closed and latched, opened w/o tools	Remained closed and latched, opened w/o tools
Rear Door Opening	Remained closed and latched, opened w/o tools	Remained closed and latched, opened w/o tools
Seat Track Shift (mm)	None	None
Seat Back Failure	No	No

**TEST DUMMY INFORMATION**

Description	Driver	Passenger
Dummy Type/ Serial No.	50% Male Hybrid III No. 34	50% Male Hybrid III No. 35
Head Contact	Airbag	Airbag
Chest Contact	Airbag	Airbag
Abdomen Contact	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

**MOVIE COVERAGE**

Cameras	Standard	Additional
High Speed	14	
Real Time	1	2
Total	15	2

**DATA CHANNELS**

Driver ATD Sensors	40
Passenger ATD Sensors	40
Belt Assessment Sensors	8
Vehicle Structure Accelerometers	8
Rigid Barrier Load Cells	36
Total	132

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

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA No.	M60101
Make	Buick
Model	Lucerne CX
Body Style	4-Door Sedan
Vin No.	1G4HP57236U145033
Color	Tan
Delivery Date	1/16/2006
Odometer (Miles)	22.0
Dealer	Greiner
Transmission	4-Speed Automatic
Final Drive	Front
Type/No. Cyl.	V6
Engine Disp. (L)	3.8
Engine Placement	Transverse
Roof Rack	No
Sunroof/T-Top	No
Tinted Glass	No
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes

Anti-Lock Brakes	Yes
All Wheel Drive	No
Power Steering	Yes
Driver Front Airbag	Yes
Driver Side Airbag	Yes
Driver Head Airbag	No
Driver Curtain Airbag	Yes
Pass. Airbag	Yes
Pass. Side Airbag	Yes
Pass. Head Airbag	No
Pass. Curtain Airbag	Yes
Pre-Tensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes
Air. Cond.	Yes
AM/FM Cassette	Yes
Tilt Steering	Yes
Automatic Door Locks	Yes
Power Windows	Yes
Power Seats	Yes
Other	None

Does Owners Manual provide instructions to turn off automatic door locks.

Yes

**DATA FROM CERTIFICATION LABEL**

Manufactured By	General Motors Corporation
Date of Manufacture	Dec-05

GWR (kg)	2221
GAWR Front (kg)	1186
GAWR Rear (kg)	1035

**VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION**

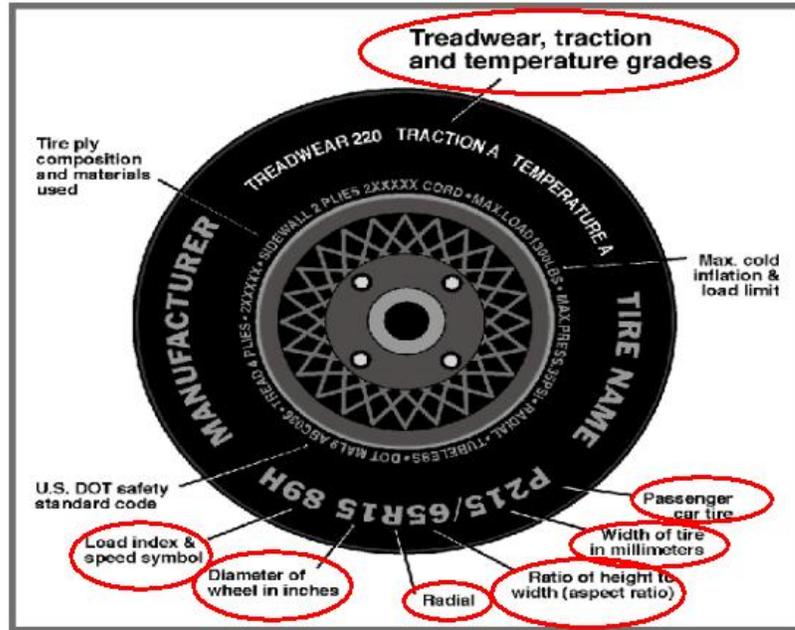
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket		
Number of Occupants	3	3		6
Capacity Weight (VCW) (kg)				488
Cargo Weight (RCLW) (kg)				80

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

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



**TIRE INFORMATION**

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Cold Pressure (kpa)	210	210
Recommended Tire Size	P225/60R16	P225/60R16
Tire Size on Vehicle	P255/60R16	P255/60R16
Tire Manufacturer	Bridgestone	Bridgestone
Treadwear	380	380
Traction	B	B
Temperature Grades	B	B
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester + 2 Steel	1 Polyester + 2 Steel
Load Index/Speed Symbol	97S	97S
Tire Material	Polyester + Steel	Polyester + Steel
DOT Safety Code Right	OBXO E24 4505	OBXO E24 4505
DOT Safety Code Left	OBXO E24 4505	OBXO E24 4505

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

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
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NHTSA No.: M60101  
 Test Date: 1/24/06

**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	518	331	849	568	398	966
Right	kg	531	328	859	566	403	969
Ratio	%	61.4	38.6	100	58.6	41.4	100
Totals	kg	1049	659	1708	1134	801	1935

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1708
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Wt. (RCLW)	kg	80
Calculated Vehicle Target Wt. (TVTW)	kg	1940

**TEST VEHICLE ATTITUDE AND CG**

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	753	752	752	756	1131
As Tested	mm	736	737	716	717	1213

Vehicle Wheel Base (mm) 2930  
 Weight of Ballast Secured in cargo area (kg) 74  
 Weight of Items Removed (kg) 24  
 Vehicle Components Removed Spare tire, floor mats, rear carpet in trunk

\* Ballast weight does not include cameras, instrumentation and brake abort system.

**FUEL SYSTEM DATA**

Fuel System Capacity From Owners Manual (L) 18.50  
 Actual Test Volume with entire fuel System Filled (L) 17.20  
 Test Fluid Type: Stoddard Solvent  
 Kinematic Viscosity: as per ASTM Standard D484-71 Red  
 Is Vehicle Fuel Pump Electric or Mechanical? Electric  
 If electric, does pump operate with ignition switch "On" & engine "OFF" Yes  
 Fuel System Particulars: Electric fuel pump. Activated when electrical system is activated  
Fuel pump will run for 3 seconds when ignition is in "on" position.

**DATA SHEET NO. 3  
POST-TEST IMPACT DATA**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**SPEED TRAP DATA**

Measured Parameter	Units	Requirement	Value
Trap No.1 Velocity (Primary)	km/h	55.51 to 57.12	56.46
Trap No.2 Velocity (Redun.)	km/h	55.51 to 57.12	56.37

**VEHICLE STATIC CRUSH**

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4946	4526	-420
Center	mm	5147	4576	-571
Right Side	mm	4945	4554	-391

**VEHICLE REBOUND FROM BARRIER**

Measured Parameter	Units	Value
Left Side	mm	535
Center	mm	485
Right Side	mm	405
Average	mm	475

**DATA SHEET NO. 4  
TEST VEHICLE INFORMATION**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

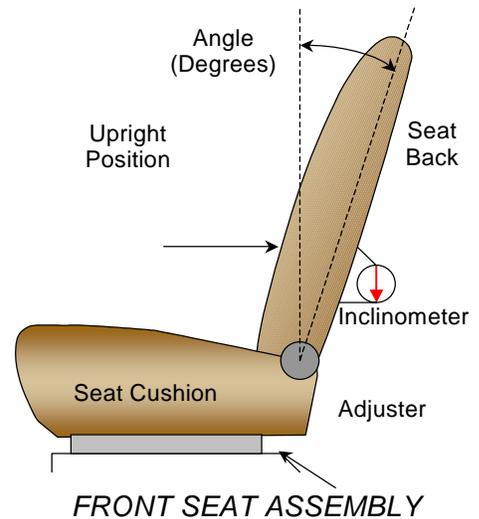
NHTSA No.: M60101  
 Test Date: 1/24/06

**NOMINAL DESIGN RIDING POSITION**

The driver and passenger seat backs are positioned to the manufacturer's designated angle. The procedure is as follows: Seat back angle was measured at the headrest of the seat back using a digital inclinometer.

**SEAT BACK ANGLES**

	Deg.
Driver w/seated Dummy	24.0
Passenger w/seated Dummy	24.0

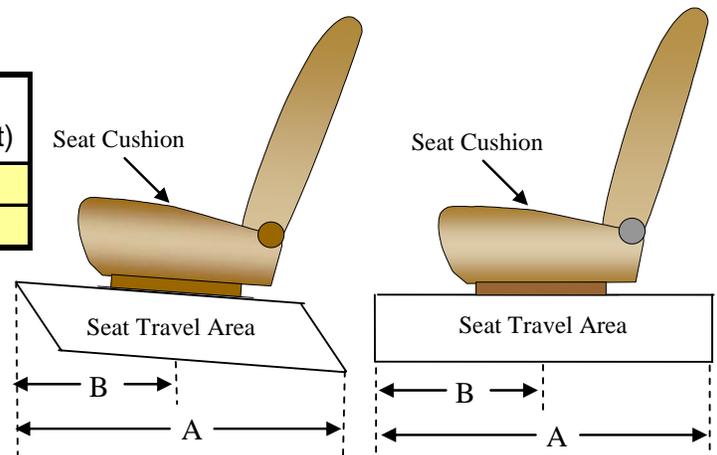


**SEAT FORE/AFT POSITIONS**

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

**SEAT FORE/AFT POSITIONING**

	Total Fore/Aft Travel (Detent)	Placed in Position (Detent)
Driver Seat	274 mm	137 mm
Passenger Seat	274 mm	137 mm



**SEAT BELT UPPER ANCHORAGE**

Position number one (1) is the uppermost position.

**SEAT BELT UPPER ANCHORAGE**

	Total # of Positions	Placed in Position #
Driver Seat	4	2
Passenger Seat	4	2

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

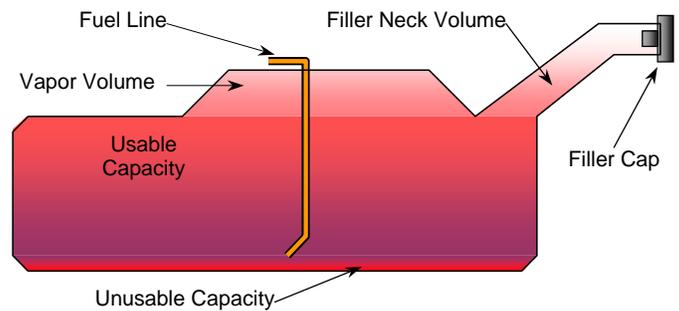
Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**FUEL TANK CAPACITY**

	Liters
Usable Capacity of "Standard Tank"	70.02
Usable Capacity of "Optional" Tank	
Usable Capacity used for FMVSS 301	64.42 to 65.82
Actual Amount of Solvent used	65.10

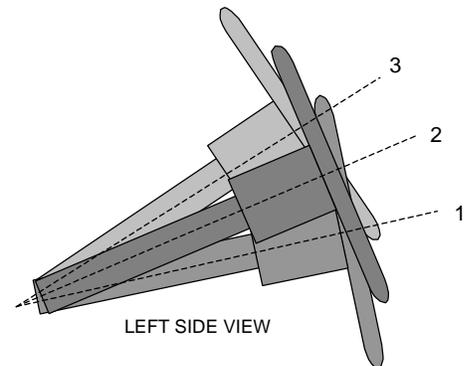
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies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



VEHICLE FUEL TANK ASSEMBLY

**STEERING COLUMN ADJUSTMENT**

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



STEERING COLUMN ASSEMBLY

**STEERING COLUMN POSITIONS**

	Degrees	Fore/Aft Position (mm)
Lowermost position No. 1	8.4	
Geometric center position No. 2	20.2	
Uppermost position No. 3	30.4	

**DATA SHEET NO. 5**  
**DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
Test Date: 1/24/06

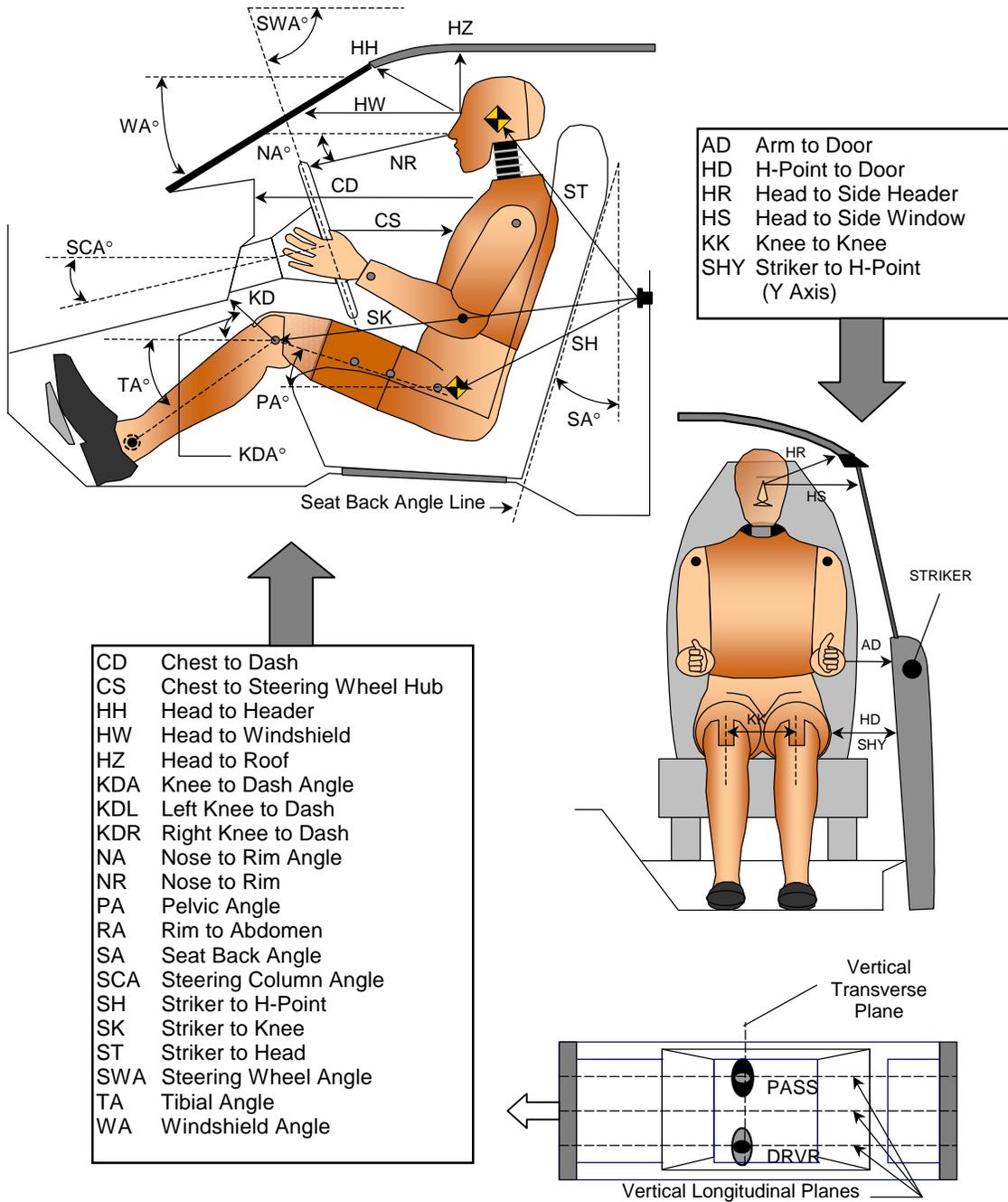
**TEST DUMMY POSITION MEASUREMENTS**

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (deg)	Length (mm)	Angle (deg)
WA	Windshield Angle		26.8		
SWA	Steering Wheel Angle		69.8		
SCA	Steering Column Angle		20.2		
SA	Seat Back Angle		24.0		24.0
HZ	Head to Roof (Z)	210	90.0	195	90.0
HH	Head to Header	405		400	
HW	Head to Windshield	736		690	
HR	Head to Side Header (Y)	290		285	
NR	Nose to Rim	385	2.0		
CD	Chest to Dash	630		535	
CS	Chest to Steering Hub	345			
RA	Rim to Abdomen	215			
KDL	Left Knee to Dash	235	2.6	230	
KDR	Right Knee to Dash	190		270	2.6
PA	Pelvic Angle		24.4		24.3
TA	Tibia Angle		33.7		35.5
KK	Knee to Knee (Y)	300		272	
SK	Striker to Knee	586	3.0	593	2.6
ST	Striker to Head	525	83.5	480	86.0
SH	Striker to H-Point	220	39.0	222	37.7
SHY	Striker to H-Point (Y)	285		300	
HS	Head to Side Window	400		400	
HD	H-Point to Door (Y)	180		157	
AD	Arm to Door (Y)	130		136	

**DATA SHEET NO. 5...(CONTINUED)**  
**DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06



- |     |                             |
|-----|-----------------------------|
| 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            |

**DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS**

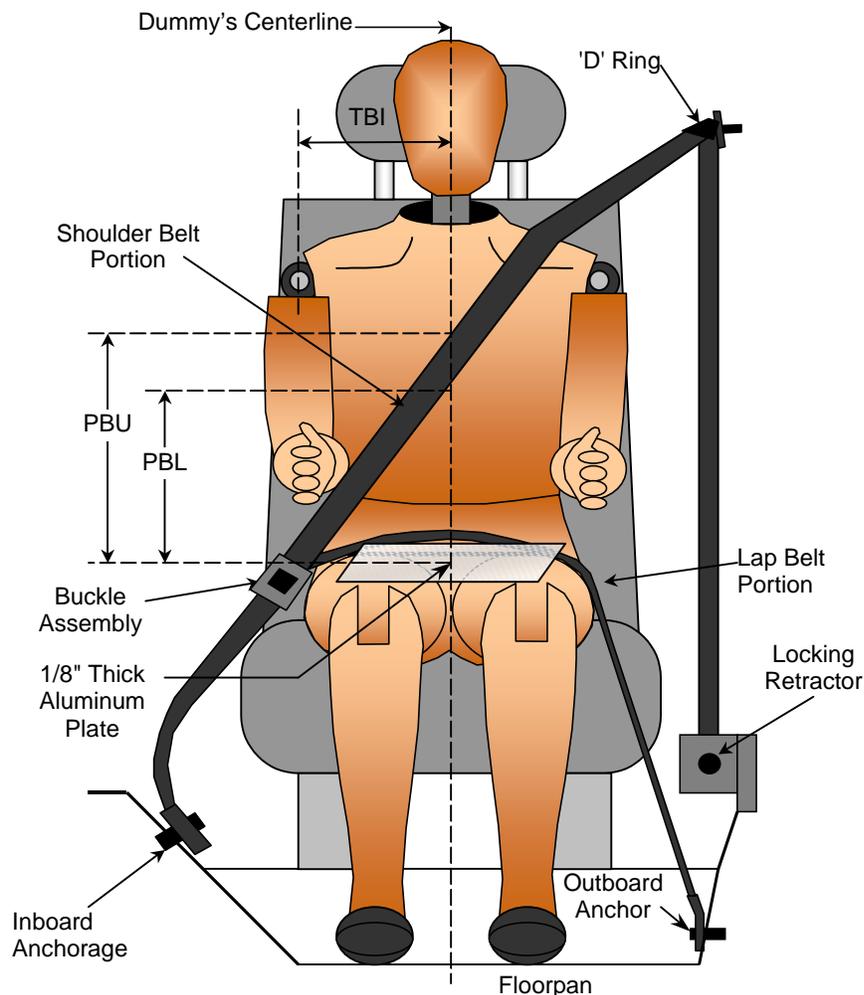
**DATA SHEET NO. 6  
SEAT BELT POSITIONING DATA**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan

NHTSA No.: M60101

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 1/24/06



**SEAT BELT POSITIONING MEASUREMENTS**

Measured Parameter	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	200	200
PBU - Top Surface of reference to belt upper edge	mm	300	280
PBL - Top Surface of reference to belt lower edge	mm	220	209
Lap Belt Tension	Newtons	10	10
Shoulder Belt Tension	N/A	Retractor	Retractor

**DATA SHEET NO. 7  
VEHICLE ACCELEROMETER LOCATION**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan

NHTSA No.: M60101

Test Program: 2006 NHTSA 35mph NCAP

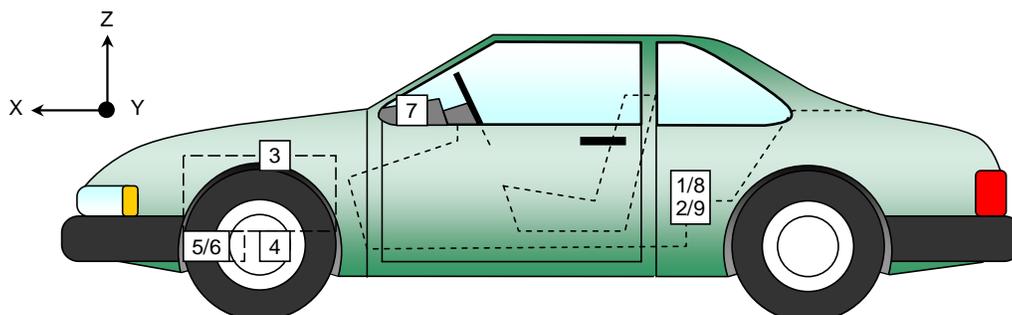
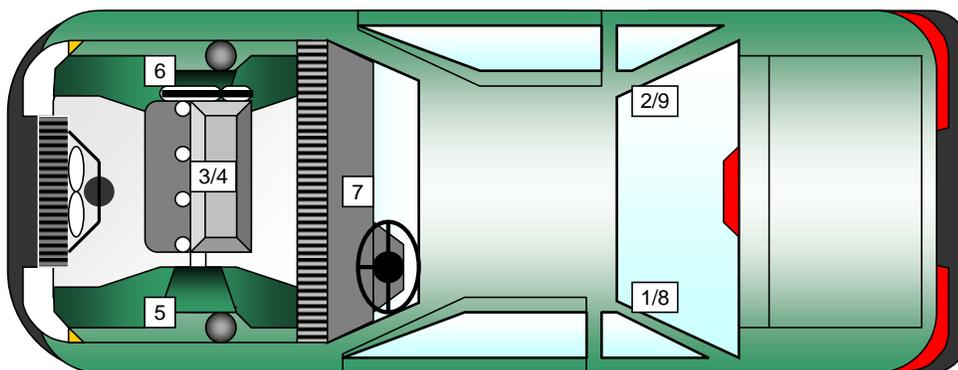
Test Date: 1/24/06

**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member	2109	-736	391
2	Right Rear X-Member	2109	736	391
3	Engine Top	4305	112	891
4	Engine Bottom	4305	0	185
5	Left Brake Caliper	4205	-699	305
6	Right Brake Caliper	402	699	305
7	Instrument Panel			
8	Left Rear X-Member (Z-Axis)	2109	-736	391
9	Right Rear X-Member (Z-Axis)	2109	736	391

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane

1.) Not installed



**DATA SHEET NO. 8**  
**SEAT BELT ASSESSMENT TEST DATA**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**SEAT BELT POSITIONING MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
Retractor Reel to "D" ring	mm	640	640
Shoulder Belt length as measured on ATD	mm	840	870
Lap Belt length as measured on ATD	mm	600	590
Remainder of belt on reel	mm	1130	1165
Total belt length for continuous webbing systems	mm	3210	3265

**SHOULDER BELT SPOOL-OFF DATA**

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	48	152
As determined electronically	mm	15	*

\* Channel failed at 62.0 msec

**BELT STRETCH DATA**

Measurement Description	Units	Driver	Passenger
Electronically between belt load cell and "D" ring	mm/cm	*	*
Mechanically	mm/cm		

\* Not used with shoulder belt pre-tensioner systems

**DATA SHEET NO. 9  
SUMMARY OF FMVSS 212 DATA**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

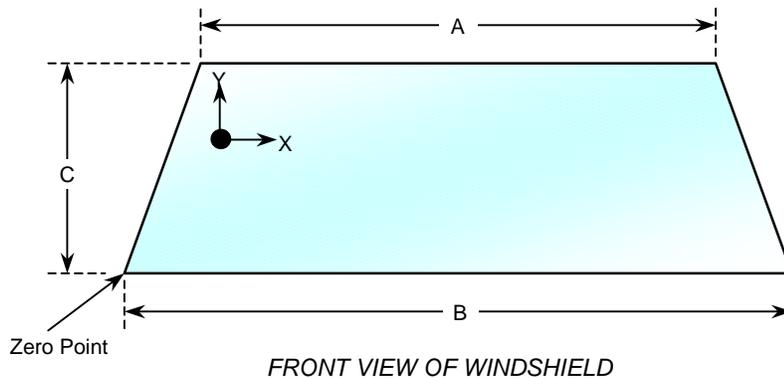
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

The standard requires that the post-test retention measurement be a minimum of 75 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 that are equipped with occupant passive restraints.

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test(mm)	Post-Test(mm)	% of Retention
Left Side	2254	2254	100
Right Side	2254	2254	100
Total	4508	4508	100

Temperature of windshield molding during test: 21.1 °C



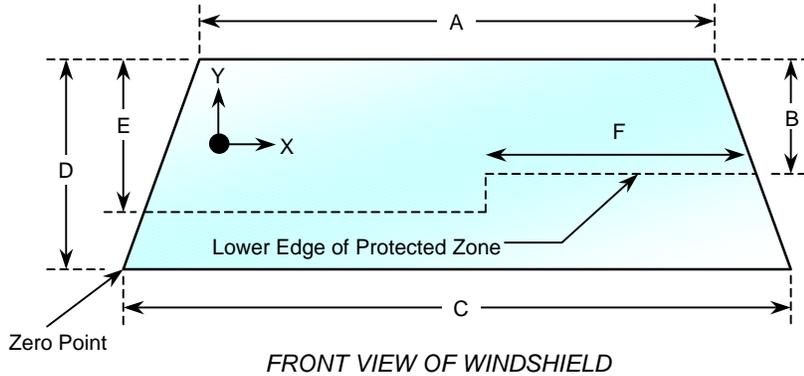
**WINDSHIELD DIMENSIONS**

Item	Units	Segment Length	Molding Width
A	mm	1219	3
B	mm	1569	
C-Left	mm	860	3
C-Right	mm	860	3

**DATA SHEET NO. 10  
WINDSHIELD ZONE INTRUSION FMVSS 219 DATA (PARTIAL)**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06



**WINDSHIELD AND  
PROTECTED ZONE**

Item	Units	Value
A	mm	1219
B	mm	600
C	mm	1569
D	mm	860
E	mm	504
F	mm	543

**AREA OF PROTECTED ZONE FAILURES**

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 in. by a vehicle component other than one that is normally in contact with the windshield.

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.

X	Y

**DATA SHEET NO. 11**  
**FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan

NHTSA No.: M60101

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 1/24/06

Test Time: 12:10 PM

Temperature: 14.0 Deg. C.

**STODDARD SOLVENT SPILLAGE MEASUREMENTS**

A. From impact until vehicle motion ceases: 0.0 oz.  
(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0.0 oz.  
(Maximum Allowable = 5 ounces)

C. For the following 25 minutes: 0.0 oz.  
(Maximum Allowable = 1 oz./minute)

D. Spillage Location Details: No leakage occurred

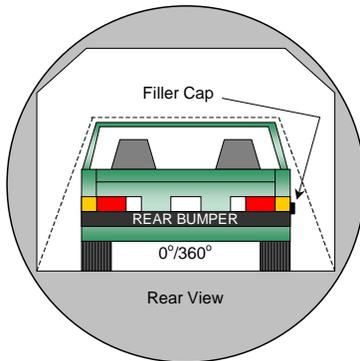
**DATA SHEET NO. 12**  
**FMVSS 301 STATIC ROLLOVER DATA**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan

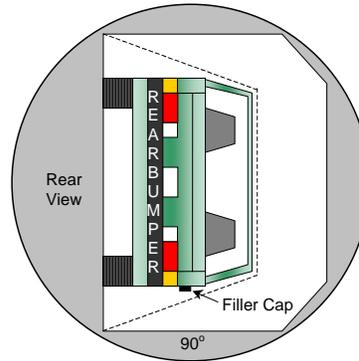
NHTSA No.: M60101

Test Program: 2006 NHTSA 35mph NCAP

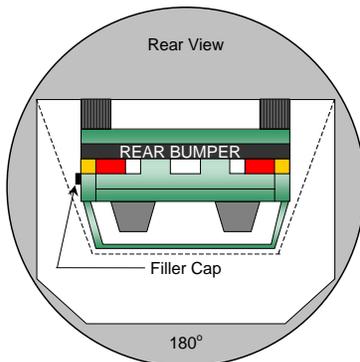
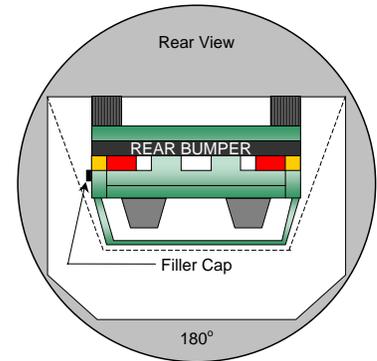
Test Date: 1/24/06



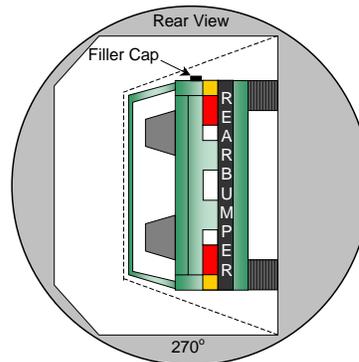
**0° to 90°**



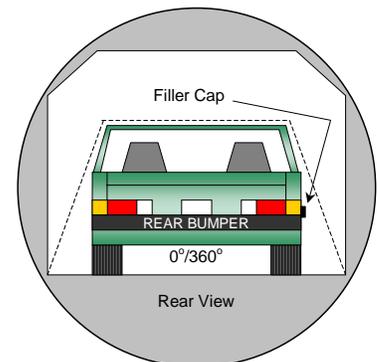
**90° to 180°**



**180° to 270°**



**270° to 360°**



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

**DATA SHEET NO. 12...(CONTINUED)  
FMVSS 301 STATIC ROLLOVER DATA**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	81	300	381
90° to 180°	80	300	380
180° to 270°	79	300	379
270° to 360°	79	300	379

**FMVSS 301 SPILLAGE TABLE REQUIREMENT (oz.)**

First 5 Minutes	5.0
Sixth Minute	1.0
Seventh Minute	1.0
Eighth Minute	1.0

**ACTUAL TEST VEHICLE SOLVENT SPILLAGE TABLE (oz.)**

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

**SOLVENT SPILLAGE LOCATION TABLE**

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

**DATA SHEET NO. 13**  
**VEHICLE MEASUREMENTS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan

NHTSA No.: M60101

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 1/24/06

**VEHICLE MEASUREMENT TABLE**

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length of vehicle at centerline	mm	5147	4576	-571
2	RSOV to front of engine	mm	4554	4127	-427
3	RSOV to firewall centerline	mm	4012	3986	-26
4	RSOV to leading edge of right door	mm	3537	3510	-27
5	RSOV to leading edge of left door	mm	3537	3520	-17
6	RSOV to lower leading edge of right door	mm	3526	3529	3
7	RSOV to lower leading edge of left door	mm	3540	3530	-10
8	RSOV to upper trailing edge of right door	mm	2445	2419	-26
9	RSOV to upper trailing edge of left door	mm	2448	2435	-13
10	RSOV to lower trailing edge of right door	mm	2435	2441	6
11	RSOV to lower trailing edge of left door	mm	2440	2444	4
12	RSOV to bottom of right 'A' pillar	mm	3492	3471	-21
13	RSOV to bottom of left 'A' pillar	mm	3476	3521	45
14	RSOV to firewall on right side	mm	4137	4117	-20
15	RSOV to firewall on left side	mm	4142	4181	39
16	RSOV to steering column	mm	3065	3030	-35
17	Center of steering column to left 'A' pillar	mm	417	420	3
18	Center of steering column to headlining	mm	415	430	15
19	RSOV to right side of front bumper	mm	4945	4554	-391
20	RSOV to left side of front bumper	mm	4946	4526	-420
21	Length of engine block	mm	615	615	0
RD	RSOV to right side of dash panel	mm	3276	3258	-18
CD	RSOV to center of dash panel	mm	3206	3180	-26
LD	RSOV to left side of dash panel	mm	3286	3271	-15

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

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan

NHTSA No.: M60101

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 1/24/06

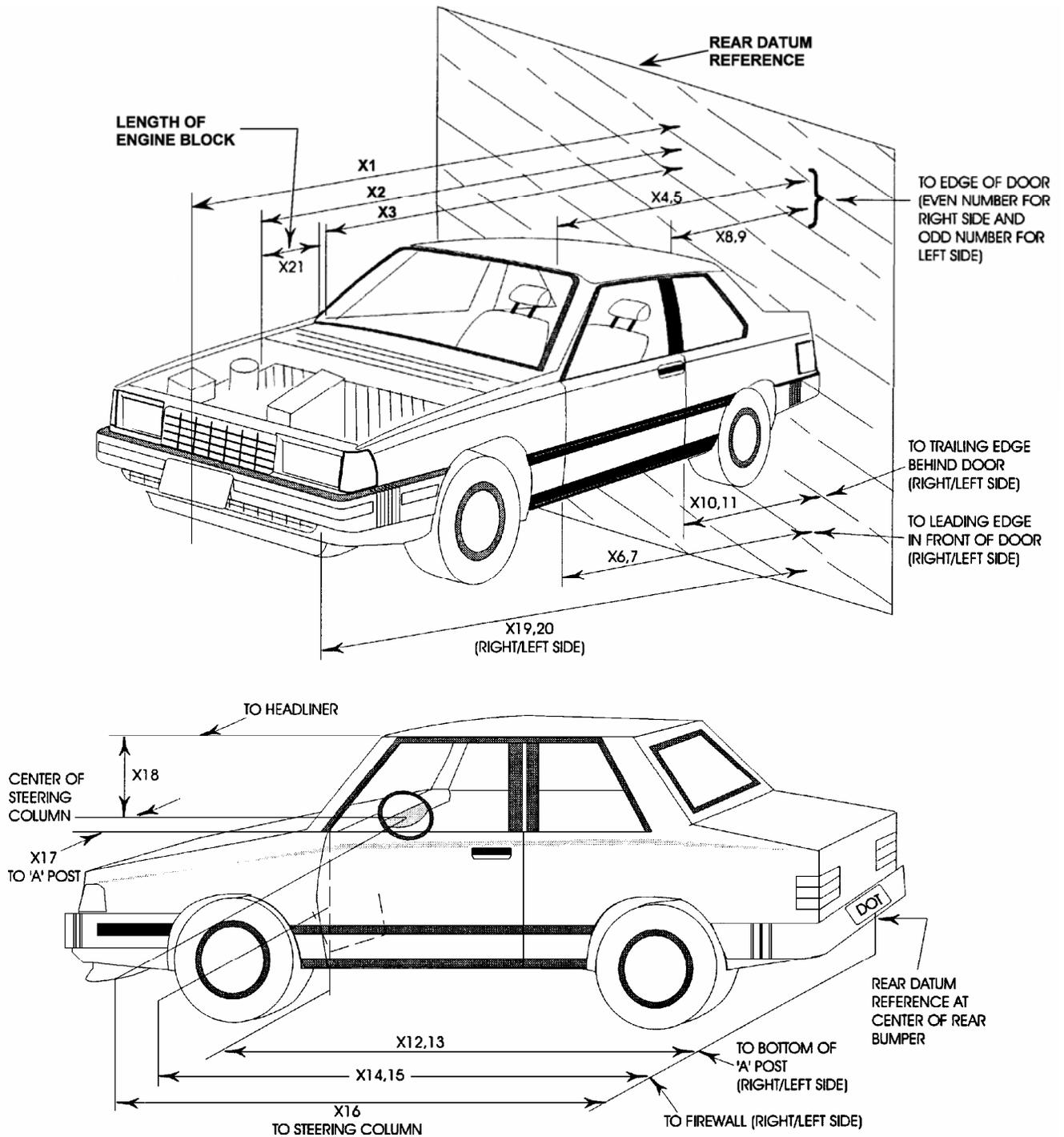
**VEHICLE STRUCTURAL MEASUREMENT TABLE**

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length	mm	5147	4576	-571
2	Total width	mm	1850	1860	10
3	Bumper top height	mm	579	655	76
4	Bumper bottom height	mm	176	246	70
5	Longitudinal member top height	mm	520	160	-360
6	Longitudinal member bottom height	mm	390	100	-290
7	Distance between longitudinal members	mm	928	870	-58
8	Longitudinal member width	mm	60	60	0
9	Engine top height	mm	870	921	51
10	Engine bottom height	mm	290	341	51
11	Engine and gear box width	mm	544	544	0
12	Front bumper to engine distance	mm	593	400	-193
13	Front shock absorber fixing width	mm	905	982	77
14	Bonnet leading edge height	mm	720	873	153
15	Front shock absorber fixing width	mm	1230	1220	-10
16	Front bumper to front axle distance	mm	1021	460	-561
17	Front axle to 'A' pillar distance	mm	545	418	-127
18	'A' pillar to 'B' pillar distance	mm	1110	1107	-3
19	'B' pillar to rear axle distance	mm	1290	1295	5
20	'B' pillar to 'C' pillar distance	mm	1081	1035	-46
21	Roof sill bottom height	mm	1291	1325	34
22	Roof sill top height	mm	1429	1450	21
23	Floor sill bottom height	mm	200	234	34
24	Floor sill top height	mm	405	447	42

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

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06



**DATA SHEET NO. 14  
CAMERA LOCATIONS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**VEHICLE CAMERA MEASUREMENT TABLE**

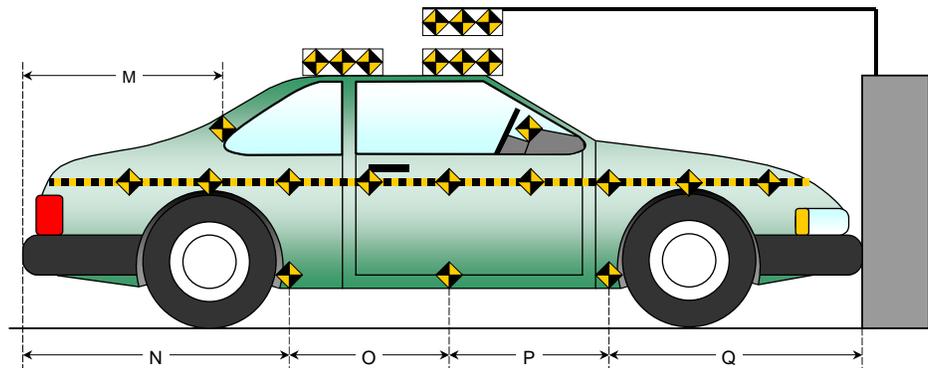
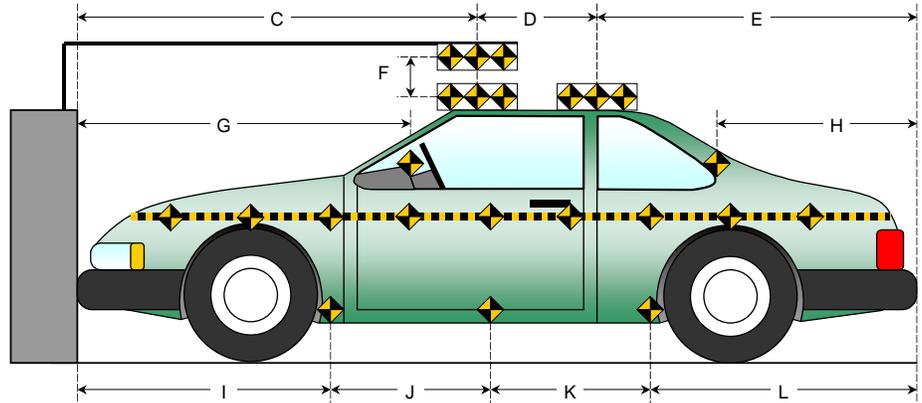
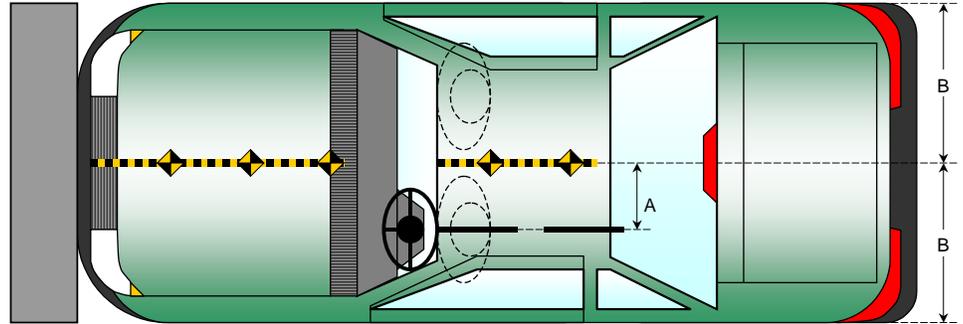
No.	Camera View	Location (mm)			Angle (deg.)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Real Time Camera (Panning)	-15385	-7882	-1598	0			30
2	Overall Left Side	-1795	-7239	-1167	0	7549	20mm	1000
3	Left Side View	-1533	-7126	-1188	-3	7385	50mm	1000
4	Driver and Interior View	-8696	-12562	-4511	-13	15930	ZOOM	1000
5	Steering Column (Bottom)	-1631	-8234	-2682	-13	8812	35mm	1000
6	Steering Column (Top)	-1663	-8153	-3078	-17	8872	35mm	1000
7	Overall Right Side	-2536	6923	-1184	-2	7467	20mm	1000
8	Right Side View	-2005	6510	-1249	-4	6925	50mm	1000
9	Passenger and Interior View	-5330	9365	-2407	-10	11041	ZOOM	1000
10	Right Side View	-2006	6967	-1463	-6	7396	25mm	1000
11	Windshield View	-601	0	-5556	-75		25mm	1000
12	Driver Front View	378	-286	-2438	-35		25mm	1000
13	Passenger Front View	375	413	-2439	-35		25mm	1000
14	Pit View of Engine	-832	0	1495	90		12mm	1000
15	Pit View of Fuel Tank	-3350	0	1495	90		10mm	1000
16	Real Time Camera	-1585	-8255	-1767	-1	8590		30
17	Real Time Camera	-2167	6988	-1463	-1	7461		30

**DATA SHEET NO. 15**  
**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

All Dimensions in (mm)	
Item	Value
A	365
B	925
C	2393
D	605
E	2172
F	155
G	1895
H	1346
I	1582
J	981
K	981
L	1621
M	1347
N	1621
O	981
P	981
Q	1582



**DATA SHEET NO. 16**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

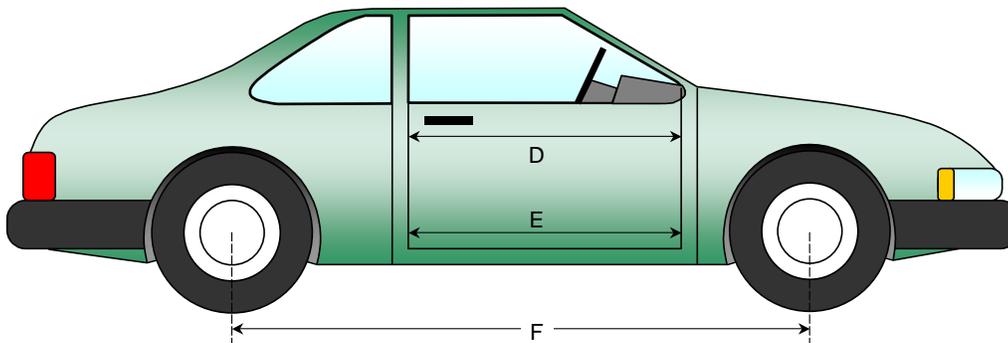
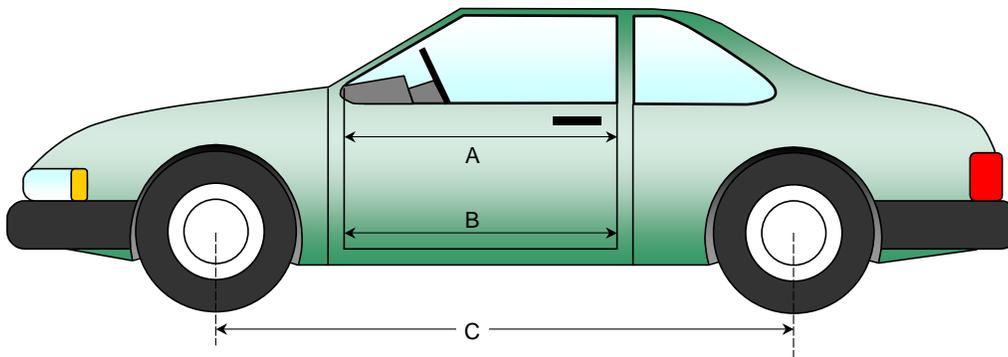
NHTSA No.: M60101  
 Test Date: 1/24/06

**DOOR OPENING WIDTH TABLE**

Item	Description	Units	Pre-Test	Post-Test	Diff.
A	Left Side Upper	mm	1006	956	-50
B	Left Side Lower	mm	919	911	-8
D	Right Side Upper	mm	1006	961	-45
E	Right Side Lower	mm	919	884	-35

**WHEELBASE MEASUREMENT TABLE**

Item	Description	Units	Pre-Test	Post-Test	Diff.
C	Left Side Wheel Base	mm	2930	2930	0
F	Right Side Wheel Base	mm	2930	2810	-120



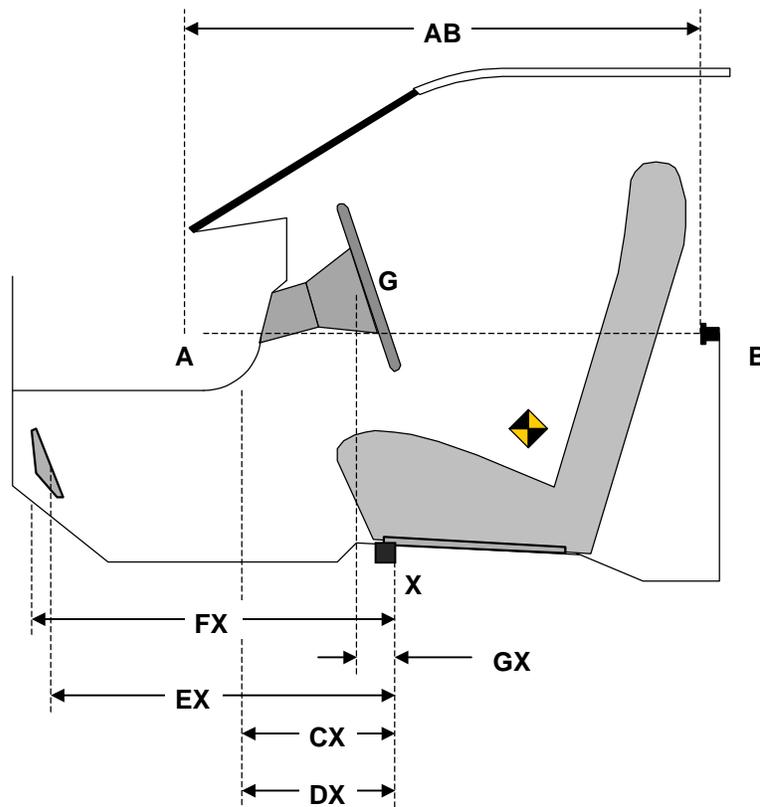
**DATA SHEET NO. 16...(CONTINUED)  
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**DRIVER COMPARTMENT INTRUSION TABLE**

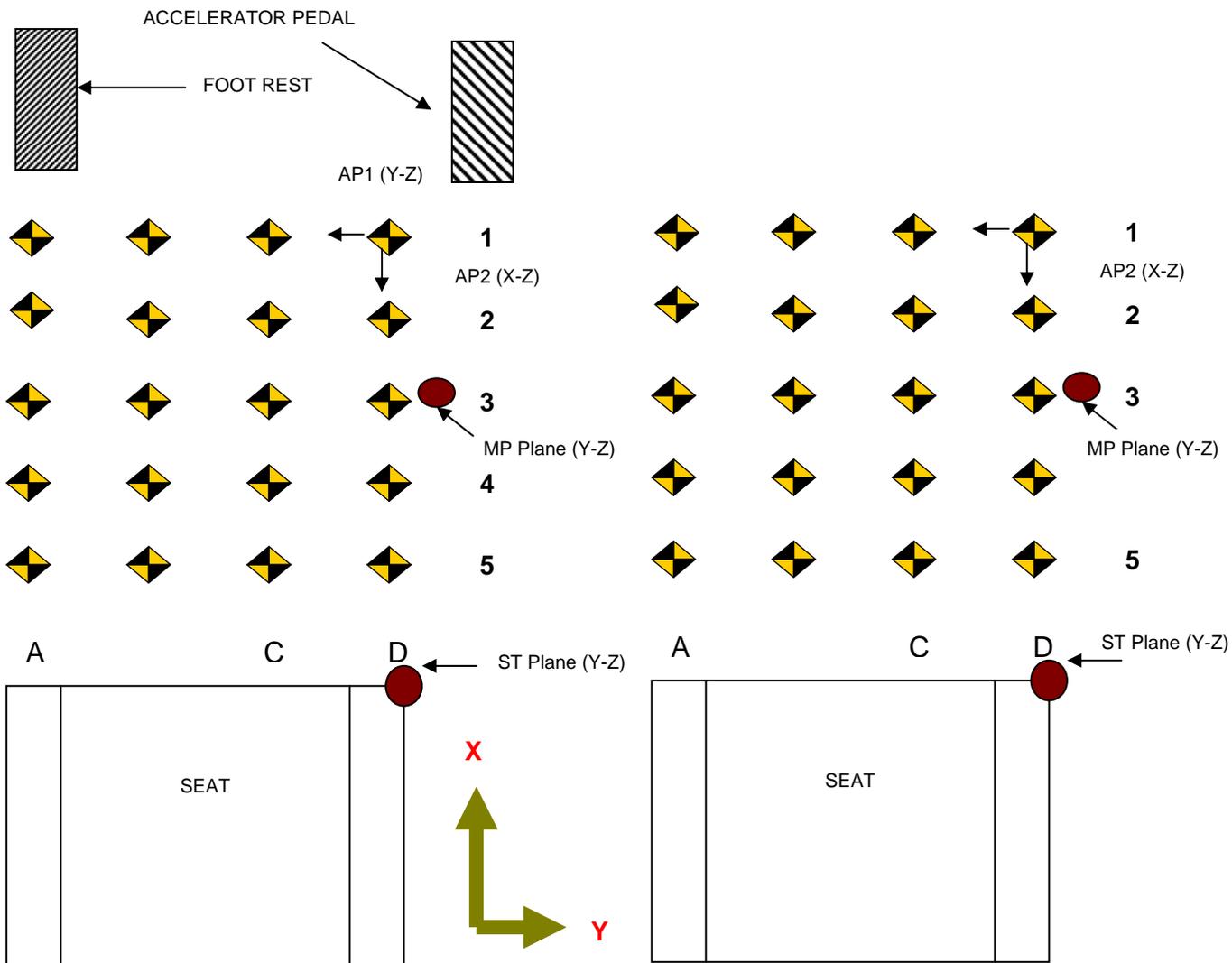
Item	Description	Units	Pre-Test	Post-Test	Diff.
AB	Door Opening (Inside window jam)	mm	919	911	-8
CX	Left Knee Bolster to X	mm	230	195	-35
DX	Right Knee Bolster to X	mm	235	210	-25
EX	Brake Pedal to X	mm	530	510	-20
FX	Foot Rest to X	mm	560	545	-15
GX	Center of Steering Wheel Hub to X	mm	65	75	10



**DATA SHEET NO. 16...(CONTINUED)  
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06



- AP1: Y-Z Plane passing through D1
- AP2: X-Z Plane passing through D1
- AP3: X-Y plane passing through D1
- MP: Y-Z plane, halfway between the ST plane and AP1 plane
- CF Plane: X-Z plane passes through center of footrest.
- BP Plane: X-Z plane passes through center of brake pedal
- TP Plane: Y-Z plane, intersection of BP Plane and the intersection of the toe pan and floorboard
- Column A: intersection of vehicle and CF plane
- Column D: Intersection of vehicle and AP2 plane
- Row 1: intersection of the vehicle and the AP3 Plane
- Row 3: intersection of the vehicle and TP plane
- Row 5: intersection of the vehicle and MP plane
- Row 2: evenly spaced between row 1 and 3
- Row 4: evenly spaced between row 3 and 5

**DATA SHEET NO. 16...(CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

All measurements in mm

**DRIVER FLOOR PAN X-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	701	737	740	751	673	707	722	727	-28	-30	-18	-24
2	638	685	698	709	619	670	686	697	-19	-15	-12	-12
3	591	630	636	646	580	621	634	650	-11	-9	-2	4
4	512	505	507	494	508	513	513	505	-4	8	6	11
5	360	359	362	347	361	363	367	341	1	4	5	-6

**DRIVER FLOOR PAN Y-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	38	163	292	426	26	157	288	399	-12	-6	-4	-27
2	46	164	293	428	37	154	279	413	-9	-10	-14	-15
3	48	164	287	430	37	154	277	418	-11	-10	-10	-12
4	38	131	285	414	31	152	372	409	-7	21	87	-5
5	44	165	285	394	37	158	279	408	-7	-7	-6	14

**DRIVER FLOOR PAN Z-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-140	-113	-97	-81	-211	-181	-155	-168	-71	-68	-58	-87
2	-102	-64	-60	-39	-158	-127	-117	-92	-56	-63	-57	-53
3	-55	-21	-9	9	-108	-75	-61	-38	-53	-54	-52	-47
4	57	59	62	64	11	17	23	33	-46	-42	-39	-31
5	64	65	68	71	27	36	40	22	-37	-29	-28	-49

**DATA SHEET NO. 16...(CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

All measurements in mm

**PASSENGER FLOOR PAN X-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	702	700	701	675	610	572	561	613	-92	-128	-140	-62
2	646	647	648	630	590	553	537	579	-56	-94	-111	-51
3	594	591	597	585	563	535	514	541	-31	-56	-83	-44
4	466	461	467	476	461	467	458	470	-5	6	-9	-6
5	306	310	320	326	299	317	334	334	-7	7	14	8

**PASSENGER FLOOR PAN Y-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-416	-311	-191	-35	-404	-314	-195	-40	12	-3	-4	-5
2	-422	-310	-189	-37	-410	-313	-190	-34	12	-3	-1	3
3	-414	-304	-185	-37	-411	-307	-186	-33	3	-3	-1	4
4	-405	-302	-180	-40	-405	-298	-172	-47	0	4	8	-7
5	-406	-299	-166	-34	-413	-300	-178	-40	-7	-1	-12	-6

**PASSENGER FLOOR PAN Z-AXIS**

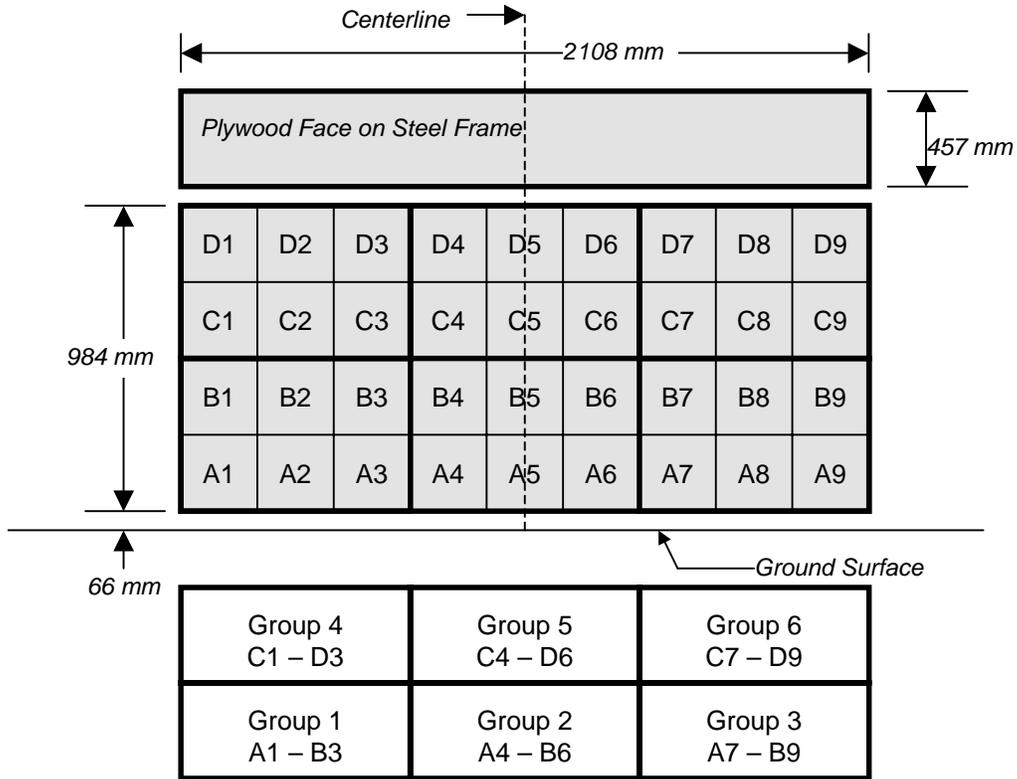
	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-93	-87	-86	-127	-175	-200	-221	-217	-82	-113	-135	-90
2	-43	-43	-40	-76	-130	-146	-152	-146	-87	-103	-112	-70
3	1	5	2	-22	-63	-70	-89	-90	-64	-75	-91	-68
4	59	61	60	59	33	49	44	7	-26	-12	-16	-52
5	33	65	66	63	7	75	76	57	-26	10	10	-6

**DATA SHEET NO. 17**  
**FIXED BARRIER LOAD CELL LOCATIONS**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**36 Load Cell Rigid Barrier (NHTSA Standard)**  
**Load Cell Locations on Fixed Barrier**



6 Groups of 6 Load Cells Each

**DATA SHEET NO. 18**  
**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
 Test Date: 1/24/06

**VEHICLE INFORMATION**

VIN: 1G4HP57236U145033  
 Vehicle Size Category: 4-Door

Wheel base (mm): 2930  
 Test Weight (kg): 1935

**ACCELEROMETER DATA**

Accelerometer Location: Left rear cross member  
 Cal. Procedure/Interval: 6 months / drop test  
 Integration Algorithm: NHTSA Standard  
 Impact Velocity (km/h): 56.46  
 Velocity Change (km/h): 63.9

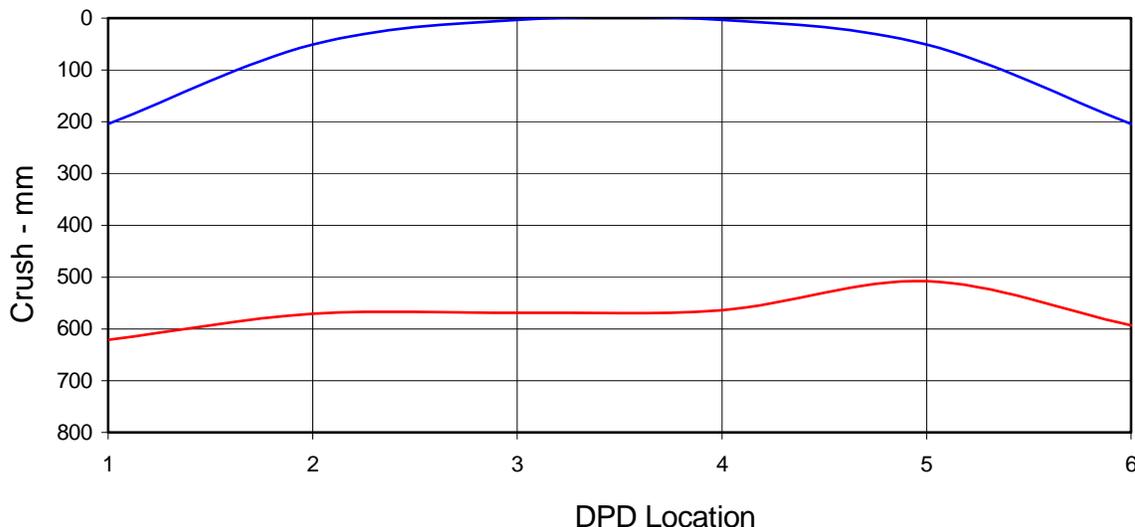
Linearity: Good

Time of Separation (msec): 84.5

**CRUSH PROFILE**

Collision Deformation Classification: 12FDEW6 Midpoint of Damage: Vehicle Centerline  
 Damage Region Length (mm): 1550 Impact Mode: Full Frontal

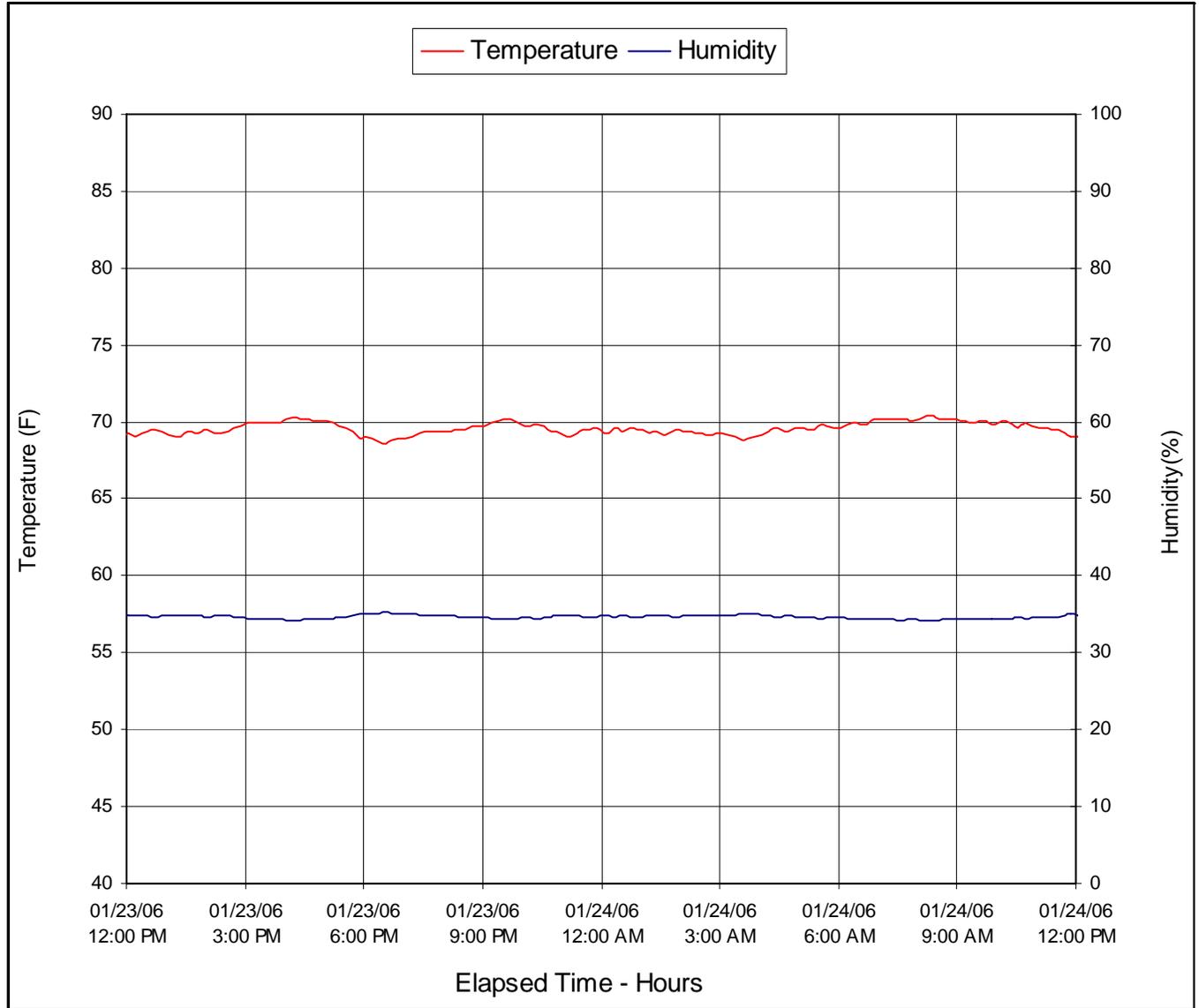
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	204	621	-417
C2	Crush zone 2 on left side	mm	51	571	-520
C3	Crush zone 3 on left side	mm	3	569	-566
C4	Crush zone 4 on right side	mm	3	564	-561
C5	Crush zone 5 on right side	mm	51	508	-457
C6	Crush zone 6 at right side	mm	204	593	-389



**DATA SHEET NO. 19**  
**DUMMY/VEHICLE TEMPERATURE STABILIZATION**

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60101  
Test Date: 1/24/06



**APPENDIX A**  
**PHOTOGRAPHS**

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Figure A-1: Load Cell Location

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MFD BY GENERAL MOTORS CORP

DATE	GVWR	GAWR FRT	GAWR RR
12/05	2221 KG 4896 LB	1186 KG 2614 LB	1035 KG 2282 LB

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

1G4HP57236U145033

TYPE: PASS CAR

Figure A-2: Manufacturer's Label



# TIRE AND LOADING INFORMATION

SEATING CAPACITY : TOTAL 6 : FRONT 3 : REAR 3

The combined weight of occupants and cargo should never exceed 488 kg or 1076 lbs.

TIRE	ORIGINAL SIZE		COLD TIRE PRESSURE
FRONT	P225/60R16	S	210 kPa, 30 PSI
REAR	P225/60R16	S	210 kPa, 30 PSI
SPARE	T125/70R16	M	420 kPa, 60 PSI

SEE OWNER'S  
MANUAL FOR  
ADDITIONAL  
INFORMATION

1G4HP57236U145033

Figure A-3: Tire Placard



Figure A-4: Right Front  $\frac{3}{4}$  View, As Received



A-5

TR-P26001-08-NC

Figure A-5: Left Rear  $\frac{3}{4}$  View, as Received





Figure A-7: Post-Test Front View (Vehicle Moved)



Figure A-8: Pre-Test Left Side View



Figure A-9: Post-Test Left Side View



A-10

TR-P26001-08-NC

Figure A-10: Pre-Test Right Side View



Figure A-11: Post-Test Right Side View



A-12

TR-P26001-08-NC

Figure A-12: Pre-Test Right Front ¾ View



Figure A-13: Post-Test Right Front ¾ View (Vehicle Moved)



A-14

TR-P26001-08-NC

Figure A-14: Pre-Test Left Rear ¾ View





Figure A-16: Post-Test Left Side 3/4 View of Doors After Impact



Figure A-17: Post-Test Right Side ¾ View of Doors After Impact

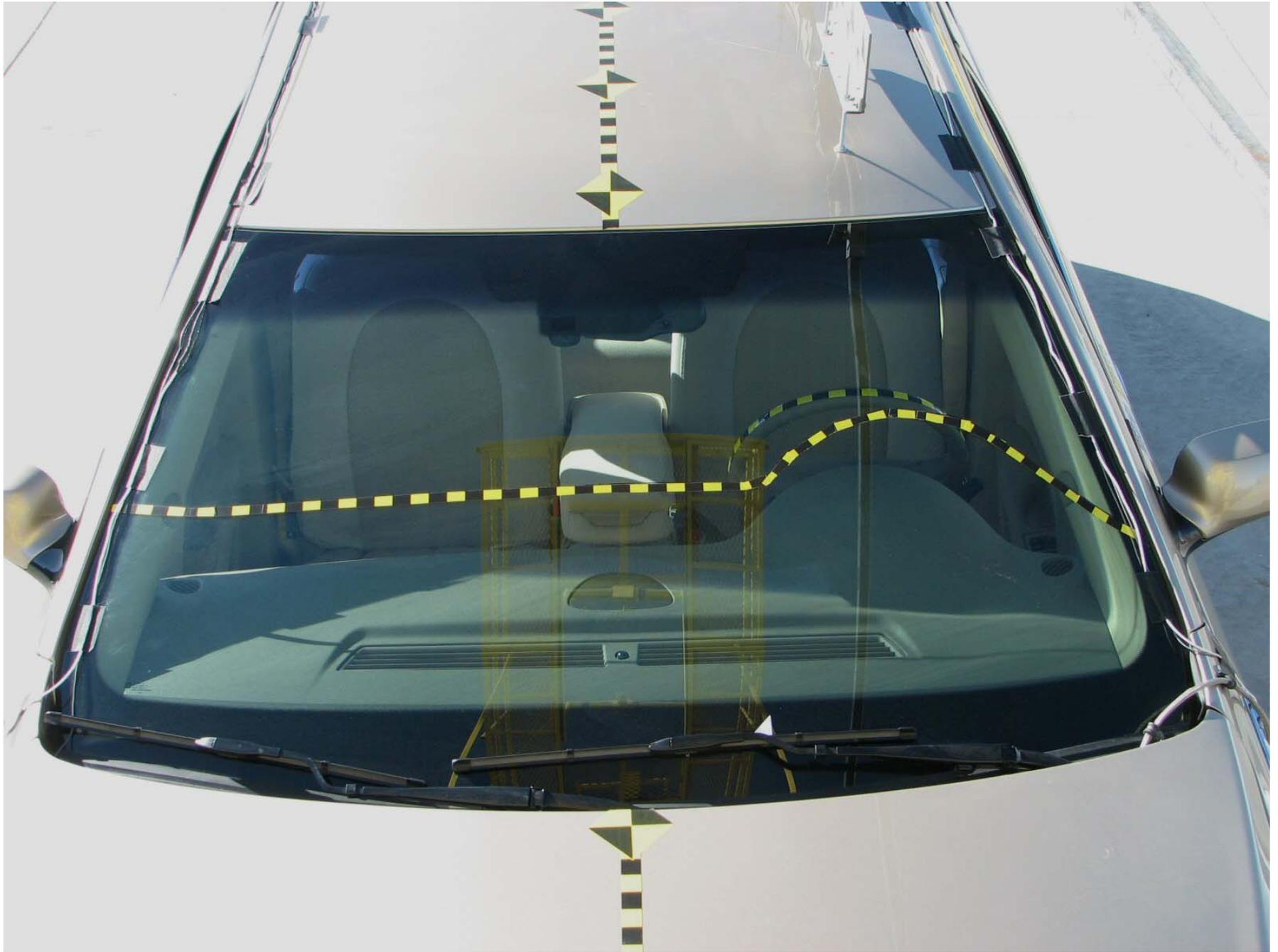


Figure A-18: Pre-Test Windshield

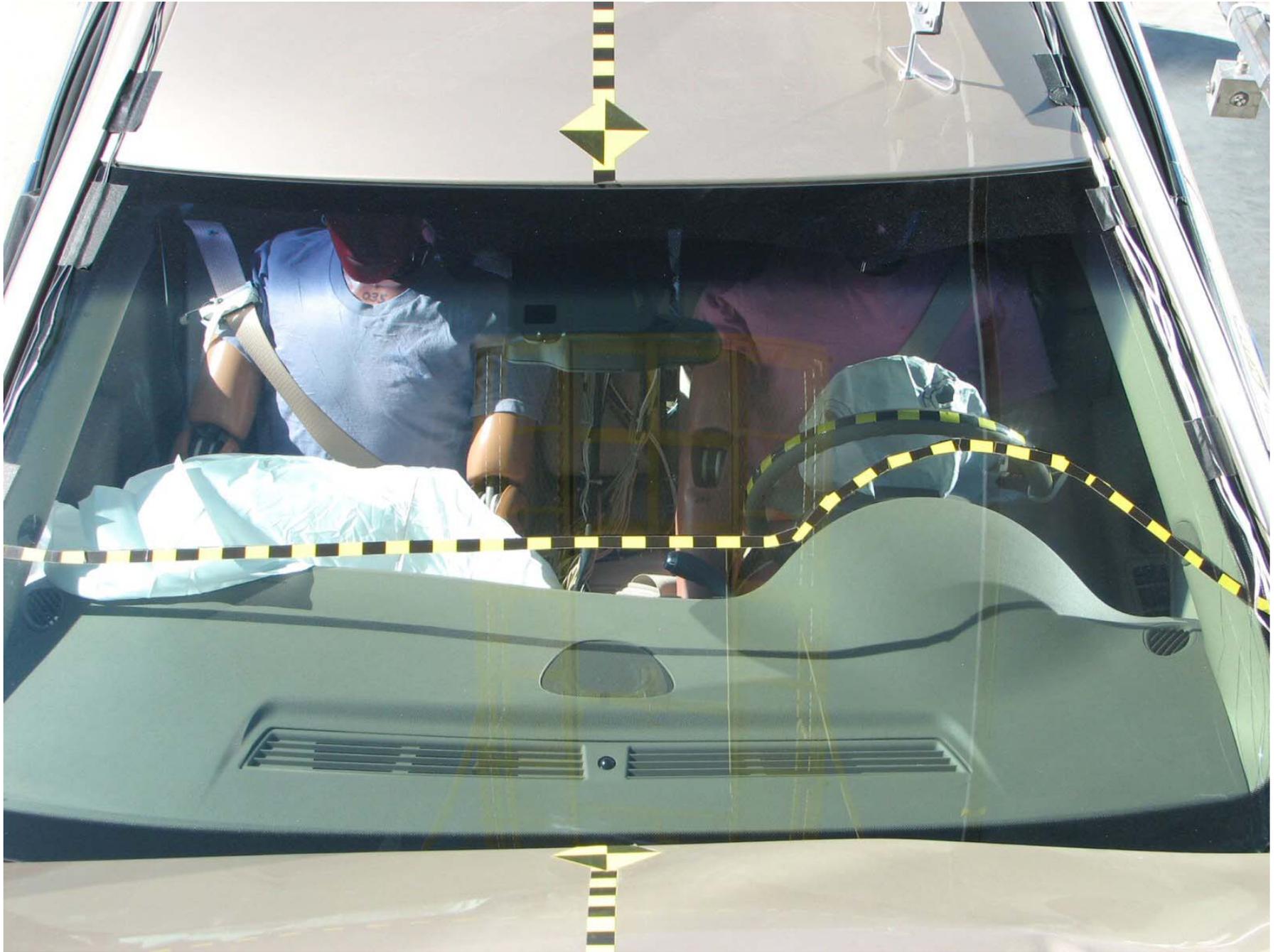


Figure A-19: Post-Test Windshield



Figure A-20: Pre-Test Engine Compartment



Figure A-21: Post-Test Engine Compartment (Vehicle Moved)



Figure A-22: Pre-Test Fuel Cap



2006 BUICK LUCERNE  
M60101  
STODDARD SOLVENT ADDED  
17.2 GALLONS  
(64.1 LITERS)

 **KARCO**  
Engineering, LLC

Figure A-23: Post-Test Fuel Cap

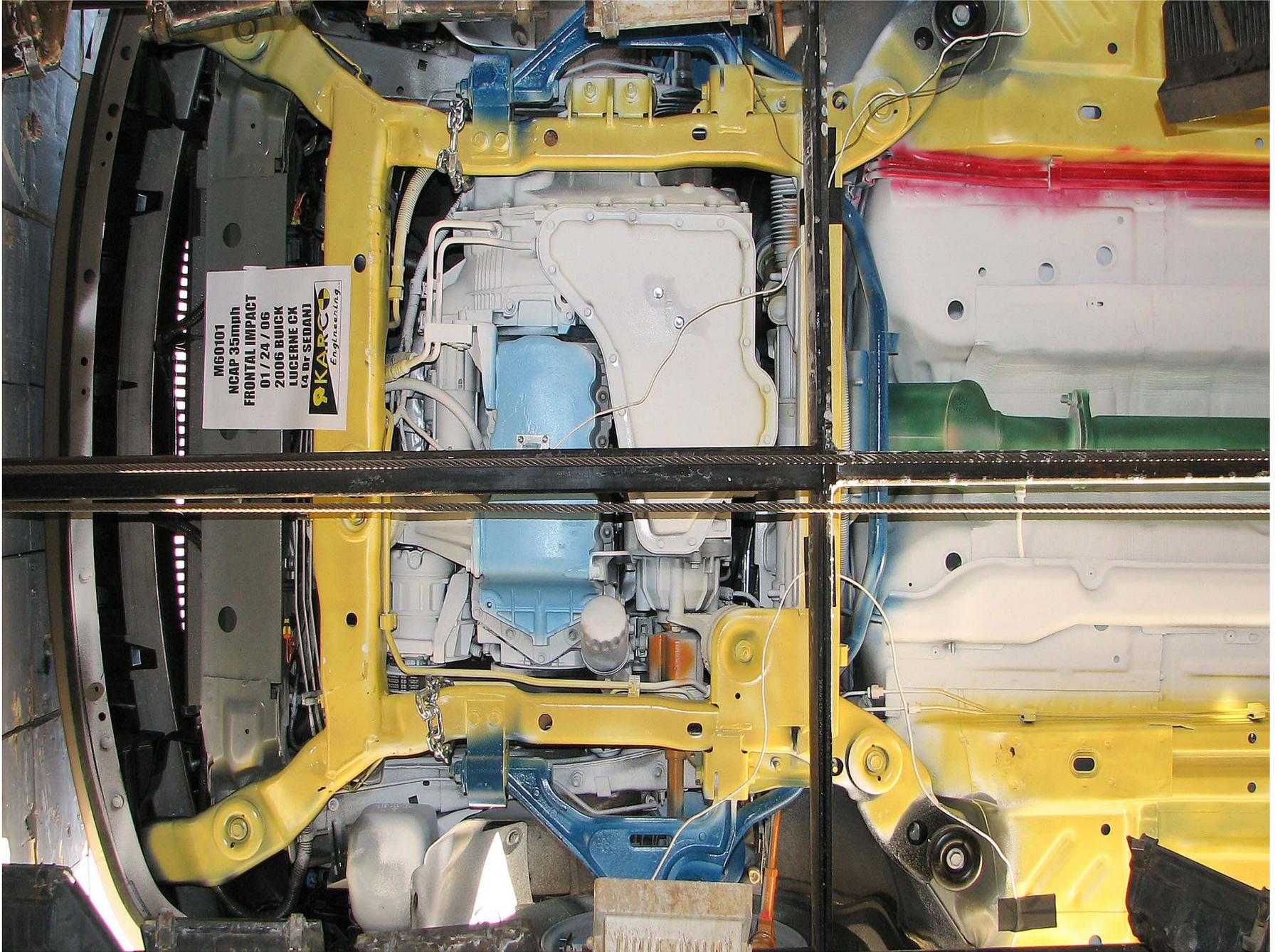


Figure A-24: Pre-Test Front Underbody



Figure A-25: Post-Test Front Underbody

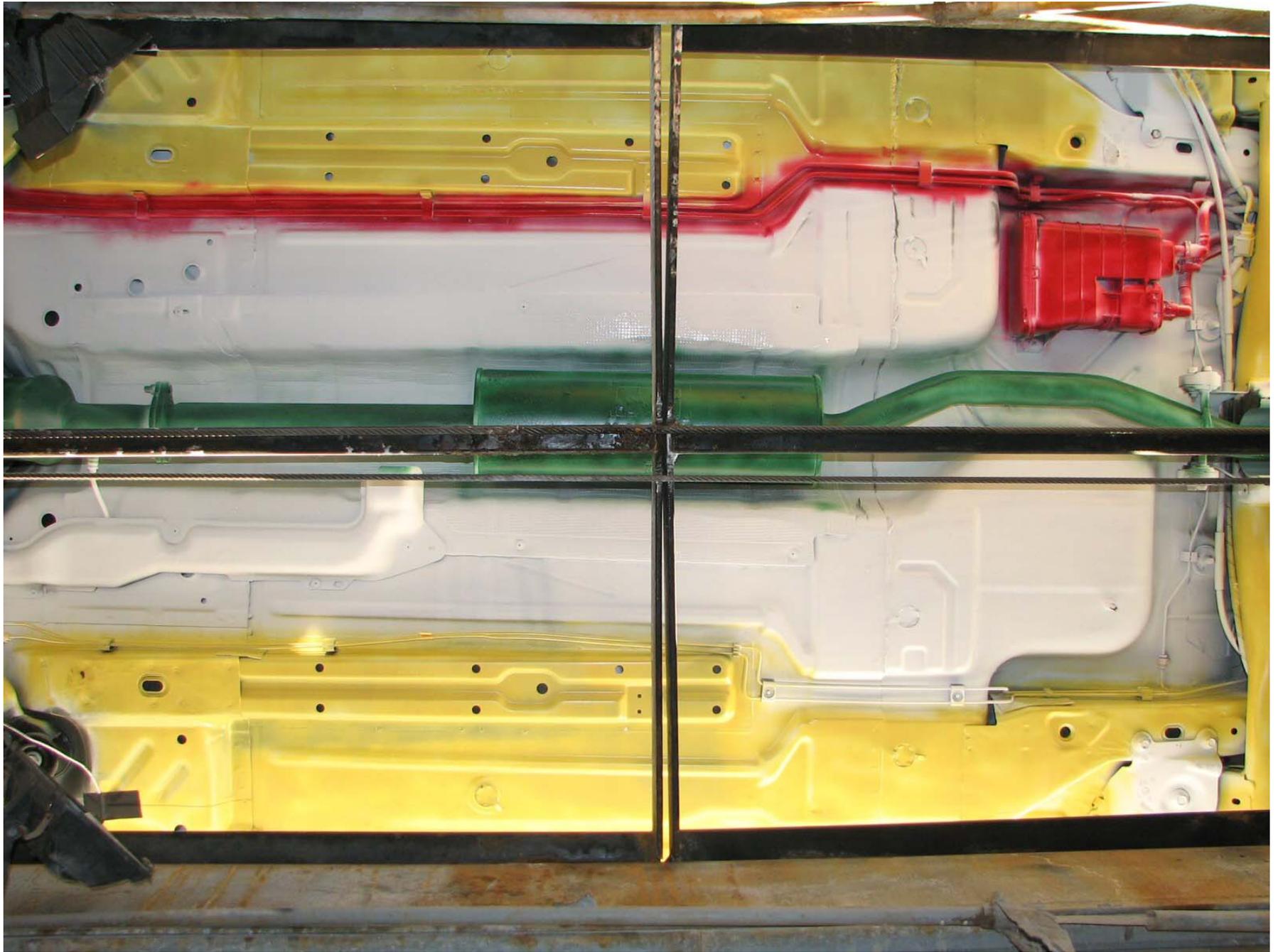


Figure A-26: Pre-Test Mid Underbody



Figure A-27: Post-Test Mid Underbody



Figure A-28: Pre-Test Rear Underbody

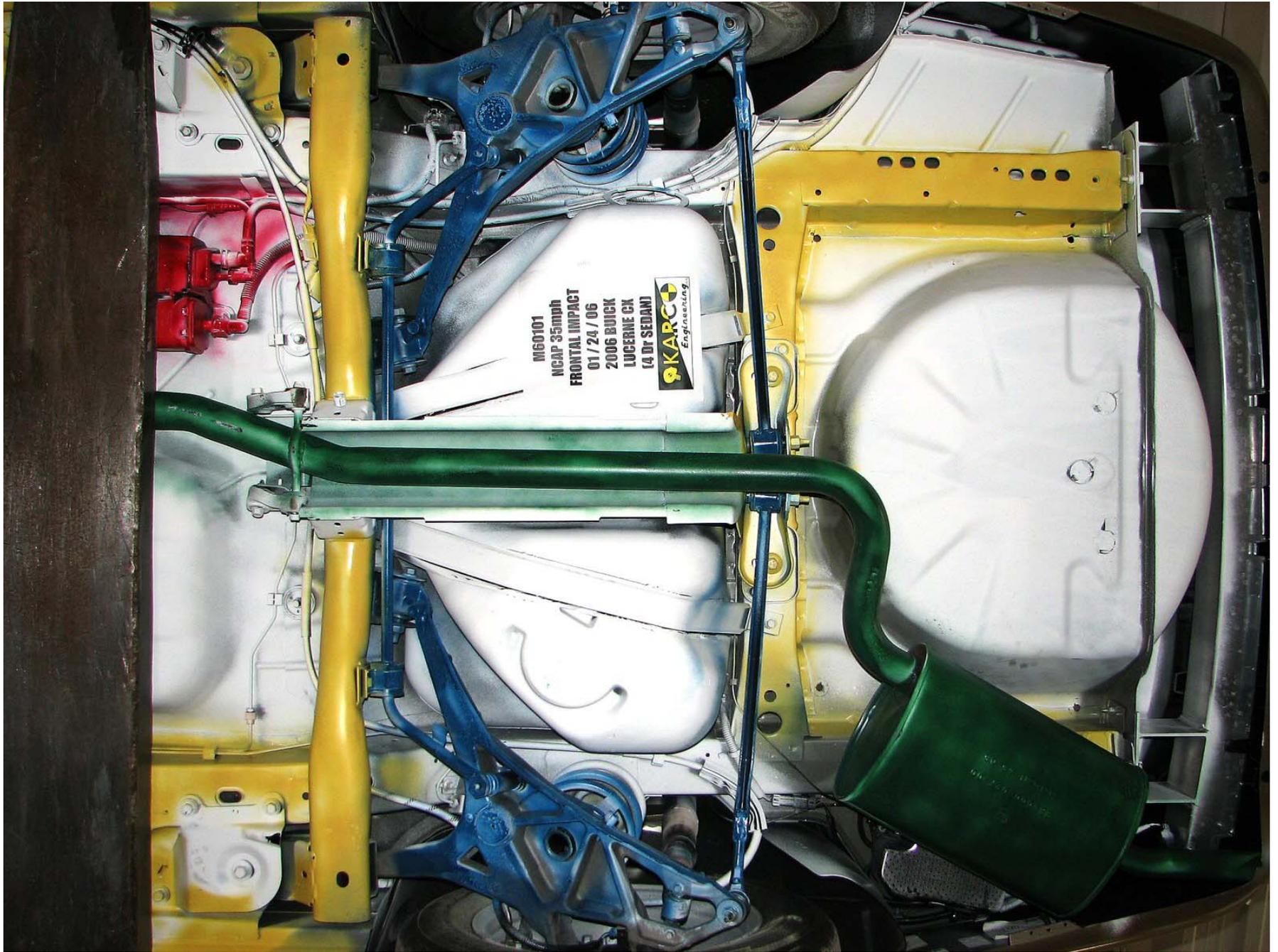


Figure A-29: Post-Test Rear Underbody



Figure A-30: Pre-Test Driver Dummy Front View (Head Position)



Figure A-31: Post-Test Driver Dummy Front View (Head Position)



Figure A-32: Pre-Test Driver Dummy (Through Window)



Figure A-33: Post-Test Driver Dummy (Through Window)



Figure A-34: Pre-Test Driver Dummy (Door Open)



Figure A-35: Post-Test Driver Dummy (Door Open)



A-36

TR-P26001-08-NC

Figure A-36: Pre-Test Driver Dummy Feet



Figure A-37: Post-Test Driver Dummy Feet



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



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



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



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



Figure A-42: Post-Test Driver Dummy Head



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



Figure A-44: Pre-Test Passenger Dummy Front View (Head Position)



Figure A-45: Post-Test Passenger Dummy Front View (Head Position)



Figure A-46: Pre-Test Passenger Dummy (Through Window)



Figure A-47: Post-Test Passenger Dummy (Through Window)



Figure A-48: Pre-Test Passenger Dummy (Door Open)



Figure A-49: Post-Test Passenger Dummy (Door Open)

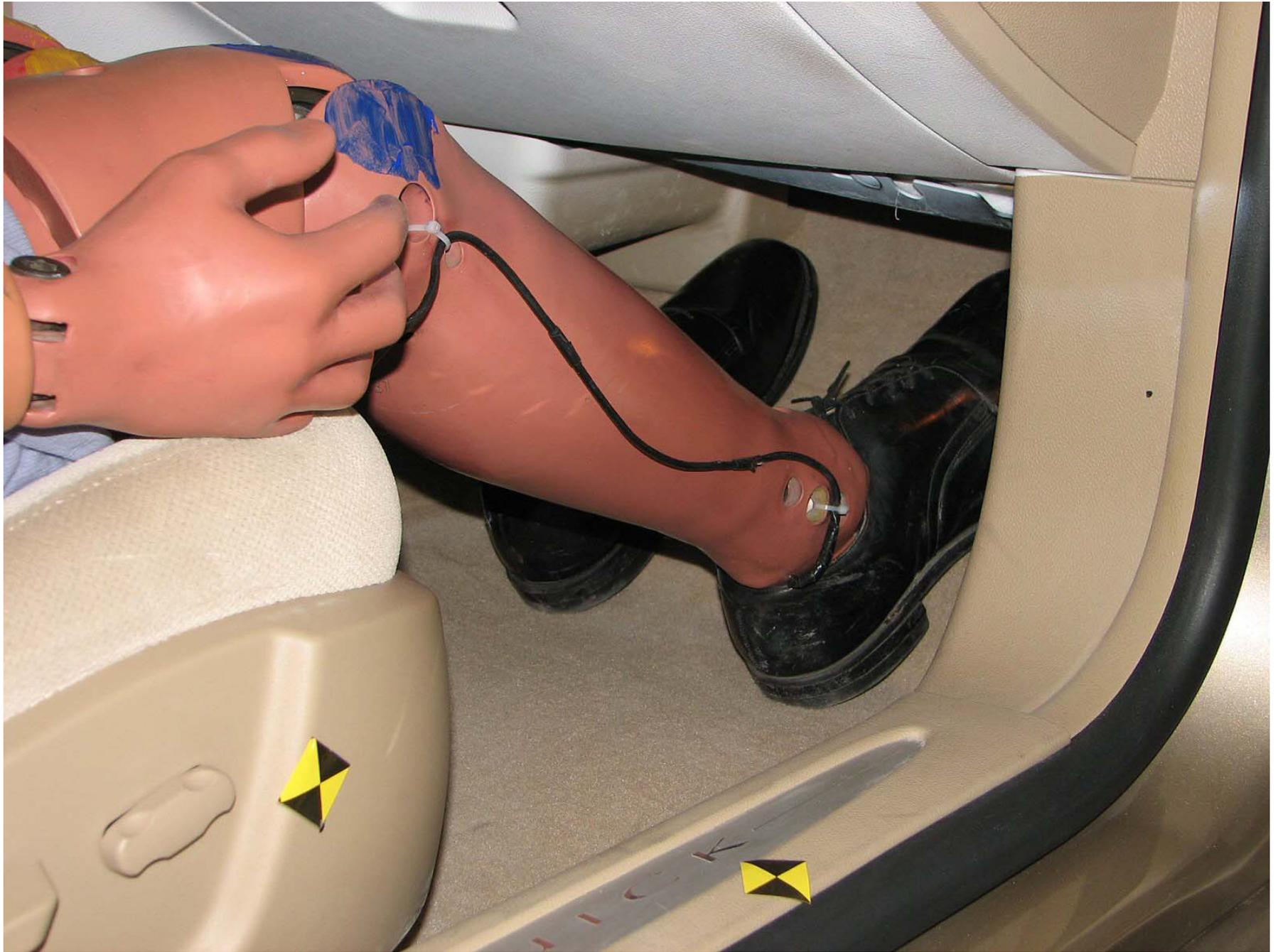


Figure A-50: Pre-Test Passenger Dummy Feet



Figure A-51: Post-Test Passenger Dummy Feet



Figure A-52: Pre-Test Passenger Side Glove Box



Figure A-53: Post-Test Passenger Side Glove Box



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



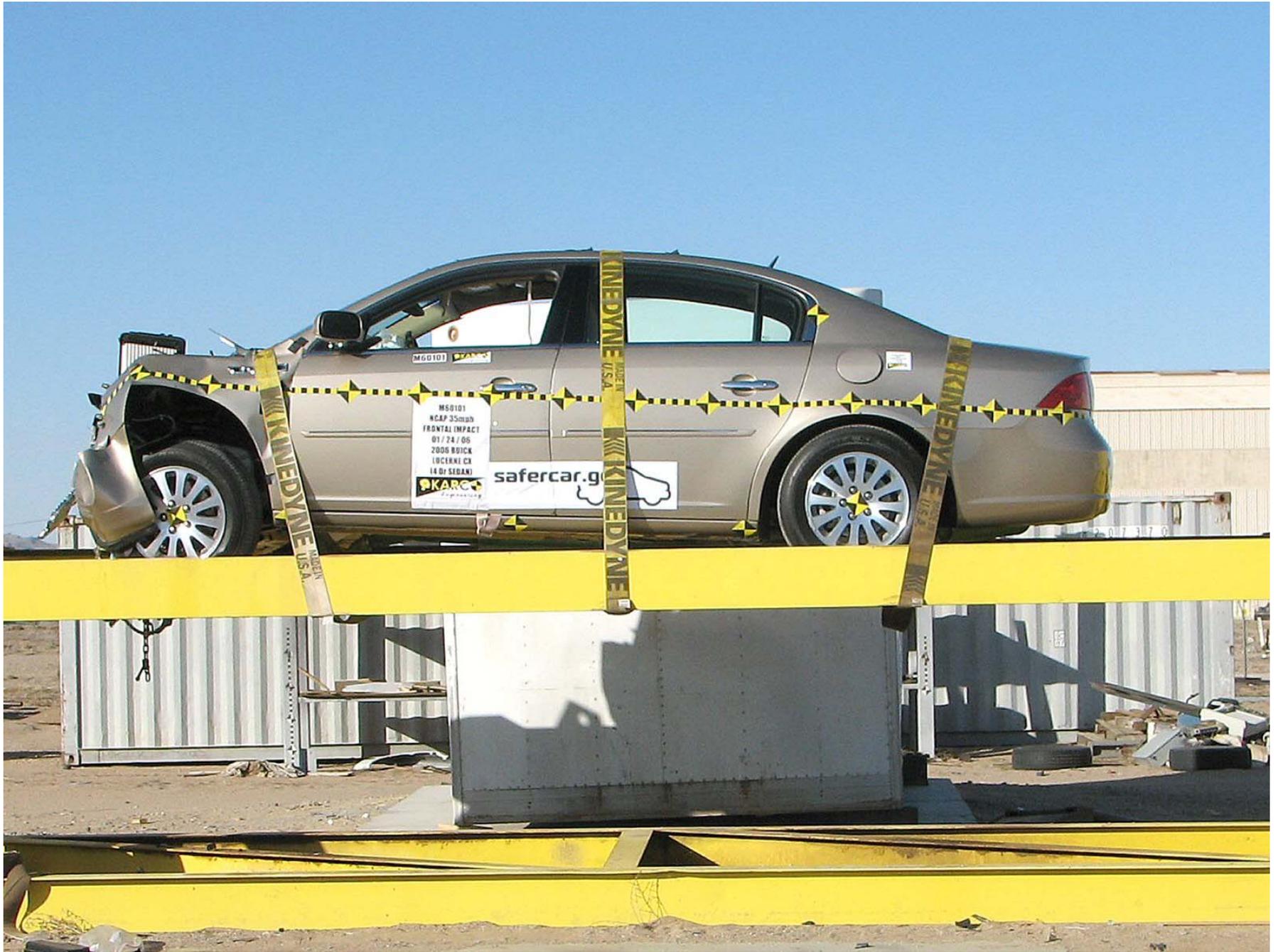
Figure A-55: Post-Test Passenger Side Floor Pan



Figure A-56: Post-Test Passenger Dummy Head



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



A-58

TR-P26001-08-NC

Figure A-58: Vehicle on Rollover Device (0°)



Figure A-59: Vehicle on Rollover Device (90°)



Figure A-60: Vehicle on Rollover Device (180°)



Figure A-61: Vehicle on Rollover Device (270°)



Figure A-62: Vehicle Impact

**APPENDIX B**

**DATA PLOTS**

## LIST OF DATA PLOTS

Data Plot	Page	
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	Driver Head Primary Y	B-1
	Driver Head Primary Z	B-1
	Driver Head Resultant Primary	B-1
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B-5	Passenger Chest Primary X	B-5
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B-6	Passenger Left Femur Force Z	B-6
	Passenger Right Femur Force Z	B-6

## LIST OF DATA PLOTS...(CONTINUED)

The following additional data plots for this test can be obtained from the research and development section of the NHTSA website. The website can be found at [www.NHTSA.dot.gov](http://www.NHTSA.dot.gov).

Driver Head Primary X Velocity  
Driver Head Primary X Displacement  
Driver Head Redundant X  
Driver Head Redundant Y  
Driver Head Redundant Z  
Driver Head Resultant Redundant  
Driver Head Redundant X Velocity  
Driver Head Redundant X Displacement  
Driver Upper Neck Force X  
Driver Upper Neck Force Y  
Driver Upper Neck Force Z  
Driver Upper Neck Force Resultant  
Driver Upper Neck Moment X  
Driver Upper Neck Moment Y  
Driver Upper Neck Moment Z  
Driver Upper Neck Moment Resultant  
Driver Chest Primary X Velocity  
Driver Chest Primary X Displacement  
Driver Chest Redundant X  
Driver Chest Redundant Y  
Driver Chest Redundant Z  
Driver Chest Resultant Redundant  
Driver Chest Redundant X Velocity  
Driver Chest Redundant X Displacement  
Driver Chest Displacement  
Driver Pelvis X  
Driver Pelvis Y  
Driver Pelvis Z  
Driver Pelvis Resultant  
Driver Pelvis X Velocity  
Driver Pelvis X Displacement  
Driver Left Upper Tibia Moment X  
Driver Left Upper Tibia Moment Y  
Driver Right Upper Tibia Moment X

LIST OF DATA PLOTS...(CONTINUED)

Driver Right Upper Tibia Moment Y  
Driver Left Lower Tibia Moment X  
Driver Left Lower Tibia Moment Y  
Driver Left Lower Tibia Force Z  
Driver Right Lower Tibia Moment X  
Driver Right Lower Tibia Moment Y  
Driver Right Lower Tibia Force Z  
Driver Left Foot Aft X  
Driver Left Foot Aft Z  
Driver Left Foot Fore Z  
Driver Right Foot Aft X  
Driver Right Foot Aft Z  
Driver Right Foot Fore Z  
Driver Lap Belt Force  
Driver Shoulder Belt Force  
Driver Shoulder Belt Pullout  
Driver Shoulder Belt Elongation  
Passenger Head Primary X Velocity  
Passenger Head Primary X Displacement  
Passenger Head Redundant X  
Passenger Head Redundant Y  
Passenger Head Redundant Z  
Passenger Head Resultant Redundant  
Passenger Head Redundant X Velocity  
Passenger Head Redundant X Displacement  
Passenger Upper Neck Force X  
Passenger Upper Neck Force Y  
Passenger Upper Neck Force Z  
Passenger Upper Neck Force Resultant  
Passenger Upper Neck Moment X  
Passenger Upper Neck Moment Y  
Passenger Upper Neck Moment Z  
Passenger Upper Neck Moment Resultant  
Passenger Chest Primary X Velocity  
Passenger Chest Primary X Displacement  
Passenger Chest Redundant X

LIST OF DATA PLOTS...(CONTINUED)

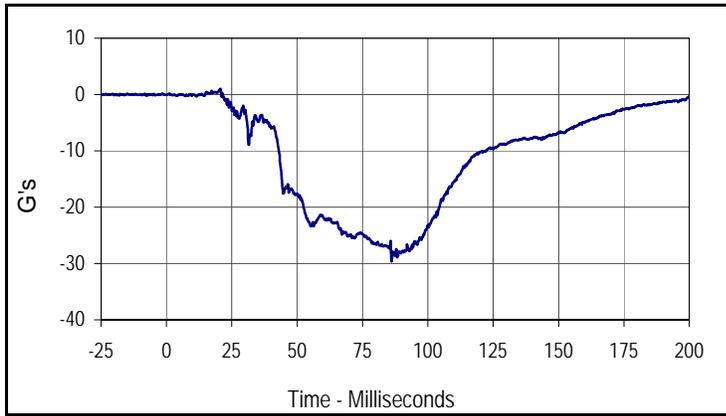
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Passenger Chest Resultant Redundant  
Passenger Chest Redundant X Velocity  
Passenger Chest Redundant X Displacement  
Passenger Chest Displacement  
Passenger Pelvis X  
Passenger Pelvis Y  
Passenger Pelvis Z  
Passenger Pelvis Resultant  
Passenger Pelvis X Velocity  
Passenger Pelvis X Displacement  
Passenger Left Femur Force  
Passenger Right Femur Force  
Passenger Left Upper Tibia Moment X  
Passenger Left Upper Tibia Moment Y  
Passenger Right Upper Tibia Moment X  
Passenger Right Upper Tibia Moment Y  
Passenger Left Lower Tibia Moment X  
Passenger Left Lower Tibia Moment Y  
Passenger Left Lower Tibia Force Z  
Passenger Right Lower Tibia Moment X  
Passenger Right Lower Tibia Moment Y  
Passenger Right Lower Tibia Force Z  
Passenger Left Foot Aft X  
Passenger Left Foot Aft Z  
Passenger Left Foot Fore Z  
Passenger Right Foot Aft X  
Passenger Right Foot Aft Z  
Passenger Right Foot Fore Z  
Passenger Lap Belt Force  
Passenger Shoulder Belt Force  
Passenger Shoulder Belt Pullout  
Passenger Shoulder Belt Elongation  
Vehicle Left Rear X  
Vehicle Left Rear X Velocity

LIST OF DATA PLOTS...(CONTINUED)

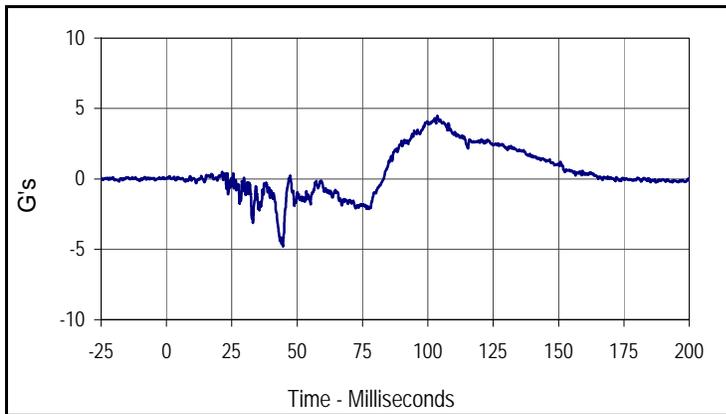
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Vehicle Right Rear X  
Vehicle Right Rear X Velocity  
Vehicle Right Rear X Displacement  
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Vehicle Engine Top Velocity  
Vehicle Engine Top Displacement  
Vehicle Engine Bottom  
Vehicle Engine Bottom Velocity  
Vehicle Engine Bottom Displacement  
Vehicle Left Brake Caliper  
Vehicle Left Brake Caliper Velocity  
Vehicle Left Brake Caliper Displacement  
Vehicle Right Brake Caliper  
Vehicle Right Brake Caliper Velocity  
Vehicle Right Brake Caliper Displacement  
Vehicle Instrument Panel  
Vehicle Instrument Panel Velocity  
Vehicle Instrument Panel Displacement  
Vehicle Left Rear Z  
Vehicle Left Rear Z Velocity  
Vehicle Left Rear Z Displacement  
Vehicle Right Rear Z  
Vehicle Right Rear Z Velocity  
Vehicle Right Rear Z Displacement

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

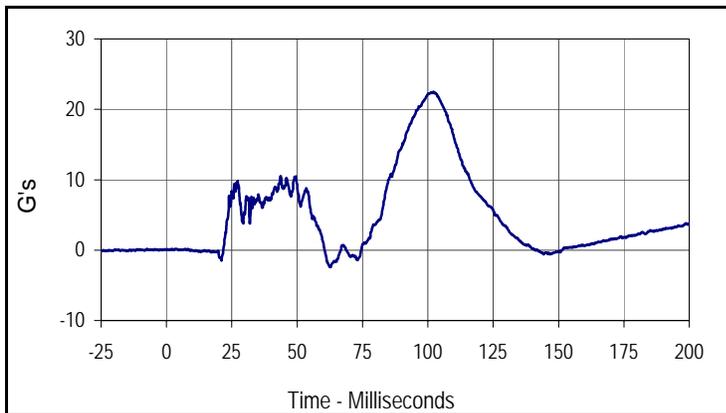
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 NHTSA No.: M60101



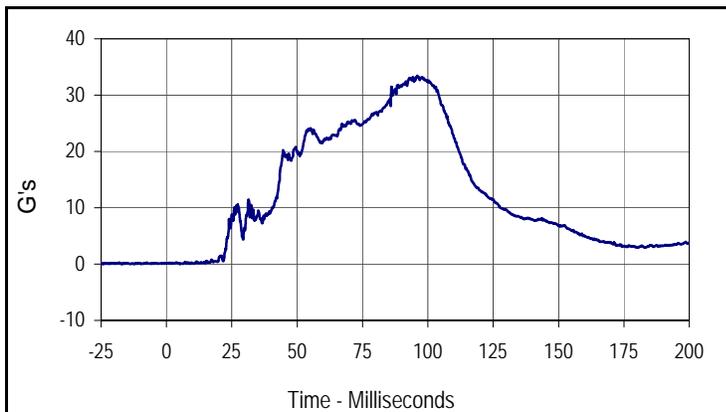
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001	FIL	1000	G's
Max	Time	Min	Time
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Curve Description			
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CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.5	103.6	-4.8	44.5



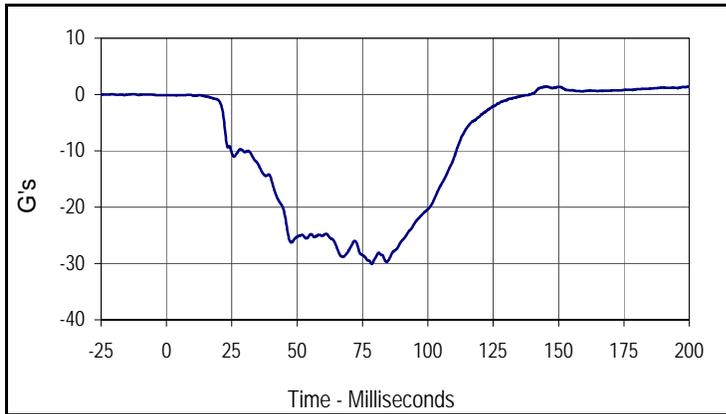
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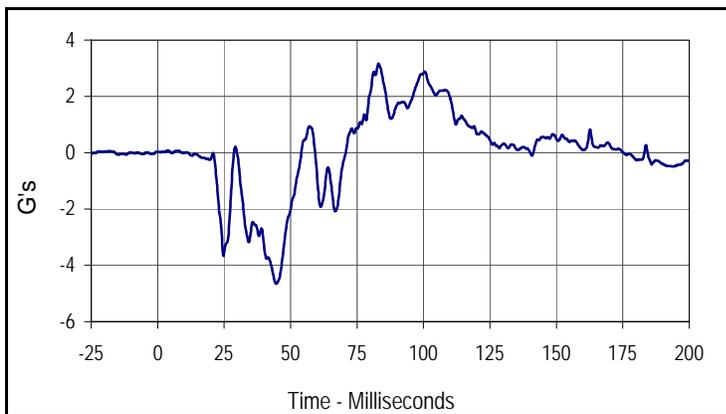
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CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
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Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

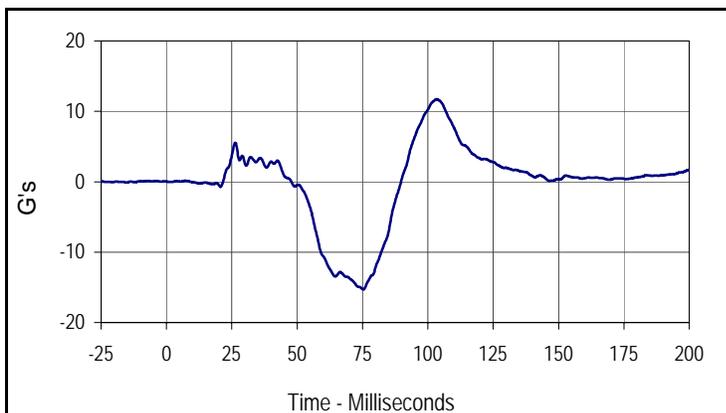
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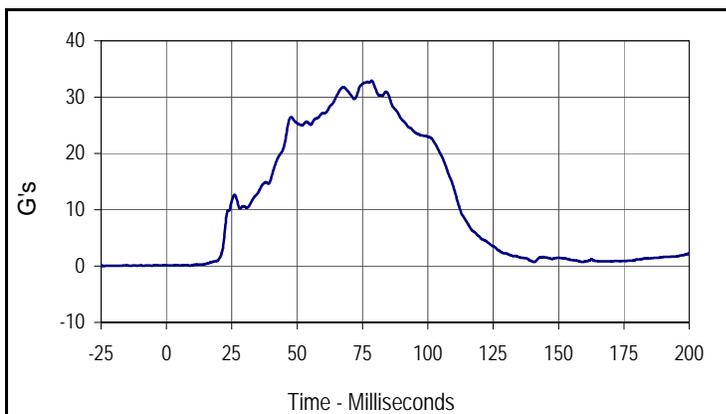
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CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
1.4	200.0	-30.1	78.5



Curve Description			
Driver Chest Primary Y			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
3.2	83.1	-4.7	44.6



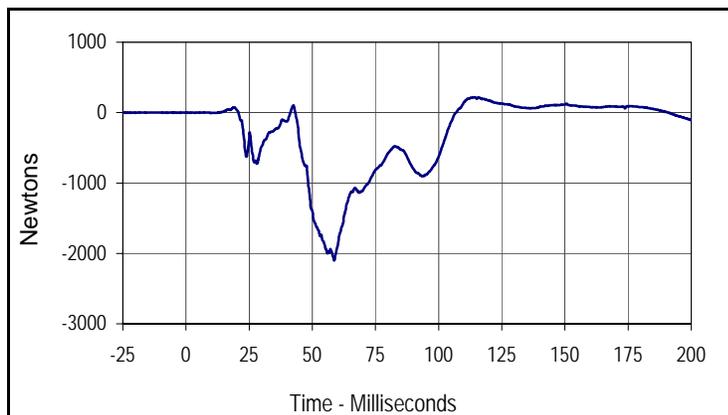
Curve Description			
Driver Chest Primary Z			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
11.7	103.4	-15.3	75.3



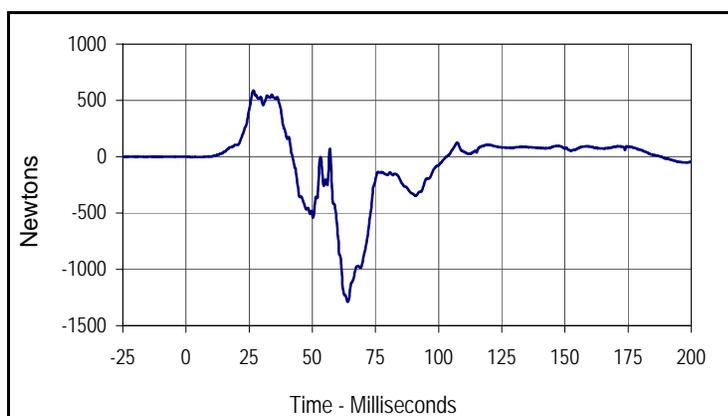
Curve Description			
Driver Chest Resultant Primary			
CURNO	Type	SAE Class	Units
004	RES	180	G's
Max	Time	Min	Time
32.9	78.5	0.0	9.0

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

Test Date: 1/24/06  
 NHTSA No.: M60101



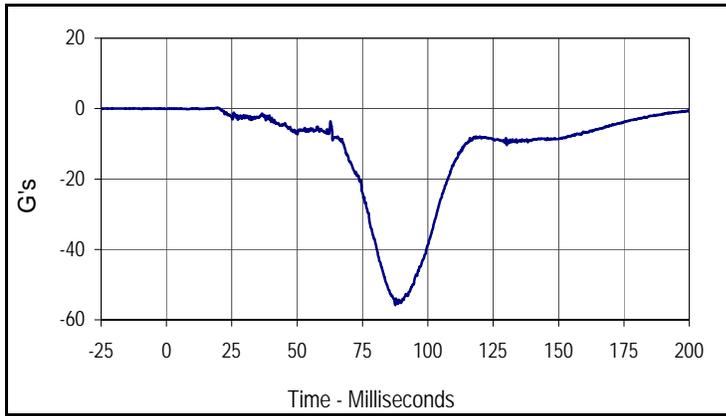
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Driver Left Femur Force Z			
CURNO	Type	SAE Class	Units
007	FIL	600	Newtons
Max	Time	Min	Time
219.7	114.4	-2099.6	58.7



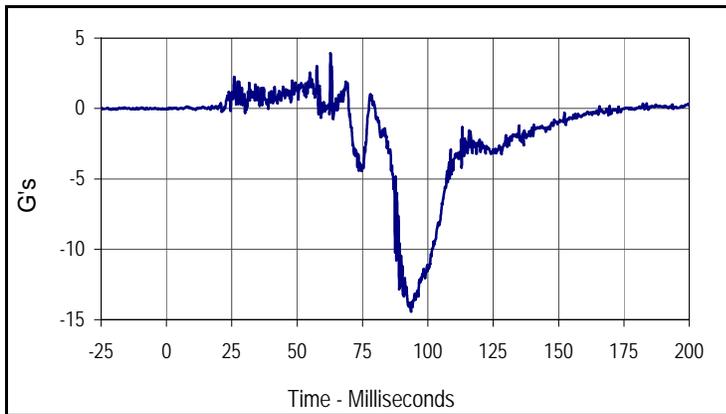
Curve Description			
Driver Right Femur Force Z			
CURNO	Type	SAE Class	Units
008	FIL	600	Newtons
Max	Time	Min	Time
587.0	26.7	-1288.5	64.0

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

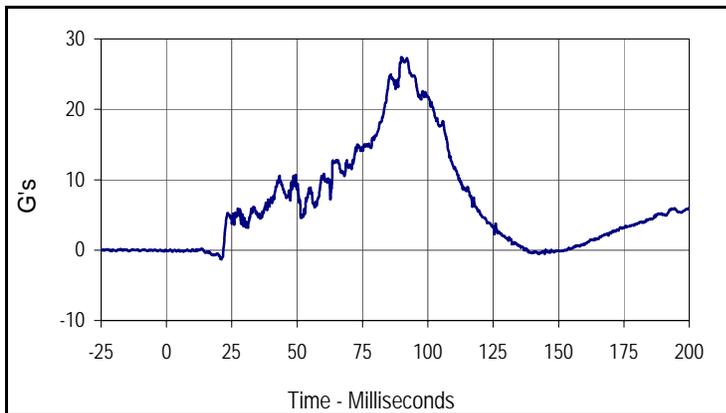
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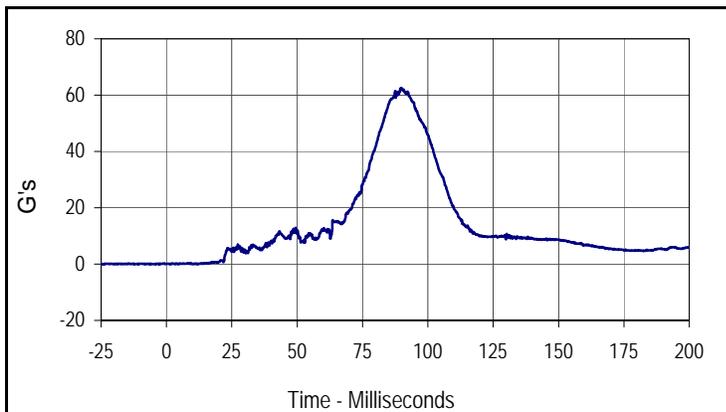
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Passenger Head Primary X			
CURNO	Type	SAE Class	Units
009	FIL	1000	G's
Max	Time	Min	Time
0.2	19.7	-55.8	87.5



Curve Description			
Passenger Head Primary Y			
CURNO	Type	SAE Class	Units
010	FIL	1000	G's
Max	Time	Min	Time
3.9	62.7	-14.4	93.5



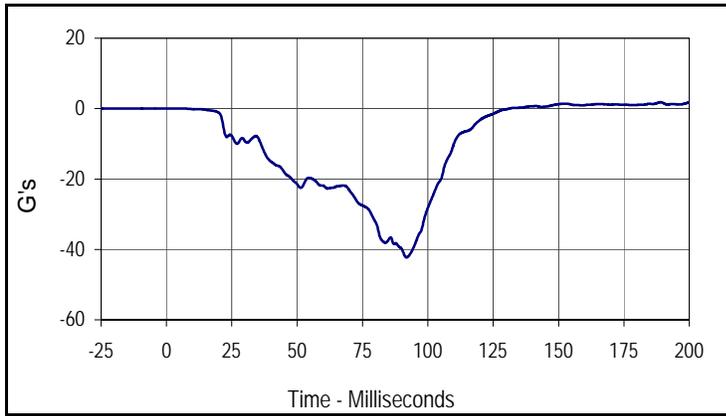
Curve Description			
Passenger Head Primary Z			
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011	FIL	1000	G's
Max	Time	Min	Time
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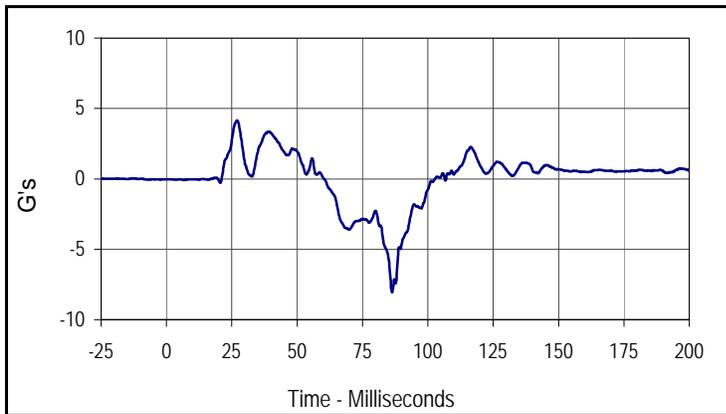
Curve Description			
Passenger Head Resultant Primary			
CURNO	Type	SAE Class	Units
009	RES	1000	G's
Max	Time	Min	Time
62.5	90.0	0.0	3.4

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

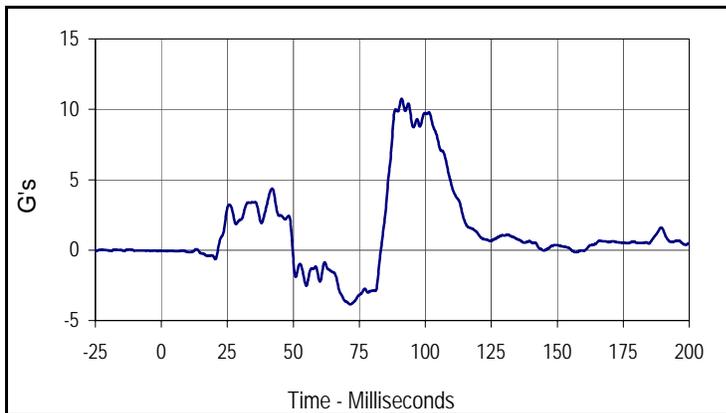
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 NHTSA No.: M60101



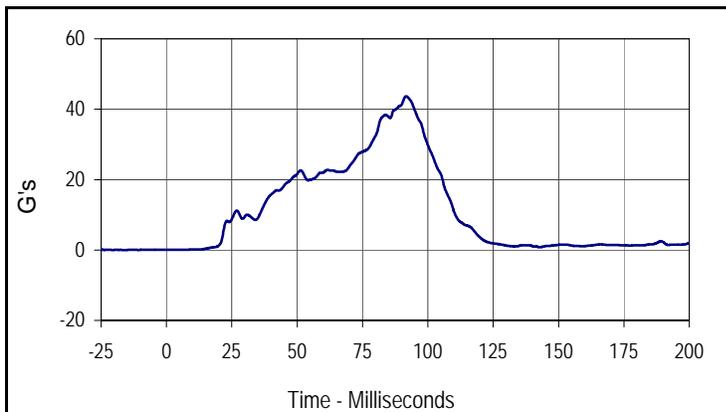
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CURNO	Type	SAE Class	Units
012	FIL	180	G's
Max	Time	Min	Time
1.8	189.0	-42.3	91.8



Curve Description			
Passenger Chest Primary Y			
CURNO	Type	SAE Class	Units
013	FIL	180	G's
Max	Time	Min	Time
4.2	27.0	-8.0	86.3



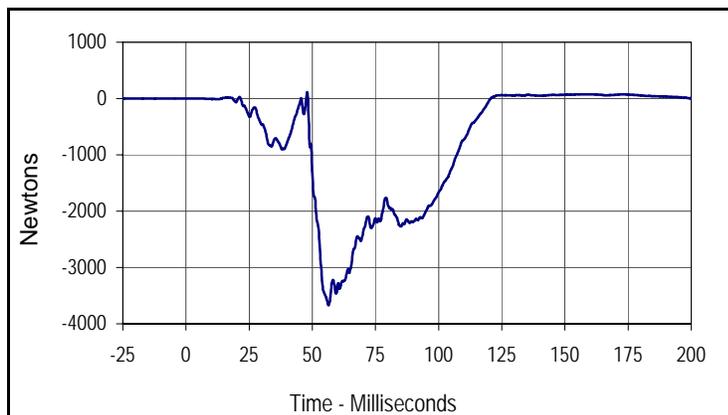
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Passenger Chest Primary Z			
CURNO	Type	SAE Class	Units
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Max	Time	Min	Time
10.8	91.0	-3.9	71.6



Curve Description			
Passenger Chest Resultant Primary			
CURNO	Type	SAE Class	Units
012	RES	180	G's
Max	Time	Min	Time
43.7	91.7	0.1	0.0

Test Vehicle: 2006 Buick Lucerne CX 4-Door Sedan  
 Test Program: 2006 NHTSA 35mph NCAP

Test Date: 1/24/06  
 NHTSA No.: M60101



Curve Description			
Passenger Left Femur Force Z			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
113.6	48.0	-3672.4	56.4



Curve Description			
Passenger Right Femur Force Z			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
384.7	48.5	-1680.6	59.4

**APPENDIX C**  
**DUMMY CALIBRATION DATA**

Test Program: Hybrid III 50th Percentile Male Head Drop Test

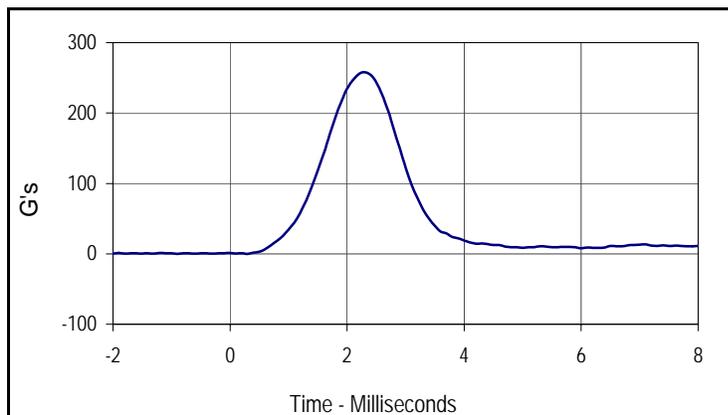
Test Date: 1/19/06

ATD Serial No.: 034

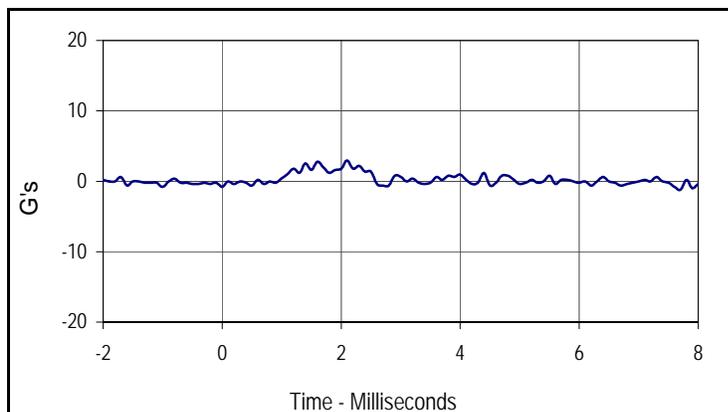
Test I.D.: HD01A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	258.0	Pass
Peak Lateral Acceleration	G's	≤15.0	3.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
258.0	2.3	0.1	-0.9



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.0	2.1	-0.8	-1.0

Test Program: Hybrid III 50th Percentile Male Thorax Impact Test

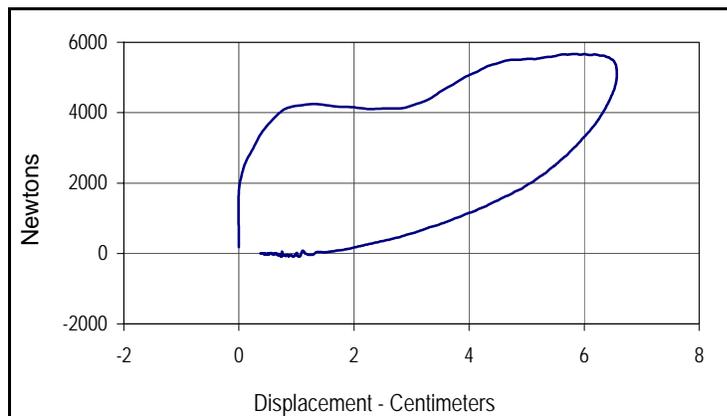
Test Date: 1/19/06

ATD Serial No.: 034

Test I.D.: CH01A



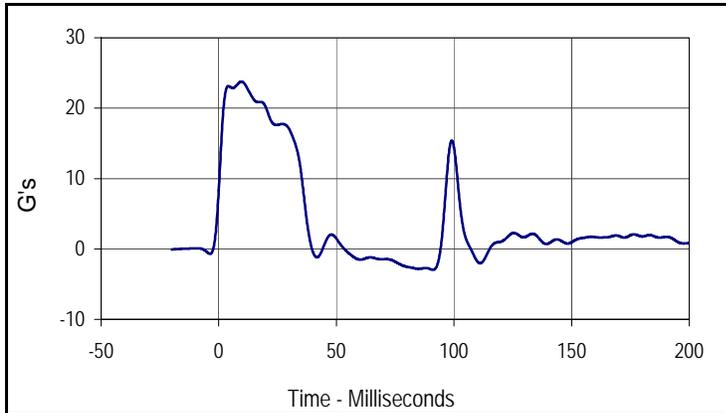
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.64	Pass
Peak Probe Force	Newtons	5159 to 5893	5670	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.57	Pass
Internal Hysteresis	%	69 to 85	75.1	Pass
Overall Test Results				Pass



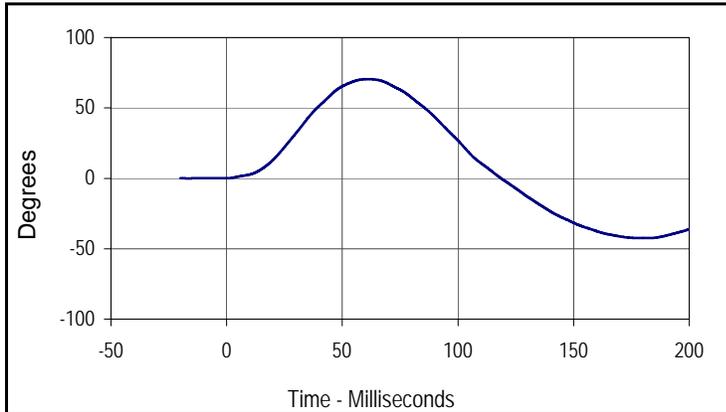
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysteresis
001	FIL	180	75.1
Peak Probe Force		Peak Chest Deflection	
5670		6.57	



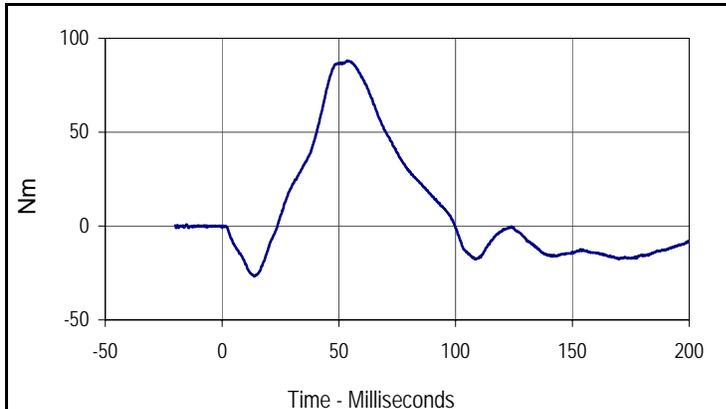
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.98	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.8	Pass
	20 Msec.	G's	17.6 to 22.6	20.1	Pass
	30 Msec.	G's	12.5 to 18.5	17.0	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	17.0	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	37.1	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	70.4	Pass
	Time	Msec.	57.0 to 64.0	60.9	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	118.6	Pass	
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	88.1	Pass
	Time	Msec.	47.0 to 58.0	53.6	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	99.8	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
23.8	9.6	-3.0	91.0



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
70.4	60.9	-42.4	181.8



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
88.1	53.6	-26.8	13.8

Test Program: Hybrid III 50th Percentile Male Neck Extension Test

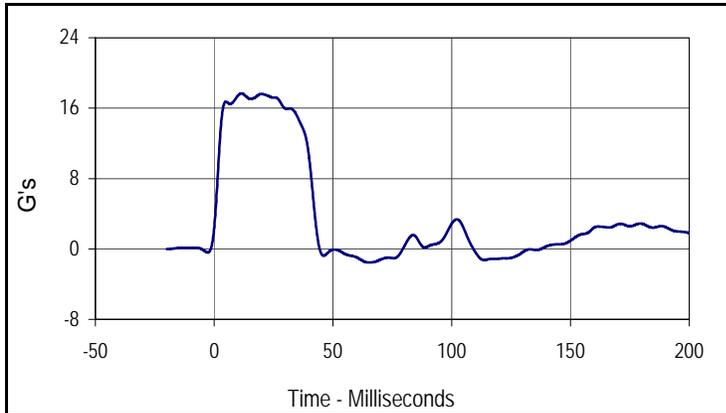
Test Date: 1/19/06

ATD Serial No.: 034

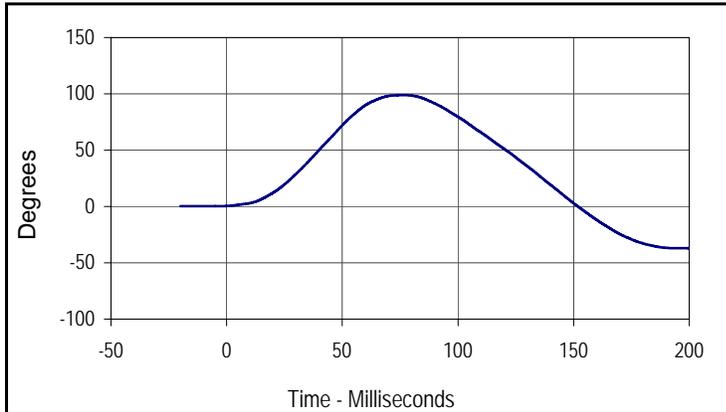
Test I.D.: NE01A



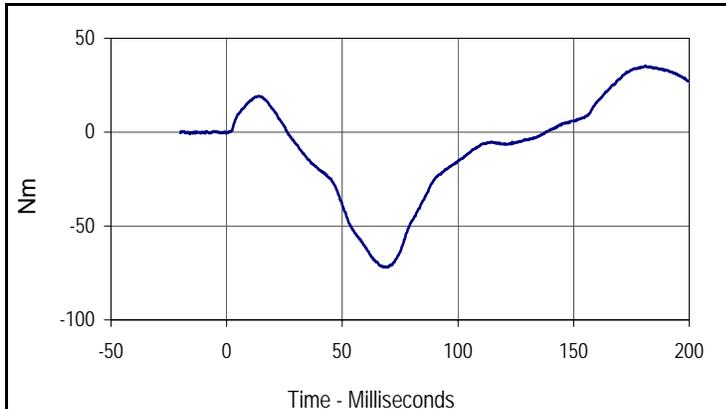
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.00	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.4	Pass
	20 Msec.	G's	14.0 to 19.0	17.6	Pass
	30 Msec.	G's	11.0 to 16.0	15.9	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	16.0	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	42.0	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	98.8	Pass
	Time	Msec.	72.0 to 82.0	76.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	151.9	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-72.1	Pass
	Time	Msec.	65.0 to 79.0	68.1	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	137.8	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
17.7	11.5	-1.5	65.2



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
98.8	76.8	-37.1	196.4



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
35.5	181.0	-72.1	68.1

Test Program: Hybrid III 50th Percentile Male Knee Impact Test

Test Date: 1/19/06

ATD Serial No.: 034

Test I.D.: LK01A , RK01A

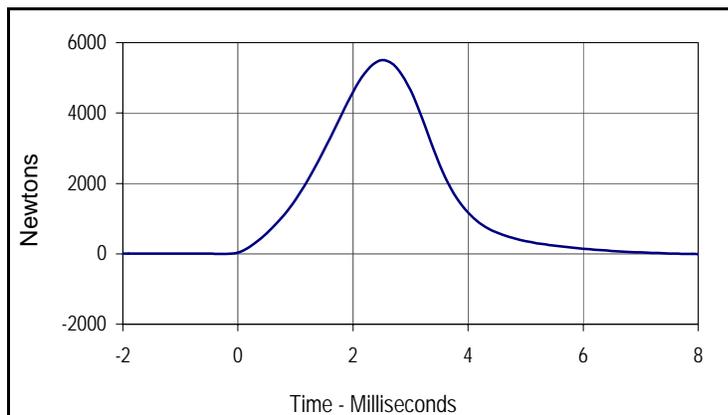


**Left Knee**

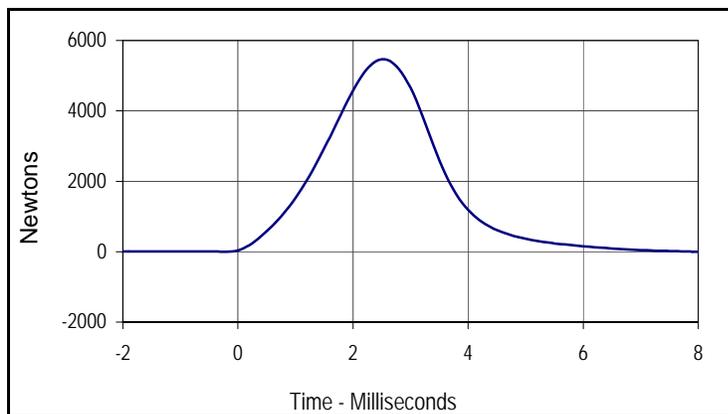
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5499	Pass
Overall Test Results				Pass

**Right Knee**

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5465	Pass
Overall Test Results				Pass



Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5498.8	2.5	-9.1	8.1



Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5465.2	2.5	-195.5	9.7

Test Program: Hybrid III 50th Percentile Male External Measurements Test Date: 1/19/06  
 ATD Serial No.: 034 Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A - Total sitting height	mm	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	510	Pass
C - "H" point height	mm	84 to 89	86	Pass
D - "H" point from seat back	mm	135 to 140	139	Pass
E - Shoulder pivot from back	mm	84 to 94	86	Pass
F - Thigh clearance	mm	140 to 155	148	Pass
G - Elbow back to wrist pivot	mm	290 to 305	295	Pass
H - Skull cap to back line	mm	41 to 46	45	Pass
I - Shoulder to elbow length	mm	330 to 345	335	Pass
J - Elbow rest height	mm	190 to 211	198	Pass
K - Buttock to knee length	mm	579 to 604	600	Pass
L - Popliteal length	mm	429 to 455	450	Pass
M - Knee pivot height	mm	485 to 500	490	Pass
N - Buttock popliteal length	mm	452 to 477	470	Pass
O - Chest depth	mm	213 to 229	215	Pass
P - Foot length	mm	251 to 267	265	Pass
V - Shoulder breadth	mm	422 to 437	425	Pass
W - Foot breadth	mm	91 to 107	105	Pass
Y - Chest circumference	mm	970 to 1001	985	Pass
Z - Waist circumference	mm	836 to 866	850	Pass
AA - Location for chest circumference	mm	429 to 434	431	Pass
BB - Location for waist circumference	mm	226 to 231	230	Pass
Overall Test Results				Pass

Test Program: Hybrid III 50th Percentile Male Head Drop Test

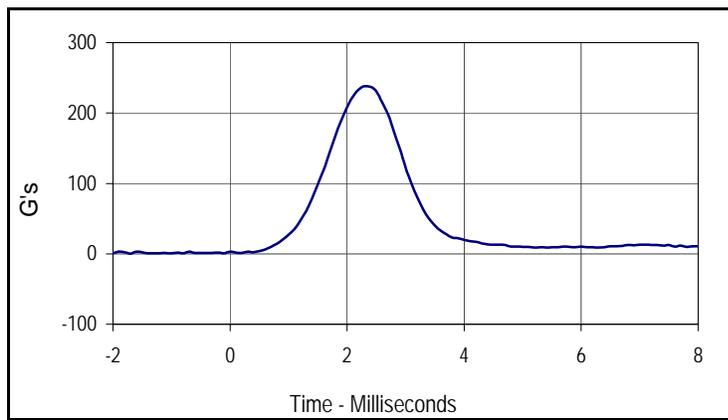
Test Date: 1/19/06

ATD Serial No.: 035

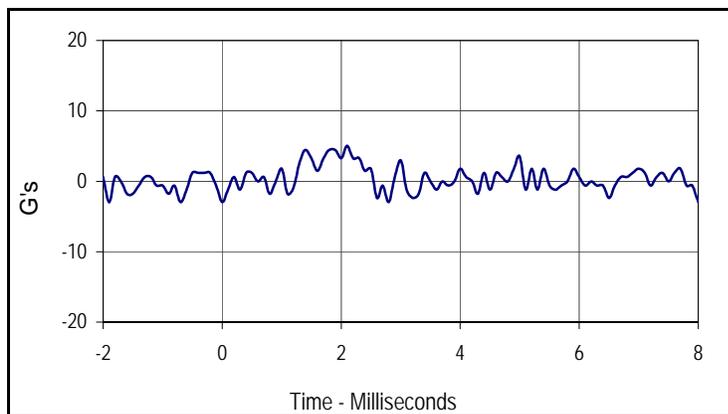
Test I.D.: HD01B



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	237.9	Pass
Peak Lateral Acceleration	G's	≤15.0	5.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
237.9	2.3	0.4	-1.7



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
5.0	2.1	-2.9	-1.9

Test Program: Hybrid III 50th Percentile Male Thorax Impact Test

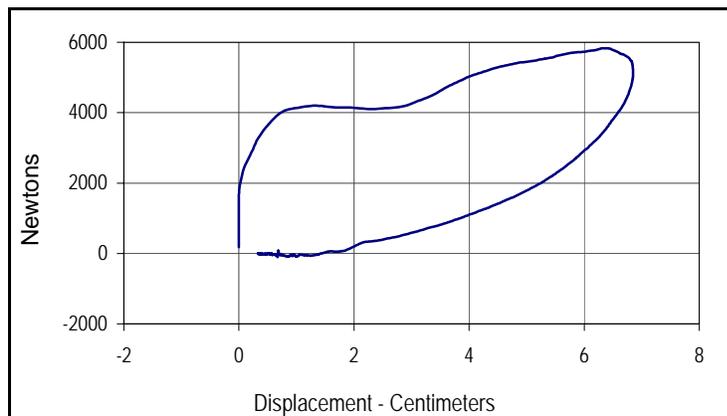
Test Date: 1/19/06

ATD Serial No.: 035

Test I.D.: CH01A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.70	Pass
Peak Probe Force	Newtons	5159 to 5893	5829	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.85	Pass
Internal Hysteresis	%	69 to 85	74.5	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysteresis
001	FIL	180	74.5
Peak Probe Force		Peak Chest Deflection	
5829		6.85	

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

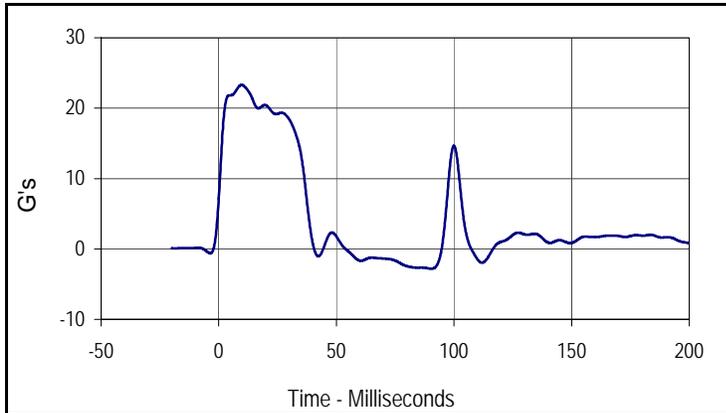
Test Date: 1/19/06

ATD Serial No.: 035

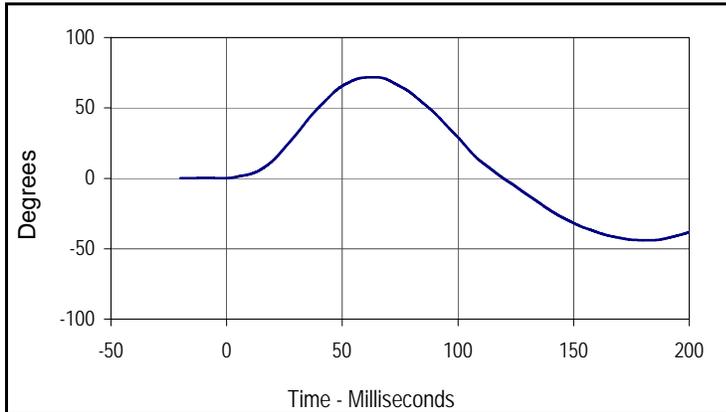
Test I.D.: NF01B



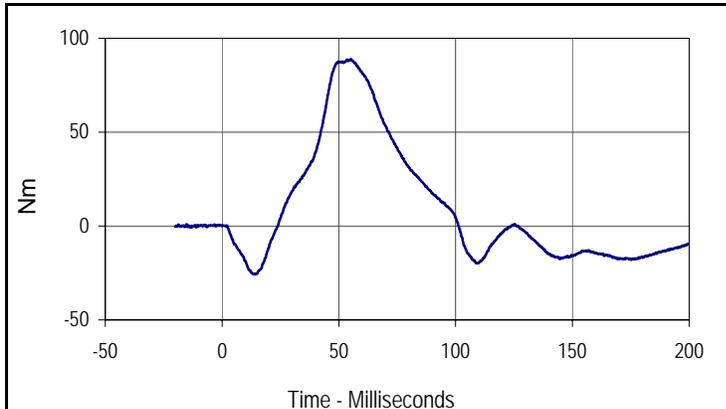
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	7.11	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.3	Pass
	20 Msec.	G's	17.6 to 22.6	20.4	Pass
	30 Msec.	G's	12.5 to 18.5	18.4	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	18.4	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	38.1	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	71.8	Pass
	Time	Msec.	57.0 to 64.0	63.7	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	119.6	Pass	
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	89.0	Pass
	Time	Msec.	47.0 to 58.0	55.1	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	101.3	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
23.3	9.7	-2.8	90.4



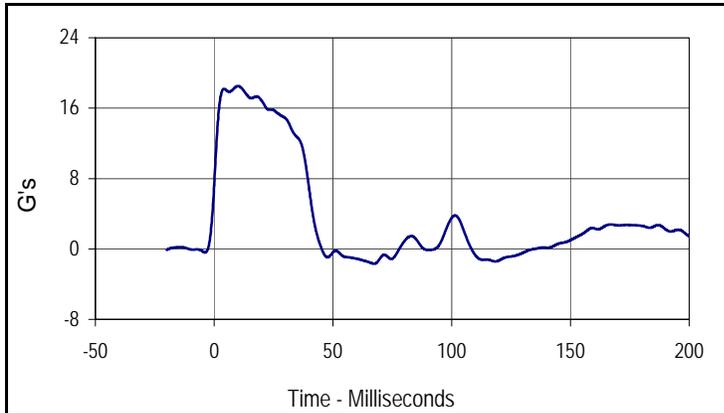
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
71.8	63.7	-44.0	183.4



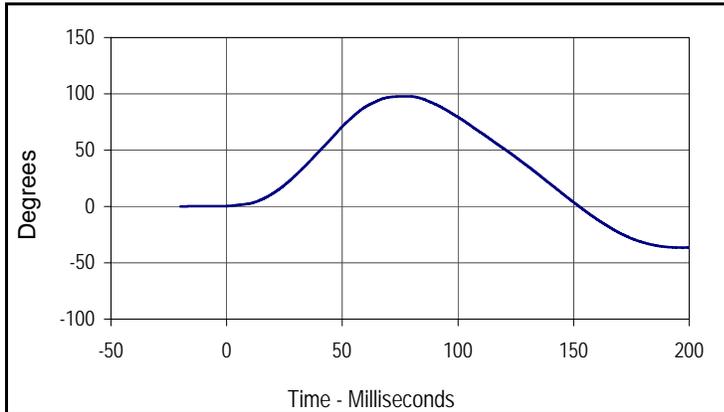
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
89.0	55.1	-25.8	14.1



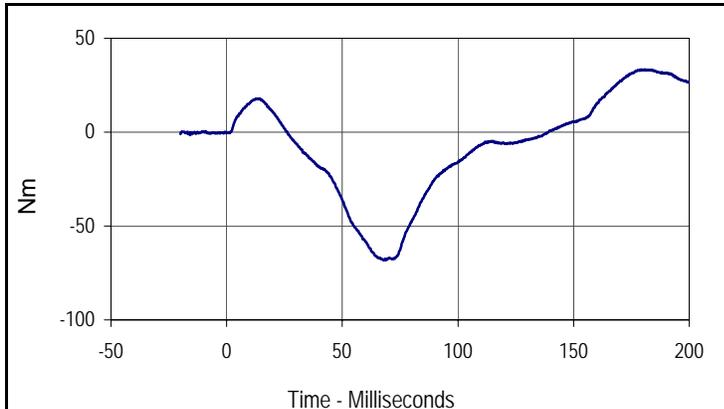
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.11	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.5	Pass
	20 Msec.	G's	14.0 to 19.0	16.9	Pass
	30 Msec.	G's	11.0 to 16.0	14.9	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	14.9	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	41.0	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	97.9	Pass
	Time	Msec.	72.0 to 82.0	78.0	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	152.5	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-68.3	Pass
	Time	Msec.	65.0 to 79.0	68.0	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	139.2	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
18.5	10.0	-1.7	67.4



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
97.9	78.0	-36.6	197.1



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
33.5	180.7	-68.3	68.0

Test Program: Hybrid III 50th Percentile Male Knee Impact Test

Test Date: 1/19/06

ATD Serial No.: 034

Test I.D.: LK01B , RK01B

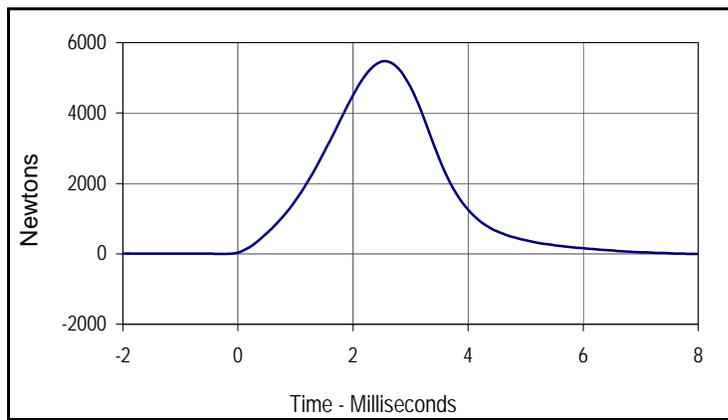


**Left Knee**

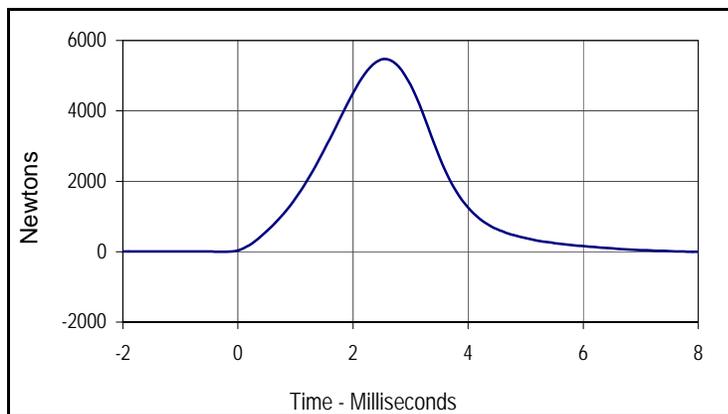
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5468	Pass
Overall Test Results				Pass

**Right Knee**

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5468	Pass
Overall Test Results				Pass



Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5467.6	2.6	-6.9	9.9



Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5467.6	2.6	-6.9	9.9

Test Program: Hybrid III 50th Percentile Male External Measurements Test Date: 1/19/06  
 ATD Serial No.: 035 Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A - Total sitting height	mm	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	515	Pass
C - "H" point height	mm	84 to 89	85	Pass
D - "H" point from seat back	mm	135 to 140	139	Pass
E - Shoulder pivot from back	mm	84 to 94	86	Pass
F - Thigh clearance	mm	140 to 155	145	Pass
G - Elbow back to wrist pivot	mm	290 to 305	300	Pass
H - Skull cap to back line	mm	41 to 46	45	Pass
I - Shoulder to elbow length	mm	330 to 345	335	Pass
J - Elbow rest height	mm	190 to 211	210	Pass
K - Buttock to knee length	mm	579 to 604	600	Pass
L - Popliteal length	mm	429 to 455	451	Pass
M - Knee pivot height	mm	485 to 500	490	Pass
N - Buttock popliteal length	mm	452 to 477	475	Pass
O - Chest depth	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	255	Pass
V - Shoulder breadth	mm	422 to 437	430	Pass
W - Foot breadth	mm	91 to 107	105	Pass
Y - Chest circumference	mm	970 to 1001	985	Pass
Z - Waist circumference	mm	836 to 866	860	Pass
AA - Location for chest circumference	mm	429 to 434	430	Pass
BB - Location for waist circumference	mm	226 to 231	229	Pass
Overall Test Results				Pass