REPORT NUMBER TR-P28124-01-NC

NEW CAR ASSESMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

GENERAL MOTORS CORPORATION
2009 CADILLAC CTS4 AWD
4-DOOR SEDAN

NHTSA NUMBER: G90101

Prepared By:
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JULY 21, 2008

FINAL REPORT

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U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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Manager, New Car Assessment Program

Date of Acceptance

COTR, NCAP Frontal Impact Program

Date of Acceptance

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15. Supplementary Notes

16. Abstract

A 35 mph (56.3 km/h) frontal barrier impact test was conducted on the subject 2009 Cadillac CTS4 AWD 4-Door Sedan at KARCO Engineering, LLC, in Adelanto, CA, on July 21, 2008. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity was 56.12 km/h. The ambient temperature at the barrier at the time of the crash was 34.4 degrees Celsius. The vehicle's maximum post static crush was 450 mm at the vehicle's centerline. The test vehicle was equipped with a 3-point continuous belt system and a second generation airbag at both front outboard positions. With respect to FMVSS 208 'Occupant Crash Protection', the occupant injury criteria summary is as follows:

Measurement Description	Units	Threshold	Driver ATD	Passenger ATD
Head Injury Criteria (HIC)	N/A	1000	587.6	505.6
Max. Chest Accel. (3 msec. Chest Clip)	G's	60	43.0	46.5
Left Femur Force	Newtons	10008	-153.5	-1701.9
Right Femur Force	Newtons	10008	-683.7	-542.4

17. Key Words	18. Distribution Statement
56.3 km/h NCAP Frontal Impact Test New Car Assesment Program (NCAP) 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No. G90101	Copies of this report are available from: National Highway Traffic Safety Admin. NHTSA Technical Reference Division 1200 New Jersey Ave., SE, Room W43-410 Washington, DC 20590

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SECTION 1
PURPOSE AND SUMMARY OF TEST G90101

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. DTNH22-06-D-00027. 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 2005. 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 2009 Cadillac CTS4 AWD 4-Door Sedan at a velocity of 56.12 km/h. The test was performed at KARCO Engineering, LLC on July 21, 2008

Three (3) real-time and sixteen (16) 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, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head (primary and redundant), chest (primary and redundant) and pelvis triaxial accelerometers, chest displacement potentiometers, six-axis upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were placed on the driver’s and passenger’s lap and shoulder belts to measure dummy torso and pelvic section loading. Shoulder belt spool-off was measured for the driver and passenger dummies. The driver (position 1) ATD (Serial No.035) and the right-front passenger (position 2) ATD (Serial No. 034) were calibrated two tests prior to this test.

One hundred and thirty-two (132) channels of data were recorded using a TDAS 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% windshield retention and no intrusion into the protected zone of the windshield during impact. 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 450 mm at the vehicle's centerline. Both the driver and 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, chest, and abdomen contacted the airbag. The head also contacted the headrest. Both knees contacted the bolster.

The passenger’s visible contact points were as follows: The passenger ATD's head, chest, and abdomen contacted the airbag. The head also contacted the headrest. Both knees contacted the glovebox.

Occupant injury data is contained in table below.

OCCUPANT DATA SUMMARY

ATD Position	HIC 36	3 msec Chest Clip	Chest Defl. (mm)	Left Femur (N)	Right Femur (N)
Driver	587.6	43.0	-30.0	-153.5	-683.7
Passenger	505.6	46.5	-29.5	-1701.9	-542.4

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

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

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	1.609344
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^2	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	^oF	^oC	=(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: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.12
Test Weight	kg	2134
Impact Angle	degrees	0
Average Rebound	mm	892
Maximum Static Crush	mm	450

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Remained closed and latched, jammed	Remained closed and latched, jammed
Rear Door Opening	Remained closed and latched, opened without tools	Remained closed and latched, opened without tools
Seat Track Shift (mm)	None	None
Seatback Failure	No	No

TEST DUMMY INFORMATION

Description	Driver	Passenger
Dummy Type/Serial No.	50% Male Hybrid III No.035	50% Male Hybrid III No. 034
Head Contact	Airbag, Headrest	Airbag, Headrest
Chest Contact	Airbag	Airbag
Abdomen Contact	Airbag	Airbag
Left Knee Contact	Bolster	Glovebox
Right Knee Contact	Bolster	None

MOVIE COVERAGE

Cameras	Standard	Additional
High Speed	16	0
Real Time	1	2
Total	15	2

DATA CHANNELS

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

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	G90101
Make	Cadillac
Model	CTS4 AWD
Body Style	4-Door Sedan
VIN No.	1G6DT57VX90103076
Color	Black
Delivery Date	07/11/08
Odometer (Miles)	152.0
Dealer	South Coast Cadillac
Transmission	6-Speed Automatic
Final Drive	AWD
Type/No. of Cylinders	V6
Engine Displ. (L)	3.6
Engine Placement	Longitudinal
Roof Rack	No
Sunroof/T-top	Yes
Tinted Glass	No
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes

Anti-Lock Brakes	Yes
All Wheel Drive	Yes
Power Steering	Yes
Driver Front Airbag	Yes
Driver Side Torso Airbag	Yes
Driver Side Head Airbag	No
Driver Curtain Airbag	Yes
Pass. Front Airbag	Yes
Pass. Side Torso Airbag	Yes
Pass. Head Airbag	No
Pass. Curtain Airbag	Yes
Pre-Tensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes
Air Conditioning	Yes
AM/FM CD	Yes
Tilt Steering	Yes
Automatic Door Locks	Yes
Power Windows	Yes
Power Seats	Yes
Other	n/a

Does the Owner's Manual provide instructions to turn off automatic door locks?	No

DATA FROM MANUFACTURER'S LABEL

Manufactured By	GENERAL MOTORS CORPORATION
Date of Manufacture	Jun-08

GVWR (kg)	2358
GAWR Front (kg)	1133
GAWR Rear (kg)	1225

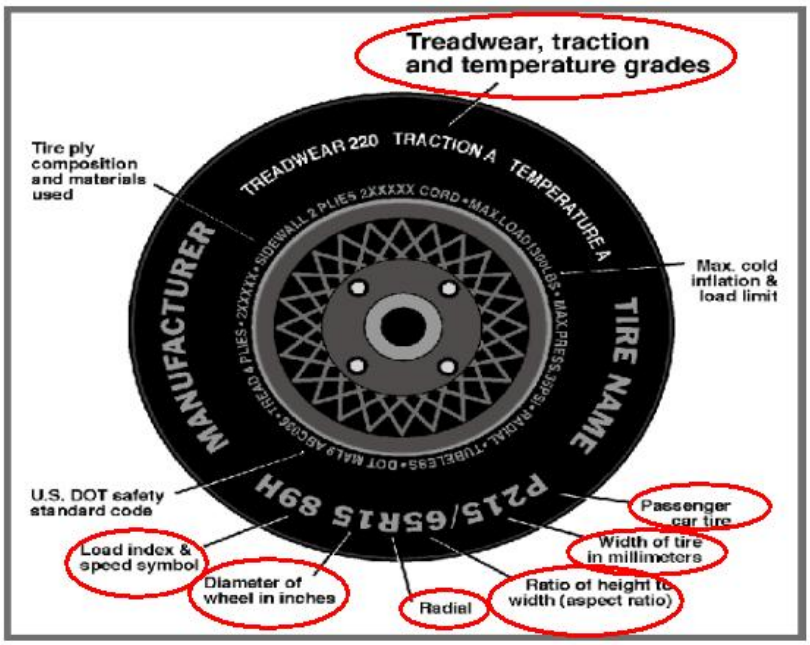
VEHICLE SEATING CAPACITY AND WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Weight (VCW) (kg)				404
Cargo Weight (RCLW) (kg)				64

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

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



TIRE INFORMATION

Measured Paramater	Front	Rear
Max. Tire Pressure (kPa)	308	308
Cold Tire Pressure (kPa)	240	240
Recommended Tire Size	P235/50R18	P235/50R18
Tire Size on Vehicle	P235/50R18	P235/50R18
Tire Manufacturer	Michelin	Michelin
Treadwear	300	300
Traction	A	A
Temperature Grades	A	A
Tire Plies - Sidewall	2 Polyester	2 Polyester
Tire Plies - Body	2 Polyester, 1Polyamide, 2 Steel	2 Polyester, 1Polyamide, 2 Steel
Load Index/Speed Symbol	97V	97V
Tire Material	Polyester, Polyamide, Steel	Polyester, Polyamide, Steel
DOT Safety Code Right	B9NP 1J9X 2108	B9NP 1J9X 2108
DOT Safety Code Left	B9NP 1J9X 2108	B9NP 1J9X 2108

DATA SHEET NO. 2…(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	496	447	943	515	532	1047
Right	kg	529	451	980	563	524	1087
Ratio	%	53.3	46.7	100.0	50.5	49.5	100.0
Totals	kg	1025	898	1923	1078	1056	2134

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1923
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Weight (RCLW)	kg	64
Calculated Target Vehicle Test Weight (TVTW)	kg	2139

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	719	721	725	728	1342
As Tested	mm	708	707	703	703	1422

Vehicle Wheel Base (mm): 2873

Weight of Ballast Secured in Cargo Area (kg): 0

Weight of Items Removed (kg): 44

Vehicle Components Removed: Rear floor mats, spare tire and tools, trunk carpeting, taillights, subwoofer, trunk lining

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

FUEL SYSTEM DATA

Fuel System Capacity from Owner's Manual (L): 68.13

Actual Test Volume with Entire Fuel System Filled (L): 63.36

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 the ignition switch "ON" & engine "OFF"? yes

Fuel System Particulars: The electric fuel pump operates for 2 seconds to pressurize the fuel system following the activation of the ignition. The fuel pump operates continuously while the engine is running.

DATA SHEET NO. 3

POST-TEST IMPACT DATA

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

SPEED TRAP DATA

Measured Paramater	Units	Requirement	Value
Trap No. 1 Velocity	km/h	55.1 to 57.12	56.12
Trap No. 2 Velocity	km/h	55.1 to 57.12	56.14

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4705	4375	330
Center	mm	4840	4390	450
Right Side	mm	4705	4370	335

VEHICLE REBOUND FROM BARRIER

Measured Paramater	Units	Value
Left Side	mm	883
Center	mm	907
Right Side	mm	885
Average	mm	892

DATA SHEET NO. 4

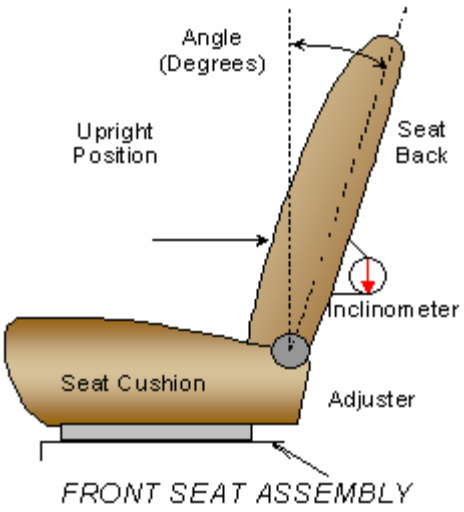
TEST VEHICLE INFORMATION

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

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 seat back, using a digital inclinometer.



SEAT BACK ANGLES

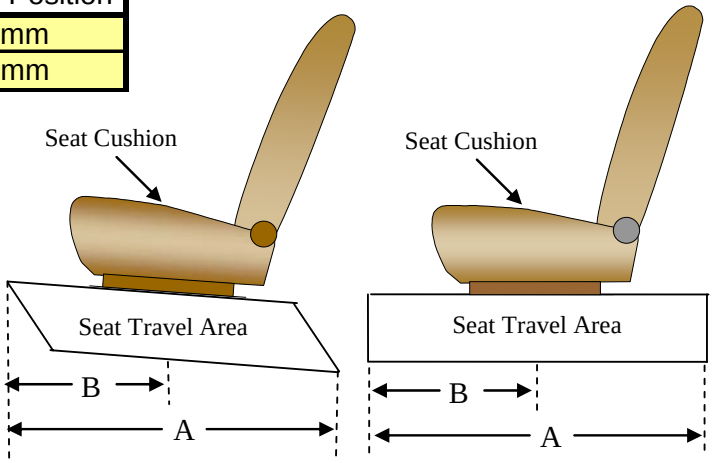
Position	Degrees
Driver w/ Seated Dummy	21.4 @ seat back
Passenger w/ Seated Dummy	21.6 @ seat back

SEAT FORE/AFT POSITIONS

The total seat travel was measured from forward most position to rearmost position. The seat was set at the longitudinal mid position. There were vertical adjustments on the driver seat that was equipped with the vehicle. There were no adjustments on the passenger seat. The driver seat was placed in the lowermost position.

SEAT FORE/AFT POSITIONING

Position	Total Fore/Aft Travel	Placed in Position
Driver Seat	270 mm	135 mm
Passenger Seat	267 mm	134 mm



SEAT BELT ANCHORAGE

Position number one (1) is the uppermost position.

SEAT BELT ANCHORAGE POSITIONING

	Total Number of Positions	Placed in Position
Driver Seat	5	3
Passenger Seat	5	3

TEST VEHICLE INFORMATION

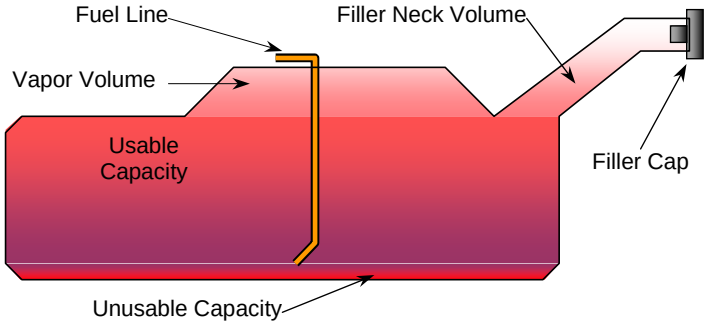
Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

FUEL TANK CAPACITY

	Liters
Usable Capacity of Standard Tank	68.13
Usable Capacity of Optional Tank	
Usable Capacity Used for FMVSS 301	62.68 to 64.04
Actual Amount of Solvent Used	63.36

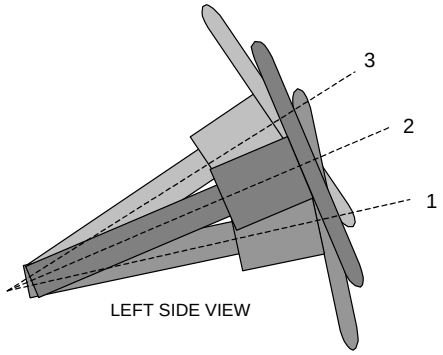
The test vehicle is equipped with an electric fuel pump. The fuel pump will operate for approximately two (2) seconds with the ignition in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the right rear fender. The standard fuel tank occupies the area under 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
Lowermost - Position No. 1	18.2	78
Geometric Center - Position No. 2	20.7	97
Uppermost - Position No. 3	23.2	117

DATA SHEET NO. 5

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

TEST DUMMY POSITION MEASUREMENTS

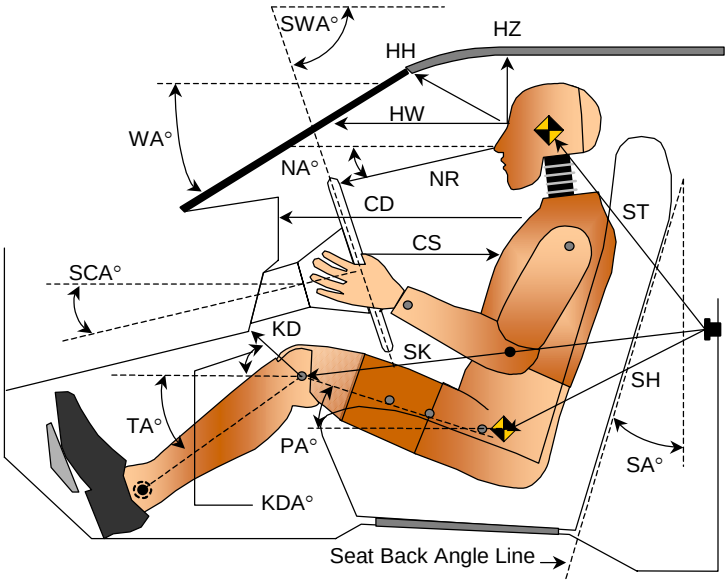
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield angle		25.4		
SWA	Steering wheel angle		69.3		
SCA	Steering column angle		20.7		
SA	Seat Back angle		21.4 @ Seat back		21.6 @ Seat back
HZ	Head to roof (Z)	190	90.0	192	90.0
HH	Head to header	385		381	
HW	Head to windshield	698		681	
HR	Head to side header (Y)	250		230	
NR	Nost to rim	405	6.5		
CD	Chest to dash	531		538	
CS	Chest to steering hub	332			
RA	Rim to abdomen	220			
KDL	Left knee to dash	185	29.6	151	
KDR	Right knee to dash	140		191	29.3
PA	Pelvic angle		22.9		23.2
TA	Tibia Angle		33.4		33.7
KK	Knee to knee	300		275	
SK	Striker to outboard knee	538	0.6	540	3.7
ST	Striker to head	526	85.6	508	89.2
SH	Striker to H-Point	131	0.0	135	0.0
SHY	Striker to H-Point (Y)	235		240	
HS	Head to side window	305		248	
HD	H-Point to door	150		160	
AD	Arm to door	142		83	

DATA SHEET NO. 5…(CONTINUED)

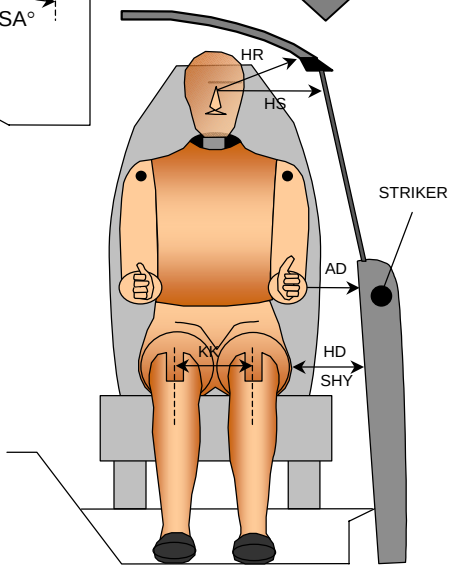
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

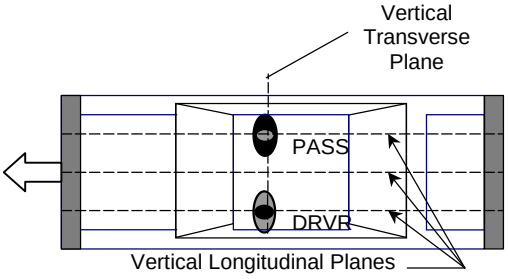
Test Program: NHTSA 35mph NCAP Test Date: 7/21/08



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

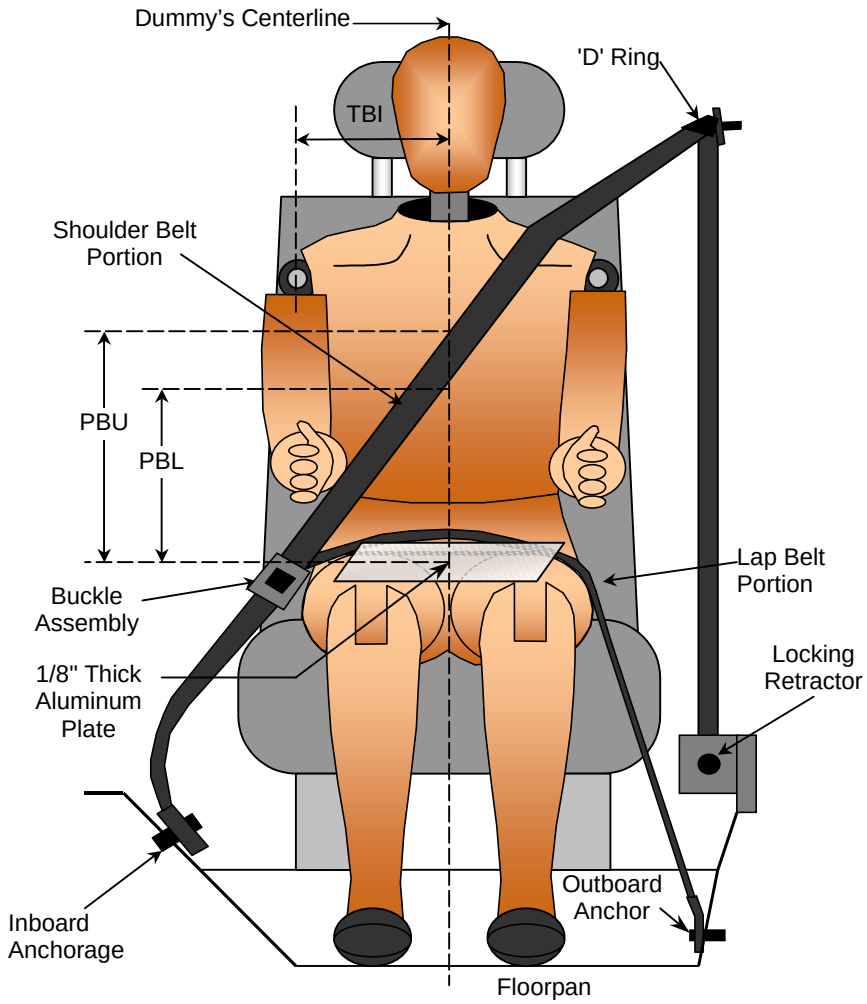


DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08



SEAT BELT POSITIONING MEASUREMENTS

Measured Parameter	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	220	220
PBU - Top Surface of Reference to Belt Upper Edge	mm	350	340
PBL - Top Surface of Reference to Belt Lower Edge	mm	280	260
Lap Belt Tension	Newtons	10	10
Shoulder Belt Tension	N/A	Retractor	Retractor

DATA SHEET NO. 7

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurement (mm)		
		X	Y	Z
1	Left Rear X-Member	1990	750	390
2	Right Rear X-Member	2000	760	365
3	Engine Top	4020	70	800
4	Engine Bottom	3930	30	260
5	Left Brake Caliper	4025	580	240
6	Right Brake Caliper	4030	585	243
7	Instrument Panel			[1]
8	Left Rear X-Member (Z-Axis)	1990	750	390
9	Right Rear X-Member (Z-Axis)	2000	760	365

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

1.) Instrument Panel no longer used by NHTSA.

DATA SHEET NO. 8

SEAT BELT ASSESSMENT TEST DATA

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
Retractor Reel to D-Ring	mm	650	650
Shoulder Belt Length as Measured on ATD	mm	850	875
Lap Belt Length as Measured on ATD	mm	568	560
Remainder of Belt on Reel	mm	1045	1073
Total Belt Length for Continuous Webbing Systems	mm	3113	3158

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	119	156
As determined electronically	mm	141.1	292.3

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: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

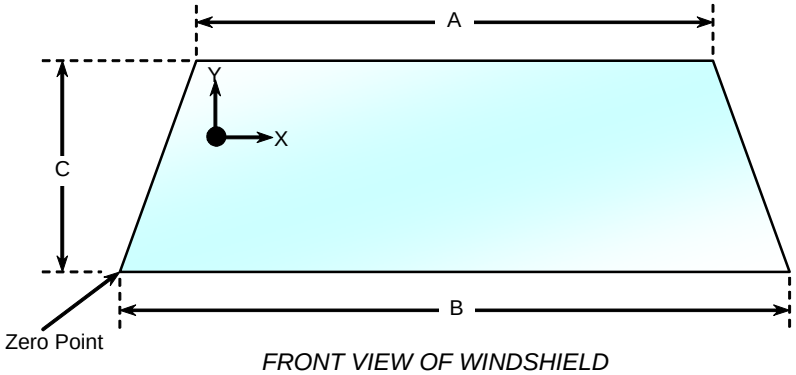
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with Rubber cement type adhesive. Plastic and rubber molding covers the windshield periphery.

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.

Temperature of windshield molding during test: 34.4 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2215	2215	100.0
Right Side	2215	2215	100.0
Total	4430	4430	100.0



FRONT VIEW OF WINDSHIELD

WINDSHIELD DIMENSIONS

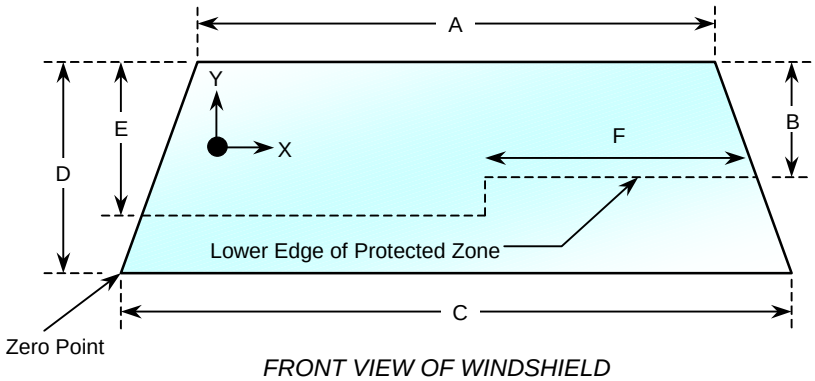
Item	Units	Segment Length	Molding Width
A	mm	1200	2
B	mm	1490	30
C-Left	mm	870	3
C-Right	mm	870	3

DATA SHEET NO. 10

WINDSHIELD ZONE INTRUSION FMVSS 219 DATA (PARTIAL)

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08



FRONT VIEW OF WINDSHIELD

WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	1200
B	mm	510
C	mm	1490
D	mm	870
E	mm	525
F	mm	505

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: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

Test Time: 1:39 PM Temperature: 34.4 ° C

STODDARD SOLVENT SPILLAGE MEASUREMENTS

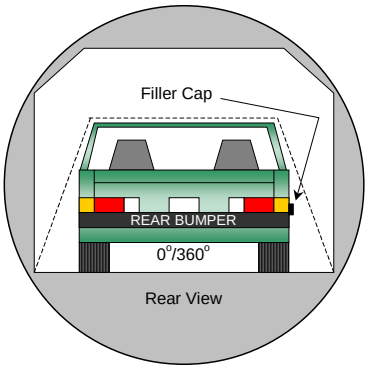
A.	From impact until vehicle motion ceases:	0
	(Maximum allowable = 1 ounce)	
B.	For the 5 minute period after motion ceases:	0
	(Maximum allowable = 5 ounces)	
C.	For the following 25 minutes:	0
	(Maximum allowable = 1 oz/minute)	
D.	Spillage Details:	No leakage occurred

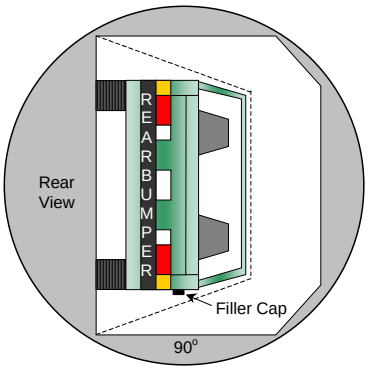
DATA SHEET NO. 12

FMVSS 301 STATIC ROLLOVER DATA

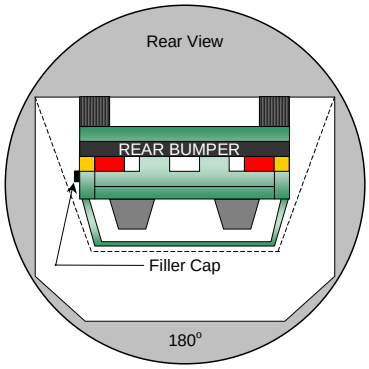
Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

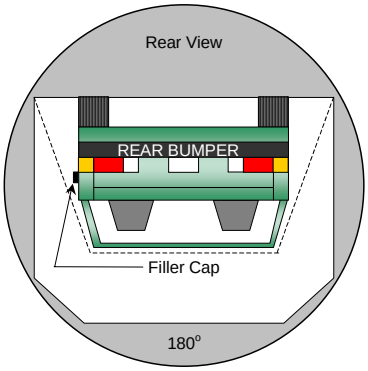




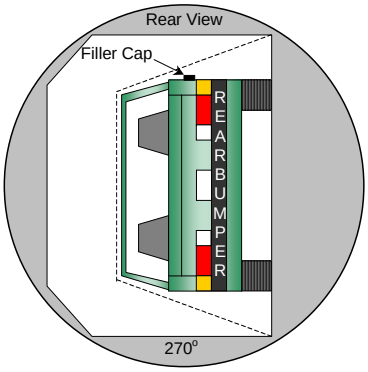
0° to 90°

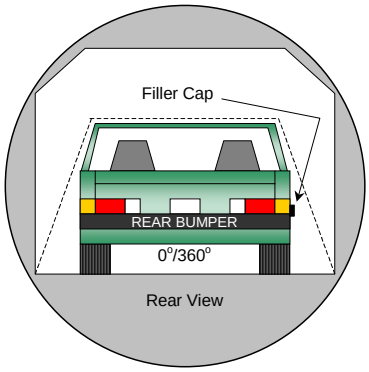


90° to 180°



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: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	82	305	387
90° to 180°	80	315	395
180° to 270°	77	319	396
270° to 360°	76	300	376

FMVSS 301 SPILLAGE TABLE REQUIREMENT

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: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

VEHICLE MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Length of test vehicle at centerline	mm	4840	4390	-450
2	RSOV to front of engine	mm	4155	4180	25
3	RSOV to firewall centerline	mm	3600	3560	-40
4	RSOV to upper leading edge of right door	mm	3360	3368	8
5	RSOV to upper leading edge of left door	mm	3362	3375	13
6	RSOV to lower leading edge of right door	mm	3341	3348	7
7	RSOV to lower leading edge of left door	mm	3345	3348	3
8	RSOV to upper trailing edge of right door	mm	2193	2200	7
9	RSOV to upper trailing edge of left door	mm	2200	2209	9
10	RSOV to lower trailing edge of right door	mm	2216	2223	7
11	RSOV to lower trailing edge of left door	mm	2220	2224	4
12	RSOV to bottom of right A-pillar	mm	3316	3321	5
13	RSOV to bottom of left A-pillar	mm	3316	3316	0
14	RSOV to firewall on right side	mm	3640	3635	-5
15	RSOV to firewall on left side	mm	3590	3595	5
16	RSOV to steering column hub	mm	2765	2835	70
17	Center of steering column to left A-pillar, Y	mm	410	405	-5
18	Center of steering column to headlining, Z	mm	410	385	-25
19	RSOV to right side of front bumper	mm	4705	4370	-335
20	RSOV to left side of front bumper	mm	4705	4375	-330
21	Length of engine block	mm	620	620	0
RD	RSOV to right side of dash panel	mm	2995	3001	6
CD	RSOV to center of dash panel	mm	2945	2949	4
LD	RSOV to left side of dash panel	mm	2980	2985	5

DATA SHEET NO. 13…(CONTINUED)

VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

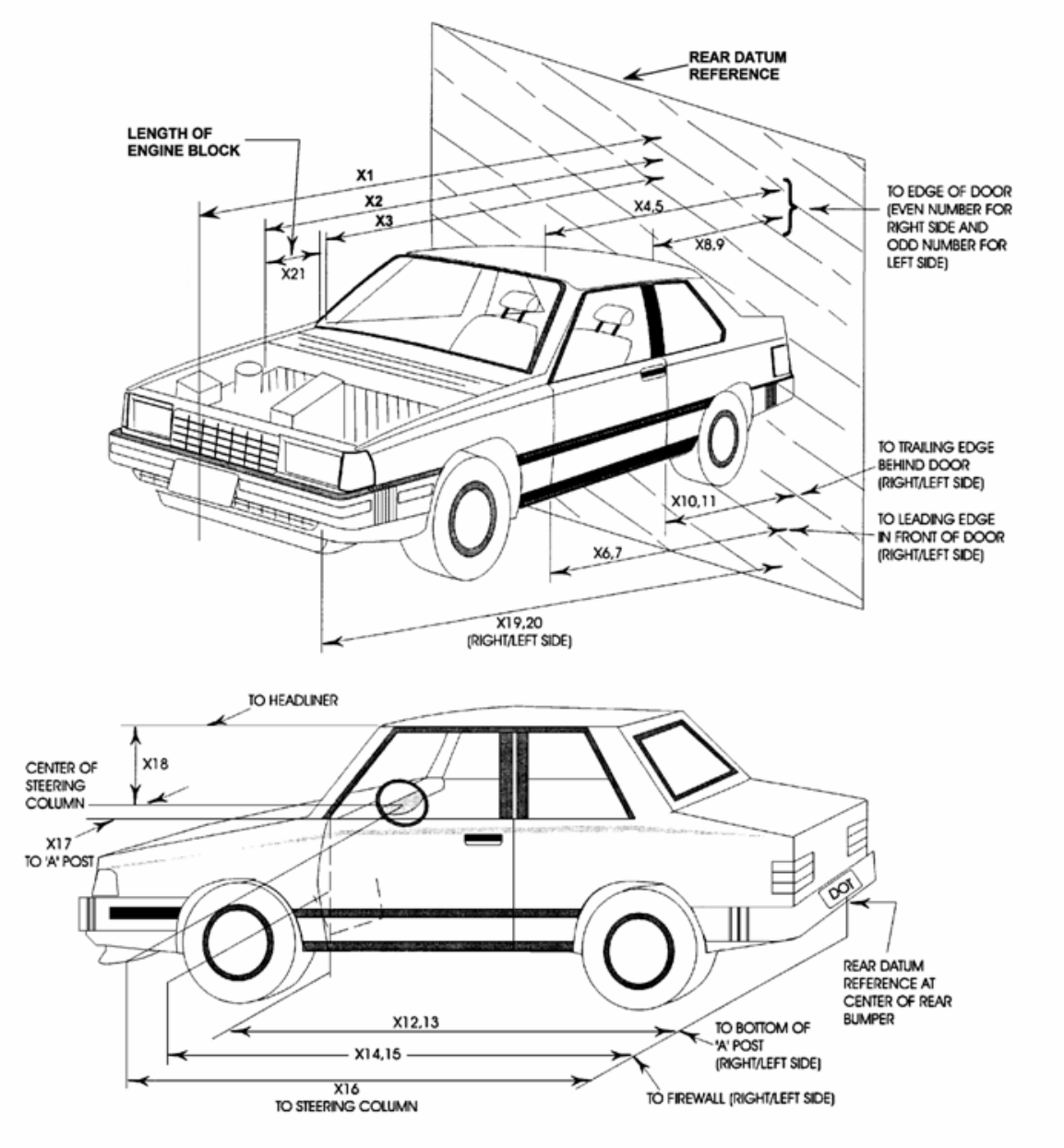
VEHICLE STRUCTURAL MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length	mm	4840	4390	-450
2	Total width	mm	1795	1770	-25
3	Front bumper top height	mm	550	570	20
4	Front bumper bottom height	mm	374	410	36
5	Longitudinal member top height	mm	530	500	-30
6	Longtidunal member bottom height	mm	450	380	-70
7	Distance between longitudinal members	mm	670	650	-20
8	Longitudinal member width	mm	80	120	40
9	Engine top height	mm	865	915	50
10	Engine bottom height	mm	181	256	75
11	Engine and gearbox width	mm	655	655	0
12	Front bumper-engine distance	mm	685	210	-475
13	Front shock absorber height	mm	710	875	165
14	Front hood leading edge height	mm	715	800	85
15	Distance between front shock absorbers	mm	855	870	15
16	Front bumper-front axle distance	mm	860	420	-440
17	Front axle to A-pillar distance	mm	605	535	-70
18	A Pillar to B Pillar distance	mm	1056	1051	-5
19	B Pillar to rear axle distance	mm	1130	1130	0
20	B Pillar to C Pillar distance	mm	1010	1000	-10
21	Roof sill bottom height	mm	1295	1310	15
22	Roof sill top height	mm	1415	1420	5
23	Floor sill bottom height	mm	186	186	0
24	Floor sill top height	mm	355	360	5

VEHICLE MEASUREMENTS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08



DATA SHEET NO. 14

CAMERA LOCATIONS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

VEHICLE CAMERA MEASUREMENT TABLE

No.	Camera View	Location			Angle (deg)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Real Time Camera (Panning)	-11412	-8150	-1484	0			30
2	Overall Left Side	-1997	6118	-1127	0	8105	20	1000
3	Closeup Left Side	-1651	5704	-1171	0	7844	50	1000
4	Driver and Interior View	-6696	-5987	-1071	-17	15570	ZOOM	1000
5	Steering Column (Bottom)	-1972	-8184	-2879	-13	9453	35	1000
6	Steering Column (Top)	-1966	-8141	-3258	-13	9549	35	1000
7	Overall Right Side	-2166	-6490	-931	0	7409	20	1000
8	Closeup Right Side	-1593	-570	-1078	0	7079	50	1000
9	Passenger and Interior View	-5136	9516	-2460	-10	10211	ZOOM	1000
10	Right Side View	-1582	7995	-1713	-6	7134	ZOOM	1000
11	Windshield View	-354	0	-5749	-90		24	1000
12	Driver Front View	363	-543	-2548	-34		25	1000
13	Passenger Front View	381	445	-2548	-34		25	1000
14	Pit View of Engine	-756	0	1495	90		12	1000
15	Pit View of Fuel Tank	-3398	0	1495	90		8	1000
16	Driver Side Dummy On-Board	3387	290	-1230	-27	1065	12	1000
17	Passenger Side Dummy On-Board	3392	283	-1230	-23	1071	12	1000
18	Real Time Driver	-1926	-8089	-1704	-1	-1704	-1	30
19	Real Time Passenger	-1433	8047	-1704	-1	-1704	-1	30

All measurements are made relative to the point of impact.

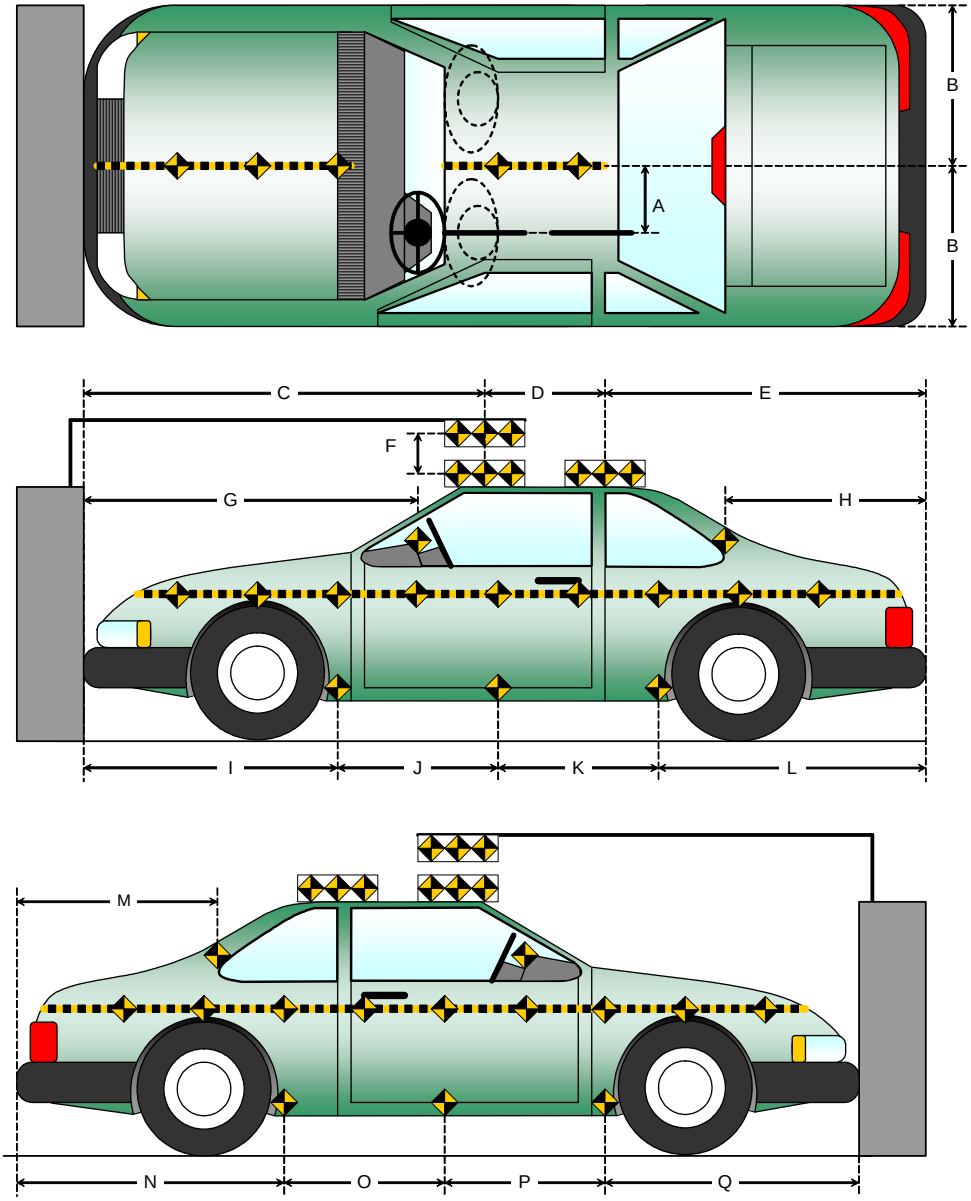
DATA SHEET NO. 15

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

All Dimensions in Millimeters (mm)	
Item	Value
A	
B	898
C	
D	
E	
F	
G	1980
H	1140
I	1315
J	983
K	983
L	1555
M	1182
N	1560
O	980
P	980
Q	1315



DATA SHEET NO. 16

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

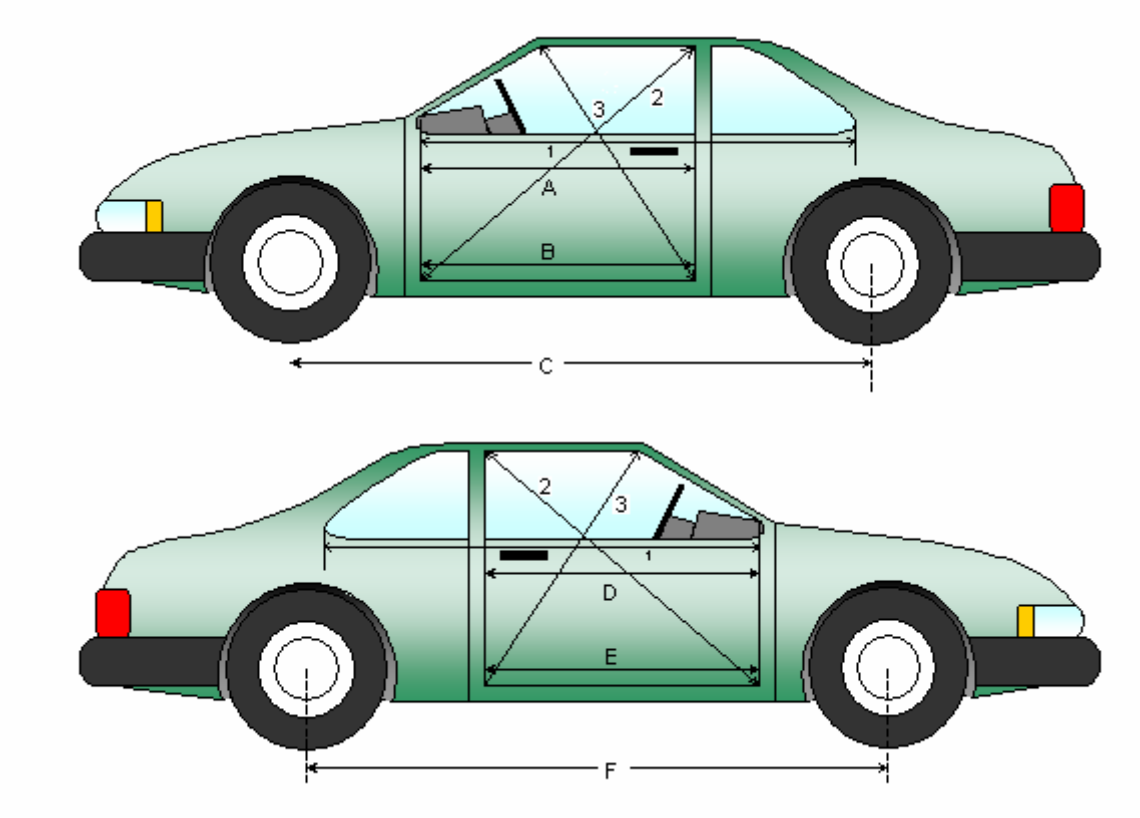
Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

DOOR OPENING WIDTH TABLE

Item	Description	Units	Pre-Test	Post-Test	Difference
1L	Left Side	mm	1056	1051	5
2L	Left Side (Diagonally)	mm	1476	1461	15
3L	Left Side (Diagonally)	mm	895	892	3
1R	Right Side	mm	1056	1056	0
2R	Right Side (Diagonally)	mm	1476	1479	-3
3R	Right Side (Diagonally)	mm	885	886	-1

WHEELBASE MEASURMENT TABLE

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2873	2800	73
F	Right Side Wheelbase	mm	2873	2793	80



DATA SHEET NO. 16…(CONTINUED)

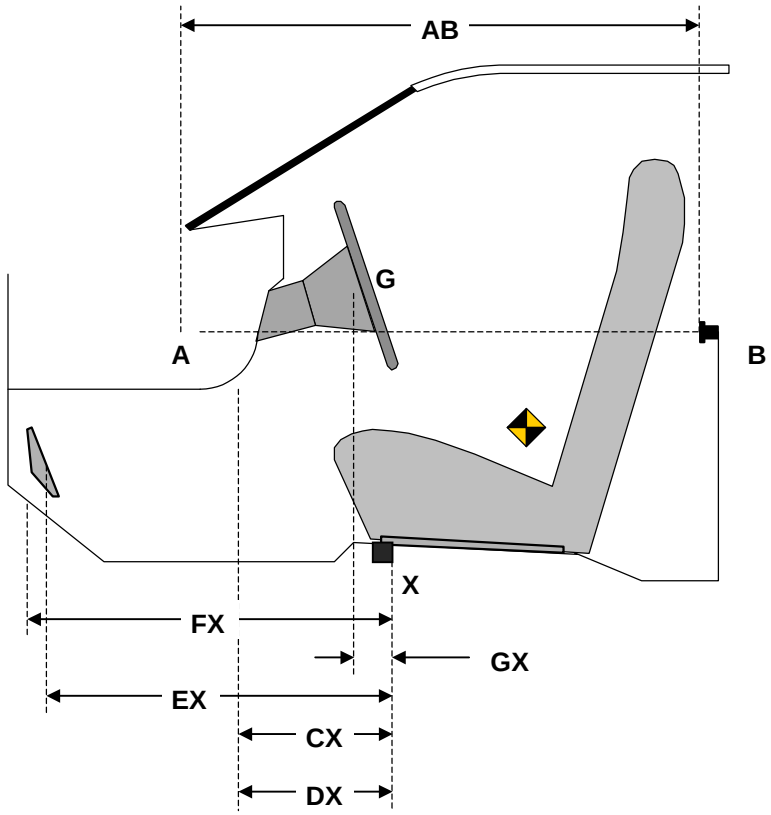
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

DRIVER COMPARTMENT INTRUSION TABLE

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Windown Jam)	mm	1056	1031	25
CX	Left Knee Bolster to X	mm	220	190	30
DX	Right Knee Bolster to X	mm	200	195	5
EX	Brake Pedal to X	mm	515	458	57
FX	Foot Rest to X	mm	575	573	2
GX	Center of Steering Wheel Hub to X	mm	35	30	5

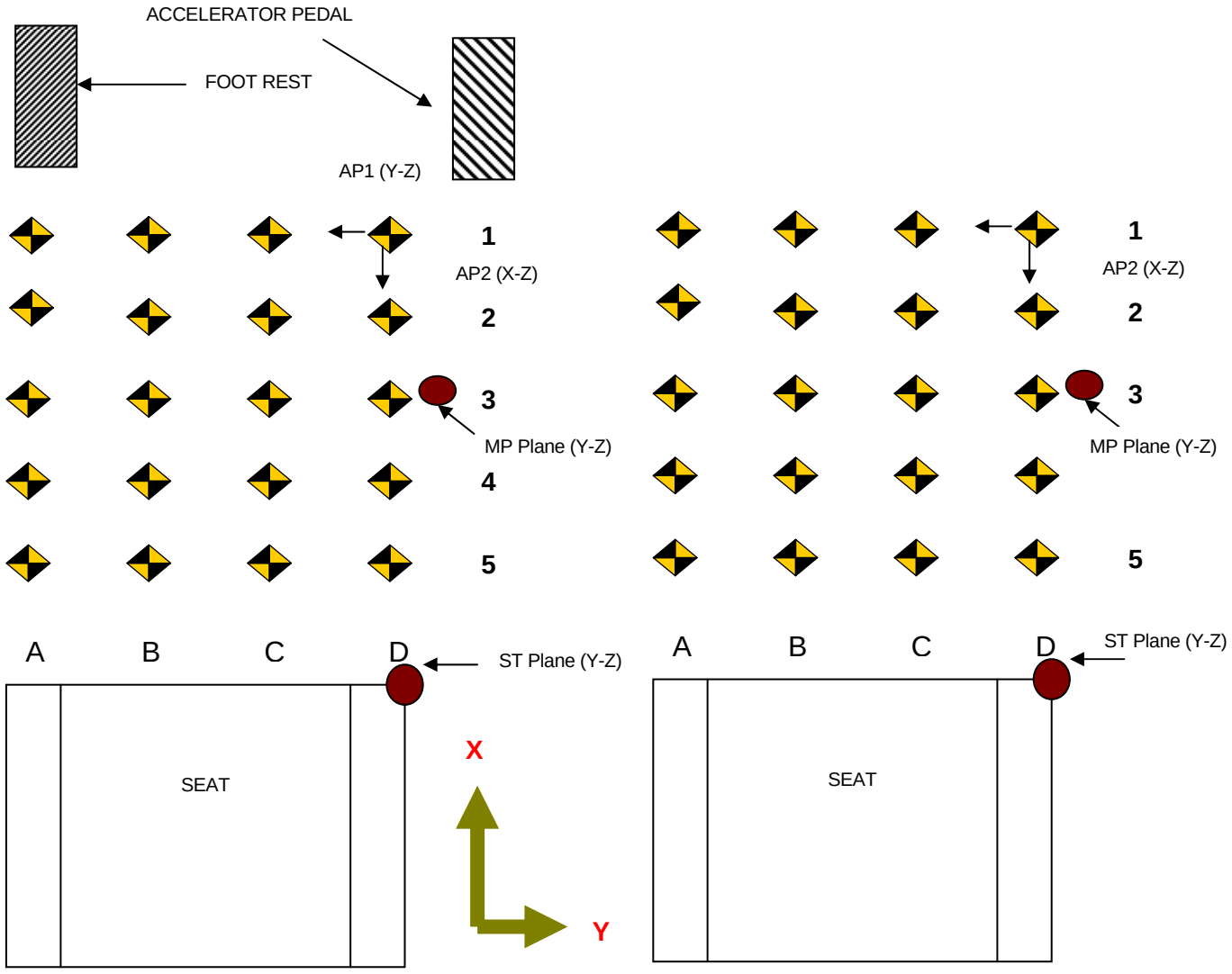


DATA SHEET NO. 16…(CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08



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: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

All measurements in mm

DRIVER FLOORPAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	648	642	630	624	644	634	616	622	4	8	14	2
2	603	597	585	582	600	594	582	582	3	3	3	0
3	561	555	541	534	559	554	542	538	2	1	-1	-4
4	415	409	402	388	414	409	402	392	1	0	0	-4
5	262	260	250	239	262	258	251	242	0	2	-1	-3

DRIVER FLOORPAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	47	144	250	386	32	130	231	367	15	14	19	19
2	42	145	247	385	28	130	230	367	14	15	17	18
3	41	145	246	380	27	130	231	367	14	15	15	13
4	32	138	239	374	21	127	227	362	11	11	12	12
5	23	127	230	362	15	116	221	354	8	11	9	8

DRIVER FLOORPAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-41	-41	-42	-40	-50	-53	-65	-59	9	12	23	19
2	0	-1	-6	-3	-6	-10	-17	-20	6	9	11	17
3	36	30	21	34	30	22	13	23	6	8	8	11
4	74	64	55	53	73	64	52	47	1	0	3	6
5	75	67	55	54	71	73	56	57	4	-6	-1	-3

DATA SHEET NO. 16…(CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

All measurements in mm

PASSENGER FLOORPAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	638	646	645	650	632	617	632	643	6	29	13	7
2	583	597	604	569	579	590	595	603	4	7	9	8
3	437	551	561	474	528	549	555	567	1	2	6	2
4	344	454	466	374	435	453	462	472	2	1	4	2
5	344	360	370	374	341	360	367	371	3	0	3	3

PASSENGER FLOORPAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-365	-230	-124	-19	-341	-209	-105	-1	-24	-21	-19	-18
2	-353	-226	-122	-17	-332	-209	-106	-1	-21	-17	-16	-16
3	-353	-223	-124	-16	-333	-209	-108	0	-20	-14	-16	-16
4	-353	-221	-121	-18	-340	-212	-110	-5	-13	-9	-11	-13
5	-349	-218	-116	-13	-339	-208	-106	-2	-10	-10	-10	-11

PASSENGER FLOORPAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-31	-33	-30	-33	-67	-75	-58	-51	36	42	28	18
2	-14	3	3	2	-44	-22	-18	-14	30	25	21	16
3	-1	31	29	37	-29	13	14	27	28	18	15	10
4	20	60	66	78	-8	45	59	66	28	15	7	12
5	28	58	76	79	7	49	73	72	21	9	3	7

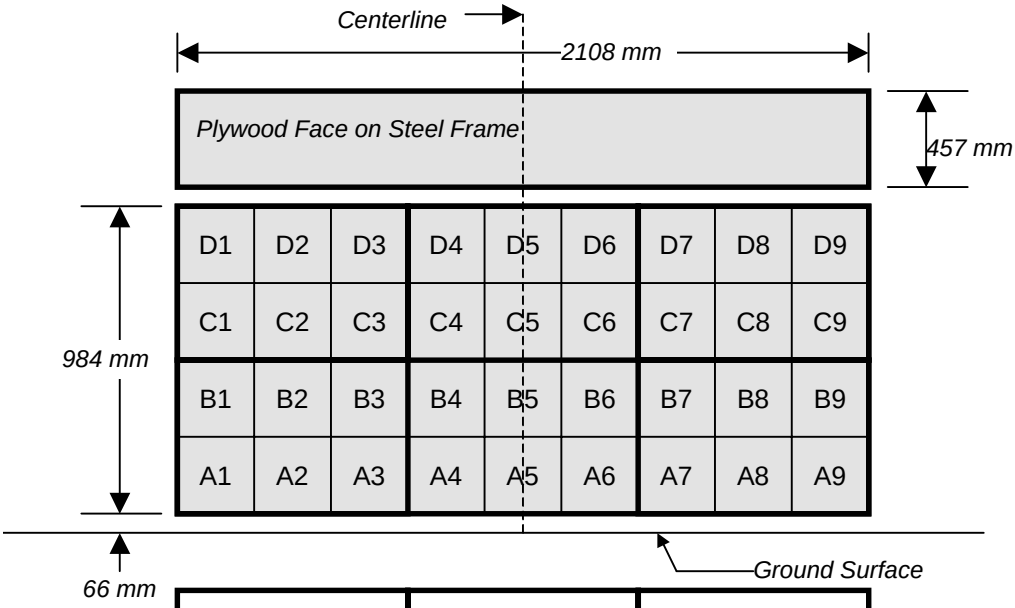
DATA SHEET NO. 17

FIXED BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

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



D1	D2	D3	D4	D5	D6	D7	D8	D9
C1	C2	C3	C4	C5	C6	C7	C8	C9
B1	B2	B3	B4	B5	B6	B7	B8	B9
A1	A2	A3	A4	A5	A6	A7	A8	A9

Group 4 C1 – D3	Group 5 C4 – D6	Group 6 C7 – D9
Group 1 A1 – B3	Group 2 A4 – B6	Group 3 A7 – B9

6 Groups of 6 Load Cells Each

DATA SHEET NO. 18

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08

VEHICLE INFORMATION

VIN: 1G6DT57VX90103076 Wheelbase (mm): 2873

Vehicle Size Category: 4-Door Sedan Test Weight (kg): 2134

ACCELEROMETER DATA

Accelerometer Location: Left rear cross member

Cal. Procedure/Interval: 6 months/drop test

Integration Algorithm: NHTSA Standard Linearity: Good

Impact Velocity (km/h): 56.12

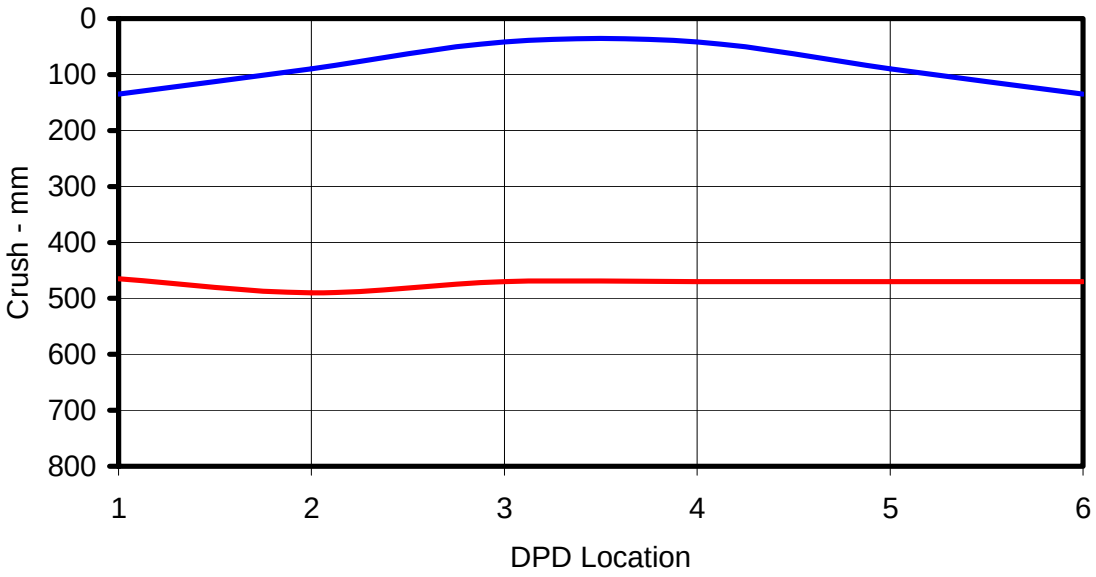
Velocity Change (km/h): 65.7 Time of Separation (msec): 63.4

CRUSH PROFILE

Collision Deformation Classification: 12FDEW6 Midpoint of Damage: Vehicle Centerline

Damage Region Length: 1795 Impact Mode: Full frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side of vehicle	mm	135	465	-330
C2	Crush zone 2 on left side of vehicle	mm	90	490	-400
C3	Crush zone 3 on left side of vehicle	mm	42	470	-428
C4	Crush zone 4 on right side of vehicle	mm	42	470	-428
C5	Crush zone 5 on right side of vehicle	mm	90	470	-380
C6	Crush zone 6 at right side of vehicle	mm	135	470	-335

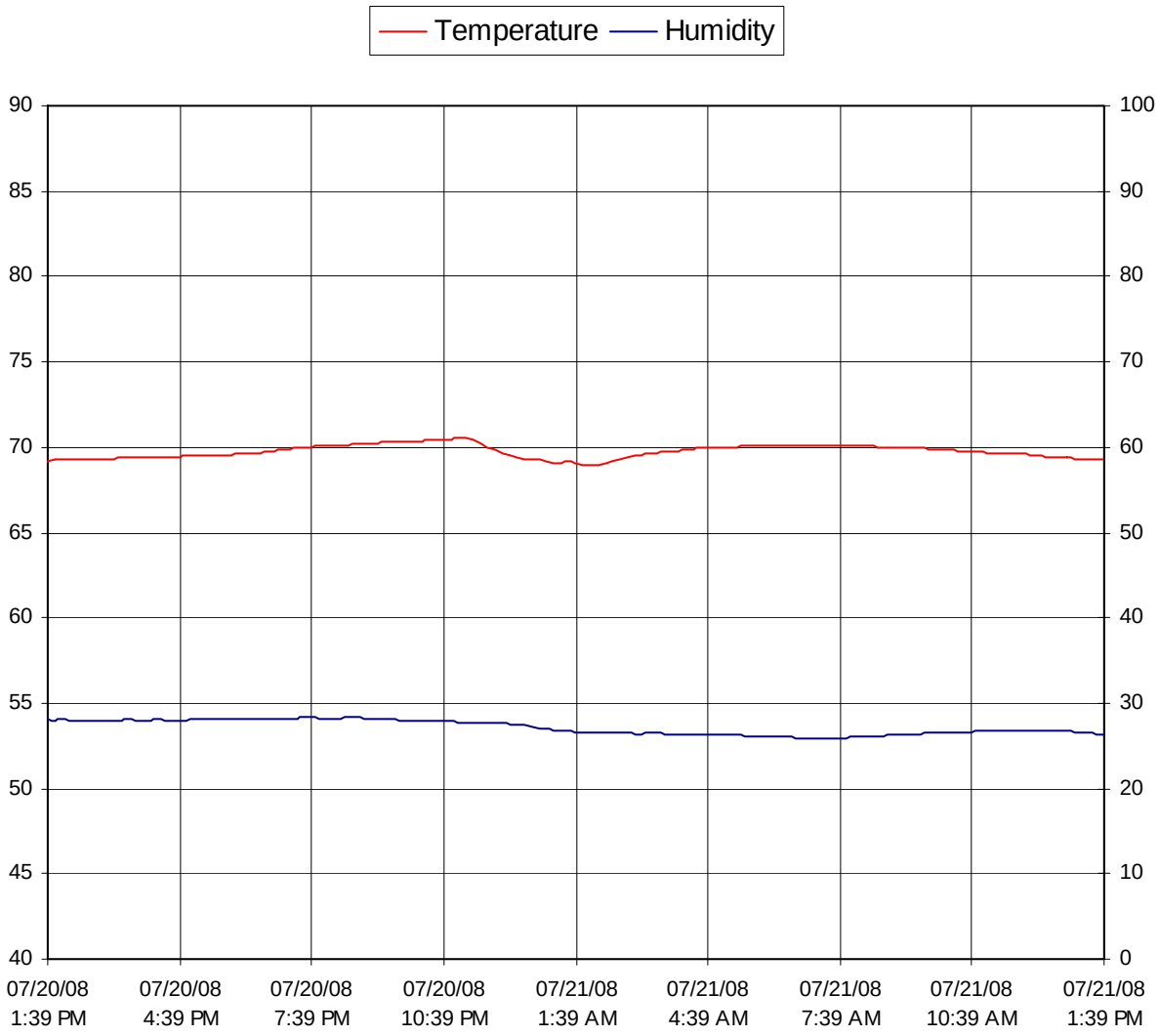


DATA SHEET NO. 19

DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2009 Cadillac CTS4 AWD 4-Door Sedan NHTSA No.: G90101

Test Program: NHTSA 35mph NCAP Test Date: 7/21/08



APPENDIX A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

Figure A-1: Load Cell Location

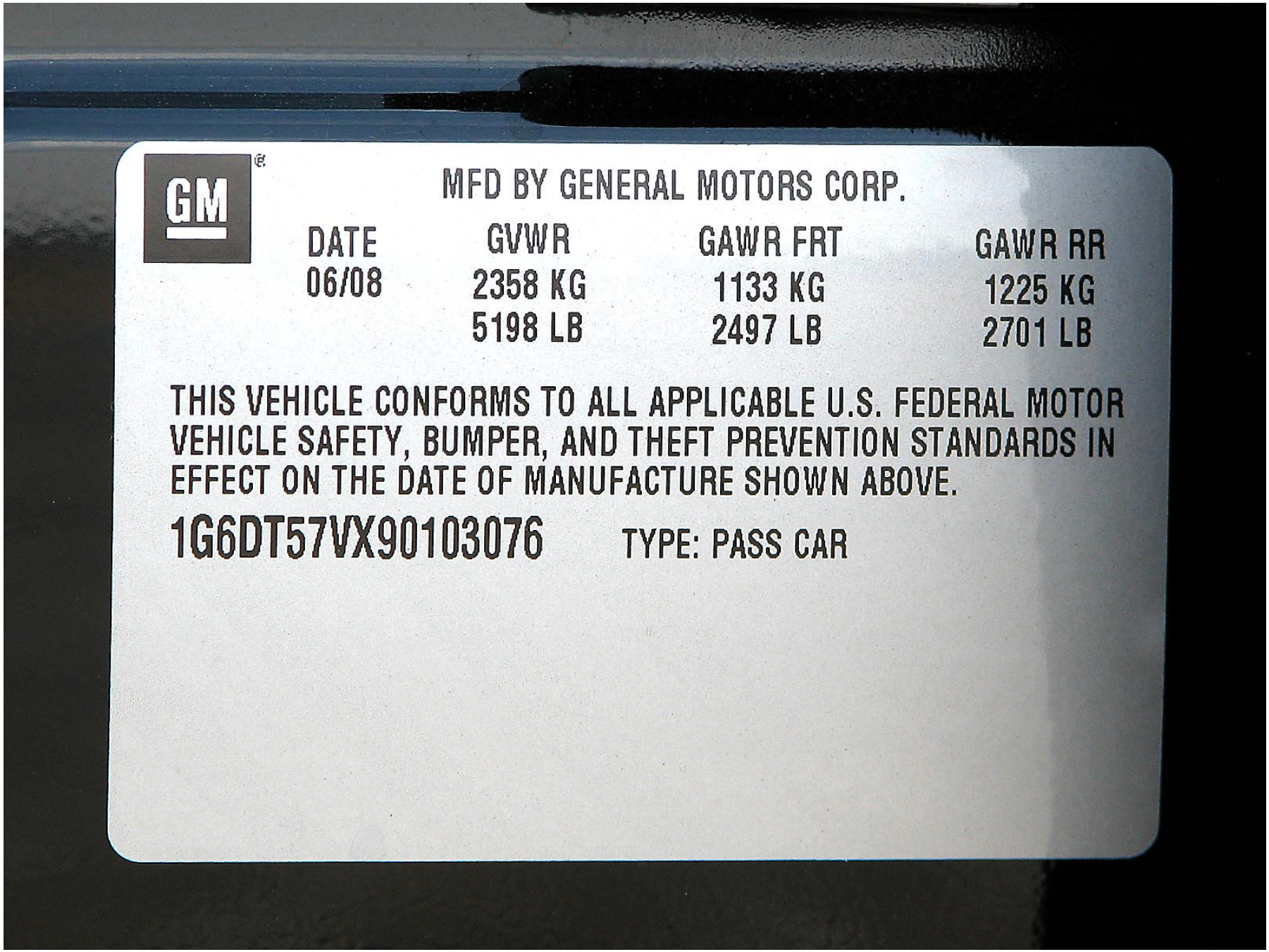


Figure A-2: Manufacturer's Label

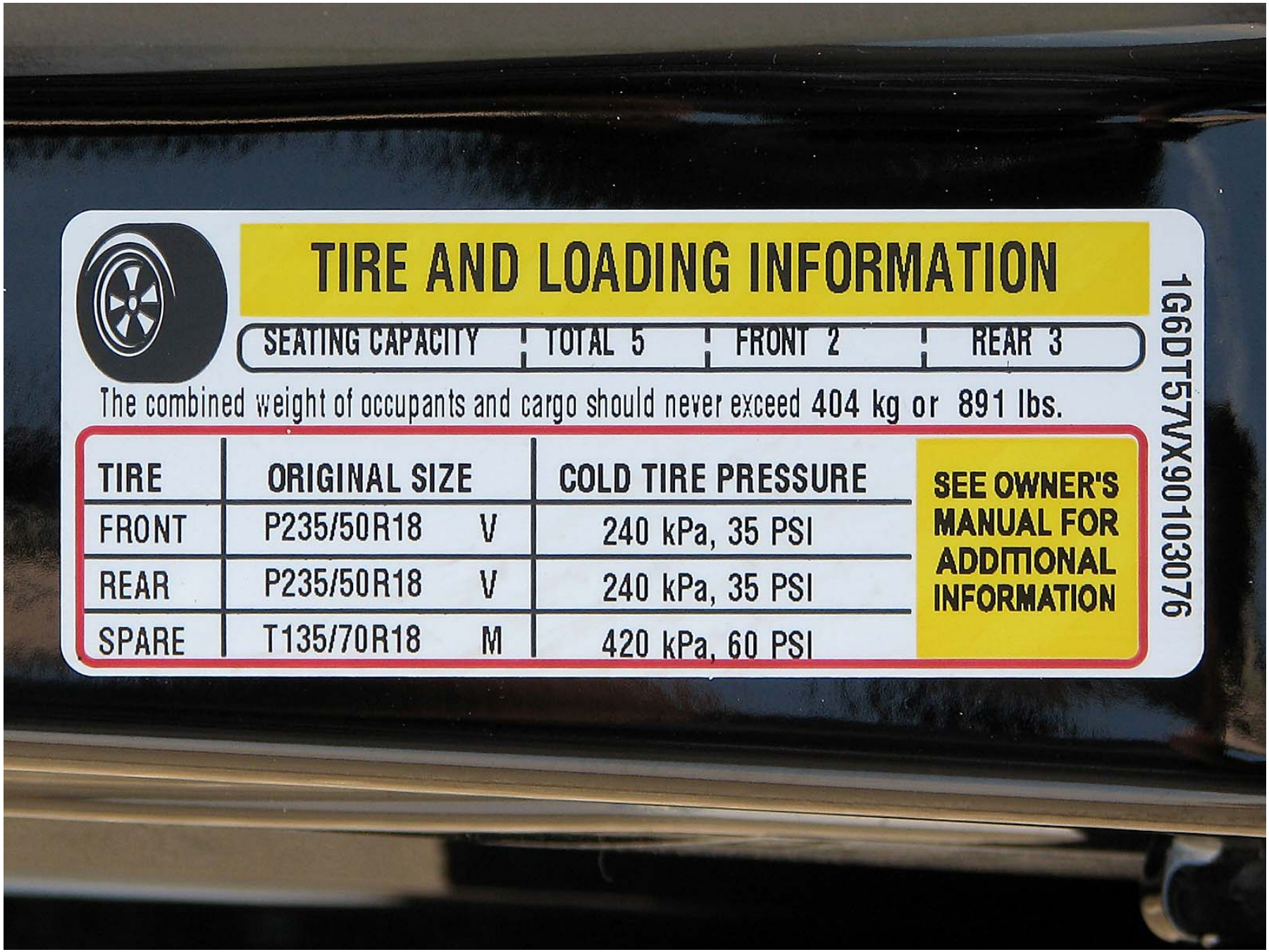


Figure A-3: Tire Placard

Figure A-4: Right Front ¾ View, As Received

Figure A-5: Left Rear ¾ View, as Received

Figure A-6: Pre-Test Front View

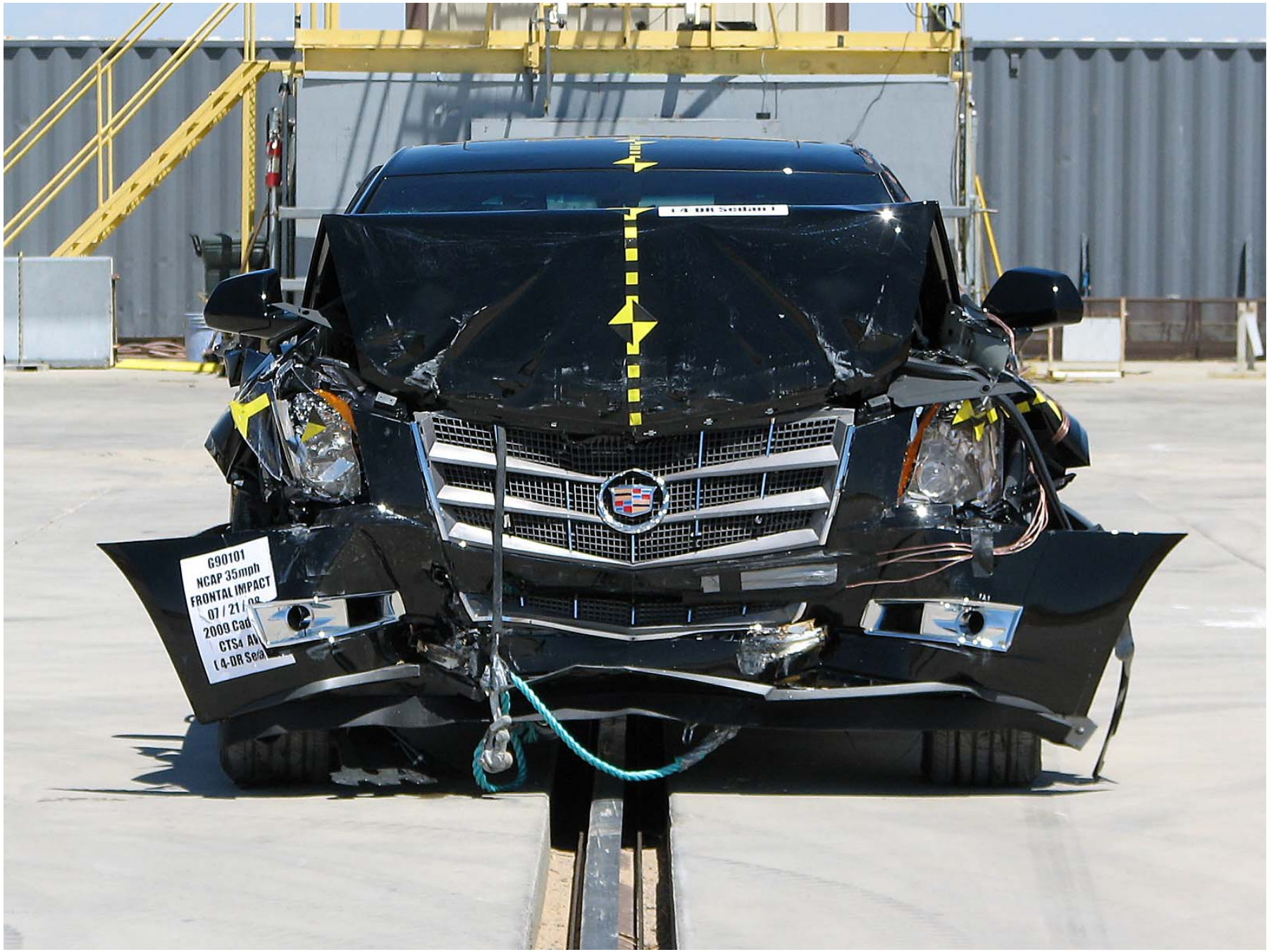


Figure A-7: Post-Test Front View (Vehicle Moved)

Figure A-8: Pre-Test Left Side View

Figure A-9: Post-Test Left Side View

Figure A-10: Pre-Test Right Side View

Figure A-11: Post-Test Right Side View

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

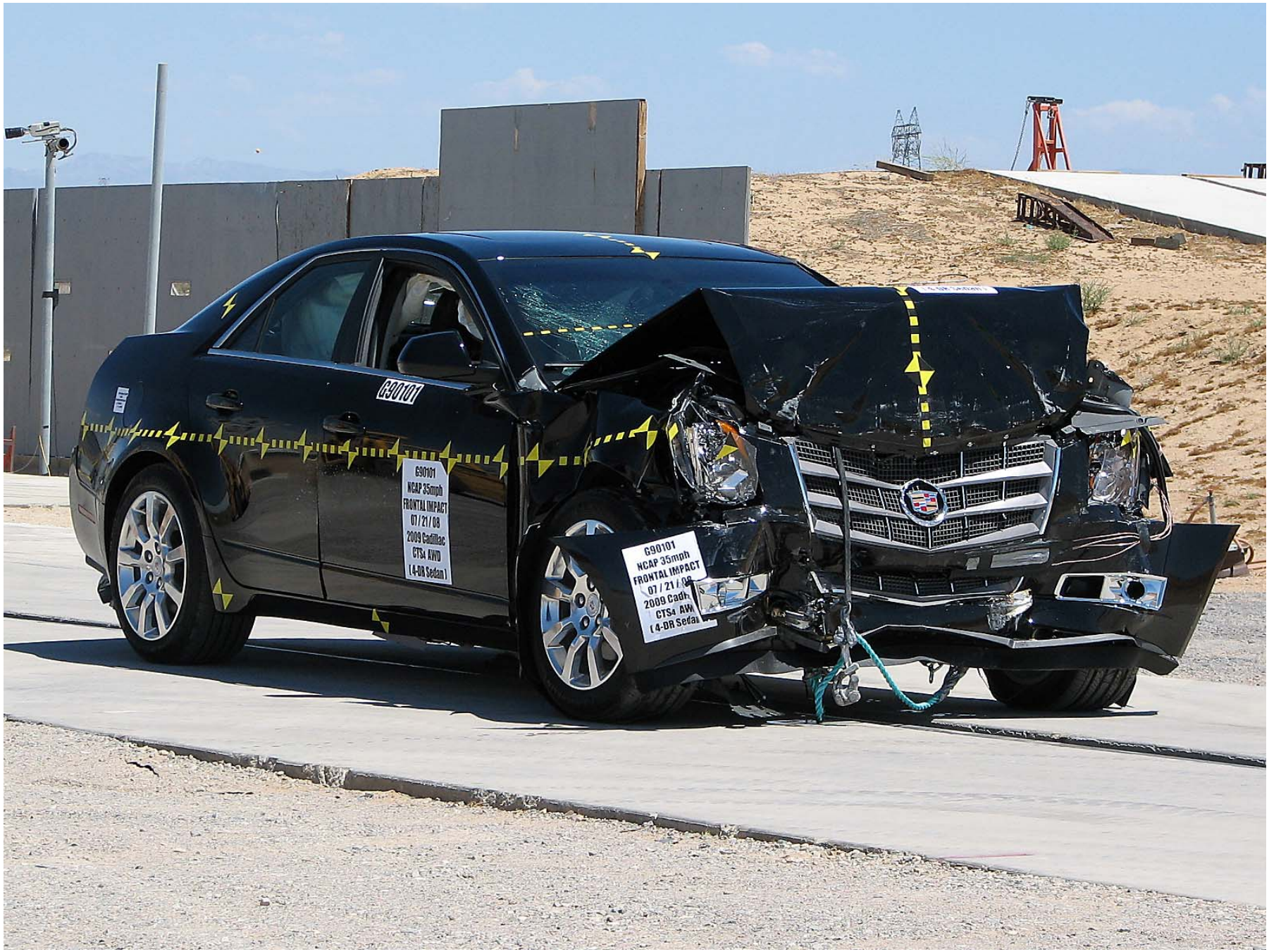


Figure A-13: Post-Test Right Front ¾ View (Vehicle Moved)

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

Figure A-15: Post-Test Left Rear ¾ View

Figure A-16: Post-Test Left Side ¾ 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

Figure A-23: Post-Test Fuel Cap

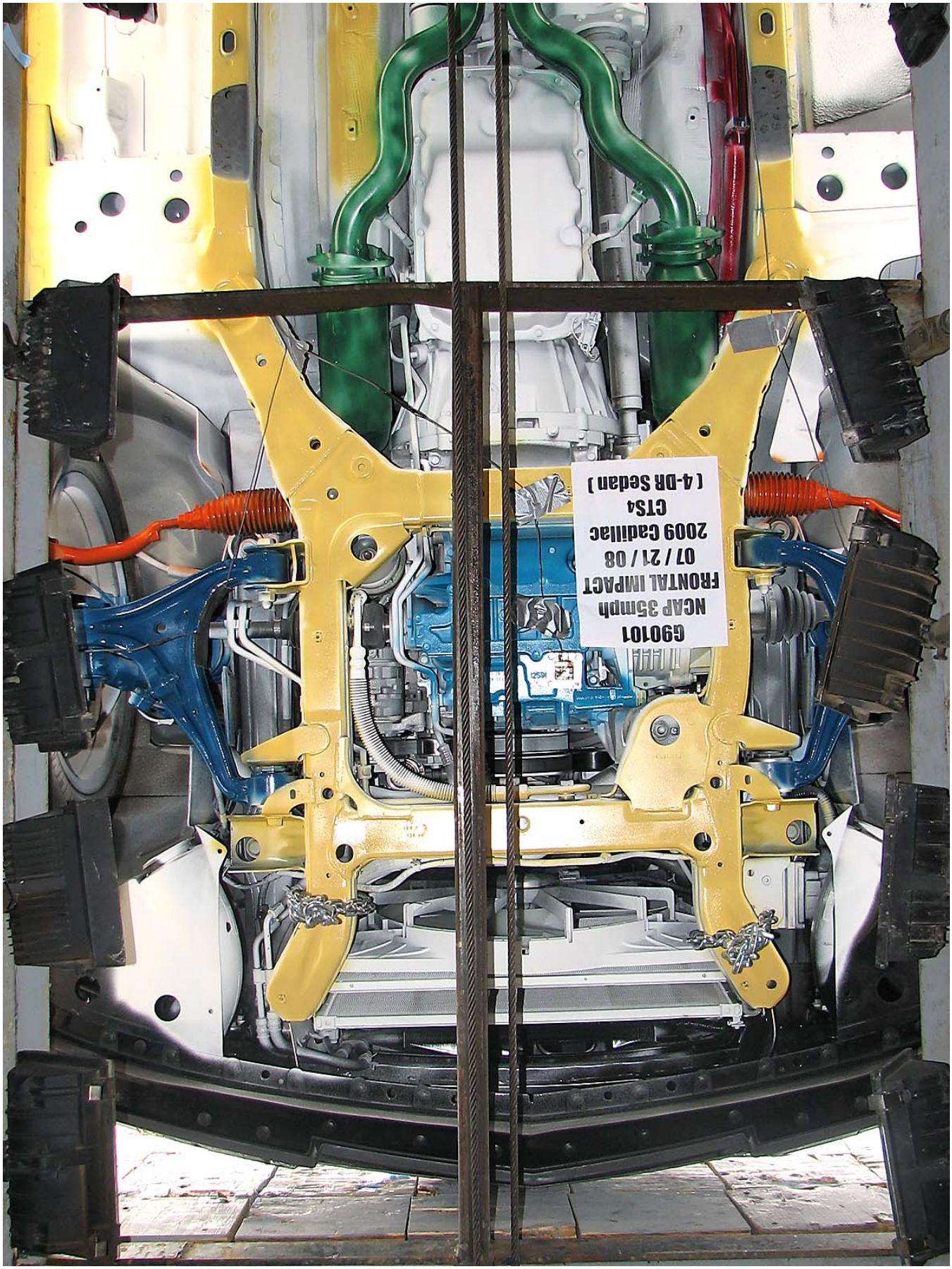


Figure A-24: Pre-Test Front Underbody

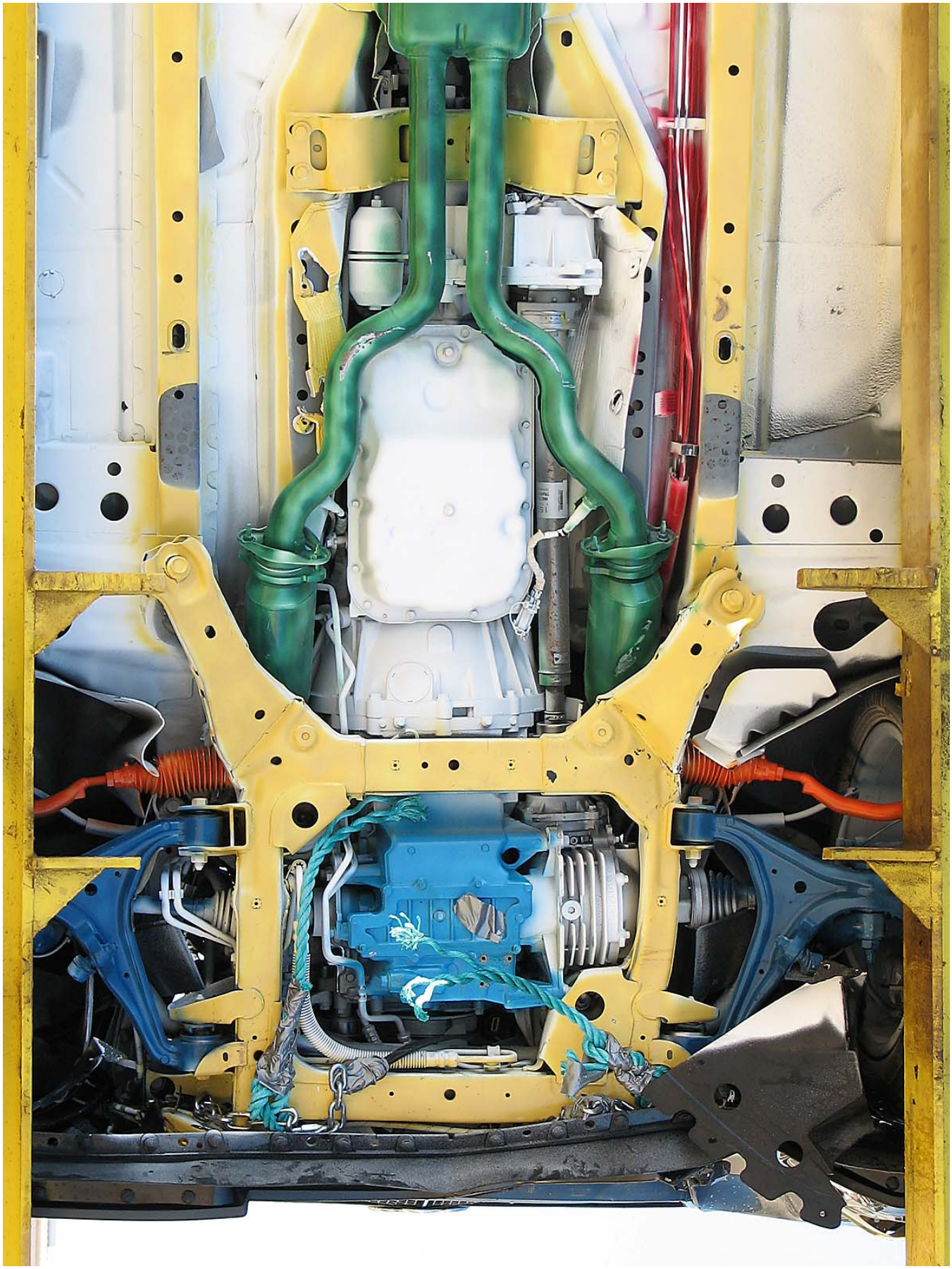


Figure A-25: Post-Test Front Underbody

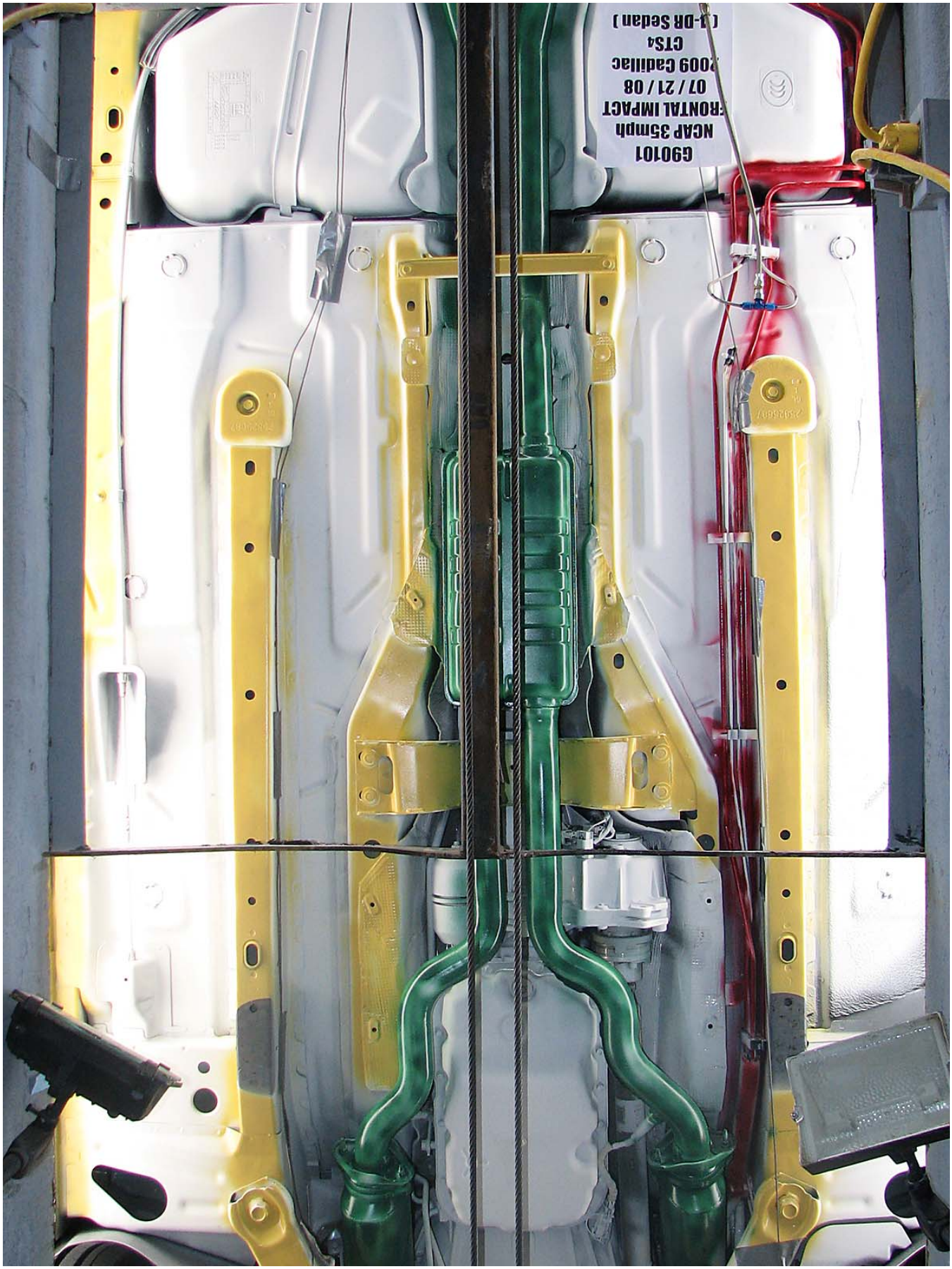


Figure A-26: Pre-Test Mid Underbody

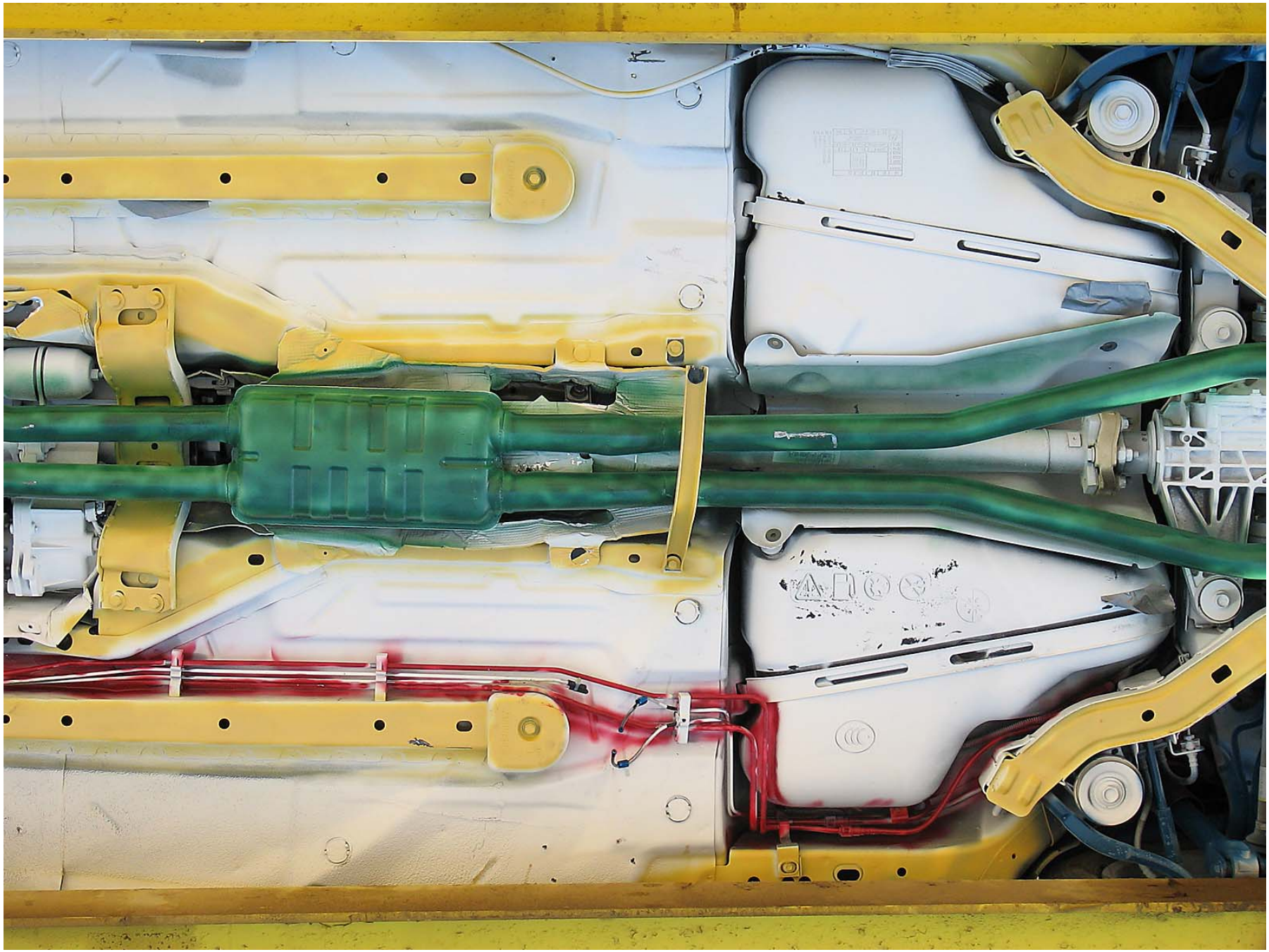


Figure A-27: Post-Test Mid Underbody

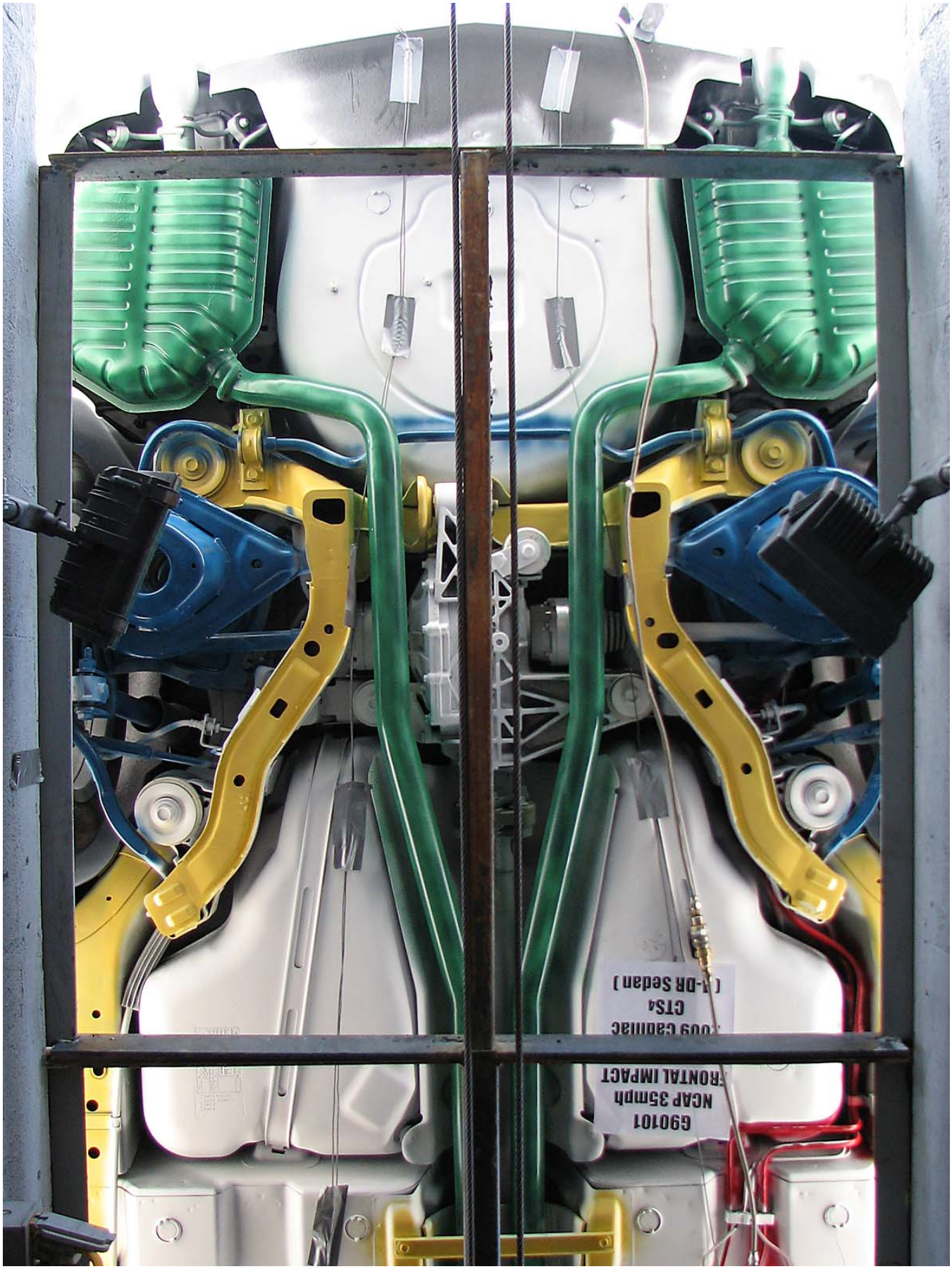


Figure A-28: Pre-Test Rear Underbody

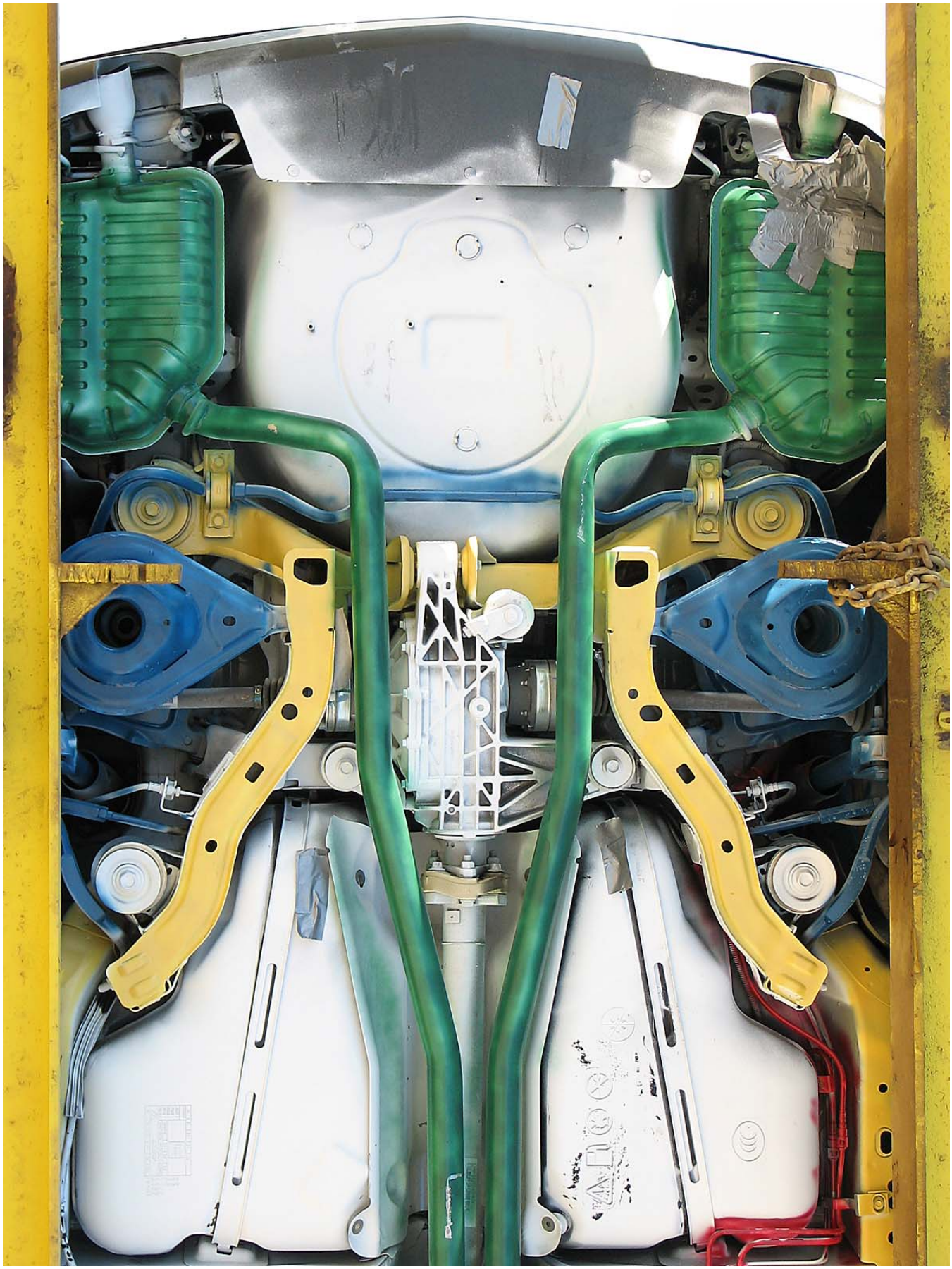


Figure A-29: Post-Test Rear Underbody

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)

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

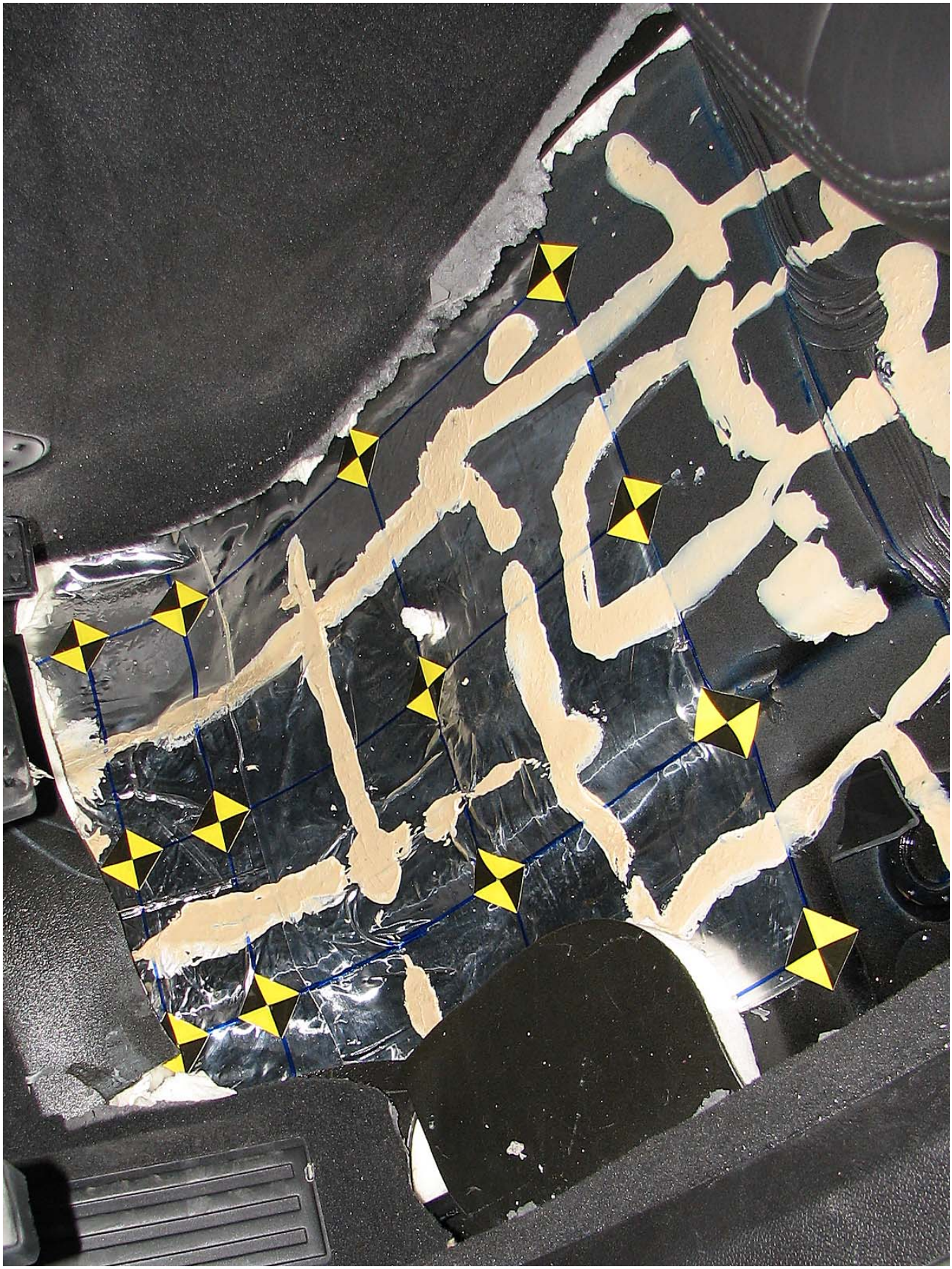


Figure A-41: Post-Test Driver Side Floor Pan

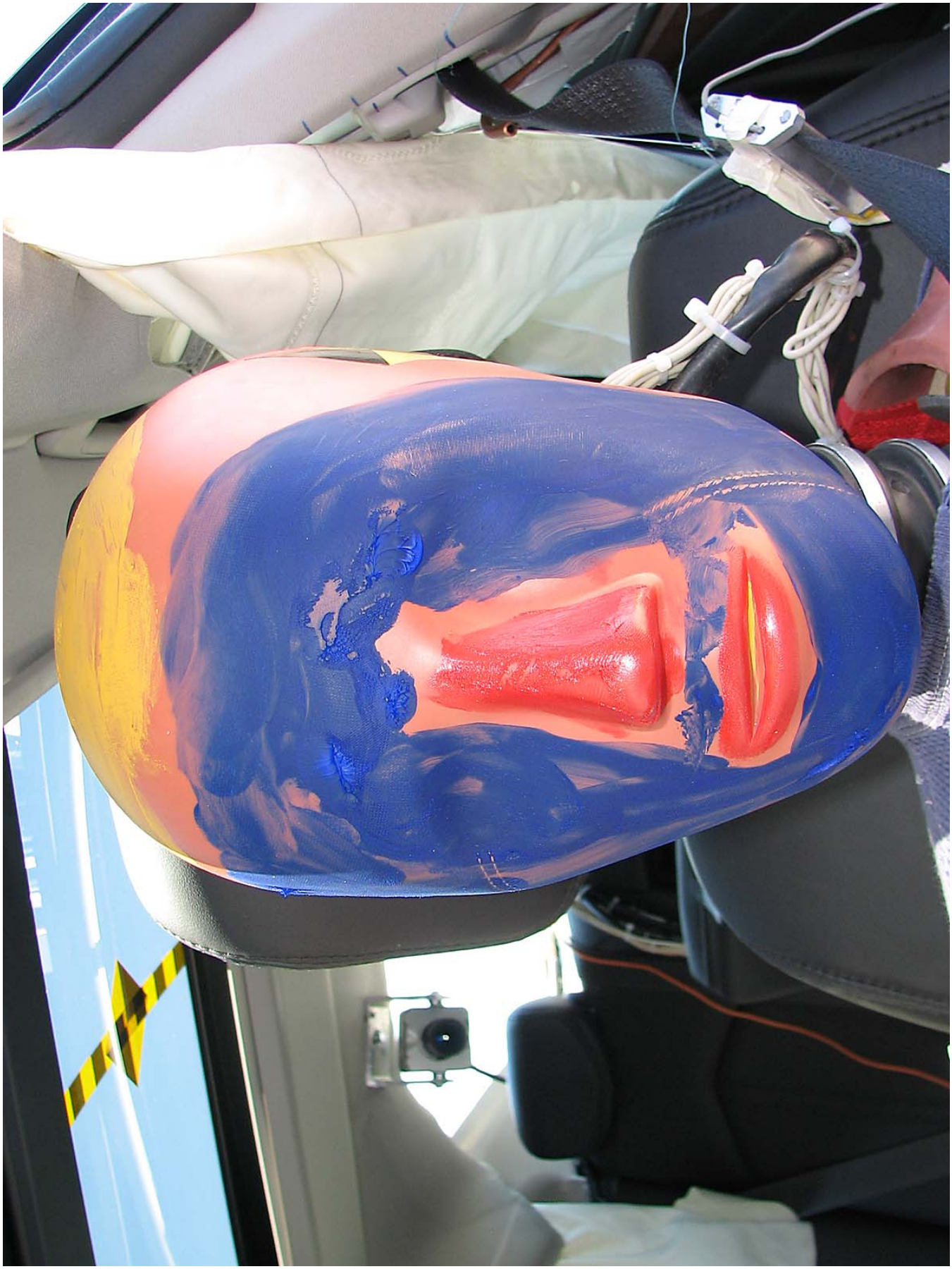


Figure A-42: Post-Test Driver Dummy Head

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)

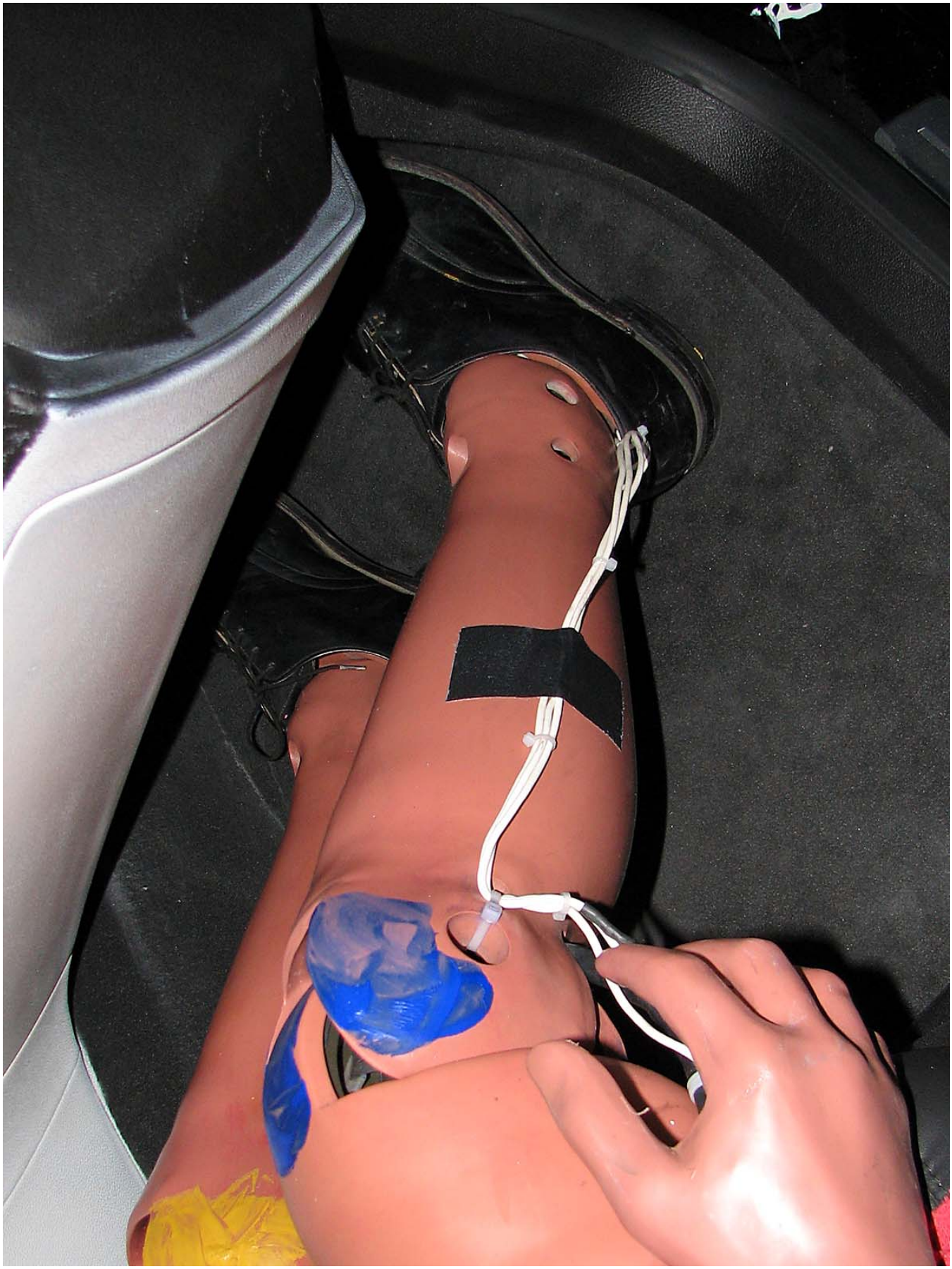


Figure A-50: Pre-Test Passenger Dummy Feet

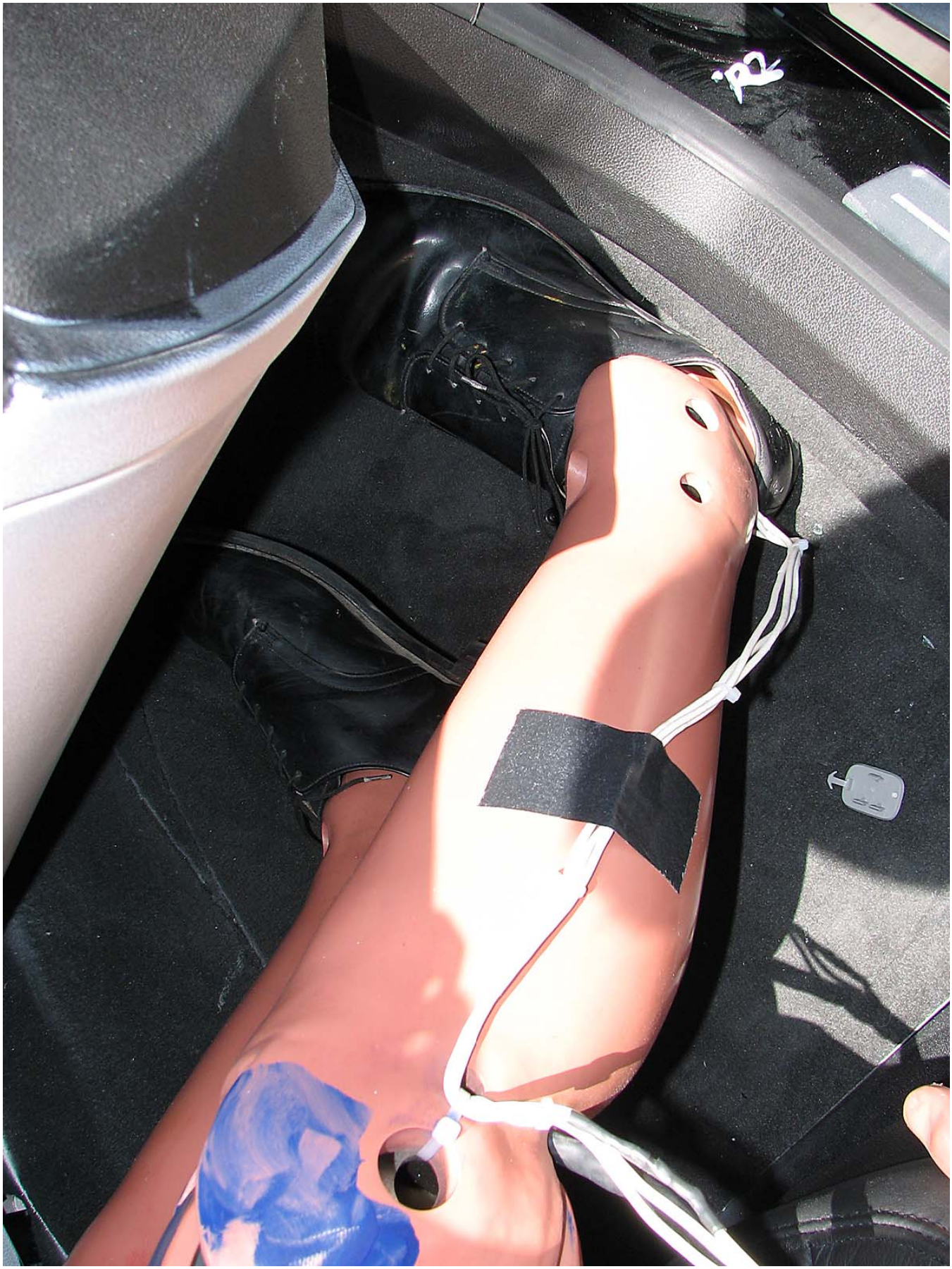


Figure A-51: Post-Test Passenger Dummy Feet

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

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

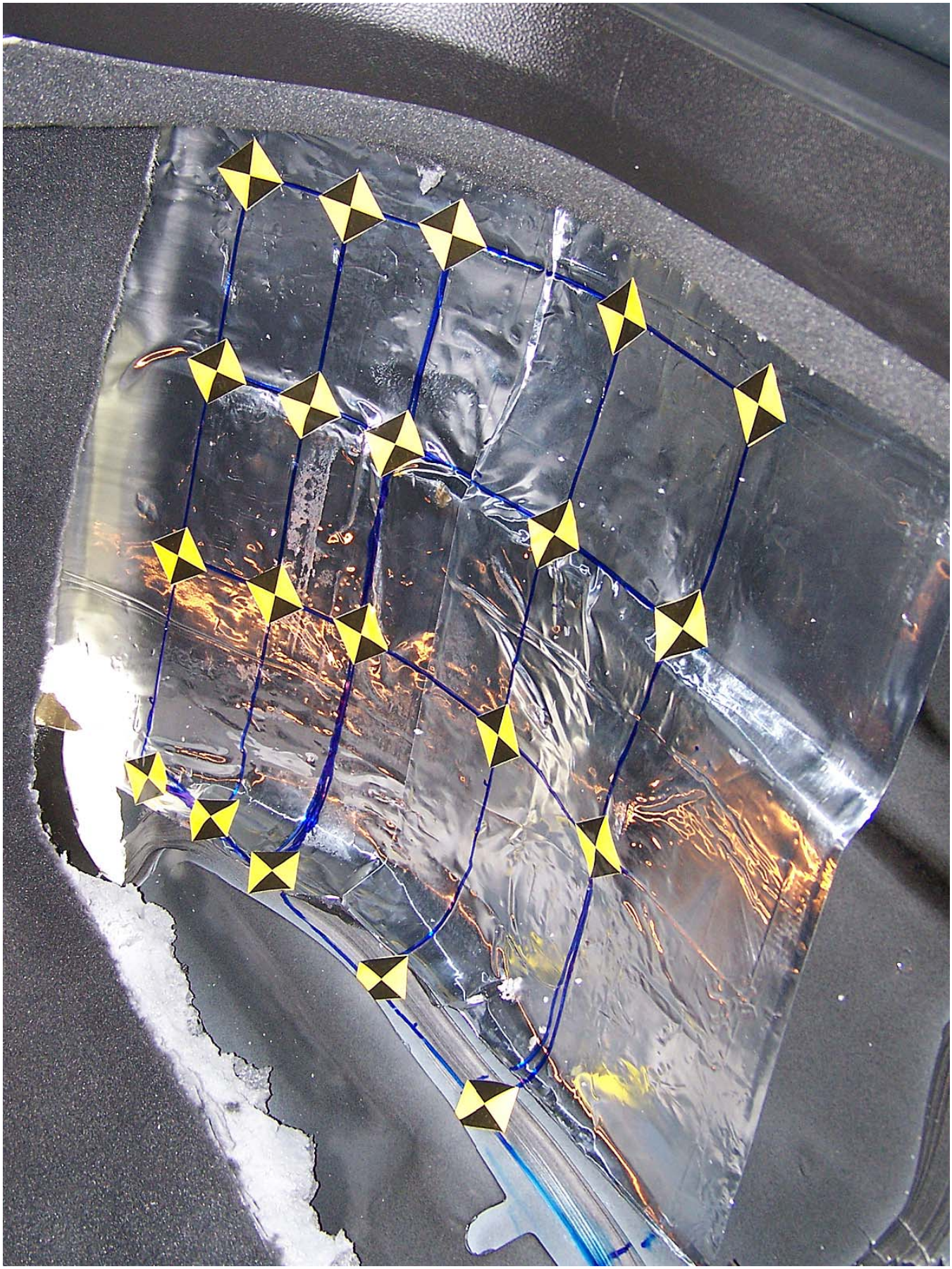


Figure A-54: Pre-Test Passenger Side Floor Pan

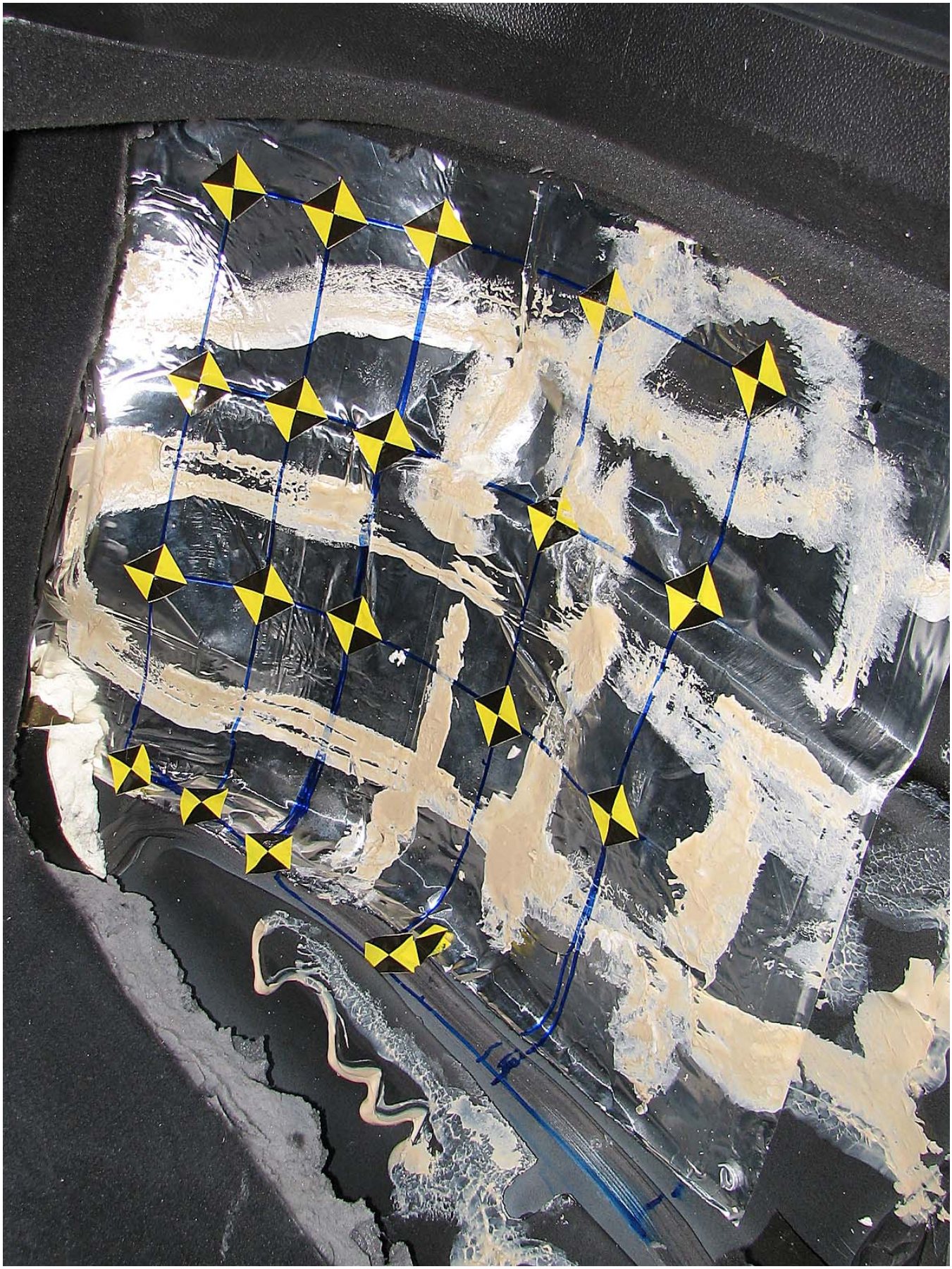


Figure A-55: Post-Test Passenger Side Floor Pan

Figure A-56: Post-Test Passenger Dummy Head

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

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

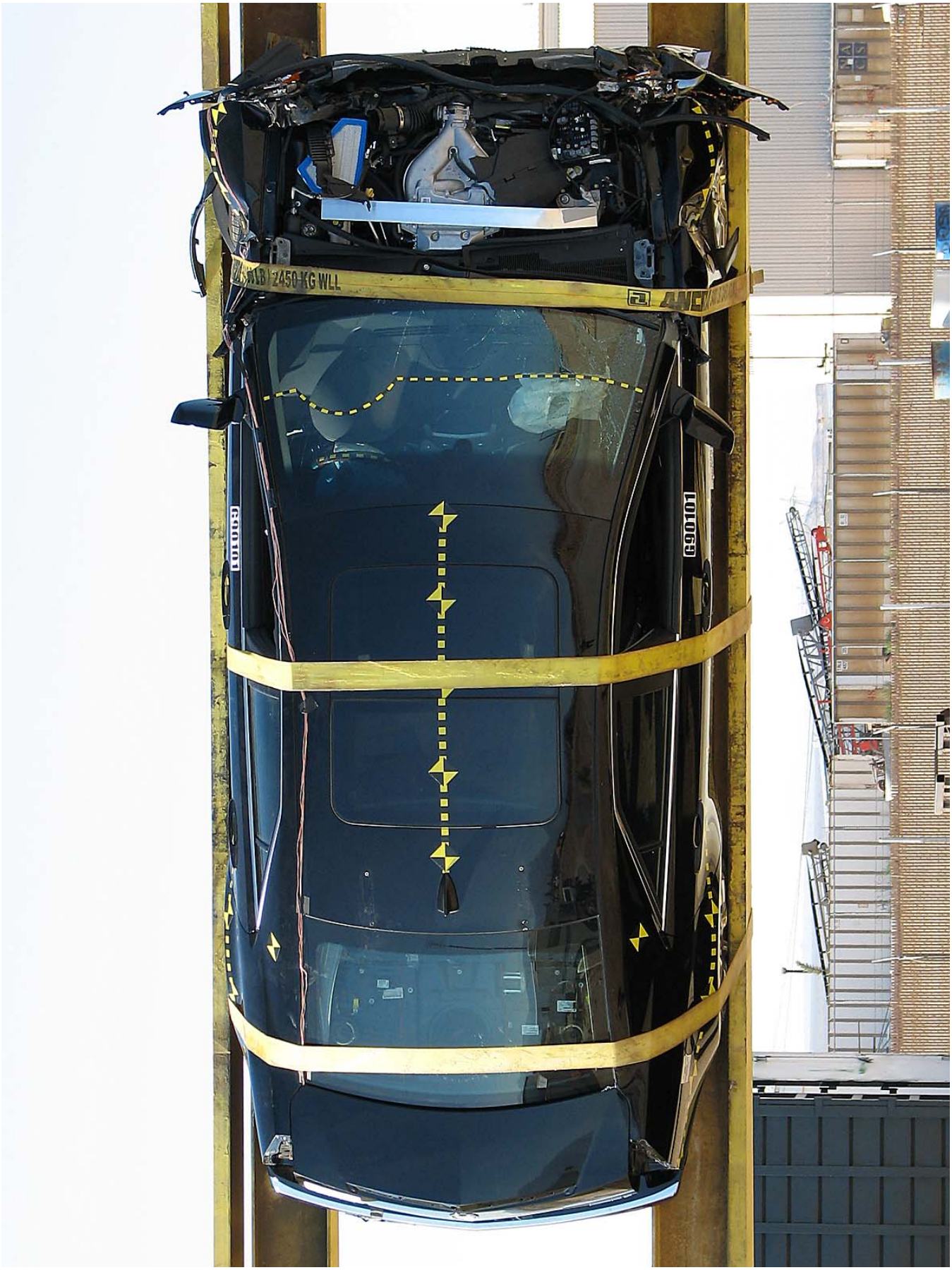


Figure A-59: Vehicle on Rollover Device (90°)

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

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

Figure A-62: Vehicle Impact

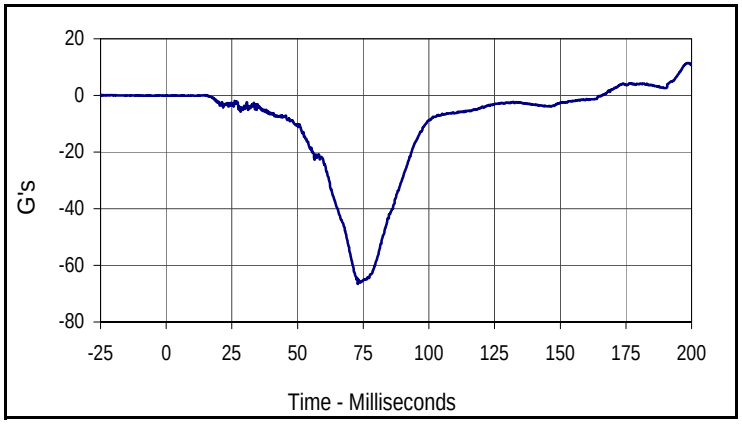
APPENDIX B
DATA PLOTS

LIST OF DATA PLOTS

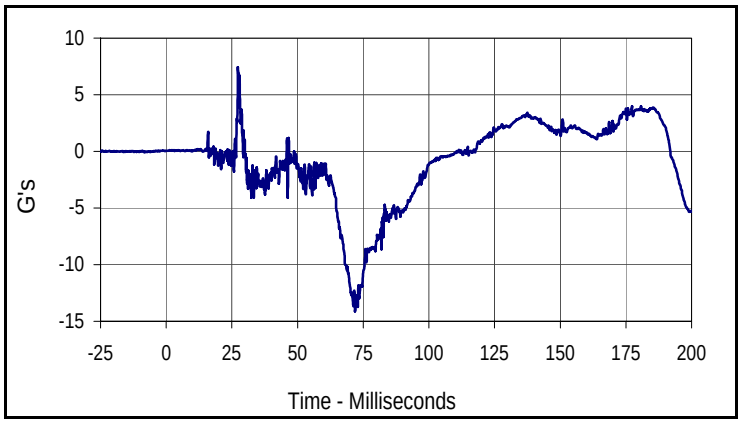
The following additional data plots for this test can be obtained from the research and development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov.

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

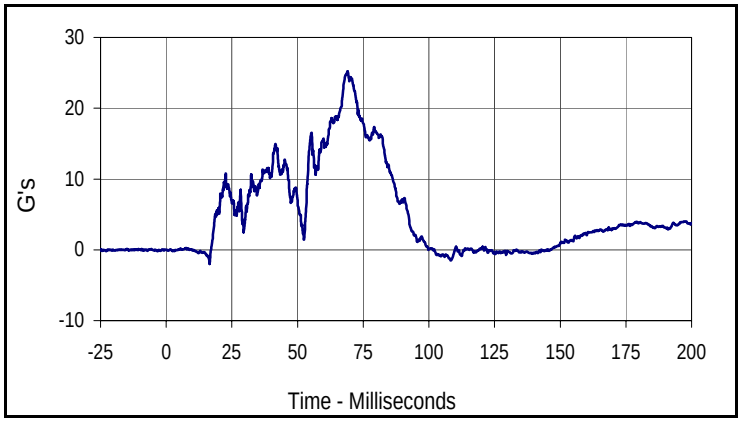
Test Vehicle:	2009 Cadillac CTS4 AWD 4-Door Sedan	Test Date:	7/21/08
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	G90101



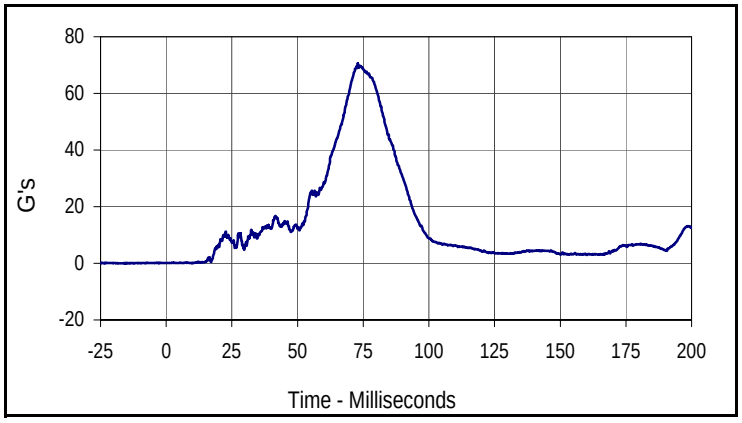
Curve Description			
Driver Head Primary X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
11.5	198.8	-66.5	73.0



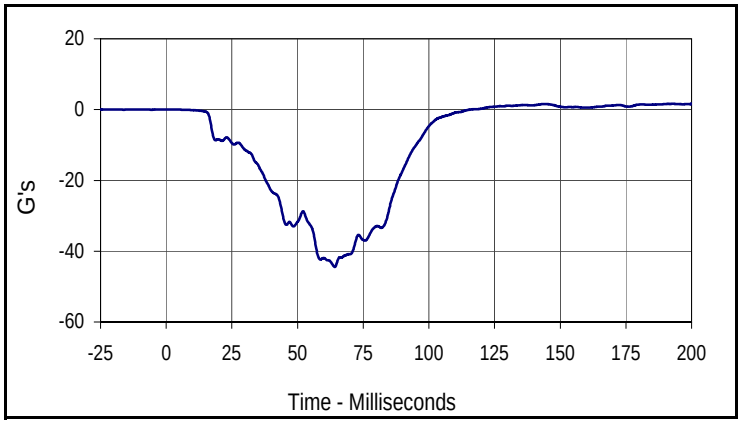
Curve Description			
Driver Head Primary Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
7.4	27.3	-14.1	71.9



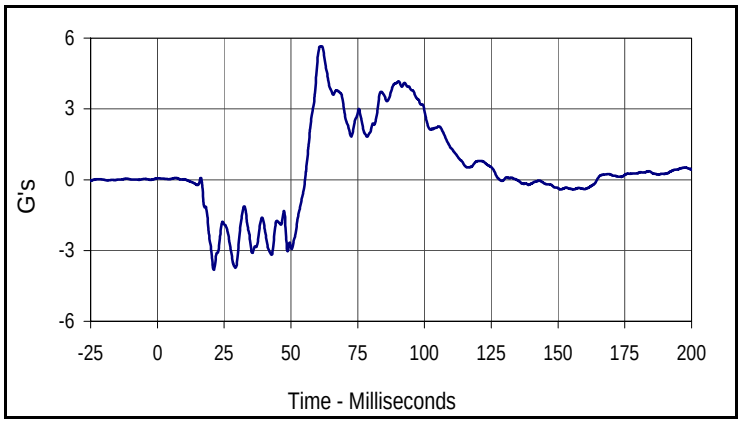
Curve Description			
Driver Head Primary Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
25.2	69.0	-2.0	16.6



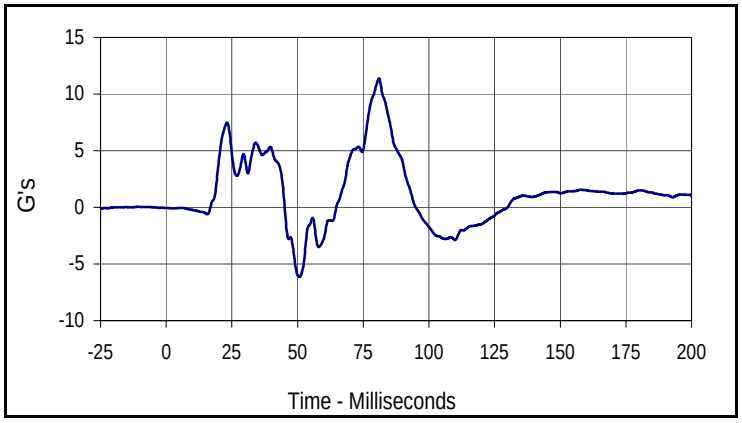
Curve Description			
Driver Head Resultant Primary			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
70.6	73.0	0.0	9.9



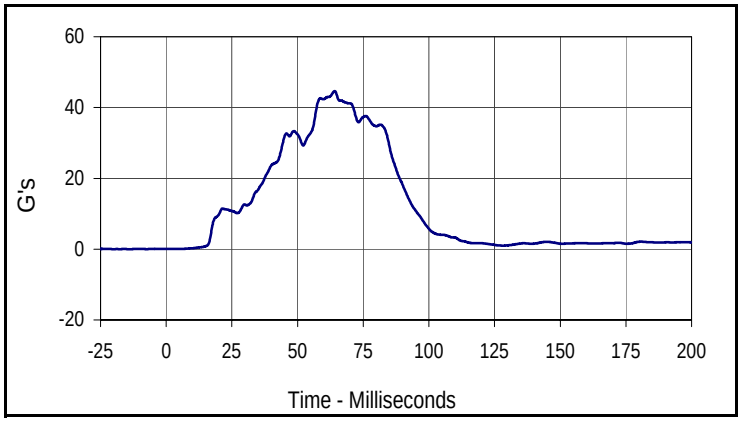
Curve Description			
Driver Chest Primary X			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
1.6	193.0	-44.5	64.1



Curve Description			
Driver Chest Primary Y			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
5.7	61.0	-3.8	21.1

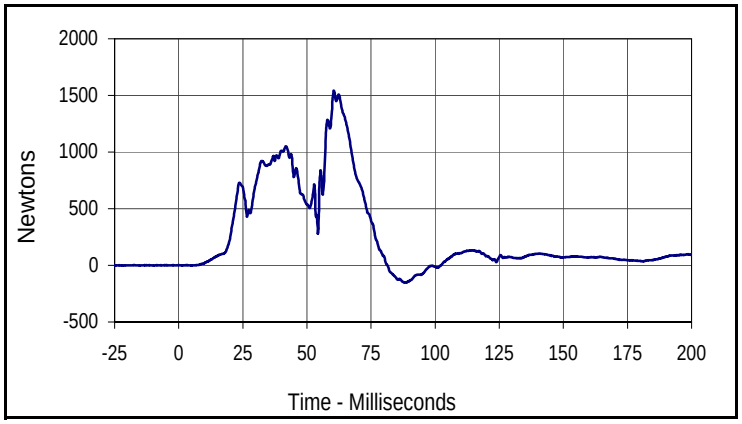


Curve Description			
Driver Chest Primary Z			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
11.4	81.0	-6.1	50.8

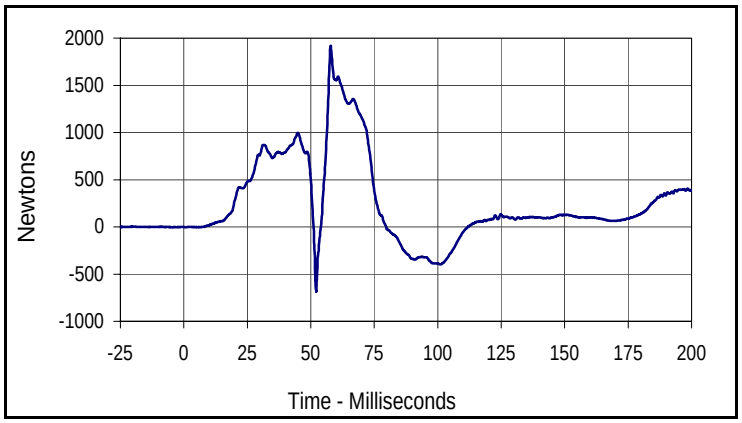


Curve Description			
Driver Chest Resultant Primary			
CURNO	Type	SAE Class	Units
004	RES	180	G's
Max	Time	Min	Time
44.7	64.1	0.1	5.0

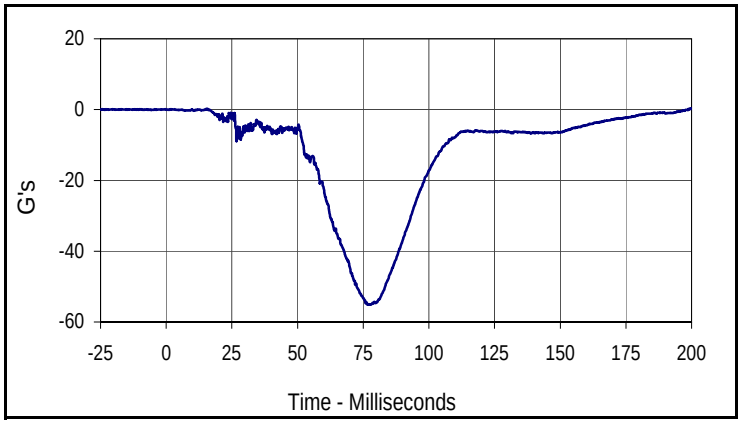
Test Vehicle:	2009 Cadillac CTS4 AWD 4-Door Sedan	Test Date:	7/21/08
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	G90101



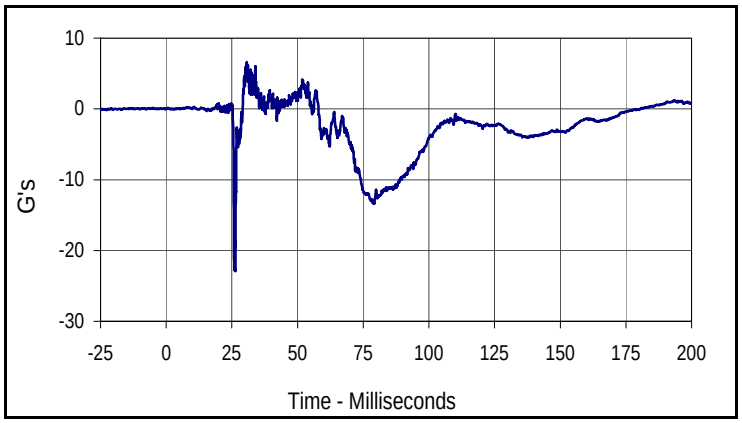
Curve Description			
Driver Left Femur Force Z			
CURNO	Type	SAE Class	Units
007	FIL	600	Newtons
Max	Time	Min	Time
1541.9	60.5	-153.5	88.3



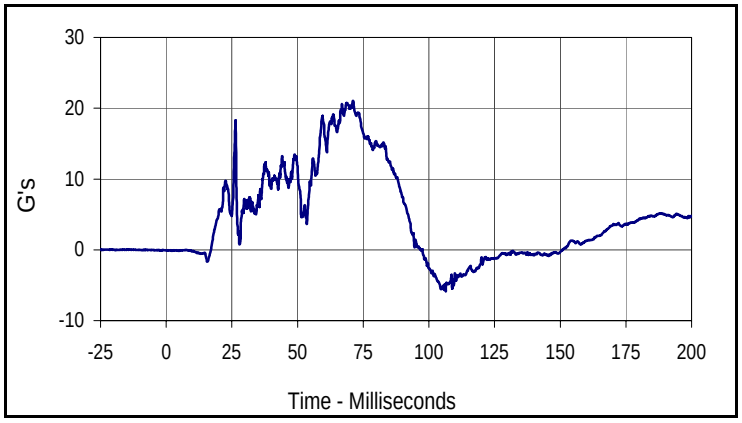
Curve Description			
Driver Right Femur Force Z			
CURNO	Type	SAE Class	Units
008	FIL	600	Newtons
Max	Time	Min	Time
1919.1	57.8	-683.7	52.1



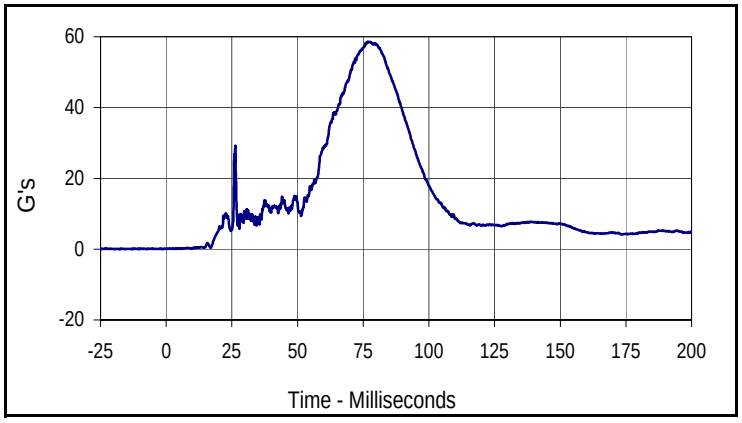
Curve Description			
Passenger Head Primary X			
CURNO	Type	SAE Class	Units
009	FIL	1000	G's
Max	Time	Min	Time
0.3	199.5	-55.1	77.6



Curve Description			
Passenger Head Primary Y			
CURNO	Type	SAE Class	Units
010	FIL	1000	G's
Max	Time	Min	Time
6.6	30.7	-22.7	26.3

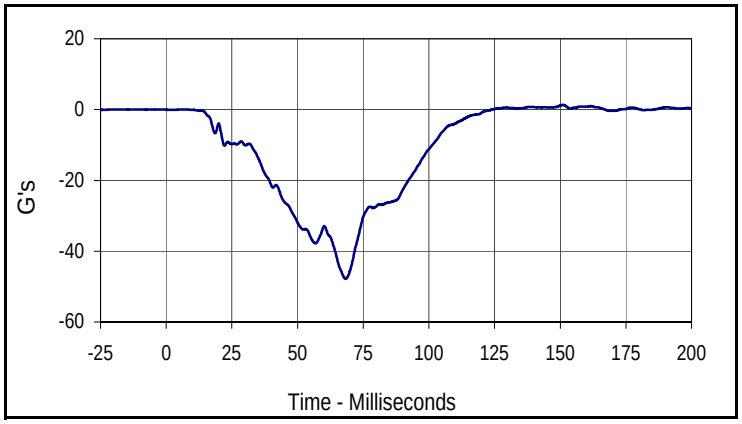


Curve Description			
Passenger Head Primary Z			
CURNO	Type	SAE Class	Units
011	FIL	1000	G's
Max	Time	Min	Time
21.0	71.1	-5.8	106.4

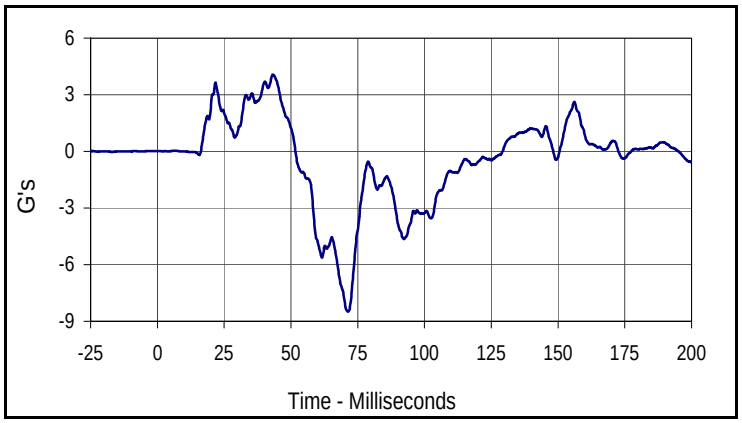


Curve Description			
Passenger Head Resultant Primary			
CURNO	Type	SAE Class	Units
009	RES	1000	G's
Max	Time	Min	Time
58.6	77.5	0.1	2.9

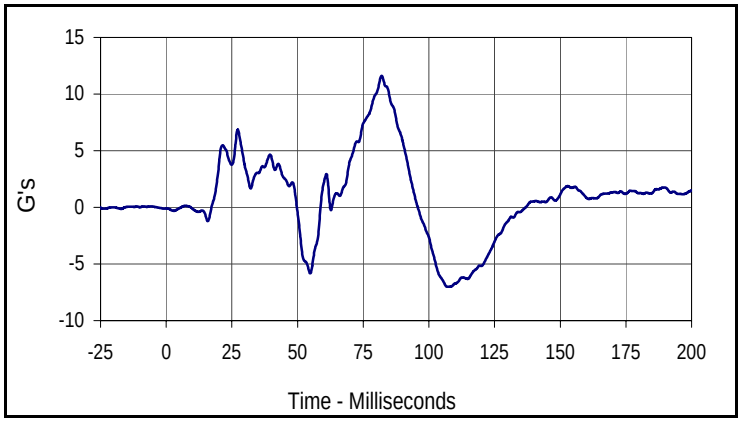
Test Vehicle:	2009 Cadillac CTS4 AWD 4-Door Sedan	Test Date:	7/21/08
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	G90101



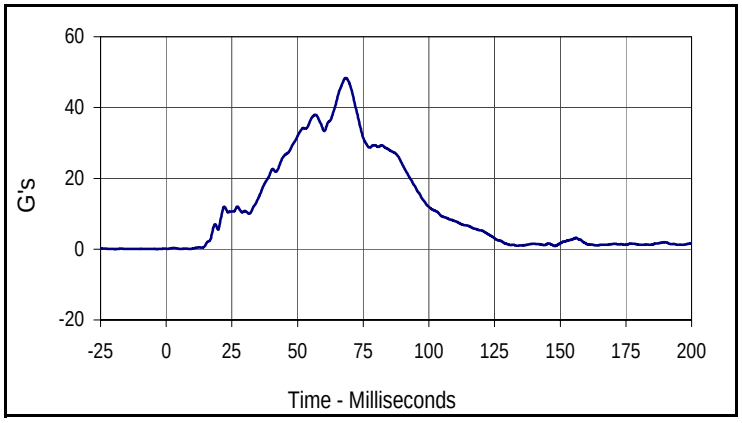
Curve Description			
Passenger Chest Primary X			
CURNO	Type	SAE Class	Units
012	FIL	180	G's
Max	Time	Min	Time
1.3	151.1	-47.8	68.3



Curve Description			
Passenger Chest Primary Y			
CURNO	Type	SAE Class	Units
013	FIL	180	G's
Max	Time	Min	Time
4.1	43.2	-8.5	71.4

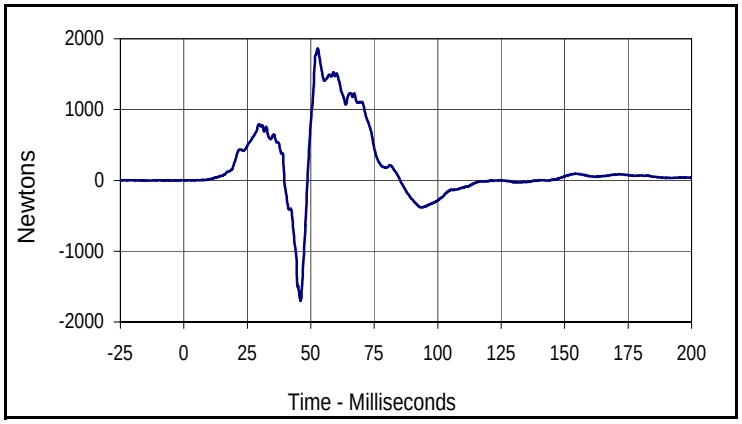


Curve Description			
Passenger Chest Primary Z			
CURNO	Type	SAE Class	Units
014	FIL	180	G's
Max	Time	Min	Time
11.6	82.0	-7.0	107.1

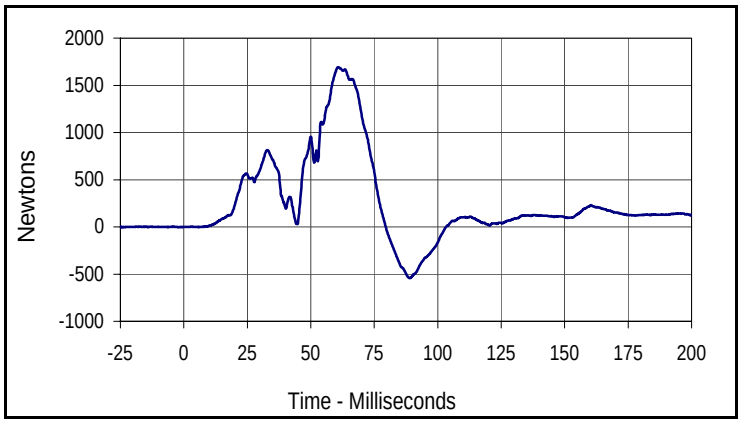


Curve Description			
Passenger Chest Resultant Primary			
CURNO	Type	SAE Class	Units
012	RES	180	G's
Max	Time	Min	Time
48.4	68.4	0.0	5.7

Test Vehicle:	2009 Cadillac CTS4 AWD 4-Door Sedan	Test Date:	7/21/08
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	G90101



Curve Description			
Passenger Left Femur Force Z			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
1864.0	52.8	-1701.9	46.0

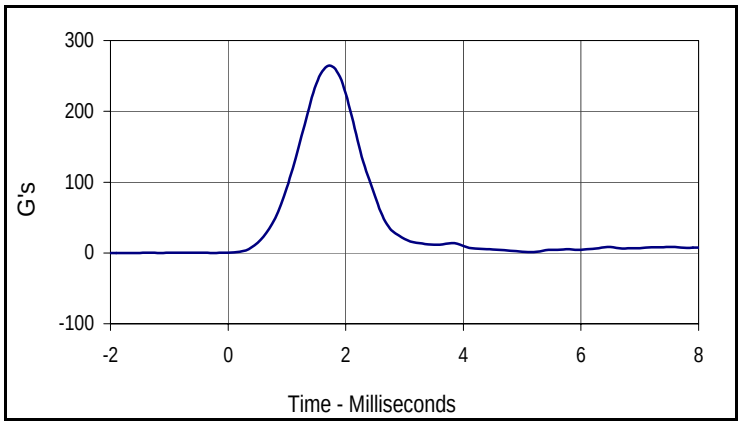


Curve Description			
Passenger Right Femur Force Z			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
1691.4	60.8	-542.4	89.0

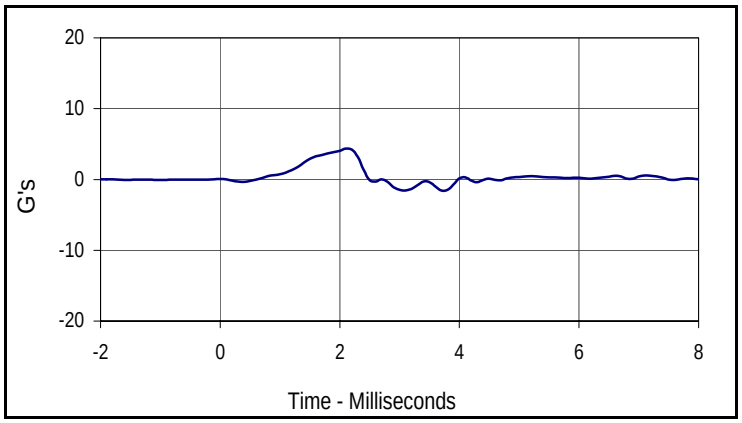
APPENDIX C
DUMMY CALIBRATION DATA

Test Program:	Hybrid III 50th Percentile Male Head Drop Test	Test Date:	6/30/08
ATD Serial No.:	035	Test I.D.:	HD06G

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	264.3	Pass
Peak Lateral Acceleration	G's	≤15.0	4.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass



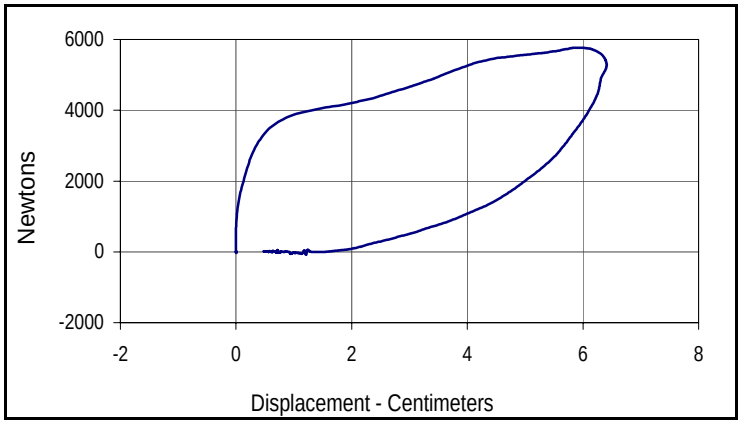
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
264.3	1.7	0.0	-0.2



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.3	2.1	-1.5	3.7

Test Program:	Hybrid III 50th Percentile Male Thorax Impact Test	Test Date:	6/30/08
ATD Serial No.:	035	Test I.D.:	CH06G

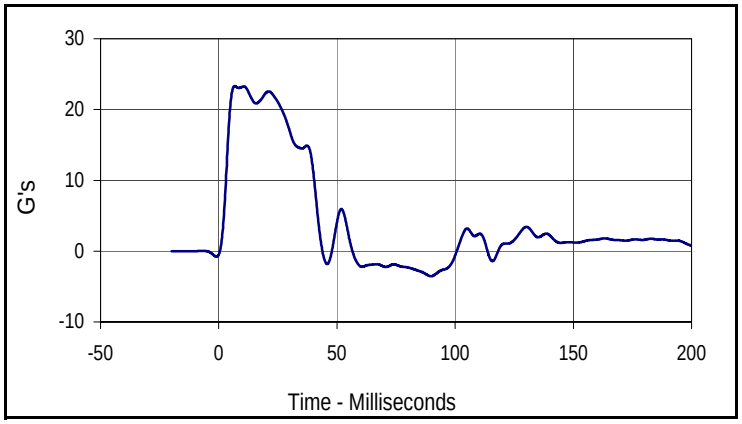
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.70	Pass
Peak Probe Force	Newtons	5159 to 5893	5763	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.41	Pass
Internal Hysterysis	%	69 to 85	76.2	Pass
		Overall Test Results		Pass



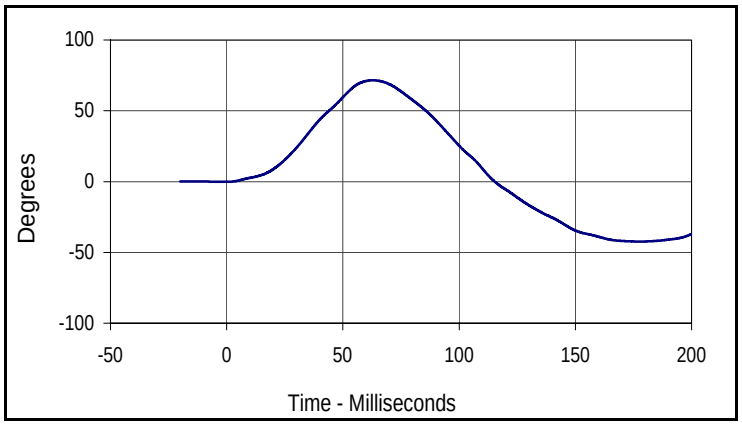
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysterysis
001	FIL	180	76.2
Peak Probe Force		Peak Chest Deflection	
5763		6.41	

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	7/1/08
ATD Serial No.:	035	Test I.D.:	NF06G

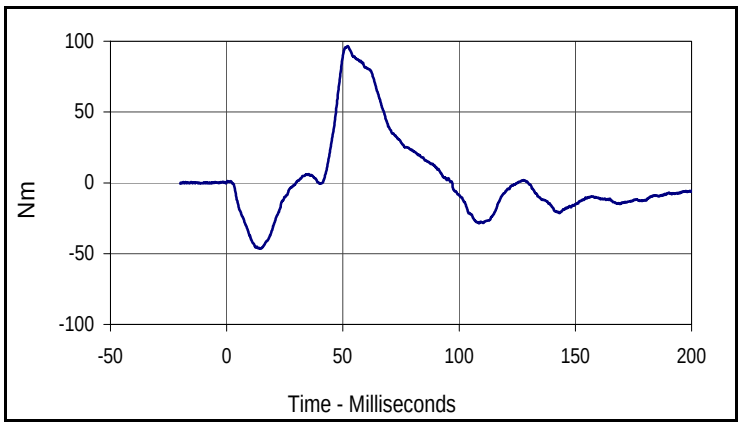
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.2	Pass
	20 Msec.	G's	17.6 to 22.6	22.4	Pass
	30 Msec.	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	41.9	Pass
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	71.6	Pass
	Time	Msec.	57.0 to 64.0	62.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	115.3	Pass
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	96.5	Pass
	Time	Msec.	47.0 to 58.0	52.1	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	97.0	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
23.3	6.7	-3.5	89.8



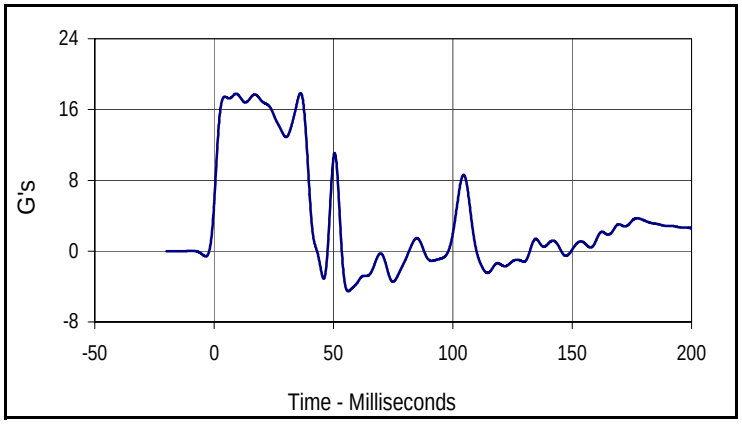
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
71.6	62.8	-42.3	178.6



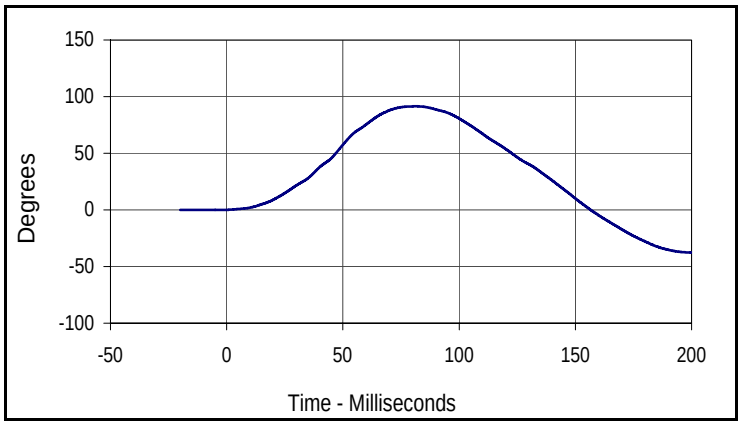
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
96.5	52.1	-46.4	14.7

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	7/1/08
ATD Serial No.:	035	Test I.D.:	NE06G

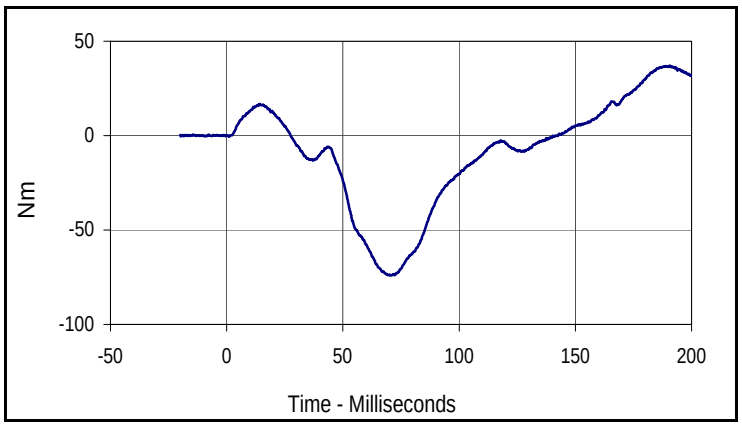
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.94 to 6.19	6.16	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.7	Pass
	20 Msec.	G's	14.0 to 19.0	16.9	Pass
	30 Msec.	G's	11.0 to 16.0	12.9	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	17.9	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	40.4	Pass
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	91.4	Pass
	Time	Msec.	72.0 to 82.0	81.4	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	156.6	Pass
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-74.1	Pass
	Time	Msec.	65.0 to 79.0	70.5	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	142.7	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
17.9	36.2	-4.5	56.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
91.4	81.4	-37.7	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
37.1	190.6	-74.1	70.5

Test Program:	Hybrid III 50th Percentile Male Knee Impact Test	Test Date:	6/30/08
ATD Serial No.:	035	Test I.D.:	LK06G , RK06G

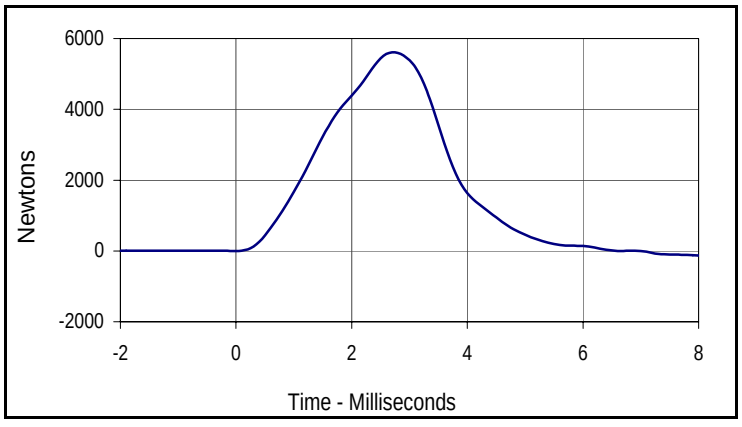
Left Knee

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	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5774	Pass
		Overall Test Results		Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5612	Pass
		Overall Test Results		Pass

Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5774.4	2.6	-148.0	10.0



Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5611.7	2.7	-180.6	10.0

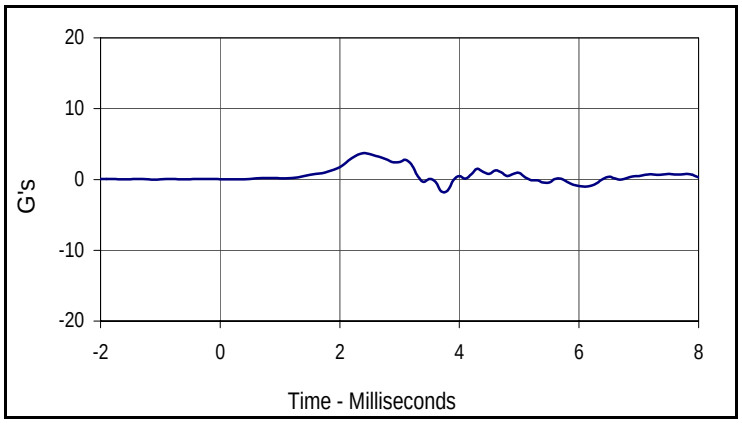
Test Program:	Hybrid III 50th Percentile Male External Measurements	Test Date:	6/30/08
ATD Serial No.:	035	Test I.D.:	N/A

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	884	Pass
B - Shoulder pivot height	mm	505 to 521	519	Pass
C - "H" point height	mm	84 to 89	87	Pass
D - "H" point from seat back	mm	135 to 140	136	Pass
E - Shoulder pivot from back	mm	84 to 94	90	Pass
F - Thigh clearance	mm	140 to 155	144	Pass
G - Elbow back to wrist pivot	mm	290 to 305	293	Pass
H - Skull cap to back line	mm	41 to 46	43	Pass
I - Shoulder to elbow length	mm	330 to 345	340	Pass
J - Elbow rest height	mm	190 to 211	198	Pass
K - Buttock to knee length	mm	579 to 604	598	Pass
L - Poplipteal length	mm	429 to 455	450	Pass
M - Knee pivot height	mm	485 to 500	491	Pass
N - Buttock poplipteal length	mm	452 to 477	471	Pass
O - Chest depth	mm	213 to 229	218	Pass
P - Foot length	mm	251 to 267	260	Pass
V - Shoulder breadth	mm	422 to 437	431	Pass
W - Foot breadth	mm	91 to 107	101	Pass
Y - Chest circumference	mm	970 to 1001	992	Pass
Z - Waist circumference	mm	836 to 866	863	Pass
AA - Location for chest circumference	mm	429 to 434	432	Pass
BB - Location for waist circumference	mm	226 to 231	231	Pass
		Overall Test Results		Pass

Test Program:	Hybrid III 50th Percentile Male Head Drop Test	Test Date:	6/28/08
ATD Serial No.:	034	Test I.D.:	HD06R

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	251.0	Pass
Peak Lateral Acceleration	G's	≤15.0	3.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass

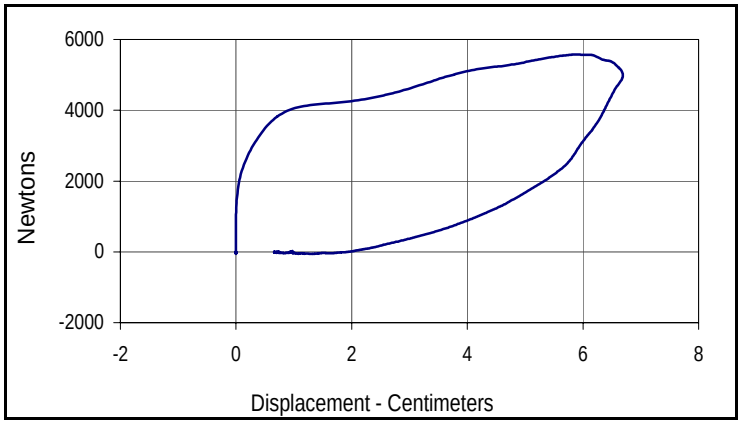
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
251.0	2.6	0.0	-1.7



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.7	2.4	-1.7	3.7

Test Program:	Hybrid III 50th Percentile Male Thorax Impact Test	Test Date:	6/30/08
ATD Serial No.:	034	Test I.D.:	CH06F

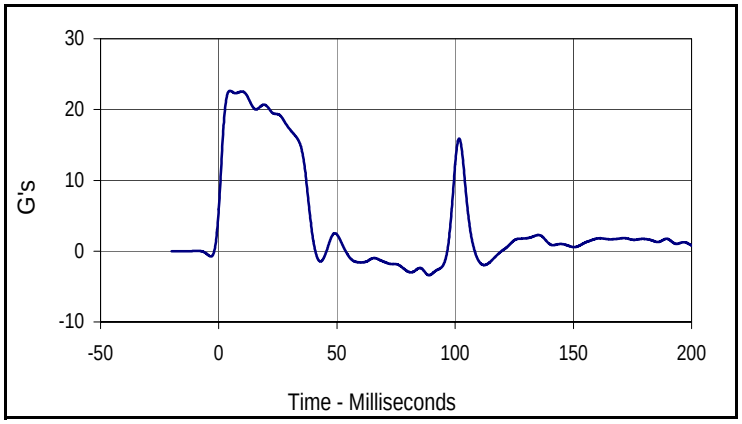
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.69	Pass
Peak Probe Force	Newtons	5159 to 5893	5574	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.69	Pass
Internal Hysterysis	%	69 to 85	77.5	Pass
		Overall Test Results		Pass



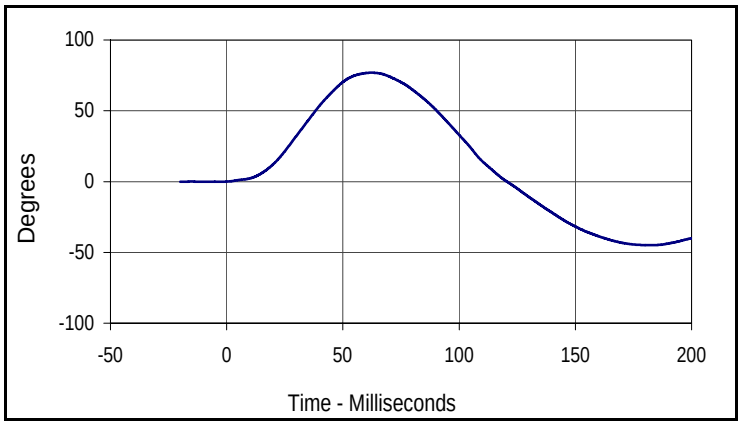
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysterysis
001	FIL	180	77.5
Peak Probe Force		Peak Chest Deflection	
5574		6.69	

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	7/1/08
ATD Serial No.:	034	Test I.D.:	NF06F

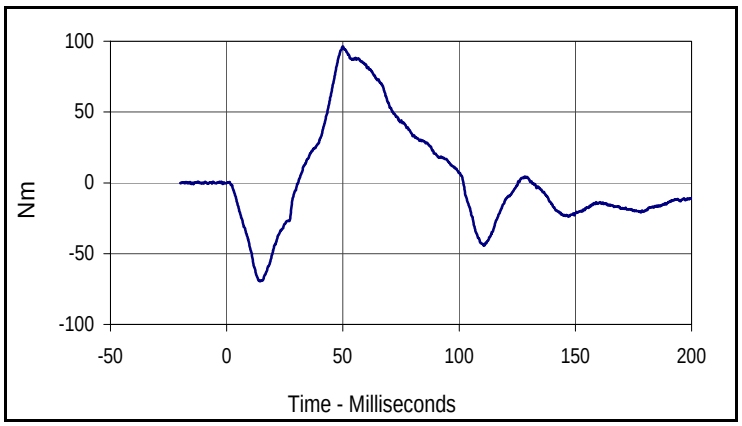
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	22.5	Pass
	20 Msec.	G's	17.6 to 22.6	20.6	Pass
	30 Msec.	G's	12.5 to 18.5	17.2	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	17.2	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	38.6	Pass
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	76.9	Pass
	Time	Msec.	57.0 to 64.0	62.3	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	120.6	Pass
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	96.4	Pass
	Time	Msec.	47.0 to 58.0	49.9	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	101.9	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
22.6	4.7	-3.4	88.9



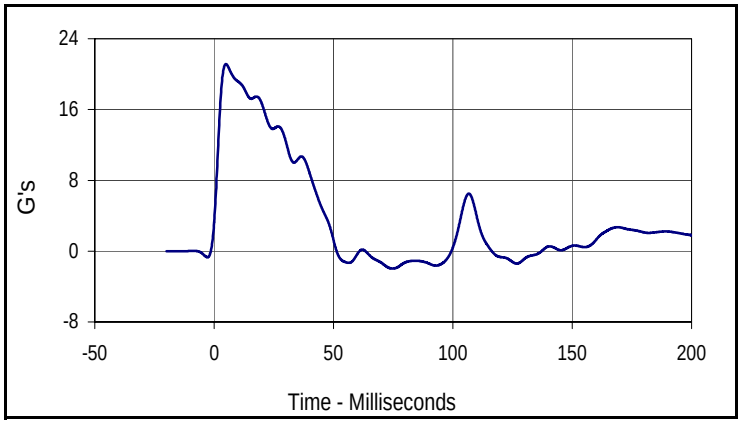
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
76.9	62.3	-44.9	182.3



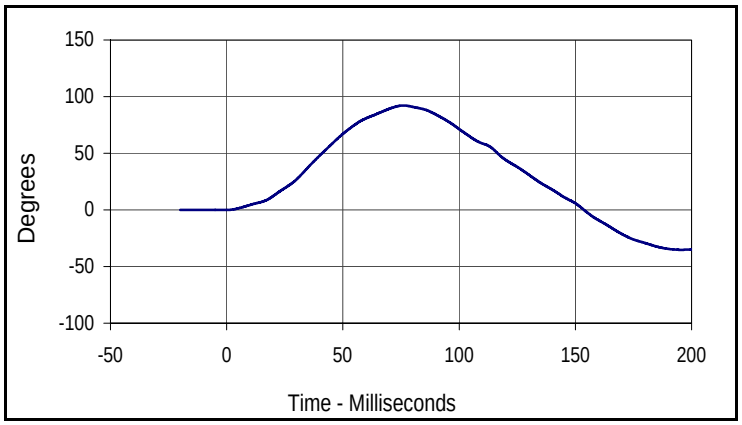
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
96.4	49.9	-69.5	14.5

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	7/1/08
ATD Serial No.:	034	Test I.D.:	NE06F

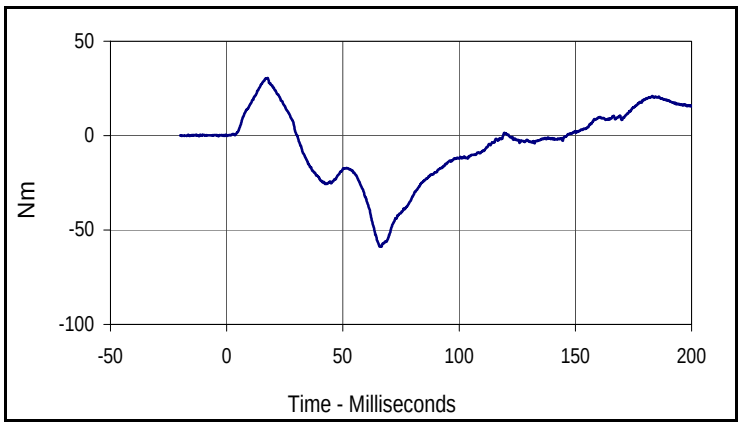
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.94 to 6.19	6.16	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	19.2	Pass
	20 Msec.	G's	14.0 to 19.0	16.7	Pass
	30 Msec.	G's	11.0 to 16.0	12.4	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	12.4	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	45.0	Pass
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	92.2	Pass
	Time	Msec.	72.0 to 82.0	76.1	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	153.8	Pass
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-58.8	Pass
	Time	Msec.	65.0 to 79.0	66.6	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	146.4	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
21.1	4.9	-2.0	74.7



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
92.2	76.1	-35.2	195.5



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
30.4	17.6	-58.8	66.6

Test Program:	Hybrid III 50th Percentile Male Knee Impact Test	Test Date:	6/30/08
ATD Serial No.:	034	Test I.D.:	LK06S , RK06R

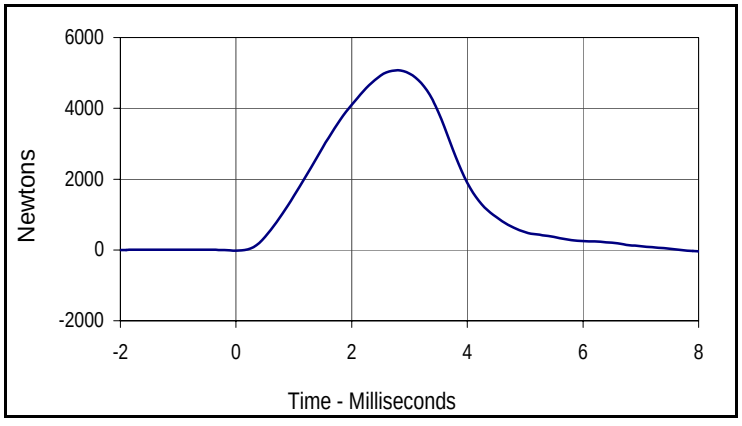
Left Knee

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	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5514	Pass
		Overall Test Results		Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5074	Pass
		Overall Test Results		Pass

Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5513.6	2.7	-181.9	9.8



Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5074.1	2.8	-127.3	10.0

Test Program:	Hybrid III 50th Percentile Male External Measurements	Test Date:	6/30/08
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	886	Pass
B - Shoulder pivot height	mm	505 to 521	520	Pass
C - "H" point height	mm	84 to 89	89	Pass
D - "H" point from seat back	mm	135 to 140	137	Pass
E - Shoulder pivot from back	mm	84 to 94	93	Pass
F - Thigh clearance	mm	140 to 155	146	Pass
G - Elbow back to wrist pivot	mm	290 to 305	298	Pass
H - Skull cap to back line	mm	41 to 46	45	Pass
I - Shoulder to elbow length	mm	330 to 345	342	Pass
J - Elbow rest height	mm	190 to 211	199	Pass
K - Buttock to knee length	mm	579 to 604	595	Pass
L - Poplipteal length	mm	429 to 455	451	Pass
M - Knee pivot height	mm	485 to 500	487	Pass
N - Buttock poplipteal length	mm	452 to 477	474	Pass
O - Chest depth	mm	213 to 229	219	Pass
P - Foot length	mm	251 to 267	263	Pass
V - Shoulder breadth	mm	422 to 437	430	Pass
W - Foot breadth	mm	91 to 107	100	Pass
Y - Chest circumference	mm	970 to 1001	996	Pass
Z - Waist circumference	mm	836 to 866	864	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

Test Program:	Dummy Damage Checklist	Test Date:	6/30/08
ATD Serial No.:	035	Test I.D.:	N/A

GENERAL	DAMAGED	OK
Outer skin on entire dummy		X
Head ballast secure		X
Gashes, rips, general appearance, etc.		X
Neck-Broken or cracks in rubber		X
Check that upper neck bracket is firmly attached to lwr neck bracket		X
Three rubber bumpers in place		X
Spine- Broken or cracks in rubber		X
Check for looseness at the condyle joint		X
Nodding blocks- cracked or out of position		X
Ribs- Check all ribs and rib supports for damage (bent or broken)		X
Check damping material or separation or cracks		X
OTHER		
CHEST DISPLACEMENT ASSEMBLY		
Bent shaft		X
Slider arm riding correctly, in track		X
TRANSDUCER LEADS		
Torn cables		X
ACCELEROMETER MOUNTINGS		
Check for secure mounting		X
KNEES		
Check outer skin, insert and casting (without removing insert)		X
Knee sliders - Wires intact		X
Knee sliders- Rubber returned to "at rest position"		X
LIMBS		
Check for normal movement and adjustment		X
PELVIS		
Inspect for breakage, especially at iliac crest		X

Comments on repair or replacement parts:

Test Program:	Dummy Damage Checklist	Test Date:	6/30/08
ATD Serial No.:	034	Test I.D.:	N/A

GENERAL	DAMAGED	OK
Outer skin on entire dummy		X
Head ballast secure		X
Gashes, rips, general appearance, etc.		X
Neck-Broken or cracks in rubber		X
Check that upper neck bracket is firmly attached to lwr neck bracket		X
Three rubber bumpers in place		X
Spine- Broken or cracks in rubber		X
Check for looseness at the condyle joint		X
Nodding blocks- cracked or out of position		X
Ribs- Check all ribs and rib supports for damage (bent or broken)		X
Check damping material or separation or cracks		X
OTHER		
CHEST DISPLACEMENT ASSEMBLY		
Bent shaft		X
Slider arm riding correctly, in track		X
TRANSDUCER LEADS		
Torn cables		X
ACCELEROMETER MOUNTINGS		
Check for secure mounting		X
KNEES		
Check outer skin, insert and casting (without removing insert)		X
Knee sliders - Wires intact		X
Knee sliders- Rubber returned to "at rest position"		X
LIMBS		
Check for normal movement and adjustment		X
PELVIS		
Inspect for breakage, especially at iliac crest		X

Comments on repair or replacement parts: