REPORT NUMBER TR-P29001-03-NC

NEW CAR ASSESMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

CHRYSLER LLC
2009 DODGE RAM 1500 ST QUAD CAB 4X4
4-DOOR TRUCK

NHTSA NUMBER: M90304

Prepared By:
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JANUARY 7, 2009

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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COTR, NCAP Frontal Impact Program

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Date of Acceptance

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15. Supplementary Notes

A thin cloud of smoke was observed coming from the engine compartment 30 minutes after the frontal impact test. The smoke appeared to come from the circuit board of the Totally Integrated Power Module. The event was not observed in an NCAP test of different 2009 Dodge Ram model and was not observed in previous model year NCAP tests of the Dodge Ram.

16. Abstract

A 35 mph (56.3 km/h) frontal barrier impact test was conducted on the subject 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck at KARCO Engineering, LLC, in Adelanto, CA, on January 7, 2009. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity was 56.36 km/h. The ambient temperature at the barrier at the time of the crash was 17.2 degrees Celsius. The vehicle's maximum post static crush was 588 mm at DPD 3, to the left of 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	371.1	484.2
Max. Chest Accel. (3 msec. Chest Clip)	G's	60	36.0	40.4
Left Femur Force	Newtons	10008	-3974.0	-3264.7
Right Femur Force	Newtons	10008	-1292.0	-3308.0

17. Key Words	18. Distribution Statement
56.3 km/h NCAP Frontal Impact Test New Car Assesment Program (NCAP) 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No. M90304	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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PURPOSE AND SUMMARY OF TEST M90304

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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck at a velocity of 56.36 km/h. The test was performed at KARCO Engineering, LLC on January 7, 2009

A thin cloud of smoke was observed coming from the engine compartment 30 minutes after the frontal impact test. The smoke appeared to come from the circuit board of the Totally Integrated Power Module. The event was not observed in an NCAP test of different 2009 Dodge Ram model and was not observed in previous model year NCAP tests of the Dodge Ram.

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, 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.034) and the right-front passenger (position 2) ATD (Serial No. 035) were calibrated 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 588 mm at DPD 3, to the left of 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 and chest 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 and chest contacted the airbag. 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	371.1	36.0	-31.8	-3974.0	-1292.0
Passenger	484.2	40.4	-23.8	-3264.7	-3308.0

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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.36
Test Weight	kg	2671
Impact Angle	degrees	0
Average Rebound	mm	593
Maximum Static Crush	mm	588

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Remained closed and latched, opened without tools	Remained closed and latched, opened without tools
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.034	50% Male Hybrid III No. 035
Head Contact	Airbag, Headrest	Airbag
Chest Contact	AIrbag	Airbag
Abdomen Contact	None	None
Left Knee Contact	Bolster	Glovebox
Right Knee Contact	Bolster	Glovebox

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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M90304
Make	Dodge
Model	Ram 1500 ST Quad Cab 4x4
Body Style	4-Door Truck
VIN No.	1D3HV18P89S741288
Color	Silver
Delivery Date	12/23/08
Odometer (Miles)	51.0
Dealer	Towbin Dodge LLC
Transmission	5-Speed Automatic
Final Drive	4WD
Type/No. of Cylinders	V-8
Engine Displ. (L)	4.7
Engine Placement	Longitudinal
Roof Rack	No
Sunroof/T-top	No
Tinted Glass	Yes
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	No
Driver Side Head Airbag	No
Driver Curtain Airbag	Yes
Pass. Front Airbag	Yes
Pass. Side Torso Airbag	No
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? Yes

DATA FROM MANUFACTURER'S LABEL

Manufactured By	CHRYSLER LLC
Date of Manufacture	Oct-08

GVWR (kg)	3040
GAWR Front (kg)	1770
GAWR Rear (kg)	1770

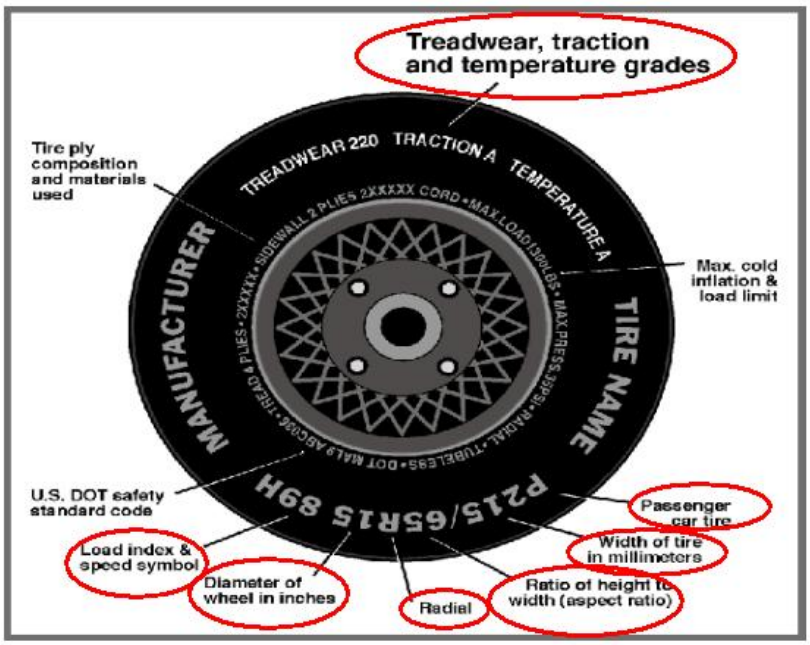
VEHICLE SEATING CAPACITY AND WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	3	3		6
Capacity Weight (VCW) (kg)				671
Cargo Weight (RCLW) (kg)				136

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

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)	300	300
Cold Tire Pressure (kPa)	240	240
Recommended Tire Size	P265/70R17	P265/70R17
Tire Size on Vehicle	P265/70R17	P265/70R17
Tire Manufacturer	Goodyear	Goodyear
Treadwear	500	500
Traction	A	A
Temperature Grades	B	B
Tire Plies - Sidewall	2	2
Tire Plies - Body	6	6
Load Index/Speed Symbol	113R	113R
Tire Material	Polyester and Steel.	Polyester and Steel.
DOT Safety Code Right	4B16 EXWR	4B16 EXWR
DOT Safety Code Left	4B16 EXWR	4B16 EXWR

DATA SHEET NO. 2…(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	680	531	1211	734	633	1367
Right	kg	701	475	1176	732	572	1304
Ratio	%	57.9	42.1	100.0	54.9	45.1	100.0
Totals	kg	1381	1006	2387	1466	1205	2671

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2387
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Weight (RCLW)	kg	136
Calculated Target Vehicle Test Weight (TVTW)	kg	2675

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	937	941	993	1004	1503
As Tested	mm	928	929	958	962	1610

Vehicle Wheel Base (mm) 3570

Weight of Ballast Secured in Cargo Area (kg) 58

Weight of Items Removed (kg) 10

Vehicle Components Removed: Rear Window, Spare Tire Tools

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

FUEL SYSTEM DATA

Fuel System Capacity from Owner's Manual (L) 98.41

Actual Test Volume with Entire Fuel System Filled (L) 91.52

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 Fuel pump operates with key in and turned to on position.

DATA SHEET NO. 3

POST-TEST IMPACT DATA

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

SPEED TRAP DATA

Measured Paramater	Units	Requirement	Value
Trap No. 1 Velocity	km/h	55.1 to 57.12	56.36
Trap No. 2 Velocity	km/h	55.1 to 57.12	56.34

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	5270	4956	314
Center	mm	5821	5242	579
Right Side	mm	5266	4950	316

VEHICLE REBOUND FROM BARRIER

Measured Paramater	Units	Value
Left Side	mm	595
Center	mm	585
Right Side	mm	600
Average	mm	593

DATA SHEET NO. 4

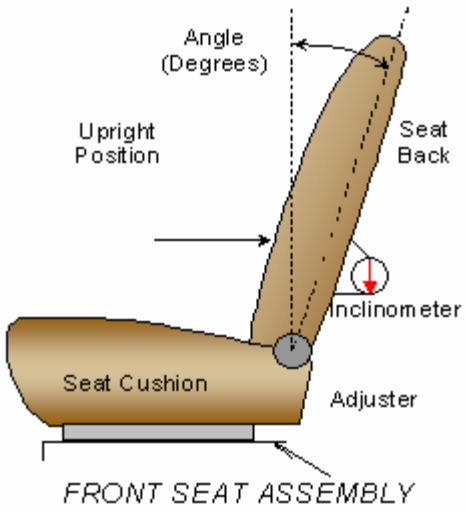
TEST VEHICLE INFORMATION

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

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

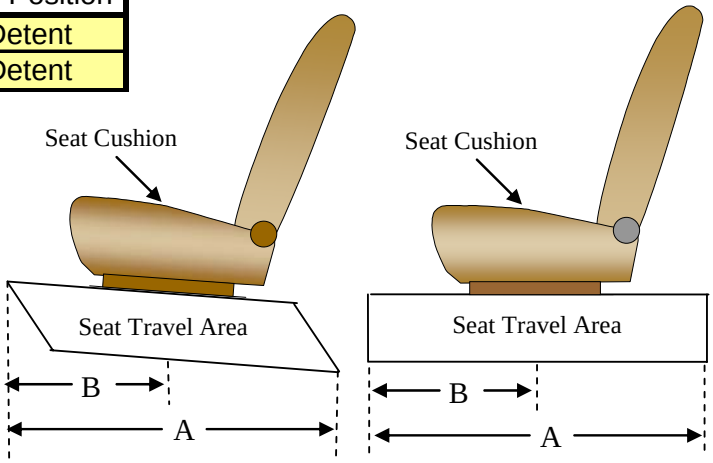
Position	Degrees
Driver w/ Seated Dummy	26.0 @ Seat Back
Passenger w/ Seated Dummy	26.3 @ Seat Back

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	24 Detents	13th Detent
Passenger Seat	24 Detents	13th Detent



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

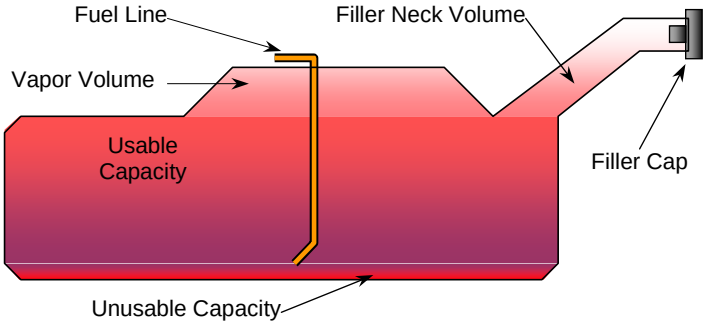
Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

FUEL TANK CAPACITY

	Liters
Usable Capacity of Standard Tank	98.41
Usable Capacity of Optional Tank	
Usable Capacity Used for FMVSS 301	90.54 to 92.51
Actual Amount of Solvent Used	91.52

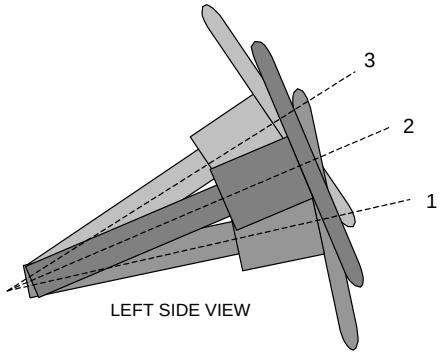
The test vehicle is equipped with an electric fuel pump. The fuel pump will operate for approximately two (2) seconds with the ignition in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under left rear passenger 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	13.9	
Geometric Center - Position No. 2	22.8	
Uppermost - Position No. 3	31.7	

DATA SHEET NO. 5

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

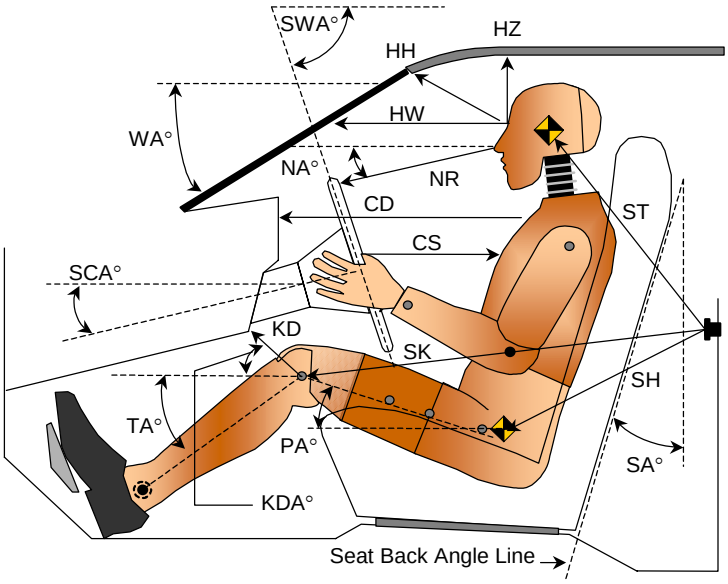
Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

TEST DUMMY POSITION MEASUREMENTS

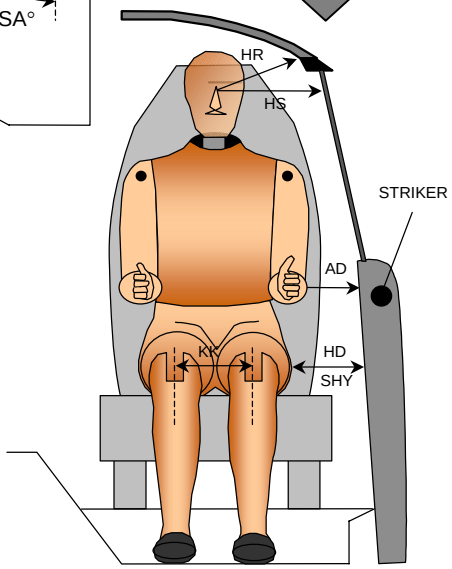
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield angle		32.1		
SWA	Steering wheel angle		67.7		
SCA	Steering column angle		12.3		
SA	Seat Back angle		26.0		26.3
HZ	Head to roof (Z)	269	90.0	266	90.0
HH	Head to header	475		479	
HW	Head to windshield	769		759	
HR	Head to side header (Y)	231		265	
NR	Nost to rim	414	6.6		
CD	Chest to dash	584		618	
CS	Chest to steering hub	354			
RA	Rim to abdomen	215			
KDL	Left knee to dash	129	24.3	114	
KDR	Right knee to dash	125		162	17.7
PA	Pelvic angle		24.7		23.1
TA	Tibia Angle		58.1		64.7
KK	Knee to knee	287		285	
SK	Striker to outboard knee	593	10.0	595	11.0
ST	Striker to head	659	95.0	640	94.5
SH	Striker to H-Point	196	0.0	198	0.0
SHY	Striker to H-Point (Y)	225		232	
HS	Head to side window	271		249	
HD	H-Point to door	142		144	
AD	Arm to door	106		46	

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

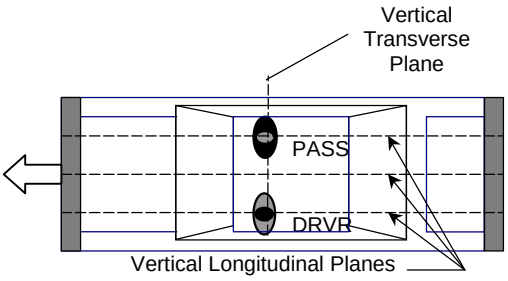
Test Program: NHTSA 35mph NCAP Test Date: 1/07/09



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

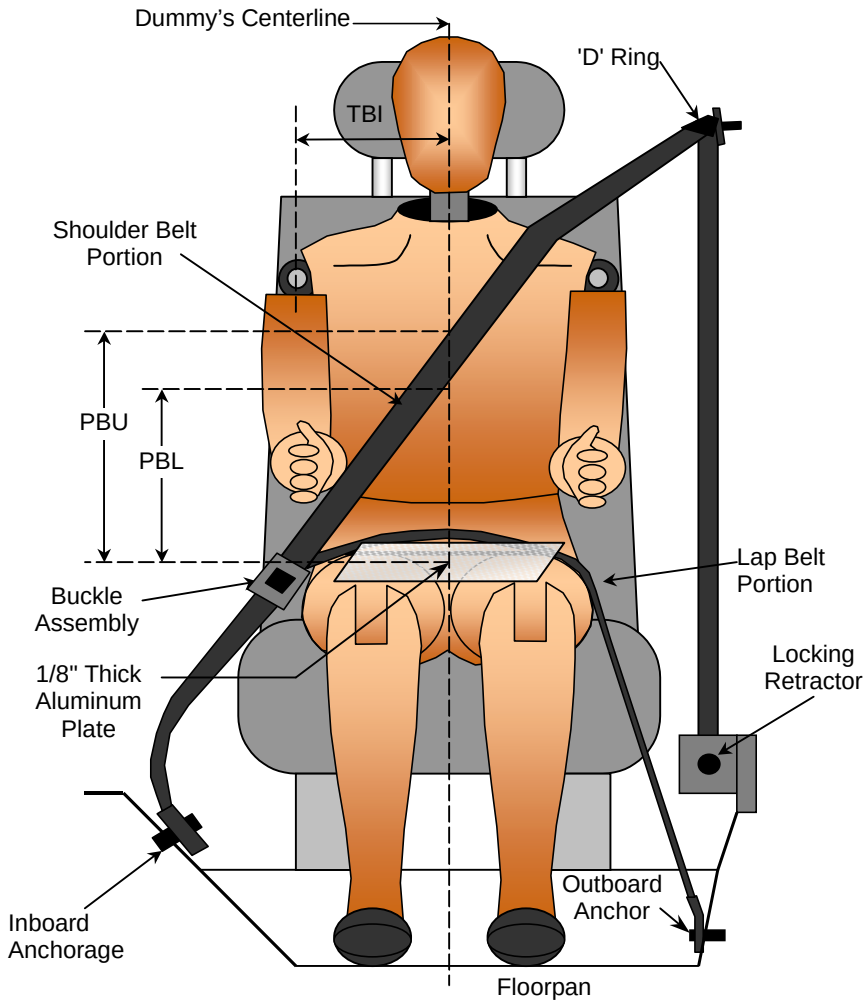


DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09



SEAT BELT POSITIONING MEASUREMENTS

Measured Parameter	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	245	260
PBU - Top Surface of Reference to Belt Upper Edge	mm	335	302
PBL - Top Surface of Reference to Belt Lower Edge	mm	255	232
Lap Belt Tension	Newtons	10	10
Shoulder Belt Tension	N/A	Retractor	Retractor

DATA SHEET NO. 7

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurement (mm)		
		X	Y	Z
1	Left Rear X-Member	2840	760	610
2	Right Rear X-Member	2810	-750	605
3	Engine Top	4900	0	1120
4	Engine Bottom	4500	0	320
5	Left Brake Caliper	4670	810	330
6	Right Brake Caliper	4675	-815	330
7	Instrument Panel			[1]
8	Left Rear X-Member (Z-Axis)	2840	760	610
9	Right Rear X-Member (Z-Axis)	2810	750	605

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

1.) Instrument Panel no longer used by NHTSA.

2.) Not installed

DATA SHEET NO. 8

SEAT BELT ASSESSMENT TEST DATA

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
Retractor Reel to D-Ring	mm	710	710
Shoulder Belt Length as Measured on ATD	mm	835	829
Lap Belt Length as Measured on ATD	mm	845	850
Remainder of Belt on Reel	mm	1118	1162
Total Belt Length for Continuous Webbing Systems	mm	3508	3551

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	215	249
As determined electronically	mm	224.4	297.7

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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

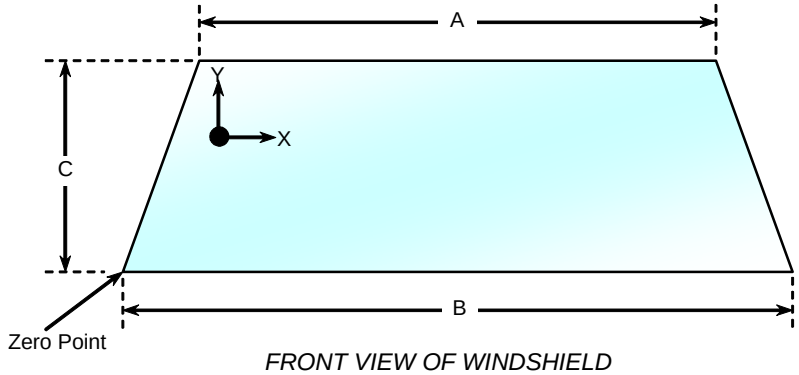
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with rubber cement type adhesive. Plastic and rubber molding covers the windshield periphery.

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: 17. 2 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2308	2308	100.0
Right Side	2308	2308	100.0
Total	4616	4616	100.0



FRONT VIEW OF WINDSHIELD

WINDSHIELD DIMENSIONS

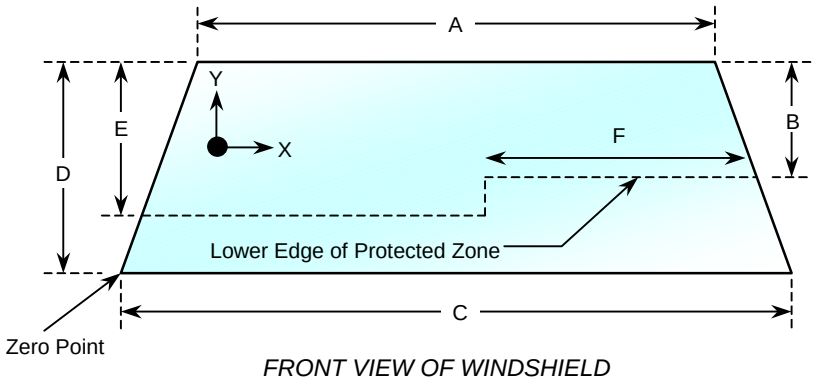
Item	Units	Segment Length	Molding Width
A	mm	1375	N/A
B	mm	1630	40
C-Left	mm	805	30
C-Right	mm	805	30

DATA SHEET NO. 10

WINDSHIELD ZONE INTRUSION FMVSS 219 DATA (PARTIAL)

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09



FRONT VIEW OF WINDSHIELD

WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	1375
B	mm	422
C	mm	1630
D	mm	805
E	mm	500
F	mm	480

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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

Test Time: 11:16 AM Temperature: 17.2 ° C

STODDARD SOLVENT SPILLAGE MEASUREMENTS

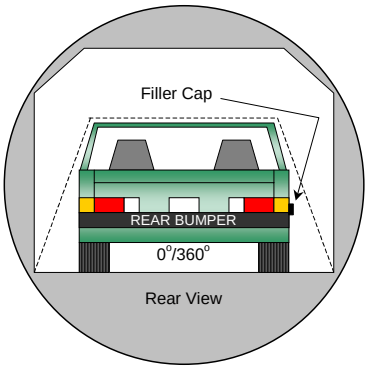
A.	From impact until vehicle motion ceases:	0
	(Maximum allowable = 1 ounce)	
B.	For the 5 minute period after motion ceases:	0
	(Maximum allowable = 5 ounces)	
C.	For the following 25 minutes:	0
	(Maximum allowable = 1 oz/minute)	
D.	Spillage Details:	No leakage occurred

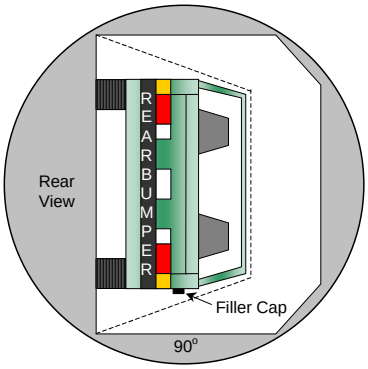
DATA SHEET NO. 12

FMVSS 301 STATIC ROLLOVER DATA

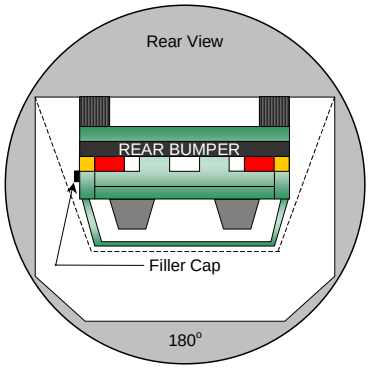
Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

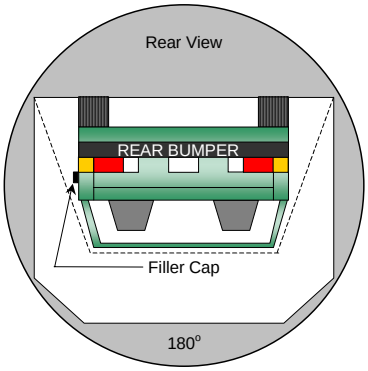




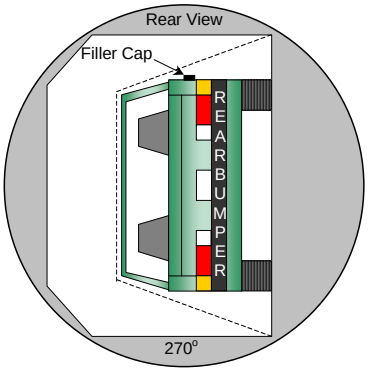
0° to 90°

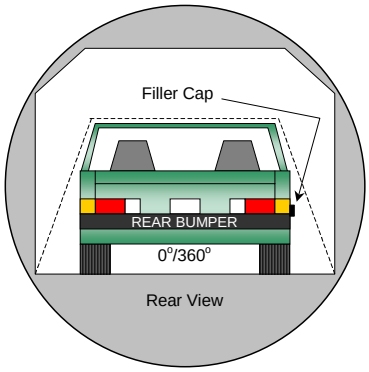


90° to 180°



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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	80	302	382
90° to 180°	87	303	390
180° to 270°	80	320	400
270° to 360°	80	300	380

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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

VEHICLE MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Length of test vehicle at centerline	mm	5821	5242	-579
2	RSOV to front of engine	mm	4981	4966	-15
3	RSOV to firewall centerline	mm	4641	4683	42
4	RSOV to upper leading edge of right door	mm	4261	4285	24
5	RSOV to upper leading edge of left door	mm	4263	4284	21
6	RSOV to lower leading edge of right door	mm	4186	4207	21
7	RSOV to lower leading edge of left door	mm	4190	4203	13
8	RSOV to upper trailing edge of right door	mm	3132	3156	24
9	RSOV to upper trailing edge of left door	mm	3142	3163	21
10	RSOV to lower trailing edge of right door	mm	3118	3133	15
11	RSOV to lower trailing edge of left door	mm	3120	3131	11
12	RSOV to bottom of right A-pillar	mm	4166	4193	27
13	RSOV to bottom of left A-pillar	mm	4166	4184	18
14	RSOV to firewall on right side	mm	4666	4698	32
15	RSOV to firewall on left side	mm	4666	4686	20
16	RSOV to steering column hub	mm	3735	3777	42
17	Center of steering column to left A-pillar, Y	mm	415	420	5
18	Center of steering column to headlining, Z	mm	465	440	-25
19	RSOV to right side of front bumper	mm	5266	4950	-316
20	RSOV to left side of front bumper	mm	5270	4956	-314
21	Length of engine block	mm	680	680	0
RD	RSOV to right side of dash panel	mm	3976	4000	24
CD	RSOV to center of dash panel	mm	3940	3980	40
LD	RSOV to left side of dash panel	mm	3980	3987	7

DATA SHEET NO. 13…(CONTINUED)

VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

VEHICLE STRUCTURAL MEASUREMENT TABLE

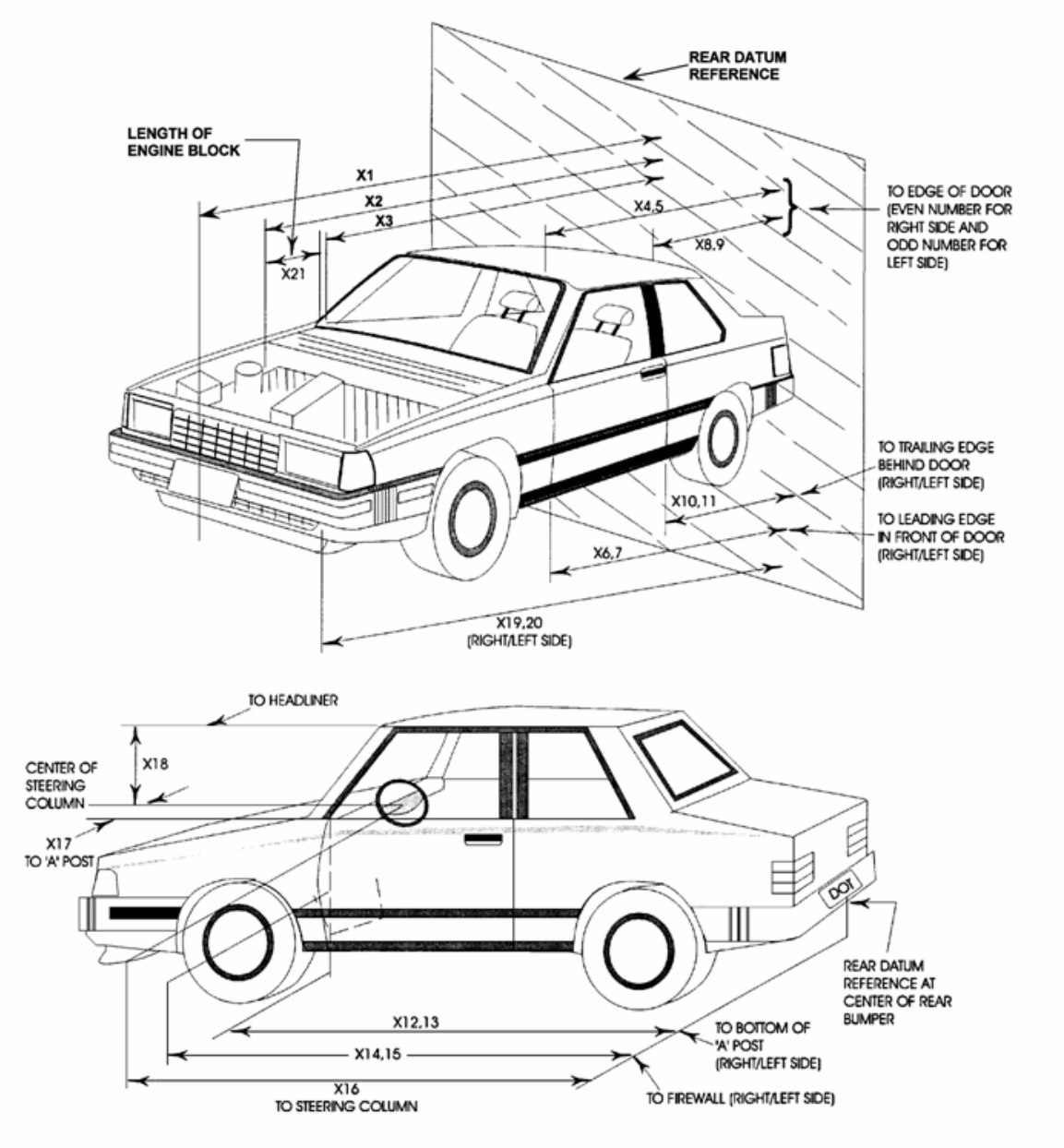
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length	mm	5821	5242	-579
2	Total width	mm	2013	2013	0
3	Front bumper top height	mm	655	687	32
4	Front bumper bottom height	mm	290	355	65
5	Longitudinal member top height	mm	642	675	33
6	Longtidunal member bottom height	mm	495	540	45
7	Distance between longitudinal members	mm	285	800	515
8	Longitudinal member width	mm	65	70	5
9	Engine top height	mm	1073	1107	34
10	Engine bottom height	mm	360	374	14
11	Engine and gearbox width	mm	660	660	0
12	Front bumper-engine distance	mm	903	298	-605
13	Front shock absorber height	mm	764	790	26
14	Front hood leading edge height	mm	1175	1220	45
15	Distance between front shock absorbers	mm	1060	950	-110
16	Front bumper-front axle distance	mm	1033	530	-503
17	Front axle to A-pillar distance	mm	623	585	-38
18	A Pillar to B Pillar distance	mm	976	976	0
19	B Pillar to rear axle distance	mm	1955	1965	10
20	B Pillar to C Pillar distance	mm	696	694	-2
21	Roof sill bottom height	mm	1773	1735	-38
22	Roof sill top height	mm	1871	1839	-32
23	Floor sill bottom height	mm	389	355	-34
24	Floor sill top height	mm	600	563	-37

DATA SHEET NO. 13…(CONTINUED)

VEHICLE MEASUREMENTS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09



DATA SHEET NO. 14

CAMERA LOCATIONS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

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	-2590	-7950	-1371	0	8105	20	1000
3	Closeup Left Side	-1701	-6197	-1701	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	-2336	7569	-1168	0	7409	20	1000
8	Closeup Right Side	-1600	6121	-1651	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	3200	-584	-1828	-5	927	12	1000
17	Passenger Side Dummy On-Board	3200	584	-1828	-5	939	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.

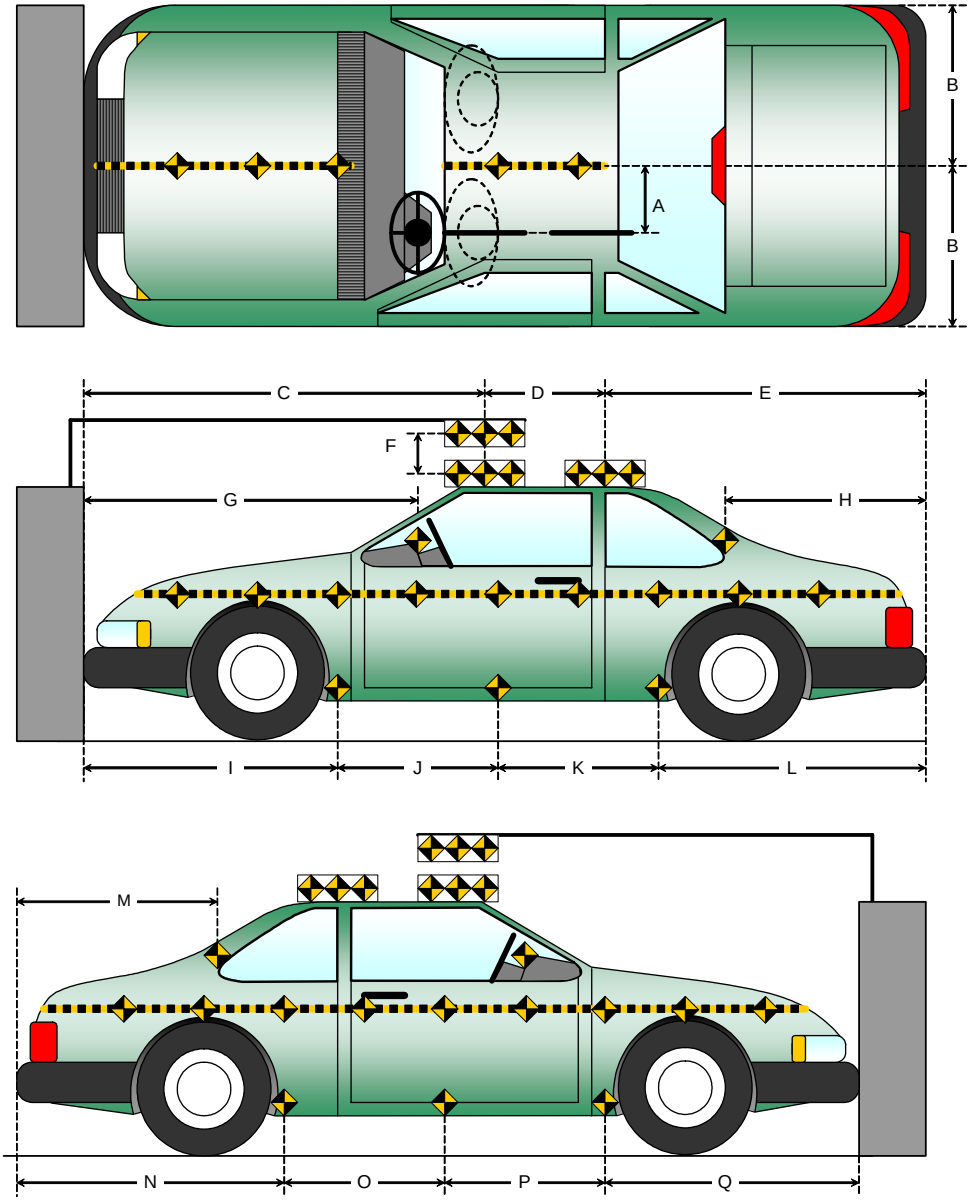
DATA SHEET NO. 15

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

All Dimensions in Millimeters (mm)	
Item	Value
A	495
B	1007
C	2380
D	615
E	2835
F	155
G	1860
H	2310
I	1585
J	1221
K	1221
L	1790
M	2310
N	1795
O	1218
P	1218
Q	1590



DATA SHEET NO. 16

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

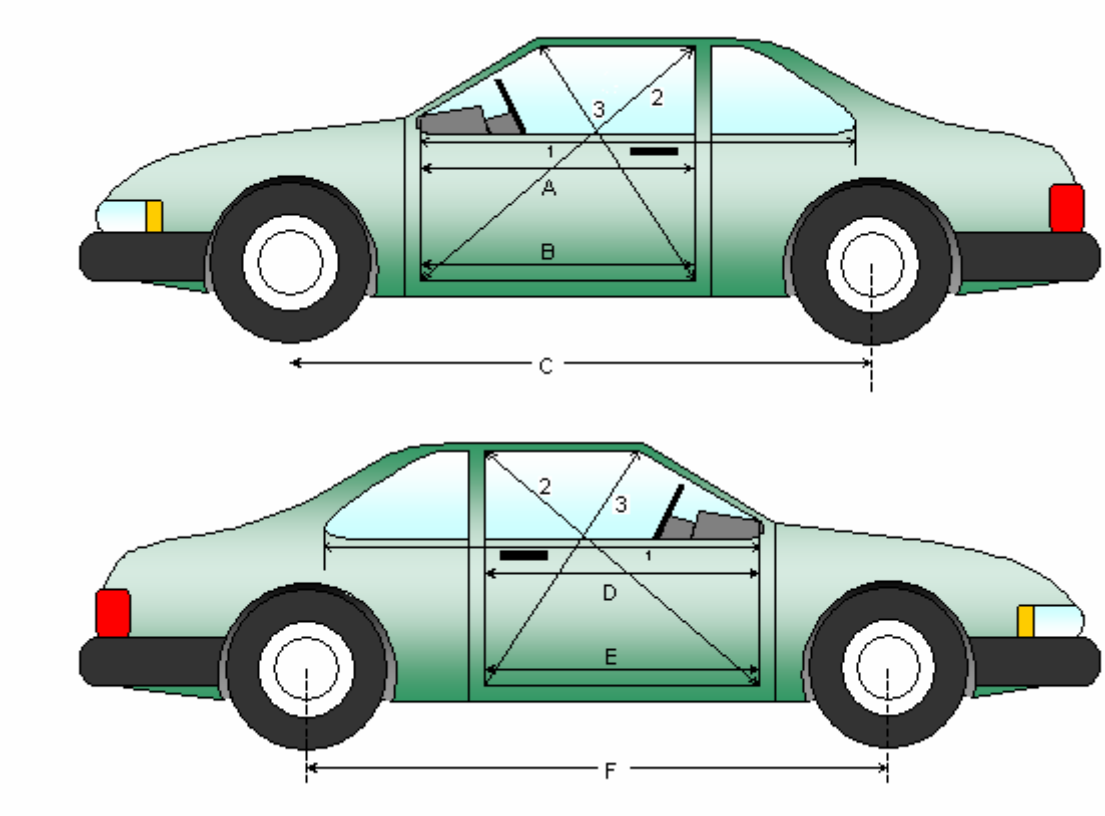
Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

DOOR OPENING WIDTH TABLE

Item	Description	Units	Pre-Test	Post-Test	Difference
1L	Left Side	mm	978	976	2
2L	Left Side (Diagonally)	mm	1593	1601	-8
3L	Left Side (Diagonally)	mm	1240	1241	-1
1R	Right Side	mm	978	976	2
2R	Right Side (Diagonally)	mm	1593	1599	-6
3R	Right Side (Diagonally)	mm	1223	1230	-7

WHEELBASE MEASURMENT TABLE

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3570	3550	20
F	Right Side Wheelbase	mm	3570	3527	43



DATA SHEET NO. 16…(CONTINUED)

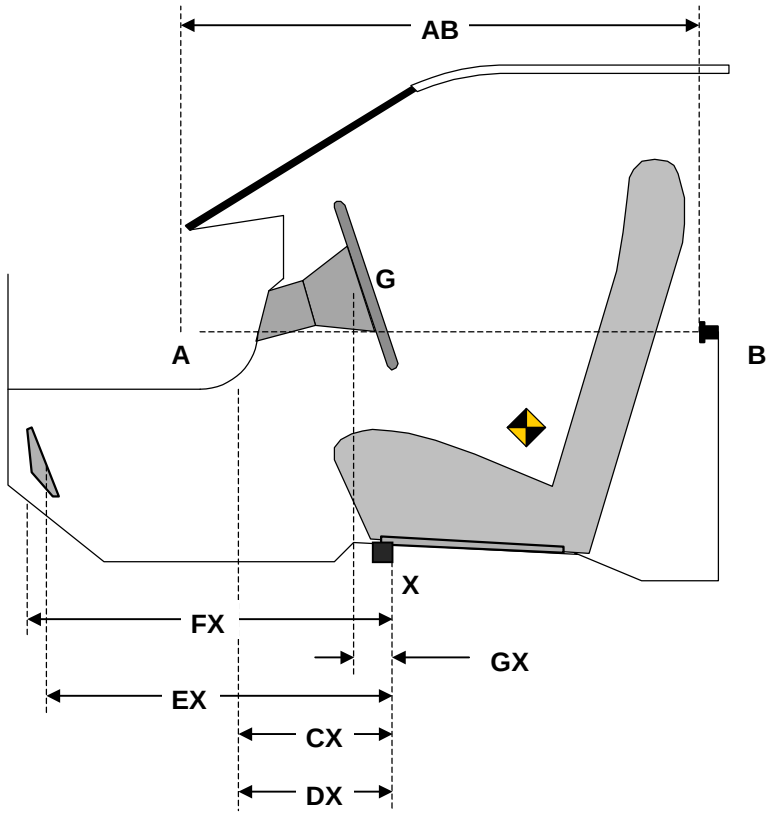
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

DRIVER COMPARTMENT INTRUSION TABLE

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Windown Jam)	mm	978	976	2
CX	Left Knee Bolster to X	mm	270	295	-25
DX	Right Knee Bolster to X	mm	255	274	-19
EX	Brake Pedal to X	mm	523	516	7
FX	Foot Rest to X	mm	595	561	34
GX	Center of Steering Wheel Hub to X	mm	110	115	-5

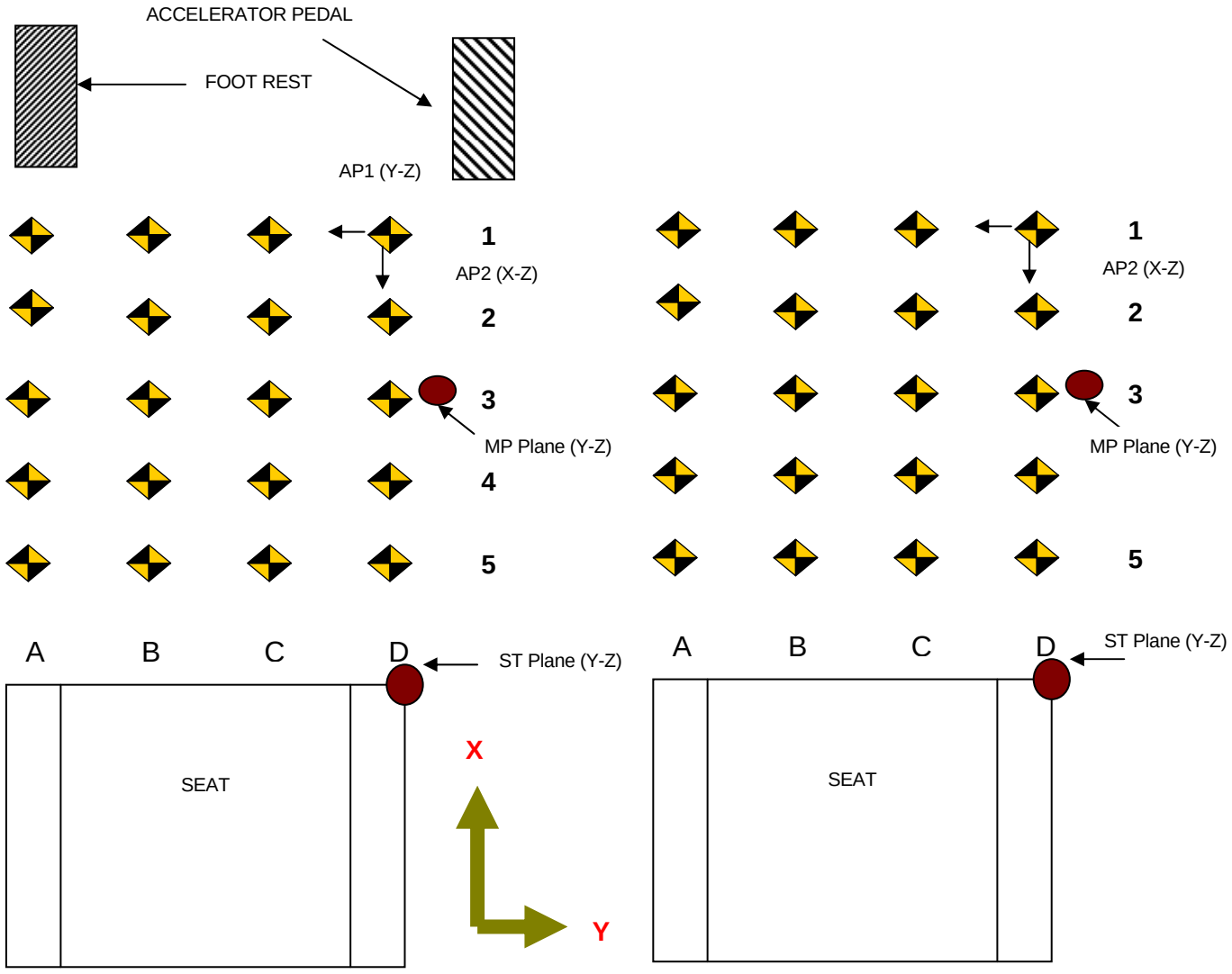


DATA SHEET NO. 16…(CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09



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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

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	-593	-595	-595	-597	-596	-597	-596	-597	3	2	1	0
2	-505	-503	-504	-503	-508	-506	-507	-505	3	3	3	2
3	-404	-407	-408	-411	-406	-410	-411	-414	2	3	3	3
4	-305	-307	-313	-320	-307	-309	-316	-324	2	2	3	4
5	-205	-208	-213	-221	-207	-210	-216	-225	2	2	3	4

DRIVER FLOORPAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	20	108	187	358	4	91	169	340	16	17	18	18
2	20	106	190	358	3	88	173	341	17	18	17	17
3	21	109	190	356	5	90	174	337	16	19	16	19
4	23	109	196	353	6	94	179	336	17	15	17	17
5	26	110	195	351	9	94	179	334	17	16	16	17

DRIVER FLOORPAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-25	-28	-28	-25	-9	-13	-11	-5	-16	-15	-17	-20
2	-73	-74	-72	-72	-58	-58	-58	-55	-15	-16	-14	-17
3	-99	-98	-96	-95	-83	-82	-82	-79	-16	-16	-14	-16
4	-97	-96	-95	-93	-81	-80	-79	-76	-16	-16	-16	-17
5	-89	-88	-87	-87	-73	-72	-72	-71	-16	-16	-15	-16

DATA SHEET NO. 16…(CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

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	557	606	602	596	543	597	596	593	14	9	6	3
2	468	515	510	406	457	507	505	504	11	8	5	2
3	313	407	408	308	383	402	404	404	8	5	4	2
4	215	311	309	206	306	306	304	306	7	5	5	2
5	215	211	208	206	207	205	205	203	8	6	3	3

PASSENGER FLOORPAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	292	164	75	-18	301	174	84	-9	-9	-10	-9	-9
2	302	167	76	-12	310	174	84	-5	-8	-7	-8	-7
3	322	169	81	-8	329	174	86	-3	-7	-5	-5	-5
4	334	168	84	-5	336	171	88	-2	-2	-3	-4	-3
5	334	170	84	-4	335	172	86	-2	-1	-2	-2	-2

PASSENGER FLOORPAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	97	-3	-3	-3	101	1	0	1	-4	-4	-3	-4
2	41	-54	-54	-54	41	-52	-53	-54	0	-2	-1	0
3	-22	-82	-82	-80	-26	-83	-82	-80	4	1	0	0
4	-78	-73	-80	-79	-84	-75	-81	-79	6	2	1	0
5	-74	-72	-72	-71	-81	-76	-74	-72	7	4	2	1

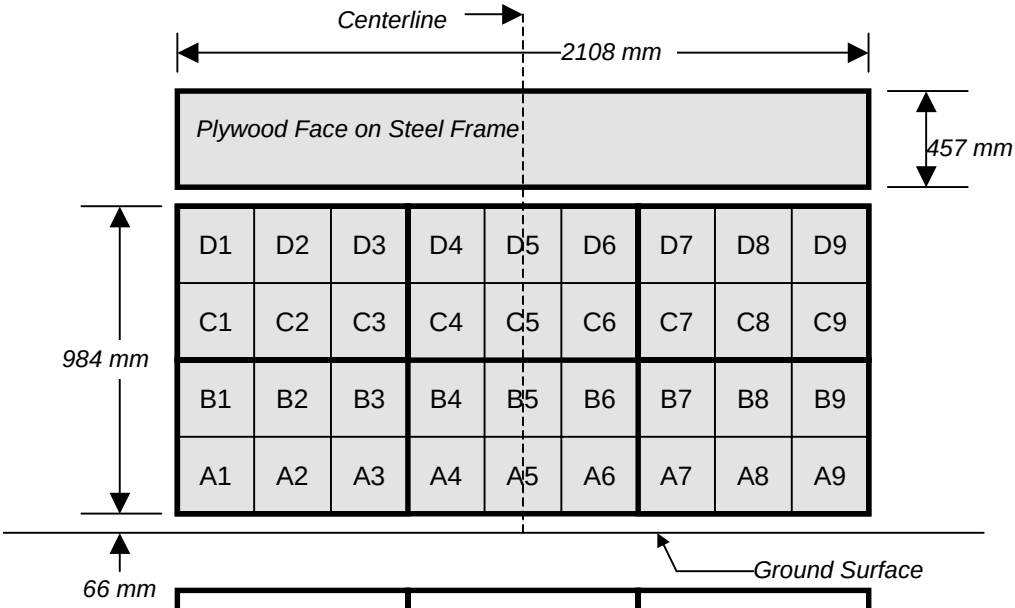
DATA SHEET NO. 17

FIXED BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

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 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09

VEHICLE INFORMATION

VIN: 1D3HV18P89S741288 Wheelbase (mm): 3570

Vehicle Size Category: 4-Door Truck Test Weight (kg): 2671

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): 56.36

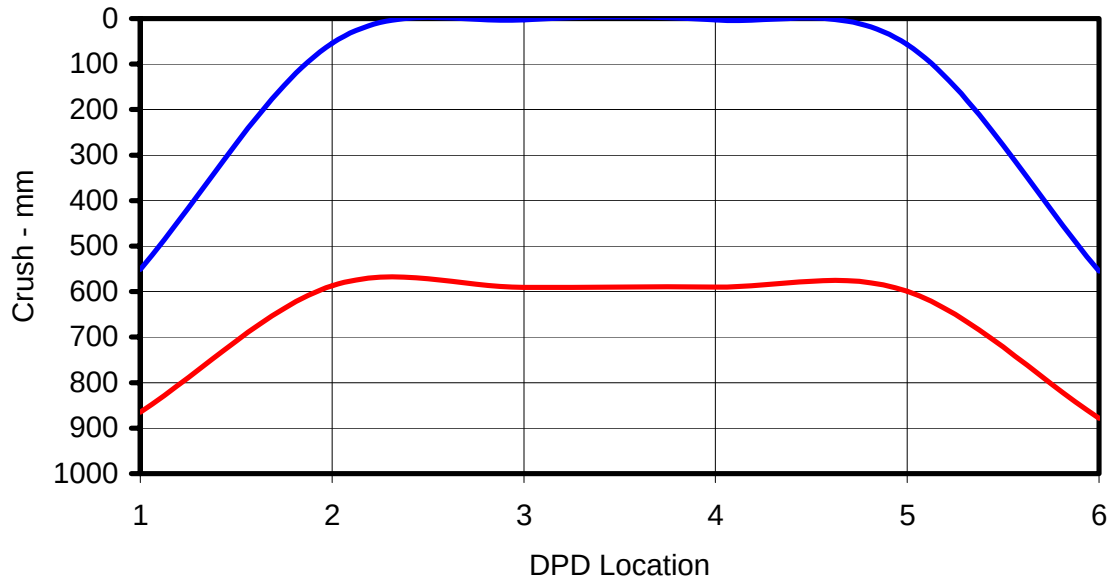
Velocity Change (km/h): 66.0 Time of Separation (msec): 67.9

CRUSH PROFILE

Collision Deformation Classification: 12FDEW3 Midpoint of Damage: Vehicle Centerline

Damage Region Length: 2013 Impact Mode: Full frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side of vehicle	mm	551	865	-314
C2	Crush zone 2 on left side of vehicle	mm	54	587	-533
C3	Crush zone 3 on left side of vehicle	mm	3	591	-588
C4	Crush zone 4 on right side of vehicle	mm	3	590	-587
C5	Crush zone 5 on right side of vehicle	mm	57	599	-542
C6	Crush zone 6 at right side of vehicle	mm	555	878	-323

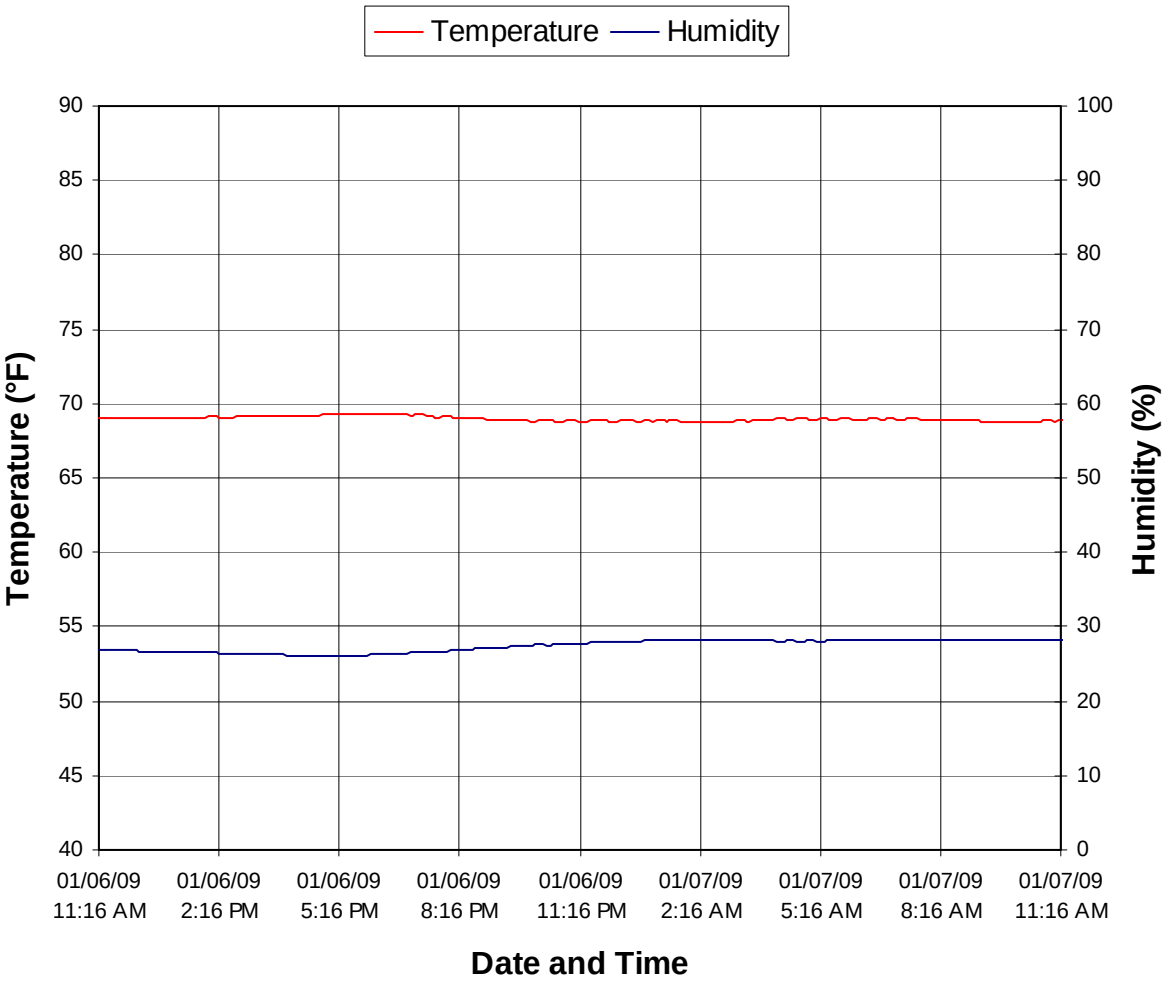


DATA SHEET NO. 19

DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck NHTSA No.: M90304

Test Program: NHTSA 35mph NCAP Test Date: 1/07/09



APPENDIX A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

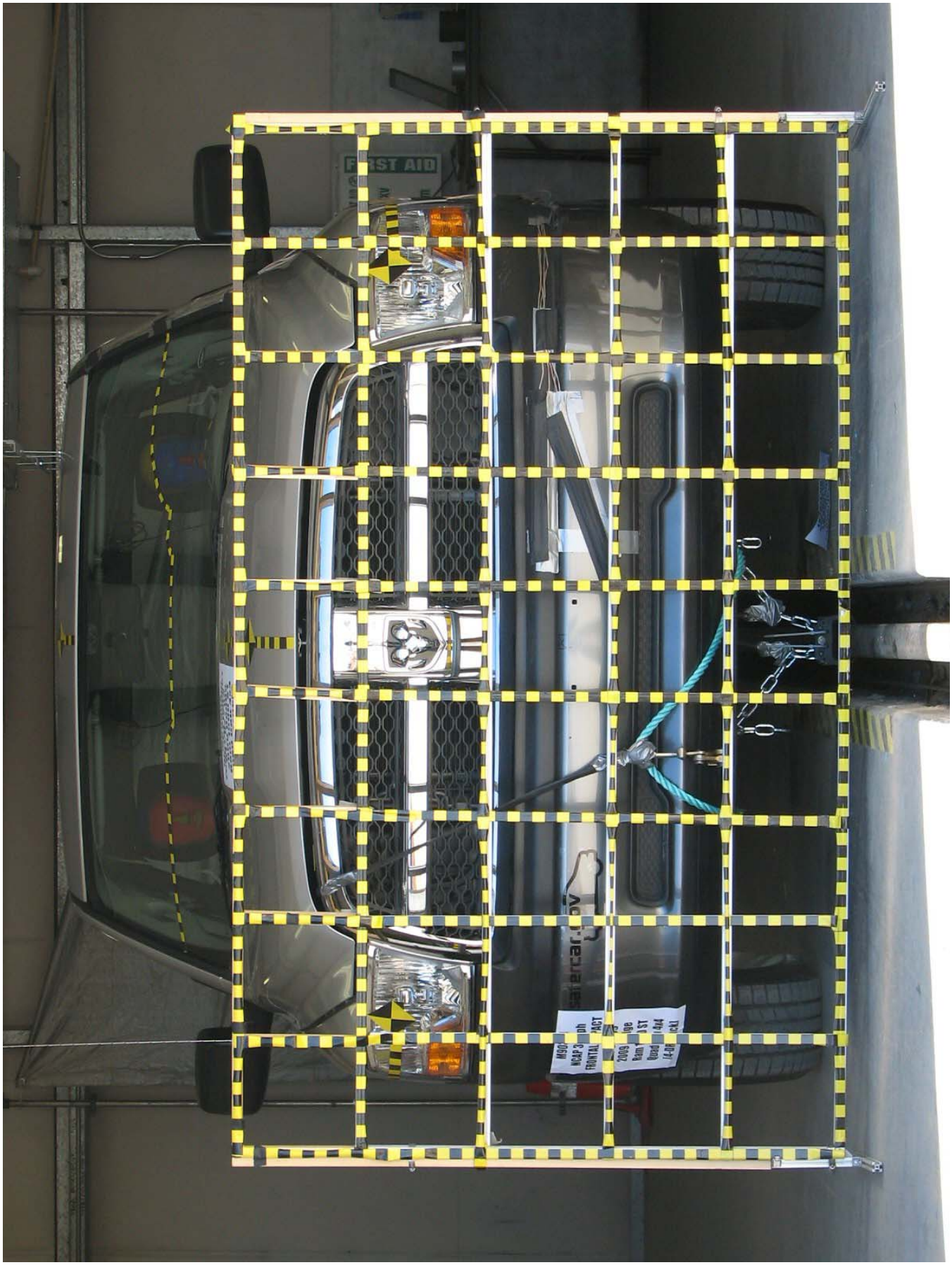


Figure A-1: Load Cell Location

Figure A-2: Manufacturer's Label

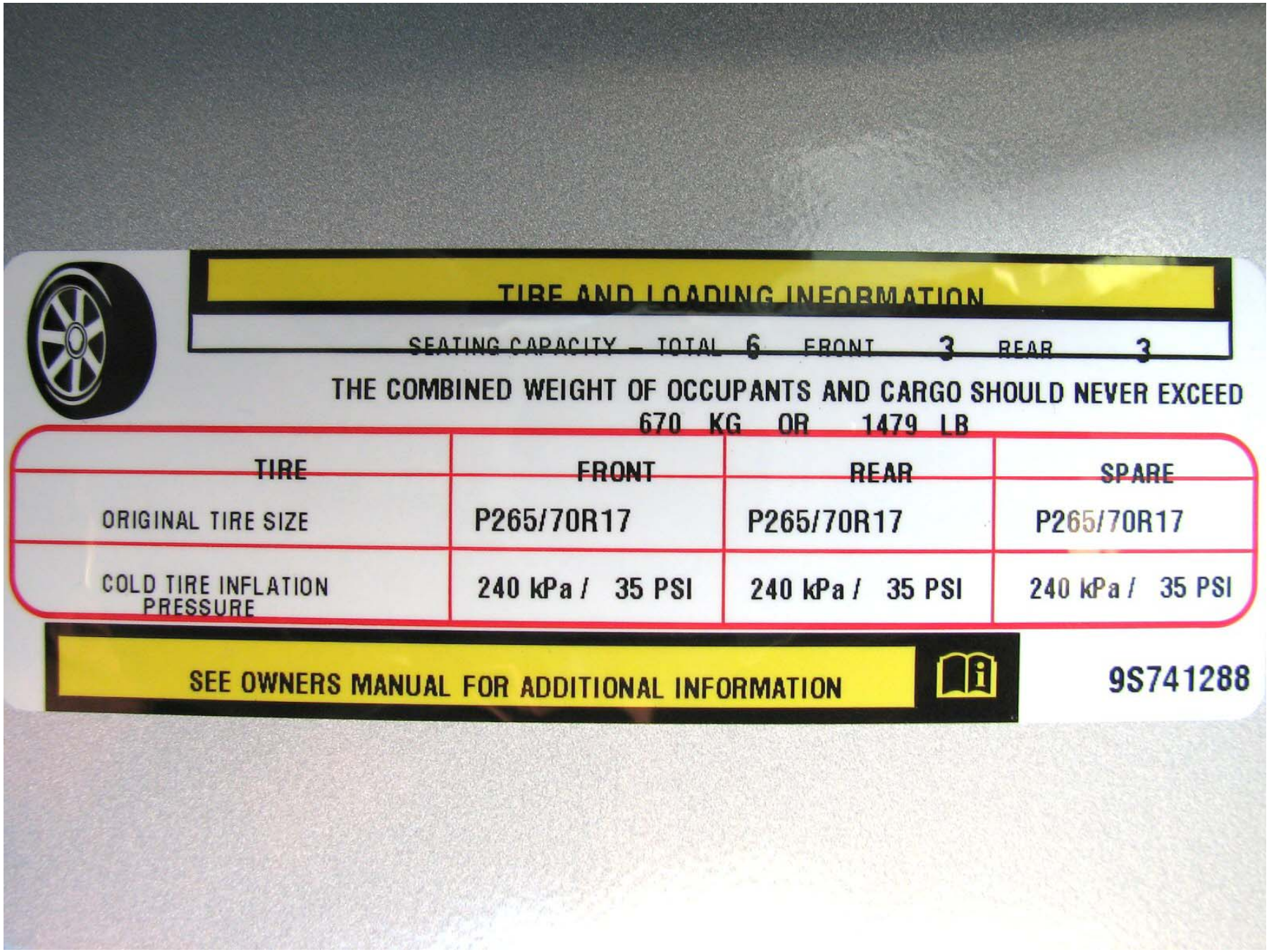


Figure A-3: Tire Placard

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

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

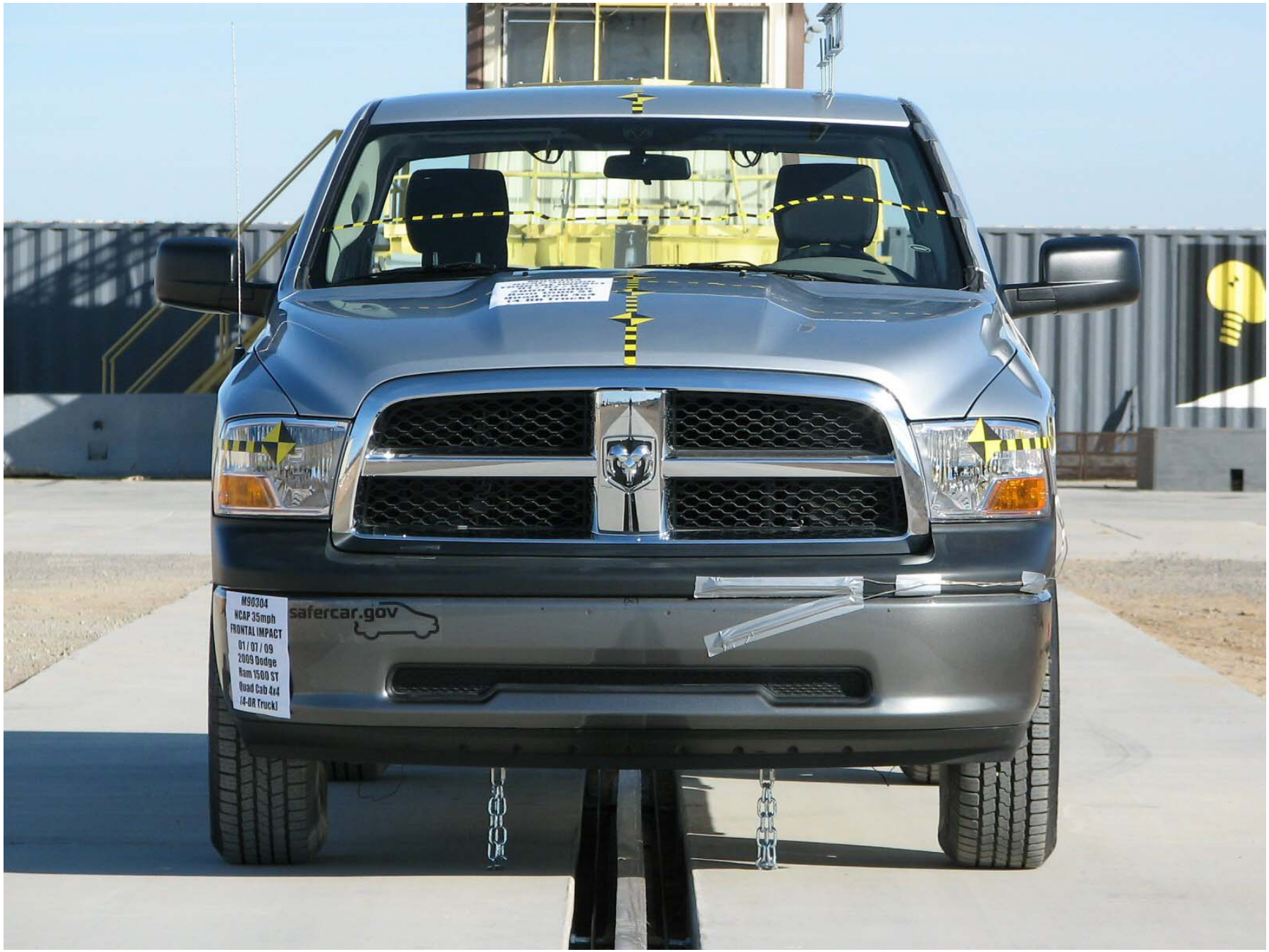


Figure A-6: Pre-Test Front View

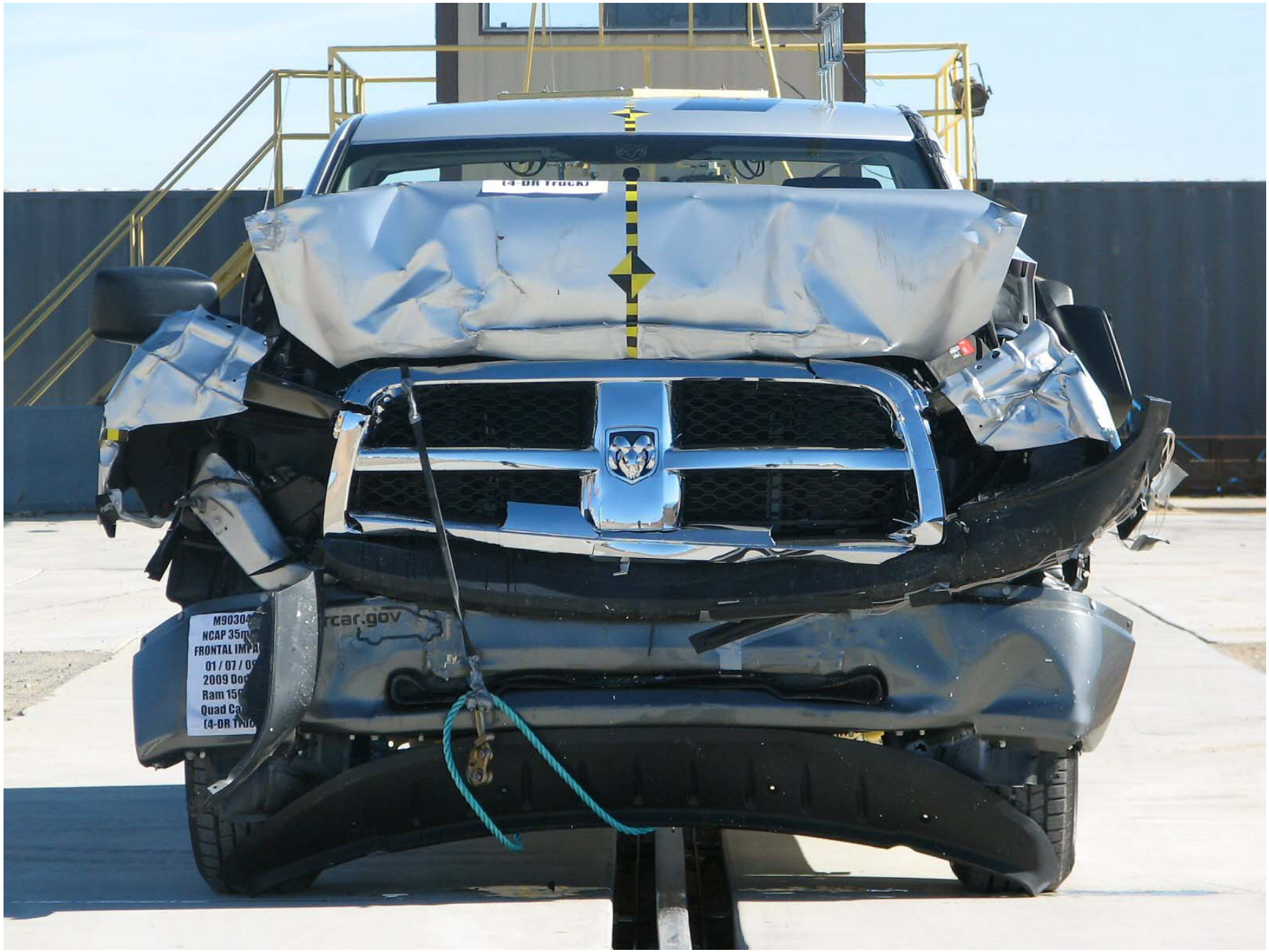


Figure A-7: Post-Test Front View (Vehicle Moved)

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

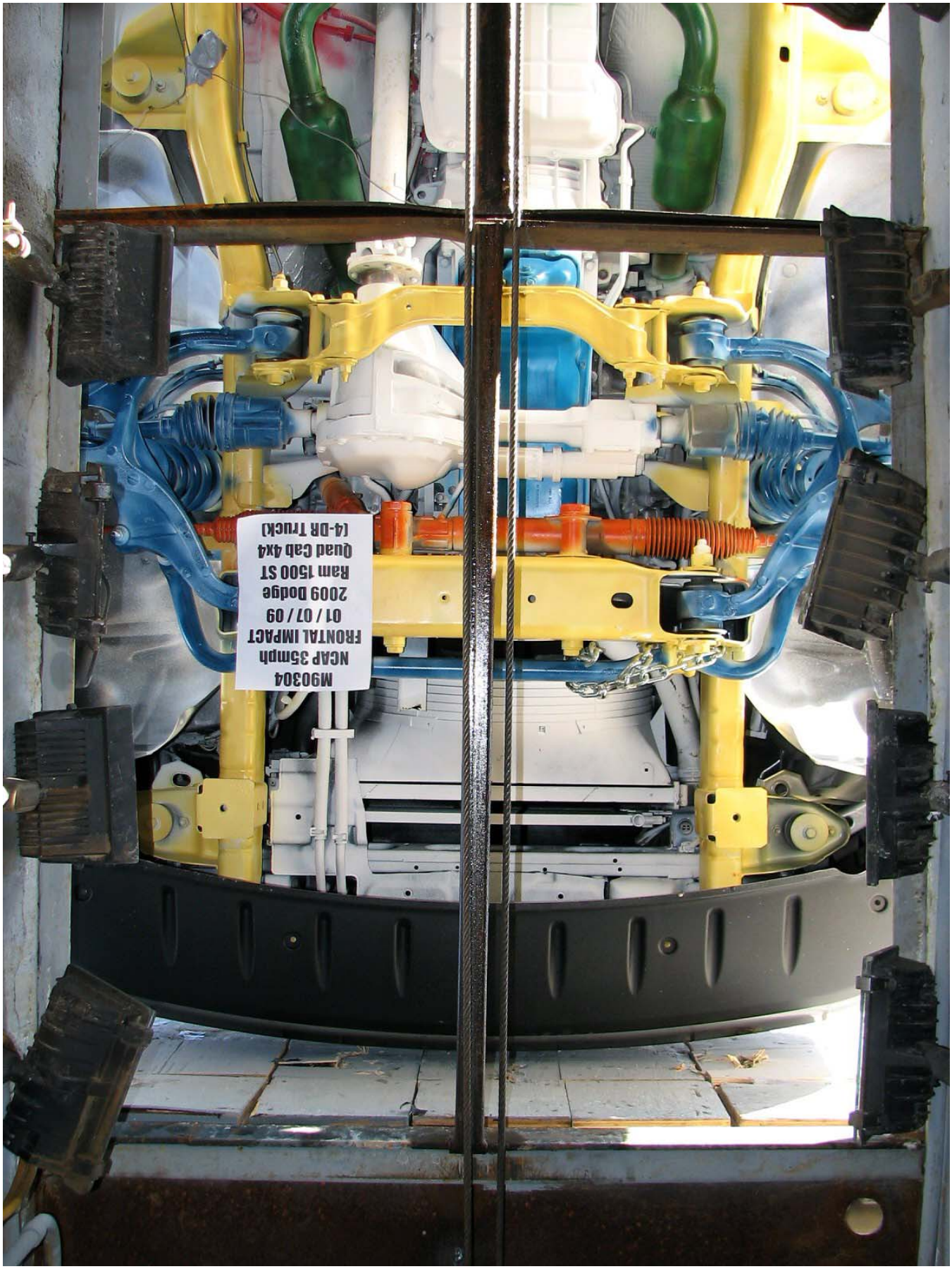


Figure A-24: Pre-Test Front Underbody

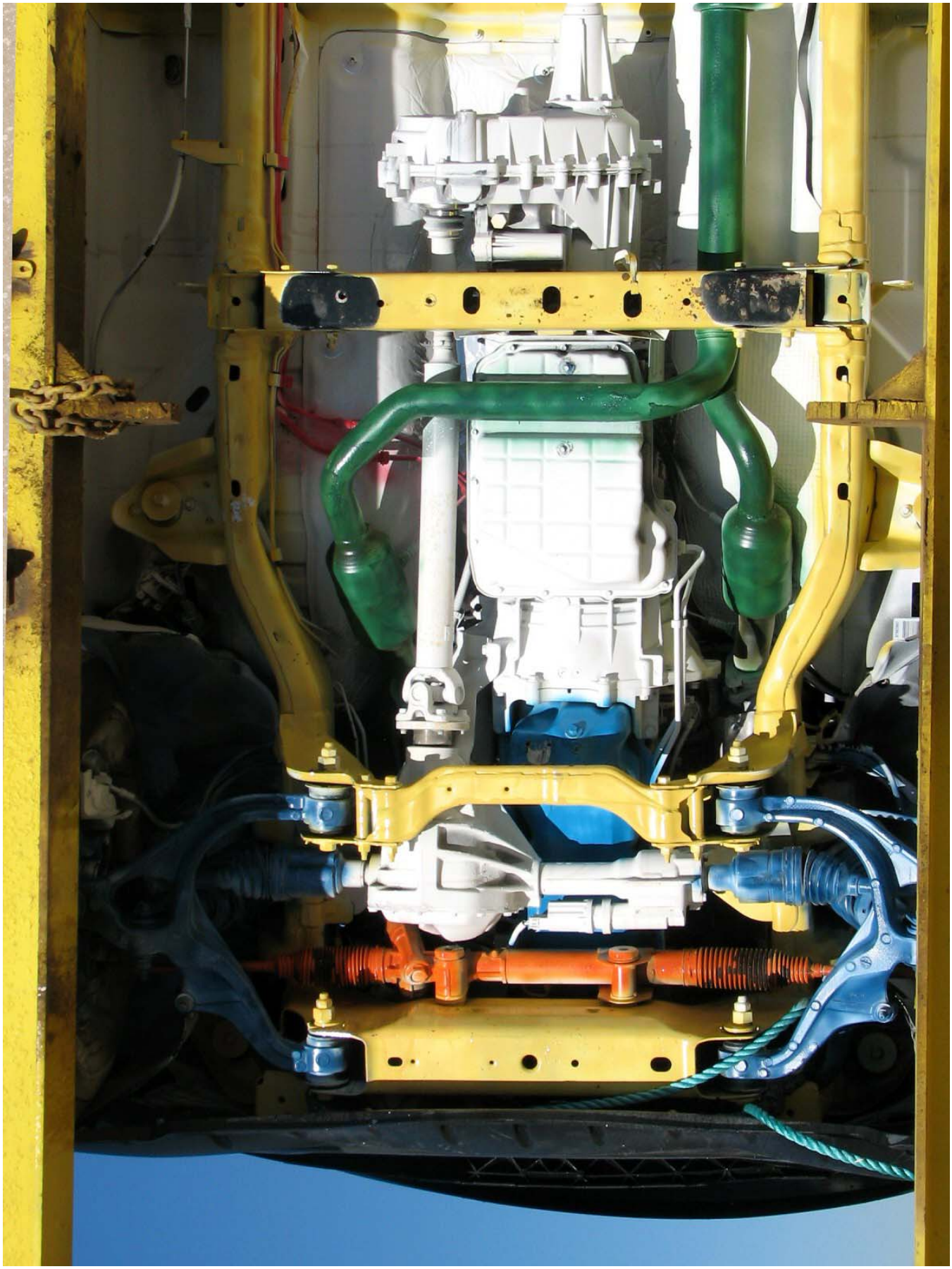


Figure A-25: Post-Test Front Underbody

Figure A-26: Pre-Test Mid Underbody

Figure A-27: Post-Test Mid Underbody

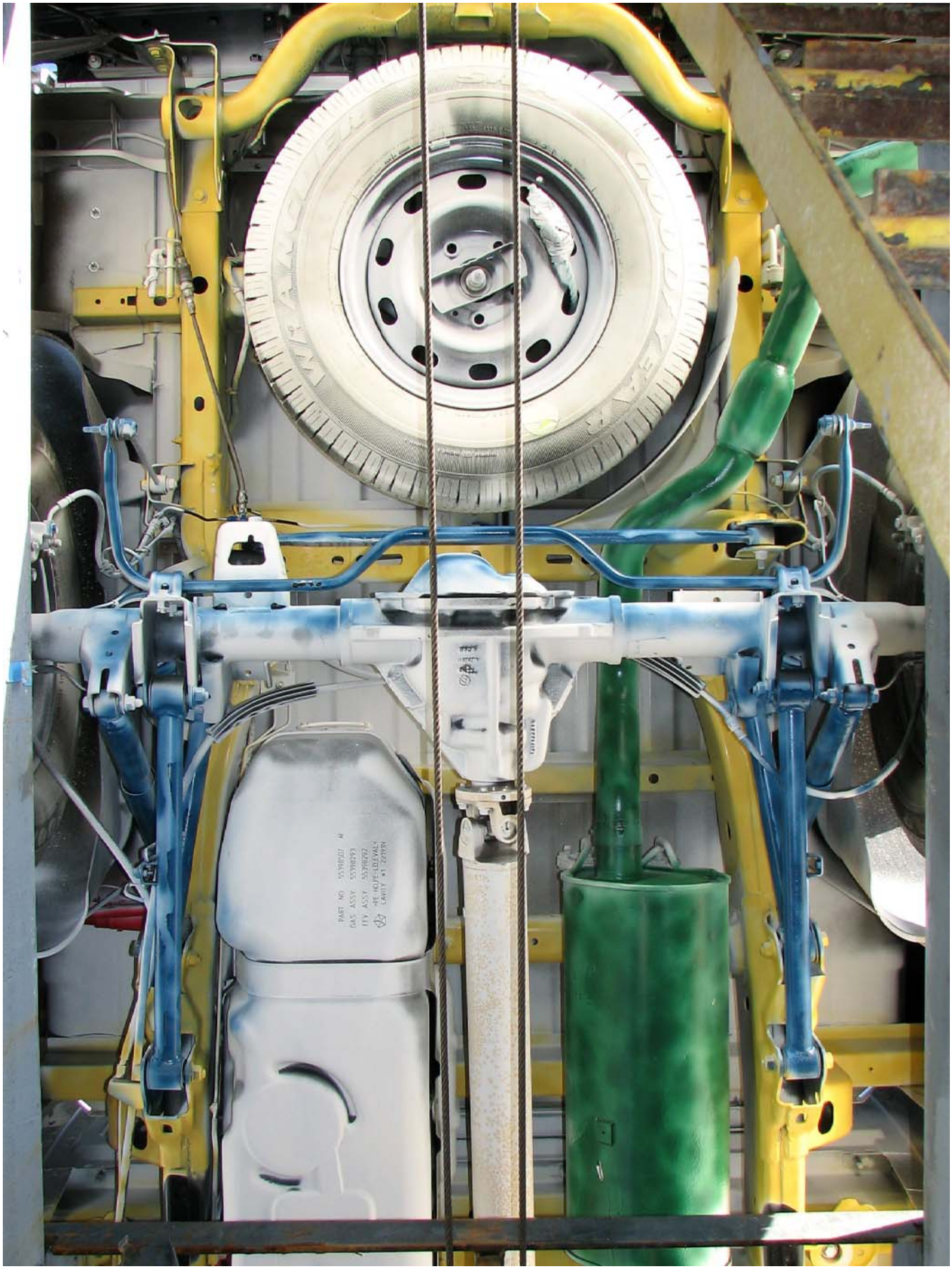


Figure A-28: Pre-Test Rear Underbody

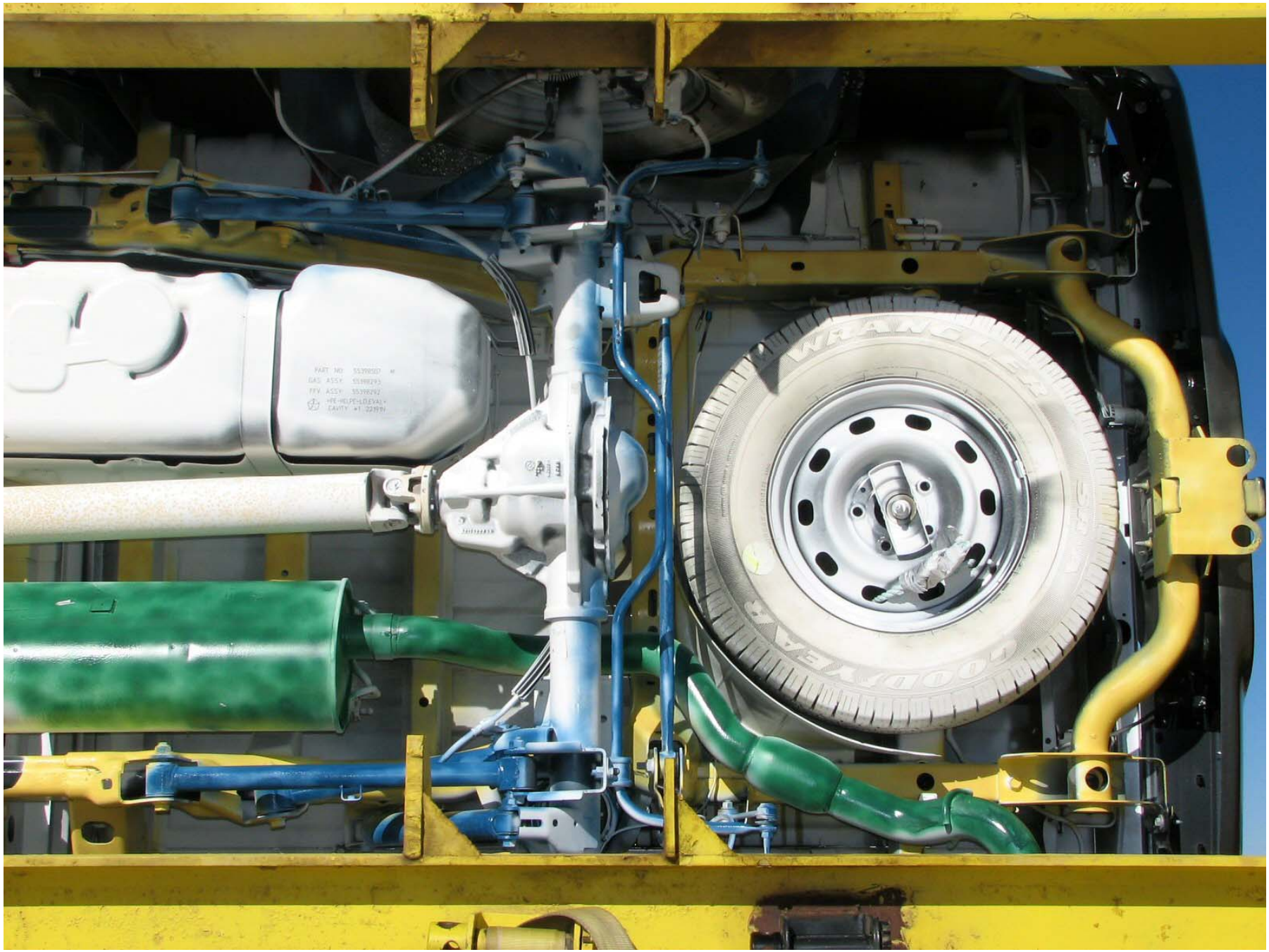


Figure A-29: Post-Test Rear Underbody

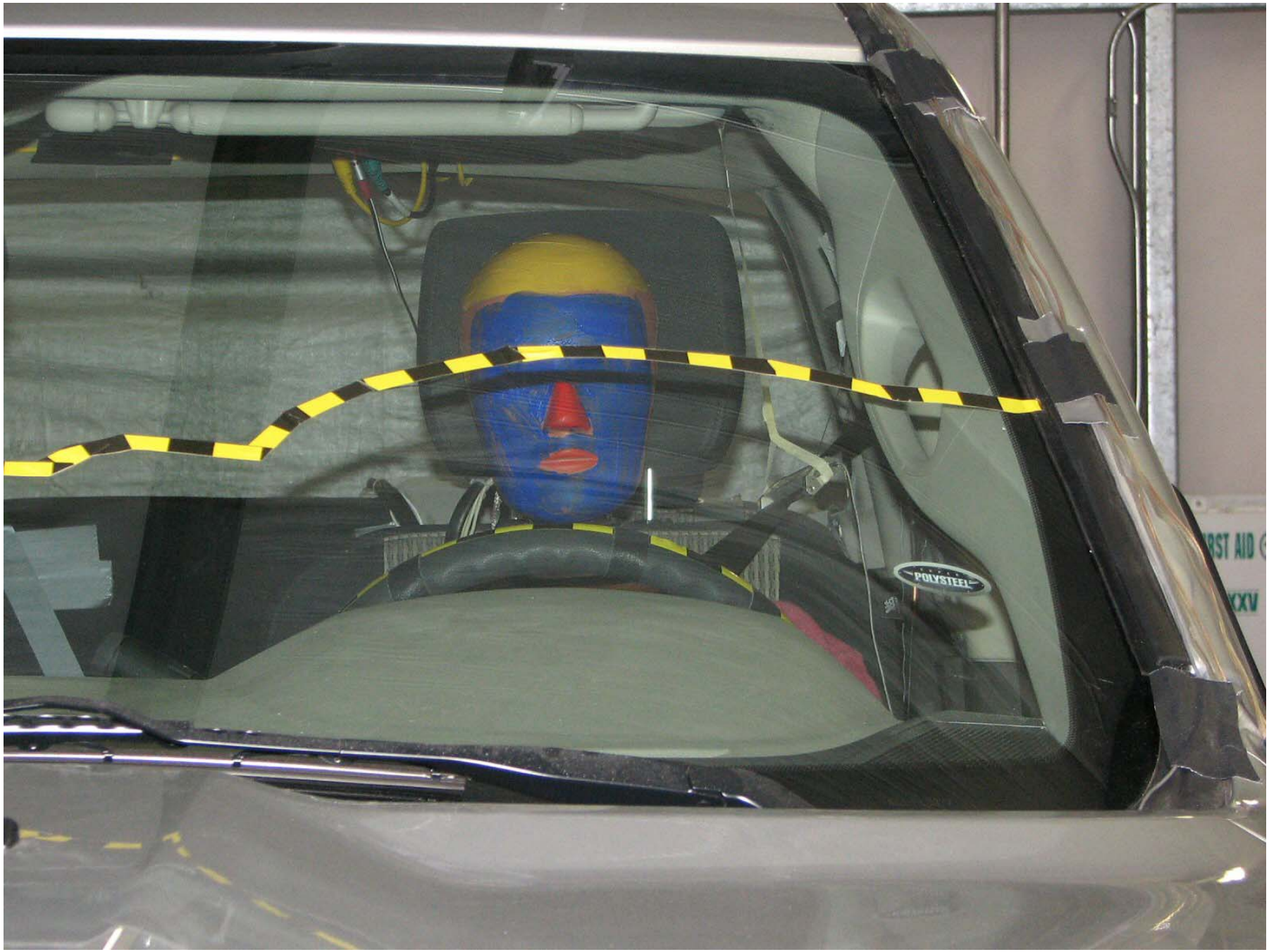


Figure A-30: Pre-Test Driver Dummy Front View (Head Position)

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

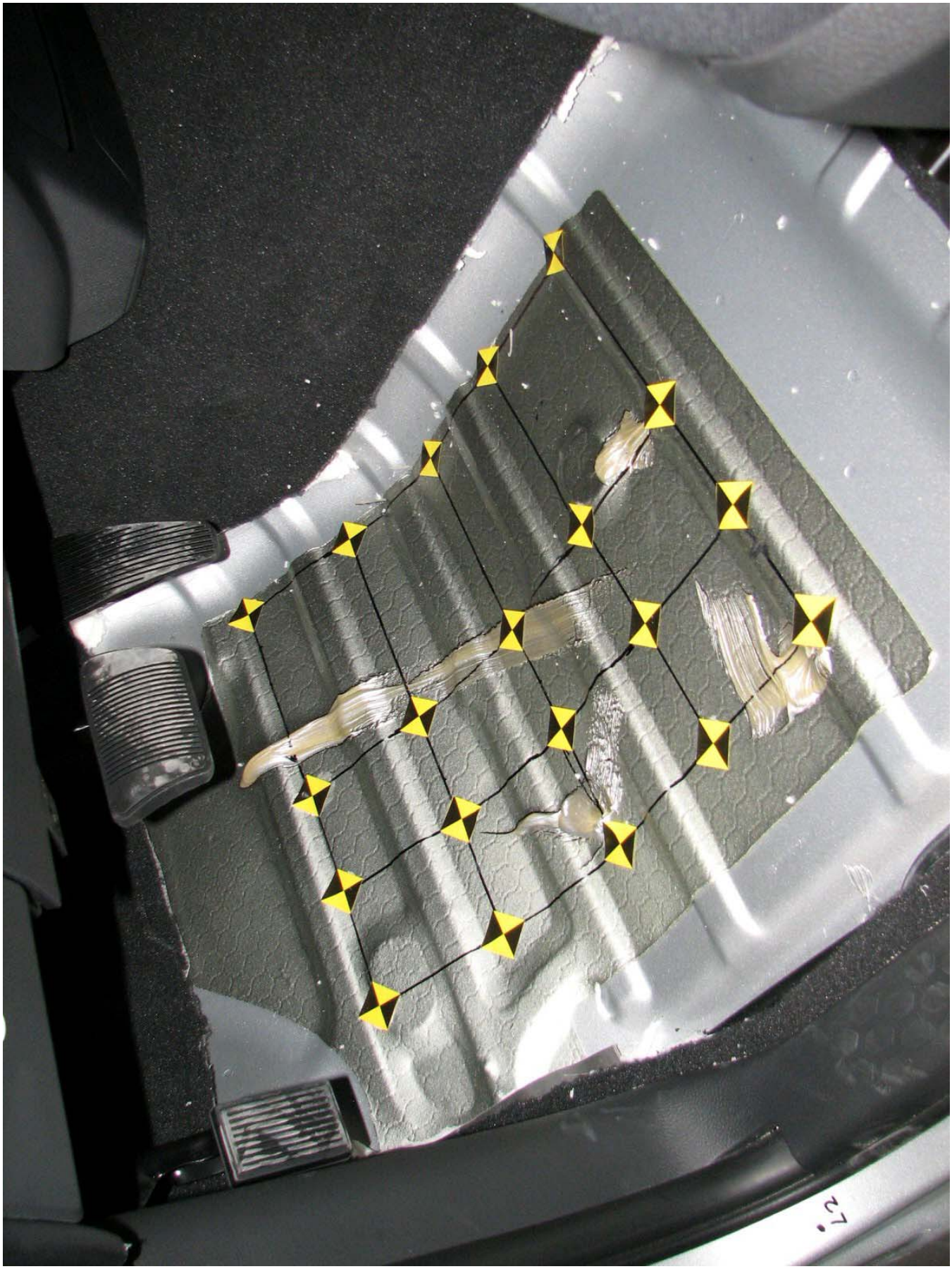


Figure A-40: Pre-Test Driver Side Floor Pan

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°)

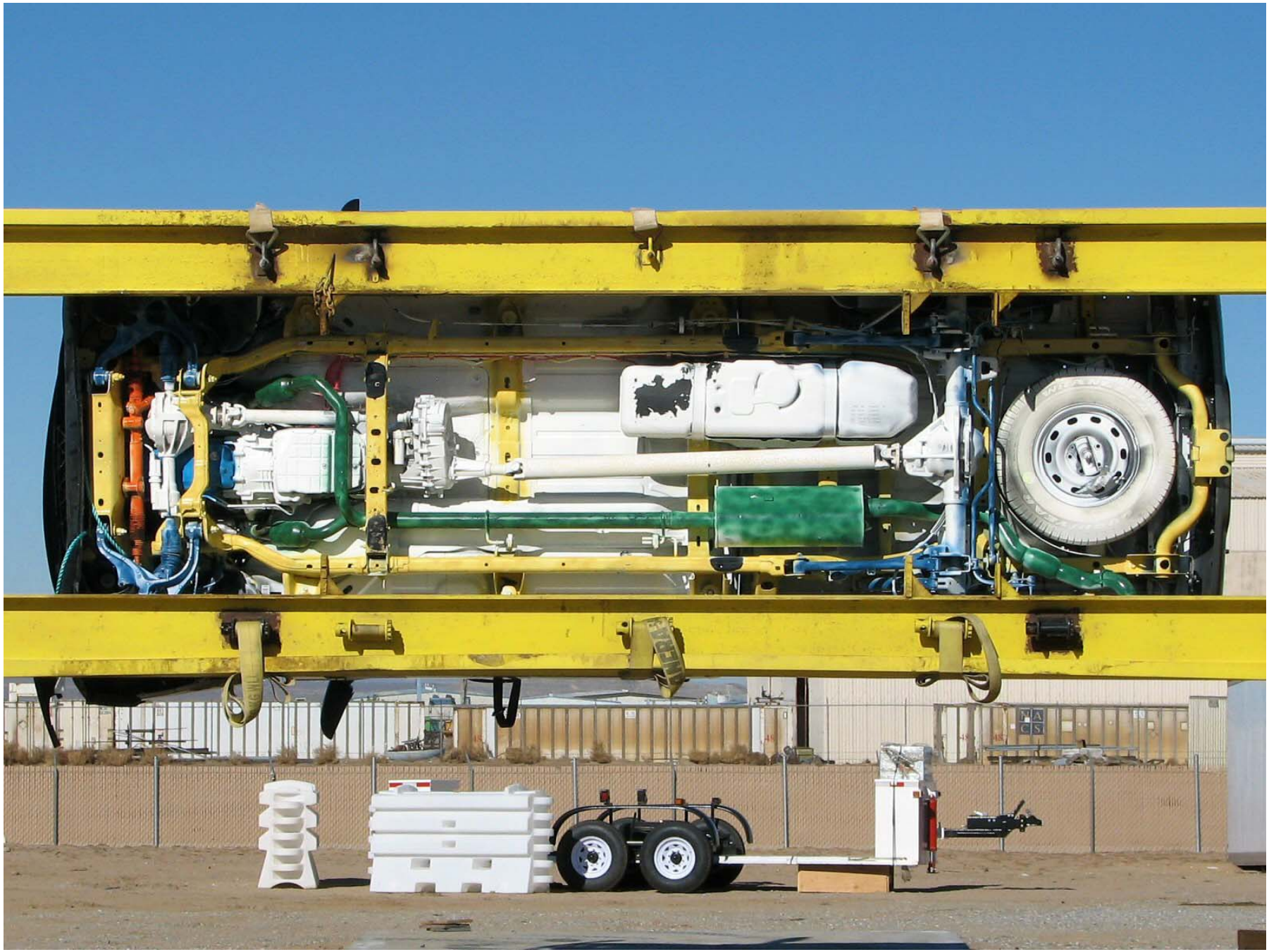


Figure A-61: Vehicle on Rollover Device (270°)

Figure A-62: Vehicle on Rollover Device (360°)

Figure A-63: Timers

Figure A-64: Vehicle Impact

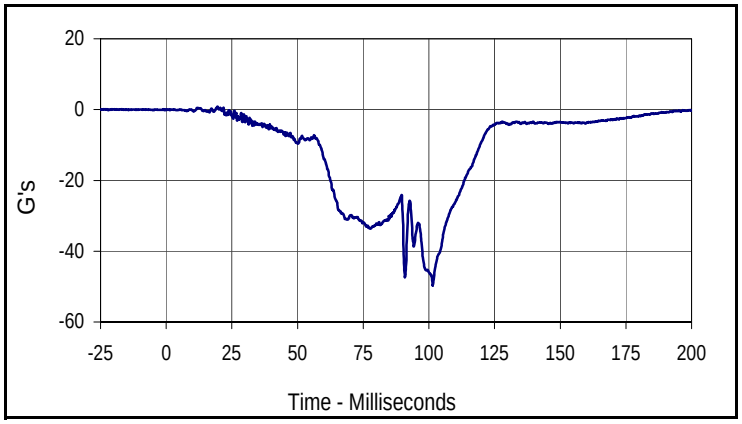
APPENDIX B
DATA PLOTS

LIST OF DATA PLOTS

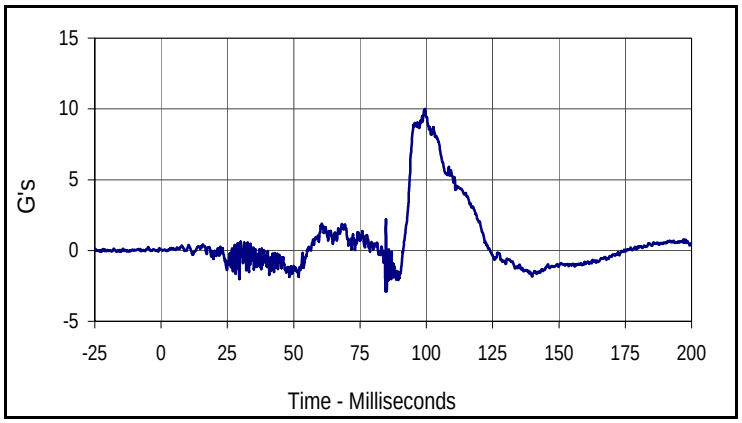
The following additional data plots for this test can be obtained from the research and development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov.

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

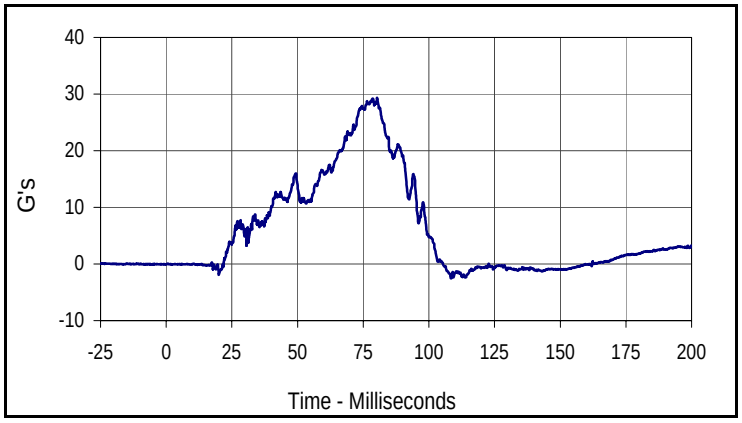
Test Vehicle:	2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck	Test Date:	01/07/09
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	M90304



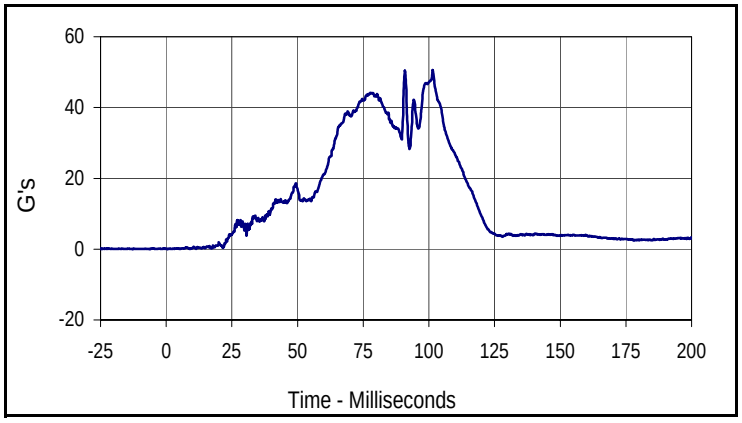
Curve Description			
Driver Head Primary X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
0.9	19.5	-49.7	101.5



Curve Description			
Driver Head Primary Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
10.0	99.5	-2.9	84.5

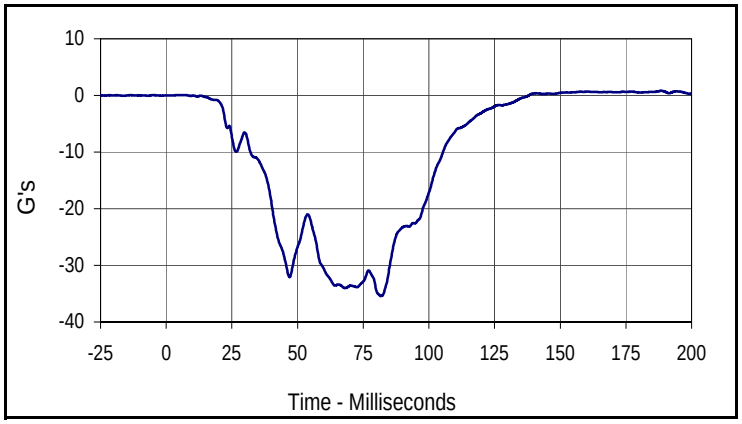


Curve Description			
Driver Head Primary Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
29.3	80.3	-2.6	108.5

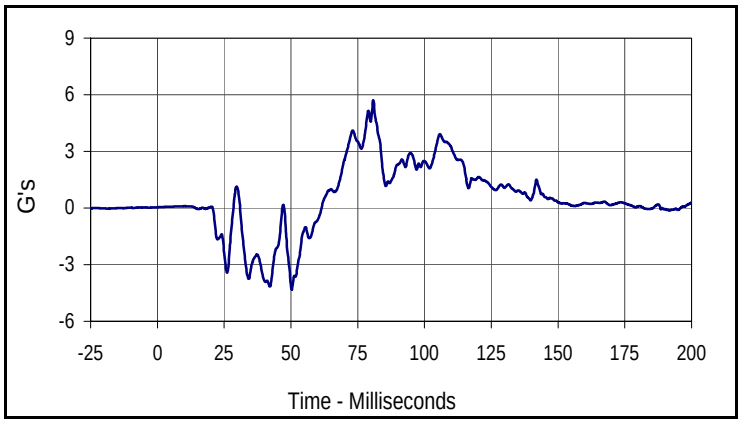


Curve Description			
Driver Head Resultant Primary			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
50.6	101.5	0.0	0.3

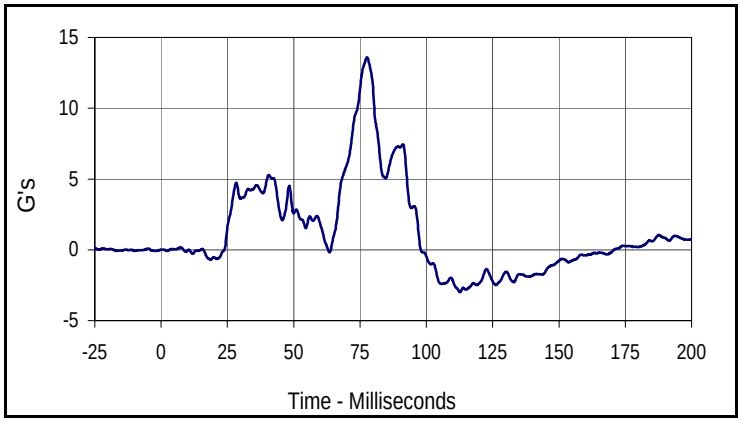
Test Vehicle:	2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck	Test Date:	01/07/09
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	M90304



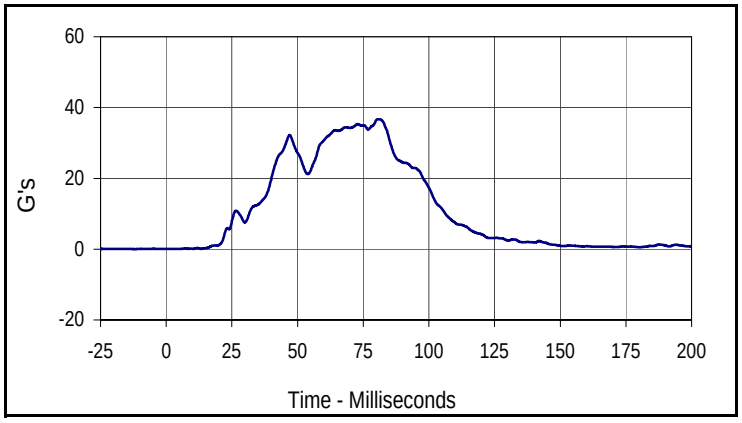
Curve Description			
Driver Chest Primary X			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
0.8	188.4	-35.4	81.6



Curve Description			
Driver Chest Primary Y			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
5.7	80.8	-4.3	50.3

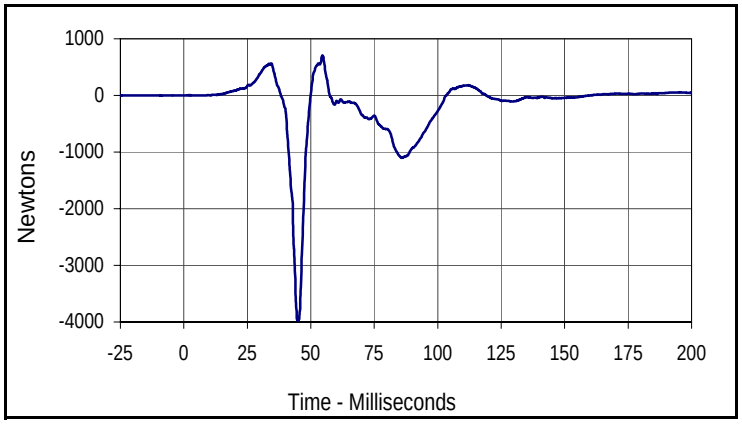


Curve Description			
Driver Chest Primary Z			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
13.6	77.6	-3.0	112.7

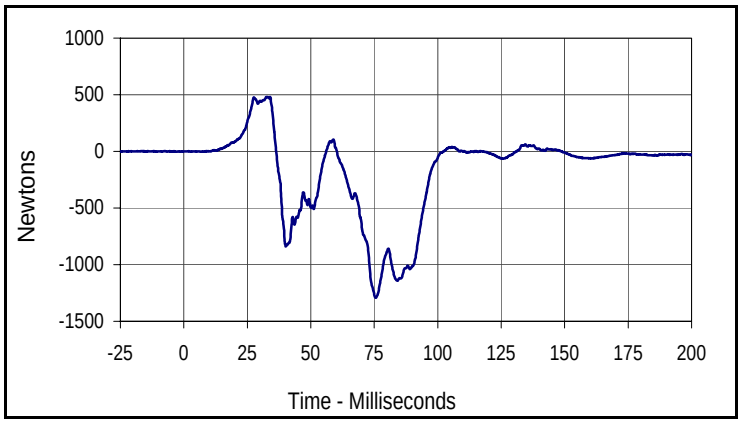


Curve Description			
Driver Chest Resultant Primary			
CURNO	Type	SAE Class	Units
004	RES	180	G's
Max	Time	Min	Time
36.7	81.4	0.0	0.0

Test Vehicle:	2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck	Test Date:	01/07/09
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	M90304

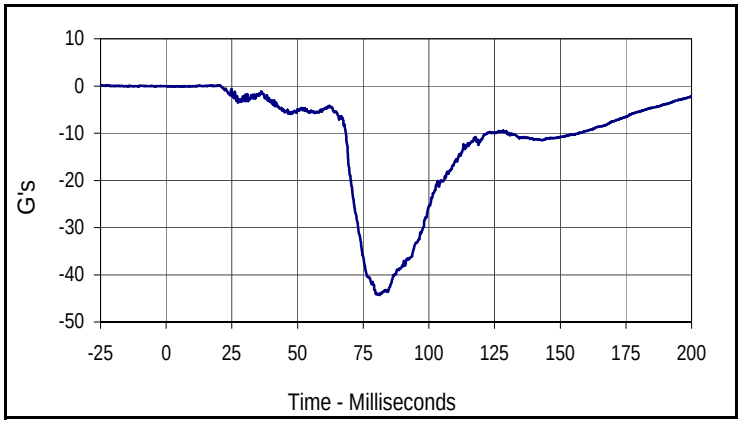


Curve Description			
Driver Left Femur Force Z			
CURNO	Type	SAE Class	Units
007	FIL	600	Newtons
Max	Time	Min	Time
707.7	54.6	-3974.0	45.0

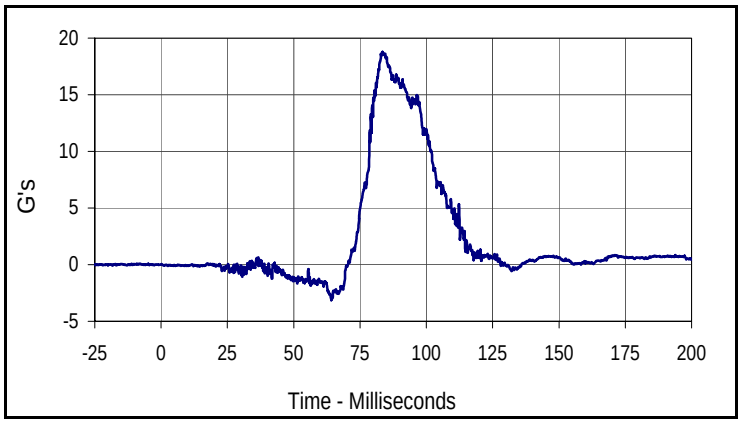


Curve Description			
Driver Right Femur Force Z			
CURNO	Type	SAE Class	Units
008	FIL	600	Newtons
Max	Time	Min	Time
481.2	32.6	-1292.0	75.5

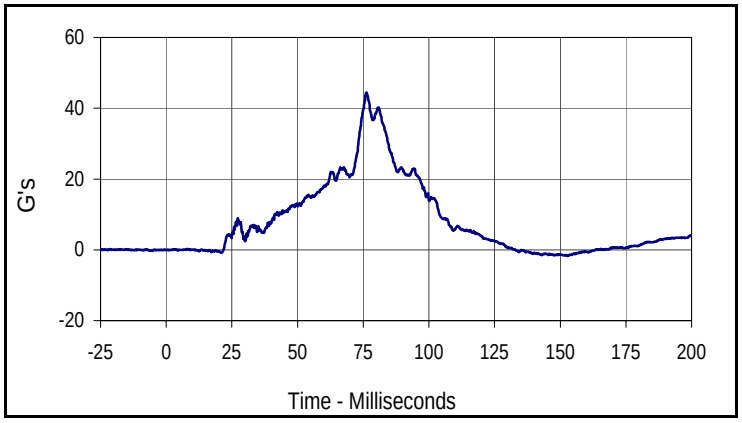
Test Vehicle:	2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck	Test Date:	01/07/09
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	M90304



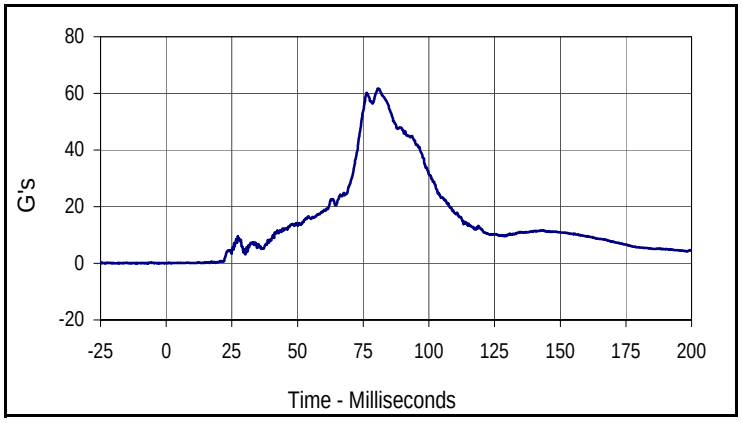
Curve Description			
Passenger Head Primary X			
CURNO	Type	SAE Class	Units
009	FIL	1000	G's
Max	Time	Min	Time
0.2	20.1	-44.3	81.3



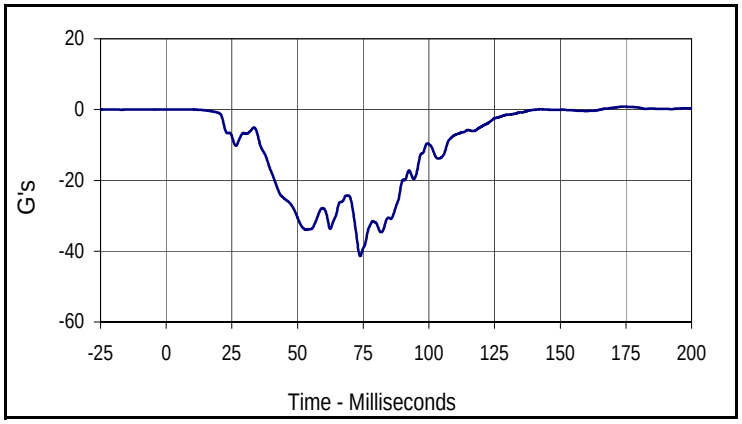
Curve Description			
Passenger Head Primary Y			
CURNO	Type	SAE Class	Units
010	FIL	1000	G's
Max	Time	Min	Time
18.8	83.5	-3.1	64.1



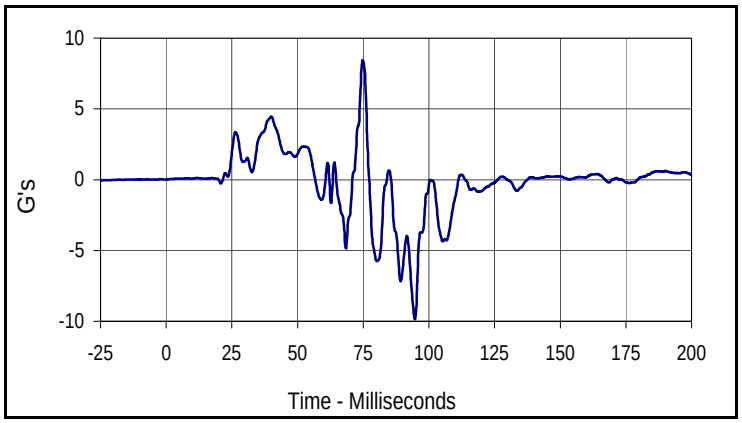
Curve Description			
Passenger Head Primary Z			
CURNO	Type	SAE Class	Units
011	FIL	1000	G's
Max	Time	Min	Time
44.5	76.2	-1.7	152.7



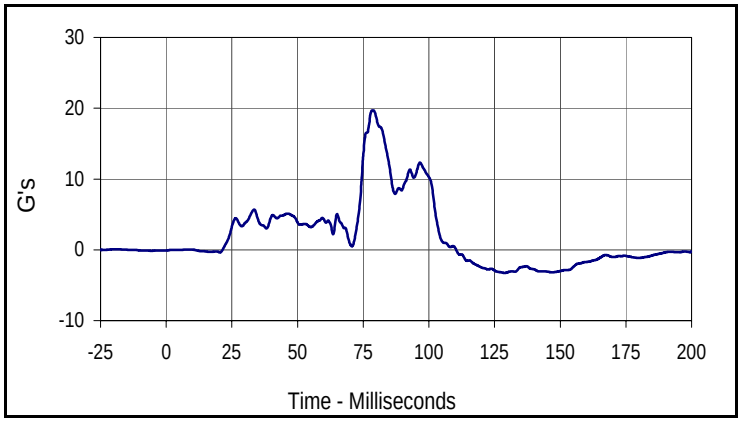
Curve Description			
Passenger Head Resultant Primary			
CURNO	Type	SAE Class	Units
009	RES	1000	G's
Max	Time	Min	Time
61.7	80.6	0.0	0.7



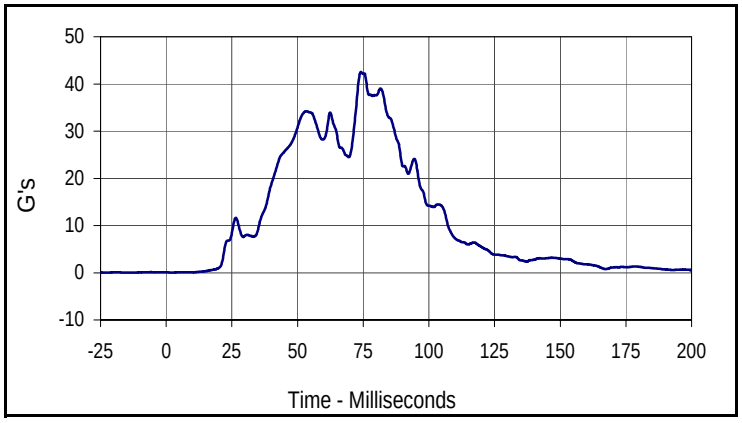
Curve Description			
Passenger Chest Primary X			
CURNO	Type	SAE Class	Units
012	FIL	180	G's
Max	Time	Min	Time
0.9	173.8	-41.4	73.9



Curve Description			
Passenger Chest Primary Y			
CURNO	Type	SAE Class	Units
013	FIL	180	G's
Max	Time	Min	Time
8.5	74.8	-9.9	94.7

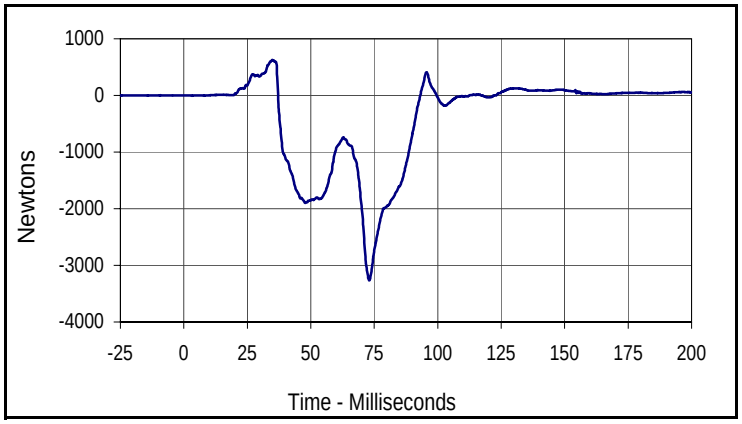


Curve Description			
Passenger Chest Primary Z			
CURNO	Type	SAE Class	Units
014	FIL	180	G's
Max	Time	Min	Time
19.7	78.5	-3.3	128.7

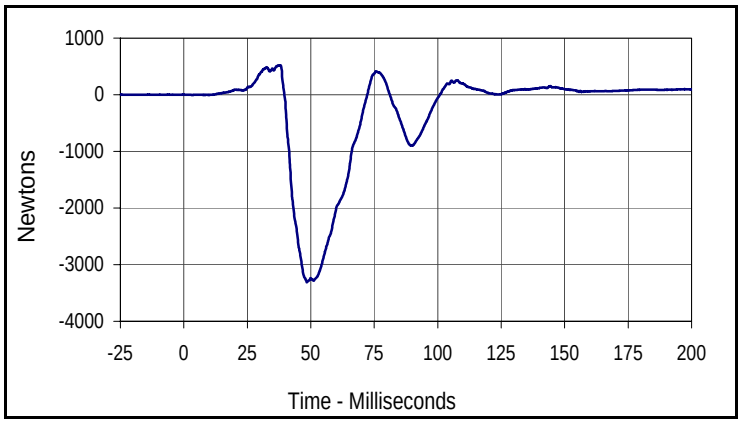


Curve Description			
Passenger Chest Resultant Primary			
CURNO	Type	SAE Class	Units
012	RES	180	G's
Max	Time	Min	Time
42.5	74.1	0.1	2.7

Test Vehicle:	2009 Dodge Ram 1500 ST Quad Cab 4x4 4-Door Truck	Test Date:	01/07/09
Test Program:	NHTSA 35mph NCAP	NHTSA No.:	M90304



Curve Description			
Passenger Left Femur Force Z			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
624.3	34.9	-3264.7	73.0

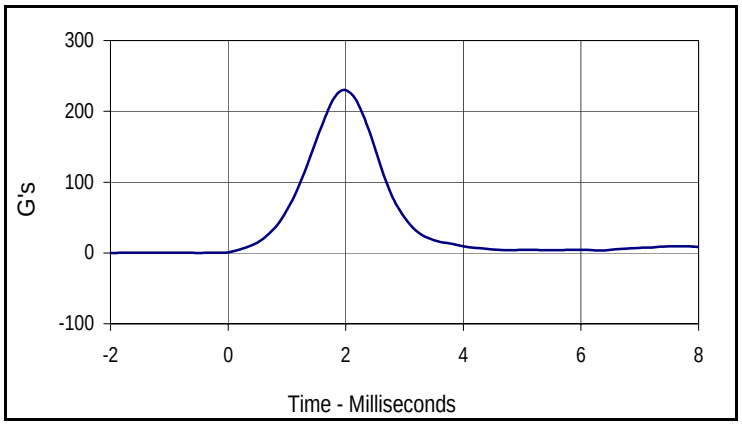


Curve Description			
Passenger Right Femur Force Z			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
521.9	37.5	-3308.0	48.5

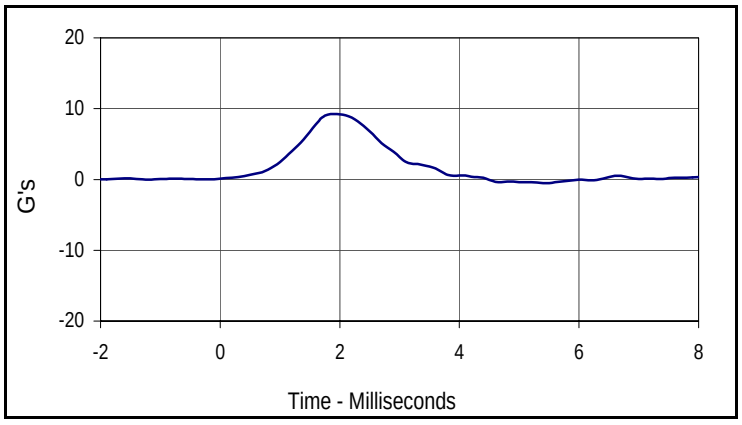
APPENDIX C
DUMMY CALIBRATION DATA

Test Program:	Hybrid III 50th Percentile Male Head Drop Test	Test Date:	12/11/08
ATD Serial No.:	035	Test I.D.:	HD12G

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	229.8	Pass
Peak Lateral Acceleration	G's	≤15.0	9.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass



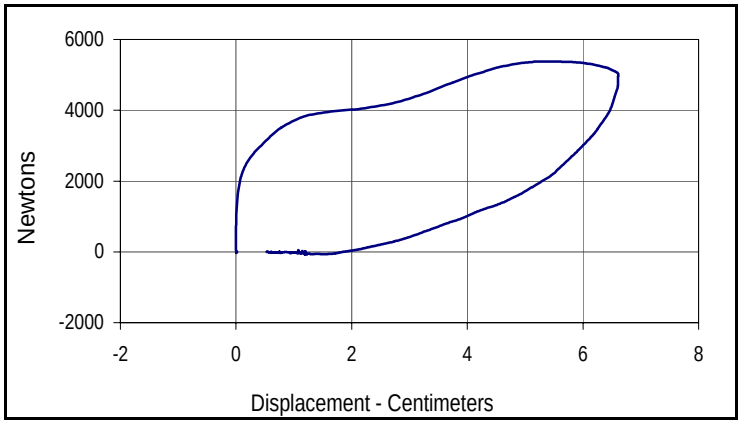
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
229.8	2.0	0.0	-2.0



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
9.2	1.9	-0.5	5.4

Test Program:	Hybrid III 50th Percentile Male Thorax Impact Test	Test Date:	12/11/08
ATD Serial No.:	35	Test I.D.:	CH12E

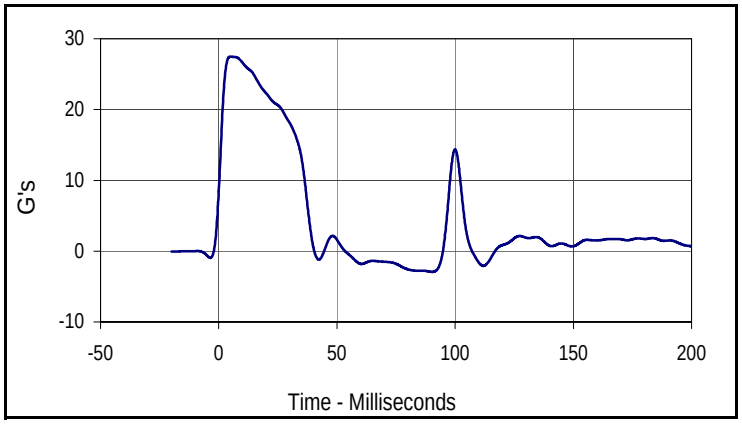
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.61	Pass
Peak Probe Force	Newtons	5159 to 5893	5380	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.61	Pass
Internal Hysterysis	%	69 to 85	76.9	Pass
		Overall Test Results		Pass



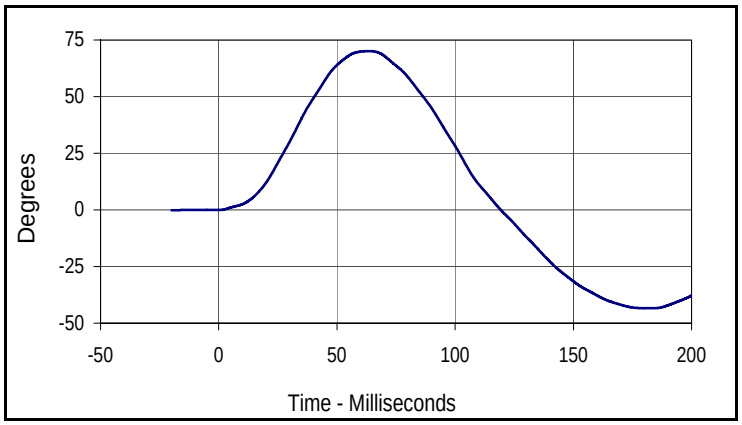
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysterysis
001	FIL	180	76.9
Peak Probe Force		Peak Chest Deflection	
5380		6.61	

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	12/11/08
ATD Serial No.:	035	Test I.D.:	NF12A

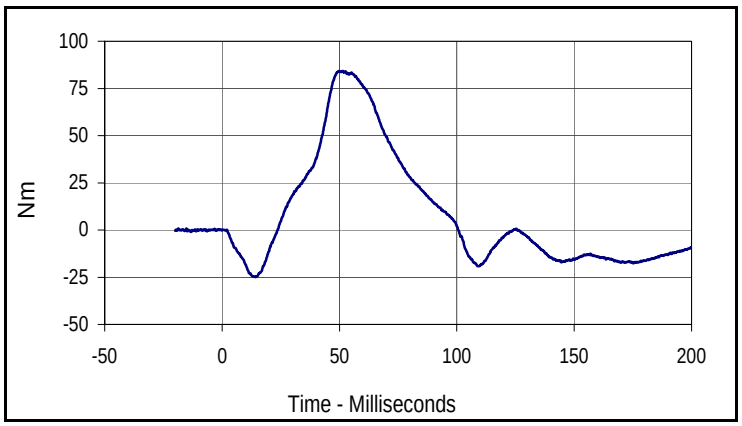
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.01	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	26.6	Pass
	20 Msec.	G's	17.6 to 22.6	22.3	Pass
	30 Msec.	G's	12.5 to 18.5	18.1	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	18.1	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	70.1	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	119.3	Pass
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	84.2	Pass
	Time	Msec.	47.0 to 58.0	51.4	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	100.6	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
27.5	4.9	-2.9	90.4



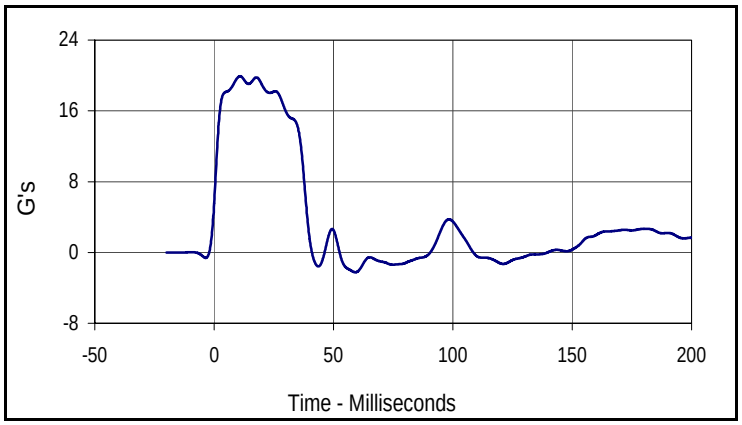
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
70.1	63.7	-43.4	183.4



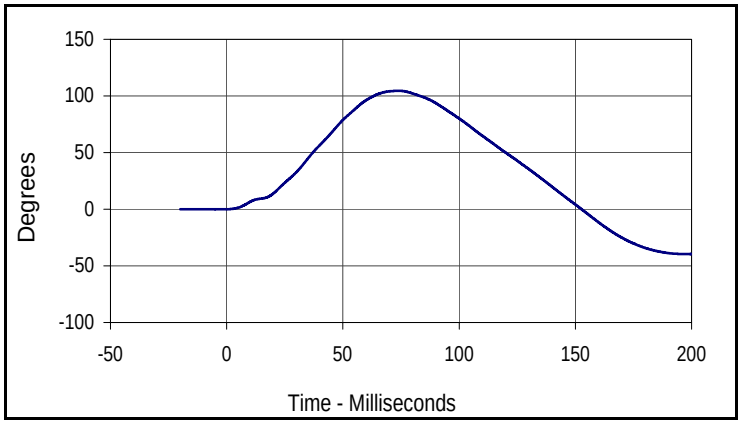
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
84.2	51.4	-24.9	14.1

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	12/11/08
ATD Serial No.:	034	Test I.D.:	NE12G

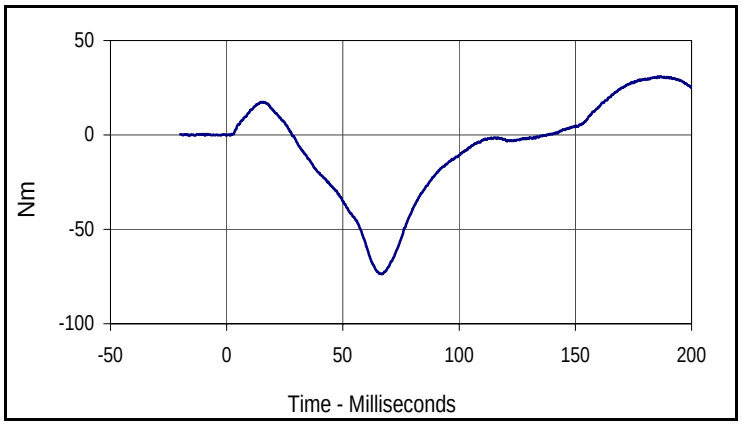
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.94 to 6.19	6.11	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	19.8	Pass
	20 Msec.	G's	14.0 to 19.0	19.0	Pass
	30 Msec.	G's	11.0 to 16.0	16.0	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	38.7	Pass
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	104.5	Pass
	Time	Msec.	72.0 to 82.0	73.9	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	152.7	Pass
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-73.8	Pass
	Time	Msec.	65.0 to 79.0	66.8	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	137.7	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
19.9	10.9	-2.2	59.2



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
104.5	73.9	-39.6	197.4



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
31.1	185.5	-73.8	66.8

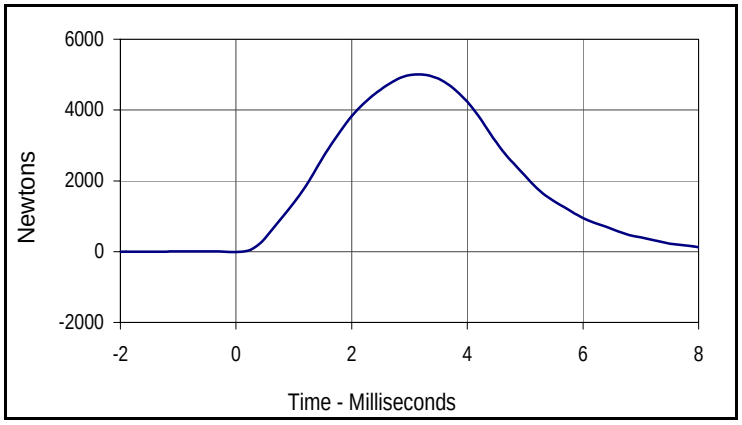
Test Program:	Hybrid III 50th Percentile Male Knee Impact Test	Test Date:	12/11/08
ATD Serial No.:	034	Test I.D.:	LK12G , RK12G

Left Knee

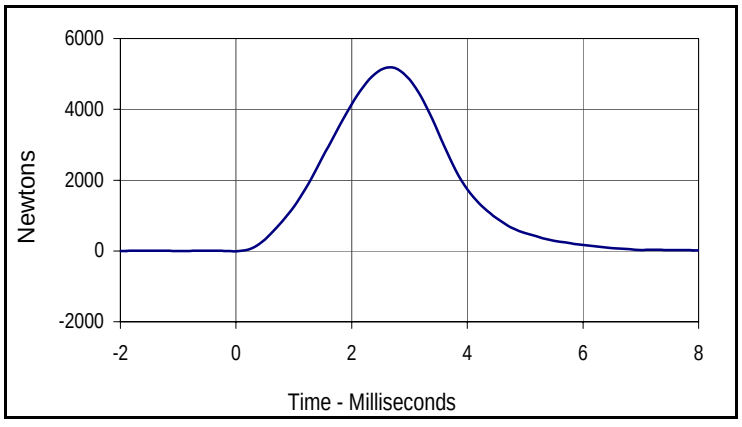
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5003	Pass
		Overall Test Results		Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5183	Pass
		Overall Test Results		Pass



Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5003.4	3.1	-11.9	9.6



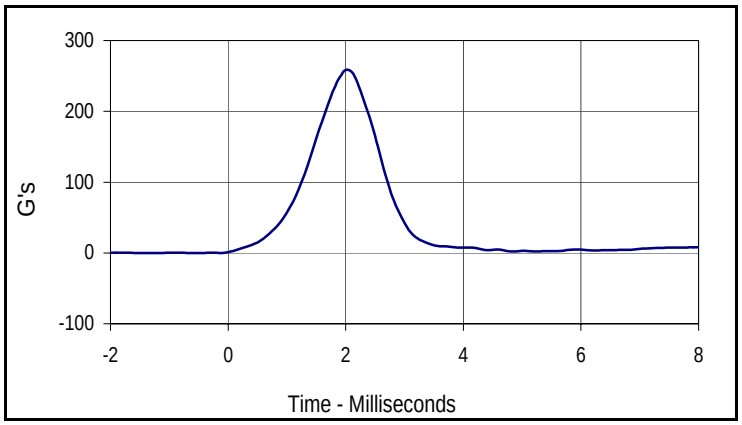
Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5182.8	2.7	-30.9	10.0

Test Program:	Hybrid III 50th Percentile Male External Measurements	Test Date:	12/11/08
ATD Serial No.:	034	Test I.D.:	N/A

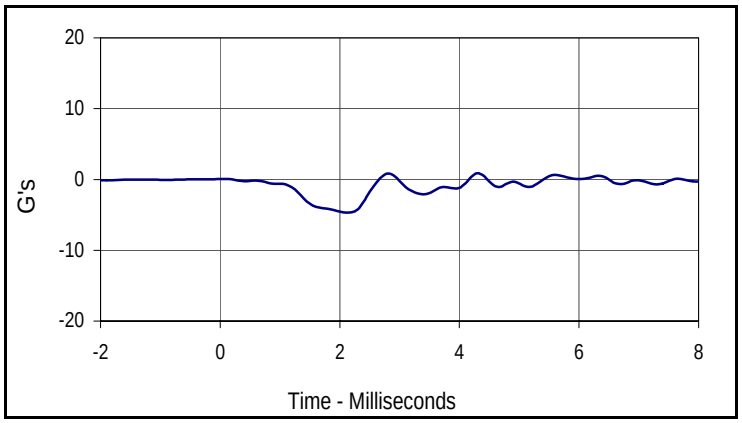
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A - Total sitting height	mm	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	510	Pass
C - "H" point height	mm	84 to 89	85	Pass
D - "H" point from seat back	mm	135 to 140	135	Pass
E - Shoulder pivot from back	mm	84 to 94	90	Pass
F - Thigh clearance	mm	140 to 155	150	Pass
G - Elbow back to wrist pivot	mm	290 to 305	299	Pass
H - Skull cap to back line	mm	41 to 46	45	Pass
I - Shoulder to elbow length	mm	330 to 345	330	Pass
J - Elbow rest height	mm	190 to 211	205	Pass
K - Buttock to knee length	mm	579 to 604	593	Pass
L - Poplipteal length	mm	429 to 455	448	Pass
M - Knee pivot height	mm	485 to 500	492	Pass
N - Buttock poplipteal length	mm	452 to 477	473	Pass
O - Chest depth	mm	213 to 229	213	Pass
P - Foot length	mm	251 to 267	253	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	998	Pass
Z - Waist circumference	mm	836 to 866	847	Pass
AA - Location for chest circumference	mm	429 to 434	430	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:	12/11/08
ATD Serial No.:	035	Test I.D.:	HD12D

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	258.5	Pass
Peak Lateral Acceleration	G's	≤15.0	4.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass



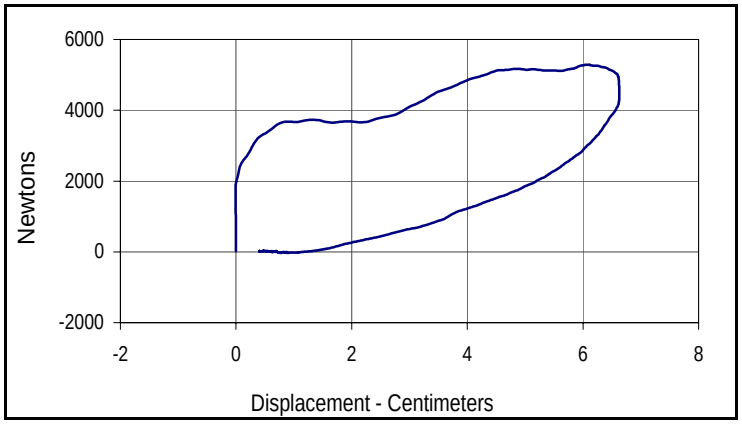
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
258.5	2.0	0.0	-1.2



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.9	4.3	-4.7	2.1

Test Program:	Hybrid III 50th Percentile Male Thorax Impact Test	Test Date:	12/11/08
ATD Serial No.:	35	Test I.D.:	CH12E

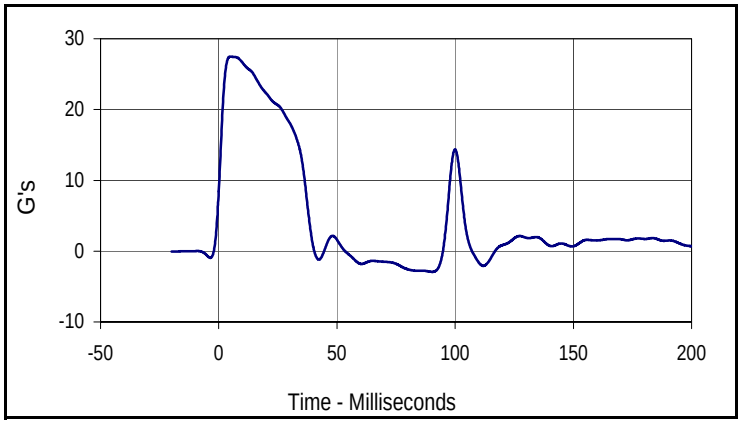
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.61	Pass
Peak Probe Force	Newtons	5159 to 5893	5288	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.63	Pass
Internal Hysterysis	%	69 to 85	73.8	Pass
		Overall Test Results		Pass



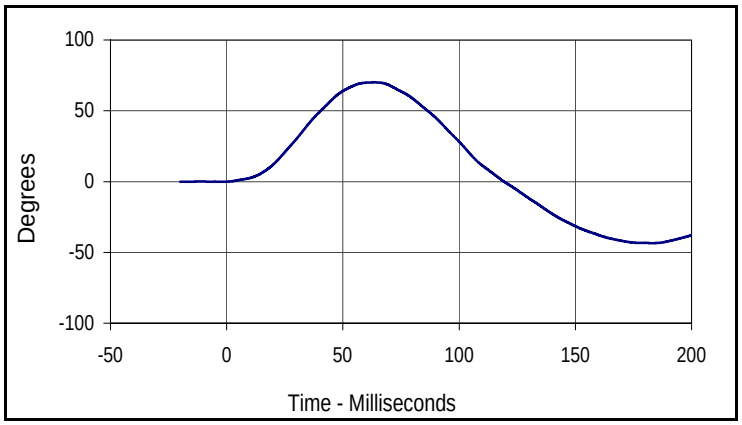
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysterysis
001	FIL	180	73.8
Peak Probe Force		Peak Chest Deflection	
5288		6.63	

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	12/11/08
ATD Serial No.:	035	Test I.D.:	NF12A

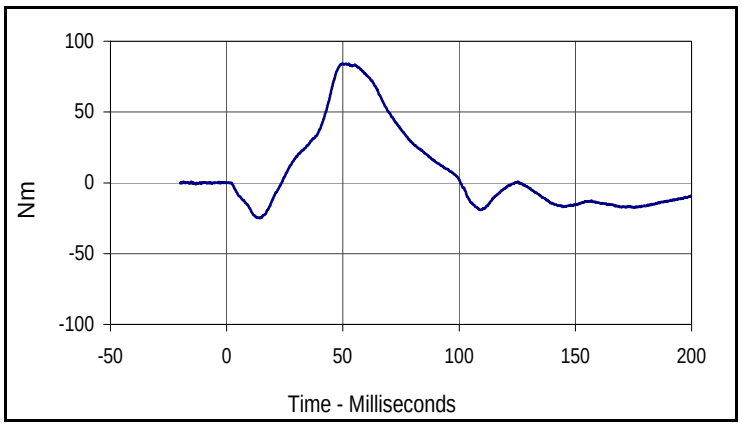
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.01	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	26.6	Pass
	20 Msec.	G's	17.6 to 22.6	22.3	Pass
	30 Msec.	G's	12.5 to 18.5	18.1	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	18.1	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	70.1	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	119.3	Pass
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	84.2	Pass
	Time	Msec.	47.0 to 58.0	51.4	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	100.6	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
27.5	4.9	-2.9	90.4



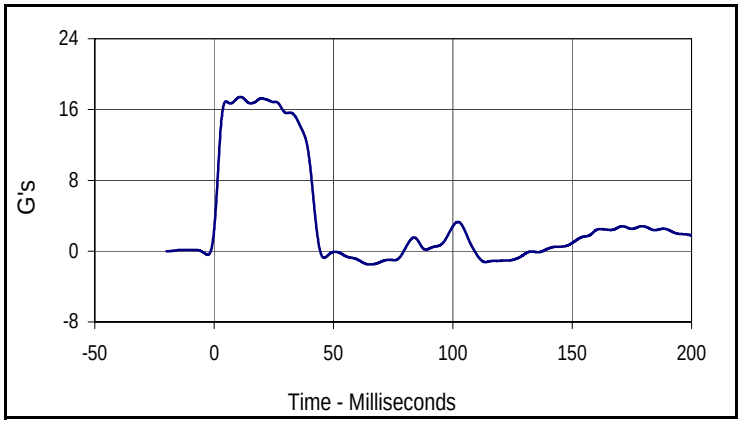
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
70.1	63.7	-43.4	183.4



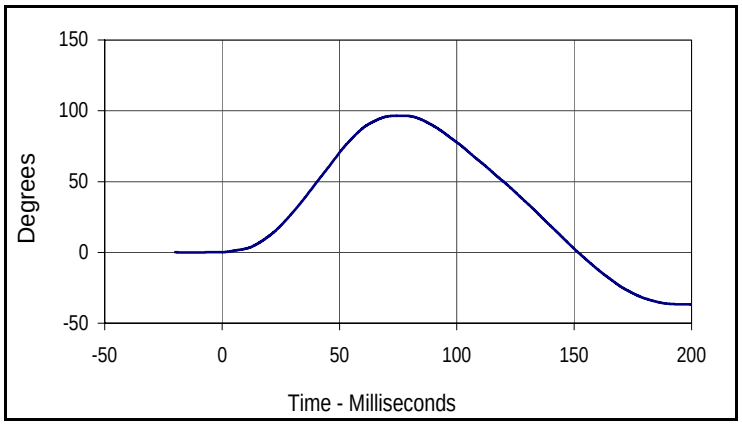
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
84.2	51.4	-24.9	14.1

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	12/11/08
ATD Serial No.:	035	Test I.D.:	NE12A

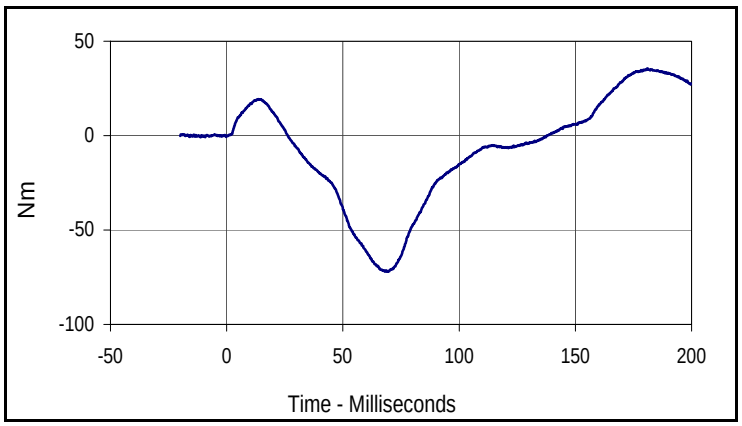
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.94 to 6.19	6.16	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.3	Pass
	20 Msec.	G's	14.0 to 19.0	17.3	Pass
	30 Msec.	G's	11.0 to 16.0	15.6	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	15.7	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	96.5	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	151.7	Pass
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-72.0	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
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
17.4	11.0	-1.5	65.2



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
96.5	76.8	-36.7	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	-72.0	68.1

Test Program:	Dummy Damage Checklist	Test Date:	12/11/08
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:

Test Program:	Dummy Damage Checklist	Test Date:	12/11/08
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: