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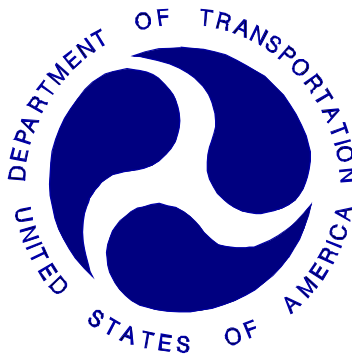
**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

FORD MOTOR COMPANY
2009 LINCOLN MKS
4-DOOR SEDAN

NHTSA NUMBER: F90200

CALSPAN TEST NUMBER: 8872-01

CALSPAN CORPORATION
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November 7, 2008

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Rulemaking
Office of Crashworthiness Standards
Mail Code: NVS-111
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Washington, DC 20590

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16. Abstract A frontal load cell barrier test of a 2009 Lincoln MKS 4-Door Sedan was performed at Calspan Corporation's crash test facility in Buffalo, New York, on November 7, 2008. The impact velocity was 55.62 kph and the temperature at the barrier face was 22°C. The maximum post-test vehicle crush was 519 mm. The test vehicle was equipped with 3-point restraint systems, knee bolsters, and airbags at both the driver and right outboard passenger seating positions. With respect to FMVSS 208 "Occupant Crash Protection - Injury Criteria" both the driver and passenger appeared to comply with head, chest, and femur requirements. The occupant injury criteria summary is as follows:					
Measurement Description		Units	Threshold	Driver (1047)	Passenger (1046)
Head Injury Criteria (HIC - 36 ms)		-	1000	304.7	399.5
Maximum Thorax Acceleration (3 ms Clip)		g's	60 g's	41.6	43.6
Chest Displacement		mm	-76 mm	-37.9	-25.4
Left Femur Force		Newtons	-10000 N	-1603.9	-1763.5
Right Femur Force		Newtons	-10000 N	-2007.9	-1097.7
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SECTION 1

PURPOSE AND SUMMARY OF TEST

1.1 PURPOSE

This 55.62 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-D-00024. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 55.62 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Inducant Test procedure.

1.2 TEST PROCEDURE

This 55.62 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) New Car Assessment Program (NCAP) Laboratory Inducant Test Procedure, dated December 1999. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion (Partial)"; and FMVSS 301 "Fuel System Integrity" performance. Procedures for receiving, inspection testing and reporting of test results are described in the test procedures and are not repeated in this report.

One real-time camera and 14 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

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

Both ATDs were fully instrumented with chest and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 1047) and the right-front passenger (position 2) ATD (Serial No.1046) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The vehicle, occupant, camera and measurement data are presented in Section 2. Appendix A contains the still photograph prints. The 129 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Appendix C contains the dummy calibration data and Appendix D contains the transducer calibration dates.

1.3 SUMMARY OF FRONTAL BARRIER IMPACT TEST

A load cell barrier consisting of 36 load cells was impacted by a 2009 Lincoln MKS 4-Door Sedan at a velocity of 55.62 kph. The test was performed at Calspan on November 7, 2008. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The occupant data is summarized below.

ATD	HIC	T ₁	T ₂	Clip (g)	T ₁	T ₂	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	304.7	66.0	102.0	41.6	71.2	74.2	-37.9	-1603.9	-2007.9
Passenger	399.5	68.3	98.0	43.6	78.2	81.2	-25.4	-1763.5	-1097.7

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

TEST NOTES	
Data Channel	Anomalies
V1P1 Pelvic x	Questionable Data 72 - 83 msec
V1P1 Left Lower Tibia My	Saturated channel 59.7 - 64.7 msec
V1P1 Head CG y Red	Questionable Data 40 - 43.8 msec
V1P2 Pelvic x	Questionable Data 38.4 - 79.7 msec
V1P2 Pelvic y	Questionable Data 47.4 - 97.8 msec
V1P2 Pelvic z	Questionable Data 73.9 - 92.8 msec
V1P2 Right Foot Aft x	Questionable Data 41- 109 msec
V1P2 Right Upper Tibia Mx	Questionable Data after 143.8 msec
V1 Engine Bottom #4x	Cut sensor cable after 54 msec

SECTION 2
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
CRASH TEST SUMMARY

Vehicle NHTSA No.: F90200 Test Mode: 56.3 kph Frontal Barrier
 Test Date: November 7, 2008 Time: 17:20 Temperature: 22 °C
 Vehicle Make/Model/Body Style: 2009 Lincoln MKS 4-Door Sedan
 Vehicle Test Weight: 2165.0 kg Impact Velocity: 55.62 kph (55.5 – 57.1 kph)
 Vehicle/Barrier Impact Angle: 0 ° Max Static Crush: 519 mm

ATD INFORMATION AND VISIBLE CONTACT POINTS

	DRIVER	PASSENGER
ATD Type:	Part 572E	Part 572E
Restraint System:	Seatbelt, Airbag, Knee Bolster	Seatbelt, Airbag, Knee Bolster
Head Contact:	Airbag, Back of head to head restraint	Airbag, Top of head to sunvisor
Abdomen Contact:	None	None
Chest Contact:	Airbag	Airbag
Left Knee Contact:	Knee Bolster	Glove Box
Right Knee Contact:	Knee Bolster	Glove Box

DOOR OPENING, SEAT TRACK AND GLAZING INFORMATION

Description	Driver Side	Passenger Side
Door Lock Status	Unlocked	Unlocked
Front Door Opening	Closed / Operable without tools	Closed / Operable without tools
Rear Door Opening	Closed / Operable without tools	Closed / Operable without tools
Hatch/Other Door Opening	Closed / Operable without tools	
Front Seat Track Shift (mm)	7 mm forward	6 mm forward
Front Seat Back Failure	None	None
Glazing Damage	None	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Left Side (mm)	Center (mm)	Right Side (mm)	Average (mm)
Value	1181	1137	1137	1152

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	790	785
Lap belt length as measured on ATD	mm	510	510
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems	mm	N/A	N/A

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2009 Lincoln MKS 4-Door Sedan

NHTSA No. : F90200 ; VIN: 1LNHM94R29G616514 ; Color: Blue

Engine Data: 6 cylinders; - CID; 3.7 Liters; - cc

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

Transmission Data: 6 speeds; - Manual; X Automatic; - Overdrive

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

AUTOMATIC DOOR LOCKS:

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

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

DEALER AND DELIVERY INFORMATION:

Date Received: 10/16/08 ; Odometer Reading 478 km

Selling Dealer: Coccia Lincoln-Mercury

Dealer Address: Wilkes-Barre, PA 18702

TEST VEHICLE OPTIONS:

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

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

SAFETY BELT FEATURES:

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

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

AIRBAG FEATURES:

Position	Frontal	Knee Bolster	Side Torso	Side Head/Torso Combination	Side Curtain
Driver:	X	-	X	-	X
Passenger:	X	-	X	-	X
Rear Passenger:	-	-	-	-	X

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Ford Motor Company

Date of Manufacture 09/08

GVWR: 2449 kg; GAWR: 1315 kg FRONT; 1179 kg REAR

VEHICLE CAPACITY DATA:

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

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

Vehicle Capacity Weight (VCW) = 430.0 kg

No. of Occupants x 68.04 kg = 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = 89.8 kg

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

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

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	572.0	568.0	59.1	1140.0
Rear =	401.0	388.0	40.9	789.0
Total Delivered Weight (UDW) =				1929.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW)	=	1929.0	kg
Rated Cargo/Luggage Weight (RCLW)	=	89.8	kg
Weight of 2 p.572 Dummies @ 76 each	=	152	kg
TARGET TEST WEIGHT	=	2170.8	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 84.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	612.0	613.0	56.6	1225.0
Rear =	474.0	466.0	43.4	940.0
Total Vehicle Test Weight (ATW) =				2165.0

Weight of Ballast Secured in Vehicle Trunk Area¹ = 34 kg

Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

	Left Front	Right Front	Left Rear	Right Rear	CG ²
AS DELIVERED:	778	773	788	784	1171.8
FULLY LOADED:	766	761	761	757	-
AS TESTED:	770	764	763	762	1243.9

Vehicle's Wheel Base: 2865 mm

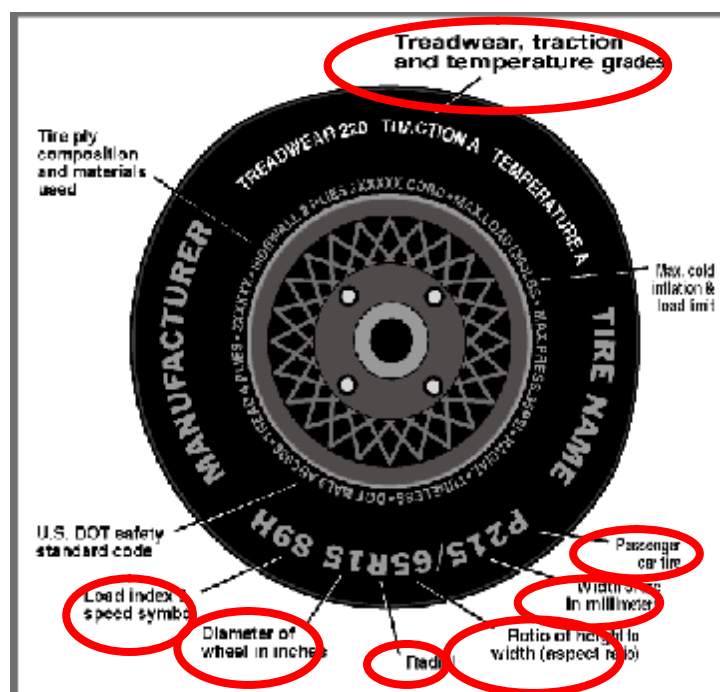
¹Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

²Rearward of the front axle centerline.

DATA SHEET NO. 3
TEST VEHICLE TIRE INFORMATION

Vehicle Year/Make/Model/Body Style: 2009 Lincoln MKS 4-Door Sedan

NHTSA Test No.: F90200 Test Date: November 7, 2008



Measured Parameter	Front	Rear
Maximum Tire Pressure (from sidewall - kPa)	350	350
Cold Pressure (from tire placard - kPa)*	220	220
Recommended Tire Size (from tire placard)	P235/55R18	P235/55R18
Tire size on Vehicle	P235/55R18	P235/55R18
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Assurance	Assurance
Tire Type	P	P
Tire Width (mm)	235	235
Ratio of Height to Width (aspect ratio)	55	55
Radial	R	R
Wheel Diameter	18	18
Load Index & Speed Symbol	99T	99T
Treadwear	700	700
Traction Grade	A	A
Temperature Grade	B	B

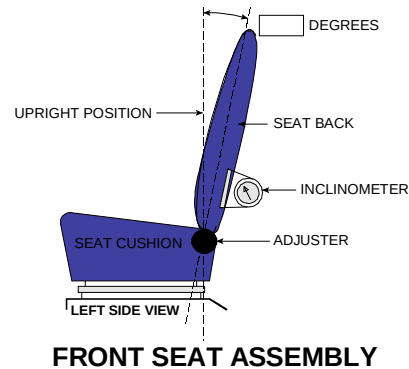
*Tire pressure used for test

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 2009 Vehicle Model: Lincoln MKS Body Style : 4-Door Sedan

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



Seat back angle for driver's seat: 23

Measurement instructions: Seat back was set to 18.9° on the head restraint post with vehicle sill at 0°

Seat back angle for passenger's seat: 23

Measurement instructions: Seat back was set to 18.9° on the head restraint post with vehicle sill at 0°

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Full forward to full rear range = 326mm. Seat was set with vertical adjustment full down at 163mm.

Positioning of the passenger's seat: Full forward to full rear range = 332mm. Seat was set with vertical adjustment full down at 166mm.

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 71.9 liters

B. "Usable Capacity" of the optional equipment fuel tank is 0 liters

C. "Usable Capacity" of the vehicle(s) used for certification
testing to requirements of FMVSS 301 = 66.1 to 67.6 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 67.0 liters

3.3 One-Third of Useable Capacity = 24.0 liters

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

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

With ignition put in the "ON" position.

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

4. STEERING COLUMN ADJUSTMENTS:

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

Operational Instructions: Wheel at center is 67° on the face of the wheel

Telescoping travel was 40mm and was centered at 20mm.

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: Driver and passenger seat belt adjusters are placed in the uppermost position.

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

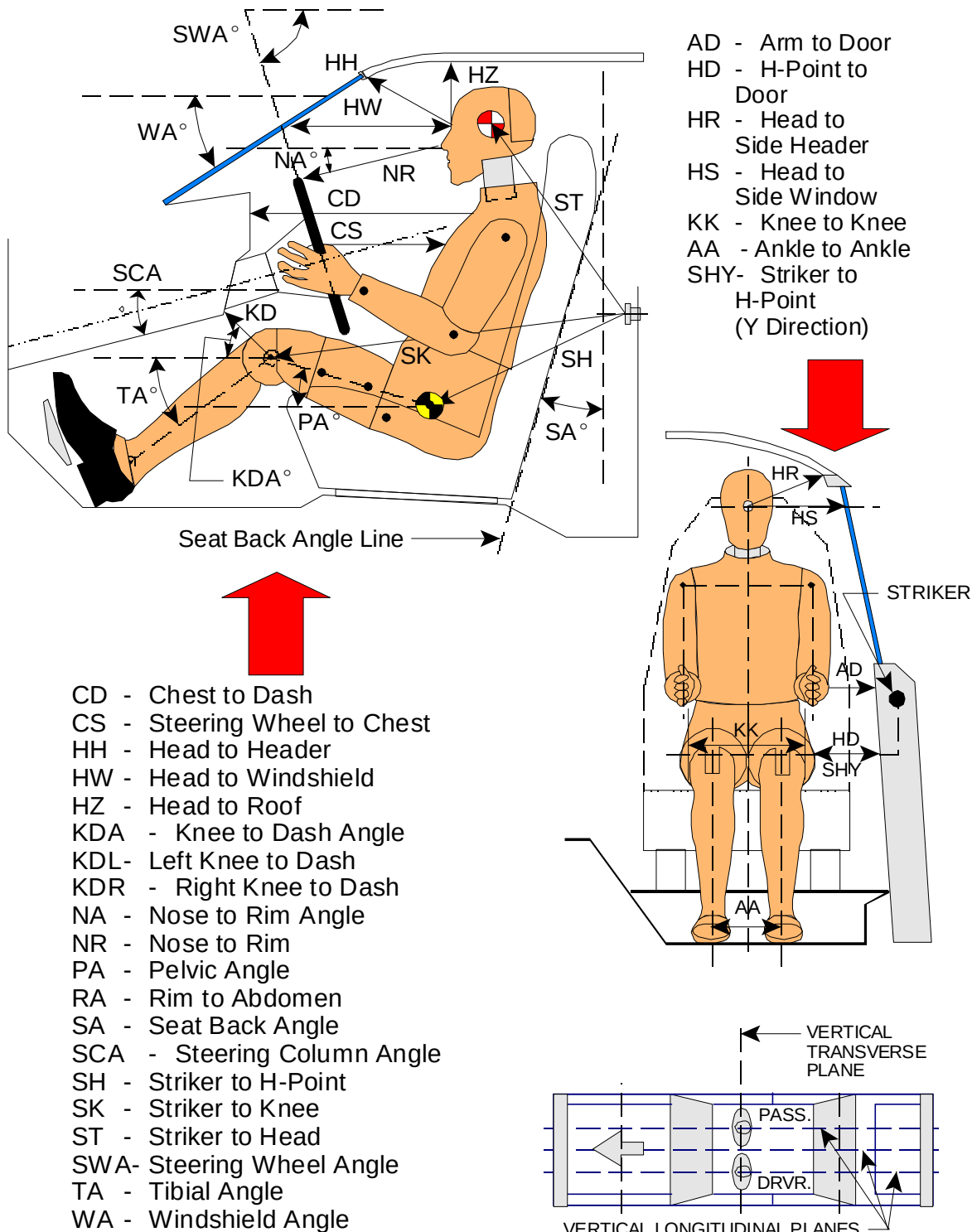
Does vehicle owner's manual describe how to deactivate ADLs? X Yes; - No; - N/A

Comments: None

DATA SHEET NO. 5

FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



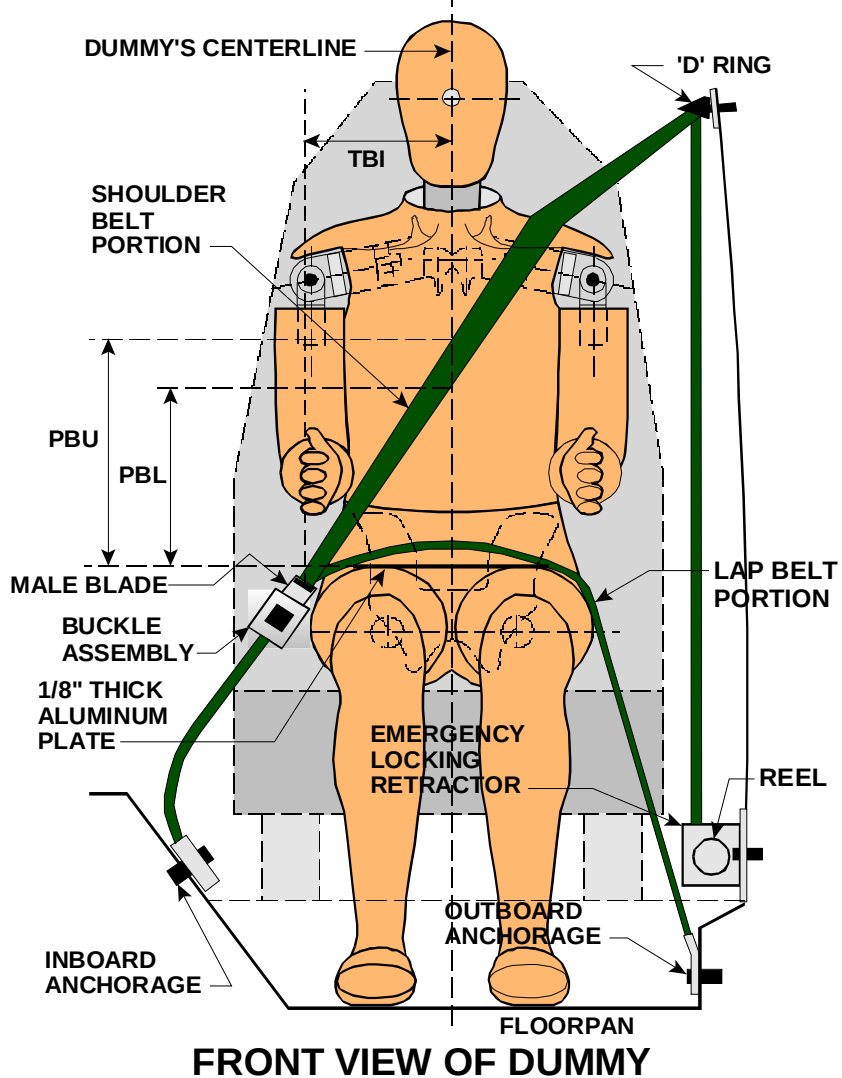
DATA SHEET NO. 5
FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE (cont.)

	DRIVER (Serial #1047)			PASS. (Serial #1046)		
WA ⁰	27.2 deg.			N/A		
SWA ⁰	67.2 deg.			N/A		
SCA ⁰	22.8 deg.			N/A		
SA ⁰	18.9 * deg.			18.9 * deg.		
HZ	245			232		
HH	386			415		
HW	726			705		
HR	245			249		
NR	392	Angle	4.2 deg.	N/A		
CD	567			517		
CS	341			N/A		
RA	209			N/A		
KDL	165	Angle (KDA)	36 deg.	184		
KDR	145			191	Angle (KDA)	36 deg.
PA ⁰	23.9 deg.			20.5 deg.		
TA ⁰	54 deg.			41 deg.		
KK	318			270		
AA	325			214		
ST	446	Angle	10 deg.	469	Angle	8 deg.
SK	572	Angle	98 deg.	566	Angle	99 deg.
SH	275	Angle	144 deg.	262	Angle	141 deg.
SHY	295			291		
HS	372			375		
HD	161			121		
AD	141			130		

Dimensions in millimeters

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

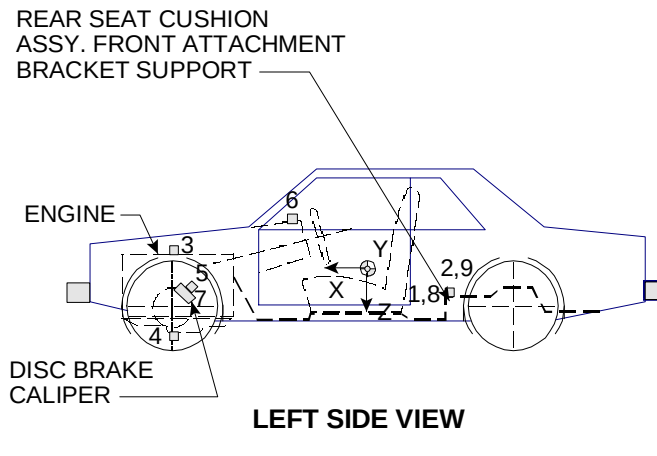
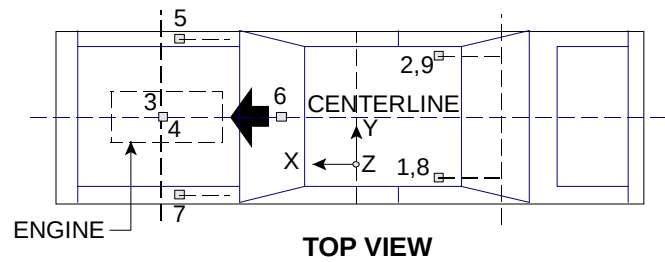
SEAT BELT POSITIONING DATA



	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	310	295
PBL-- Top surface of alum. plate to belt lower edge	225	210
LAP BELT TENSION	10 N	10 N
SHOULDER BELT TENSION	Retractor	Retractor

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

VEHICLE ACCELEROMETER LOCATIONS



No.	LOCATION	PRE-TEST LENGTH (mm)		
		X	Y	Z
1	Left Rear Seat Cross Member X	2150	-618	456
2	Right Rear Seat Cross Member X	2148	618	457
3	Top of Engine Block	4371	-92	794
4	Bottom of Engine	5182	1	438
5	Disc Brake Caliper @ Right Side	4136	728	505
6	Instrument Panel**	-	-	-
7	Disc Brake Caliper @Left Side	4093	-732	509
8	Left Rear Seat Cross Member Z	2150	-618	456
9	Right Rear Seat Cross Member Z	2148	618	457

X – From rear surface of vehicle (+ forward)

Y – From vehicle centerline (+ right)

Z – From ground plane (+ up)

** Accelerometer was not requested by the COTR

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

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

Windshield is bonded in place and covered with a 15 mm molding.

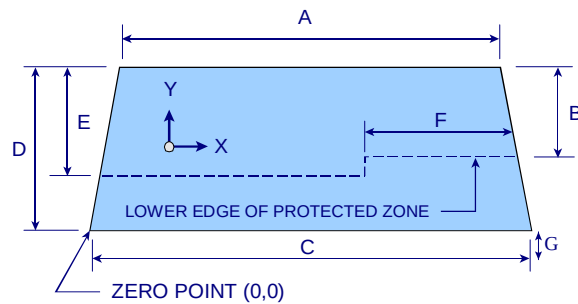
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of the windshield for vehicles equipped with automatic restraint systems for front occupants,

Temperature of windshield molding during test: 22°C.

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		% OF RETENTION
	PRE-TEST (mm)	POST-TEST (mm)	
RIGHT SIDE	2162.5	2162.5	100.0%
LEFT SIDE	2162.5	2162.5	100.0%
TOTAL	4325	4325	100.0%



DIMENSIONS (mm)	
A	1260
B	500
C	1545
D	760
E	470
F	540
G	20

FRONT VIEW OF WINDSHIELD

FAILURE DETAILS: None

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm:

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

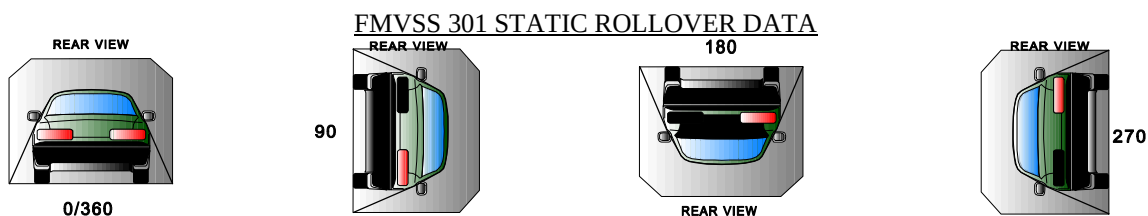
DATA SHEET NO. 9
SUMMARY OF FMVSS NO. 301 DATA

NHTSA TEST No.: _____ F90200 _____ TEST DATE: _____ November 7, 2008
VEHICLE MAKE/MODEL: _____ 2009 Lincoln MKS 4-Door Sedan _____
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

FUEL SPILLAGE MEASUREMENT:

Time Interval	Amount	Maximum Allowable Spillage
Impact Until Motion Ceases		28 g
First Five Minutes Following Impact		142 g
Next 25 Minutes		28 g / 1 minute

SOLVENT SPILLAGE DETAILS: None



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Stage	Rotation Time (spec. 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0° - 90°	1	minutes	09	seconds	5	minutes	6	minutes	9	seconds	7	minutes
90° - 180°	1	minutes	07	seconds	5	minutes	6	minutes	7	seconds	7	minutes
180°-270°	0	minutes	59	seconds	5	minutes	5	minutes	59	seconds	6	minutes
270°-360°	1	minutes	07	seconds	5	minutes	6	minutes	7	seconds	7	minutes

II. FMVSS 301 REQUIREMENTS: (Maximum allowable solvent spillage):

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

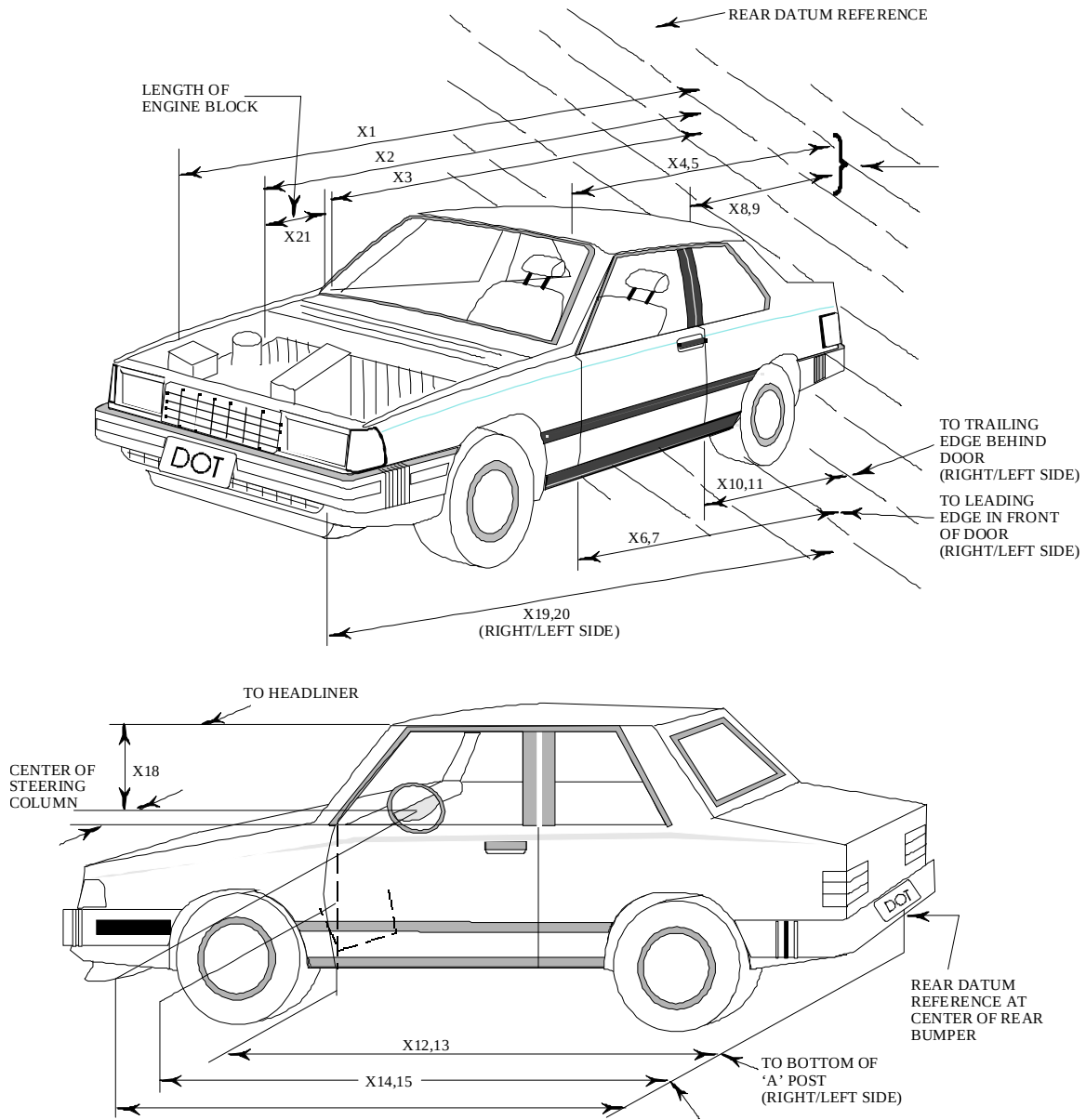
Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0° - 90°	0	0	0	N/A
90° - 180°	0	0	0	N/A
180°-270°	0	0	0	N/A
270°-360°	0	0	0	N/A

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

Rollover Stage	Spillage Location
0° - 90°	None
90° - 180°	None
180°-270°	None
270°-360°	None

DATA SHEET NO. 10
TEST VEHICLE MEASUREMENTS



DATA SHEET NO.10
VEHICLE MEASUREMENTS (cont.)

NHTSA TEST No.: F90200 TEST DATE: November 7, 2008
VEHICLE MAKE/MODEL: 2009 Lincoln MKS 4-Door Sedan

No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	5186	4667	519
X2	Rear Surface of Vehicle to Front of Engine	4610	4467	143
X3	Rear Surface of Vehicle to Firewall	3997	3963	34
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3586	3578	8
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3585	3575	10
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3560	3550	10
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3556	3553	3
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2479	2474	5
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2481	2479	2
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2523	2512	11
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2520	2515	5
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3533	3529	4
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3530	3528	2
X14	Rear Surface of Vehicle to Firewall, Right Side	3973	3925	48
X15	Rear Surface of Vehicle to Firewall, Left Side	3972	3945	27
X16	Rear Surface of Vehicle to Steering Column	3108	3202	-94
X17	Center of Steering Column to "A" Post	308	306	2
X18	Center of Steering Column to Headliner	429	454	-25
X19	Rear Surface of Vehicle to Right Side of Front Bumper	5103	4663	440
X20	Rear Surface of Vehicle to Left Side of Front Bumper	5105	4634	471
X21	Length of Engine Block	4053	4053	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	3323	3319	4
CD	Rear Surface of Vehicle to Center of Dash Panel	3353	3351	2
LD	Rear Surface of Vehicle to Left Side of Dash Panel	3320	3319	1

All Dimensions in mm

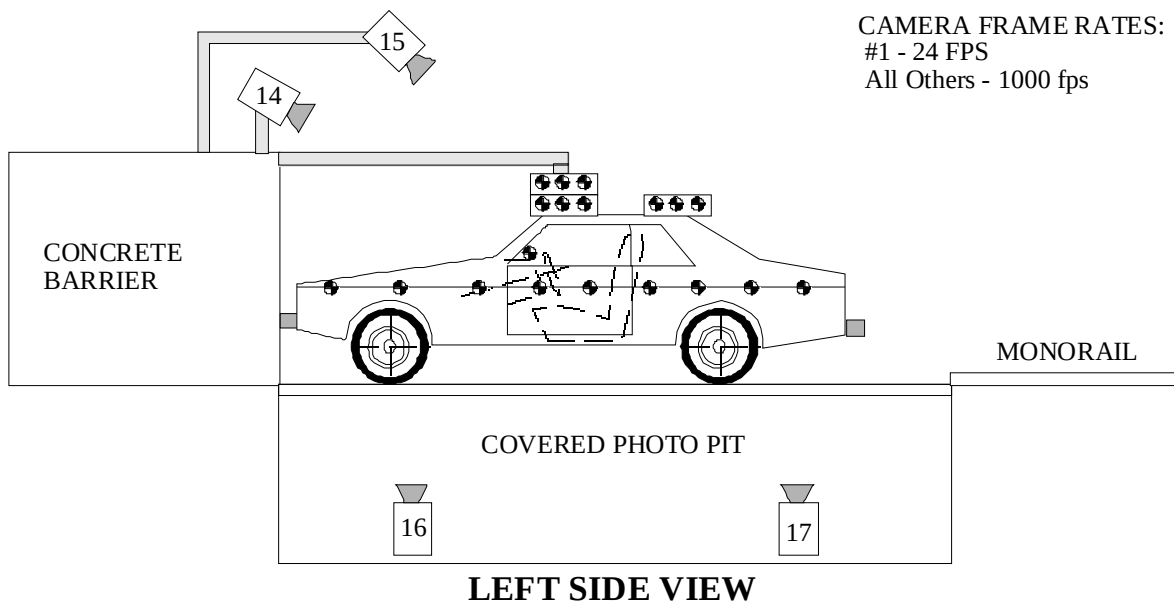
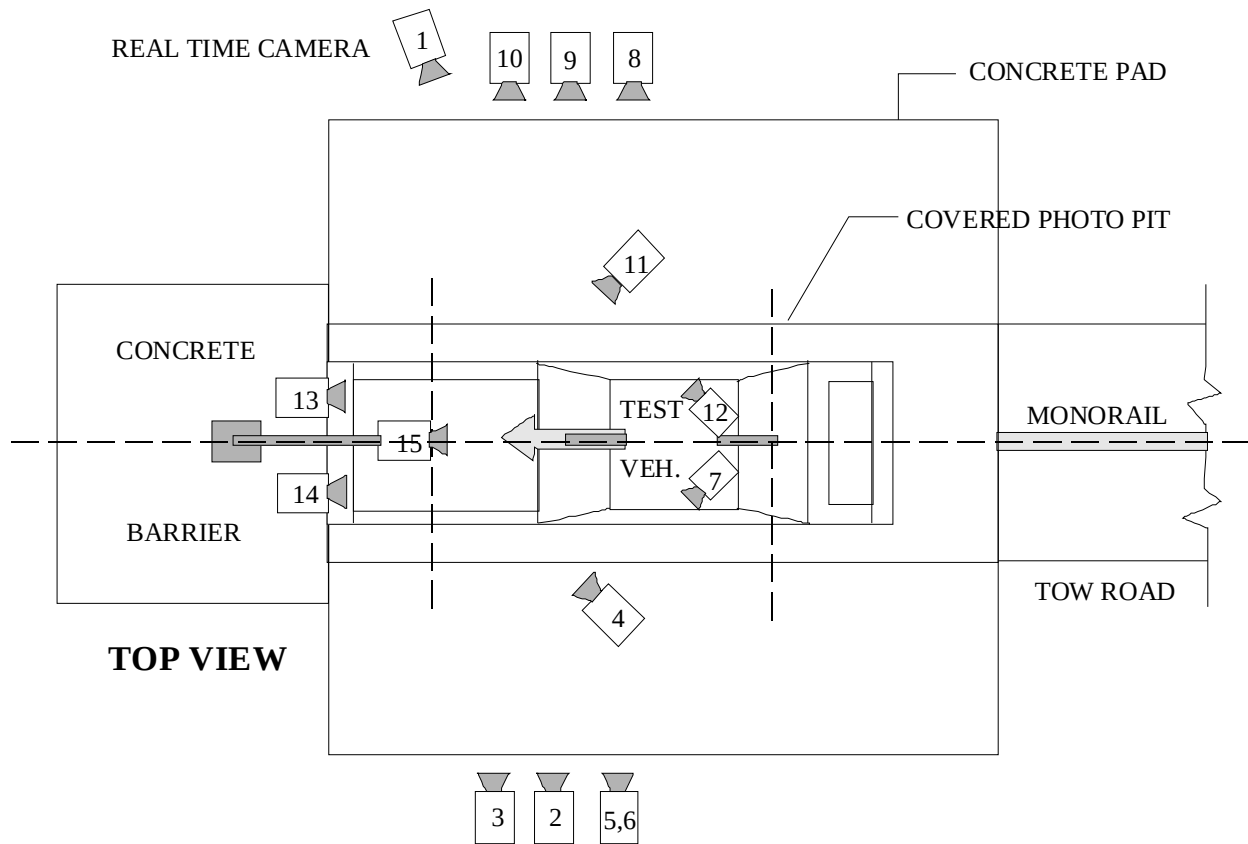
DATA SHEET NO.10
VEHICLE MEASUREMENTS (cont.)

NHTSA TEST No.: F90200 TEST DATE: November 7, 2008
VEHICLE MAKE/MODEL: 2009 Lincoln MKS 4-Door Sedan

TARGET VEHICLE STRUCTURAL MEASUREMENTS

	Elements	Pre-Test (mm)
1	Total length	5186
2	Total Width	1810
3	Bumper Top Height	525
4	Bumper Bottom Height	455
5	Longitudinal Member Top Height	584
6	Distance Between Longitudinal Members	1026
7	Longitudinal Member Width	78
8	Engine top height	922
9	Engine bottom height	209
10	Engine and gearbox width	558
11	Front bumper-engine distance	575
12	Front shock absorber fixing height	928
13	Bonnet leading edge height	758
14	Front shock absorber fixing width	1264
15	Front bumper – front axle distance	1067
16	Front axle – A pillar distance	4117
17	A-pillar – B pillar distance	1113
18	B-pillar – rear axle distance	1223
19	B-pillar – C Pillar distance	1094
20	Roof sill bottom height	1394
21	Roof sill top height	1495
22	Floor sill bottom height	291
23	Floor sill top height	385

DATA SHEET NO.11
HIGH-SPEED CAMERA LOCATIONS



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

NHTSA Test No.: F90200 Vehicle: 2009 Lincoln MKS 4-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE (deg)**	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	30
2	Overall Left Side	8050	2070	965	-3	7594	28	1000
3	Left Side View	9080	1410	950	-3	8624	50	1000
4	Driver and Interior View	6776	3520	1995	-8	-	50	500
5	Steering Column (Bottom)	7606	2530	1200	-6	7150	24-70	1000
6	Steering Column (Top)	7606	2530	1805	-9	7150	28-70	1000
7	Left CRS Lateral View	-	-	-	-	-	-	-
8	Overall Right Side	7720	2490	950	-1	7264	28	1000
9	Right Side View	9010	1870	935	-1	8554	50	1000
10	Right Passenger View	7950	2310	1210	1	7494	50	1000
11	Passenger and Interior View	7236	3010	1960	-9	-	50	500
12	Right CRS Lateral View	-	-	-	-	-	-	-
13	Passenger Front View	620	-92	1987	-34	-	24	500
14	Driver Front View	620	-92	1987	-34	-	24	500
15	Windshield View	0	-530	3374	-48	-	25	500
16	Pit View of Engine	0	615	-3048	90	-	12.5	500
17	Pit View of Fuel Tank	0	2745	-3048	90	-	12.5	500

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

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

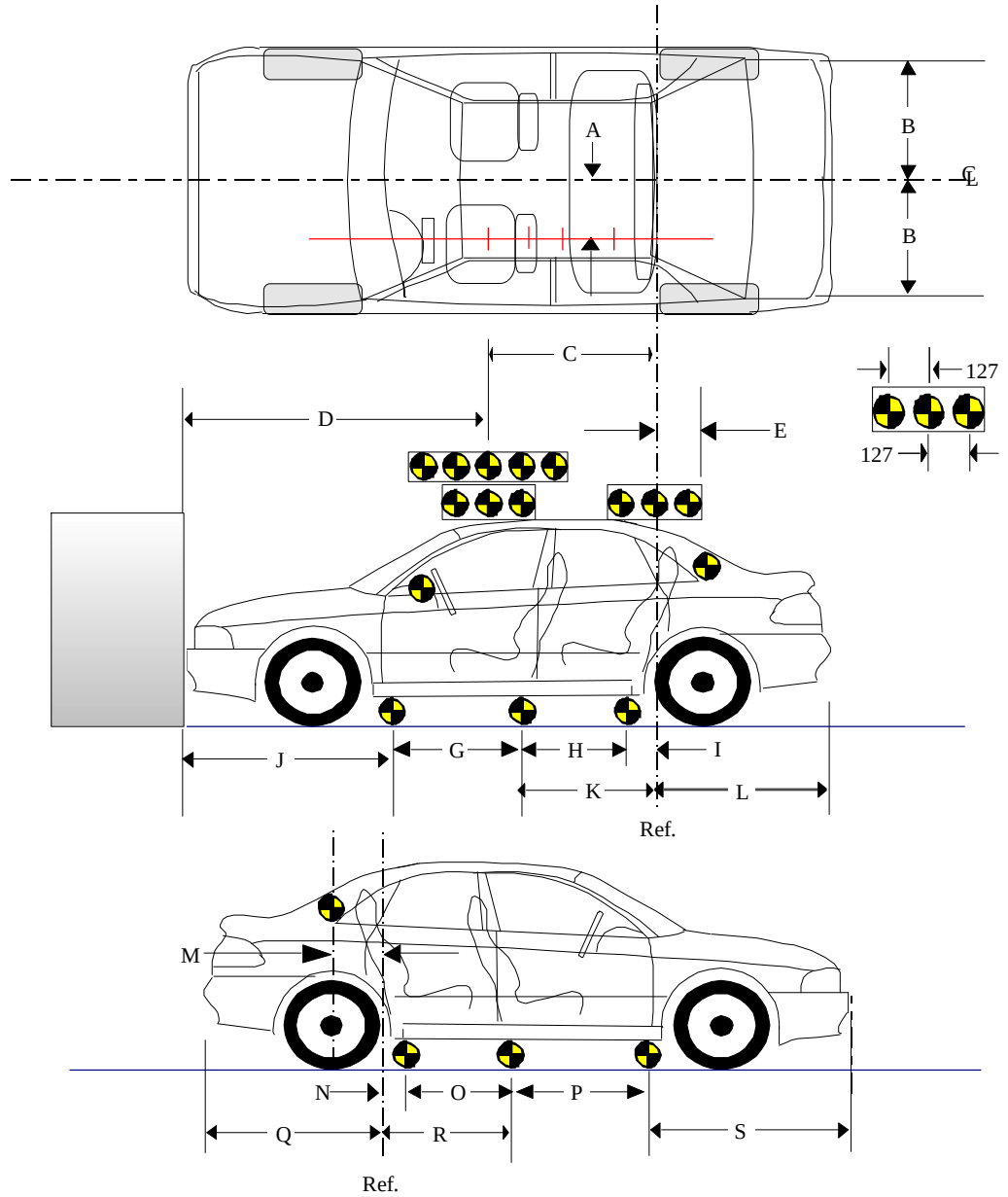
Z = film plane to ground

DATA SHEET NO. 12
VEHICLE REFERENCE PHOTO TARGET LOCATIONS

NHTSA Test No.: F90200 Vehicle: 2009 Lincoln MKS 4-Door Sedan

(Dimensions in millimeters)

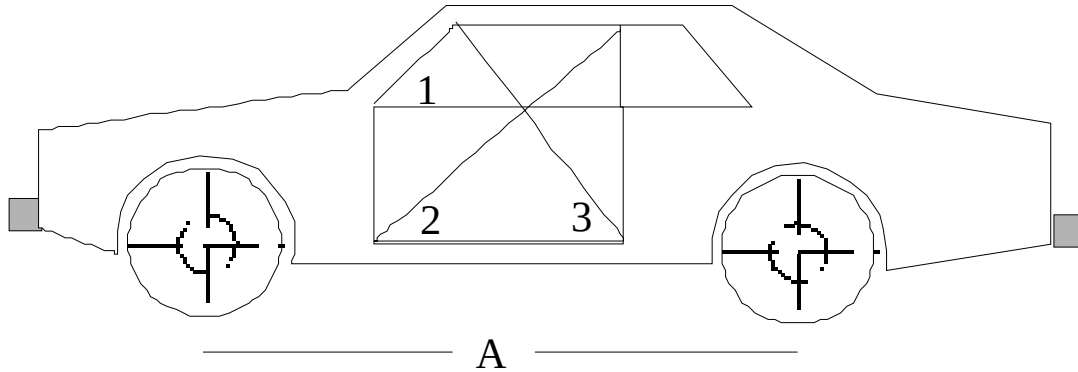
A	380
B	686
C	1221
D	2468
E	249
F	1774
G	946
H	943
I	114
J	1569
K	1057
L	1614
M	249
N	109
O	942
P	951
Q	1617
R	1051
S	1567



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

NHTSA Test No.: F90200 Vehicle: 2009 Lincoln MKS 4-Door Sedan

DOOR OPENING WIDTH AND WHEELBASE MEASUREMENTS



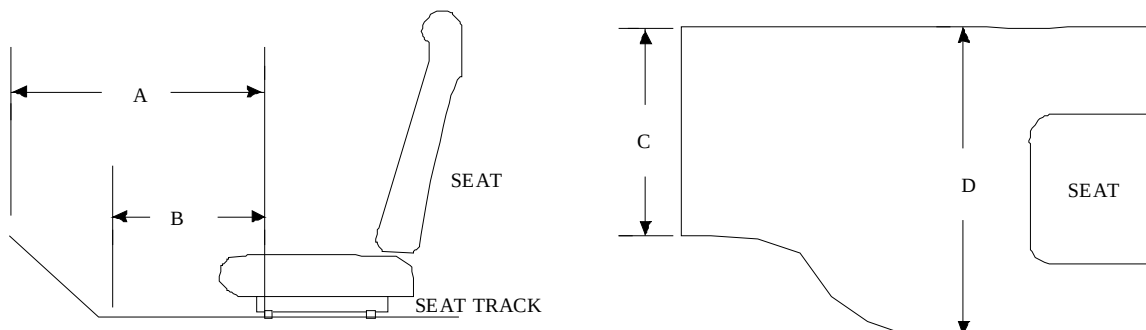
UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	947	1369	1013	947	1378	1012
AFTER TEST	945	1372	1014	942	1384	1013
DIFFERENCE	2	-3	-1	5	-6	-1

UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	2865	2863
AFTER TEST	2822	2835
DIFFERENCE	43	28

DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont)

NHTSA Test No.: F90200 Vehicle: 2009 Lincoln MKS 4-Door Sedan

STATIC FOOTWELL DEFORMATION



DRIVER

Measurement	Pre-Test	Post-Test	Difference
A	731	710	21
B	538	535	3
C	429	428	1
D	422	422	0

PASSENGER

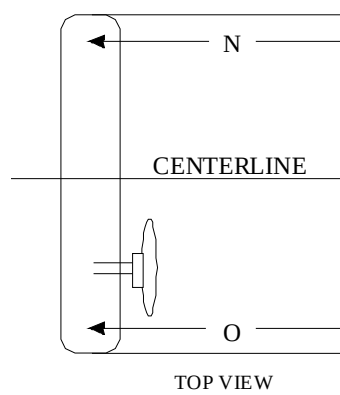
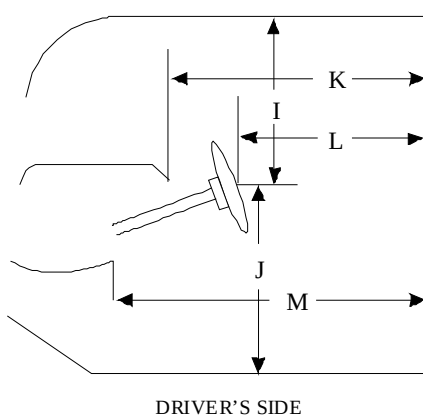
Measurement	Pre-Test	Post-Test	Difference
A	694	693	1
B	427	437	-10
C	418	407	11
D	423	423	0

Units = mm

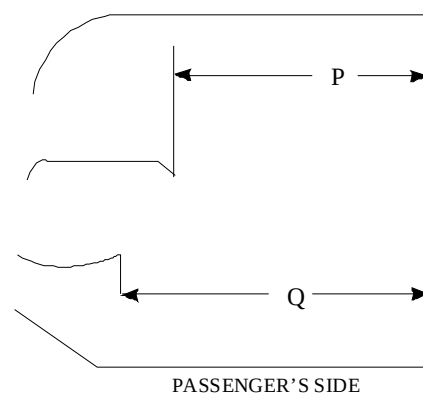
DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont.)

NHTSA Test No.: F90200 Vehicle: 2009 Lincoln MKS 4-Door Sedan

STATIC PASSENGER COMPARTMENT INTRUSION



MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



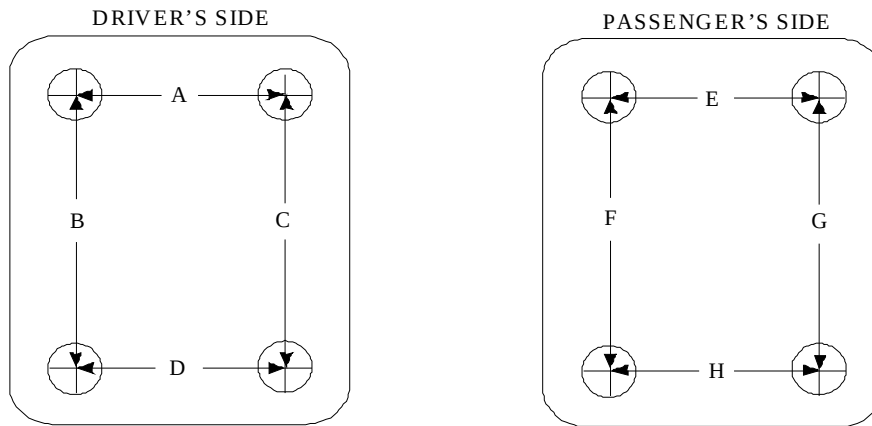
Measurement	Pre-Test	Post-Test	Difference
I	429	454	-25
J	668	642	26
K	753	753	0
L	539	634	-95
M	792	794	-2
N	754	753	1
O	751	751	0
P = K (PASS.)	787	789	-2
Q = M (PASS.)	803	810	-7

Units = mm

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

NHTSA Test No.: F90200 Vehicle: 2009 Lincoln MKS 4-Door Sedan

FLOORBOARD DEFORMATION



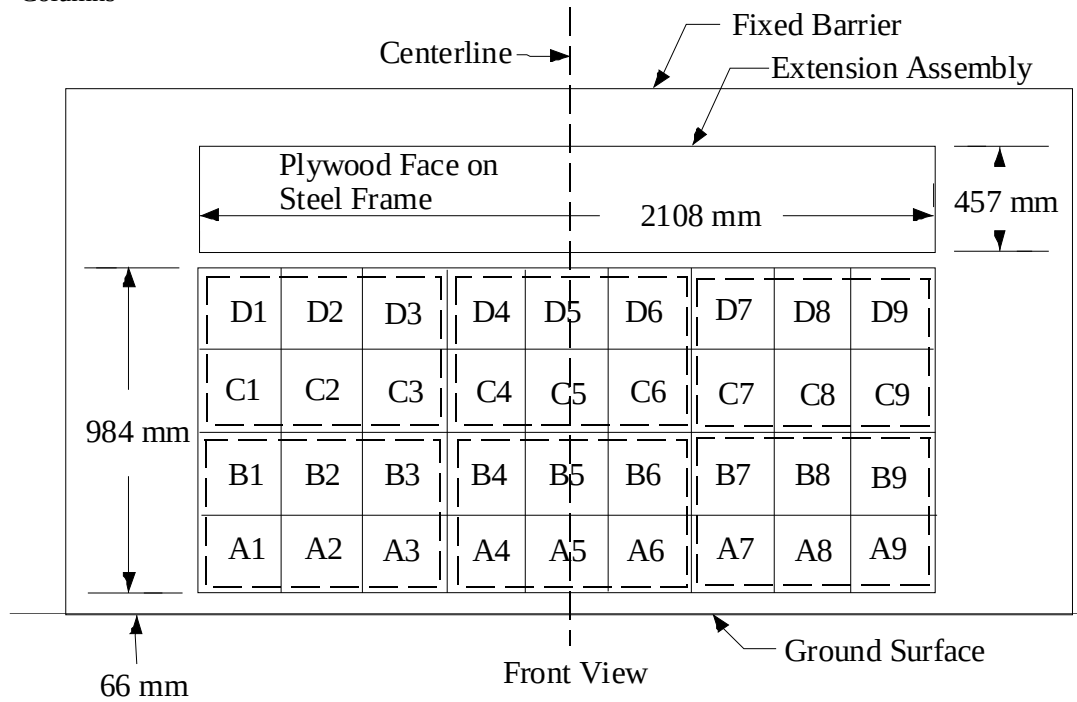
TOP VIEW THROUGH FLOOR PAN

Measurement	Pre-Test	Post-Test	Difference
A	429	428	1
B	276	281	-5
C	282	280	2
D	422	422	0
E	418	407	11
F	283	287	-4
G	254	243	11
H	423	423	0

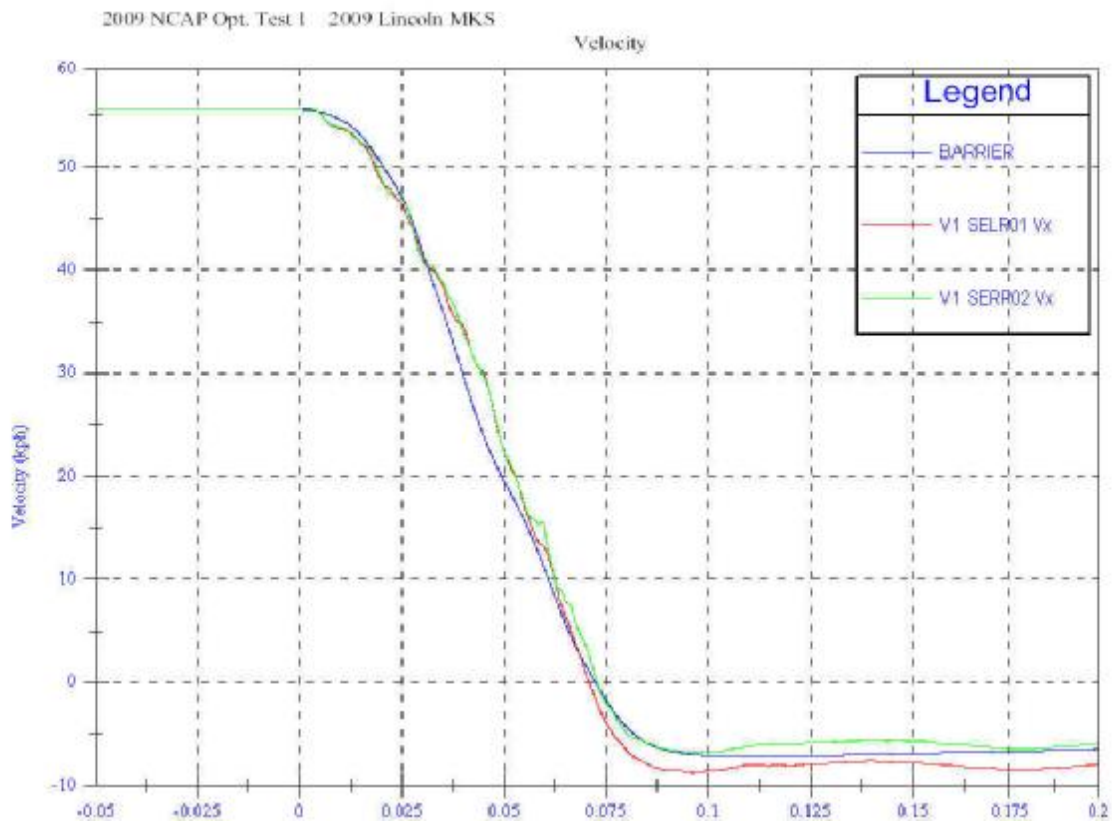
Units = mm

DATA SHEET NO.14
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells
4 Rows
9 Columns



Momentum Plot



DATA SHEET NO. 15
ACCIDENT INVESTIGATION DIVISION DATA
FOR FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Lincoln MKS 4-Door Sedan

NHTSA Test No.: F90200 VIN: 1LNHM94R29G616514

Model Year: 2009 Build Date: 09/08 Test Date: November 7, 2008

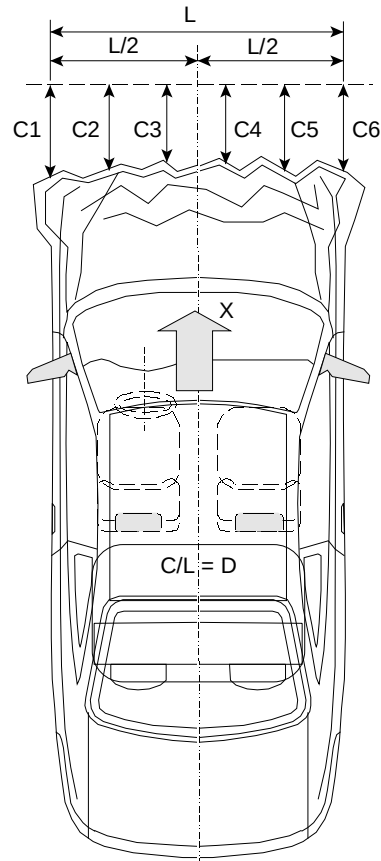
Vehicle Size Category: Sedan Test Weight: 2165.0 kg

Vehicle Wheelbase: 2865 mm; Front Overhang: 1069 mm; Overall Width: 1810 mm

Collision Deformation Classification (CDC) Code: 12FDEW3

Crush Depth Dimensions

	PRE (mm)	POST (mm)	DIFF (mm)
C1 =	4973	4590	383
C2 =	5113	4622	491
C3 =	5170	4664	506
C4 =	5169	4653	516
C5 =	5111	4644	467
C6 =	4973	4641	332



Midpoint of Damage: $D = \text{Vehicle Centerline (Longitudinal)}$

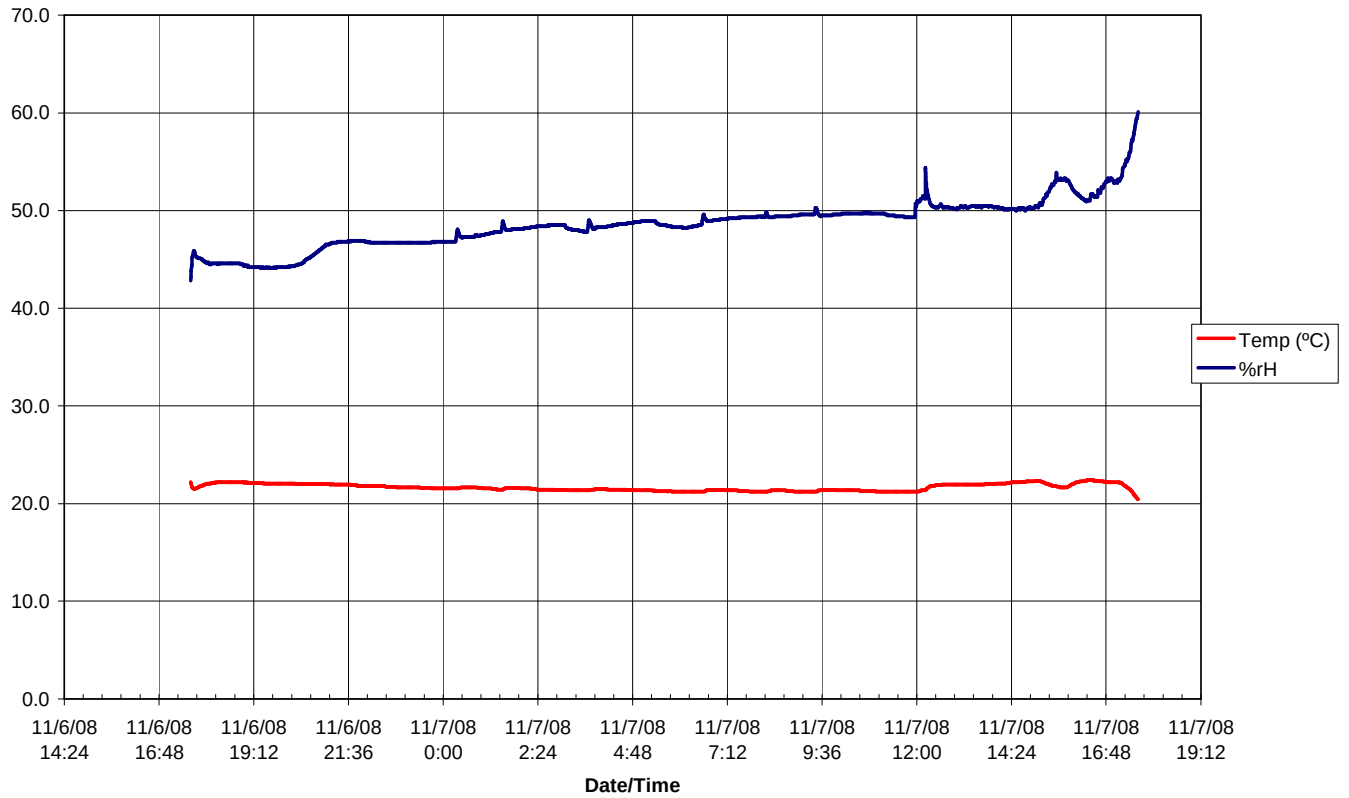
Length of Damaged Region:

L1=	<u>1163</u>	mm
L2=	<u>581.5</u>	mm
L5=	<u>232.6</u>	mm

DATA SHEET NO.16
VEHICLE AND DUMMY TEMPERATURE STABILIZATION CHART

NHTSA Test No.: F90200 Vehicle: 2009 Lincoln MKS 4-Door Sedan

2009 Lincoln MKS F90200 Environmental Conditions



APPENDIX A
PHOTOGRAPHS

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Figure A-1: Load Cell Locations



Figure A-2: Vehicle Certification Placard



Figure A-3: Vehicle Tire Placard



Figure A-4: Right Front, As Received



Figure A-5: Left Rear, As Received



Figure A-6: Pre-Test Front View

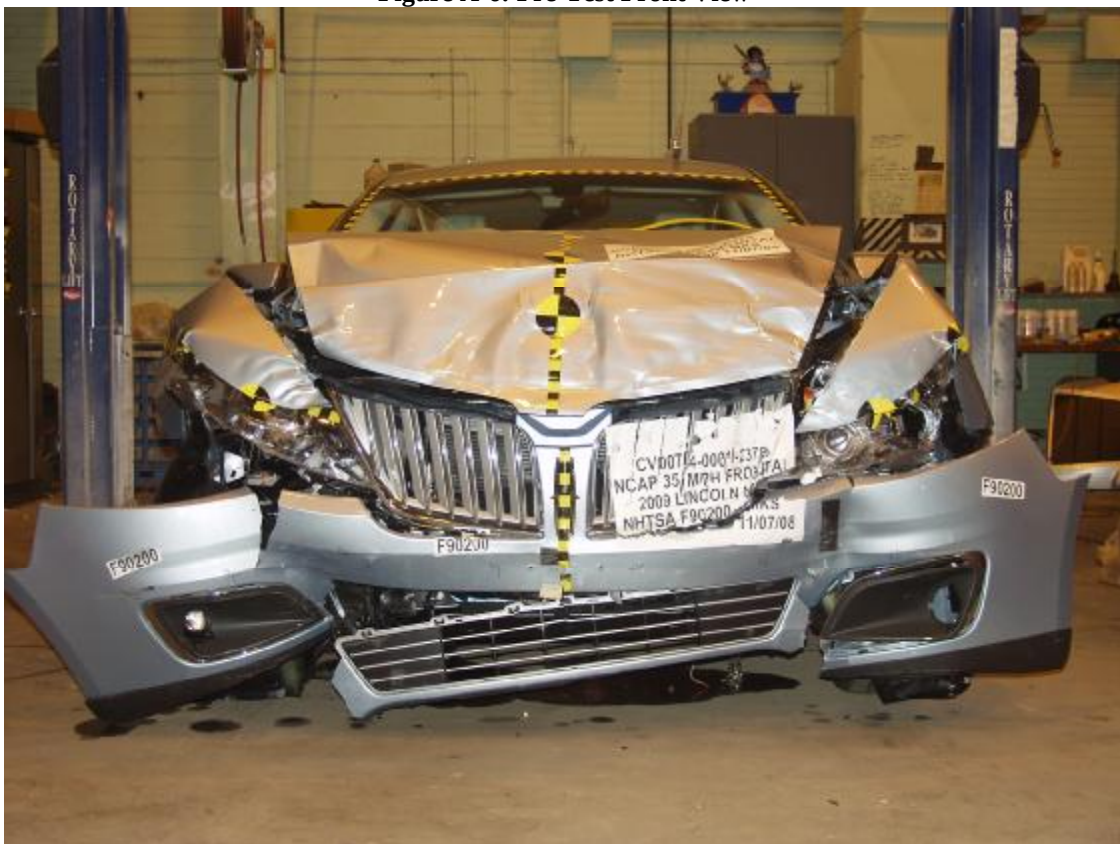


Figure A-7: Post-Test Front View



Figure A-8: Pre-Test Left Side View



Figure A-9: Post-Test Left Side View



Figure A-10: Pre-Test Right Side View



Figure A-11: Post-Test Right Side View



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



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



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



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



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



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



Figure A-18: Pre-Test Windshield View



Figure A-19: Post-Test Windshield View



Figure A-20: Pre-Test Engine Compartment View



Figure A-21: Post-Test Engine Compartment View



Figure A-22: Pre-Test Fuel Cap View



Figure A-23: Post-Test Fuel Cap View



Figure A-24: Pre-Test Front Underbody View



Figure A-25: Post-Test Front Underbody View



Figure A-26: Pre-Test Mid Underbody View



Figure A-27: Post-Test Mid Underbody View



Figure A-28: Pre-Test Rear Underbody View

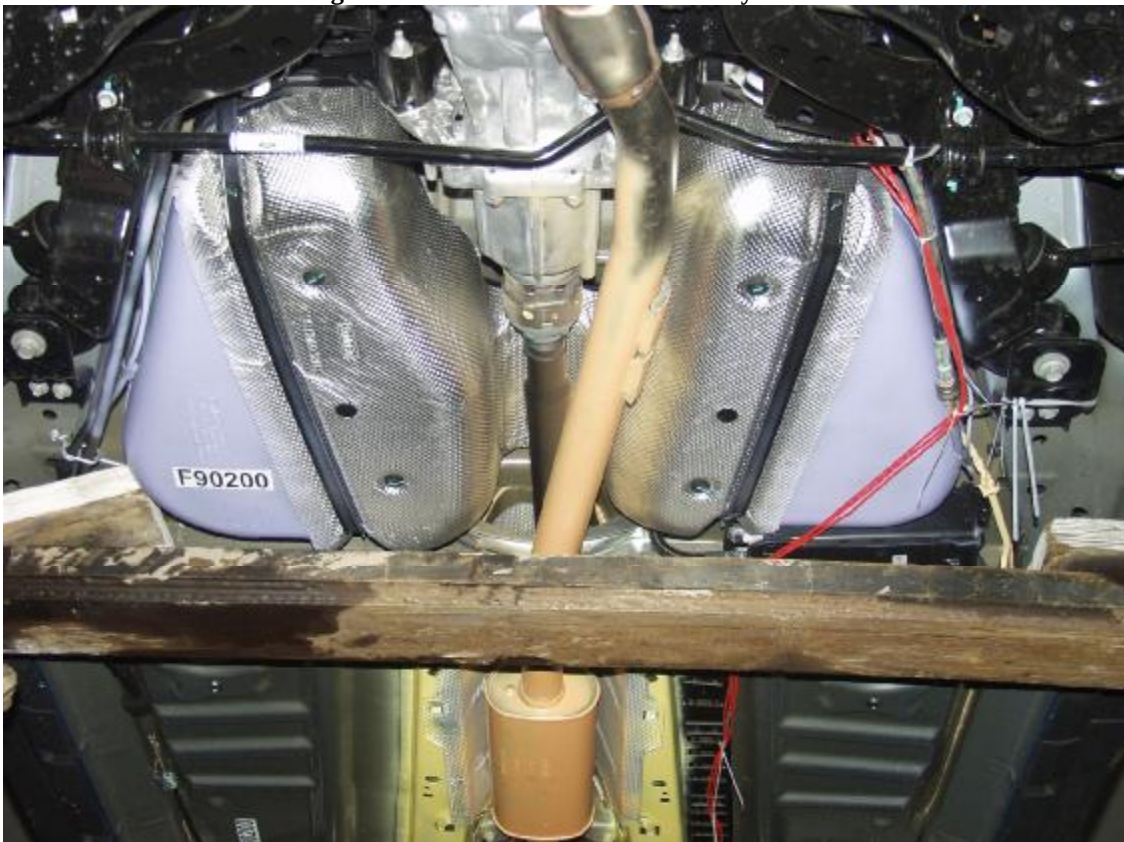


Figure A-29: Post-Test Rear Underbody View



Figure A-30: Pre-Test Driver Head Location

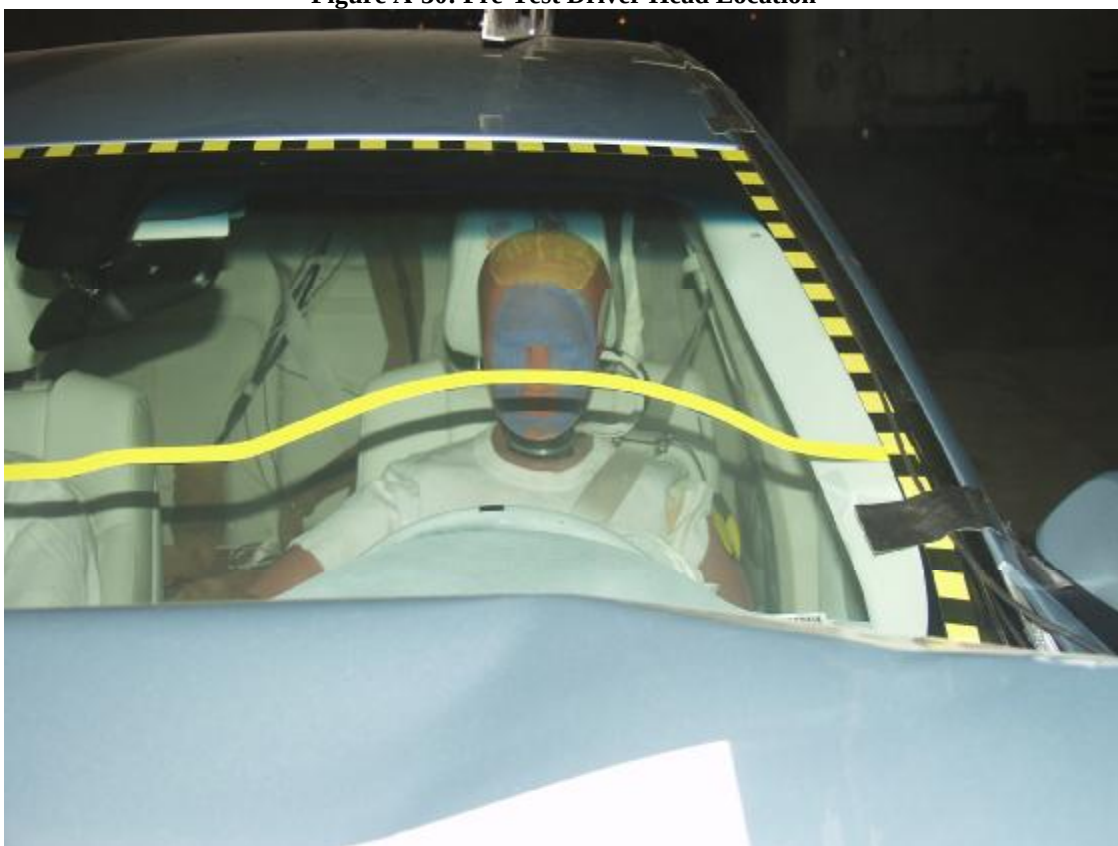


Figure A-31: Post-Test Driver Head Location



Figure A-32: Pre-Test Driver Position View



Figure A-33: Post-Test Driver Position View



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

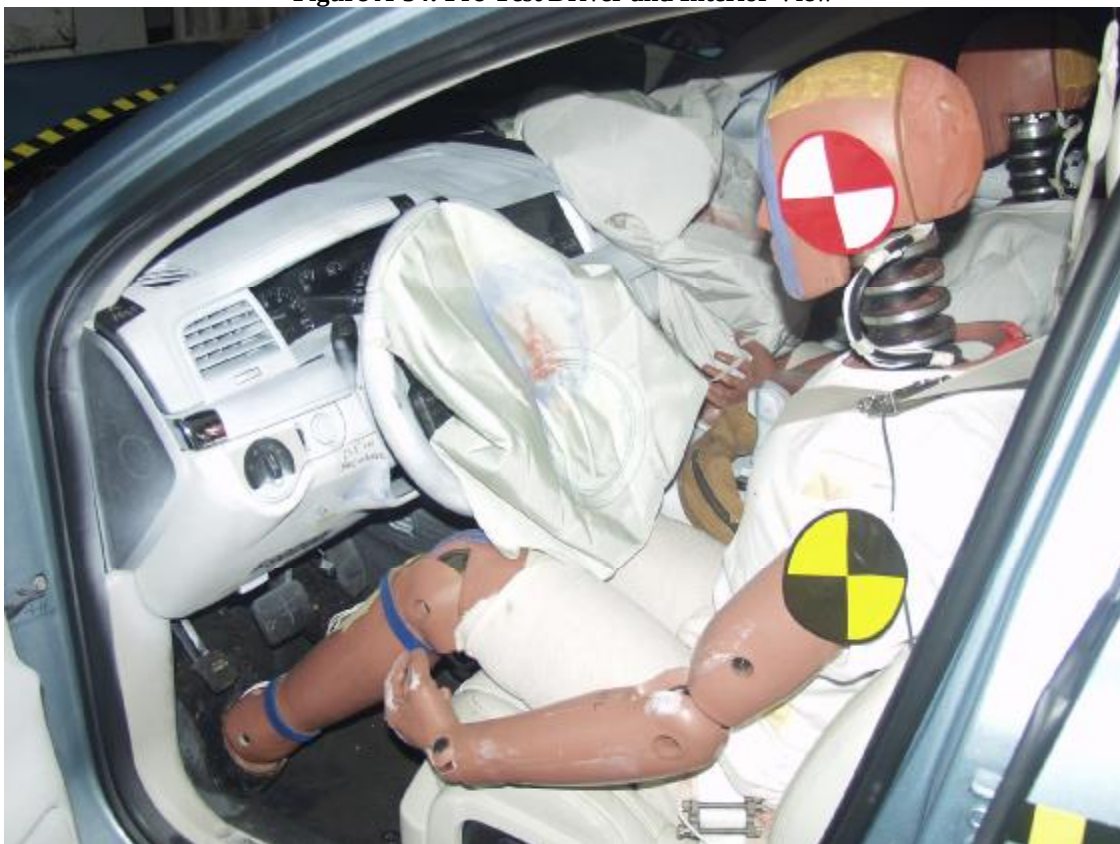


Figure A-35: Post-Test Driver and Interior View



Figure A-36: Pre-Test Driver Feet View

Photograph Not Available

Figure A-37: Post-Test Driver Feet View



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



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



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



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

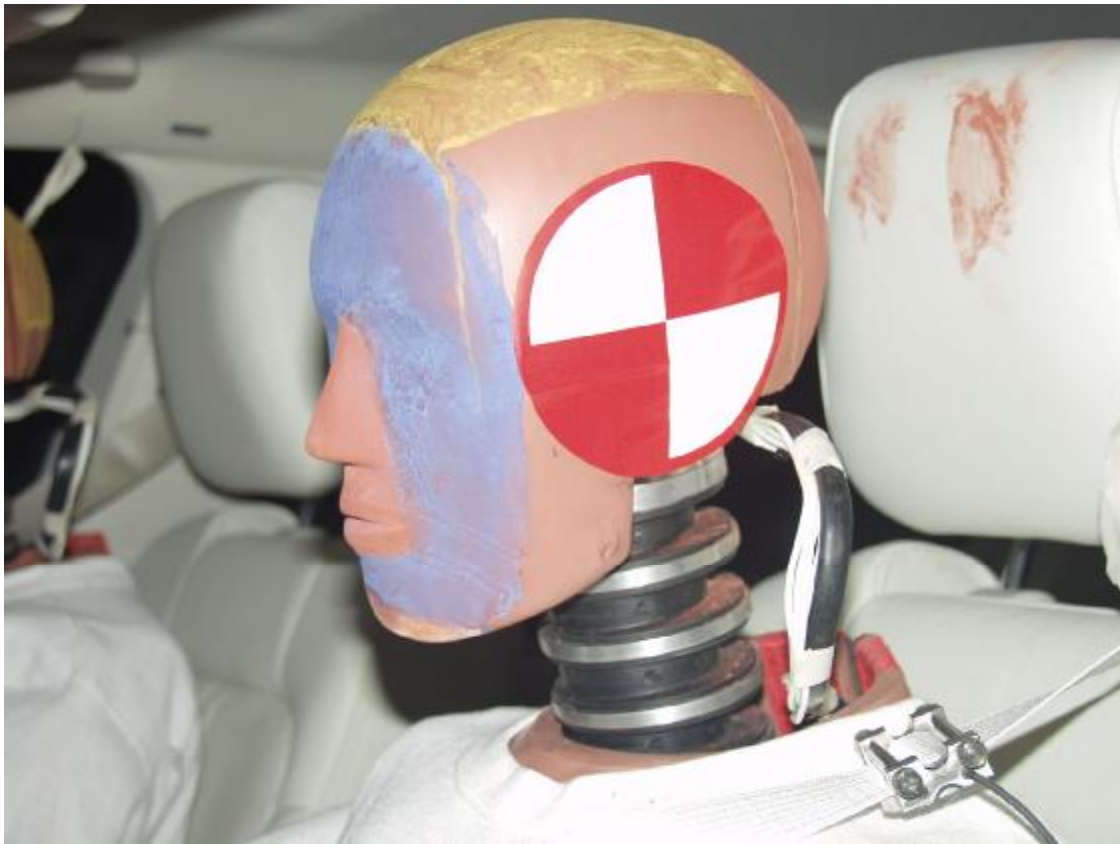


Figure A-42: Post-Test Driver Head View



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



Figure A-44: Pre-Test Passenger Head Location



Figure A-45: Post-Test Passenger Head Location



Figure A-46: Pre-Test Passenger Position View



Figure A-47: Post-Test Passenger Position View



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



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



Figure A-50: Pre-Test Passenger Feet View

Photograph Not Available

Figure A-51: Post-Test Passenger Feet View



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



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



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

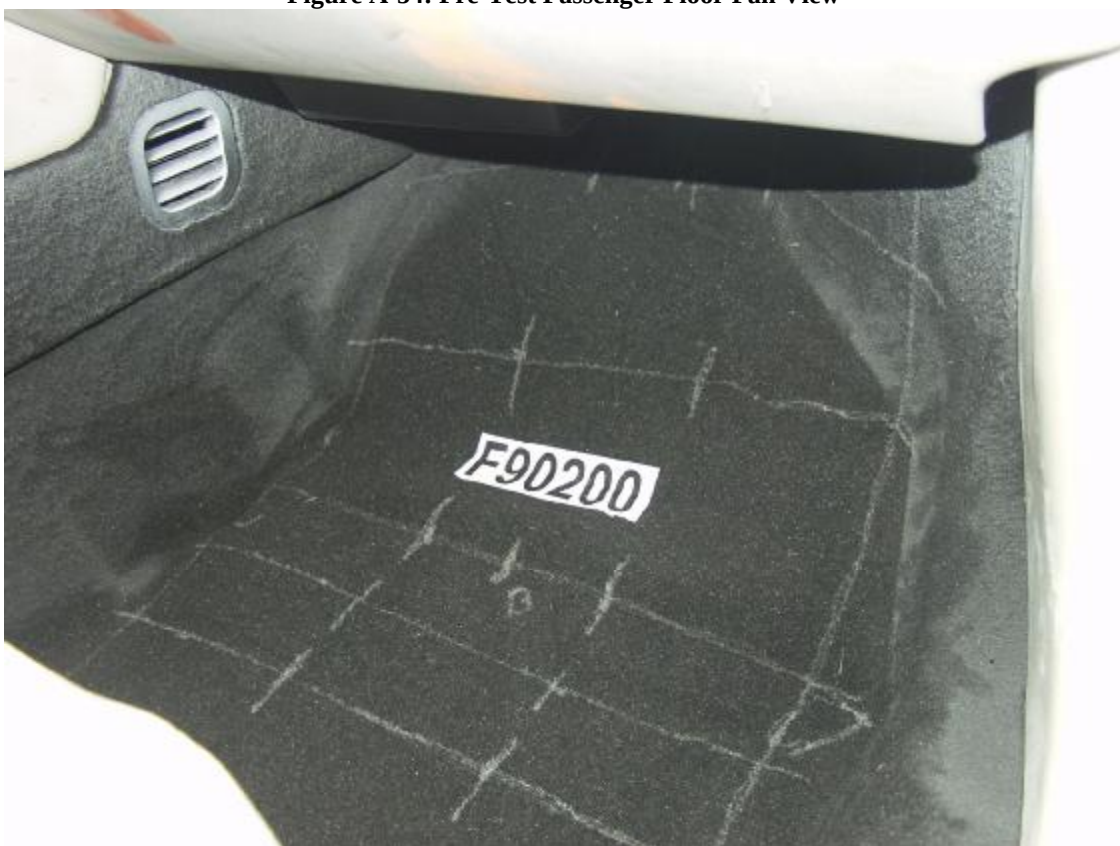


Figure A-55: Post-Test Passenger Floor Pan View

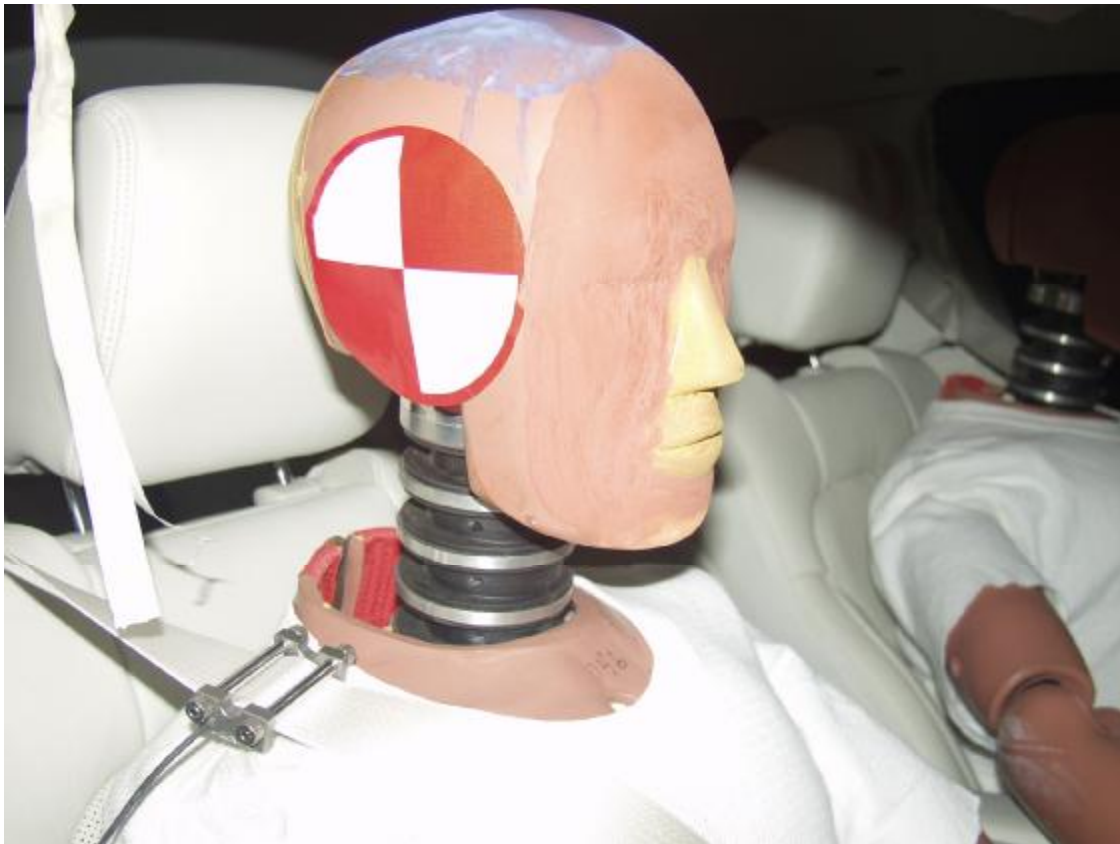


Figure A-56: Post-Test Passenger Head View

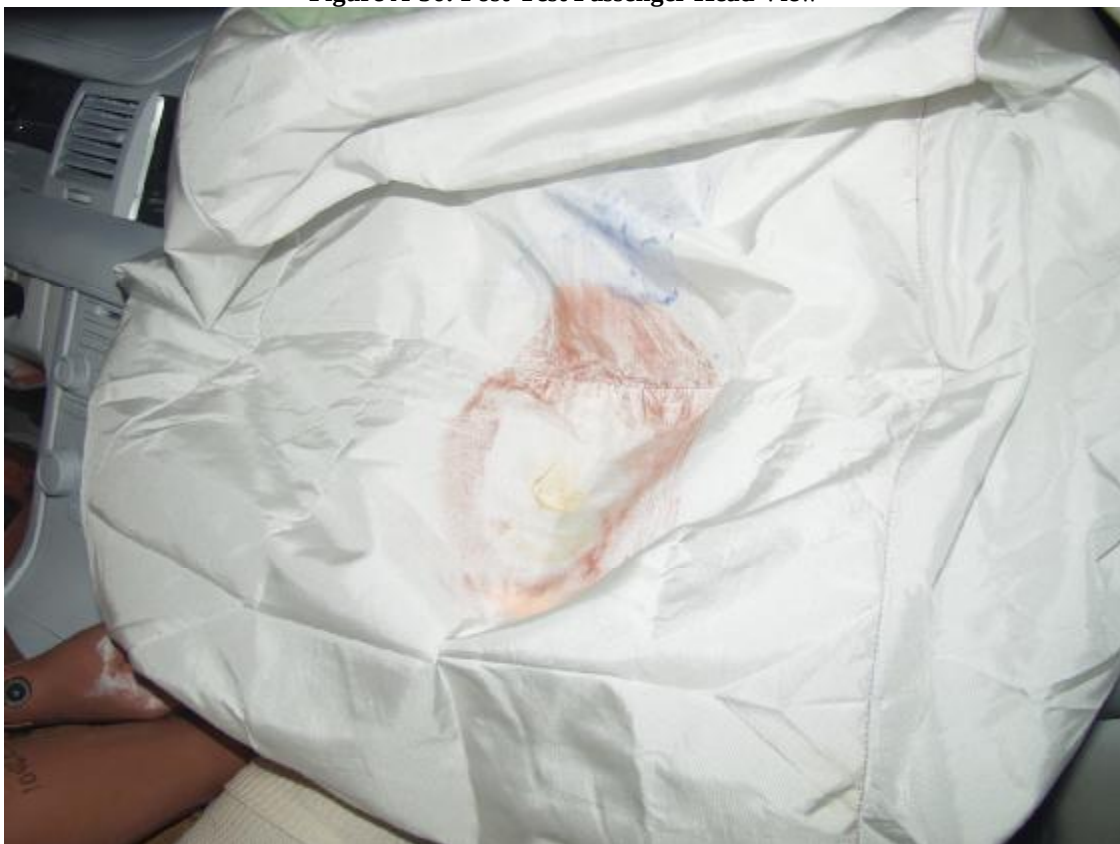


Figure A-57: Post-Test Passenger Contact to Airbag



Figure A-58: Rollover View - 90°



Figure A-59: Rollover View - 180°

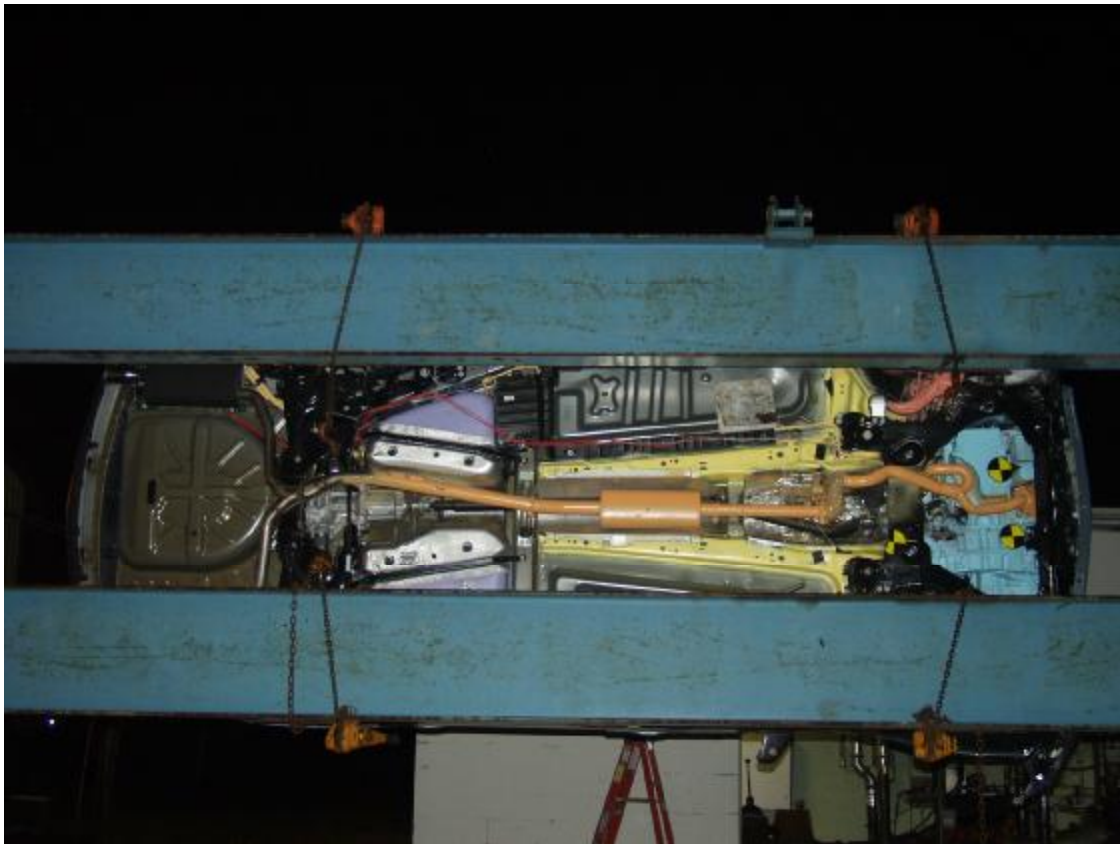


Figure A-60: Rollover View - 270°



Figure A-61: Rollover View - 360°



Figure A-62: Impact View

APPENDIX B

DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA

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

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

DATA CHANNEL FILTER CLASS SUMMARY

NHTSA TEST NO.: F90200

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

Table of Data Plots

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

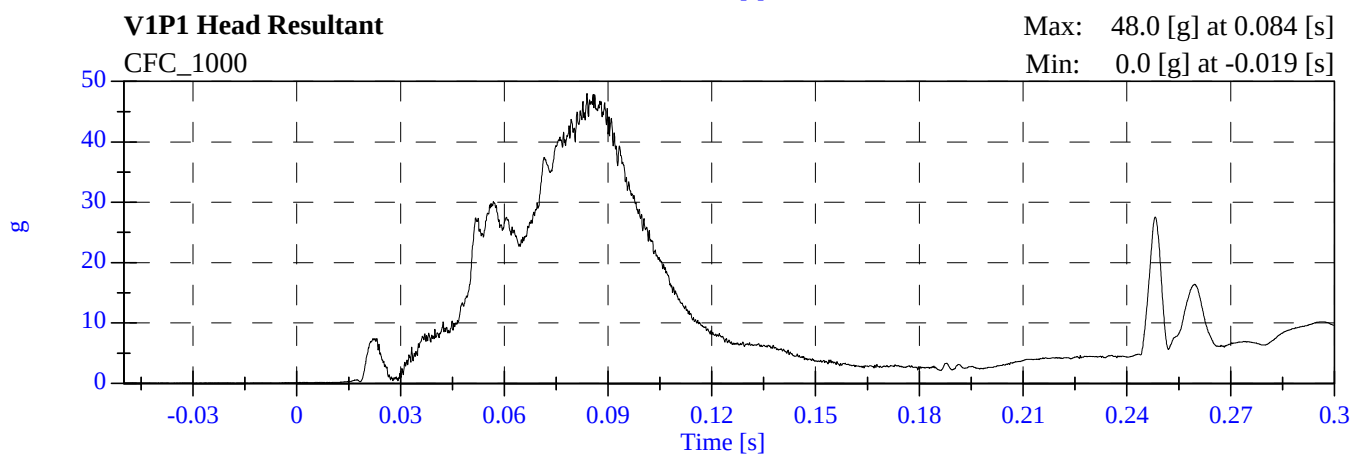
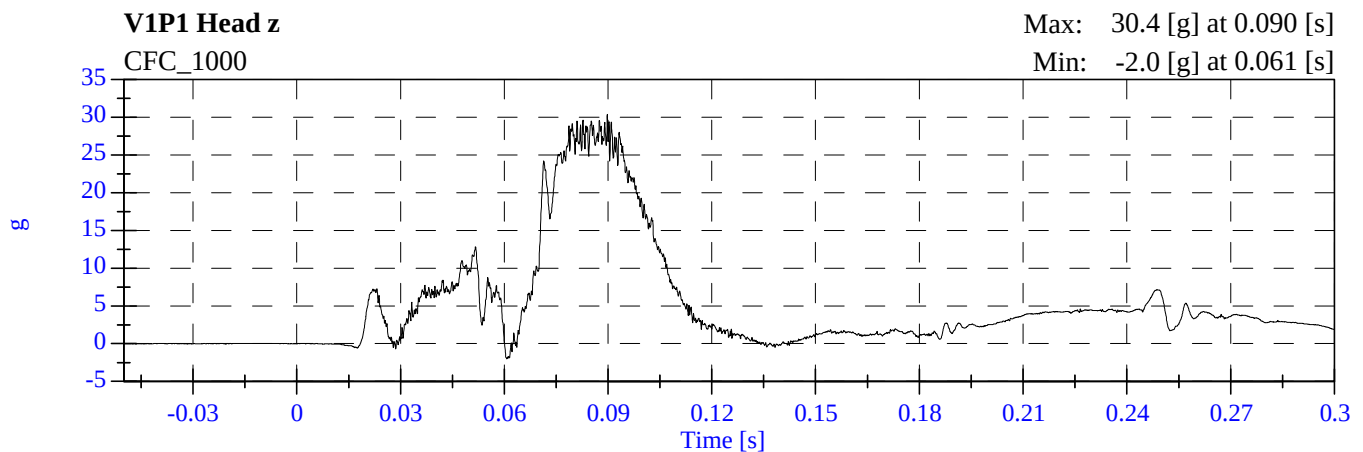
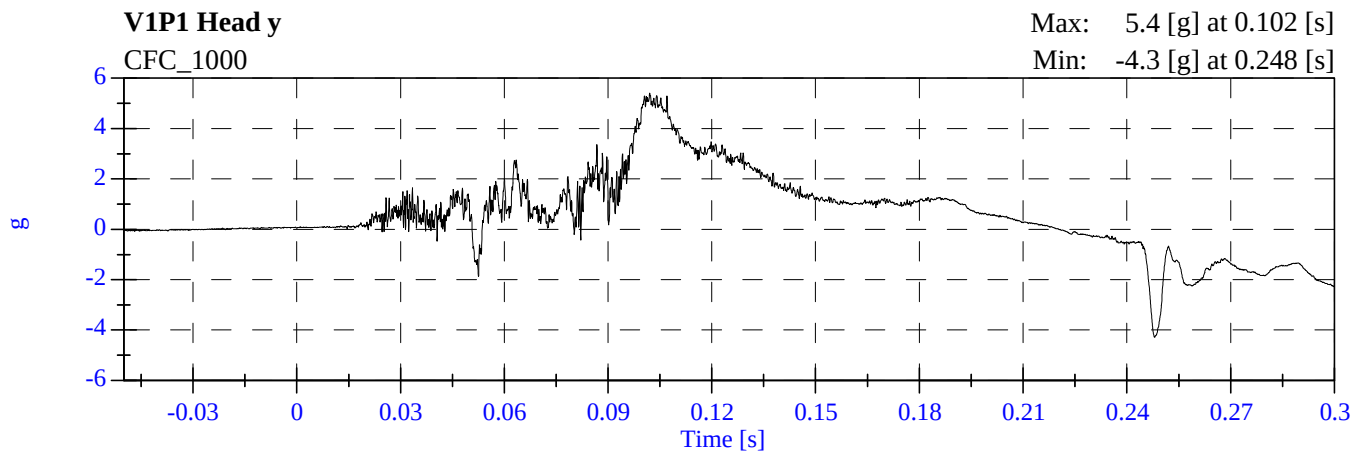
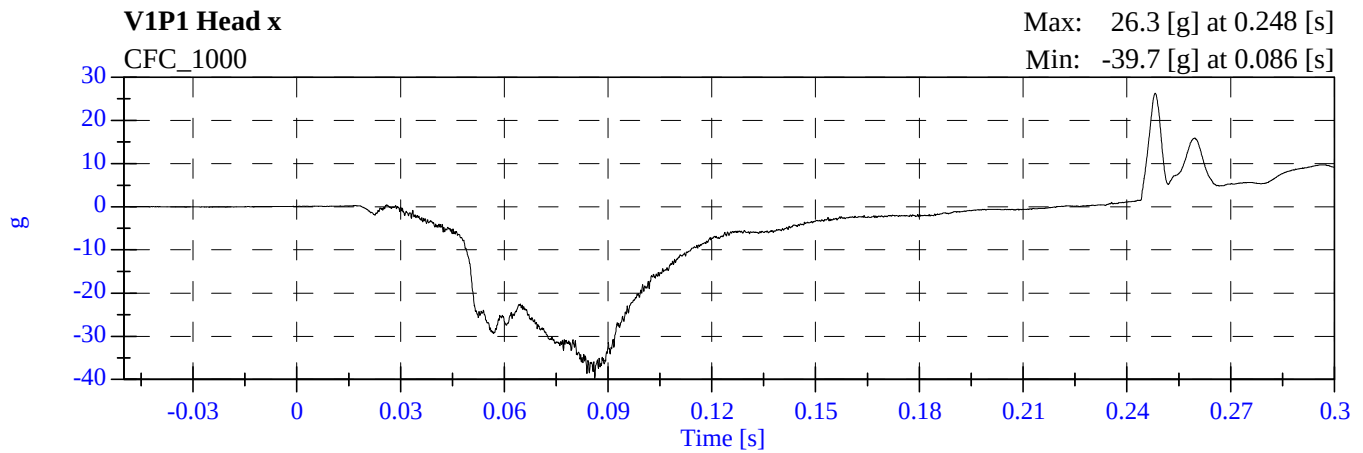
The following dummy, vehicle and load cell response data can be found in the research and development section of the NHTSA website at: www.nhtsa.dot.gov

V1P1 Head CG Ax	V1P2 Head CG Ax
V1P1 Head CG Ay	V1P2 Head CG Ay
V1P1 Head CG Az	V1P2 Head CG Az
V1P1 Head CG Red Ax	V1P2 Head CG Red Ax
V1P1 Head CG Red Ay	V1P2 Head CG Red Ay
V1P1 Head CG Red Az	V1P2 Head CG Red Az
V1P1 Upper Neck Fx	V1P2 Upper Neck Fx
V1P1 Upper Neck Fy	V1P2 Upper Neck Fy
V1P1 Upper Neck Fz	V1P2 Upper Neck Fz
V1P1 Upper Neck Mx	V1P2 Upper Neck Mx
V1P1 Upper Neck My	V1P2 Upper Neck My
V1P1 Upper Neck Mz	V1P2 Upper Neck Mz
V1P1 Chest Ax	V1P2 Chest Ax
V1P1 Chest Ay	V1P2 Chest Ay
V1P1 Chest Az	V1P2 Chest Az
V1P1 Chest Red Ax	V1P2 Chest Red Ax
V1P1 Chest Red Ay	V1P2 Chest Red Ay
V1P1 Chest Red Az	V1P2 Chest Red Az
V1P1 Chest Compression	V1P2 Chest Compression
V1P1 Pelvic Ax	V1P2 Pelvic Ax
V1P1 Pelvic Ay	V1P2 Pelvic Ay
V1P1 Pelvic Az	V1P2 Pelvic Az
V1P1 Left Femur Fz	V1P2 Left Femur Fz
V1P1 Right Femur Fz	V1P2 Right Femur Fz
V1P1 Left Upper Tibia Mx	V1P2 Left Upper Tibia Fz
V1P1 Left Upper Tibia My	V1P2 Left Upper Tibia Mx
V1P1 Left Lower Tibia Fz	V1P2 Left Upper Tibia My
V1P1 Left Lower Tibia Mx	V1P2 Left Lower Tibia Mx
V1P1 Left Lower Tibia My	V1P2 Left Lower Tibia My
V1P1 Right Upper Tibia Fz	V1P2 Right Upper Tibia Mx
V1P1 Right Upper Tibia Mx	V1P2 Right Upper Tibia My
V1P1 Right Upper Tibia My	V1P2 Right Lower Tibia Fz
V1P1 Right Lower Tibia Mx	V1P2 Right Lower Tibia Mx
V1P1 Right Lower Tibia My	V1P2 Right Lower Tibia My
V1P1 Left Foot Aft Ax	V1P2 Left Foot Aft Ax
V1P1 Left Foot Aft Az	V1P2 Left Foot Aft Az
V1P1 Left Foot Fore Az	V1P2 Left Foot Fore Az
V1P1 Right Foot Aft Ax	V1P2 Right Foot Aft Ax
V1P1 Right Foot Aft Az	V1P2 Right Foot Aft Az
V1P1 Right Foot Fore z	V1P2 Right Foot Fore Az
V1P1 Lap Belt Load	V1P2 Lap Belt Load
V1P1 Shoulder Belt Load	V1P2 Shoulder Belt Load

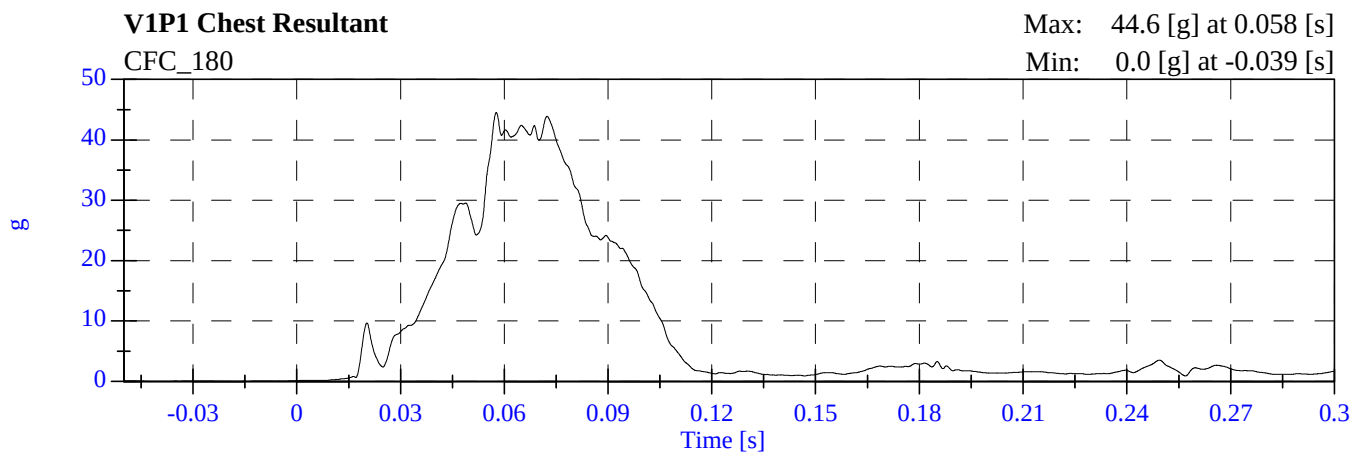
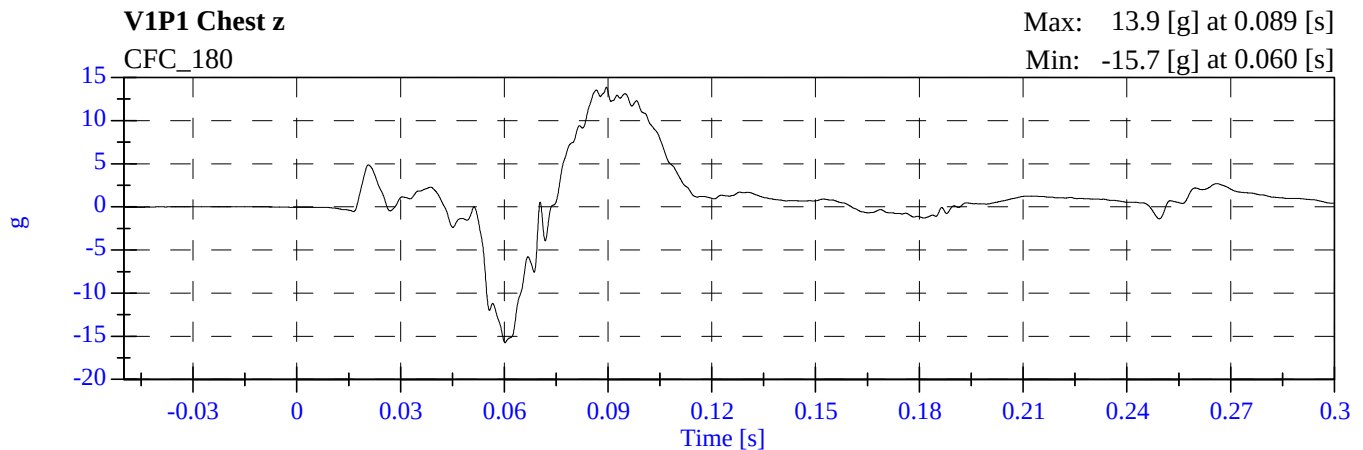
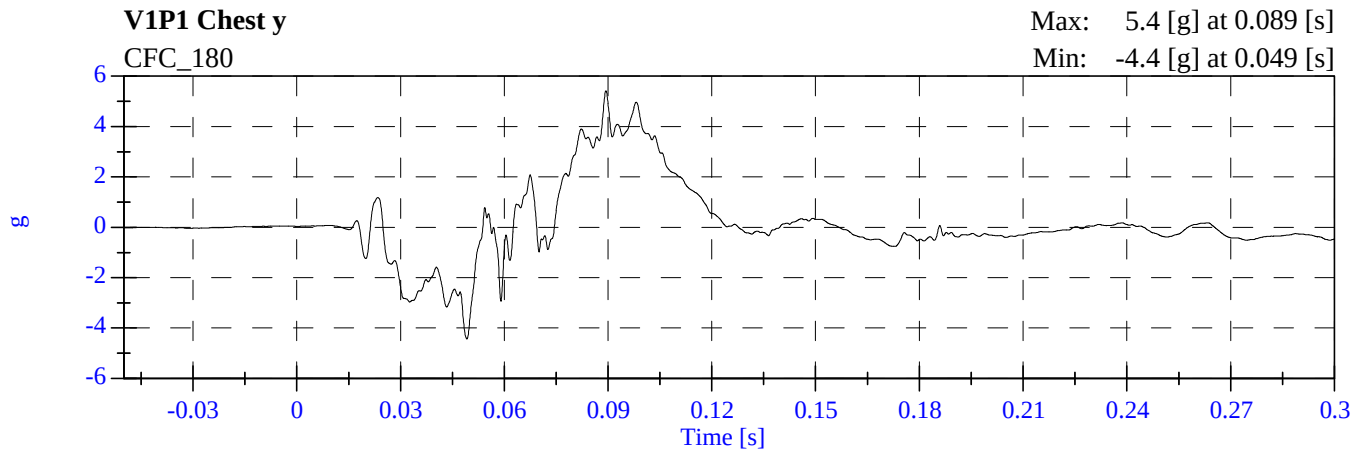
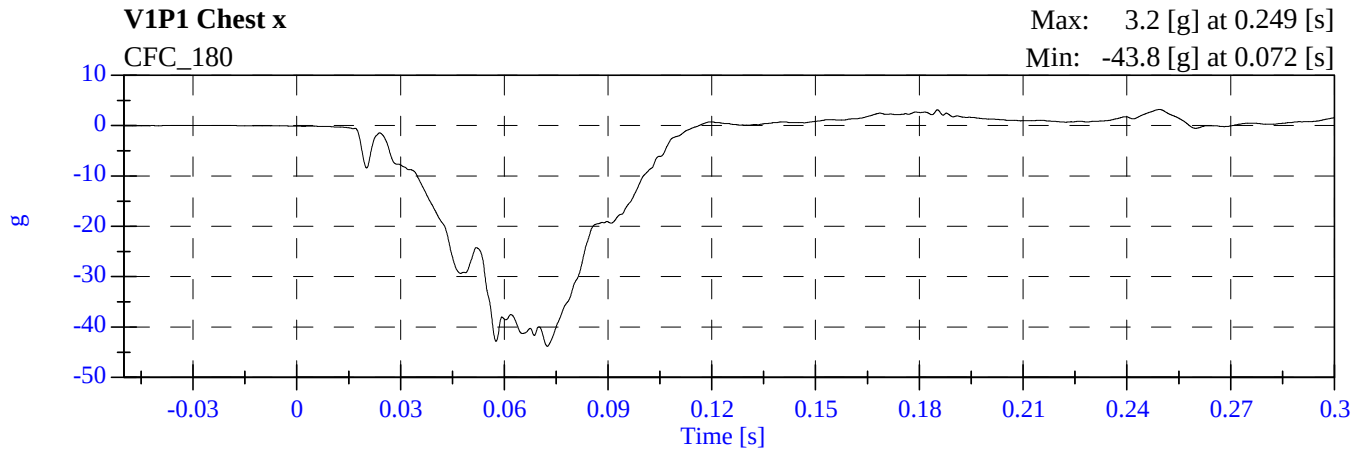
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Barrier Load Cell A2 Fx	Barrier Load Cell D7 Fx
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Barrier Load Cell A4 Fx	Barrier Load Cell D9 Fx
Barrier Load Cell A5 Fx	
Barrier Load Cell A6 Fx	
Barrier Load Cell A7 Fx	
Barrier Load Cell A8 Fx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

TEST NOTES	
Data Channel	Anomalies
V1P1 Pelvic x	Questionable Data 72 - 83 msec
V1P1 Left Lower Tibia My	Saturated channel 59.7 - 64.7 msec
V1P1 Head CG y Red	Questionable Data 40 - 43.8 msec
V1P2 Pelvic x	Questionable Data 38.4 - 79.7 msec
V1P2 Pelvic y	Questionable Data 47.4 - 97.8 msec
V1P2 Pelvic z	Questionable Data 73.9 - 92.8 msec
V1P2 Right Foot Aft x	Questionable Data 41- 109 msec
V1P2 Right Upper Tibia Mx	Questionable Data after 143.8 msec
V1 Engine Bottom #4x	Cut sensor cable after 54 msec

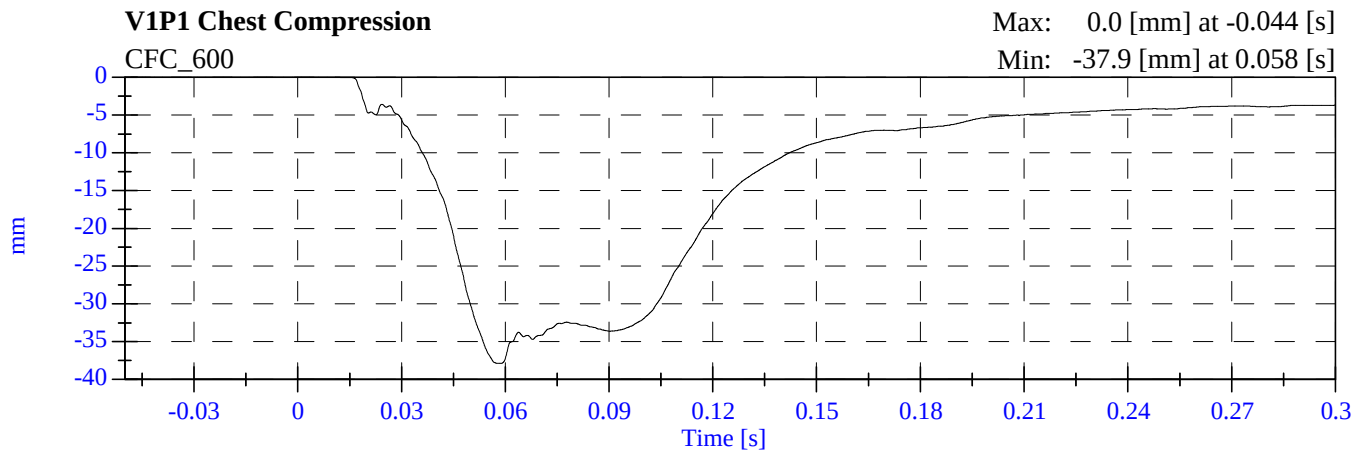
**2009 NCAP Opt. Test 1 2009 Lincoln MKS
F90200 - November 07, 2008**



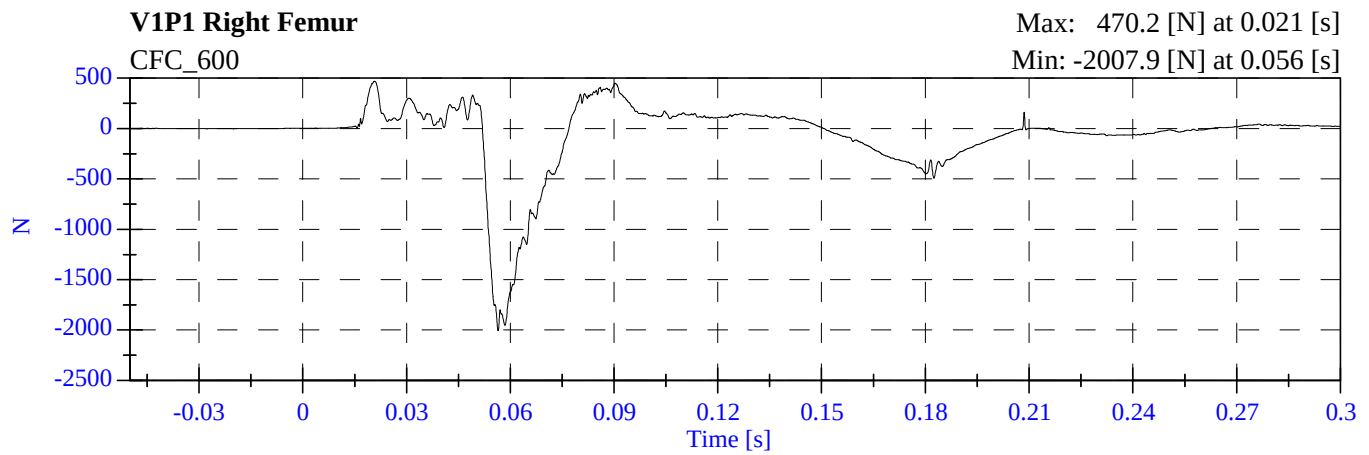
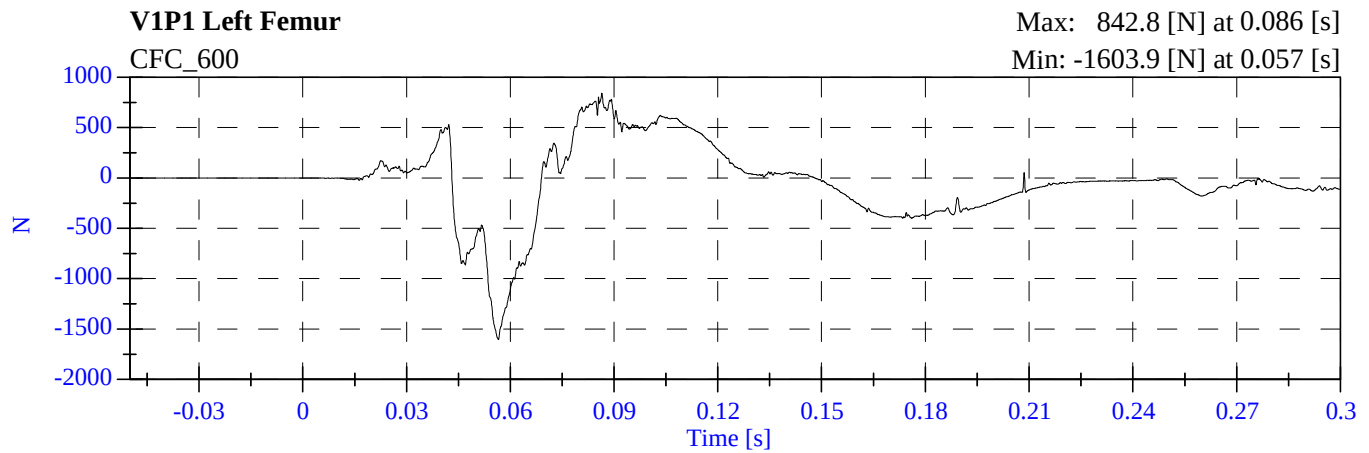
2009 NCAP Opt. Test 1 2009 Lincoln MKS F90200 - November 07, 2008



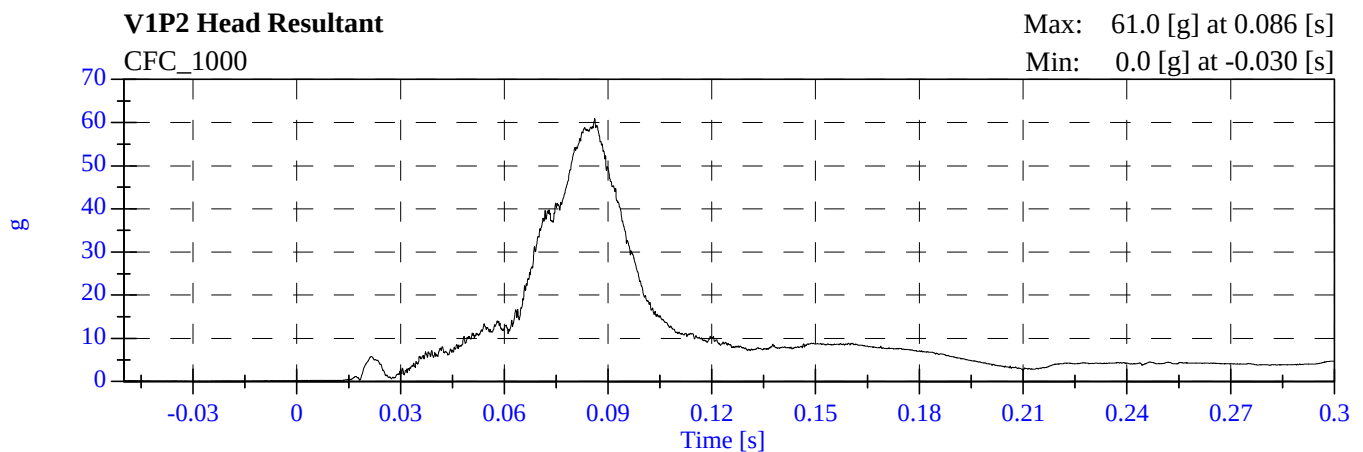
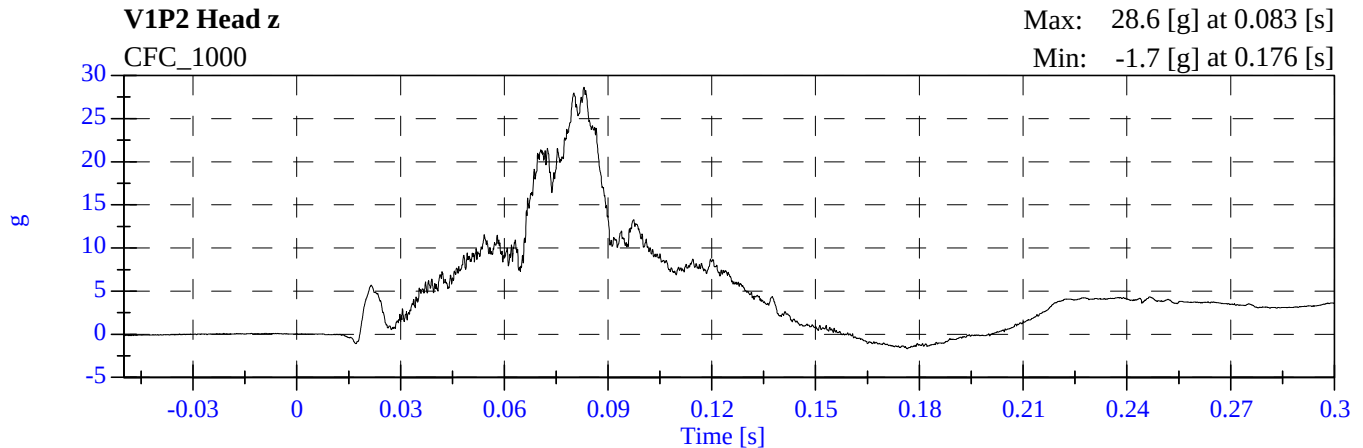
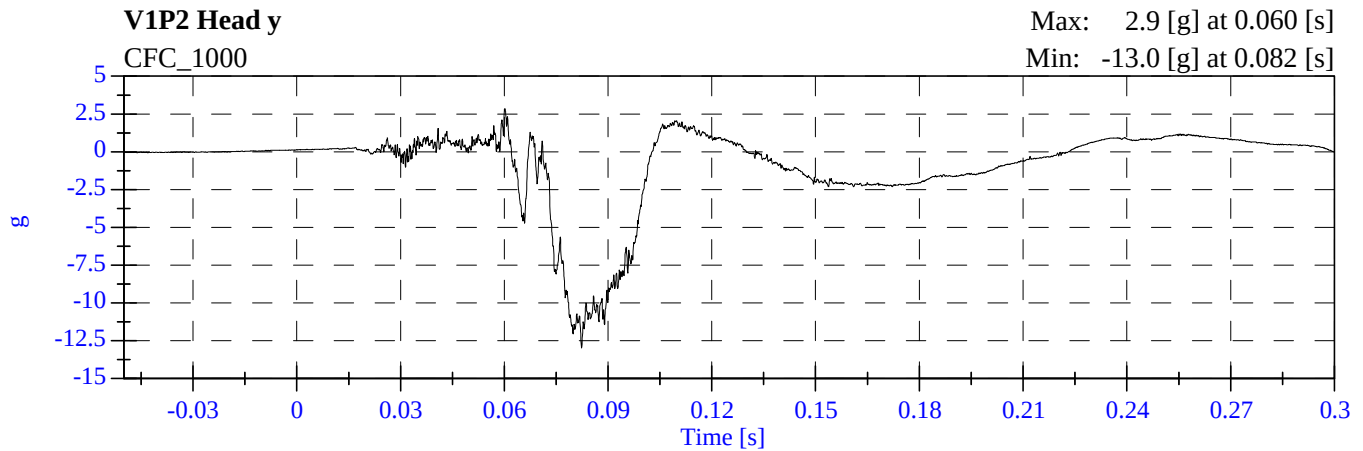
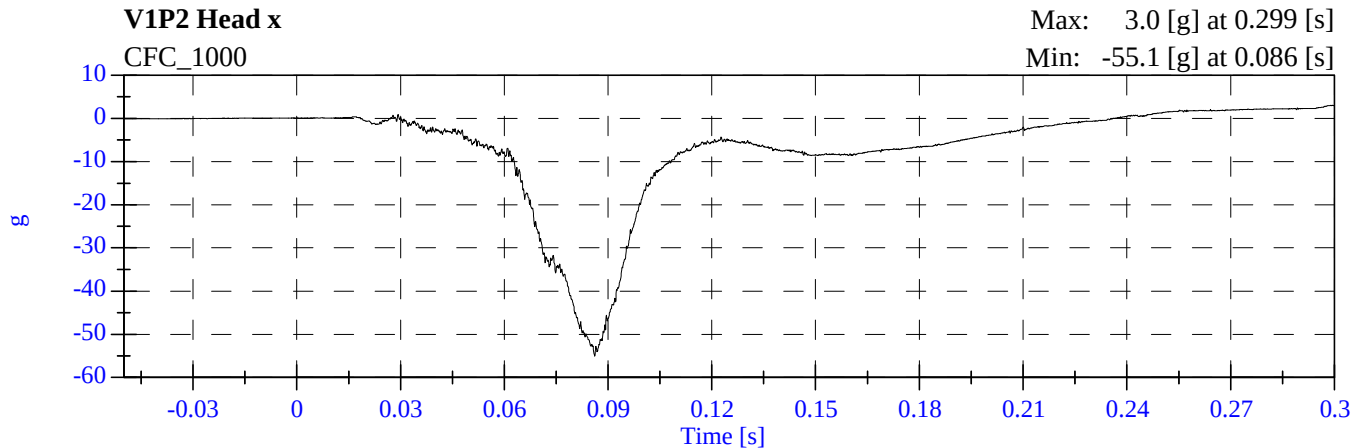
2009 NCAP Opt. Test 1 2009 Lincoln MKS
F90200 - November 07, 2008



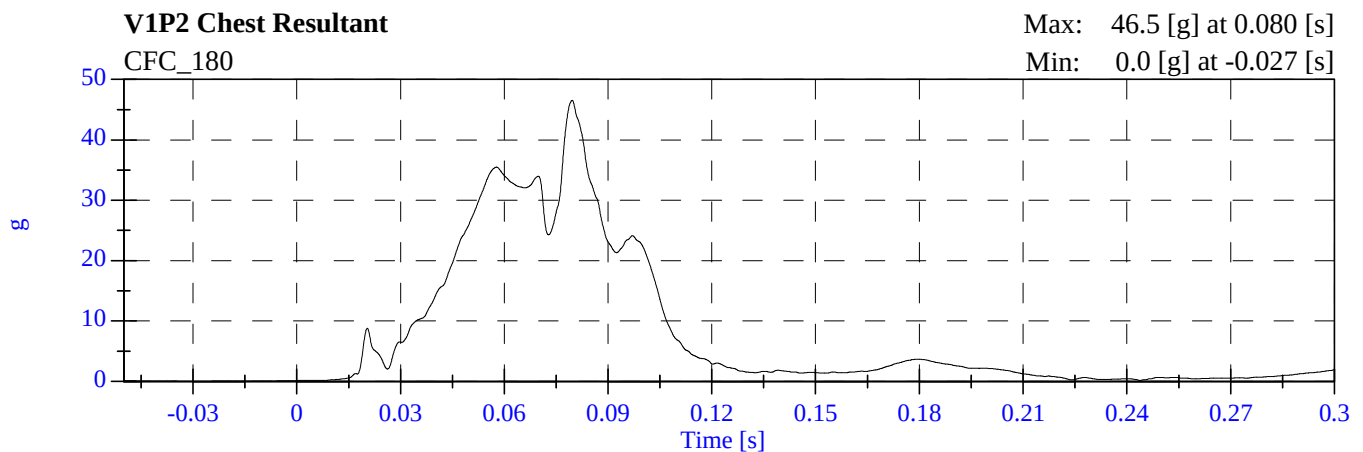
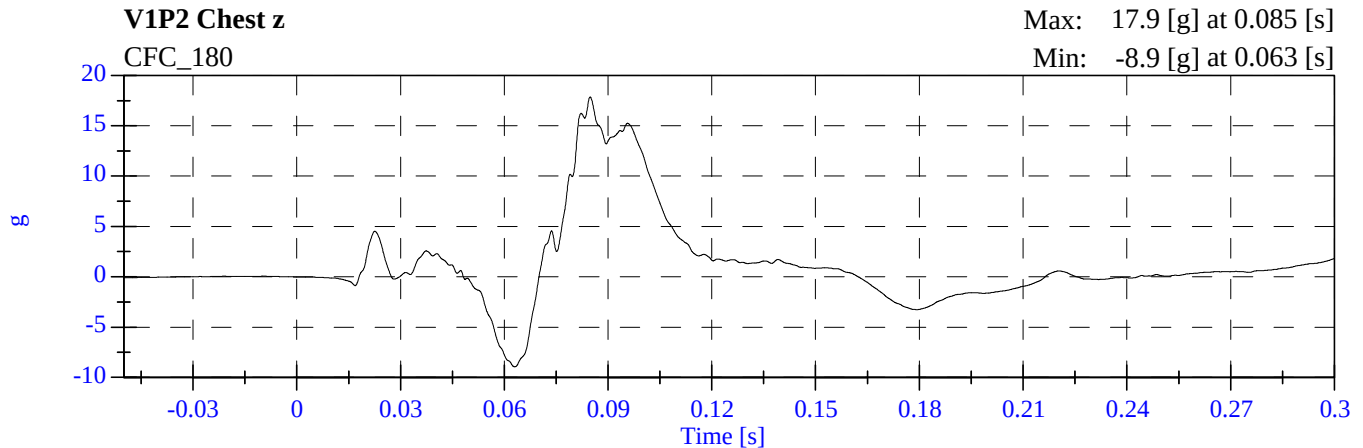
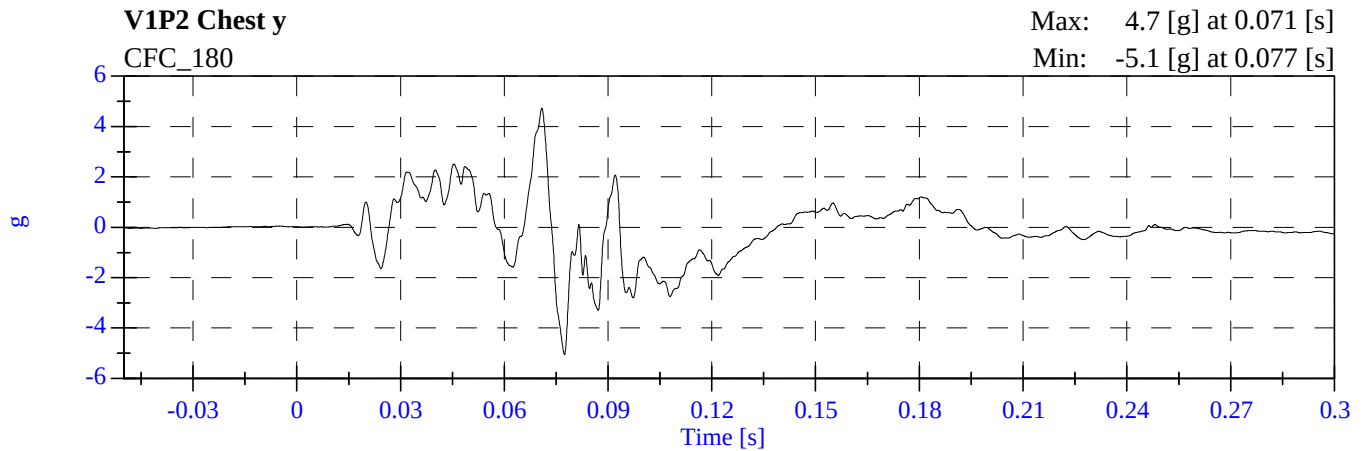
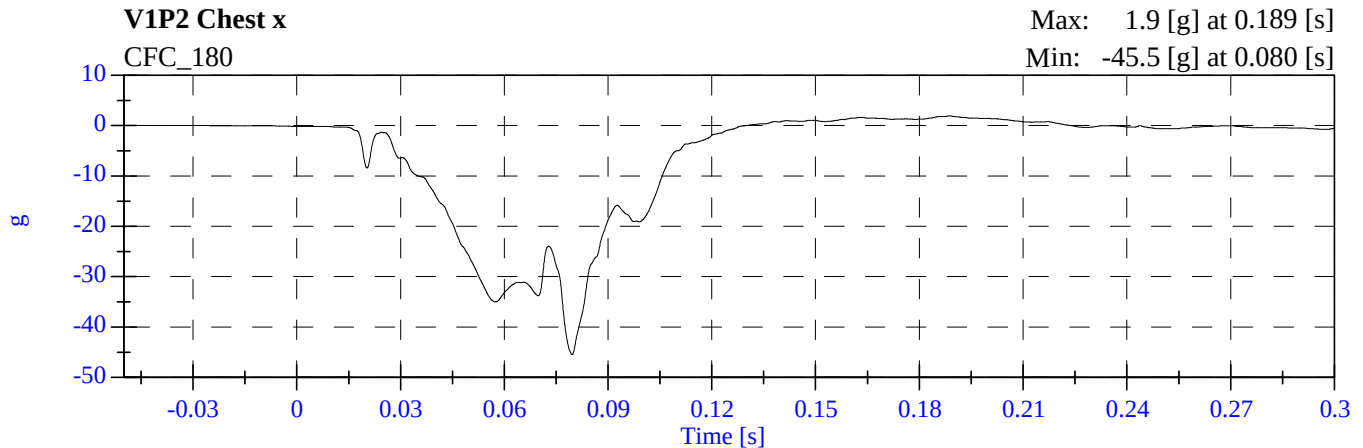
2009 NCAP Opt. Test 1 2009 Lincoln MKS
F90200 - November 07, 2008



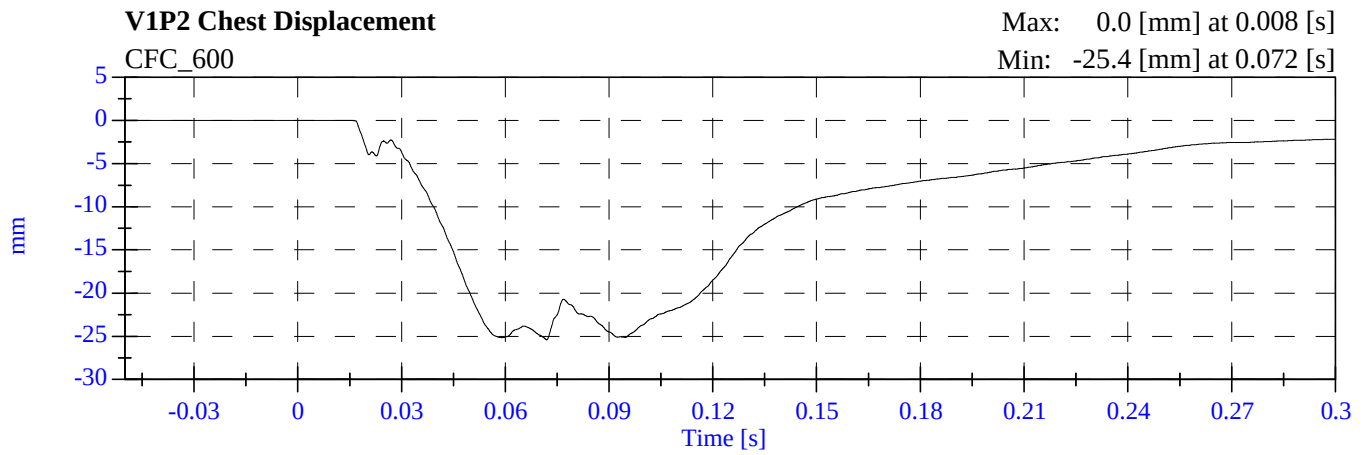
**2009 NCAP Opt. Test 1 2009 Lincoln MKS
F90200 - November 07, 2008**



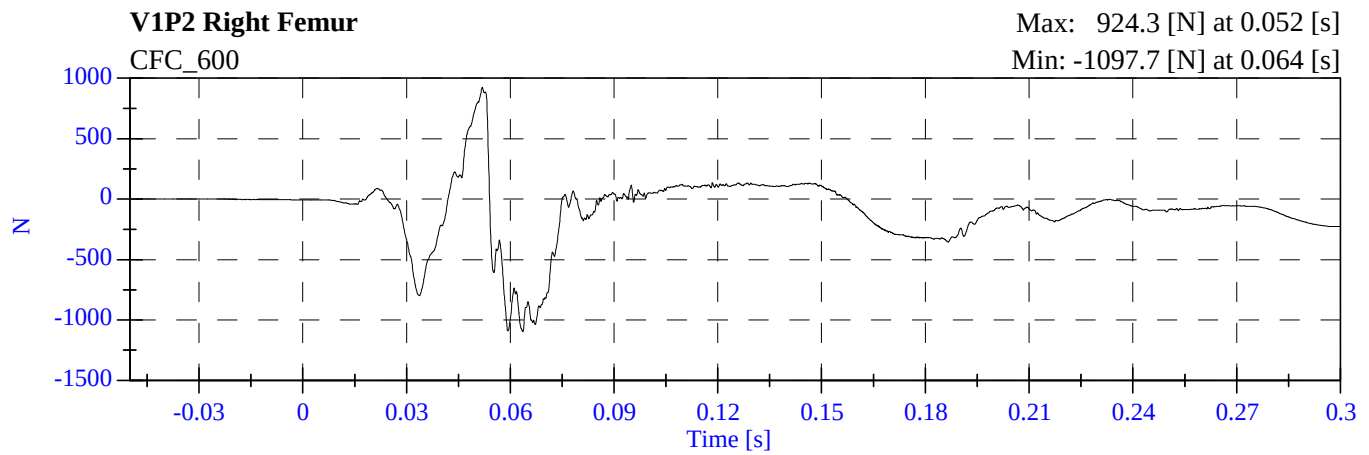
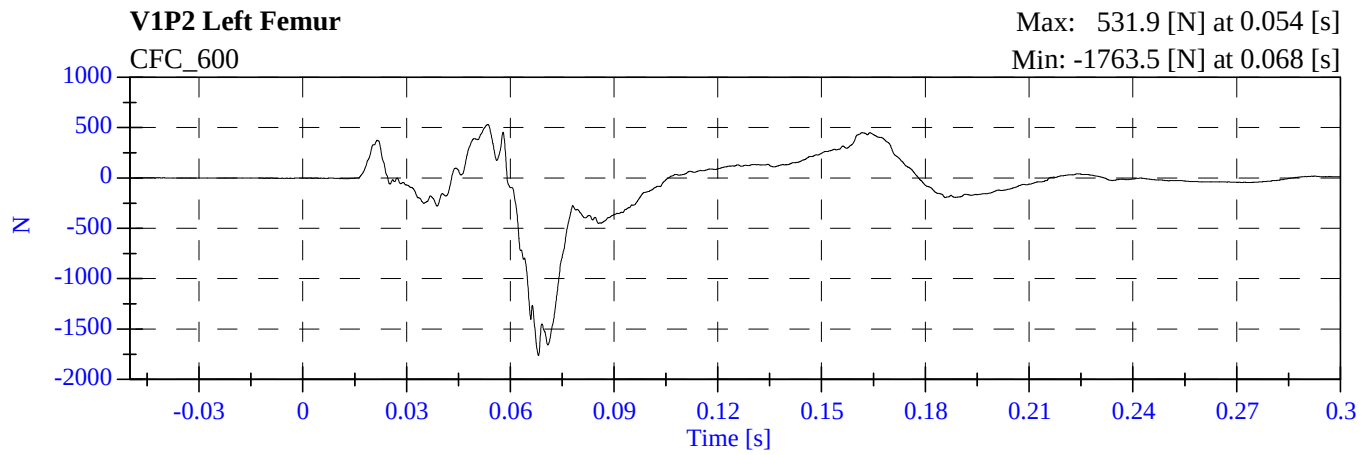
2009 NCAP Opt. Test 1 2009 Lincoln MKS F90200 - November 07, 2008



2009 NCAP Opt. Test 1 2009 Lincoln MKS
F90200 - November 07, 2008



2009 NCAP Opt. Test 1 2009 Lincoln MKS
F90200 - November 07, 2008



APPENDIX C

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

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

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

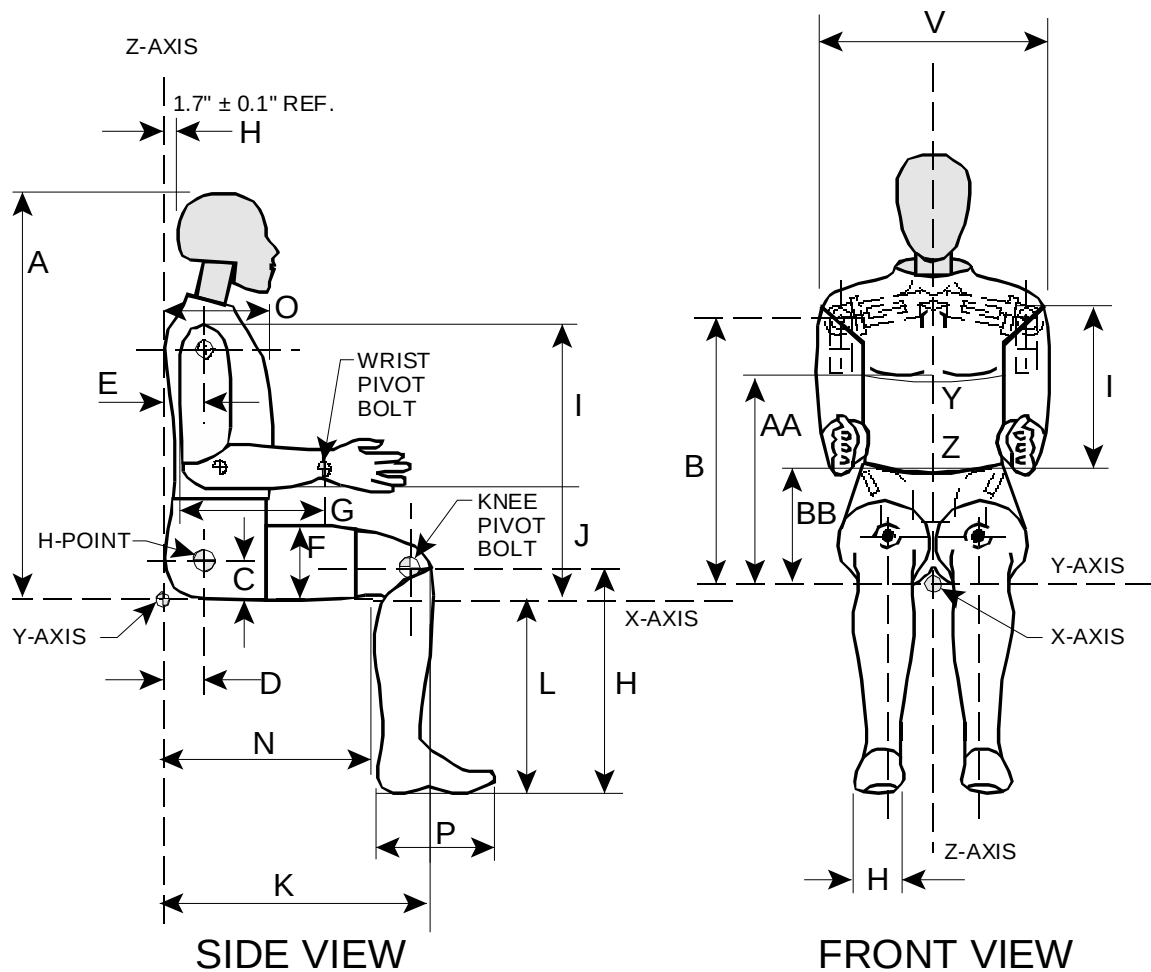
Dummy serial numbers and certification dates are:

<u>Position No./Location</u>	<u>Serial No.</u>	<u>Completion Date</u>
#1/Driver	1047	08-22-08
#2/Right Front Passenger	1046	08-22-08

Electronic Test Equipment

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

EXTERNAL DIMENSIONS SPECIFICATIONS



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

PART 572E
HEAD DROP TEST

Dummy Serial Number 1047
Sequential Test Number 1
Date 08-18-08
Workfile 1047H 08-18-08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	22.2
Relative Humidity	10% - 70%	60
Peak Resultant Acceleration	225-275 G's	268.75
Peak Lateral Acceleration	15 G's Max	11.43
Is Acceleration Curve Unimodal?	YES	Yes

Remarks: None

Laboratory Technician:

B. Swiecicki

PART 572E NECK FLEXION TEST

Dummy Serial Number	1047	
Sequential Test Number	1	
Date	08-20-08	6 Axis Neck Transducer
Workfile	1047NF2 08-20-08	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.1
Relative Humidity		10% - 70%	48
Impact Velocity		6.89 – 7.13 m/s	7.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	25.19
	20 ms	17.60 - 22.60 G's	21.08
	30 ms	12.50 - 18.50 G's	16.39
Max Pendulum G's Above 30 ms		29 G's Max	16.39
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	38.20
D Plane Rotation	Max	64 - 78 Deg	70.63
	Time	57 - 64 ms	59.40
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m	96.39
	Time	47 - 58 ms	49.10
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	114.20
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	100.20

Remarks:	None
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Laboratory Technician: B. Swiecicki

PART 572E NECK EXTENSION TEST

Dummy Serial Number	1047	
Sequential Test Number	1	
Date	8-20-08	6 Axis Neck Transducer
Workfile	1047NE2 08-20-08	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.11
Relative Humidity		10% - 70%	48
Impact Velocity		5.94 – 6.19 m/s	6.07
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	20.40
	20 ms	14.00 - 19.00 G's	17.81
	30 ms	11.00 - 16.00 G's	14.05
Max Pendulum G's Above 30 ms		22 G's Max	14.05
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	40.20
D Plane Rotation	Max	81 - 106 Deg	95.43
	Time	72 - 82 ms	74.90
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-71.15
	Time	65 - 79 ms	70.90
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	153.50
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	138.30

Remarks: None

Laboratory Technician: B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 1047
Sequential Test Number 1
Date 8-21-08
Workfile 1047T5 08-21-08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.67
Relative Humidity	10% - 70%	51
Pendulum Velocity	6.58 – 6.83 m/s	6.66
Maximum Deflection	63.50 – 72.64 mm	70.87
Maximum Resistive Force	5159.9 – 5893.9 N	5306.2
Internal Hysteresis	69 - 85 %	70.3

Remarks: None

Laboratory Technician: B. Swiecicki

PART 572E KNEE IMPACT TEST

Dummy Serial Number	1047
Sequential Test Number	1
Date	8-22-08
Workfile	1047LF 8-22-08; 1047RF 8-22-08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.7
Relative Humidity	10% - 70%	56
Probe Velocity	2.07 – 2.13 m/s	2.08
Peak Knee Impact Force	4715.1 – 5782.7 N	4894.4
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	21.7
Relative Humidity	10% - 70%	56
Probe Velocity	2.07 – 2.13 m/s	2.09
Peak Knee Impact Force	4715.1 – 5782.7 N	5097.7

Remarks: None

Laboratory Technician:

B. Swiecicki

Dummy Serial Number	1047
Sequential Test Number	1
Date	8-22-08

Remarks:	None
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B. Swiecicki

PART 572E
HEAD DROP TEST

Dummy Serial Number 1046
Sequential Test Number 1
Date 8-18-08
Workfile 1046H 08-18-08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	22.2
Relative Humidity	10% - 70%	60
Peak Resultant Acceleration	225-275 G's	274.49
Peak Lateral Acceleration	15 G's Max	6.79
Is Acceleration Curve Unimodal?	YES	Yes

Remarks: None

Laboratory Technician:

B. Swiecicki

PART 572E NECK FLEXION TEST

Dummy Serial Number	1046	
Sequential Test Number	1	
Date	08-19-08	6 Axis Neck Transducer
Workfile	1046NF4 08-19-08	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.67
Relative Humidity		10% - 70%	61
Impact Velocity		6.89 – 7.13 m/s	7.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	23.62
	20 ms	17.60 - 22.60 G's	21.16
	30 ms	12.50 - 18.50 G's	15.90
Max Pendulum G's Above 30 ms		29 G's Max	15.90
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	39
D Plane Rotation	Max	64 - 78 Deg	69.6
	Time	57 - 64 ms	60.30
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m	100.01
	Time	47 - 58 ms	51.30
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	114.8
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	98.60

Remarks:	None
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Laboratory Technician: B. Swiecicki

PART 572E NECK EXTENSION TEST

Dummy Serial Number	1046
Sequential Test Number	1
Date	8-19-08
Workfile	1046NE 08-18-08

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.67
Relative Humidity		10% - 70%	58
Impact Velocity		5.94 – 6.19 m/s	6.07
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	20.06
	20 ms	14.00 - 19.00 G's	18.59
	30 ms	11.00 - 16.00 G's	14.82
Max Pendulum G's Above 30 ms		22 G's Max	14.82
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	39.70
D Plane Rotation	Max	81 - 106 Deg	92.89
	Time	72 - 82 ms	72.80
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-55.41
	Time	65 - 79 ms	70.20
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	149.20
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	146.20

Remarks: None

Laboratory Technician:

B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 1046
Sequential Test Number 1
Date 8-21-08
Workfile 1046T 08-21-08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	50
Pendulum Velocity	6.58 – 6.83 m/s	6.70
Maximum Deflection	63.50 – 72.64 mm	67.06
Maximum Resistive Force	5159.9 – 5893.9 N	5165.2
Internal Hysteresis	69 - 85 %	71.5

Remarks: None

Laboratory Technician: B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 1046
Sequential Test Number 1
Date 08-22-08
Workfile 1046LF 8-22-08; 1046RF 8-22-08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.7
Relative Humidity	10% - 70%	58
Probe Velocity	2.07 – 2.13 m/s	2.12
Peak Knee Impact Force	4715.1 – 5782.7 N	5377.7
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	21.7
Relative Humidity	10% - 70%	56
Probe Velocity	2.07 – 2.13 m/s	2.09
Peak Knee Impact Force	4715.1 – 5782.7 N	5260.9

Remarks: None

Laboratory Technician:

B. Swiecicki

Dummy Serial Number	1046
Sequential Test Number	1
Date	8-22-08

Remarks:	None
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B. Swiecicki

APPENDIX D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 1047)		Manufacturer	Serial #	Calibration	
				Last	Next
Head	X	ENDEVCO	AC-P50073	02-Sep-08	3-Mar-09
	Y	ENDEVCO	AC-P50062	02-Sep-08	3-Mar-09
	Z	ENDEVCO	AC-P50097	02-Sep-08	3-Mar-09
Head	X (R)	ENDEVCO	AC-P58984	02-Sep-08	3-Mar-09
	Y (R)	ENDEVCO	AC-P58786	02-Sep-08	3-Mar-09
	Z (R)	ENDEVCO	AC-P58787	02-Sep-08	3-Mar-09
Neck Load Cell	X	DENTON	LC-441Fx	14-Mar-08	12-Sep-08
	Y	DENTON	LC-441Fy	14-Mar-08	12-Sep-08
	Z	DENTON	LC-441Fz	14-Mar-08	12-Sep-08
Neck Moment	X	DENTON	LC-441Mx	14-Mar-08	12-Sep-08
	Y	DENTON	LC-441My	14-Mar-08	12-Sep-08
	Z	DENTON	LC-441Mz	14-Mar-08	12-Sep-08
Chest	X	ENDEVCO	AC-P49459	02-Sep-08	3-Mar-09
	Y	ENDEVCO	AC-P52108	02-Sep-08	3-Mar-09
	Z	ENDEVCO	AC-P49213	02-Sep-08	3-Mar-09
Chest	X (R)	ENDEVCO	AC-P58892	02-Sep-08	3-Mar-09
	Y (R)	ENDEVCO	AC-P58885	02-Sep-08	3-Mar-09
	Z (R)	ENDEVCO	AC-P51238	03-Sep-08	4-Mar-09
Chest Deflection	X	SERVO	DS-1047	19-Mar-08	17-Sep-08
Pelvic	X	ENDEVCO	AC-P49186	02-Sep-08	3-Mar-09
	Y	ENDEVCO	AC-P49164	02-Sep-08	3-Mar-09
	Z	ENDEVCO	AC-P52126	02-Sep-08	3-Mar-09

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 1047)		Manufacturer	Serial #	Calibration	
				Last	Next
Left Femur Load Cell	Fz	DENTON	LC-255	11-Mar-08	9-Sep-08
Right Femur Load Cell	Fz	DENTON	LC-257	11-Mar-08	9-Sep-08
Left Upper Tibia	Mx	DENTON	LC-368Mx	19-Mar-08	17-Sep-08
	My	DENTON	LC-368My	19-Mar-08	17-Sep-08
Left Lower Tibia	Fz	DENTON	LC-364Fz	18-Mar-08	16-Sep-08
	Mx	DENTON	LC-364Mx	18-Mar-08	16-Sep-08
	My	DENTON	LC-364My	18-Mar-08	16-Sep-08
Right Upper Tibia	Mx	DENTON	LC-370Mx	19-Mar-08	17-Sep-08
	My	DENTON	LC-370My	19-Mar-08	17-Sep-08
Right Lower Tibia	Fz	DENTON	LC-368LFz	18-Mar-08	16-Sep-08
	Mx	DENTON	LC-368LMx	18-Mar-08	16-Sep-08
	My	DENTON	LC-368LMy	18-Mar-08	16-Sep-08
Left Foot Rear	X	ENDEVCO	AC-P50065	03-Sep-08	4-Mar-09
	Z	ENDEVCO	AC-P52123	03-Sep-08	4-Mar-09
Left Foot Front	Z	ENDEVCO	AC-P52149	03-Sep-08	4-Mar-09
Right Foot Rear	X	ENDEVCO	AC-P50089	03-Sep-08	4-Mar-09
	Z	ENDEVCO	AC-P49463	03-Sep-08	4-Mar-09
Right Foot Front	Z	ENDEVCO	AC-P50092	03-Sep-08	4-Mar-09
Lap Belt Load Cell		First Technology	LC-156	07-Nov-07	7-May-08
Shoulder Belt Load Cell		First Technology	LC-159	07-Nov-07	7-May-08

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 1046)		Manufacturer	Serial #	Calibration	
				Last	Next
Head	X	ENDEVCO	AC-P50060	04-Sep-08	5-Mar-09
	Y	ENDEVCO	AC-P59009	03-Sep-08	4-Mar-09
	Z	ENDEVCO	AC-P49239	03-Sep-08	4-Mar-09
Head	X (R)	ENDEVCO	AC-P50098	03-Sep-08	4-Mar-09
	Y (R)	ENDEVCO	AC-P58975	03-Sep-08	4-Mar-09
	Z (R)	ENDEVCO	AC-P58894	03-Sep-08	4-Mar-09
Neck Load Cell	X	DENTON	LC-1911Fx	13-Mar-08	11-Sep-08
	Y	DENTON	LC-1911Fy	13-Mar-08	11-Sep-08
	Z	DENTON	LC-1911Fz	19-Mar-08	17-Sep-08
Neck Moment	X	DENTON	LC-1911Mx	19-Mar-08	17-Sep-08
	Y	DENTON	LC-1911My	19-Mar-08	17-Sep-08
	Z	DENTON	LC-1911Mz	19-Mar-08	17-Sep-08
Chest	X	ENDEVCO	AC-P49224	04-Sep-08	5-Mar-09
	Y	ENDEVCO	AC-P49200	04-Sep-08	5-Mar-09
	Z	ENDEVCO	AC-P49231	04-Sep-08	5-Mar-09
Chest	X (R)	ENDEVCO	AC-P58779	04-Sep-08	5-Mar-09
	Y (R)	ENDEVCO	AC-P58893	04-Sep-08	5-Mar-09
	Z (R)	ENDEVCO	AC-P59008	04-Sep-08	5-Mar-09
Chest Deflection	X	SERVO	DS-1046	19-Mar-08	17-Sep-08
Pelvic	X	ENDEVCO	AC-P52105	04-Sep-08	5-Mar-09
	Y	ENDEVCO	AC-P49440	04-Sep-08	5-Mar-09
	Z	ENDEVCO	AC-P49222	04-Sep-08	5-Mar-09

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 1046)		Manufacturer	Serial #	Calibration	
				Last	Next
Left Femur Load Cell	Fz	DENTON	LC-256	11-Mar-08	9-Sep-08
Right Femur Load Cell	Fz	DENTON	LC-261	11-Mar-08	9-Sep-08
Left Upper Tibia	Mx	DENTON	LC-114Mx	19-Mar-08	17-Sep-08
	My	DENTON	LC-114My	19-Mar-08	17-Sep-08
Left Lower Tibia	Fz	DENTON	LC-115Fz	18-Mar-08	16-Sep-08
	Mx	DENTON	LC-115Mx	18-Mar-08	16-Sep-08
	My	DENTON	LC-115My	18-Mar-08	16-Sep-08
Right Upper Tibia	Mx	DENTON	LC-92UMx	18-Mar-08	16-Sep-08
	My	DENTON	LC-92UMy	18-Mar-08	16-Sep-08
Right Lower Tibia	Fz	DENTON	LC-92LFz	18-Mar-08	16-Sep-08
	Mx	DENTON	LC-92LMx	18-Mar-08	16-Sep-08
	My	DENTON	LC-92LMy	18-Mar-08	16-Sep-08
Left Foot Rear	X	ENDEVCO	AC-P49205	04-Sep-08	5-Mar-09
	Z	ENDEVCO	AC-P49211	04-Sep-08	5-Mar-09
Left Foot Front	Z	ENDEVCO	AC-P49235	04-Sep-08	5-Mar-09
Right Foot Rear	X	ENDEVCO	AC-P49185	04-Sep-08	5-Mar-09
	Z	ENDEVCO	AC-P49206	03-Sep-08	4-Mar-09
Right Foot Front	Z	ENDEVCO	AC-P49195	03-Sep-08	4-Mar-09
Lap Belt Load Cell		First Technology	LC-173	07-Nov-07	7-May-08
Shoulder Belt Load Cell		First Technology	LC-178	07-Nov-07	7-May-08

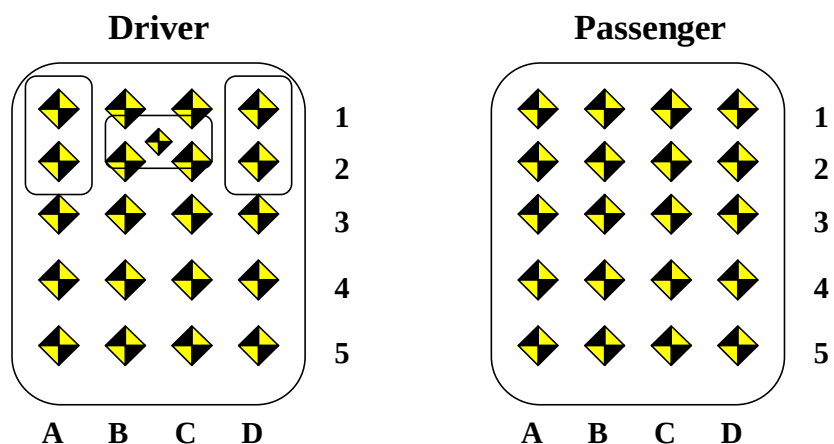
INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(Six Month Calibration Minimum)

	Manufacturer	Serial #	Calibration	
			Last	Next
Left Seat Rear Crossmember X	ENDEVCO	AC-P15526	11-Jul-08	9-Jan-09
Right Rear Seat Crossmember X	ENDEVCO	AC-P35811	11-Jul-08	9-Jan-09
Top of Engine	ICS	AC-FA2483	04-Apr-08	3-Oct-08
Bottom of Engine	ICS	AC-FA2485	06-Oct-08	6-Apr-09
Right Disc Brake Caliper	ICS	AC-FA2482	06-Oct-08	6-Apr-09
Left Disc Brake Caliper	ICS	AC-FA2474	27-Mar-08	25-Sep-08
Left Seat Rear Crossmember Z	ENDEVCO	AC-P39575	11-Jul-08	9-Jan-09
Right Seat Rear Crossmember Z	ENDEVCO	AC-P35789	11-Jul-08	9-Jan-09

APPENDIX E

VEHICLE INTERIOR INTRUSION MEASUREMENTS

DRIVER SIDE INTRUSION MEASUREMENTS

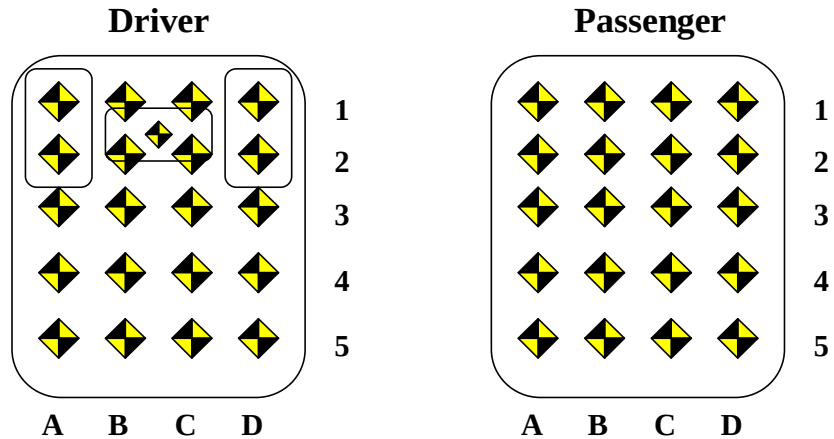


Driver Side Intrusion Measurements

Intrusion Location	PRE-TEST (mm)			POST-TEST (mm)			CHANGE (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	3655	-557	447	3654	-569	447	1	12	0
B1	3725	-440	447	3717	-449	458	8	9	-11
C1	3783	-322	444	3764	-329	456	19	7	-12
D1	3759	-192	443	3752	-198	444	7	6	-1
A2	3519	-560	350	3523	-571	345	-4	11	5
B2	3689	-442	346	3691	-451	351	-2	9	-5
C2	3686	-316	341	3689	-324	341	-3	8	0
D2	3685	-189	338	3691	-200	336	-6	11	2
A3	3484	-561	319	3488	-570	313	-4	9	6
B3	3589	-440	289	3591	-449	289	-2	9	0
C3	3552	-315	298	3560	-326	294	-8	11	4
D3	3543	-189	299	3550	-199	295	-7	10	4
A4	3470	-561	291	3475	-570	286	-5	9	5
B4	3487	-437	287	3490	-447	285	-3	10	2
C4	3479	-317	289	3488	-325	289	-9	8	0
D4	3476	-188	290	3482	-199	288	-6	11	2
A5	3410	-562	287	3416	-571	282	-6	9	5
B5	3413	-439	284	3419	-446	281	-6	7	3
C5	3414	-313	287	3418	-321	287	-4	8	0
D5	3409	-192	291	3417	-199	288	-8	7	3
BP	3569	-364	455	3547	-380	463	22	16	-8
G	3335	-518	741	3335	-520	738	0	2	3
H	3318	-213	738	3321	-214	732	-3	1	6
L	3108	-372	959	3202	-376	931	-94	4	28
AB	3049	-612	407	3056	-621	396	-7	9	11

BP=Brake Pedal, G=Left side of bolster, H=Right side of bolster, L=Steering wheel center;
 AB = Front outboard seat anchor bolt

PASSENGER SIDE INTRUSION MEASUREMENTS



Passenger Side Intrusion Measurements

Intrusion Location	PRE-TEST (mm)			POST-TEST (mm)			CHANGE (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	3718	188	438	3727	193	434	-9	-5	4
B1	3735	313	442	3738	317	452	-3	-4	-10
C1	3736	441	448	3738	442	470	-2	-1	-22
D1	3643	559	450	3645	565	462	-2	-6	-12
A2	3596	195	363	3613	199	362	-17	-4	1
B2	3606	318	364	3614	323	371	-8	-5	-7
C2	3611	441	367	3620	446	379	-9	-5	-12
D2	3605	560	371	3621	564	381	-16	-4	-10
A3	3477	193	297	3498	195	315	-21	-2	-18
B3	3473	319	295	3490	323	317	-17	-4	-22
C3	3480	441	296	3495	448	312	-15	-7	-16
D3	3475	563	294	3492	571	298	-17	-8	-4
A4	3412	198	291	3429	204	316	-17	-6	-25
B4	3415	316	291	3430	324	316	-15	-8	-25
C4	3414	444	290	3431	451	298	-17	-7	-8
D4	3418	561	291	3438	566	289	-20	-5	2
A5	3348	197	293	3365	202	309	-17	-5	-16
B5	3349	319	290	3365	325	311	-16	-6	-21
C5	3352	441	290	3370	450	294	-18	-9	-4
D5	3349	564	293	3361	569	288	-12	-5	5
R	3310	218	747	3317	216	743	-7	2	4
S	3335	524	749	3336	523	742	-1	1	7
AB	3050	612	407	3055	627	394	-5	-15	13

R=Left side of bolster, S=Right side of bolster, L=Steering wheel center;

AB = Front outboard seat anchor bolt