

REPORT NUMBER: CAL-10-01

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

FORD MOTOR COMPANY
2010 LINCOLN MKT
4-DOOR SUV

NHTSA NUMBER: FA0201

CALSPAN TEST NUMBER: TR2428

CALSPAN CORPORATION
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225



12/17/09

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Rulemaking
Office of Crashworthiness Standards
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16. Abstract A frontal load cell barrier test of a 2010 Lincoln MKT 4-Door SUV was performed at Calspan Corporation's crash test facility in Buffalo, New York, on 12/17/09. The impact velocity was 56.5 kph and the temperature at the barrier face was 21.1°C. The maximum post-test vehicle crush was 716 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: <table border="1"> <thead> <tr> <th>Measurement Description</th> <th>Units</th> <th>Threshold</th> <th>Driver (064)</th> <th>Passenger (061)</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC - 36 ms)</td> <td>-</td> <td>1000</td> <td>298.7</td> <td>293.6</td> </tr> <tr> <td>Maximum Thorax Acceleration (3 ms Clip)</td> <td>g's</td> <td>60 g's</td> <td>34.6</td> <td>38.9</td> </tr> <tr> <td>Chest Displacement</td> <td>mm</td> <td>-76 mm</td> <td>34.4</td> <td>28.9</td> </tr> <tr> <td>Left Femur Force</td> <td>Newtons</td> <td>-10000 N</td> <td>2603.8</td> <td>4367.2</td> </tr> <tr> <td>Right Femur Force</td> <td>Newtons</td> <td>-10000 N</td> <td>3550.0</td> <td>1895.9</td> </tr> </tbody> </table>						Measurement Description	Units	Threshold	Driver (064)	Passenger (061)	Head Injury Criteria (HIC - 36 ms)	-	1000	298.7	293.6	Maximum Thorax Acceleration (3 ms Clip)	g's	60 g's	34.6	38.9	Chest Displacement	mm	-76 mm	34.4	28.9	Left Femur Force	Newtons	-10000 N	2603.8	4367.2	Right Femur Force	Newtons	-10000 N	3550.0	1895.9
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SECTION 1

PURPOSE AND SUMMARY OF TEST

1.1 PURPOSE

This 56.5 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 56.5 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

1.2 TEST PROCEDURE

This 56.5 kph 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 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 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

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

Both ATDs were fully instrumented with head, chest and pelvis 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. 064) and the right-front passenger (position 2) ATD (Serial No.061) 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 205 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 2010 Lincoln MKT 4-Door SUV at a velocity of 56.5 kph. The test was performed at Calspan on 12/17/09. 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	298.7	68.8	104 .8	34.6	60.4	63.4	34.4	2603.8	3550.0
Passenger	293.6	59.5	95. 5	38.9	69.2	72.9	28.9	4367.2	1895.9

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

TEST NOTES	
Data Channel	Anomalies

SECTION 2
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
CRASH TEST SUMMARY

Vehicle NHTSA No.: FA0201 Test Mode: 56.3 kph Frontal Barrier
 Test Date: 12/17/09 Time: 13:45 Temperature: 21.1 °C
 Vehicle Make/Model/Body Style: 2010 Lincoln MKT 4-Door SUV
 Vehicle Test Weight: 2421 kg Impact Velocity: 56.5 kph (55.5 – 57.1 kph)
 Vehicle/Barrier Impact Angle: 0 ° Max Static Crush: 716 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 / Back of head to head restraint
Abdomen Contact:	None	None
Chest Contact:	Airbag	Airbag
Left Knee Contact:	Knee Bolster	Knee Bolster
Right Knee Contact:	Knee Bolster	Knee Bolster

DOOR OPENING, SEAT TRACK AND GLAZING INFORMATION

Description	Driver Side	Passenger Side
Door Lock Status	Unlocked	Unlocked
Front Door Opening	Closed / Operable	Closed / Operable
Rear Door Opening	Closed / Operable	Closed / Operable
Hatch/Other Door Opening	Closed / Operable	
Front Seat Track Shift (mm)	5	3
Front Seat Back Failure	None	None
Glazing Damage	Cracking on both of both sides of Windshield / No failures	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Left Side (mm)	Center (mm)	Right Side (mm)	Average (mm)
Value	1031	991	1004	1009

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	815	825
Lap belt length as measured on ATD	mm	545	540
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems	mm	210	210

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2010 Lincoln MKT 4-Door SUV

NHTSA No. : FA0201 ; VIN: 2LMHJ5AR6ABJ10142 ; Color: Red

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

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

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

Final Drive: - Rear Wheel Drive; - Front Wheel Drive; x Four 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: 12/7/09 ; Odometer Reading 380 km

Selling Dealer: Carbone Ford Lincoln Mercury

Dealer Address: 1925 Black River Blvd Rome, NY 13440

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 10/09

GVWR: 2817 kg; GAWR: 1352 kg FRONT; 1477 kg REAR

VEHICLE CAPACITY DATA:

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

Number of Occupants: 2 Front; 5 Rear; 7 Total

Vehicle Capacity Weight (VCW) = 526 kg

No. of Occupants x 68.04 kg = 476 kg

Rated Cargo/Luggage Weight (RCLW) = 50 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 =	608	595	54.0	1203.0
Rear =	515	508	46.0	1023.0
Total Delivered Weight (UDW) =				2226.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW)	=	2226.0	kg
Rated Cargo/Luggage Weight (RCLW)	=	50	kg
Weight of 2 p.572 Dummies @ 76 each	=	152	kg
TARGET TEST WEIGHT	=	2428.0	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 43.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	647	625	52.5	1272.0
Rear =	578	571	47.5	1149.0
Total Vehicle Test Weight (ATW) =				2421.0

Weight of Ballast Secured in Vehicle Trunk Area¹ = 52 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:	810	818	837	840	880.5
FULLY LOADED:	800	806	823	825	-
AS TESTED:	809	814	827	828	909.3

Vehicle's Wheel Base: 1916 mm

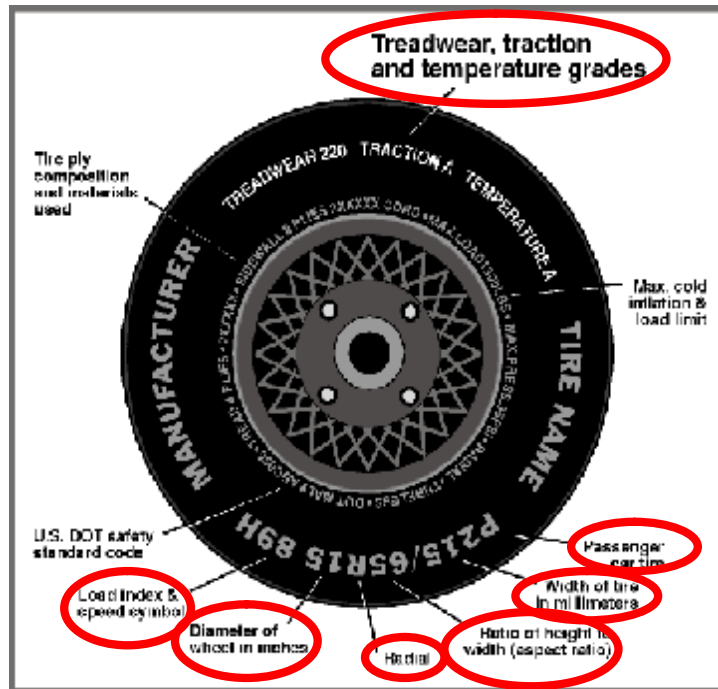
¹Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

²Rearward of the front axle centerline.

DATA SHEET NO. 3
TEST VEHICLE TIRE INFORMATION

Vehicle Year/Make/Model/Body Style: 2010 Lincoln MKT 4-Door SUV

NHTSA Test No.: FA0201 Test Date: 12/17/09



Measured Parameter	Front	Rear
Maximum Tire Pressure (from sidewall - kPa)	300	300
Cold Pressure (from tire placard - kPa)*	240	240
Recommended Tire Size (from tire placard)	P235/55R19	P235/55R19
Tire size on Vehicle	P235/55R19	P235/55R19
Tire Manufacturer	Hankook	Hankook
Tire Name	Optimo	Optimo
Tire Type	Passenger	Passenger
Tire Width (mm)	235	235
Ratio of Height to Width (aspect ratio)	55	55
Radial	Radial	Radial
Wheel Diameter	19	19
Load Index & Speed Symbol	101H	101H
Treadwear	600	600
Traction Grade	A	A
Temperature Grade	A	A

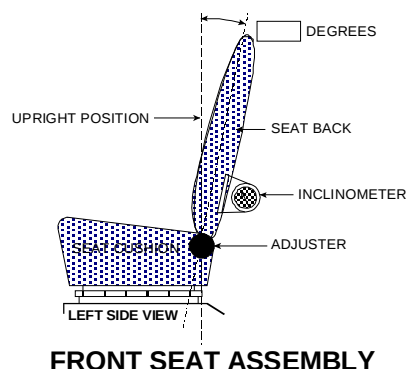
*Tire pressure used for test

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 2010 Vehicle Model: Lincoln MKT Body Style : 4-Door SUV

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: 16.7

Measurement instructions: Measure angle from head restraint post

Seat back angle for passenger's seat: 16.7

Measurement instructions: Measure angle from head restraint post

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Total range of travel = 318 mm. Seat is placed in mid travel = 159 mm

Positioning of the passenger's seat: Total range of travel = 318 mm. Seat is placed in mid travel = 159 mm

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 70.4 liters

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

C. "Usable Capacity" of the vehicle(s) used for certification
testing to requirements of FMVSS 301 = 64.8 to 66.2 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 65.0 liters

3.3 One-Third of Useable Capacity = 23.5 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 turned "ON"

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: Telescoping from 0 to 40 mm – set in mid-position at 20 mm.

Steering column set in its geometric center.

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: Full up position – five detents were available

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

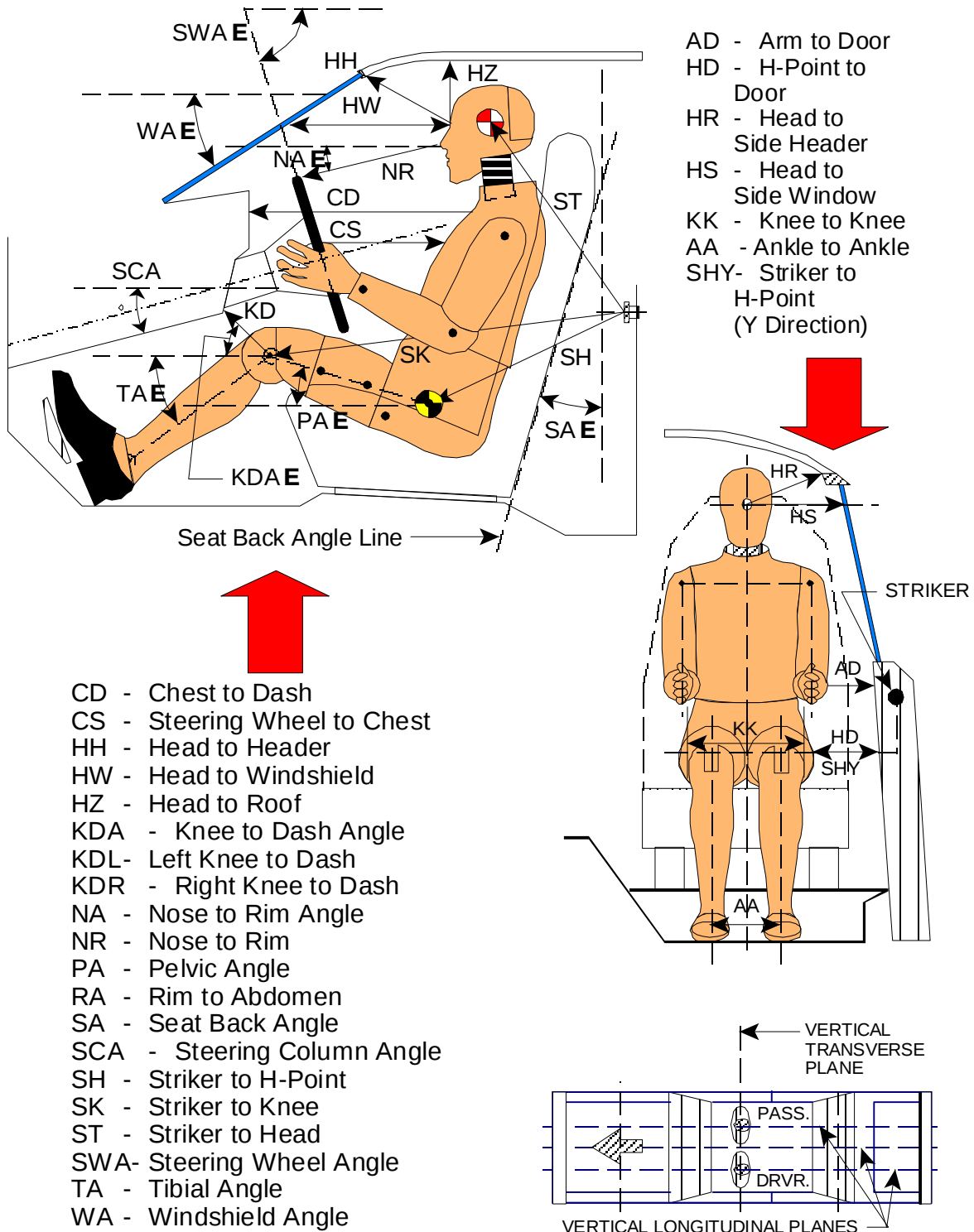
Does vehicle owner's manual describe how to deactivate ADLs? x Yes; - No; - N/A

Comments: Pg 152 in the owner's manual.

DATA SHEET NO. 5

FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



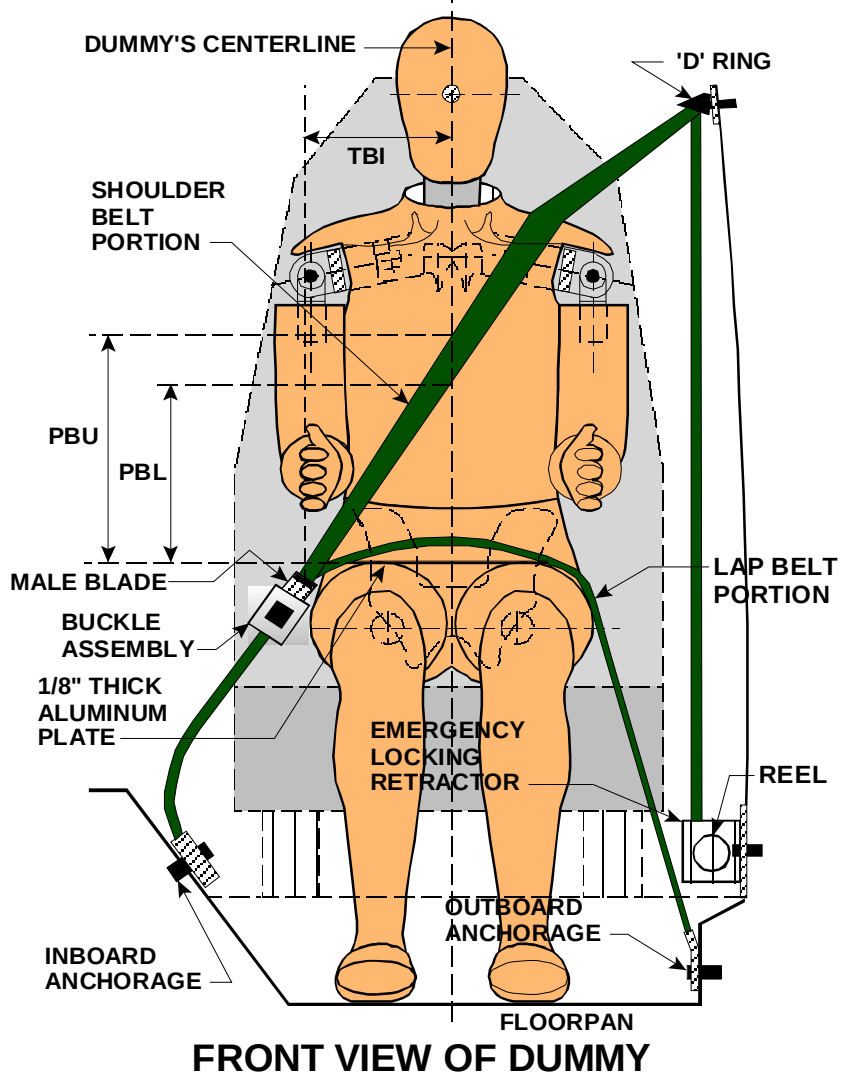
DATA SHEET NO. 5
FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE (cont.)

	DRIVER (Serial #064)			PASS. (Serial #061)		
WA ^o	28.8 deg.			N/A		
SWA ^o	64.9 deg.			N/A		
SCA ^o	25.1 deg.			N/A		
SA ^o	16.7 deg.			16.7 deg.		
HZ	197			194		
HH	359			361		
HW	698			701		
HR	255			254		
NR	398	Angle	13 deg.	N/A		
CD	543			509		
CS	296			N/A		
RA	192			N/A		
KDL	125	Angle (KDA)	35 deg.	109		
KDR	96			128	Angle (KDA)	48 deg.
PA ^o	21.5 deg.			24.9 deg.		
TA ^o	63.5 deg.			53.8 deg.		
KK	351			270		
AA	371			194		
ST	504	Angle	69.1 deg.	499	Angle	68.8 deg.
SK	654	Angle	93.0 deg.	659	Angle	98.0 deg.
SH	334	Angle	125.9 deg.	332	Angle	129.1 deg.
SHY	263			263		
HS	396			396		
HD	147			151		
AD	114			136		

Dimensions in millimeters

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

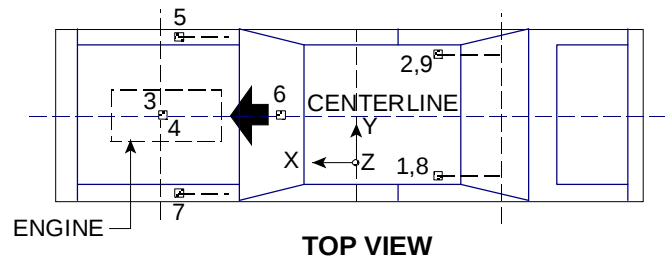
SEAT BELT POSITIONING DATA



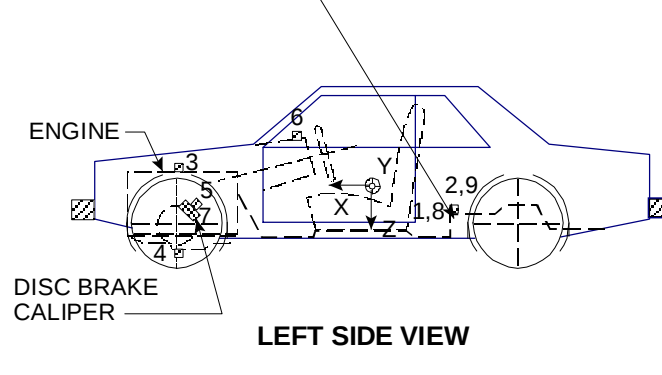
	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	300	285
PBL-- Top surface of alum. plate to belt lower edge	215	200
LAP BELT TENSION	10 N	10 N
SHOULDER BELT TENSION	Retractor	Retractor

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

VEHICLE ACCELEROMETER LOCATIONS



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



No.	LOCATION	PRE-TEST LENGTH (mm)		
		X	Y	Z
1	Left Rear Seat Cross Member X	2131	-635	480
2	Right Rear Seat Cross Member X	2157	629	486
3	Top of Engine Block	4476	-89	824
4	Bottom of Engine	4940	43	195
5	Disc Brake Caliper @ Right Side	4174	689	714
6	Instrument Panel**	-	-	-
7	Disc Brake Caliper @Left Side	4207	-700	722
8	Left Rear Seat Cross Member Z	2131	-635	480
9	Right Rear Seat Cross Member Z	2157	629	486

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 12 mm molding.

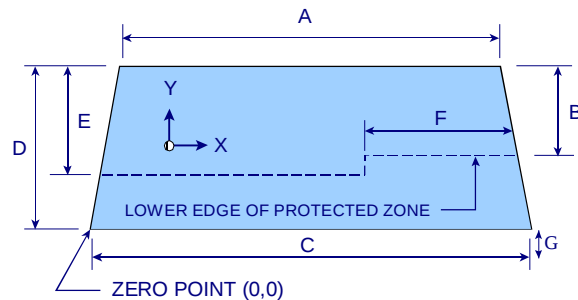
FMVSS 212 REQUIREMENTS:

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: 21.1°C.

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		% OF RETENTION
	PRE-TEST (mm)	POST-TEST (mm)	
RIGHT SIDE	2219.0	2219.0	100.0%
LEFT SIDE	2219.0	2219.0	100.0%
TOTAL	4438	4438	100.0%



DIMENSIONS (mm)	
A	1319
B	509
C	1581
D	769
E	551
F	559
G	12

FRONT VIEW OF WINDSHIELD

FAILURE DETAILS:

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm: None

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

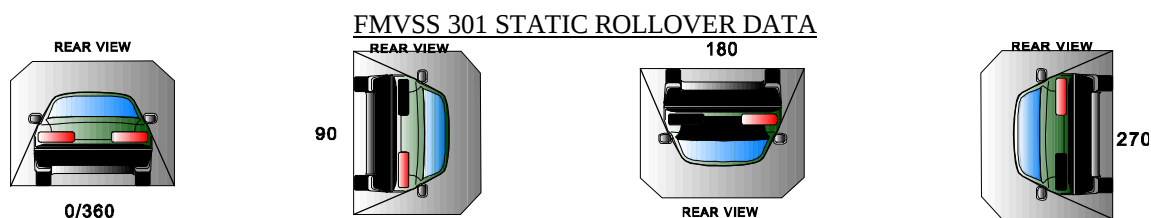
DATA SHEET NO. 9
SUMMARY OF FMVSS NO. 301 DATA

NHTSA TEST No.: FA0201 TEST DATE: 12/17/09
VEHICLE MAKE/MODEL: 2010 Lincoln MKT 4-Door SUV
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

FUEL SPILLAGE MEASUREMENT:

Time Interval	Amount	Maximum Allowable Spillage
Impact Until Motion Ceases	0	28 g
First Five Minutes Following Impact	0	142 g
Next 25 Minutes	0	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	13	seconds	5	minutes	6	minutes	13	seconds	7	minutes
90° - 180°	1	minutes	12	seconds	5	minutes	6	minutes	12	seconds	7	minutes
180°-270°	1	minutes	10	seconds	5	minutes	6	minutes	10	seconds	7	minutes
270°-360°	1	minutes	14	seconds	5	minutes	6	minutes	14	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:

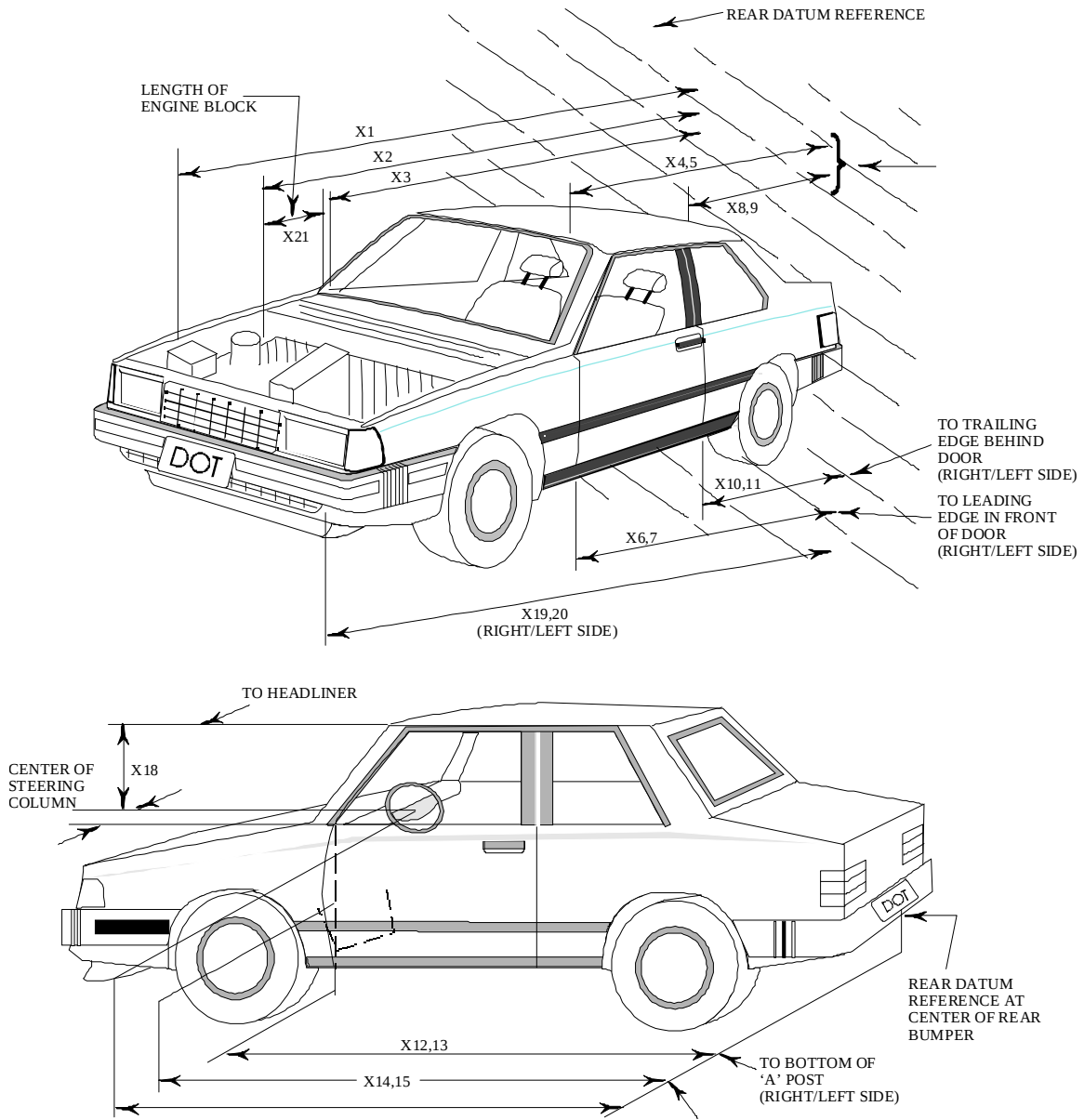
Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0° - 90°	0	0	0	N/A
90° - 180°	0	0	0	N/A
180°-270°	0	0	0	N/A
270°-360°	0	0	0	N/A

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.: FA0201 TEST DATE: 12/17/09
VEHICLE MAKE/MODEL: 2010 Lincoln MKT 4-Door SUV

No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	5270	4554	716
X2	Rear Surface of Vehicle to Front of Engine	4702	4565	137
X3	Rear Surface of Vehicle to Firewall	4204	4089	115
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3699	3684	15
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3699	3693	6
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3678	3660	18
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3676	3667	9
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2571	2558	13
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2571	2564	7
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2577	2559	18
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2574	2567	7
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3671	3663	8
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3671	3668	3
X14	Rear Surface of Vehicle to Firewall, Right Side	4078	4028	50
X15	Rear Surface of Vehicle to Firewall, Left Side	4078	4015	63
X16	Rear Surface of Vehicle to Steering Column	3241	3282	-41
X17	Center of Steering Column to "A" Post	296	300	-4
X18	Center of Steering Column to Headliner	474	469	5
X19	Rear Surface of Vehicle to Right Side of Front Bumper	5173	4585	588
X20	Rear Surface of Vehicle to Left Side of Front Bumper	5174	4596	578
X21	Length of Engine Block	533	533	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	3418	3402	16
CD	Rear Surface of Vehicle to Center of Dash Panel	3475	3446	29
LD	Rear Surface of Vehicle to Left Side of Dash Panel	3418	3400	18

All Dimensions in mm

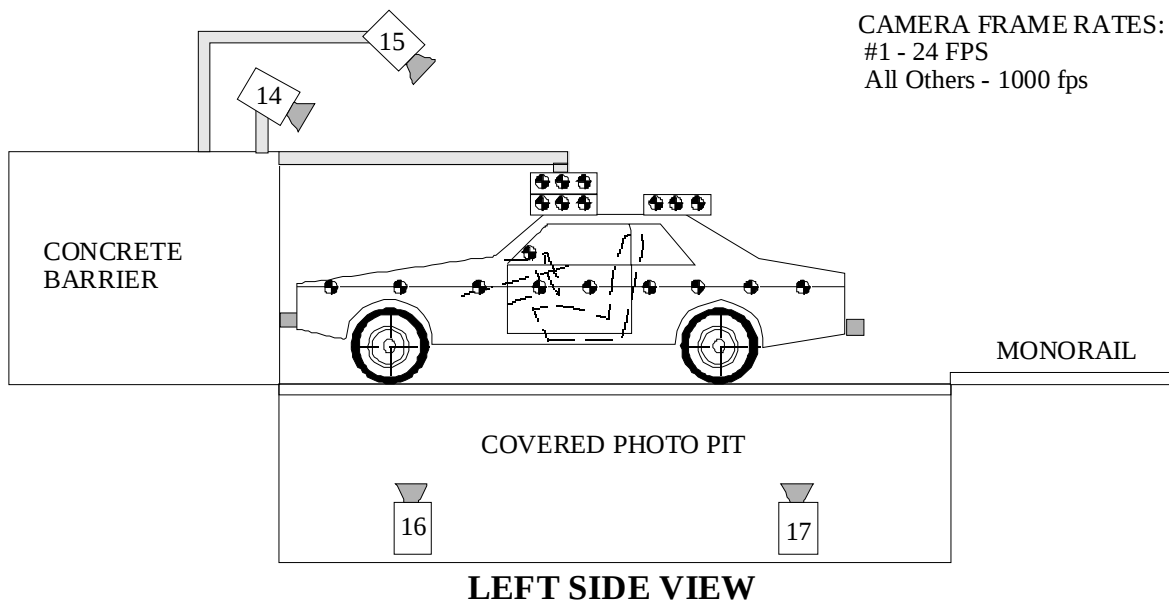
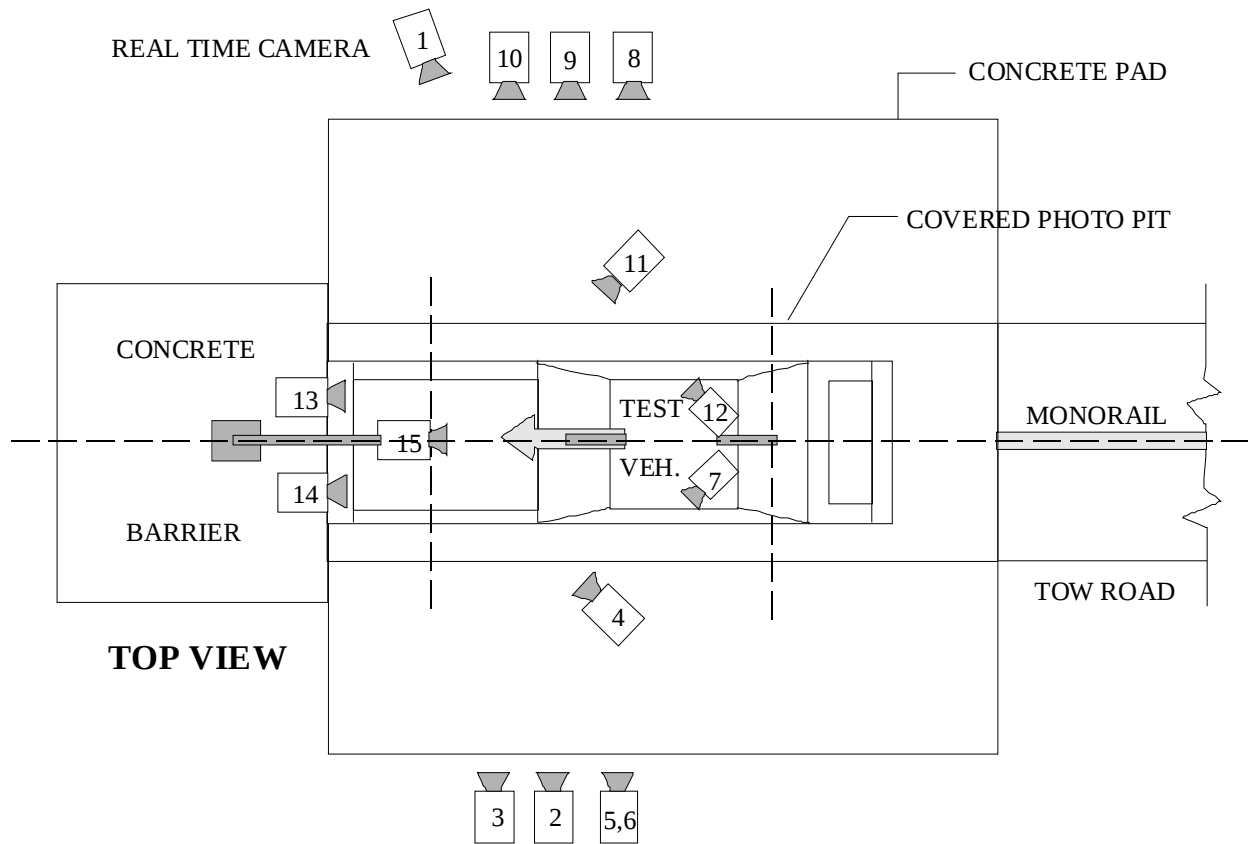
DATA SHEET NO.10
VEHICLE MEASUREMENTS (cont.)

NHTSA TEST No.: FA0201 TEST DATE: 12/17/09
VEHICLE MAKE/MODEL: 2010 Lincoln MKT 4-Door SUV

TARGET VEHICLE STRUCTURAL MEASUREMENTS

	Elements	Pre-Test (mm)
1	Total length	5270
2	Total Width	1916
3	Bumper Top Height	593
4	Bumper Bottom Height	454
5	Longitudinal Member Top Height	600
6	Distance Between Longitudinal Members	1194
7	Longitudinal Member Width	105
8	Engine top height	961
9	Engine bottom height	195
10	Engine and gearbox width	563
11	Front bumper-engine distance	568
12	Front shock absorber fixing height	966
13	Bonnet leading edge height	798
14	Front shock absorber fixing width	1264
15	Front bumper – front axle distance	1046
16	Front axle – A pillar distance	524
17	A-pillar – B pillar distance	1134
18	B-pillar – rear axle distance	1333
19	B-pillar – C Pillar distance	1096
20	Roof sill bottom height	1476
21	Roof sill top height	1611
22	Floor sill bottom height	318
23	Floor sill top height	428

DATA SHEET NO.11
HIGH-SPEED CAMERA LOCATIONS



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

NHTSA Test No.: FA0201 Vehicle: 2010 Lincoln MKT 4-Door SUV

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	7715	1890	930	-2.2	7097	28	1000
3	Left Side View	9476	910	955	0	8858	50	1000
4	Driver and Interior View	8510	2820	1955	-8.2	-	50	1000
5	Steering Column (Bottom)	8202	1690	1200	-3.6	7584	28-70	1000
6	Steering Column (Top)	8202	1690	1805	-7.6	7584	28-70	1000
7	Left CRS Lateral View	-	-	-	-	-	-	-
8	Overall Right Side	7691	2070	925	-1.4	7073	28	1000
9	Right Side View	9685	1290	850	-0.5	9067	50	1000
10	Right Passenger View	8273	1930	1170	-2.0	7655	50	1000
11	Passenger and Interior View	7389	2625	1895	-7.0	-	50	1000
12	Right CRS Lateral View	-	-	-	-	-	-	-
13	Passenger Front View	620	-92	1987	-33	-	24	500
14	Driver Front View	620	-92	1987	-34	-	24	500
15	Windshield View	0	-530	3374	-47	-	25	500
16	Pit View of Engine	0	615	-3048	90	-	13	500
17	Pit View of Fuel Tank	0	8314	-3048	90	-	13	500

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

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

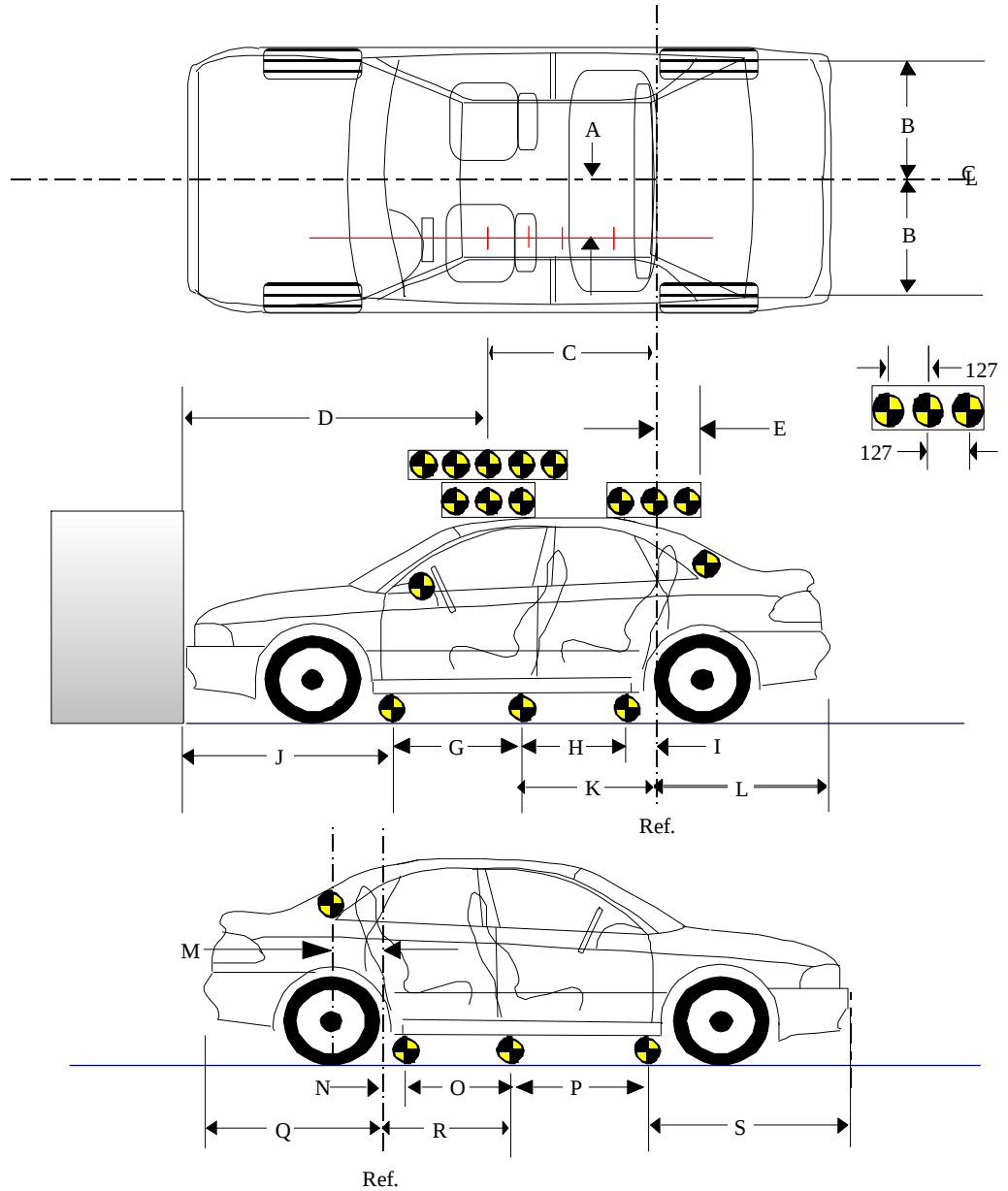
Z = film plane to ground

DATA SHEET NO. 12
VEHICLE REFERENCE PHOTO TARGET LOCATIONS

NHTSA Test No.: FA0201 Vehicle: 2010 Lincoln MKT 4-Door SUV

(Dimensions in millimeters)

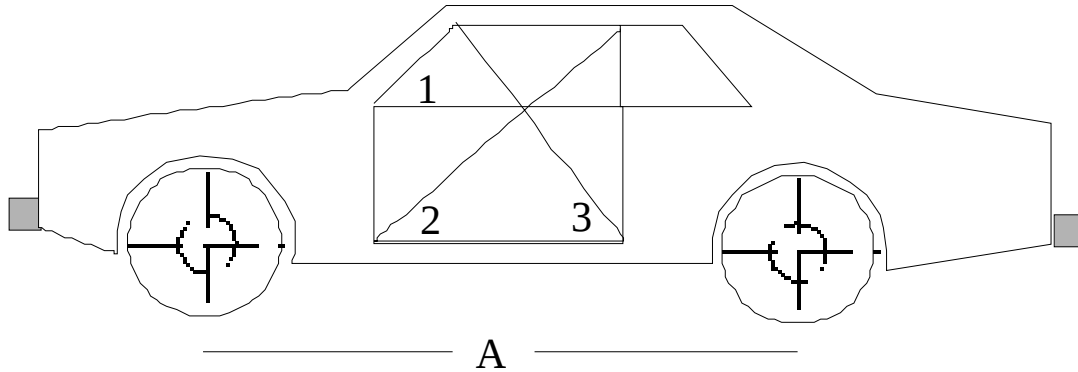
A	542
B	694
C	1217
D	2460
E	129
F	1799
G	1005
H	1008
I	104
J	1545
K	1112
L	1608
M	125
N	104
O	1005
P	1007
Q	1608
R	1109
S	1546



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

NHTSA Test No.: FA0201 Vehicle: 2010 Lincoln MKT 4-Door SUV

DOOR OPENING WIDTH AND WHEELBASE MEASUREMENTS



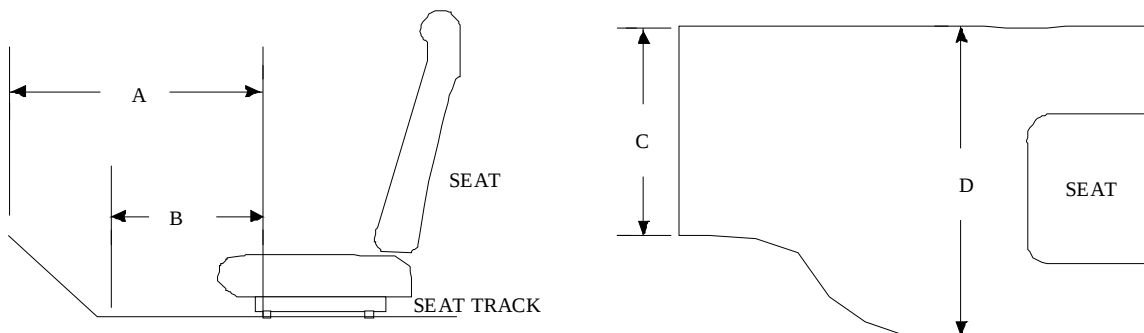
UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	979	1424	1084	979	1428	1085
AFTER TEST	968	1432	1084	965	1438	1084
DIFFERENCE	11	-8	0	14	-10	1

UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	2991	2989
AFTER TEST	2897	2893
DIFFERENCE	94	96

DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont)

NHTSA Test No.: FA0201 Vehicle: 2010 Lincoln MKT 4-Door SUV

STATIC FOOTWELL DEFORMATION



DRIVER

Measurement	Pre-Test	Post-Test	Difference
A	678	606	72
B	521	520	1
C	429	431	-2
D	411	416	-5

PASSENGER

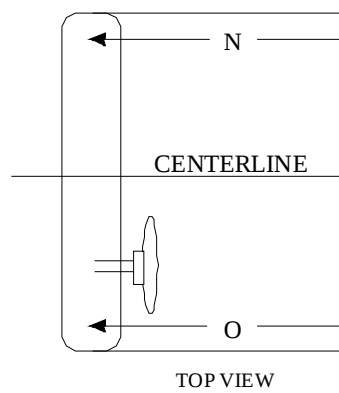
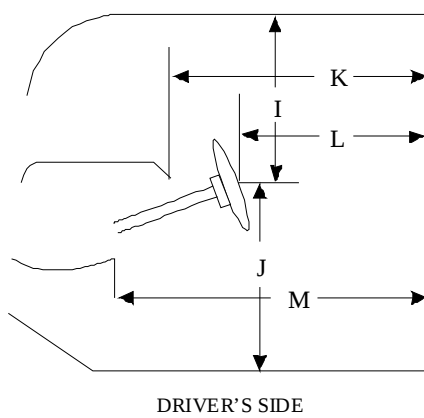
Measurement	Pre-Test	Post-Test	Difference
A	646	623	23
B	482	484	-2
C	384	383	1
D	400	398	2

Units = mm

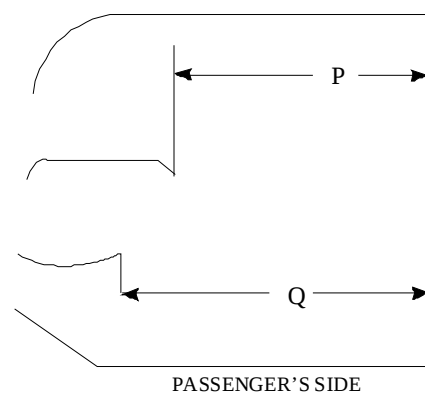
DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont.)

NHTSA Test No.: FA0201 Vehicle: 2010 Lincoln MKT 4-Door SUV

STATIC PASSENGER COMPARTMENT INTRUSION



MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



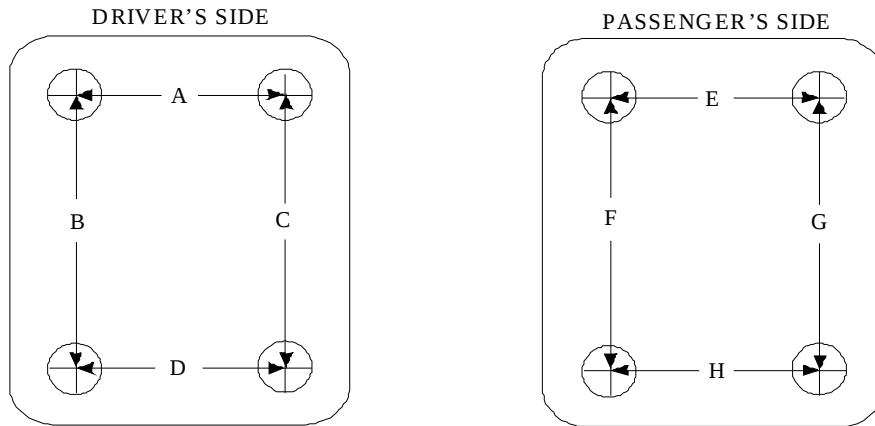
Measurement	Pre-Test	Post-Test	Difference
I	474	469	5
J	695	706	-11
K	813	794	19
L	607	650	-43
M	842	825	17
N	784	774	10
O	784	768	16
P = K (PASS.)	938	921	17
Q = M (PASS.)	816	807	9

Units = mm

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

NHTSA Test No.: FA0201 Vehicle: 2010 Lincoln MKT 4-Door SUV

FLOORBOARD DEFORMATION



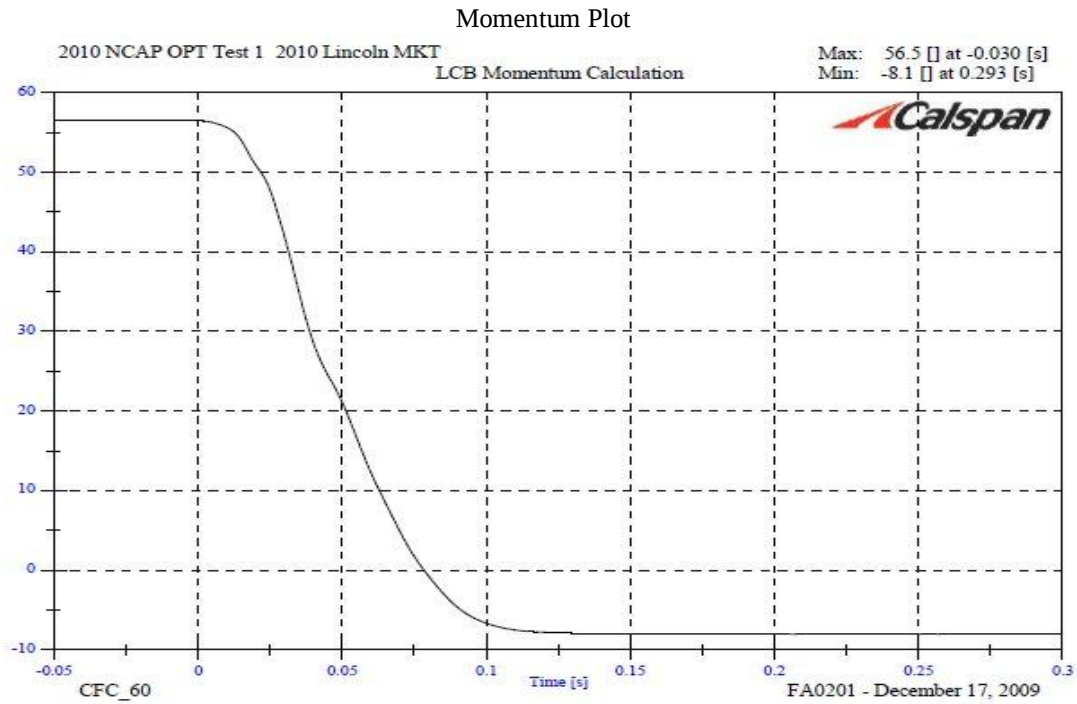
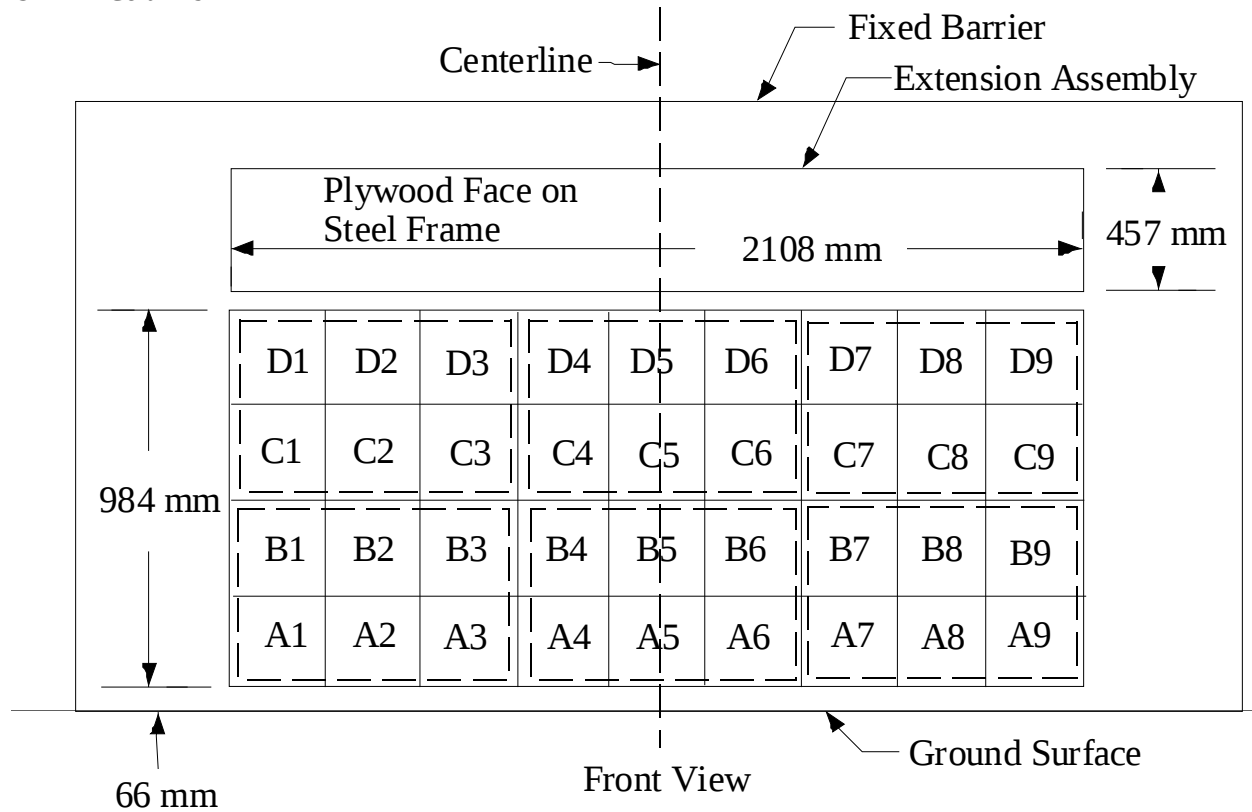
TOP VIEW THROUGH FLOOR PAN

Measurement	Pre-Test	Post-Test	Difference
A	429	431	-2
B	240	244	-4
C	230	234	-4
D	411	416	-5
E	384	383	1
F	316	315	1
G	312	311	1
H	400	398	2

Units = mm

DATA SHEET NO.14
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells
4 Rows
9 Columns



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

Vehicle Make/Model/Body Style: Lincoln MKT 4-Door SUV

NHTSA Test No.: FA0201 VIN: 2LMHJ5AR6ABJ10142

Model Year: 2010 Build Date: 10/09 Test Date: 12/17/09

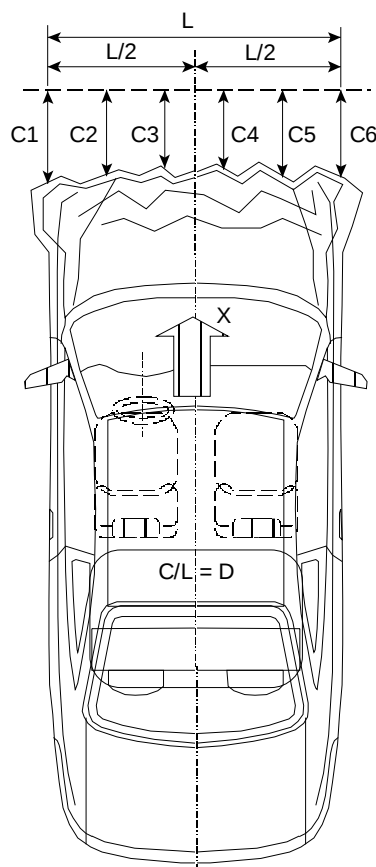
Vehicle Size Category: SUV Test Weight: 2421 kg

Vehicle Wheelbase: 2990 mm; Front Overhang: 1046 mm; Overall Width: 1916 mm

Collision Deformation Classification (CDC) Code: 12FDEW4

Crush Depth Dimensions

	PRE (mm)	POST (mm)	DIFF (mm)
C1 =	5058	4507	551
C2 =	5185	4590	595
C3 =	5250	4556	694
C4 =	5249	4551	698
C5 =	5183	4579	604
C6 =	5056	4534	522



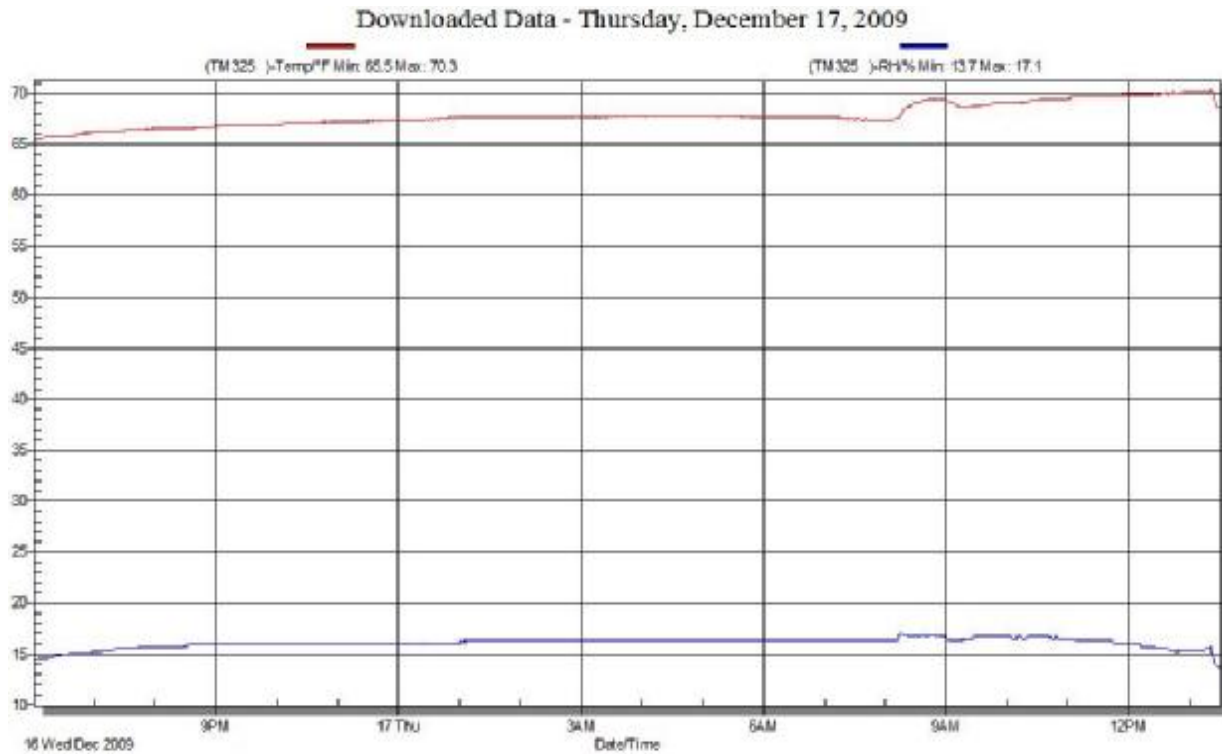
Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

Length of Damaged Region:

L1=	<u>1472</u>	mm
L2=	<u>736.0</u>	mm
L5=	<u>294.4</u>	mm

DATA SHEET NO.16
VEHICLE AND DUMMY TEMPERATURE STABILIZATION CHART

NHTSA Test No.: FA0201 Vehicle: 2010 Lincoln MKT 4-Door SUV



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



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



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

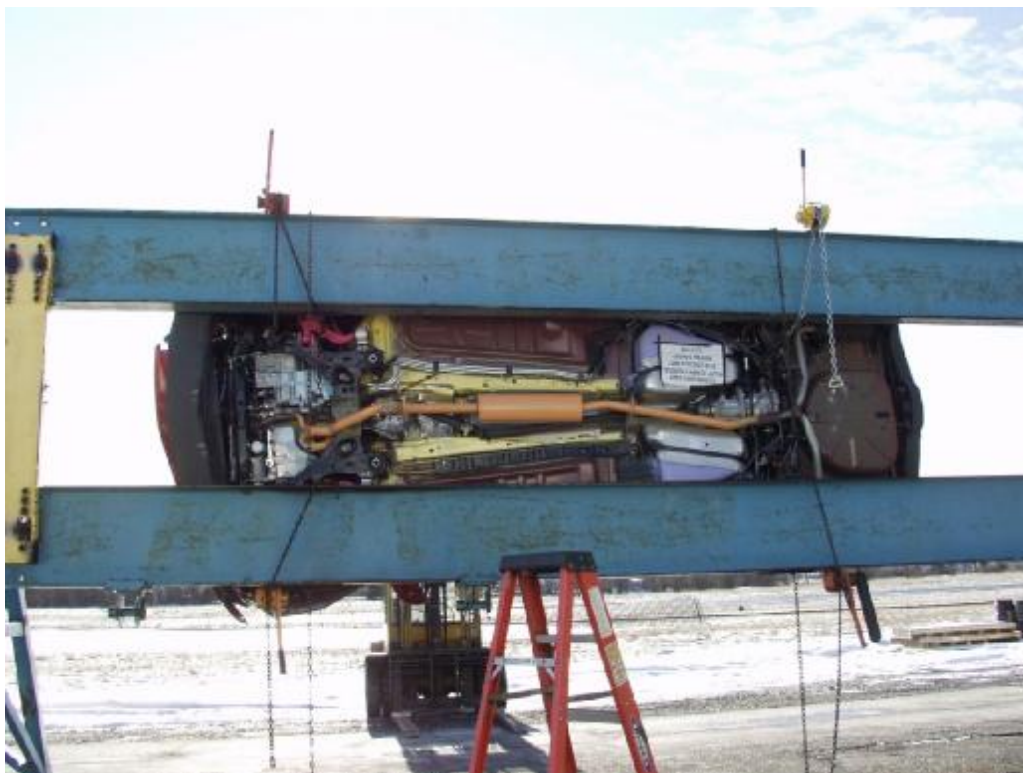


Figure A-58: Rollover View - 90°



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.: FA0201

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 9 Array X Arm Ay	V1P1 Lap Belt Load
V1P1 Head 9 Array X Arm Az	V1P1 Shoulder Belt Load
V1P1 Head 9 Array Y Arm Ax	V1P2 Lap Belt Load
V1P1 Head 9 Array Y Arm Az	V1P2 Shoulder Belt Load
V1P1 Head 9 Array Z Arm Ax	V1 Left Rear #1x
V1P1 Head 9 Array Z Arm Ay	V1 Right Rear #2x
V1P1 Head CG Ax	V1 Engine Top #3x
V1P1 Head CG Ay	V1 Engine Bottom #4x
V1P1 Head CG Az	V1 Right Caliper #5x
V1P1 Head CG Red Ax	V1 Left Caliper #7x
V1P1 Head CG Red Ay	V1 Left Rear #8z
V1P1 Head CG Red Az	V1 Right Rear #9z
V1P1 Upper Neck Fx	
V1P1 Upper Neck Fy	
V1P1 Upper Neck Fz	
V1P1 Upper Neck Mx	
V1P1 Upper Neck My	
V1P1 Upper Neck Mz	
V1P1 Chest Ax	
V1P1 Chest Ay	
V1P1 Chest Az	
V1P1 Chest Red Ax	
V1P1 Chest Red Ay	
V1P1 Chest Red Az	
V1P1 Chest Compression	
V1P1 Pelvic Ax	
V1P1 Pelvic Ay	
V1P1 Pelvic Az	
V1P1 Left Femur Fz	
V1P1 Right Femur Fz	
V1P1 Left Upper Tibia Mx	
V1P1 Left Upper Tibia My	
V1P1 Left Lower Tibia Fz	
V1P1 Left Lower Tibia Mx	
V1P1 Left Lower Tibia My	
V1P1 Right Upper Tibia Fz	
V1P1 Right Upper Tibia Mx	
V1P1 Right Upper Tibia My	
V1P1 Right Lower Tibia Mx	
V1P1 Right Lower Tibia My	
V1P1 Left Foot Aft Ax	
V1P1 Left Foot Aft Az	
V1P1 Left Foot Fore Az	
V1P1 Right Foot Aft Ax	
V1P1 Right Foot Aft Az	
V1P1 Right Foot Fore z	
V1P2 Head 9 Array X Arm Ay	

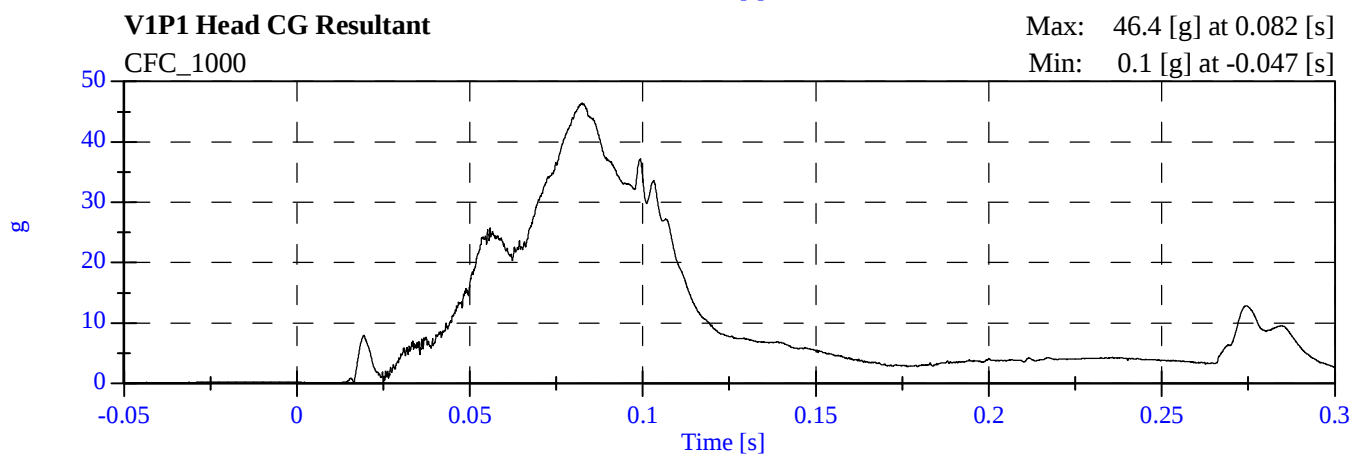
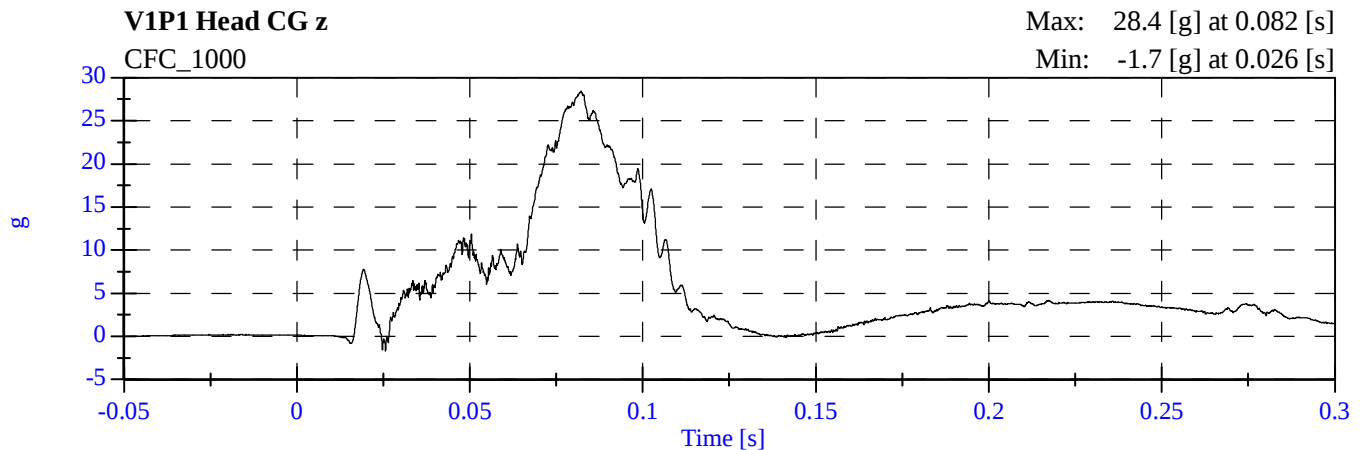
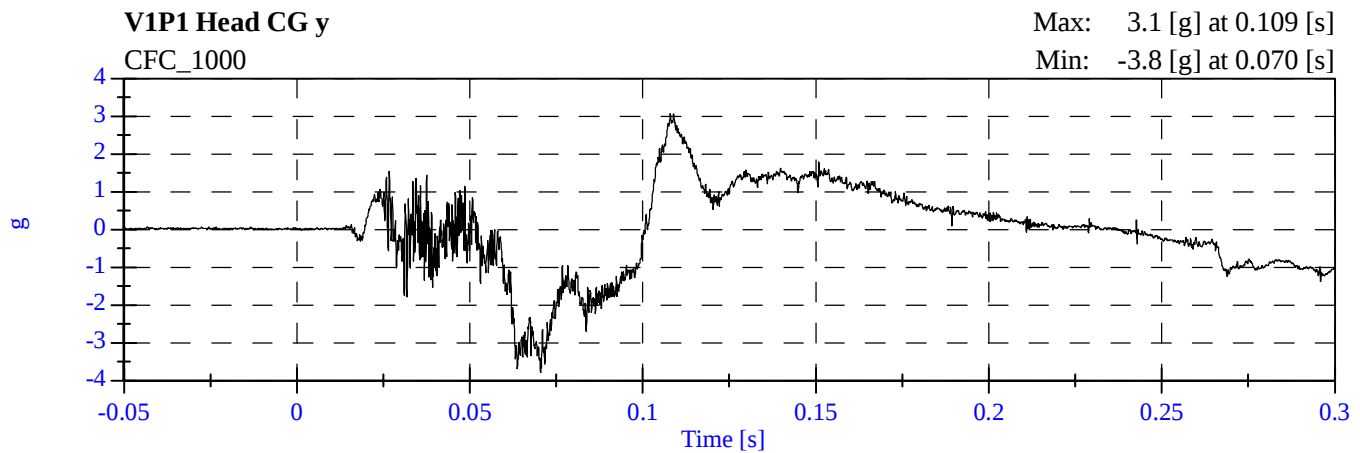
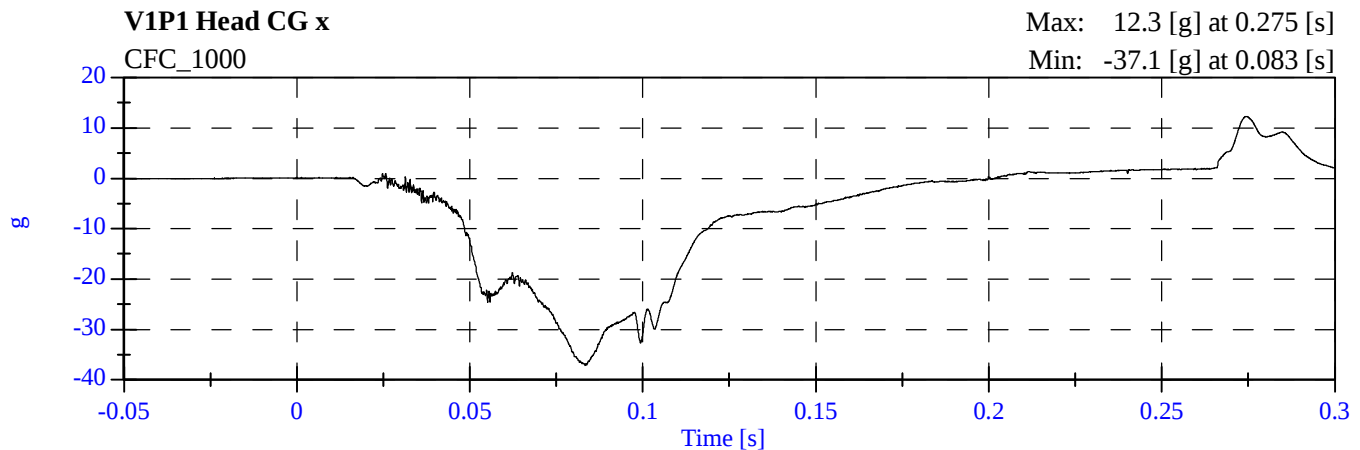
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V1P2 Head 9 Array Y Arm Ax	
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V1P2 Head 9 Array Z Arm Ay	
V1P2 Head CG Ax	
V1P2 Head CG Ay	
V1P2 Head CG Az	
V1P2 Head CG Red Ax	
V1P2 Head CG Red Ay	
V1P2 Head CG Red Az	
V1P2 Upper Neck Fx	
V1P2 Upper Neck Fy	
V1P2 Upper Neck Fz	
V1P2 Upper Neck Mx	
V1P2 Upper Neck My	
V1P2 Upper Neck Mz	
V1P2 Chest Ax	
V1P2 Chest Ay	
V1P2 Chest Az	
V1P2 Chest Red Ax	
V1P2 Chest Red Ay	
V1P2 Chest Red Az	
V1P2 Chest Compression	
V1P2 Pelvic Ax	
V1P2 Pelvic Ay	
V1P2 Pelvic Az	
V1P2 Left Femur Fz	
V1P2 Right Femur Fz	
V1P2 Left Upper Tibia Fz	
V1P2 Left Upper Tibia Mx	
V1P2 Left Upper Tibia My	
V1P2 Left Lower Tibia Mx	
V1P2 Left Lower Tibia My	
V1P2 Right Upper Tibia Mx	
V1P2 Right Upper Tibia My	
V1P2 Right Lower Tibia Fz	
V1P2 Right Lower Tibia Mx	
V1P2 Right Lower Tibia My	
V1P2 Left Foot Aft Ax	
V1P2 Left Foot Aft Az	
V1P2 Left Foot Fore Az	
V1P2 Right Foot Aft Ax	
V1P2 Right Foot Aft Az	
V1P2 Right Foot Fore Az	
Barrier Load Cell A1 Fx	
Barrier Load Cell A2 Fx	
Barrier Load Cell A3 Fx	
Barrier Load Cell A4 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	
Barrier Load Cell D6 Fx	
Barrier Load Cell D7 Fx	
Barrier Load Cell D8 Fx	
Barrier Load Cell D9 Fx	

TEST NOTES	
Data Channel	Anomalies

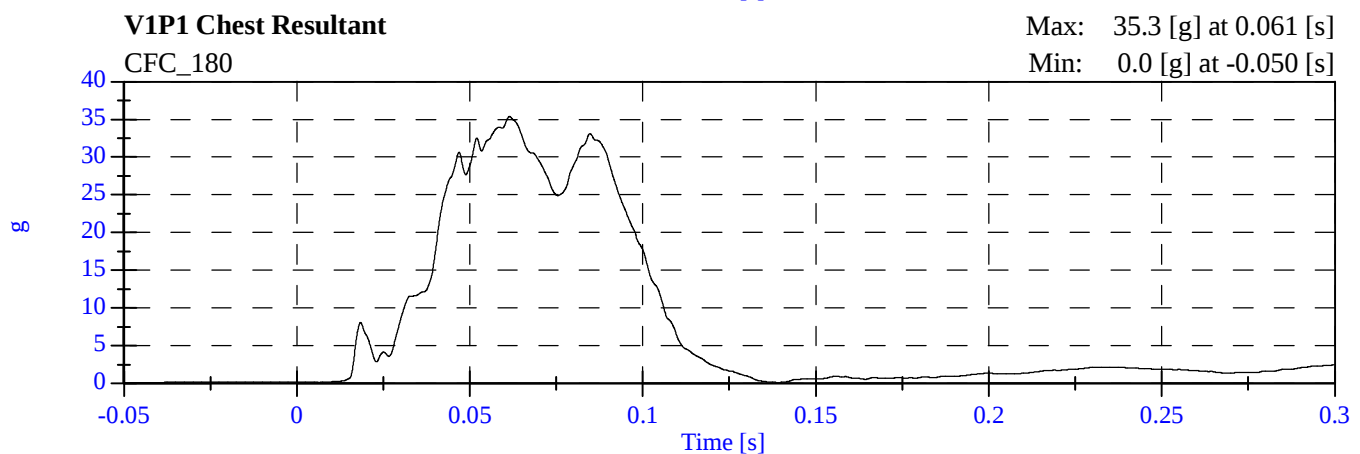
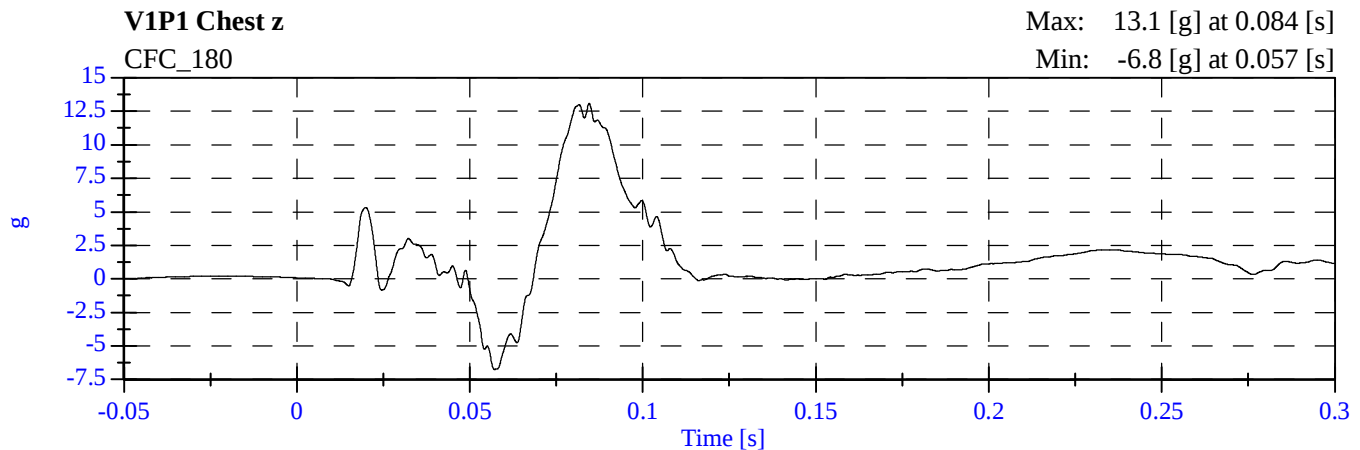
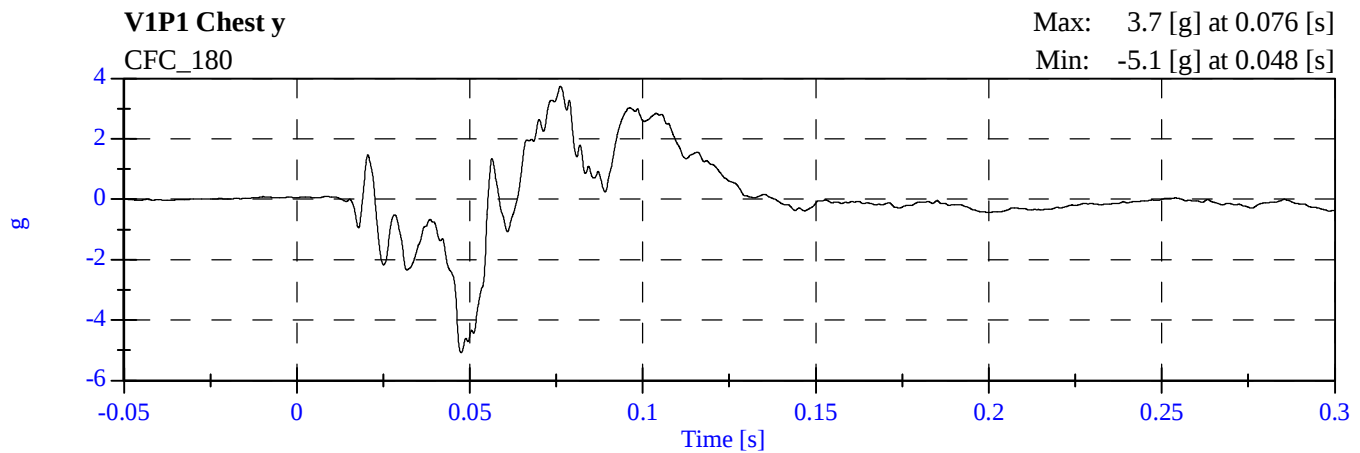
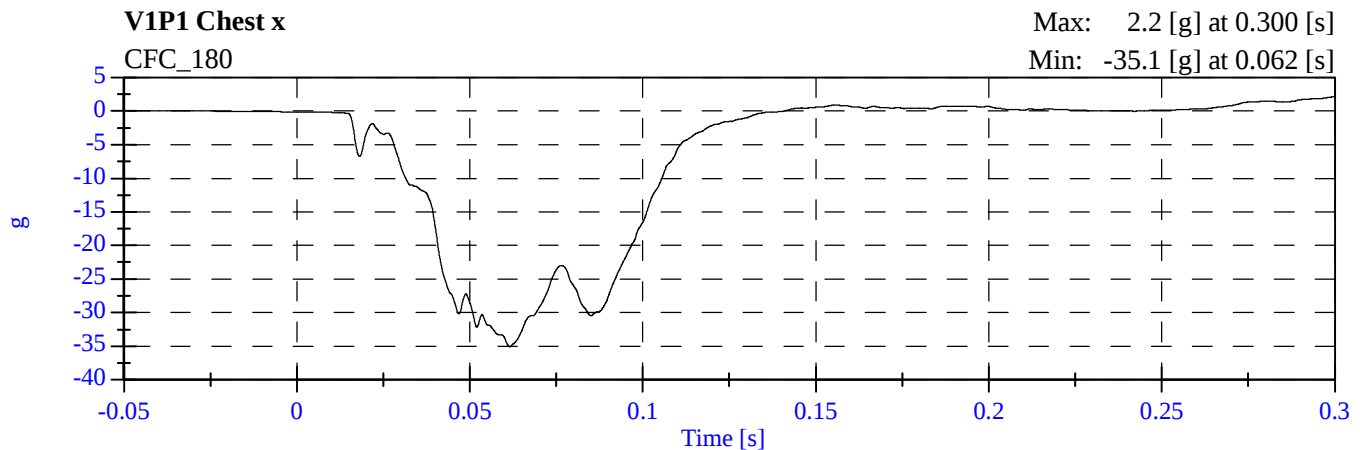
2010 NCAP OPT Test 1 2010 Lincoln MKT

FA0201 - December 17, 2009

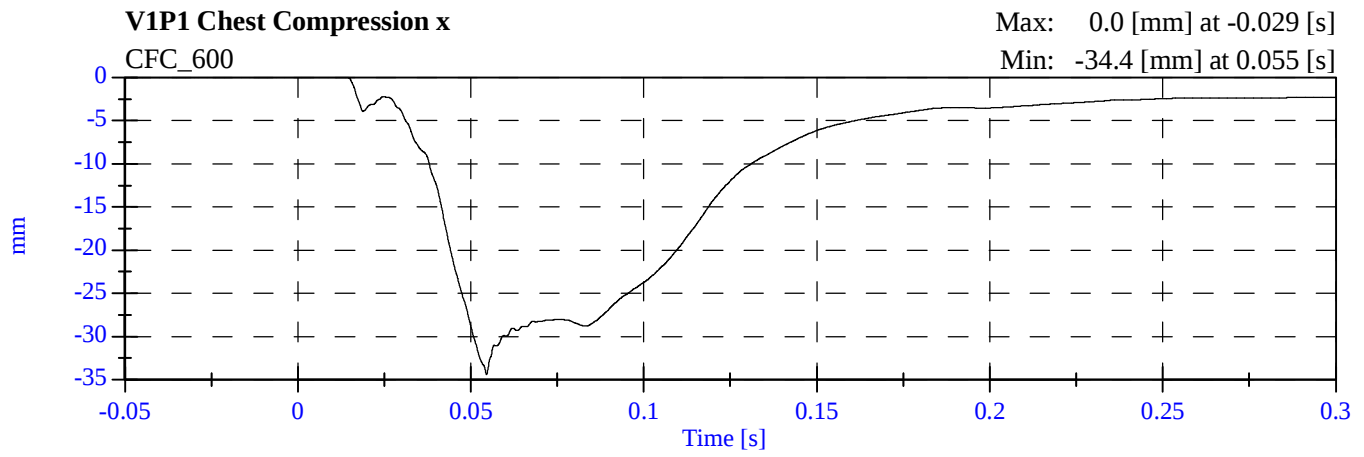


2010 NCAP OPT Test 1 2010 Lincoln MKT

FA0201 - December 17, 2009

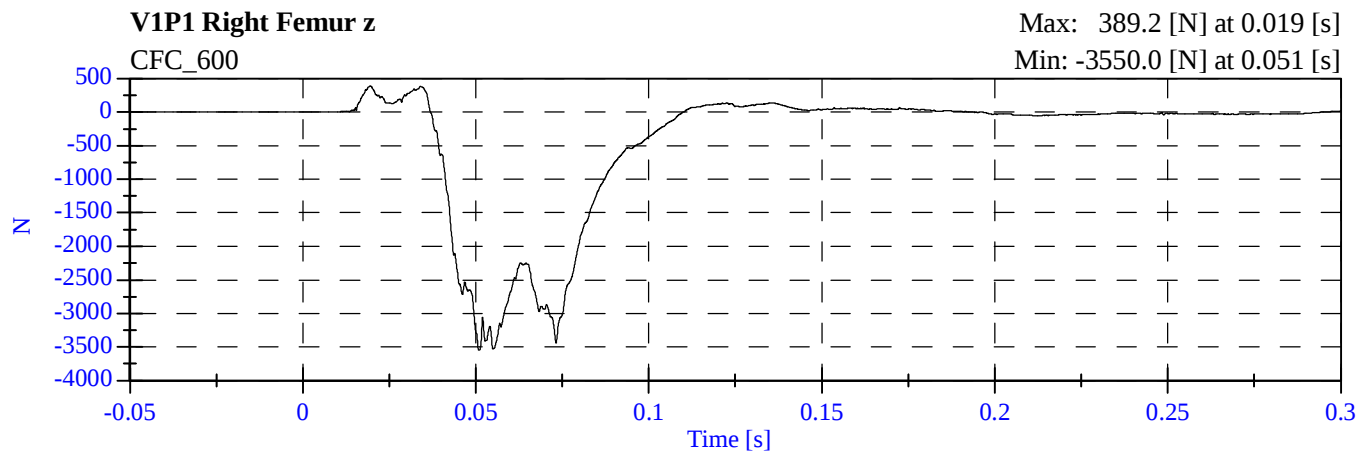
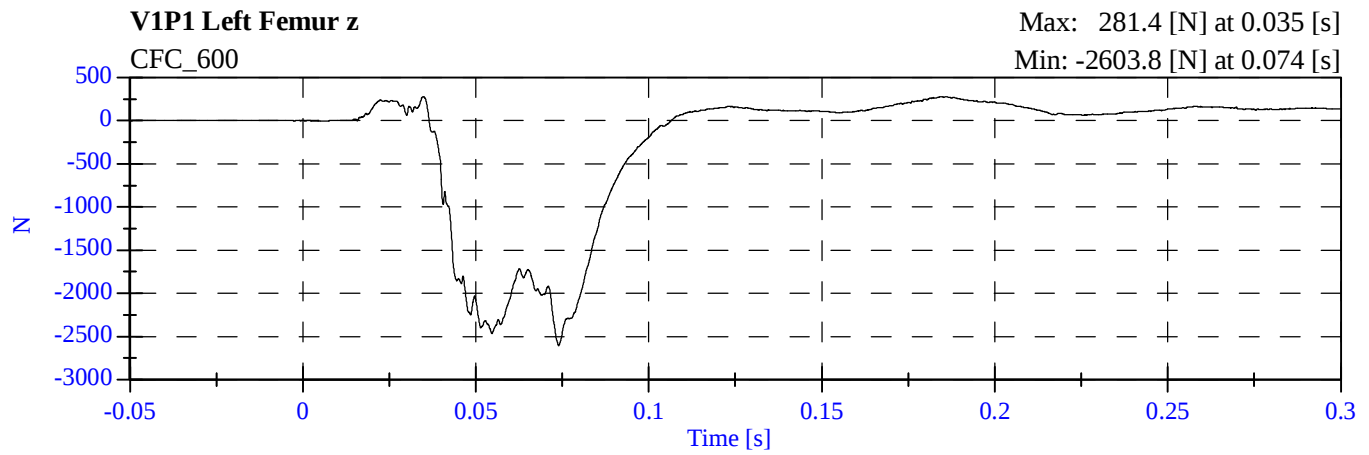


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FA0201 - December 17, 2009



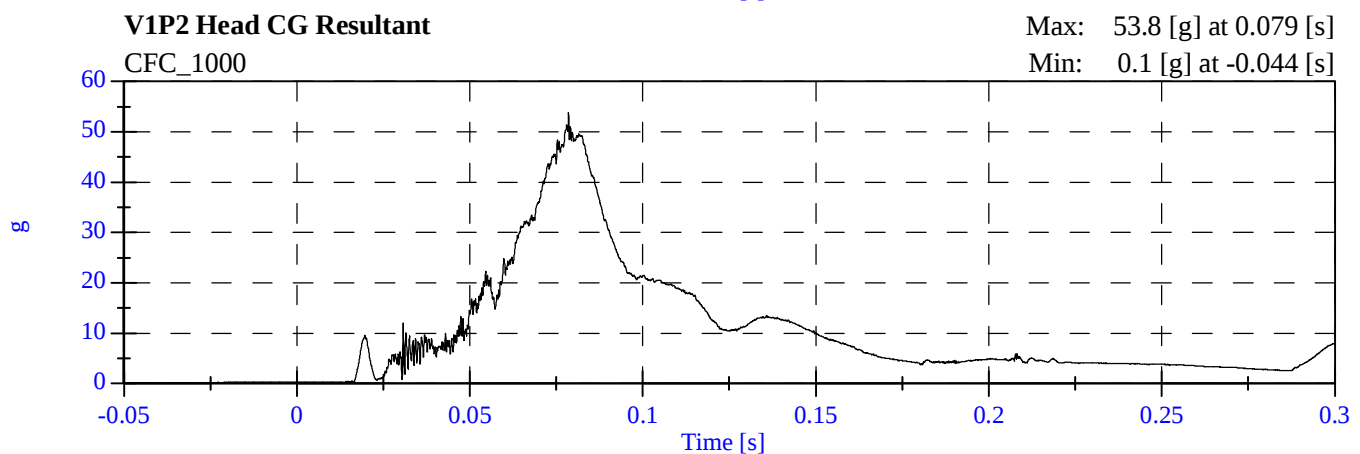
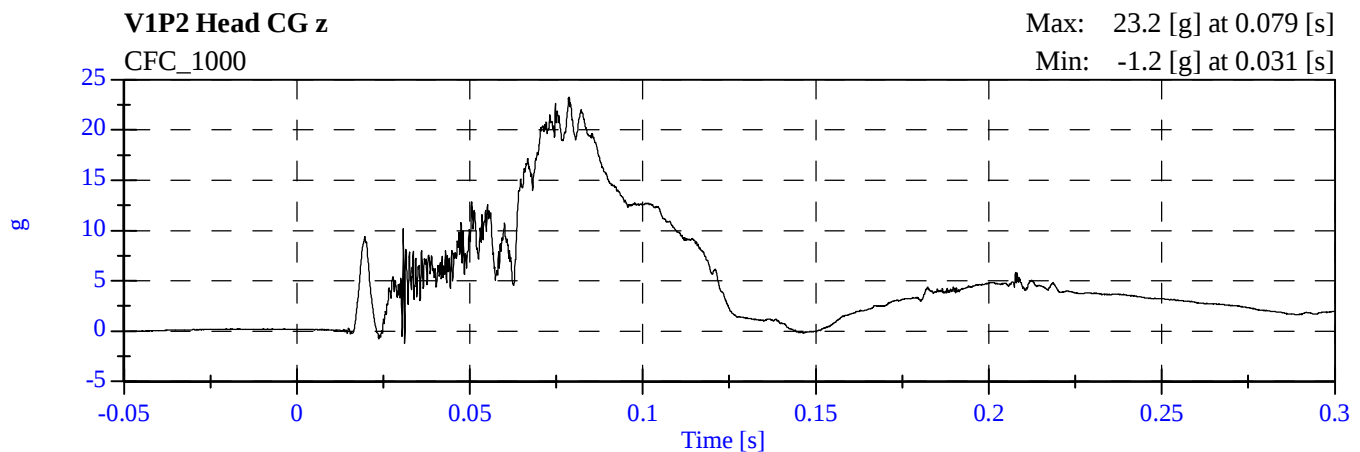
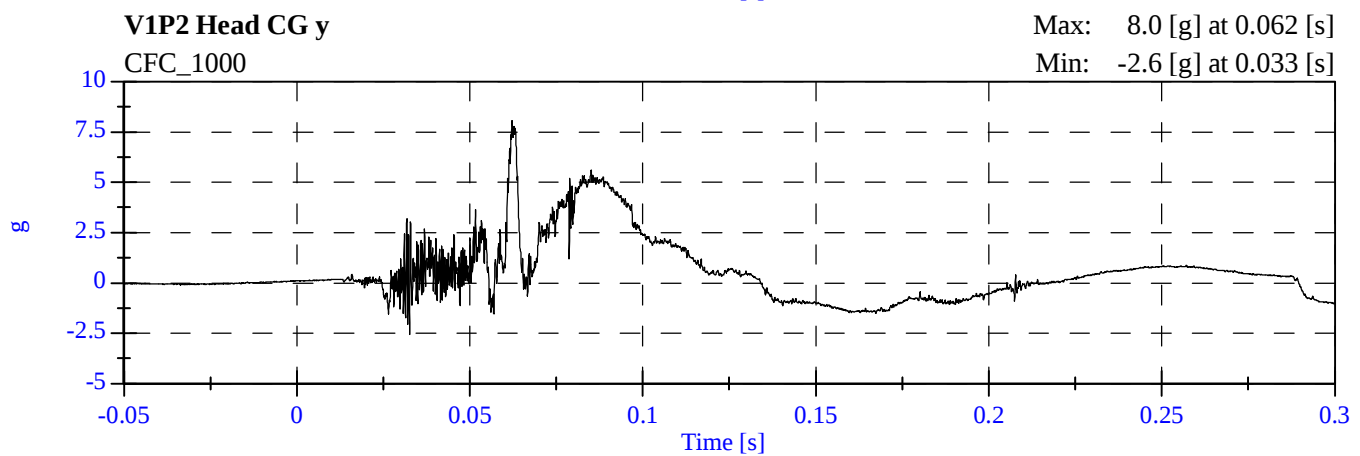
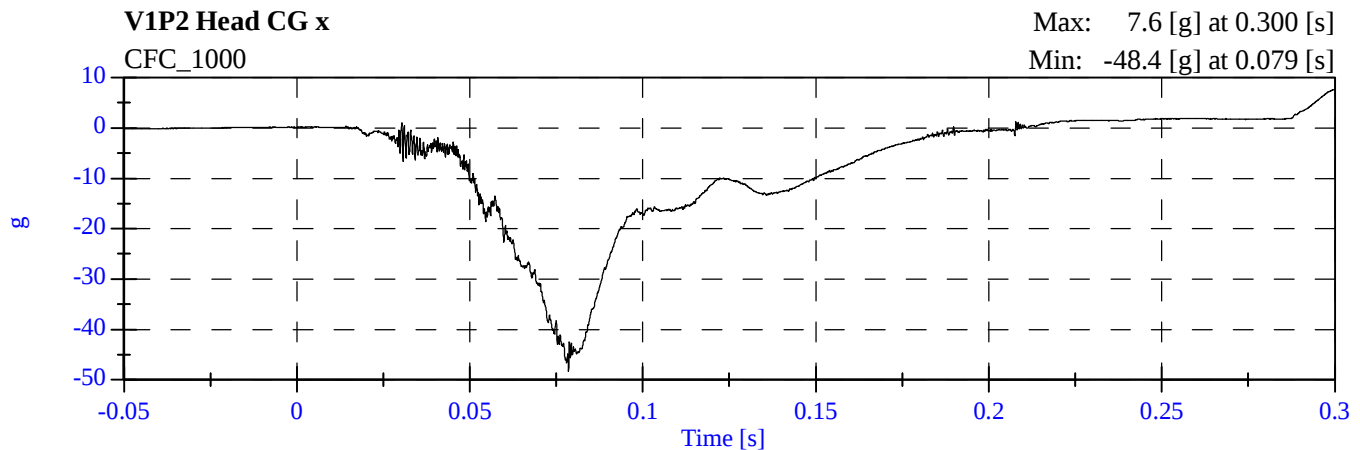
2010 NCAP OPT Test 1 2010 Lincoln MKT

FA0201 - December 17, 2009



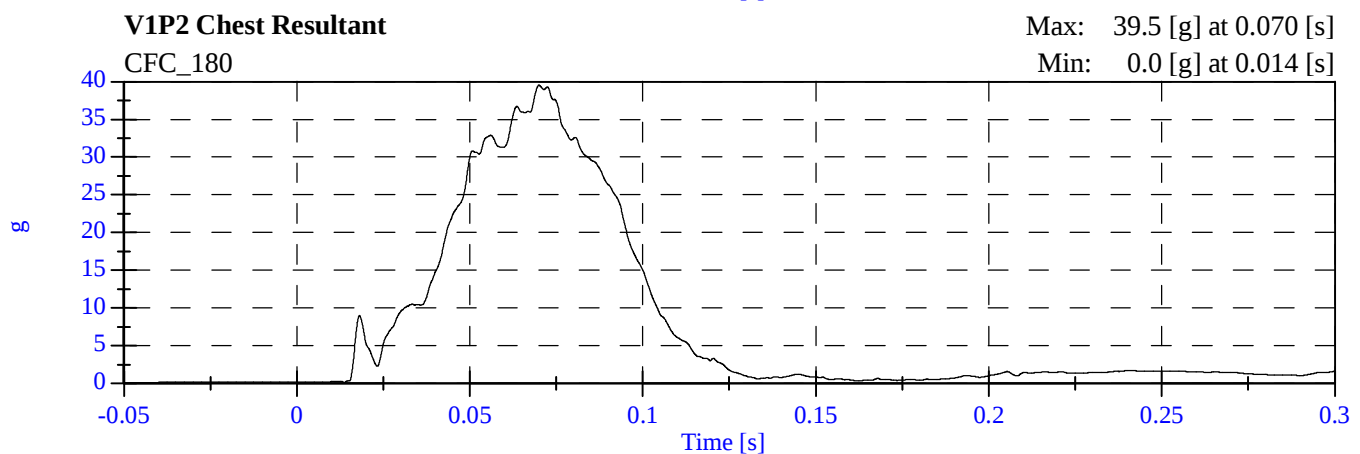
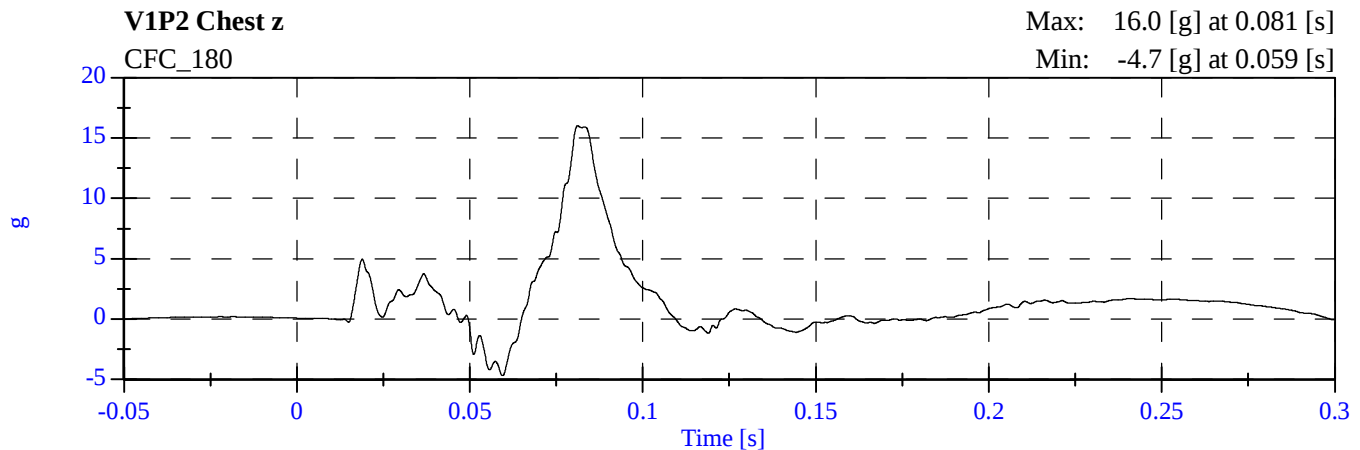
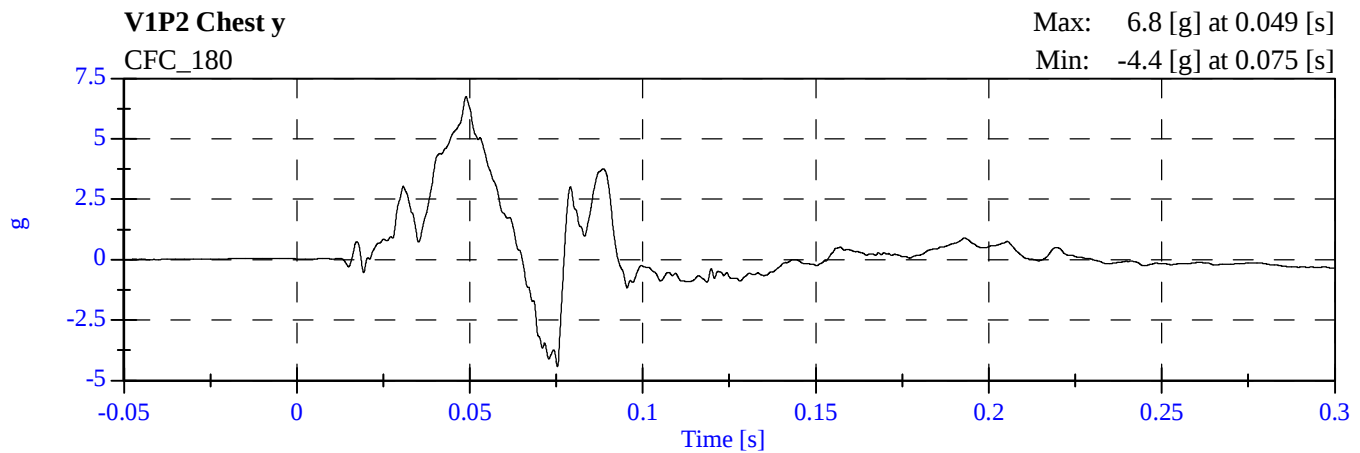
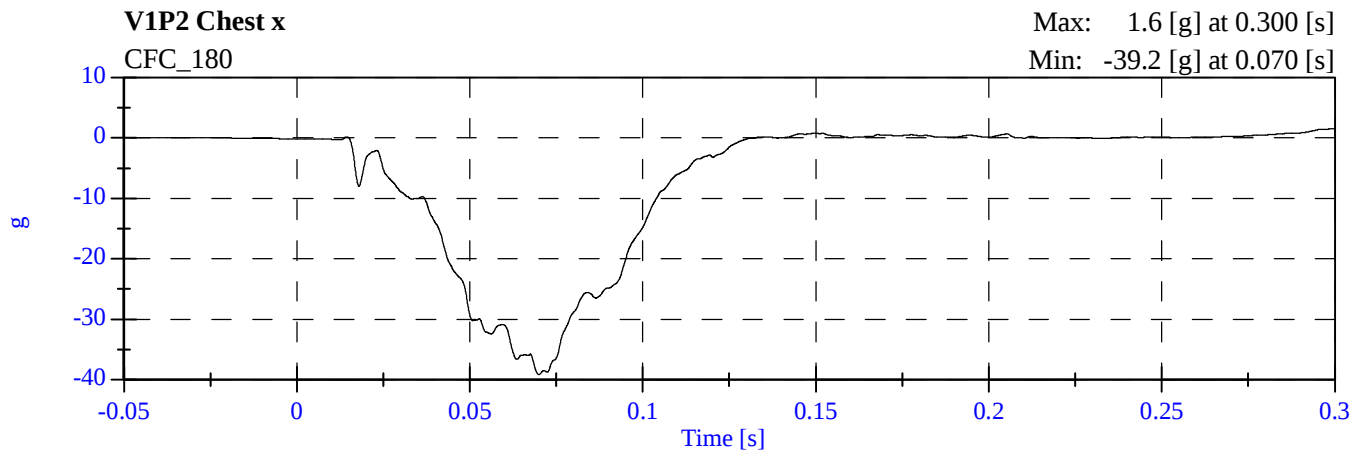
2010 NCAP OPT Test 1 2010 Lincoln MKT

FA0201 - December 17, 2009

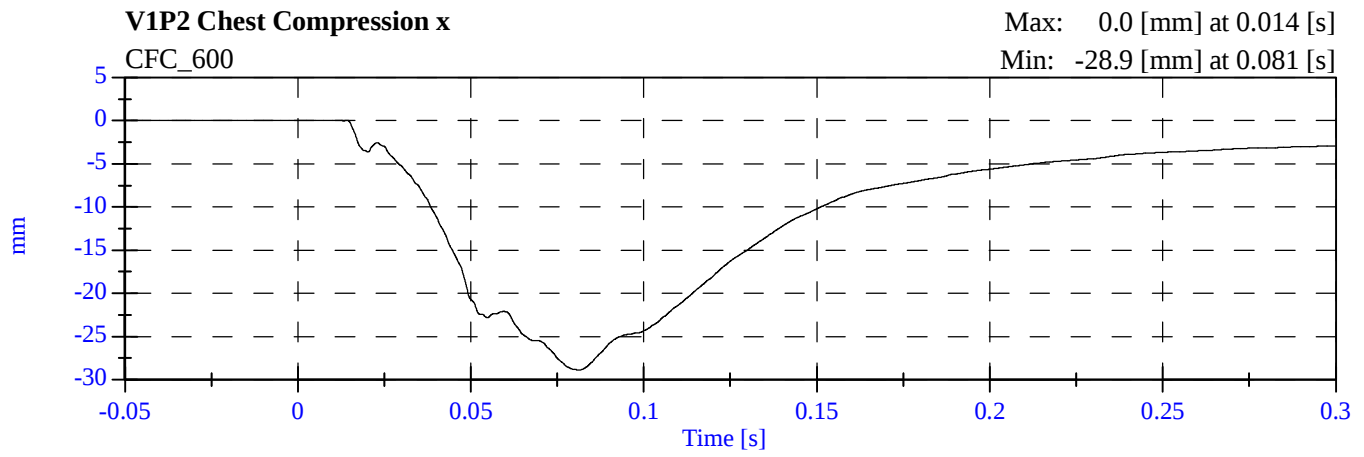


2010 NCAP OPT Test 1 2010 Lincoln MKT

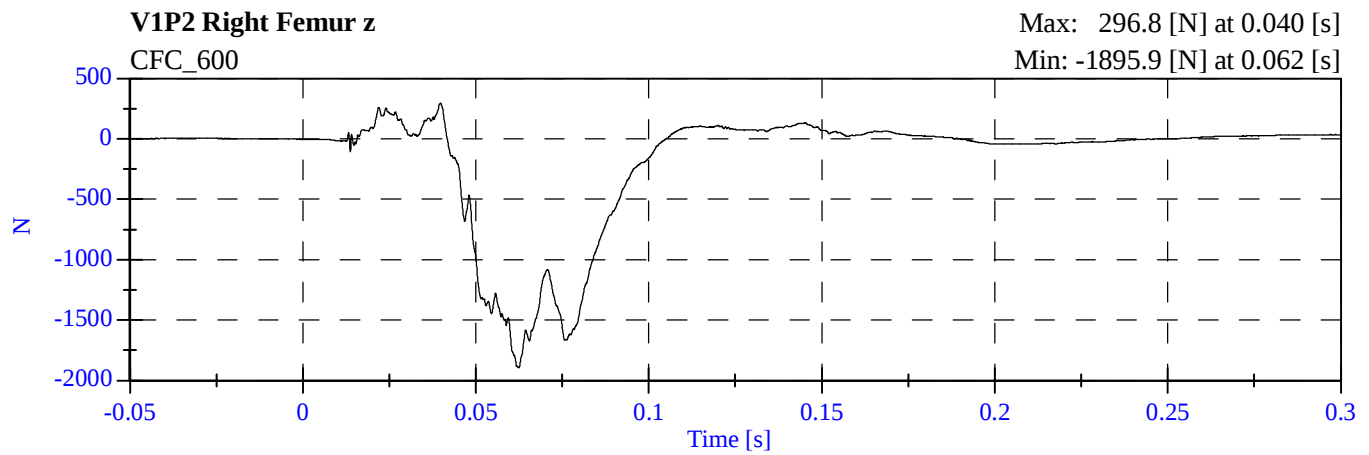
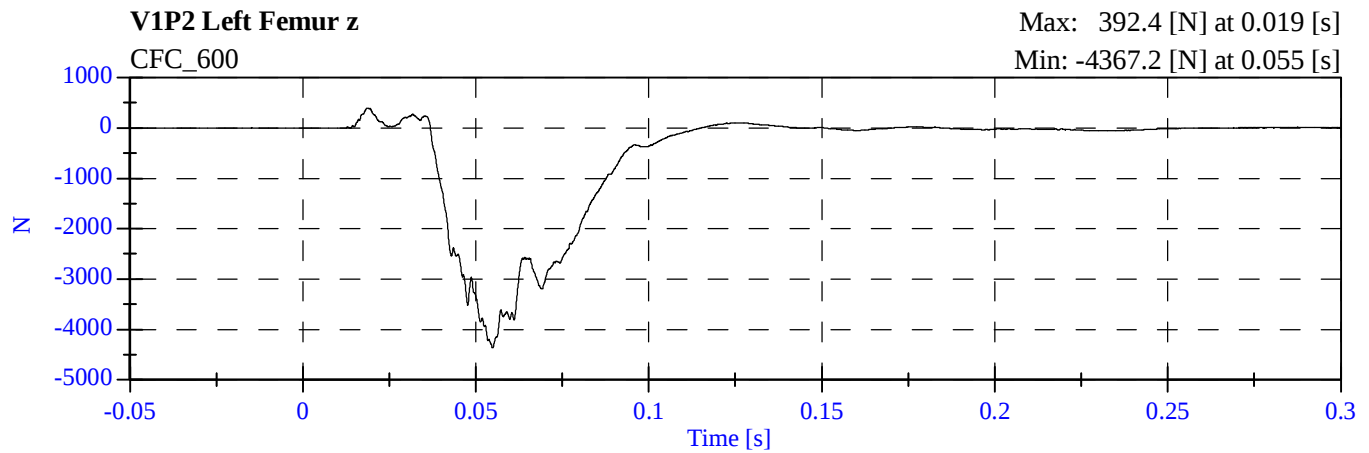
FA0201 - December 17, 2009



2010 NCAP OPT Test 1 2010 Lincoln MKT
FA0201 - December 17, 2009



2010 NCAP OPT Test 1 2010 Lincoln MKT
FA0201 - December 17, 2009



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.

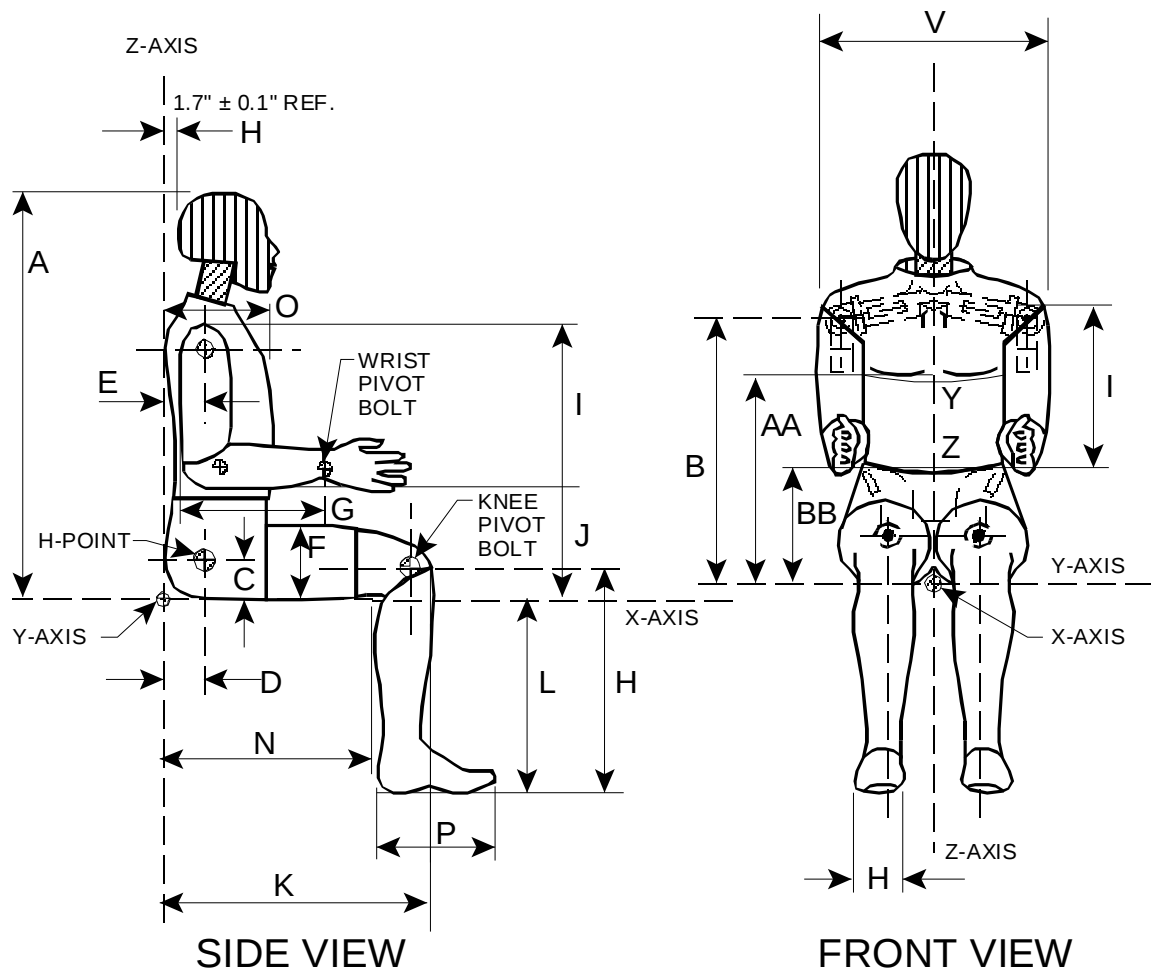
Dummy serial numbers and certification dates are:

<u>Position No./Location</u>	<u>Serial No.</u>	<u>Completion Date</u>
#1/Driver	064	12-15-09
#2/Right Front Passenger	061	10-16-09

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 064
Sequential Test Number 1
Date 12-10-09
Workfile 064H 12-10-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	22.0
Peak Resultant Acceleration	225-275 G's	269.74
Peak Lateral Acceleration	15 G's Max	12.04
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	064	
Sequential Test Number	1	
Date	12-15-09	6 Axis Neck Transducer
Workfile	064NF 12-15-09	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.67
Relative Humidity		10% - 70%	32.0
Impact Velocity		6.89 – 7.13 m/s	7.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	24.96
	20 ms	17.60 - 22.60 G's	22.41
	30 ms	12.50 - 18.50 G's	16.36
Max Pendulum G's Above 30 ms		29 G's Max	16.36
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	38.10
D Plane Rotation	Max	64 - 78 Deg	65.33
	Time	57 - 64 ms	58.50
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m	96.72
	Time	47 - 58 ms	49.90
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	114.20
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	98.80

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	064	
Sequential Test Number	1	
Date	12-15-09	6 Axis Neck Transducer
Workfile	064NE 12-15-09	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.11
Relative Humidity		10% - 70%	32.00
Impact Velocity		5.94 – 6.19 m/s	6.08
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	20.18
	20 ms	14.00 - 19.00 G's	19.00
	30 ms	11.00 - 16.00 G's	15.00
Max Pendulum G's Above 30 ms		22 G's Max	15.00
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	38.80
D Plane Rotation	Max	81 - 106 Deg	94.95
	Time	72 - 82 ms	76.90
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-65.18
	Time	65 - 79 ms	76.90
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	158.50
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	140.10

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 064
Sequential Test Number 1
Date 12-14-09
Workfile 064T 12-14-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	32.0
Pendulum Velocity	6.58 – 6.83 m/s	6.69
Maximum Deflection	63.50 – 72.64 mm	69.74
Maximum Resistive Force	5159.9 – 5893.9 N	5632.03
Internal Hysteresis	69 - 85 %	72.48

Remarks:

Laboratory Technician:

_____ B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 064
Sequential Test Number 1
Date 12-14-09
Workfile 064LK RK 12-14-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	32.0
Probe Velocity	2.07 – 2.13 m/s	2.10
Peak Knee Impact Force	4715.1 – 5782.7 N	5583.76
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	32.0
Probe Velocity	2.07 – 2.13 m/s	2.10
Peak Knee Impact Force	4715.1 – 5782.7 N	5640.88

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 064
Sequential Test Number 1
Date 12-15-09

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			20.6
Relative Humidity			52
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Total Sitting Height	A	34.6 - 35.0 in	34.8
Shoulder Pivot Height	B	19.9 - 20.5 in	20.0
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.4
Thigh Clearance	F	5.5 - 6.1 in	5.7
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.8
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.3
Elbow Rest Height	J	7.5 - 8.3 in	7.8
Buttock Knee Length	K	22.8 - 23.8 in	23.0
Popliteal Height	L	16.9 - 17.9 in	17.5
Knee Pivot Height	M	19.1 - 19.7 in	19.5
Buttock Popliteal Length	N	17.8 - 18.8 in	17.9
Chest Depth	O	8.4 - 9.0 in	8.9
Foot Length	P	9.9 - 10.5 in	10.0
Shoulder Breadth	V	16.6 - 17.2 in	16.9
Foot Breadth	W	3.6 - 4.2 in	3.9
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	38.7
Waist Circumference	Z	32.9 - 34.1 in	33.6

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
HEAD DROP TEST

Dummy Serial Number 061
Sequential Test Number 1
Date 10-16-09
Workfile 061H 10-16-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	32
Peak Resultant Acceleration	225-275 G's	240.8
Peak Lateral Acceleration	15 G's Max	13.44
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	061	
Sequential Test Number	1	
Date	10-19-09	6 Axis Neck Transducer
Workfile	061NF2 10-19-09	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.1
Relative Humidity		10% - 70%	28
Impact Velocity		6.89 – 7.13 m/s	7.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	25.50
	20 ms	17.60 - 22.60 G's	20.27
	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	37.70
D Plane Rotation	Max	64 - 78 Deg	69.33
	Time	57 - 64 ms	58.70
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m	90.09
	Time	47 - 58 ms	48.70
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	117.5
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	98.20

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	061	
Sequential Test Number	1	
Date	10-19-09	6 Axis Neck Transducer
Workfile	061NE1 10-19-09	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.1
Relative Humidity		10% - 70%	29
Impact Velocity		5.94 – 6.19 m/s	6.09
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	20.18
	20 ms	14.00 - 19.00 G's	17.62
	30 ms	11.00 - 16.00 G's	14.27
Max Pendulum G's Above 30 ms		22 G's Max	14.27
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	41.30
D Plane Rotation	Max	81 - 106 Deg	96.96
	Time	72 - 82 ms	75.50
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-69.95
	Time	65 - 79 ms	72.10
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	157.70
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	141.50

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 061
Sequential Test Number 1
Date 10-21-09
Workfile 061T2 10-20-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	44
Pendulum Velocity	6.58 – 6.83 m/s	6.67
Maximum Deflection	63.50 – 72.64 mm	70.40
Maximum Resistive Force	5159.9 – 5893.9 N	5412.36
Internal Hysteresis	69 - 85 %	71.71

Remarks:

Laboratory Technician:

_____ B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 061
Sequential Test Number 1
Date 10-20-09
Workfile 061LK/RK 10-20-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	20.6
Relative Humidity	10% - 70%	36.00
Probe Velocity	2.07 – 2.13 m/s	2.10
Peak Knee Impact Force	4715.1 – 5782.7 N	5064.97
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	20.6
Relative Humidity	10% - 70%	36.00
Probe Velocity	2.07 – 2.13 m/s	2.11
Peak Knee Impact Force	4715.1 – 5782.7 N	5295.45

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 061
Sequential Test Number 1
Date 10-20-09

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			20.6
Relative Humidity			36
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Total Sitting Height	A	34.6 - 35.0 in	34.8
Shoulder Pivot Height	B	19.9 - 20.5 in	20.1
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.5
Thigh Clearance	F	5.5 - 6.1 in	5.9
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.7
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.4
Elbow Rest Height	J	7.5 - 8.3 in	7.7
Buttock Knee Length	K	22.8 - 23.8 in	22.9
Popliteal Height	L	16.9 - 17.9 in	17.2
Knee Pivot Height	M	19.1 - 19.7 in	19.3
Buttock Popliteal Length	N	17.8 - 18.8 in	17.9
Chest Depth	O	8.4 - 9.0 in	8.8
Foot Length	P	9.9 - 10.5 in	10.1
Shoulder Breadth	V	16.6 - 17.2 in	16.9
Foot Breadth	W	3.6 - 4.2 in	3.7
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	39.0
Waist Circumference	Z	32.9 - 34.1 in	33.5

Remarks:

Laboratory Technician:

B. Swiecicki

APPENDIX D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 064)		Manufacturer	Serial #	Calibration	
				Last	Next
Head	X	ENDEVCO	P52011	12/1/2009	6/1/2010
	Y	ENDEVCO	P52128	12/1/2009	6/1/2010
	Z	ENDEVCO	P51990	12/1/2009	6/1/2010
Head	X (R)	ENDEVCO	P51303	12/1/2009	6/1/2010
	Y (R)	ENDEVCO	P51985	12/1/2009	6/1/2010
	Z (R)	ENDEVCO	P51294	12/1/2009	6/1/2010
Neck Load Cell	X	DENTON	440Fx	4/7/2009	10/6/2009
	Y	DENTON	440Fy	4/7/2009	10/6/2009
	Z	DENTON	440Fz	4/7/2009	10/6/2009
Neck Moment	X	DENTON	440Mx	4/7/2009	10/6/2009
	Y	DENTON	440My	4/7/2009	10/6/2009
	Z	DENTON	440Mz	4/7/2009	10/6/2009
Chest	X	ENDEVCO	P52000	12/3/2009	6/3/2010
	Y	ENDEVCO	P49163	12/3/2009	6/3/2010
	Z	ENDEVCO	P52009	12/2/2009	6/2/2010
Chest	X (R)	ENDEVCO	P52035	12/3/2009	6/3/2010
	Y (R)	ENDEVCO	P52030	12/3/2009	6/3/2010
	Z (R)	ENDEVCO	P52033	12/2/2009	6/2/2010
Chest Deflection	X	SERVO	64	5/24/2009	11/22/2009
Pelvic	X	ENDEVCO	P17285	12/8/2009	6/8/2010
	Y	ENDEVCO	P17837	12/8/2009	6/8/2010
	Z	ENDEVCO	P17553	12/8/2009	6/8/2010

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 064)		Manufacturer	Serial #	Calibration	
				Last	Next
Left Femur Load Cell	Fz	DENTON	1525	5/29/2009	11/27/2009
Right Femur Load Cell	Fz	DENTON	1533	5/29/2009	11/27/2009
Left Upper Tibia	Mx	DENTON	374Mx	6/2/2009	12/1/2009
	My	DENTON	374My	6/2/2009	12/1/2009
Left Lower Tibia	Fz	DENTON	372Fz	6/2/2009	12/1/2009
	Mx	DENTON	372My	6/2/2009	12/1/2009
	My	DENTON	372My	6/2/2009	12/1/2009
Right Upper Tibia	Mx	DENTON	404Mx	6/1/2009	11/30/2009
	My	DENTON	404My	6/1/2009	11/30/2009
Right Lower Tibia	Fz	DENTON	396Fz	6/1/2009	11/30/2009
	Mx	DENTON	396Mx	6/1/2009	11/30/2009
	My	DENTON	396My	6/1/2009	11/30/2009
Left Foot Rear	X	ENDEVCO	P52383	12/9/2009	6/9/2010
	Z	ENDEVCO	P52152	12/9/2009	6/9/2010
Left Foot Front	Z	ENDEVCO	P52082	12/9/2009	6/9/2010
Right Foot Rear	X	ENDEVCO	P52025	12/9/2009	6/9/2010
	Z	ENDEVCO	P51873	12/9/2009	6/9/2010
Right Foot Front	Z	ENDEVCO	P58987	12/9/2009	6/9/2010
Lap Belt Load Cell		First Technology	156	4/2/2009	10/1/2009
Shoulder Belt Load Cell		First Technology	316	8/18/2009	2/16/2010

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 061)		Manufacturer	Serial #	Calibration	
				Last	Next
Head	X	ENDEVCO	P58871	7/12/2009	1/10/2010
	Y	ENDEVCO	P51281	7/12/2009	1/10/2010
	Z	ENDEVCO	P51209	7/12/2009	1/10/2010
Head	X (R)	ENDEVCO	P52155	7/12/2009	1/10/2010
	Y (R)	ENDEVCO	P51274	7/12/2009	1/10/2010
	Z (R)	ENDEVCO	P52133	7/12/2009	1/10/2010
Neck Load Cell	X	DENTON	1916Fx	7/13/2009	1/11/2010
	Y	DENTON	1916Fy	7/13/2009	1/11/2010
	Z	DENTON	1916Fz	7/13/2009	1/11/2010
Neck Moment	X	DENTON	1916Mx	7/13/2009	1/11/2010
	Y	DENTON	1916My	7/13/2009	1/11/2010
	Z	DENTON	1916Mz	7/13/2009	1/11/2010
Chest	X	ENDEVCO	P52157	7/12/2009	1/10/2010
	Y	ENDEVCO	P52018	7/12/2009	1/10/2010
	Z	ENDEVCO	P52398	6/27/2009	12/26/2009
Chest	X (R)	ENDEVCO	P52156	7/12/2009	1/10/2010
	Y (R)	ENDEVCO	P49179	7/12/2009	1/10/2010
	Z (R)	ENDEVCO	P52405	6/27/2009	12/26/2009
Chest Deflection	X	SERVO	61	7/14/2009	1/12/2010
Pelvic	X	ENDEVCO	P58743	7/12/2009	1/10/2010
	Y	ENDEVCO	P58766	7/12/2009	1/10/2010
	Z	ENDEVCO	P58767	7/12/2009	1/10/2010

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 061)		Manufacturer	Serial #	Calibration	
				Last	Next
Left Femur Load Cell	Fz	DENTON	1532	6/15/2009	12/14/2009
Right Femur Load Cell	Fz	DENTON	1526	6/15/2009	12/14/2009
Left Upper Tibia	Mx	DENTON	91UMx	7/14/2009	1/12/2010
	My	DENTON	91UMy	7/14/2009	1/12/2010
Left Lower Tibia	Fz	DENTON	91LFz	7/14/2009	1/12/2010
	Mx	DENTON	91LMx	7/14/2009	1/12/2010
	My	DENTON	91LMy	7/14/2009	1/12/2010
Right Upper Tibia	Mx	DENTON	200Mx	7/14/2009	1/12/2010
	My	DENTON	200My	7/14/2009	1/12/2010
Right Lower Tibia	Fz	DENTON	128Fz	7/14/2009	1/12/2010
	Mx	DENTON	128Mx	7/14/2009	1/12/2010
	My	DENTON	128My	7/14/2009	1/12/2010
Left Foot Rear	X	ENTRAN	02I02I16-A05	7/12/2009	1/10/2010
	Z	ENTRAN	00L20-A30	7/12/2009	1/10/2010
Left Foot Front	Z	ENTRAN	00L20-A22	7/12/2009	1/10/2010
Right Foot Rear	X	ENDEVCO	J29805	7/12/2009	1/10/2010
	Z	ENTRAN	00L20-A29	7/12/2009	1/10/2010
Right Foot Front	Z	ENTRAN	03E03E20-N12	7/12/2009	1/10/2010
Lap Belt Load Cell		First Technology	173	4/2/2009	10/1/2009
Shoulder Belt Load Cell		First Technology	275	8/7/2009	2/5/2010

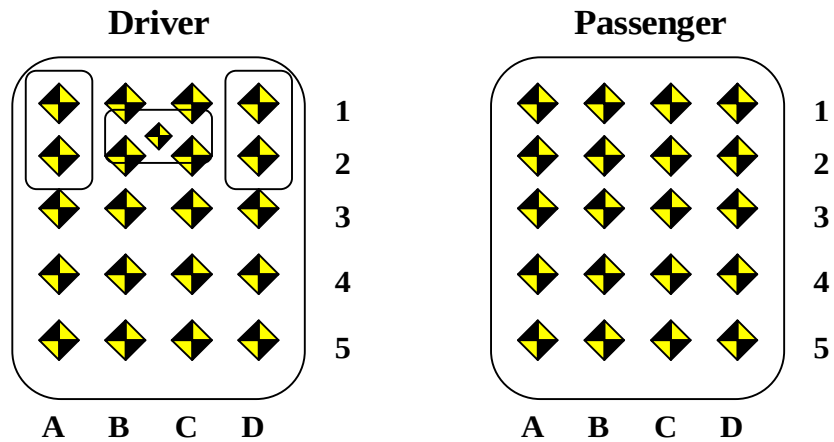
INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(Six Month Calibration Minimum)

	Manufacturer	Serial #	Calibration	
			Last	Next
Left Seat Rear Crossmember X	ENDEVCO	P18531	9/17/2009	3/18/2010
Right Rear Seat Crossmember X	ENDEVCO	P15526	7/23/2009	1/21/2010
Top of Engine	ENDEVCO	J37854	11/4/2009	5/5/2010
Bottom of Engine	ICS	FGP49	11/4/2009	5/5/2010
Right Disc Brake Caliper	ICS	FGP50	11/4/2009	5/5/2010
Left Disc Brake Caliper	GS SENSORS	9440-011	11/9/2009	5/10/2010
Left Seat Rear Crossmember Z	ENDEVCO	P23128	7/23/2009	1/21/2010
Right Seat Rear Crossmember Z	ENDEVCO	P18528	7/23/2009	1/21/2010

APPENDIX E

VEHICLE INTERIOR INTRUSION MEASUREMENTS

DRIVER SIDE INTRUSION MEASUREMENTS



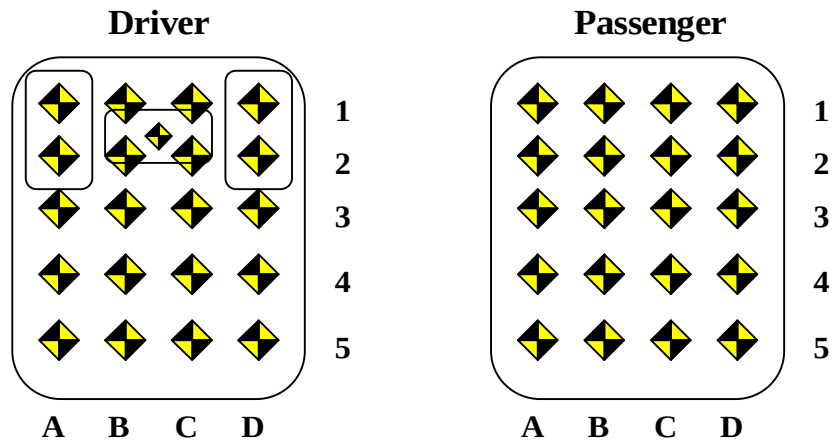
Driver Side Intrusion Measurements

Intrusion Location	PRE-TEST (mm)			POST-TEST (mm)			CHANGE (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	3769	-556	465	3748	-567	480	21	11	-15
B1	3867	-425	463	3816	-420	511	51	-5	-48
C1	3884	-307	458	3799	-307	512	85	0	-54
D1	3855	-191	468	3786	-188	501	69	-3	-33
A2	3639	-558	386	3628	-574	387	11	16	-1
B2	3812	-425	382	3784	-429	416	28	4	-34
C2	3813	-310	384	3754	-325	418	59	15	-34
D2	3810	-193	381	3788	-209	407	22	16	-26
A3	3612	-558	361	3603	-573	359	9	15	2
B3	3729	-433	322	3726	-443	337	3	10	-15
C3	3726	-317	328	3722	-331	326	4	14	2
D3	3670	-205	342	3664	-219	339	6	14	3
A4	3586	-560	328	3580	-574	323	6	14	5
B4	3627	-434	312	3624	-450	313	3	16	-1
C4	3616	-323	315	3614	-336	306	2	13	9
D4	3612	-209	321	3611	-220	308	1	11	13
A5	3513	-562	312	3510	-576	301	3	14	11
B5	3510	-441	311	3510	-453	301	0	12	10
C5	3511	-328	315	3510	-339	303	1	11	12
D5	3511	-218	314	3511	-227	298	0	9	16
BP	3677	-365	481	3710	-316	465	-33	-49	16
G	3469	-518	765	3452	-520	765	17	2	0
H	3442	-217	764	3420	-220	765	22	3	-1
L	3241	-374	1011	3282	-378	1007	-41	4	4
AB	3204	-582	382	3205	-590	374	-1	8	8

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	3852	229	448	3831	228	486	21	1	-38
B1	3851	344	448	3828	348	482	23	-4	-34
C1	3844	455	448	3808	452	487	36	3	-39
D1	3757	568	454	3742	577	469	15	-9	-15
A2	3777	225	388	3767	227	406	10	-2	-18
B2	3774	339	386	3758	342	410	16	-3	-24
C2	3776	456	387	3764	457	410	12	-1	-23
D2	3734	570	389	3726	572	401	8	-2	-12
A3	3683	222	338	3686	227	337	-3	-5	1
B3	3686	337	339	3688	341	338	-2	-4	1
C3	3686	456	340	3687	458	340	-1	-2	0
D3	3684	569	342	3691	572	343	-7	-3	-1
A4	3551	214	331	3554	220	320	-3	-6	11
B4	3584	336	321	3589	337	318	-5	-1	3
C4	3586	448	322	3592	456	321	-6	-8	1
D4	3587	565	324	3593	570	323	-6	-5	1
A5	3479	214	318	3483	220	307	-4	-6	11
B5	3477	329	319	3483	335	308	-6	-6	11
C5	3475	450	319	3481	455	310	-6	-5	9
D5	3476	565	320	3483	573	315	-7	-8	5
R	3441	216	770	3427	221	769	14	-5	1
S	3470	518	772	3455	522	765	15	-4	7
AB	3205	582	385	3204	587	379	1	-5	6

R=Left side of bolster, S=Right side of bolster, L=Steering wheel center;
AB = Front outboard seat anchor bolt