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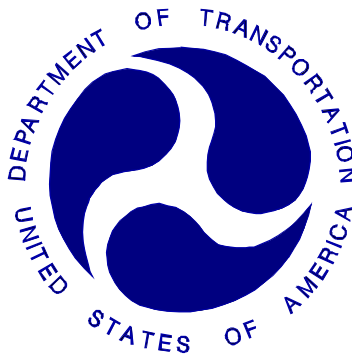
**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

FORD MOTOR COMPANY
2010 FORD TRANSIT CONNECT XLT
WAGON

NHTSA NUMBER: MA0217

CALSPAN TEST NUMBER: tr2418

CALSPAN CORPORATION
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October 1, 2009

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 2010 Ford Transit Connect XLT Wagon was performed at Calspan Corporation's crash test facility in Buffalo, New York, on October 1, 2009. The impact velocity was 56.6 kph and the temperature at the barrier face was 21.7°C. The maximum post-test vehicle crush was 611 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 (1046)	Passenger (064)
Head Injury Criteria (HIC - 36 ms)		-	1000	534.2	567.3
Maximum Thorax Acceleration (3 ms Clip)		g's	60 g's	42.0	45.7
Chest Displacement		mm	-76 mm	-38.7	-30.9
Left Femur Force		Newtons	-10000 N	-3201.7	-2984.7
Right Femur Force		Newtons	-10000 N	-2413.8	-3701.3
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SECTION 1

PURPOSE AND SUMMARY OF TEST

1.1 PURPOSE

This 56.6 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 56.6 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

1.2 TEST PROCEDURE

This 56.6 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 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 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. 1046) and the right-front passenger (position 2) ATD (Serial No.064) 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 2010 Ford Transit Connect XLT Wagon at a velocity of 56.6 kph. The test was performed at Calspan on October 1, 2009. 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	534.2	63.8	99.8	42.0	58.2	61.2	-38.7	-3201.7	-2413.8
Passenger	567.3	70.5	106.5	45.7	79.6	82.6	-30.9	-2984.7	-3701.3

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

TEST NOTES	
Data Channel	Anomalies
V1P1 Right Lower Tibia Fz	Questionable Data 76.1 to 105.4 milliseconds
V1 Engine Top X	Sensor wire cut after 45 milliseconds
V1 Right Caliper X	Questionable Data after 18.5 milliseconds
V1 Left Caliper X	Sensor did not function properly

SECTION 2
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
CRASH TEST SUMMARY

Vehicle NHTSA No.: MA0217 Test Mode: 56.3 kph Frontal Barrier
 Test Date: October 1, 2009 Time: 14:12 Temperature: 21.7 °C
 Vehicle Make/Model/Body Style: 2010 Ford Transit Connect XLT Wagon
 Vehicle Test Weight: 1881.0 kg Impact Velocity: 56.6 kph (55.5 – 57.1 kph)
 Vehicle/Barrier Impact Angle: 0 ° Max Static Crush: 611 mm

ATD INFORMATION AND VISIBLE CONTACT POINTS

	DRIVER	PASSENGER
ATD Type:	Part 572E	Part 572E
Restraint System:	3 Point Seatbelt, Frontal Airbag, Knee Bolster	3-Point Seatbelt, Frontal Airbag, Knee Bolster
Head Contact:	Face – Frontal Airbag	Face – Frontal Airbag
Abdomen Contact:	Frontal Airbag	Frontal Airbag
Chest Contact:	Frontal Airbag	Frontal Airbag
Left Knee Contact:	Knee Bolster	GloveBox
Right Knee Contact:	Knee Bolster	GloveBox

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)	0	0
Front Seat Back Failure	None	None
Glazing Damage	Windshield shattered	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Left Side (mm)	Center (mm)	Right Side (mm)	Average (mm)
Value	610	625	669	635

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	950	940
Lap belt length as measured on ATD	mm	860	870
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems	mm	250	240

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2010 Ford Transit Connect XLT Wagon

NHTSA No. : MA0217 ; VIN: NM0KS9BN2AT012275 ; Color: White

Engine Data: 4 cylinders; - CID; 2.0 Liters; - cc

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

Transmission Data: 4 speeds; - Manual; X Automatic; X Overdrive

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

AUTOMATIC DOOR LOCKS:

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

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

DEALER AND DELIVERY INFORMATION:

Date Received: 9/15/09 ; Odometer Reading 282 km

Selling Dealer: Summit Ford

Dealer Address: Elbridge, New York 13060

TEST VEHICLE OPTIONS:

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

X ABS; X Tilt Wheel; - Stability Control X Traction Control - 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	-
Passenger:	X	-	-	X	-
Rear Passenger:	-	-	-	-	-

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Ford Motor Company

Date of Manufacture 07/09

GVWR: 2252 kg; GAWR: 1128 kg FRONT; 1239 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) = 647.0 kg

No. of Occupants x 68.04 kg = 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = 136.0 MAX 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 =	437.0	441.0	55.6	878.0
Rear =	362.0	338.0	44.4	700.0
Total Delivered Weight (UDW) =				1578.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW)	=	1578.0	kg
Rated Cargo/Luggage Weight (RCLW)	=	136.0	kg
Weight of 2 p.572 Dummies @ 86.2 each	=	172.4	kg
TARGET TEST WEIGHT	=	1886.4	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 130.6 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	475.0	476.0	50.6	951.0
Rear =	478.0	452.0	49.4	930.0
Total Vehicle Test Weight (ATW) =				1881.0

Weight of Ballast Secured in Vehicle Trunk Area¹ = 86.2 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:	723	729	790	793	1294.9
FULLY LOADED:	707	713	769	773	-
AS TESTED:	715	719	765	765	1443.2

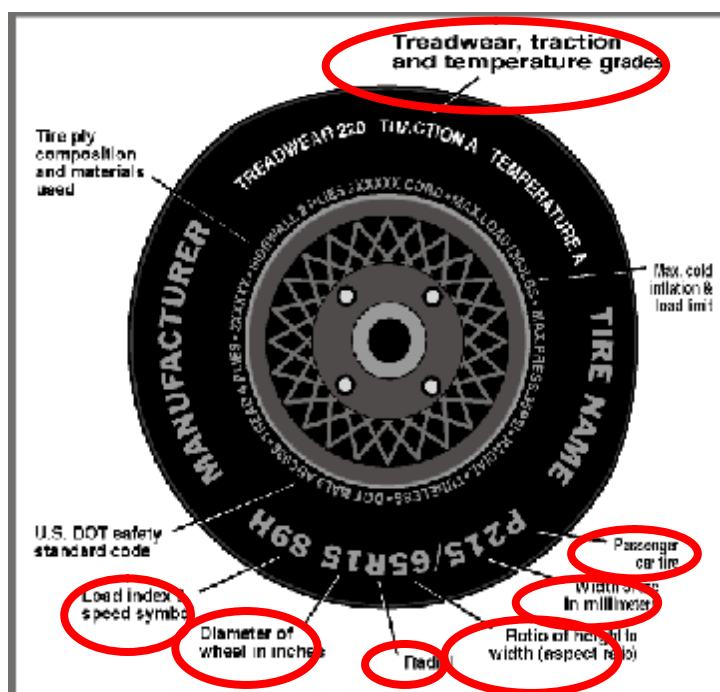
Vehicle's Wheel Base: 2919 mm

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 Ford Transit Connect XLT Wagon
NHTSA Test No.: MA0217 Test Date: October 1, 2009



Measured Parameter	Front	Rear
Maximum Tire Pressure (from sidewall - kPa)	340	340
Cold Pressure (from tire placard - kPa)*	250	250
Recommended Tire Size (from tire placard)	P205/65R15 95T	P205/65R15 95T
Tire size on Vehicle	P205/65R15 95T	P205/65R15 95T
Tire Manufacturer	Continental	Continental
Tire Name	ContiPro Contract	ContiPro Contract
Tire Type	Passenger	Passenger
Tire Width (mm)	205	205
Ratio of Height to Width (aspect ratio)	65	65
Radial	Yes	Yes
Wheel Diameter	15	15
Load Index & Speed Symbol	95T	95T
Treadwear	540	540
Traction Grade	A	A
Temperature Grade	A	A

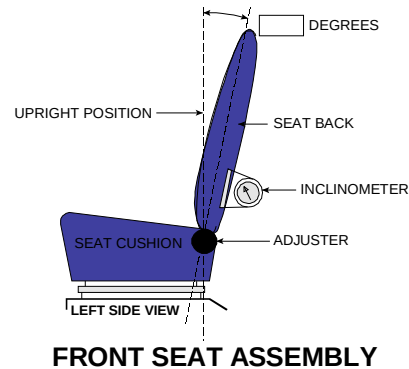
*Tire pressure used for test

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 2010 Vehicle Model: Ford Transit Connect XLT Body Style : Wagon

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: 25.8 deg.

Measurement instructions: Remove seat back panel and position inclinometer 13 inches above seat back pivot point. Measure angle from seat back frame.

Seat back angle for passenger's seat: 25.4 deg.

Measurement instructions: Remove seat back panel and position inclinometer 13 inches above seat back pivot point. Measure angle from seat back frame.

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Total seat travel = 292 mm. Seat was placed at 146 mm (mid-travel) position. The test position was at 8th detent from forward most detent.

Positioning of the passenger's seat: Seat was placed in Mid-position. Total number of detents (22). Seat was placed in 11th detent (mid-position).

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 56.0 liters

B. "Usable Capacity" of the optional equipment fuel tank is N/A liters

C. "Usable Capacity" of the vehicle(s) used for certification
testing to requirements of FMVSS 301 = 51.5 to 52.6 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 52.2 liters

3.3 One-Third of Useable Capacity = 18.7 liters

3.4 Is vehicle equipped with electric fuel pump? Yes- ☒ ; No- ☐

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

The fuel pump will operate for 2 seconds to pressurize the fuel system following the actuation of the ignition system. The fuel pump will operate continuously while the engine is running.

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: The tilt position angle was set to 25.2 degrees from horizontal. The
Telescopic position was in mid-position (15 mm outward from the most inboard position)

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: Placed in the uppermost locking position.

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

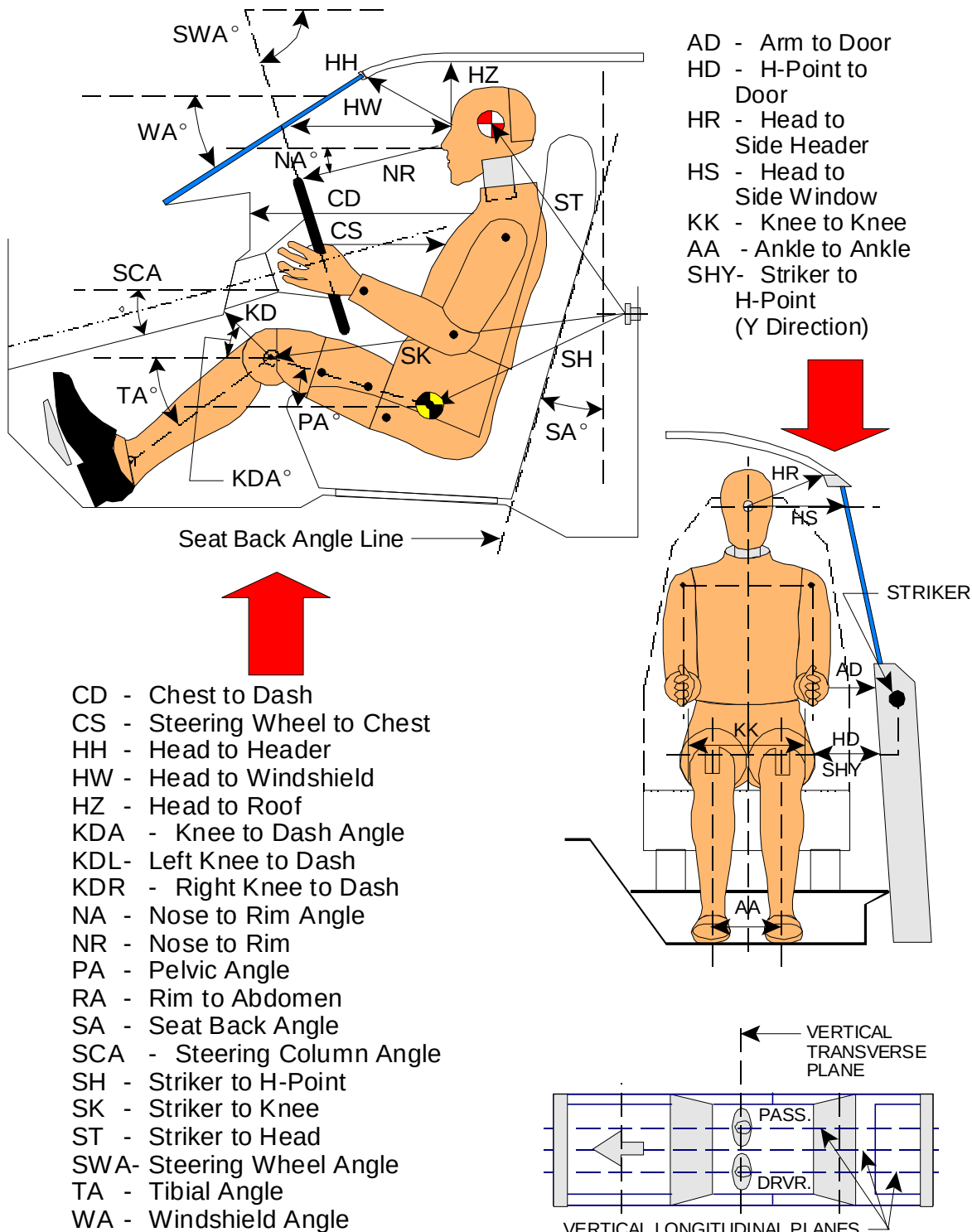
Does vehicle owner's manual describe how to deactivate ADLs? - Yes; X No; - N/A

Comments: None

DATA SHEET NO. 5

FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



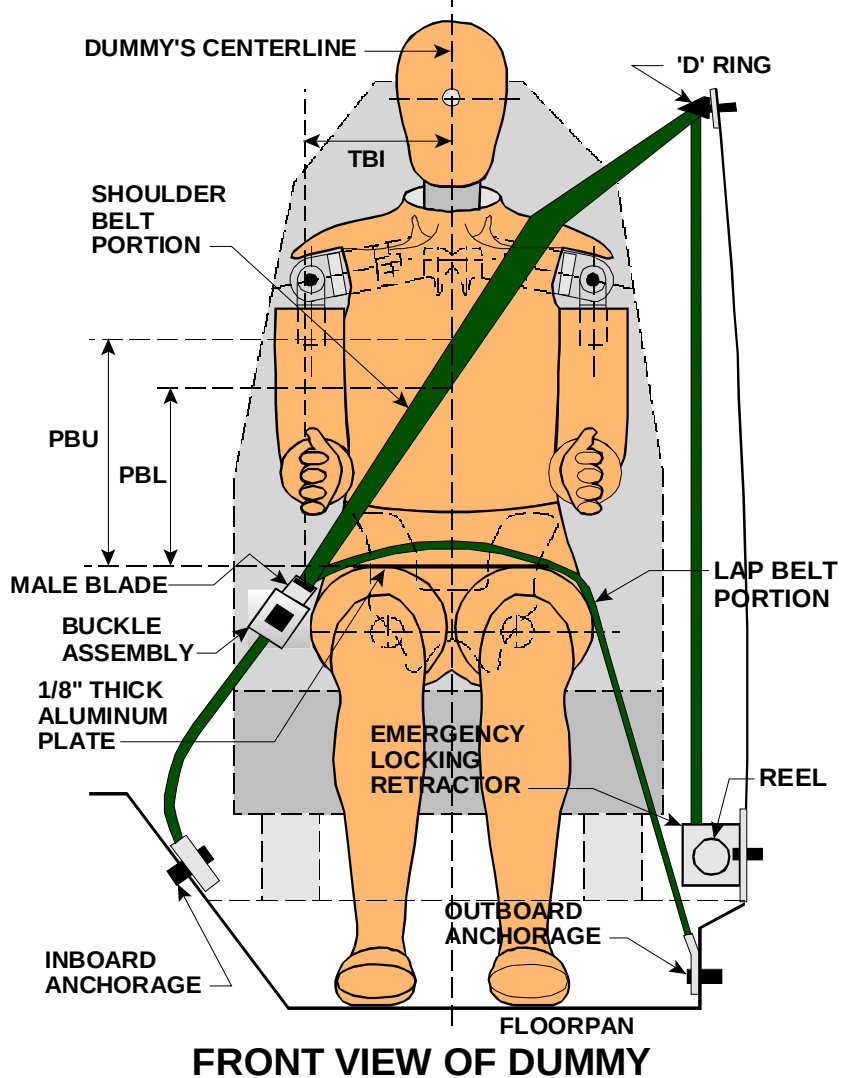
DATA SHEET NO. 5
FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE (cont.)

	DRIVER (Serial #1046)			PASS. (Serial #064)		
WA ^o	41.2 deg.			N/A		
SWA ^o	25.5 deg.			N/A		
SCA ^o	64.5 deg.			N/A		
SA ^o	25.8 deg.			25.4 deg.		
HZ	545			495		
HH	505			511		
HW	778			756		
HR	401			372		
NR	375	Angle	16.4 deg.	N/A		
CD	545			531		
CS	274			N/A		
RA	171			N/A		
KDL	142	Angle (KDA)	35 deg.	65		
KDR	75			150	Angle (KDA)	35 deg.
PA ^o	22.7 deg.			24.6 deg.		
TA ^o	68.7 deg.			62.4 deg.		
KK	365			270		
AA	335			210		
ST	435	Angle	20 deg.	480	Angle	21 deg.
SK	675	Angle	98 deg.	725	Angle	102 deg.
SH	345	Angle	130 deg.	350	Angle	126 deg.
SHY	265			255		
HS	437			425		
HD	182			168		
AD	104			94		

Dimensions in millimeters

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

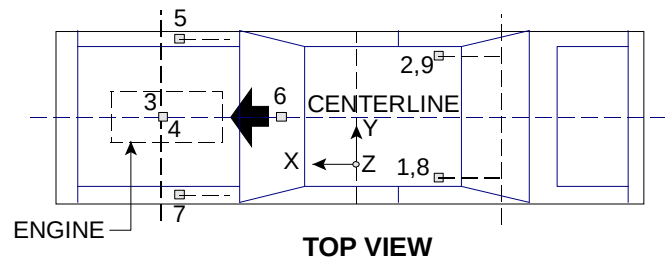
SEAT BELT POSITIONING DATA



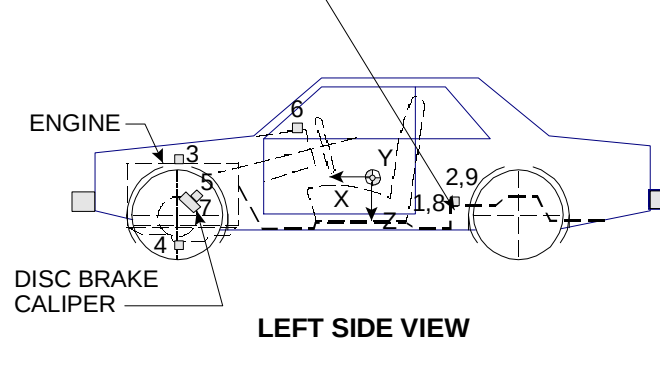
	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	375	370
PBL-- Top surface of alum. plate to belt lower edge	300	295
LAP BELT TENSION	13 N	13 N
SHOULDER BELT TENSION	Retractor	Retractor

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	1120	-582	580
2	Right Rear Seat Cross Member X	1159	588	587
3	Top of Engine Block	3782	136	853
4	Bottom of Engine	3975	470	268
5	Disc Brake Caliper @ Right Side	3628	596	621
6	Instrument Panel**	-	-	-
7	Disc Brake Caliper @Left Side	3629	-594	629
8	Left Rear Seat Cross Member Z	1120	-582	580
9	Right Rear Seat Cross Member Z	1159	588	587

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 8 mm molding.

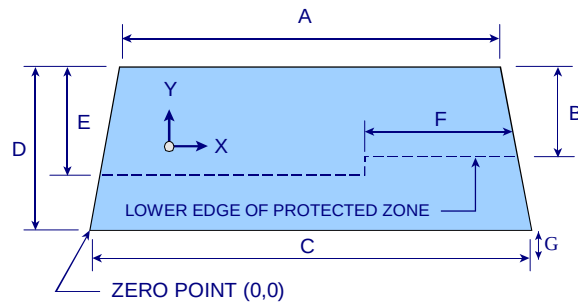
FMVSS 212 REQUIREMENTS:

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: 21.7°C.

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		% OF RETENTION
	PRE-TEST (mm)	POST-TEST (mm)	
RIGHT SIDE	2340.0	2340.0	100.0%
LEFT SIDE	2340.0	2340.0	100.0%
TOTAL	4680	4680	100.0%



DIMENSIONS (mm)	
A	1315
B	616
C	1525
D	920
E	626
F	540
G	8

FRONT VIEW OF WINDSHIELD

FAILURE DETAILS:

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm: None

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

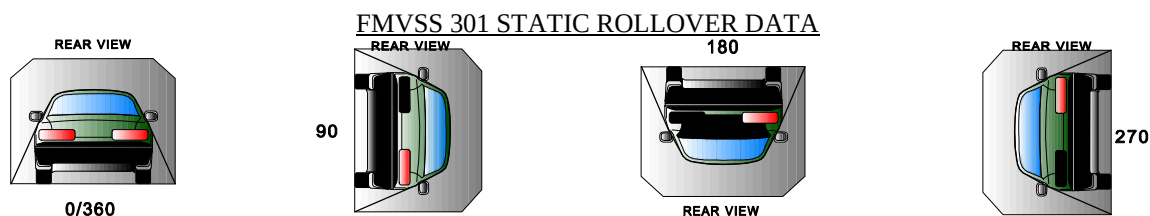
DATA SHEET NO. 9
SUMMARY OF FMVSS NO. 301 DATA

NHTSA TEST No.: _____ MA0217 _____ TEST DATE: _____ October 1, 2009
VEHICLE MAKE/MODEL: _____ 2010 Ford Transit Connect XLT Wagon _____
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	07	seconds	5	minutes	6	minutes	7	seconds	7	minutes
90° - 180°	1	minutes	06	seconds	5	minutes	6	minutes	6	seconds	7	minutes
180°-270°	1	minutes	03	seconds	5	minutes	6	minutes	3	seconds	7	minutes
270°-360°	1	minutes	08	seconds	5	minutes	6	minutes	8	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:

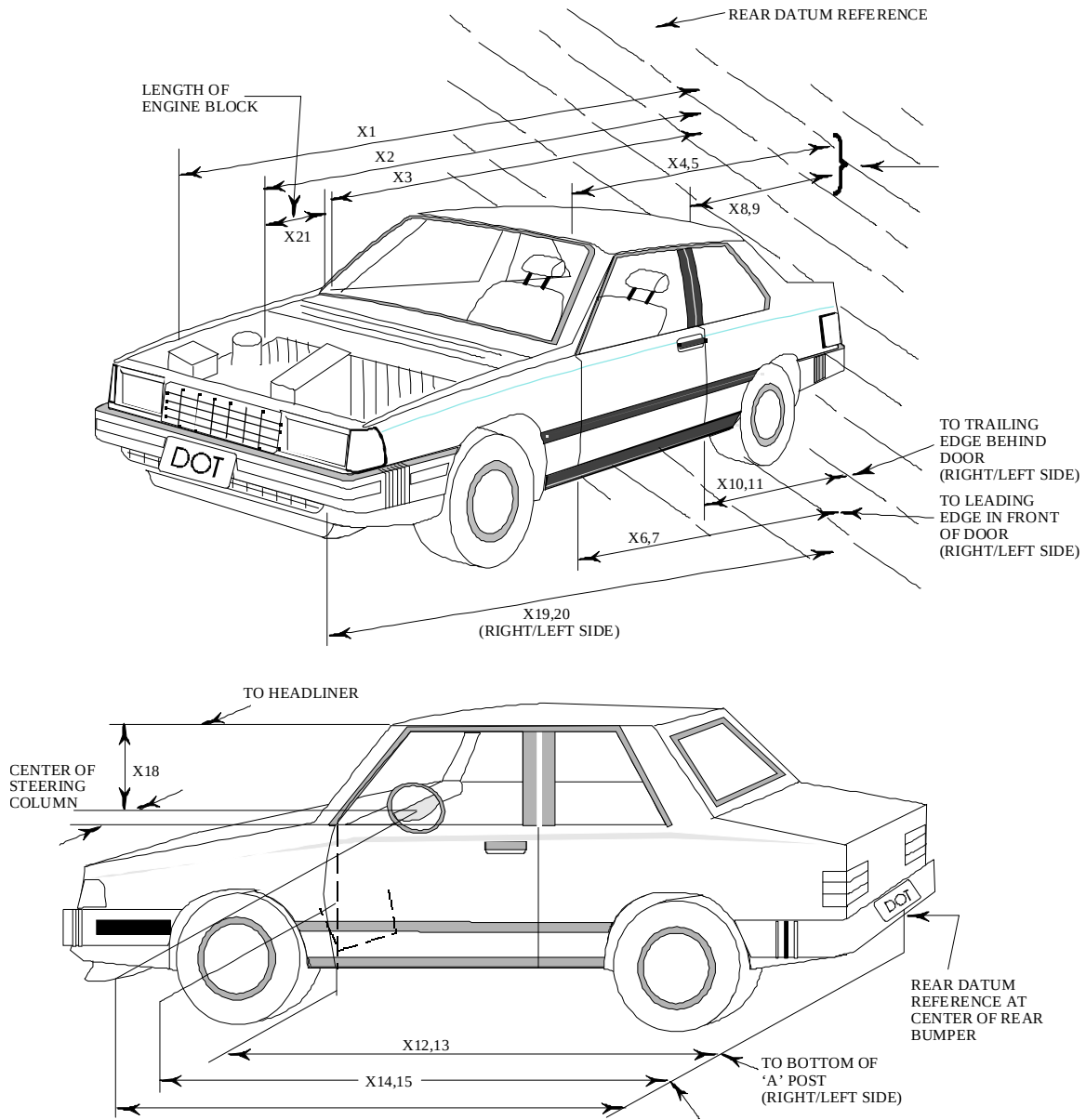
Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0° - 90°	0	0	0	N/A
90° - 180°	0	0	0	N/A
180°-270°	0	0	0	N/A
270°-360°	0	0	0	N/A

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.: MA0217 TEST DATE: October 1, 2009
VEHICLE MAKE/MODEL: 2010 Ford Transit Connect XLT Wagon

No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	4582	3971	611
X2	Rear Surface of Vehicle to Front of Engine	4155	3812	343
X3	Rear Surface of Vehicle to Firewall	3666	3619	47
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3249	3238	11
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3244	3241	3
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3180	3164	16
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3174	3171	3
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2109	2100	9
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2107	2102	5
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2109	2098	11
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2107	2103	4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3361	3347	14
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3355	3345	10
X14	Rear Surface of Vehicle to Firewall, Right Side	3721	3599	122
X15	Rear Surface of Vehicle to Firewall, Left Side	3718	3545	173
X16	Rear Surface of Vehicle to Steering Column	2741	2767	-26
X17	Center of Steering Column to "A" Post	333	356	-23
X18	Center of Steering Column to Headliner	557	556	1
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4527	3935	592
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4522	3970	552
X21	Length of Engine Block	570	570	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2939	2921	18
CD	Rear Surface of Vehicle to Center of Dash Panel	2918	2895	23
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2937	2914	23

All Dimensions in mm

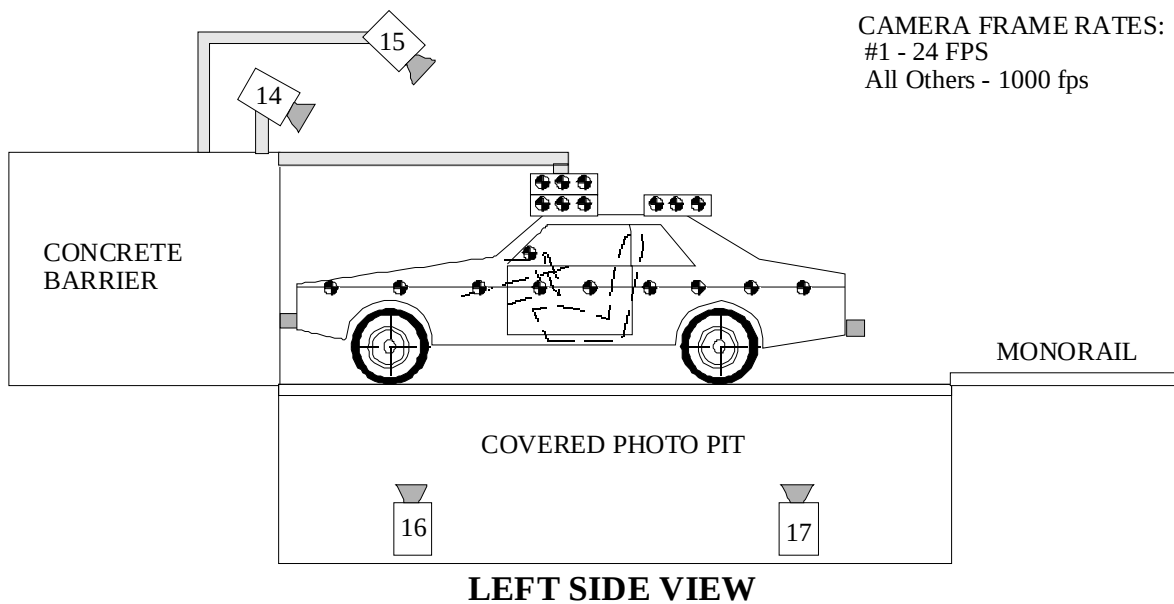
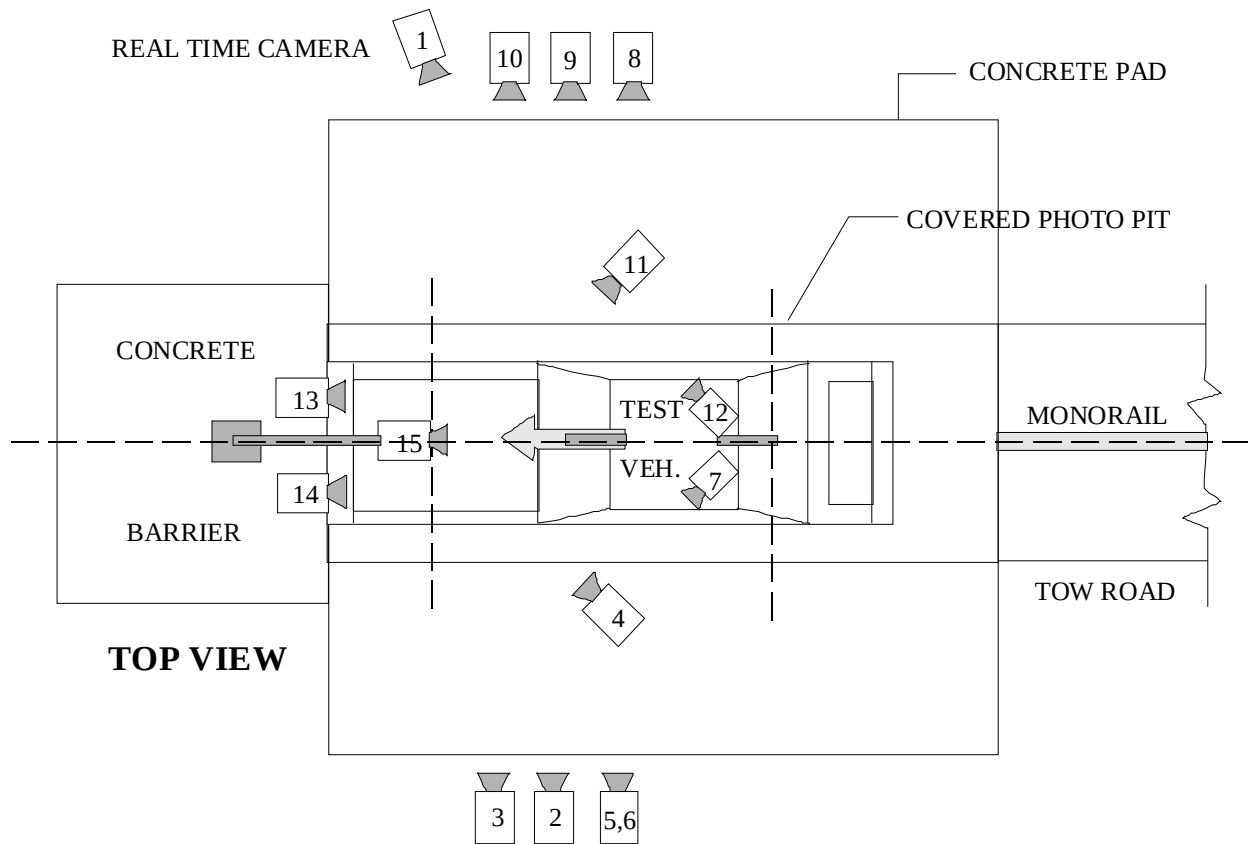
DATA SHEET NO.10
VEHICLE MEASUREMENTS (cont.)

NHTSA TEST No.: MA0217 TEST DATE: October 1, 2009
VEHICLE MAKE/MODEL: 2010 Ford Transit Connect XLT Wagon

TARGET VEHICLE STRUCTURAL MEASUREMENTS

	Elements	Pre-Test (mm)
1	Total length	4582
2	Total Width	1740
3	Bumper Top Height	537
4	Bumper Bottom Height	434
5	Longitudinal Member Top Height	572
6	Distance Between Longitudinal Members	1078
7	Longitudinal Member Width	85
8	Engine top height	838
9	Engine bottom height	245
10	Engine and gearbox width	503
11	Front bumper-engine distance	427
12	Front shock absorber fixing height	867
13	Bonnet leading edge height	743
14	Front shock absorber fixing width	1100
15	Front bumper – front axle distance	916
16	Front axle – A pillar distance	416
17	A-pillar – B pillar distance	1143
18	B-pillar – rear axle distance	1357
19	B-pillar – C Pillar distance	991
20	Roof sill bottom height	1618
21	Roof sill top height	1911
22	Floor sill bottom height	344
23	Floor sill top height	419

DATA SHEET NO.11
HIGH-SPEED CAMERA LOCATIONS



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

NHTSA Test No.: MA0217 Vehicle: 2010 Ford Transit Connect XLT Wagon

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	7915	1655	960	0	7480	28	1000
3	Left Side View	10019	1065	975	-1	9584	50	1000
4	Driver and Interior View	7176	2795	2065	-9	-	50	1000
5	Steering Column (Bottom)	8440	1615	1210	-2	8005	28-70	1000
6	Steering Column (Top)	8440	1615	1815	-6	8005	24-70	1000
7	Left CRS Lateral View	-	-	-	-	-	-	-
8	Overall Right Side	7620	1885	900	-1	7185	28	1000
9	Right Side View	9613	1310	920	-1	9178	50	1000
10	Right Passenger View	8175	1770	1125	0	7740	50	1000
11	Passenger and Interior View	7420	2610	1885	-7	-	50	1000
12	Right CRS Lateral View	-	-	-	-	-	-	-
13	Passenger Front View	620	-92	1987	-36	-	24	500
14	Driver Front View	620	-92	1987	-36	-	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	2801	-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

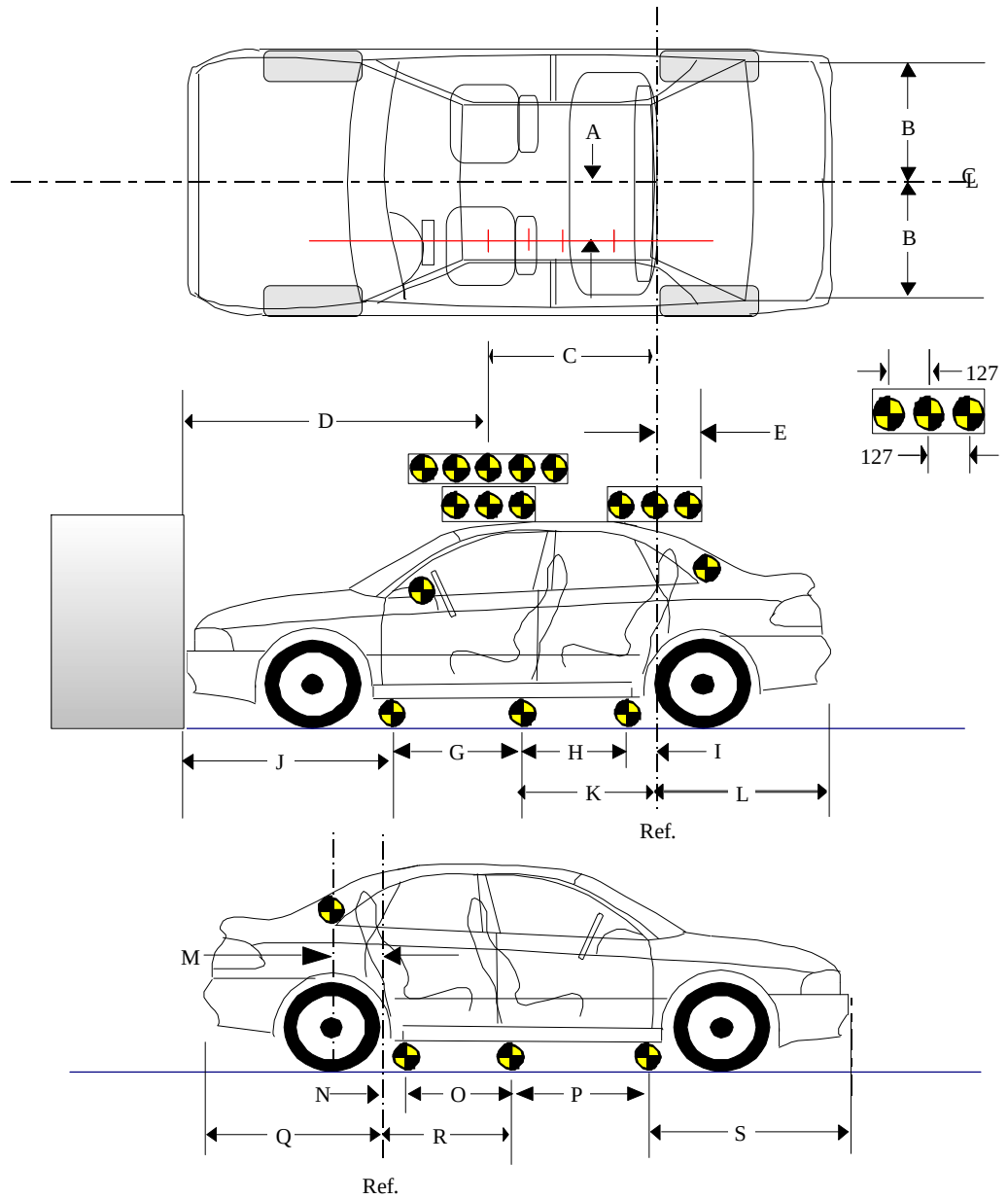
Z = film plane to ground

DATA SHEET NO. 12
VEHICLE REFERENCE PHOTO TARGET LOCATIONS

NHTSA Test No.: MA0217 Vehicle: 2010 Ford Transit Connect XLT Wagon

(Dimensions in millimeters)

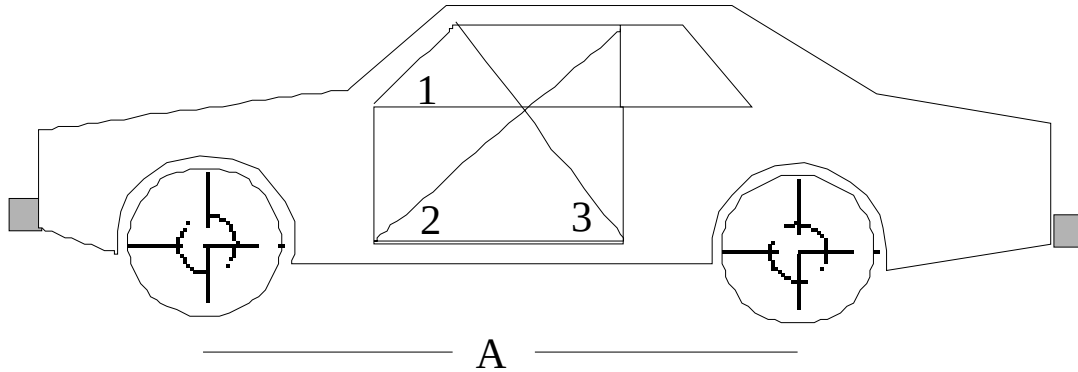
A	359
B	699
C	1215
D	2255
E	52
F	1779
G	917
H	915
I	226
J	1453
K	1141
L	1071
M	52
N	225
O	923
P	918
Q	1069
R	1148
S	1447



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

NHTSA Test No.: MA0217 Vehicle: 2010 Ford Transit Connect XLT Wagon

DOOR OPENING WIDTH AND WHEELBASE MEASUREMENTS



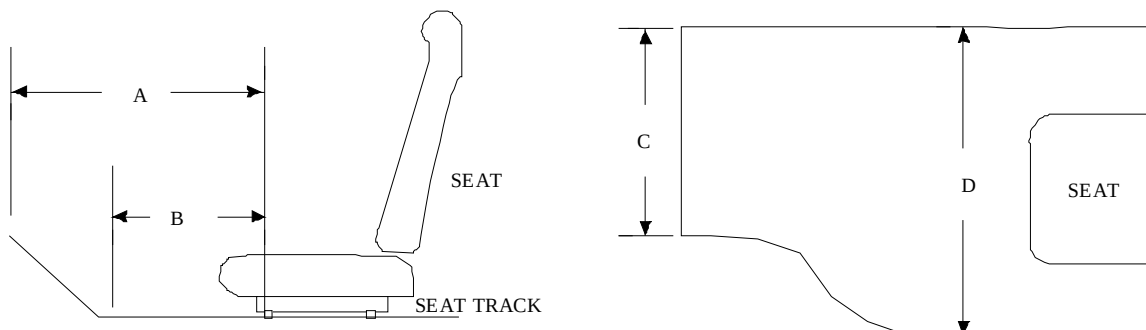
UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	1024	1487	1279	1020	1498	1280
AFTER TEST	1010	1494	1288	1011	1503	1286
DIFFERENCE	14	-7	-9	9	-5	-6

UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	2917	2920
AFTER TEST	2864	2821
DIFFERENCE	53	99

DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont)

NHTSA Test No.: MA0217 Vehicle: 2010 Ford Transit Connect XLT Wagon

STATIC FOOTWELL DEFORMATION



DRIVER

Measurement	Pre-Test	Post-Test	Difference
A	665	605	60
B	457	447	10
C	481	470	11
D	494	498	-4

PASSENGER

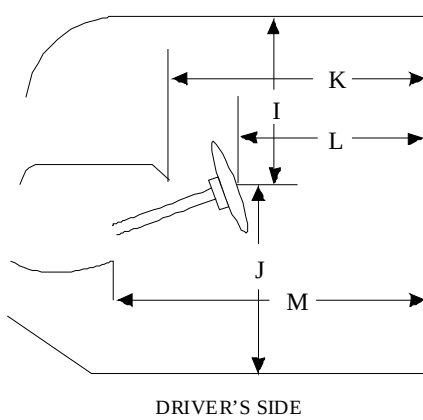
Measurement	Pre-Test	Post-Test	Difference
A	663	606	57
B	459	454	5
C	472	472	0
D	486	488	-2

Units = mm

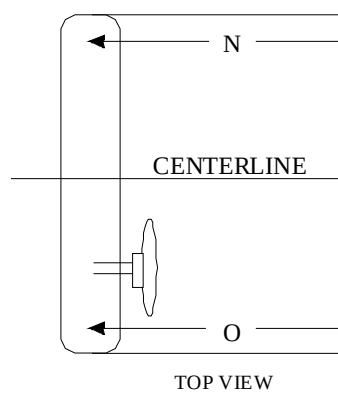
DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont.)

NHTSA Test No.: MA0217 Vehicle: 2010 Ford Transit Connect XLT Wagon

STATIC PASSENGER COMPARTMENT INTRUSION

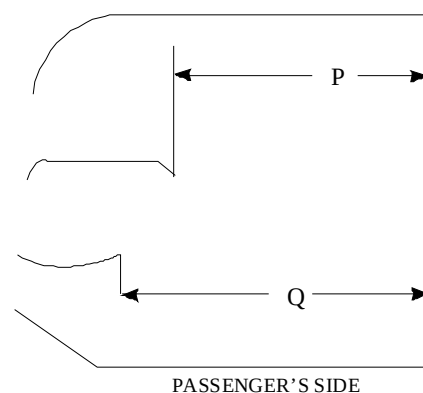


DRIVER'S SIDE



TOP VIEW

MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



PASSENGER'S SIDE

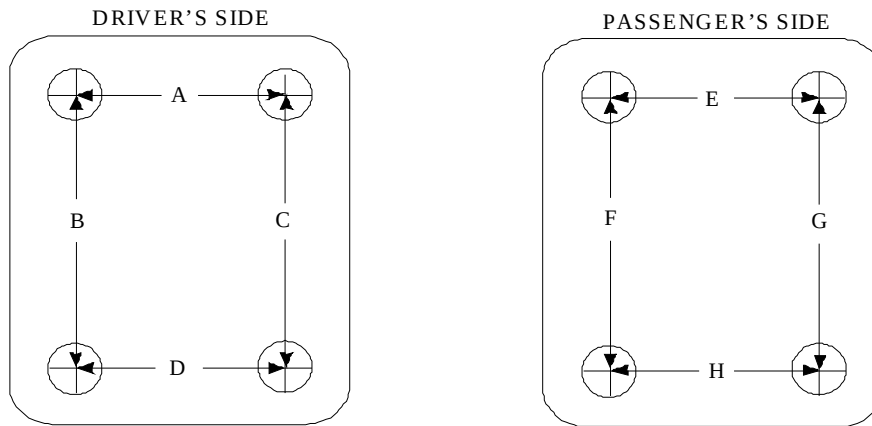
Measurement	Pre-Test	Post-Test	Difference
I	557	556	1
J	692	732	-40
K	849	814	35
L	607	635	-28
M	873	861	12
N	807	793	14
O	803	782	21
P = K (PASS.)	840	829	11
Q = M (PASS.)	841	849	-8

Units = mm

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

NHTSA Test No.: MA0217 Vehicle: 2010 Ford Transit Connect XLT Wagon

FLOORBOARD DEFORMATION



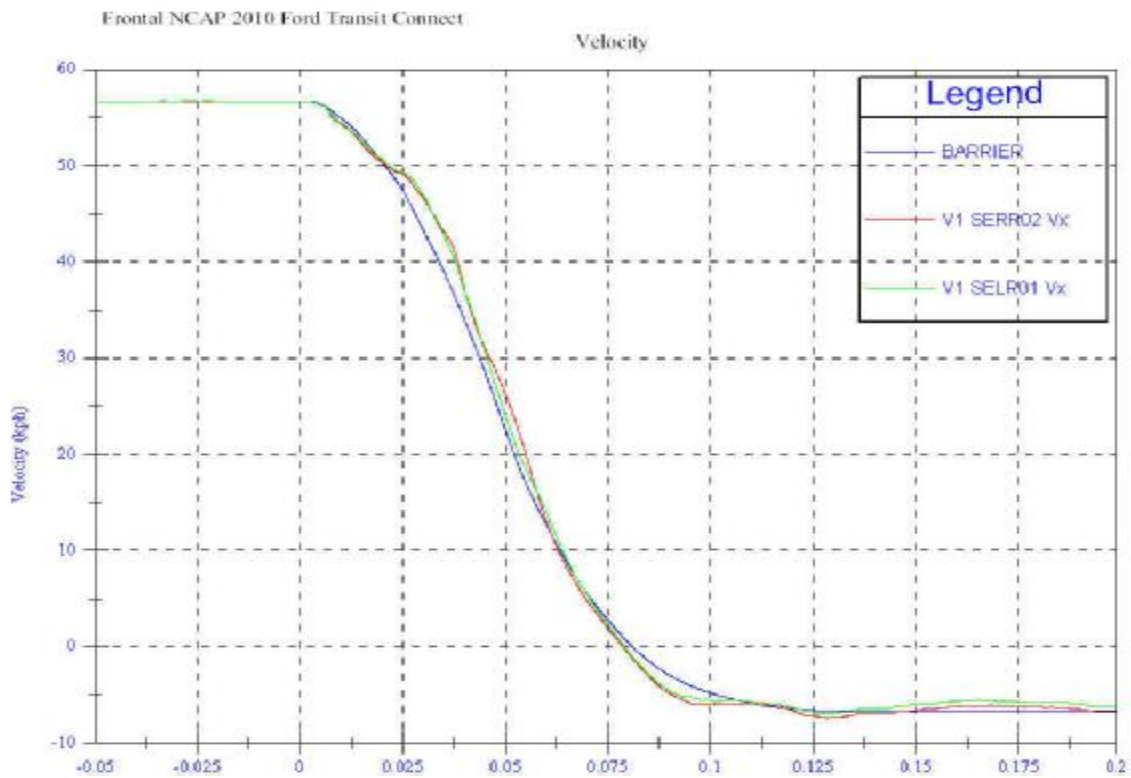
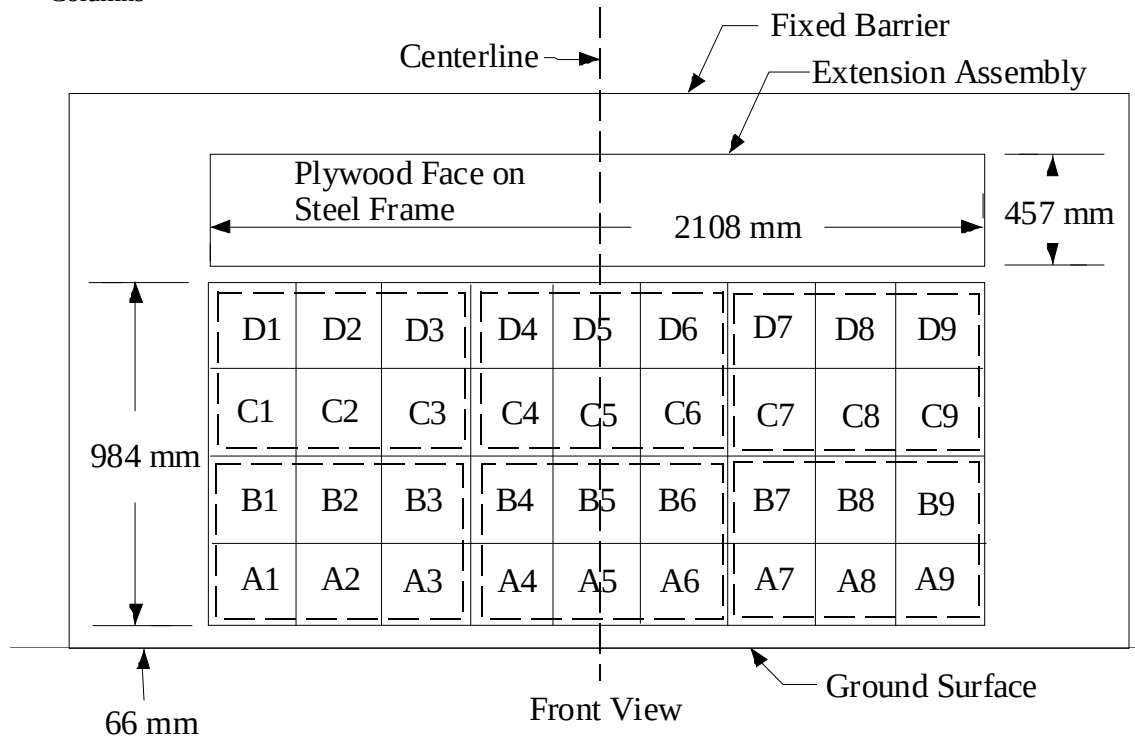
TOP VIEW THROUGH FLOOR PAN

Measurement	Pre-Test	Post-Test	Difference
A	481	470	11
B	275	276	-1
C	371	365	6
D	494	498	-4
E	472	472	0
F	377	376	1
G	374	374	0
H	486	488	-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: Ford Transit Connect XLT Wagon

NHTSA Test No.: MA0217 VIN: NM0KS9BN2AT012275

Model Year: 2010 Build Date: 07/09 Test Date: October 1, 2009

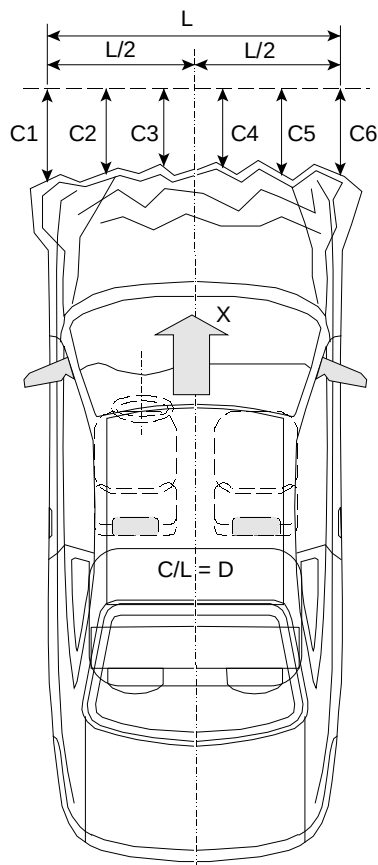
Vehicle Size Category: Utility Vehicle Test Weight: 1881.0 kg

Vehicle Wheelbase: 2919 mm; Front Overhang: 917 mm; Overall Width: 1740 mm

Collision Deformation Classification (CDC) Code: 12FDEW4

Crush Depth Dimensions

	PRE (mm)	POST (mm)	DIFF (mm)
C1 =	4422	3978	444
C2 =	4543	3964	579
C3 =	4577	3972	605
C4 =	4579	3962	617
C5 =	4546	3930	616
C6 =	4422	3939	483



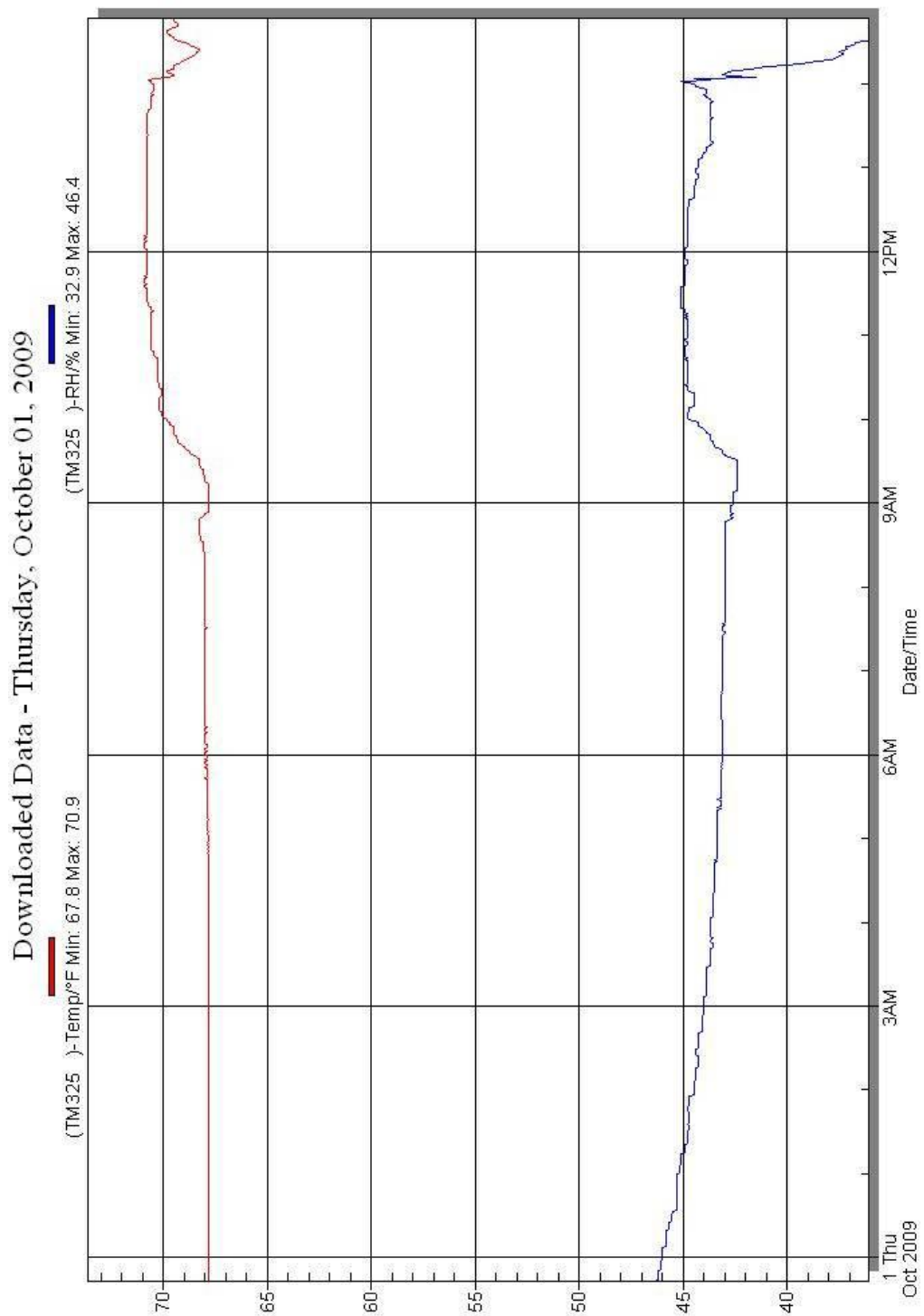
Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

Length of Damaged Region:

L1=	<u>1306</u>	mm
L2=	<u>653.0</u>	mm
L5=	<u>261.2</u>	mm

DATA SHEET NO.16
VEHICLE AND DUMMY TEMPERATURE STABILIZATION CHART

NHTSA Test No.: MA0217 Vehicle: 2010 Ford Transit Connect XLT Wagon



APPENDIX A
PHOTOGRAPHS

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Figure A-1: Load Cell Locations



Figure A-2: Vehicle Certification Placard

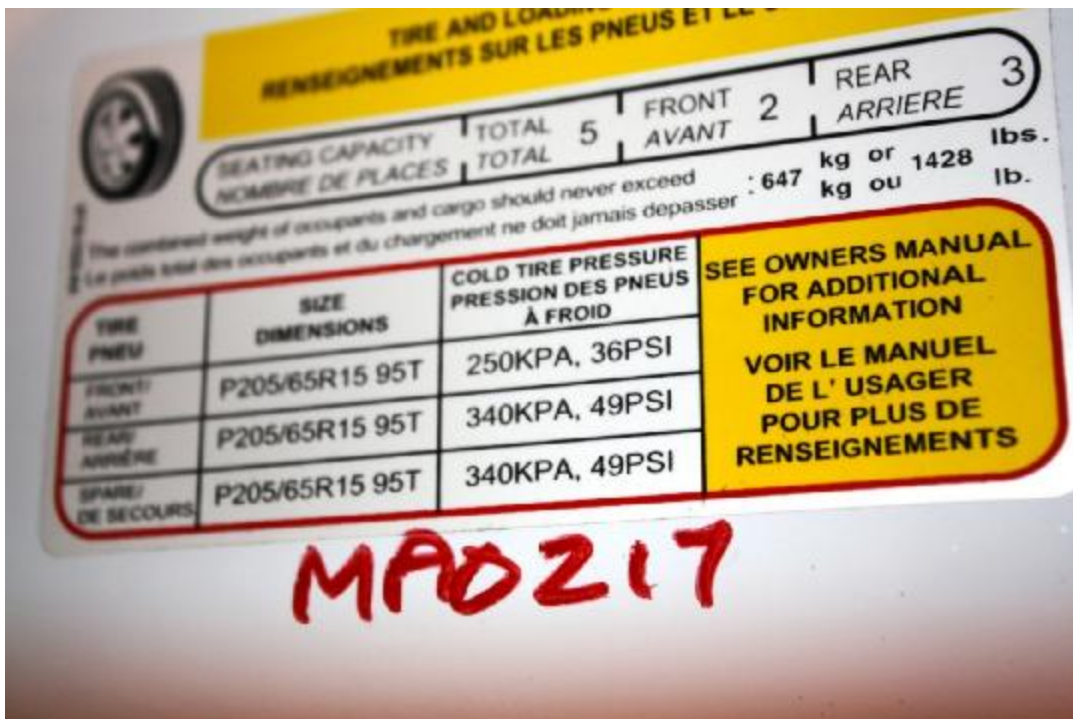


Figure A-3: Vehicle Tire Placard



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

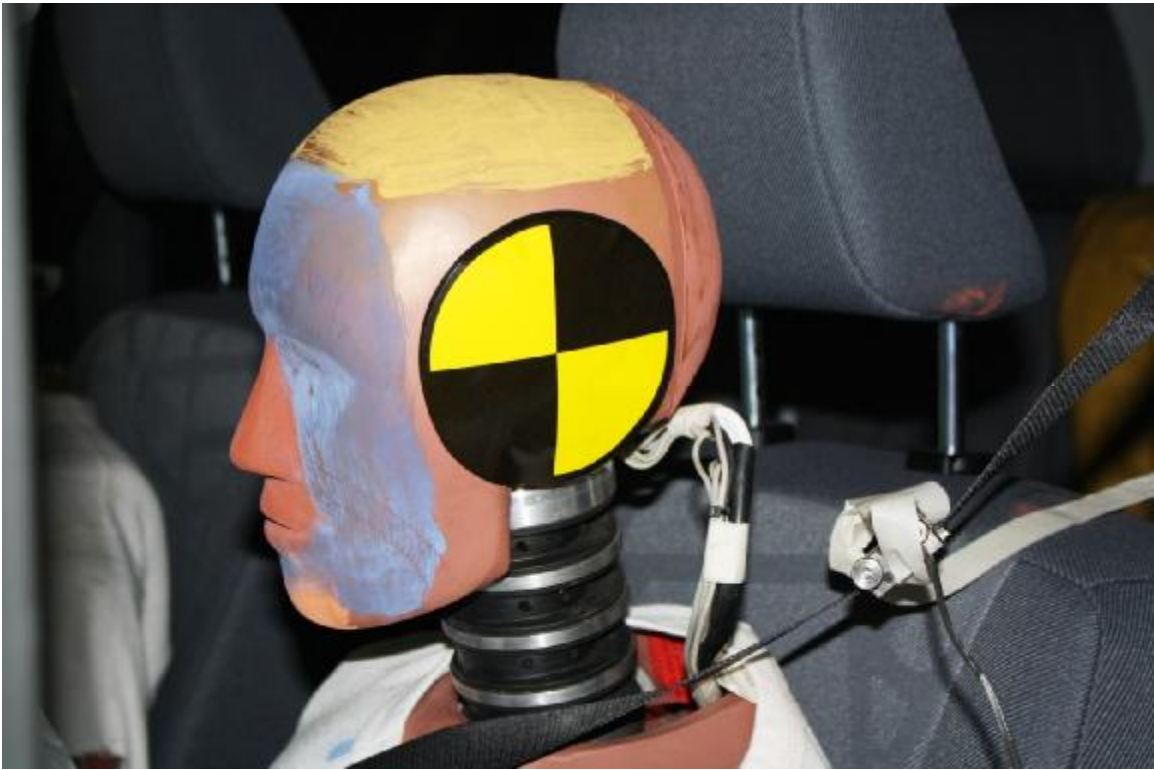


Figure A-42: Post-Test Driver Head View



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

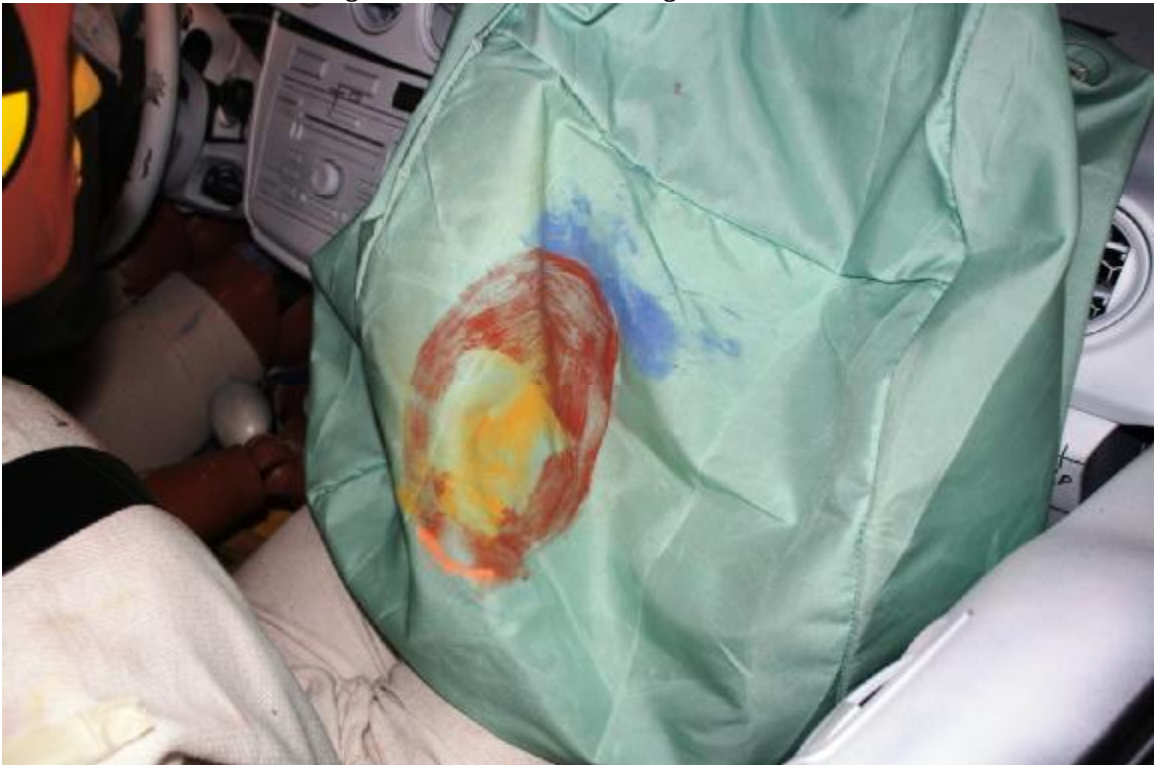


Figure A-57: Post-Test Passenger Contact to Airbag



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.: MA0217

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

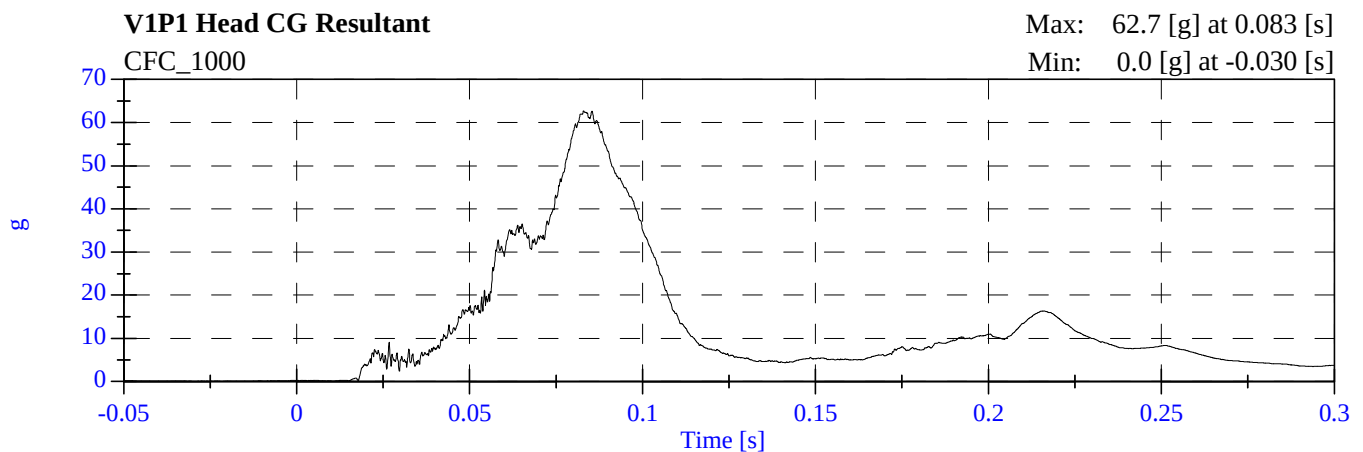
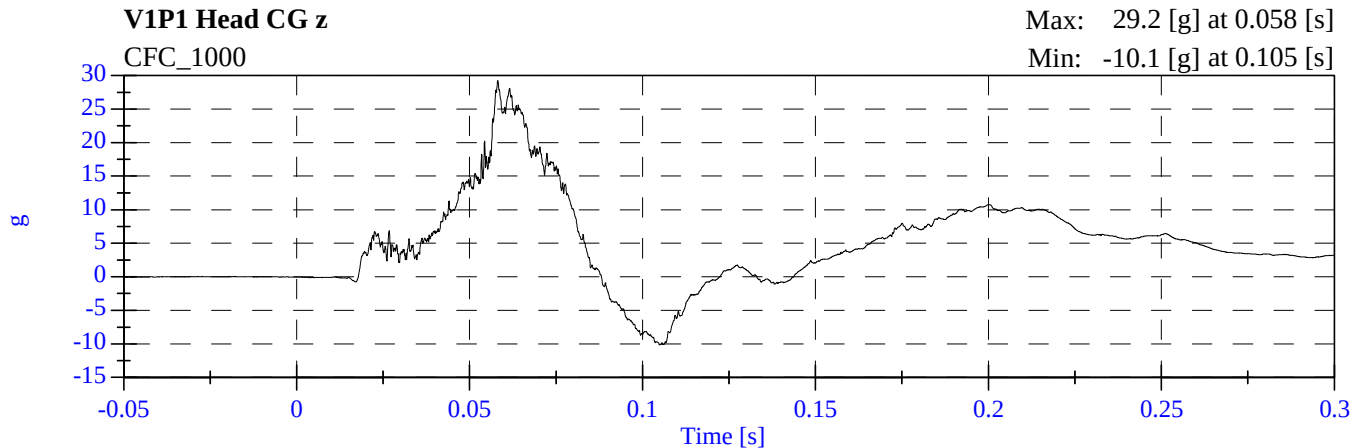
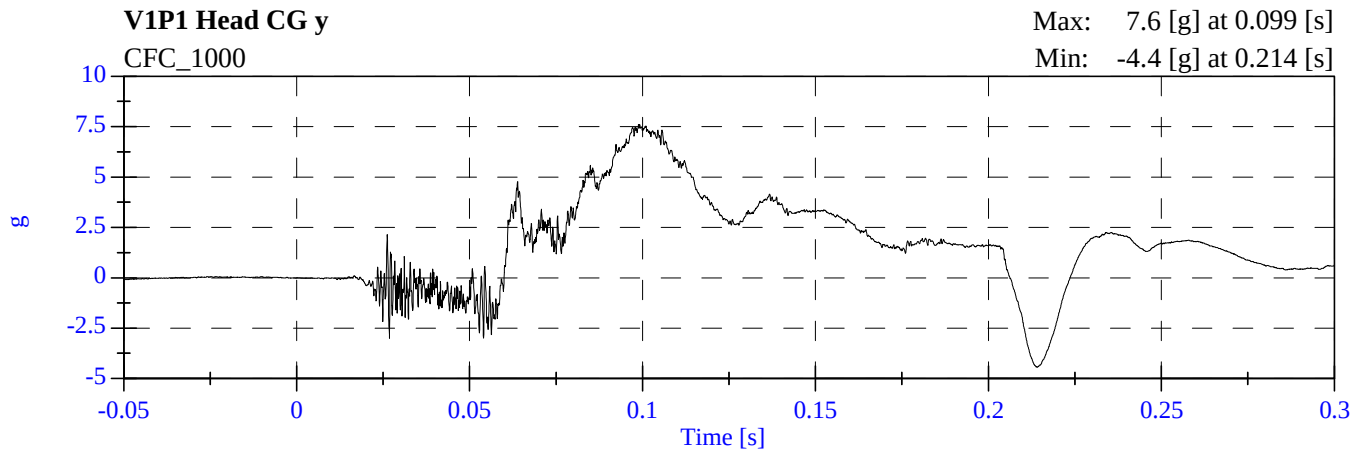
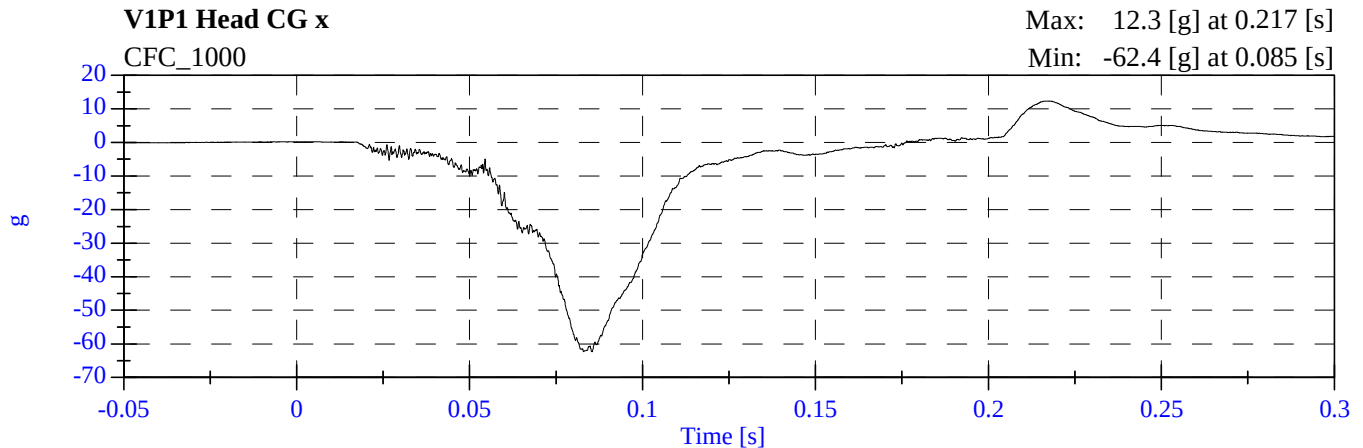
V1P1 Head CG Ax	V1P1 Lap Belt Load
V1P1 Head CG Ay	V1P1 Shoulder Belt Load
V1P1 Head CG Az	V1P2 Lap Belt Load
V1P1 Head CG Red Ax	V1P2 Shoulder Belt Load
V1P1 Head CG Red Ay	V1 Left Rear #1x
V1P1 Head CG Red Az	V1 Right Rear #2x
V1P1 Upper Neck Fx	V1 Engine Top #3x
V1P1 Upper Neck Fy	V1 Engine Bottom #4x
V1P1 Upper Neck Fz	V1 Right Caliper #5x
V1P1 Upper Neck Mx	V1 Left Caliper #7x
V1P1 Upper Neck My	V1 Left Rear #8z
V1P1 Upper Neck Mz	V1 Right Rear #9z
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 CG Ax	Barrier Load Cell A5 Fx
V1P2 Head CG Ay	Barrier Load Cell A6 Fx
V1P2 Head CG Az	Barrier Load Cell A7 Fx
V1P2 Head CG Red Ax	Barrier Load Cell A8 Fx
V1P2 Head CG Red Ay	Barrier Load Cell A9 Fx
V1P2 Head CG Red Az	Barrier Load Cell B1 Fx
V1P2 Upper Neck Fx	Barrier Load Cell B2 Fx
V1P2 Upper Neck Fy	Barrier Load Cell B3 Fx
V1P2 Upper Neck Fz	Barrier Load Cell B4 Fx
V1P2 Upper Neck Mx	Barrier Load Cell B5 Fx
V1P2 Upper Neck My	Barrier Load Cell B6 Fx
V1P2 Upper Neck Mz	Barrier Load Cell B7 Fx
V1P2 Chest Ax	Barrier Load Cell B8 Fx
V1P2 Chest Ay	Barrier Load Cell B9 Fx
V1P2 Chest Az	Barrier Load Cell C1 Fx
V1P2 Chest Red Ax	Barrier Load Cell C2 Fx
V1P2 Chest Red Ay	Barrier Load Cell C3 Fx
V1P2 Chest Red Az	Barrier Load Cell C4 Fx
V1P2 Chest Compression	Barrier Load Cell C5 Fx
V1P2 Pelvic Ax	Barrier Load Cell C6 Fx
V1P2 Pelvic Ay	Barrier Load Cell C7 Fx
V1P2 Pelvic Az	Barrier Load Cell C8 Fx
V1P2 Left Femur Fz	Barrier Load Cell C9 Fx
V1P2 Right Femur Fz	Barrier Load Cell D1 Fx
V1P2 Left Upper Tibia Fz	Barrier Load Cell D2 Fx
V1P2 Left Upper Tibia Mx	Barrier Load Cell D3 Fx
V1P2 Left Upper Tibia My	Barrier Load Cell D4 Fx
V1P2 Left Lower Tibia Mx	Barrier Load Cell D5 Fx
V1P2 Left Lower Tibia My	Barrier Load Cell D6 Fx
V1P2 Right Upper Tibia Mx	Barrier Load Cell D7 Fx
V1P2 Right Upper Tibia My	Barrier Load Cell D8 Fx
V1P2 Right Lower Tibia Fz	Barrier Load Cell D9 Fx
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	

TEST NOTES	
Data Channel	Anomalies
V1P1 Right Lower Tibia Fz	Questionable Data 76.1 to 105.4 milliseconds
V1 Engine Top X	Sensor wire cut after 45 milliseconds
V1 Right Caliper X	Questionable Data after 18.5 milliseconds
V1 Left Caliper X	Sensor did not function properly

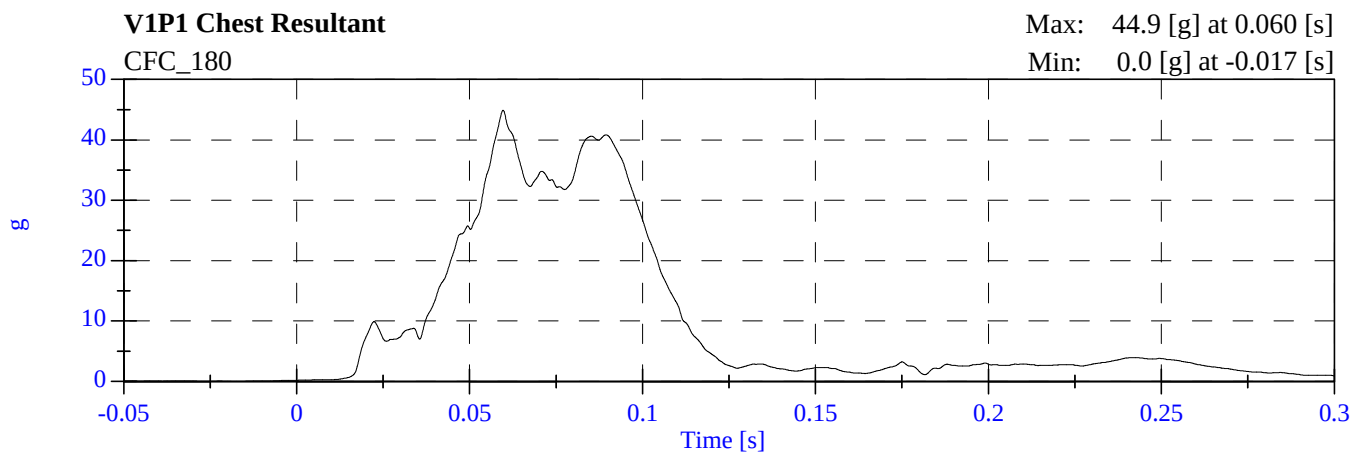
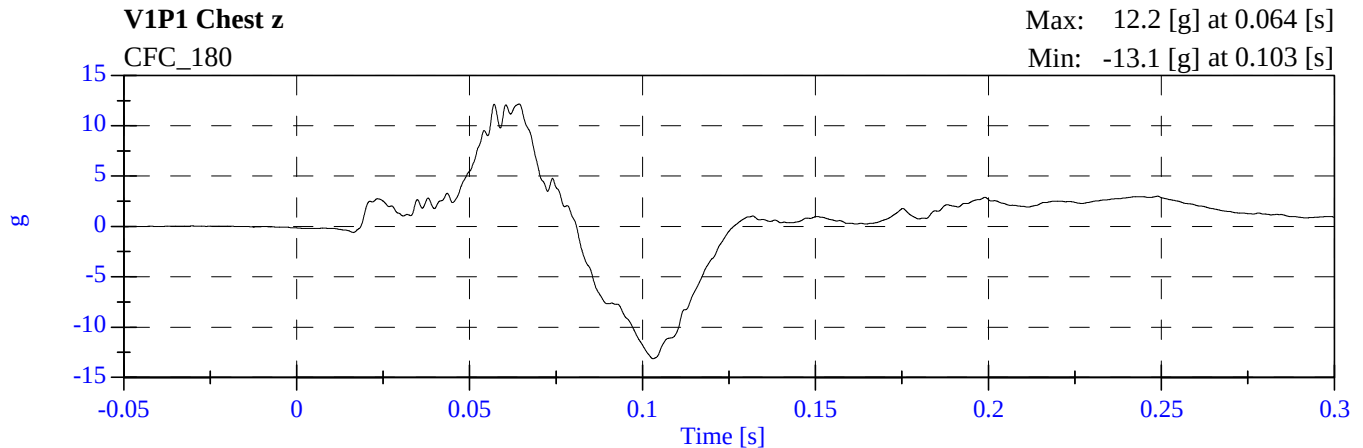
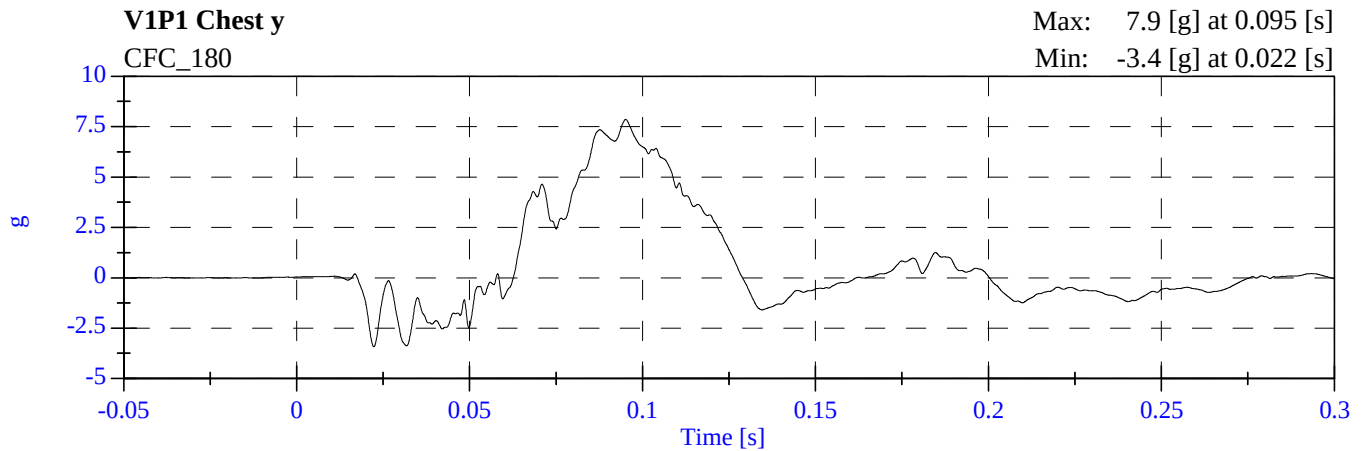
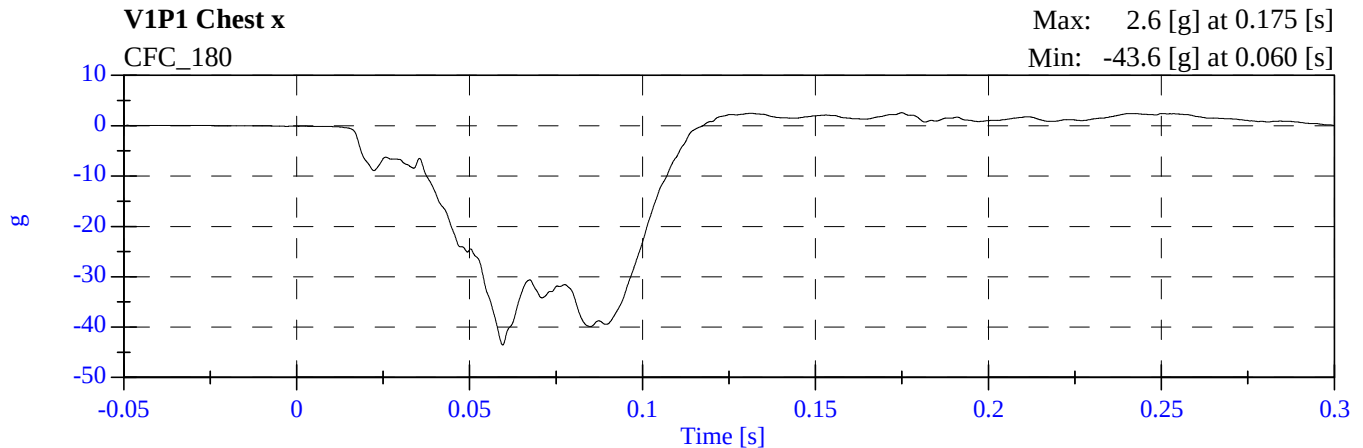
Frontal NCAP 2010 Ford Transit Connect

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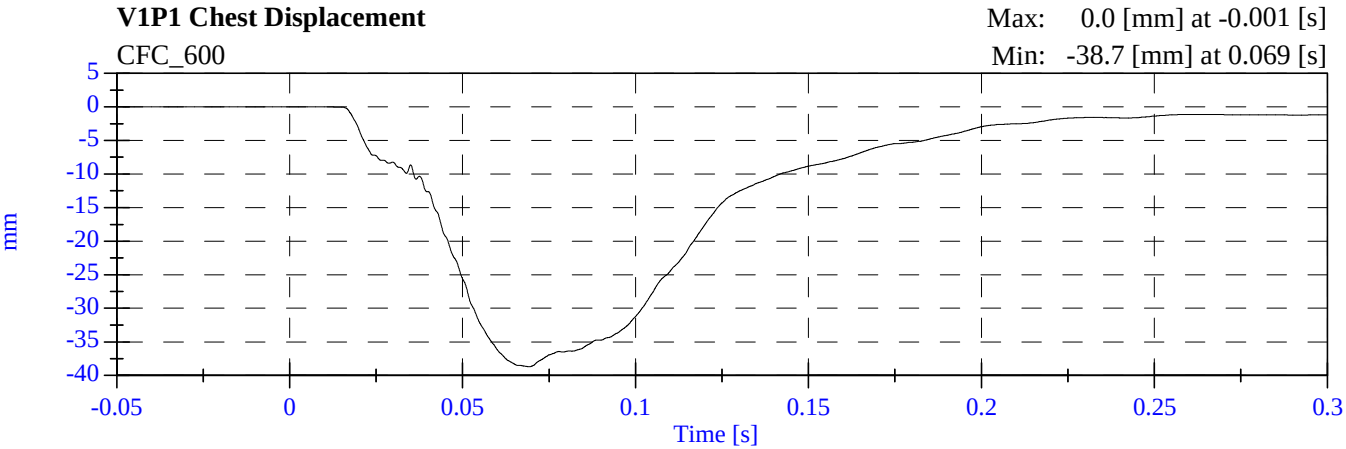


Frontal NCAP 2010 Ford Transit Connect

MA0217 - October 01, 2009

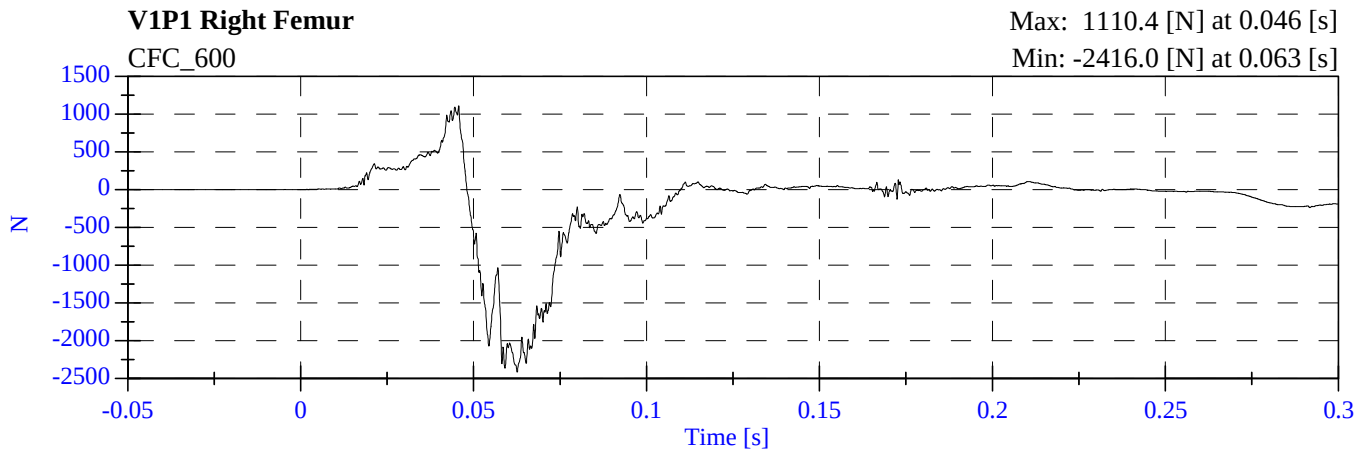
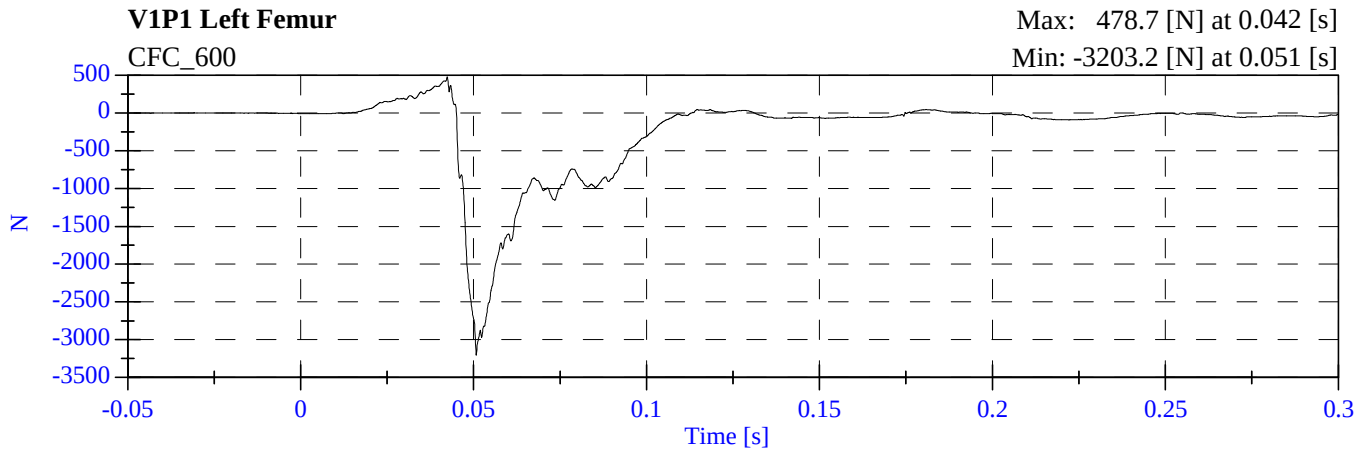


Frontal NCAP 2010 Ford Transit Connect
MA0217 - October 01, 2009



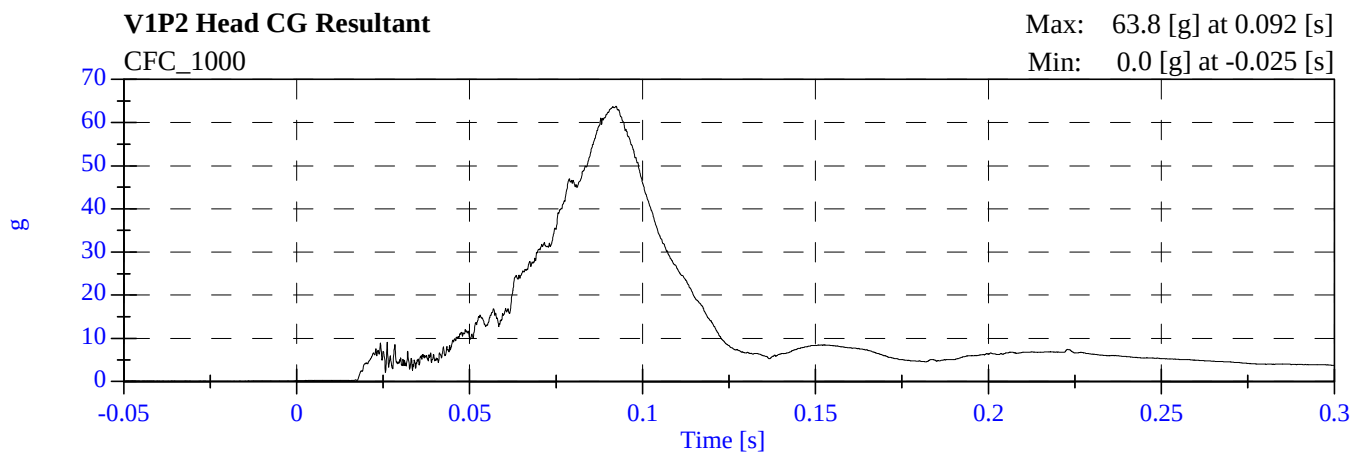
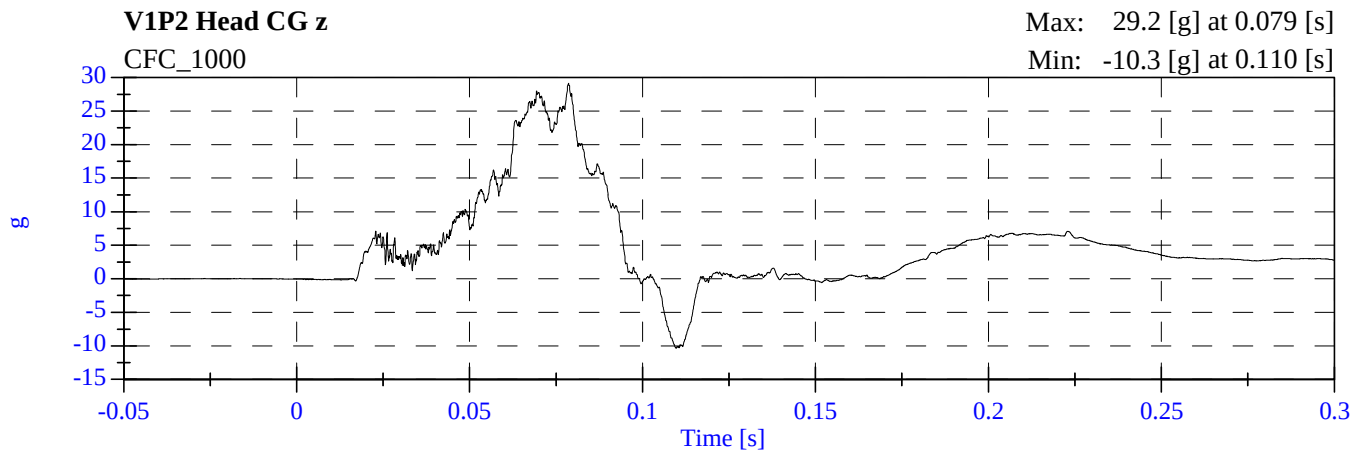
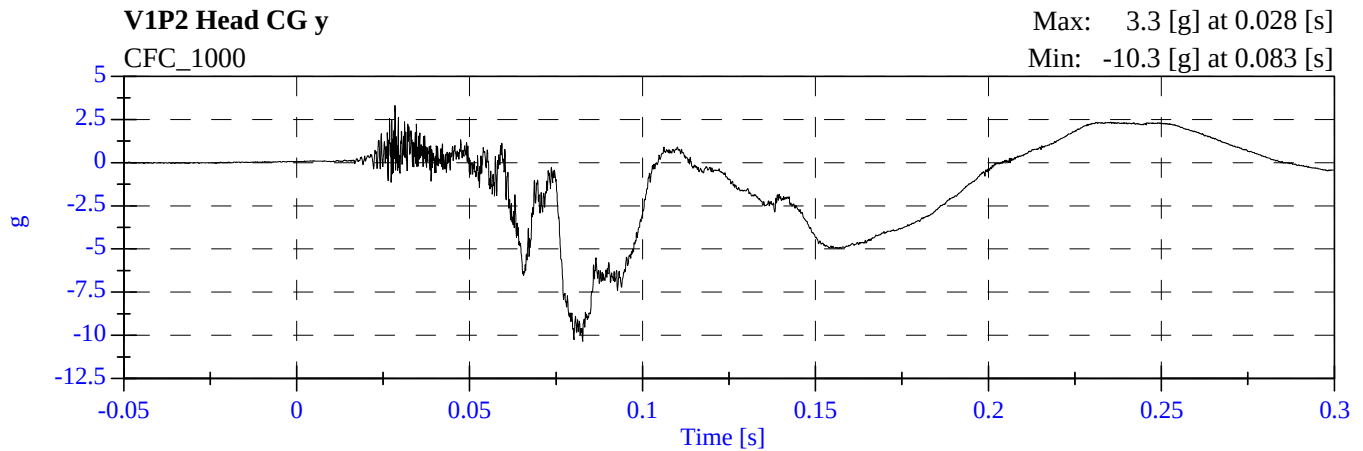
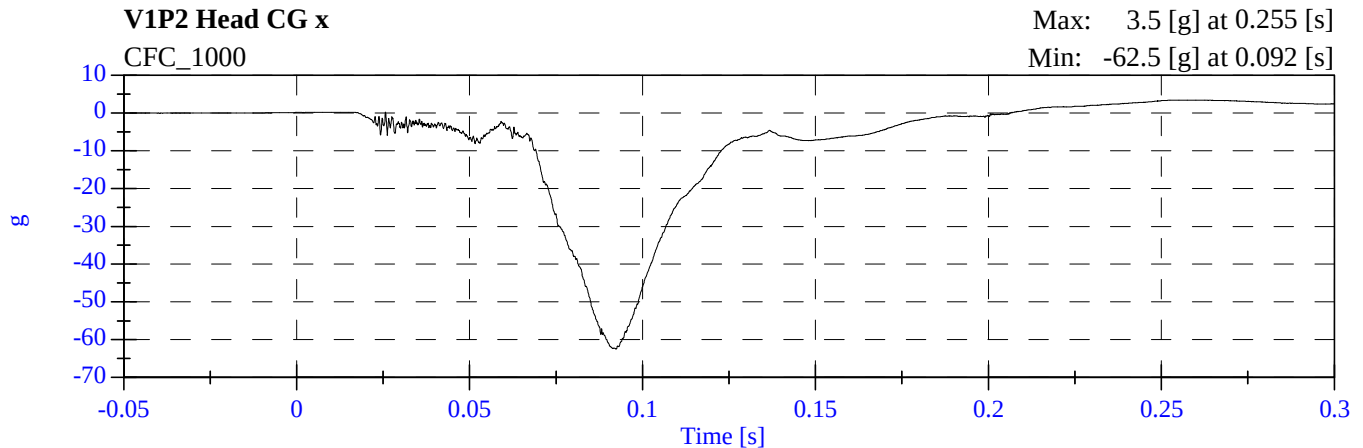
Frontal NCAP 2010 Ford Transit Connect

MA0217 - October 01, 2009



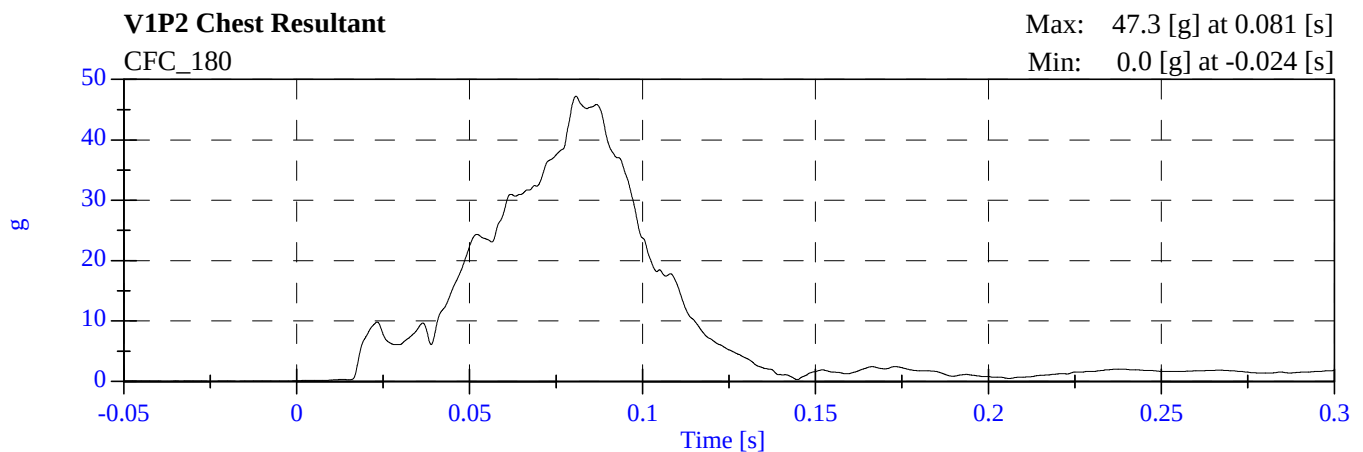
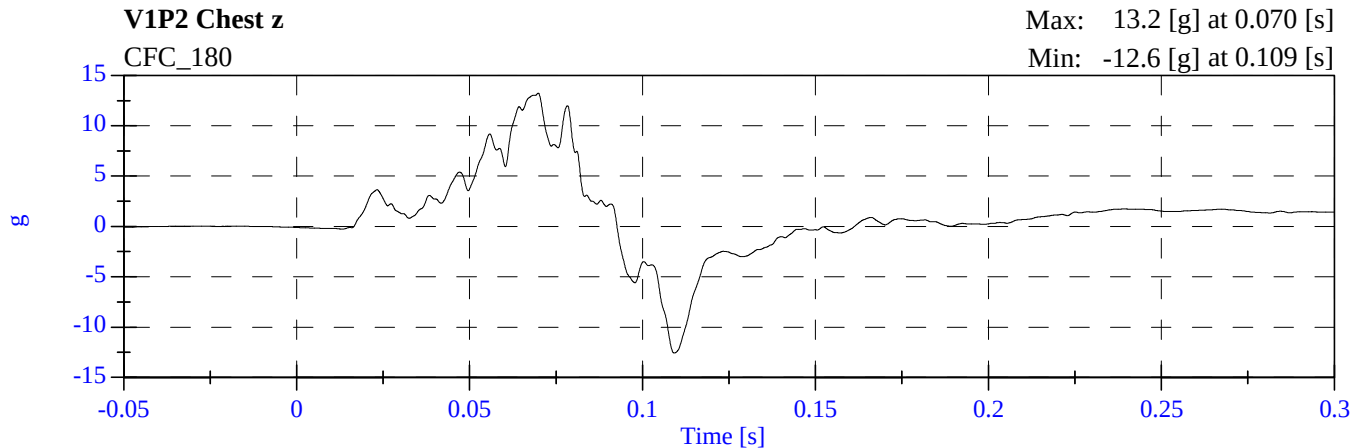
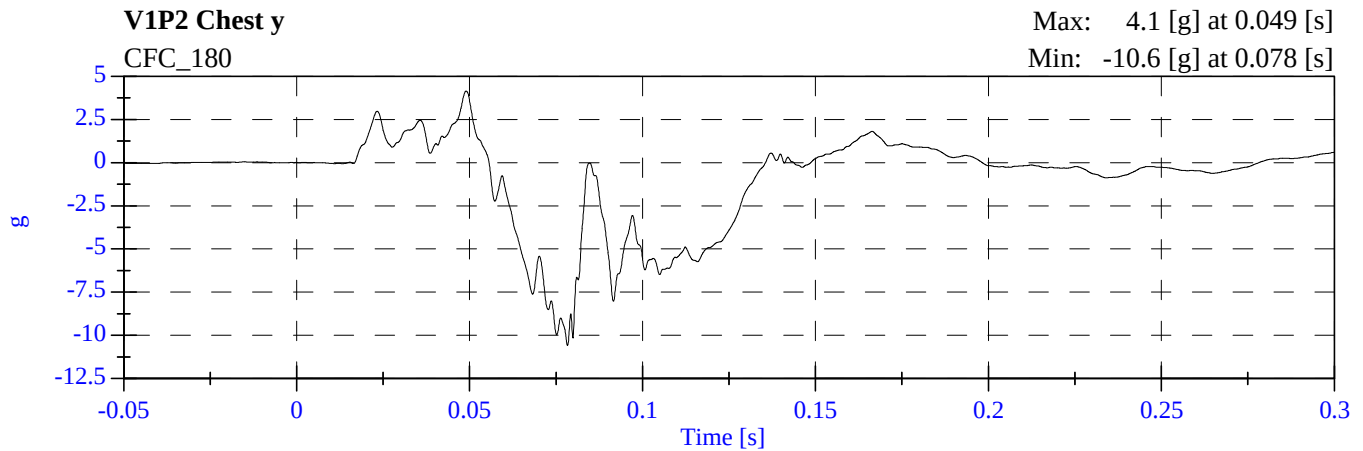
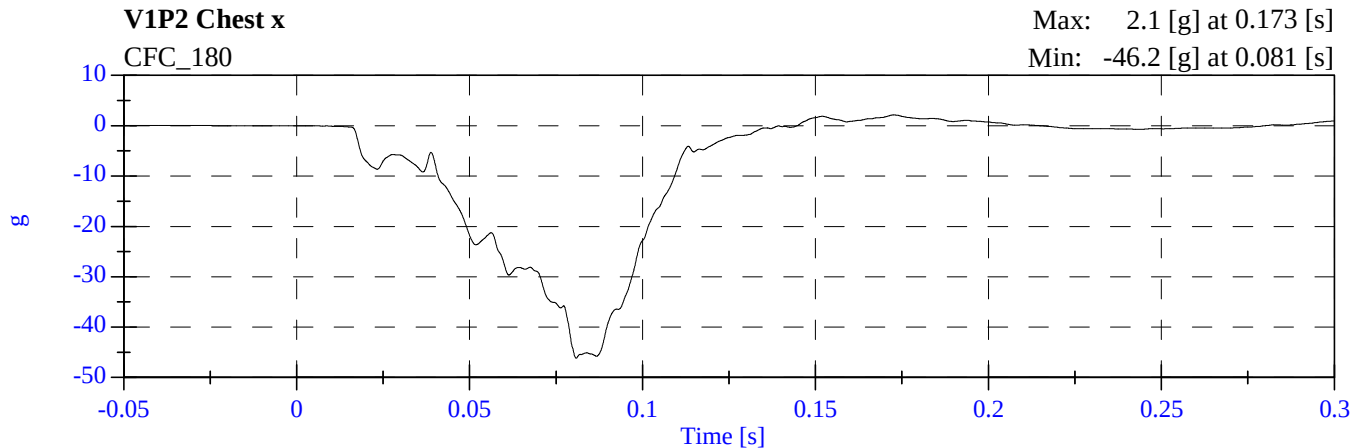
Frontal NCAP 2010 Ford Transit Connect

MA0217 - October 01, 2009

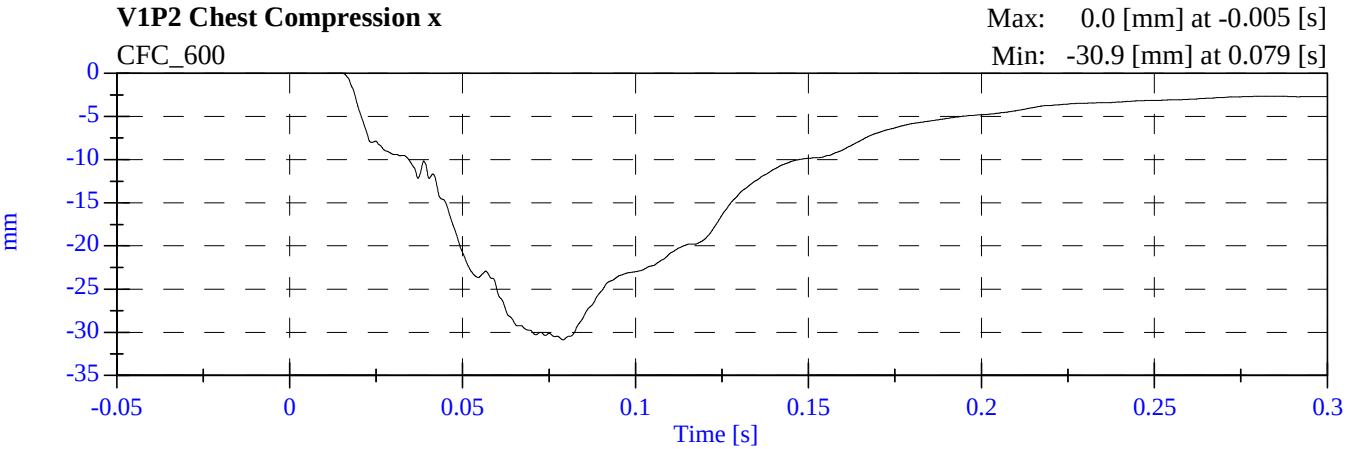


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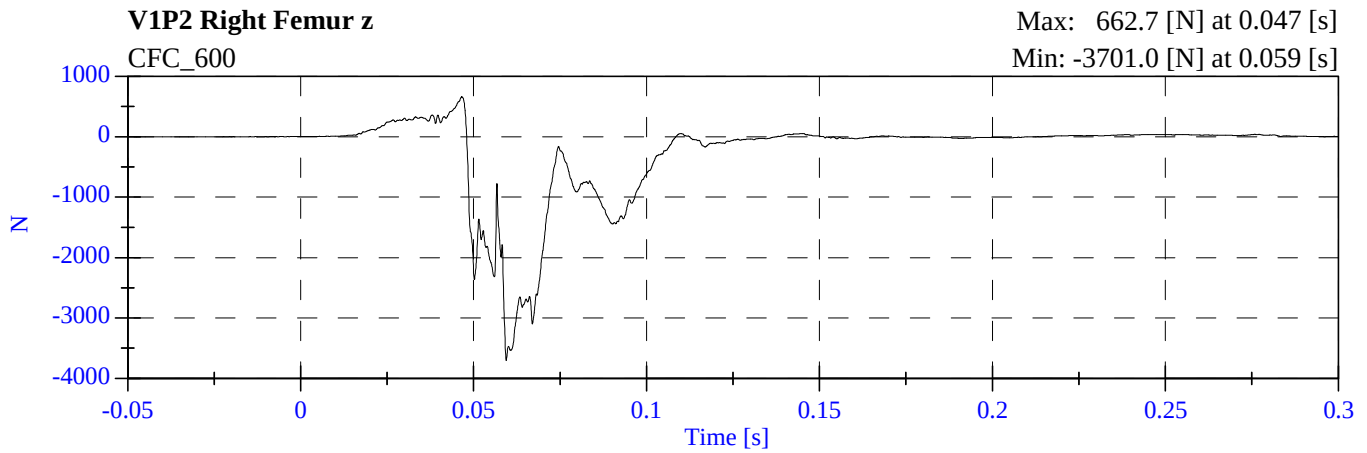
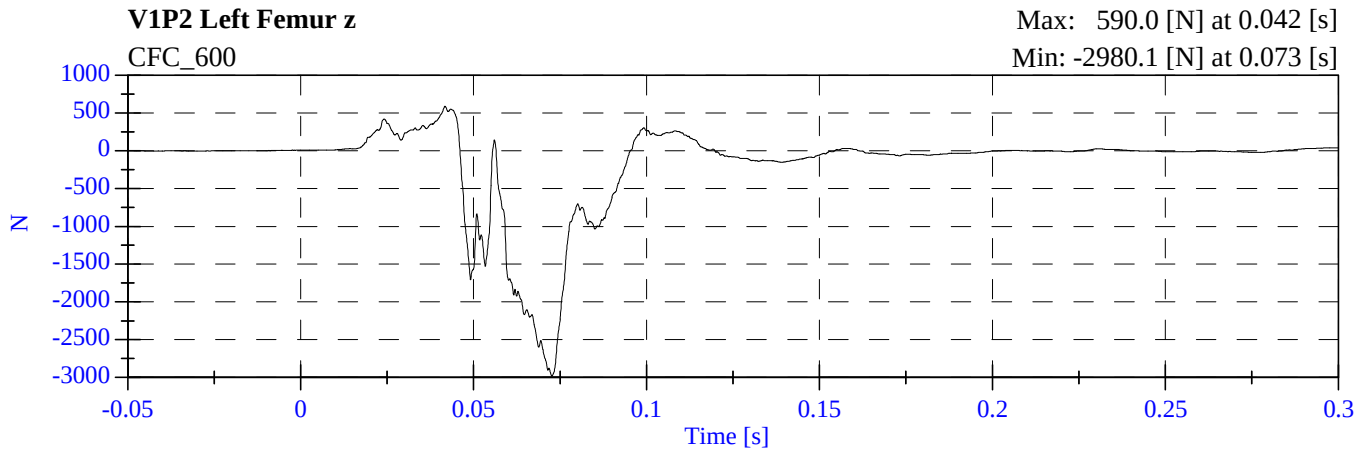


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Frontal NCAP 2010 Ford Transit Connect

MA0217 - October 01, 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.

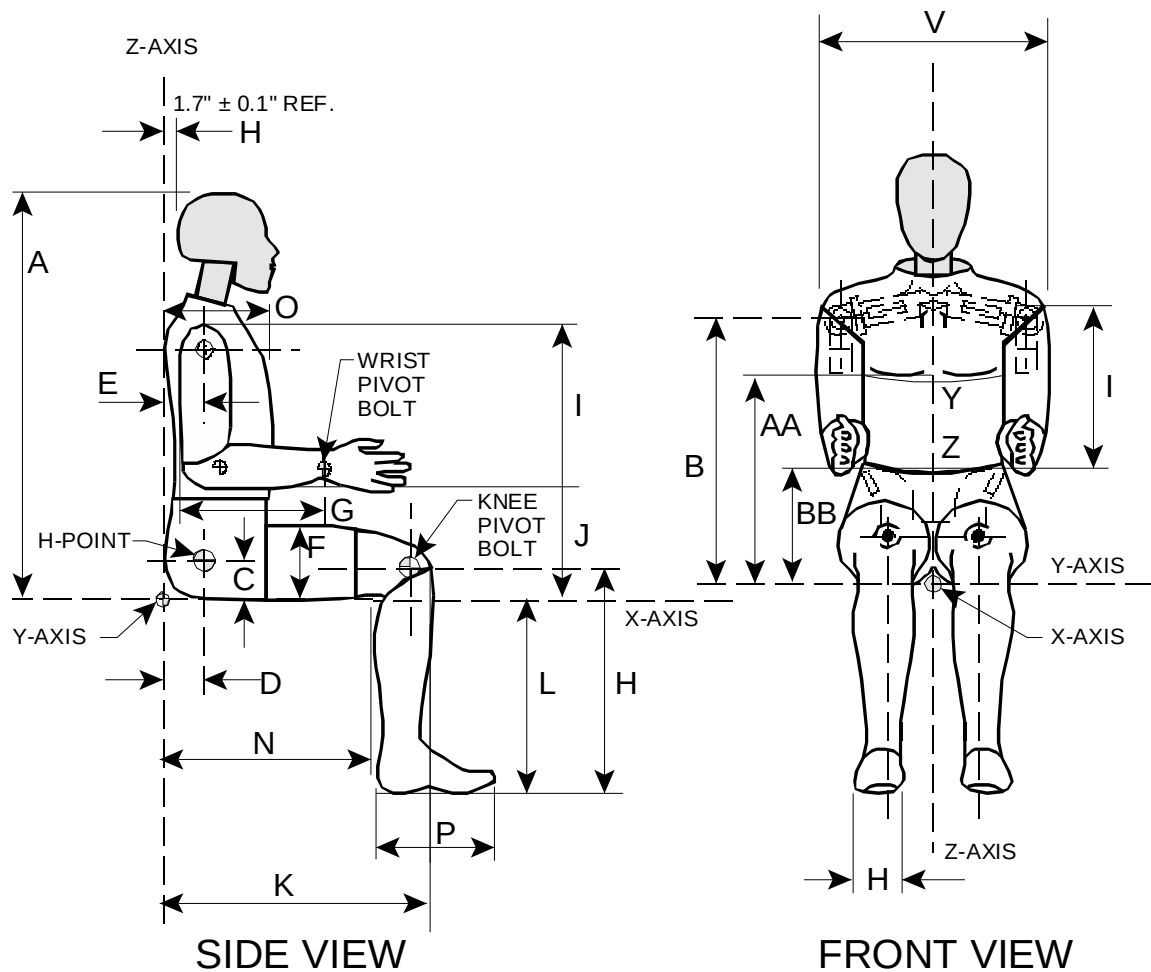
Dummy serial numbers and certification dates are:

<u>Position No./Location</u>	<u>Serial No.</u>	<u>Completion Date</u>
#1/Driver	1046	9/18/09
#2/Right Front Passenger	064	7/30/09

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 1046
Sequential Test Number 1
Date 9/16/09
Workfile 1046H2 09-16-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	21.7
Relative Humidity	10% - 70%	48
Peak Resultant Acceleration	225-275 G's	258.14
Peak Lateral Acceleration	15 G's Max	4.49
Is Acceleration Curve Unimodal?	YES	Yes

Remarks: None

Laboratory Technician:

A. Rudniski

PART 572E
NECK FLEXION TEST

Dummy Serial Number	1046	
Sequential Test Number	1	
Date	9/17/09	6 Axis Neck Transducer
Workfile	1046NF1 09-17-09	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.67
Relative Humidity		10% - 70%	51
Impact Velocity		6.89 – 7.13 m/s	7.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	25.09
	20 ms	17.60 - 22.60 G's	21.33
	30 ms	12.50 - 18.50 G's	15.07
Max Pendulum G's Above 30 ms		29 G's Max	15.07
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	38.40
D Plane Rotation	Max	64 - 78 Deg	68.86
	Time	57 - 64 ms	59.1
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m	92.51
	Time	47 - 58 ms	52.20
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	115.5
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	97.2

Remarks: None

Laboratory Technician: A. Rudniski

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	1046	
Sequential Test Number	1	
Date	9/17/09	6 Axis Neck Transducer
Workfile	1046NE 09-17-09	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.67
Relative Humidity		10% - 70%	51
Impact Velocity		5.94 – 6.19 m/s	6.07
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	19.71
	20 ms	14.00 - 19.00 G's	18.30
	30 ms	11.00 - 16.00 G's	15.08
Max Pendulum G's Above 30 ms		22 G's Max	15.08
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	40.3
D Plane Rotation	Max	81 - 106 Deg	94.38
	Time	72 - 82 ms	75.60
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-69.43
	Time	65 - 79 ms	72.2
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	154.8
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	138.4

Remarks: None

Laboratory Technician: A. Rudniski

PART 572E THORAX IMPACT TEST

Dummy Serial Number	1046
Sequential Test Number	1
Date	9/17/09
Workfile	1046T 09-17-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.7
Relative Humidity	10% - 70%	51
Pendulum Velocity	6.58 – 6.83 m/s	6.65
Maximum Deflection	63.50 – 72.64 mm	66
Maximum Resistive Force	5159.9 – 5893.9 N	5469.5
Internal Hysteresis	69 - 85 %	73.16

Remarks: None

Laboratory Technician:

A. Rudniski

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 1046
Sequential Test Number 1
Date 9/17/09
Workfile 1046LK 09-17-09/1046RK 09-17-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.7
Relative Humidity	10% - 70%	51
Probe Velocity	2.07 – 2.13 m/s	2.09
Peak Knee Impact Force	4715.1 – 5782.7 N	5060.85
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	20.6
Relative Humidity	10% - 70%	52
Probe Velocity	2.07 – 2.13 m/s	2.09
Peak Knee Impact Force	4715.1 – 5782.7 N	5014.46

Remarks: None

Laboratory Technician:

A. Rudniski

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 1046
Sequential Test Number 1
Date 9/17/09

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			21.7
Relative Humidity			60
Location for Chest Circumference	AA	16.9 - 17.1 in	16.9
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Total Sitting Height	A	34.6 - 35.0 in	34.9
Shoulder Pivot Height	B	19.9 - 20.5 in	20.3
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.5
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.5
Thigh Clearance	F	5.5 - 6.1 in	6.0
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.9
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	8.2
Buttock Knee Length	K	22.8 - 23.8 in	23.5
Popliteal Height	L	16.9 - 17.9 in	17.5
Knee Pivot Height	M	19.1 - 19.7 in	19.4
Buttock Popliteal Length	N	17.8 - 18.8 in	18.7
Chest Depth	O	8.4 - 9.0 in	8.5
Foot Length	P	9.9 - 10.5 in	10.2
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	38.5
Waist Circumference	Z	32.9 - 34.1 in	33.4

Remarks:

Laboratory Technician:

A. Rudniski

PART 572E
HEAD DROP TEST

Dummy Serial Number 064
Sequential Test Number 1
Date 7/30/09
Workfile 064H4 07-30-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	62
Peak Resultant Acceleration	225-275 G's	263.45
Peak Lateral Acceleration	15 G's Max	3.57
Is Acceleration Curve Unimodal?	YES	Yes

Remarks: None

Laboratory Technician:

A. Rudniski

PART 572E
NECK FLEXION TEST

Dummy Serial Number	064	
Sequential Test Number	1	
Date	07-28-09	6 Axis Neck Transducer
Workfile	064NF 07-28-09	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.1
Relative Humidity		10% - 70%	60
Impact Velocity		6.89 – 7.13 m/s	7.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	23.92
	20 ms	17.60 - 22.60 G's	20.73
	30 ms	12.50 - 18.50 G's	15.86
Max Pendulum G's Above 30 ms		29 G's Max	15.86
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	39.4
D Plane Rotation	Max	64 - 78 Deg	71.13
	Time	57 - 64 ms	61.8
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m	88.64
	Time	47 - 58 ms	52.8
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	116.9
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	99.5

Remarks: None

Laboratory Technician: A. Rudniski

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	064	
Sequential Test Number	1	
Date	07-28-09	6 Axis Neck Transducer
Workfile	064NE 07-28-09	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.1
Relative Humidity		10% - 70%	60
Impact Velocity		5.94 – 6.19 m/s	6.07
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	20.18
	20 ms	14.00 - 19.00 G's	18.42
	30 ms	11.00 - 16.00 G's	14.94
Max Pendulum G's Above 30 ms		22 G's Max	14.94
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	39.50
D Plane Rotation	Max	81 - 106 Deg	100.89
	Time	72 - 82 ms	77.0
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-73.09
	Time	65 - 79 ms	71.9
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	156.8
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	145.1

Remarks: None

Laboratory Technician: A. Rudniski

PART 572E THORAX IMPACT TEST

Dummy Serial Number	064
Sequential Test Number	1
Date	07-28-09
Workfile	064T 07-28-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	22.2
Relative Humidity	10% - 70%	60
Pendulum Velocity	6.58 – 6.83 m/s	6.64
Maximum Deflection	63.50 – 72.64 mm	70
Maximum Resistive Force	5159.9 – 5893.9 N	5859.0
Internal Hysteresis	69 - 85 %	73.68

Remarks: None

Laboratory Technician:

A. Rudniski

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 064
Sequential Test Number 1
Date 07-29-09
Workfile 064LK 07-29-09/064RK 07-29-09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.7
Relative Humidity	10% - 70%	66
Probe Velocity	2.07 – 2.13 m/s	21.3
Peak Knee Impact Force	4715.1 – 5782.7 N	5052.0
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	21.7
Relative Humidity	10% - 70%	66
Probe Velocity	2.07 – 2.13 m/s	2.09
Peak Knee Impact Force	4715.1 – 5782.7 N	5222.1

Remarks: None

Laboratory Technician:

A. Rudniski

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 064
Sequential Test Number 1
Date 7/30/09

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			21.7
Relative Humidity			60
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	34.6
Shoulder Pivot Height	B	19.9 - 20.5 in	20.5
H-Point Height	C	3.3 - 3.5 in	3.5
H-Point from Backline	D	5.3 - 5.5 in	5.5
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.5
Thigh Clearance	F	5.5 - 6.1 in	6.0
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.5
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.2
Elbow Rest Height	J	7.5 - 8.3 in	7.8
Buttock Knee Length	K	22.8 - 23.8 in	23.5
Popliteal Height	L	16.9 - 17.9 in	17.5
Knee Pivot Height	M	19.1 - 19.7 in	19.1
Buttock Popliteal Length	N	17.8 - 18.8 in	18.7
Chest Depth	O	8.4 - 9.0 in	8.5
Foot Length	P	9.9 - 10.5 in	10.2
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Foot Breadth	W	3.6 - 4.2 in	3.8
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	38.5
Waist Circumference	Z	32.9 - 34.1 in	33.4

Remarks: None

Laboratory Technician:

A. Rudniski

APPENDIX D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 1046)		Manufacturer	Serial #	Calibration	
				Last	Next
Head	X	ENDEVCO	AC-AAKB4	6/30/2009	12/29/2009
	Y	ENDEVCO	AC-ACCY2	6/30/2009	12/29/2009
	Z	ENDEVCO	AC-CC92H	6/30/2009	12/29/2009
Head	X (R)	ENDEVCO	AC-BD15J	6/30/2009	12/29/2009
	Y (R)	ENDEVCO	AC-J20165	6/30/2009	12/29/2009
	Z (R)	ENDEVCO	AC-J19611	6/29/2009	12/28/2009
Neck Load Cell	X	DENTON	LC-1629Fx	4/15/2009	10/14/2009
	Y	DENTON	LC-1629Fy	4/15/2009	10/14/2009
	Z	DENTON	LC-1629Fz	4/15/2009	10/14/2009
Neck Moment	X	DENTON	LC-1629Mx	4/15/2009	10/14/2009
	Y	DENTON	LC-1629My	4/15/2009	10/14/2009
	Z	DENTON	LC-1629Mz	4/15/2009	10/14/2009
Chest	X	ENDEVCO	AC-J19547	6/8/2009	12/7/2009
	Y	ENDEVCO	AC-J14669	6/8/2009	12/7/2009
	Z	ENDEVCO	AC-J21963	6/8/2009	12/7/2009
Chest	X (R)	ENDEVCO	AC-J31819	6/29/2009	12/28/2009
	Y (R)	ENDEVCO	AC-J27490	6/29/2009	12/28/2009
	Z (R)	ENDEVCO	AC-J14688	6/9/2009	12/8/2009
Chest Deflection	X	SERVO	DS-1046	7/2/2009	12/31/2009
Pelvic	X	ENDEVCO	AC-J20125	6/30/2009	12/29/2009
	Y	ENDEVCO	AC-AJ452	6/30/2009	12/29/2009
	Z	ENDEVCO	AC-J32156	6/30/2009	12/29/2009

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 1046)		Manufacturer	Serial #	Calibration	
				Last	Next
Left Femur Load Cell	Fz	DENTON	LC-744	5/29/2009	11/27/2009
Right Femur Load Cell	Fz	DENTON	LC-723	9/21/2009	3/22/2010
Left Upper Tibia	Mx	DENTON	LC-368Mx	5/28/2009	11/26/2009
	My	DENTON	LC-368My	5/28/2009	11/26/2009
Left Lower Tibia	Fz	DENTON	LC-364Fz	5/28/2009	11/26/2009
	Mx	DENTON	LC-364Mx	5/28/2009	11/26/2009
	My	DENTON	LC-364My	5/28/2009	11/26/2009
Right Upper Tibia	Mx	DENTON	LC-370Mx	5/28/2009	11/26/2009
	My	DENTON	LC-370My	5/28/2009	11/26/2009
Right Lower Tibia	Fz	DENTON	LC-368LFz	5/28/2009	11/26/2009
	Mx	DENTON	LC-368LMx	5/28/2009	11/26/2009
	My	DENTON	LC-368LMy	5/28/2009	11/26/2009
Left Foot Rear	X	ENDEVCO	AC-J19934	6/29/2009	12/28/2009
	Z	ENDEVCO	AC-P15321	6/29/2009	12/28/2009
Left Foot Front	Z	ENDEVCO	AC-J32011	6/29/2009	12/28/2009
Right Foot Rear	X	ENDEVCO	AC-J36743	6/30/2009	12/29/2009
	Z	ENDEVCO	AC-P15856	6/30/2009	12/29/2009
Right Foot Front	Z	ENDEVCO	AC-ACC14	6/30/2009	12/29/2009
Lap Belt Load Cell		First Technology	LC-156	4/2/2009	10/1/2009
Shoulder Belt Load Cell		First Technology	LC-159	4/2/2009	10/1/2009

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)		Manufacturer	Serial #	Calibration	
				Last	Next
Head	X	ENDEVCO	AC-P52011	5/27/2009	11/25/2009
	Y	ENDEVCO	AC-P52128	5/27/2009	11/25/2009
	Z	ENDEVCO	AC-P51990	5/27/2009	11/25/2009
Head	X (R)	ENDEVCO	AC-P51303	5/27/2009	11/25/2009
	Y (R)	ENDEVCO	AC-P51985	5/27/2009	11/25/2009
	Z (R)	ENDEVCO	AC-P51294	5/27/2009	11/25/2009
Neck Load Cell	X	DENTON	LC-440Fx	4/7/2009	10/6/2009
	Y	DENTON	LC-440Fy	4/7/2009	10/6/2009
	Z	DENTON	LC-440Fz	4/7/2009	10/6/2009
Neck Moment	X	DENTON	LC-440Mx	4/7/2009	10/6/2009
	Y	DENTON	LC-440My	4/7/2009	10/6/2009
	Z	DENTON	LC-440Mz	4/7/2009	10/6/2009
Chest	X	ENDEVCO	AC-P52000	5/28/2009	11/26/2009
	Y	ENDEVCO	AC-P49163	5/28/2009	11/26/2009
	Z	ENDEVCO	AC-P52009	5/28/2009	11/26/2009
Chest	X (R)	ENDEVCO	AC-P52035	5/28/2009	11/26/2009
	Y (R)	ENDEVCO	AC-P52030	5/28/2009	11/26/2009
	Z (R)	ENDEVCO	AC-P52033	5/28/2009	11/26/2009
Chest Deflection	X	SERVO	DS-064	5/24/2009	11/22/2009
Pelvic	X	ENDEVCO	AC-P17285	5/28/2009	11/26/2009
	Y	ENDEVCO	AC-P17837	5/28/2009	11/26/2009
	Z	ENDEVCO	AC-P17553	5/28/2009	11/26/2009

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)		Manufacturer	Serial #	Calibration	
				Last	Next
Left Femur Load Cell	Fz	DENTON	LC-1525	5/29/2009	11/27/2009
Right Femur Load Cell	Fz	DENTON	LC-1533	5/29/2009	11/27/2009
Left Upper Tibia	Mx	DENTON	LC-374Mx	6/2/2009	12/1/2009
	My	DENTON	LC-374My	6/2/2009	12/1/2009
Left Lower Tibia	Fz	DENTON	LC-372Fz	6/2/2009	12/1/2009
	Mx	DENTON	LC-372Mx	6/2/2009	12/1/2009
	My	DENTON	LC-372My	6/2/2009	12/1/2009
Right Upper Tibia	Mx	DENTON	LC-404Mx	6/1/2009	11/30/2009
	My	DENTON	LC-404My	6/1/2009	11/30/2009
Right Lower Tibia	Fz	DENTON	LC-396Fz	6/1/2009	11/30/2009
	Mx	DENTON	LC-396Mx	6/1/2009	11/30/2009
	My	DENTON	LC-396My	6/1/2009	11/30/2009
Left Foot Rear	X	ENDEVCO	AC-P52152	5/28/2009	11/26/2009
	Z	ENDEVCO	AC-P52082	5/28/2009	11/26/2009
Left Foot Front	Z	ENDEVCO	AC-P52383	5/27/2009	11/25/2009
Right Foot Rear	X	ENDEVCO	AC-P51873	5/28/2009	11/26/2009
	Z	ENDEVCO	AC-P58987	5/28/2009	11/26/2009
Right Foot Front	Z	ENDEVCO	AC-P52025	5/28/2009	11/26/2009
Lap Belt Load Cell		First Technology	LC-173	4/2/2009	10/1/2009
Shoulder Belt Load Cell		First Technology	LC-178	4/2/2009	10/1/2009

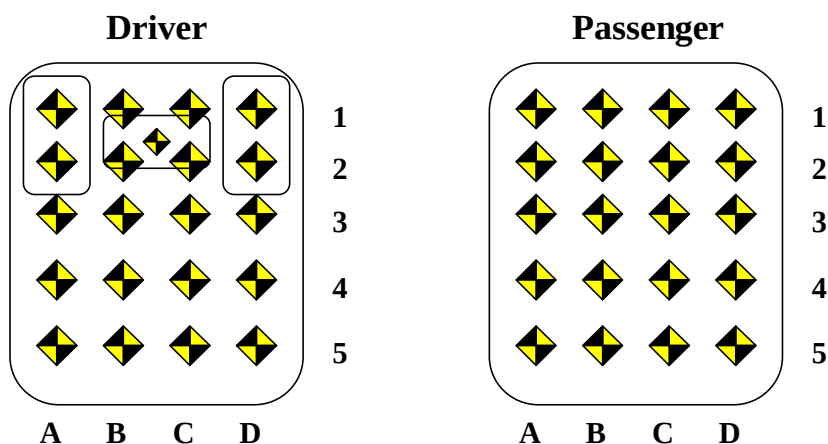
INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(Six Month Calibration Minimum)

	Manufacturer	Serial #	Calibration	
			Last	Next
Left Seat Rear Crossmember X	ENDEVCO	AC-P15526	7/23/2009	1/21/2010
Right Rear Seat Crossmember X	ENDEVCO	AC-P18531	9/17/2009	3/18/2010
Top of Engine	ENDEVCO	AC-P26259	9/25/2009	3/26/2010
Bottom of Engine	ICS	AC-FA2486	4/16/2009	10/15/2009
Right Disc Brake Caliper	ICS	AC-8084-041	5/27/2009	11/25/2009
Left Disc Brake Caliper	GS SENSORS	AC-9440-011	4/16/2009	10/15/2009
Left Seat Rear Crossmember Z	ENDEVCO	AC-P18528	7/23/2009	1/21/2010
Right Seat Rear Crossmember Z	ENDEVCO	AC-P23128	7/23/2009	1/21/2010

APPENDIX E

VEHICLE INTERIOR INTRUSION MEASUREMENTS

DRIVER SIDE INTRUSION MEASUREMENTS



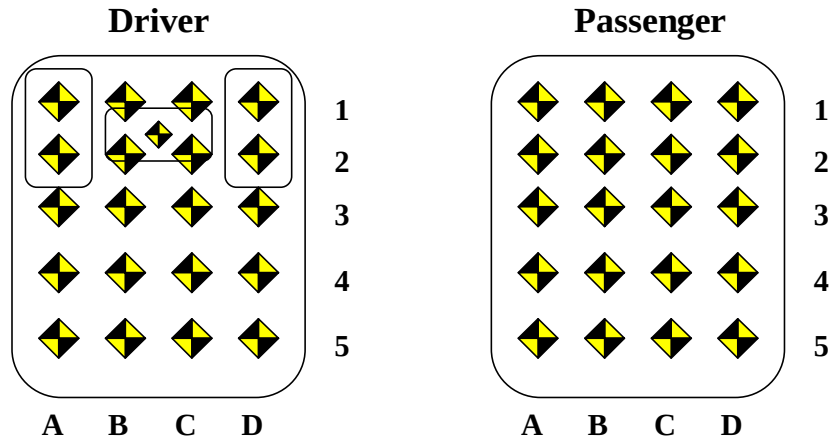
Driver Side Intrusion Measurements

Intrusion Location	PRE-TEST (mm)			POST-TEST (mm)			CHANGE (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	3176	-579	401	3152	-567	402	24	-12	-1
B1	3347	-449	400	3279	-426	431	68	-23	-31
C1	3356	-315	399	3279	-300	417	77	-15	-18
D1	3326	-186	399	3263	-179	398	63	-7	1
A2	3129	-577	368	3108	-568	366	21	-9	2
B2	3252	-450	346	3222	-429	352	30	-21	-6
C2	3254	-313	347	3212	-301	335	42	-12	12
D2	3250	-181	347	3214	-180	341	36	-1	6
A3	3086	-572	334	3070	-570	326	16	-2	8
B3	3142	-446	310	3126	-441	296	16	-5	14
C3	3148	-314	314	3132	-311	275	16	-3	39
D3	3146	-179	317	3124	-177	288	22	-2	29
A4	3073	-578	319	3056	-569	309	17	-9	10
B4	3076	-446	300	3062	-442	277	14	-4	23
C4	3077	-313	305	3061	-310	263	16	-3	42
D4	3080	-178	311	3066	-176	262	14	-2	49
A5	3012	-578	306	2996	-576	290	16	-2	16
B5	3011	-445	303	2999	-442	267	12	-3	36
C5	3012	-313	306	2998	-310	266	14	-3	40
D5	3016	-177	312	3003	-174	268	13	-3	44
BP	3169	-331	473	3066	-335	513	103	4	-40
G	2998	-479	757	2994	-470	763	4	-9	-6
H	2981	-178	765	2977	-169	766	4	-9	-1
L	2741	-348	1028	2767	-313	1031	-26	-35	-3
AB	2689	-588	413	2682	-577	397	7	-11	16

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	3323	189	405	3237	198	385	86	-9	20
B1	3343	314	405	3265	319	429	78	-5	-24
C1	3345	454	407	3286	456	451	59	-2	-44
D1	3233	592	409	3210	607	421	23	-15	-12
A2	3234	187	343	3213	196	334	21	-9	9
B2	3243	313	344	3214	324	350	29	-11	-6
C2	3246	455	346	3214	465	367	32	-10	-21
D2	3221	591	351	3200	607	364	21	-16	-13
A3	3130	190	314	3122	200	277	8	-10	37
B3	3138	315	309	3129	330	283	9	-15	26
C3	3144	454	307	3135	469	294	9	-15	13
D3	3146	591	306	3136	605	304	10	-14	2
A4	3067	191	309	3062	198	272	5	-7	37
B4	3074	315	302	3066	327	272	8	-12	30
C4	3080	454	300	3075	465	281	5	-11	19
D4	3086	590	303	3078	602	295	8	-12	8
A5	3000	191	310	2994	201	274	6	-10	36
B5	3006	316	305	2997	329	278	9	-13	27
C5	3013	454	303	3007	466	285	6	-12	18
D5	3019	589	307	3010	601	296	9	-12	11
R	2946	181	763	2962	189	768	-16	-8	-5
S	3011	485	755	3008	499	763	3	-14	-8
AB	2683	595	414	2677	598	405	6	-3	9

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

AB = Front outboard seat anchor bolt