



REPORT NUMBER: TWG-MGA-2009-007

**SIDE AIRBAG OUT-OF-POSITION INJURY
TECHNICAL WORKING GROUP**

**CHRYSLER LLC
2009 DODGE CHALLENGER
NHTSA NUMBER: M90303TWG2**

TEST DATE: SEPTEMBER 22, 2009

FINAL REPORT DATE: DECEMBER 8, 2009

FINAL REPORT

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The results presented in this report relate only to the specified test items.

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

The purpose of this test was to obtain data in a static out-of-position side air bag deployment. These data constitute part of the general consumer information collected by Alpha Technology Associate, Inc.

SUMMARY

The effects of a curtain airbag deployment in a 2009 Dodge Challenger with an out-of-position SID-IIs Build Level D were evaluated. The curtain airbag was fired remotely. The test was performed by MGA Research Corporation on September 22, 2009. Pre and post test photographs of the vehicle and dummy can be found in Appendix A.

Three high-speed cameras (1000 fps) were used to document the side airbag deployment event. The following camera locations were used:

- Left Side Through Removed Driver Door
- Front Through Windshield
- Left Side ¾ View Through Windshield

One SID-IIs Build Level D dummy (Serial Number 296) was placed in the right front passenger seat situated in the forward-facing position in the center of the seat per Section 3.3.5.2 according to dummy placement instructions specified in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags as prepared by the Side Airbag Out-of-Position Injury Technical Working Group (TWG).

The dummy was instrumented with the following instrumentation:

- Head Accelerations
- Upper Neck Load Cell
- Lower Neck Load Cell

The 15 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy data traces.

The SID-IIs dummy's visible contact points were as follows:

- Curtain airbag to top of head

The SID-IIs dummy was placed in the right front passenger seat facing forward in the center of the seat with its arm rotated horizontal to clear the armrest. The seat track was adjusted forward. The dummy was moved outboard until contact with the door trim panel ensuring that the deployment trajectory of the airbag intersects with the centerline of the top of the head. Masking tape was wrapped around the dummy's neck bracket to hold the dummy in place.

This orientation complies with Section 3.3.5.2 of the TWG Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags as defined by Lund, et al and the Technical Working Group First Revision dated July, 2003.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
TEST SUMMARY

	Test Data	Description
Seating Position	P2	Right Front Seating Position
Test	3.3.5.2*	Forward-facing SID-IIs dummy
Curtain Airbag	Roof-Rail Mounted	Side Airbag
ATD Type/Serial No.	SID-IIs Build Level D / 296	5 th Percentile Adult Female

* Procedure as defined by Lund, et al and the Technical Working Group dated July, 2003

Number of Data Channels	15
Number of High-Speed Video	3

Visible Dummy Contact Points	
Head Contact	Curtain airbag to top of head
Left Shoulder Contact	None
Left Torso Contact	None
Left Pelvis Contact	None

DATA SHEET NO. 2**TEST VEHICLE INFORMATION**

Please note that this vehicle had previously been tested in an
NCAP Frontal Impact on October 1, 2008.

TEST VEHICLE INFORMATION

Manufacturer	Dodge
Model	Challenger
Body Style	Sedan
NHTSA No.	M90303TWG2
VIN	2B3LJ44V69H502481
Color	Deep Water Blue Pearl
Delivery Date	9/08/2008
Odometer Reading (mile)	82
Dealer	Boucher Fleet Group
Transmission	Automatic
Final Drive	Rear
Number of Cylinders	6
Engine Displacement (L)	3.5
Engine Placement	Longitudinal
Automatic Door Lock (ADL)	Yes
Owners Manual Details Instructions on Disabling ADLs	No
Bucket Seats	Yes

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Driver Side Curtain Airbag	Yes
Driver Side Torso Airbag	No
Rear Passenger Side Curtain Airbag	Yes
Rear Passenger Side Torso Airbag	No
Force Limiter	Yes
Pretensioner	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Anti-lock Brakes	Yes
Traction Control	Yes
All Wheel Drive	No
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrysler LLC
Date of Manufacture	8-08

GVWR (kg)	2225
GAWR Front (kg)	1275
GAWR Rear (kg)	1275

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				392
Cargo Wt. (RCLW) (kg)				52

DATA SHEET NO. 3
DUMMY POSITIONING IN VEHICLE

Measurement		Value
Seat Position		Rearmost
Seat Height Position		Non-Adjustable
Placed in Position No. 2		---
Seat Back Angle	SA (°)	24
Top of Airbag Module to Head/Neck Junction	AN (mm)	216
Head CG to Door Panel/Window	HD (mm)	124
Head to Seat Back Centerline	HSC (mm)	258
Chest to Dash	CD (mm)	558
Chest to Seatback	CS (mm)	296
Right Arm to Seat Back Centerline	RACL (mm)	336
Left Arm to Seat Back Centerline	LACL (mm)	---
Right Arm to Door Panel	RA (mm)	Contact
Left Arm to B-Post	LA (mm)	---
Knee to Knee	KK (mm)	120
Toe to Toe	TT (mm)	193
Right Knee to Seat Cushion Centerline	KSCR (mm)	102
Left Knee to Seat Cushion Centerline	KSCL (mm)	25
Right Toe to Seat Cushion Centerline	TSCR (mm)	---
Left Toe to Seat Cushion Centerline	TSCL (mm)	---
Nose to Dash	ND (mm)	594
Nose to Seatback	NS (mm)	372
Top of Head to Headliner	HH (mm)	97

DATA SHEET NO. 4
DUMMY INJURY CRITERIA VALUES

NHTSA No. M90303TWG2

		MAXIMUM VALUE			
		Position No. 2			
DESCRIPTION	UNIT	MAXIMUM	TIME (ms)	MINIMUM	TIME (ms)
Head X	g	10.3	15.1	-20.0	12.8
Head Y	g	39.5	9.6	-7.3	10.2
Head Z	g	31.7	9.6	-10.7	13.5
Head Resultant	g	50.9	9.6		
Upper Neck Fx	N	61.0	11.6	-78.4	168.1
Upper Neck Fy	N	4.2	0.0	-191.2	12.8
Upper Neck Fz	N	60.8	18.0	-963.9	12.8
Upper Neck F Resultant	N	982.9	12.8		
Upper Neck Mx	Nm	11.8	15.7	-17.2	177.3
Upper Neck My	Nm	8.1	176.6	-1.5	25.9
Upper Neck Mz	Nm	2.6	13.4	-0.6	90.2
Upper Neck M Resultant	Nm	19.1	178.5		
Lower Neck Fx	N	72.2	18.6	-77.9	27.2
Lower Neck Fy	N	69.5	289.3	-131.6	17.4
Lower Neck Fz	N	141.2	8.6	-1030.2	13.6
Lower Neck F Resultant	N	1030.9	13.6		
Lower Neck Mx	Nm	1.2	10.4	-27.9	145.2
Lower Neck My	Nm	43.1	43.2	-8.2	18.6
Lower Neck Mz	Nm	7.2	181.2	-4.9	17.2
Lower Neck M Resultant	Nm	43.5	43.2		

DATA SHEET NO. 4 (continued)
DUMMY INJURY CRITERIA VALUES

NHTSA No. M90303TWG2

ATD position	HEAD INJURY CRITERIA (HIC)					
	HIC15			HIC36		
	HIC	T ¹ (msec)	T ² (msec)	HIC	T ¹ (msec)	T ² (msec)
No. 2 Right Front	5.8	9.3	19.1	5.8	9.3	19.1

Position 2 Neck Injury Summary (SID-IIs Build Level D – Out-Of-Position)

	Nij	Time (msec)	Z Force (N) (CFC 600)	X Force (N) (CFC 600)	Y Moment (N-m) (CFC 600)
Ntf	0.04	18.9	37.58	5.32	4.48
Nte	0.00	-2.3	3.08	1.61	-0.09
Ncf	0.24	12.6	-924.17	0.54	0.10
Nce	0.25	12.9	-951.84	17.90	-0.21
Peak Tension (CFC1000)	60.8 N		Peak Compression (CFC 1000)		-963.9 N

Critical Values

Nij Intercepts				Peak Limits	
Tension (CVt)	3880 N	Extension (mCVe)	61 N-m	Tension	2070 N
Compression (CVc)	3880 N	Flexion (mCVf)	155 N-m	Compression	2520 N
Condyle Offset	0.01778 m				

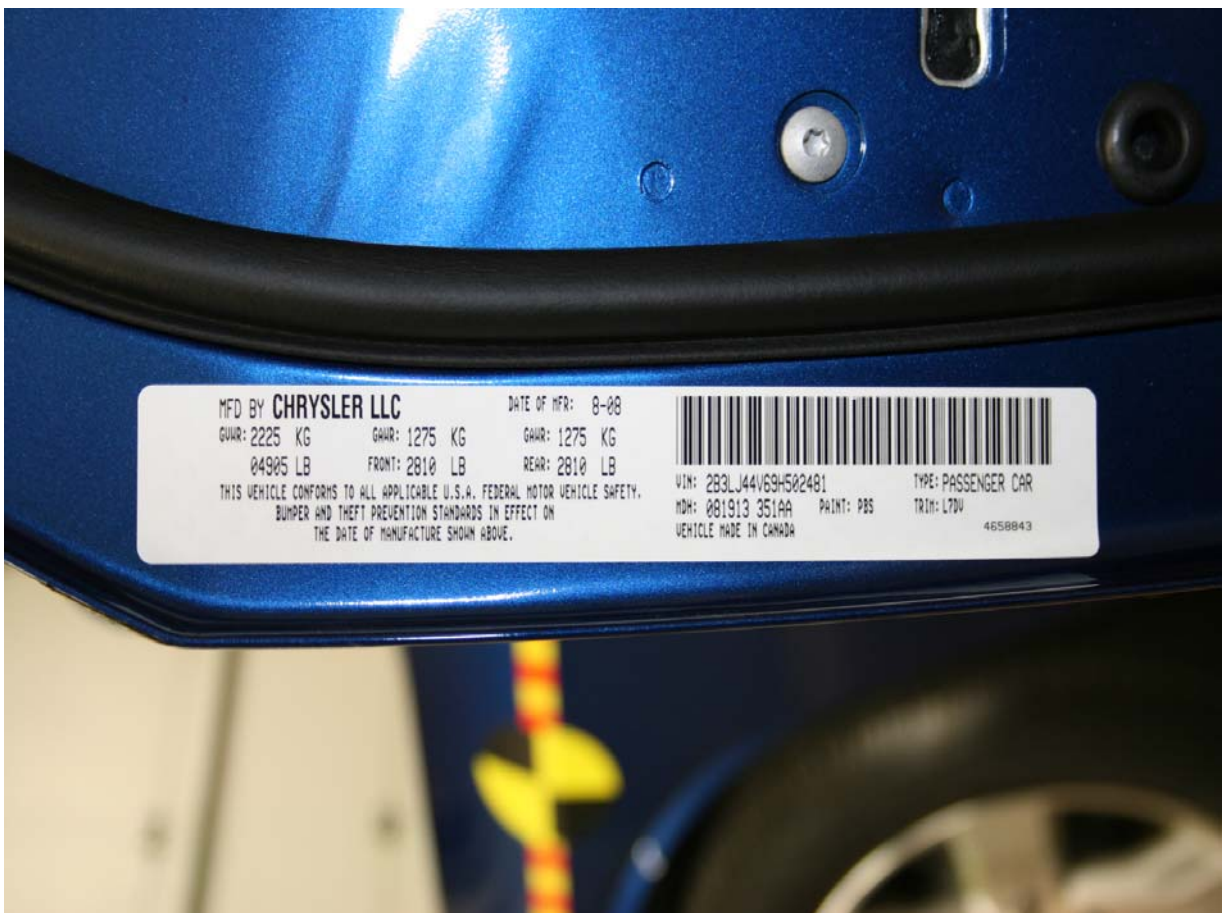
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Front ¾ View of Vehicle, As Received



Vehicle Certification Placard



Pre-Test Vehicle Left Side View



Post-Test Vehicle Left Side View



Pre-Test SID-IIs Dummy Left Side View



Post-Test SID-IIs Dummy Left Side View



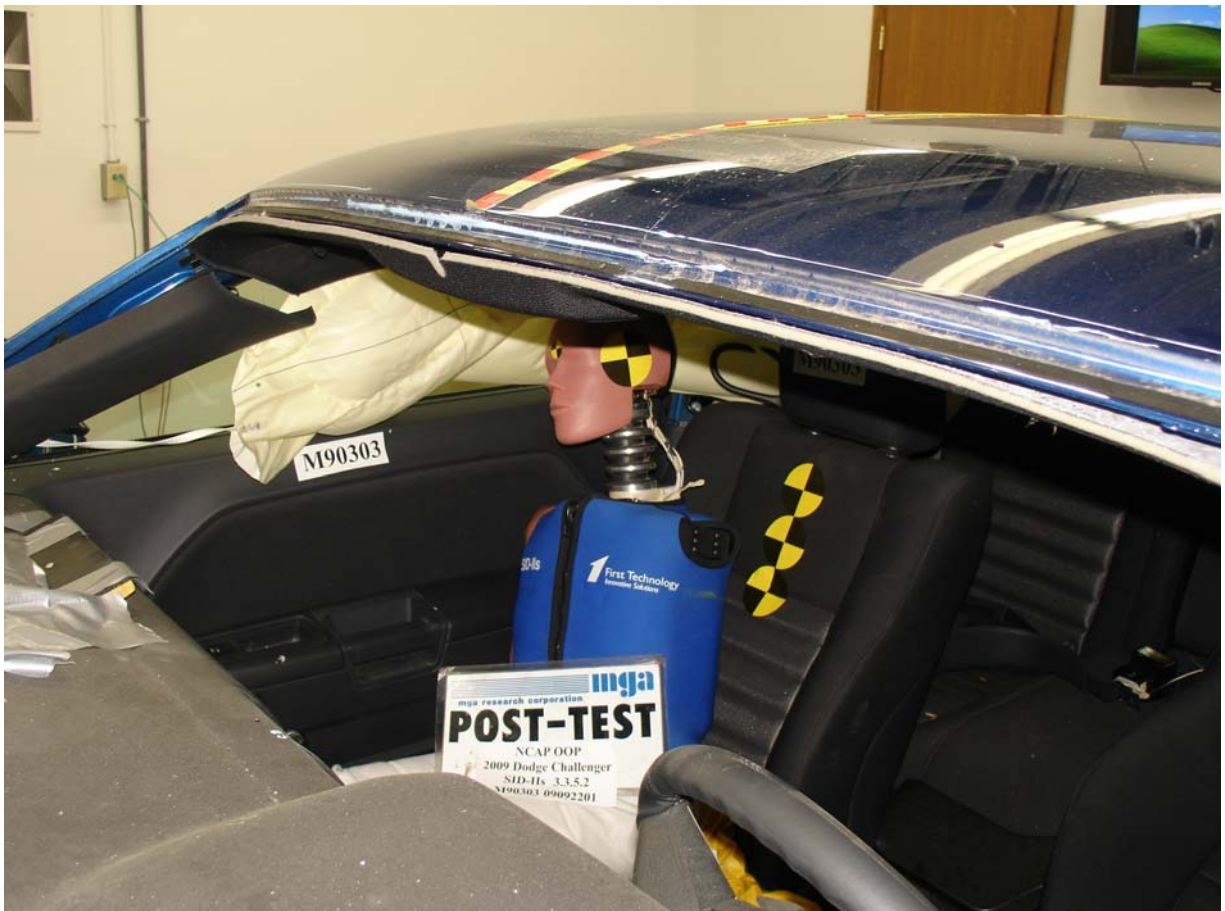
Pre-Test SID-IIs Dummy Left Side Closeup View



Post-Test SID-IIs Dummy Left Side Closeup View



Pre-Test SID-11s Dummy Left 3/4 Front View



Post-Test SID-11s Dummy Left 3/4 Front View



Pre-Test SID-11s Dummy Left 3/4 Front Closeup View



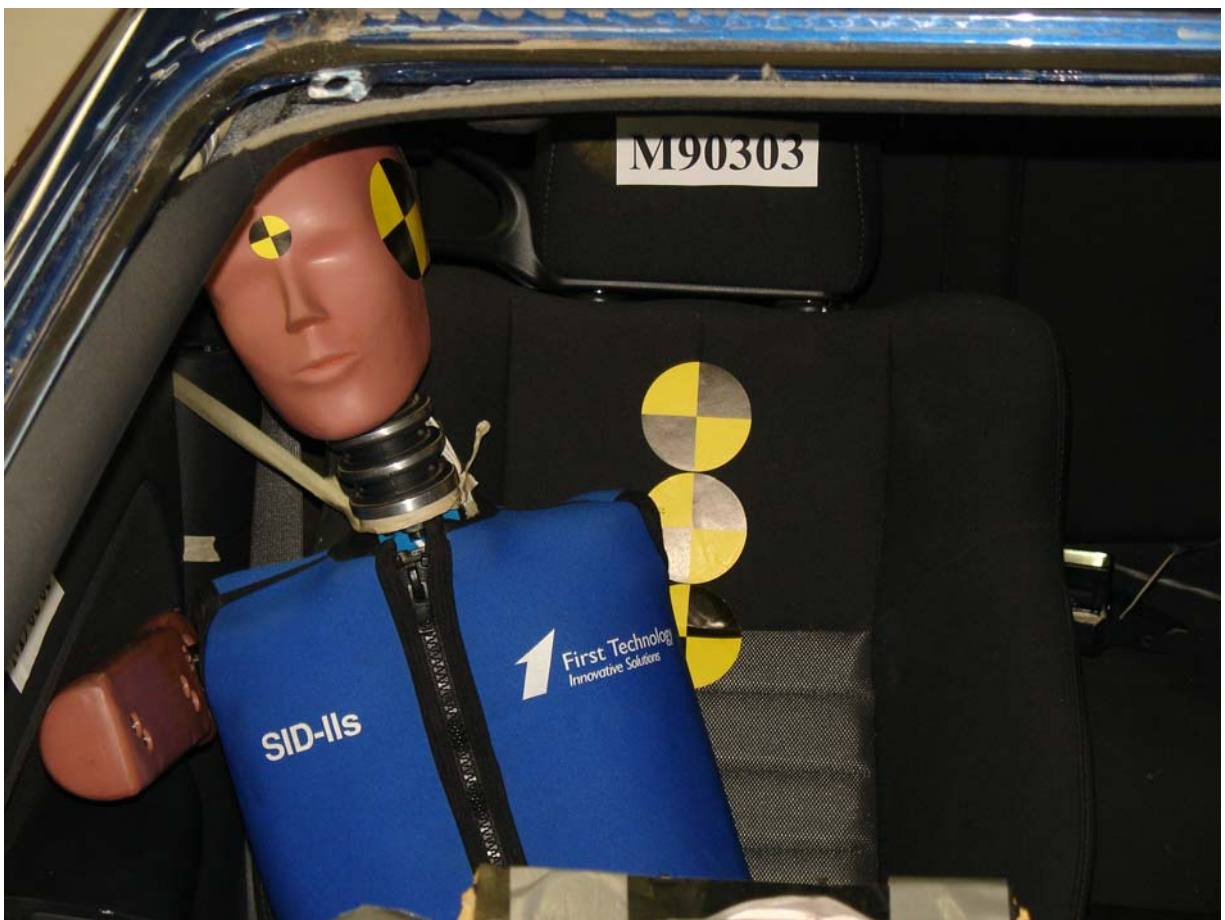
Post-Test SID-11s Dummy Left 3/4 Front Closeup View



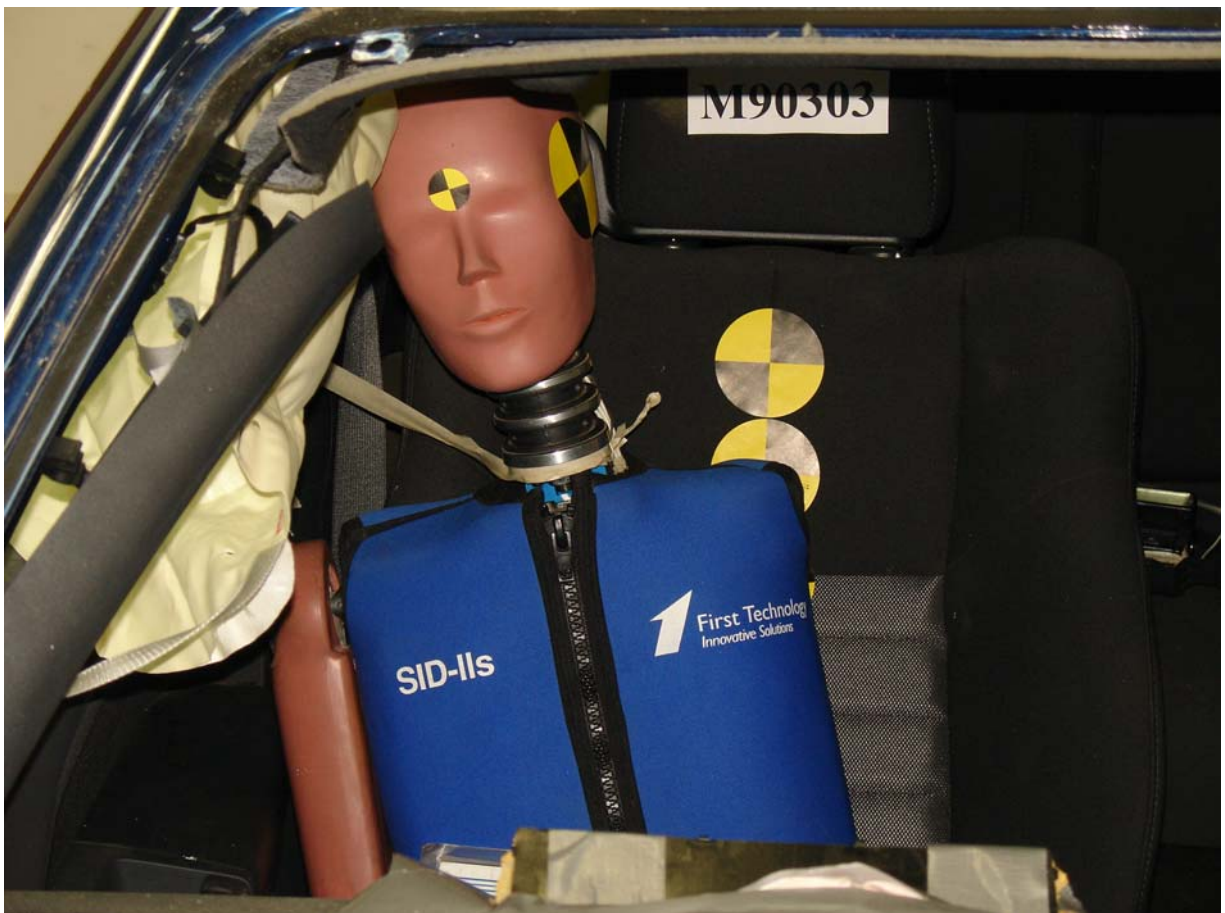
Pre-Test SID-IIs Dummy Front View



Post-Test SID-IIs Dummy Front View



Pre-Test SID-IIs Dummy Front Closeup View



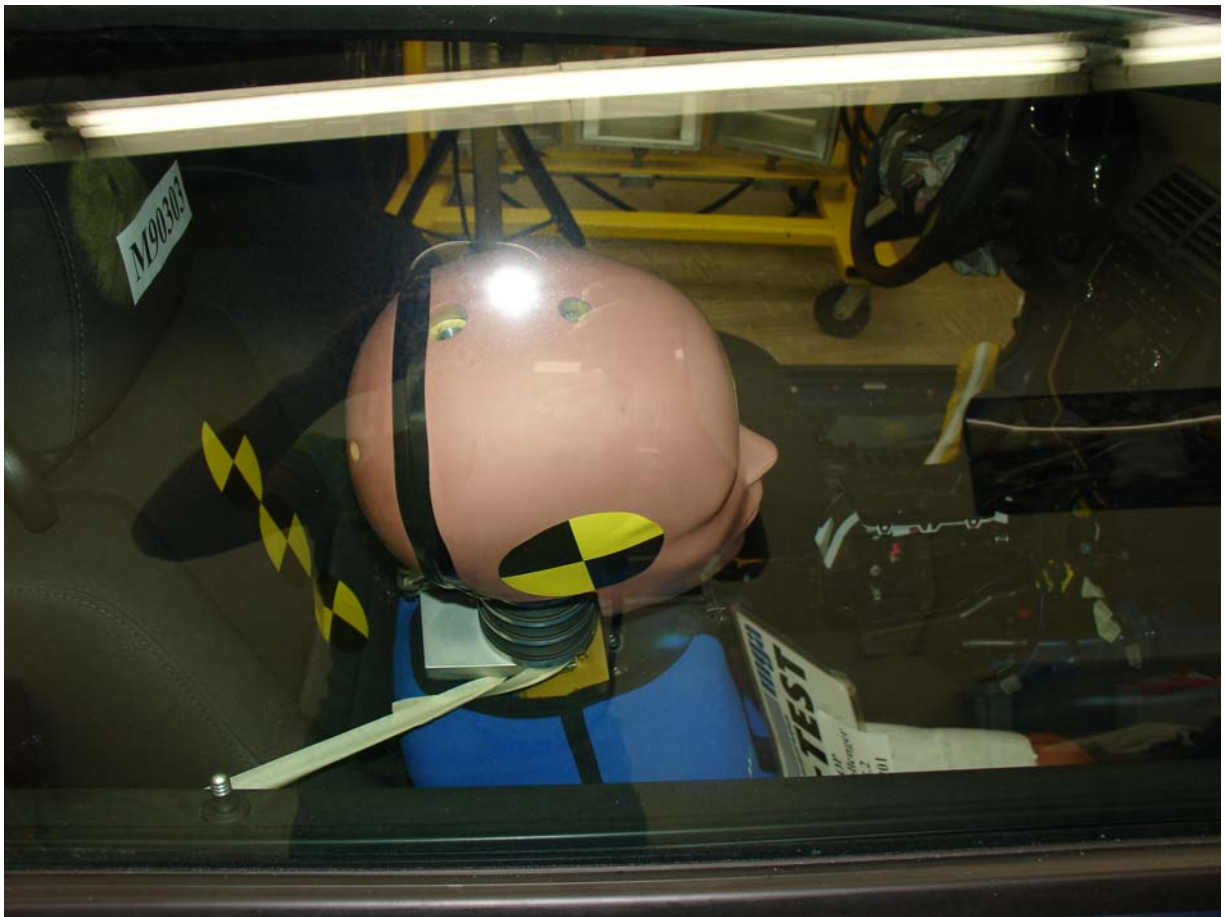
Post-Test SID-IIs Dummy Front Closeup View



Pre-Test SID-IIs Dummy Right ¾ Front View



Post-Test SID-IIs Dummy Right ¾ Front View



Pre-Test SID-11s Dummy Right Side Closeup View



Post-Test Right Front Passenger Compartment View



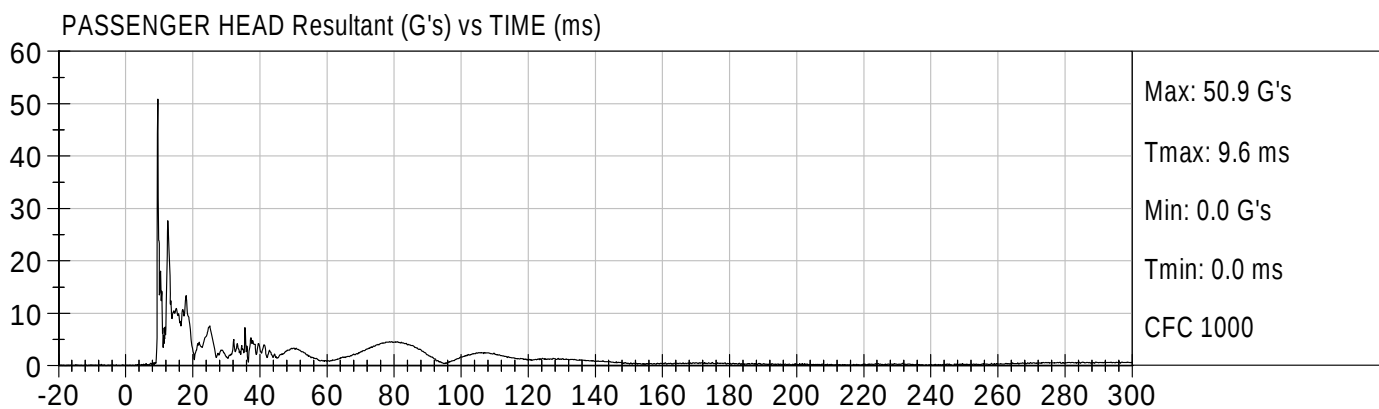
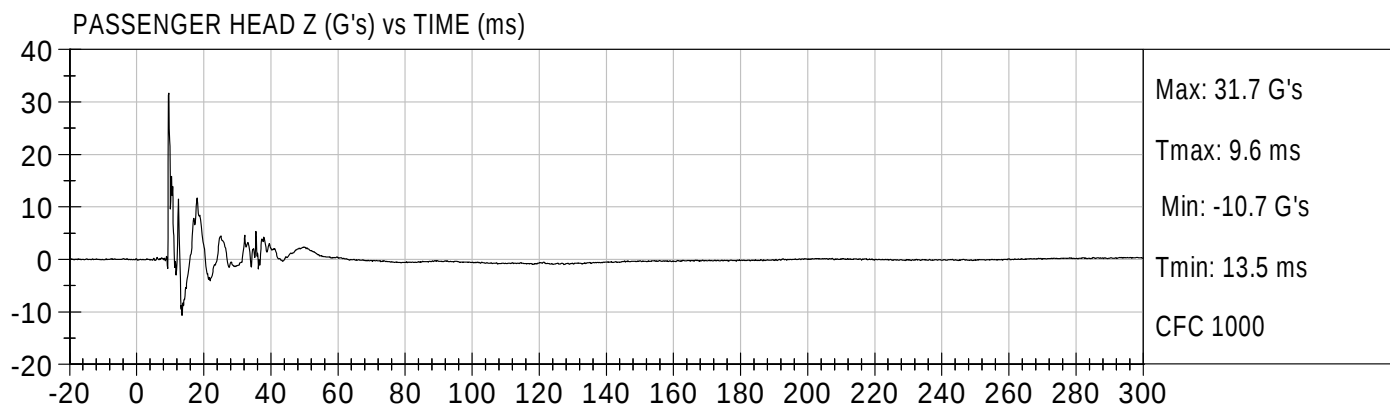
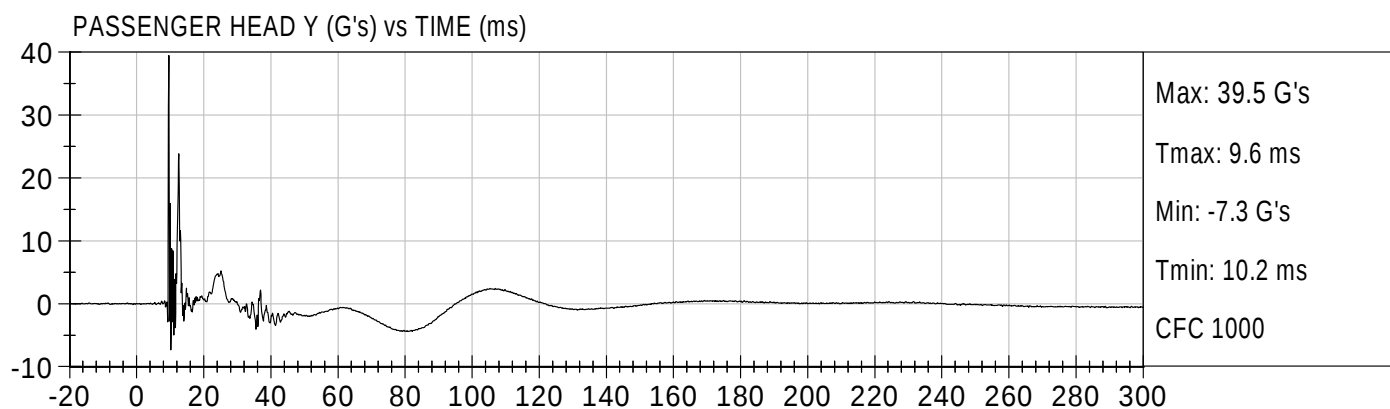
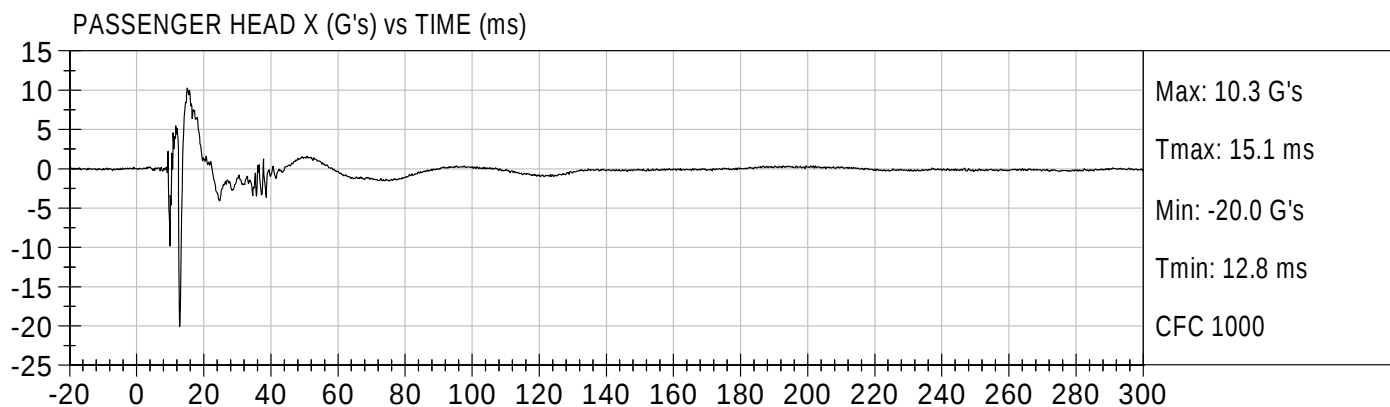
Post-Test Curtain Airbag Front View

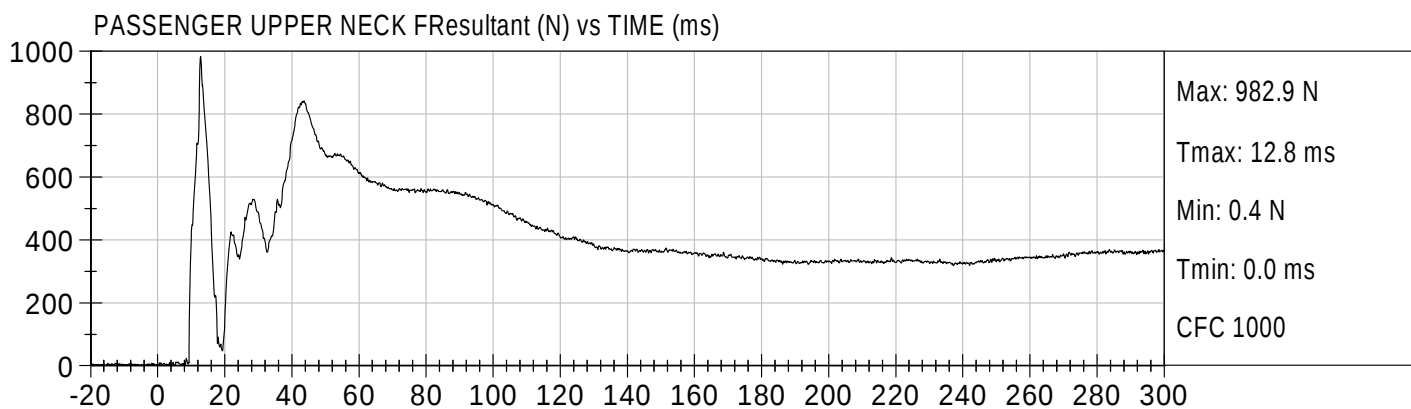
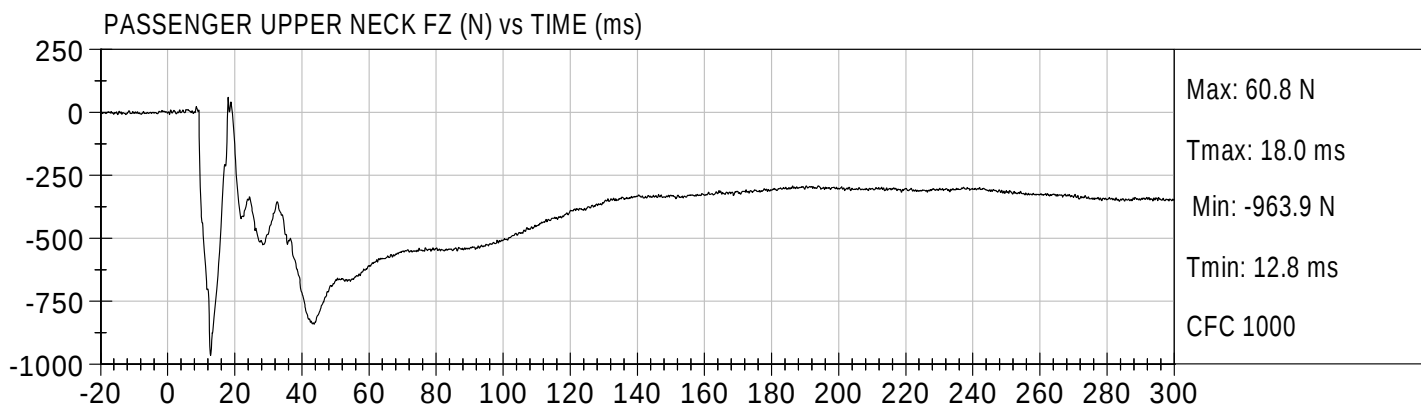
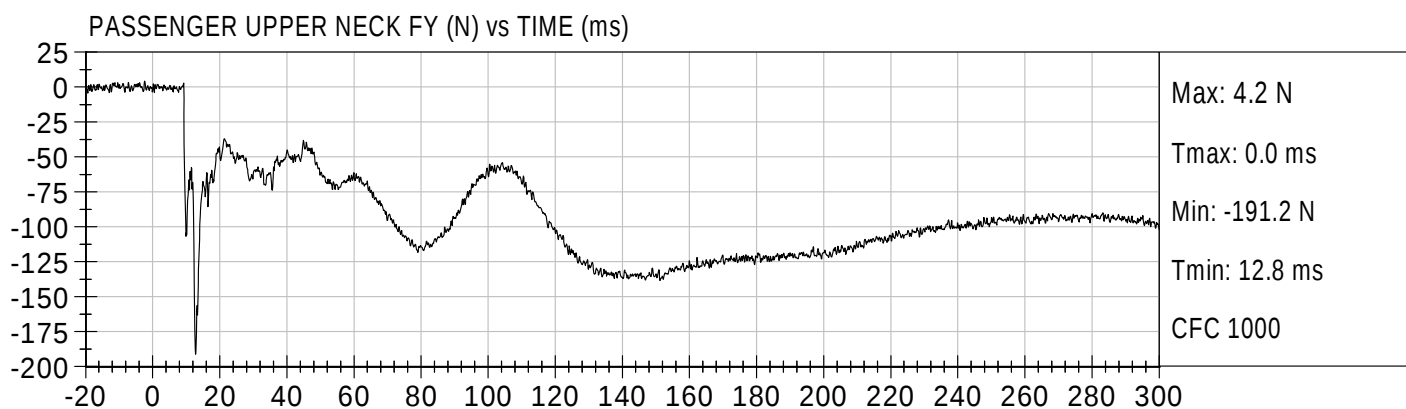
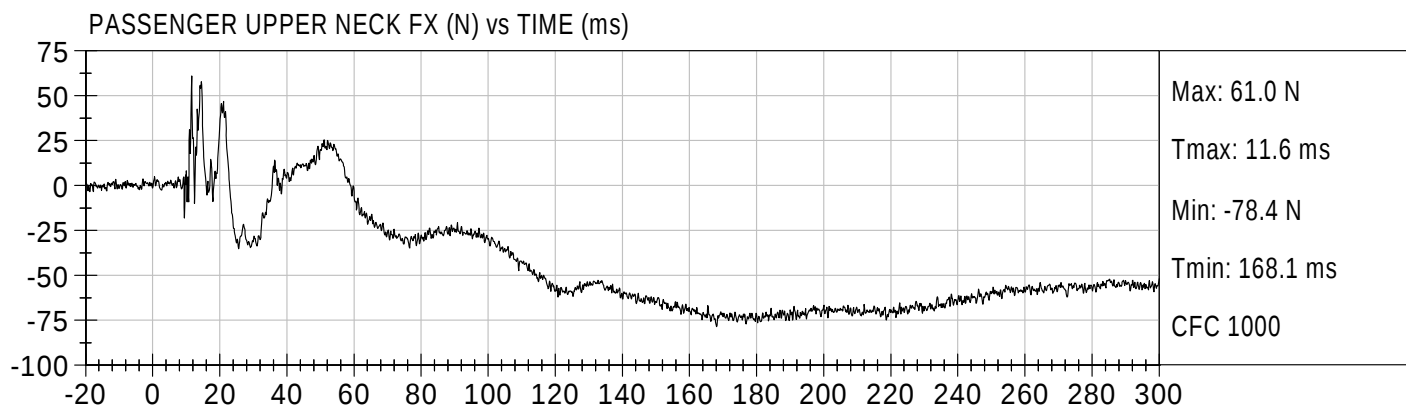
APPENDIX B

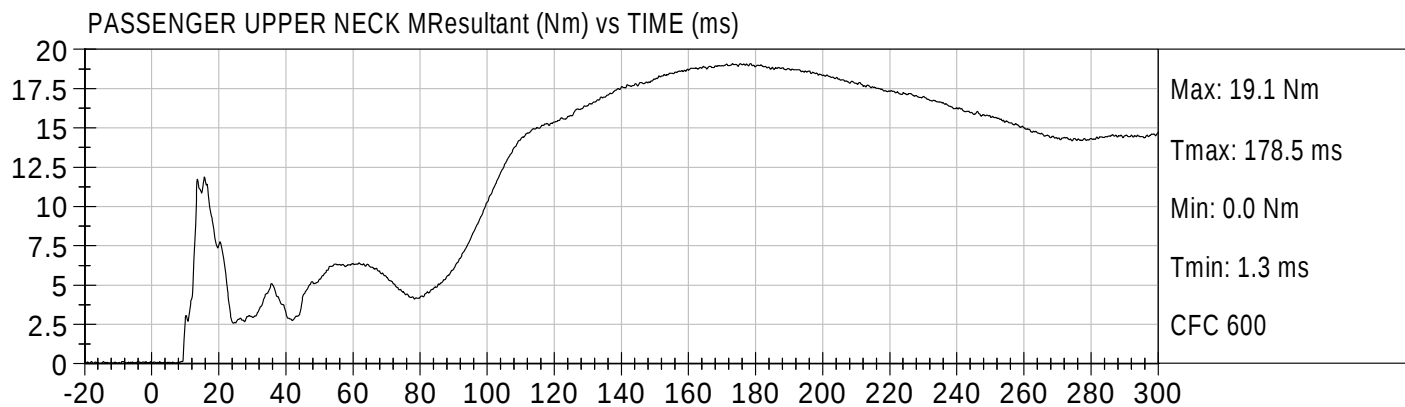
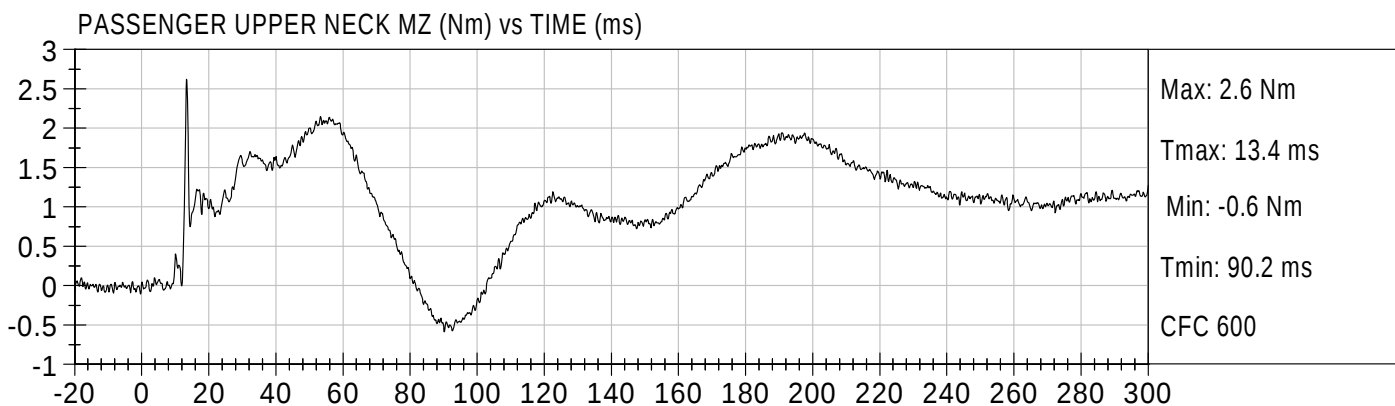
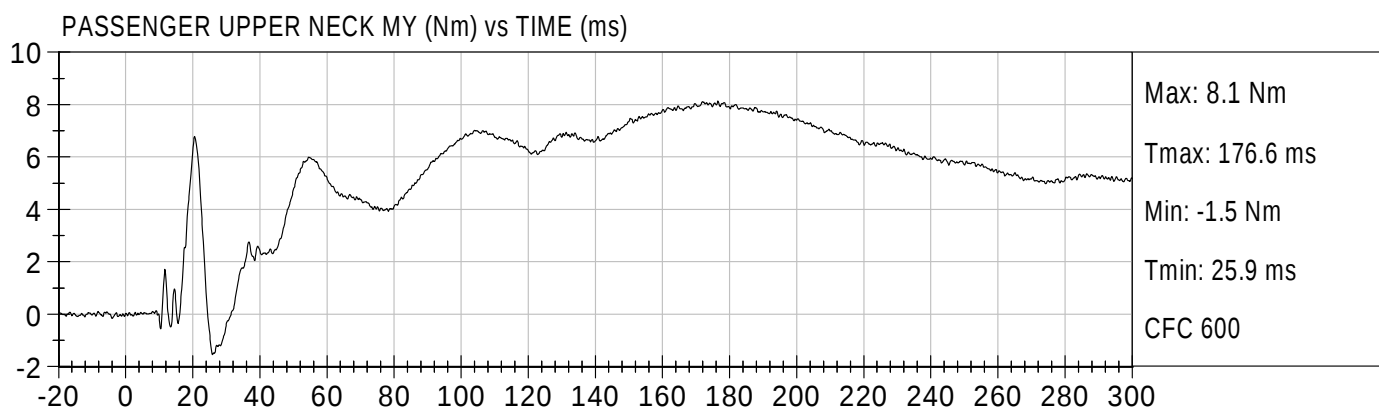
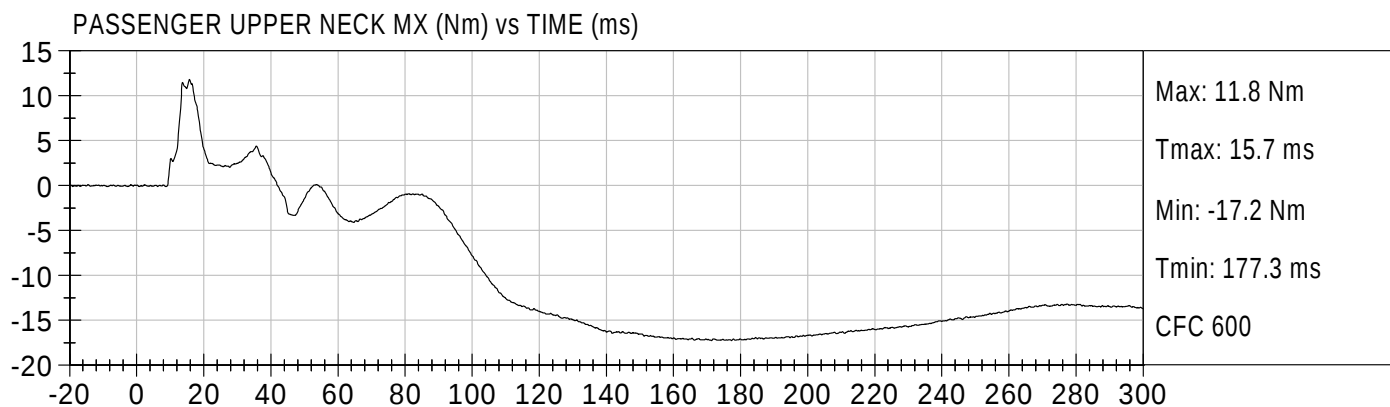
DUMMY RESPONSE DATA TRACES

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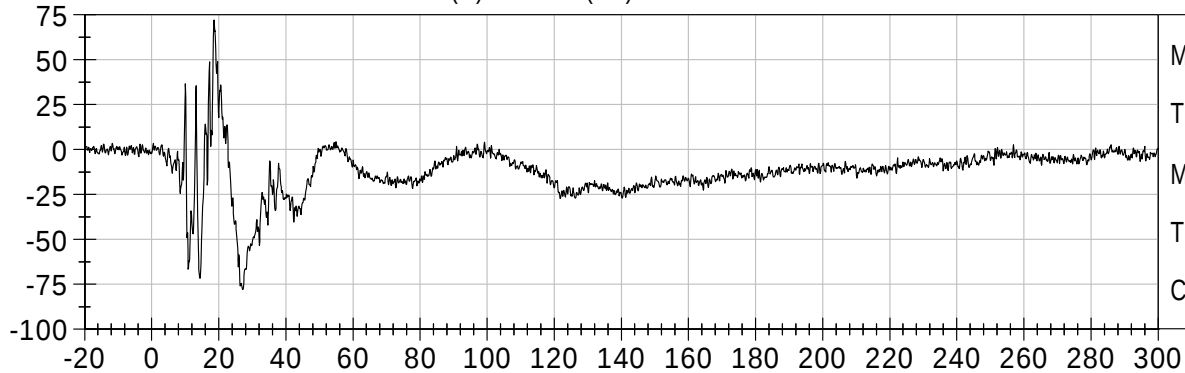






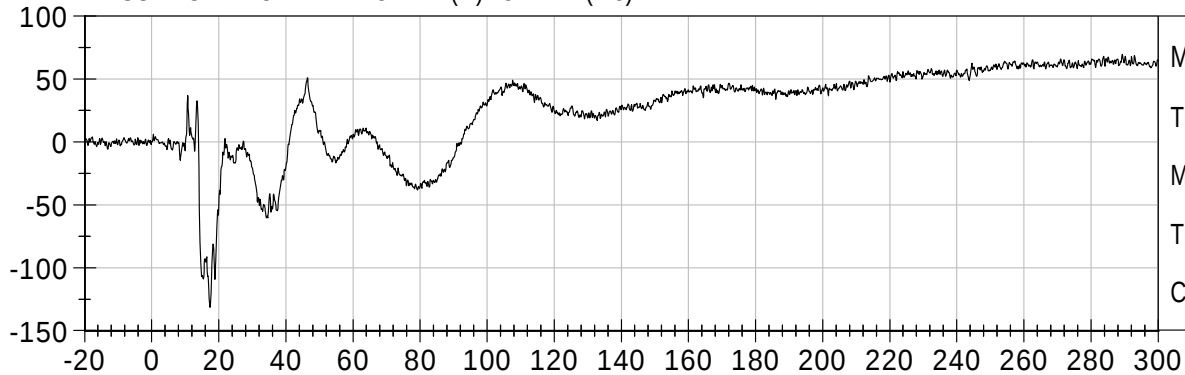


PASSENGER LOWER NECK FX (N) vs TIME (ms)



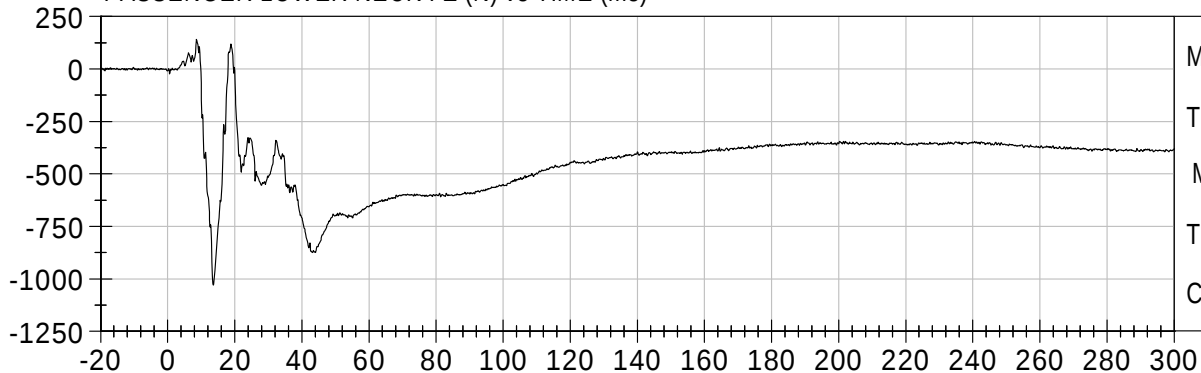
Max: 72.2 N
Tmax: 18.6 ms
Min: -77.9 N
Tmin: 27.2 ms
CFC 1000

PASSENGER LOWER NECK FY (N) vs TIME (ms)



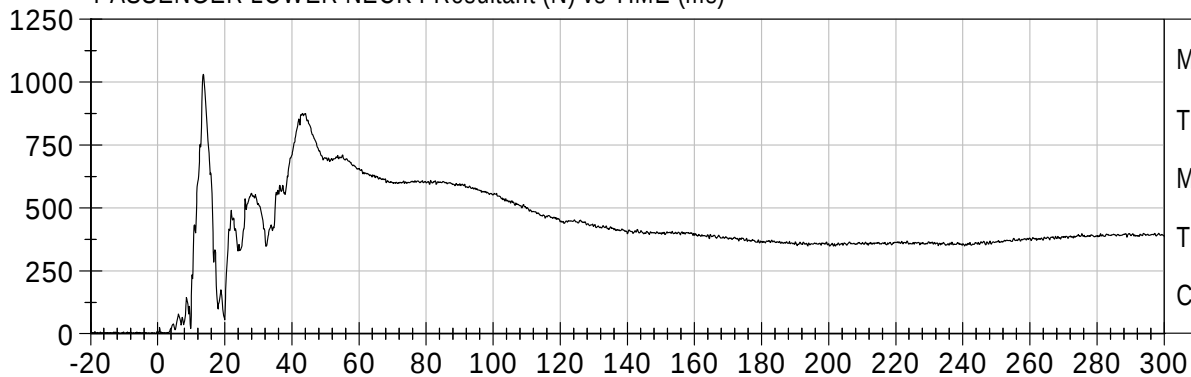
Max: 69.5 N
Tmax: 289.3 ms
Min: -131.6 N
Tmin: 17.4 ms
CFC 1000

PASSENGER LOWER NECK FZ (N) vs TIME (ms)



Max: 141.2 N
Tmax: 8.6 ms
Min: -1030.2 N
Tmin: 13.6 ms
CFC 1000

PASSENGER LOWER NECK FResultant (N) vs TIME (ms)



Max: 1030.9 N
Tmax: 13.6 ms
Min: 0.4 N
Tmin: 0.2 ms
CFC 1000

