

REPORT NUMBER: TWG-MGA-2008-002

**NEW CAR ASSESSMENT PROGRAM
SIDE AIRBAG OUT-OF-POSITION INJURY TESTING**

**DAIMLERCHRYSLER CORPORATION
2008 CHRYSLER SEBRING CONVERTIBLE
NHTSA NUMBER: M80301TWG2**

**PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105**



Test Date: July 2, 2008

Final Report Date: July 16, 2008

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
WASHINGTON, D.C. 20590**

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Date: 7/16/2008

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Technical Report Documentation Page

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16. Abstract This side impact out-of-position test was performed in conjunction with a New Car Assessment Program (NCAP). This test was conducted at MGA Research Corporation in Burlington, Wisconsin, on July 2, 2008. <table style="margin-left: auto; margin-right: auto; border: none;"> <tr> <td style="text-align: center;">HIC 15</td> <td style="text-align: center;">HIC 36</td> <td style="text-align: center;">NIJ NTF</td> <td style="text-align: center;">NIJ NTE</td> <td style="text-align: center;">NIJ NCF</td> <td style="text-align: center;">NIJ NCE</td> </tr> <tr> <td style="text-align: center;">46.8</td> <td style="text-align: center;">46.8</td> <td style="text-align: center;">0.83</td> <td style="text-align: center;">0.96</td> <td style="text-align: center;">0.61</td> <td style="text-align: center;">0.01</td> </tr> </table>				HIC 15	HIC 36	NIJ NTF	NIJ NTE	NIJ NCF	NIJ NCE	46.8	46.8	0.83	0.96	0.61	0.01
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46.8	46.8	0.83	0.96	0.61	0.01										
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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 the New Car Assessment Program (NCAP) sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-03-D-12005.

SUMMARY

The effects of a torso airbag deployment in a 2008 Chrysler Sebring Convertible with an out-of-position Hybrid III 3-Year-Old child dummy was evaluated. The test was performed by MGA Research Corporation on July 2, 2008. Pre and post test photographs of the vehicle and dummy can be found in Appendix A.

One real-time camera (24 fps) and 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 $\frac{3}{4}$ View Through Windshield

One Hybrid III 3-Year-Old child dummy (Serial Number 139) was placed in the right front passenger seat situated in the rearward facing position per Section 3.3.3.2 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
- Chest Displacement
- Upper Spine Accelerations
- Mid Spine Accelerations
- Lower Spine Accelerations
- Upper Sternum Acceleration
- Lower Sternum Acceleration
- Lower Rib @ Spine Acceleration

The 28 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy data traces. Appendix C contains the instrumentation calibration data.

The Hybrid III 3-Year-Old child dummy's visible contact points were as follows: The torso airbag to the left shoulder and torso of the dummy.

The Hybrid III 3-Year-Old child dummy was placed in the right front passenger seat along the outboard edge of the seat cushion, kneeling and facing rearward. The dummy's sternum centerline was aligned vertically with the leading edge of the seat back bolster. The sternum was contacting the seat. The dummy's head was placed in between the seat bolster and the pillar/side trim. The outboard leg was positioned at the outboard edge of the seat cushion and parallel to the seat centerline. The outboard knee and lower leg was slid toward the junction of the seat back/seat cushion until the top edge of the upper rib was aligned horizontally with the top edge of the airbag module. The inboard leg was aligned parallel to the centerline of the seat cushion. The inboard knee and lower leg was skid towards the junction of the seat back/seat cushion until, a line drawn through both shoulder bolts is perpendicular to the vehicle centerline. The inboard arm was rotated towards the seat back until the thumb contacted the seat back. The outboard arm and hand was rotated to hang down as close to vertical as possible.

This orientation complies with Section 3.3.3.2 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	3.3.3.2*	Rearward Facing 3-Year-Old
Curtain Airbag	None	None
Torso Airbag	Seat Mounted	Side airbag
ATD Type/Serial No.	Hybrid III 3-Year-Old / 139	Hybrid III Child Dummy

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

Number of Data Channels	28
Number of Real-Time Video	1
Number of High-Speed Video	3

Visible Dummy Contact Points	
Head Contact	Torso bag to left side of head
Left Shoulder Contact	Torso bag
Left Torso Contact	Torso bag
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 August 28, 2007.

TEST VEHICLE INFORMATION

Manufacturer	Chrysler
Model	Sebring
Body Style	Convertible
NHTSA No.	M80301TWG2
VIN	1C3LC45K58N572951
Color	Stone White
Delivery Date	8/16/2007
Odometer Reading (mile)	522
Dealer	Frank Boucher
Transmission	Automatic Overdrive
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2.4
Engine Placement	Lateral
Automatic Door Lock (ADL)	Yes
Owners Manual Details Instructions on Disabling ADLs	No
Bucket Seats	Yes

TEST VEHICLE OPTIONS

Front Airbag	Yes
Driver Side Curtain Airbag	No
Driver Side Torso Airbag	Yes
Rear Passenger Side Curtain Airbag	No
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	No
All Wheel Drive	No
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	DaimlerChrysler Corporation
Date of Manufacture	4-07

GVWR (kg)	2178
GAWR Front (kg)	1180
GAWR Rear (kg)	1007

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	2		4
Capacity Wt. (VCW) (kg)				324
Cargo Wt. (RCLW) (kg)				52

DATA SHEET NO. 3
DUMMY POSITIONING IN VEHICLE

Measurement		Value
Seat Position		Rearmost
Seat Height Position		Lowest
Placed in Position No. 2		---
Seat Back Angle	SA (°)	25
Top of Airbag Module to Head/Neck Junction	AN (mm)	150
Head CG to Door Panel / Window	HD (mm)	84 / 168
Head to Seat Back Centerline	HSC (mm)	242
Chest to Dash	CD (mm)	724
Chest to Seatback	CS (mm)	Contact
Right Arm to Seat Back Centerline	RACL (mm)	116
Left Arm to Seat Back Centerline	LACL (mm)	352
Right Arm to Door Panel	RA (mm)	268
Left Arm to B-Post	LA (mm)	Contact
Knee to Knee	KK (mm)	97
Toe to Toe	TT (mm)	90
Right Knee to Seat Cushion Centerline	KSCR (mm)	122
Left Knee to Seat Cushion Centerline	KSCL (mm)	215
Right Toe to Seat Cushion Centerline	TSCR (mm)	116
Left Toe to Seat Cushion Centerline	TSCL (mm)	203
Nose to Dash	ND (mm)	1010
Nose to Seatback	NS (mm)	Contact
Top of Head to Headliner	HH (mm)	226

DATA SHEET NO. 4
DUMMY INJURY CRITERIA VALUES

NHTSA No. M80301TWG2

		MAXIMUM VALUE			
		Position No. 2			
DESCRIPTION	UNIT	MAXIMUM	TIME (ms)	MINIMUM	TIME (ms)
Head X	g	30.1	252.5	-29.7	14.4
Head Y	g	25.1	10.2	-9.9	253.1
Head Z	g	45.6	9.1	-7.5	6.9
Head Resultant	g	49.3	9.1		
Upper Neck FX	N	424.8	261.6	-150.2	8.2
Upper Neck FY	N	282.6	15.8	-82.9	274.8
Upper Neck FZ	N	1836.2	9.4	-702.1	258.1
Upper Neck Force Resultant	N	1838.9	9.4		
Upper Neck MX	Nm	13.2	21.1	-16.7	262.2
Upper Neck MY	Nm	21.5	262.3	-5.3	8.3
Upper Neck MZ	Nm	0.7	8.4	-15.4	278.4
Upper Neck Moment Resultant	Nm	29.5	262.3		
Lower Neck FX	N	351.4	264.9	-144.0	6.4
Lower Neck FY	N	524.5	15.6	-42.8	290.4
Lower Neck FZ	N	1875.6	9.4	-608.4	258.2
Lower Neck Force Resultant	N	1893.0	9.4		
Lower Neck MX	Nm	8.5	268.6	-35.8	15.7
Lower Neck MY	Nm	6.7	7.7	-25.9	263.3
Lower Neck MZ	Nm	2.5	58.1	-17.0	276.0
Lower Neck Moment Resultant	Nm	40.5	15.7		

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

NHTSA No. M80301TWG2

		MAXIMUM VALUE			
		Position No. 2			
DESCRIPTION	UNIT	MAXIMUM	TIME (ms)	MINIMUM	TIME (ms)
Upper Spine X	g	17.8	14.7	-61.3	8.9
Upper Spine Y	g	31.1	9.9	-11.4	7.3
Upper Spine Z	g	17.7	8.2	-13.1	6.0
Upper Spine Resultant	g	65.2	9.1		
Lower Spine X	g	24.1	15.5	-73.7	7.0
Lower Spine Y	g	19.9	7.4	-4.5	20.6
Lower Spine Z	g	28.7	7.4	-6.4	18.4
Lower Spine Resultant	g	80.6	7.1		
Lower Rib @ Spine X	g	22.2	15.5	-87.8	6.8
Upper Sternum X	g	947.2	9.0	-967.9	5.8
Lower Sternum X	g	618.8	9.9	-650.8	4.9
Chest Displacement	mm			-29.7	9.6

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

NHTSA No. M80301TWG2

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	46.8	7.6	22.6	46.8	7.6	22.7

Position 2 Neck Injury Summary (3-Year-Old Child Dummy – Out-Of-Position)

	Nij	Time (msec)	Z Force (N) (CFC 600)	X Force (N) (CFC 600)	Y Moment (N-m) (CFC 600)
Ntf	0.83	9.7	1758.98	-54.98	0.02
Nte	0.96	9.2	1798.91	-114.26	-3.04
Ncf	0.61	260.1	-667.84	412.79	20.02
Nce	0.01	17.2	470.24	256.81	13.27
Peak Tension (CFC1000)	1836.2 N		Peak Compression (CFC 1000)		-702.1 N

Critical Values

Nij Intercepts				Peak Limits	
Tension (CVt)	2120 N	Extension (mCVe)	27 N-m	Tension	1130 N
Compression (CVc)	2120 N	Flexion (mCVf)	60 N-m	Compression	1380 N
Condyle Offset	0				

APPENDIX A
PHOTOGRAPHS

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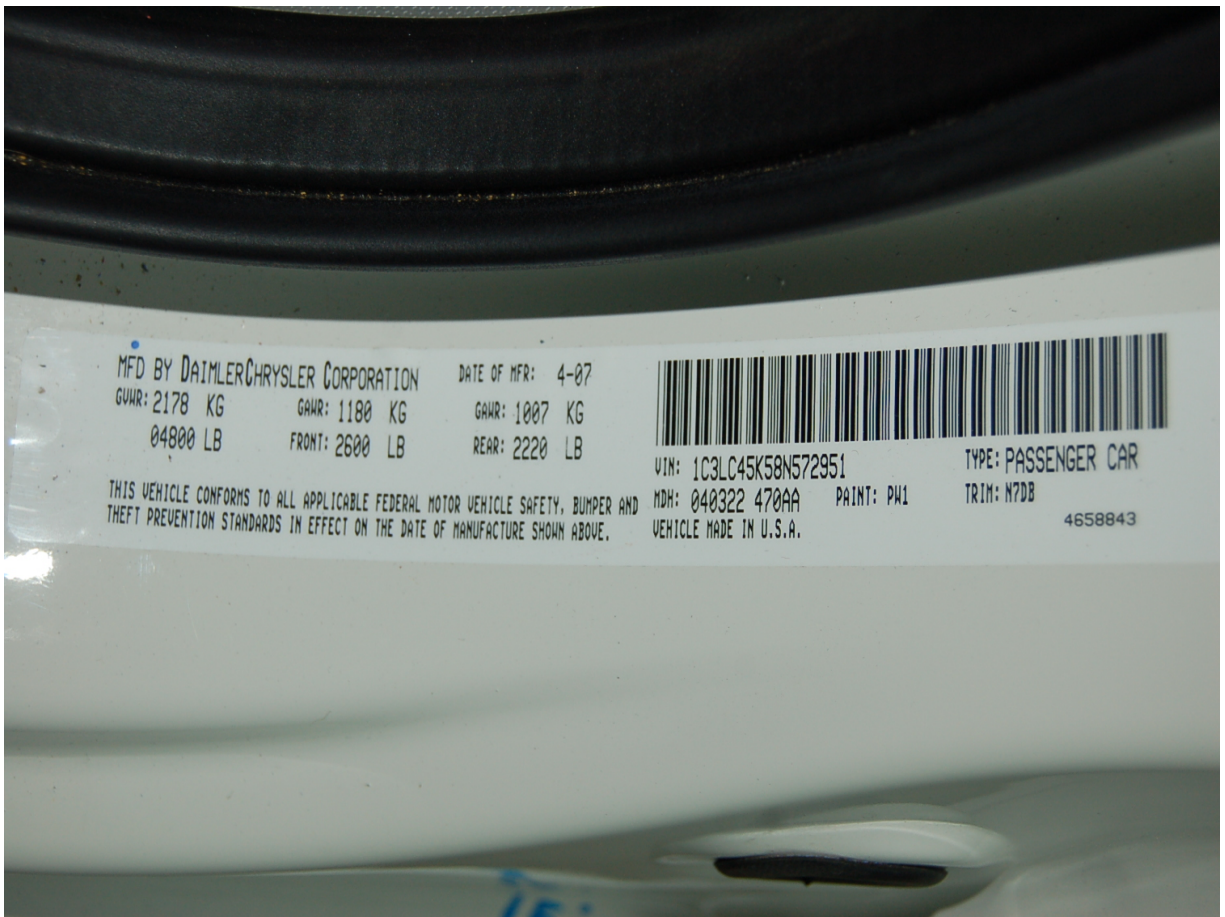
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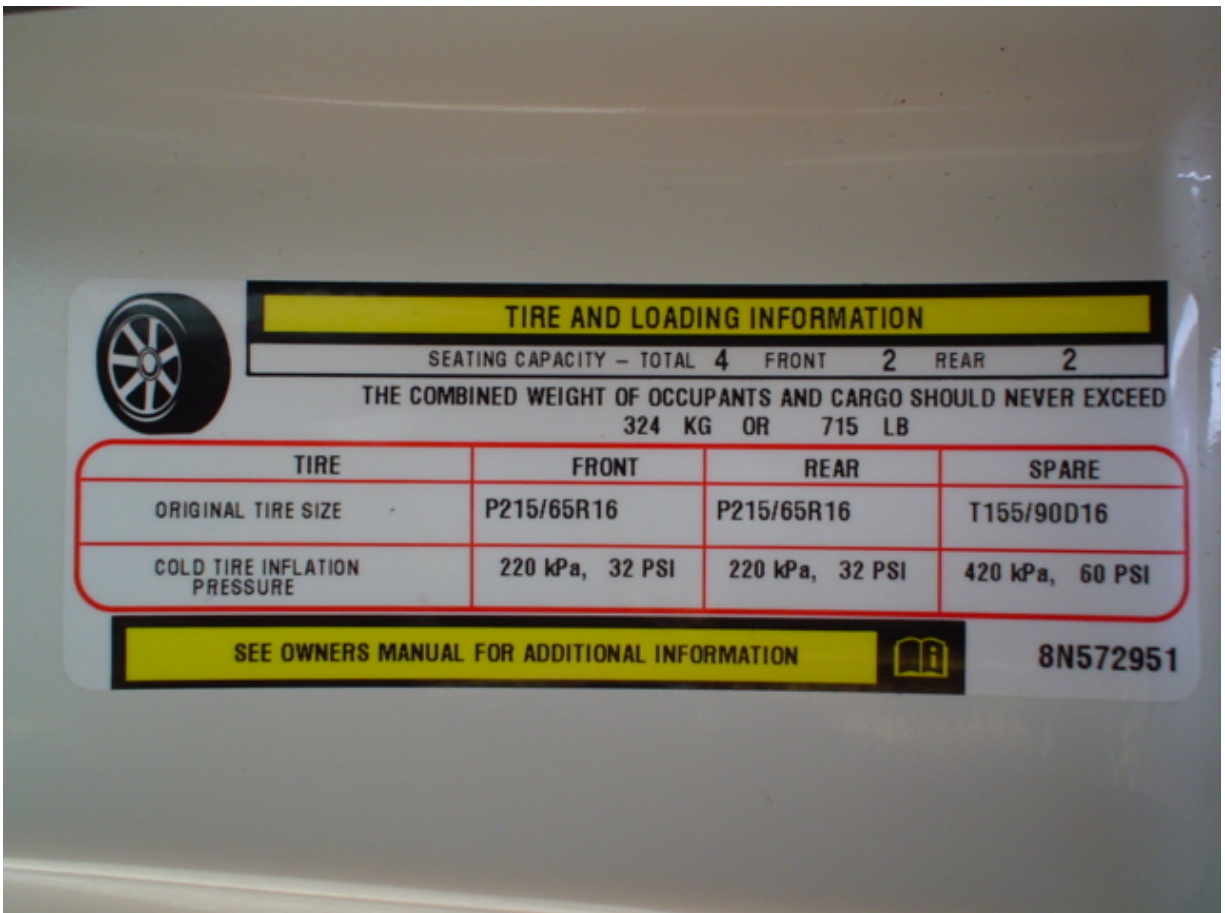
Pre-Test Vehicle Left Side View



Post-Test Vehicle Left Side View



Vehicle Certification Placard



Vehicle Tire Placard



Pre-Test 3-Year-Old Dummy Left Side View



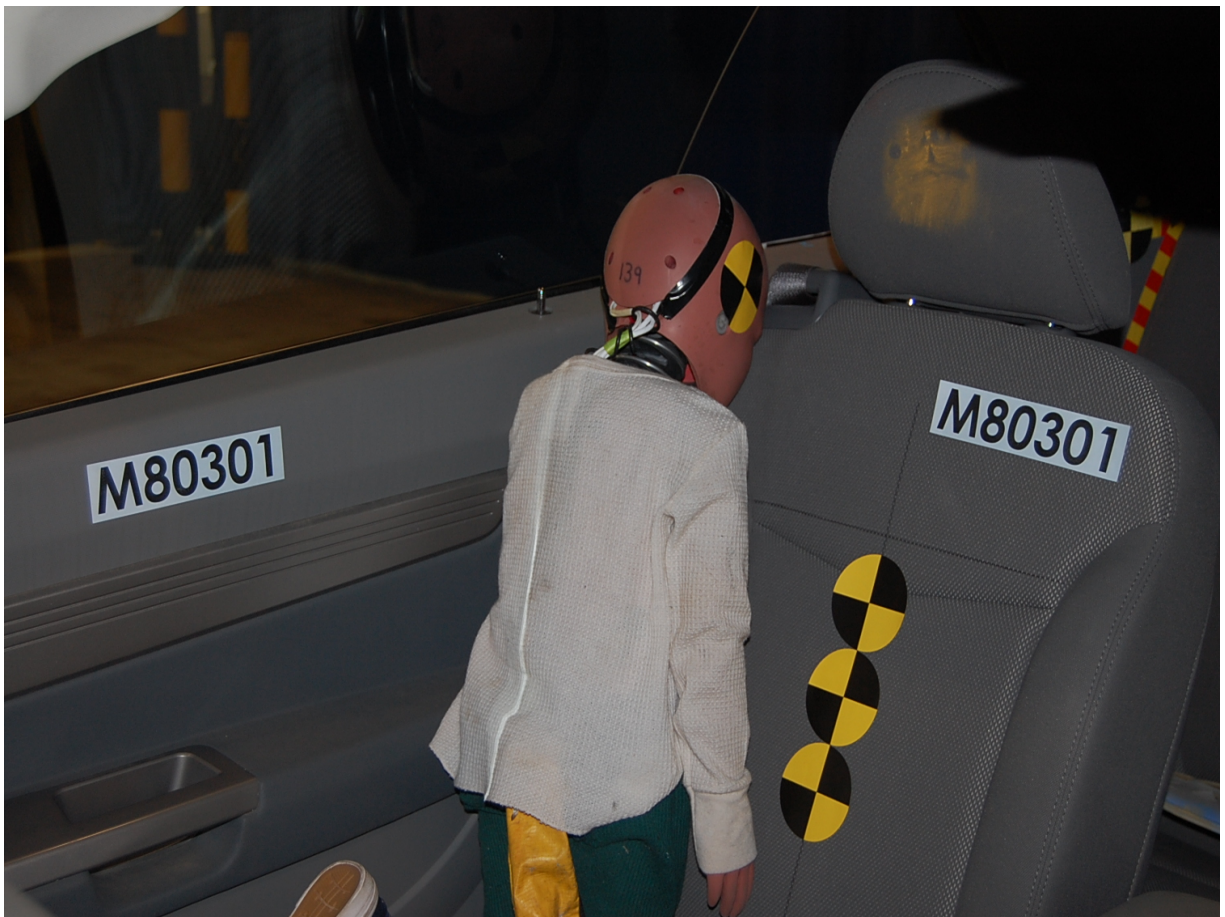
Post-Test 3-Year-Old Dummy Left Side View



Pre-Test 3-Year-Old Dummy Left $\frac{3}{4}$ Front View



Post-Test 3-Year-Old Dummy Left $\frac{3}{4}$ Front View



Pre-Test 3-Year-Old Dummy Left $\frac{3}{4}$ Front Closeup View



Post-Test 3-Year-Old Dummy Left $\frac{3}{4}$ Front Closeup View



Pre-Test 3-Year-Old Dummy Front View



Post-Test 3-Year-Old Dummy Front View



Pre-Test 3-Year-Old Dummy Right ¾ Front View



Post-Test 3-Year-Old Dummy Right ¾ Front View



Post-Test Right Front Passenger Compartment View



Post-Test Torso Airbag View

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DUMMY RESPONSE DATA TRACES

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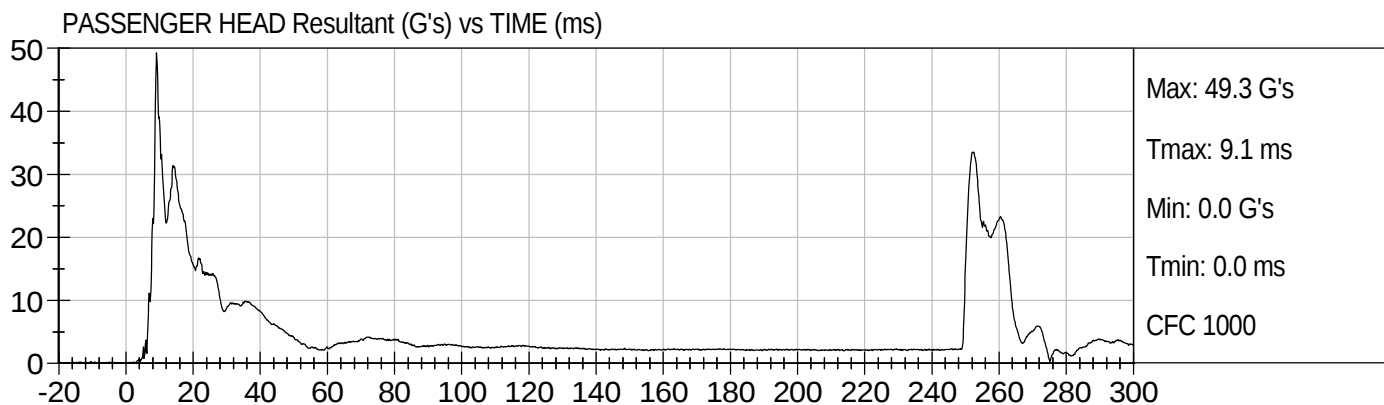
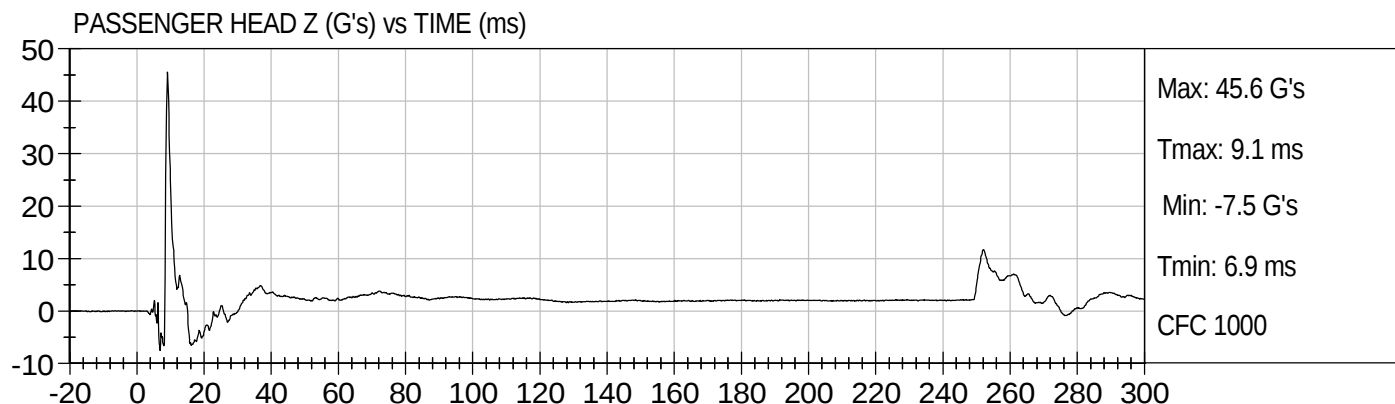
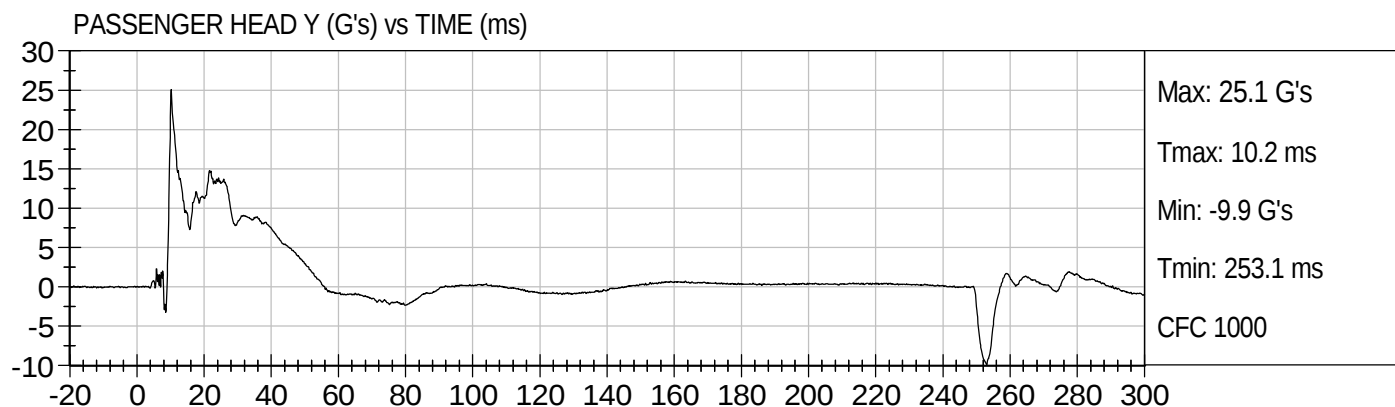
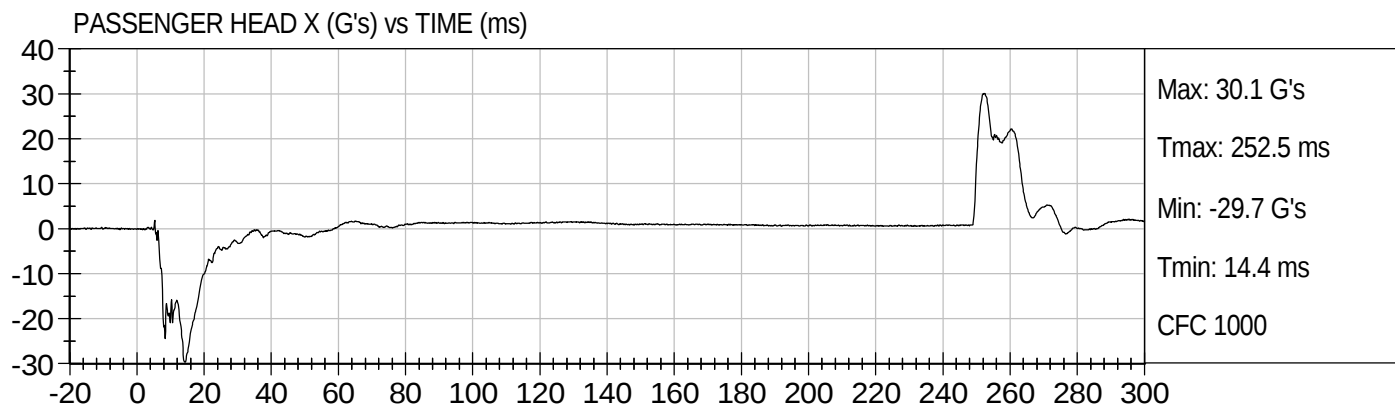
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NCAP SIDE OOP 3YO
2008 CHRYSLER SEBRING

3.3.3.2
M80301

Test Date: 07/02/2008
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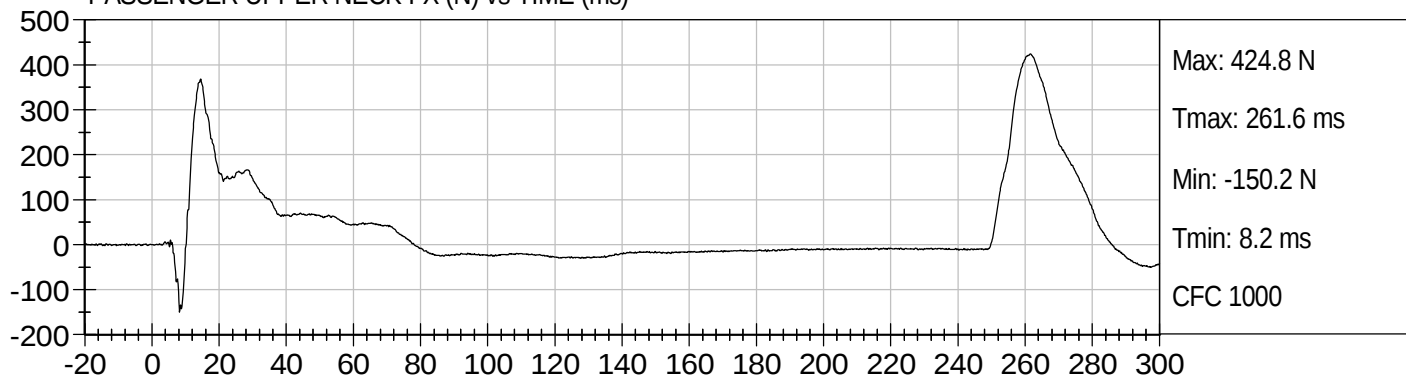


NCAP SIDE OOP 3YO
2008 CHRYSLER SEBRING

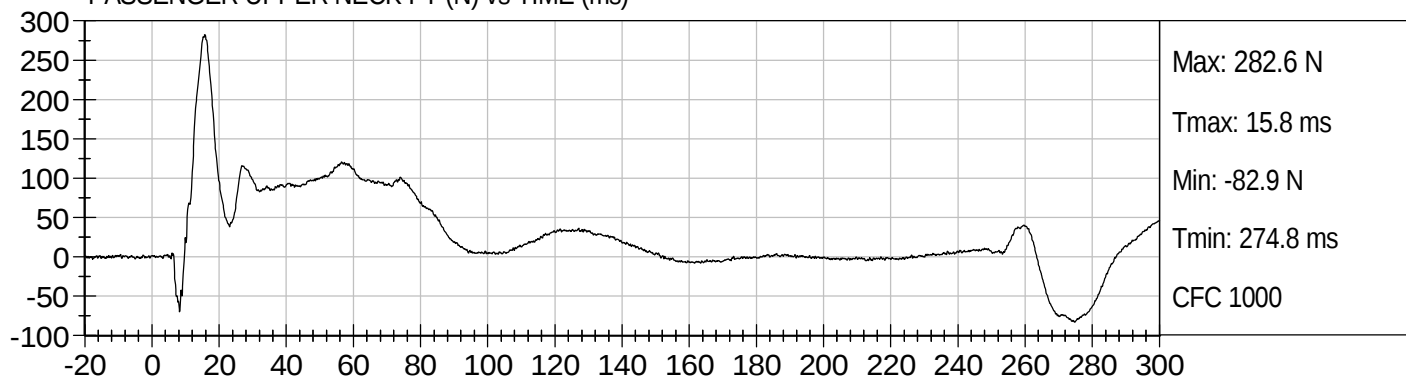
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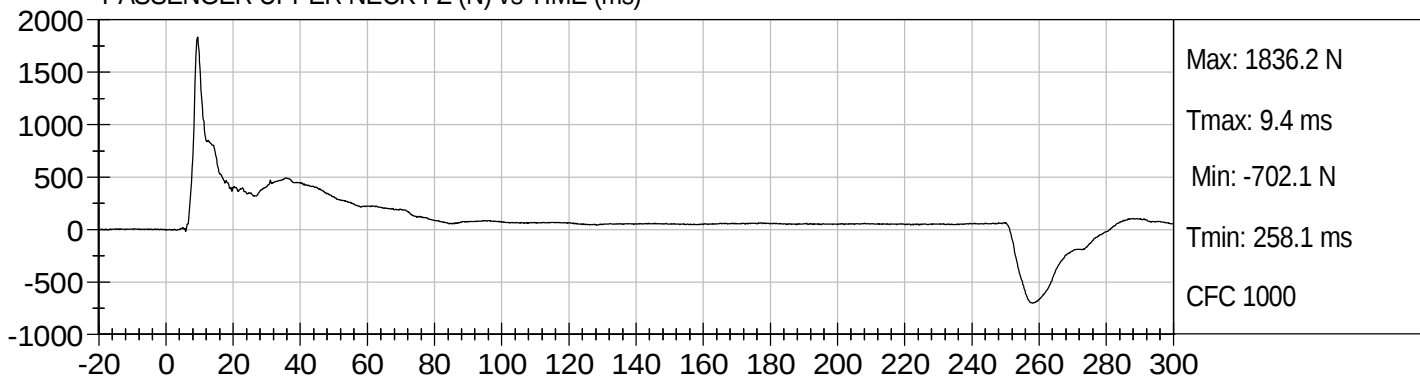
PASSENGER UPPER NECK FX (N) vs TIME (ms)



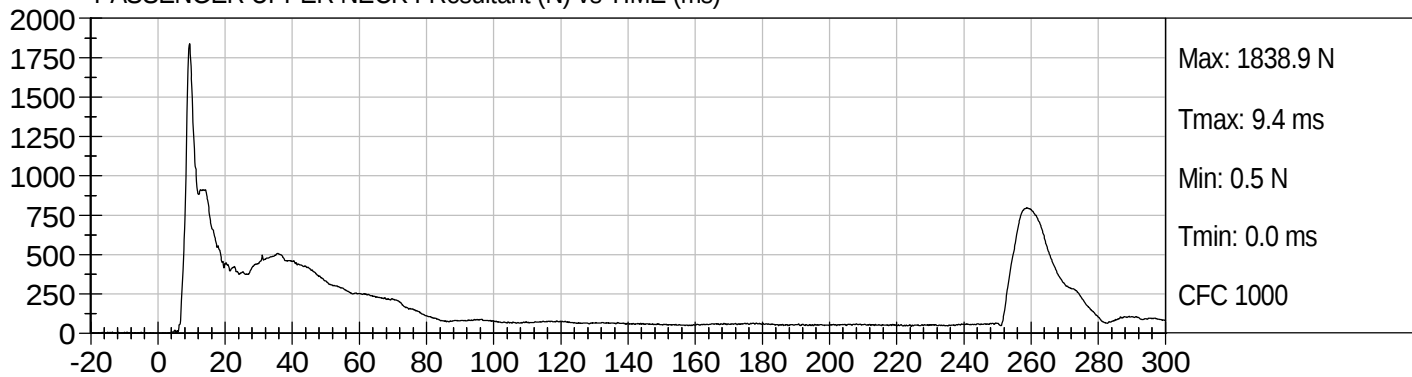
PASSENGER UPPER NECK FY (N) vs TIME (ms)



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



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



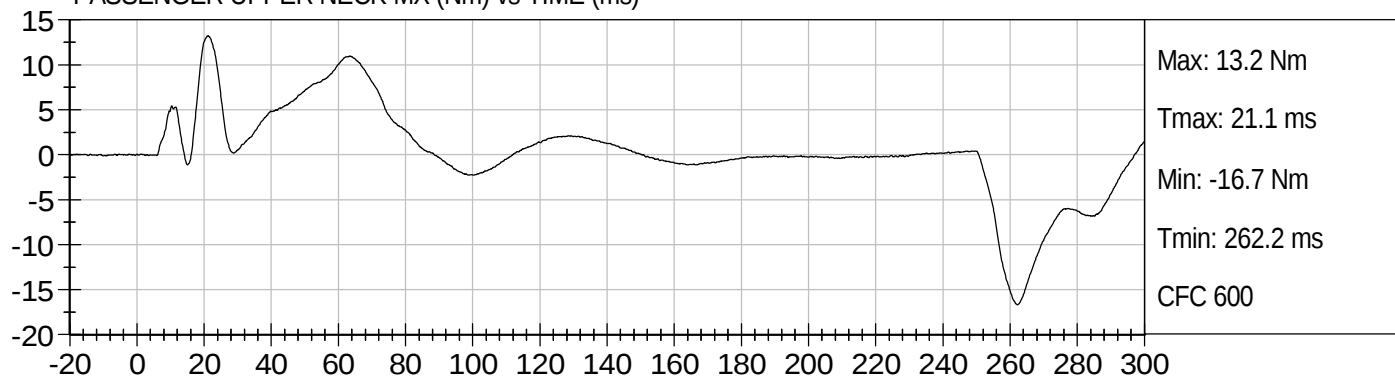


NCAP SIDE OOP 3YO
2008 CHRYSLER SEBRING

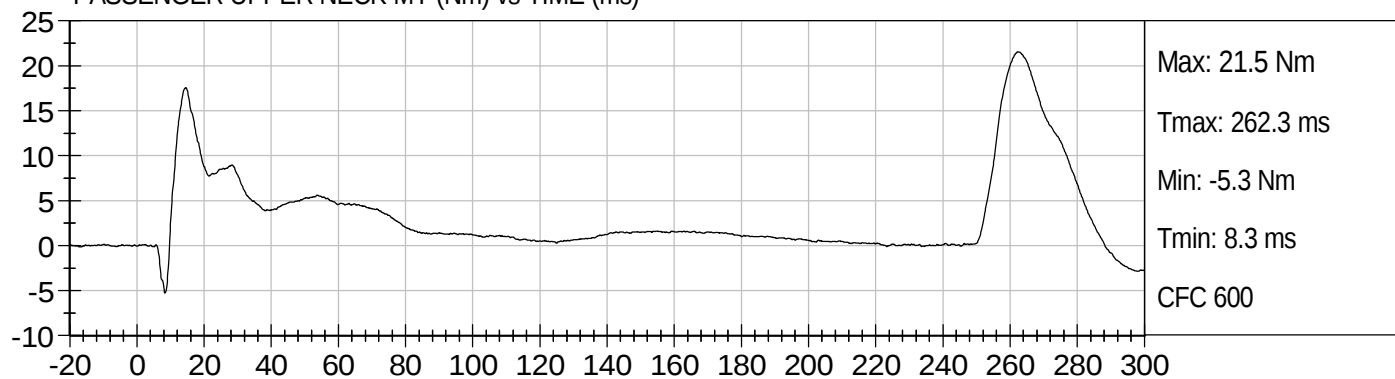
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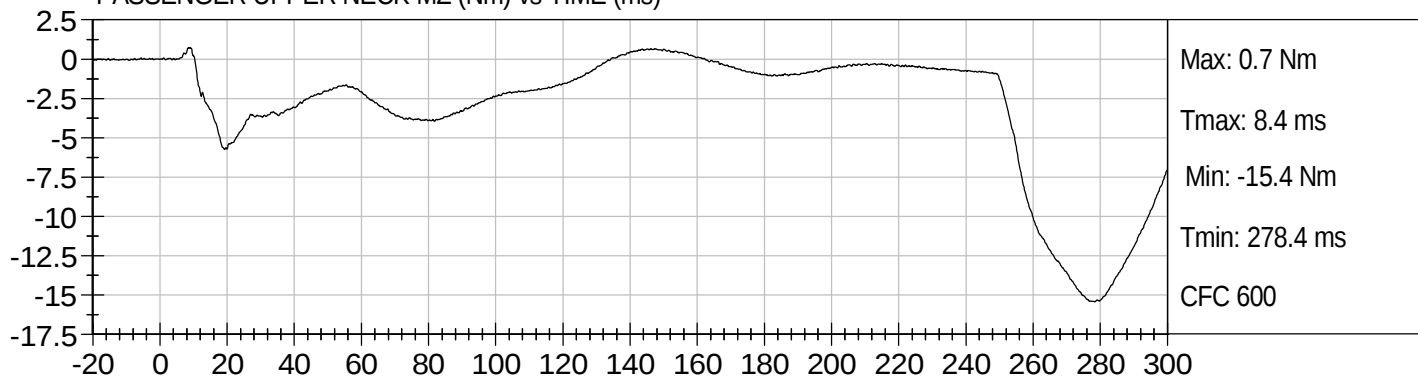
PASSENGER UPPER NECK MX (Nm) vs TIME (ms)



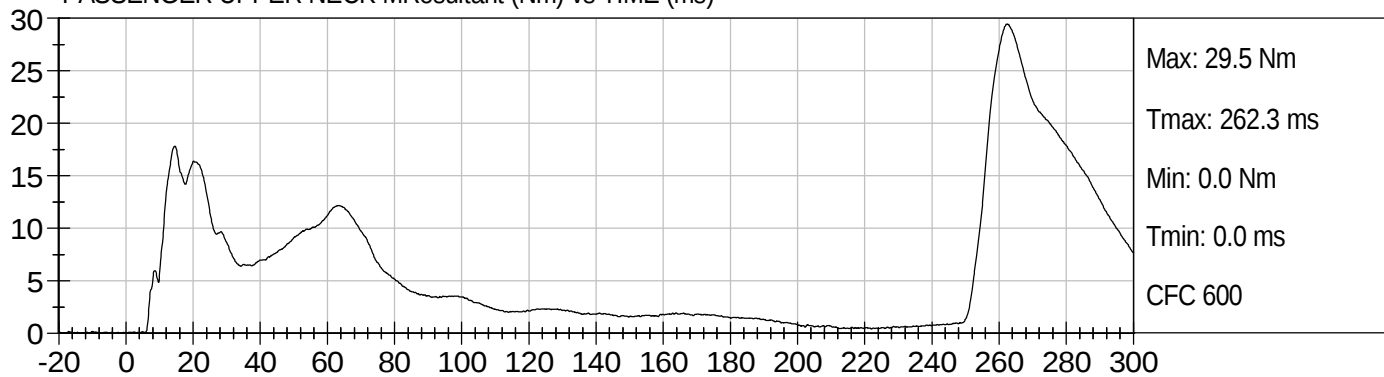
PASSENGER UPPER NECK MY (Nm) vs TIME (ms)



PASSENGER UPPER NECK MZ (Nm) vs TIME (ms)



PASSENGER UPPER NECK MResultant (Nm) vs TIME (ms)



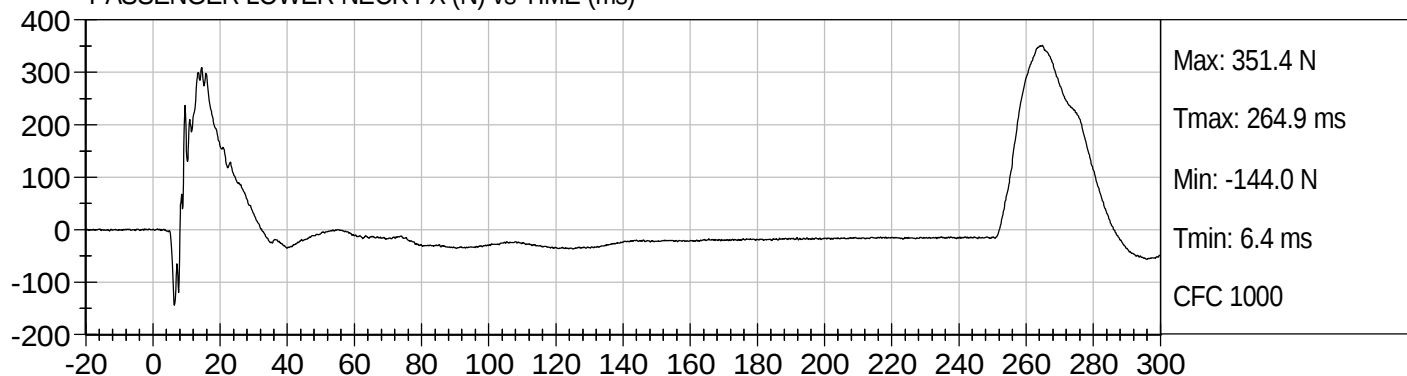


NCAP SIDE OOP 3YO
2008 CHRYSLER SEBRING

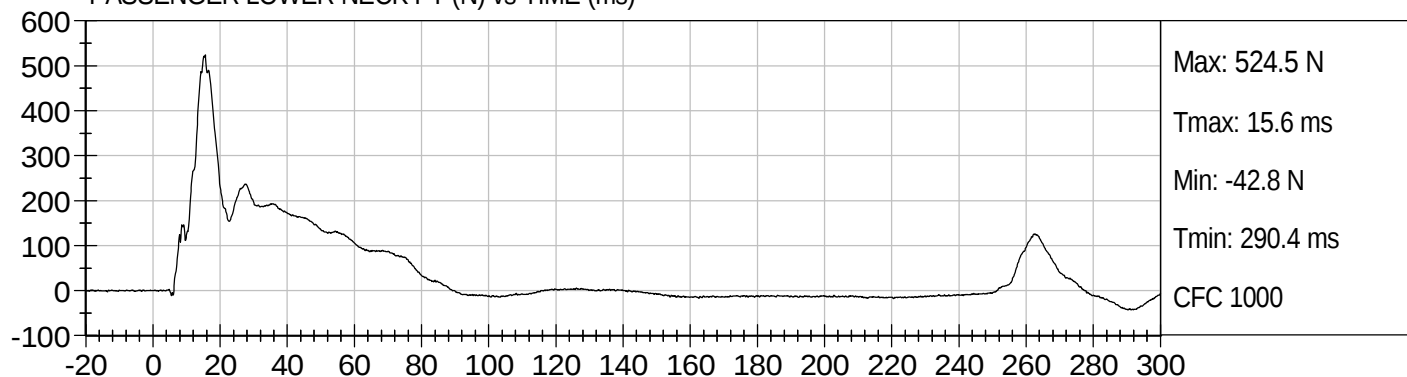
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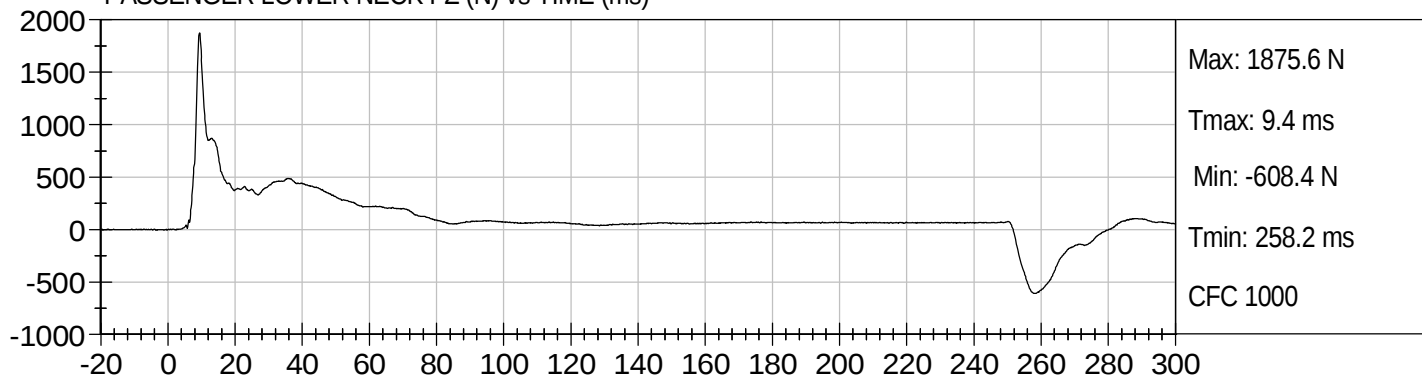
PASSENGER LOWER NECK FX (N) vs TIME (ms)



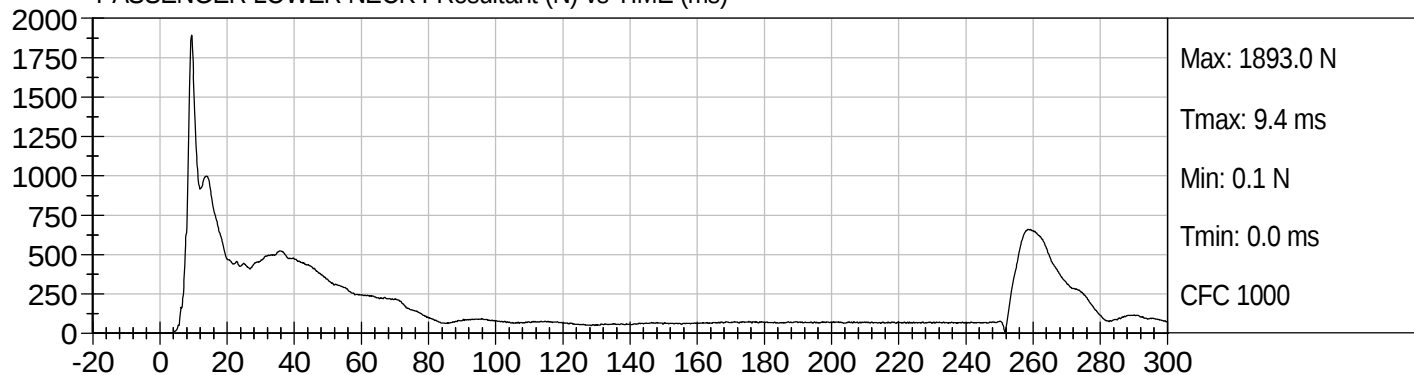
PASSENGER LOWER NECK FY (N) vs TIME (ms)



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



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



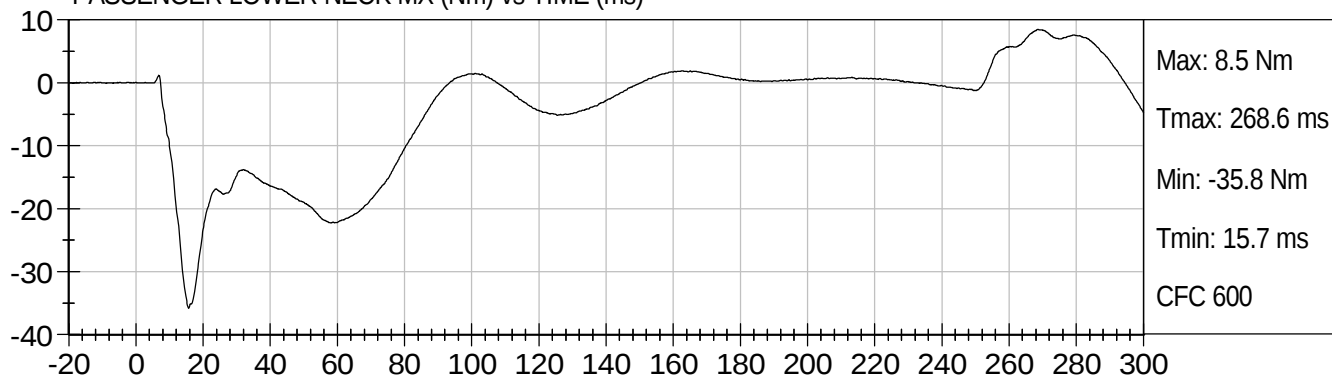


NCAP SIDE OOP 3YO
2008 CHRYSLER SEBRING

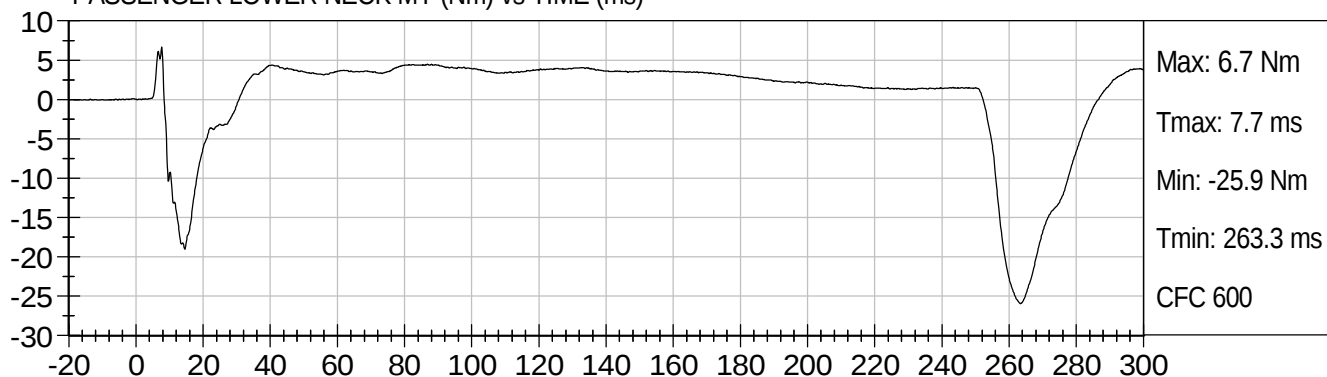
3.3.3.2
M80301

Test Date: 07/02/2008
Speed: 0.0 mph (0.0 km/h)

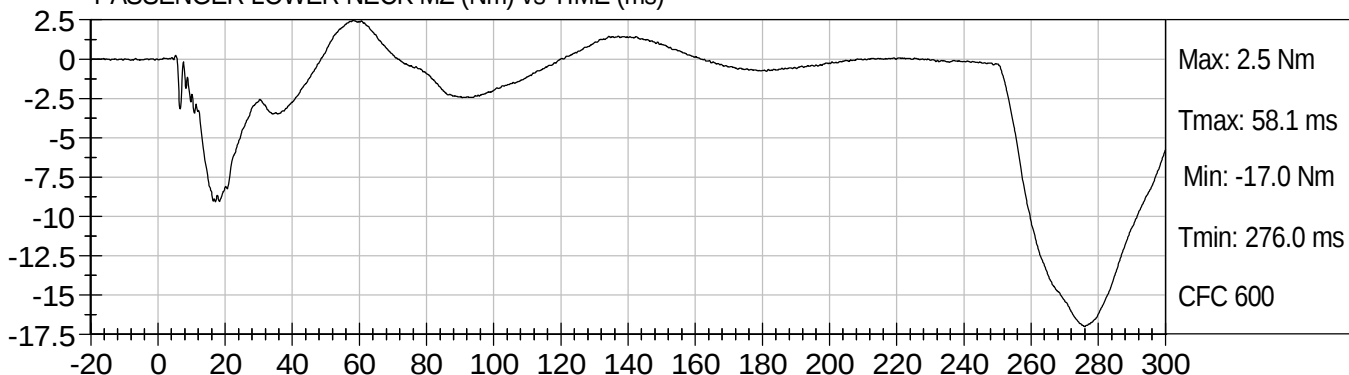
PASSENGER LOWER NECK MX (Nm) vs TIME (ms)



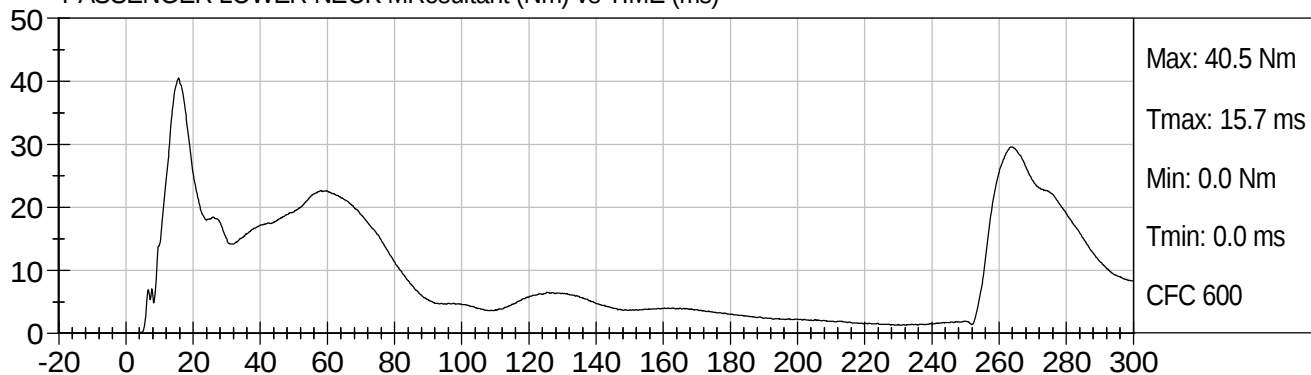
PASSENGER LOWER NECK MY (Nm) vs TIME (ms)



PASSENGER LOWER NECK MZ (Nm) vs TIME (ms)



PASSENGER LOWER NECK MResultant (Nm) vs TIME (ms)

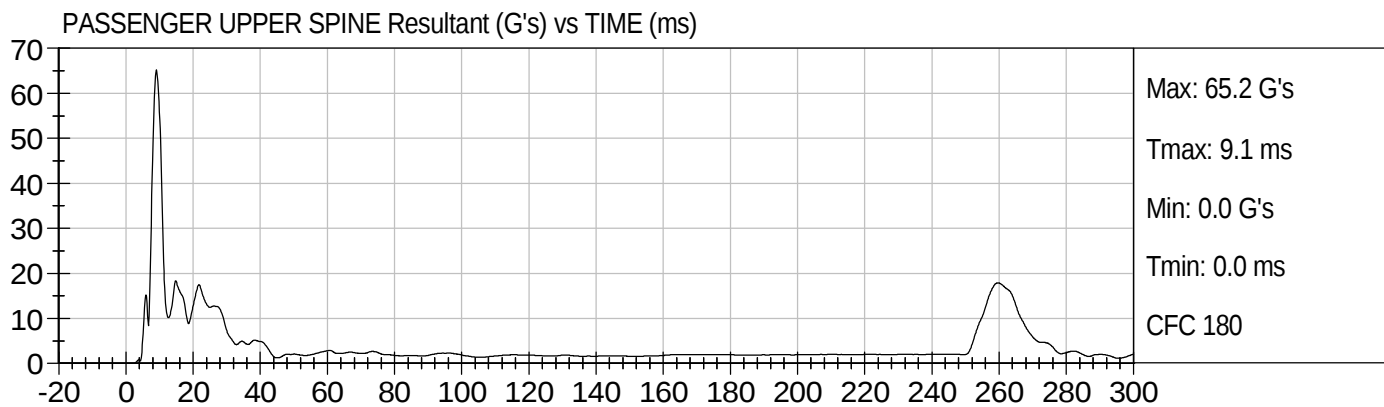
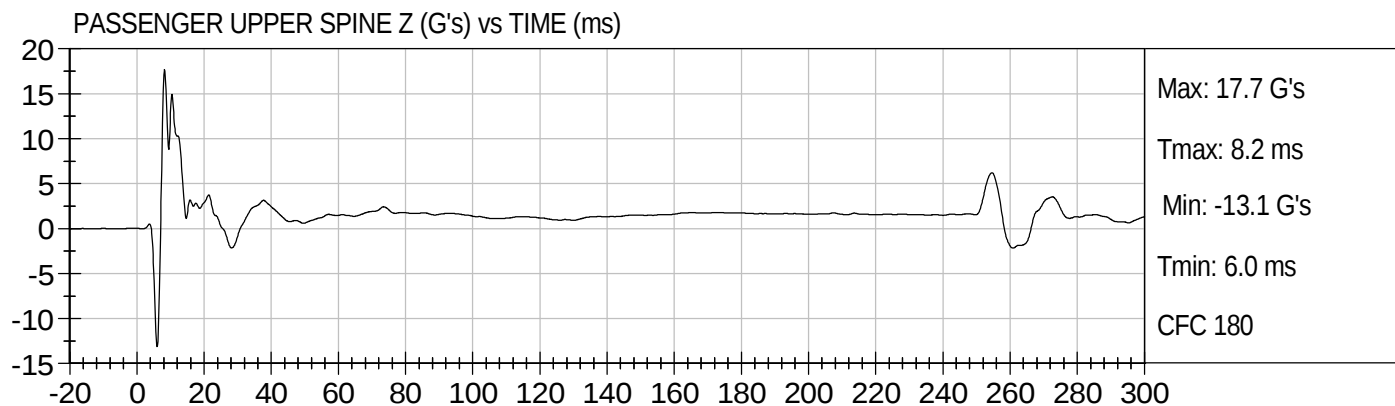
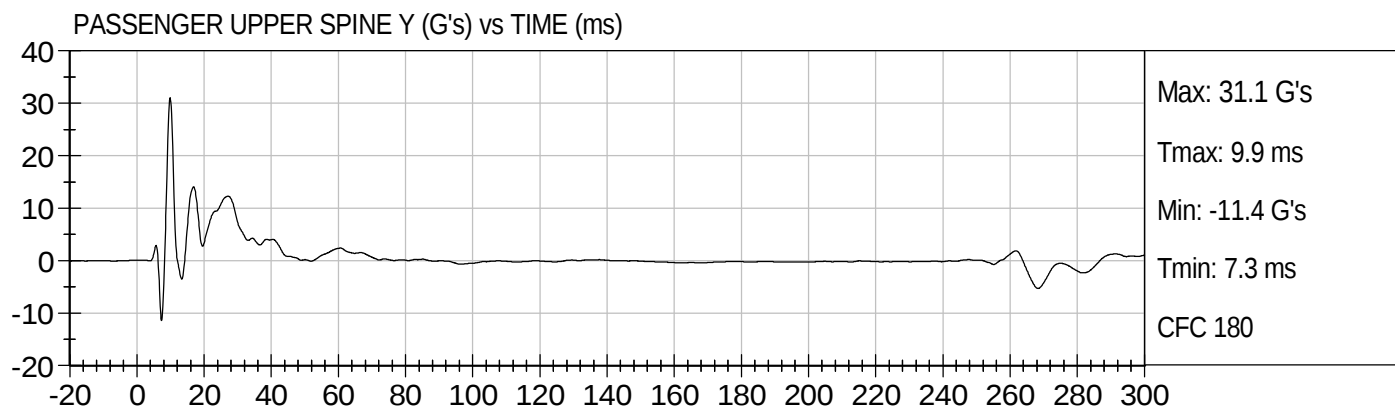
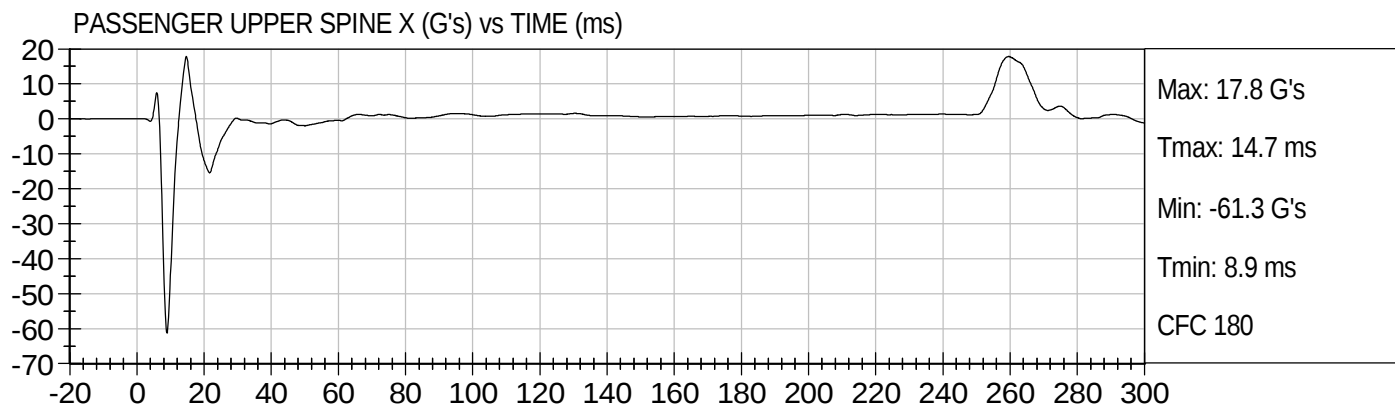




NCAP SIDE OOP 3YO
2008 CHRYSLER SEBRING

3.3.3.2
M80301

Test Date: 07/02/2008
Speed: 0.0 mph (0.0 km/h)

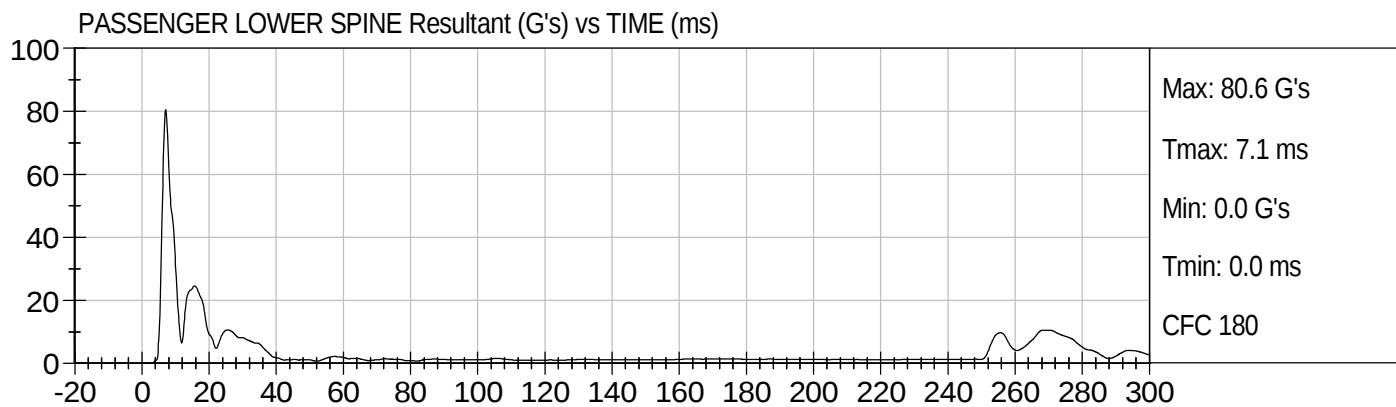
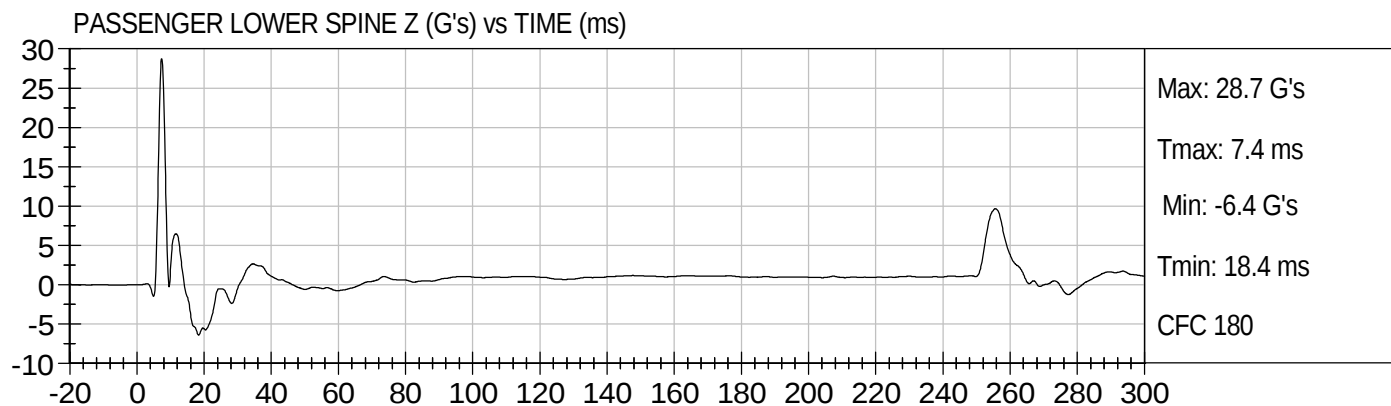
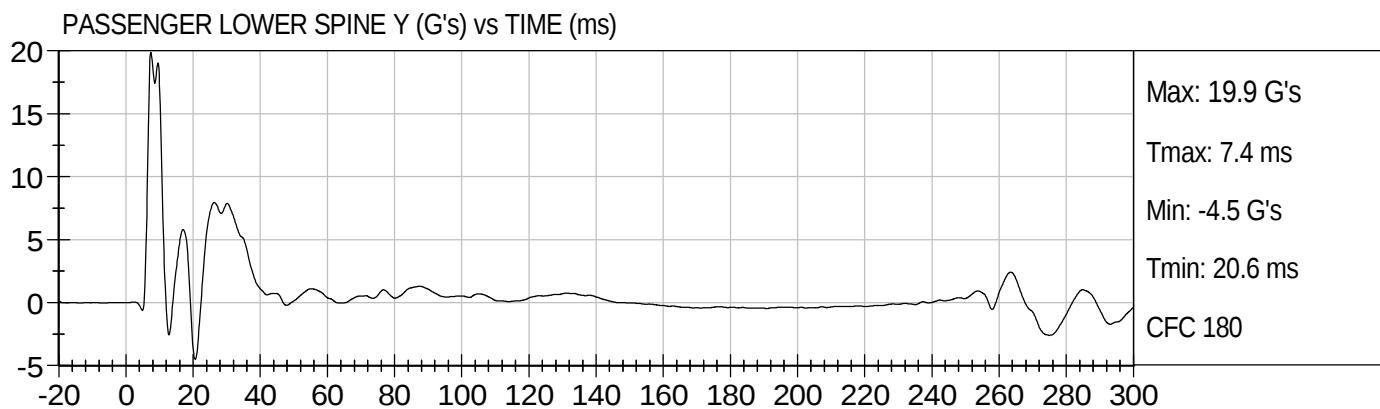
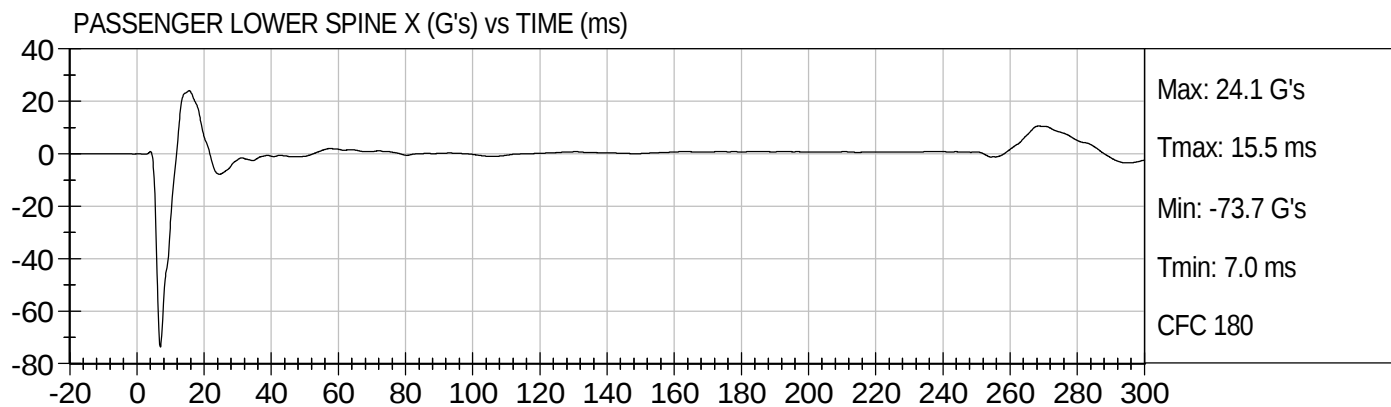




NCAP SIDE OOP 3YO
2008 CHRYSLER SEBRING

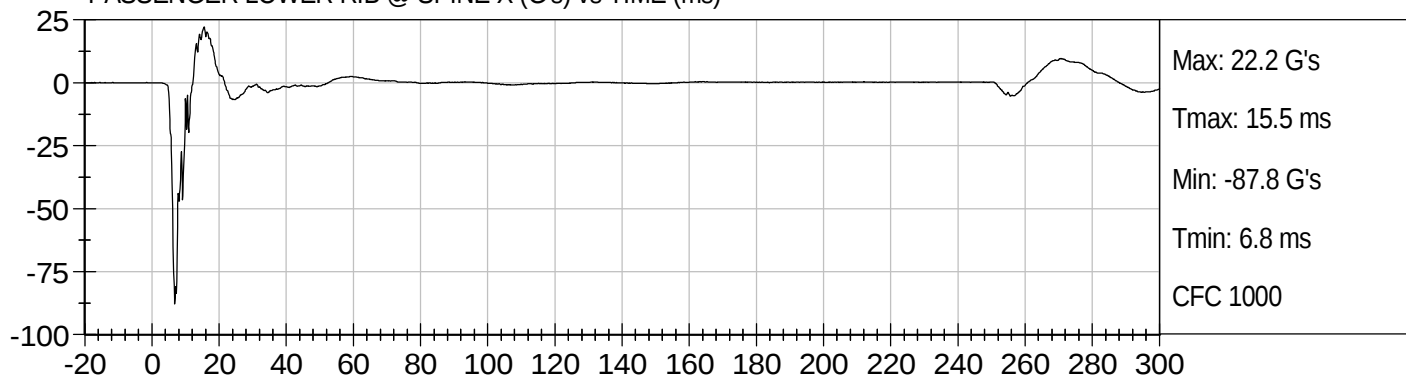
3.3.3.2
M80301

Test Date: 07/02/2008
Speed: 0.0 mph (0.0 km/h)

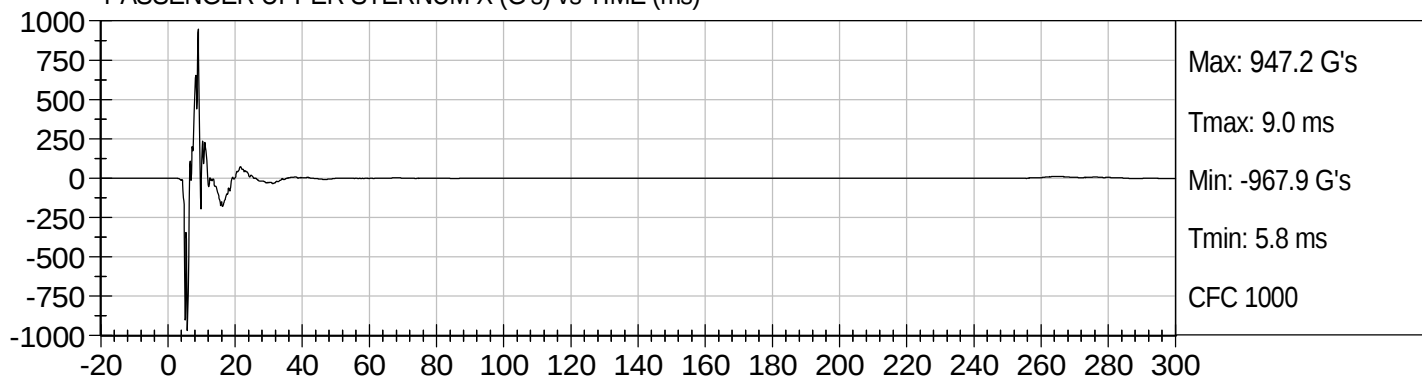




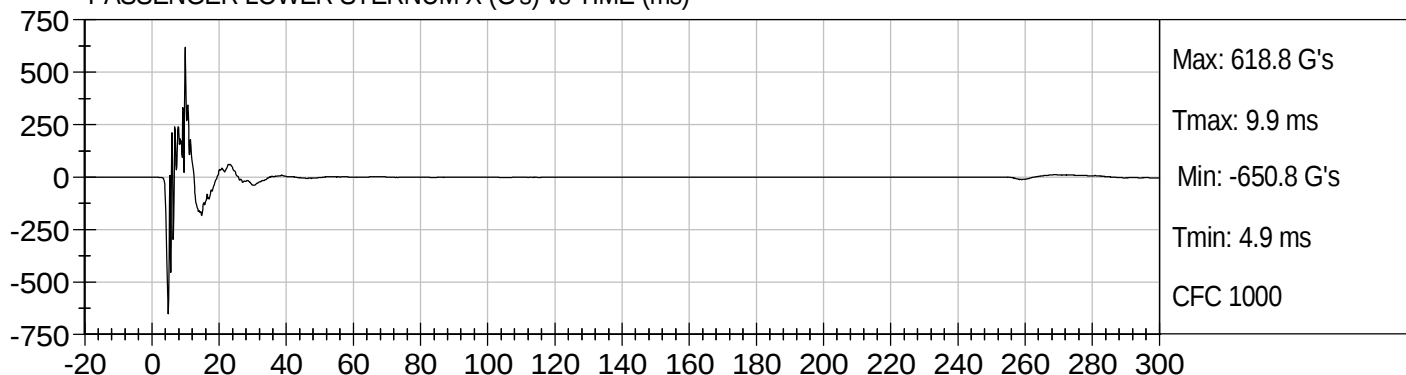
PASSENGER LOWER RIB @ SPINE X (G's) vs TIME (ms)



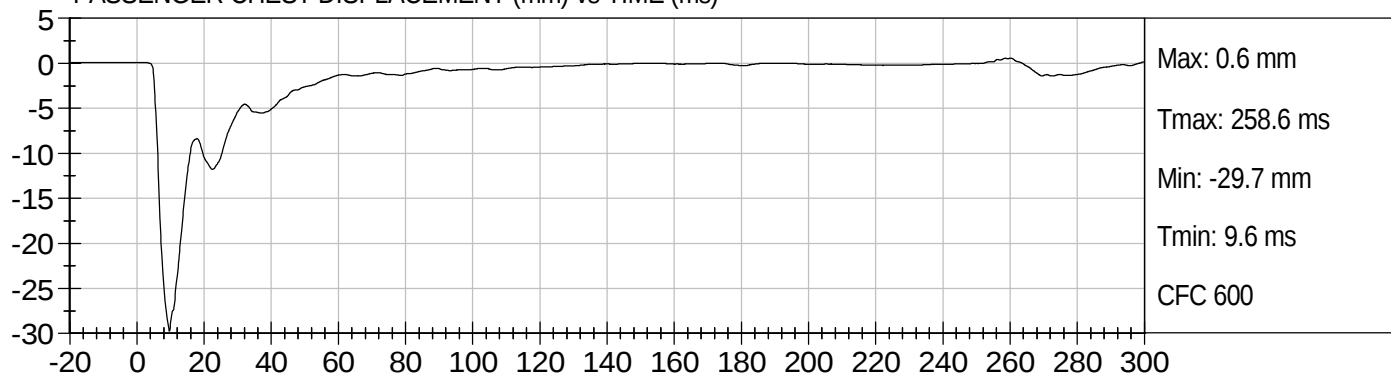
PASSENGER UPPER STERNUM X (G's) vs TIME (ms)

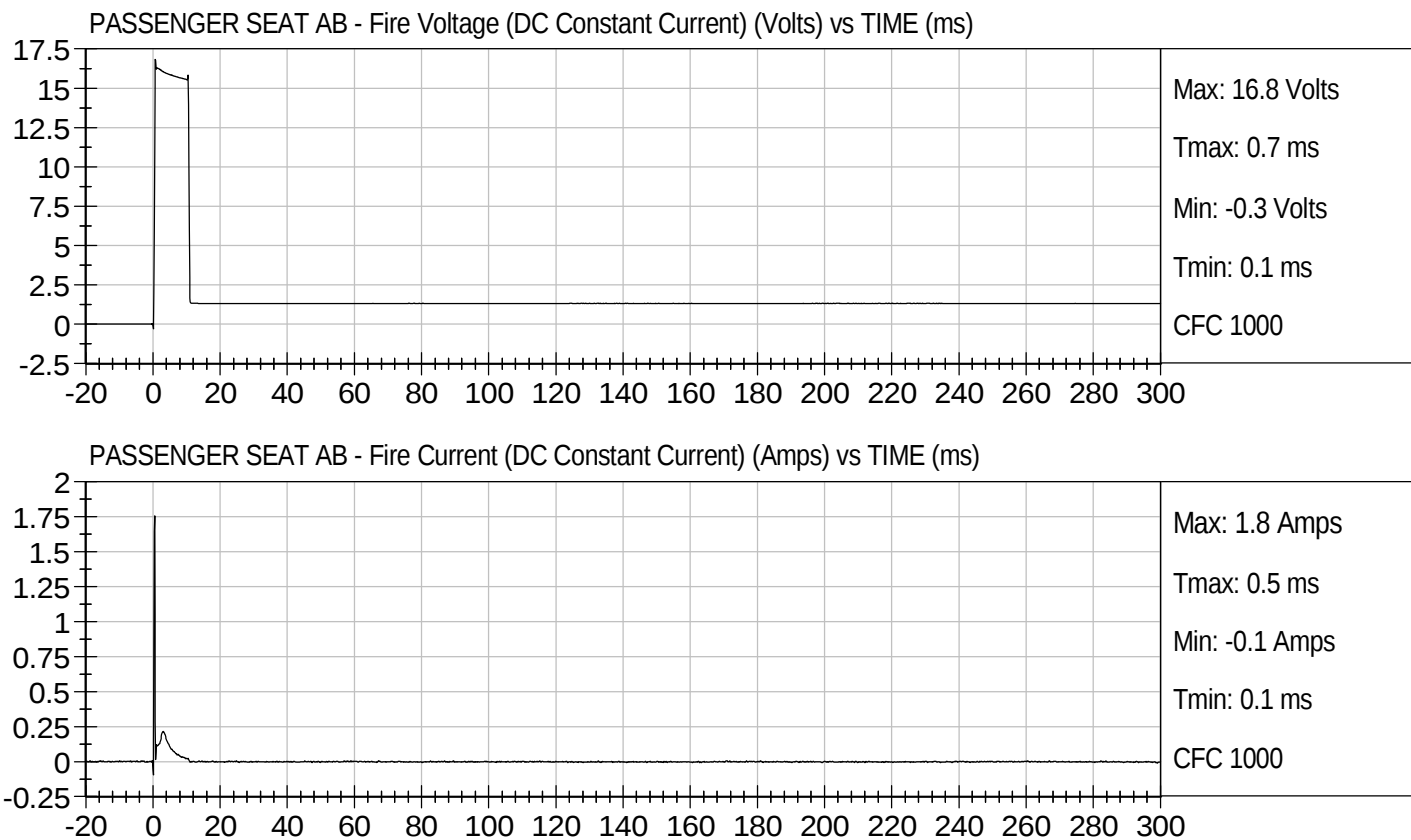


PASSENGER LOWER STERNUM X (G's) vs TIME (ms)



PASSENGER CHEST DISPLACEMENT (mm) vs TIME (ms)





APPENDIX C

INSTRUMENTATION CALIBRATION DATA

Hybrid III 3-Year-Old – Serial Number 139

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	P59272	Endevco	4/29/2008
Head Y	P59270	Endevco	4/29/2008
Head Z	P59273	Endevco	4/29/2008
Upper Neck Load Cell	NG213	R.A. Denton	4/22/2008
Lower Neck Load Cell	LNG86	R.A. Denton	4/24/2008
Chest Displacement	139	Servo	5/09/2008
Upper Spine X	P49480	Endevco	6/18/2008
Upper Spine Y	P52140	Endevco	6/18/2008
Upper Spine Z	P52142	Endevco	6/18/2008
Mid Spine X	P47111	Endevco	6/18/2008
Mid Spine Y	P47112	Endevco	6/18/2007
Mid Spine Z	P47114	Endevco	6/18/2008
Lower Spine X	P59394	Endevco	6/19/2008
Lower Spine Y	P59395	Endevco	6/19/2008
Lower Spine Z	P59396	Endevco	6/19/2008
Upper Sternum X	P59256	Endevco	4/29/2008
Lower Sternum X	P59257	Endevco	4/29/2008
Lower Rib @ Spine X	P59255	Endevco	4/29/2008