

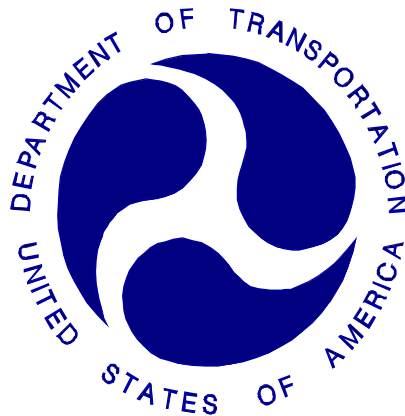
REPORT NUMBER: TWG-CAL-14-06

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE AIRBAG OUT-OF-POSITION INJURY TESTING

Honda of Canada Mfg.
2015 Honda CR-V

NHTSA NUMBER: M20155317TWG2
CALSPAN TEST NUMBER: CT2014-06

PREPARED BY:
CALSPAN CORPORATION
4455 Genesee St.
BUFFALO, NEW YORK 14225



August 21, 2015

FINAL REPORT

Alpha Technology Associate, Inc.
2810 Old Lee Highway, Suite 120
Fairfax, VA 22031

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-13-R-00694, Alpha Technology PO 4GC154. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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Approval Date:

FINAL REPORT ACCEPTANCE BY:

Accepted By:

Acceptance Date:

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15. Supplementary Notes						
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 the Calspan Test Facility in Buffalo, New York, on August 21, 2015.						
Injury Summary						
HIC15	Maximum Chest Displacement (mm)	Maximum Chest Displacement Rate (m/s)	NIJ(NTF)	NIJ(NTE)	NIJ(NCF)	NIJ(NCE)
29.88	N/A	N/A	0.098	0.170	0.539	0.729
17. Key Words New Car Assessment Program (NCAP) Side Airbag Out-Of-Position			18. Distribution Statement <u>Copies of this report are available from:</u> Alpha Technology Associate, Inc. 2810 Old Lee Hwy, Suite 120 Fairfax, VA 22031 Phone: (703) 876-0010 Fax: (703) 876-0120 Attn: Mai Lan Aram			
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SECTION 1

PURPOSE AND SUMMARY OF TEST:

1.1 PURPOSE

The purpose of this test was to obtain data from a static out-of-position side impact using a vehicle that had previously undergone a New Car Assessment Program (NCAP) sponsored side MDB impact test requested by the National Highway Traffic Safety Administration (NHTSA). This test was performed under NHTSA contract No. DTNH22-13-R-00694 and through Alpha Technology Associate, Inc.

1.2 SUMMARY

The effects of both a seat-mounted side airbag and a curtain airbag deployment in a 2015 Honda CR-V on an out-of-position SID-IIs 5th Female ATD were evaluated. The test was performed by Calspan on August 21, 2015. Pre-and post-test photographs of the vehicle and ATD can be found in Appendix A.

Three high-speed digital cameras were used to document the side airbag deployment event. Images were recorded at rates of 1000 frames per second. One camera was placed perpendicular to the right-front seat centerline to capture the deployment event from the side. The second camera was placed parallel to the right-front seat centerline to capture the deployment event from the front. A third camera was placed $\frac{3}{4}$ to the front to also capture the deployment event.

The SID-IIs 5th Female anthropomorphic test device (ATD) was placed in the right front (passenger) seat situated perpendicular to the seat centerline, reclined and facing towards the left front seat according to the ATD placement instructions specified by Alpha Technology Associate, Inc. who referenced 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). This orientation complies with section 3.3.5.3 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.

The SID-IIs 5th Female ATD was instrumented with head x, y and z accelerometers (primary and redundant). In addition, six axis upper and lower neck load cell sensors were utilized to record the resulting neck forces and moments during the event.

Twenty-two channels of data were recorded using an on-board data acquisition system. Appendix A contains photographs. Appendix B contains ATD response data traces. Appendix C contains the Instrumentation Data Channel assignments.

SECTION 2

DATA SHEET NO. 1 TEST SUMMARY

TEST CONFIGURATION INFORMATION:

Seating Position:	P2	Right Front Seating Position
Test:	3.3.5.3	Inboard Facing SID-IIs 5th Female ATD (Driver and Passenger Positions with Roof-Rail-Mounted Airbags)
Airbag: 1	Curtain	Roof Rail Mounted – Passenger Side
Airbag: 2	Seat/Torso	Passenger Seat Mounted – Outside Seam
Booster Block:	N/A	N/A
ATD Type/Serial No.:	300	SID-IIs 5th Female ATD

Number of Data Channels:

22

Number of Cameras:

0

Real Time

3

High Speed Digital

0

High Speed Film

PRE-TEST VISIBLE DUMMY CONTACT POINTS

Head Contact:	None
Upper Torso Contact:	Door Panel, Passenger Seat Back
Lower Torso Contact:	Passenger Seat Pan
Knee Contact:	None
Foot Contact:	Driver Seat Pan

POST-TEST VISIBLE DUMMY CONTACT POINTS

Head Contact:	Curtain Airbag
Upper Torso Contact:	Seat/Torso Airbag, Passenger Seat Back
Lower Torso Contact:	Passenger Seat Pan
Knee Contact:	None
Foot Contact:	Driver Seat Pan

DATA SHEET NO. 2
VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2015 Honda CR-V

NHTSA No. : M20155317TWG2 ; VIN: 2HKRM3H35FH502462 Color: Red

Engine Data: 14 cylinders; 146.57 CID; 2.4 Liters; 2400 cc

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

Transmission Data: CVT speeds; X Manual; X Automatic; X Overdrive

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

Safety Belt Features – Driver X Pretensioner (Shoulder); X Load Limiter; X Adj. Anchorage

Safety Belt Features - Passenger X Pretensioner (Shoulder); X Load Limiter; X Adj. Anchorage

Major Options: X A/C; X Pwr. Steering.; X Pwr. Brakes

X Pwr. Windows; X Pwr. Door Locks; X Tilt Wheel

Date Received: 11/20/2014 ; Odometer Reading 119.1 Km

Selling Dealer: Napleton's Honda

& Address: 6600 E Riverside Blvd. Loves Park, IL 61111

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Honda of Canada Mfg.

Date of Manufacture 10/2014

GVWR: 2025 kg; GAWR: 1030 kg FRONT; 1015 kg REAR

DATA FROM TIRE PLACARD:

Recommended Tire Size: 215/70R16

*Recommended Cold Tire Pressure: 220 kPa Front 220 kPa Rear

DATA FROM TIRE SIDEWALL:

Size of Tires on Test Vehicle: 215/70R16 ; Manufacturer: Continental

Tire Pressure with Maximum Capacity Vehicle Load: Front 300 kPa Rear: 300 kPa

Treadwear: 680 ; Traction: A ; Temperature: B

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) = 385 Kg

No. of Occupants x 68.04 kg = 340.2 Kg

Rated Cargo/Luggage Weight (RCLW) = 44.8 Kg

*Tire pressure used for test

‡Vehicle had previously undergone a New Car Assessment Program Frontal NCAP Test.

DATA SHEET NO. 3
SID-IIs 5th Female POSITIONING IN VEHICLE

NHTSA No. M20155317TWG2

Measurement	Value
Total Fore/Aft Travel (mm)	240
Test Distance Rearward of Full-Forward (mm)	100
Total Fore/Aft Travel (Detents)	24
Placed in Position #	10

Seat Back Angle	SA (9°)	Value
Airbag Module Width	AMW (mm)	-
Airbag Width	ABW (mm)	-
Airbag Module Length	AML (mm)	-
Airbag Length	ABL (mm)	-
Top of Airbag Module to Head/Neck Junction	AN (mm)	-
Head CG to Door Panel/Side Window	HD (mm)	77
Head to Seat Back Centerline	HSC (mm)	-
Head to B-Pillar (cg)	HB (mm)	240
Head to Roof, Z (top of the head)	HZ (mm)	90
Head to Header	HHH (mm)	374
Chest to Dash	CD (mm)	323
Chest to Seatback	CS (mm)	0
Right Arm to Seat Back Centerline	RACL (mm)	-
Right Arm to Seat Back Centerline	RACL (°)	-
Left Arm to Seat Back Centerline	LACL (mm)	-
Left Arm to Seat Back Centerline	LACL (°)	-
Right Arm to Door Panel	RA (mm)	N/A
Left Arm to Door Panel	LA (mm)	N/A
Knee to Knee	KK (mm)	-
Toe to Toe	TT (mm)	-
Right Knee to Seat Cushion Centerline	KSCR (mm)	-
Left Knee to Seat Cushion Centerline	KSCL (mm)	-
Right Toe to Seat Cushion Centerline	TSCR (mm)	-
Left Toe to Seat Cushion Centerline	TSCL (mm)	-
Nose to Dash	ND (mm)	-
Nose to Seatback	NS (mm)	-
Nose to Header	NR (mm)	-
Foam Block Depth	(mm)	-
Foam Block Width	(mm)	-
Foam Block Thickness	(mm)	-
HD36 foam density	(g/L)	-

DATA SHEET 4

CHILD DUMMY INJURY CRITERIA VALUES

NHTSA No.: M20155317TWG2

Channel	Units	Max	Time (ms)	Min	Time (ms)
V1P2 Head x [CFC_1000]	g's	17.99	21.95	-27.13	13.20
V1P2 Head y [CFC_1000]	g's	16.62	13.00	-39.48	13.50
V1P2 Head z [CFC_1000]	g's	90.87	13.00	-23.05	16.05
V1P2 Headform Resultant [CFC_1000]	g's	93.86	13.00	0.00	-34.35
V1P2 Upper Neck Mocy [CFC_600]	Nm	18.85	18.15	-33.18	64.40
V1P2 Upper Neck Ntf [CFC_600]	-	0.10	179.30	0.00	-49.55
V1P2 Upper Neck Nte [CFC_600]	-	0.17	117.30	0.00	-50.00
V1P2 Upper Neck Ncf [CFC_600]	-	0.54	14.95	0.00	-50.00
V1P2 Upper Neck Nce [CFC_600]	-	0.73	64.45	0.00	-50.00
V1P2 Upper Neck Nij [CFC_600]	-	0.73	64.45	0.00	-16.05
V1P2 Upper Neck Fx [CFC_1000]	N	258.37	13.00	-112.02	31.05
V1P2 Upper neck Fy [CFC_1000]	N	318.45	36.25	-256.91	13.20
V1P2 Upper neck Fz [CFC_1000]	N	183.34	160.20	-1752.44	14.75
V1P2 Neck Force Resultant [CFC_1000]	N	1771.88	14.75	0.05	-44.20
V1P2 Upper Neck Mx [CFC_600]	Nm	10.30	17.70	-22.38	42.25
V1P2 Upper Neck My [CFC_600]	Nm	22.20	17.90	-32.58	64.40
V1P2 Upper Neck Mz [CFC_600]	Nm	7.45	23.35	-10.54	79.25
V1P2 Neck Moment Resultant [CFC_600]	Nm	35.11	37.10	0.00	-36.75
V1P2 Lower Neck Fx F [CFC_1000]	N	254.58	19.75	-492.07	66.65
V1P2 Lower Neck Fy F [CFC_1000]	N	217.40	35.00	-201.87	16.25
V1P2 Lower Neck Fz F [CFC_1000]	N	219.76	159.50	-1918.38	15.15
V1P2 Lower Neck Force Resultant [CFC_1000]	N	1928.70	15.15	0.04	-21.60
V1P2 Lower Neck Mx F [CFC_600]	Nm	30.09	35.05	-8.36	106.60
V1P2 Lower Neck My F [CFC_600]	Nm	79.72	15.00	-16.25	134.25
V1P2 Lower Neck Mz F [CFC_600]	Nm	16.83	35.10	-5.64	92.80
V1P2 Lower Neck Moment Resultant [CFC_600]	Nm	80.01	15.10	0.00	-18.10
Curtain Airbag Volts	V	6.31	0.50	-12.95	0.00
Torso/Pelvis Airbag Volts	V	5.90	8.10	-22.86	0.00
Curtain Airbag Current	A	1.51	0.40	-1.97	148.00
Torso/Pelvis Airbag Current	A	2.35	0.40	-1.11	53.90

DATA SHEET 4

CHILD DUMMY INJURY CRITERIA VALUES (CONTINUED)

VEHICLE: 2015 Honda CR-V

NHTSA No.: M20155317TWG2

HEAD INJURY CRITERIA (HIC)

	HIC15			
	HIC(15)	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂
Position P2	29.88	11.05	26.05	20.92

THORAX CRITERIA

	Critical Values	Actual	Time(ms)
Maximum Deflection (mm)	N/A	N/A	N/A
Maximum Deflection Rate (m/s)	N/A	N/A	N/A

Position P2 - Neck Injury Summary (Child Dummy – Out Of Position)

Nij V10	Nij	Time (ms)	Z Force (N)	X Force (N)	Y Moment (N-m)
Ntf	0.098	179.300	109.341	-83.599	9.288
Nte	0.170	117.300	0.340	67.361	-9.159
Ncf	0.539	14.950	-1738.522	246.587	18.366
Nce	0.729	64.450	-718.946	34.098	-32.577

Peak Tension (CFC1000) 183.341 N Peak Compression (CFC1000) -1752.443 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

Appendix A

PHOTOGRAPHS

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Figure A-1: Right ¾ Front View of Vehicle, As Received



Figure A-2: Vehicle Certification Placard



Figure A-3: Pre-Test Vehicle Left Side View



Figure A-4: Post-Test Vehicle Left Side View



Figure A-5: Pre-Test SID-II 5th Female Left Side View



Figure A-6: Post-Test SID-II 5th Female Left Side View



Figure A-7: Pre-Test SID-IIs 5th Female Left Side Close-up View

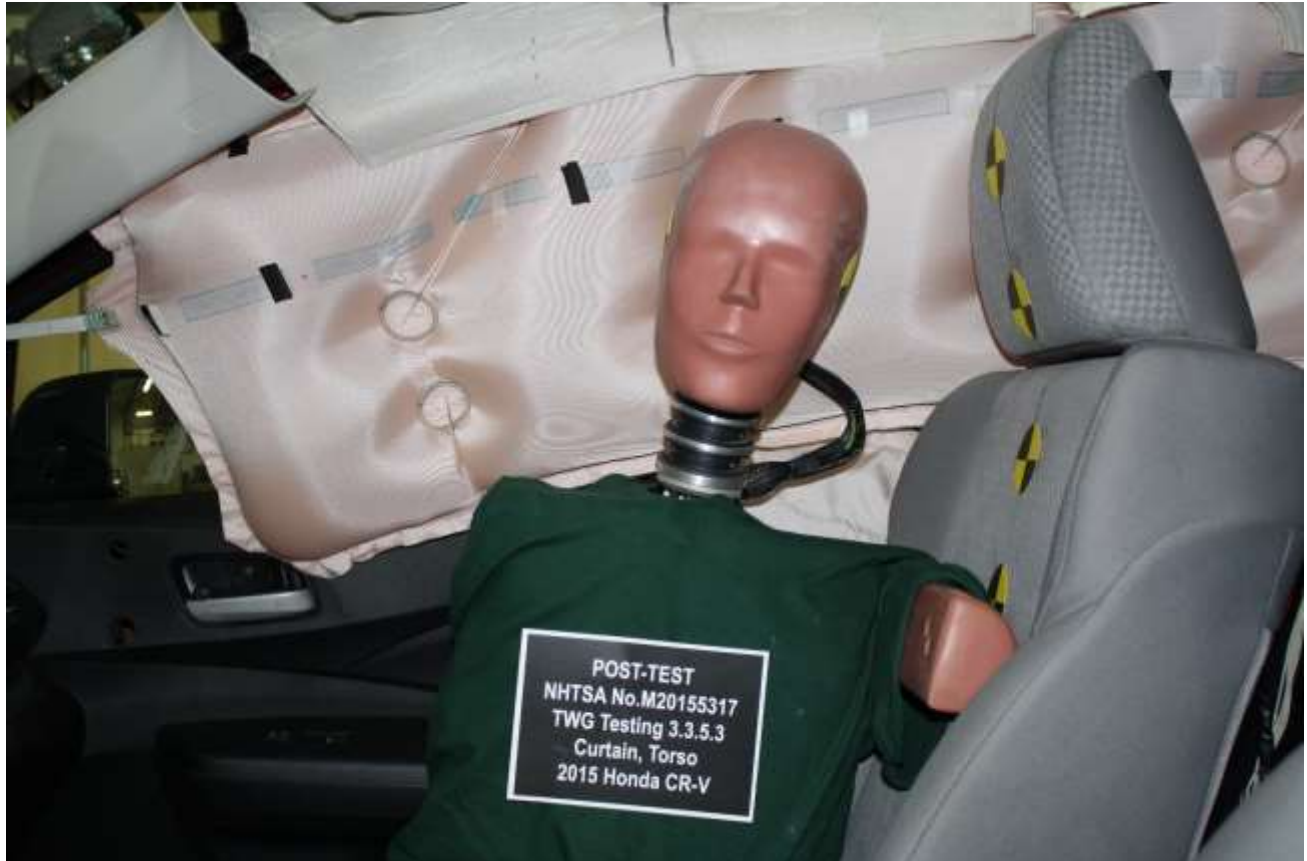


Figure A-8: Post-Test SID-IIs 5th Female Left Side Close-up View



Figure A-9: Pre-Test SID-IIs 5th Female Left $\frac{3}{4}$ Front View

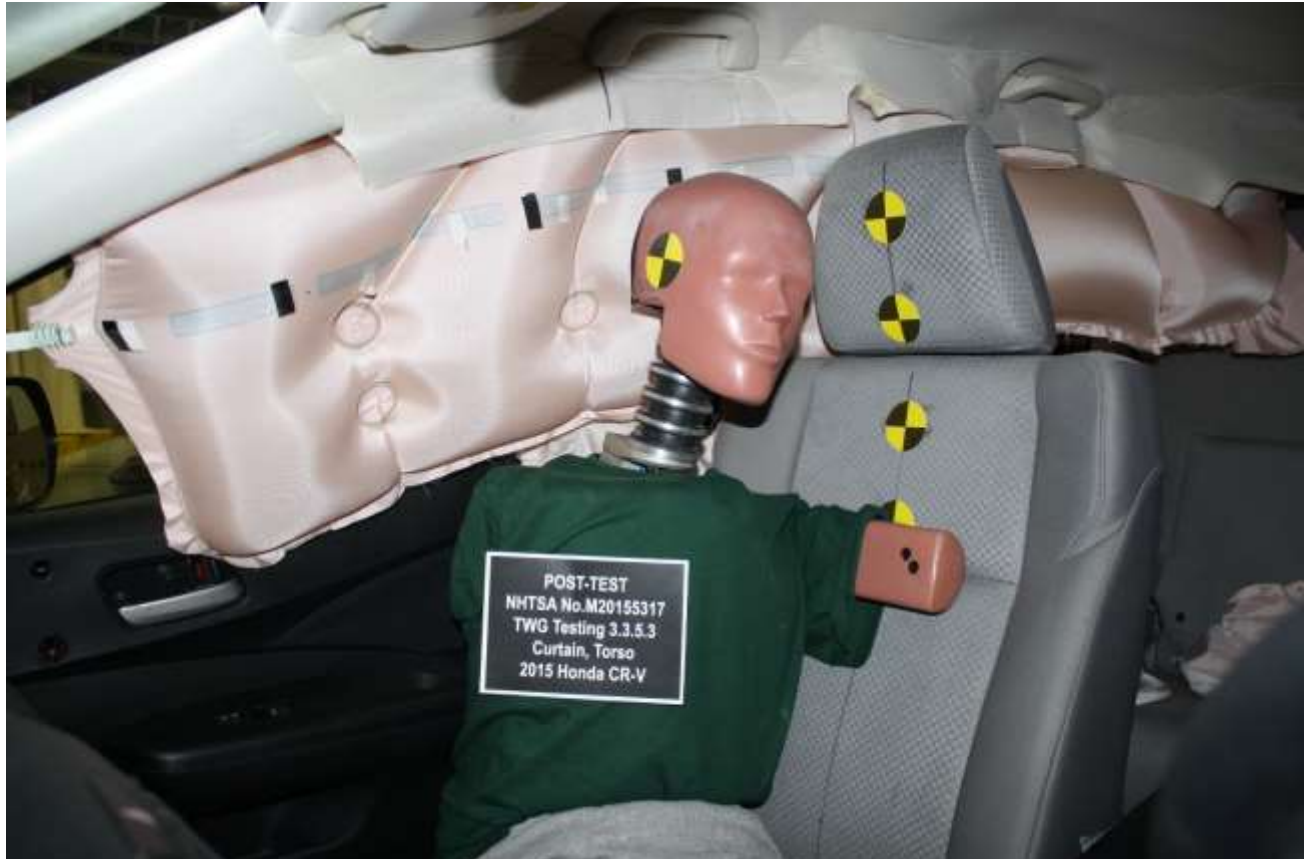


Figure A-10: Post-Test SID-IIs 5th Female Left $\frac{3}{4}$ Front View



Figure A-11: Pre-Test SID-IIs 5th Female Left ¾ Front Close-up View



Figure A-12: Post-Test SID-IIs 5th Female Left ¾ Front Close-up View



Figure A-13: Pre-Test SID-IIs 5th Female Front View



Figure A-14: Post-Test SID-IIs 5th Female Front View



Figure A-15: Pre-Test SID-IIs 5th Female Front Close-up View



Figure A-16: Pre-Test SID-IIs 5th Female Right Side View



Figure A-17: Pre-Test SID-IIs 5th Female Right Side Clearance View



Figure A-18: Pre-Test SID-IIs 5th Female Rear Right Side Clearance View



Figure A-19: Post-Test Curtain Airbag Left Side View



Figure A-20: Post-Test Curtain Airbag Left $\frac{3}{4}$ Front View



Figure A-21: Post-Test Curtain Airbag Front View



Figure A-22: Post-Test Curtain Airbag Right Side View



Figure A-23: Post-Test Curtain Airbag Rear Right Side View

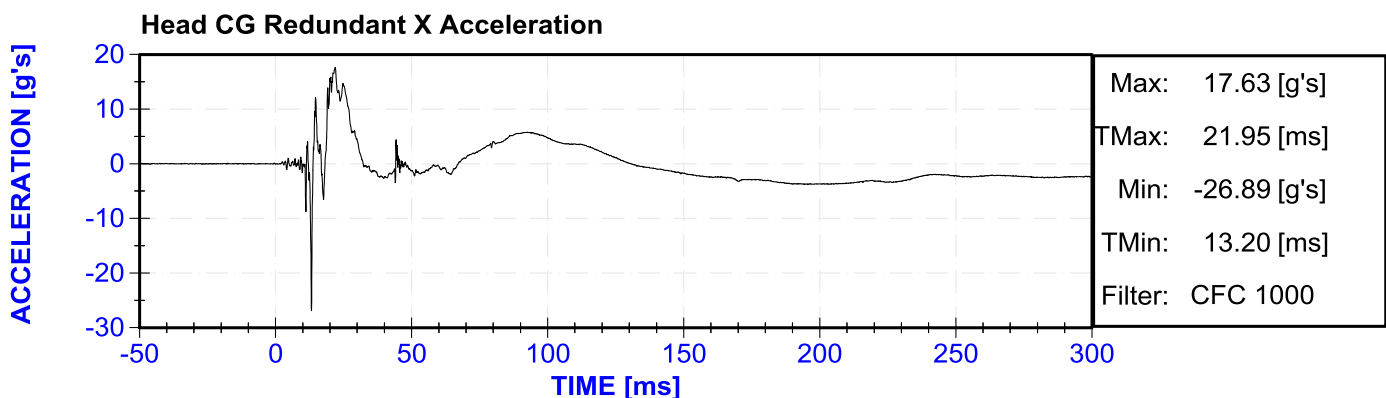
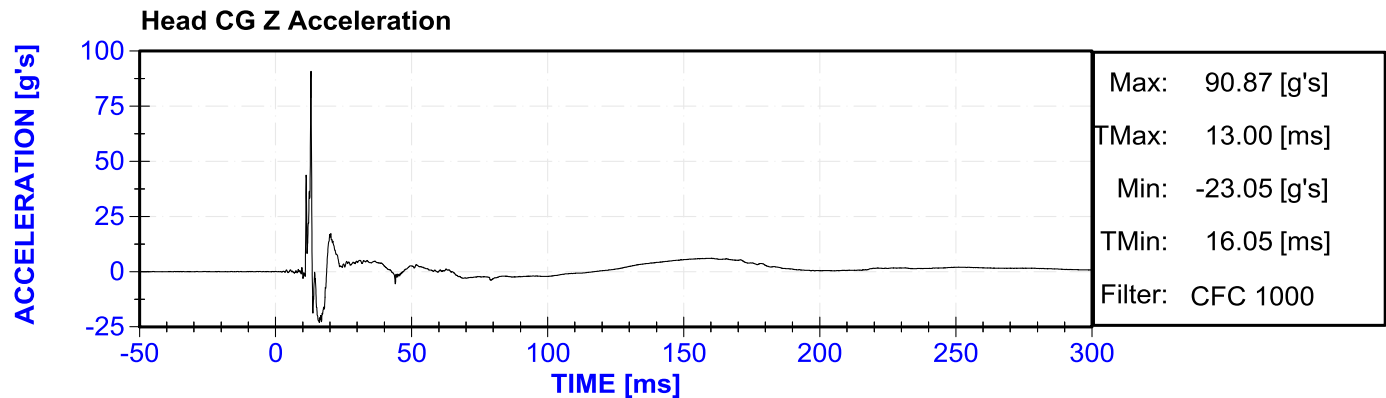
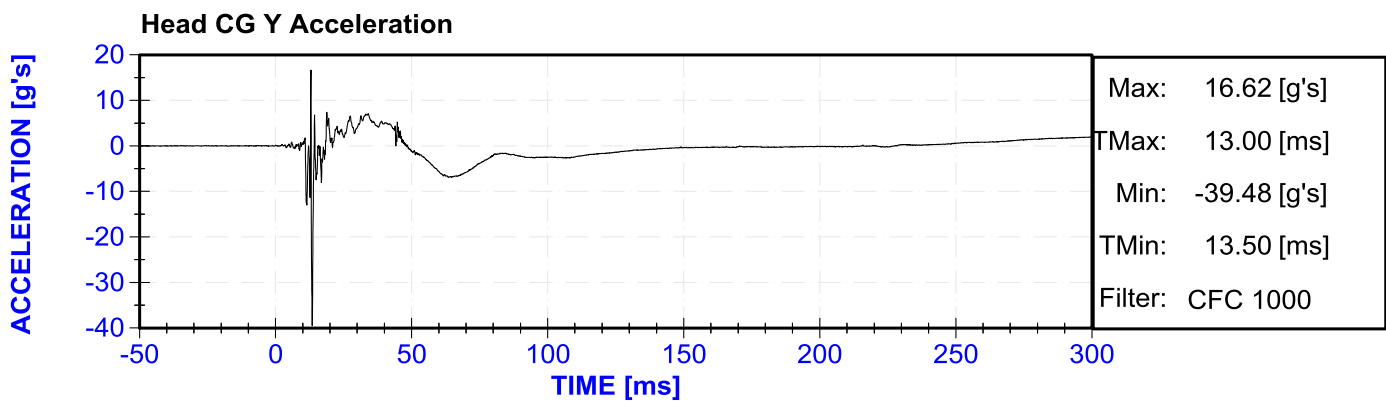
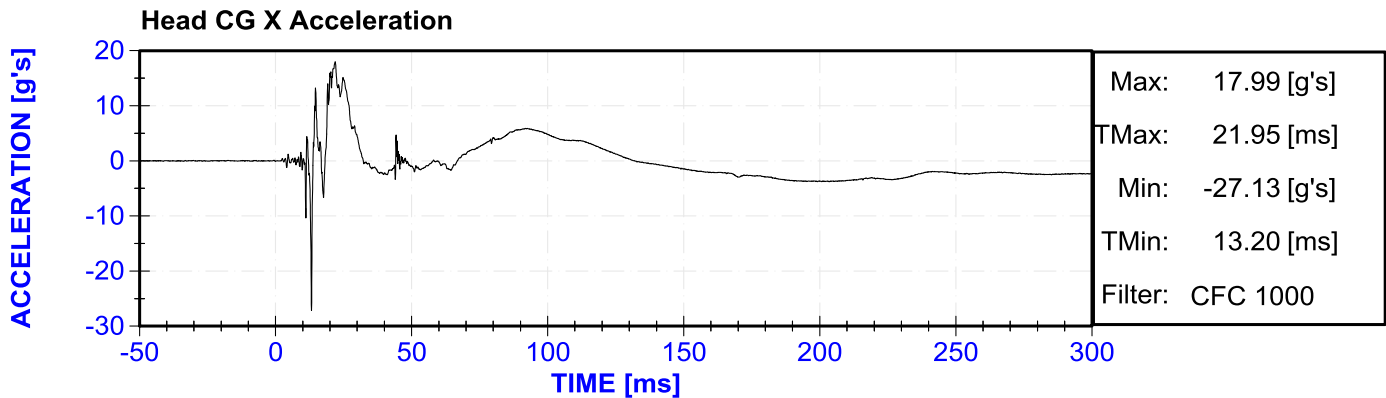


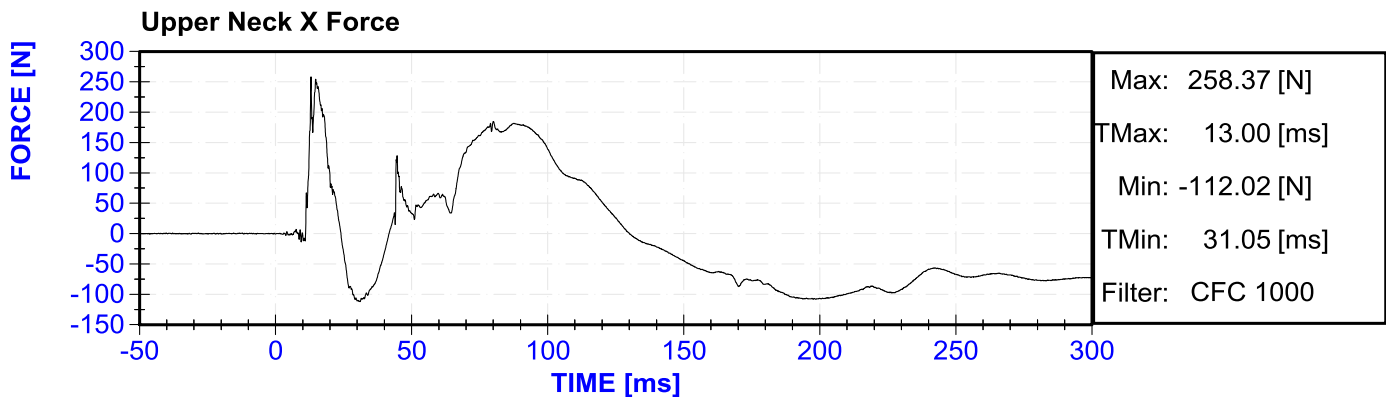
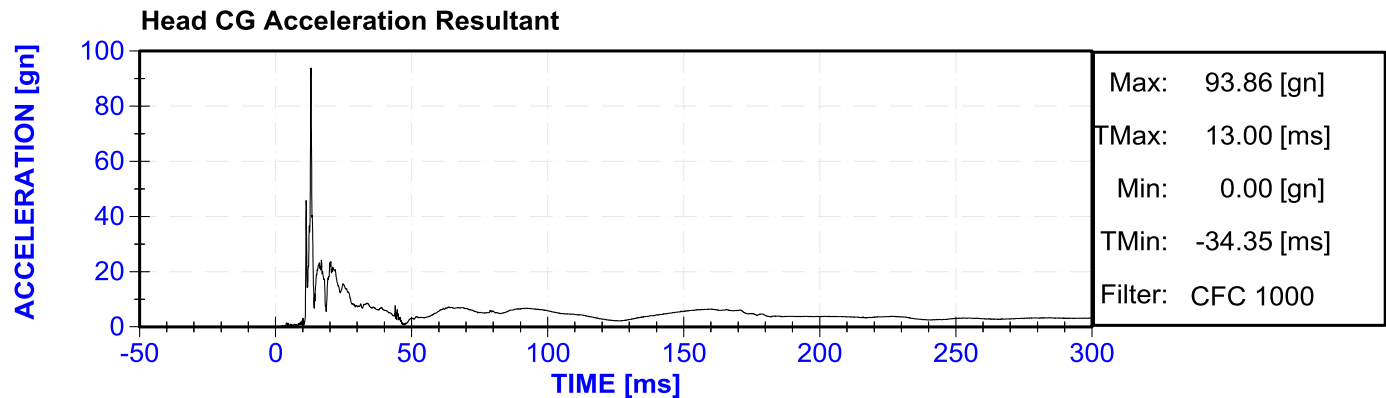
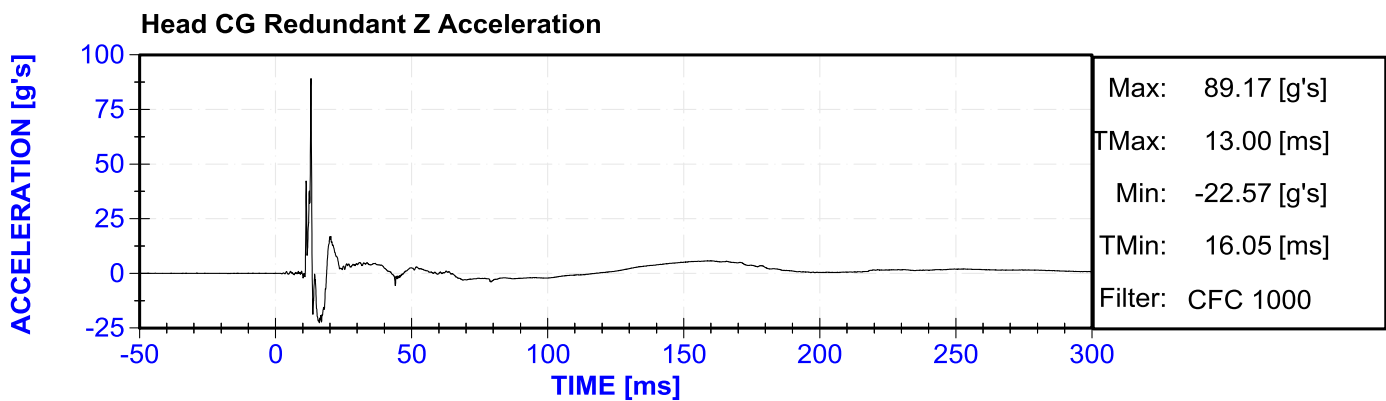
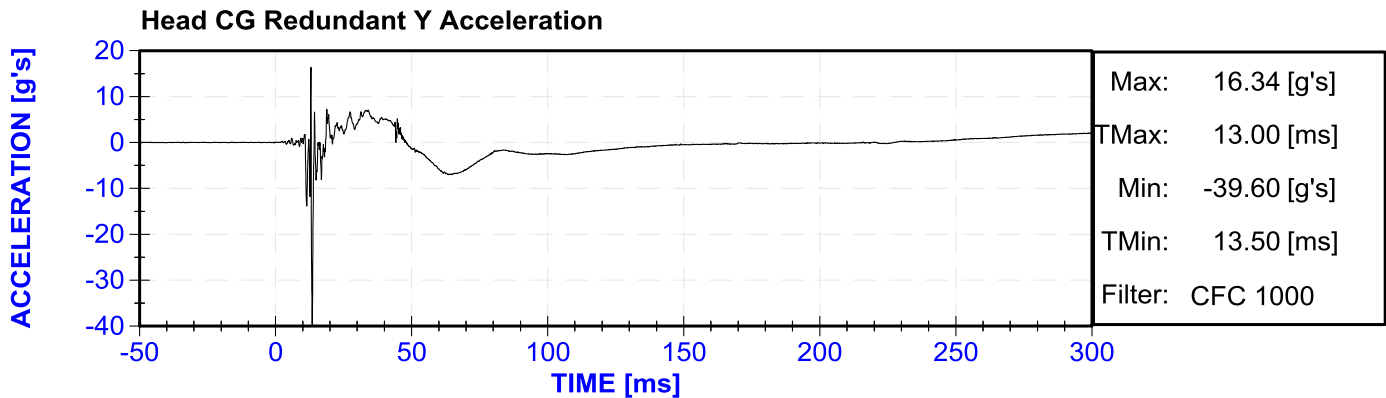
Figure A-24: Post NCAP Left Side View

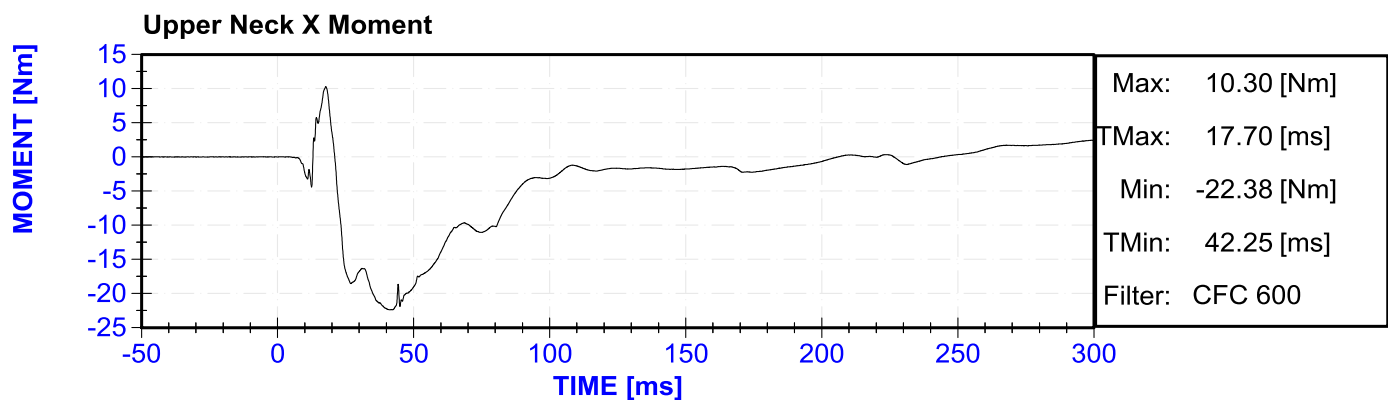
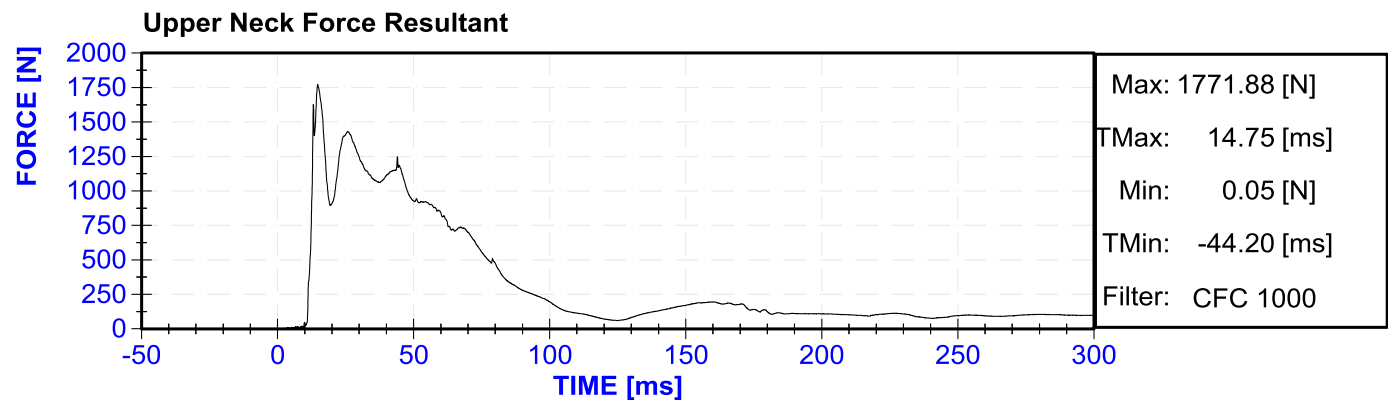
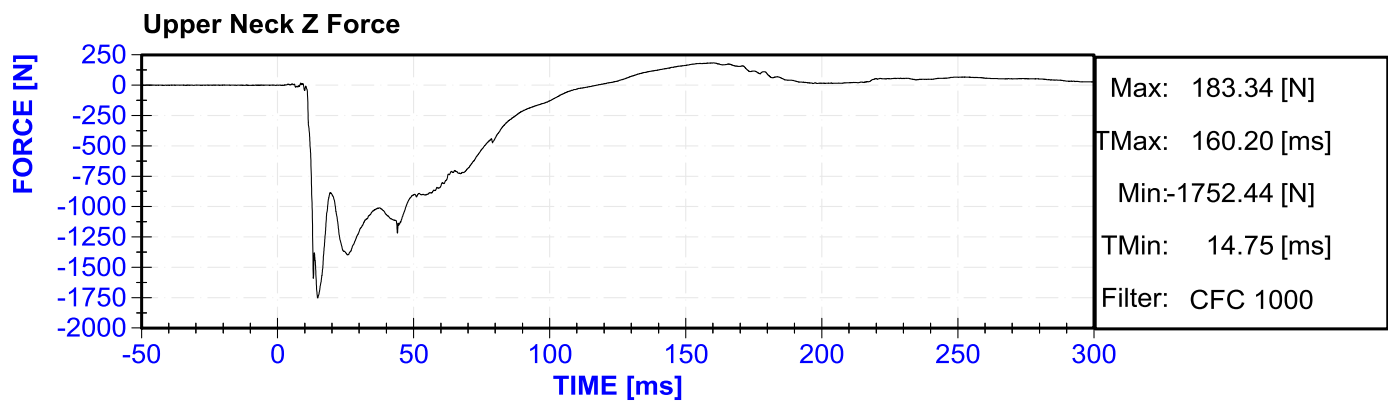
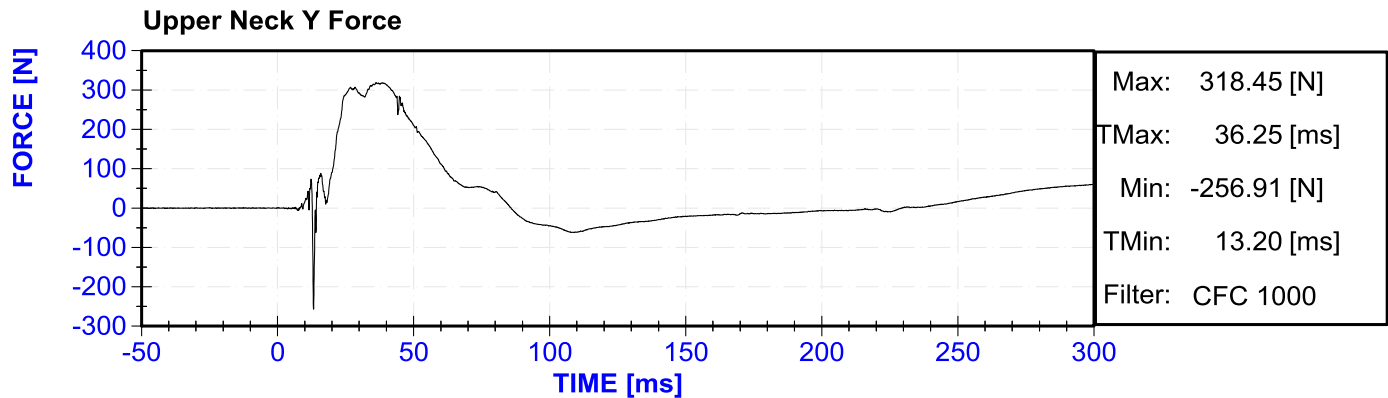
APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

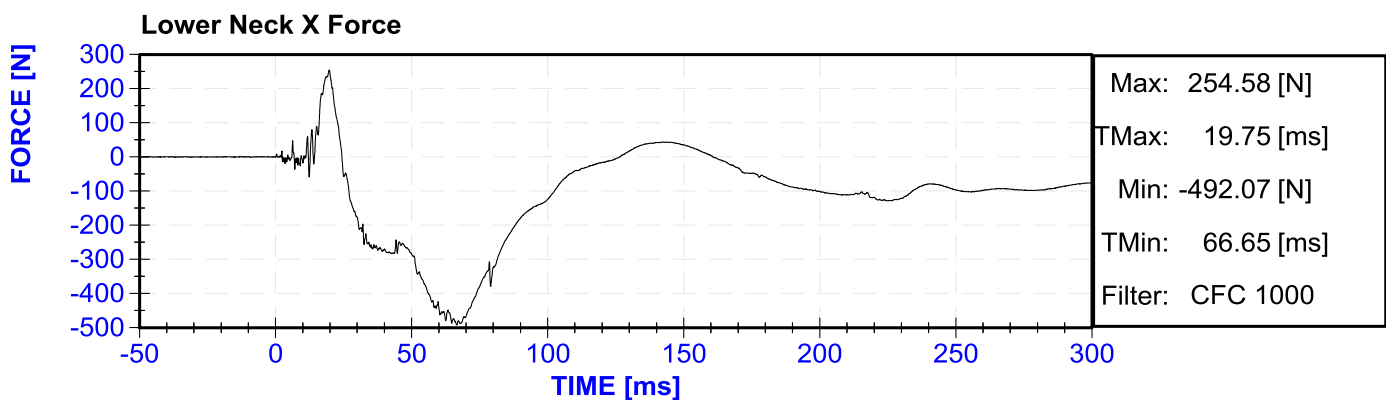
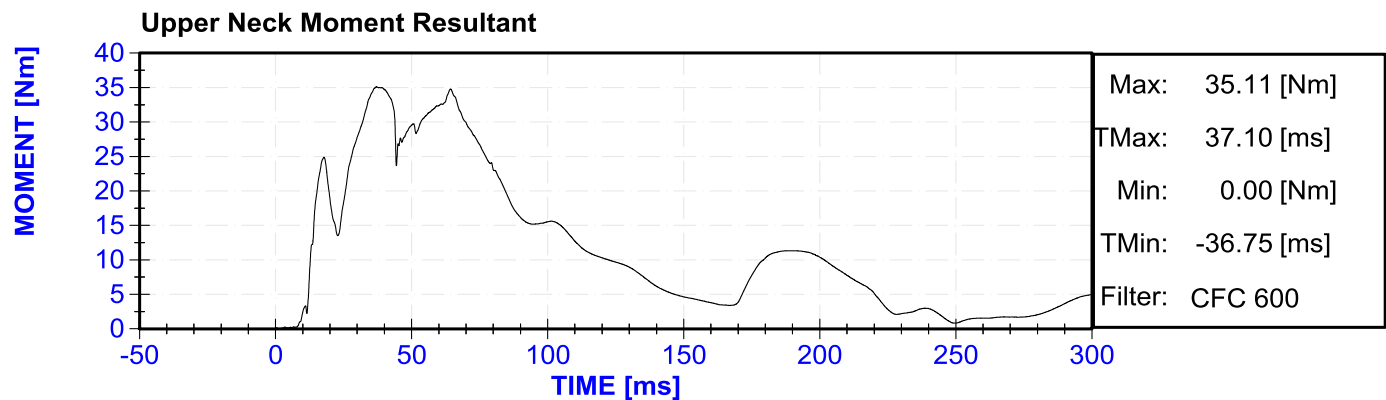
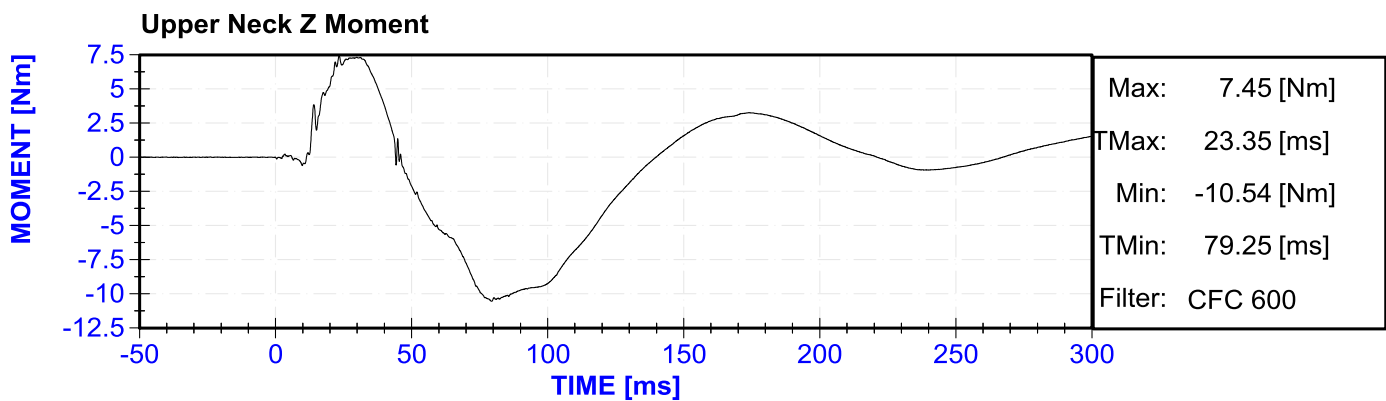
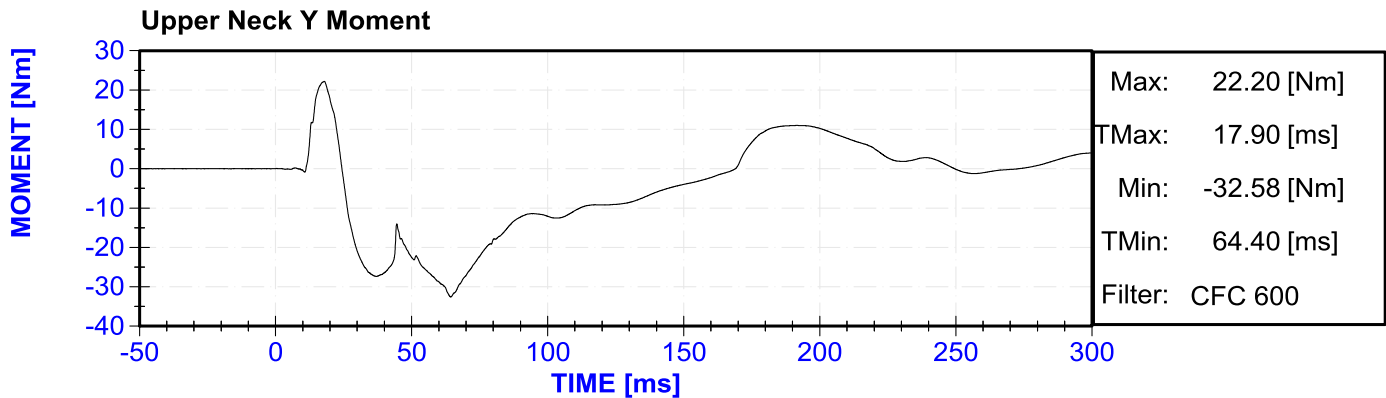
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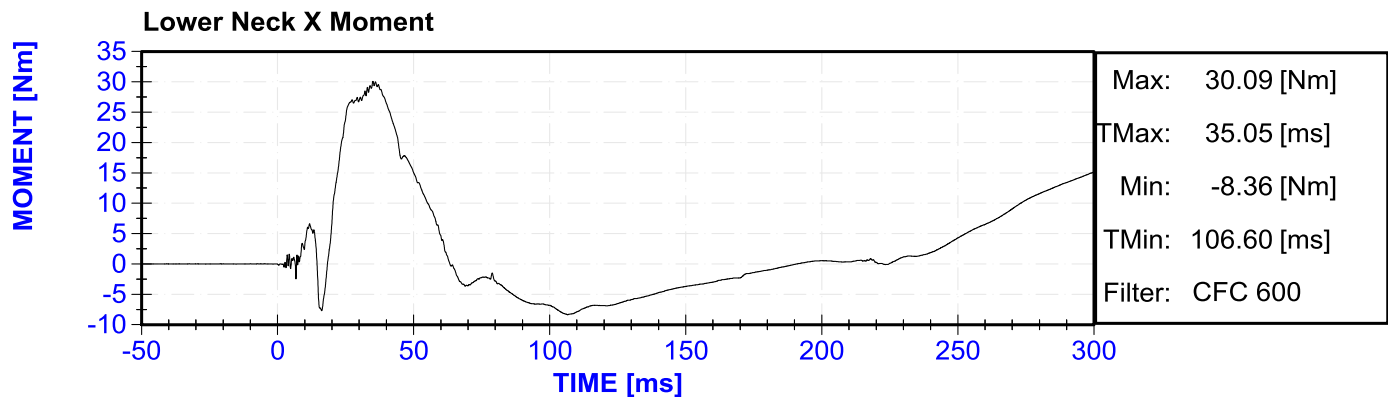
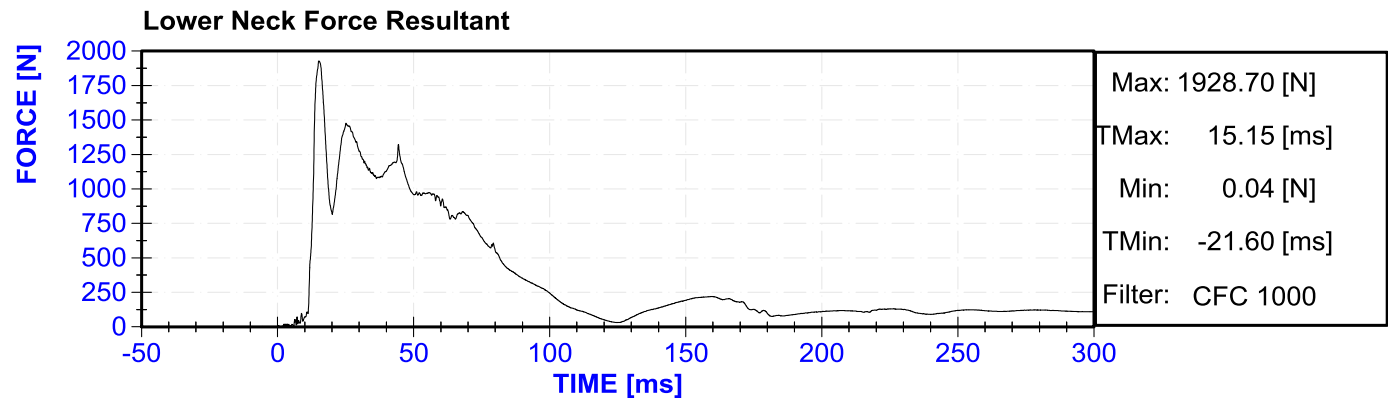
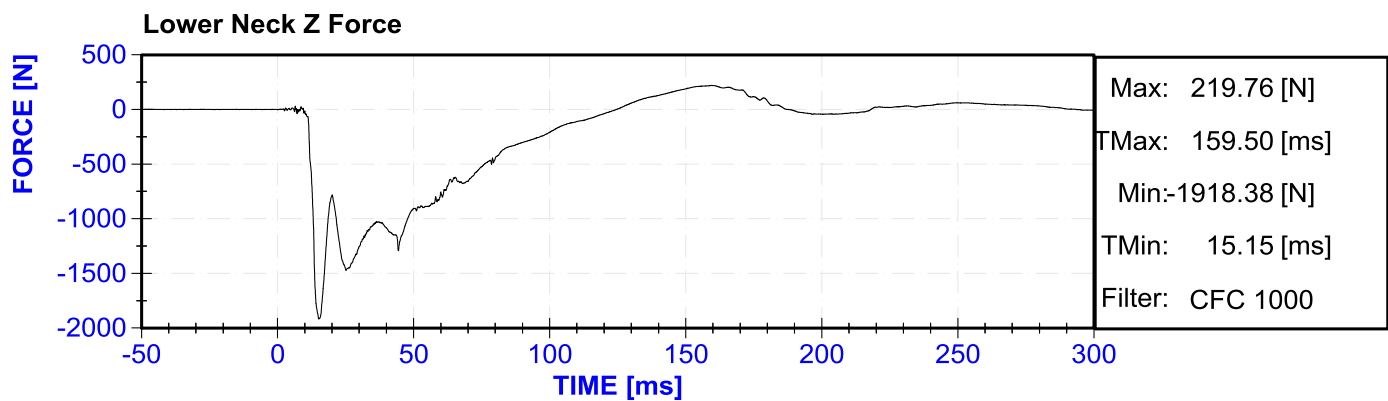
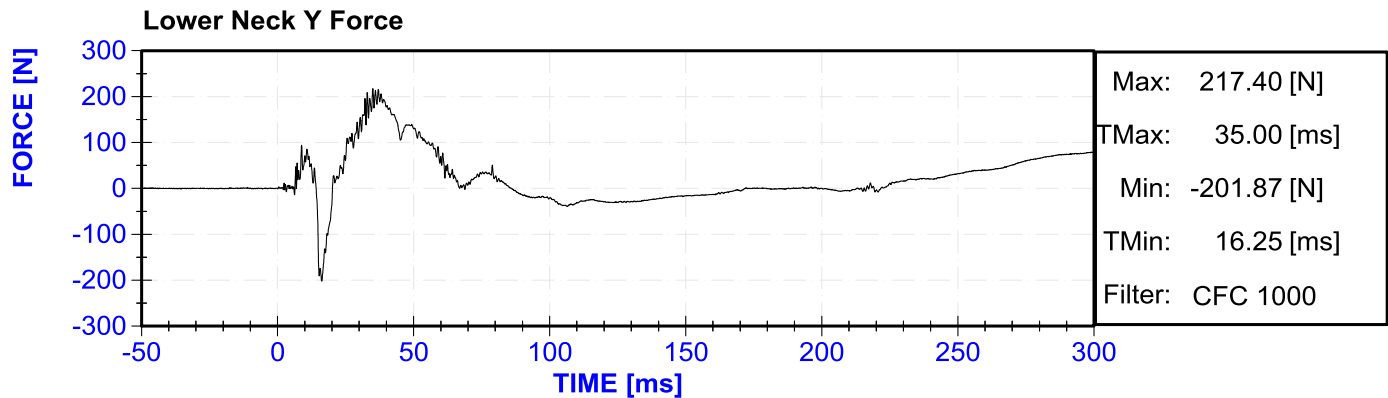
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Plot 16	Lower Neck X Force	B-6
Plot 17	Lower Neck Y Force	B-7
Plot 18	Lower Neck Z Force	B-7
Plot 19	Lower Neck Force Resultant	B-7
Plot 20	Lower Neck X Moment	B-7
Plot 21	Lower Neck Y Moment	B-8
Plot 22	Lower Neck Z Moment	B-8
Plot 23	Lower Neck Moment Resultant	B-8
Plot 24	Total Moment about the OC	B-8
Plot 25	Neck Tension-Flexion Injury	B-9
Plot 26	Neck Tension-Extension Injury	B-9
Plot 27	Neck Compression-Flexion Injury	B-9
Plot 28	Neck Compression-Extension Injury	B-9
Plot 29	Total Neck Injury	B-10
Plot 30	Passenger Curtain Squib Current	B-10
Plot 31	Passenger Curtain Squib Voltage	B-10
Plot 32	Passenger Seat Squib Current	B-10
Plot 33	Passenger Seat Squib Voltage	B-11

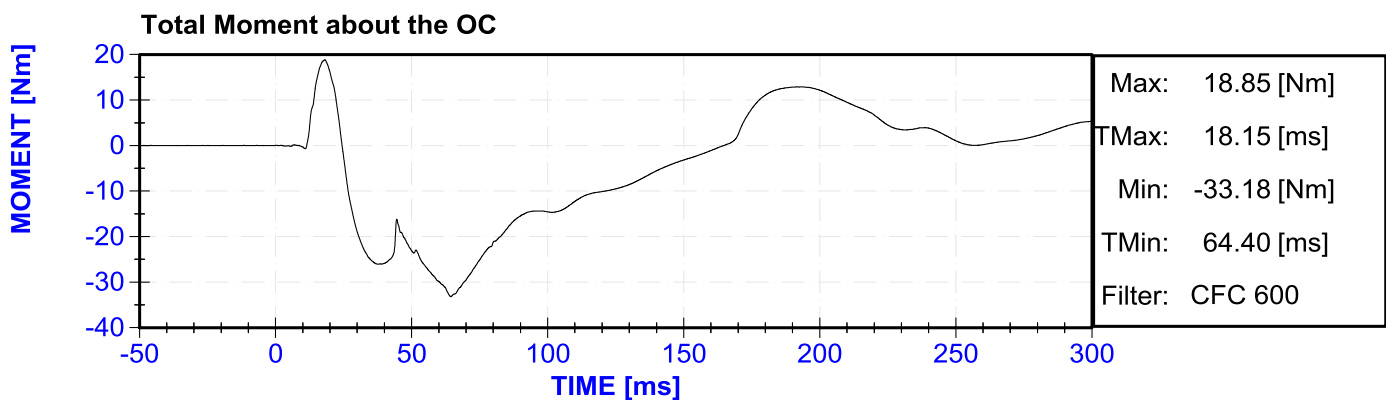
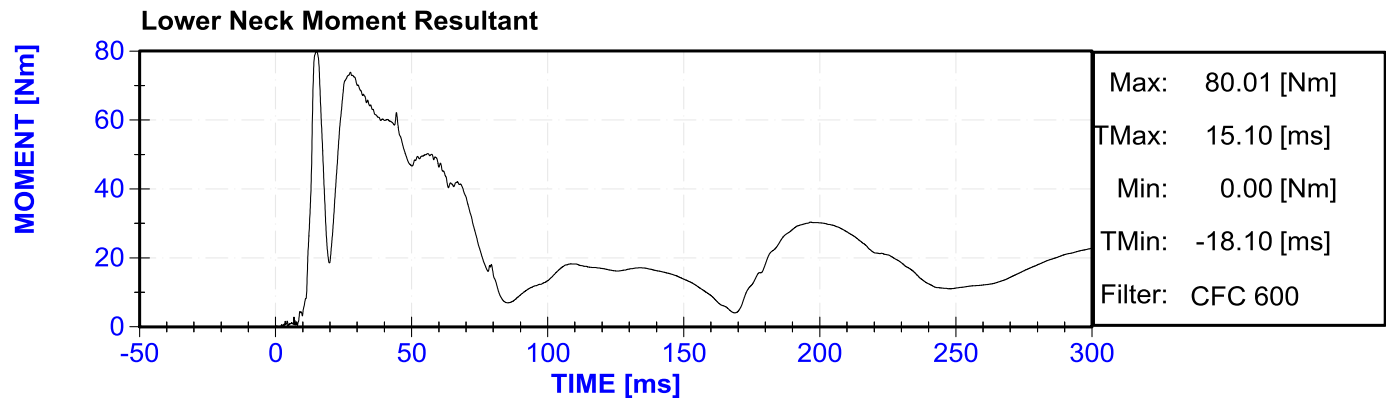
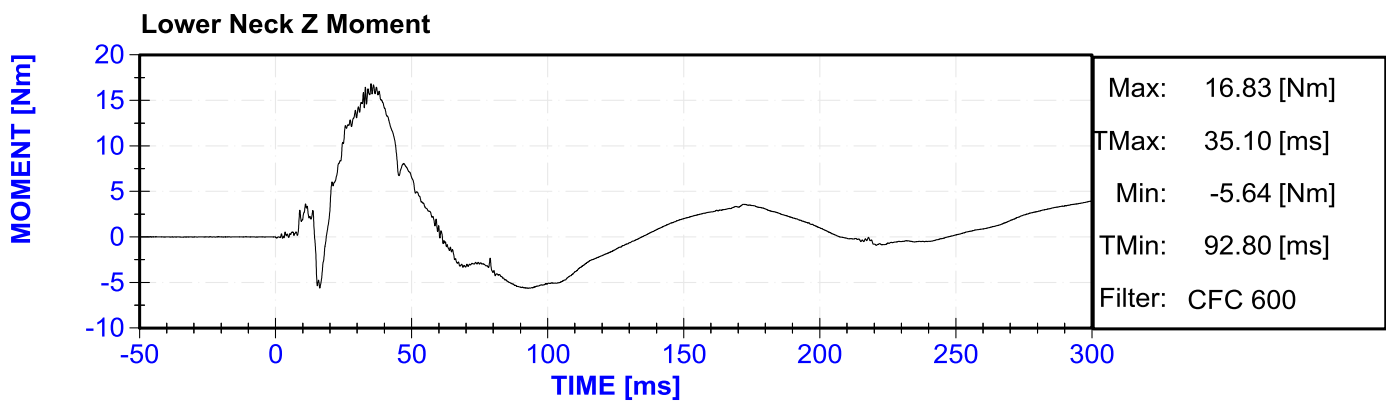
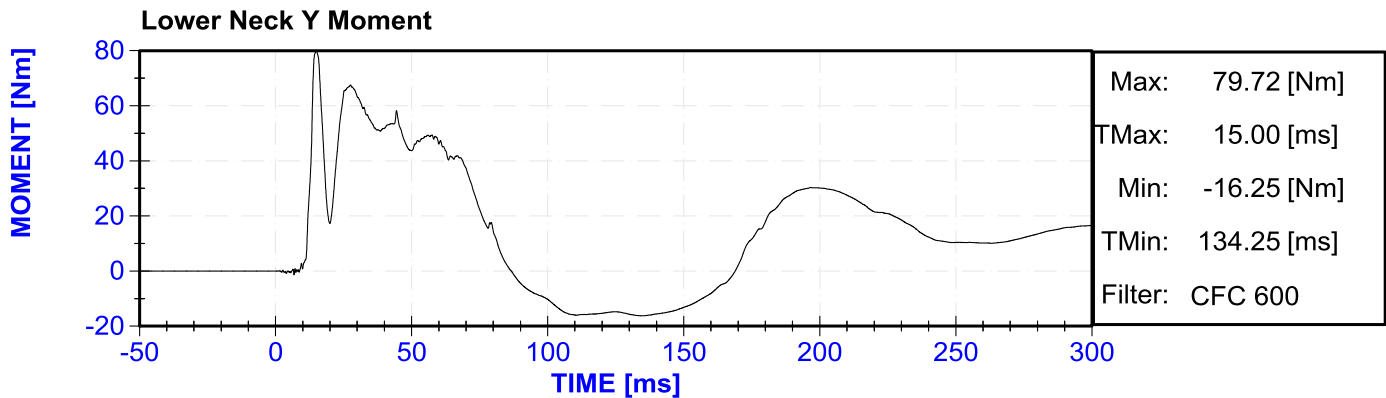


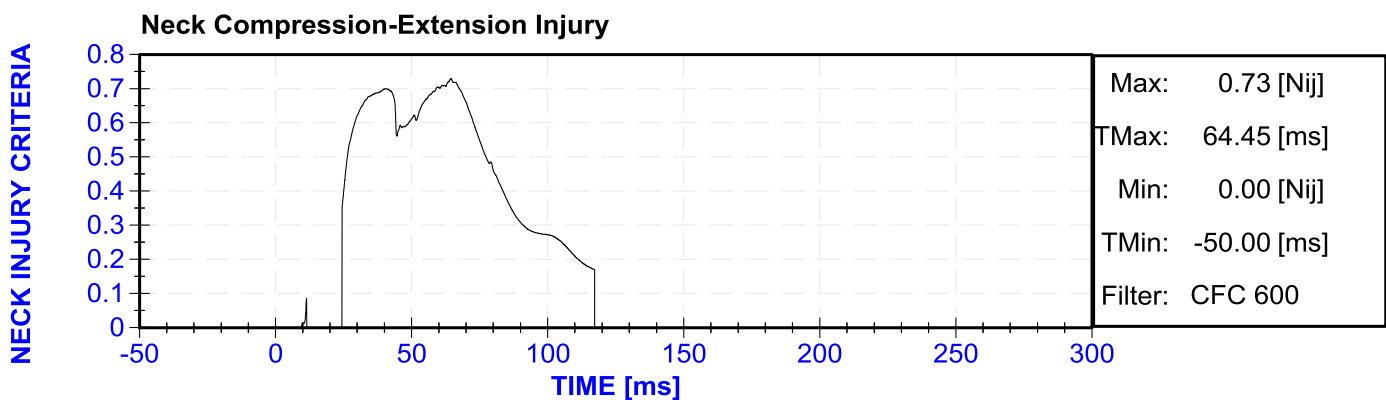
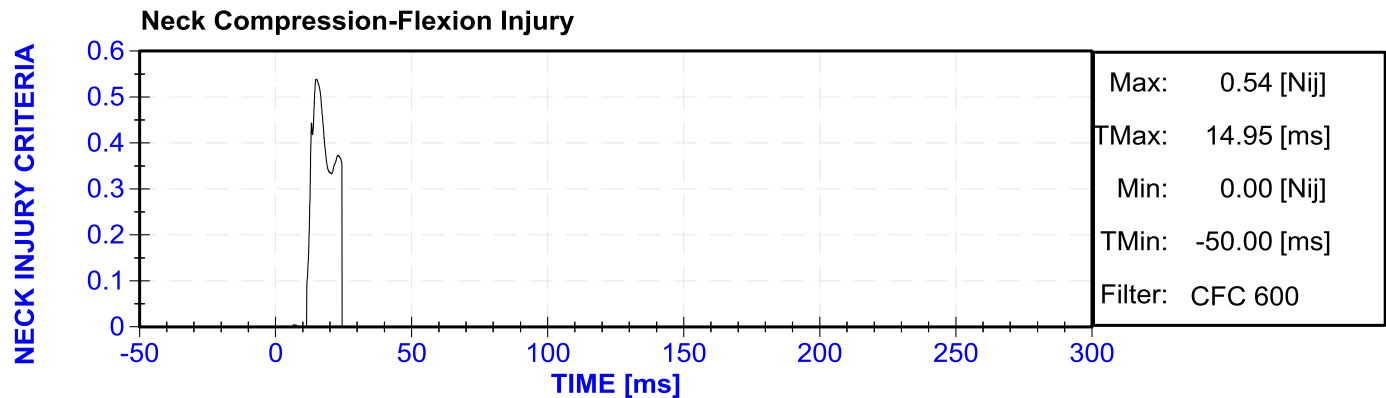
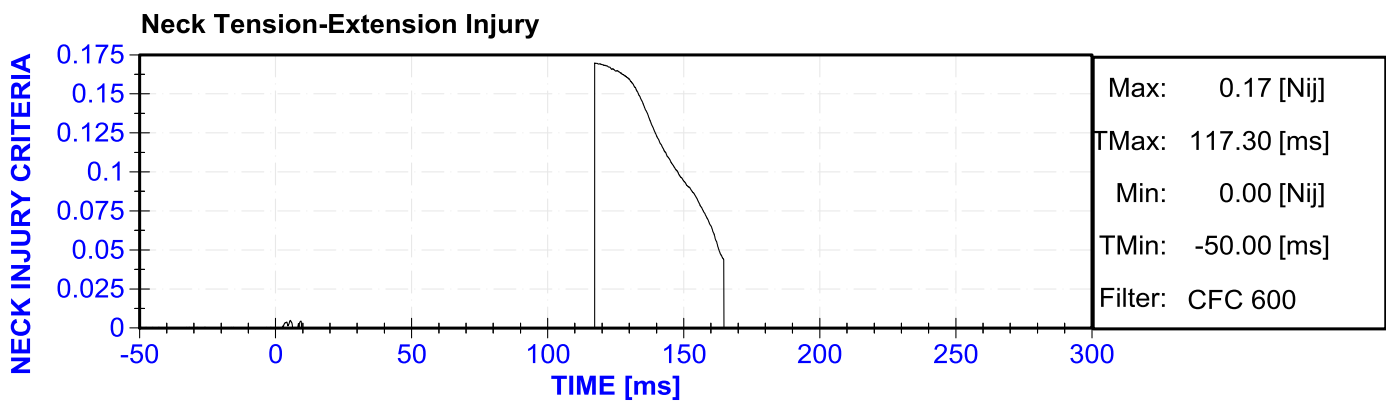
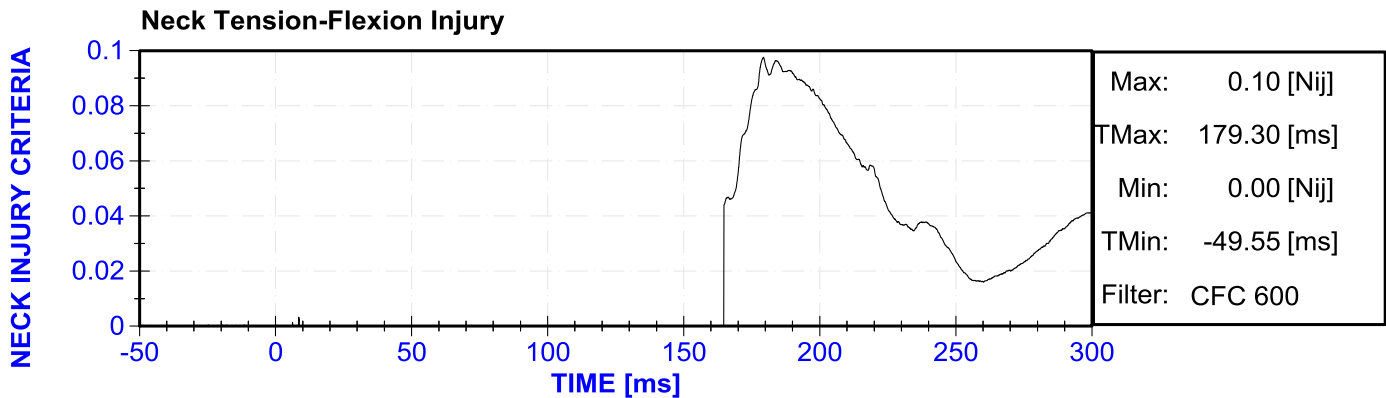


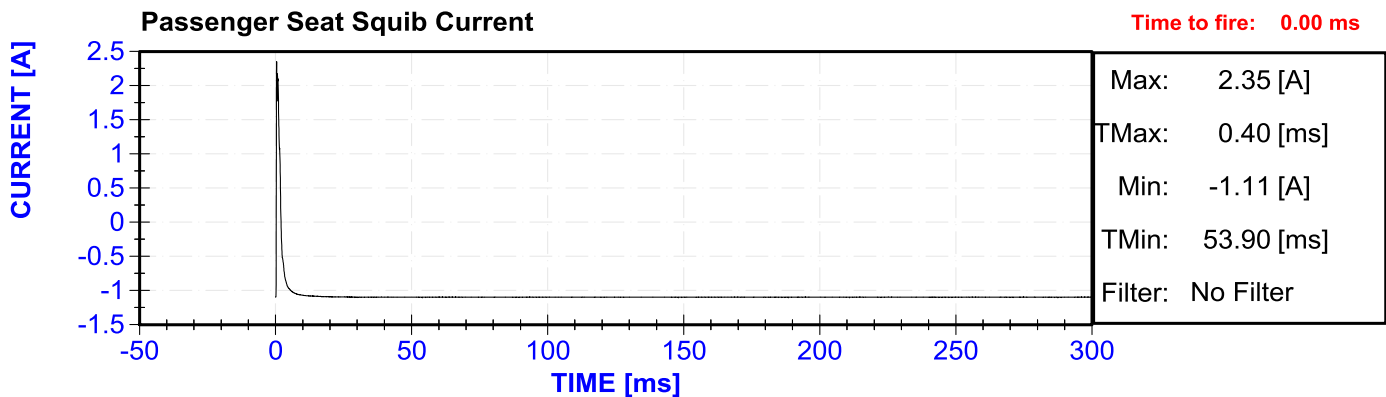
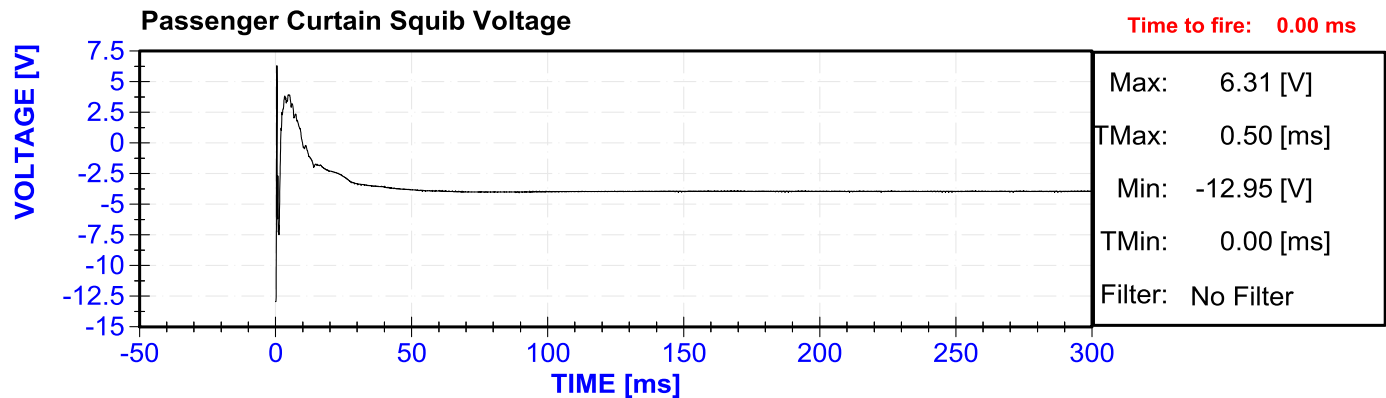
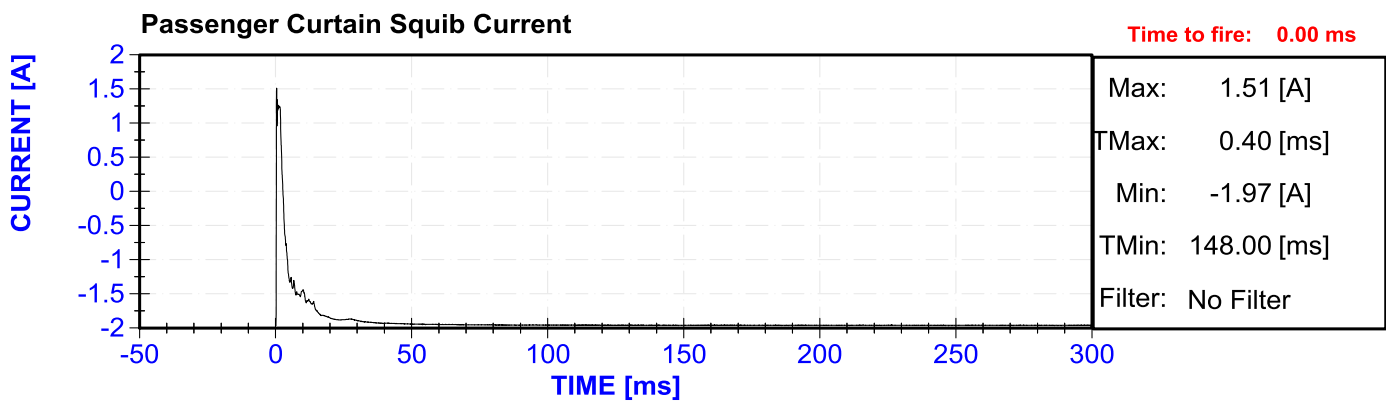
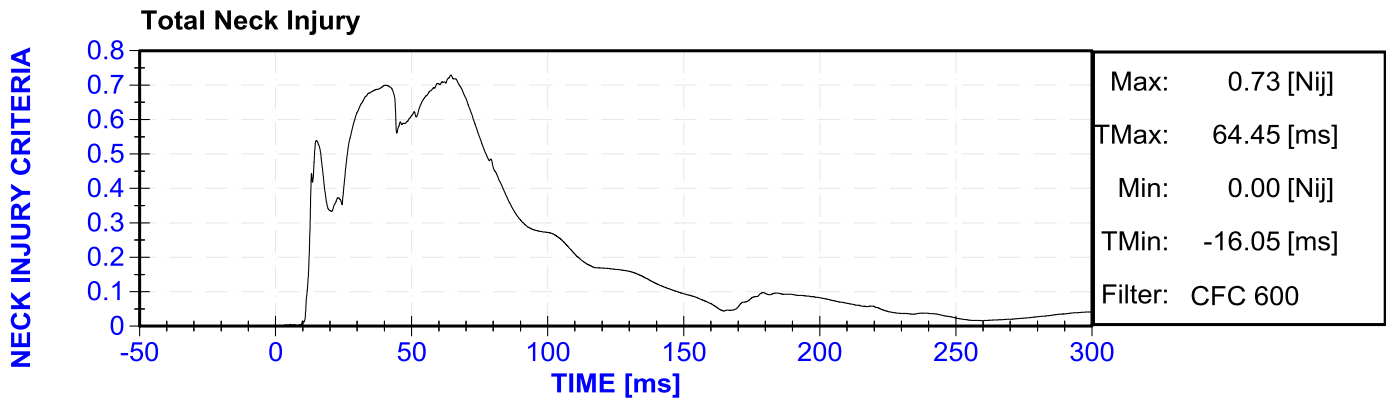


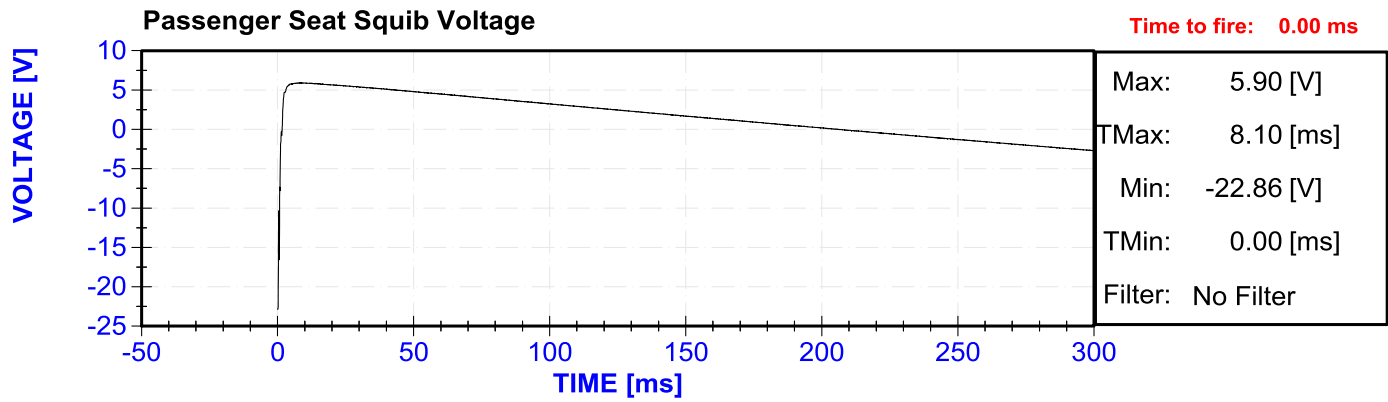












APPENDIX C

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

	POSITION #2 (Right Front Passenger) SERIAL NO.: 300 M20155317TWG2		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
Head X Acceleration	AC-P58777	ENDEVCO 7264CT	8/19/2015
Head Y Acceleration	AC-P59018	ENDEVCO 7264CT	8/18/2015
Head Z Acceleration	AC-P68608	ENDEVCO 7264CT	8/18/2015
Head Redundant X Acceleration	AC-P52095	ENDEVCO 7264CT	8/18/2015
Head Redundant Y Acceleration	AC-P58986	ENDEVCO 7264CT	8/18/2015
Head Redundant Z Acceleration	AC-P68057	ENDEVCO 7264	8/18/2015
Upper Neck X Force	LC-440Fx	Denton 1716A	6/29/2015
Upper Neck Y Force	LC-440Fy	Denton 1716A	6/29/2015
Upper Neck Z Force	LC-440Fz	Denton 1716A	6/29/2015
Upper Neck X Moment	LC-440Mx	Denton 1716A	6/29/2015
Upper Neck Y Moment	LC-440My	Denton 1716A	6/29/2015
Upper Neck Z Moment	LC-440Mz	Denton 1716A	6/29/2015
Lower Neck X Force	LC-149Fx	Denton 3166JTF	5/11/2015
Lower Neck Y Force	LC-149Fy	Denton 3166JTF	5/11/2015
Lower Neck Z Force	LC-149Fz	Denton 3166JTF	5/11/2015
Lower Neck X Moment	LC-149Mx	Denton 3166JTF	5/11/2015
Lower Neck Y Moment	LC-149My	Denton 3166JTF	5/11/2015
Lower Neck Z Moment	LC-149Mz	Denton 3166JTF	5/11/2015
Curtain Bag Voltage	ABT squib volts	AutoLab System	NOVALUE
Curtain Bag Current	ABT squib amps	AutoLab System	NOVALUE
Seat/Torso Bag Voltage	ABT squib volts	AutoLab System	NOVALUE
Seat/Torso Bag Current	ABT squib amps	AutoLab System	NOVALUE