

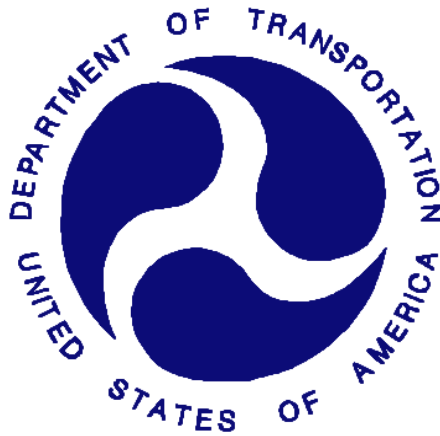
REPORT NUMBER: TWG-TRC-18-04

NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Airbag Out-of-Position Test

FCA US LLC
2018 Dodge Journey

NHTSA NUMBER: M20180305TWG2
TRC TEST NUMBER: 180719-1

PREPARED BY:
TRANSPORTATION RESEARCH CENTER INC.
10820 State Route 347
P.O. BOX B-67
East Liberty, OH 43319



Test Date: July 19, 2018

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-D-00311L, Alpha Technology PO 14GT150. 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.

Prepared By: ILO Projects Operations Group

Approved By: 
John Shultz
Project Manager

Approval Date: November 6, 2018

FINAL REPORT ACCEPTANCE BY:

Accepted By: _____

Acceptance Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. <u>REPORT NO.</u> TWG-TRC-18-04	2. <u>GOVERNMENT ACCESSION NO.</u>	3. <u>RECIPIENT'S CATALOG NO.</u>		
4. <u>TITLE AND SUBTITLE</u> Final Report of New Car Assessment Program Side Air Bag Out-of-Position Testing of 2018 Dodge Journey NHTSA No. M20180305TWG2		5. Report Date November 6, 2018		
		6. <u>PERFORMING ORGANIZATION CODE</u> TRC		
7. <u>AUTHOR(S)</u> John Shultz, Project Manager		8. <u>PERFORMING ORGANIZATION REPORT NO.</u> 180719-1		
9. <u>PERFORMING ORGANIZATION NAME AND ADDRESS</u> Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		10. <u>WORK UNIT NO.</u>		
		11. <u>CONTRACT OR GRANT NO.</u> DTNH22-13-D-00311L		
12. <u>SPONSORING AGENCY NAME AND ADDRESS</u> Alpha Technology Associate, Inc. 2810 Old Lee Hwy, Suite 120 Fairfax, VA 22031		13. <u>TYPE OF REPORT AND PERIOD COVERED</u> Final Test Report July 19, 2018 – November 6, 2018		
		14. <u>SPONSORING AGENCY CODE</u> NRM-110		
15. <u>SUPPLEMENTARY NOTES</u>				
16. <u>ABSTRACT</u> <p>A side air bag out of position test was conducted on the subject 2018 Dodge Journey in accordance with the specifications of the Office of Crashworthiness Standards SAB OOP NCAP Laboratory Test Procedure for the generation of consumer information on vehicle side air bag protection. The test was conducted at the by Transportation Research Center Inc. in East Liberty, Ohio, on July 19, 2018.</p> <p>The curtain and torso side air bags were deployed and responses were measured on a SID-IIs. One real-time camera and three high speed cameras recorded the event. The ambient temperature at the time of air bag deployment was 21.0°C.</p>				
Section 3.3.5.2 – SID-IIs – Position 2				
Measurement Description		Units	IARV	Result
Head Injury Criteria (HIC15)		N/A	779	6
Nij		N/A	1	0.22
Upper Neck Tension		Newton	2070	302.9
Upper Neck Compression		Newton	2520	-393.7
Maximum Chest Compression		mm	34	
Maximum Chest Compression rate		m/sec	8.2	
17. <u>KEY WORDS</u> New Car Assessment Program Side Air Bag Out-of-position (OOP) Technical Working Group (TWG)		18. <u>DISTRIBUTION STATEMENT</u> Copies of this report are available from the following: Alpha Technology Associate, Inc. 2810 Old Lee Hwy, Suite 120 Fairfax, VA 22031 Phone: (703) 876-0010 FAX: (703) 876-0120 Attn: Steven Kim		
19. <u>SECURITY CLASSIFICATION OF REPORT</u> Unclassified	20. <u>SECURITY CLASSIFICATION OF PAGE</u> Unclassified	21. <u>NO. OF PAGES</u> 49	22. <u>PRICE</u>	

TABLE OF CONTENTS

<u>Section</u>		Page No.
1	Test Purpose and Procedure	1
2	Summary of Test Results	2
3	Data Sheets	3
	Data Sheet 1 – Test Summary	3
	Data Sheet 2 – General Test and Vehicle Parameter Data	4
	Data Sheet 3 – Seat Adjustment Data	5
	Data Sheet 4 – Dummy Setup and Positioning Data	6
	Data Sheet 5 – Dummy Injury Criteria Data	7
	Data Sheet 6 – Camera Setup and Description	9
A	Photographs	A-1
B	Dummy Response Data Plots	B-1
C	Test Equipment List and Calibration Information	C-1
D	Dummy Configuration and Performance Verification Data	D-1

SECTION 1 – TEST PURPOSE AND PROCEDURE

This side air bag out-of-position test is part of the MY18 New Car Assessment Program (NCAP), sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-13-D-00311L. The purpose of this test is to obtain data on the performance of side air bags with an out-of-position occupant in a 2018 Dodge Journey. The air bag test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure, dated April 2018.

SECTION 2 – SUMMARY OF TEST RESULTS

The effects of both a seat-mounted side air bag and a curtain air bag deployment in a 2018 Dodge Journey on an out-of-position SID-IIs were evaluated. The test was performed by TRC on July 19, 2018. Pre and post-test photographs of the vehicle and ATD can be found in Appendix A.

The vehicle had previously undergone crash testing as part of the NCAP. After conducting the crash test and before conducting the air bag deployment test, the vehicle was inspected for damage. The vehicle was found to be in good condition to undergo the air bag deployment test.

One real-time camera and three high-speed cameras were used to record the air bag deployment event. High speed images were recorded at rates of 1,000 frames per second. Cameras were placed relative to the position 2 and were positioned to capture the deployment event from the side, the front, and the oblique views.

The SID-IIs was placed in the right front (passenger) seat situated forward facing. This placement followed the ATD placement instructions in the NCAP Laboratory Test Procedure as well as 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 specific test section was section 3.3.5.2.

The SID-IIs was instrumented with head X, Y, and Z accelerometers, a six-axis upper neck load cell, and a six-axis lower neck load cell. During the air bag deployment, a total of twenty-two channels of data were recorded using an on-board data acquisition system. Appendix B contains the ATD response data traces and Appendix C contains the instrumentation list and calibration information. Appendix D contains the dummy's pre-test qualification performance verification data.

No Injury Reference Values were exceeded during the test. The occupant data is summarized below:

Measurement Description	Units	Passenger ATD SID-IIs	
		IARV	Result
Head Injury Criteria (HIC15)	N/A	779	6
Nij	N/A	1	0.22
Upper Neck Tension	N	2070	302.9
Upper Neck Compression	N	2520	-393.7
Thorax Compression	mm	34	
Thorax Compression rate	m/sec	8.2	

SECTION 3 DATA SHEET

DATA SHEET NO. 1 TEST SUMMARY

Test Vehicle: 2018 Dodge Journey
Test Program: Side Air Bag Out-of-Position Test

NHTSA No.: M20180305TWG2
Test Date: 7/19/2018

TEST SUMMARY

TEST CONFIGURATION INFORMATION

Seating Position:	P2	Right Front Seating Position
Test Section:	3.3.5.2	Roof-Rail-Mounted, Forward Facing
Airbag 1:	Seat	Seat mounted – outside seam
Airbag 2:	Side Rail	Side curtain airbag
Booster Block:	N/A	N/A
ATD Type/Serial No.:	SID-IIs	DI8818
Vehicle	Dodge	Journey
Previous Crash Test	MDB	5/4/2018 and M20180305

EQUIPMENT INFORMATION

Number of Data Channels	22
Number of High Speed Video Cameras	3
Number of Real Time Video Cameras	1

VISIBLE DUMMY CONTACT POINTS

Head	None Visible
Upper Torso	None Visible
Lower Torso	None Visible
Knee	None Visible

**DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2018 Dodge Journey
Test Program: Side Air Bag Out-of-Position Test

NHTSA No.: M20180305TWG2
Test Date: 7/19/2018

TEST CONFIGURATION INFORMATION

NHTSA No.	M20180305
Model Year	2018
Make	Dodge
Model	Journey SE
Body Style	MPV
VIN	3C4PDCAB8JT182880
Body Color	Billet Clear Coat
Odometer Reading (km/mi)	8 mi
Engine Displacement (L)	2.4
Type/No. Cylinders	Gas/4
Engine Placement	Front/Transverse
Transmission Type	Automatic
Transmission Speeds	4
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	No
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Passenger Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Passenger Load Limiter	No
Other Safety Restraint	No

DATA FROM CERTIFICATION LABEL

Manufactured By	FCA US LLC
Date of Manufacture	10-17
Vehicle Type	MPV

GVWR (kg)	2405
GAWR Front (kg)	1248
GAWR Rear (kg)	1316

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	2	7	
Capacity Weight (VCW) (kg)				528.0	(A)
DSC x 68.04 (kg)				476.28	(B)
Cargo Weight (RCLW) (kg)				51.72	(A-B)

VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	Yes	N/A	N/A		N/A	Yes	N/A
Rear or Second Row Seat	N/A	N/A	Yes	Yes	N/A	Yes	N/A
Third Row Seat	N/A	Yes	N/A	N/A	Yes	N/A	N/A

**DATA SHEET NO. 3
SEAT ADJUSTMENT DATA**

Test Vehicle: 2018 Dodge Journey
 Test Program: Side Air Bag Out-of-Position Test

NHTSA No.: M20180305TWG2
 Test Date: 7/19/2018

VEHICLE SEAT FORE/AFT POSITION

Seat Location	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	# Detents	mm	# Detents
Front Right	234	35	0	0
Rear Right	120	13	120	13

Seat Fore/Aft Position Per TWG Guidelines	Start at full rear, move forward to minimize distance between airbag and top of head
Reason for Deviation from TWG Guidelines	To minimize distance between airbag and top of head

VEHICLE SEAT BACK ANGLE ADJUSTMENT

Seat Location	Total Seat Back Angle Range		Test Position from Most Upright (Vertical)	
	Degrees	# Detents	Degrees	# Detents
Front Right	76.2	40	21.4	10
Rear Right	22.0	12	17.3	1

OEM Back Angle Design Position	21.4 degrees measured across seat back
Method of Measuring Back Angle Position	Inclinometer on straight edge across seat back
Seat Back Angle Position Per TWG Guidelines	Per OEM Form 1
Reason for Deviation from TWG Guidelines	None

VEHICLE SEAT HEIGHT ADJUSTMENT

Seat Location	Total Height Adjustment Range		Test Position from Lowest Position	
	mm	# Detents	mm	# Detents
Front Right	N/A	N/A	Fixed	N/A
Rear Right	N/A	N/A	Fixed	N/A

Seat Height Adjustment Per TWG Guidelines	Full up
Reason for Deviation from TWG Guidelines	No Feature

**DATA SHEET NO. 4
DUMMY SETUP AND POSITIONING DATA**

Test Vehicle: 2018 Dodge Journey
 Test Program: Side Air Bag Out-of-Position Test

NHTSA No.: M20180305TWG2
 Test Date: 7/19/2018

DUMMY INFORMATION

ATD Type	SID-IIs
Serial Number	DI8818
Qualification Date	7/13/18
Qualification Type	Partial
Clothing	Shirt, pants, shoes
Other ATD Prep	Baby powder, electrical tape

DUMMY POSITIONING INFORMATION

TWG Setup Instructions	As specified in the 3.3.5.2 Test Procedure; Seat is adjusted to its highest position; ATD positioned to 3.3.5.2.1
Actual Setup	As specified in the 3.3.5.2 Test Procedure; The vehicle seat has no height adjustment. The seat is in the full forward position with the seat back angle set to 21.4 degrees, as called out in Form 1. The dummy's skull cap is powdered and the seam is taped. The dummy is facing forward with the shoulder in contact with the vehicle's door panel. The dummy is leaned outboard with the centerline of the top of the head directly under the projected deployment trajectory of the side curtain airbag. Masking tape is wrapped around the dummy's neck bracket and attached to the B-pillar to hold the head in position. The head is neither in flexion or extension in this position. The arm was positioned to 90 degrees with respect to its body.

DATA SHEET NO. 5
DUMMY INJURY CRITERIA DATA

Test Vehicle: 2018 Dodge Journey
Test Program: Side Air Bag Out-of-Position Test

NHTSA No.: M20180305TWG2
Test Date: 7/19/2018

RECORDED DATA - MINIMUMS AND MAXIMUMS

Channel	Unit	CFC	Maximum	Time (ms)	Minimum	Time (ms)
Head X	G	1000	3.36	16.56	-12.68	29.84
Head Y	G	1000	19.94	32.16	-3.95	16.64
Head Z	G	1000	8.18	29.20	-8.61	12.64
Head Resultant	G	1000	21.00	32.16		
Head Red X	G	1000	3.37	15.84	-13.09	29.84
Head Red Y	G	1000	19.81	32.16	-4.10	16.64
Head Red Z	G	1000	7.66	29.20	-8.65	12.64
Head Red Resultant	G	1000	20.80	32.16		
Upper Neck X	N	1000	19.43	120.16	-141.22	19.76
Upper Neck Y	N	1000	6.09	7.36	-171.42	46.72
Upper Neck Z	N	1000	302.86	35.60	-393.67	11.92
Upper Neck X	Nm	600	10.52	31.92	-7.28	17.44
Upper Neck Y	Nm	600	10.68	18.72	-8.71	35.28
Upper Neck Z	Nm	600	1.68	102.80	-5.76	39.84
Lower Neck X	N	1000	234.82	17.12	-53.55	33.12
Lower Neck Y	N	1000	13.42	3.52	-218.38	12.56
Lower Neck Z	N	1000	291.87	35.28	-337.55	12.16
Lower Neck X	Nm	600	0.52	3.52	-33.44	59.60
Lower Neck Y	Nm	600	8.29	12.16	-23.30	35.44
Lower Neck Z	Nm	600	1.85	10.24	-7.62	46.48

HEAD INJURY SUMMARY

HIC15	T1 (ms)	T2 (ms)	HIC36	T1 (ms)	T2 (ms)
6	28.56	41.44	6	28.56	41.44

**DATA SHEET NO. 5
DUMMY INJURY CRITERIA DATA (CONTINUED)**

Test Vehicle: 2018 Dodge Journey
 Test Program: Side Air Bag Out-of-Position Test

NHTSA No.: M20180305TWG2
 Test Date: 7/19/2018

NECK INJURY SUMMARY

Injury Criteria	Value	Time (ms)
Upper Neck NTF	0.05	22.64
Upper Neck NTE	0.22	35.36
Upper Neck NCF	0.13	12.80
Upper Neck NCE	0.07	29.04
Peak Tension	302.9	35.60
Peak Compression	-393.7	11.92

CHEST INJURY SUMMARY

Injury Criteria	Value	Time (ms)
[Chest/Rib] Deflection		
Deflection Rate ¹		

¹Deflection Rate was assessed by measuring compression from a rotary potentiometer

RESEARCH INJURY SUMMARY

Research Injury Criteria ¹	Value	Time (ms)
Upper Neck Lateral Moment		
Upper Neck Twist Moment		
Lower Neck Flexion Moment		
Lower Neck Extension Moment		
Lower Neck Lateral Moment		
Lower Neck Twist Moment		
Lower Neck Tension		
Lower Neck Compression		
Spine Acceleration		

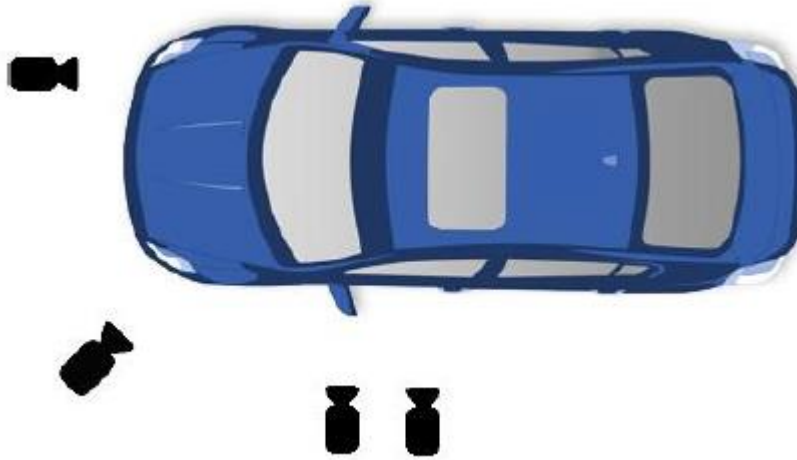
¹These injury criteria are only monitored and not considered pass/fail

**DATA SHEET NO. 6
CAMERA SETUP AND DESCRIPTION**

Test Vehicle: 2018 Dodge Journey
 Test Program: Side Air Bag Out-of-Position Test

NHTSA No.: M20180305TWG2
 Test Date: 7/19/2018

CAMERA SETUP DIAGRAM FOR SAB OOP TESTS



No.	Camera View	Location (mm) ¹			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Left View	0	-2449	-1127	50	1000
2	Oblique View	2098	-1651	-1601	50	1000
3	Front View	2477	-221	-1658	50	1000
4	Real Time	-89	-2484	-1143	Zoom	30

¹ +X forward of vehicle, +Y right of vehicle, +Z into ground

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

<u>Figure</u>	<u>Photograph Title</u>	<u>Page</u>
Figure A-1	Right Front ¾ View of Test Vehicle as Delivered	A-3
Figure A-2	Vehicle Certification Label	A-3
Figure A-3	Pre-Test Vehicle Left Side View	A-4
Figure A-4	Post-Test Vehicle Left Side View	A-4
Figure A-5	Pre-Test Vehicle Location of Air Bag 1	A-5
Figure A-6	Pre-Test Vehicle Location of Air Bag 2	A-5
Figure A-7	Pre-Test Vehicle Location of Air Bag 3	A-6
Figure A-8	Pre-Test Vehicle Seat Back Angle	A-6
Figure A-9	Pre-Test Dummy Left Side View	A-7
Figure A-10	Post-Test Dummy Left Side View	A-7
Figure A-11	Pre-Test Dummy Left Side Close-up View	A-8
Figure A-12	Post-Test Dummy Left Side Close-up View	A-8
Figure A-13	Pre-Test Dummy Left ¾ Front View	A-9
Figure A-14	Post-Test Dummy Left ¾ Front View	A-9
Figure A-15	Pre-Test Dummy Left ¾ Front Close-up View	A-10
Figure A-16	Post-Test Dummy Left ¾ Front Close-up View	A-10
Figure A-17	Pre-Test Dummy Front View	A-11
Figure A-18	Post-Test Dummy Front View	A-11
Figure A-19	Pre-Test Dummy Front Close-up View	A-12
Figure A-20	Post-Test Dummy Front Close-up View	A-12
Figure A-21	Pre-Test Dummy Right ¾ Front View	A-13
Figure A-22	Post-Test Dummy Right ¾ Front View	A-13
Figure A-23	Pre-Test Dummy Right Side Front View	A-14
Figure A-24	Post-Test Dummy Right Side Front View	A-14
Figure A-25	Post-Test Dummy Right Side Front View	A-15
Figure A-26	Post-Test Curtain Air Bag Left Side View	A-15
Figure A-27	Post-Test Curtain Air Bag Left ¾ Front View	A-16
Figure A-28	Post-Test Curtain Air Bag Front View	A-16
Figure A-29	Post-Test Curtain Air Bag Right Side View	A-17



Figure A-1 Right Front ¾ View of Test Vehicle as Delivered



Figure A-2 Vehicle Certification Label



Figure A-3 Pre-Test Vehicle Left Side View



Figure A-4 Post-Test Vehicle Left Side View



Figure A-5 Pre-Test Vehicle Location of Air Bag 1



Figure A-6 Pre-Test Vehicle Location of Air Bag 2



Figure A-7 Pre-Test Vehicle Location of Air Bag 3



Figure A-8 Pre-Test Vehicle Seat Back Angle



Figure A-9 Pre-Test Dummy Left Side View



Figure A-10 Post-Test Dummy Left Side View



Figure A-11 Pre-Test Dummy Left Side Close-up View



Figure A-12 Post-Test Dummy Left Side Close-up View



Figure A-13 Pre-Test Dummy Left $\frac{3}{4}$ Front View



Figure A-14 Post-Test Dummy Left $\frac{3}{4}$ Front View



Figure A-15 Pre-Test Dummy Left $\frac{3}{4}$ Front Close-up View



Figure A-16 Post-Test Dummy Left $\frac{3}{4}$ Front Close-up View



Figure A-17 Pre-Test Dummy Front View



Figure A-18 Post-Test Dummy Front View



Figure A-19 Pre-Test Dummy Front Close-up View



Figure A-20 Post-Test Dummy Front Close-up View



Figure A-21 Pre-Test Dummy Right 3/4 Front View



Figure A-22 Post-Test Dummy Right 3/4 Front View



Figure A-23 Pre-Test Dummy Right Side Front View



Figure A-24 Post-Test Dummy Right Side Front View



Figure A-25 Post-Test Dummy Right Side Front View



Figure A-26 Post-Test Curtain Air Bag Left Side View



Figure A-27 Post-Test Curtain Air Bag Left ¾ Front View



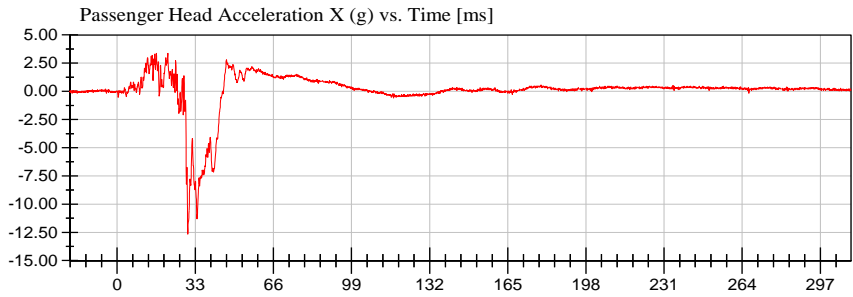
Figure A-28 Post-Test Curtain Air Bag Front View



Figure A-29 Post-Test Curtain Air Bag Right Side View

APPENDIX B
DUMMY RESPONSE DATA PLOTS

<u>No.</u>	<u>List of Data Plots Provided in the Test Report</u>	<u>Page</u>
1	Dummy Head Acceleration (X) Primary vs. Time	B-3
2	Dummy Head Acceleration (Y) Primary vs. Time	B-3
3	Dummy Head Acceleration (Z) Primary vs. Time	B-3
4	Dummy Head Resultant Acceleration Primary vs. Time	B-3
5	Dummy Head Acceleration (X) Redundant vs. Time	B-4
6	Dummy Head Acceleration (Y) Redundant vs. Time	B-4
7	Dummy Head Acceleration (Z) Redundant vs. Time	B-4
8	Dummy Head Resultant Acceleration Redundant vs. Time	B-4
9	Dummy Upper Neck Force X vs. Time	B-5
10	Dummy Upper Neck Force Y vs. Time	B-5
11	Dummy Upper Neck Force Z vs. Time	B-5
12	Dummy Upper Neck Moment X vs. Time	B-6
13	Dummy Upper Neck Moment Y vs. Time	B-6
14	Dummy Upper Neck Moment Z vs. Time	B-6
15	Dummy Lower Neck Force X vs. Time	B-7
16	Dummy Lower Neck Force Y vs. Time	B-7
17	Dummy Lower Neck Force Z vs. Time	B-7
18	Dummy Lower Neck Moment X vs. Time	B-8
19	Dummy Lower Neck Moment Y vs. Time	B-8
20	Dummy Lower Neck Moment Z vs. Time	B-8
21	NIJ vs. Time	B-9
22	Airbag Event Front Passenger Seat (V) vs. Time	B-10
23	Airbag Event Passenger Side Curtain (V) vs. Time	B-10
24	Airbag Event Front Passenger Seat (A) vs. Time	B-10
25	Airbag Event Passenger Side Curtain (A) vs. Time	B-10



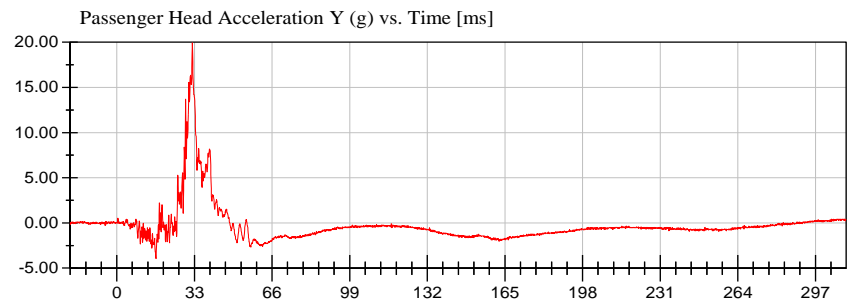
<Max>

3.36 g at 16.56 ms

<Min>

-12.68 g at 29.84 ms

CFC_1000



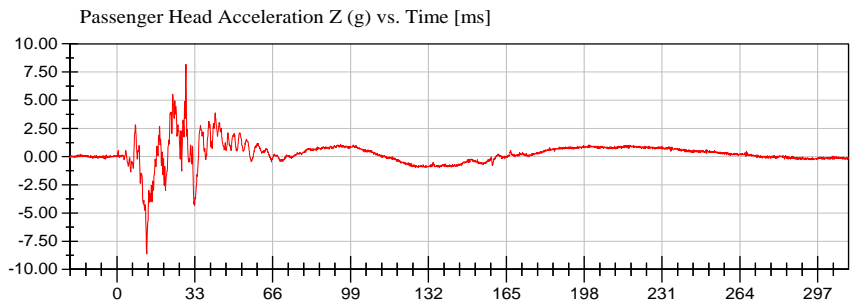
<Max>

19.94 g at 32.16 ms

<Min>

-3.95 g at 16.64 ms

CFC_1000



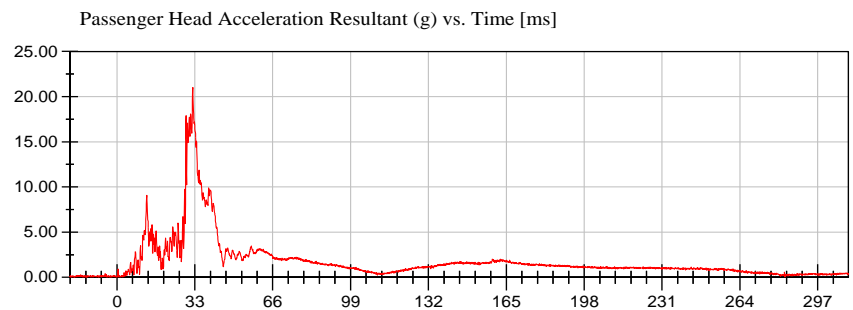
<Max>

8.18 g at 29.20 ms

<Min>

-8.61 g at 12.64 ms

CFC_1000



<Max>

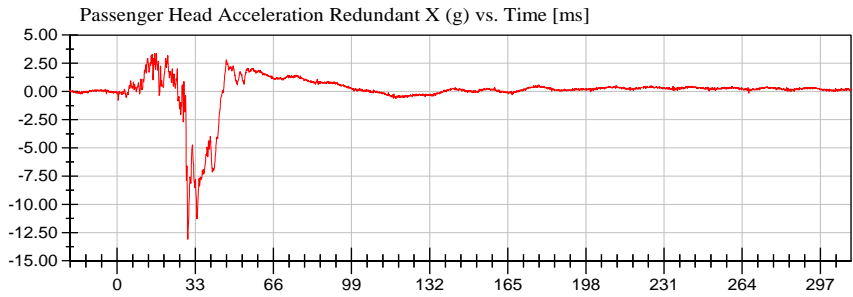
21.00 g at 32.16 ms

<Min>

0.05 g at -20.00 ms

CFC_1000





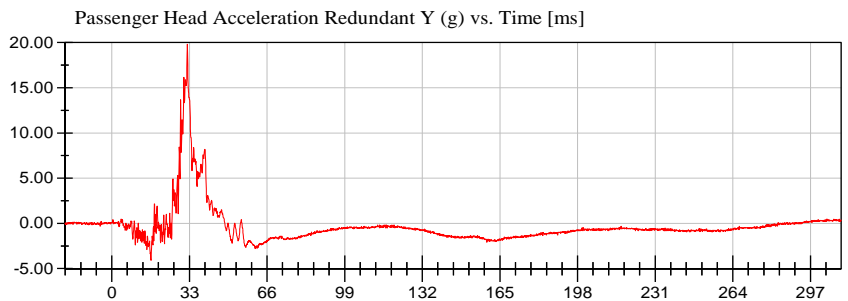
<Max>

3.37 g at 15.84 ms

<Min>

-13.09 g at 29.84 ms

CFC_1000



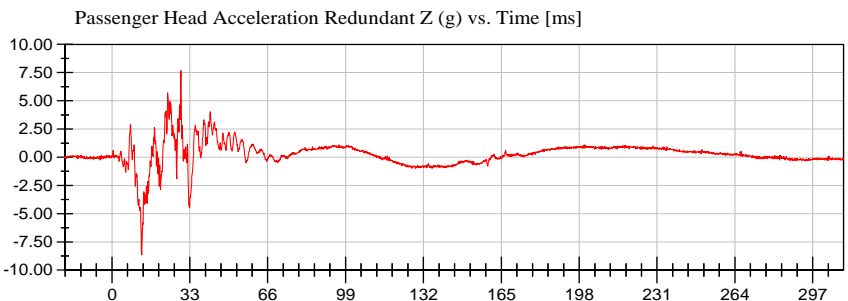
<Max>

19.81 g at 32.16 ms

<Min>

-4.10 g at 16.64 ms

CFC_1000



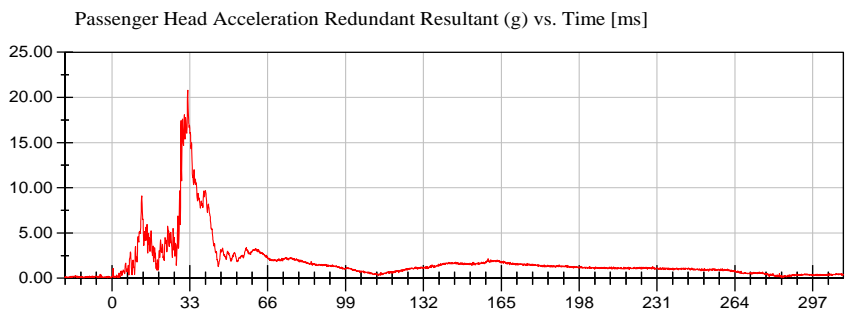
<Max>

7.66 g at 29.20 ms

<Min>

-8.65 g at 12.64 ms

CFC_1000



<Max>

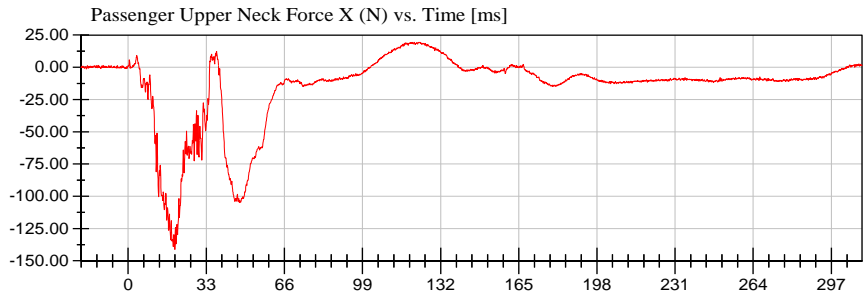
20.80 g at 32.16 ms

<Min>

0.03 g at -19.04 ms

CFC_1000





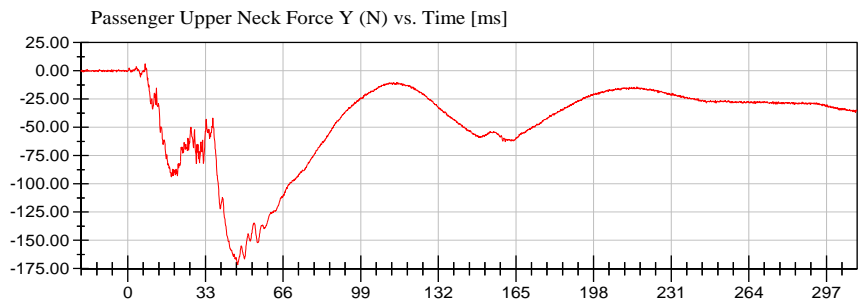
<Max>

19.43 N at 120.16 ms

<Min>

-141.22 N at 19.76 ms

CFC_1000



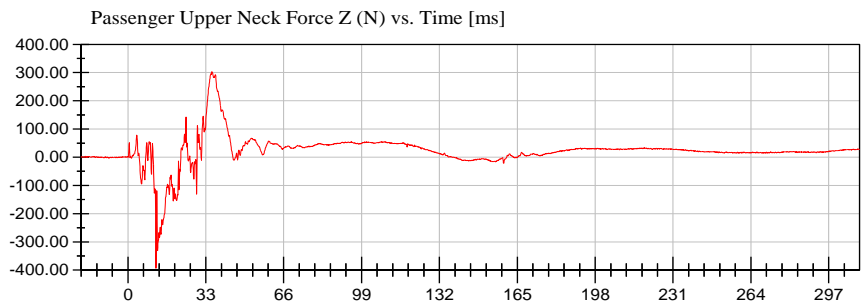
<Max>

6.09 N at 7.36 ms

<Min>

-171.41 N at 46.72 ms

CFC_1000



<Max>

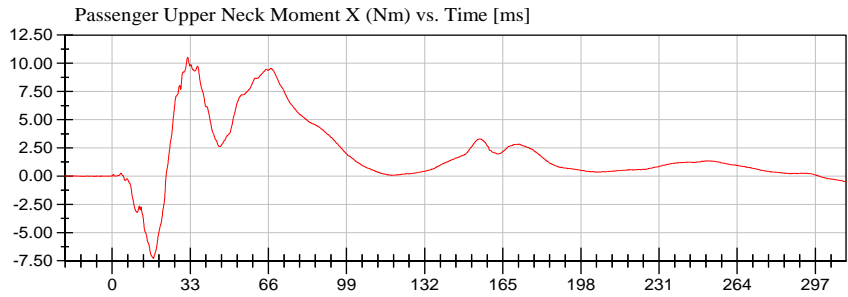
302.86 N at 35.60 ms

<Min>

-393.67 N at 11.92 ms

CFC_1000





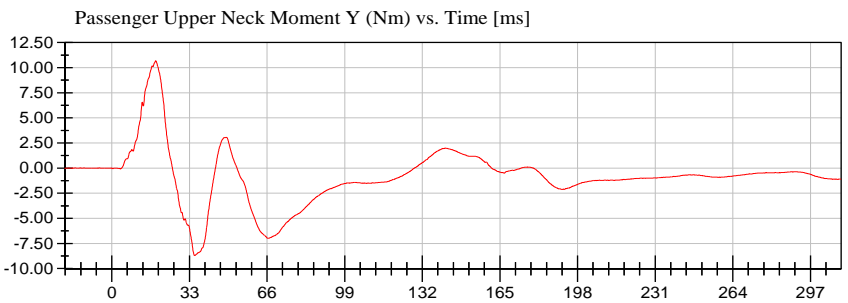
<Max>

10.52 Nm at 31.92 ms

<Min>

-7.28 Nm at 17.44 ms

CFC_600



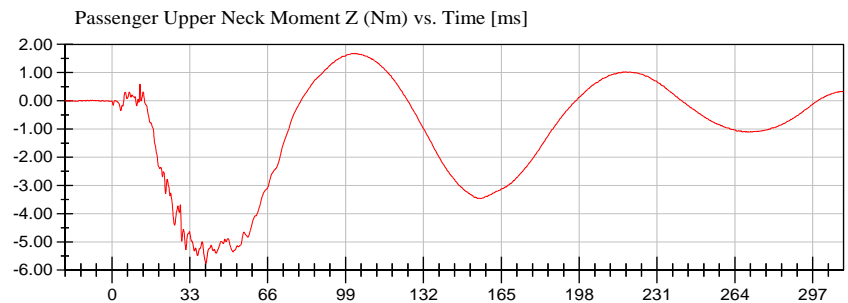
<Max>

10.68 Nm at 18.72 ms

<Min>

-8.70 Nm at 35.28 ms

CFC_600



<Max>

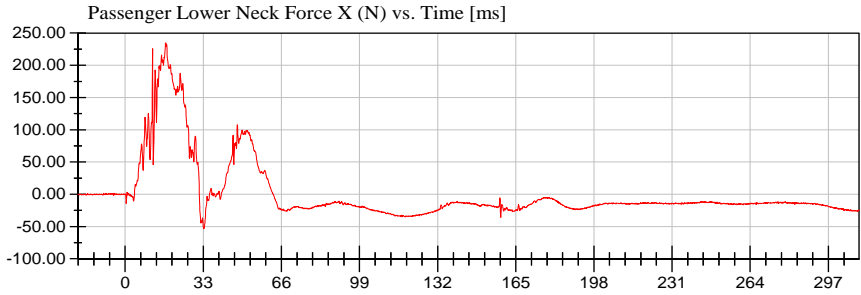
1.68 Nm at 102.80 ms

<Min>

-5.76 Nm at 39.84 ms

CFC_600





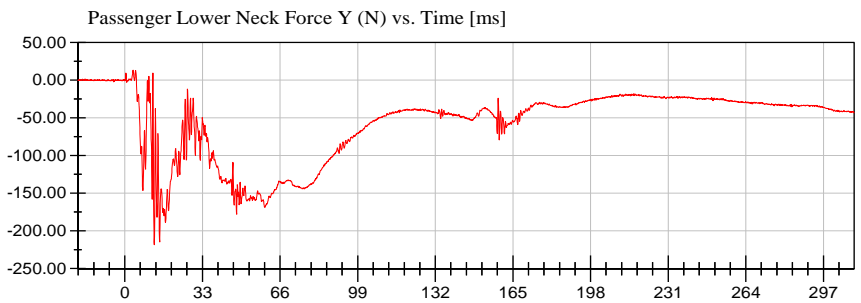
<Max>

234.82 N at 17.12 ms

<Min>

-53.55 N at 33.12 ms

CFC_1000



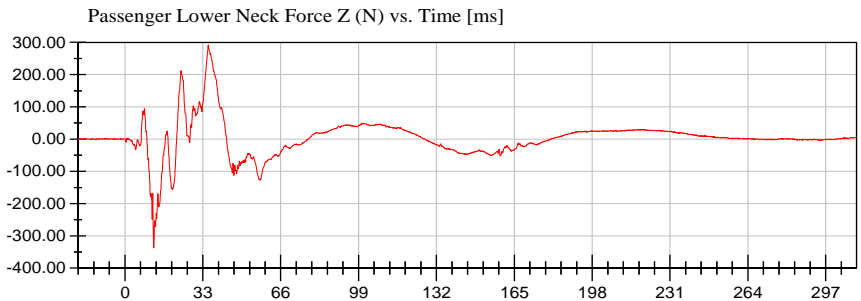
<Max>

13.42 N at 3.52 ms

<Min>

-218.38 N at 12.56 ms

CFC_1000



<Max>

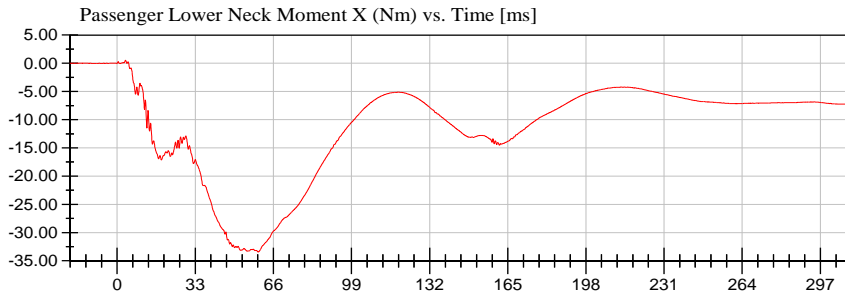
291.87 N at 35.28 ms

<Min>

-337.55 N at 12.16 ms

CFC_1000





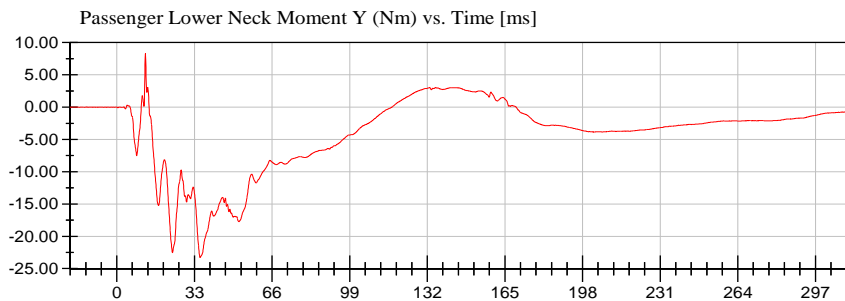
<Max>

0.52 Nm at 3.52 ms

<Min>

-33.44 Nm at 59.60 ms

CFC_600



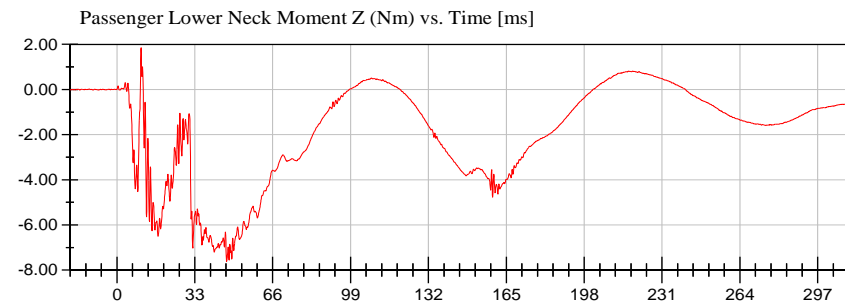
<Max>

8.29 Nm at 12.16 ms

<Min>

-23.30 Nm at 35.44 ms

CFC_600



<Max>

1.85 Nm at 10.24 ms

<Min>

-7.62 Nm at 46.48 ms

CFC_600





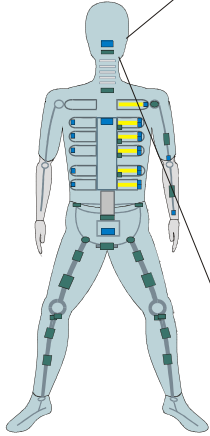
2018 Dodge Journey TWG OOP Test 3.3.5.2

Neck Injury Predictor (NIJ)

Date: 07/19/2018
Time: 11:17

Customer: Alpha Technology
Test Number: M20180305TWG2

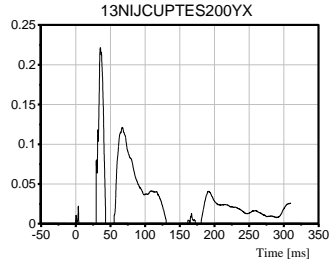
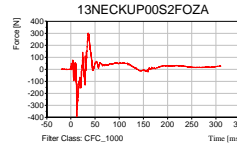
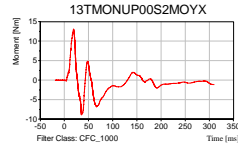
Test Orientation = Side
Fz:(Tension) = 3880
Fz:(Compression) = 3880
Myc(Extension) = 61
Myc(Flexion) = 155



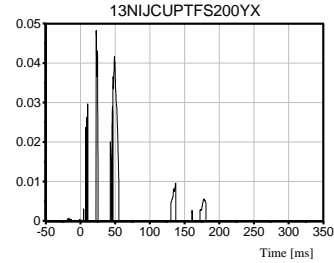
Dummy: SID IIs
Seating Position:
Right Front Passenger

NIJ Source Code: (Fz/Fz)+(Myc/Myc)

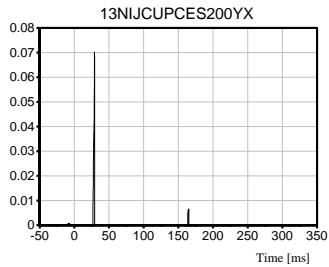
TRC Inc. Test Lab: CTF
Test Number: 180719-1



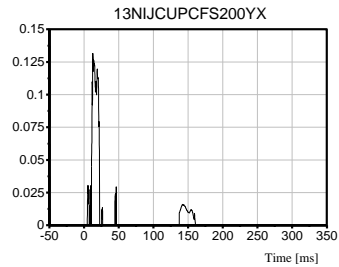
Max [NTE] 0.2215 at 35.36 ms



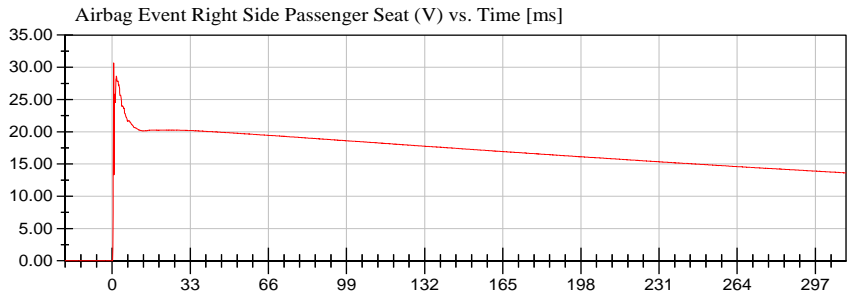
Max [NTF] 0.0482 at 22.64 ms



Max [NCE] 0.0701 at 29.04 ms



Max [NCF] 0.1315 at 12.80 ms



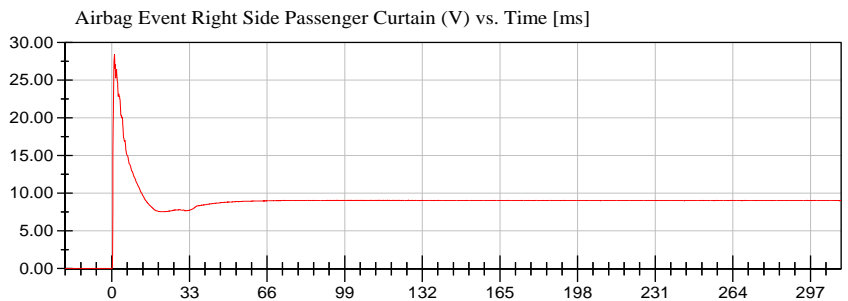
<Max>

30.69 V at 0.64 ms

<Min>

0.00 V at -20.00 ms

Unfiltered



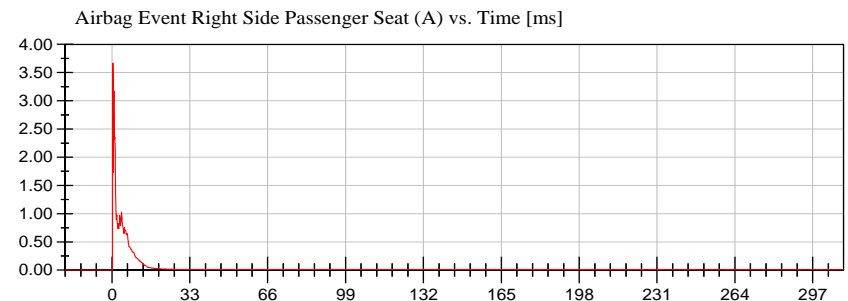
<Max>

28.42 V at 1.12 ms

<Min>

0.00 V at -20.00 ms

Unfiltered



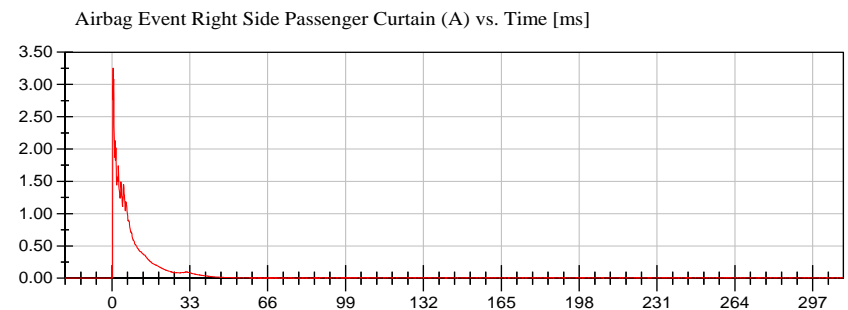
<Max>

3.67 A at 0.40 ms

<Min>

0.00 A at -20.00 ms

Unfiltered



<Max>

3.25 A at 0.48 ms

<Min>

0.00 A at -20.00 ms

Unfiltered



APPENDIX C
DUMMY QUALIFICATION DATA

Pre-Test Calibration Sheets
Passenger S/N DI8818

Transportation Research Center Inc.

Right Lateral Head Drop
SID IIs Serial No. DI8818 Certification No. 26-1
Test Date: 7/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	134.4 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	4.1 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Condition: Used

Comments:

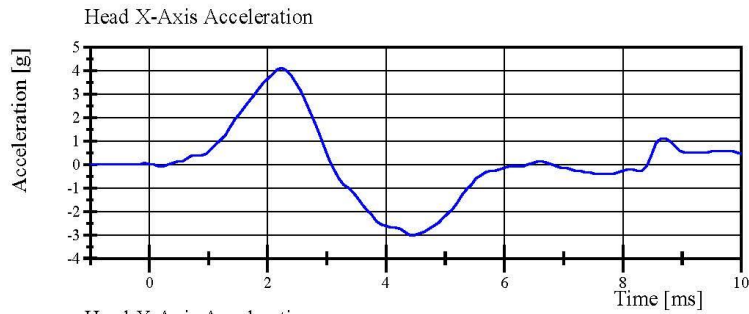
Head Skin S/N: DI6457

Transportation Research Center Inc.

Right Lateral Head Drop

SID IIs Serial No. DI8818 Certification No. 26-1

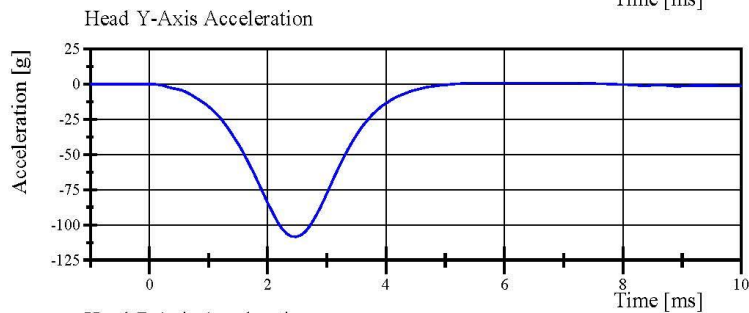
Test Date: 7/11/2018



Filter Class: CFC_1000

Max: 4.1 g at 2.2 ms

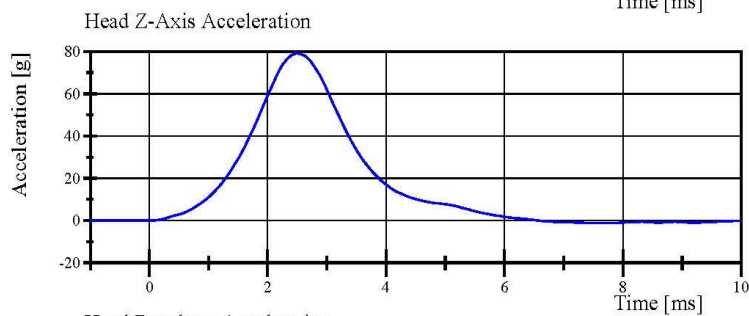
Min: -3.0 g at 4.4 ms



Filter Class: CFC_1000

Max: 1.0 g at 5.7 ms

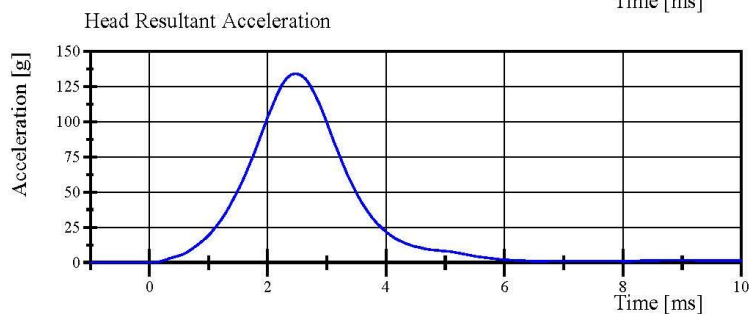
Min: -108.5 g at 2.5 ms



Filter Class: CFC_1000

Max: 79.2 g at 2.5 ms

Min: -1.1 g at 7.4 ms



Filter Class: CFC_1000

Max: 134.4 g at 2.5 ms

Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

07.11.2018 09:39:24 199



Transportation Research Center Inc.

Right Lateral Neck
SID IIs Serial No. DI8818 Certification No. 26-4
Test Date: 7/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Pendulum Velocity	5.51 - 5.63 m/s	5.597 m/s	Yes
Pendulum Integrated Velocity			
Change at 10 ms	(-2.20) - (-2.80) m/s	-2.446 m/s	Yes
Change at 15 ms	(-3.30) - (-4.10) m/s	-3.529 m/s	Yes
Change at 20 ms	(-4.40) - (-5.40) m/s	-4.733 m/s	Yes
Change at 25 ms	(-5.40) - (-6.10) m/s	-5.685 m/s	Yes
Change at 25 to 100 ms	(-5.50) - (-6.20) m/s	-5.927 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	71 - 81 deg	71.0 deg	Yes
Time of Peak	50 - 70 ms	62.2 ms	Yes
Total Neck Occipital Condyles Moment	(-36) - (-44) N·m	-39.4 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	117.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:

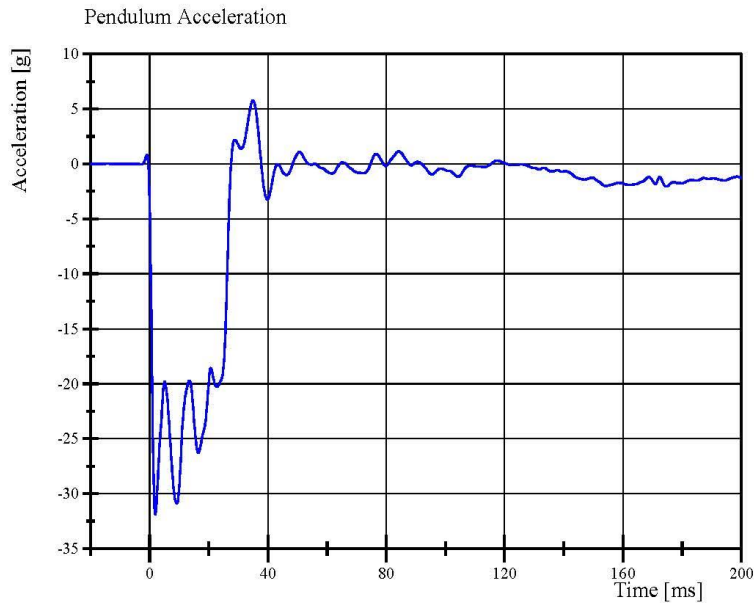
Neck S/N: DJ1259

Transportation Research Center Inc.

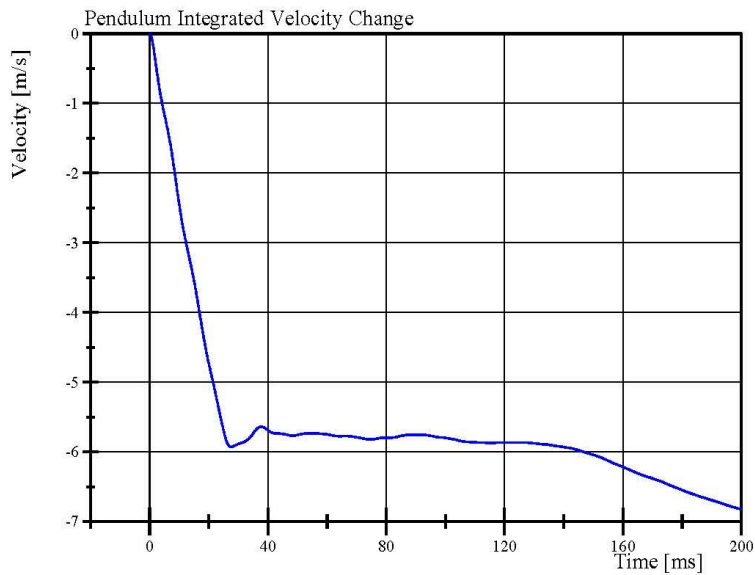
Right Lateral Neck

SID IIs Serial No. DI8818 Certification No. 26-4

Test Date: 7/11/2018



Filter Class: CFC_180
Max: 5.8 g at 35.0 ms
Min: -31.9 g at 1.9 ms



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -6.8 m/s at 200.0 ms

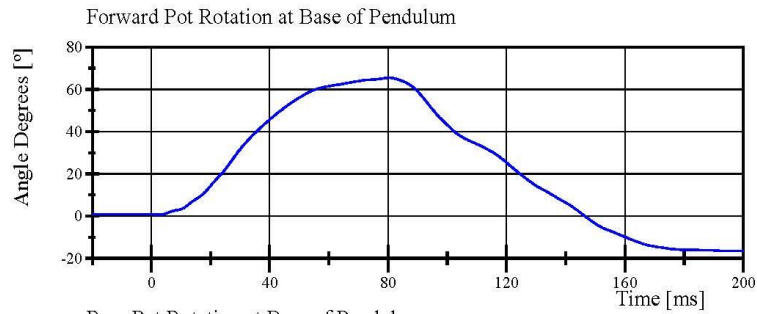
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

07.11.2018 13:17:09 717

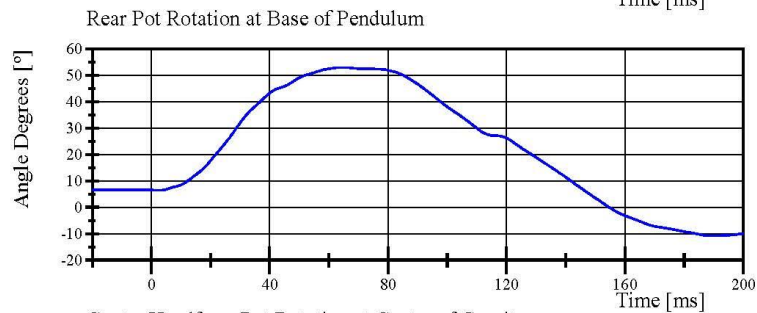


Transportation Research Center Inc.

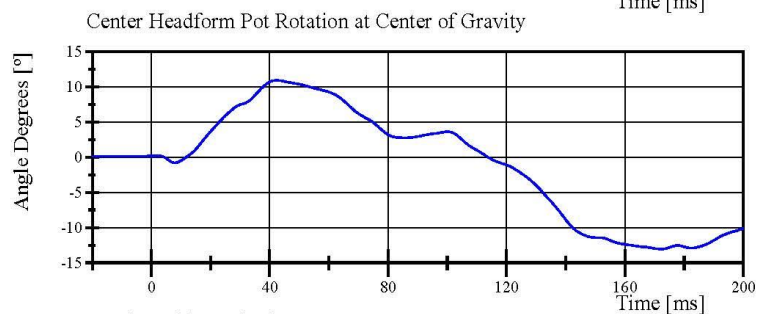
Right Lateral Neck
SID IIs Serial No. DI8818 Certification No. 26-4
Test Date: 7/11/2018



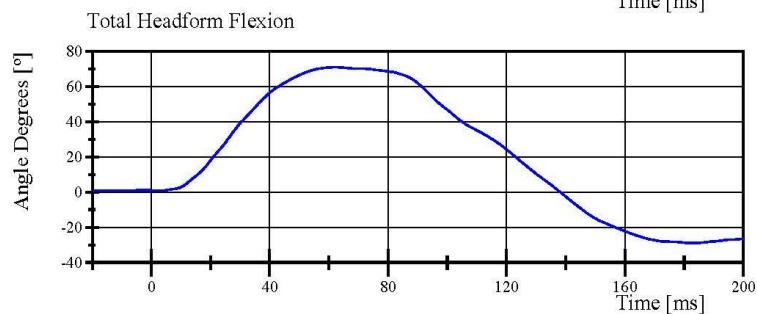
Filter Class: CFC_60
Max: 65.5 ° at 80.3 ms
Min: -16.3 ° at 197.0 ms



Filter Class: CFC_60
Max: 53.0 ° at 64.6 ms
Min: -10.7 ° at 189.4 ms



Filter Class: CFC_60
Max: 10.9 ° at 42.3 ms
Min: -13.0 ° at 172.2 ms

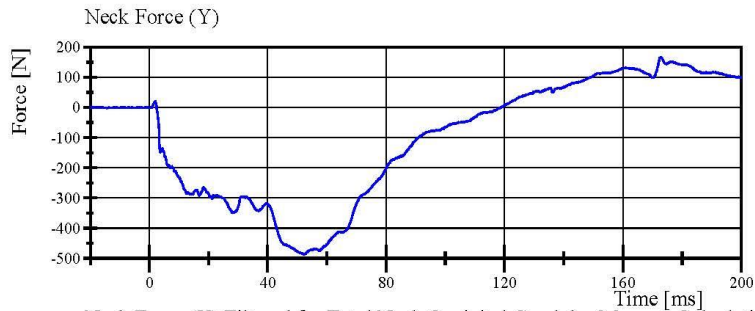


Filter Class: CFC_60
Max: 71.0 ° at 62.2 ms
Min: -28.8 ° at 182.5 ms

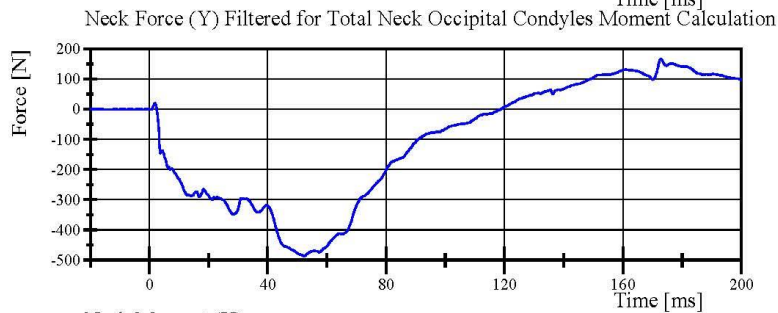


Transportation Research Center Inc.

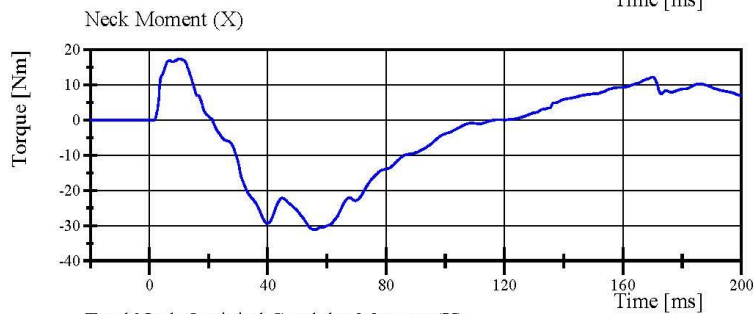
Right Lateral Neck
SID IIs Serial No. DI8818 Certification No. 26-4
Test Date: 7/11/2018



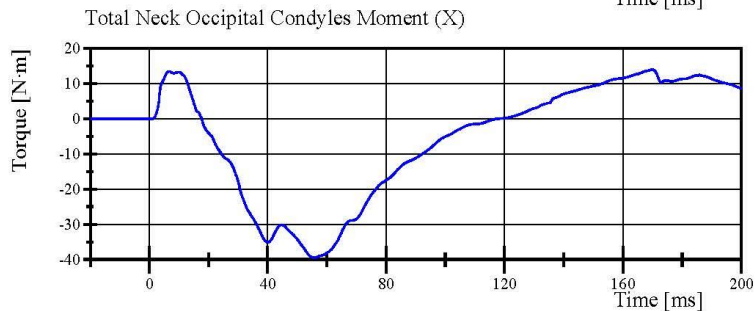
Filter Class: CFC_1000
Max: 166.1 N at 172.7 ms
Min: -485.8 N at 52.0 ms



Filter Class: CFC_600
Max: 166.2 N at 172.8 ms
Min: -485.7 N at 52.2 ms



Filter Class: CFC_600
Max: 17.4 Nm at 10.1 ms
Min: -31.1 Nm at 55.8 ms



Filter Class: Without_(Consta
Max: 14.0 N.m at 169.9 ms
Min: -39.4 N.m at 55.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

07.11.2018 13:17:10 717



APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

			Serial Number	Manufacturer and Model #	Calibration Date	Date Due
ATD		N/A	DI8818	FTSS	13-Jul-2018	
Head Accelerometers	Primary	X	P97682	Endevco	10-Jul-2018	9-Jan-2019
		Y	P97834	Endevco	10-Jul-2018	9-Jan-2019
		Z	P97883	Endevco	10-Jul-2018	9-Jan-2019
	Redundant	X	P97692	Endevco	10-Jul-2018	10-Jan-2019
		Y	P97543	Endevco	10-Jul-2018	9-Jan-2019
		Z	P97848	Endevco	10-Jul-2018	9-Jan-2019
Upper Neck Load Cell		Fx, Fy, Fz, Mx, My, Mz	DK7373S	FTSS	10-Jul-2018	10-Jul-2019
Lower Neck Load Cell		Fx, Fy, Fz, Mx, My, Mz	130	Denton	5-Mar-2018	5-Mar-2019
Chest Potentiometer		Dx				
Sternum Accelerometer		X				
Spine Accelerometer		X				
Data System		N/A	223	Kayser-Threde	16-Jul-2018	
Inclinometer		N/A	DP-2	Mitutoyo Pro 360	11/20/2017	11/20/2018