

REPORT NUMBER: TWG-TRC-16-03

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

FCA US LLC
2016 Chrysler 300 4-Door Sedan

NHTSA NUMBER: M20160302TWG2
TRC TEST NUMBER: 160525-2

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



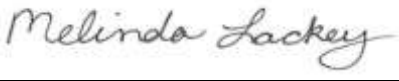
Test Date: May 25, 2016

DRAFT REPORT

Alpha Technology Associate, Inc.
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Fairfax, VA 22031

This Draft 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 12GT150. 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: 
Melinda Lackey
Project Manager

Approval Date: June 8, 2016

DRAFT REPORT ACCEPTANCE BY:

Accepted By: _____

Acceptance Date: _____

TECHNICAL REPORT STANDARD TITLE PAGE

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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 TRC Test Facility in East Liberty, Ohio, on May 25, 2016.						
Injury Summary						
HIC15	Maximum Chest Displacement (mm)	Maximum Chest Displacement Rate (m/s)	NIJ(NTF)	NIJ(NTE)	NIJ(NCF)	NIJ(NCE)
16	N/A	N/A	0.0221	0.0358	0.4613	0.2047
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: Steven Kim		
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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 undergone a New Car Assessment Program (NCAP) sponsored test requested by the National Highway Traffic Safety Administration (NHTSA). This test was performed following the technical requirements 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 2016 Chrysler 300 4-Door Sedan on an out-of-position SID-II's 49CFR Part 572 Subpart V anthropomorphic test device (ATD) was evaluated. The test was performed by TRC on May 25, 2016. Pre- and post-test photographs of the vehicle and ATD can be found in Appendix A.

Three (3) high-speed digital cameras were used to document the front seat side airbag deployment event. Images were recorded at rates of 1000 frames per second. Cameras were placed relative to the right front seat and positioned to capture the deployment event from the side, front, and oblique views.

The SID-II's ATD was placed in the right front (passenger) seat situated parallel to the centerline of the seat, facing forward. This was placed following the ATD 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 specific test was section 3.3.5.2.

The SID-II's ATD was instrumented with head x, y and z accelerometers, six upper neck axial force and moment load cell transducers, and six lower neck axial force and moment load cell transducers.

Nineteen (19) 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.

The SID-II's ATD was positioned in the seat with the dummy facing toward the front of the vehicle with its arm against the door panel. The arm was rotated horizontal in the forward direction with respect to the dummy. The seat was positioned to minimize the vertical distance between the dummy's head and the roof-rail module and to maximize the cushion to head interaction. The seat was set in the full forward position with a seatback angle of 11.7 degrees. The head was in a neutral orientation and the CG of the head was centered in the deployment trajectory of the airbag. The pelvis was adjusted inboard to achieve the optimal deployment trajectory to intersect the centerline of the top of the dummy's head. Masking tape (25mm) was wrapped around the dummy's neck bracket was used to hold the dummy in the test orientation. This orientation complies with section 3.3.5.2 of the TWG Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags, First Revision dated July, 2003.

SECTION 2

DATA SHEET NO. 1

TEST SUMMARY

TEST CONFIGURATION INFORMATION:

Seating Position:	P2	Right Front Seating Position
Test:	3.3.5.2	Forward Facing SID-IIs on Raised Seat (Driver and Passenger Positions with Roof-Rail-Mounted Airbags)
Airbag:	Seat	Seat mounted – outside seam
Airbag:	Side Rail	Side curtain airbag
Booster Block:	N/A	N/A
ATD Type/Serial Number:	DI8818	SID-IIS

Measurement	Value
Total Fore/Aft Travel (Detents):	220
Placed in Position #:	Full Forward

Number of Data Channels:

19

Number of Cameras:

1

Real Time

3

High Speed Digital

VISIBLE DUMMY CONTACT POINTS

Head Contact:	Side Curtain Airbag
Upper Torso Contact:	Torso/Pelvis Airbag
Lower Torso Contact:	Torso/Pelvis Airbag
Left Knee Contact:	None
Right Knee Contact:	None

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION

NHTSA No.	M20160302
Model Year	2016
Make	Chrysler
Model	300
Body Style	Sedan
VIN	2C3CCAAG4GH134994
Body Color	Silver
Odometer Reading (km/mi)	92.0 mi
Engine Displacement (L)	3.6
Type/No. Cylinders	V/6
Engine Placement	Front/Longitudinal
Transmission Type	Automatic
Transmission Speeds	8 Speed
Overdrive	Yes
Final Drive	RWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

TEST VEHICLE OPTIONS

Traction Control System (TCS)	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal 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	No
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	No
Driver Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other	No

Does owner's manual provide instructions to turn off automatic door locks?

No

DATA FROM CERTIFICATION LABEL

Manufactured by	FCA US LLC
Date of Manufacture	10/15

GVWR (kg)	2314
GAWR Front (kg)	1275
GAWR Rear (kg)	1275

VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				392.0
Cargo Wt. (RCLW) (kg)				51.8

DATA SHEET NO. 3
DUMMY POSITIONING IN VEHICLE

Measurement		Value
Seat Position		Full Forward
Seat Height Position		Uppermost
Placed in Position #		0
Seat Back Angle at Headrest Post	SA (°)	11.7 Rearward
Top of Curtain Airbag Module to Head/Neck Junction	AN (mm)	199
Top of Seat Airbag Module to Head/Neck Junction	AN (mm)	145
Head CG to Window	HD (mm)	105
Bridge of Nose to Seat Back Centerline	HSC (mm)	205
Chest to Dash	CD (mm)	453
Chest to Seat Back	CS (mm)	N/A
Right Arm to Seat Back Centerline (@ arm tip)	RACL (mm)	323
Left Arm to Seat Back Centerline	LACL (mm)	N/A
Right Arm to Door Panel (@ arm tip)	RA (mm)	0
Left Arm to B-Post	LA (mm)	N/A
Knee to Knee	KK (mm)	133
Toe to Toe	TT (mm)	180
Right Knee to Seat Cushion Centerline	KSCR (mm)	122
Left Knee to Seat Cushion Centerline	KSCL (mm)	10
Right Toe to Seat Cushion Centerline	TSCR (mm)	120
Left Toe to Seat Cushion Centerline	TSCL (mm)	60
Nose to Head Restraint	ND (mm)	195
Nose to Seat Back	NS (mm)	N/A
Top of Head to Headliner	HH (mm)	45

DATA SHEET NO. 4

DUMMY INJURY CRITERIA VALUES

Channel	Max	Time (ms)	Min	Time (ms)
Head Ax [g , CFC_1000]	9.37	12.16	-20.36	9.12
Head Ay [g , CFC_1000]	4.05	8.32	-10.74	10.32
Head Az [g , CFC_1000]	82.33	9.12	-18.05	12.56
Upper Neck Fx [N , CFC_1000]	401.98	52.24	-28.33	274.16
Upper Neck Fy [N , CFC_1000]	46.34	258.00	-260.52	115.28
Upper Neck Fz [N , CFC_1000]	47.06	4.88	-1,457.82	11.76
Upper Neck Mx [N-m , CFC_600]	17.92	12.96	-23.44	106.64
Upper Neck My [N-m , CFC_600]	26.24	17.12	-1.97	195.76
Upper Neck Mz [N-m , CFC_600]	9.64	183.60	-7.69	77.04
Lower Neck Fx [N , CFC_1000]	256.96	18.96	-124.18	39.28
Lower Neck Fy [N , CFC_1000]	217.29	69.60	-255.90	15.28
Lower Neck Fz [N , CFC_1000]	89.47	4.48	-1,619.32	11.84
Lower Neck Mx [N-m , CFC_600]	11.62	260.72	-44.45	116.80
Lower Neck My [N-m , CFC_600]	60.20	11.68	-13.11	19.92
Lower Neck Mz [N-m , CFC_600]	19.52	137.36	-16.13	15.20
Airbag Event Passenger Side Curtain Voltage [V]	33.07	0.64	0.00	-20.00
Airbag Event Front Passenger Seat Voltage [V]	30.81	9.04	0.00	-20.00
Airbag Event Passenger Side Curtain Current [A]	3.62	0.40	0.00	-20.00
Airbag Event Front Passenger Seat Current [A]	3.36	0.48	0.00	-20.00

HEAD INJURY CRITERIA (HIC)

	HIC(15)	T ₁ (msec)	T ₂ (msec)	HIC(36)	T ₁ (msec)	T ₂ (msec)
Position #2 Right Front	16	8.96	9.36	16	8.96	9.36

Position 2 Neck Injury Summary (SID-IIs)

Nij V10	Nij	Time (ms)
Upper Neck NTF	0.0221	287.84
Upper Neck NTE	0.0358	209.92
Upper Neck NCF	0.4613	11.92
Upper Neck NCE	0.2047	35.36

Peak Tension (CFC1000) 47.05 N

Peak Compression (CFC1000) -1,457.82 N

Test Vehicle: 2016 Chrysler 300 4-Door Sedan
Test Program: Side Airbag O.O.P. Injury Testing

NHTSA No.: M20160302TWG2
Test Date: 5/25/2016

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PHOTOGRAPHS

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Figure A-1 As Delivered Right Front 3/4 View of Test Vehicle



Figure A-2 Vehicle Certification Label



Figure A-3 Pre-Test Left Front 3/4 View of Test Vehicle



Figure A-4 Post-Test Left Front 3/4 View of Test Vehicle



Figure A-5 Pre-Test Left Side View of Test Vehicle



Figure A-6 Post-Test Left Side View of Test Vehicle



Figure A-7 Pre-Test Left Rear 3/4 View of Test Vehicle



Figure A-8 Pre-Test Left Rear 3/4 View of Test Vehicle



Figure A-9 Pre-Test SIDIIs Dummy - Left Side View



Figure A-10 Post-Test SIDIIs Dummy - Left Side View



Figure A-11 Pre-Test SIDIIs Dummy - Left Side Close-Up View



Figure A-12 Post-Test SIDIIs Dummy - Left Side Close-Up View



Figure A-13 Pre-Test SIDII's Dummy - Left Front 3/4 View



Figure A-14 Post-Test SIDII's Dummy - Left Front 3/4 View



Figure A-15 Pre-Test SIDIIs Dummy - Left Front 3/4 Close-Up View



Figure A-16 Post-Test SIDIIs Dummy - Left Front 3/4 Close-Up View



Figure A-17 Pre-Test SIDI Dummy - Front View



Figure A-18 Post-Test SIDI Dummy - Front View



Figure A-19 Pre-Test SIDII's Dummy - Front Close-Up View



Figure A-20 Post-Test SIDII's Dummy - Front Close-Up View



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



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



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



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



Figure A-25 Post-Test SIDII Dummy - Right Side View (Door Open)

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Figure A-26 Post-Test Curtain Airbag - Left Side View



Figure A-27 Post-Test Curtain Airbag - Left Front 3/4 View



Figure A-28 Post-Test Curtain Airbag - Front View



Figure A-29 Post-Test Curtain Airbag - Right Side View (Door Open)

Test Vehicle: 2016 Chrysler 300 4-Door Sedan
Test Program: Side Airbag O.O.P. Injury Testing

NHTSA No.: M20160302TWG2
Test Date: 5/25/2016

APPENDIX B

DUMMY RESPONSE DATA TRACES

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20	Airbag Event Front Passenger Seat (A) vs. Time	B-8

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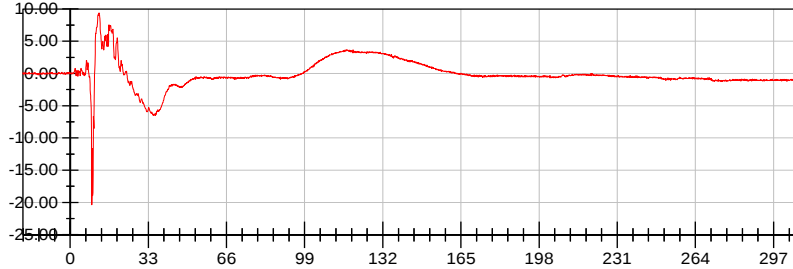
Test Lab: TRC Inc.

Test Number: 160525-2 (M20160302TWG2)

Position #2 SID IIs Dummy (DI8818)

Test Date: 05/25/2016

Head Accel X (g) vs. Time [ms]



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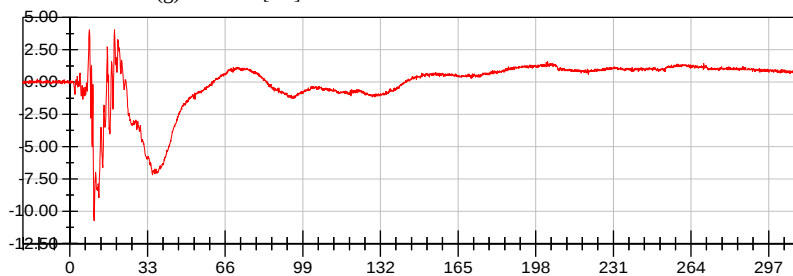
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-20.36 g at 9.12 ms

CFC_1000

Head Accel Y (g) vs. Time [ms]



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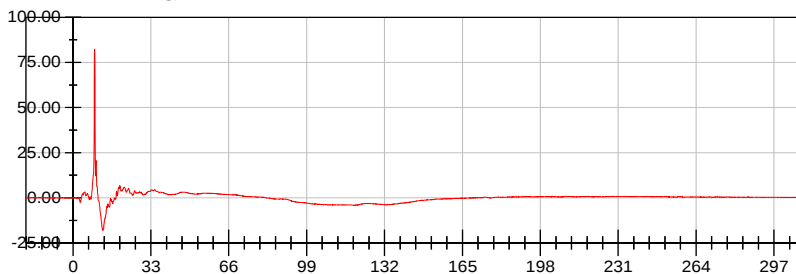
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-10.73 g at 10.32 ms

CFC_1000

Head Accel Z (g) vs. Time [ms]



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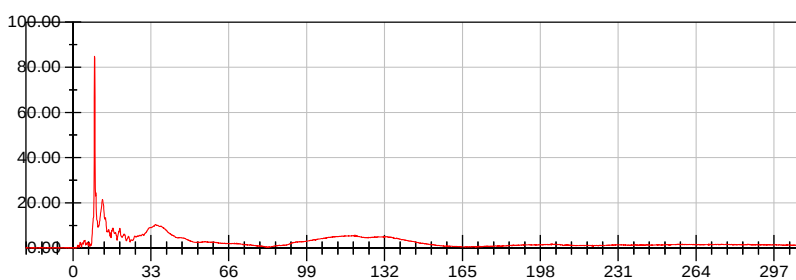
82.33 g at 9.12 ms

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-18.04 g at 12.56 ms

CFC_1000

Head Accel Resultant (g) vs. Time [ms]



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84.81 g at 9.12 ms

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0.02 g at -18.00 ms

CFC_1000



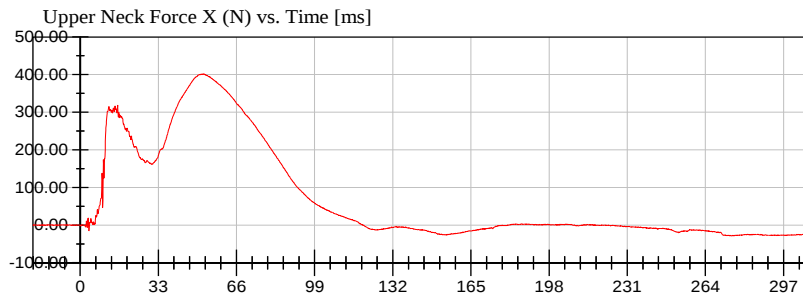
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Test Lab: TRC Inc.

Test Number: 160525-2 (M20160302TWG2)

Position #2 SID IIs Dummy (DI8818)

Test Date: 05/25/2016



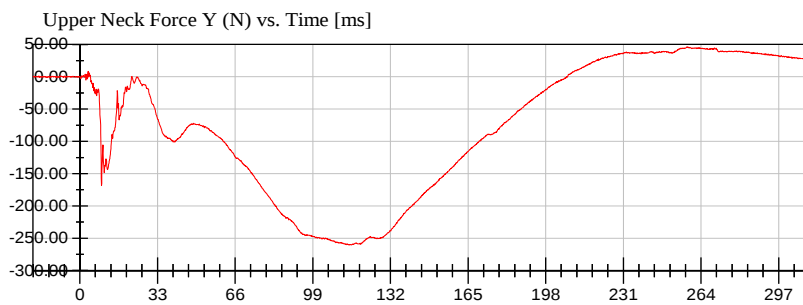
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-28.33 N at 274.16 ms

CFC_1000



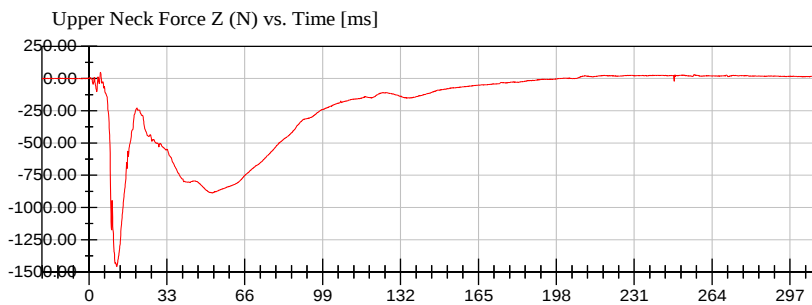
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46.34 N at 258.00 ms

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-260.52 N at 115.28 ms

CFC_1000



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47.05 N at 4.88 ms

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-1,457.82 N at 11.76 ms

CFC_1000



Alpha Technology

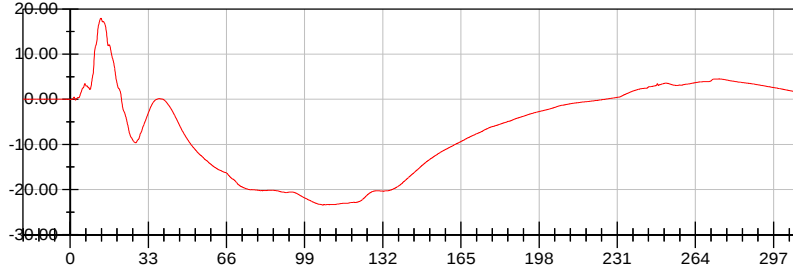
Test Lab: TRC Inc.

Test Number: 160525-2 (M20160302TWG2)

Position #2 SID IIs Dummy (DI8818)

Test Date: 05/25/2016

Upper Neck Moment X (Nm) vs. Time [ms]



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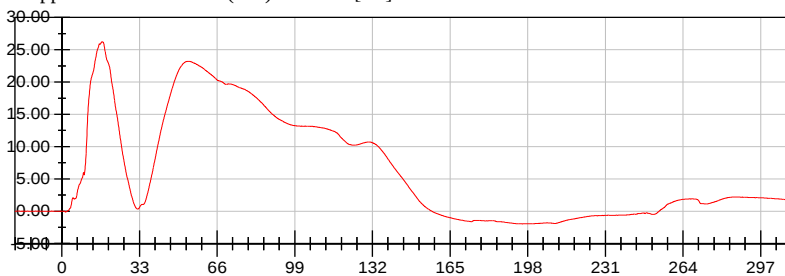
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CFC_600

Upper Neck Moment Y (Nm) vs. Time [ms]



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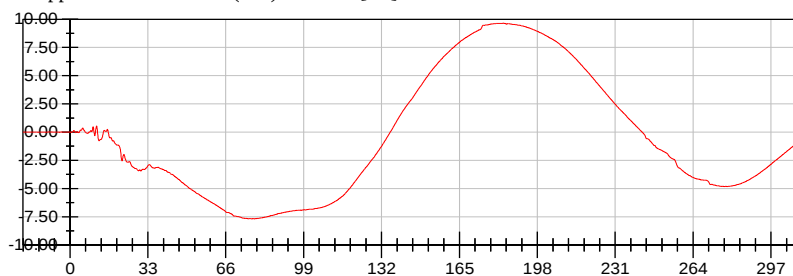
26.24 Nm at 17.12 ms

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-1.97 Nm at 195.76 ms

CFC_600

Upper Neck Moment Z (Nm) vs. Time [ms]



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9.64 Nm at 183.60 ms

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-7.69 Nm at 77.04 ms

CFC_600



Alpha Technology

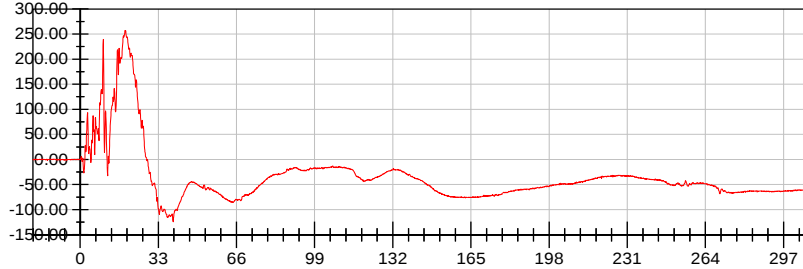
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Test Number: 160525-2 (M20160302TWG2)

Position #2 SID IIs Dummy (DI8818)

Test Date: 05/25/2016

Lower Neck Force X (N) vs. Time [ms]



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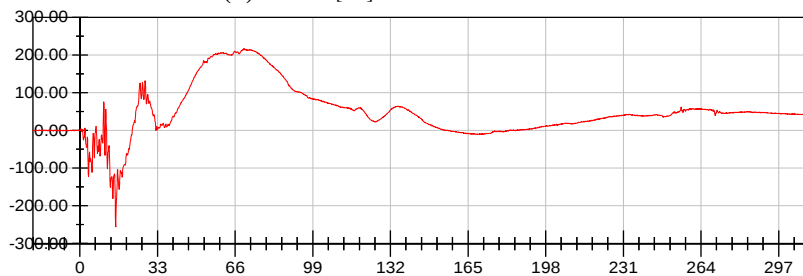
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CFC_1000

Lower Neck Force Y (N) vs. Time [ms]



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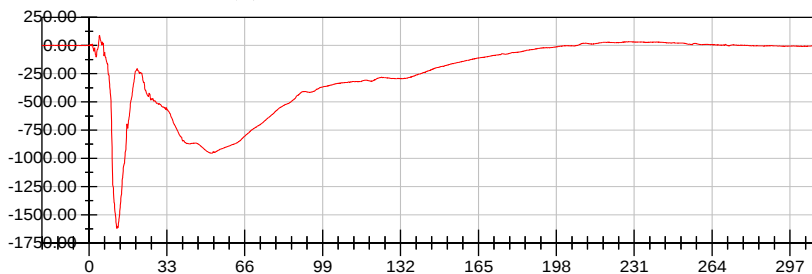
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-255.90 N at 15.28 ms

CFC_1000

Lower Neck Force Z (N) vs. Time [ms]



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89.47 N at 4.48 ms

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-1,619.32 N at 11.84 ms

CFC_1000



Alpha Technology

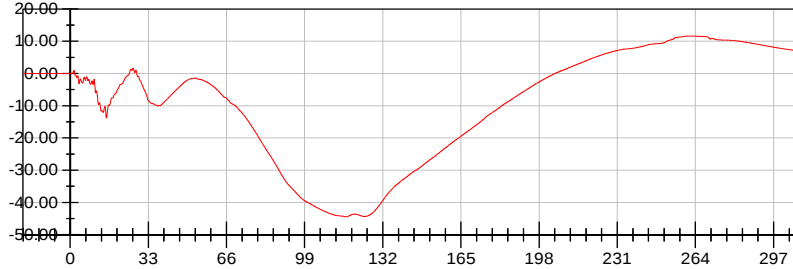
Test Lab: TRC Inc.

Test Number: 160525-2 (M20160302TWG2)

Position #2 SID IIs Dummy (DI8818)

Test Date: 05/25/2016

Lower Neck Moment X (Nm) vs. Time [ms]



<Max>

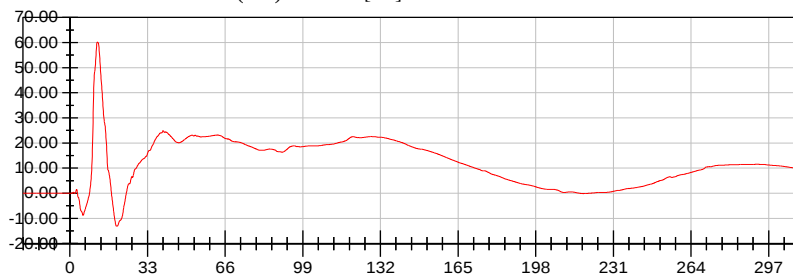
11.62 Nm at 260.72 ms

<Min>

-44.45 Nm at 116.80 ms

CFC_600

Lower Neck Moment Y (Nm) vs. Time [ms]



<Max>

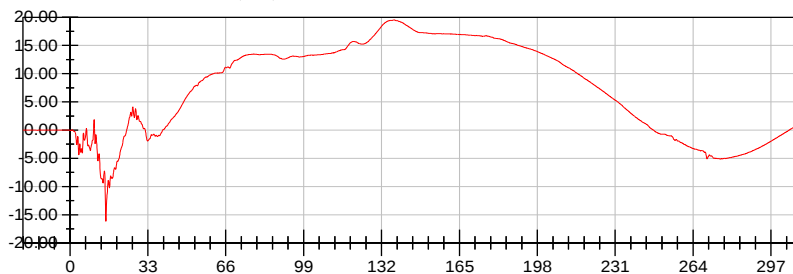
60.20 Nm at 11.68 ms

<Min>

-13.11 Nm at 19.92 ms

CFC_600

Lower Neck Moment Z (Nm) vs. Time [ms]



<Max>

19.52 Nm at 137.36 ms

<Min>

-16.13 Nm at 15.20 ms

CFC_600



Alpha Technology

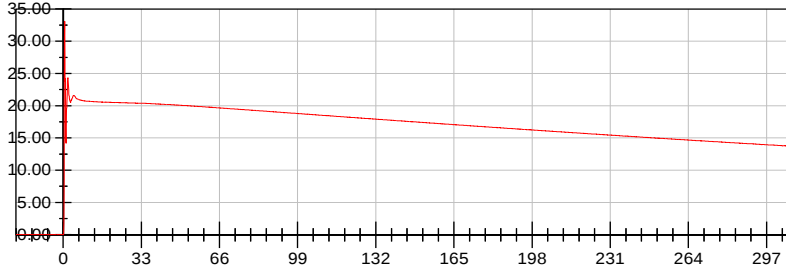
Test Lab: TRC Inc.

Test Number: 160525-2 (M20160302TWG2)

Position #2 SID IIs Dummy (DI8818)

Test Date: 05/25/2016

Airbag Event Right Side Passenger Seat (V) vs. Time [ms]



<Max>

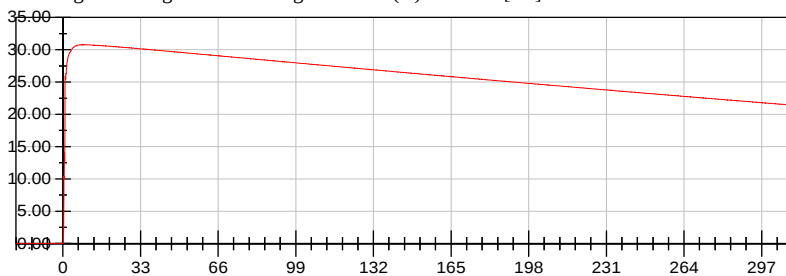
33.07 V at 0.64 ms

<Min>

0.00 V at -20.00 ms

Unfiltered

Airbag Event Right Side Passenger Curtain (V) vs. Time [ms]



<Max>

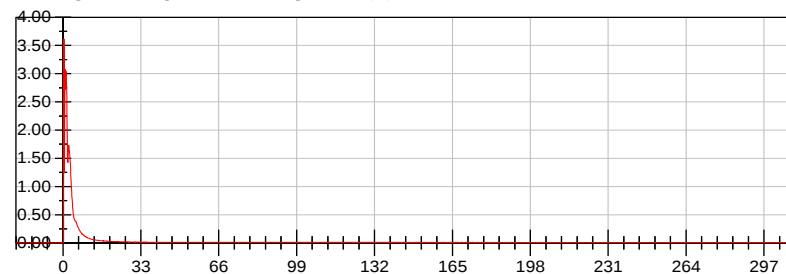
30.81 V at 9.04 ms

<Min>

0.00 V at -20.00 ms

Unfiltered

Airbag Event Right Side Passenger Seat (A) vs. Time [ms]



<Max>

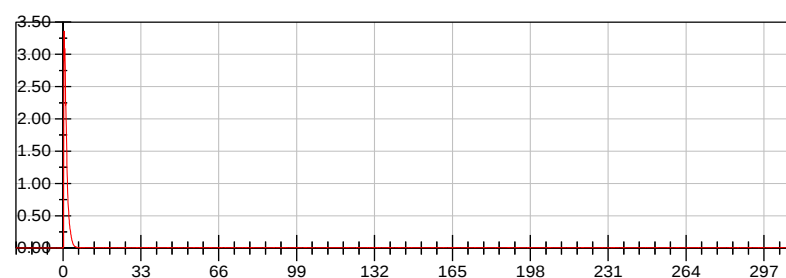
3.61 A at 0.40 ms

<Min>

0.00 A at -20.00 ms

Unfiltered

Airbag Event Right Side Passenger Curtain (A) vs. Time [ms]



<Max>

3.36 A at 0.48 ms

<Min>

0.00 A at -20.00 ms

Unfiltered



Test Vehicle: 2016 Chrysler 300 4-Door Sedan
Test Program: Side Airbag O.O.P. Injury Testing

NHTSA No.: M20160302TWG2
Test Date: 5/25/2016

APPENDIX C

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

Test Vehicle: 2016 Chrysler 300 4-Door Sedan
 Test Program: Side Airbag O.O.P. Injury Testing

NHTSA No.: M20160302TWG2
 Test Date: 5/25/2016

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

P572V INSTRUMENTATION

	POSITION #2 (RIGHT) SERIAL NO.: DI8818		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
Head Accel X	P51292	Endevco	26-Mar-2016
Head Accel Y	P58999	Endevco	26-Mar-2016
Head Accel Z	P58797	Endevco	26-Mar-2016
Upper Neck Force X	1716A-1914-FX	Denton	26-Mar-2016
Upper Neck Force Y	1716A-1914-FY	Denton	26-Mar-2016
Upper Neck Force Z	1716A-1914-FZ	Denton	26-Mar-2016
Upper Neck Moment X	1716A-1914-MX	Denton	26-Mar-2016
Upper Neck Moment Y	1716A-1914-MY	Denton	26-Mar-2016
Upper Neck Moment Z	1716A-1914-MZ	Denton	26-Mar-2016
Lower Neck Force X	3166-150-FX	Denton	24-Mar-2014
Lower Neck Force Y	3166-150-FY	Denton	24-Mar-2014
Lower Neck Force Z	3166-150-FZ	Denton	24-Mar-2014
Lower Neck Moment X	3166-150-MX	Denton	24-Mar-2014
Lower Neck Moment Y	3166-150-MY	Denton	24-Mar-2014
Lower Neck Moment Z	3166-150-MZ	Denton	24-Mar-2014
Airbag Event Front Passenger Seat	K3789-223	KAYSER-THREDE	25-May-2016
Airbag Event Passenger Side Curtain	K3789-223	KAYSER-THREDE	25-May-2016
Airbag Event Front Passenger Seat	K3789-223	KAYSER-THREDE	25-May-2016
Airbag Event Passenger Side Curtain	K3789-223	KAYSER-THREDE	25-May-2016