

REPORT NUMBER: TR-P36147-01-NC

**SIDE AIRBAG OCCUPANT RISK PROGRAM
OCCUPANT OUT-OF-POSITION TESTS**

**FCA US LLC.
2016 JEEP PATRIOT SPORT
5-DOOR MPV**

NHTSA NUMBER: M20160309TWG2

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JUNE 2, 2016


FINAL REPORT

**PREPARED FOR:
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This final test report was prepared for the U.S. Department of Transportation, Alpha Technology Associate, Inc., in response to Contract Number DTNH22-14-D-00355.

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Date of Acceptance

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This occupant out-of-position static side airbag deployment test is part of the Technical Working Group Occupant Injury Risk from Deploying Side Airbags Testing Program sponsored by Alpha Technology Associate, Inc. under Contract No. DTNH22-14-D-00355. The purpose of this test was to obtain occupant injury data for a side airbag deployment.

The occupant out-of-position (OOP) side airbag test was conducted in accordance with the Technical Working Group Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

SUMMARY

The effects of a roof mounted curtain airbag and a seat mounted torso/pelvis airbag deployment in a 2016 Jeep Patriot Sport 5-door MPV with an out-of-position Part 572V (SID-IIs) crash test dummy were evaluated. The test was performed at KARCO Engineering, LLC. on May 19, 2016. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

Three (3) high-speed digital cameras and one (1) real time camera were used to document the deployment of the airbags. Camera locations and other pertinent camera information can be found on Data Sheet No.1 and Data Sheet No.6.

A SID-IIs anthropomorphic test device (ATD) was placed in the right front passenger seating position facing inboard according to the dummy placement instructions (3.3.5.3) in the July 2003 Revision of the Technical Working Group's 'Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags'.

The SID-IIs ATD was instrumented with head tri-axial accelerometers, upper and lower neck force transducers.

The airbags were deployed and fifteen (15) channels of data were recorded using a data acquisition system. Appendix B contains dummy response data traces. Appendix C contains the instrumentation data channel assignments. Appendix D contains ATD calibration sheets.

Orientation of the SID-IIs dummy was with the dummy facing toward the center of the vehicle with its arm against the seatback. The seat track is adjusted forward to minimize the vertical distance between the dummy's head and the roof-rail module and to maximize the airbag to head interaction. The dummy's pelvis is slid outboard until the dummy's back contacts the door trim panel or armrest and the CG of the head is centered in the deployment trajectory of the airbag. This orientation complies with section 3.3.5.3 of the Technical Working Group (TWG) recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

The passenger side door remained closed during the test, and was operable after the airbag deployed.

The SID-IIs dummy's visible contact points were as follows: The ATD's head contacted the curtain airbag and dash. The ATD's abdomen, pelvis and left arm contacted the torso/pelvis airbag.

The occupant data is summarized below:

Measurement Description	Units	Passenger ATD (HIII 3YO)	
		IARV	Result
Head Injury Criteria (HC15)	N/A	779	18.8
Upper Neck Nij	N/A	1	0.68
Upper Neck Peak Tension	Newtons (N)	2070	70.6
Upper Neck Peak Compression	Newtons (N)	2520	-1785.3

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV NHTSA No.: M20160309TWG2

Test Program: TWG 3.3.5.3 Test Date: 05/19/16

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in ²	kPa	6.895
Temperature	General Use	°F	°C	$=(T_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

DATA SHEET NO. 1

TEST SUMMARY

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV NHTSA No.: M20160309TWG2
Test Program: TWG 3.3.5.3 Test Date: 05/19/16

TEST DUMMY INFORMATION

Description	Passenger Seat
Dummy Type / Serial No.	SID-IIs / 308
Head Contact	Curtain Airbag, Dash
Chest Contact	None
Abdomen Contact	Torso/Pelvis Airbag, Seatback
Pelvis Contact	Torso/Pelvis Airbag, Seatback
Left Knee Contact	None
Right Knee Contact	None

VIDEO COVERAGE

Description	Quantity
High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

Description	Quantity
Head Accelerometers	3
Upper Neck Transducers	6
Lower Neck Transducers	6
Total	15

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV NHTSA No.: M20160309TWG2
 Test Program: TWG 3.3.5.3 Test Date: 05/19/16

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20160309
Model Year	2016
Make	Jeep
Model	Patriot Sport
Body Style	5-Door MPV
VIN	1C4NJPBB9GD519061
Body Color	Billet Silver Metallic
Odometer Reading (km / mi)	164 / 102
Engine Displacement (L)	2.4
Type / No. of Cylinders	Inline 4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	Front
Roof Rack	Yes
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	No
Power Window Auto-Reverse	No
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	No
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	No

Does Owner's Manual provide instructions to turn off automatic door locks?

N/A

DATA FROM CERTIFICATION LABEL

Manufactured By	FCA US LLC.
Date of Manufacture	Aug-15
Vehicle Type	MPV

GVWR (kg)	2012
GAWR Front (kg)	1080
GAWR Rear (kg)	1044

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Bench			
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				419.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				78.8	A-B

*Vehicle underwent New Car Assessment Program Side MDB Impact Testing on October 7, 2015.

DATA SHEET NO. 2 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV NHTSA No.: M20160309TWG2
 Test Program: TWG 3.3.5.3 Test Date: 05/19/16



VEHICLE TIRE INFORMATION

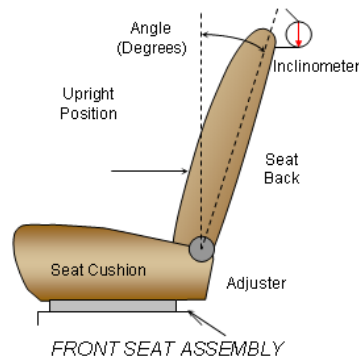
Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P205/70R16	P205/70R16
Tire Size on Vehicle	P205/70R16	P205/70R16
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Eagle LS	Eagle LS
Treadware	400	400
Traction Grade	A	A
Temperature Grade	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel	2 Polyester, 2 Steel
Load Index/Speed Symbol	96T	96T
Tire Material	Polyester, Steel	Polyester, Steel
DOT Safety Code Left	M60W CUER 2915	M60W CUER 2915
DOT Safety Code Right	M60W CUER 2915	M60W CUER 2915

DATA SHEET NO. 3
SEAT ADJUSTMENTS

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV NHTSA No.: M20160309TWG2
 Test Program: TWG 3.3.5.3 Test Date: 05/19/16

SEAT BACK ANGLE

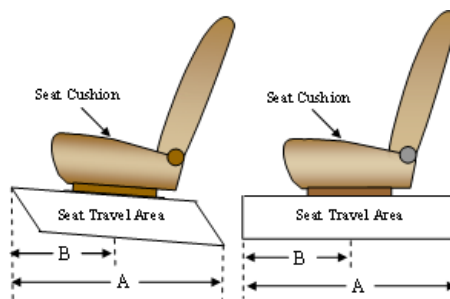
The passenger seat back is positioned per section 3.3.5.3 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. Seat back angle is measured at the headrest post.



Seating Position	Degrees
Passenger Seat	12.3

SEAT FORE / AFT POSITIONING

The passenger seat track travel is set per section 3.3.5.3 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. The first or forward most position is counted as zero (0)



Seating Position	Total Fore-Aft Travel		Placed in Position	
	mm	Detents	mm	Detents
Passenger Seat	262	39 (0-38)	120	18

SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the uppermost position. Position "H" is the uppermost position, followed by position "M1". Position "L" is the lowermost position.

Seating Position	Total No. of Positions	Placed in Position
Passenger Seat	3	H

DATA SHEET NO. 4

DUMMY POSITIONING AND AIRBAG DIMENSIONS

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV NHTSA No.: M20160309TWG2
 Test Program: TWG 3.3.5.3 Test Date: 05/19/16

DUMMY POSITIONING

Code	Measurement Description	Passenger	
		Length (mm)	Angle (°)
SA	Seat Back Angle		12.3
AN	Top of Airbag Module to Head/Neck Junction	60	90.0
HD	Head CG to Door Panel/ Window	153	0.0
HSC	Head to Seat Back Centerline	267	0.0
HB	Head to B-Pillar (first contact)	260	7.1
HZ	Head to Roof (Z)	234	90.0
HH	Head to Header (measured from back of head)		
ND	Nose to Dash	589	21.2
NS	Nose to Seat Back	266	0.0
NR	Nose to Header	584	16.8
CD	Chest to Dash	528	2.9
CS	Chest to Seat Back	299	0.0
RACL	Right Arm to Seat Back		0.0
LACL	Left Arm to Seat Back	48	0.0
RA	Right Arm to Door Panel		
LA	Left Arm to Door Panel		
KK	Knee to Knee	142	0.0
TT	Toe to Toe	105	0.0
KSCR	Right Knee to Seat Cushion Centerline	206	0.0
KSCL	Left Knee to Seat Cushion Centerline	200	0.0
	Head Level (X Direction)		4.8
	Head Level (Y Direction)		11.3

AIRBAG DIMENSIONS

Code	Measurement Description	Airbag
		Length (mm)
AMW	Curtain Airbag Module Diameter	40
AML	Curtain Airbag Module Length	380
ABW	Curtain Airbag Width	600
ABL	Curtain Airbag Length	1740
AMW	Torso/Pelvis Airbag Module Diameter	40
AML	Torso/Pelvis Airbag Module Length	160
ABW	Torso/Pelvis Airbag Width	400
ABL	Torso/Pelvis Airbag Length	570

DATA SHEET NO. 5

DUMMY INJURY CRITERIA AND PERFORMANCE DATA

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV NHTSA No.: M20160309TWG2
 Test Program: TWG 3.3.5.3 Test Date: 05/19/16

HEAD PEAK ACCELERATIONS

Location	Axis	Units	SID-lis			
			Max	Time	Min	Time
Head CG	X	G's	13.1	20.3	-16.5	10.3
Head CG	Y	G's	19.3	18.2	-12.9	10.6
Head CG	Z	G's	72.1	10.1	-23.5	12.7
Head CG Resultant	N/A	G's	73.3	10.1		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	SID-lis			
			Max	Time	Min	Time
Neck Force	X	Newtons	41.3	25.2	-191.1	16.1
Neck Force	Y	Newtons	132.5	50.4	-153.1	11.4
Neck Force	Z	Newtons	70.6	106.1	-1785.3	12.2
Neck Force Resultant	N/A	Newtons	1788.6	12.2		
Neck Moment	X	Nm	14.9	14.1	-4.7	133.1
Neck Moment	Y	Nm	4.7	144.3	-23.2	15.8
Neck Moment	Z	Nm	8.7	29.4	-7.9	85.1
Neck Moment Resultant	N/A	Nm	26.1	14.4		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	SID-lis			
			Max	Time	Min	Time
Neck Force	X	Newtons	146.6	10.5	-396.4	14.5
Neck Force	Y	Newtons	123.2	14.9	-138.3	12.7
Neck Force	Z	Newtons	97.1	106.2	-1773.7	12.7
Neck Force Resultant	N/A	Newtons	1807.6	12.7		
Neck Moment	X	Nm	23.8	50.1	-15.0	125.8
Neck Moment	Y	Nm	108.9	12.7	-7.2	90.3
Neck Moment	Z	Nm	10.1	25.8	-8.9	83.2
Neck Moment Resultant	N/A	Nm	109.7	12.7		

HEAD INJURY CRITERIA (HIC 15)

Location	SID-lis			
	HIC15	T ¹	T ²	Avg G
Head CG	18.8	9.9	24.9	17.4

UPPER NECK NIJ VALUES

Location	SID-lis			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.05	0.07	0.00	0.68

DATA SHEET NO. 6

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV NHTSA No.: M20160309TWG2

Test Program: TWG 3.3.5.3 Test Date: 05/19/16

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Side View	0	-2500	-960	0.0	50	1000
2	High Speed 3/4 View	1900	-1430	-1340	0.0	35	1000
3	High Speed Front View	2160	-180	-1340	0.0	24	1000
4	Real Time	0	-2500	-1060	0.0	24	1000

Coordinates: +X = forward of vehicle relative to dummy's head CG
+Y = right of vehicle relative to dummy's head CG
+Z = into ground

**APPENDIX A
PHOTOGRAPHS**

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FIGURE 1. Right Front ¾ View, As Received



FIGURE 2. Vehicle Certification Label



FIGURE 3. Post-Test Left Front 3/4 View of NCAP Side MDB Impact Test



FIGURE 4. Post-Test Left Side View of NCAP Side MDB Impact Test



FIGURE 5. Post-Test Left Rear 3/4 View of NCAP Side MDB Impact Test



FIGURE 6. Post-Test Right Side View of NCAP Side MDB Impact Test



FIGURE 7. Pre-Test Dummy Position, Left View



FIGURE 8. Post-Test Dummy Position, Left View



FIGURE 9. Pre-Test Dummy Position, $\frac{3}{4}$ View



FIGURE 10. Post-Test Dummy Position, $\frac{3}{4}$ View



FIGURE 11. Pre-Test Dummy Position, Front View



FIGURE 12. Post-Test Dummy Position, Front View



FIGURE 13. Pre-Test Dummy Position, Close-Up Front View



FIGURE 14. Post-Test Dummy Position, Close-Up Front View

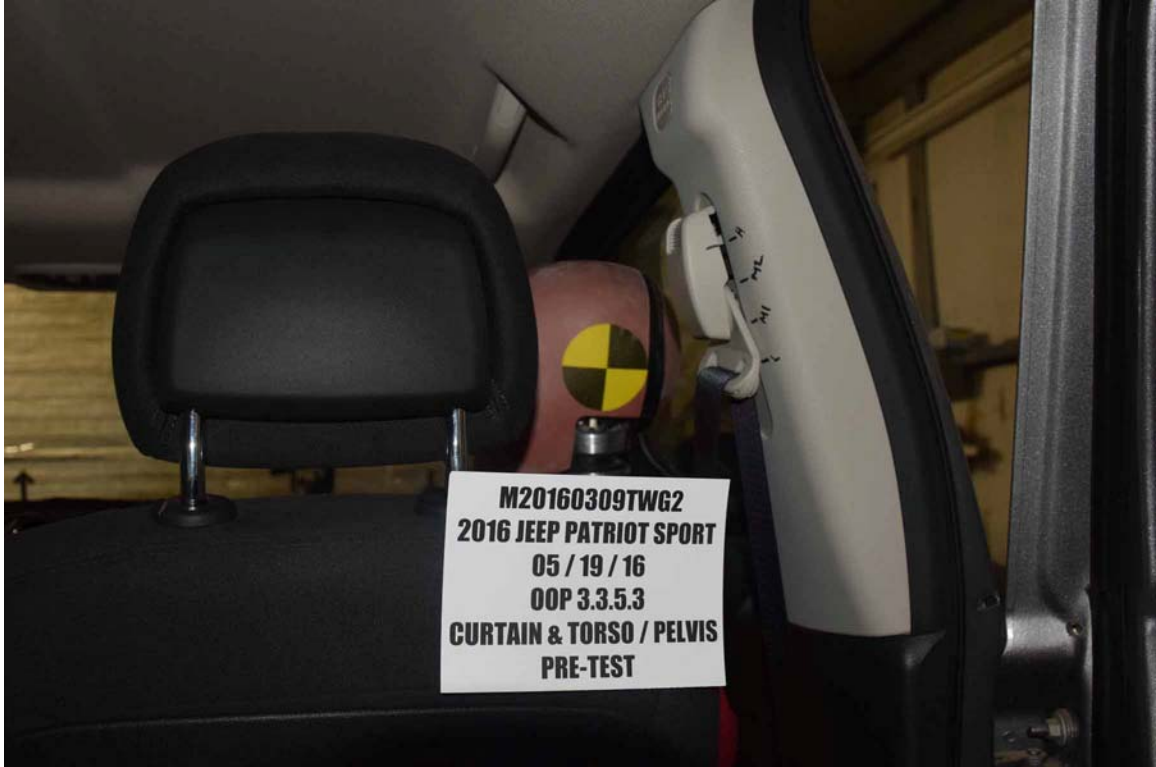


FIGURE 15. Pre-Test Dummy Position, Close-Up Rear View



FIGURE 16. Post-Test Dummy Position, Close-Up Rear View



FIGURE 17. Post-Test Airbags, Left Side View



FIGURE 18. Post-Test Airbags, Left Front 3/4 View

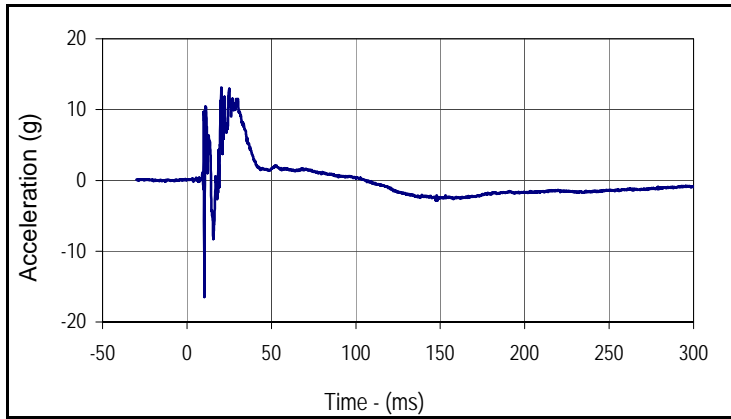
APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

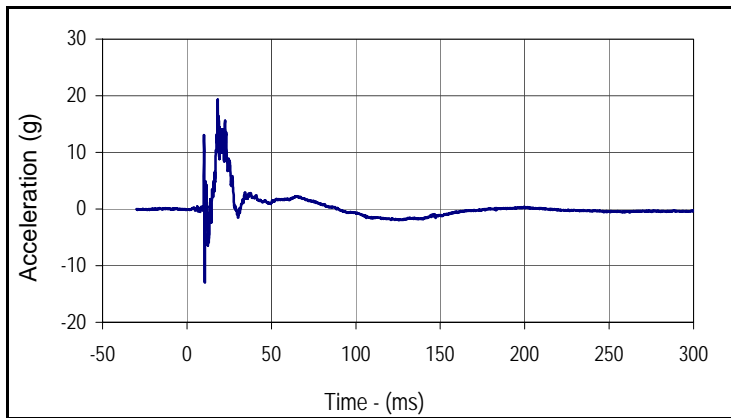
<u>Plot</u>		<u>Page</u>
1	SID-IIs Head X	B-1
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3	SID-IIs Head Z	B-1
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Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV
 Test Program: TWG 3.3.5.3

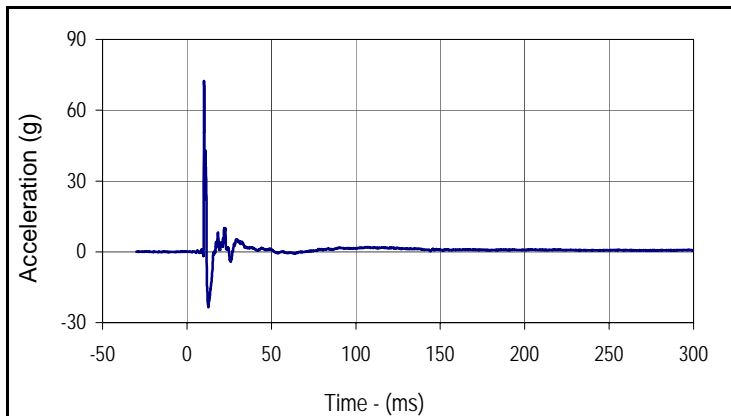
Test Date: 5/19/16
 NHTSA No.: M20160309TWG2



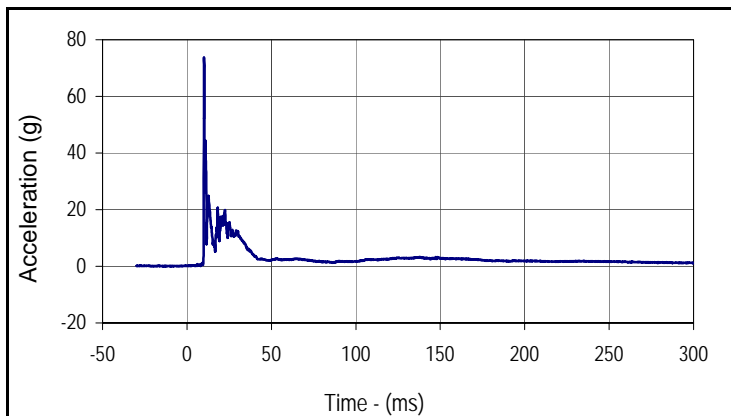
Curve Description			
SID-IIs Head X			
Plot No.	Type	SAE Class	Units
001	FIL	1000	g
Max	Time	Min	Time
13.1	20.3	-16.5	10.3



Curve Description			
SID-IIs Head Y			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
19.3	18.2	-12.9	10.6



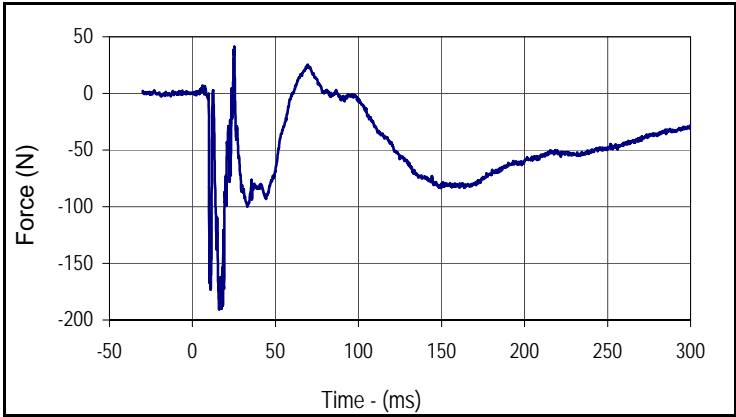
Curve Description			
SID-IIs Head Z			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
72.1	10.1	-23.5	12.7



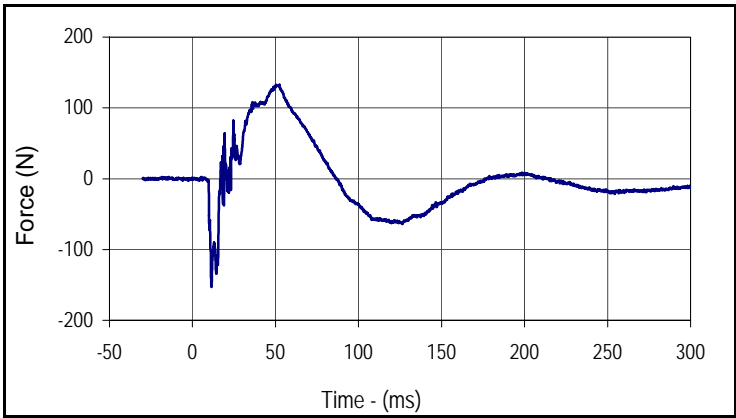
Curve Description			
SID-IIs Head Resultant			
Plot No.	Type	SAE Class	Units
004	RES	1000	g
Max	Time	Min	Time
73.3	10.1	0.1	2.7

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV
 Test Program: TWG 3.3.5.3

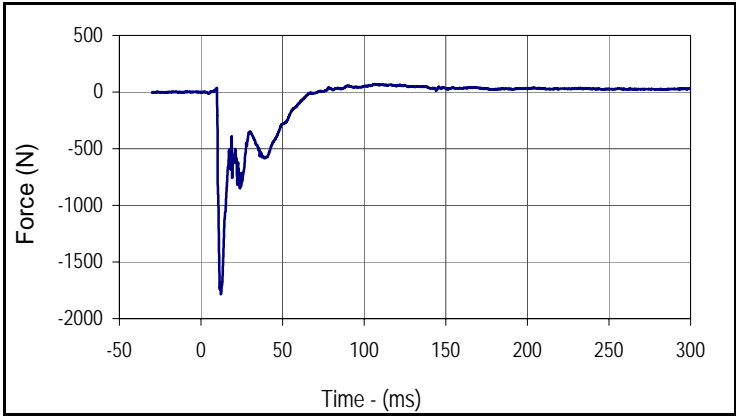
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 NHTSA No.: M20160309TWG2



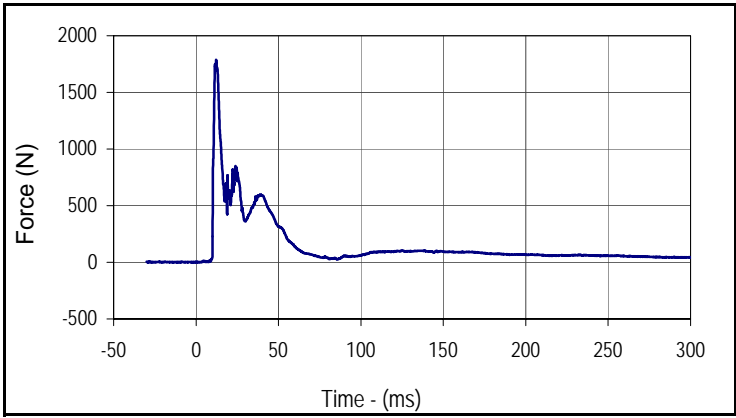
Curve Description			
SID-IIs Upper Neck Force X			
Plot No.	Type	SAE Class	Units
005	FIL	1000	N
Max	Time	Min	Time
41.3	25.2	-191.1	16.1



Curve Description			
SID-IIs Upper Neck Force Y			
Plot No.	Type	SAE Class	Units
006	FIL	1000	N
Max	Time	Min	Time
132.5	50.4	-153.1	11.4



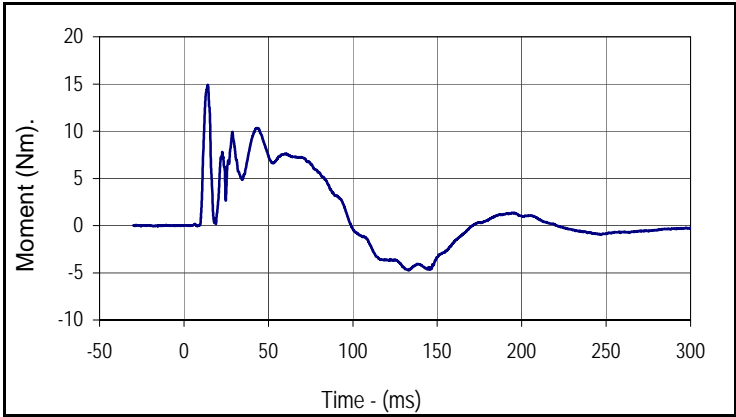
Curve Description			
SID-IIs Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
007	FIL	1000	N
Max	Time	Min	Time
70.6	106.1	-1785.3	12.2



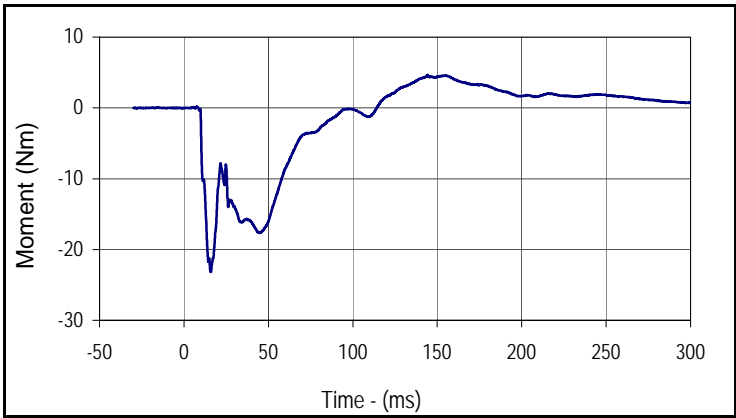
Curve Description			
SID-IIs Upper Neck Force Resultant			
Plot No.	Type	SAE Class	Units
008	RES	1000	N
Max	Time	Min	Time
1788.6	12.2	0.7	1.7

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV
 Test Program: TWG 3.3.5.3

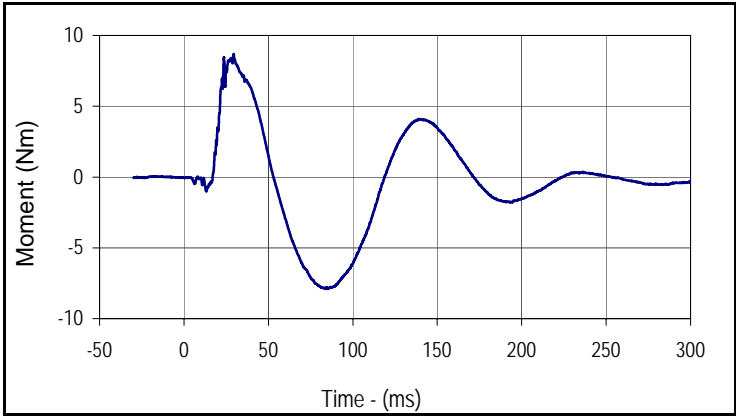
Test Date: 5/19/16
 NHTSA No.: M20160309TWG2



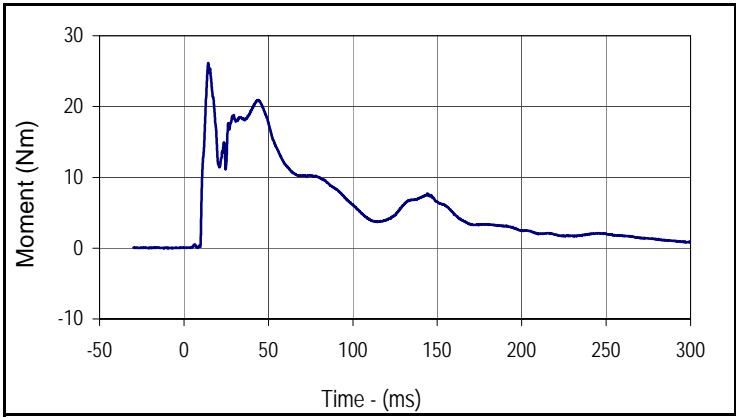
Curve Description			
SID-IIs Upper Neck Moment X			
Plot No.	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
14.9	14.1	-4.7	133.1



Curve Description			
SID-IIs Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Nm
Max	Time	Min	Time
4.7	144.3	-23.2	15.8



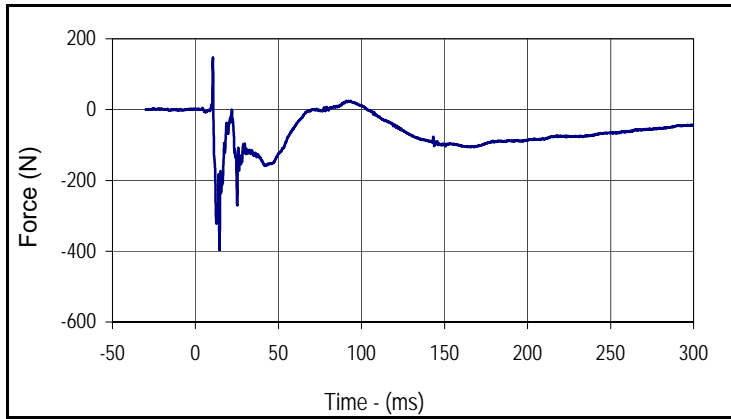
Curve Description			
SID-IIs Upper Neck Moment Z			
Plot No.	Type	SAE Class	Units
011	FIL	600	Nm
Max	Time	Min	Time
8.7	29.4	-7.9	85.1



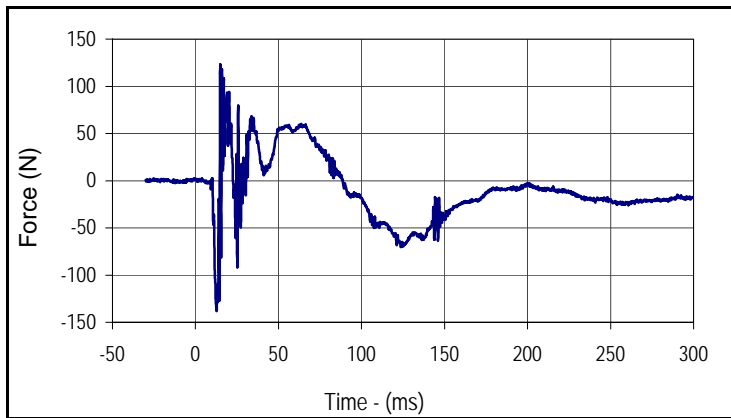
Curve Description			
SID-IIs Upper Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
012	RES	600	Nm
Max	Time	Min	Time
26.1	14.4	0.0	8.3

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV
 Test Program: TWG 3.3.5.3

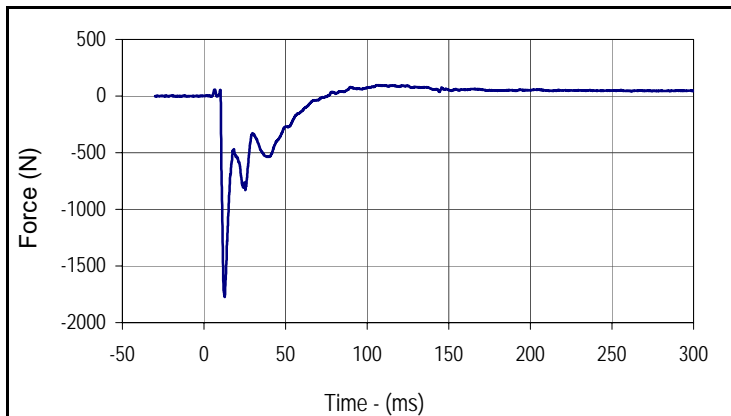
Test Date: 5/19/16
 NHTSA No.: M20160309TWG2



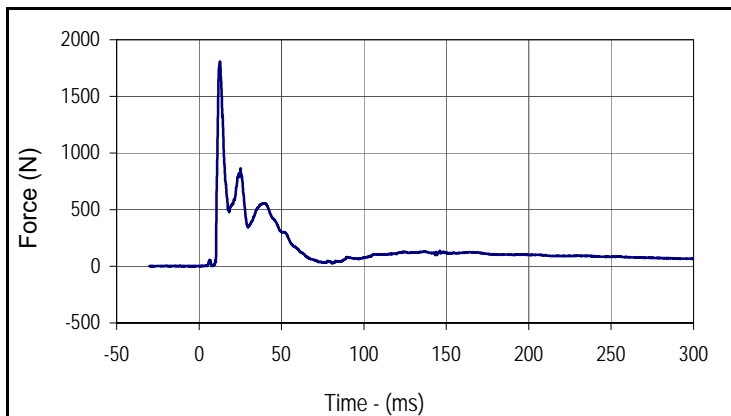
Curve Description			
SID-IIs Lower Neck Force X			
Plot No.	Type	SAE Class	Units
013	FIL	1000	N
Max	Time	Min	Time
146.6	10.5	-396.4	14.5



Curve Description			
SID-IIs Lower Neck Force Y			
Plot No.	Type	SAE Class	Units
014	FIL	1000	N
Max	Time	Min	Time
123.2	14.9	-138.3	12.7



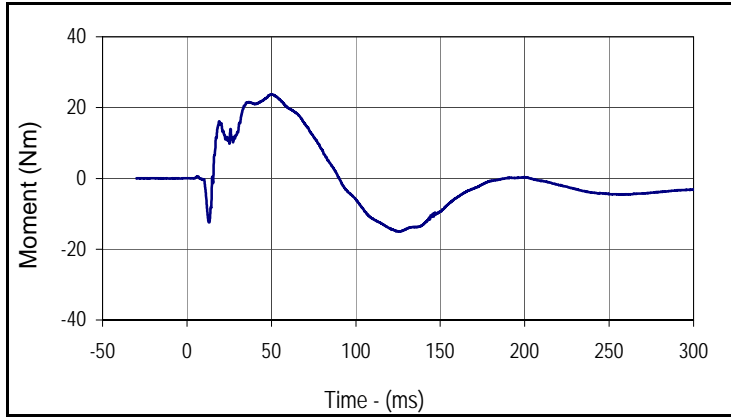
Curve Description			
SID-IIs Lower Neck Force Z			
Plot No.	Type	SAE Class	Units
015	FIL	1000	N
Max	Time	Min	Time
97.1	106.2	-1773.7	12.7



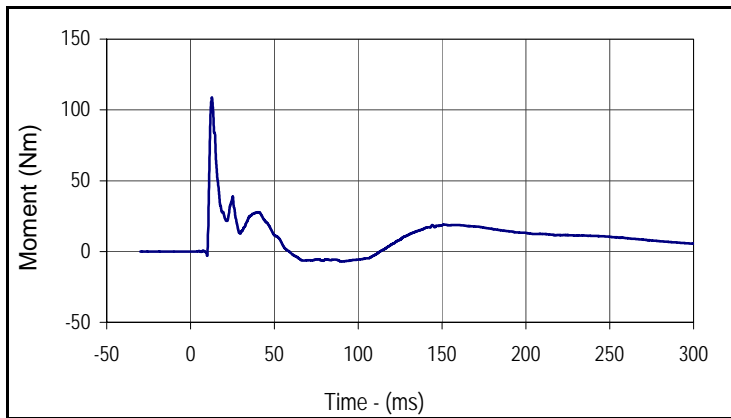
Curve Description			
SID-IIs Lower Neck Force Resultant			
Plot No.	Type	SAE Class	Units
016	RES	1000	N
Max	Time	Min	Time
1807.6	12.7	0.3	1.0

Test Vehicle: 2016 Jeep Patriot Sport 5-Door MPV
 Test Program: TWG 3.3.5.3

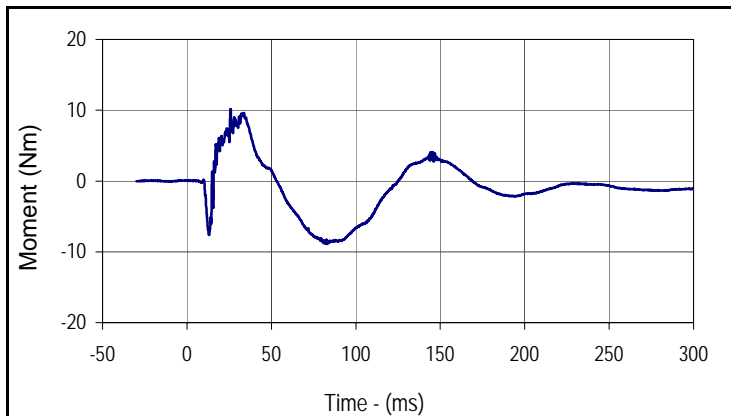
Test Date: 5/19/16
 NHTSA No.: M20160309TWG2



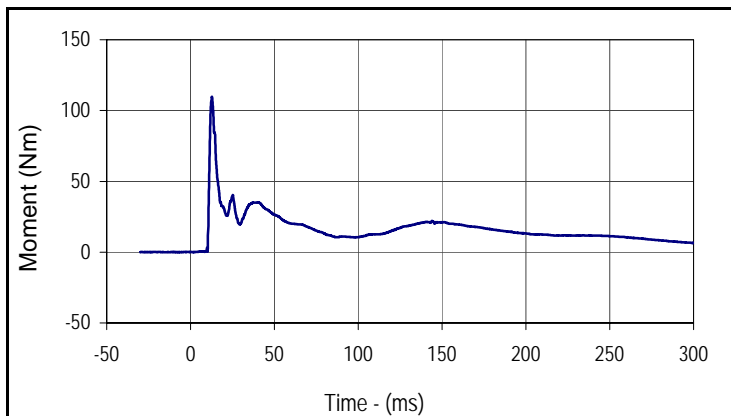
Curve Description			
SID-IIs Lower Neck Moment X			
Plot No.	Type	SAE Class	Units
017	FIL	600	Nm
Max	Time	Min	Time
23.8	50.1	-15.0	125.8



Curve Description			
SID-IIs Lower Neck Moment Y			
Plot No.	Type	SAE Class	Units
018	FIL	600	Nm
Max	Time	Min	Time
108.9	12.7	-7.2	90.3



Curve Description			
SID-IIs Lower Neck Moment Z			
Plot No.	Type	SAE Class	Units
019	FIL	600	Nm
Max	Time	Min	Time
10.1	25.8	-8.9	83.2



Curve Description			
SID-IIs Lower Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
020	RES	600	Nm
Max	Time	Min	Time
109.7	12.7	0.0	2.1

APPENDIX C
INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.5.3
Instrumentation Data Channel Assignments
A.T.D. Serial Number 308
5/19/16
2016 Jeep Patriot Sport 5-Door MPV

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD	X	P50099	Accel.,full bridge	Endevco	7264C-2K	G
2	HEAD	Y	P52013	Accel.,full bridge	Endevco	7264C-2K	G
3	HEAD	Z	P64127	Accel.,full bridge	Endevco	7264C-2K	G
4	UPPER NECK FORCE	X	1627	Load cell, six axis neck	FTSS	IF-205	N
5	UPPER NECK FORCE	Y	1627	Load cell, six axis neck	FTSS	IF-205	N
6	UPPER NECK FORCE	Z	1627	Load cell, six axis neck	FTSS	IF-205	N
7	UPPER NECK MOMENT	X	1627	Load cell, six axis neck	FTSS	IF-205	Nm
8	UPPER NECK MOMENT	Y	1627	Load cell, six axis neck	FTSS	IF-205	Nm
9	UPPER NECK MOMENT	Z	1627	Load cell, six axis neck	FTSS	IF-205	Nm
10	LOWER NECK FORCE	X	DR8678	Load cell, six axis neck	FTSS	IF-269	N
11	LOWER NECK FORCE	Y	DR8678	Load cell, six axis neck	FTSS	IF-269	N
12	LOWER NECK FORCE	Z	DR8678	Load cell, six axis neck	FTSS	IF-269	N
13	LOWER NECK MOMENT	X	DR8678	Load cell, six axis neck	FTSS	IF-269	Nm
14	LOWER NECK MOMENT	Y	DR8678	Load cell, six axis neck	FTSS	IF-269	Nm
15	LOWER NECK MOMENT	Z	DR8678	Load cell, six axis neck	FTSS	IF-269	Nm

C-1

TR-P36147-01-NC

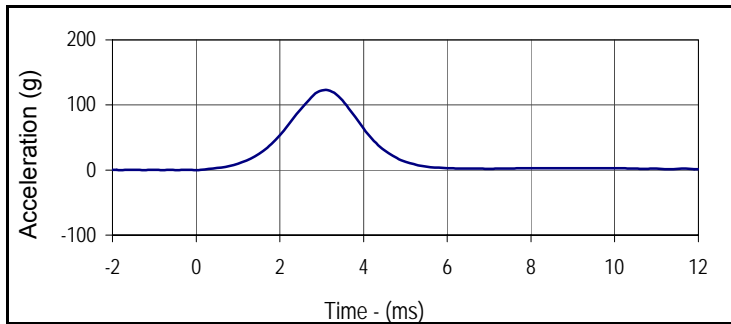
APPENDIX D
PRE-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID IIs Head Drop Test
 ATD Serial No.: 308

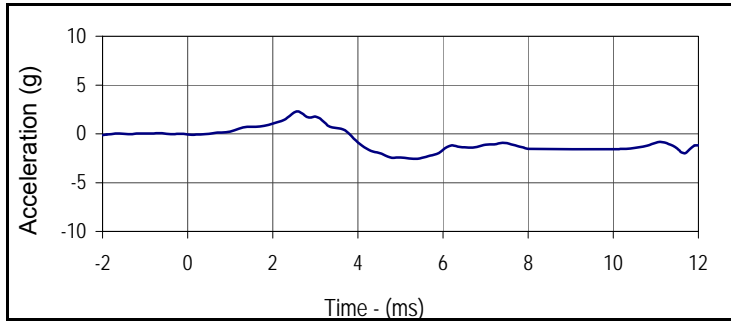
Test Date: 5/17/16
 Test I.D.: HDM20160309TWG2



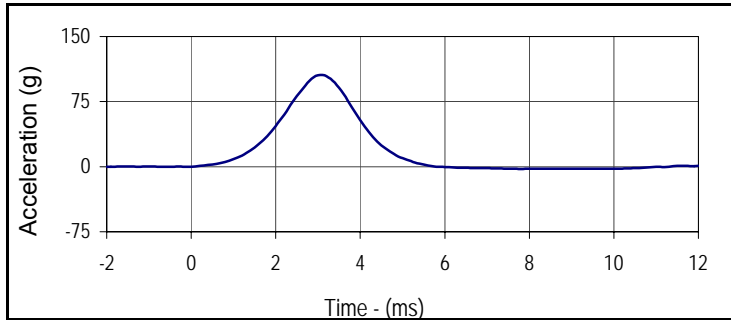
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	305	Pass
Temperature During Soak	Max	18.9 to 25.6	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	29.2	Pass
	Min		19.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.0	Pass
Peak Head Resultant Acceleration	g	115 to 137	123.3	Pass
Peak Head X Acceleration	g	<15	2.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	0.3	Pass
Overall Test Results				Pass



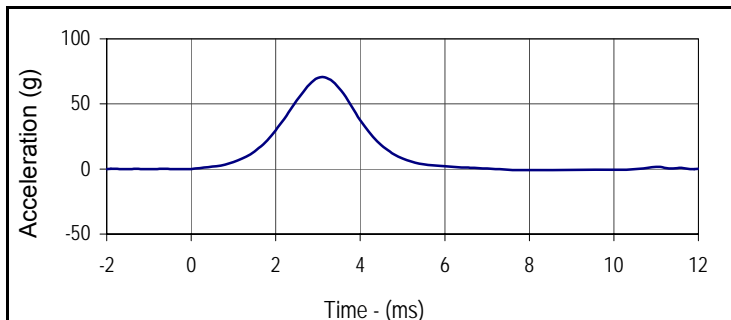
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
123.3	3.1	0.0	-5.3



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
2.3	2.6	-2.6	5.3



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
105.8	3.1	-2.5	7.8



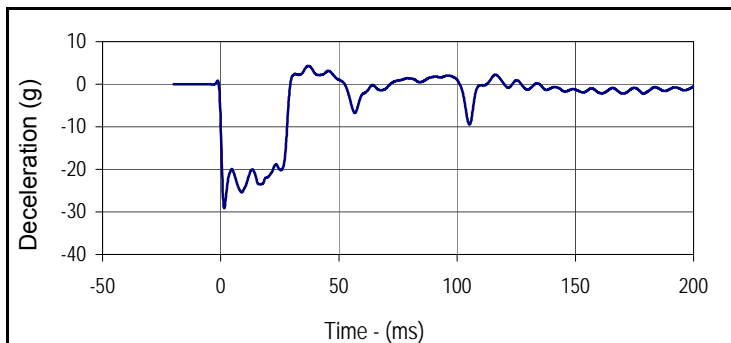
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
70.6	3.1	-0.9	7.8

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 308

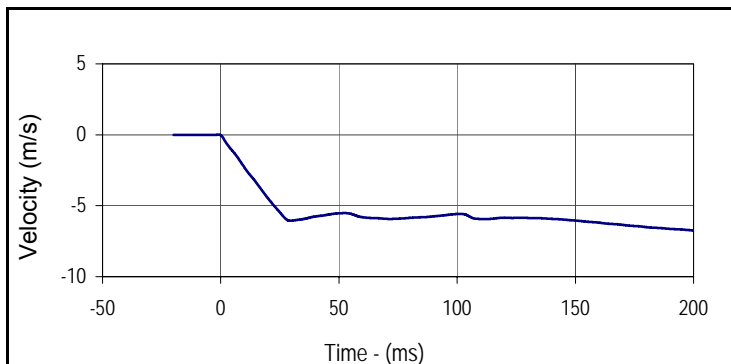
Test Date: 5/17/16
 Test I.D.: NBM20160309TWG2



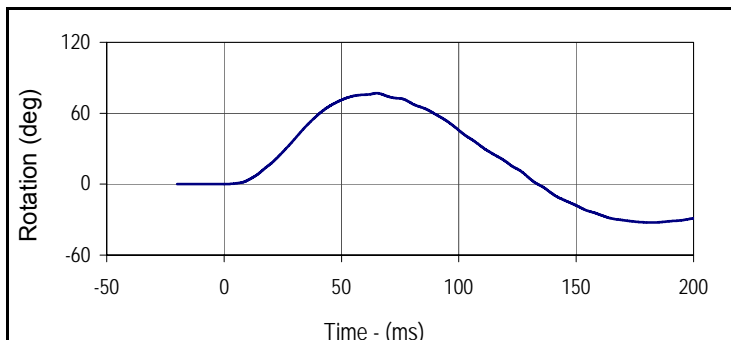
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	370	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	29.2	Pass	
	Min		19.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	29.2	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.61	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.30	Pass
	15 msec	m/s	-3.30 to -4.10	-3.36	Pass
	20 msec	m/s	-4.40 to -5.40	-4.48	Pass
	25 msec	m/s	-5.40 to -6.10	-5.47	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.06	Pass
D-Plane Rotation	Max	deg	71 to 81	77.0	Pass
	Time	msec	50 to 70	65.0	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-43.2	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	105.9	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	g
Max	Time	Min	Time
4.3	0.0	-29.1	0.0



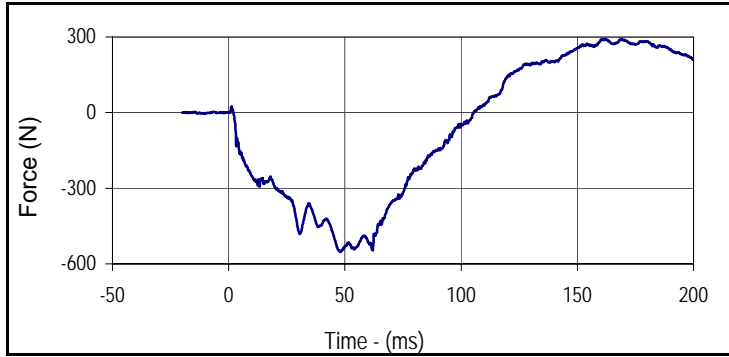
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.8	-6.7	199.9



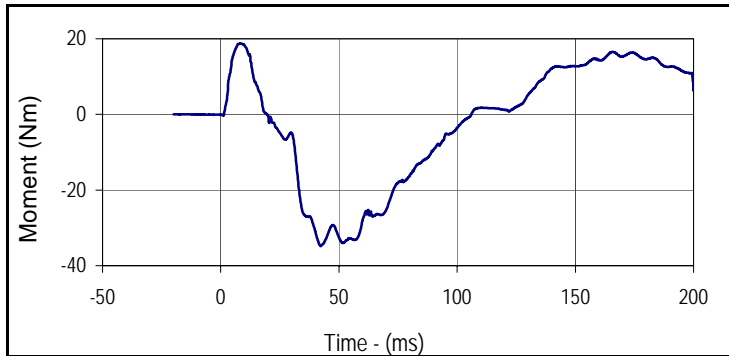
Curve Description			
D-Plane Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	deg
Max	Time	Min	Time
77.0	65.0	-32.5	182.2

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 308

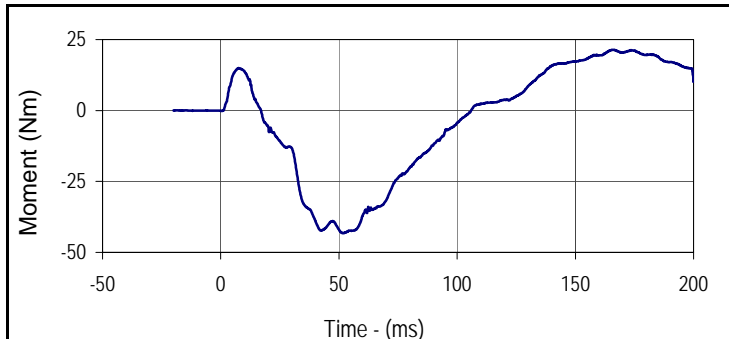
Test Date: 5/17/16
 Test I.D.: NBM20160309TWG2



Curve Description			
Neck Force Y			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
292.6	162.1	-553.5	48.2



Curve Description			
Neck Moment X			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
18.8	8.5	-34.8	42.3



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
006	FIL	600	Nm
Max	Time	Min	Time
21.4	165.9	-43.2	51.5