

REPORT NUMBER TR-P31043-11-NC

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

**AUDI AG
2011 AUDI A4
4-DOOR SEDAN**

NHTSA NUMBER: MB5801TWG2

**PREPARED BY:
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SEPTEMBER 8, 2011

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 DTNH22-06-D-00027.

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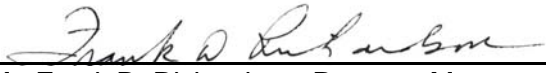
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Date of Acceptance

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SECTION 1

PURPOSE AND SUMMARY OF TEST MB5801TWG2

1.1 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. DTNH22-06-D-00027. The purpose of this test was to obtain occupant injury data for a side airbag deployment.

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

1.2 SUMMARY

The effects of a roof mounted curtain airbag and a torso airbag deployment in a 2011 Audi A4 4-Door Sedan with an out-of-position SID IIs 5th percentile adult female dummy were evaluated. The test was performed at KARCO Engineering, LLC on September 8, 2011. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

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

A SID IIs 5th percentile adult female 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 5th percentile adult female ATD was instrumented with head tri-axial accelerometers, and upper and lower neck transducers.

Fifteen (15) channels of data were recorded using an on-board data acquisition system. Appendix A contains photographs. Appendix B contains dummy response data traces. Appendix C contains the Instrumentation Data Channel assignments.

The front passenger side door remained closed during the deployment and was operable after the deployment.

The SID IIs 5th percentile adult female dummy's visible contact points were as follows: The curtain airbag contacted the ATD's head and upper torso, and the torso airbag contacted the ATD's back.

OUT OF POSITION OCCUPANT DATA SUMMARY

ATD Position	HIC ₁₅
Passenger	23.4

Orientation of the SID IIs 5th percentile adult female dummy was in the inboard facing position leaning back against the front passenger door. The dummy's head centerline was aligned with the deployment trajectory of the curtain 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.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2011 Audi A4 4-Door Sedan NHTSA No.: MB5801TWG2
Test Program: TWG 3.3.5.3 Test Date: 09/08/11

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	=(tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

* Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1

TEST SUMMARY

Test Vehicle: 2011 Audi A4 4-Door Sedan NHTSA No.: MB5801TWG2

Test Program: TWG 3.3.5.3 Test Date: 09/08/11

TEST DUMMY INFORMATION

Description	Passenger Seat Inboard Facing
Dummy Type / Serial No.	SID IIs / 299
Head Contact	Yes
Chest Contact	Yes
Abdomen Contact	None
Pelvis	None
Left Knee Contact	None
Right Knee Contact	None

MOVIE COVERAGE

High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

SID IIs ATD Sensors	15
Belt Assessment Sensors	0
Vehicle Structure Accelerometers	0
Total	15

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Audi A4 4-Door Sedan NHTSA No.: MB5801TWG2
 Test Program: TWG 3.3.5.3 Test Date: 09/08/11

TEST VEHICLE INFORMATION

Make	Audi
Model	A4
Body Style	4-Door Sedan
NHTSA No.	MB5801TWG2
VIN	WAUAFAPL5BN000377
Color	Quartz Gray Metallic
Delivery Date	August 10, 2010
Odometer Reading (mile)	22
Dealer	Rusnak Audi
Transmission	Audi Multitronic CVT
Final Drive	Front
Type/Number Cylinders	4
Engine Displacement (L)	2.0
Engine Placement	Longitudinal

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Driver Side Airbag	Yes
Driver Side Curtain Airbag	Yes
Pass. Front Airbag	Yes
Pass.Side Airbag	Yes
Pass. Curtain Airbag	Yes
Power Brakes	Yes
Power Steering	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
Tilt Steering Wheel	Yes
Power Windows	Yes
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Audi AG	GVWR (kg)	2135
Date of Manufacture	May-11	GAWR Front (kg)	1100
		GAWR Rear (kg)	1090

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	250
Recommend Tire Size	225/50 R17 94H	225/50 R17 94H
Tire Size on Vehicle	225/50 R17 94H	225/50 R17 94H
Tire Manufacturer	Pirelli	Pirelli

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	N/A	
Number of Occupants	2	3	N/A	5
Capacity Wt. (VCW) (kg)				375

* Vehicle had undergone New Car Assessment Program Side Impact Testing on September 9, 2010

DATA SHEET NO. 3

TEST VEHICLE INFORMATION

Test Vehicle: 2011 Audi A4 4-Door Sedan NHTSA No.: MB5801TWG2
 Test Program: TWG 3.3.5.3 Test Date: 09/08/11

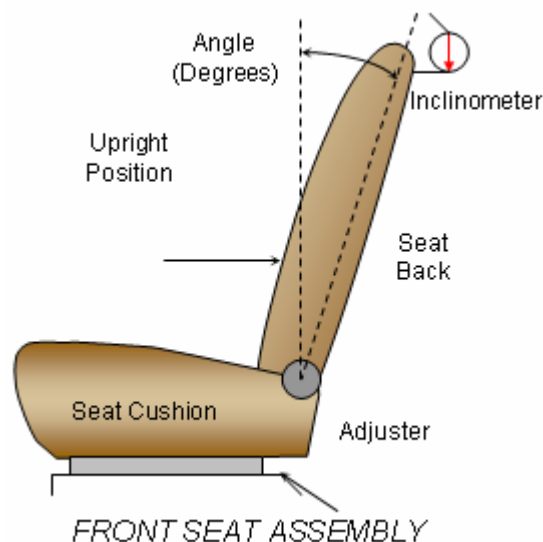
NOMINAL DESIGN RIDING POSITION

The passenger seat back is positioned to 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.

SEAT BACK ANGLES

Position	Deg.
Passenger w/ Dummy	18.9

Seat upright is 0 degrees.
 Taken at head rest post



SEAT FORE/AFT POSITIONS

The first or forward most position is counted as number one (1). The fore/aft position was set to minimize the distance between the ATD head and the roof rail module with no interference between the head and B-pillar.

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Passenger Seat	247	226

DATA SHEET NO. 4

DUMMY POSITIONING INFORMATION

Test Vehicle: 2011 Audi A4 4-Door Sedan NHTSA No. MB5801TWG2
 Test Program: TWG 3.3.5.3 Test Date: 09/08/11

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	SID IIs 5th percentile female	
		Length (mm)	Angle (°)
SA	Seat Back Angle		18.9
AMW	Side Airbag Module Width (Torso / Curtain)	30 / 30	
ABW	Side Airbag Width (Torso / Curtain)	250 / 400	
AML	Side Airbag Module Length (Torso / Curtain)	160 / 200	
ABL	Side Airbag Length (Torso / Curtain)	595 / 1710	
AN	Top of Airbag Module to Head/Neck Junction	251	
HD	Head CG to Door Panel/ Window	139	
HSC	Head to Seat Back Centerline	164	
HB	Head to B-Pillar (first contact)	13	
HZ	Head to Roof (Z)	151	
HHD	Head to Header	469	
ND	Nose to Dash	734	
NS	Nose to Seat Back	196	
NR	Nose to Header	474	
CD	Chest to Dash	630	
CS	Chest to Seat Back	249	
RACL	Right Arm to Seat Back Centerline	222	
LACL	Left Arm to Seat Back Centerline	254	
RA	Right Arm to Door Panel	140	
LA	Left Arm to Door Panel	35	
KK	Knee to Knee	265	
TT	Toe to Toe	135	
KSCR	Right Knee to Seat Cushion Centerline	196	
KSCL	Left Knee to Seat Cushion Centerline	198	
	Head Level (X Direction)		N/A
	Head Level (Y Direction)		N/A

**DATA SHEET NO. 5
HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2011 Audi A4 4-Door Sedan

NHTSA No.: MB5801TWG2

Test Program: TWG 3.3.5.3

Test Date: 9/8/11

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Pass. SID-IIs			
			Max	Time	Min	Time
Head CG	X	G's	18.0	9.9	-20.6	14.9
Head CG	Y	G's	28.3	46.5	-14.0	28.6
Head CG	Z	G's	22.4	9.7	-12.8	14.8
Head CG Resultant	N/A	G's	31.5	46.5		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. SID-IIs			
			Max	Time	Min	Time
Neck Force	X	Newtons	338.5	27.7	-111.8	96.6
Neck Force	Y	Newtons	346.4	40.6	-40.2	127.2
Neck Force	Z	Newtons	67.4	61.4	-1055.4	13.3
Neck Force Resultant	N/A	Newtons	1082.6	13.3		
Neck Moment	X	Nm	3.6	27.4	-23.9	15.9
Neck Moment	Y	Nm	31.3	27.9	-0.6	8.0
Neck Moment	Z	Nm	13.5	38.4	-0.8	13.5
Neck Moment Resultant	N/A	Nm	32.8	28.0		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. SID-IIs			
			Max	Time	Min	Time
Neck Force	X	Newtons	284.9	50.0	-100.9	90.9
Neck Force	Y	Newtons	423.0	17.0	-69.4	9.4
Neck Force	Z	Newtons	26.7	20.9	-1195.8	13.9
Neck Force Resultant	N/A	Newtons	1241.9	13.9		
Neck Moment	X	Nm	44.3	37.9	-12.4	300.0
Neck Moment	Y	Nm	49.6	14.1	-17.4	41.9
Neck Moment	Z	Nm	20.7	17.1	-3.5	9.4
Neck Moment Resultant	N/A	Nm	57.8	14.7		

HEAD INJURY CRITERIA (HIC 15)

Location	Pass. SID-IIs			
	HIC15	T ¹	T ²	Avg G
Head CG	23.4	42.1	49.7	24.7

UPPER NECK NIJ VALUES

Location	Pass. SID-IIs			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.13	0.04	0.21	0.04

DATA SHEET NO. 6

CAMERA LOCATIONS

Test Vehicle: 2011 Audi A4 4-Door Sedan NHTSA No.: MB5801TWG2

Test Program: TWG 3.3.5.3 Test Date: 09/08/11

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Real Time	350	-3050	1005	0.0	N/A	30
2	High Speed Side View	190	-3400	965	1.8	35	1000
3	High Speed 3/4 View	2150	-1490	1383	6.9	50	1000
4	High Speed Front View	2565	-380	1255	4.0	35	1000

* All measurements are taken relative to CG of dummy's head.

APPENDIX A
PHOTOGRAPHS



A-1

TR-P31043-1-NC

Figure A-1: Right Front $\frac{3}{4}$ View, As Received

MB5801

MFD. BY AUDI AG 05 10

GVWR LBS 4707 GAWR LBS FRONT 2425/REAR 2403

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S.
FEDERAL MOTOR VEHICLE SAFETY, BUMPER AND THEFT
PREVENTION STANDARDS IN EFFECT ON THE DATE OF
MANUFACTURE SHOWN ABOVE



Audi

PASSENGER CAR
WAUAFAPL5BN000377
GERMANY

2214182

Figure A-2: Vehicle Certification Label



Figure A-3: Post-Test Right Front ¾ View of NCAP Side Impact Test



Figure A-4: Post-Test Right Side View of NCAP Side Impact Test



Figure A-5: Pre-Test Dummy Position, Left Side View



Figure A-6: Pre-Test Dummy Position, $\frac{3}{4}$ View



Figure A-7: Pre-Test Dummy Position, Front View



Figure A-8: Post-Test Dummy Position and Airbags, Left Side View



Figure A-9: Post-Test Airbags, Left Side View



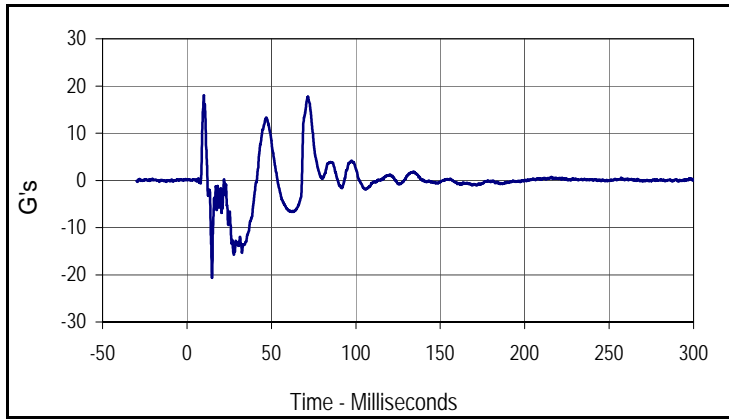
Figure A-10: Post-Test Airbags, Left Front ¾ View

APPENDIX B

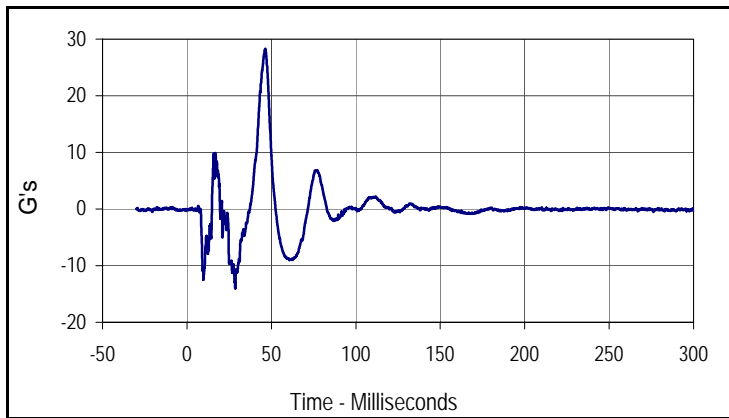
DATA PLOTS

Test Vehicle: 2011 Audi A4 4-Door Sedan
 Test Program: TWG 3.3.5.3

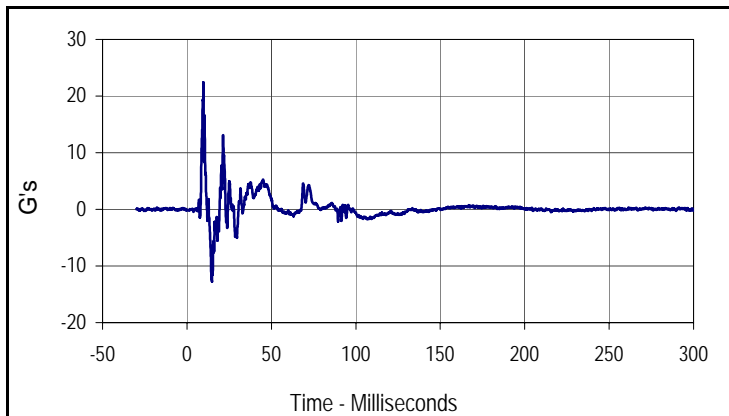
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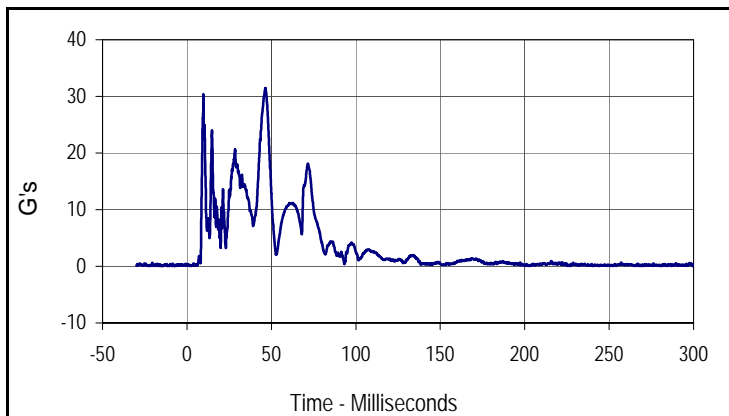
Curve Description			
Pass. SID-IIs Head X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
18.0	9.9	-20.6	14.9



Curve Description			
Pass. SID-IIs Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
28.3	46.5	-14.0	28.6



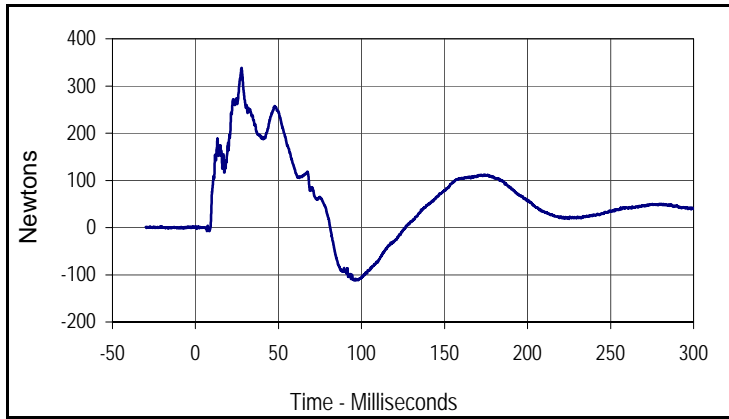
Curve Description			
Pass. SID-IIs Head Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
22.4	9.7	-12.8	14.8



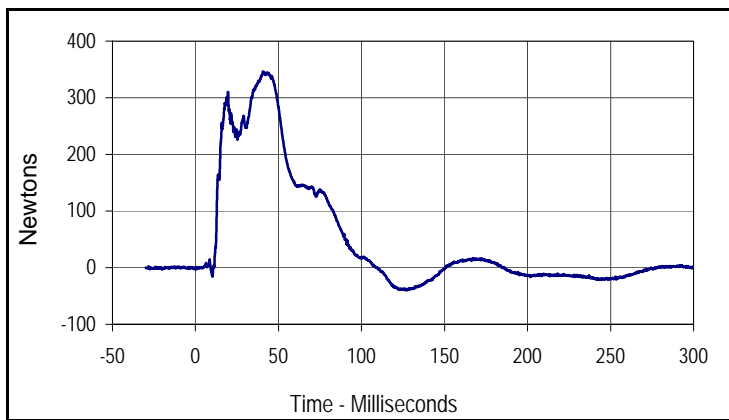
Curve Description			
Pass. SID-IIs Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
31.5	46.5	0.0	248.7

Test Vehicle: 2011 Audi A4 4-Door Sedan
 Test Program: TWG 3.3.5.3

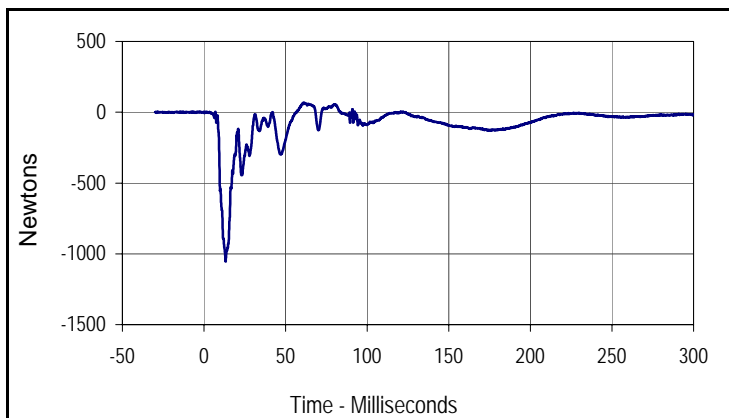
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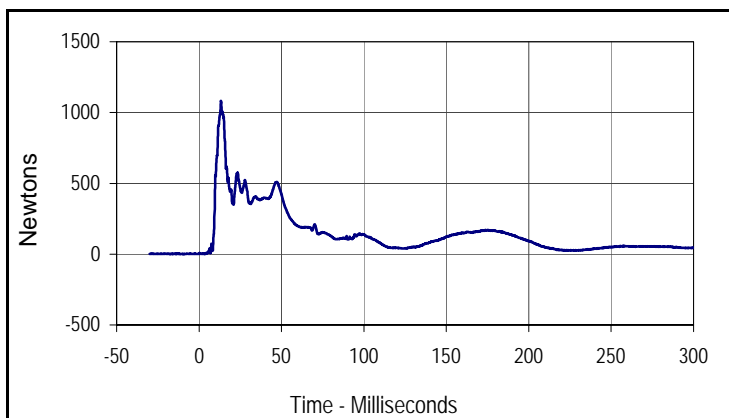
Curve Description			
Pass. SID-Its Upper Neck Force X			
CURNO	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
338.5	27.7	-111.8	96.6



Curve Description			
Pass. SID-Its Upper Neck Force Y			
CURNO	Type	SAE Class	Units
005	FIL	1000	Newtons
Max	Time	Min	Time
346.4	40.6	-40.2	127.2



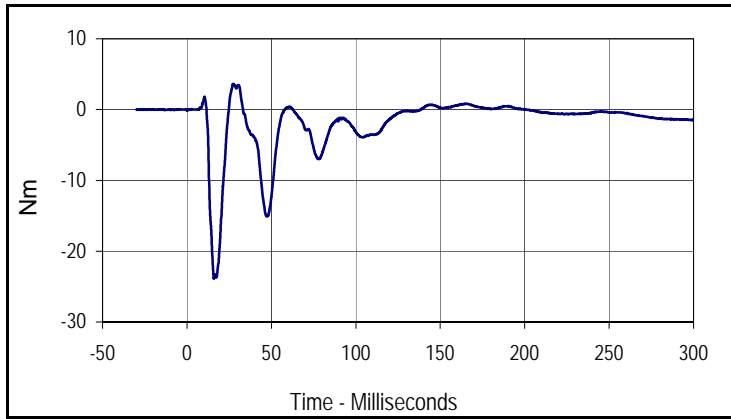
Curve Description			
Pass. SID-Its Upper Neck Force Z			
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006	FIL	1000	Newtons
Max	Time	Min	Time
67.4	61.4	-1055.4	13.3



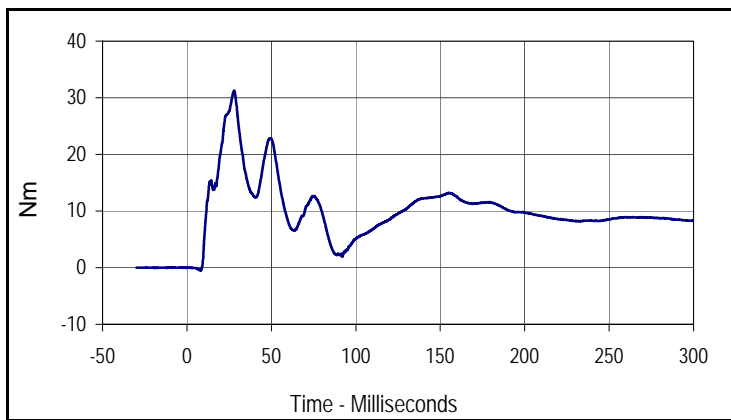
Curve Description			
Pass. SID-Its Upper Neck Force Resultant			
CURNO	Type	SAE Class	Units
004	RES	1000	Newtons
Max	Time	Min	Time
1082.6	13.3	0.4	3.2

Test Vehicle: 2011 Audi A4 4-Door Sedan
 Test Program: TWG 3.3.5.3

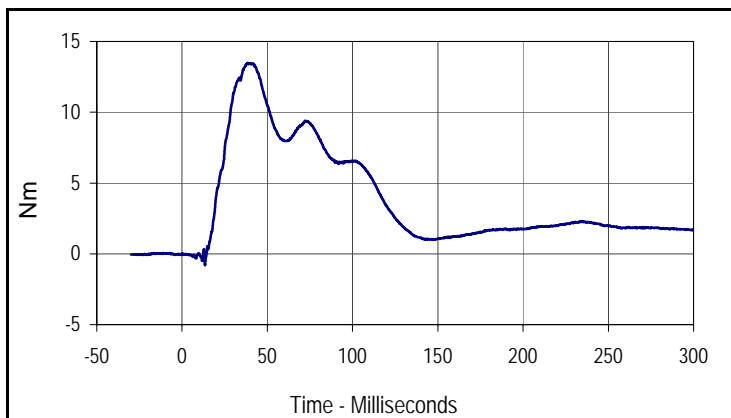
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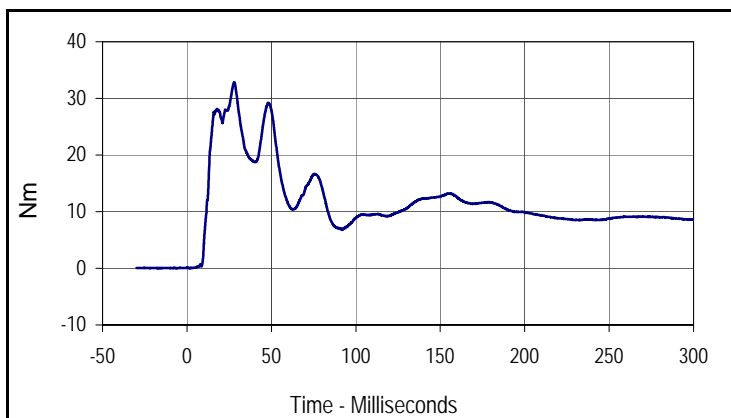
Curve Description			
Pass. SID-IIs Upper Neck Moment X			
CURNO	Type	SAE Class	Units
007	FIL	600	Nm
Max	Time	Min	Time
3.6	27.4	-23.9	15.9



Curve Description			
Pass. SID-IIs Upper Neck Moment Y			
CURNO	Type	SAE Class	Units
008	FIL	600	Nm
Max	Time	Min	Time
31.3	27.9	-0.6	8.0



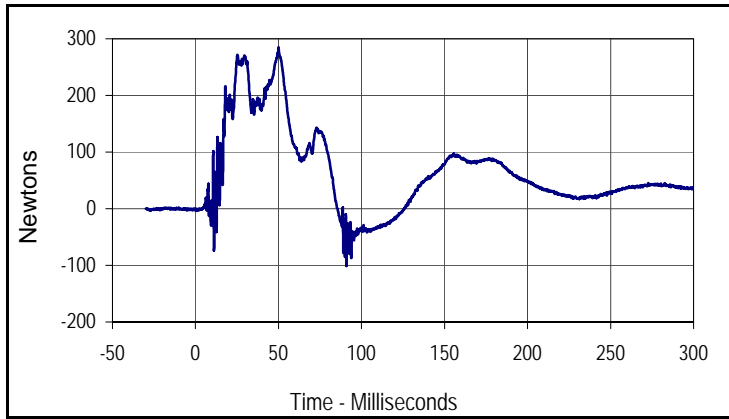
Curve Description			
Pass. SID-IIs Upper Neck Moment Z			
CURNO	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
13.5	38.4	-0.8	13.5



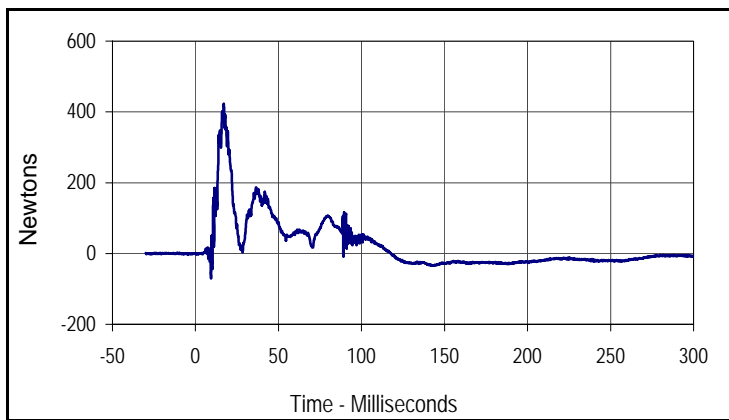
Curve Description			
Pass. SID-IIs Upper Neck Moment Resultant			
CURNO	Type	SAE Class	Units
007	RES	600	Nm
Max	Time	Min	Time
32.8	28.0	0.0	2.1

Test Vehicle: 2011 Audi A4 4-Door Sedan
 Test Program: TWG 3.3.5.3

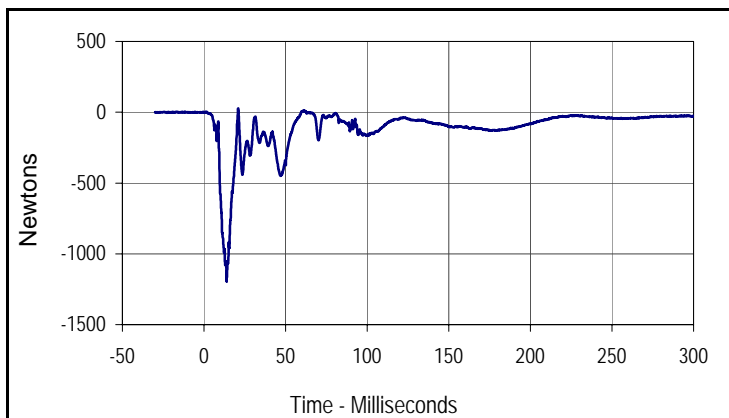
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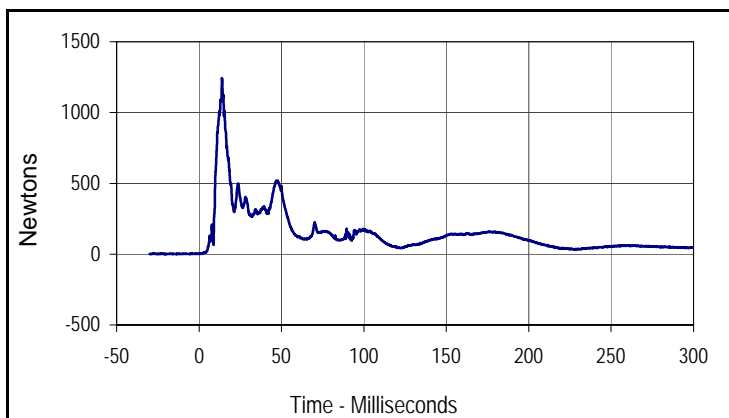
Curve Description			
Pass. SID-IIs Lower Neck Force X			
CURNO	Type	SAE Class	Units
010	FIL	1000	Newtons
Max	Time	Min	Time
284.9	50.0	-100.9	90.9



Curve Description			
Pass. SID-IIs Lower Neck Force Y			
CURNO	Type	SAE Class	Units
011	FIL	1000	Newtons
Max	Time	Min	Time
423.0	17.0	-69.4	9.4



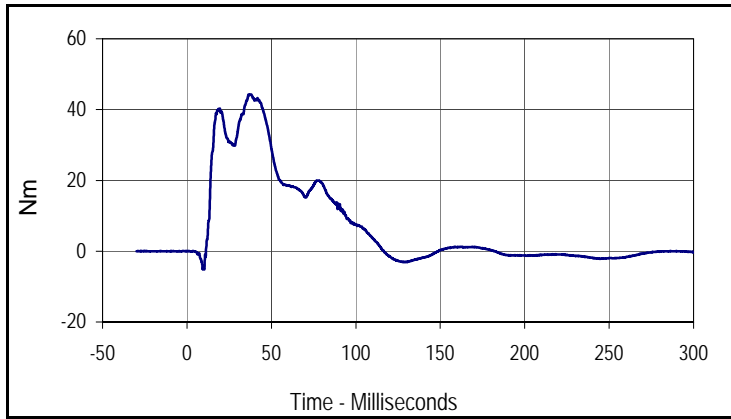
Curve Description			
Pass. SID-IIs Lower Neck Force Z			
CURNO	Type	SAE Class	Units
012	FIL	1000	Newtons
Max	Time	Min	Time
26.7	20.9	-1195.8	13.9



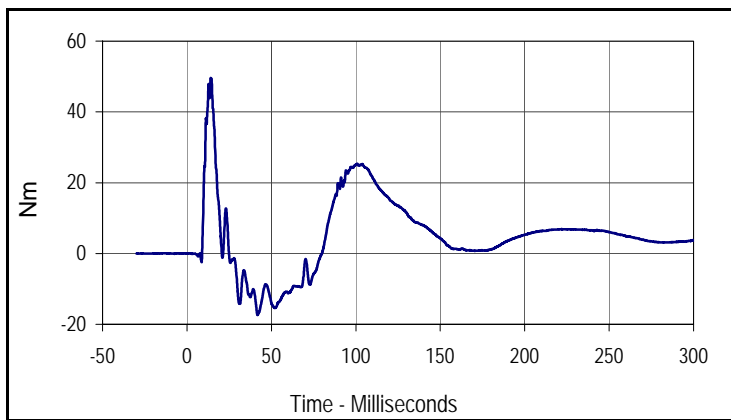
Curve Description			
Pass. SID-IIs Lower Neck Force Resultant			
CURNO	Type	SAE Class	Units
010	RES	1000	Newtons
Max	Time	Min	Time
1241.9	13.9	1.0	0.6

Test Vehicle: 2011 Audi A4 4-Door Sedan
 Test Program: TWG 3.3.5.3

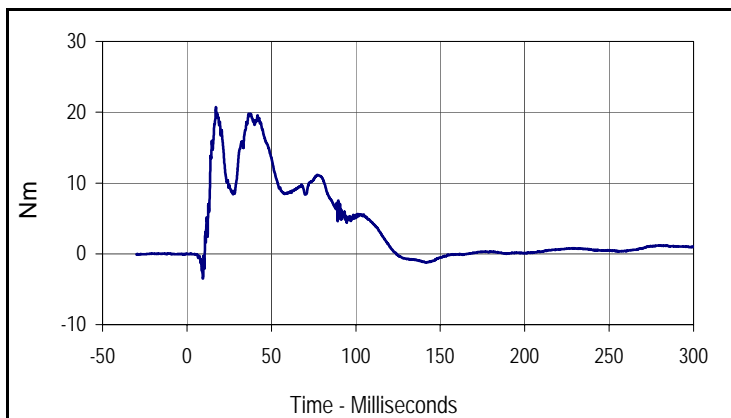
Test Date: 9/8/11
 NHTSA No.: MB5801TWG2



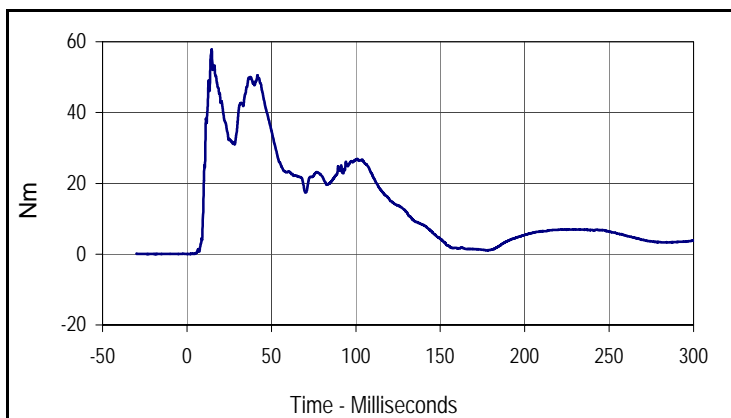
Curve Description			
Pass. SID-IIs Lower Neck Moment X			
CURNO	Type	SAE Class	Units
013	FIL	600	Nm
Max	Time	Min	Time
44.3	37.9	-5.2	10.2



Curve Description			
Pass. SID-IIs Lower Neck Moment Y			
CURNO	Type	SAE Class	Units
014	FIL	600	Nm
Max	Time	Min	Time
49.6	14.1	-17.4	41.9



Curve Description			
Pass. SID-IIs Lower Neck Moment Z			
CURNO	Type	SAE Class	Units
015	FIL	600	Nm
Max	Time	Min	Time
20.7	17.1	-3.5	9.4



Curve Description			
Pass. SID-IIs Lower Neck Moment Resultant			
CURNO	Type	SAE Class	Units
013	RES	600	Nm
Max	Time	Min	Time
57.8	14.7	0.0	0.3

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.5.3
Instrumentation Data Channel Assignments
A.T.D. Serial Number 299
9/8/11
2011 Audi A4 4-Door Sedan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD	X	P51926	Accel.,full bridge	Endevco	7264C-2K	G
2	HEAD	Y	P51929	Accel.,full bridge	Endevco	7264C-2K	G
3	HEAD	Z	P51934	Accel.,full bridge	Endevco	7264C-2K	G
4	UPPER NECK FORCE	X	1624	Load cell, six axis neck	Denton	1716A	N
5	UPPER NECK FORCE	Y	1624	Load cell, six axis neck	Denton	1716A	N
6	UPPER NECK FORCE	Z	1624	Load cell, six axis neck	Denton	1716A	N
7	UPPER NECK MOMENT	X	1624	Load cell, six axis neck	Denton	1716A	Nm
8	UPPER NECK MOMENT	Y	1624	Load cell, six axis neck	Denton	1716A	Nm
9	UPPER NECK MOMENT	Z	1624	Load cell, six axis neck	Denton	1716A	Nm
10	LOWER NECK FORCE	X	143	Load cell, six axis neck	Denton	IF-205	N
11	LOWER NECK FORCE	Y	143	Load cell, six axis neck	Denton	IF-205	N
12	LOWER NECK FORCE	Z	143	Load cell, six axis neck	Denton	IF-205	N
13	LOWER NECK MOMENT	X	143	Load cell, six axis neck	Denton	IF-205	Nm
14	LOWER NECK MOMENT	Y	143	Load cell, six axis neck	Denton	IF-205	Nm
15	LOWER NECK MOMENT	X	143	Load cell, six axis neck	Denton	IF-205	Nm

APPENDIX D

DUMMY CALIBRATION DATA

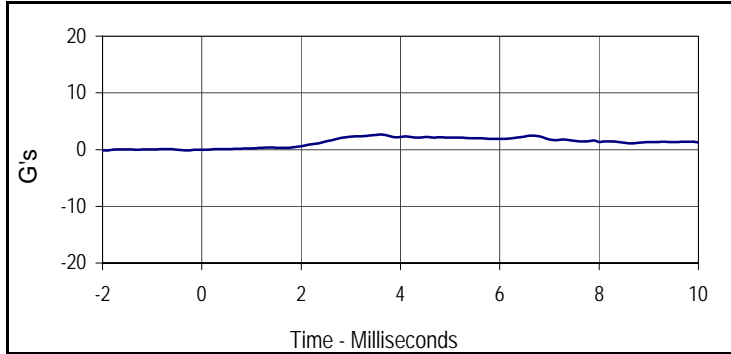
APPENDIX D
PRE-TEST / SID-IIs CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID IIs Lateral Head Drop Calibration
 ATD Serial No.: 299

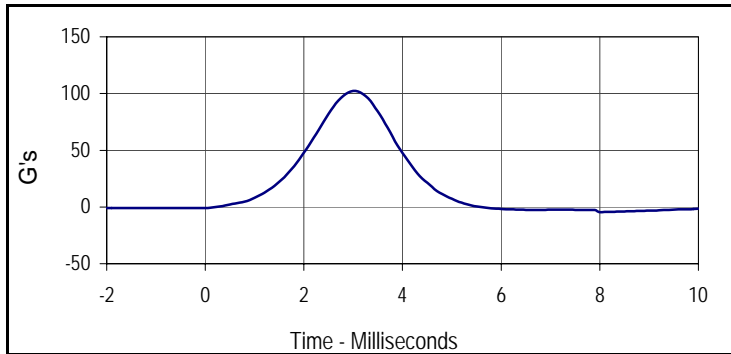
Test Date: 8/30/11
 Test I.D.: 299HD015



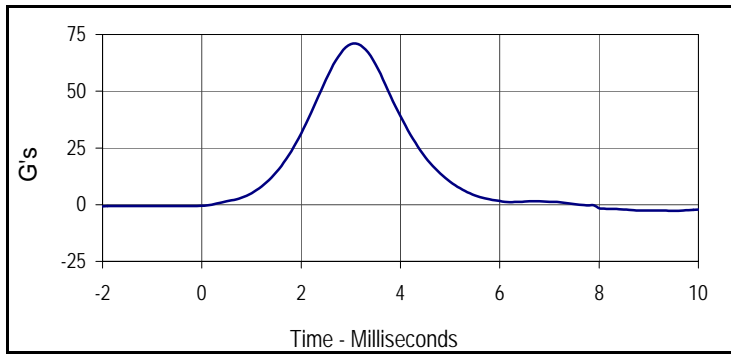
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.26	Pass
Laboratory Relative Humidity	%	10 to 70	20.62	Pass
Peak Resultant Acceleration	G's	115 to 137	124.4	Pass
Peak Longitudinal Acceleration	G's	≤15	2.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	10.1	Pass
Overall Test Results			Pass	



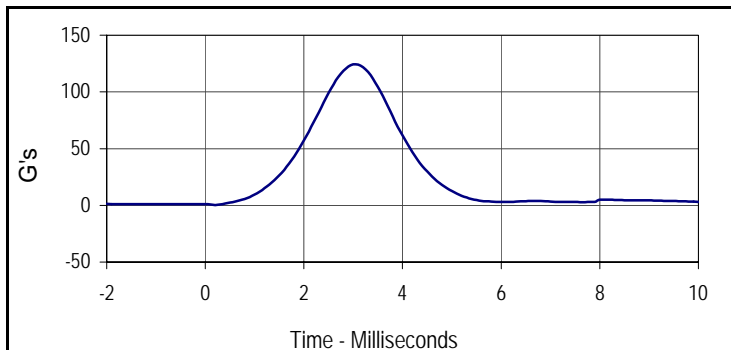
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
2.7	3.6	-0.2	-2.0



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
102.3	3.0	-4.5	8.0



Curve Description			
Head Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
71.0	3.1	-2.7	9.5



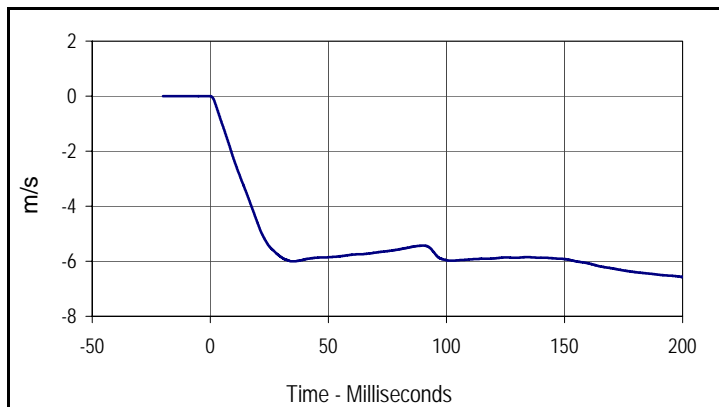
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
124.4	3.0	0.2	0.2

Test Program: SID IIs Neck Calibration
 ATD Serial No.: 299

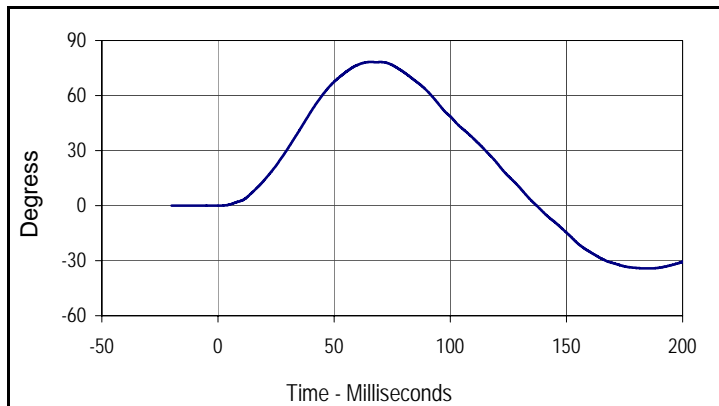
Test Date: 8/30/11
 Test I.D.: 299NB015



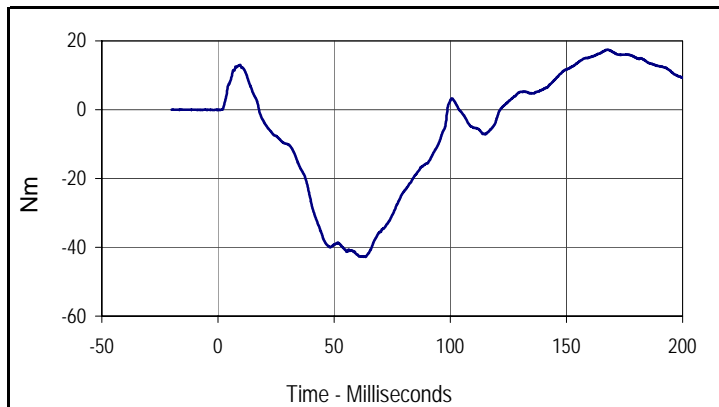
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.38	Pass	
Laboratory Relative Humidity	%	10 to 70	20.14	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.58	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.31	Pass
	15 msec	m/s	-3.30 to -4.10	-3.44	Pass
	20 msec	m/s	-4.40 to -5.40	-4.60	Pass
	25 msec	m/s	-5.40 to -6.10	-5.46	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.00	Pass
Translation-Rotation	Max	Degrees	71.0 to 81.0	78.3	Pass
	Time	msec	50.0 to 70.0	65.6	Pass
Peak Occipital Condyle Moment	Nm	-36.0 to -44.0	-42.8	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102.0 to 126.0	121.5	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.3	-6.6	200.0



Curve Description			
Maximum Translation Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degree
Max	Time	Min	Time
78.3	65.6	-34.2	184.9



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
17.5	167.7	-42.8	63.6

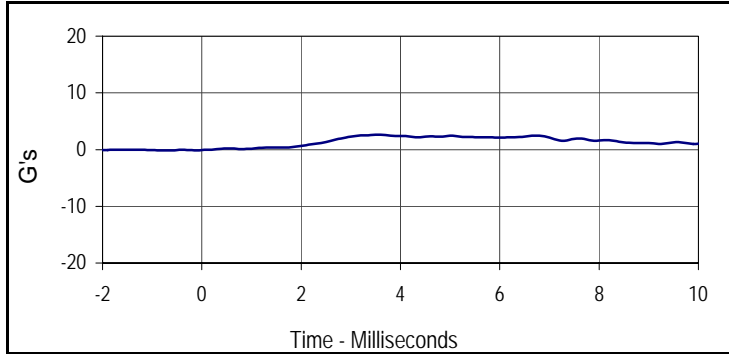
APPENDIX D
POST-TEST / SID-IIs CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID IIs Lateral Head Drop Calibration
 ATD Serial No.: 299

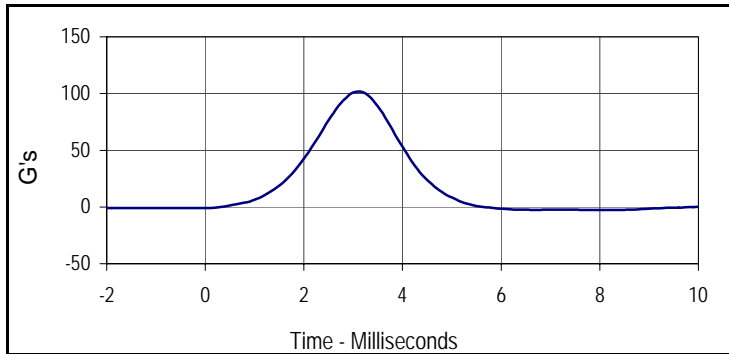
Test Date: 9/9/11
 Test I.D.: 299HD016



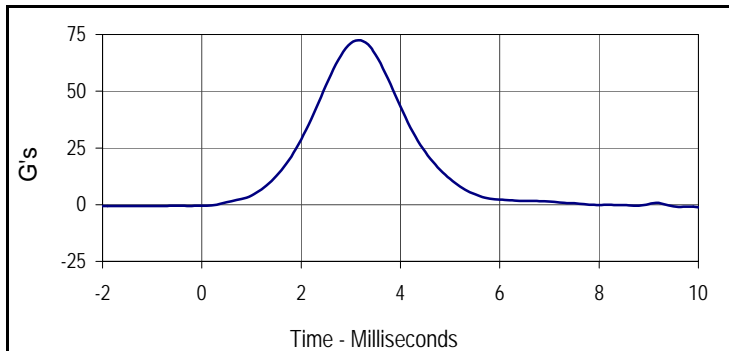
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.54	Pass
Laboratory Relative Humidity	%	10 to 70	20.82	Pass
Peak Resultant Acceleration	G's	115 to 137	125.0	Pass
Peak Longitudinal Acceleration	G's	≤15	2.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	11.4	Pass
Overall Test Results			Pass	



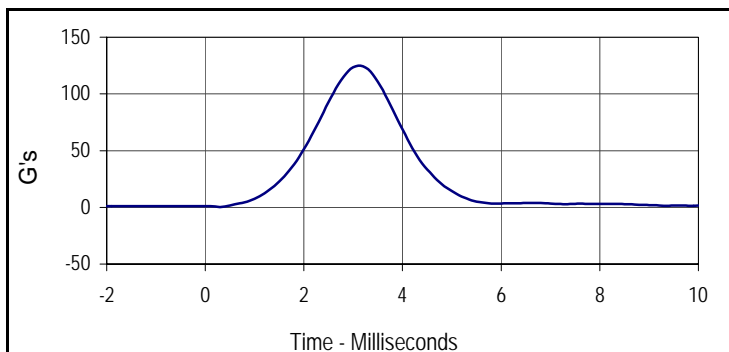
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
2.6	3.6	-0.1	-0.7



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
101.8	3.1	-2.7	8.0



Curve Description			
Head Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
72.5	3.2	-1.1	10.0



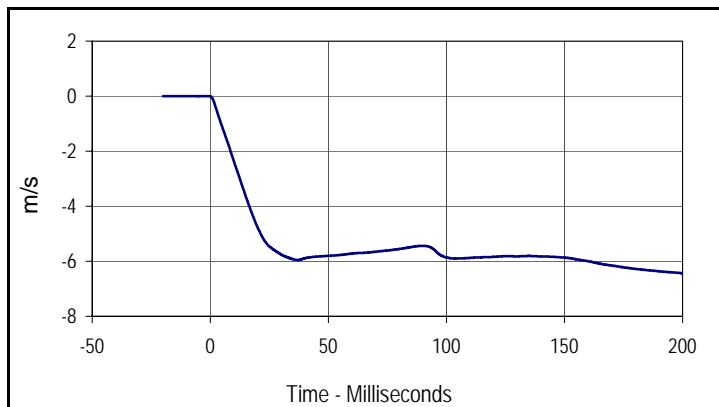
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
125.0	3.1	0.2	0.3

Test Program: SID IIs Neck Calibration
 ATD Serial No.: 299

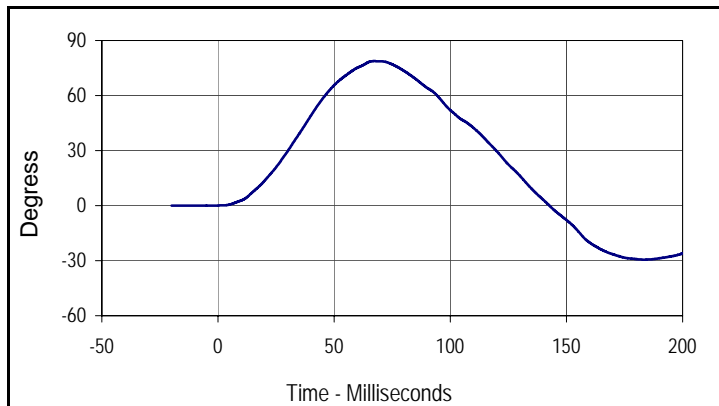
Test Date: 9/9/11
 Test I.D.: 299NB016



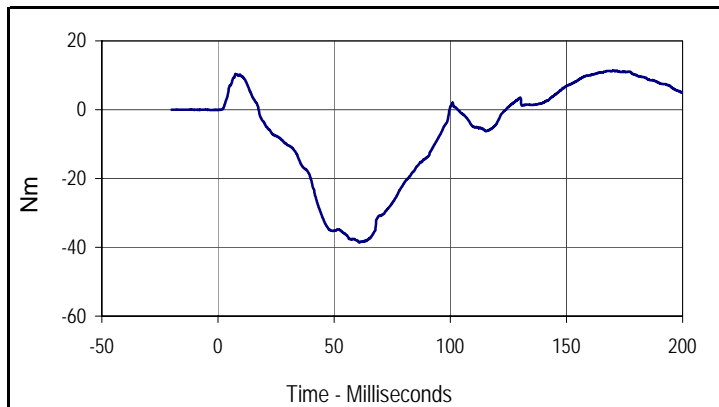
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.58	Pass	
Laboratory Relative Humidity	%	10 to 70	20.76	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.55	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.38	Pass
	15 msec	m/s	-3.30 to -4.10	-3.64	Pass
	20 msec	m/s	-4.40 to -5.40	-4.77	Pass
	25 msec	m/s	-5.40 to -6.10	-5.46	Pass
	25-100 msec	m/s	-5.50 to -6.20	-5.95	Pass
Translation-Rotation	Max	Degrees	71.0 to 81.0	78.8	Pass
	Time	msec	50.0 to 70.0	67.1	Pass
Peak Occipital Condyle Moment	Nm	-36.0 to -44.0	-38.6	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102.0 to 126.0	124.0	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.6	-6.4	200.0



Curve Description			
Maximum Translation Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degree
Max	Time	Min	Time
78.8	67.1	-29.4	183.4



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
11.4	170.1	-38.6	60.8