

REPORT NUMBER TR-P33007-14-NC

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

**VOLKSWAGEN DE MEXICO S.A. DE C.V.
2013 VOLKSWAGEN BEETLE
2-DOOR COUPE**

NHTSA NUMBER: MD5801TWG2-2

**PREPARED BY:
KARCO ENGINEERING, LLC.
9270 HOLLY ROAD
ADELANTO, CA 92301**

NOVEMBER 1, 2013

FINAL REPORT

PREPARED FOR:

**ALPHA TECHNOLOGY ASSOCIATE, INC.
2810 OLD LEE HWY, SUITE 120
FAIRFAX, VA 22031**

This final test report was prepared for the U.S. Department of Transportation, Alpha Technology Associate, Inc., in response to Contract Number DTNH22-12-D-00259.

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Prepared By: 
Mr. Matthew S. Hubbard, Test Engineer
KARCO Engineering, LLC.

Reviewed By: 
Mr. Steven D. Matsusaka, Engineering Dept. Supervisor
KARCO Engineering, LLC.


Mr. Michael L. Dunlap, Director of Operations
KARCO Engineering, LLC.

Approved By: 
Mr. Frank D. Richardson, Program Manager
KARCO Engineering, LLC.

Approval Date: November 1, 2013

FINAL REPORT ACCEPTED BY:

Engineer, Alpha Technology Associate, Inc.

Date of Acceptance

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SECTION 1

PURPOSE AND SUMMARY OF TEST MD5801TWG2-2

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. DTNH22-12-D-00259. 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 seat mounted head/torso side airbag deployment in a 2013 Volkswagen Beetle 2-door coupe with an out-of-position 3 year old dummy were evaluated. The test was performed at KARCO Engineering, LLC. on October 25, 2013. 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 3 year old anthropomorphic test device (ATD) was placed in the right front passenger seating position facing rearward according to the dummy placement instructions (3.3.3.2) in the July 2003 Revision of the Technical Working Group's 'Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags'.

The 3 year old ATD was instrumented with head tri-axial accelerometers, upper and lower neck force transducers.

Fifteen (15) channels of data were recorded using an on-board data acquisition system. Appendix B contains dummy response data traces. Appendix C contains the instrumentation data channel assignments. Appendix D contains ATD calibration sheets.

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

The 3 year old dummy's visible contact points were as follows: The head/torso side airbag contacted the ATD's head, abdomen, pelvis and legs.

OUT OF POSITION OCCUPANT DATA SUMMARY

ATD Position	HIC ₁₅
Passenger	378.1

Orientation of the 3 year old dummy was in the rearward facing position leaning against the seat. The dummy's upper sternum was aligned with the deploying trajectory of the airbag. This orientation complies with section 3.3.3.2 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: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: MD5801TWG2-2
Test Program: TWG 3.3.3.2 Test Date: 10/25/13

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: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: MD5801TWG2-2

Test Program: TWG 3.3.3.2 Test Date: 10/25/13

TEST DUMMY INFORMATION

Description	Passenger Seat Rearward Facing
Dummy Type / Serial No.	3 year old / 044
Head Contact	Yes
Chest Contact	Yes
Abdomen Contact	Yes
Pelvis	Yes
Left Knee Contact	No
Right Knee Contact	No

VIDEO COVERAGE

High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

3 year old 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: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: MD5801TWG2-2
 Test Program: TWG 3.3.3.2 Test Date: 10/25/13

TEST VEHICLE INFORMATION

Make	Volkswagen
Model	Beetle
Body Style	2-Door Coupe
NHTSA No.	MD5801TWG2-2
VIN	3VWHP7AT7DM601728
Color	Moonrock Silver Metallic
Delivery Date	September 25, 2012
Odometer (km./mi.)	177 / 110
Dealer	Roseville Volkswagen
Transmission	Manual
Final Drive	Front
Type/Number Cylinders	Inline 5
Engine Displacement (L)	2.5
Engine Placement	Transverse

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Driver Side Airbag	Yes
Driver Side Curtain Airbag	No
Pass. Front Airbag	Yes
Pass.Side Airbag	Yes
Pass. Curtain Airbag	No
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	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen De Mexico S.A. De C.V.	GVWR (kg)	1750
Date of Manufacture	July-12	GAWR Front (kg)	980
		GAWR Rear (kg)	820

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	200	200
Recommend Tire Size	P215/55R17	P215/55R17
Tire Size on Vehicle	P215/55R17	P215/55R17
Tire Manufacturer	Hankook	Hankook

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	2		4
Capacity Wt. (VCW) (kg)				370

* Vehicle underwent New Car Assessment Program Frontal Impact Testing on October 12, 2012

DATA SHEET NO. 3

TEST VEHICLE INFORMATION

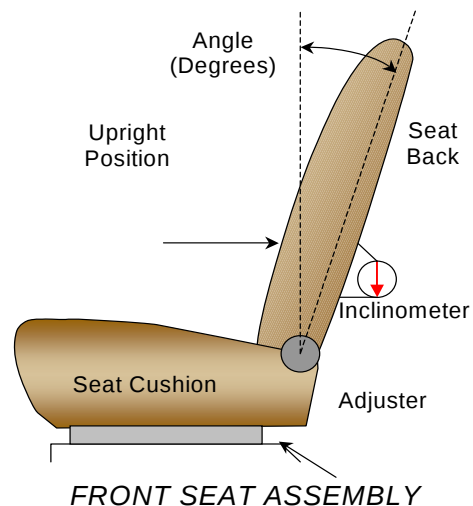
Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: MD5801TWG2-2
Test Program: TWG 3.3.3.2 Test Date: 10/25/13

NOMINAL DESIGN RIDING POSITION

The passenger seat back is positioned per section 3.3.3.2 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. Seat back angle is measured at the seatback.

SEAT BACK ANGLES

Position	Deg.
Passenger w/ Dummy	18.2



SEAT FORE/AFT POSITIONS

The passenger seat track travel is set per section 3.3.3.2 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).

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Passenger Seat	252mm (0-37 detents)	252mm (37th detent)

DATA SHEET NO. 4

DUMMY POSITIONING INFORMATION

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: MD5801TWG2-2

Test Program: TWG 3.3.3.2 Test Date: 10/25/13

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Hybrid III 3 YO	
		Length (mm)	Angle (°)
SA	Seat Back Angle		18.2
AMV	Side Airbag Module Diameter	25	
ABW	Side Airbag Width	805	
AML	Side Airbag Module Length	160	
ABL	Side Airbag Length	370	
AN	Top of Airbag Module to Head/Neck Junction	155	
HD	Head CG to Door Panel/ Window	44	
HSC	Head to Seat Back Centerline	197	
HB	Head to B-Pillar (first contact)	25	
HZ	Head to Roof (Z)	222	
HH	Head to Header (measured from back of head)	734	20.0
ND	Nose to Dash (measured from back of head)	853	4.9
NS	Nose to Seat Back	12	
NR	Nose to Header (measured from back of head)	734	20.0
CD	Chest to Dash (measured from back)	685	0
CS	Chest to Seat Back	0	
RACL	Right Arm to Seat Back Centerline	72	
LACL	Left Arm to Seat Back Centerline	333	
RA	Right Arm to Door Panel	262	
LA	Left Arm to Door Panel	0	
KK	Knee to Knee	125	
TT	Toe to Toe	128	
KSCR	Right Knee to Seat Cushion Centerline	115	
KSCL	Left Knee to Seat Cushion Centerline	187	
	Head Level (X Direction)		52.8
	Head Level (Y Direction)		4.4

DATA SHEET NO. 5

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: MD5801TWG2-2

Test Program: TWG 3.3.3.2 Test Date: 10/25/13

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Pass. 3 YO			
			Max	Time	Min	Time
Head CG	X	G's	26.5	194.1	-35.9	13.7
Head CG	Y	G's	76.5	12.0	-10.3	187.4
Head CG	Z	G's	26.8	12.8	-1.5	4.7
Head CG Resultant	N/A	G's	83.7	12.0		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 3 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	337.7	8.9	-300.5	198.9
Neck Force	Y	Newtons	40.3	64.3	-617.3	13.5
Neck Force	Z	Newtons	1423.9	13.5	-864.0	196.5
Neck Force Resultant	N/A	Newtons	1569.8	13.5		
Neck Moment	X	Nm	26.1	11.6	-23.8	23.3
Neck Moment	Y	Nm	12.4	9.0	-21.0	204.4
Neck Moment	Z	Nm	10.1	73.7	-19.1	20.3
Neck Moment Resultant	N/A	Nm	30.6	23.3		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 3 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	103.3	31.6	-441.5	205.1
Neck Force	Y	Newtons	56.5	64.6	-663.0	14.3
Neck Force	Z	Newtons	1507.3	13.2	-744.7	196.6
Neck Force Resultant	N/A	Newtons	1618.6	13.3		
Neck Moment	X	Nm	5.5	65.5	-31.1	15.9
Neck Moment	Y	Nm	25.6	203.8	-9.8	85.9
Neck Moment	Z	Nm	9.6	73.0	-26.3	18.3
Neck Moment Resultant	N/A	Nm	39.5	17.3		

HEAD INJURY CRITERIA (HIC 15)

Location	Pass. 3 YO			
	HIC15	T ¹	T ²	Avg G
Head CG	378.1	8.4	19.4	65.0

UPPER NECK NIJ VALUES

Location	Pass. 3 YO			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.78	0.30	0.07	1.15

DATA SHEET NO. 6**CAMERA LOCATIONS**Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: MD5801TWG2-2Test Program: TWG 3.3.3.2 Test Date: 10/25/13**CAMERA LOCATIONS**

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Front View	1970	-210	-1500	-15.2	35	1000
2	High Speed 3/4 View	1604	-1524	-1440	-13.9	35	1000
3	High Speed Side View	-374	-3059	-940	0.0	35	1000
4	Real Time	-404	-3021	-905	0.0	N/A	30

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 Front View of NCAP Frontal Impact Test



FIGURE 4. Post-Test Right Front 3/4 View of NCAP Frontal Impact Test



FIGURE 5. Post-Test Left Front $\frac{3}{4}$ View of NCAP Frontal Impact Test



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



FIGURE 7. Pre-Test Dummy Position, Left Side View



FIGURE 8. Post-Test Dummy Position, Left Side View



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

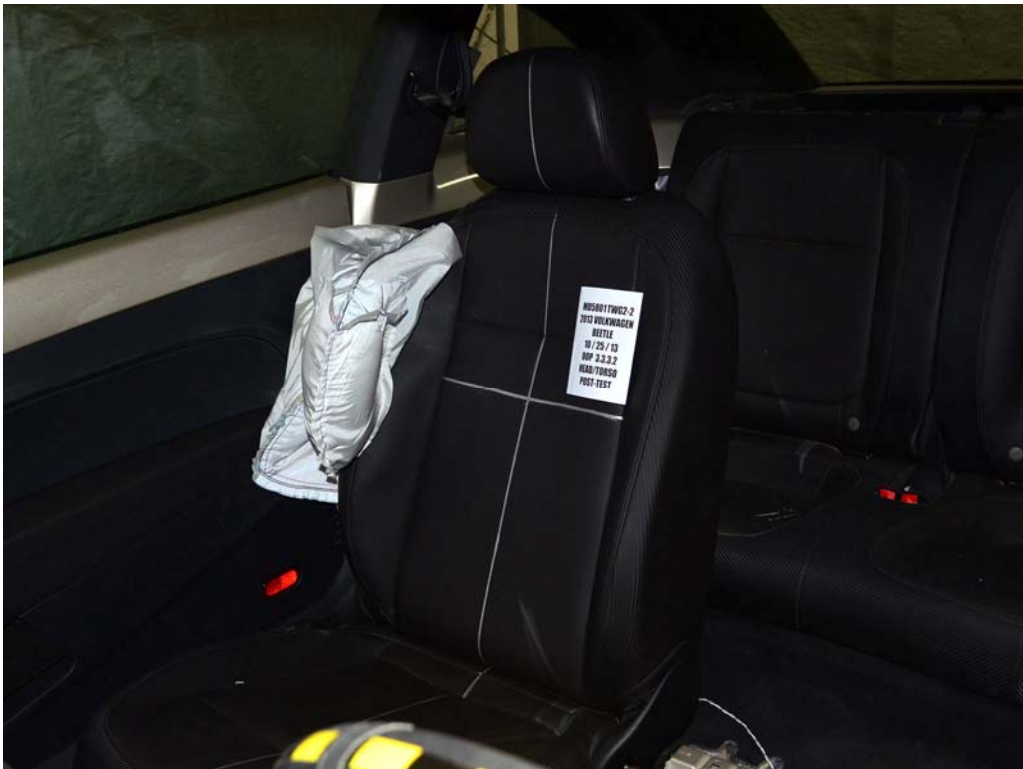


FIGURE 10. Post-Test Dummy Position, $\frac{3}{4}$ View



FIGURE 11. Pre-Test Dummy Position, Front View



FIGURE 12. Post-Test Dummy Position, Front View



FIGURE 13. Post-Test Airbags, Left Side View

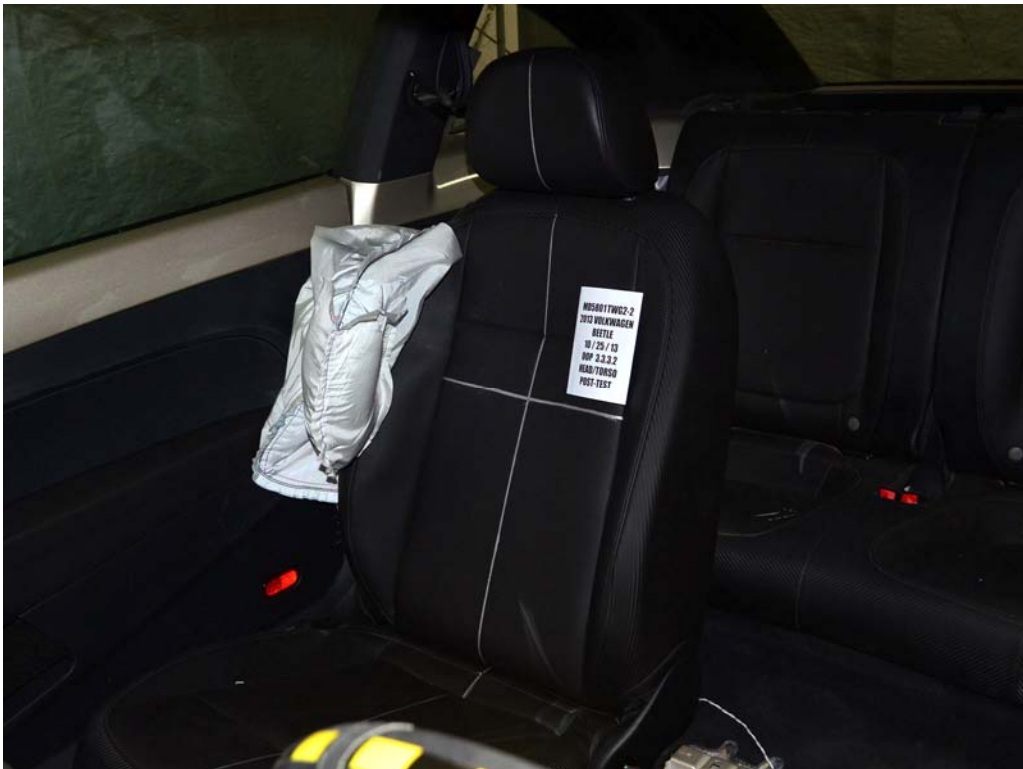


FIGURE 14. Post-Test Airbags, Left Front $\frac{3}{4}$ View

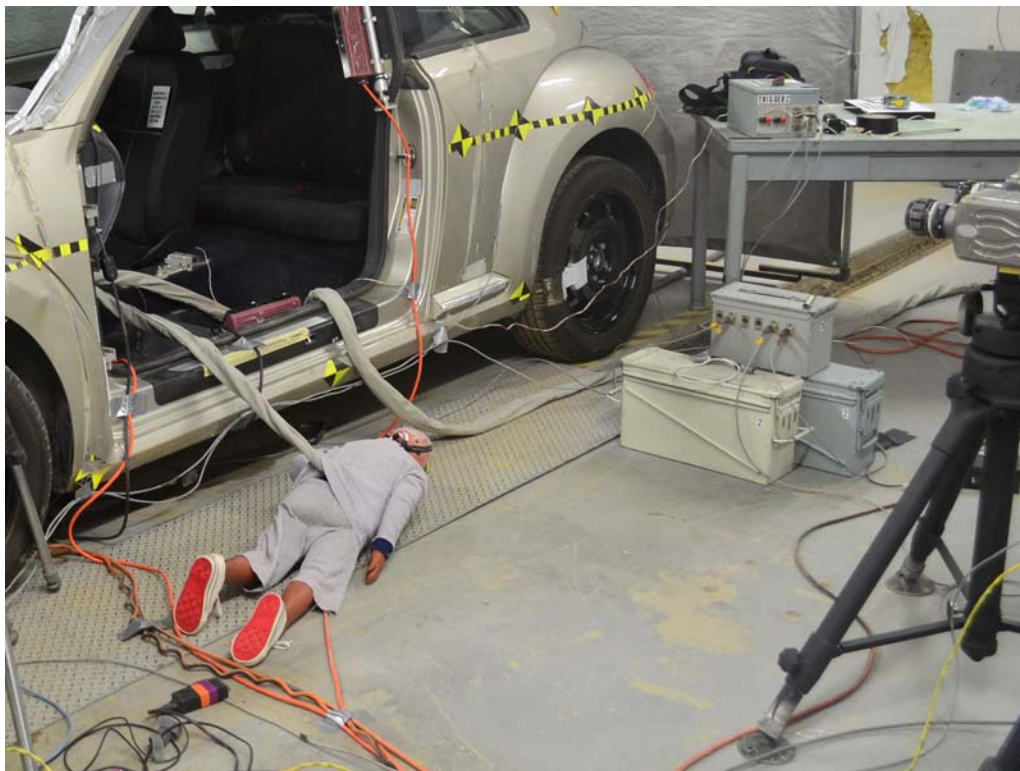


FIGURE 15. Post-Test, Dummy Final Resting Position



FIGURE 16. Post-Test, Dummy Final Resting Position



FIGURE 17. Post-Test, Dummy Final Resting Position

APPENDIX B

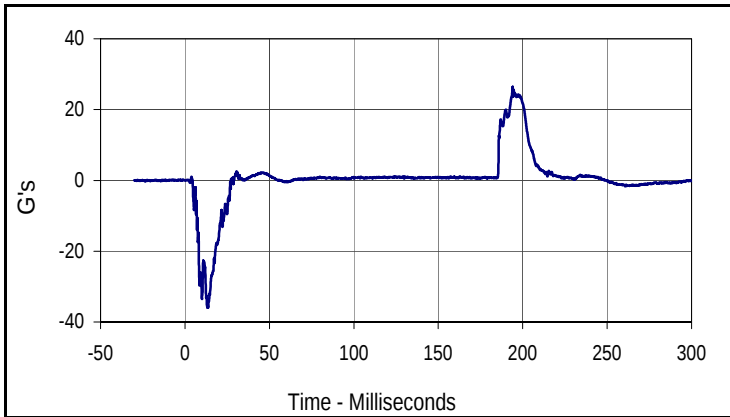
DATA PLOTS

TABLE OF DATAPLOTS

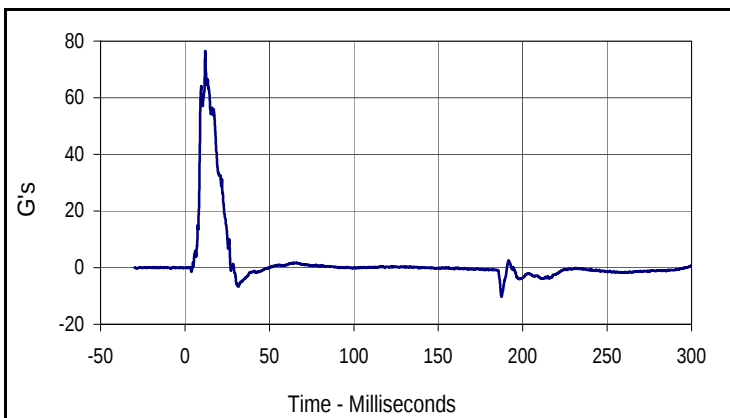
Plot		Page
1	Pass. (3 Yr. Old) Head X	B-1
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Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe
 Test Program: TWG 3.3.3.2

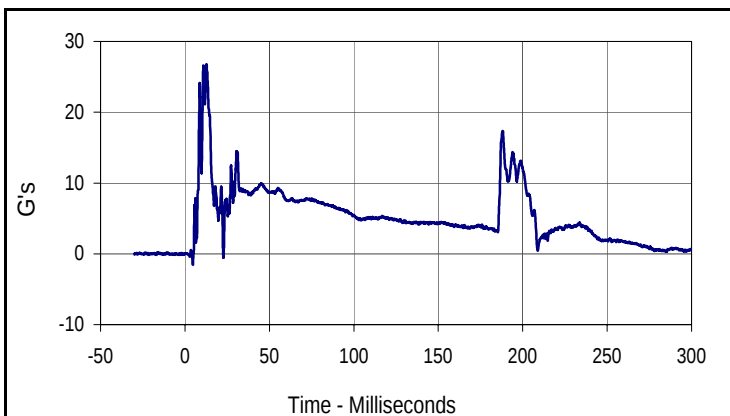
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 NHTSA No.: MD5801TWG2-2



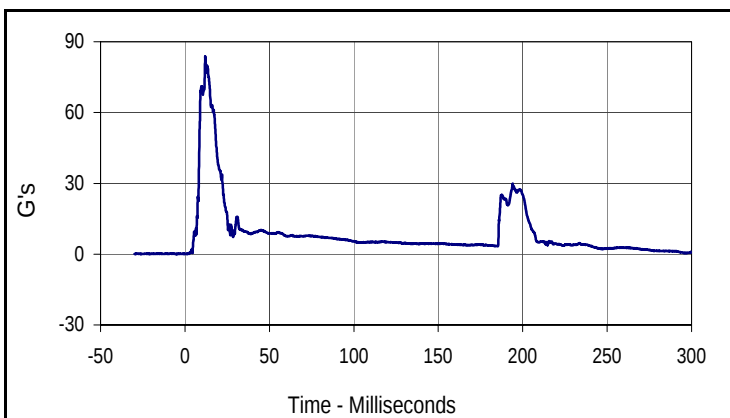
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Plot No.	Type	SAE Class	Units
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Curve Description			
3 Yr. Old Head Y			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
76.5	12.0	-10.3	187.4



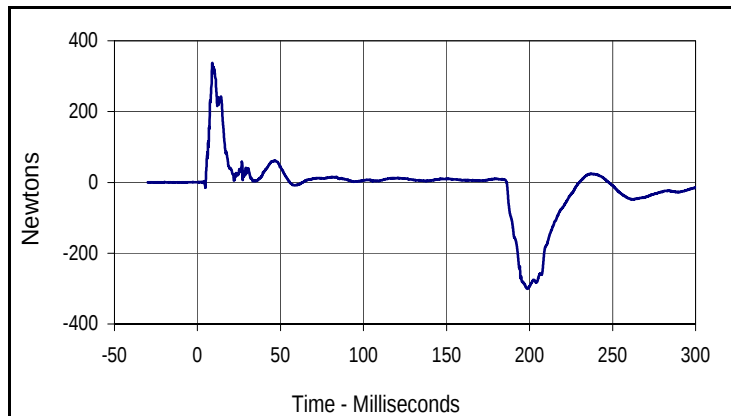
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3 Yr. Old Head Z			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
26.8	12.8	-1.5	4.7



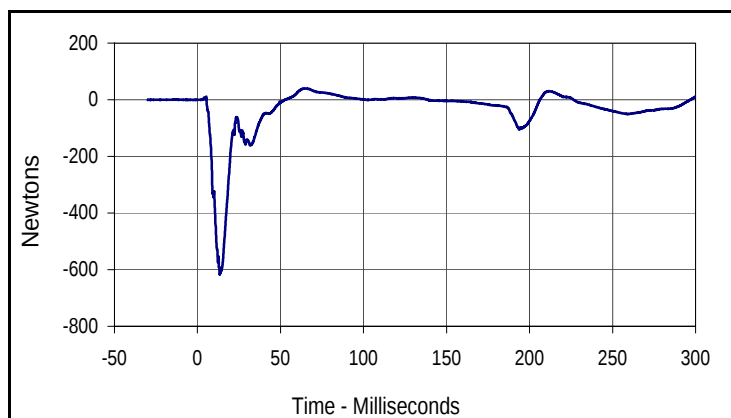
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3 Yr. Old Head Resultant			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
83.7	12.0	0.0	1.4

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe
 Test Program: TWG 3.3.3.2

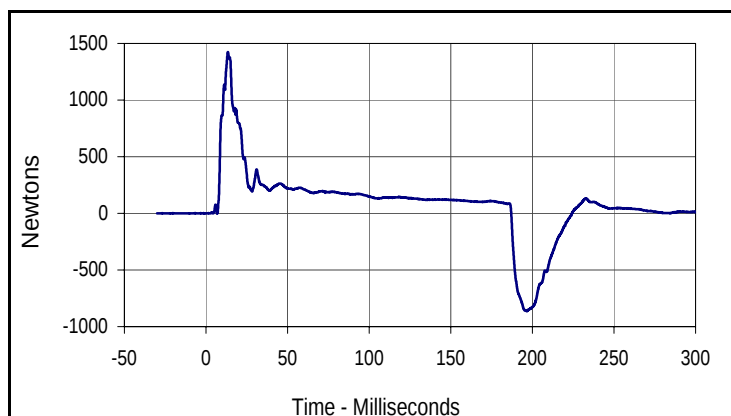
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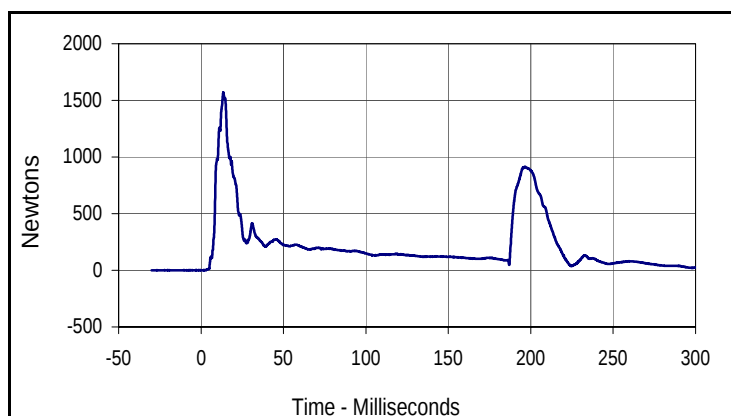
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3 Yr. Old Upper Neck Force X			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
337.7	8.9	-300.5	198.9



Curve Description			
3 Yr. Old Upper Neck Force Y			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
40.3	64.3	-617.3	13.5



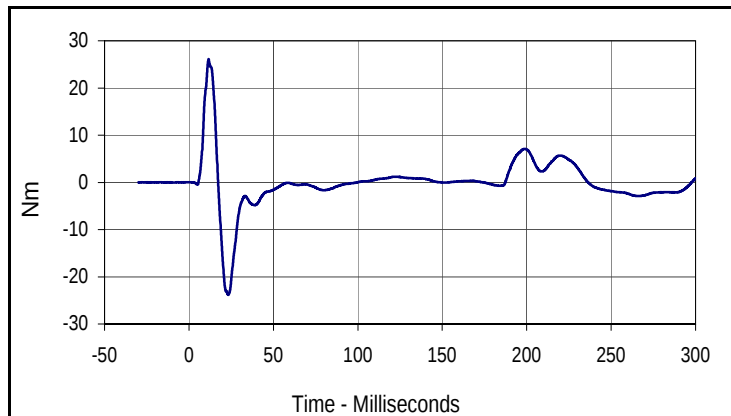
Curve Description			
3 Yr. Old Upper Neck Force Z			
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007	FIL	1000	Newtons
Max	Time	Min	Time
1423.9	13.5	-864.0	196.5



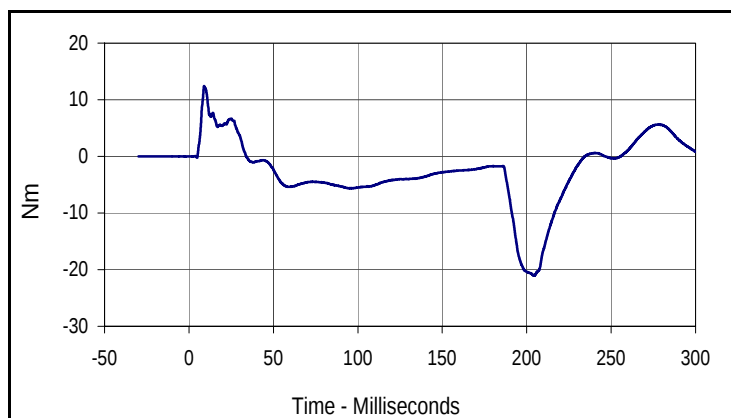
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Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe
 Test Program: TWG 3.3.3.2

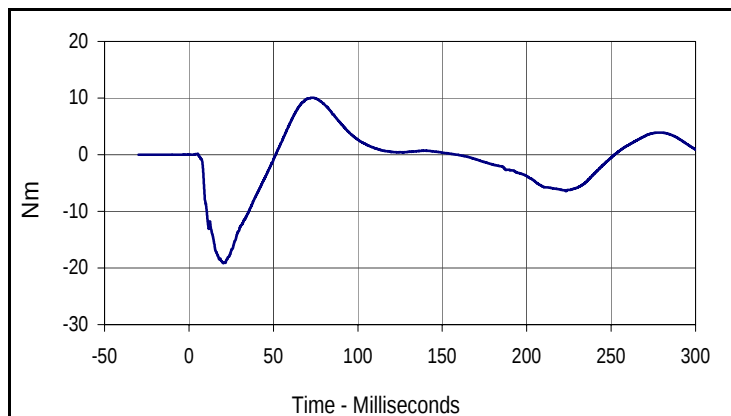
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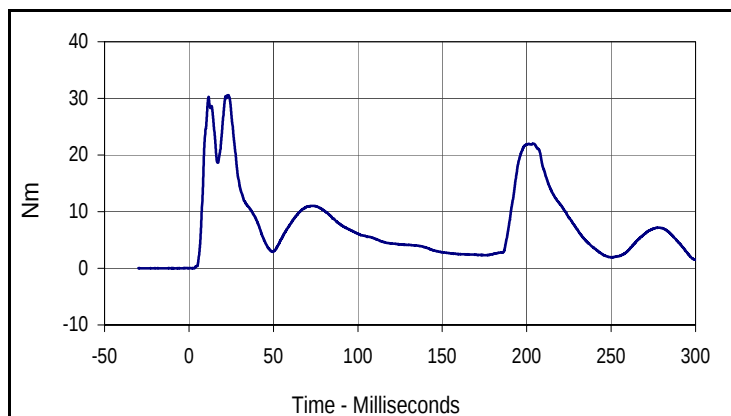
Curve Description			
3 Yr. Old Upper Neck Moment X			
Plot No.	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
26.1	11.6	-23.8	23.3



Curve Description			
3 Yr. Old Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
12.4	9.0	-21.0	204.4



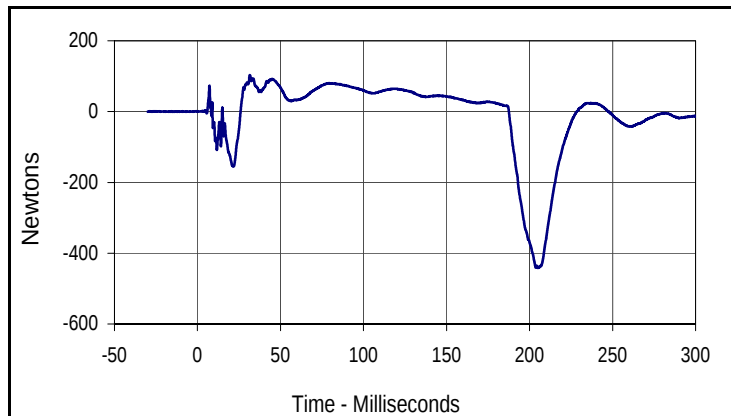
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3 Yr. Old Upper Neck Moment Z			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
10.1	73.7	-19.1	20.3



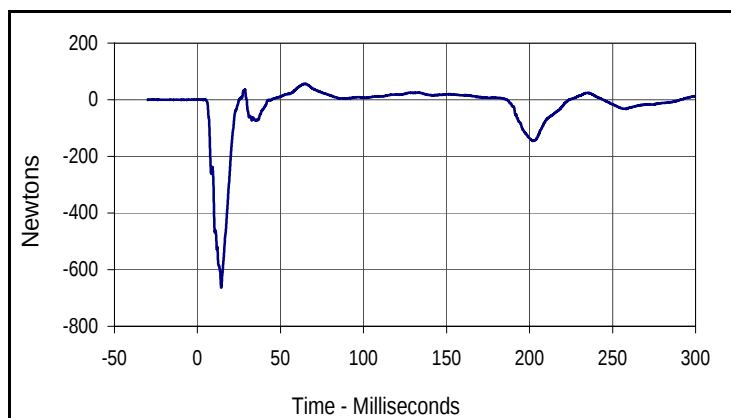
Curve Description			
3 Yr. Old Upper Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
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Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe
 Test Program: TWG 3.3.3.2

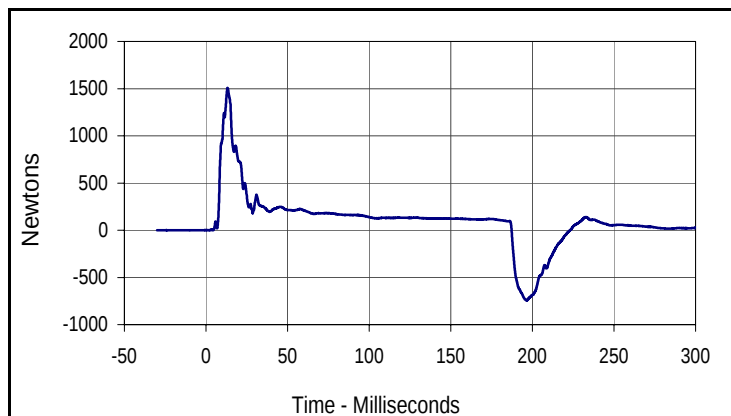
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 NHTSA No.: MD5801TWG2-2



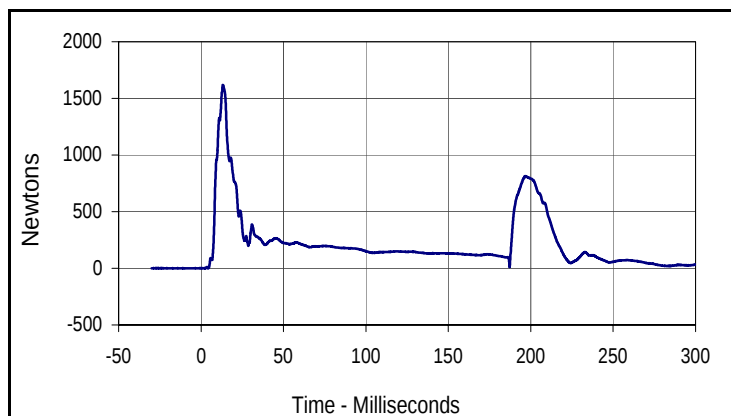
Curve Description			
3 Yr. Old Lower Neck Force X			
Plot No.	Type	SAE Class	Units
013	FIL	1000	Newtons
Max	Time	Min	Time
103.3	31.6	-441.5	205.1



Curve Description			
3 Yr. Old Lower Neck Force Y			
Plot No.	Type	SAE Class	Units
014	FIL	1000	Newtons
Max	Time	Min	Time
56.5	64.6	-663.0	14.3



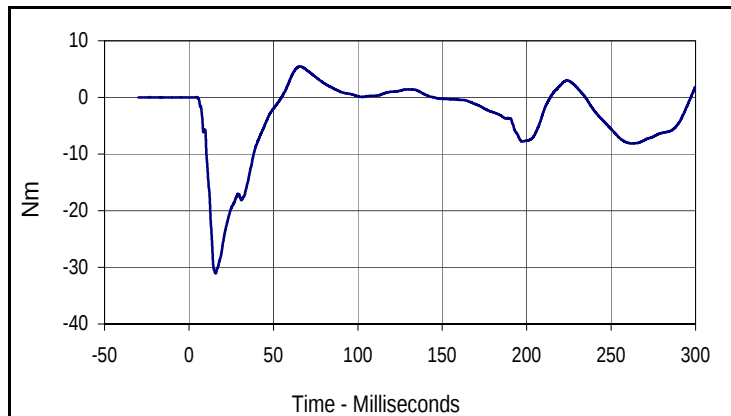
Curve Description			
3 Yr. Old Lower Neck Force Z			
Plot No.	Type	SAE Class	Units
015	FIL	1000	Newtons
Max	Time	Min	Time
1507.3	13.2	-744.7	196.6



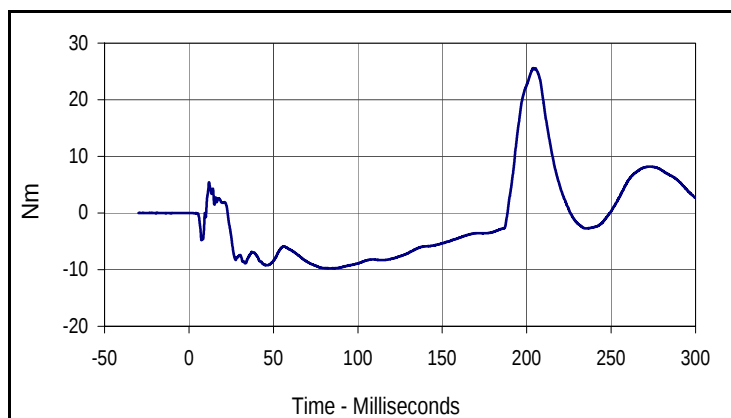
Curve Description			
3 Yr. Old Lower Neck Force Resultant			
Plot No.	Type	SAE Class	Units
016	RES	1000	Newtons
Max	Time	Min	Time
1618.6	13.3	0.4	1.5

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe
 Test Program: TWG 3.3.3.2

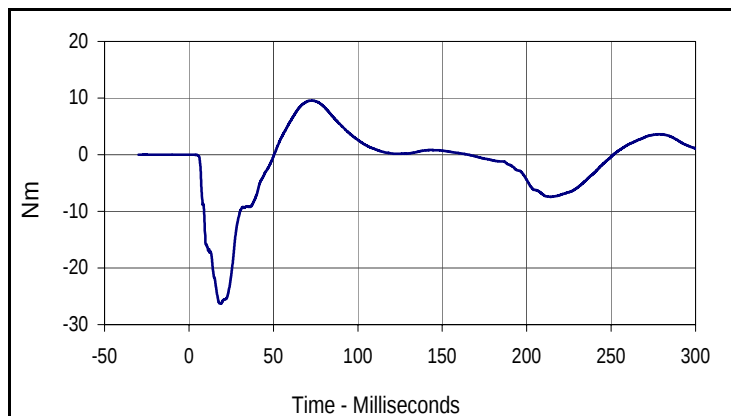
Test Date: 10/25/13
 NHTSA No.: MD5801TWG2-2



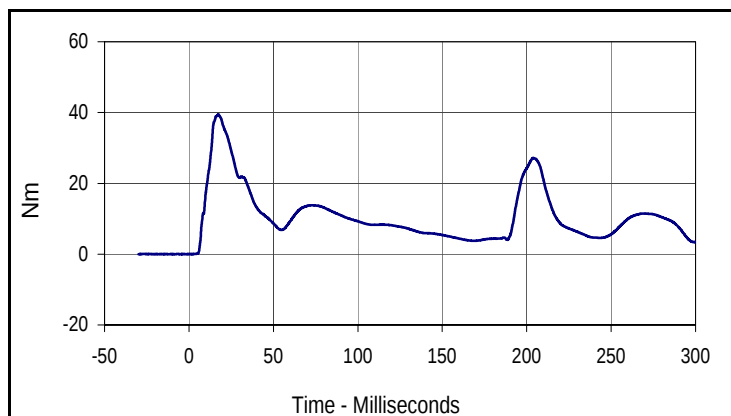
Curve Description			
3 Yr. Old Lower Neck Moment X			
Plot No.	Type	SAE Class	Units
017	FIL	600	Nm
Max	Time	Min	Time
5.5	65.5	-31.1	15.9



Curve Description			
3 Yr. Old Lower Neck Moment Y			
Plot No.	Type	SAE Class	Units
018	FIL	600	Nm
Max	Time	Min	Time
25.6	203.8	-9.8	85.9



Curve Description			
3 Yr. Old Lower Neck Moment Z			
Plot No.	Type	SAE Class	Units
019	FIL	600	Nm
Max	Time	Min	Time
9.6	73.0	-26.3	18.3



Curve Description			
3 Yr. Old Lower Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
020	RES	600	Nm
Max	Time	Min	Time
39.5	17.3	0.0	1.2

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.3.2
Instrumentation Data Channel Assignments
A.T.D. Serial Number 044
10/25/13
2013 Volkswagen Beetle 2-Door Coupe

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD	X	P58808	Accel.,full bridge	ENDEVCO	7264C-2000	G
2	HEAD	Y	P49189	Accel.,full bridge	ENDEVCO	7264C-2000	G
3	HEAD	Z	P58861	Accel.,full bridge	ENDEVCO	7264C-2000	G
4	UPPER NECK FORCE	X	212	Load cell, six axis neck	R. A. Denton	3303	N
5	UPPER NECK FORCE	Y	212	Load cell, six axis neck	R. A. Denton	3303	N
6	UPPER NECK FORCE	Z	212	Load cell, six axis neck	R. A. Denton	3303	N
7	UPPER NECK MOMENT	X	212	Load cell, six axis neck	R. A. Denton	3303	Nm
8	UPPER NECK MOMENT	Y	212	Load cell, six axis neck	R. A. Denton	3303	Nm
9	UPPER NECK MOMENT	Z	212	Load cell, six axis neck	R. A. Denton	3303	Nm
10	LOWER NECK FORCE	X	93	Load cell, six axis neck	R. A. Denton	3303	N
11	LOWER NECK FORCE	Y	93	Load cell, six axis neck	R. A. Denton	3303	N
12	LOWER NECK FORCE	Z	93	Load cell, six axis neck	R. A. Denton	3303	N
13	LOWER NECK MOMENT	X	93	Load cell, six axis neck	R. A. Denton	3303	Nm
14	LOWER NECK MOMENT	Y	93	Load cell, six axis neck	R. A. Denton	3303	Nm
15	LOWER NECK MOMENT	Z	93	Load cell, six axis neck	R. A. Denton	3303	Nm

APPENDIX D

PRE-TEST AND POST-TEST HYBRID III CONFIGURATION AND PERFORMANCE VERIFICATION DATA

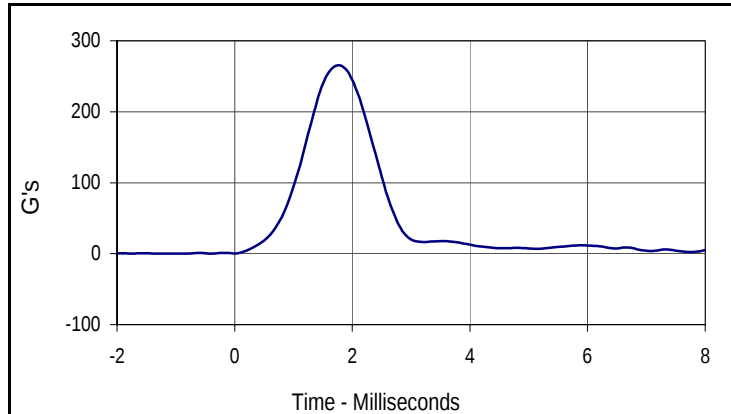
APPENDIX D
PRE-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: Hybrid III 3 Yr Old Head Drop Test
 ATD Serial No.: 044

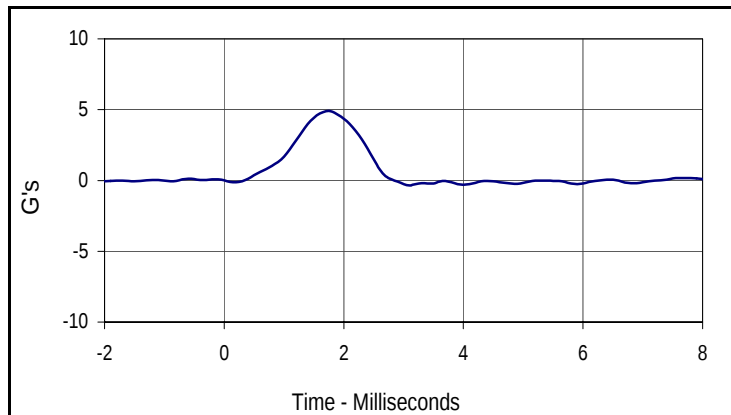
Test Date: 10/21/13
 Test I.D.: HD003A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	250.0 to 280.0	265.1	Pass
Peak Lateral Acceleration	G's	≤15.0	4.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
265.1	1.8	0.0	0.0



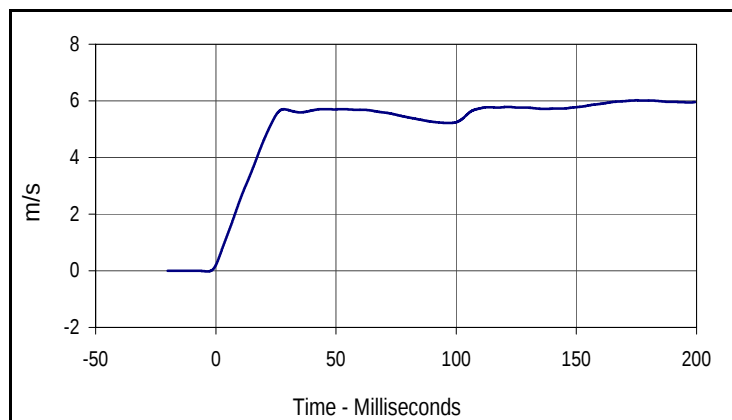
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.9	1.7	-0.3	3.1

Test Program: Hybrid III 3 Yr Old Neck Flexion Test
 ATD Serial No.: 044

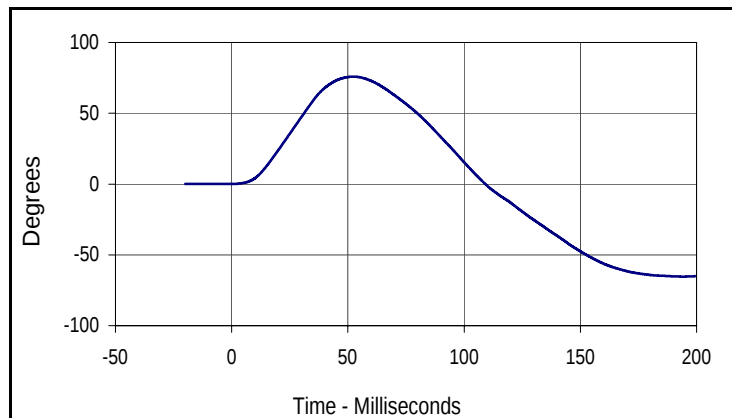
Test Date: 10/22/13
 Test I.D.: 044NF1



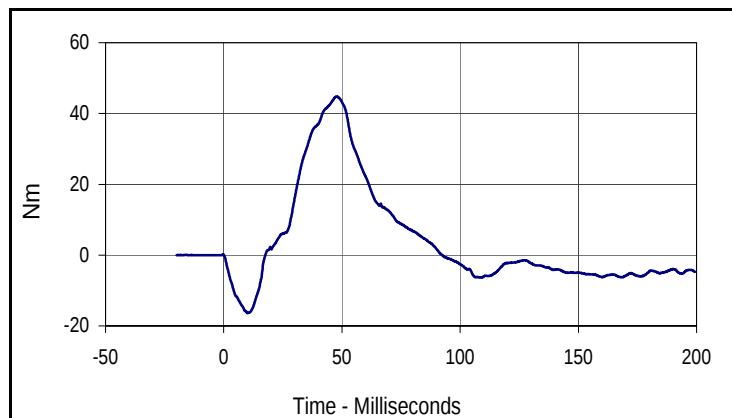
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Velocity		m/s	5.40 to 5.60	5.50	Pass
Pendulum Deceleration	10 Msec.	m/s	2.0 to 2.7	2.3	Pass
	15 Msec.	m/s	3.0 to 4.0	3.4	Pass
	20 Msec.	m/s	4.0 to 5.1	4.5	Pass
"D" Plane Rotation	Max	Degrees	70.0 to 82.0	75.9	Pass
Peak Moment in Rotation	Max	Nm	42.0 to 53.0	44.8	Pass
Positive Moment Decay, Time To 10 Nm		Msec.	60.0 to 80.0	73.4	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.0	174.9	0.0	-3.4



Curve Description			
D Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
75.9	52.3	-65.3	194.2



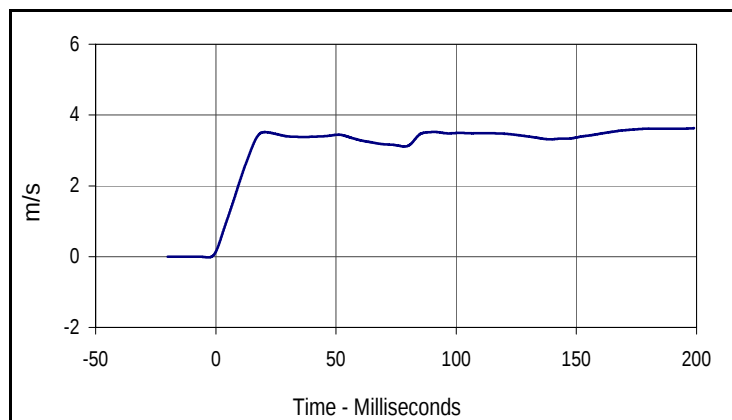
Curve Description			
Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
44.8	47.7	-16.4	10.1

Test Program: Hybrid III 3 Yr Old Neck Extension Test
 ATD Serial No.: 044

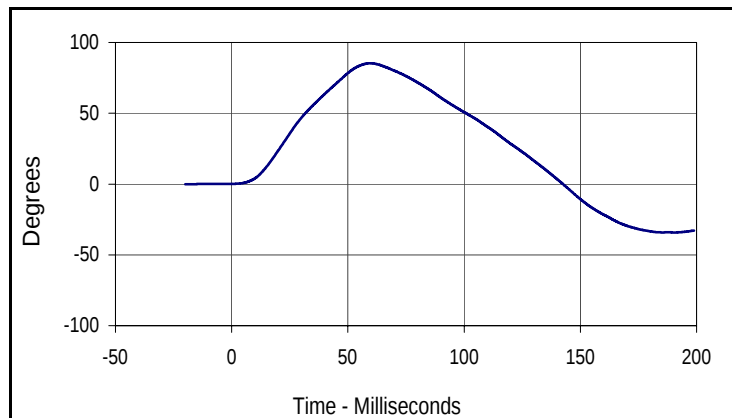
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 Test I.D.: 044NE1



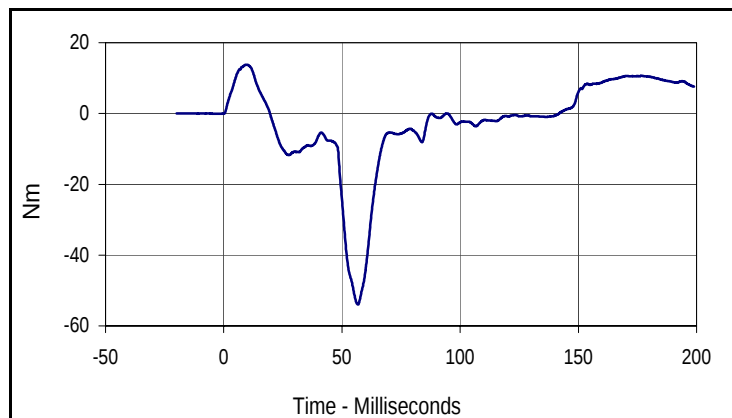
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	3.55 to 3.75	3.64	Pass
Pendulum Deceleration	6 Msec.	m/s	1.0 to 1.4	1.3	Pass
	10 Msec.	m/s	1.9 to 2.5	2.1	Pass
	14 Msec.	m/s	2.8 to 3.5	2.9	Pass
"D" Plane Rotation	Max	Degrees	83.0 to 93.0	85.3	Pass
Peak Moment in Rotation	Max	Nm	-43.7 to -53.3	-45.7	Pass
Positive Moment Decay, Time To -10 Nm		Msec.	60.0 to 80.0	66.7	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
3.6	198.9	0.0	-3.2



Curve Description			
D Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
85.3	59.6	-34.2	190.8



Curve Description			
Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
13.8	9.5	-54.0	56.7

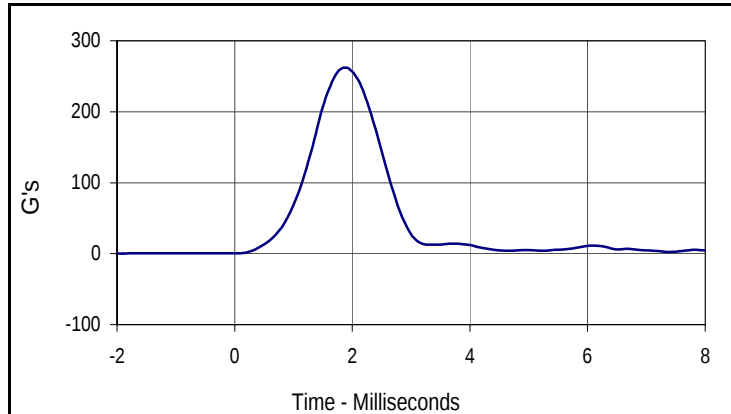
APPENDIX D
POST-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: Hybrid III 3 Yr Old Head Drop Test
 ATD Serial No.: 044

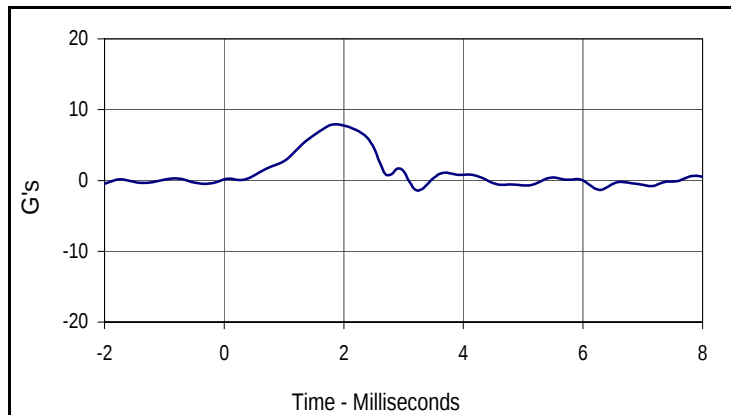
Test Date: 10/28/13
 Test I.D.: HD044-02



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Peak Resultant Acceleration	G's	250.0 to 280.0	262.3	Pass
Peak Lateral Acceleration	G's	≤15.0	7.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
262.3	1.9	0.3	-1.9



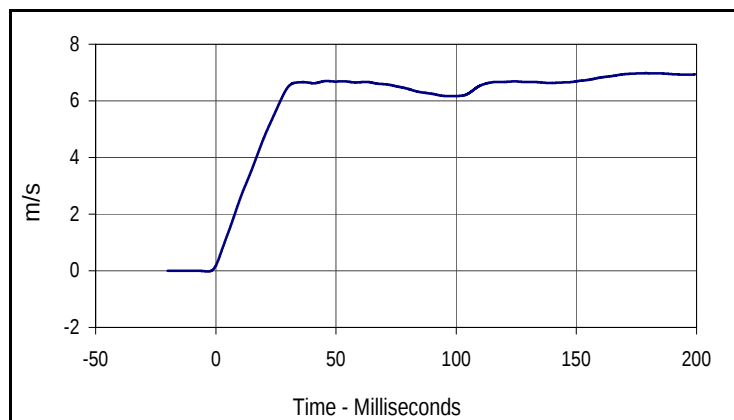
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
7.9	1.9	-1.3	3.2

Test Program: Hybrid III 3 Yr Old Neck Flexion Test
 ATD Serial No.: 044

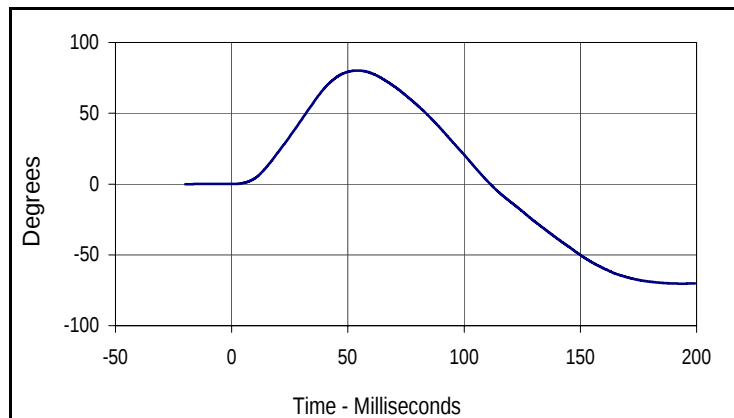
Test Date: 10/28/13
 Test I.D.: NF044-02



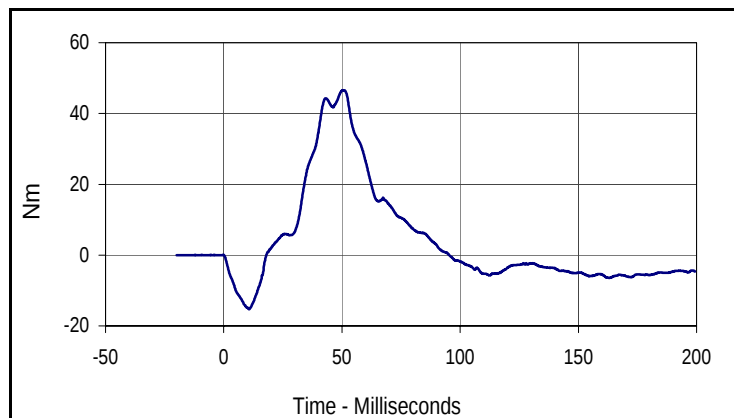
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Velocity		m/s	5.40 to 5.60	5.57	Pass
Pendulum Deceleration	10 Msec.	m/s	2.0 to 2.7	2.4	Pass
	15 Msec.	m/s	3.0 to 4.0	3.4	Pass
	20 Msec.	m/s	4.0 to 5.1	4.6	Pass
"D" Plane Rotation	Max	Degrees	70.0 to 82.0	80.2	Pass
Peak Moment in Rotation	Max	Nm	42.0 to 53.0	46.6	Pass
Positive Moment Decay, Time To 10 Nm		Msec.	60.0 to 80.0	77.2	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.0	179.0	0.0	-3.3



Curve Description			
D Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
80.2	54.1	-70.3	193.9



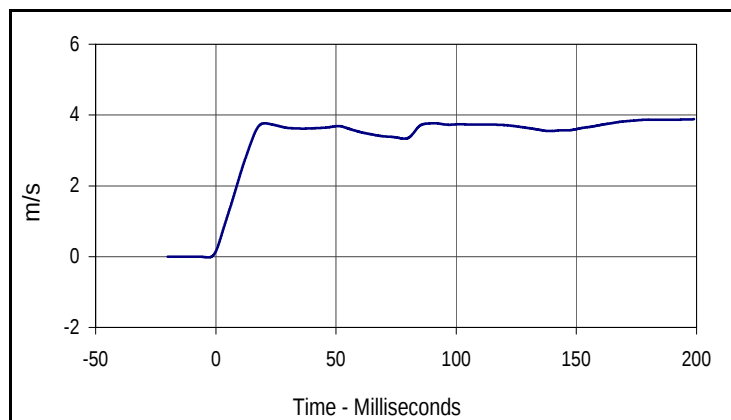
Curve Description			
Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
46.6	50.4	-15.3	10.8

Test Program: Hybrid III 3 Yr Old Neck Extension Test
 ATD Serial No.: 044

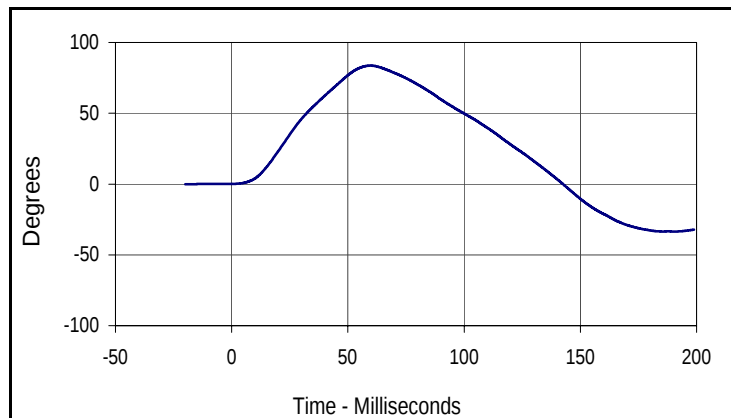
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 Test I.D.: NE044-02



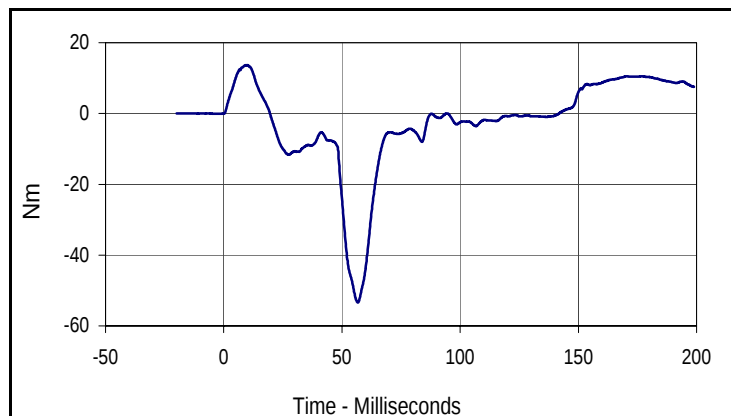
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	3.55 to 3.75	3.65	Pass
Pendulum Deceleration	6 Msec.	m/s	1.0 to 1.4	1.4	Pass
	10 Msec.	m/s	1.9 to 2.5	2.3	Pass
	14 Msec.	m/s	2.8 to 3.5	3.1	Pass
"D" Plane Rotation	Max	Degrees	83.0 to 93.0	83.7	Pass
Peak Moment in Rotation	Max	Nm	-43.7 to -53.3	-45.2	Pass
Positive Moment Decay, Time To -10 Nm		Msec.	60.0 to 80.0	66.7	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
3.9	198.9	0.0	-3.2



Curve Description			
D Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
83.7	59.6	-33.5	190.8



Curve Description			
Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
13.7	9.5	-53.4	56.7