

REPORT NUMBER TR-P33007-03-NC

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

**TOYOTA MOTOR MANUFACTURING CANADA INC.
2013 LEXUS RX350 AWD
5-DOOR MPV**

NHTSA NUMBER: MD5100TWG3

**PREPARED BY:
KARCO ENGINEERING, LLC.
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FEBRUARY 8, 2013

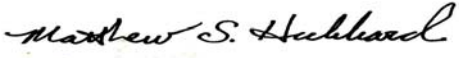
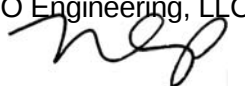
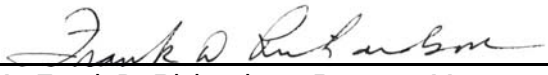
FINAL REPORT

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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Date of Acceptance

TABLE OF CONTENTS

<u>Section</u>	<u>Description</u>	<u>Page</u>
1	Purpose and Summary of Test MD5100TWG3	1
2	Occupant and Vehicle Information	3

<u>Data Sheet</u>	<u>Description</u>	<u>Page</u>
1	Test Summary	4
2	General Test and Vehicle Parameter Data	5
3	Test Vehicle Information	6
4	Dummy Positioning Information	7
5	Hybrid III ATD Injury Criteria and Sensor Data	8
6	Camera Locations	9

<u>Appendix</u>	<u>Description</u>	<u>Appendix</u>
A	Photographs	A
B	Data Plots	B
C	Instrumentation Data Channel Assignments	C
D	Pre-Test and Post-Test Hybrid III Configuration and Performance Verification Data	D

SECTION 1

PURPOSE AND SUMMARY OF TEST MD5100TWG3

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 roof mounted curtain airbag and a torso airbag deployment in a 2013 Lexus RX350 AWD 5-door MPV with an out-of-position 3 year old dummy were evaluated. The test was performed at KARCO Engineering, LLC. on January 23, 2013. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

Two 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 rear passenger seating position facing forward according to the dummy placement instructions (3.3.3.1) 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, and 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 rear passenger side door remained closed during the deployment and was operable after the deployment.

The 3 year old dummy's visible contact points were as follows: The curtain airbag contacted the ATD's head and the torso airbag contacted the ATD's back.

OUT OF POSITION OCCUPANT DATA SUMMARY

ATD Position	HIC ₁₅
Passenger	53.9

Orientation of the 3 year old dummy was in the forward facing position leaning back against the seat back. The dummy's upper spine was aligned with the deploying trajectory of the airbag. This orientation complies with section 3.3.3.1 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 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100TWG3
Test Program: TWG 3.3.3.1 Test Date: 01/23/13

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	$=(tf - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

DATA SHEET NO. 1

TEST SUMMARY

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100TWG3

Test Program: TWG 3.3.3.1 Test Date: 01/23/13

TEST DUMMY INFORMATION

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

VIDEO COVERAGE

High Speed Digital	2
Real Time	1
Total	3

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 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100TWG3
 Test Program: TWG 3.3.3.1 Test Date: 01/23/13

TEST VEHICLE INFORMATION

Make	Lexus
Model	RX350 AWD
Body Style	5-Door MPV
NHTSA No.	MD5100TWG3
VIN	2T2BK1BA7DC154467
Color	Nebula Grey Pearl
Delivery Date	May 25, 2012
Odometer (km./mi.)	77 / 48
Dealer	Longo Lexus
Transmission	Automatic
Final Drive	AWD
Type/Number Cylinders	V6
Engine Displacement (L)	3.5
Engine Placement	Transverse

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	Toyota Motor Manufacturing Canada Inc.	GVWR (kg)	2560
Date of Manufacture	April-12	GAWR Front (kg)	1360
		GAWR Rear (kg)	1385

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	220
Recommend Tire Size	P235/60R18	P235/60R18
Tire Size on Vehicle	P235/60R18	P235/60R18
Tire Manufacturer	Bridgestone	Bridgestone

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				395

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

DATA SHEET NO. 3

TEST VEHICLE INFORMATION

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100TWG3

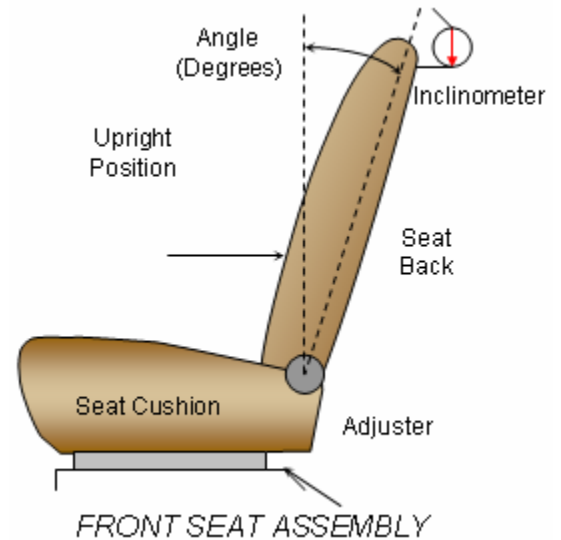
Test Program: TWG 3.3.3.1 Test Date: 01/23/13

NOMINAL DESIGN RIDING POSITION

The passenger seat back is positioned per section 3.3.3.1 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.

SEAT BACK ANGLES

Position	Deg.
Passenger w/ Dummy	0.3



SEAT FORE/AFT POSITIONS

The passenger seat track travel is set per section 3.3.3.1 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 number zero (0).

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Passenger Seat	118 mm (0-8 detents)	118 mm (8th detent)

DATA SHEET NO. 4

DUMMY POSITIONING INFORMATION

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100TWG3

Test Program: TWG 3.3.3.1 Test Date: 01/23/13

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Hybrid III 3 YO	
		Length (mm)	Angle (°)
SA	Seat Back Angle		0.3
AMV	Side Airbag Module Diameter (Torso / Curtain)	25 / 35	
ABW	Side Airbag Width (Torso / Curtain)	340 / 575	
AML	Side Airbag Module Length (Torso / Curtain)	105 / 250	
ABL	Side Airbag Length (Torso / Curtain)	450 / 1730	
AN	Top of Airbag Module to Head/Neck Junction	356	
HD	Head CG to Door Panel/ Window	141	
HSC	Head to Seat Back Centerline	285	
HB	Head to B-Pillar (first contact)	65	
HZ	Head to Roof (Z)	302	
HH	Head to Header		
ND	Nose to Dash (Back of Front Seat)	554	2.1
NS	Nose to Seat Back	246	
NR	Nose to Header		
CD	Chest to Dash (Back of Front Seat)	452	4.7
CS	Chest to Seat Back	237	
RACL	Right Arm to Seat Back Centerline	358	
LACL	Left Arm to Seat Back Centerline	85	
RA	Right Arm to Door Panel	35	
LA	Left Arm to Door Panel	308	
KK	Knee to Knee	160	
TT	Toe to Toe	148	
KSCR	Right Knee to Seat Cushion Centerline	205	
KSCL	Left Knee to Seat Cushion Centerline	60	
	Head Level (X Direction)		
	Head Level (Y Direction)		

DATA SHEET NO. 5

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100TWG3

Test Program: TWG 3.3.3.1 Test Date: 01/23/13

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Pass. 3 YO			
			Max	Time	Min	Time
Head CG	X	G's	86.4	14.9	-16.0	12.4
Head CG	Y	G's	32.9	14.6	-33.6	15.3
Head CG	Z	G's	55.5	14.9	-27.4	16.4
Head CG Resultant	N/A	G's	107.6	14.9		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 3 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	326.5	8.5	-79.3	0.0
Neck Force	Y	Newtons	75.1	4.7	-298.0	14.9
Neck Force	Z	Newtons	269.2	21.3	-737.1	15.0
Neck Force Resultant	N/A	Newtons	798.8	15.0		
Neck Moment	X	Nm	5.1	15.9	-7.0	26.9
Neck Moment	Y	Nm	13.2	8.5	-4.4	45.5
Neck Moment	Z	Nm	2.1	91.2	-4.9	21.3
Neck Moment Resultant	N/A	Nm	13.3	8.5		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 3 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	417.7	7.6	-57.4	43.4
Neck Force	Y	Newtons	64.2	4.1	-269.4	10.5
Neck Force	Z	Newtons	196.5	21.5	-666.7	15.5
Neck Force Resultant	N/A	Newtons	714.5	15.4		
Neck Moment	X	Nm	5.0	245.8	-22.1	16.3
Neck Moment	Y	Nm	9.0	297.3	-21.7	7.7
Neck Moment	Z	Nm	4.7	95.4	-5.5	11.3
Neck Moment Resultant	N/A	Nm	27.1	16.2		

HEAD INJURY CRITERIA (HIC 15)

Location	Pass. 3 YO			
	HIC15	T ¹	T ²	Avg G
Head CG	53.9	14.4	15.1	85.4

UPPER NECK NIJ VALUES

Location	Pass. 3 YO			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.21	0.21	0.45	0.18

DATA SHEET NO. 6**CAMERA LOCATIONS**Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100TWG3Test Program: TWG 3.3.3.1 Test Date: 01/23/13

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Side View	225	-2345	-1138	0.2	35	1000
2	High Speed 3/4 View	1725	-1845	-1135	2.8	50	1000
3	Real Time	425	-2345	-1150	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

TABLE OF PHOTOGRAPHS

Figure		Page
1	Right Front $\frac{3}{4}$ View, As Received	A-1
2	Vehicle Certification Label	A-1
3	Post-Test Front View of NCAP Frontal Impact Test	A-2
4	Post-Test Right Front $\frac{3}{4}$ View of NCAP Frontal Impact Test	A-2
5	Post-Test Left Front $\frac{3}{4}$ View of NCAP Frontal Impact Test	A-3
6	Post-Test Right Side View of NCAP Frontal Impact Test	A-3
7	Pre-Test Dummy Position, Left Side View	A-4
8	Post-Test Dummy Position, Left Side View	A-4
9	Pre-Test Dummy Position, $\frac{3}{4}$ View	A-5
10	Post-Test Dummy Position, $\frac{3}{4}$ View	A-5
11	Pre-Test Dummy Position, Front View	A-6
12	Post-Test Dummy Position, Front View	A-6
13	Post-Test Airbags, Left Side View	A-7
14	Post-Test Airbags, Left Front $\frac{3}{4}$ View	A-7



FIGURE 1. Right Front ¾ View, As Received



FIGURE 2. Vehicle Certification Label

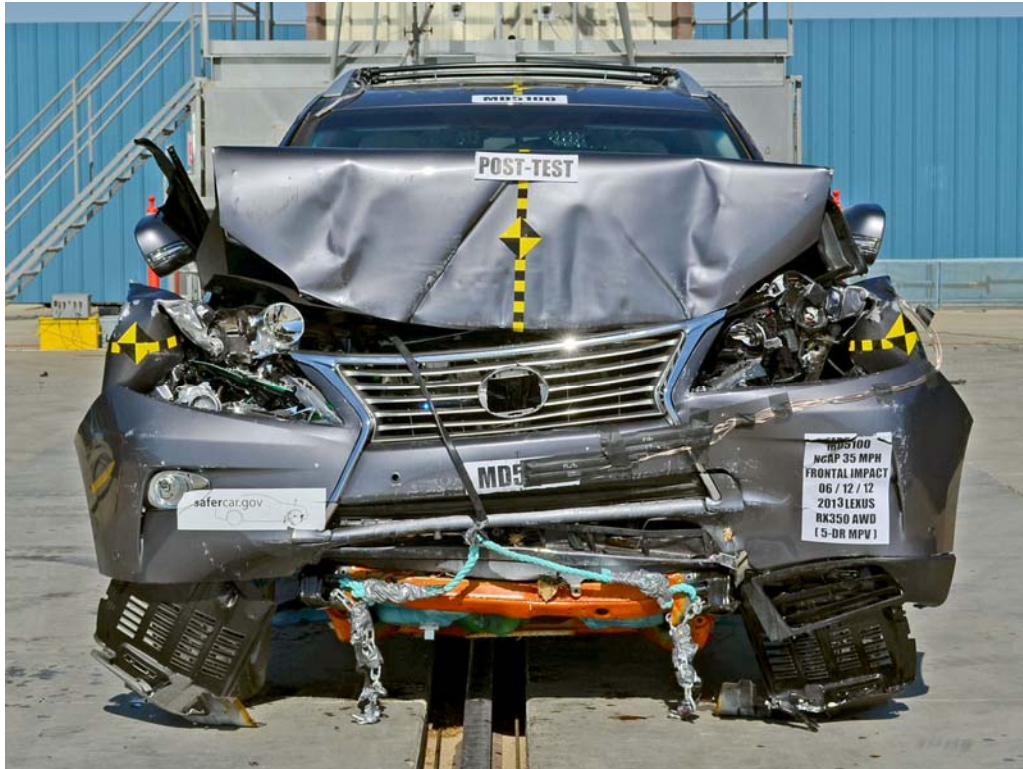


FIGURE 3. Post-Test Front View of NCAP Frontal Impact Test



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 ¾ View

APPENDIX B

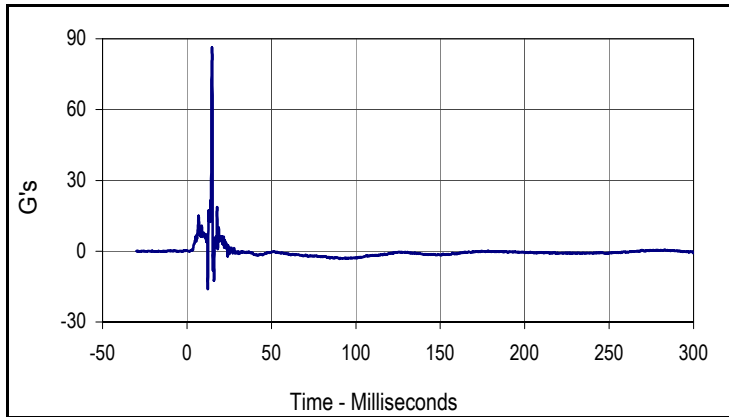
DATA PLOTS

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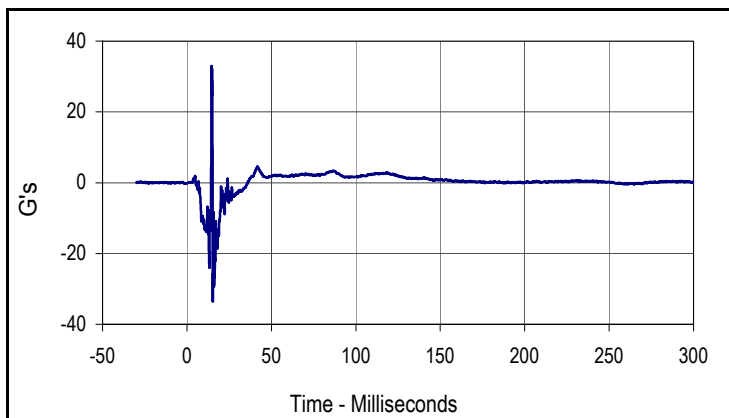
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2	Pass. (3 Yr. Old) Head Y	B-1
3	Pass. (3 Yr. Old) Head Z	B-1
4	Pass. (3 Yr. Old) Head Resultant	B-1
5	Pass. (3 Yr. Old) Upper Neck Force X	B-2
6	Pass. (3 Yr. Old) Upper Neck Force Y	B-2
7	Pass. (3 Yr. Old) Upper Neck Force Z	B-2
8	Pass. (3 Yr. Old) Upper Neck Force Resultant	B-2
9	Pass. (3 Yr. Old) Upper Neck Moment X	B-3
10	Pass. (3 Yr. Old) Upper Neck Moment Y	B-3
11	Pass. (3 Yr. Old) Upper Neck Moment Z	B-3
12	Pass. (3 Yr. Old) Upper Neck Moment Resultant	B-3
13	Pass. (3 Yr. Old) Lower Neck Force X	B-4
14	Pass. (3 Yr. Old) Lower Neck Force Y	B-4
15	Pass. (3 Yr. Old) Lower Neck Force Z	B-4
16	Pass. (3 Yr. Old) Lower Neck Force Resultant	B-4
17	Pass. (3 Yr. Old) Lower Neck Moment X	B-5
18	Pass. (3 Yr. Old) Lower Neck Moment Y	B-5
19	Pass. (3 Yr. Old) Lower Neck Moment Z	B-5
20	Pass. (3 Yr. Old) Lower Neck Moment Resultant	B-5

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV
 Test Program: TWG 3.3.3.1

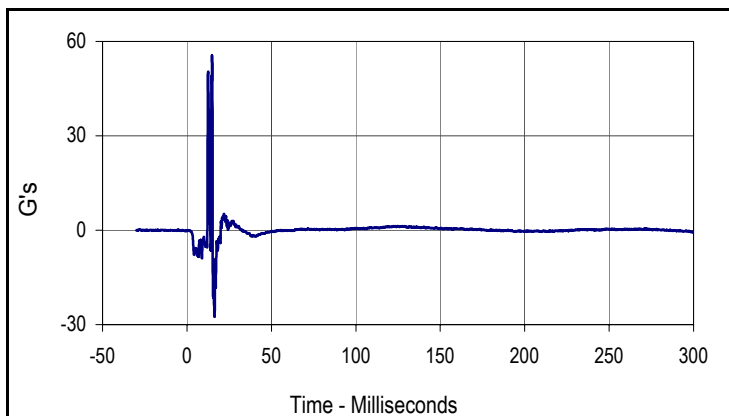
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 NHTSA No.: MC5100TWG3



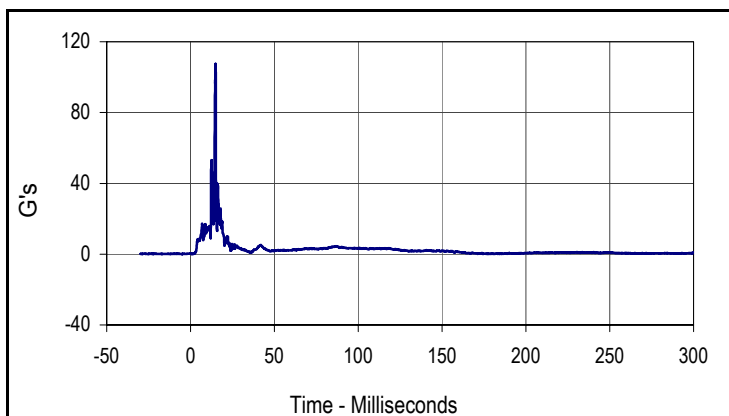
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Curve Description			
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Max	Time	Min	Time
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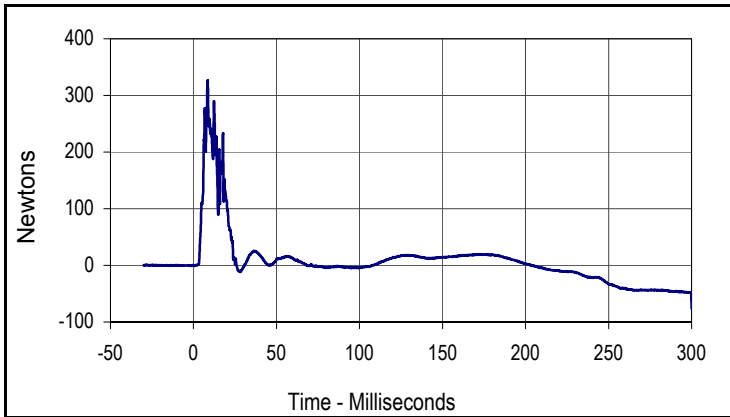
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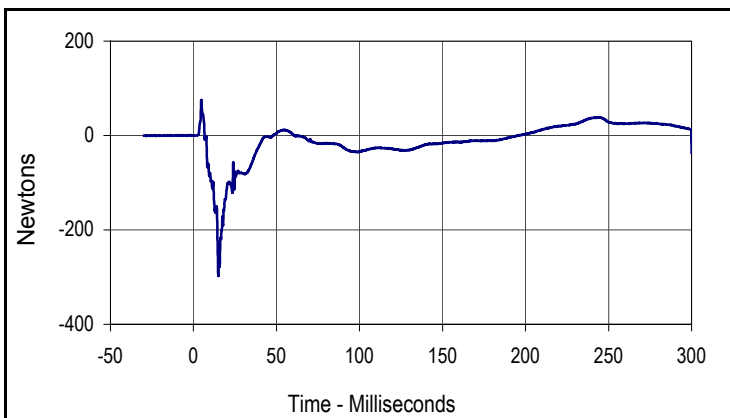
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Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV
 Test Program: TWG 3.3.3.1

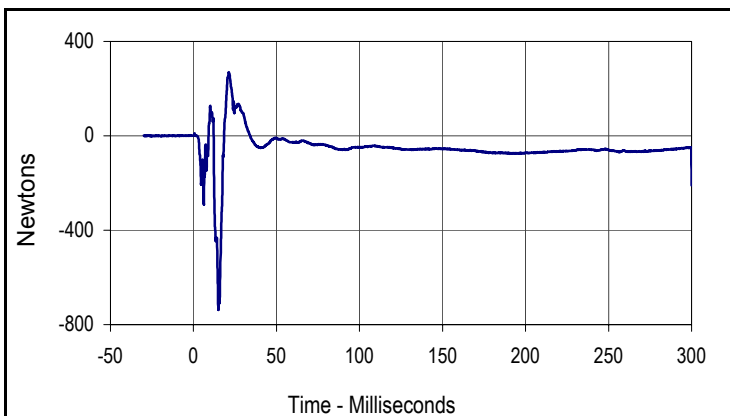
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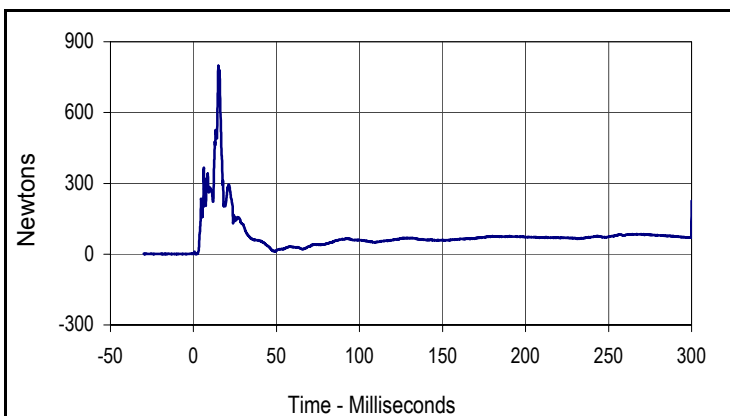
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Plot No.	Type	SAE Class	Units
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Curve Description			
3 Yr. Old Upper Neck Force Y			
Plot No.	Type	SAE Class	Units
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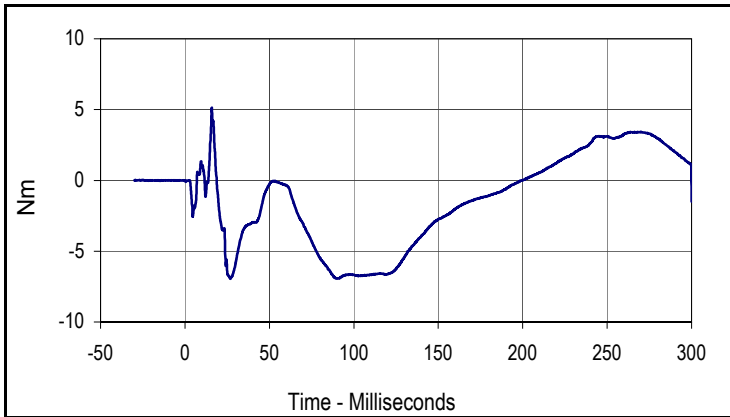
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3 Yr. Old Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
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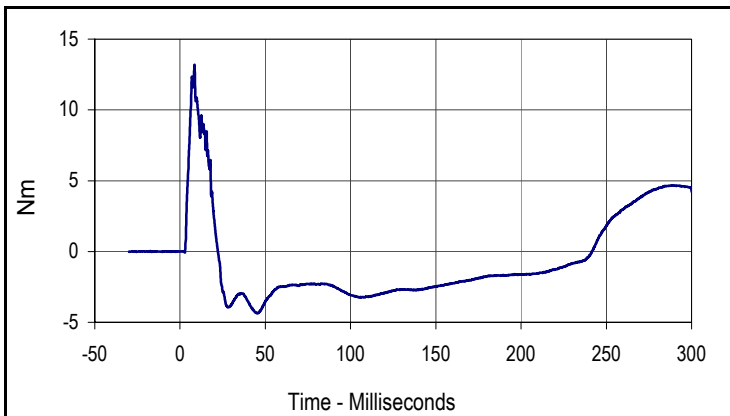
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Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV
 Test Program: TWG 3.3.3.1

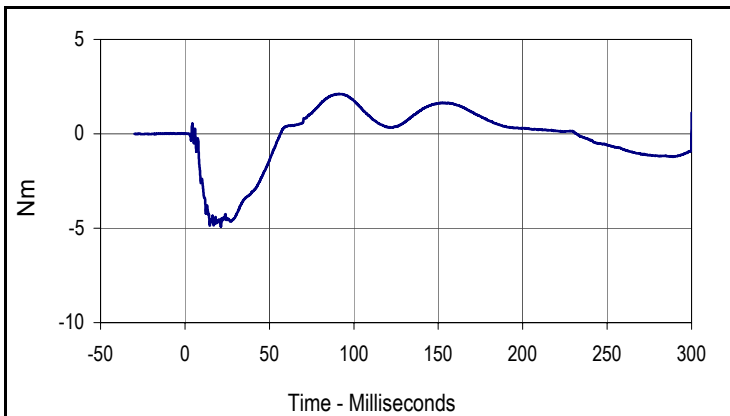
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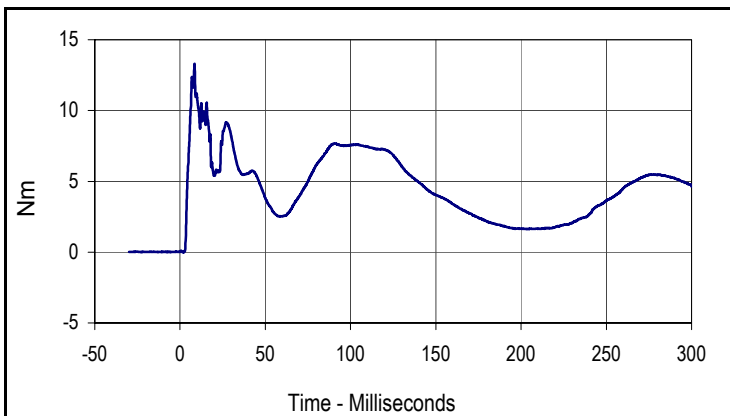
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Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
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Curve Description			
3 Yr. Old Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
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13.2	8.5	-4.4	45.5



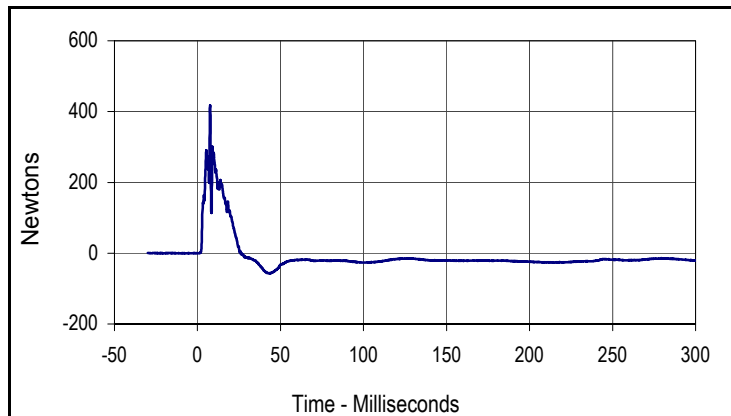
Curve Description			
3 Yr. Old Upper Neck Moment Z			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
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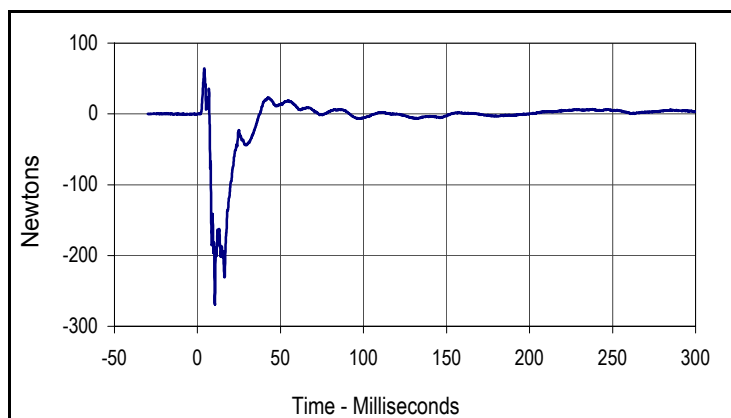
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3 Yr. Old Upper Neck Moment Resultant			
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Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV
 Test Program: TWG 3.3.3.1

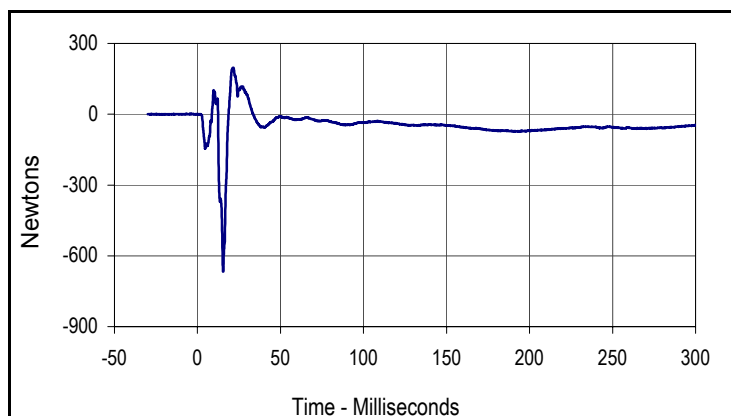
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 NHTSA No.: MC5100TWG3



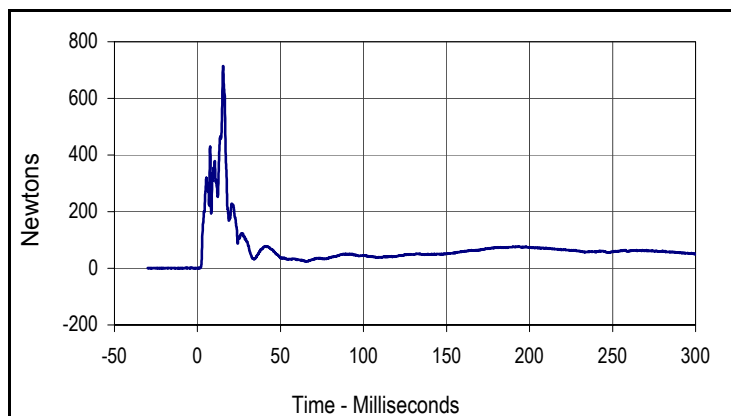
Curve Description			
3 Yr. Old Lower Neck Force X			
Plot No.	Type	SAE Class	Units
013	FIL	1000	Newtons
Max	Time	Min	Time
417.7	7.6	-57.4	43.4



Curve Description			
3 Yr. Old Lower Neck Force Y			
Plot No.	Type	SAE Class	Units
014	FIL	1000	Newtons
Max	Time	Min	Time
64.2	4.1	-269.4	10.5



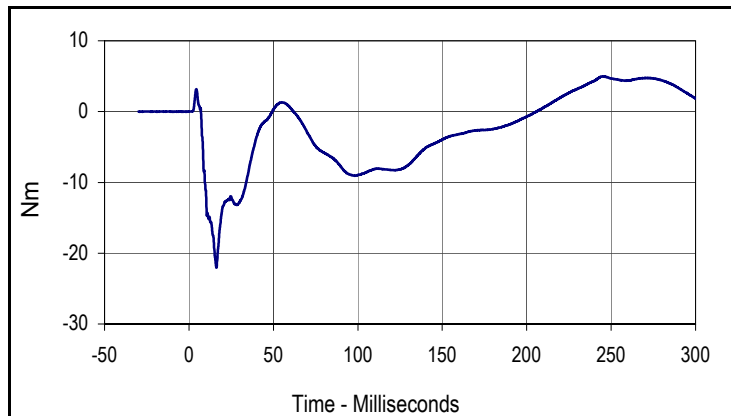
Curve Description			
3 Yr. Old Lower Neck Force Z			
Plot No.	Type	SAE Class	Units
015	FIL	1000	Newtons
Max	Time	Min	Time
196.5	21.5	-666.7	15.5



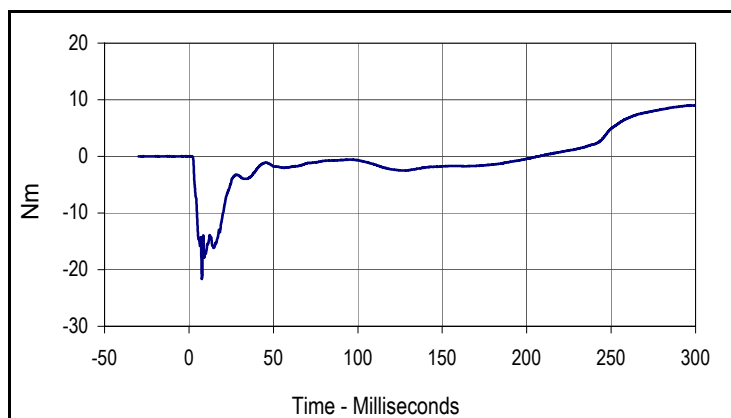
Curve Description			
3 Yr. Old Lower Neck Force Resultant			
Plot No.	Type	SAE Class	Units
016	RES	1000	Newtons
Max	Time	Min	Time
714.5	15.4	0.1	0.2

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV
 Test Program: TWG 3.3.3.1

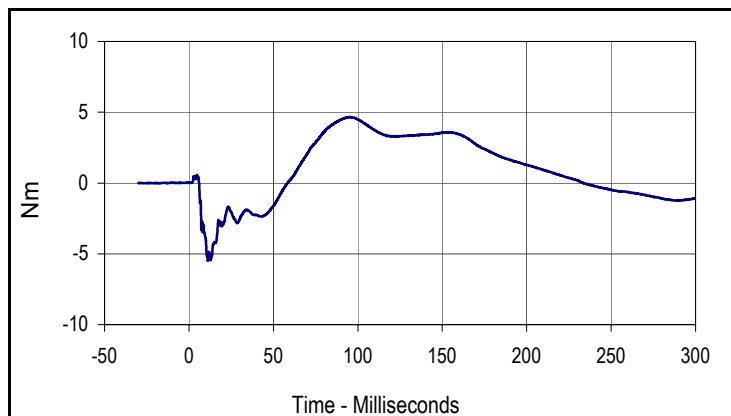
Test Date: 1/23/13
 NHTSA No.: MC5100TWG3



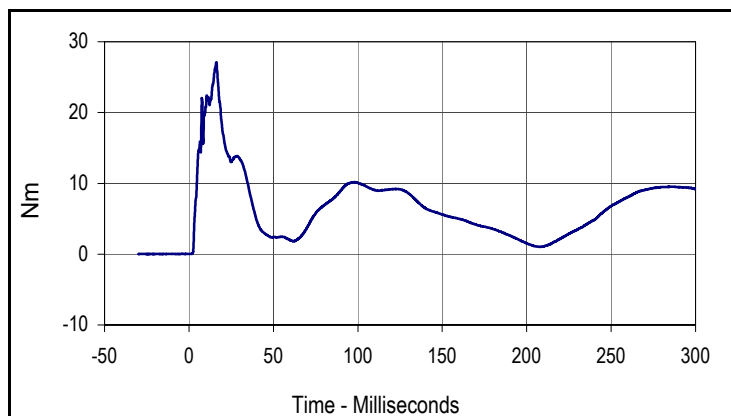
Curve Description			
3 Yr. Old Lower Neck Moment X			
Plot No.	Type	SAE Class	Units
017	FIL	600	Nm
Max	Time	Min	Time
5.0	245.8	-22.1	16.3



Curve Description			
3 Yr. Old Lower Neck Moment Y			
Plot No.	Type	SAE Class	Units
018	FIL	600	Nm
Max	Time	Min	Time
9.0	297.3	-21.7	7.7



Curve Description			
3 Yr. Old Lower Neck Moment Z			
Plot No.	Type	SAE Class	Units
019	FIL	600	Nm
Max	Time	Min	Time
4.7	95.4	-5.5	11.3



Curve Description			
3 Yr. Old Lower Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
020	RES	600	Nm
Max	Time	Min	Time
27.1	16.2	0.0	0.1

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.3.1
Instrumentation Data Channel Assignments
A.T.D. Serial Number 044
1/23/13

2013 Lexus RX350 AWD 5-Door MPV

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

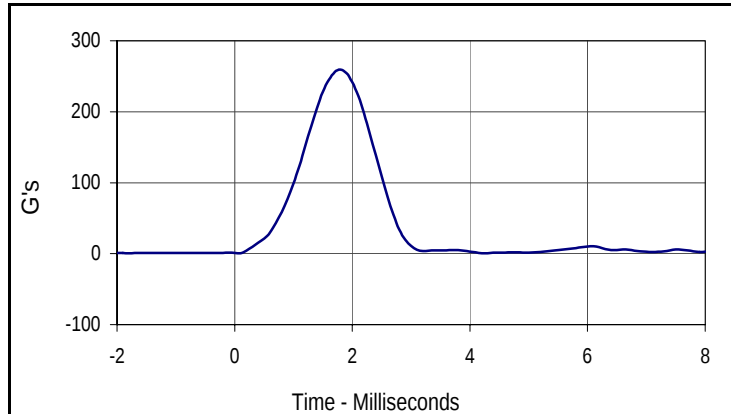
APPENDIX D
PRE-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

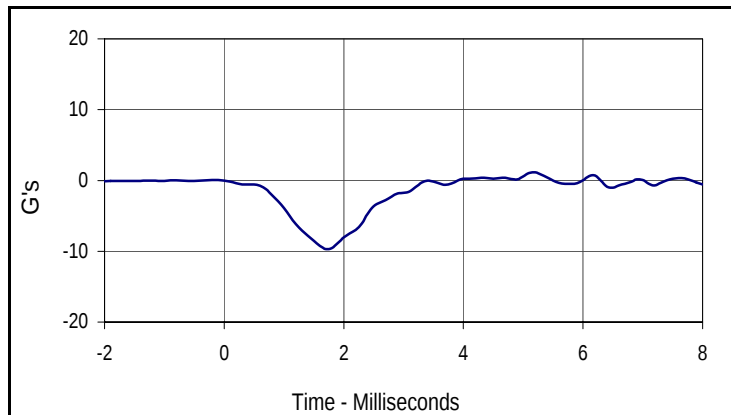
Test Date: 1/23/13
 Test I.D.: 3YOHD1



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	250.0 to 280.0	259.3	Pass
Peak Lateral Acceleration	G's	≤15.0	9.7	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
259.3	1.8	0.6	0.1



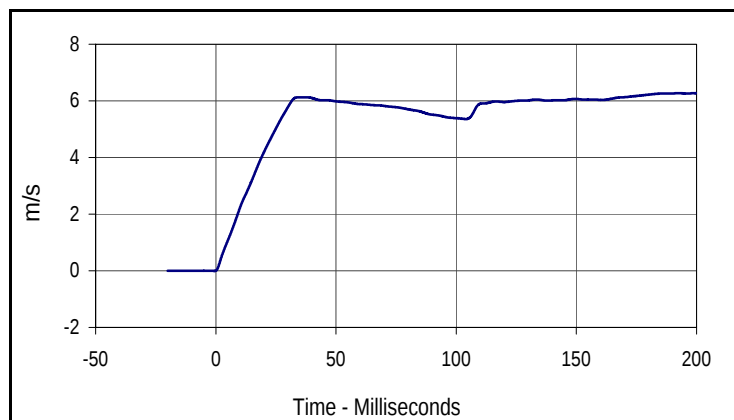
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.1	5.2	-9.7	1.7

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

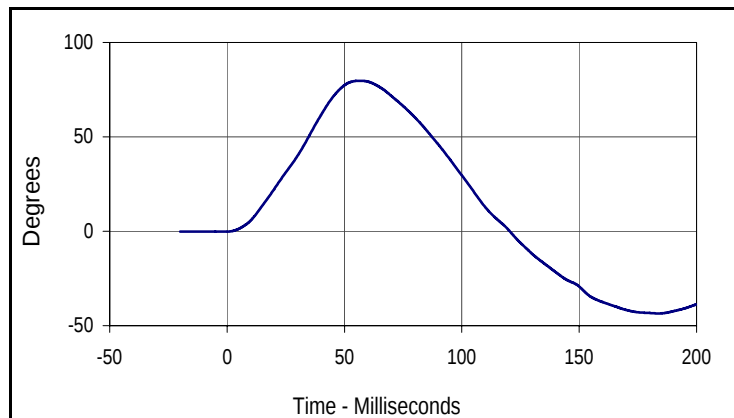
Test Date: 1/23/13
 Test I.D.: 3YRNF



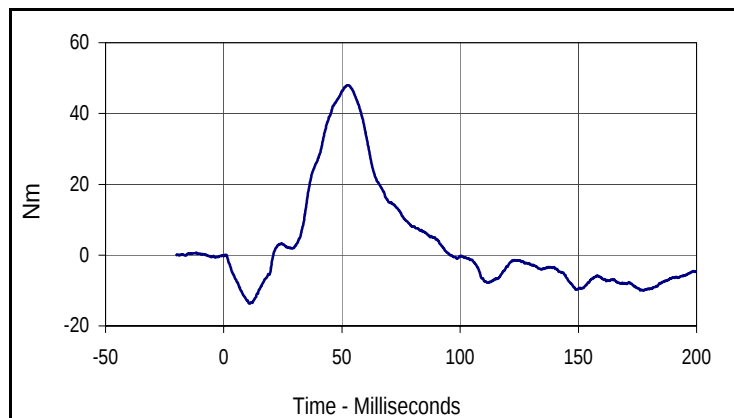
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	26	Pass
Pendulum Velocity		m/s	5.40 to 5.60	5.56	Pass
Pendulum Deceleration	10 Msec.	m/s	2.0 to 2.7	2.1	Pass
	15 Msec.	m/s	3.0 to 4.0	3.1	Pass
	20 Msec.	m/s	4.0 to 5.1	4.1	Pass
"D" Plane Rotation	Max	Degrees	70.0 to 82.0	79.7	Pass
Peak Moment in Rotation	Max	Nm	42.0 to 53.0	48.0	Pass
Positive Moment Decay, Time To 10 Nm		Msec.	60.0 to 80.0	77.1	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.3	199.7	0.0	-0.5



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
79.7	56.6	-43.5	183.9



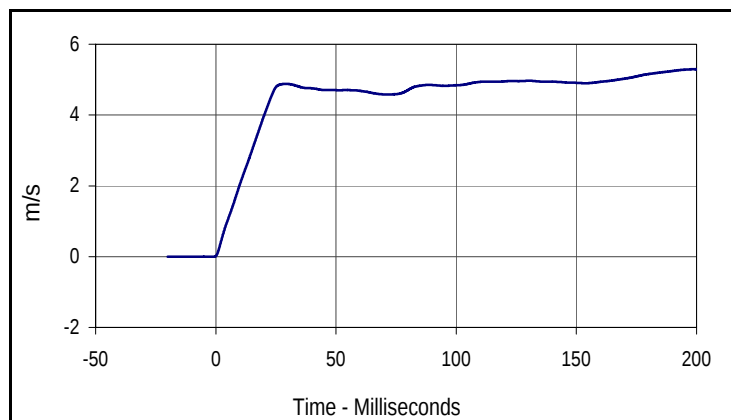
Curve Description			
Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
48.0	52.7	-13.7	10.8

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

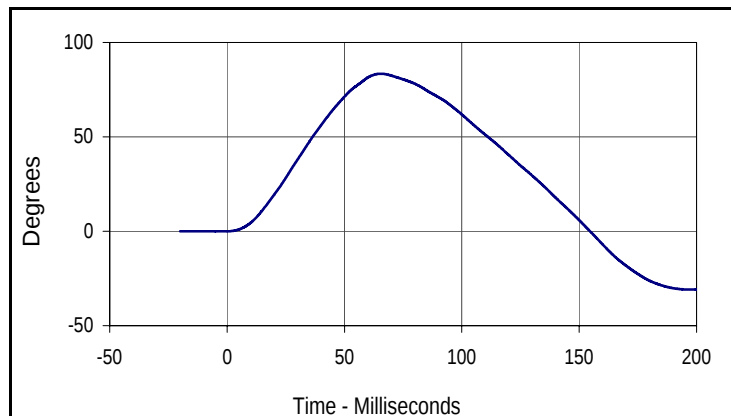
Test Date: 1/23/13
 Test I.D.: 3YRNE



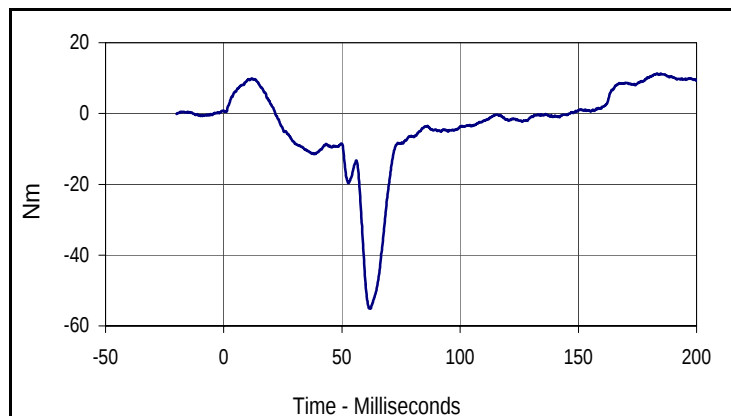
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	3.55 to 3.75	3.65	Pass
Pendulum Deceleration	6 Msec.	m/s	1.0 to 1.4	1.2	Pass
	10 Msec.	m/s	1.9 to 2.5	2.0	Pass
	14 Msec.	m/s	2.8 to 3.5	2.8	Pass
"D" Plane Rotation	Max	Degrees	83.0 to 93.0	83.4	Pass
Peak Moment in Rotation	Max	Nm	-43.7 to -53.3	-45.3	Pass
Positive Moment Decay, Time To -10 Nm		Msec.	60.0 to 80.0	72.3	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.3	200.0	0.0	-0.9



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
83.4	65.6	-30.9	200.0



Curve Description			
Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
11.4	183.3	-55.1	61.7

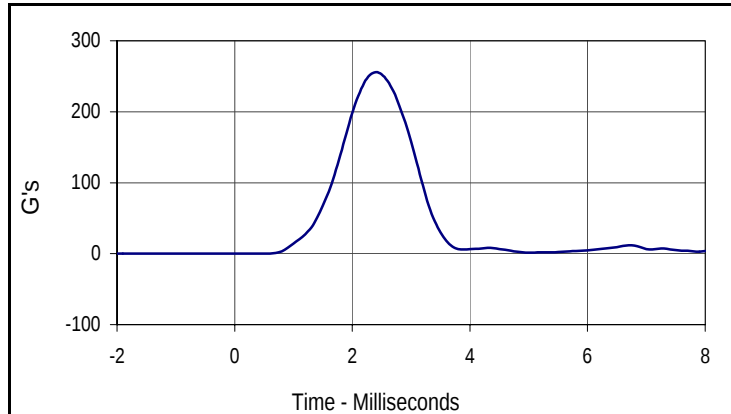
APPENDIX D
POST-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

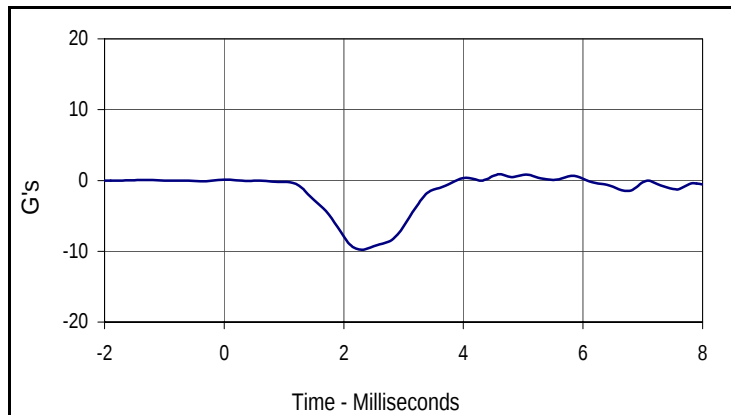
Test Date: 1/24/13
 Test I.D.: HD001A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	250.0 to 280.0	255.6	Pass
Peak Lateral Acceleration	G's	≤15.0	9.8	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
255.6	2.4	0.0	-0.6



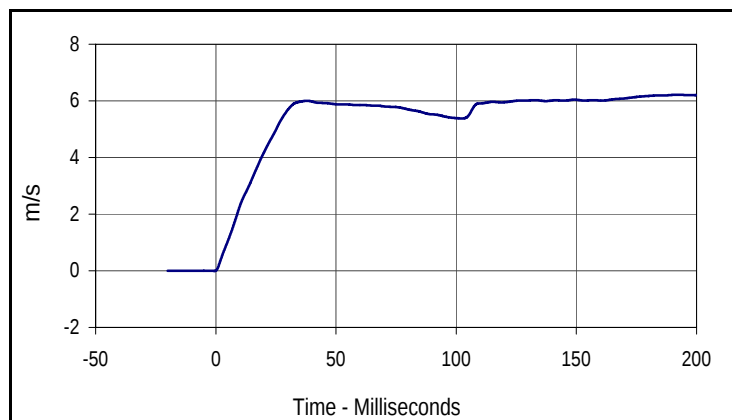
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.9	4.6	-9.8	2.3

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

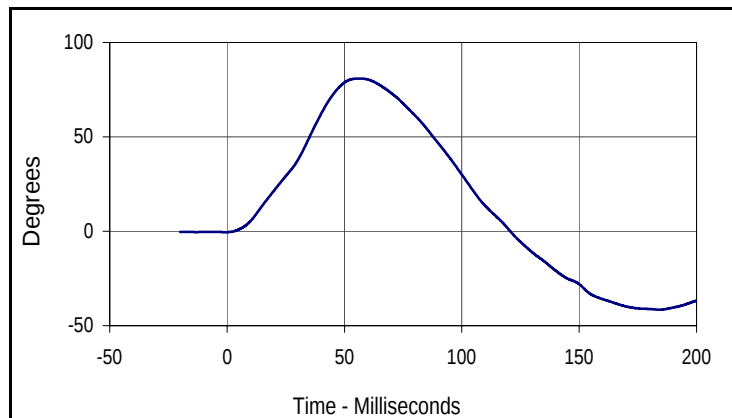
Test Date: 1/24/13
 Test I.D.: NF001A



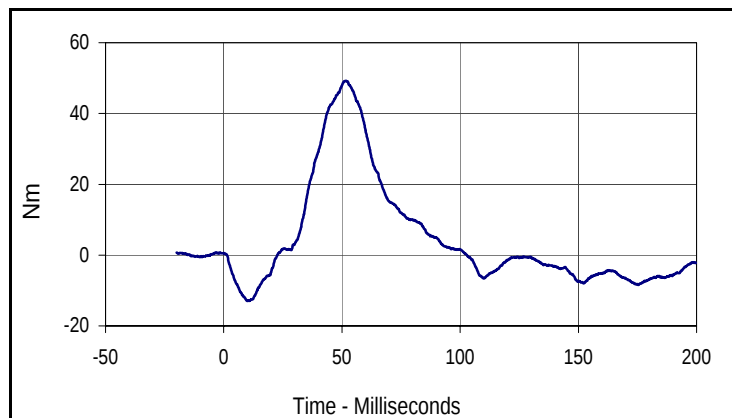
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Velocity		m/s	5.40 to 5.60	5.52	Pass
Pendulum Deceleration	10 Msec.	m/s	2.0 to 2.7	2.2	Pass
	15 Msec.	m/s	3.0 to 4.0	3.2	Pass
	20 Msec.	m/s	4.0 to 5.1	4.1	Pass
"D" Plane Rotation	Max	Degrees	70.0 to 82.0	80.9	Pass
Peak Moment in Rotation	Max	Nm	42.0 to 53.0	49.2	Pass
Positive Moment Decay, Time To 10 Nm		Msec.	60.0 to 80.0	79.0	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.2	192.1	0.0	-0.6



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
80.9	56.2	-41.5	184.2



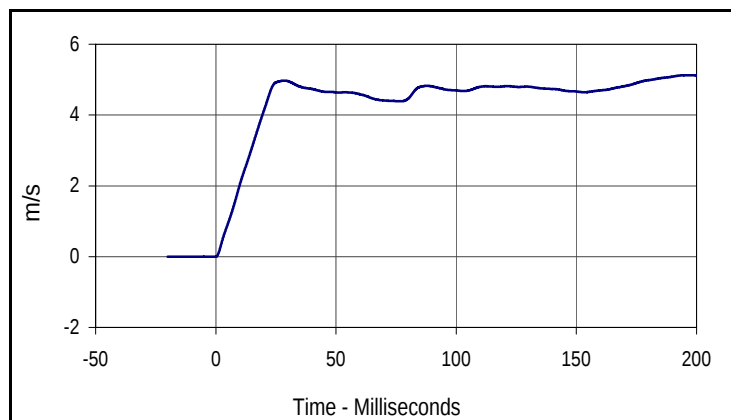
Curve Description			
Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
49.2	51.7	-13.0	10.0

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

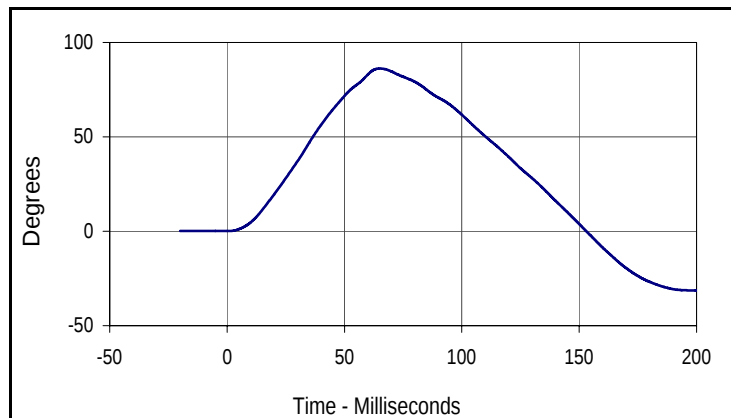
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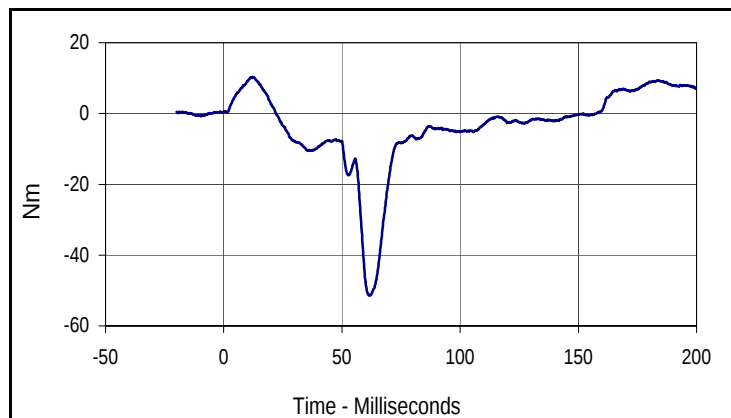
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	3.55 to 3.75	3.67	Pass
Pendulum Deceleration	6 Msec.	m/s	1.0 to 1.4	1.1	Pass
	10 Msec.	m/s	1.9 to 2.5	2.0	Pass
	14 Msec.	m/s	2.8 to 3.5	2.9	Pass
"D" Plane Rotation	Max	Degrees	83.0 to 93.0	86.2	Pass
Peak Moment in Rotation	Max	Nm	-43.7 to -53.3	-44.1	Pass
Positive Moment Decay, Time To -10 Nm		Msec.	60.0 to 80.0	72.2	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.1	200.0	0.0	-0.3



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
86.2	65.1	-31.4	200.0



Curve Description			
Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
10.3	12.3	-51.4	61.5