

REPORT NUMBER TR-P33007-09-NC

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

**TOYOTA MOTOR CORPORATION
2013 LEXUS IS250 AWD
4-DOOR SEDAN**

NHTSA NUMBER: MD5106TWG2

**PREPARED BY:
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MARCH 11, 2013

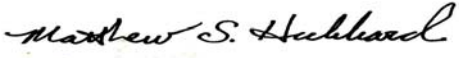
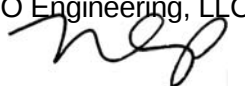
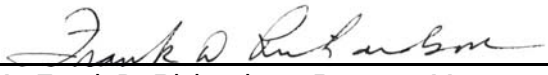
FINAL REPORT

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 DTNH22-12-D-00259.

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Approval Date:	March 11, 2013

FINAL REPORT ACCEPTED BY:

Engineer, Alpha Technology Associate, Inc.

Date of Acceptance

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SECTION 1

PURPOSE AND SUMMARY OF TEST MD5106TWG2

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/pelvis airbag deployment in a 2013 Lexus IS250 AWD 4-door sedan with an out-of-position 6 year old dummy were evaluated. The test was performed at KARCO Engineering, LLC. on February 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 6 year old anthropomorphic test device (ATD) was placed in the right front passenger seating position facing forward according to the dummy placement instructions (3.3.3.5) in the July 2003 Revision of the Technical Working Group's 'Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags'.

The 6 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 front passenger side door remained closed during the deployment and was operable after the deployment.

The 6 year old dummy's visible contact points were as follows: The curtain airbag contacted the ATD's head and the torso/pelvis airbag contacted the ATD's back.

OUT OF POSITION OCCUPANT DATA SUMMARY

ATD Position	HIC ₁₅
Passenger	11.3

Orientation of the 6 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 3.3.3.5 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 IS250 AWD 4-Door Sedan NHTSA No.: MD5106TWG2
Test Program: TWG 3.3.3.5 Test Date: 02/25/13

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	$=(tf - 32)/1.8$
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 IS250 AWD 4-Door Sedan NHTSA No.: MD5106TWG2

Test Program: TWG 3.3.3.5 Test Date: 02/25/13

TEST DUMMY INFORMATION

Description	Passenger Seat Forward Facing
Dummy Type / Serial No.	6 year old / 186
Head Contact	Yes
Chest Contact	No
Abdomen Contact	No
Pelvis	Yes
Left Knee Contact	No
Right Knee Contact	No

VIDEO COVERAGE

High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

6 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 IS250 AWD 4-Door Sedan NHTSA No.: MD5106TWG2Test Program: TWG 3.3.3.5 Test Date: 02/25/13**TEST VEHICLE INFORMATION**

Make	Lexus
Model	IS250 AWD
Body Style	4-Door Sedan
NHTSA No.	MD5106TWG2
VIN	JTHCF5C28D5060962
Color	Nebula Grey Pearl
Delivery Date	October 29, 2012
Odometer (km./mi.)	16 / 10
Dealer	El Monte Longo
Transmission	Automatic
Final Drive	AWD
Type/Number Cylinders	V6
Engine Displacement (L)	2.5
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	Toyota Motor Corporation	GVWR (kg)	2093
Date of Manufacture	August-12	GAWR Front (kg)	1168
		GAWR Rear (kg)	1150

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommend Tire Size	P225/45R17	P225/45R17
Tire Size on Vehicle	P225/45R17	P225/45R17
Tire Manufacturer	Dunlop	Dunlop

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

* Vehicle underwent New Car Assessment Program Frontal Impact Testing on November 16, 2012.

DATA SHEET NO. 3

TEST VEHICLE INFORMATION

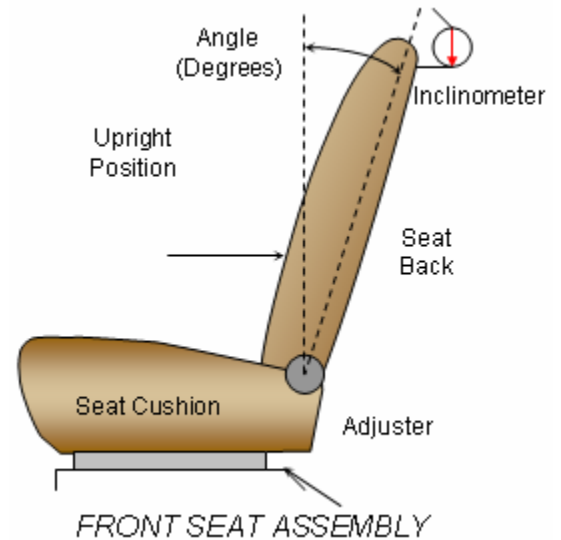
Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan NHTSA No.: MD5106TWG2
Test Program: TWG 3.3.3.5 Test Date: 02/25/13

NOMINAL DESIGN RIDING POSITION

The passenger seat back is positioned per section 3.3.3.5 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	5.2



SEAT FORE/AFT POSITIONS

The passenger seat track travel is set per section 3.3.3.5 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	238 mm	85 mm

DATA SHEET NO. 4

DUMMY POSITIONING INFORMATION

Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan NHTSA No.: MD5106TWG2

Test Program: TWG 3.3.3.5 Test Date: 02/25/13

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Hybrid III 6 YO	
		Length (mm)	Angle (°)
SA	Seat Back Angle		5.2
AMW	Side Airbag Module Diameter (Torso / Curtain)	30 / 25	
ABW	Side Airbag Width (Torso / Curtain)	595 / 415	
AML	Side Airbag Module Length (Torso / Curtain)	180 / 275	
ABL	Side Airbag Length (Torso / Curtain)	350 / 1580	
AN	Top of Airbag Module to Head/Neck Junction	321	
HD	Head CG to Door Panel/ Window	92	
HSC	Head to Seat Back Centerline	324	
HB	Head to B-Pillar (first contact)	33	
HZ	Head to Roof (Z)	240	
HHD	Head to Header	423	39.3
ND	Nose to Dash	623	4.8
NS	Nose to Seat Back	295	
NR	Nose to Header	426	39.6
CD	Chest to Dash	456	0
CS	Chest to Seat Back	285	
RACL	Right Arm to Seat Back Centerline	345	
LACL	Left Arm to Seat Back Centerline	62	
RA	Right Arm to Door Panel	0	
LA	Left Arm to Door Panel	283	
KK	Knee to Knee	171	
TT	Toe to Toe	165	
KSCR	Right Knee to Seat Cushion Centerline	145	
KSCL	Left Knee to Seat Cushion Centerline	10	
	Head Level (X Direction)		15.1
	Head Level (Y Direction)		2.0

DATA SHEET NO. 5

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan NHTSA No.: MD5106TWG2

Test Program: TWG 3.3.3.5 Test Date: 02/25/13

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Head CG	X	G's	14.6	13.0	-15.6	29.0
Head CG	Y	G's	9.3	23.3	-7.9	13.1
Head CG	Z	G's	15.3	15.7	-11.0	9.3
Head CG Resultant	N/A	G's	19.3	29.0		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	400.0	49.2	-38.0	222.1
Neck Force	Y	Newtons	35.7	168.5	-163.3	15.4
Neck Force	Z	Newtons	126.0	187.9	-468.4	35.9
Neck Force Resultant	N/A	Newtons	576.9	36.7		
Neck Moment	X	Nm	12.0	12.8	-20.8	23.9
Neck Moment	Y	Nm	29.2	13.4	-12.2	28.5
Neck Moment	Z	Nm	2.3	161.3	-10.0	48.0
Neck Moment Resultant	N/A	Nm	31.7	13.3		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	390.3	14.0	-190.7	49.2
Neck Force	Y	Newtons	150.6	22.2	-216.2	13.7
Neck Force	Z	Newtons	137.6	187.9	-511.4	37.6
Neck Force Resultant	N/A	Newtons	540.7	37.6		
Neck Moment	X	Nm	8.3	165.4	-24.6	13.7
Neck Moment	Y	Nm	8.2	228.0	-38.2	14.3
Neck Moment	Z	Nm	6.6	24.5	-20.7	9.6
Neck Moment Resultant	N/A	Nm	46.7	14.6		

HEAD INJURY CRITERIA (HIC 15)

Location	Pass. 6 YO			
	HIC15	T ¹	T ²	Avg G
Head CG	11.3	21.0	35.7	14.2

UPPER NECK NIJ VALUES

Location	Pass. 6 YO			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.25	0.27	0.29	0.50

DATA SHEET NO. 6**CAMERA LOCATIONS**Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan NHTSA No.: MD5106TWG2Test Program: TWG 3.3.3.5 Test Date: 02/25/13

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Front View	1935	-175	-1320	-10.3	50	1000
2	High Speed 3/4 View	1390	-1460	-1290	-8.9	50	1000
3	High Speed Side View	170	-2370	-835	-1.4	35	1000
4	Real Time	370	-2530	-945	-2.6	28	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

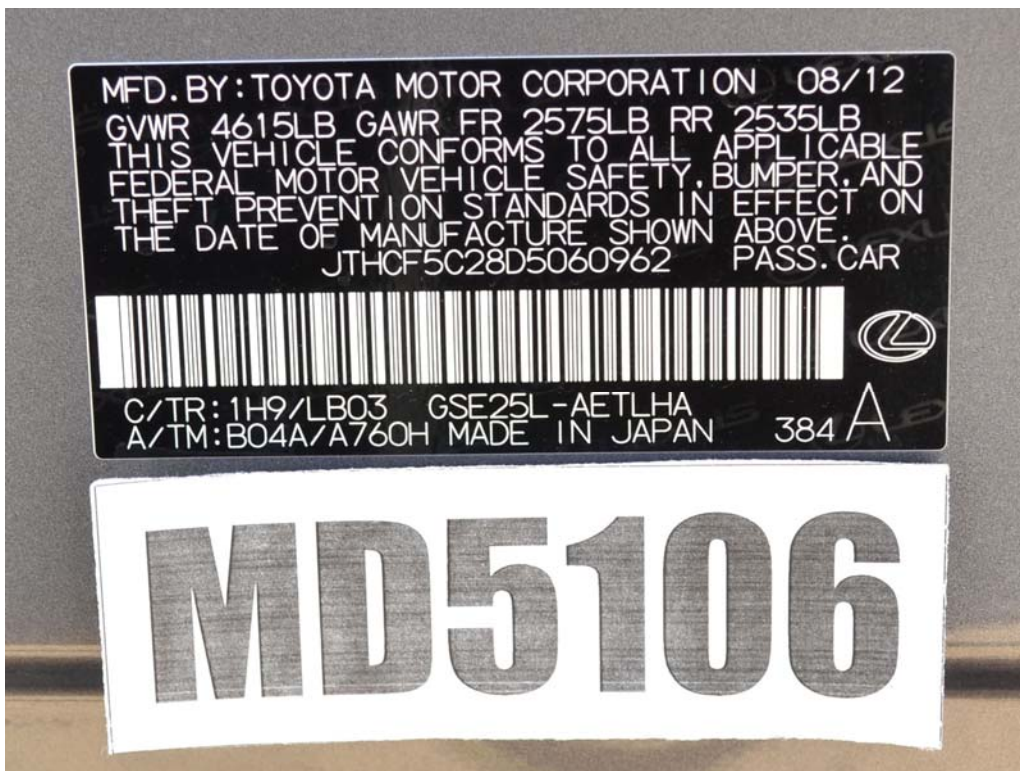


FIGURE 2. Vehicle Certification Label

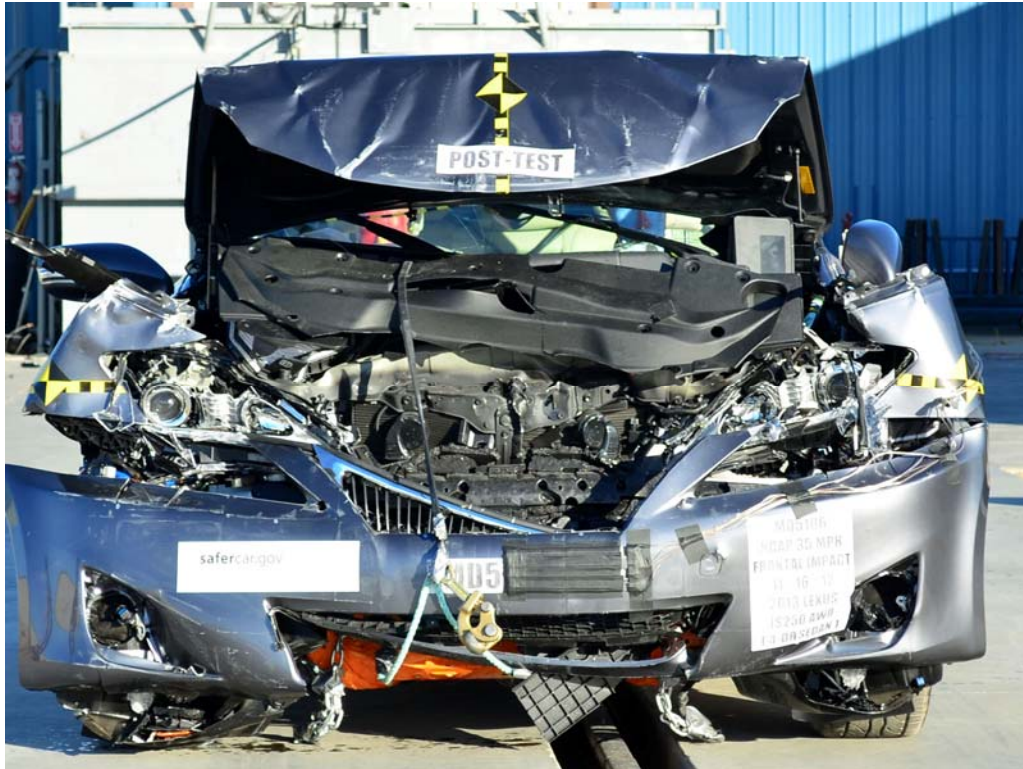


FIGURE 3. Post-Test Front View of NCAP Frontal Impact Test



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

APPENDIX B

DATA PLOTS

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15	Pass. (6 Yr. Old) Lower Neck Force Z	B-4
16	Pass. (6 Yr. Old) Lower Neck Force Resultant	B-4
17	Pass. (6 Yr. Old) Lower Neck Moment X	B-5
18	Pass. (6 Yr. Old) Lower Neck Moment Y	B-5
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20	Pass. (6 Yr. Old) Lower Neck Moment Resultant	B-5

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

Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan

NHTSA No.: MD5106TWG2

Test Program: TWG 3.3.3.5

Test Date: 2/25/13

HEAD PEAK ACCELERATIONS

Location	Axis	Units	6 Yr. Old			
			Max	Time	Min	Time
Head CG	X	G's	14.6	13.0	-15.6	29.0
Head CG	Y	G's	9.3	23.3	-7.9	13.1
Head CG	Z	G's	15.3	15.7	-11.0	9.3
Head CG Resultant	N/A	G's	19.3	29.0		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	6 Yr. Old			
			Max	Time	Min	Time
Neck Force	X	Newtons	400.0	49.2	-38.0	222.1
Neck Force	Y	Newtons	35.7	168.5	-163.3	15.4
Neck Force	Z	Newtons	126.0	187.9	-468.4	35.9
Neck Force Resultant	N/A	Newtons	576.9	36.7		
Neck Moment	X	Nm	12.0	12.8	-20.8	23.9
Neck Moment	Y	Nm	29.2	13.4	-12.2	28.5
Neck Moment	Z	Nm	2.3	161.3	-10.0	48.0
Neck Moment Resultant	N/A	Nm	31.7	13.3		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	6 Yr. Old			
			Max	Time	Min	Time
Neck Force	X	Newtons	390.3	14.0	-190.7	49.2
Neck Force	Y	Newtons	150.6	22.2	-216.2	13.7
Neck Force	Z	Newtons	137.6	187.9	-511.4	37.6
Neck Force Resultant	N/A	Newtons	540.7	37.6		
Neck Moment	X	Nm	8.3	165.4	-24.6	13.7
Neck Moment	Y	Nm	8.2	228.0	-38.2	14.3
Neck Moment	Z	Nm	6.6	24.5	-20.7	9.6
Neck Moment Resultant	N/A	Nm	46.7	14.6		

HEAD INJURY CRITERIA (HIC 15)

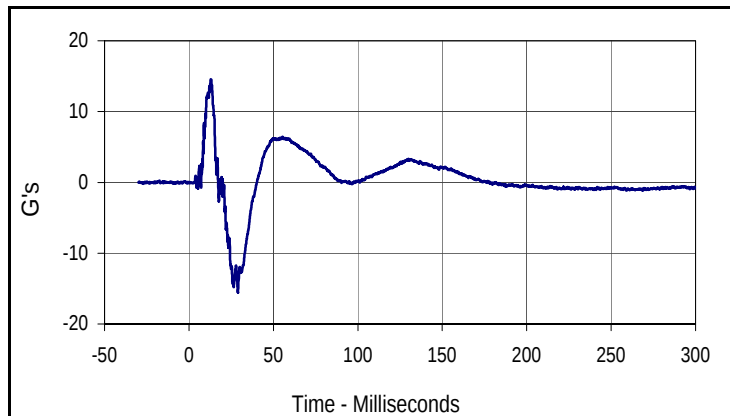
Location	6 Yr. Old			
	HIC15	T ¹	T ²	Avg G
Head CG	11.3	21.0	35.7	14.2

UPPER NECK NIJ VALUES

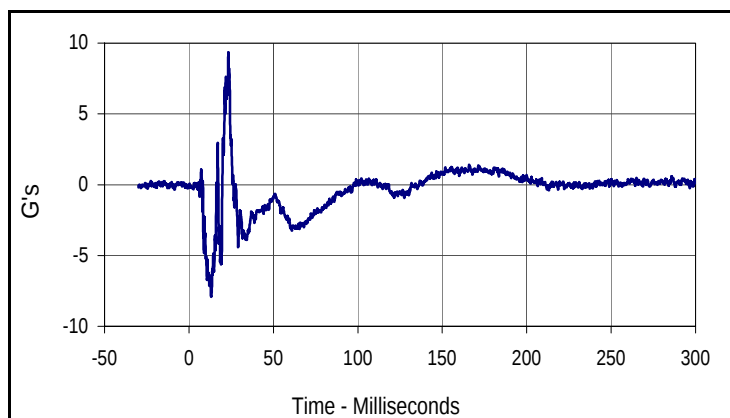
Location	6 Yr. Old			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.25	0.27	0.29	0.50

Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan
 Test Program: TWG 3.3.3.5

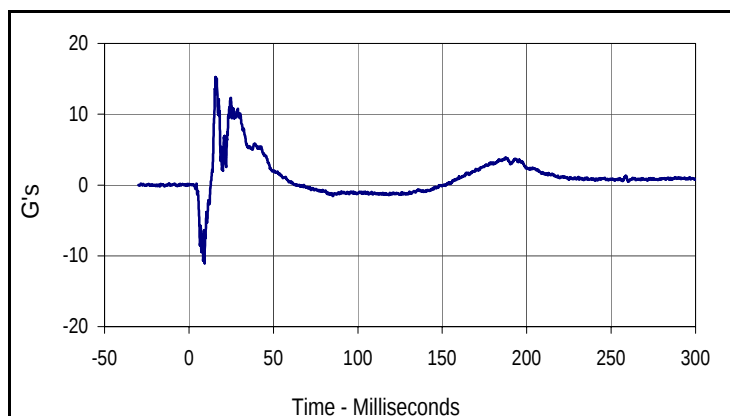
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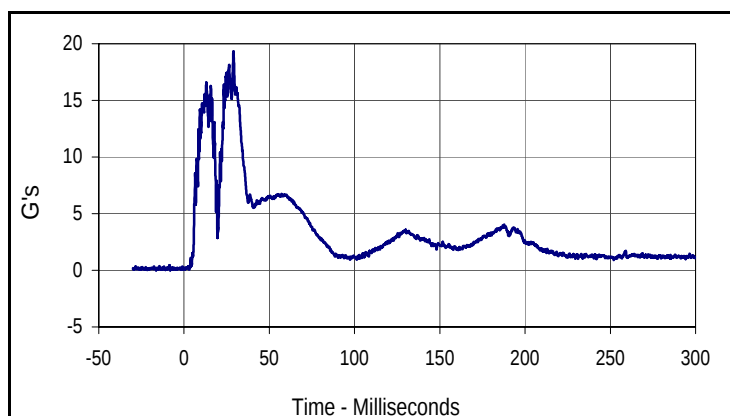
Curve Description			
6 Yr. Old Head X			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
14.6	13.0	-15.6	29.0



Curve Description			
6 Yr. Old Head Y			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
9.3	23.3	-7.9	13.1



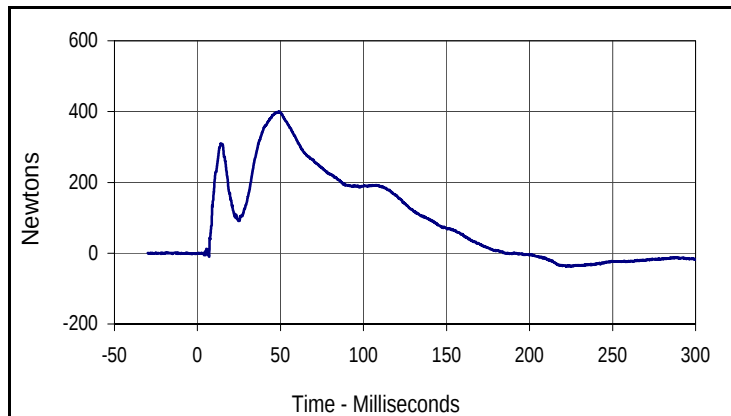
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6 Yr. Old Head Z			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
15.3	15.7	-11.0	9.3



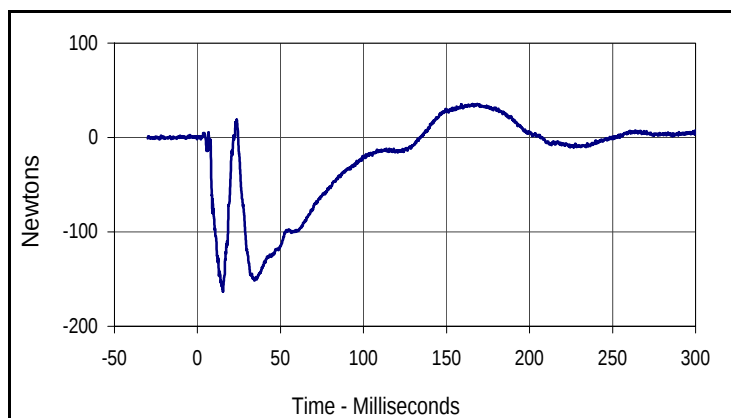
Curve Description			
6 Yr. Old Head Resultant			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
19.3	29.0	0.1	3.1

Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan
 Test Program: TWG 3.3.3.5

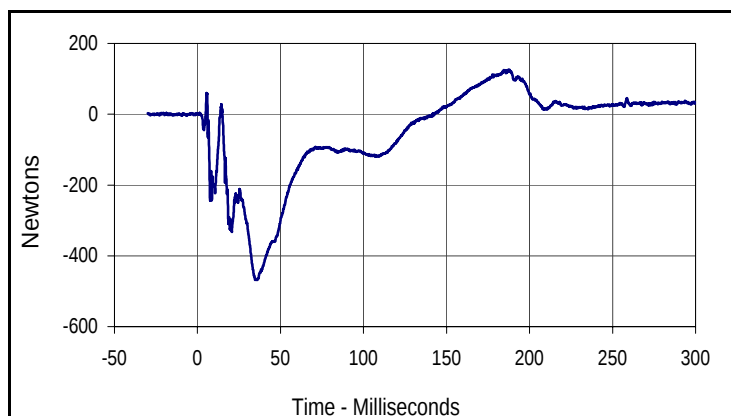
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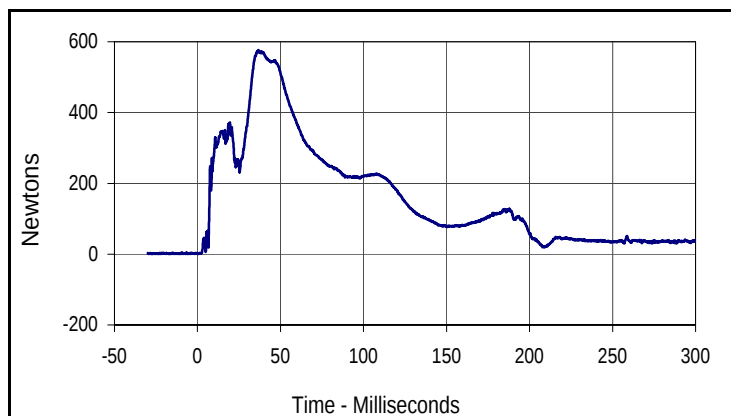
Curve Description			
6 Yr. Old Upper Neck Force X			
Plot No.	Type	SAE Class	Units
005	FIL	1000	Newtons
Max	Time	Min	Time
400.0	49.2	-38.0	222.1



Curve Description			
6 Yr. Old Upper Neck Force Y			
Plot No.	Type	SAE Class	Units
006	FIL	1000	Newtons
Max	Time	Min	Time
35.7	168.5	-163.3	15.4



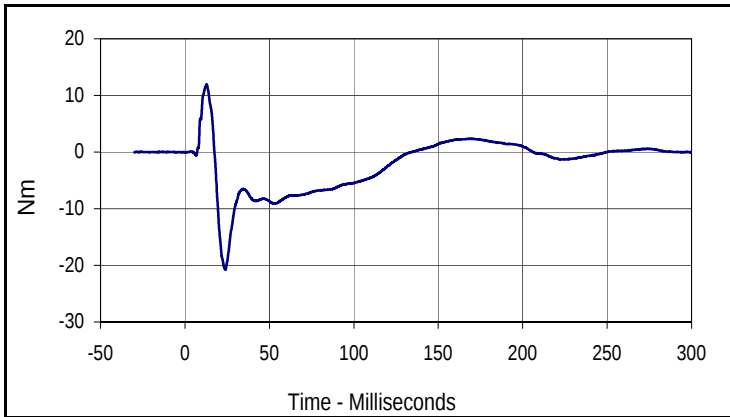
Curve Description			
6 Yr. Old Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
007	FIL	1000	Newtons
Max	Time	Min	Time
126.0	187.9	-468.4	35.9



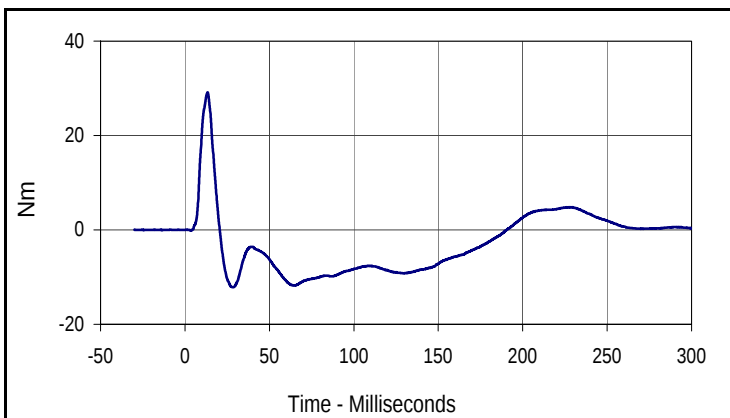
Curve Description			
6 Yr. Old Upper Neck Force Resultant			
Plot No.	Type	SAE Class	Units
008	RES	1000	Newtons
Max	Time	Min	Time
576.9	36.7	0.8	0.7

Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan
 Test Program: TWG 3.3.3.5

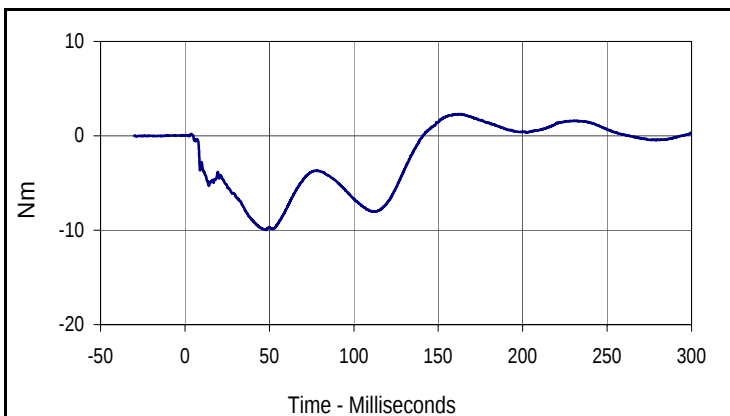
Test Date: 2/25/13
 NHTSA No.: MD5106TWG2



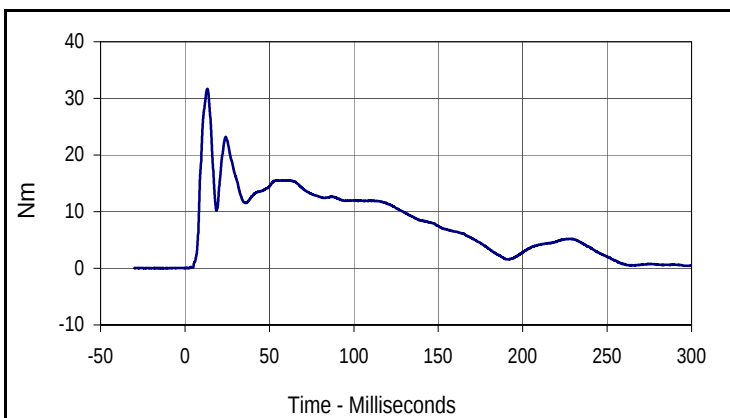
Curve Description			
6 Yr. Old Upper Neck Moment X			
Plot No.	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
12.0	12.8	-20.8	23.9



Curve Description			
6 Yr. Old Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Nm
Max	Time	Min	Time
29.2	13.4	-12.2	28.5



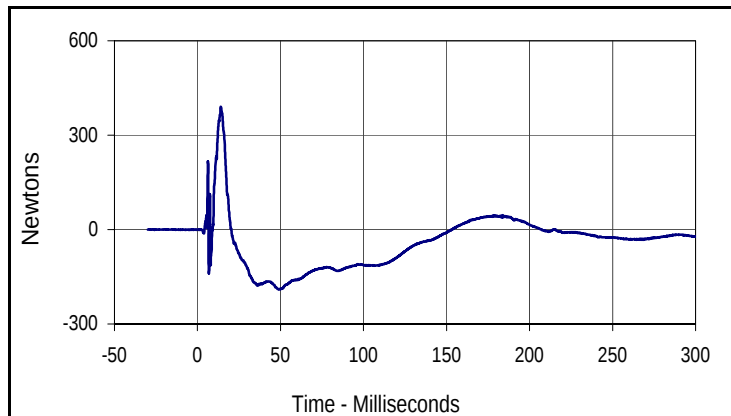
Curve Description			
6 Yr. Old Upper Neck Moment Z			
Plot No.	Type	SAE Class	Units
011	FIL	600	Nm
Max	Time	Min	Time
2.3	161.3	-10.0	48.0



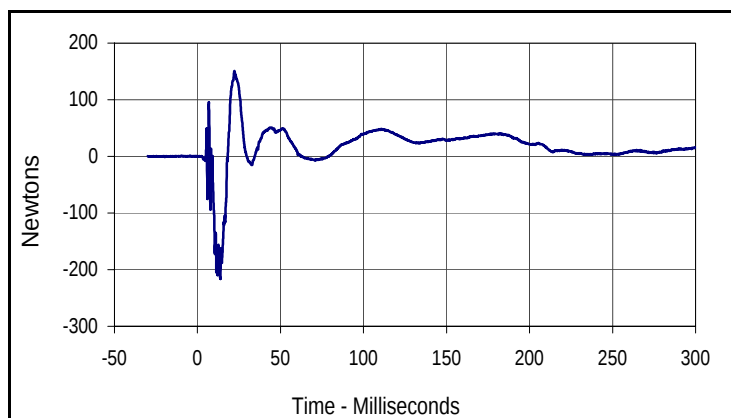
Curve Description			
6 Yr. Old Upper Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
012	RES	600	Nm
Max	Time	Min	Time
31.7	13.3	0.0	2.1

Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan
 Test Program: TWG 3.3.3.5

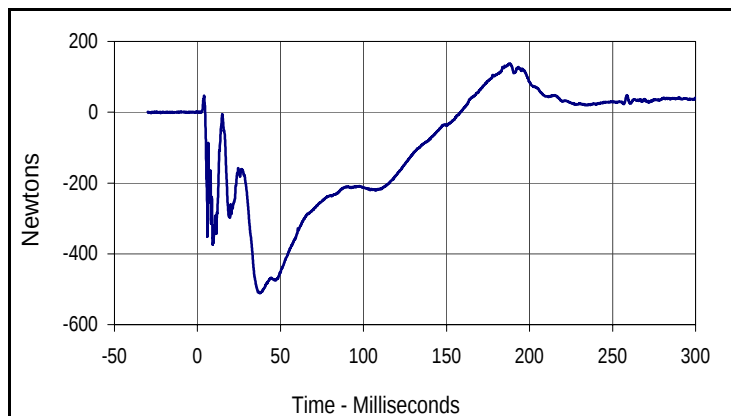
Test Date: 2/25/13
 NHTSA No.: MD5106TWG2



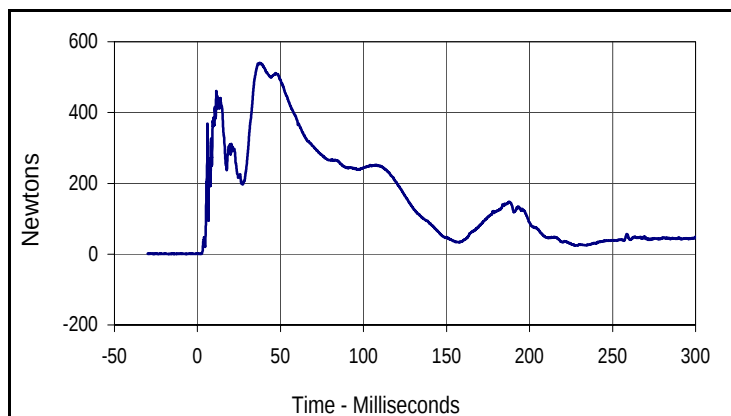
Curve Description			
6 Yr. Old Lower Neck Force X			
Plot No.	Type	SAE Class	Units
013	FIL	1000	Newtons
Max	Time	Min	Time
390.3	14.0	-190.7	49.2



Curve Description			
6 Yr. Old Lower Neck Force Y			
Plot No.	Type	SAE Class	Units
014	FIL	1000	Newtons
Max	Time	Min	Time
150.6	22.2	-216.2	13.7



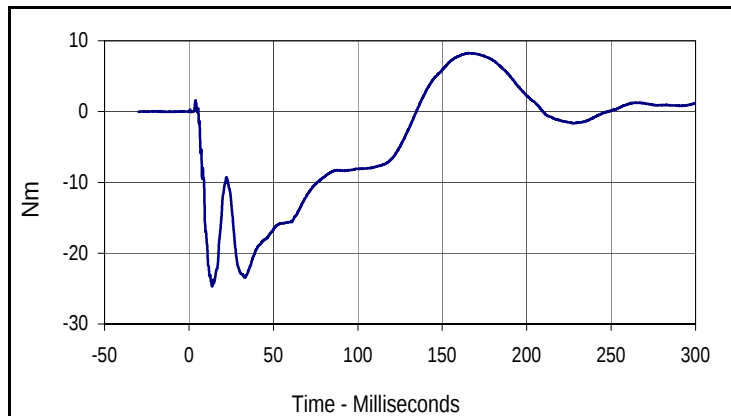
Curve Description			
6 Yr. Old Lower Neck Force Z			
Plot No.	Type	SAE Class	Units
015	FIL	1000	Newtons
Max	Time	Min	Time
137.6	187.9	-511.4	37.6



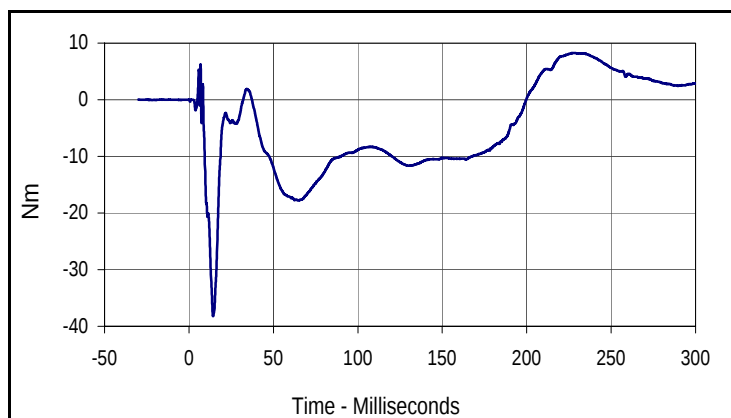
Curve Description			
6 Yr. Old Lower Neck Force Resultant			
Plot No.	Type	SAE Class	Units
016	RES	1000	Newtons
Max	Time	Min	Time
540.7	37.6	0.3	2.1

Test Vehicle: 2013 Lexus IS250 AWD 4-Door Sedan
 Test Program: TWG 3.3.3.5

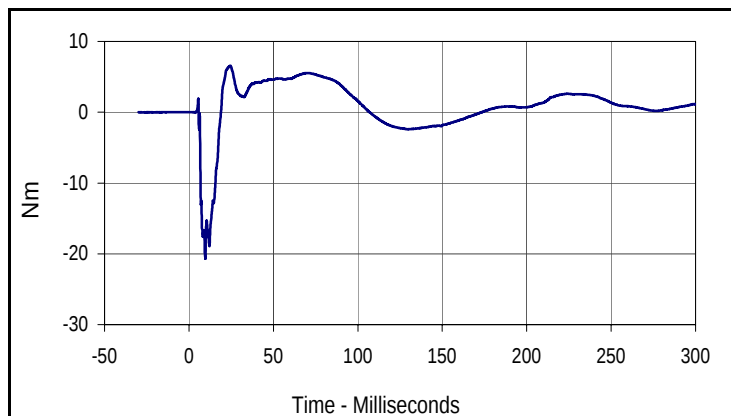
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 NHTSA No.: MD5106TWG2



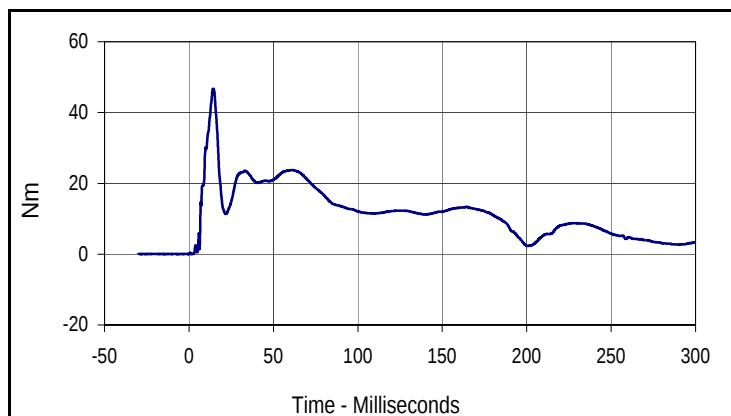
Curve Description			
6 Yr. Old Lower Neck Moment X			
Plot No.	Type	SAE Class	Units
017	FIL	600	Nm
Max	Time	Min	Time
8.3	165.4	-24.6	13.7



Curve Description			
6 Yr. Old Lower Neck Moment Y			
Plot No.	Type	SAE Class	Units
018	FIL	600	Nm
Max	Time	Min	Time
8.2	228.0	-38.2	14.3



Curve Description			
6 Yr. Old Lower Neck Moment Z			
Plot No.	Type	SAE Class	Units
019	FIL	600	Nm
Max	Time	Min	Time
6.6	24.5	-20.7	9.6



Curve Description			
6 Yr. Old Lower Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
020	RES	600	Nm
Max	Time	Min	Time
46.7	14.6	0.0	1.5

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.3.5
Instrumentation Data Channel Assignments
A.T.D. Serial Number 186
2/25/13
2013 Lexus IS250 AWD 4-Door Sedan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD	X	J34330	Accel.,full bridge	Endevco	7264-2000	G
2	HEAD	Y	P15334	Accel.,full bridge	Endevco	7264C-2000	G
3	HEAD	Z	ACCW9	Accel.,full bridge	Endevco	7264-2000	G
4	UPPER NECK FORCE	X	1646	Load cell, six axis neck	R. A. Denton	1716A	N
5	UPPER NECK FORCE	Y	1646	Load cell, six axis neck	R. A. Denton	1716A	N
6	UPPER NECK FORCE	Z	1646	Load cell, six axis neck	R. A. Denton	1716A	N
7	UPPER NECK MOMENT	X	1646	Load cell, six axis neck	R. A. Denton	1716A	Nm
8	UPPER NECK MOMENT	Y	1646	Load cell, six axis neck	R. A. Denton	1716A	Nm
9	UPPER NECK MOMENT	Z	1646	Load cell, six axis neck	R. A. Denton	1716A	Nm
10	LOWER NECK FORCE	X	139	Load cell, six axis neck	R. A. Denton	2430	N
11	LOWER NECK FORCE	Y	139	Load cell, six axis neck	R. A. Denton	2430	N
12	LOWER NECK FORCE	Z	139	Load cell, six axis neck	R. A. Denton	2430	N
13	LOWER NECK MOMENT	X	139	Load cell, six axis neck	R. A. Denton	2430	Nm
14	LOWER NECK MOMENT	Y	139	Load cell, six axis neck	R. A. Denton	2430	Nm
15	LOWER NECK MOMENT	Z	139	Load cell, six axis neck	R. A. Denton	2430	Nm

APPENDIX D

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

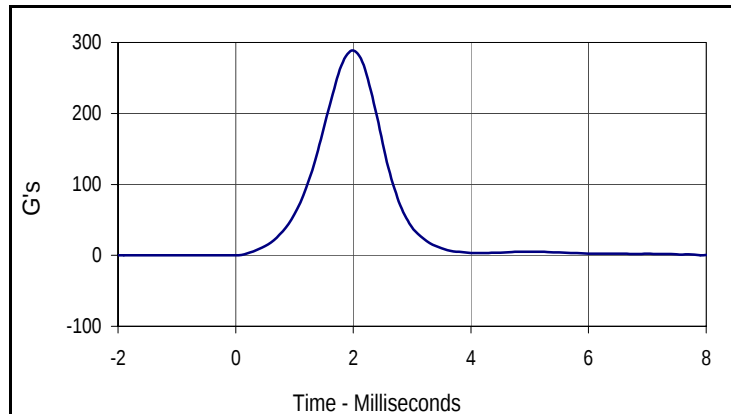
APPENDIX D
PRE-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: Hybrid III 6 Yr Old Head Drop Test
 ATD Serial No.: 186

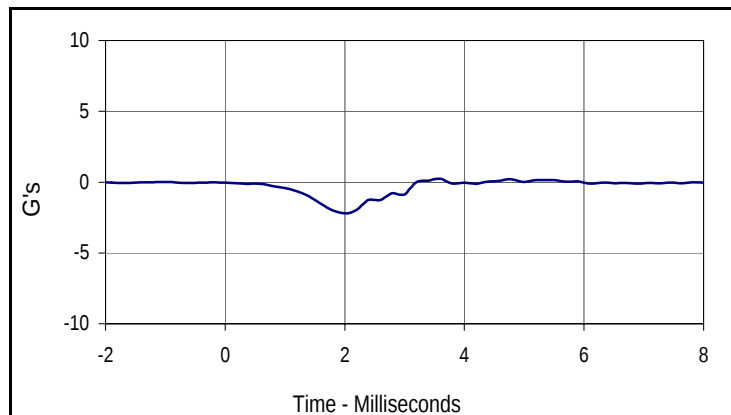
Test Date: 1/25/13
 Test I.D.: 186HD023



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	245.0 to 300.0	288.8	Pass
Peak Lateral Acceleration	G's	≤15.0	2.2	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
288.8	2.0	0.0	-1.1



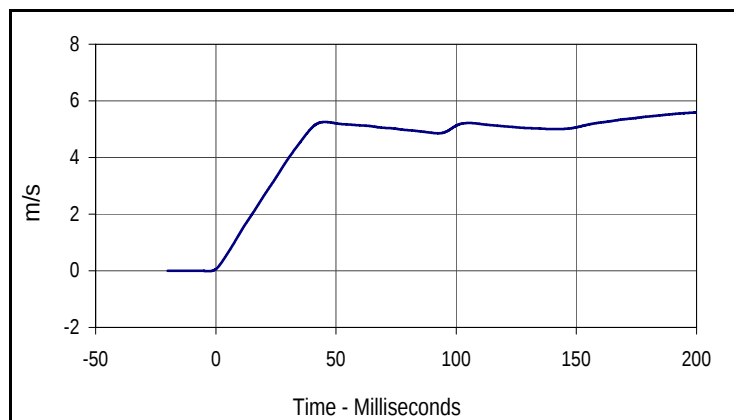
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.2	3.6	-2.2	2.0

Test Program: Hybrid III 6 Yr Old Neck Flexion Test
 ATD Serial No.: 186

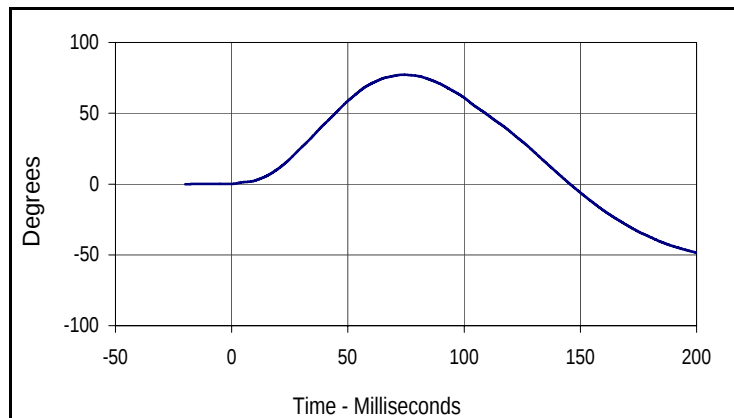
Test Date: 1/25/13
 Test I.D.: 186NF023



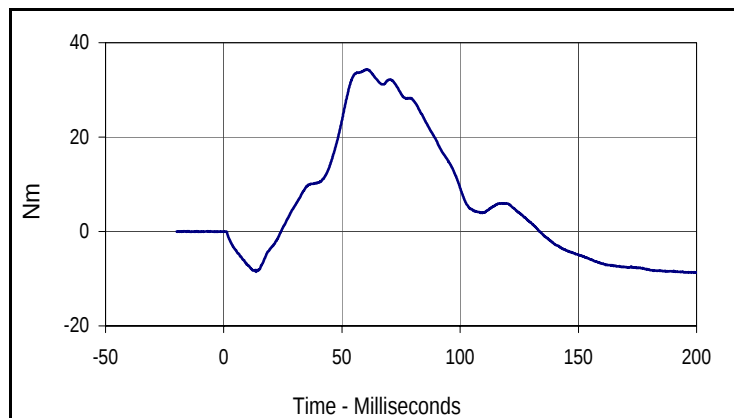
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	24	Pass
Pendulum Velocity		m/s	4.83 to 5.07	5.06	Pass
Pendulum Deceleration	10 Msec.	m/s	1.2 to 1.6	1.3	Pass
	20 Msec.	m/s	2.4 to 3.4	2.7	Pass
	30 Msec.	m/s	3.8 to 5.0	3.9	Pass
"D" Plane Rotation	Max	Degrees	74.0 to 92.0	77.2	Pass
Peak Moment in Rotation	Max	Nm	27.0 to 33.0	32.5	Pass
Positive Moment Decay, Time To 5 Nm		Msec.	103.0 to 123.0	103.8	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.6	200.0	0.0	-2.8



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
77.2	73.8	-48.4	200.0



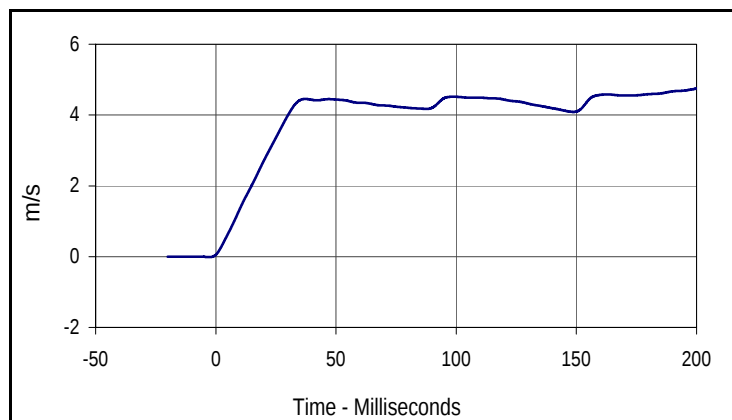
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
34.3	60.9	-8.7	199.9

Test Program: Hybrid III 6 Yr Old Neck Extension Test
 ATD Serial No.: 186

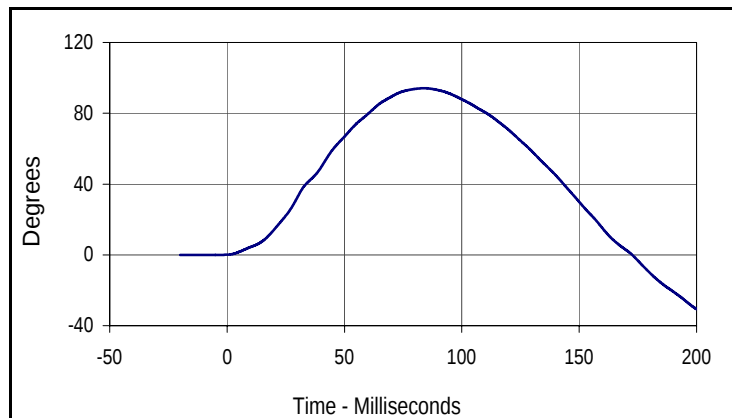
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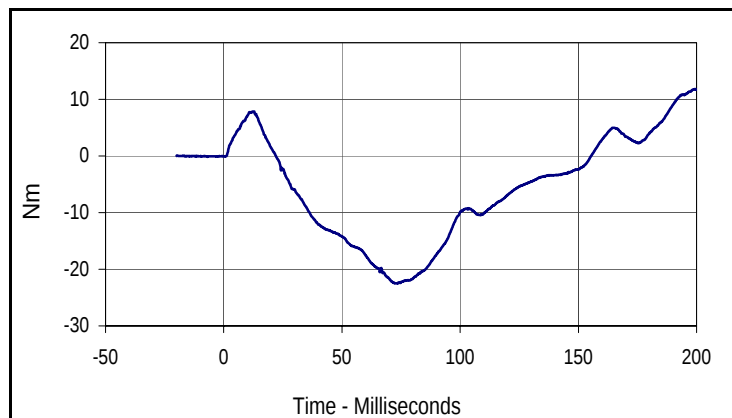
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	24	Pass
Pendulum Velocity		m/s	4.18 to 4.42	4.40	Pass
Pendulum Deceleration	10 Msec.	m/s	1.0 to 1.4	1.3	Pass
	20 Msec.	m/s	2.2 to 3.0	2.7	Pass
	30 Msec.	m/s	3.2 to 4.2	4.0	Pass
"D" Plane Rotation	Max	Degrees	85.0 to 103.0	94.1	Pass
Peak Moment in Rotation	Max	Nm	-24.0 to -19.0	-22.5	Pass
Positive Moment Decay, Time To -5 Nm		Msec.	123.0 to 147.0	127.1	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
4.7	200.0	0.0	-2.7



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
94.1	83.8	-30.7	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
11.8	199.3	-22.5	73.2

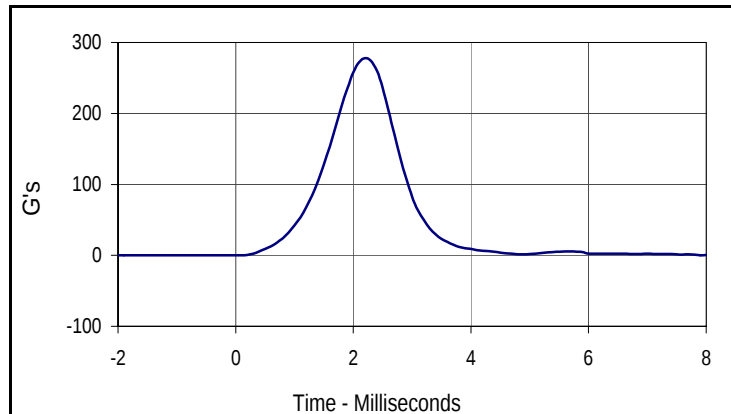
APPENDIX D
POST-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: Hybrid III 6 Yr Old Head Drop Test
 ATD Serial No.: 186

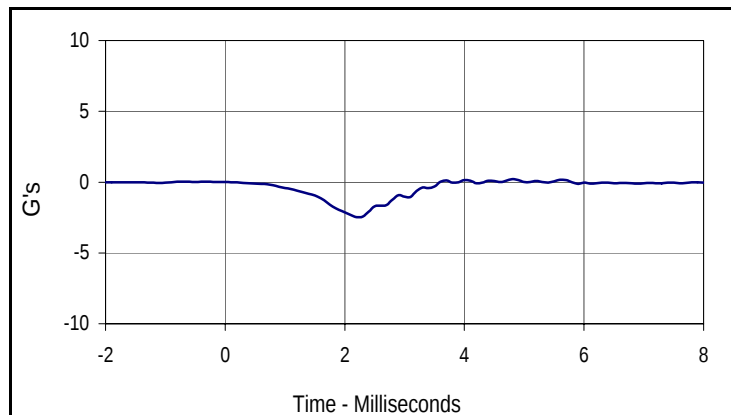
Test Date: 1/26/13
 Test I.D.: 186HD024



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	245.0 to 300.0	278.1	Pass
Peak Lateral Acceleration	G's	≤15.0	2.5	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
278.1	2.2	0.0	-0.3



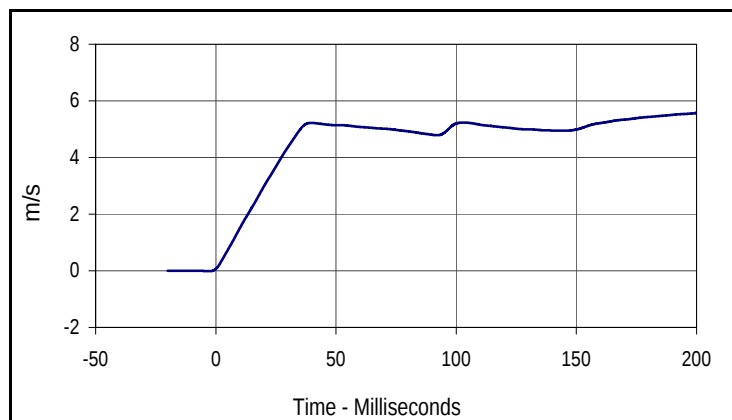
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.2	4.8	-2.5	2.2

Test Program: Hybrid III 6 Yr Old Neck Flexion Test
 ATD Serial No.: 186

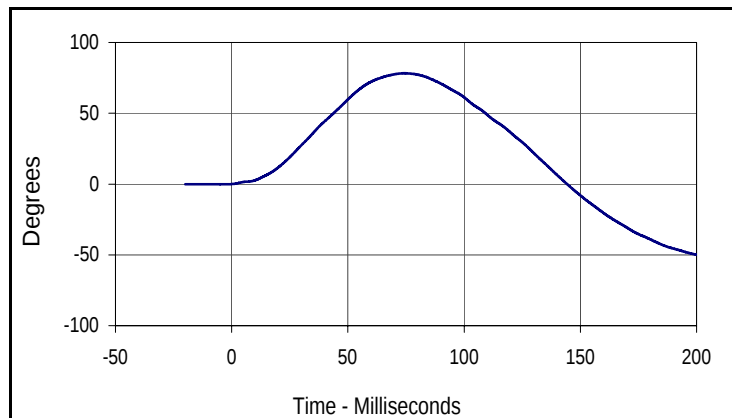
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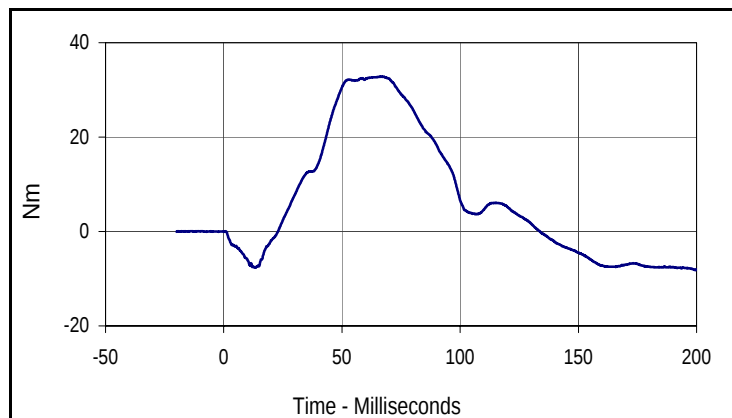
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Velocity		m/s	4.83 to 5.07	4.96	Pass
Pendulum Deceleration	10 Msec.	m/s	1.2 to 1.6	1.5	Pass
	20 Msec.	m/s	2.4 to 3.4	3.0	Pass
	30 Msec.	m/s	3.8 to 5.0	4.4	Pass
"D" Plane Rotation	Max	Degrees	74.0 to 92.0	78.2	Pass
Peak Moment in Rotation	Max	Nm	27.0 to 33.0	32.8	Pass
Positive Moment Decay, Time To 5 Nm		Msec.	103.0 to 123.0	110.7	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.6	200.0	0.0	-2.8



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
78.2	74.3	-49.8	200.0



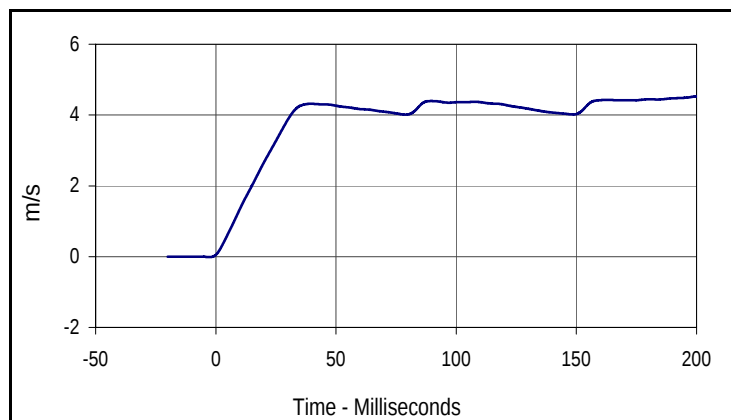
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
32.8	66.5	-8.2	199.6

Test Program: Hybrid III 6 Yr Old Neck Extension Test
 ATD Serial No.: 186

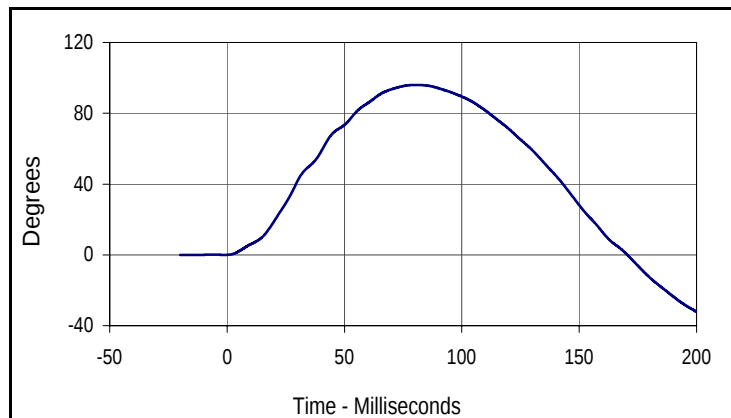
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 Test I.D.: 186NE024



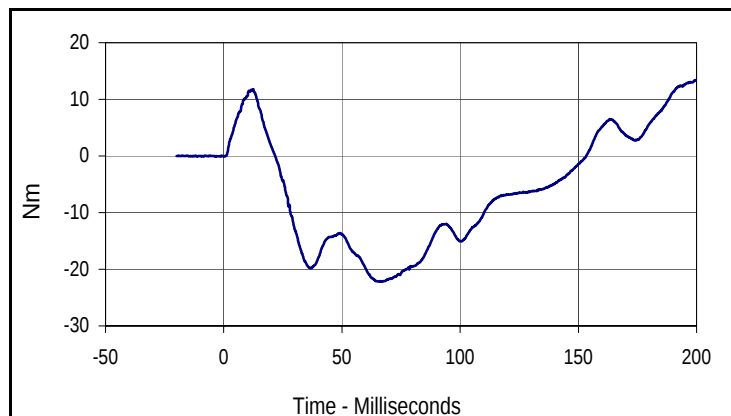
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Velocity		m/s	4.18 to 4.42	4.41	Pass
Pendulum Deceleration	10 Msec.	m/s	1.0 to 1.4	1.3	Pass
	20 Msec.	m/s	2.2 to 3.0	2.7	Pass
	30 Msec.	m/s	3.2 to 4.2	3.9	Pass
"D" Plane Rotation	Max	Degrees	85.0 to 103.0	96.0	Pass
Peak Moment in Rotation	Max	Nm	-24.0 to -19.0	-22.2	Pass
Positive Moment Decay, Time To -5 Nm		Msec.	123.0 to 147.0	127.1	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
4.5	200.0	0.0	-2.7



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
96.0	80.6	-32.2	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
13.4	200.0	-22.2	66.9