

REPORT NUMBER: TR-P35007-05-NC

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

**BAYERISCHE MOTOREN WERKE AG
2015 MINI COOPER HARDTOP
3-DOOR HATCHBACK**

NHTSA NUMBER: M20154108TWG2

**PREPARED BY:
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JUNE 23, 2015

FINAL REPORT

**PREPARED FOR:
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Approval Date: June 23, 2015

FINAL REPORT ACCEPTANCE BY:

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Date of Acceptance

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This occupant out-of-position static side airbag deployment test is part of the Technical Working Group Occupant Injury Risk from Deploying Side Airbags Testing Program sponsored by Alpha Technology Associate, Inc. under Contract No. DTNH22-12-D-00259. The purpose of this test was to obtain occupant injury data for a side airbag deployment.

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

SUMMARY

The effects of a roof mounted curtain airbag and a seat mounted torso/pelvis airbag deployment in a 2015 Mini Cooper Hardtop 3-Door Hatchback with an out-of-position 6-year old dummy were evaluated. The test was performed at KARCO Engineering, LLC. on June 9, 2015. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

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

A 6-year old anthropomorphic test device (ATD) was placed in the right front passenger seating position facing inboard according to the dummy placement instructions (3.3.5.1) 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.

Orientation of the 6-year old dummy was with the dummy facing forward. The seat is adjusted to its highest position. The dummy is placed on the foam block facing inboard with its arms hanging at its sides and its legs extended. The seat track is adjusted forward to minimize the vertical distance between the dummy's head and the roof module and to maximize the cushion to head interaction. The dummy's pelvis is slid outboard until its back contacts the door trim panel or armrest and the head is centered in the deployment trajectory of the curtain airbag with its shoulder bolts parallel to the vehicle centerline. This orientation complies with section 3.3.5.1 of the Technical Working Group (TWG) recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

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

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

The occupant data is summarized below:

Measurement Description	Passenger ATD (SID-IIs)	
	IARV	Result
Head Injury Criteria (HIC15)	723	13.2
T^1		61.0
T^2		65.7
Avg G		23.8
Upper Neck		
Nij	1	0.24
Intercepts		
F_T (N)	2800	176.7
F_C (N)	2800	-16.9
M_F (Nm)	93	12.3
M_E (Nm)	37	-0.1
Tension (N)	1490	99.9
Compression (N)	1820	-629.5
Ntf		0.13
Nte		0.00
Ncf		0.24
Nce		0.01

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback NHTSA No.: M20154108TWG2
Test Program: TWG 3.3.5.1 Test Date: 06/09/15

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: 2015 Mini Cooper Hardtop 3-Door Hatchback NHTSA No.: M20154108TWG2
Test Program: TWG 3.3.5.1 Test Date: 06/09/15

TEST DUMMY INFORMATION

Description	Passenger Seat
Dummy Type / Serial No.	6-Year Old / 186
Head Contact	Curtain Airbag
Chest Contact	No
Abdomen Contact	Torso/Pelvis Airbag
Pelvis Contact	Torso/Pelvis Airbag
Left Knee Contact	No
Right Knee Contact	No

VIDEO COVERAGE

Description	Quantity
High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

Description	Quantity
SID-IIs	15
Belt Assessment Sensors	0
Vehicle Structure Accelerometers	0
Total	15

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback NHTSA No.: M20154108TWG2
 Test Program: TWG 3.3.5.1 Test Date: 06/09/15

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20154108TWG2
Model Year	2015
Make	Mini
Model	Cooper Hardtop
Body Style	3-Door Hatchback
VIN	WMWXM5C55FT973127
Body Color	Moonwalk Gray Metallic
Odometer Reading (km / mi)	126 / 78
Engine Displacement (L)	1.5
Type / No. of Cylinders	Inline 3
Engine Placement	Transverse
Transmission Type	Manual
Transmission Speeds	6
Overdrive	Yes
Final Drive	Front
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	No
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	Yes
Driver Torso/Pelvis Airbag	No
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	No

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Bayerische Motoren Werke AG
Date of Manufacture	Jul-14
Vehicle Type	Passenger Car

GVWR (kg)	1567
GAWR Front (kg)	871
GAWR Rear (kg)	755

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity	2	2		4
Capacity Weight (VCW) (kg)				305.0
DSC x 68.04 (kg)				272.2
Cargo Weight (RCLW) (kg)				32.8

VEHICLE SEAT TYPE

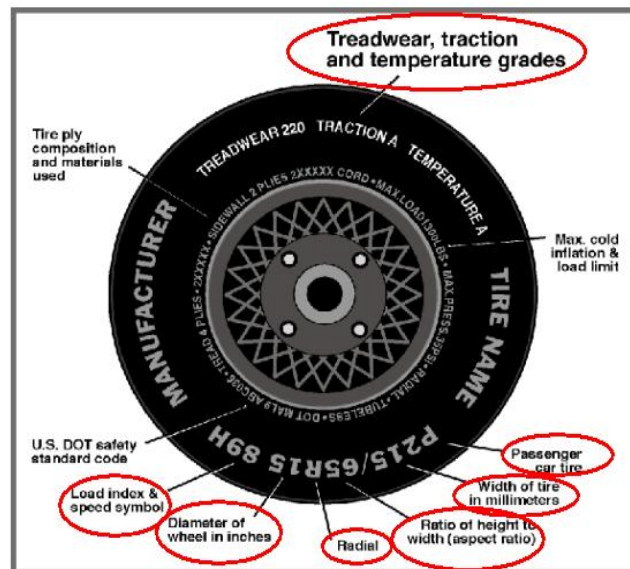
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable w/ Lever	w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat				Yes	Yes		
Third Row Seat							

*Vehicle underwent New Car Assessment Program MDB Side Impact Testing on January 14, 2015.

DATA SHEET NO. 2 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback NHTSA No.: M20154108TWG2
 Test Program: TWG 3.3.5.1 Test Date: 06/09/15



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	175/65R15	175/65R15
Tire Size on Vehicle	175/65R15	175/65R15
Tire Manufacturer	Michelin	Michelin
Tire Model	Energy Saver	Energy Saver
Treadware	400	400
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	84H	84H
Tire Material	Polyester, Steel, Polyamide	Polyester, Steel, Polyamide
DOT Safety Code Left	FT4E 00FX 2514	FT4E 00FX 2514
DOT Safety Code Right	FT4E 00FX 2514	FT4E 00FX 2514

DATA SHEET NO. 3

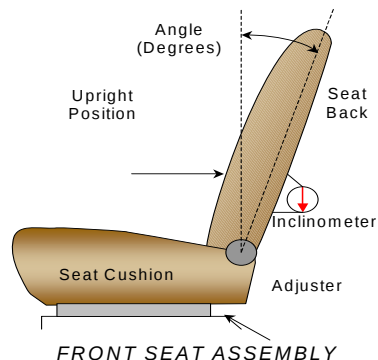
SEAT ADJUSTMENTS

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback NHTSA No.: M20154108TWG2
 Test Program: TWG 3.3.5.1 Test Date: 06/09/15

SEAT BACK ANGLE

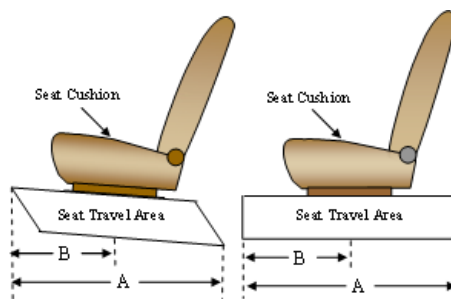
The passenger seat back is positioned per section 3.3.5.1 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. Seat back angle is measured at the seat back.

Seating Position	Degrees
Passenger Seat	15.1



SEAT FORE / AFT POSITIONING

The passenger seat track travel is set per section 3.3.5.1 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 zero (0)



Seating Position	Total Fore-Aft Travel		Placed in Position	
	mm	Detents	mm	Detents
Passenger Seat	250	26 (0-25)	130	13

SEAT BELT UPPER ANCHORAGE

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

Seating Position	Total No. of Positions	Placed in Position
Passenger Seat	Fixed	Fixed *

DATA SHEET NO. 4**DUMMY POSITIONING AND AIRBAG DIMENSIONS**

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback NHTSA No.: M20154108TWG2
 Test Program: TWG 3.3.5.1 Test Date: 06/09/15

DUMMY POSITIONING

Code	Measurement Description	Passenger	
		Length (mm)	Angle (°)
SA	Seat Back Angle		15.1
AN	Top of Airbag Module to Head/Neck Junction	280	90.0
HD	Head CG to Door Panel/ Window	125	0.0
HSC	Head to Seat Back Centerline	320	0.0
HB	Head to B-Pillar (first contact)	357	0.0
HZ	Head to Roof (Z)	235	90.0
HH	Head to Header (measured from back of head)	456	23.9
ND	Nose to Dash (measured from back of head)	545	11.1
NS	Nose to Seat Back	320	0.0
NR	Nose to Header (measured from back of head)	456	23.9
CD	Chest to Dash (measured from back)	533	7.1
CS	Chest to Seat Back	304	0.0
RACL	Right Arm to Seat Back Centerline	249	0.0
LACL	Left Arm to Seat Back Centerline	249	0.0
RA	Right Arm to Door Panel	82	0.0
LA	Left Arm to Door Panel	87	0.0
KK	Knee to Knee	115	0.0
TT	Toe to Toe	86	0.0
KSCR	Right Knee to Seat Cushion Centerline	87	0.0
KSCL	Left Knee to Seat Cushion Centerline	90	0.0
	Head Level (X Direction)		1.2
	Head Level (Y Direction)		0.4

AIRBAG DIMENSIONS

Code	Measurement Description	Airbag
		Length (mm)
AMW	Curtain Airbag Module Diameter	25
AML	Curtain Airbag Module Length	355
ABW	Curtain Airbag Width	455
ABL	Curtain Airbag Length	1610
AMW	Torso/Pelvis Airbag Module Diameter	18
AML	Torso/Pelvis Airbag Module Length	110
ABW	Torso/Pelvis Airbag Width	600
ABL	Torso/Pelvis Airbag Length	275

DATA SHEET NO. 5

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback NHTSA No.: M20154108TWG2

Test Program: TWG 3.3.5.1 Test Date: 06/09/15

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Head CG	X	G's	27.1	62.4	-17.5	5.8
Head CG	Y	G's	11.5	16.6	-28.6	6.2
Head CG	Z	G's	41.7	5.9	-12.5	8.2
Head CG Resultant	N/A	G's	48.7	5.8		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	176.7	67.2	-16.9	4.7
Neck Force	Y	Newtons	96.4	15.7	-155.6	6.3
Neck Force	Z	Newtons	99.9	110.8	-629.5	6.0
Neck Force Resultant	N/A	Newtons	642.0	6.0		
Neck Moment	X	Nm	10.1	7.9	-0.1	0.5
Neck Moment	Y	Nm	12.3	69.2	-0.1	0.8
Neck Moment	Z	Nm	4.7	60.4	-0.9	166.6
Neck Moment Resultant	N/A	Nm	13.9	67.5		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	89.2	7.4	-110.0	13.6
Neck Force	Y	Newtons	146.2	14.9	-65.0	153.9
Neck Force	Z	Newtons	114.9	111.1	-683.0	8.7
Neck Force Resultant	N/A	Newtons	683.2	8.7		
Neck Moment	X	Nm	19.0	17.4	-4.6	215.8
Neck Moment	Y	Nm	26.3	7.8	-14.7	67.3
Neck Moment	Z	Nm	10.5	14.9	-2.0	216.1
Neck Moment Resultant	N/A	Nm	26.3	7.7		

HEAD INJURY CRITERIA (HIC 15)

Location	Pass. 6 YO			
	HIC15	T ¹	T ²	Avg G
Head CG	13.2	61.0	65.7	23.8

UPPER NECK NIJ VALUES

Location	Pass. 6 YO			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.13	0.00	0.24	0.01

DATA SHEET NO. 6**HIGH SPEED CAMERA LOCATIONS AND DATA**Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback NHTSA No.: M20154108TWG2Test Program: TWG 3.3.5.1 Test Date: 06/09/15**CAMERA LOCATIONS**

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Side View	140	-3605	-1020	-0.1	35	1000
2	High Speed 3/4 View	1680	-1150	-1445	-10.5	50	1000
3	High Speed Front View	2045	-240	-1285	-6.6	50	1000
4	Real Time	140	-3605	-1135	-0.1		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 Left Front 3/4 View of NCAP Side MDB Impact Test



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



FIGURE 5. Post-Test Left Rear ¾ View of NCAP Side MDB Impact Test



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



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



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



FIGURE 9. Pre-Test Dummy Position, ¾ View



FIGURE 10. Post-Test Dummy Position, ¾ View



FIGURE 11. Pre-Test Dummy Position, Front View



FIGURE 12. Post-Test Dummy Position, Front View



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



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



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

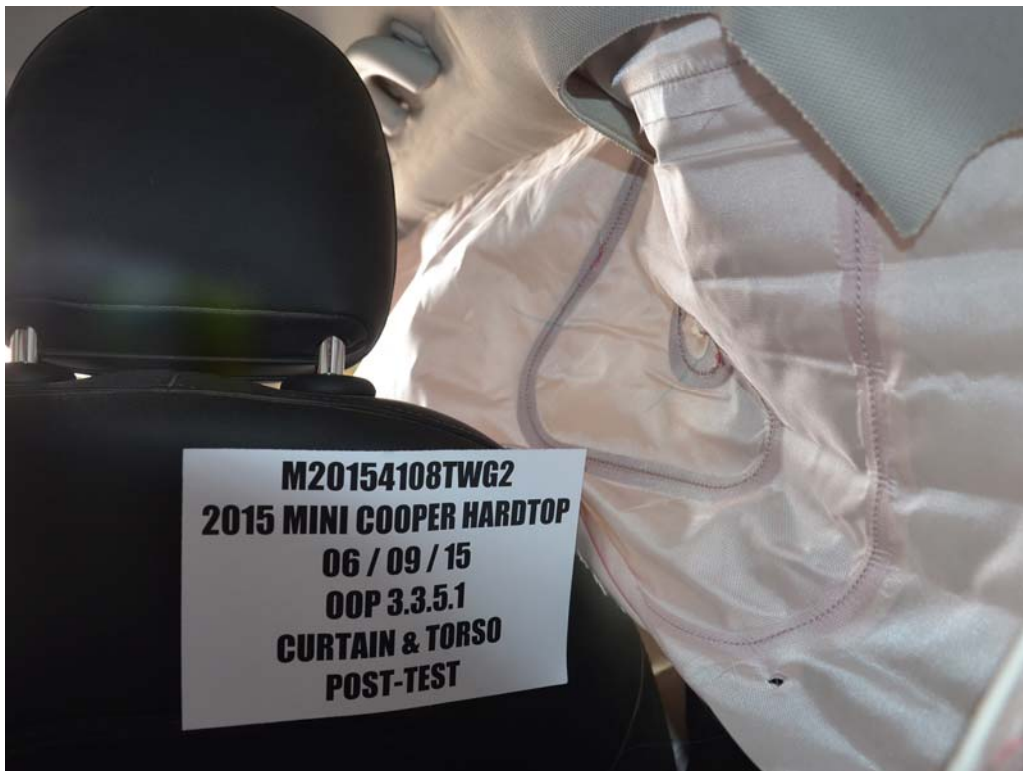


FIGURE 16. Post-Test Dummy Position, Close-Up Rear View



FIGURE 17. Post-Test Airbags, Left Side View



FIGURE 18. Post-Test Airbags, Left Front $\frac{3}{4}$ View

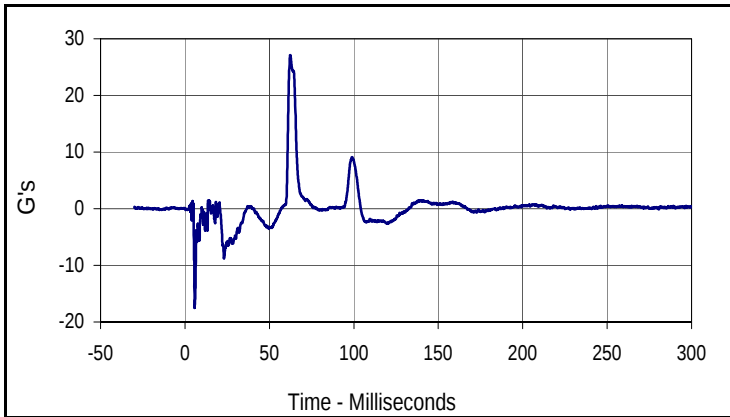
APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

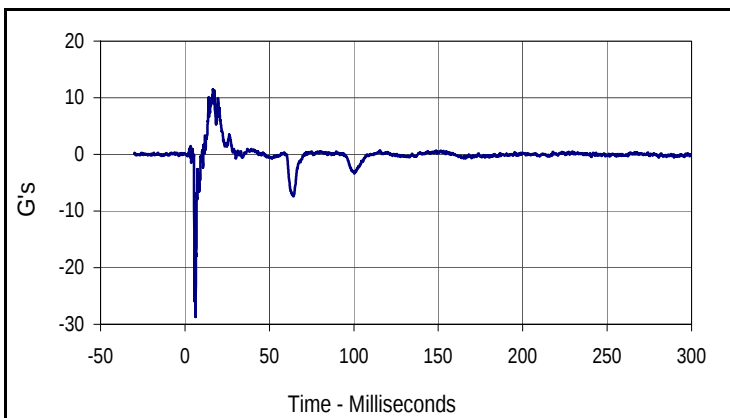
Plot		Page
1	6-year old Head X	B-1
2	6-year old Head Y	B-1
3	6-year old Head Z	B-1
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20	6-year old Lower Neck Moment Resultant	B-5

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback
 Test Program: TWG 3.3.5.1

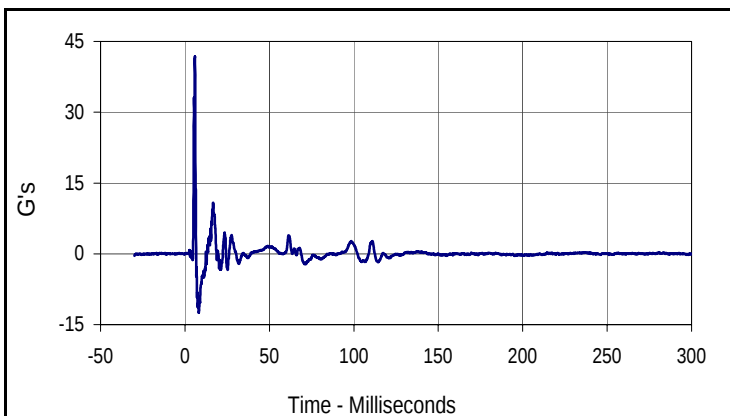
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 NHTSA No.: M20154108TWG2



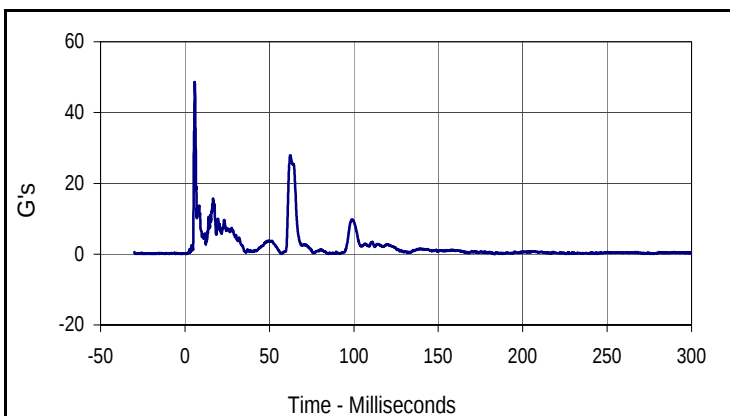
Curve Description			
6 Yr. Old Head X			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
27.1	62.4	-17.5	5.8



Curve Description			
6 Yr. Old Head Y			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
11.5	16.6	-28.6	6.2



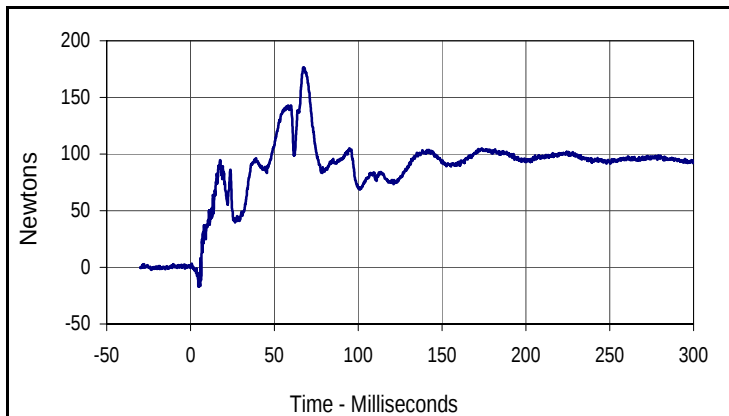
Curve Description			
6 Yr. Old Head Z			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
41.7	5.9	-12.5	8.2



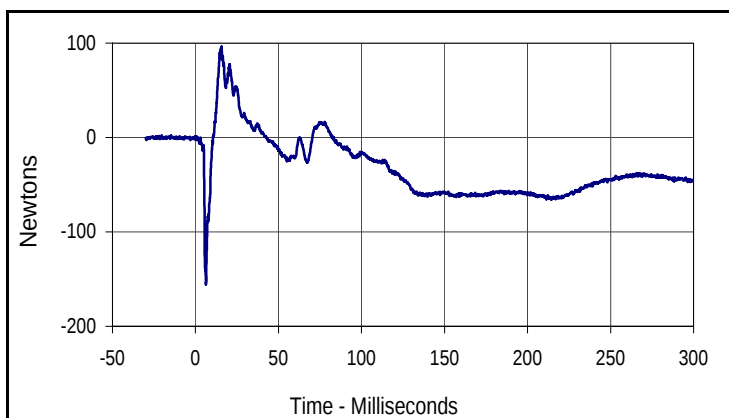
Curve Description			
6 Yr. Old Head Resultant			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
48.7	5.8	0.0	183.4

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback
 Test Program: TWG 3.3.5.1

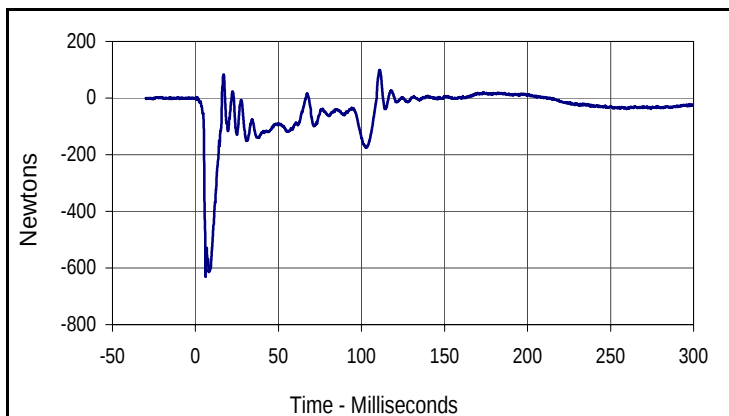
Test Date: 6/9/15
 NHTSA No.: M20154108TWG2



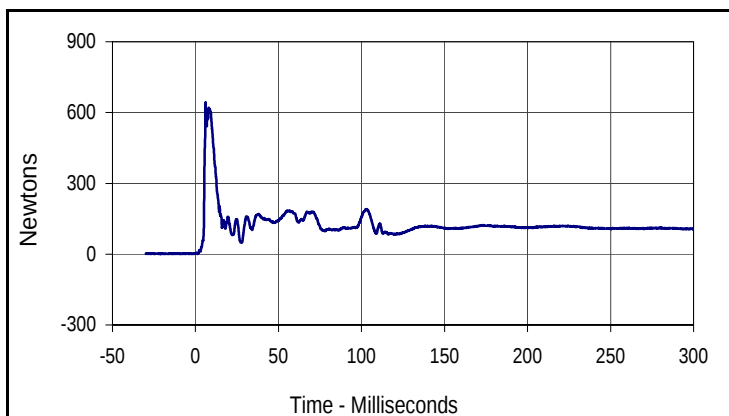
Curve Description			
6 Yr. Old Upper Neck Force X			
Plot No.	Type	SAE Class	Units
005	FIL	1000	Newtons
Max	Time	Min	Time
176.7	67.2	-16.9	4.7



Curve Description			
6 Yr. Old Upper Neck Force Y			
Plot No.	Type	SAE Class	Units
006	FIL	1000	Newtons
Max	Time	Min	Time
96.4	15.7	-155.6	6.3



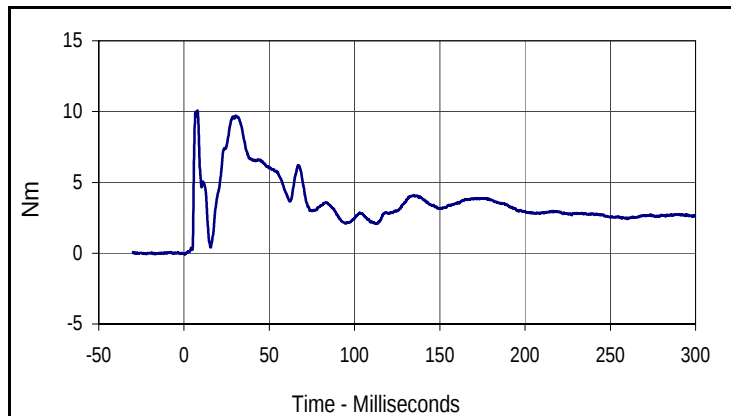
Curve Description			
6 Yr. Old Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
007	FIL	1000	Newtons
Max	Time	Min	Time
99.9	110.8	-629.5	6.0



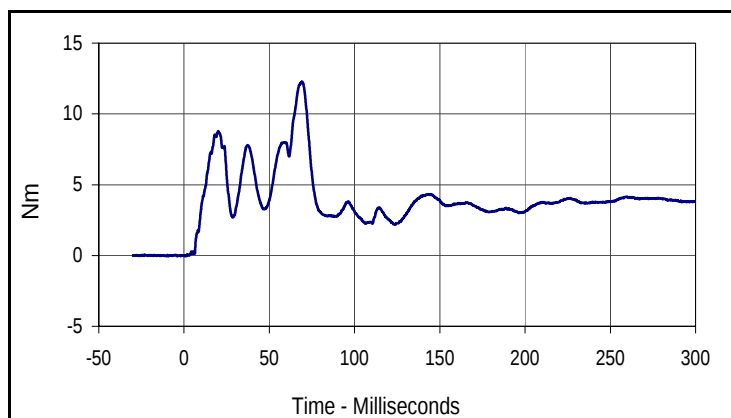
Curve Description			
6 Yr. Old Upper Neck Force Resultant			
Plot No.	Type	SAE Class	Units
008	RES	1000	Newtons
Max	Time	Min	Time
642.0	6.0	0.6	1.1

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback
 Test Program: TWG 3.3.5.1

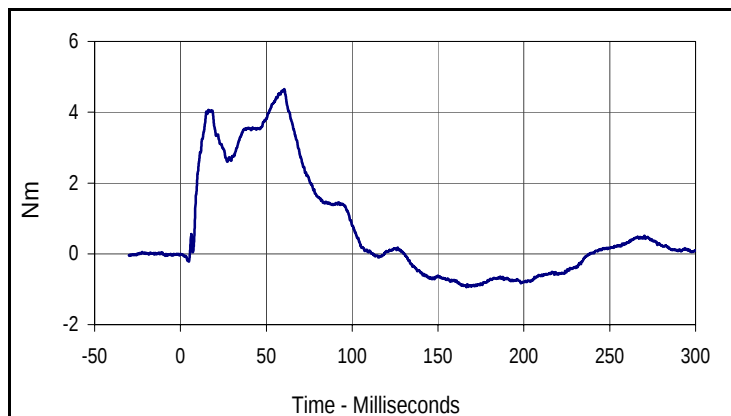
Test Date: 6/9/15
 NHTSA No.: M20154108TWG2



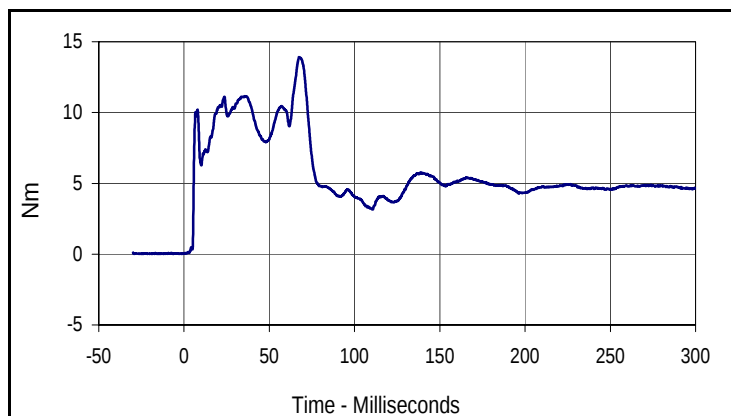
Curve Description			
6 Yr. Old Upper Neck Moment X			
Plot No.	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
10.1	7.9	-0.1	0.5



Curve Description			
6 Yr. Old Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Nm
Max	Time	Min	Time
12.3	69.2	-0.1	0.8



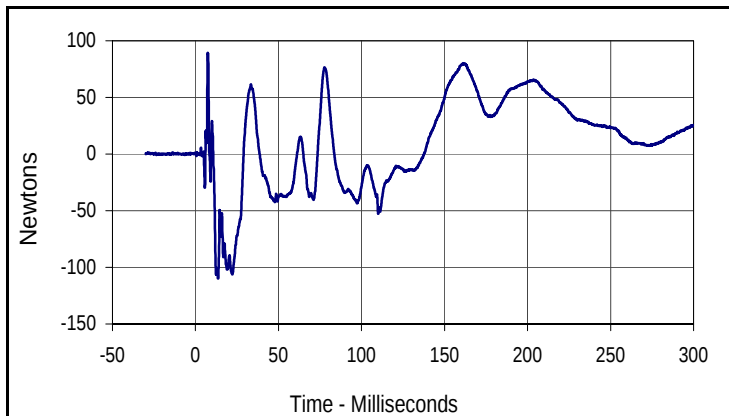
Curve Description			
6 Yr. Old Upper Neck Moment Z			
Plot No.	Type	SAE Class	Units
011	FIL	600	Nm
Max	Time	Min	Time
4.7	60.4	-0.9	166.6



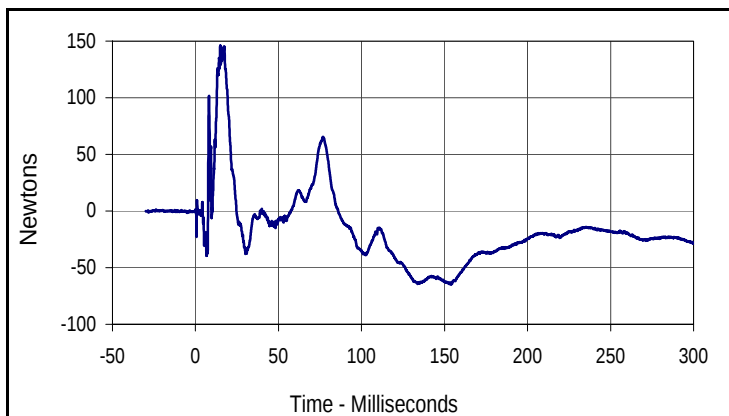
Curve Description			
6 Yr. Old Upper Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
012	RES	600	Nm
Max	Time	Min	Time
13.9	67.5	0.0	1.4

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback
 Test Program: TWG 3.3.5.1

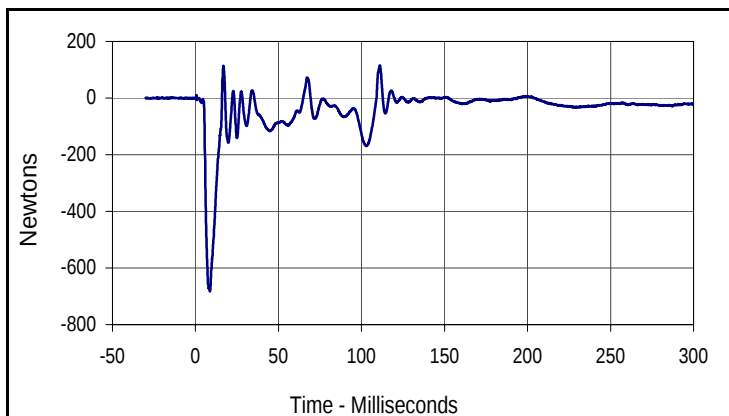
Test Date: 6/9/15
 NHTSA No.: M20154108TWG2



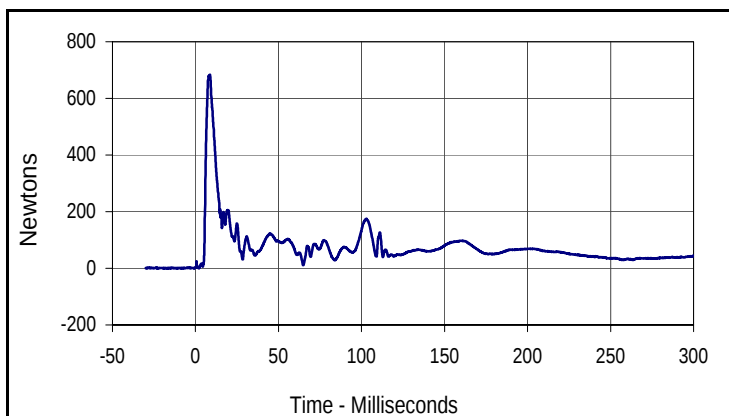
Curve Description			
6 Yr. Old Lower Neck Force X			
Plot No.	Type	SAE Class	Units
013	FIL	1000	Newtons
Max	Time	Min	Time
89.2	7.4	-110.0	13.6



Curve Description			
6 Yr. Old Lower Neck Force Y			
Plot No.	Type	SAE Class	Units
014	FIL	1000	Newtons
Max	Time	Min	Time
146.2	14.9	-65.0	153.9



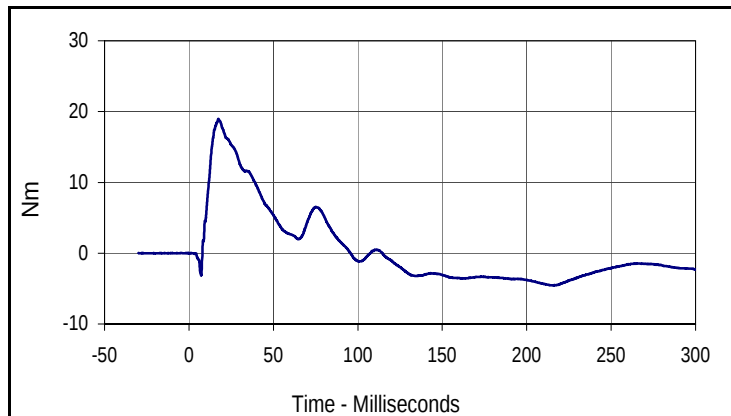
Curve Description			
6 Yr. Old Lower Neck Force Z			
Plot No.	Type	SAE Class	Units
015	FIL	1000	Newtons
Max	Time	Min	Time
114.9	111.1	-683.0	8.7



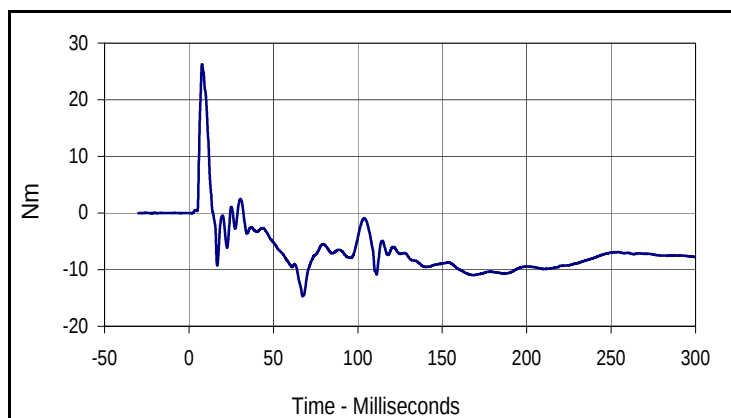
Curve Description			
6 Yr. Old Lower Neck Force Resultant			
Plot No.	Type	SAE Class	Units
016	RES	1000	Newtons
Max	Time	Min	Time
683.2	8.7	0.4	2.0

Test Vehicle: 2015 Mini Cooper Hardtop 3-Door Hatchback
 Test Program: TWG 3.3.5.1

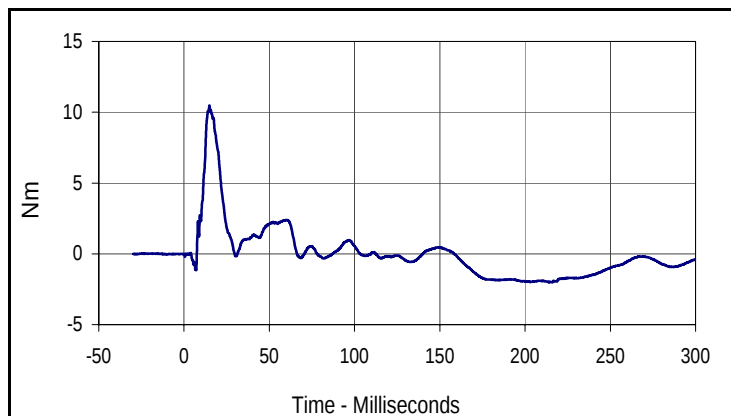
Test Date: 6/9/15
 NHTSA No.: M20154108TWG2



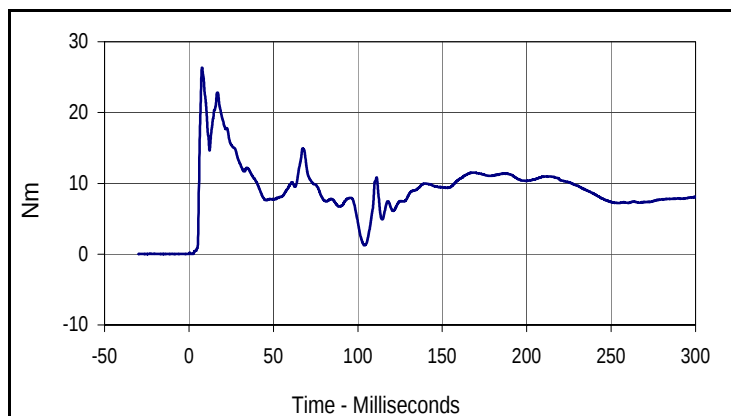
Curve Description			
6 Yr. Old Lower Neck Moment X			
Plot No.	Type	SAE Class	Units
017	FIL	600	Nm
Max	Time	Min	Time
19.0	17.4	-4.6	215.8



Curve Description			
6 Yr. Old Lower Neck Moment Y			
Plot No.	Type	SAE Class	Units
018	FIL	600	Nm
Max	Time	Min	Time
26.3	7.8	-14.7	67.3



Curve Description			
6 Yr. Old Lower Neck Moment Z			
Plot No.	Type	SAE Class	Units
019	FIL	600	Nm
Max	Time	Min	Time
10.5	14.9	-2.0	216.1



Curve Description			
6 Yr. Old Lower Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
020	RES	600	Nm
Max	Time	Min	Time
26.3	7.7	0.0	2.3

APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

TWG 3.3.5.1
Instrumentation Data Channel Assignments
A.T.D. Serial Number 186
6/9/15
2015 Mini Cooper Hardtop 3-Door Hatchback

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	2189	Load cell, six axis neck	R. A. Denton	1716A	N
5	UPPER NECK FORCE	Y	2189	Load cell, six axis neck	R. A. Denton	1716A	N
6	UPPER NECK FORCE	Z	2189	Load cell, six axis neck	R. A. Denton	1716A	N
7	UPPER NECK MOMENT	X	2189	Load cell, six axis neck	R. A. Denton	1716A	Nm
8	UPPER NECK MOMENT	Y	2189	Load cell, six axis neck	R. A. Denton	1716A	Nm
9	UPPER NECK MOMENT	Z	2189	Load cell, six axis neck	R. A. Denton	1716A	Nm
10	LOWER NECK FORCE	X	180	Load cell, six axis neck	R. A. Denton	2430	N
11	LOWER NECK FORCE	Y	180	Load cell, six axis neck	R. A. Denton	2430	N
12	LOWER NECK FORCE	Z	180	Load cell, six axis neck	R. A. Denton	2430	N
13	LOWER NECK MOMENT	X	180	Load cell, six axis neck	R. A. Denton	2430	Nm
14	LOWER NECK MOMENT	Y	180	Load cell, six axis neck	R. A. Denton	2430	Nm
15	LOWER NECK MOMENT	Z	180	Load cell, six axis neck	R. A. Denton	2430	Nm

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

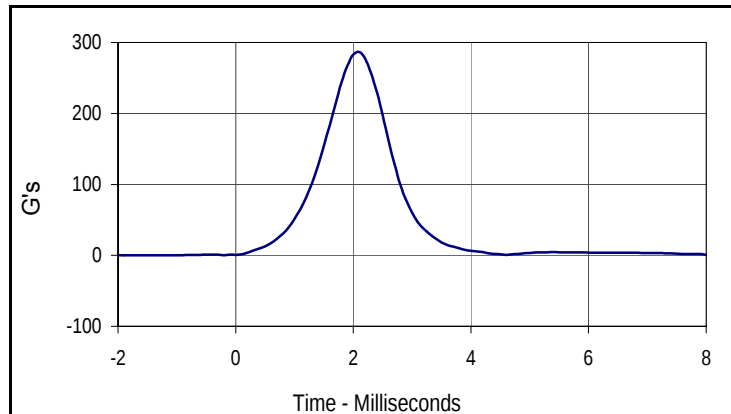
APPENDIX D
PRE-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

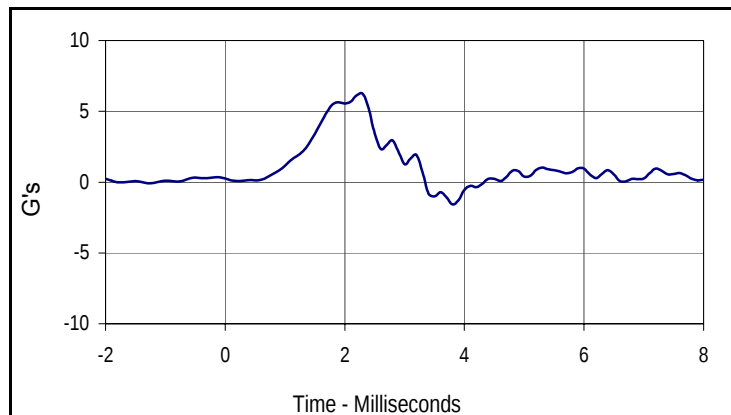
Test Date: 6/2/15
 Test I.D.: 186HD034



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	245.0 to 300.0	286.4	Pass
Peak Lateral Acceleration	G's	≤15.0	6.2	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
286.4	2.1	0.2	-1.0



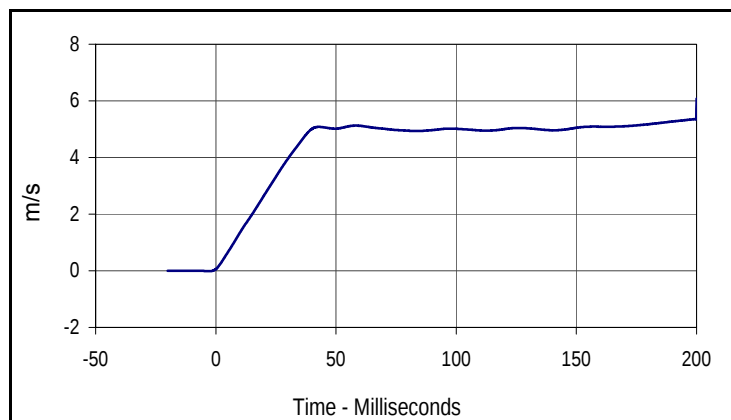
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
6.2	2.3	-1.6	3.8

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

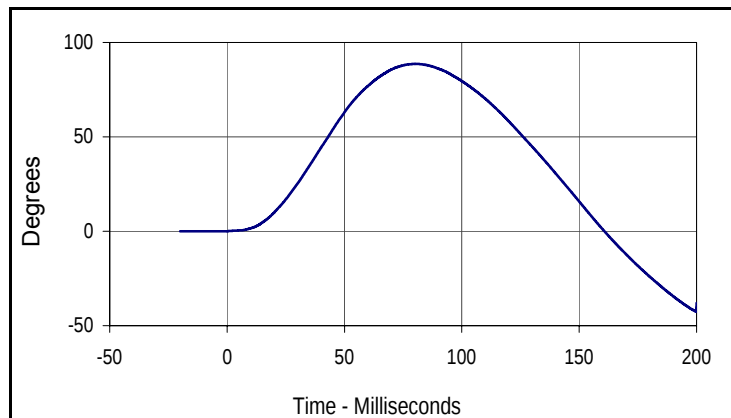
Test Date: 6/2/15
 Test I.D.: 186NF034



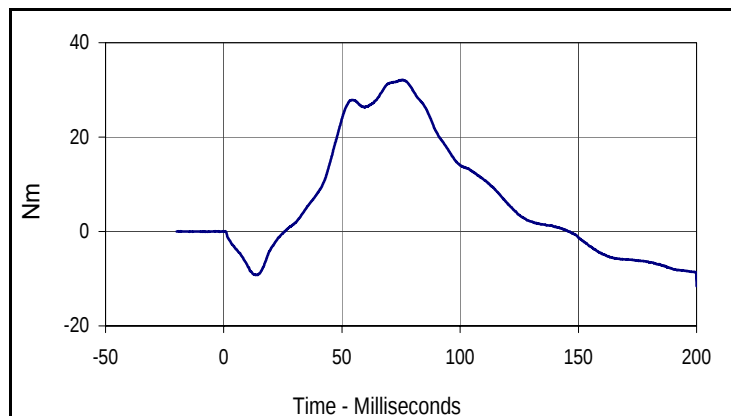
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	33	Pass
Pendulum Velocity		m/s	4.83 to 5.07	4.87	Pass
Pendulum Deceleration	10 Msec.	m/s	1.2 to 1.6	1.3	Pass
	20 Msec.	m/s	2.4 to 3.4	2.7	Pass
	30 Msec.	m/s	3.8 to 5.0	4.0	Pass
"D" Plane Rotation	Max	Degrees	74.0 to 92.0	88.6	Pass
Peak Moment in Rotation	Max	Nm	27.0 to 33.0	32.1	Pass
Positive Moment Decay, Time To 5 Nm		Msec.	103.0 to 123.0	122.0	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.1	200.0	0.0	-2.8



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
88.6	80.6	-42.5	199.9



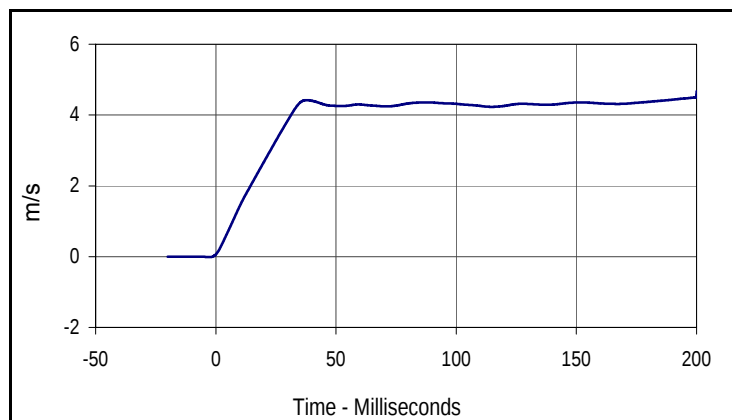
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
32.1	75.6	-11.6	200.0

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

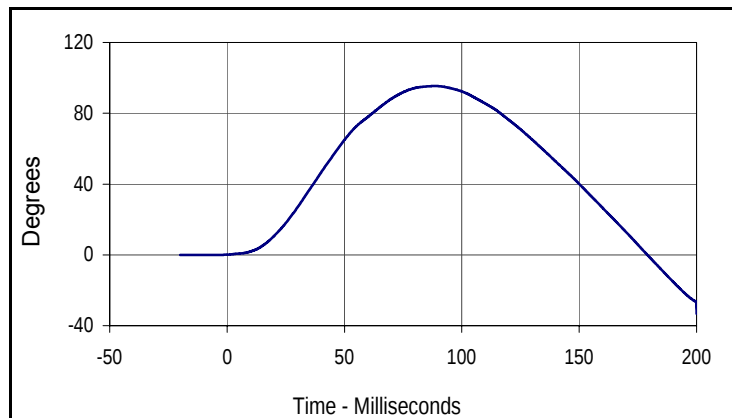
Test Date: 6/2/15
 Test I.D.: 186NE034



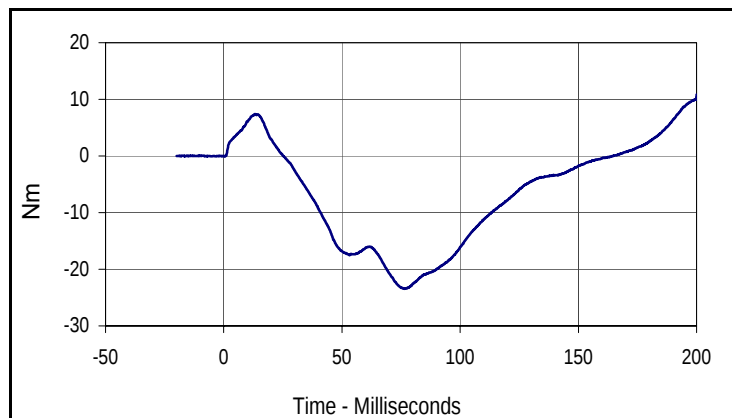
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Velocity		m/s	4.18 to 4.42	4.32	Pass
Pendulum Deceleration	10 Msec.	m/s	1.0 to 1.4	1.4	Pass
	20 Msec.	m/s	2.2 to 3.0	2.7	Pass
	30 Msec.	m/s	3.2 to 4.2	3.9	Pass
"D" Plane Rotation	Max	Degrees	85.0 to 103.0	95.4	Pass
Peak Moment in Rotation	Max	Nm	-24.0 to -19.0	-23.4	Pass
Positive Moment Decay, Time To -5 Nm		Msec.	123.0 to 147.0	127.2	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	-2.8



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
95.4	88.7	-33.3	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
10.8	200.0	-23.4	76.4