REPORT NUMBER TR-P33007-01-NC

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

FORD MOTOR CO.
2013 FORD ESCAPE SE AWD
5-DOOR MPV

NHTSA NUMBER: MD0200TWG2

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

FEBRUARY 5, 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.

This publication is distributed by the U.S. Department of Transportation, Alpha Technology Associate, Inc., in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or Alpha Technology Associate, Inc. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By: Matthew S. Hubbard

Mr. Matthew S. Hubbard, Test Engineer
KARCO Engineering, LLC.

Reviewed By:

Mr. Kelsey Chiu, Engineering Department 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: February 5, 2013

FINAL REPORT ACCEPTED BY:

Engineer, Alpha Technology Associate, Inc.

Date of Acceptance

TABLE OF CONTENTS

SECTION 1

PURPOSE AND SUMMARY OF TEST MD0200TWG2

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 Ford Escape SE AWD 5-door MPV with an out-of-position 6 year old dummy were evaluated. The test was performed at KARCO Engineering, LLC. on January 22, 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	12.4

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 Ford Escape SE AWD 5-Door MPV NHTSA No.: MD0200TWG2
Test Program: TWG 3.3.3.5 Test Date: 01/22/13

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	^oF	^oC	=(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 Ford Escape SE AWD 5-Door MPV NHTSA No.: MD0200TWG2

Test Program: TWG 3.3.3.5 Test Date: 01/22/13

TEST DUMMY INFORMATION

Description	Passenger Seat Forward Facing
Dummy Type / Serial No.	6 year old / 186
Head Contact	Yes
Chest Contact	No
Abdomen Contact	Yes
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 Ford Escape SE AWD 5-Door MPV NHTSA No.: MD0200TWG2

Test Program: TWG 3.3.3.5 Test Date: 01/22/13

TEST VEHICLE INFORMATION

Make	Ford
Model	Escape SE AWD
Body Style	5-Door MPV
NHTSA No.	MD0200TWG2
VIN	1FMCU9G93DUA16410
Color	Ginger Ale Metallic
Delivery Date	July 11, 2012
Odometer (km./mi.)	74 / 46
Dealer	Ferrario
Transmission	Automatic
Final Drive	AWD
Type/Number Cylinders	Inline 4
Engine Displacement (L)	2.0
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	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Co.
Date of Manufacture	May-12

GVWR (kg)	2195
GAWR Front (kg)	1134
GAWR Rear (kg)	1067

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommend Tire Size	P235/55R17	P235/55R17
Tire Size on Vehicle	P235/55R17	P235/55R17
Tire Manufacturer	Continental	Continental

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 July 18, 2012.

DATA SHEET NO. 3

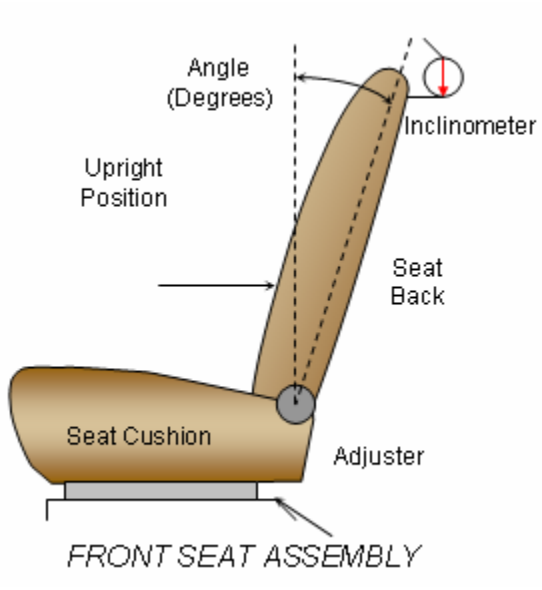
TEST VEHICLE INFORMATION

Test Vehicle: 2013 Ford Escape SE AWD 5-Door MPV NHTSA No.:MD0200TWG2

Test Program: TWG 3.3.3.5 Test Date: 01/22/13

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	10.2

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	268mm [0-39 detents]	268mm [39th detent]

DATA SHEET NO. 4

DUMMY POSITIONING INFORMATION

Test Vehicle: 2013 Ford Escape SE AWD 5-Door MPV NHTSA No.: MD0200TWG2

Test Program: TWG 3.3.3.5 Test Date: 01/22/13

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Hybrid III 6 YO	
		Length (mm)	Angle (°)
SA	Seat Back Angle		10.2
AMW	Side Airbag Module Diameter (Torso / Curtain)	20 / 35	
ABW	Side Airbag Width (Torso / Curtain)	610 / 490	
AML	Side Airbag Module Length (Torso / Curtain)	130 / 265	
ABL	Side Airbag Length (Torso / Curtain)	340 / 1500	
AN	Top of Airbag Module to Head/Neck Junction	354	
HD	Head CG to Door Panel/ Window	147	
HSC	Head to Seat Back Centerline	272	
HB	Head to B-Pillar (first contact)	2	
HZ	Head to Roof (Z)	291	
HHD	Head to Header	498	30.3
ND	Nose to Dash	717	11.2
NS	Nose to Seat Back	212	
NR	Nose to Header	503	30.5
CD	Chest to Dash	650	1.0
CS	Chest to Seat Back	254	
RACL	Right Arm to Seat Back Centerline	337	
LACL	Left Arm to Seat Back Centerline	55	
RA	Right Arm to Door Panel	7	
LA	Left Arm to Door Panel	289	
KK	Knee to Knee	152	
TT	Toe to Toe	134	
KSCR	Right Knee to Seat Cushion Centerline	185	
KSCL	Left Knee to Seat Cushion Centerline	70	
	Head Level (X Direction)		
	Head Level (Y Direction)		

DATA SHEET NO. 5

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2013 Ford Escape SE AWD 5-Door MPV NHTSA No.: MD0200TWG2

Test Program: TWG 3.3.3.5 Test Date: 01/22/13

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Head CG	X	G's	20.7	15.4	-12.3	25.9
Head CG	Y	G's	4.6	10.9	-30.5	12.9
Head CG	Z	G's	39.7	12.8	-9.0	12.2
Head CG Resultant	N/A	G's	50.3	12.8		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	236.6	18.2	-39.3	172.5
Neck Force	Y	Newtons	69.8	10.4	-67.2	46.0
Neck Force	Z	Newtons	128.0	126.1	-488.5	16.2
Neck Force Resultant	N/A	Newtons	518.7	16.2		
Neck Moment	X	Nm	8.2	14.8	-15.1	25.2
Neck Moment	Y	Nm	19.1	14.9	-12.1	31.7
Neck Moment	Z	Nm	1.7	12.7	-11.1	51.1
Neck Moment Resultant	N/A	Nm	20.7	14.8		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	79.5	126.3	-260.1	7.8
Neck Force	Y	Newtons	239.8	14.5	-206.0	6.7
Neck Force	Z	Newtons	130.6	133.4	-653.1	14.4
Neck Force Resultant	N/A	Newtons	734.9	14.5	0.7	0.1
Neck Moment	X	Nm	8.4	8.7	-18.1	30.3
Neck Moment	Y	Nm	7.0	172.9	-27.4	21.7
Neck Moment	Z	Nm	9.4	6.8	-18.1	15.4
Neck Moment Resultant	N/A	Nm	32.0	20.8	0.0	0.1

HEAD INJURY CRITERIA (HIC 15)

Location	Pass. 6 YO			
	HIC15	T^1	T^2	Avg G
Head CG	12.4	12.5	27.5	14.7

UPPER NECK NIJ VALUES

Location	Pass. 6 YO			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.08	0.37	0.33	0.45

DATA SHEET NO. 6

CAMERA LOCATIONS

Test Vehicle: 2013 Ford Escape SE AWD 5-Door MPV NHTSA No.: MD0200TWG2

Test Program: TWG 3.3.3.5 Test Date: 01/22/13

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Front View	-1990	-235	-1275	-0.2	50	1000
2	High Speed 3/4 View	-1735	-1510	-1340	-0.9	50	1000
3	High Speed Side View	-390	-2485	-1055	-0.3	35	1000
4	Real Time	-620	-2645	-950	1.7	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 1. Right Front ¾ View, As Received

FIGURE 2. Vehicle Certification Label

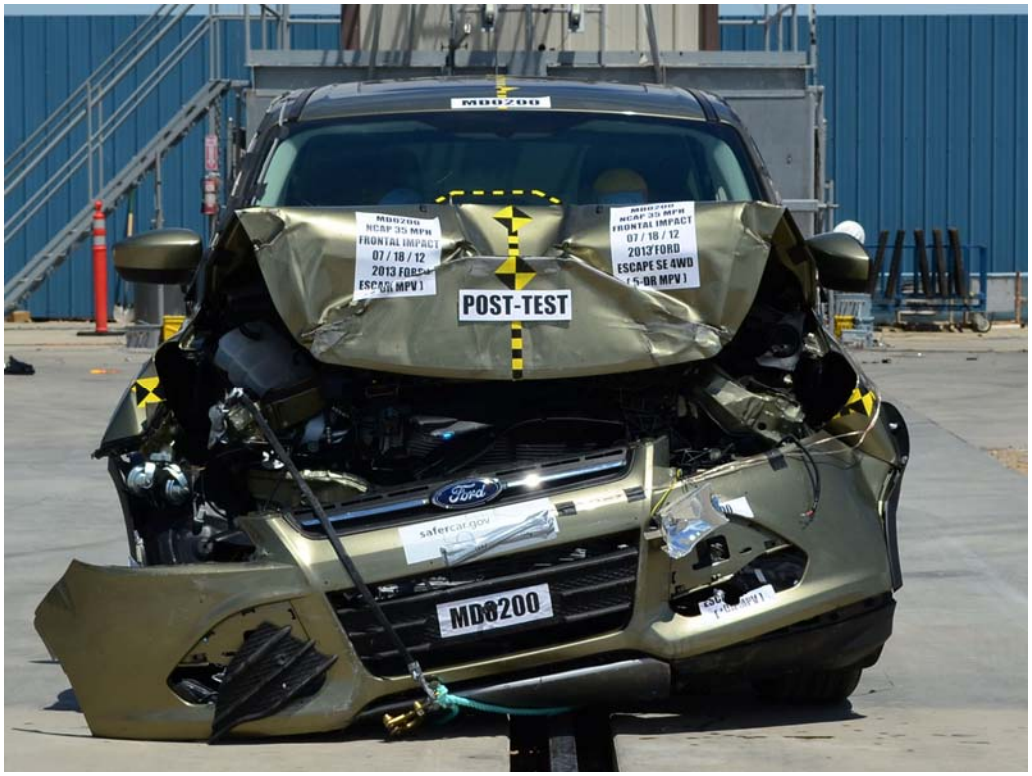


FIGURE 3. Post-Test Front View of NCAP Frontal Impact Test

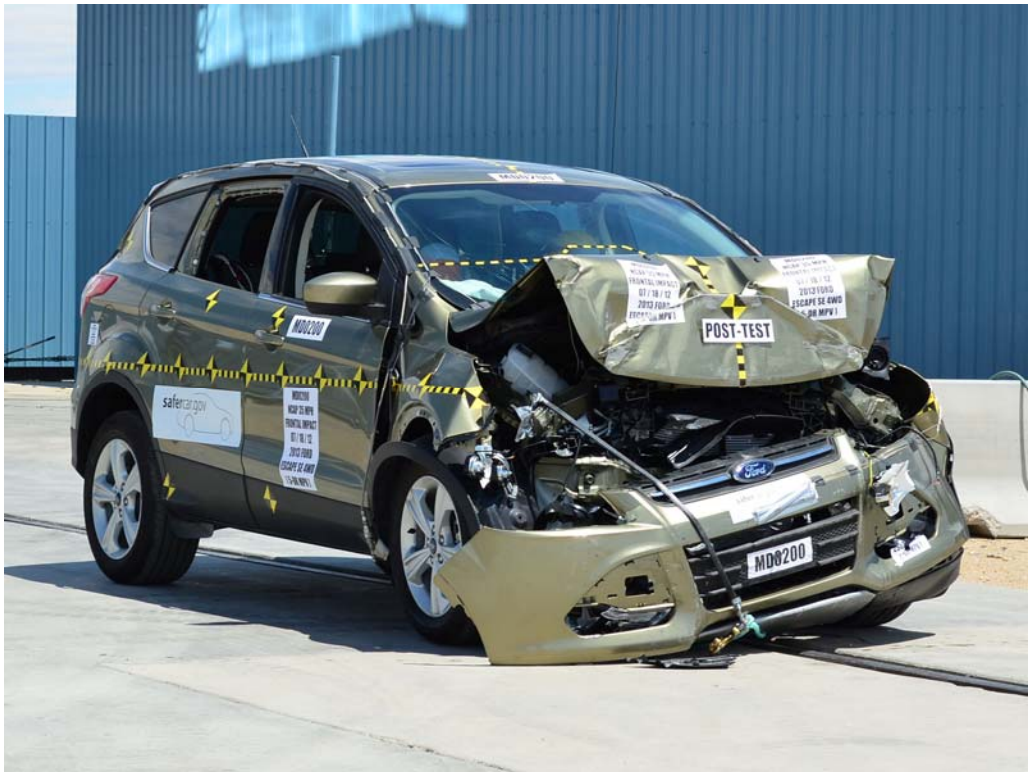


FIGURE 4. Post-Test Right Front ¾ View of NCAP Frontal Impact Test

FIGURE 5. Post-Test Left Front ¾ 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, 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. Post-Test Airbags, Left Side View

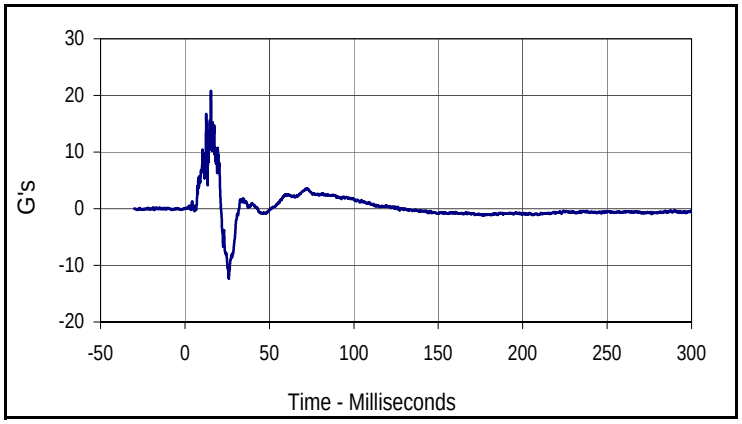
FIGURE 14. Post-Test Airbags, Left Front ¾ View

APPENDIX B

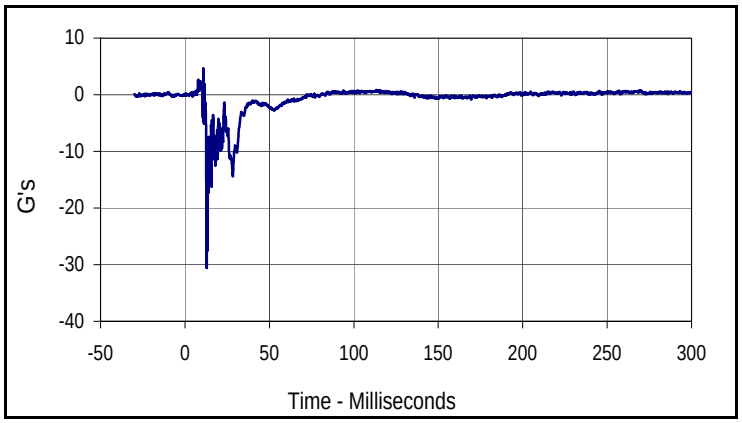
DATA PLOTS

TABLE OF DATAPLOTS

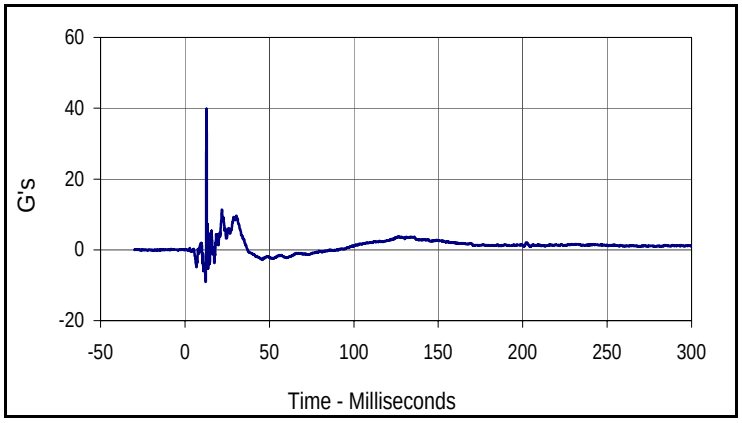
Test Vehicle:	2013 Ford Escape SE AWD 5-Door MPV	Test Date:	1/22/13
Test Program:	TWG 3.3.3.5	NHTSA No.:	MD0200TWG2



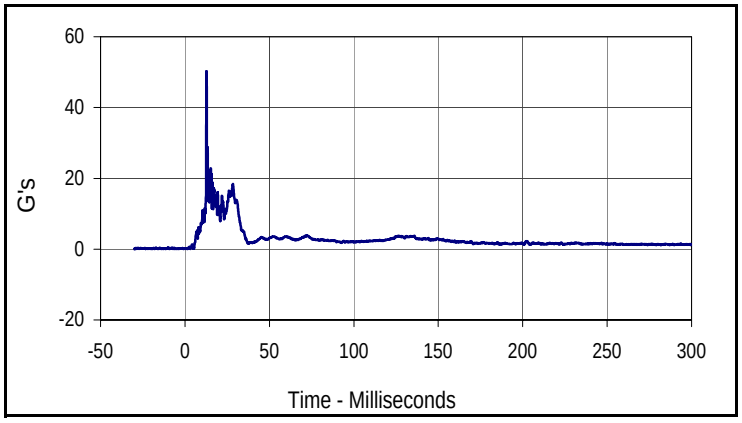
Curve Description			
6 Yr. Old Head X			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
20.7	15.4	-12.3	25.9



Curve Description			
6 Yr. Old Head Y			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.6	10.9	-30.5	12.9

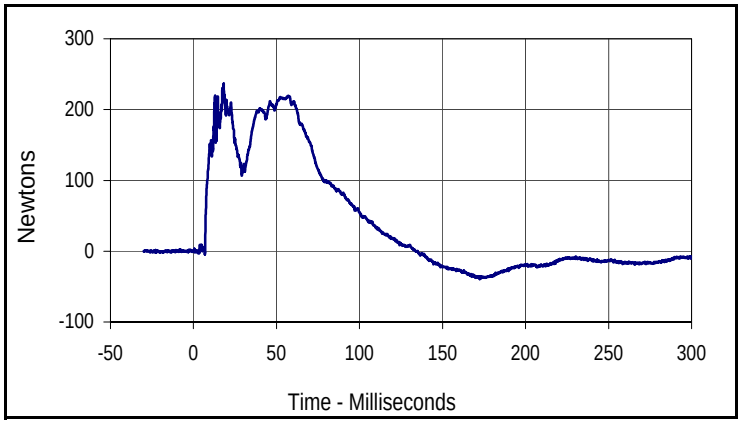


Curve Description			
6 Yr. Old Head Z			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
39.7	12.8	-9.0	12.2

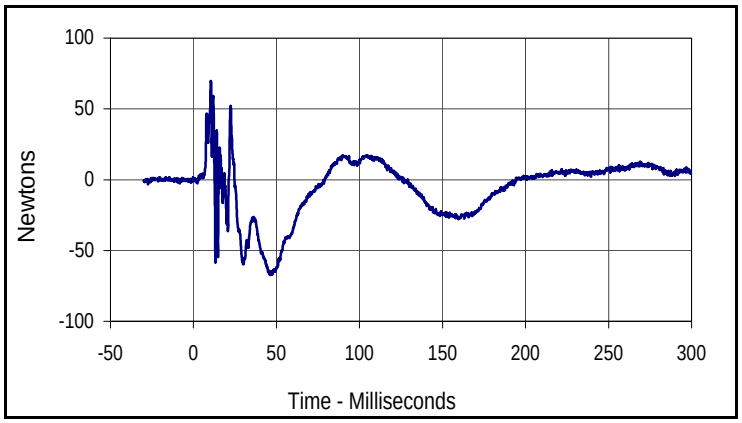


Curve Description			
6 Yr. Old Head Resultant			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
50.3	12.8	0.0	1.3

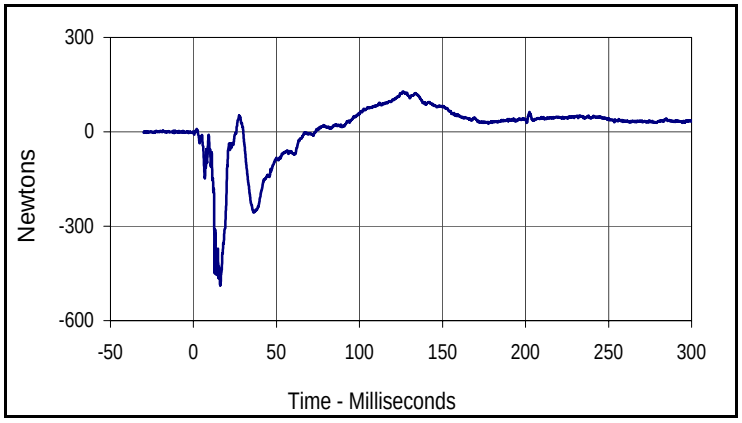
Test Vehicle:	2013 Ford Escape SE AWD 5-Door MPV	Test Date:	1/22/13
Test Program:	TWG 3.3.3.5	NHTSA No.:	MD0200TWG2



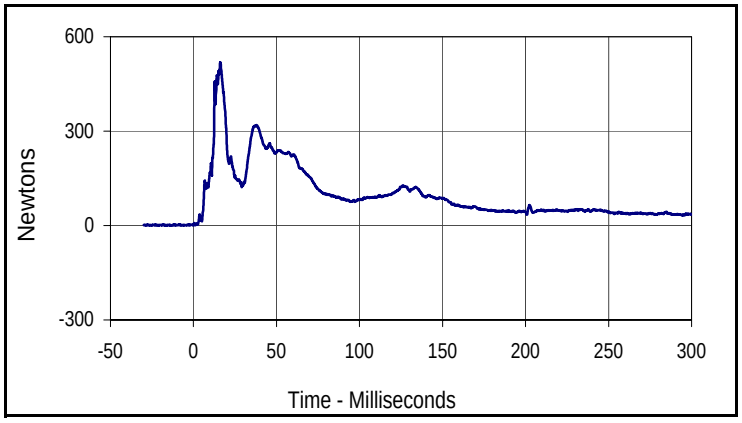
Curve Description			
6 Yr. Old Upper Neck Force X			
Plot No.	Type	SAE Class	Units
005	FIL	1000	Newtons
Max	Time	Min	Time
236.6	18.2	-39.3	172.5



Curve Description			
6 Yr. Old Upper Neck Force Y			
Plot No.	Type	SAE Class	Units
006	FIL	1000	Newtons
Max	Time	Min	Time
69.8	10.4	-67.2	46.0

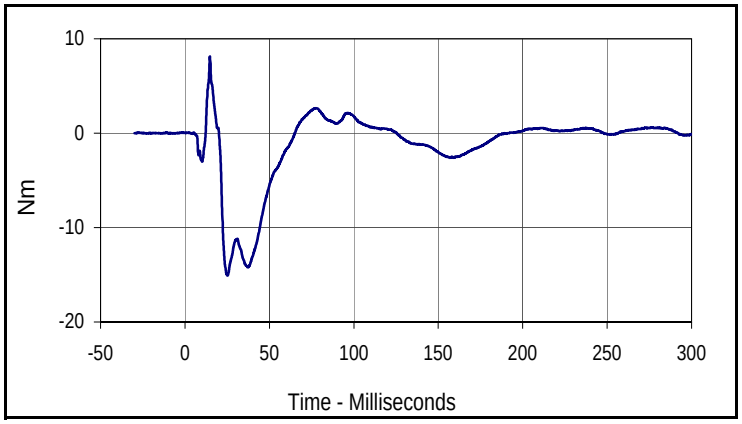


Curve Description			
6 Yr. Old Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
007	FIL	1000	Newtons
Max	Time	Min	Time
128.0	126.1	-488.5	16.2

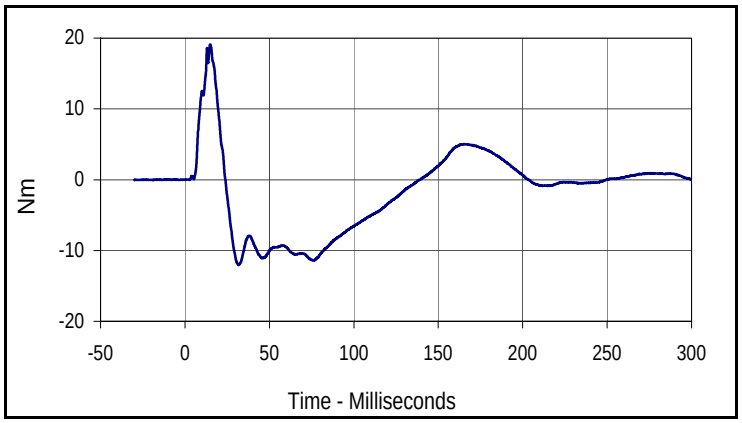


Curve Description			
6 Yr. Old Upper Neck Force Resultant			
Plot No.	Type	SAE Class	Units
008	RES	1000	Newtons
Max	Time	Min	Time
518.7	16.2	1.0	0.0

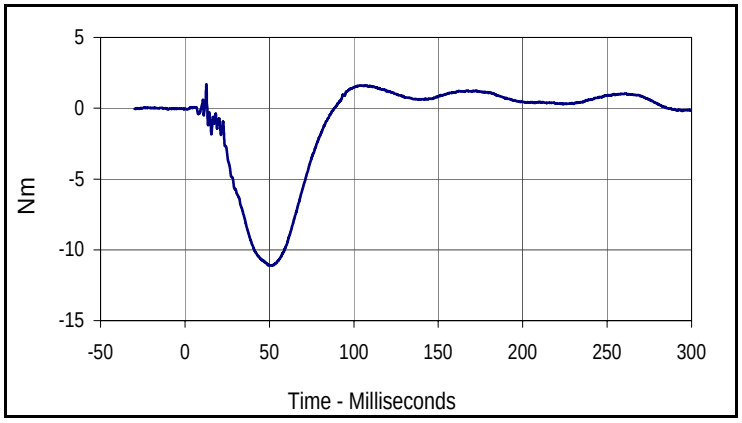
Test Vehicle:	2013 Ford Escape SE AWD 5-Door MPV	Test Date:	1/22/13
Test Program:	TWG 3.3.3.5	NHTSA No.:	MD0200TWG2



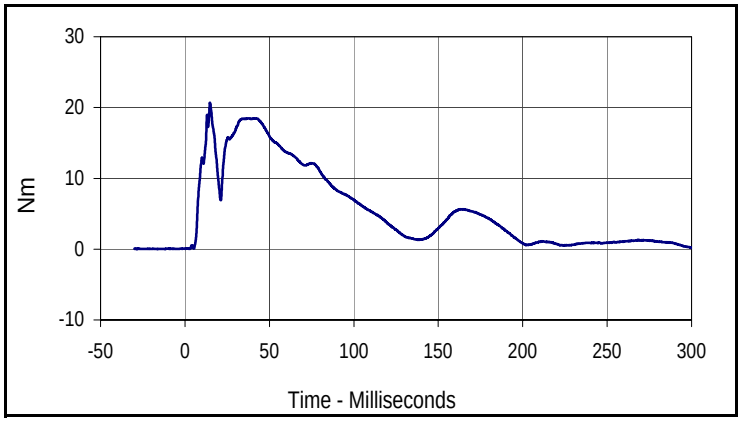
Curve Description			
6 Yr. Old Upper Neck Moment X			
Plot No.	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
8.2	14.8	-15.1	25.2



Curve Description			
6 Yr. Old Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Nm
Max	Time	Min	Time
19.1	14.9	-12.1	31.7

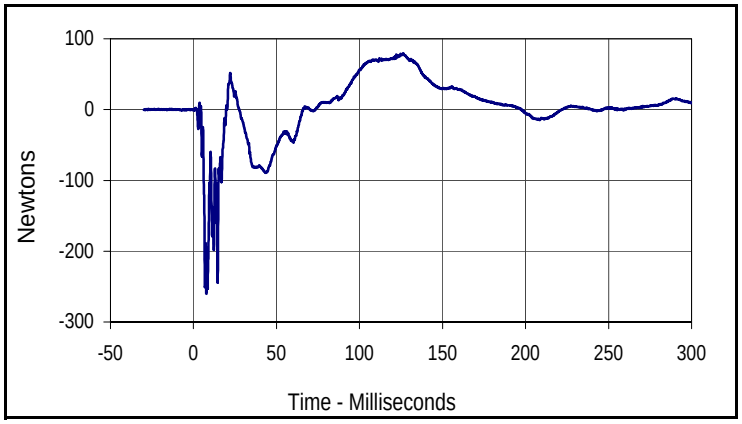


Curve Description			
6 Yr. Old Upper Neck Moment Z			
Plot No.	Type	SAE Class	Units
011	FIL	600	Nm
Max	Time	Min	Time
1.7	12.7	-11.1	51.1

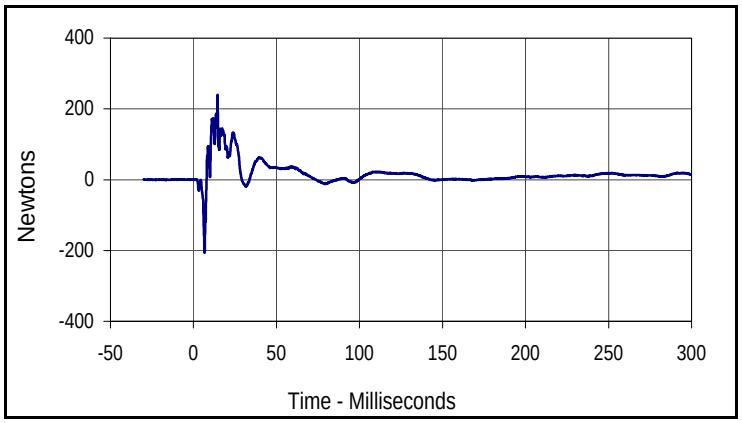


Curve Description			
6 Yr. Old Upper Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
012	RES	600	Nm
Max	Time	Min	Time
20.7	14.8	0.0	2.9

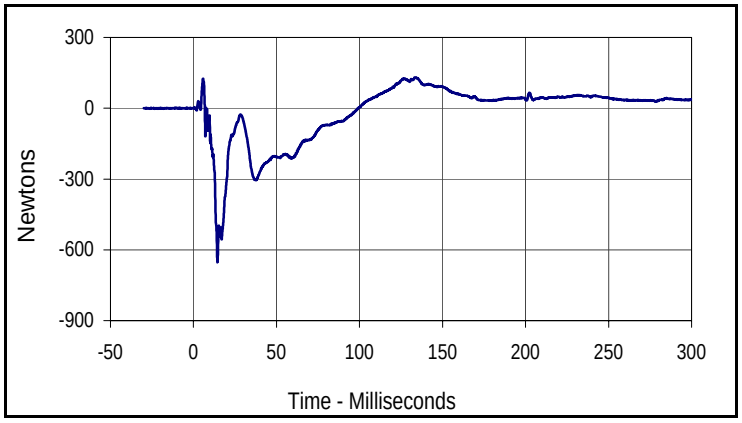
Test Vehicle:	2013 Ford Escape SE AWD 5-Door MPV	Test Date:	1/22/13
Test Program:	TWG 3.3.3.5	NHTSA No.:	MD0200TWG2



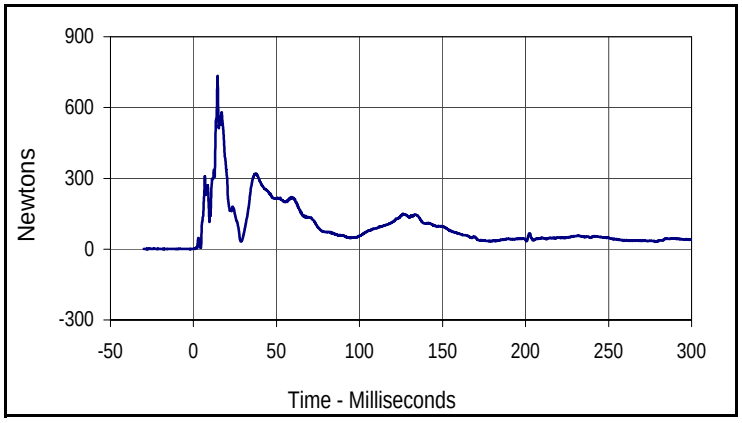
Curve Description			
6 Yr. Old Lower Neck Force X			
Plot No.	Type	SAE Class	Units
013	FIL	1000	Newtons
Max	Time	Min	Time
79.5	126.3	-260.1	7.8



Curve Description			
6 Yr. Old Lower Neck Force Y			
Plot No.	Type	SAE Class	Units
014	FIL	1000	Newtons
Max	Time	Min	Time
239.8	14.5	-206.0	6.7

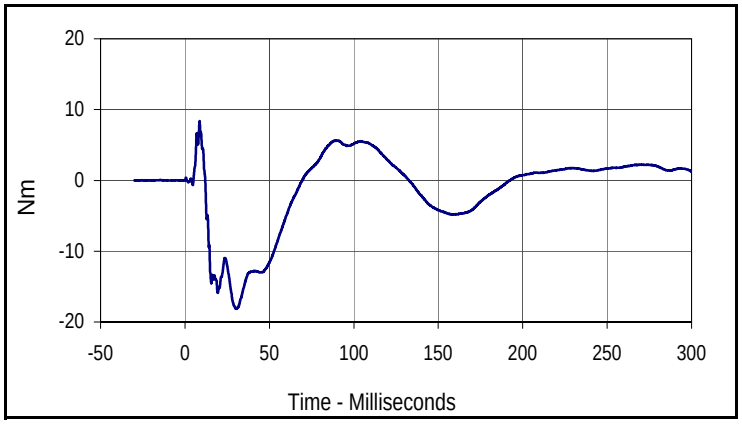


Curve Description			
6 Yr. Old Lower Neck Force Z			
Plot No.	Type	SAE Class	Units
015	FIL	1000	Newtons
Max	Time	Min	Time
130.6	133.4	-653.1	14.4

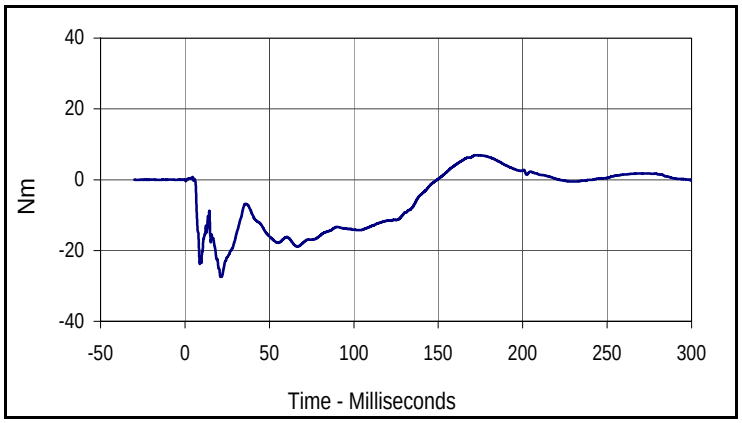


Curve Description			
6 Yr. Old Lower Neck Force Resultant			
Plot No.	Type	SAE Class	Units
016	RES	1000	Newtons
Max	Time	Min	Time
734.9	14.5	0.7	0.1

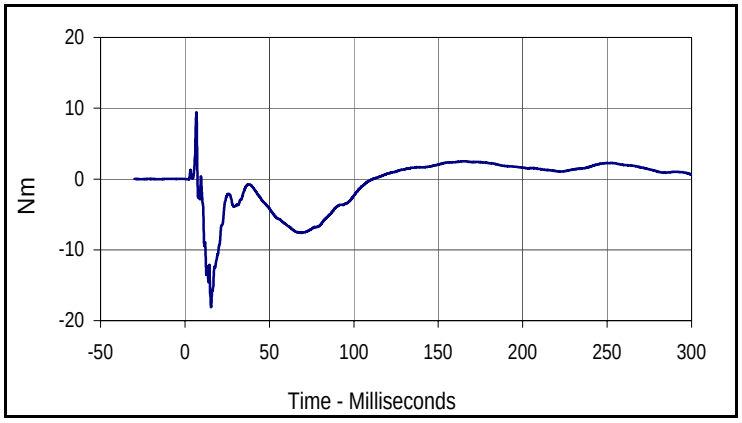
Test Vehicle:	2013 Ford Escape SE AWD 5-Door MPV	Test Date:	1/22/13
Test Program:	TWG 3.3.3.5	NHTSA No.:	MD0200TWG2



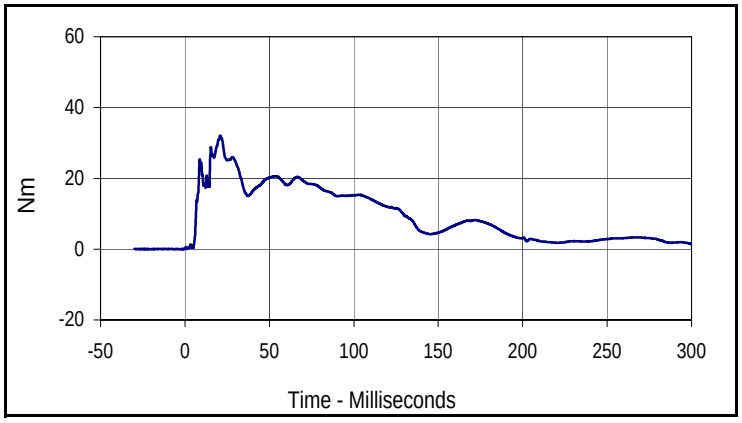
Curve Description			
6 Yr. Old Lower Neck Moment X			
Plot No.	Type	SAE Class	Units
017	FIL	600	Nm
Max	Time	Min	Time
8.4	8.7	-18.1	30.3



Curve Description			
6 Yr. Old Lower Neck Moment Y			
Plot No.	Type	SAE Class	Units
018	FIL	600	Nm
Max	Time	Min	Time
7.0	172.9	-27.4	21.7



Curve Description			
6 Yr. Old Lower Neck Moment Z			
Plot No.	Type	SAE Class	Units
019	FIL	600	Nm
Max	Time	Min	Time
9.4	6.8	-18.1	15.4



Curve Description			
6 Yr. Old Lower Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
020	RES	600	Nm
Max	Time	Min	Time
32.0	20.8	0.0	0.1

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.3.5
Instrumentation Data Channel Assignments
A.T.D. Serial Number 186
1/22/13
2013 Ford Escape SE AWD 5-Door MPV

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

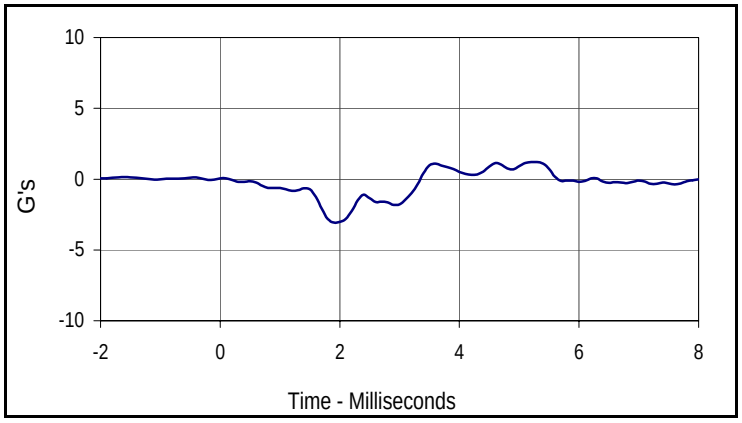
PRE-TEST AND POST-TEST HYBRID III CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

Test Program:	Hybrid III 6 Yr Old Head Drop Test	Test Date:	1/18/13
ATD Serial No.:	186	Test I.D.:	186HD020

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Peak Resultant Acceleration	G's	245.0 to 300.0	282.4	Pass
Peak Lateral Acceleration	G's	≤15.0	3.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass

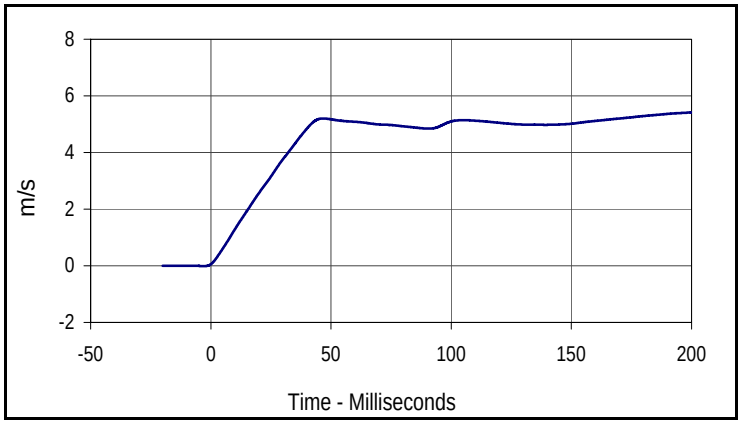
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
282.4	2.0	0.2	0.0



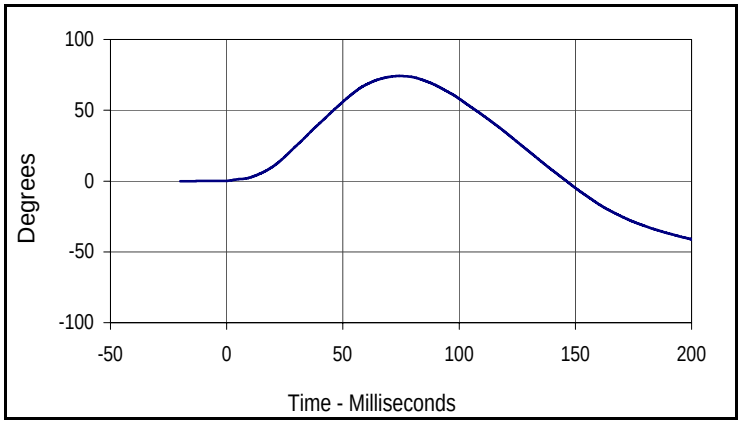
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.2	5.2	-3.1	1.9

Test Program:	Hybrid III 6 Yr Old Neck Flexion Test	Test Date:	1/18/13
ATD Serial No.:	186	Test I.D.:	186NF020

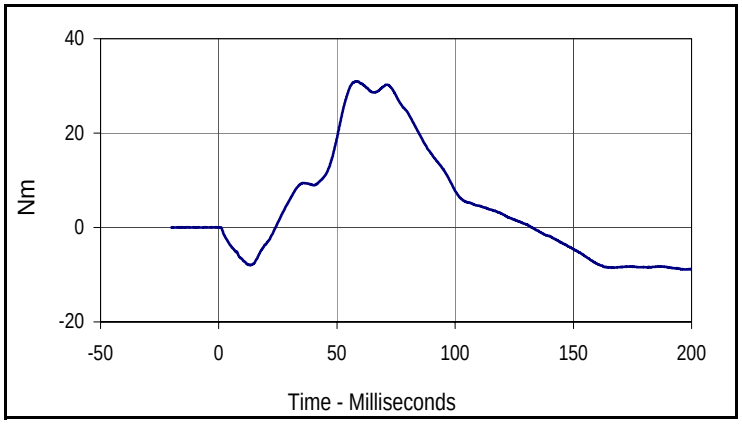
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	4.83 to 5.07	4.96	Pass
Pendulum Deceleration	10 Msec.	m/s	1.2 to 1.6	1.3	Pass
	20 Msec.	m/s	2.4 to 3.4	2.6	Pass
	30 Msec.	m/s	3.8 to 5.0	3.8	Pass
"D" Plane Rotation	Max	Degrees	74.0 to 92.0	74.2	Pass
Peak Moment in Rotation	Max	Nm	27.0 to 33.0	30.1	Pass
Positive Moment Decay, Time To 5 Nm		Msec.	103.0 to 123.0	107.5	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.4	200.0	0.0	-2.8



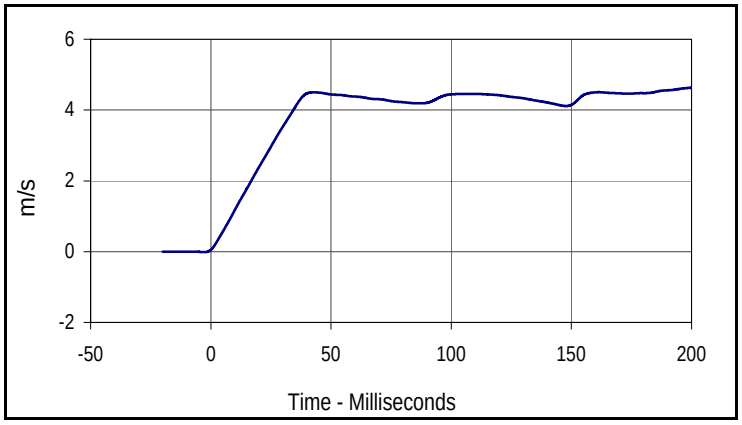
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
74.2	74.3	-41.1	200.0



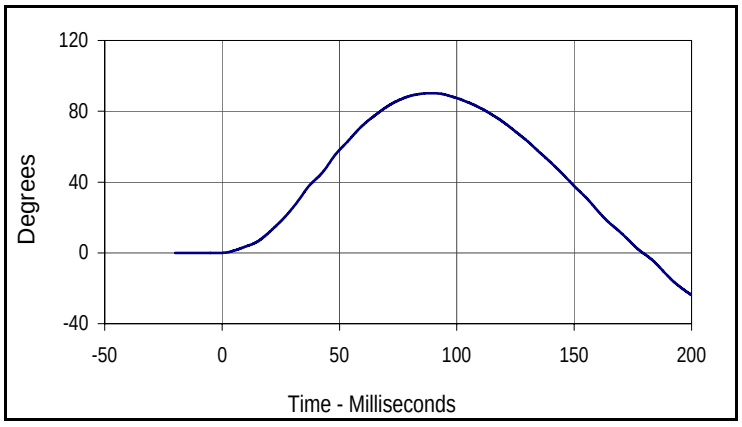
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
31.0	58.3	-8.9	197.9

Test Program:	Hybrid III 6 Yr Old Neck Extension Test	Test Date:	1/18/13
ATD Serial No.:	186	Test I.D.:	186NE020

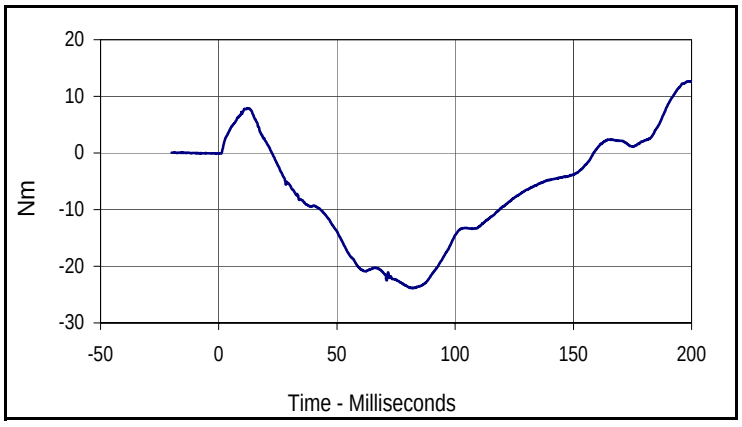
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	26	Pass
Pendulum Velocity		m/s	4.18 to 4.42	4.29	Pass
Pendulum Deceleration	10 Msec.	m/s	1.0 to 1.4	1.2	Pass
	20 Msec.	m/s	2.2 to 3.0	2.4	Pass
	30 Msec.	m/s	3.2 to 4.2	3.5	Pass
"D" Plane Rotation	Max	Degrees	85.0 to 103.0	90.2	Pass
Peak Moment in Rotation	Max	Nm	-24.0 to -19.0	-23.9	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
4.6	200.0	0.0	-2.8



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
90.2	89.0	-23.8	200.0



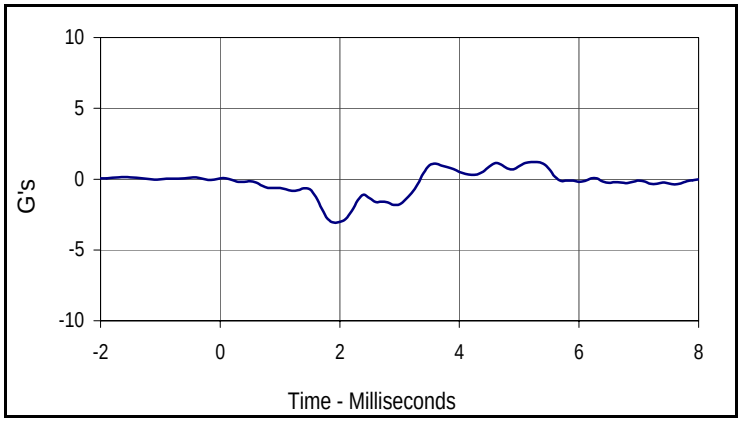
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
12.7	199.1	-23.9	82.0

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

Test Program:	Hybrid III 6 Yr Old Head Drop Test	Test Date:	1/22/13
ATD Serial No.:	186	Test I.D.:	186HD013

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Peak Resultant Acceleration	G's	245.0 to 300.0	282.4	Pass
Peak Lateral Acceleration	G's	≤15.0	3.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass

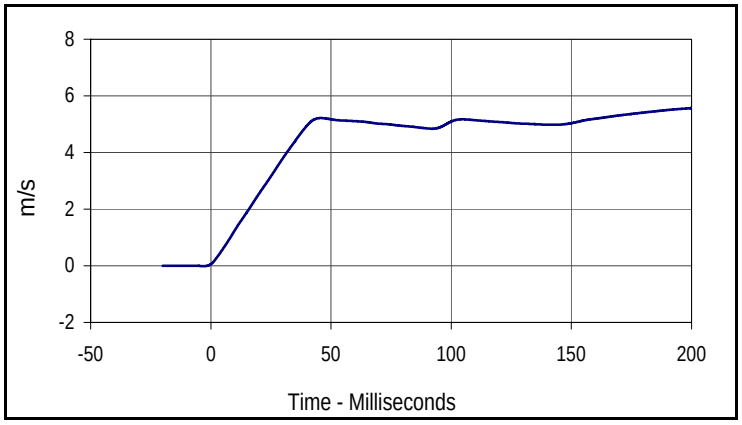
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
282.4	2.0	0.2	0.0



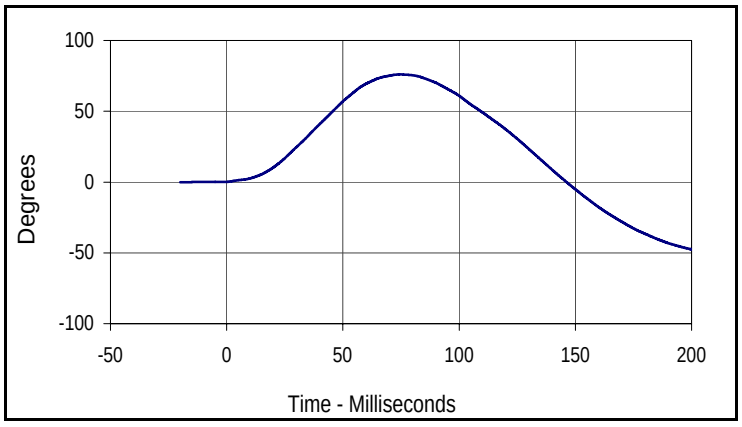
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.2	5.2	-3.1	1.9

Test Program:	Hybrid III 6 Yr Old Neck Flexion Test	Test Date:	1/22/13
ATD Serial No.:	186	Test I.D.:	186NF021

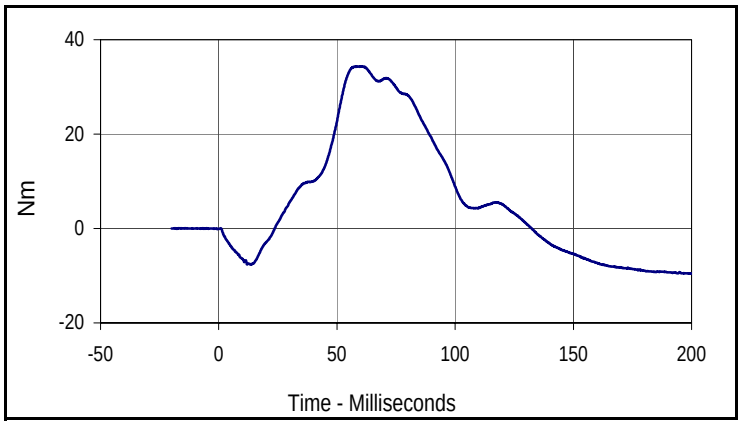
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	26	Pass
Pendulum Velocity		m/s	4.83 to 5.07	4.97	Pass
Pendulum Deceleration	10 Msec.	m/s	1.2 to 1.6	1.3	Pass
	20 Msec.	m/s	2.4 to 3.4	2.5	Pass
	30 Msec.	m/s	3.8 to 5.0	3.8	Pass
"D" Plane Rotation	Max	Degrees	74.0 to 92.0	76.0	Pass
Peak Moment in Rotation	Max	Nm	27.0 to 33.0	31.9	Pass
Positive Moment Decay, Time To 5 Nm		Msec.	103.0 to 123.0	104.3	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.6	200.0	0.0	-2.9



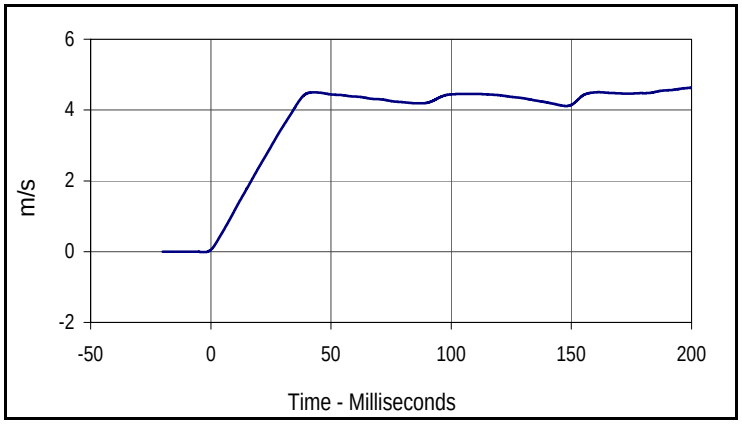
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
76.0	74.5	-47.6	200.0



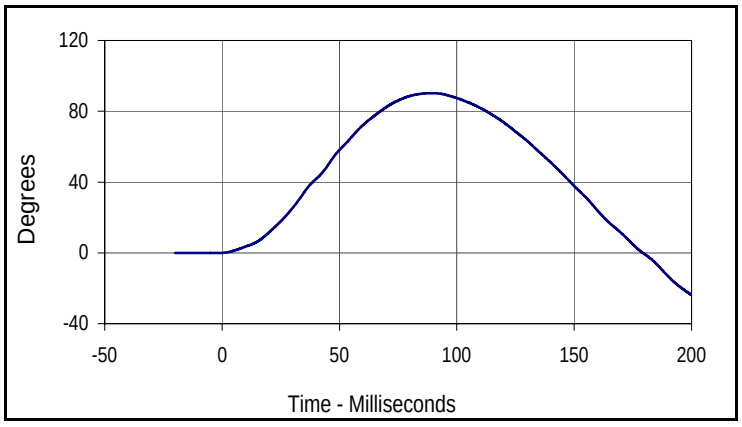
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
34.4	58.5	-9.6	199.7

Test Program:	Hybrid III 6 Yr Old Neck Extension Test	Test Date:	1/22/13
ATD Serial No.:	186	Test I.D.:	186NE013

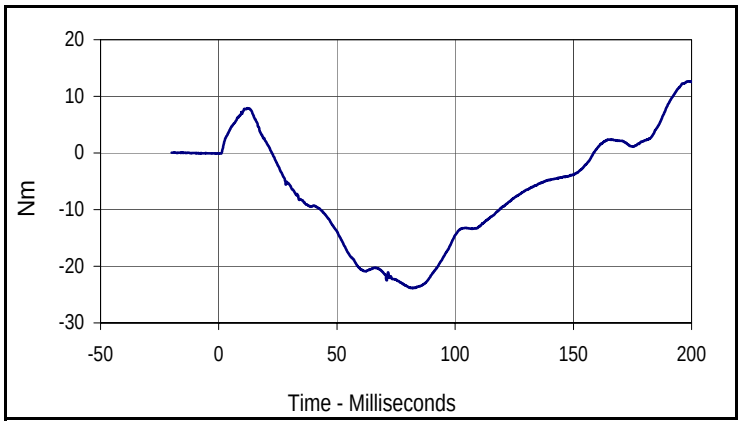
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	26	Pass
Pendulum Velocity		m/s	4.18 to 4.42	4.29	Pass
Pendulum Deceleration	10 Msec.	m/s	1.0 to 1.4	1.2	Pass
	20 Msec.	m/s	2.2 to 3.0	2.4	Pass
	30 Msec.	m/s	3.2 to 4.2	3.5	Pass
"D" Plane Rotation	Max	Degrees	85.0 to 103.0	90.2	Pass
Peak Moment in Rotation	Max	Nm	-24.0 to -19.0	-23.9	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
4.6	200.0	0.0	-2.8



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
90.2	89.0	-23.8	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
12.7	199.1	-23.9	82.0