

REPORT NUMBER: TWG-KAR-17-004

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

**FORD MOTOR CO.
2017 FORD FOCUS RS 5-DOOR HATCHBACK**

NHTSA NUMBER: M20170210TWG2

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AUGUST 10, 2017


FINAL REPORT

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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 DTNH22-13-D-00311L.

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16. Abstract A side airbag out of position test was conducted on the subject 2017 Ford Focus RS 5-door hatchback in accordance with the specifications of the Office of Crashworthiness Standards SAB OOP NCAP Laboratory Test Procedure for the generation of consumer information on vehicle side airbag protection. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on July 27, 2017. The curtain and torso/pelvis side airbags were deployed and responses were measured on a Hybrid III 6-year old child dummy. Three high speed cameras recorded the event. The ambient temperature at the time of airbag deployment was 21.7°C <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th colspan="4" style="text-align: center;">Section 3.3.5.1 - HIII 6-Year Old Child Dummy - P2</th> </tr> <tr> <th style="width: 30%;">Measurement Description</th> <th style="width: 10%;">Units</th> <th style="width: 20%;">IARV</th> <th style="width: 40%;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td style="text-align: center;">723</td> <td style="text-align: center;">57.5</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0.84</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td style="text-align: center;">1490</td> <td style="text-align: center;">515.2</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td style="text-align: center;">1820</td> <td style="text-align: center;">-995.1</td> </tr> </tbody> </table>				Section 3.3.5.1 - HIII 6-Year Old Child Dummy - P2				Measurement Description	Units	IARV	Result	Head Injury Criteria (HIC ₁₅)	N/A	723	57.5	Nij	N/A	1	0.84	Neck Tension	N	1490	515.2	Neck Compression	N	1820	-995.1
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17. Key Words New Car Assessment Program (NCAP) Side Airbag Out-of-position Technical Working Group (TWG)		18. Distribution Statement Copies of this report are available from the following: National Highway Traffic Safety Administration Technical Information Services 1200 New Jersey Ave, SE Washington, DC 20590 Email: tis@nhtsa.dot.gov FAX: 202-493-2833																									
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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. DTNH22-13-D-00311L. 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 2017 Ford Focus RS 5-door hatchback with an out-of-position 6-year old dummy were evaluated. The test was performed at KARCO Engineering, LLC. on July 27, 2017. 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.

The airbags were deployed and fifteen (15) channels of data were recorded using a 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 inboard. The seat is set at the 16th detent (110 mm) from the full forward position and full down. The was seat was set in the full down position due to the seat lacking a height adjustment. The dummy is placed on the foam block facing inboard with its legs extended. With the dummy's head in its neutral orientation, the dummy's pelvis was slid outboard until the dummy's back contacted the door trim. The center of gravity of the head was centered in the deployment trajectory of the airbag. The shoulder bolts of the dummy were parallel to the vehicle centerline. The dummy's arms were bent at the elbow until the fingers just touched the booster seat. 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 and torso/pelvis airbag and the dashboard. The ATD's torso contacted the curtain and torso/pelvis airbags and the dashboard.

The occupant data is summarized below:

Measurement Description	Passenger ATD (HIII 6YO)	
	IARV	Result
Head Injury Criteria (HIC15)	723	57.5
T ¹		12.0
T ²		27.0
Average g		27.1
Upper Neck		
Nij	1	0.84
Tension (N)	1490	515.2
Compression (N)	1820	-995.1

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback NHTSA No.: M20170210TWG2

Test Program: TWG 3.3.5.1 Test Date: 07/27/17

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: 2017 Ford Focus RS 5-Door Hatchback NHTSA No.: M20170210TWG2

Test Program: TWG 3.3.5.1 Test Date: 07/27/17

TEST DUMMY INFORMATION

Description	Passenger Seat
Dummy Type / Serial No.	HIII 6YO / 186
Head Contact	Curtain & Torso/Pelvis Airbag, Dashboard
Chest Contact	Curtain & Torso/Pelvis Airbag, Dashboard
Abdomen Contact	None
Pelvis Contact	None
Left Knee Contact	None
Right Knee Contact	None

VIDEO COVERAGE

Description	Quantity
High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

Description	Quantity
Head CG Accelerometers	3
Upper Neck Load Cell	6
Lower Neck Load Cell	6
Total	15

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback NHTSA No.: M20170210TWG2
 Test Program: TWG 3.3.5.1 Test Date: 07/27/17

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20170210TWG2
Model Year	2017
Make	Ford
Model	Focus RS
Body Style	5-Door Hatchback
VIN	WF0DP3TH5H4120572
Body Color	Stealth Gray
Odometer Reading (km / mi)	227 / 141
Engine Displacement (L)	2.3
Type / No. of Cylinders	4 Cylinder
Engine Placement	Transverse
Transmission Type	Manual
Transmission Speeds	6
Overdrive	Yes
Final Drive	AWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
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	No
Driver Torso/Pelvis Airbag	Yes
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? No

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Co.
Date of Manufacture	Nov-16
Vehicle Type	Passenger Car

GVWR (kg)	1978
GAWR Front (kg)	1070
GAWR Rear (kg)	960

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

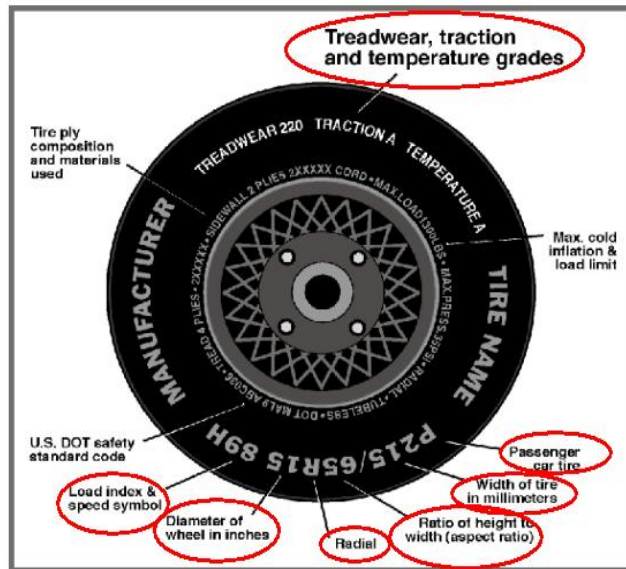
Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Bench			
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				375.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				34.8	A-B

*Vehicle underwent New Car Assessment Program Frontal Impact Testing on April 4, 2017.

DATA SHEET NO. 2 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback NHTSA No.: M20170210TWG2
 Test Program: TWG 3.3.5.1 Test Date: 07/27/17



VEHICLE TIRE INFORMATION

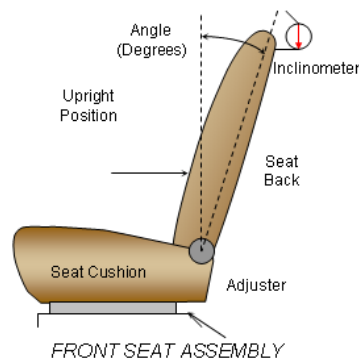
Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	340	340
Cold Pressure (kPa)	320	320
Recommended Tire Size	P235/35R19	P235/35R19
Tire Size on Vehicle	P235/35R19	P235/35R19
Tire Manufacturer	Michelin	Michelin
Tire Model	Pilot Super Sport	Pilot Super Sport
Treadware	300	300
Traction Grade	AA	AA
Temperature 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	91Y	91Y
Tire Material	Polyester, Steel, Polyamide	Polyester, Steel, Polyamide
DOT Safety Code Left	6U17 00KX 4516	6U17 00KX 4516
DOT Safety Code Right	6U17 00KX 4516	6U17 00KX 4516

DATA SHEET NO. 3
SEAT ADJUSTMENTS

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback NHTSA No.: M20170210TWG2
 Test Program: TWG 3.3.5.1 Test Date: 07/27/17

SEAT BACK ANGLE

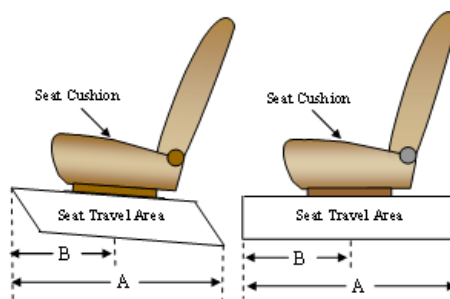
The passenger seat back is positioned per section 3.3.5.1 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. Seat back angle is measured at the headrest post.



Seating Position	Degrees
Passenger Seat	5.9

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	247	36	110	16

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” and “M2”. Position “L” is the lowermost position.

Seating Position	Total No. of Positions	Placed in Position
Passenger Seat	4	H

SEAT HEIGHT POSITIONING

The passenger seat height is set to the position described in section 3.3.5.1 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. For this test the height of the passenger seat was not adjustable.

DATA SHEET NO. 4

DUMMY POSITIONING AND AIRBAG DIMENSIONS

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback NHTSA No.: M20170210TWG2
 Test Program: TWG 3.3.5.1 Test Date: 07/27/17

DUMMY POSITIONING

Code	Measurement Description	Passenger	
		Length (mm)	Angle (°)
SA	Seat Back Angle		5.9
AN	Top of Airbag Module to Head/Neck Junction	217	90.0
HD	Head CG to Door Panel/ Window	127	0.0
HSC	Head to Seat Back Centerline	187	0.0
HB	Head to B-Pillar (first contact)	215	0.0
HZ	Head to Roof (Z)	274	90.0
HHD	Head to Header (measured from back of head)	435	30.3
ND	Nose to Dash	603	25.9
NS	Nose to Seat Back	185	0.0
NR	Nose to Header	434	30.6
CD	Chest to Dash	458	17.0
CS	Chest to Seat Back	173	0.0
RACL	Right Arm to Seat Back	440	0.0
LACL	Left Arm to Seat Back	291	0.0
RA	Right Arm to Door Panel	87	0.0
LA	Left Arm to Door Panel	65	0.0
KK	Knee to Knee	95	0.0
TT	Toe to Toe	85	0.0
KSCR	Right Knee to Seat Cushion Centerline	47	0.0
KSCL	Left Knee to Seat Cushion Centerline	47	0.0
	Head Level (X Direction)		12.3
	Head Level (Y Direction)		24.3

AIRBAG DIMENSIONS

Code	Measurement Description	Airbag
		Length (mm)
AMW	Curtain Airbag Module Diameter	30
AML	Curtain Airbag Module Length	300
ABL	Curtain Airbag Length	1700
ABW	Curtain Airbag Width	450
AMW	Torso/Pelvis Airbag Module Diameter	25
AML	Torso/Pelvis Airbag Module Length	125
ABW	Torso/Pelvis Airbag Length	660
ABL	Torso/Pelvis Airbag Width	320

DATA SHEET NO. 5

DUMMY INJURY CRITERIA AND PERFORMANCE DATA

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback NHTSA No.: M20170210TWG2
 Test Program: TWG 3.3.5.1 Test Date: 07/27/17

HEAD PEAK ACCELERATIONS

Location	Axis	Units	6 Yr. Old			
			Max	Time	Min	Time
Head CG	X	g	58.4	12.7	-28.3	13.0
Head CG	Y	g	24.5	47.6	-28.3	13.1
Head CG	Z	g	106.3	12.3	-33.3	12.7
Head CG Resultant	N/A	g	106.9	12.3		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	6 Yr. Old			
			Max	Time	Min	Time
Neck Force	X	N	270.4	54.8	-138.6	25.6
Neck Force	Y	N	824.8	36.0	-107.9	118.1
Neck Force	Z	N	515.2	49.2	-995.1	28.6
Neck Force Resultant	N/A	N	1268.1	28.6		
Neck Moment	X	Nm	50.9	49.5	-19.4	11.4
Neck Moment	Y	Nm	21.4	17.7	-26.0	42.2
Neck Moment	Z	Nm	10.9	19.3	-11.9	44.1
Neck Moment Resultant	N/A	Nm	51.5	49.3		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	6 Yr. Old			
			Max	Time	Min	Time
Neck Force	X	N	276.0	18.7	-346.1	40.3
Neck Force	Y	N	464.0	9.5	-313.1	32.9
Neck Force	Z	N	152.0	90.2	-1038.3	29.3
Neck Force Resultant	N/A	N	1077.5	29.4		
Neck Moment	X	Nm	81.8	49.1	-24.6	118.0
Neck Moment	Y	Nm	32.0	29.7	-23.3	49.5
Neck Moment	Z	Nm	19.6	10.6	-37.1	44.3
Neck Moment Resultant	N/A	Nm	87.2	49.2		

HEAD INJURY CRITERIA (HIC 15)

Location	6 Yr. Old			
	HIC15	T ¹	T ²	Avg g
Head CG	57.5	12.0	27.0	27.1

UPPER NECK NIJ VALUES

Location	6 Yr. Old			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.10	0.59	0.51	0.84

DATA SHEET NO. 6

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback NHTSA No.: M20170210TWG2
Test Program: TWG 3.3.5.1 Test Date: 07/27/17

CAMERA LOCATIONS

Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
	X	Y	Z			
High Speed Front View	2300	-950	-1320	0.7	35	1000
High Speed 3/4 View	1950	-1800	-1370	1.9	35	1000
High Speed Left Side View	-96	-2690	-1150	1.4	20	1000
Real Time	-96	-2690	-1270	1.4	20	60

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

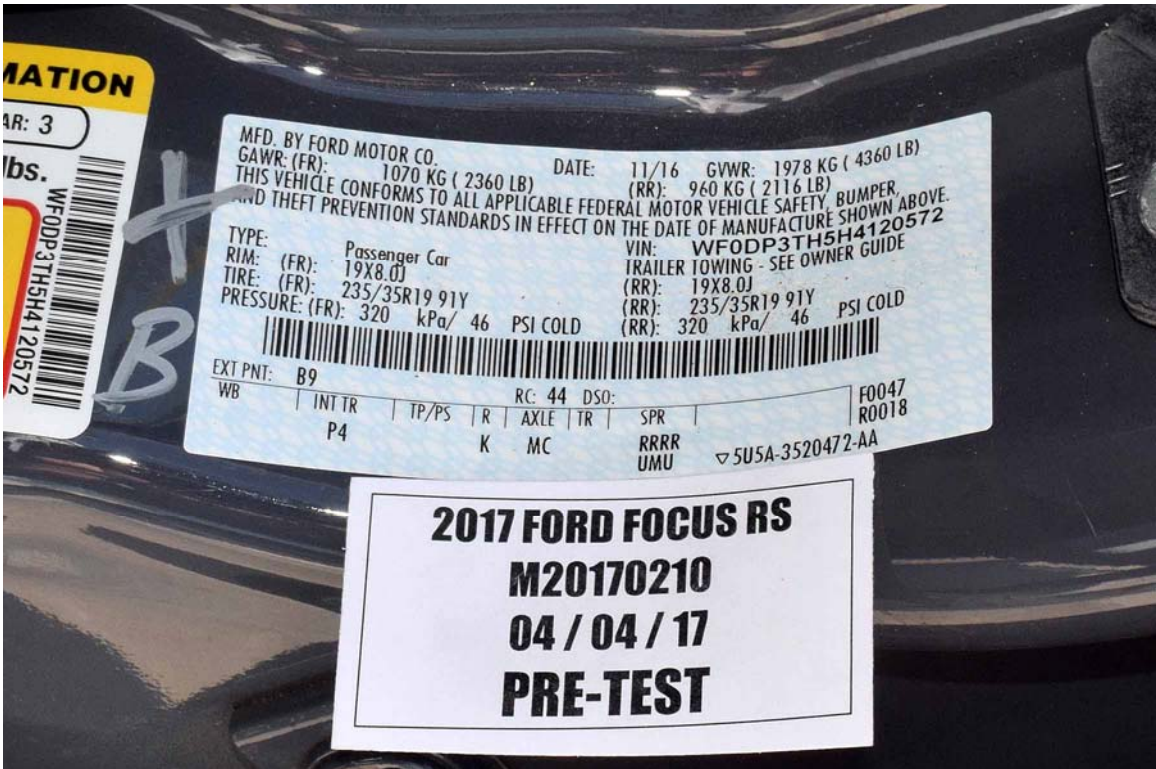


FIGURE 2. Vehicle Certification Label



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



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



FIGURE 5. Post-Test Right Front 3/4 View of NCAP Frontal Impact Test

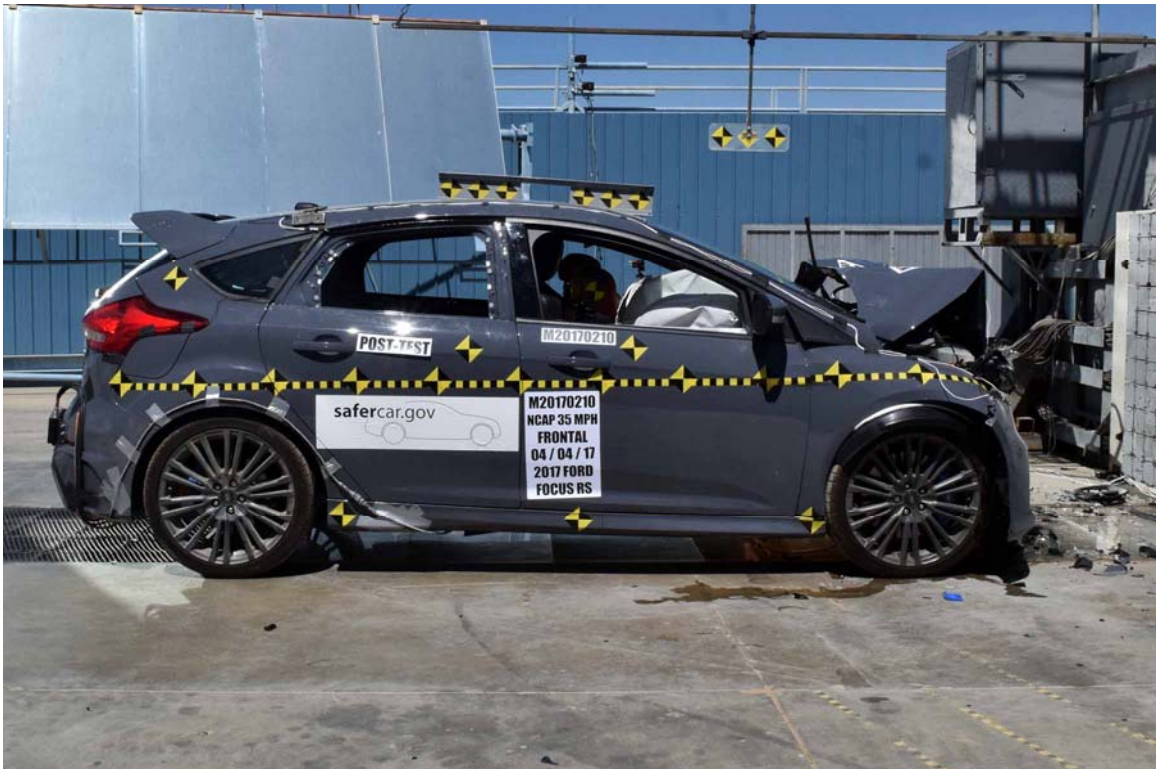


FIGURE 6. Post-Test Right Side View of NCAP Frontal Impact Test



FIGURE 7. Pre-Test Dummy Position, Left View



FIGURE 8. Post-Test Dummy Position, Left 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 3/4 View

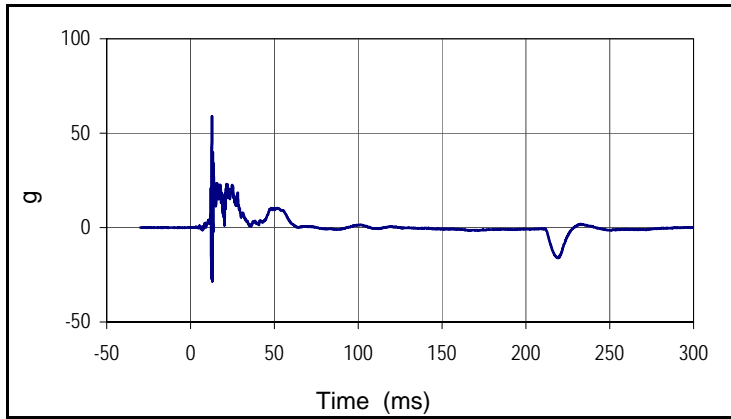
APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

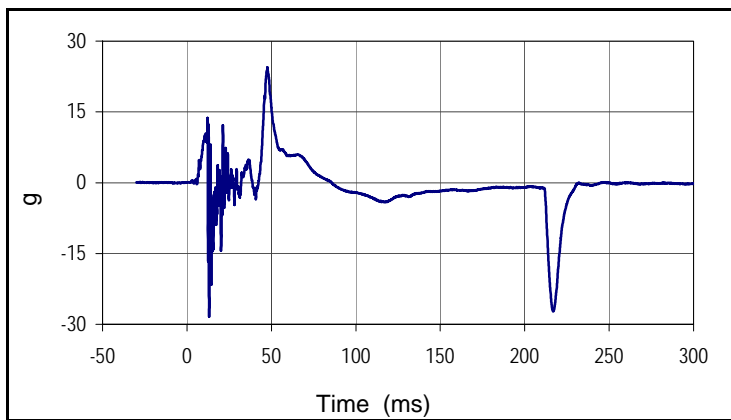
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18	6 Yr. Old Lower Neck Moment Y	B-5
19	6 Yr. Old Lower Neck Moment Z	B-5
20	6 Yr. Old Lower Neck Moment Resultant	B-5

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback
 Test Program: TWG 3.3.5.1

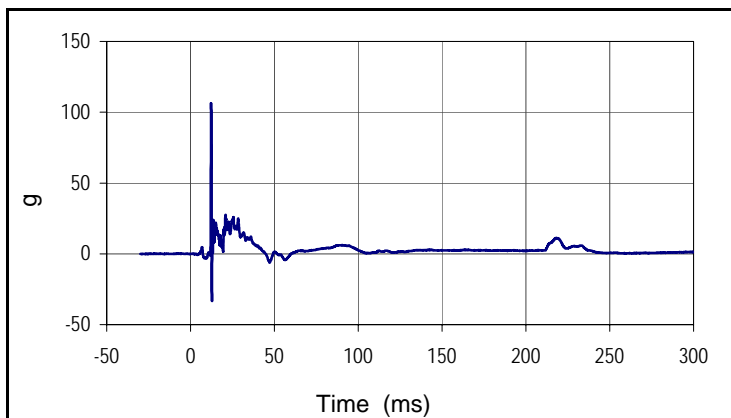
Test Date: 7/27/17
 NHTSA No.: M20170210TWG2



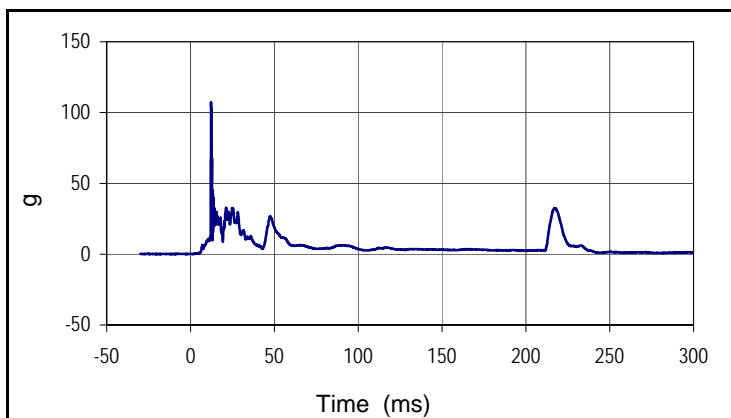
Curve Description			
6 Yr. Old Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
58.4	12.7	-28.3	13.0



Curve Description			
6 Yr. Old Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
24.5	47.6	-28.3	13.1



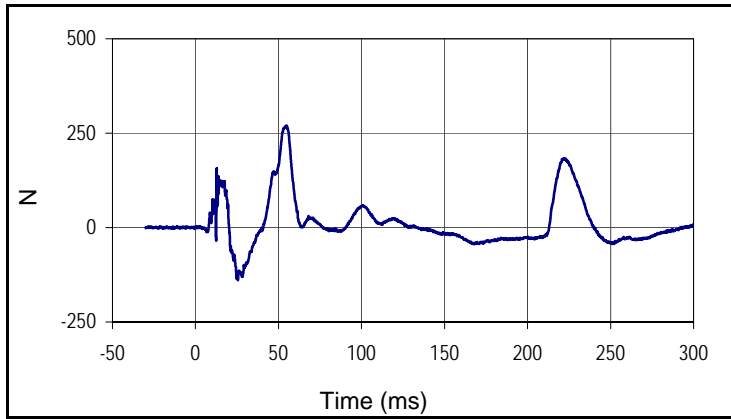
Curve Description			
6 Yr. Old Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
106.3	12.3	-33.3	12.7



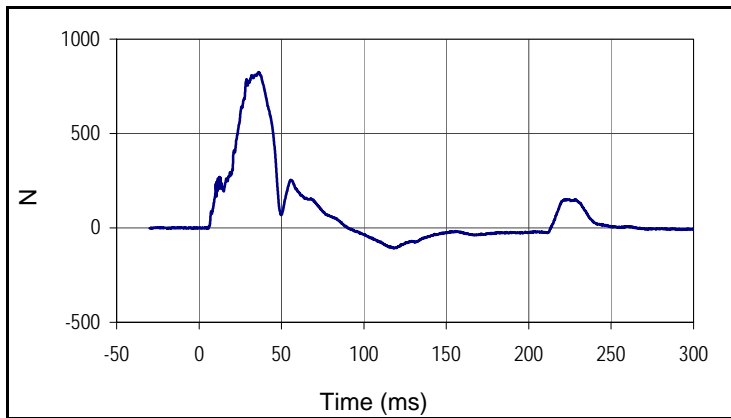
Curve Description			
6 Yr. Old Head Acceleration Primary Resultant			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
106.9	12.3	0.0	1.7

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback
 Test Program: TWG 3.3.5.1

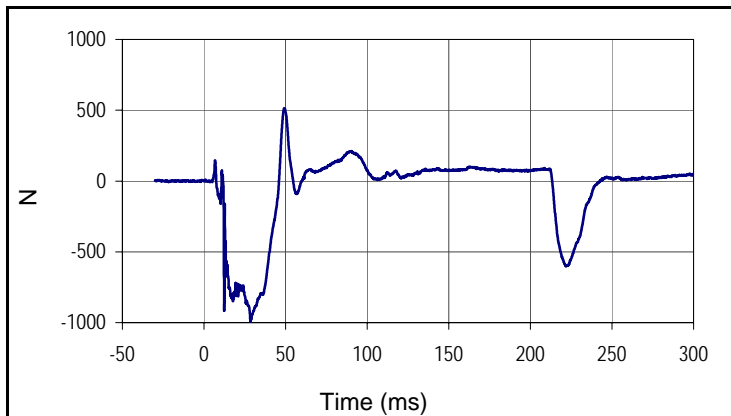
Test Date: 7/27/17
 NHTSA No.: M20170210TWG2



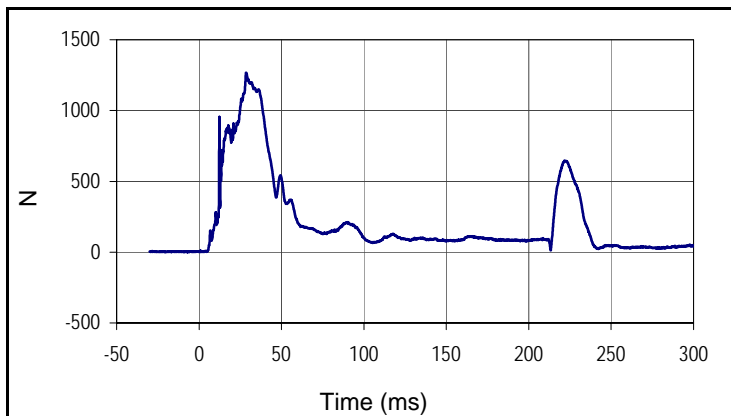
Curve Description			
6 Yr. Old Upper Neck Force X			
Plot No.		SAE Class	Units
005		1000	N
Max	Time	Min	Time
270.4	54.8	-138.6	25.6



Curve Description			
6 Yr. Old Upper Neck Force Y			
Plot No.		SAE Class	Units
006		1000	N
Max	Time	Min	Time
824.8	36.0	-107.9	118.1



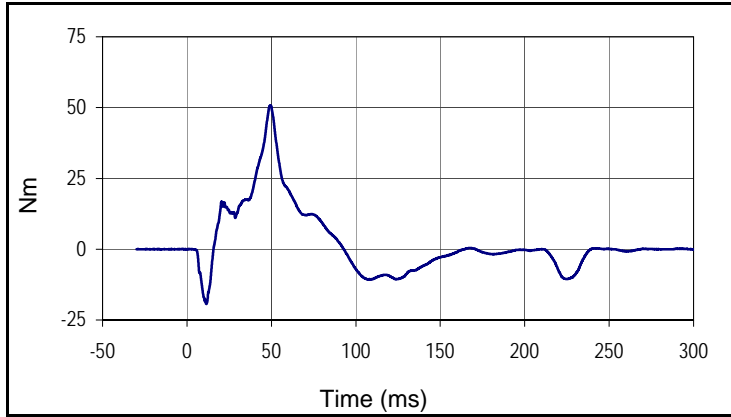
Curve Description			
6 Yr. Old Upper Neck Force Z			
Plot No.		SAE Class	Units
007		1000	N
Max	Time	Min	Time
515.2	49.2	-995.1	28.6



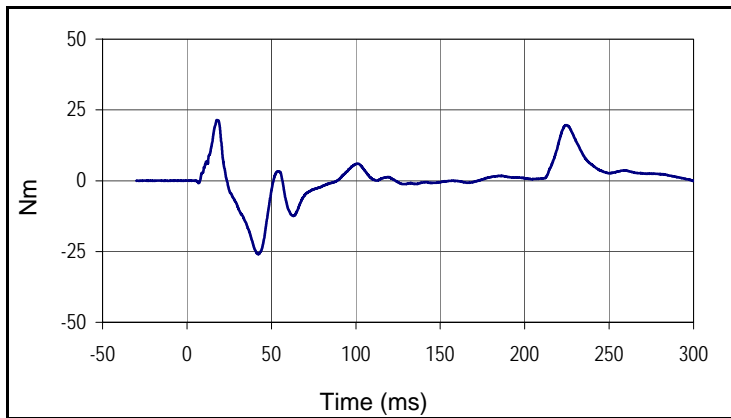
Curve Description			
6 Yr. Old Upper Neck Force Resultant			
Plot No.		SAE Class	Units
008		1000	N
Max	Time	Min	Time
1268.1	28.6	1.1	0.3

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback
 Test Program: TWG 3.3.5.1

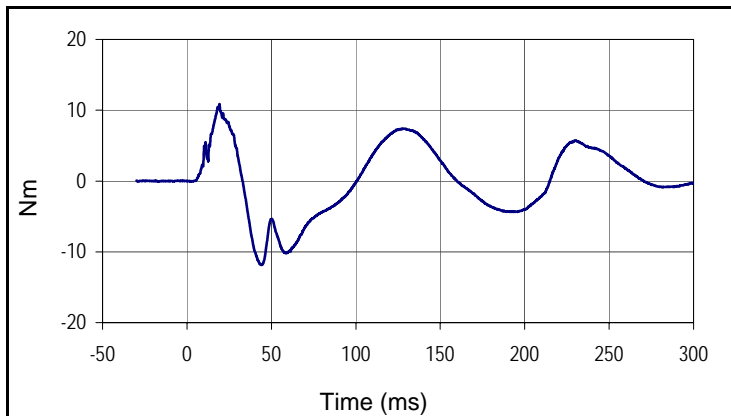
Test Date: 7/27/17
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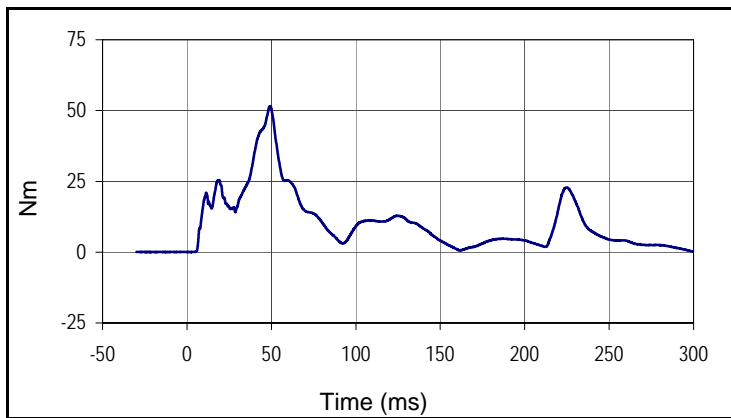
Curve Description			
6 Yr. Old Upper Neck Moment X			
Plot No.		SAE Class	Units
009		600	Nm
Max	Time	Min	Time
50.9	49.5	-19.4	11.4



Curve Description			
6 Yr. Old Upper Neck Moment Y			
Plot No.		SAE Class	Units
010		600	Nm
Max	Time	Min	Time
21.4	17.7	-26.0	42.2



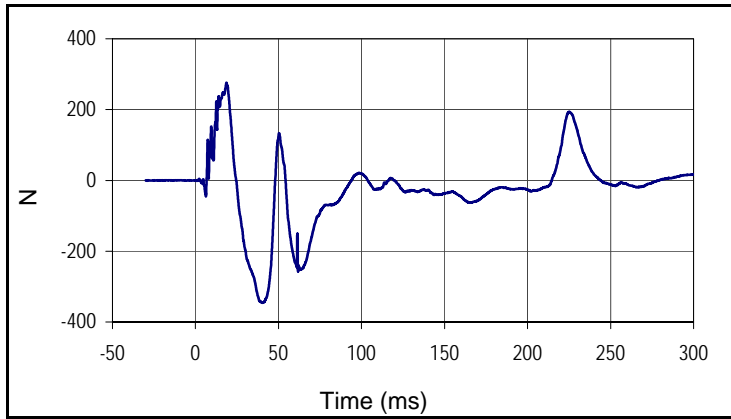
Curve Description			
6 Yr. Old Upper Neck Moment Z			
Plot No.		SAE Class	Units
011		600	Nm
Max	Time	Min	Time
10.9	19.3	-11.9	44.1



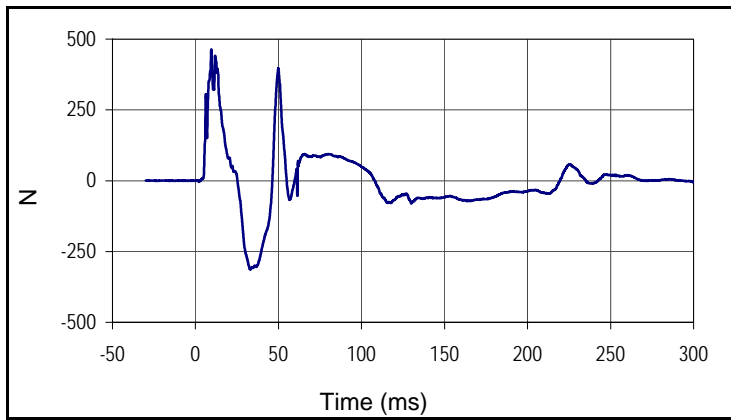
Curve Description			
6 Yr. Old Upper Neck Moment Resultant			
Plot No.		SAE Class	Units
012		600	Nm
Max	Time	Min	Time
51.5	49.3	0.0	2.4

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback
 Test Program: TWG 3.3.5.1

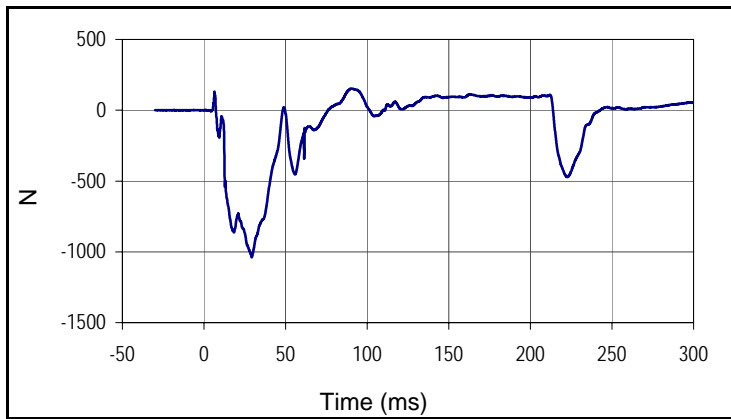
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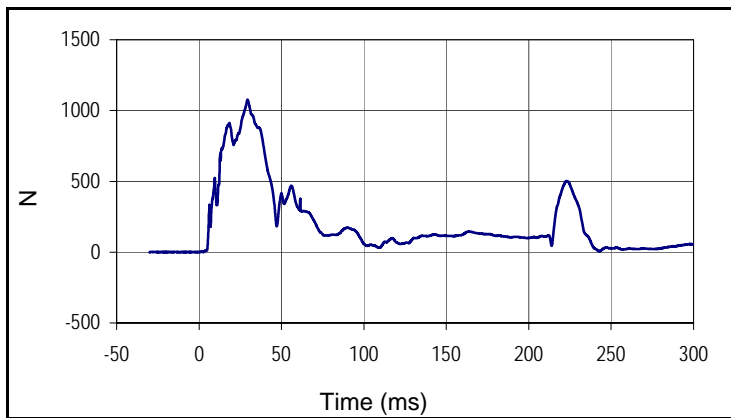
Curve Description			
6 Yr. Old Lower Neck Force X			
Plot No.		SAE Class	Units
013		1000	N
Max	Time	Min	Time
276.0	18.7	-346.1	40.3



Curve Description			
6 Yr. Old Lower Neck Force Y			
Plot No.		SAE Class	Units
014		1000	N
Max	Time	Min	Time
464.0	9.5	-313.1	32.9



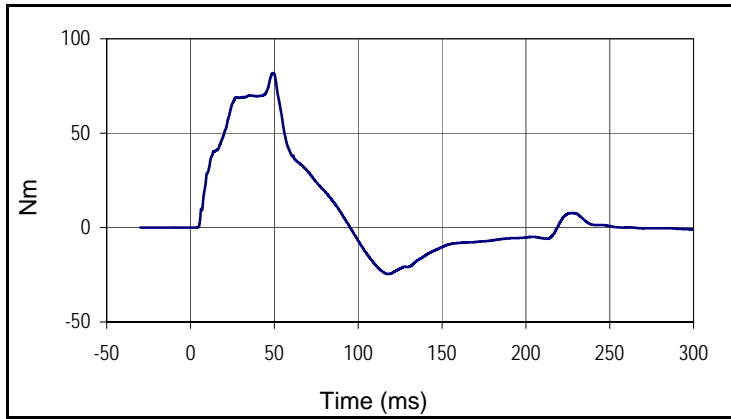
Curve Description			
6 Yr. Old Lower Neck Force Z			
Plot No.		SAE Class	Units
015		1000	N
Max	Time	Min	Time
152.0	90.2	-1038.3	29.3



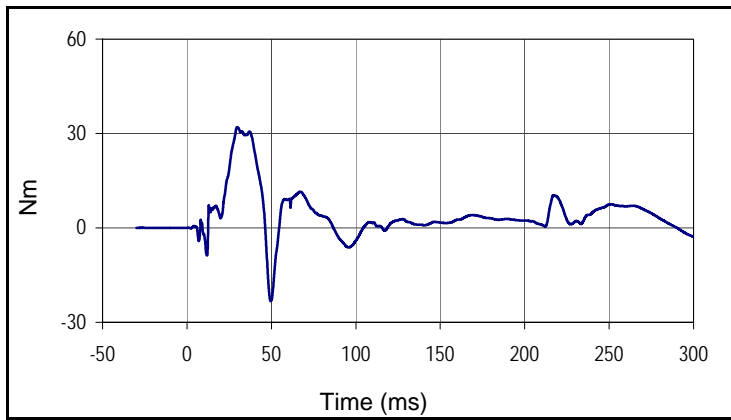
Curve Description			
6 Yr. Old Lower Neck Force Resultant			
Plot No.		SAE Class	Units
016		1000	N
Max	Time	Min	Time
1077.5	29.4	0.2	2.6

Test Vehicle: 2017 Ford Focus RS 5-Door Hatchback
 Test Program: TWG 3.3.5.1

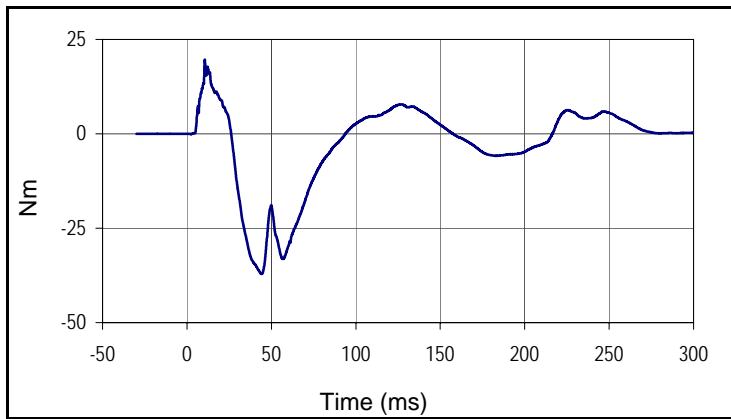
Test Date: 7/27/17
 NHTSA No.: M20170210TWG2



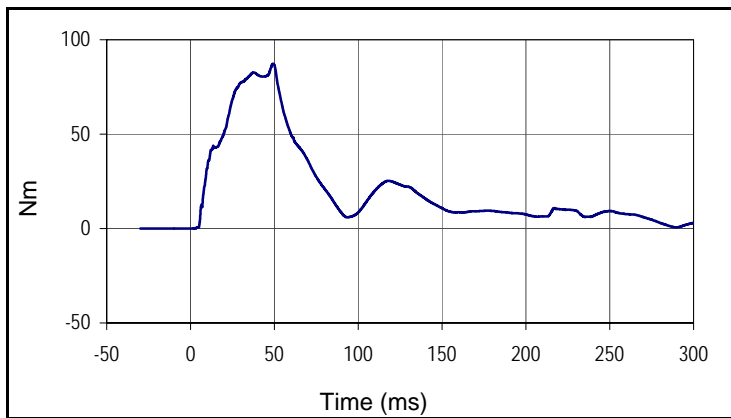
Curve Description			
6 Yr. Old Lower Neck Moment X			
Plot No.		SAE Class	Units
017		600	Nm
Max	Time	Min	Time
81.8	49.1	-24.6	118.0



Curve Description			
6 Yr. Old Lower Neck Moment Y			
Plot No.		SAE Class	Units
018		600	Nm
Max	Time	Min	Time
32.0	29.7	-23.3	49.5



Curve Description			
6 Yr. Old Lower Neck Moment Z			
Plot No.		SAE Class	Units
019		600	Nm
Max	Time	Min	Time
19.6	10.6	-37.1	44.3



Curve Description			
6 Yr. Old Lower Neck Moment Resultant			
Plot No.		SAE Class	Units
020		600	Nm
Max	Time	Min	Time
87.2	49.2	0.0	0.6

APPENDIX C
INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.5.1
Instrumentation Data Channel Assignments
A.T.D. Serial Number 186
7/27/17
2017 Ford Focus RS 5-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	7264-2000	g
3	HEAD	Z	ACCW9	Accel.,full bridge	Endevco	7264-2000	g
4	UPPER NECK FORCE	X	452	Load cell, six axis neck	R. A. Denton	1716A	N
5	UPPER NECK FORCE	Y	452	Load cell, six axis neck	R. A. Denton	1716A	N
6	UPPER NECK FORCE	Z	452	Load cell, six axis neck	R. A. Denton	1716A	N
7	UPPER NECK MOMENT	X	452	Load cell, six axis neck	R. A. Denton	1716A	Nm
8	UPPER NECK MOMENT	Y	452	Load cell, six axis neck	R. A. Denton	1716A	Nm
9	UPPER NECK MOMENT	Z	452	Load cell, six axis neck	R. A. Denton	1716A	Nm
10	LOWER NECK FORCE	X	146	Load cell, six axis neck	R. A. Denton	2430	N
11	LOWER NECK FORCE	Y	146	Load cell, six axis neck	R. A. Denton	2430	N
12	LOWER NECK FORCE	Z	146	Load cell, six axis neck	R. A. Denton	2430	N
13	LOWER NECK MOMENT	X	146	Load cell, six axis neck	R. A. Denton	2430	Nm
14	LOWER NECK MOMENT	Y	146	Load cell, six axis neck	R. A. Denton	2430	Nm
15	LOWER NECK MOMENT	Z	146	Load cell, six axis neck	R. A. Denton	2430	Nm

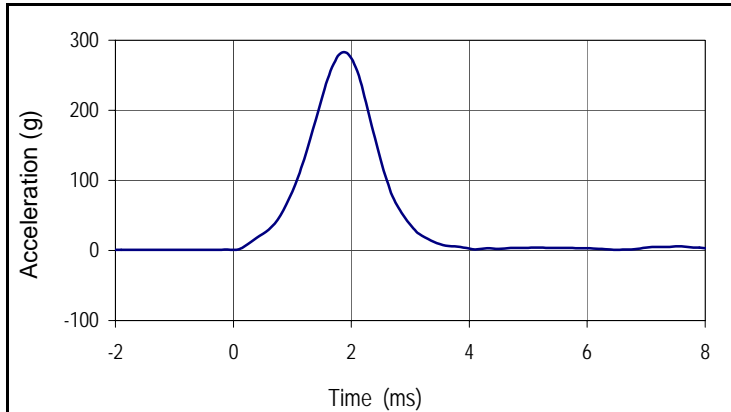
APPENDIX D
PRE-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

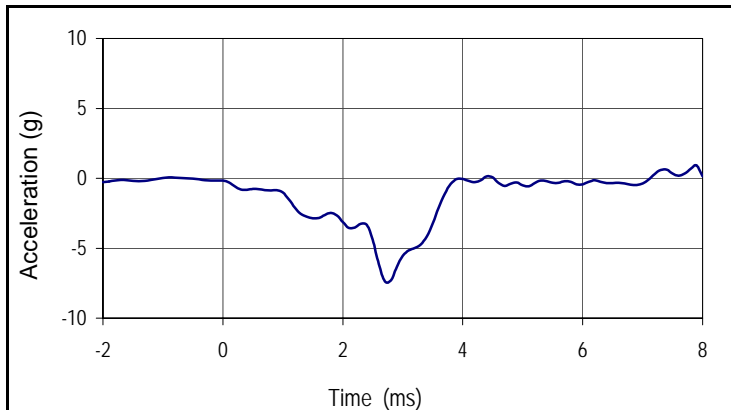
Test Date: 5/26/17
 Test I.D.: 6YR186HD52617



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	245.0 to 300.0	282.6	Pass
Peak Lateral Acceleration	g	≤15.0	7.4	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
Max	Time	Min	Time
282.6	1.9	0.8	0.0



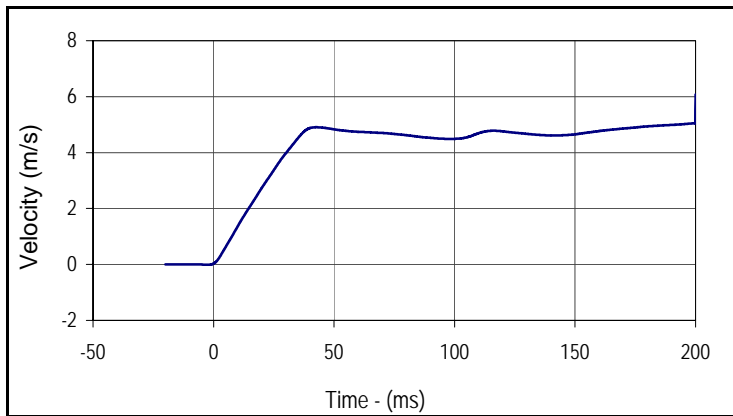
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
0.1	4.4	-7.4	2.7

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

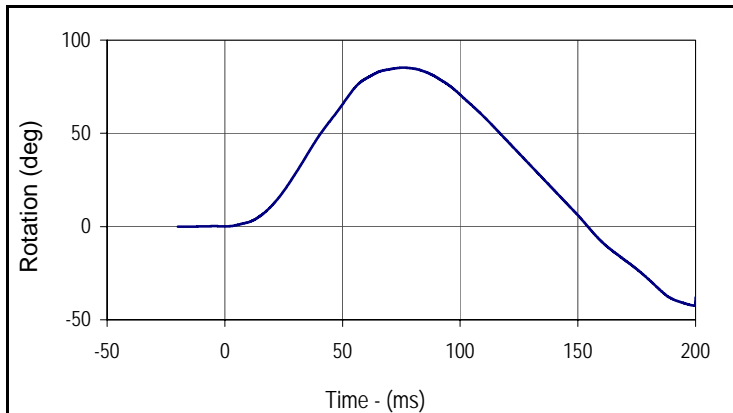
Test Date: 5/26/17
 Test I.D.: 6YR186NF52617



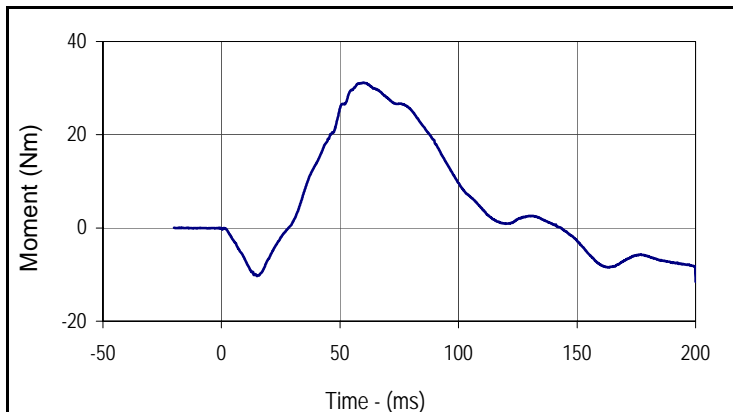
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.8	Pass	
Laboratory Relative Humidity	%	10 to 70	33	Pass	
Pendulum Velocity	m/s	4.83 to 5.07	4.86	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.2 to 1.6	1.4	Pass
	20 Msec.	m/s	2.4 to 3.4	2.7	Pass
	30 Msec.	m/s	3.8 to 5.0	4.0	Pass
"D" Plane Rotation	Max	deg	74.0 to 92.0	85.2	Pass
Peak Moment in Rotation	Max	Nm	27.0 to 33.0	31.2	Pass
Positive Moment Decay, Time To 5 Nm	ms	103.0 to 123.0	108.4	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.1	200.0	0.0	-2.2



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	deg
Max	Time	Min	Time
85.2	75.7	-42.5	199.9



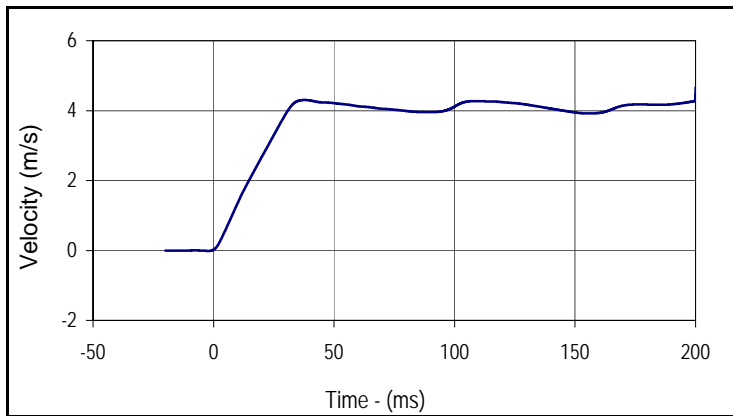
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
31.2	59.8	-11.6	200.0

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

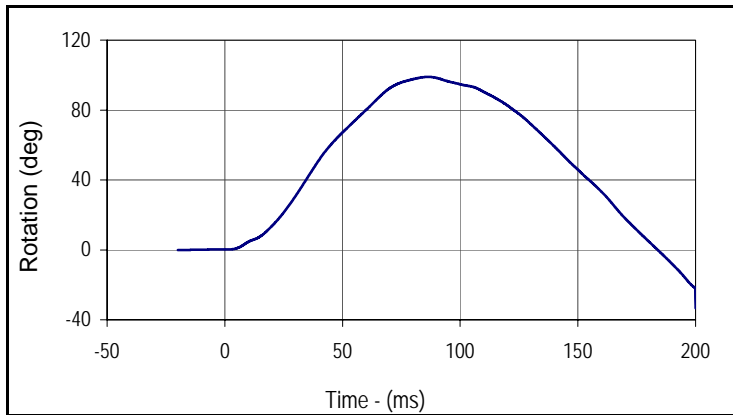
Test Date: 5/26/17
 Test I.D.: 6YR186NE52617



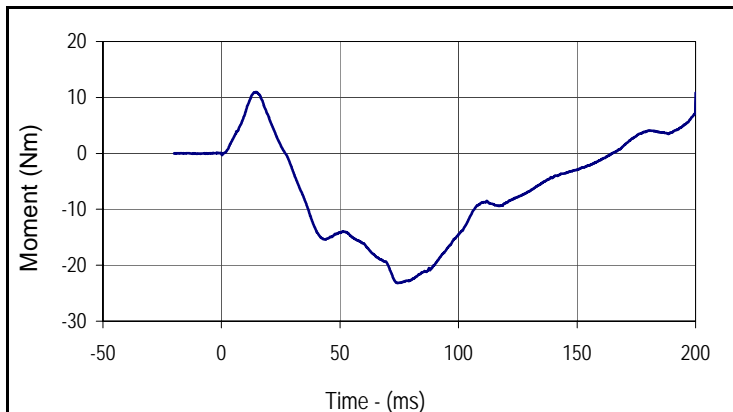
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.8	Pass	
Laboratory Relative Humidity	%	10 to 70	32	Pass	
Pendulum Velocity	m/s	4.18 to 4.42	4.32	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.0 to 1.4	1.4	Pass
	20 Msec.	m/s	2.2 to 3.0	2.7	Pass
	30 Msec.	m/s	3.2 to 4.2	3.9	Pass
"D" Plane Rotation	Max	deg	85.0 to 103.0	99.0	Pass
Peak Moment in Rotation	Max	Nm	-24.0 to -19.0	-23.2	Pass
Positive Moment Decay, Time To -5 Nm	ms	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	-2.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	deg
Max	Time	Min	Time
99.0	86.4	-33.3	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
11.0	14.6	-23.2	74.3