

REPORT NUMBER: TWG-KAR-18-002

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

**DAIMLER AG STUTT GART
2018 MERCEDES-BENZ GLC300 5-DOOR MPV**

NHTSA NUMBER: M20184302TWG2

**PREPARED BY:
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AUGUST 27, 2018

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 <p>A side airbag out of position test was conducted on the subject 2018 Mercedes-Benz GLC300 5-door MPV 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 August 13, 2018.</p> <p>The curtain and torso/pelvis side airbags were deployed and responses were measured on a Hybrid III 3-year old child dummy. Three high speed cameras, and one real time camera recorded the event. The ambient temperature at the time of airbag deployment was 20.6°C</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="4" style="text-align: center;">Section 3.3.3.1 - HIII 3-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>570</td> <td style="background-color: yellow;">26.4</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td style="background-color: yellow;">0.92</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>1130</td> <td style="background-color: yellow;">868.9</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>1380</td> <td style="background-color: yellow;">-976.9</td> </tr> </tbody> </table>				Section 3.3.3.1 - HIII 3-Year Old Child Dummy - P2				Measurement Description	Units	IARV	Result	Head Injury Criteria (HIC ₁₅)	N/A	570	26.4	Nij	N/A	1	0.92	Neck Tension	N	1130	868.9	Neck Compression	N	1380	-976.9
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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 2018 Mercedes-Benz GLC300 5-door MPV with an out-of-position Hybrid III 3-year old crash test dummy were evaluated. The test was performed at KARCO Engineering, LLC. on August 13, 2018. 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 3-year old anthropomorphic test device (ATD) was placed in the right front passenger seating position laying on its back with its feet pointing inboard according to the dummy placement instructions (3.3.3.1) in the July 2003 Revision of the Technical Working Group's 'Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags'.

The 3-year old ATD was instrumented with head tri-axial accelerometers, upper and lower neck force, and moment 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 3-year old dummy was with the dummy facing forward. The seat is set at the 80mm from the full forward position and adjusted vertically to its highest position. The seat was not tested in the lowest and rearmost position in order to maximize the interaction and contact between the dummy and airbag. The dummy is placed on the outboard edge of the foam block with the upper spine aligning with the deployment trajectory of the airbag. The dummy's head is placed between the seat bolster and pillar or side trim and the legs crossing the heel points. The pelvis is slid forward for spine alignment and outboard to contact the door panel. The outboard arm is placed on the armrest. This orientation complies with section 3.3.3.1 of the Technical Working Group (TWG) recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

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

The 3-year old dummy's visible contact points were as follows: The ATD's head contacted the curtain airbag, center console touch screen, and steering wheel. The ATD's torso contacted the Torso/Pelvis airbag, seat pan, and booster block. The ATD's pelvis contacted the torso/pelvis airbag, booster block, and seat pan.

The occupant data is summarized below:

Measurement Description	Units	Passenger ATD (HIII 3YO)	
		IARV	Result
Head Injury Criteria (HIC15)	N/A	570	26.4
Upper Neck Nij	N/A	1	0.92
Upper Neck Peak Tension	Newtons (N)	1130	868.9
Upper Neck Peak Compression	Newtons (N)	1380	-976.9

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2018 Mercedes-Benz GLC300 5-Door MPV NHTSA No.: M20184302TWG2

Test Program: TWG 3.3.3.1 Test Date: 08/13/18

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: 2018 Mercedes-Benz GLC300 5-Door MPV NHTSA No.: M20184302TWG2
Test Program: TWG 3.3.3.1 Test Date: 08/13/18

TEST DUMMY INFORMATION

Description	Passenger Seat
Dummy Type / Serial No.	3-year old / 044
Head Contact	Curtain Airbag, Center Console Screen, Steering Wheel
Chest Contact	Torso/Pelvis Airbag, Seat Pan, Booster Block
Abdomen Contact	Seat Pan, Booster Block
Pelvis Contact	Torso/Pelvis Airbag, Seat Pan, Booster Block
Left Knee Contact	Seat Pan
Right Knee Contact	None

VIDEO COVERAGE

Description	Quantity
High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

Description	Quantity
Head Accelerometers	3
Upper Neck Transducers	6
Lower Neck Transducers	6
Total	15

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Mercedes-Benz GLC300 5-Door MPV NHTSA No.: M20184302TWG2
 Test Program: TWG 3.3.3.1 Test Date: 08/13/18

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20184302TWG2
Model Year	2018
Make	Mercedes-Benz
Model	GLC300
Body Style	5-Door MPV
VIN	WDC0G4JB9JV020233
Body Color	Blue
Odometer Reading (km / mi)	82 / 51
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	9
Overdrive	Yes
Final Drive	RWD
Roof Rack	Yes
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	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	Yes

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Daimler AG Stuttgart
Date of Manufacture	Jul-17
Vehicle Type	MPV

GVWR (kg)	2315
GAWR Front (kg)	1060
GAWR Rear (kg)	1255

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)				432.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				91.8

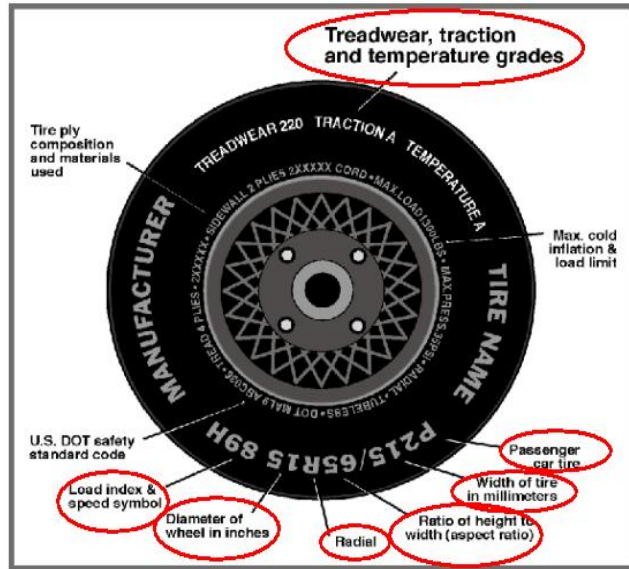
A
B
A-B

*Vehicle underwent New Car Assessment Program Side MDB Impact Testing on December 13, 2017.

DATA SHEET NO. 2 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Mercedes-Benz GLC300 5-Door MPV NHTSA No.: M20184302TWG2
 Test Program: TWG 3.3.3.1 Test Date: 08/13/18



VEHICLE TIRE INFORMATION

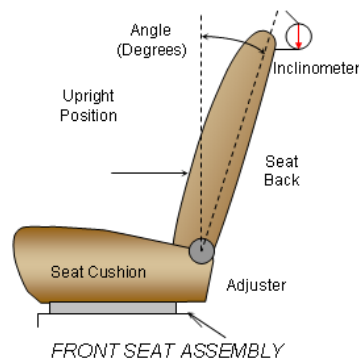
Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	240	290
Recommended Tire Size	P235/60R18	P235/60R18
Tire Size on Vehicle	P235/60R18	P235/60R18
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Scorpion Verde	Scorpion Verde
Treadware	600	600
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Rayon	1 Rayon
Tire Plies Body	1 Rayon, 2 Steel, 1 Polyamide	1 Rayon, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	103H	103H
Tire Material	Rayon, Steel, Polyamide	Rayon, Steel, Polyamide
DOT Safety Code Left	93K3 T899 2417	93K3 T899 2417
DOT Safety Code Right	93K3 T899 2417	93K3 T899 2417

DATA SHEET NO. 3
SEAT ADJUSTMENTS

Test Vehicle: 2018 Mercedes-Benz GLC300 5-Door MPV NHTSA No.: M20184302TWG2
 Test Program: TWG 3.3.3.1 Test Date: 08/13/18

SEAT BACK ANGLE

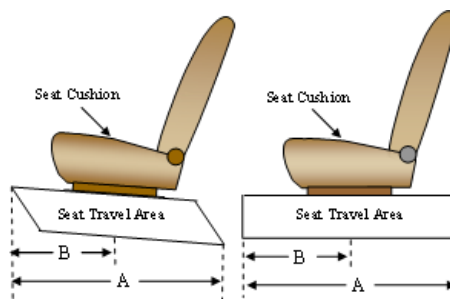
The passenger seat back is positioned per section 3.3.3.1 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. Seat back angle is measured at the headrest post.



Seating Position	Degrees
Passenger Seat	21.0

SEAT FORE / AFT POSITIONING

The passenger seat track travel is set per section 3.3.3.1 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. The first or forward most position is counted as zero (0)



Seating Position	Total Fore-Aft Travel		Placed in Position	
	mm	Detents	mm	Detents
Passenger Seat	233	N/A	80	N/A

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	4	H

DATA SHEET NO. 4

DUMMY POSITIONING AND AIRBAG DIMENSIONS

Test Vehicle: 2018 Mercedes-Benz GLC300 5-Door MPV NHTSA No.: M20184302TWG2

Test Program: TWG 3.3.3.1 Test Date: 08/13/18

DUMMY POSITIONING

Code	Measurement Description	Passenger	
		Length (mm)	Angle (°)
SA	Seat Back Angle		21.0
AN	Top of Airbag Module to Head/Neck Junction	45	90.0
HD	Head CG to Door Panel/ Window	72	0.0
HSC	Head to Seat Back Centerline	185	0.0
HB	Head to B-Pillar (measured from bridge of nose)	209	32.9
HZ	Head to Roof (Z)	323	90.0
HHD	Head to Side Header	438	34.9
ND	Nose to Dash	509	8.5
NS	Nose to Seat Back	227	0.0
NR	Nose to Header	435	38.4
CD	Chest to Dash	444	3.4
CS	Chest to Seat Back (measured to centerline)	213	0.0
RACL	Right Arm to Seat Back Centerline	235	0.0
LACL	Left Arm to Seat Back Centerline	39	0.0
RA	Right Arm to Door Panel	32	0.0
LA	Left Arm to Door Panel	313	0.0
KK	Knee to Knee	135	0.0
TT	Toe to Toe	115	0.0
KSCR	Right Knee to Seat Cushion Centerline	142	0.0
KSCL	Left Knee to Seat Cushion Centerline	60	0.0
	Head Level (X Direction)		6.6
	Head Level (Y Direction)		4.4

AIRBAG DIMENSIONS

Code	Measurement Description	Airbag
		Length (mm)
AMW	Curtain Airbag Module Diameter	25
AML	Curtain Airbag Module Length	305
ABW	Curtain Airbag Width	1858
ABL	Curtain Airbag Length	375
AMW	Torso/Pelvis Airbag Module Diameter	25
AML	Torso/Pelvis Airbag Module Length	105
ABW	Torso/Pelvis Airbag Width	530
ABL	Torso/Pelvis Airbag Length	362

DATA SHEET NO. 5

DUMMY INJURY CRITERIA AND PERFORMANCE DATA

Test Vehicle: 2018 Mercedes-Benz GLC300 5-Door MPV NHTSA No.: M20184302TWG2
 Test Program: TWG 3.3.3.1 Test Date: 08/13/18

HEAD PEAK ACCELERATIONS

Location	Axis	Units	3 Year Old			
			Max	Time	Min	Time
Head CG	X	g	29.8	45.9	-21.3	12.7
Head CG	Y	g	37.4	12.6	-36.3	12.9
Head CG	Z	g	78.8	12.6	-19.1	14.1
Head CG Resultant	N/A	g	87.3	12.6		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	3 Year Old			
			Max	Time	Min	Time
Neck Force	X	N	323.8	41.6	-62.8	179.2
Neck Force	Y	N	81.1	50.5	-209.7	13.5
Neck Force	Z	N	868.9	47.6	-976.9	13.5
Neck Force Resultant	N/A	N	1009.8	13.5		
Neck Moment	X	Nm	10.1	14.2	-11.0	29.7
Neck Moment	Y	Nm	12.4	12.1	-14.0	47.2
Neck Moment	Z	Nm	2.6	104.4	-8.5	32.1
Neck Moment Resultant	N/A	Nm	14.9	14.3		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	3 Year Old			
			Max	Time	Min	Time
Neck Force	X	N	328.0	11.4	-152.5	41.5
Neck Force	Y	N	82.0	49.7	-306.0	14.9
Neck Force	Z	N	158.0	47.8	-944.6	13.9
Neck Force Resultant	N/A	N	1028.4	13.9		
Neck Moment	X	Nm	8.3	111.5	-18.7	18.9
Neck Moment	Y	Nm	11.6	175.4	-50.0	47.0
Neck Moment	Z	Nm	3.3	258.1	-7.2	16.3
Neck Moment Resultant	N/A	Nm	50.1	47.0		

HEAD INJURY CRITERIA (HIC15)

Location	3 Year Old			
	HIC15	T ¹	T ²	Avg G
Head CG	26.4	23.9	38.9	19.8

UPPER NECK NIJ VALUES

Location	3 Year Old			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.10	0.92	0.59	0.25

DATA SHEET NO. 6**HIGH SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2018 Mercedes-Benz GLC300 5-Door MPV NHTSA No.: M20184302TWG2
Test Program: TWG 3.3.3.1 Test Date: 08/13/18

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Side View	2850	497	1550	6.4	35	1000
2	High Speed 3/4 View	2375	1472	1555	6.1	35	1000
3	High Speed Front View	0	2755	975	0.0	20	1000
4	Real Time	0	2755	1065	0.0	18	1000

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 3/4 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 3/4 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 View



FIGURE 8. Post-Test Dummy Position, Left 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. Pre-Test Dummy Position, Close-Up Front View



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

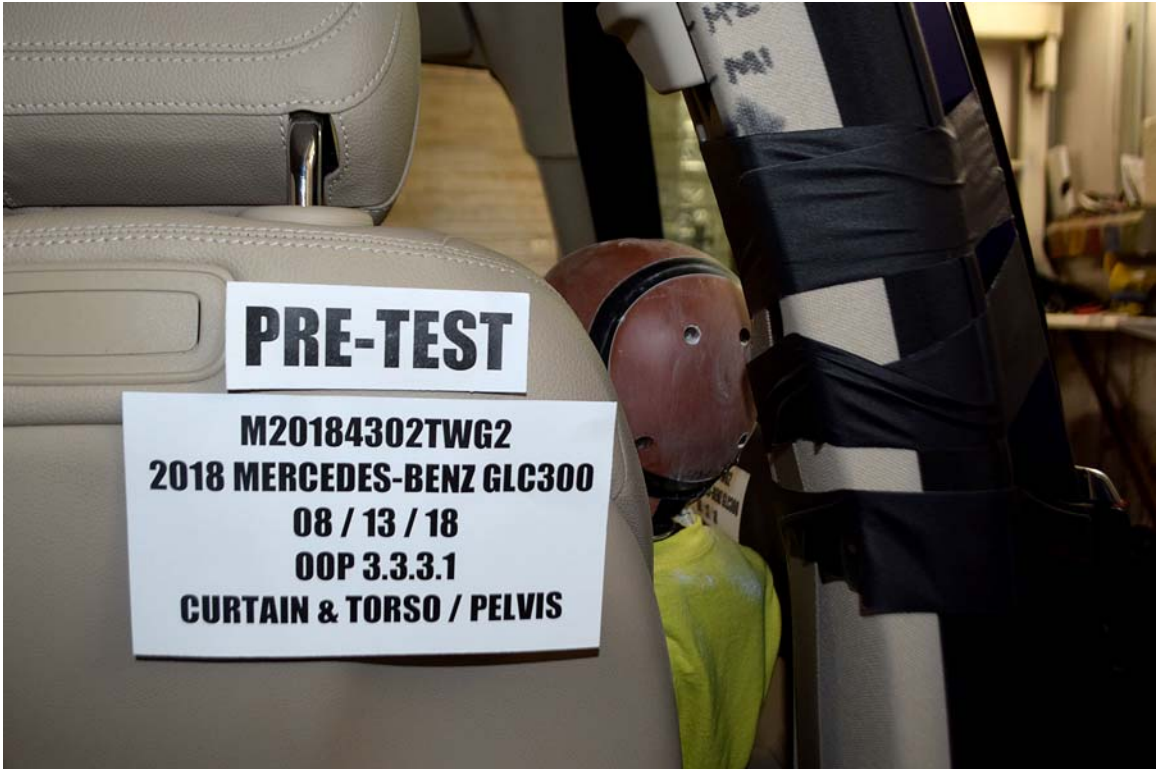


FIGURE 15. Pre-Test Dummy Position, Close-Up Rear View

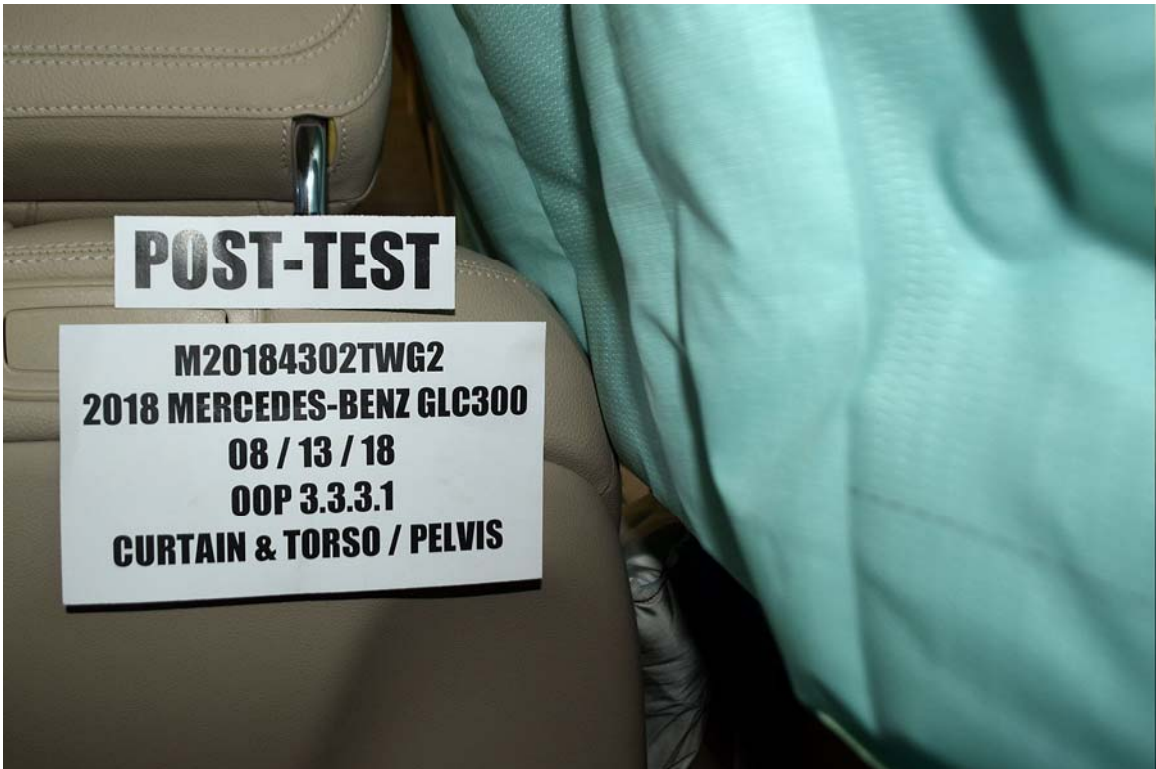


FIGURE 16. Post-Test Dummy Position, Close-Up Rear View



FIGURE 17. Post-Test Airbags, Left Side View



FIGURE 18. Post-Test Airbags, Left Front 3/4 View

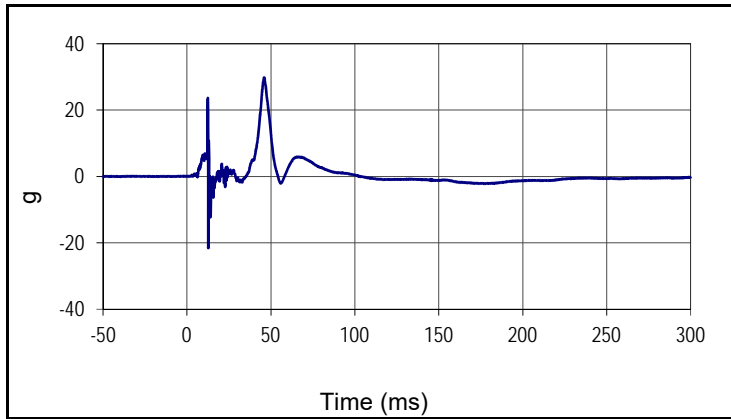
APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

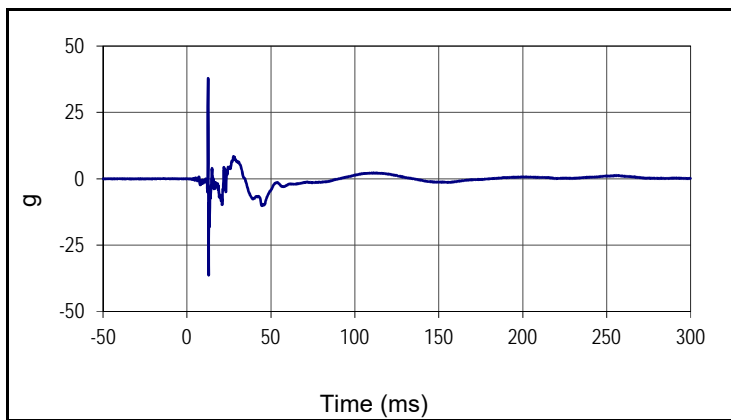
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14	3 Yr. Old Lower Neck Force Y	B-4
15	3 Yr. Old Lower Neck Force Z	B-4
16	3 Yr. Old Lower Neck Force Resultant	B-4
17	3 Yr. Old Lower Neck Moment X	B-5
18	3 Yr. Old Lower Neck Moment Y	B-5
19	3 Yr. Old Lower Neck Moment Z	B-5
20	3 Yr. Old Lower Neck Moment Resultant	B-5

Test Vehicle: 2018 Mercedes-Benz GLC 300 5-Door MPV
 Test Program: TWG 3.3.3.1

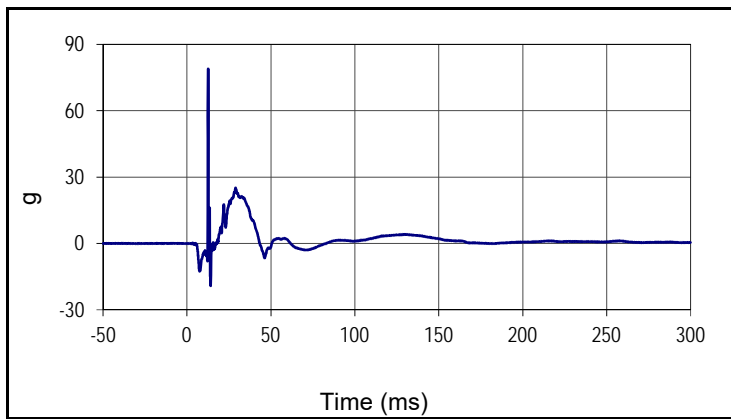
Test Date: 08/13/18
 NHTSA No.: M20184302TWG2



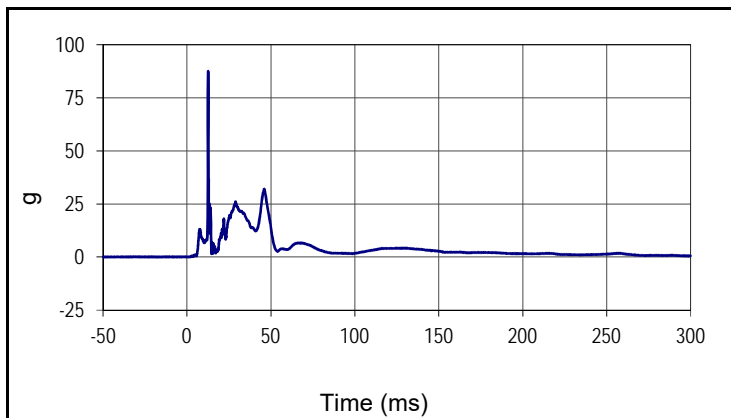
Curve Description			
3 Year Old Head Acceleration X			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
29.8	45.9	-21.3	12.7



Curve Description			
3 Year Old Head Acceleration Y			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
37.4	12.6	-36.3	12.9



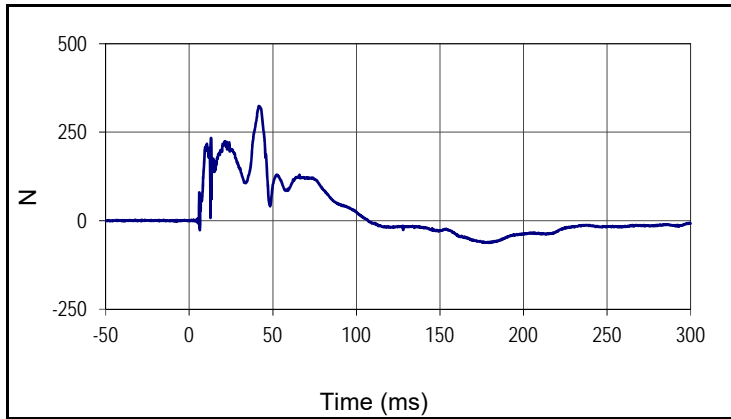
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Max	Time	Min	Time
78.8	12.6	-19.1	14.1



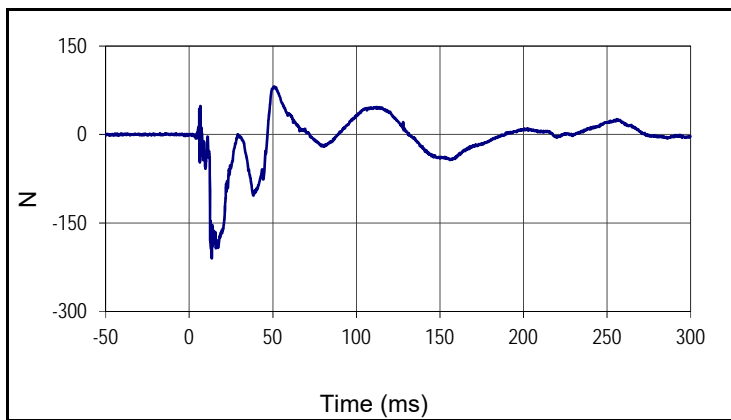
Curve Description			
3 Year Old Head Acceleration Primary Resultant			
Plot No.		SAE Class	Units
004		1000	g
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Test Vehicle: 2018 Mercedes-Benz GLC 300 5-Door MPV
 Test Program: TWG 3.3.3.1

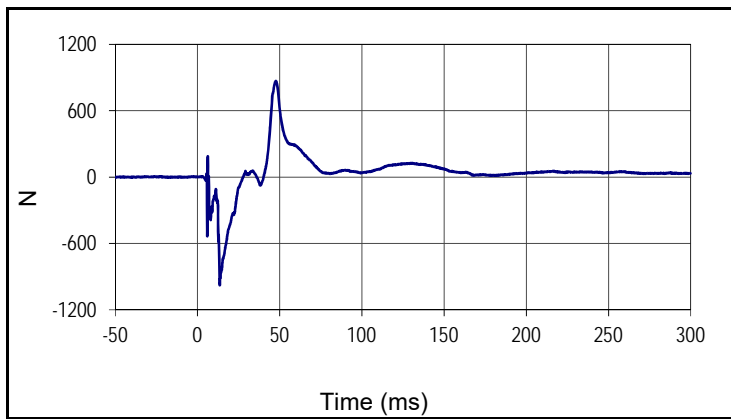
Test Date: 08/13/18
 NHTSA No.: M20184302TWG2



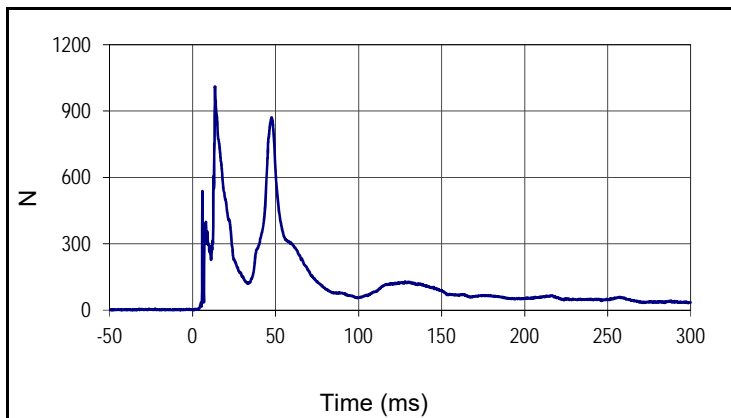
Curve Description			
3 Year Old Upper Neck Force X			
Plot No.		SAE Class	Units
005		1000	N
Max	Time	Min	Time
323.8	41.6	-62.8	179.2



Curve Description			
3 Year Old Upper Neck Force Y			
Plot No.		SAE Class	Units
006		1000	N
Max	Time	Min	Time
81.1	50.5	-209.7	13.5



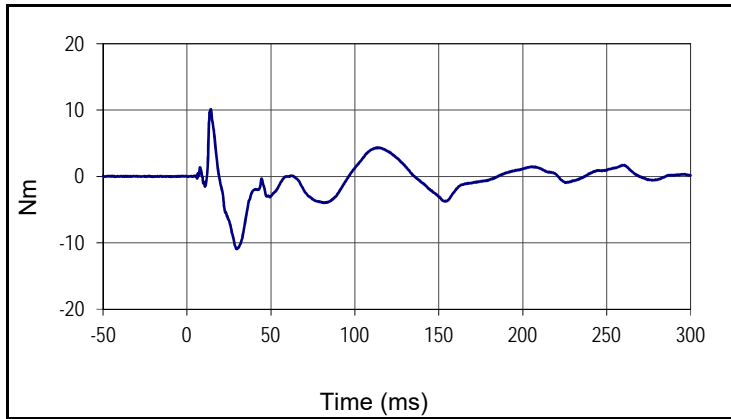
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Plot No.		SAE Class	Units
007		1000	N
Max	Time	Min	Time
868.9	47.6	-976.9	13.5



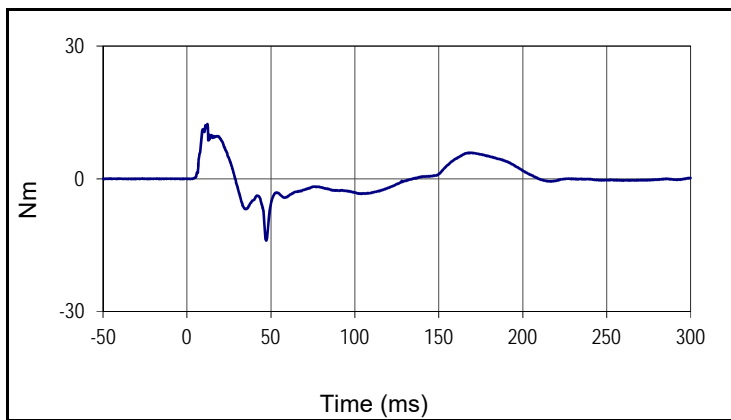
Curve Description			
3 Year Old Upper Neck Force Resultant			
Plot No.		SAE Class	Units
008		1000	N
Max	Time	Min	Time
1009.8	13.5	0.3	0.8

Test Vehicle: 2018 Mercedes-Benz GLC 300 5-Door MPV
 Test Program: TWG 3.3.3.1

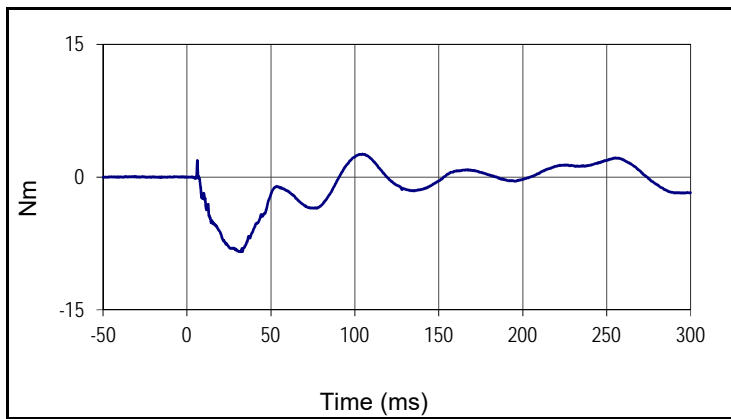
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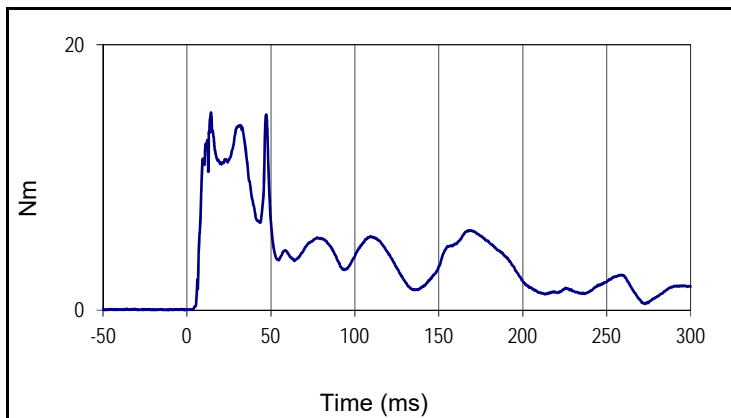
Curve Description			
3 Year Old Upper Neck Moment X			
Plot No.		SAE Class	Units
009		600	Nm
Max	Time	Min	Time
10.1	14.2	-11.0	29.7



Curve Description			
3 Year Old Upper Neck Moment Y			
Plot No.		SAE Class	Units
010		600	Nm
Max	Time	Min	Time
12.4	12.1	-14.0	47.2



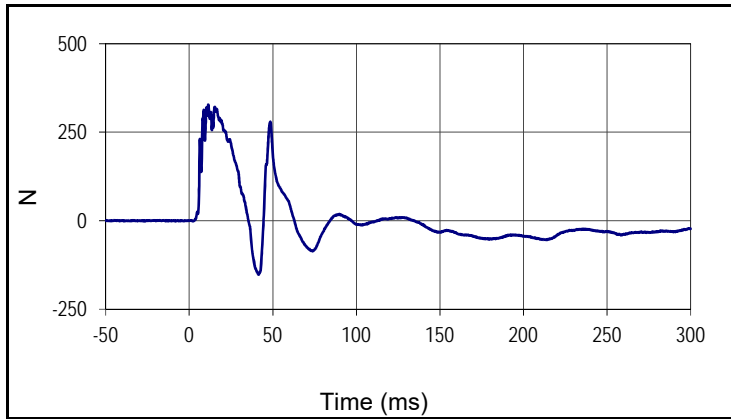
Curve Description			
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Plot No.		SAE Class	Units
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Max	Time	Min	Time
2.6	104.4	-8.5	32.1



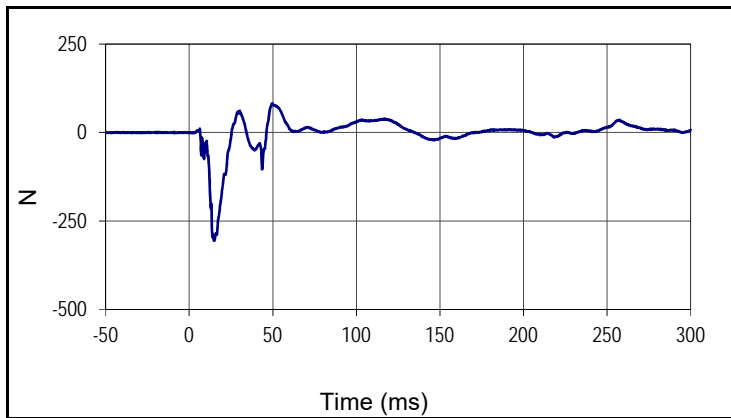
Curve Description			
3 Year Old Upper Neck Moment Resultant			
Plot No.		SAE Class	Units
012		1000	Nm
Max	Time	Min	Time
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Test Vehicle: 2018 Mercedes-Benz GLC 300 5-Door MPV
 Test Program: TWG 3.3.3.1

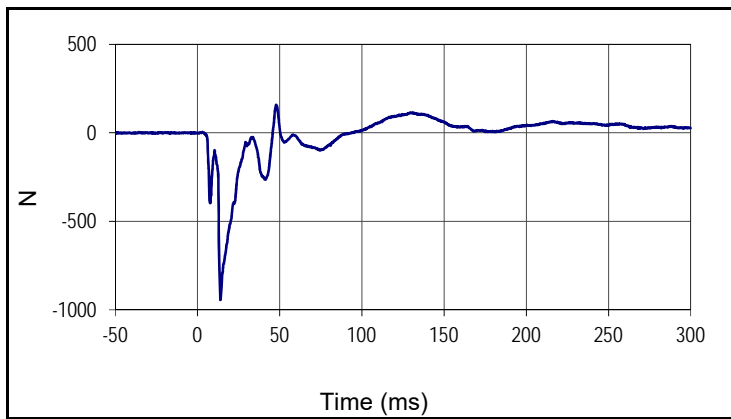
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 NHTSA No.: M20184302TWG2



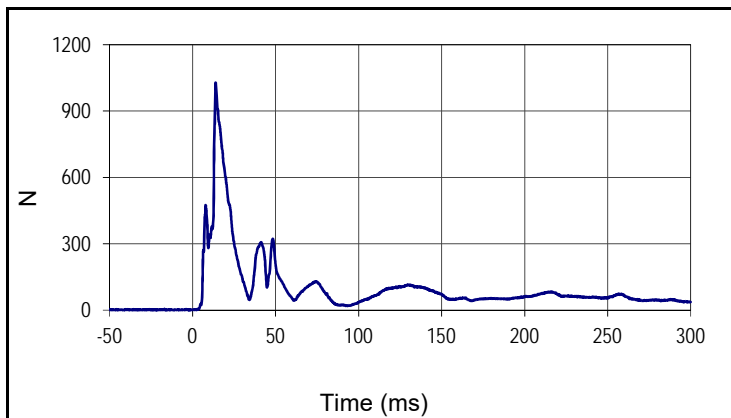
Curve Description			
3 Year Old Lower Neck Force X			
Plot No.		SAE Class	Units
013		1000	N
Max	Time	Min	Time
328.0	11.4	-152.5	41.5



Curve Description			
3 Year Old Lower Neck Force Y			
Plot No.		SAE Class	Units
014		1000	N
Max	Time	Min	Time
82.0	49.7	-306.0	14.9



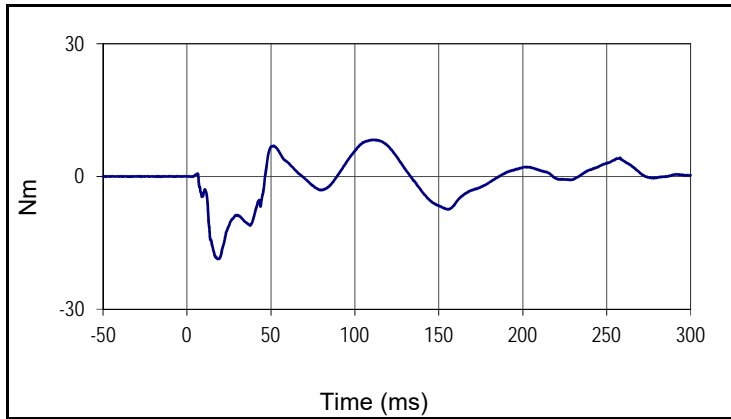
Curve Description			
3 Year Old Lower Neck Force Z			
Plot No.		SAE Class	Units
015		1000	N
Max	Time	Min	Time
158.0	47.8	-944.6	13.9



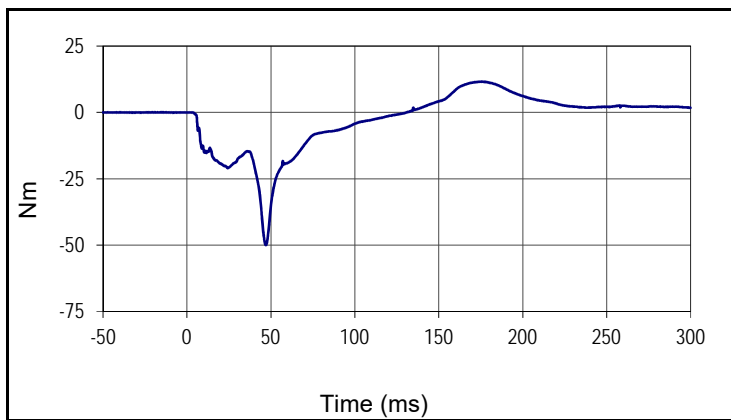
Curve Description			
3 Year Old Lower Neck Force Resultant			
Plot No.		SAE Class	Units
016		1000	N
Max	Time	Min	Time
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Test Vehicle: 2018 Mercedes-Benz GLC 300 5-Door MPV
 Test Program: TWG 3.3.3.1

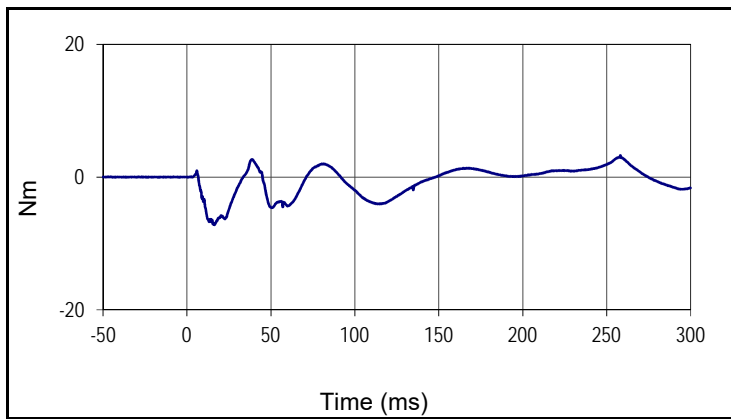
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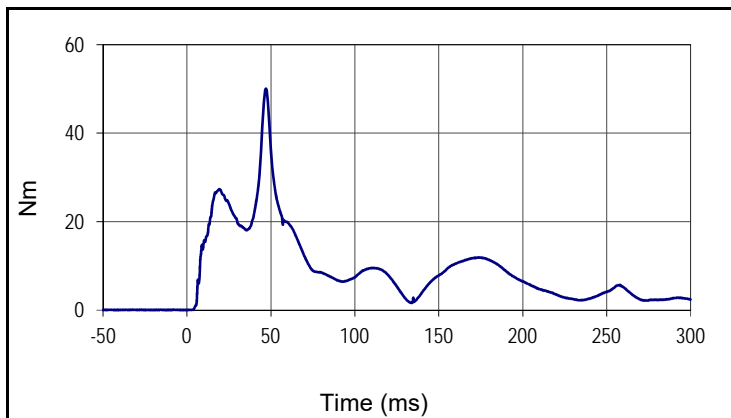
Curve Description			
3 Year Old Lower Neck Moment X			
Plot No.		SAE Class	Units
017		600	Nm
Max	Time	Min	Time
8.3	111.5	-18.7	18.9



Curve Description			
3 Year Old Lower Neck Moment Y			
Plot No.		SAE Class	Units
018		600	Nm
Max	Time	Min	Time
11.6	175.4	-50.0	47.0



Curve Description			
3 Year Old Lower Neck Moment Z			
Plot No.		SAE Class	Units
019		600	Nm
Max	Time	Min	Time
3.3	258.1	-7.2	16.3



Curve Description			
3 Year Old Lower Neck Moment Resultant			
Plot No.		SAE Class	Units
020		600	Nm
Max	Time	Min	Time
50.1	47.0	0.0	1.1

APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

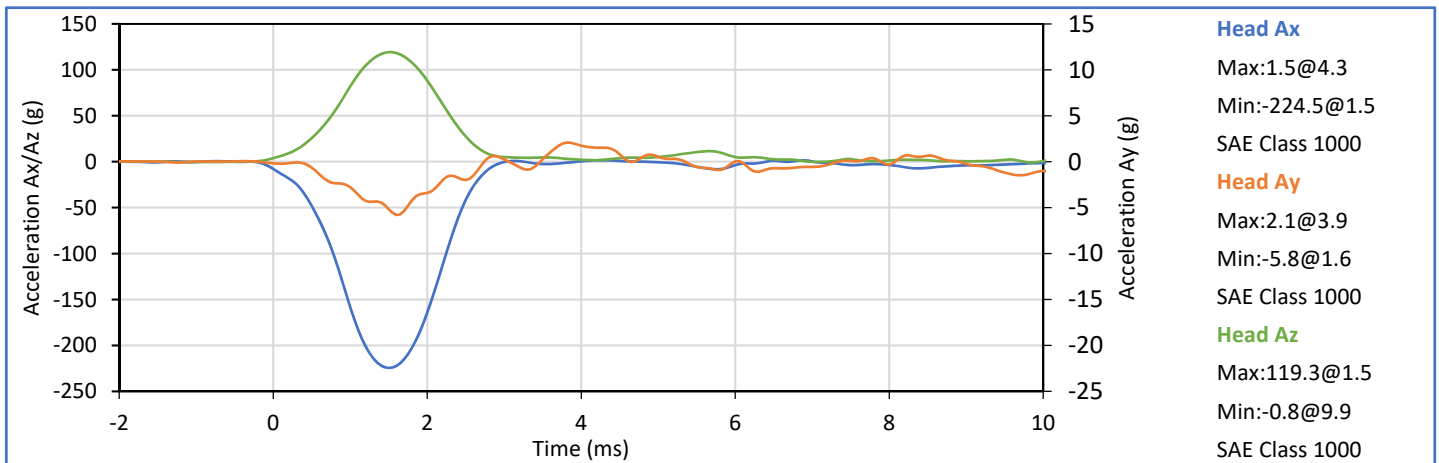
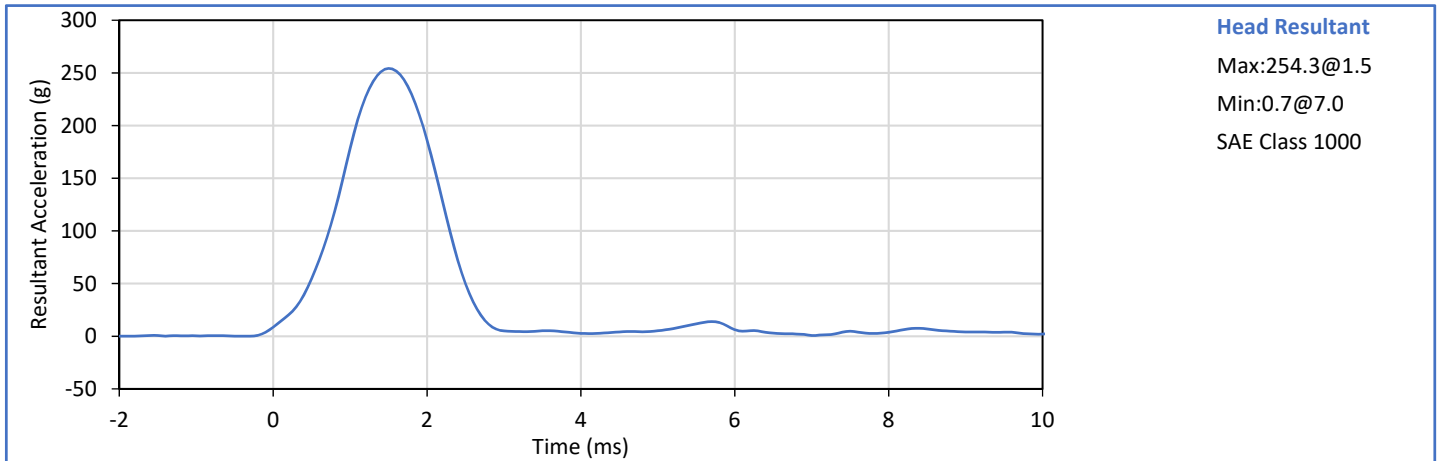
APPENDIX C
POST-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA



ATD Serial No.: 044

Test Date: 2018-08-06

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	22	Pass
Peak Resultant Acceleration	g	250.0	280.0	254.3	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-5.8	Pass
Oscillations After Main Pulse	%	0.0	10.0	5.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass



Technician: *P. Puzzuto*
 P. Puzzuto

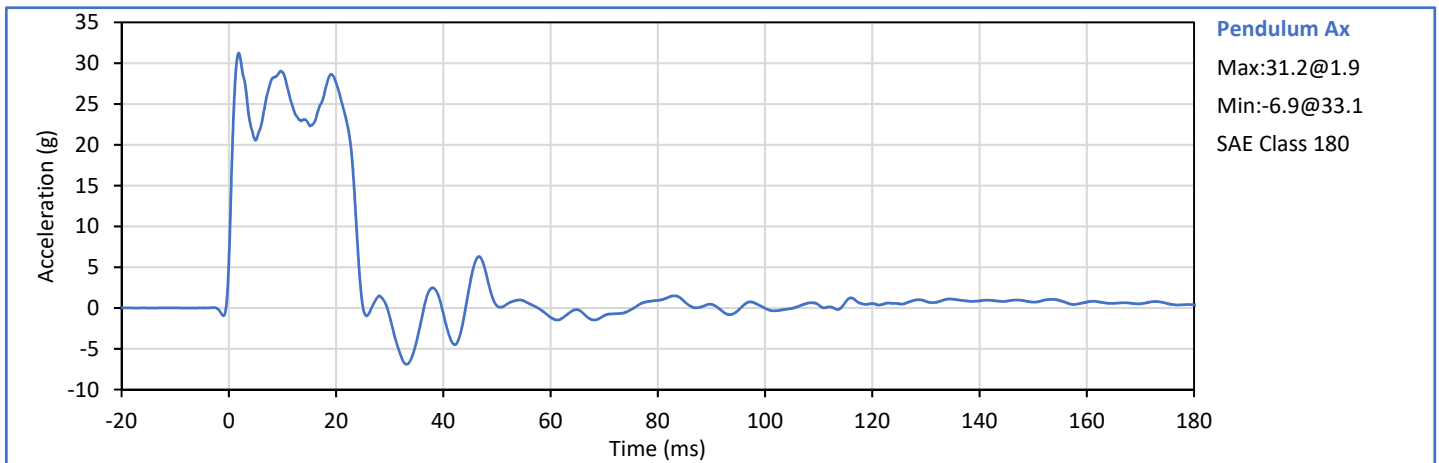
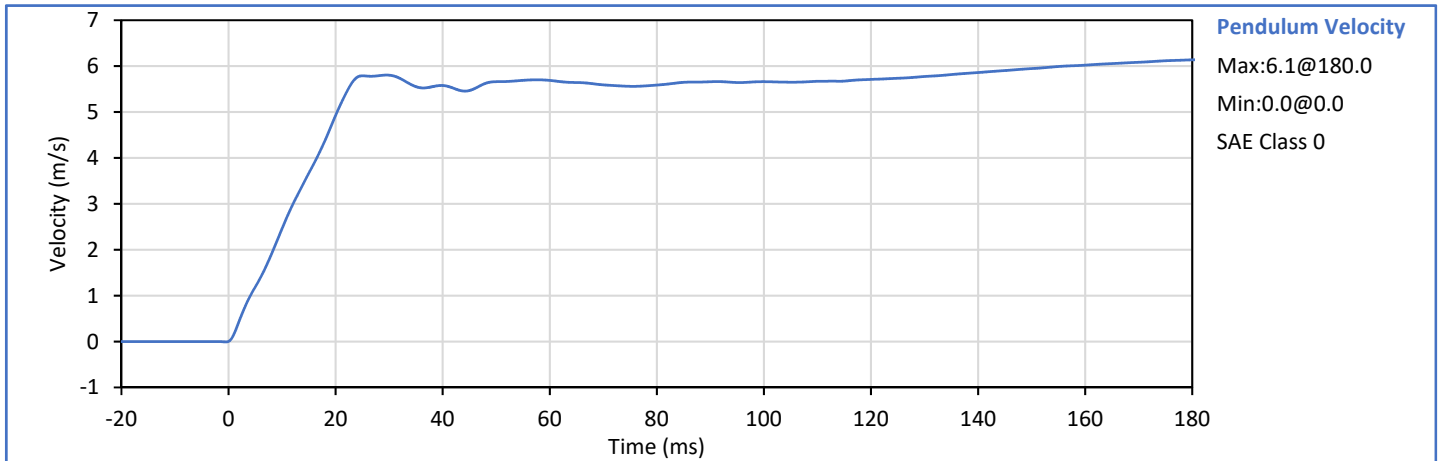
Approved By: *P. Puzzuto*
 P. Puzzuto



ATD Serial No.: 044

Test Date: 2018-08-06

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	39	Pass
Pendulum Velocity	m/s	5.40	5.60	5.59	Pass
Pendulum Velocity at 10 ms	m/s	2.00	2.70	2.46	Pass
Pendulum Velocity at 15 ms	m/s	3.00	4.00	3.67	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.10	4.93	Pass
Peak Moment in Rotation	Nm	42.0	53.0	50.1	Pass
	deg	70.0	82.0	76.2	Pass
Positive Moment Decay to 10 Nm	ms	60.0	80.0	69.0	Pass
Overall Test Results					Pass



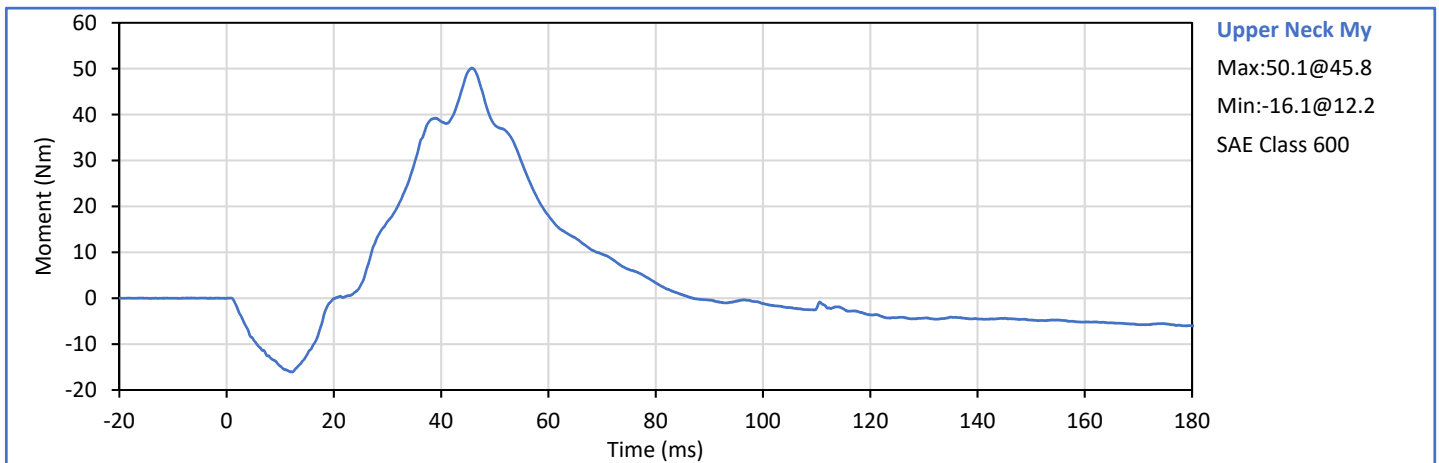
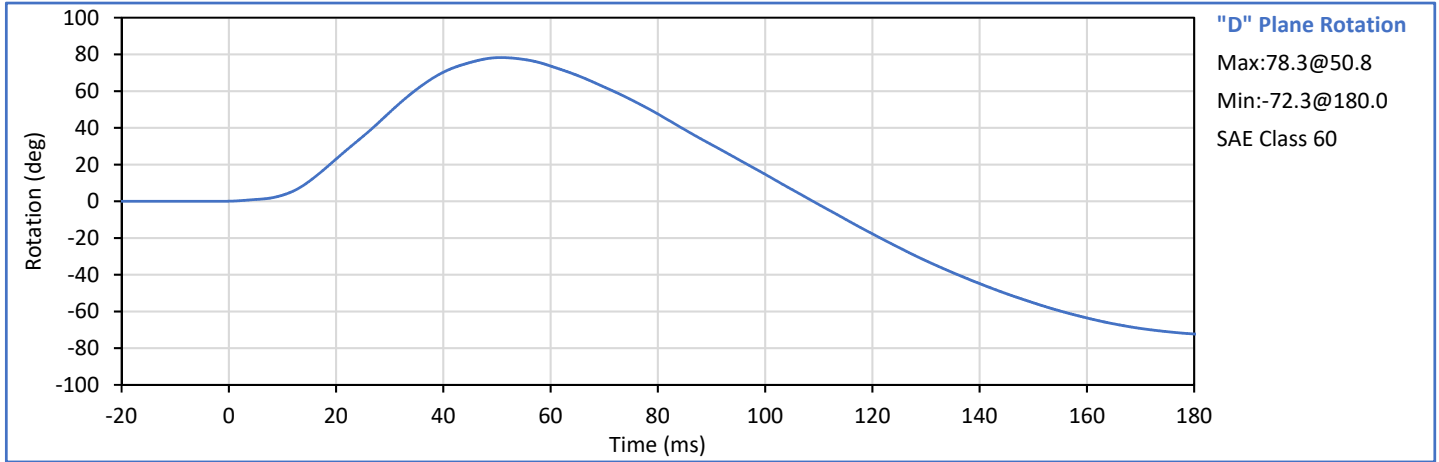
Technician:
 J. Hernandez

Approved By:
 P. Puzzuto



ATD Serial No.: 044

Test Date: 2018-08-06

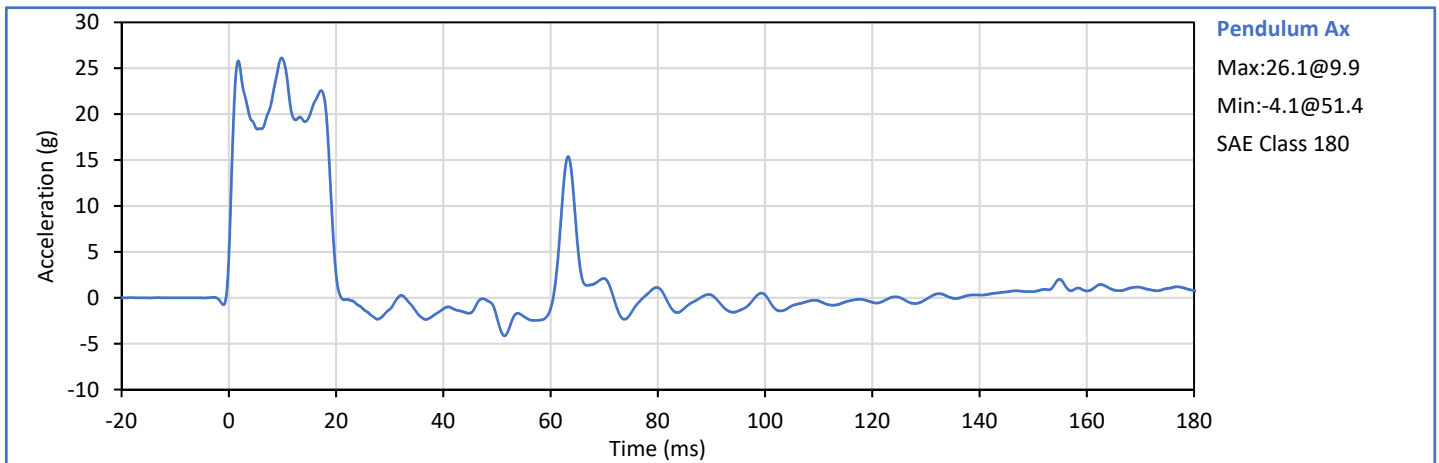
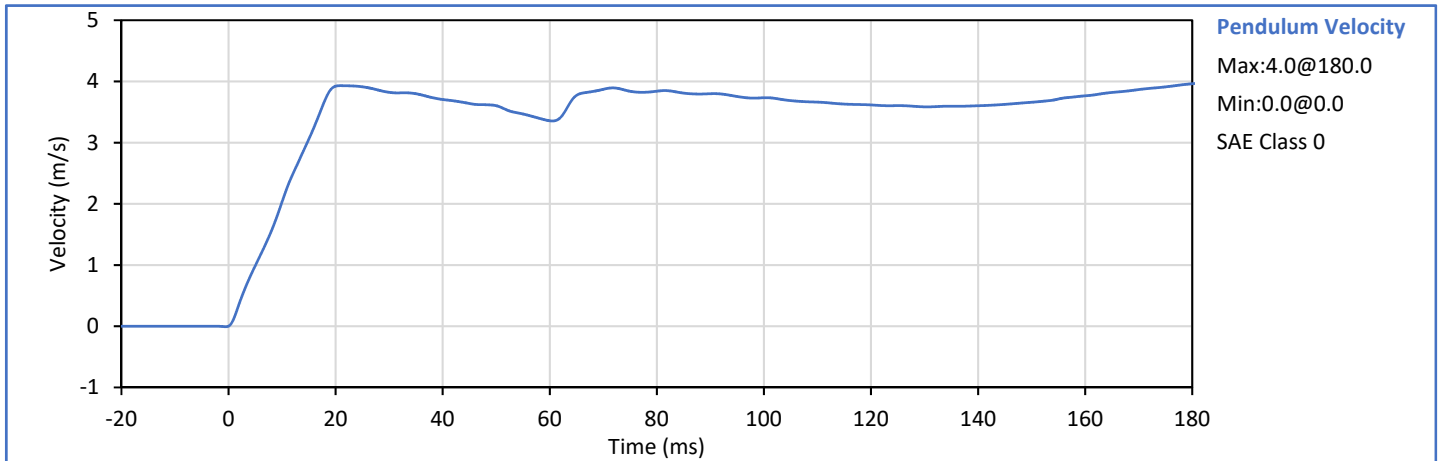




ATD Serial No.: 044

Test Date: 2018-08-07

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	39	Pass
Pendulum Velocity	m/s	3.55	3.75	3.71	Pass
Pendulum Velocity at 6 ms	m/s	1.00	1.40	1.17	Pass
Pendulum Velocity at 10 ms	m/s	1.90	2.50	2.03	Pass
Pendulum Velocity at 14 ms	m/s	2.80	3.50	2.87	Pass
Peak Moment in Rotation	Nm	-53.3	-43.7	-48.3	Pass
	deg	83.0	93.0	83.3	Pass
Positive Moment Decay to -10 Nm	ms	60.0	80.0	65.3	Pass
Overall Test Results					Pass



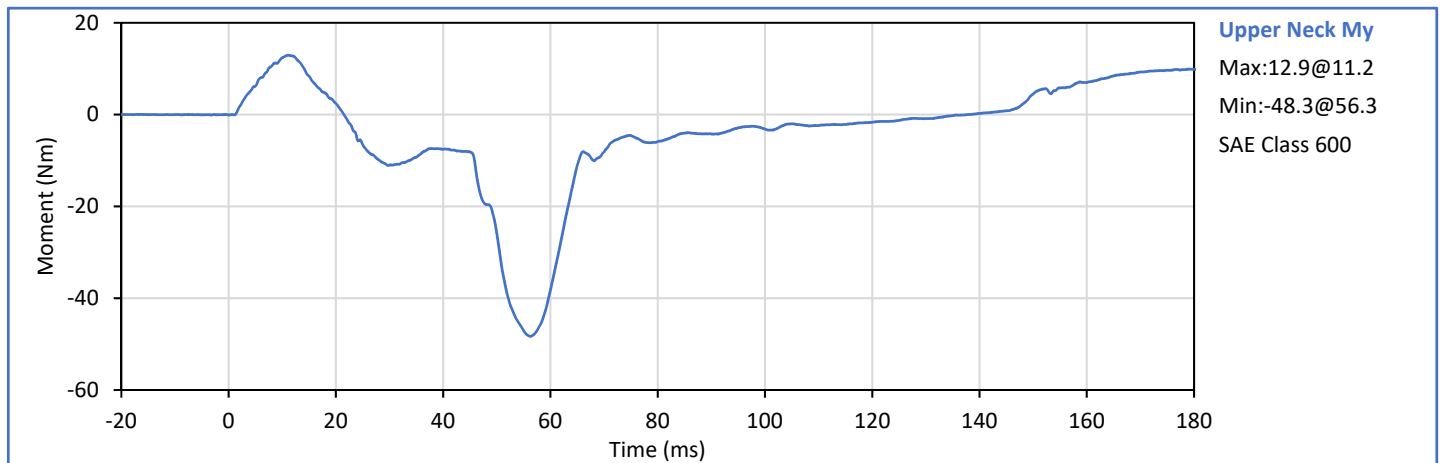
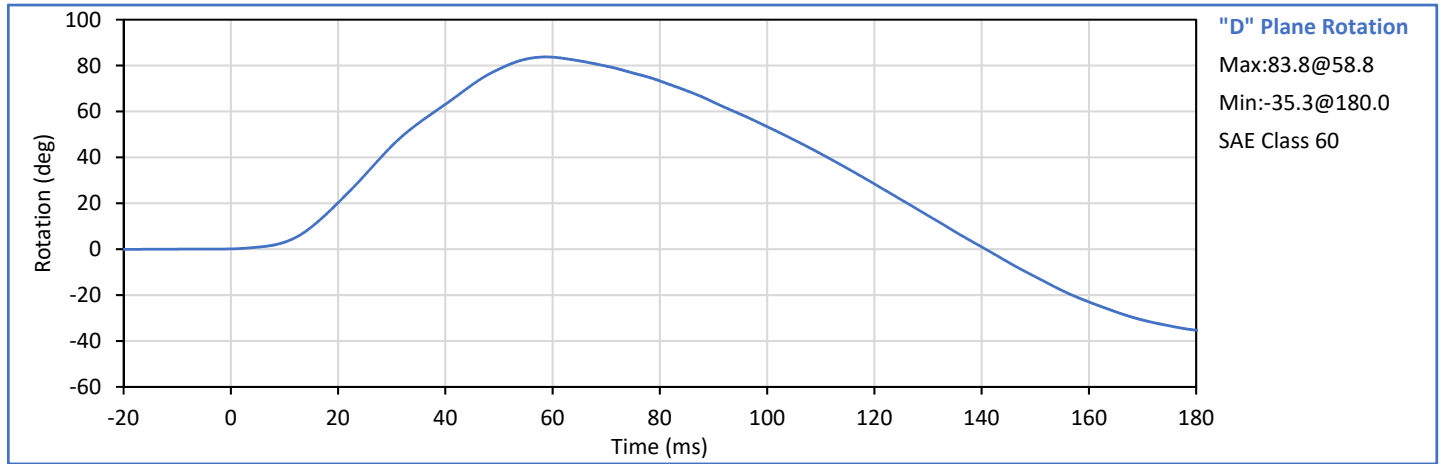
Technician: *J. Hernandez*
 J. Hernandez

Approved By: *P. Puzzuto*
 P. Puzzuto



ATD Serial No.: 044

Test Date: 2018-08-07



APPENDIX D
INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.3.1

Test Equipment and Instrumentation Calibration Data

A.T.D. Serial Number 044

08/13/18

2018 Mercedes-Benz GLC 300 5-Door MPV

Channel	Location	Axis	Sensor S/N	MFR	Model	Units
1	Head Acceleration	X	P49240	Endevco	7264C-2k	g
2	Head Acceleration	Y	03J01-R11	Entran	EGEB6Q-2k	g
3	Head Acceleration	Z	03E21-M14	Entran	EGEB6Q-2k	g
4	Upper Neck Force	X	212 Fx	R.A. Denton	3303	N
5	Upper Neck Force	Y	212 Fy	R.A. Denton	3303	N
6	Upper Neck Force	Z	212 Fz	R.A. Denton	3303	N
7	Upper Neck Moment	X	212 Mx	R.A. Denton	3303	Nm
8	Upper Neck Moment	Y	212 My	R.A. Denton	3303	Nm
9	Upper Neck Moment	Z	212 Mz	R.A. Denton	3303	Nm
10	Lower Neck Force	X	93 Fx	R.A. Denton	3303	N
11	Lower Neck Force	Y	93 Fy	R.A. Denton	3303	N
12	Lower Neck Force	Z	93 Fz	R.A. Denton	3303	N
13	Lower Neck Moment	X	93 Mx	R.A. Denton	3303	Nm
14	Lower Neck Moment	Y	93 My	R.A. Denton	3303	Nm
15	Lower Neck Moment	Z	93 Mz	R.A. Denton	3303	Nm