

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

**NISSAN MOTOR COMPANY, LTD
2005 NISSAN TITAN LE
4-DOOR TRUCK**

NHTSA NUMBER: M55207TWG2

**PREPARED BY:
KARCO ENGINEERING, LLC
9270 HOLLY ROAD
ADELANTO, CALIFORNIA 92301**



JUNE 27, 2005

FINAL REPORT

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Date of Acceptance

COTR, NCAP Frontal Impact Program

Date of Acceptance

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16. Abstract			
A static side airbag deployment was conducted on a 2005 Nissan Titan LE 4-Door Truck at KARCO Engineering, LLC on 6/27/2005. This test was conducted to obtain data indicant of TWG Side Airbag Out-of-Position Injury criteria.			
Measurement Description	Units	Threshold	Hybrid III 6-Year-Old ATD
Head Injury Criteria (HIC ₁₅)		700	1.8
Max. Thorax Accel. (3 msec clip)	G's	60	8.7
17. Key Words		18. Distribution Statement	
TWG Occupant Out-of-Position Test Section 3.3.5.1 New Car Assessment Program (NCAP) 2005 Nissan Titan LE 4-Door Truck NHTSA No. M55207TWG2		Copies of this report available from: NHTSA Technical Reference Division National Highway Traffic Safety Admin. 400 Seventh St., SW, Room 5111 Washington, D.C. 20590	
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SECTION 1

PURPOSE AND SUMMARY OF TEST M55207TWG2

1.1 PURPOSE

This occupant out-of-position injury test is part of the Occupant Injury Risk from Deploying Side Airbags Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-01-D-02055. 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 seat mounted torso and roof rail mounted curtain airbag deployment in a 2005 Nissan Titan LE 4-Door Truck with an out-of-position Hybrid III 6 Year-Old Child dummy were evaluated. The test was performed at Karco Engineering, LLC on June 27, 2005. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

Two high speed digital cameras were used to document the torso and curtain airbag deployment. Camera locations and other pertinent camera information can be found on Data Sheet No.1 and Data Sheet No.6.

One Part 572N, Hybrid III 6-Year-Old child anthropomorphic test device (ATD), was placed in the right front passenger seat, positioned 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 ATD was instrumented with head, chest and pelvic triaxial accelerometers, a chest displacement potentiometer, and a six-axis upper neck transducer.

Sixteen (16) channels of data were recorded using an on-board data acquisition system. Appendix A contains Photographs. Appendix B contains dummy response data traces. Appendix C contains the Instrumentation Data Channel Assignments.

The passenger side doors remained closed during the deployment and were operable after the deployment.

The Hybrid III 6 Year-Old Child Dummy's visible contact points were as follows: The torso airbag contacted the middle and lower portion of the ATD's back. The curtain airbag contacted the top of the ATD's head.

Out of Position Occupant injury data is contained in table below.

OUT OF POSITION OCCUPANT DATA SUMMARY

ATD Position	HIC ₁₅	Clip (g)	Chest Defl. (mm)
Front Passenger	1.8	8.7	1.3

Orientation of the Hybrid III 6-Year-old Child Dummy was in the inboard facing position leaning against the passenger door. The CG of the head was centered with the deploying trajectory of the airbag. The lower legs were extended. Synthetic foam was used to raise the dummy. 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 and curtain Airbags.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck NHTSA No.: M55207TWG2
Test Program: TWG Testing (Inboard Facing Hybrid III 6 Yr. Old) Test Date: 6/27/05

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	$=(tf - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

* Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1

TEST SUMMARY

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck NHTSA No.: M55207TWG2

Test Program: TWG Testing (Inboard Facing Hybrid III 6 Yr. Old) Test Date: 6/27/05

TEST DUMMY INFORMATION

Description	Passenger Seat Inboard Facing
Dummy Type / Serial No.	027
Head Contact	Curtain Airbag
Chest Contact	Torso Airbag
Abdomen Contact	Torso Airbag
Pelvis	No
Left Knee Contact	No
Right Knee Contact	No

16mm MOVIE COVERAGE

High Speed Digital	2
Total	2

DATA CHANNELS

Child ATD Sensors	16
Belt Assessment Sensors	0
Vehicle Structure Accelerometers	0
Total	16

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck NHTSA No.: M55207TWG2

Test Program: TWG Testing (Inboard Facing Hybrid III 6 Yr. Old) Test Date: 6/27/05

TEST VEHICLE INFORMATION

Make	Nissan
Model	Titan LE
Body Style	4-Door Truck
NHTSA No.	M55207TWG2
VIN	1N6AA07A05N506256
Color	Deep Water
Delivery Date	2/11/2005
Odometer Reading (mile)	57
Dealer	Soutars
Transmission	5-Speed Automatic
Final Drive	Rear
Type/Number Cylinders	V8
Engine Displacement (L)	5.6
Engine Placement	Longitudinal

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Driver Side Torso Airbag	Yes
Driver Side Curtain Airbag	Yes
Front Pass. Front Airbag	Yes
Front Pass. Side Airbag	Yes
Front Pass. Curtain Airbag	Yes
Power Brakes	Yes
Power Steering	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
Tilt Steering Wheel	Yes
Power Windows	Yes
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Nissan Motor Company, Ltd.	GVWR (kg)	2913
Date of Manufacture	Oct-04	GAWR Front (kg)	1497
		GAWR Rear (kg)	1724

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	245	245
Recommend Tire Size	P265/70R18	P265/70R18
Tire Size on Vehicle	P265/70R18	P265/70R18
Tire Manufacturer	Goodyear	Goodyear

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket		
Number of Occupants	2	3		3
Capacity Wt. (VCW) (kg)				635
Cargo Weight (RCLW) (kg)				136

* Vehicle had undergone New Car Assessment Program Frontal Impact Testing on February 15, 2005

DATA SHEET NO. 3

TEST VEHICLE INFORMATION

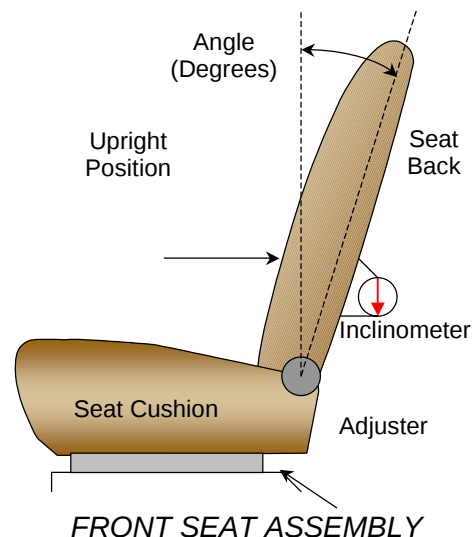
Test Vehicle: 2005 Nissan Titan LE 4-Door Truck NHTSA No.: M55207TWG2
Test Program: TWG Testing (Inboard Facing Hybrid III 6 Yr. Old) Test Date: 6/27/05

NOMINAL DESIGN RIDING POSITION

The passenger seat back is positioned to 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.

SEAT BACK ANGLES

Position	Deg.
Passenger w/ Dummy	10.0



SEAT FORE/AFT POSITIONS

The first or forward most position is counted as number one (1).

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Passenger Seat	234 mm	234 mm

DATA SHEET NO. 4

DUMMY POSITIONING INFORMATION

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck NHTSA No.: M55207TWG2
 Test Program: TWG Testing (Inboard Facing Hybrid III 6 Yr. Old) Test Date: 6/27/05

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Hybrid III 6-Year-Old Child Dummy	
		Length (mm)	Angle (°)
SA	Seat Back Angle		10.0
AMW	Side Airbag Module Diameter	25	
ABW	Side Airbag Width	300	
AML	Side Airbag Module Length	130	
ABL	Side Airbag Length	270	
AN	Top of Airbag Module to Head/Neck Junction	380	
HD	Head CG to Door Panel/ Window	145	
HSC	Head to Seat Back Centerline	405	
HB	Head to B-Pillar	305	
HZ	Head to Roof (Z)	220	
HHD	Head to Header	550	
ND	Nose to Dash	785	
NS	Nose to Seat Back	345	
NR	Nose to Header	590	
CD	Chest to Dash	795	
CS	Chest to Seat Back	255	
RACL	Right Arm to Seat Back Centerline	370	
LACL	Left Arm to Seat Back Centerline	135	
RA	Right Arm to Door Panel	90	
LA	Left Arm to Door Panel	111	
KK	Knee to Knee	115	
TT	Toe to Toe	90	
KSCR	Right Knee to Seat Cushion Centerline	230	
KSCL	Left Knee to Seat Cushion Centerline	113	
TSCR	Right Toe to Seat Cushion Centerline	225	
TSCL	Left Toe to Seat Cushion Centerline	120	

DATA SHEET NO. 5 - HYBRID III ATD INJURY CRITERIA AND SENSOR DATATest Vehicle: 2005 Nissan Titan LE 4-Door TruckNHTSA No.: M55207TWG2Test Program: TWG Testing (Inboard Facing HIII 6 Yr. Old)Test Date: 6/27/05**HEAD PEAK ACCELERATIONS**

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Head CG	X	G's	5.5	24.2	-3.9	49.7
Head CG	Y	G's	7.8	30.0	-7.8	22.9
Head CG	Z	G's	9.1	19.5	-5.6	13.1
Head CG Resultant	N/A	G's	10.1	19.6		

CHEST PEAK ACCELERATIONS

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	8.5	12.1	-3.6	27.6
Chest CG	Y	G's	16.6	6.7	-2.6	32.8
Chest CG	Z	G's	2.2	26.0	-2.6	11.4
Chest CG Resultant	N/A	G's	17.0	6.7		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	68.9	23.9	-47.7	6.4
Neck Force	Y	Newtons	149.6	14.2	-17.2	6.5
Neck Force	Z	Newtons	58.0	6.5	-357.0	28.2
Neck Force Resultant	N/A	Newtons	383.0	28.7		
Neck Moment	X	Nm	15.7	24.2	-8.6	11.6
Neck Moment	Y	Nm	6.7	173.6	-0.5	44.9
Neck Moment	Z	Nm	3.5	101.9	-1.2	46.9
Neck Moment Resultant	N/A	Nm	22.2	24.2		

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	2.4	25.6	-1.0	56.8
Pelvis	Y	G's	2.5	7.6	-2.3	11.7
Pelvis	Z	G's	3.1	12.0	-1.4	68.1
Pelvis Resultant	N/A	G's	3.7	12.0		

DATA SHEET NO. 5...(CONTINUED)Test Vehicle: 2005 Nissan Titan LE 4-Door TruckNHTSA No.: M55207TWG2Test Program: TWG Testing (Inboard Facing HIII 6 Yr. Old)Test Date: 6/27/05**HEAD INJURY CRITERIA (HIC15)**

Location	Passenger			
	HIC	T ¹	T ²	Avg G
Head CG	1.8	10.7	25.7	6.8

PRIMARY CHEST CLIP (3MSEC)

Location	Passenger		
	CLIP	T ¹	T ²
Chest CG	8.7	9.4	12.4

CHEST PEAK DEFLECTIONS

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Chest	X	MM	1.3	15.4	-0.4	9.3

DATA SHEET NO. 6**CAMERA LOCATIONS**Test Vehicle: 2005 Nissan Titan LE 4-Door Truck NHTSA No.: M55207TWG2Test Program: TWG Testing (Inboard Facing Hybrid III 6 Yr. Old) Test Date: 6/27/05

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Digital Side View	0	-2690	-1200	0.0	35	1000
2	High Speed Digital Front View	1260	-300	-1500	-2.0	17	1000

* Cameras aligned to the center of seat back as reference.

APPENDIX A

PHOTOGRAPHS



Figure A-1: Right Front $\frac{3}{4}$ View, As Received



MFD BY NISSAN MOTOR CO., LTD

DATE 10/04
GVWR 6422 LB
GAWR FR. 3300 LB
WITH P265/70R18 TIRES
18X8.0 RIMS AT 35 PSI
COLD SINGLE
GAWR RR. 3800 LB
WITH P265/70R18 TIRES
18X8.0 RIMS AT 35 PSI
COLD SINGLE

THIS VEHICLE CONFORMS TO
ALL APPLICABLE FEDERAL
MOTOR VEHICLE SAFETY
STANDARDS IN EFFECT ON
THE DATE OF MANUFACTURE
SHOWN ABOVE.
SEE OWNERS MANUAL FOR
ADDITIONAL INFORMATION.

1N6AA07A05N506256

TYPE:	TRUCK	384	L
MODEL:	PKELVK-EUN	OZ000	
COLOR	TRIM	TRANS	
B18	W	RE5R05A	
AXLE	ENGINE		
CC29	VK56DE	5552CC	



Figure A-2: Vehicle Certification Label



Figure A-3: Post-Test Right Front ¾ View of Frontal NCAP Test



Figure A-4: Post-Test Right Side View of Frontal NCAP Test



Figure A-5: Pre-Test Dummy Position, Left Side View



Figure A-6: Pre-Test Dummy Position, ¾ View

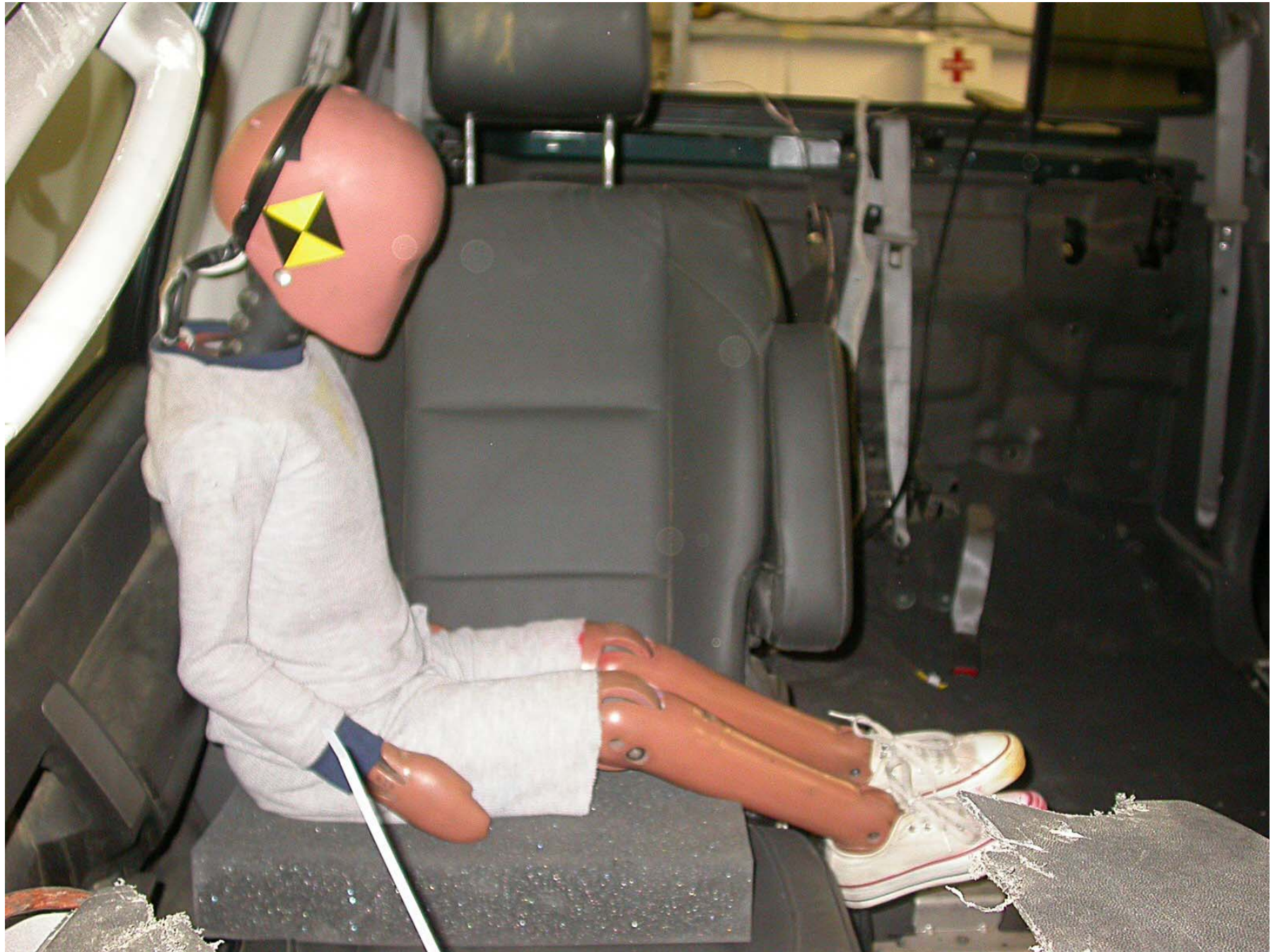


Figure A-7: Pre-Test Dummy Position, Front View



Figure A-8: Post-Test Dummy Position and Airbags, Left Side View



Figure A-9: Post-Test Airbags, Left Side View



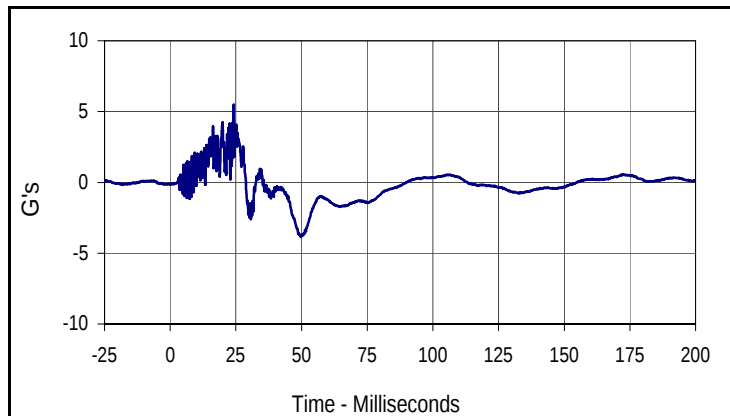
Figure A-10: Post-Test Airbags, Left Side Close-up View

APPENDIX B

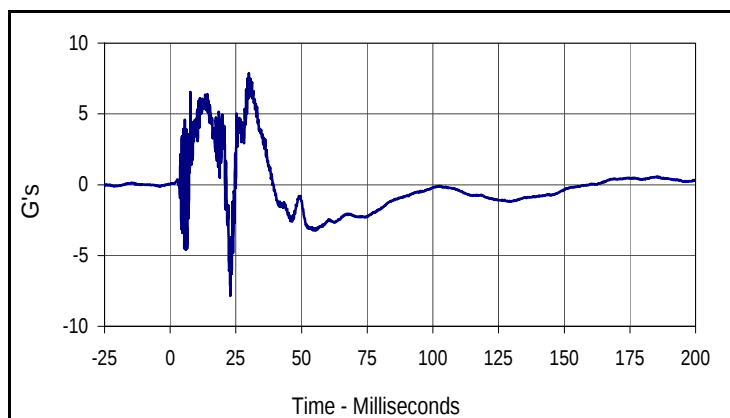
DATA PLOTS

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck
 Test Program: TWG Testing (Inboard Facing HIII 6 Yr. Old)

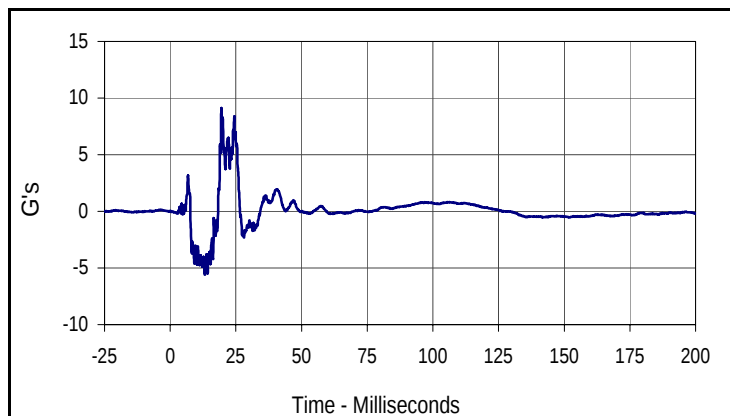
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 NHTSA No.: M55207TWG2



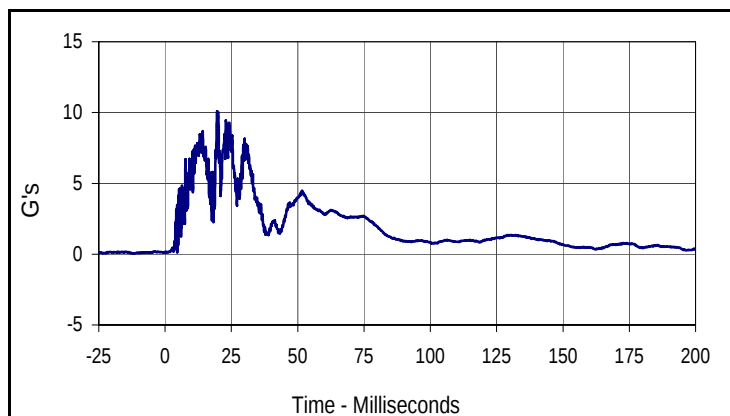
Curve Description			
Driver Head X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
5.5	24.2	-3.9	49.7



Curve Description			
Driver Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
7.8	30.0	-7.8	22.9



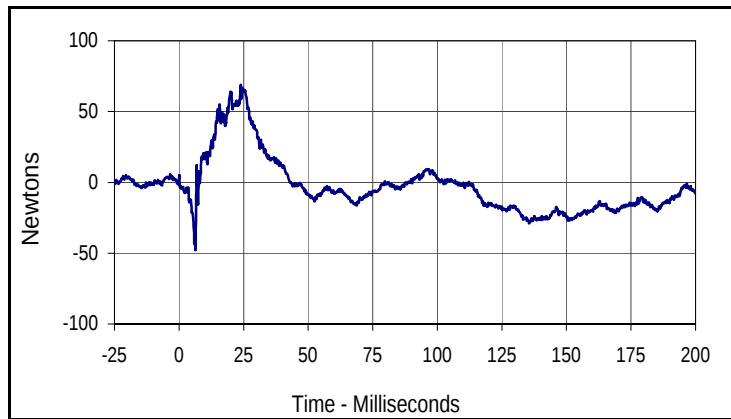
Curve Description			
Driver Head Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
9.1	19.5	-5.6	13.1



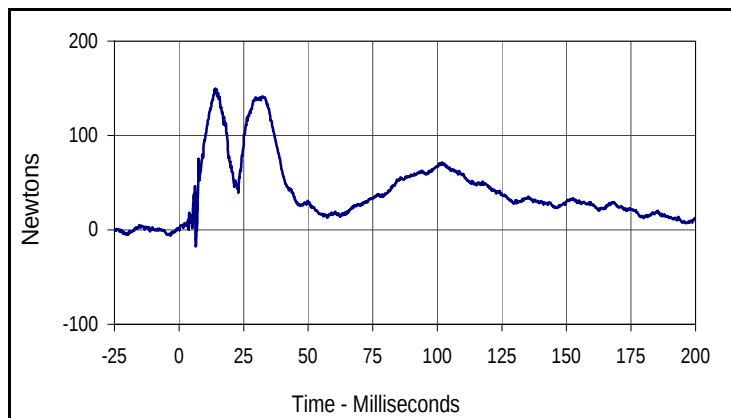
Curve Description			
Driver Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
10.1	19.6	0.1	1.0

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck
 Test Program: TWG Testing (Inboard Facing HIII 6 Yr. Old)

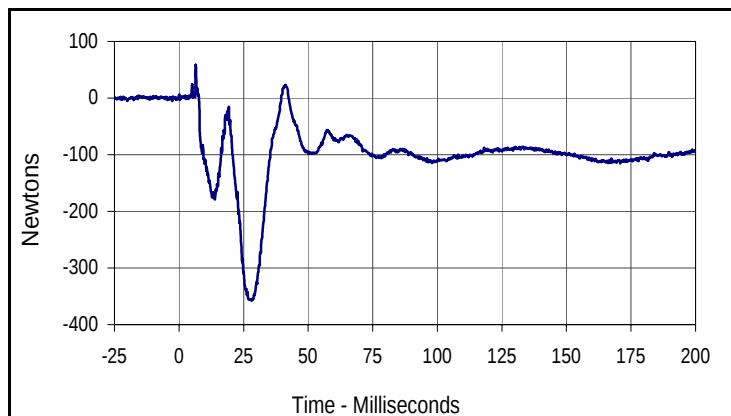
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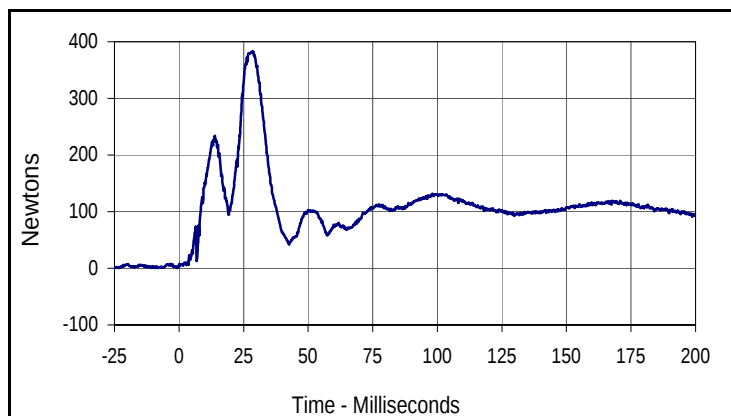
Curve Description			
Driver Upper Neck Force X			
CURNO	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
68.9	23.9	-47.7	6.4



Curve Description			
Driver Upper Neck Force Y			
CURNO	Type	SAE Class	Units
005	FIL	1000	Newtons
Max	Time	Min	Time
149.6	14.2	-17.2	6.5



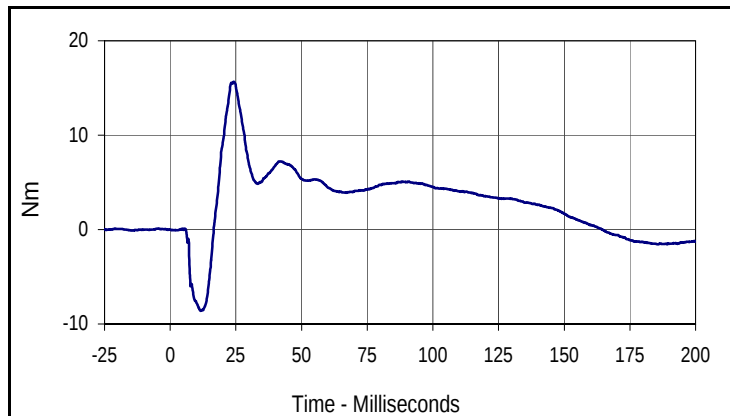
Curve Description			
Driver Upper Neck Force Z			
CURNO	Type	SAE Class	Units
006	FIL	1000	Newtons
Max	Time	Min	Time
58.0	6.5	-357.0	28.2



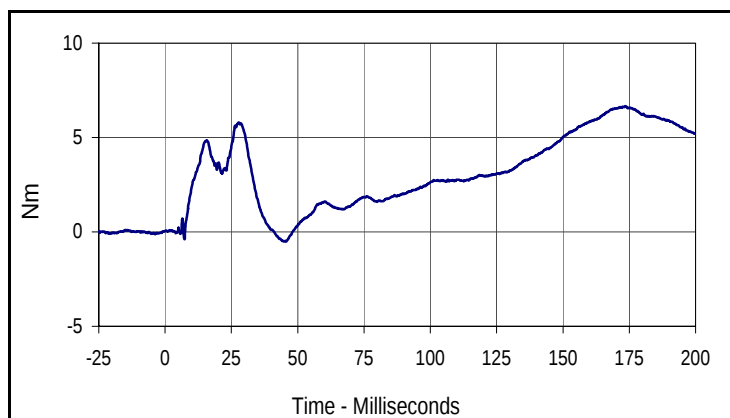
Curve Description			
Driver Upper Neck Force Resultant			
CURNO	Type	SAE Class	Units
004	RES	1000	Newtons
Max	Time	Min	Time
383.0	28.7	2.9	0.2

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck
 Test Program: TWG Testing (Inboard Facing HIII 6 Yr. Old)

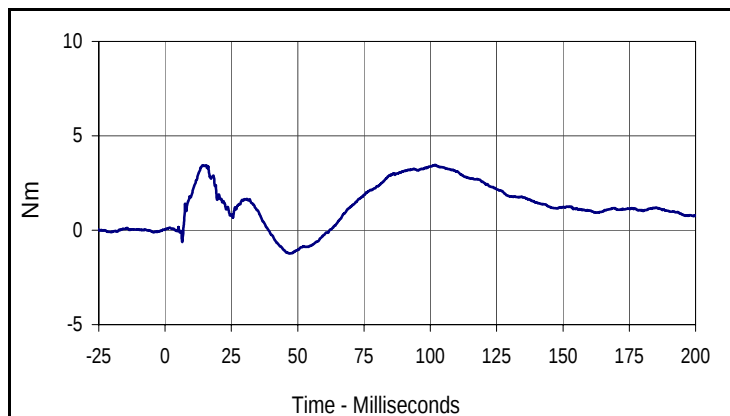
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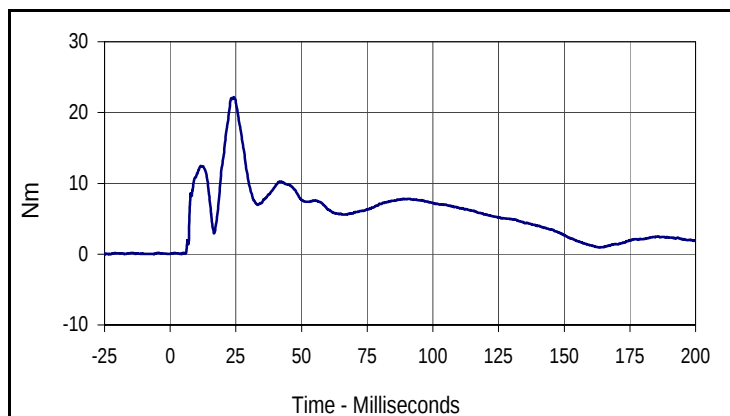
Curve Description			
Driver Upper Neck Moment X			
CURNO	Type	SAE Class	Units
007	FIL	600	Nm
Max	Time	Min	Time
15.7	24.2	-8.6	11.6



Curve Description			
Driver Upper Neck Moment Y			
CURNO	Type	SAE Class	Units
008	FIL	600	Nm
Max	Time	Min	Time
6.7	173.6	-0.5	44.9



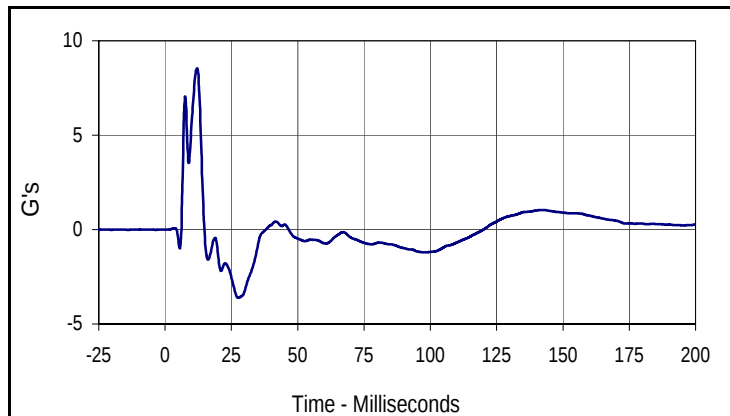
Curve Description			
Driver Upper Neck Moment Z			
CURNO	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
3.5	101.9	-1.2	46.9



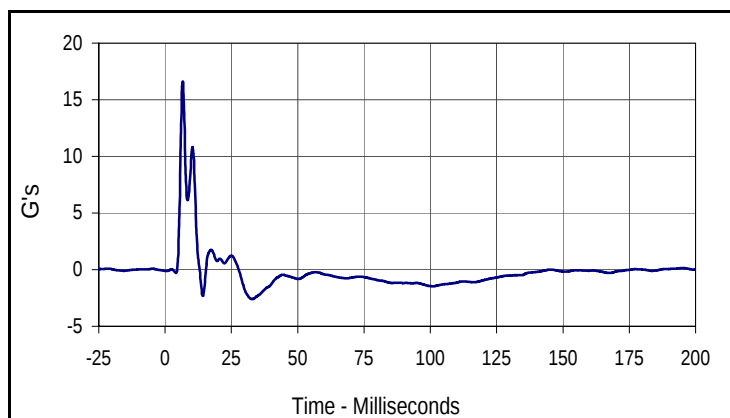
Curve Description			
Driver Upper Neck Moment Resultant			
CURNO	Type	SAE Class	Units
007	RES	600	Nm
Max	Time	Min	Time
22.2	24.2	0.0	4.4

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck
 Test Program: TWG Testing (Inboard Facing HIII 6 Yr. Old)

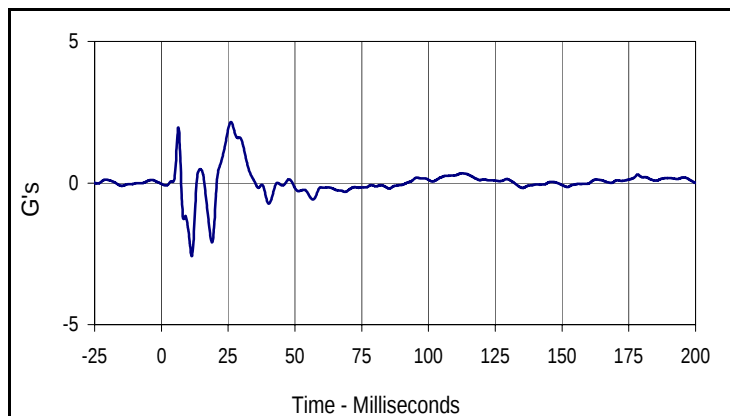
Test Date: 6/27/05
 NHTSA No.: M55207TWG2



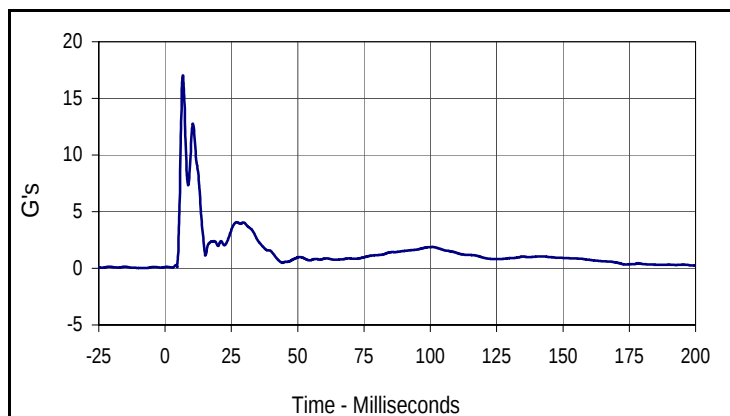
Curve Description			
Driver Chest X			
CURNO	Type	SAE Class	Units
010	FIL	180	G's
Max	Time	Min	Time
8.5	12.1	-3.6	27.6



Curve Description			
Driver Chest Y			
CURNO	Type	SAE Class	Units
011	FIL	180	G's
Max	Time	Min	Time
16.6	6.7	-2.6	32.8



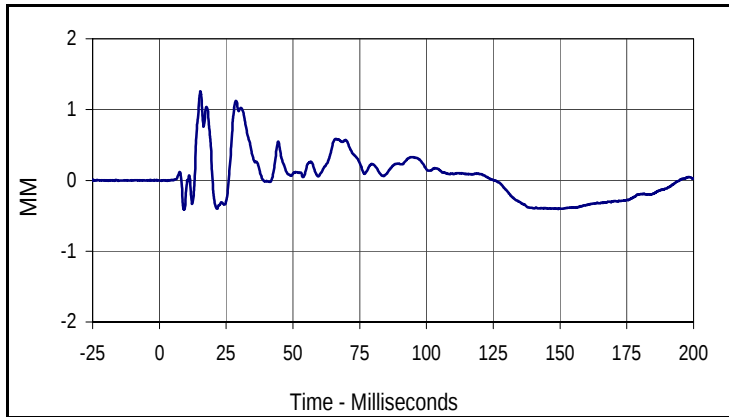
Curve Description			
Driver Chest Z			
CURNO	Type	SAE Class	Units
012	FIL	180	G's
Max	Time	Min	Time
2.2	26.0	-2.6	11.4



Curve Description			
Driver Chest Resultant			
CURNO	Type	SAE Class	Units
010	RES	180	G's
Max	Time	Min	Time
17.0	6.7	0.1	2.9

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck
Test Program: TWG Testing (Inboard Facing HIII 6 Yr. Old)

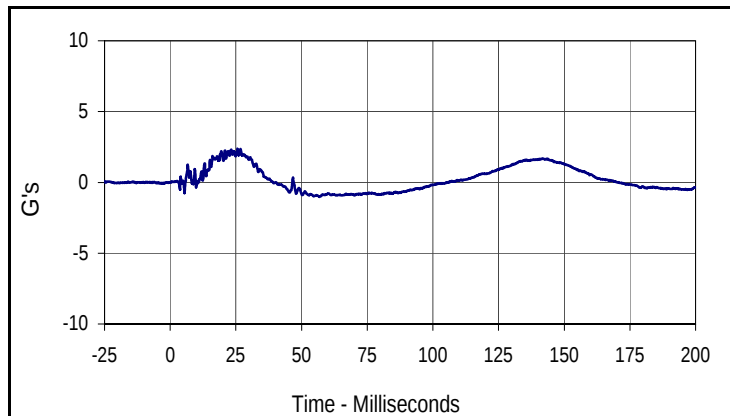
Test Date: 6/27/05
NHTSA No.: M55207TWG2



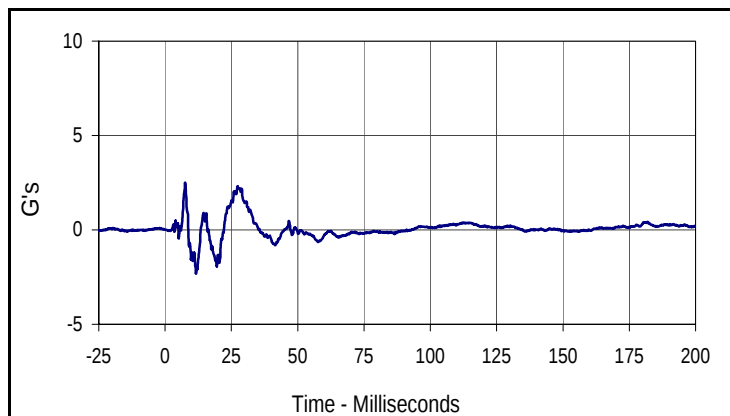
Curve Description			
Driver Chest Deflection			
CURNO	Type	SAE Class	Units
013	FIL	600	MM
Max	Time	Min	Time
1.3	15.4	-0.4	9.3

Test Vehicle: 2005 Nissan Titan LE 4-Door Truck
 Test Program: TWG Testing (Inboard Facing HIII 6 Yr. Old)

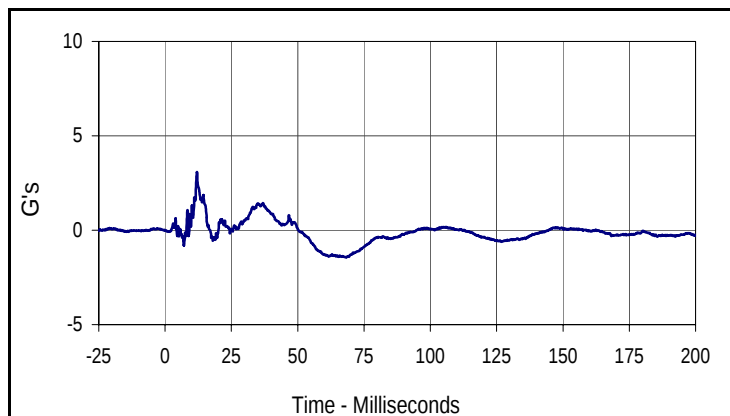
Test Date: 6/27/05
 NHTSA No.: M55207TWG2



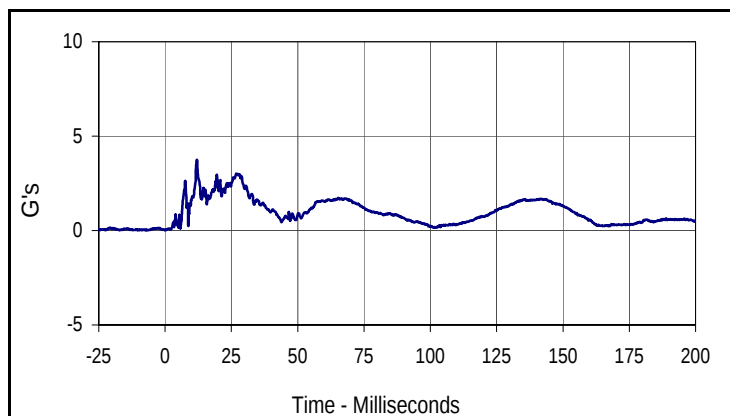
Curve Description			
Driver Pelvis X			
CURNO	Type	SAE Class	Units
014	FIL	1000	G's
Max	Time	Min	Time
2.4	25.6	-1.0	56.8



Curve Description			
Driver Pelvis Y			
CURNO	Type	SAE Class	Units
015	FIL	1000	G's
Max	Time	Min	Time
2.5	7.6	-2.3	11.7



Curve Description			
Driver Pelvis Z			
CURNO	Type	SAE Class	Units
016	FIL	1000	G's
Max	Time	Min	Time
3.1	12.0	-1.4	68.1



Curve Description			
Driver Pelvis Resultant			
CURNO	Type	SAE Class	Units
014	RES	1000	G's
Max	Time	Min	Time
3.7	12.0	0.0	0.1

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG Testing (Inboard Facing HIII 6 Yr. Old)
Instrumentation Data Channel Assignments
A.T.D. Serial Number 027
6/27/05
2005 Nissan Titan LE 4-Door Truck

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD, PRIMARY	X	027HDX	Accel.,1/2 bridge	Endevco	7264-2000	G
2	HEAD, PRIMARY	Y	027HDY	Accel.,1/2 bridge	Endevco	7264-2000	G
3	HEAD, PRIMARY	Z	027HDZ	Accel.,1/2 bridge	Endevco	7264-2000	G
4	UPPER NECK FORCE	X	027UNFX	Load cell, six axis neck	R. A. Denton	IF-234	N
5	UPPER NECK FORCE	Y	027UNFY	Load cell, six axis neck	R. A. Denton	IF-234	N
6	UPPER NECK FORCE	Z	027UNFZ	Load cell, six axis neck	R. A. Denton	IF-234	N
7	UPPER NECK MOMENT	X	027UNMX	Load cell, six axis neck	R. A. Denton	IF-234	Nm
8	UPPER NECK MOMENT	Y	027UNMY	Load cell, six axis neck	R. A. Denton	IF-234	Nm
9	UPPER NECK MOMENT	Z	027UNMZ	Load cell, six axis neck	R. A. Denton	IF-234	Nm
10	CHEST , PRIMARY	X	027CHX	Accel., Full Bridge	Entran	2000JF	G
11	CHEST , PRIMARY	Y	027CHY	Accel., Full Bridge	Entran	2000JF	G
12	CHEST , PRIMARY	Z	027CHZ	Accel., Full Bridge	Entran	2000JF	G
13	CHEST DISPLACEMENT	X	027CP	Rotary Pot Chest	Servo	14CBI	MM
14	PELVIS, PRIMARY	X	027PELX	Accel., Full Bridge	Entran	2000JF	G
15	PELVIS, PRIMARY	Y	027PELY	Accel., Full Bridge	Entran	2000JF	G
16	PELVIS, PRIMARY	Z	027PELZ	Accel., Full Bridge	Entran	2000JF	G