LABORATORY TEST REPORT FOR

S8

35 mph 45 Degree Impact

1994 Nissan Sentra 4-Door Sedan

53 Foot Box Trailer

PREPARED FOR:

Engineering Institute

13045 West Highway 62

Farmington, AR 72730

TEST REPORT NUMBER: TR-P28178-01-NC

December 30, 2008

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SECTION 1
TEST PROCEDURE

A passenger car-to-trailer impact was conducted on December 30, 2008 by KARCO Engineering, LLC, using a 1994 Nissan Sentra 4-door sedan and a 53 foot tractor supported box trailer. The box trailer was fitted with an underride guard on both sides. Upon client request the test vehicle was ballasted to a test weight of 1362.2 kg (3003 lbs). The test was conducted at a velocity of 57.0 km/h (35.4 mph) with the test vehicle at a target impact angle of 135° to the tractor and trailer (45° to a perpendicular impact). The tractor and trailer were positioned so that a point 5.8 m (19.0 ft.) from the front of the trailer was aligned over the center of the track. The test vehicle impacted the trailer at the left (driver's) side front bumper corner approximately 4.5 m (14.7 ft.) from the front of the trailer.

The test vehicle contained one instrumented Part 572O 5th percentile adult female anthropomorphic test device (ATD) (Serial No. 118). Test positioning of the ATD was performed by the client. No ATD clearance measurements were taken by KARCO. The test vehicle was also instrumented with two tri-axial accelerometers (x, y, and z axes, primary and redundant) located at the rear center tunnel of the vehicle. Data plots of the dummy and vehicle instrumentation are presented in Appendix B.

The test was documented by four (4) high-speed video and two (2) real time video cameras. High-speed video cameras were positioned to the left and right sides of the test vehicle, behind the trailer, and overhead of the impact. One real time camera recorded the test vehicle in-run, and one recorded the left side of the test vehicle. Pre- and post-test photographs of the test vehicle, trailer and test setup are presented in Appendix A.

SECTION 2

DATA SHEETS

Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

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	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	29.573
Pressure	Tire Pressures	lbf/in^2	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	^oF	^oC	=(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 1

TEST VEHICLE INFORMATION

Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

TEST VEHICLE INFORMATION

Project Number	P28178-01
Make	Nissan
Model	Sentra
Body Style	4-Door Sedan
VIN	1N4EB31P7RC830263
Color	Blue
Delivery Date	12/20/2008
Transmission	3-Speed Automatic
Final Drive	Front
Type / No. of Cylinders	Inline 4
Engine Displacement (L)	1.6
Engine Placement	Transverse
Roof Rack	No
Sunroof / T-Top	No
Tinted Glass	No
Traction Control	No
Power Brakes	Yes
Front Disc	Yes
Rear Disc	No

Anti-Lock Brakes	No
All Wheel Drive	No
Power Steering	Yes
Driver Front Airbag	No
Driver Side Airbag	No
Driver Head Airbag	No
Driver Curtain Airbag	No
Pass. Front Airbag	No
Pass. Side Airbag	No
Pass. Head Airbag	No
Pass. Curtain Airbag	No
Pre-Tensioners	No
Bucket Seats	Yes
Air Conditioning	Yes
AM/FM Cassette	Yes
Tilt Steering	Yes
Automatic Door Locks	No
Power Windows	Yes
Power Seats	No

DATA FROM MANUFACTURER'S LABEL

Manufactured By	Nissan Motor Co.
Date of Manufacture	May-94

GVWR (kg)	3318
GAWR Front (kg)	1918
GAWR Rear (kg)	1653

TIRE INFORMATION

Description	Front	Rear
Cold Tire Pressure	32 psi	29 psi
Tire Size	P175/70R13	P175/70R13
Tire Manufacturer	Regent	Regent
Tire Model	Sigma E	Sigma E
Treadware Rating	560	560
Traction Rating	A	A
Temperature Rating	B	B
Tire Plies - Sidewall	2 Polyester	2 Polyester
Tire Plies - Body	2 Steel, 1 Polyester	2 Steel, 1 Polyester
Load Index / Speed Symbol	82S	82S

DATA SHEET 1 … (CONTINUED)

TEST VEHICLE INFORMATION

Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

TEST VEHICLE WEIGHTS

	As-Received (lbs)			As-Tested (lbs)		
	Front	Rear	Total	Front	Rear	Total
Left	750	455		791	685	
Right	796	431		844	683	
Ratio	63.6	36.4	100.0	54.4	45.6	100.0
Total	1,546	886	2,432	1,635	1,368	3,003

	As-Received (kg)			As-Tested (kg)		
	Front	Rear	Total	Front	Rear	Total
Left	340.2	206.4		358.8	310.7	
Right	361.1	195.5		382.8	309.8	
Ratio	63.6	36.4	100.0	54.4	45.6	100.0
Total	701.3	401.9	1,103.2	741.6	620.5	1,362.2

Description	Value	
	lbs	kg
Weight of 1 P572O ATD	119	54.0
Weight added to Right Front Seat	170	77.1
Weight added to Left Rear Seat	170	77.1
Weight Added to Right Rear Seat	130	59.0
Total Occupant Weight Added	589	267.2

DATA SHEET 2

TRACTOR AND TRAILER INFORMATION

Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

TRACTOR AND TRAILER WEIGHTS

	Tractor Weight (lbs)			Trailer Weight (lbs)		
	Front	Rear	Total	Drive Axle	Trailer Axle	Total
Left				5,480	9,060	
Right						
Ratio				37.7	62.3	100.0
Total			22,150*	5,480	9,060	14,540

	Tractor Weight (kg)			Trailer Weight (kg)		
	Front	Rear	Total	Drive Axle	Trailer Axle	Total
Left				2,485.7	4,109.6	
Right						
Ratio				37.7	62.3	100.0
Total			10,047.2*	2,485.7	4,109.6	6,595.3

* -Approximate Weight

DATA SHEET 3

TEST VEHICLE CRUSH MEASUREMENTS

Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

Description	Pre-Test	Post-Test	Difference
Bumper Crush Zone 1	-80	-154	-75
Bumper Crush Zone 2	-18	-81	-63
Bumper Crush Zone 3	-3	-55	-52
Bumper Crush Zone 4	-2	-44	-41
Bumper Crush Zone 5	-18	-49	-31
Bumper Crush Zone 6	-80	-98	-17
Grill Crush Zone 1	-182	*	*
Grill Crush Zone 2	-135	*	*
Grill Crush Zone 3	-120	*	*
Grill Crush Zone 4	-121	*	*
Grill Crush Zone 5	-132	*	*
Grill Crush Zone 6	-187	*	*
A1	-213	-1488	-1275
A2	-158	-1461	-1303
A3	-140	-1273	-1133
A4	-141	-1069	-928
A5	-157	-849	-692
A6	-212	-689	-477
B1	-309	-1564	-1255
B2	-307	-1473	-1166
B3	-306	-1308	-1002
B4	-305	-1090	-785
B5	-304	-885	-581
B6	-305	-722	-417
C1	-612	-1763	-1151
C2	-613	-1575	-962
C3	-610	-1384	-773
C4	-610	-1216	-605
C5	-610	-1045	-435
C6	-611	-880	-269
D1	-913	-1648	-735
D2	-915	-1635	-720
D3	-914	-1575	-661
D4	-917	-1408	-490
D5	-915	-1226	-311
D6	-915	-1060	-145

NOTE: All measurements are in the X direction from the front of the vehicle (0).

* - Measurement unavailable due to test vehicle damage.

DATA SHEET 3 … (CONTINUED)

TEST VEHICLE CRUSH MEASUREMENTS

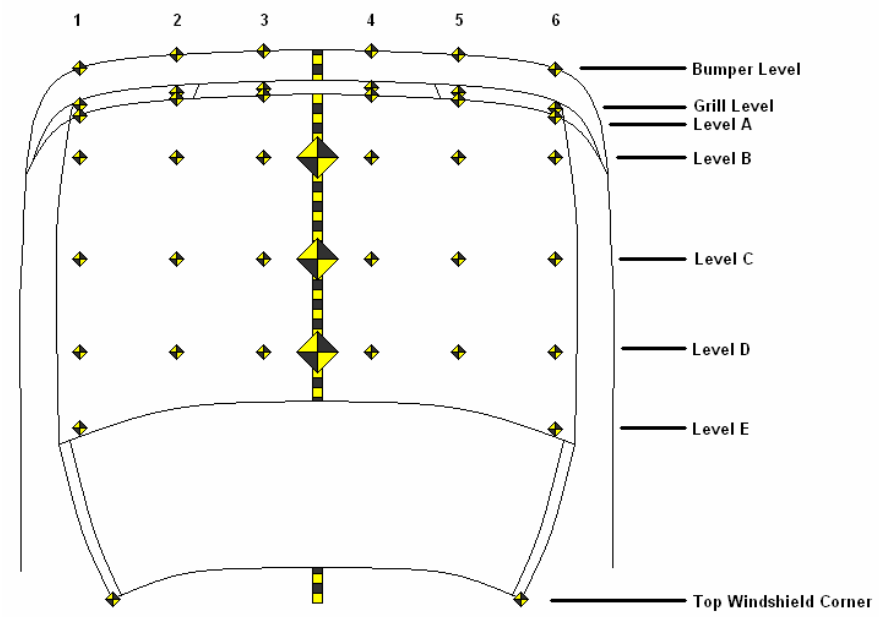
Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

Description	Pre-Test	Post-Test	Difference
E1	-1221	-2484	-1262
E6	-1219	*	*
Right Side 1 Foot Target	-305	-309	-4
Right Side 2 Foot Target	-613	-614	-1
Right Side 3 Foot Target	-914	-915	-1
Right Side 4 Foot Target	-1222	-1221	0
Right Side 5 Foot Target	-1524	-1521	3
Right Side Top Windshield Corner	-1980	-1936	44
Left Side 1 Foot Target	-305	*	*
Left Side 2 Foot Target	-611	*	*
Left Side 3 Foot Target	-916	*	*
Left Side 4 Foot Target	-1225	*	*
Left Side 5 Foot Target	-1522	-1608	-85
Left Side Top Windshield Corner	-1974	-1918	56

Note: All measurements are in the X direction from the front of the vehicle (0).

* - Measurement unavailable due to test vehicle damage.



DATA SHEET 4

ATD INJURY AND SENSOR DATA

Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Head CG	X	g	0.4	58.8	-20.9	124.3
Head CG	Y	g	8.5	141.9	-2.8	226.5
Head CG	Z	g	32.0	126.0	-1.8	242.8
Head CG Resultant	n/a	g	38.3	125.8		

CHEST PEAK ACCELERATIONS

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Chest CG	X	g	1.2	267.9	-29.3	116.4
Chest CG	Y	g	14.9	116.9	-4.9	213.7
Chest CG	Z	g	5.3	140.3	-5.8	219.8
Chests CG Resultant	n/a	g	33.0	116.5		

FEMUR PEAK FORCES

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Left Femur	Z	N	910.6	163.3	-3042.5	106.0
Right Femur	Z	N	860.8	115.0	-3047.1	141.3

HEAD INJURY CRITERIA (HIC_{36})

Location	HIC_{36}	T^1	T^2	Avg g
Head CG	196.9	114.2	148.9	31.7

HEAD INJURY CRITERIA (HIC_{15})

Location	HIC_{15}	T^1	T^2	Avg g
Head CG	117.0	121.1	1361.0	36.0

CHEST CLIP (3 MSEC)

Location	HIC_{15}	T^1	T^2
Chest CG	117.0	121.1	136.1

DATA SHEET 4 ... (CONTINUED)

ATD INJURY AND SENSOR DATA

Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Neck Force	X	N	5.7	60.0	-683.4	125.2
Neck Force	Y	N	249.5	147.4	-85.1	244.5
Neck Force	Z	N	1151.9	122.3	-63.5	244.6
Neck Force Resultant	n/a	N	1351.3	122.3		
Neck Moment	X	Nm	17.1	130.3	-8.4	108.2
Neck Moment	Y	Nm	43.4	150.8	-30.2	121.4
Neck Moment	Z	Nm	12.7	147.5	-6.8	188.0
Neck Moment Resultant	n/a	Nm	46.4	150.4		

CHEST PEAK DEFLECTIONS

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Chest	X	mm	0.1	33.2	-12.5	125.4

VEHICLE ACCELEROMETER PEAK ACCELERATIONS

Location	Axis	Units	Max	Time	Min	Time
Vehicle Center Tunnel	X	g	0.1	0.0	-18.2	85.6
Vehicle Center Tunnel	Y	g	2.1	131.9	-6.5	90.0
Vehicle Center Tunnel	Z	g	5.8	156.1	-7.9	136.5
Vehicle Center Tunnel Res.	n/a	g	19.7	90.3		
Vehicle Center Tunnel Redundant	X	g	0.1	0.0	-18.3	84.1
Vehicle Center Tunnel Redundant	Y	g	2.3	224.9	-6.8	90.0
Vehicle Center Tunnel Redundant	Z	g	7.3	86.4	-6.9	136.6
Vehicle Center Tunnel Redundant Res.	n/a	g	20.1	85.8		

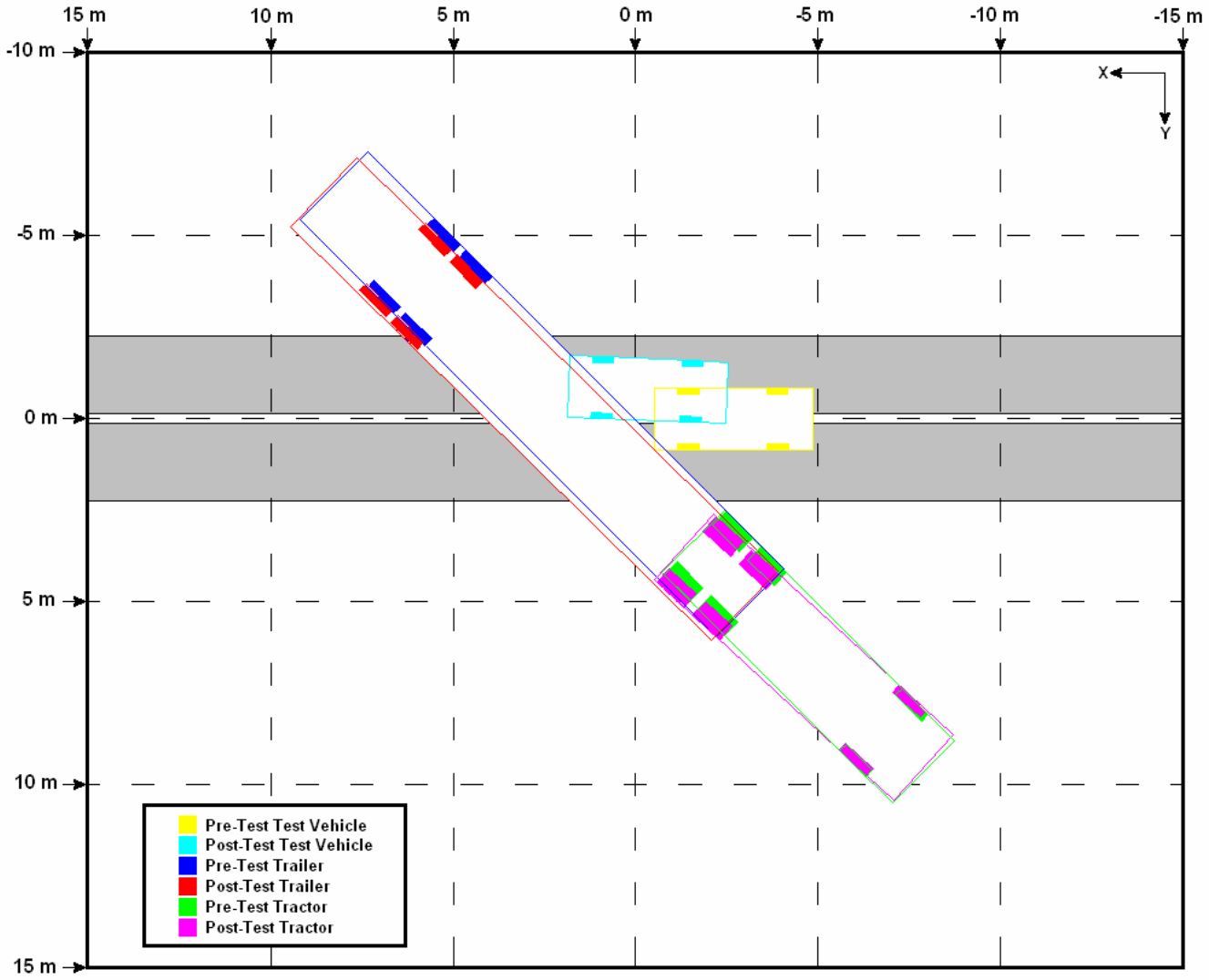
DATA SHEET 5

PRE- AND POST-TEST LOCATION DATA

Test Vehicle: 1994 Nissan Sentra 4-Door Sedan Project No.: P28178-01

Test Program: S8 35 mph 45 Degree Impact Test Date: 12/30/08

OVERHEAD ILLUSTRATION



APPENDIX A
PHOTOGRAPHS

FIGURE 1. Test Vehicle, As Received

FIGURE 2. Test Vehicle, As Received

FIGURE 3. Test Vehicle Manufacturer's Label

FIGURE 4. Pre-Test Left Rear ¾ View of Test Trailer

FIGURE 5. Pre-Test Impact Area of Test Trailer

FIGURE 6. Pre-Test Left Side View of Test Trailer

FIGURE 7. Pre-Test Left Front ¾ View of Test Trailer

FIGURE 8. Pre-Test Impact Area of Test Trailer

FIGURE 9. Pre-Test Front View Test Vehicle

FIGURE 10. Pre-Test Right Font ¾ View of Test Vehicle

FIGURE 11. Pre-Test Left Rear ¾ View of Test Vehicle

FIGURE 12. Pre-Test Exterior View of Windshield

FIGURE 13. Pre-Test Interior View of Windshield

FIGURE 14. Pre-Test Driver's Side Occupant Compartment

FIGURE 15. Pre-Test Passenger's Side Occupant Compartment

FIGURE 16. Test Set-up

FIGURE 17. Test Set-up

FIGURE 18. Test Set-up

FIGURE 19. Test Set-up

FIGURE 20. Test Set-up

FIGURE 21. Test Set-up

FIGURE 22. Test Set-up

FIGURE 23. Test Set-up Impact Area

FIGURE 24. Test Set-up Impact Area

FIGURE 25. Test Set-up Impact Area

FIGURE 26. Test Set-up Impact Area

FIGURE 27. Post-Test

FIGURE 28. Post-Test

FIGURE 29. Post-Test

FIGURE 30. Post-Test

FIGURE 31. Post-Test

FIGURE 32. Post-Test

FIGURE 33. Post-Test of Impact Area

FIGURE 34. Post-Test of Impact Area

FIGURE 35. Post-Test of Impact Area

FIGURE 36. Post-Test of Impact Area

FIGURE 37. Post-Test of Impact Area

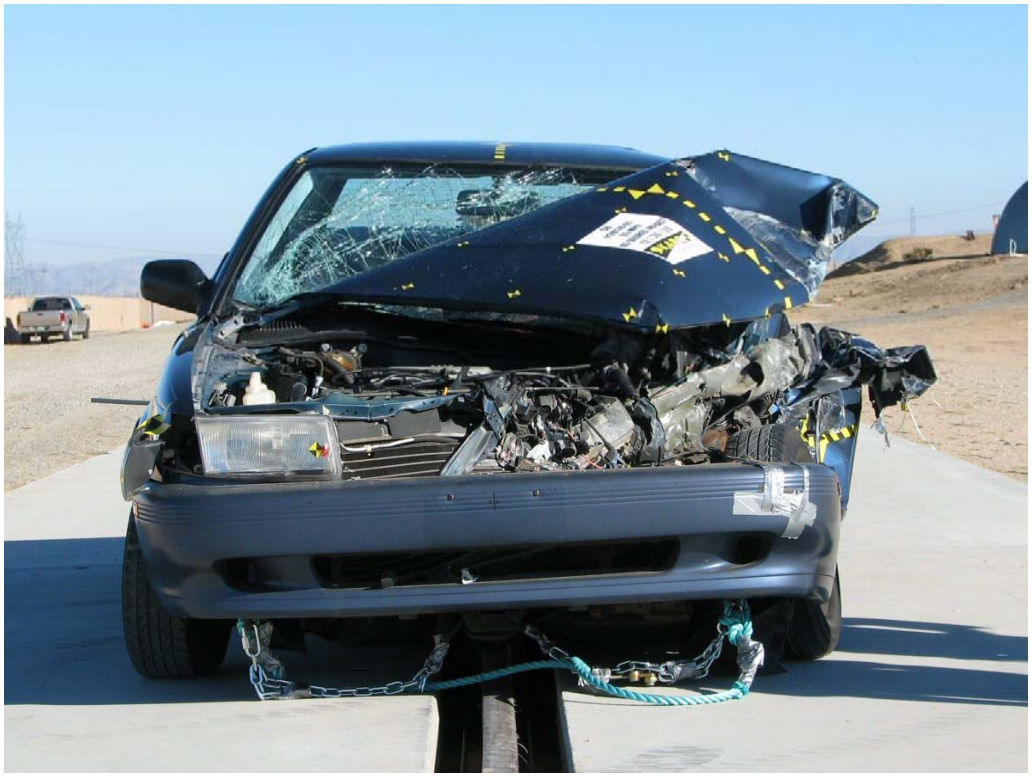


FIGURE 38. Post-Test Front View of Test Vehicle

FIGURE 39. Post-Test Right Front ¾ View of Test Vehicle

FIGURE 40. Post-Test Right Side View of Test Vehicle

FIGURE 41. Post-Test Right Rear ¾ View of Test Vehicle

FIGURE 42. Post-Test Rear View of Test Vehicle

FIGURE 43. Post-Test Left Rear ¾ View of Test Vehicle

FIGURE 44. Post-Test Left Side View of Test Vehicle

FIGURE 45. Post-Test Left Front ¾ View of Test Vehicle

FIGURE 46. Post-Test Exterior View of Windshield

FIGURE 47. Post-Test Interior View of Windshield

FIGURE 48. Post-Test Driver Dummy (Through Window)

FIGURE 49. Post-Test Driver Dummy

FIGURE 50. Post-Test Passenger Side Occupant Compartment

FIGURE 51. Post-Test Left Rear ¾ View of Test Trailer

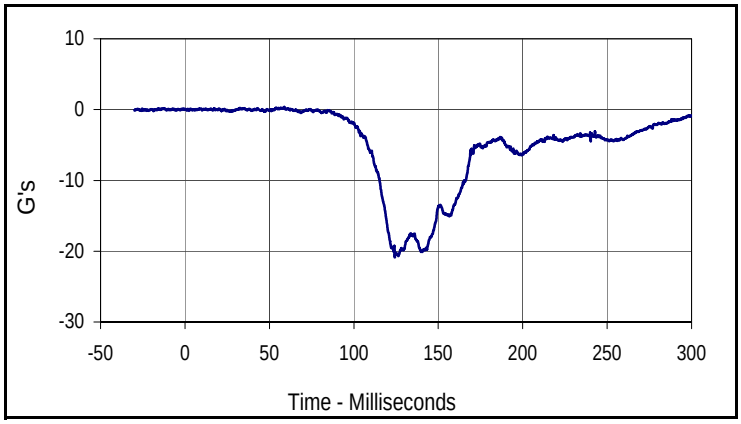
FIGURE 52. Post-Test Left Side View of Test Trailer

FIGURE 53. Post-Test Impact Area of Test Trailer

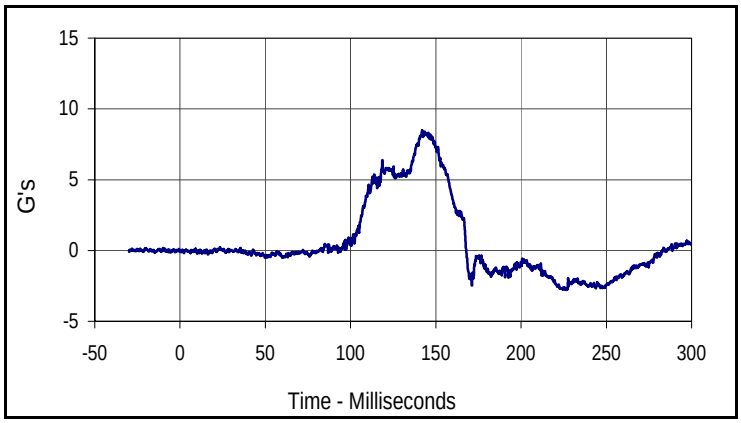
FIGURE 54. Post-Test Left Front ¾ View of Test Trailer

APPENDIX B
DATA PLOTS

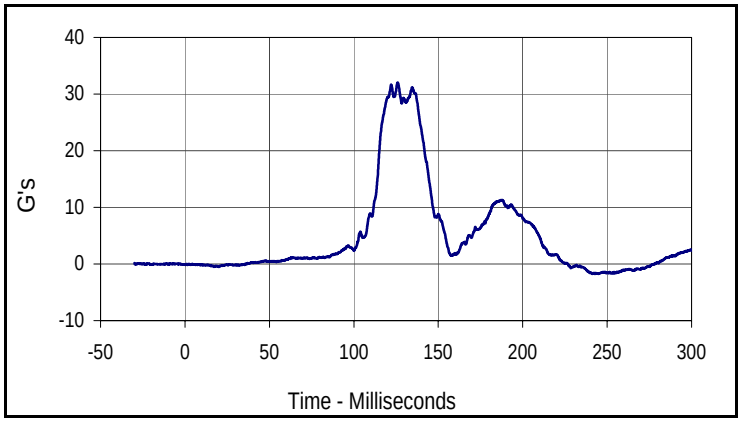
Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01



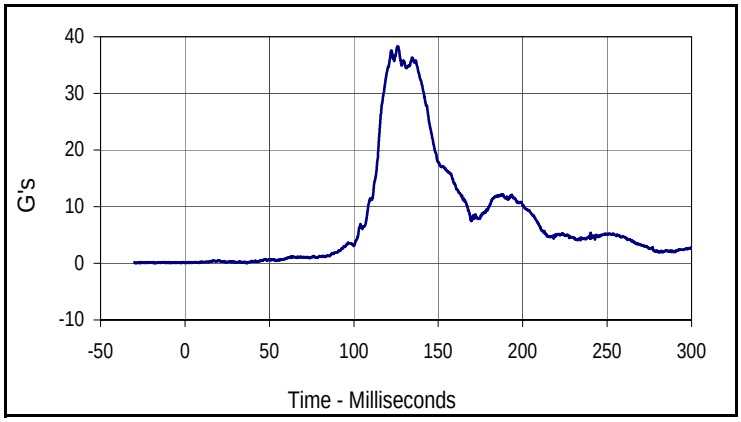
Curve Description			
Driver Head X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
0.4	58.8	-20.9	124.3



Curve Description			
Driver Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
8.5	141.9	-2.8	226.5

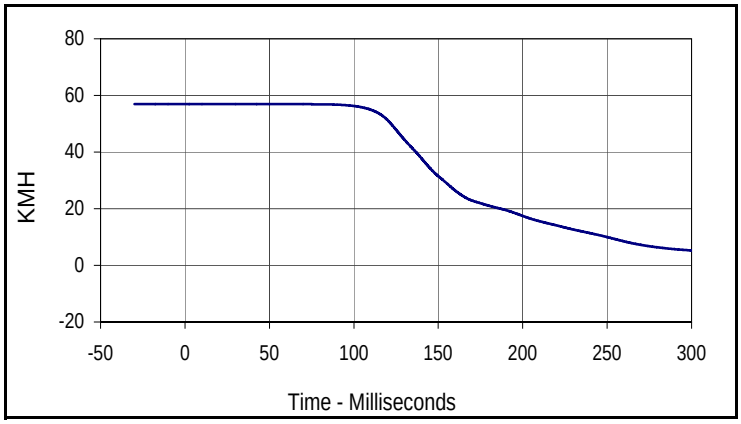


Curve Description			
Driver Head Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
32.0	126.0	-1.8	242.8



Curve Description			
Driver Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
38.3	125.8	0.0	36.8

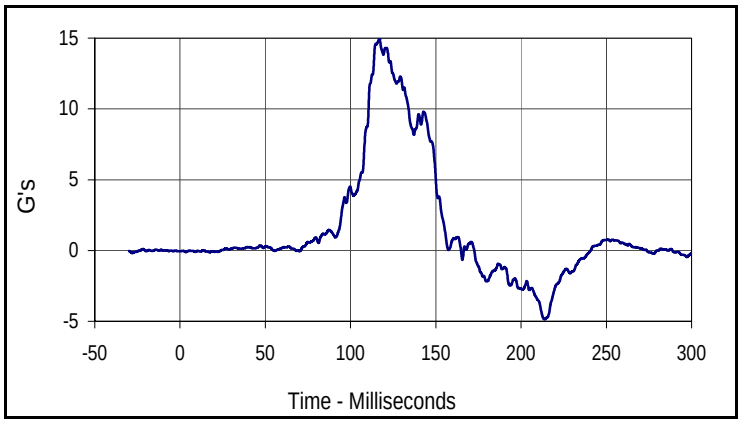
Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01



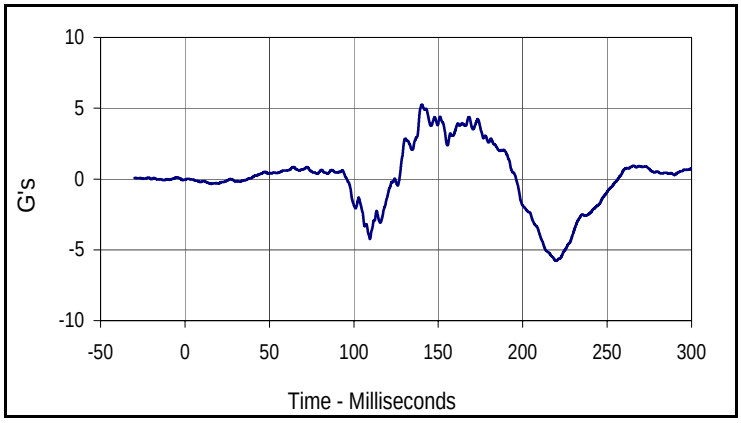
Curve Description			
Driver Head X Velocity			
CURNO	Type	SAE Class	Units
001	IN1	180	KMH
Max	Time	Min	Time
57.0	20.8	5.3	299.9

Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01

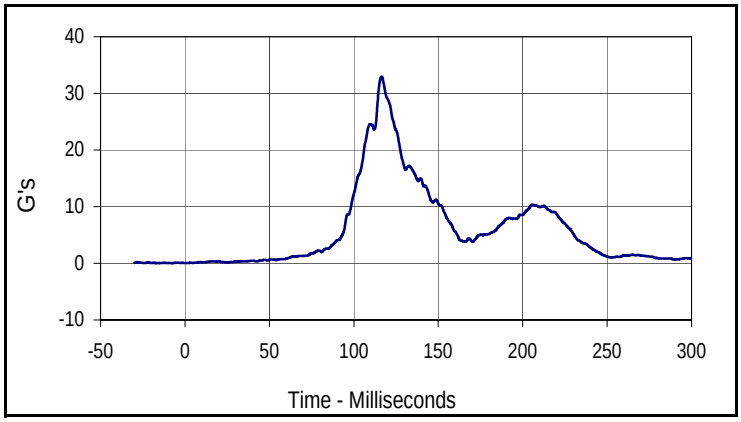
Curve Description			
Driver Chest X			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
1.2	267.9	-29.3	116.4



Curve Description			
Driver Chest Y			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
14.9	116.9	-4.9	213.7

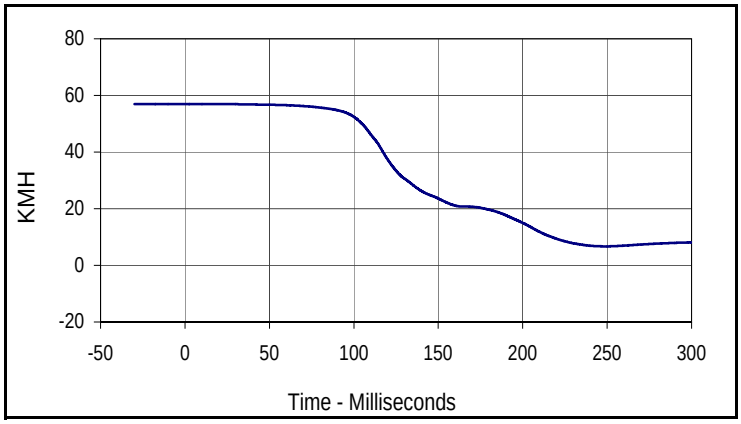


Curve Description			
Driver Chest Z			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
5.3	140.3	-5.8	219.8



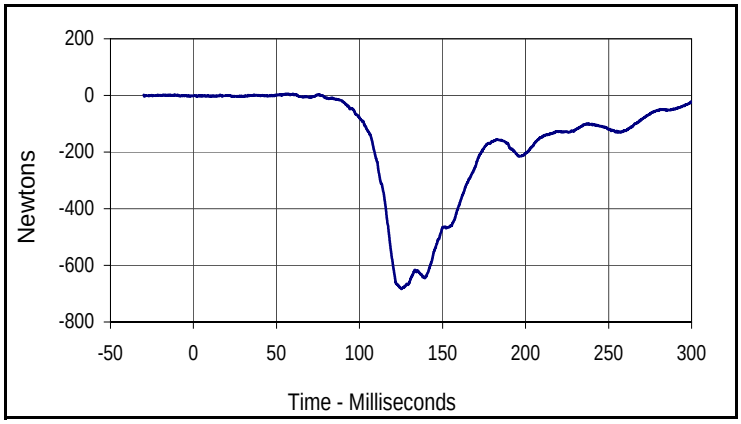
Curve Description			
Driver Chest Resultant			
CURNO	Type	SAE Class	Units
004	RES	180	G's
Max	Time	Min	Time
33.0	116.5	0.0	1.2

Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01

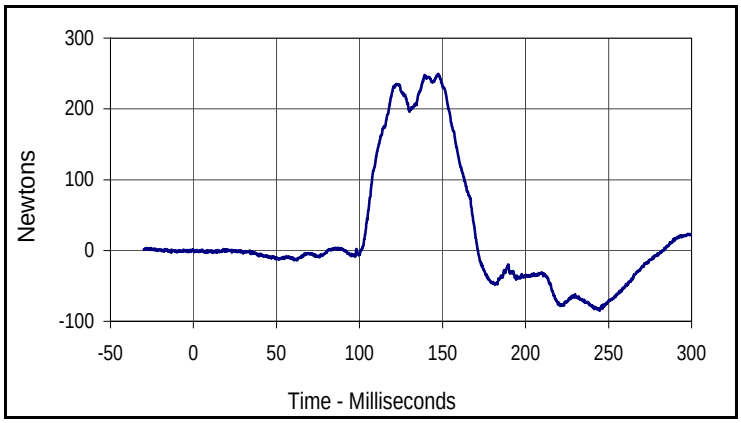


Curve Description			
Driver Chest X Velocity			
CURNO	Type	SAE Class	Units
004	IN1	180	KMH
Max	Time	Min	Time
57.0	15.6	6.7	249.1

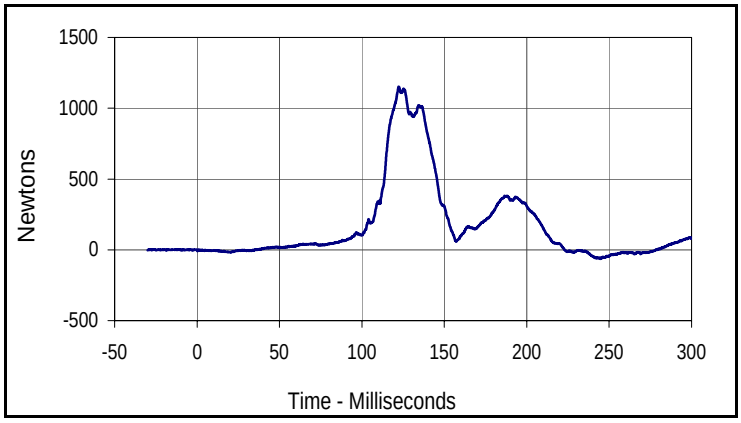
Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01



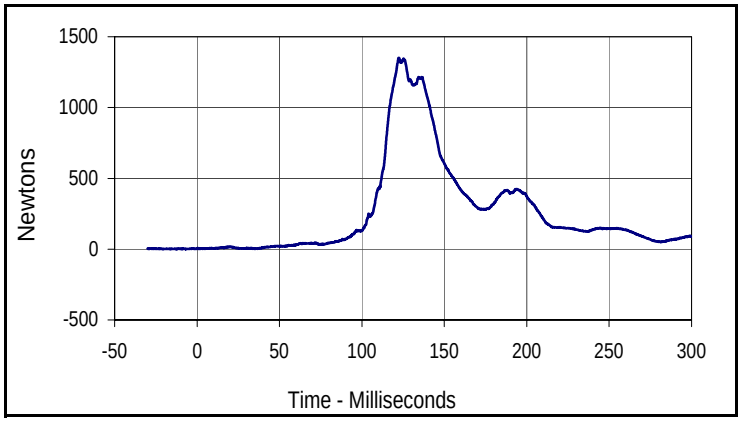
Curve Description			
Driver Upper Neck Force X			
CURNO	Type	SAE Class	Units
007	FIL	1000	Newtons
Max	Time	Min	Time
5.7	60.0	-683.4	125.2



Curve Description			
Driver Upper Neck Force Y			
CURNO	Type	SAE Class	Units
008	FIL	1000	Newtons
Max	Time	Min	Time
249.5	147.4	-85.1	244.5

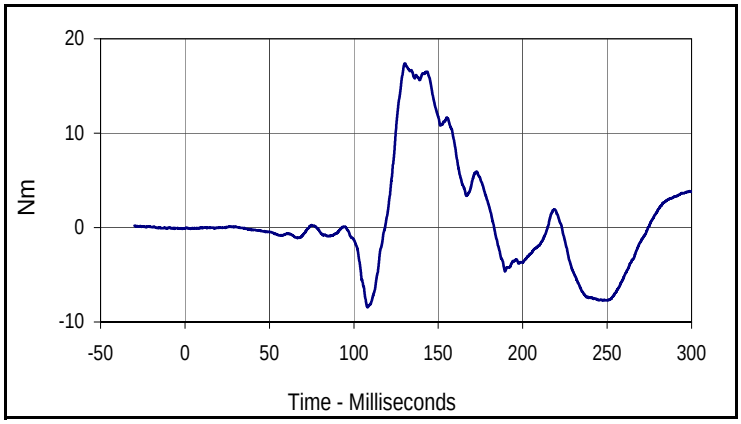


Curve Description			
Driver Upper Neck Force Z			
CURNO	Type	SAE Class	Units
009	FIL	1000	Newtons
Max	Time	Min	Time
1151.9	122.3	-63.5	244.6

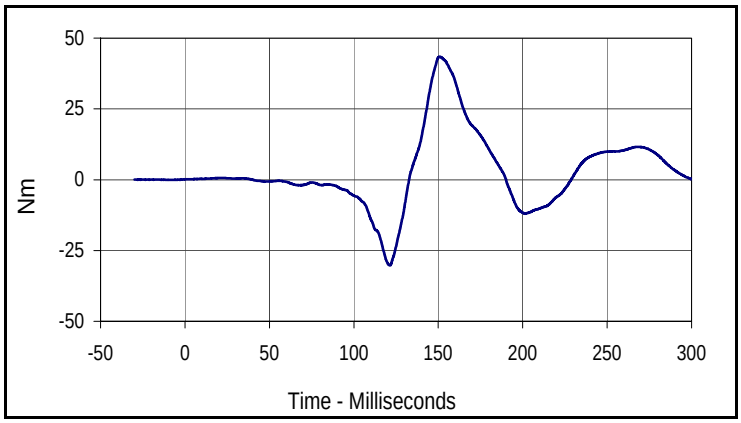


Curve Description			
Driver Upper Neck Force Res.			
CURNO	Type	SAE Class	Units
007	RES	1000	Newtons
Max	Time	Min	Time
1351.3	122.3	1.1	33.9

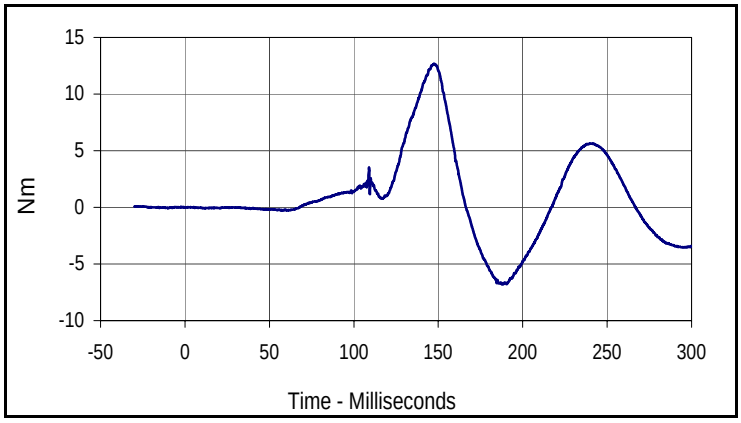
Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01



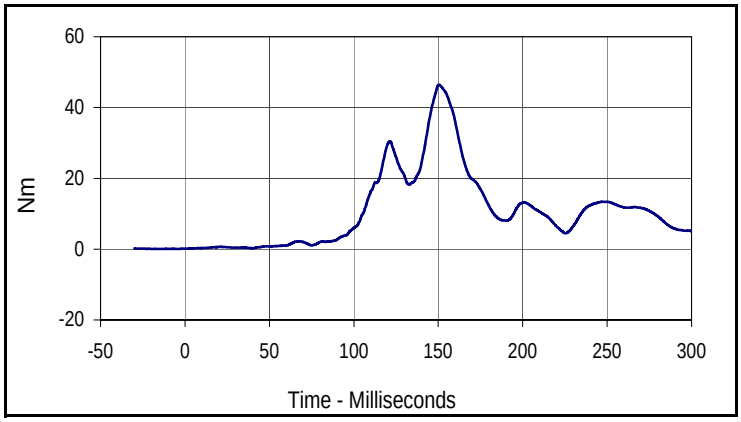
Curve Description			
Driver Upper Neck Moment X			
CURNO	Type	SAE Class	Units
010	FIL	600	Nm
Max	Time	Min	Time
17.4	130.3	-8.4	108.2



Curve Description			
Driver Upper Neck Moment Y			
CURNO	Type	SAE Class	Units
011	FIL	600	Nm
Max	Time	Min	Time
43.4	150.8	-30.2	121.4

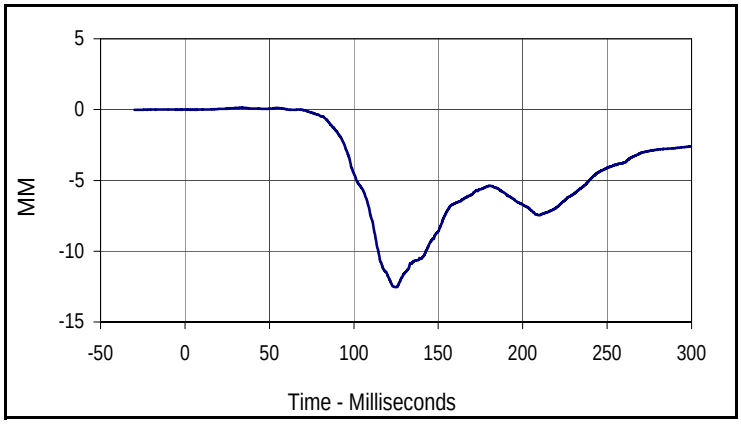


Curve Description			
Driver Upper Neck Moment Z			
CURNO	Type	SAE Class	Units
012	FIL	600	Nm
Max	Time	Min	Time
12.7	147.5	-6.8	188.0

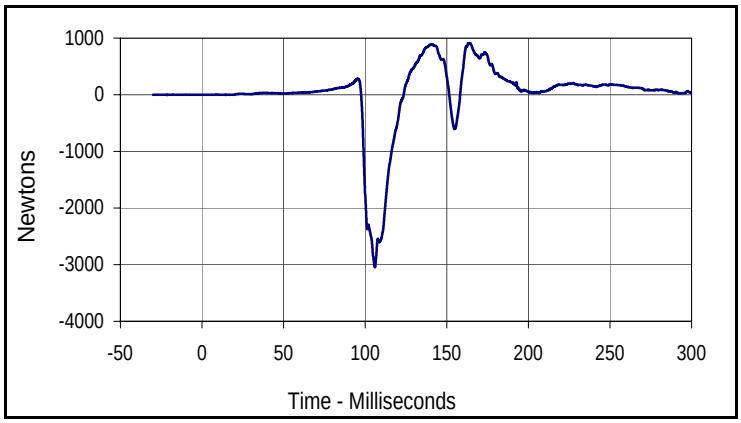


Curve Description			
Driver Upper Neck Moment Res.			
CURNO	Type	SAE Class	Units
010	RES	600	Nm
Max	Time	Min	Time
46.4	150.4	0.1	0.7

Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01



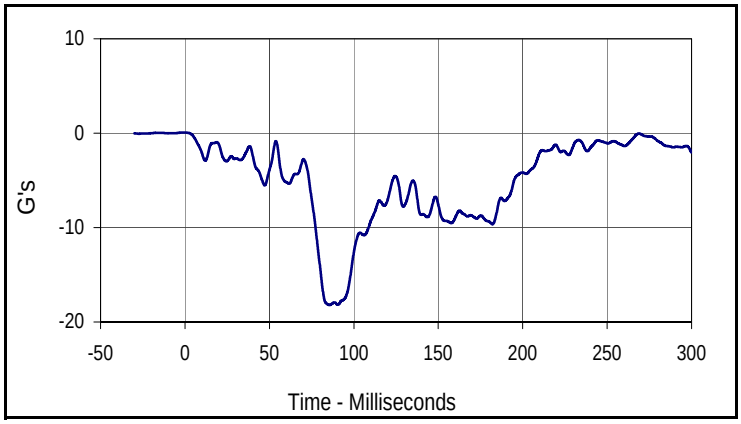
Curve Description			
Driver Chest Deflection			
CURNO	Type	SAE Class	Units
013	FIL	600	MM
Max	Time	Min	Time
0.1	33.2	-12.5	125.4



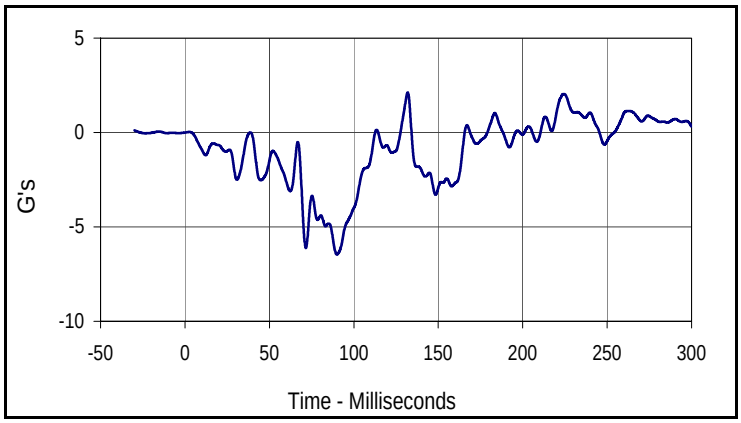
Curve Description			
Driver Left Femur Force			
CURNO	Type	SAE Class	Units
014	FIL	600	Newtons
Max	Time	Min	Time
910.6	163.3	-3042.5	106.0

Curve Description			
Driver Right Femur Force			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
860.8	115.0	-3047.1	141.3

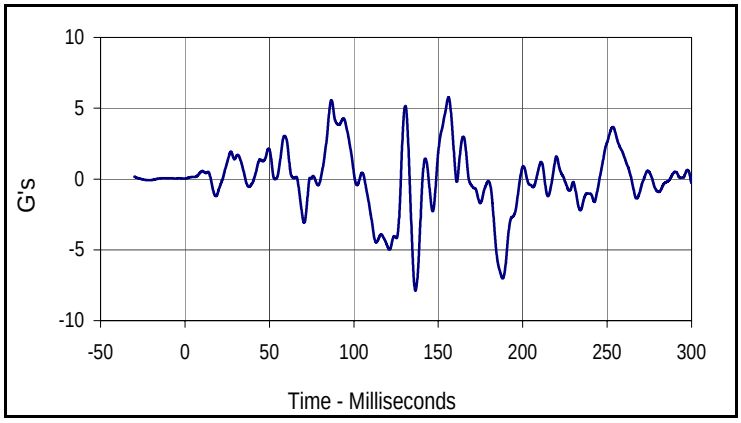
Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01



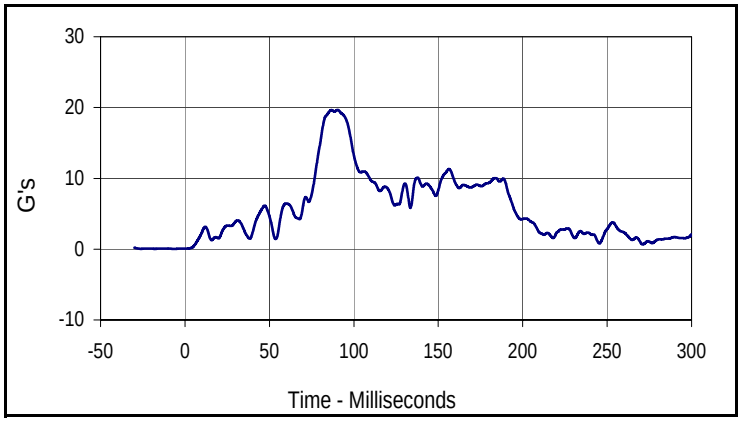
Curve Description			
Vehicle Rear Center Tunnel X			
CURNO	Type	SAE Class	Units
016	FIL	60	G's
Max	Time	Min	Time
0.1	0.0	-18.2	85.6



Curve Description			
Vehicle Rear Center Tunnel Y			
CURNO	Type	SAE Class	Units
017	FIL	60	G's
Max	Time	Min	Time
2.1	131.9	-6.5	90.0

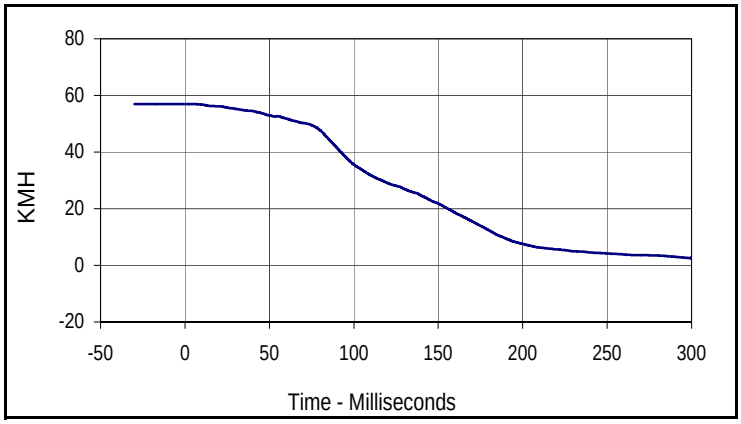


Curve Description			
Vehicle Rear Center Tunnel Z			
CURNO	Type	SAE Class	Units
018	FIL	60	G's
Max	Time	Min	Time
5.8	156.1	-7.9	136.5

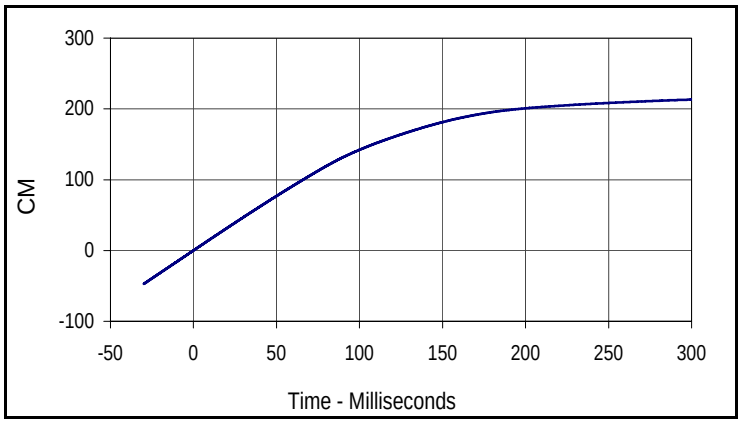


Curve Description			
Vehicle Rear Center Tunnel Resultant			
CURNO	Type	SAE Class	Units
016	RES	60	G's
Max	Time	Min	Time
19.7	90.3	0.1	0.2

Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01

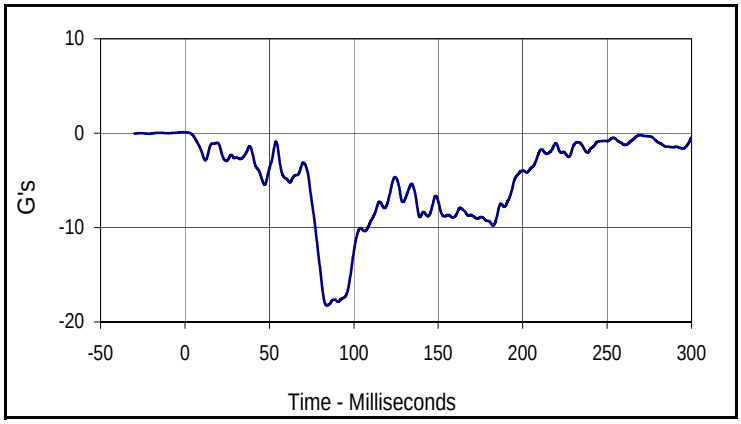


Curve Description			
Vehicle Rear Center Tunnel X Velocity			
CURNO	Type	SAE Class	Units
016	IN1	180	KMH
Max	Time	Min	Time
57.0	2.2	2.5	299.9

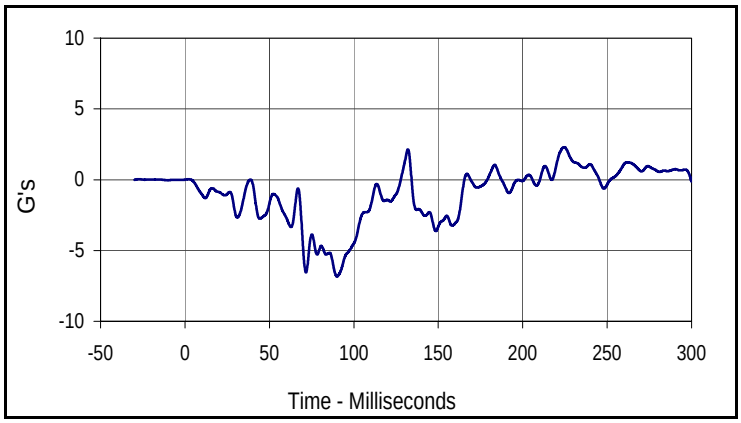


Curve Description			
Vehicle Rear Center Tunnel Primary X Displacement			
CURNO	Type	SAE Class	Units
016	IN2	180	CM
Max	Time	Min	Time
213.2	299.9	0.0	0.0

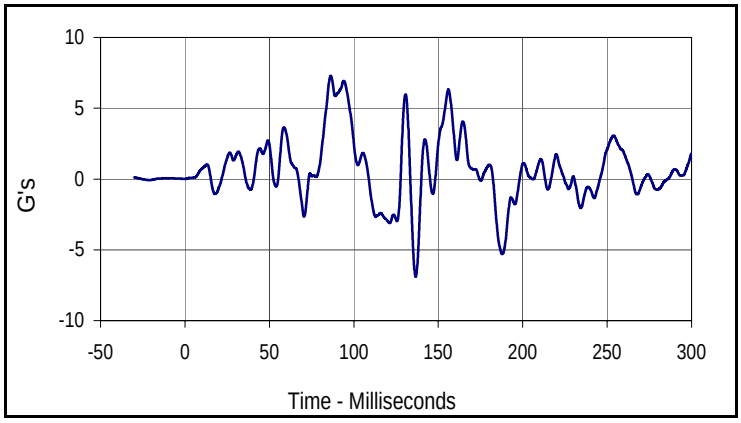
Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01



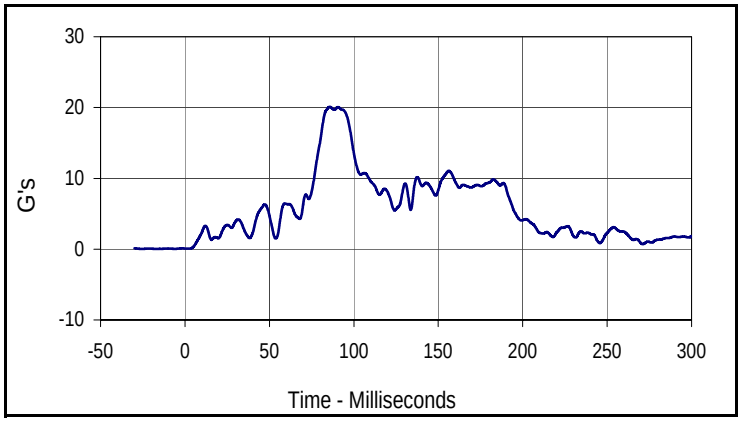
Curve Description			
Vehicle Rear Center Tunnel Redundant X			
CURNO	Type	SAE Class	Units
019	FIL	60	G's
Max	Time	Min	Time
0.1	0.0	-18.3	84.1



Curve Description			
Vehicle Rear Center Tunnel Redundant Y			
CURNO	Type	SAE Class	Units
020	FIL	60	G's
Max	Time	Min	Time
2.3	224.9	-6.8	90.0

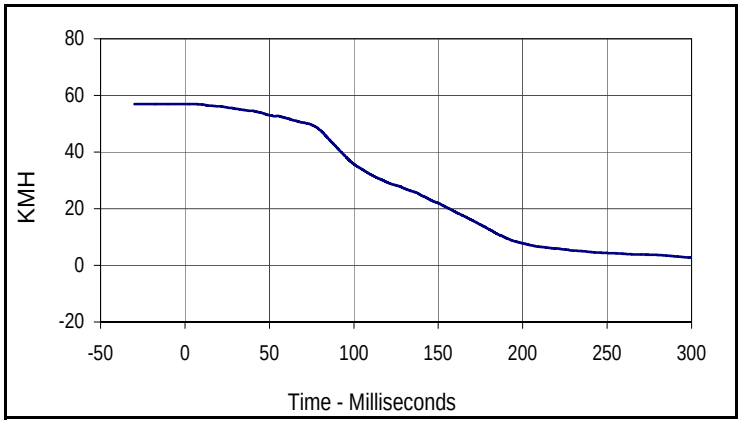


Curve Description			
Vehicle Rear Center Tunnel Redundant Z			
CURNO	Type	SAE Class	Units
021	FIL	60	G's
Max	Time	Min	Time
7.3	86.4	-6.9	136.6

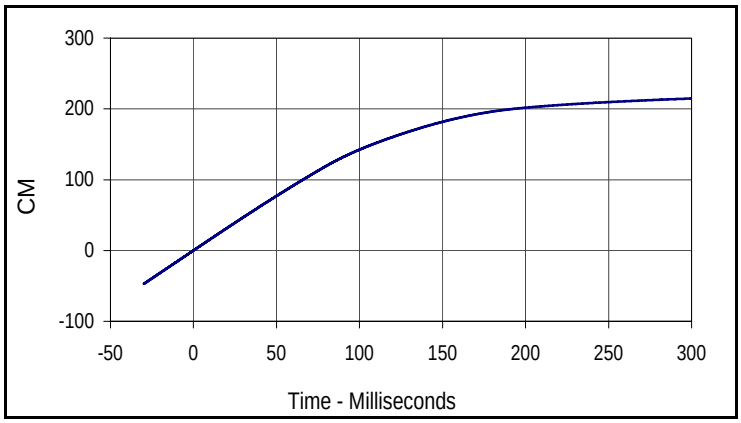


Curve Description			
Vehicle Rear Center Tunnel Redundant Resultant			
CURNO	Type	SAE Class	Units
019	RES	60	G's
Max	Time	Min	Time
20.1	85.8	0.1	1.1

Test Vehicle:	1994 Nissan Sentra 4-Door Sedan	Test Date:	12/30/08
Test Program:	S8 35 MPH 45 Degree Impact	Project No.:	P28178-01



Curve Description			
Vehicle Rear Center Tunnel Redundant X Velocity			
CURNO	Type	SAE Class	Units
019	IN1	180	KMH
Max	Time	Min	Time
57.0	4.5	2.7	299.9



Curve Description			
Vehicle Rear Center Tunnel Redundant X Displacement			
CURNO	Type	SAE Class	Units
019	IN2	180	CM
Max	Time	Min	Time
214.6	299.9	0.0	0.0

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNEMENTS

S8 35 MPH 45 Degree Impact
Instrumentation Data Channel Assignments
Driver A.T.D. Serial Number 118
12/30/08
1994 Nissan Sentra 4-Door Sedan

CH.	LOCATION	AXIS	DESCRIPTION	MFR	MODEL	SERIAL	UNITS
1	HEAD	X	Accelerometer	Endevco	7264-2000	AAKE2	G
2	HEAD	Y	Accelerometer	Endevco	7264-2000	ACC02	G
3	HEAD	Z	Accelerometer	Endevco	7264-2000	EY99J	G
4	NECK FORCE	X	Load Cell	R. A. Denton	1716A	260	N
5	NECK FORCE	Y	Load Cell	R. A. Denton	1716A	260	N
6	NECK FORCE	Z	Load Cell	R. A. Denton	1716A	260	N
7	NECK MOMENT	X	Load Cell	R. A. Denton	1716A	260	Nm
8	NECK MOMENT	Y	Load Cell	R. A. Denton	1716A	260	Nm
9	NECK MOMENT	Z	Load Cell	R. A. Denton	1716A	260	Nm
10	CHEST	X	Accelerometer	Entrans	7264-2000	J19865	G
11	CHEST	Y	Accelerometer	Entrans	7264-2000	AALD5	G
12	CHEST	Z	Accelerometer	Entrans	7264-2000	FJ66J	G
13	CHEST DEFLECTION	X	Potentiometer	Servo	14CBI	POT118	MM
14	LEFT FEMUR FORCE	Z	Load Cell	R.A. Denton	2121	1348	N
15	RIGHT FEMUR FORCE	Z	Load Cell	R.A. Denton	2121	1347	N

S8 35 MPH 45 Degree Impact
Instrumentation Data Channel Assignments
Vehicle Sensors
12/30/08
1994 Nissan Sentra 4-Door Sedan

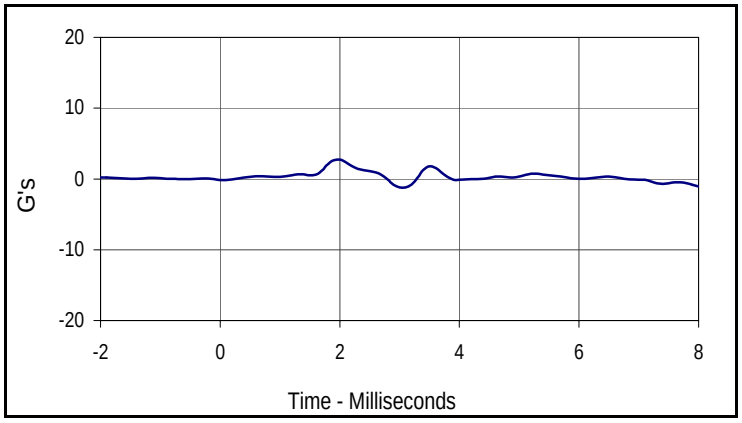
CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
16	REAR CENTER TUNNEL PRIMARY	X	KETX11X	Accelerometer	I.C. Sensor	3031-500	G
17	REAR CENTER TUNNEL PRIMARY	Y	KETX11Y	Accelerometer	I.C. Sensor	3031-500	G
18	REAR CENTER TUNNEL PRIMARY	Z	KETX11Z	Accelerometer	I.C. Sensor	3031-500	G
19	REAR CENTER TUNNEL RED.	X	KEVA203A	Accelerometer	I.C. Sensor	3031-500	G
20	REAR CENTER TUNNEL RED.	Y	KEVA203B	Accelerometer	I.C. Sensor	3031-500	G
21	REAR CENTER TUNNEL RED.	Z	KEVA203C	Accelerometer	I.C. Sensor	3031-500	G

APPENDIX D
DUMMY CALIBRATION DATA

Test Program:	Hybrid III 5th Percentile Female Head Drop Test	Test Date:	11/29/08
ATD Serial No.:	118	Test I.D.:	HD11D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	250.0 to 300.0	252.8	Pass
Peak Lateral Acceleration	G's	≤15.0	2.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass

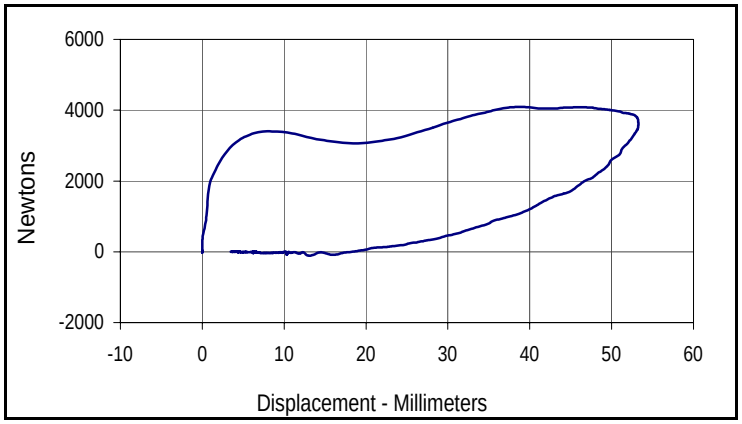
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
252.8	2.2	0.0	-1.5



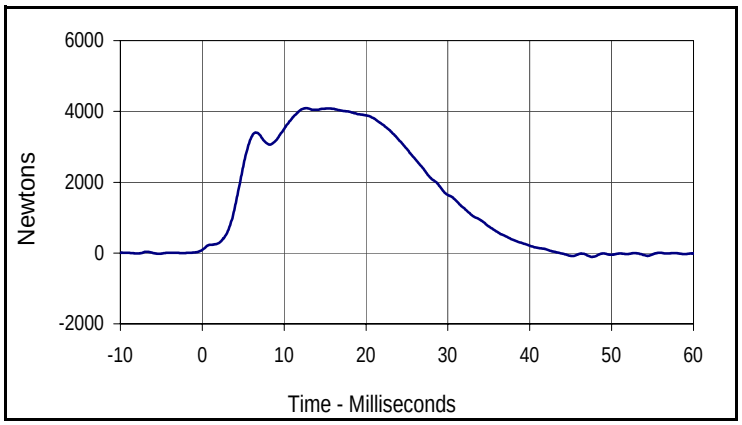
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.9	2.0	-1.2	3.0

Test Program:	Hybrid III 5th Percentile Female Thorax Impact Test	Test Date:	11/23/08
ATD Serial No.:	118	Test I.D.:	CH11A

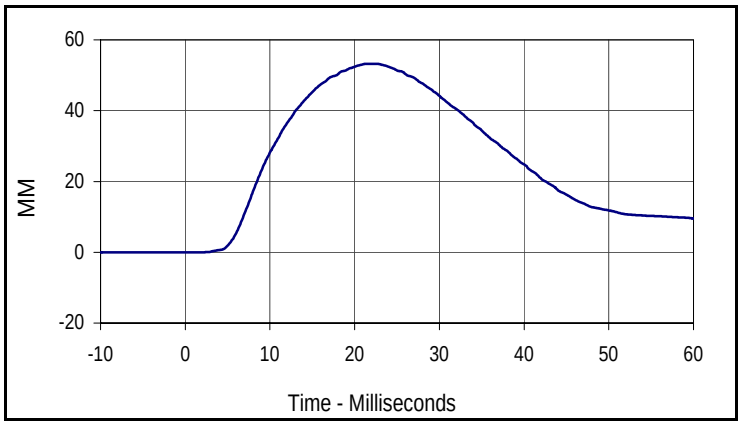
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.59 to 6.83	6.74	Pass
Peak Chest Deflection	MM	50.0 to 58.0	53.3	Pass
Peak Force Between 50 and 58 MM	Newtons	3900 to 4400	4093	Pass
Peak Force Between 18 and 50 MM	Newtons	≤4600	3997	Pass
Internal Hysterysis	%	69 to 85	79.6	Pass
		Overall Test Results		Pass



Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysterysis
003	FIL	180	79.6
Peak Probe Force		Peak Chest Displ.	
4093.1		53.3	



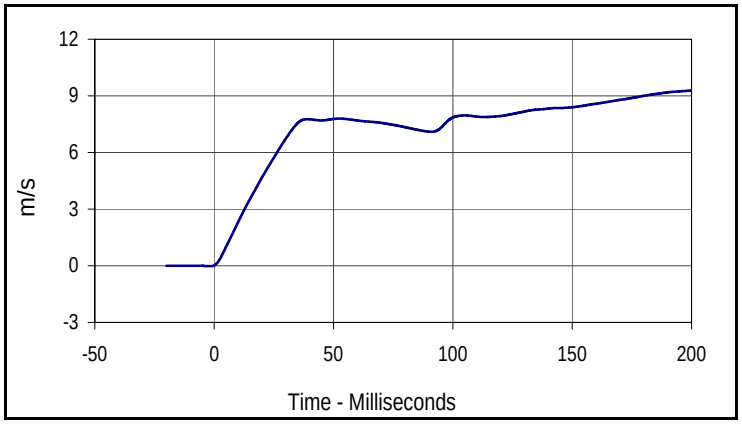
Curve Description			
Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4093.1	12.7	-108.7	47.6



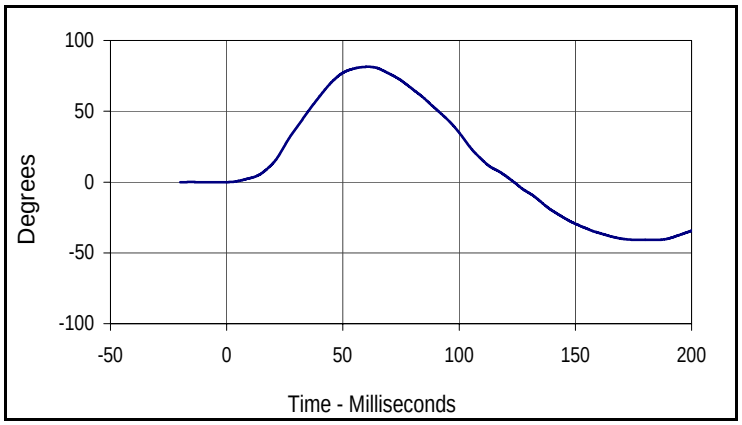
Curve Description			
Chest Deflection			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
53.3	22.1	0.0	-8.2

Test Program:	Hybrid III 5th Percentile Female Neck Flexion Test	Test Date:	11/23/08
ATD Serial No.:	118	Test I.D.:	NF12A

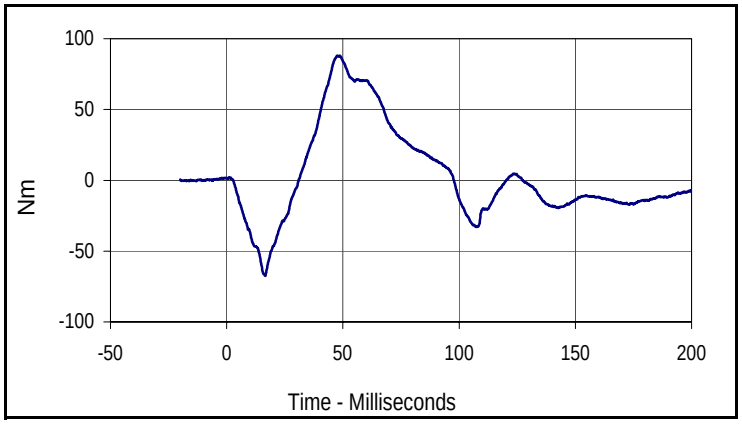
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.3	Pass
	20 Msec.	m/s	4.0 to 5.0	4.7	Pass
	30 Msec.	m/s	5.8 to 7.0	6.7	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	81.4	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	69.2	Pass
Positive Moment Decay, Time To 10 Nm		Msec.	80.0 to 100.0	94.3	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
9.3	200.0	0.0	-1.8



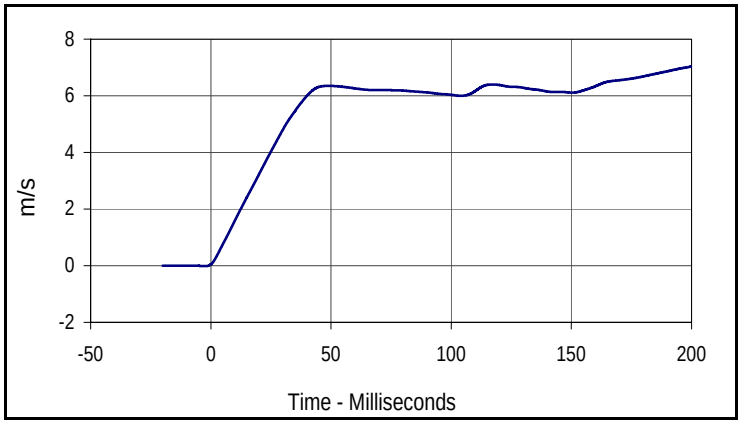
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
81.4	60.9	-40.8	183.7



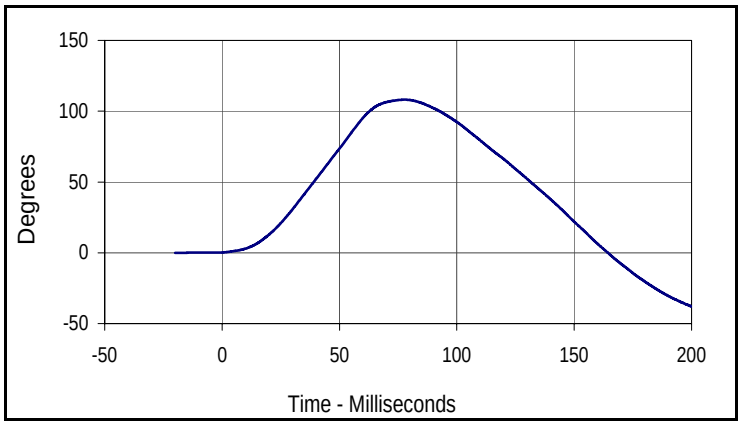
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
88.1	47.7	-67.5	16.5

Test Program:	Hybrid III 5th Percentile Female Neck Extension Test	Test Date:	11/23/08
ATD Serial No.:	118	Test I.D.:	NE14A

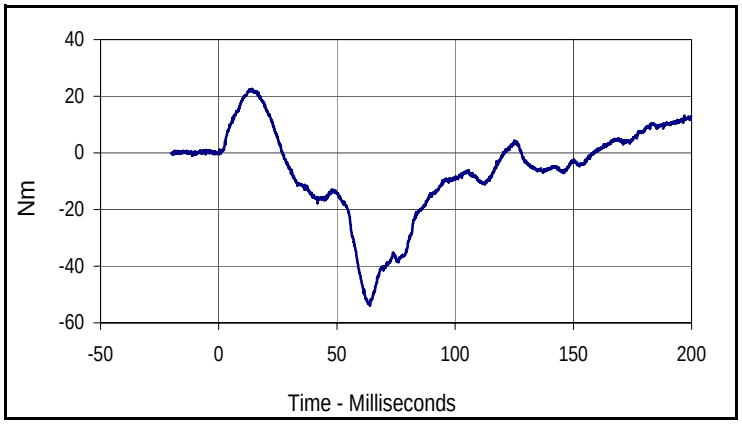
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.00	Pass
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.6	Pass
	20 Msec.	m/s	3.1 to 3.9	3.2	Pass
	30 Msec.	m/s	4.6 to 5.6	4.8	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	108.1	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-53.9	Pass
Positive Moment Decay, Time To -10 Nm		Msec.	94.0 to 114.0	95.1	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
7.0	200.0	0.0	-2.4



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
108.1	77.7	-37.9	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
22.6	14.2	-53.9	64.0