REPORT NUMBER: NCAP-MGA-2005-010

NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

TOYOTA MOTOR CORPORATION
2005 TOYOTA CAMRY LE
NHTSA NUMBER: M55101

PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105

Test Date: January 13, 2005

Final Report Date: March 11, 2005

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
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WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-12005.

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_____
Date of Acceptance

_____
COTR, NCAP Frontal Impact Program

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Date of Acceptance

Technical Report Documentation Page

1. Report No. NCAP-MGA-2005-010	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Final Report of New Car Assessment Program Testing of a 2005 Toyota Camry LE NHTSA No.: M55101		*5. Report Date* March 11, 2005 *6. Performing Organization Code* MGA	
7. Author(s) Shefalika Naik, Project Engineer		*8. Performing Organization Report No.* NCAP-MGA-2005-010	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-01-D-12005	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 400 Seventh Street, SW, Room 5311 Washington, D.C. 20590		*13. Type of Report and Period Covered* 01/13/05 to 03/11/05 *14. Sponsoring Agency Code* NVS-111	
15. Supplementary Notes			

16. Abstract

A 35.1 mph (56.5 km/h) frontal barrier impact was conducted on a 2005 Toyota Camry LE at MGA Research Corporation on January 13, 2005. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.5 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum post test static crush is 603 mm located to the right of the vehicle centerline. The test vehicle is equipped with a 3-point continuous belt system and an airbag in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:

Measurement Description	Units	Threshold	Driver ATD	Pass. ATD
Head Injury Criteria (HIC)	N/A	1000	518	323
Max. Thorax Accel. (3ms Clip)	G's	60	40	41
Left Femur Force	Newton	10009	-1109	-1813
Right Femur Force	Newton	10009	-3190	-1126

17. Key Words 56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2005 Toyota Camry LE NHTSA No: M55101		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Admin., Technical Ref. Division, Room 5108 (NPO-230) 400 Seventh Street, S.W. Washington, D.C. 20590	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 211	22. Price

Form DOT F1700.7 (8-72)

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-01-D-12005. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact in excess of the current 48.3 kph requirements.

SUMMARY

A load cell barrier consisting of 30 load cells was impacted by a 2005 Toyota Camry LE at a velocity of 56.5 kph. The test was performed at MGA Research Corporation on January 13, 2005. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and sixteen high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometer, upper neck transducers, right/left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 066) and right-front passenger (position 2) ATD (Serial No. 065) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 153 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle and dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 603 mm and both the driver and passenger side doors remained closed and latched during the impact event and were operable after the impact.

The driver’s head, chest, and abdomen contacted the airbag. The driver’s head also contacted the headrest. The driver’s knees contacted the bolster and the steering column. The passenger’s head, chest and abdomen contacted the airbag. The passenger's head contacted the headrest. The passenger’s knees contacted the glove box.

The occupant data is summarized below:

ATD position	HIC	Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	517.5	39.6	-22.8	-1109	-3190
Passenger	322.5	40.7	-20.7	-1813	-1126

TEST NOTES

No valid data was collected for the following:
Instrument Panel X after 62 msec.
Driver Right Upper Tibia MX after 45 msec.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	English 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 Pressure	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
CRASH TEST SUMMARY

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact
NHTSA No.: M55101
Test Date: 01/13/05

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/hr	56.5
Test Weight	kg	1687.5
Average Rebound	mm	709
Maximum Static Crush	mm	603
Impact Angle	degrees	0.0

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None
Glazing Damage	None	

TEST DUMMY INFORMATION

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50th / 066	HIII 50th / 065
Head Contact	Airbag, Headrest	Airbag, Headrest
Chest Contact	Airbag	Airbag
Abdomen Contact	Airbag	Airbag
Left Knee Contact	Knee Bolster, Steering Column	Glove Box
Right Knee Contact	Knee Bolster, Steering Column	Glove Box

16mm MOVIE COVERAGE

High Speed	16
Real Time	1
Total	17

Driver ATD Sensors	42
Passenger ATD Sensors	46
Belt Assessment Sensors	4
Vehicle Structure Accelerometers	9
Total	101

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Toyota Camry LE NHTSA No: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

TEST VEHICLE INFORMATION

Manufacturer	Toyota Motor Manufacturing Kentucky, Inc.
Model	Camry LE
Body Style	Sedan
NHTSA No.	M55101
VIN	4T1BE30K65U013411
Color	Red
Delivery Date	12/16/04
Odometer Reading (mile)	44
Dealer	Wilde Toyota
Tansmission	Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2.4
Engine Placement	Lateral
Automatic Door Lock (ADL)	Yes
Owners Manual Details Instructions on Disabling ADLs	Yes

TEST VEHICLE OPTIONS

Driver Airbag	Yes
Passenger Airbag	Yes
Force Limiter	Yes
Pretensioner	Yes
Power Windows	Yes
Power Steering	Yes
Power Door Locks	No
Telescope Wheel	No
Air Conditioning	Yes
Power Brakes	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	No
Anti-lock Brakes	Yes
AM/FM/CD	Yes
Anti-theft System	Yes
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing Kentucky, Inc.
Date of Manufacture	11/04

GVWR (kg)	1905
GAWR Front (kg)	1210
GAWR Rear (kg)	1035

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure	200	200
Recommended Tire Size	P205/65R15	P205/65R15
Tire size on Vehicle	P205/65R15	P205/65R15
Tire Manufacturer	Bridgestone	Bridgestone

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				410
Cargo Wt. (RCLW) (kg)				68.0

DATA SHEET NO. 2... (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	438.6	303.5		479.9	374.7	
Right	kg	433.2	293.0		472.7	360.2	
Ratio	%	59.4	40.6		56.5	43.5	
Totals	kg	871.8	596.5	1468.3	952.6	734.9	1687.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1468.3
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	68.0
Calculated Vehicle Target Weight (TVTW)	kg	1692.3

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	696	696	697	702	1103
As Tested	mm	688	685	673	675	1182
Post Test	mm	689	705	655	651	

Vehicle Wheelbase (mm): 2715

Weight of Ballast secured in cargo area (kg): 0

Vehicle Components Removed: Spare tire, jack, trunk interior, exhaust, both taillights, bumper cover, rear bumper

Ballast weight does not include instrumentation and data acquisition system.

FUEL SYSTEM DATA

Fuel System Capacity From Owner's Manual (L): 70.0

Usable Capacity Figure Furnished by COTR (L): 70.0

Actual Test Volume (L): 23.5

Test Fluid Type: Stoddard Solvent; Specific Gravity: 0.77

Is Vehicle Fuel Pump Electric or Mechanical? Electric

If electric, does pump operate with ignition switch "ON" & engine "OFF"? Yes

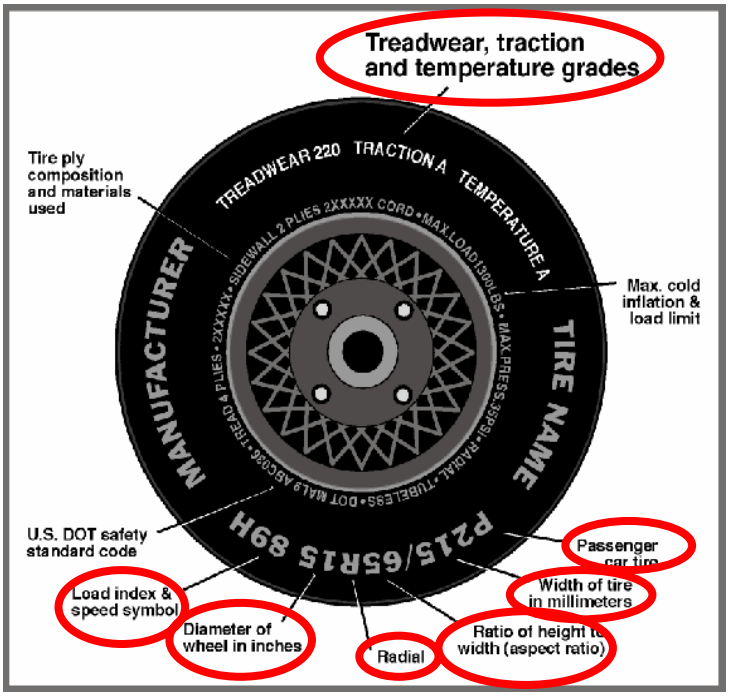
DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

Vehicle Year	2005	Vehicle Make	Toyota
VIN	4T1BE30K65U013411	Vehicle Model	Camry LE



	Front	Rear
Tire Manufacturer	Bridgestone	Bridgestone
Tire Name	Potenza	Potenza
Tire Type	P	P
Tire Width (mm)	205	205
Ratio of Height to Width (aspect ratio)	65	65
Radial	R	R
Wheel Diameter	15	15
Load Index & Speed Symbol	92T	92T
Treadwear	160	160
Traction Grade	A	A
Temperature Grade	A	A

DATA SHEET NO. 4

POST IMPACT DATA

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.5 – 57.1	56.5
Trap No. 1 Entry Distance	mm	<1524	1300
Trap No. 1 Exit Distance	mm	<1524	300
Trap No. 2 Velocity (Redundant)	km/h	55.5 – 57.1	56.5
Trap No. 2 Entry Distance	mm	<1524	1425
Trap No. 2 Exit Distance	mm	<1524	425

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4663	4201	462
Center	mm	4797	4221	576
Right Side	mm	4669	4210	459

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	715
Center	mm	713
Right Side	mm	700
Average	mm	709

DATA SHEET NO. 5

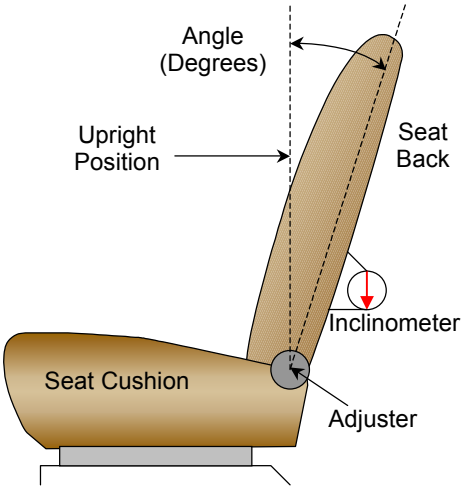
TEST VEHICLE INFORMATION

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows:

Driver seat back angle: 3.3° on headrest post
Passenger seat back angle: 0.7° on headrest post



FRONT SEAT ASSEMBLY

SEAT FORE/AFT POSITIONS

The driver seat is power operated. The passenger seat is manually operated.

Driver seat fore/aft total travel:	260 mm
Driver seat fore/aft position:	130 of 260 mm
Passenger seat fore/aft total travel:	16 detents
Passenger seat fore/aft position:	8th detent with the forward most as 0

DATA SHEET NO. 5... (continued)

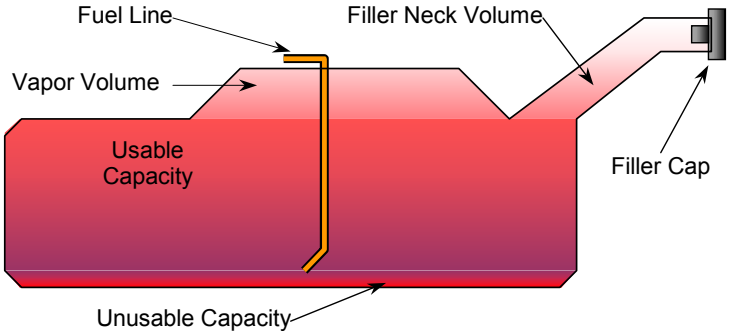
TEST VEHICLE INFORMATION

Test Vehicle:	2005 Toyota Camry LE	NHTSA No.:	M55101
Test Program:	35mph Frontal Impact	Test Date:	01/13/05

FUEL TANK CAPACITY DATA

The "Usable Capacity" of the standard equipment fuel tank is:	70.0 liters
The "Usable Capacity" of any optional equipment fuel tank is:	N/A liters
The "Usable Capacity" used for certification to FMVSS 301 requirements:	70.0 liters
Actual amount of Stoddard solvent added to vehicle for certification test:	23.5 liters

The fuel door is located on the left (driver's) side of the vehicle.

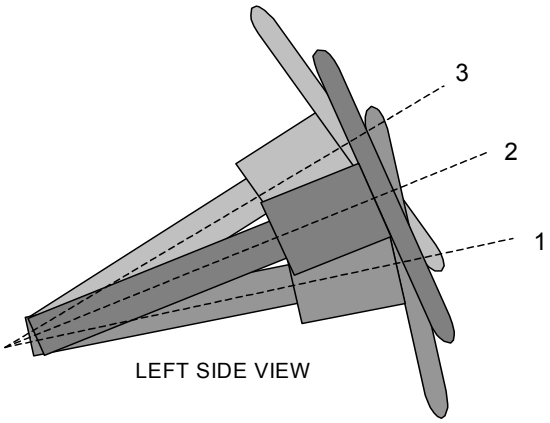


VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Adjustable steering controls are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions.

Lowermost, Position 1: 23.4°
Geometric Center, Position 2: 25.4°
Uppermost, Position 3: 27.4°



STEERING COLUMN ASSEMBLY

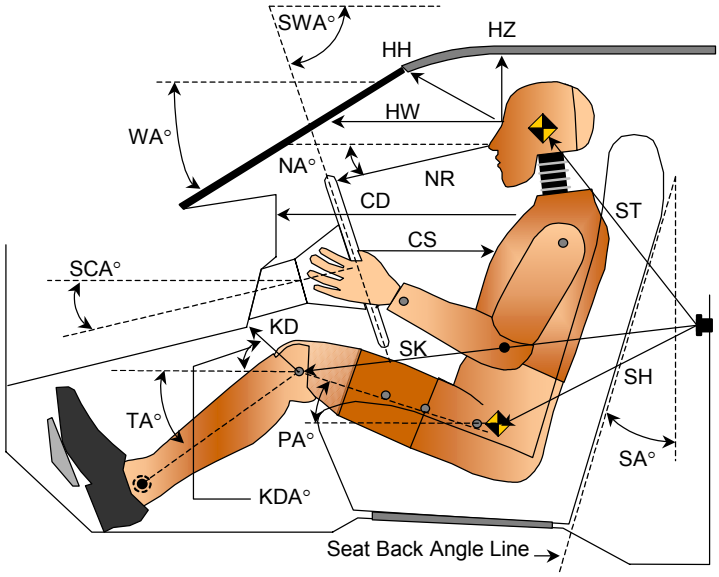
DATA SHEET NO. 6

DUMMY POSITIONING IN VEHICLE

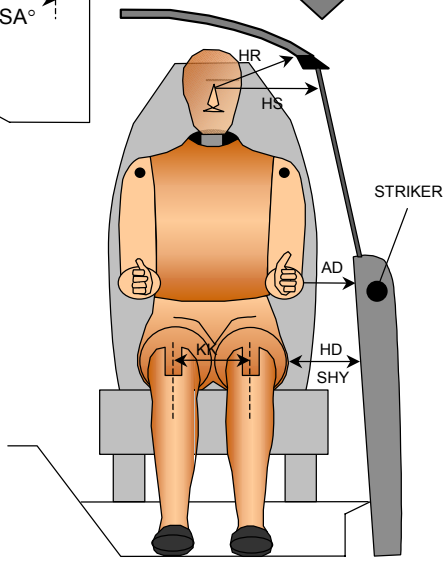
Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

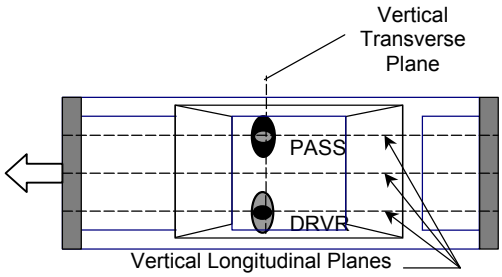
DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



AD	Arm to Door
HD	H-Point to Door
HR	Head to Side Header
HS	Head to Side Window
KK	Knee to Knee
SHY	Striker to H-Point (Y Axis)



CD	Chest to Dash
CS	Chest to Steering Wheel Hub
HH	Head to Header
HW	Head to Windshield
HZ	Head to Roof
KDA	Knee to Dash Angle
KDL	Left Knee to Dash
KDR	Right Knee to Dash
NA	Nose to Rim Angle
NR	Nose to Rim
PA	Pelvic Angle
RA	Rim to Abdomen
SA	Seat Back Angle
SCA	Steering Column Angle
SH	Striker to H-Point
SK	Striker to Knee
ST	Striker to Head
SWA	Steering Wheel Angle
TA	Tibial Angle
WA	Windshield Angle



DATA SHEET NO. 6... (continued)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

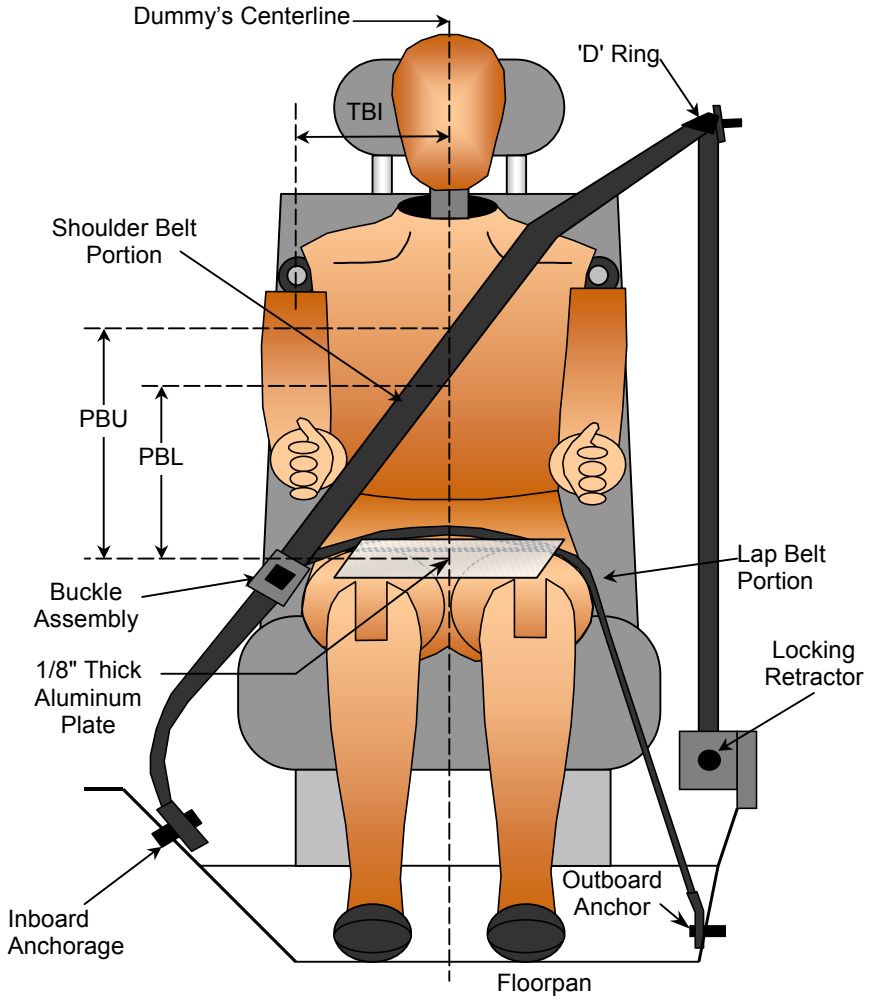
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		29.6		
SWA	Steering Wheel Angle		64.4		
SCA	Steering Column Angle		25.7		
SA	Seat Back Angle (on headrest post)		3.0		0.7
HZ	Head to Roof (Z)	180	90.0	138	90.0
HH	Head to Header	344	18.1	322	14.6
HW	Head to Windshield	578	0.0	514	0.0
HR	Head to Side Header (Y)	207		170	
NR	Nose to Rim	422	13.3		
CD	Chest to Dash	535		530	
CS	Chest to Steering Hub	328	14.5		
RA	Rim to Abdomen	193	0.0		
KDL	Left Knee to Dash	166	36.0	152	
KDR	Right Knee to Dash	139		151	36.9
PA	Pelvic Angle		21.5		23.5
TA	Tibia Angle		46.4		44.4
KK	Knee to Knee (Y)	351		245	
SK	Striker to Knee	600	104.6	630	100.5
ST	Striker to Head	435	2.5	479	11.3
SH	Striker to H-Point	300	131.6	288	126.5
SHY	Striker to H-Point (Y)	281		241	
HS	Head to Side Window	319		270	
HD	H-Point to Door (Y)	138		110	
AD	Arm to Door (Y)	120		100	
AA	Ankle to Ankle	344		180	

DATA SHEET NO. 7

SEAT BELT POSITIONING DATA

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact
NHTSA No.: M55101
Test Date: 01/13/05



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	170	170
PBU - Top surface of reference to belt upper edge	mm	350	347
PBL - To surface of reference to belt lower edge	mm	277	270

DATA SHEET NO. 8

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

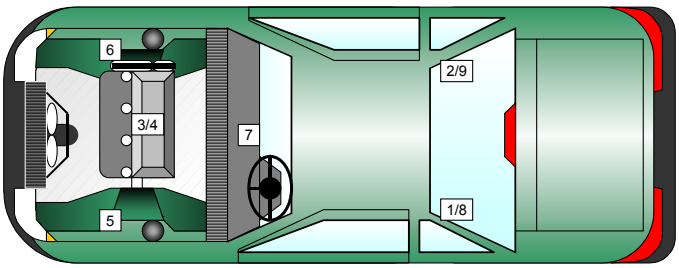
NHTSA No.: M55101
Test Date: 01/13/05

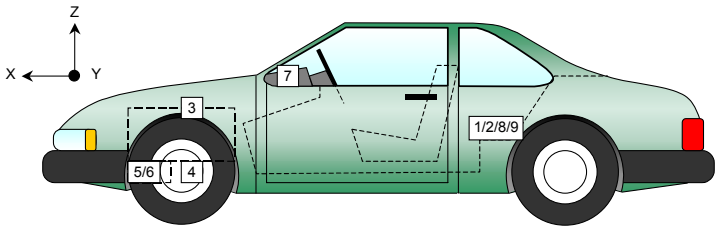
VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)			Peak Values				
		X	Y	Z	Units	Max	Time	Min	Time
1	Left Rear X-Member X	1896	-380	430	G's	1.2	119	-32.0	50
2	Right Rear X-Member X	1896	380	430	G's	2.3	118	-34.6	43
3	Engine Top X	4024	0	825	G's	52.4	47	-156.0	32
4	Engine Bottom X	4300	-20	215	G's	59.7	42	-140.2	33
5	Left Brake Caliper X	3970	-685	240	G's	54.0	71	-83.1	52
6	Right Brake Caliper X	3970	685	240	G's	22.5	73	-80.7	57
7	Instrument Panel X	3334	0	1006	G's	*	*	*	*
8	Left Rear X-Member Z	1896	-380	430	G's	4.7	30	-21.6	36
9	Right Rear X-Member Z	1896	380	430	G's	5.8	23	-20.4	36

* No valid data collected after 62ms

Reference Points: X - Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ up)





DATA SHEET NO. 9

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact
NHTSA No.: M55101
Test Date: 01/13/05

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	13.4	217	-58.3	75	4.1	298	-47.6	79
Head CG	Y	G's	3.5	27	-5.9	231	3.5	24	-8.5	89
Head CG	Z	G's	17.2	55	-13.0	98	17.7	53	-1.6	148
Head CG Resultant	N/A	G's	59.0	75			49.1	79		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	5.6	171	-40.5	67	1.5	173	-40.9	75
Chest CG	Y	G's	3.3	64	-2.6	30	1.9	80	-13.2	73
Chest CG	Z	G's	6.5	49	-9.2	106	8.0	39	-3.9	119
Chest CG Resultant	N/A	G's	40.6	67			42.8	74		

FEMUR PEAK FORCES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	775	50	-1109	61	152	22	-1813	49
Right Femur	Z	Newtons	657	37	-3190	61	772	73	-1126	37

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	7103	58			5877	62		
Shoulder Belt Force	N/A	Newtons	5259	52			5426	53		

HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg. G's	T^1	T^2	HIC	Avg. G's	T^1	T^2
Head CG Primary	517.5	46.0	56.3	92.3	322.5	38.4	64.0	99.2

CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T^1	T^2	CLIP	T^1	T^2
Chest CG Primary	39.6	66.2	69.2	40.7	72.6	75.6

DATA SHEET NO. 9... (continued)

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	4.1	124	-50.6	59	2.8	124	-41.0	49
Pelvis	Y	G's	6.9	69	-3.1	37	5.4	66	-25.6	56
Pelvis	Z	G's	4.3	239	-22.2	67	3.2	37	-26.6	73

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	565	74	-279	52	138	87	-341	150
Neck Force	Y	Newtons	65	168	-83	35	85	71	-183	143
Neck Force	Z	Newtons	1495	69	-320	110	1038	73	-157	156
Neck Moment	X	N•m	5.3	63	-10.3	86	16.9	78	-9.9	140
Neck Moment	Y	N•m	30.4	69	-26.8	244	27.3	145	-14.3	78
Neck Moment	Z	N•m	3.9	117	-4.6	232	8.4	110	-4.9	167

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	11.8	93	-51.3	29	6.9	91	-62.6	44
Left Foot Aft	Z	G's	5.1	217	-52.3	52	14.4	75	-46.2	62
Left Foot Fore	Z	G's	31.7	46	-87.7	50	15.7	75	-69.2	46
Right Foot Aft	X	G's	15.7	89	-109.5	47	14.1	89	-65.5	60
Right Foot Aft	Z	G's	6.1	74	-93.5	46	3.1	75	-42.4	36
Right Foot Fore	Z	G's	37	49	-194	46	12.2	76	-53.2	46

UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Lower Moment	X	N•m	19.9	89	-20.9	31	21.3	80	-59.3	64
Left Lower Moment	Y	N•m	42.5	55	-27.7	90	28.6	114	-81.0	62
Left Lower Force	Z	Newtons	111	117	-2030	29	186	19	-3307	36
Left Upper Moment	X	N•m	65.8	59	-9.0	87	28.3	63	-59.6	81
Left Upper Moment	Y	N•m	12.8	103	-123.2	55	21.4	42	-40.3	81
Left Upper Force	Z	Newtons	135	125	-1680	57	149	19	-4026	35
Right Lower Moment	X	N•m	95.4	50	-18.8	47	11.9	61	-32.9	83
Right Lower Moment	Y	N•m	61.2	47	-42.3	51	31.1	61	-30.9	38
Right Lower Force	Z	Newtons	80	122	-3939	49	147	117	-3922	36
Right Upper Moment	X	N•m	*	*	*	*	17.2	34	-19.5	64
Right Upper Moment	Y	N•m	23.8	116	-125.1	47	20.1	113	-134	62
Right Upper Force	Z	Newtons	103	26	-3095	59	243	149	-2958	37

* No valid data collected after 45ms

DATA SHEET NO. 9... (continued)

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact
NHTSA No.: M55101
Test Date: 01/13/05

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest	X	mm			-22.9	77			-20.7	82

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	13.3	217	-56.9	76	4.4	298	-47.5	79
Head CG	Y	G's	4.7	29	-6.1	230	4.3	65	-8.5	90
Head CG	Z	G's	16.4	54	-13.7	98	18.3	53	-2.1	147
Head CG Resultant	N/A	G's	57.3	76			49.1	78		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	5.8	163	-42.5	81	1.4	162	-42.5	74
Chest CG	Y	G's	3.7	63	-3.1	31	1.8	27	-11.2	74
Chest CG	Z	G's	6.6	49	-9.1	105	8.0	39	-3.8	118
Chest CG Resultant	N/A	G's	42.6	81			43.9	74		

REDUNDANT HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg.	T^1	T^2	HIC	Avg.	T^1	T^2
Head CG Primary Redundant	483.3	44.8	56.4	92.4	337.0	39.1	64.0	99.3

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T^1	T^2	CLIP	T^1	T^2
Chest CG Primary Redundant	41.7	80.0	83.0	41.2	72.6	75.6

DATA SHEET NO. 10

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

SEAT BELT PLACEMENT MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	170	170
PBU - Top surface of reference to belt upper edge	mm	350	347
PBL - Top surface of reference to belt lower edge	mm	277	270

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	898	880
Lap belt length as measured on ATD	mm	824	838
Remainder of belt on reel	mm	742	762
Total belt length for continuous webbing systems	mm	2464	2480

SHOULDER BELT SPOOL-OUT DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	Not recorded	
As determined electronically	mm	Not recorded	

DATA SHEET NO. 11

SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

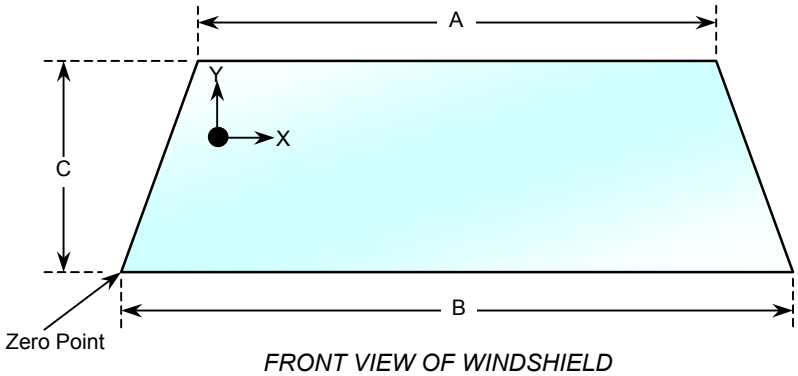
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles, which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2165	2165	100
Right Side	2165	2165	100
Total	4330	4330	100



FRONT VIEW OF WINDSHIELD

WINDSHIELD DIMENSIONS

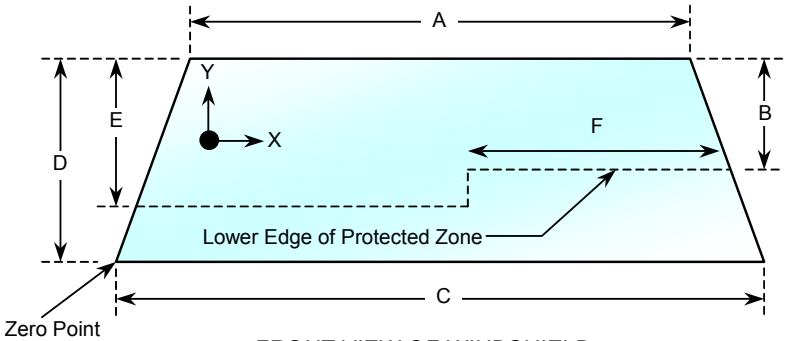
Item	Units	Segment Length	Molding Width
A	mm	1210	13
B	mm	1515	9
C	mm	803	14

DATA SHEET NO. 12

WINDSHIELD ZONE INTRUSION FMVSS 219 (Partial) DATA

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1210
B	mm	490
C	mm	1514
D	mm	803
E	mm	539
F	mm	531

AREA OF PROTECTED ZONE FAILURES - NONE

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

DATA SHEET NO. 13

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

Temperature at Time of Impact: 21° C Test Time: 1:25pm

Stoddard Solvent Spillage Measurements

A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0 oz.
(Maximum Allowable = 5 ounces)

C. For the following 25 minutes: 0 oz.
(Maximum Allowable = 1 oz. /minute)

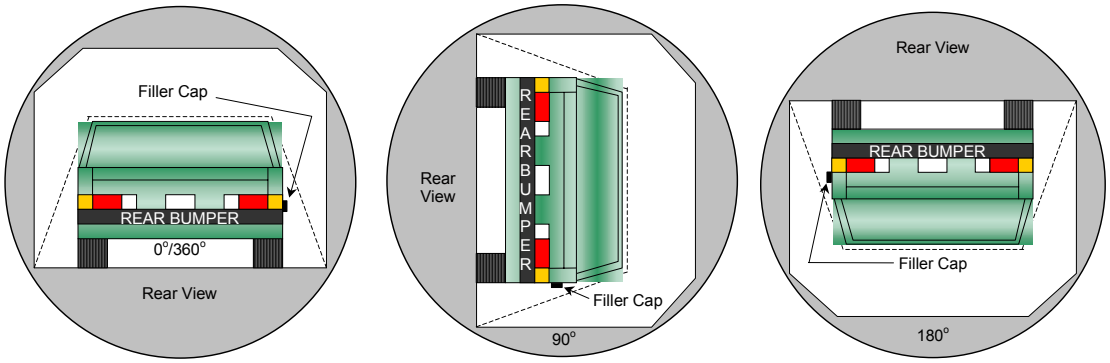
D. Spillage: None

DATA SHEET NO. 14

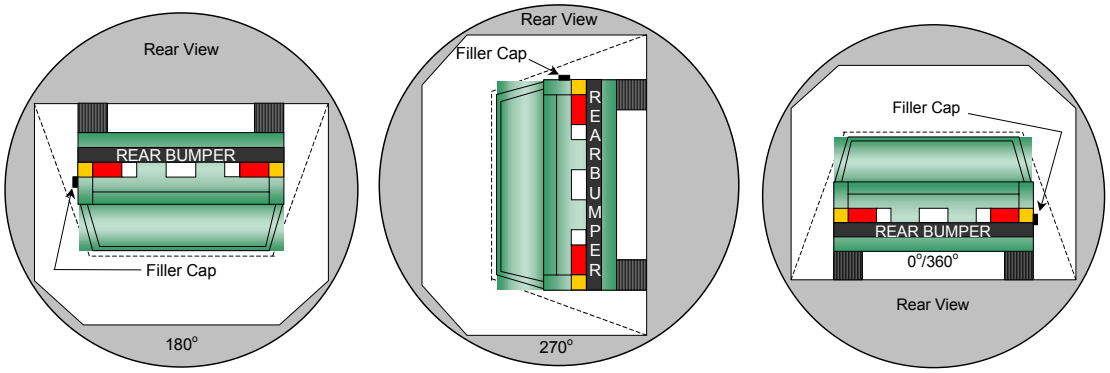
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

Test Time: 1:25 pm



0° to 90° 90° to 180°



180° to 270° 270° to 360°

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage locations: None

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	165	300	0
90° to 180°	152	300	0
180° to 270°	135	300	0
270° to 360°	161	300	0

DATA SHEET NO. 15

VEHICLE MEASUREMENTS

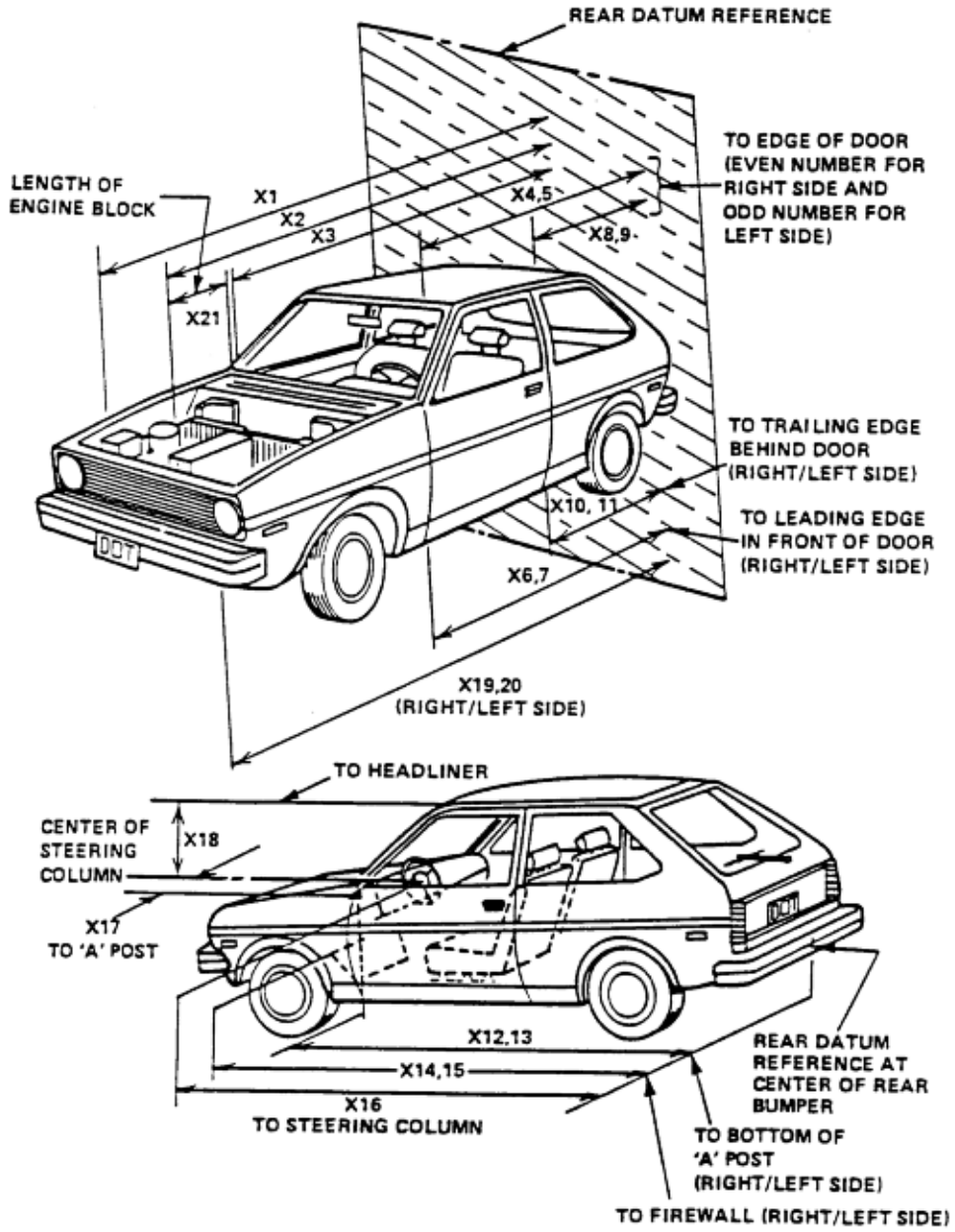
Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4797	4221	576
2	RSOV to front of engine	mm	4014	3744	270
3	RSOV to firewall centerline	mm	3679	3635	44
4	RSOV to leading edge of right door	mm	3370	3355	15
5	RSOV to leading edge of left door	mm	3372	3355	17
6	RSOV to lower leading edge of right door	mm	3318	3304	14
7	RSOV to lower leading edge of left door	mm	3321	3304	17
8	RSOV to upper leading edge of right door	mm	2278	2261	17
9	RSOV to upper leading edge of left door	mm	2280	2263	17
10	RSOV to lower trailing edge of right door	mm	2256	2243	13
11	RSOV to lower trailing edge of left door	mm	2260	2244	16
12	RSOV to bottom of right 'A' pillar	mm	3318	3301	17
13	RSOV to bottom of left 'A' pillar	mm	3323	3306	17
14	RSOV to firewall on right side	mm	3601	3565	36
15	RSOV to firewall on left side	mm	3608	3564	44
16	RSOV to steering column	mm	2900	3878	22
17	Center of steering column to left 'A' pillar	mm	462	430	32
18	Center of steering column to headlining	mm	430	400	30
19	RSOV to right side of front bumper	mm	4669	4210	459
20	RSOV to left side of front bumper	mm	4663	4201	462
21	Length of engine block	mm	450	450	0
RD	RSOV to right side of dash panel	mm	3100	3065	35
CD	RSOV to center of dash panel	mm	3209	3204	5
LD	RSOV to left side of dash panel	mm	3102	3065	37

DATA SHEET NO. 15... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05



DATA SHEET NO. 15... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

Target Vehicle Structural Measurement

	Elements	Pre-Test (mm)
1	Total Length	4797
2	Total Width	1801
3	Bumper Top Height	575
4	Bumper Bottom Height	405
5	Longitudinal Member Top Height	260
6	Distance between Longitudinal Members	965
7	Longitudinal Member Width	67
8	Engine Top Height	835
9	Engine Bottom Height	195
10	Engine and gearbox width	602
11	Front bumper-engine distance	360
12	Front shock absorber fixing height	885
13	Bonnet leading edge height	582
14	Front shock absorber fixing width	1185
15	Front bumper – front axle distance	935
16	Front axle – a pillar distance	421
17	A-pillar – B-pillar distance	1162
18	B-Pillar – rear axle distance	1120
19	B-pillar – C-pillar distance	718
20	Roof sill bottom height	1460
21	Roof sill top height	1480
22	Floor sill bottom height	242
23	Floor sill top height	320

DATA SHEET NO. 16

CAMERA LOCATIONS

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	1215	-9680	1125	25	1000
3	Steering Column Top	2370	-7240	1570	19	1000
4	Steering Column Bottom	2340	-7240	1035	19	1000
5	Driver Close-up	1689	-9175	1285	50	1000
6	Driver Angle	6580	-5690	2090	50	1000
7	On board Driver Side				8	1000
8	On board Passenger Side				8	1000
9	Right Overall	2224	7500	1360	19	1000
10	Right Passenger Half	885	10090	1465	24	1000
11	Right Close-up	1580	9010	1470	50	1000
12	Right Angle	6610	5330	2220	50	1000
13	Windshield	-290	0	2800	10	1000
14	Top Driver	80	-444	1745	25	1000
15	Top Passenger	105	460	1760	25	1000
16	Pit Front	1126	0	-3150	24	1000
17	Pit Rear	3486	0	-3150	24	1000

*COORDINATES:

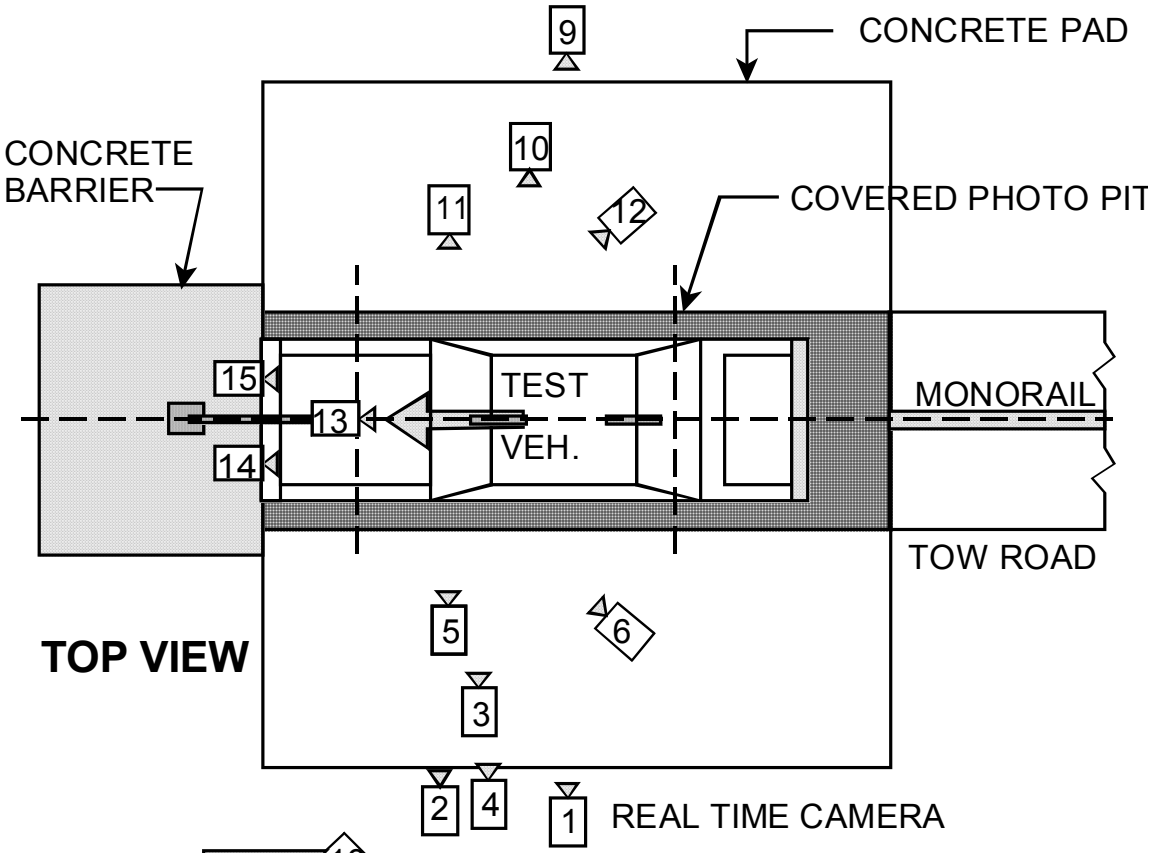
+X = forward of impact plane
+Y = right of monorail centerline
+Z = above ground level

DATA SHEET NO. 16... (continued)

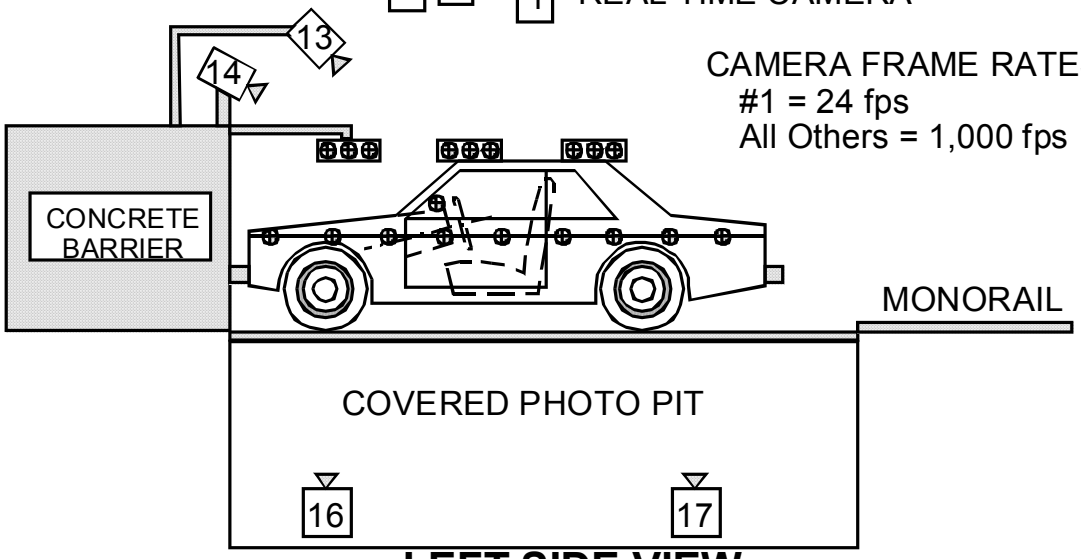
CAMERA LOCATIONS

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

CAMERA POSITIONS FOR FRONTAL IMPACTS



TOP VIEW



CAMERA FRAME RATES:
#1 = 24 fps
All Others = 1,000 fps

LEFT SIDE VIEW

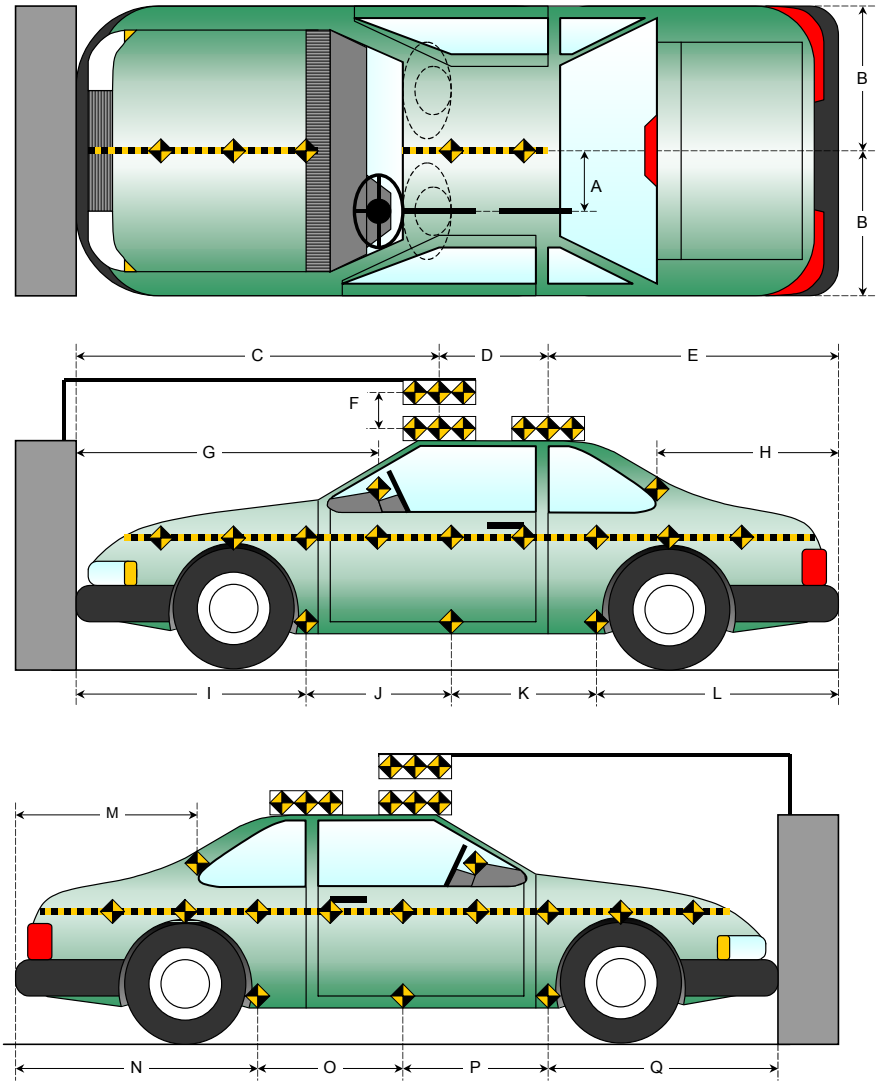
DATA SHEET NO. 17

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05

Item	Value
A	380
B	900
C	2361
D	670
E	1766
F	
G	
H	1292
I	1380
J	940
K	943
L	1534
M	1294
N	1534
O	936
P	941
Q	1386



DATA SHEET NO. 18

VEHICLE INTRUSION MEASUREMENTS

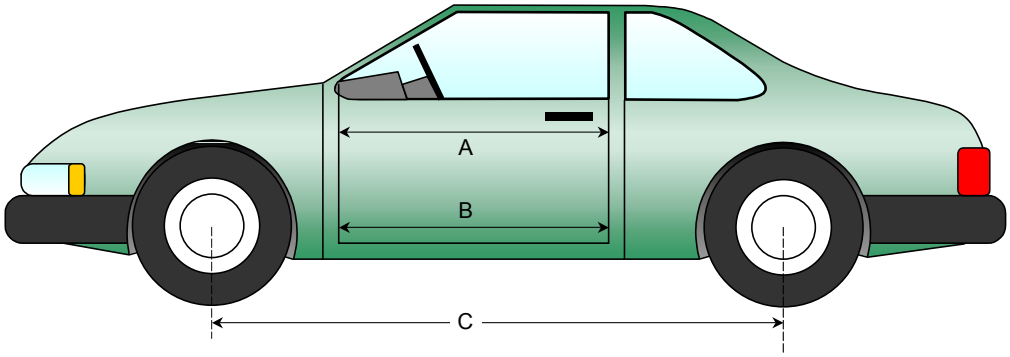
Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact
NHTSA No.: M55101
Test Date: 01/13/05

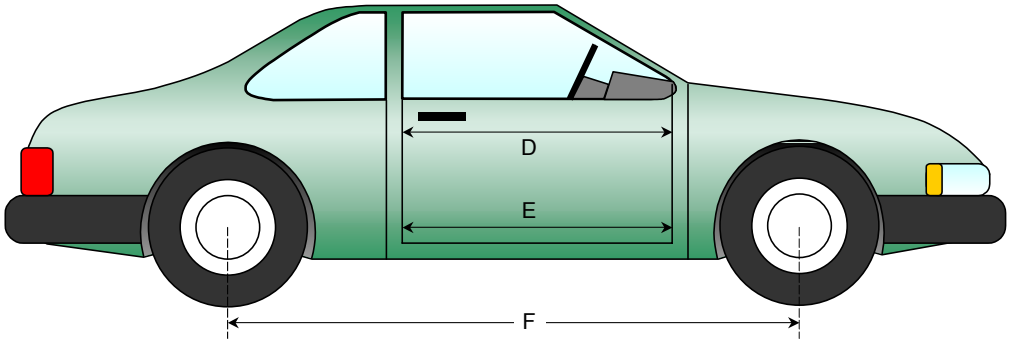
DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1047	1046	1
B	Left Side Lower	mm	930	929	1
D	Right Side Upper	mm	1046	1048	-2
E	Right Side Lower	mm	899	897	2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2715	2633	77
F	Right Side Wheelbase	mm	2715	2648	62





DATA SHEET NO. 18... (continued)

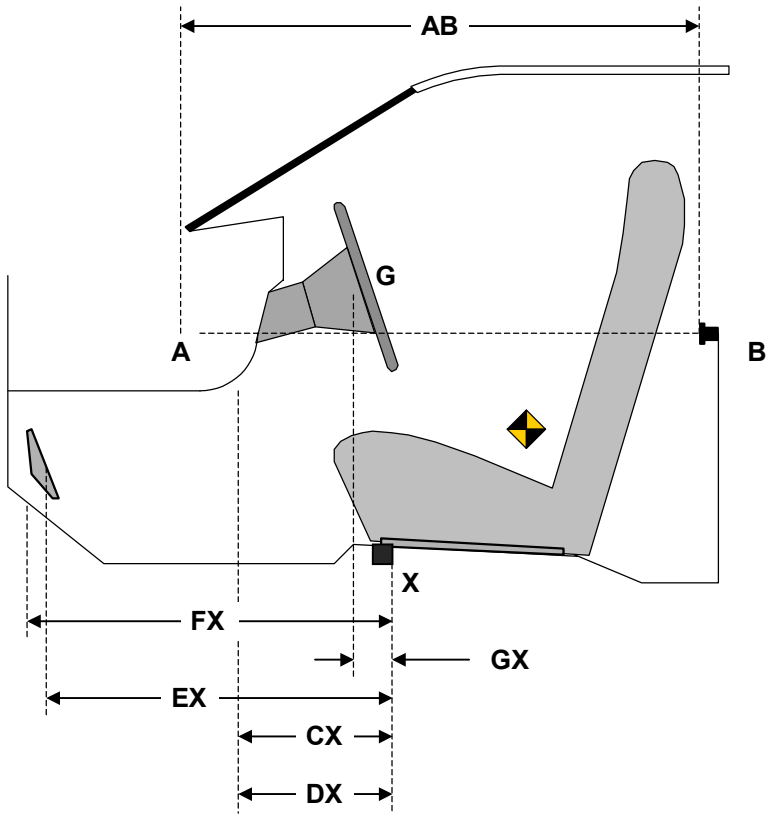
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact
NHTSA No.: M55101
Test Date: 01/13/05

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	1047	1046	1
CX	Left Knee Bolster to X	mm	314	307	7
DX	Right Knee Bolster to X	mm	312	295	17
EX	Brake Pedal to X	mm	577	579	-2
FX	Foot Rest to X	mm	611	586	25
GX	Center of Steering Column Wheel Hub to X	mm	88	93	-5

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

DATA SHEET NO. 18... (continued)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

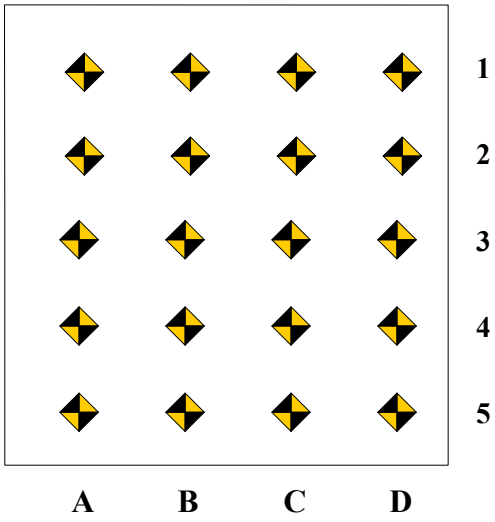
NHTSA No.: M55101
Test Date: 01/13/05

Measurement reference point for X and Z axis is the forward outboard seat mounting bolt.

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3, 4, and 5 are located on the most level portion of the floor pan.

Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.



DRIVER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	678	715	717	713	651	685	676	658	27	30	41	55
2	621	614	616	613	606	595	588	579	15	19	28	34
3	504	502	499	500	495	490	483	471	9	12	16	29
4	372	374	376	375	363	365	367	364	9	9	9	11
5	242	246	247	248	237	237	240	238	5	9	9	10

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	96	55	54	59	103	64	65	59	-7	-9	-11	0
2	-27	-21	-22	-23	-23	-20	-24	-27	-4	-1	2	4
3	-75	-71	-70	-88	-72	-85	-96	-80	-3	14	26	-8
4	-73	-74	-74	-86	-96	-92	-100	-90	23	18	26	4
5	-99	-84	-84	-97	-111	-108	-109	-118	12	24	25	21

DATA SHEET NO. 18... (continued)

VEHICLE INTRUSION MEASUREMENTS

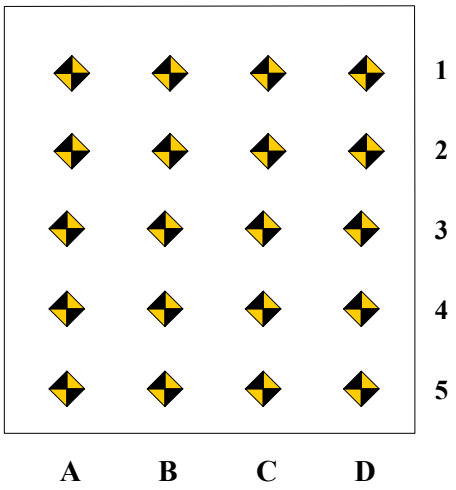
Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact
NHTSA No.: M55101
Test Date: 01/13/05

Measurement reference point for X and Z axis is the forward outboard seat mounting bolt.

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3, 4, and 5 are located on the most level portion of the floor pan.

Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.



PASSENGER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	684	681	683		627	626	637		57	55	46	
2	583	577	580	580	532	538	549	574	51	39	31	6
3	459	454	458	458	415	422	437	447	44	32	21	11
4	334	328	332	333	313	312	316	321	21	16	16	12
5	209	203	206	205	189	186	192	197	20	17	14	8

PASSENGER FLOOR PAN Z-AXIS

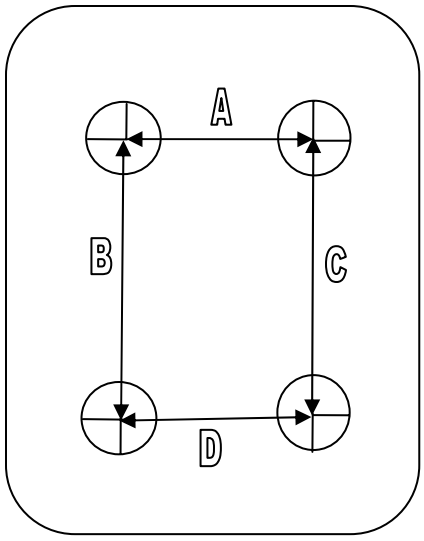
	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	40	38	41		38	44	52		2	-6	-11	
2	-32	-35	-32	-34	-41	-44	-39	-41	9	9	7	7
3	-67	-66	-65	-69	-72	-92	-86	-76	5	26	21	7
4	-87	-73	-73	-82	-100	-107	-102	-100	13	34	29	18
5	-97	-81	-80	-89	-121	-112	-107	-79	24	31	27	-10

DATA SHEET NO. 18... (continued)

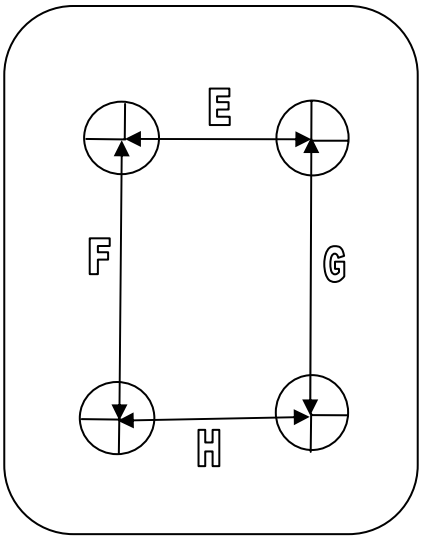
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05



Driver



Passenger

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test	Post-Test	Difference
A	234	221	13
B	270	267	3
C	262	265	-3
D	208	208	0
E	215	220	-5
F	274	270	4
G	268	274	-6
H	210	216	-6

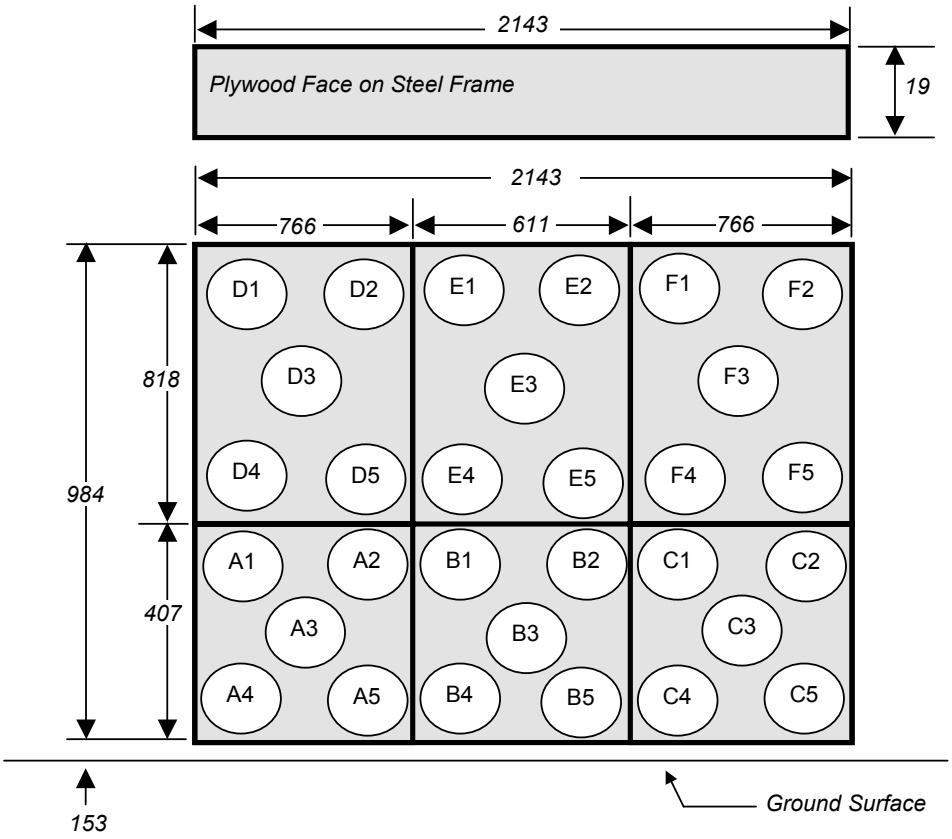
DATA SHEET NO. 19

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

30 Load Cell Rigid Barrier

Load Cell Locations on Fixed Barrier



Group 4 D1-D5	Group 5 E1-E5	Group 6 F1-F5
Group 1 A1-A5	Group 2 B1-B5	Group 3 C1-C5

6 Groups of 5 Load Cells Each

The Data is presented in Appendix B with the following requirements:

1. Sum data from 6 groupings shown above (5 cells/group)
2. Sum of left 2 groupings, center 2 groupings and right 2 groupings.
3. Total or sum of all 30 individual load cells.
4. Total versus average rear seat cross member displacement.

DATA SHEET NO. 20

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2005 Toyota Camry LE NHTSA No.: M55101
Test Program: 35mph Frontal Impact Test Date: 01/13/05

VEHICLE INFORMATION

VIN: 4T1BE30K65U013411 Wheelbase (mm) : 2715
Vehicle Size Category: Sedan Test Weight (kg) : 1687.5

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 14
Cal. Procedure/Interval: MGA procedure / 6 month
Integration Algorithm: Trapezoidal Linearity: > 99%
Impact Velocity (km/h): 56.5
Velocity Change (km/h): 61.1 Time of Separation (msec): 110

CRUSH PROFILE

Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
Damage Region Length (mm): 1364 Impact Mode: Frontal

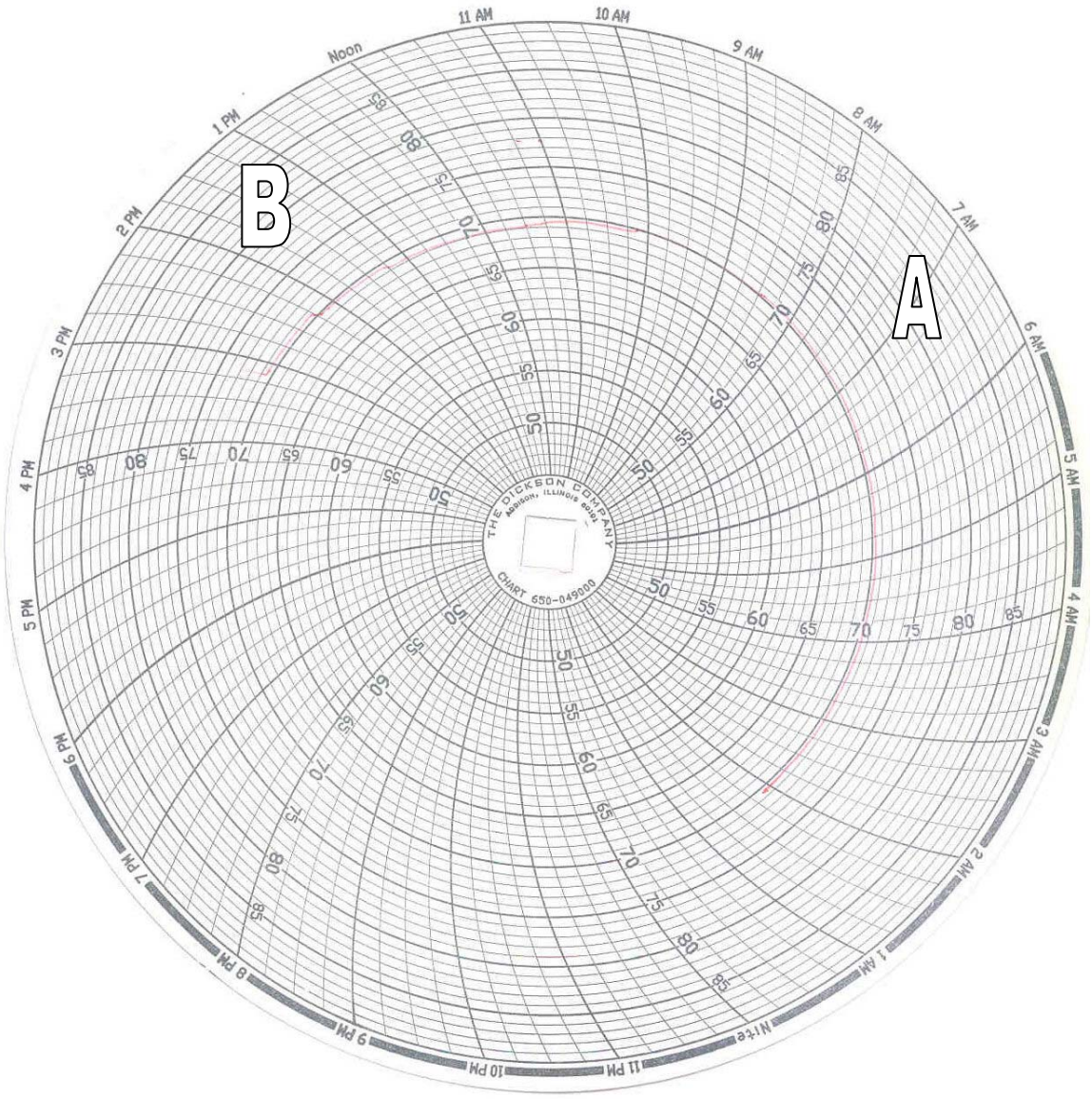
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4663	4201	462
C2	Crush zone 2 at left side	mm	4740	4228	512
C3	Crush zone 3 at left side	mm	4782	4232	550
C4	Crush zone 4 at right side	mm	4784	4181	603
C5	Crush zone 5 at right side	mm	4744	4183	561
C6	Crush zone 6 at right side	mm	4669	4210	459
L	C1 TO C6	mm	1364	1350	14

DATA SHEET NO. 21

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2005 Toyota Camry LE
Test Program: 35mph Frontal Impact

NHTSA No.: M55101
Test Date: 01/13/05



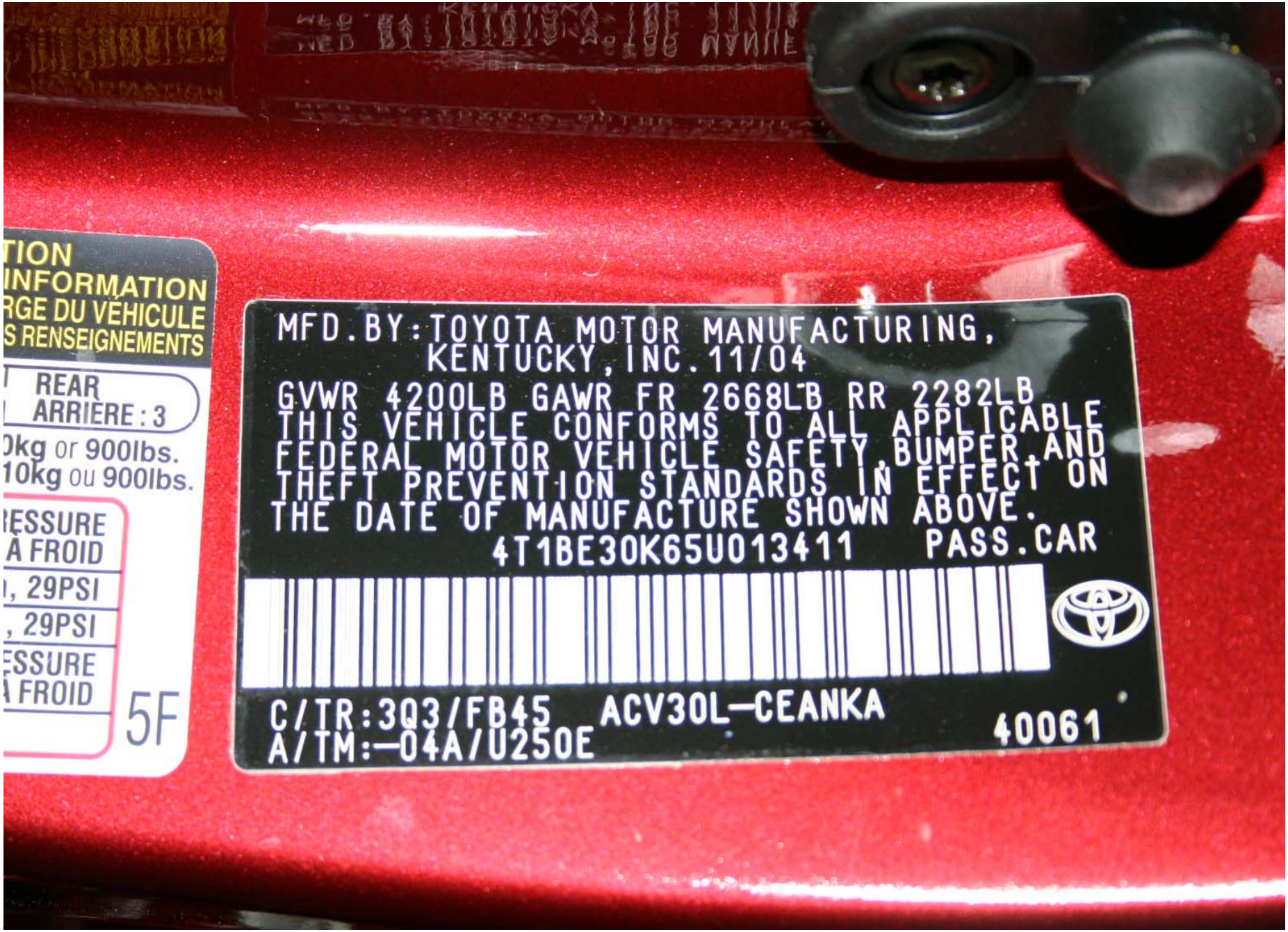
A = Dummies installed in vehicle at 7:00 am

B = Test conducted at 1:25 pm

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS



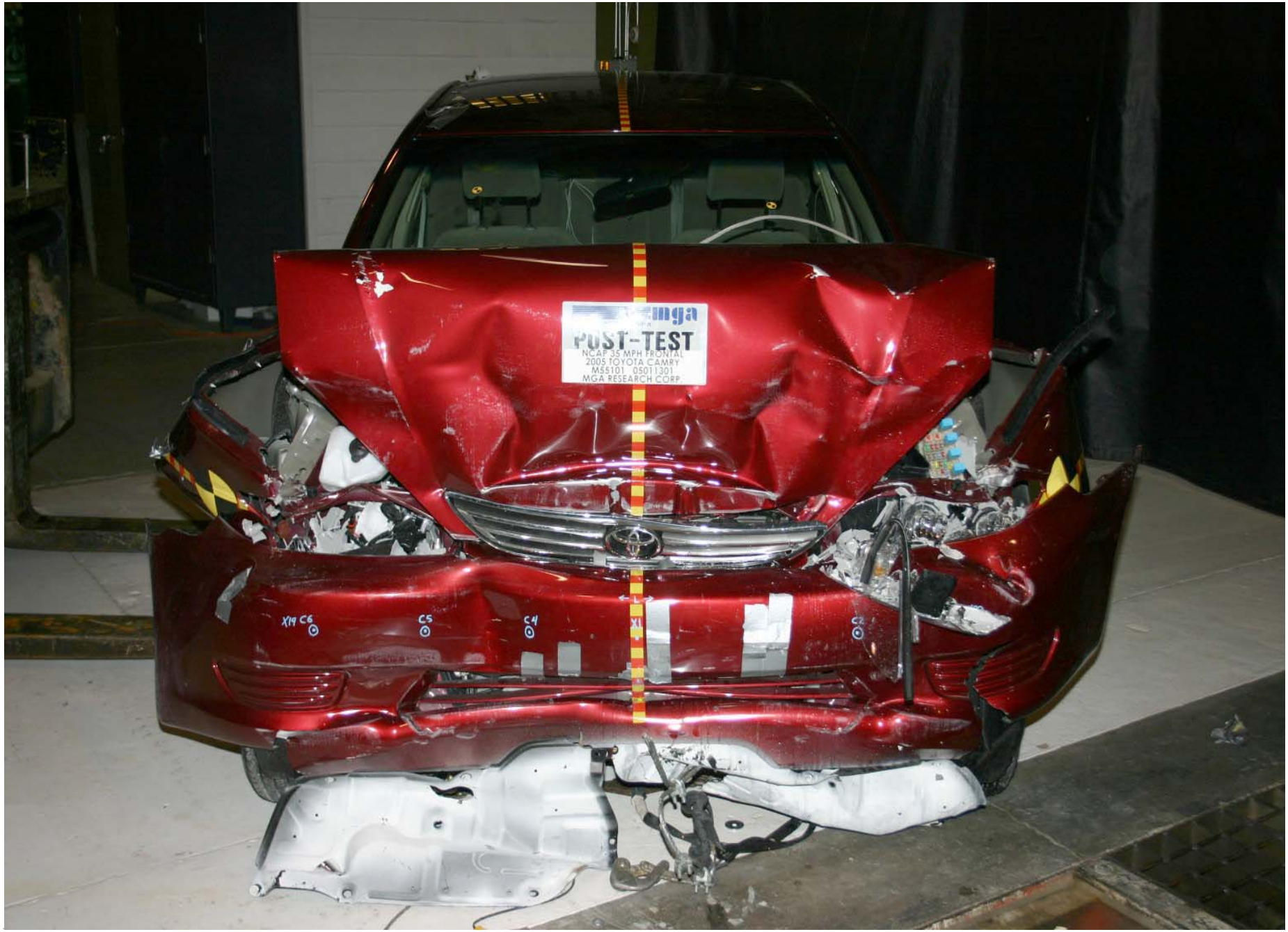
Vehicle Certification Label

Tire Placard

Right Front View of Test Vehicle, as received

Left Rear View of Test Vehicle, as received

Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle

Pre-Test Left Side View of Test Vehicle

Post-Test Left Side View of Test Vehicle

Pre-Test Right Side View of Test Vehicle

Post-Test Right Side View of Test Vehicle

Pre-Test Right Front Three-Quarter View of Test Vehicle

Post-Test Right Front Three-Quarter View of Test Vehicle

Pre-Test Left Rear Three-Quarter View of Test Vehicle

Post-Test Left Rear Three-Quarter View of Test Vehicle

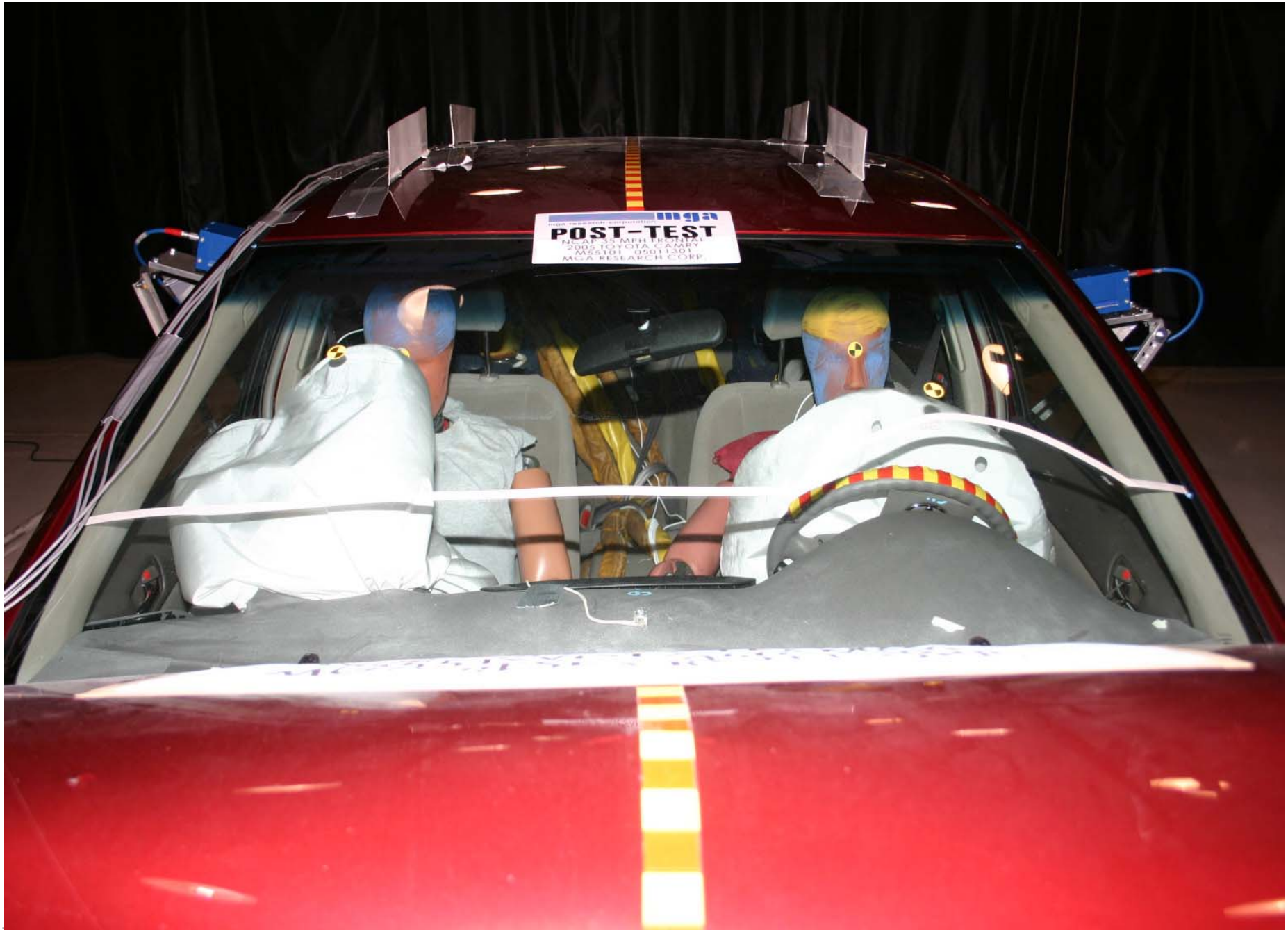
Pre-Test Left Rear Three-Quarter View of Doors

Post-Test Left Rear Three-Quarter View of Doors

Pre-Test Right Rear Three-Quarter View of Doors

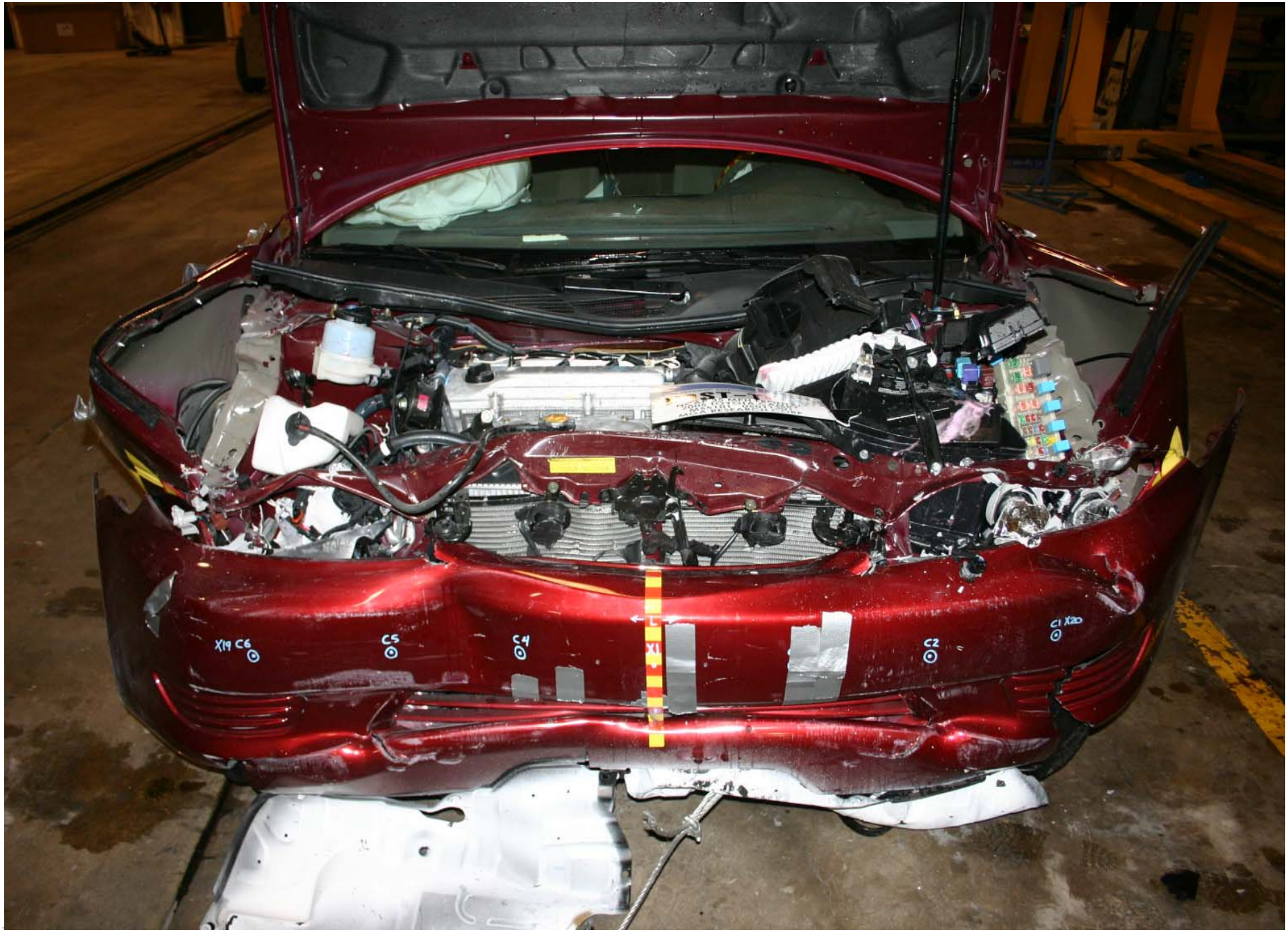
Post-Test Right Rear Three-Quarter View of Doors

Pre-Test Windshield View



Post-Test Windshield View

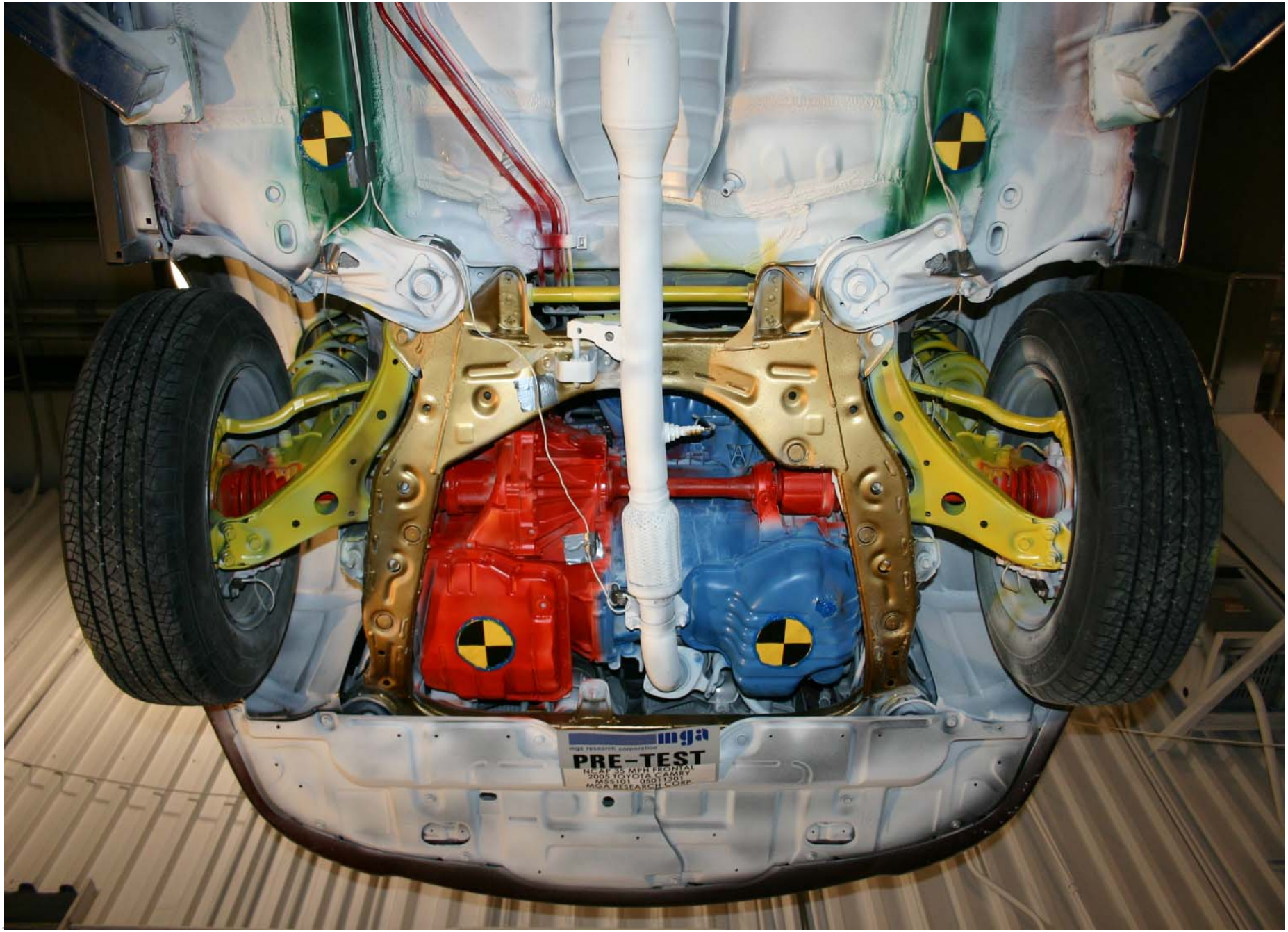
Pre-Test Engine Compartment View



Post-Test Engine Compartment View

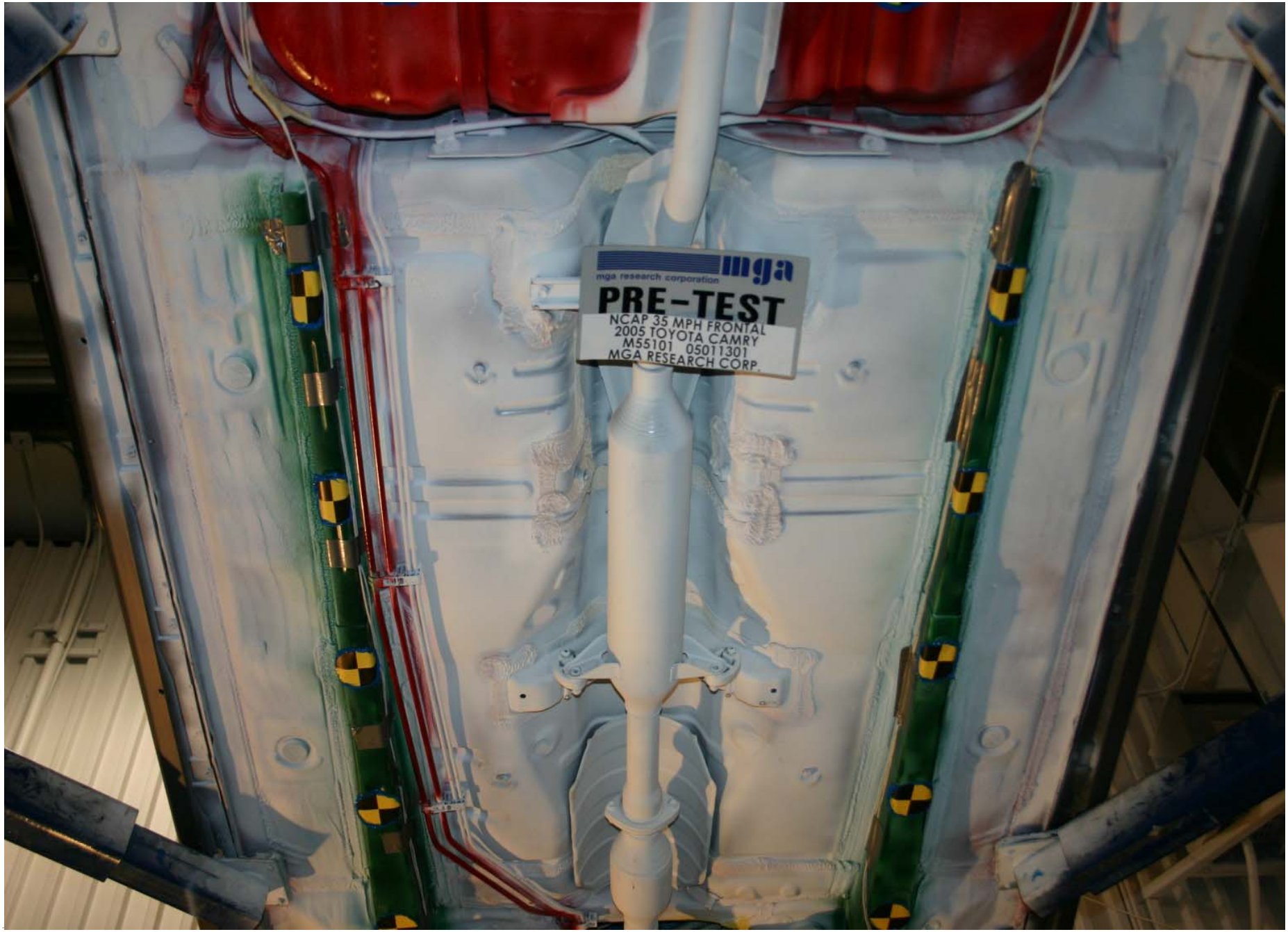
Pre-Test Fuel Filler Cap View

Post-Test Fuel Filler Cap View

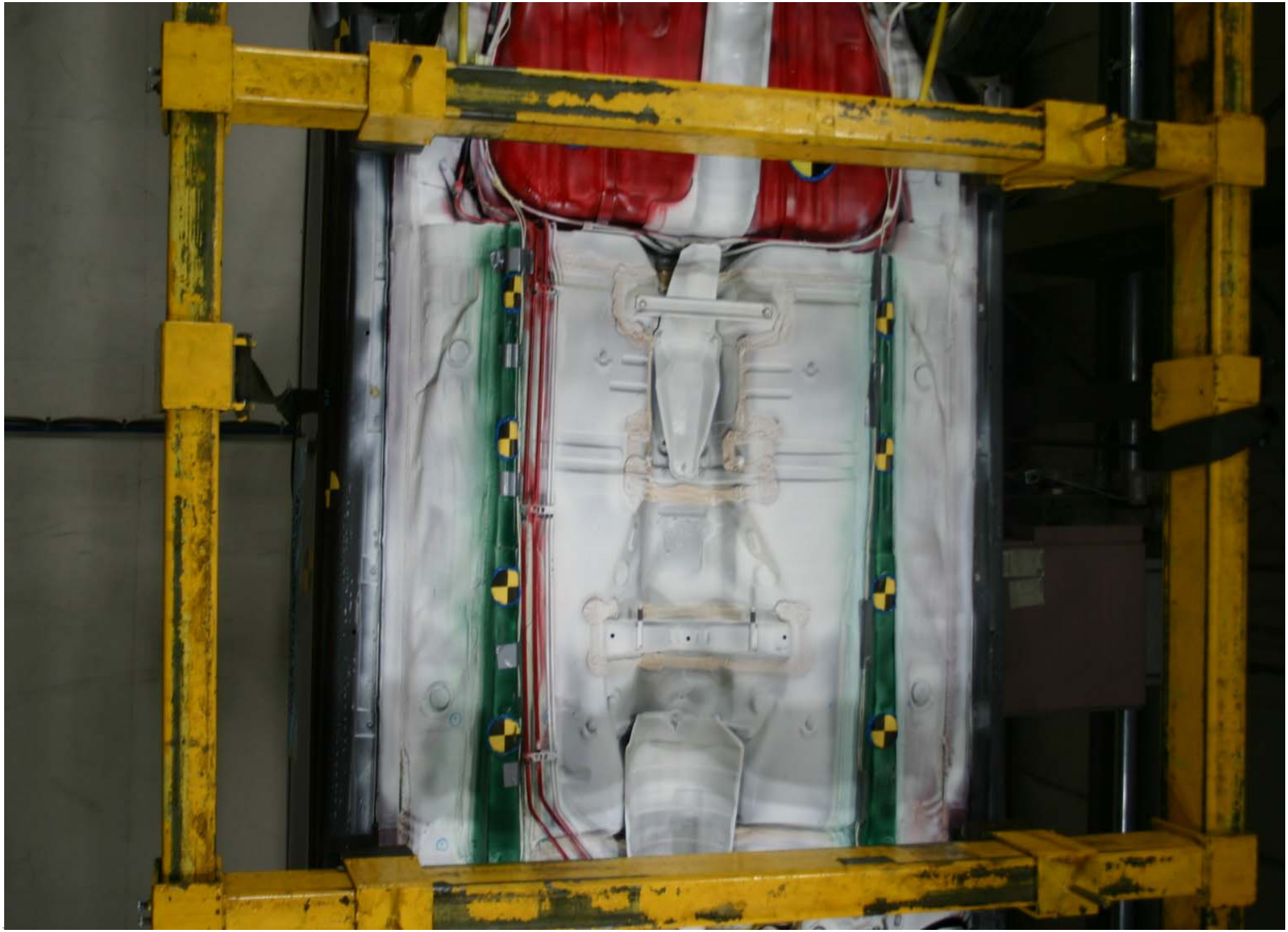


Pre-Test Front Underbody View

Post-Test Front Underbody View



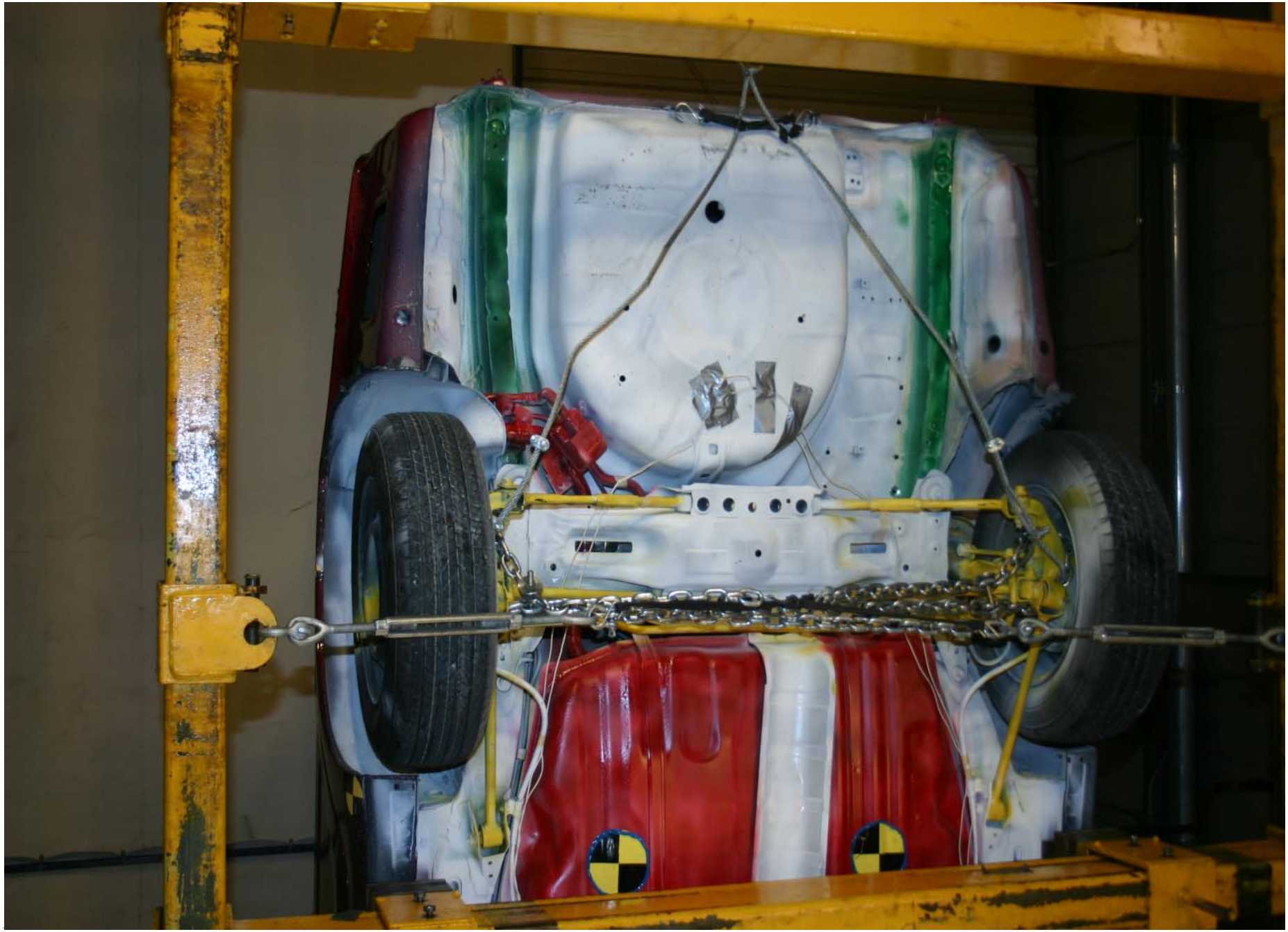
Pre-Test Front Mid Underbody



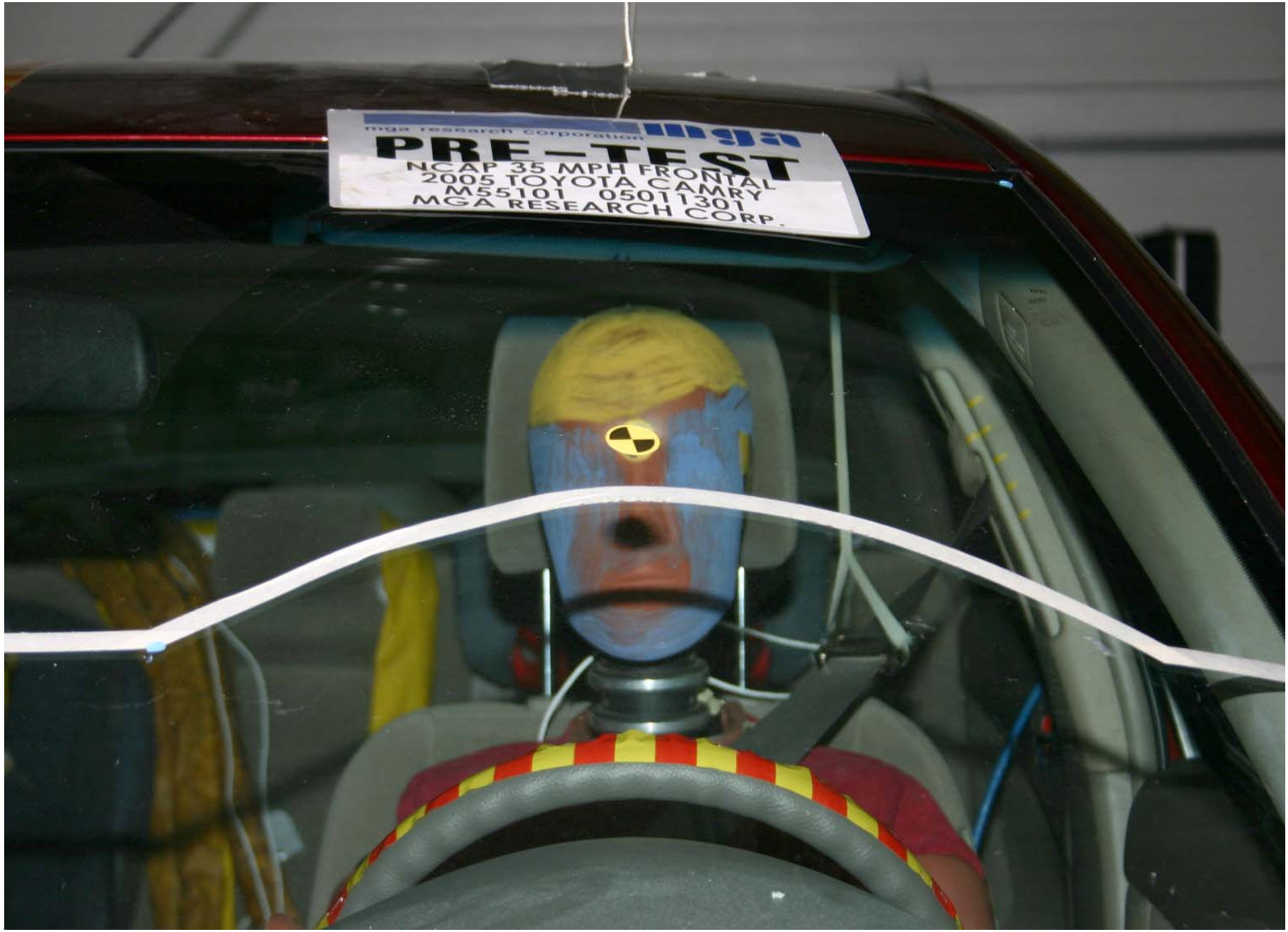
Post-Test Front Mid Underbody

Post-Test Rear Mid Underbody

Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Driver Dummy Front View (head position)

Post-Test Driver Dummy Front View (head position)

Pre-Test Driver Dummy Position Left Side View

Post-Test Driver Dummy Position Left Side View

Pre-Test Driver Dummy Position Left Side View (Door Open)

Post-Test Driver Dummy Position Left Side View (Door Open)

Pre-Test Driver Dummy Seat Position

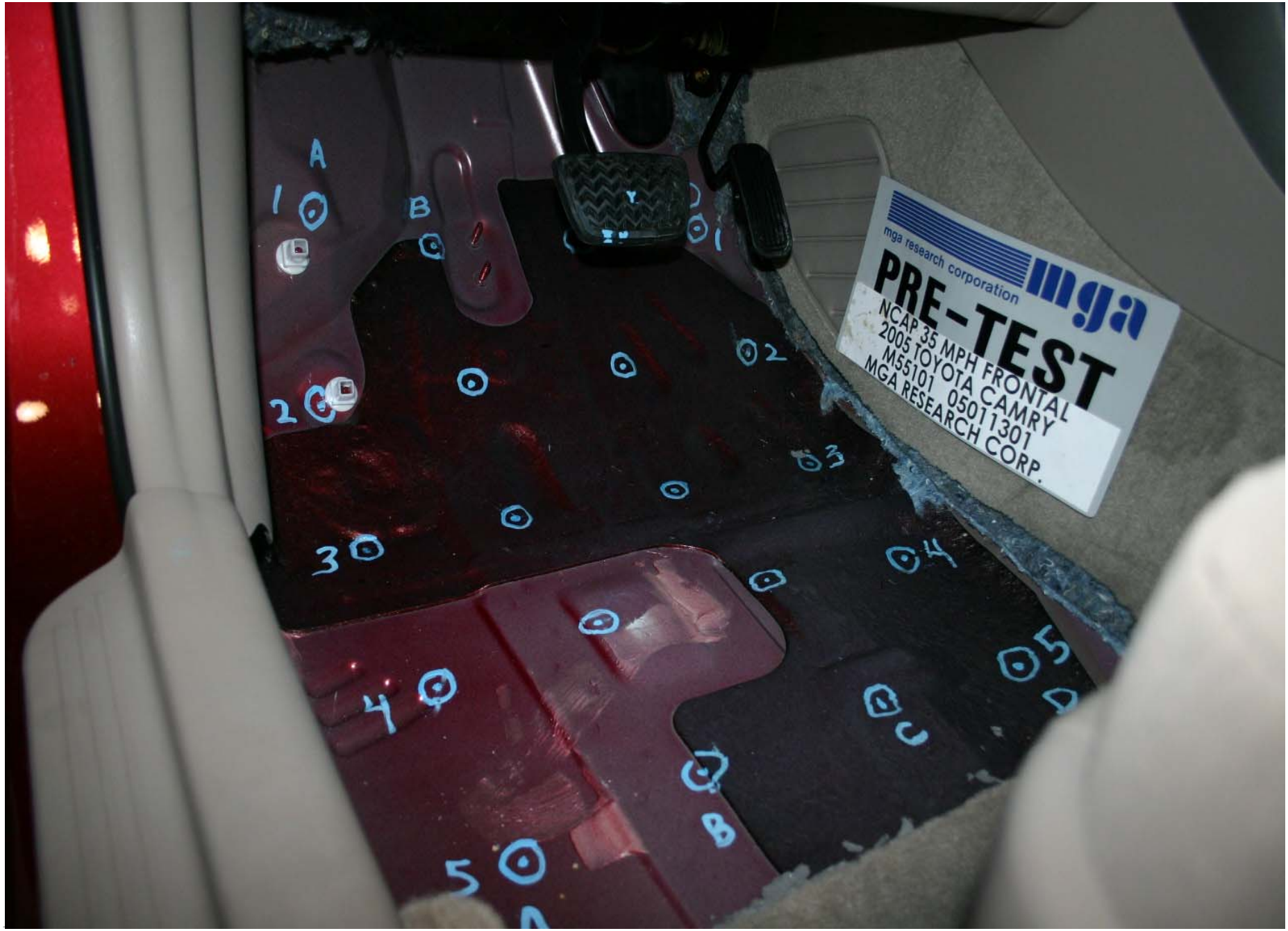
Post-Test Driver Dummy Seat Position

Pre-Test Driver Dummy Feet Position

Post-Test Driver Dummy Feet Position

Pre-Test Driver Side Knee Bolster View

Post-Test Driver Side Knee Bolster View



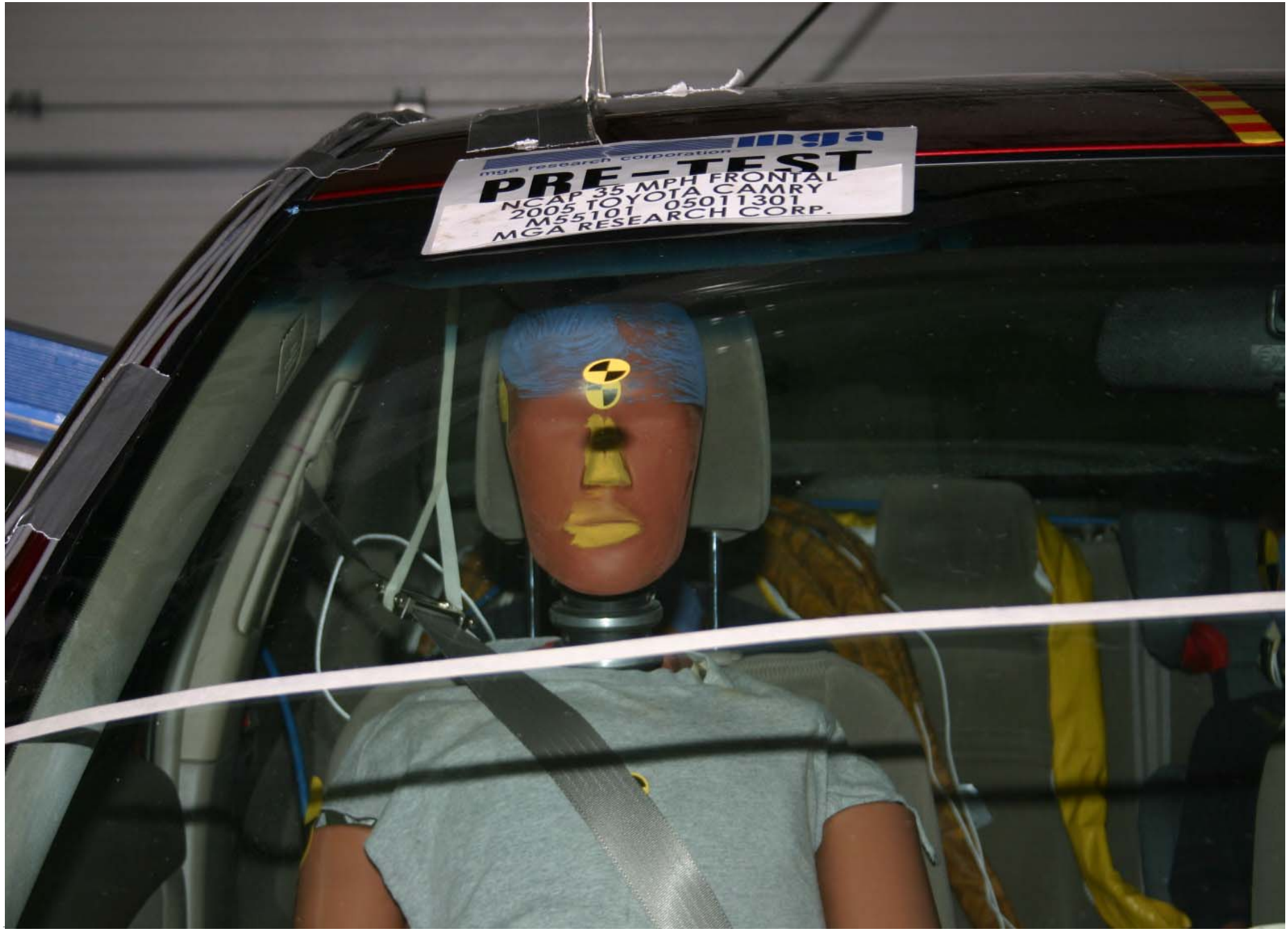
Pre-Test Driver Side Floor Pan View

Post-Test Driver Side Floor Pan View

Post-Test Driver Dummy Head Contact

Post-Test Driver Dummy Knee Contact

Post-Test Driver Dummy Airbag Contact



Pre-Test Passenger Dummy Front View (head position)

Post-Test Passenger Dummy Front View (head position)

Pre-Test Passenger Dummy Position Right Side View

Post-Test Passenger Dummy Position Right Side View

Pre-Test Passenger Dummy Position Right Side View (Door Open)

Post-Test Passenger Dummy Position Right Side View (Door Open)

Pre-Test Passenger Dummy Seat Position

Post-Test Passenger Dummy Seat Position

Pre-Test Passenger Dummy Feet Position

Post-Test Passenger Dummy Feet Position

Pre-Test Passenger Side Knee Bolster View

Post-Test Passenger Side Knee Bolster View

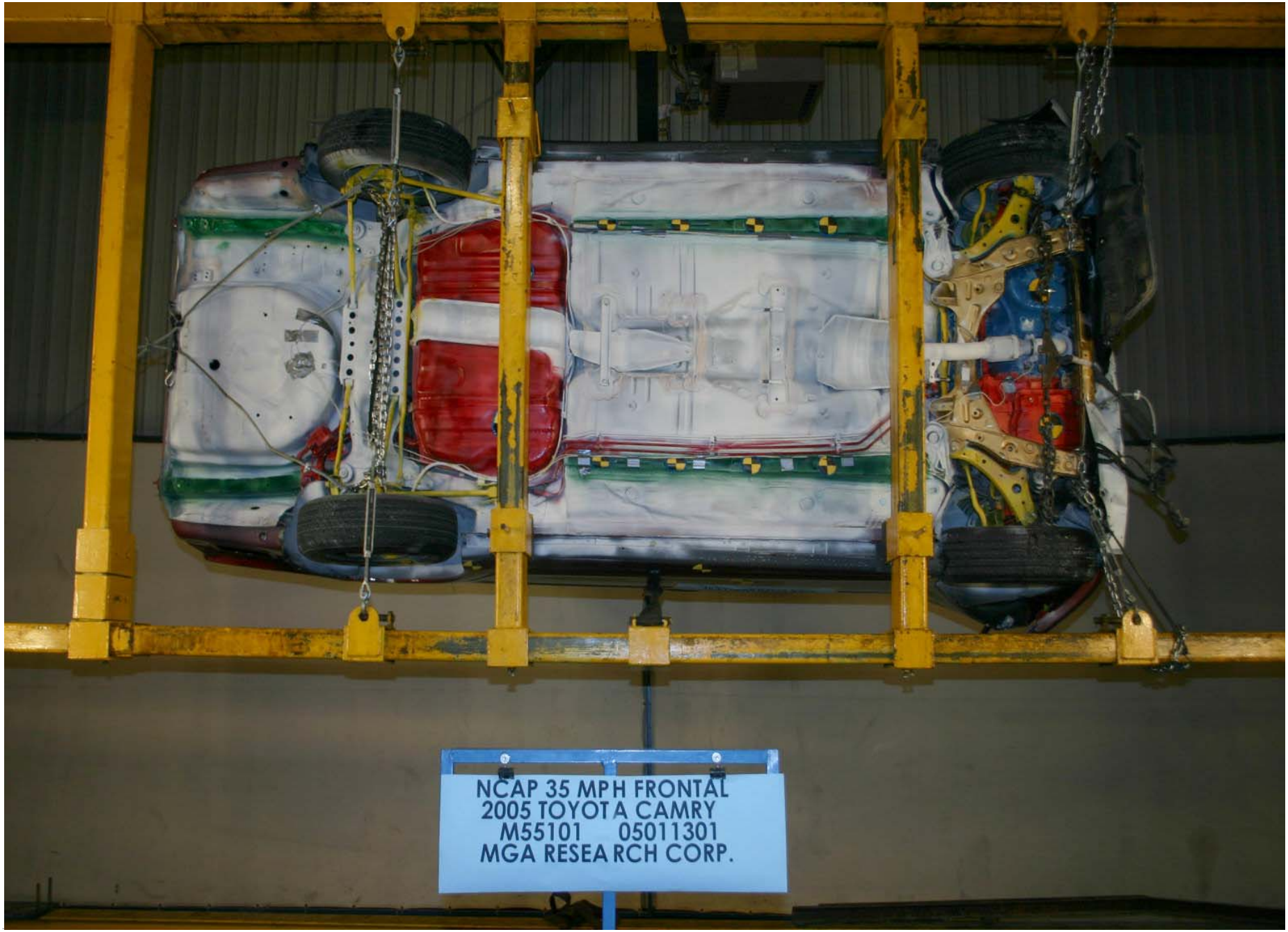
Pre-Test Passenger Side Floor Pan View

Post-Test Passenger Side Floor Pan View

Post-Test Passenger Dummy Head Contact

Post-Test Passenger Dummy Knee Contact

Post-Test Passenger Dummy Airbag Contact

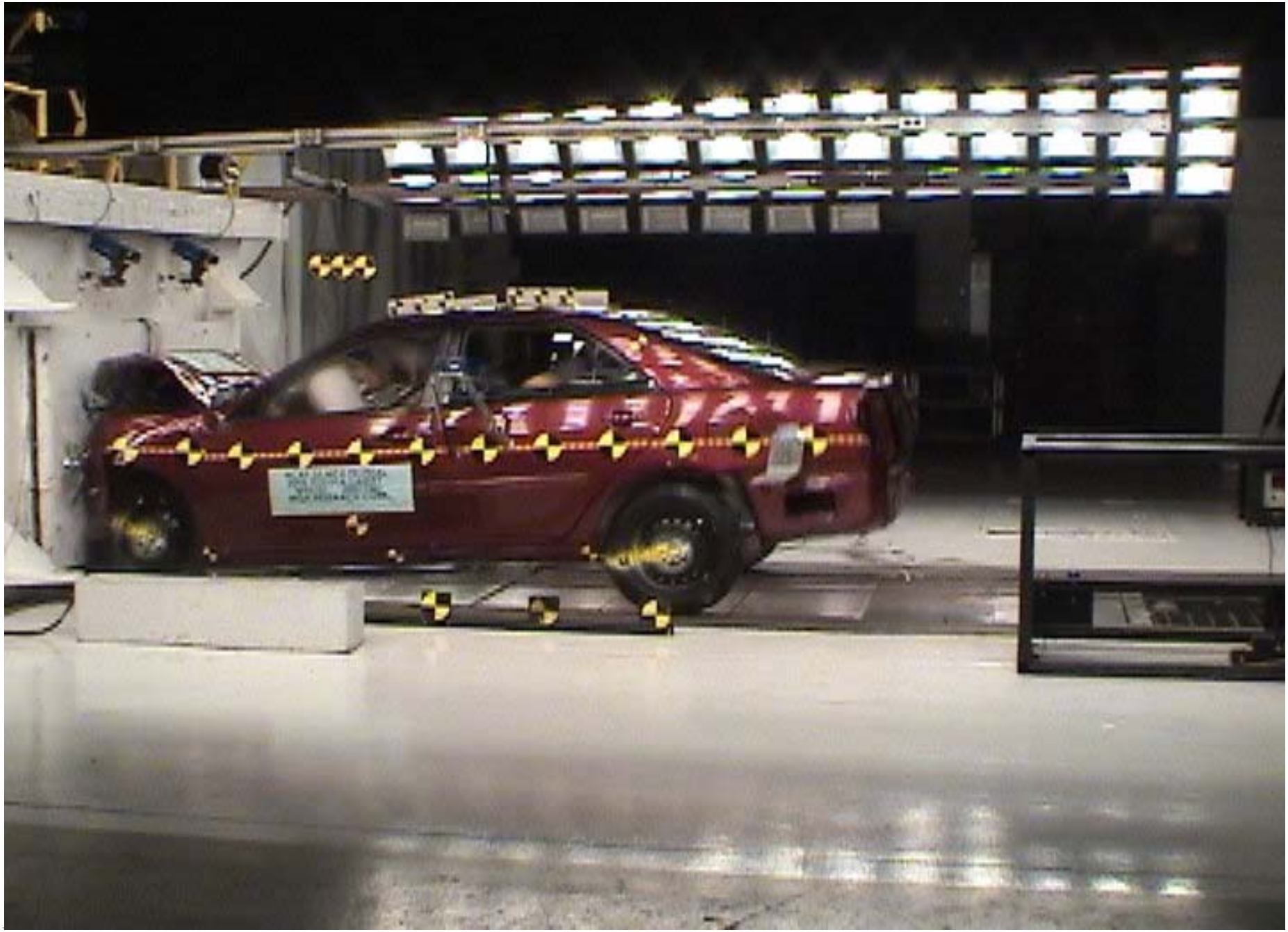


Rollover 90 Degrees

Rollover 180 Degrees

Rollover 270 Degrees

Rollover 360 Degrees



Vehicle Impact

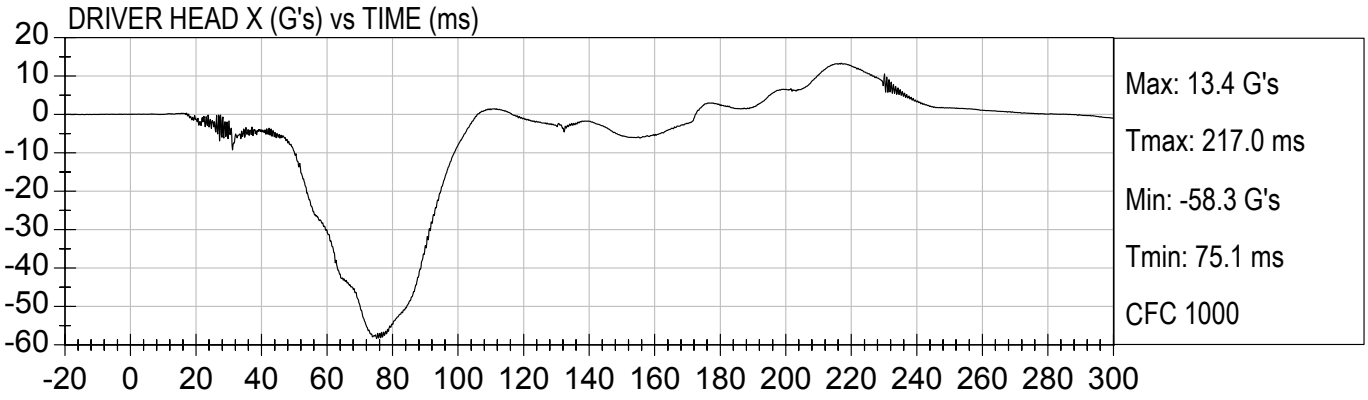
APPENDIX B

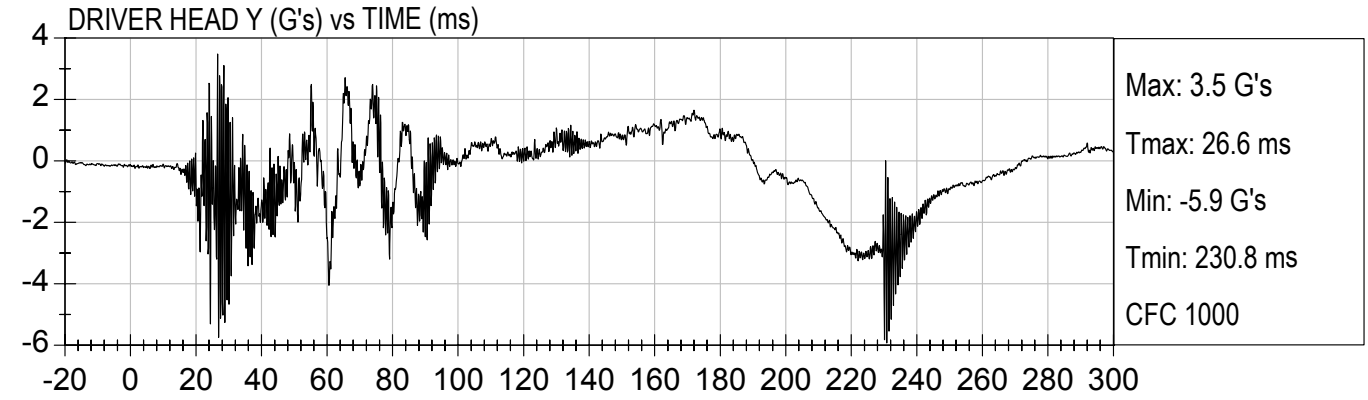
DUMMY AND VEHICLE RESPONSE DATA TRACES

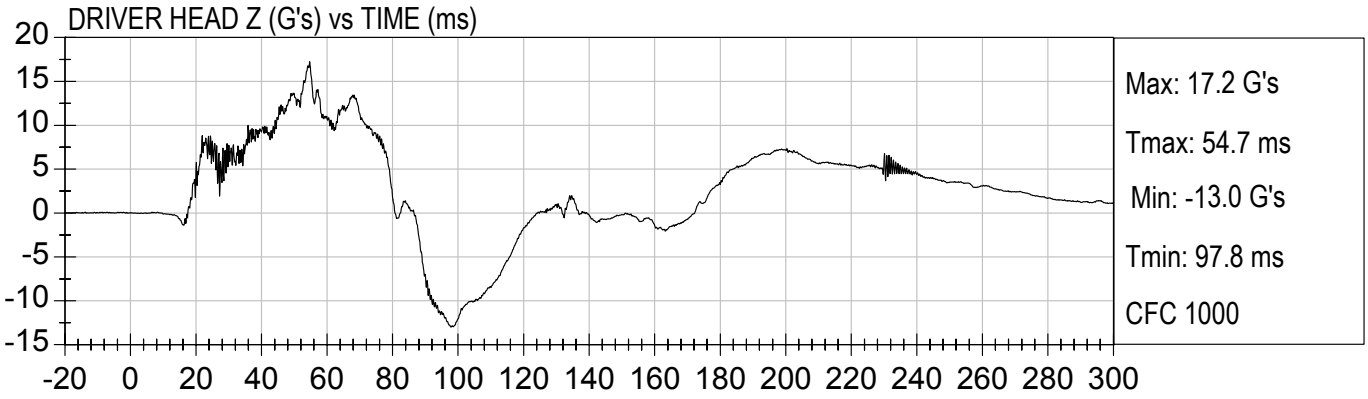
TABLE OF DATA PLOTS

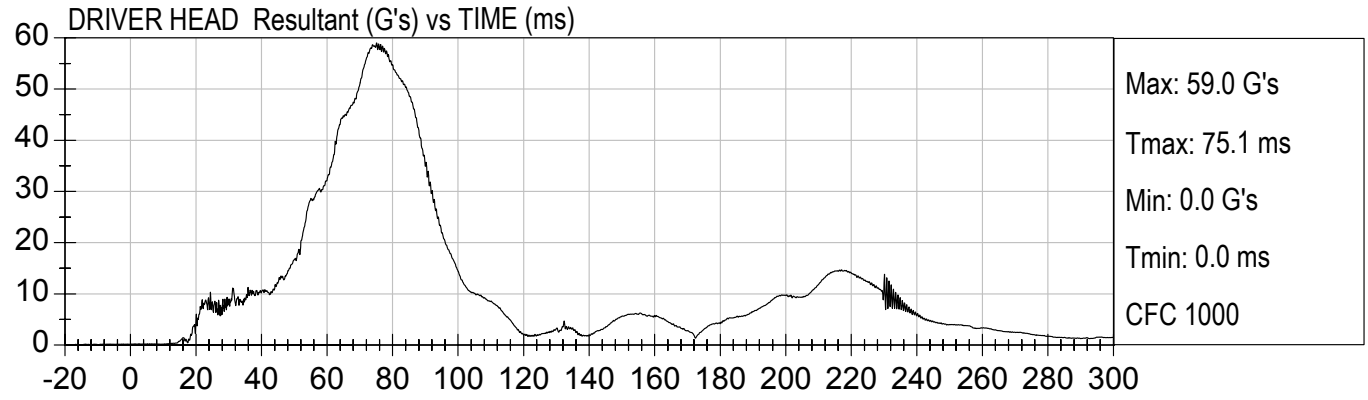
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

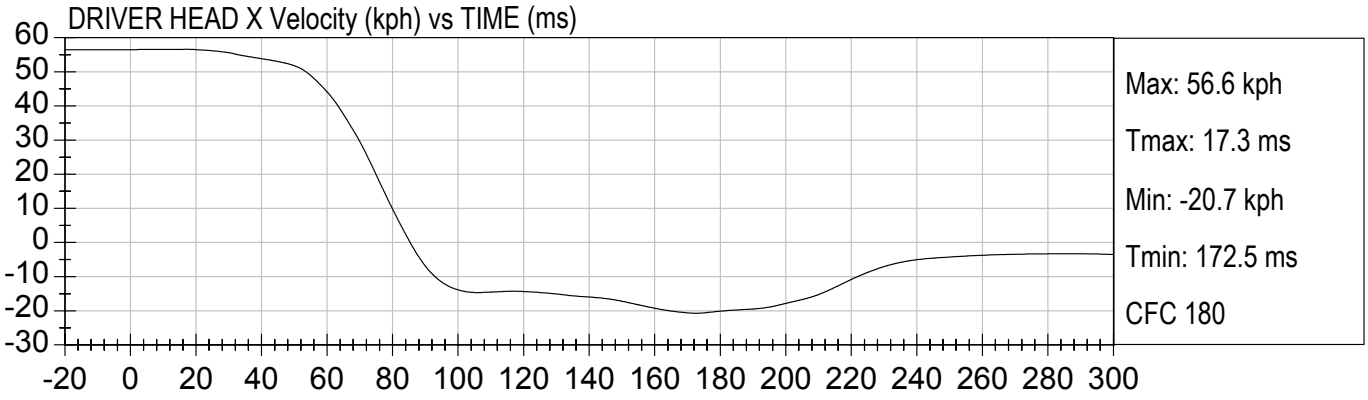
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

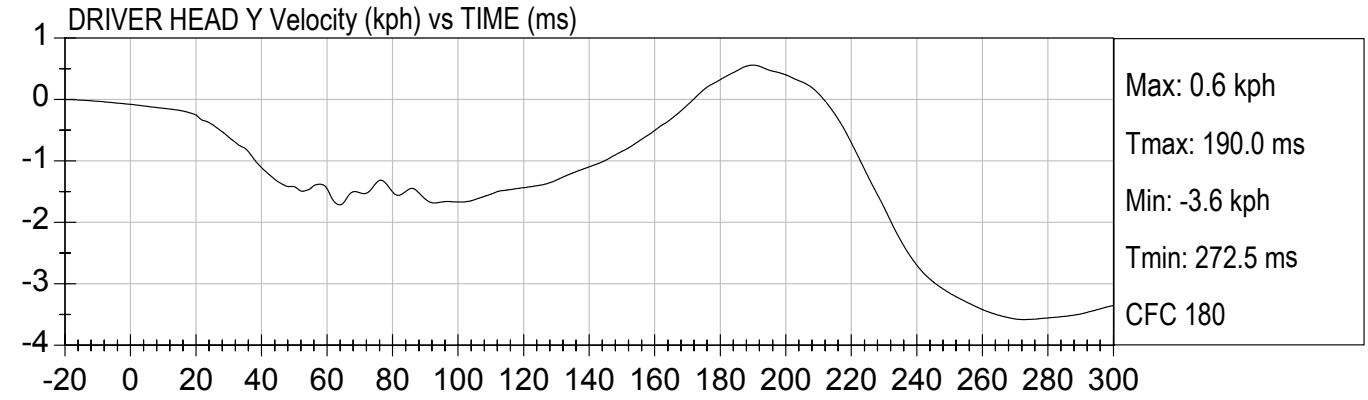


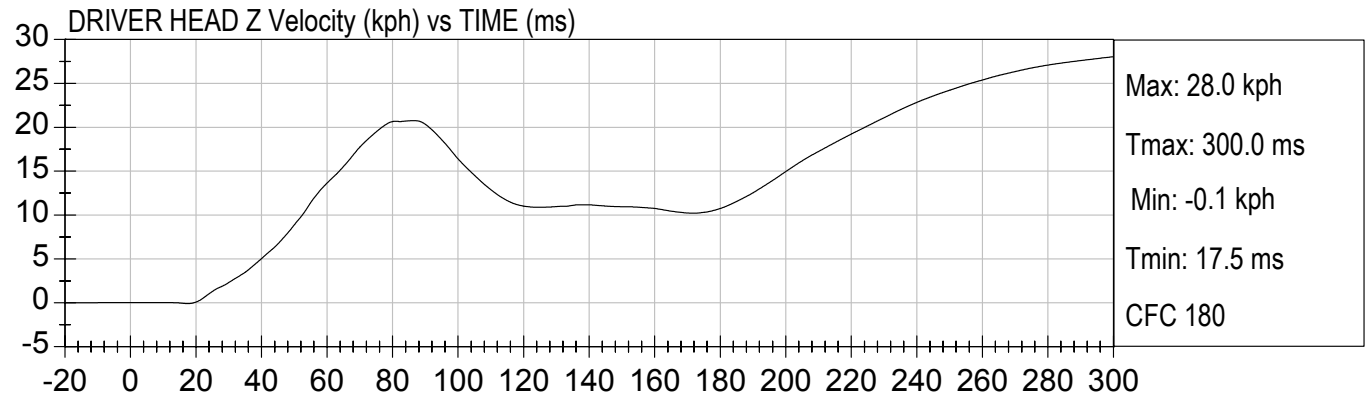






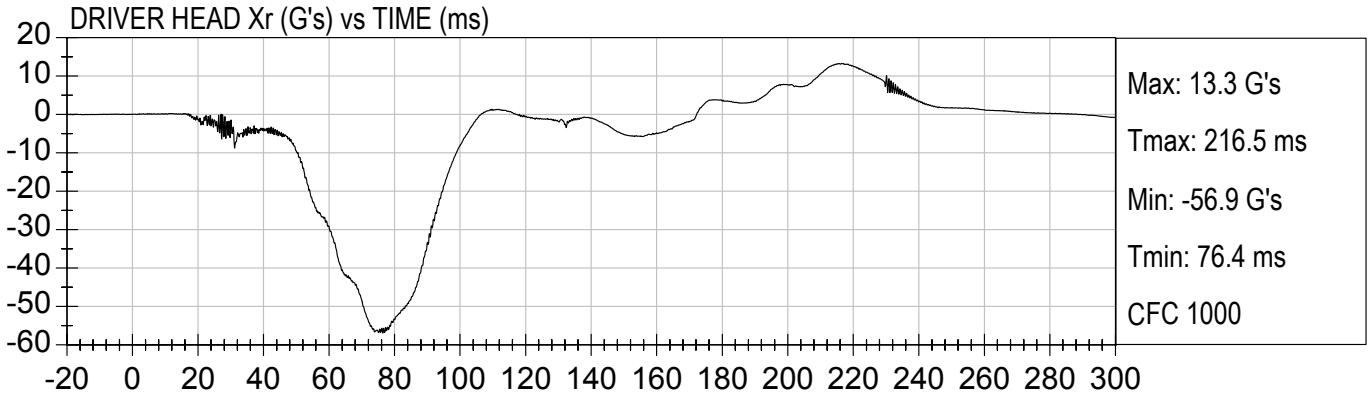

DRIVER HEAD X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-30
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.6 kph
Tmax: 17.3 ms
Min: -20.7 kph
Tmin: 172.5 ms
CFC 180

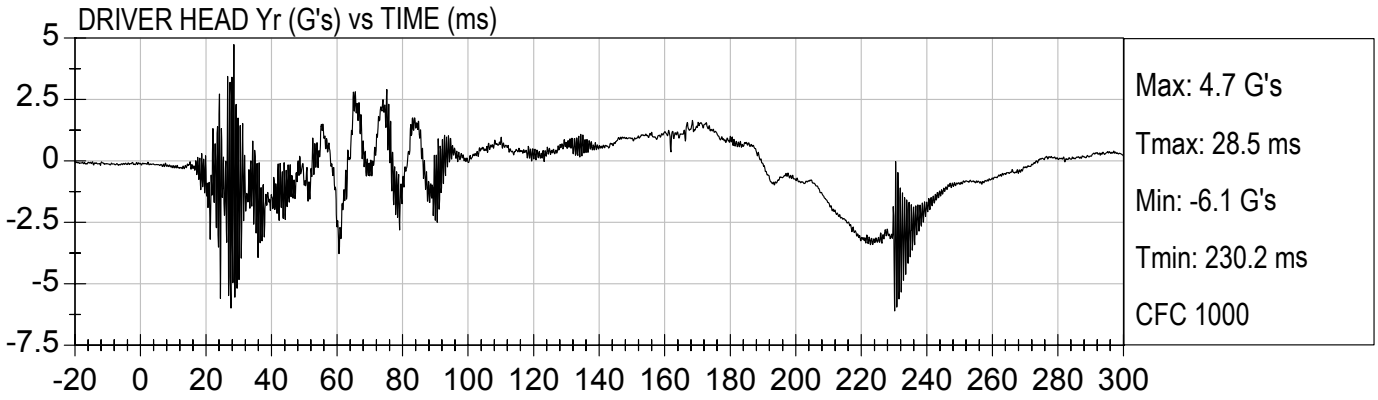

DRIVER HEAD Y Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.6 kph
Tmax: 190.0 ms
Min: -3.6 kph
Tmin: 272.5 ms
CFC 180

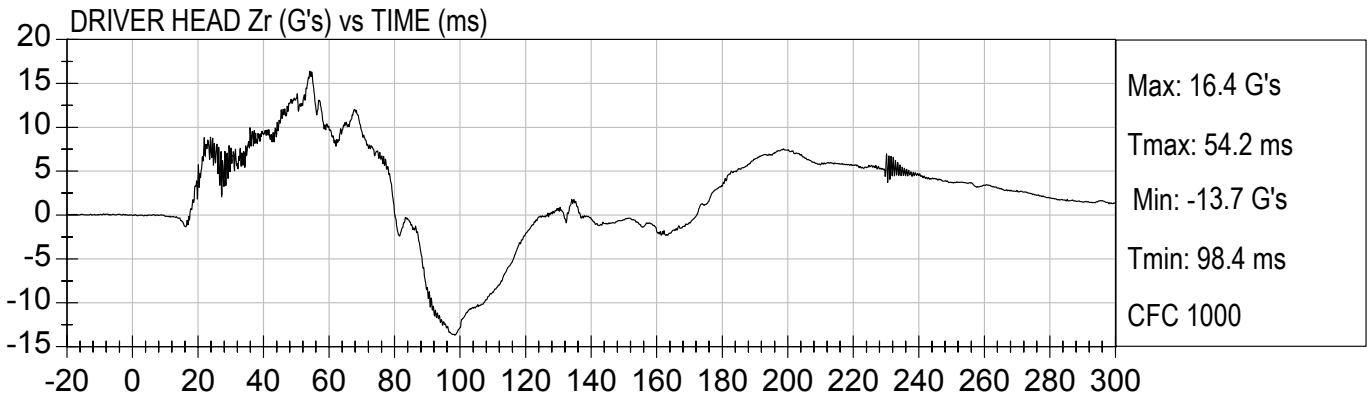

DRIVER HEAD Z Velocity (kph) vs TIME (ms)
30
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 28.0 kph
Tmax: 300.0 ms
Min: -0.1 kph
Tmin: 17.5 ms
CFC 180

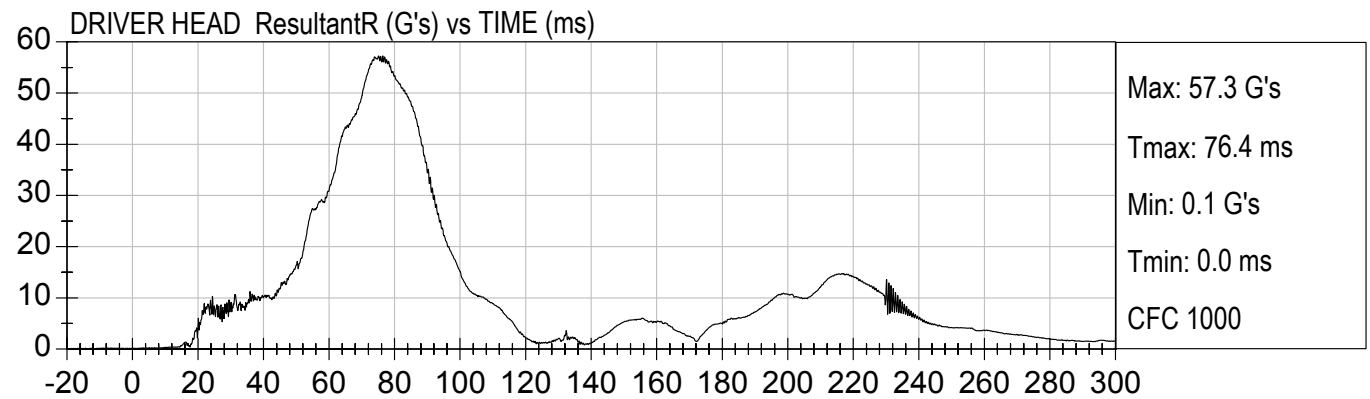
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

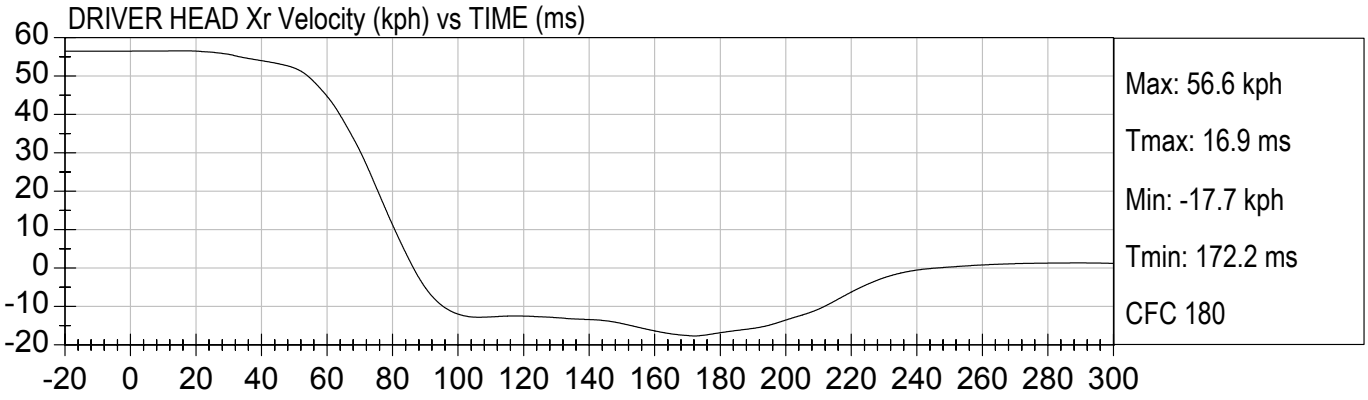
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

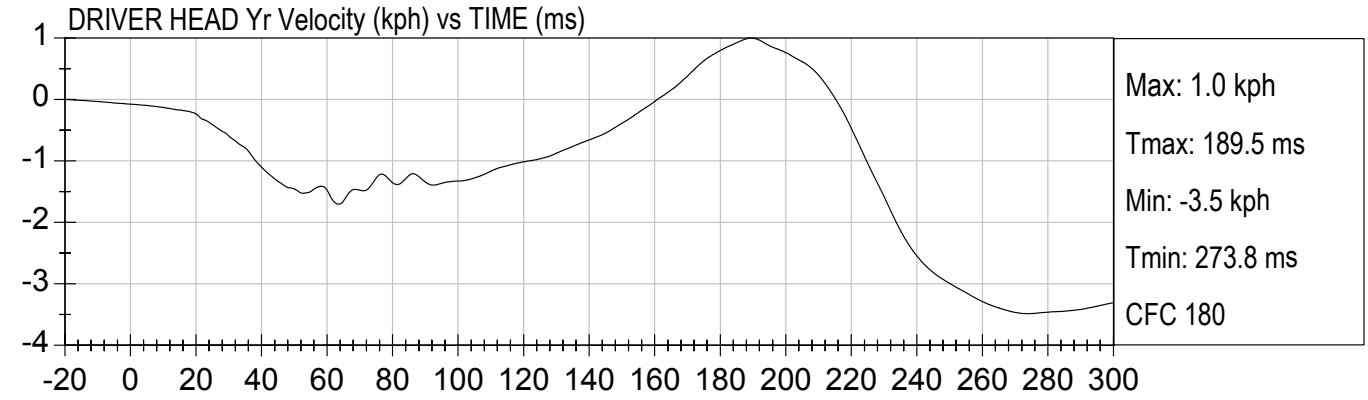


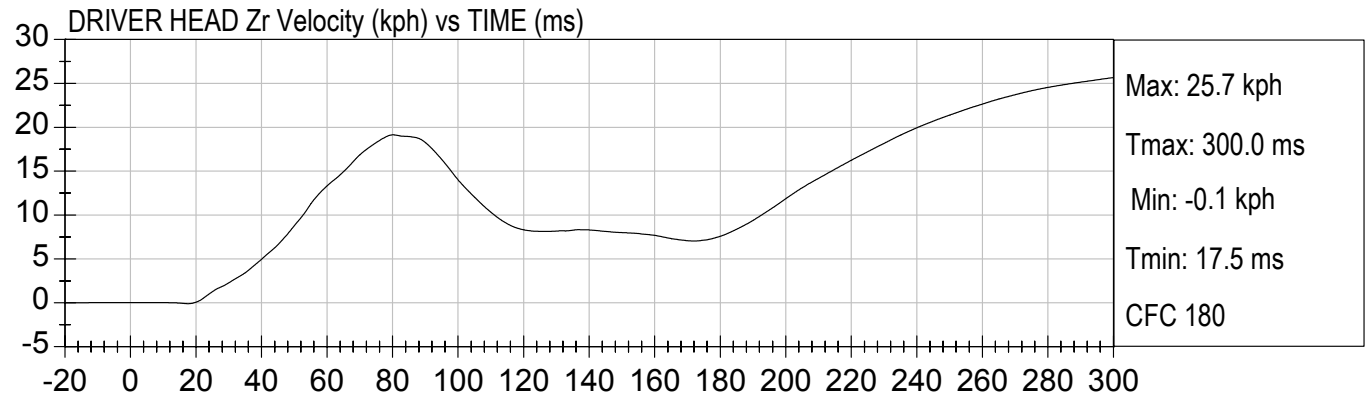






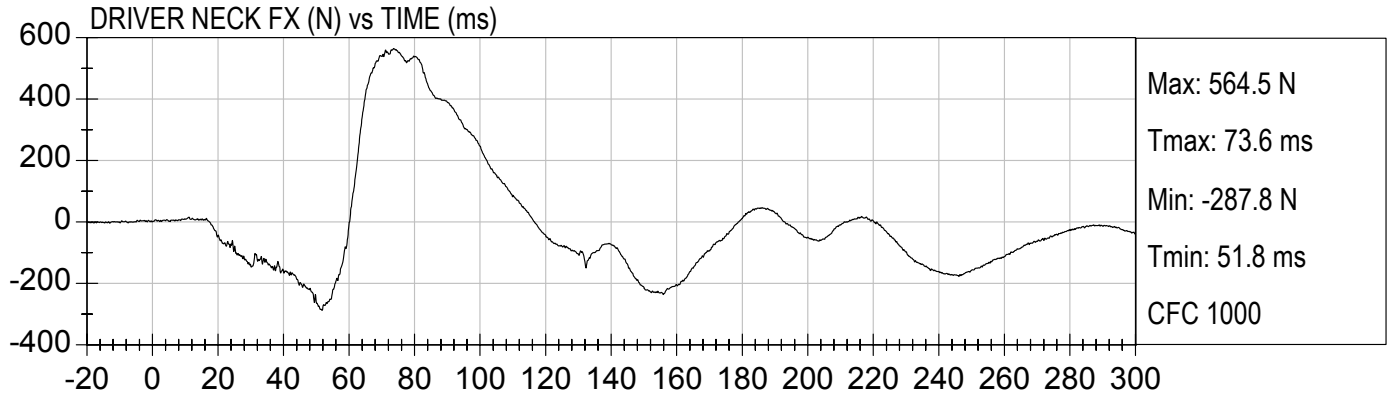

DRIVER HEAD Xr Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.6 kph
Tmax: 16.9 ms
Min: -17.7 kph
Tmin: 172.2 ms
CFC 180

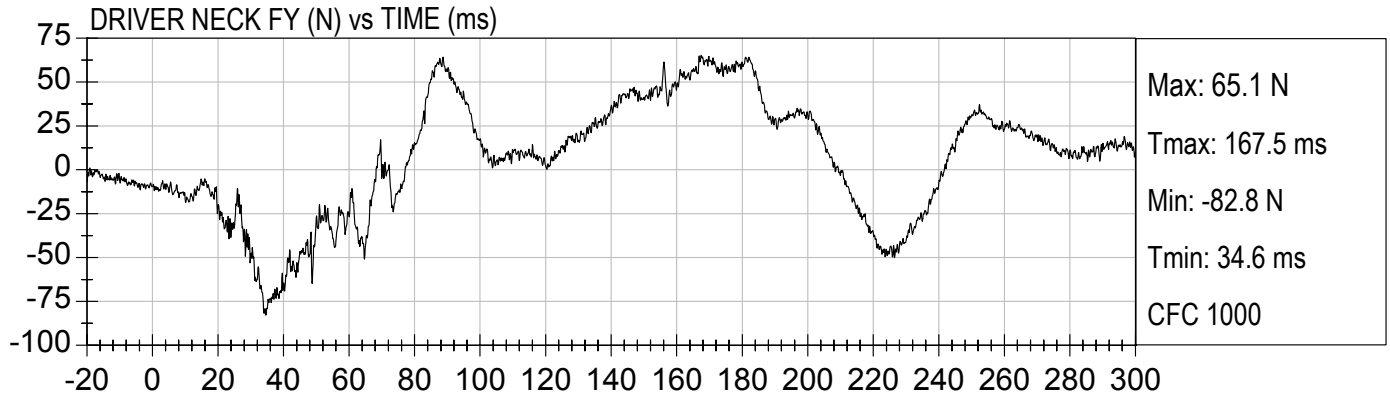

DRIVER HEAD Yr Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.0 kph
Tmax: 189.5 ms
Min: -3.5 kph
Tmin: 273.8 ms
CFC 180

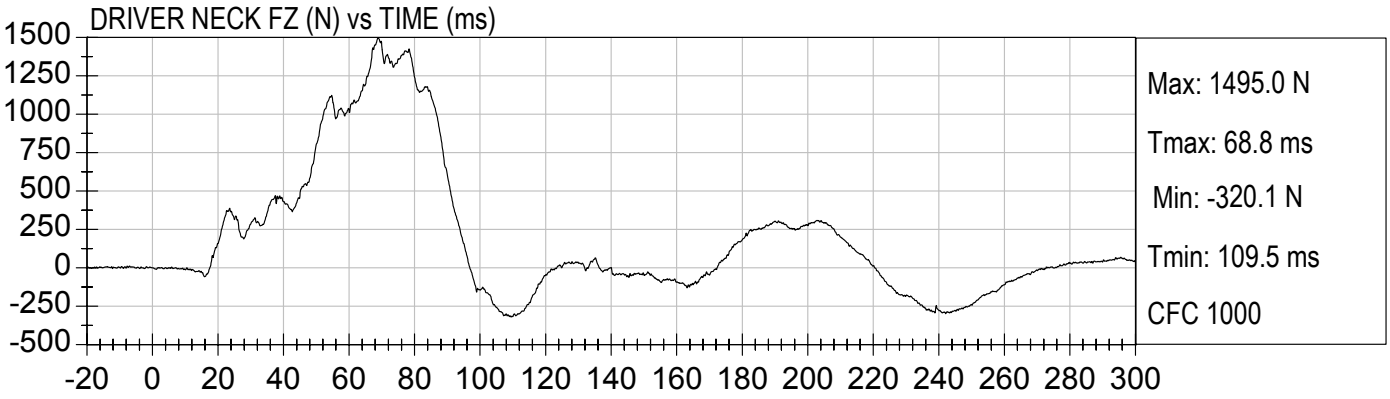

DRIVER HEAD Zr Velocity (kph) vs TIME (ms)
30
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 25.7 kph
Tmax: 300.0 ms
Min: -0.1 kph
Tmin: 17.5 ms
CFC 180

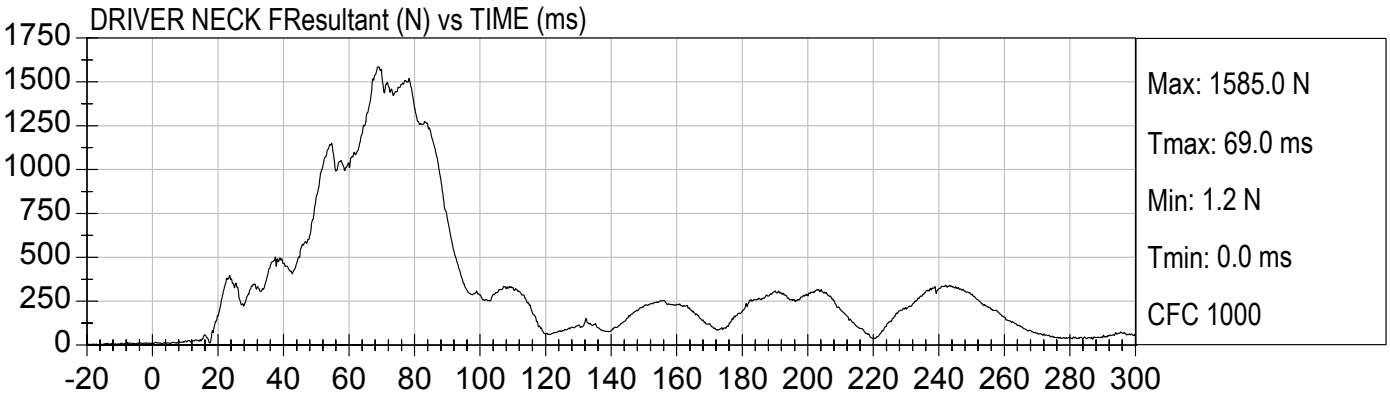
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)



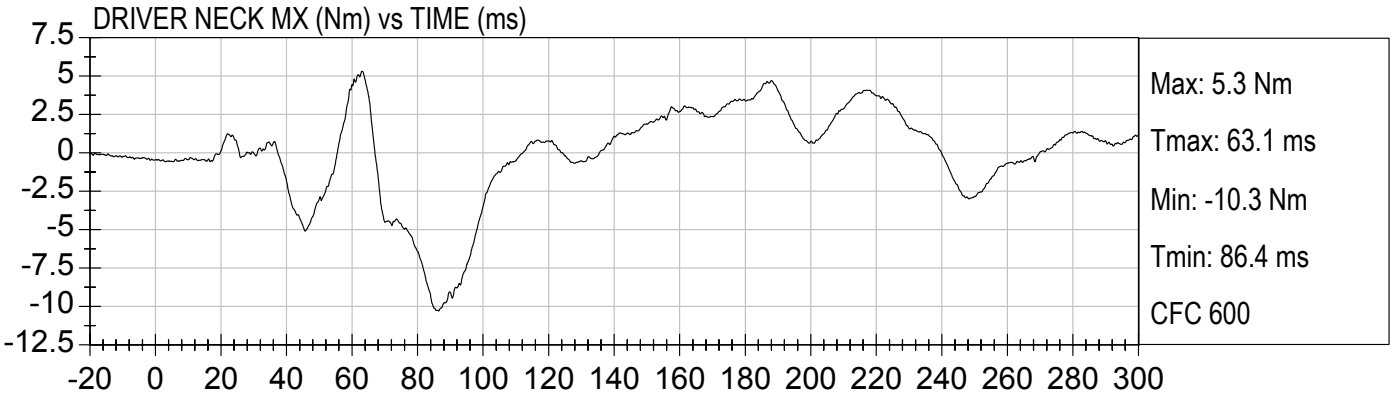


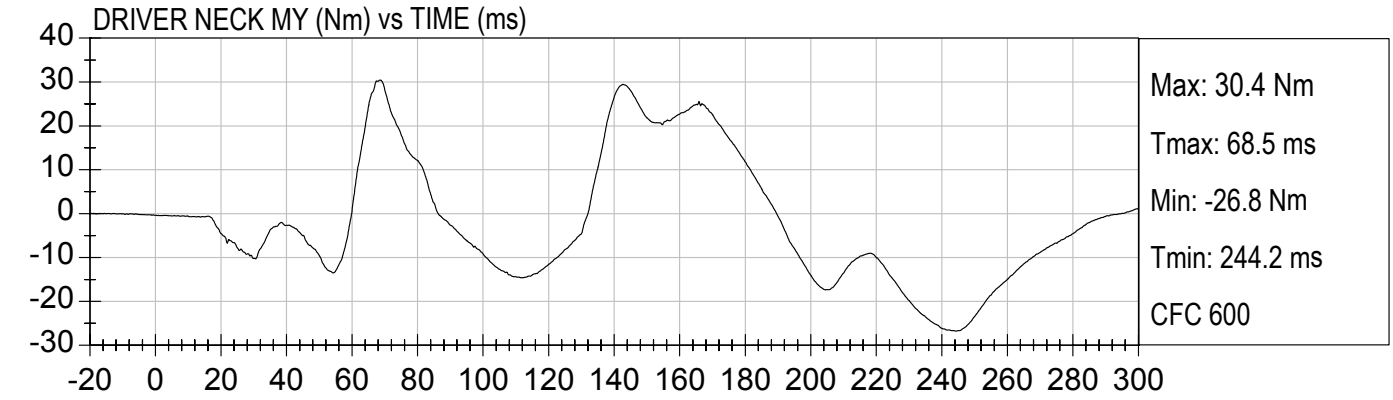


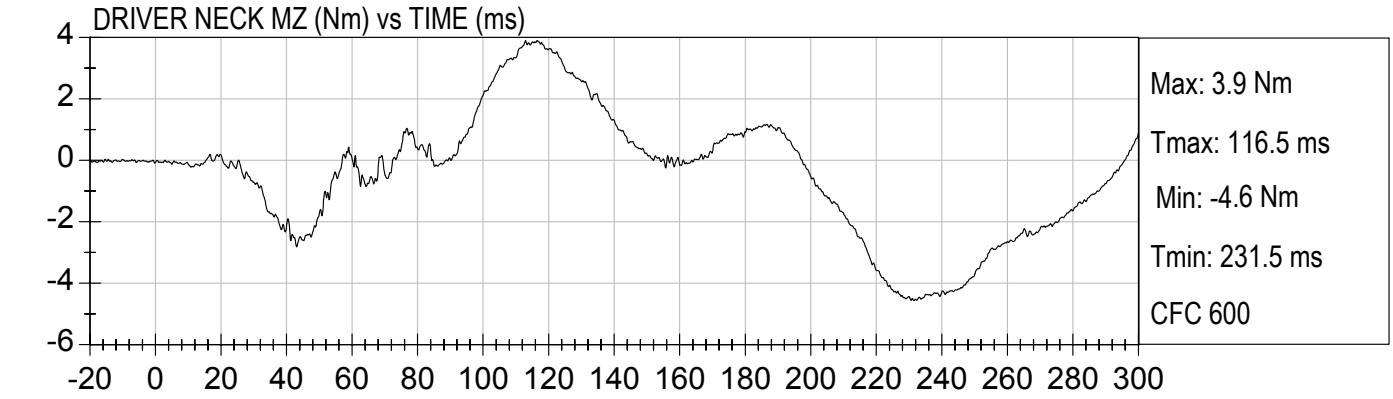


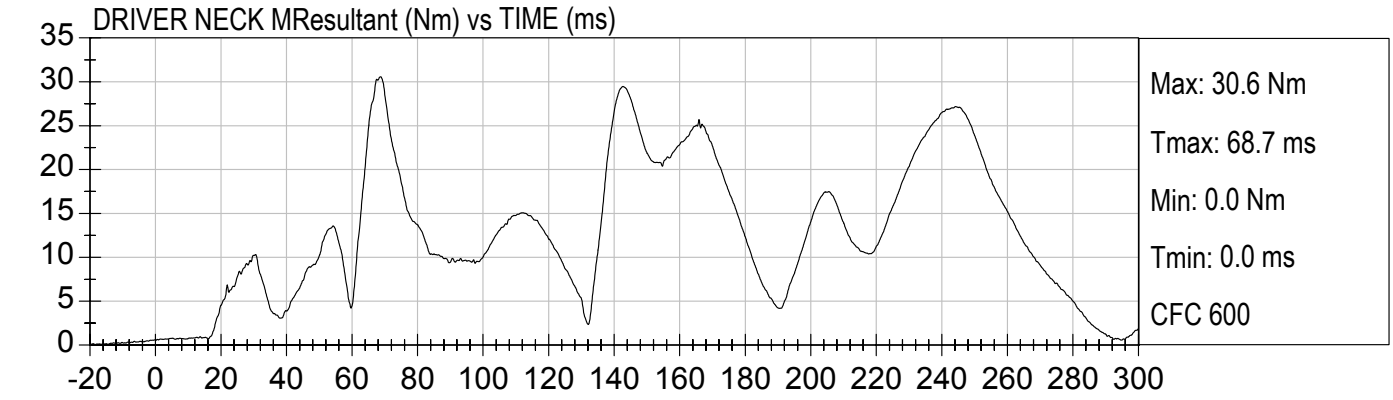
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)



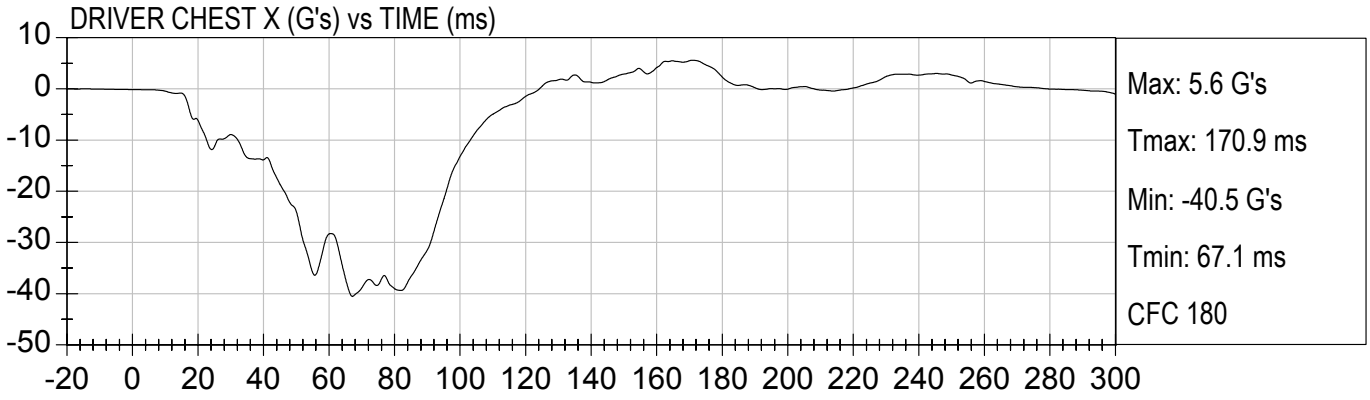


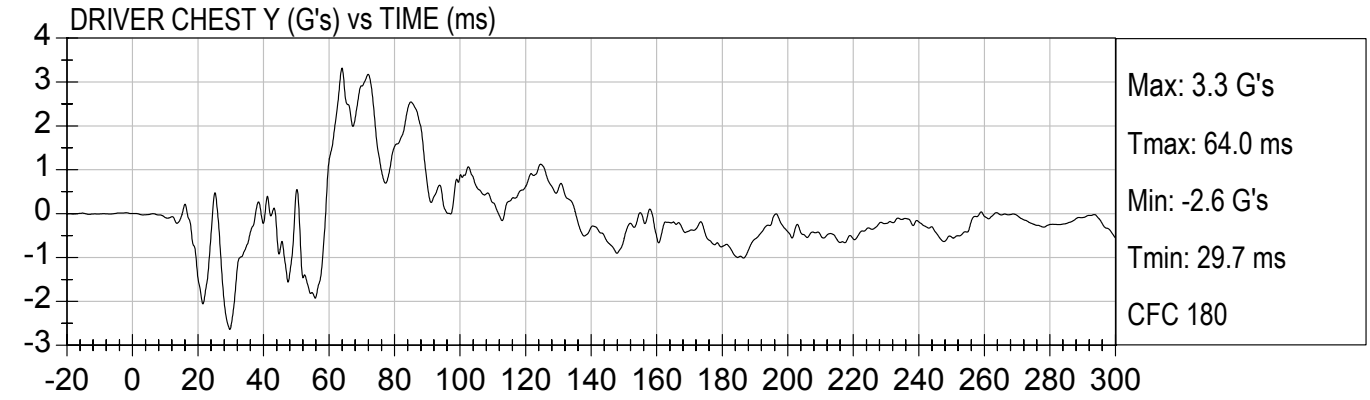


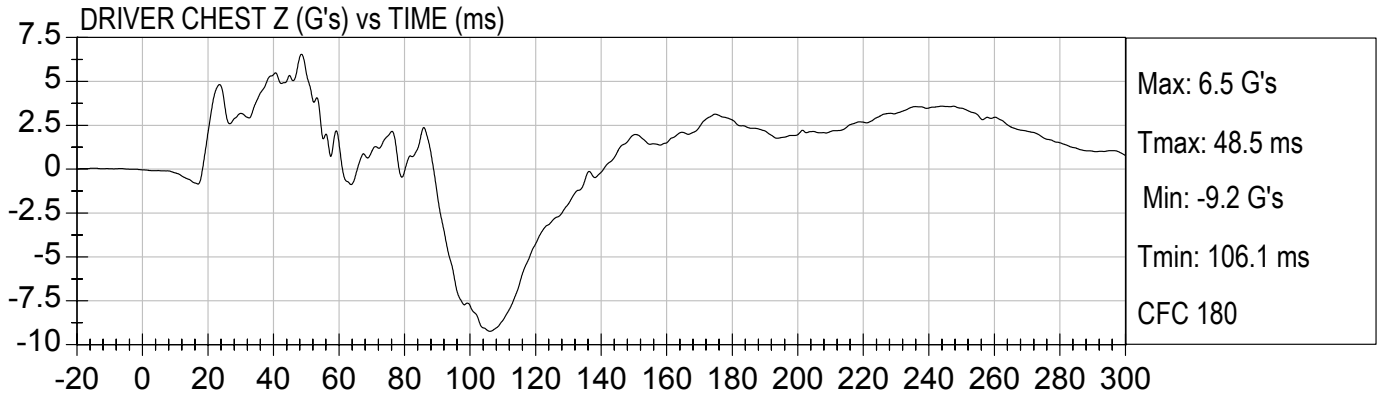


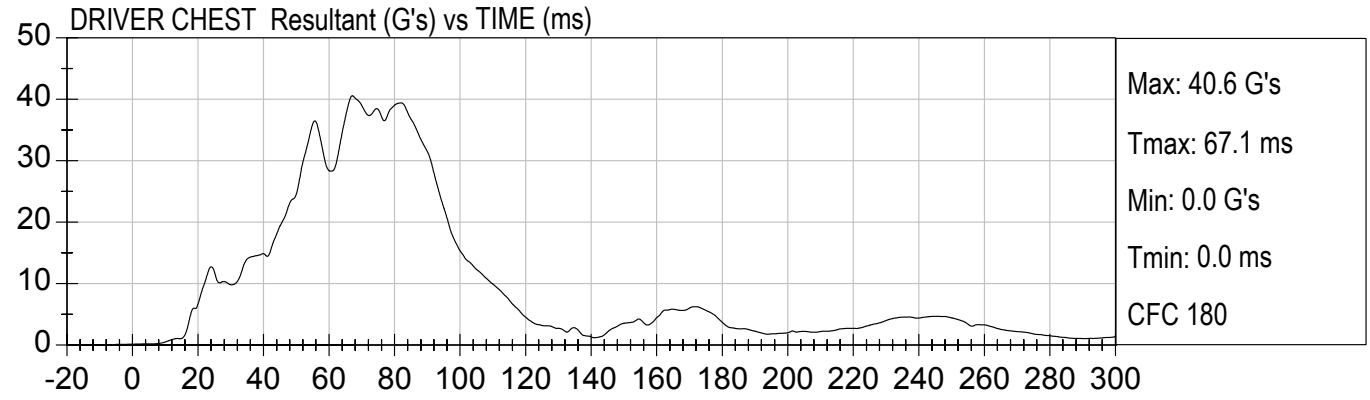
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

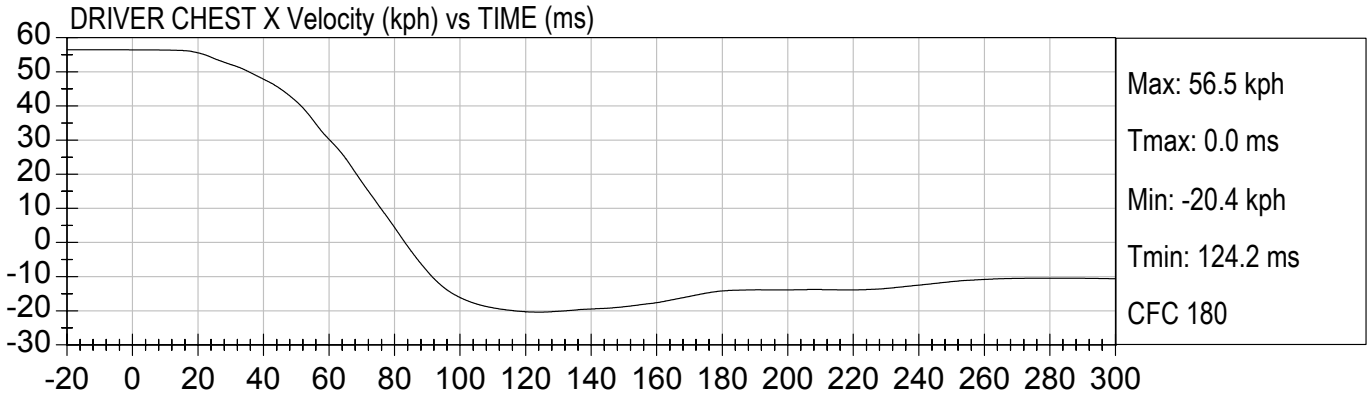
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

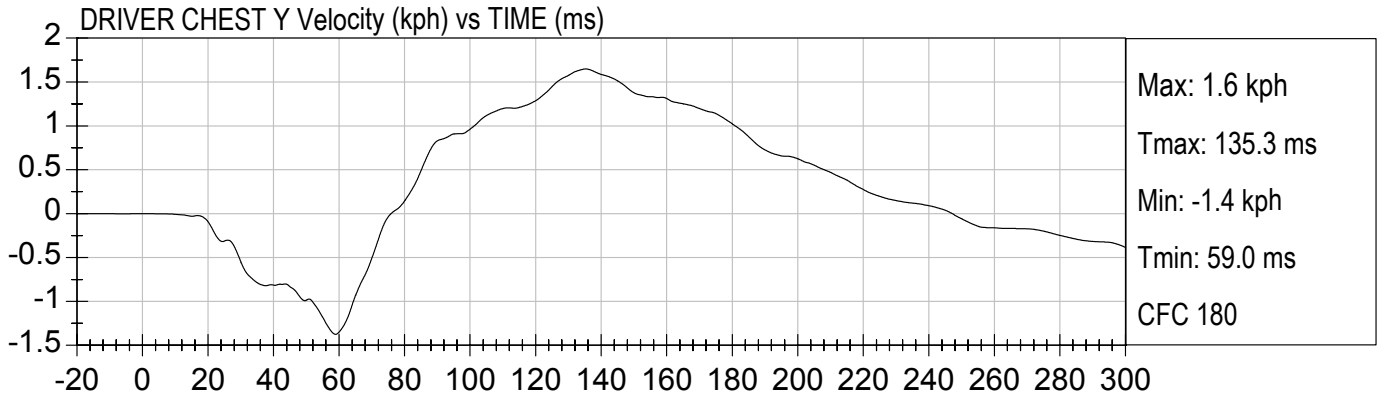


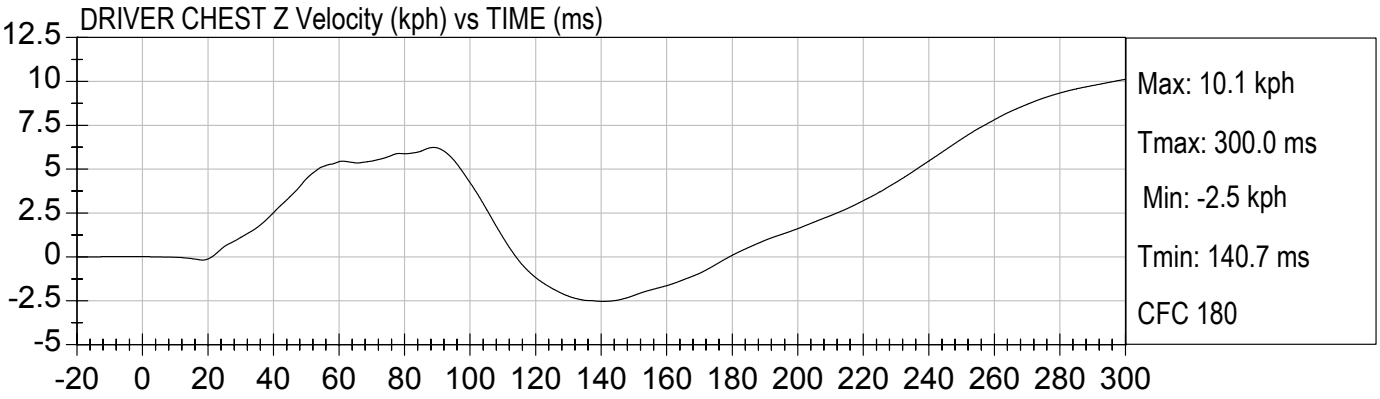


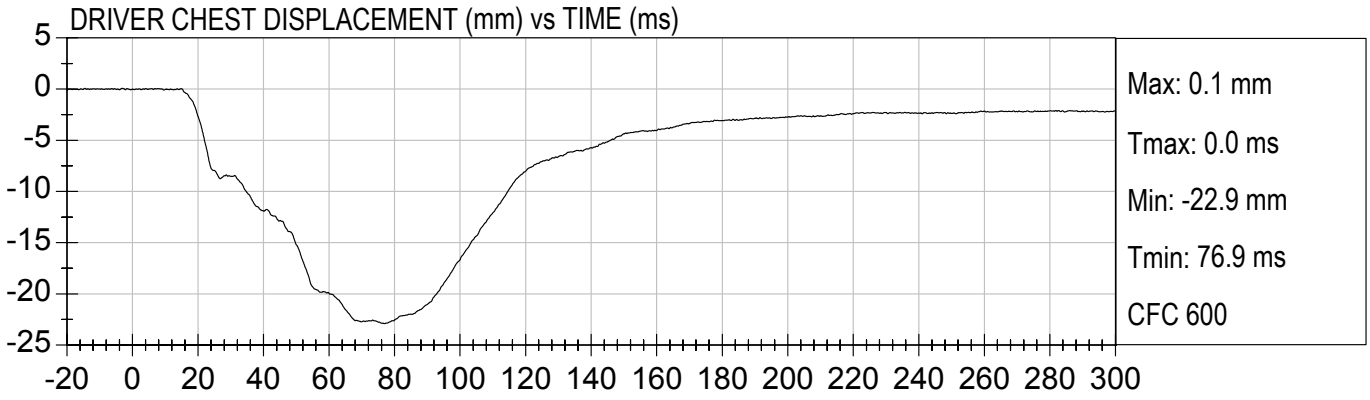





DRIVER CHEST X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-30
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -20.4 kph
Tmin: 124.2 ms
CFC 180

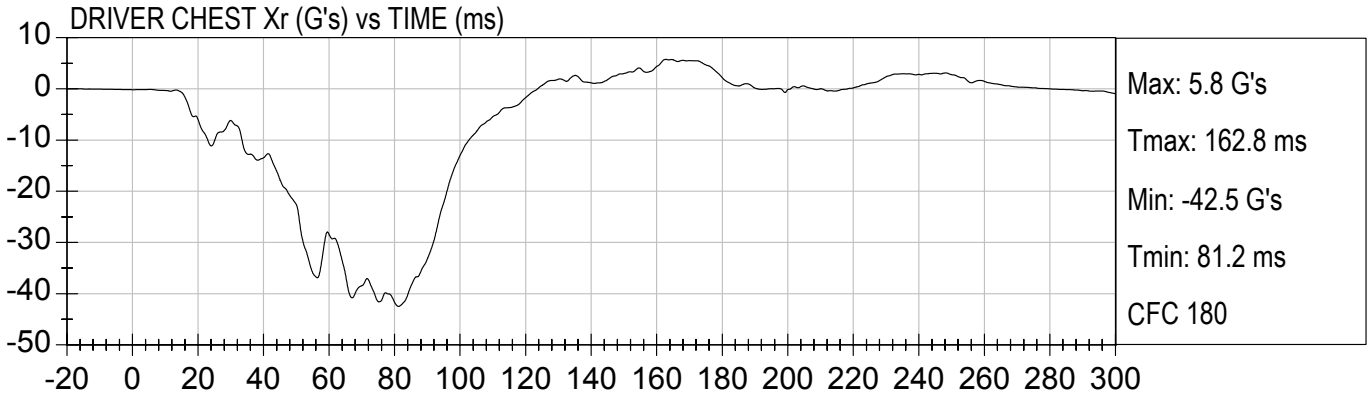

DRIVER CHEST Y Velocity (kph) vs TIME (ms)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.6 kph
Tmax: 135.3 ms
Min: -1.4 kph
Tmin: 59.0 ms
CFC 180

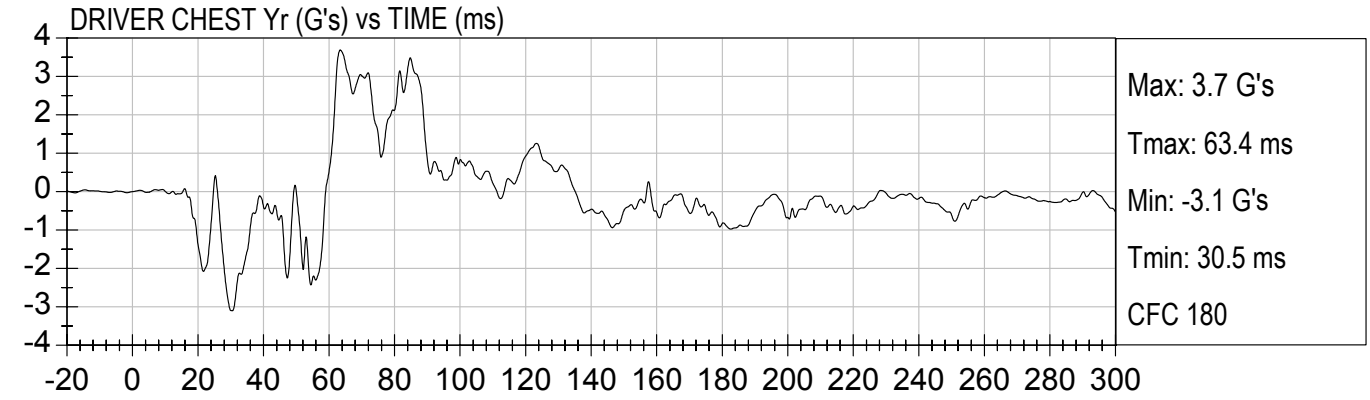

DRIVER CHEST Z Velocity (kph) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 10.1 kph
Tmax: 300.0 ms
Min: -2.5 kph
Tmin: 140.7 ms
CFC 180

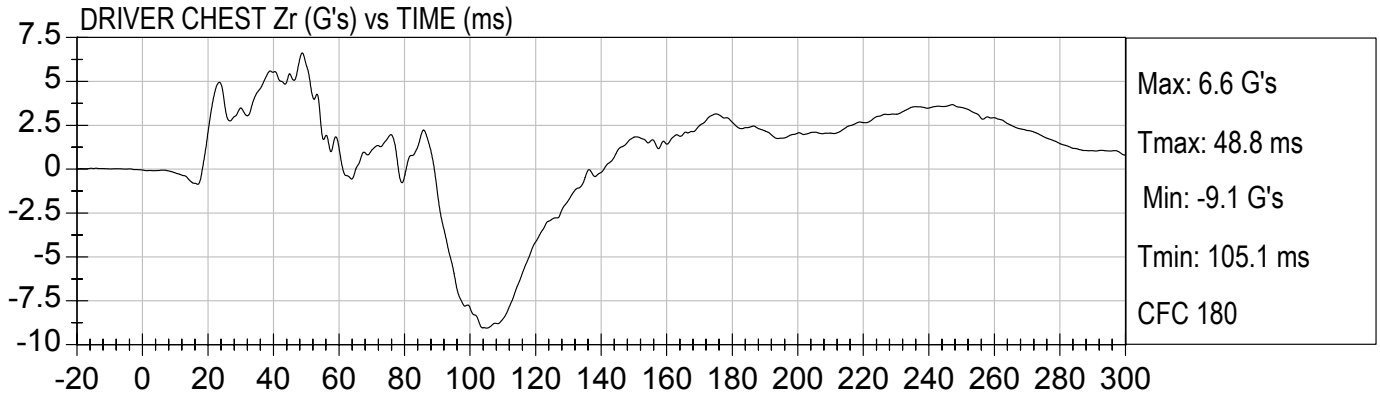

DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.1 mm
Tmax: 0.0 ms
Min: -22.9 mm
Tmin: 76.9 ms
CFC 600

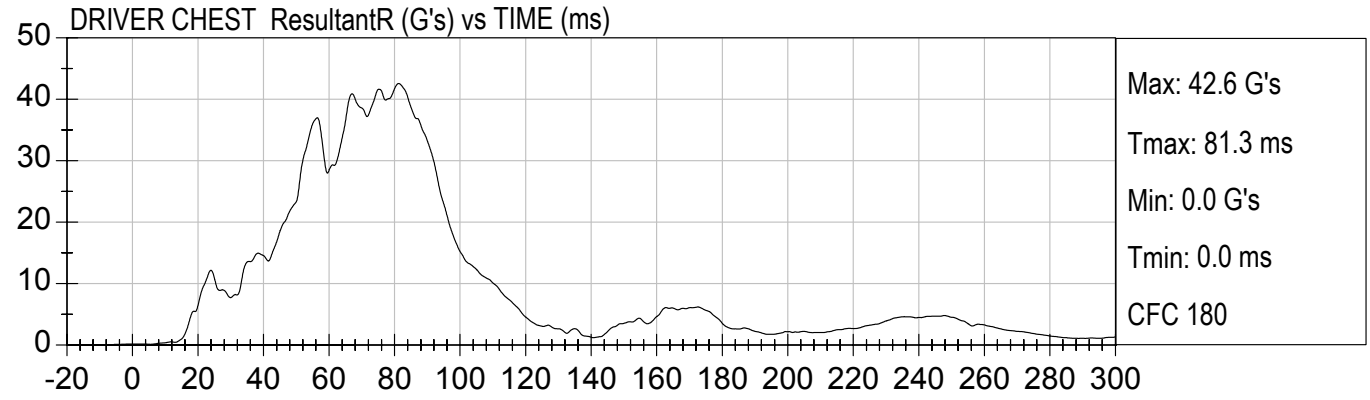
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

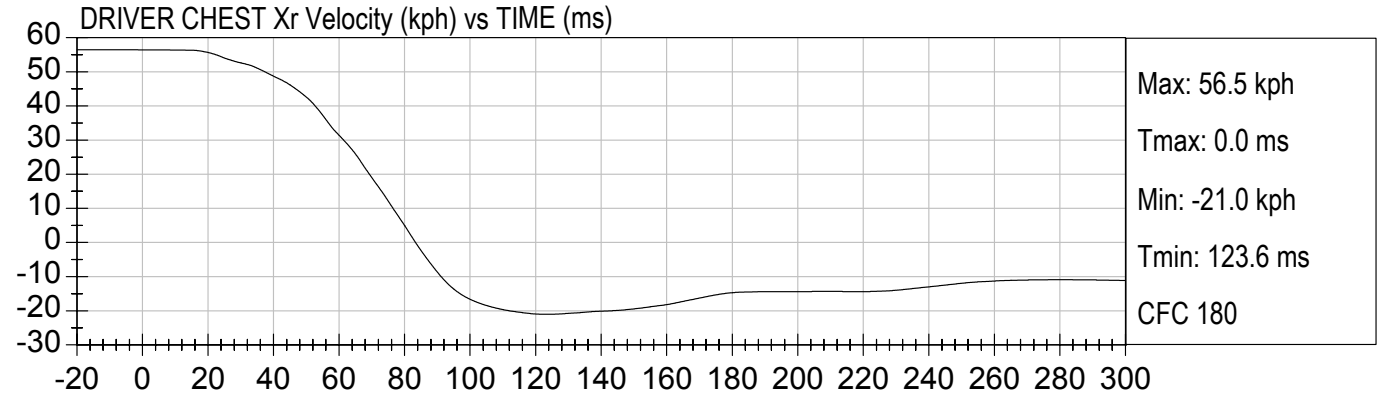
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

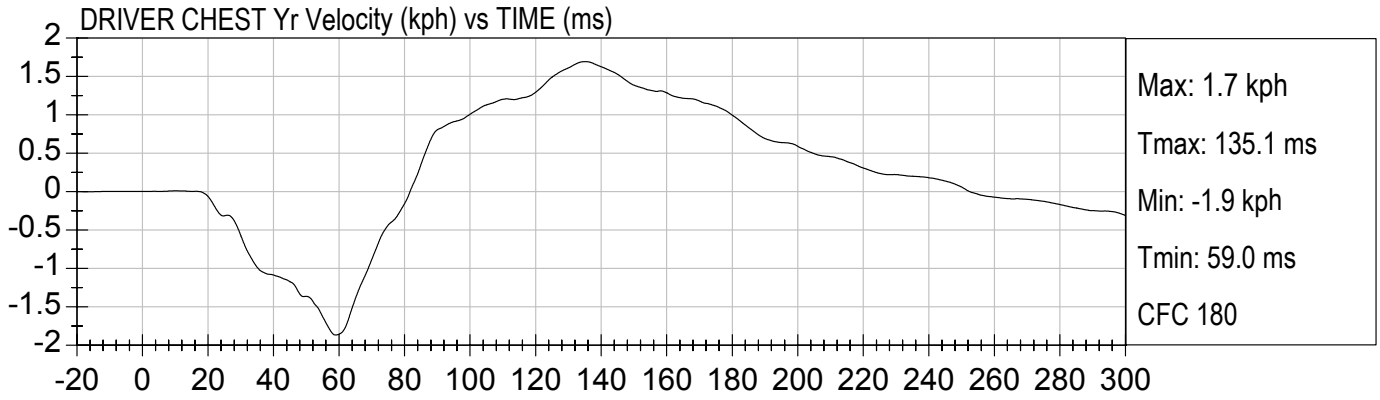


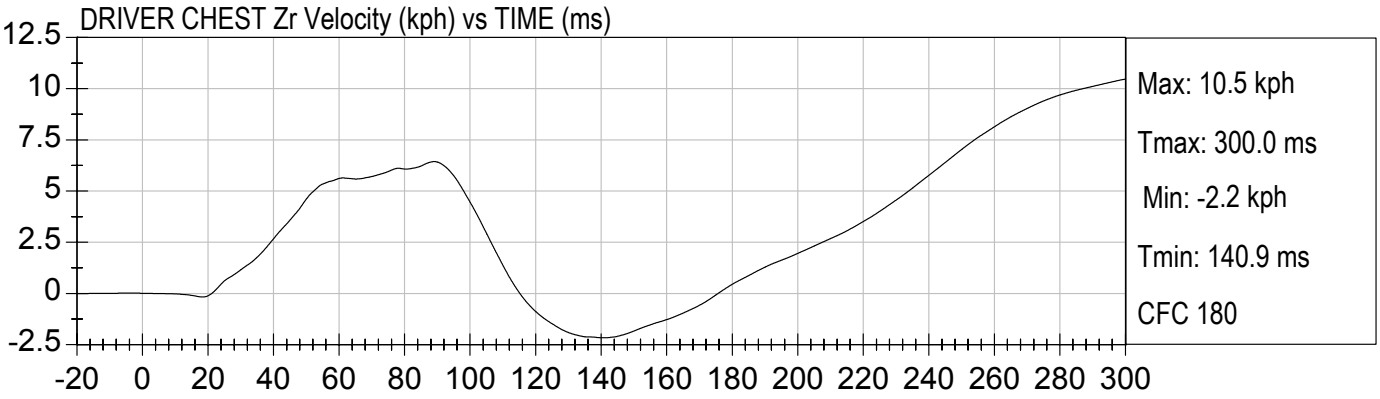






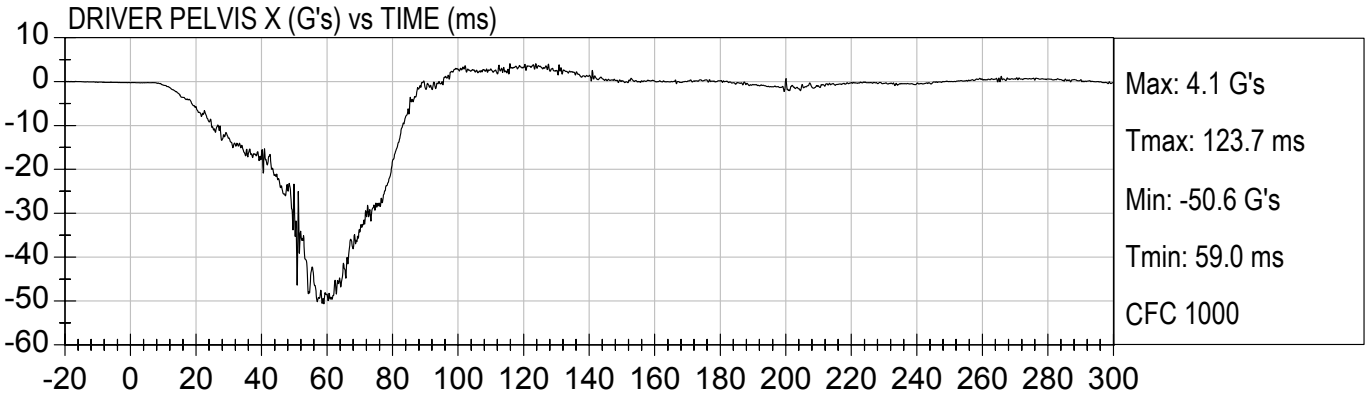

DRIVER CHEST Xr Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-30
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -21.0 kph
Tmin: 123.6 ms
CFC 180

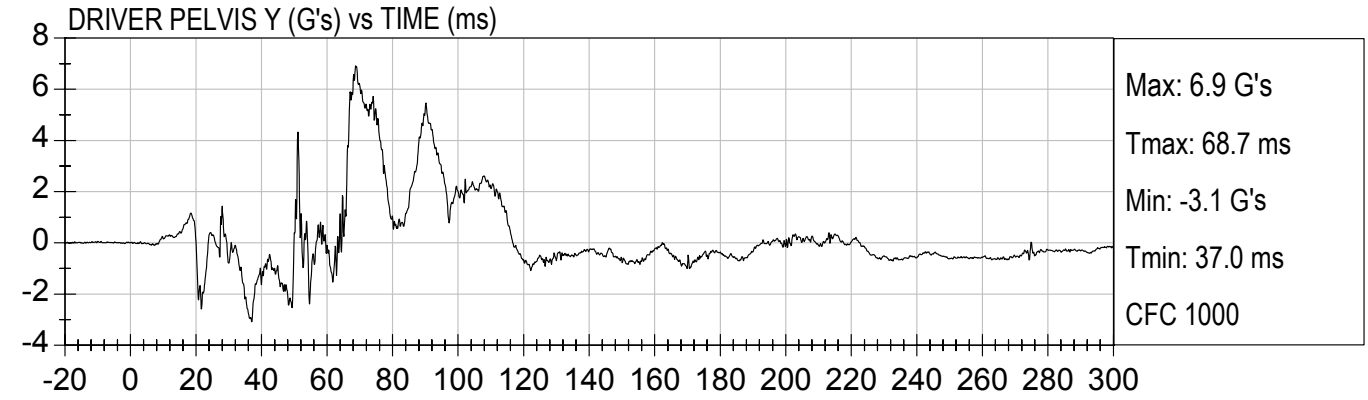

DRIVER CHEST Yr Velocity (kph) vs TIME (ms)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.7 kph
Tmax: 135.1 ms
Min: -1.9 kph
Tmin: 59.0 ms
CFC 180

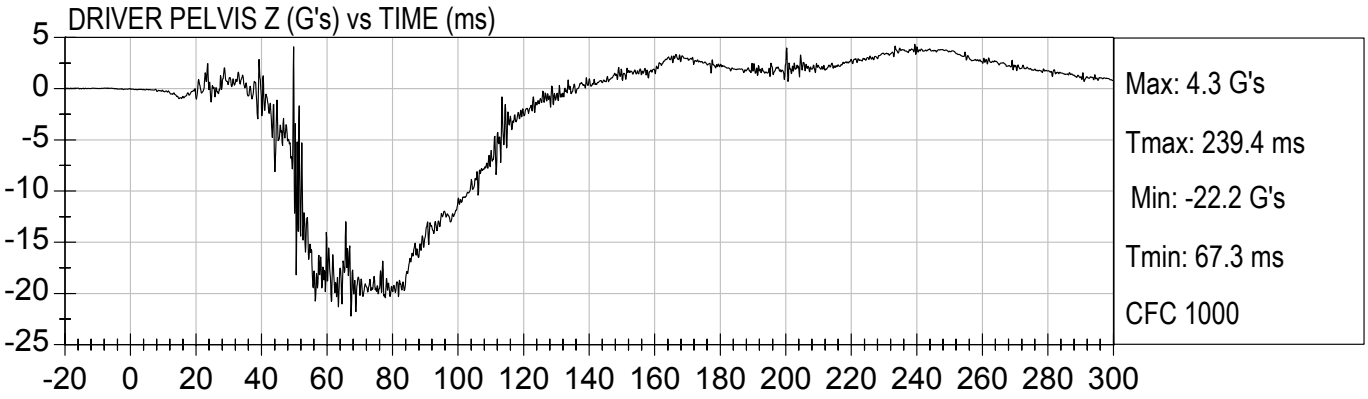

DRIVER CHEST Zr Velocity (kph) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 10.5 kph
Tmax: 300.0 ms
Min: -2.2 kph
Tmin: 140.9 ms
CFC 180

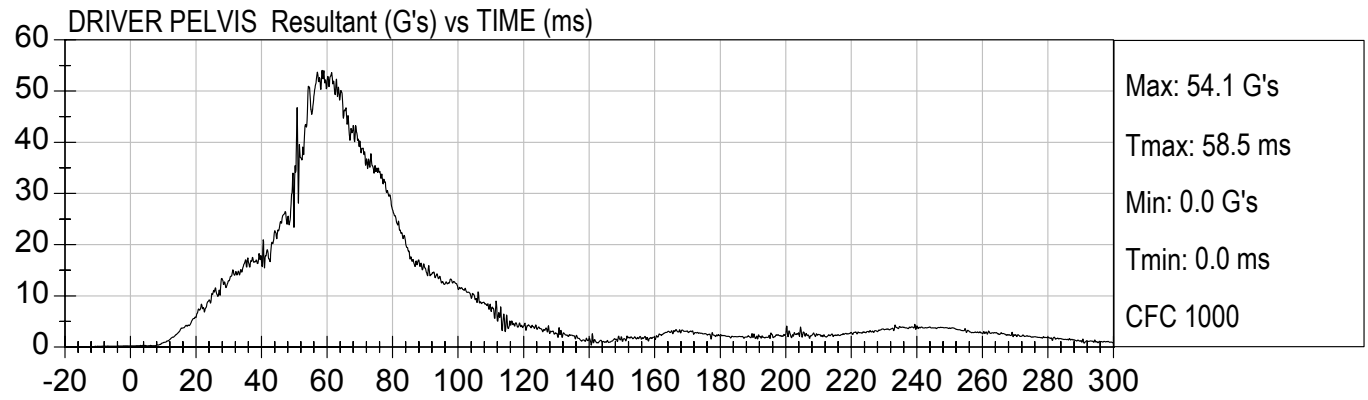
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

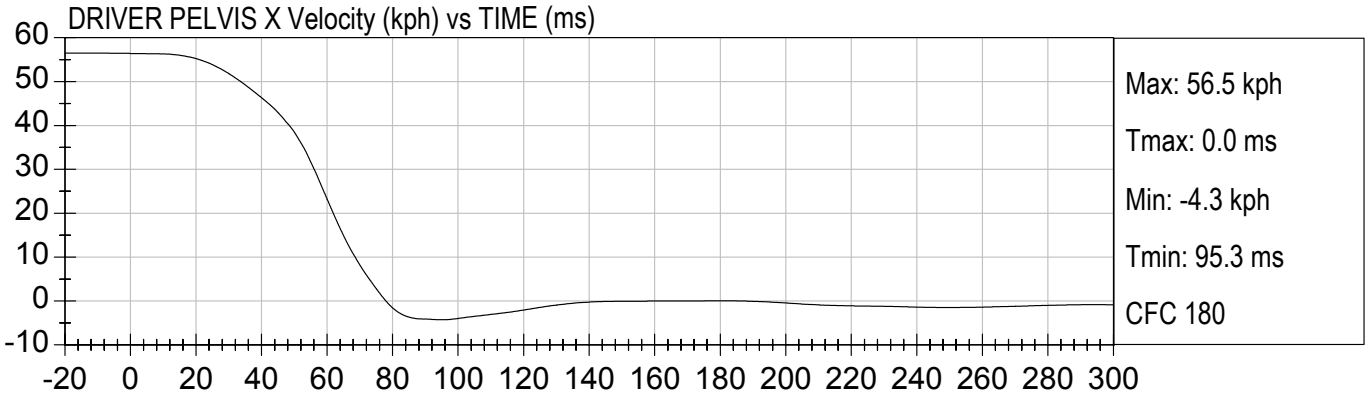
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

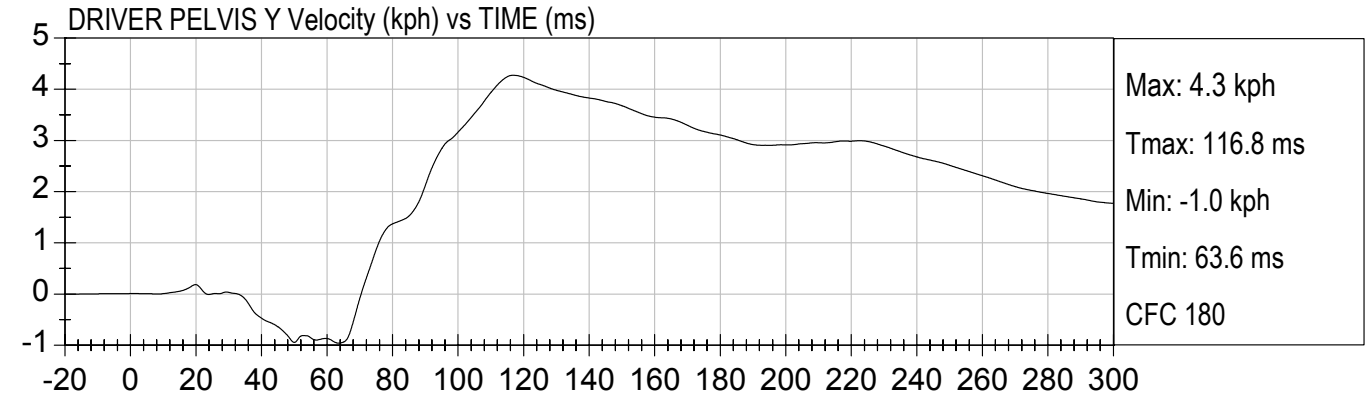


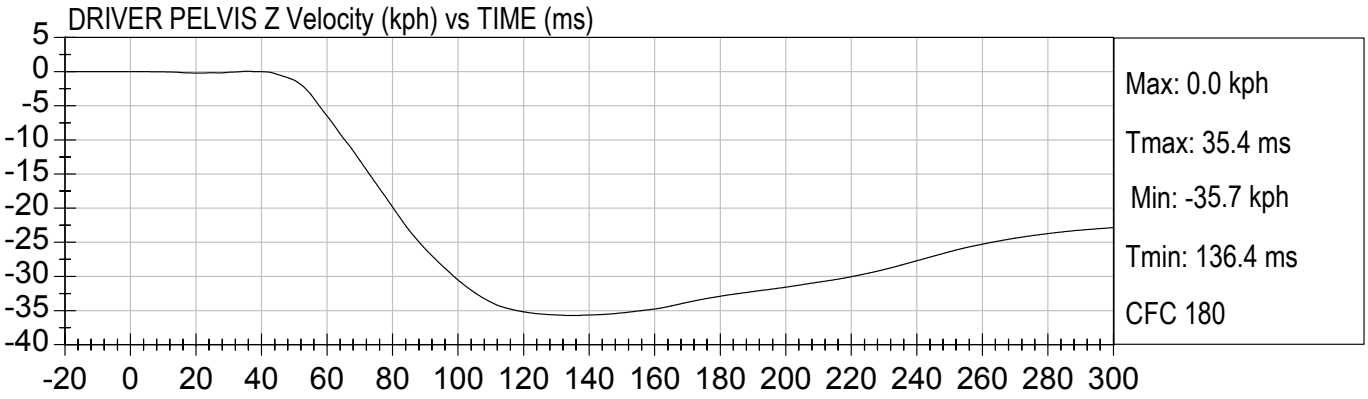






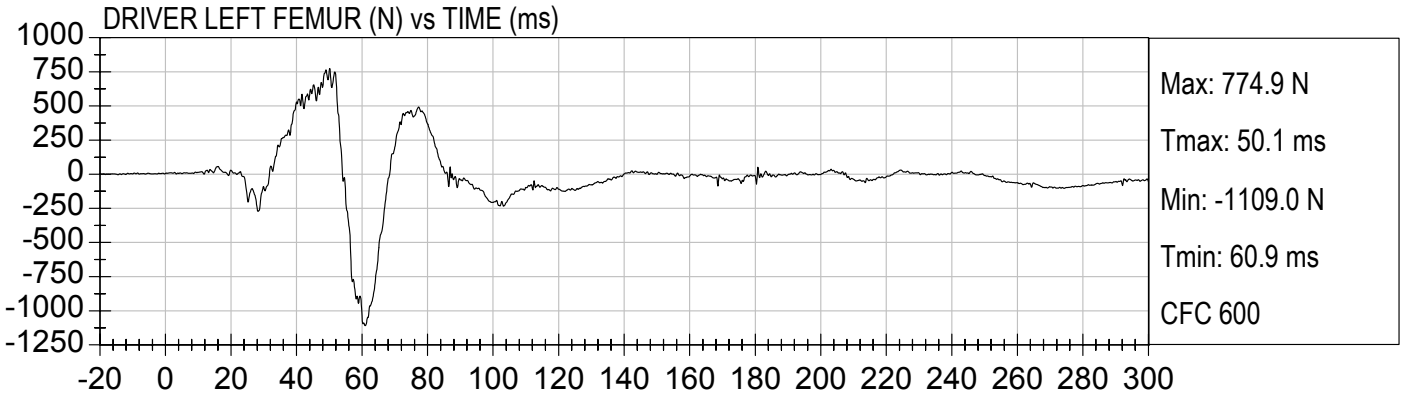

DRIVER PELVIS X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -4.3 kph
Tmin: 95.3 ms
CFC 180

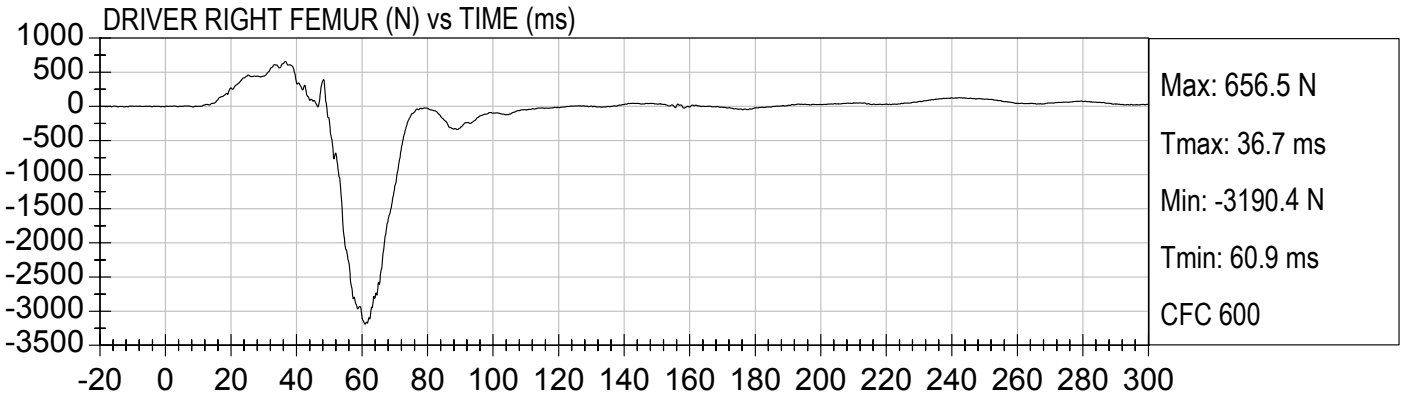

DRIVER PELVIS Y Velocity (kph) vs TIME (ms)
5
4
3
2
1
0
-1
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 4.3 kph
Tmax: 116.8 ms
Min: -1.0 kph
Tmin: 63.6 ms
CFC 180

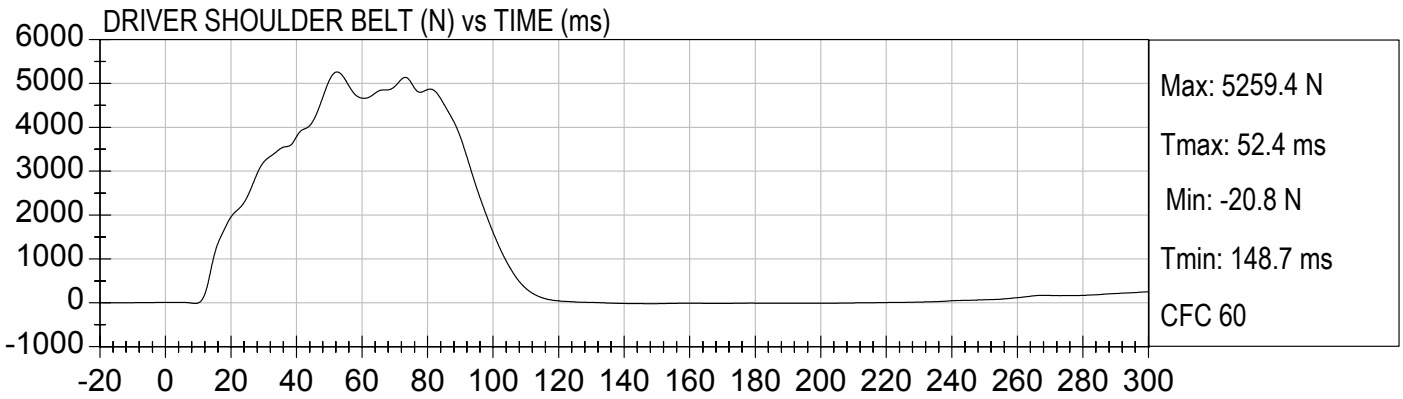

DRIVER PELVIS Z Velocity (kph) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.0 kph
Tmax: 35.4 ms
Min: -35.7 kph
Tmin: 136.4 ms
CFC 180

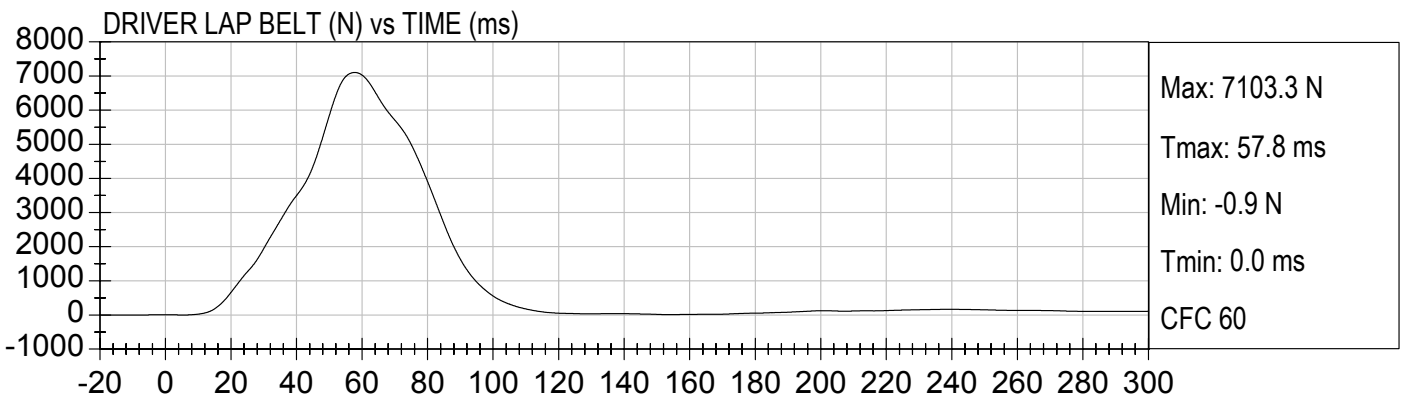
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

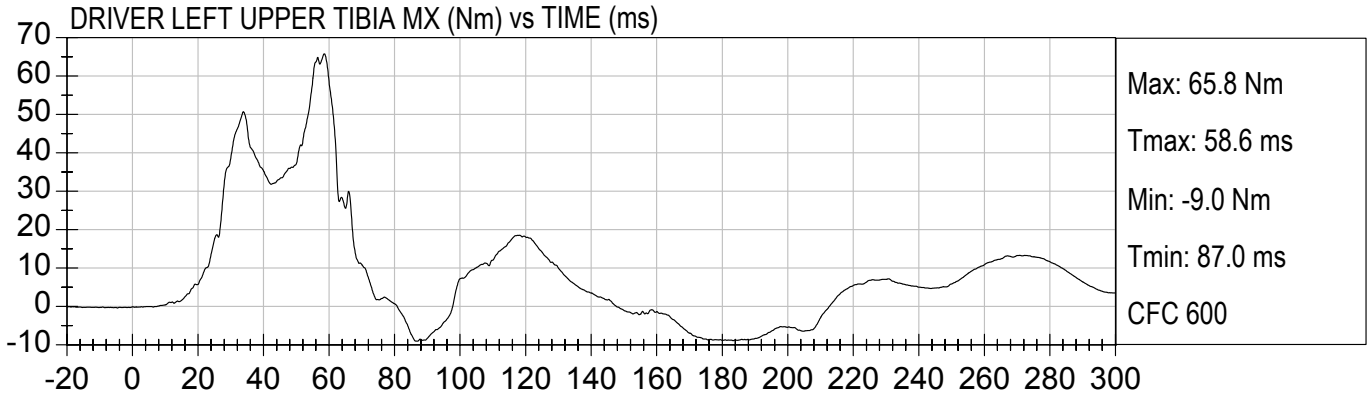
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

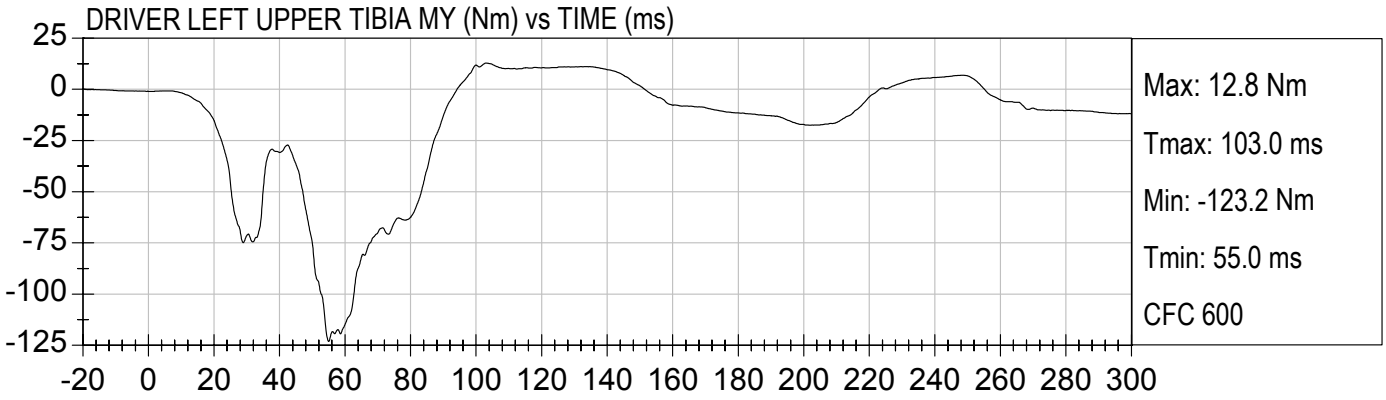


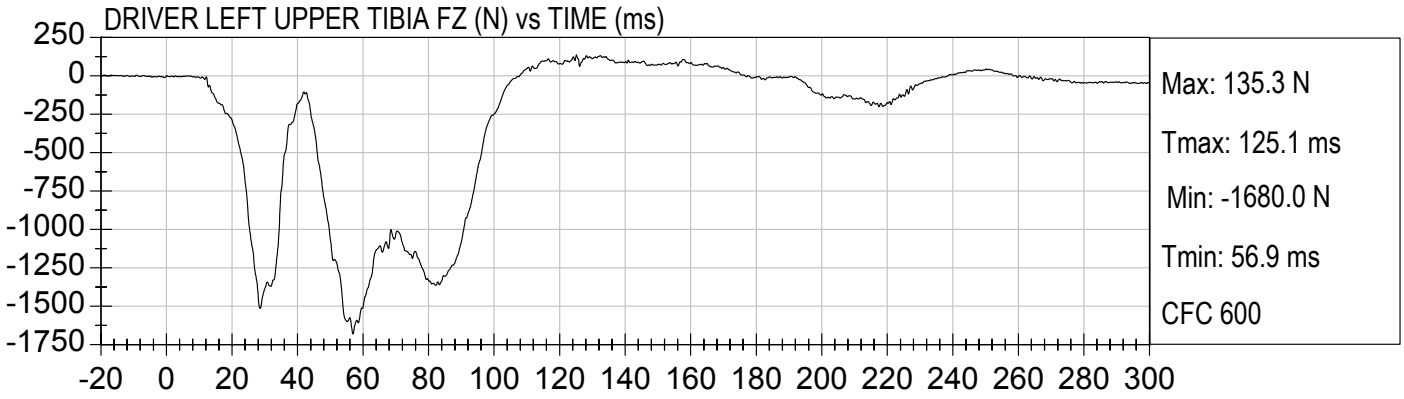


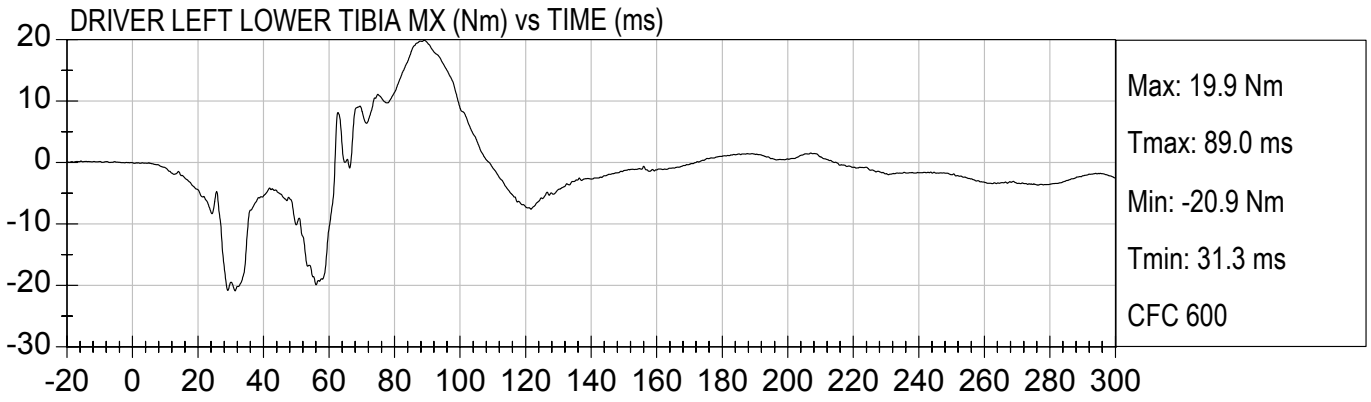


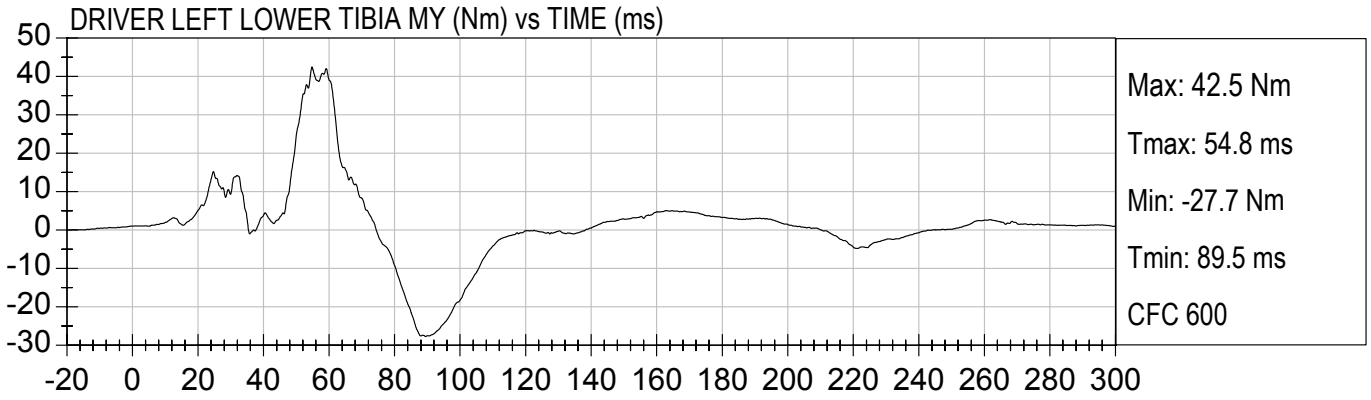


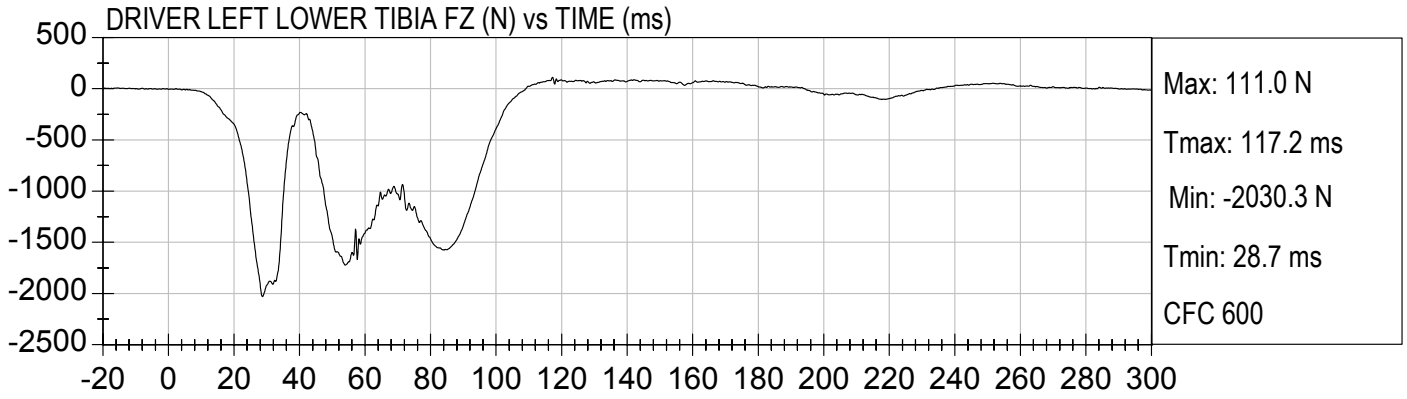

DRIVER LEFT UPPER TIBIA MX (Nm) vs TIME (ms)
70
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 65.8 Nm
Tmax: 58.6 ms
Min: -9.0 Nm
Tmin: 87.0 ms
CFC 600

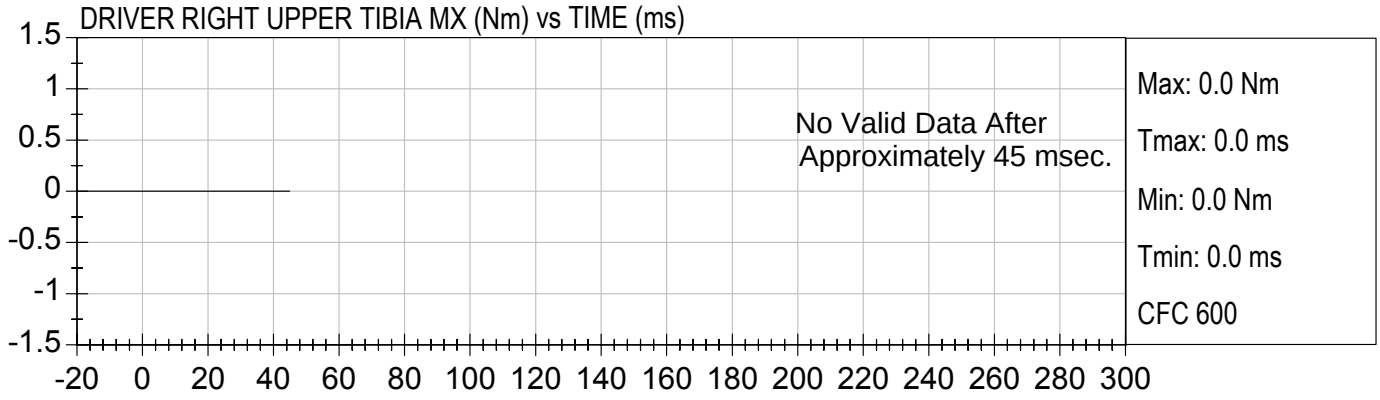

DRIVER LEFT UPPER TIBIA MY (Nm) vs TIME (ms)
25
0
-25
-50
-75
-100
-125
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 12.8 Nm
Tmax: 103.0 ms
Min: -123.2 Nm
Tmin: 55.0 ms
CFC 600

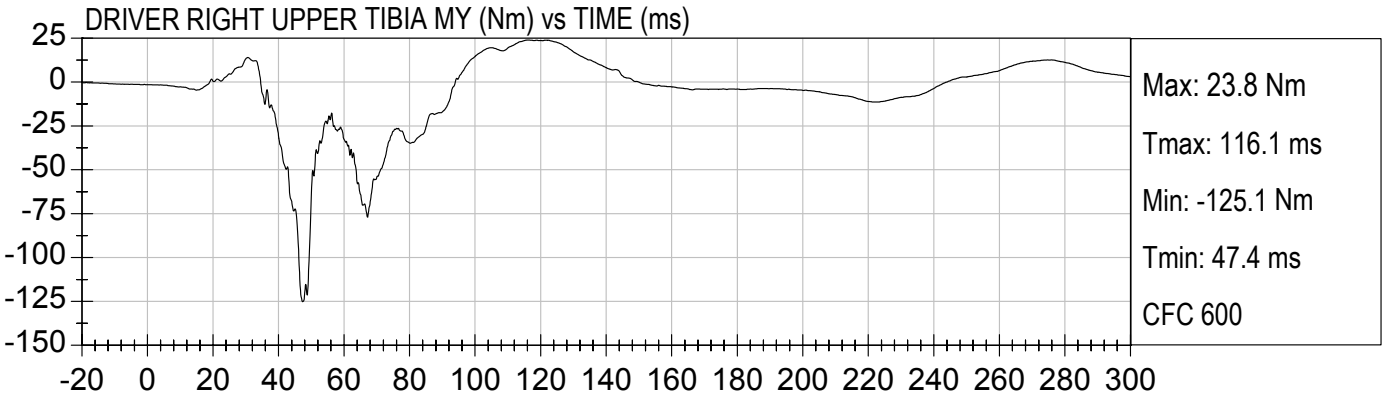

DRIVER LEFT UPPER TIBIA FZ (N) vs TIME (ms)
250
0
-250
-500
-750
-1000
-1250
-1500
-1750
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 135.3 N
Tmax: 125.1 ms
Min: -1680.0 N
Tmin: 56.9 ms
CFC 600

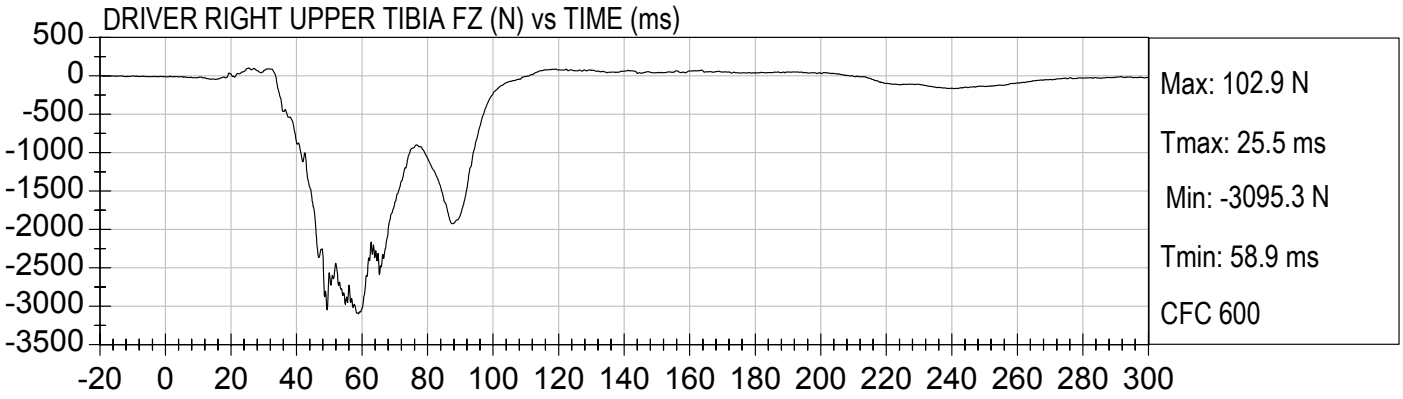

DRIVER LEFT LOWER TIBIA MX (Nm) vs TIME (ms)
20
10
0
-10
-20
-30
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 19.9 Nm
Tmax: 89.0 ms
Min: -20.9 Nm
Tmin: 31.3 ms
CFC 600


DRIVER LEFT LOWER TIBIA MY (Nm) vs TIME (ms)
50
40
30
20
10
0
-10
-20
-30
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 42.5 Nm
Tmax: 54.8 ms
Min: -27.7 Nm
Tmin: 89.5 ms
CFC 600


DRIVER LEFT LOWER TIBIA FZ (N) vs TIME (ms)
500
0
-500
-1000
-1500
-2000
-2500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 111.0 N
Tmax: 117.2 ms
Min: -2030.3 N
Tmin: 28.7 ms
CFC 600

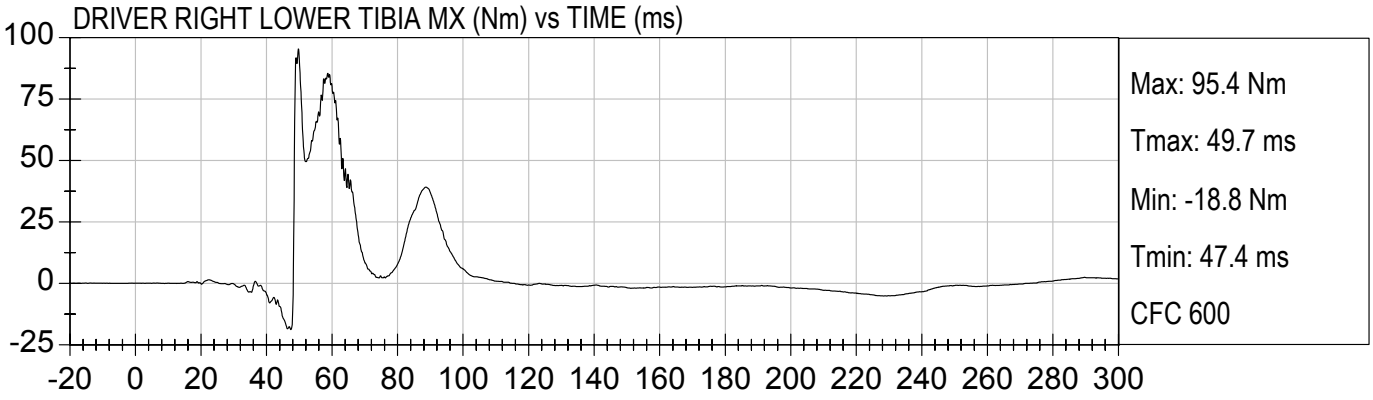

DRIVER RIGHT UPPER TIBIA MX (Nm) vs TIME (ms)
No Valid Data After
Approximately 45 msec.
Max: 0.0 Nm
Tmax: 0.0 ms
Min: 0.0 Nm
Tmin: 0.0 ms
CFC 600

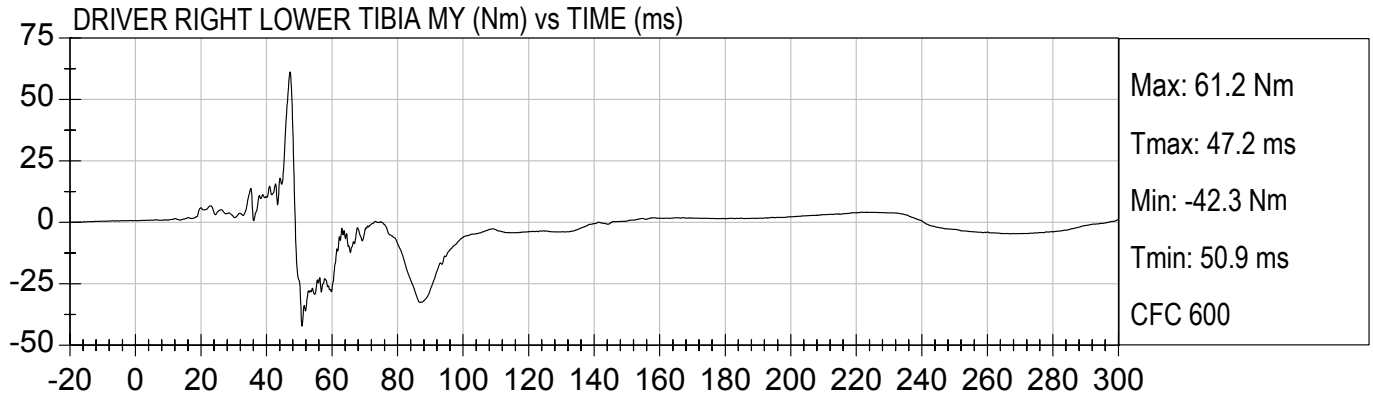

DRIVER RIGHT UPPER TIBIA MY (Nm) vs TIME (ms)
Max: 23.8 Nm
Tmax: 116.1 ms
Min: -125.1 Nm
Tmin: 47.4 ms
CFC 600

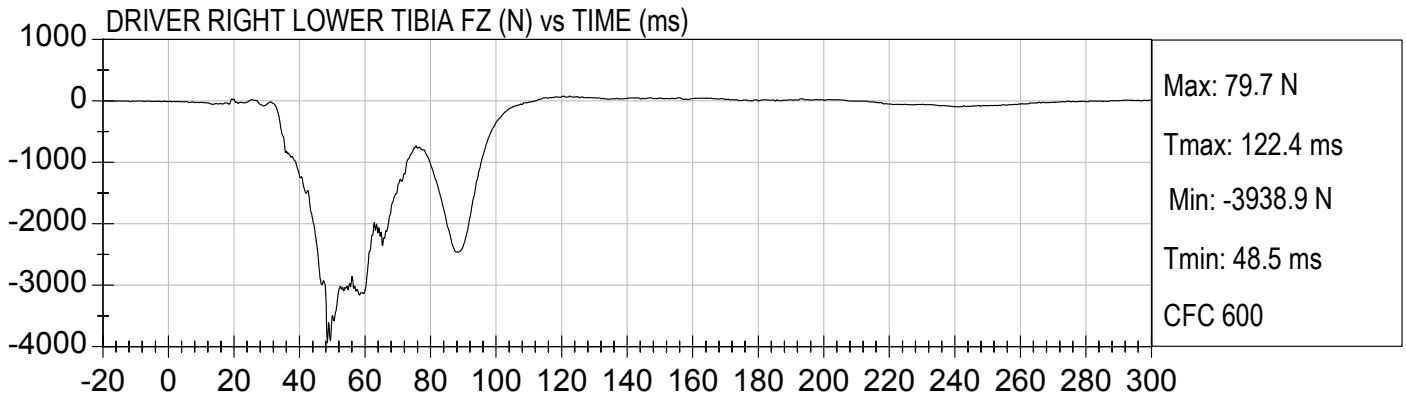

DRIVER RIGHT UPPER TIBIA FZ (N) vs TIME (ms)
Max: 102.9 N
Tmax: 25.5 ms
Min: -3095.3 N
Tmin: 58.9 ms
CFC 600

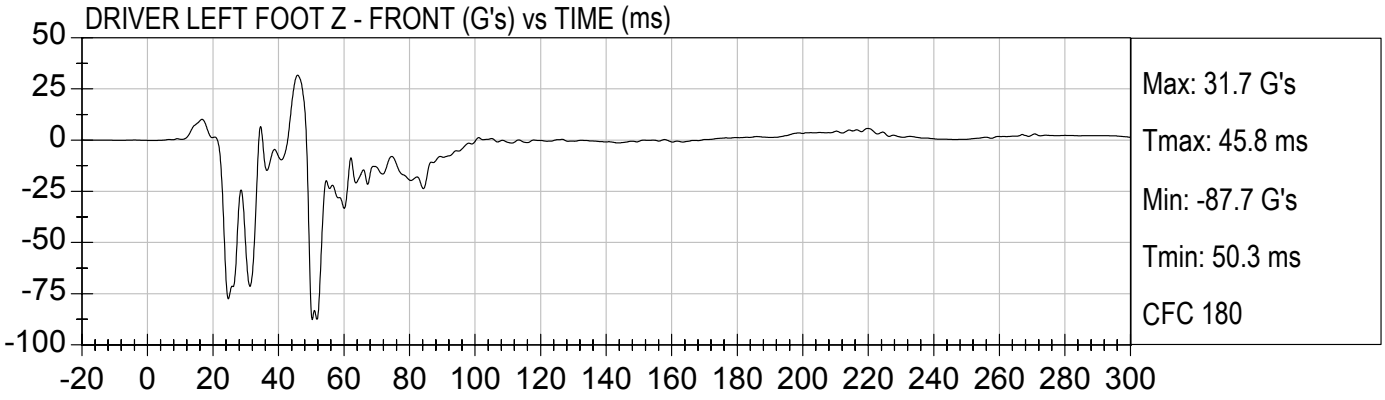
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

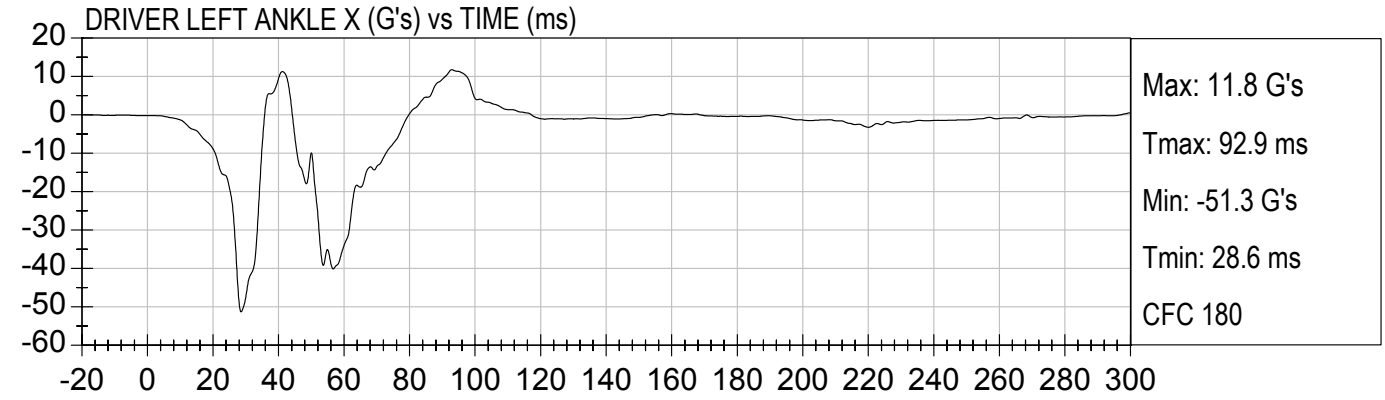
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

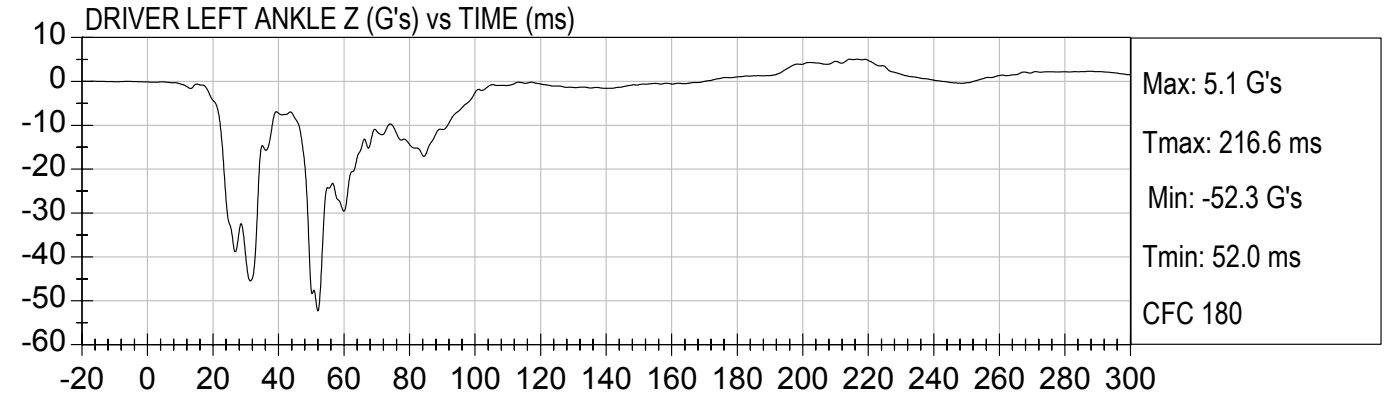


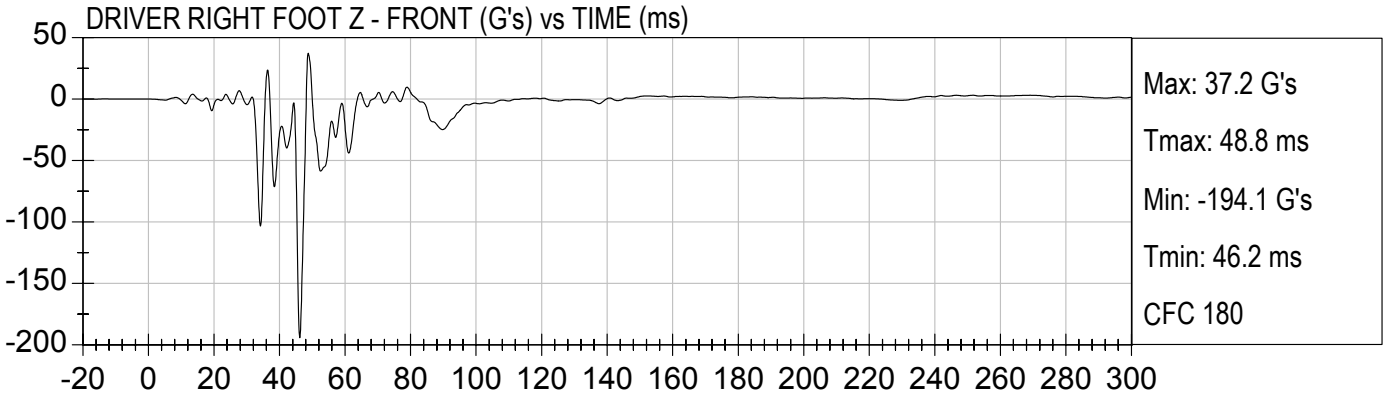


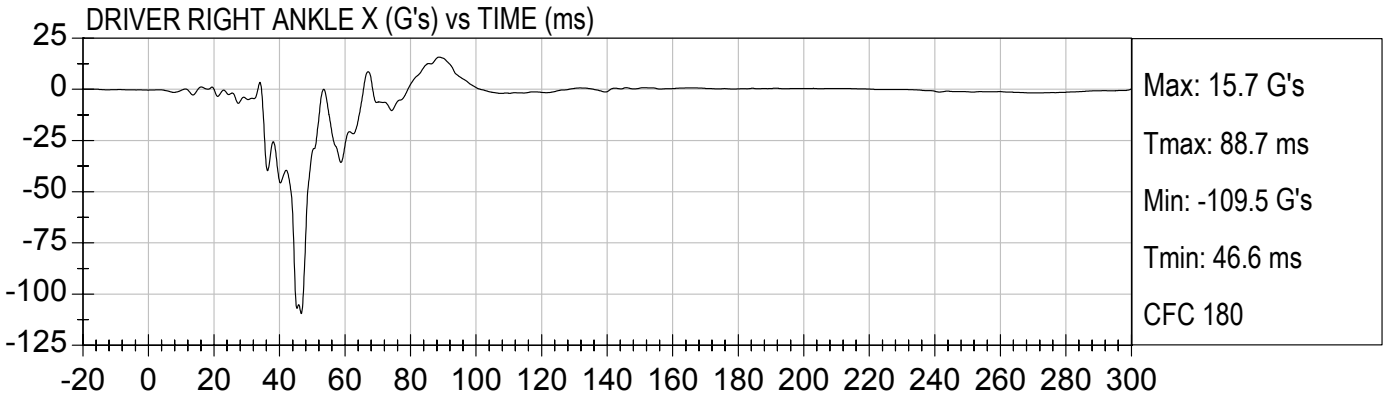


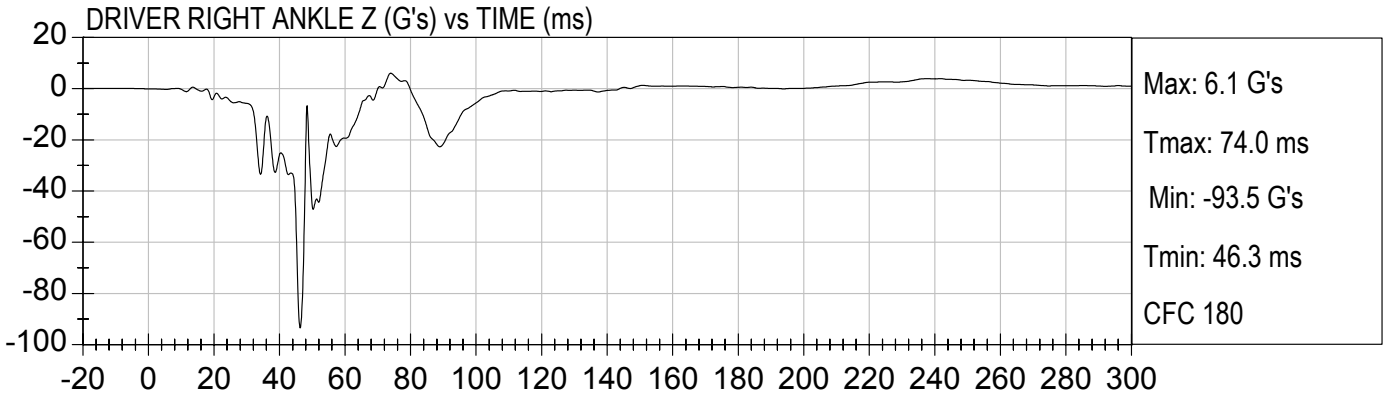

DRIVER LEFT FOOT Z - FRONT (G's) vs TIME (ms)
50
25
0
-25
-50
-75
-100
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 31.7 G's
Tmax: 45.8 ms
Min: -87.7 G's
Tmin: 50.3 ms
CFC 180


DRIVER LEFT ANKLE X (G's) vs TIME (ms)
20
10
0
-10
-20
-30
-40
-50
-60
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 11.8 G's
Tmax: 92.9 ms
Min: -51.3 G's
Tmin: 28.6 ms
CFC 180


DRIVER LEFT ANKLE Z (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-60
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 5.1 G's
Tmax: 216.6 ms
Min: -52.3 G's
Tmin: 52.0 ms
CFC 180

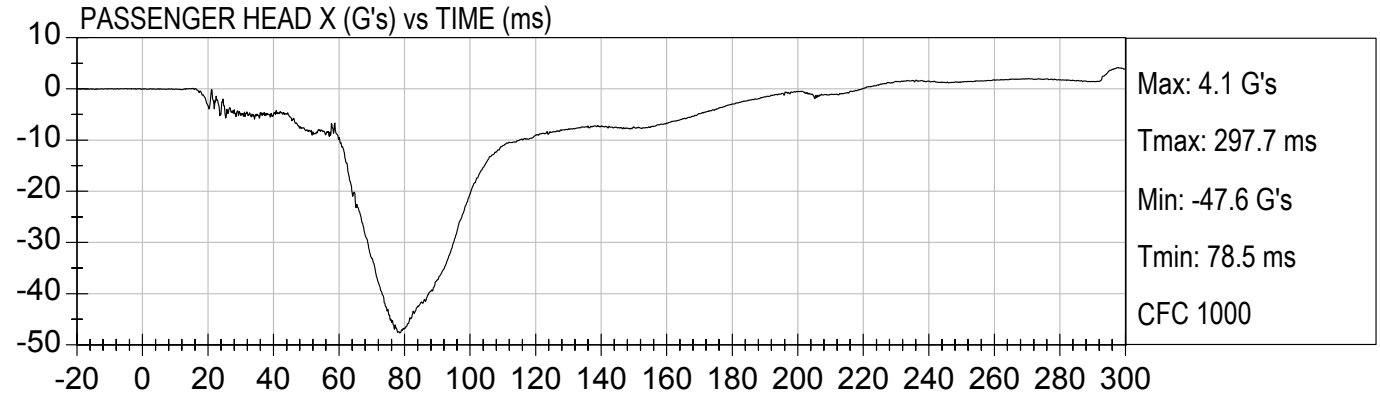

DRIVER RIGHT FOOT Z - FRONT (G's) vs TIME (ms)
50
0
-50
-100
-150
-200
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 37.2 G's
Tmax: 48.8 ms
Min: -194.1 G's
Tmin: 46.2 ms
CFC 180

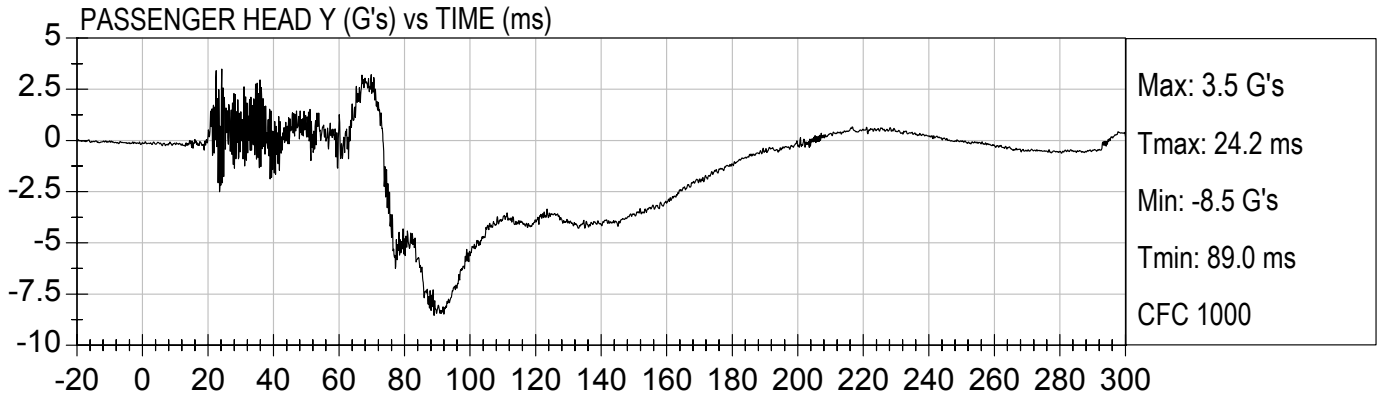

DRIVER RIGHT ANKLE X (G's) vs TIME (ms)
25
0
-25
-50
-75
-100
-125
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 15.7 G's
Tmax: 88.7 ms
Min: -109.5 G's
Tmin: 46.6 ms
CFC 180

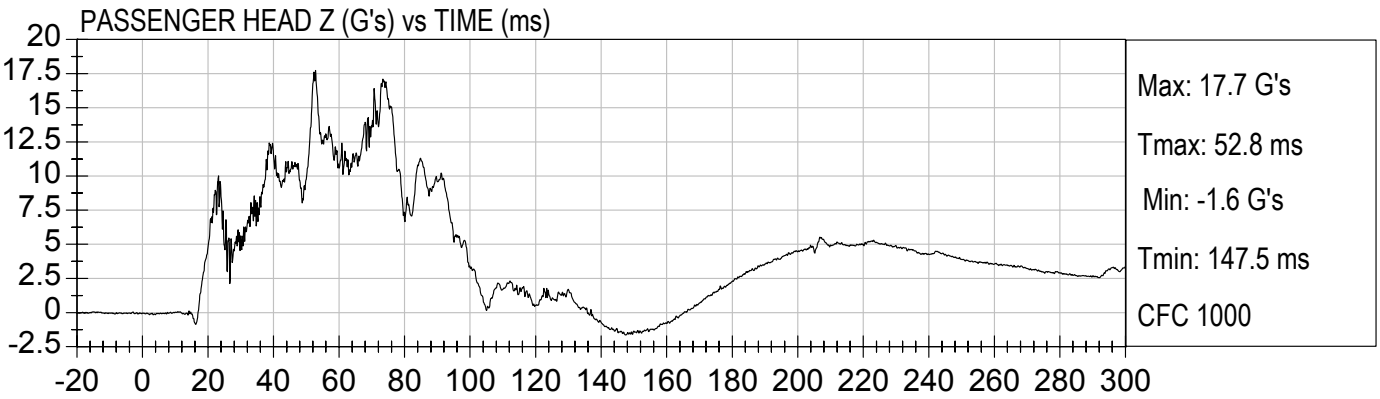

DRIVER RIGHT ANKLE Z (G's) vs TIME (ms)
20
0
-20
-40
-60
-80
-100
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 6.1 G's
Tmax: 74.0 ms
Min: -93.5 G's
Tmin: 46.3 ms
CFC 180

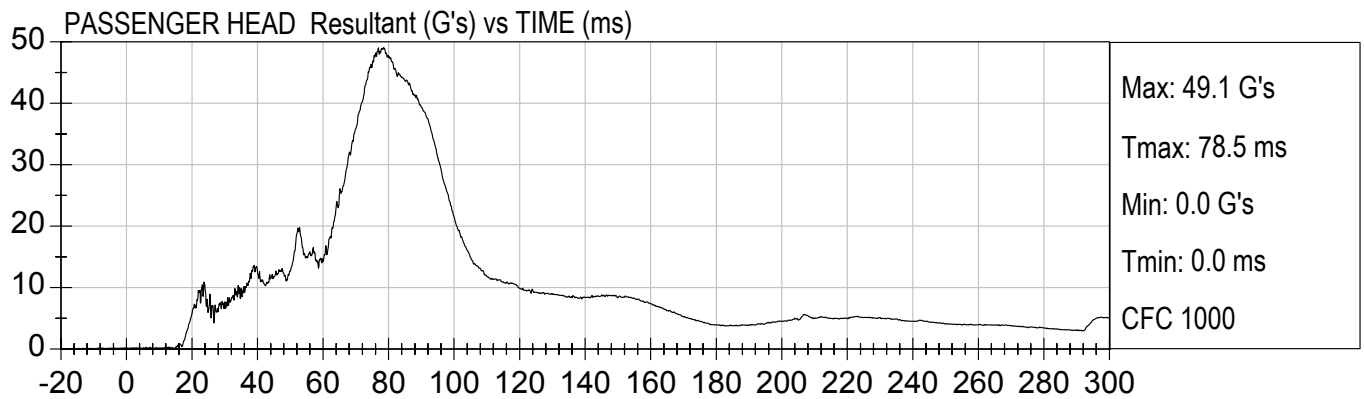
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

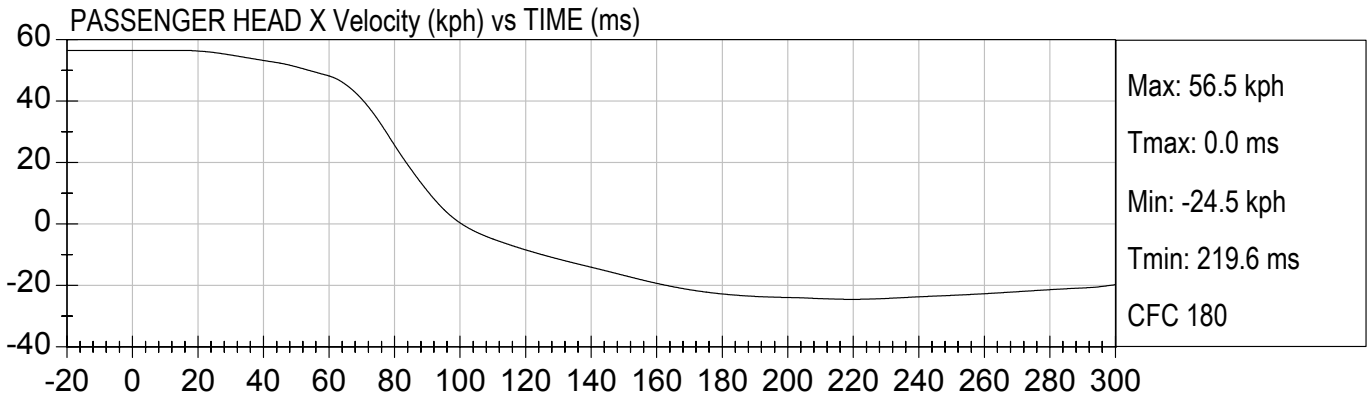
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

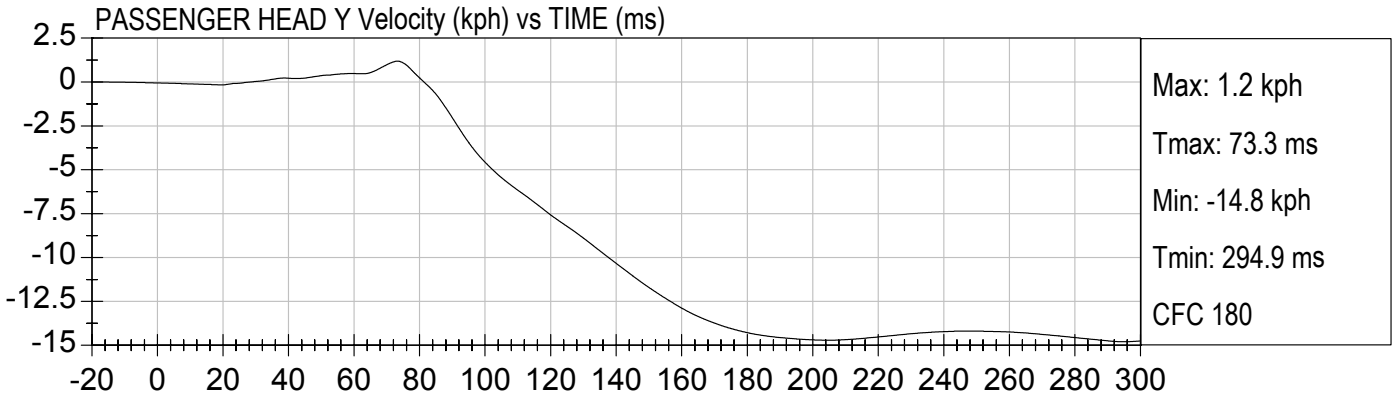


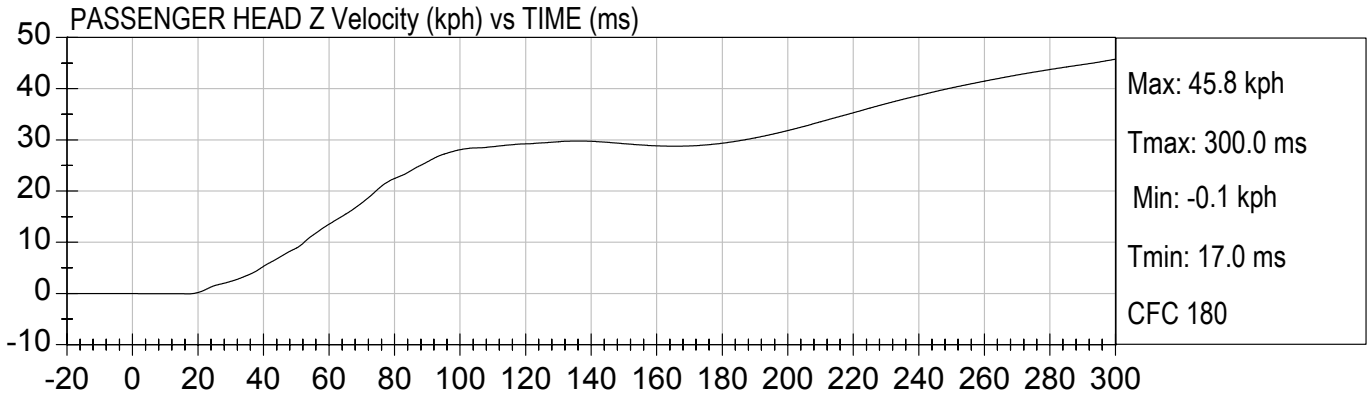






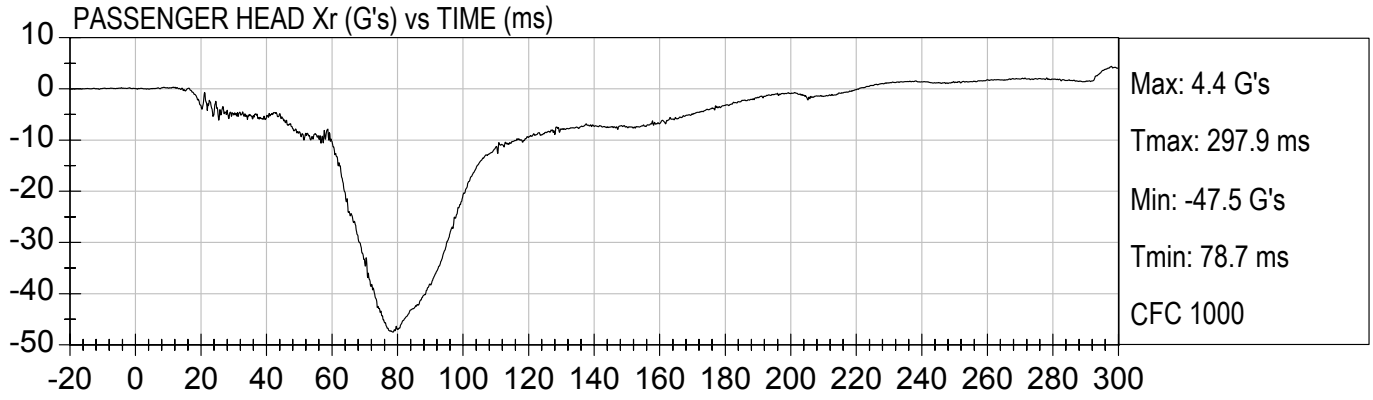

PASSENGER HEAD X Velocity (kph) vs TIME (ms)
60
40
20
0
-20
-40
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -24.5 kph
Tmin: 219.6 ms
CFC 180

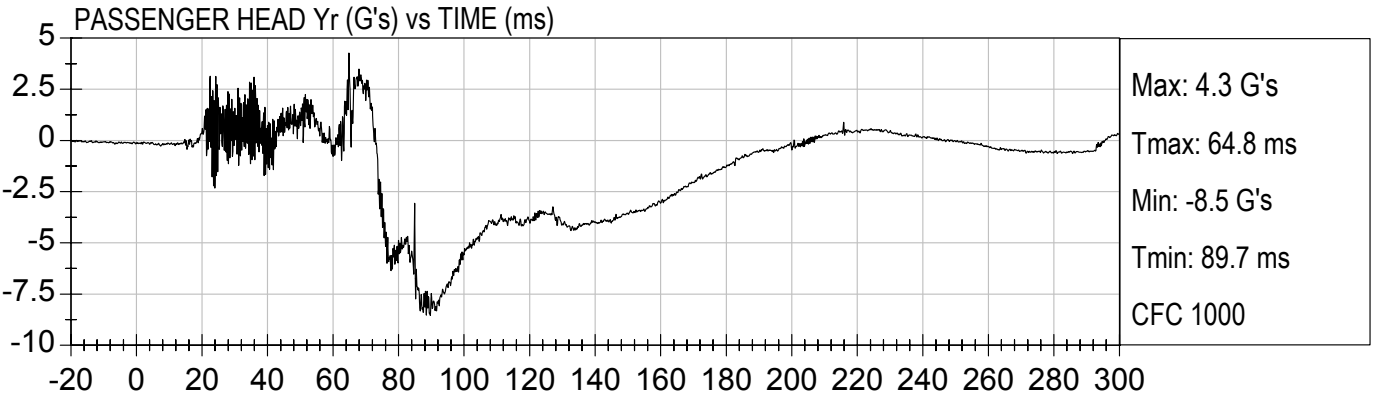

PASSENGER HEAD Y Velocity (kph) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.2 kph
Tmax: 73.3 ms
Min: -14.8 kph
Tmin: 294.9 ms
CFC 180

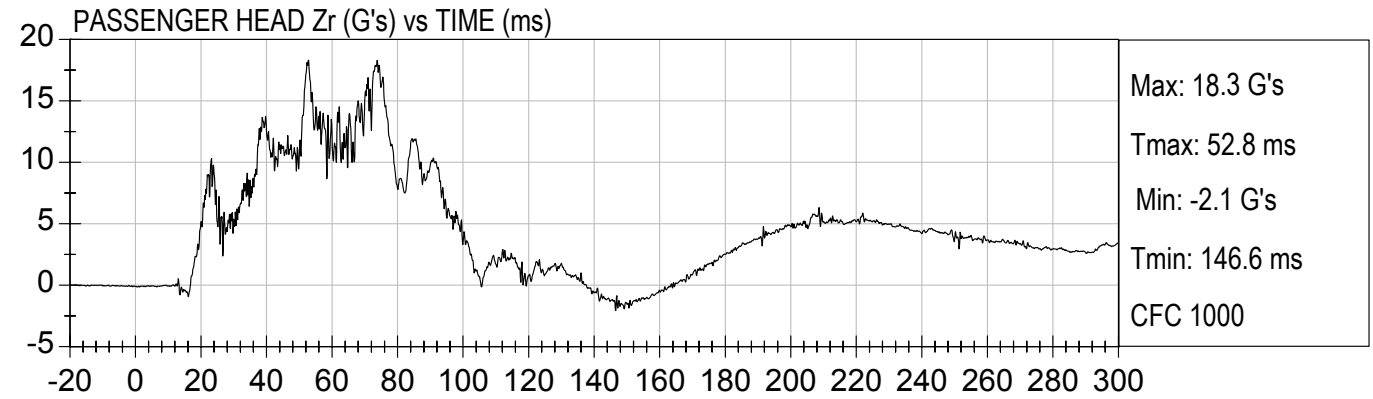

PASSENGER HEAD Z Velocity (kph) vs TIME (ms)
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 45.8 kph
Tmax: 300.0 ms
Min: -0.1 kph
Tmin: 17.0 ms
CFC 180

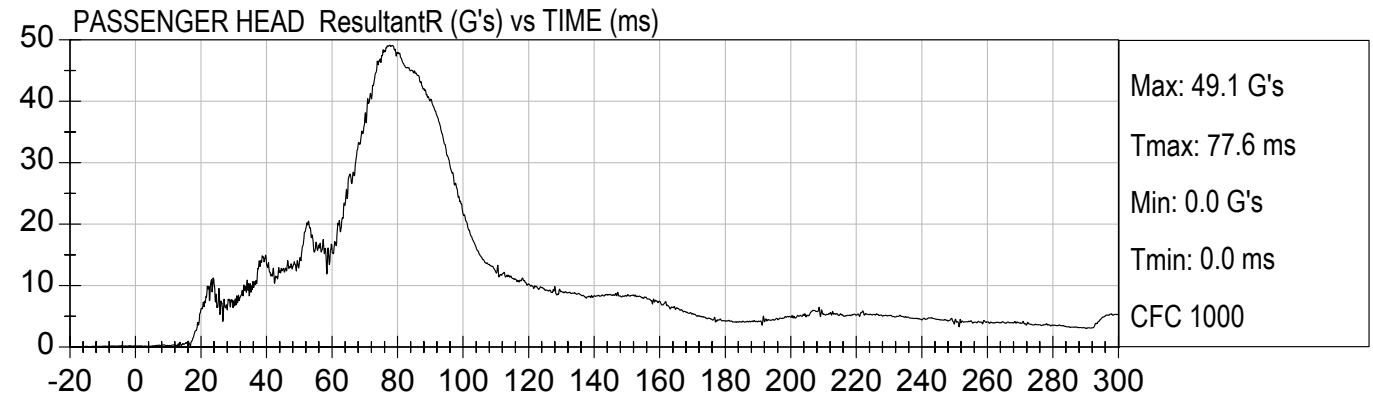
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

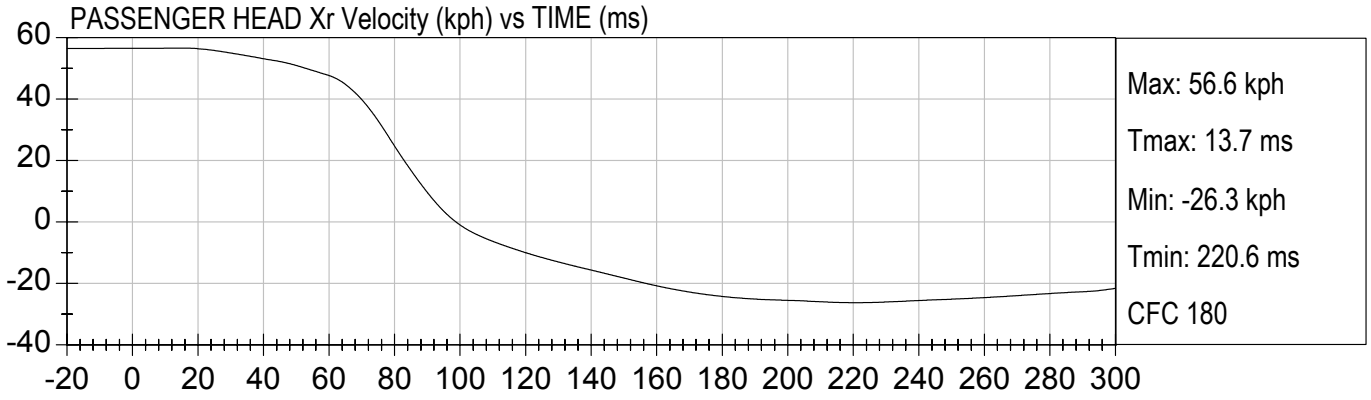
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

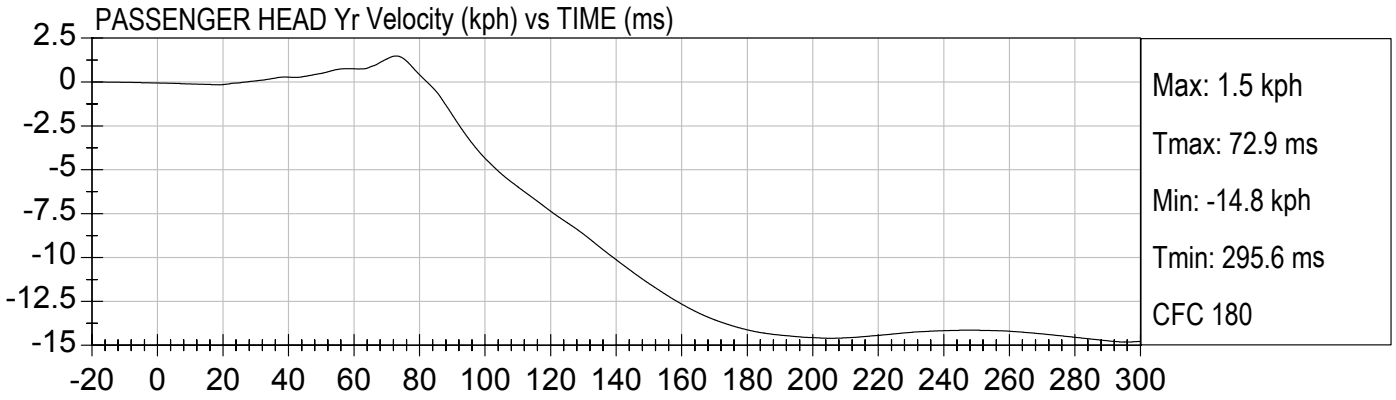


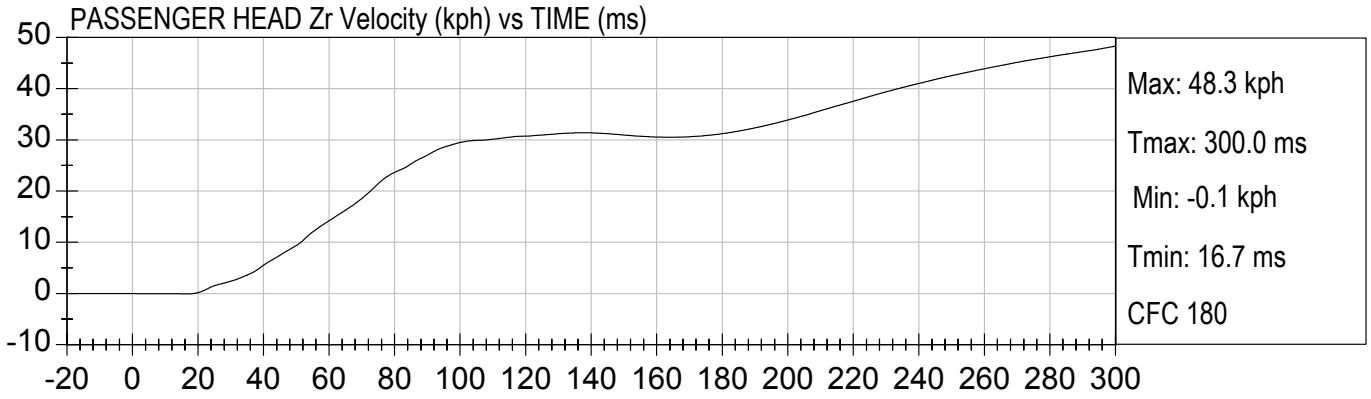






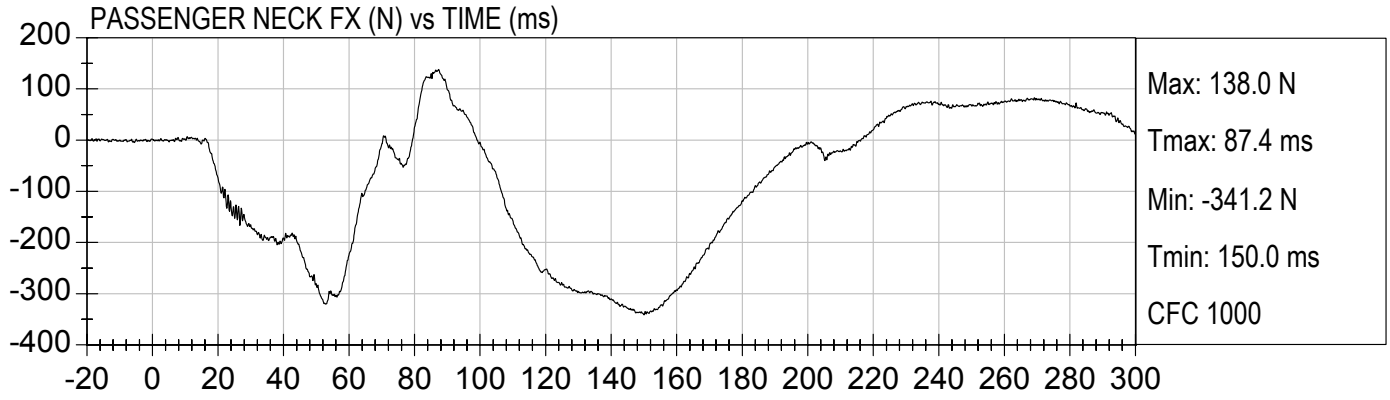

PASSENGER HEAD Xr Velocity (kph) vs TIME (ms)
60
40
20
0
-20
-40
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.6 kph
Tmax: 13.7 ms
Min: -26.3 kph
Tmin: 220.6 ms
CFC 180

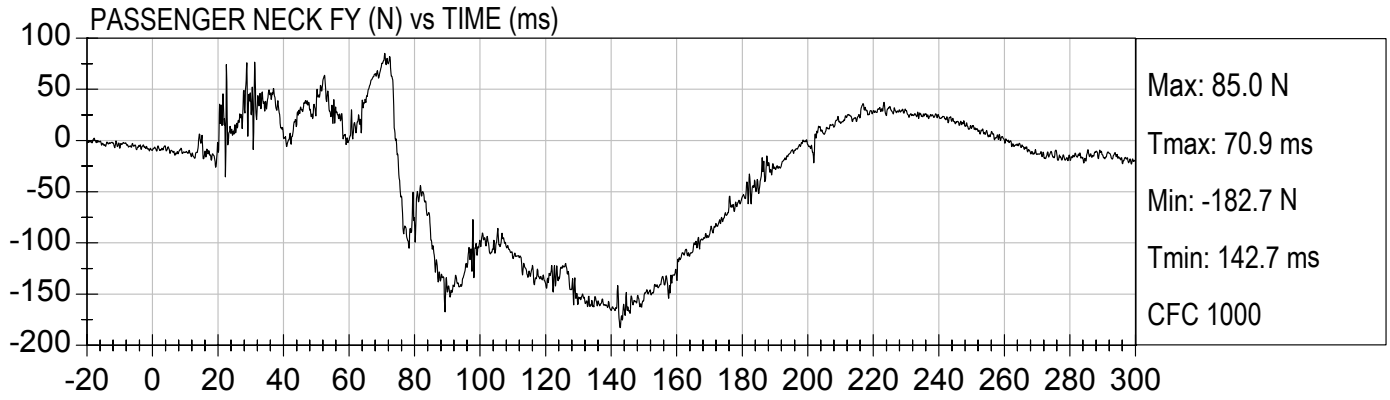

PASSENGER HEAD Yr Velocity (kph) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.5 kph
Tmax: 72.9 ms
Min: -14.8 kph
Tmin: 295.6 ms
CFC 180

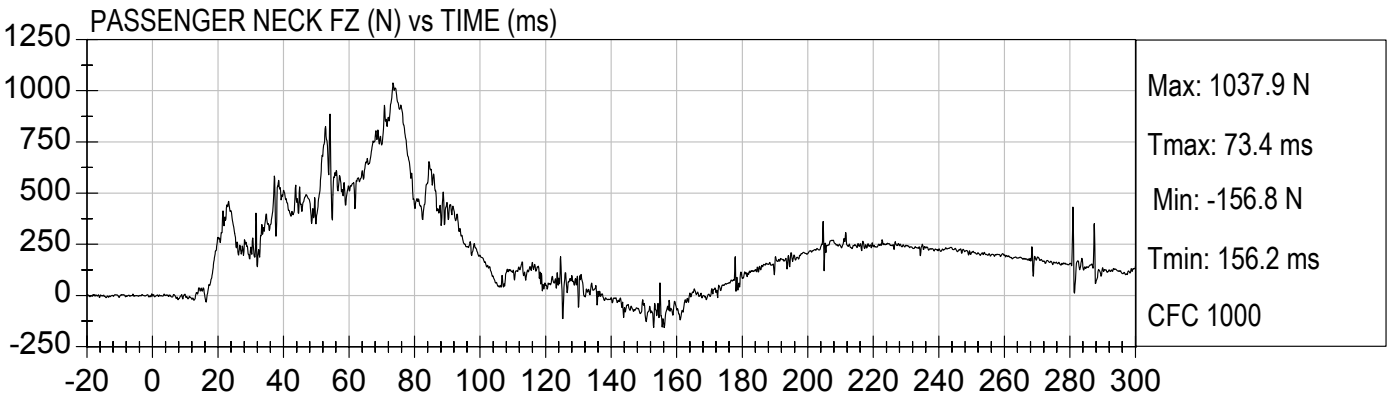

PASSENGER HEAD Zr Velocity (kph) vs TIME (ms)
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 48.3 kph
Tmax: 300.0 ms
Min: -0.1 kph
Tmin: 16.7 ms
CFC 180

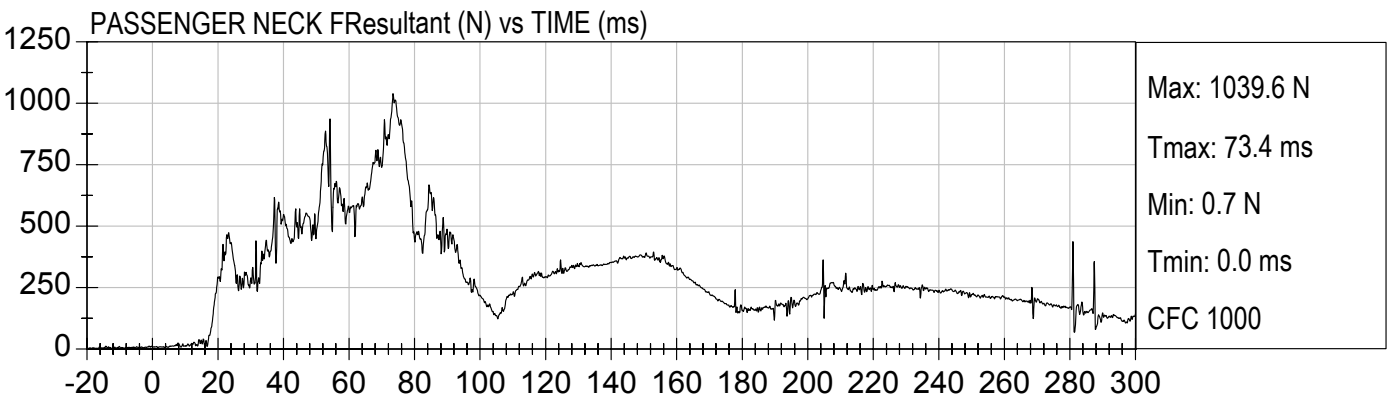
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

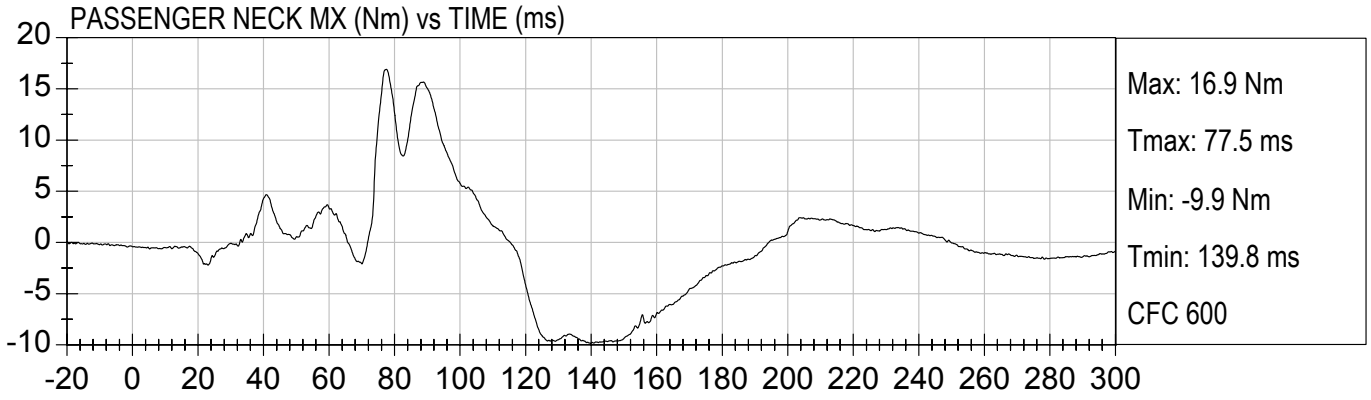
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

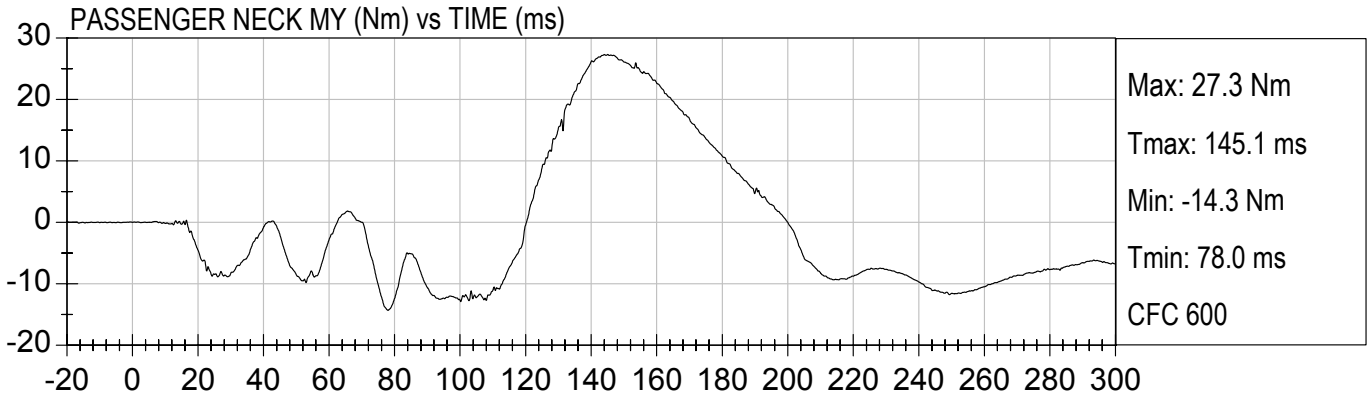


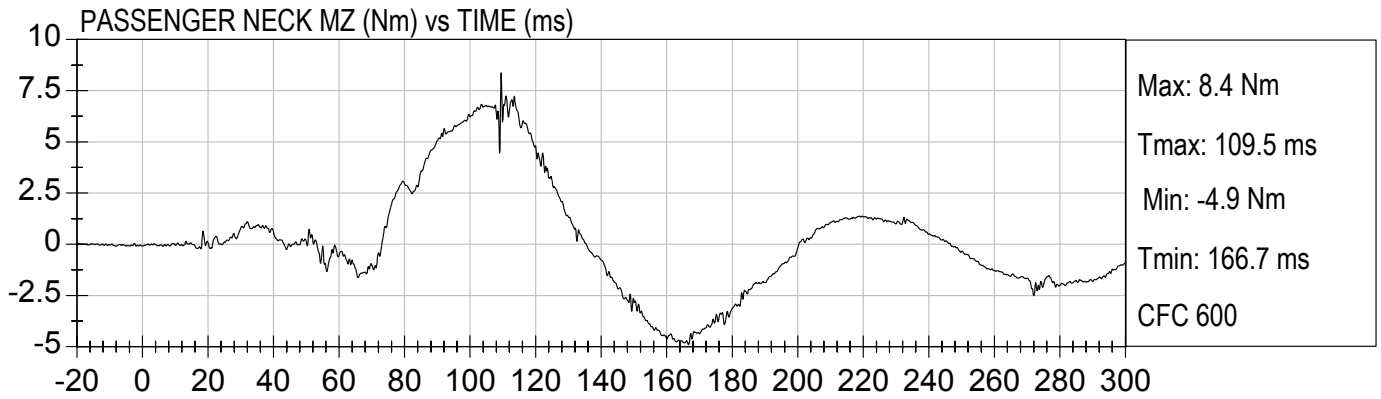


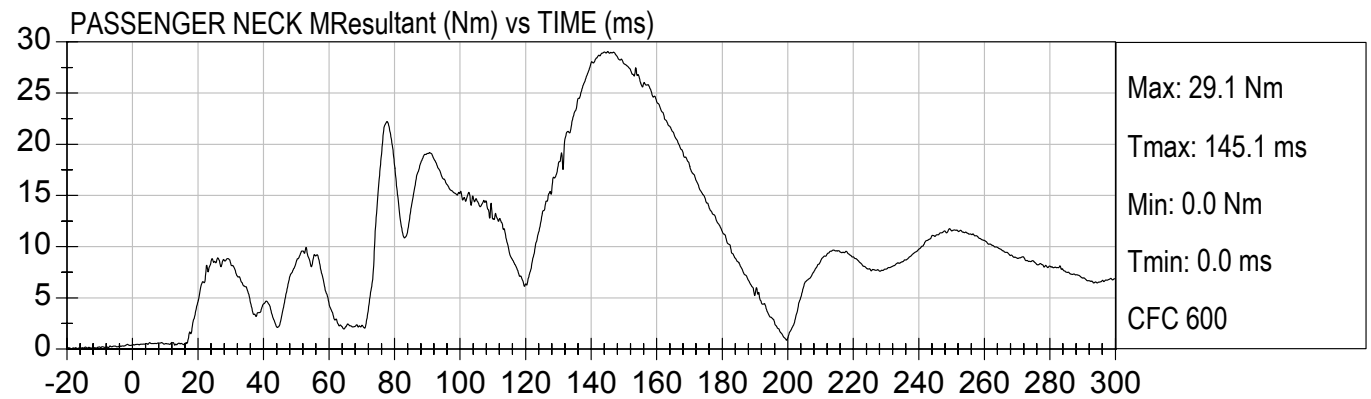


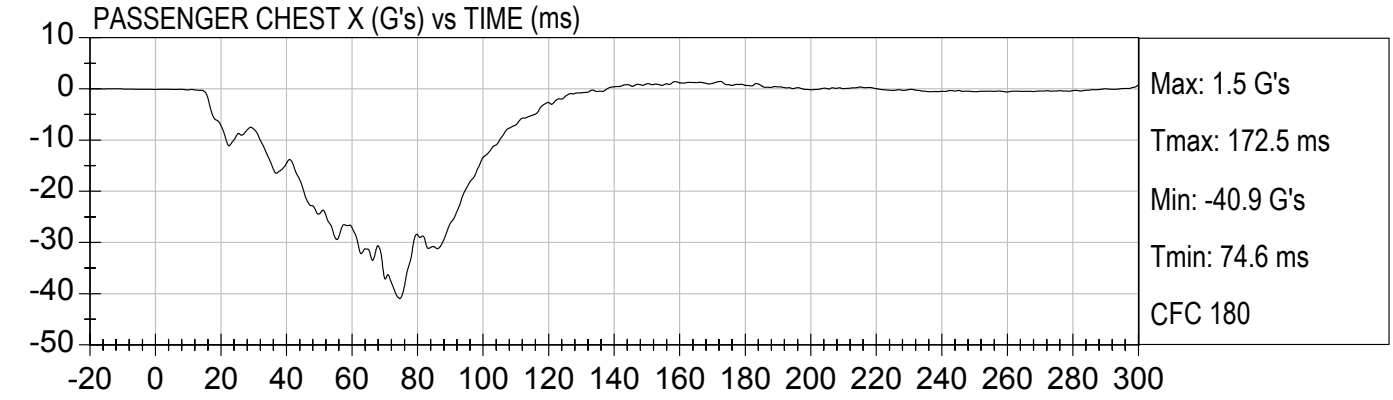


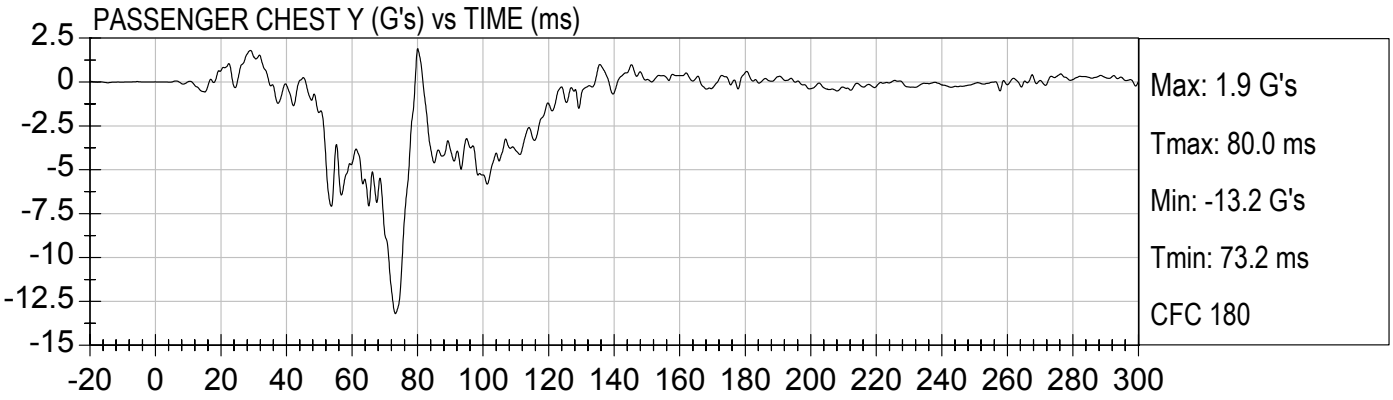

PASSENGER NECK MX (Nm) vs TIME (ms)
20
15
10
5
0
-5
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 16.9 Nm
Tmax: 77.5 ms
Min: -9.9 Nm
Tmin: 139.8 ms
CFC 600

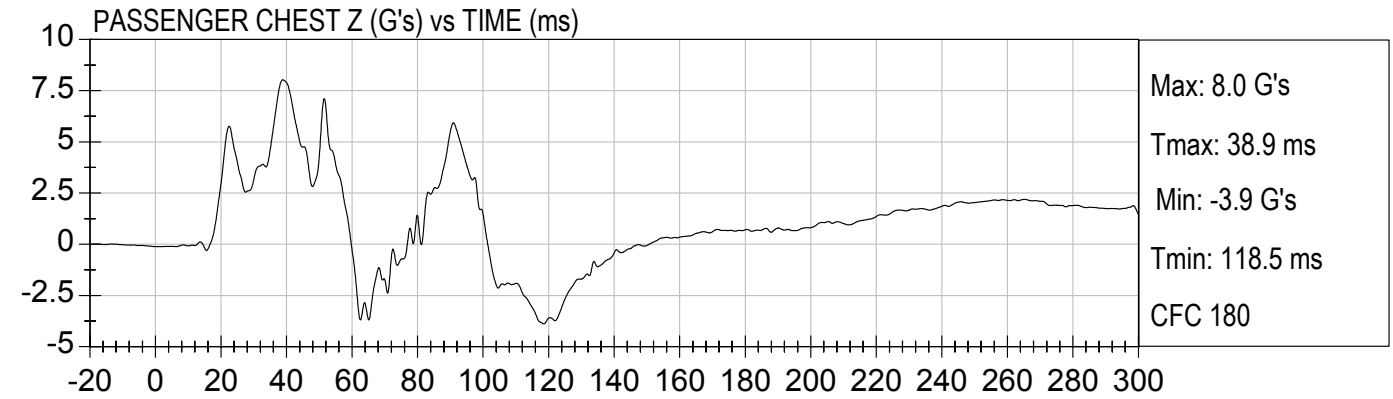

PASSENGER NECK MY (Nm) vs TIME (ms)
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 27.3 Nm
Tmax: 145.1 ms
Min: -14.3 Nm
Tmin: 78.0 ms
CFC 600

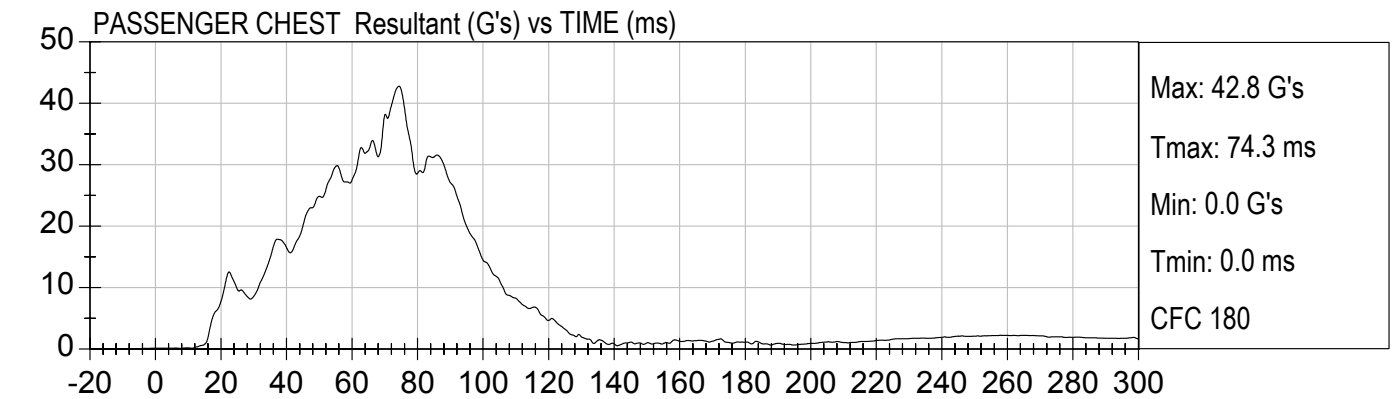

PASSENGER NECK MZ (Nm) vs TIME (ms)
10
7.5
5
2.5
0
-2.5
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 8.4 Nm
Tmax: 109.5 ms
Min: -4.9 Nm
Tmin: 166.7 ms
CFC 600

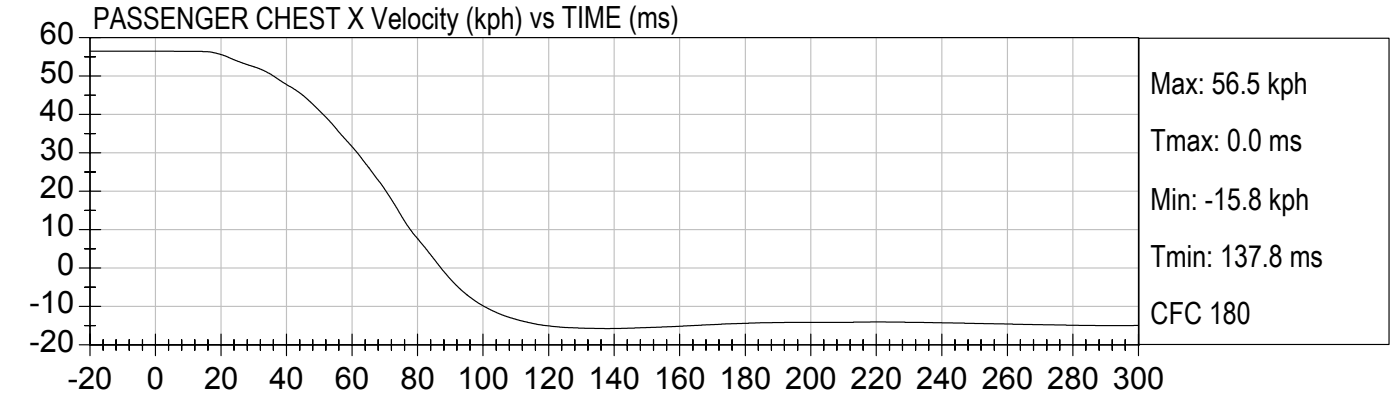

PASSENGER NECK MResultant (Nm) vs TIME (ms)
30
25
20
15
10
5
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 29.1 Nm
Tmax: 145.1 ms
Min: 0.0 Nm
Tmin: 0.0 ms
CFC 600

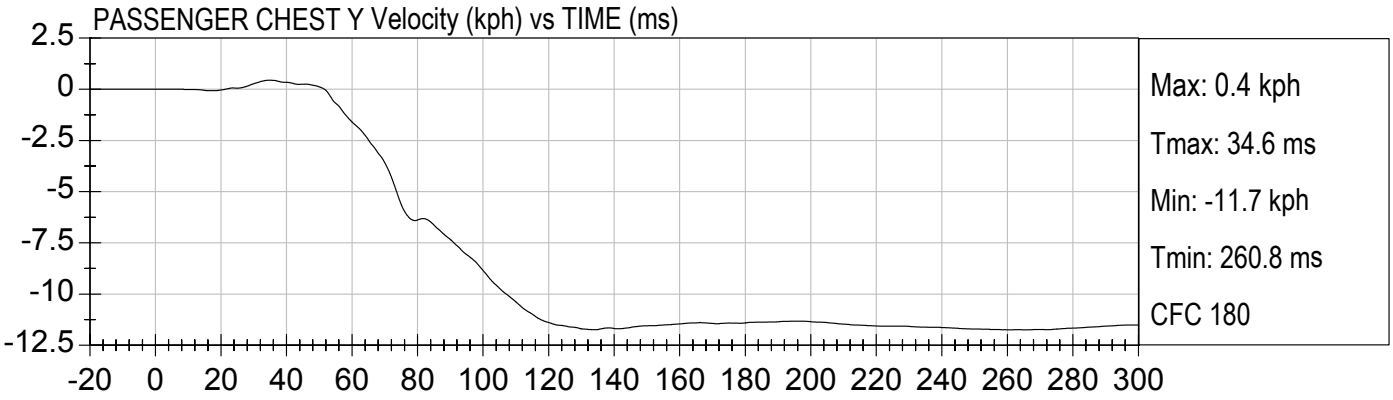

PASSENGER CHEST X (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.5 G's
Tmax: 172.5 ms
Min: -40.9 G's
Tmin: 74.6 ms
CFC 180

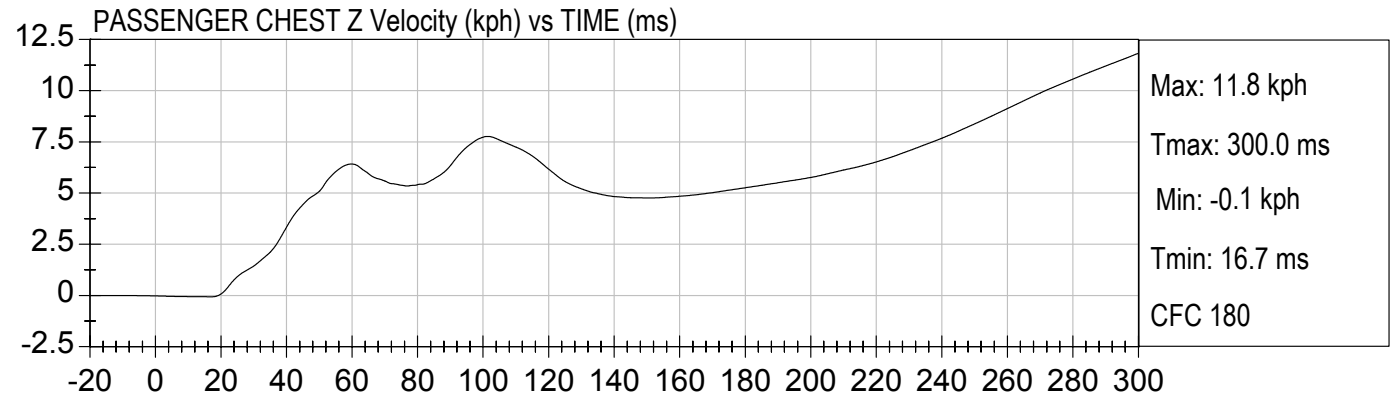

PASSENGER CHEST Y (G's) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.9 G's
Tmax: 80.0 ms
Min: -13.2 G's
Tmin: 73.2 ms
CFC 180

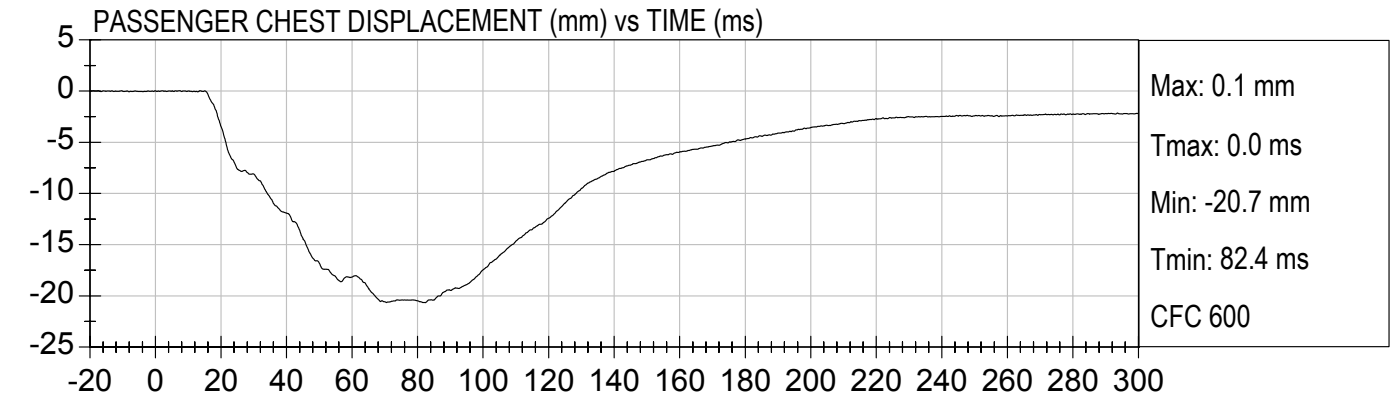

PASSENGER CHEST Z (G's) vs TIME (ms)
10
7.5
5
2.5
0
-2.5
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 8.0 G's
Tmax: 38.9 ms
Min: -3.9 G's
Tmin: 118.5 ms
CFC 180

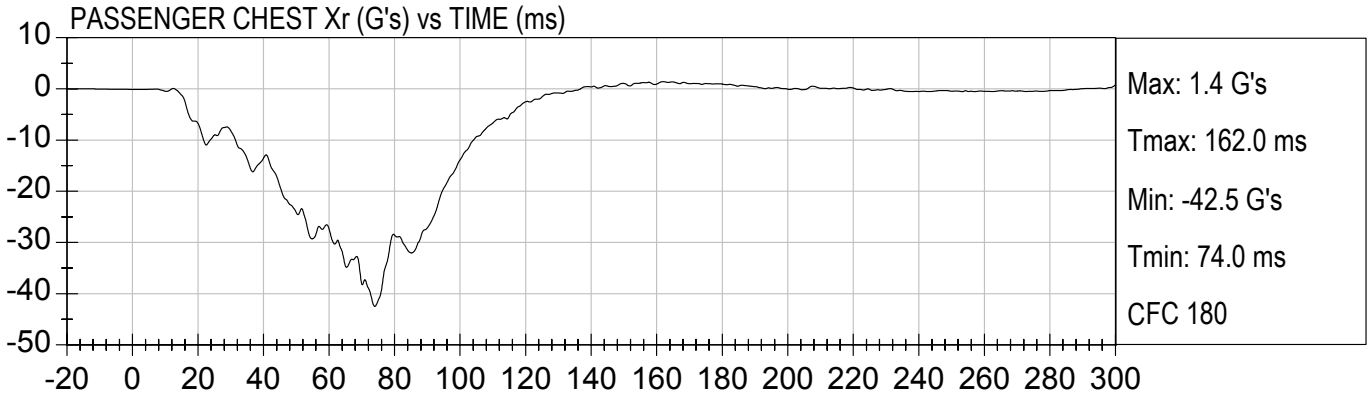

PASSENGER CHEST Resultant (G's) vs TIME (ms)
50
40
30
20
10
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 42.8 G's
Tmax: 74.3 ms
Min: 0.0 G's
Tmin: 0.0 ms
CFC 180

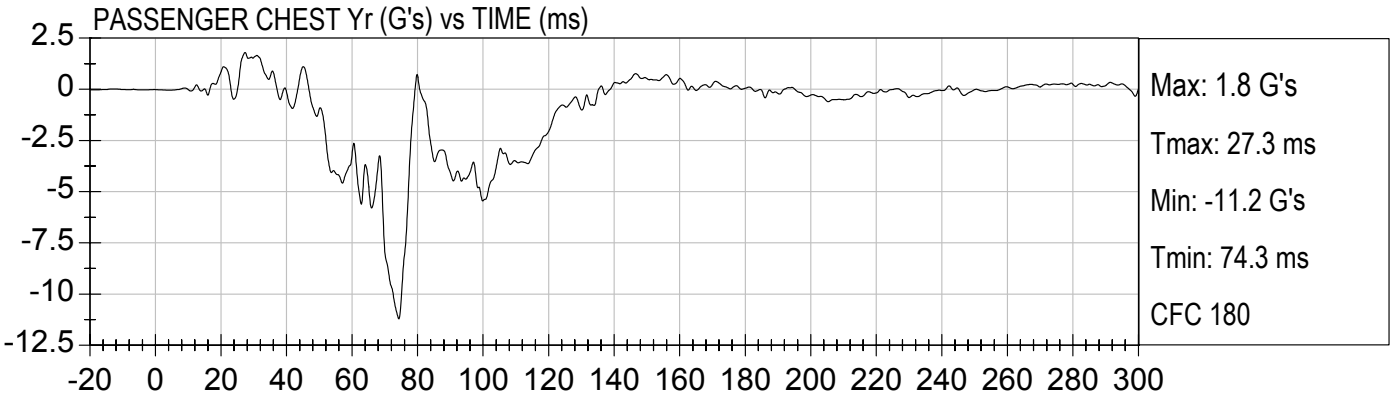

PASSENGER CHEST X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -15.8 kph
Tmin: 137.8 ms
CFC 180

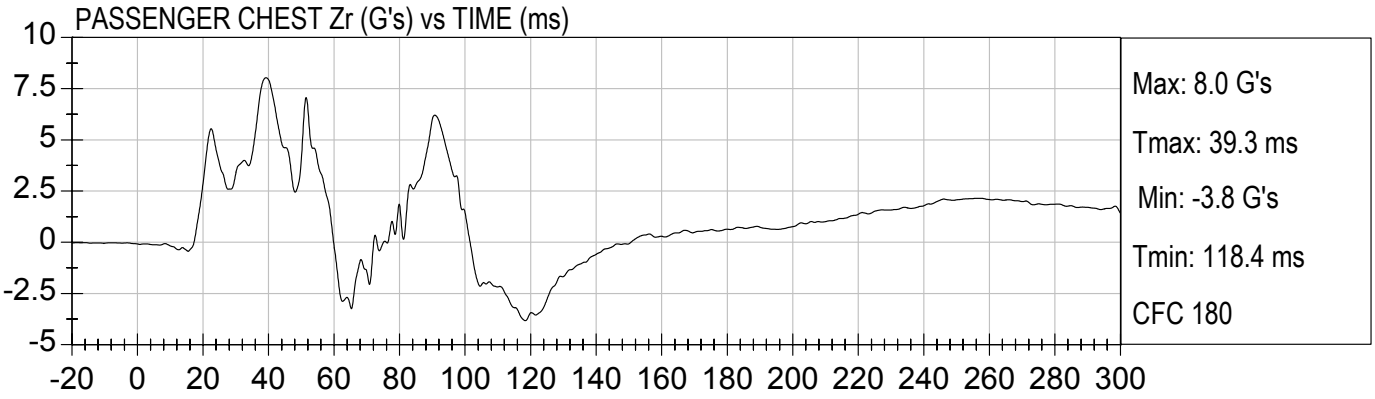

PASSENGER CHEST Y Velocity (kph) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.4 kph
Tmax: 34.6 ms
Min: -11.7 kph
Tmin: 260.8 ms
CFC 180

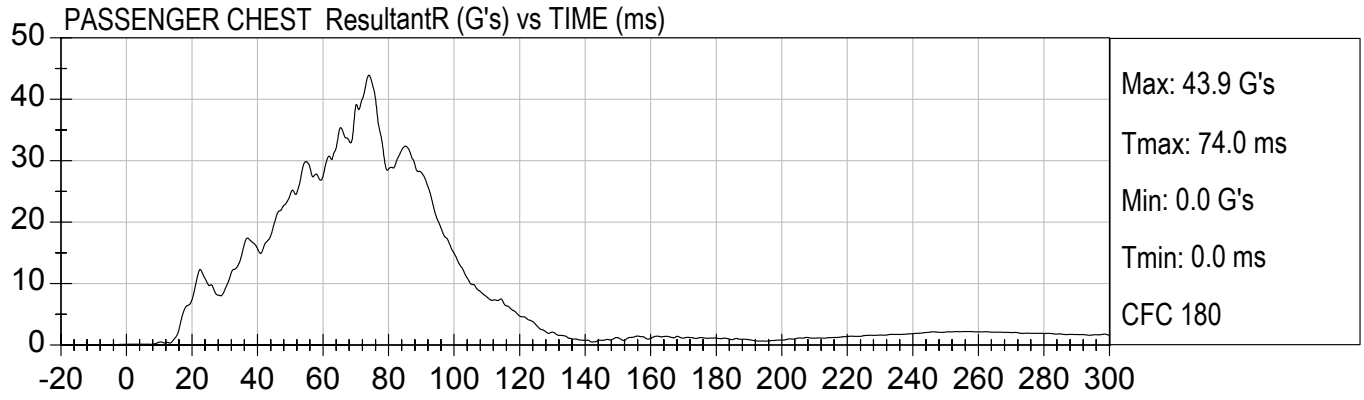

PASSENGER CHEST Z Velocity (kph) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 11.8 kph
Tmax: 300.0 ms
Min: -0.1 kph
Tmin: 16.7 ms
CFC 180

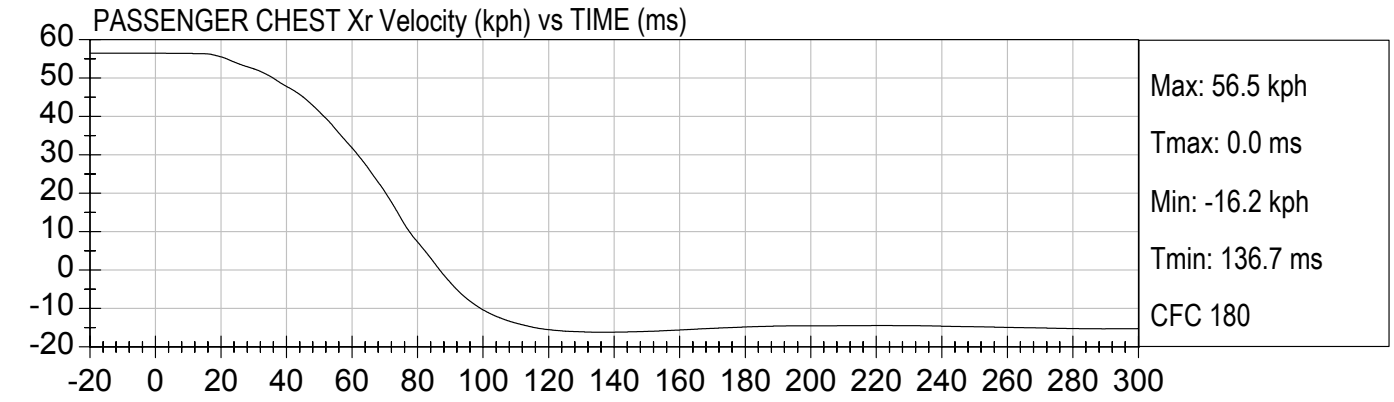

PASSENGER CHEST DISPLACEMENT (mm) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.1 mm
Tmax: 0.0 ms
Min: -20.7 mm
Tmin: 82.4 ms
CFC 600

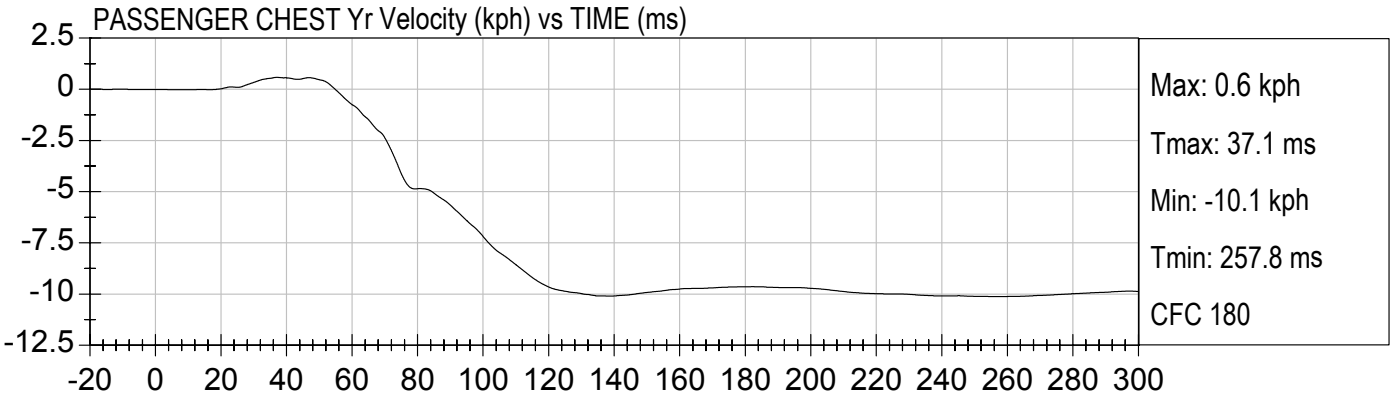

PASSENGER CHEST Xr (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.4 G's
Tmax: 162.0 ms
Min: -42.5 G's
Tmin: 74.0 ms
CFC 180

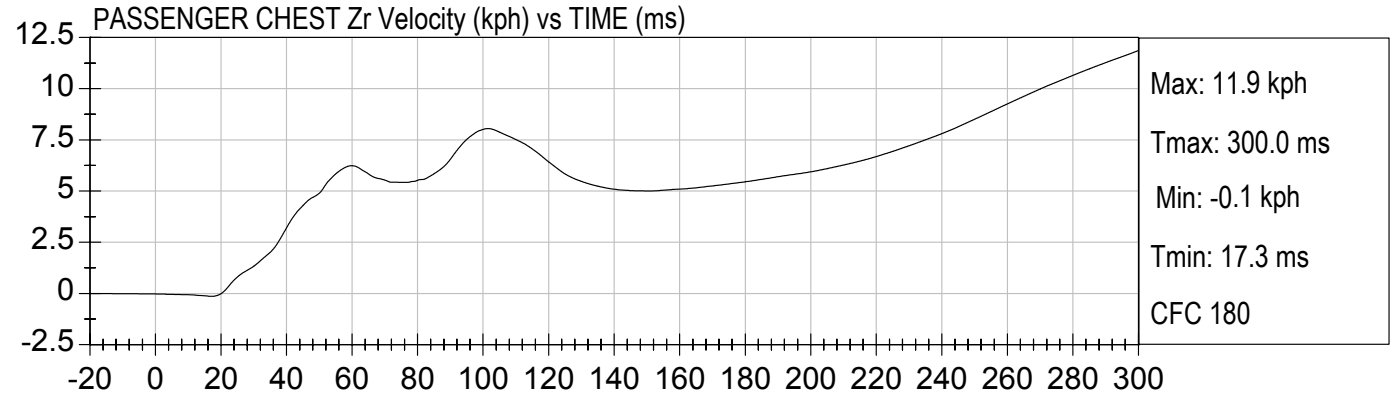

PASSENGER CHEST Yr (G's) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.8 G's
Tmax: 27.3 ms
Min: -11.2 G's
Tmin: 74.3 ms
CFC 180

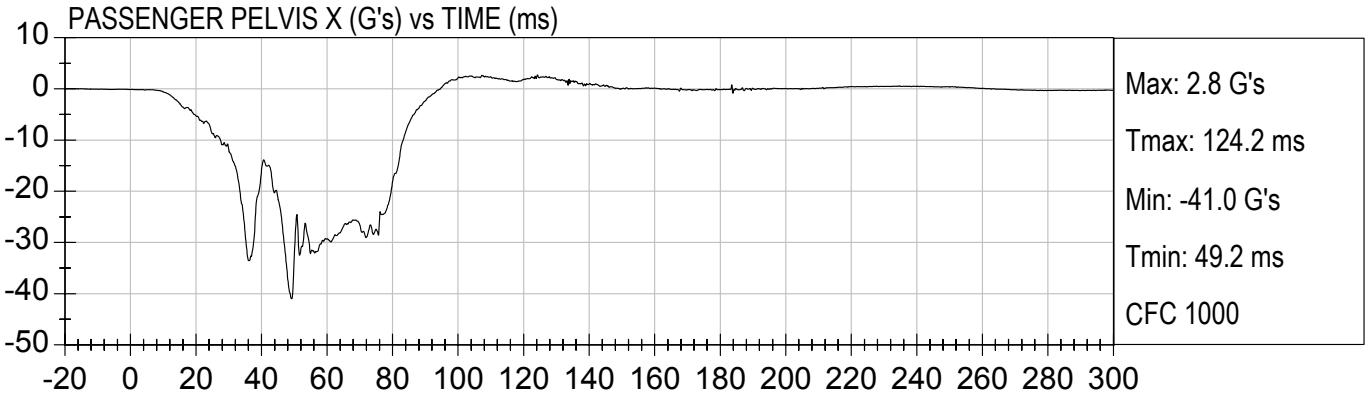

PASSENGER CHEST Zr (G's) vs TIME (ms)
10
7.5
5
2.5
0
-2.5
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 8.0 G's
Tmax: 39.3 ms
Min: -3.8 G's
Tmin: 118.4 ms
CFC 180

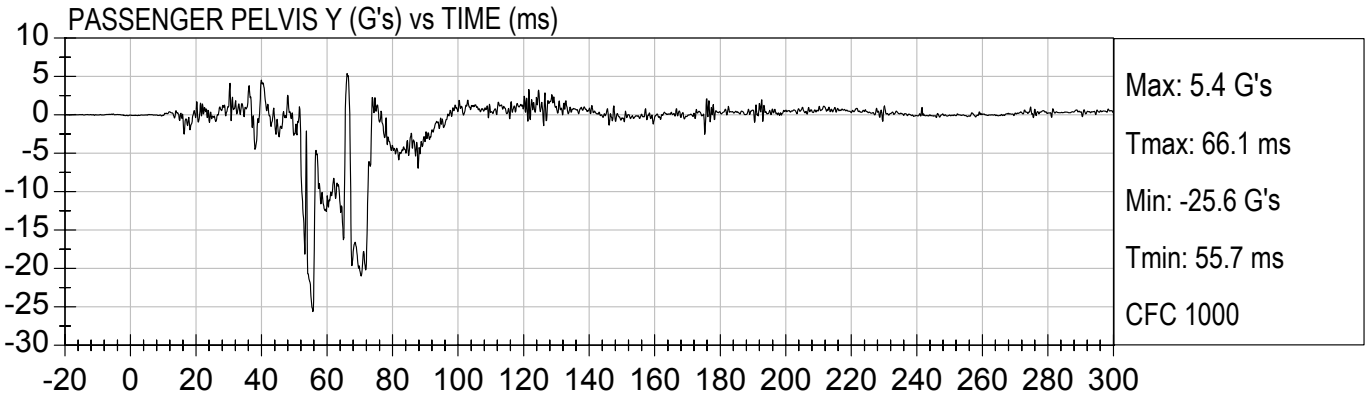

PASSENGER CHEST ResultantR (G's) vs TIME (ms)
50
40
30
20
10
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 43.9 G's
Tmax: 74.0 ms
Min: 0.0 G's
Tmin: 0.0 ms
CFC 180

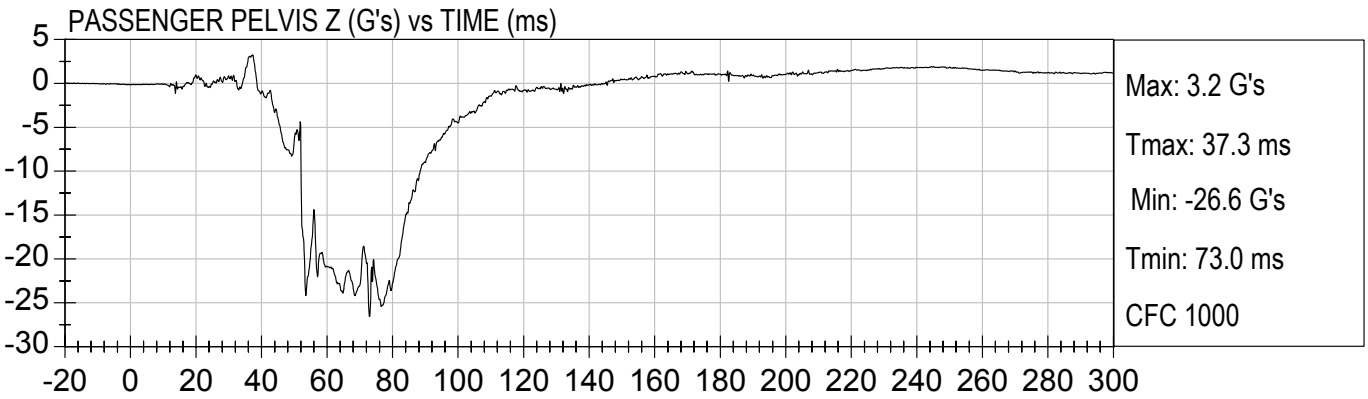

PASSENGER CHEST Xr Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -16.2 kph
Tmin: 136.7 ms
CFC 180

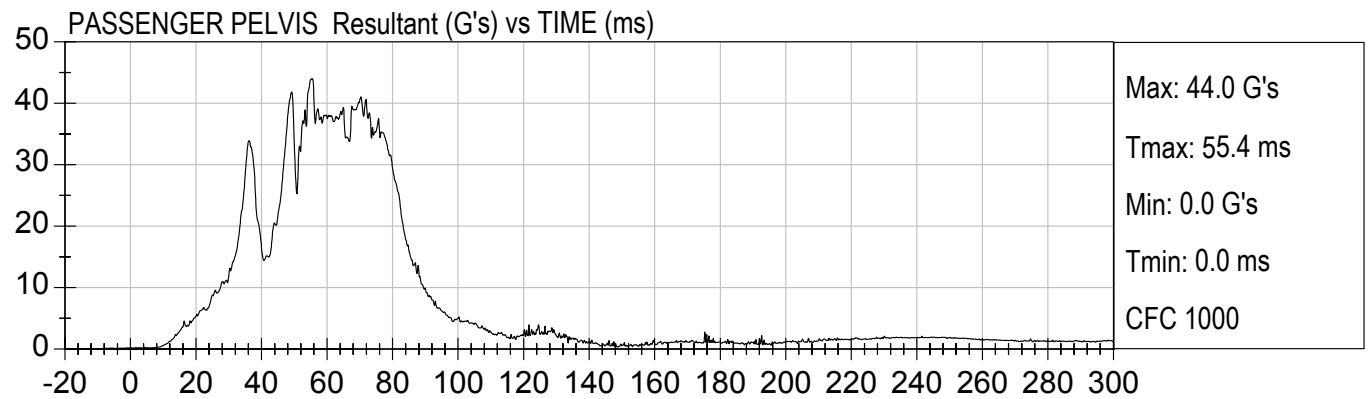

PASSENGER CHEST Yr Velocity (kph) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.6 kph
Tmax: 37.1 ms
Min: -10.1 kph
Tmin: 257.8 ms
CFC 180

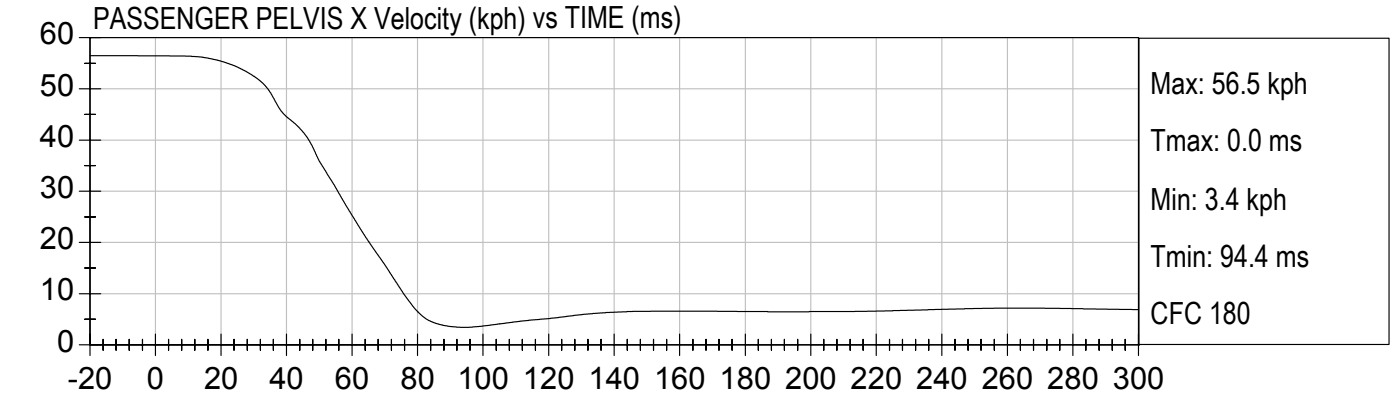

PASSENGER CHEST Zr Velocity (kph) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 11.9 kph
Tmax: 300.0 ms
Min: -0.1 kph
Tmin: 17.3 ms
CFC 180

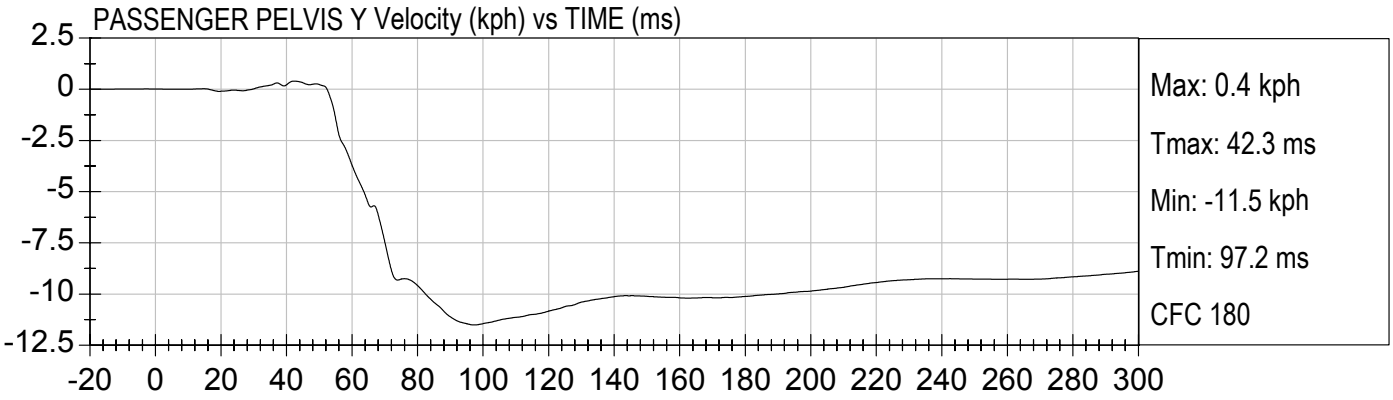

PASSENGER PELVIS X (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.8 G's
Tmax: 124.2 ms
Min: -41.0 G's
Tmin: 49.2 ms
CFC 1000

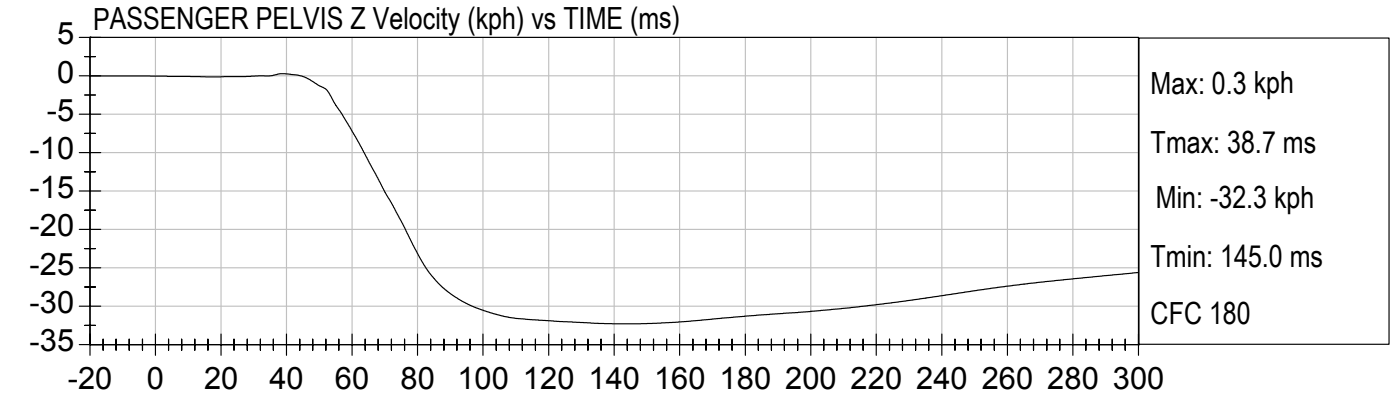

PASSENGER PELVIS Y (G's) vs TIME (ms)
10
5
0
-5
-10
-15
-20
-25
-30
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 5.4 G's
Tmax: 66.1 ms
Min: -25.6 G's
Tmin: 55.7 ms
CFC 1000


PASSENGER PELVIS Z (G's) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 3.2 G's
Tmax: 37.3 ms
Min: -26.6 G's
Tmin: 73.0 ms
CFC 1000


PASSENGER PELVIS Resultant (G's) vs TIME (ms)
50
40
30
20
10
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 44.0 G's
Tmax: 55.4 ms
Min: 0.0 G's
Tmin: 0.0 ms
CFC 1000

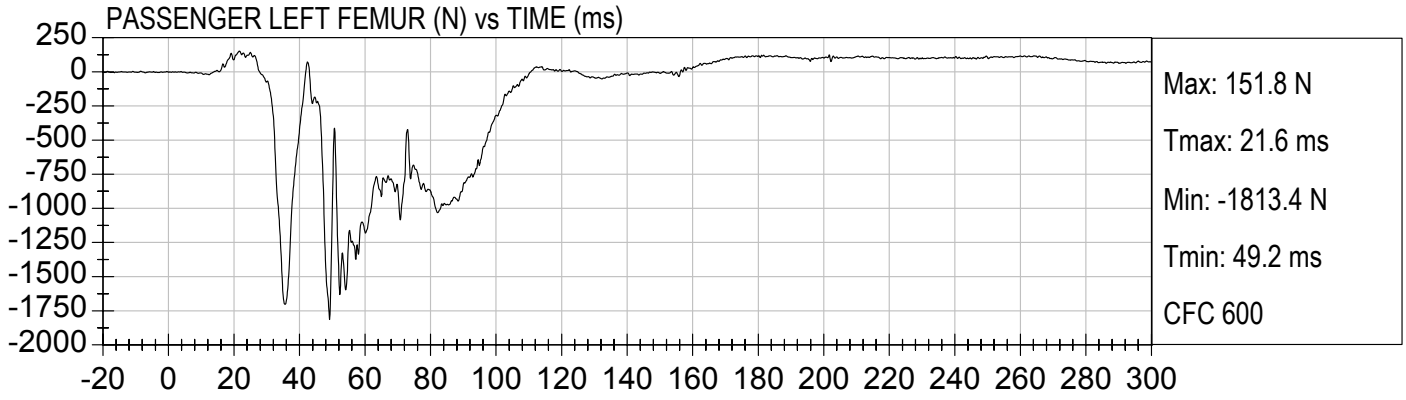

PASSENGER PELVIS X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: 3.4 kph
Tmin: 94.4 ms
CFC 180

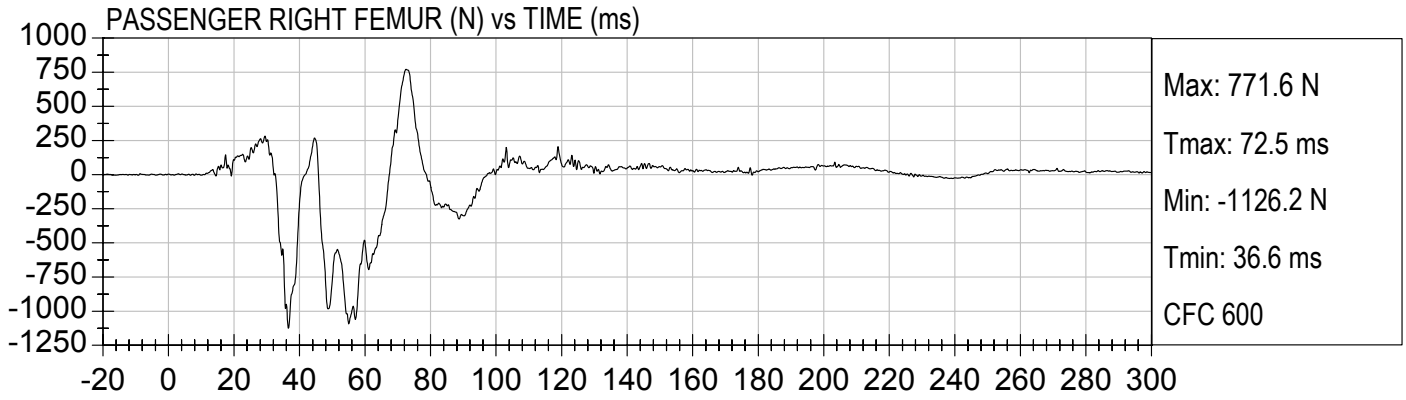

PASSENGER PELVIS Y Velocity (kph) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.4 kph
Tmax: 42.3 ms
Min: -11.5 kph
Tmin: 97.2 ms
CFC 180

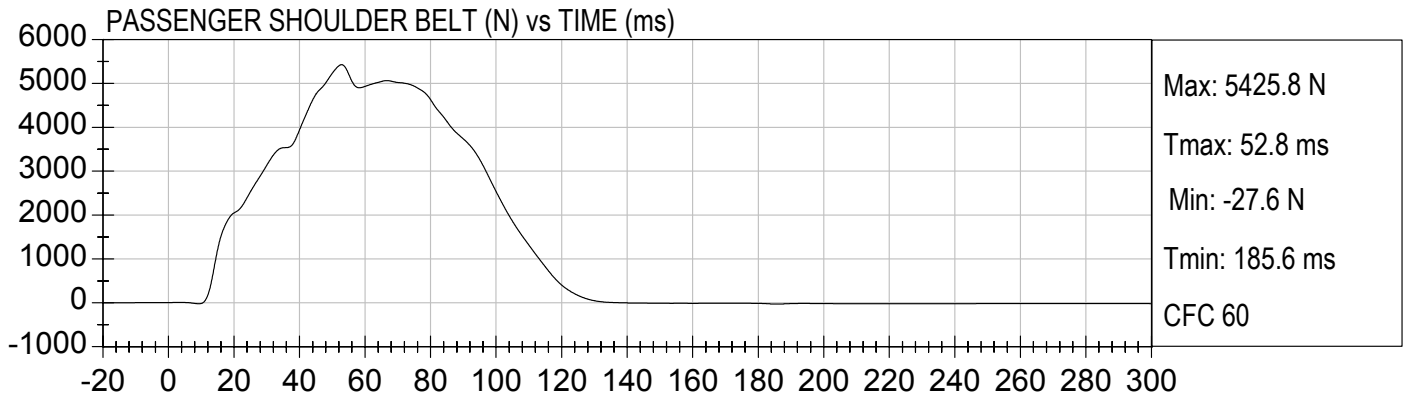

PASSENGER PELVIS Z Velocity (kph) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.3 kph
Tmax: 38.7 ms
Min: -32.3 kph
Tmin: 145.0 ms
CFC 180

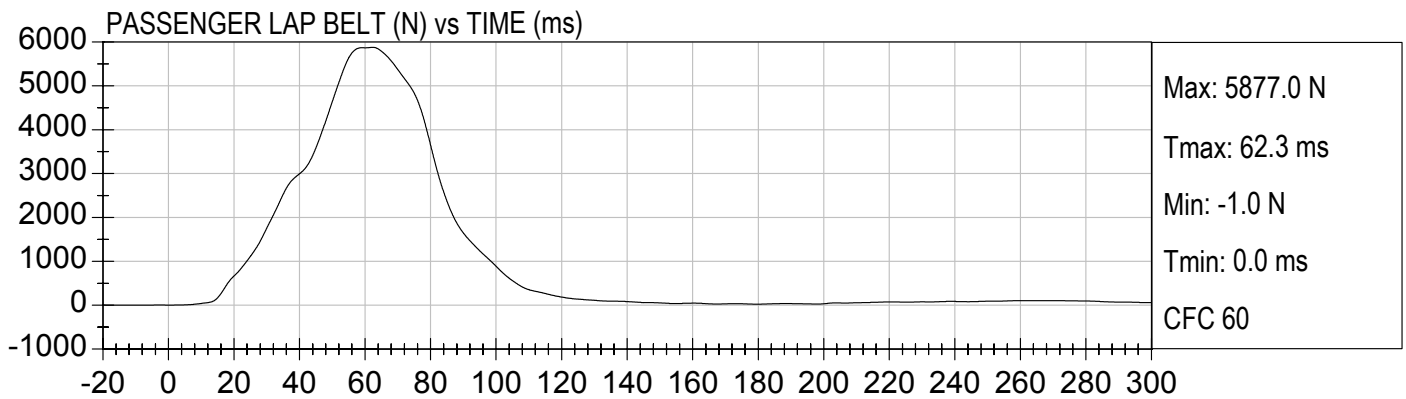
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)



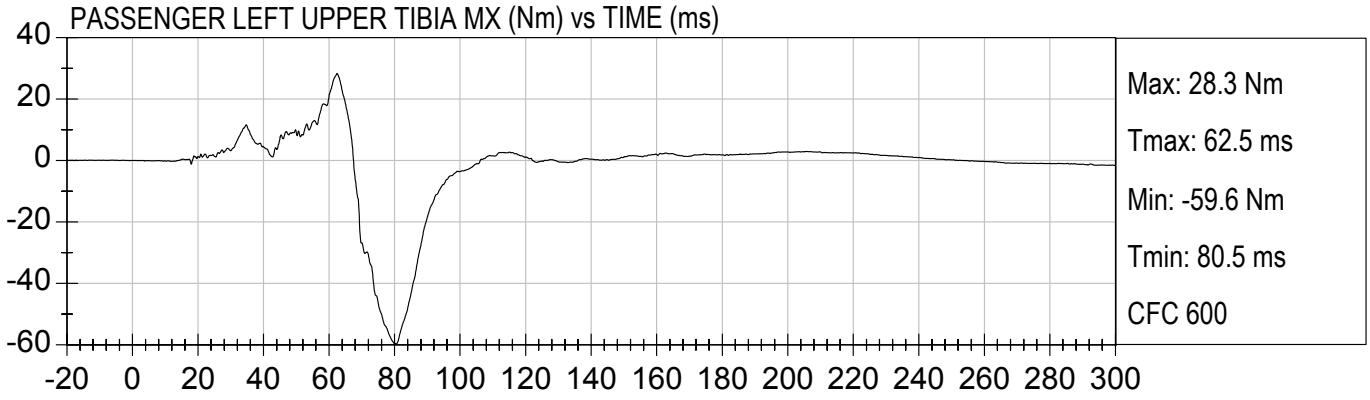


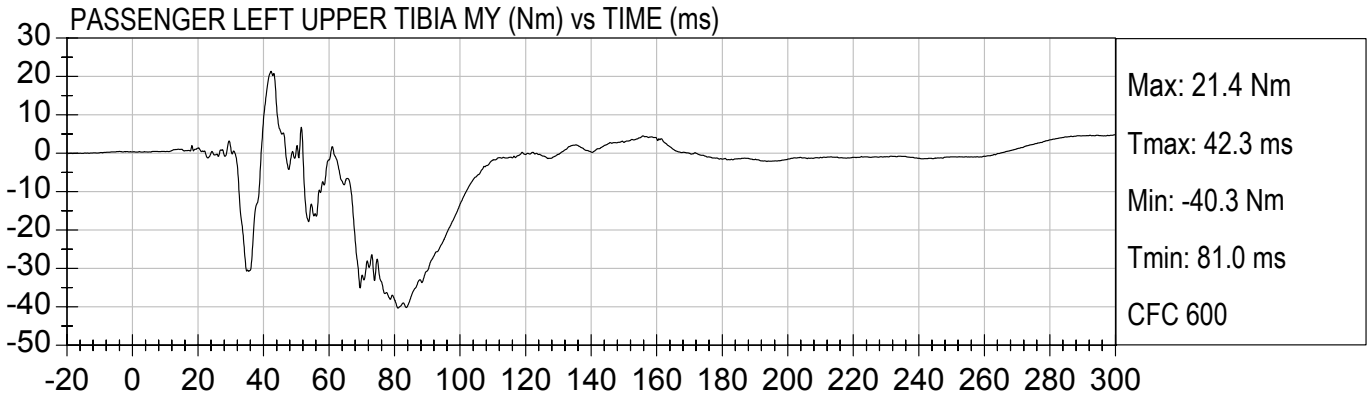


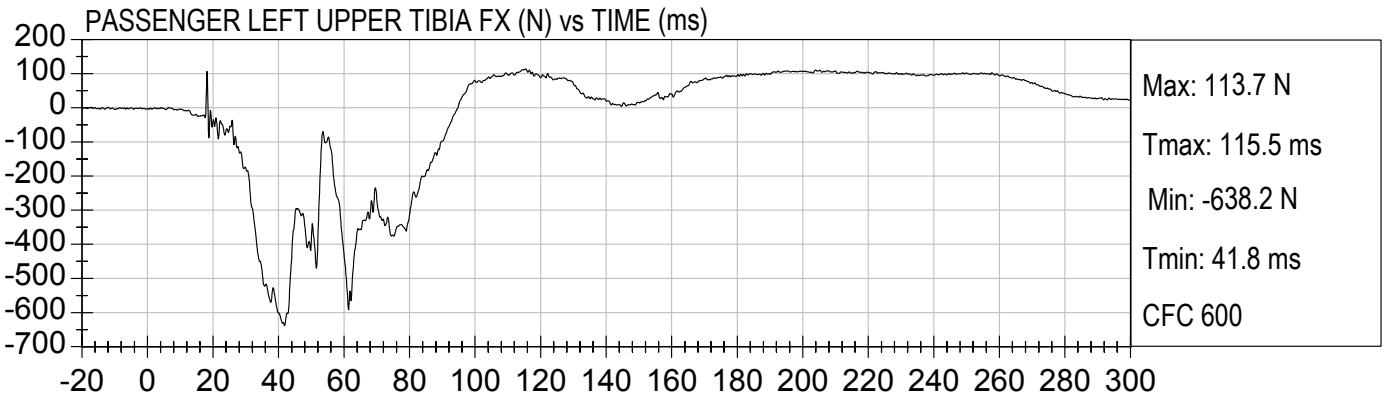


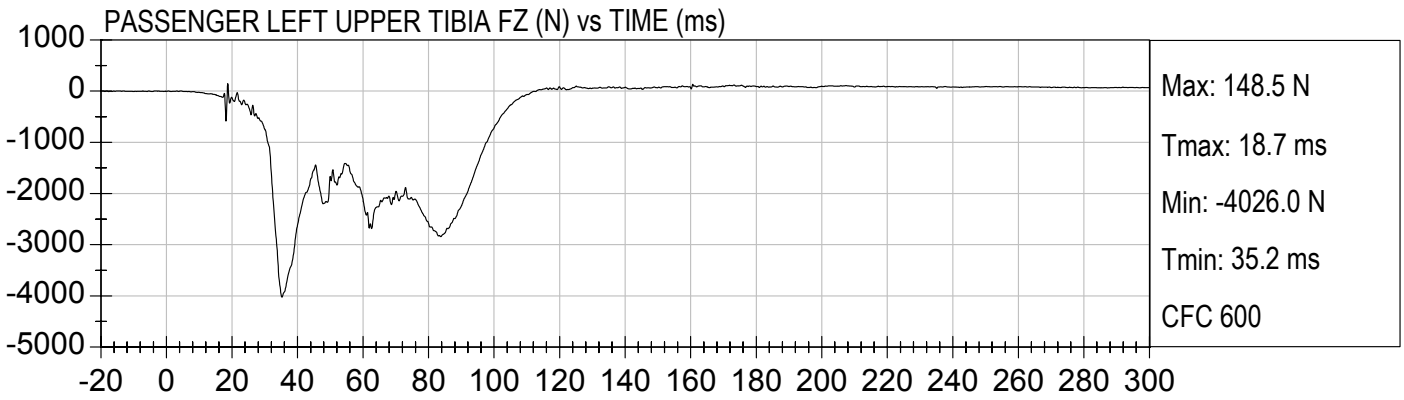
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

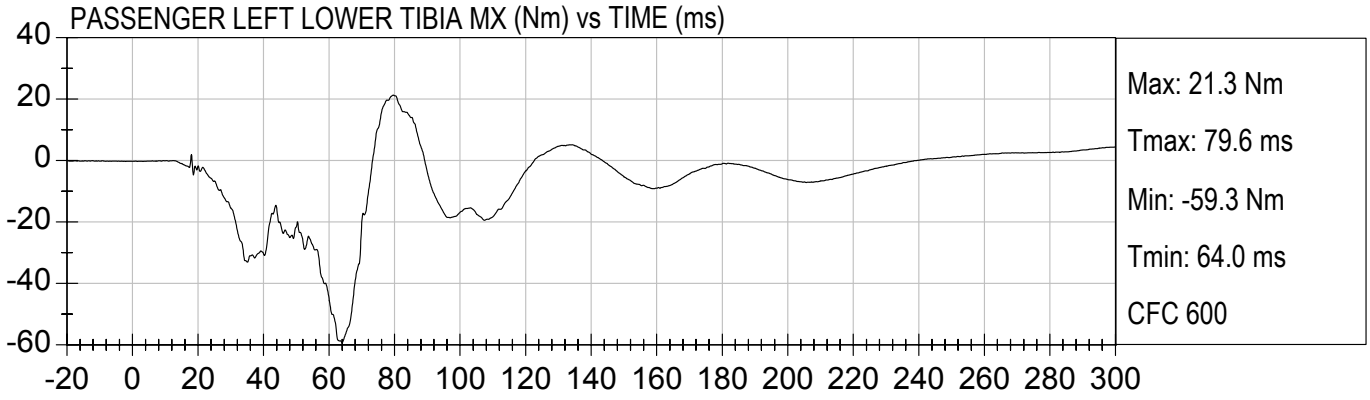
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

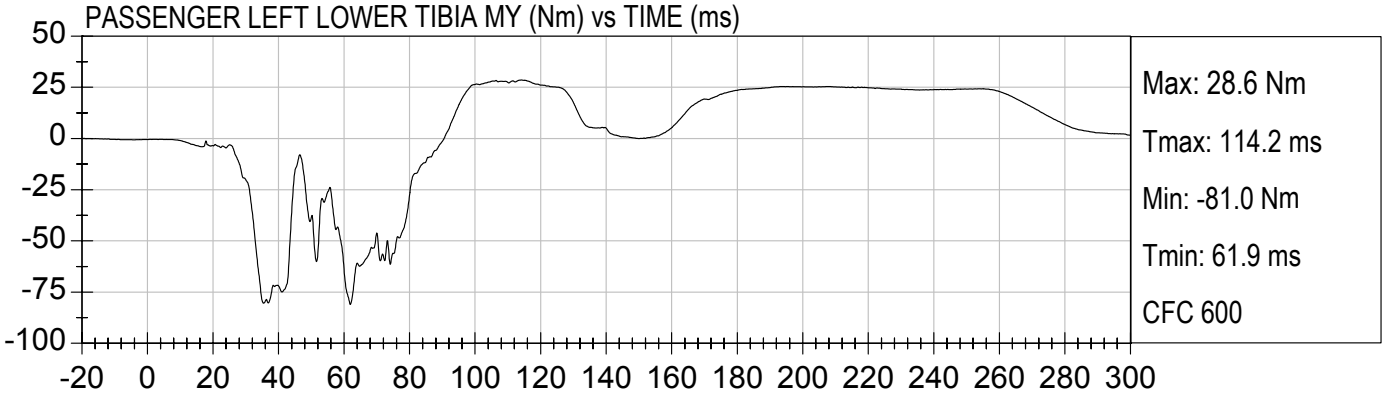


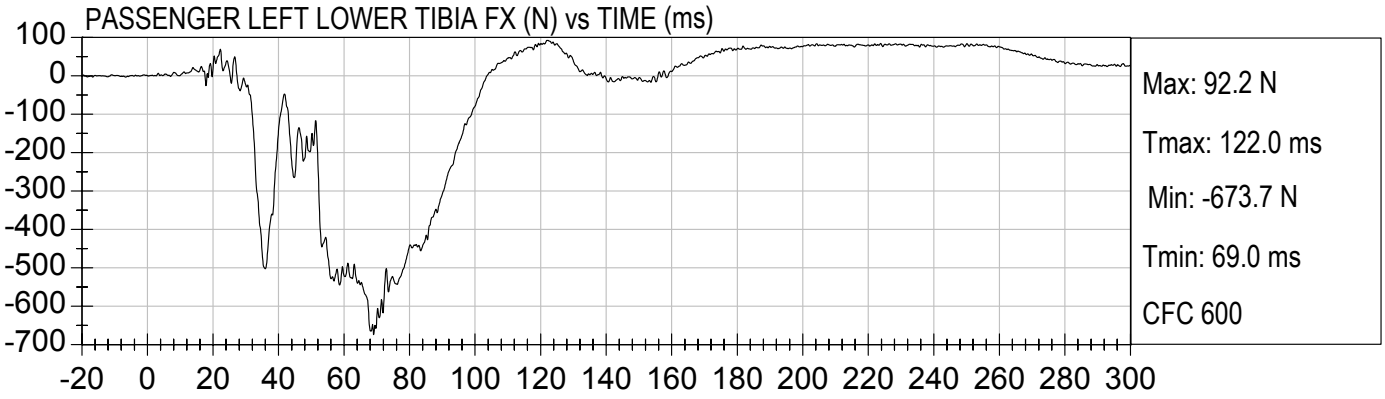


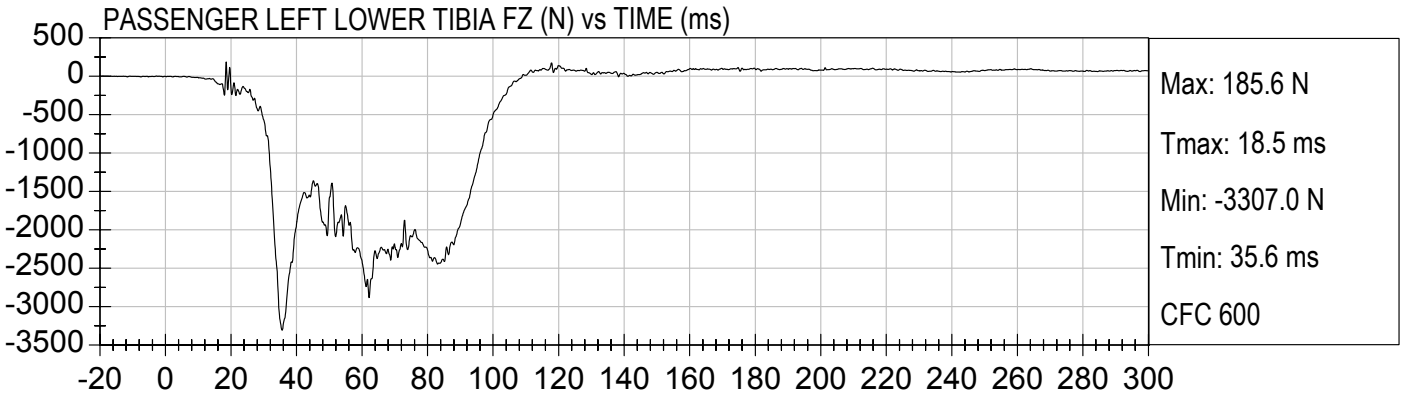


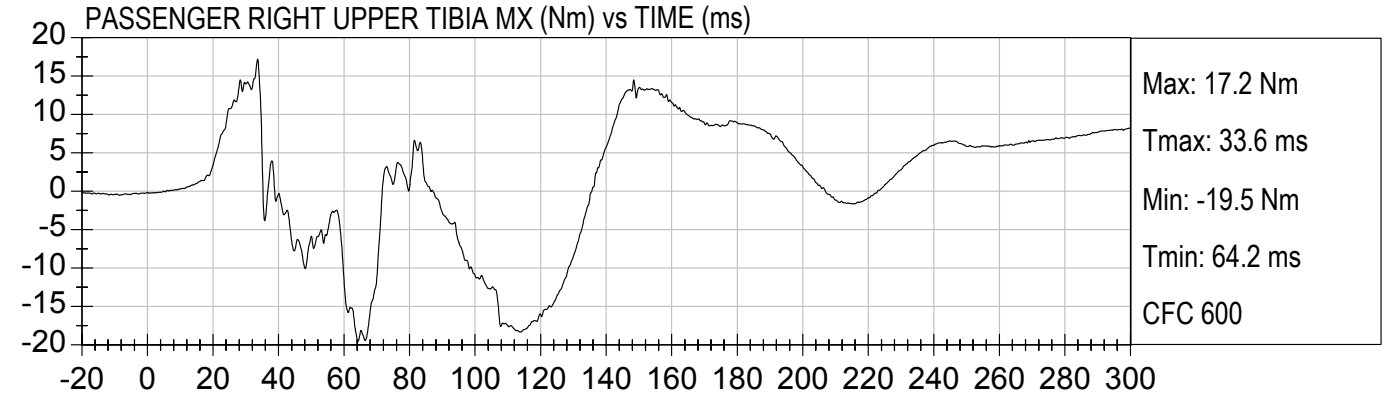


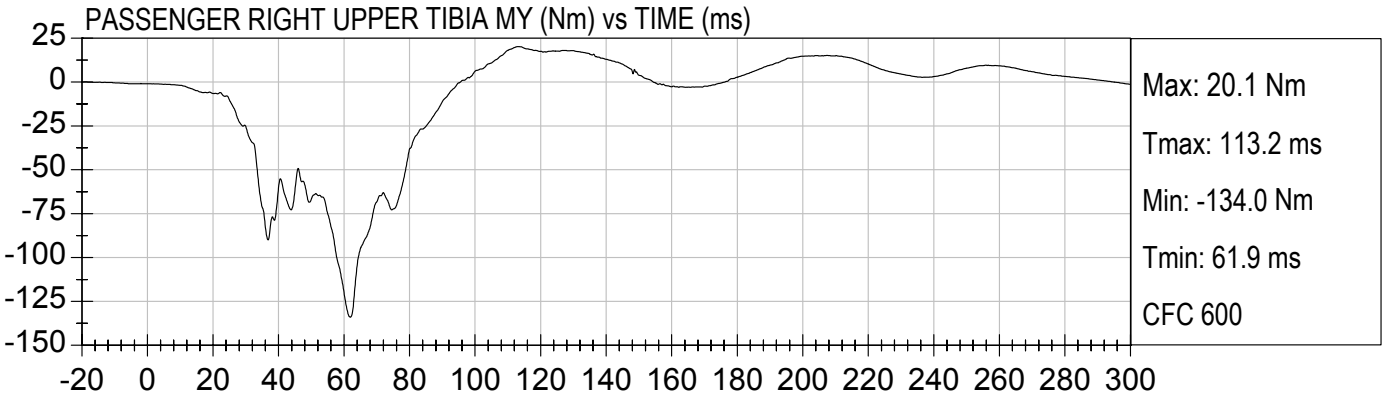

PASSENGER LEFT LOWER TIBIA MX (Nm) vs TIME (ms)
40
20
0
-20
-40
-60
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 21.3 Nm
Tmax: 79.6 ms
Min: -59.3 Nm
Tmin: 64.0 ms
CFC 600

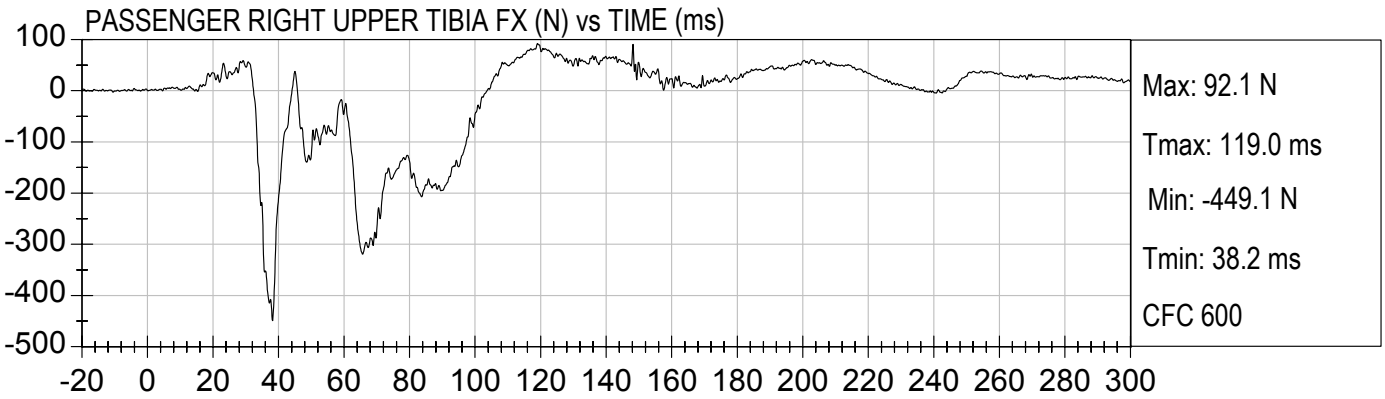

PASSENGER LEFT LOWER TIBIA MY (Nm) vs TIME (ms)
50
25
0
-25
-50
-75
-100
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 28.6 Nm
Tmax: 114.2 ms
Min: -81.0 Nm
Tmin: 61.9 ms
CFC 600

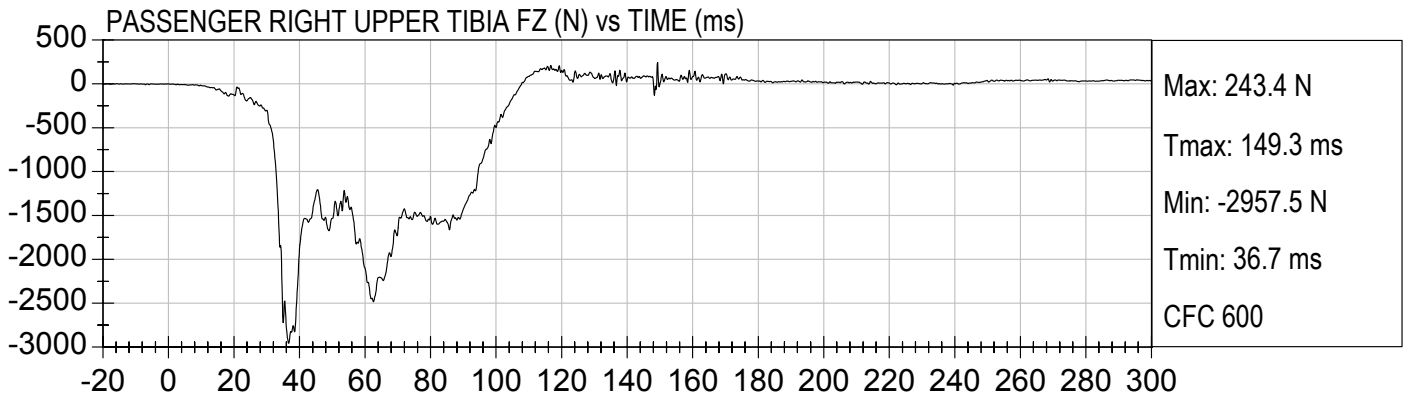

PASSENGER LEFT LOWER TIBIA FX (N) vs TIME (ms)
100
0
-100
-200
-300
-400
-500
-600
-700
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 92.2 N
Tmax: 122.0 ms
Min: -673.7 N
Tmin: 69.0 ms
CFC 600

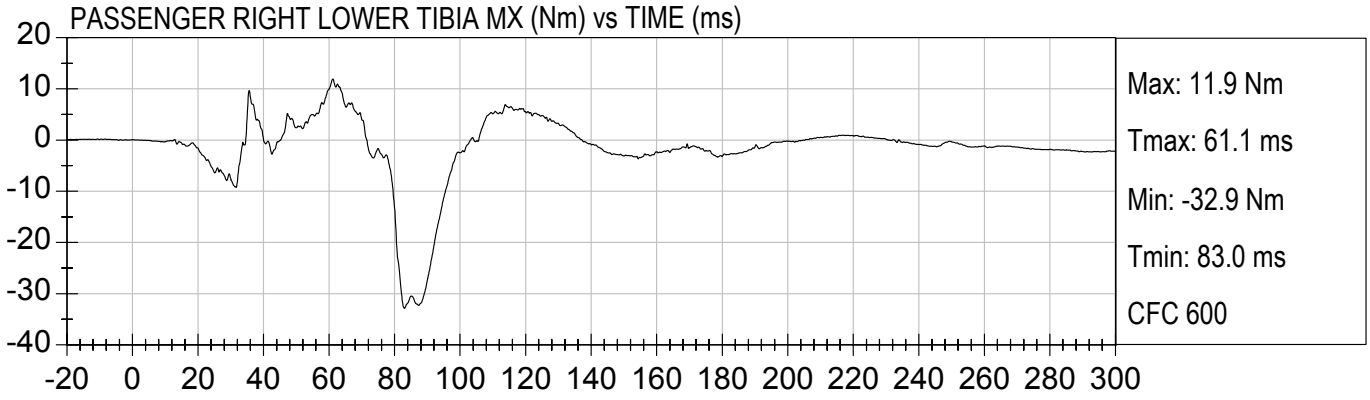

PASSENGER LEFT LOWER TIBIA FZ (N) vs TIME (ms)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 185.6 N
Tmax: 18.5 ms
Min: -3307.0 N
Tmin: 35.6 ms
CFC 600

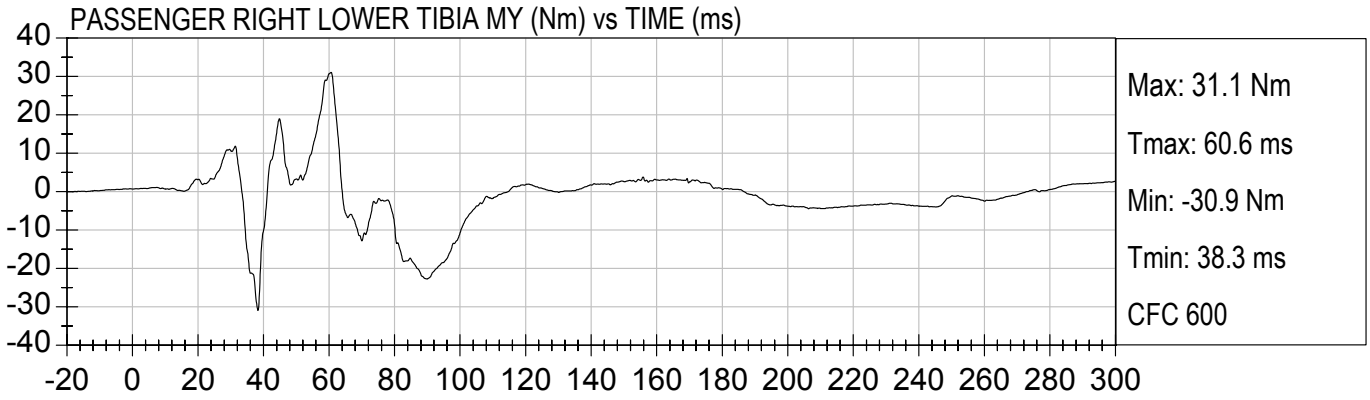

PASSENGER RIGHT UPPER TIBIA MX (Nm) vs TIME (ms)
20
15
10
5
0
-5
-10
-15
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 17.2 Nm
Tmax: 33.6 ms
Min: -19.5 Nm
Tmin: 64.2 ms
CFC 600

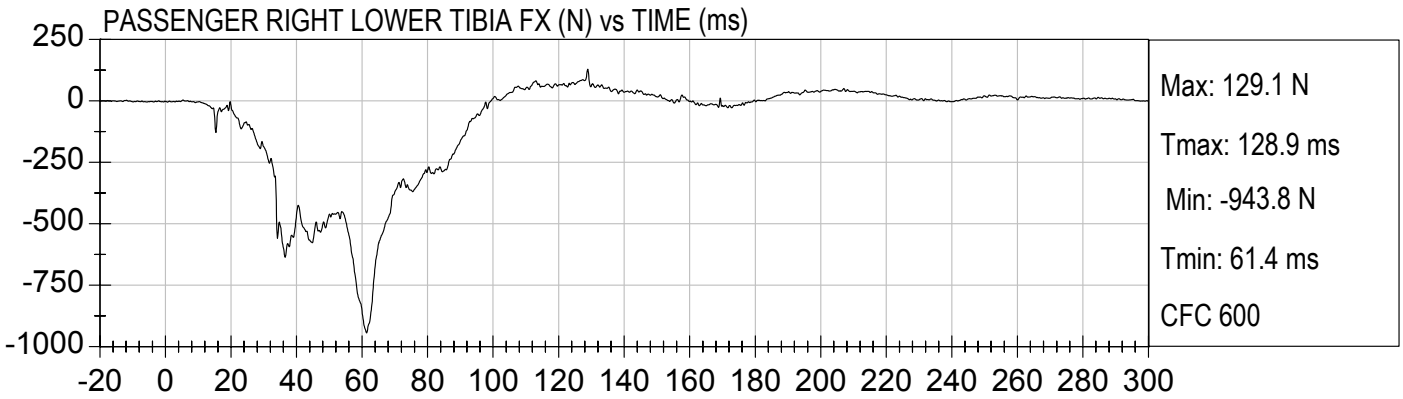

PASSENGER RIGHT UPPER TIBIA MY (Nm) vs TIME (ms)
25
0
-25
-50
-75
-100
-125
-150
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 20.1 Nm
Tmax: 113.2 ms
Min: -134.0 Nm
Tmin: 61.9 ms
CFC 600

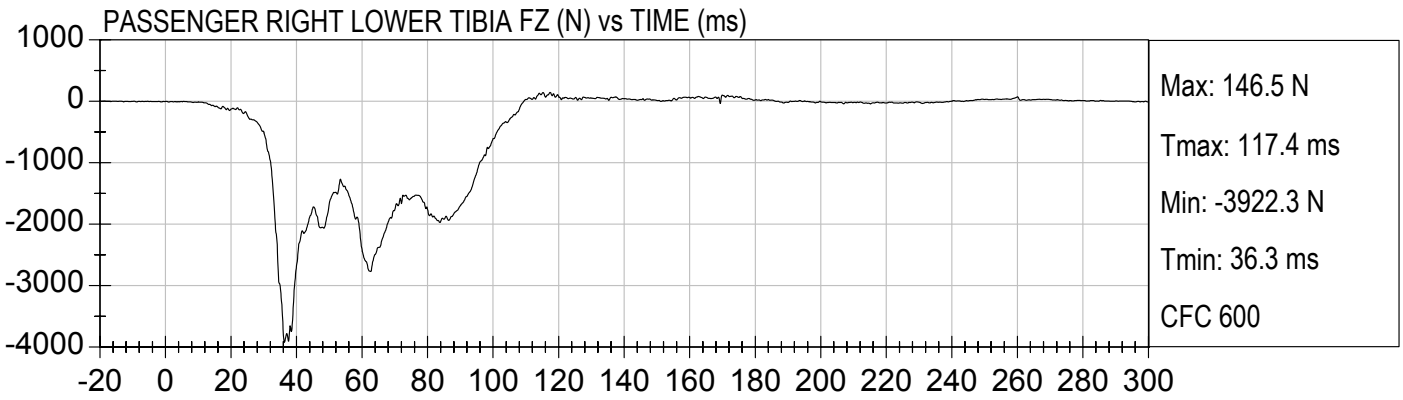

PASSENGER RIGHT UPPER TIBIA FX (N) vs TIME (ms)
100
0
-100
-200
-300
-400
-500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 92.1 N
Tmax: 119.0 ms
Min: -449.1 N
Tmin: 38.2 ms
CFC 600

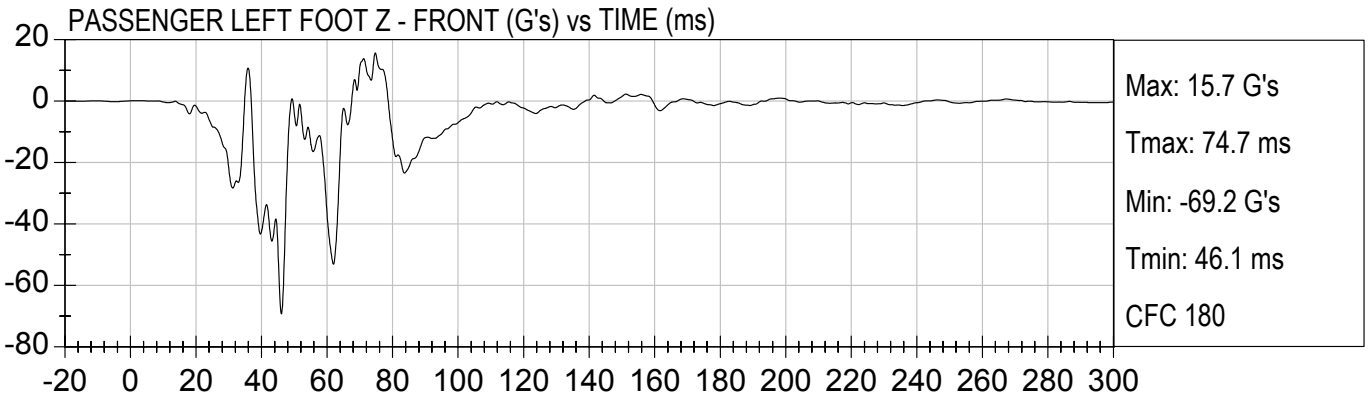

PASSENGER RIGHT UPPER TIBIA FZ (N) vs TIME (ms)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 243.4 N
Tmax: 149.3 ms
Min: -2957.5 N
Tmin: 36.7 ms
CFC 600

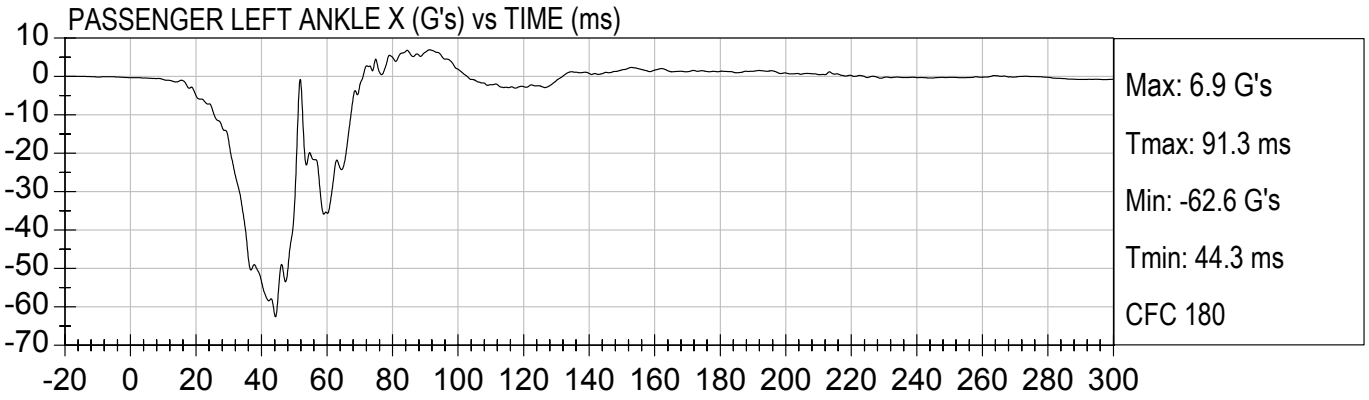

PASSENGER RIGHT LOWER TIBIA MX (Nm) vs TIME (ms)
20
10
0
-10
-20
-30
-40
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 11.9 Nm
Tmax: 61.1 ms
Min: -32.9 Nm
Tmin: 83.0 ms
CFC 600

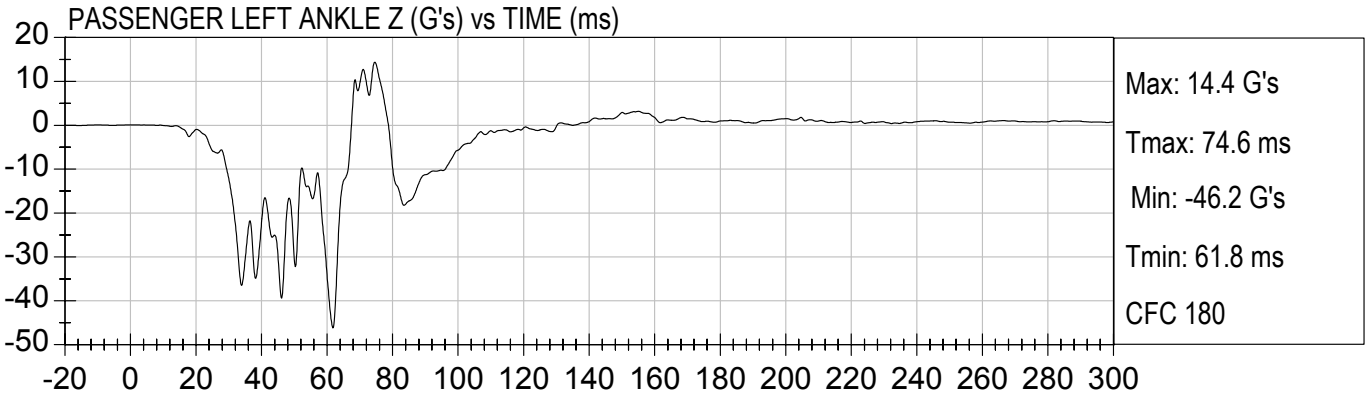

PASSENGER RIGHT LOWER TIBIA MY (Nm) vs TIME (ms)
40
30
20
10
0
-10
-20
-30
-40
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 31.1 Nm
Tmax: 60.6 ms
Min: -30.9 Nm
Tmin: 38.3 ms
CFC 600

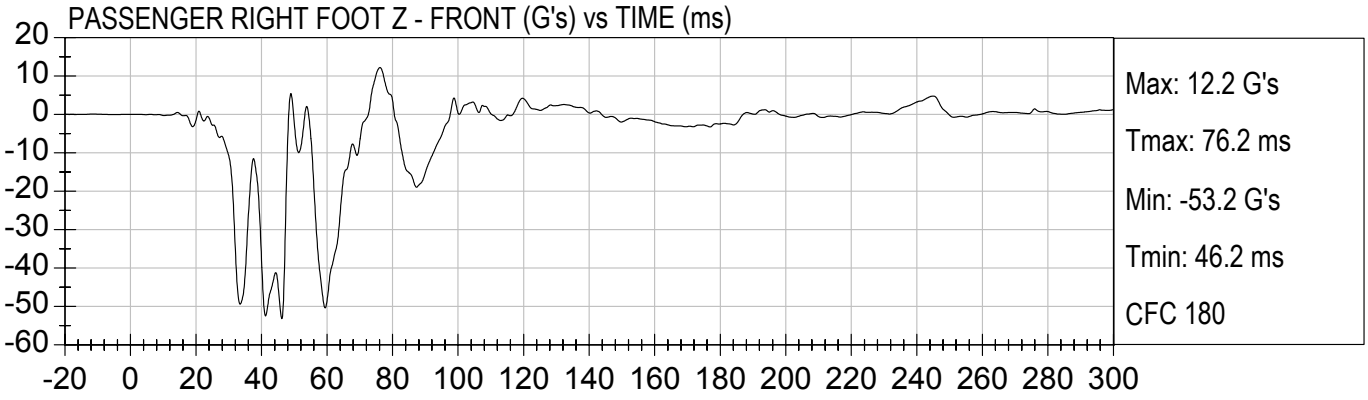

PASSENGER RIGHT LOWER TIBIA FX (N) vs TIME (ms)
250
0
-250
-500
-750
-1000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 129.1 N
Tmax: 128.9 ms
Min: -943.8 N
Tmin: 61.4 ms
CFC 600

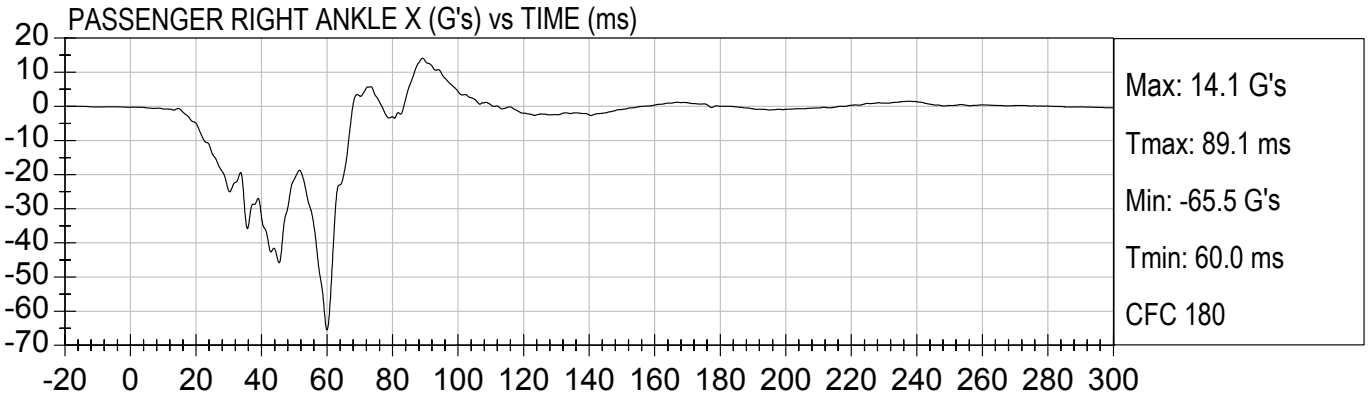

PASSENGER RIGHT LOWER TIBIA FZ (N) vs TIME (ms)
1000
0
-1000
-2000
-3000
-4000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 146.5 N
Tmax: 117.4 ms
Min: -3922.3 N
Tmin: 36.3 ms
CFC 600

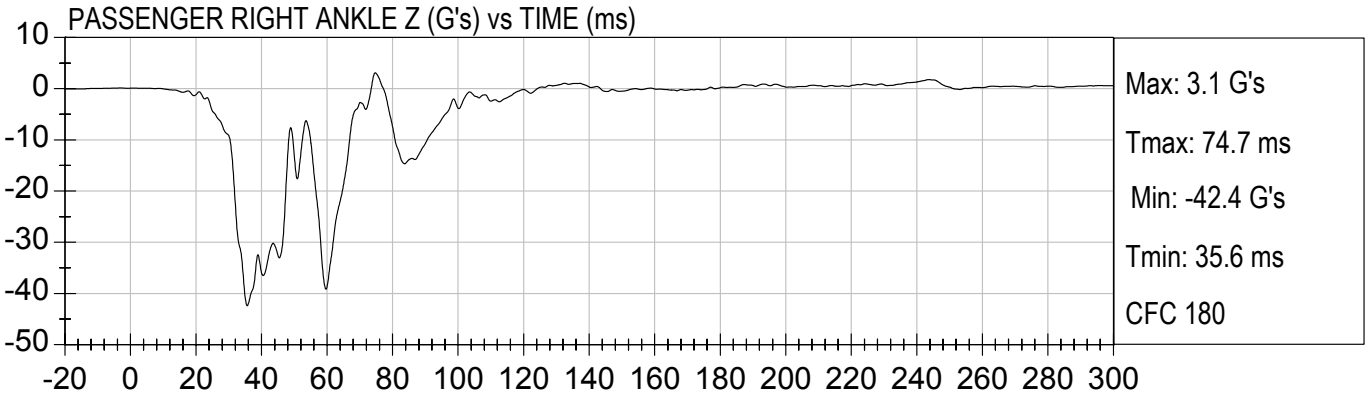

PASSENGER LEFT FOOT Z - FRONT (G's) vs TIME (ms)
20
0
-20
-40
-60
-80
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 15.7 G's
Tmax: 74.7 ms
Min: -69.2 G's
Tmin: 46.1 ms
CFC 180

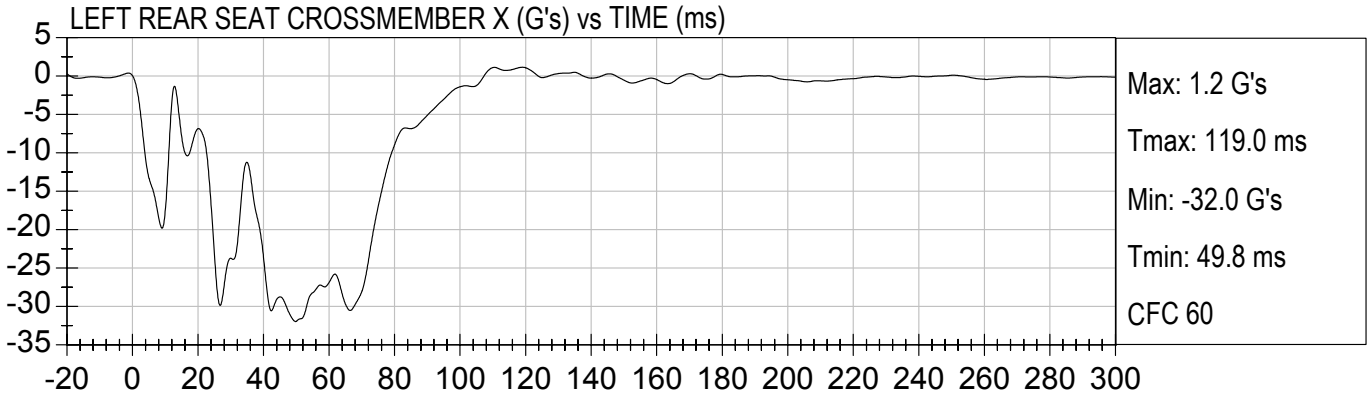

PASSENGER LEFT ANKLE X (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-60
-70
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 6.9 G's
Tmax: 91.3 ms
Min: -62.6 G's
Tmin: 44.3 ms
CFC 180

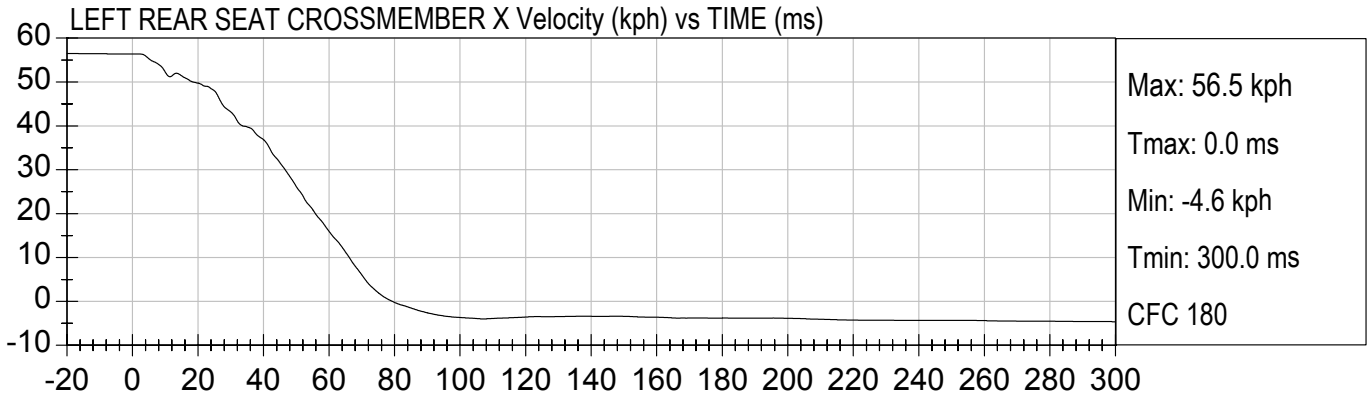

PASSENGER LEFT ANKLE Z (G's) vs TIME (ms)
20
10
0
-10
-20
-30
-40
-50
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 14.4 G's
Tmax: 74.6 ms
Min: -46.2 G's
Tmin: 61.8 ms
CFC 180

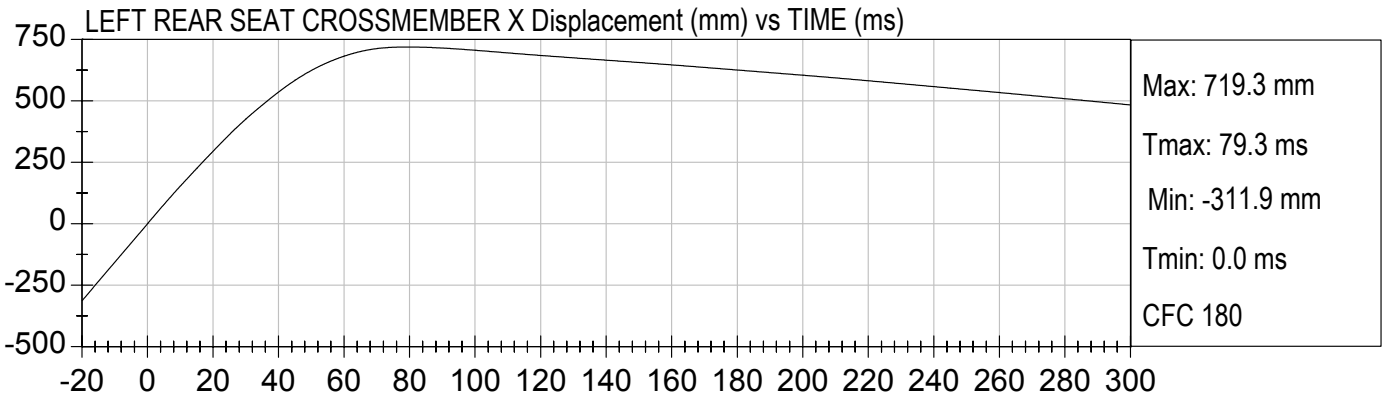

PASSENGER RIGHT FOOT Z - FRONT (G's) vs TIME (ms)
20
10
0
-10
-20
-30
-40
-50
-60
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 12.2 G's
Tmax: 76.2 ms
Min: -53.2 G's
Tmin: 46.2 ms
CFC 180

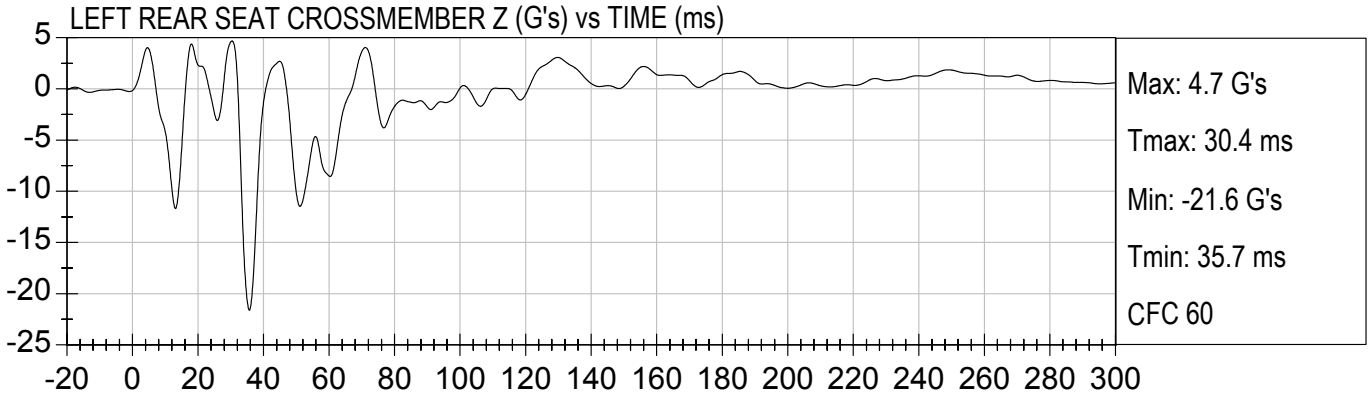

PASSENGER RIGHT ANKLE X (G's) vs TIME (ms)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 14.1 G's
Tmax: 89.1 ms
Min: -65.5 G's
Tmin: 60.0 ms
CFC 180

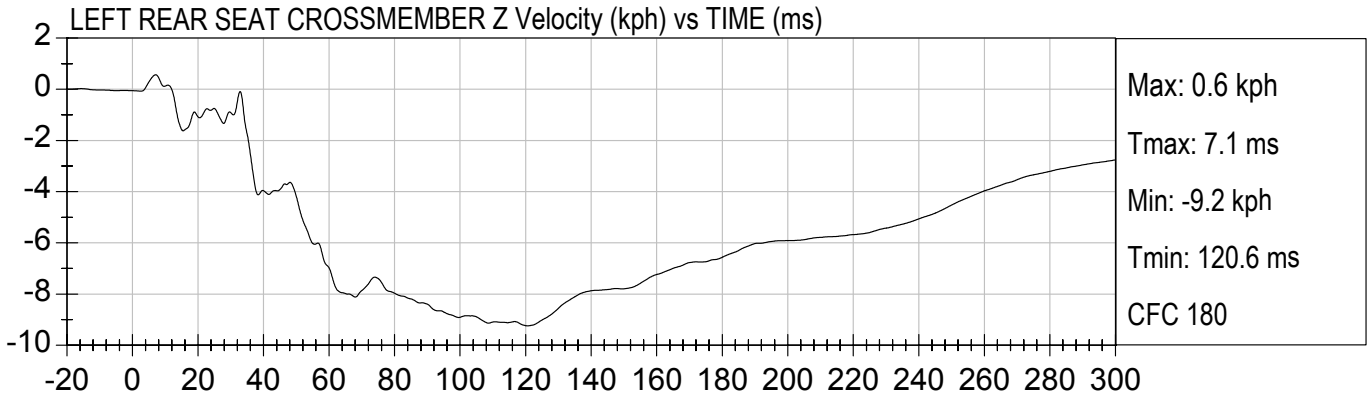

PASSENGER RIGHT ANKLE Z (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 3.1 G's
Tmax: 74.7 ms
Min: -42.4 G's
Tmin: 35.6 ms
CFC 180

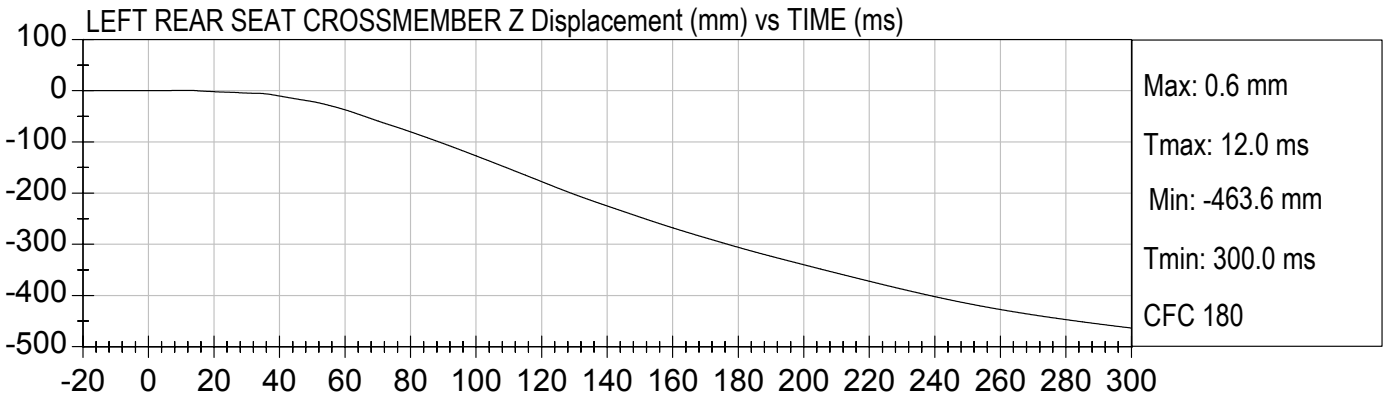

LEFT REAR SEAT CROSSMEMBER X (G's) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.2 G's
Tmax: 119.0 ms
Min: -32.0 G's
Tmin: 49.8 ms
CFC 60

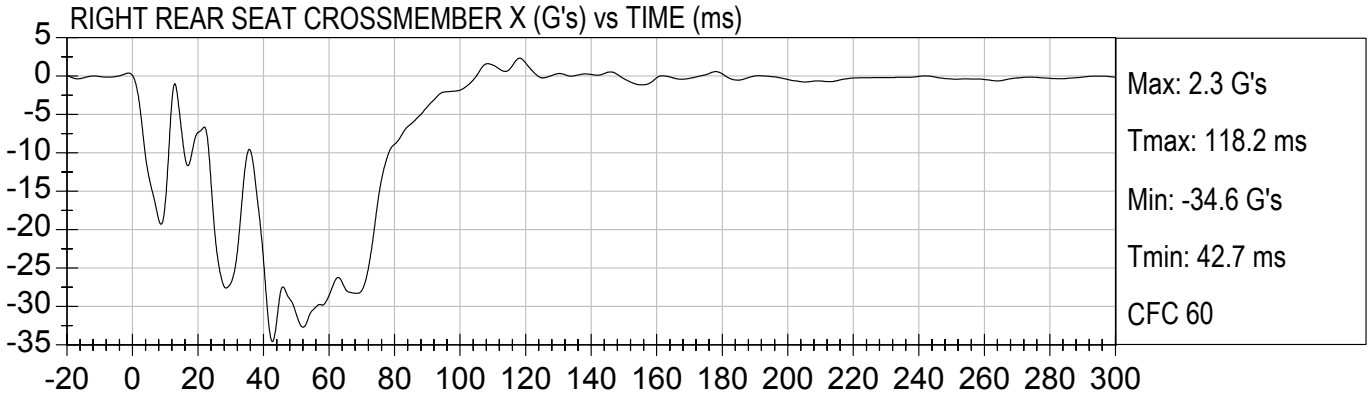

LEFT REAR SEAT CROSSMEMBER X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -4.6 kph
Tmin: 300.0 ms
CFC 180

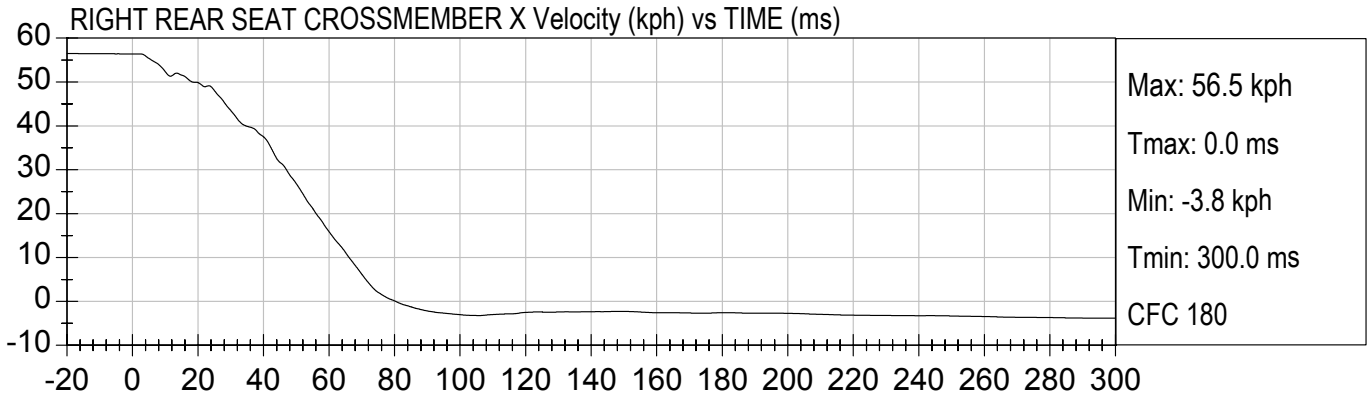

LEFT REAR SEAT CROSSMEMBER X Displacement (mm) vs TIME (ms)
750
500
250
0
-250
-500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 719.3 mm
Tmax: 79.3 ms
Min: -311.9 mm
Tmin: 0.0 ms
CFC 180

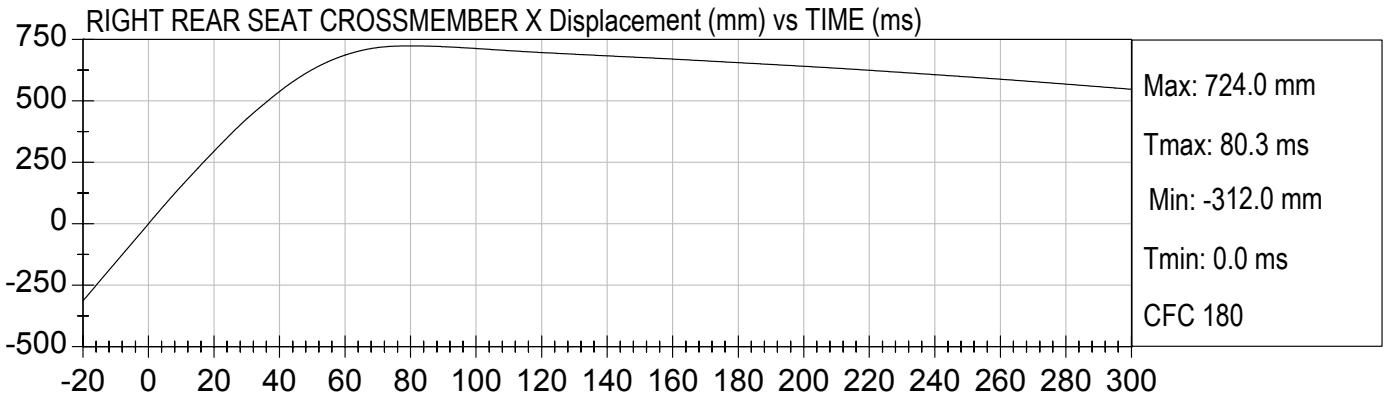

LEFT REAR SEAT CROSSMEMBER Z (G's) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 4.7 G's
Tmax: 30.4 ms
Min: -21.6 G's
Tmin: 35.7 ms
CFC 60

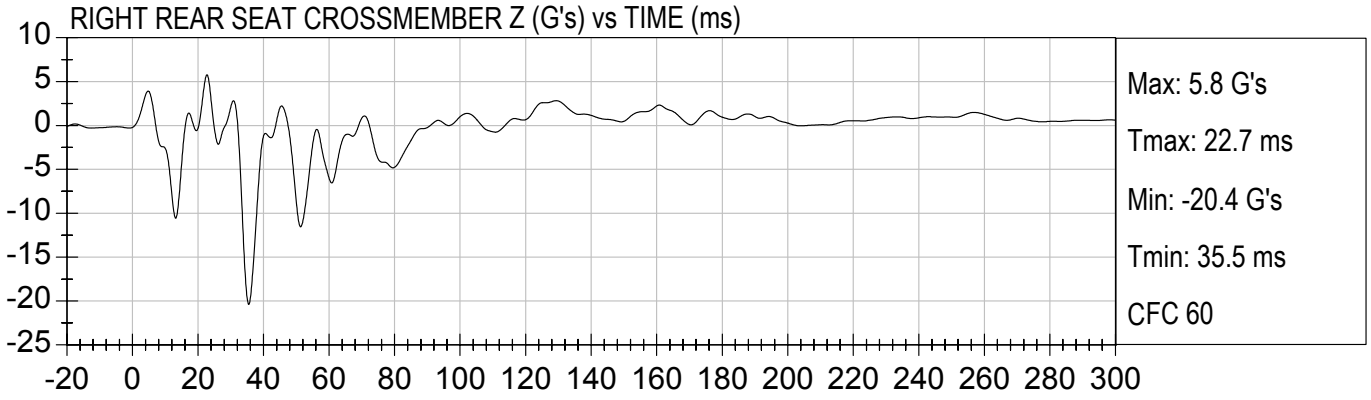

LEFT REAR SEAT CROSSMEMBER Z Velocity (kph) vs TIME (ms)
2
0
-2
-4
-6
-8
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.6 kph
Tmax: 7.1 ms
Min: -9.2 kph
Tmin: 120.6 ms
CFC 180

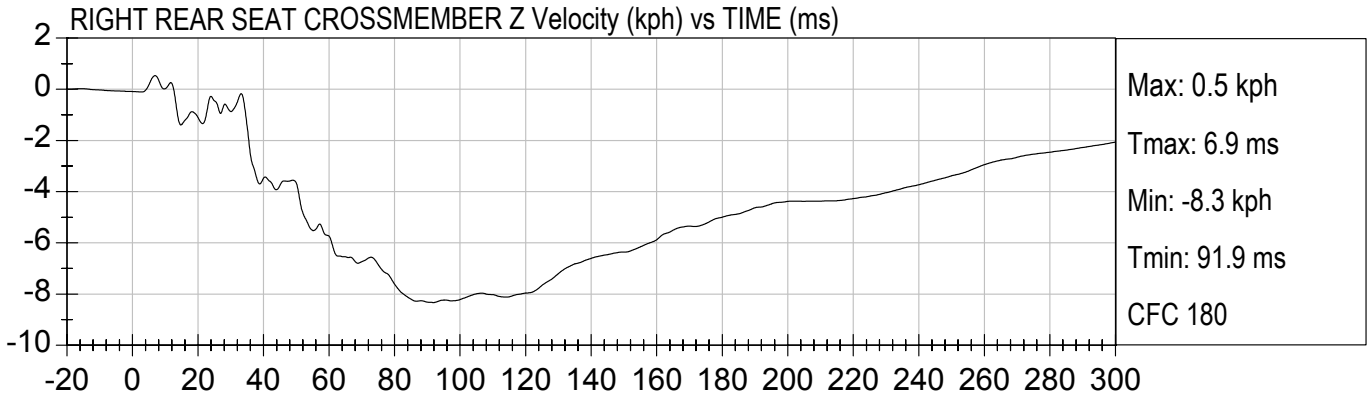

LEFT REAR SEAT CROSSMEMBER Z Displacement (mm) vs TIME (ms)
100
0
-100
-200
-300
-400
-500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.6 mm
Tmax: 12.0 ms
Min: -463.6 mm
Tmin: 300.0 ms
CFC 180

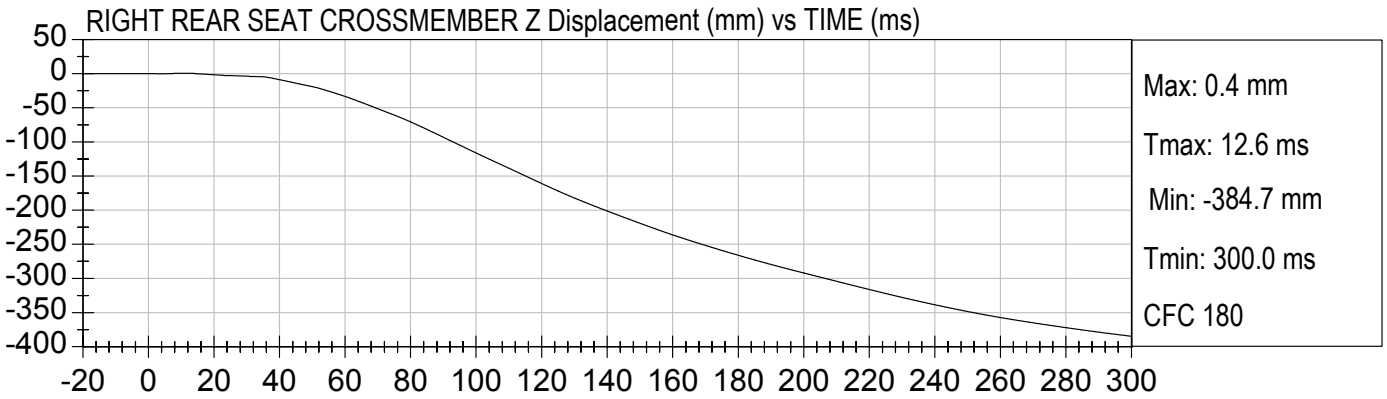

RIGHT REAR SEAT CROSSMEMBER X (G's) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.3 G's
Tmax: 118.2 ms
Min: -34.6 G's
Tmin: 42.7 ms
CFC 60

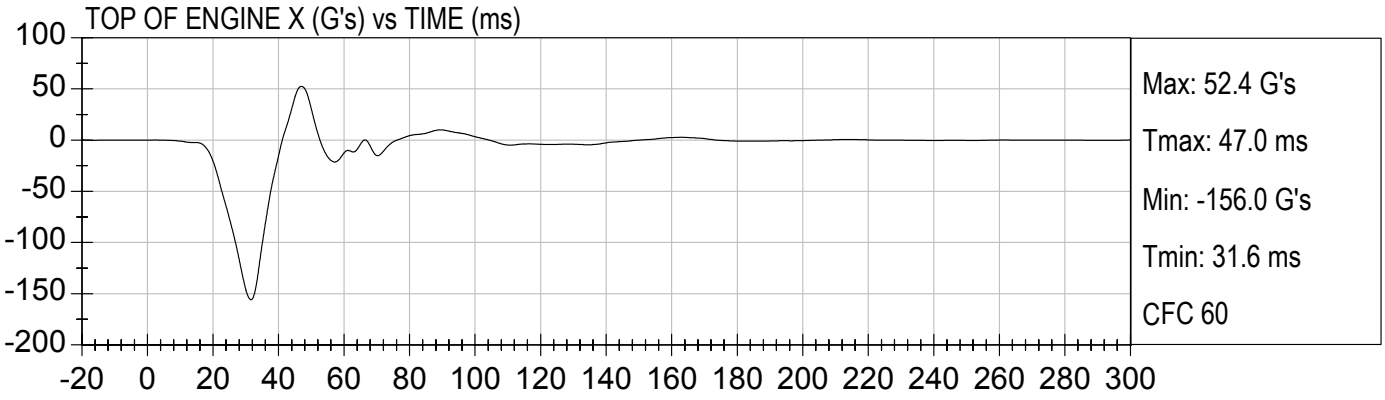

RIGHT REAR SEAT CROSSMEMBER X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -3.8 kph
Tmin: 300.0 ms
CFC 180

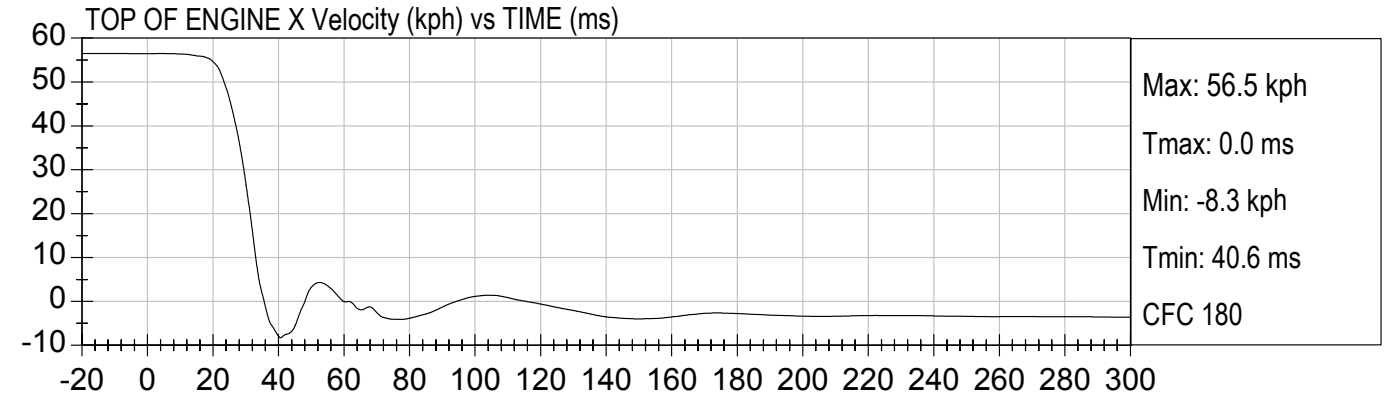

RIGHT REAR SEAT CROSSMEMBER X Displacement (mm) vs TIME (ms)
750
500
250
0
-250
-500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 724.0 mm
Tmax: 80.3 ms
Min: -312.0 mm
Tmin: 0.0 ms
CFC 180

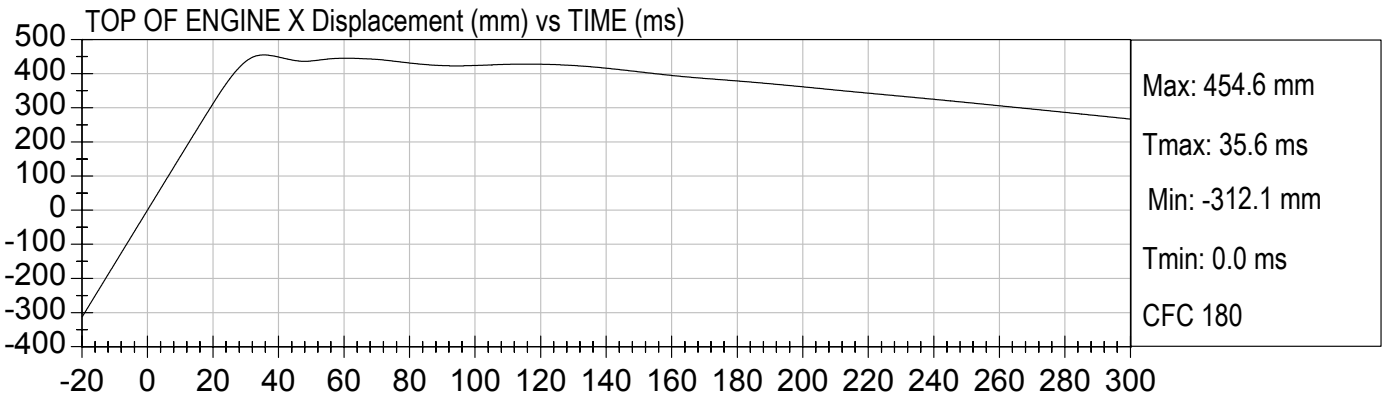

RIGHT REAR SEAT CROSSMEMBER Z (G's) vs TIME (ms)
10
5
0
-5
-10
-15
-20
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 5.8 G's
Tmax: 22.7 ms
Min: -20.4 G's
Tmin: 35.5 ms
CFC 60

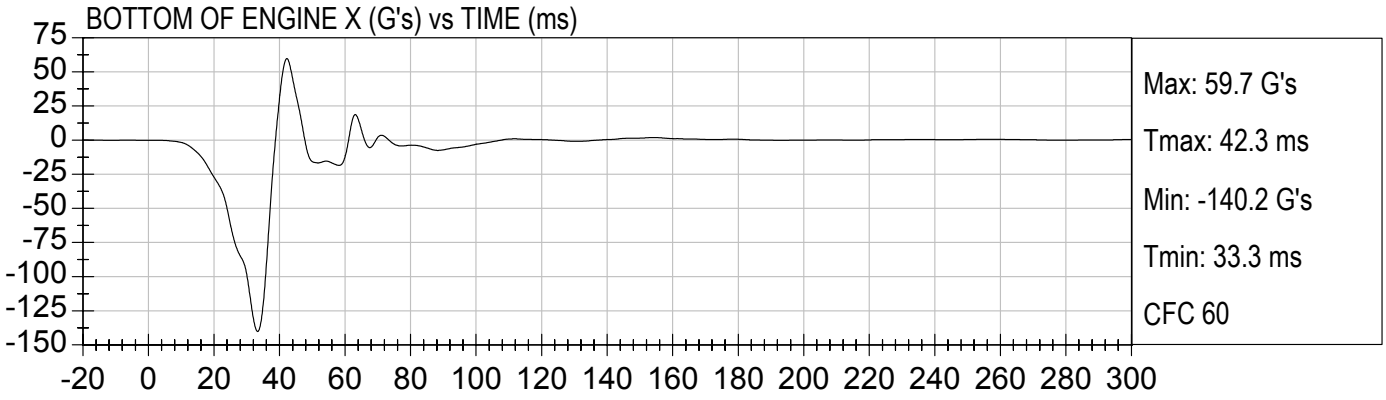

RIGHT REAR SEAT CROSSMEMBER Z Velocity (kph) vs TIME (ms)
2
0
-2
-4
-6
-8
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.5 kph
Tmax: 6.9 ms
Min: -8.3 kph
Tmin: 91.9 ms
CFC 180

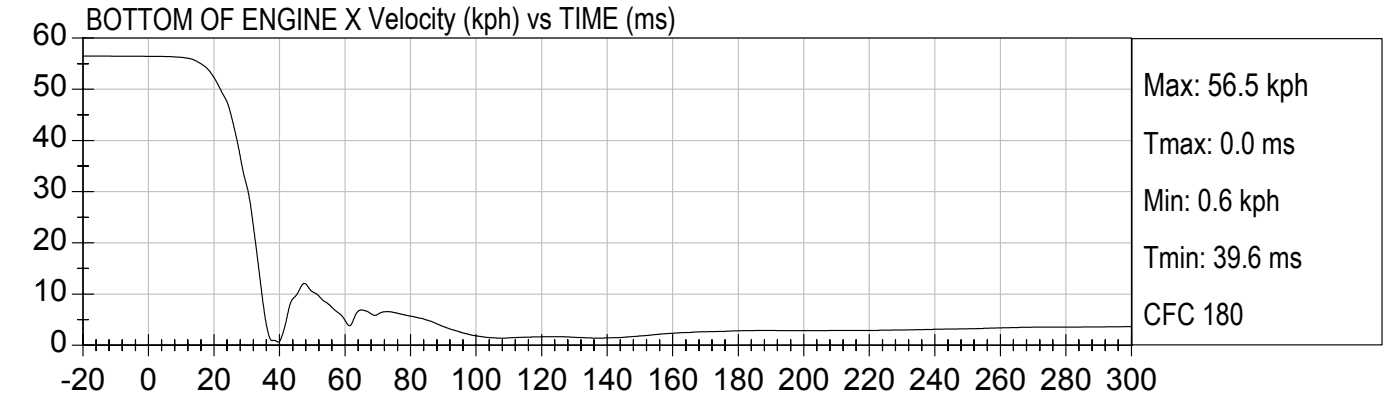

RIGHT REAR SEAT CROSSMEMBER Z Displacement (mm) vs TIME (ms)
50
0
-50
-100
-150
-200
-250
-300
-350
-400
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.4 mm
Tmax: 12.6 ms
Min: -384.7 mm
Tmin: 300.0 ms
CFC 180

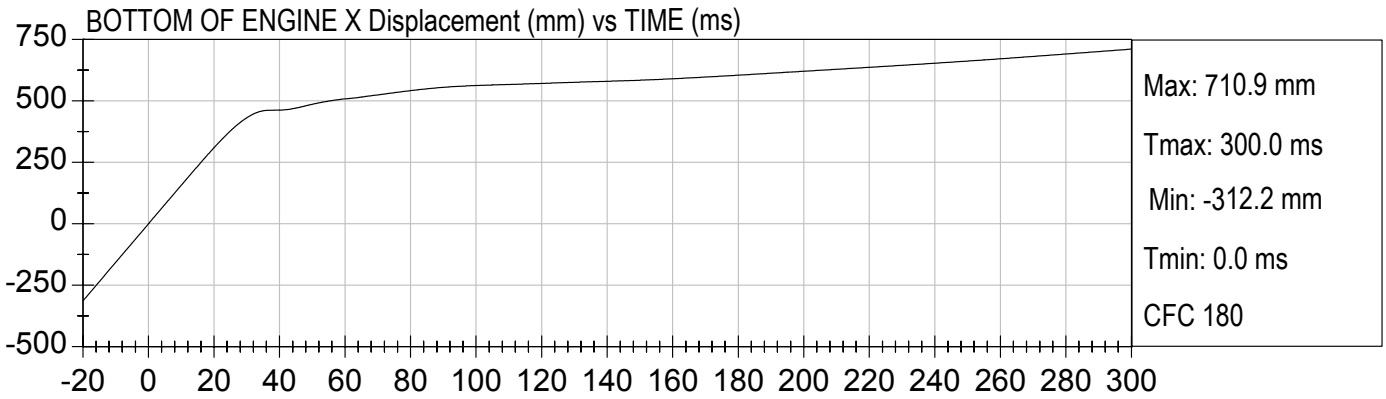

TOP OF ENGINE X (G's) vs TIME (ms)
100
50
0
-50
-100
-150
-200
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 52.4 G's
Tmax: 47.0 ms
Min: -156.0 G's
Tmin: 31.6 ms
CFC 60

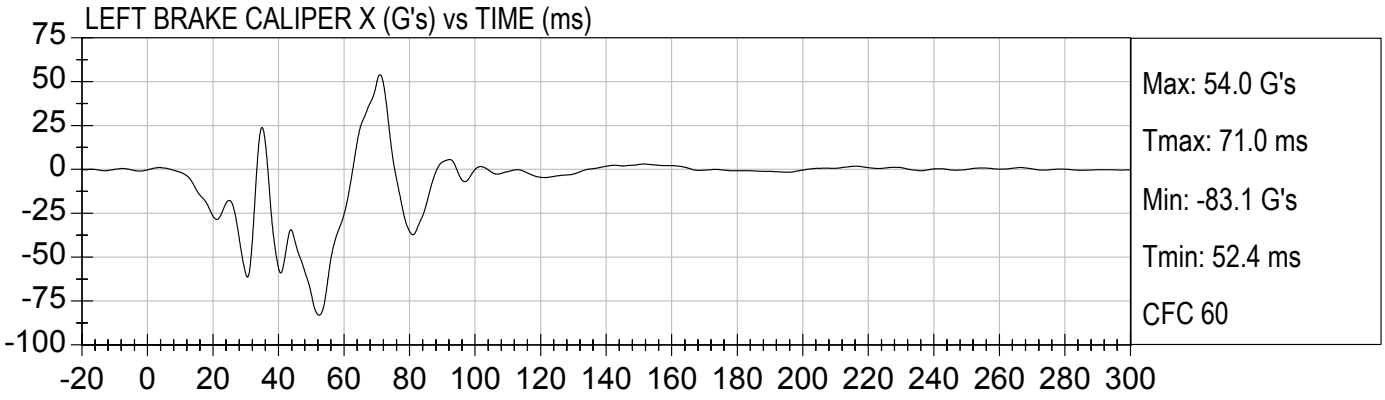

TOP OF ENGINE X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -8.3 kph
Tmin: 40.6 ms
CFC 180

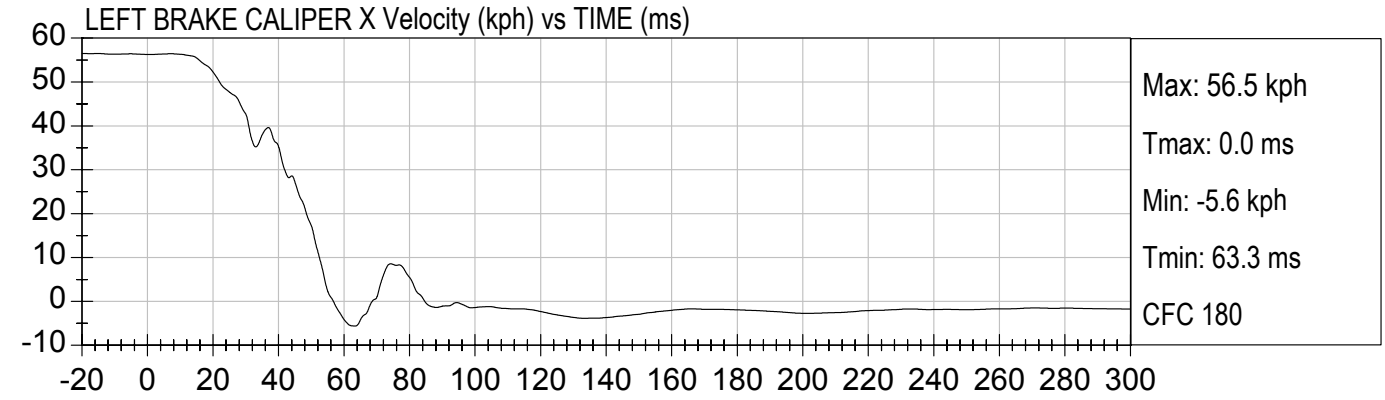

TOP OF ENGINE X Displacement (mm) vs TIME (ms)
500
400
300
200
100
0
-100
-200
-300
-400
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 454.6 mm
Tmax: 35.6 ms
Min: -312.1 mm
Tmin: 0.0 ms
CFC 180

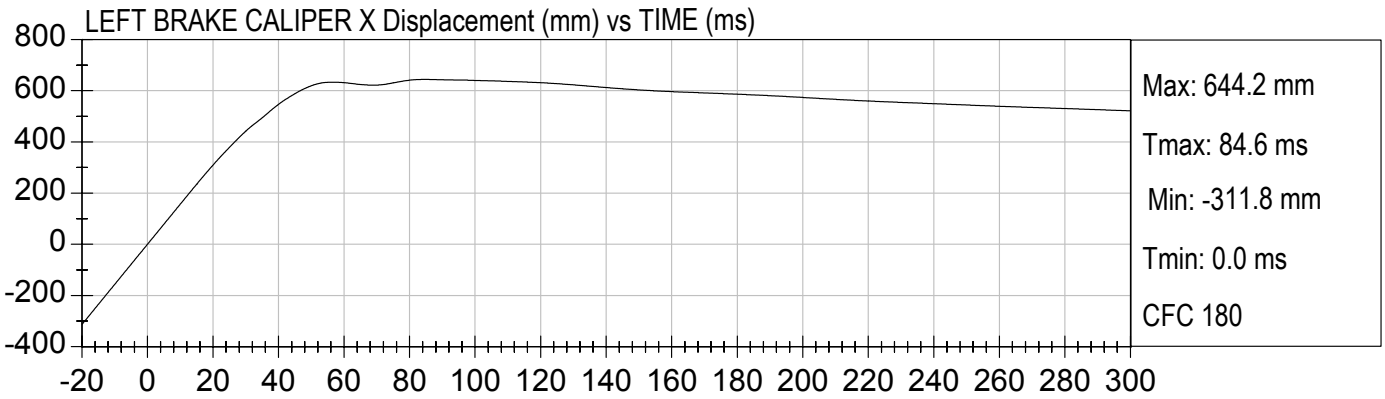

BOTTOM OF ENGINE X (G's) vs TIME (ms)
75
50
25
0
-25
-50
-75
-100
-125
-150
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 59.7 G's
Tmax: 42.3 ms
Min: -140.2 G's
Tmin: 33.3 ms
CFC 60

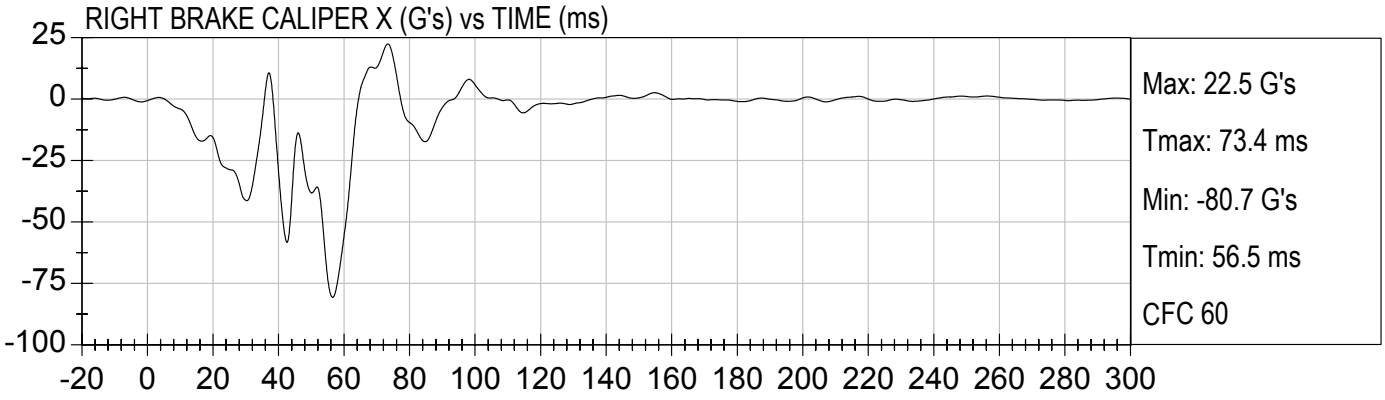

BOTTOM OF ENGINE X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: 0.6 kph
Tmin: 39.6 ms
CFC 180

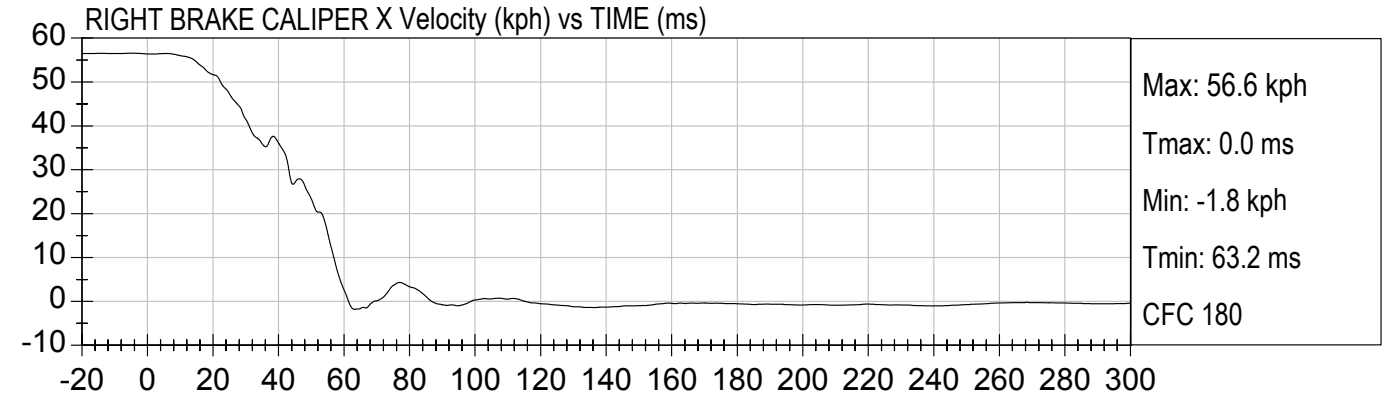

BOTTOM OF ENGINE X Displacement (mm) vs TIME (ms)
750
500
250
0
-250
-500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 710.9 mm
Tmax: 300.0 ms
Min: -312.2 mm
Tmin: 0.0 ms
CFC 180

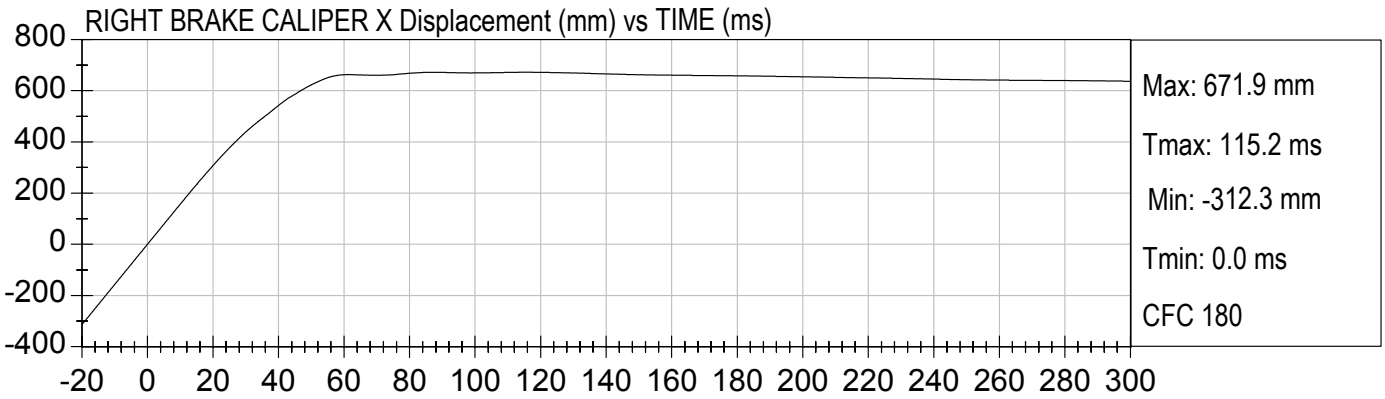

LEFT BRAKE CALIPER X (G's) vs TIME (ms)
75
50
25
0
-25
-50
-75
-100
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 54.0 G's
Tmax: 71.0 ms
Min: -83.1 G's
Tmin: 52.4 ms
CFC 60


LEFT BRAKE CALIPER X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.5 kph
Tmax: 0.0 ms
Min: -5.6 kph
Tmin: 63.3 ms
CFC 180


LEFT BRAKE CALIPER X Displacement (mm) vs TIME (ms)
800
600
400
200
0
-200
-400
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 644.2 mm
Tmax: 84.6 ms
Min: -311.8 mm
Tmin: 0.0 ms
CFC 180

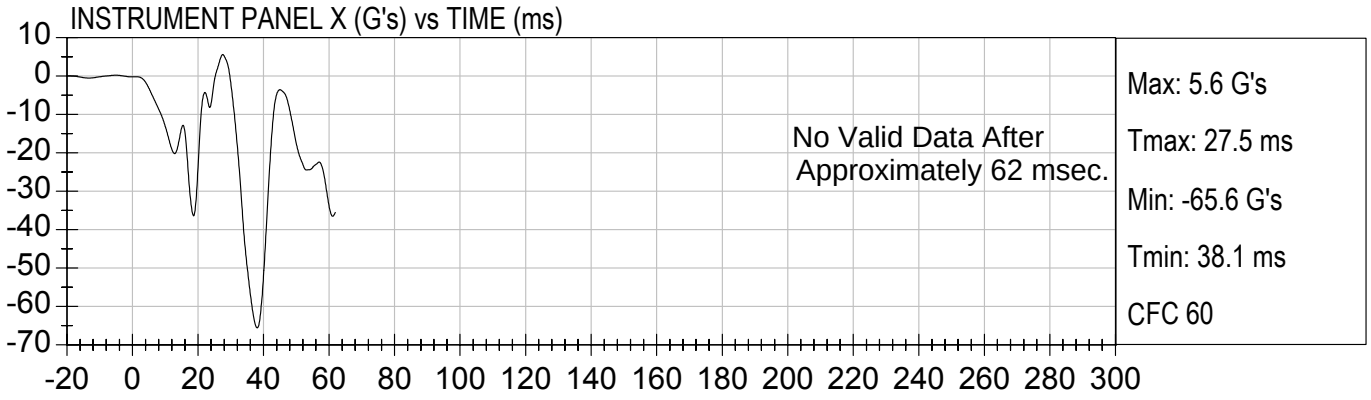

RIGHT BRAKE CALIPER X (G's) vs TIME (ms)
25
0
-25
-50
-75
-100
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 22.5 G's
Tmax: 73.4 ms
Min: -80.7 G's
Tmin: 56.5 ms
CFC 60

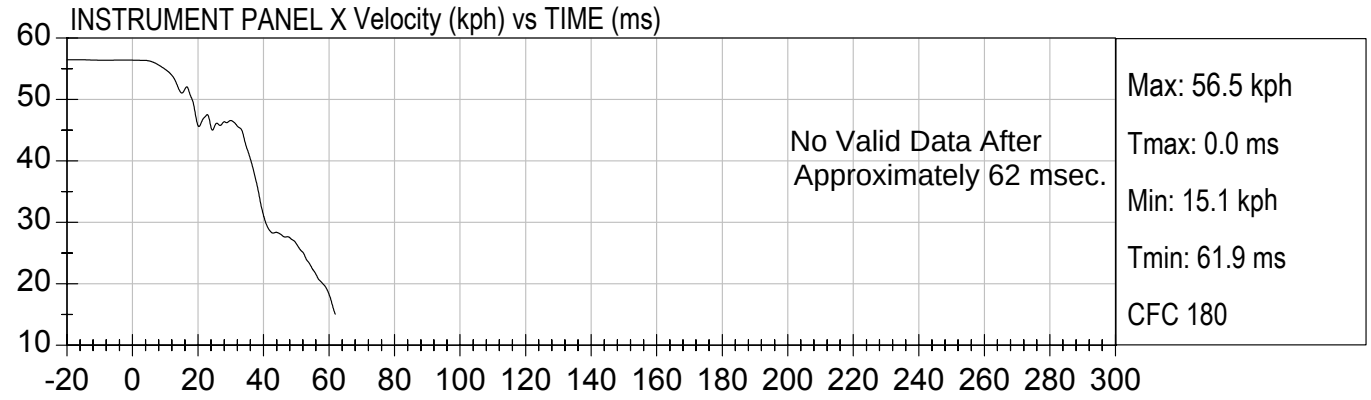

RIGHT BRAKE CALIPER X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.6 kph
Tmax: 0.0 ms
Min: -1.8 kph
Tmin: 63.2 ms
CFC 180

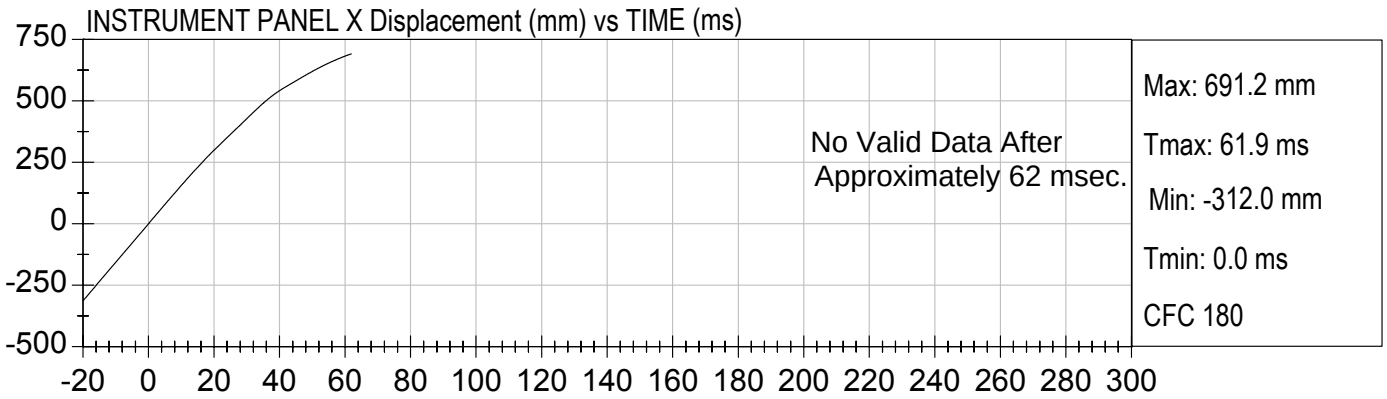

RIGHT BRAKE CALIPER X Displacement (mm) vs TIME (ms)
800
600
400
200
0
-200
-400
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 671.9 mm
Tmax: 115.2 ms
Min: -312.3 mm
Tmin: 0.0 ms
CFC 180

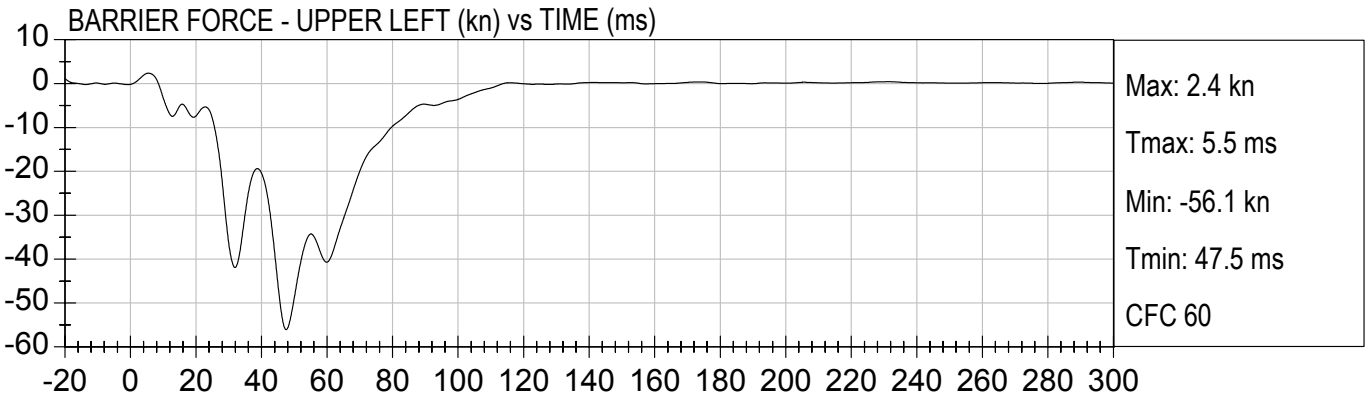
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

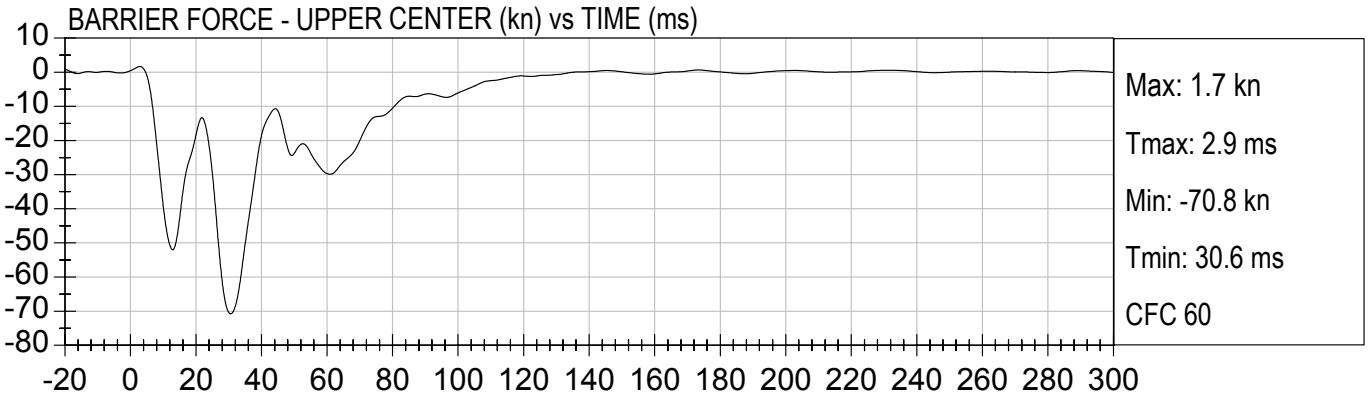
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)

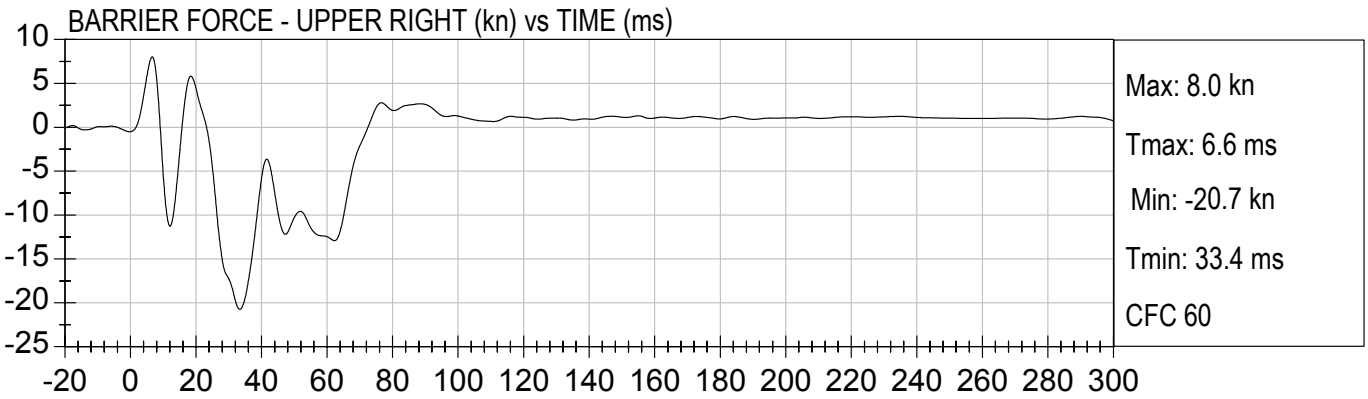


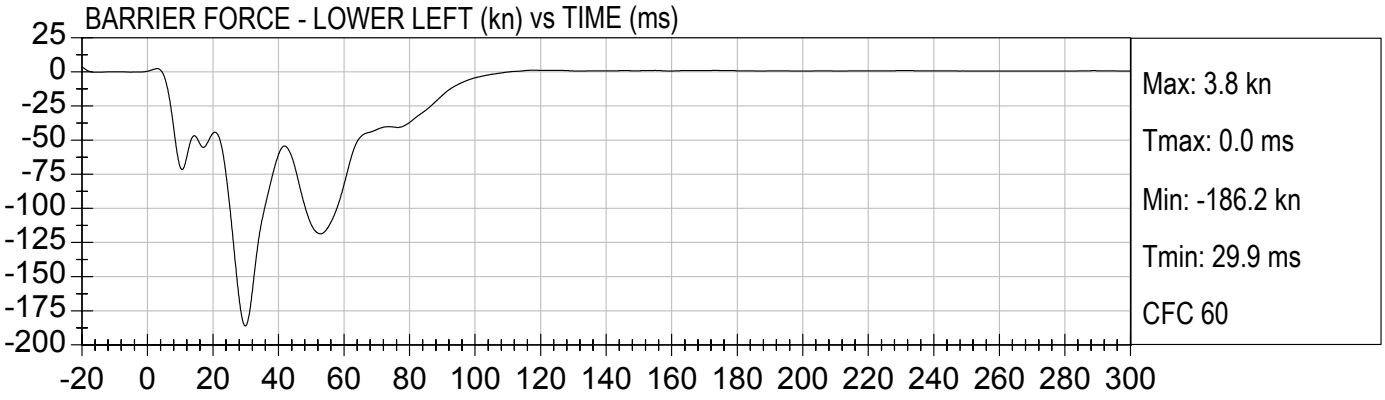


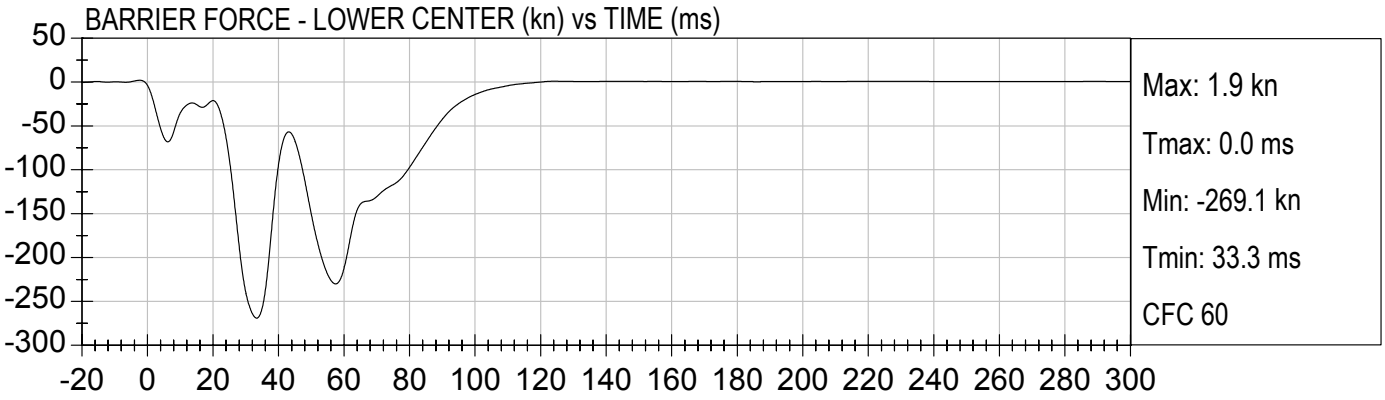


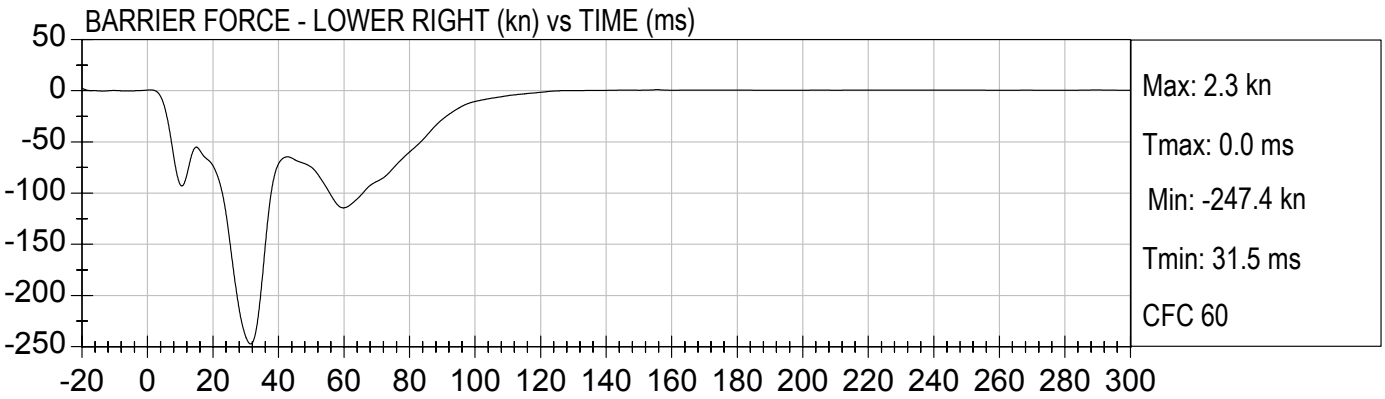

BARRIER FORCE - UPPER LEFT (kn) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-60
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.4 kn
Tmax: 5.5 ms
Min: -56.1 kn
Tmin: 47.5 ms
CFC 60


BARRIER FORCE - UPPER CENTER (kn) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.7 kn
Tmax: 2.9 ms
Min: -70.8 kn
Tmin: 30.6 ms
CFC 60


BARRIER FORCE - UPPER RIGHT (kn) vs TIME (ms)
10
5
0
-5
-10
-15
-20
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 8.0 kn
Tmax: 6.6 ms
Min: -20.7 kn
Tmin: 33.4 ms
CFC 60

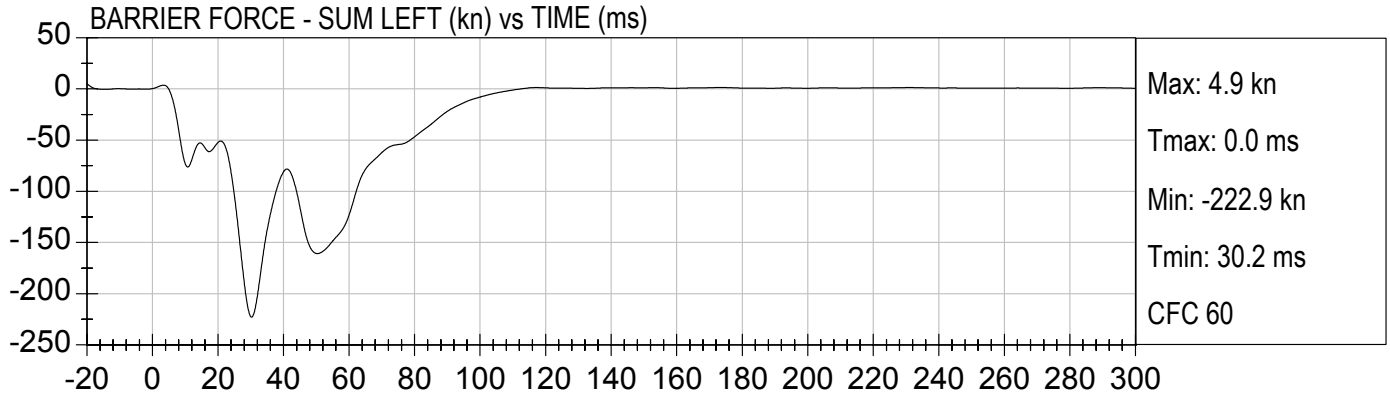

BARRIER FORCE - LOWER LEFT (kn) vs TIME (ms)
25
0
-25
-50
-75
-100
-125
-150
-175
-200
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 3.8 kn
Tmax: 0.0 ms
Min: -186.2 kn
Tmin: 29.9 ms
CFC 60

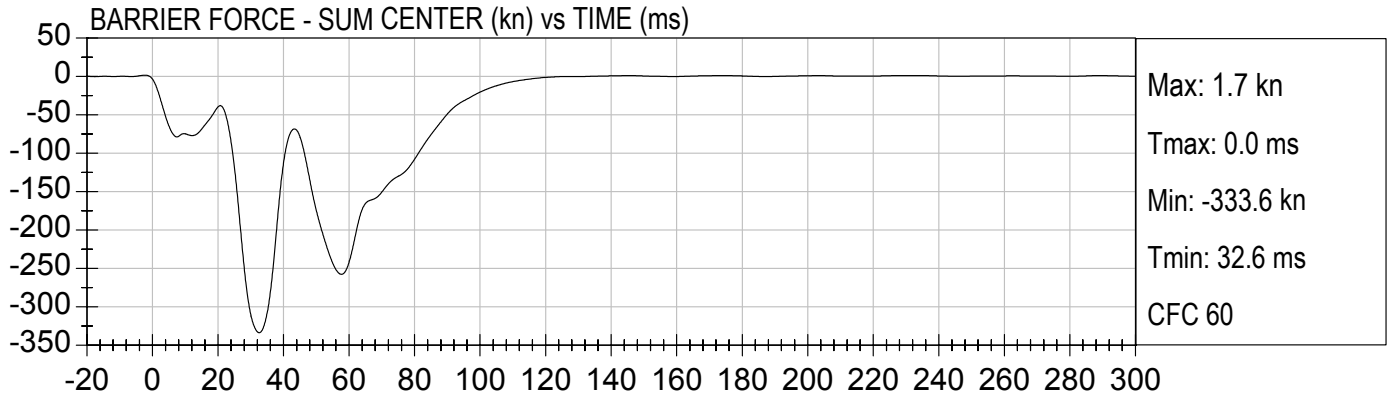

BARRIER FORCE - LOWER CENTER (kn) vs TIME (ms)
50
0
-50
-100
-150
-200
-250
-300
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1.9 kn
Tmax: 0.0 ms
Min: -269.1 kn
Tmin: 33.3 ms
CFC 60

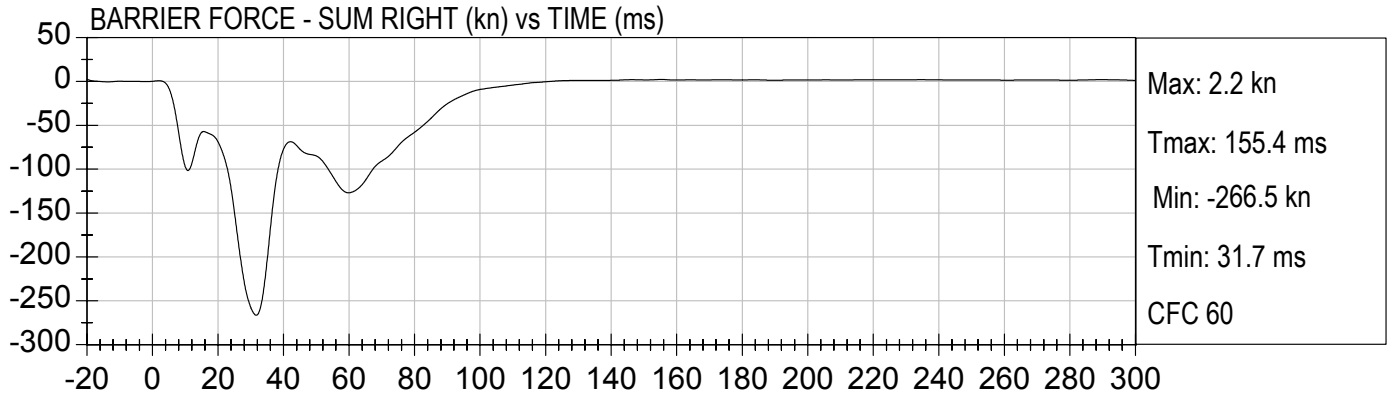

BARRIER FORCE - LOWER RIGHT (kn) vs TIME (ms)
50
0
-50
-100
-150
-200
-250
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.3 kn
Tmax: 0.0 ms
Min: -247.4 kn
Tmin: 31.5 ms
CFC 60

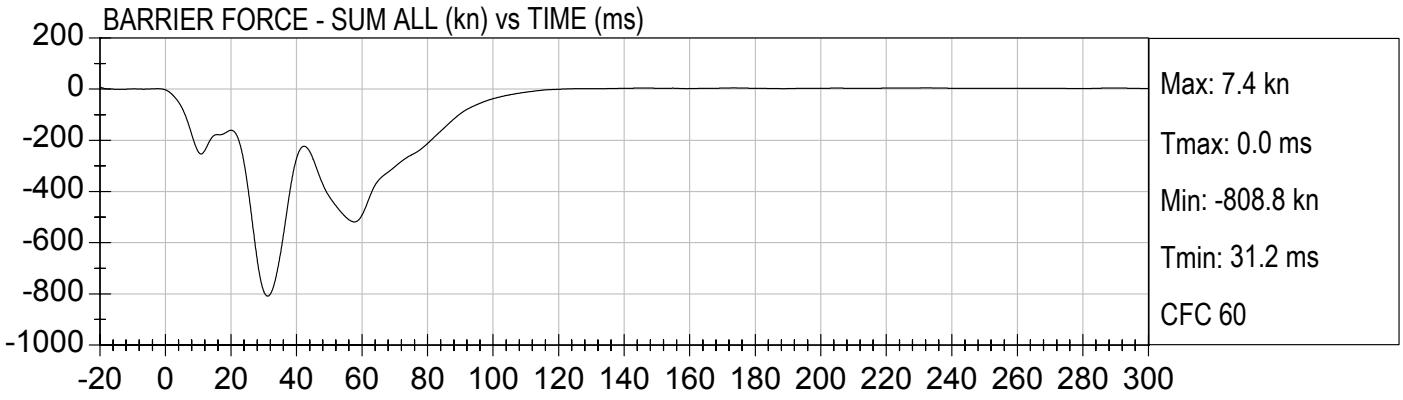
NCAP 35MPH FRONTAL IMPACT
2005 TOYOTA CAMRY (M55101)

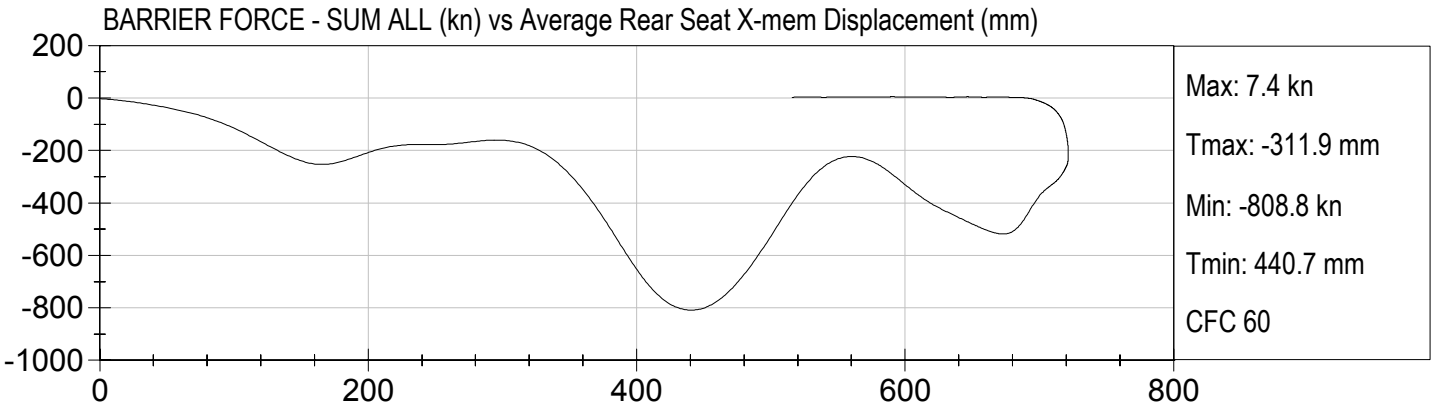
Test Date: 01/13/05
Speed: 35.1 mph (56.5 km/h)










BARRIER FORCE - SUM ALL (kn) vs Average Rear Seat X-mem Displacement (mm)
200
0
-200
-400
-600
-800
-1000
0
200
400
600
800
Max: 7.4 kn
Tmax: -311.9 mm
Min: -808.8 kn
Tmin: 440.7 mm
CFC 60

APPENDIX C

DUMMY CALIBRATION DATA TRACES AND TABLES

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test ID:** D042911

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Peak Resultant Acceleration	G's	225 - 275	240	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	7.6	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

James Carney

Laboratory Technician

12/21/2004

Test Date

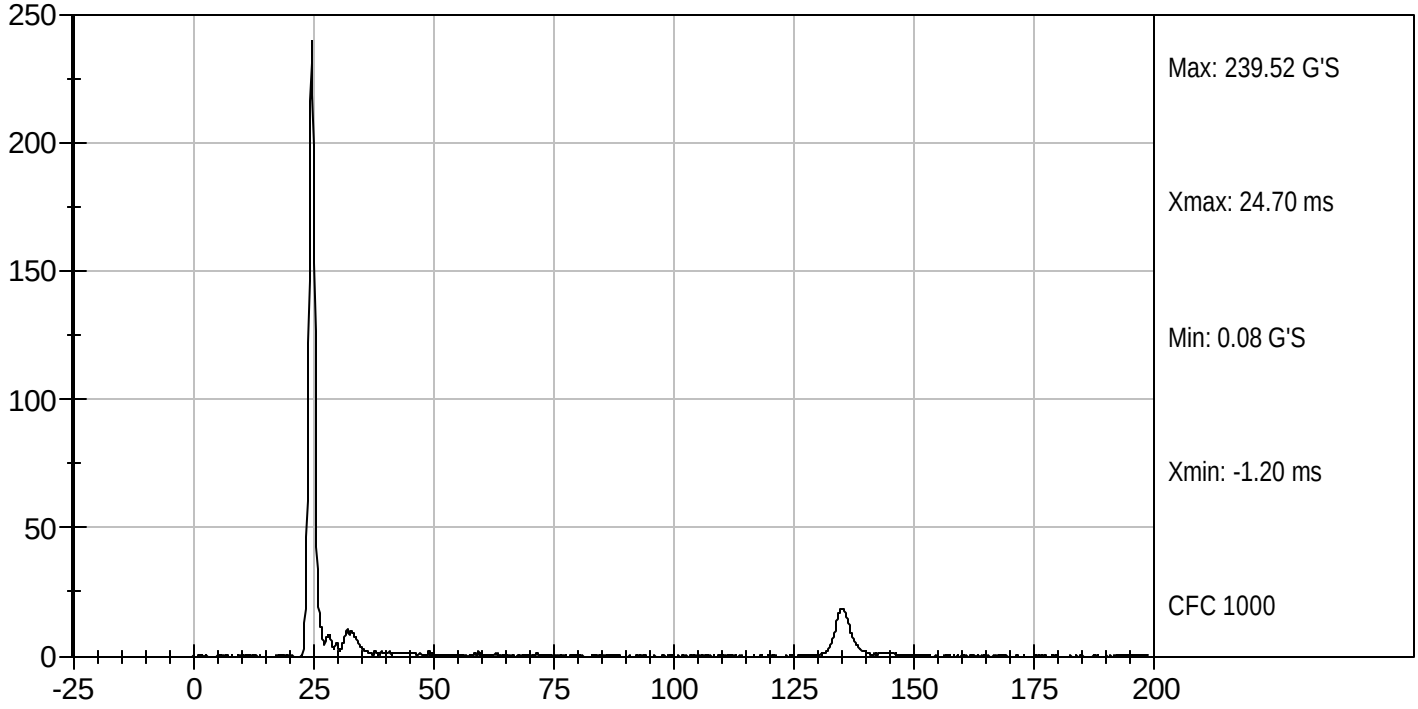
David Winkelbauer

Approved By

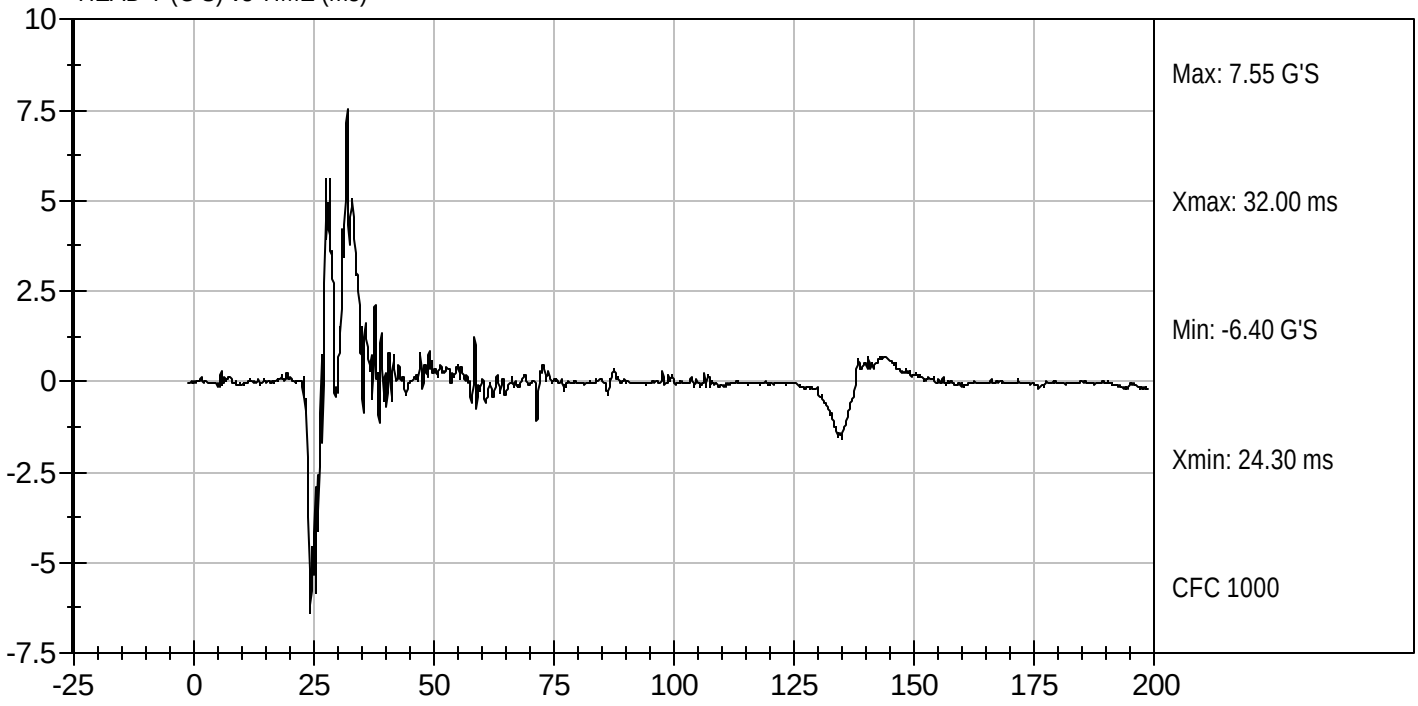
Test Desc: Head Drop
Componet ID: D042911

Test Date: 12/21/2004
Velocity: 0 ft/s, 0.00 m/s

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)



HEAD Y (G'S) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D042912

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.98	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	25.25	Pass
	20 msec	G's	17.60 to 22.60	19.43	Pass
	30 msec	G's	12.50 to 18.50	13.41	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	13.36	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	37.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.6	Pass
	Time	msec	57.0 to 64.0	57.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	114.0	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	92.9	Pass
	Time	msec	47.0 to 58.0	51.7	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	101.8	Pass
			Overall Test Results		Pass

Joe Fleck

Laboratory Technician

12/21/2004

Test Date

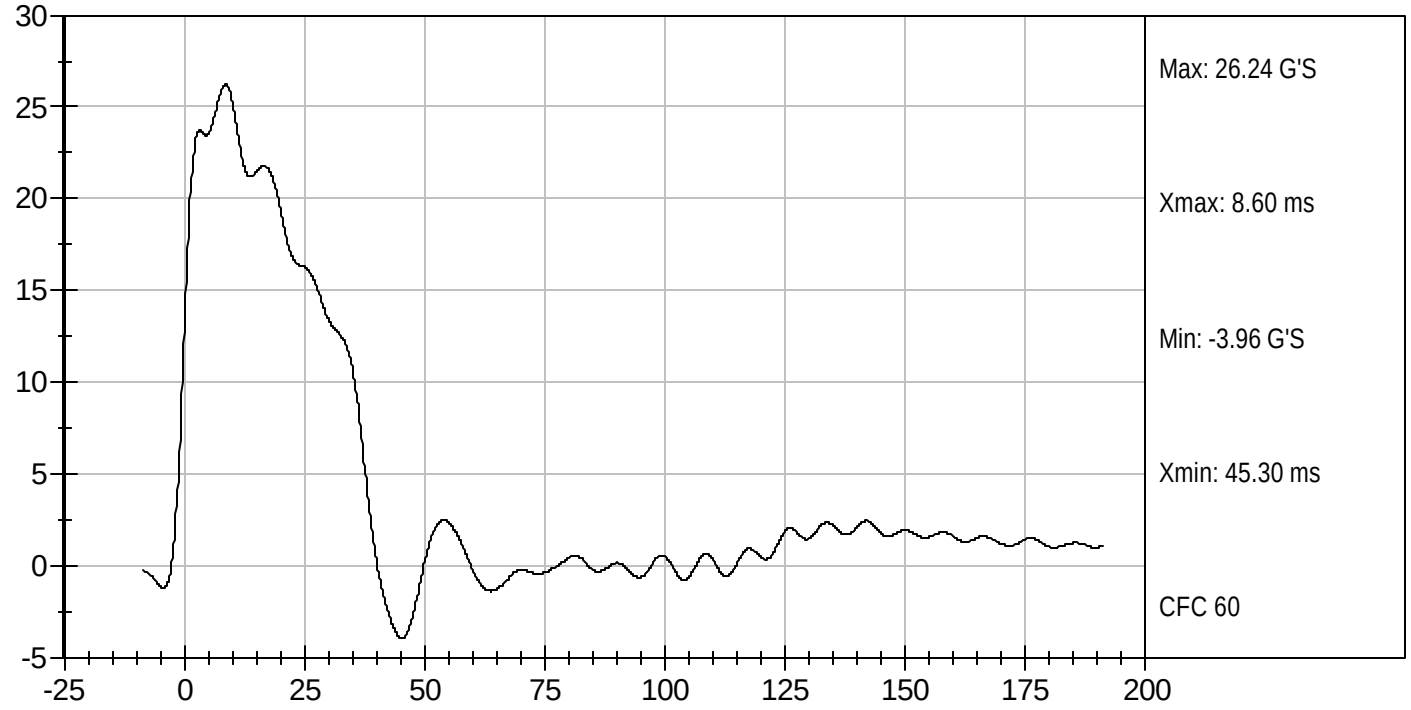
David Winkelbauer

Approved By

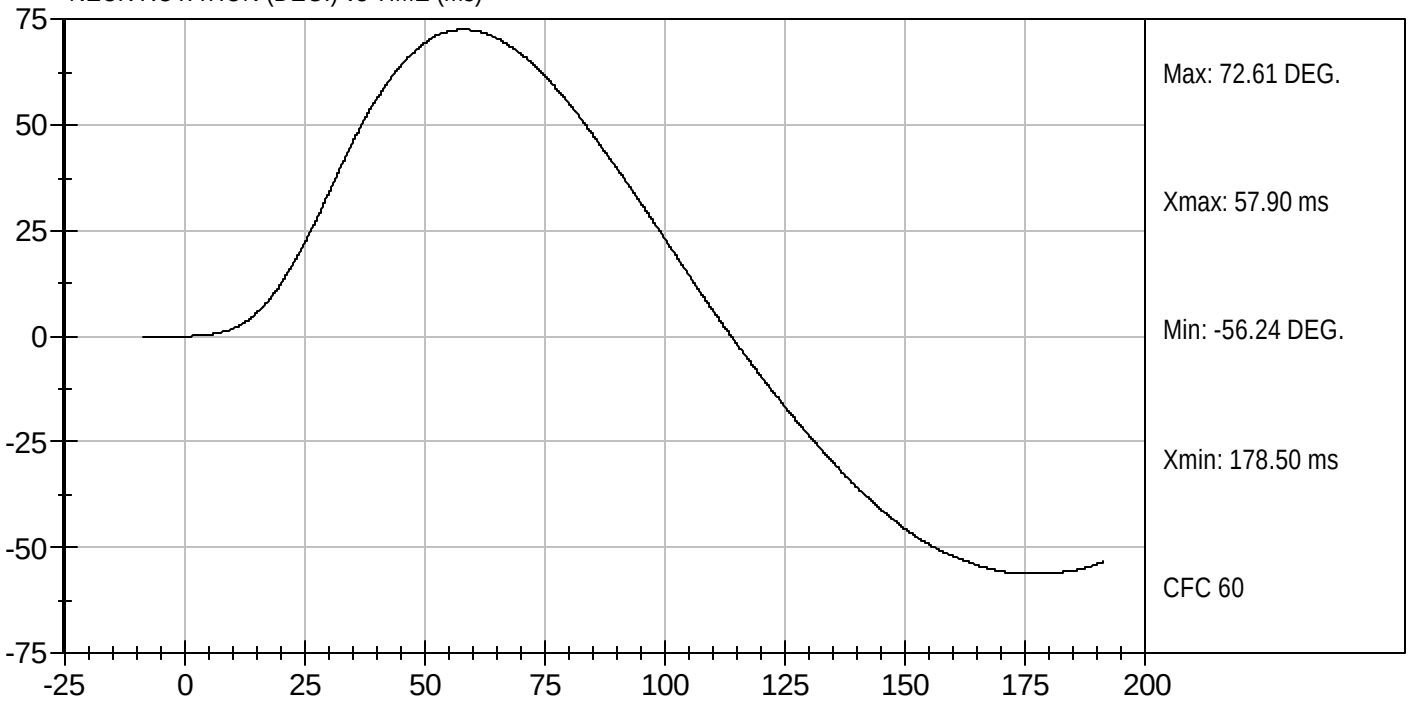
Test Desc: Neck Flexion
Componet ID: D042912

Test Date: 12/21/2004
Velocity: 22.9 ft/s, 6.98 m/s

PENDULUM DECELERATION (G'S) vs TIME (ms)

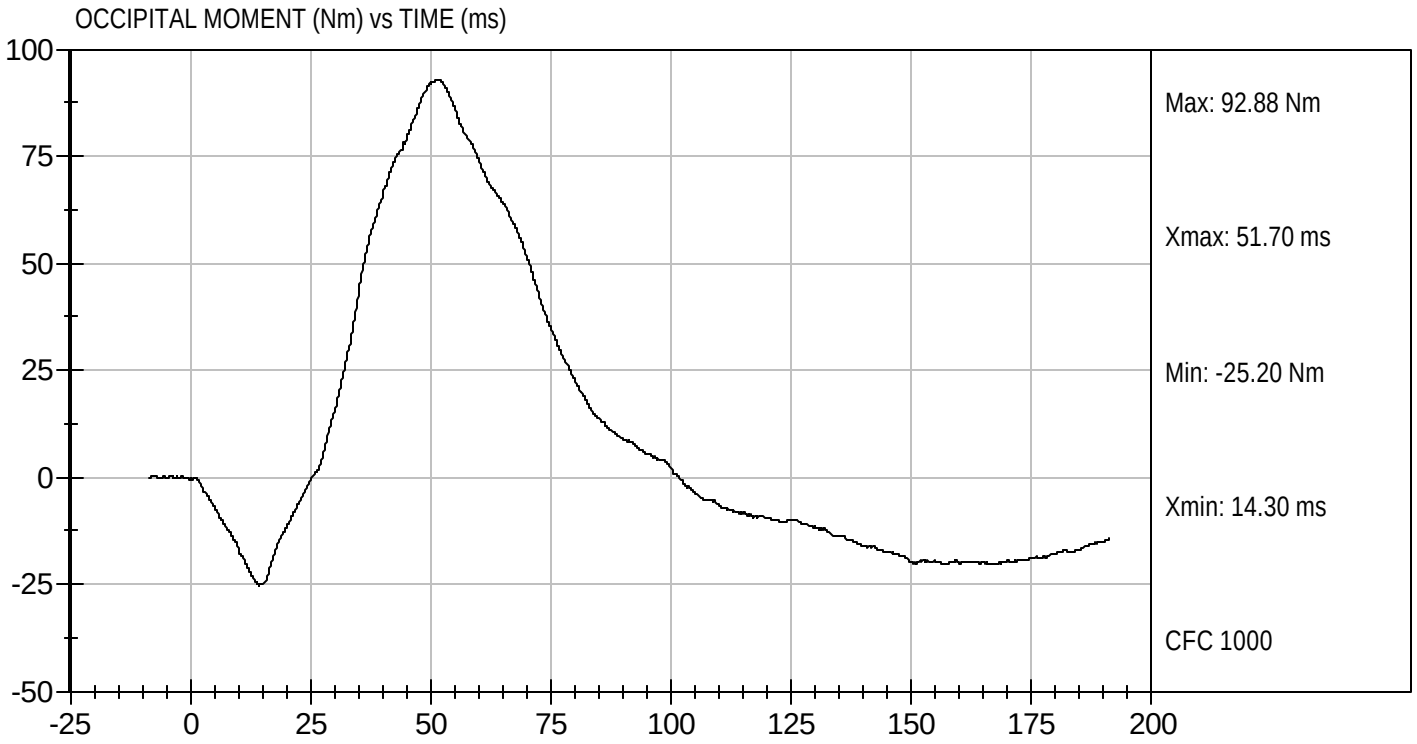


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Componet ID: D042912

Test Date: 12/21/2004
Velocity: 22.9 ft/s, 6.98 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D042913

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	15	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.09	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.07	Pass
	20 msec	G's	14.00 to 19.00	16.46	Pass
	30 msec	G's	11.00 to 16.00	11.43	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	11.97	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	43.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	99.2	Pass
	Time	msec	72.0 to 82.0	81.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	159.0	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-65.5	Pass
	Time	msec	65.0 to 79.0	75.2	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	146.2	Pass
			Overall Test Results		Pass

Joe Fleck

Laboratory Technician

12/21/2004

Test Date

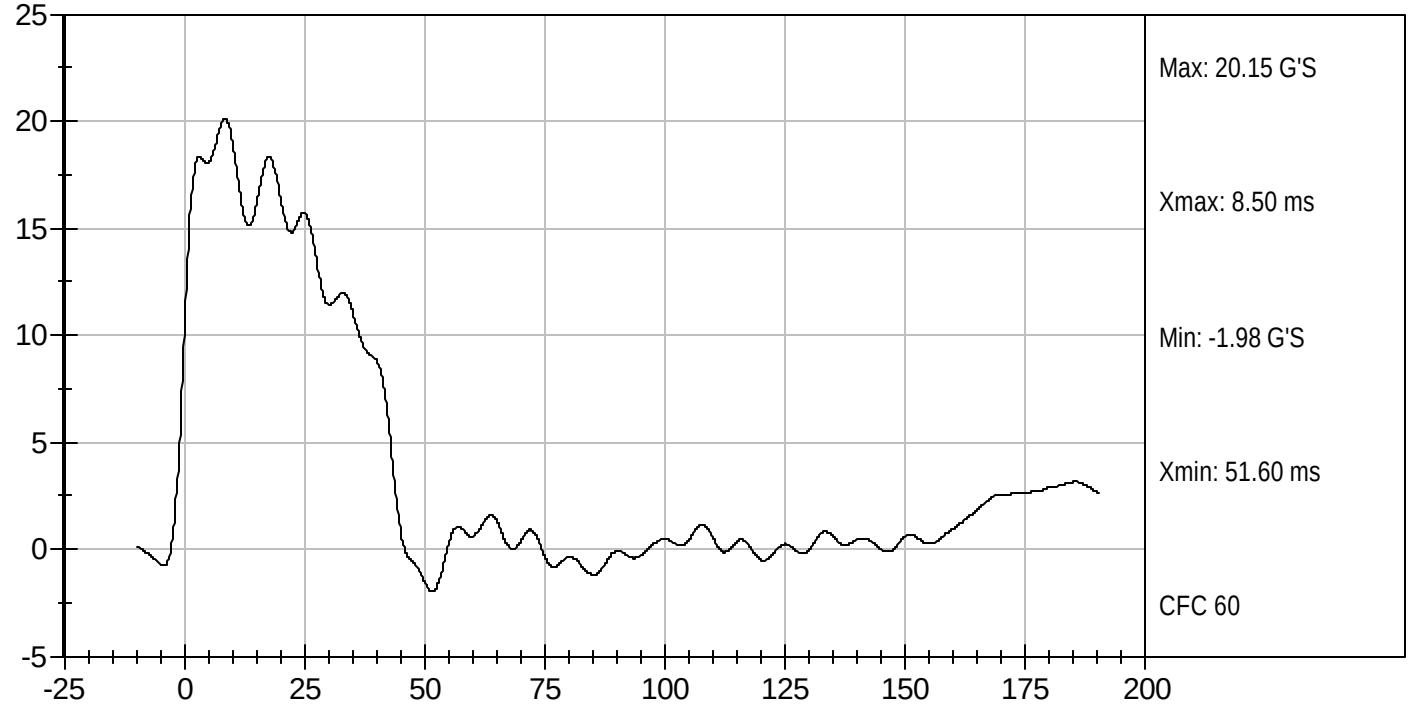
David Winkelbauer

Approved By

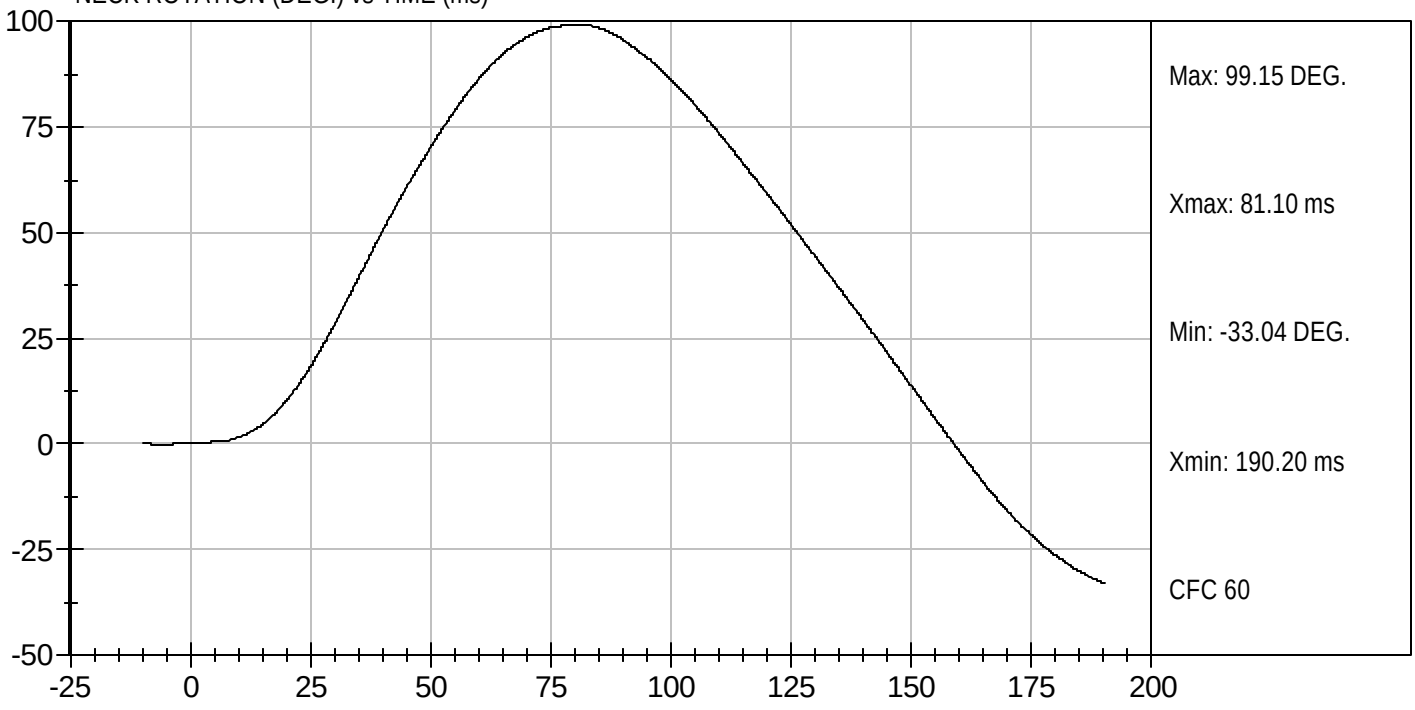
Test Desc: Neck Extension
Componet ID: D042913

Test Date: 12/21/2004
Velocity: 19.97 ft/s, 6.09 m/s

PENDULUM DECELERATION (G'S) vs TIME (ms)



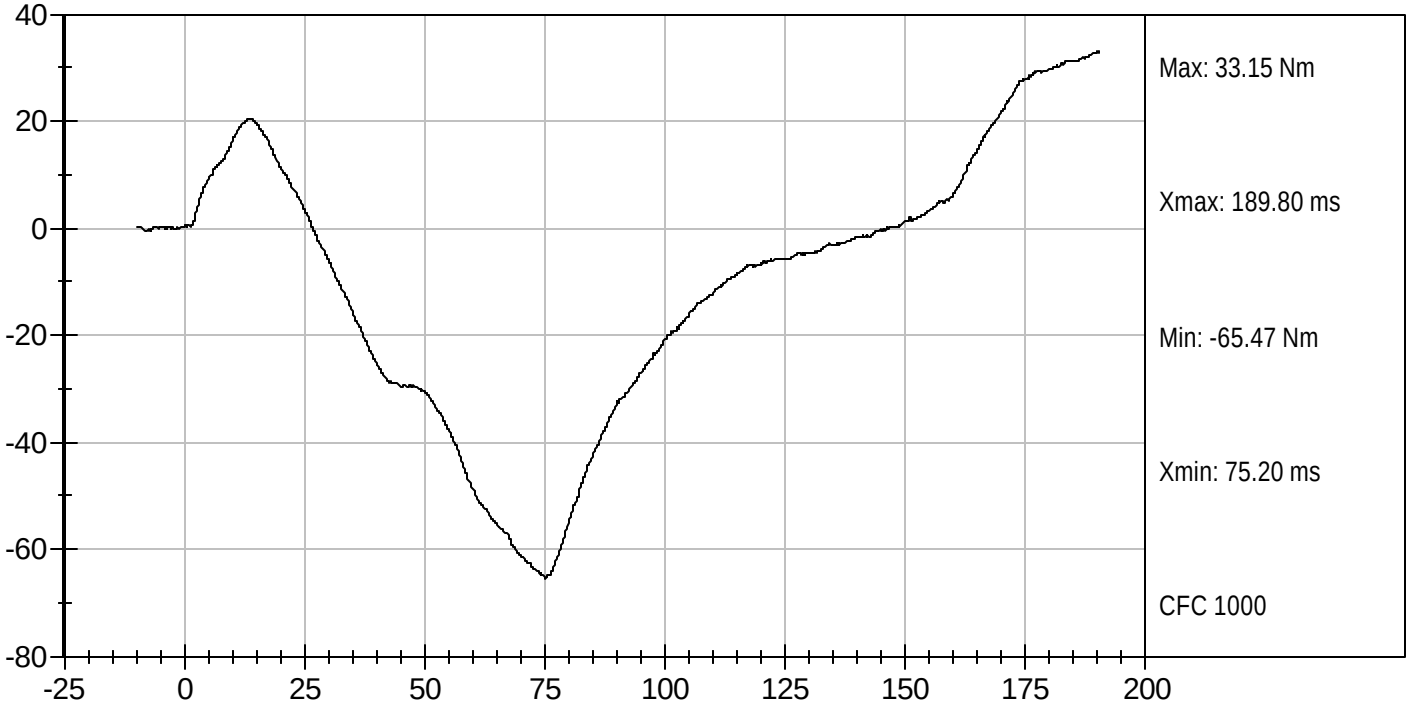
NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Componet ID: D042913

Test Date: 12/21/2004
Velocity: 19.97 ft/s, 6.09 m/s

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D042914

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Probe Velocity	m/s	6.58 to 6.82	6.72	Pass
Peak Probe Force	N	5159 to 5893	5,707	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.01	Pass
Internal Hysteresis	%	69 to 85	69	Pass
		Overall Test Results		Pass

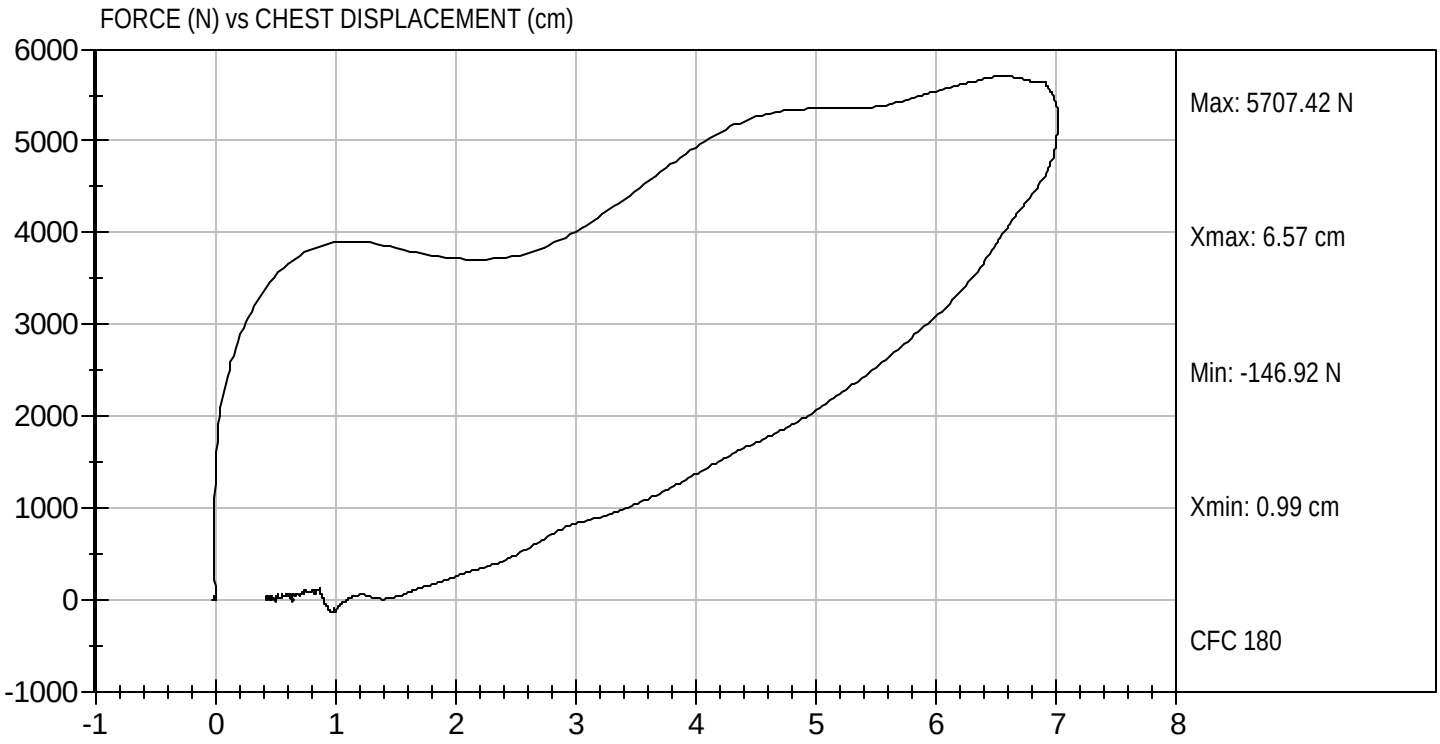
Joe Fleck
Laboratory Technician

12/21/2004
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Componet ID: D042914

Test Date: 12/21/2004
Velocity: 22.04 ft/s, 6.72 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D042915

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	4,977	Pass
		Overall Test Results		Pass

Joe Fleck

Laboratory Technician

12/21/2004

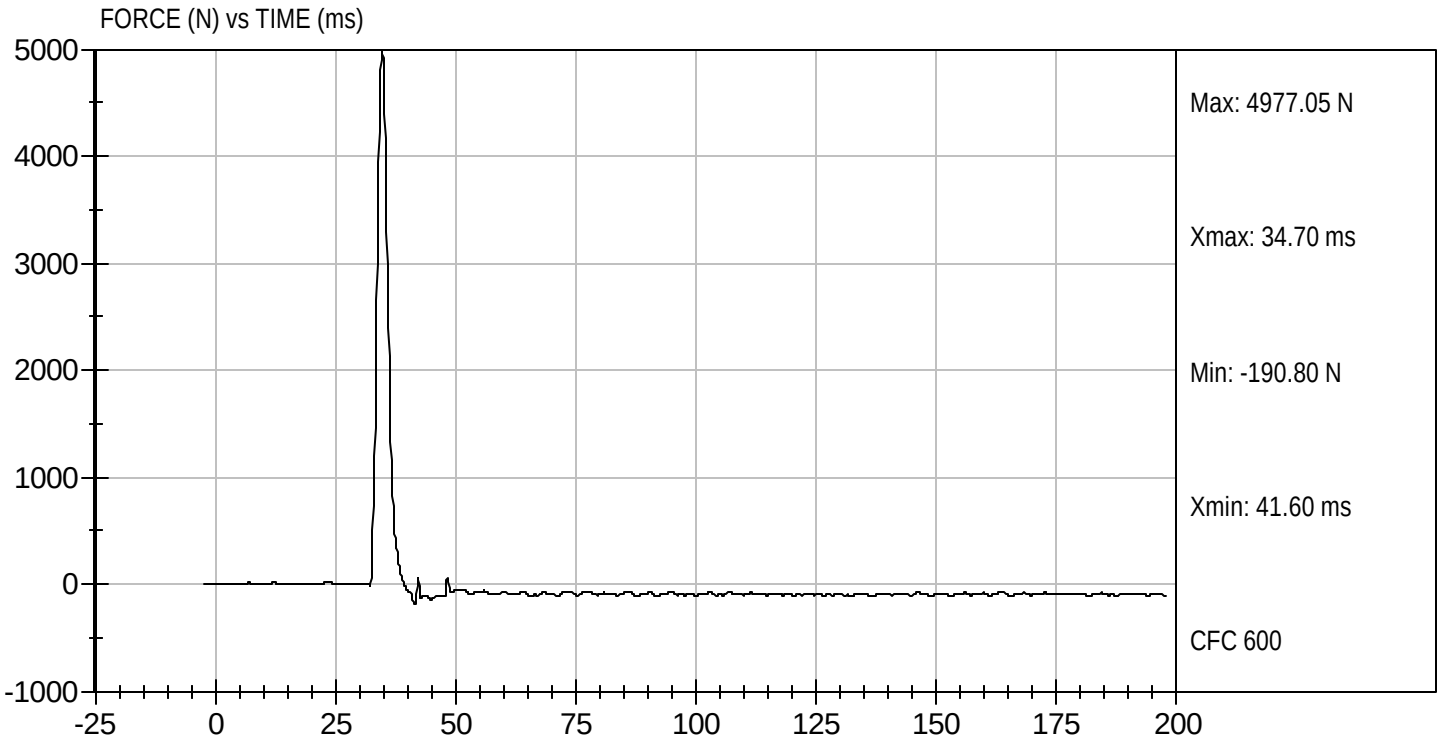
Test Date

David Winkelbauer

Approved By

Test Desc: Right Knee
Componet ID: D042915

Test Date: 12/21/2004
Velocity: 6.86 ft/s, 2.09 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D042916

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,825	Pass
		Overall Test Results		Pass

Joe Fleck

Laboratory Technician

12/21/2004

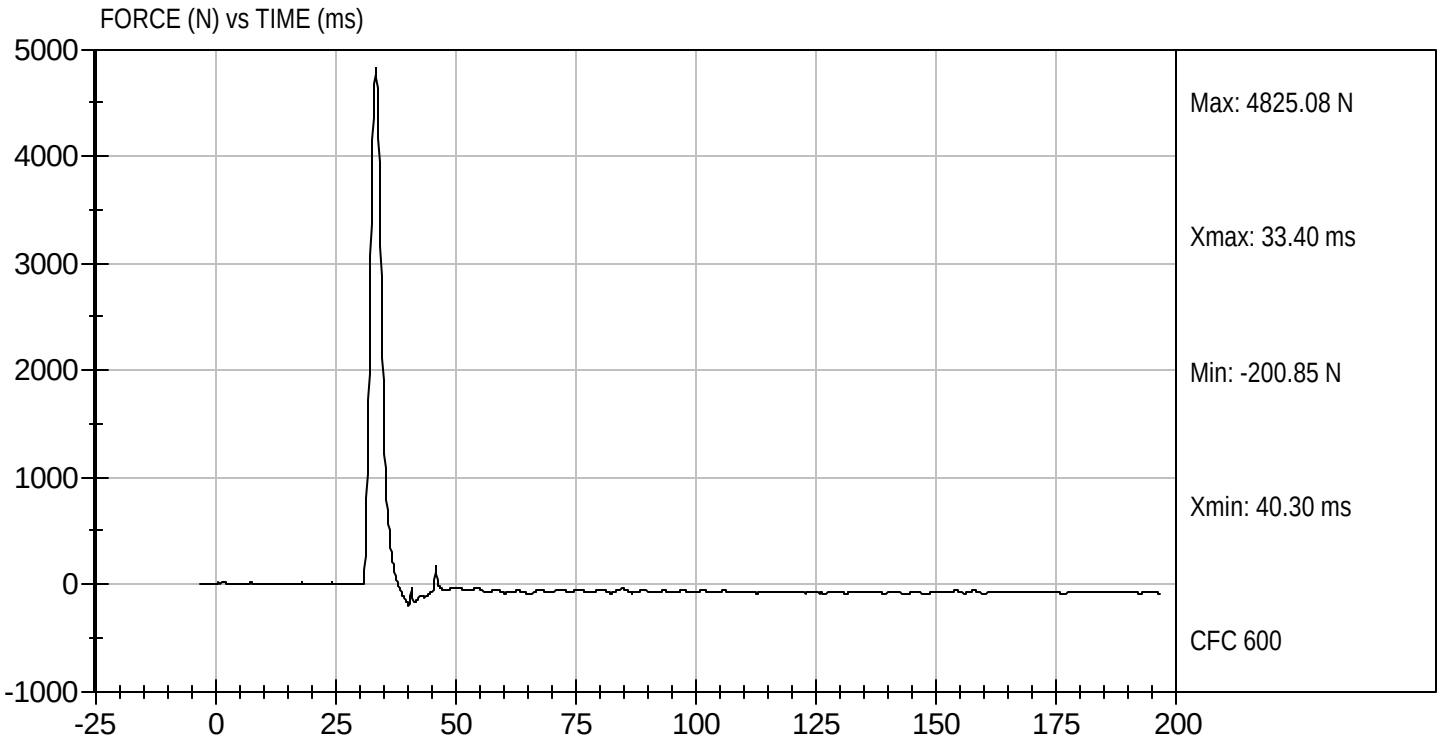
Test Date

David Winkelbauer

Approved By

Test Desc: Left Knee
Componet ID: D042916

Test Date: 12/21/2004
Velocity: 6.88 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D042910

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.1	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	18	18	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	94.6	80.8	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	41	40	Pass
		Overall Test Results			Pass

James Carney

Laboratory Technician

12/21/2004

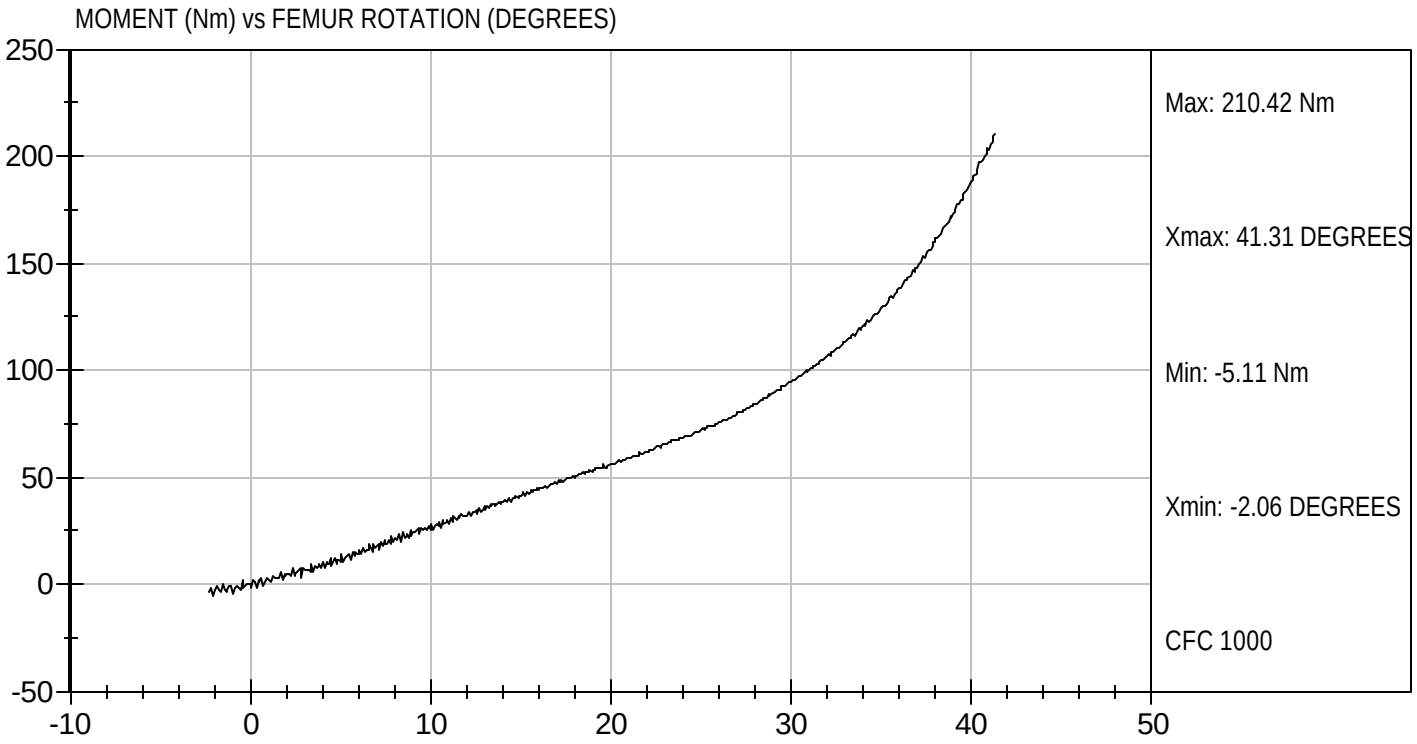
Test Date

David Winkelbauer

Approved By

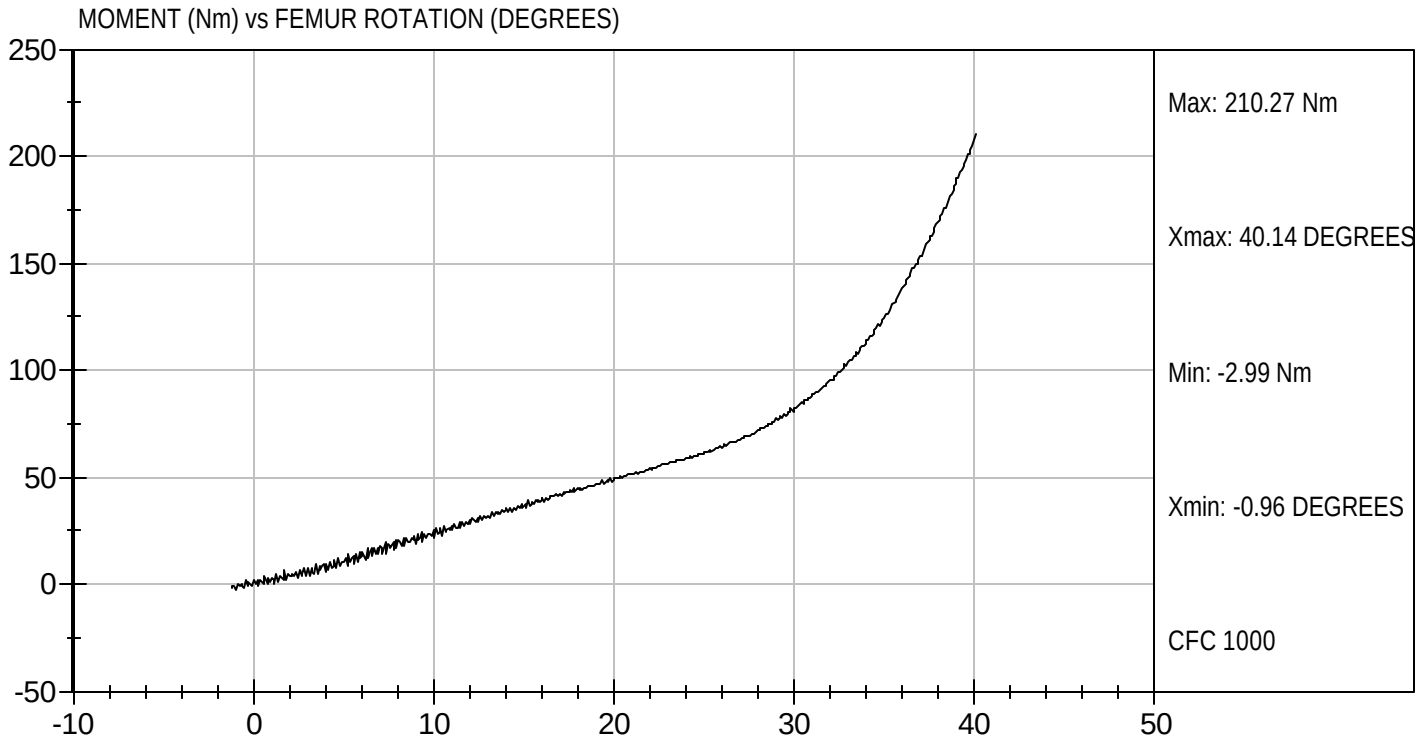
Test Desc: Hip Femur Flexion
Componet ID: D042919

Test Date: 12/21/2004
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Componet ID: D042910

Test Date: 12/21/2004
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test ID:** D042901

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Peak Resultant Acceleration	G's	225 - 275	260	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	8.1	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

James Carney

Laboratory Technician

12/21/2004

Test Date

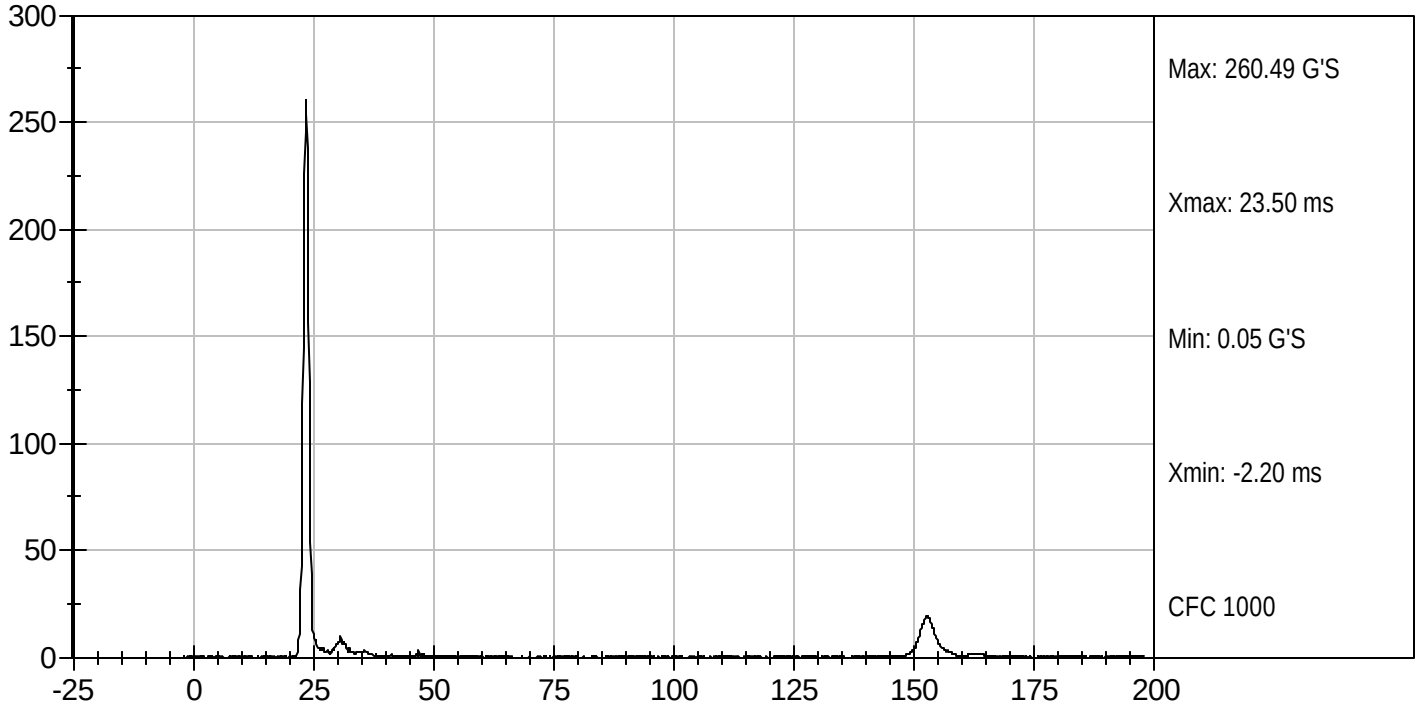
David Winkelbauer

Approved By

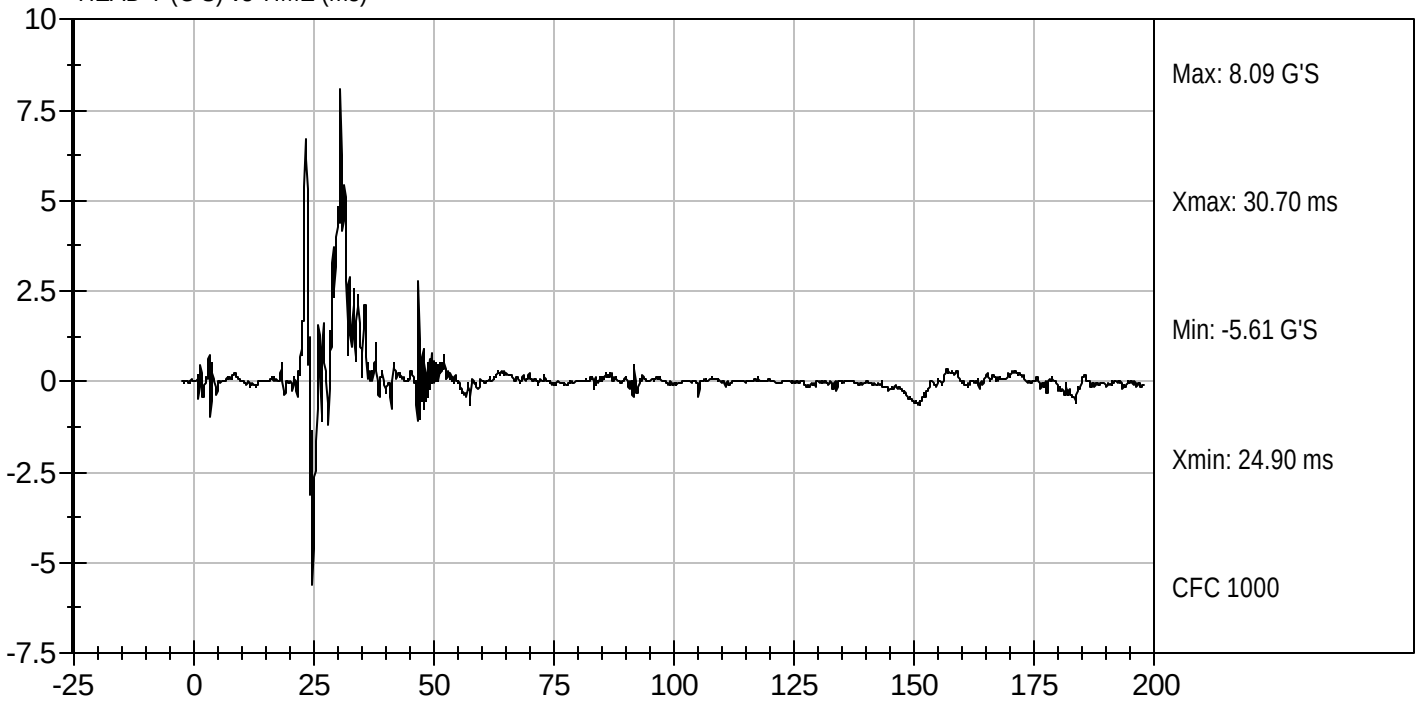
Test Desc: Head Drop
Componet ID: D042901

Test Date: 12/21/2004
Velocity: 0 ft/s, 0.00 m/s

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)



HEAD Y (G'S) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D042902

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	15	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.97	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	23.98	Pass
	20 msec	G's	17.60 to 22.60	20.32	Pass
	30 msec	G's	12.50 to 18.50	15.05	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.99	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	37.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	74.0	Pass
	Time	msec	57.0 to 64.0	58.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.7	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	96.4	Pass
	Time	msec	47.0 to 58.0	50.4	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	103.8	Pass
			Overall Test Results		Pass

Joe Fleck

Laboratory Technician

12/21/2004

Test Date

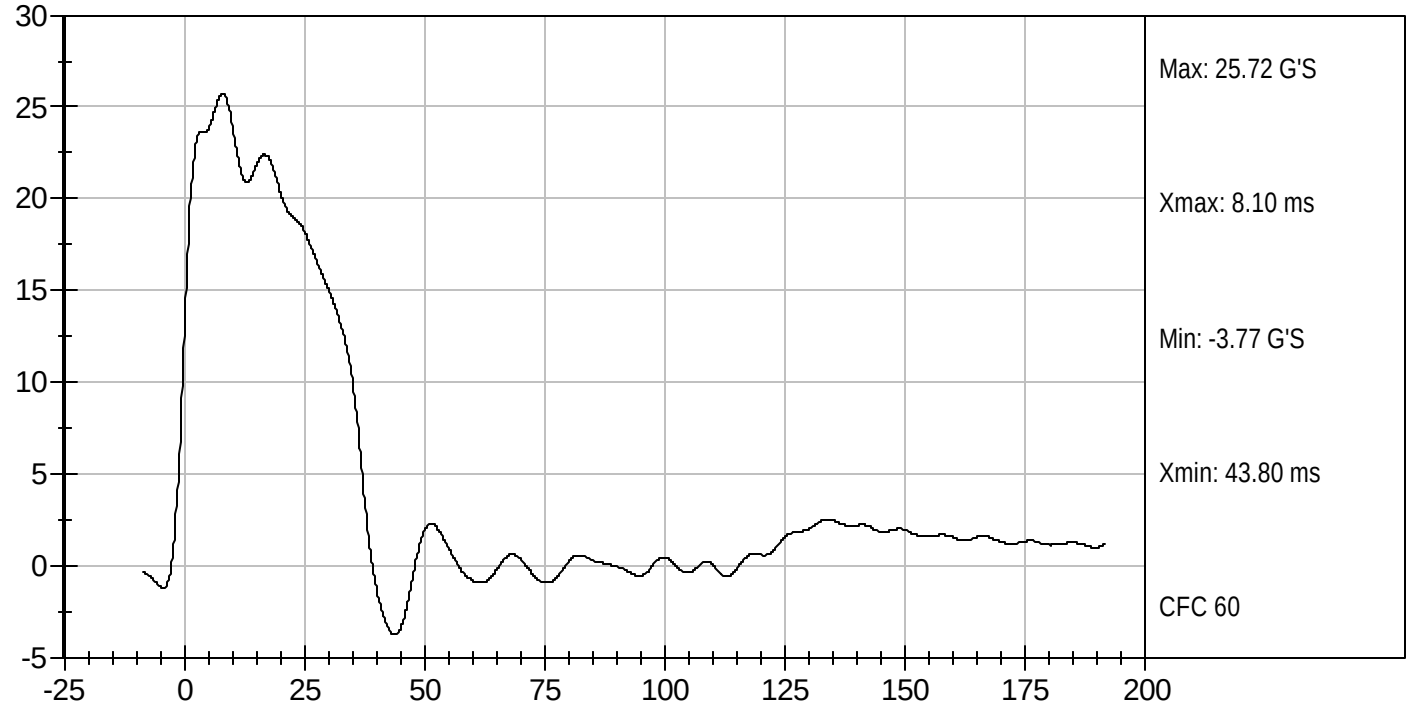
David Winkelbauer

Approved By

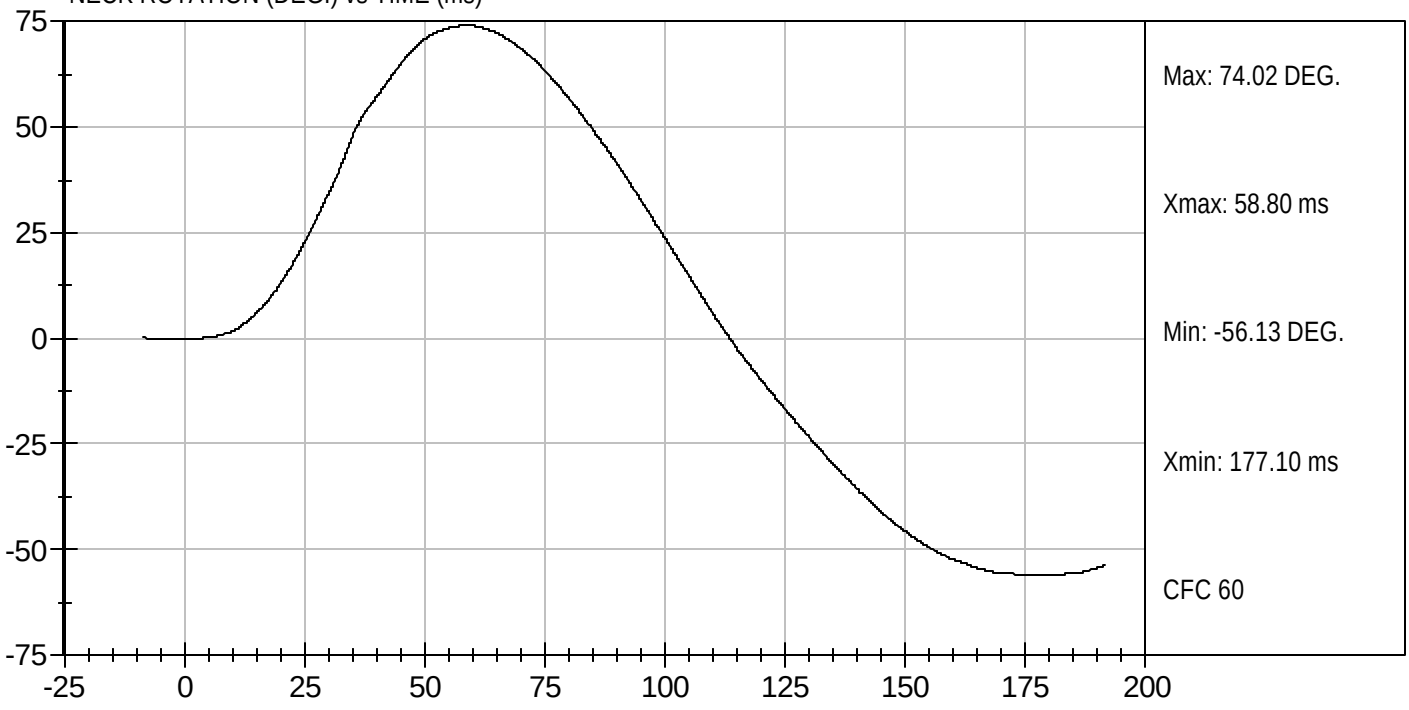
Test Desc: Neck Flexion
Componet ID: D042902

Test Date: 12/21/2004
Velocity: 22.87 ft/s, 6.97 m/s

PENDULUM DECELERATION (G'S) vs TIME (ms)

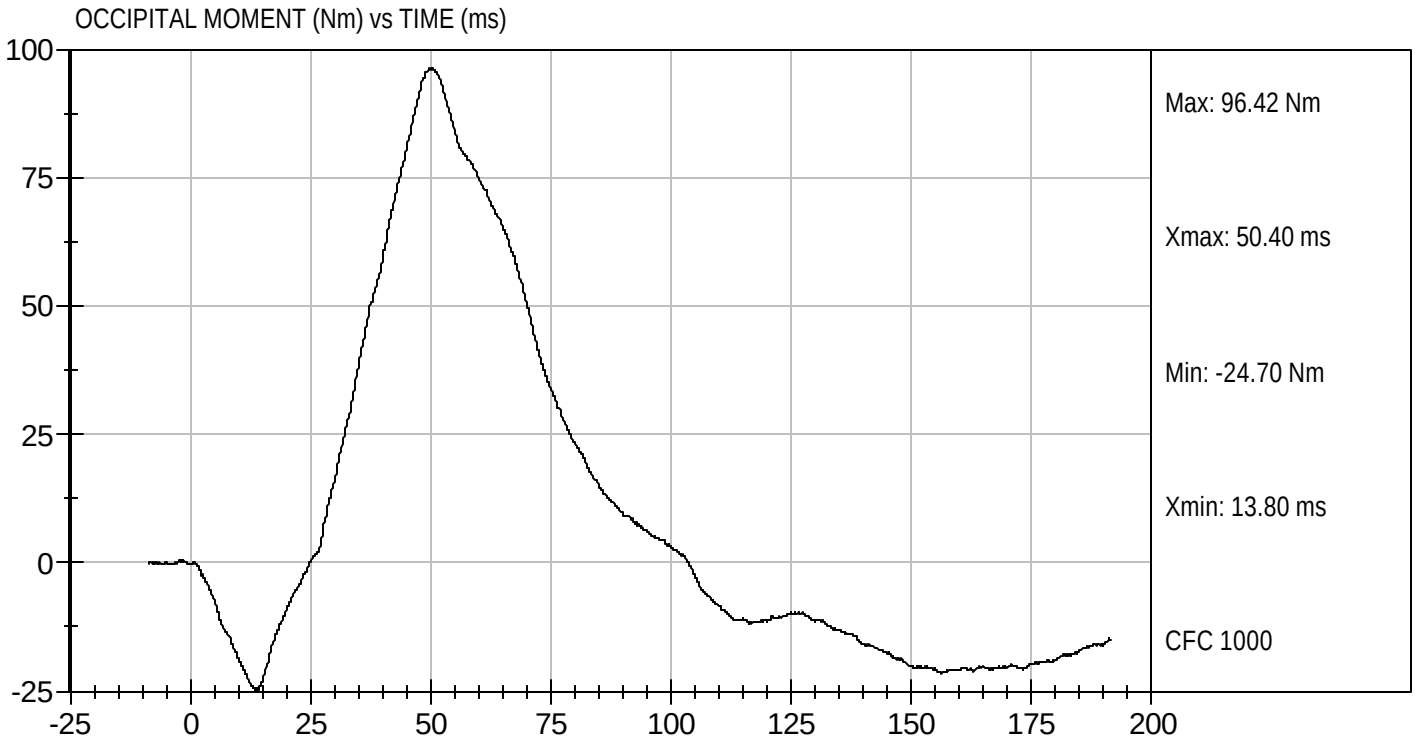


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Componet ID: D042902

Test Date: 12/21/2004
Velocity: 22.87 ft/s, 6.97 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D042903

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	15	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.04	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.49	Pass
	20 msec	G's	14.00 to 19.00	16.65	Pass
	30 msec	G's	11.00 to 16.00	14.19	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	14.15	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	39.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	100.3	Pass
	Time	msec	72.0 to 82.0	78.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	157.8	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-68.2	Pass
	Time	msec	65.0 to 79.0	72.6	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	146.5	Pass
			Overall Test Results		Pass

Joe Fleck

Laboratory Technician

12/21/2004

Test Date

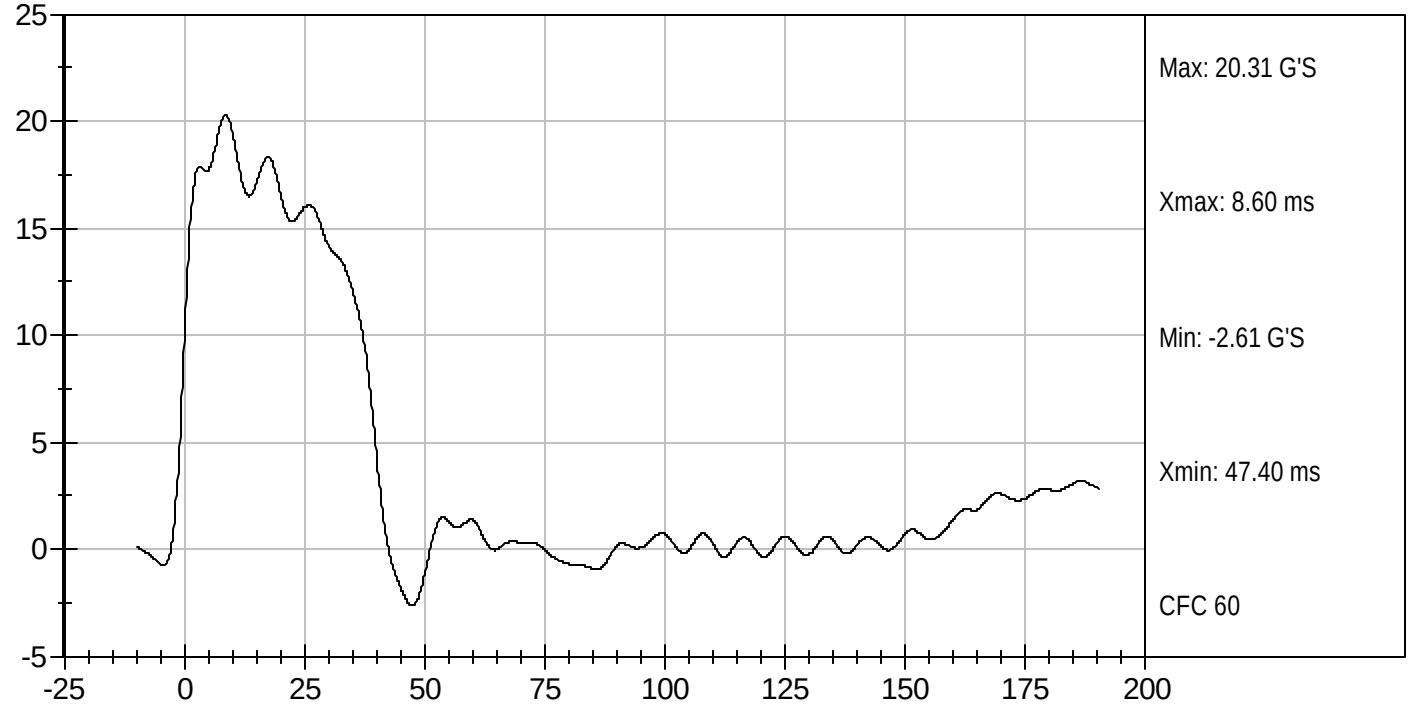
David Winkelbauer

Approved By

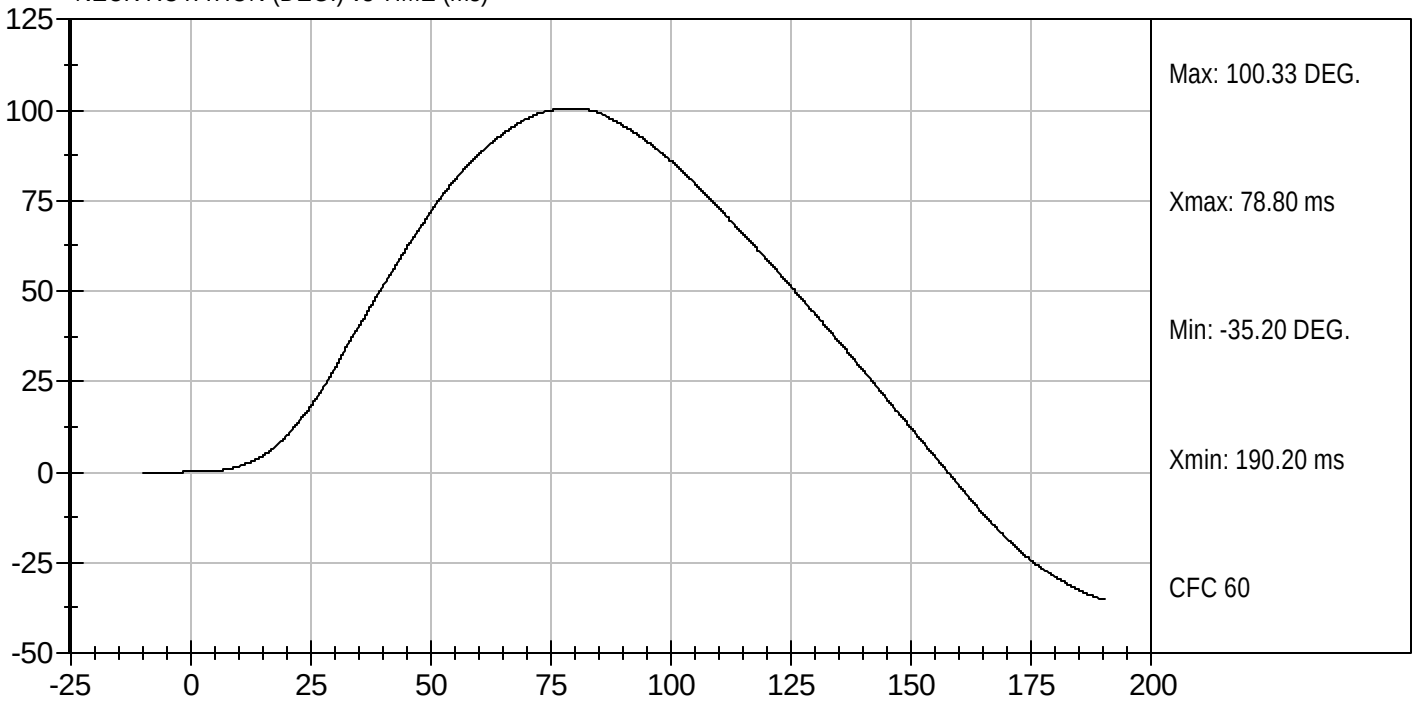
Test Desc: Neck Extension
Componet ID: D042903

Test Date: 12/21/2004
Velocity: 19.8 ft/s, 6.04 m/s

PENDULUM DECELERATION (G'S) vs TIME (ms)



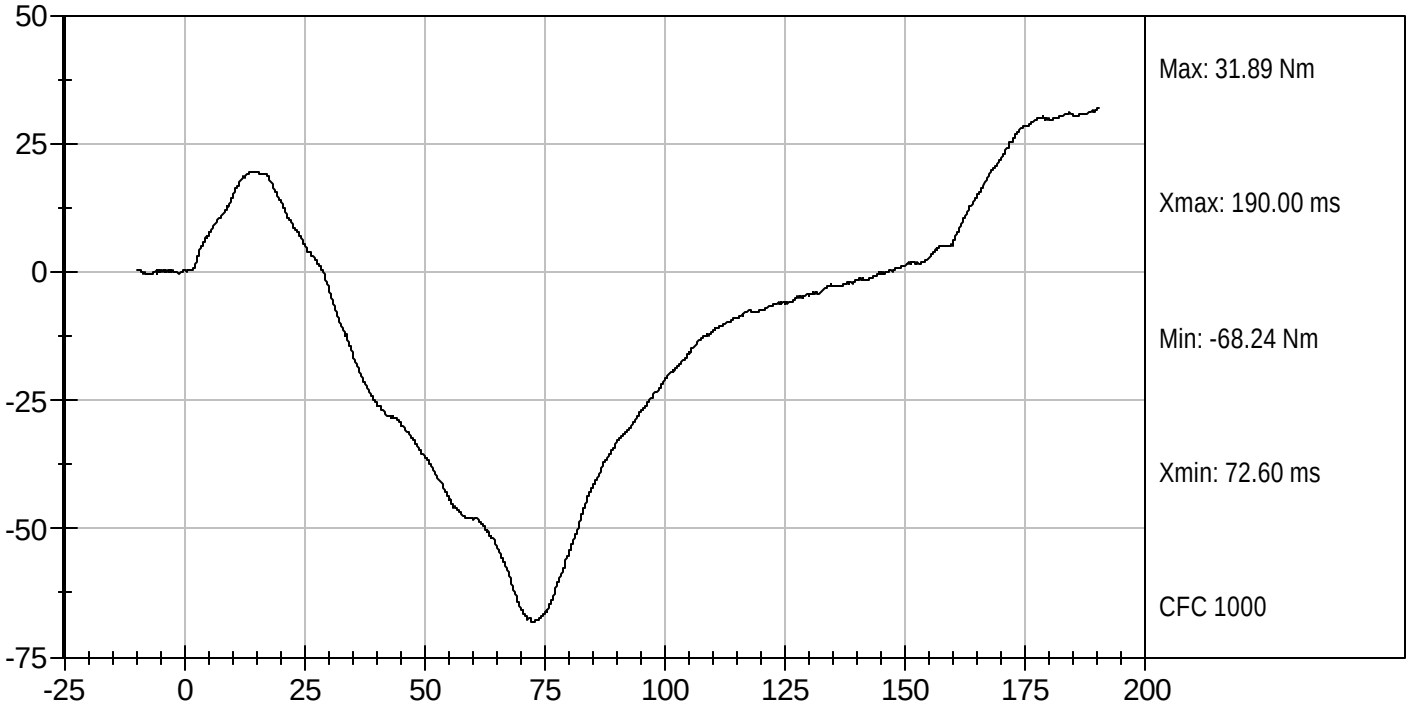
NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Componet ID: D042903

Test Date: 12/21/2004
Velocity: 19.8 ft/s, 6.04 m/s

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D042904

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Probe Velocity	m/s	6.58 to 6.82	6.63	Pass
Peak Probe Force	N	5159 to 5893	5,727	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.81	Pass
Internal Hysteresis	%	69 to 85	69	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

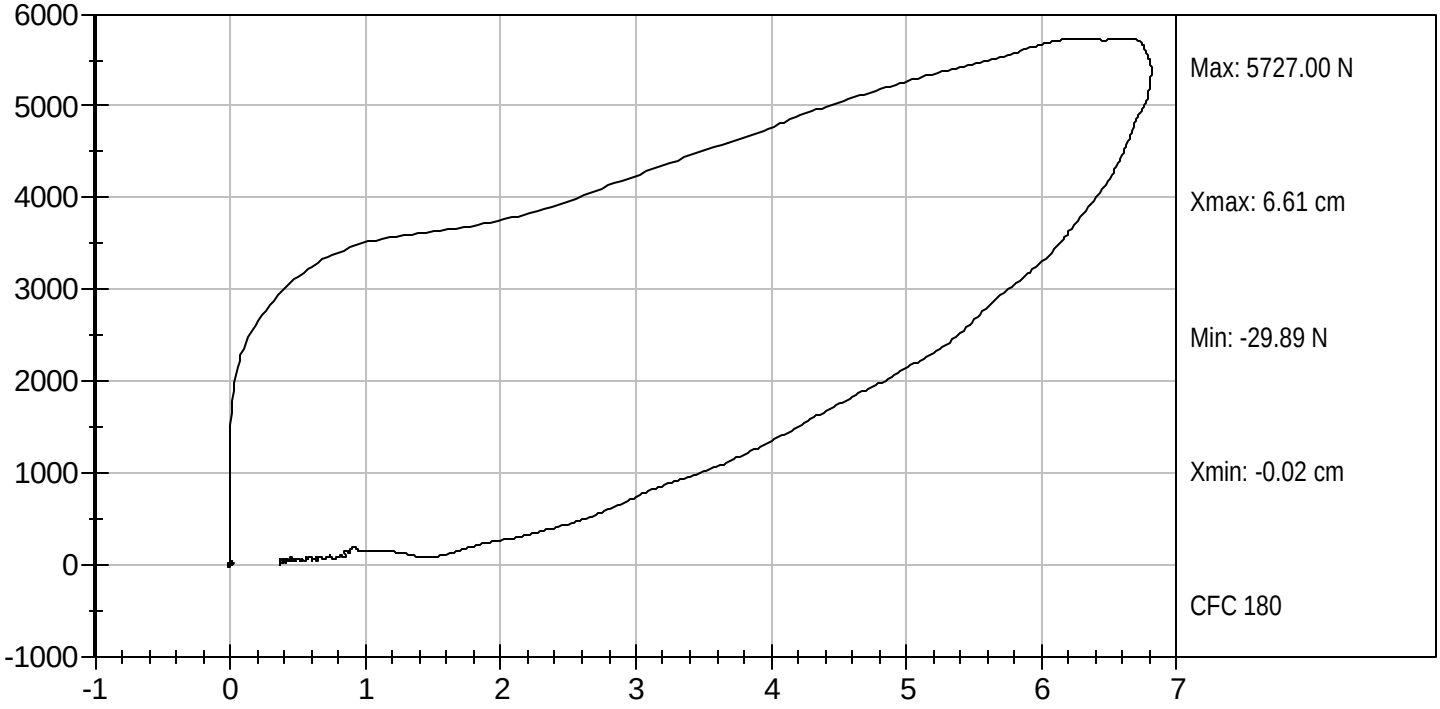
12/21/2004
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Componet ID: D042904

Test Date: 12/21/2004
Velocity: 21.75 ft/s, 6.63 m/s

FORCE (N) vs CHEST DISPLACEMENT (cm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D042905

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5,243	Pass
		Overall Test Results		Pass

Joe Fleck

Laboratory Technician

12/21/2004

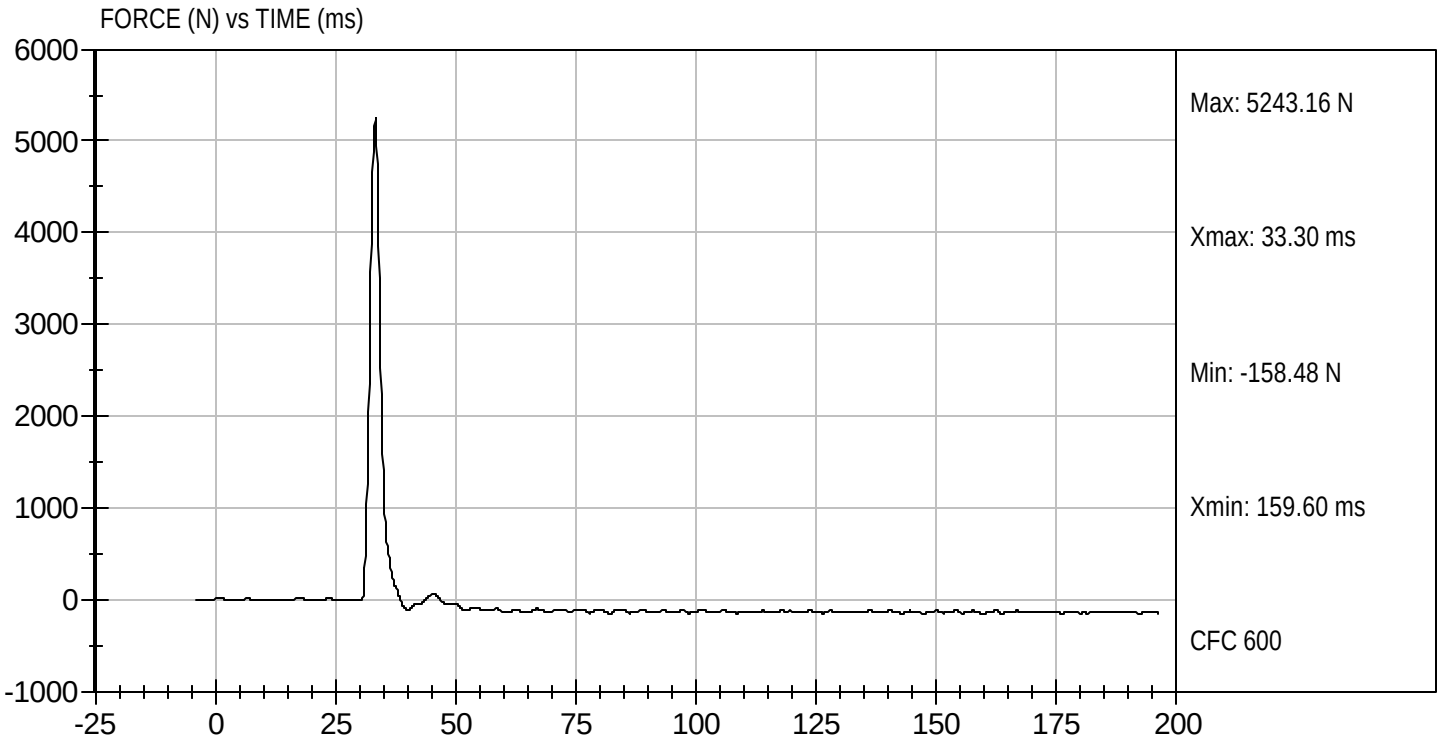
Test Date

David Winkelbauer

Approved By

Test Desc: Right Knee
Componet ID: D042905

Test Date: 12/21/2004
Velocity: 6.87 ft/s, 2.09 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D042906

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5,181	Pass
		Overall Test Results		Pass

Joe Fleck

Laboratory Technician

12/21/2004

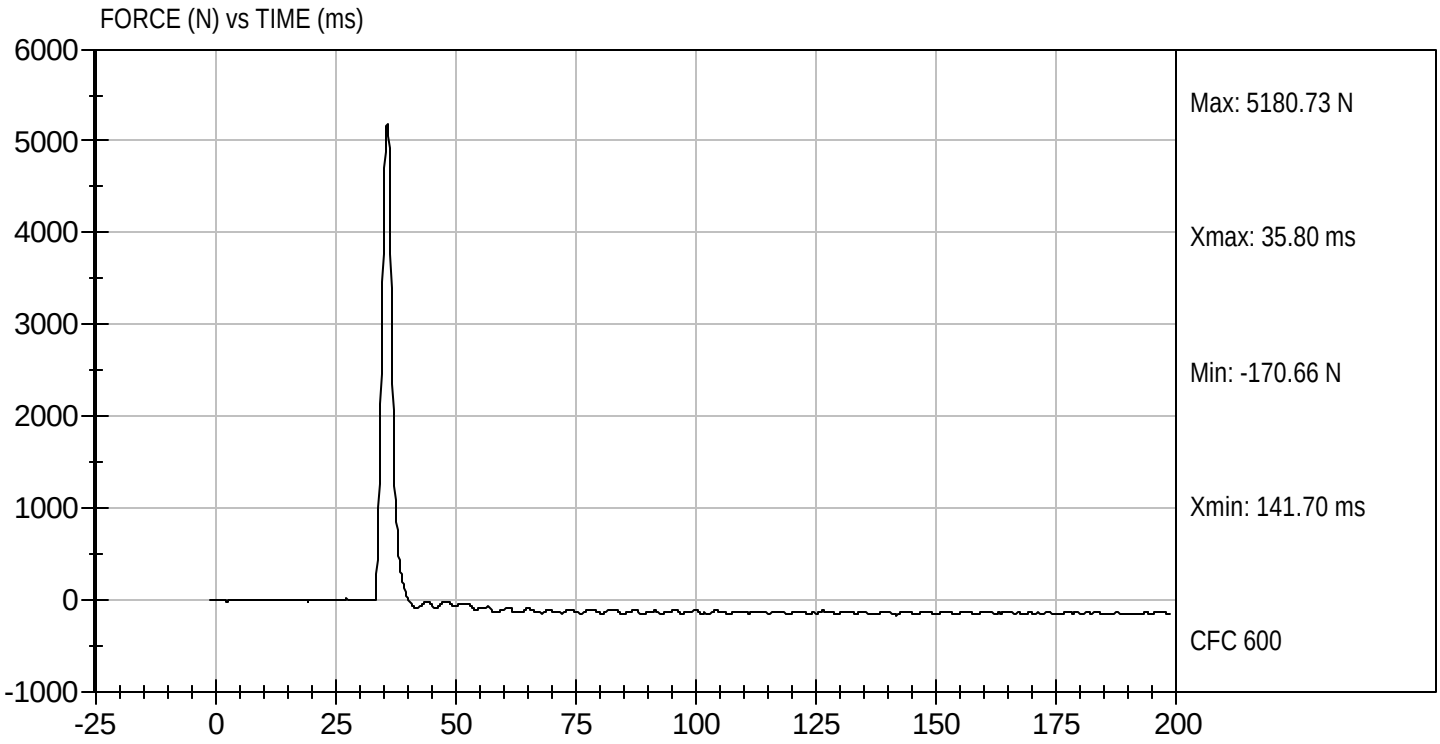
Test Date

David Winkelbauer

Approved By

Test Desc: Left Knee
Componet ID: D042906

Test Date: 12/21/2004
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D042900

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.1	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	18	18	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	74.7	74.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	43	43	Pass
		Overall Test Results			Pass

James Carney

Laboratory Technician

12/21/2004

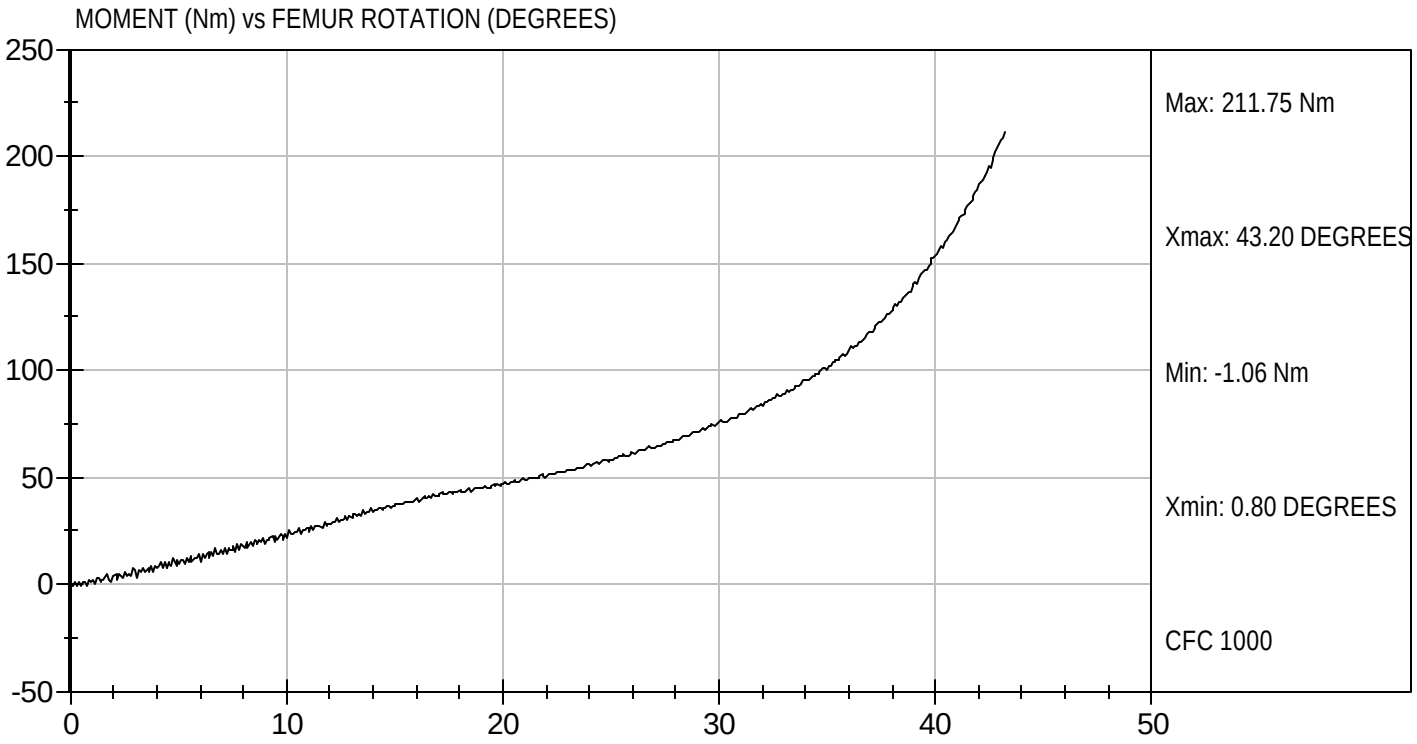
Test Date

David Winkelbauer

Approved By

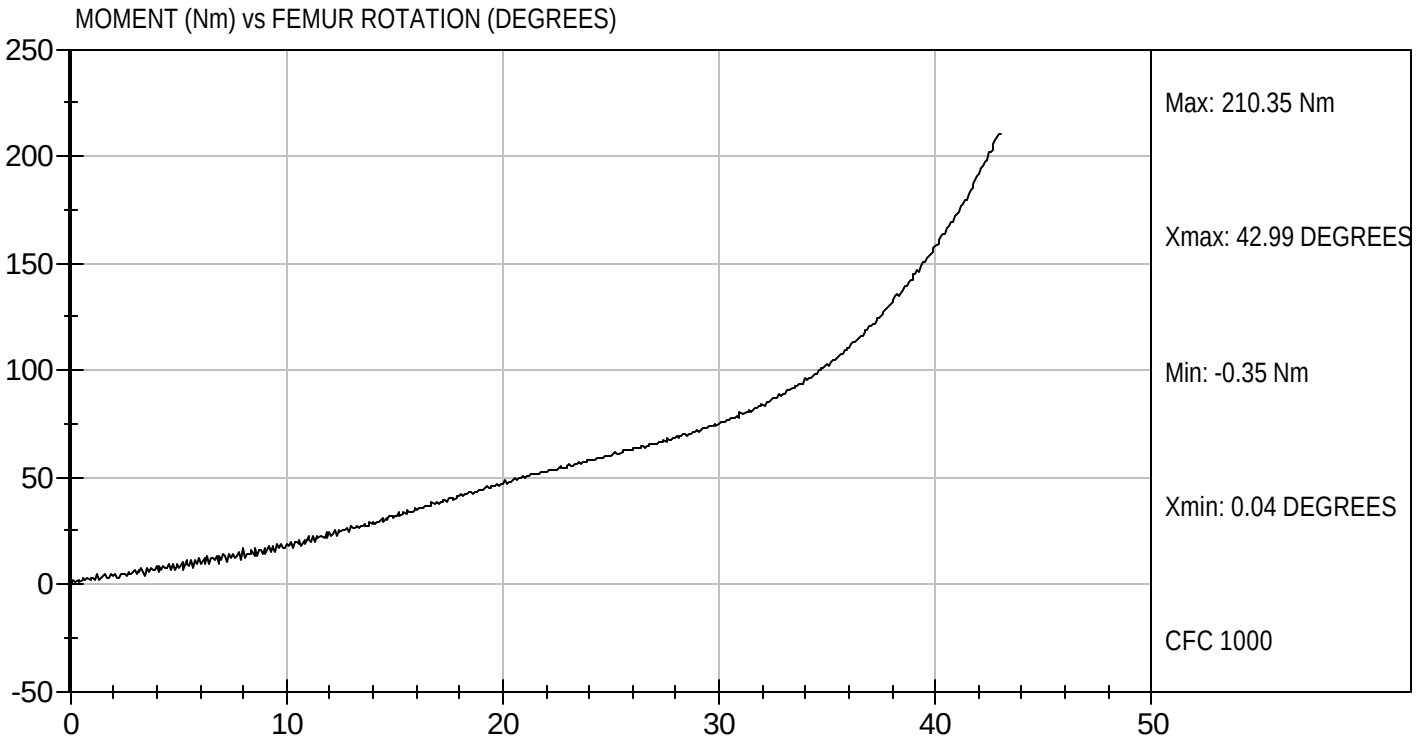
Test Desc: Hip Femur Flexion
Componet ID: D042909

Test Date: 12/21/2004
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Componet ID: D042900

Test Date: 12/21/2004
Velocity: 0 ft/s, 0.00 m/s



APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

INSTRUMENTS FOR DRIVER DUMMY NO. 066

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	A28-H01	Entran	09/17/04
Head Y	J13535	Endevco	10/25/04
Head Z	A28-H02	Entran	09/17/04
Head X Redundant	A27-Z12	Entran	09/17/04
Head Y Redundant	AH097	Endevco	10/25/04
Head Z Redundant	L17-Z14	Entran	09/17/04
Neck Load Cell	442	Denton	07/20/04
Chest X	P22086	Endevco	08/04/04
Chest Y	AJ9D2	Endevco	08/04/04
Chest Z	P24265	Endevco	08/04/04
Chest Deflection Gauge	066	Servo	08/03/04
Chest X Redundant	P22652	Endevco	08/04/04
Chest Y Redundant	AJ417	Endevco	08/04/04
Chest Z Redundant	P22150	Endevco	08/04/04
Pelvis X	J13851	Endevco	08/02/04
Pelvis Y	AJ808	Endevco	08/02/04
Pelvis Z	AH0F0	Endevco	08/02/04
Left Femur Load Cell	259	Denton	07/20/04
Right Femur Load Cell	256	Denton	07/20/04
Left Upper Tibia Load Cell	107	Denton	07/22/04
Left Lower Tibia Load Cell	136	Denton	07/22/04
Right Upper Tibia Load Cell	103	Denton	07/22/04
Right Lower Tibia Load Cell	133	Denton	07/22/04
Left Foot Z – Front	A05-A20	Entran	08/04/04
Left Ankle X	A05-A21	Entran	08/04/04
Left Ankle Z	A07-J01	Entran	08/04/04
Right Foot Z – Front	ANBP7	Endevco	07/23/04
Right Ankle X	L30-Z18	Entran	08/04/04
Right Ankle Z	A12-A11	Entran	08/04/04
Shoulder Belt Load Cell	158	Denton	12/07/04
Lap Belt Load Cell	166	Denton	12/07/04

INSTRUMENTS FOR PASSENGER DUMMY NO. 065

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	P27020	Endevco	08/04/04
Head Y	P27025	Endevco	08/04/04
Head Z	P22692	Endevco	08/04/04
Head X Redundant	J10431	Endevco	08/04/04
Head Y Redundant	P26986	Endevco	08/04/04
Head Z Redundant	AN9E3	Endevco	08/04/04
Neck Load Cell	443	Denton	07/20/04
Chest X	AMT78	Endevco	08/04/04
Chest Y	AP1Y8	Endevco	08/04/04
Chest Z	J11361	Endevco	08/04/04
Chest Deflection Gauge	065	Servo	08/03/04
Chest X Redundant	ALFP5	Endevco	08/04/04
Chest Y Redundant	AP138	Endevco	08/04/04
Chest Z Redundant	AJ9Y3	Endevco	08/04/04
Pelvis X	AJ9D8	Endevco	11/12/04
Pelvis Y	AJ4J3	Endevco	11/12/04
Pelvis Z	AF0M3	Endevco	11/12/04
Left Femur Load Cell	262	Denton	07/20/04
Right Femur Load Cell	261	Denton	07/20/04
Left Upper Tibia Load Cell	266	Denton	07/22/04
Left Lower Tibia Load Cell	179	Denton	07/22/04
Right Upper Tibia Load Cell	263	Denton	07/22/04
Right Lower Tibia Load Cell	174	Denton	07/22/04
Left Foot Z – Front	AMTL6	Endevco	09/17/04
Left Ankle X	AMTG3	Endevco	09/17/04
Left Ankle Z	ALC37	Endevco	09/17/04
Right Foot Z – Front	J21970	Endevco	09/17/04
Right Ankle X	J22033	Endevco	09/17/04
Right Ankle Z	J21691	Endevco	09/17/04
Shoulder Belt Load Cell	157	Denton	08/18/04
Lap Belt Load Cell	194	Denton	12/07/04

INSTRUMENTS FOR VEHICLE

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	L20-B12	Entran	12/02/04
Left Rear Seat Crossmember Z	J21-Z02	Entran	12/01/04
Right Rear Seat Crossmember X	C24-B02	Entran	09/30/04
Right Rear Seat Crossmember Z	J21-Z04	Entran	12/01/04
Top of Engine X	K07-R08	Entran	12/02/04
Bottom of Engine X	J21-Z01	Entran	12/01/04
Left Brake Caliper X	L17-D01	Entran	09/24/04
Right Brake Caliper X	A08-M02	Entran	09/13/04
Instrument Panel X	L17-D09	Entran	08/24/04