REPORT NUMBER: 208-MGA-2004-010

VEHICLE SAFETY COMPLIANCE TESTING
FOR
FMVSS 208, OCCUPANT CRASH PROTECTION
FMVSS 212, WINDSHIELD MOUNTING
FMVSS 219, WINDSHIELD INTRUSION (PARTIAL)
FMVSS 301, FUEL SYSTEM INTEGRITY

Toyota Motor Corporation
2004 Toyota Highlander Limited
NHTSA No.: C45111

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

Test Date: August 18, 2004

Final Report Date: September 27, 2004

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
MAIL CODE: NVS-220
400 SEVENTH STREET, SW, ROOM 6115
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 DTNH22-03-D-11002.

Prepared _____ Date: September 27, 2004
Jeff Lewandowski, Project Engineer

Reviewed by: _____ Date: September 27, 2004
David Winkelbauer, Facility Director

FINAL REPORT ACCEPTED BY OVSC:

Accepted By: _____

Acceptance Date: _____

Technical Report Documentation Page

1. Report No. 208-MGA-2004-010	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Final Report of FMVSS 208 Compliance Testing of a 2004 Toyota Highlander MPV NHTSA No.: C45111		*5. Report Date* September 27, 2004 *6. Performing Organization Code* MGA	
7. Author(s) Jeff Lewandowski, Project Engineer		*8. Performing Organization Report No.* 208-MGA-2004-010	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-03-D-11002	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Enforcement Office of Vehicle Safety Compliance 400 Seventh St., S.W., Room 6115 NVS-220 Washington, D.C. 20590		*13. Type of Report and Period Covered* 8/18/04 to 9/27/04 *14. Sponsoring Agency Code* NVS-220	
15. Supplementary Notes			
16. Abstract Compliance tests were conducted on the subject 2004 Toyota Highlander in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP208-12 for the determination of FMVSS 208 compliance. Test failures identified were as follows: TEST FAILURES: None			
17. Key Words Frontal Impact 40 kmph Vehicle Safety Compliance Testing FMVSS 208, “Occupant Crash Protection” FMVSS 212, “Windshield Mounting” FMVSS 219, (partial), “Windshield Zone Intrusion” FMVSS 301, “Fuel System Integrity”		*18. Distribution Statement* Copies of this report are available from the following: NHTSA Technical Information Services (TIS), Mail Code: NPO-230 400 Seventh Street, S.W., Room 5108 Washington, D.C. 20590 Tel. No.: (202) 366-4946	
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SECTION 1

PURPOSE OF COMPLIANCE TEST

This Federal Motor Vehicle Safety Standard (FMVSS) 208 compliance test is part of a program conducted for the National Highway Traffic Safety Administration (NHTSA) by MGA Research Corporation (MGA) under Contract No. DTNH22-03-D-11002. The purpose of this test was to determine whether the subject vehicle, a 2004 Toyota Highlander MPV, NHTSA No. C45111, meets certain performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219, "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity". The compliance test was conducted in accordance with OVSC Laboratory Test Procedure No. TP208-12 dated January 14, 2003.

SECTION 2
TESTS PERFORMED

Test Vehicle: 2004 Toyota Highlander MPV NHTSA No.: C45111
Test Program: FMVSS 208 Compliance Test Dates: 8/18/04

The following checked items indicate the tests that were performed:

- [ ] 1. Rear outboard seating position seat belts (S4.1.1.2(b) & (S4.2.4)
- [ ] 2. Air bag labels (S4.5.1)
- [ ] 3. Readiness indicator (S4.5.2)
- [ ] 4. Passenger air bag manual cut-off device (S4.5.4)
- [ ] 5. Lap belt lockability (S7.1.1.5)
- [ ] 6. Seat belt warning system (S7.3)
- [ ] 7. Seat belt contact force (S7.4.4)
- [ ] 8. Seat belt latch plate access (S7.4.4)
- [ ] 9. Seat belt retraction (S7.4.5)
- [ ] 10. Seat belt guides and hardware (S7.4.6)
- [ ] 11. Suppression tests with 12-month-old CRABI dummy (Part 572, Subpart R)
- [ ] 12. Suppression tests with newborn infant (Part 572, Subpart K)
- [ ] 13. Suppression tests with 3-year-old dummy (Part 572, Subpart P)
- [ ] 14. Suppression tests with 6-year-old dummy (Part 572, Subpart N)
- [ ] 15. Test of reactivation of the passenger air bag system with an unbelted 5th percentile female dummy
- [ ] 16. Low risk deployment test with 12-month-old dummy (Part 572, Subpart R)
- [ ] 17. Low risk deployment test with 3-year-old dummy (Part 572, Subpart P)
- [ ] 18. Low risk deployment test with 6-year-old dummy (Part 572, Subpart N)
- [ ] 19. Low risk deployment test with 5th female dummy (Part 572, Subpart O)
- [X] 20. Impact Tests
  - [ ] Frontal Oblique
    - [ ] Belted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.1(a))
    - [ ] Unbelted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.2(a)(1))
    - [ ] Unbelted 50th male dummy driver and passenger (32 to 40 kmph) (S5.1.2(a) (1) or S5.1.2(b))
  - [X] Frontal 0°
    - [ ] Belted 50th male dummy driver (0 to 48 kmph) (S5.1.1.(b)(1) or S5.1.1(a))
    - [ ] Belted 50th male dummy passenger (0 to 48 kmph) (S5.1.1.(b)(1) or S5.1.1(a))
    - [ ] Belted 5th female dummy driver (0 to 48 kmph) (S16.1(a))
    - [ ] Belted 5th female dummy passenger (0 to 48 kmph) (S16.1(a))
    - [ ] Belted 50th male dummy driver and passenger (0 to 56 kmph) (S5.1.1.(b)(2))
    - [ ] Unbelted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.2(a) (1))
    - [ ] Unbelted 50th male dummy driver (32 to 40 kmph) (S5.1.2.(a)(2) or S5.1.2(b))
    - [ ] Unbelted 50th male dummy passenger (32 to 40 kmph) (S5.1.2.(a)(2) or S5.1.2(b))

X		Unbelted 5th female dummy driver (32 to 40 kmph) (S16.1(b))
X		Unbelted 5th female dummy passenger (32 to 40 kmph) (S16.1(b))
		40% Offset 0° Belted 5th male dummy driver and passenger (0 to 40 kmph) (S18.1)
	21.	Sled Test: unbelted 50th male dummy driver and passenger (S13)
	22.	FMVSS 204 Indicant Test
X	23.	FMVSS 212 Test
X	24.	FMVSS 219 Indicant Test
X	25.	FMVSS 301 Frontal Test

For the crash tests, the vehicle was instrumented with 8 accelerometers. The accelerometer data from the vehicle and dummies were sampled at 10,000 samples per second and processed as specified in SAE J211/1 MAR95 and FMVSS 208, S4.13.

The dynamic tests were recorded using high-speed film and high-speed digital video.

The post test FMVSS 301 rollover was not conducted at the request of the COTR.

SECTION 3

INJURY RESULT SUMMARY FOR FMVSS 208 TESTS

Test Vehicle: 2004 Toyota Highlander MPV NHTSA No.: C45111
Test Program: FMVSS 208 Compliance Test Date: 08/18/04

40 kmph Frontal Crash

Impact Angle: Zero degrees

Belted Dummies: __Yes (Rear Passenger) _X_ No (Driver and Front Passenger)
Speed Range: ___ 0 to 40 kmph _X_ 32 to 40 kmph
___ 0 to 48 kmph ___ 0 to 56 kmph

Test Speed: 39.8 kmph Test Weight: 2064.7 kg

Driver Dummy: _X_ 5th female ___ 50th male
Passenger Dummy: _X_ 5th female ___ 50th male
Center Rear Passenger Dummy: ___ 5th female __ 50th male

5th Percentile Female Frontal Crash Test
Vehicles certified to S16.1(a), S16.1(b), or S18.1

Injury Criteria	Max. Allowable Injury Assessment Values	Driver	Passenger
HIC15	700	72	67
N_{te}	1.0	0.4	0.2
N_{tf}	1.0	0.2	0.2
N_{ce}	1.0	0.1	0.2
N_{cf}	1.0	0.1	0.5
Neck Tension	2620 N	898	396
Neck Compression	2520 N	66	683
Chest g	60 g	44	29
Chest Displacement	52 mm	23	6
Left Femur	6805 N	3306	4483
Right Femur	6805 N	3828	3842

SECTION 4

DISCUSSION OF TESTS

Test Vehicle:	2004 Toyota Highlander MPV	NHTSA No.:	C45111
Test Program:	FMVSS 208 Compliance	Test Date:	8/18/04

The vehicle was tested in a 25 mph frontal impact only. FMVSS 208 Datasheets not used for this test have been removed from the report.

The test vehicle was incorrectly ballasted for the test. A Designated Seating Capacity (DSC) of 5 was used to measure Fully Loaded Weight and Test Weight. This resulted in the Rated Cargo and Luggage Weight (RCLW) to be 136kg rather than the 50kg if the DSC of 7 had been used. The vehicle Test Weight was approximately 86kg over the value that would have been used in the correct procedure.

The post test FMVSS 301 rollover was not conducted at the request of the COTR.

Partial data was collected for the Top of Engine X. It was truncated at 75 msec.

SECTION 5

TEST DATA SHEETS

Test Vehicle:	2004 Toyota Highlander MPV	NHTSA No.:	C45111
Test Program:	FMVSS 208 Compliance	Test Dates:	8/18/04

DATA SHEET 1

COTR VEHICLE WORK ORDER

Test Vehicle: 2004 Toyota Highlander MPV NHTSA No.: C45111
Test Program: FMVSS 208 Compliance Test Dates: 8/18/04

COTR Signature: Charles R. Case

Test to be performed for this vehicle are checked below:

	1.	Rear Outboard Seating Position Seat Belts (S4.1.2(b)) & (S4.2.4)
	2.	Air Bag Labels (S4.5.1)
	3.	Readiness Indicator (S4.5.2)
	4.	Passenger Air Bag Manual Cut-off Device (S4.5.4)
	5.	Lap Belt Lockability (S7.1.1.5)
	6.	Seat Belt Warning System (S7.3)
	7.	Seat Belt Contact Force (S7.4.4)
	8.	Seat Belt Latch Plate Access (S7.4.4)
	9.	Seat Belt Retraction (S7.4.5)
	10.	Seat Belt Guides and Hardware (S7.4.6)
	11.	Suppression tests with 12-month-old CRABI dummy (Part 572, Subpart R) using the following indicated child restraints.

Section B

	Britax Handle with Care 191	Full Rearward	Mid Position	Full Forward
	Century Assura 4553	Full Rearward	Mid Position	Full Forward
	Century Avanta SE 41530	Full Rearward	Mid Position	Full Forward
	Century Smart Fit 4543	Full Rearward	Mid Position	Full Forward
	Cosco Arriva 02727	Full Rearward	Mid Position	Full Forward
	Cosco Opus 35 02603	Full Rearward	Mid Position	Full Forward
	Evenflo Discovery Adjust Right 212	Full Rearward	Mid Position	Full Forward
	Evenflo First Choice 204	Full Rearward	Mid Position	Full Forward
	Evenflo On My Way Position Right V 282	Full Rearward	Mid Position	Full Forward
	Graco Infant 8457	Full Rearward	Mid Position	Full Forward

Section C

	Britax Roundabout 161	Full Rearward	Mid Position	Full Forward
	Century Encore 4612	Full Rearward	Mid Position	Full Forward
	Century STE 1000 4416	Full Rearward	Mid Position	Full Forward
	Cosco Olympian 02803	Full Rearward	Mid Position	Full Forward
	Cosco Touriva 02519	Full Rearward	Mid Position	Full Forward
	Evenflo Horizon V 425	Full Rearward	Mid Position	Full Forward
	Evenflo Medallion 254	Full Rearward	Mid Position	Full Forward

	12.	Suppression tests with newborn infant (Part 572, Subpart K) using the following indicated child restraints.

Section A

	Cosco Dream Ride 02-719	Full Rearward	Mid Position	Full Forward

	13.	Suppression tests with 3-year-old dummy (Part 572, Subpart P) using the following indicated child restraints where a child restraint is required.

Section C

Britax Roundabout 161	Full Rearward	Mid Position	Full Forward
Century Encore 4612	Full Rearward	Mid Position	Full Forward
Century STE 1000 4416	Full Rearward	Mid Position	Full Forward
Cosco Olympian 02803	Full Rearward	Mid Position	Full Forward
Cosco Touriva 02519	Full Rearward	Mid Position	Full Forward
Evenflo Horizon V 425	Full Rearward	Mid Position	Full Forward
Evenflo Medallion 254	Full Rearward	Mid Position	Full Forward

Section D

Britax Roadster 9004	Full Rearward	Mid Position	Full Forward
Century Next Step 4920	Full Rearward	Mid Position	Full Forward
Cosco High Back Booster 02-442	Full Rearward	Mid Position	Full Forward
Evenflo Right Fit 245	Full Rearward	Mid Position	Full Forward

14. Suppression tests with representative 3-year-old child using the following indicated child restraints where a child restraint is required. (Appendix H, Data Sheet 16H and 17H)

Section C

Britax Roundabout 161	Full Rearward	Mid Position	Full Forward
Century Encore 4612	Full Rearward	Mid Position	Full Forward
Century STE 1000 4416	Full Rearward	Mid Position	Full Forward
Cosco Olympian 02803	Full Rearward	Mid Position	Full Forward
Cosco Touriva 02519	Full Rearward	Mid Position	Full Forward
Evenflo Horizon V 425	Full Rearward	Mid Position	Full Forward
Evenflo Medallion 254	Full Rearward	Mid Position	Full Forward

Section D

Britax Roadster 9004	Full Rearward	Mid Position	Full Forward
Century Next Step 4920	Full Rearward	Mid Position	Full Forward
Cosco High Back Booster 02-442	Full Rearward	Mid Position	Full Forward
Evenflo Right Fit 245	Full Rearward	Mid Position	Full Forward

15. Suppression tests with 3-year-old dummy (Part 572, Subpart P) in the following Forward, Middle, and Rearward seat track positions

- Sitting on seat with back against seat back (S22.2.2.1)
- Sitting on seat with back against reclined seat back (S22.2.2.2)
- Sitting on seat with back not against seat back (S22.2.2.3)
- Sitting on seat edge, spine vertical, hands by the child's side (S22.2.2.4)
- Standing on seat, facing forward (S22.2.2.5)
- Kneeling on seat facing forward (S22.2.2.6)
- Kneeling on seat facing rearward (S22.2.2.7)
- Lying on seat (S22.2.2.8)

16. Suppression tests with representative 3-year-old child in the following positions

- Sitting on seat with back against seat back (S22.2.2.1)
- Sitting on seat with back against reclined seat back (S22.2.2.2)
- Sitting on seat with back not against seat back (S22.2.2.3)
- Sitting on seat edge, spine vertical, hands by the child's side (S22.2.2.4)
- Standing on seat, facing forward (S22.2.2.5)
- Kneeling on seat facing forward (S22.2.2.6)
- Kneeling on seat facing rearward (S22.2.2.7)
- Lying on seat (S22.2.2.8)

17. Suppression tests with 6-year-old dummy (Part 572, Subpart N) using the following indicated child restraints where a child restraint is required.

Section D

Britax Roadster 9004	Full Rearward	Mid Position	Full Forward
Century Next Step 4920	Full Rearward	Mid Position	Full Forward
Cosco High Back Booster 02-442	Full Rearward	Mid Position	Full Forward
Evenflo Right Fit 245	Full Rearward	Mid Position	Full Forward

18. Suppression tests with representative 6-year-old child using the following indicated child restraints where a child restraint is required.

Section D

Britax Roadster 9004	Full Rearward	Mid Position	Full Forward
Century Next Step 4920	Full Rearward	Mid Position	Full Forward
Cosco High Back Booster 02-442	Full Rearward	Mid Position	Full Forward
Evenflo Right Fit 245	Full Rearward	Mid Position	Full Forward

19. Suppression tests with 6-year-old dummy (Part 572, Subpart N) in the following Forward, Middle, and Rearward seat track positions

- Sitting on seat with back against seat back (S22.2.2.1)
- Sitting on seat with back against reclined seat back (S22.2.2.2)
- Sitting on seat edge, spine vertical, hands by the child's side (S22.2.2.4)
- Sitting back in the seat and leaning on the right front passenger door (S24.2.3)

20. Suppression tests with representative 6-year-old child in the following positions

- Sitting on seat with back against seat back (S22.2.2.1)
- Sitting on seat with back against reclined seat back (S22.2.2.2)
- Sitting on seat edge, spine vertical, hands by the child's side (S22.2.2.4)
- Sitting back in the seat and leaning on the right front passenger door (S24.2.3)

21. Test of Reactivation of the Passenger Air Bag System with an Unbelted 5th percentile female dummy (S20.3, 22.3, S24.3). Perform this test after the following suppression tests: After each restraint.

22. Test of Reactivation of the passenger air bag system with a representative 5th percentile female (S20.3, 22.3, S24.3). Perform this test after the following suppression tests:

23. Low risk deployment test with 12-month-old dummy (Part 572, Subpart R) using the following indicated child restraints.

Section B

Britax Handle with Care 191	Full Rearward	Mid Position	Full Forward
Century Assura 4553	Full Rearward	Mid Position	Full Forward
Century Avanta SE 41530	Full Rearward	Mid Position	Full Forward
Century Smart Fit 4543	Full Rearward	Mid Position	Full Forward
Cosco Arriva 02727	Full Rearward	Mid Position	Full Forward
Cosco Opus 35 02603	Full Rearward	Mid Position	Full Forward
Evenflo Discovery Adjust Right 212	Full Rearward	Mid Position	Full Forward
Evenflo First Choice 204	Full Rearward	Mid Position	Full Forward
Evenflo On My Way Position Right V 282	Full Rearward	Mid Position	Full Forward
Graco Infant 8457	Full Rearward	Mid Position	Full Forward

Section C

Britax Roundabout 161	Full Rearward	Mid Position	Full Forward
Century Encore 4612	Full Rearward	Mid Position	Full Forward
Century STE 1000 4416	Full Rearward	Mid Position	Full Forward
Cosco Olympian 02803	Full Rearward	Mid Position	Full Forward
Cosco Touriva 02519	Full Rearward	Mid Position	Full Forward
Evenflo Horizon V 425	Full Rearward	Mid Position	Full Forward

[ ] Evenflo Medallion 254 [ ] Full Rearward [ ] Mid Position [ ] Full Forward

[ ] 24. Low risk deployment test with 3-year-old dummy (Part 572, Subpart P) in the following positions

- [ ] Position 1
- [ ] Position 2

[ ] 25. Low risk deployment test with 6-year-old dummy (Part 572, Subpart N) in the following positions

- [ ] Position 1
- [ ] Position 2

[ ] 26. Low risk deployment test with 5th percentile female dummy (Part 572, Subpart O) in the following positions

- [ ] Position 1
- [ ] Position 2

[X] 27. Impact Tests

- [ ] Frontal Oblique – Test Speed:
  - [ ] Belted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.1(a))
  - [ ] Unbelted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.2(a)(1))
  - [ ] Unbelted 50th male dummy driver and passenger (32 to 40 kmph) (S5.1.2(a) (1) or S5.1.2(b))
- [X] Frontal 0° - Test Speed: 39.8 kmph
  - [ ] Belted 50th male dummy driver (0 to 48 kmph) (S5.1.1.(b)(1) or S5.1.1(a))
  - [ ] Belted 50th male dummy passenger (0 to 48 kmph) (S5.1.1.(b)(1) or S5.1.1(a))
  - [ ] Belted 5th female dummy driver (0 to 48 kmph) (S16.1(a))
  - [ ] Belted 5th female dummy passenger (0 to 48 kmph) (S16.1(a))
  - [ ] Belted 50th male dummy driver and passenger (0 to 56 kmph) (S5.1.1.(b)(2))
  - [ ] Unbelted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.2(a) (1))
  - [ ] Unbelted 50th male dummy driver (32 to 40 kmph) (S5.1.2.(a)(2) or S5.1.2(b))
  - [ ] Unbelted 50th male dummy passenger (32 to 40 kmph) (S5.1.2.(a)(2) or S5.1.2(b))
  - [X] Unbelted 5th female dummy driver (32 to 40 kmph) (S16.1(b))
  - [X] Unbelted 5th female dummy passenger (32 to 40 kmph) (S16.1(b))
- [ ] 40% Offset 0° Belted 5th male dummy driver and passenger (0 to 40 kmph) (S18.1) – Test Speed:

[ ] 28. Sled Test: Unbelted 50th male dummy driver and passenger (S13)

[ ] 29. FMVSS 204 Indicant Test

[X] 30. FMVSS 212 Indicant Test

[X] 31. FMVSS 219 Indicant Test

[X] 32. FMVSS 301 Indicant Frontal Test

DATA SHEET 2

REPORT OF VEHICLE CONDITION

Test Vehicle: 2004 Toyota Highlander MPV NHTSA No.: C45111
Test Program: FMVSS 208 Compliance Test Dates: 8/18/04

CONTRACT NO. DTNH22- 03-D-11002 Date: 7/28/04
FROM (Lab and rep name): MGA Research Corporation
TO: NHTSA, OVSC (NVS-220)

PURPOSE: (X) Initial Receipt ( ) Received via Transfer (X) Present vehicle condition

MODEL YEAR/MAKE/MODEL/BODY STYLE:	2004 Toyota Highlander MPV		
MANUFACTURE DATE:	12/03		
NHTSA NO.	C45111	GVWR:	2430 kg (5360 lbs)
BODY COLOR:	Indigo Blue	GAWR (Fr):	1300 kg (2865 lbs)
VIN:	JTEEP21A940025615	GAWR (Rr):	1340 kg (2950 lbs)

ODOMETER READINGS:	ARRIVAL (miles):	95	DATE:	7/28/04
	COMPLETION (miles):	96	DATE:	8/18/04
PURCHASE PRICE: ($)	35,867			
DEALER'S NAME:	Elmhurst Toyota; 440 West Lake Street; Elmhurst, IL 60128			

A. All options listed on window sticker are present on the test vehicle:
_X_Yes ___No
B. Tires and wheel rims are new and the same as listed: _X_Yes ___No
C. There are no dents or other interior or exterior flaws: _X_Yes ___No
D. The vehicle has been properly prepared and is in running condition:
_X_Yes ___No
E. Keyless remote is available and working: _X_ Yes __No
F. The glove box contains an owner's manual, warranty document, consumer information, and extra set of keys: _X_Yes ___No
G. Proper fuel filler cap is supplied on the test vehicle: _X_Yes ___No
H. Using permanent marker, identify vehicle with NHTSA number and FMVSS test type(s) on roof line above driver door or for school buses, place a placard with NHTSA number inside the windshield and to the exterior front and rear side of bus:
_X_Yes ___No
I. Place vehicle in storage area: _X_Yes ___No
J. Inspect the vehicle's interior and exterior, including all windows, seats, doors, etc. to confirm that each system is complete and functional per the manufacturer's specifications. Any damage, misadjustment, or other unusual condition that could influence the test program or test results shall be recorded. Report any abnormal condition to the NHTSA COTR before beginning any test:
_X_Vehicle OK ___Conditions reported below

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

LIST OF FMVSS TESTS PERFORMED BY THIS LAB: FMVSS 208, 212, 219, 301

VEHICLE: 2004 Toyota Highlander MPV NHTSA NO. C45111

REMARKS:

Equipment that is no longer on the test vehicle as noted on previous page:

Tool and jack, luggage door inner trim, luggage room side trim, deck board and tray, luggage cover, third seat

Explanation for equipment removal:

Components removed for instrumentation installation and to meet target weight.

Test Vehicle Condition:

25 mph frontal impact damage- front suspension & structure damaged, hood & front quarter panels damaged, radiator damaged, air bags & pretensioners deployed, Stoddard in fuel system

RECORDED BY: Jeff Lewandowski DATE: 8/18/2004

APPROVED BY: David Winkelbauer DATE: 8/18/2004

##########

RELEASE OF TEST VEHICLE

The vehicle described above is released from MGA to be delivered to:

Date: Time: Odometer:

Lab Rep's Signature:

Title:

Carrier/Customer Rep:

Date:

DATA SHEET 3

CERTIFICATION LABEL AND TIRE PLACARD INFORMATION

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Clark Subrt

NHTSA No.: C45111
Test Date: 8/18/04

Certification Label	
Manufacturer:	Toyota Motor Corp.
Date of Manufacture:	12/03
VIN:	JTEEP21A940025615
Vehicle Certified As (Pass. Car/MPV/Truck/Bus):	MPV
Front Axle GVWR:	1300 kg (2865 lbs)
Rear Axle GVWR:	1340 kg (2950 lbs)
Total GVWR:	2430 kg (5360 lbs)

Tire Placard	
Not applicable, vehicle is not a passenger car and does not have a tire placard.	MPV
This is not a passenger car, but all or part of this information is still contained on a vehicle label and is reported here.	MPV
Vehicle Capacity Weight:	526 kg (1159 lbs)
Designated Seating Capacity Front:	2
Designated Seating Capacity Rear:	5
Total Designated Seating Capacity:	7
Recommended Cold Tire Inflation Pressure Front:	210 kpa (30 psi)
Recommended Cold Tire Inflation Pressure Rear:	210 kpa (30 psi)
Recommended Tire Size:	P225/65R17

Signature: Clark Subrt

Date: 08/18/04

DATA SHEET 14

MARKING OF REFERENCE POINTS FOR VARIOUS TEST POSITIONS AND POINTS

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Eric Peschman

NHTSA No.: C45111
Test Date: 8/18/04

1. Driver Designated Seating Position:

X	1.1	Position the seat's adjustable lumbar supports so that the lumbar supports are in the lowest, retracted or deflated adjustment positions. (S16.2.10.1)
		☐ N/A – No lumbar adjustment
X	1.2	Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position (S16.2.10.2)
		☐ N/A – No additional support adjustment
X	1.3	Mark a point (seat cushion reference point) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion.
X	1.4	Draw a line (seat cushion reference line) through the seat cushion reference point.
X	1.5	Using only the controls that primarily move the seat in the fore-aft direction, move the seat cushion reference point to the rearmost position.
X	1.6	If the seat cushion adjusts fore-aft, independent of the seat back, use only the controls that primarily move the seat cushion in the fore-aft direction to move the seat cushion reference point to the rearmost position (S16.2.10.3)
		☐ N/A – No independent fore-aft seat cushion adjustment
X	1.7	Using any part of any control, other than the parts just used for fore-aft positioning, determine the range of angles of the seat cushion reference line and set the seat cushion reference line at the mid-angle.
X		Maximum Angle: 6.0 Degrees, Nose Up
X		Minimum Angle: 3.7 Degrees Nose Down
X		Mid-angle: 1.2 Degrees, Nose Up
X	1.8	If the seat and/or seat cushion height is adjustable, use any part of any control other than those which primarily move the seat or seat cushion fore-aft, to put the seat cushion reference point in its lowest position with the seat cushion reference line angle at the mid-angle found in 1.7.
		☐ N/A – No seat height adjustment
X	1.9	Using only the controls that primarily move the seat in the fore-aft direction, verify the seat is in the rearmost position.
X	1.10	Using only the controls that primarily move the seat in the fore-aft direction, mark for future reference the fore-aft seat positions. Mark each position so that there is a visual indication when the seat is at a particular position. For manual seats, move the seat forward one detent at a time and mark each detent. For power seats, mark only the rearmost, middle, and foremost positions. Label three of the positions with the following: F for foremost, M for mid-position (if there is no mid-position, label the closest adjustment position to the rear of the mid-point), and R for rearmost.
X	1.11	Use only the controls that primarily move the seat in the fore-aft direction to place the seat in the rearmost position.

[X] 1.12 Using any controls, other than the controls that primarily move the seat and/or seat cushion in the fore-aft direction, find and visually mark for future reference the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.7.

[X] 1.13 Using only the controls that primarily move the seat and/or seat cushion in the fore-aft direction, place the seat in the mid-fore-aft position.

[X] 1.14 Using any controls, other than the controls that primarily move the seat in the fore-aft direction, find and visually mark for future reference the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.7.

[X] 1.15 Using only the controls that change the seat in the fore-aft direction, place the seat in the foremost position.

[X] 1.16 Using any controls, other than the controls that primarily move the seat in the fore-aft direction, find and visually mark for future reference the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.7.

[X] 1.17 Visually mark for future reference the seat back angle, if adjustable, at the manufacturer's nominal design riding position for a 50th percentile adult male in the manner specified by the manufacturer.

[ ] N/A – No seat back angle adjustment

[X] Manufacturer's design seat back angle: 3°on Headrest

[X] 1.18 Is the seat a bucket seat?

[X] Yes, go to 1.18.1 and skip 1.18.2

[ ] No, go to 1.18.2 and skip 1.18.1

1.18.1 Bucket seats:

[X] Locate and mark for future reference the longitudinal centerline of the seat cushion. The longitudinal centerline of a bucket seat cushion is determined at the widest part of the seat cushion. Measure perpendicular to the longitudinal centerline of the vehicle. (S16.3.1.10)

[X] Record the width of the seat cushion: 520 mm

[X] One half the width of the seat cushion is: 260 mm

[X] Record the distance from the edge of the seat cushion to the seat mark: 260 mm

1.18.2 Bench seats:

[ ] Locate and mark for future reference the longitudinal line on the seat cushion that marks the longitudinal vertical plane through the centerline of the steering wheel.

2. Passenger Designated Seating Position

[X] 2.1 Is the seat adjustable independent of the driver seating position?

[X] Yes, go to 2.2

[ ] No, go to 2.18

[X] 2.2 Position the seat's adjustable lumbar supports so that the lumbar supports are in the lowest, retracted or deflated adjustment positions (S16.2.10.1, S20,1.9.1, S22.1.7.1)

[ ] N/A – No lumbar adjustment

[X] 2.3 Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position. (S16.2.10.2, S20.1.9.2, S22.1.7.2)

[ ] N/A – No additional support adjustment

X 2.4 Mark a point (seat cushion reference point) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion.

X 2.5 Draw a line (seat cushion reference line) through the seat cushion reference point.

X 2.6 Using only the controls that primarily move the seat in the fore-aft direction, move the seat cushion reference point to the rearmost position.

X 2.7 If the seat cushion adjusts fore-aft, independent of the seat back, use only the controls that primarily move the seat cushion in the fore-aft direction to move the seat cushion reference point to the rearmost position (S16.2.10.3, S20.1.9.3, S22.1.7.3)

X N/A – No independent fore-aft seat cushion adjustment.

X 2.8 Using any part of the control, other than the parts just used for fore-aft positioning, determine the range of angles of the seat cushion reference line and set the seat cushion reference line at the mid-angle.

X Maximum Angle: Zero Degrees

X Minimum Angle: Zero Degrees

X Mid-angle: Zero Degrees

X 2.9 If the seat and/or seat cushion height is adjustable, use any part of any control other than those which primarily move the seat or seat cushion fore-aft, to put the seat cushion reference point in its lowest position with the seat cushion reference line angle at the mid-range angle.

X N/A – No seat height adjustment

X 2.10 Using only the controls that primarily move the seat and/or seat cushion in the fore-aft direction, verify the seat is in the rearmost position.

X 2.11 Using only the controls that primarily move the seat in the fore-aft direction, mark for future reference the fore-aft seat positions. Mark each position so that there is a visual indication when the seat is at a particular position. For manual seats, move the seat forward one detent at a time and mark each detent. For power seats, mark only the rearmost, middle, and foremost positions. Label three of the positions with the following: F for foremost, M for mid-position (if there is no mid-position, label the closest adjustment position to the rear of the mid-point), and R for rearmost.

X 2.12 Using only the controls that primarily move the seat in the fore-aft direction, place the seat in the rearmost position.

X 2.13 Using any controls, other than the controls that primarily move the seat in the fore-aft direction, find and visually mark for future reference the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 2.8.

X N/A – No seat height adjustment Go to 2.18

X 2.14 Using only the controls that primarily move the seat in the fore-aft direction, place the seat in the mid-fore-aft position.

X 2.15 Using any controls, other than the controls that primarily move the seat in the fore-aft direction, find and visually mark for future reference the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 2.8.

X 2.16 Using only the controls that change the seat in the fore-aft direction, place the seat in the foremost position.

X 2.17 Using any controls, other than the controls that primarily move the seat in the fore-aft direction, find and visually mark for future reference the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 2.8.

X 2.18 Visually mark for future reference the seat back angle, if adjustable, at the manufacturer's nominal design riding position for a 50th percentile adult male in the manner specified by the manufacturer.

☐ N/A – No seat back angle adjustment

☐ N/A – The seat back angle adjustment is controlled by the setting of the driver seat back angle.

X Manufacturer's design seat back angle: 3 ° on headrest post

X Actual seat back angle: 3 ° on headrest post

X 2.19 Is the seat a bucket seat?

X Yes, go to 2.19.1 and skip 2.19.2

☐ No, go to 2.19.2 and skip 2.19.1

2.19.1 Bucket seats:

X Locate and mark for future reference the longitudinal centerline of the seat cushion. (S20.2.1.3, S22.2.1.3) The longitudinal centerline of a bucket seat cushion is determined at the widest part of the seat cushion. Measure perpendicular to the longitudinal centerline of the vehicle. (S20.1.10)

X Record the width of the seat cushion: 525 mm

X One half the width of the seat cushion is: 262 mm

X Record the distance from the edge of the seat cushion to the longitudinal centerline of the seat cushion. (The vertical plane through this longitudinal centerline is Plane B for suppression.) 262 mm

2.19.2 Bench seats:

☐ Locate and mark for future reference the longitudinal centerline of the passenger seat cushion. The longitudinal centerline is the same distance from the longitudinal centerline of the vehicle as the center of the steering wheel. (S20.2.1.3, S22.2.1.3)

☐ Record the distance from the longitudinal centerline of the vehicle to the center of the steering wheel:

☐ Record the distance from the longitudinal centerline of the vehicle to the longitudinal centerline of the seat cushion. (The vertical plane through this longitudinal centerline is Plane B for suppression.)

X 3. Head Restraints

☐ N/A, vehicle contains automatic head restraints

☐ N/A, there is no head restraint adjustment

X 3.1 Left outboard

X 3.1.1 Adjust the head restraint to its lowest position. (S16.3.4.2)

X 3.1.2 Any adjustment of the head restraint shall be used to position it full forward. For example, if it rotates, rotate it such that the head restraint extends as far forward as possible. **Mark** the foremost position.

X 3.1.3 Measure the vertical distance from the top most point of the head restraint to the bottom most point. Locate and **mark** a horizontal plane through the midpoint of this distance.

X Vertical height of head restraint (mm): 200

X Mid-point height (mm): 100

X 3.2 Right outboard

X 3.2.1 Adjust the head restraint to its lowest position. (S16.3.4.2)

[X] 3.2.2 Any adjustment of the head restraint shall be used to position it full forward. For example, if it rotates, rotate it such that the head restraint extends as far forward as possible. **Mark** the foremost position.

[X] 3.2.3 Measure the vertical distance from the top most point of the head restraint to the bottom most point. Locate and **mark** a horizontal plane through the midpoint of this distance.

[X] Vertical height of head restraint (mm): 190

[X] Mid-point height (mm): 95

[X] 4. Steering Wheel

[X] 4.1 Is the steering wheel adjustable up and down and/or in and out?

[X] Yes, go to 4.2

[ ] No, this form is complete

[X] 4.2 Find and **mark** for future reference each up and down position. Label three of the positions with the following: H for highest, M for mid-position (if there is no mid-position, label the next lowest adjustment position), and L for lowest.

[ ] N/A, steering wheel is not adjustable up and down

[X] 4.3 Find and **mark** for future references each in and out position. Label three of the positions with the following: F for foremost, M for mid-position (if there is no mid-position, label the next rearmost adjustment position), and R for rearmost.

[ ] N/A, steering wheel is not adjustable in and out

[X] 5. Driver Low Risk Deployment

[X] N/A, no low risk deployment tests scheduled

[ ] 5.1 Position the steering wheel so the front wheels are in the straight-ahead position. (S26.2.1)

[ ] 5.2 Position any adjustable parts of the steering controls to the mid-position as determined in item 3 above. If a mid-position adjustment is not achievable, position the controls to the next lowest detent position. (S26.2.1)

[ ] 5.3 Locate the vertical plane parallel to the vehicle longitudinal centerline through the geometric center of the opening through which the driver air bag deploys into the occupant compartment. This is referred to as “Plane E”. (Check determination method below.) (S26.2.6)

[ ] Plane E determined using manufacturer’s information supplied by the COTR . (Found in Appendix D on page D-47)

[ ] Plane E determined by test lab personnel and approved by the COTR. (Include supporting documentation in the test report.)

	Ey (mm)
“Plane E” Measurement::	
Measured:	
Specified:	
Verify Measured Equals Specified +/- 6mm:	

[ ] 5.4 Locate the horizontal plane through the highest point of the air bag module cover. This is referred to as “Plane F." (Check determination method below.) (S26.2.6)

[ ] Plane F determined using manufacturer’s information supplied by the COTR . (Found in Appendix D on page D-47)

[ ] Plane F determined by test lab personnel and approved by the COTR. (Include supporting documentation in the test report.)

	Fz (mm)
“Plane F” Measurement::	

Measured:	
Specified:	
Verify Measured Equals Specified +/- 6mm:	

[X] 6. Passenger Low Risk Deployment – Planes C and D

[X] N/A, no low risk deployment tests scheduled

[ ] 6.1 Locate the horizontal plane through the geometric center of the opening through which the right front air bag deploys into the occupant compartment. This is referred to as "Plane C." (Check location method below.) (S22.4.1.3)

[ ] Plane C located using manufacturer's information supplied by the COTR. (Include manufacturer's information in the test report.) OR

[ ] Plane C located by test lab personnel and approved by the COTR. (Include supporting documentation in the test report.)

	Cz (mm)
"Plane C" Measurement::	
Measured:	
Specified:	
Verify Measured Equals Specified +/- 6mm:	

[ ] 6.2 Locate the vertical plane parallel to the vehicle longitudinal centerline through the geometric center of the opening through which the right front air bag deploys into the occupant compartment. This is referred to as "Plane D." (Check determination method below.) (S22.4.1.2)

[ ] Plane D determined using manufacturer's information supplied by the COTR. (Include manufacturer's information in the test report.) OR

[ ] Plane D determined by test lab personnel and approved by the COTR. (Include supporting documentation in the test report.)

	Dy (mm)
"Plane D" Measurement:	
Measured:	
Specified:	
Verify Measured Equals Specified +/- 6mm:	

[ ] 6.3 **Mark** the intersection of Planes C and D on the instrument panel.

[ ] 7. 5th Female Dummy
Mark a point on the chin of the dummy 40 mm below the center of the mouth. (Chin Point) (S26.2.6)

[ ] 8. 6-Year-Old Dummy
Locate and **mark** a point on the front of the dummy's chest jacket on the midsaggital plane which is 139 mm (5.5 in) ± 3 mm (± 0.1 in) along the surface of the skin down from the top of the skin at the neck line. Designate this point as "Point 1." (S24.4.1.1)

[ ] "Point 1" measurement (mm):

[ ] 9. 3-Year-Old Dummy
Locate and **mark** a point on the front of the dummy's chest jacket on the midsaggital plane which is 114 mm (4.5 in) ± 3 mm (± 0.1 in) along the surface of the skin down from the top of the skin at the neck line. Designate this point as "Point 1." (S22.4.1.1)

[ ] "Point 1" measurement (mm +/- 3 mm):

REMARKS:

I certify that I have read and performed each instruction.

Signature: _____ Date: 08/18/04

DATA SHEET 30
VEHICLE WEIGHT, FUEL TANK, AND ATTITUDE DATA

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Wayne Dahlke

NHTSA No.: C45111
Test Date: 8/18/04

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	___ 50th Male Ctr Rear	

X	1.	Fill the transmission with transmission fluid to the satisfactory range.
X	2.	Drain fuel from vehicle
X	3.	Run the engine until fuel remaining in the fuel delivery system is used and the engine stops.
X	4.	Record the useable fuel tank capacity supplied by the COTR
X		Useable Fuel Tank Capacity supplied by COTR: 72.5 liters (19.2 gallons)
X	5.	Record the fuel tank capacity supplied in the owner's manual.
X		Useable Fuel Tank Capacity in owner's manual: 72.5 liters (19.2 gallons)
X	6.	Using purple dyed Stoddard solvent having the physical and chemical properties of Type 1 solvent or cleaning fluid, Table 1, ASTM Standard D484-71, "Standard Specifications for Hydrocarbon Dry-cleaning Solvents," or gasoline, fill the fuel tank.
X		Amount Added: 72.5 liters (19.2 gallons)
X	7.	Fill the coolant system to capacity.
X	8.	Fill the engine with motor oil to the Max. mark on the dip stick.
X	9.	Fill the brake reservoir with brake fluid to its normal level.
X	10.	Fill the windshield washer reservoir to capacity.
X	11.	Inflate the tires to the tire pressure on the tire placard. If no tire placard is available, inflate the tires to the recommended pressure in the owner's manual.

Tire placard pressure:	RF:	30 psi	LF:	30 psi	RR:	30 psi	LR:	30 psi
Owner's manual pressure:	RF:	30 psi	LF:	30 psi	RR:	30 psi	LR:	30 psi
Actual inflated pressure:	RF:	30 psi	LF:	30 psi	RR:	30 psi	LR:	30 psi

X	12.	Record the vehicle weight at each wheel to determine the unloaded vehicle weight (UVW), i.e. "as delivered" weight).	

Right Front (kg):	504.8	Right Rear (kg):	403.3
Left Front (kg):	526.2	Left Rear (kg):	402.8
Total Front (kg):	1031.0	Total Rear (kg):	806.1
% Total Weight:	56.1	% Total Weight:	43.9
UVW = TOTAL FRONT PLUS TOTAL REAR (KG):			1837.1

X	13.	UVW Test Vehicle Attitude: (All dimensions in millimeters)
X	13.1	Mark a point on the vehicle above the center of each wheel.
X	13.2	Place the vehicle on a level surface.

X 13.3 Measure perpendicular to the level surface to the 4 points marked on the body and record the measurements

RF:	807	LF:	800	RR:	809	LR:	810

X 14. Calculate the Rated Cargo and Luggage Weight (RCLW): 186 kg ***The RCLW was incorrectly calculated; the correct calculation appears below.***

X 14.1 Does the vehicle have the vehicle capacity weight (VCW) on the certification label or tire placard?

X X Yes, go to 14.3

No, go to 14.2

14.2 VCW = Gross Vehicle Weight – UVW

VCW = _____ - _____ =_____

X 14.3 VCW = 526 kg (1159 lbs)

X 14.4 Does the certification or tire placard contain the Designated Seating Capacity (DSC)?

X Yes, go to 14.6

No, go to 14.5 and skip 14.6

14.5 DSC = Total number of seat belt assemblies = _____

X 14.6 DSC = 5
The DSC was incorrectly interpreted as 5; it should have been 7.

X 14.7 RCLW = VCW – (68 kg x DSC) = 526 kg - (68 kg x 5) = 186 kg
The RCLW was incorrectly calculated; the correct calculation appears below.
RCLW = VCW – (68 kg x DSC) = 526 kg - (68 kg x 7) = 50 kg

X 14.8 Is the vehicle certified as a truck, MPV or bus (see the certification label on the door jamb)?

X Yes, if the calculated RCLW is greater than 136 kg, use 136 kg as the RCLW. (S8.1.1)

No, use the RCLW calculated in 14.7 ***(This option should have been used)***

X 15. Fully Loaded Weight (100% fuel fill): 2071.1 kg

X 15.1 Place the appropriate test dummy in both front outboard seating positions.

Driver: X 5th female __50th male
Passenger: X 5th female __50th male

X 15.2 Load the vehicle with the RCLW from 14.7 or 14.8 whichever is applicable.

X 15.3 Place the RCLW in the cargo area. Center the load over the longitudinal centerline of the vehicle. (S8.1.1 (d))

X 15.4 Record the vehicle weight at each wheel to determine the Fully Loaded Weight.

Right Front (kg):	532.5	Right Rear (kg):	493.5
Left Front (kg):	552.1	Left Rear (kg):	493.1
Total Front (kg):	1084.6	Total Rear (kg):	986.6
% Total Weight:	52.4	% Total Weight:	47.6
% GVW	44.6	% GVW	40.6
Fully Loaded Weight = Total Front Plus Total Rear (kg):			2071.2

X 16. Fully Loaded Test Vehicle Attitude: (All dimensions in millimeters)

X 16.1 Place the vehicle on a level surface.

X 16.2 Measure perpendicular to the level surface to the 4 points marked on the body (see 13.1 above) and record the measurements

RF:	802	LF:	795	RR:	785	LR:	784

X 17. Drain the fuel system

X 18. Using purple dyed Stoddard solvent having the physical and chemical properties of Type 1 solvent or cleaning fluid, Table 1, ASTM Standard D484-71, "Standard Specifications for Hydrocarbon Dry-cleaning Solvents," fill the fuel tank to 92 - 94 percent of useable capacity.

X Fuel tank capacity x .94 = 72.5 liters (19.2 gallons) x .94 = 68.1 liters (18.0 gallons)

X Amount added 68.1 liters (18.0 gallons) 94%

X 19. Crank the engine to fill the fuel delivery system with Stoddard solvent

X 20. Calculate the test weight range.

X 20.1 Calculated Weight = UVW (see 12 above) + RCLW (see 14 above) + 2x(dummy weight)

2071.1 kg = 1837.1 kg + 136.0 kg + 98.0 kg

X 20.2 Test Weight Range = Calculated Weight (- 4.5 kg, - 9 kg.)
Max. Test Weight = Calculated Test Weight – 4.5 kg = 2066.6 kg
Min. Test Weight = Calculated Test Weight – 9 kg = 2062.1 kg

X 21. Remove the RCLW from the cargo area.

X 22. Drain transmission fluid, engine coolant, motor oil, and windshield washer fluid from the test vehicle so that Stoddard solvent leakage from the fuel system will be evident.

X 23. Vehicle Components Removed For Weight Reduction:
Tool and jack, luggage door inner trim, luggage room side trim, deck board and tray, luggage cover, third seat

X 24. Secure the equipment and ballast in the load carrying area and distribute it, as nearly as possible, to obtain the proportion of axle weight indicated by the gross axle weight ratings and center it over the longitudinal centerline of the vehicle.

X 25. If necessary, add ballast to achieve the actual test weight.

X N/A

Weight of Ballast: 111.6 kg

X 26. Ballast, including test equipment, must be contained so that it will not shift during the impact event or interfere with data collection or interfere with high-speed film recordings or affect the structural integrity of the vehicle or do anything else to affect test results. Care must be taken to assure that any attachment hardware added to the vehicle is not in the vicinity of the fuel tank or lines.

X 27. Record the vehicle weight at each wheel to determine the actual test weight.

Right Front (kg):	526.6	Right Rear (kg):	483.1
Left Front (kg):	560.6	Left Rear (kg):	494.4
Total Front (kg):	1087.2	Total Rear (kg):	977.5
% Total Weight:	52.7	% Total Weight:	47.3
% GVW	44.7	% GVW	40.2
(% GVW = Axle GVW divided by Vehicle GVW)			
TOTAL FRONT PLUS TOTAL REAR (kg):			2064.7

The Test Weight was over by approximately 86kg due to the incorrect DSC being used for Test Weight Calculation.

X 28. Is the test weight between the Max. Weight and the Min. Weight (See 20.2)?

X Yes

No, explain why not.

X 29. Test Weight Vehicle Attitude: (all dimensions in millimeters)

X 29.1 Place the vehicle on a level surface

X 29.2 Measure perpendicular to the level surface to the 4 points marked on the body (see 13 above) and record the measurements

RF:	804	LF:	797	RR:	785	LR:	784

X 30. Summary of test attitude

X 30.1 AS DELIVERED:

RF:	807	LF:	800	RR:	809	LR:	810

AS TESTED:

RF:	804	LF:	797	RR:	785	LR:	784

FULLY LOADED:

RF:	802	LF:	795	RR:	785	LR:	784

X 30.2 Is the “as tested” test attitude equal to or between the “fully loaded” and “as delivered” attitude?

X Yes

No, explain why not.

REMARKS: The test vehicle was incorrectly ballasted for the test. The RCLW was calculated on a Designated Seating Capacity (DSC) of 5 instead of the actual DSC of 7. The result was a Rated Cargo and Luggage Weight (RCLW) of 136 kg instead of 50 kg. Therefore, the wrong RCLW was used to calculate the test weight and the test weight was 86 kg heavier than it was supposed to be.

I certify that I have read and performed each instruction.

Signature: 

Date: 08/18/04

DATA SHEET 31

VEHICLE ACCELEROMETER LOCATION AND MEASUREMENT

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Clark Subrt

NHTSA No.: C45111
Test Date: 8/18/04

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	___ 50th Male Ctr Rear	

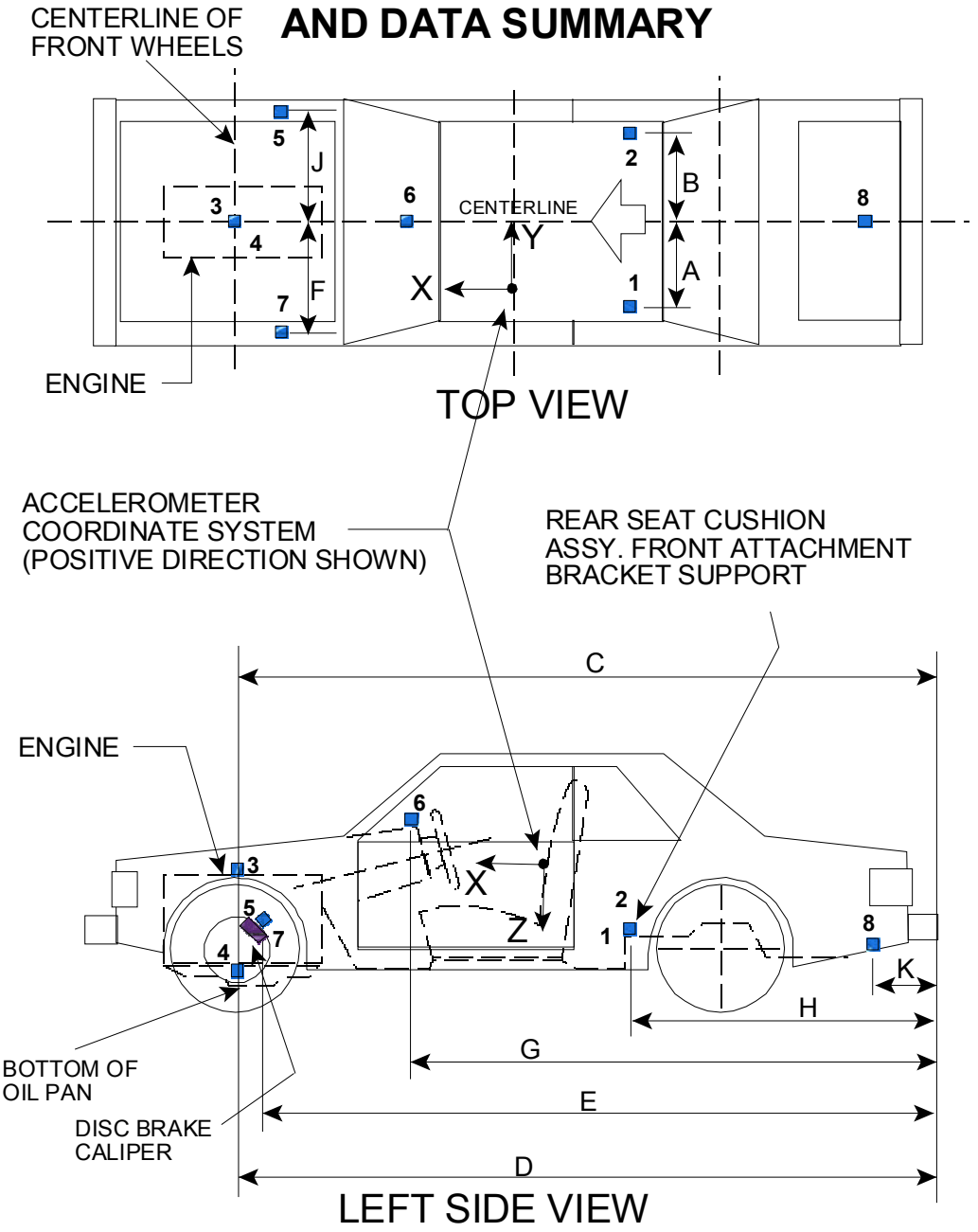
X	1.	Find the location where the vertical plane parallel to the longitudinal centerline of the vehicle and through the center of the left front outboard seating position intersects the left rear seat cross member. Install an accelerometer at this intersection on the rear seat cross member to record x-direction accelerations. Record the location on the following chart.
X	2.	Find the location where the vertical plane parallel to the longitudinal centerline of the vehicle and through the center of the right front outboard seating position intersects the right rear seat cross member. Install an accelerometer at this intersection on the rear seat cross member to record x-direction accelerations. Record the location on the following chart.
X	3.	Find the location where a vertical plane through the longitudinal centerline of the vehicle and a vertical transverse plane through the center of the two wheels on opposite sides of the engine intersect at the top of the engine. Install an accelerometer at this intersection to record x-direction accelerations. Record the location on the following chart.
X	4.	Find the location where a vertical plane through the longitudinal centerline of the vehicle and a vertical transverse plane through the center of the two wheels on opposite sides of the engine intersect the bottom of the engine. Install an accelerometer at this intersection to record x-direction accelerations. Record the location on the following chart
X	5.	Install an accelerometer on the right front brake caliper to record x-direction accelerations. Record the location on the following chart
X	6.	Find the location where a vertical plane through the longitudinal centerline of the vehicle intersects the top of the instrument panel. Install an accelerometer at this intersection to record x-direction accelerations. Record the location on the following chart
X	7.	Install an accelerometer on the left front brake caliper to record x-direction accelerations. Record the location on the following chart
X	8.	Find the location where a vertical plane through the longitudinal centerline of the vehicle intersects the floor of the trunk. Install an accelerometer on the trunk floor at this intersection to record z-direction accelerations. Record the location on the following chart

REMARKS:

I certify that I have read and performed each instruction.

Signature: Clark Subrt Date: 08/18/04

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



Dimensions Corresponding To The Letters “A” Through “K” (Excluding “I”) Are Recorded In The Table On The Following Page.
Accelerometers Corresponding To The Numbers 1 Through 8 Are Specified On The Preceding Page.

DATA SHEET 31
VEHICLE ACCELEROMETER LOCATION AND MEASUREMENTS

DIMENSION	LENGTH (mm)	
PRETEST VALUES		
A (LH Rear Seat Xmbr)	365	
B (RH Rear Seat Xmbr)	365	
C (Engine Top)	4105	
D (Engine Bottom)	3920	
E (Caliper)	Right Side 3863	Left Side 3863
F (Left Caliper)	698	
G (IP)	3084	
H (Seat)	1848	
J (Right Caliper)	698	
K (Trunk)	235	
POST TEST VALUES		
A (LH Rear Seat Xmbr)	365	
B (RH Rear Seat Xmbr)	365	
C (Engine Top)	3961	
D (Engine Bottom)	3898	
E (Caliper)	Right Side 3843	Left Side 3859
F (Left Caliper)	700	
G (IP)	3084	
H (Seat)	1848	
J (Right Caliper)	700	
K (Trunk)	235	

DATA SHEET 32

PHOTOGRAPHIC TARGETS

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Clark Subrt

NHTSA No.: C45111
Test Date: 8/18/04

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	___ 50th Male Ctr Rear	

X	1.	FMVSS 208 vehicle targeting requirements (See Figures 28A and 28B)
X	1.1	Targets A1 and A2 are on flat rectangular panels.
X	1.2	Three circular targets at least 90 mm in diameter and with black and yellow quadrants are mounted at the front on the outboard sides of A1 and A2. The center of each circular target is 100 mm from the one next to it.
X		Distance between targets (mm): 100 mm
X	1.3	Three circular targets at least 90 mm in diameter and with black and yellow quadrants are mounted at the back on the outboard sides of on A1 and A2. The center of each circular target is 100 mm from the one next to it.
X		Distance between targets (mm): 100 mm
X	1.4	The distance between the first circular target at the front of A1 and A2 and the last circular target at the back of A1 and A2 is at least 915 mm.
X		Distance between the first and last circular targets (mm): 915 mm
X	1.5	Firmly fix target A1 on the vehicle roof in the vertical longitudinal plane that is coincident with the midsagittal plane of the driver dummy.
X	1.6	Firmly fix target A2 on the vehicle roof in the vertical longitudinal plane that is coincident with the midsagittal plane of the passenger dummy.
X	1.7	Two circular targets (C1 and C2) at least 90 mm in diameter and with black and yellow quadrants are mounted on the outside of the driver door. The centers of each circular target are at least 610 mm apart.
X		Distance between targets (mm): 610 mm
X	1.8	Two circular targets (C1 and C2) at least 90 mm in diameter and with black and yellow quadrants are mounted on the outside of the passenger door. The centers of each circular target are at least 610 mm apart.
X		Distance between targets (mm): 610 mm
X	1.9	Place tape with squares having alternating colors on the top portion of the steering wheel.
X	1.10	Chalk the bottom portion of the steering wheel
X	1.11	Is this an offset test?
		Yes, continue with this section
X		No, go to 2.
	1.12	Measure the width of the vehicle.
		Vehicle width (mm):

	1.13	Find the centerline of the vehicle. (½ of the vehicle width)
	1.14	Find the line parallel to the centerline of the vehicle and 0.1 x vehicle width from the centerline of the vehicle.
	1.15	Apply 25 mm wide tape with alternating black and yellow squares parallel to and on each side of the line found in 1.14. The edge of each tape shall be 50 mm from the line found in 1.14. The tape shall extend from the bottom of the bumper to the front edge of the windshield. (Figure 28D
X	2.	Barrier Targeting
X	2.1	Fix two stationary targets D1 and D2 to the barrier as shown in the Figure 28A. One target is in the vertical longitudinal plane that is coincident with the midsagittal plane of the driver dummy. The other is in the vertical longitudinal plane that is coincident with the midsagittal plane of the passenger dummy
X	2.2	Targets D1 and D2 are on a rectangular panel.
X	2.3	Three circular targets at least 90 mm in diameter and with black and yellow quadrants are mounted on the sides of the rectangular panel away from the longitudinal centerline of the vehicle. The center of each circular target is 100 mm from the one next to it.
X		Distance between circular targets on D1 (mm): 100mm
X		Distance between circular targets on D2 (mm): 100mm
X	3.	FMVSS 208 Dummy Targeting Requirements
X	3.1	Place a circular target with black and yellow quadrants on both sides of the driver dummy head as close as possible to the center of gravity of the head in the x and z direction (relative to the measuring directions of the accelerometers).
X	3.2	Place a circular target with black and yellow quadrants on both sides of the passenger dummy head as close as possible to the center of gravity of the head in the x and z direction (relative to the measuring directions of the accelerometers).
X	3.3	Place a circular target with black and yellow quadrants on the outboard shoulder of the driver dummy. Place the target as high up on the arm as possible at the intersection of the arm and shoulder. The sleeve of the shirt on the dummy may be cut to make the target visible, but do not remove any material.
X	3.4	Place a circular target with black and yellow quadrants on the outboard shoulder of the passenger dummy. Place the target as high up on the arm as possible at the intersection of the arm and shoulder. The sleeve of the shirt on the dummy may be cut to make the target visible, but do not remove any material.
X	4.	FMVSS 204 Targeting Requirements
X	4.1	Is an FMVSS 204 indicant test ordered on the “COTR Vehicle Work Order?”
		Yes, continue with this form.
X		No, this form is complete. (Removed at manufacturer’s request with COTR approval)
	4.2	Resection panel (Figure 28C)
	4.2.1	The panel deviates no more than 6 mm from perfect flatness when suspended vertically
	4.2.2	The 8 targets on the panel are circular targets at least 90 mm in diameter and with black and yellow quadrants.
	4.2.3	The center of each of the 4 outer targets are placed within 1 mm of the corners of a square measuring 914 mm on each side.
	4.2.4	Locate another square with 228 mm sides and with the center of this square coincident with the center of the 914 mm square.
	4.2.5	The center of the 4 inner targets are placed at the midpoints of each of the 228 mm sides.

4.3 Place a circular target at least 90 mm in diameter and with black and yellow quadrants on a material (cardboard, metal, etc.) that can be taped to the top of the steering column.

4.4 Tape the target from 4.3 to the top of the steering column in a manner that does not interfere with the movement of the steering column in a crash

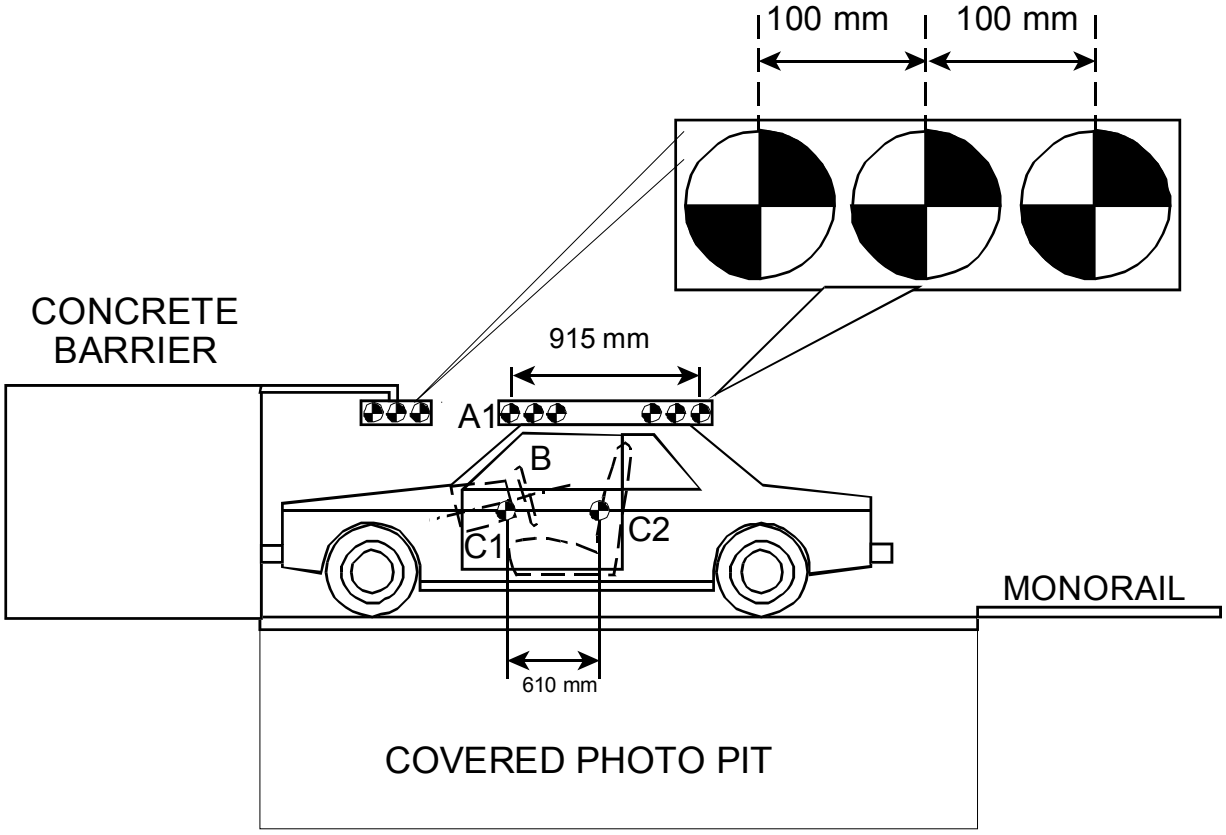
REMARKS:

I certify that I have read and performed each instruction.

Signature: 

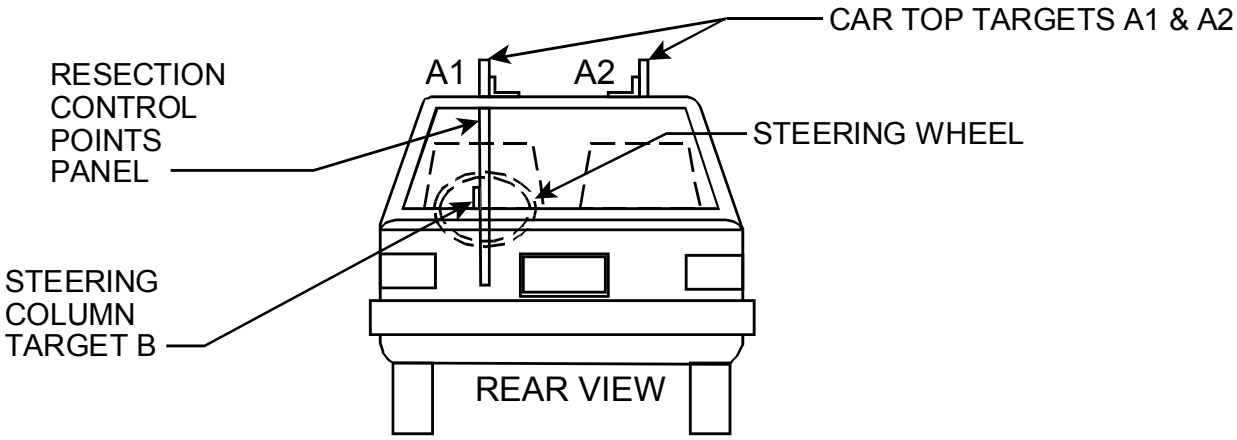
Date: 08/18/04

REFERENCE PHOTO TARGETS

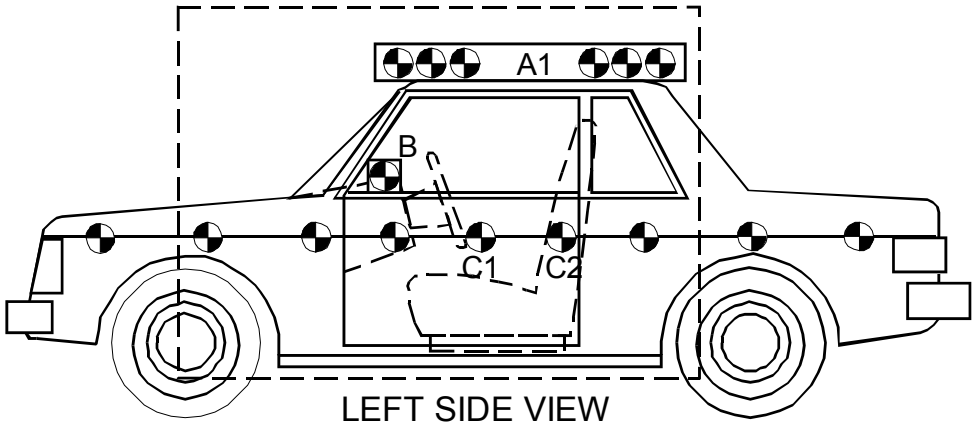


LEFT SIDE VIEW

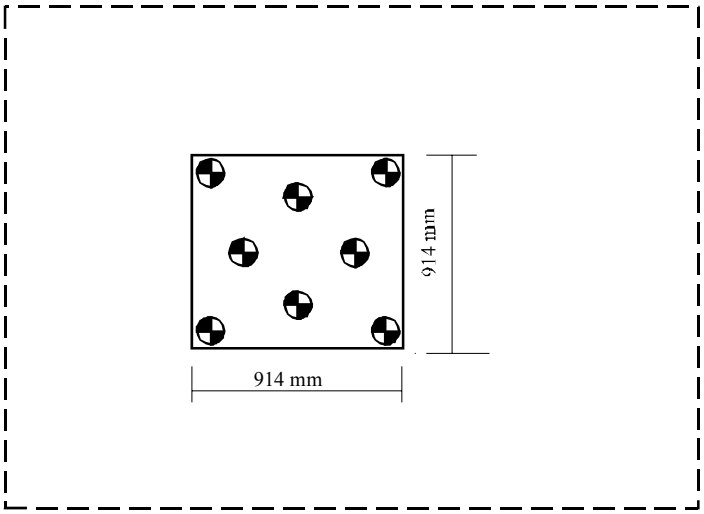
RESECTION PANEL TARGETING ALIGNMENT



TEST RUN STEERING COLUMN CAMERA VIEW OF TYPICAL TIME ZERO VEHICLE POSITION



PRE-RUN STEERING COLUMN HIGH SPEED CAMERA VIEW



LEFT SIDE VIEW

DATA SHEET 33

CAMERA LOCATIONS

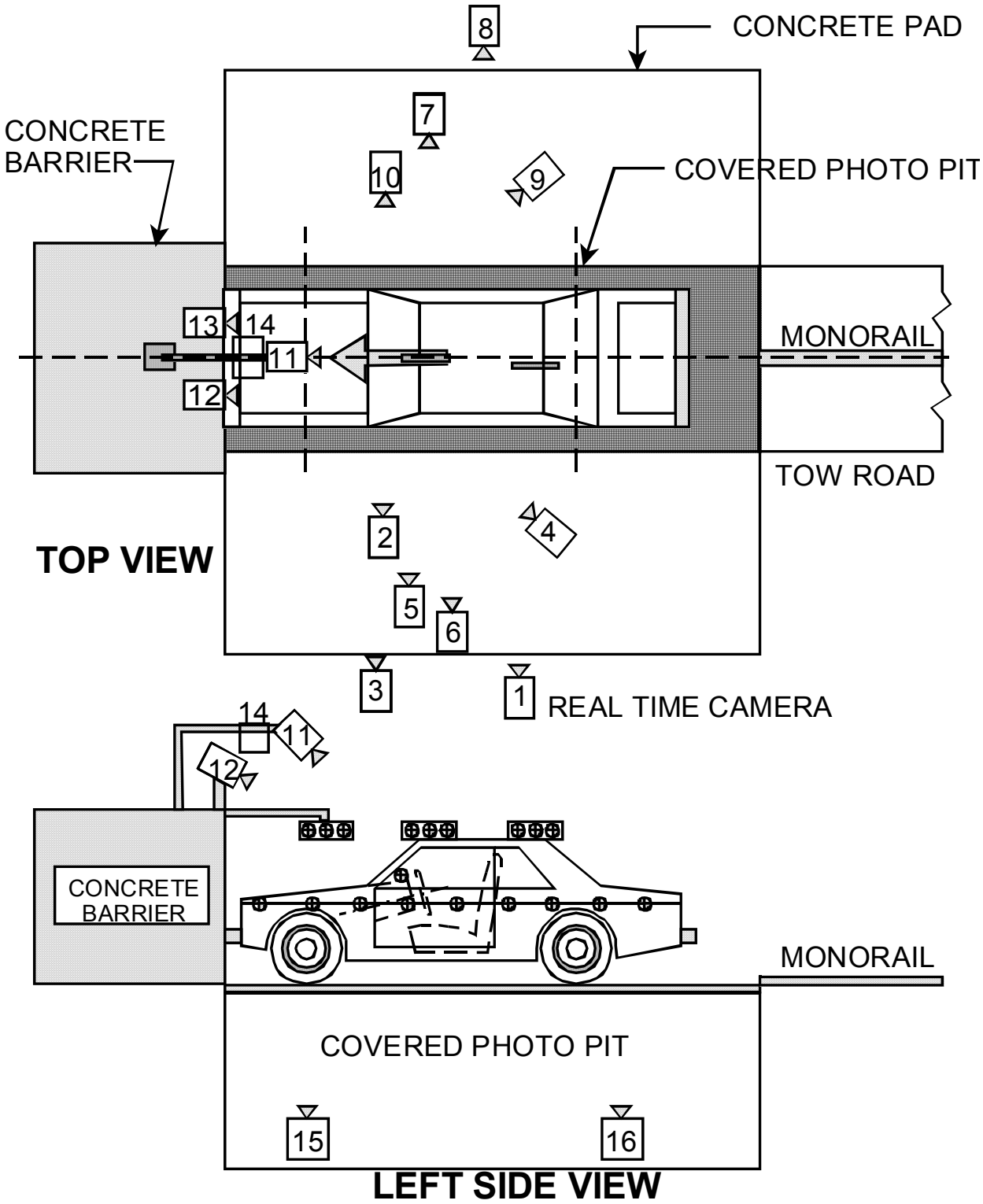
Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance

NHTSA No.: C45111
Test Date: 8/18/04
Time: 11:10 am

CAMERA NO.	VIEW	CAMERA POSITIONS (mm) *			LENS (mm)	SPEED (fps)
		X	Y	Z		
1	Real Time Left Side View				13	24
2	Left Side View (Barrier face to front seat backs)	950	-8260	1323	25	1000
3	Left Side View (Driver)	1625	-6260	1505	19	1000
4	Left Side View (B-post aimed toward center of steering wheel)	5560	-5090	1980	50	1000
5	Left Side View (Steering Column)	1990	-7170	1575	50	1000
6	Left Side View (Steering Column)	1990	-7170	1040	19	1000
7	Right Side View (Overall)	2546	6660	1492	19	1000
8	Right Side View (Passenger)	1570	5270	1410	28	1000
9	Right Side View (Angle)	5595	5170	1970	50	1000
10	Right Side View (Front door)	890	8620	1450	24	1000
11	Front View Windshield	-470	0	2865	19	1000
12	Front View Driver	80	-440	1770	13	1000
13	Front View Passenger	140	460	1720	13	1000
14	Overhead Barrier Impact View	940	0	5050	24	1000
15	Pit Camera Engine View	1320	0	-3150	19	1000
16	Pit Camera Fuel Tank View	3300	0	-3150	19	1000

*COORDINATES:
+X – forward of impact plane
+Y – right of monorail centerline
+Z – above ground level

CAMERA POSITIONS FOR FMVSS 208



DATA SHEET 34

APPENDIX G
DUMMY POSITIONING PROCEDURES
FOR 5th% DRIVER TEST DUMMY CONFORMING TO SUBPART O OF PART 572

Test Vehicle: 2004 Toyota Highlander MPV NHTSA No.: C45111
Test Program: FMVSS 208 Compliance Test Date: 8/18/04
Test Technician: Eric Peschman

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	___ 50th Male Ctr Rear	

X 1. Position the seat's adjustable lumbar supports so that the lumbar supports are in the lowest, retracted or deflated adjustment position. (S16.2.10.1)

__ N/A – No lumbar adjustment

X 2. Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position. (S16.2.10.2)
___ N/A – No additional support adjustment

X 3. If the seat cushion adjusts fore and aft, independent of the seat back, set this adjustment to the full rearward position. (S16.2.10.3.1)
___ N/A – No independent fore-aft seat cushion adjustment

X 4. Use the seat markings determined during the completion of Data Sheet 14 to set the rearmost fore-aft position, mid-height position and the seat cushion mid-angle. (S16.3.2.1.1)

X 5. If the vehicle has an adjustable accelerator pedal, place it in the full forward position. (S16.3.2.2.1)
___ N/A accelerator pedal not adjustable

X 6. Set the steering wheel hub at the geometric center of the full range of driving positions including any telescoping positions as determined in data sheet 14. (S16.2.9)

X 7. Fully recline the seat back. (S16.3.2.1.2)
__ N/A seat back not adjustable.

X 8. Place the dummy in the seat with the legs at an angle of 120 degrees to the thighs. The calves should not be touching the seat cushion. (S16.3.2.1.2)

X 9. Position the dummy in the seat such that the midsagittal plane is coincident with the longitudinal seat cushion markings as determined in item 1.18 of Data Sheet 14 (S16.3.2.1.3 and S16.3.2.1.4)

X 10. Hold down the dummy's thighs and push rearward on the upper torso to maximize the pelvic angle. (S16.3.2.1.5)

X 11. Set the angle between the legs and the thighs to 120 degrees. (S16.3.2.1.6)

X 12. Set the transverse distance between the centers of the front of the knees at 160 to 170 mm. (6.3 to 6.7 inches) Center the knee separation with respect to the longitudinal seat cushion marking as determined in item 1.18 of Data Sheet 14. (S16.3.2.1.6)
Record Knee Separation 167 mm

X 13. Push rearward on the dummy's knees until the pelvis contacts the seat back, or the backs of the calves contact the seat cushion, whichever occurs first. (S16.3.2.1.6)
__Pelvis contacted seat back.
X Calves contacted seat cushion.

X 14. Gently rock the upper torso ± 5 degrees (approximately 51 mm (2 inches)) side to side three time. (S16.3.2.1.7)

X 15. If needed, extend the legs until the feet do not contact the floor pan. The thighs should be resting on the seat cushion. (S16.3.2.1.8)

X 16. Position the right foot until the foot is in line with a longitudinal vertical plane passing through the center of the accelerator pedal. Maintain the leg and thigh in a vertical plane. (S16.3.2.1.8)

X 17. Rotate the left leg and thigh laterally to equalize the distance between each knee and the longitudinal seat cushion marking as determined in item 1.18 of Data Sheet 14. (S16.3.2.1.8)

X 18. Attempt to return the seat to the foremost fore-aft position, mid-height, and seat cushion mid-angle. The foot may contact and depress the accelerator and/or change the angle of the foot with respect to the leg. (S16.3.2.1.8)
X Foremost position achieved. Proceed to step 23.
__Foremost not achieved because of foot interference. Proceed to step 20.
__Foremost not achieved because of steering wheel contact.

__19. If the dummy's legs contact the steering wheel, move the steering wheel up the minimum amount required to avoid contact. If the steering wheel is not adjustable separate the knees the minimum required to avoid contact. (S16.3.2.1.8)
__N/A- there was no leg contact
__Steering wheel repositioned
__Knees separated

__20. If the left foot interferes with the clutch or brake pedals, rotate the left foot about the leg to provide clearance. If this is not sufficient, rotate the thigh outboard at the hip the minimum amount required for clearance. (S16.3.2.1.8)
_ N/A, No foot interference with pedals.
__Foot adjusted to provide clearance.
__Foot and Thigh adjusted to provide clearance.

__21. Continue to move the seat. Use seat controls to line up the seat markings determined during the completion of Data Sheet 14 to set the foremost fore-aft position, mid-height position and the seat cushion mid-angle. If the dummy contacts the interior move the seat rearward until a maximum clearance of 5 mm (0.2 inches) is achieved or the seat is in the closest detent position that does not cause dummy contact. (S16.3.2.1.8)
__Foremost, mid-height position and the seat cushion mid-angle reached

__Dummy contact. Clearance set at maximum of 5mm
Measured Clearance_____

__Dummy Contact. Seat set at nearest detent position.
Seat position ___ detent positions rearward of foremost
(Foremost is position zero)

__22. If the steering wheel was repositioned in step 19, return the steering wheel to the original position. If the steering wheel contacts the dummy before reaching the original position, position the wheel until a maximum clearance of 5mm (.2 inches) is achieved, or the steering wheel is in the closest detent position that does not cause dummy contact. (S16.3.2.1.8)
__N/A Steering wheel was not repositioned.

__Original position achieved.

__Dummy contact. Clearance set at maximum of 5mm
Measured Clearance_____

__Dummy Contact. Steering wheel set at nearest detent position.
Steering wheel position ___ detent positions upward of original position.
(Original position is position zero)

_X_23. If the seat back is adjustable, rotate the seat back forward while holding the thighs in place. Continue rotating the seat back forward until the transverse instrument platform of the dummy head is level ± 0.5 degrees. If the head cannot be leveled using the seat back adjustment, or the seat back is not adjustable, use the lower neck bracket adjustment to level the head. If a level position cannot be achieved, minimize the angle. (S16.3.2.1.9)

_X_Head Level Achieved. (Check all that apply)
_X_Head leveled using the adjustable seat back
__Head leveled using the neck bracket.
Head Angle _____0.2_____degrees

__Head Level NOT Achieved. (Check all that apply)
__Head adjusted using the adjustable seat back
__Head adjusted using the neck bracket.
Head Angle _____ degrees

_X_24. Verify the pelvis is not interfering with the seat bight. (S16.3.2.1.9)
_X_No interference
__Pelvis moved forward the minimum amount so that it is not caught in the seat bight.

X 25. Verify the dummy abdomen is properly installed. (S16.3.2.1.9)
X Abdomen still seated properly into dummy
__Abdomen was adjusted because it was not seated properly into dummy

X 26. Head Angle
__N/A, neither the pelvis nor the abdomen were adjusted.

X 26.1 Head still level (Go to 27)

__26.2 Head level adjusted

__Head Level Achieved. (Check all that apply)
__Head leveled using the adjustable seat back
__Head leveled using the neck bracket.
Head Angle _____ degrees

__Head Level NOT Achieved. (Check all that apply)
__Head level adjusted using the adjustable seat back
__Head level adjusted using the neck bracket.
Head Angle _____ degrees

X 27. If the dummy torso contacts the steering wheel while performing step 23, reposition the steering wheel in the following order to eliminate contact.
X N/A, No dummy torso contact with the steering wheel.

__27.1 Adjust telescoping mechanism.
__N/A No telescoping adjustment.
__Adjustment performed (fill in appropriate change)
Steering wheel moved ____ detent positions in the forward direction.
Steering wheel moved ____ mm in the forward direction.

__27.2 Adjust tilt mechanism.
__N/A No tilt adjustment.
__No adjustment performed.
__Adjustment performed.
Steering wheel moved ____ detent positions Upward/Downward.
(circle one)
Steering wheel moved ____ degrees Upward/Downward

__27.3 Adjust Seat in the aft direction.
__No Adjustment performed.
__Seat moved aft ___ mm from original position.
__Seat moved aft ___ detent positions from the original position.

X 28. Measure and set the pelvic angle using the pelvic angle gage TE-2504. The pelvic angle should be 20.0 degrees ± 2.5 degrees. If the pelvic angle cannot be set to the specified range because the head will not be level, adjust the pelvis as closely as possible to the angle range, but keep the head level.
__Pelvic angle set to 20.0 degrees ± 2.5 degrees.
X Pelvic angle of 20.0 degrees not achieved, the angular difference was minimized.
X Record the pelvic angle.____25.8_____degrees

_X_ 29. Check the dummy for contact with the interior after completing adjustments.
_X_ No contact.
__ Dummy in contact with interior.
__ Seat moved aft ___ mm from the previous position.
__ Seat moved aft ___ detent positions from the previous position.

_X_ 30. Check the dummy to see if additional interior clearance is obtained, allowing the seat to be moved forward.
_X_ N/A, Seat already at foremost position.
__ Clearance unchanged. No adjustments required.
__ Additional clearance available
__ Seat moved Forward ___ mm from the previous position.
__ Seat moved Forward ___ detent positions from the previous position.

_X_ 31. Driver's foot positioning, right foot. Place the foot perpendicular to the leg and determine if the heel contacts the floor pan at any leg position. If the heel contacts the floor pan proceed to step 32 otherwise, proceed to step 33.

_X_ 32. Perform the following steps until either all steps are completed, or the foot contacts the accelerator pedal. Step 32.6 shall be completed in all cases.

_X_ 32.1 With the rear of the heel contacting the floor pan, move the foot forward until pedal contact occurs or the foot is at the full forward position.

__ 32.2 If the vehicle has an adjustable accelerator pedal, move the pedals rearward until pedal contact occurs or the pedals reach the full rearward position. Not Applicable

__ 32.3 Extend the leg, allowing the heel to lose contact with the floor until the foot contacts the pedal. Do not raise the toe of the foot higher than the top of the accelerator pedal. If the foot does not contact the pedal, proceed to the next step. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward.

__ 32.4 Angle the foot to achieve contact between the foot and the pedal. If the foot does not contact the pedal, return the foot to the perpendicular orientation. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward.

__ 32.5 Align the centerline of the foot with the vertical-longitudinal plane passing through the center of the accelerator pedal. Place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward.

_X_ 32.6 Record foot position
_X_ Pedal Contact achieved. Contact occurred at step 32.1 .
__ Heel contacts floor pan
__ Heel set _____ mm from floor pan.

__ Pedal Contact not achieved. Heel set _____ mm from the floor pan.

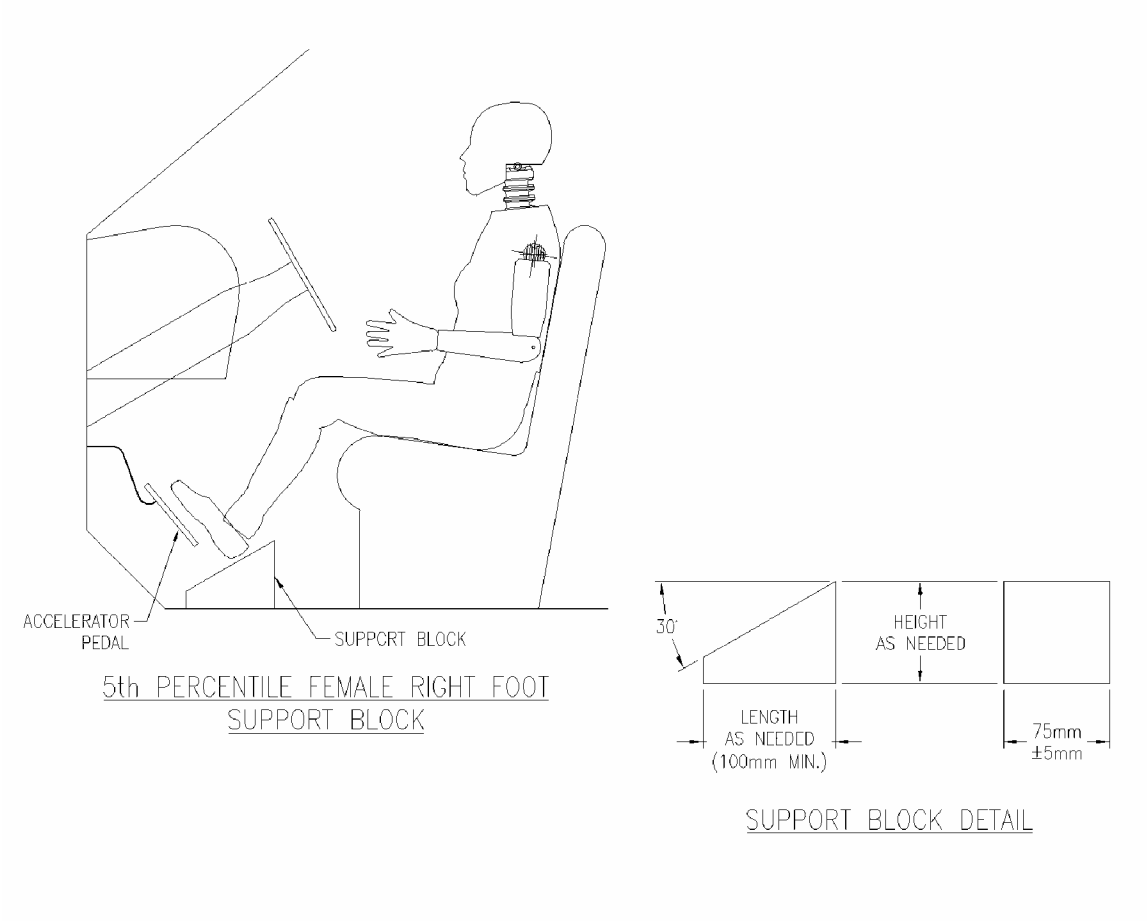


FIGURE G1

__33. Perform the following steps until either all steps are completed, or the foot contacts the accelerator pedal. Step 33.5 shall be completed in all cases.

__33.1 Extend the leg until the foot contacts the pedal. Do not raise the toe of the foot higher than the top of the accelerator pedal. If the foot does not contact the pedal, proceed to the next step. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward.

__33.2 If the vehicle has an adjustable accelerator pedal, move the pedals rearward until pedal contact occurs or the pedals reach the full rearward position. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward.

__33.3 Angle the foot to achieve contact between the foot and the pedal. If the foot does not contact the pedal, return the foot to the perpendicular orientation. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward.

__33.4 Align the centerline of the foot in the same horizontal plane as the centerline of the accelerator pedal. Place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward.

__33.5 Record foot position

__Pedal Contact achieved. Contact occurred at step ____.

__ Heel set _____ mm from floor pan.

__Pedal Contact not achieved. Heel set _____ mm from the floor pan.

X 34. Driver's foot positioning, left foot.

X 34.1 Place the foot perpendicular to the leg and determine if the heel contacts the floor pan at any leg position. If the heel contacts the floor pan proceed to step 34.2, otherwise position the leg as perpendicular to the thigh as possible with the foot parallel to the floor pan.

X 34.2 Place the foot on the toe board with the heel resting on the floor pan as close to the intersection of the floor pan and the toe board as possible. Adjust the angle of the foot if necessary to contact the toe board. If the foot will not contact the toe board, set the foot perpendicular to the leg, and set the heel on the floor pan as far forward as possible. Do not place the foot on the wheel well projection or footrest. If the pedals interfere with the placement of the foot, reposition the foot by rotating the foot about the leg, or rotate the leg outboard about the hip if necessary.

__Foot rotated about the leg

__Foot rotated about the leg, and the leg rotated about the hip.

X No pedal interference

X 34.3 Record foot position.

__Heel does not contact floor pan.

_X Foot placed on toe board.

_X Foot placed on floor pan.

X 35. Driver arm/hand positioning.

X 35.1 Place the dummy's upper arms adjacent to the torso with the arm centerlines as close to a vertical longitudinal plane as possible. (S16.3.2.3.1)

X 35.2 Place the palms of the dummy in contact with the outer part of the steering wheel rim at its horizontal centerline with the thumbs over the steering wheel rim. (S16.3.2.3.2)

X 35.3 If it is not possible to position the thumbs inside the steering wheel rim at its horizontal centerline, then position them above and as close to the horizontal centerline of the steering wheel rim as possible. (S16.3.2.3.3)

X 35.4 Lightly tape the hands to the steering wheel rim so that if the hand of the test dummy is pushed upward by a force of not less than 9 N (2 lb) and not more than 22 N (5 lb), the tape releases the hand from the steering wheel rim. S16.3.2.3.4

X 36. Adjustable head restraints

__N/A, there is no head restraint adjustment

X 36.1 If the head restraint has an automatic adjustment, leave it where the system positions the restraint after the dummy is placed in the seat. (S16.3.4.1) Go to 37.

X 36.2 Adjust each head restraint vertically so that the horizontal plane determined in item 3 of Data Sheet 14 is aligned with the center of gravity (CG) of the dummy head. (S16.3.4.3)

X 36.3 If the above position is not attainable, move the vertical center of the head restraint to the closest detent below the center of the head CG. (S16.3.4.3)
__N/A midpoint position attained in previous step
_X_Headrest set at nearest detent below the head CG

X 36.4 If the head restraint has a fore and aft adjustment, place the restraint in the foremost position or until contact with the head is made, whichever occurs first. (S16.3.4.4)

X 37. Driver and passenger manual belt adjustment (for tests conducted with a belted dummy). (S16.3.5) **Unbelted Test**

__37.1 If an adjustable seat belt D-ring anchorage exists, place it in the manufacturer's design position for a 5th percentile adult female.
This information will be supplied by the COTR.
Manufacturer's specified position _____
Actual Position_____

__37.2 Place the Type 2 manual belt around the test dummy and fasten the latch. (S16.3.5.2)

__37.3 Ensure that the dummy's head remains as level as possible. (S16.3.5.3)

__37.4 Remove all slack from the lap belt. Pull the upper torso webbing out of the retractor and allow it to retract; repeat this operation four times. Apply a 9 N (2 lbf) to 18 N (4 lbf) tension load to the lap belt. If the belt system is equipped with a tension-relieving device, introduce the maximum amount of slack into the upper torso belt that is recommended by the manufacturer. If the belt system is not equipped with a tension-relieving device, allow the excess webbing in the shoulder belt to be retracted by the retractive force of the retractor. (S16.3.5.4)

REMARKS: NONE

I certify that I have read and performed each instruction.

Signature: _____ Date: 08/18/04

APPENDIX G
DUMMY POSITIONING PROCEDURES
FOR 5th% PASSENGER TEST DUMMY CONFORMING TO SUBPART O OF PART 572

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Wayne Dahlke

NHTSA No.: C45111
Test Date: 8/18/04

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	__ 50th Male Ctr Rear	

(Check this item ONLY if it applies to this vehicle.)

__The passenger seat adjustments are controlled by the adjustments made to the driver's seat. Therefore, positioning of the passenger dummy is made simultaneously with the driver dummy. Adjustments made to the seat to position the driver will over ride any adjustments that would normally be made to position the passenger. (S16.2.10.3)

X 1. Position the seat's adjustable lumbar supports so that the lumbar supports are in the lowest, retracted or deflated adjustment position. (S16.2.10.1)

X N/A – No lumbar adjustment

X 2. Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position. (S16.2.10.2)
X N/A – No additional support adjustment

X 3. If the seat cushion adjusts fore and aft, independent of the seat back, set this adjustment to the full rearward position. (S16.2.10.3.1)
X N/A – No independent fore-aft seat cushion adjustment

X 4. Use the seat markings determined during the completion of Data Sheet 14 to set the rearmost fore-aft position, mid-height position and the seat cushion mid-angle. (S16.3.3.1.1)

X 5. Fully recline the seat back. (S16.3.3.1.2)
__ N/A seat back not adjustable.

X 6. Place the dummy in the seat with the legs at an angle of 120 degrees to the thighs. The calves should not be touching the seat cushion. (S16.3.3.1.2)

X 7. Position the dummy in the seat such that the midsagittal plane is coincident with the longitudinal seat cushion marking that was determined in item 2.19 of Data Sheet 14 (S16.3.3.1.3 and S16.3.3.1.4)

X 8. Hold down the dummy's thighs and push rearward on the upper torso to maximize the pelvic angle. (S16.3.3.1.5)

X 9. Set the angle between the legs and the thighs to 120 degrees. (S16.3.3.1.6)

X 10. Set the transverse distance between the centers of the front of the knees at 160 to 170 mm. (6.3 to 6.7 inches) Center the knee separation with respect to the longitudinal seat cushion marking that was determined in item 2.19 of Data Sheet 14. (S16.3.3.1.6)
Record Knee Separation 168 mm

X 11. Push rearward on the dummy's knees until the pelvis contacts the seat back, or the backs of the calves contact the seat cushion, whichever occurs first. (S16.3.3.1.6)
__Pelvis contacted seat back.
X Calves contacted seat cushion.

X 12. Gently rock the upper torso ± 5 degrees (approximately 51 mm (2 inches)) side-to-side three times. (S16.3.3.1.7)

X 13. If needed, extend the legs until the feet do not contact the floor pan. The thighs should be resting on the seat cushion. (S16.3.3.1.8)

X 14. Use seat controls to line up the seat markings determined during the completion of Data Sheet 14 to set the foremost fore-aft position, mid-height position and the seat cushion mid-angle. If the dummy contacts the interior move the seat rearward until a maximum clearance of 5 mm (0.2 inches) is achieved or the seat is in the closest detent position that does not cause dummy contact. (S16.3.3.1.8)
X Foremost, mid-height position and the seat cushion mid-angle reached

__Dummy contact. Clearance set at maximum of 5mm
Measured Clearance_____

__Dummy Contact. Seat set at nearest detent position.
Seat position ___ detent positions rearward of foremost
(Foremost is position zero)

X 15. If the seat back is adjustable, rotate the seat back forward while holding the thighs in place. Continue rotating the seat back forward until the transverse instrument platform of the dummy head is level ± 0.5 degrees. If head cannot be leveled using the seat back adjustment, or the seat back is not adjustable, use the lower neck bracket adjustment to level the head. If a level position cannot be achieved, adjust the head as closely as possible to the ± 0.5 degree range. (S16.3.3.1.9 and S16.3.3.1.10)
(Check All That Apply)
__Seat back not adjustable

__Seat back not independent of driver side seat back

X Head Level Achieved. (Check all that apply)
X Head leveled using the adjustable seat back
__Head leveled using the neck bracket.
Head Angle 0.1 degrees

__Head Level NOT Achieved. (Check all that apply)
__ Head adjusted using the adjustable seat back
__ Head adjusted using the neck bracket.
Head Angle _____ degrees

X 16. Verify the pelvis is not interfering with the seat bight. (S16.3.3.1.9)
X No interference
__Pelvis moved forward the minimum amount so that it is not caught in the seat bight.

X 17. Verify the dummy abdomen is properly installed. (S16.3.3.1.9)
X Abdomen still seated properly into dummy
__Abdomen was adjusted because it was not seated properly into dummy

X 18. Head Angle
X N/A, neither the pelvis nor the abdomen were adjusted.

X 18.1 Head still level (Go to 19)

__18.2 Head level adjusted

__Head Level Achieved. (Check all that apply)
__Head leveled using the adjustable seat back
__Head leveled using the neck bracket.
Head Angle _____ degrees

__Head Level NOT Achieved. (Check all that apply)
__Head adjusted using the adjustable seat back
__Head adjusted using the neck bracket.
Head Angle _____ degrees

X 19. Measure and set the pelvic angle using the pelvic angle gage TE-2504. The pelvic angle should be 20.0 degrees ± 2.5 degrees. If the pelvic angle cannot be set to the specified range because the head will not be level, adjust the pelvis as closely as possible to the angle range, but keep the head level.
__Pelvic angle set to 20.0 degrees ± 2.5 degrees.
X Pelvic angle of 20.0 degrees not achieved, the angular difference was minimized.
X Record the pelvic angle. 25.2 degrees

X 20. Check the dummy for contact with the interior after completing adjustments.
X No contact.
__Dummy in contact with interior.
__Seat moved aft ___ mm from the previous position.
__Seat moved aft ___ detent positions from the previous position.

X 21. Verify the transverse instrument platform of the dummy head is level +/- 0.5 degrees. Use the lower neck bracket adjustment to level the head. If a level position cannot be achieved, minimize the angle. (S16.3.3.1.9, S16.3.3.1.10, and S16.3.3.1.11)
X Head Level Achieved
Head Angle 0.1 degrees
__Head Level NOT Achieved.
Head Angle _____ degrees

_X_ 22. Check the dummy to see if additional interior clearance is obtained, allowing the seat to be moved forward. (S16.3.3.1.12)
__N/A Bench Seat
_X_ N/A Seat already at full forward position.
__Clearance unchanged. No adjustments required.
__Additional clearance available
__Seat moved Forward ___ mm from the previous position.
__Seat moved Forward ___ detent positions from the previous position.
__Seat moved Forward, Full Forward position reached.

_X_ 23. Passenger foot positioning. (Indicate final position achieved) (S16.3.3.2)

__23.1 Place feet flat on the toe board; OR

_X_ 23.2 If the feet cannot be placed flat on the toe board, set the feet perpendicular to the lower leg, and rest the heel as far forward on the floor pan as possible; OR

__23.3 If the heels do not touch the floor pan, set the legs to vertical and set the feet parallel to the floor pan.

_X_ 24. Passenger arm/hand positioning. (S16.3.3.3)

_X_ 24.1 Place the dummy's upper arms adjacent to the torso with the arm centerlines as close to a vertical longitudinal plane as possible. (S16.3.2.3.1)

_X_ 24.2 Place the palms of the dummy in contact with the outer part of the thighs (S16.3.3.3.2)

_X_ 24.3 Place the little fingers in contact with the seat cushion. (S16.3.3.3.3)

_X_ 25. Adjustable head restraints
__N/A, there is no head restraint adjustment

_X_ 25.1 If the head restraint has an automatic adjustment, leave it where the system positions the restraint after the dummy is placed in the seat. (S16.3.4.1) Go to 26.

_X_ 25.2 Adjust each head restraint vertically so that the horizontal plane determined in item 3 of Data Sheet 14 is aligned with the center of gravity (CG) of the dummy head. (S16.3.4.3)

_X_ 25.3 If the above position is not attainable, move the vertical center of the head restraint to the closest detent below the center of the head CG. (S16.3.4.3)
__N/A midpoint position attained in previous step
_X_ Headrest set at nearest detent below the head CG

_X_ 25.4 If the head restraint has a fore and aft adjustment, place the restraint in the foremost position or until contact with the head is made, whichever occurs first. (S16.3.4.4)

_X_ 26. Manual belt adjustment (for tests conducted with a belted dummy) S16.3.5
_X_ N/A, **Unbelted test**

__26.1 If an adjustable seat belt D-ring anchorage exists, place it in the manufacturer's design position for a 5th percentile adult female.
This information will be supplied by the COTR.
Manufacturer's specified position _____
Actual Position_____

__26.2 Place the Type 2 manual belt around the test dummy and fasten the latch. (S16.3.5.2)

__26.3 Ensure that the dummy's head remains as level as possible. (S16.3.5.3)

__26.4 Remove all slack from the lap belt. Pull the upper torso webbing out of the retractor and allow it to retract; repeat this operation four times. Apply a 9 N (2 lbf) to 18 N (4 lbf) tension load to the lap belt. If the belt system is equipped with a tension-relieving device, introduce the maximum amount of slack into the upper torso belt that is recommended by the manufacturer. If the belt system is not equipped with a tension-relieving device, allow the excess webbing in the shoulder belt to be retracted by the retractive force of the retractor. (S16.3.5.4)

REMARKS: NONE

I certify that I have read and performed each instruction.

Signature:  Date: 08/18/04

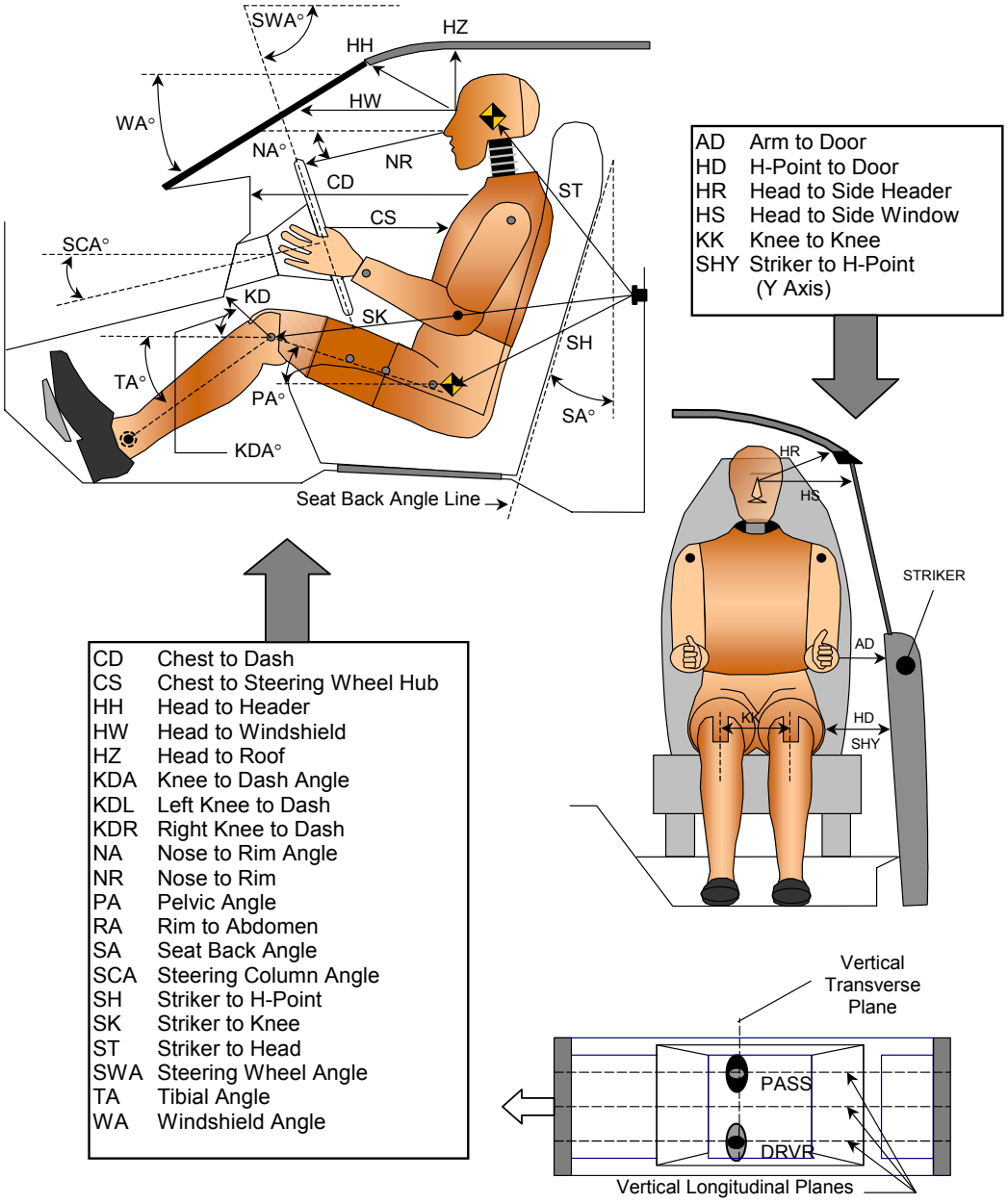
DATA SHEET 35

DUMMY MEASUREMENTS

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Eric Peschman

NHTSA No.: C45111
Test Date: 8/18/04

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET 35

DUMMY MEASUREMENTS

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Eric Peschman

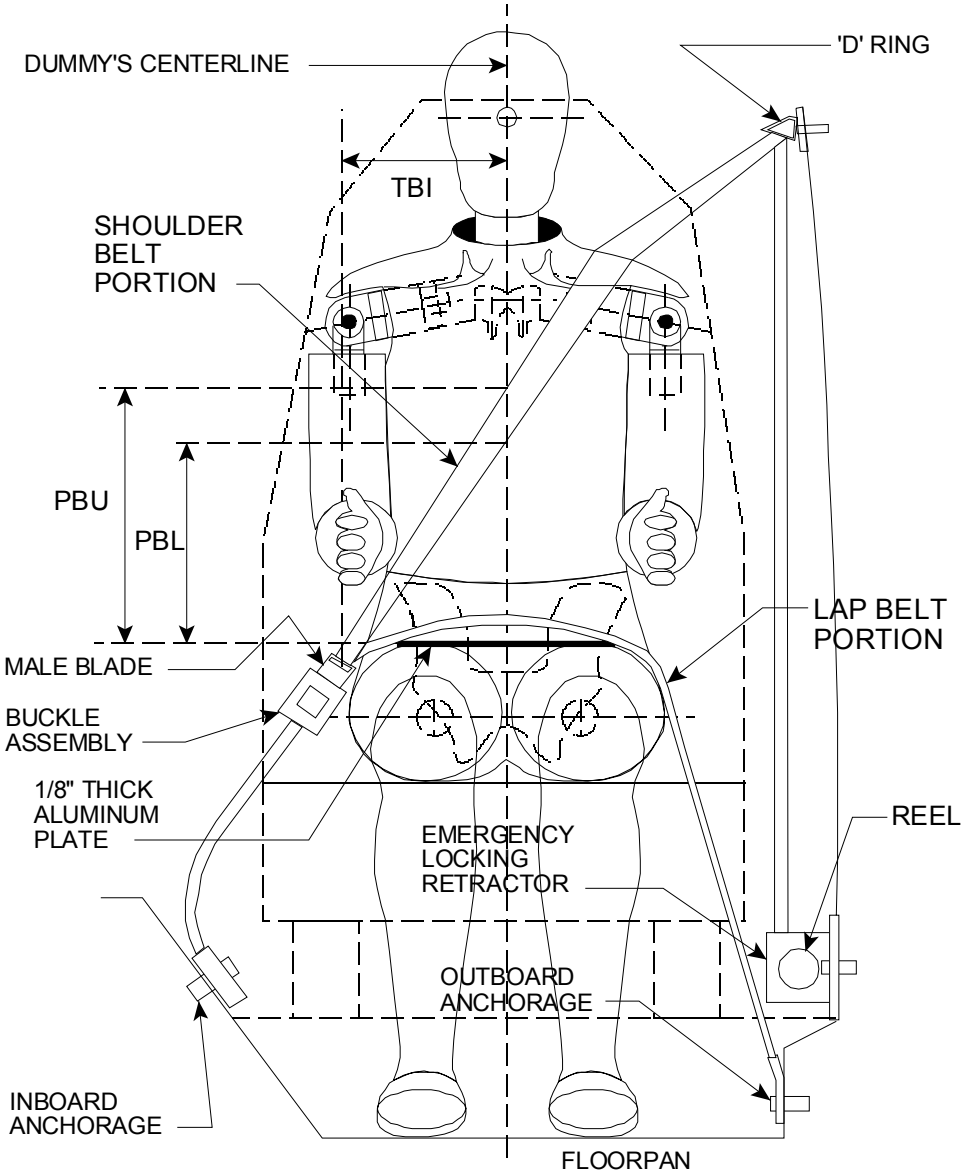
NHTSA No.: C45111
Test Date: 8/18/04

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver SN 506		Passenger SN 511	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		31.3		
SWA	Steering Wheel Angle		63.0		
SCA	Steering Column Angle		26.6		
SA	Seat Back Angle*		3.2		8.8
HZ	Head to Roof (Z)	218	90	247	90
HH	Head to Header	327	44.6	369	40.4
HW	Head to Windshield	609	0	647	0
HR	Head to Side Header (Y)	274		287	
NR	Nose to Rim	287	6.8		
CD	Chest to Dash	438		410	
CS	Chest to Steering Hub	203	2.5		
RA	Rim to Abdomen	80	0		
KDL	Left Knee to Dash	95	38.7	95	
KDR	Right Knee to Dash	89		94	31.6
PA	Pelvic Angle		25.8		25.2
TA	Tibia Angle		51.0		50.3
KK	Knee to Knee (Y)	220		169	
SK	Striker to Knee	693	84.3	668	84.9
ST	Striker to Head	495	25.2	484	23.8
SH	Striker to H-Point	368	106.4	370	108.4
SHY	Striker to H-Point (Y)	307		319	
HS	Head to Side Window	367		338	
HD	H-Point to Door (Y)	223		219	
AD	Arm to Door (Y)	156		161	
AA	Ankle to Ankle	253		139	

*Measured on the headrest post

SEAT BELT POSITIONING DATA



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger	Rear Passenger
PBU - Top surface of reference to belt upper edge	mm	N/A	N/A	N/A
PBL - To surface of reference to belt lower edge	mm	N/A	N/A	N/A

DATA SHEET 36

CRASH TEST

Test Vehicle: 2004 Toyota Highlander MPV NHTSA No.: C45111
Test Program: FMVSS 208 Compliance Test Date: 8/18/04
Test Technician: Eric Peschman

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	___ 50th Male Ctr Rear	

X	1.	Vehicle underbody painted
X	2.	The speed measuring devices are in place and functioning.
X	3.	The speed measuring devices are 1.0 m from the barrier (spec. 1.5m) and 30 cm from the barrier (spec. is 30 cm)
X	4.	Convertible top is in the closed position.
X		N/A, not a convertible
X	5.	Instrumentation and wires are placed so the motion of the dummies during impact is not affected.
X	6.	Tires inflated to pressure on tire placard or if it does not have a tire placard because it is not a passenger car, then inflated to the tire pressure specified in the owner information.

210 kpa front left tire	210 kpa specified on tire placard or in owner information
210 kpa front right tire	210 kpa specified on tire placard or in owner information
210 kpa rear left tire	210 kpa specified on tire placard or in owner information
210 kpa rear right tire	210 kpa specified on tire placard or in owner information

X	7.	Time zero contacts on barrier in place.
X	8.	Pre test zero and shunt calibration adjustments performed and recorded
X	9.	Dummy temperature meets requirements of section 12.2 of the test procedure.
X	10.	Vehicle hood closed and latched
X	11.	Transmission placed in neutral
X	12.	Parking brake off
X	13.	Ignition in the ON position
X	14.	Doors closed and latched but not locked
X	15.	Posttest zero and shunt calibration checks performed and recorded
X	16.	Actual test speed 39.8 kmph
X	17.	Vehicle rebound from the barrier 411 cm
X	18.	Describe whether the doors open after the test and what method is used to open the doors.
X		Left Front Door: Door remained closed and latched; Door opened without tools
X		Right Front Door: Door remained closed and latched; Door opened without tools
X		Left Rear Door: Door remained closed and latched; Door opened without tools

X Right Rear Door: Door remained closed and latched; Door opened without tools

X 19. Describe the contact points of the dummy with the interior of the vehicle.

X Driver Dummy: Head to air bag, sun visor and headrest; Chest to air bag; Knees to knee bolster and steering column.

X Passenger Dummy: Head to air bag; Chest to air bag; Knees to instrument panel

REMARKS:

I certify that I have read and performed each instruction.

Signature:  Date: 08/18/04

DATA SHEET NO. 38

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Eric Peschman

NHTSA No.: C45111
Test Date: 8/18/04

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	___ 50th Male Ctr Rear	

Vehicle Year/Make/Model/Body Style:	2004 Toyota Highlander MPV
VIN:	JTEEP21A940025615
Wheelbase:	2720 mm
Build Date:	12/03
Vehicle Size Category:	3
Test Weight:	2064.7 kg
Front Overhang:	920 mm
Overall Width:	1829 mm
Overall Length Center:	4657 mm

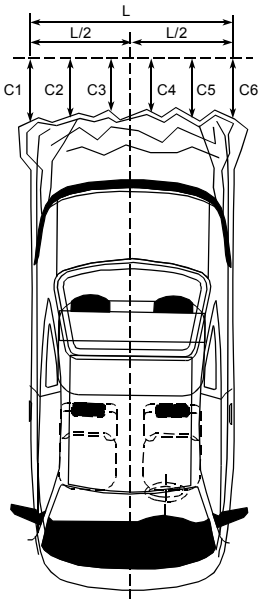
Accelerometer Data	
Location:	As per measurements on Data Sheet 31
Linearity:	>99.9%

Integration Algorithm:	Trapezoidal
Vehicle Impact Speed:	39.8 kmph
Time of Separation:	119.5 ms
Velocity Change:	46.1 kmph

CRUSH PROFILE

Collision Deformation Classification: 12FDEW6
Midpoint of Damage: Vehicle Longitudinal Centerline
Damage Region Length (mm): 1222
Impact Mode: Frontal Barrier

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4567	4327	240
C2	Crush zone 2 at left side	mm	4632	4335	297
C3	Crush zone 3 at left side	mm	4651	4341	310
C4	Crush zone 4 at right side	mm	4651	4342	309
C5	Crush zone 5 at right side	mm	4632	4342	290
C6	Crush zone 6 at right side	mm	4567	4335	232



REMARKS:

I certify that I have read and performed each instruction.

Signature: Clark Dubb

Date: 08/18/04

DATA SHEET 39

WINDSHIELD MOUNTING (FMVSS 212)

Test Vehicle: 2004 Toyota Highlander MPV NHTSA No.: C45111
Test Program: FMVSS 208 Compliance Test Date: 8/18/04
Test Technician: Clark Subrt

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	___ 50th Male Ctr Rear	

1. Pre-Crash

[X] 1.1 Describe from visual inspection how the windshield is mounted and describe any trim material.

Retained with glue
Rubber and plastic trim

[X] 1.2 Mark the longitudinal centerline of the windshield

[X] 1.3 Measure pre-crash A, B, and C for the left side and record in the chart below.

[X] 1.4 Measure pre-crash C, D, and E for the right side and record in the chart below.

[X] 1.5 Measure from the edge of the retainer or molding to the edge of the windshield.

[X] Dimension G (mm): 16

2. Post Crash

[X] 2.1 Can a single thickness of copier type paper (as small a piece as necessary) slide between the windshield and the vehicle body?

[X] No – Pass. Skip to the table of measurements, complete it by repeating the pre-crash measurements in the post crash column, and calculate the retention percentage, which will be 100%.

[ ] Yes, go to 2.2

[ ] 2.2 Visibly mark the beginning and end of the portions of the periphery where the paper slides between the windshield and the vehicle body.

[ ] 2.3 Measure and record post-crash A, B, C, D, E, and F such that the measurements do not include any of the parts of the windshield where the paper slides between the windshield and the vehicle body.

[ ] 2.4 Calculate and record the percent retention for the right and left side of the windshield.

[ ] 2.5 Is total right side percent retention less than 75%?

[ ] Yes, Fail

[ ] No, Pass

[ ] 2.6 Is total left side percent retention less than 75%?

[ ] Yes, Fail

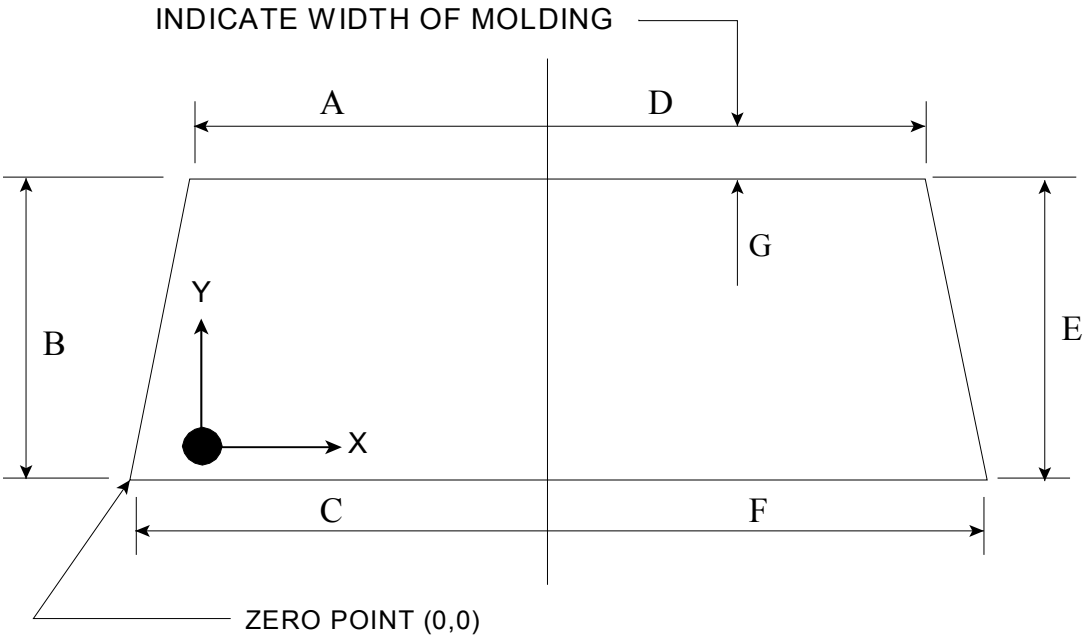
[ ] No, Pass

WINDSHIELD RETENTION MEASUREMENTS

	Dimension	Pre-Crash (mm)	Post-Crash (mm)	Percent Retention (Post-Test ÷ Pre-Crash)
Left Side	A	607	607	100%
	B	746	746	100%
	C	759	759	100%
	Total	2112	2112	100%
Right Side	D	607	607	100%
	E	746	746	100%
	F	759	759	100%
	Total	2112	2112	100%

Indicate area of mounting failure. NONE

FRONT VIEW OF WINDSHIELD



REMARKS:

I certify that I have read and performed each instruction.

Signature: Clarke Sulst

Date: 08/18/04

DATA SHEET 40

WINDSHIELD ZONE INTRUSION (FMVSS 219)

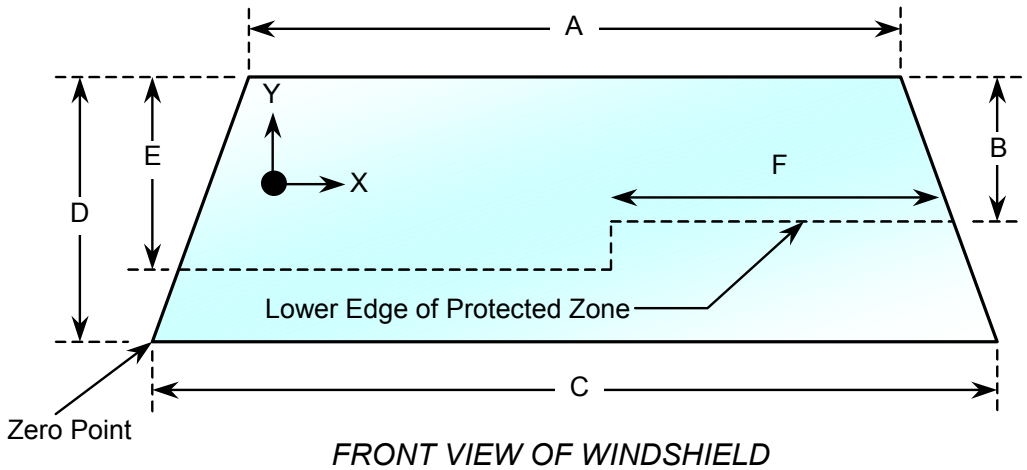
Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Clark Subrt

NHTSA No.: C45111
Test Date: 8/18/04

IMPACT ANGLE:	Zero Degrees		
BELTED DUMMIES (YES/NO):	No – Front Occupants		
TEST SPEED:	_X_ 32 to 40 kmph	__ 0 to 48 kmph	__ 0 to 56 kmph
DRIVER DUMMY:	_X_ 5TH female	__ 50th Male	
PASSENGER DUMMY:	_X_ 5TH female	___ 50th Male Ctr Rear	

X	1.	Place a 165 mm diameter rigid sphere, with a mass of 6.8 kg on the instrument panel so that it is simultaneously touching the instrument panel and the windshield. (571.219 S6.1(a))
X	2.	Roll the sphere from one side of the windshield to the other while marking on the windshield where the sphere contacts the windshield. (571.219 S6.1(b))
X	3.	From the outermost contactable points on the windshield draw a horizontal line to the edges of the windshield. (571.219 S6.1(b))
X	4.	Draw a line on the inner surface of the windshield that is 13 mm below the line determined in items 2 and 3
X	5.	After the crash test, record any points where a part of the exterior of the vehicle has marked, penetrated, or broken the windshield.

Provide all dimensions necessary to reproduce the protected area.



FRONT VIEW OF WINDSHIELD

WINDSHIELD DIMENSIONS

Item	Units	Value
A	mm	1214
B	mm	497
C	mm	1518
D	mm	746
E	mm	486
F	mm	504

AREA OF PROTECTED ZONE FAILURES:

B. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one which is normally in contact with the windshield.

X	Y
NONE	

C. Provide coordinates of the area beneath the protected zone template that the inner surface of the windshield was penetrated by a vehicle component.

X	Y
NONE	

REMARKS:

I certify that I have read and performed each instruction.

Signature: Clarke Dulet Date: 08/18/04

DATA SHEET 41

FUEL SYSTEM INTEGRITY (FMVSS 301)

Test Vehicle: 2004 Toyota Highlander MPV
Test Program: FMVSS 208 Compliance
Test Technician: Eric Peschman

NHTSA No.: C45111
Test Date: 8/18/04

TYPE OF IMPACT:	25 mph Unbelted Flat Frontal

Stoddard Solvent Spillage Measurements

A. From impact until vehicle motion ceases: 0 grams
(Maximum Allowable = 28 grams)

B. For the 5 minute period after motion ceases: 0 grams
(Maximum Allowable = 142 grams)

C. For the following 25 minutes: 0 grams
(Maximum Allowable = 28 grams/minute)

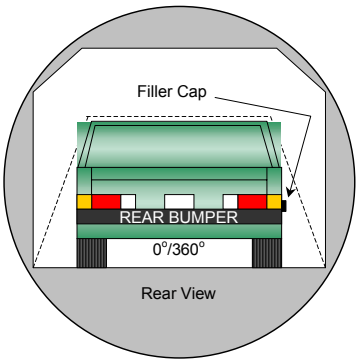
D. Spillage: 0

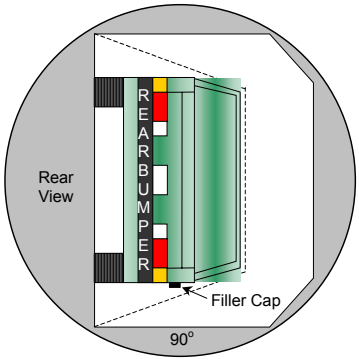
REMARKS: **The post test FMVSS 301 rollover was not conducted at the request of the COTR.**

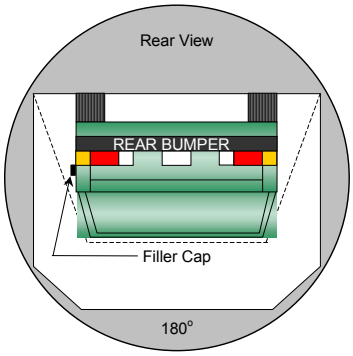
DATA SHEET NO. 41

FMVSS 301 STATIC ROLLOVER DATA

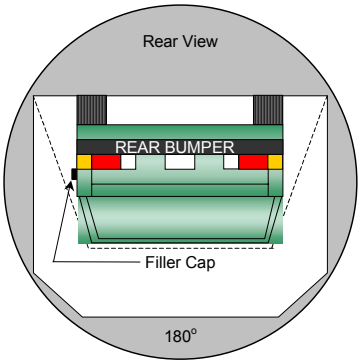
Test Vehicle: 2004 Toyota Highlander MPV NHTSA No.: C45111
Test Program: FMVSS 208 Compliance Test Date: 8/18/04

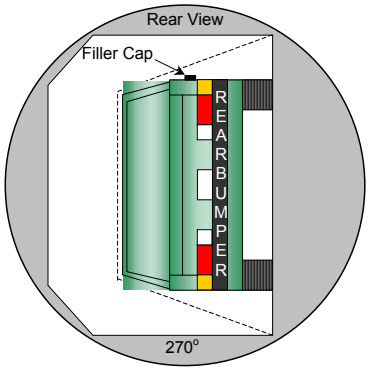


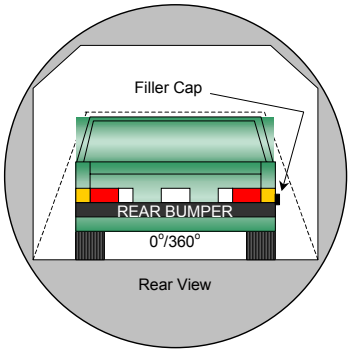




0° to 90° 90° to 180°







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: **The post test FMVSS 301 rollover was not conducted at the request of the COTR.**

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (grams)
0° to 90°			
90° to 180°			
180° to 270°			
270° to 360°			

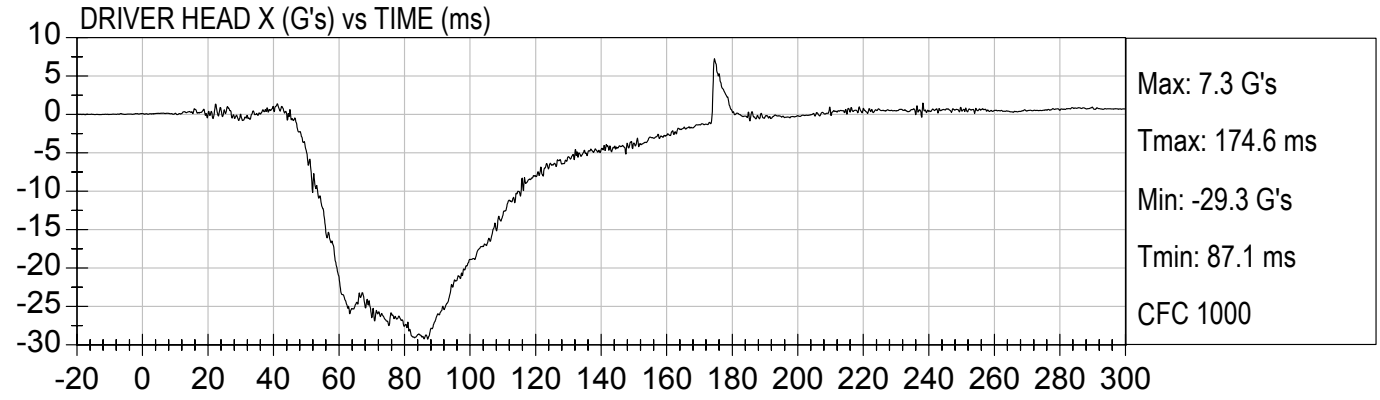
APPENDIX A

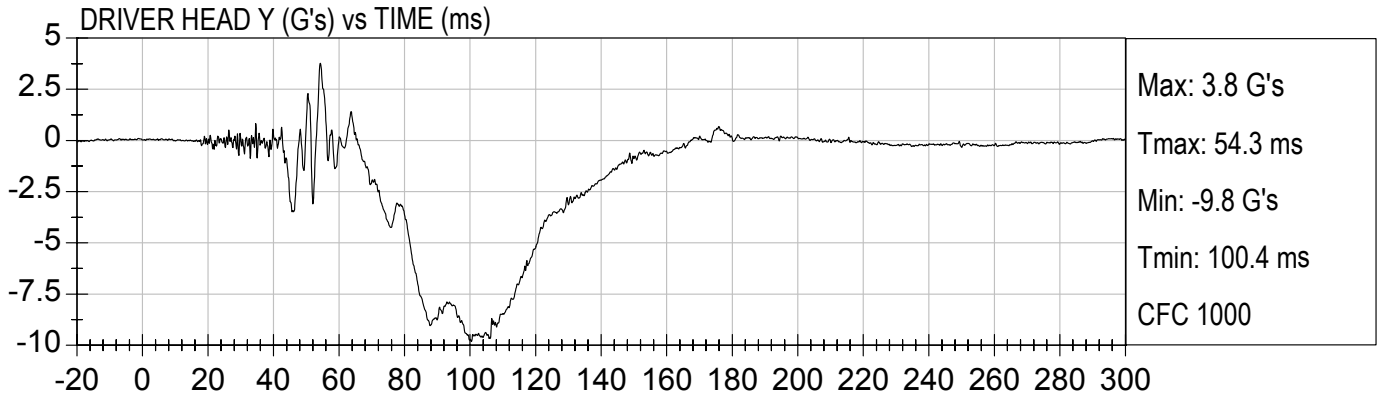
CRASH TEST DATA

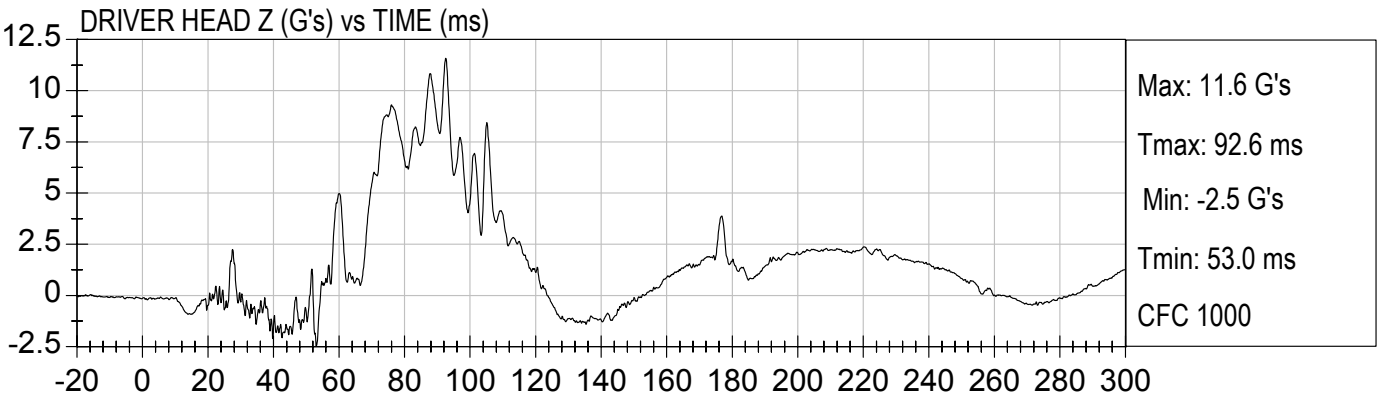
TABLE OF DATA PLOTS

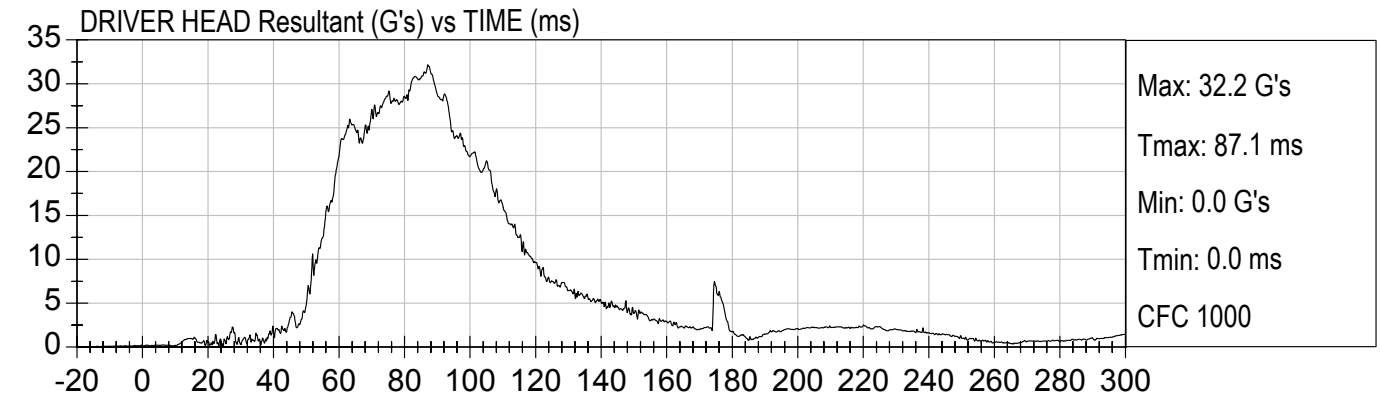
25MPH FRONTAL IMPACT
2004 TOYOTA HIGHLANDER (C45111)

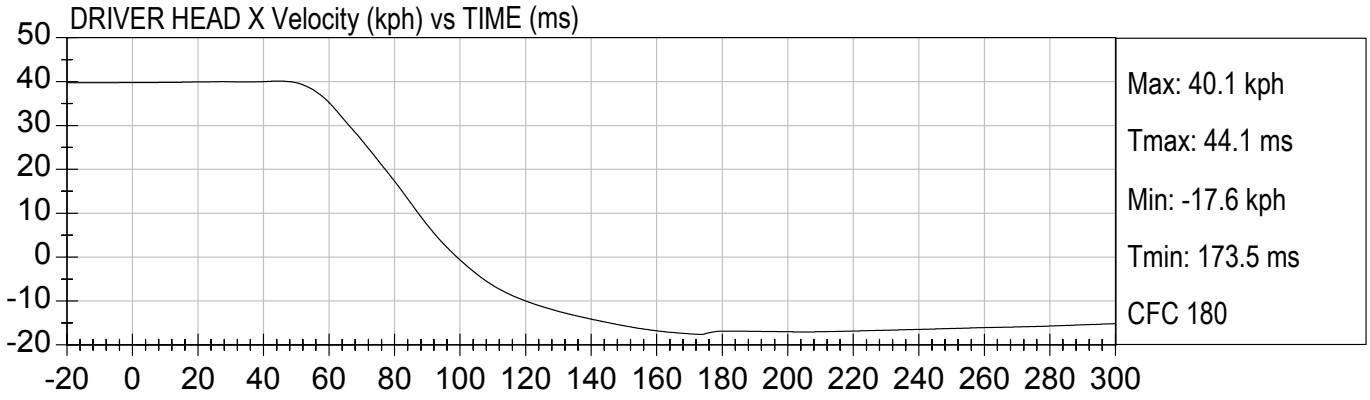
Test Date: 08/18/04
Speed: 24.7 mph (39.8 km/h)

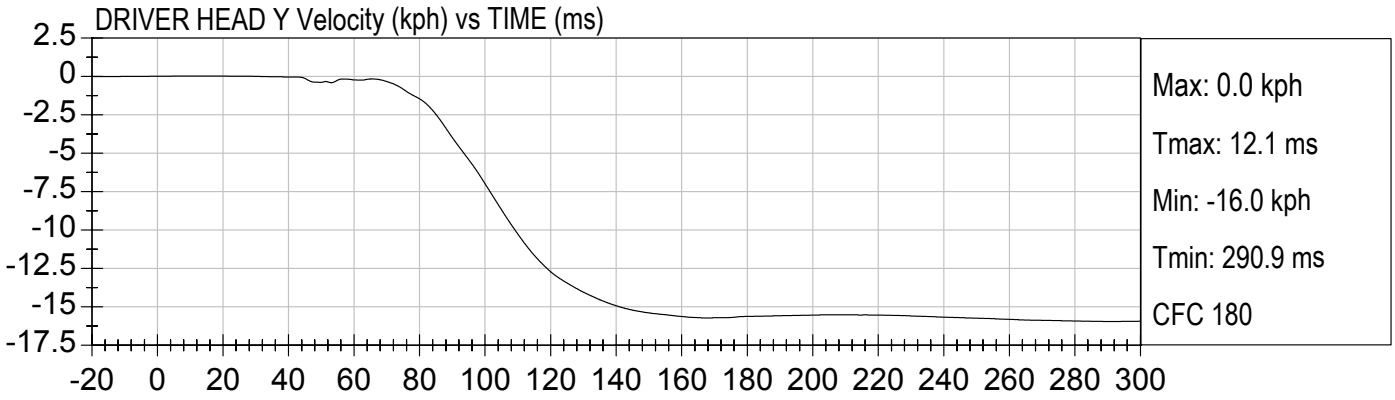


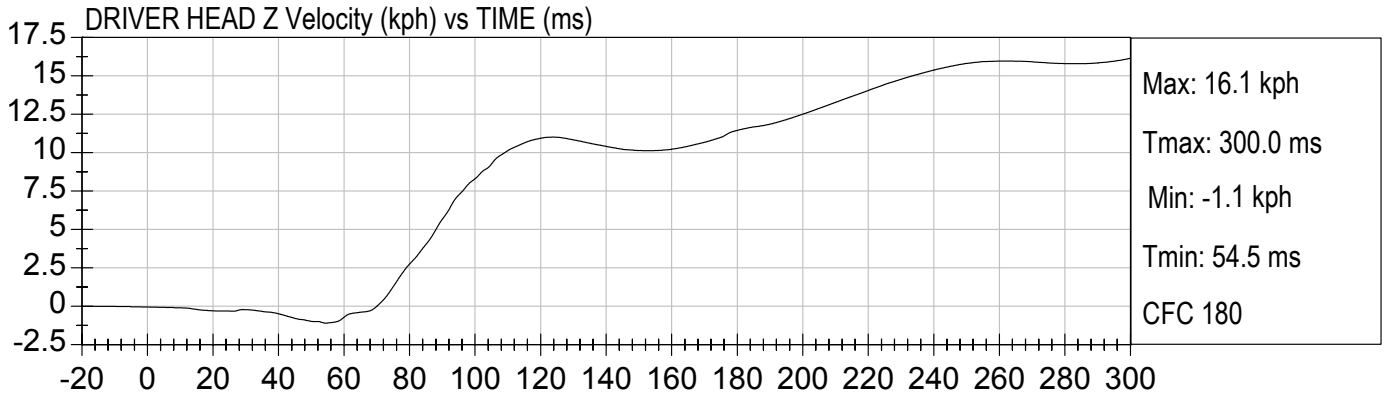






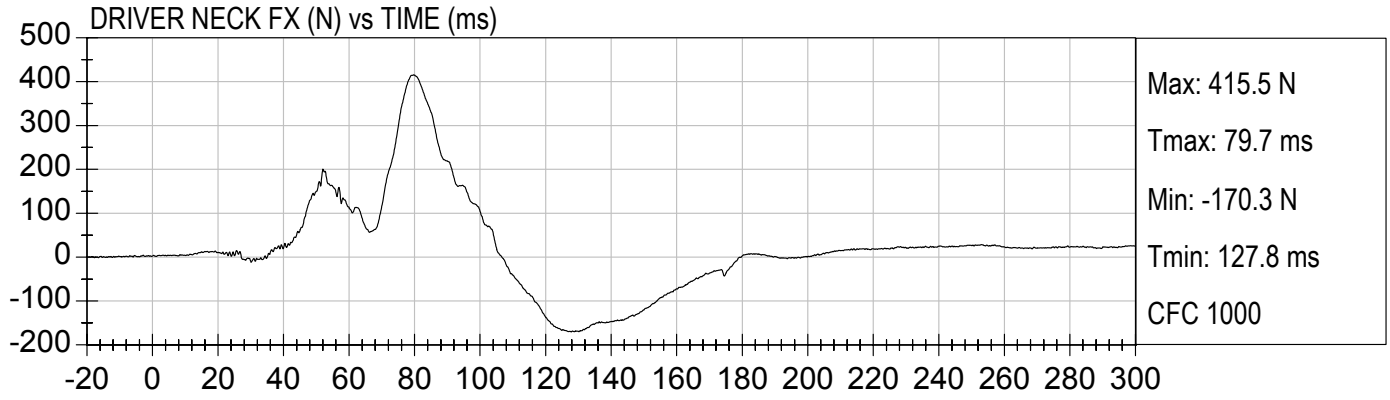

DRIVER HEAD X Velocity (kph) vs TIME (ms)
50
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 40.1 kph
Tmax: 44.1 ms
Min: -17.6 kph
Tmin: 173.5 ms
CFC 180

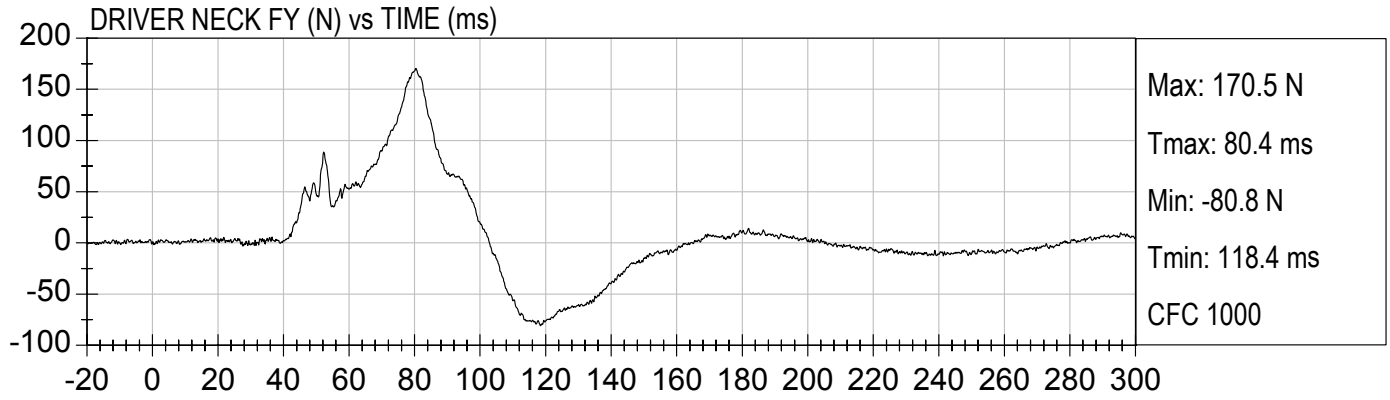

DRIVER HEAD Y Velocity (kph) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-17.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.0 kph
Tmax: 12.1 ms
Min: -16.0 kph
Tmin: 290.9 ms
CFC 180

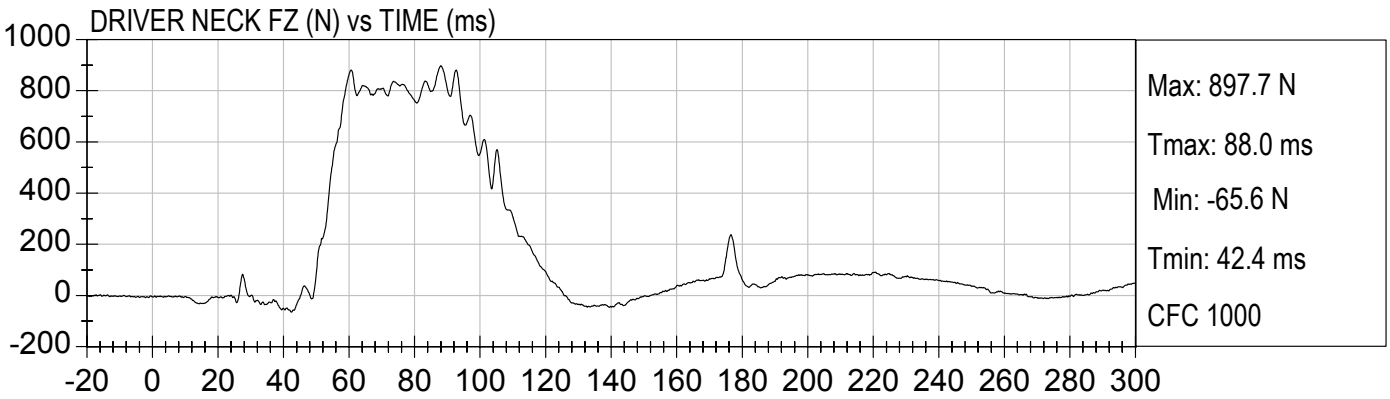

DRIVER HEAD Z Velocity (kph) vs TIME (ms)
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 16.1 kph
Tmax: 300.0 ms
Min: -1.1 kph
Tmin: 54.5 ms
CFC 180

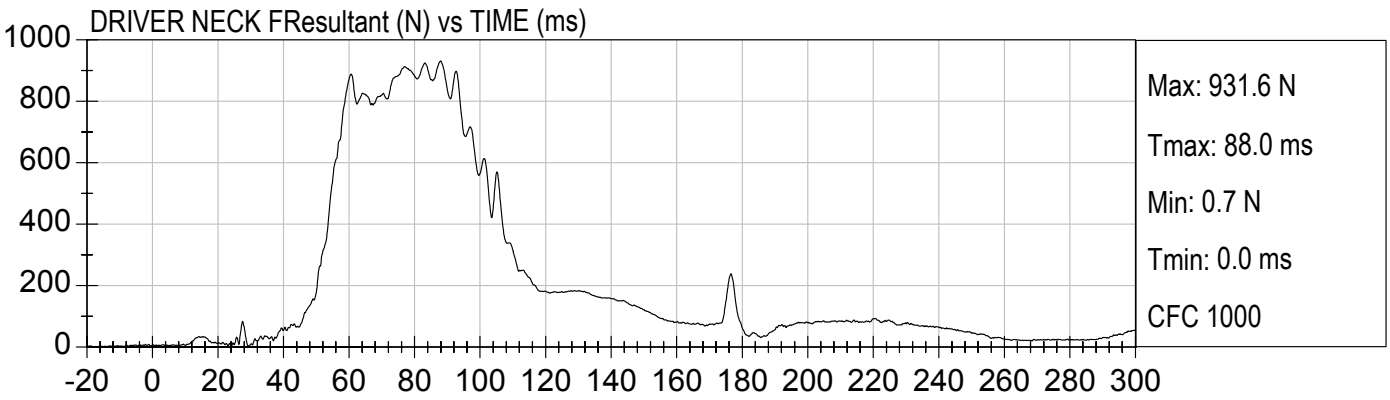
25MPH FRONTAL IMPACT
2004 TOYOTA HIGHLANDER (C45111)

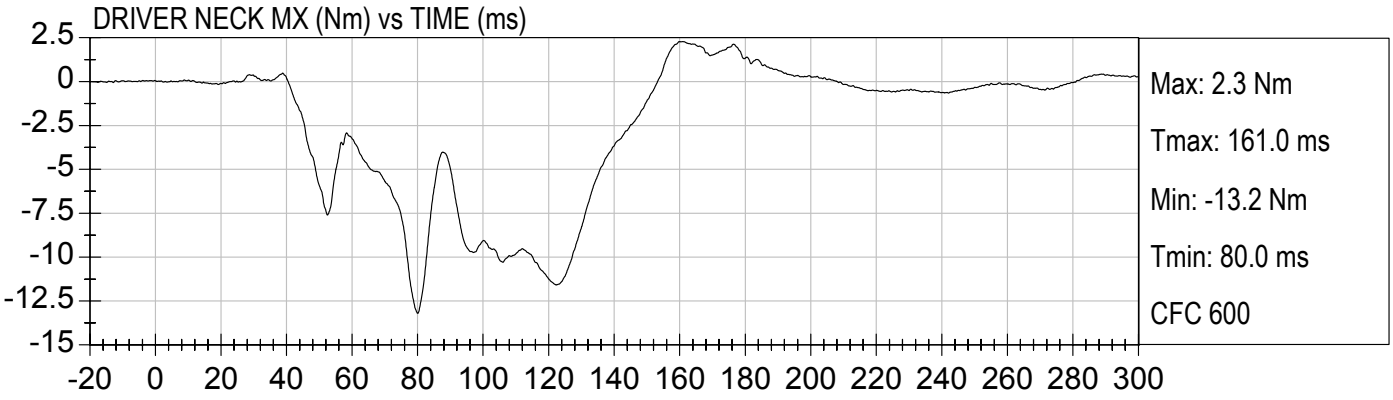
Test Date: 08/18/04
Speed: 24.7 mph (39.8 km/h)

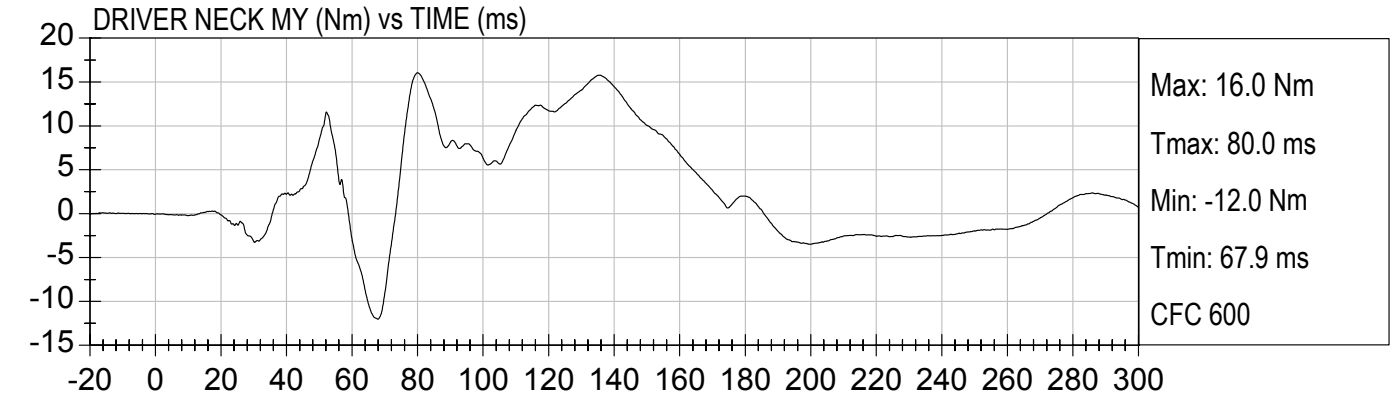


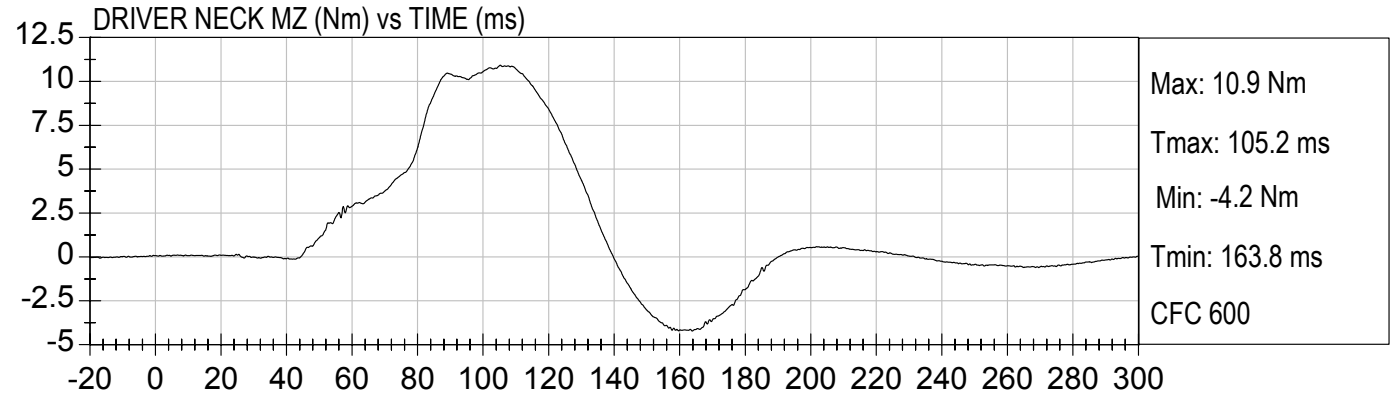


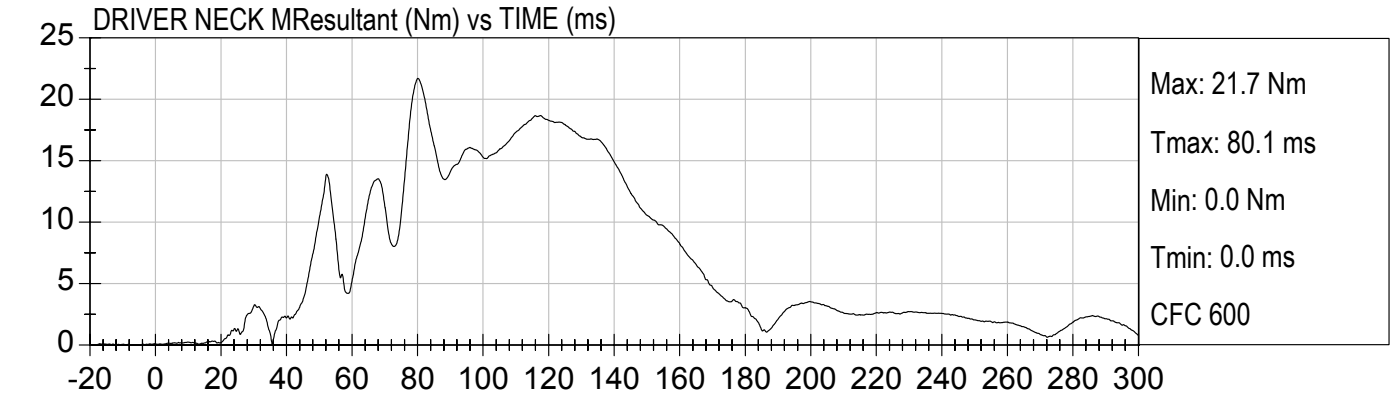





DRIVER NECK MX (Nm) vs TIME (ms)
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.3 Nm
Tmax: 161.0 ms
Min: -13.2 Nm
Tmin: 80.0 ms
CFC 600

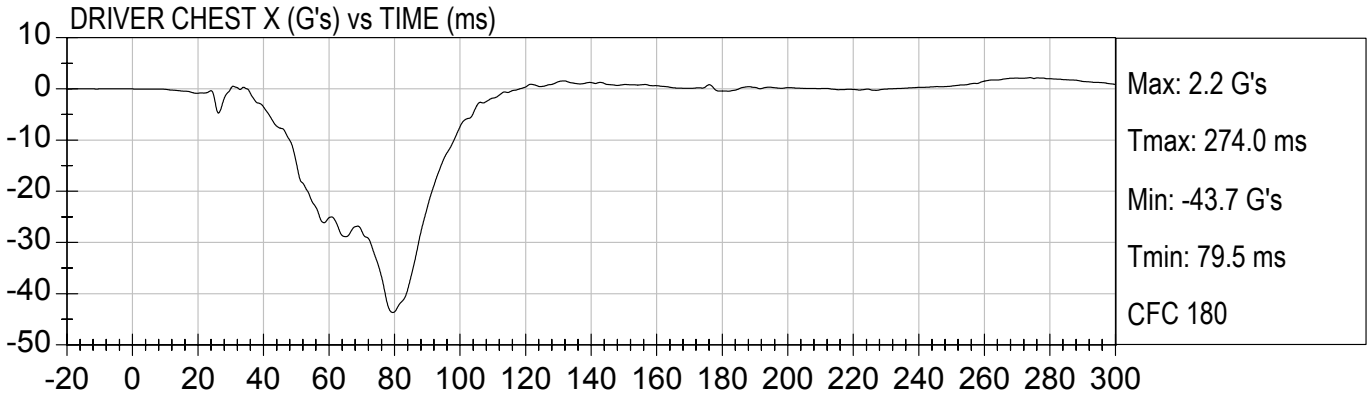

DRIVER NECK MY (Nm) vs TIME (ms)
20
15
10
5
0
-5
-10
-15
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 16.0 Nm
Tmax: 80.0 ms
Min: -12.0 Nm
Tmin: 67.9 ms
CFC 600

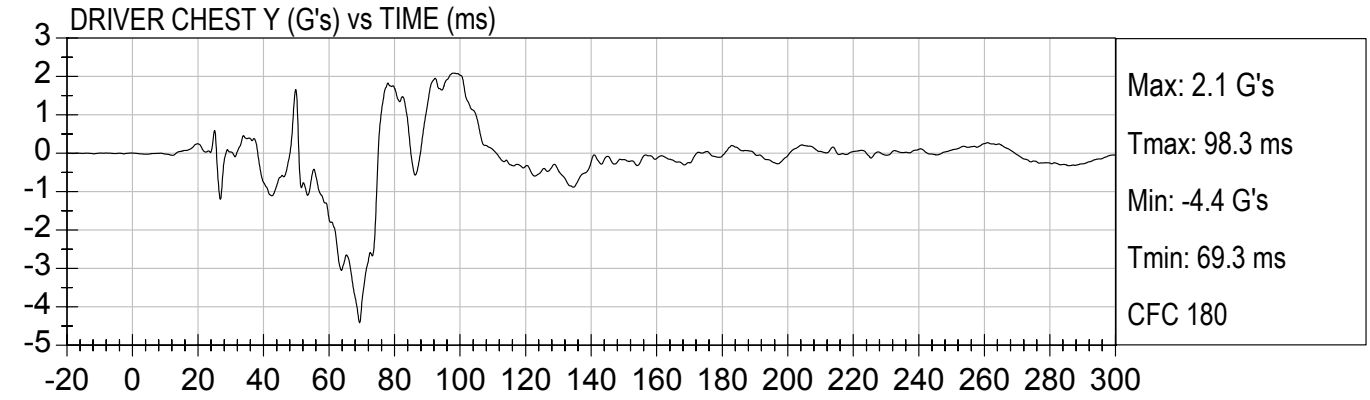

DRIVER NECK MZ (Nm) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 10.9 Nm
Tmax: 105.2 ms
Min: -4.2 Nm
Tmin: 163.8 ms
CFC 600

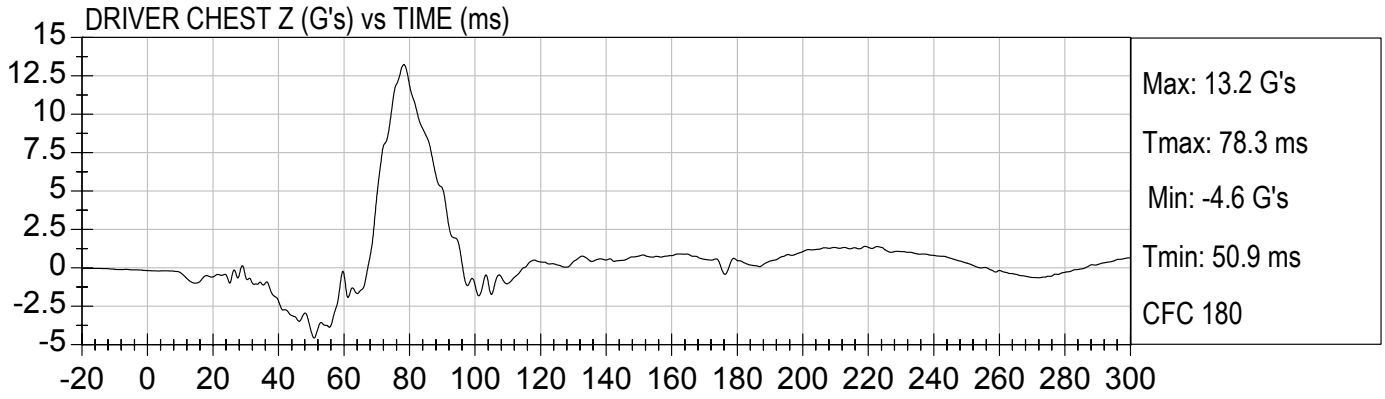

DRIVER NECK MResultant (Nm) vs TIME (ms)
25
20
15
10
5
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 21.7 Nm
Tmax: 80.1 ms
Min: 0.0 Nm
Tmin: 0.0 ms
CFC 600

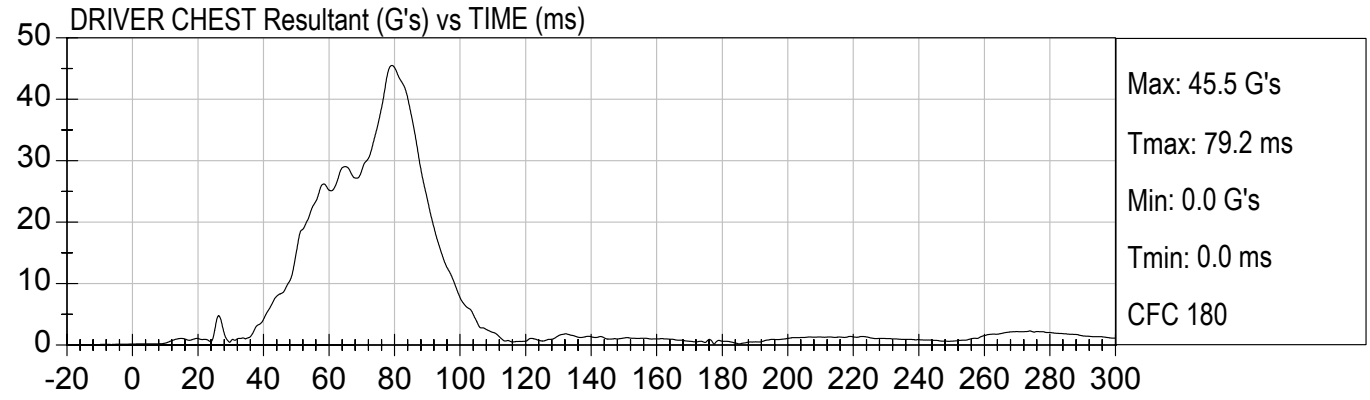
25MPH FRONTAL IMPACT
2004 TOYOTA HIGHLANDER (C45111)

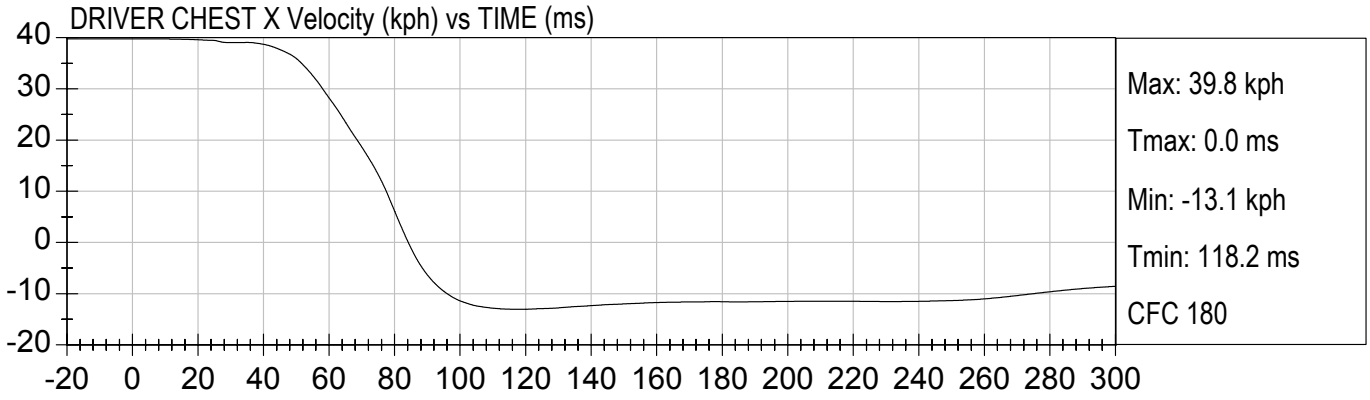
Test Date: 08/18/04
Speed: 24.7 mph (39.8 km/h)

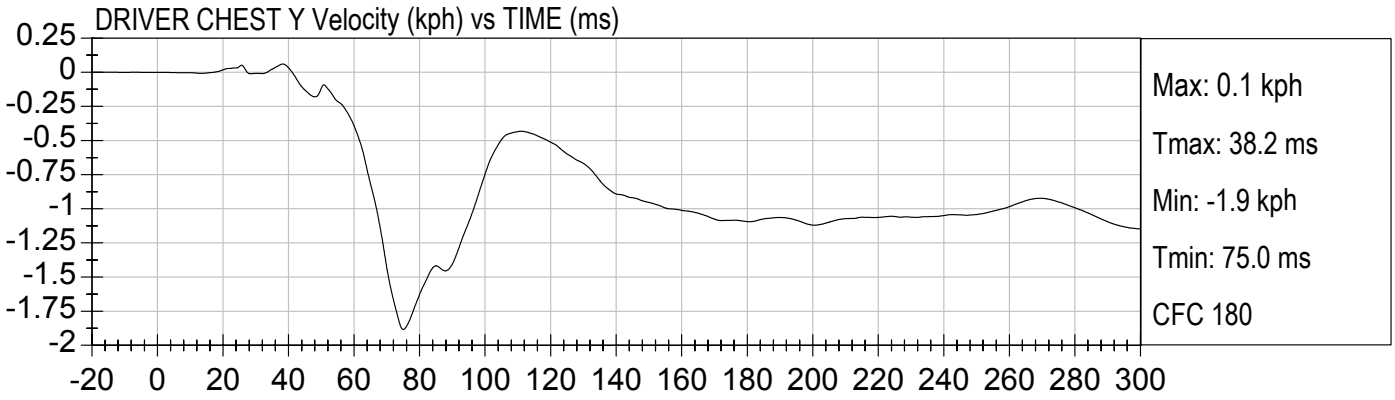


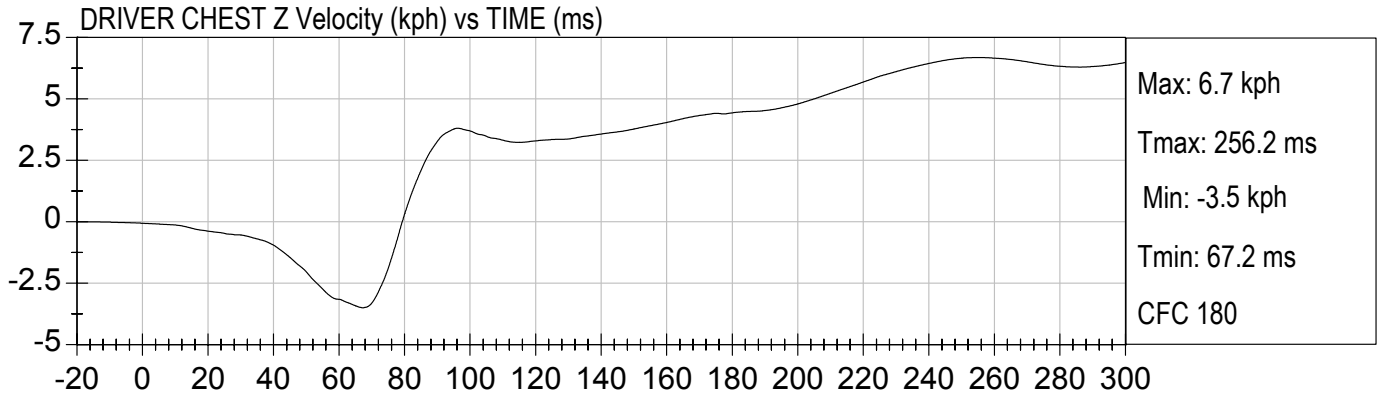


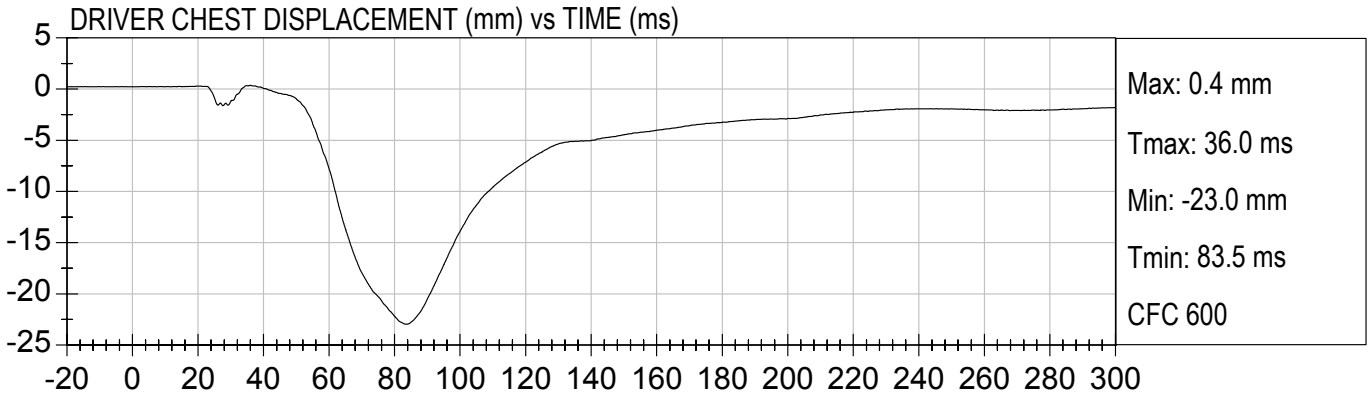


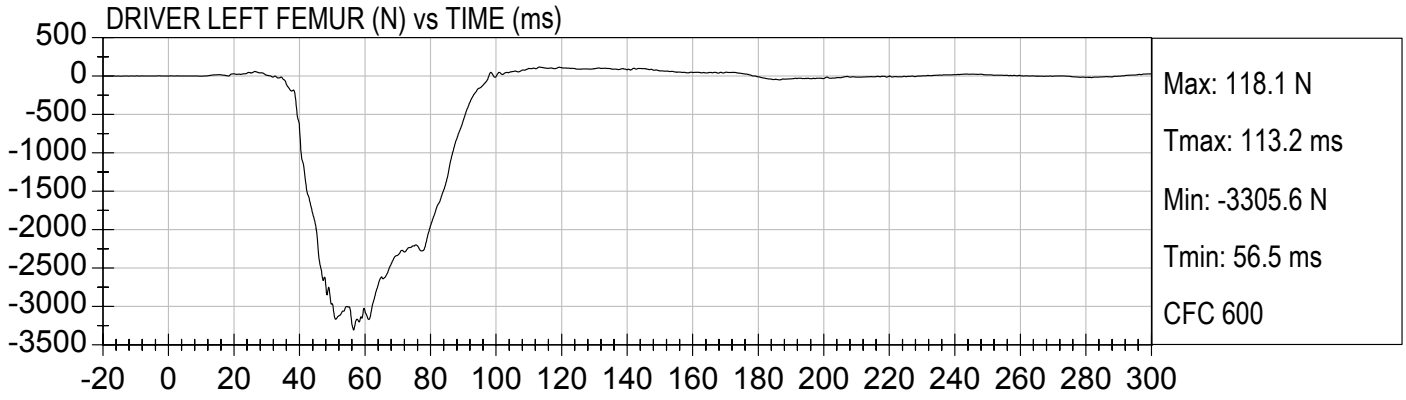


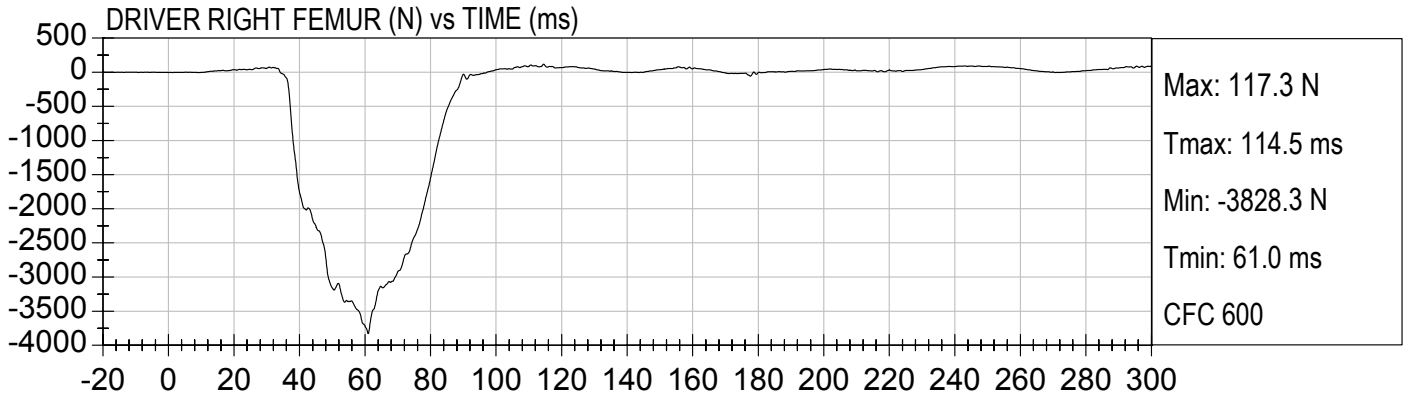

DRIVER CHEST X Velocity (kph) vs TIME (ms)
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 39.8 kph
Tmax: 0.0 ms
Min: -13.1 kph
Tmin: 118.2 ms
CFC 180


DRIVER CHEST Y Velocity (kph) vs TIME (ms)
0.25
0
-0.25
-0.5
-0.75
-1
-1.25
-1.5
-1.75
-2
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.1 kph
Tmax: 38.2 ms
Min: -1.9 kph
Tmin: 75.0 ms
CFC 180


DRIVER CHEST Z Velocity (kph) vs TIME (ms)
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: 6.7 kph
Tmax: 256.2 ms
Min: -3.5 kph
Tmin: 67.2 ms
CFC 180

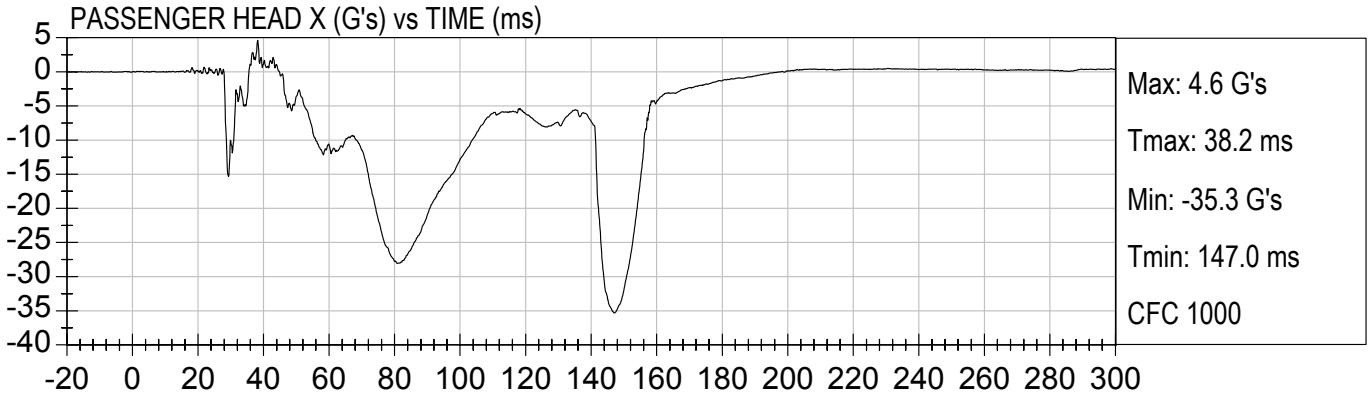

DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.4 mm
Tmax: 36.0 ms
Min: -23.0 mm
Tmin: 83.5 ms
CFC 600

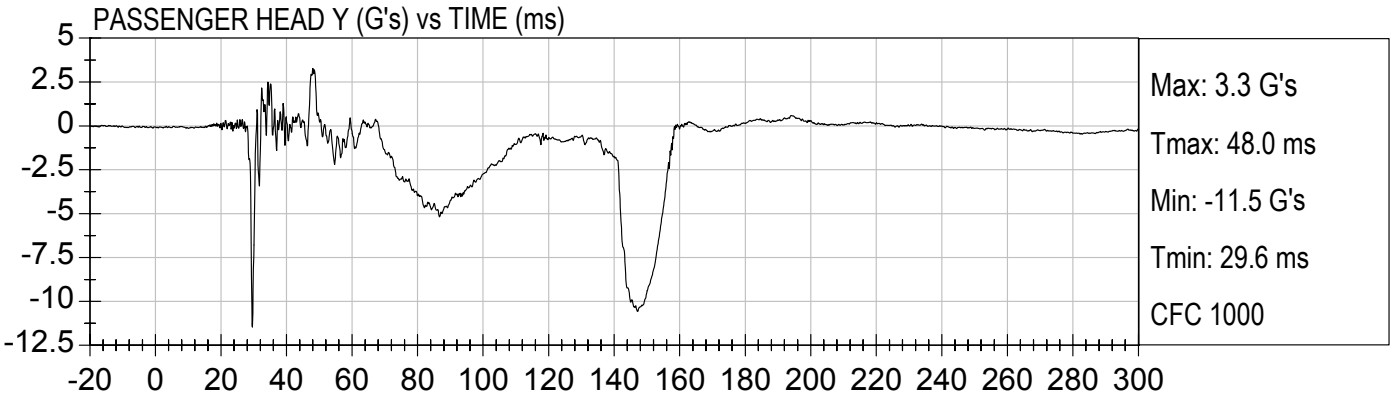

DRIVER LEFT FEMUR (N) vs TIME (ms)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 118.1 N
Tmax: 113.2 ms
Min: -3305.6 N
Tmin: 56.5 ms
CFC 600

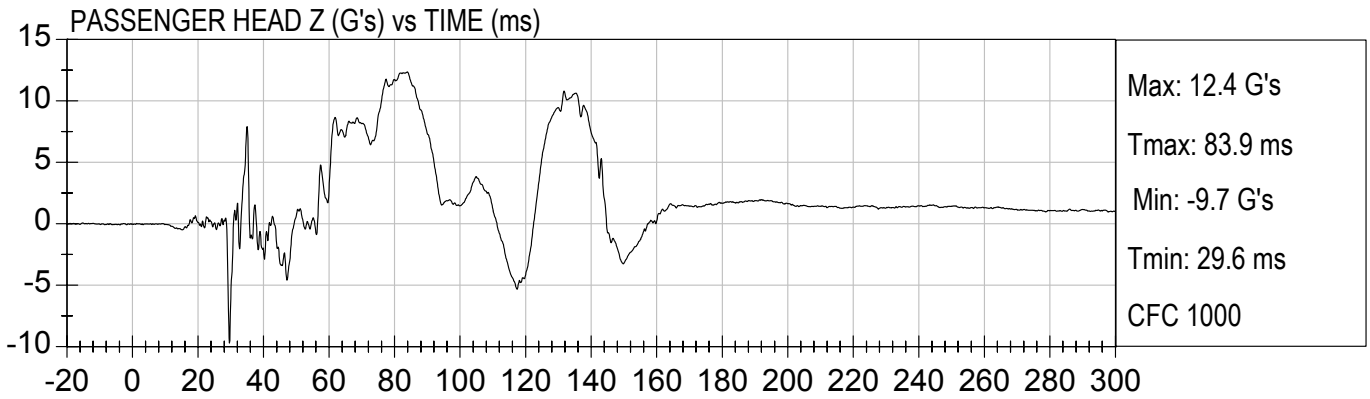

DRIVER RIGHT FEMUR (N) vs TIME (ms)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-4000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 117.3 N
Tmax: 114.5 ms
Min: -3828.3 N
Tmin: 61.0 ms
CFC 600

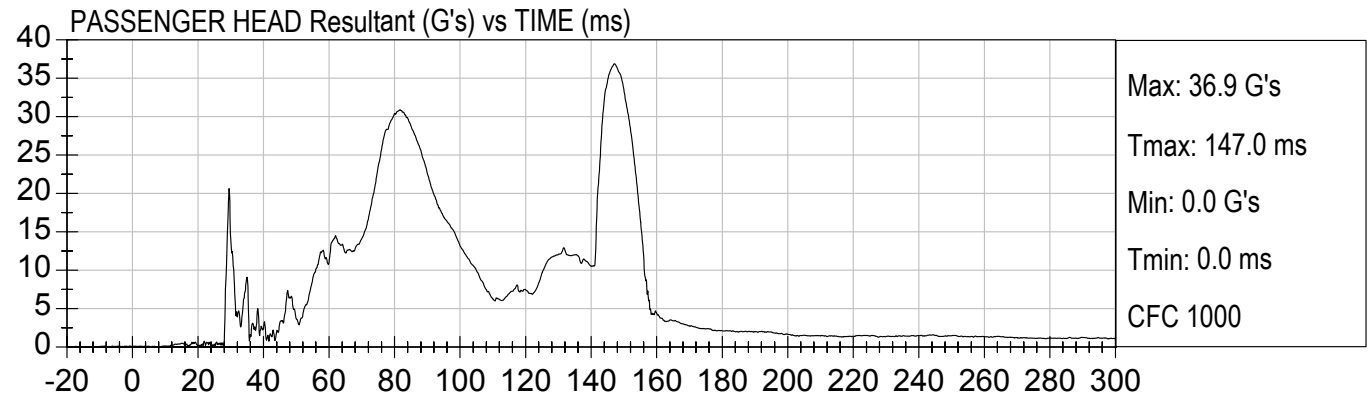
25MPH FRONTAL IMPACT
2004 TOYOTA HIGHLANDER (C45111)

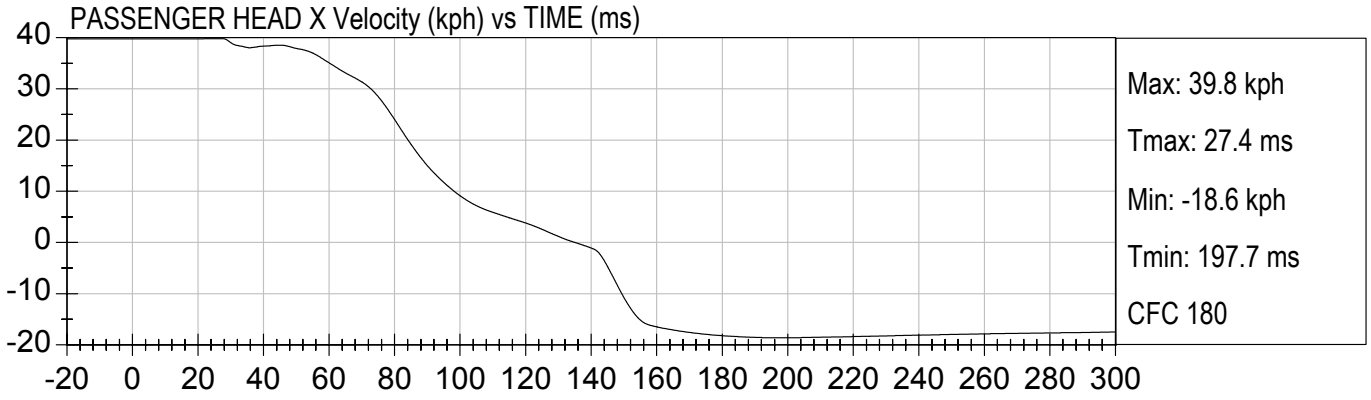
Test Date: 08/18/04
Speed: 24.7 mph (39.8 km/h)

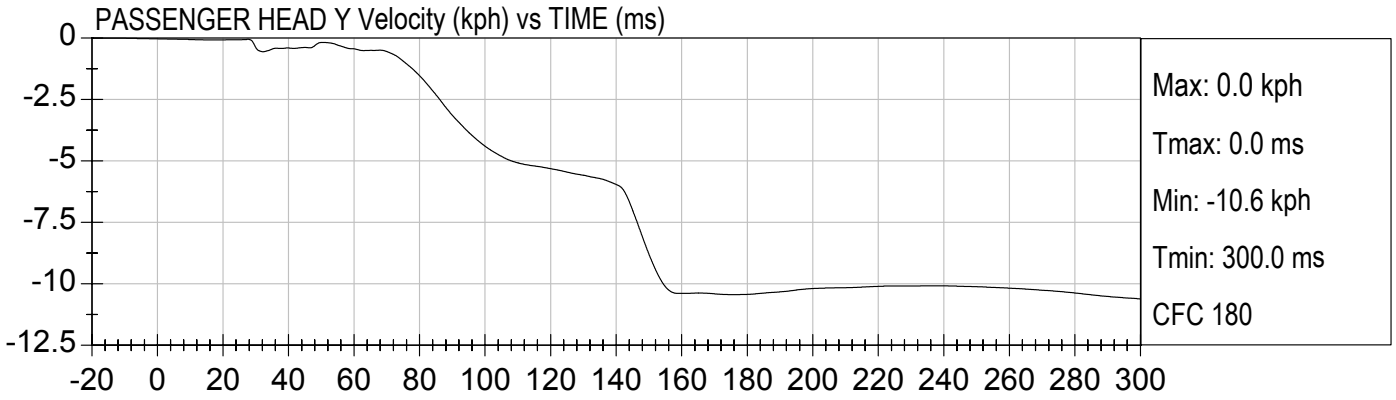


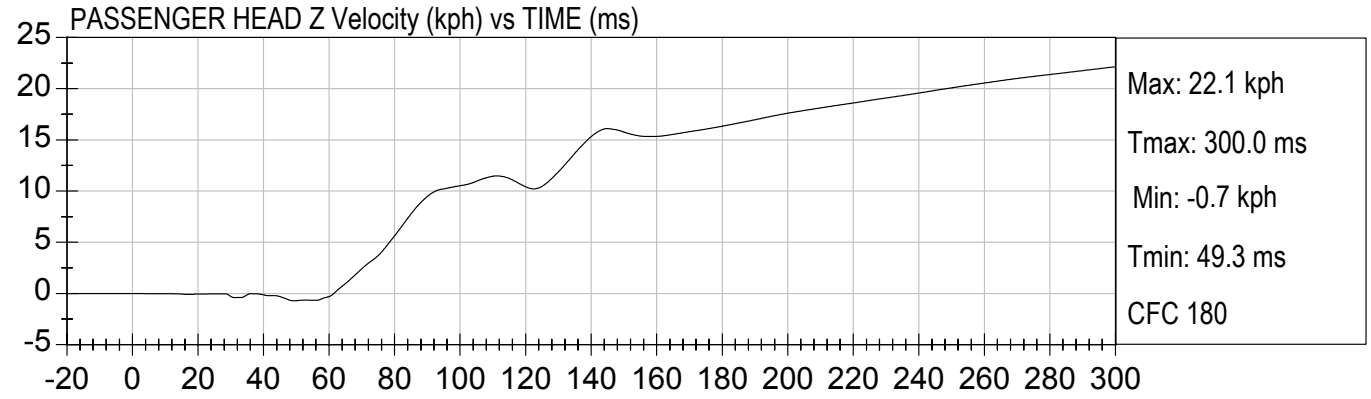






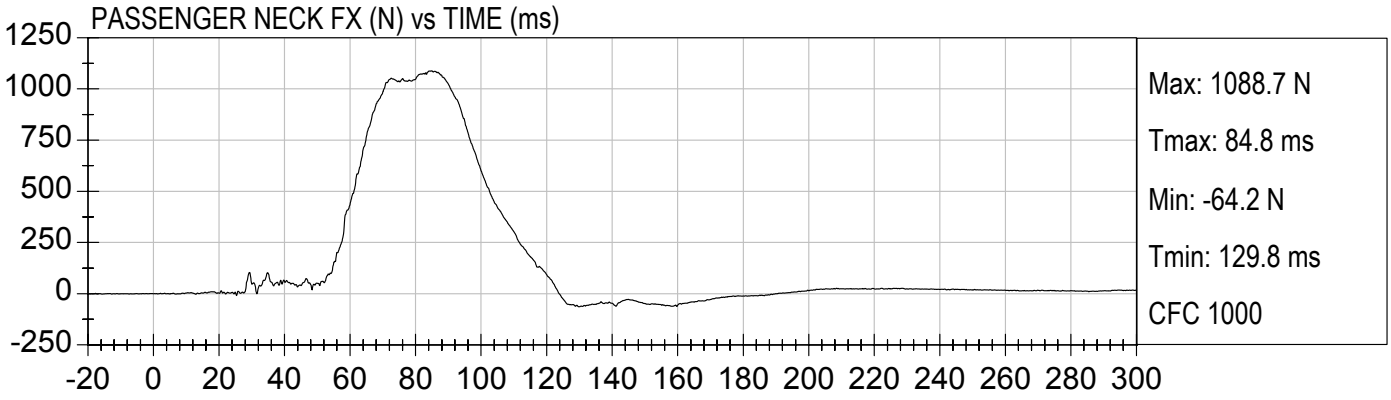

PASSENGER HEAD X Velocity (kph) vs TIME (ms)
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 39.8 kph
Tmax: 27.4 ms
Min: -18.6 kph
Tmin: 197.7 ms
CFC 180

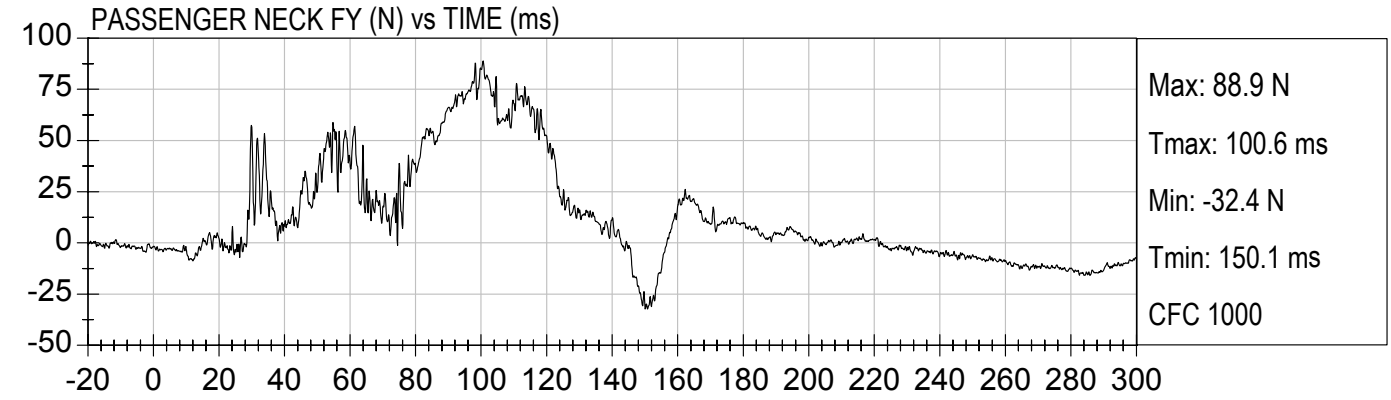

PASSENGER HEAD Y Velocity (kph) vs TIME (ms)
0
-2.5
-5
-7.5
-10
-12.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.0 kph
Tmax: 0.0 ms
Min: -10.6 kph
Tmin: 300.0 ms
CFC 180

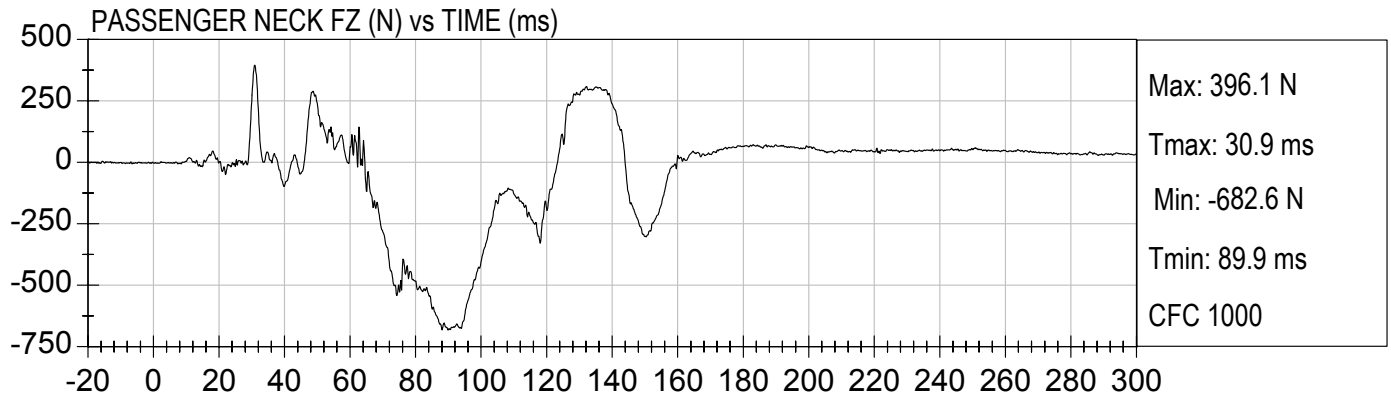

PASSENGER HEAD Z Velocity (kph) vs TIME (ms)
25
20
15
10
5
0
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 22.1 kph
Tmax: 300.0 ms
Min: -0.7 kph
Tmin: 49.3 ms
CFC 180

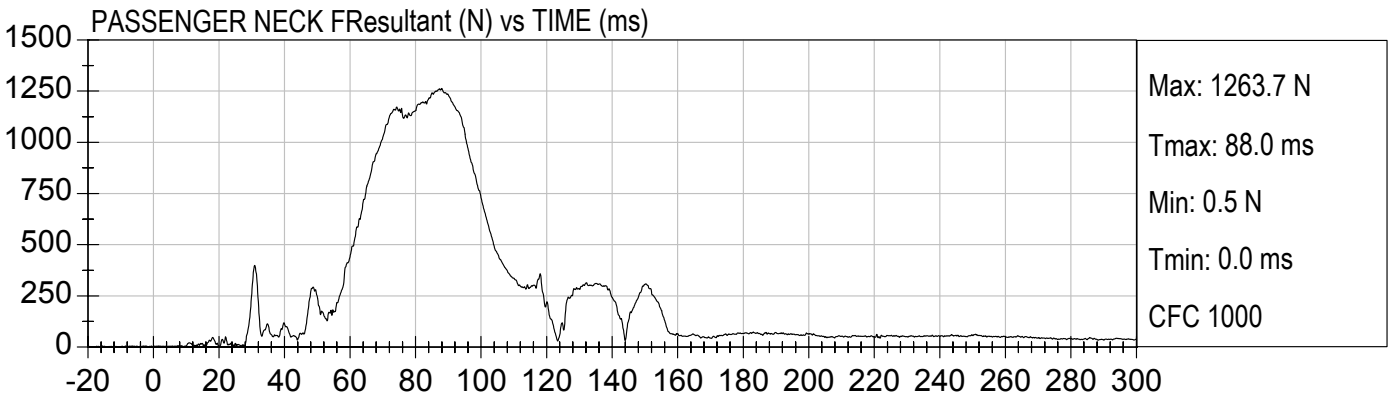
25MPH FRONTAL IMPACT
2004 TOYOTA HIGHLANDER (C45111)

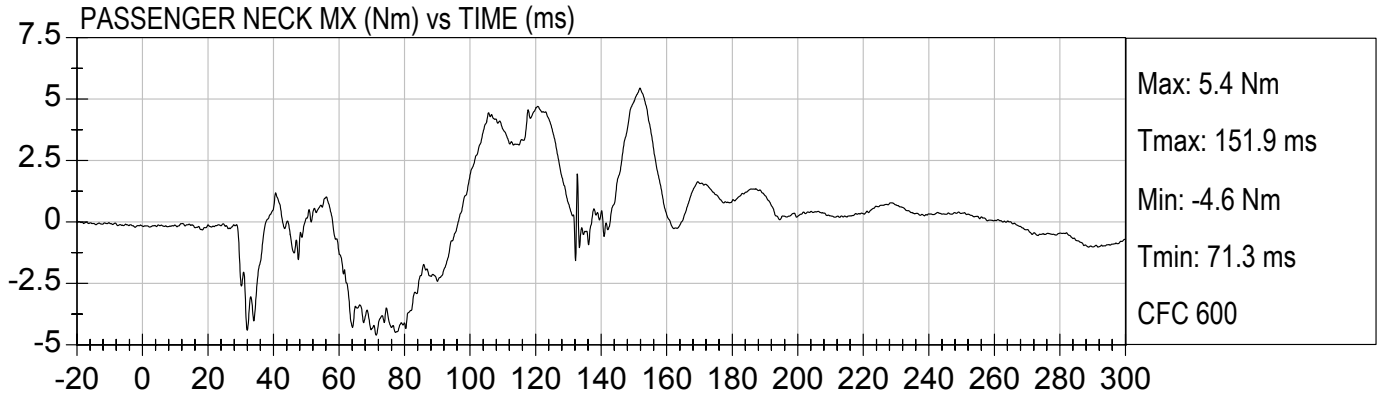
Test Date: 08/18/04
Speed: 24.7 mph (39.8 km/h)

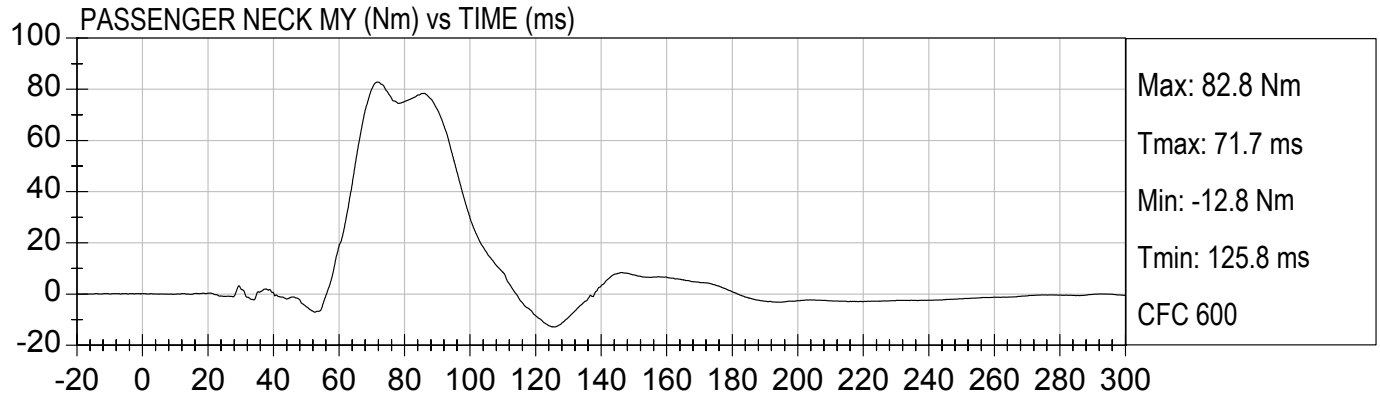


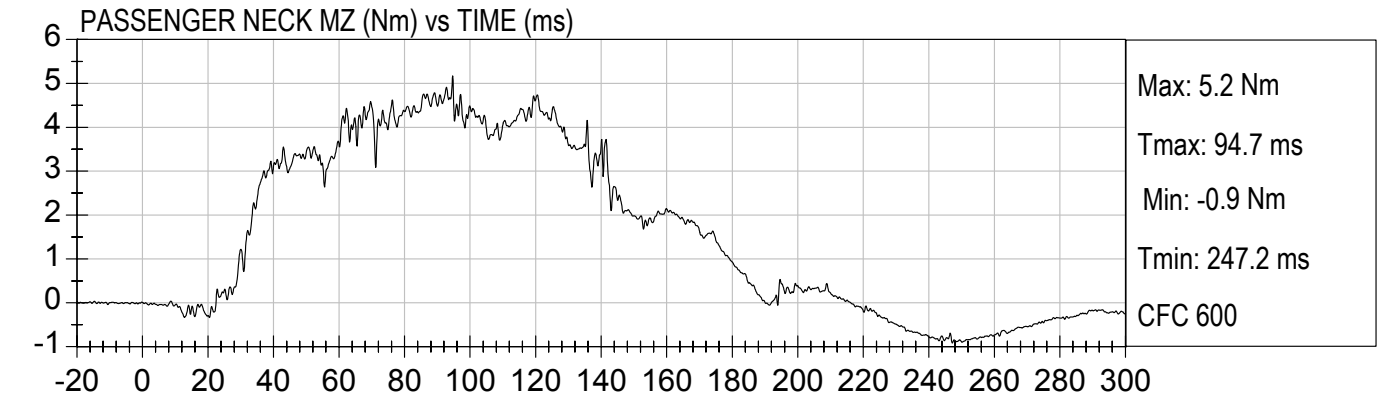


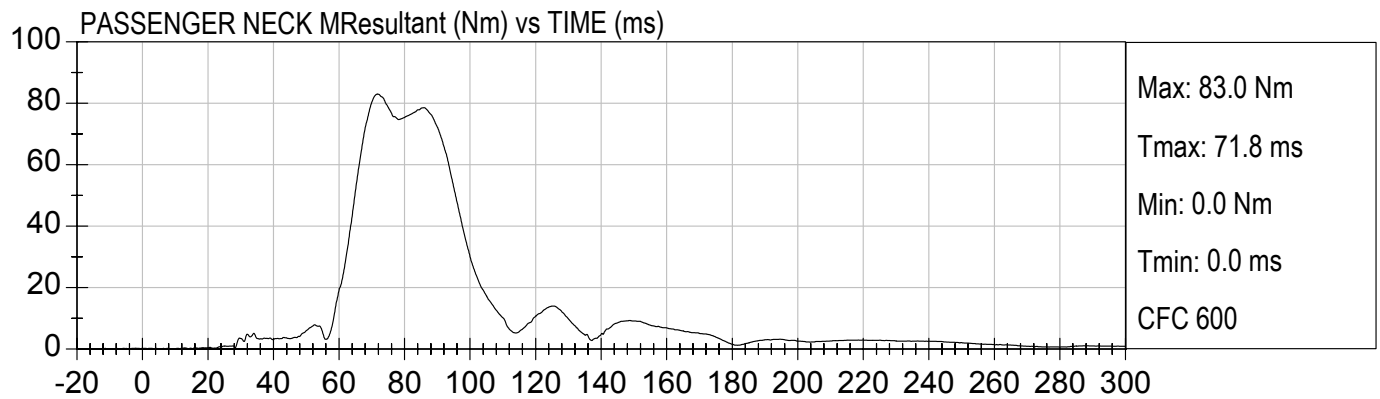





PASSENGER NECK MX (Nm) vs TIME (ms)
7.5
5
2.5
0
-2.5
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 5.4 Nm
Tmax: 151.9 ms
Min: -4.6 Nm
Tmin: 71.3 ms
CFC 600

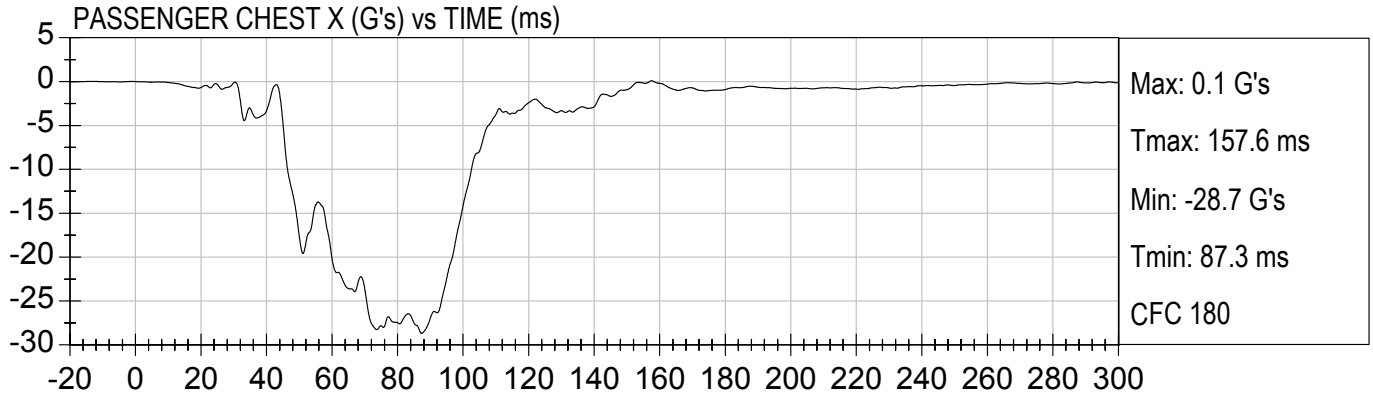

PASSENGER NECK MY (Nm) vs TIME (ms)
100
80
60
40
20
0
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 82.8 Nm
Tmax: 71.7 ms
Min: -12.8 Nm
Tmin: 125.8 ms
CFC 600

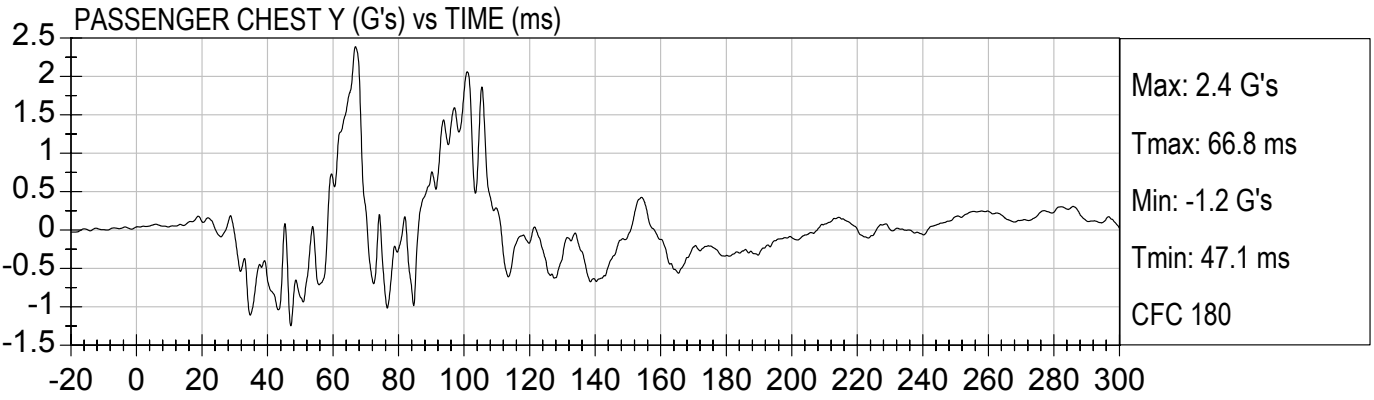

PASSENGER NECK MZ (Nm) vs TIME (ms)
6
5
4
3
2
1
0
-1
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 5.2 Nm
Tmax: 94.7 ms
Min: -0.9 Nm
Tmin: 247.2 ms
CFC 600

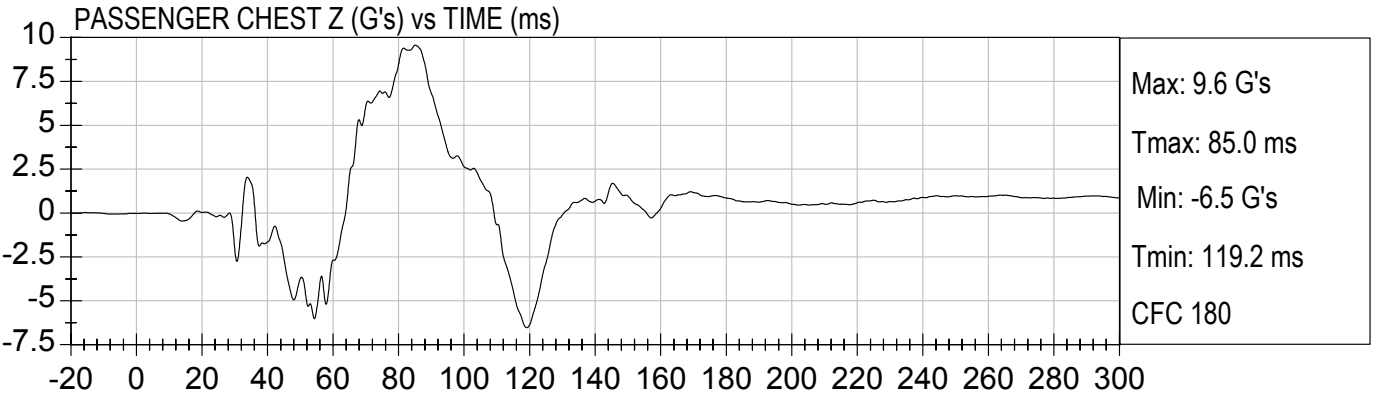

PASSENGER NECK MResultant (Nm) vs TIME (ms)
100
80
60
40
20
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 83.0 Nm
Tmax: 71.8 ms
Min: 0.0 Nm
Tmin: 0.0 ms
CFC 600

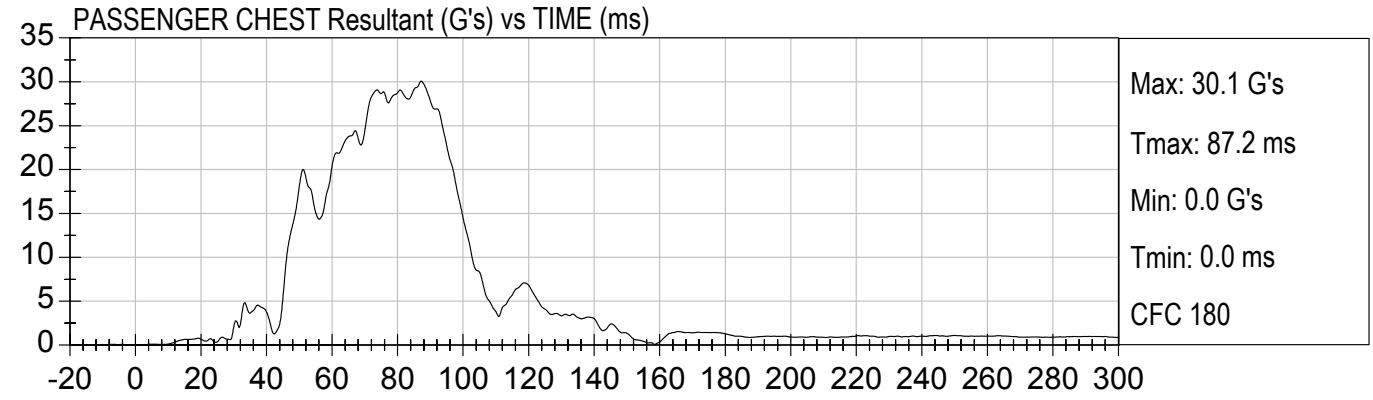
25MPH FRONTAL IMPACT
2004 TOYOTA HIGHLANDER (C45111)

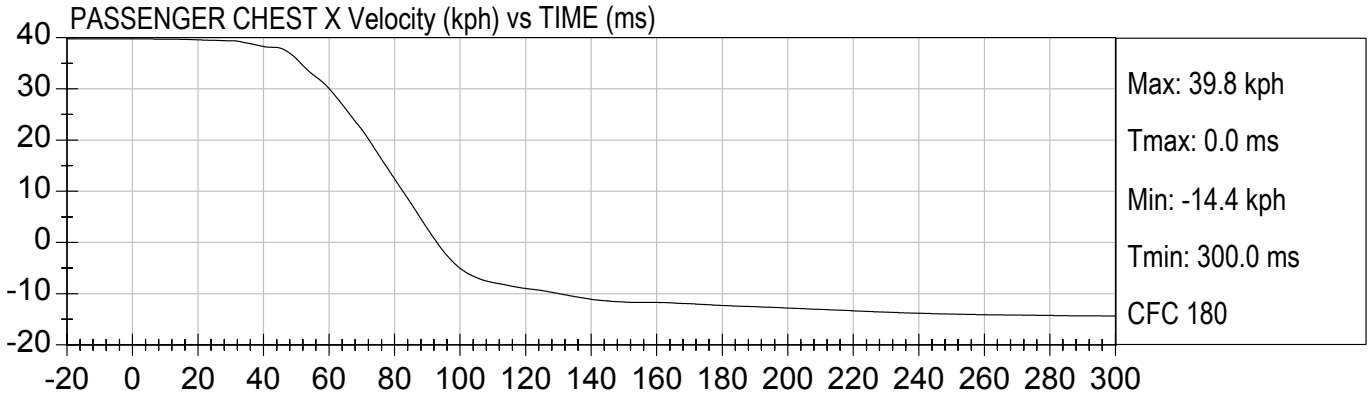
Test Date: 08/18/04
Speed: 24.7 mph (39.8 km/h)

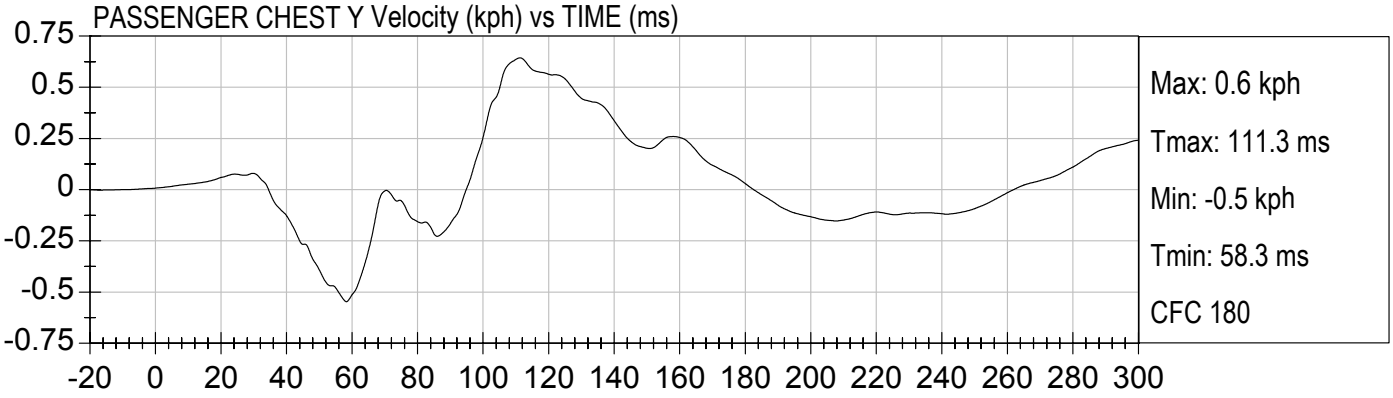


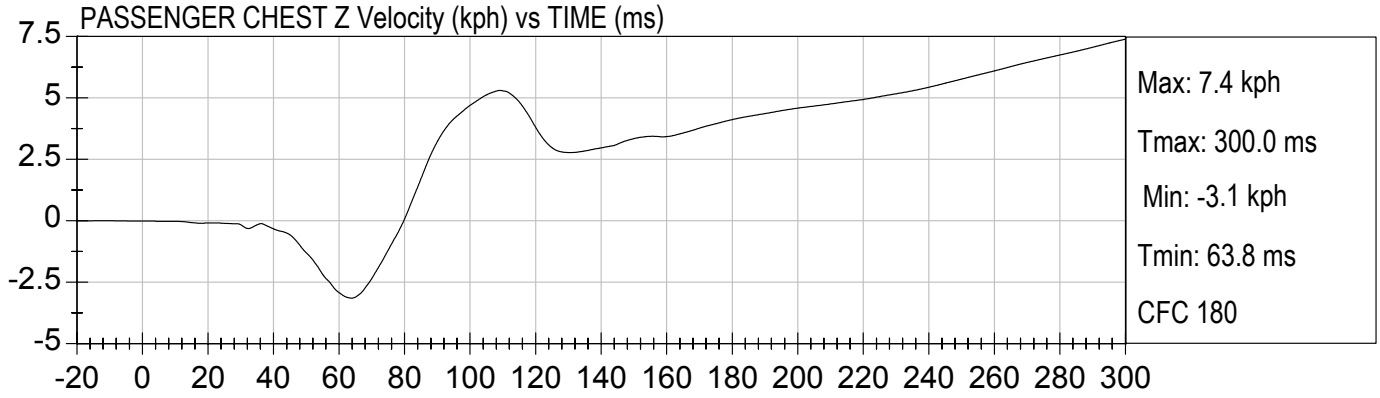


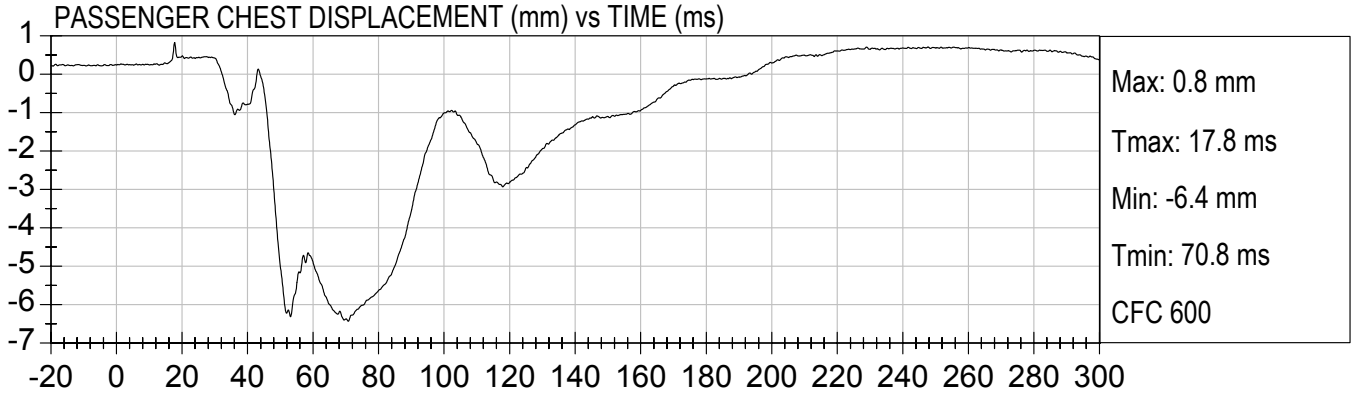


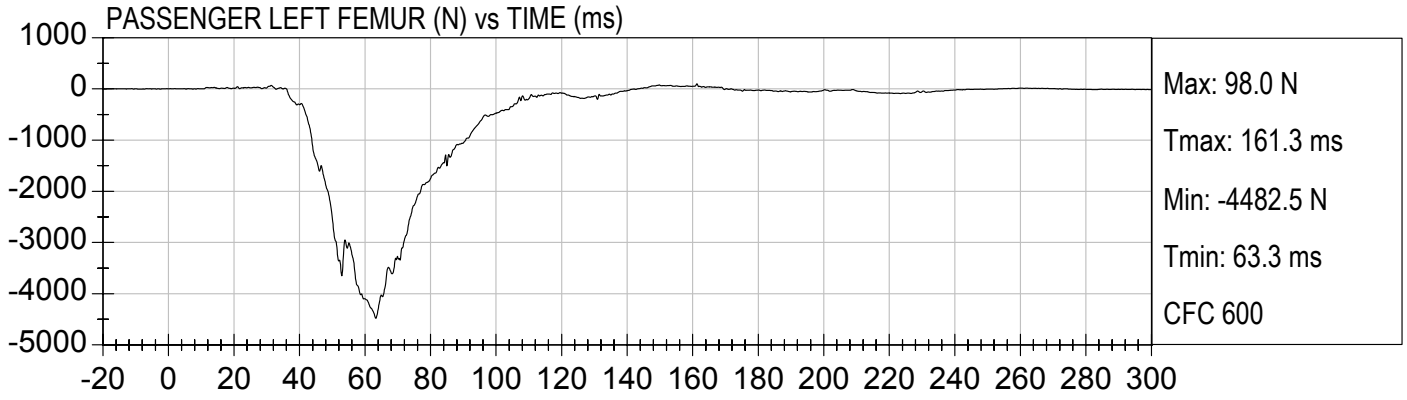


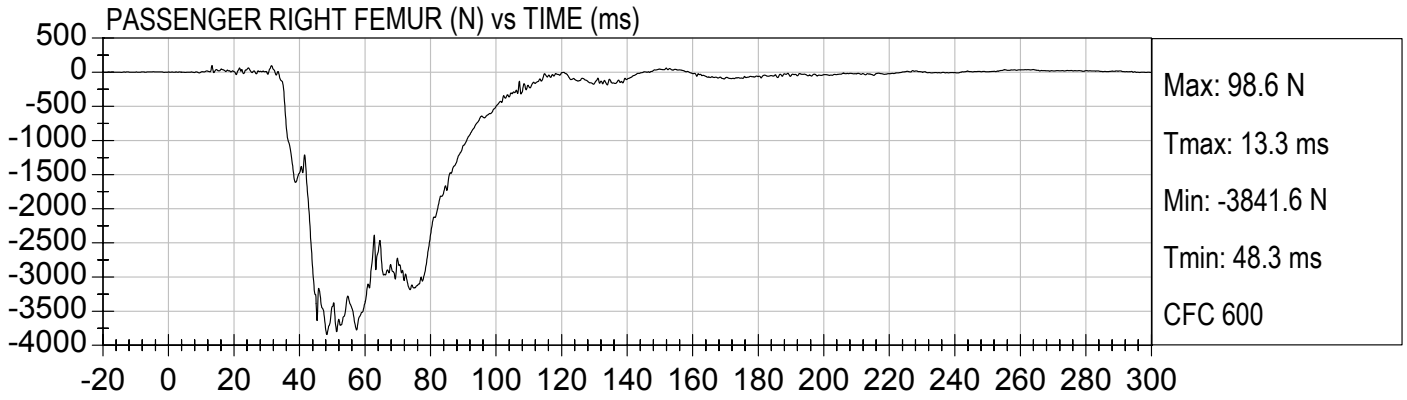

PASSENGER CHEST X Velocity (kph) vs TIME (ms)
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 39.8 kph
Tmax: 0.0 ms
Min: -14.4 kph
Tmin: 300.0 ms
CFC 180

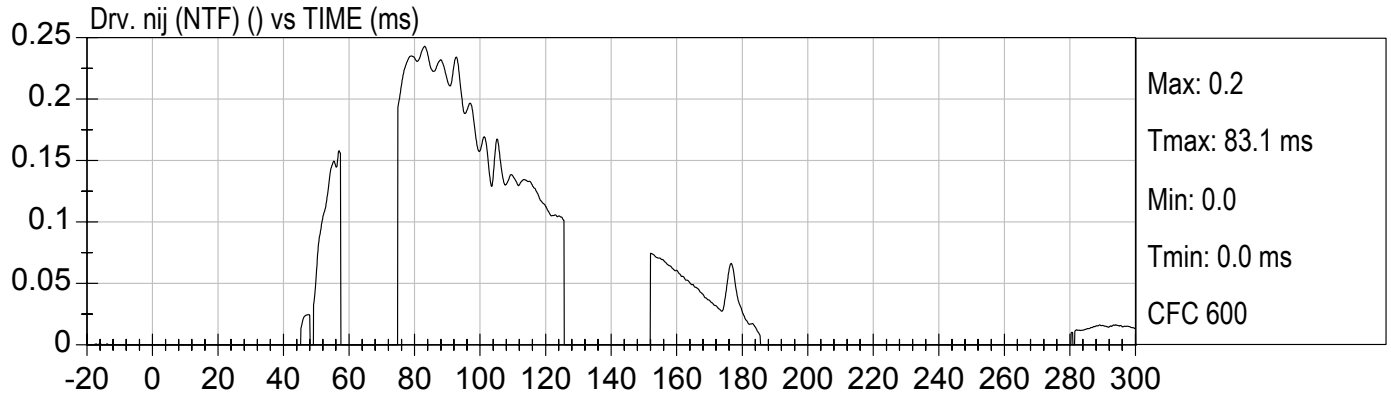

PASSENGER CHEST Y Velocity (kph) vs TIME (ms)
0.75
0.5
0.25
0
-0.25
-0.5
-0.75
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.6 kph
Tmax: 111.3 ms
Min: -0.5 kph
Tmin: 58.3 ms
CFC 180

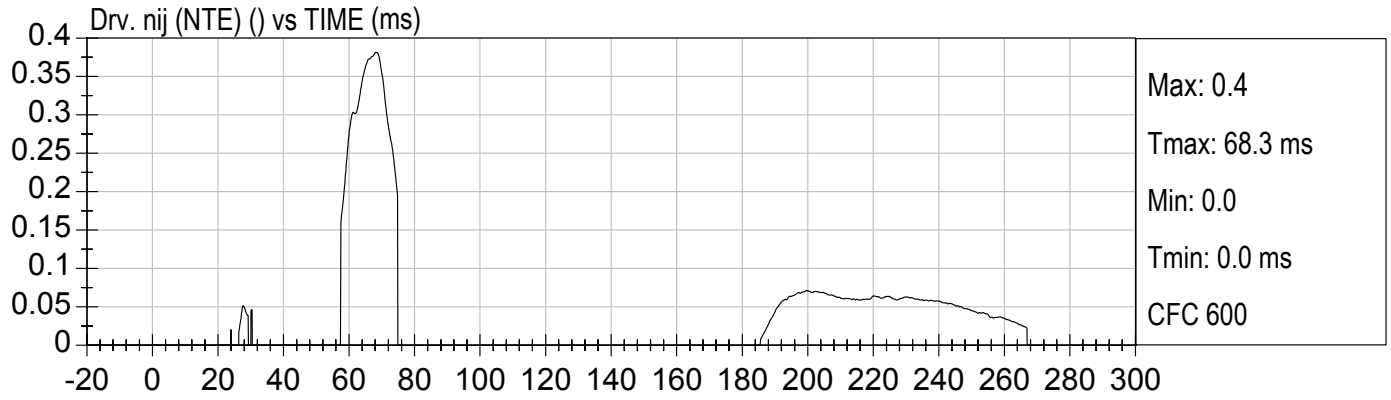

PASSENGER CHEST Z Velocity (kph) vs TIME (ms)
7.5
5
2.5
0
-2.5
-5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 7.4 kph
Tmax: 300.0 ms
Min: -3.1 kph
Tmin: 63.8 ms
CFC 180

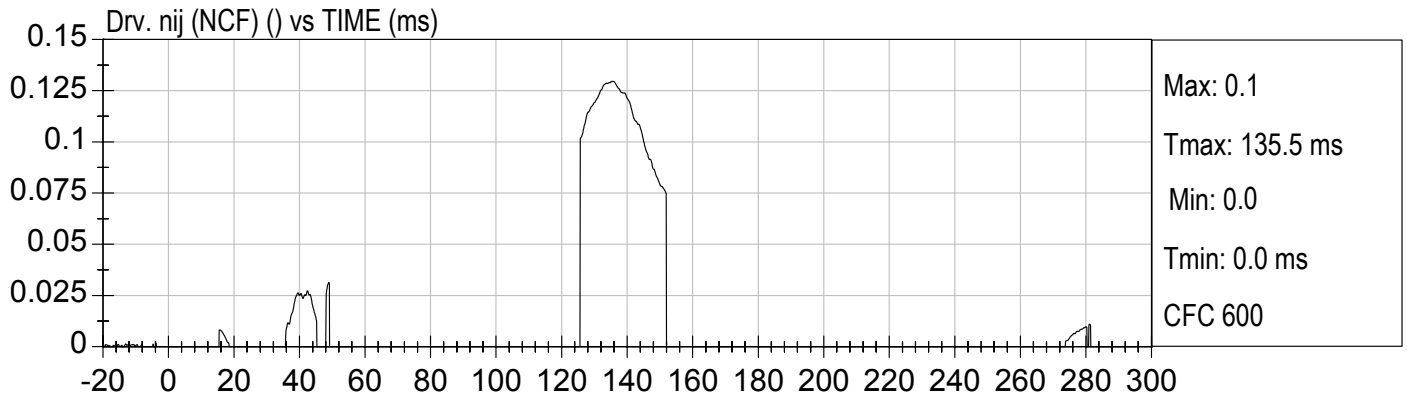

PASSENGER CHEST DISPLACEMENT (mm) vs TIME (ms)
1
0
-1
-2
-3
-4
-5
-6
-7
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.8 mm
Tmax: 17.8 ms
Min: -6.4 mm
Tmin: 70.8 ms
CFC 600

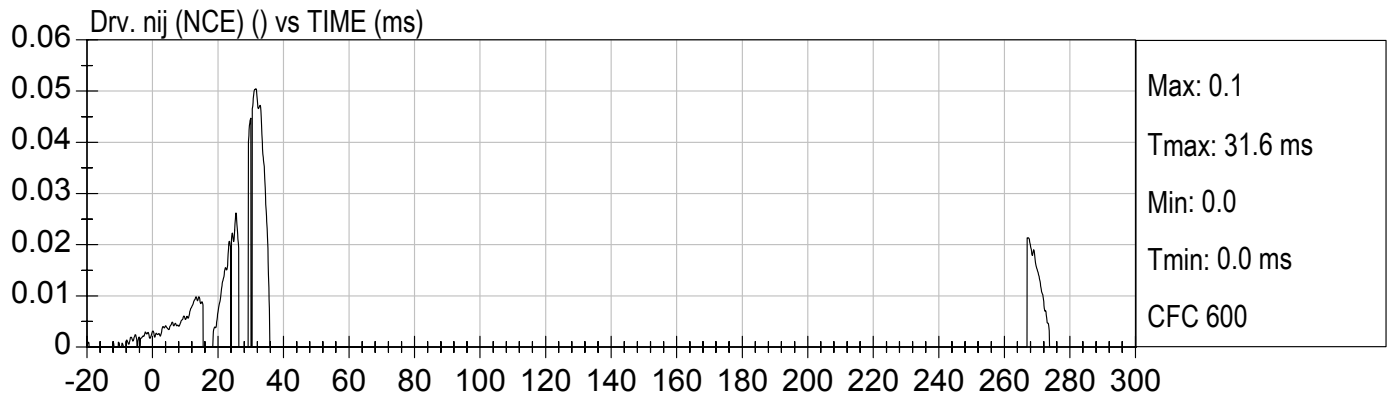

PASSENGER LEFT FEMUR (N) vs TIME (ms)
1000
0
-1000
-2000
-3000
-4000
-5000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 98.0 N
Tmax: 161.3 ms
Min: -4482.5 N
Tmin: 63.3 ms
CFC 600

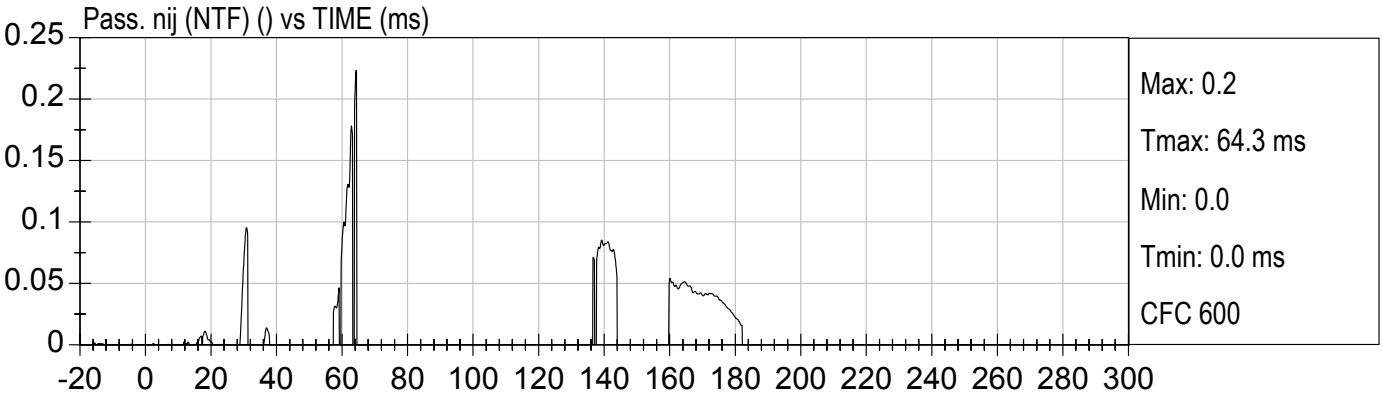

PASSENGER RIGHT FEMUR (N) vs TIME (ms)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-4000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 98.6 N
Tmax: 13.3 ms
Min: -3841.6 N
Tmin: 48.3 ms
CFC 600

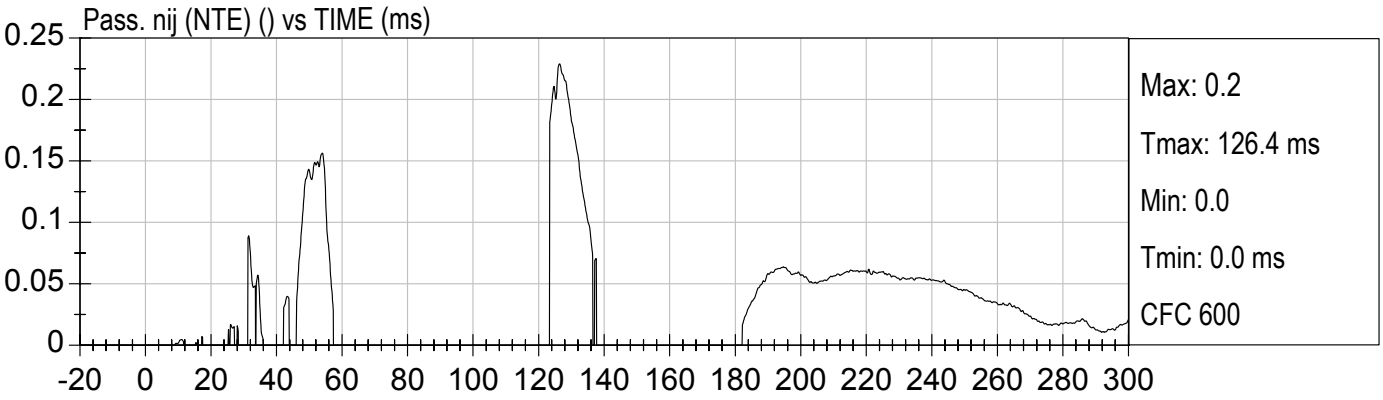

Drv. nij (NTF) () vs TIME (ms)
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2
Tmax: 83.1 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

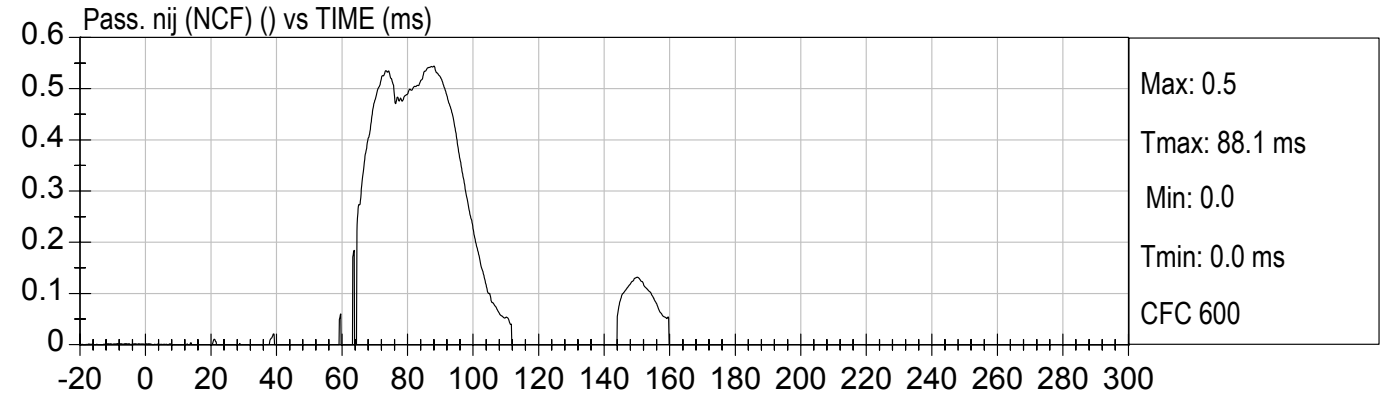

Drv. nij (NTE) () vs TIME (ms)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.4
Tmax: 68.3 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

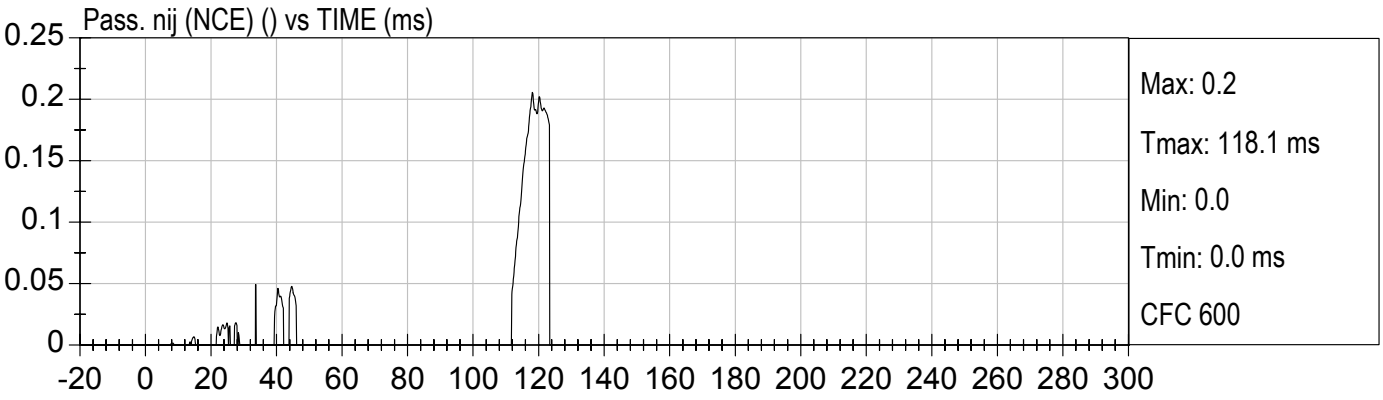

Drv. nij (NCF) () vs TIME (ms)
0.15
0.125
0.1
0.075
0.05
0.025
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.1
Tmax: 135.5 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

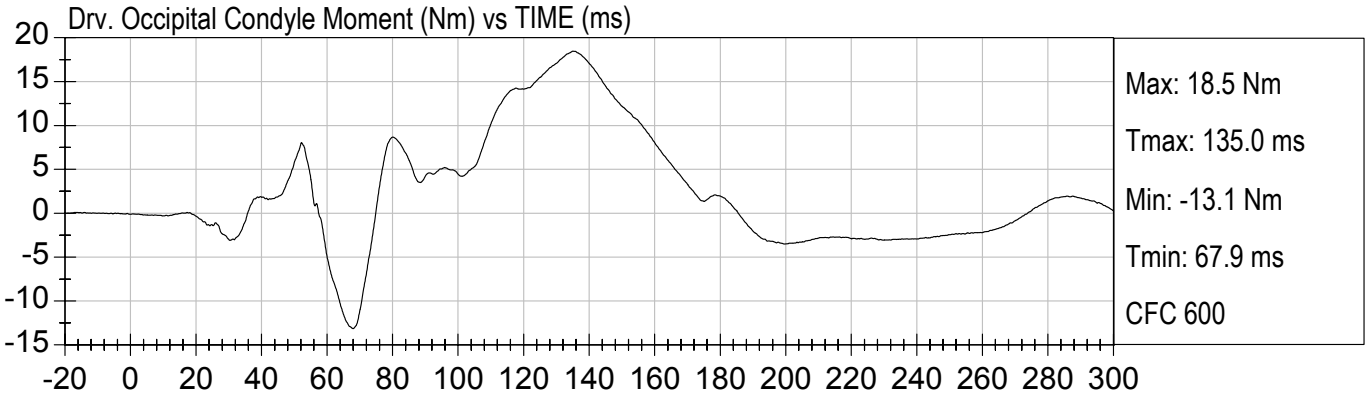

Drv. nij (NCE) () vs TIME (ms)
0.06
0.05
0.04
0.03
0.02
0.01
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.1
Tmax: 31.6 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

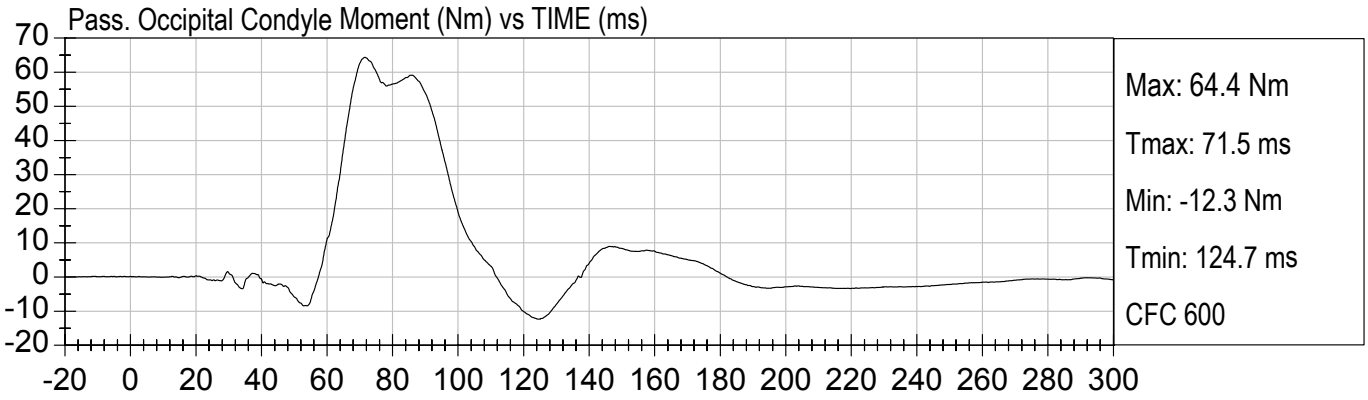

Pass. nij (NTF) () vs TIME (ms)
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2
Tmax: 64.3 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

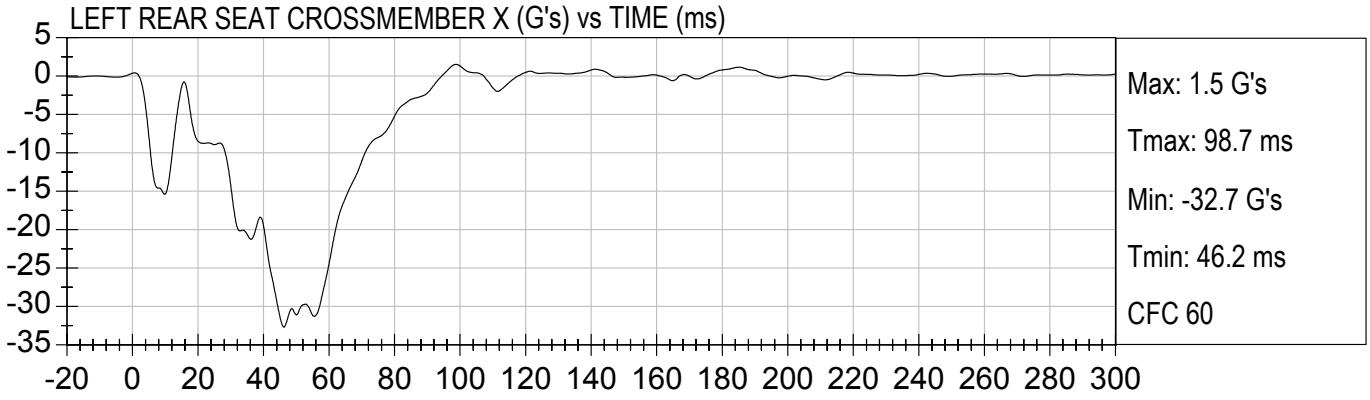

Pass. nij (NTE) () vs TIME (ms)
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2
Tmax: 126.4 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

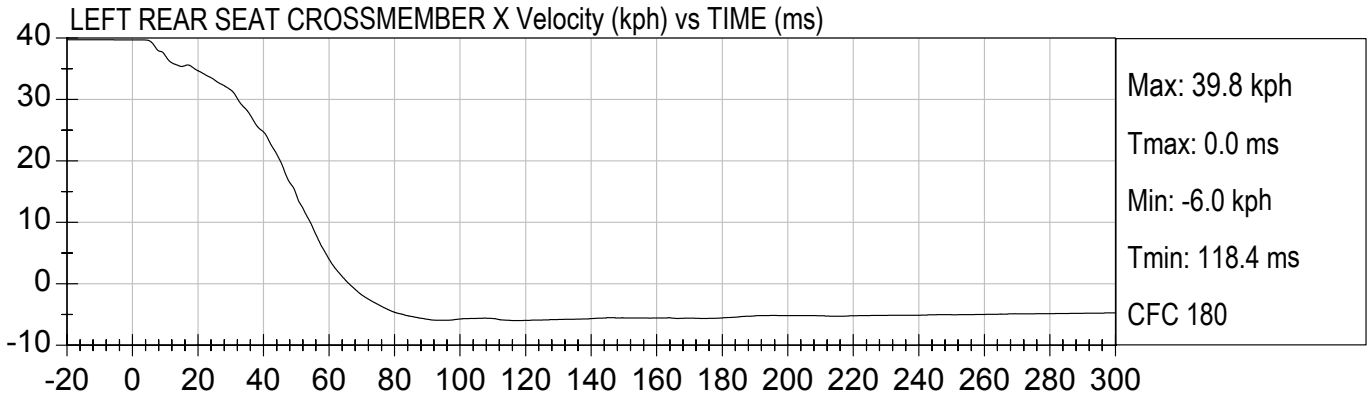

Pass. nij (NCF) () vs TIME (ms)
0.6
0.5
0.4
0.3
0.2
0.1
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.5
Tmax: 88.1 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

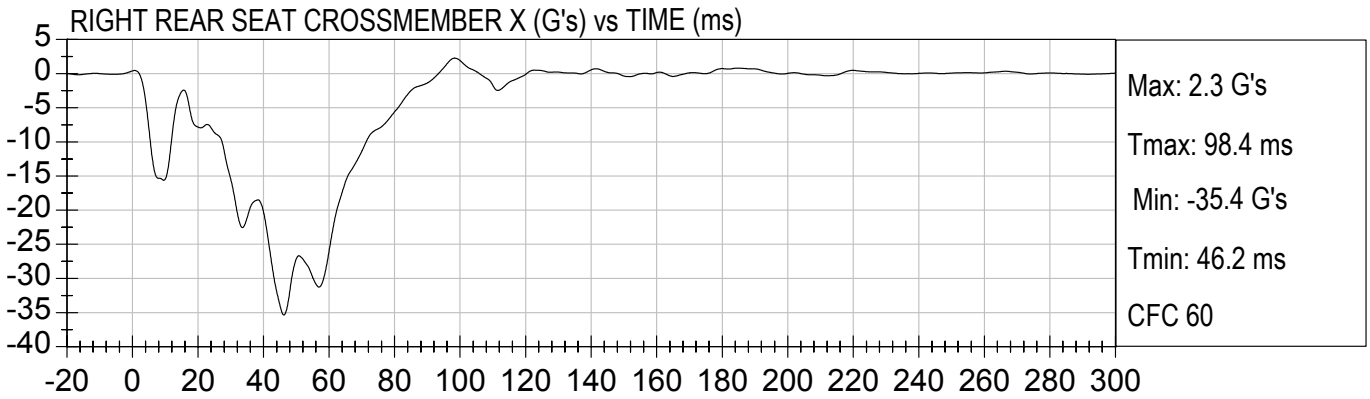

Pass. nij (NCE) () vs TIME (ms)
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2
Tmax: 118.1 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

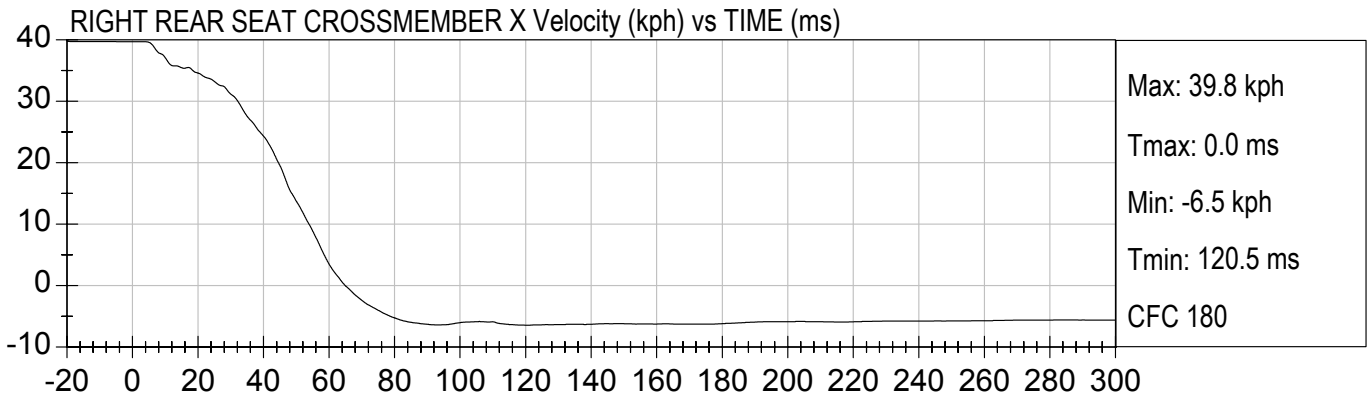

Drv. Occipital Condyle Moment (Nm) vs TIME (ms)
20
15
10
5
0
-5
-10
-15
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 18.5 Nm
Tmax: 135.0 ms
Min: -13.1 Nm
Tmin: 67.9 ms
CFC 600


Pass. Occipital Condyle Moment (Nm) vs TIME (ms)
70
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: 64.4 Nm
Tmax: 71.5 ms
Min: -12.3 Nm
Tmin: 124.7 ms
CFC 600


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: 1.5 G's
Tmax: 98.7 ms
Min: -32.7 G's
Tmin: 46.2 ms
CFC 60

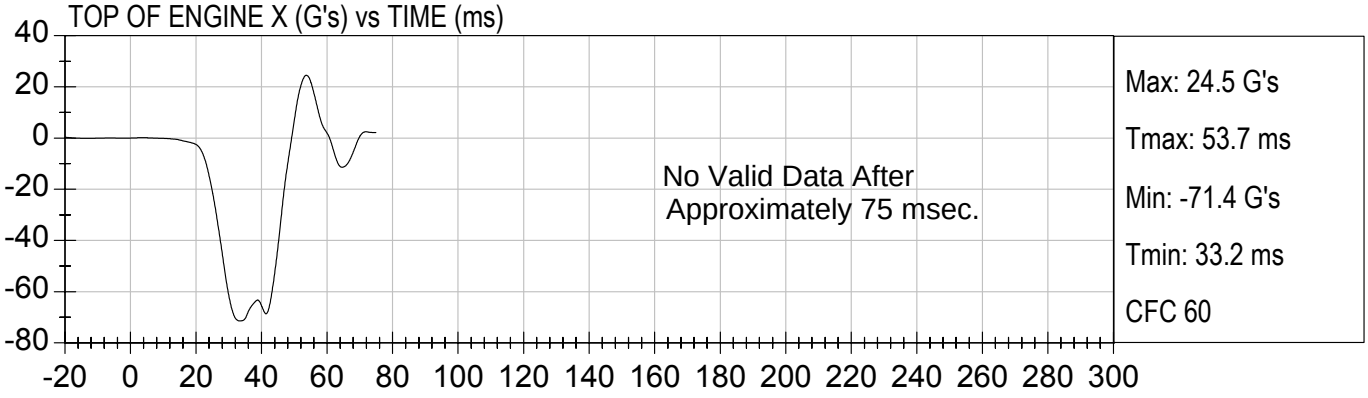

LEFT REAR SEAT CROSSMEMBER X Velocity (kph) vs TIME (ms)
40 30 20 10 0 -10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 39.8 kph
Tmax: 0.0 ms
Min: -6.0 kph
Tmin: 118.4 ms
CFC 180

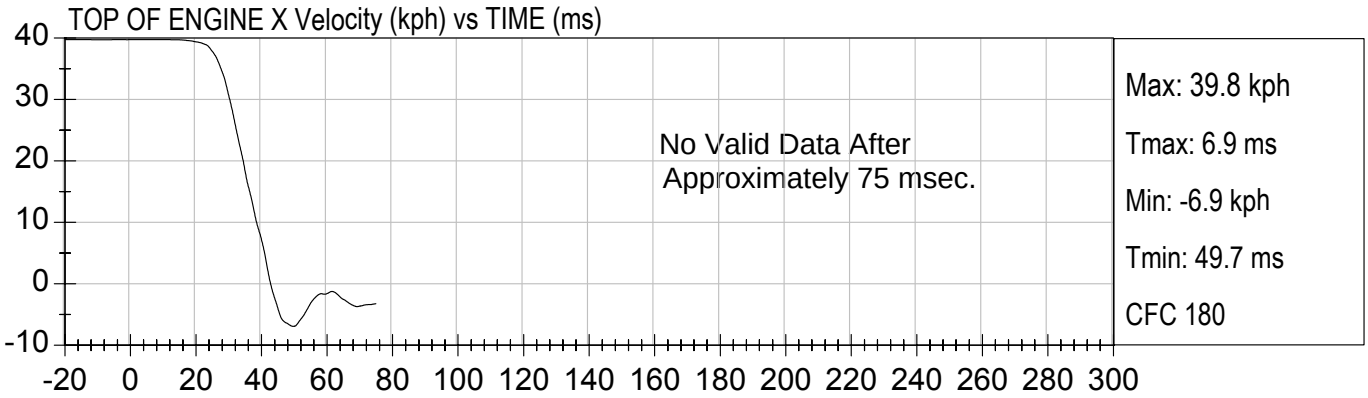

RIGHT REAR SEAT CROSSMEMBER X (G's) vs TIME (ms)
5 0 -5 -10 -15 -20 -25 -30 -35 -40
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 2.3 G's
Tmax: 98.4 ms
Min: -35.4 G's
Tmin: 46.2 ms
CFC 60

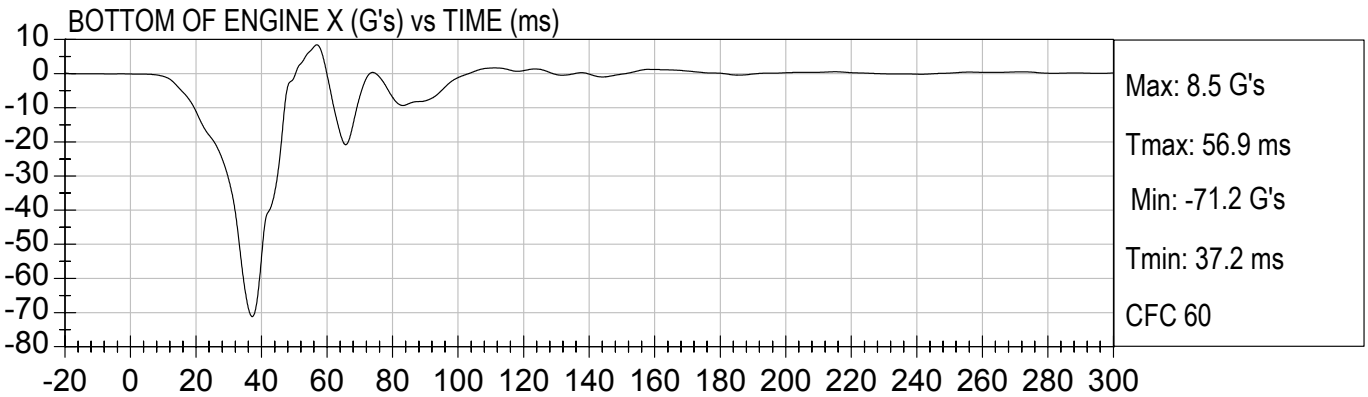

RIGHT REAR SEAT CROSSMEMBER X Velocity (kph) vs TIME (ms)
40 30 20 10 0 -10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 39.8 kph
Tmax: 0.0 ms
Min: -6.5 kph
Tmin: 120.5 ms
CFC 180

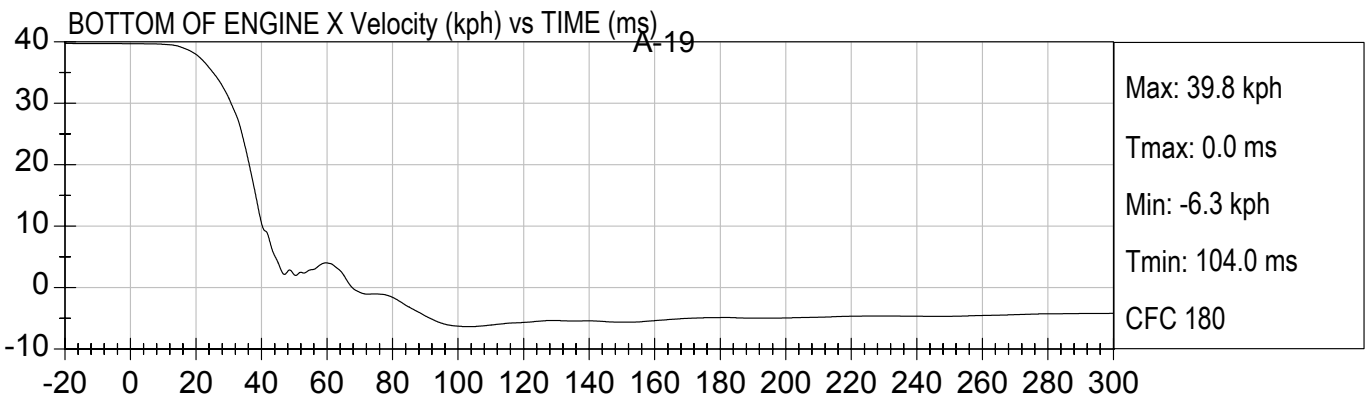
25MPH FRONTAL IMPACT
2004 TOYOTA HIGHLANDER (C45111)

Test Date: 08/18/04
Speed: 24.7 mph (39.8 km/h)

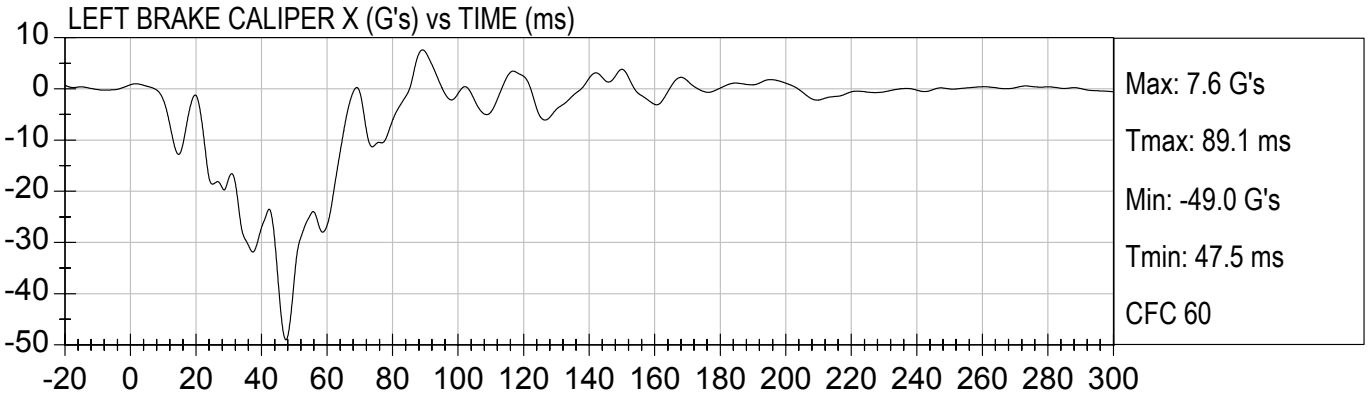


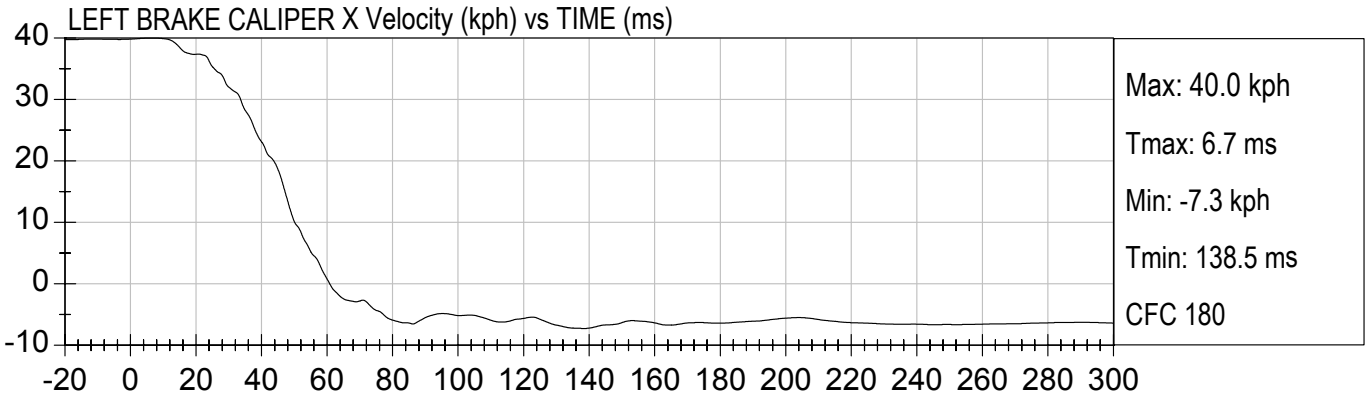


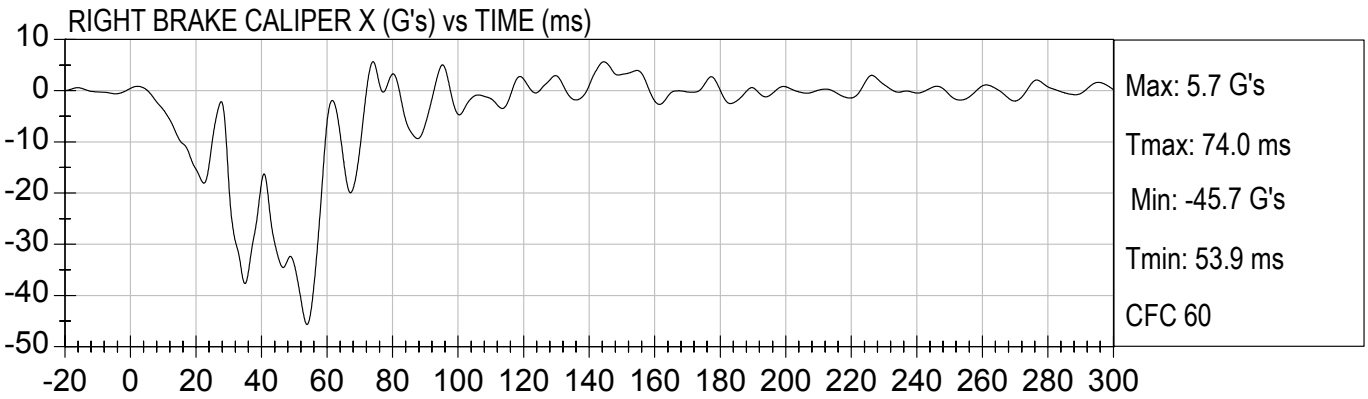


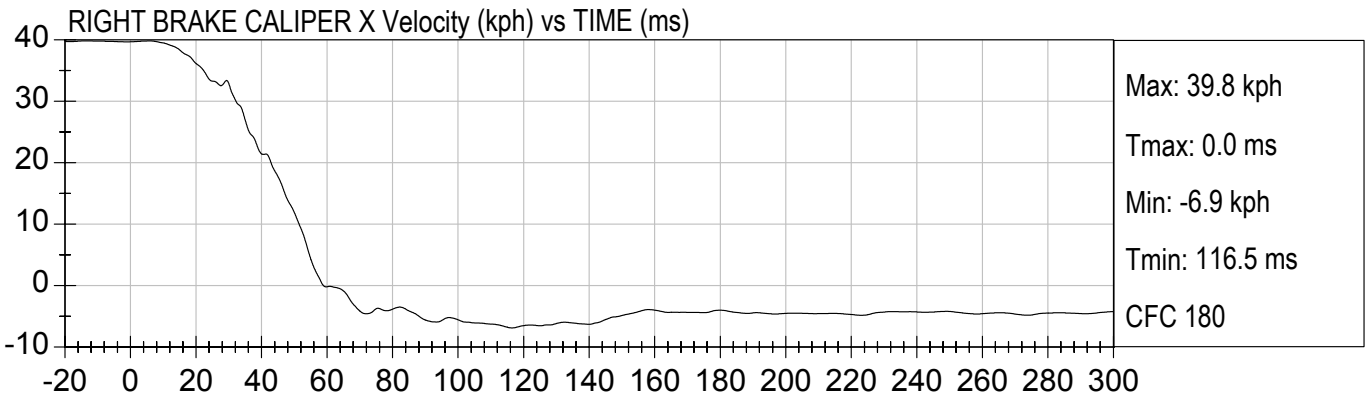


A-19


LEFT BRAKE CALIPER 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: 7.6 G's
Tmax: 89.1 ms
Min: -49.0 G's
Tmin: 47.5 ms
CFC 60

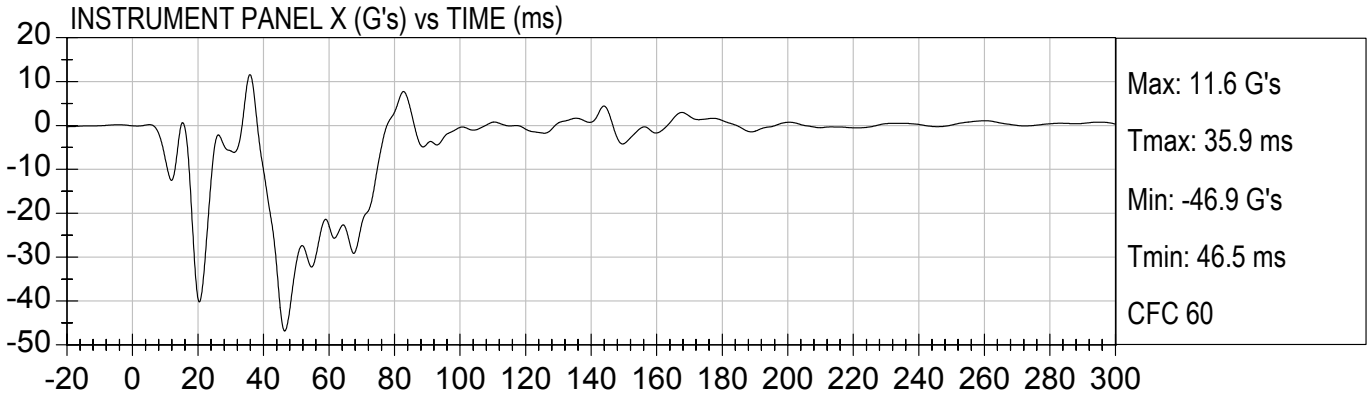

LEFT BRAKE CALIPER X Velocity (kph) vs TIME (ms)
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 40.0 kph
Tmax: 6.7 ms
Min: -7.3 kph
Tmin: 138.5 ms
CFC 180

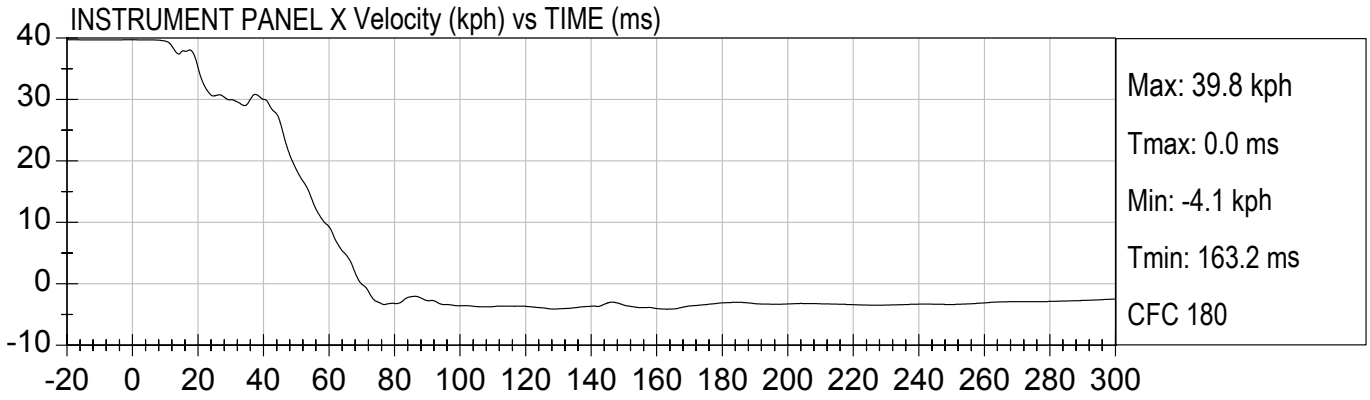

RIGHT BRAKE CALIPER X (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 5.7 G's
Tmax: 74.0 ms
Min: -45.7 G's
Tmin: 53.9 ms
CFC 60

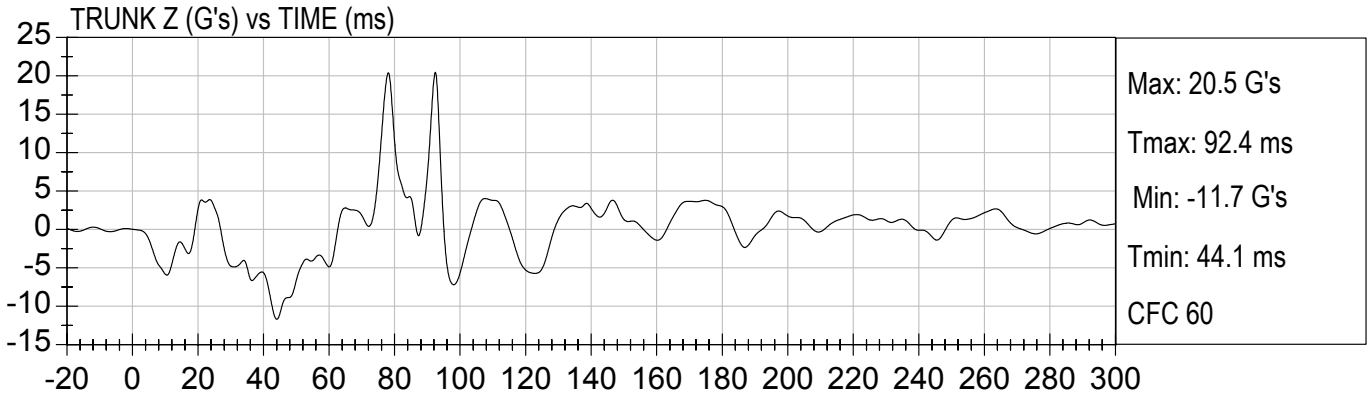

RIGHT BRAKE CALIPER X Velocity (kph) vs TIME (ms)
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 39.8 kph
Tmax: 0.0 ms
Min: -6.9 kph
Tmin: 116.5 ms
CFC 180

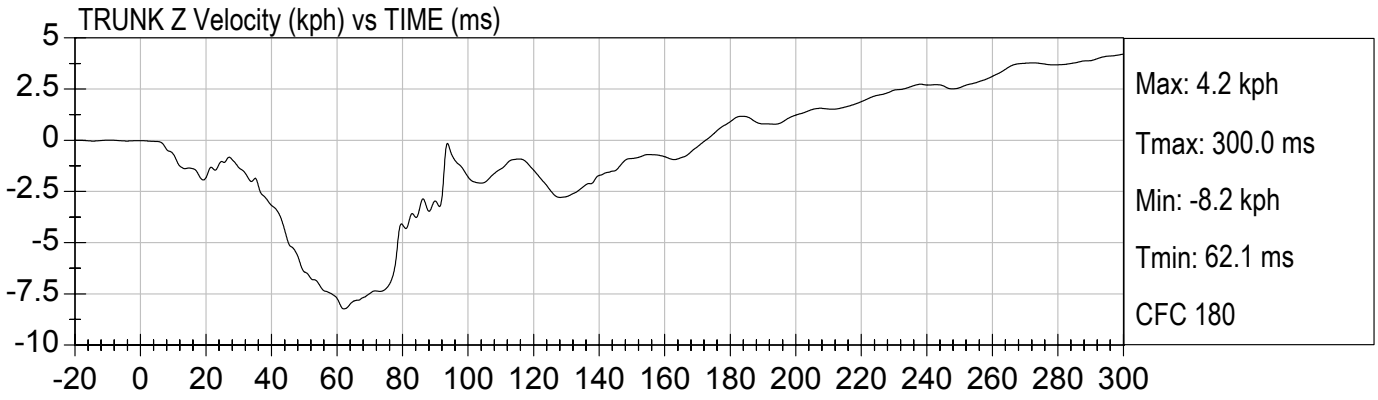
25MPH FRONTAL IMPACT
2004 TOYOTA HIGHLANDER (C45111)

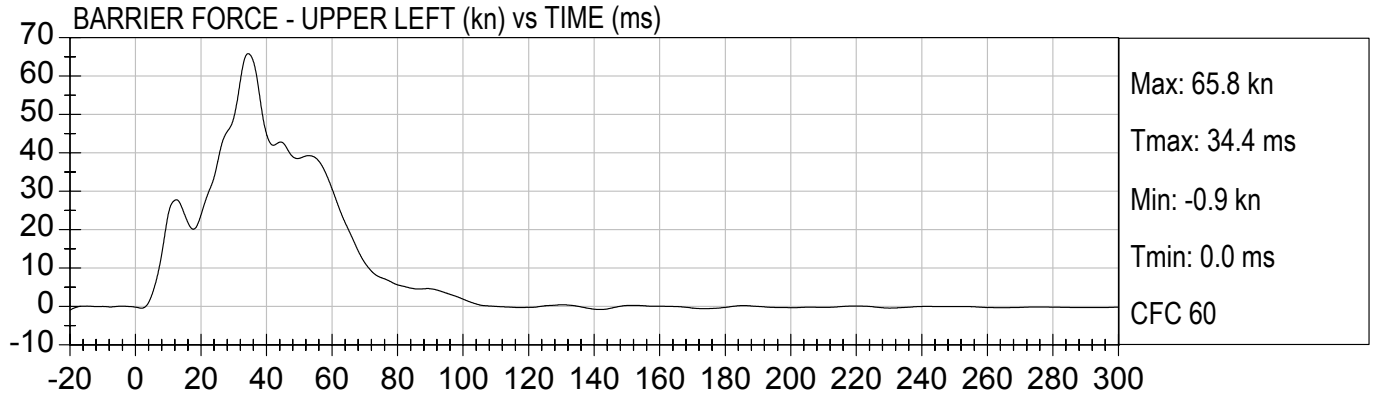
Test Date: 08/18/04
Speed: 24.7 mph (39.8 km/h)

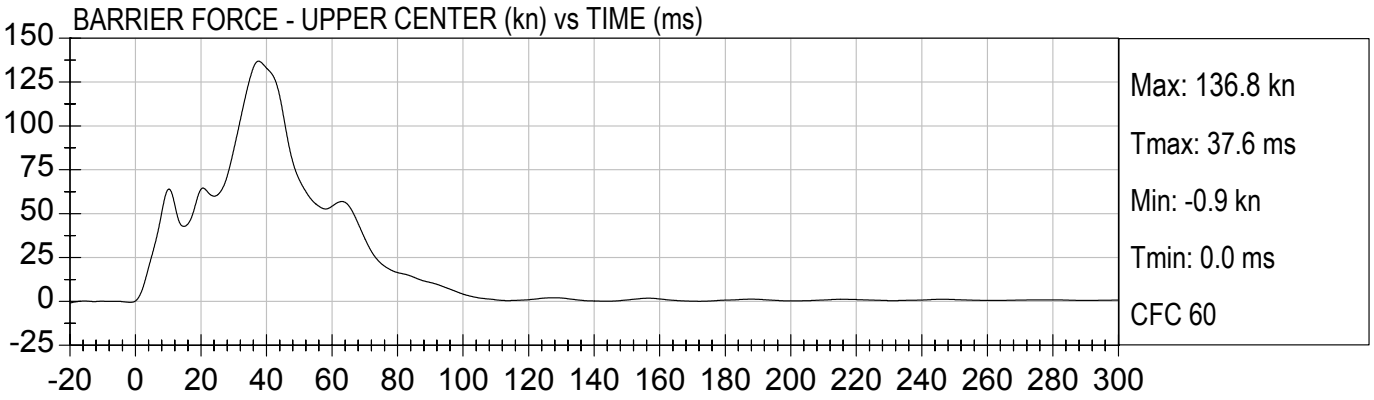


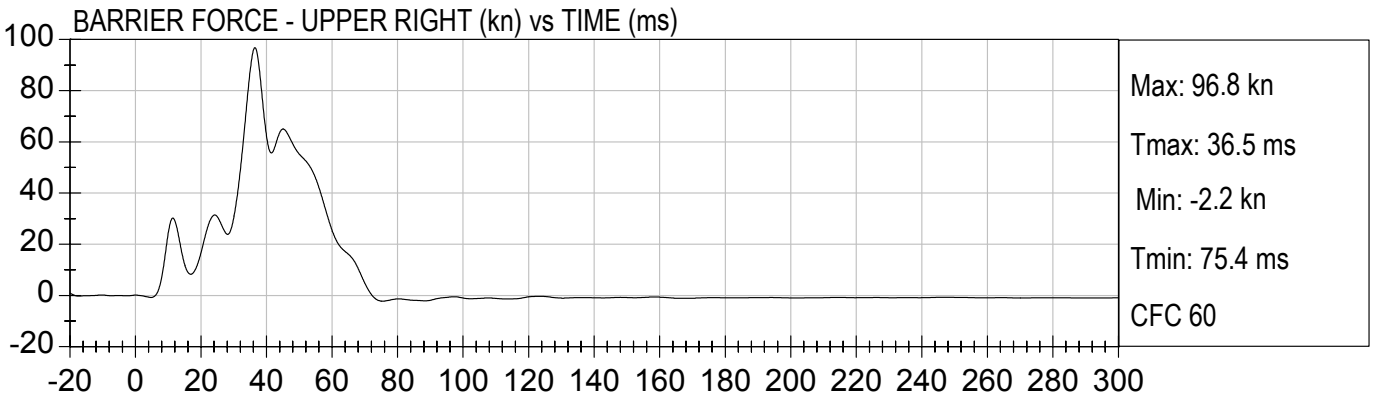


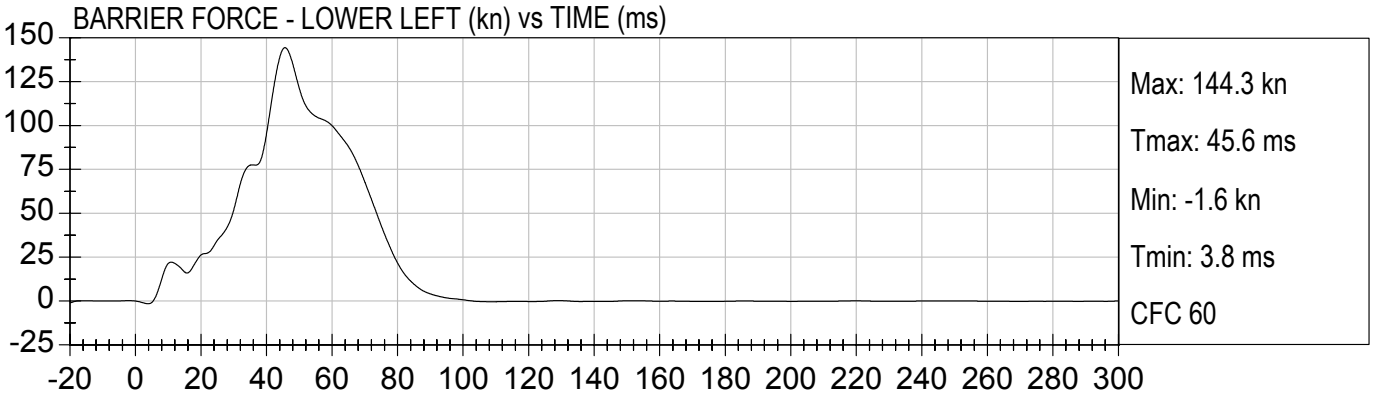


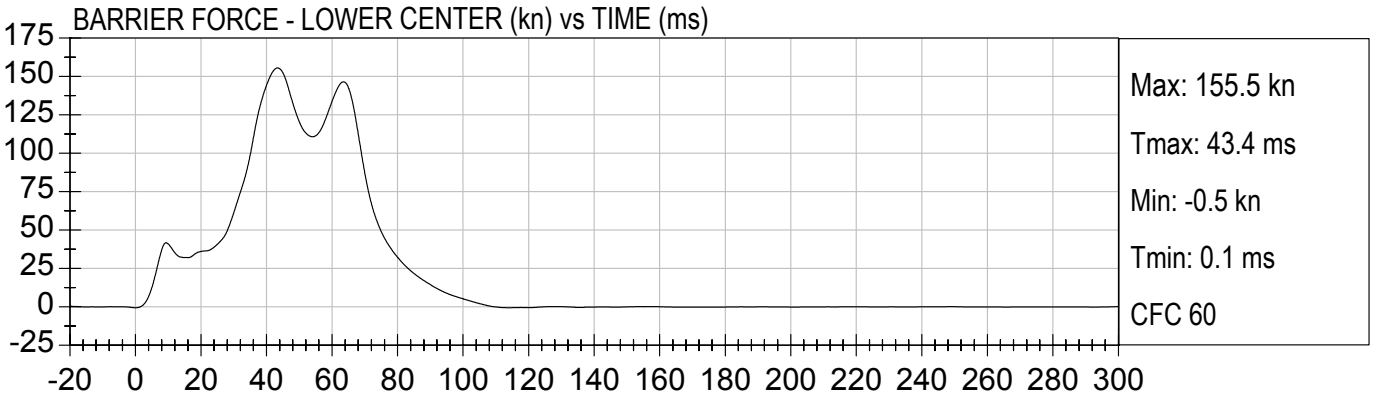


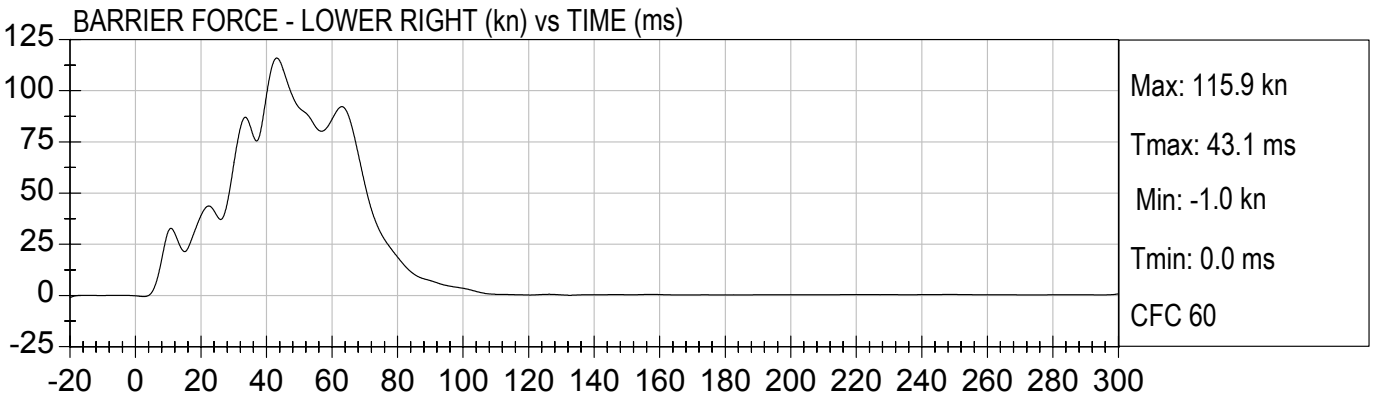

BARRIER FORCE - UPPER LEFT (kn) vs TIME (ms)
70
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 65.8 kn
Tmax: 34.4 ms
Min: -0.9 kn
Tmin: 0.0 ms
CFC 60

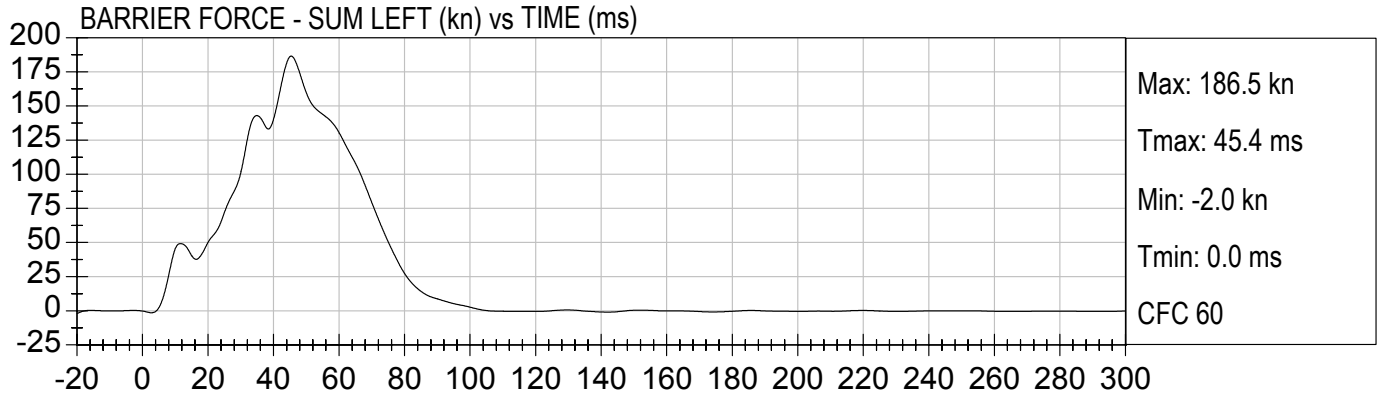

BARRIER FORCE - UPPER CENTER (kn) vs TIME (ms)
150
125
100
75
50
25
0
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 136.8 kn
Tmax: 37.6 ms
Min: -0.9 kn
Tmin: 0.0 ms
CFC 60

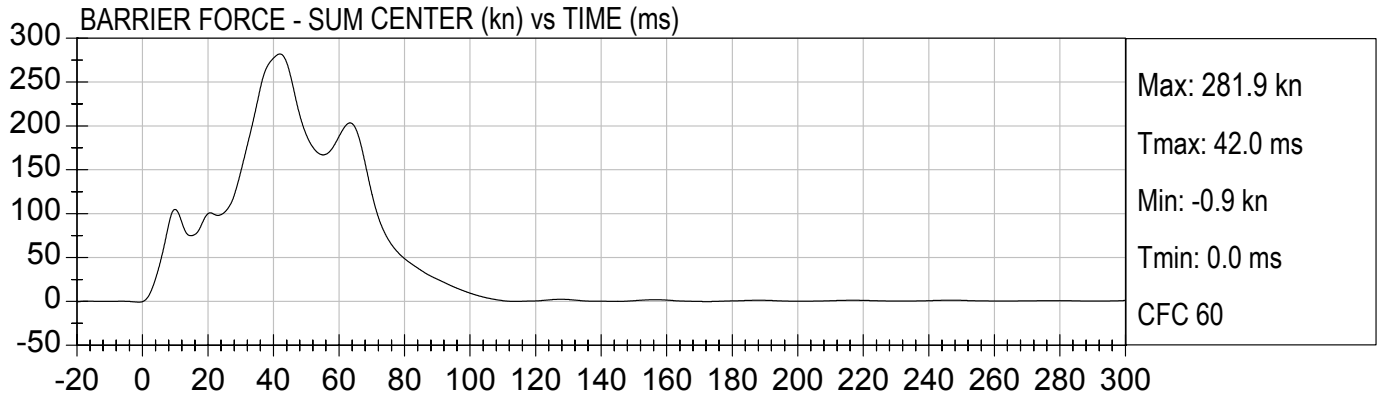

BARRIER FORCE - UPPER RIGHT (kn) vs TIME (ms)
100
80
60
40
20
0
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 96.8 kn
Tmax: 36.5 ms
Min: -2.2 kn
Tmin: 75.4 ms
CFC 60

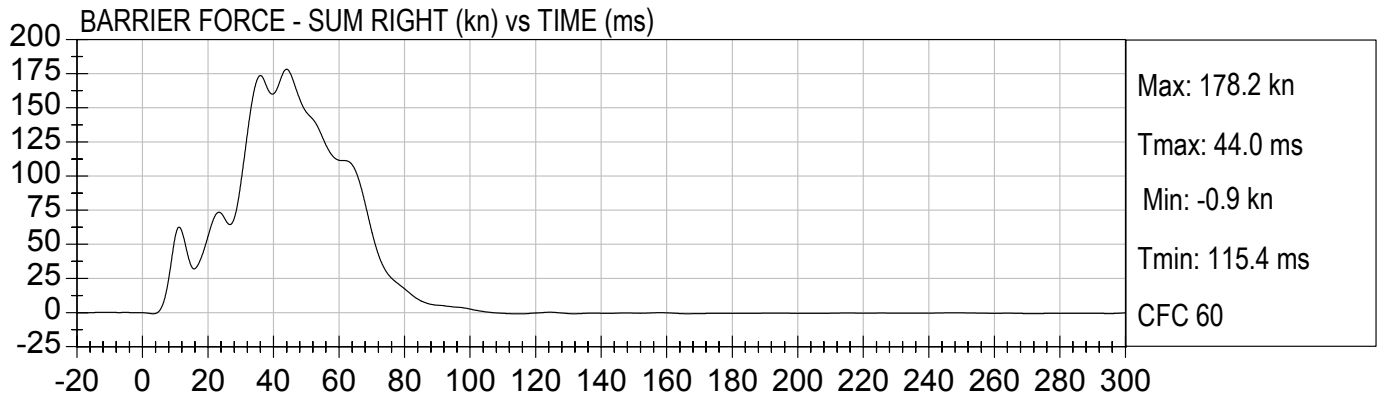

BARRIER FORCE - LOWER LEFT (kn) vs TIME (ms)
150
125
100
75
50
25
0
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 144.3 kn
Tmax: 45.6 ms
Min: -1.6 kn
Tmin: 3.8 ms
CFC 60

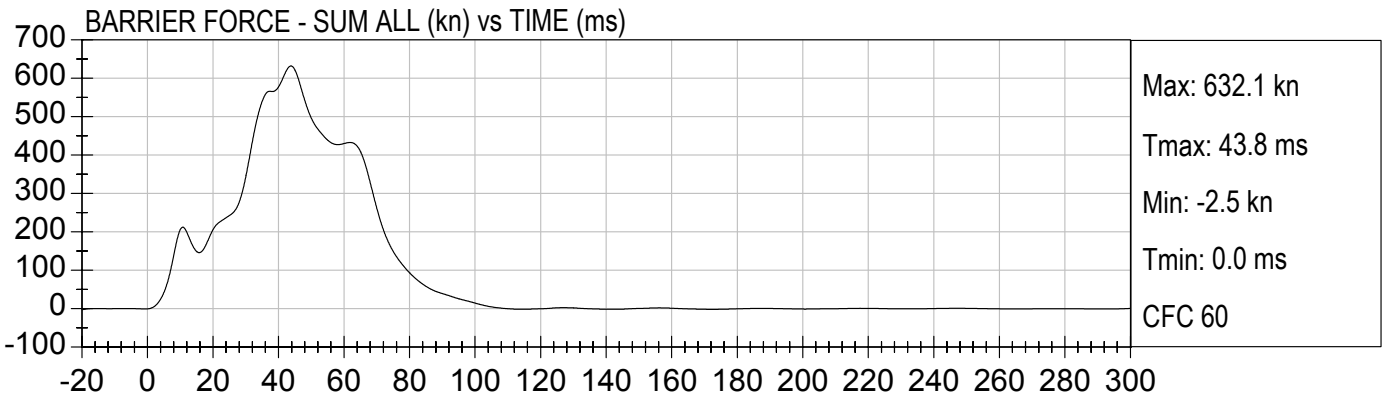

BARRIER FORCE - LOWER CENTER (kn) vs TIME (ms)
175
150
125
100
75
50
25
0
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 155.5 kn
Tmax: 43.4 ms
Min: -0.5 kn
Tmin: 0.1 ms
CFC 60

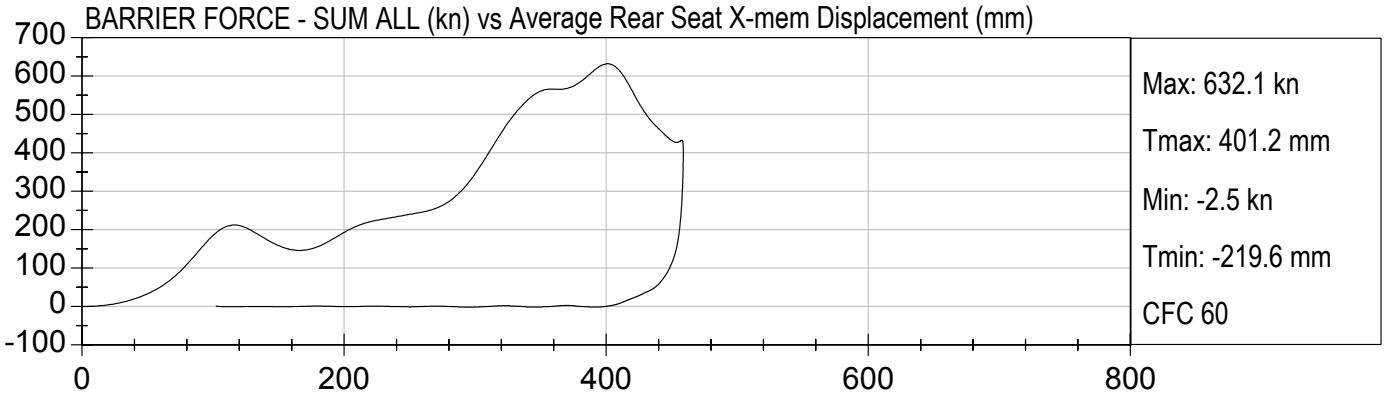

BARRIER FORCE - LOWER RIGHT (kn) vs TIME (ms)
125
100
75
50
25
0
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 115.9 kn
Tmax: 43.1 ms
Min: -1.0 kn
Tmin: 0.0 ms
CFC 60


BARRIER FORCE - SUM LEFT (kn) vs TIME (ms)
200
175
150
125
100
75
50
25
0
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 186.5 kn
Tmax: 45.4 ms
Min: -2.0 kn
Tmin: 0.0 ms
CFC 60


BARRIER FORCE - SUM CENTER (kn) vs TIME (ms)
300
250
200
150
100
50
0
-50
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 281.9 kn
Tmax: 42.0 ms
Min: -0.9 kn
Tmin: 0.0 ms
CFC 60


BARRIER FORCE - SUM RIGHT (kn) vs TIME (ms)
200
175
150
125
100
75
50
25
0
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 178.2 kn
Tmax: 44.0 ms
Min: -0.9 kn
Tmin: 115.4 ms
CFC 60


BARRIER FORCE - SUM ALL (kn) vs TIME (ms)
700
600
500
400
300
200
100
0
-100
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 632.1 kn
Tmax: 43.8 ms
Min: -2.5 kn
Tmin: 0.0 ms
CFC 60


BARRIER FORCE - SUM ALL (kn) vs Average Rear Seat X-mem Displacement (mm)
700
600
500
400
300
200
100
0
-100
0
200
400
600
800
Max: 632.1 kn
Tmax: 401.2 mm
Min: -2.5 kn
Tmin: -219.6 mm
CFC 60

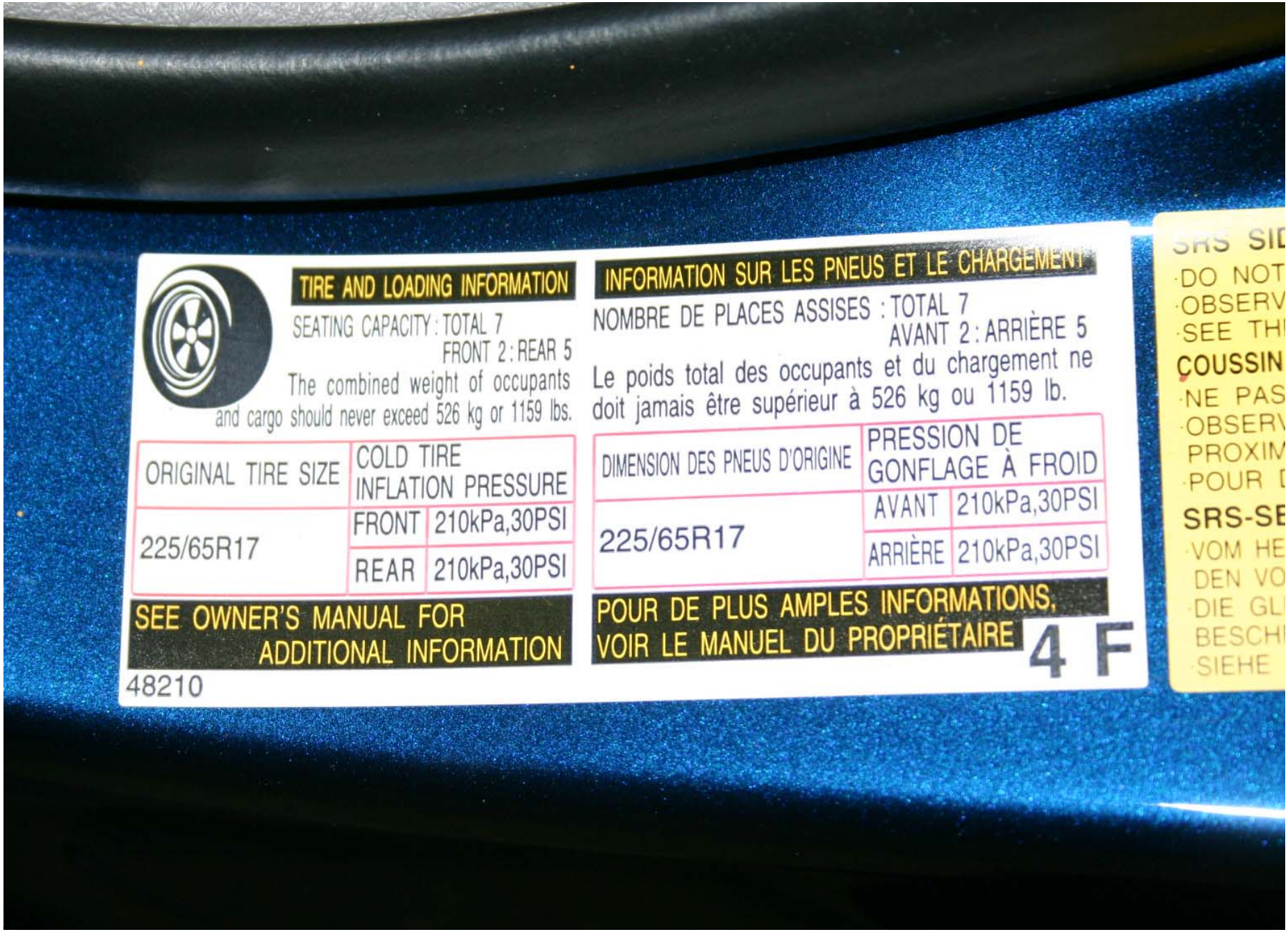
APPENDIX B

CRASH TEST PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

B-1.

Vehicle Certification Label



Tire Placard

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

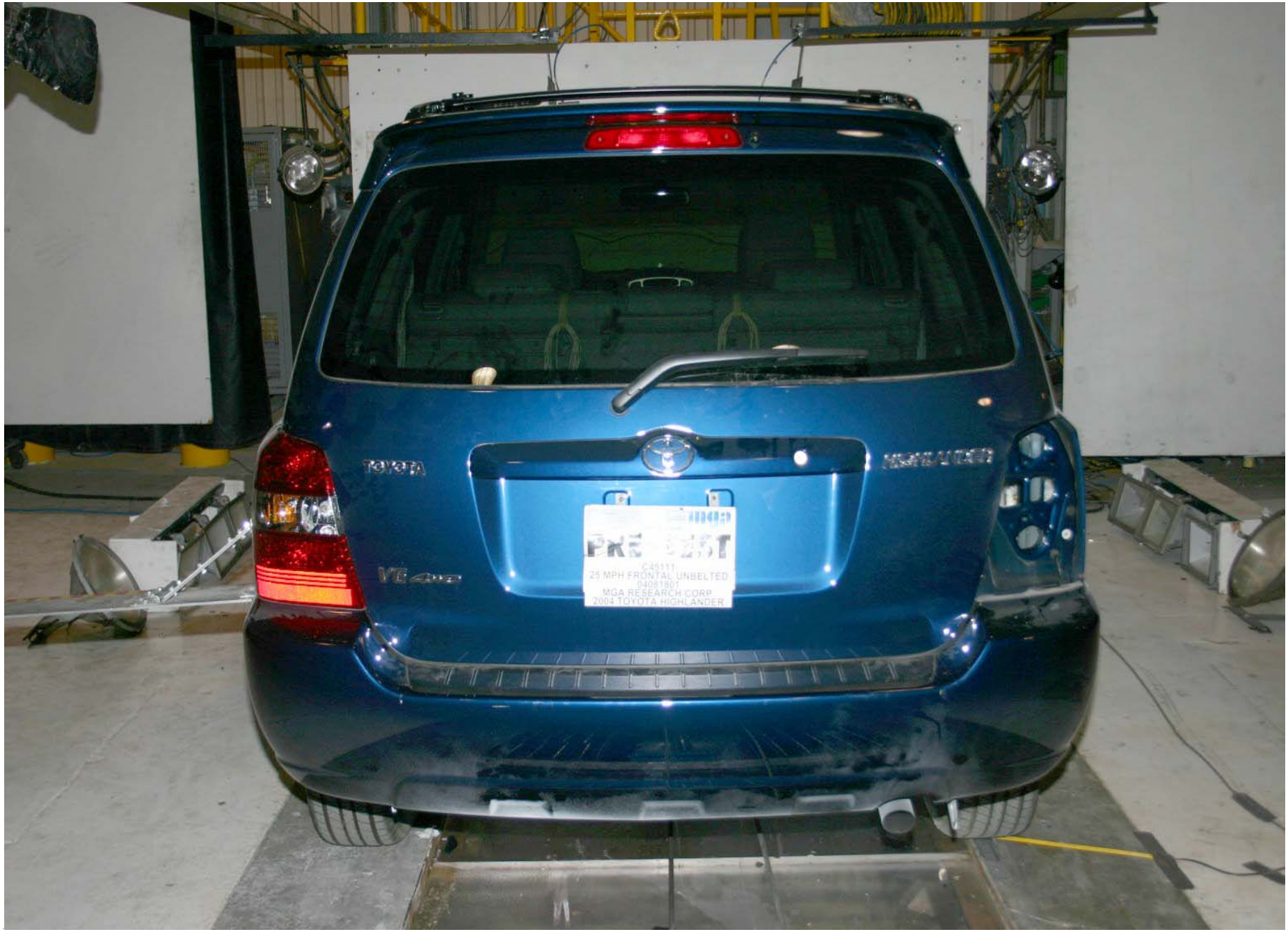
Post-Test Right Side View of Test Vehicle

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

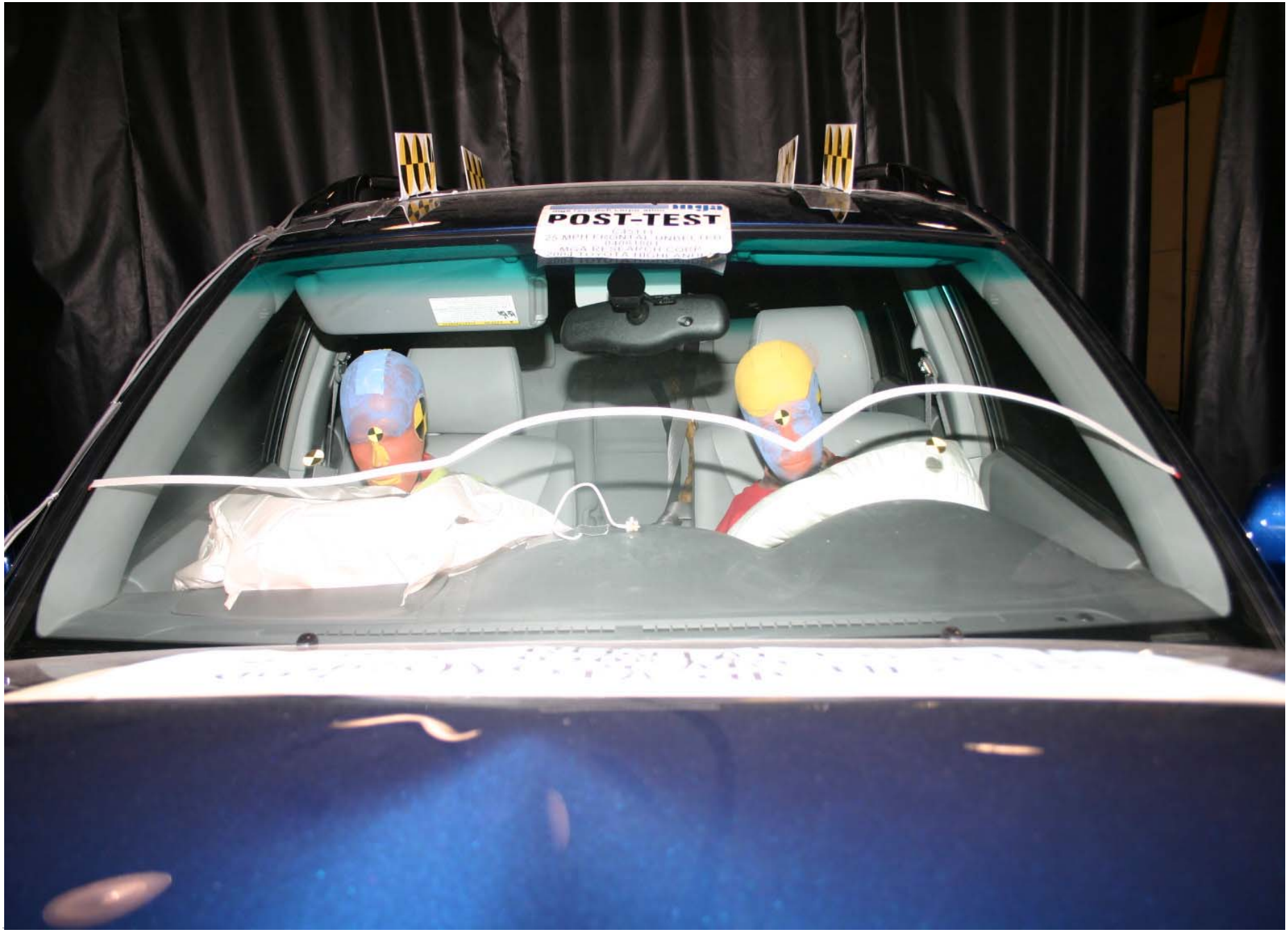
Post-Test Left Rear Three-Quarter View of Test Vehicle



Pre-Test Rear View of Test Vehicle

Post-Test Rear View of Test Vehicle

Pre-Test Windshield View

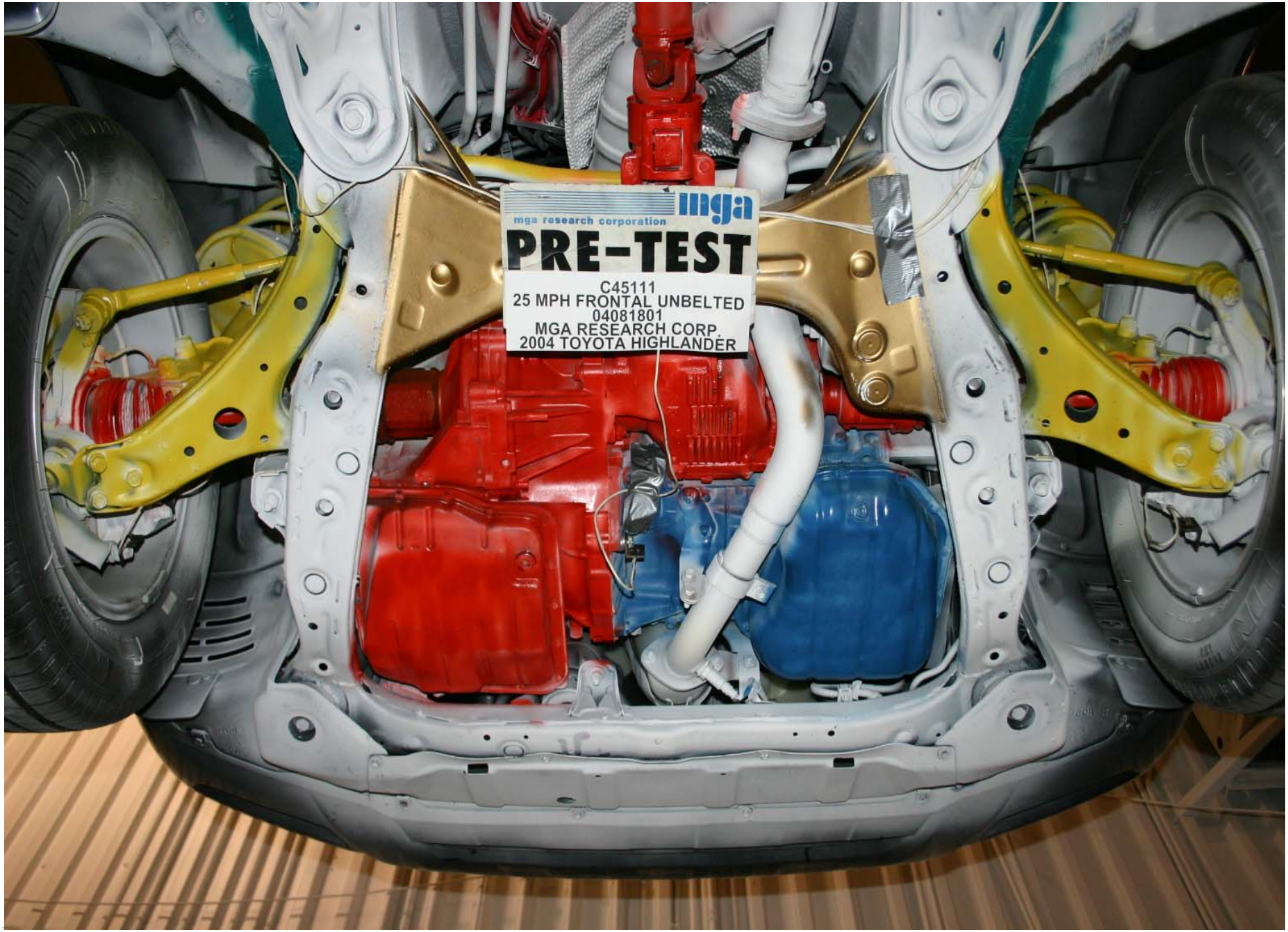


Post-Test Windshield View

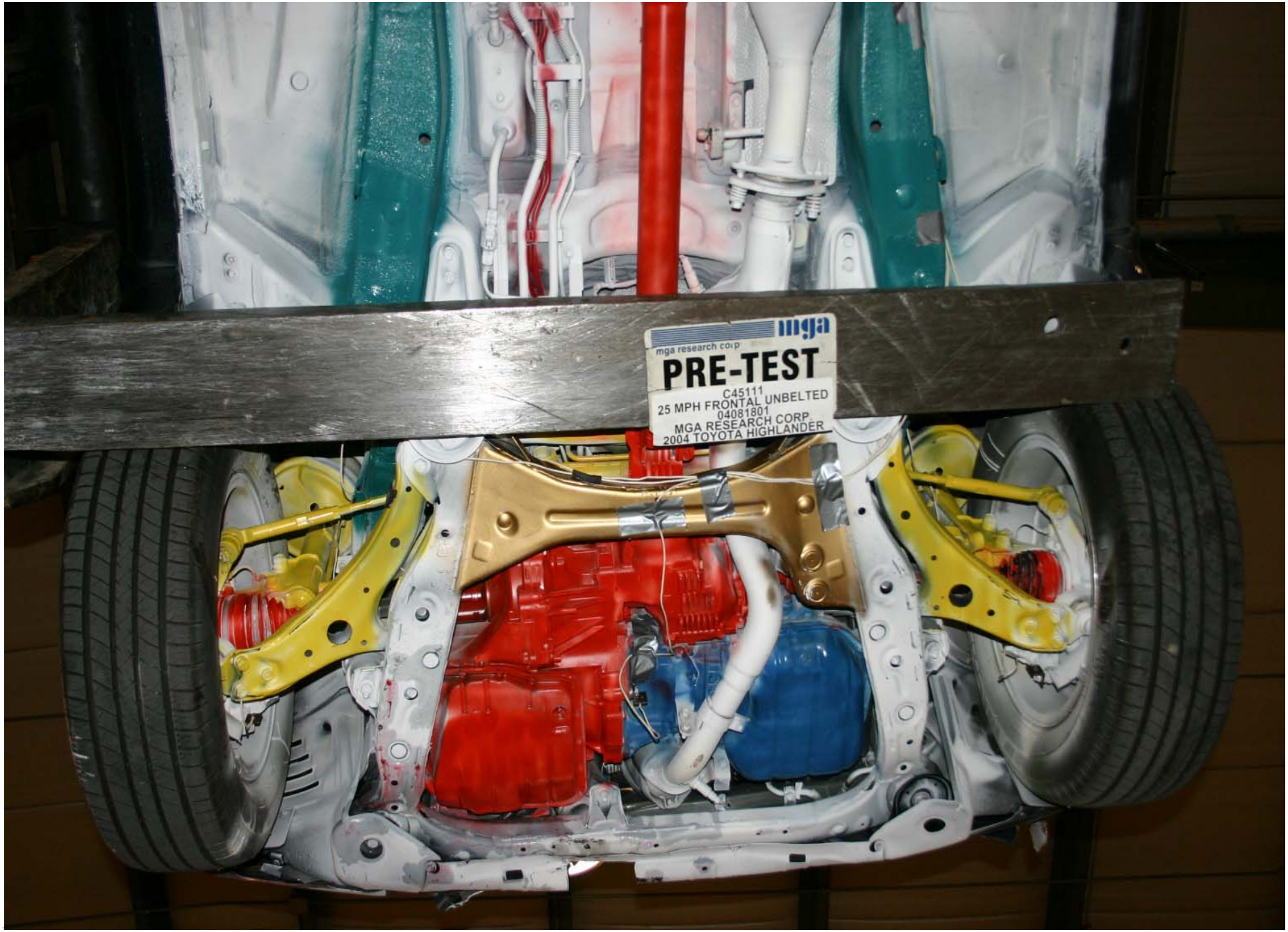
Pre-Test Engine Compartment View

Post-Test Engine Compartment View

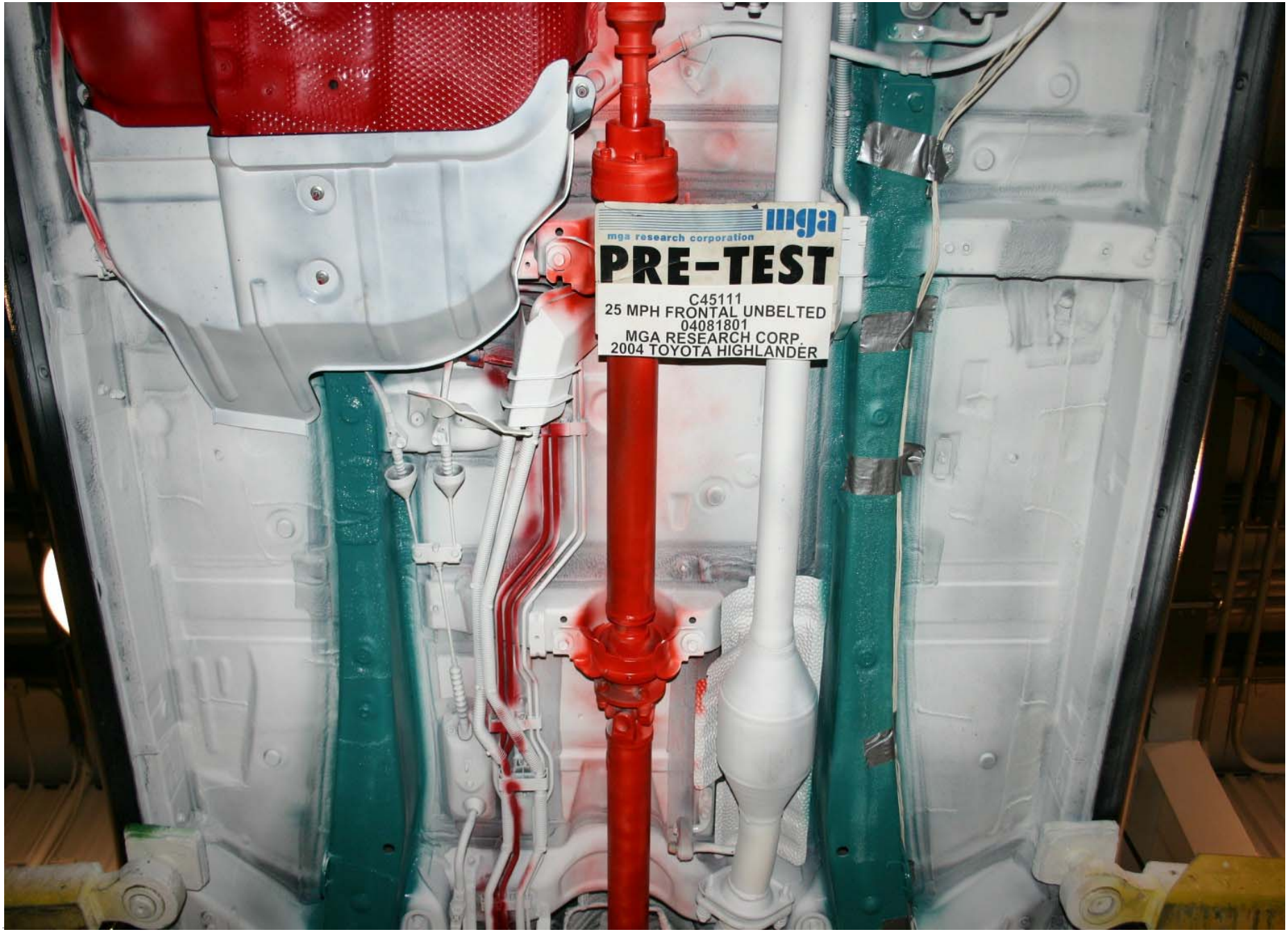
Post-Test Fuel Filler Cap View



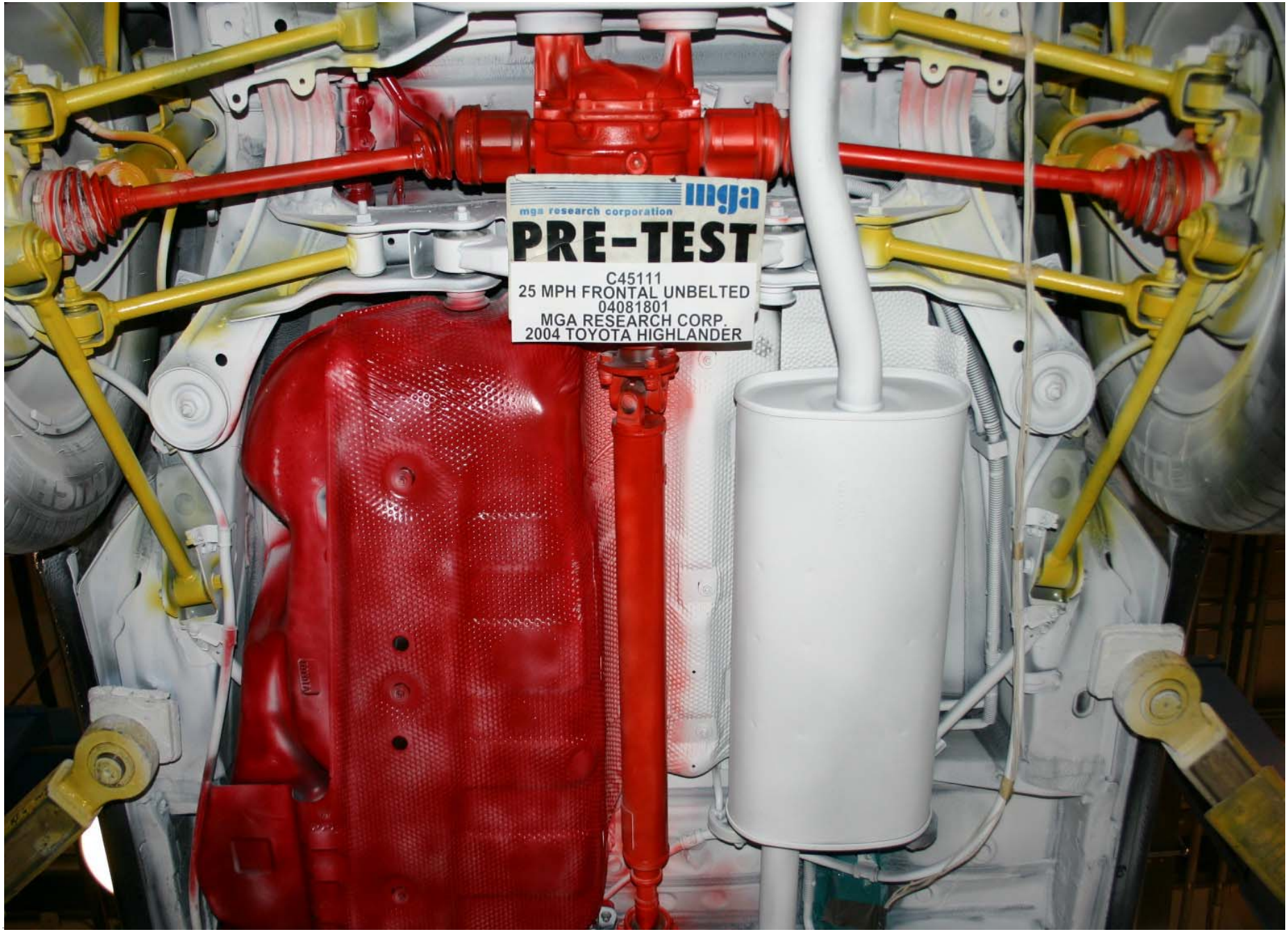
Pre-Test Front Underbody View



Post-Test Front Underbody View



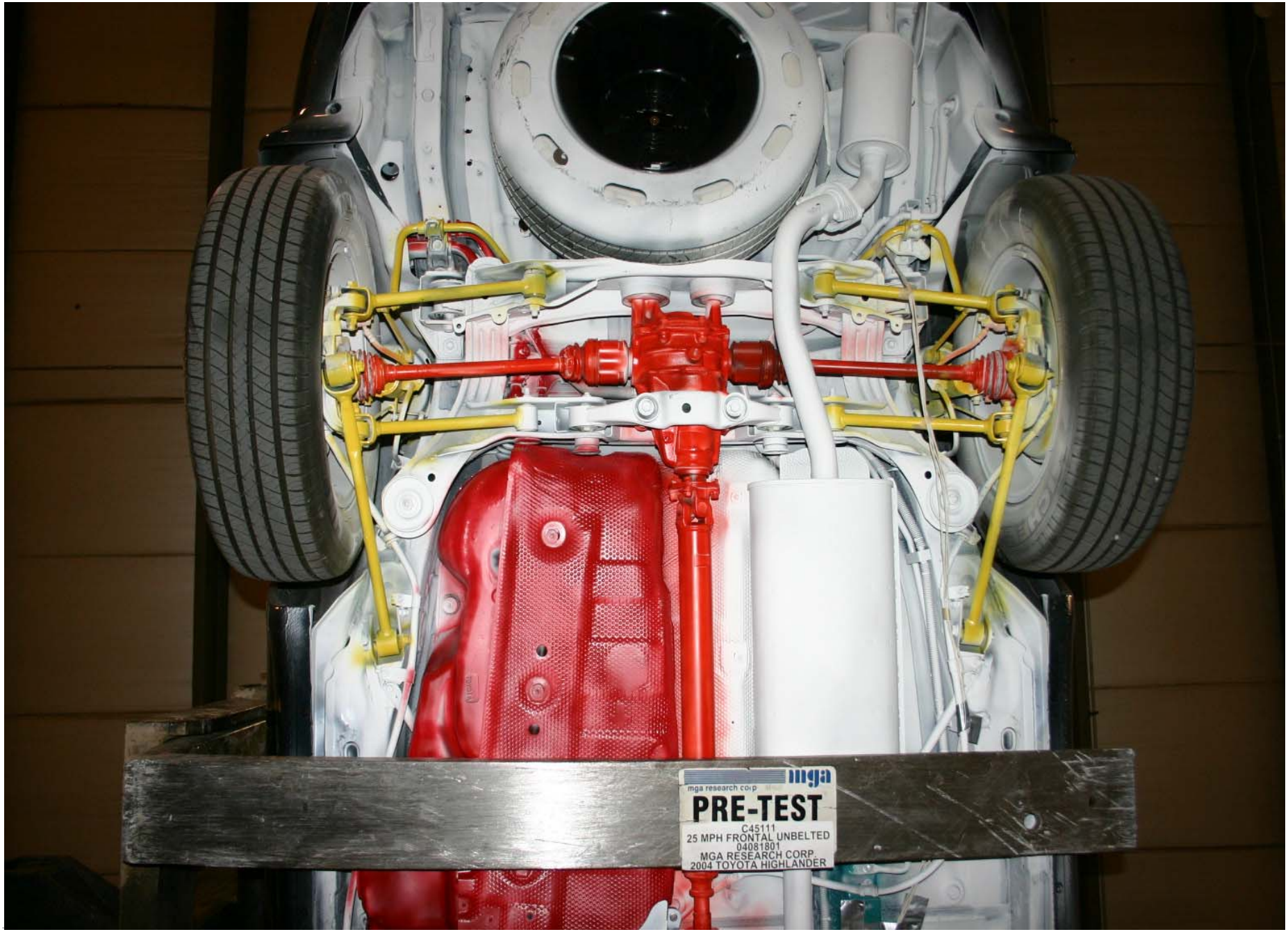
Pre-Test Front Mid Underbody



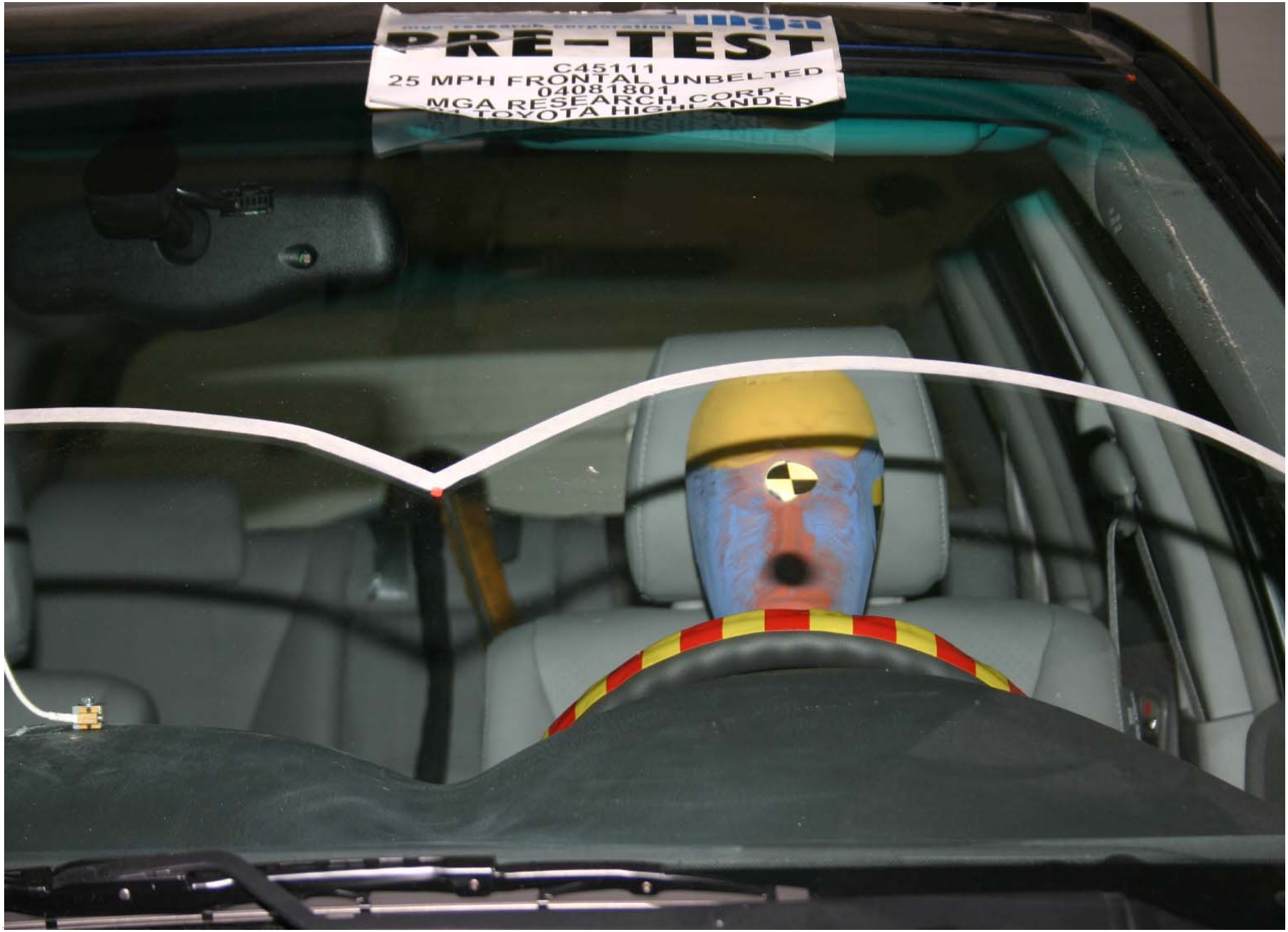
Pre-Test Rear Mid Underbody

Post-Test Mid Underbody

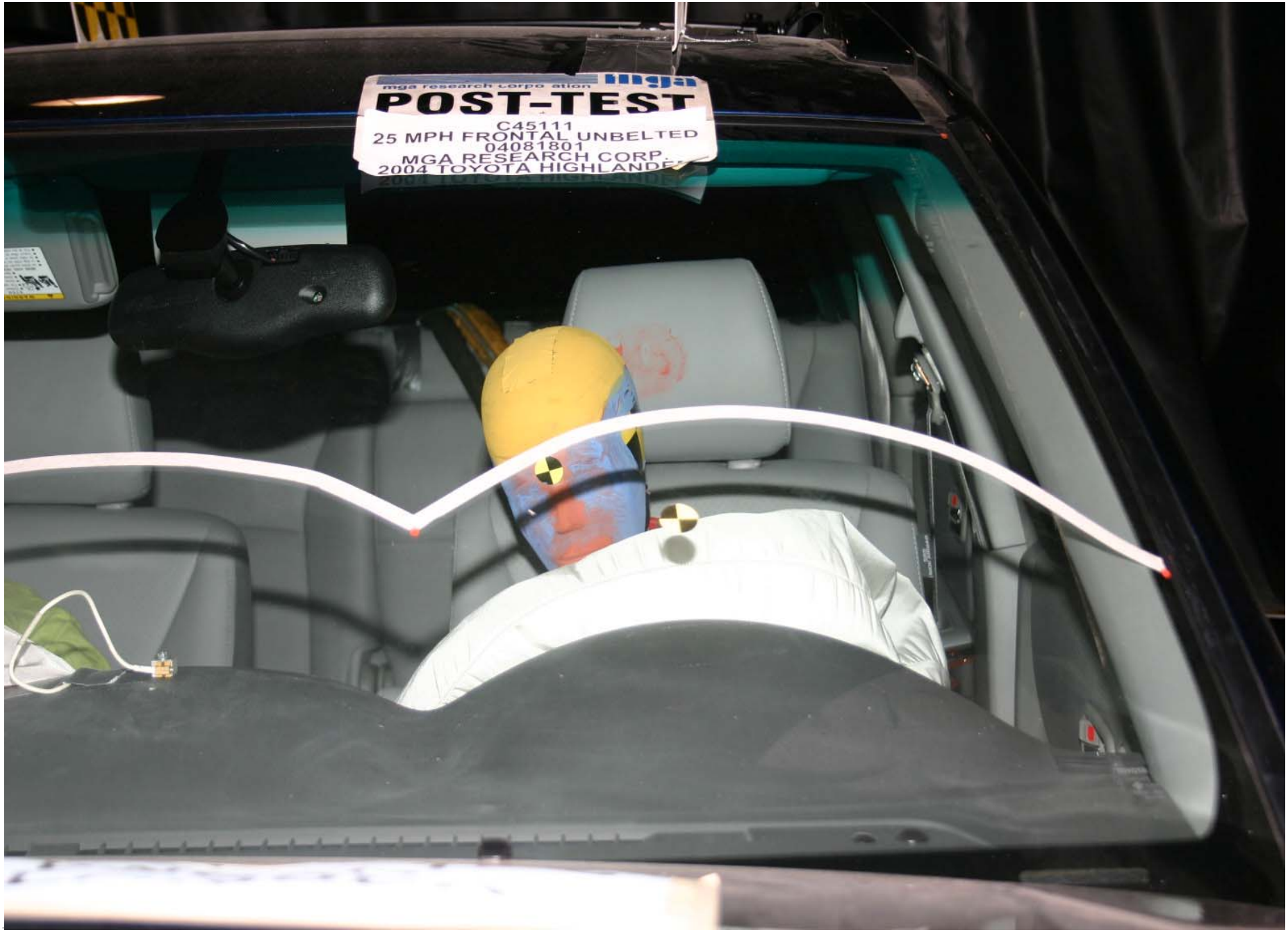
Pre-Test Rear Underbody View



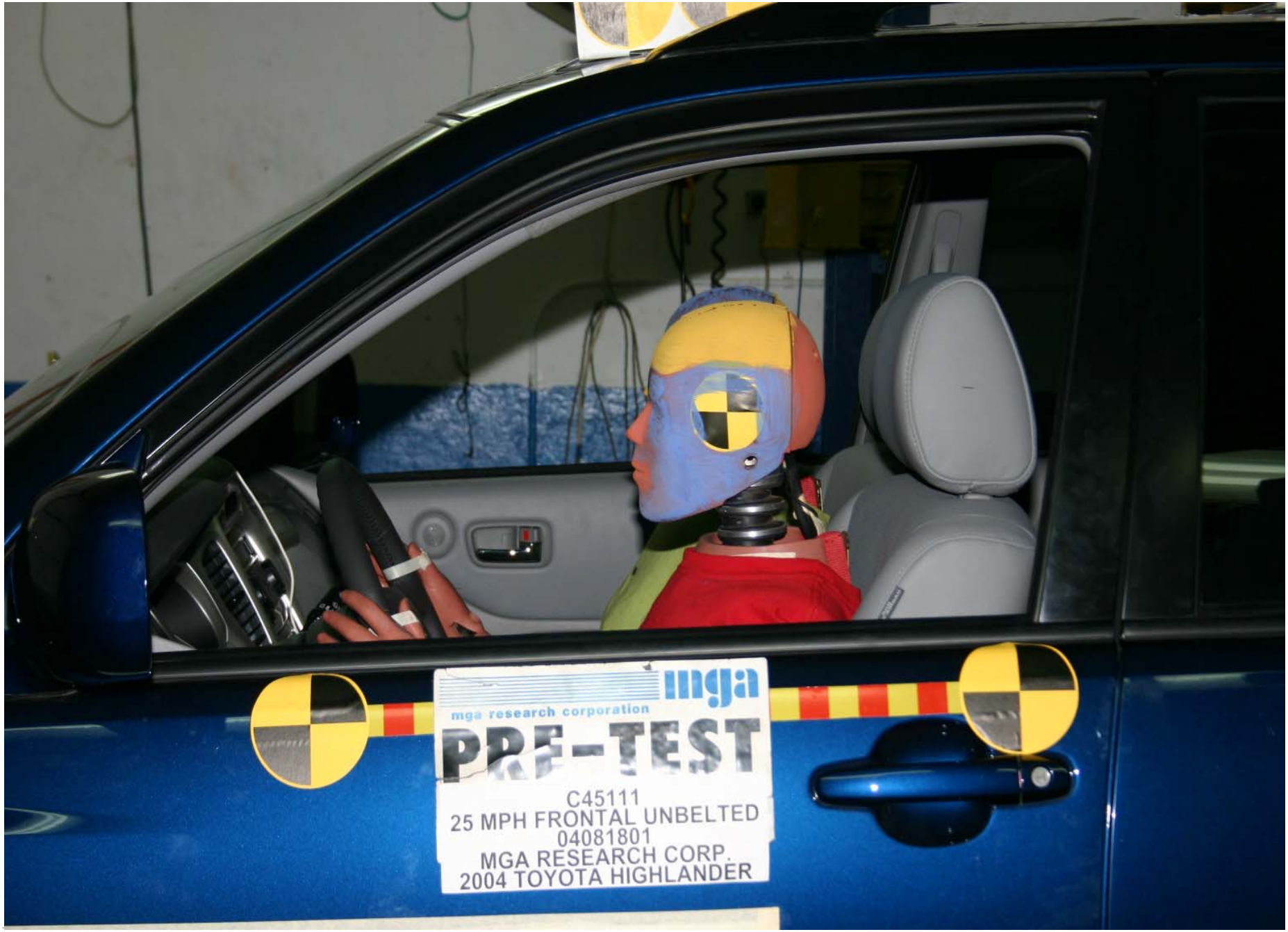
Post-Test Rear Underbody View



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)

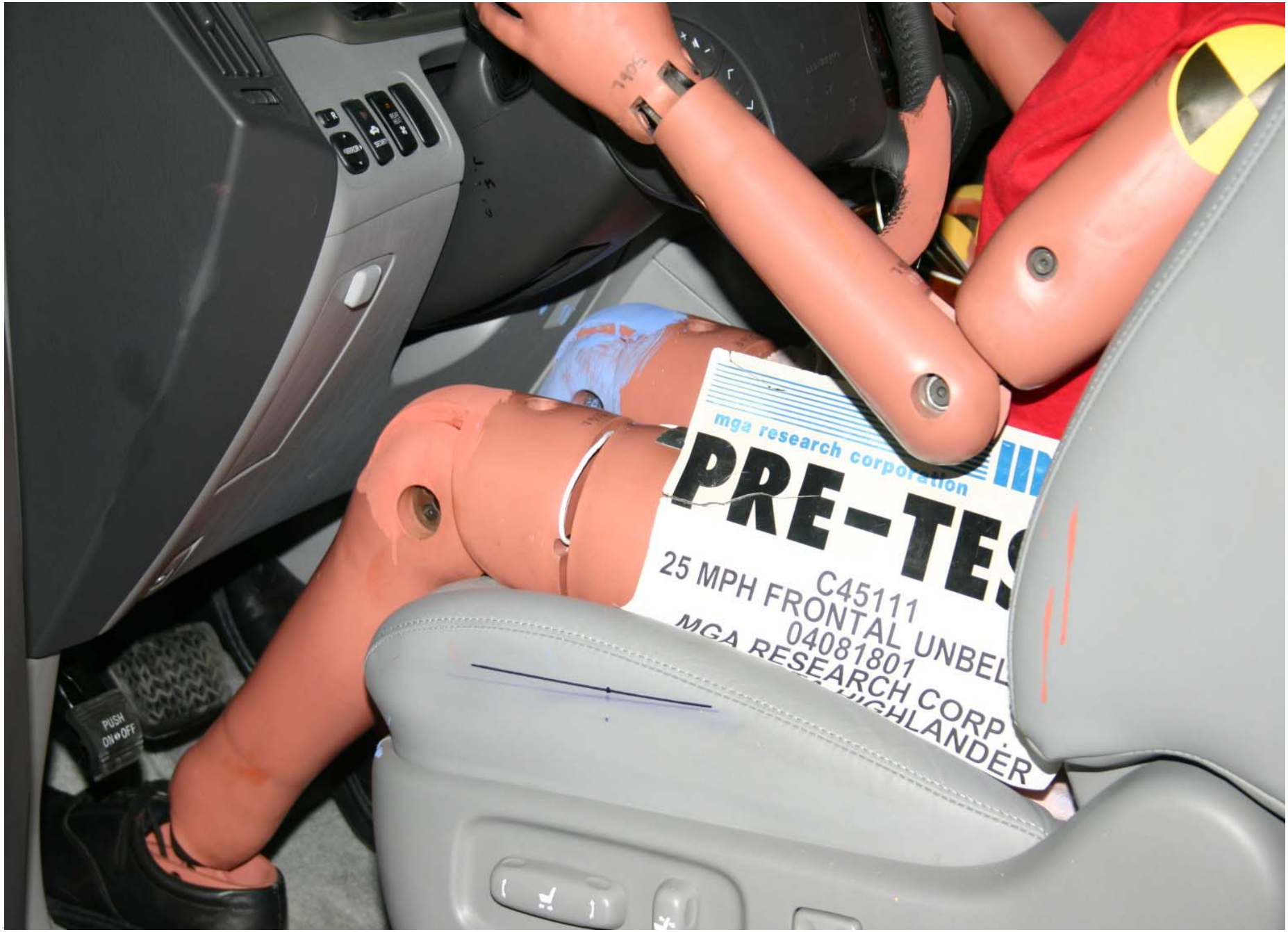
Post-Test Driver Dummy Position Left Side View (Door Open)

Pre-Test Driver Dummy Seat Position

Post-Test Driver Dummy Seat Position

Pre-Test Driver Dummy Feet Position

Post-Test Driver Dummy Feet Position



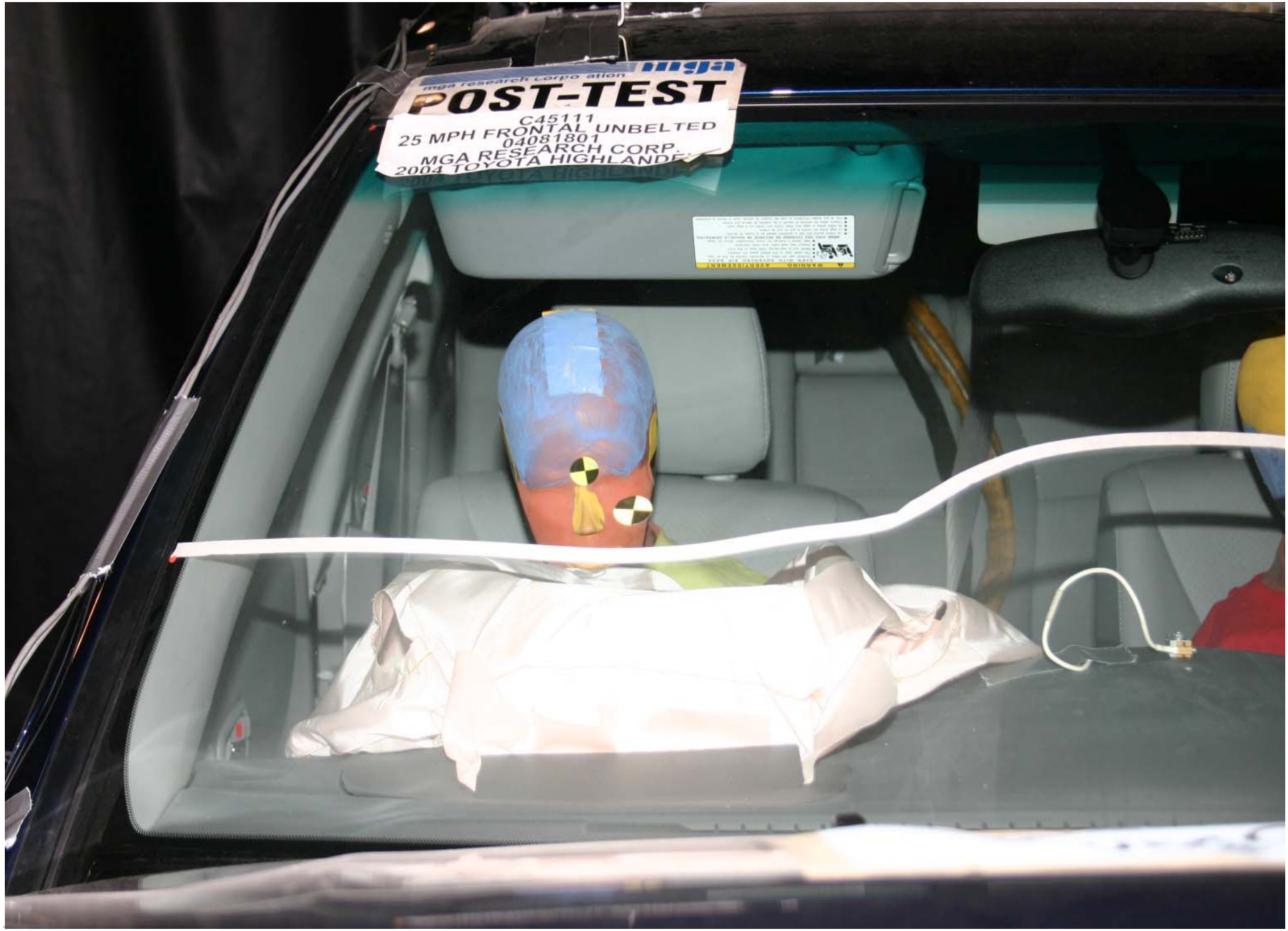
Pre-Test Driver Side Knee Bolster View

Post-Test Driver Side Knee Bolster View

Post-Test Driver Dummy Head Contact

Post-Test Driver Dummy Knee Contact

Post-Test Driver Dummy Airbag Contact



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

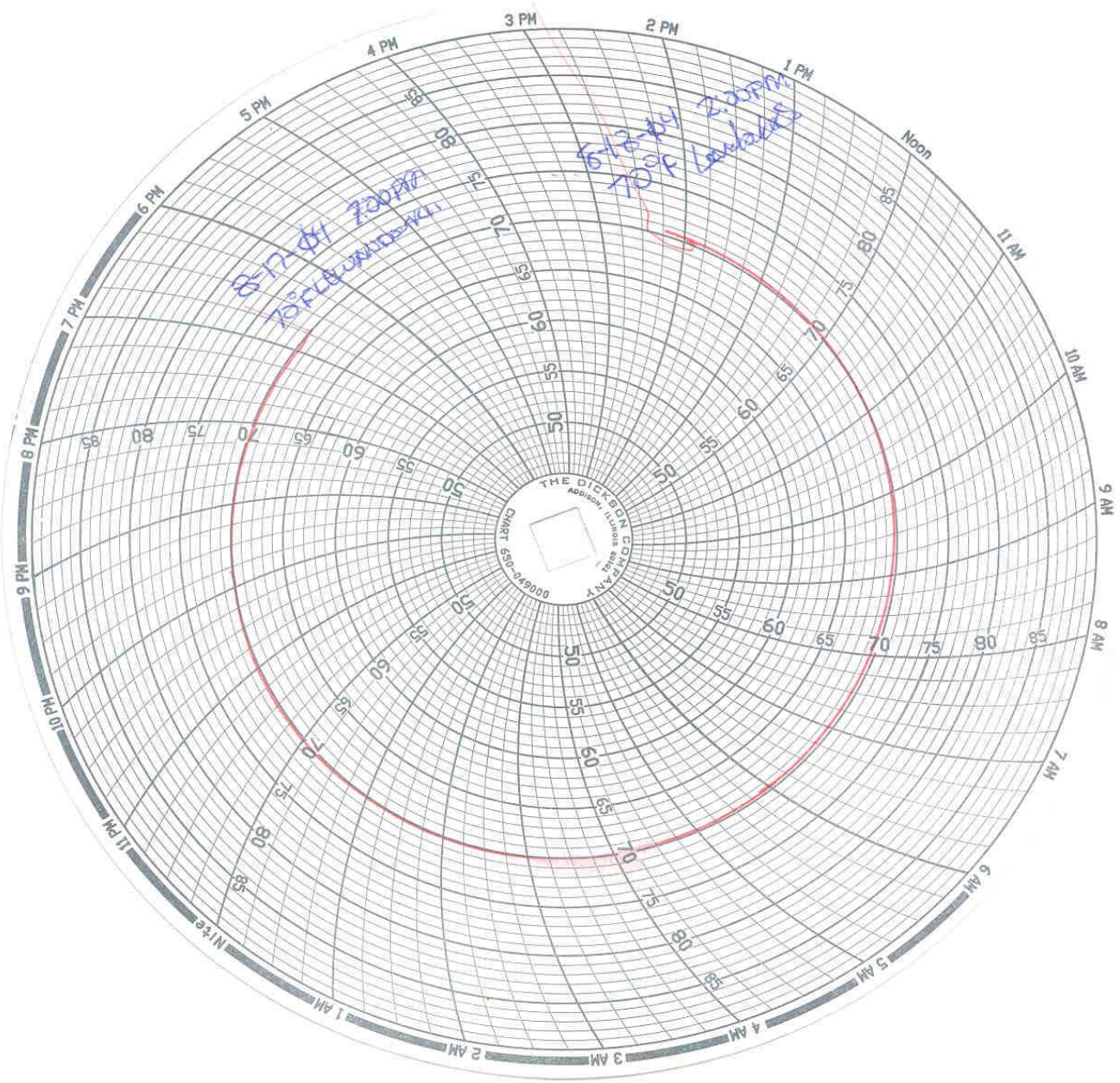
Pre-Test Passenger Side Knee Bolster View

Post-Test Passenger Side Knee Bolster View

Post-Test Passenger Dummy Knee Contact

Post-Test Passenger Dummy Airbag Contact

Vehicle Impact



Temperature Plot

APPENDIX C

INSTRUMENTATION CALIBRATION

INSTRUMENTS FOR DRIVER DUMMY NO. 506

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	J10866	Endevco	2/23/04
Head Y	J11548	Endevco	2/23/04
Head Z	AM749	Endevco	4/08/04
Neck Load Cell	376	Denton	3/01/04
Chest X	P27009	Endevco	8/08/04
Chest Y	P27022	Endevco	8/08/04
Chest Z	P26983	Endevco	8/08/04
Chest Displacement	506	Servo	2/24/04
Left Femur Load Cell	86	GSE	6/08/04
Right Femur Load Cell	85	GSE	6/08/04

INSTRUMENTS FOR PASSENGER DUMMY NO. 511

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	C25-Z24	Entran	4/23/04
Head Y	C12-R16	Entran	4/23/04
Head Z	C12-R11	Entran	4/23/04
Neck Load Cell	252	Denton	4/08/04
Chest X	P27024	Endevco	6/01/04
Chest Y	P26982	Endevco	6/01/04
Chest Z	P26985	Endevco	6/01/04
Chest Displacement	511	Servo	2/24/04
Left Femur Load Cell	957	GSE	4/29/04
Right Femur Load Cell	956	GSE	4/29/04

VEHICLE INSTRUMENTS

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	I15-Z05	Entran	5/28/04
Right Rear Seat Crossmember X	K18-D18	Entran	6/04/04
Top of Engine X	A27-R06	Entran	3/09/04
Bottom of Engine X	K07-R04	Entran	7/26/04
Left Brake Caliper X	K18-D14	Entran	6/04/04
Right Brake Caliper X	A29-J15	Entran	3/12/04
Instrument Panel X	L13-R28	Entran	3/30/04
Trunk Z	I25-F09	Entran	4/19/04