REPORT NUMBER: 222-MGA-2007-005

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 222 SCHOOL BUS PASSENGER SEATING AND CRASH PROTECTION

US BUS CORPORATION
2006 US BUS SCHOOL BUS
NHTSA NO.: C60900

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

FINAL REPORT DATE: JUNE 7, 2007

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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June 7, 2007
Date of Acceptance

Technical Report Documentation Page

1. Report No. 222-MGA-2007-005	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Final Report of FMVSS 222 Compliance Testing of 2006 US BUS School Bus NHTSA No.: C60900		*5. Report Date* June 7, 2007 *6. Performing Organization Code* MGA	
7. Author(s) James Hansen, Project Engineer Michael Janovicz, Program Manager		*8. Performing Organization Report No.* 222-MGA-2007-005	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-02-D-01057	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance Mail Code: NVS-220 400 Seventh St., S.W. Room 6111 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Report 10/31/2006 to 6/07/2007 *14. Sponsoring Agency Code* NVS-220	
15. Supplementary Notes			
16. Abstract Compliance tests were conducted on the subject 2006 US BUS School Bus, NHTSA No. C60900, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-222-03 for the determination of FMVSS 222 compliance. Test Failure: See Section 2, Test Data Summary.			
17. Key Words Compliance Testing Safety Engineering FMVSS 222		*18. Distribution Statement* Copies of this report are available from: NHTSA, Technical Information Services (TIS), Room 2334 (NPO-411) 400 Seventh Street, S.W. Washington, D.C. 20590	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 103	22. Price

Form DOT F1700.7 (8-72)

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SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a 2006 US BUS School Bus, NHTSA No. C60900, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-222-03 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 222, “School Bus Passenger Seating and Crash Protection”.

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-02-D-01057.

SECTION 2
TEST DATA SUMMARY

The passenger seating and crash protection tests were conducted during October 2006 through March 2007. All tests were conducted by MGA Research Corporation at the Wisconsin Operations. The test vehicle, 2006 US BUS School Bus, NHTSA No. C60900, did not appear to meet all the requirements of FMVSS 222. The test failures are listed below.

Failure 1

FMVSS Requirement: Paragraph S5.1.4 (c): *Seat performance rearward*, "The seat shall not deflect by an amount such that any part of the seat moves to within 102 mm of any part of another passenger seat in its originally installed position."

During the rearward deflection test, the S5 seat back moved to within 102 mm of the seat located directly behind the test seat prior to reaching the energy absorption required by S5.1.4.2. A repeat test on a new seat was performed while limiting the travel of the loading bar. The seat back still moved to within 102 mm of the seat located directly behind the test seat well before the energy absorption requirement was met.

Failure 2

FMVSS Requirement: Paragraph S.5.1: "Apply the force at the onset rate of not more than 22,241 N per second. Attain the 22,241 N force in not more than 30 seconds and maintain it for 10 seconds."

The force application, for the seat belt assembly anchorages, in the S5 location did not reach the specified force before the failure of the floor and wall mount anchor structure. The force requirement as specified in 49 CFR 571.210 is 22,000 N. The actual force reached 14,602 N before failure of the floor and wall mount anchor structure.

LINEAR AND AREA MEASUREMENTS

Seat to seat/barrier spacing was checked on all seats and found to be 610 mm or less as shown on Data Sheet 1.

The seat back height and front surface area of Seat Nos. 1 and 7 were measured in accordance with Section 12.1 of OVSC TP-222-03. As shown in Data Sheet 2 for Seat Nos. 1 and 7, the seat back area is greater than ninety percent of the seat bench width multiplied by 508.

SECTION 2 (CONTINUED)
TEST DATA SUMMARY

Restraining barriers positions and projected rear surface areas of Barrier Nos. 1 and 7 were measured in accordance with OVSC TP-222-03. The projected perimeter of seats S1 and S7 do not fall completely within the perimeter of the B1 and B7 restraining barrier, respectively. These measurements were recorded for indicant purposes as Paragraphs S5.2, S5.2.1, S5.2.2, and S5.2.3 are not required for Class 2 school buses.

SEAT BACK FORCE/DEFLECTION TEST - FORWARD

Seat Nos. 6 and 7 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 895 mm for S6 and 900 mm for S7. “W” was calculated to be 2 for S6 and S7. The seating reference point (SRP) was 482 mm above the bus floor. The deflection of the seat back at conclusion of lower loading bar loading at 1557 W N load was 60.8 mm for S6 and 54.4 mm for S7. The allowable maximum deflection without moving the seat back to within 102 mm of another seat or restraining barrier was 356 mm. The stroke rate of the upper loading bar was determined by the test engineer to be 14.4 mm/sec. The location of the upper loading bar was 406 mm above the SRP. The tests were stopped when the maximum deflection of 356 mm was reached. The minimum required area under the force versus deflection curve of the upper loading bar was 452 W or 904 joules for both S6 and S7. As shown on Data Sheet No. 3, Seat Nos. 6 and 7 met the force deflection forward requirements. See Plots 1, 2, 3, and 4.

SEAT BACK FORCE/DEFLECTION TEST - REARWARD

Seat Nos. 5 and 4, tested in the seat 5 location were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 895 mm for S5 and 898 mm for S4. “W” was calculated to be 2 for both S4 and S5. The seating reference point (SRP) was 482 mm above the bus floor. The allowable maximum deflection without moving the seat back to within 102 mm of another seat or restraining barrier was 254 mm. The stroke rate of the upper loading bar was determined by the test engineer to be 14.4 mm/sec for both S4 and S5. The location of the loading bar was 343 mm above the SRP for both seats. The test was stopped when the maximum deflection of the seat back of 254 mm was achieved for S5. The test was stopped when the seat back moved within 102 mm of another seat for S4.

The area under the force versus deflection curve of the loading bar was 858 joules for S5 and 674 joules for S4. The minimum required area under the force versus deflection curve of the loading bar was 316 W or 632 joules for both S4 and S5.

KNEE FORM IMPACT ZONE TESTS

Seat No. S2 was tested in accordance with Section 12.7 of OVSC TP-222-03. The mass of the knee form was 4.53 kg. All knee form contact area criteria and impact energy criteria were met for the seat.

HEAD FORM IMPACT ZONE TESTS

Seat No. S2 was tested in accordance with Section 12.6 of OVSC TP-222-03. The mass of the head form was 5.21 kg. All head form contact area criteria was met for the seat. The impact energy criteria and head injury criteria for all impact locations were met.

SEAT BELT ANCHORAGES

Seat belt anchorage for S3, in location S4, was tested in accordance with Appendix A of OVSC TP-222-03. Seat belt anchorages and specially made high strength webbing straps were used to conduct the test. The seat mounting failed before the required load of 22,000 N per belt was achieved. The force application, for the seat belt assembly anchorages, in the S5 location did not reach the specified force before the failure of the floor and wall mount anchor structure. The force requirement as specified in 49 CFR 571.210 is 22,000 N. The actual force reached 14,602 N before failure of the floor and wall mount anchor structure. See Plot 7.

ADMINISTRATIVE DATA SHEET

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **9/21/2006**

INCOMPLETE VEHICLE (IF APPLICABLE)

Manufacturer:	GENERAL MOTORS CORPORATION
Model:	CG33503
VIN:	1GBHG31V561226021
Build Date:	03/06
Certification Date:	

COMPLETED VEHICLE (SCHOOL BUS)

Manufacturer:	US BUS CORPORATION
Make/Model:	GM / US BUS
VIN:	1GBHG31V561226021
NHTSA No.:	C60900
Color:	Yellow
GVWR:	4,536 kg / 10,000 lbs
Build Date:	08/06
Certification Date:	08/06

DATES

Vehicle Receipt:	9/21/2006
Start of Compliance Test:	10/31/2006
Completion of Compliance Test:	4/18/2007

COMPLIANCE TEST:
All tests were performed in accordance with the references outlined in TP-222-03.

Recorded By:_____

Approved By:_____ DATE: 9/21/2006

GENERAL TEST DATA SHEET

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

SCHOOL BUS IDENTIFICATION

Model Year/Mfr./Make/Model:	2006 / US BUS
Passenger Capacity:	(1 Driver, 14 Passengers)
NHTSA No.:	C60900
VIN:	1GBHG31V561226021
Conventional or Forward Control:	Conventional
GVWR (Certification Label) FRONT:	1,860 kg / 4,100 lbs
GVWR (Certification Label) REAR:	3,402 kg / 7,500 lbs
GVWR (Certification Label) TOTAL:	4,536 kg / 10,000 lbs

TEST CONDITIONS

Date(s) of Test:	10/31/06 – 4/18/07
Ambient Temperature (°C):	21
Required Temperature Range:	0°C to 32°C

SEAT IDENTIFICATION

Seat Manufacturer:	FREEDMAN
Model Name & Number:	
Description of Seats:	Seat frames are constructed of 25.4 mm round welded steel tubing. The seat back has .68 mm by 25.4 mm strapping welded between the tubing and is covered with 45 mm poly foam on the back surface and 45 mm molded Styrofoam blocks inset into the outboard knee impact areas. The seat cushion is non-removable and designed into the seat. The seat back and seat cushion are wrapped with .58 mm vinyl.

SECTION 3
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the 2006 US BUS School Bus, NHTSA No. C60900.

DATA SHEET 1

SEAT TO SEAT/BARRIER SPACING

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

SEAT NUMBER	MEASUREMENT OF SPACING FROM SRP FORWARD TO SEAT/BARIER (mm)	REQMT ≤ 610 MM (≤ 24") CLASS 1 BUSES ONLY PASS/FAIL
1	**494**	**PASS**
2	**552**	**PASS**
3	**542**	**PASS**
4	**476**	**PASS**
5	**511**	**PASS**
6	**534**	**PASS**
7	**536**	**PASS**

COMMENTS: NONE

Recorded By:_____

Approved By:_____ DATE: 10/31/2006

DATA SHEET 2

SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

SEAT NUMBER: S1

		PASS/FAIL
1.	Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)	**PASS**

2. Measure the seat back front projected area in a vertical plane bound by horizontal planes through the SRP and 508 mm above the SRP according to the following procedure:

   Width, a = 380 mm; Width, b = 438 mm; Height, c = 218 mm; Height, d = 290 mm

   Width, e = 380 mm; Height, f = 218 mm; Height, g = 290 mm; Width, h = 450 mm

   Area = (½ (a+b) x c) + (d x b) = 216,182 mm^2 = $Area^i$

   Area = (½ (e+h) x f) + (h x g) = 220,970 mm^2 = $Area^o$

   $Area^i + Area^o = 437,152\ mm^2$

3. Measure the seat cushion width - W1 = 900 mm

   If the seat cushion is not rectangular, measure the cushion at the forward most edge and the rearward most edge, average the widths, and use the average width as W1.

4. Calculate the following: 0.9 x W1 x 508 mm = 411,480 mm^2

		PASS/FAIL
5.	Is item 2 greater than item 4? (S5.1.2)	**PASS**

Comments: None

Recorded By:_____

Approved By:_____ DATE: 10/31/2006

DATA SHEET 2 (CONTINUED)

SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

SEAT NUMBER: S7

		PASS/FAIL
1.	Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)	**PASS**

2. Measure the seat back front projected area in a vertical plane bound by horizontal planes through the SRP and 508 mm above the SRP according to the following procedure:

   Width, a = 380 mm; Width, b = 445 mm; Height, c = 198 mm; Height, d = 310 mm

   Width, e = 382 mm; Height, f = 198 mm; Height, g = 310 mm; Width, h = 440 mm

   Area = (½ (a+b) x c) + (d x b) = 219,625 mm^2 = $Area^i$

   Area = (½ (e+h) x f) + (h x g) = 217,778 mm^2 = $Area^o$

   $Area^i$ + $Area^o$ = 437,403 mm^2

3. Measure the seat cushion width - W1 = 900 mm

   If the seat cushion is not rectangular, measure the cushion at the forward most edge and the rearward most edge, average the widths, and use the average width as W1.

4. Calculate the following: 0.9 x W1 x 508 mm = 411,480 mm^2

		PASS/FAIL
5.	Is item 2 greater than item 4? (S5.1.2)	**PASS**

Comments: None

Recorded By:_____

Approved By:_____ DATE: 10/31/2006

DATA SHEET 3

SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**11/15/2006**

SEAT NUMBER: S6

1. Seat Bench Width = 895 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (2)
   Seat Reference Point (SRP) location is: (Description of location as supplied by the COTR): 482 mm Above Floor, 56 mm forward from the rear seat to frame mounting bolt.
2. Location of lower loading bar is 0 mm above the SRP.
   (Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
   Length of lower loading bar = 801 mm
   Seat Back width at SRP = 900 mm
3. Include x-y plot of Force vs. Time for the lower loading bar.
4. Deflection of the seat back at conclusion of lower bar loading (1557 W Newtons position) = 60.8 mm, at start of upper bar loading 60.8 mm, at end of upper bar loading 60.8 mm.
5. Maximum deflection allowed without moving the seat back to within 102 mm of another seat or restraining barrier = 356 mm (must be 356 mm of less) (S5.1.3)
6. Seat back movement rate selected by the test engineer = 14.4 mm/sec
7. Location of upper loading bar is in a horizontal plane 406 mm above the SRP. (Requirement: 406 mm) (S5.1.3.3). Length of upper loading bar = 763 mm. Width of seat back at 406 mm above SRP = 865 mm.
8. Reason for stopping seat back deflection:
   ___ Reached deflection determined in Item 6 above (if less than 356 mm)
   _X_ Reached 356 mm maximum allowed deflection (Actual deflection was 361 mm)
   ___ Separation was about to occur
9. Include the x-y plot of force vs. deflection for the upper loading bar with boundaries of Figure 14 (OVSC TP-222-3) superimposed.

DATA SHEET 3 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST - FORWARD

		PASS/FAIL
10.	Is the seat in its final deflected position within 102 mm of the next seat or barrier?	**PASS**

		PASS/FAIL
11.	Does the forward force vs. deflection trace of the seat back lie within the corridor? (S5.1.3)	**PASS**

12. Include a deflection vs. time plot for the upper loading bar.
13. The area within the force vs. deflection curve = 1,455 joules
14. 452W = 904 joules (S5.1.3.4)

		PASS/FAIL
15.	Is item 13 greater than or equal to item 14? (S5.1.3.4)	**PASS**

Comments: None

Recorded By:_____

Approved By:_____ DATE: 11/15/2006

DATA SHEET 3 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**11/15/2006**

SEAT NUMBER: S7

1. Seat Bench Width = 900 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (2)
   Seat Reference Point (SRP) location is: (Description of location as supplied by the COTR: 482 mm Above Floor, 56 mm forward from the rear seat to frame mounting bolt.
2. Location of lower loading bar is 0 mm above the SRP.
   (Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
   Length of lower loading bar = 801 mm
   Seat Back width at SRP = 900 mm
3. Include x-y plot of Force vs. Time for the lower loading bar.
4. Deflection of the seat back at conclusion of lower bar loading (1557 W Newtons position) = 54.4 mm, at start of upper bar loading 54.4 mm, at end of upper bar loading 54.4 mm.
5. Maximum deflection allowed without moving the seat back to within 102 mm of another seat or restraining barrier = 356 mm (must be 356 mm of less) (S5.1.3)
6. Seat back movement rate selected by the test engineer = 14.4 mm/sec
7. Location of upper loading bar is in a horizontal plane 406 mm above the SRP. (Requirement: 406 mm) (S5.1.3.3). Length of upper loading bar = 763 mm. Width of seat back at 406 mm above SRP = 865 mm.
8. Reason for stopping seat back deflection:
   ___ Reached deflection determined in Item 6 above (if less than 356 mm)
   _X_ Reached 356 mm maximum allowed deflection (Actual deflection was 356 mm)
   ___ Separation was about to occur
9. Include the x-y plot of force vs. deflection for the upper loading bar with boundaries of Figure 14 (OVSC TP-222-3) superimposed.

DATA SHEET 3 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST – FORWARD

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **11/15/2006**

		PASS/FAIL
10.	Is the seat in its final deflected position within 102 mm of the next seat or barrier?	**PASS**

		PASS/FAIL
11.	Does the forward force vs. deflection trace of the seat back lie within the corridor? (S5.1.3)	**PASS**

12. Include a deflection vs. time plot for the upper loading bar.
13. The area within the force vs. deflection curve = 1,258 joules
14. 452W = 904 joules (S5.1.3.4)

		PASS/FAIL
15.	Is item 13 greater than or equal to item 14? (S5.1.3.4)	**PASS**

Comments: None

Recorded By:_____

Approved By:_____ DATE: 11/15/2006

DATA SHEET 4

SEAT BACK FORCE DEFLECTION TEST – REARWARD

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**11/16/2006**

SEAT NUMBER: S5

1. Seat Bench Width = 895 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (2)
2. Location of the loading bar is in a horizontal plane 343 mm above the SRP of the test seat. (Requirement: 343 mm above the SRP) (S5.1.4.1)
   Length of loading bar = 762 mm
   Width of seat back at 343 mm above SRP = 868 mm
3. Deflection of seat back at 222 N preload = 19 mm
4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = approximately 175 mm (maximum allowed = 254 mm) (S5.1.4)
5. Seat back movement rate selected by the test engineer = 14.4 mm/sec
6. Reason for stopping deflection:
   ___ Reached deflection determined in Item 4 above (if less than 254 mm)
   _X_ Reached 254 mm maximum allowed deflection (Actual deflection was 256 mm)
   ___ Separation was about to occur
7. Include the x-y plot of force vs. deflection for the loading bar with boundaries of Figure 18 (OVSC TP-222-3) superimposed.

		PASS/FAIL
8.	Does the force vs. deflection plot lie within the boundaries of Figure 18 (OVSC TP-222-03)?	**PASS**

9. Include a deflection vs. time plot for the upper loading bar.
10. 316W = 632 joules
11. The area within the force vs. deflection curve = 858 joules

DATA SHEET 4 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST – REARWARD

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **11/16/2006**

		PASS/FAIL
12.	Is item 11 greater than or equal to item 10? (S5.1.4.2)	NA (See Comments)

Comments: This seat failed to meet the requirements of S5.1.4.2. The seat back moved to within 102 mm of the seat located directly behind the test seat when the loading bar reached approximately 175 mm of travel. The total energy expended by the loading bar at 175 mm was approximately 577 joules, which is below the 632 joules of energy absorption required by S5.1.4.2. When considering energy returned due to seat recoil, the total energy absorbed by the seat back is less than 577 joules.

Recorded By:_____

Approved By:_____ DATE: 11/16/2006

DATA SHEET 4 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST – REARWARD

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**11/16/2006**

SEAT NUMBER: S4, tested in the S5 location

1. Seat Bench Width = 898 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (2)
2. Location of the loading bar is in a horizontal plane 343 mm above the SRP of the test seat. (Requirement: 343 mm above the SRP) (S5.1.4.1)
   Length of loading bar = 762 mm
   Width of seat back at 343 mm above SRP = 870 mm
3. Deflection of seat back at 222 N preload = 16 mm
4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = approximately 163 mm (maximum allowed = 254 mm) (S5.1.4)
5. Seat back movement rate selected by the test engineer = 14.4 mm/sec
6. Reason for stopping deflection:
   _X_ Reached deflection determined in Item 4 above (if less than 254 mm)
   ___ Reached 254 mm maximum allowed deflection
   ___ Separation was about to occur
7. Include the x-y plot of force vs. deflection for the loading bar with boundaries of Figure 18 (OVSC TP-222-3) superimposed.

		PASS/FAIL
8.	Does the force vs. deflection plot lie within the boundaries of Figure 18 (OVSC TP-222-03)?	**PASS**

9. Include a deflection vs. time plot for the upper loading bar.
10. 316W = 632 joules
11. The area within the force vs. deflection curve = 675 joules

DATA SHEET 4 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST – REARWARD

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **11/16/2006**

		PASS/FAIL
12.	Is item 11 greater than or equal to item 10? (S5.1.4.2)	NA (See Comments)

Comments: This test was performed to verify the results of the S5 rearward deflection test. This seat also failed to meet the requirements of S5.1.4.2. The seat back moved to within 102 mm of the seat located directly behind the test seat when the loading bar reached approximately 163 mm of travel. The total energy expended by the loading bar at 163 mm was approximately 517 joules, which is below the 632 joules of energy absorption required by S5.1.4.2. When considering energy returned due to seat recoil, the total energy absorbed by the seat back is less than 517 joules.

Recorded By:_____

Approved By: Michael Janosz DATE: 11/16/2006

DATA SHEET 5

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

(NOT REQUIRED FOR CLASS 2 SCHOOL BUSES)

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

SEAT NUMBER: B1

1. Measure distance T from SRP of seat immediately aft of barrier in a horizontal longitudinal line forward to barrier. T= 494 mm.

		PASS/FAIL
2.	Is distance T equal to or less than 610 mm? (S5.2)	**PASS**

3. Measure distance D at top (t) and bottom (b) of barrier.

   D_t = 80 mm D_b = 30 mm

4. Measure distance C at top (t) and bottom (b) of seat.

   C_t = 96 mm C_b = 60 mm

		PASS/FAIL
5.	Is D_t equal to or less than C_t?	**PASS**

		PASS/FAIL
6.	Is D_b equal to or less than C_b?	**PASS**

7. Measure distance E at top of barrier and bottom of barrier.

   E_t = 756 mm E_b = 889 mm

8. Measure distance A at top of seat back and bottom of seat.

   A_t = 805 mm A_b = 889 mm

		PASS/FAIL
9.	Is distance $E_t + D_t$ equal to or greater than distance $A_t + C_t$?	**FAIL**

		PASS/FAIL
10.	Is distance $E_b + D_b$ equal to or greater than distance $A_b + C_b$	**FAIL**

11. Measure distance U at inboard (i) and outboard (o) side of barrier.

    U_i = 385 mm U_o = 368 mm

12. Measure distance V at inboard (i) and outboard (o) sides of seat.

    V_i = 310 mm V_o = 310 mm

DATA SHEET 5 (CONTINUED)

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

(NOT REQUIRED FOR CLASS 2 SCHOOL BUSES)

		PASS/FAIL
13.	Is U_i equal to or less than V_i?	**FAIL**

		PASS/FAIL
14.	Is U_o equal to or less than V_o?	**FAIL**

15. Measure distance S at inboard (I) and outboard (o) side of barrier.

    S_i = 738 mm S_o = 745 mm

16. Measure distance W at inboard (i) and outboard (o) sides of seat.

    W_i = 770 mm W_o = 775 mm

		PASS/FAIL
17.	Is $S_i + U_i$ equal to or greater than $W_i + V_i$?	**PASS**

		PASS/FAIL
18.	Is $S_o + U_o$ equal to or greater than $W_o + V_o$?	**PASS**

19. Compute area (W x A) = 654,308 mm^2

20. Compute area (E x S) = 609,884 mm^2

		PASS/FAIL
21.	Is (W x A) equal to or less than (E x S)?	**FAIL**

Comments: None

Recorded By:_____

Approved By: Michal Janosz DATE: 10/31/2006

DATA SHEET 5 (CONTINUED)

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

(NOT REQUIRED FOR CLASS 2 SCHOOL BUSES)

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

SEAT NUMBER: B7

1. Measure distance T from SRP of seat immediately aft of barrier in a horizontal longitudinal line forward to barrier. T= 536 mm.

		PASS/FAIL
2.	Is distance T equal to or less than 610 mm? (S5.2)	**PASS**

3. Measure distance D at top (t) and bottom (b) of barrier.

   D_t = 85 mm D_b = 25 mm

4. Measure distance C at top (t) and bottom (b) of seat.

   C_t = 90 mm C_b = 60 mm

		PASS/FAIL
5.	Is D_t equal to or less than C_t?	**PASS**

		PASS/FAIL
6.	Is D_b equal to or less than C_b?	**PASS**

7. Measure distance E at top of barrier and bottom of barrier.

   E_t = 765 mm E_b = 895 mm

8. Measure distance A at top of seat back and bottom of seat.

   A_t = 835 mm A_b = 895 mm

		PASS/FAIL
9.	Is distance $E_t + D_t$ equal to or greater than distance $A_t + C_t$?	**FAIL**

		PASS/FAIL
10.	Is distance $E_b + D_b$ equal to or greater than distance $A_b + C_b$	**FAIL**

11. Measure distance U at inboard (i) and outboard (o) side of barrier.

    U_i = 390 mm U_o = 360 mm

12. Measure distance V at inboard (i) and outboard (o) sides of seat.

    V_i = 305 mm V_o = 305 mm

DATA SHEET 5 (CONTINUED)

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

(NOT REQUIRED FOR CLASS 2 SCHOOL BUSES)

		PASS/FAIL
13.	Is U_i equal to or less than V_i?	**FAIL**

		PASS/FAIL
14.	Is U_o equal to or less than V_o?	**FAIL**

15. Measure distance S at inboard (I) and outboard (o) side of barrier.

    S_i = 743 mm S_o = 746 mm

16. Measure distance W at inboard (i) and outboard (o) sides of seat.

    W_i = 775 mm W_o = 775 mm

		PASS/FAIL
17.	Is $S_i + U_i$ equal to or greater than $W_i + V_i$?	**PASS**

		PASS/FAIL
18.	Is $S_o + U_o$ equal to or greater than $W_o + V_o$?	**PASS**

19. Compute area (W x A) = 670,375 mm^2

20. Compute area (E x S) = 617,935 mm^2

		PASS/FAIL
21.	Is (W x A) equal to or less than (E x S)?	**FAIL**

Comments: None

Recorded By:_____

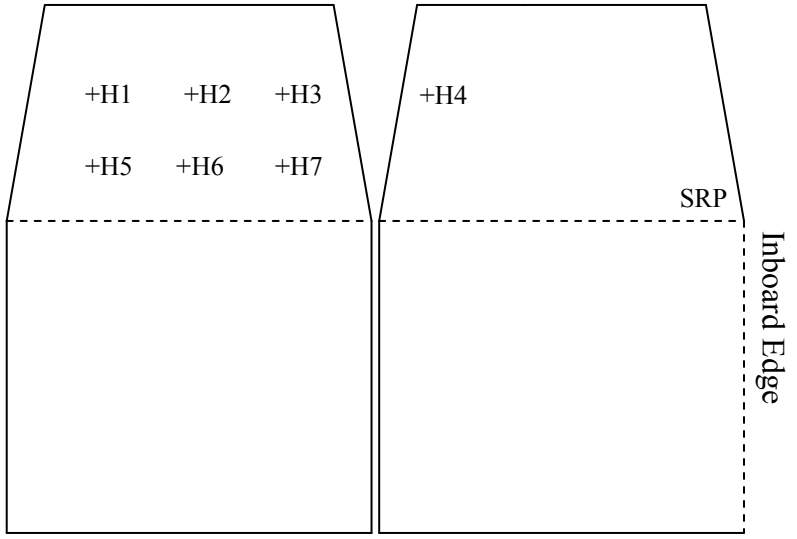
Approved By: Michael Janosz DATE: 10/31/2006

DATA SHEET 6

HEAD FORM IMPACT CONTACT AREA AND ENERGY REQUIREMENTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**1/04/2007**

SEAT NUMBER: S2



SEAT BACK REAR SURFACE

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)
2. Identify head form impact location on sketch by placing H1, H2, H3, H4, H5, H6, and H7 in the appropriate location.
3. Define and mark on graphic above, the plane of reference for head form impact angle:

   0° = Parallel With Floor, (+) is Up, (-) is Down

   X = From Inboard Edge of Seat

   Y = Measured Vertically from the SRP

DATA SHEET 6 (CONTINUED)

HEAD FORM IMPACT CONTACT AREA AND ENERGY REQUIREMENTS

4. Complete the following table:

(1)	(2)			(3)	(4)*	(5)	(6)	(7)
Head Impact & Test #	Location (a)			Speed Trap Impact Velocity** mps	Derived Velocity mps	Contact Area (CA) mm^2	CA ≥ 1935 mm^2	
	X	Y	Angle				Yes-Pass	No-Fail
H1	742	470	0	1.57	1.49	6,640	**PASS**	
H2	641	470	0	1.57	1.50	6,310	**PASS**	
H3	541	470	0	1.57	1.38	5,960	**PASS**	
H4	370	470	0	1.56	1.60	5,780	**PASS**	
H5	742	365	0	1.55	2.11	6,930	**PASS**	
H6	641	365	0	1.56	1.40	6,730	**PASS**	
H7	541	365	0	1.55	2.00	6,700	**PASS**	

* Contact Velocity from Item 7 below

** Velocity Range = 1.52 mps, +0.08, -0 mps

5. Attach Contact Area Prints.
6. Attach acceleration versus time plots for each impact.
7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By:_____

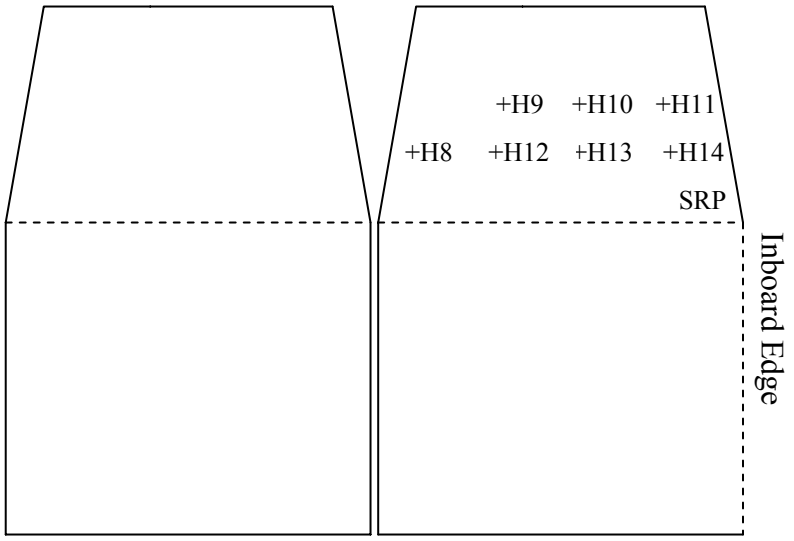
Approved By: Michael Janosz DATE: 1/04/2007

DATA SHEET 6 (CONTINUED)

HEAD FORM IMPACT CONTACT AREA AND ENERGY REQUIREMENTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**1/03/2007**

SEAT NUMBER: S2



SEAT BACK REAR SURFACE

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)
2. Identify head form impact location on sketch by placing H8, H9, H10, H11, H12, H13, and H14 in the appropriate location.
3. Define and mark on graphic above, the plane of reference for head form impact angle:

   0° = Parallel With Floor, (+) is Up, (-) is Down

   X = From Inboard Edge of Seat

   Y = Measured Vertically from the SRP

DATA SHEET 6 (CONTINUED)

HEAD FORM IMPACT CONTACT AREA AND ENERGY REQUIREMENTS

4. Complete the following table:

(1)	(2)			(3)	(4)*	(5)	(6)	(7)		(8)	
Head impact & Test #	Location (a)			Speed Trap Impact Velocity ** mps	Derived Velocity ** mps	Max HIC	Engy Reqd Joules	Column 5 < 1000		Column 6 > 4.5 joules	
	X	Y	Angle					Yes-Pass	No-Fail	Yes-Pass	No-Fail
H8	370	365	0	6.69	6.60	125	5.85	PASS		PASS	
H9	270	470	0	6.69	6.76	94	12.18	PASS		PASS	
H10	170	470	0	6.68	6.35	86	12.83	PASS		PASS	
H11	70	470	0	6.63	6.63	73	18.83	PASS		PASS	
H12	270	365	0	6.69	6.63	97	12.51	PASS		PASS	
H13	170	365	0	6.68	6.63	102	14.82	PASS		PASS	
H14	70	365	0	6.67	6.60	111	5.74	PASS		PASS	

* Impact velocity from item No. 6 below

** Impact velocity range = 6.69 mps, +0, -0.08 mps

5. Attach acceleration versus time plots for each impact.
6. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By:_____

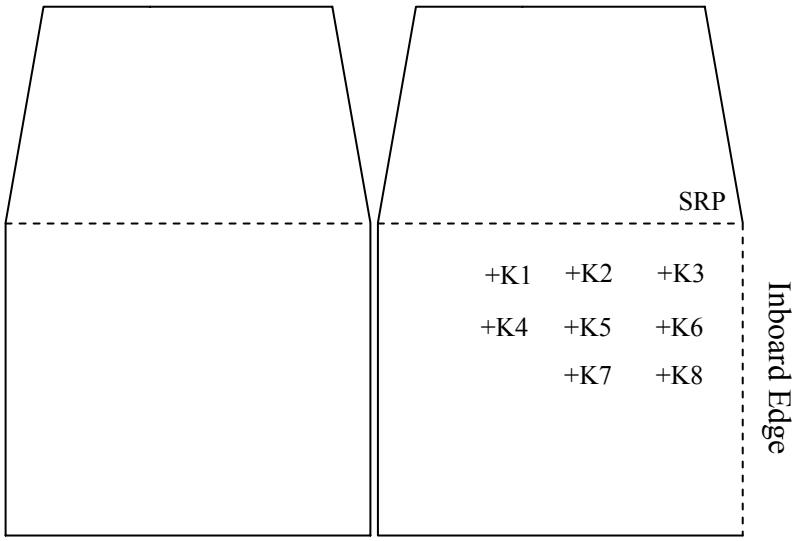
Approved By:_____ DATE: 1/03/2007

DATA SHEET 7

KNEE FORM IMPACT TEST

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**1/04/2007**

SEAT NUMBER: S2



SEAT BACK REAR SURFACE

1. Locate x-y reference point on sketch above for knee form impact locations. (Label the positive and negative directions, if applicable)
2. Identify knee form impact location on sketch by placing K1, K2, K3, K4, K5, K6, K7, and K8 in the appropriate location.
3. Define the plane of reference for knee form impact angle:
   0° = Parallel With Floor, (+) is Up, (-) is Down
   X = From Inboard Edge of the Seat
   Y = Measured Vertically from the SRP

DATA SHEET 7 (CONTINUED)

KNEE FORM IMPACT TEST

4. Complete the following table:

(1)	(2)			(3)	(4)*	(5)	(6)	(7)		(8)	
Knee impact & Test #	Location (a)			Speed Trap Impact Velocity ** mps	Derived Velocity ** mps	Cont. Area mm^2	Resist Force (N)	Column 5 > 1935 mm^2		Column 6 < 2669N	
	X	Y	Angle					Yes-Pass	No-Fail	Yes-Pass	No-Fail
K1	270	246	0	4.86	4.58	5,850	1,158	PASS		PASS	
K2	170	246	0	4.87	4.76	5,730	1,022	PASS		PASS	
K3	70	246	0	4.87	4.68	5,100	1,661	PASS		PASS	
K4	270	150	0	4.88	4.47	5,220	993	PASS		PASS	
K5	170	150	0	4.80	4.79		983			PASS	
K6	70	150	0	4.83	4.62		1,348			PASS	
K7	170	52	0	4.81	4.69		1,089			PASS	
K8	70	52	0	4.82	4.48		1,614			PASS	

* Impact velocity from item No. 7 below

** Impact velocity range = 4.86 mps, +0.08, -0 mps for contact area, +0, -0.08 mps for force

5. Attach Contact Area Prints for K1, K2, K3 and K4.
6. Attach acceleration versus time plots for each impact.
7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time for each impact K1 through K8.
8. Attach force vs. time plots for K5, K6, K7 and K8.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By:_____

Approved By:_____ DATE: 1/04/2007

DATA SHEET 8

SEAT BELT ASSEMBLY ANCHORAGES

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **3/29/2007**

SEAT LOCATION: S3 in S4 Location

		PASS/FAIL
1.	Are all seat belt assembly anchorages designed for forward-facing occupant position?	**PASS**

Seat Location	Seating Location	Anchor Type	Measured Spacing (mm) *	Measured Angle **	Load Application Angle (degrees)	
					Side View Horizontal Load Angle	Plan View From Vehicle Center Line
S3	Left	1	340	75°	10°	0°
	Right	1	340	75°	10°	0°

* The spacing for an individual seat belt assembly anchorage shall be at least 165mm apart as measured between the vertical center lines of the bolt holes.

** Specified angle range above horizontal to be 20° to 75°

Seat Location	Seating Location	Required Load (N)	Actual Max. Test Load (N)	PASS/ FAIL	Comment
S3	Left	22,000	15,047	**FAIL**	
	Right	22,000	14,347	**FAIL**	

Comments: The seat mounting failed before the required load was achieved.

Recorded By:_____

Approved By:_____ DATE: 3/29/2007

SECTION 4

TP-222-03 (APPENDIX B FMVSS 208, OCCUPANT CRASH PROTECTION FOR CLASS 2 SCHOOL BUSES)

DATA SHEET B1 - SEAT BELT CHECK

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **4/25/2007**

1. No. of designated seating positions (DSP): 17
2. Type of seat belt at each passenger DSP (571.208 S4.1.2.1, S4.1.2.2, S4.1.2.3)

Belt Type (Type 1 or 2 Required)								
Seat No.	1	2	3	4	5	6	7	8
DSP #1 Inboard	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1
DSP #2 Outboard	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1

3. Type of retractor at each passenger DSP: (571.208 S7.1.1.2)

Retractor Type (Manual, ALR, ELR)								
Seat No.	1	2	3	4	5	6	7	8
DSP #1 Inboard	Manual	Manual	Manual	Manual	Manual	Manual	Manual	Manual
DSP #2 Outboard	Manual	Manual	Manual	Manual	Manual	Manual	Manual	Manual

4. Single point, push-button, accessible latch release at each passenger DSP (571.208 S7.2(c))

Pass: single point push-button Fail: not single point push-button

Seat No.	1	2	3	4	5	6	7	8
DSP #1 Inboard	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
DSP #2 Outboard	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

DATA SHEET B1 (CONTINUED)

SEAT BELT CHECK

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **4/25/2007**

5. Latch plate and buckle must not pass through conduit or guide between seat cushion and seat back at each passenger DSP. (571.208 S7.4.6)

Pass: latch plate and/or buckle will not fit through conduit or guide

Fail: latch plate and/or buckle will fit through conduit or guide

Seat No.	1	2	3	4	5	6	7	8
DSP #1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
DSP #2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

6. Either the latch plate, buckle, or webbing must stay on top or above the seat when the seat belt is unbuckled and the remaining two parts must stay accessible at each passenger DSP. (571.208 S7.4.6)

Pass: the seat belt meets the above requirements

Fail: the seat belt does not meet the above requirements

Seat No.	1	2	3	4	5	6	7	8
DSP #1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
DSP #2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

7. Seat belt fit test dummies

		Manufacturer	Serial Number
7.1	50% 6-Year old Child	FTSS	153
7.2	5% Adult Female	FTSS	507
7.3	50% Adult Male	FTSS	312
7.4	95% Adult Male	Denton	050

DATA SHEET B1 (CONTINUED)

SEAT BELT CHECK

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **4/25/2007**

8. Seat belt must fit persons whose dimensions range from those of a 50th percentile 6-year old child to those of a 95th percentile adult male. (571.208 S7.1.1)

Two seats checked

Pass: snug fitting seat belt Fail: loose fitting seat belt

Seat Number		S3	S1
DSP #1	50% C	Pass	Pass
	95% AM	Pass	Pass
DSP #2	50% C	Pass	Pass
	95% AM	Pass	Pass

9. Driver's Seat (Not part of FMVSS 222)

Belt Type	2
Automatic Restraint	No
Type of Automatic Restraint (if applicable)	

Pass: snug fitting seat belt Fail: loose fitting seat belt

5% AF	Pass
95% AM	Pass

Comments: None

Recorded By:_____

Approved By:_____ DATE: 4/25/2007

DATA SHEET B2

SEAT BELT WARNING SYSTEM CHECK

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **4/25/2007**

X	1.	The occupant is in the driver's seat.
X	2.	The seat belt is in the stowed position.
X	3.	The key is in the "on" or "start" position.
X	4.	The time duration of the audible signal beginning with key "on" or "start" is
X		Seconds: 5
X	5.	The occupant is in the driver's seat.
X	6.	The seat belt is in the stowed position.
X	7.	The key is in the "on" or "start" position.
X	8.	The time duration of the warning light beginning with key "on" or "start" is
X		Seconds: 0
X	9.	The occupant is in the driver's seat.
X	10.	The seat belt is in the latched position and with at least 4 inches of belt webbing extended.
X	11.	The key is in the "on" or "start" position.
X	12.	The time duration of the warning light beginning with key "on" or "start" is
X		Seconds: 0
X	13.	Complete the following table with the data from 4, 8, and 12 to determine which option is used.
X	14.	Record exactly the wording of the visual seat belt warning system:
X		Symbol

		Warning light	Warning light specification	Audible signal	Audible signal specification*
S7.3 (a)(1)	Belt stowed & key on or start	Item 8: Stays On	60 seconds minimum	Item 4: 6	4 to 8 seconds
S7.3 (a)(2)	Belt latched & key on or start	Item 12: 0	4 to 8 seconds		
	Belt stowed & key on or start	Item 8: Stays On	4 to 8 seconds	Item 4: 6	4 to 8 seconds

* 49 USCS @ 30124 does NOT allow an audible signal to operate for more than 8 seconds.
A voluntary audible signal after the 4 to 8 second required signal may be provided. It must be differentiated from the required signal (5/25/2001 legal interpretation to Longacre and Associates).

Comments: None

Recorded By:_____

Approved By: Michael Javorsky DATE: 4/25/2007

SECTION 5

INSTRUMENTATION AND EQUIPMENT LIST

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

Equipment	Description	Model/Serial No.	Cal. Date	Next Cal. Date
Computer	HP	Vectra / US03263612	---	---
Test Fixture	MGA	TF2003	---	---
A/D Interface	Metrabyte	DAS-1802	---	---
Load Cell	Interface	1210AF-SK / 62736	1/29/07	7/24/07
Load Cell	Interface	1210AF / 137778	11/3/06	5/3/07
Inclinometer	Digital Protractor	Pro 360 / Comp Lab	10/4/06	4/4/07
Steel Tape	Stanley	Powerlock / 278	9/26/06	3/26/07
Impact Fixture	MGA	IF2003A	---	---
Camera	Sony	DSC-S75	---	---
Planimeter	Sokkia Corp.	Planix5 007319	11/22/06	5/22/07
Accelerometer	Endevco	7264-2000 / W04807	10/4/06	4/4/07
Linear Motion Transducer	Ametek	P-25A / 1202-19366	10/30/06	4/30/07
Linear Motion Transducer	Ametek	P25A / 21954	10/30/06	4/30/07

SECTION 6
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

Left Side View of School Bus

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

Right Side View of School Bus

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

¾ Front View From Left Side of School Bus

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

¾ Rear View From Right Side of School Bus

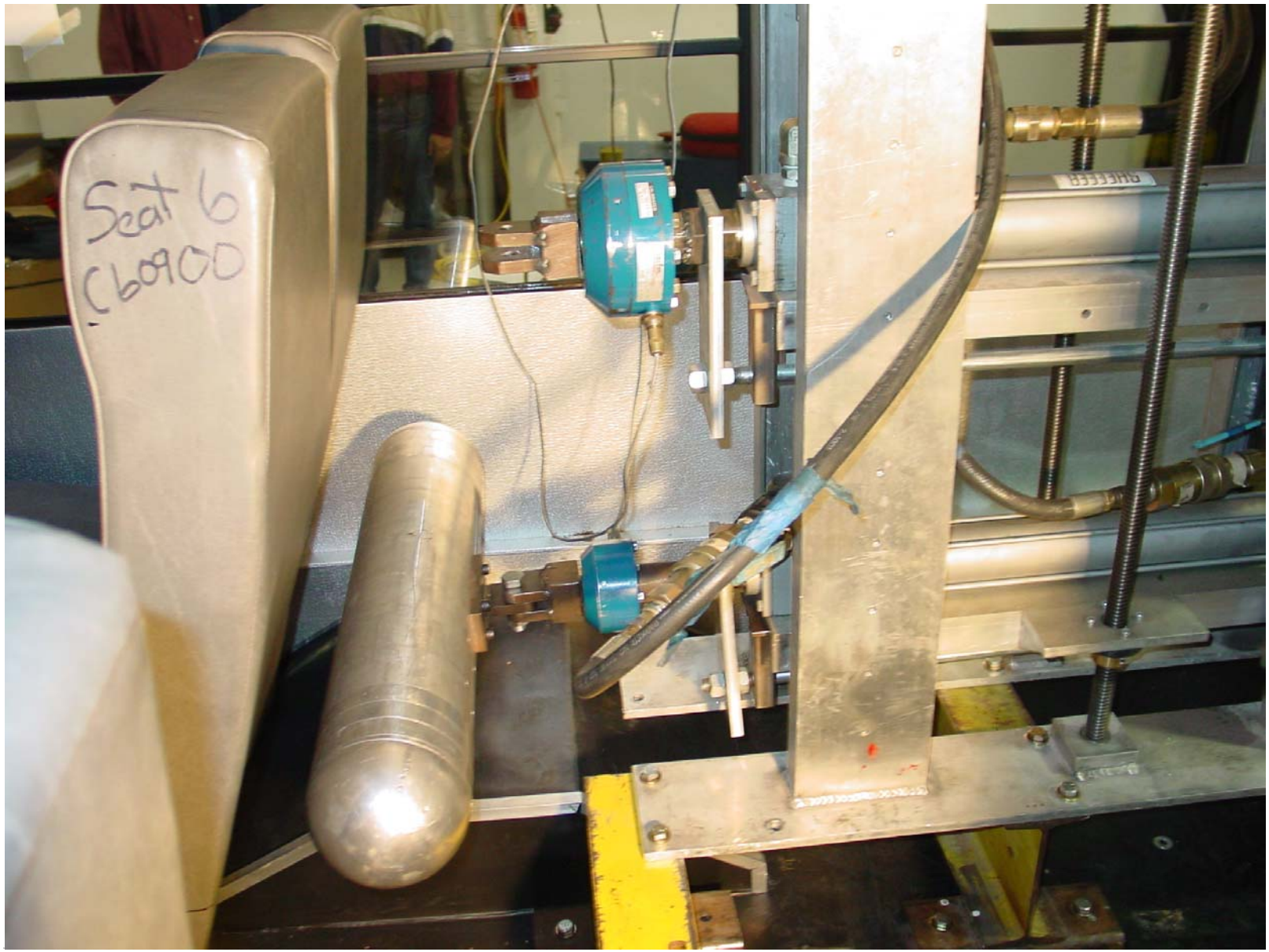
Certification Label and Tire Placard

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

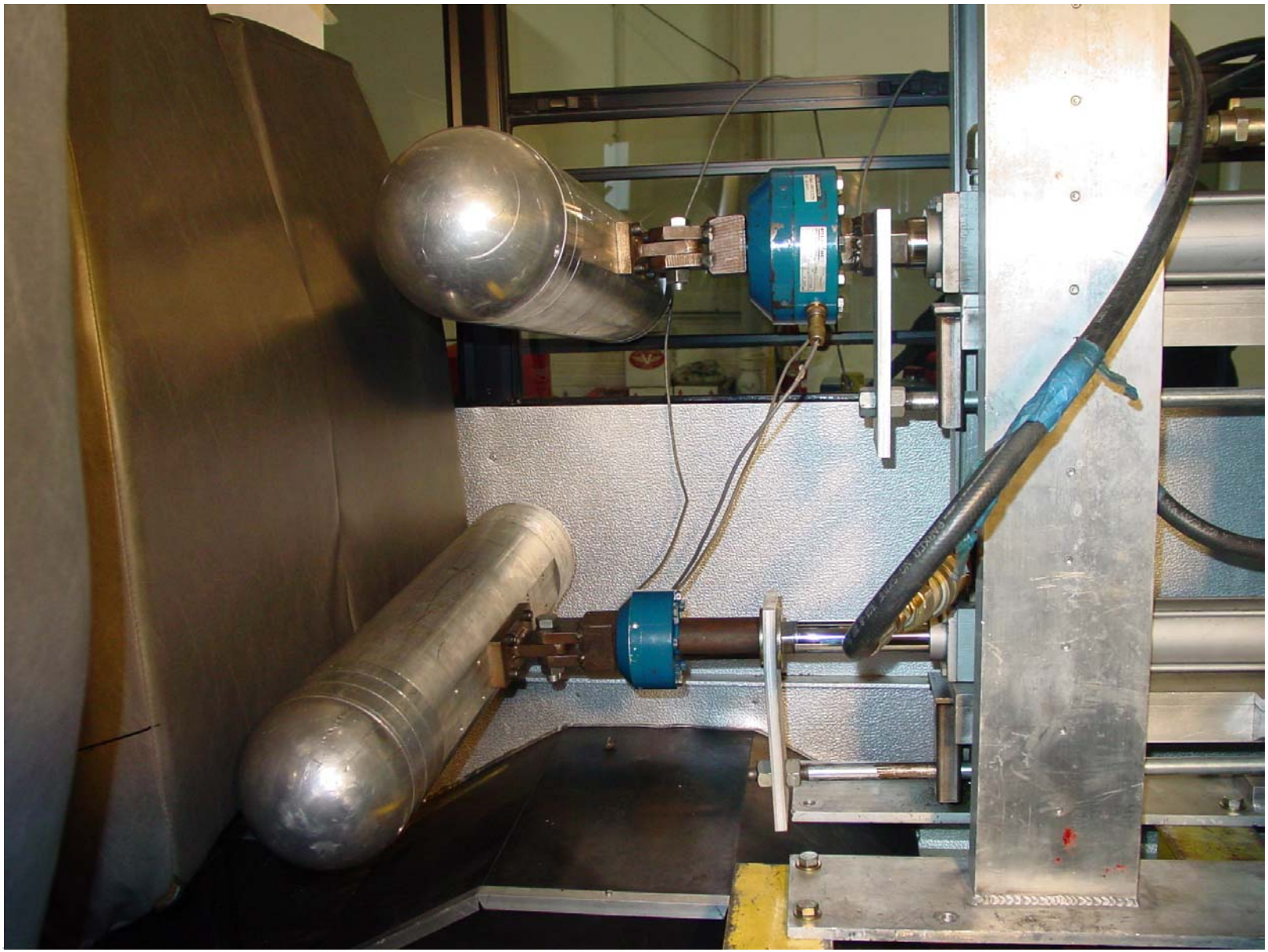
Vehicle Interior View From Front to Rear

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **10/31/2006**

Vehicle Interior View From Rear to Front



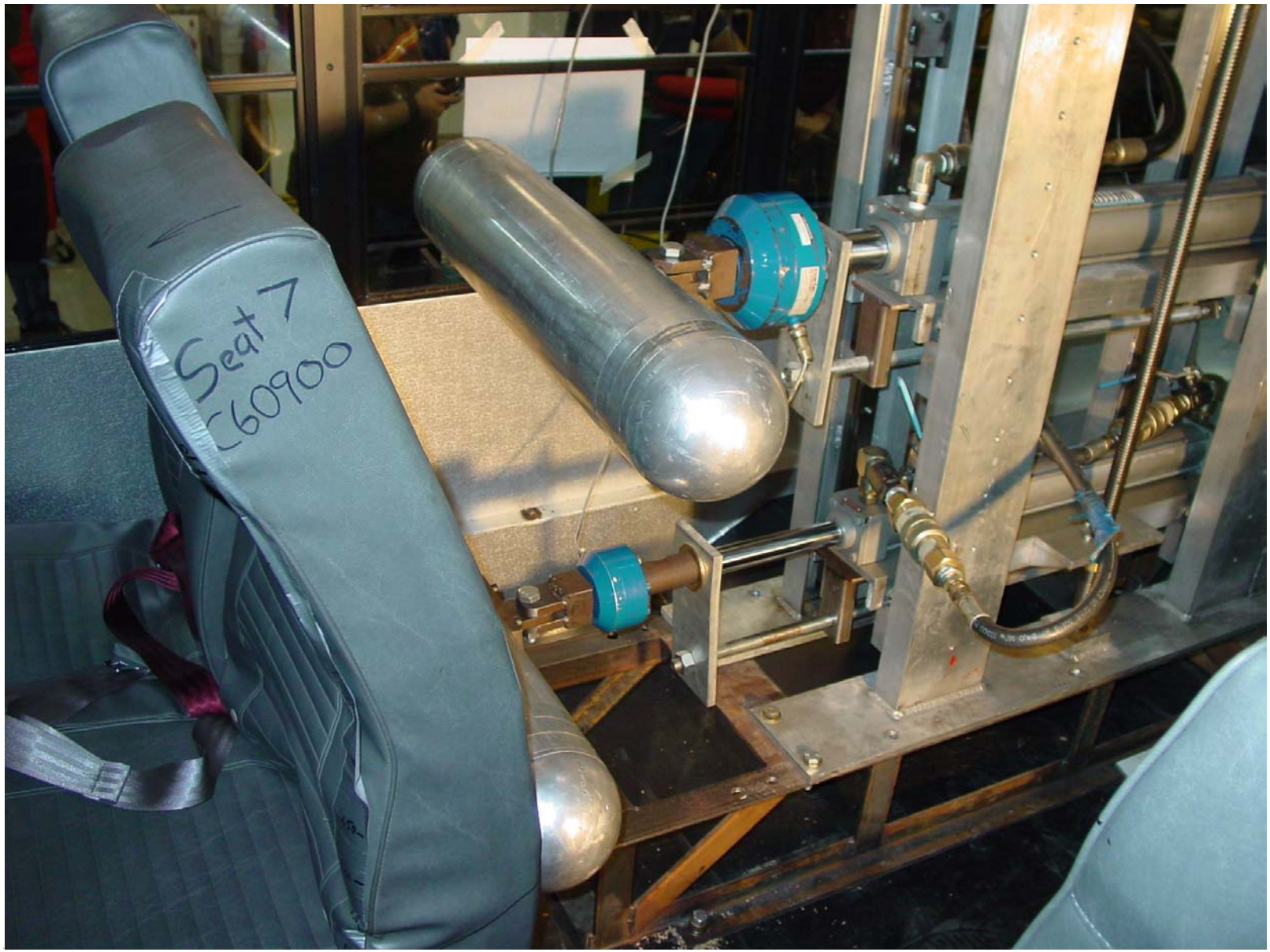
Pre-Test of Seat Back S6 Force Deflection Forward Test



Post-Test of Seat Back S6 Force Deflection Forward Test

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

Pre-Test of Seat Back S7 Force Deflection Forward Test



Post-Test of Seat Back S7 Force Deflection Forward Test

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

Pre-Test of Seat Back S4 Force Deflection Rearward Test

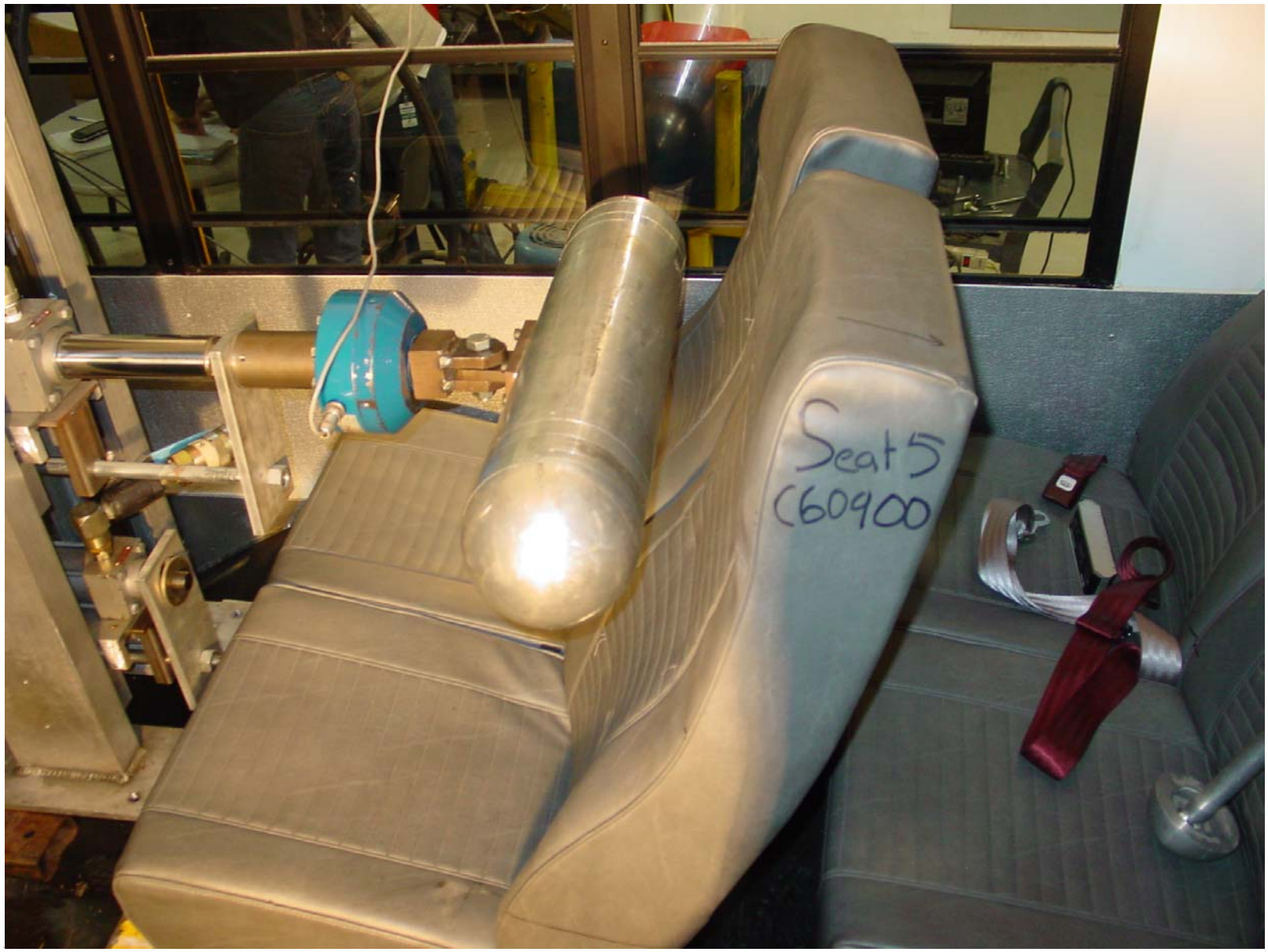
Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

Post-Test of Seat Back S4 Force Deflection Rearward Test

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

Pre-Test of Seat Back S5 Force Deflection Rearward Test

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**



Post-Test of Seat Back S5 Force Deflection Rearward Test

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

Post-Test of Head and Knee Impact Locations on Seat S2

Pre-Test FMVSS 222 Seat Belt Anchorage S3 (in Location S4)

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**10/31/2006**

Post-Test FMVSS 222 Seat Belt Anchorage Damage

Post-Test FMVSS 222 Seat Belt Anchorage Damage

Post-Test FMVSS 222 Seat Belt Anchorage Damage

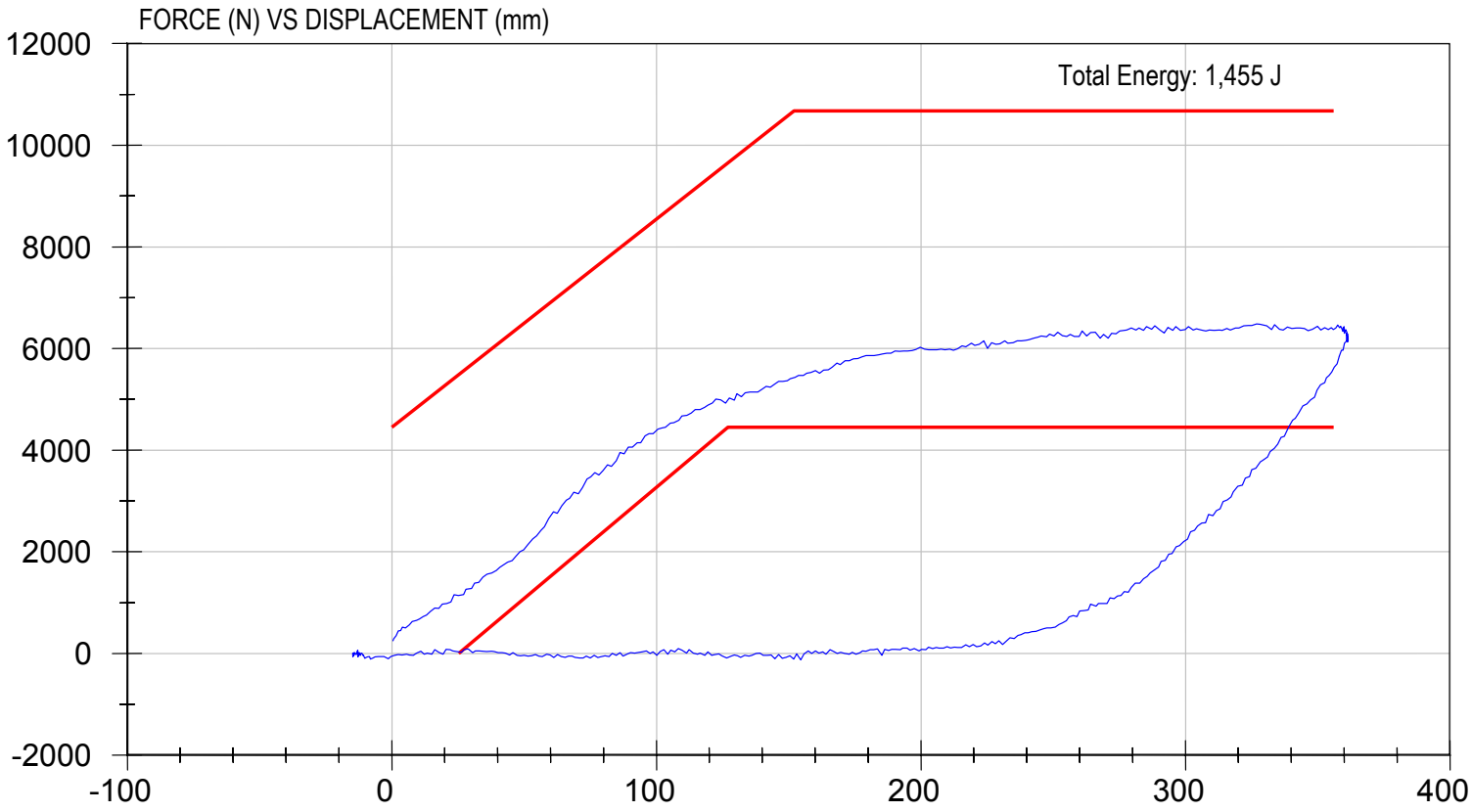
SECTION 7

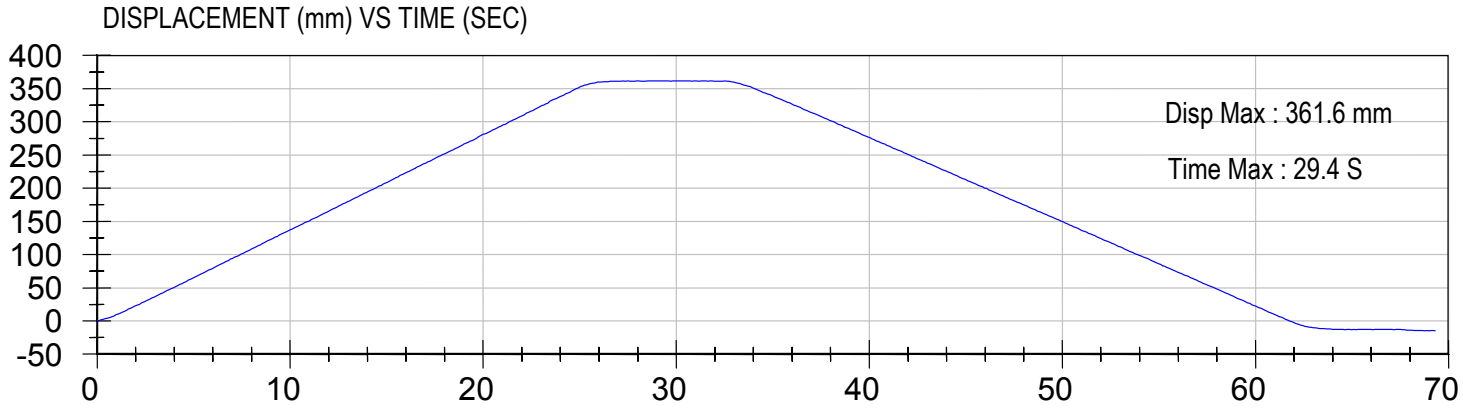
TEST PLOTS

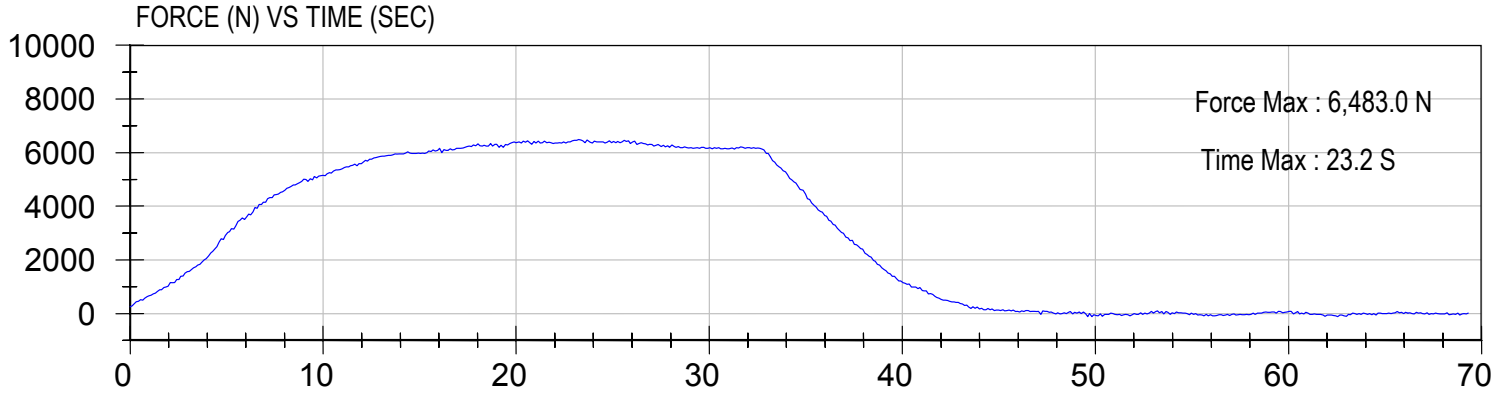
TABLE OF TEST PLOTS

Test Desc: Seat Back Forward Deflection (Upper)
Component ID: US BUS S6

Test Date: 11/15/2006
NHTSA #: C60900



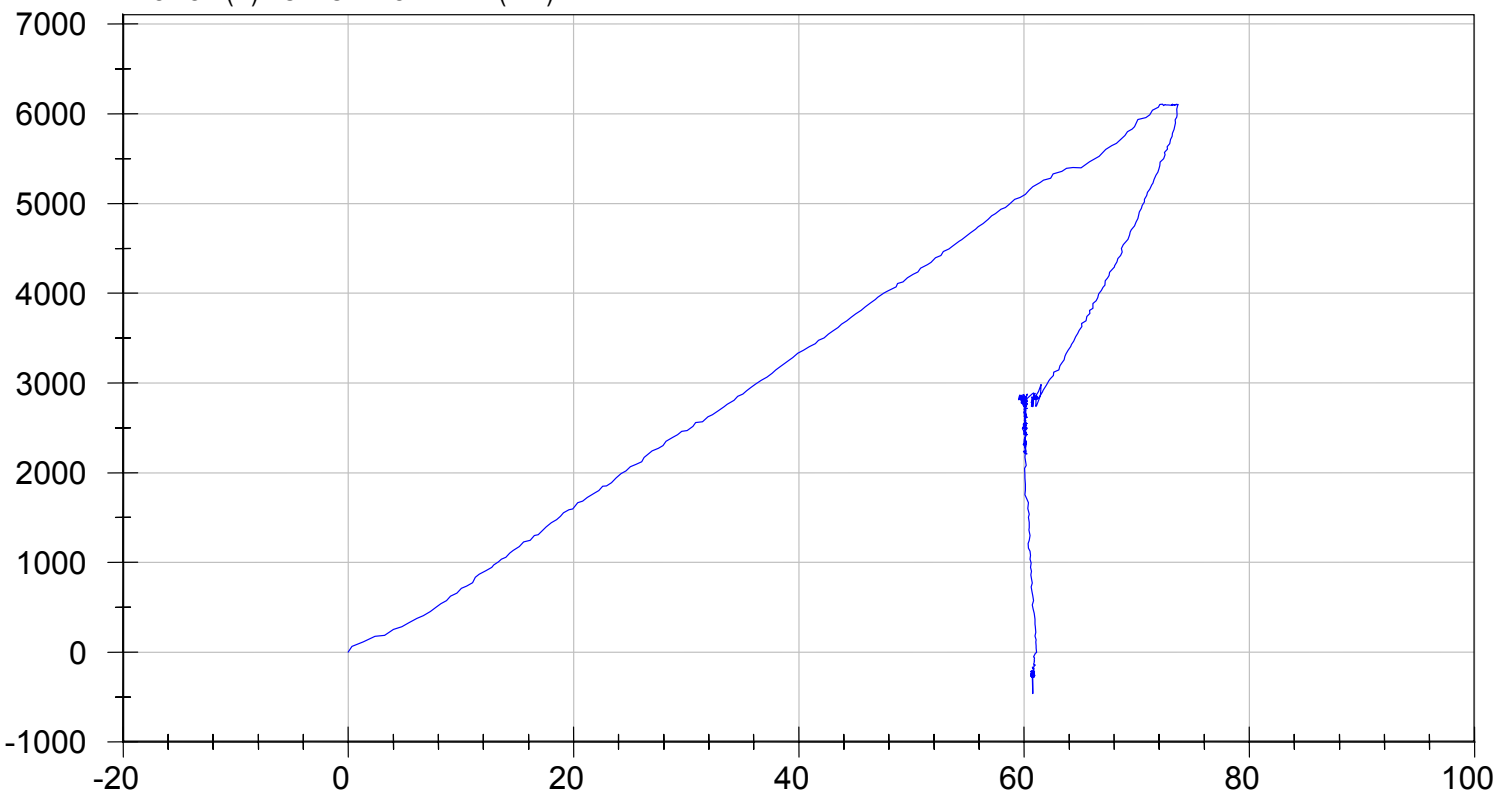




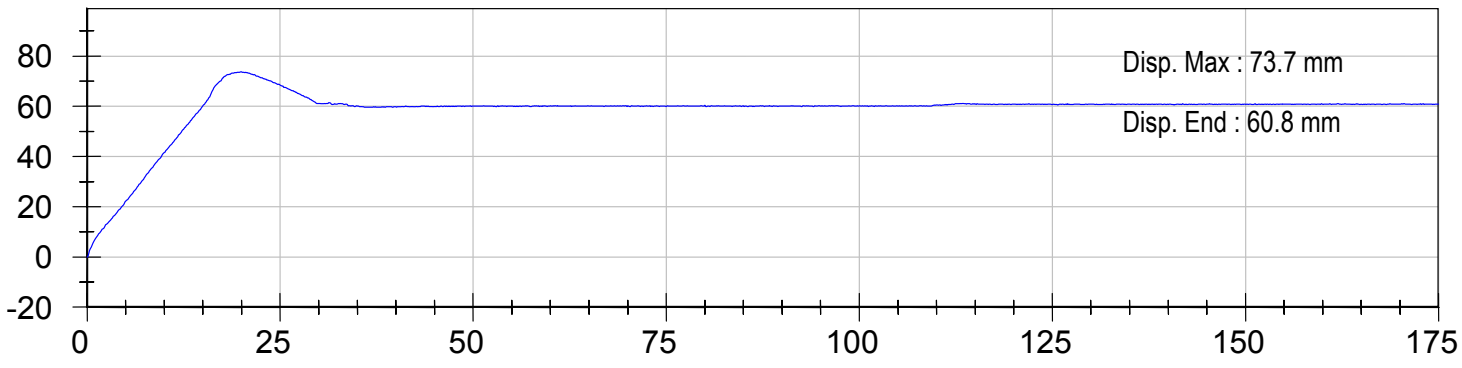
Test Desc: Seat Back Forward Deflection (Lower)
Component ID: US BUS S6

Test Date: 11/15/2006
NHTSA #: C60900

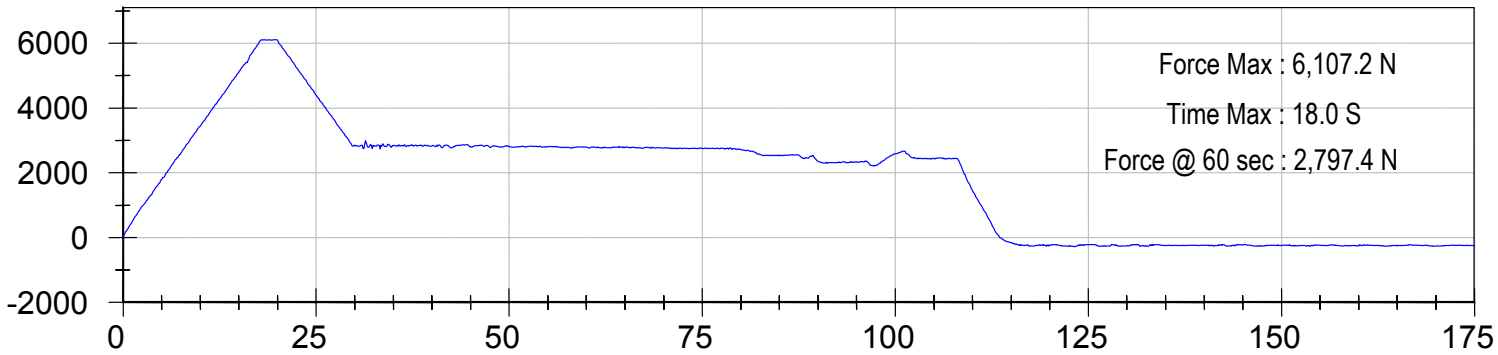
FORCE (N) VS DISPLACEMENT (mm)



DISPLACEMENT (mm) VS TIME (SEC)

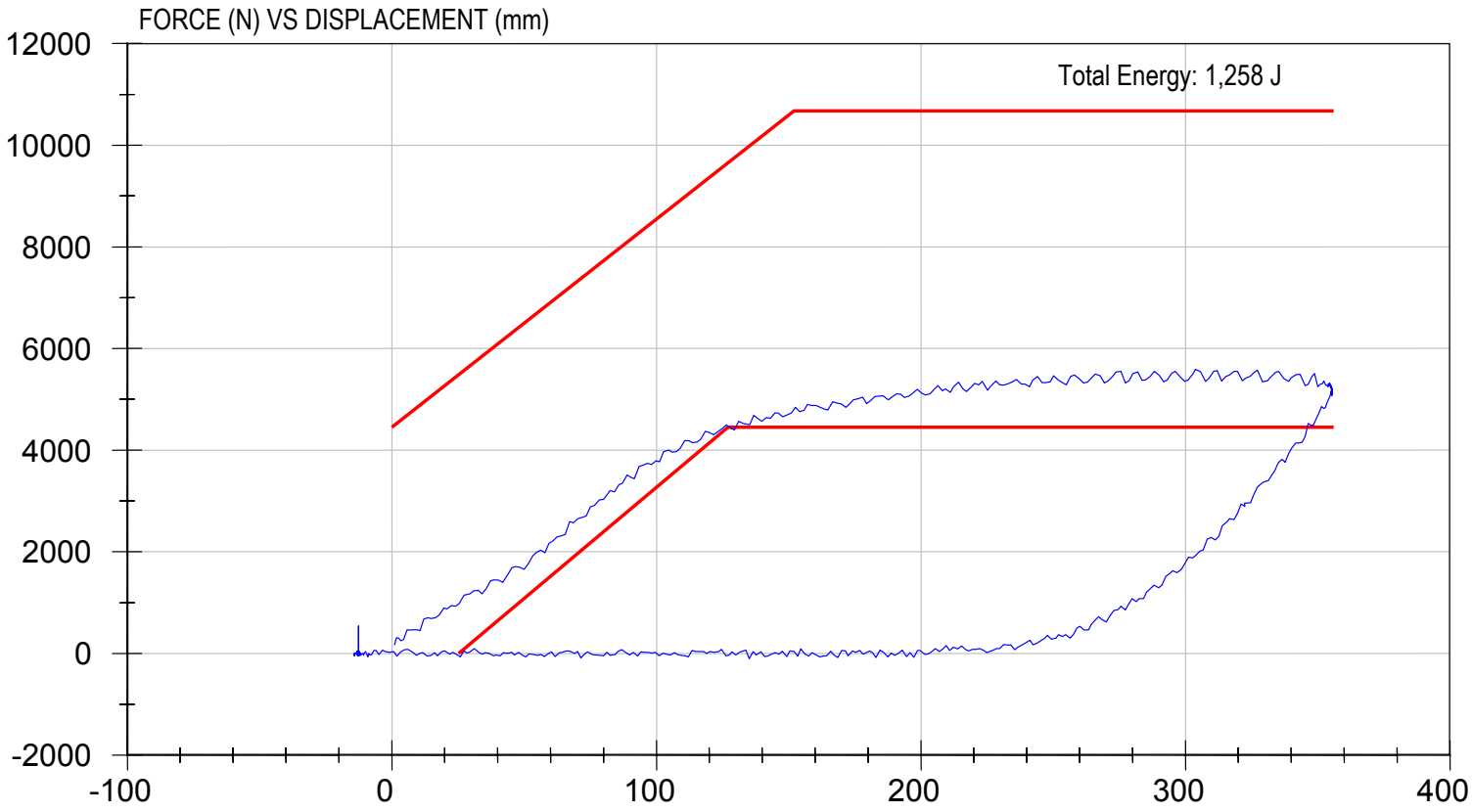


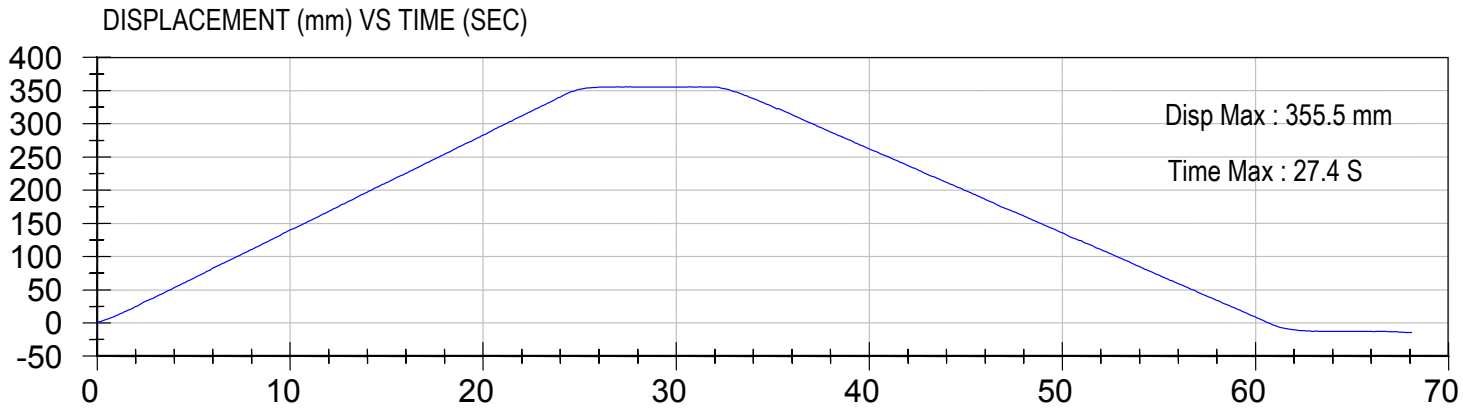
FORCE (N) VS TIME (SEC)

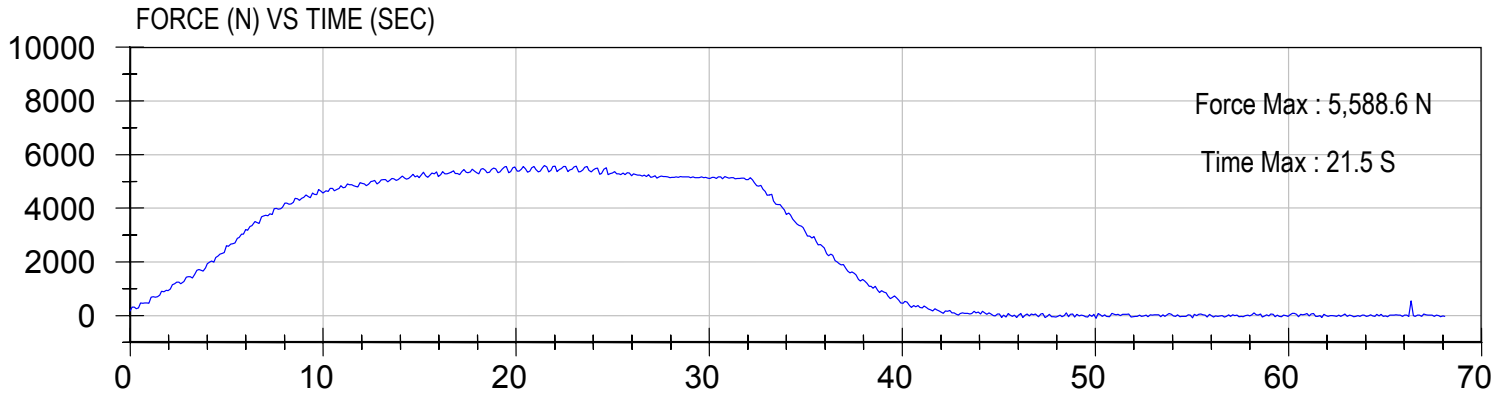


Test Desc: Seat Back Forward Deflection (Upper)
Component ID: US BUS S7

Test Date: 11/15/2006
NHTSA #: C06900



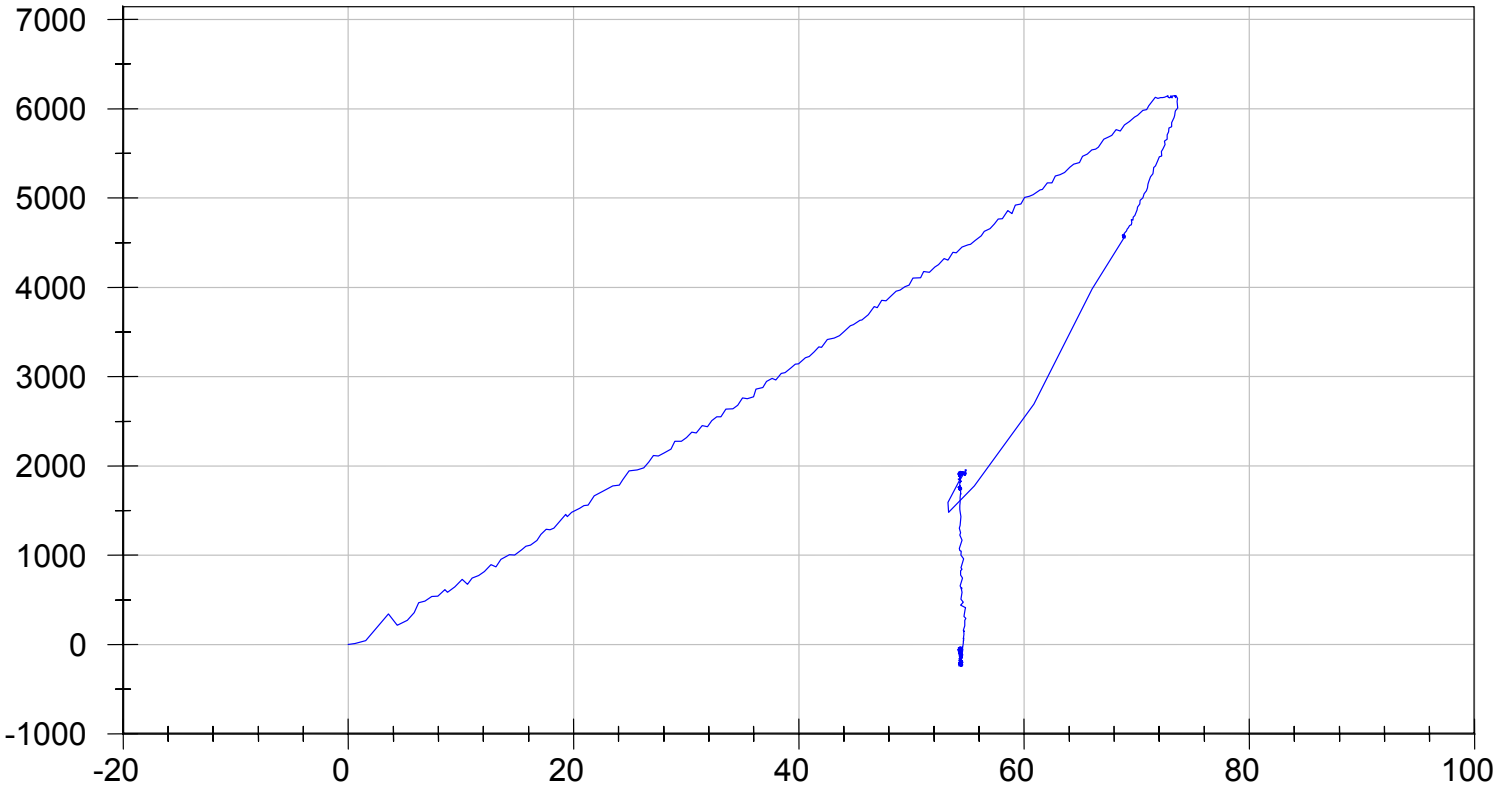




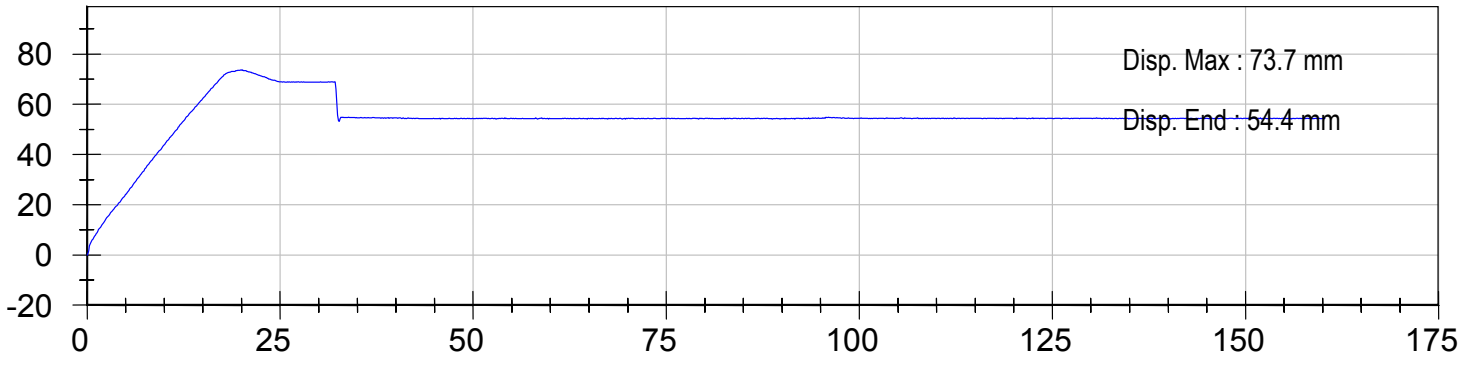
Test Desc: Seat Back Forward Deflection (Lower)
Component ID: US BUS S7

Test Date: 11/15/2006
NHTSA #: C60900

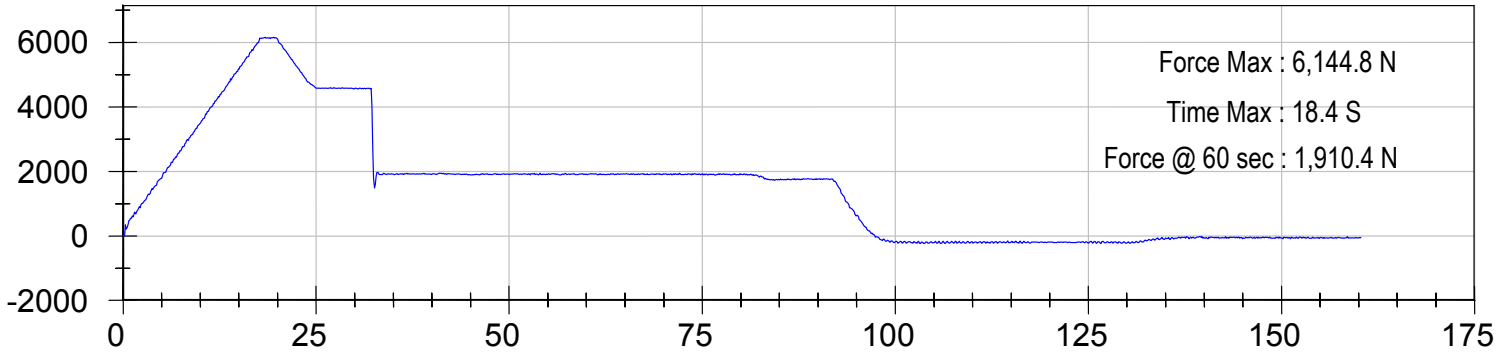
FORCE (N) VS DISPLACEMENT (mm)



DISPLACEMENT (mm) VS TIME (SEC)

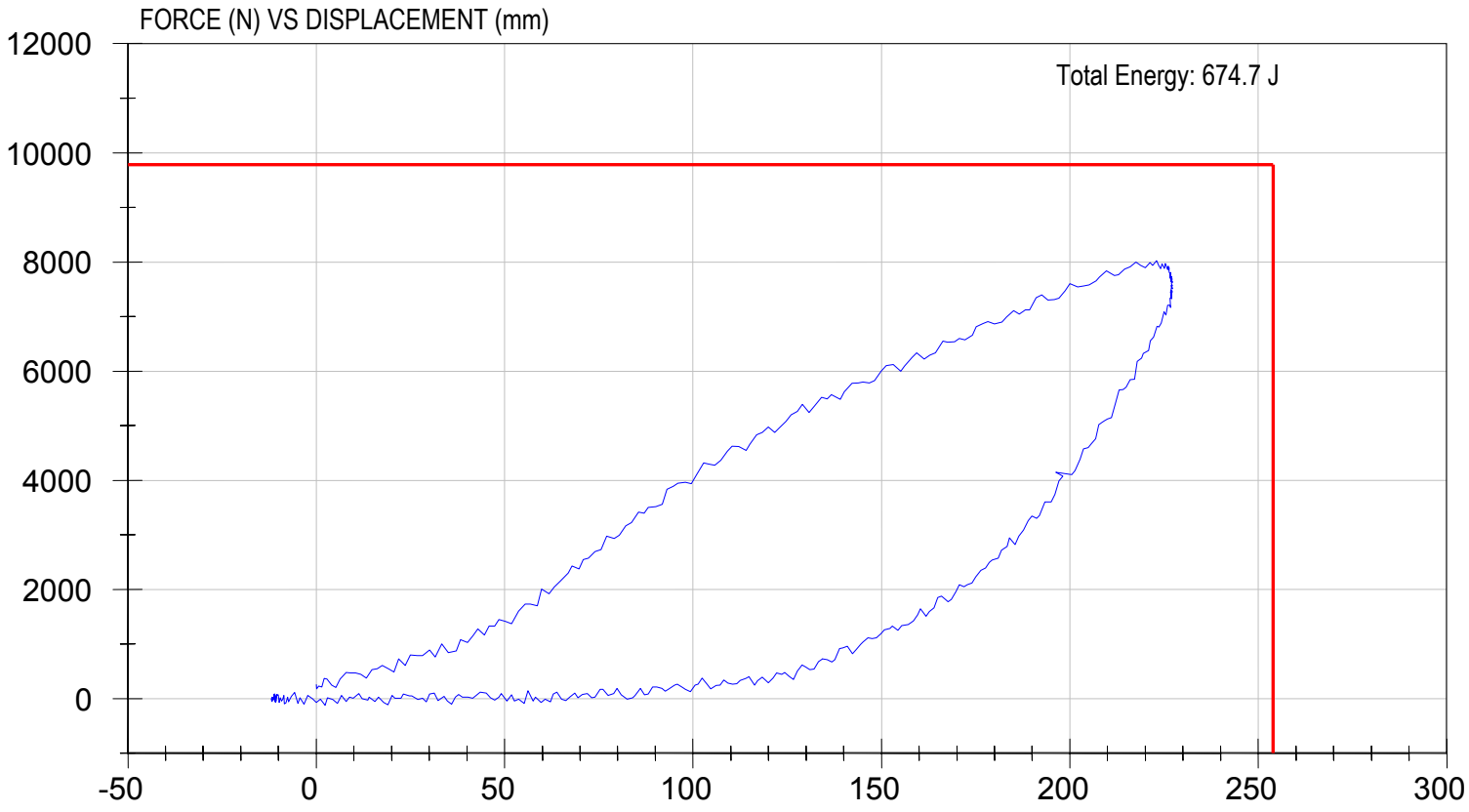


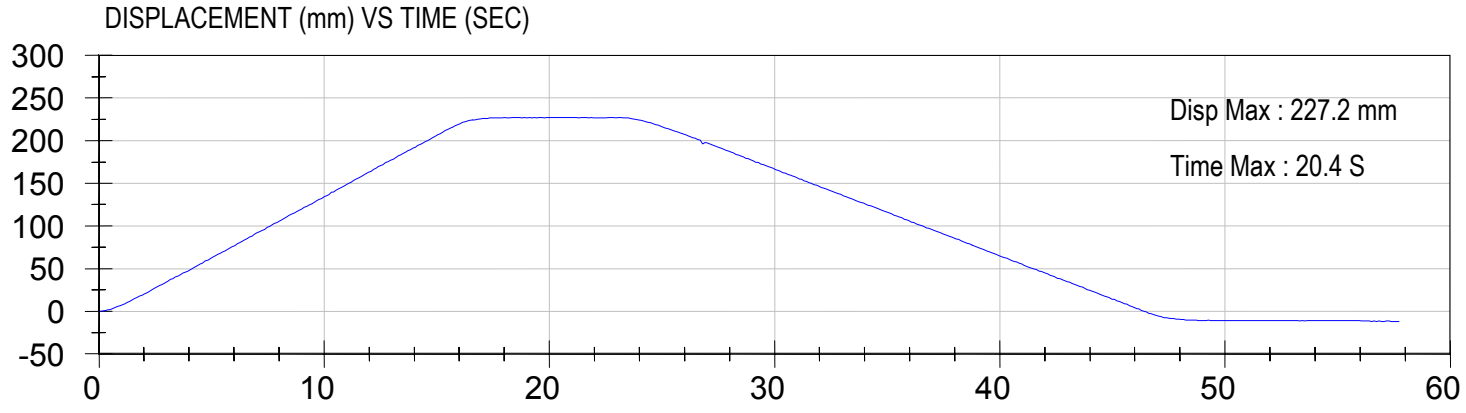
FORCE (N) VS TIME (SEC)

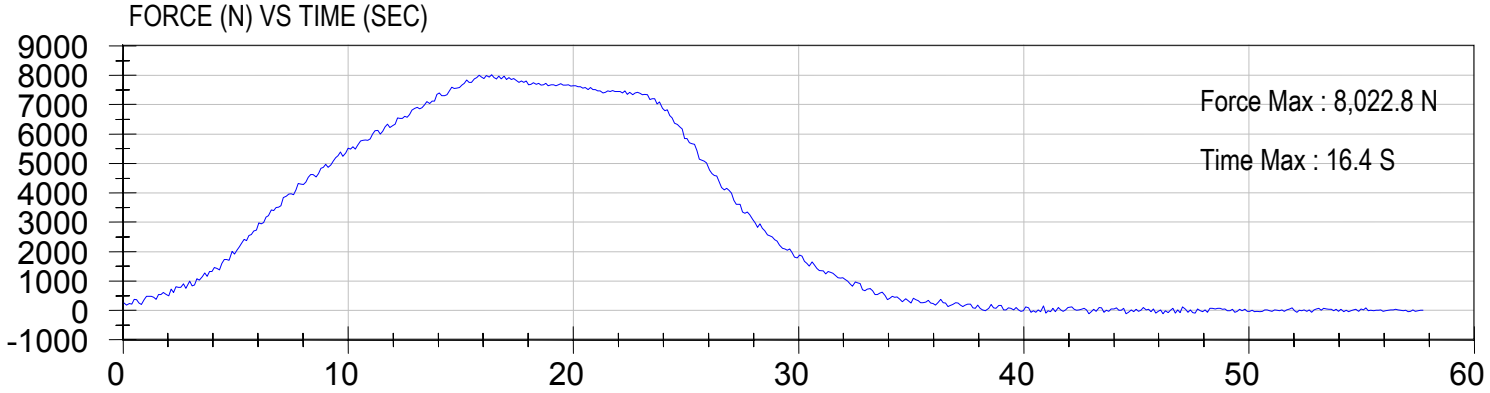


Test Desc: Seat Back Rearward Deflection
Component ID: US BUS S4

Test Date: 11/16/2006
NHTSA #: C60900

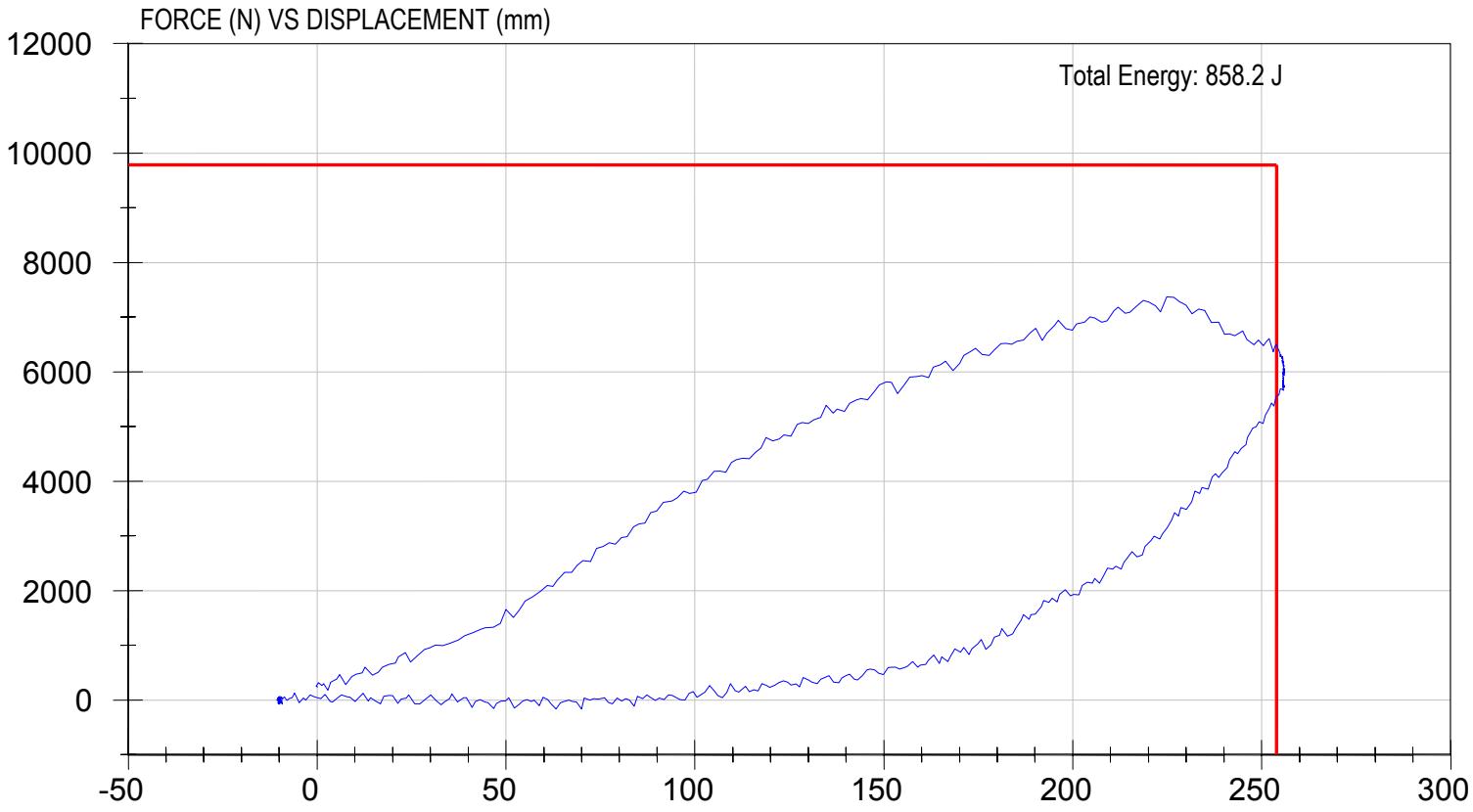


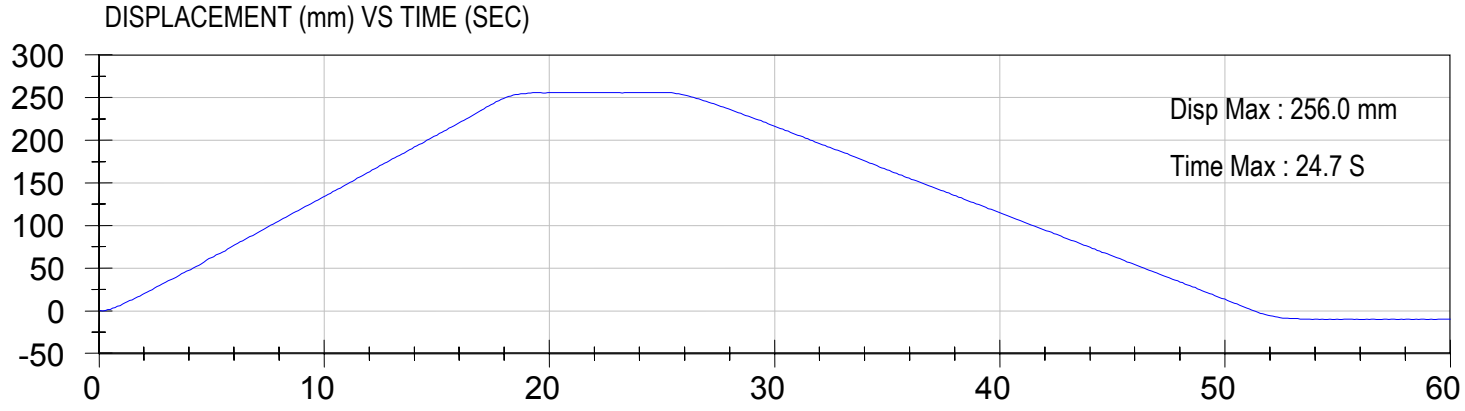


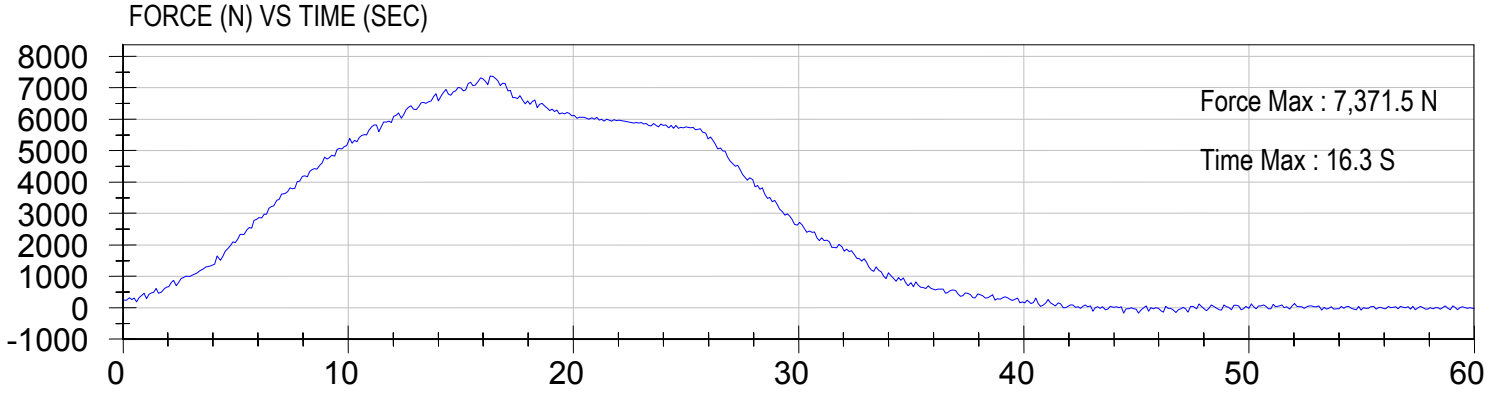


Test Desc: Seat Back Rearward Deflection
Component ID: US BUS S5

Test Date: 11/16/2006
NHTSA #: C60900



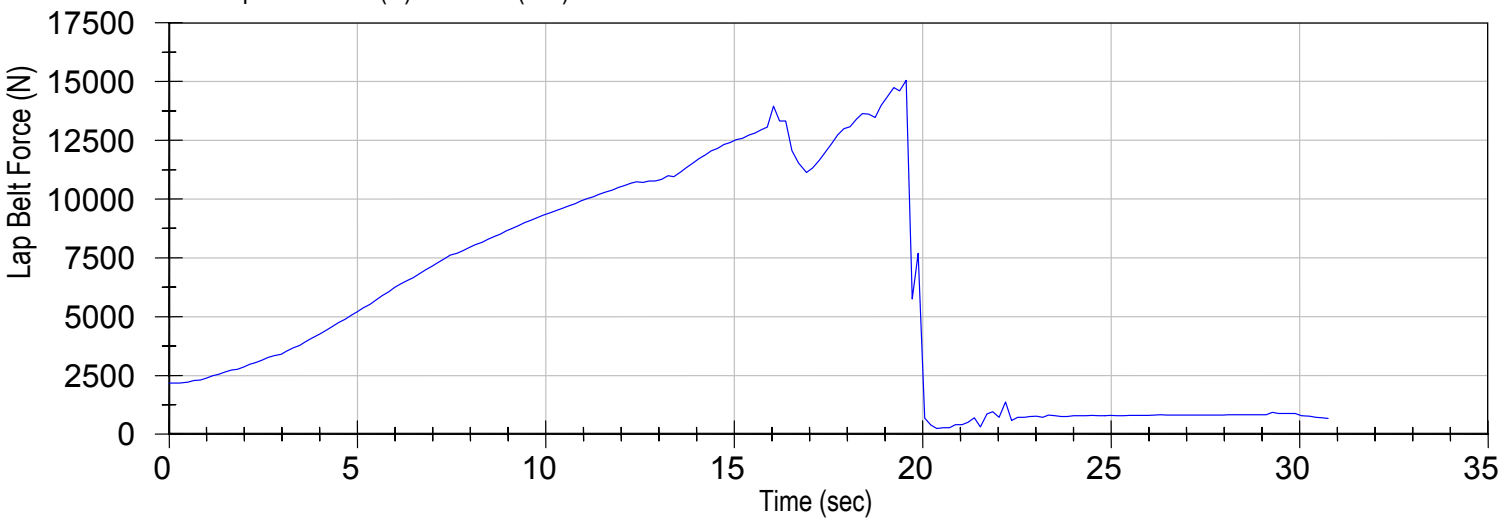




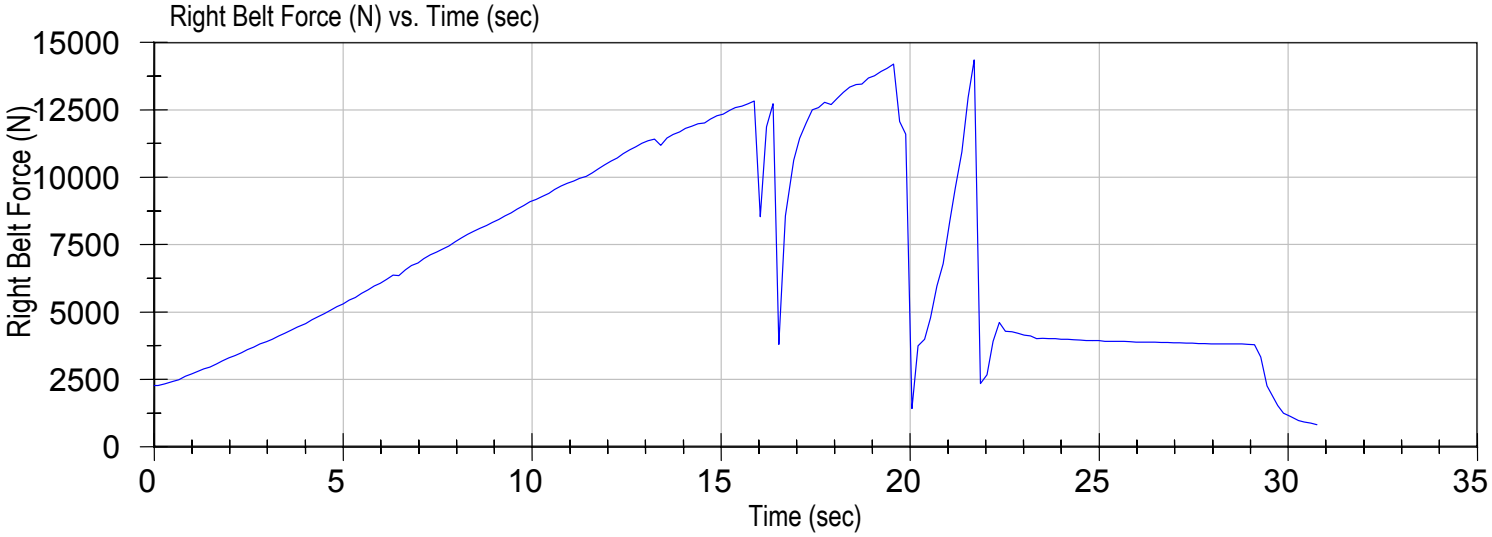
Test Desc: FMVSS 222 Seat Belt Anchorage
Component ID: US Bus S3 (in Location S4)

Test Date: 3/29/2007
NHTSA No: C60900

Left Lap Belt Force (N) vs. Time (sec)



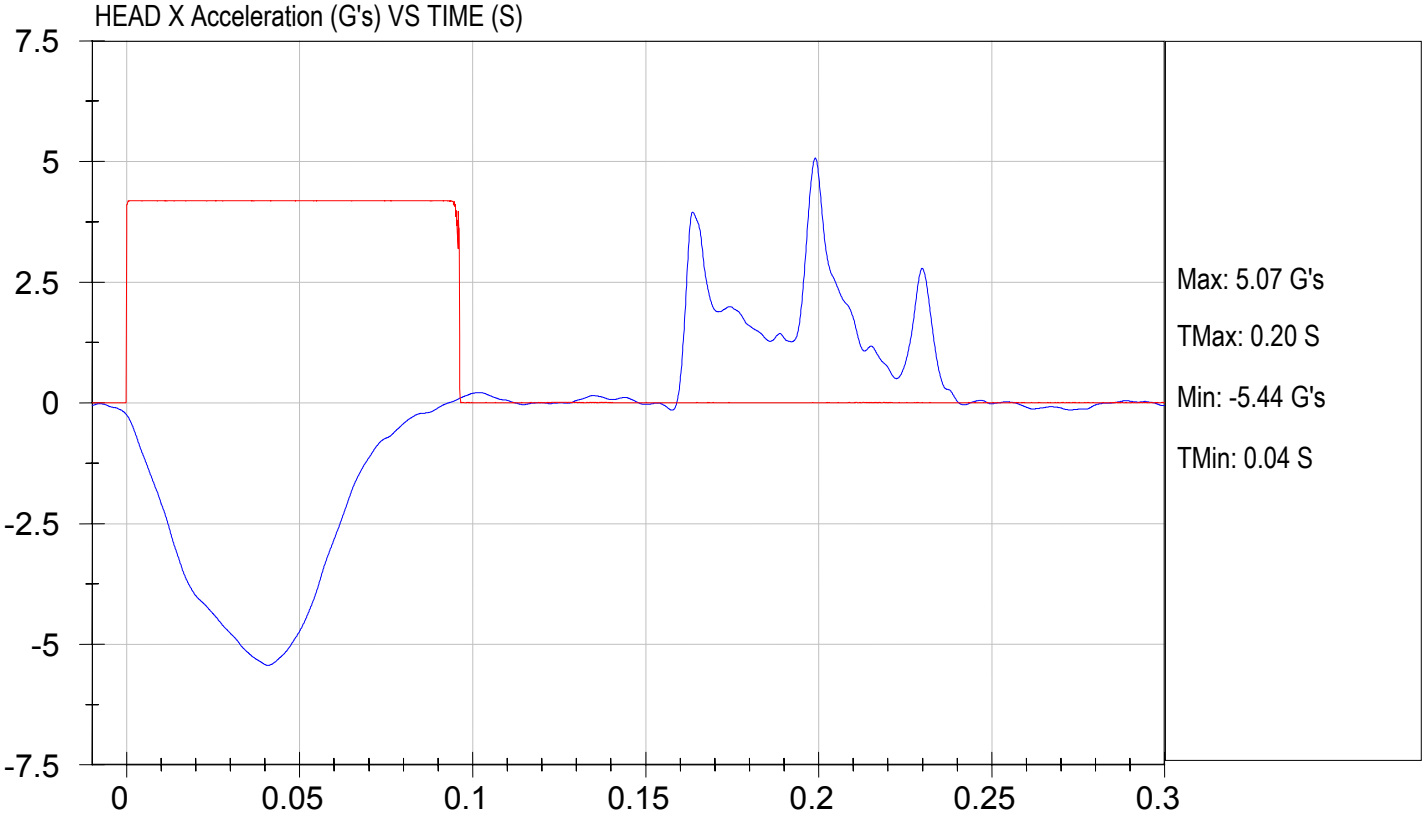
Right Belt Force (N) vs. Time (sec)



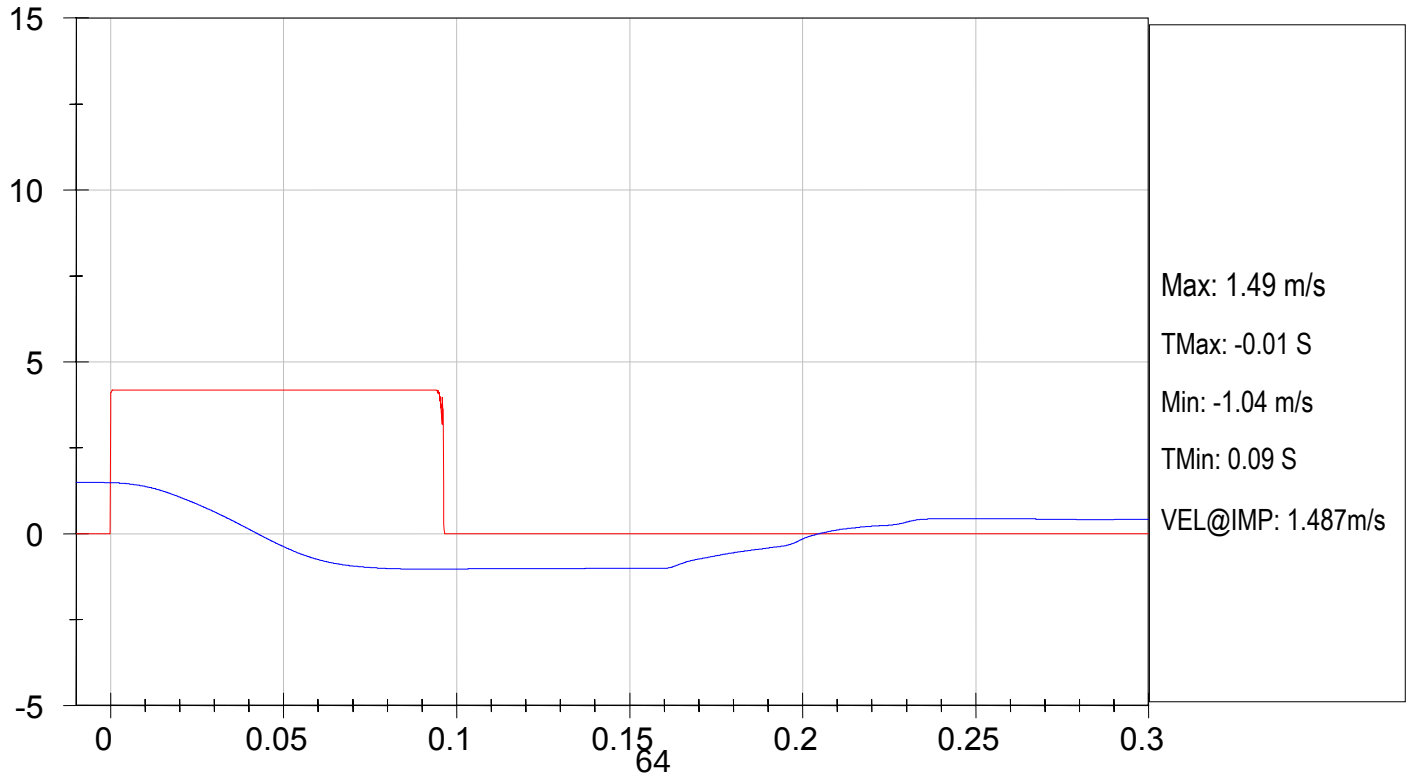
Test Desc: Head Form Impact (1.5 m/s)
Component ID: US BUS S2, Location H1

Test Date: 1/4/2007
NHTSA #: C60900

HEAD X Acceleration (G's) VS TIME (S)



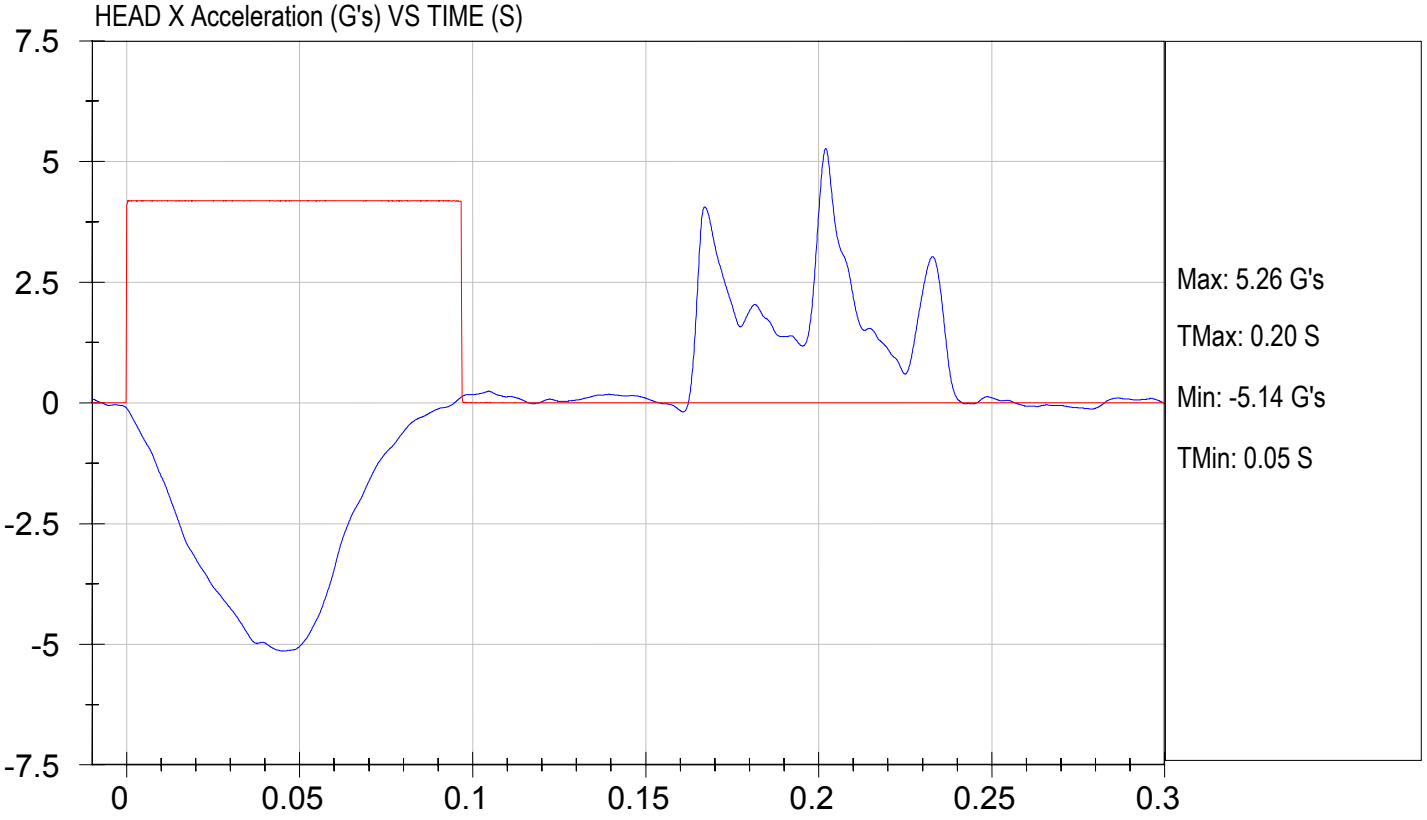
VELOCITY X (m/s) VS TIME (S)



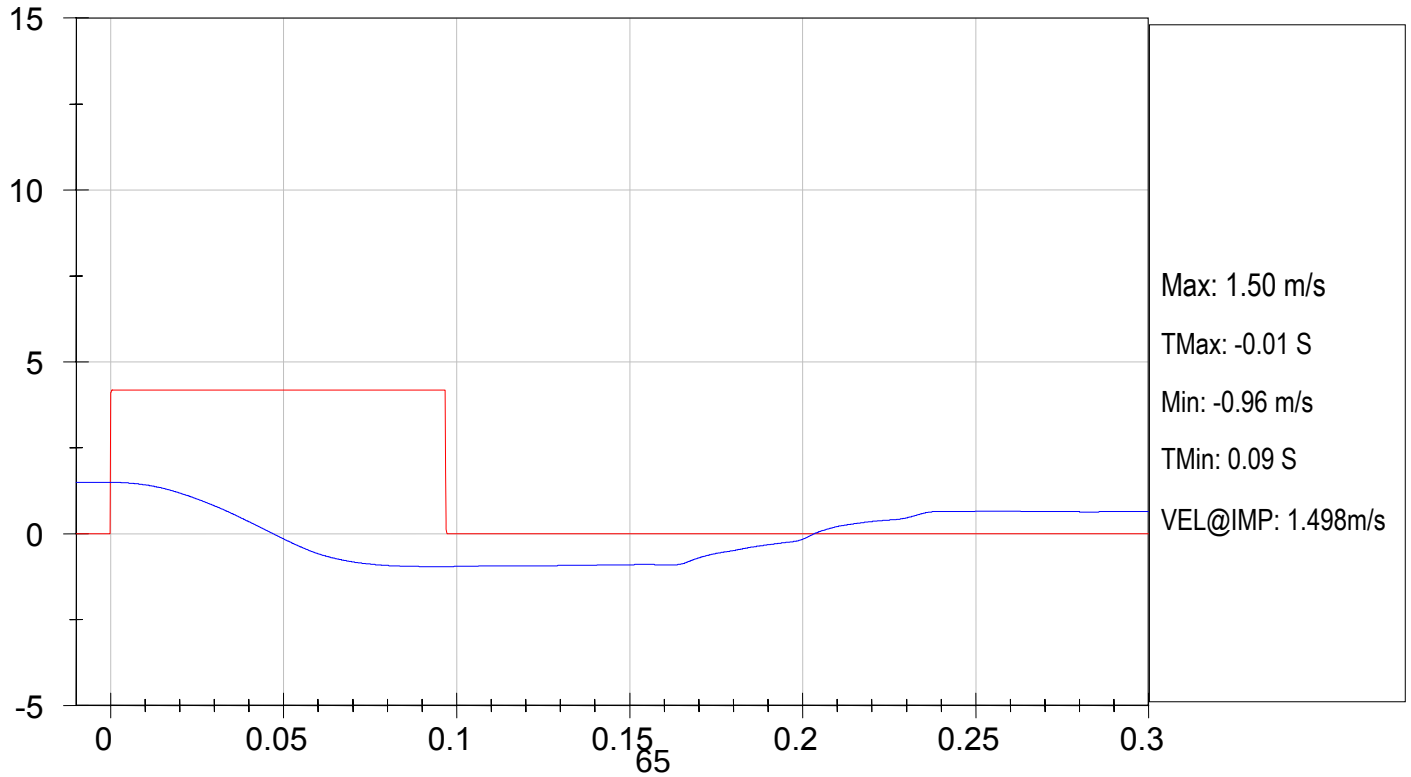
Test Desc: Head Form Impact (1.5 m/s)
Component ID: US BUS S2, Location H2

Test Date: 1/4/2007
NHTSA #: C60900

HEAD X Acceleration (G's) VS TIME (S)



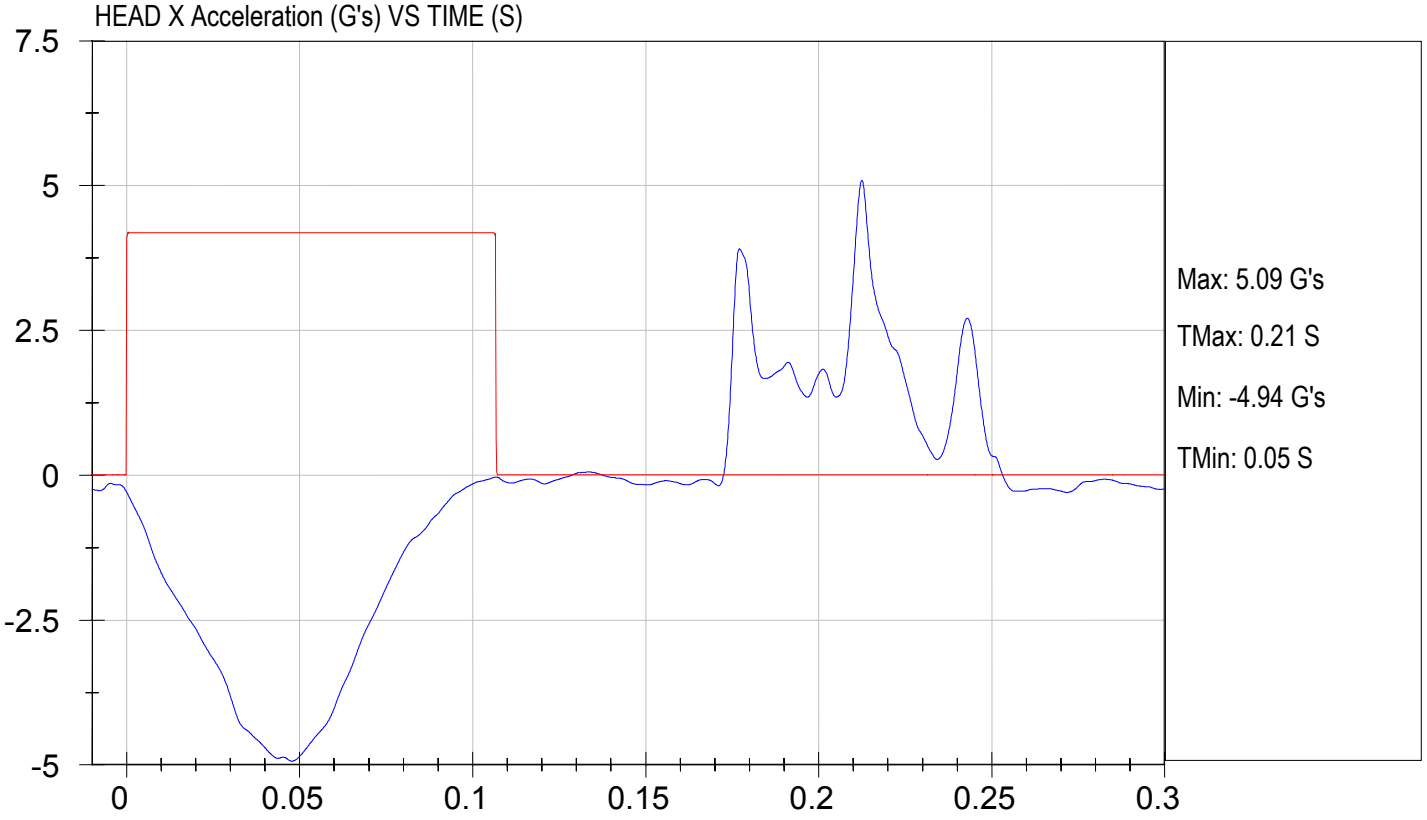
VELOCITY X (m/s) VS TIME (S)



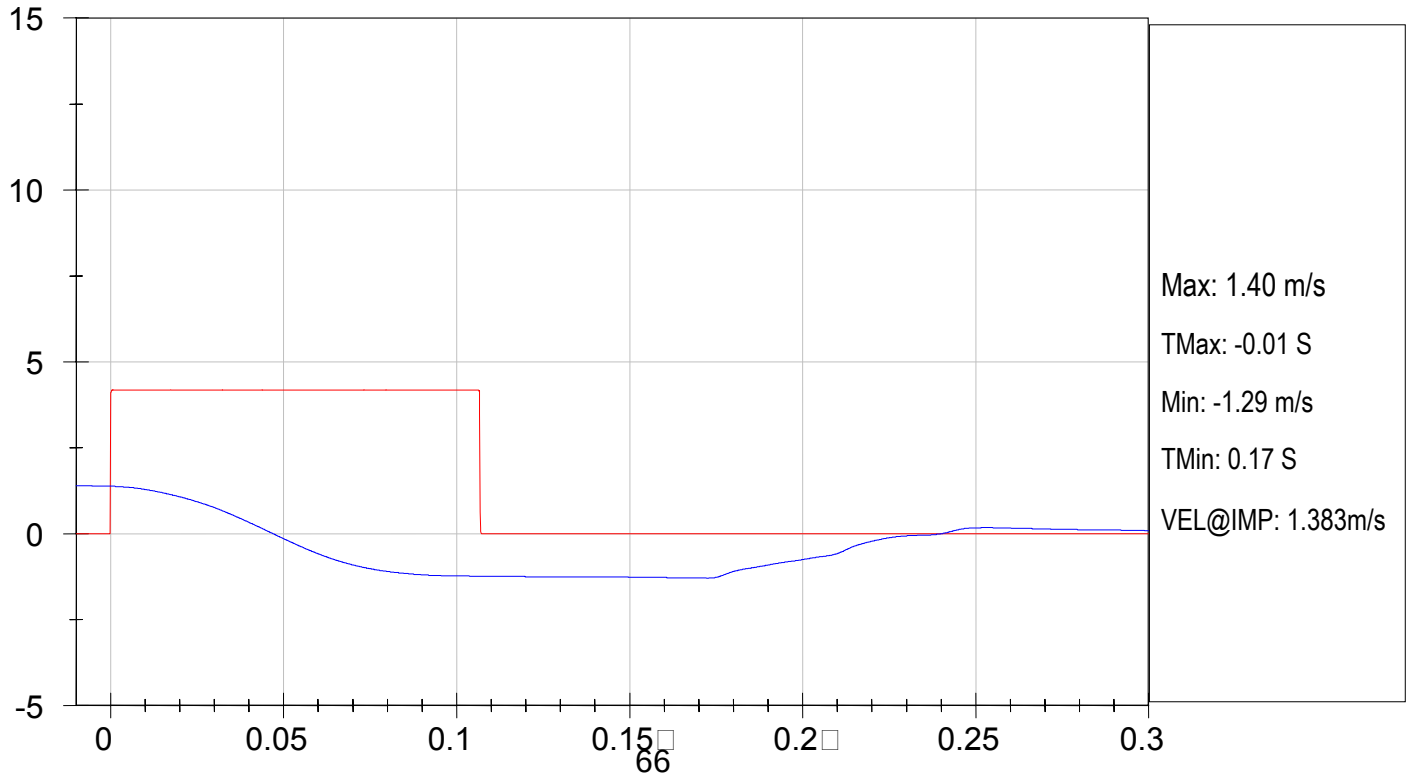
Test Desc: Head Form Impact (1.5 m/s)
Component ID: US BUS S2, Location H3

Test Date: 1/4/2007
NHTSA #: C60900

HEAD X Acceleration (G's) VS TIME (S)



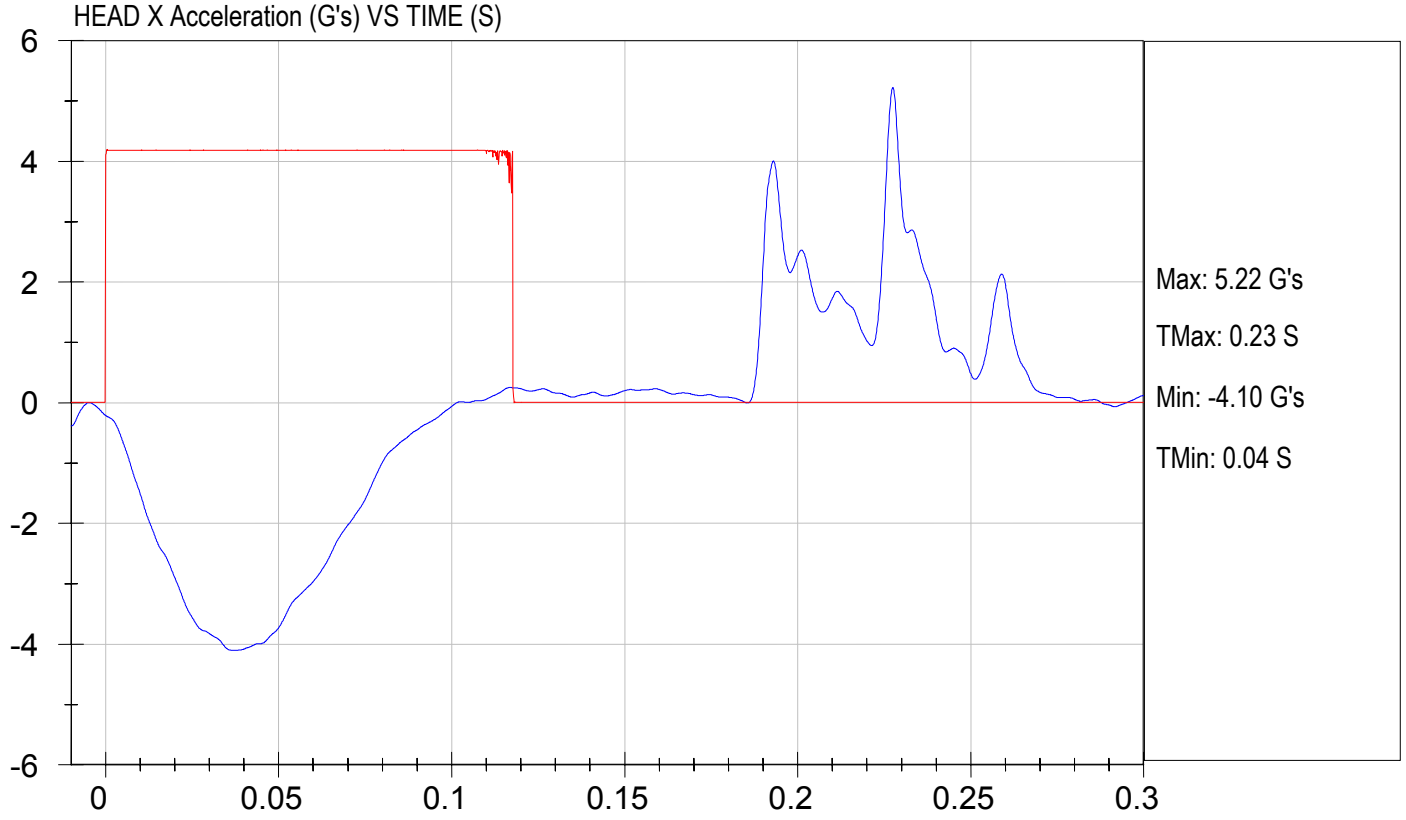
VELOCITY X (m/s) VS TIME (S)



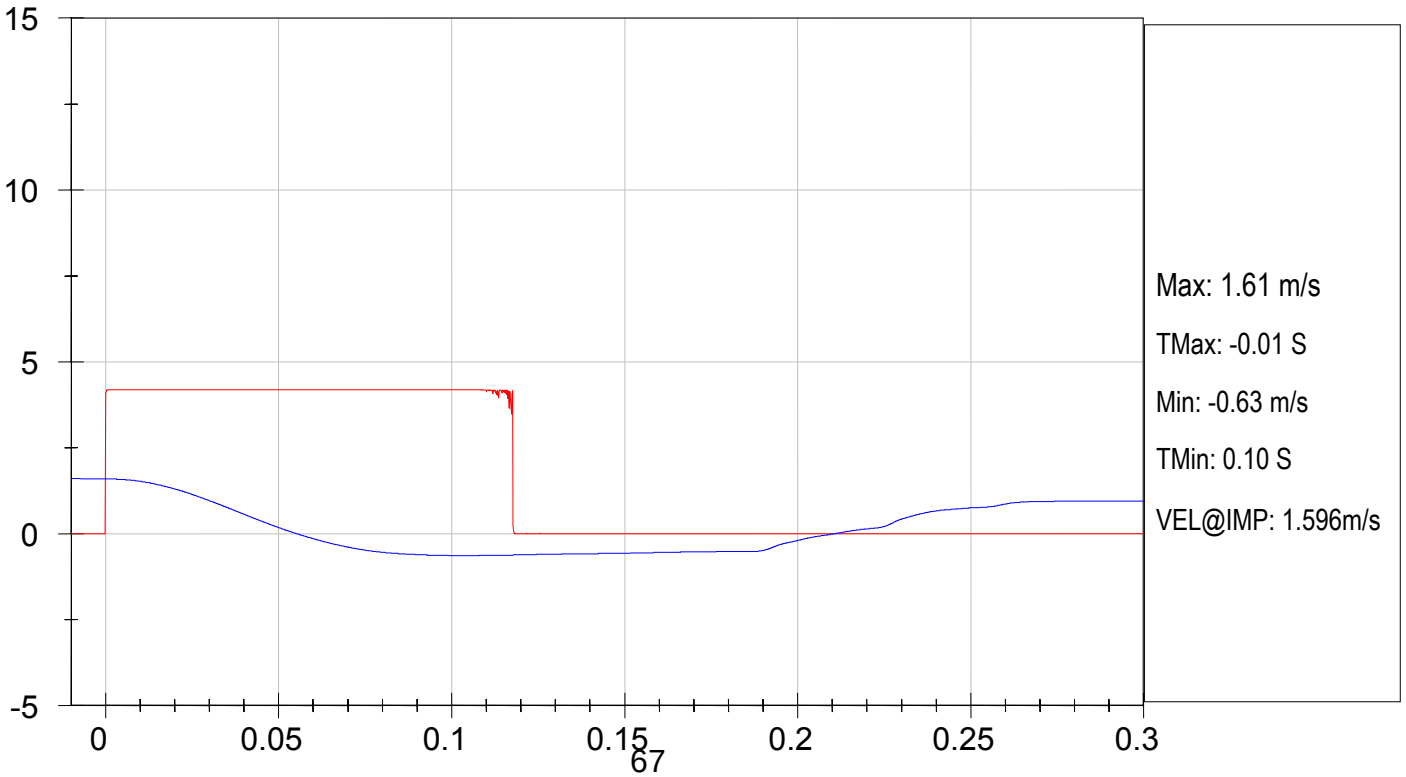
Test Desc: Head Form Impact (1.5 m/s)
Component ID: US BUS S2, Location H4

Test Date: 1/4/2007
NHTSA #: C60900

HEAD X Acceleration (G's) VS TIME (S)



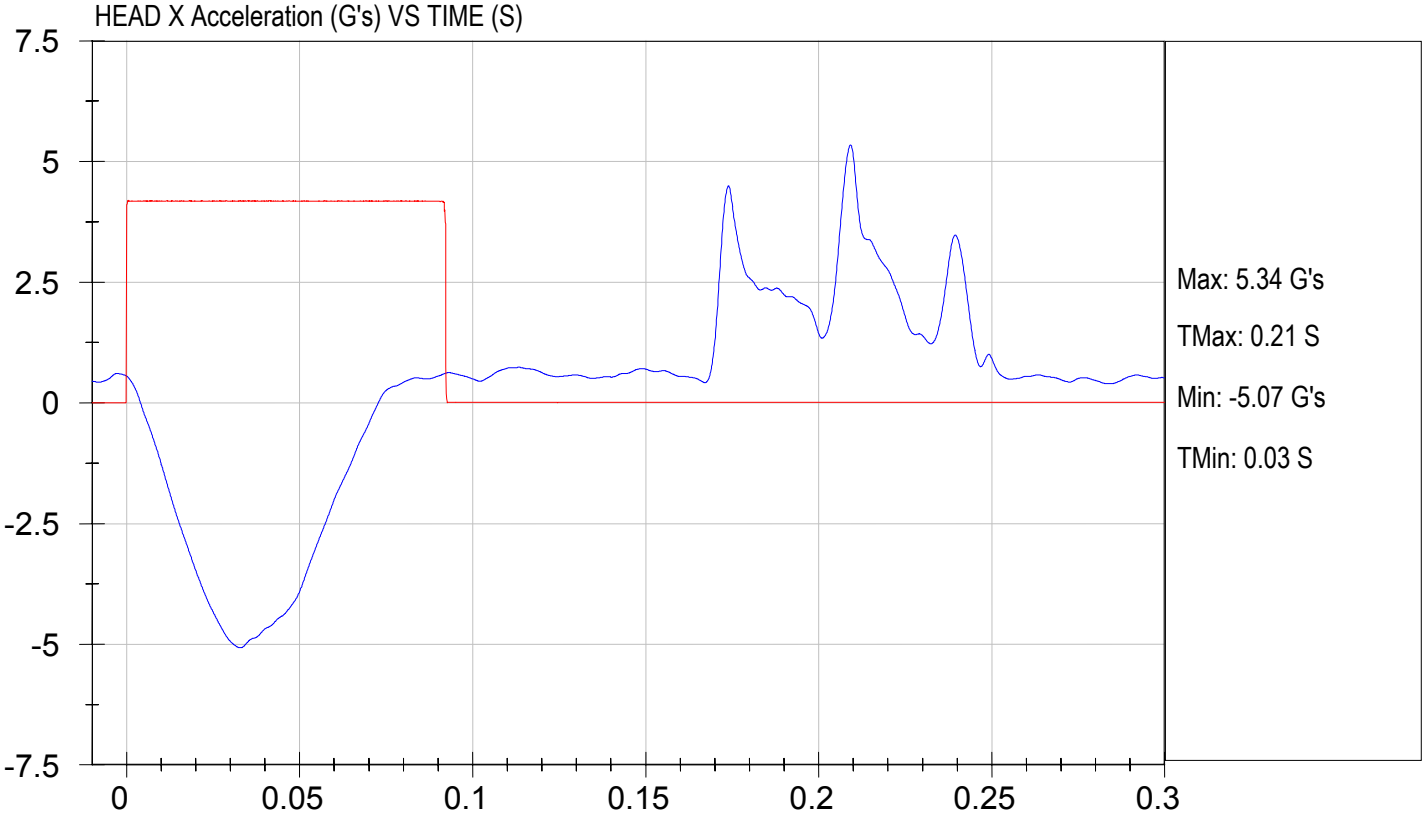
VELOCITY X (m/s) VS TIME (S)



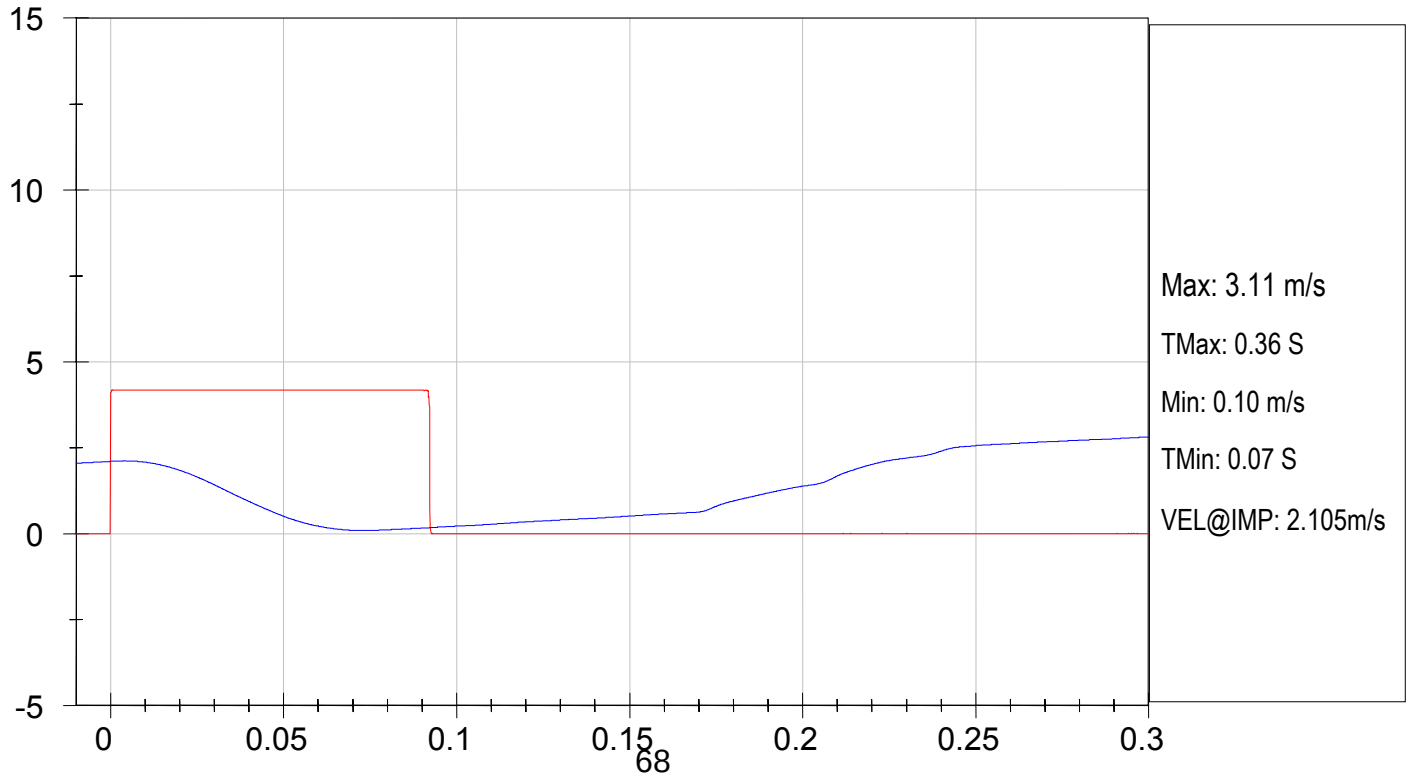
Test Desc: Head Form Impact (1.5 m/s)
Component ID: US BUS S2, Location H5

Test Date: 1/4/2007
NHTSA #: C60900

HEAD X Acceleration (G's) VS TIME (S)

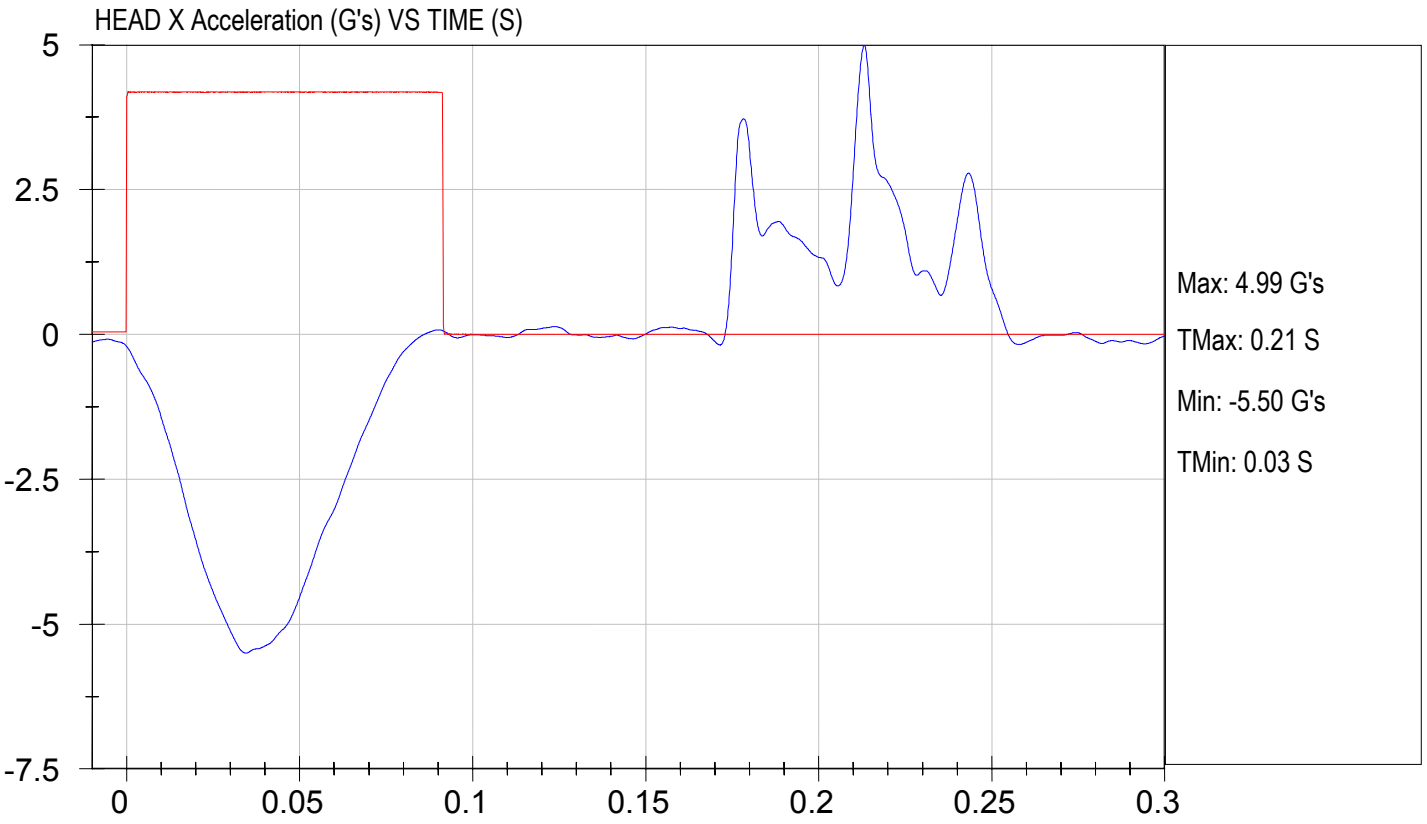


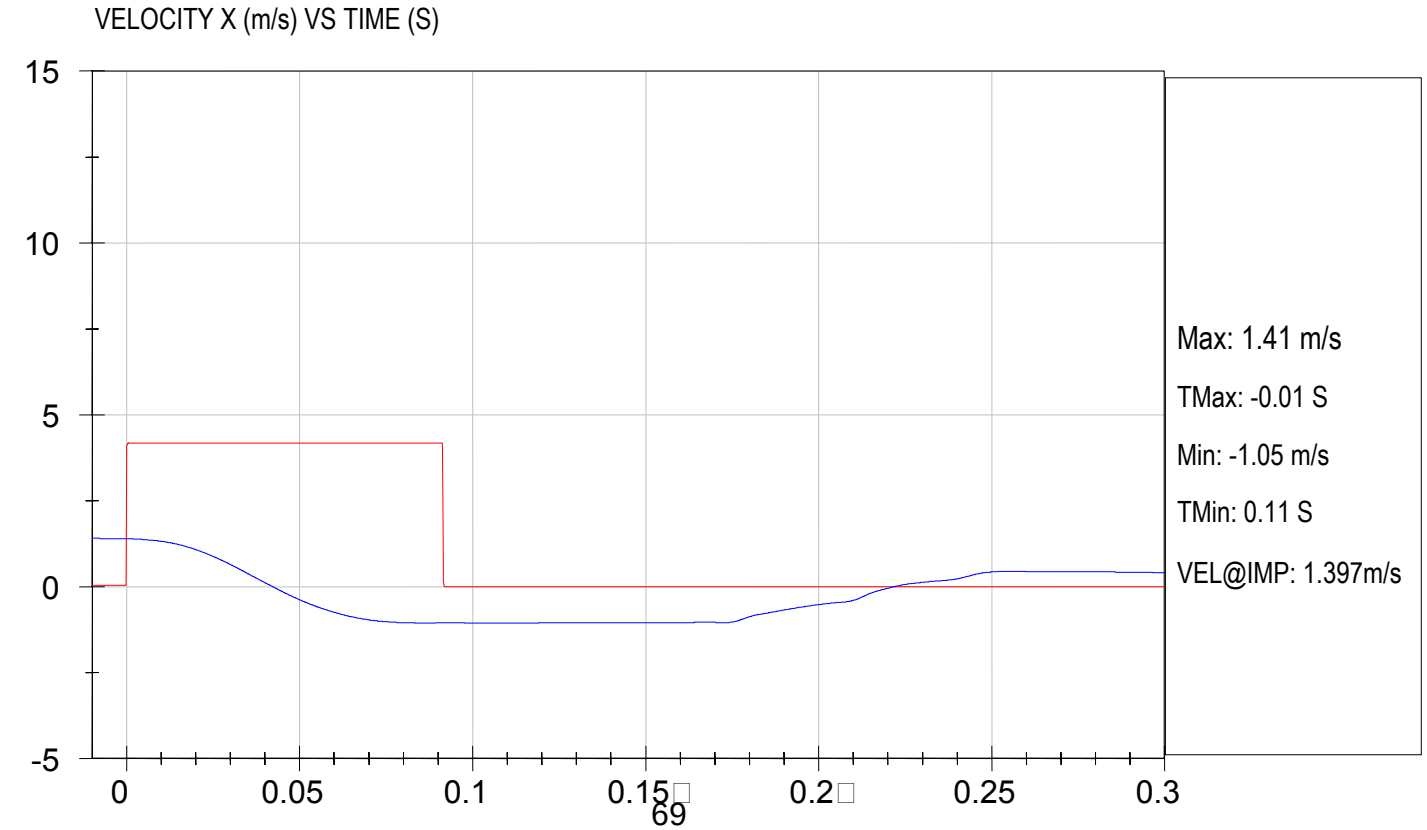
VELOCITY X (m/s) VS TIME (S)



Test Desc: Head Form Impact (1.5 m/s)
Component ID: US BUS S2, Location H6

Test Date: 1/4/2007
NHTSA #: C60900

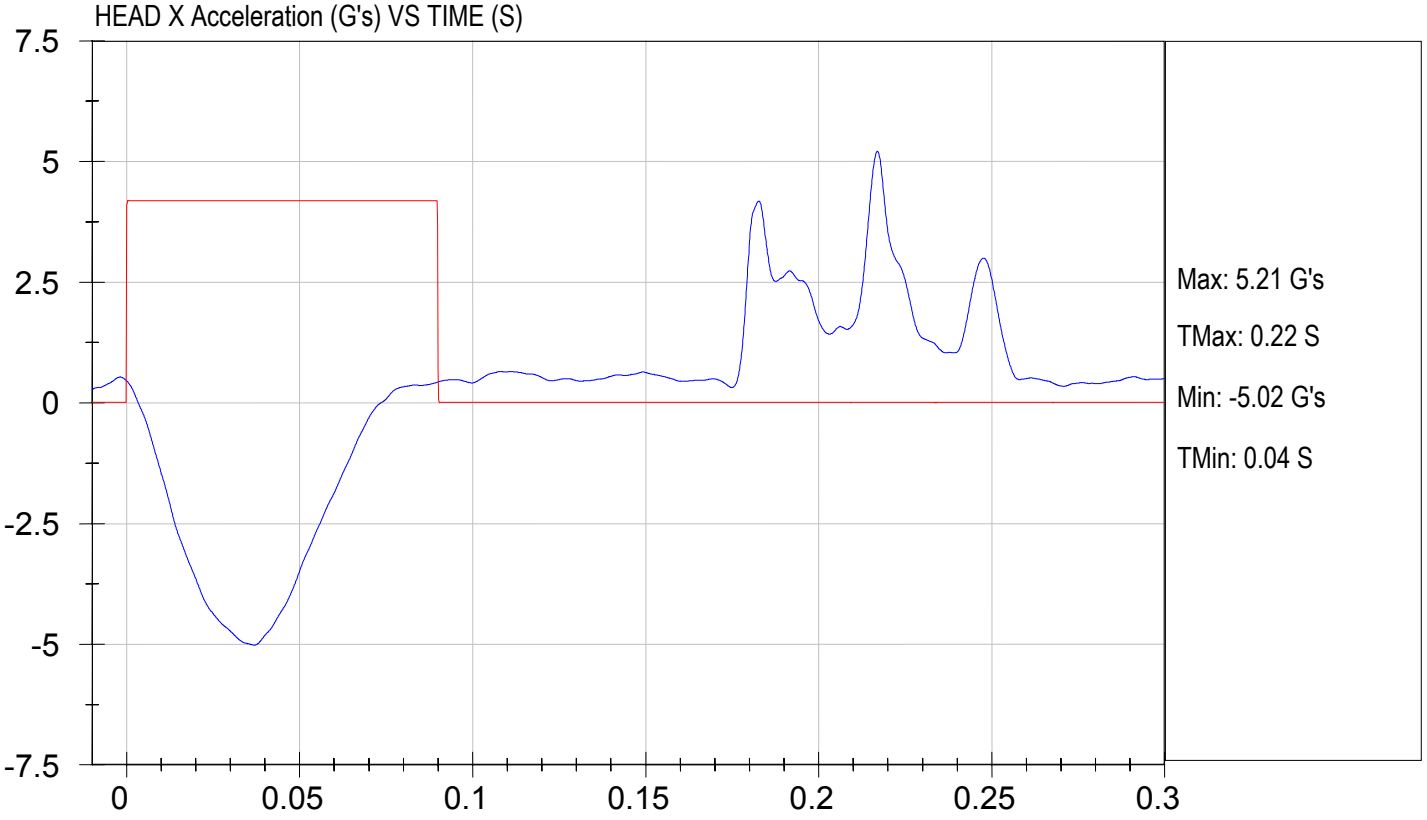




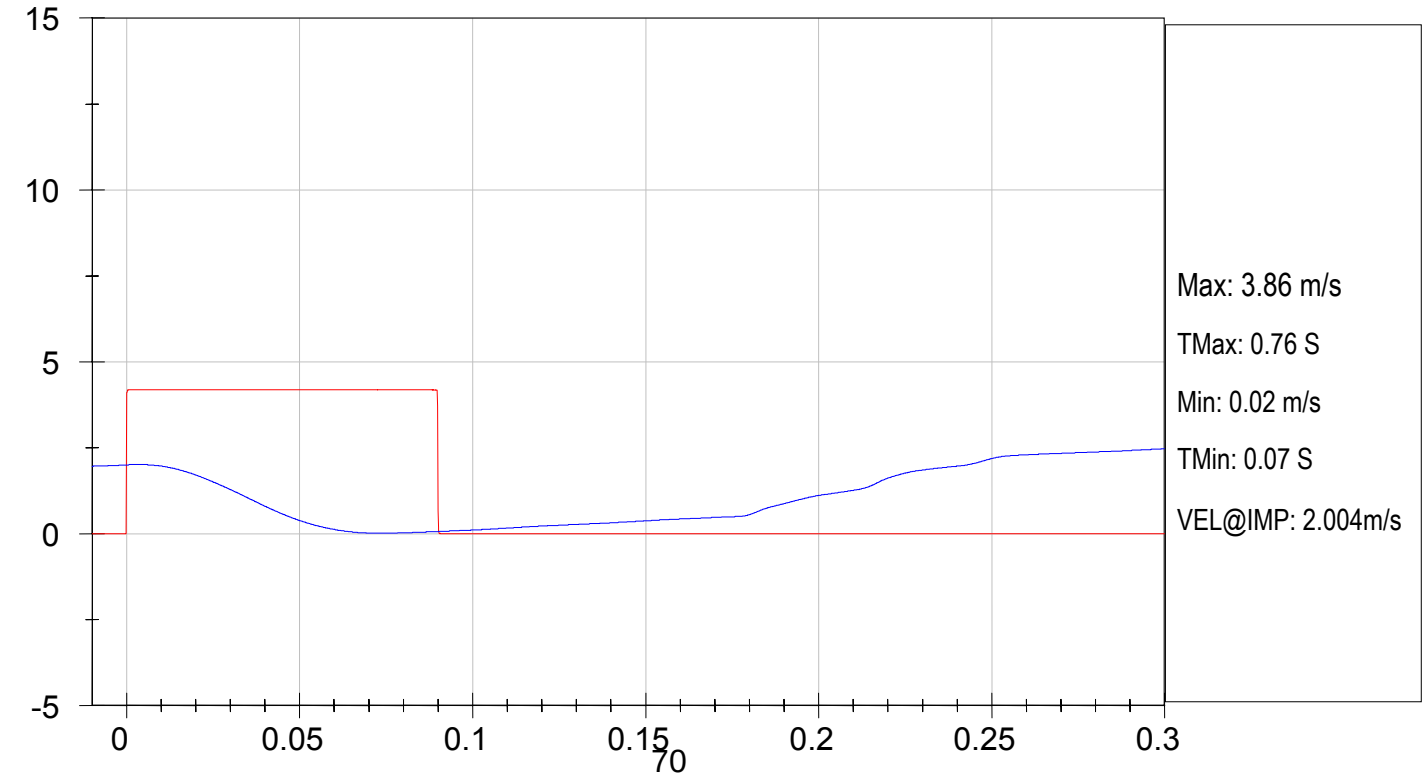
Test Desc: Head Form Impact (1.5 m/s)
Component ID: US BUS S2, Location H7

Test Date: 1/4/2007
NHTSA #: C60900

HEAD X Acceleration (G's) VS TIME (S)



VELOCITY X (m/s) VS TIME (S)



Test Desc: Head Form Impact (6.69 m/s)

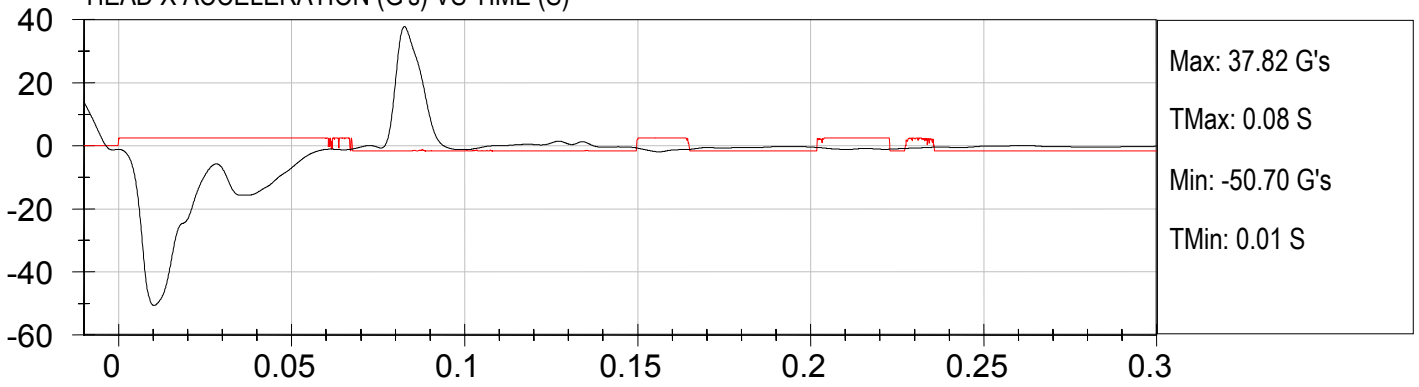
Component ID: US BUS S2, Location H8

Test Date: 1/3/2007

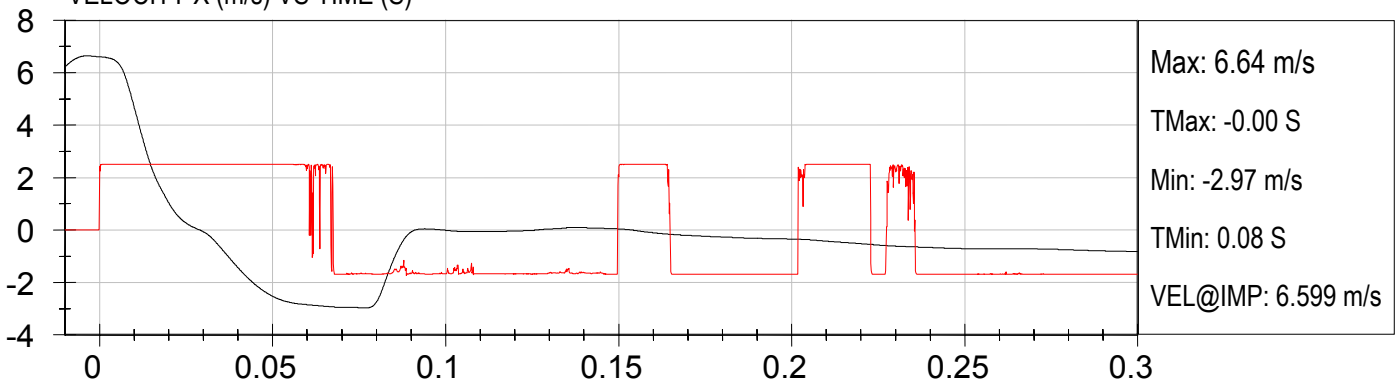
NHTSA #: C60900

Hic: 125.30 T1: 6.30 ms T2: 20.10 ms

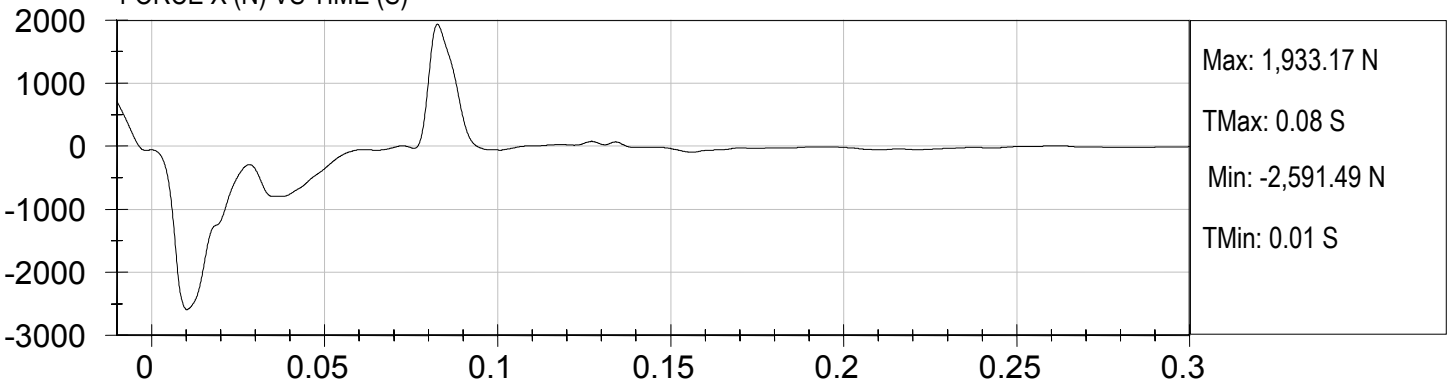
HEAD X ACCELERATION (G's) VS TIME (S)



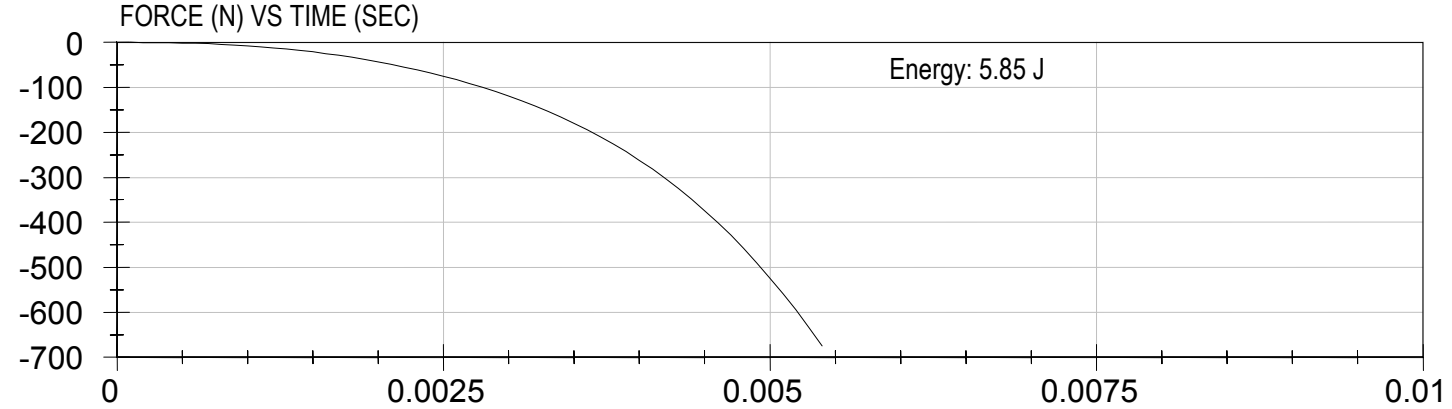
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



Test Desc: Head Form Impact (6.69 m/s)

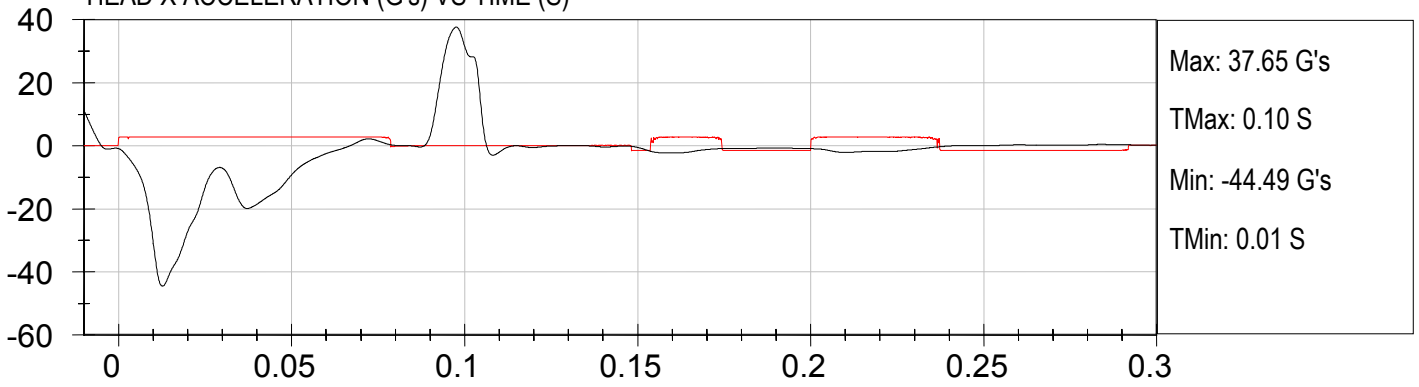
Component ID: US BUS S2, Location H9

Test Date: 1/3/2007

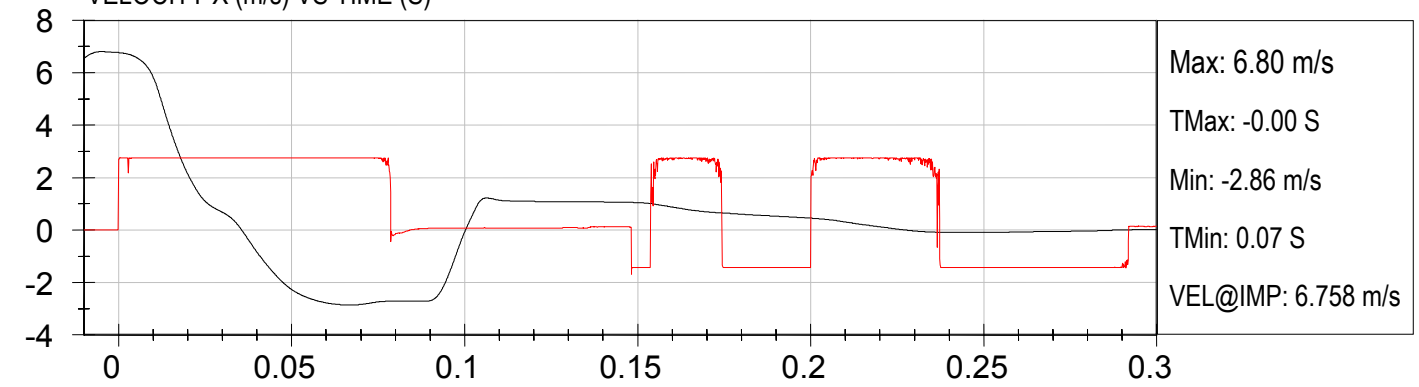
NHTSA #: C60900

HEAD X ACCELERATION (G's) VS TIME (S)

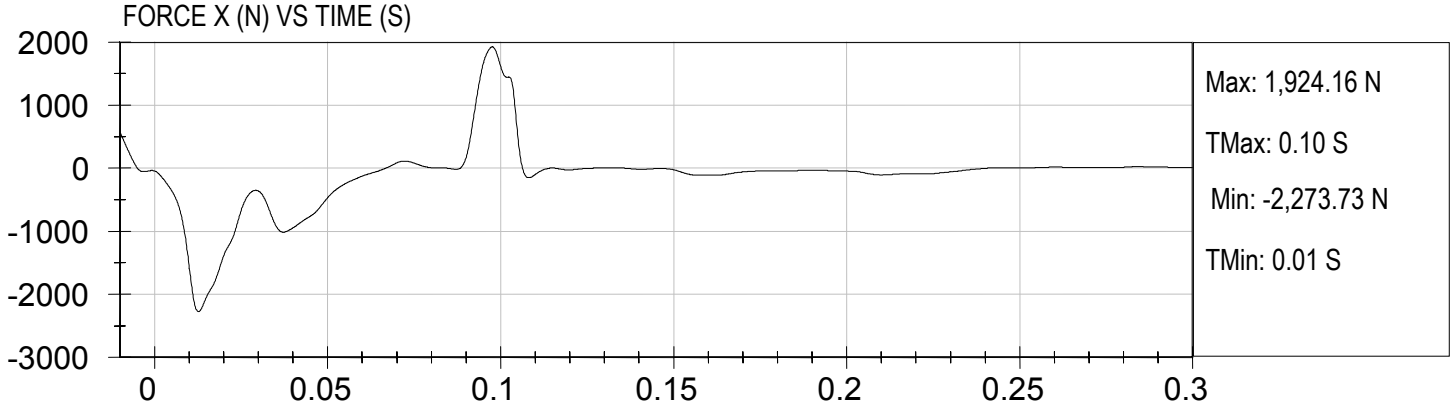
Hic: 93.92 T1: 8.70 ms T2: 23.10 ms



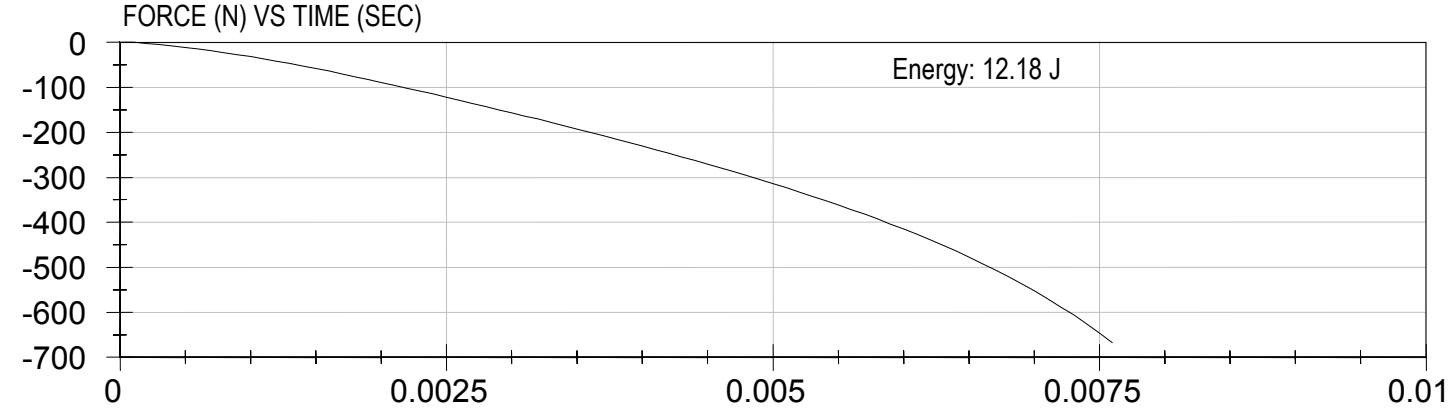
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



Test Desc: Head Form Impact (6.69 m/s)

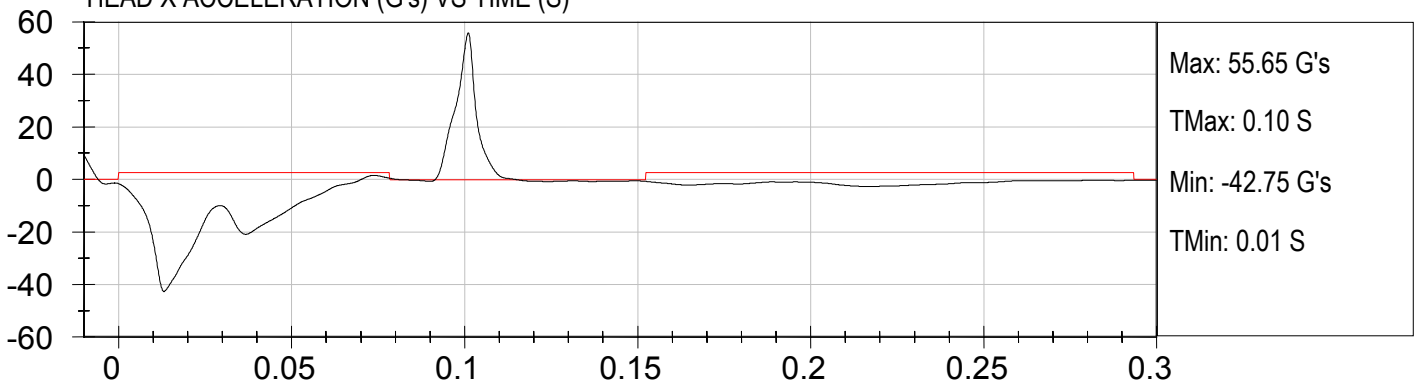
Component ID: US BUS S2, Location H10

Test Date: 1/3/2007

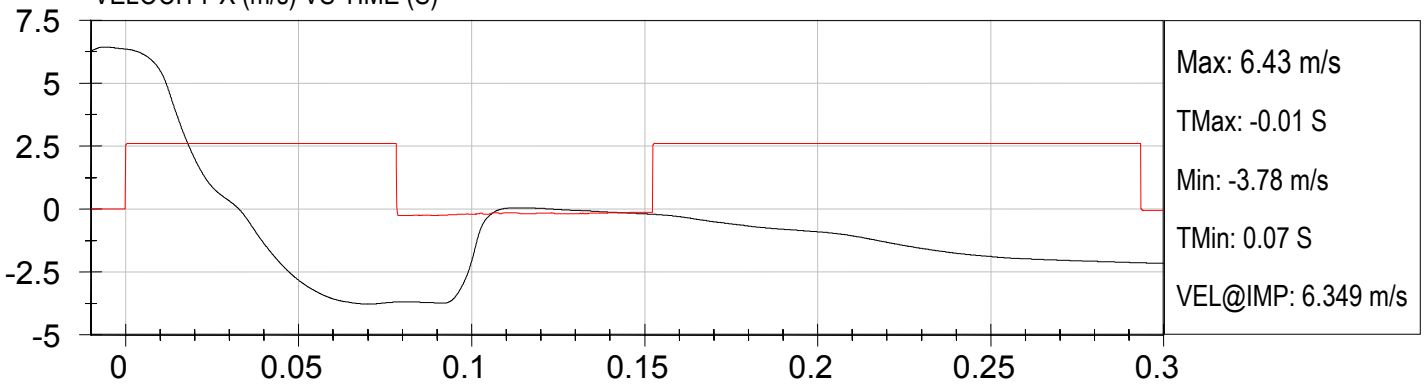
NHTSA #: C60900

HEAD X ACCELERATION (G's) VS TIME (S)

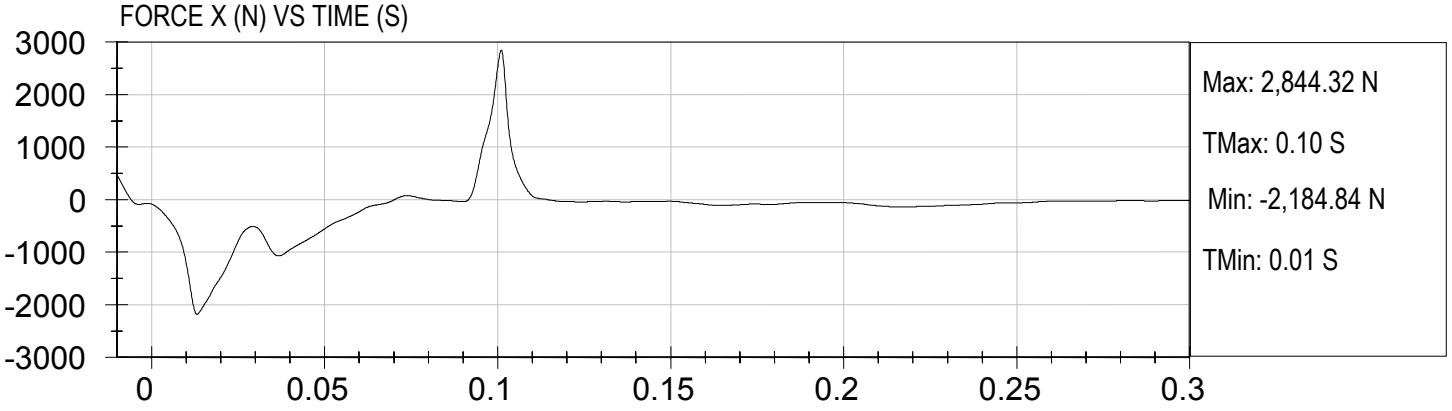
Hic: 86.04 T1: 7.70 ms T2: 47.60 ms



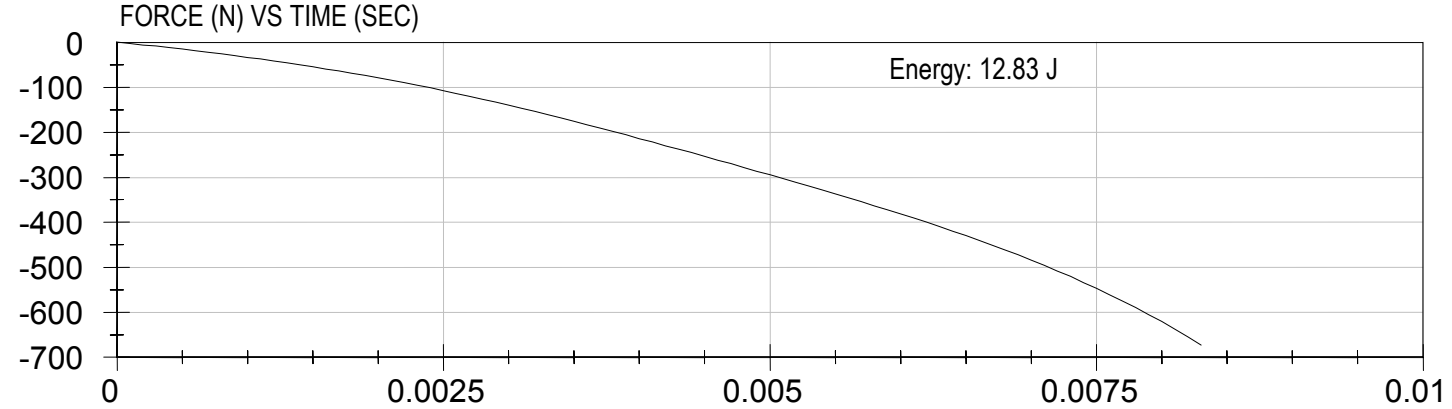
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



Test Desc: Head Form Impact (6.69 m/s)

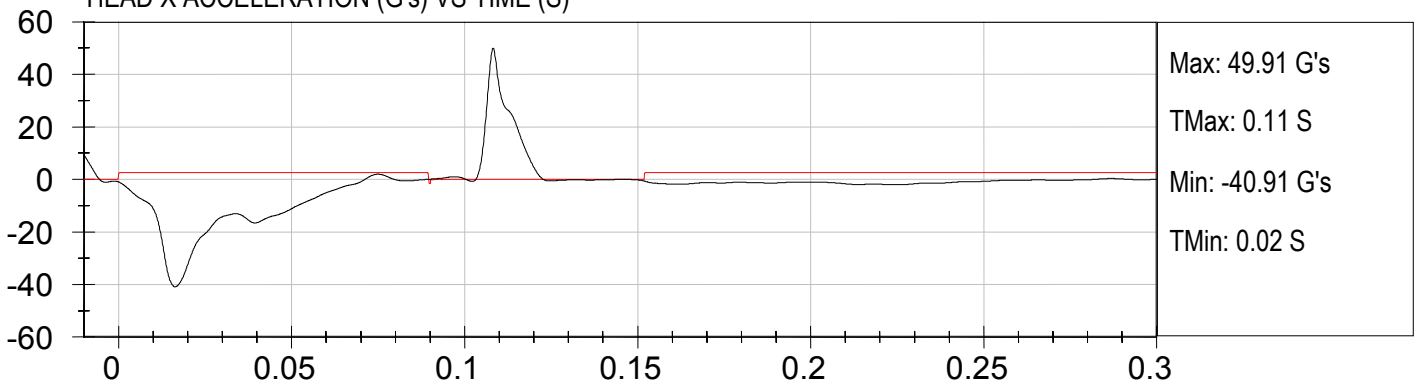
Test Date: 1/3/2007

Component ID: US BUS S2, Location H11

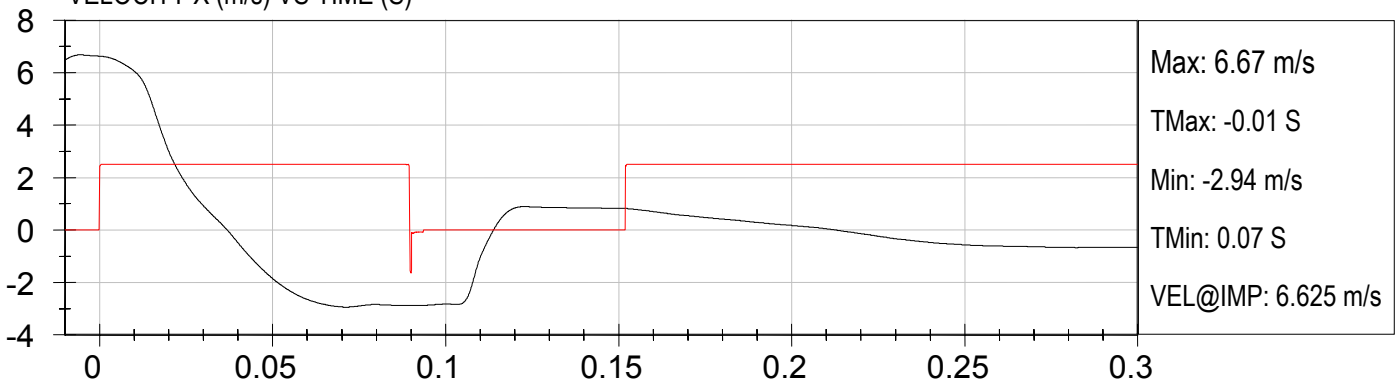
NHTSA #: C60900

Hic: 73.14 T1: 10.50 ms T2: 48.20 ms

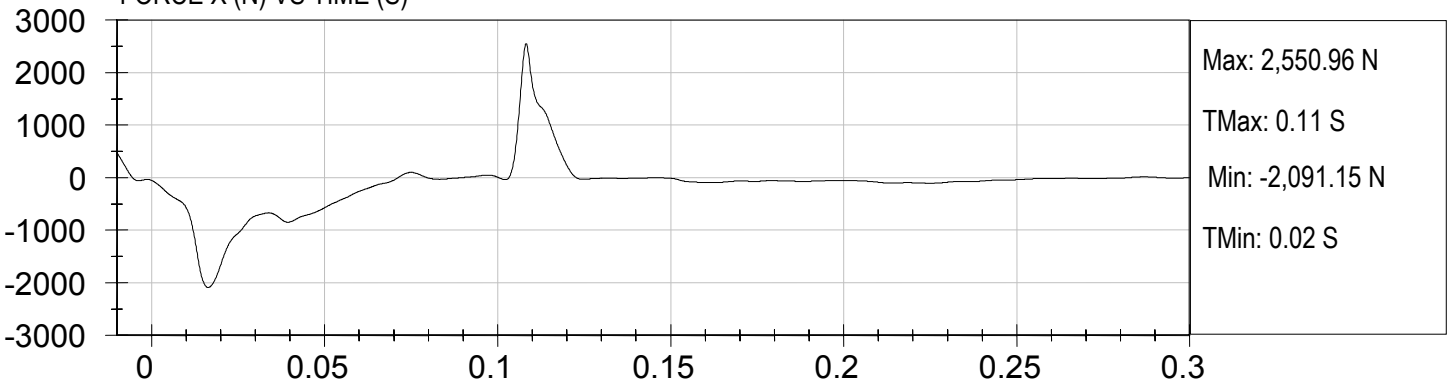
HEAD X ACCELERATION (G's) VS TIME (S)



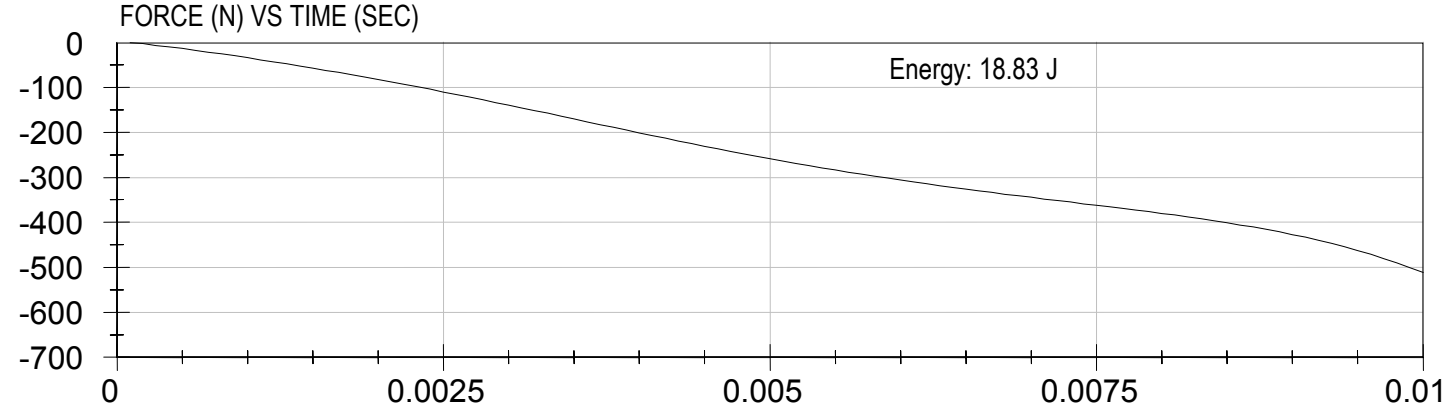
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



Test Desc: Head Form Impact (6.69 m/s)

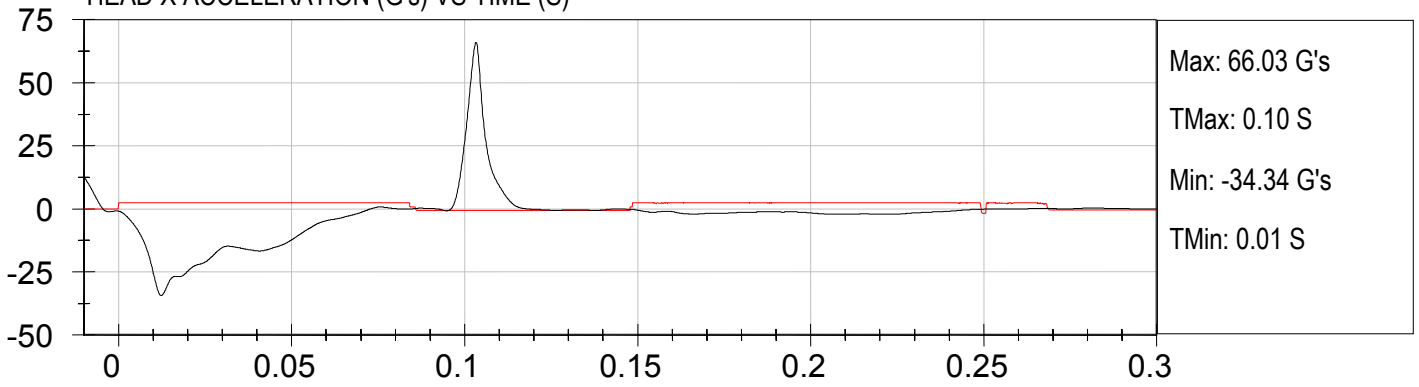
Component ID: US BUS S2, Location H12

Test Date: 1/3/2007

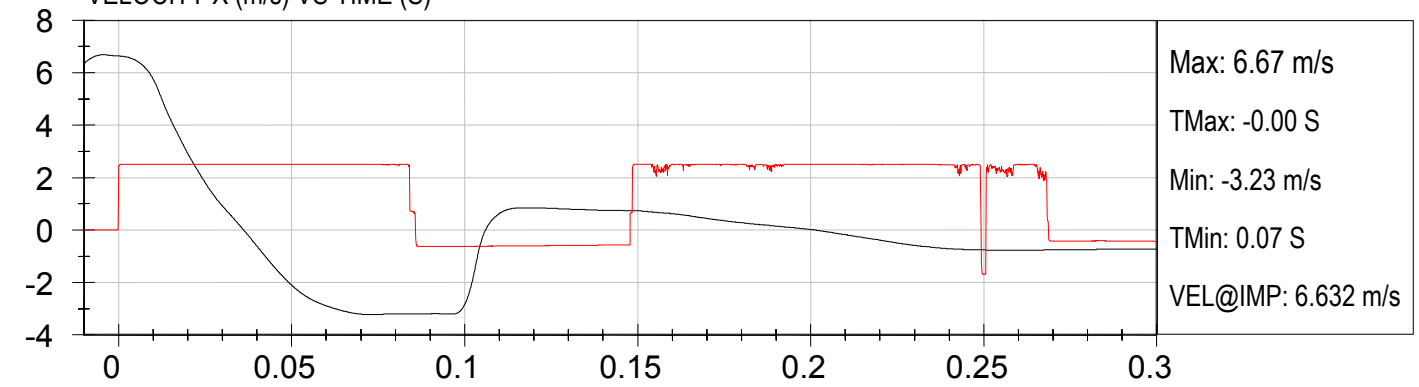
NHTSA #: C60900

HEAD X ACCELERATION (G's) VS TIME (S)

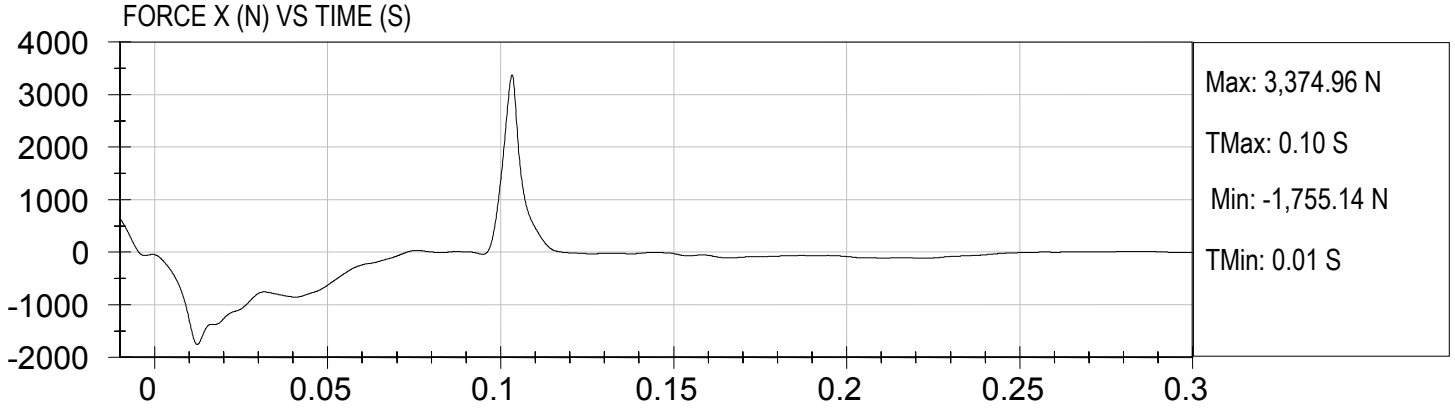
Hic: 96.81 T1: 100.30 ms T2: 105.80 ms



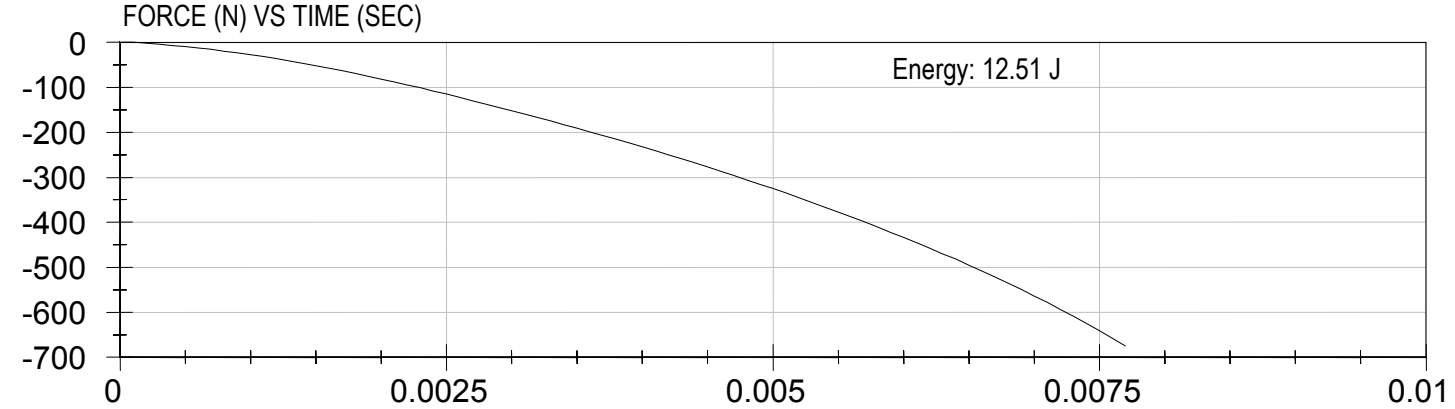
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



Test Desc: Head Form Impact (6.69 m/s)

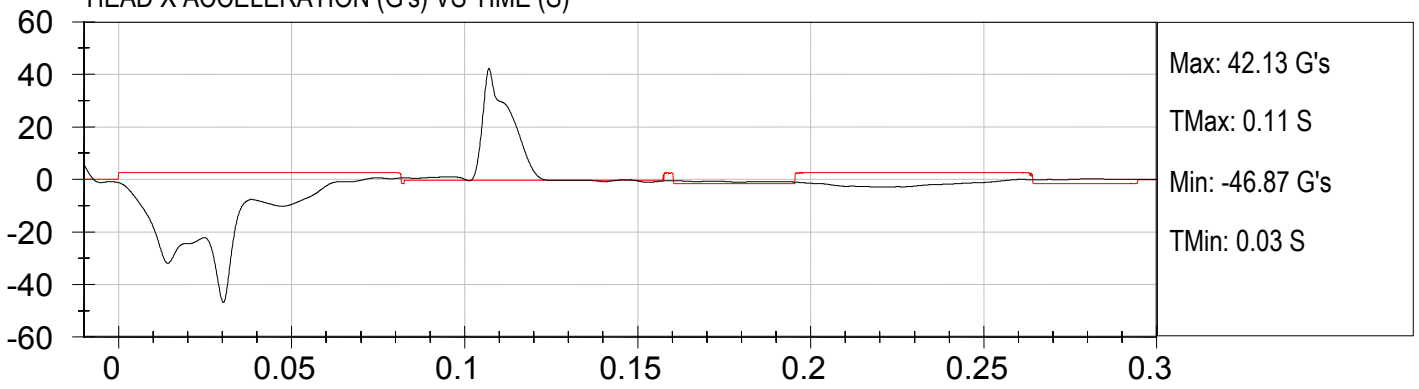
Component ID: US BUS S2, Location H13

Test Date: 1/3/2007

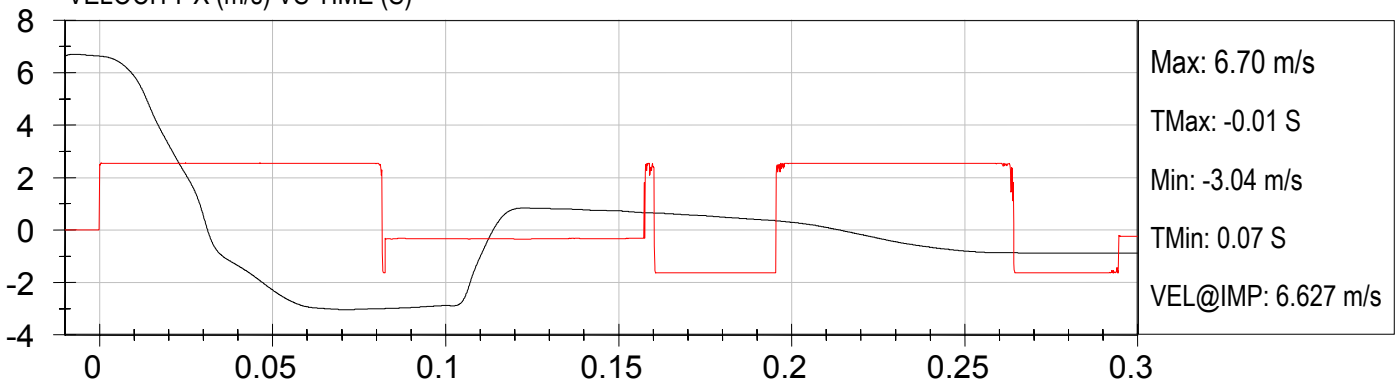
NHTSA #: C60900

Hic: 102.02 T1: 9.60 ms T2: 34.00 ms

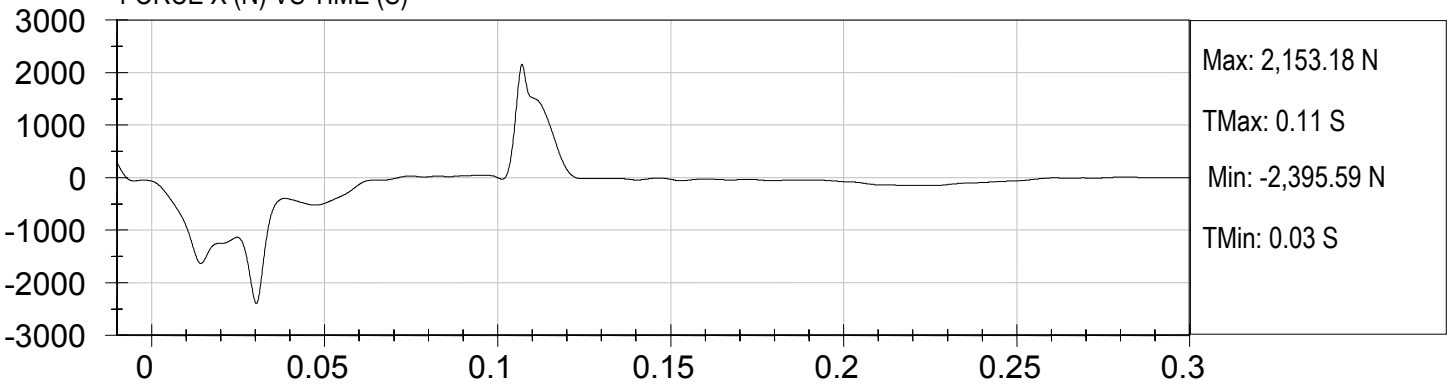
HEAD X ACCELERATION (G's) VS TIME (S)



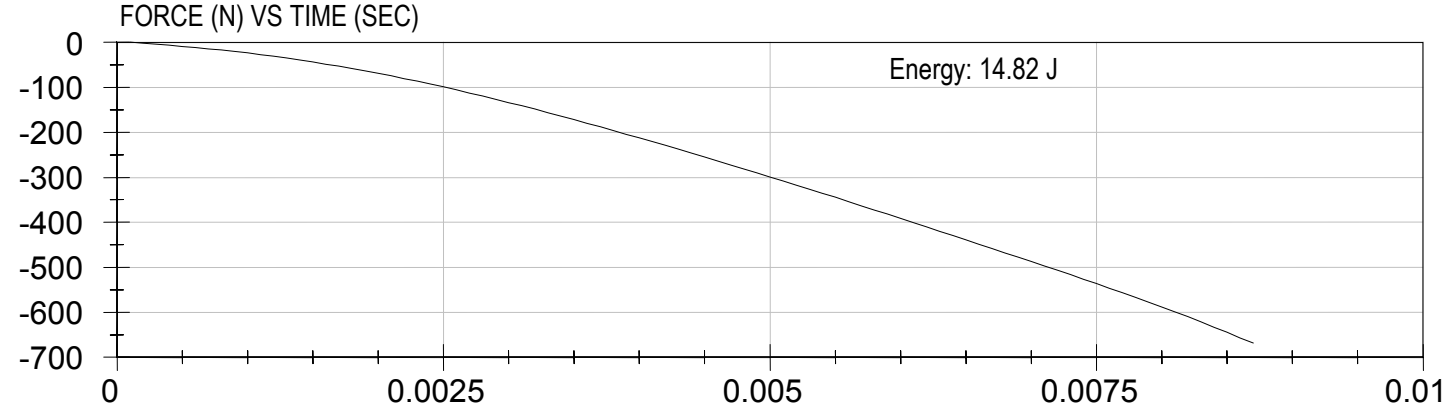
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



Test Desc: Head Form Impact (6.69 m/s)

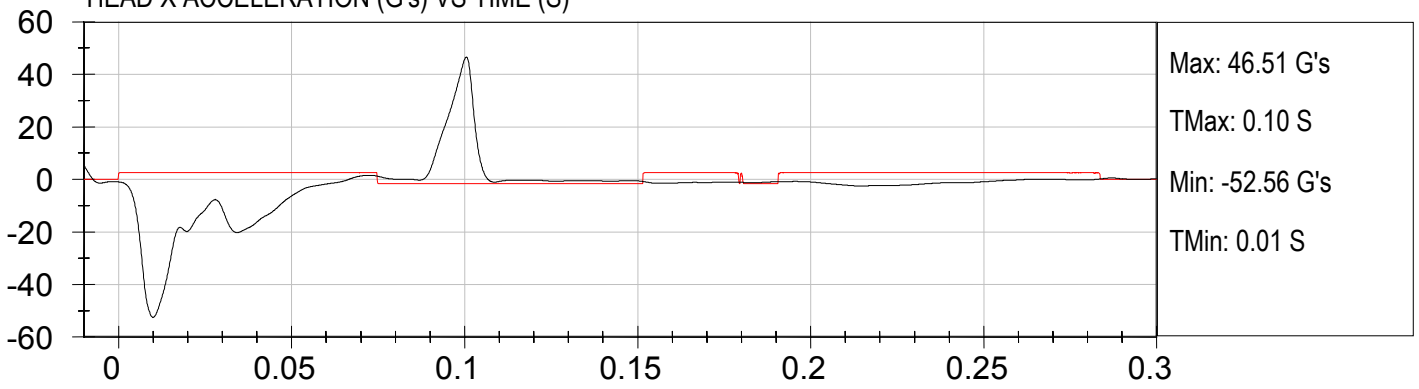
Component ID: US BUS S2, Location H14

Test Date: 1/3/2007

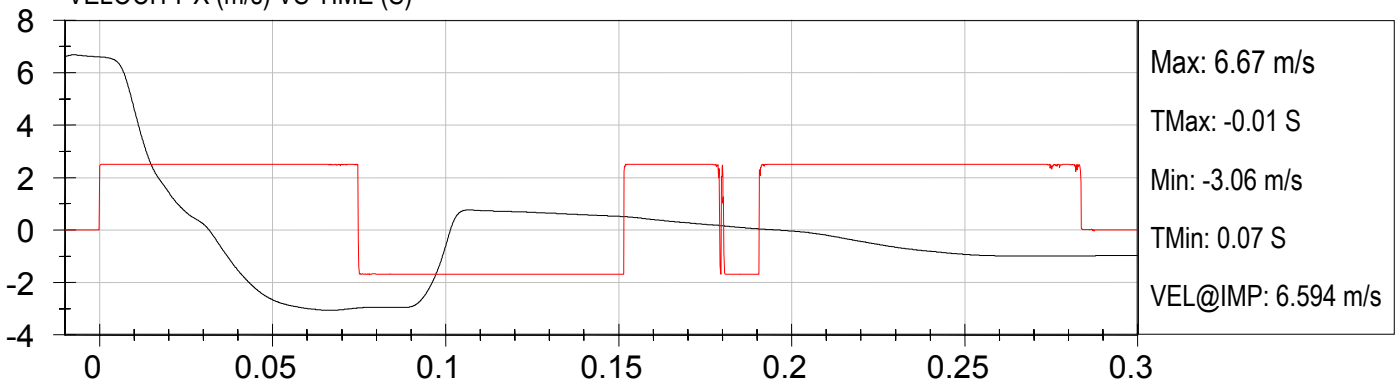
NHTSA #: C60900

Hic: 111.05 T1: 6.40 ms T2: 15.70 ms

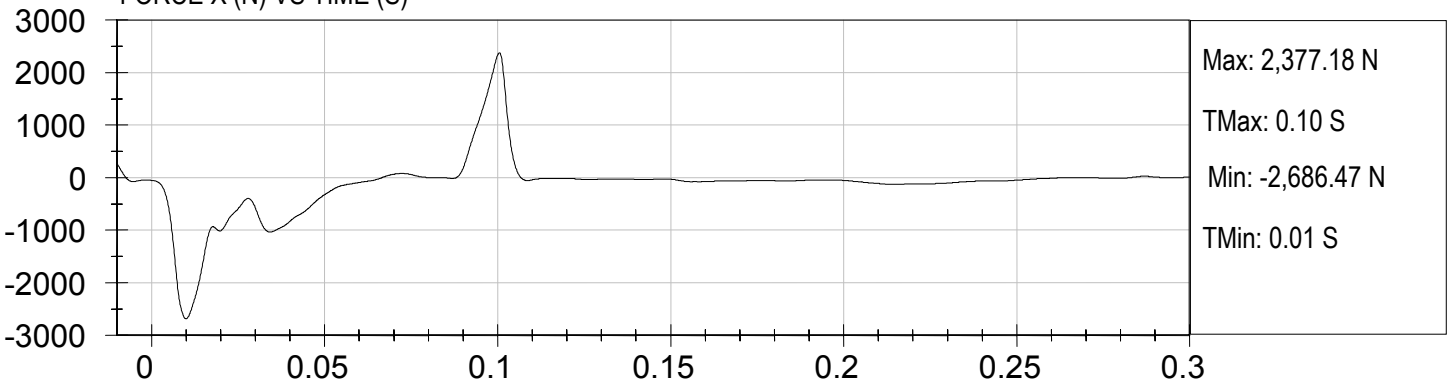
HEAD X ACCELERATION (G's) VS TIME (S)



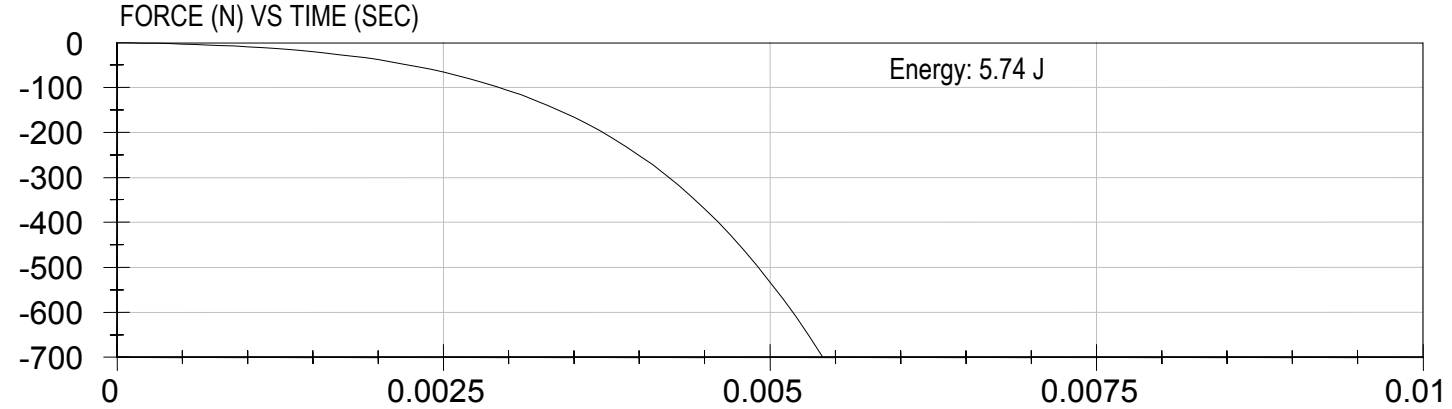
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)

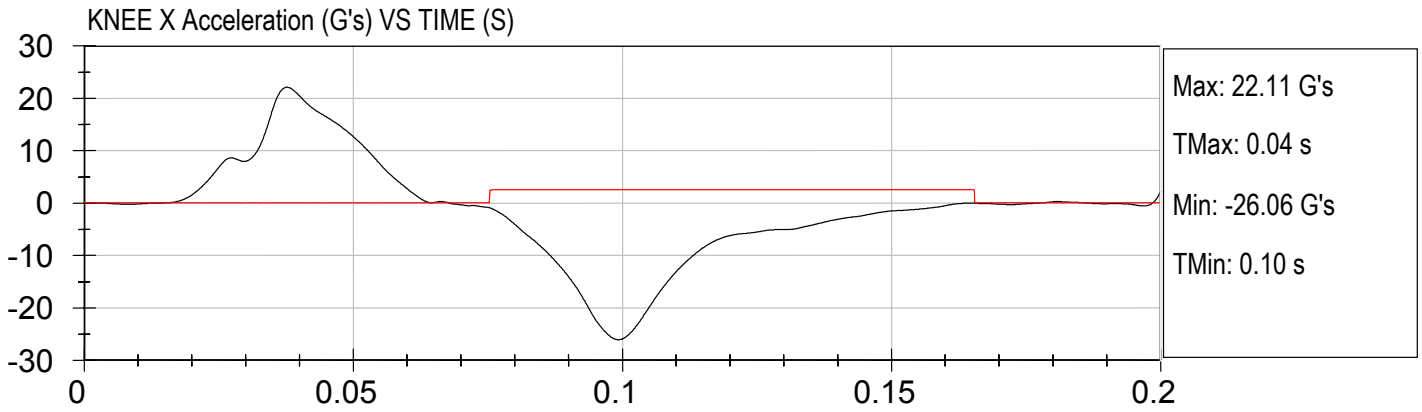


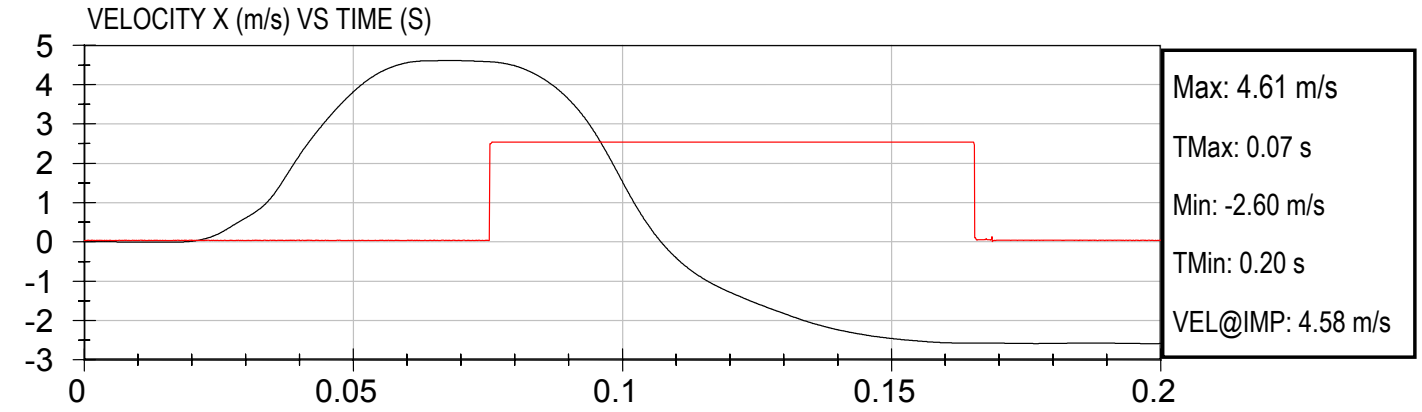
FORCE (N) VS TIME (SEC)

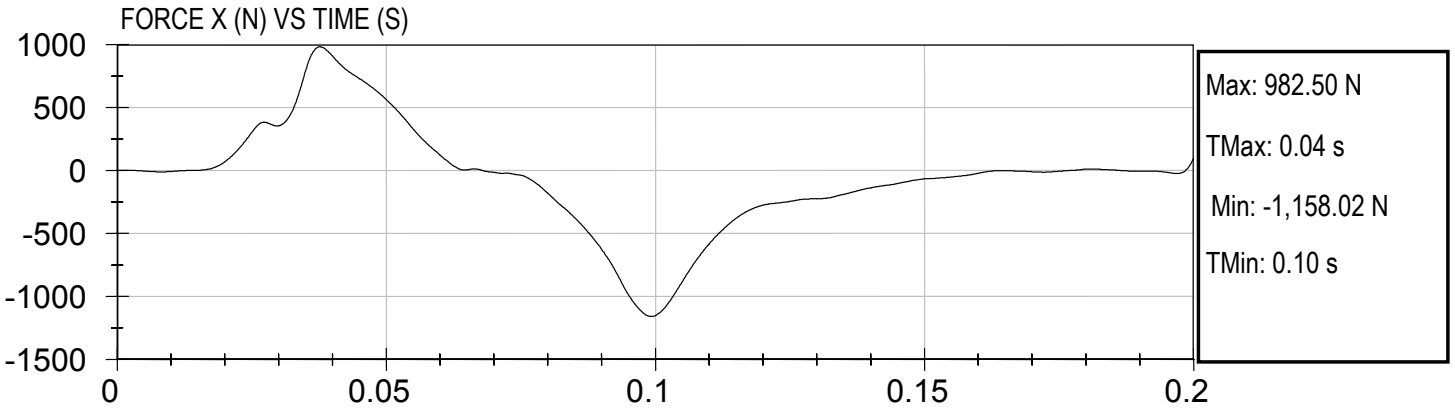


Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K1

Test Date: 1/4/2007
NHTSA #: C60900



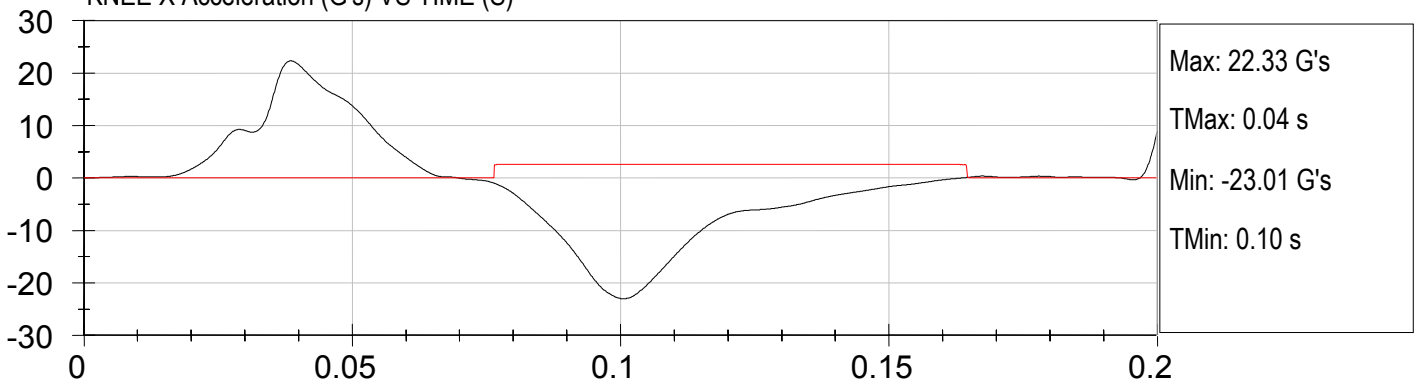




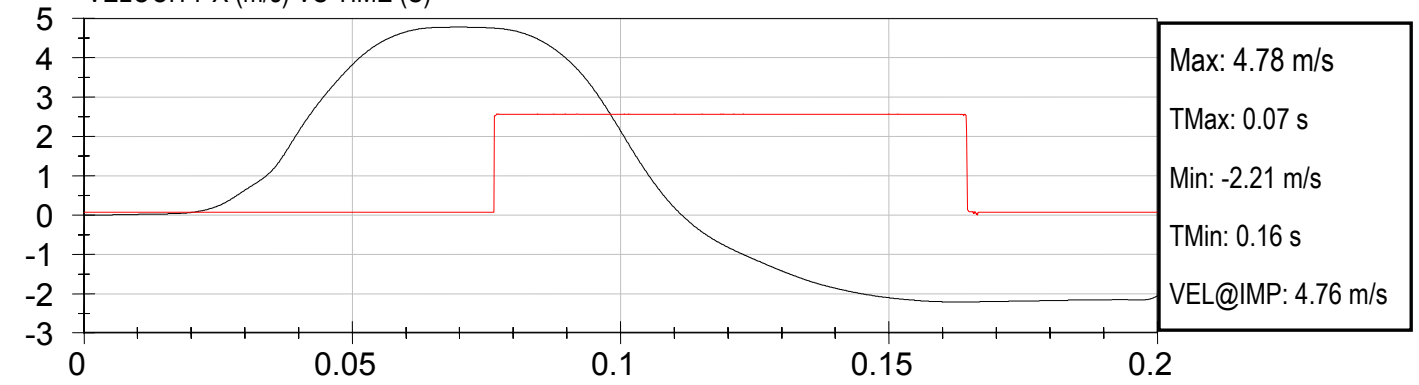
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K2

Test Date: 1/3/2007
NHTSA #: C60900

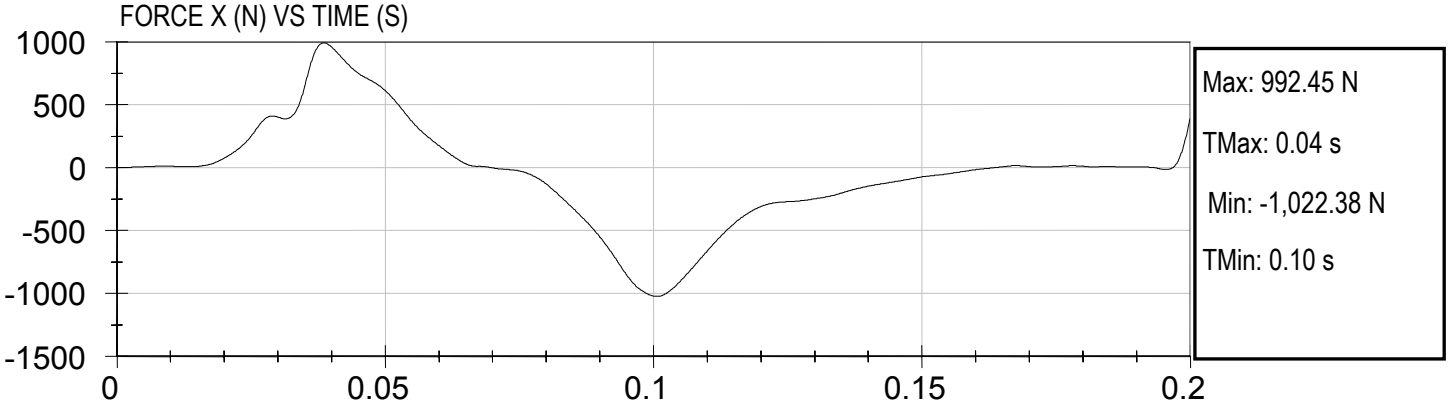
KNEE X Acceleration (G's) VS TIME (S)



VELOCITY X (m/s) VS TIME (S)



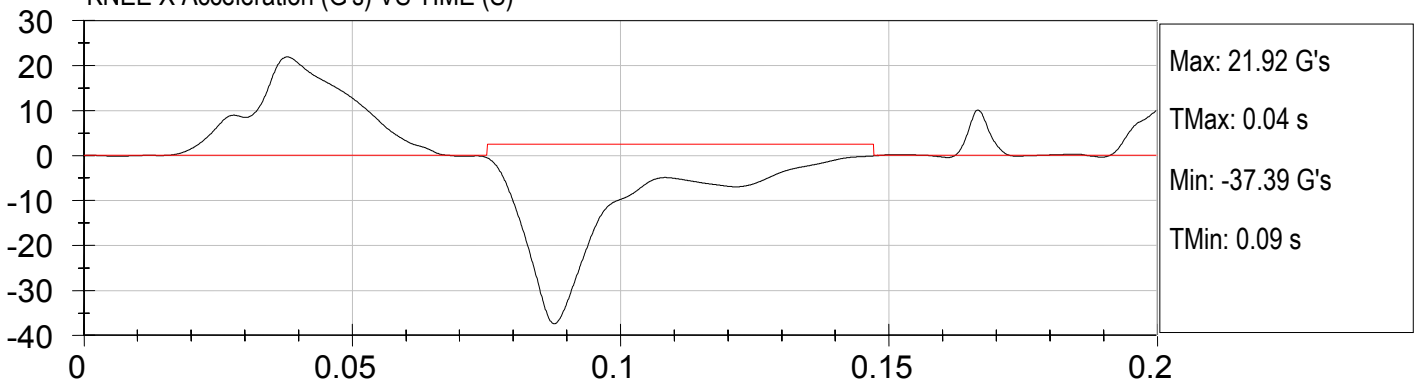
FORCE X (N) VS TIME (S)



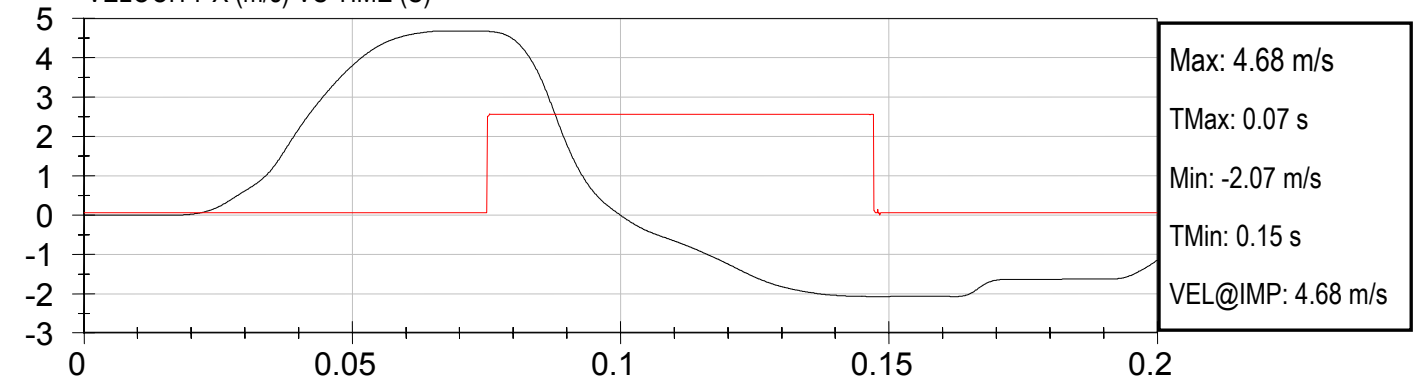
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K3

Test Date: 1/3/2007
NHTSA #: C60900

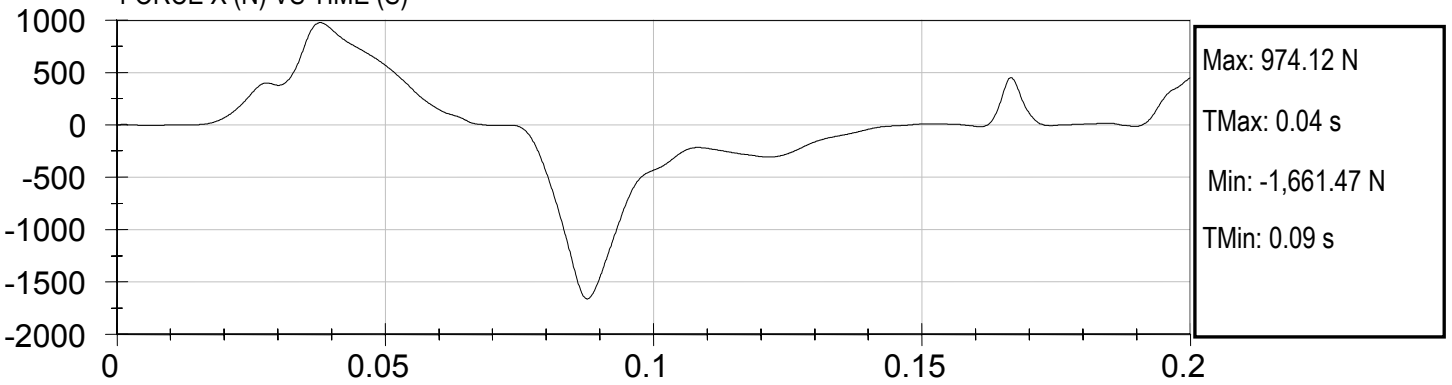
KNEE X Acceleration (G's) VS TIME (S)



VELOCITY X (m/s) VS TIME (S)



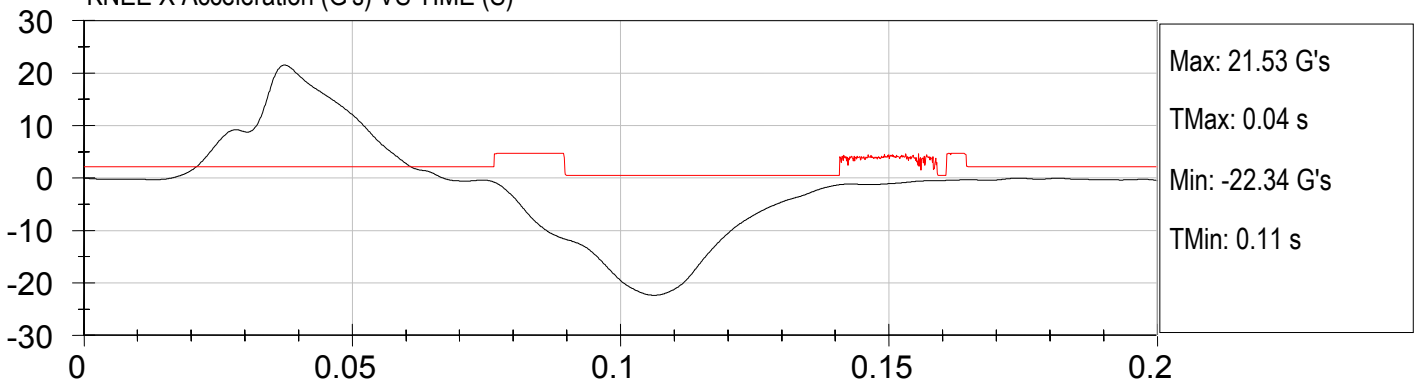
FORCE X (N) VS TIME (S)



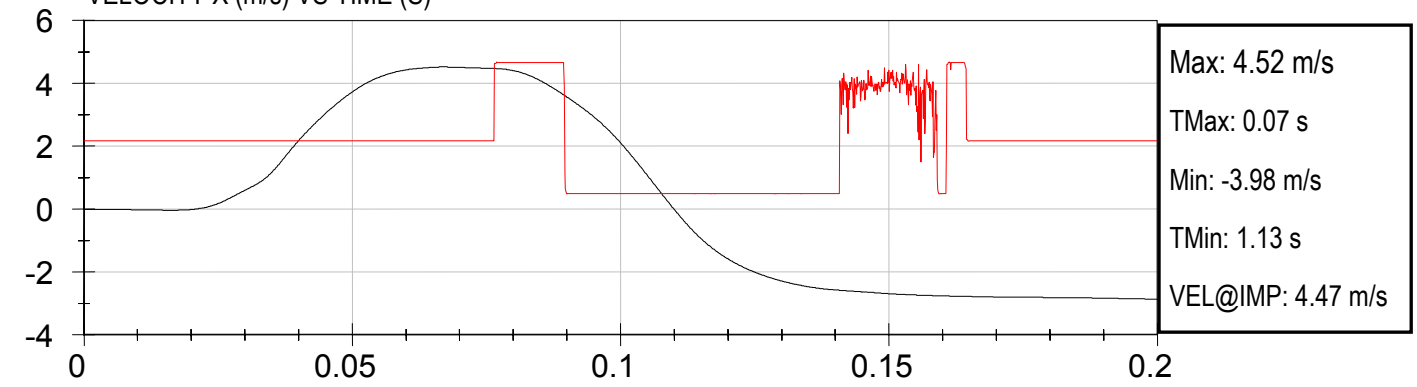
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K4

Test Date: 1/3/2007
NHTSA #: C60900

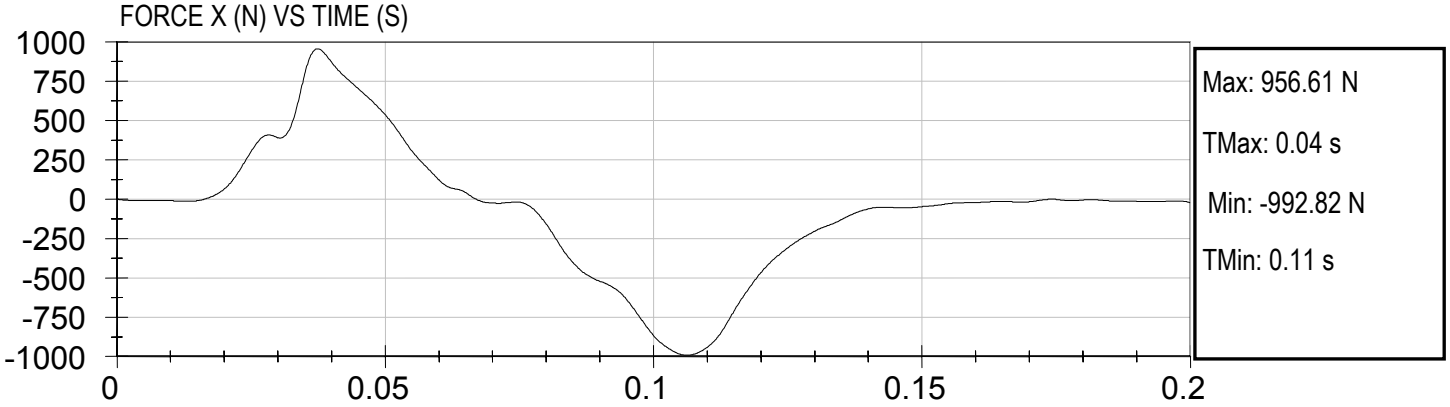
KNEE X Acceleration (G's) VS TIME (S)



VELOCITY X (m/s) VS TIME (S)



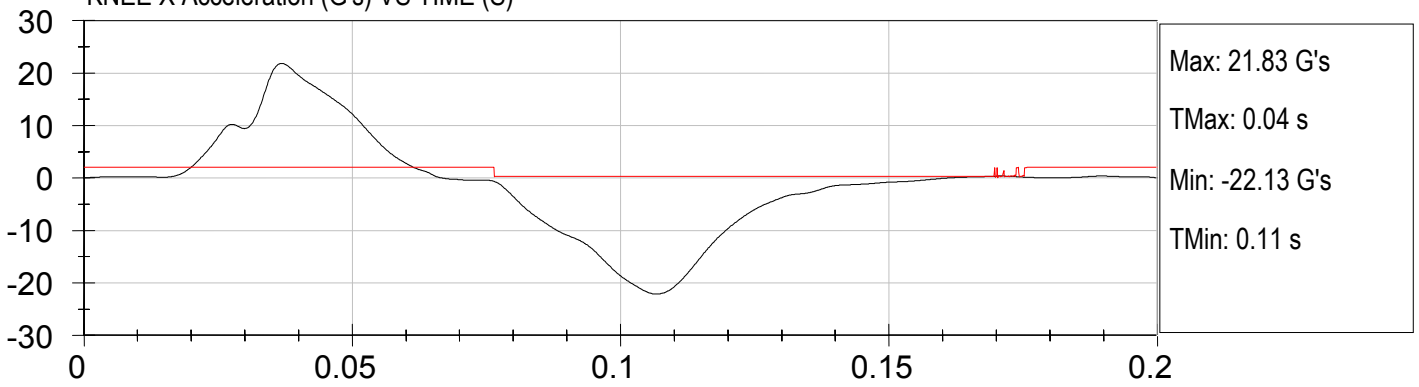
FORCE X (N) VS TIME (S)



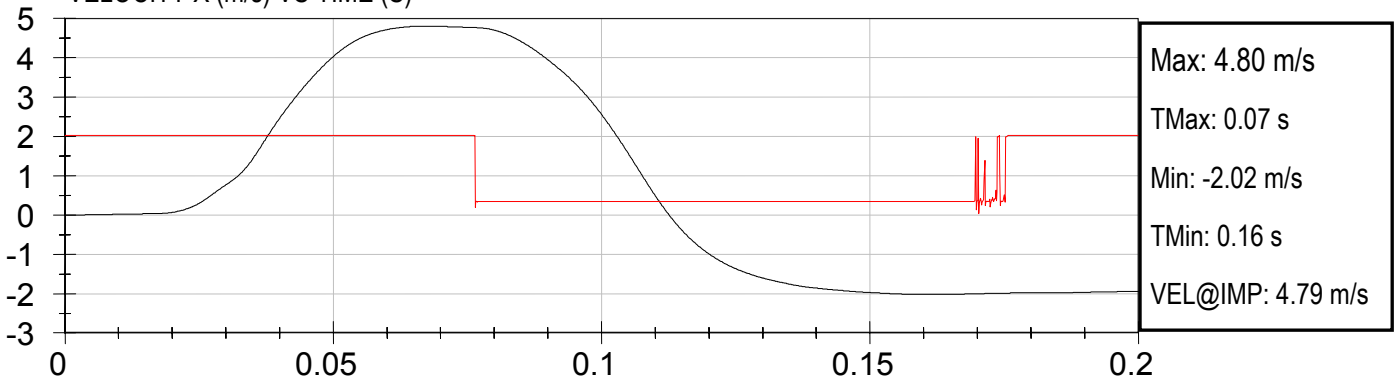
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K5

Test Date: 1/3/2007
NHTSA #: C60900

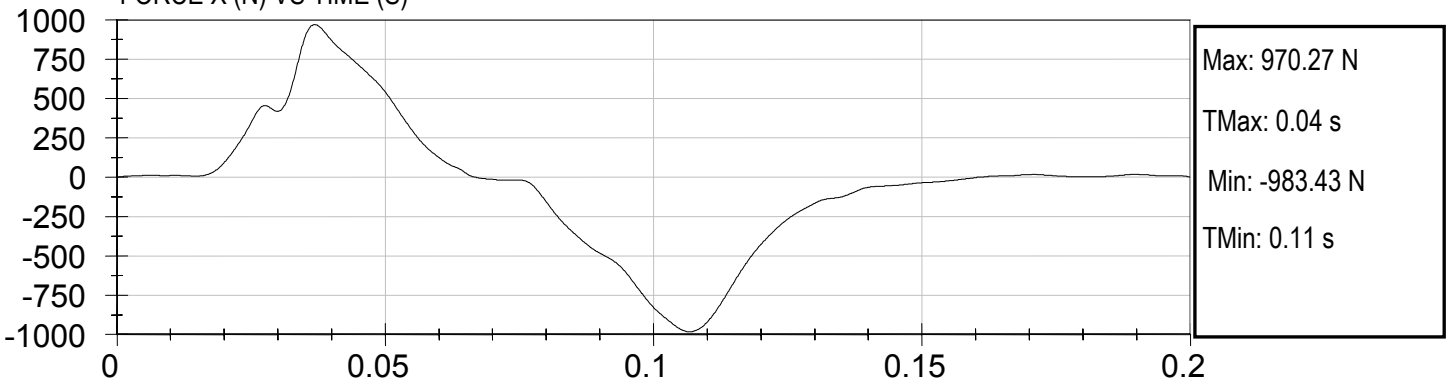
KNEE X Acceleration (G's) VS TIME (S)



VELOCITY X (m/s) VS TIME (S)



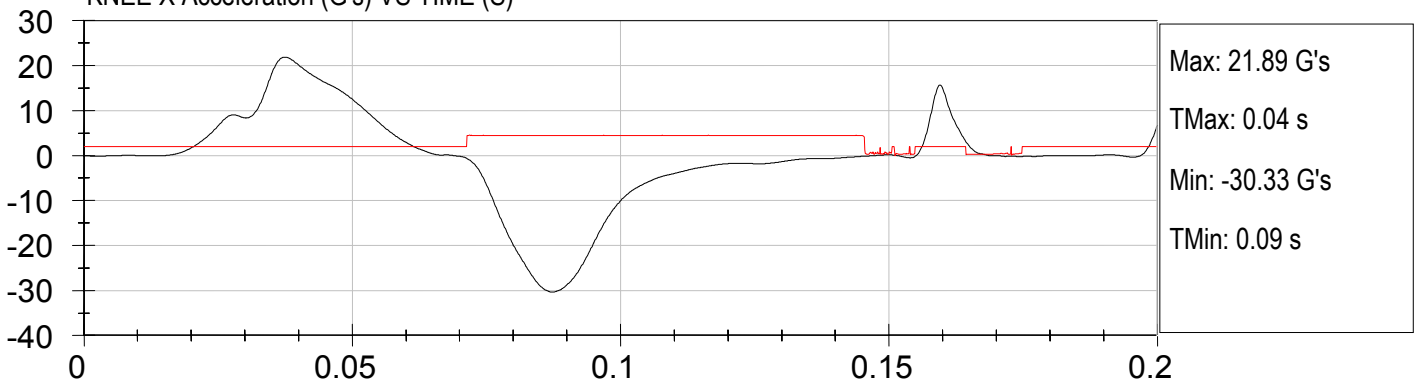
FORCE X (N) VS TIME (S)



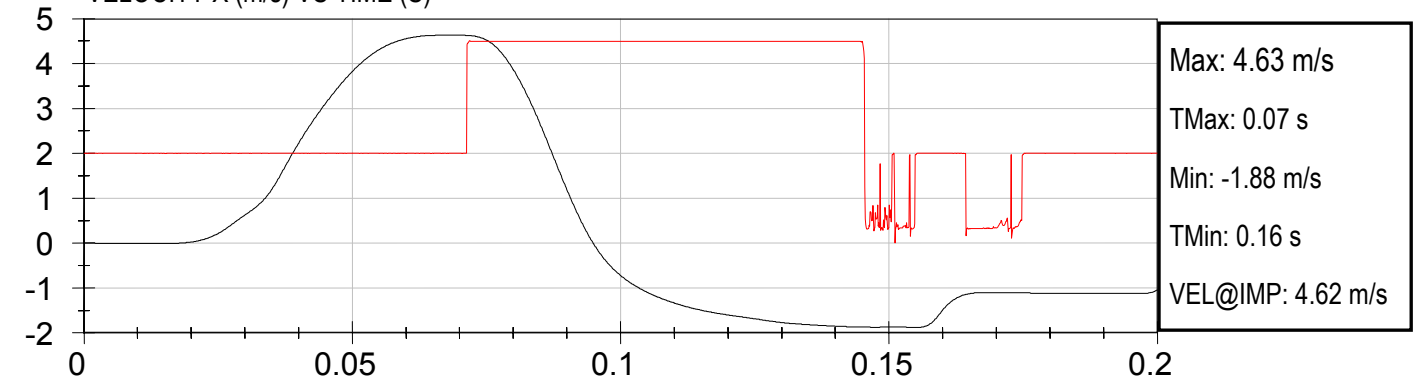
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K6

Test Date: 1/3/2007
NHTSA #: C60900

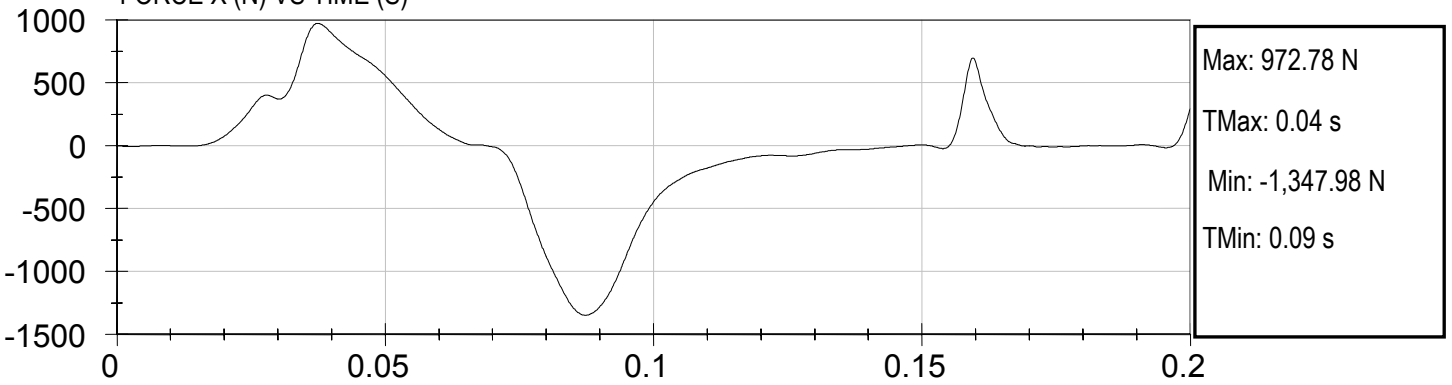
KNEE X Acceleration (G's) VS TIME (S)



VELOCITY X (m/s) VS TIME (S)



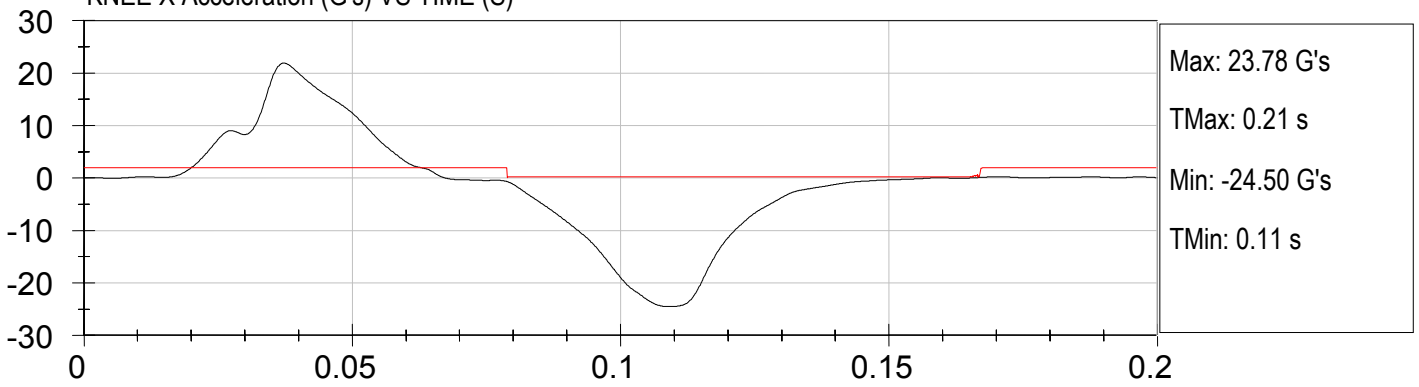
FORCE X (N) VS TIME (S)



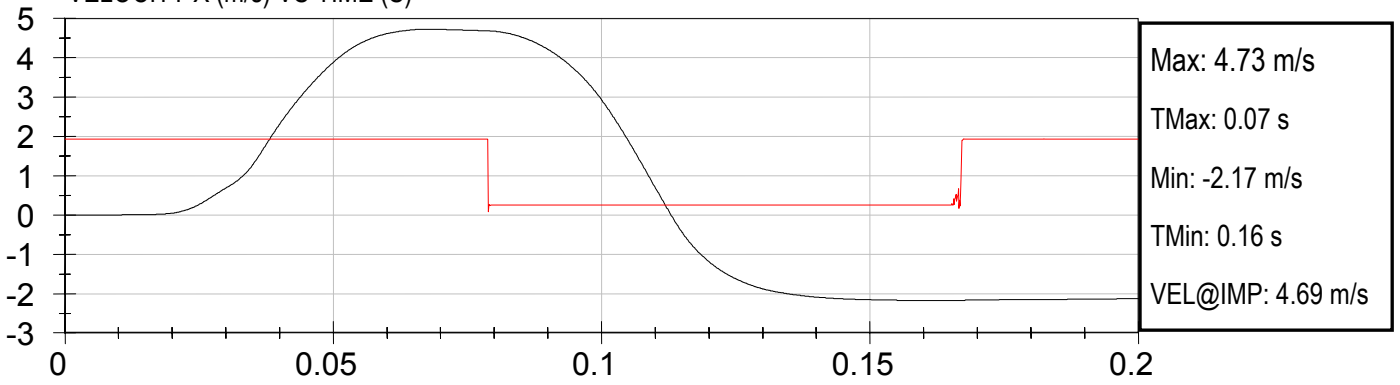
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K7

Test Date: 1/3/2007
NHTSA #: C60900

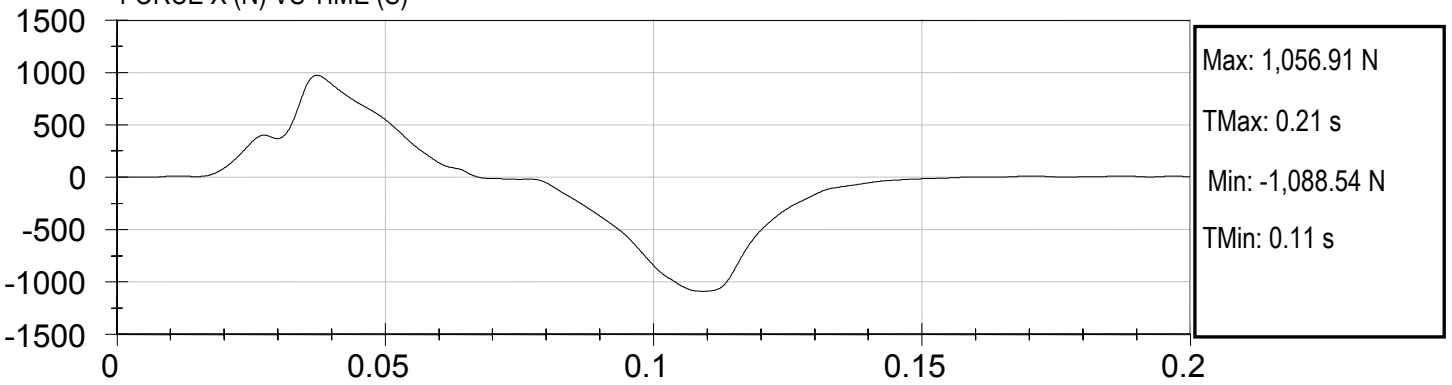
KNEE X Acceleration (G's) VS TIME (S)



VELOCITY X (m/s) VS TIME (S)

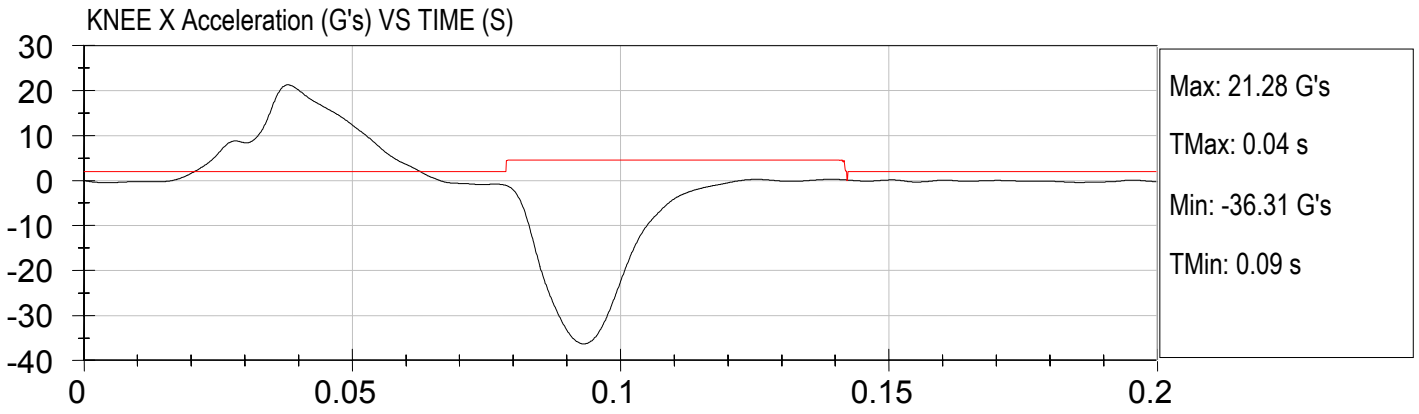


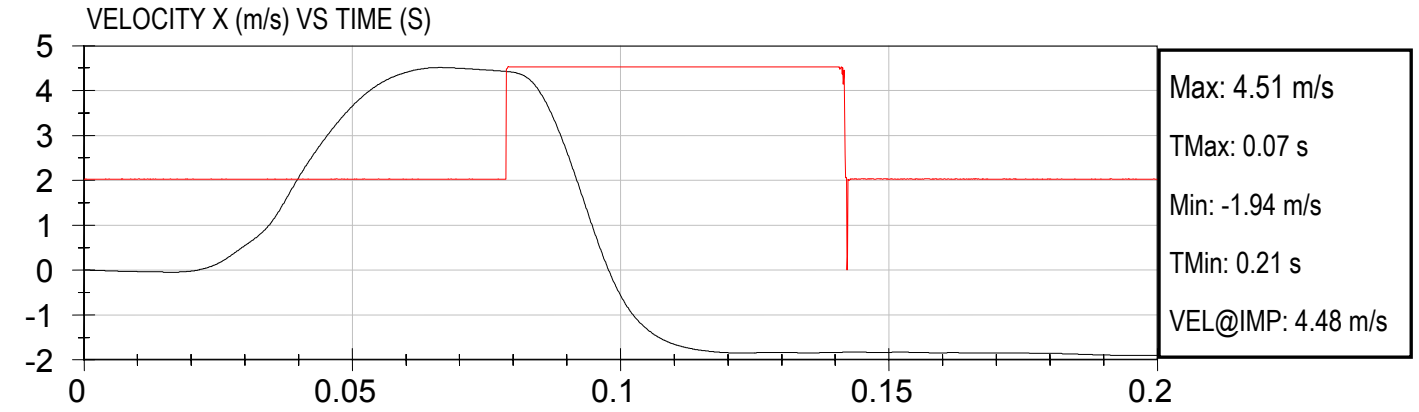
FORCE X (N) VS TIME (S)

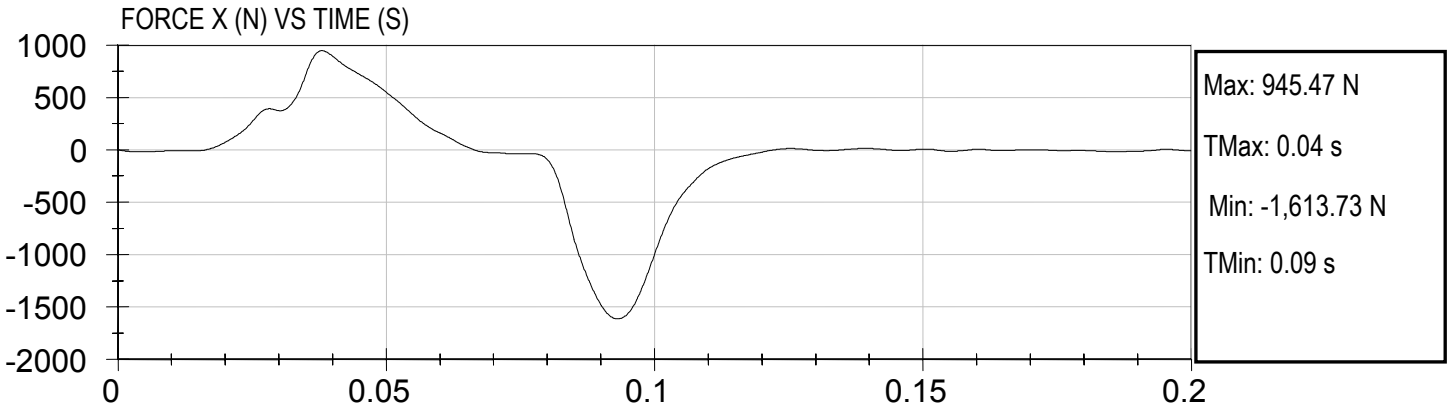


Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K8

Test Date: 1/3/2007
NHTSA #: C60900







SECTION 8

WELT CONTACT POINTS

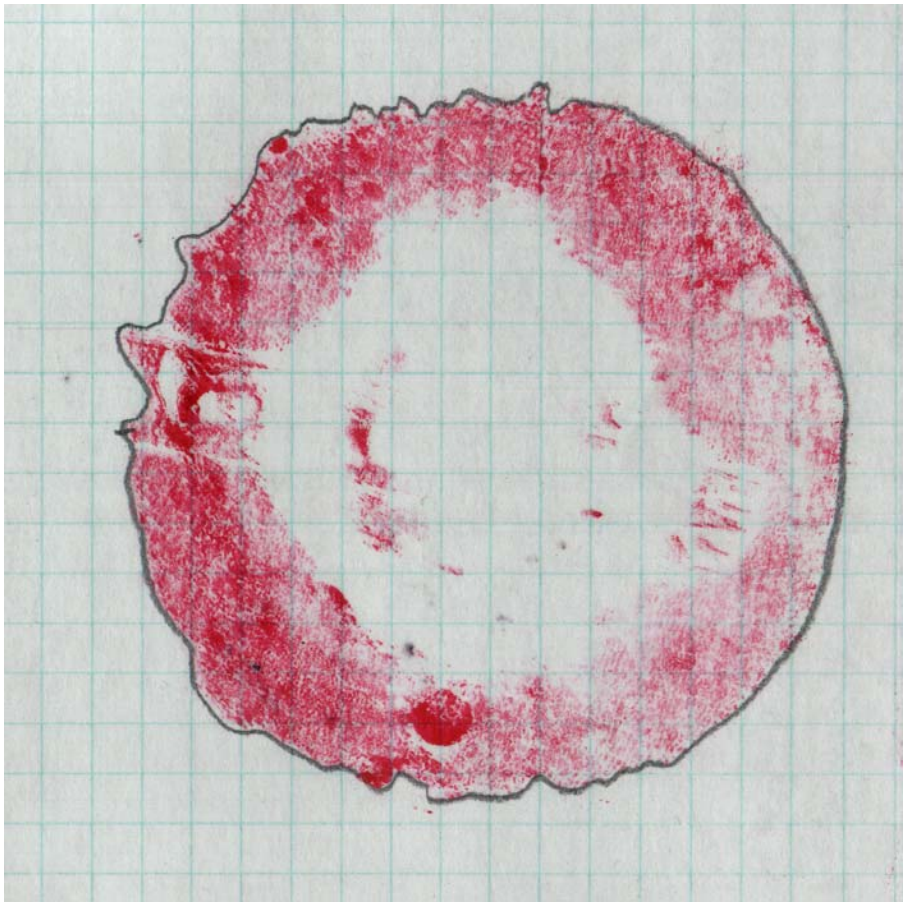
Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**2/27/2007**

H1 / SEAT S2

H1 US BUS 66.4 cm^2

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **2/27/2007**

H2 / SEAT S2



H2 US BUS 63.1 cm^2

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **2/27/2007**

H3 / SEAT S2

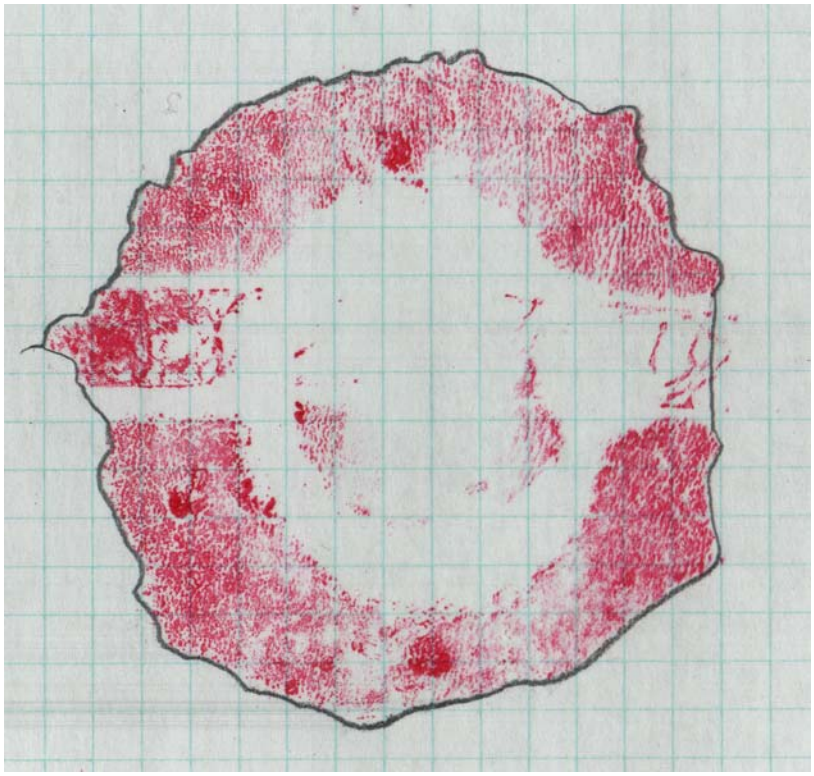
H3 US BUS 59.6 cm^2

SECTION 8 (CONTINUED)

WELT CONTACT POINTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**2/27/2007**

H4 / SEAT S2



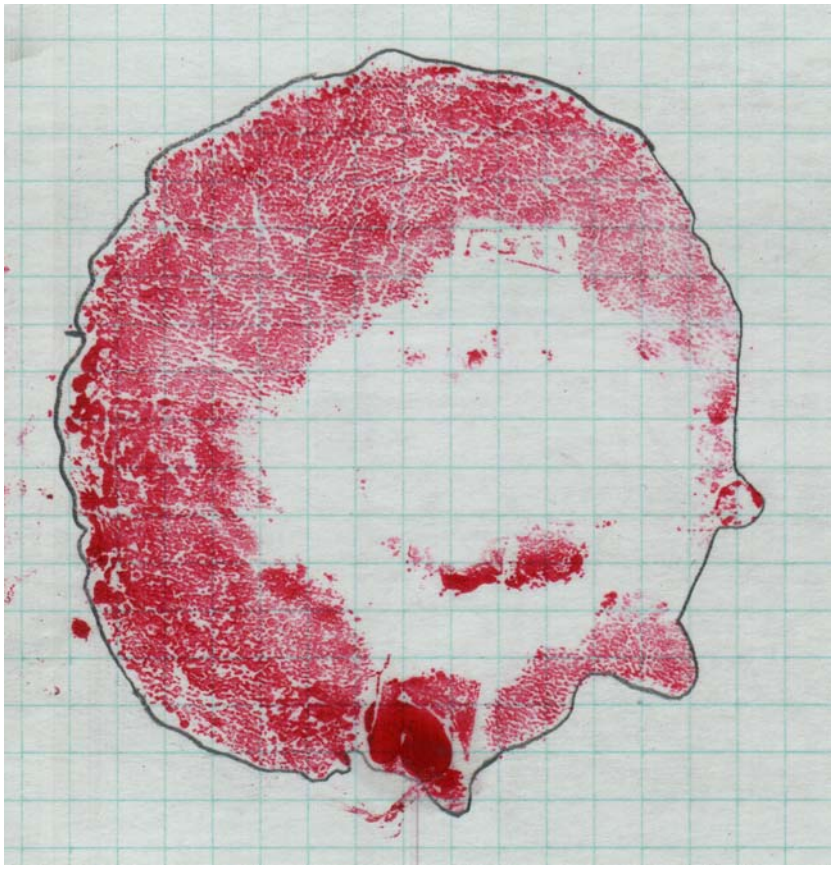
H4 US BUS 57.8 cm^2

SECTION 8 (CONTINUED)

WELT CONTACT POINTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**2/27/2007**

H5 / SEAT S2



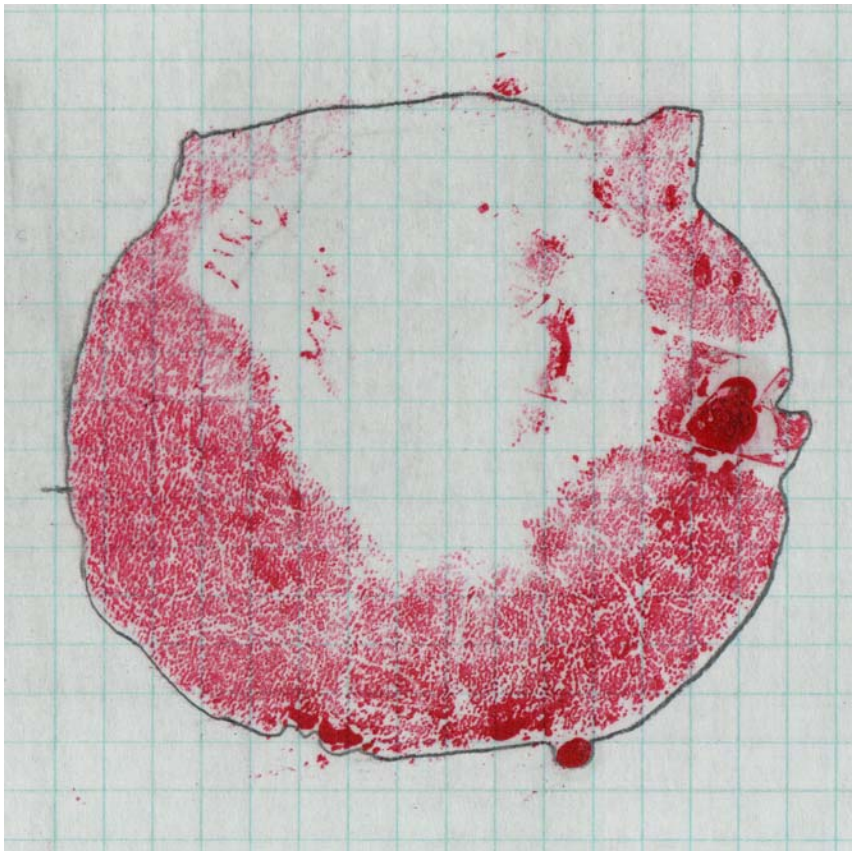
H5 US BUS 69.3 cm^2

SECTION 8 (CONTINUED)

WELT CONTACT POINTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**2/27/2007**

H6 / SEAT S2



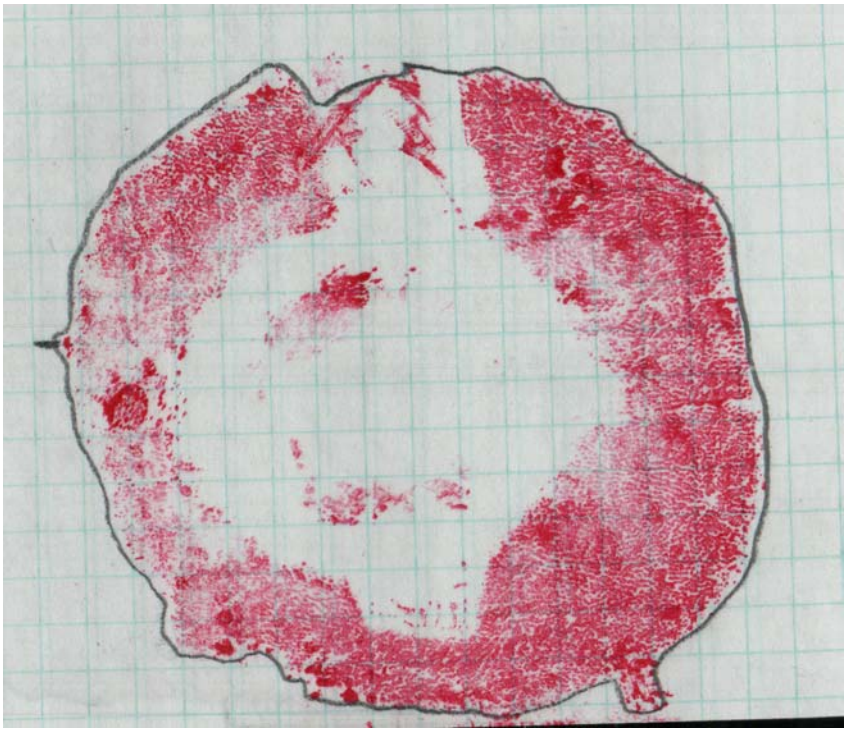
H6 US BUS 67.3 cm^2

SECTION 8 (CONTINUED)

WELT CONTACT POINTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**2/27/2007**

H7 / SEAT S2



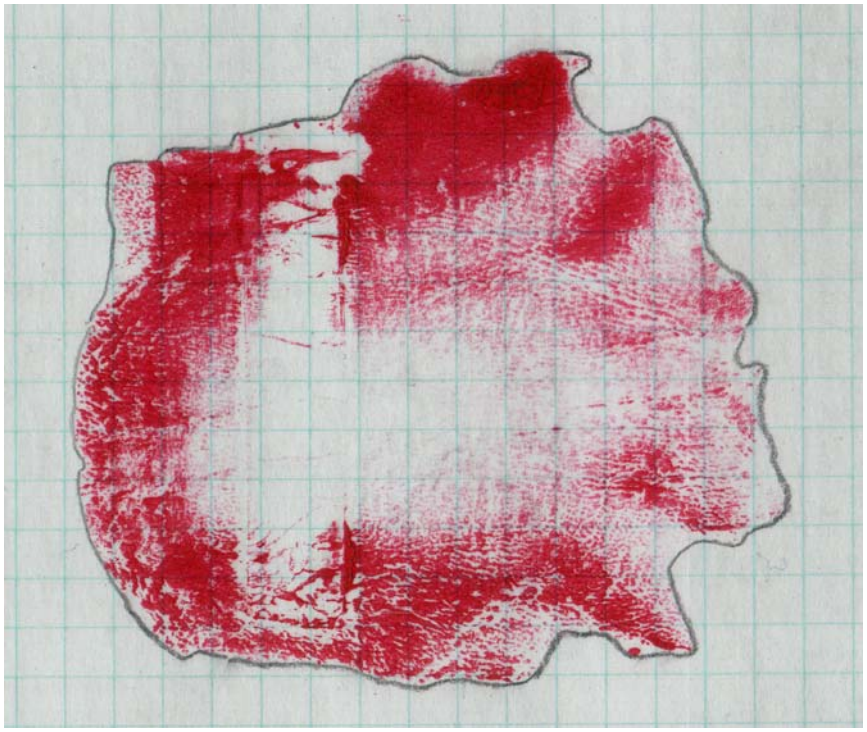
H7 US BUS 67.0 cm^2

SECTION 8 (CONTINUED)

WELT CONTACT POINTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**2/27/2007**

K1 / SEAT S2



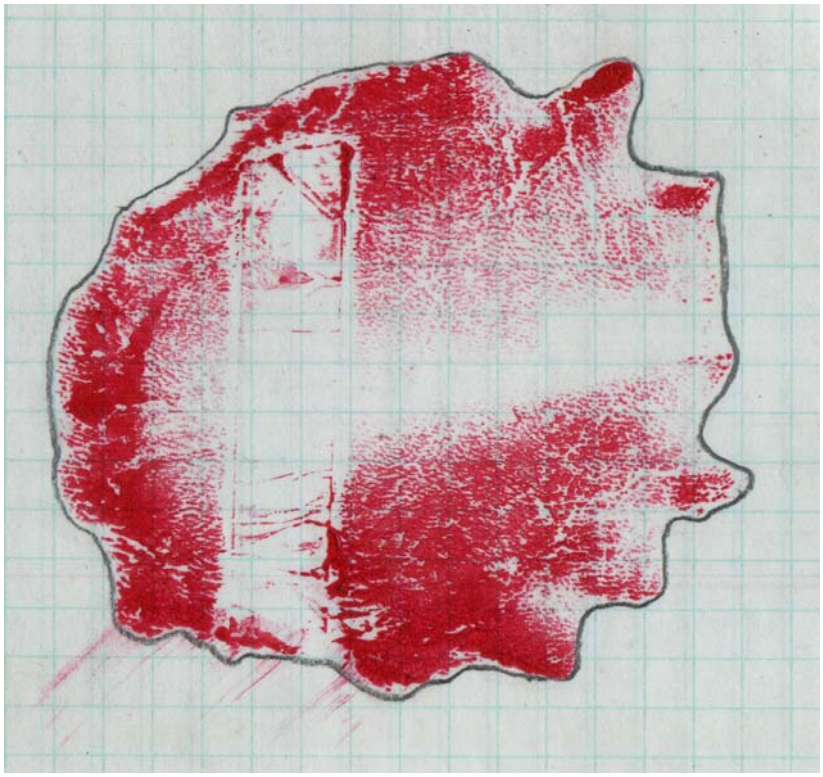
K1 US BUS 58.5 cm^2

SECTION 8 (CONTINUED)

WELT CONTACT POINTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**2/27/2007**

K2 / SEAT S2



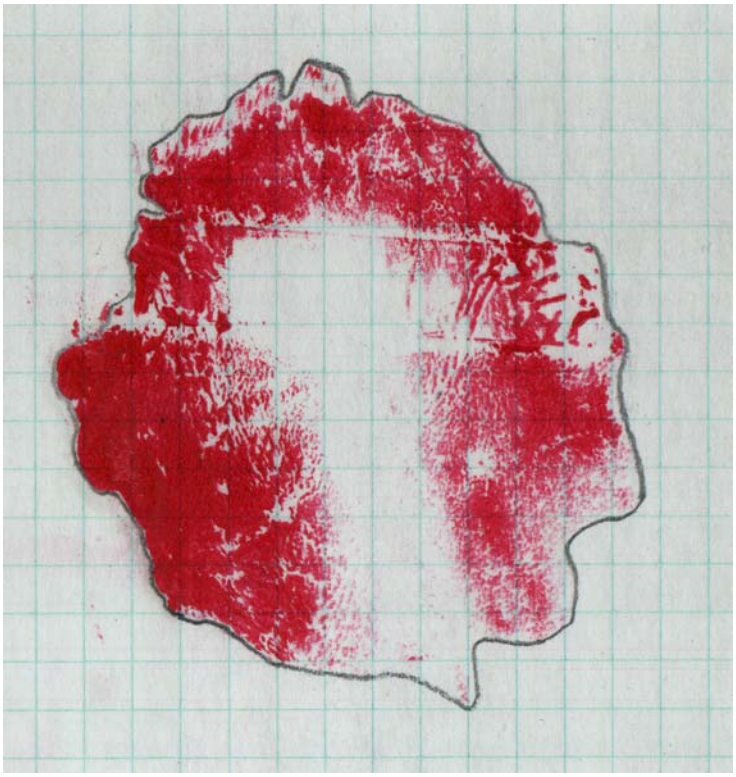
K2 US BUS 57.3 cm^2

SECTION 8 (CONTINUED)

WELT CONTACT POINTS

Test Vehicle:	**2006 US BUS SCHOOL BUS**	NHTSA No.:	**C60900**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Date:	**2/27/2007**

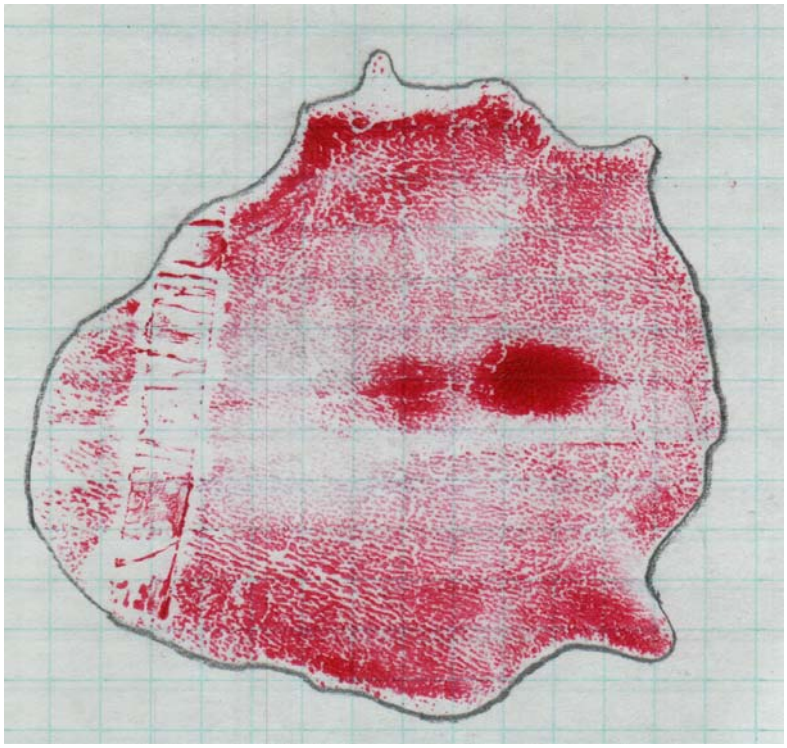
K3 / SEAT S2



K3 US BUS 51.0 cm^2

Test Vehicle: **2006 US BUS SCHOOL BUS** NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION** Test Date: **2/27/2007**

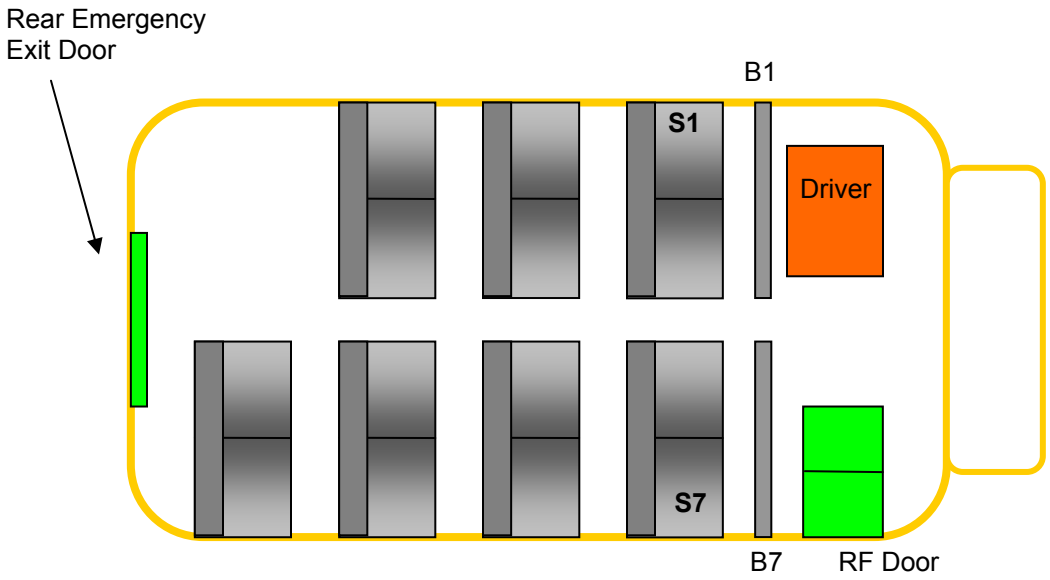
K4 / SEAT S2



K4 US BUS 52.2 cm^2

SECTION 9

BUS FLOOR PLAN



SECTION 10

LABORATORY NOTICE OF TEST FAILURE

LABORATORY NOTICE OF TEST FAILURE TO OVSC

Test Procedure:	FMVSS 222	Test Date:	November 16, 2006
Test Vehicle:	US Bus	Test Lab:	MGA Research Corp.
NHTSA No.:	C60900	Project Engineer:	Jim Hansen
Contract No.:	DTNH22-02-D-01057	Delivery Order No.:	5
MFR.:	US Bus	VIN:	1GBHG31V561226021
Build Date:	08/06		

TEST FAILURE DESCRIPTION

During the rearward deflection test, the S5 seat back moved to within 102 mm of the seat located directly behind the test seat prior to reaching the energy absorption required by S5.1.4.2. A repeat test on a new seat was performed while limiting the travel of the loading bar. The seat back still moved to within 102 mm of the seat located directly behind the test seat well before the energy absorption requirement was met.

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S5.1.4 (c): *Seat performance rearward*, "The seat shall not deflect by an amount such that any part of the seat moves to within 102 mm of any part of another passenger seat in its originally installed position."

Remarks: No remarks.

Notification to NHTSA (COTR): Brian Smith

Date: November 16, 2006

By: _____

LABORATORY NOTICE OF TEST FAILURE TO OVSC

Test Procedure:	FMVSS 222	Test Date:	March 29, 2007
Test Vehicle:	2006 US Bus	Test Lab:	MGA Research Corp.
NHTSA No.:	C60900	Project Engineer:	Eric Peschman
Contract No.:	DTNH22-02-D-01057	Delivery Order No.:	005
MFR.:	US Bus	VIN:	1GBHG31V561226021
Build Date:	8/03/2006		

TEST FAILURE DESCRIPTION

The force application, for the seat belt assembly anchorages, in the S5 location did not reach the specified force before the failure of the floor and wall mount anchor structure. The force requirement as specified in 49 CFR 571.210 is 22,000 N. The actual force reached 14,602 N before failure of the floor and wall mount anchor structure.

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S.5.1: "Apply the force at the onset rate of not more than 222,411 N per second. Attain the 22,241 N force in not more than 30 seconds and maintain it for 10 seconds."

Remarks: No remarks.

Notification to NHTSA (COTR): Lawrence Q. Valvo

Date: March 29, 2007

By: