HSRD 636734

REPORT NUMBER: 222-MGA-03-002

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

2003 American Transportation Corporation
IC3S530 School Bus
NHTSA No.: C30902

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

Final Report Date: June 6, 2003

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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_____

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Date of Acceptance

Technical Report Documentation Page

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7. Author(s) John Roberts, Project Technician Michael Janovicz, Project Manager		*8. Performing Organization Report No.* 222-MGA-03-002
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12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh St.. S.W. Room 6115 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Report April 2 - June 6, 2003 *14. Sponsoring Agency Code* NVS-220

15. Supplementary Notes

16. Abstract

Compliance tests were conducted on the subject 2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902 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 failures: NONE
Test anomalies: Testing anomalies with the original barriers during force-deflection required testing of a replacement barrier at mid-bus location.

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 5108, (NPO-230) 400 Seventh Street, S.W. Washington, D.C. 20590 (202) 366-4946	
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SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a MY2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902, 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 April 2003. The test vehicle, MY2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902 appears to meet the requirements of FMVSS 222. All of the tests were conducted by MGA Research Corporation at the Wisconsin Operations.

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 22 were measured in accordance with Section 12.1 of OVSC TP-222-03. As shown in Data Sheet 2 for Seat Nos: 1 and 22, the seat back area is greater than ninety percent of the seat bench width multiplied by 508.

Restraining barrier position and projected rear surface area of Barrier Nos. 1 and 22 were measured in accordance with OVSC TP-222-03. As shown in Data Sheet 6 for Barrier Nos: 1 and 22, the surface area of the barriers are equal to or greater than the seat backs to the rear of them.

SEAT CUSHION RETENTION

Seat Nos. 10 and 14 were tested in accordance with Section 12.3 of OVSC TP-222-03. Seat cushion weight was 3.5 kg. The maximum forces for Seat Cushion Nos. 10 and 14 were 207 N and 206 N. The lower time limit boundary (t1) was approximately 4 seconds with an approximate load duration of 5 seconds for both seat cushions. As shown in Data Sheet 3, the seat cushions tested complied with all requirements.

SECTION 2 (CONTINUED)
TEST DATA SUMMARY

SEAT BACK FORCE/DEFLECTION TEST - FORWARD

Seat Nos. 21 and 22 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 960 mm. "W" was calculated to be 2.5 and rounded to the nearest whole number (3). The seating reference point (SRP) was 465 mm above the bus floor. The deflection of the seat back at conclusion of lower loading bar loading at 4674 N position was 51 mm on Seat No. 21 and 54 mm on Seat No. 22. The allowable maximum deflection without moving the seat back to within 102 mm of another seat or restraining barrier was 356 mm on both seats. The stroke rate of the upper loading bar was determined by the test engineer to be 14.4 mm/sec for both seats. The location of the upper loading bar was 406 mm above the SRP. The test was stopped when the maximum deflection of 356 mm was achieved. The energy under the curve was 1579 joules for Seat No. 21 and 1555 joules for Seat No. 22. The minimum required area under the force versus deflection curve of the upper loading bar was 452 W or 1356 joules. As shown on Data Sheet No. 4, both Seat Nos: 21 and 22 met the force deflection forward requirements. See Plot No. 3 for Seat No. 21 and Plot No. 4 for Seat No. 22.

SEAT BACK FORCE/DEFLECTION TEST - REARWARD

Seat Nos. 6 and 18 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 960 mm for Seat No. 6 and 960 mm for Seat No. 18. "W" was calculated to be 2.5 and rounded to the nearest whole number (3). The seating reference point (SRP) was 465 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 10.6 mm/sec for Seat Nos. 6 and 18. The location of the loading bar was 343 mm above the SRP for both Seat Nos. 6 and 18. The test was stopped when the maximum deflection of the seat back of 254 mm was achieved.

SECTION 2 (CONTINUED)
TEST DATA SUMMARY

SEAT BACK FORCE/DEFLECTION TEST – REARWARD (CONTINUED)

The area under the force versus deflection curve of the loading bar was 1120 joules for Seat No. 6 and 1007 joules for Seat No. 18. The minimum required area under the force versus deflection curve of the loading bar was 316 W or 948 joules. As shown in Data Sheet No. 5, the tested area under the force versus deflection curve for the loading bar does comply with the requirements for both Seat Nos. 6 and 18. See Plots 5 and 6.

RESTRAINING BARRIER FORCE/DEFLECTION TEST - FORWARD

The replacement right restraining barrier (BX) was tested at a mid point location selected to replicate the original mounting conditions in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 960 mm. "W" was calculated to be 2.5 and rounded to the nearest whole number (3). The SRP was 465 mm above the bus floor. The lower loading bar was 480 mm above the bus floor. The deflection of the restraining barrier at the conclusion of the lower loading bar loading at 4662 N (1554 W) was 9 mm. The allowable maximum deflection without moving the restraining barrier to within interference of a seat or door was 356 mm. The stroke rate of the upper loading bar was determined by the test engineer from test data to be 14.4 mm/sec. The location of the upper loading bar was 406 mm above the SRP. The test was stopped when the maximum deflection of 356 mm was reached. The area under the force versus deflection curve of the upper loading bar was 1621 joules. The minimum required area under the force versus deflection curve of the upper loading bar was 452 W or 1356 joules. As shown in Data Sheet 7, the tested area under the force versus deflection curve for the upper loading bar does comply with the requirements for the area under the force versus deflection curve.

HEAD FORM IMPACT ZONE TESTS

Seat No. 2 was tested in accordance with Section 12.6 of OVSC TP-222-03. The mass of the head form was 5.20 kg. All head form contact area and impact energy criteria were met for the seat.

SECTION 2 (CONTINUED)
TEST DATA SUMMARY

KNEE FORM IMPACT ZONE TESTS

Seat No. 2 was tested in accordance with Section 12.7 of OVSC TP-222-03. The mass of the knee form was 4.52 kg. All knee form contact area criteria and impact energy criteria were met for the seat.

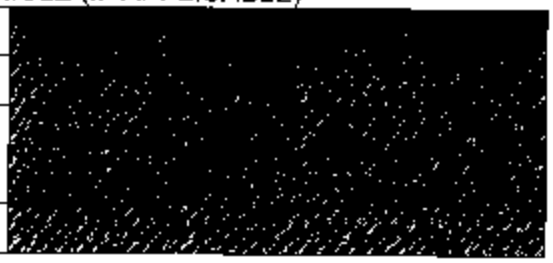
WHEELCHAIR SECUREMENT ANCHORAGES AND DEVICES

There were no wheelchair anchorages in this vehicle.

ADMINISTRATIVE DATA SHEET

Test Vehicle: **2003 ATC IC3S530 School Bus** NHTSA No.: **C30902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/02/03**

INCOMPLETE VEHICLE (IF APPLICABLE)

Manufacturer:	
Model:	
VIN:	
Build Date:	
Certification Date:	

COMPLETED VEHICLE (SCHOOL BUS)

Manufacturer:	American Transportation Corporation
Make/Model:	2003 ATC IC3S530
VIN:	4DRBRABN73B955119
NHTSA No.:	C30902
Color:	Yellow
GVWR:	12,474 kg
Build Date:	10/02
Certification Date:	10/02

DATES

Vehicle Receipt:	11/04/02
Start of Compliance Test:	4/02/03
Completion of Compliance Test:	5/30/03

TEST VEHICLE (SCHOOL BUS) DISPOSITION: FMVSS 301S Test

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

Recorded By: _____

Approved By: _____ Date: 6/6/03

GENERAL TEST DATA SHEET

Test Vehicle: **2003 ATC IC3S530 School Bus** NHTSA No.: **C30902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/02/03**

SCHOOL BUS IDENTIFICATION

Model Year/Mfr./Make/Model:	2003 ATC IC3S530
Wheelbase:	6.45 meters
Passenger Capacity:	64 (1 driver, 63 passengers)
NHTSA No.:	C30902
VIN:	4DRBRABN73B955119
Conventional or Forward Control:	Conventional
GVWR (Certification Label) FRONT:	4,536 kg
GVWR (Certification Label) REAR:	7,938 kg
GVWR (Certification Label) TOTAL:	12,474 kg

TEST CONDITIONS

Date(s) of Test:	April 9 – June 4, 2003
Ambient Temperature (°C):	20
Required Temperature Range:	0°C to 32°C

SEAT IDENTIFICATION

Seat Manufacturer:	[redacted]
Model Name & Number:	
Description of Seats:	Seat frames are constructed of 25.4 mm round and square welded steel tubing. The seat back has a .635 mm stamped steel pan welded inside the tubing and is covered with 25 mm poly foam on the front surface and 50 mm rebond foam on the outer edges and 35 mm molded Styrofoam blocks inset into the outboard knee impact areas. The seat cushion is constructed of 10 mm plywood with 90 mm poly foam pad. 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 MY2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902.

DATA SHEET 1

SEAT TO SEAT/BARRIER SPACING

Test Vehicle: **2003 ATC IC3S530 School Bus** NHTSA No.: **C30902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/02/03**

SEAT NUMBER	MEASUREMENT OF SPACING FROM SRP FORWARD TO SEAT/BARIER (mm)	REQMT ≤ 610 MM (≤ 24") CLASS 1 BUSES ONLY) PASS/FAIL
1	456	PASS
2	480	PASS
3	470	PASS
4	465	PASS
5	475	PASS
6	472	PASS
7	462	PASS
8	481	PASS
9	485	PASS
10	480	PASS
11	474	PASS
12	465	PASS
13	488	PASS
14	473	PASS
15	482	PASS
16	474	PASS
17	468	PASS
18	481	PASS
19	470	PASS
20	473	PASS
21	482	PASS
22	455	PASS

COMMENTS: NONE

Recorded By: 

Approved By:  Date: 6/6/03

DATA SHEET 2

SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

Test Vehicle: **2003 ATC IC3S530 School Bus** NHTSA No.: **C30902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/02/03**

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 = 865 mm; width, b = 960 mm; radius = 136 mm

   Area = ½ (a+b) x 508 mm = 463,550 mm^2 - *7,940 mm^2 = 455,610 mm^2

3. Measure the seat cushion width - - W1 = 960 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 = 438,912 mm^2

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

NOTE: For a seat back or a seat cushion that has a nonsymmetrical shape or has a large radius at the corner, the above described measuring method must be modified as required to obtain accurate area measurements.

Comments: * Denotes area outside of radius.

Recorded By: _____

Approved By: _____ Date: 6/6/03

DATA SHEET 2 (CONTINUED)
SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

SEAT NUMBER: S22

		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 = 865 mm; width, b = 960 mm; radius = 136 mm

   Area = ½ (a+b) x 508 mm = 463,550 mm^2 - *7,940 mm^2 = 455,610 mm^2

3. Measure the seat cushion width - - W1 = 960 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 = 438,912 mm^2

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

NOTE: For a seat back or a seat cushion that has a nonsymmetrical shape or has a large radius at the corner, the above described measuring method must be modified as required to obtain accurate area measurements.

Comments: * Denotes area outside of radius.

Recorded By: 

Approved By: 

Date: 6/6/03

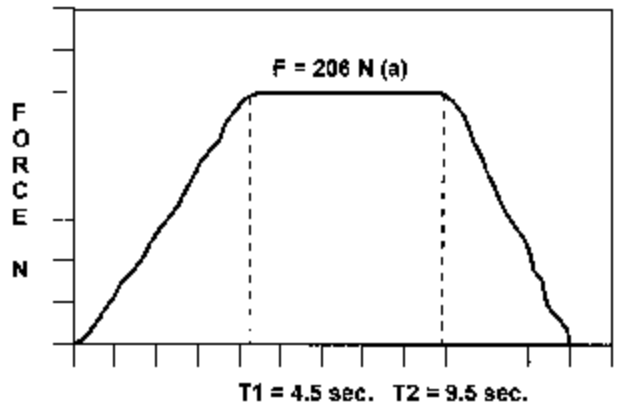
DATA SHEET 3

SEAT CUSHION RETENTION TEST

Test Vehicle:	**2003 ATC IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**4/16/03**

SEAT NUMBER: S10

1. Cushion Weight/Mass = 4.21 kg
2. Cushion Weight x 5 = F = 206 N (S5.1.5)
3. Complete the following force/time graph:



F must be 5 x Cushion Weight; t1 and t2 must be according to the following expressions: T1=>1 sec., <5 sec., t2 = t1 + 5 sec., + 0 sec. and -0.10 sec.

		PASS/FAIL
4.	Did seat cushion separate from the seat structure at any attachment point? (S5.1.5)	**PASS**

DESCRIBE SEAT CUSHION ATTACHMENTS: 2 half shell clamps on front of seat and 1 pivoting latch on rear.

Comments: NONE

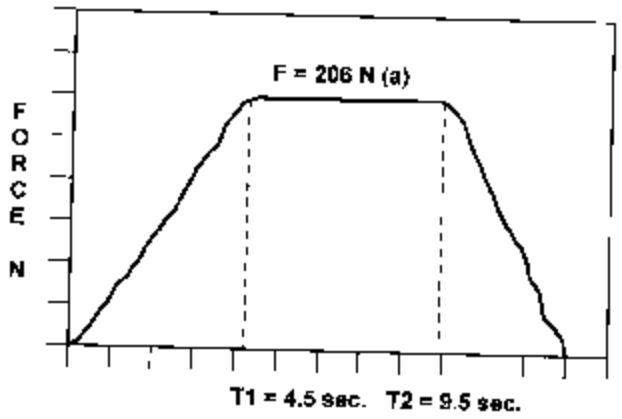
Recorded By: _____

Approved By: _____ Date: 6/6/03

DATA SHEET 3 (CONTINUED)
SEAT CUSHION RETENTION TEST

SEAT NUMBER: S14

1. Cushion Weight/Mass = 4.21 kg
2. Cushion Weight x 5 = **F** = 206 N (S5.1.5)
3. Complete the following force/time graph:



F must be 5 x Cushion Weight; t1 and t2 must be according to the following expressions: T1=>1 sec., <5 sec., t2 = t1 + 5 sec., + 0 sec. and -0.10 sec.

		PASS/FAIL
4.	Did seat cushion separate from the seat structure at any attachment point? (S5.1.5)	PASS

DESCRIBE SEAT CUSHION ATTACHMENTS: 2 half shell clamps on front of seat and 1 pivoting latch on rear.

Comments: NONE

Recorded By: _____

Approved By: _____ Date: 6/6/03

DATA SHEET 4

SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle:	**2003 ATC IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**4/09/03**

SEAT NUMBER: S21

1. Seat Bench Width = 960 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (3)
   Seat Reference Point (SRP) location is: (Description of location as supplied by the manufacturer): 465 mm Above Floor, 130.9 mm Forward of Seat Back
2. Location of lower loading bar is 15 mm above the SRP.
   (Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
   Length of lower loading bar = 864 mm
   Seat Back width at SRP = 960 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) = 58 mm; at start of upper bar loading, 58 mm; at end of upper bar loading, 58 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 or less) (S5.1.3)
6. Seat back movement rate selected by the test engineer = 14.4 mmps
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 = 787 mm Width of seat back at 406 mm above SRP = 885 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 349 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 4 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST - FORWARD

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

		PASS/FAIL
12.	Does the forward force vs. deflection trace of the seat back lie within the unshaded area? (S5.1.3)	PASS

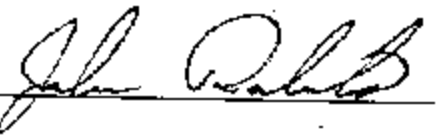
13. Include a deflection vs. time plot for the upper loading bar.

14. The area within the force vs. deflection curve = 1579 joules

15. 452W = 1356 joules (S5.1.3.4)

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

Comments: NONE

Recorded By: 

Approved By: 

Date: 6/6/03

DATA SHEET 4 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle:	**2003 ATC IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**4/09/03**

SEAT NUMBER: S22

1. Seat Bench Width = 960 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (3)
2. Seat Reference Point (SRP) location is: (Description of location as supplied by the manufacturer): 465 mm Above Floor, 130.9 mm Forward of Seat Back
3. Location of lower loading bar is 15 mm above the SRP.
   (Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
   Length of lower loading bar = 864 mm
   Seat Back width at SRP = 960 mm
4. Include x-y plot of Force vs. Time for the lower loading bar.
5. Deflection of the seat back at conclusion of lower bar loading (1557 W Newtons position) = 62 mm; at start of upper bar loading, 62 mm; at end of upper bar loading _NR_ mm. (NR = Not Recorded)
6. 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)
7. Seat back movement rate selected by the test engineer = 14.4 mmps
8. 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 = 787 mm Width of seat back at 406 mm above SRP = 885 mm
9. 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 349 mm)
   ___ Separation was about to occur
10. 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 4 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST - FORWARD

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

		PASS/FAIL
12.	Does the forward force vs. deflection trace of the seat back lie within the unshaded area? (S5.1.3)	PASS

13. Include a deflection vs. time plot for the upper loading bar.
14. The area within the force vs. deflection curve = 1555 joules
15. 452W = 1356 joules (S5.1.3.4)

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

Comments: NONE

Recorded By: _____

Approved By: _____ Date: 6/6/03

DATA SHEET 5

SEAT BACK FORCE DEFLECTION TEST - REARWARD

Test Vehicle:	**2003 ATC IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**4/09/03**

SEAT NUMBER: S6

1. Seat Bench Width = 960 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (3)
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 = 787 mm
   Width of seat back at 343 mm above SRP = 895 mm
3. Deflection of seat back at 222 N preload = 9 mm
4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = 254 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 251 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 = 948 joules
11. The area within the force vs. deflection curve = 1120 joules

DATA SHEET 5 (CONTINUED)
SEAT BACK FORCE DEFLECTION TEST – REARWARD

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

Comments: NONE

Recorded By: _____

Approved By: _____ Date: 6/6/03

DATA SHEET 5 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST - REARWARD

Test Vehicle: **2003 ATC IC3S530 School Bus** NHTSA No.: **C30902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/09/03**

SEAT NUMBER: S18

1. Seat Bench Width = 960 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (3)
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 = 787 mm
   Width of seat back at 343 mm above SRP = 895 mm
3. Deflection of seat back at 222 N preload = 10 mm
4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = 254 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 251 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**

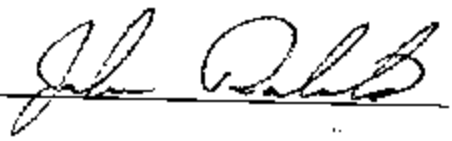
12. Include a deflection vs. time plot for the upper loading bar.
13. 316W = 948 joules
14. The area within the force vs. deflection curve = 1007 joules

DATA SHEET 5 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST – REARWARD

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

Comments: NONE

Recorded By: 

Approved By:  Date: 6/6/03

DATA SHEET 6

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

Test Vehicle: **2003 ATC IC3S530 School Bus** NHTSA No.: **C30902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/09/03**

BARRIER NUMBER: B22

See Figure 9 from OVSC TP-222-03 for diagram.

1. Measure distance T from SRP of seat immediately aft of barrier in a horizontal longitudinal line forward to barrier. T = 455 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 = 65 mm D_b = 25 mm

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

   C_t = 68 mm C_b = 25 mm

		PASS/FAIL
5.	Is D_b 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 = 885 mm E_b = 955 mm

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

   A_t = 890 mm A_b = 950 mm

DATA SHEET 6 (CONTINUED)

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

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

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

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

U_i = 320 mm U_o = 320 mm

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

V_i = 320 mm V_o = 335 mm

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

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

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

S_i = 675 mm S_o = 678 mm

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

W_i = 668 mm W_o = 660 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

DATA SHEET 6 (CONTINUED)

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

19. Compute area (W x A) = 618,880 mm^2

20. Computer area (E x S) = 622,380 mm^2

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

Comments: NONE

Recorded By: _____

Approved By: _____ Date: 6/6/03

DATA SHEET 7

RESTRAINING BARRIER FORCE/DEFLECTION TEST

Test Vehicle:	**2003 ATC IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**5/30/03**

BARRIER IDENTIFICATION: BX

1. Seat cushion width of seat immediately rearward of restraining barrier = 960 mm
   W = (Seat Cushion Width)/381 mm (round to nearest whole number) = (3)
2. Location of SRP of seat rearward of restraining barrier is: (Description of location as supplied by the manufacturer): 465 mm Above Floor, 130.9 mm Forward of Seat Back
3. Location of lower loading bar is 15 mm above the SRP.
   (Requirement: between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
   Length of loading bar = 864 mm
   Width of barrier at SRP = 960 mm
4. Include the x-y plot of force vs. time for the lower loading bar.
5. Deflection of the barrier at the conclusion of lower bar loading (1557W position) = 109 mm.
6. Maximum deflection allowed without moving the restraining barrier to within interference of door operation = 356 mm (must be 356 mm or less).
7. Barrier movement rate selected by the test engineer = 14.4 mm/sec
8. Location of upper loading bar is in a horizontal plane 406 mm above the SRP.
   (Requirement: 406 mm) (S5.1.3.3)
   Length of loading bar = 787 mm
   Width of seat at 406 mm above the SRP = 885 mm
9. Reason for stopping restraining barrier deflection:
   _X_ Reached 356 mm maximum
   ___ Separation was about to occur
   ___ Interference with door operation
10. Maximum deflection of barrier back 351 mm. (Requirement: maximum allowed is 356 mm) (S5.2.3(b))

DATA SHEET 7 (CONTINUED)

RESTRAINING BARRIER FORCE/DEFLECTION TEST

		PASS/FAIL
11.	Does the restraining barrier interfere with the normal operation of the door. (S5.2.3 (c))	

		PASS/FAIL
12.	Did any separation of barrier component or the separation of the barrier from the vehicle occur? (S5.1.3 (d) & (e))	**PASS**

3. Include the x-y plot of force vs. deflection for the upper loading bar with boundaries of Figure 14 (OVSC TP-222-3) superimposed.

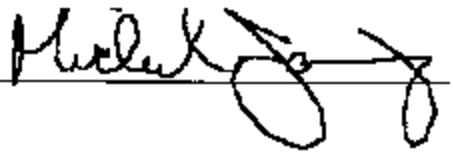
		PASS/FAIL
14.	Does the forward force vs. deflection trace of the barrier back lie within the unshaded area? (S5.2.3(a))	**PASS**

15. Include a deflection vs. time plot for the upper loading bar.
16. The area within the force vs. deflection curve = 1622 joules
17. 452W = 1356 joules (S5.2.3) (S5.1.3.4)

		PASS/FAIL
18.	Is item 16 greater than item 17?	**PASS**

Comments: Replacement barrier tested at mid-bus location per instructions from COTR.

Recorded By: 

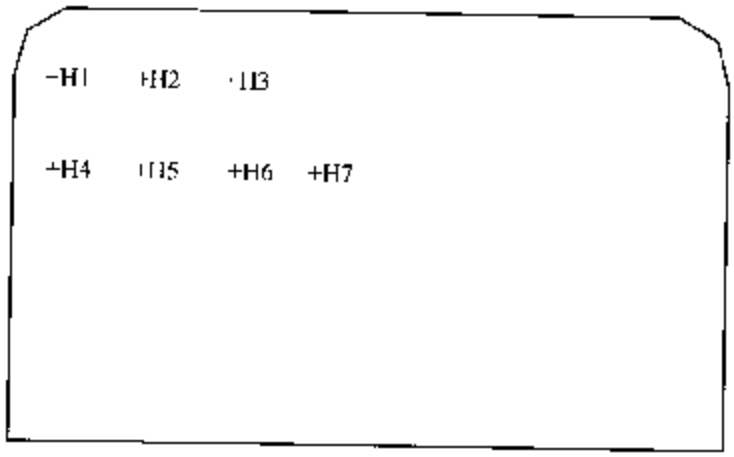
Approved By:  Date: 6/6/03

DATA SHEET 8

HEAD FORM IMPACT CONTACT AREA REQUIREMENT

Test Vehicle:	**2003 ATC IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**4/09/03**

SEAT NUMBER: S2



SEAT BACK REAR SURFACE

NOTE: SHADED AREA IS NONCONTACTABLE 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 Longitudinal Centerline of Vehicle

   Y = Up From Top Surface of Floor

DATA SHEET 8 (CONTINUED)

HEAD FORM IMPACT CONTACT AREA REQUIREMENT

4. Complete the following table:

(1)	(2)			(3)	(4)*	(5)	(6)	(7)
Head Impact & Test #	Location X	Location Y	Angle	Speed Trap Impact Velocity** mps	Derived Velocity mps	Contact Area (CA) mm^2	CA ≥ 1935 mm^2 Yes-Pass	CA ≥ 1935 mm^2 No-Fail
H1	935	889	0	1.527	1.40	4948	PASS	
H2	820	889	0	1.434 (a)	1.41	4219	PASS	
H3	700	889	0	1.469 (a)	1.49	3910	PASS	
H4	935	787	0	1.562	1.55	4381	PASS	
H5	820	787	0	1.490 (a)	1.50	3232	PASS	
H6	700	787	0	1.528	1.62	3232	PASS	
H7	580	787	0	1.640 (b)	1.58	4200	PASS	

* Contact Velocity from Item 7 below

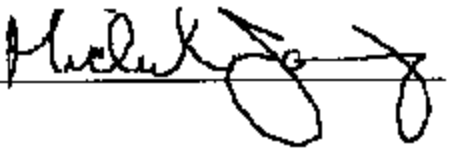
** Velocity Range = 1.52 mps, +0.08, -0 mps

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) Impact velocity lower than allowed, but contact area passes

(b) Impact velocity higher than allowed.

Recorded By: 

Approved By: 

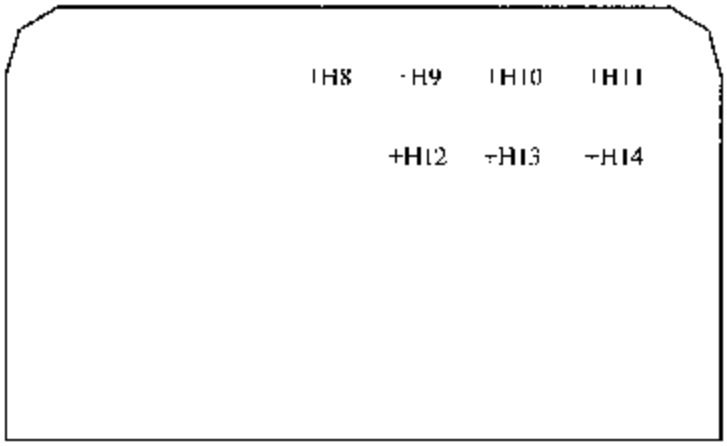
Date: 6/6/03

DATA SHEET 9

HEAD FORM IMPACT ENERGY REQUIREMENT

Test Vehicle:	**2003 ATC IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**4/09/03**

SEAT NUMBER: S2



SEAT BACK REAR SURFACE

NOTE: SHADED AREA IS NONCONTACTABLE 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 Longitudinal Centerline of Vehicle
   Y = Up From Top Surface of Floor

DATA SHEET 9 (CONTINUED)

HEAD FORM IMPACT ENERGY REQUIREMENT

4. Complete the following table:

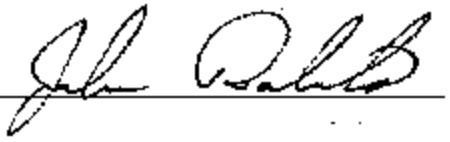
(1)	(2)			(3)	(4)*	(5)	(6)	(7)		(8)	
Head impact & Test #	Location			Speed Trap Impact Velocity ** mps	Derived Velocity ** mps	Max HIC	Engy Reqd Joules	Column 5 < 1000		Column 6 > 4.5 joules	
	X	Y	Angle					Yes-Pass	No-Fail	Yes-Pass	No-Fail
H8	580	889	0	6.69	6.67	119	7.40	PASS		PASS	
H9	460	889	0	6.69	6.61	115	7.24	PASS		PASS	
H10	395	889	0	6.72	6.63	113	7.81	PASS		PASS	
H11	240	889	0	6.75	6.68	129	5.51	PASS		PASS	
H12	460	787	0	6.71	6.66	126	11.37	PASS		PASS	
H13	345	787	0	6.69	6.63	118	11.54	PASS		PASS	
H14	240	787	0	6.69	6.72	161	4.55	PASS		PASS	

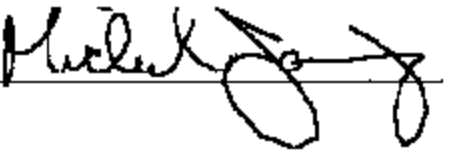
* Impact velocity from item No. 6 below

** 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: NONE

Recorded By: 

Approved By: 

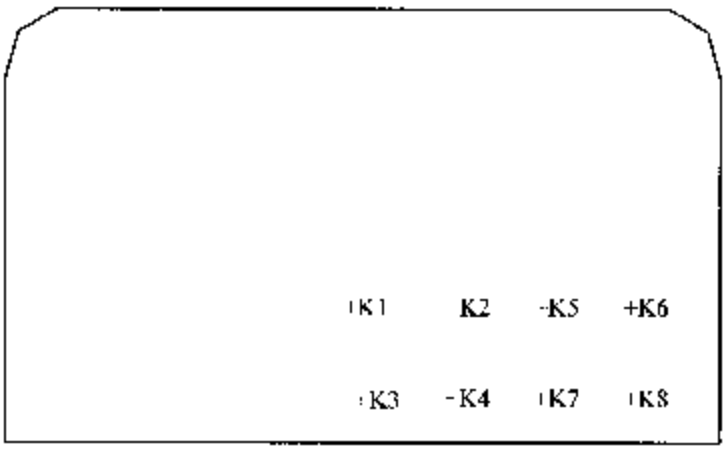
Date: 6/6/03

DATA SHEET 10

KNEE FORM IMPACT TEST

Test Vehicle:	**2003 ATC IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**4/09/03**

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 Longitudinal Centerline of Vehicle
   Y = Up From Top Surface of Floor

DATA SHEET 10 (CONTINUED)

KNEE FORM IMPACT TEST

4. Complete the following table:

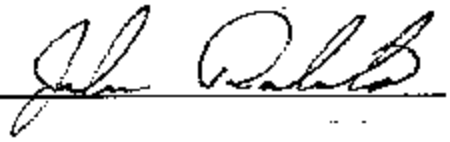
(1)	(2)			(3)	(4)*	(5)	(6)	(7)		(8)	
Knee impact & Test #	Location			Speed Trap Impact Velocity ** mps	Derived Velocity ** mps	Cont. Area mm^2	Resist Force (N)	Column 5 > 1935 mm^2		Column 6 < 2669N	
	X	Y	Angle					Yes Pass	No-Fail	Yes-Pass	No-Fail
K1	580	670	0	4.91	4.98	3368	1700	PASS		PASS	
K2	460	670	0	4.92	4.97	3413	1654	PASS		PASS	
K3	580	552	0	4.93	5.00	3310	1736	PASS		PASS	
K4	460	552	0	4.94	4.98	3271	1539	PASS		PASS	
K5	345	670	0	4.90 (a)	4.97	N/A	1562	N/A		PASS	
K6	240	670	0	4.90 (a)	4.91	N/A	2074	N/A		PASS	
K7	345	552	0	4.95 (a)	5.03	N/A	1491	N/A		PASS	
K8	240	552	0	4.95 (a)	5.05	N/A	2306	N/A		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) Impact velocity higher than allowed.

Recorded By: 

Approved By:  Date: 6/6/03

DATA SHEET 11

WHEELCHAIR SECUREMENT ANCHORAGES AND DEVICES

WHEELCHAIR OCCUPANT RESTRAINT ANCHORAGES AND RESTRAINTS

Test Vehicle: **2003 ATC IC3S530 School Bus** NHTSA No.: **C30902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **N/A**

WHEELCHAIR LOCATIONS: THERE WERE NO WHEELCHAIR ANCHORAGES

		PASS/FAIL
1.	Are all wheelchair securement and occupant restraint anchorages designed for forward wheelchair position?	

		PASS/FAIL
2.	Each wheelchair location shall have not less than four wheelchair securement anchorages (Type A or C) – two located in front of the wheelchair and two in the rear. Type C anchorage may be used in rear of the wheelchair only. Number of Type A anchorages in front of the wheelchair (≥2 Pass;<2 Fail)	

		PASS/FAIL
3.	Number of anchorages behind the wheelchair (≥2 Pass;<2 Fail): Type A _____; Type C _____; Total _____	

		PASS/FAIL
4.	Each wheelchair location shall have not less than two wheelchair occupant pelvis and upper torso restraint anchorage (Type B, C , or combination). The pelvic belt must not terminate at the wheelchair. Number of anchorages (≥2 Pass;<2 Fail): Type B _____; Type C _____; Total _____	

		PASS/FAIL
5.	The wheelchair location has at least one Type D anchorage:	

		PASS/FAIL
6.	The wheelchair securement device has means to limit movement of the wheelchair.	

DATA SHEET 11 (CONTINUED)

WHEELCHAIR SECUREMENT ANCHORAGES AND DEVICES

WHEELCHAIR OCCUPANT RESTRAINT ANCHORAGES AND RESTRAINTS

Wheelchair Location	Anchorage Location	Anchorage Type	Required Load (Newtons)	Actual Max. Test Load (Newtons)	Pass/ Fail	Comment
W-4	LF					
	RF					
	LR					
	RR					
	Upper Torso					
W-5	LF					
	RF					
	LR					
	RR					
	Upper Torso					

Comments:

Recorded By:_____

Approved By:_____ Date:

SECTION 4

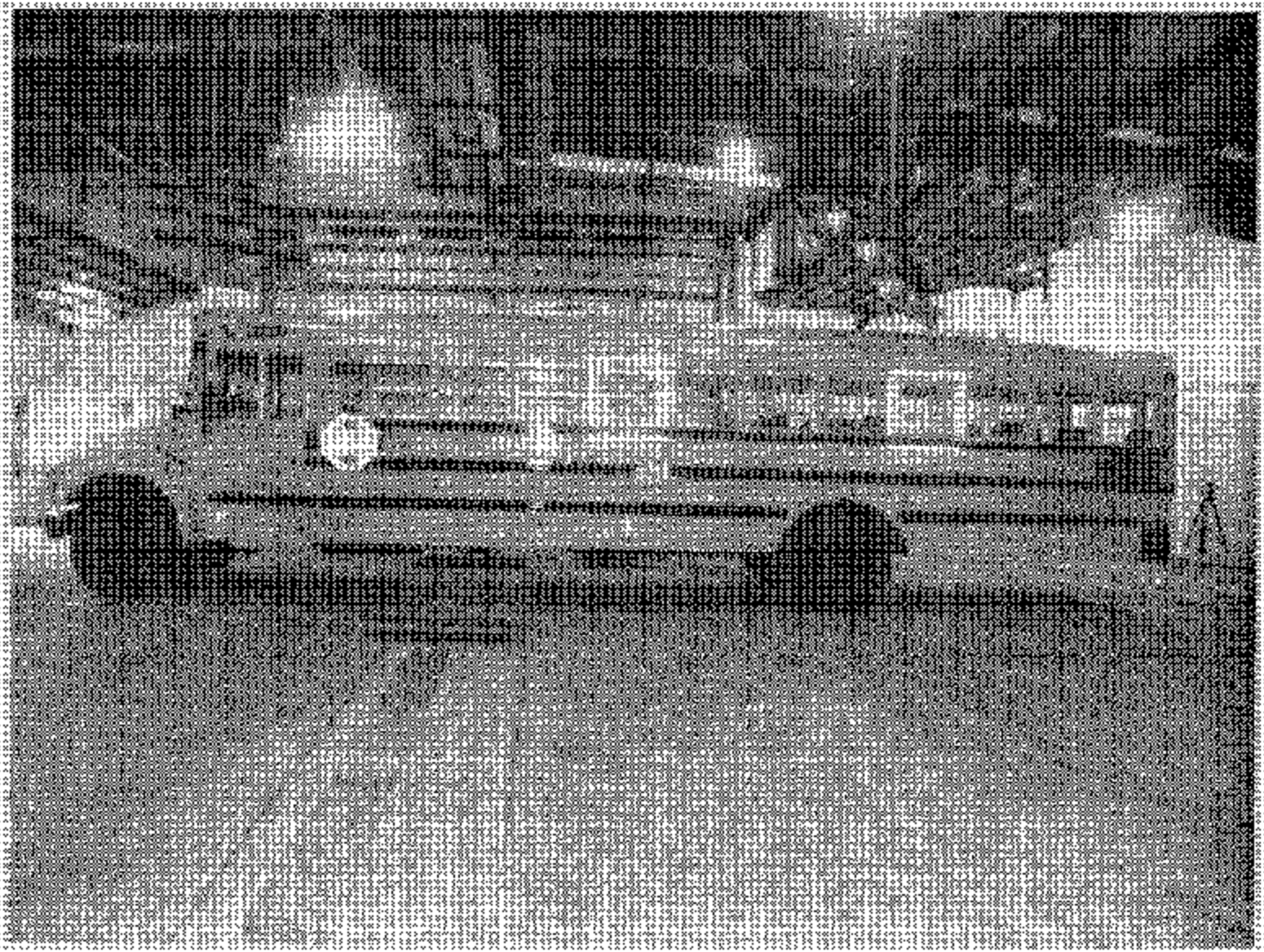
INSTRUMENTATION AND EQUIPMENT LIST

Test Vehicle: **2003 American Transportation Corp IC3S530 School Bus** NHTSA No.: **C30902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/02/03**

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 / 61219	2/10/03	8/10/03
Load Cell	Interface	1210AF / 22566	10/18/02	4/18/03
Inclinometer	Digital Protractor	Pro 360 / Comp Lab	11/15/02	5/15/03
Linear Potentiometer	Celesco	PT-101-40A / A04253	1/08/03	7/8/03
Scale	GEI	Metric / 1	1/6/03	7/6/03
Steel Tape	Stanley	Powerlock / 101	10/28/02	4/28/03
Impact Fixture	MGA	IF2003A	—	—
Camera	Sony	DSC-S75	—	—
Planimeter	Sokkia Corp.	Planix5 007319	3/7/03	6/5/03
Accelerometer	Endevco	7264-2000 / AN7F1	3/20/03	9/20/03
Accelerometer	Endevco	EGE-73B6Q-2000JF / H01-N30	10/31/02	4/31/03
Temp. Recorder	Oregon Scientific	WM-918	10/18/02	4/18/03
Linear Motion Transducer	Ametek	P-25A / 1202-19366	12/16/02	6/16/03
Linear Motion Transducer	Ametek	P25A / 1102-19182	12/16/02	6/16/03

SECTION 5
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS



Left Side View of School Bus

Test Vehicle: 2003 American Transportation Corporation IC3S630 School Bus
Procedure: FMVSS 222 NHTSA No. C30902

Profile View From Right Side of School Bus

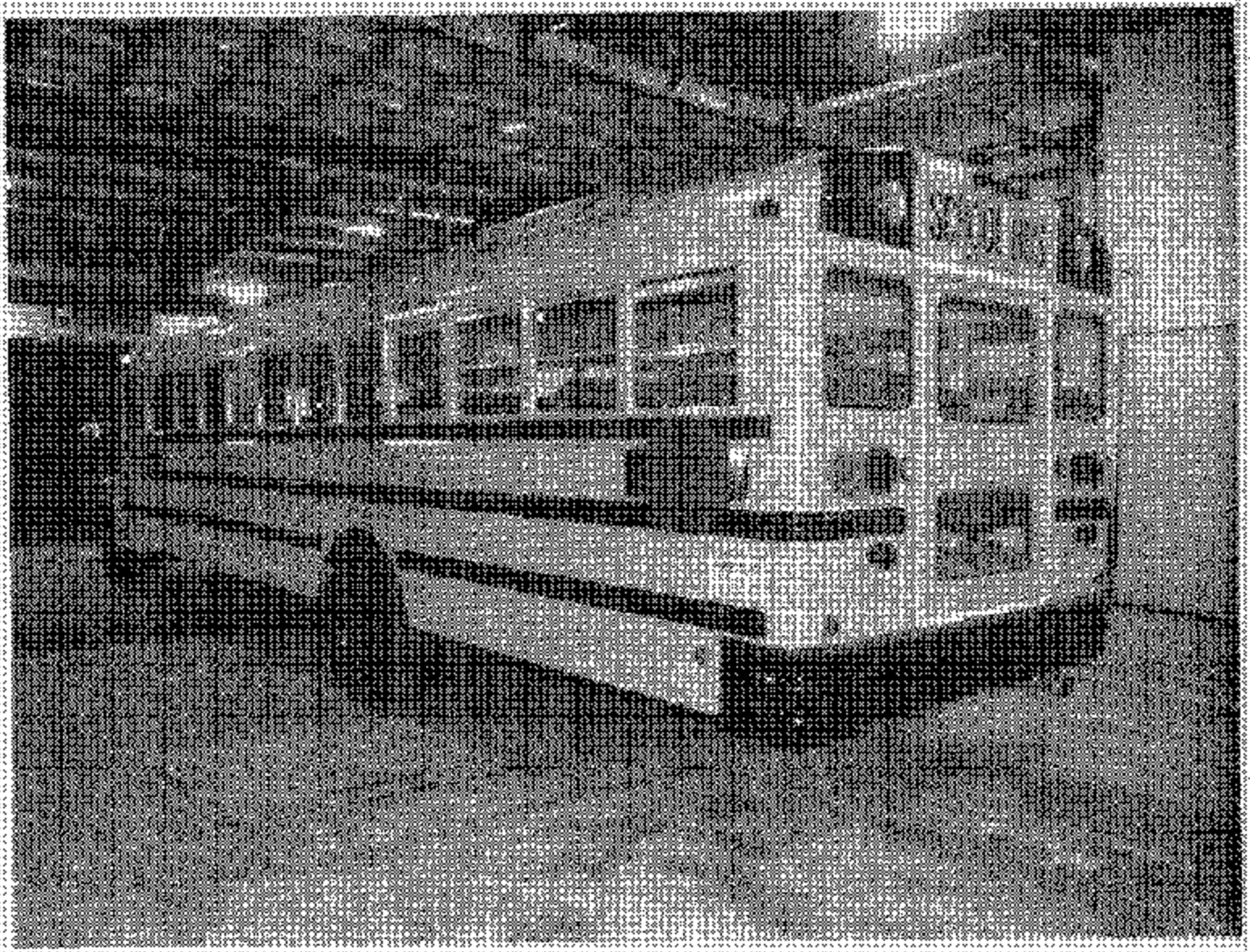
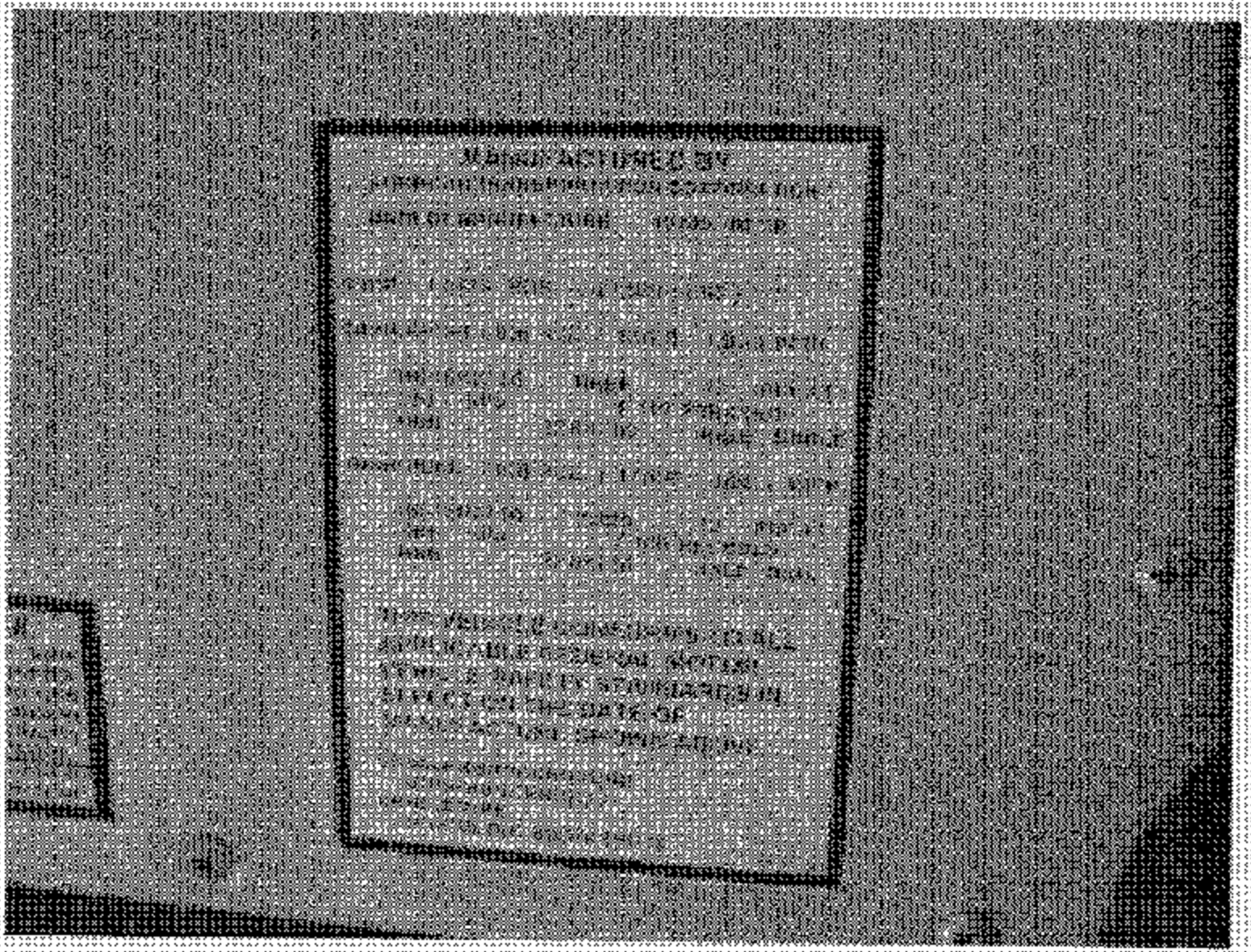


Fig. Rear View From Left Side of School Bus



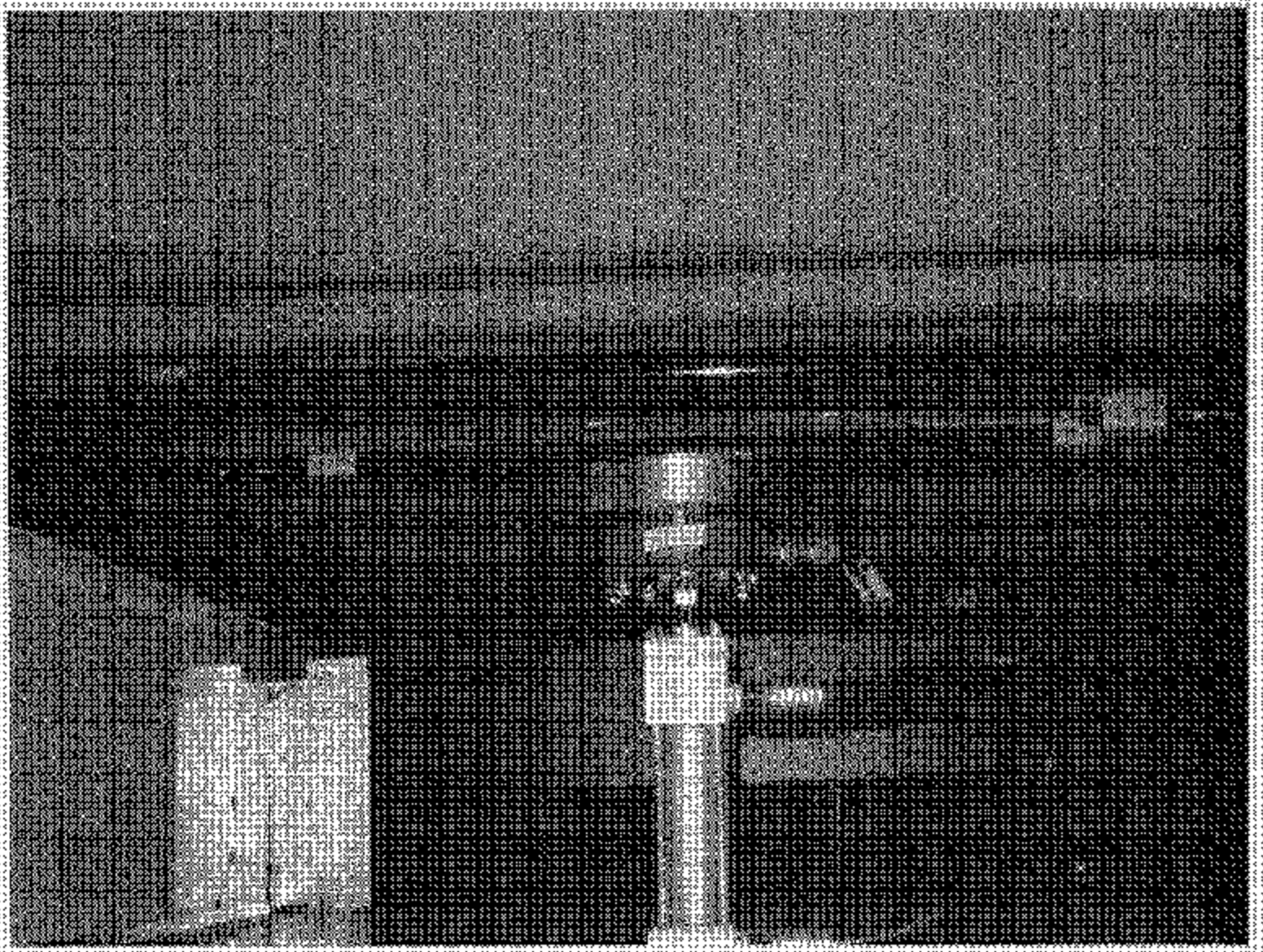
Certification Label

Test Vehicle: 2003 American Transportation Corporation IC35530 School Bus
Procedure: FMVSS 222 NHTSA No. C30902

Vehicle Interior View From Front to Rear

Vehicle Interior View From Rear to Front

Test Vehicle: 2003 American Transportation Corporation IC3S530 School Bus
Procedure: FMVSS 222 NHTSA No. C30902



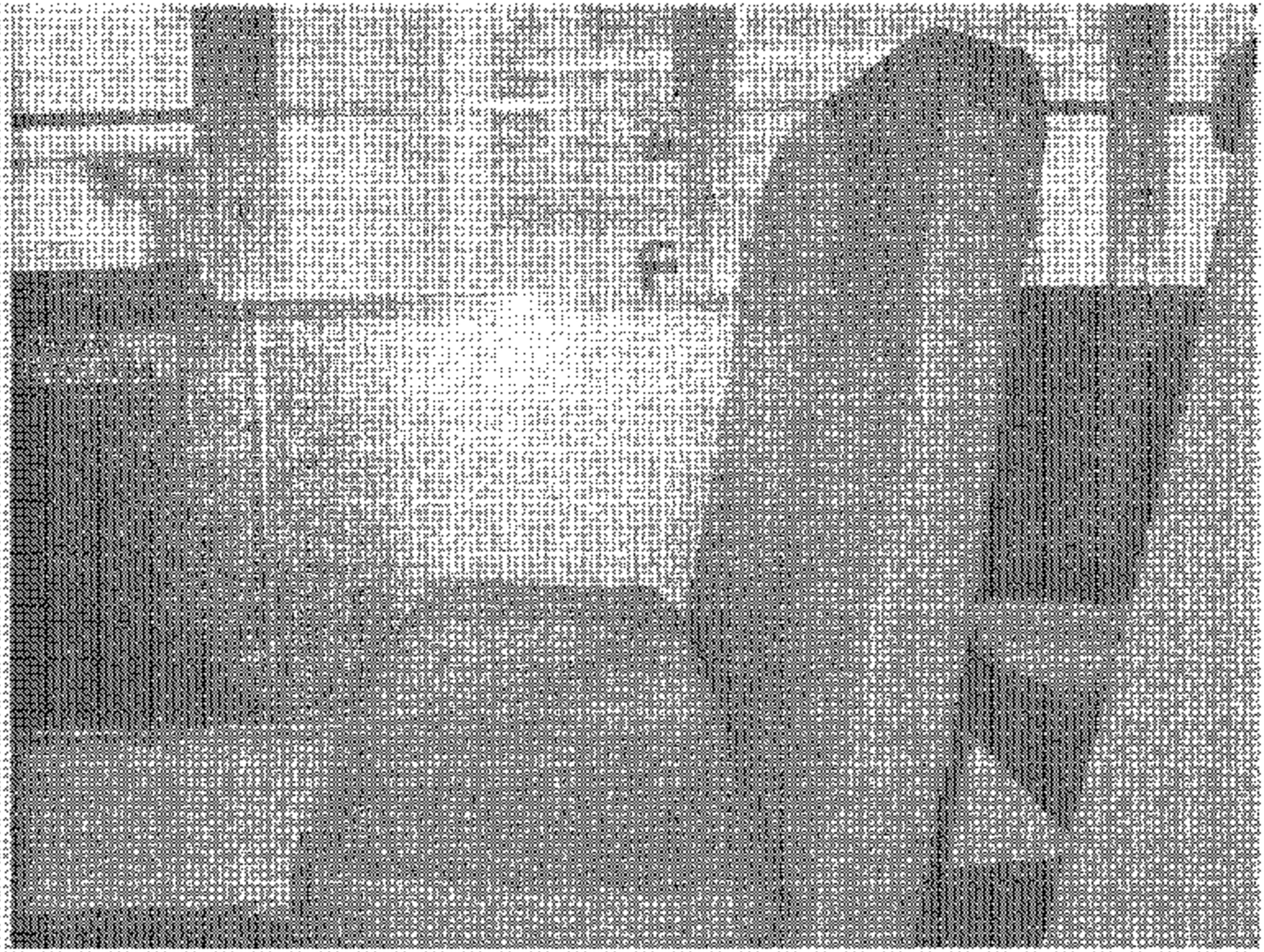
Typical Seat Cushion Test Setup

Test Vehicle: 2003 American Transportation Corporation (ATC) 5930 School Bus
Procedure: FMVSS 222 NHTSA No: C30902

Pre-Test Photo Station #10

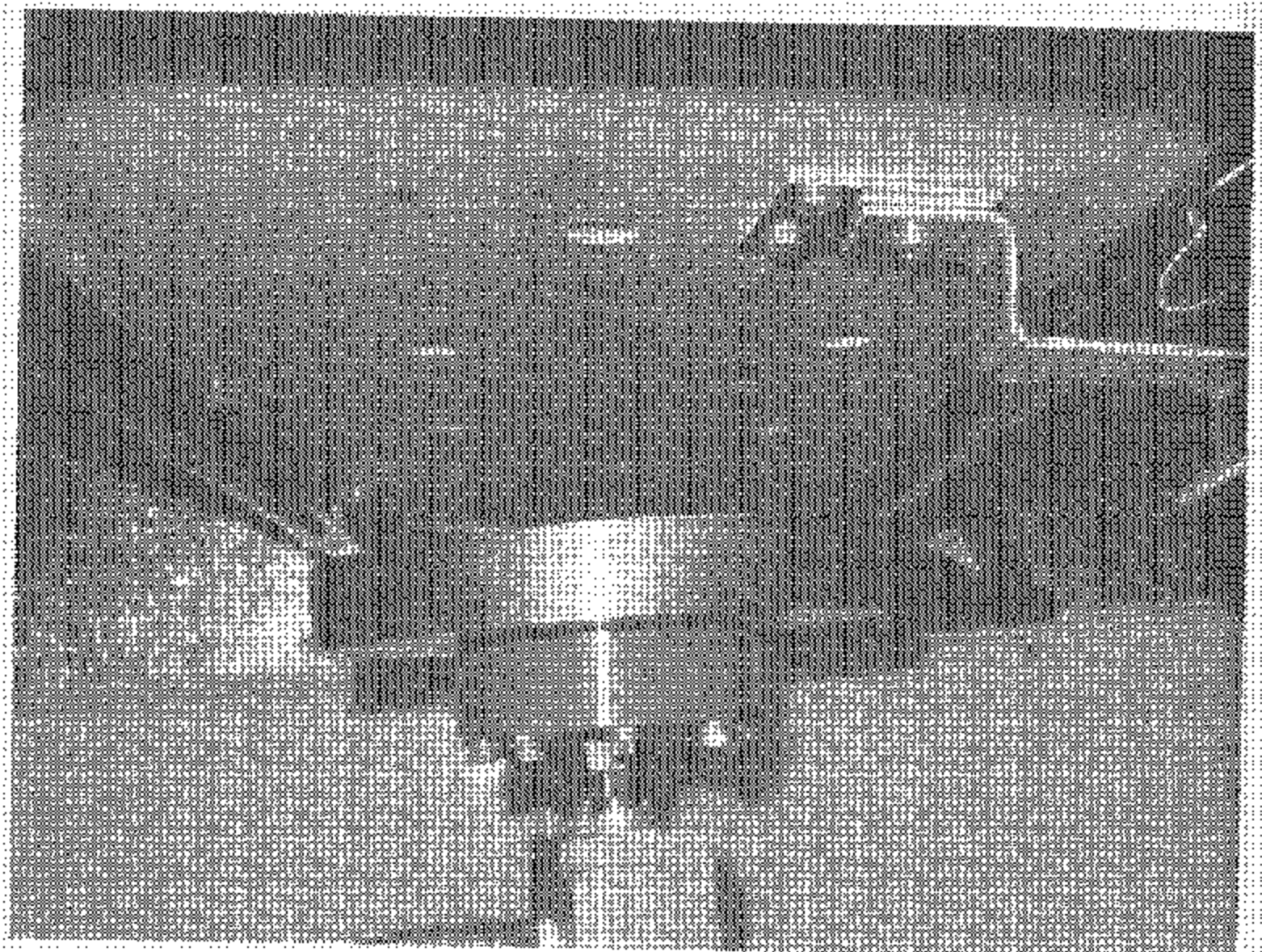
Test Vehicle: 2003 American Transportation Corporation (ATC) 3416 School Bus
Procedure: FMVSS 222 NHTSA No. 030067

Post-Test Orientation



Pre-Test of Seat Cushion #14

Test Vehicle: 2003 American Transportation Corporation (ATC) 35' School Bus
Procedure: FMVSS 222 NHTSA No.: C39602



Post Test on Seat Cushion #1

Test Vehicle: 2003 American Transportation Corporation AC3S630 School Bus
FMVSS 222
Procedure

NHTSA No. C30642

Typical Seat Back Force Deflection Forward Test Setup

Test Vehicle: 2003 American Transportation Corporation IC3852D School Bus

Propulsion: FMVSS 222 NHTSA No. 20170012

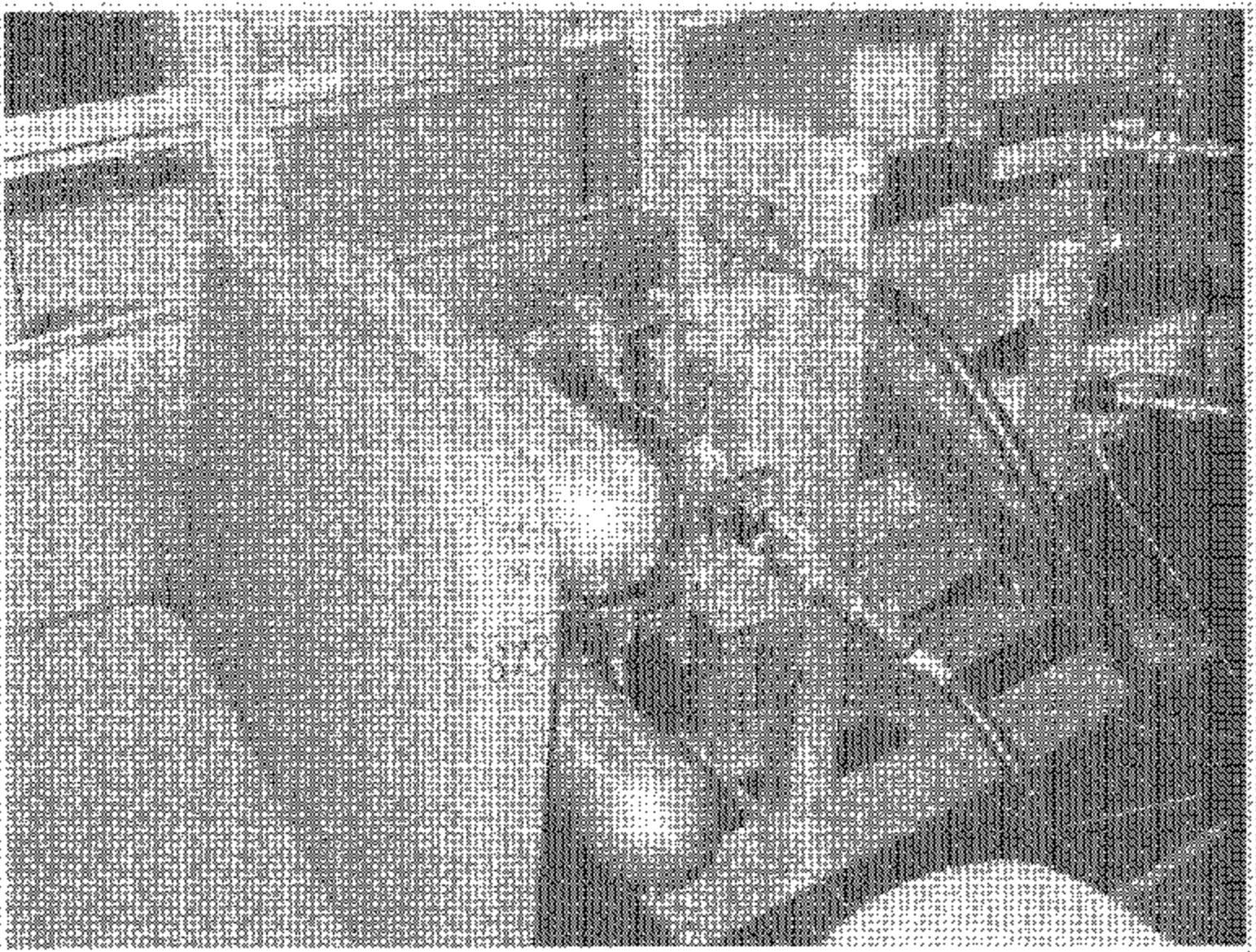
Delphi Yellow Bus 2003 American Transportation Corporation IC3S530 School Bus

Bus Number: 1NYSS 322 NHTSA No. C3S522

Seat Type: Delphi Seat Back #2 Force Detection Transducer Site

Test Vehicle: 2003 American Transportation Corporation IC3950 School Bus

Procedure: FMVSS 221 NHTSA No.: C30903



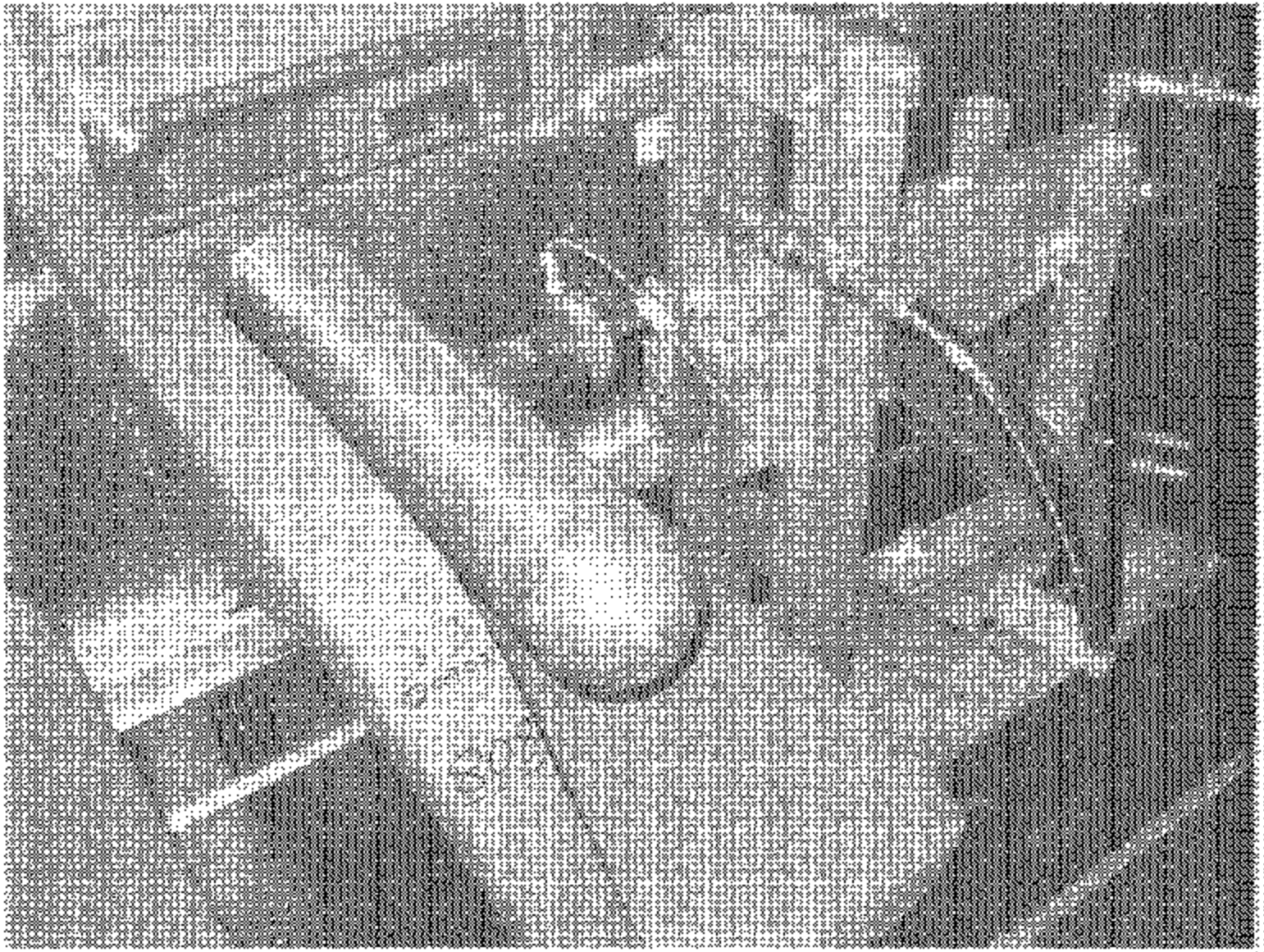
Pre-Test of Seat Back #22 Force Deflection Forward Test

Test Vehicle: 2003 American Transportation Corporation (ATC) School Bus

Procedure: FMVSS 222 NHTSA No: C30001

Projected Crush Profile #2 (Line 2 Minus Line 1)

Test Vehicle: 2003 American Transportation Corporation TC3S330 Rollout Bus
Procedure: FMVSS 222 NHTSA No: C30602

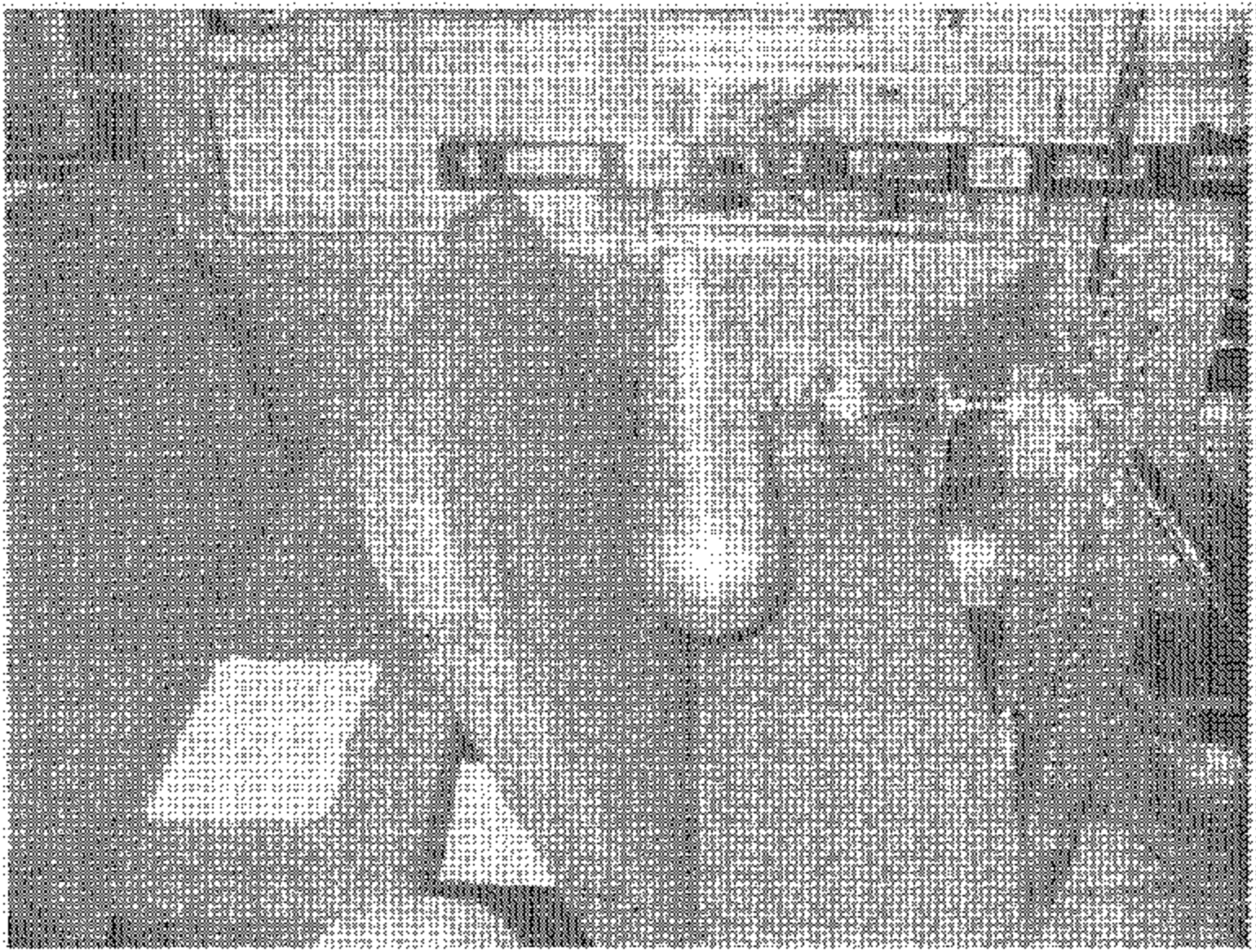


Typical Seat Back Force Deflection Rearward Test Setup

Test Vehicle: 2003 American Transportation Corporation (ATC) 84 Passenger School Bus

Procedure: FMVSS 222

Test Vehicle: 2003 American Transportation Corporation RSS330 School Bus
Procedure: FMVSS 222 NHTSA No: C30907



Post Test of Seat Back #6 Force Deflection Rearward Test

Test Report: 3003 American Transportation Corporation KC5330 Sphinx Bus
Prelude: FMVSS 222 NHTSA No: C24003

Protected Side Body Mounted Camera Location (Passenger Side)

Top View

2003 American Transportation Corporation C23D3 School Bus

Procedure

FMVSS 222

Exhibit

Photograph of Subject Bus (Passenger Side)

Test Vehicle: 2003 Ambulance Transportation Chevrolet C3500 School Bus
Project #: FMVSS 222 Test Date: 03/05/03

Photograph Depicting Vehicle Prior to Test

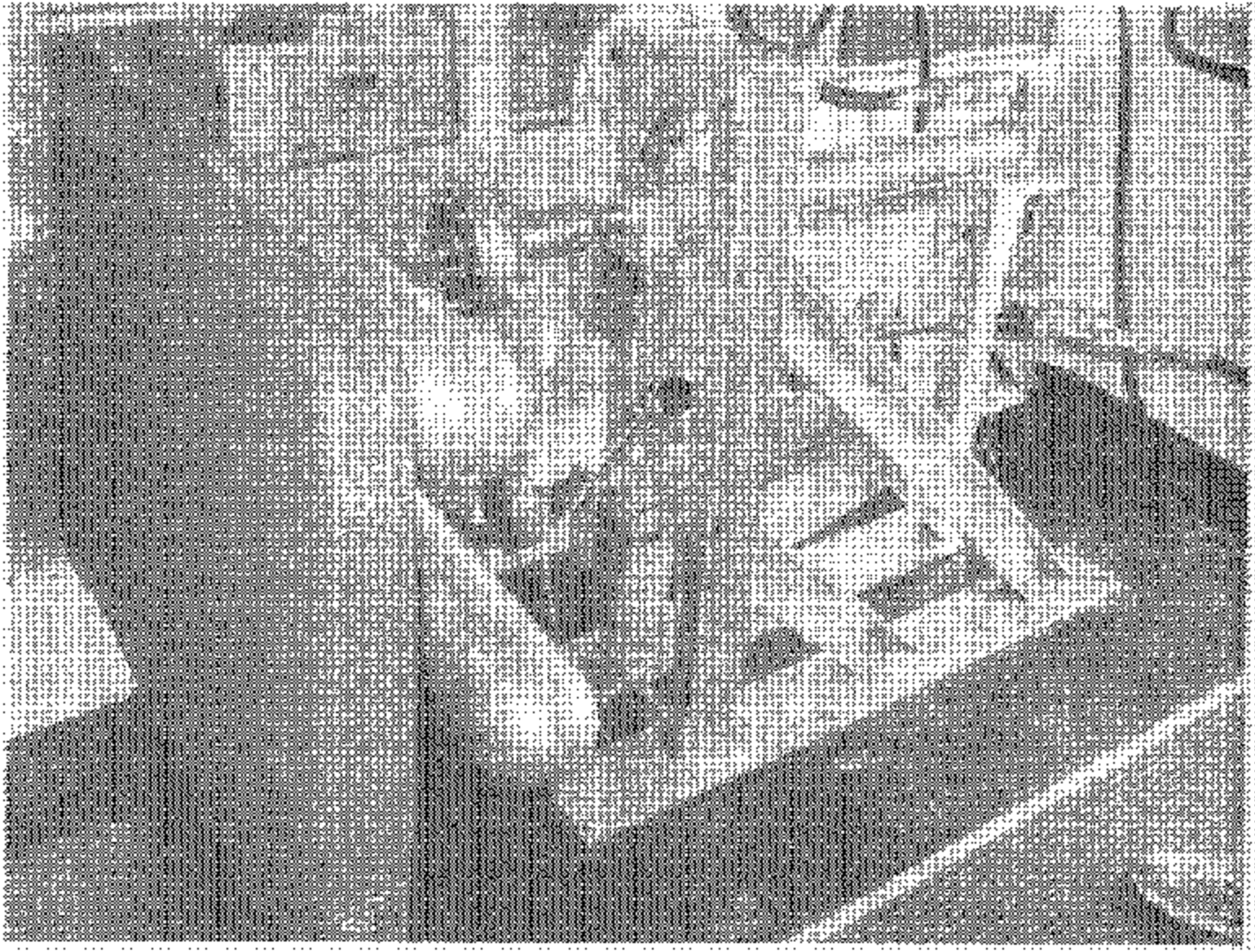
2003 American Transportation Corporation IC3350 School Bus
Navistar Inc. C3060
FMVSS 127
Driver Controls
Overview

Test Vehicle 2018 American Transportation Corporation IC3850 School Bus

Procedure FMVSS 222 NHTSA No. C31612

Figure 3.1: Subject vehicle, side view, passenger side

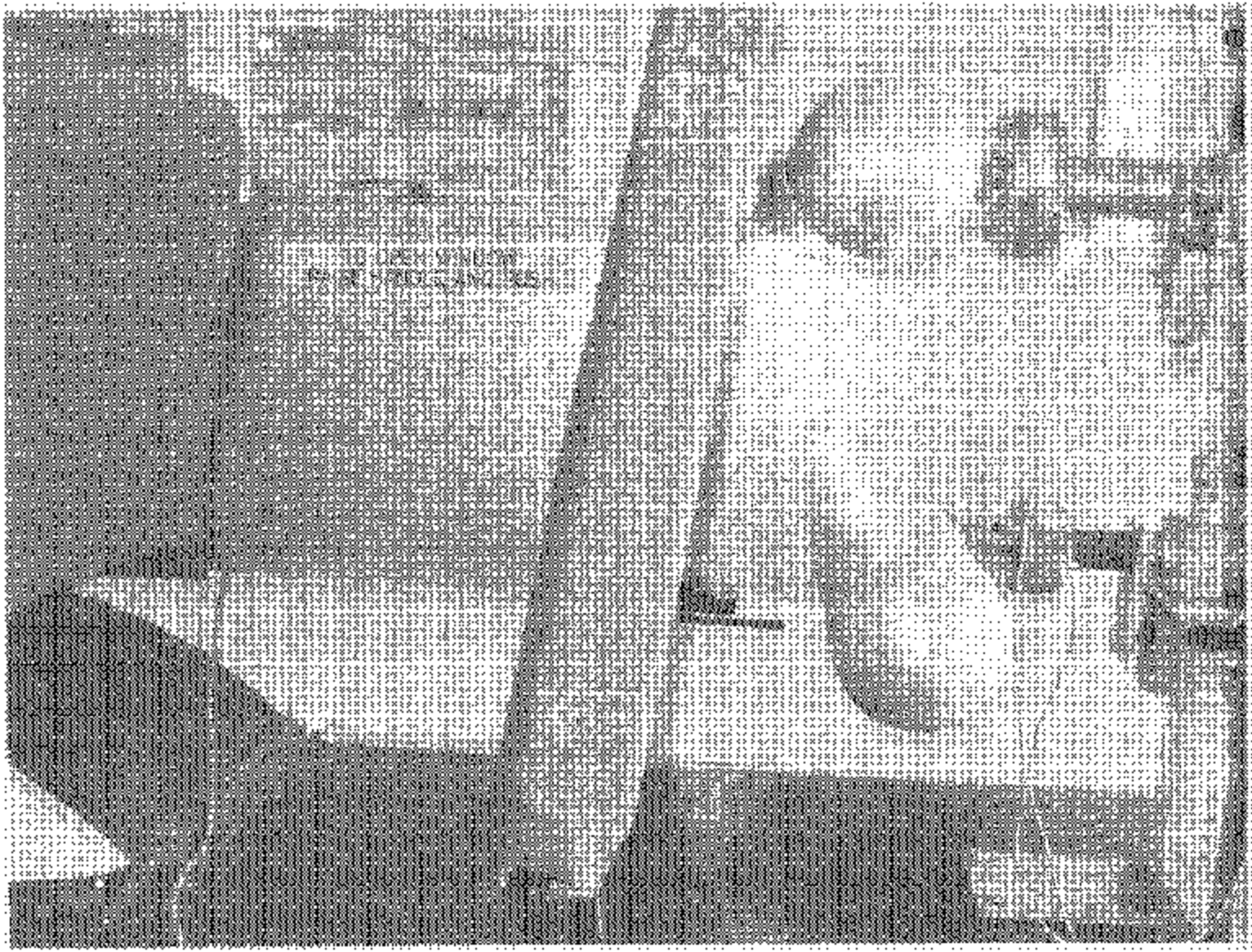
Peak Velocity
Centerline
2010 Airplane Pressurization Comparison IC33350 School Bus
TMVSS 222
NHTSA No. C40802



Typical Barrier Hood Deflection Forward Test Setup

Test Vehicle: 2003 American Transportation Corporation IC35S30 School Bus

Regulation: FMVSS 222 NHTSA No: C30902

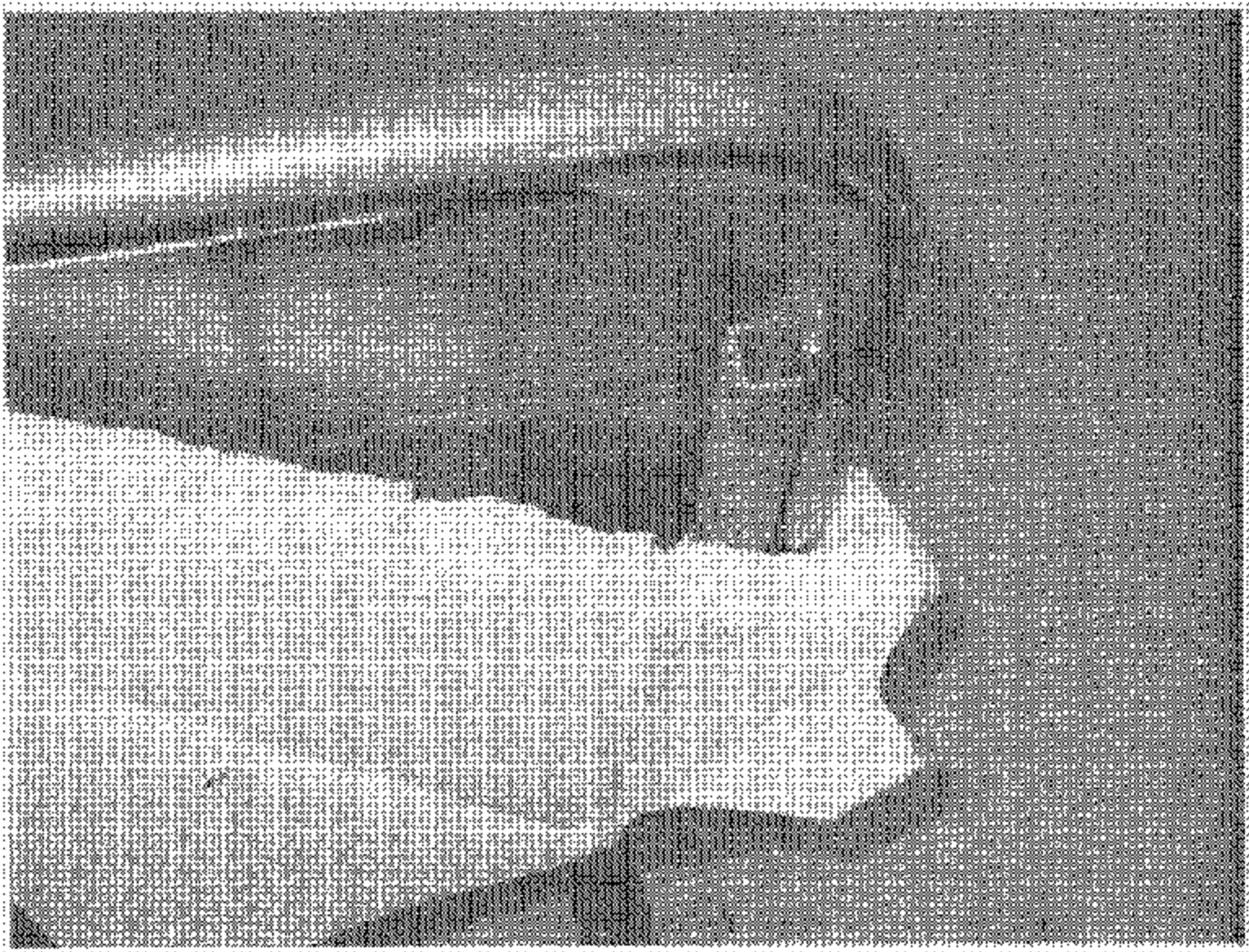


Pre-Test of Bench/Bk Force Deflection Forward Test

Jose Valbuena 4605 American Transportation Corporation CASE21 Schedule
Accident PAWSS 122 Inspection Date 6/2/2022

Fig. 1A of U.S. Patent Application Publication

Test Vehicle: 2003 American Transportation Corporation (C3S035 School Bus
Procedure: FMVSS 222 Test No.: C3M002



Typical Seat Back Stamp Deformation (Back View)

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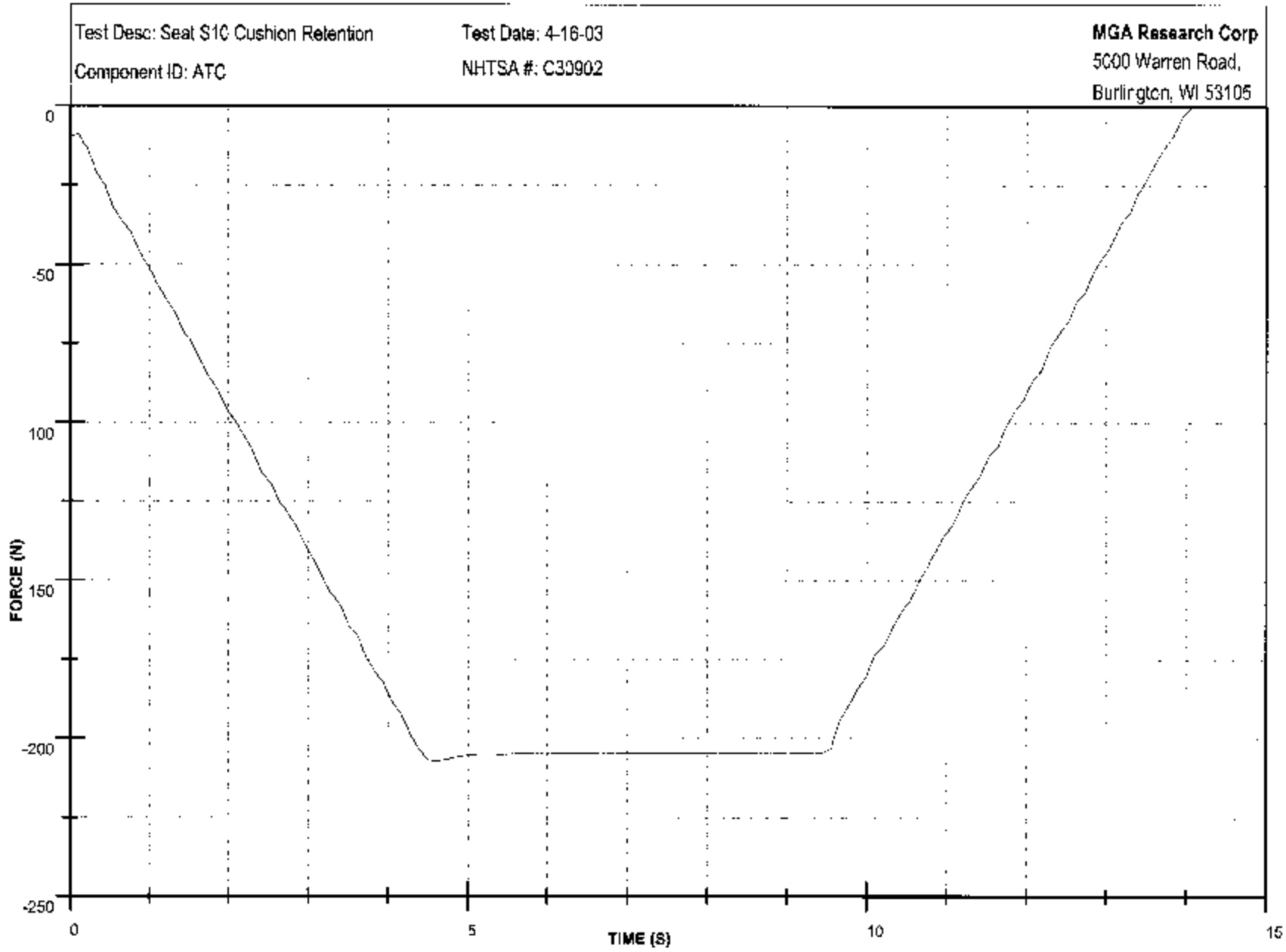
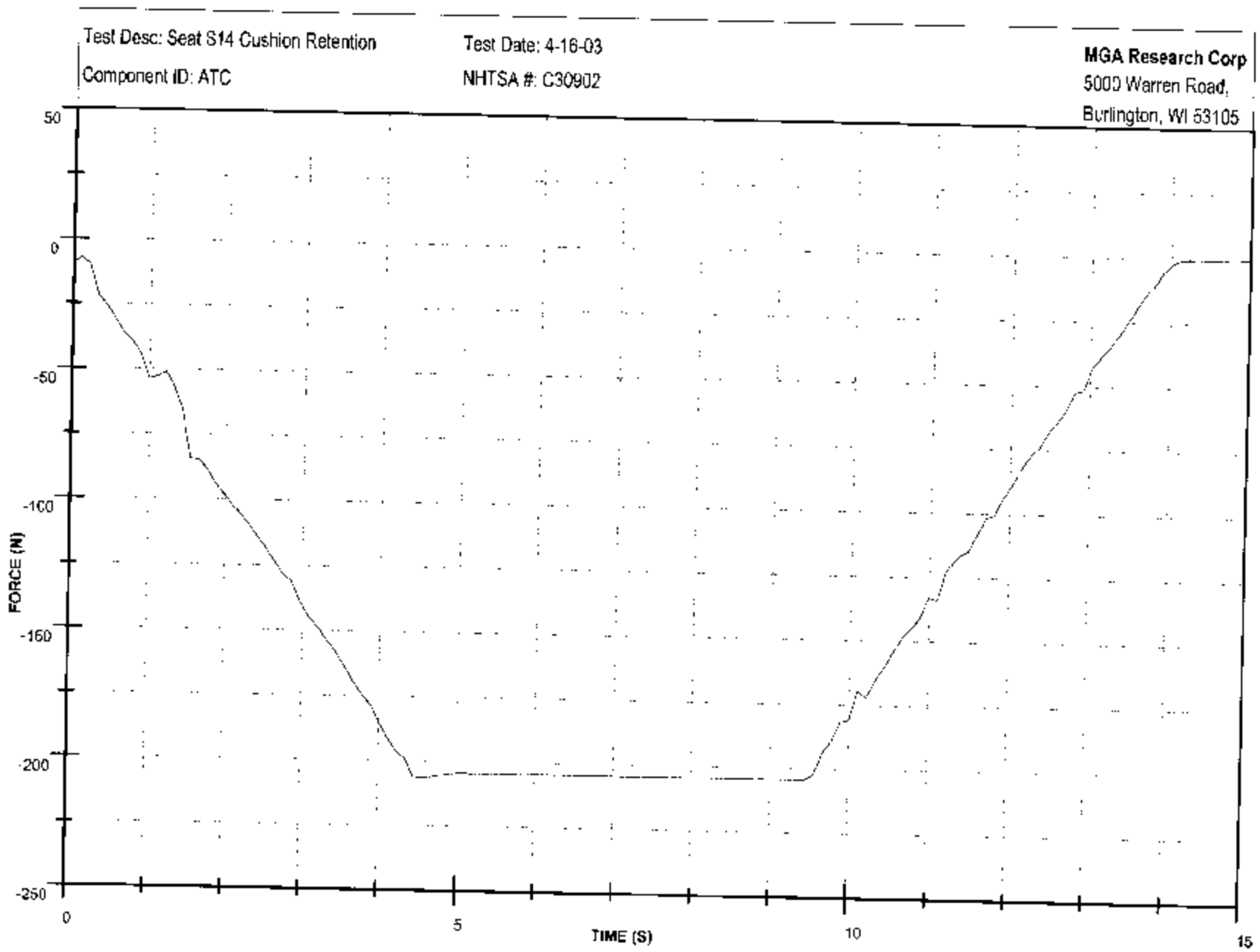
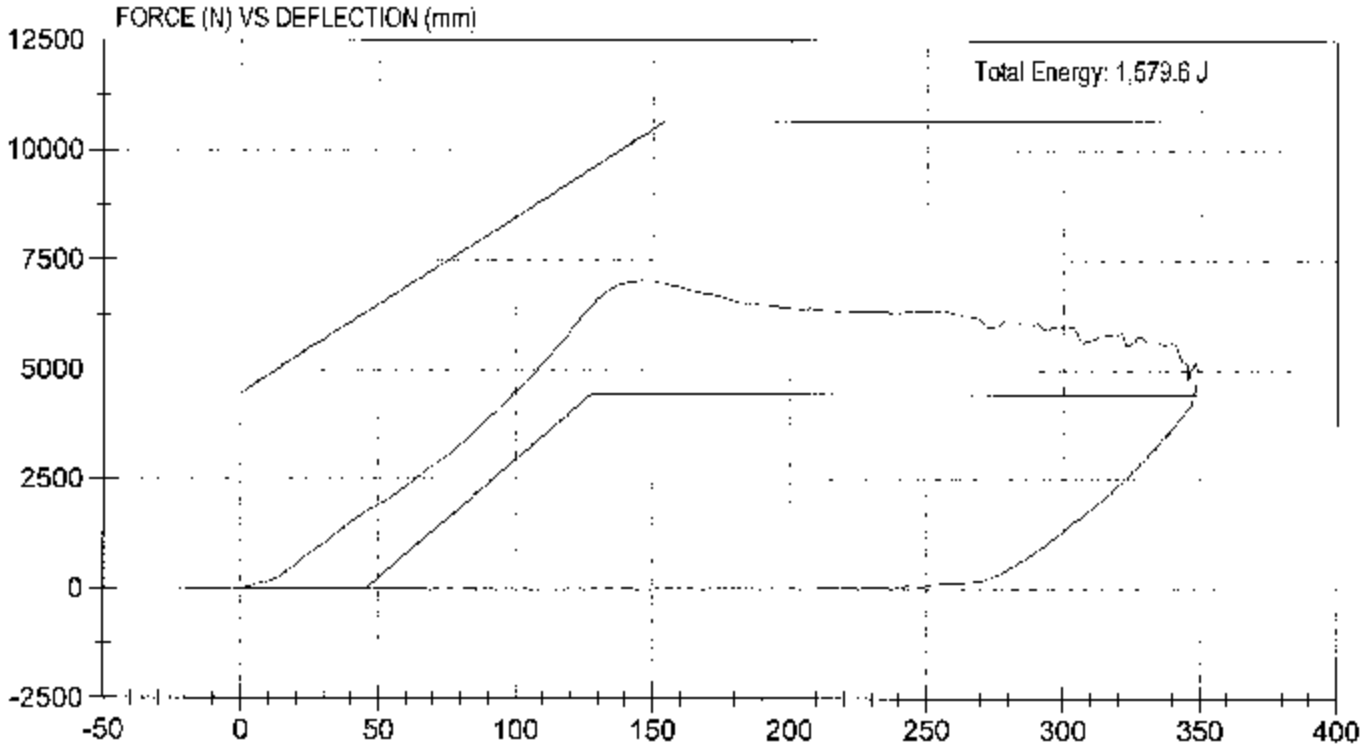
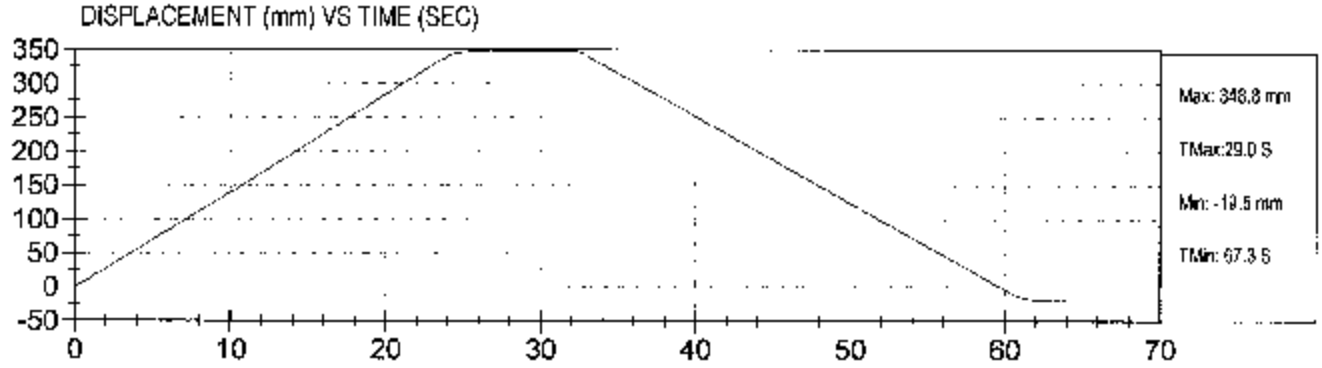
SECTION 6
TEST PLOTS

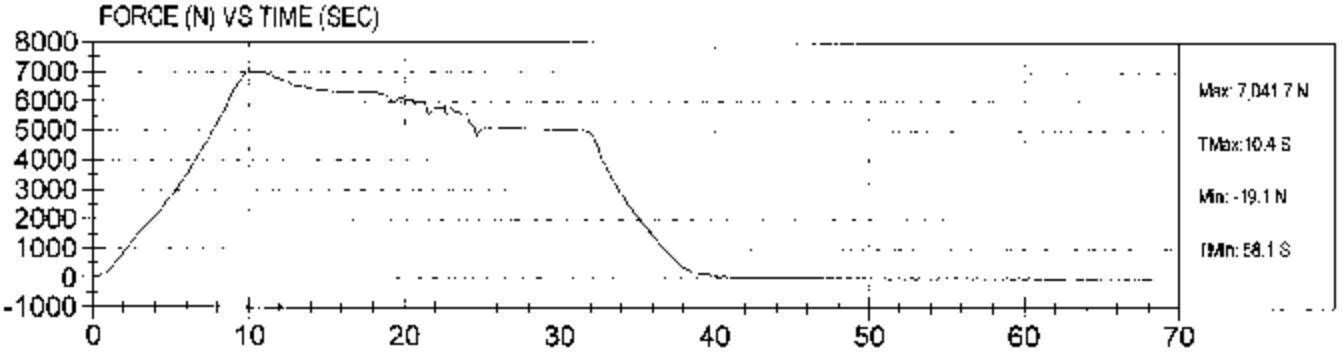
TABLE OF TEST PLOTS


Test Desc: Seat S1C Cushion Retention
Test Date: 4-16-03
MGA Research Corp
5000 Warren Road,
Component ID: ATC
NHTSA #: C30902
Burlington, WI 53105
0
-50
100
150
-200
-250
FORCE (N)
0
5
10
15
TIME (S)


Test Desc: Seat S14 Cushion Retention
Component ID: ATC
Test Date: 4-16-03
NHTSA #: C30902
MGA Research Corp
5000 Warren Road,
Burlington, WI 53105
50
0
-50
-100
-150
-200
-250
FORCE (N)
0
5
10
15
TIME (S)

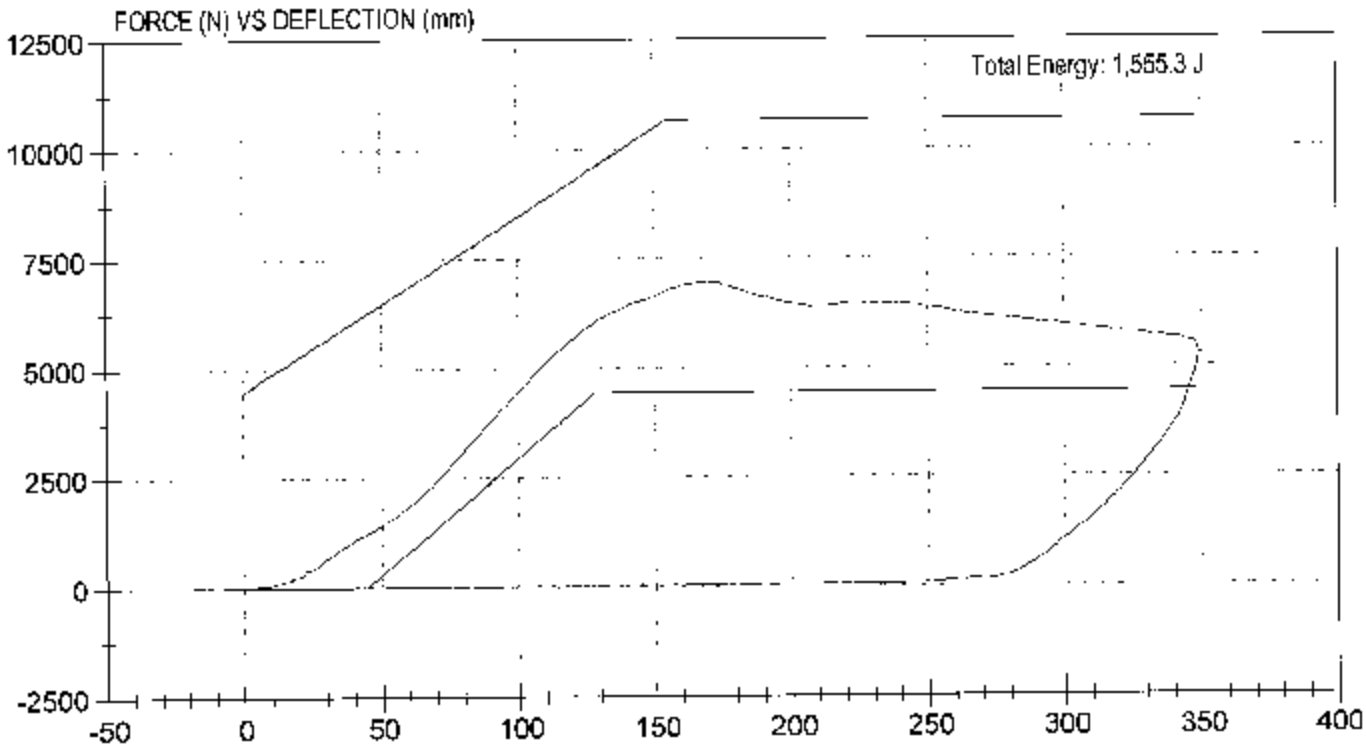

FORCE (N) VS DEFLECTION (mm)
Total Energy: 1,579.6 J
12500
10000
7500
5000
2500
0
-2500
-50
0
50
100
150
200
250
300
350
400

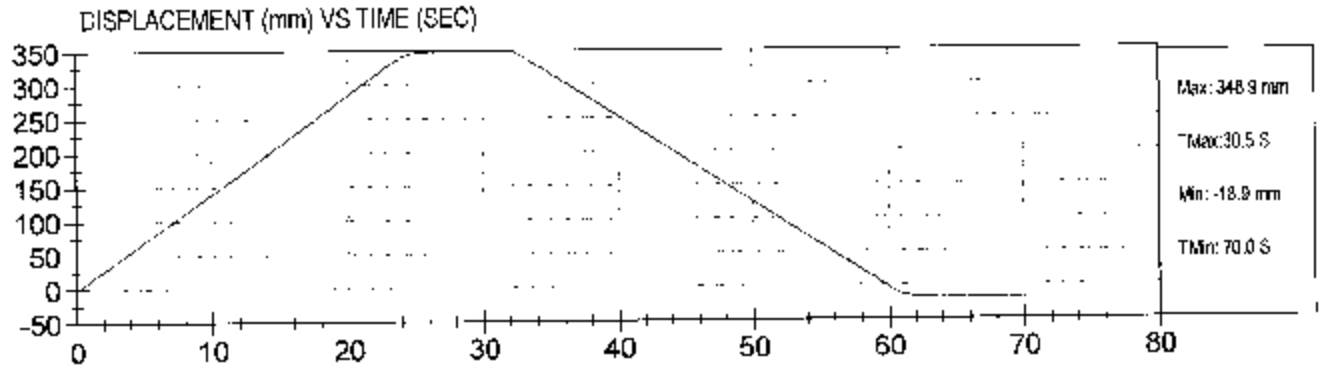

DISPLACEMENT (mm) VS TIME (SEC)
350
300
250
200
150
100
50
0
-50
0
10
20
30
40
50
60
70
Max: 348.8 mm
TMax:29.0 S
Min: -19.5 mm
TMin: 67.3 S

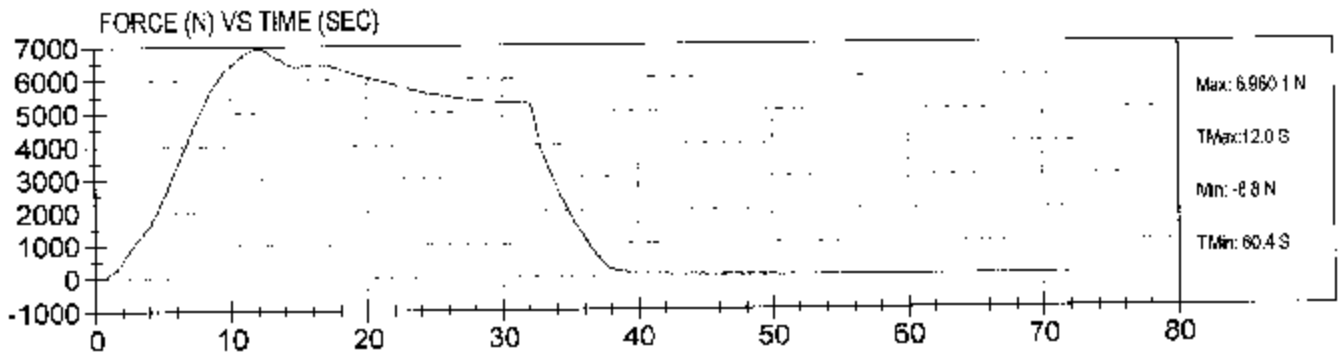

FORCE (N) VS TIME (SEC)
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
60
70
Max: 7,041.7 N
TMax:10.4 S
Min: -19.1 N
TMin: 58.1 S

Test Desc: Forward Deflection S22
Component ID: ATC

Test Date: 4/9/03
NHTSA #: C30902

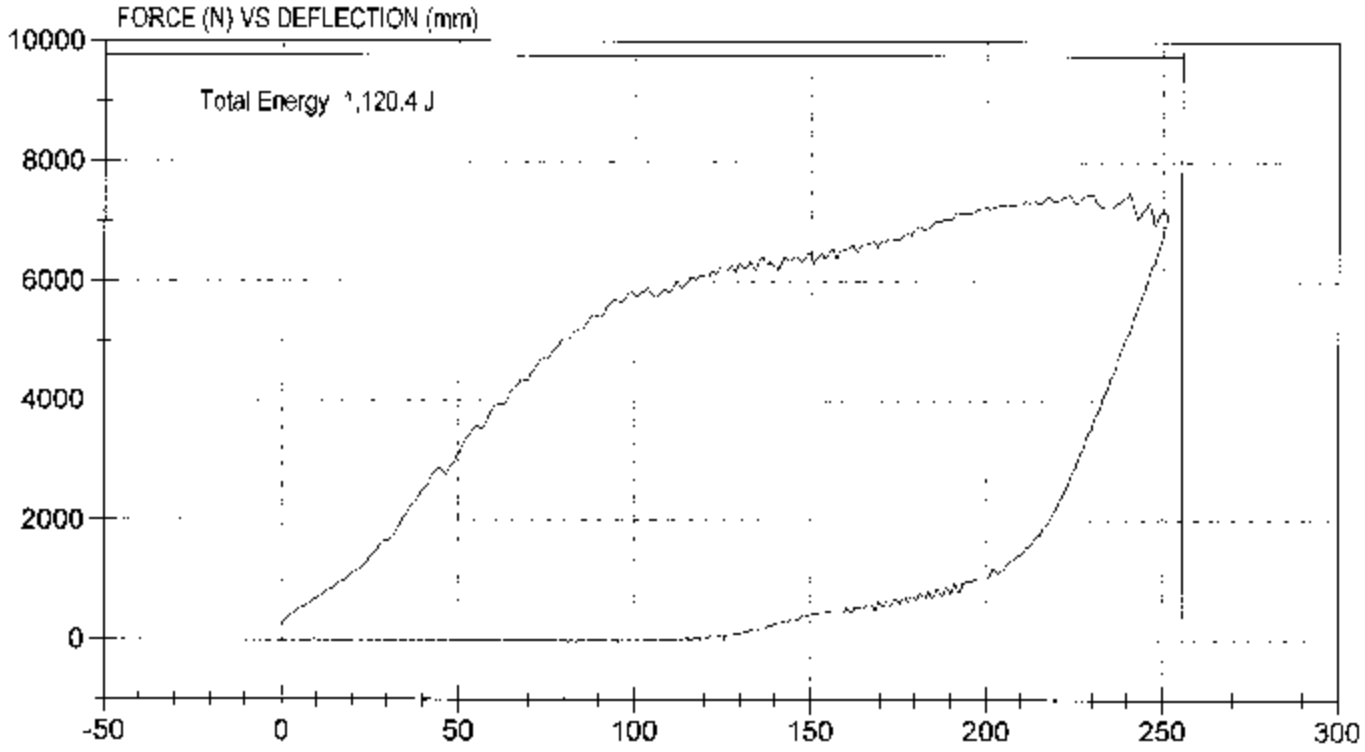


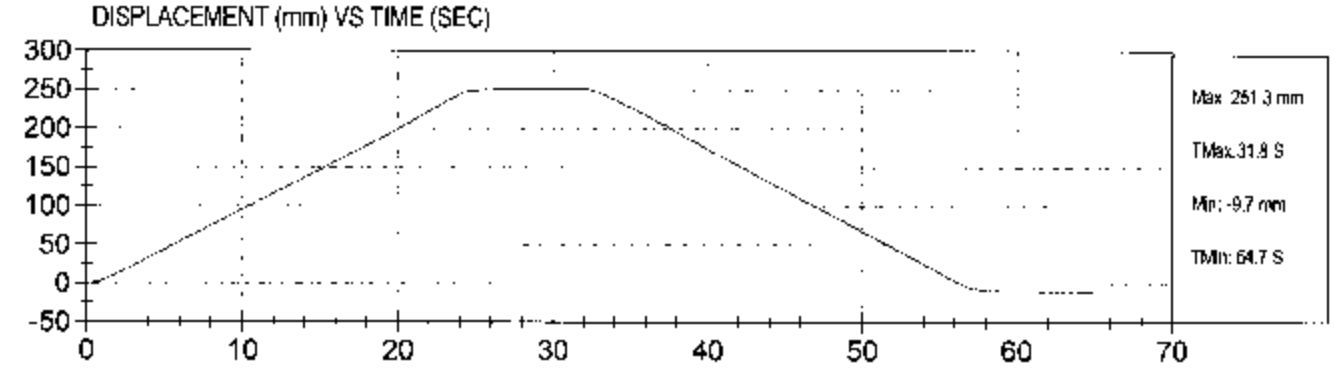


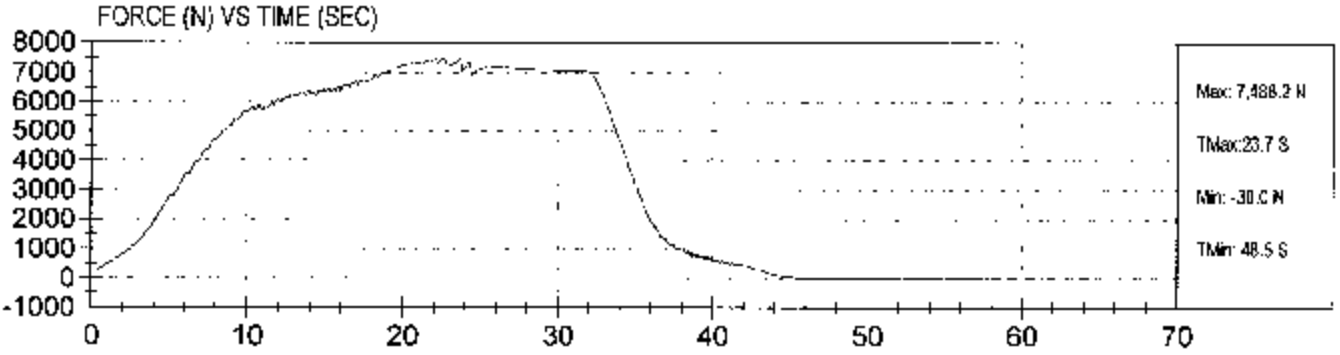


Test Desc: Rearward Deflection S6
Component ID: ATC

Test Date: 4/9/03
NHTSA #: C30902

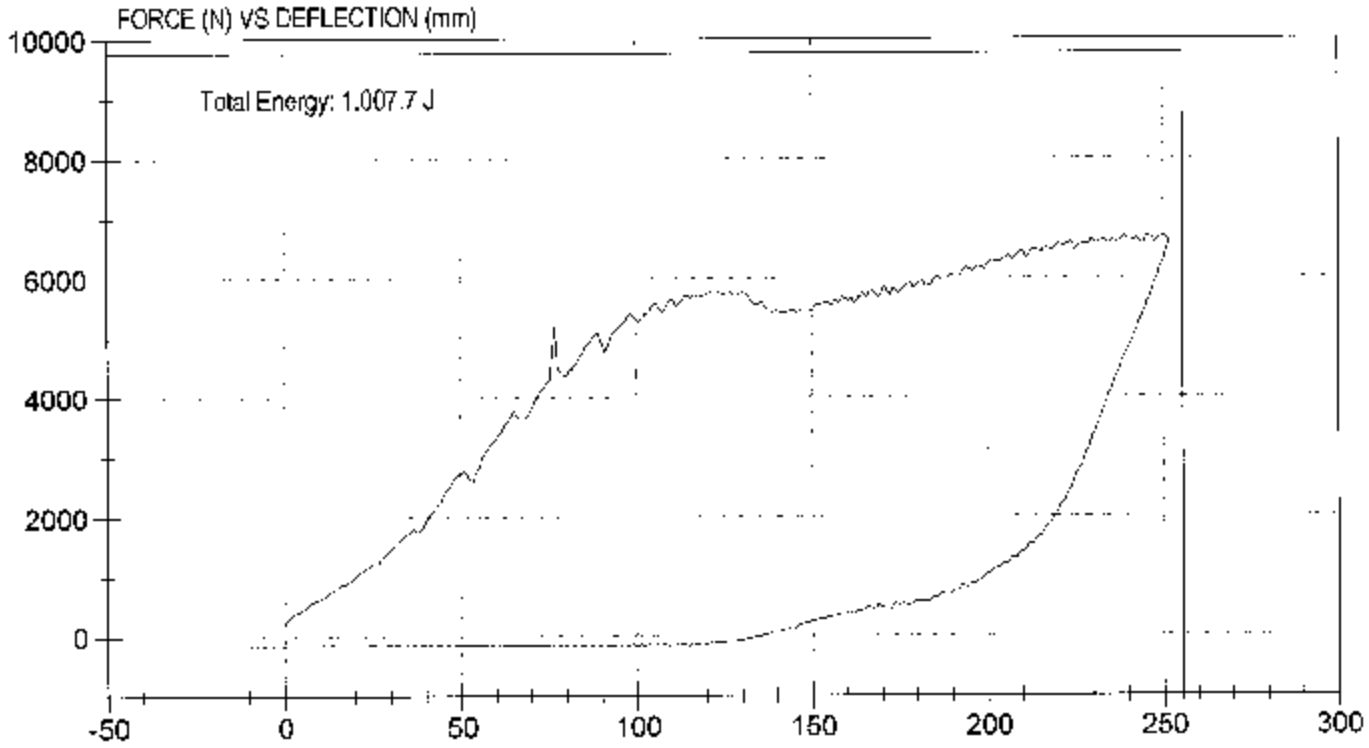


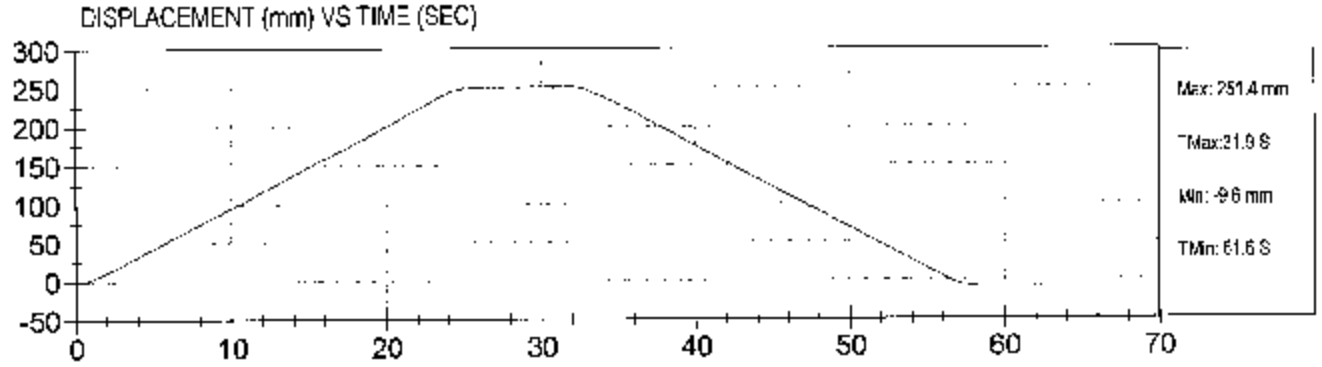


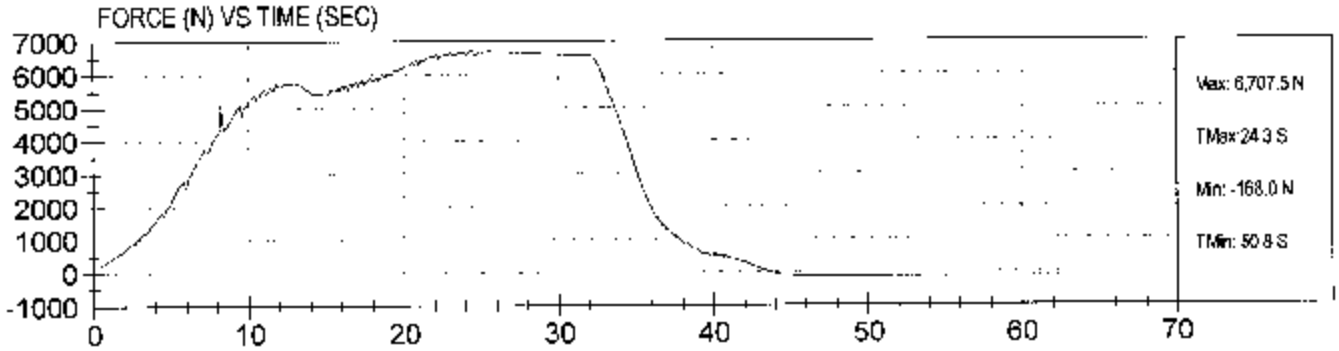


Test Desc: Rearward Deflection S18
Component ID: ATC

Test Date: 4/9/03
NHTSA #: C30902

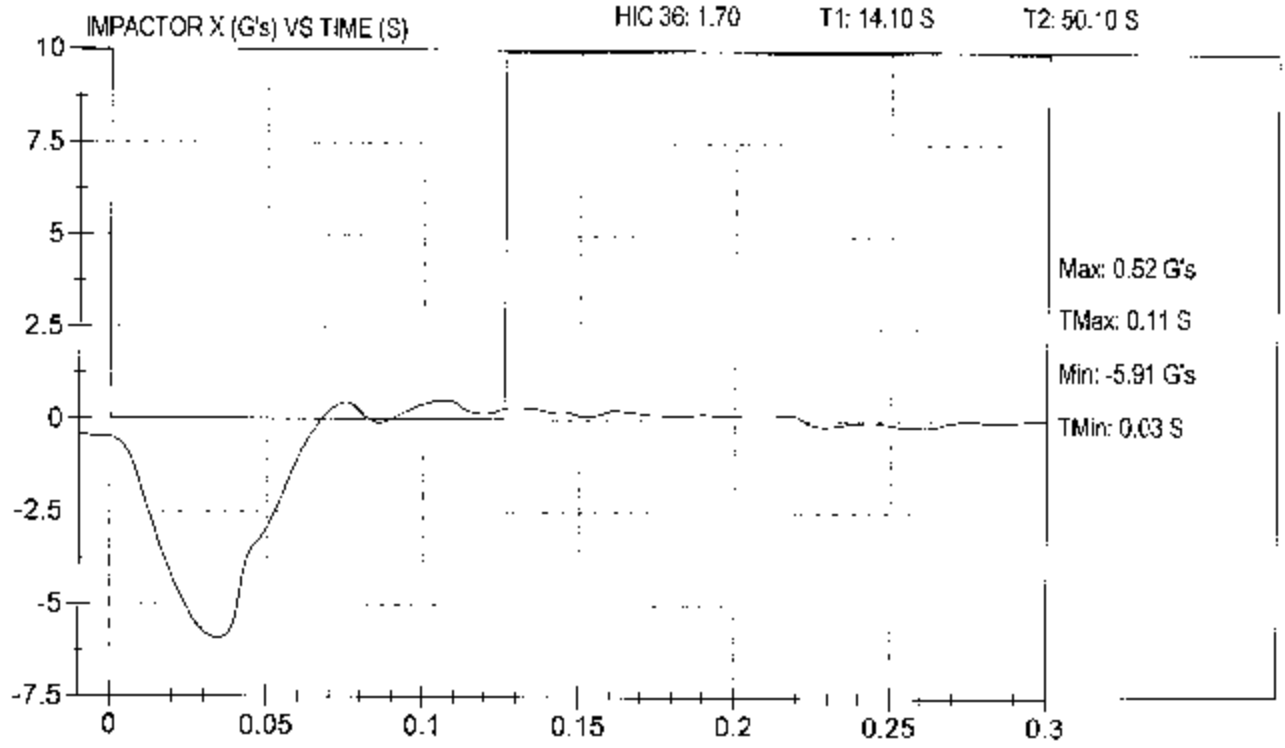


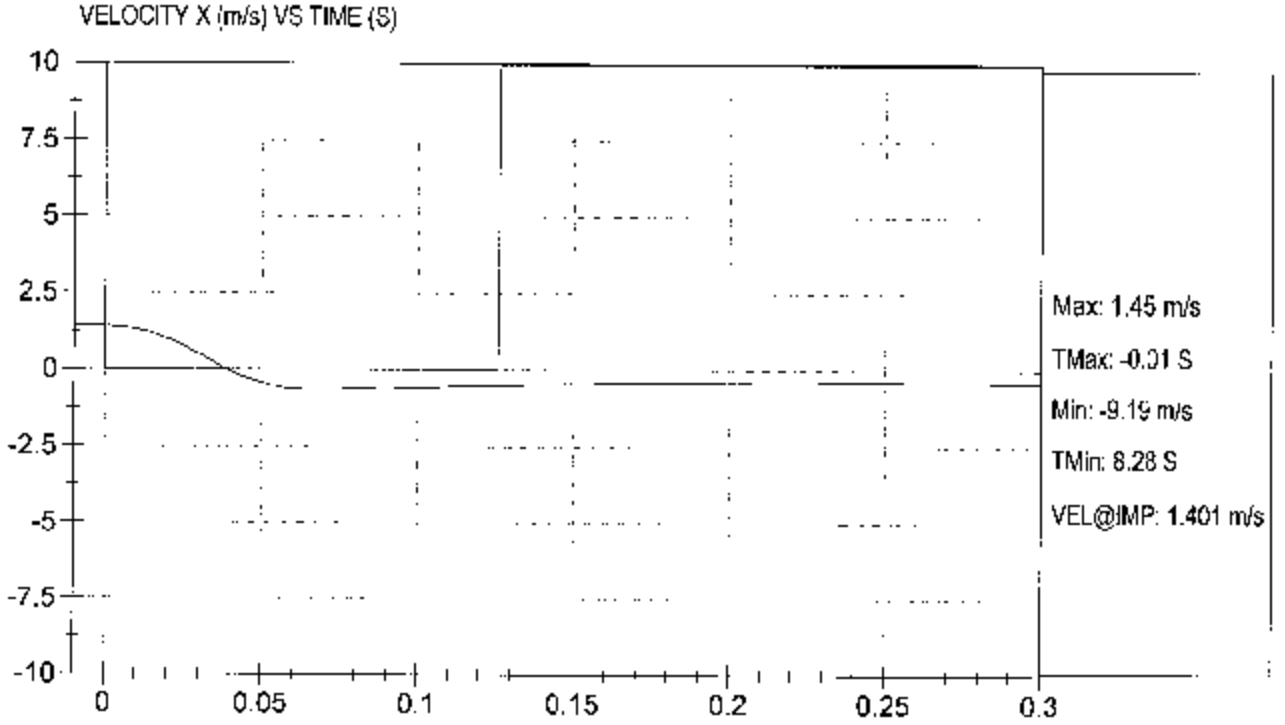




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: ATC
NHTSA #: C030902

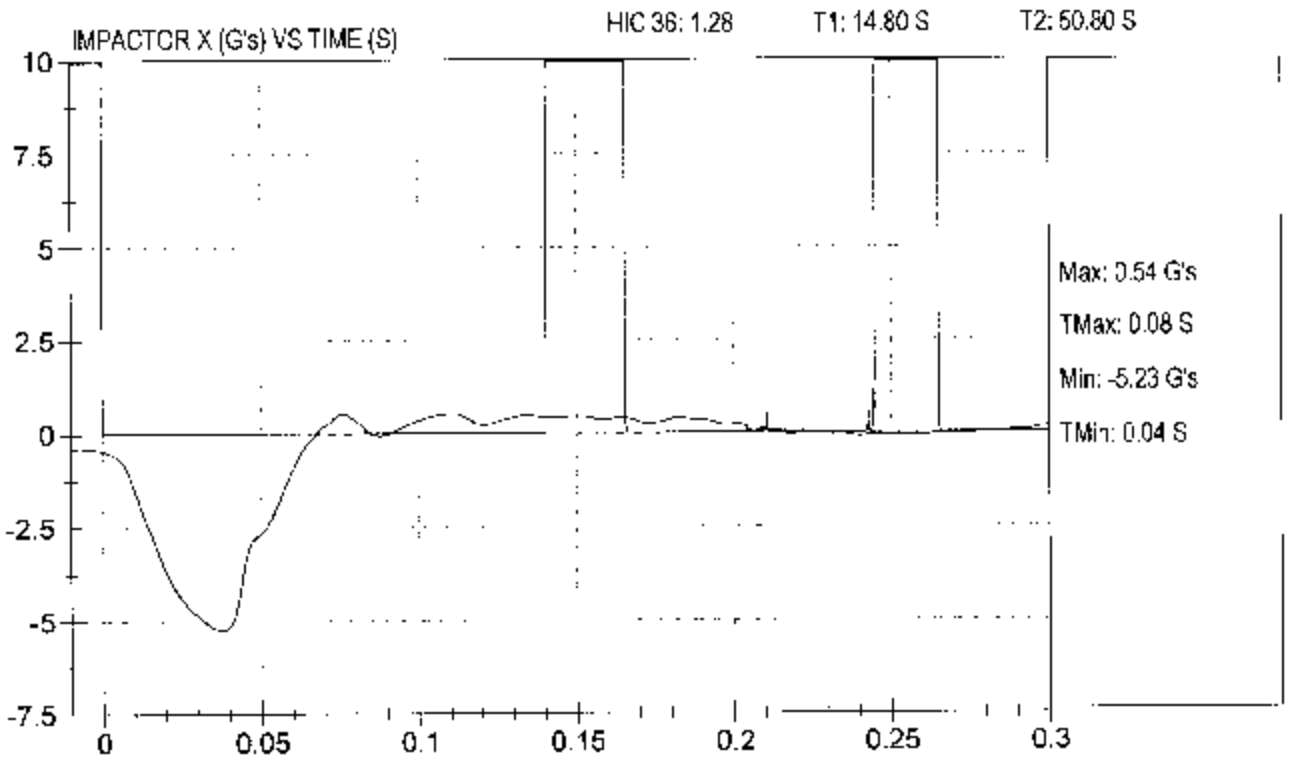
Test Date: 4-9-03
Location: H1

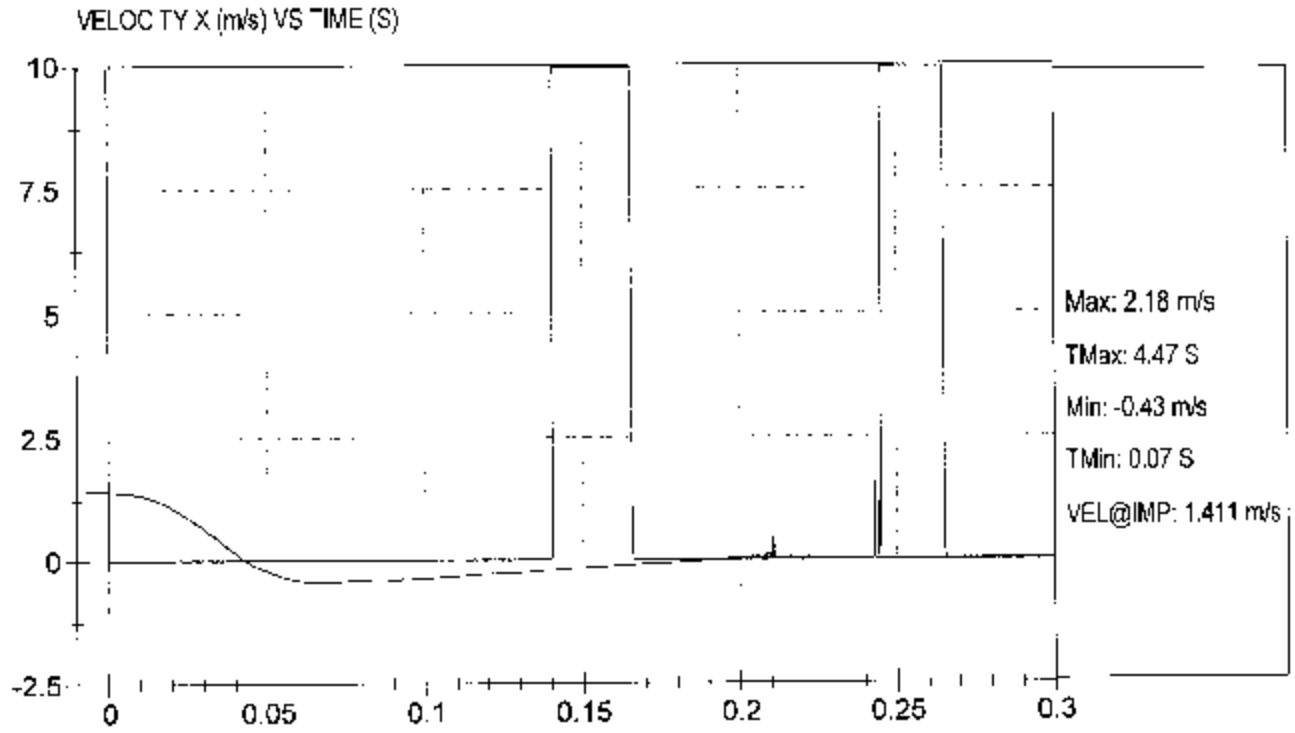




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: ATC
NHTSA #: C030902

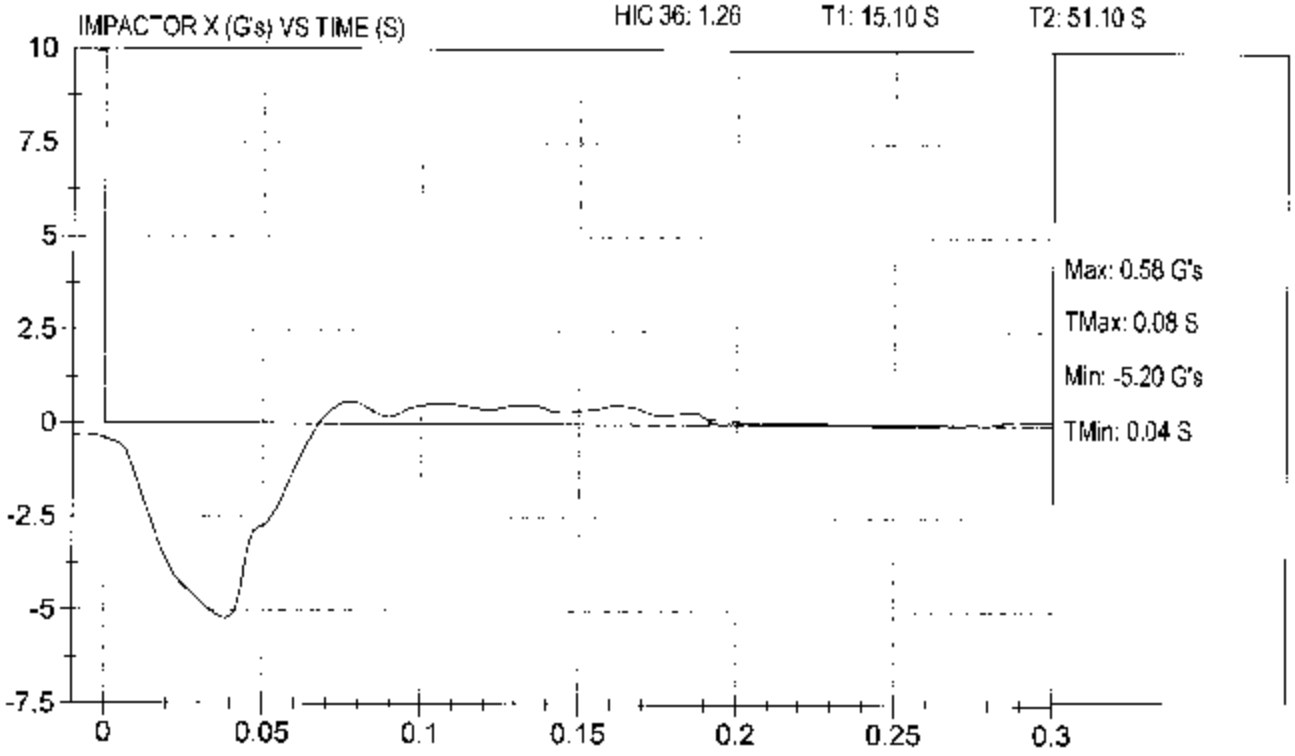
Test Date: 4-9-03
Location: H2

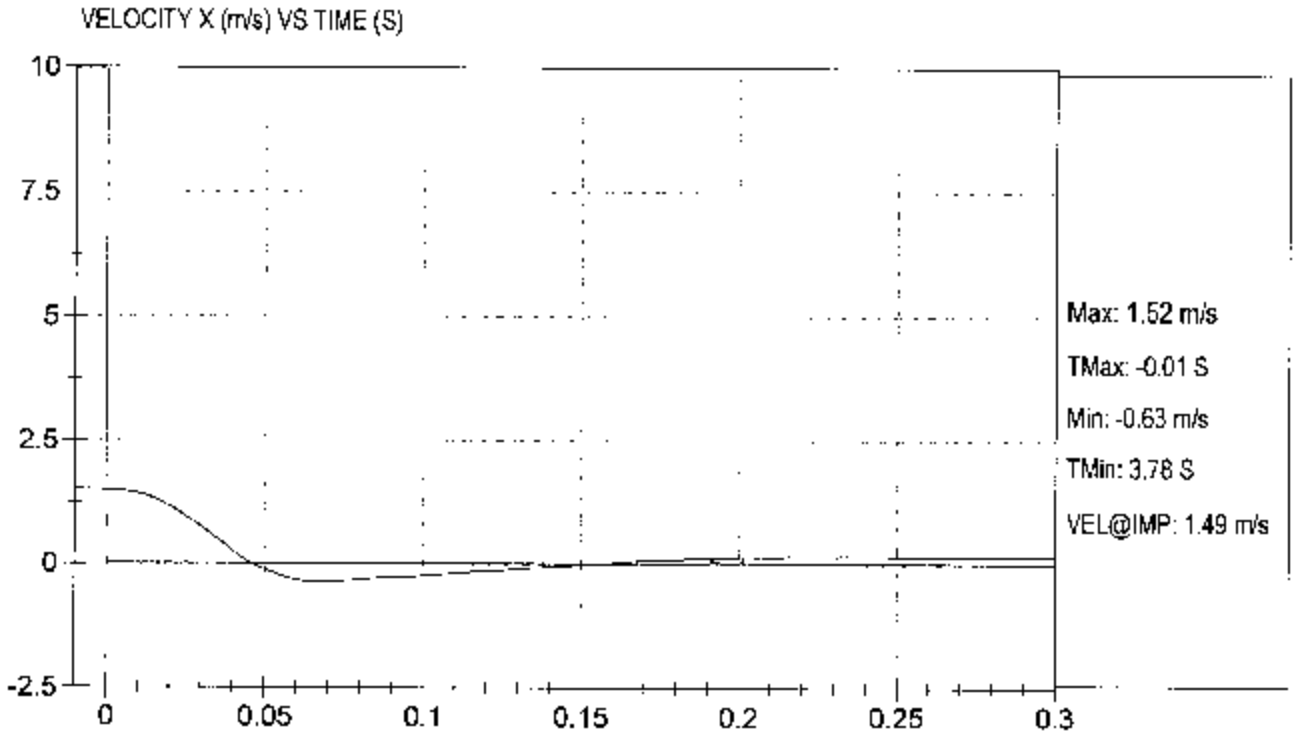




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: ATC
NHTSA #: C030902

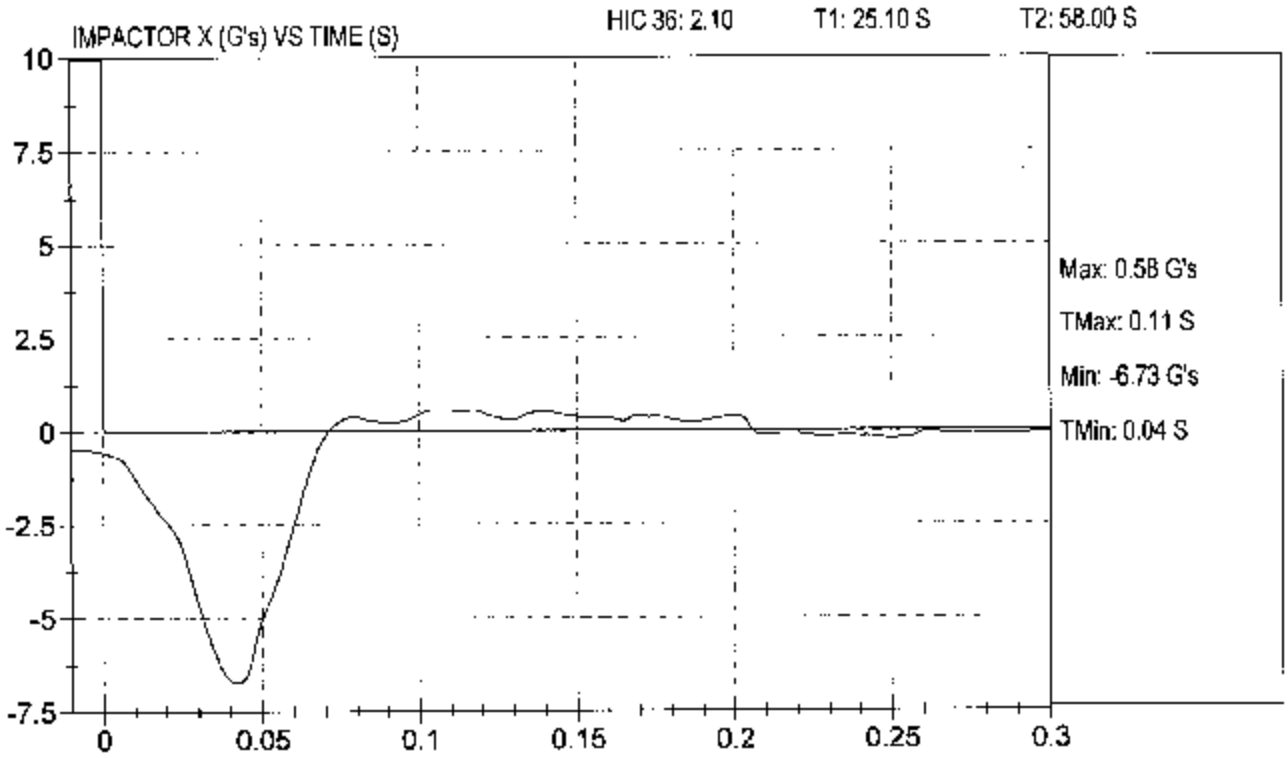
Test Date: 4-9-03
Location: H3

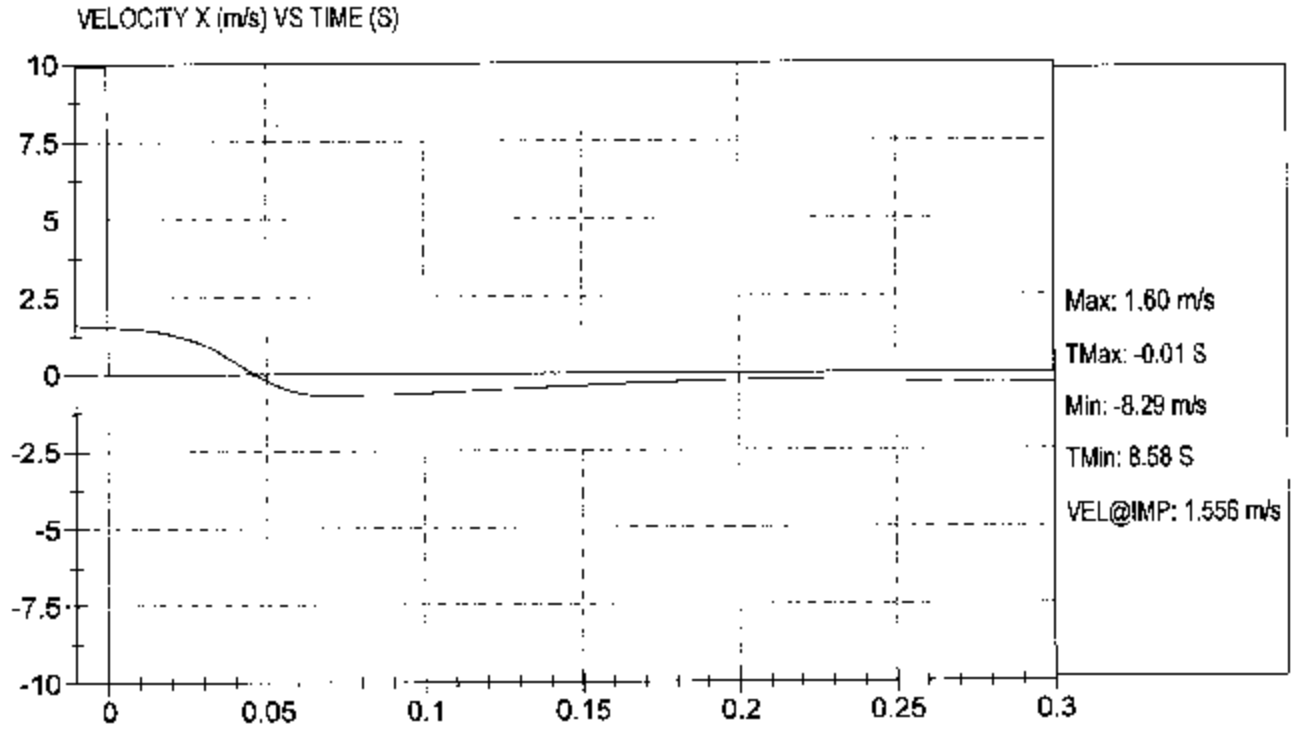




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: ATC
NHTSA #: C30902

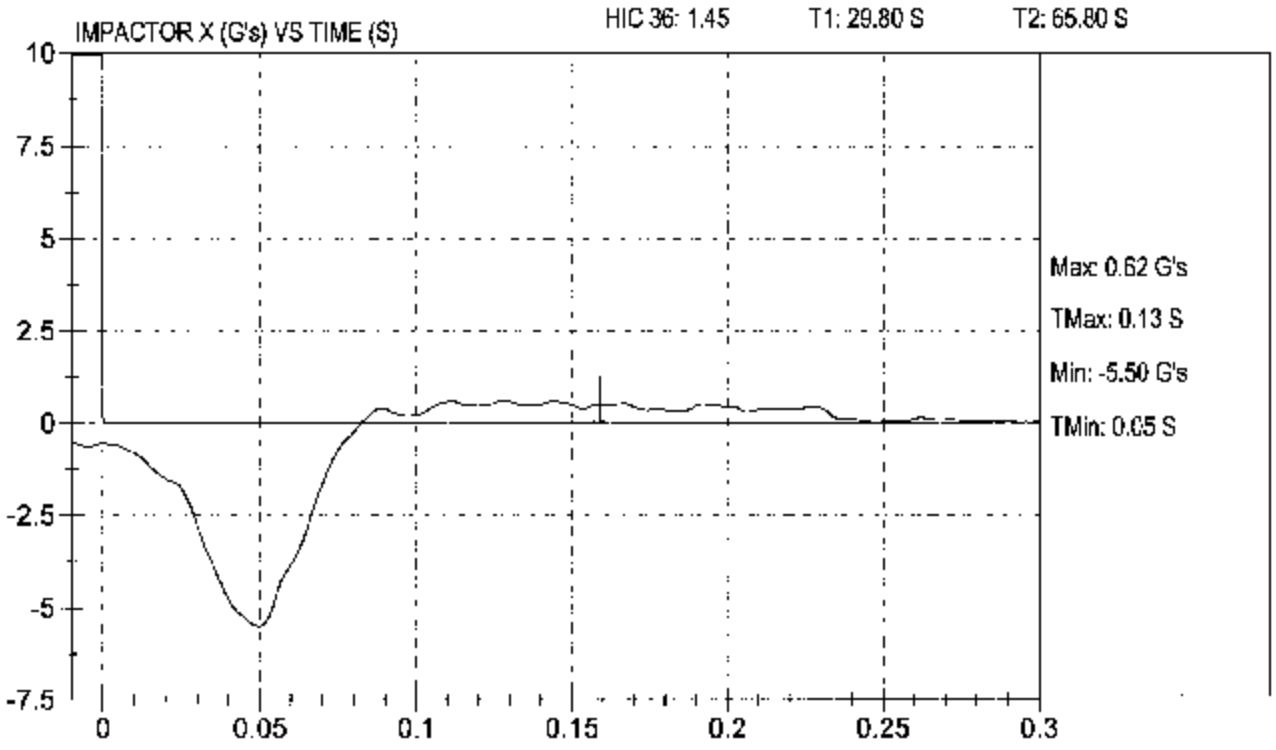
Test Date: 4-9-03
Location: H4

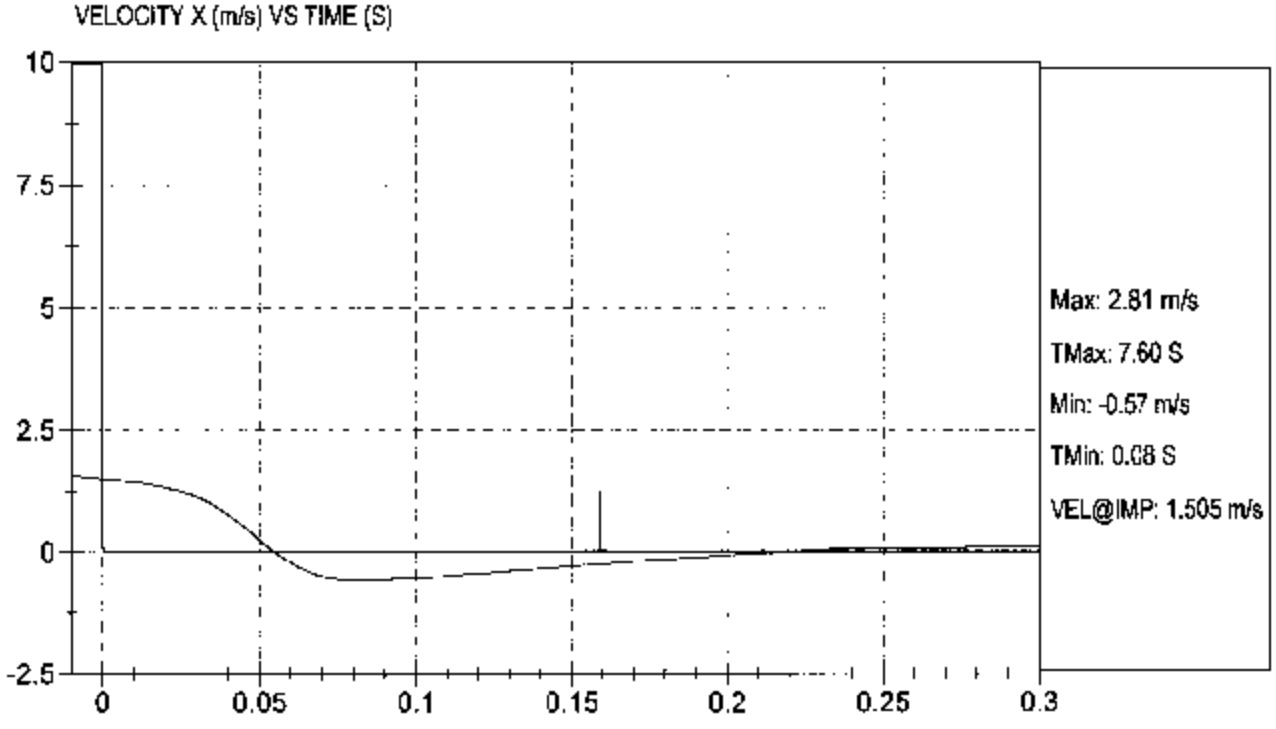




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: ATC
NHTSA #: C30902

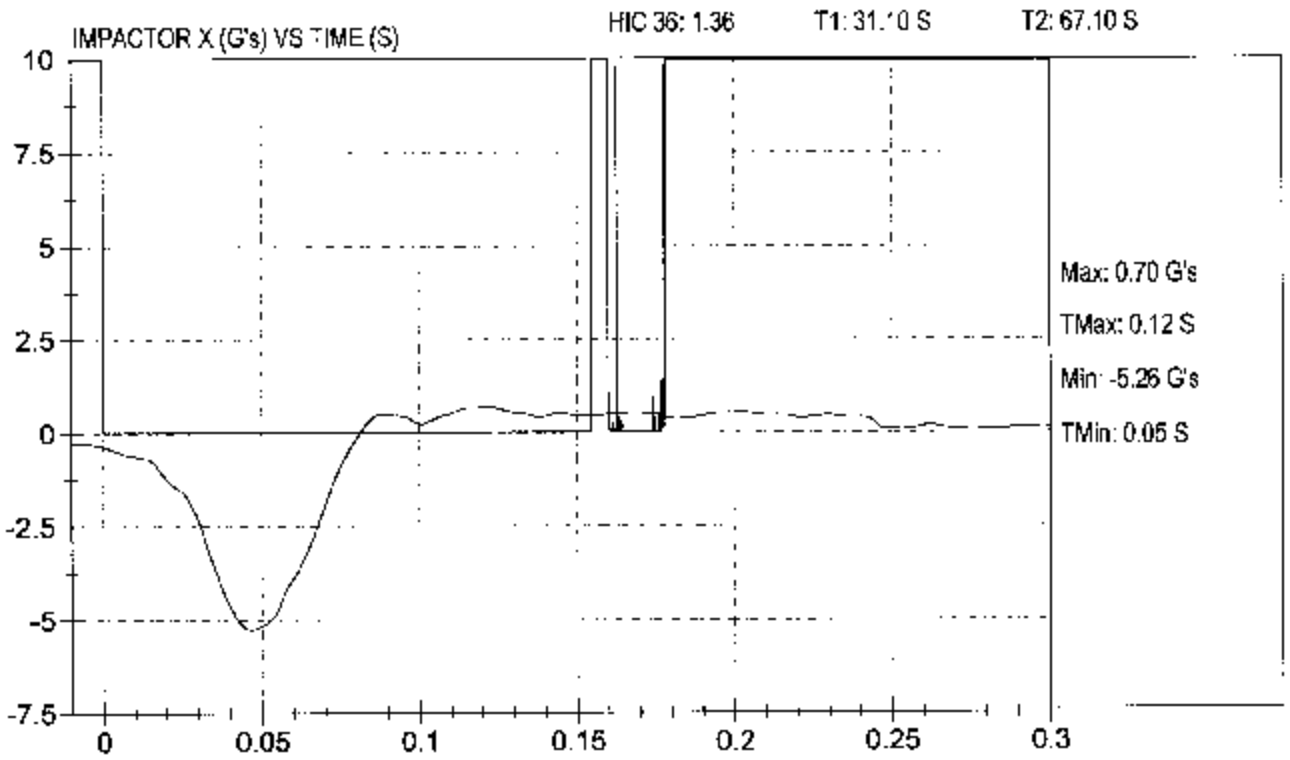
Test Date: 4-9-03
Location: H5

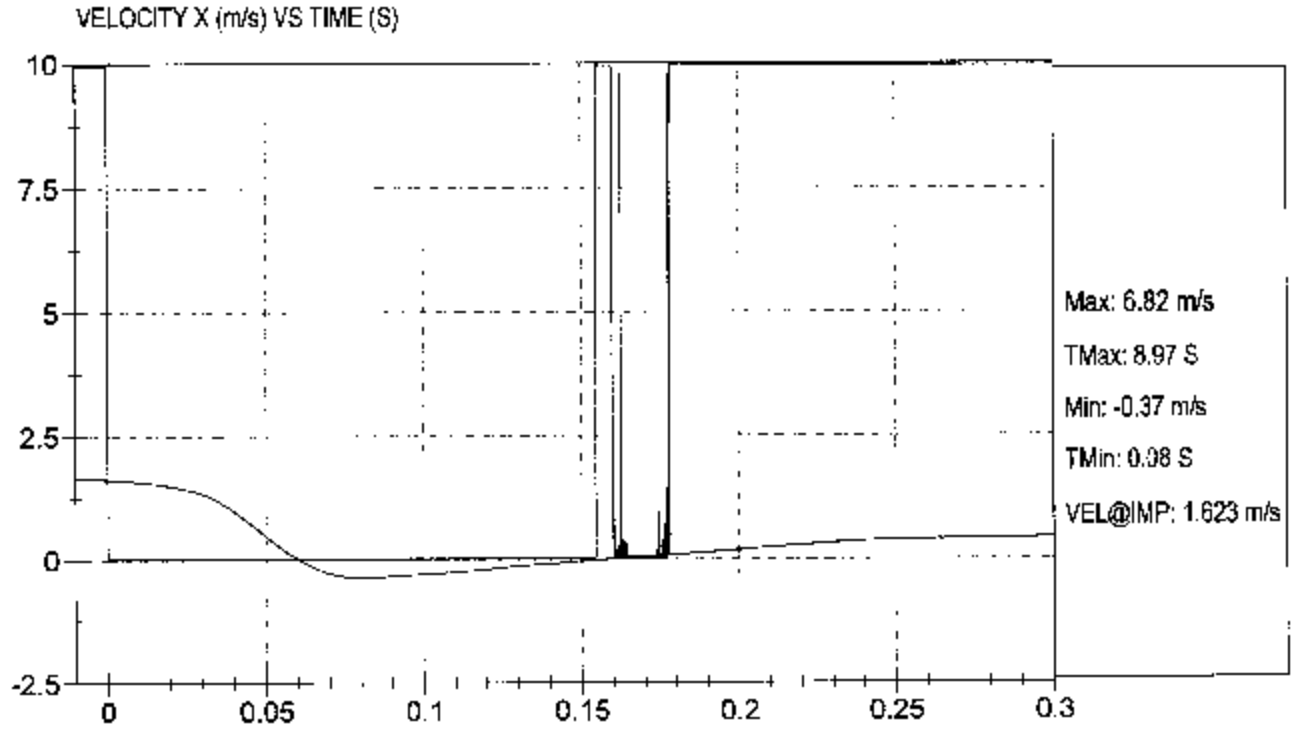




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: ATC
NHTSA #: C30902

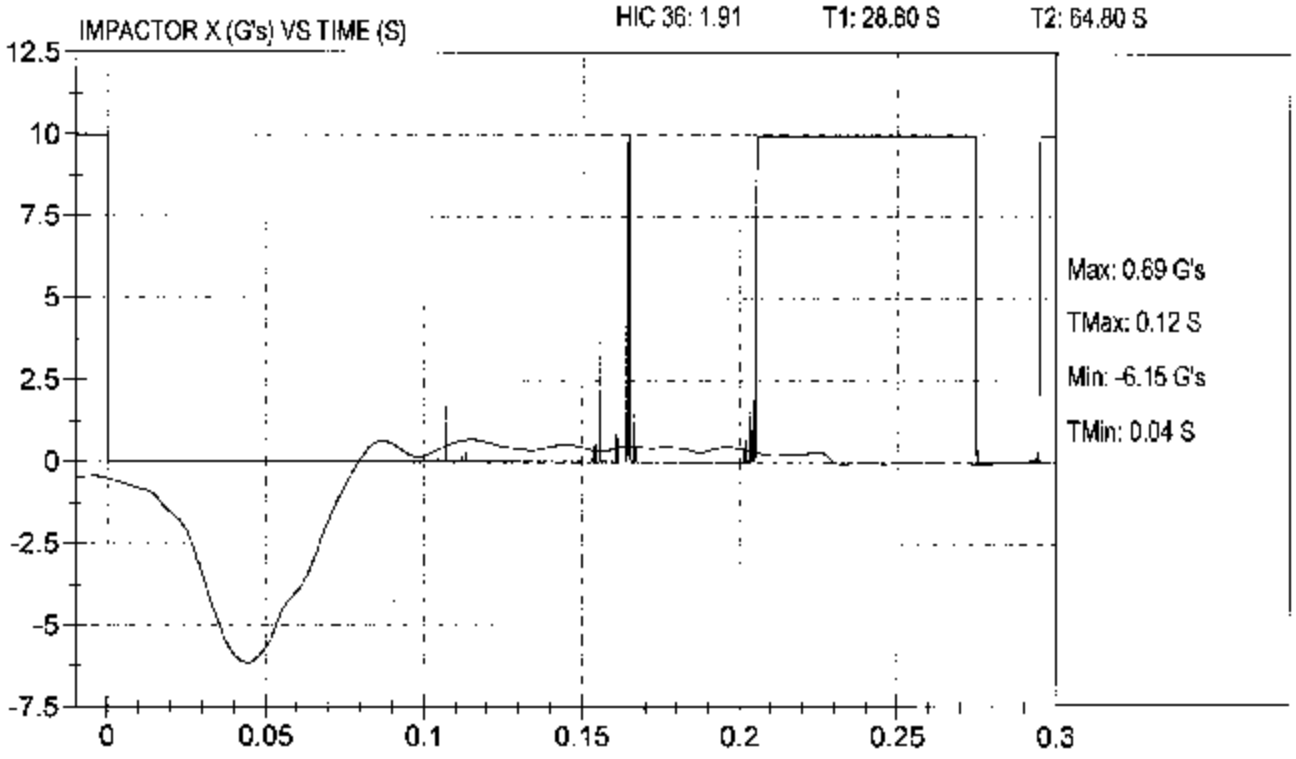
Test Date: 4-9-03
Location: H6

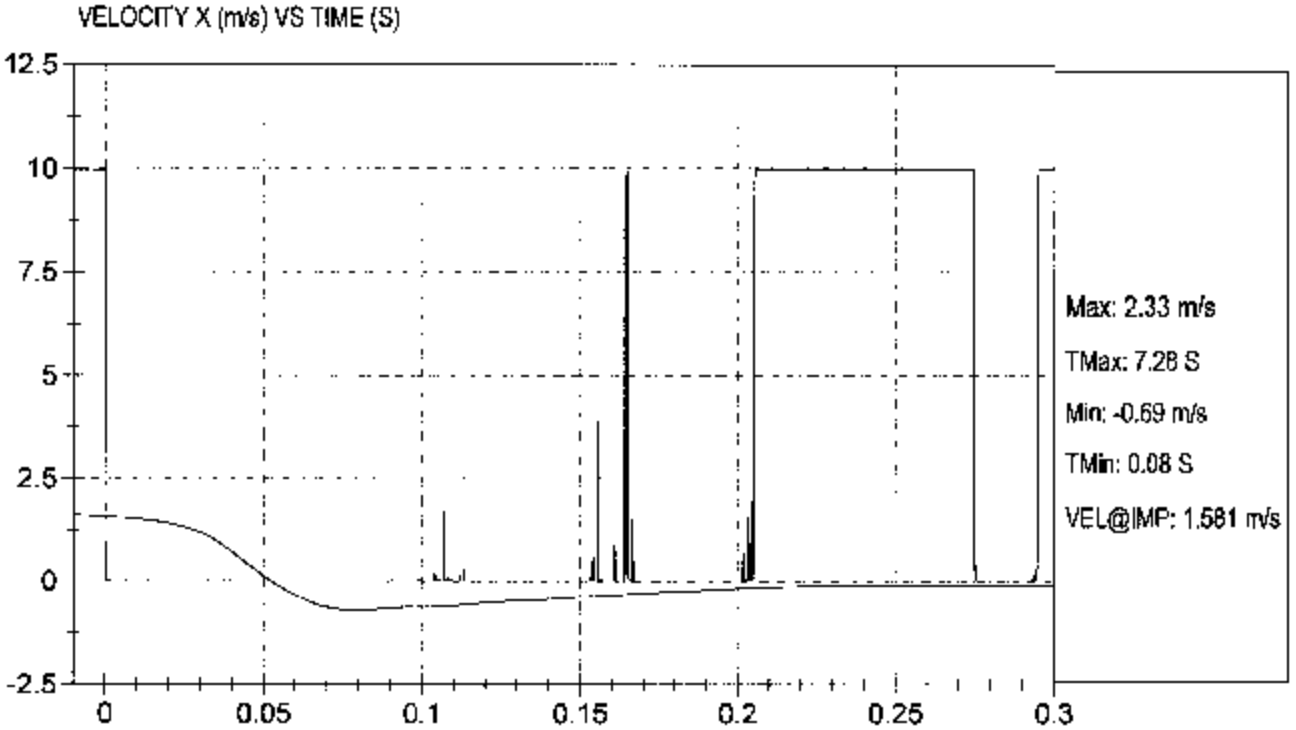




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: ATC
NHTSA #: C30902

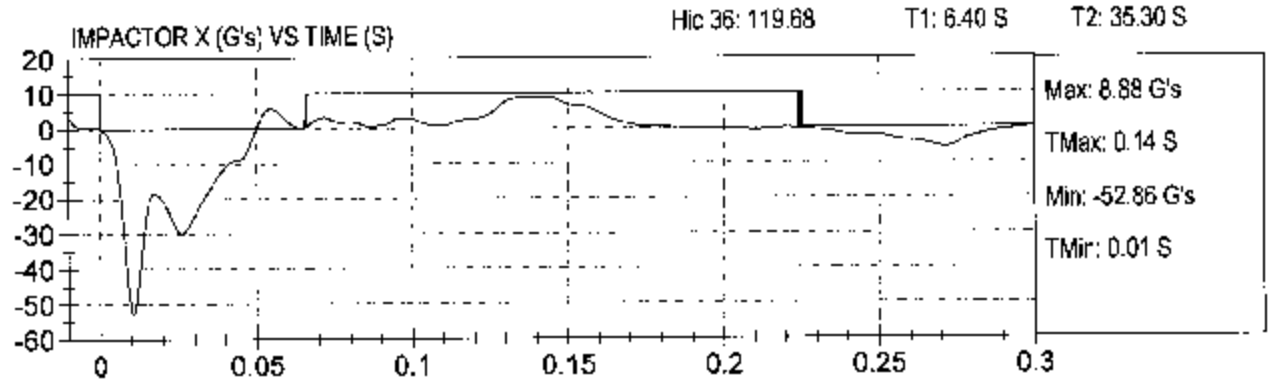
Test Date: 4-9-03
Location: H7

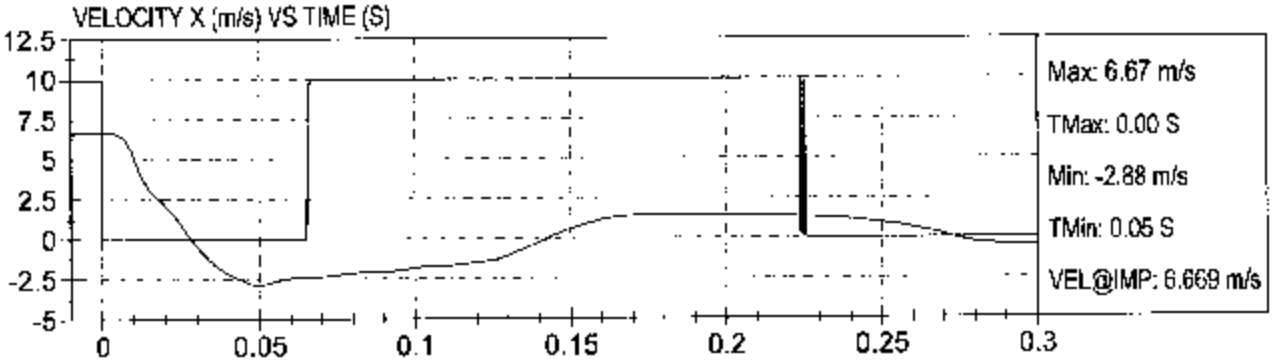


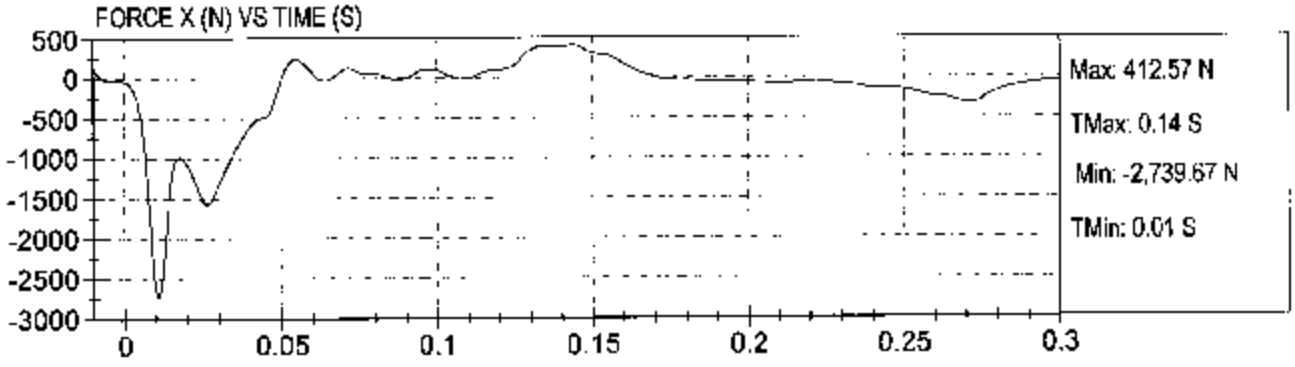


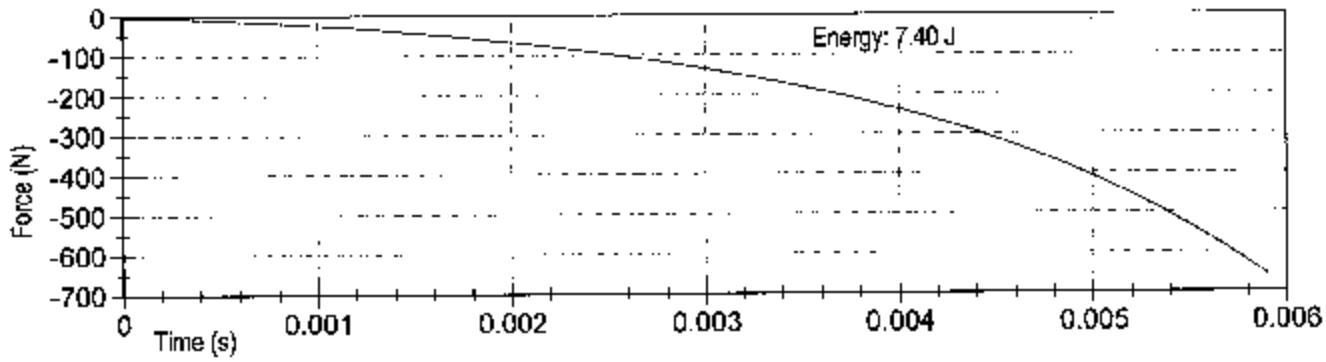
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: ATC
NHTSA #: C30902

Test Date: 4/9/03
Location: H8



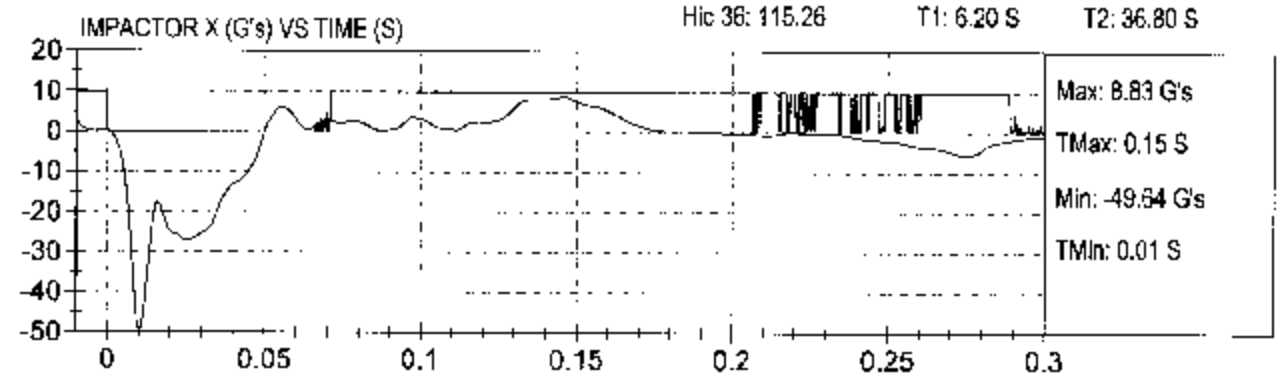


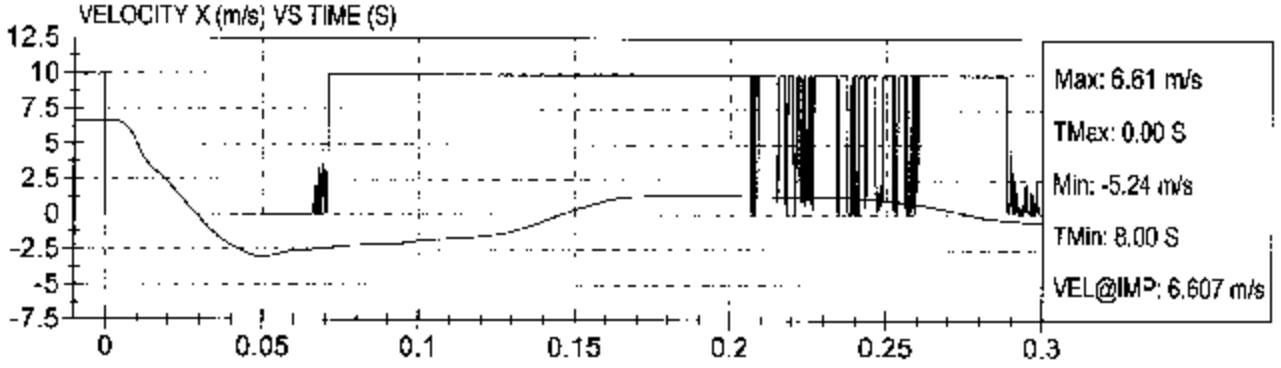


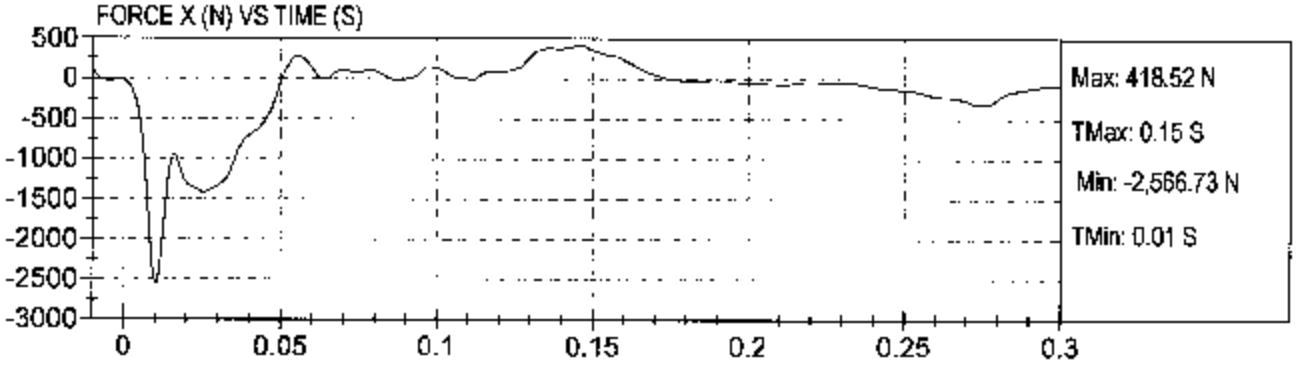


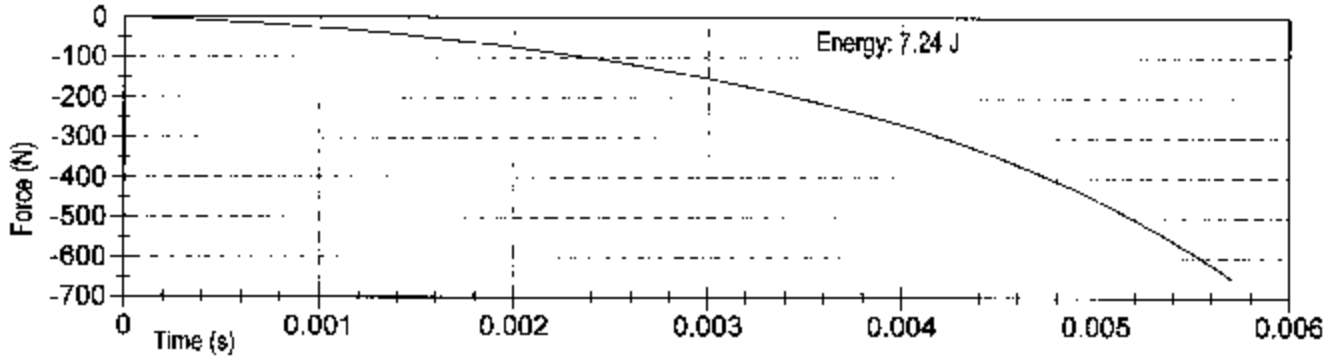
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: ATC
NHTSA #: C30902

Test Date: 4/9/03
Location: H9



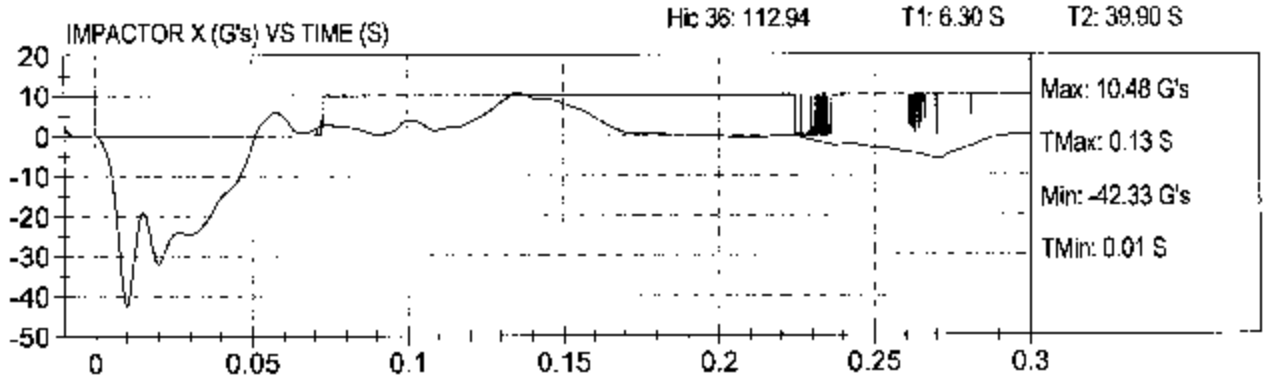


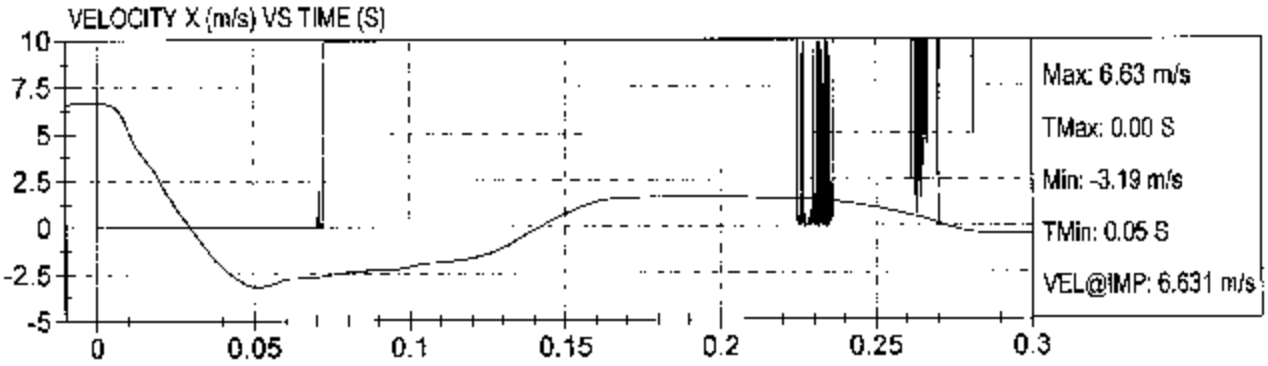


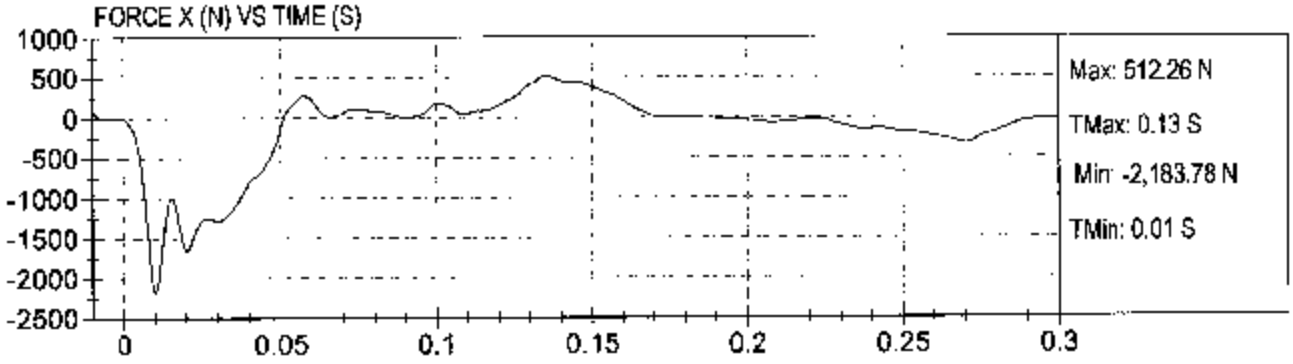


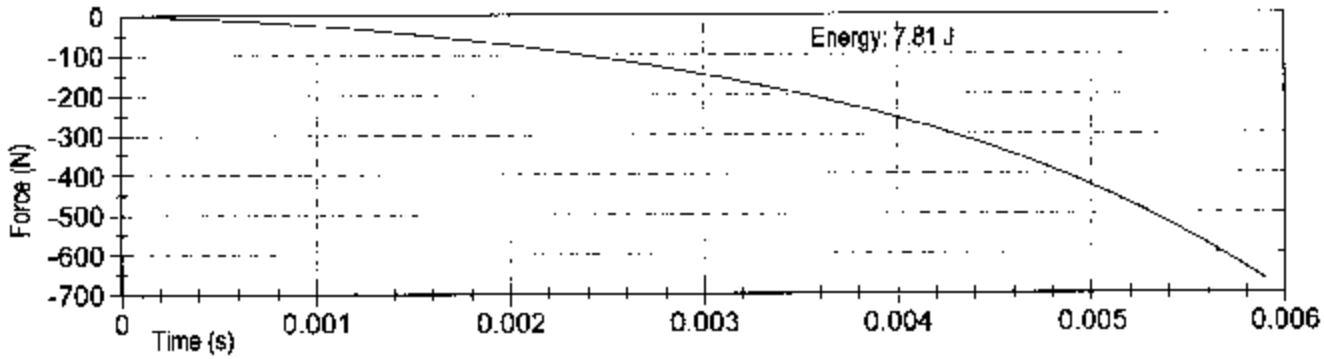
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: ATC
NHTSA #: C30902

Test Date: 4/9/03
Location: H10



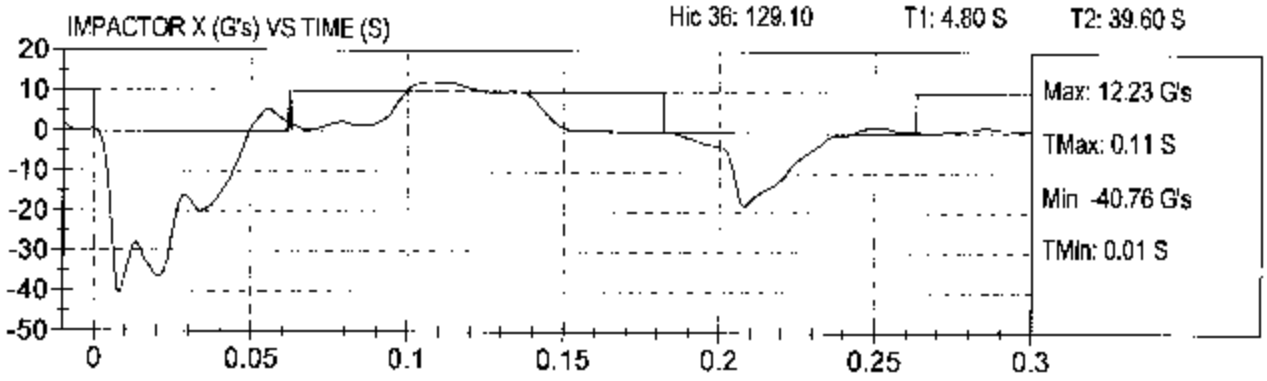


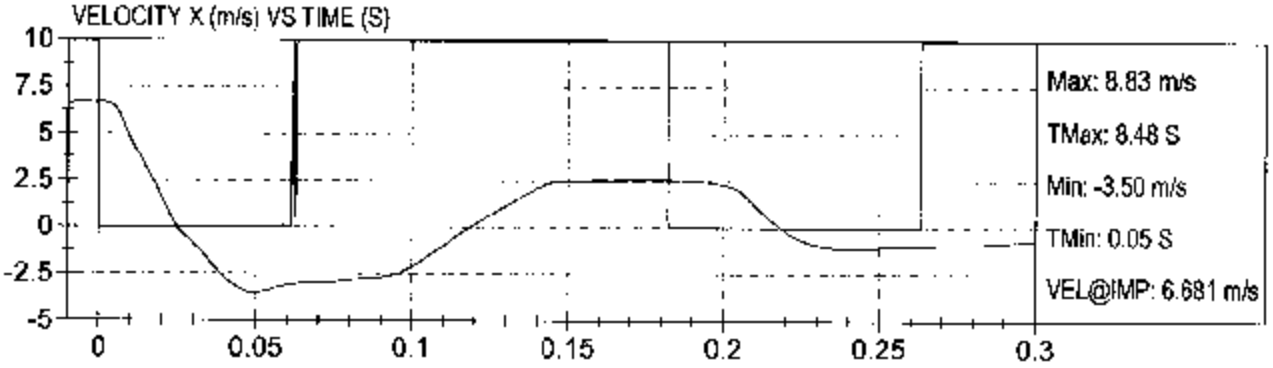


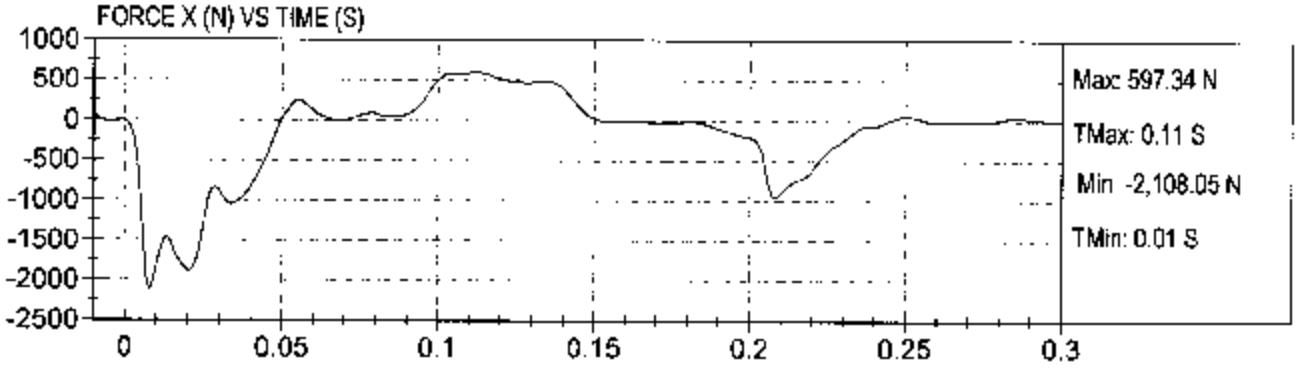


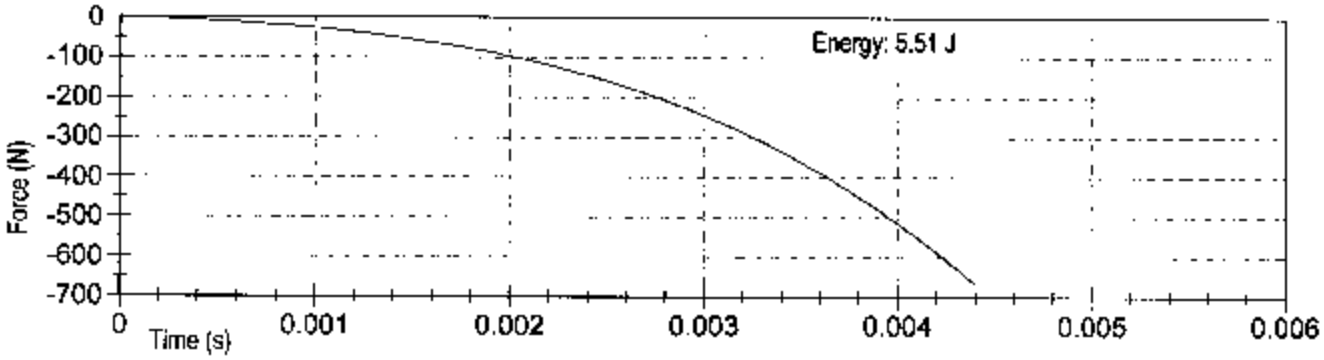
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: ATC
NHTSA #: C30902

Test Date: 4/9/03
Location: H11



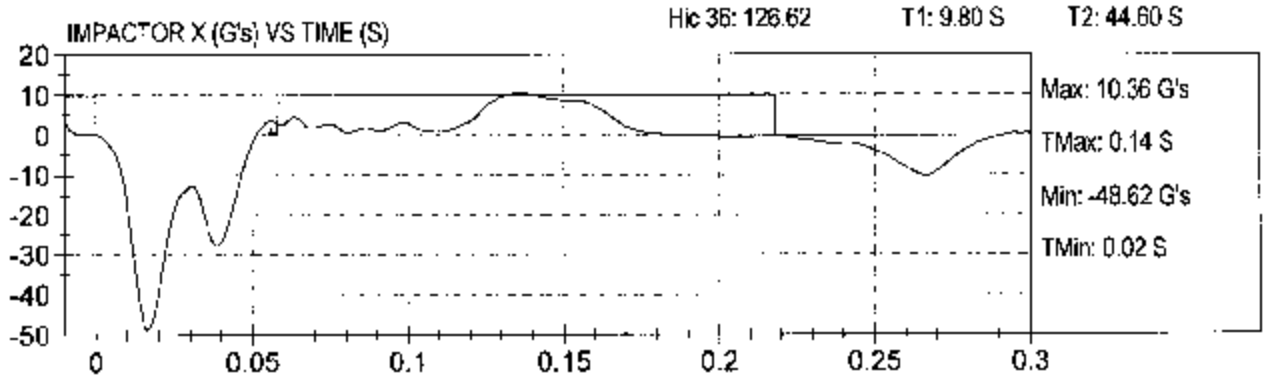


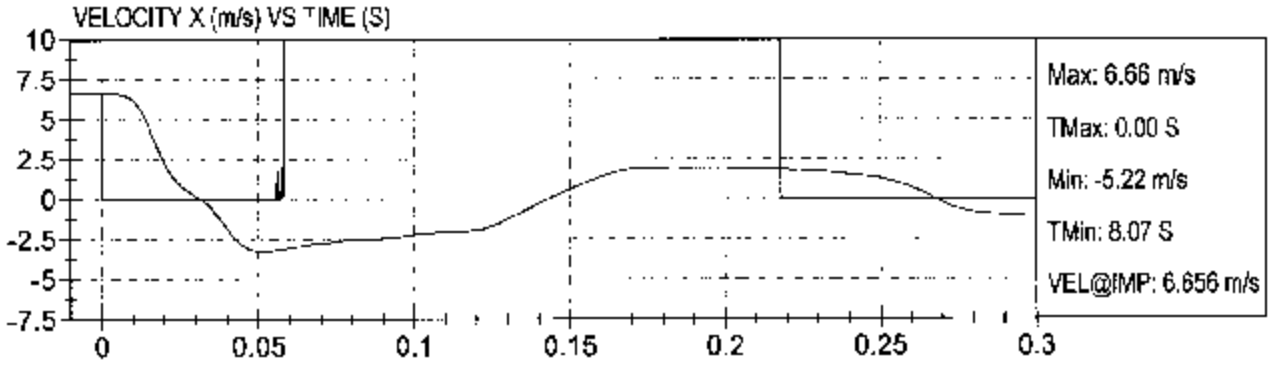


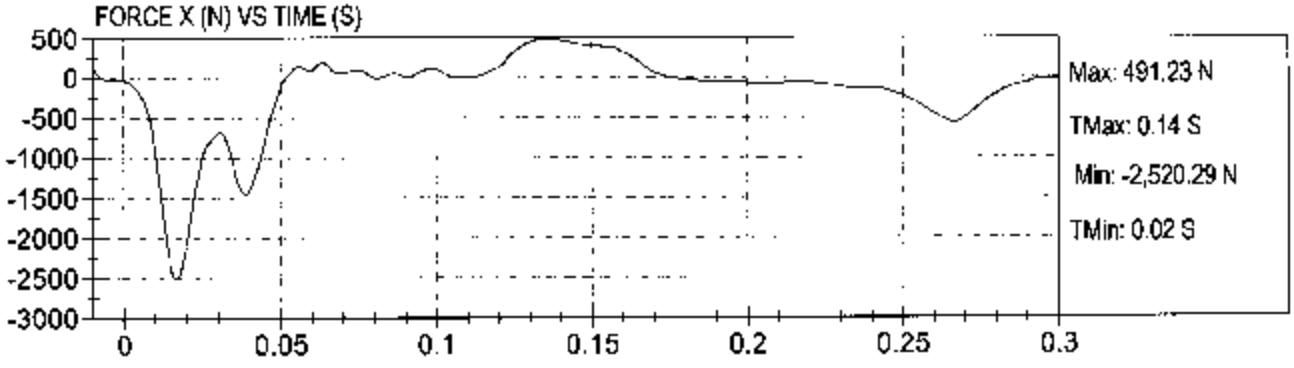


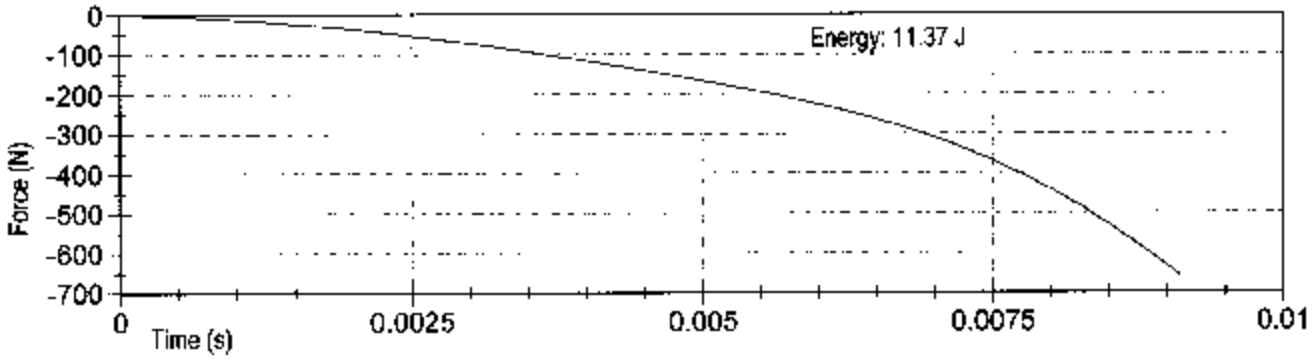
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: ATC
NHTSA #: C30902

Test Date: 4/9/03
Location: H12



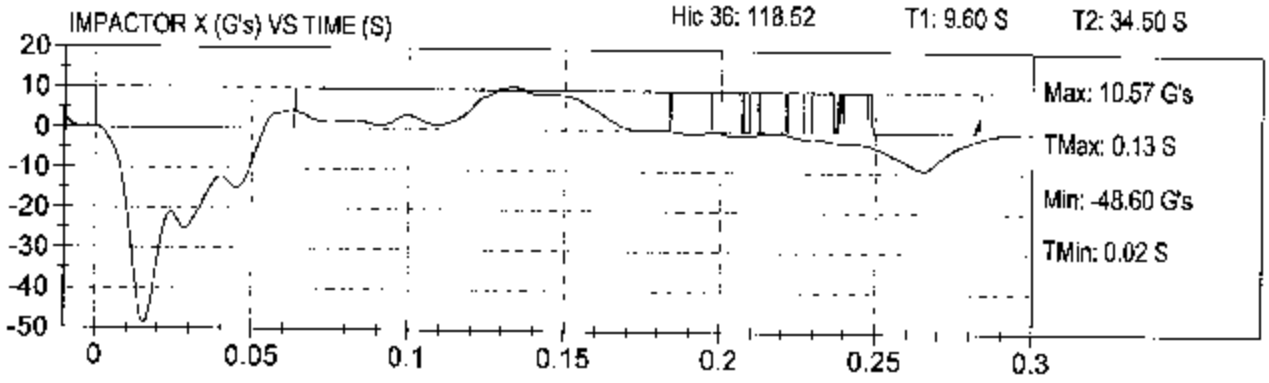


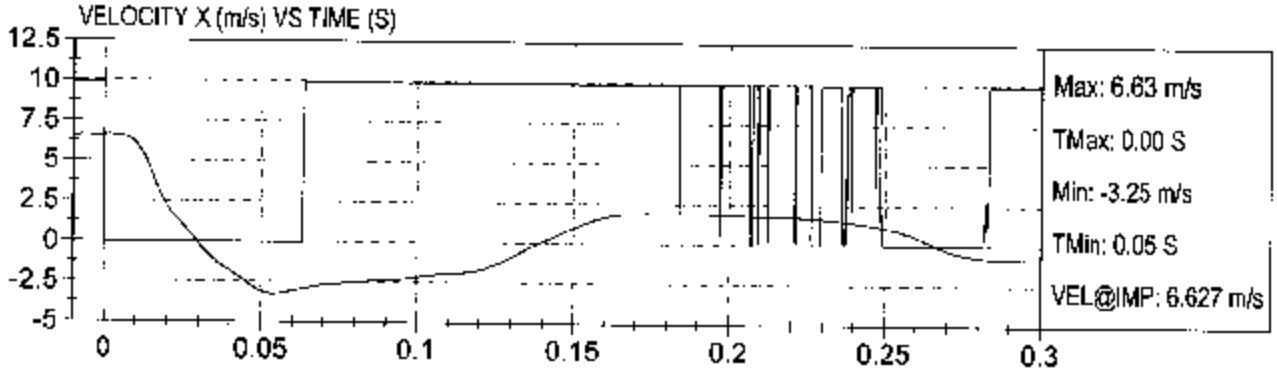


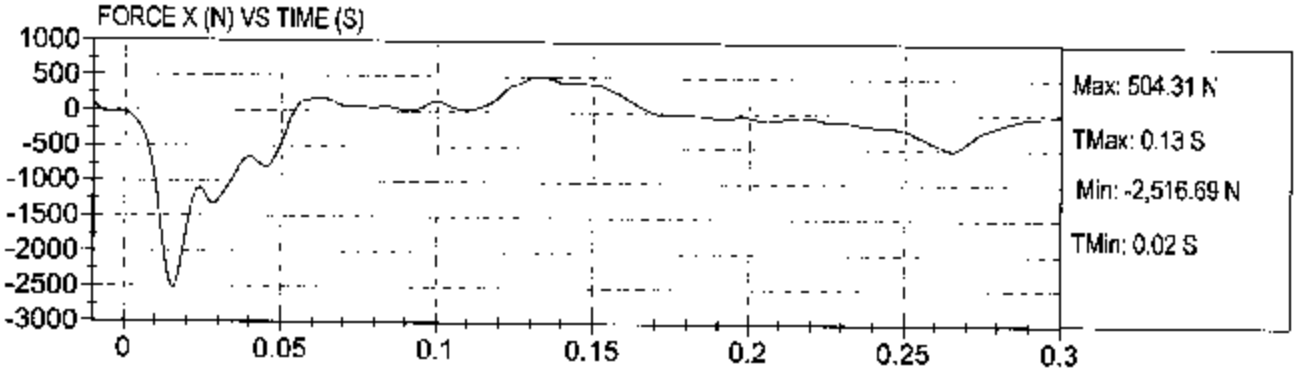


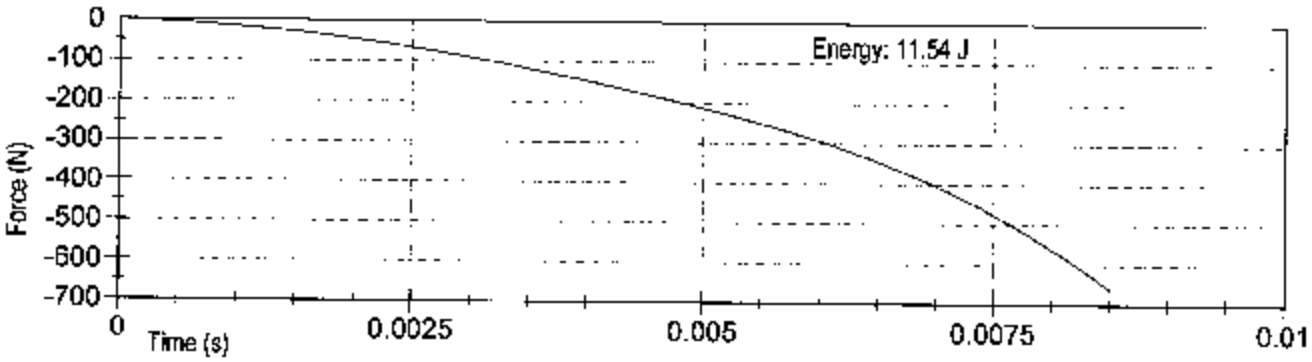
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: ATC
NHTSA #: C30902

Test Date: 4/9/03
Location: H13



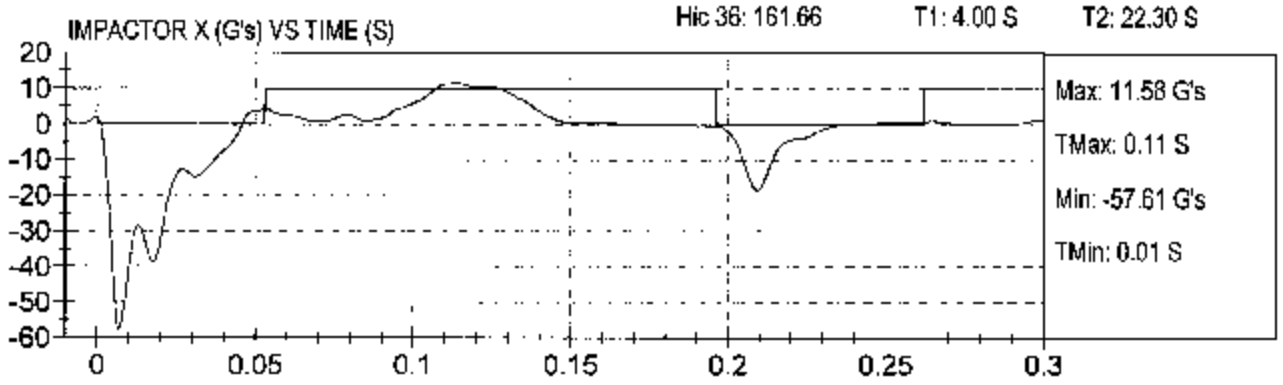


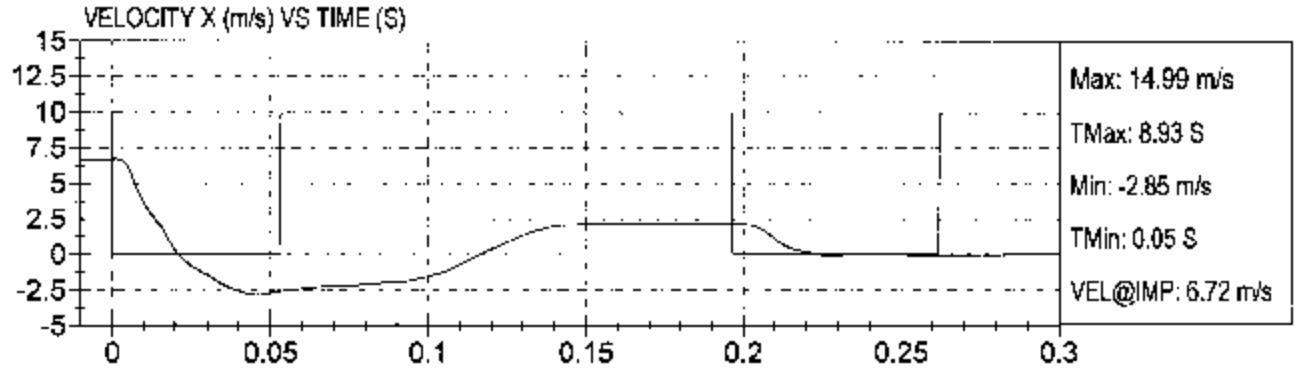


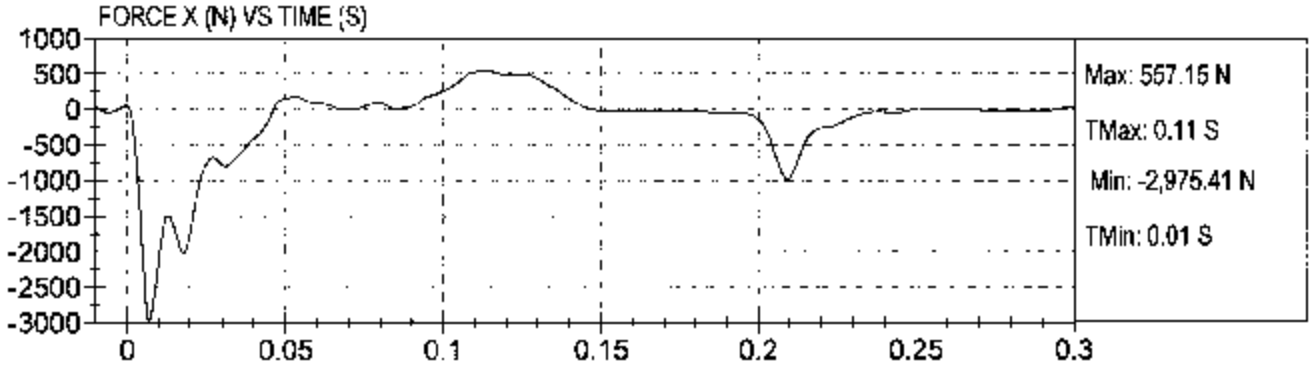


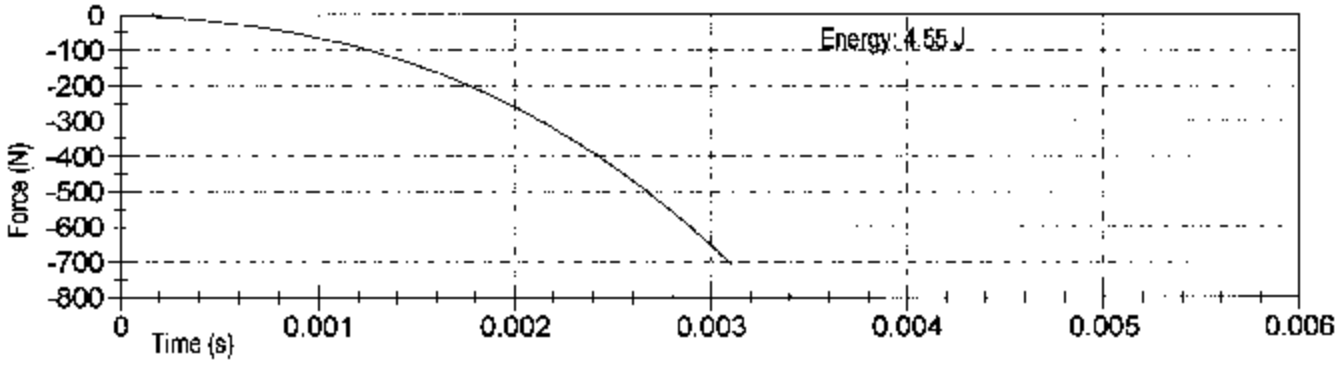
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: ATC
NHTSA #: C30902

Test Date: 4/9/03
Location: H14



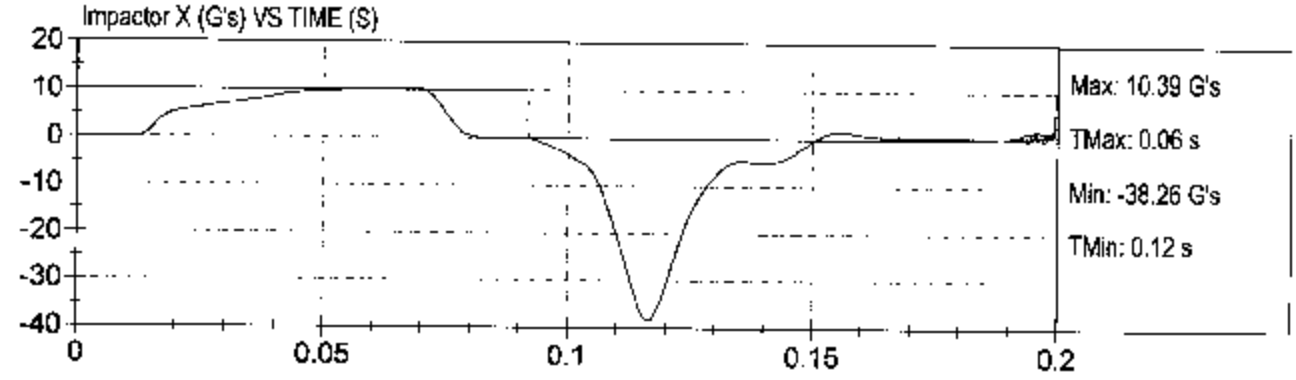


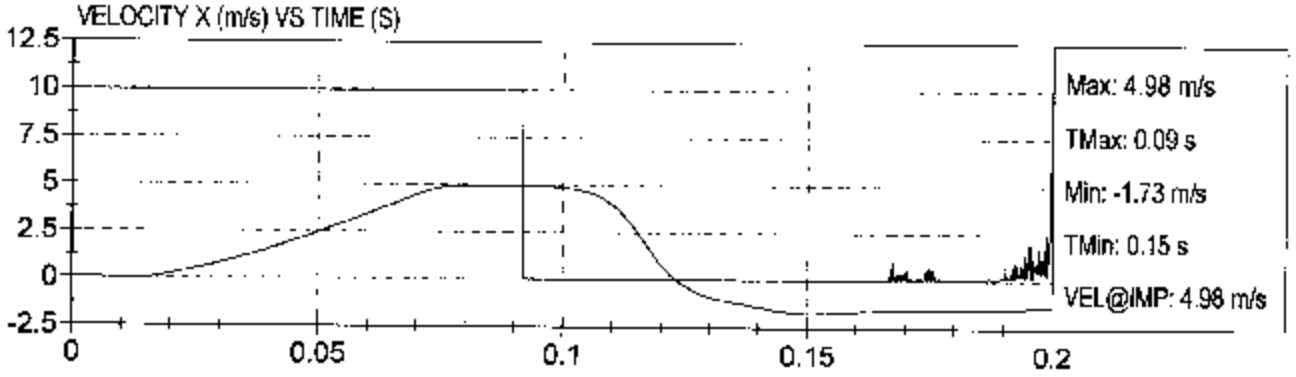


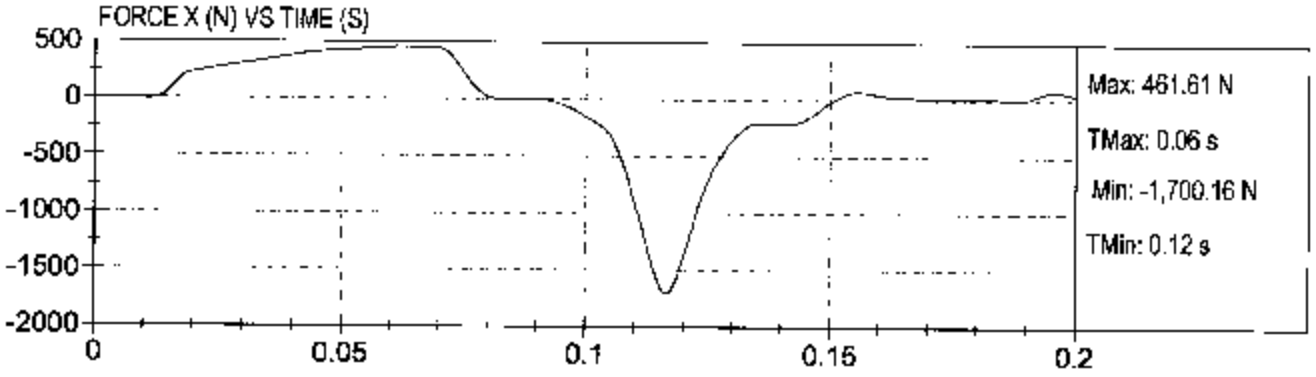


FMVSS 222 KNEE FORM IMPACTS
Vehicle: ATC
NHTSA #: C030902

Test Date: 4-9-03
Location: K1

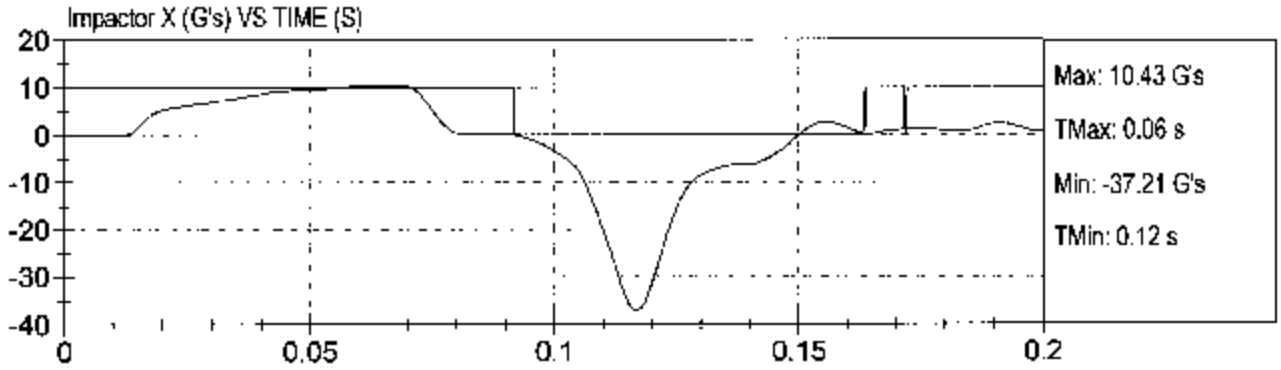


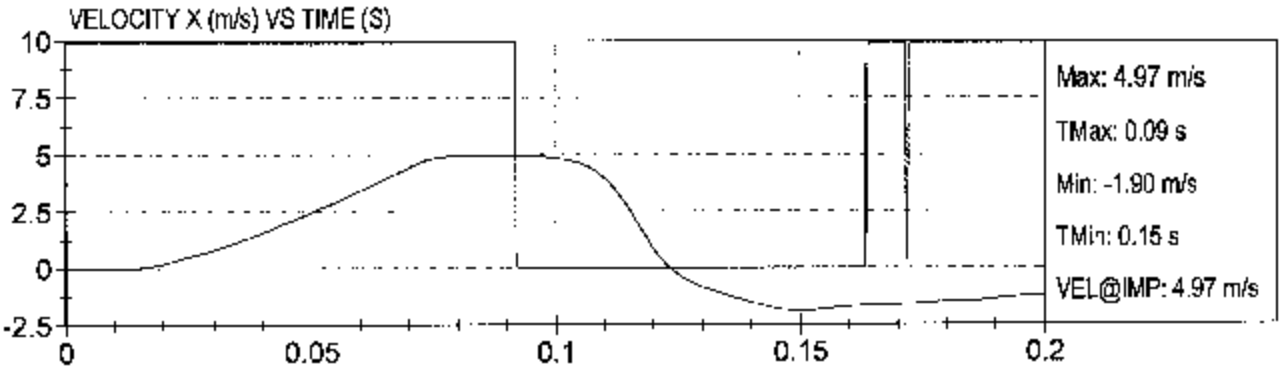


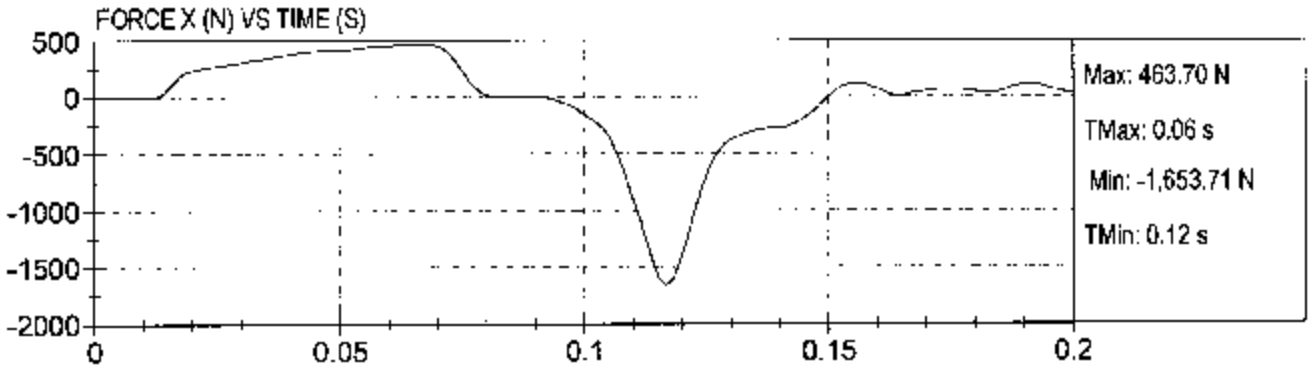


FMVSS 222 KNEE FORM IMPACTS
Vehicle: ATC
NHTSA #: C030902

Test Date: 4-9-03
Location: K2

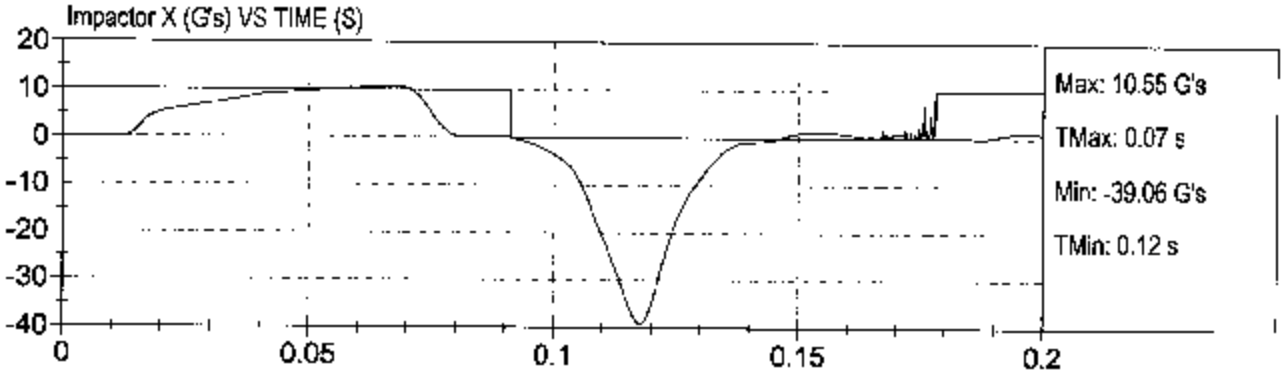


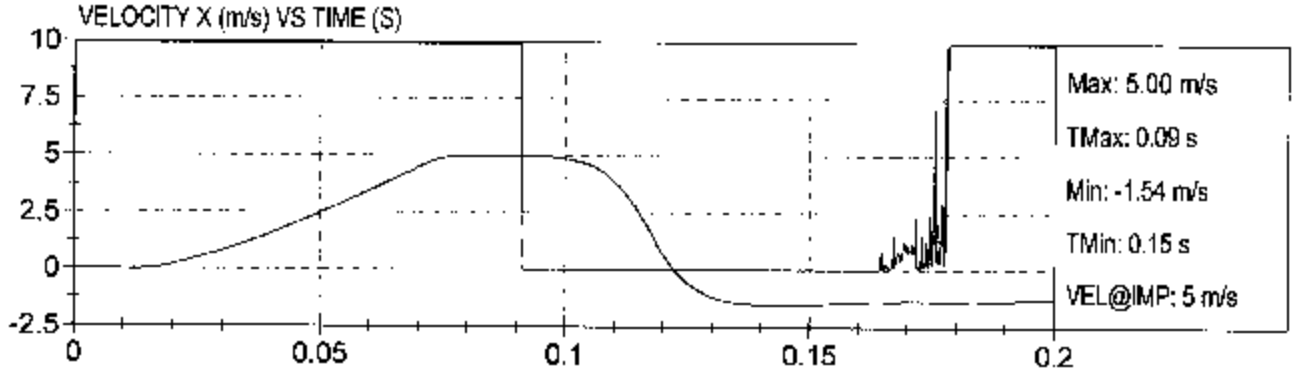


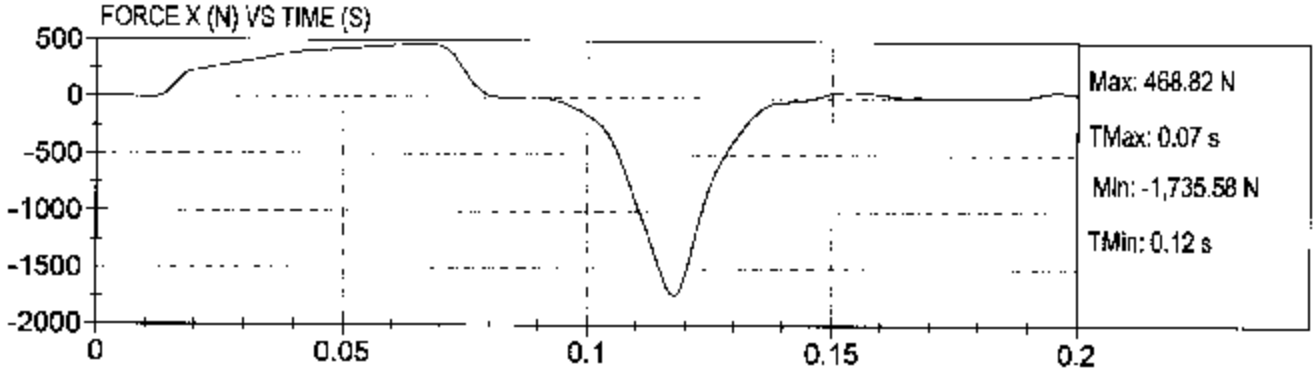


FMVSS 222 KNEE FORM IMPACTS
Vehicle: ATC
NHTSA #: C030902

Test Date: 4-9-03
Location: K3

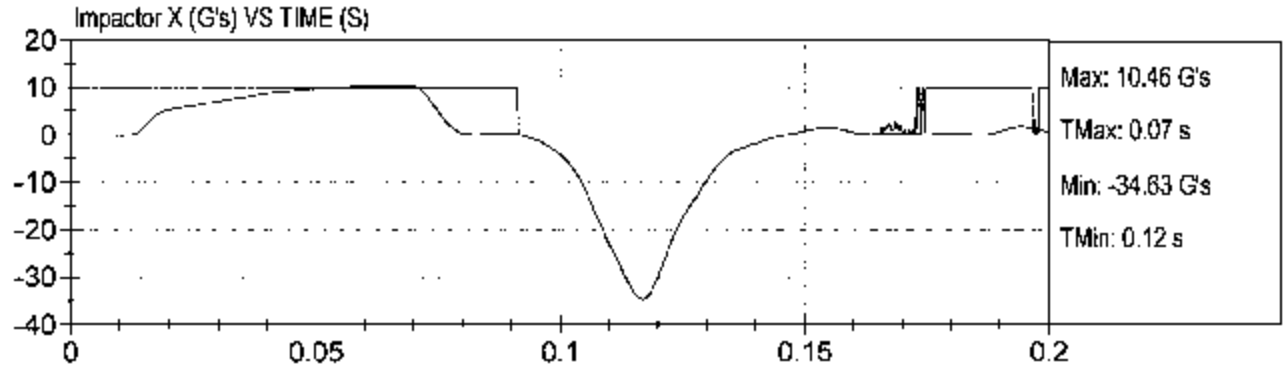


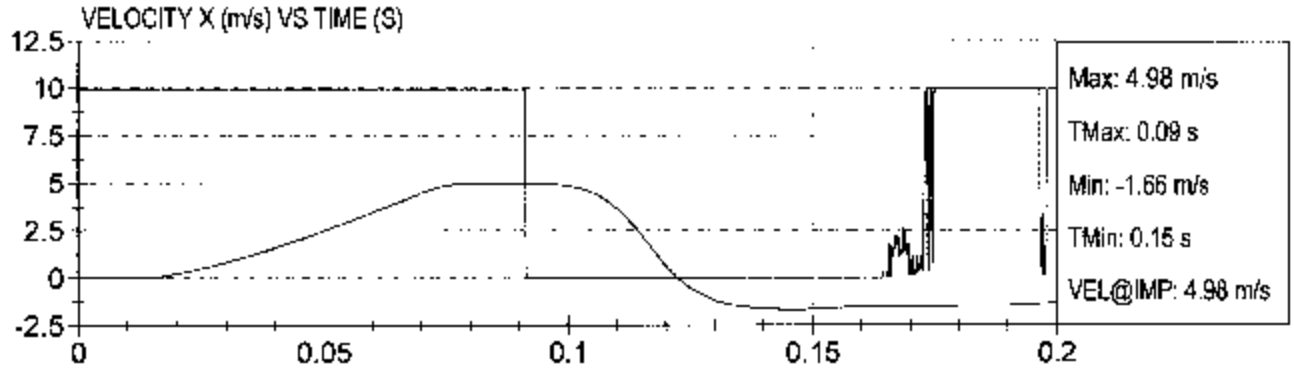


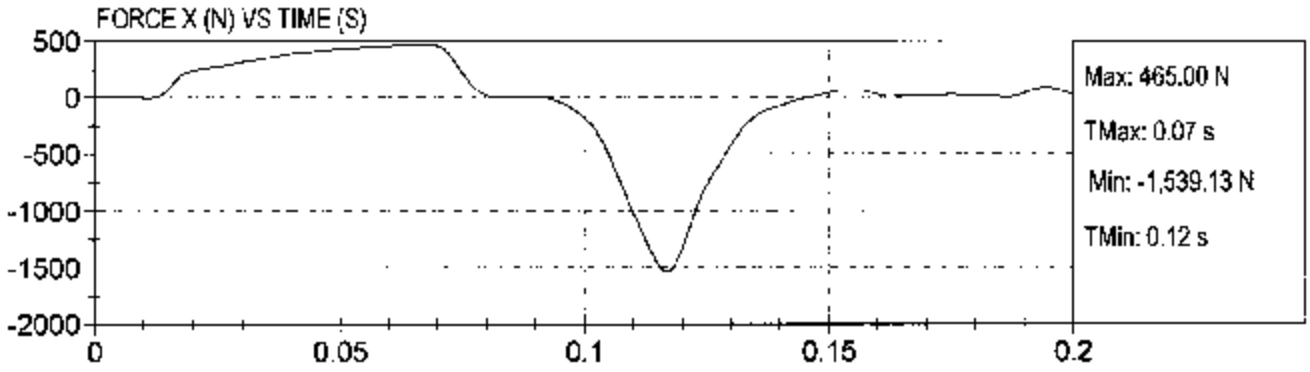


FMVSS 222 KNEE FORM IMPACTS
Vehicle: ATC
NHTSA #: C030902

Test Date: 4-9-03
Location: K4

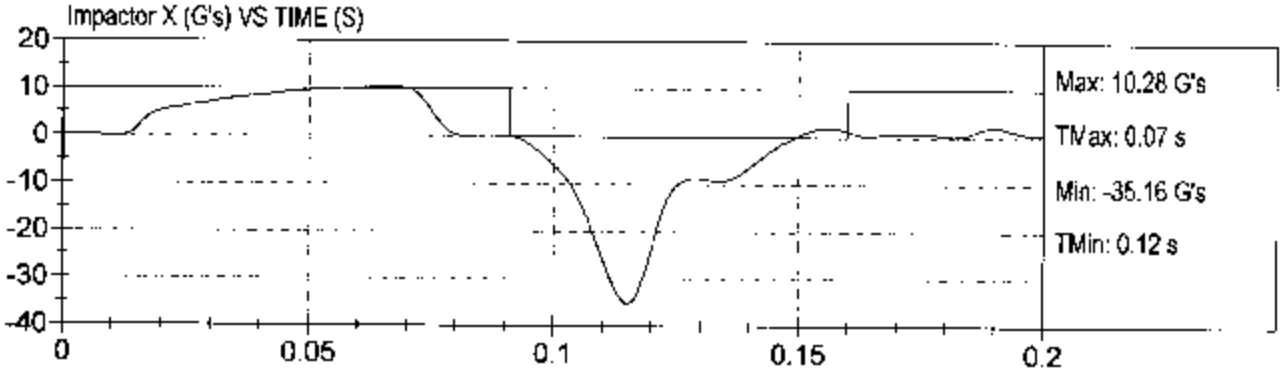


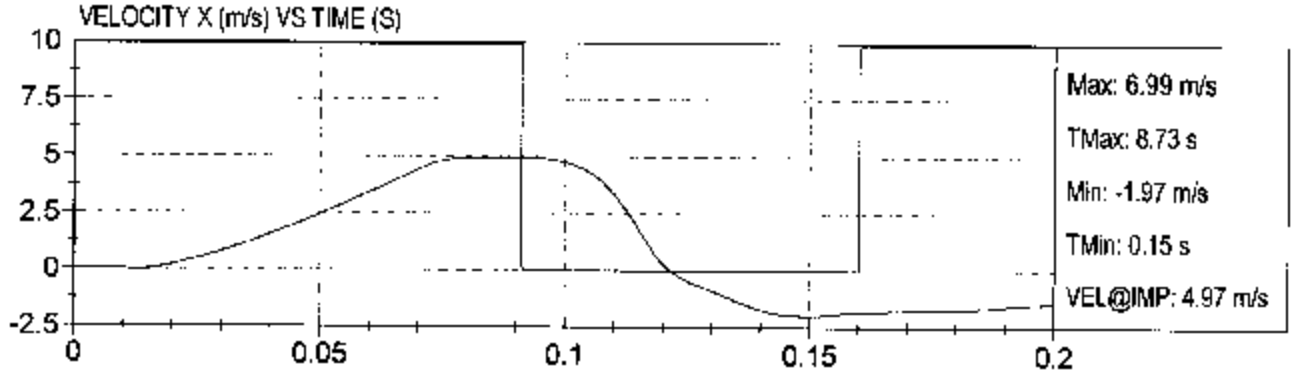


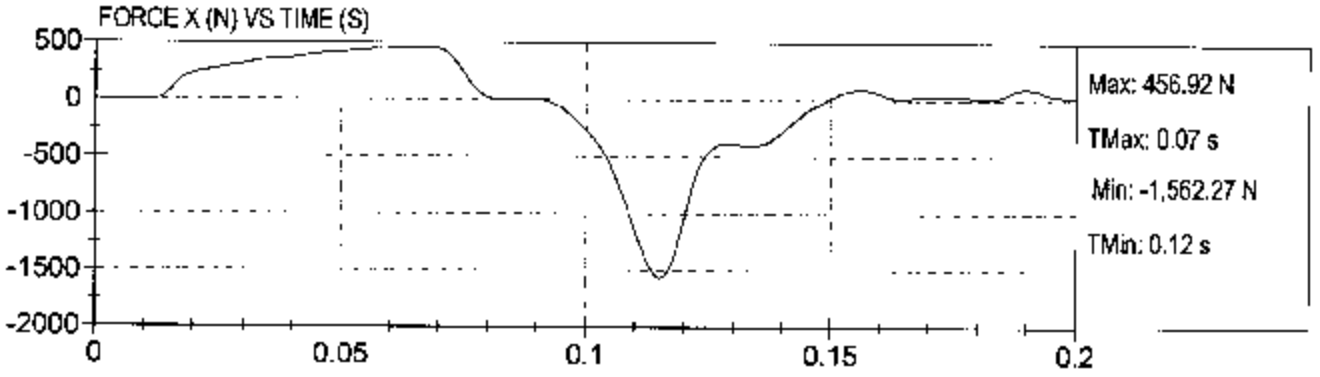


FMVSS 222 KNEE FORM IMPACTS
Vehicle: ATC
NHTSA #: C030902

Test Date: 4-9-03
Location: K5

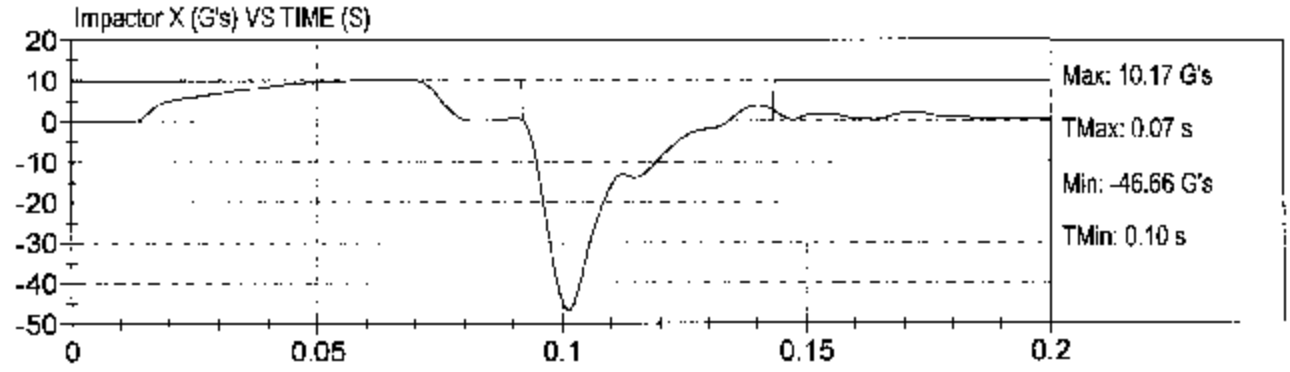


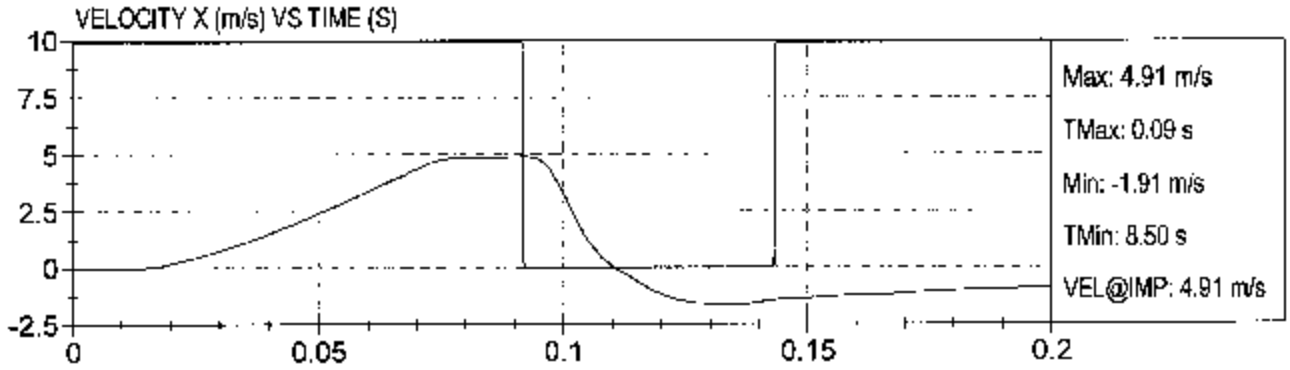


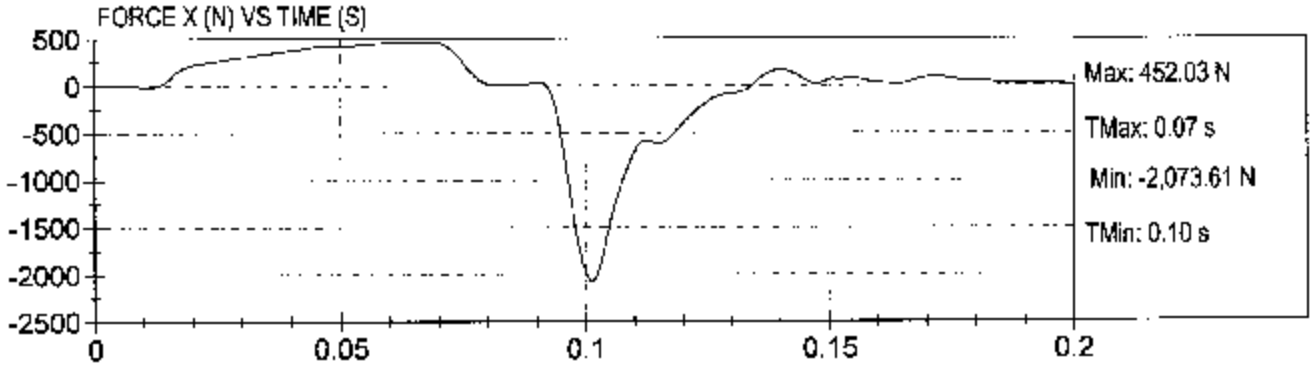


FMVSS 222 KNEE FORM IMPACTS
Vehicle: ATC
NHTSA #: C030902

Test Date: 4-9-03
Location: K6

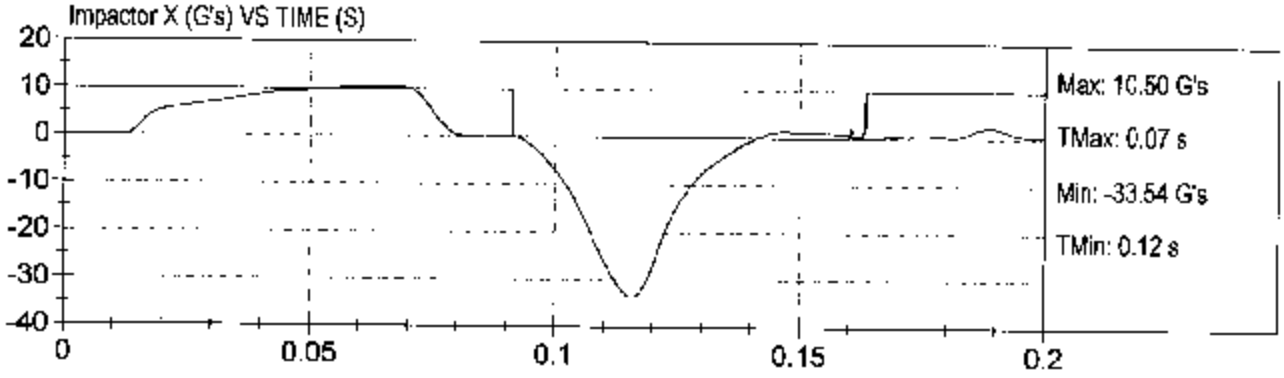


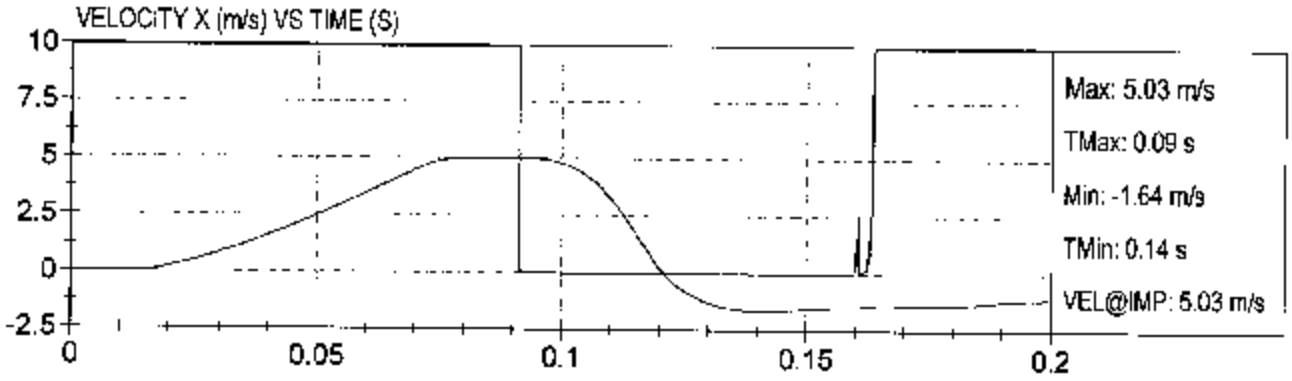


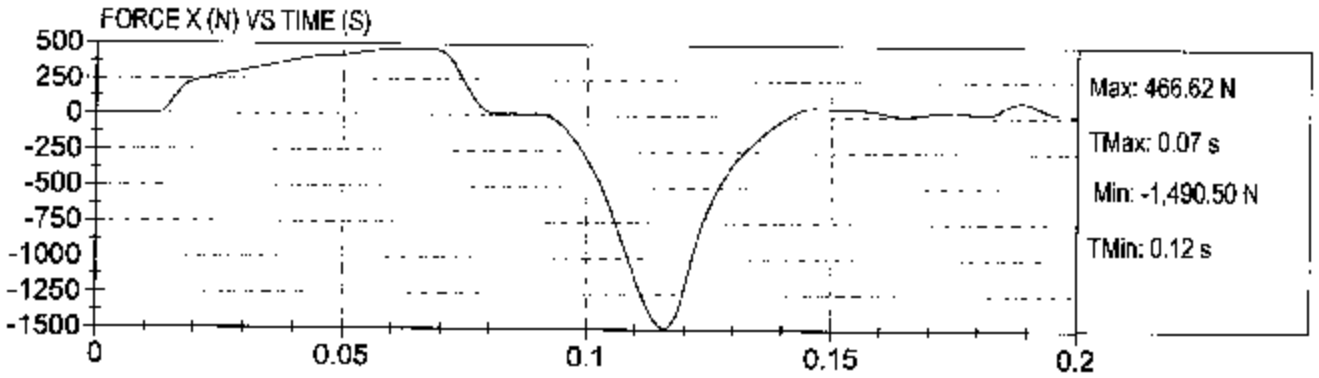


FMVSS 222 KNEE FORM IMPACTS
Vehicle: ATC
NHTSA #: C030902

Test Date: 4-9-03
Location: K7

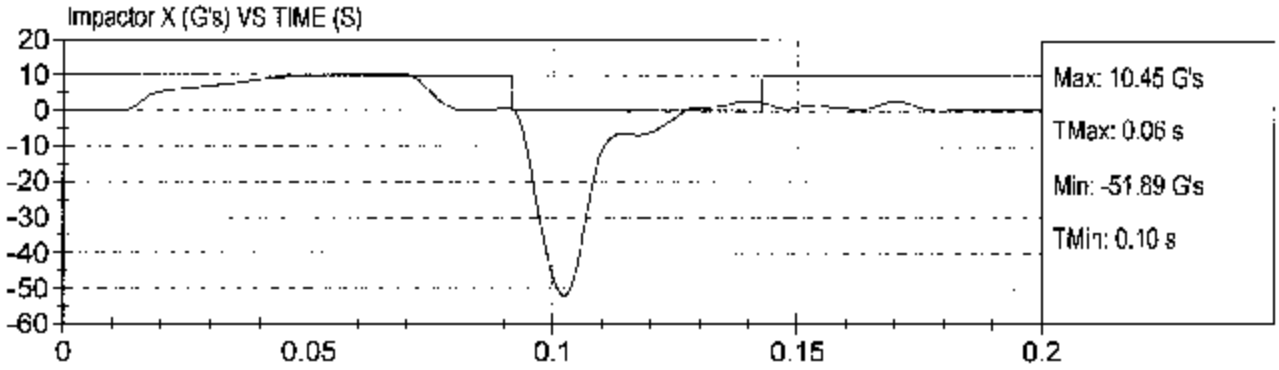


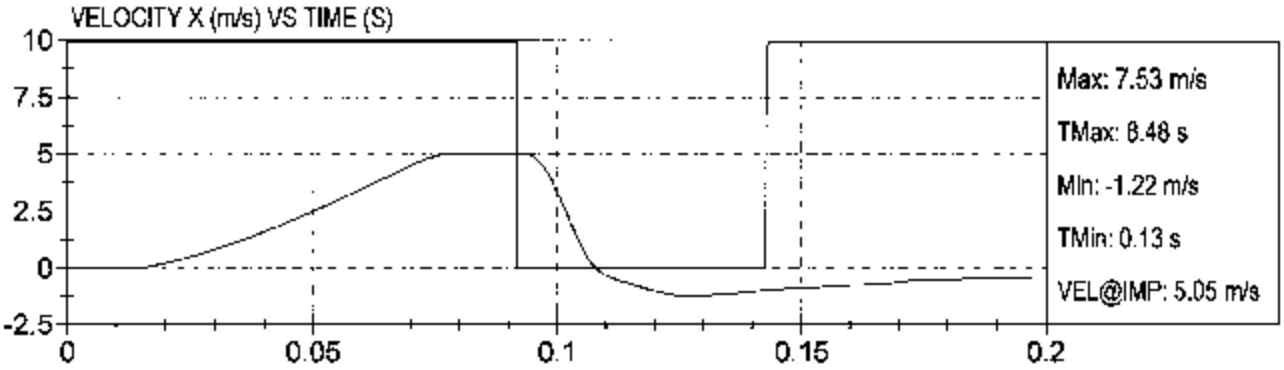


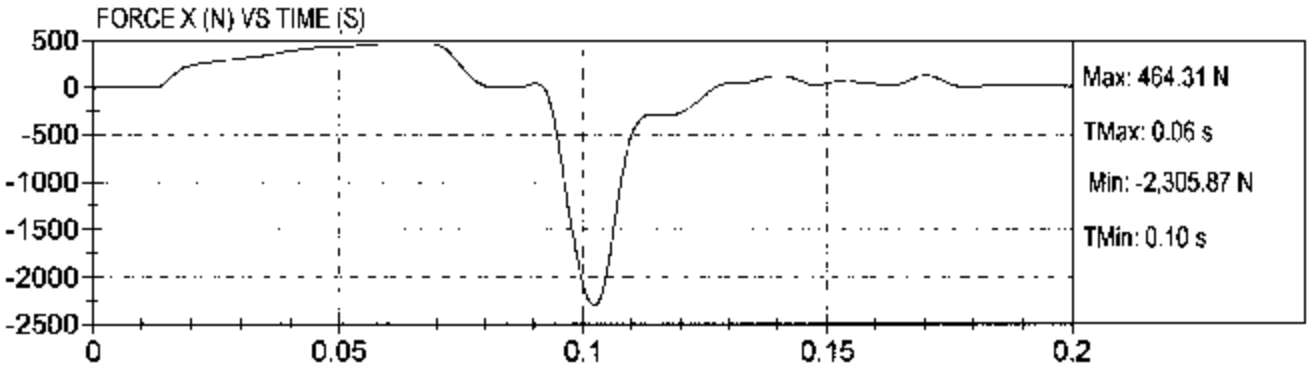


FMVSS 222 KNEE FORM IMPACTS
Vehicle: ATC
NHTSA #: C030902

Test Date: 4-9-03
Location: K8

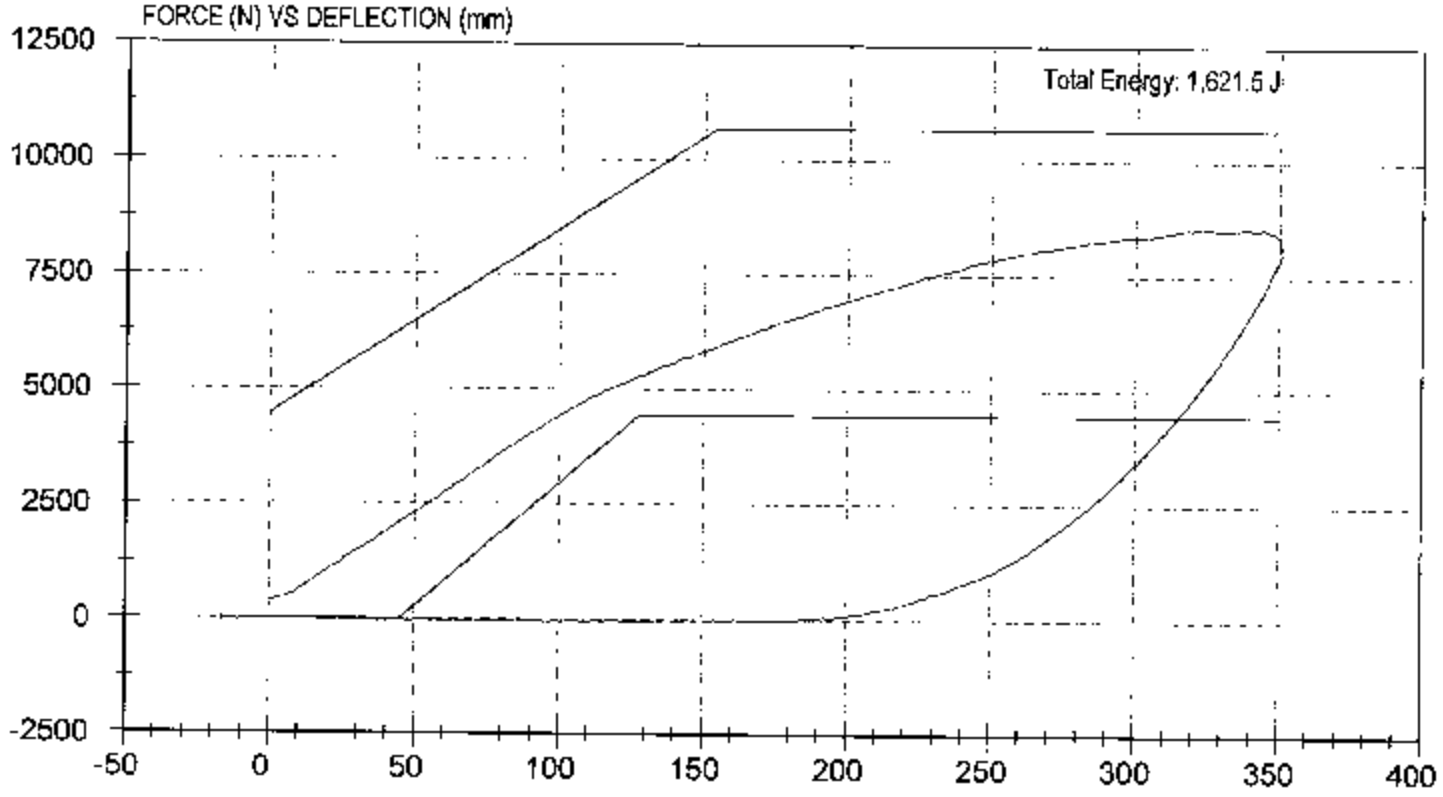


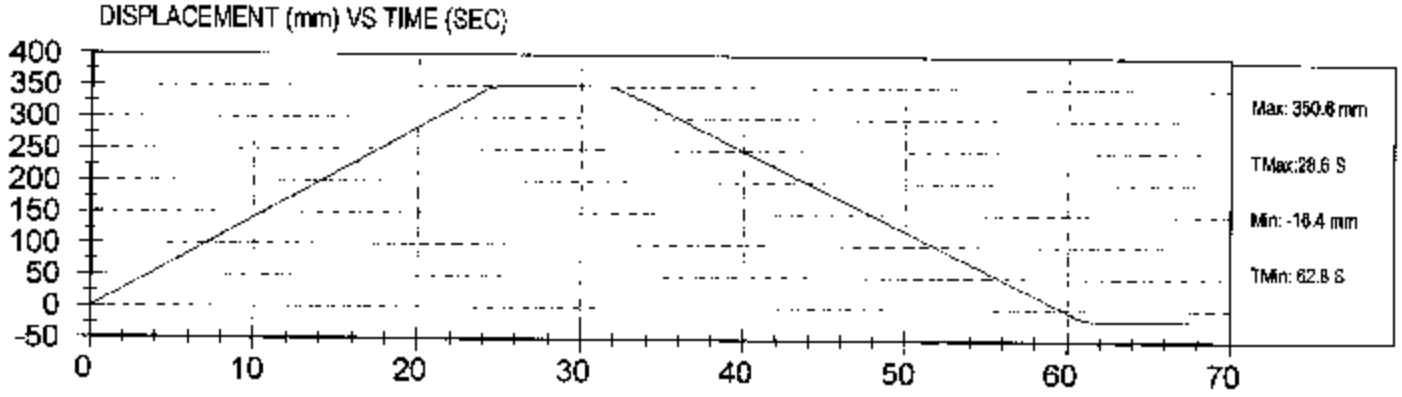


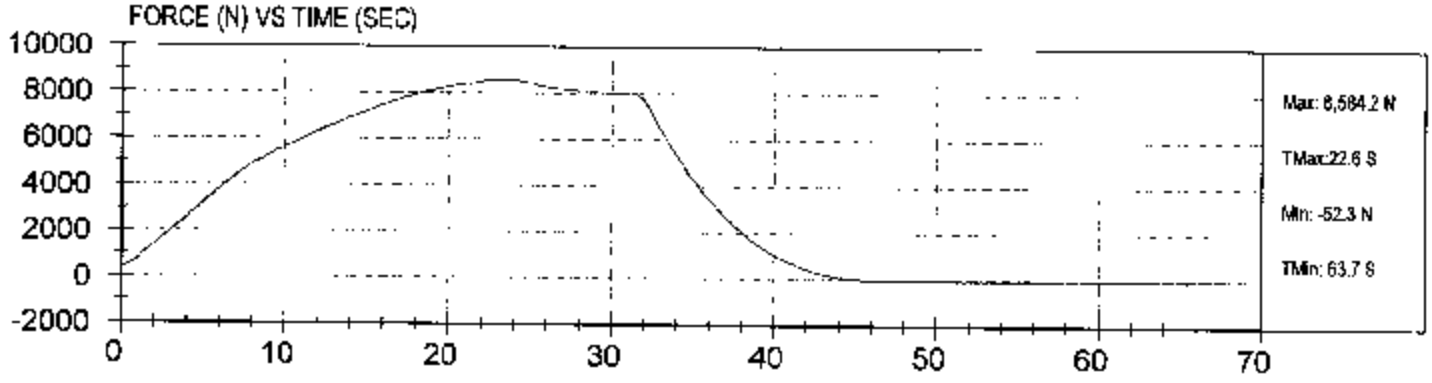


Test Desc: Forward Deflection BX
Component ID: ATC

Test Date: 5/30/03
NHTSA #: C30902

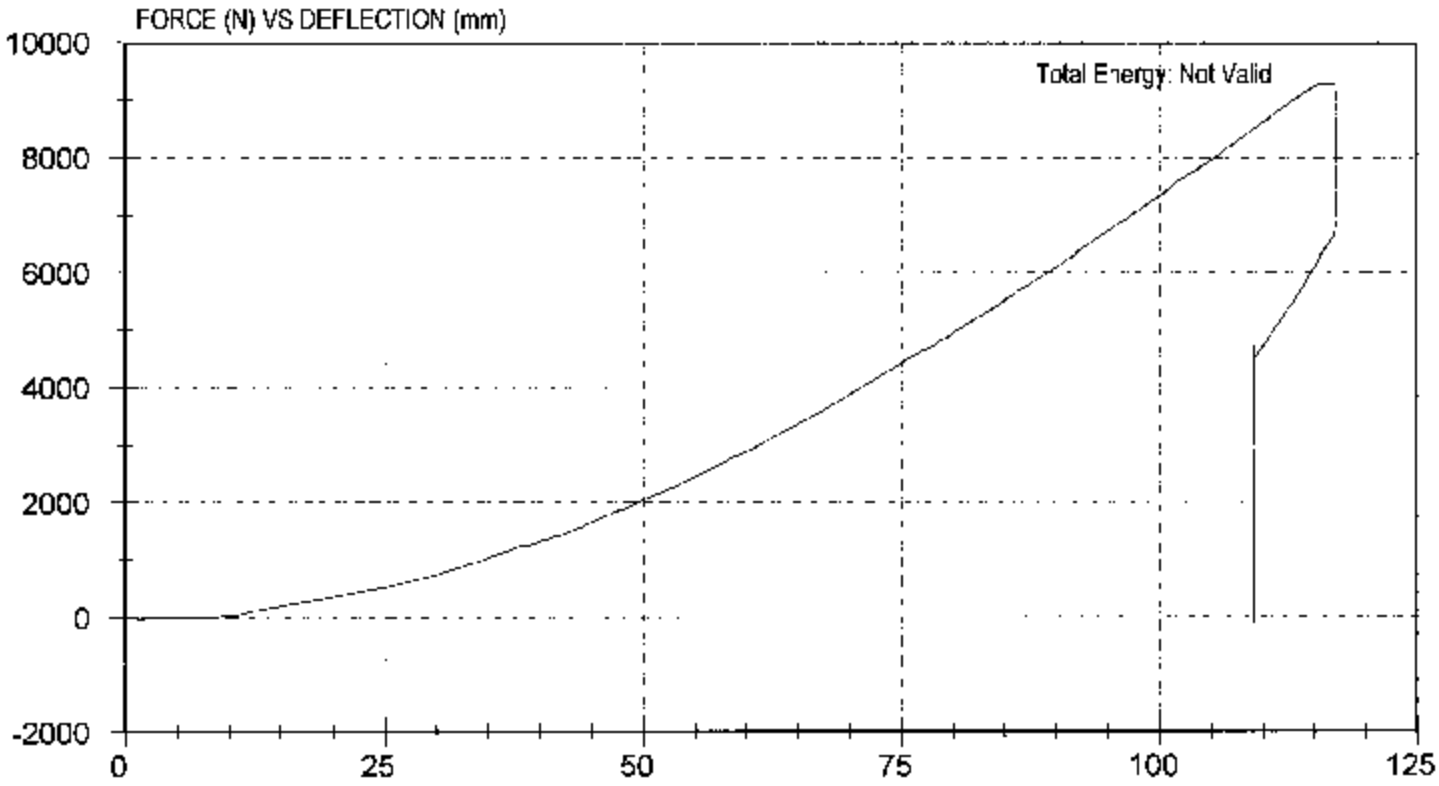


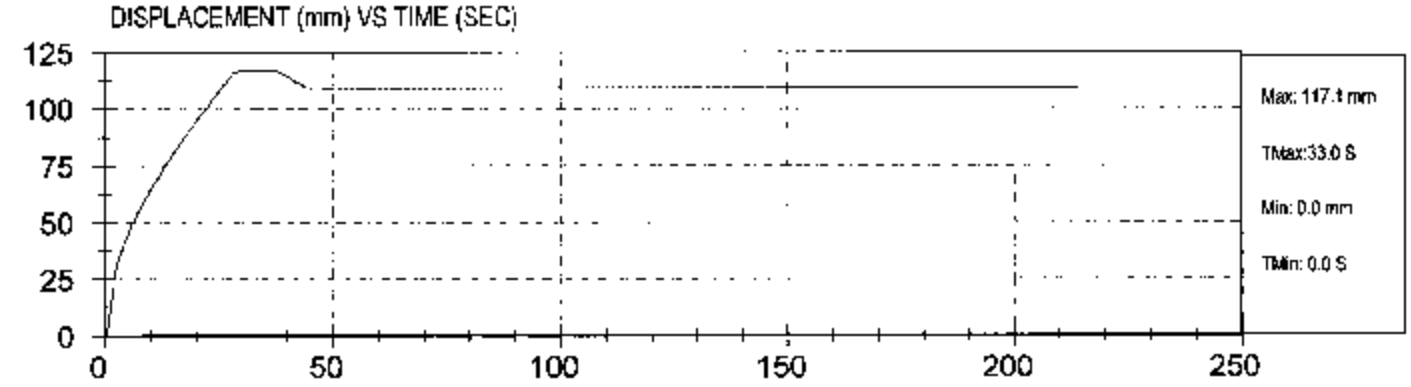


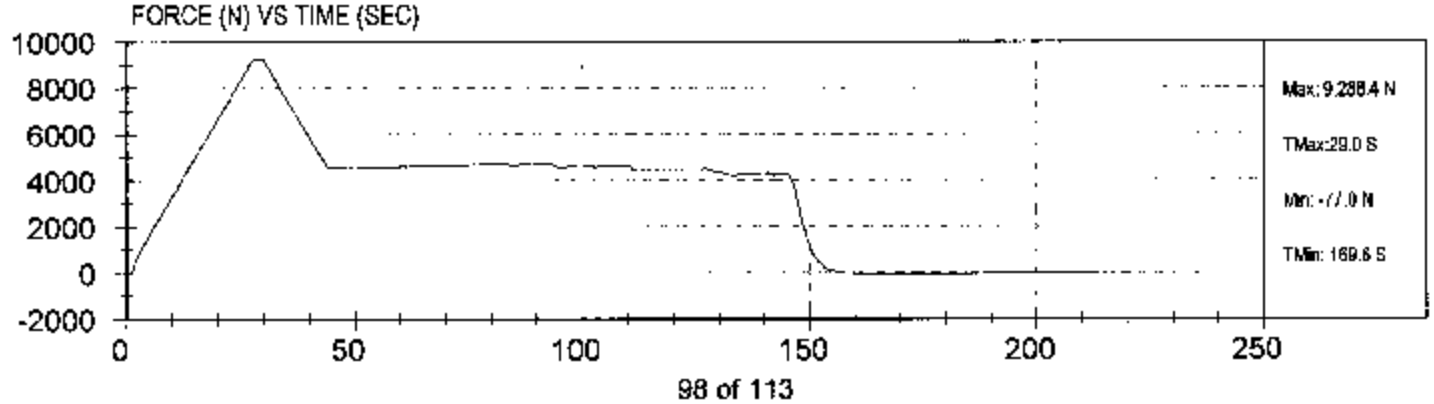


Test Desc: BX Deflection Forward Lower
Component ID: ATC

Test Date: 5/30/03
NHTSA #: C30902

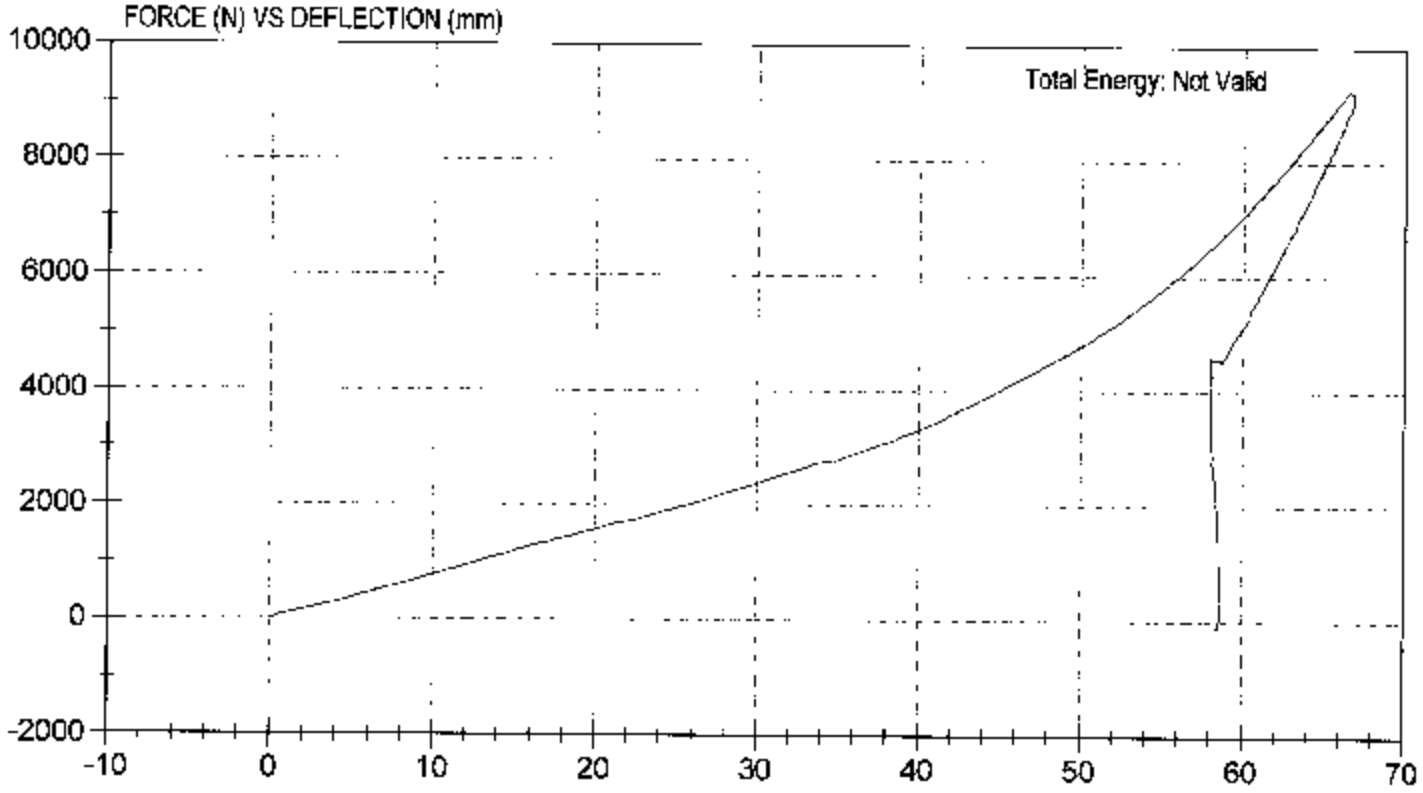


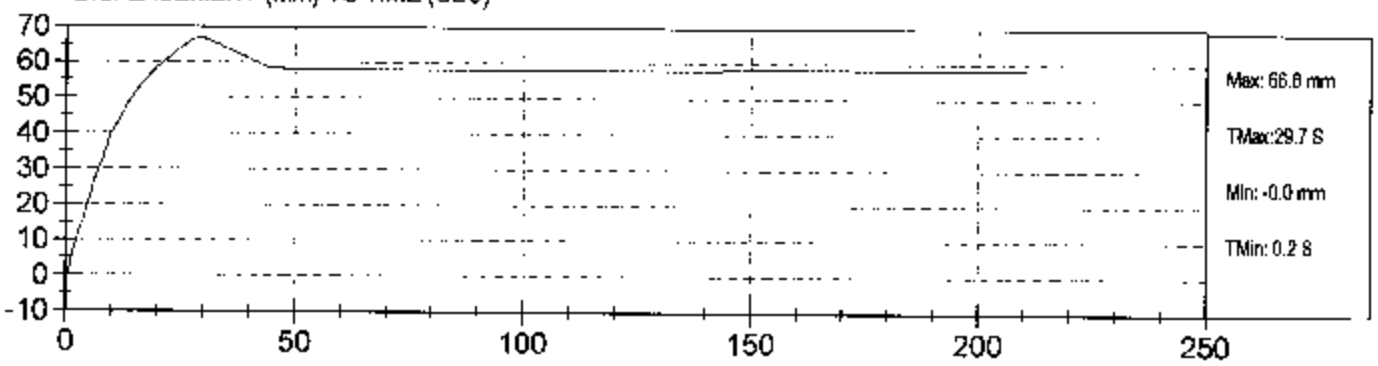


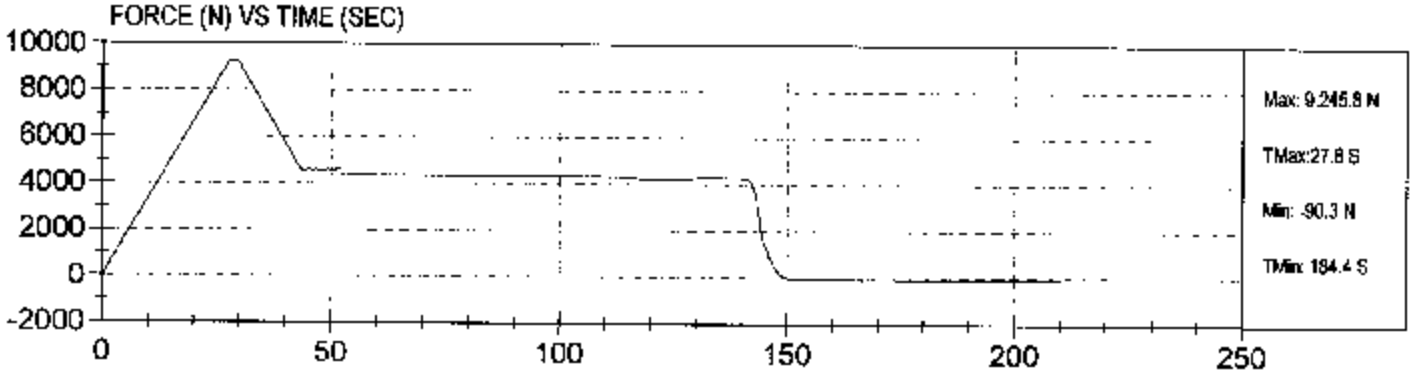


Test Desc: S21 DEFLECTION FORWARD LOWER
Component ID: ATC

Test Date: 4/8/03
NHTSA #: C30902

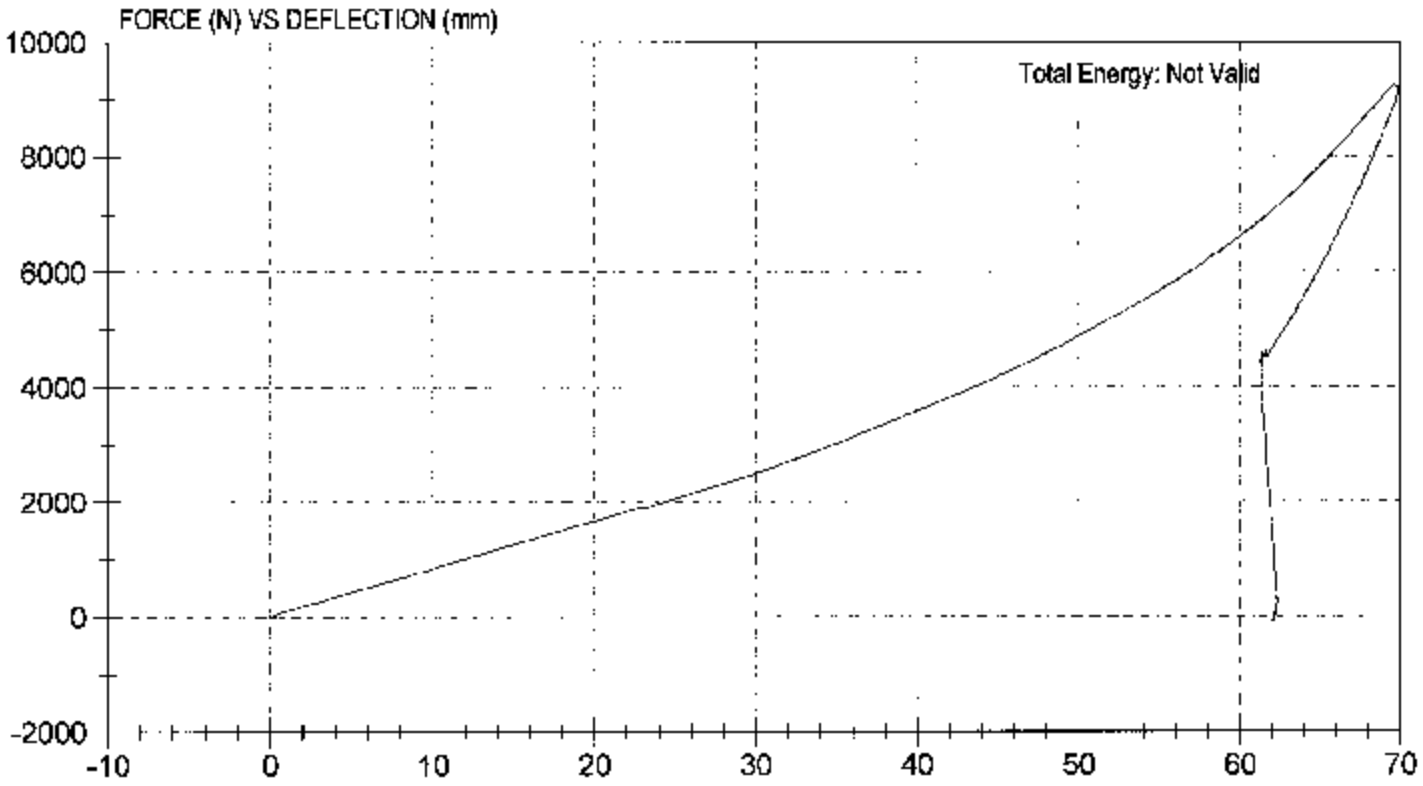


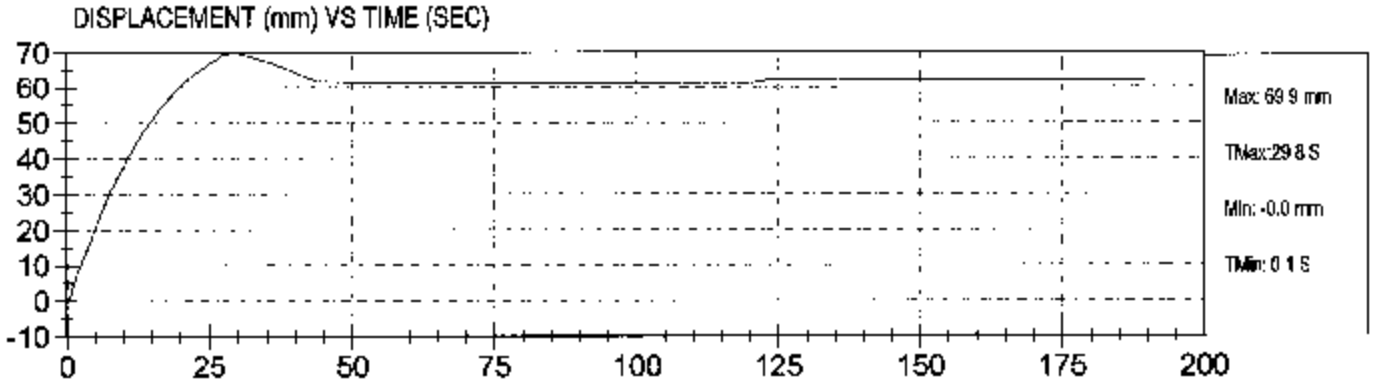


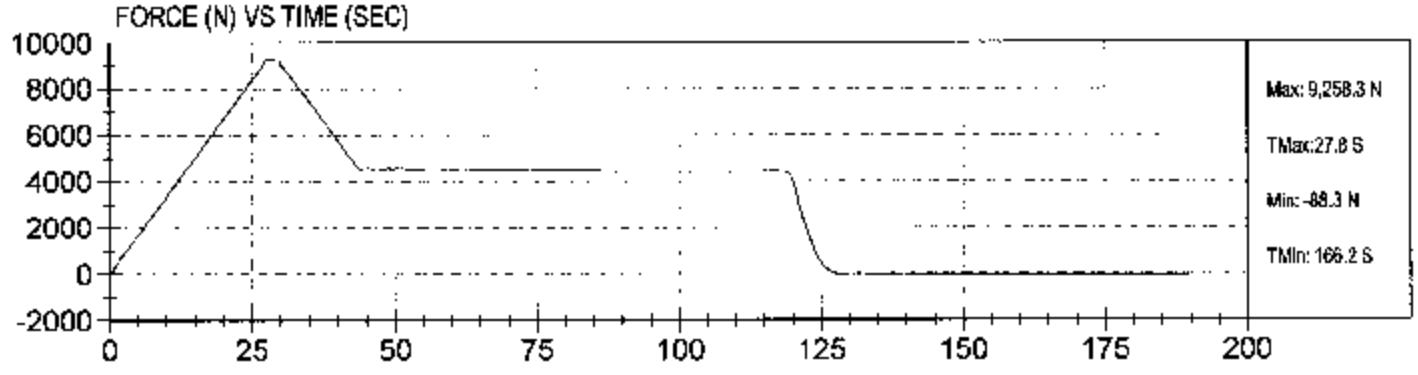


Test Desc: S22 DEFLECTION FORWARD LOWER
Component ID: ATC

Test Date: 4/8/03
NHTSA #: C30902



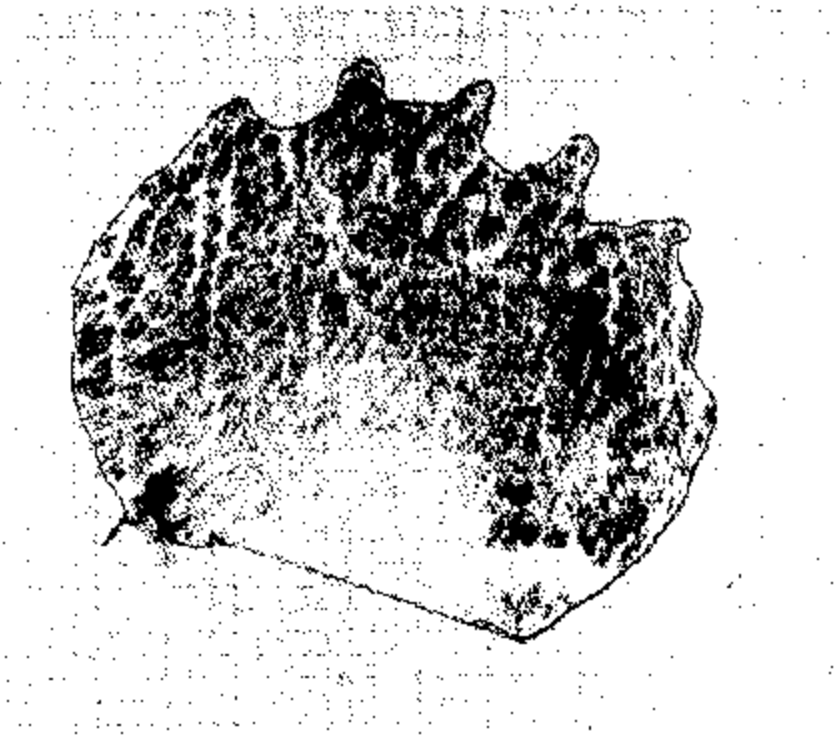




SECTION 7
WELT CONTACT POINTS

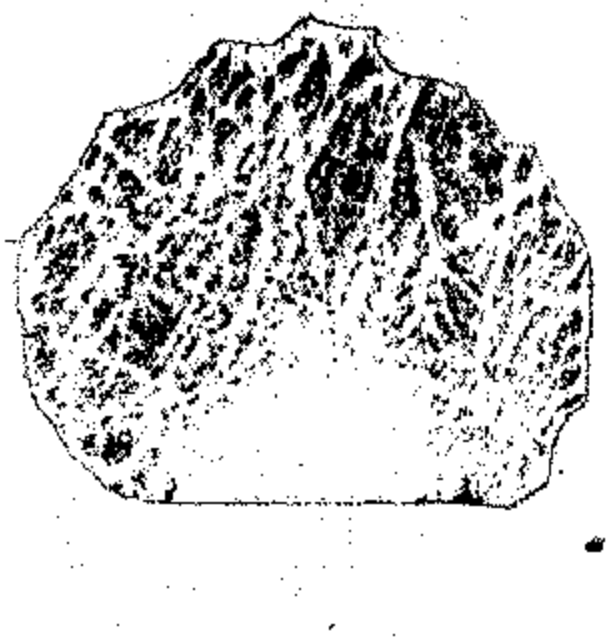
Test Vehicle: **2003 American Transportation Corporation IC3S530 School Bus**
Procedure: **FMVSS 222** NHTSA No.: **C30902**

H1 / Seat S2

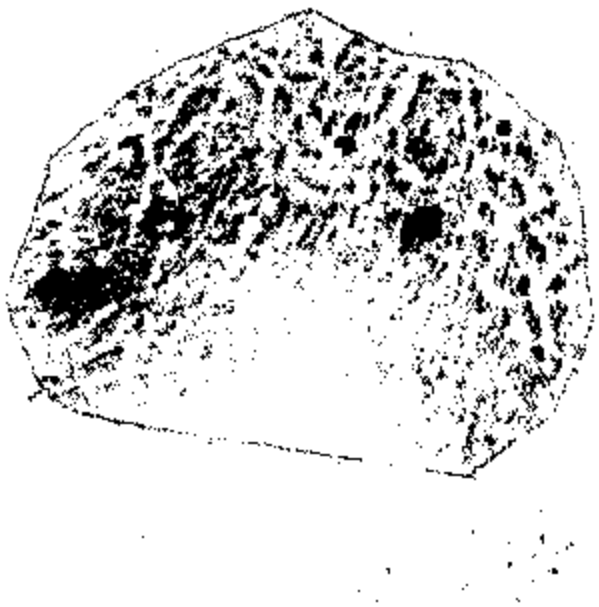


Test Vehicle: **2003 American Transportation Corporation IC3S630 School Bus**
Procedure: **FMVSS 222** NHTSA No.: **C30902**

H2 / Seat S2

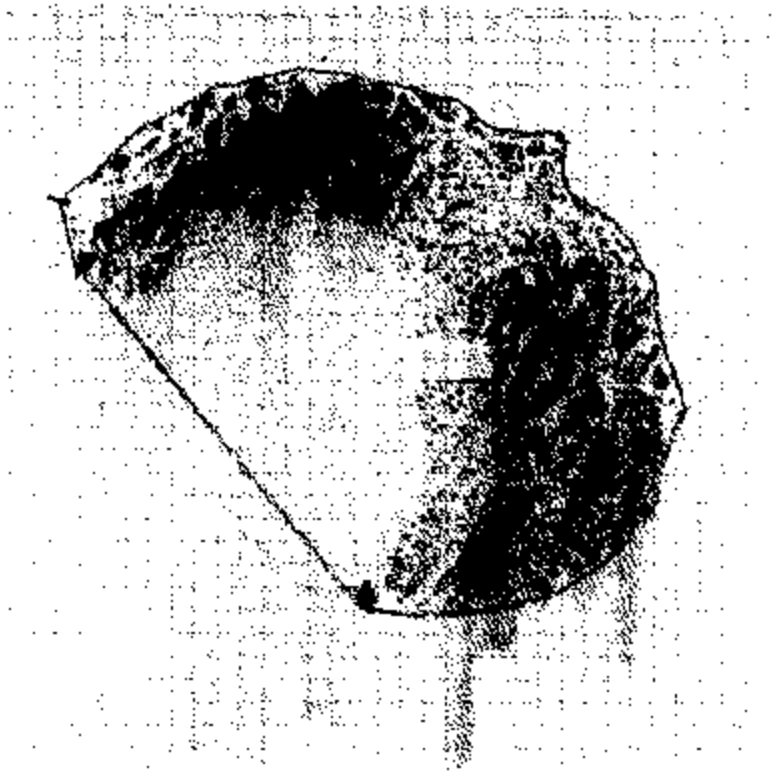


H3 / Seat S2

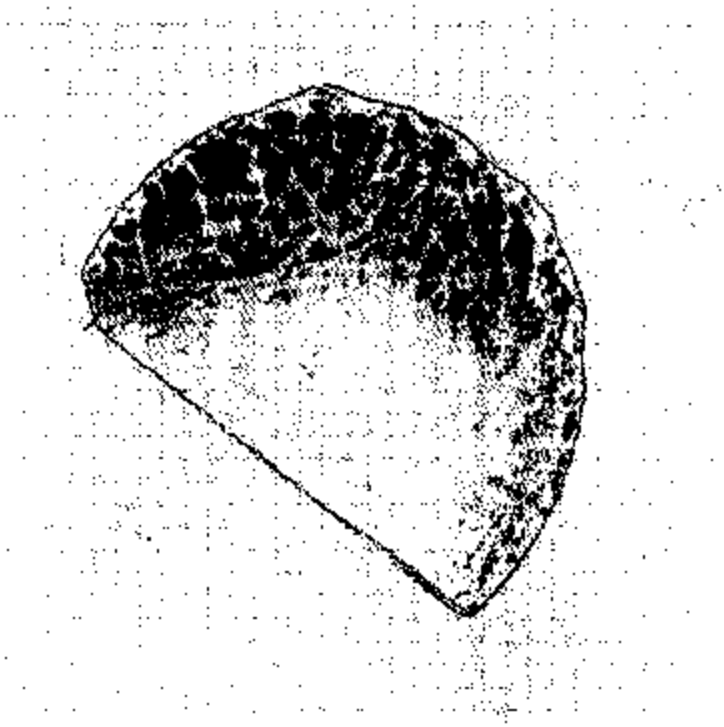


Test Vehicle: **2003 American Transportation Corporation IC3S530 School Bus**
Procedure: **FMVSS 222** NHTSA No.: **C30902**

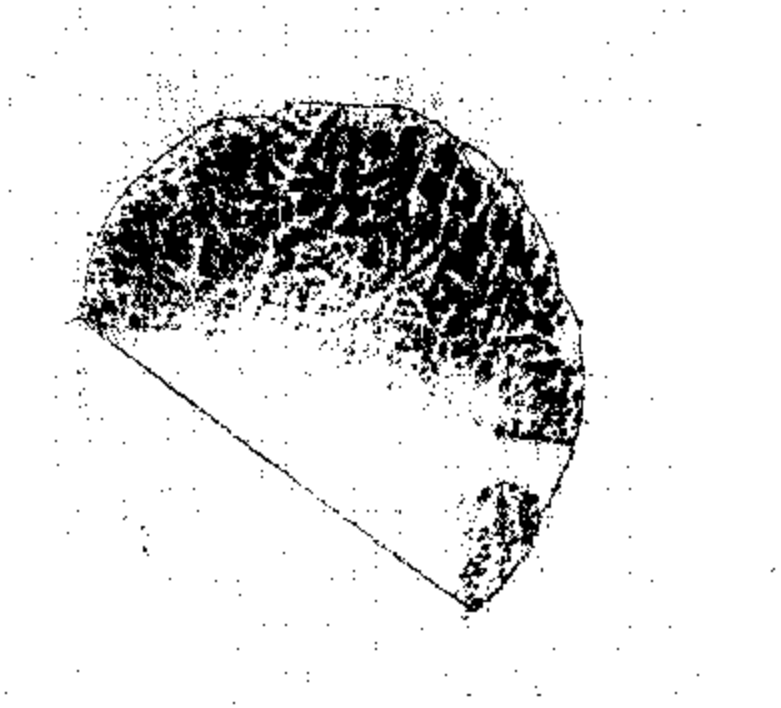
H4 / Seat S2



H5 / Seat S2

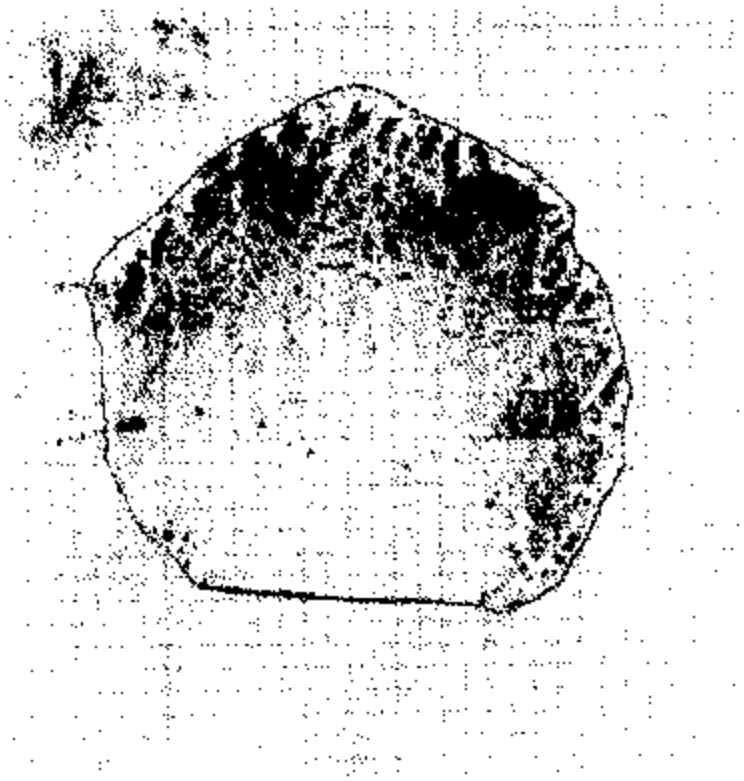


H6 / Seat S2



Test Vehicle: **2003 American Transportation Corporation IC3S530 School Bus**
Procedure: **FMVSS 222** NHTSA No.: **C30902**

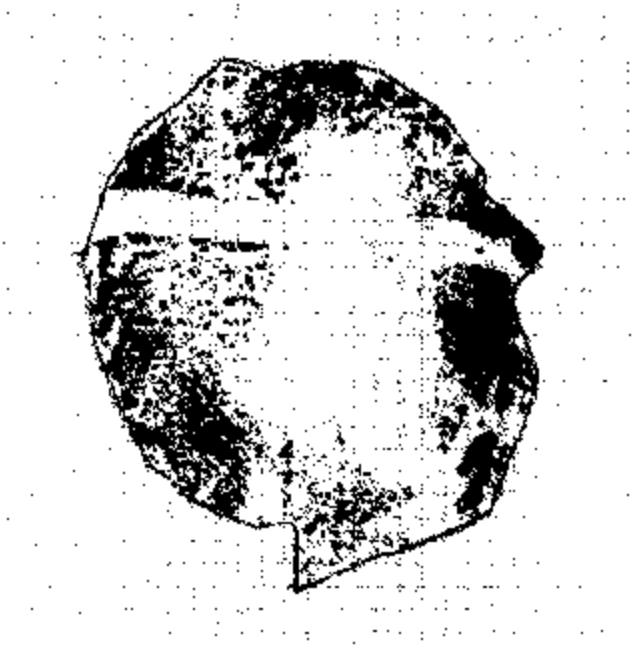
H7 / Seat S2



Test Vehicle: **2003 American Transportation Corporation IC3S530 School Bus**
Procedure: **FMVSS 222** NHTSA No.: **C30902**

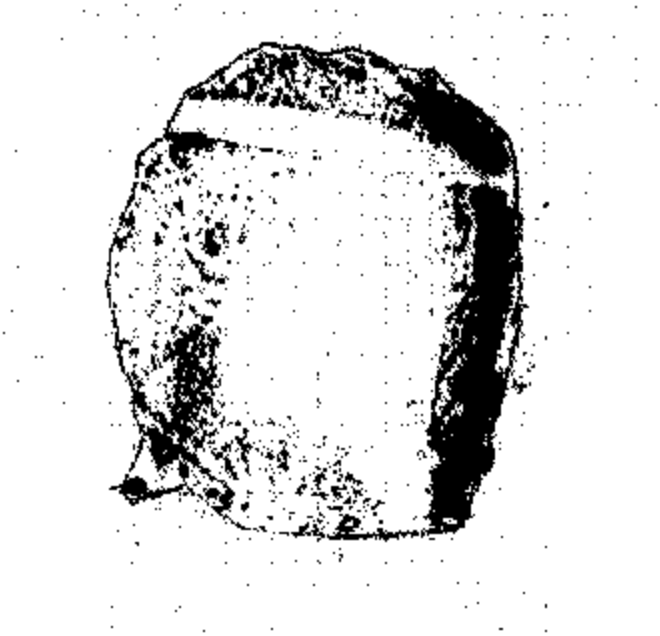
K1 / Seat S2

K2 / Seat S2



K3 / Seat S2

K4 / Seat S2



SECTION 8
BUS FLOOR PLAN