

REPORT NUMBER: 222-MGA-03-001

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

**2003 Blue Bird Corporation
All American School Bus
NHTSA No.: C30900**

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




Final Report Date: May 7, 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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WASHINGTON, D.C. 20590**

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Prepared by:  Date: May 7, 2003
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16. Abstract Compliance tests were conducted on the subject 2003 Blue Bird All American School Bus, NHTSA No. C30900 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					
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SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a MY2003 Blue Bird All American School Bus, NHTSA No. C30900, 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 March 2003. The test vehicle, MY2003 Blue Bird All American School Bus, NHTSA No. C30900 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. 2 and 3 were measured in accordance with Section 12.1 of OVSC TP-222-03. As shown in Data Sheet 2 for Seat Nos. 2 and 3, 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 28 were measured in accordance with OVSC TP-222-03. As shown in Data Sheet 6 for Barrier No. 28, the surface area of the barrier is equal to or greater than the seat back to the rear of the barrier.

SEAT CUSHION RETENTION

Seat Nos. 2 and 3 were tested in accordance with Section 12.3 of OVSC TP-222-03. Seat cushion weight was 3.57 kg. The maximum forces for Seat Cushion Nos. 2 and 3 were 173 N and 175 N. The lower time limit boundary (t_1) 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. See Plot 1 for Seat No. 2 and Plot 2 for Seat No. 3.

SECTION 2 (CONTINUED)
TEST DATA SUMMARY

SEAT BACK FORCE/DEFLECTION TEST - FORWARD

Seat Nos. 25 and 26 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 990 mm. "W" was calculated to be 2.6 and rounded to the nearest whole number (3). The seating reference point (SRP) was 473 mm above the bus floor. The deflection of the seat back at conclusion of lower loading bar loading at 4674 N position was not available on Seat No. 25 and Seat No. 26. 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 the seat back of 356 mm was achieved. The area under the force versus deflection curve of the upper loading bar was 1618 joules for Seat No. 25 and 1682 joules for Seat No. 26. 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., 25 and 26 met the force deflection forward requirements. See Plot No. 3 for Seat No. 25 and Plot No. 4 for Seat No. 26.

SEAT BACK FORCE/DEFLECTION TEST - REARWARD

Seat Nos. 6 and 22 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 990 mm for Seat No. 6 and 990 mm for Seat No. 22. "W" was calculated to be 2.6 and rounded to the nearest whole number (3). The seating reference point (SRP) was 473 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 22. The location of the loading bar was 343 mm above the SRP for both Seat Nos. 6 and 22. 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 969 joules for Seat No. 6 and 1044 joules for Seat No. 22. 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 22. See Plots 5 and 6.

RESTRAINING BARRIER FORCE/DEFLECTION TEST - FORWARD

The right front restraining barrier (B28) was tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 990 mm. "W" was calculated to be 2.6 and rounded to the nearest whole number (3). The SRP was 473 mm above the bus floor. The lower loading bar was 477 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 not available. 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 19.8 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 1661 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. 7 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. 7 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 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
Test Date: **3/24/03**

INCOMPLETE VEHICLE (IF APPLICABLE)

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

COMPLETED VEHICLE (SCHOOL BUS)

Manufacturer:	Blue Bird Corporation
Make/Model:	All American
VIN:	1BABNBPA33F210494
NHTSA No.:	C30900
Color:	Yellow
GVWR:	16,420 kg
Build Date:	8/02
Certification Date:	

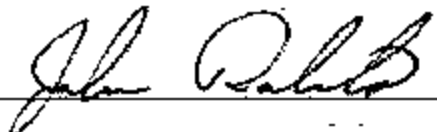
DATES

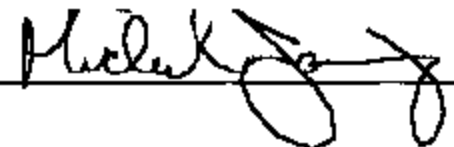
Vehicle Receipt:	November 2002
Start of Compliance Test:	March 24, 2003
Completion of Compliance Test:	April 21, 2003

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: 5/7/03

GENERAL TEST DATA SHEET

Test Vehicle: **2003 Blue Bird All American School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
 Test Date: **3/24/03**

SCHOOL BUS IDENTIFICATION

Model Year/Mfr./Make/Model:	2003 Blue Bird All American School Bus
Wheelbase:	6.934 meters
Passenger Capacity:	85 (1 driver, 84 passengers)
NHTSA No.:	C30900
VIN:	1BABNBPA33F210494
Conventional or Forward Control:	Forward Control
GVWR (Certification Label) FRONT:	16,420 kg
GVWR (Certification Label) REAR:	5,988 kg
GVWR (Certification Label) TOTAL:	10,433 kg

TEST CONDITIONS

Date(s) of Test:	March 24 – April 21, 2003
Ambient Temperature (°C):	23.1°C
Required Temperature Range:	0°C to 32°C

SEAT IDENTIFICATION

Seat Manufacturer:	[REDACTED]
Model Name & Number:	[REDACTED]
Description of Seats:	Seat frames are constructed of 25.4 mm square welded steel tubing. The seat back has a 1.52 mm stamped steel pan spot welded on the backside of the tubing and is covered with 31 mm poly foam on the front surface and 34 mm rebond foam on the rear surface and 30 mm molded Styrofoam blocks inset into the outboard knee impact areas. The seat cushion is constructed of 10 mm plywood with 109 mm rebond foam pad. The seat back and seat cushion are wrapped with 0.84 mm vinyl.

SECTION 3
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the MY2003 Blue Bird All American School Bus, NHTSA No. C30900.

DATA SHEET 1
SEAT TO SEAT/BARRIER SPACING

Test Vehicle: **2003 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

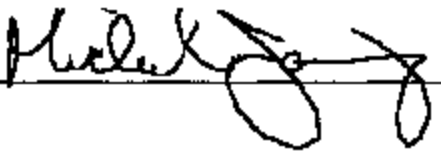
NHTSA No.: **C30900**
Test Date: **3/24/03**

SEAT NUMBER	MEASUREMENT OF SPACING FROM SRP FORWARD TO SEAT/BARRIER (mm)	REQMT \leq 610 MM (\leq 24") CLASS 1 BUSES ONLY)
		PASS/FAIL
1	488	PASS
2	470	PASS
3	480	PASS
4	480	PASS
5	470	PASS
6	510	PASS
7	428	PASS
8	450	PASS
9	438	PASS
10	445	PASS
11	454	PASS
12	450	PASS
13	440	PASS
14	490	PASS
15	490	PASS
16	480	PASS
17	467	PASS
18	497	PASS
19	452	PASS
20	482	PASS
21	450	PASS
22	465	PASS

23	470	PASS
24	465	PASS
25	462	PASS
26	470	PASS
27	460	PASS
28	480	PASS

Comments: NONE

Recorded By: 

Approved By: 

Date: 5/7/03

DATA SHEET 2
SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

Test Vehicle: **2003 Blue Bird All American School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
 Test Date: **3/24/03**

SEAT NUMBER: S2

		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 = 980 mm width, b = 834 mm radius = 136 mm


Area = $\frac{1}{2}(a+b) \times 508 \text{ mm} = 460,756 \text{ mm}^2 - *7,940 \text{ mm}^2 = 452,816 \text{ mm}^2$

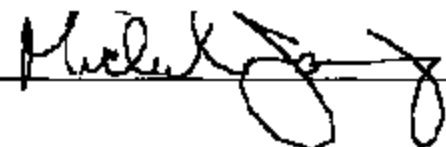
3. Measure the seat cushion width -- W1 = 890 mm
 If the seat cushion is not rectangular, measure the cushion at the forward most edge and the rearward most edge, average the widths, and use the average width as W1.
4. Calculate the following: $0.9 \times W1 \times 508 \text{ mm} = 452,628 \text{ mm}^2$

		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: 5/7/03

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

SEAT NUMBER: S3

		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, $a = 980$ mm width, $b = 834$ mm radius = 136 mm

Area = $\frac{1}{2}(a+b) \times 508$ mm = $460,756$ mm² - $*7,940$ mm² = $452,816$ mm²

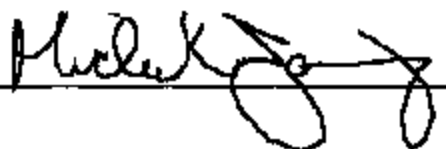
3. Measure the seat cushion width - - $W1 = 990$ mm
 If the seat cushion is not rectangular, measure the cushion at the forward most edge and the rearward most edge, average the widths, and use the average width as $W1$.
4. Calculate the following: $0.9 \times W1 \times 508$ mm = $452,628$ mm²

		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: 5/7/03

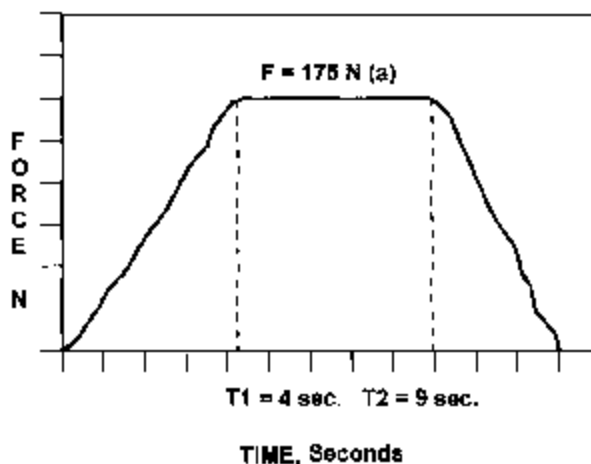
DATA SHEET 3
SEAT CUSHION RETENTION TEST

Test Vehicle: **2003 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
Test Date: **3/24/03**

SEAT NUMBER: S2

1. Cushion Weight/Mass = 3.57 kg
2. Cushion Weight x 5 = F = 175 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:
 $T1 \Rightarrow >1 \text{ sec.}, <5 \text{ sec.}, t2 = t1 + 5 \text{ sec.}, + 0 \text{ sec. and } -0.10 \text{ sec.}$

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

DESCRIBE SEAT CUSHION ATTACHMENTS: 4 steel clamps held to bottom of seat with wood screws.

Comments: (a) Force reached 175 N and held at 173 N.

Recorded By: *John Ralab*

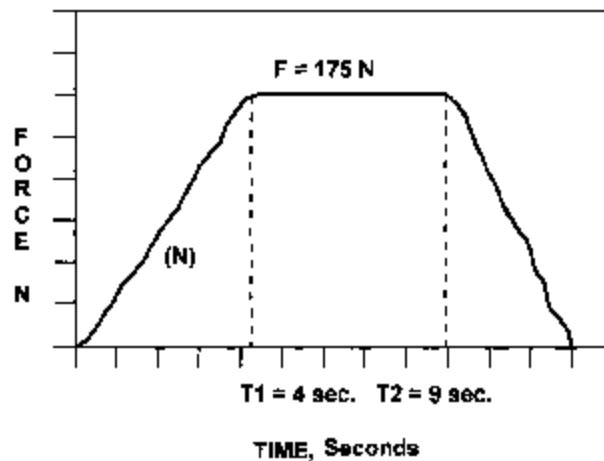
Approved By: *Michael J. [Signature]*

Date: 5/7/03

DATA SHEET 3 (CONTINUED)
SEAT CUSHION RETENTION TEST

SEAT NUMBER: S3

1. Cushion Weight/Mass = 3.57 kg
2. Cushion Weight x 5 = F = 175 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: 4 steel clamps held to bottom of seat with wood screws.

Comments: NONE

Recorded By: *John Ralston*

Approved By: *Michael J. [Signature]*

Date: 5/7/03

DATA SHEET 4
SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle: **2003 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
Test Date: **3/24/03**

SEAT NUMBER: S25

1. Seat Bench Width = 990 mm
 $W = (\text{Seat Bench Width})/381 \text{ mm (round to nearest whole number)} = (3)$
2. Seat Reference Point (SRP) location is: (Description of location as supplied by the manufacturer): 473.1 mm Up From Floor, 239.3 mm Back From Front Mounting Hole
3. Location of lower loading bar is 0 mm above/below the SRP.
(Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
Length of lower loading bar = 889 mm
Seat Back width at SRP = 990 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) = NR mm, at start of upper bar loading NR 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 or less) (S5.1.3)
7. Seat back movement rate selected by the test engineer = 14.4 mm/ps
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 = 775 mm
Width of seat back at 406 mm above SRP = 879 mm
9. Reason for stopping seat back deflection:
 Reached deflection determined in Item 6 above (if less than 356 mm)
 Reached 356 mm maximum allowed deflection
 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

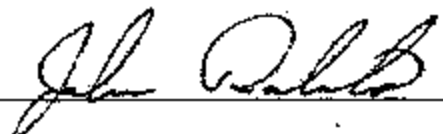
		PASS/FAIL
11.	Is the seat in its final deflected position within 102 mm of the next seat or barrier?	PASS

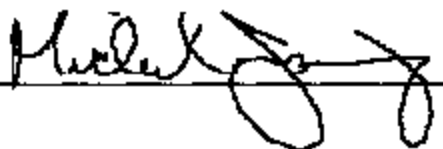
		PASS/FAIL
12.	Does the forward force vs. deflection trace of the seat back lie within the unshaded area? (S5.1.3)	PASS

- 13. Include a deflection vs. time plot for the upper loading bar.
- 14. The area within the force vs. deflection curve = 1613 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: 5/7/03

DATA SHEET 4 (CONTINUED)
SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle: **2003 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
Test Date: **3/24/03**

SEAT NUMBER: S26

1. Seat Bench Width = 990 mm
 $W = (\text{Seat Bench Width})/381 \text{ mm (round to nearest whole number)} = (3)$
2. Seat Reference Point (SRP) location is: (Description of location as supplied by the manufacturer): 473.1 mm Up From Floor, 239.3 mm Back From Front Mounting Hole
3. Location of lower loading bar is 0 mm above/below the SRP.
(Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
Length of lower loading bar = 889 mm
Seat Back width at SRP = 990 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) = 55 mm, at start of upper bar loading 55 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 or less) (S5.1.3)
7. Seat back movement rate selected by the test engineer = 14.4 mm/ps
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 = 775 mm
Width of seat back at 406 mm above SRP = 879 mm
9. Reason for stopping seat back deflection:
 Reached deflection determined in Item 6 above (if less than 356 mm)
 Reached 356 mm maximum allowed deflection
 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

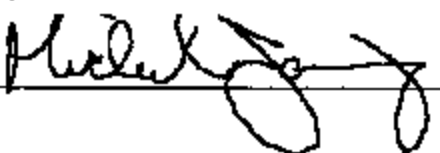
		PASS/FAIL
12.	Does the forward force vs. deflection trace of the seat back lie within the unshaded area? (S5.1.3)	PASS

- 16. Include a deflection vs. time plot for the upper loading bar.
- 17. The area within the force vs. deflection curve = 1687 joules
- 18. 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: 5/7/03

DATA SHEET 5

SEAT BACK FORCE DEFLECTION TEST - REARWARD

Test Vehicle: **2003 Blue Bird All American School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
 Test Date: **3/24/03**

SEAT NUMBER: S22

1. Seat Bench Width = 990 mm
 $W = (\text{Seat Bench Width})/381 \text{ mm (round to nearest whole number)} = (3)$
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 = 813 mm
 Width of seat back at 343 mm above SRP = 915 mm
3. Deflection of seat back at 222 N preload = 11.8 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)
 Reached 254 mm maximum allowed deflection (actual deflection was 255 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

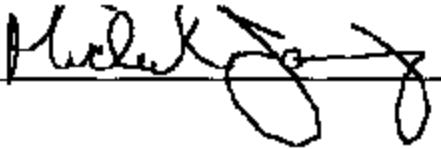
9. Include a deflection vs. time plot for the upper loading bar.
10. $316W = 948$ joules
11. The area within the force vs. deflection curve = 1044 joules

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: 5/7/03

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

Test Vehicle: **2003 Blue Bird All American School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
 Test Date: **3/24/03**

SEAT NUMBER: S6

1. Seat Bench Width = 990 mm
 $W = (\text{Seat Bench Width})/381 \text{ mm (round to nearest whole number)} = (3)$
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 = 813 mm
 Width of seat back at 343 mm above SRP = 915 mm
3. Deflection of seat back at 222 N preload = 9.5 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)
 Reached 254 mm maximum allowed deflection (actual deflection was 252 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.

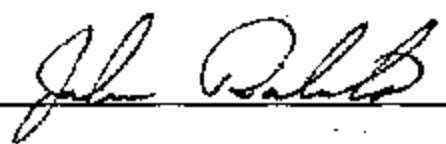
	PASS/FAIL
8. Does the force vs. deflection plot lie within the boundaries of Figure 18 (OVSC TP-222-03)?	PASS

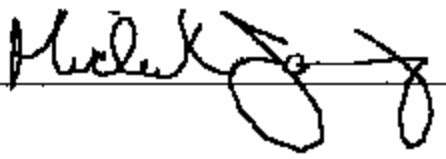
12. Include a deflection vs. time plot for the upper loading bar.
13. 316W = 948 joules
14. The area within the force vs. deflection curve = 969 joules

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: 5/7/03

DATA SHEET 6

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

Test Vehicle: **2003 Blue Bird All American School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
 Test Date: **3/24/03**

BARRIER NUMBER: B1

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 = 488 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 = 55 mm D_b = 0 mm

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

C_t = 55 mm C_b = 0 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 F at top of barrier and bottom of barrier.

F_t = 860 mm F_b = 980 mm

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

A_t = 860 mm A_b = 980 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.
 $U_i = 340$ mm $U_o = 360$ mm

12. Measure distance V at inboard (i) and outboard (o) sides of seat.
 $V_i = 340$ mm $V_o = 360$ 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.
 $S_i = 640$ mm $S_o = 620$ mm

16. Measure distance W at inboard (i) and outboard (o) sides of seat.
 $W_i = 640$ mm $W_o = 620$ 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

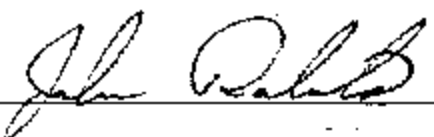
DATA SHEET 6 (CONTINUED)

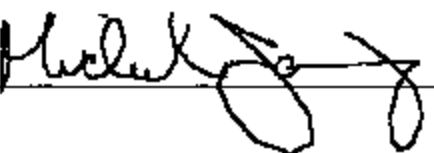
RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

- 19. Compute area (W x A) = 579,600 mm²
- 20. Computer area (E x S) = 579,600 mm²

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

Comments: NONE

Recorded By: 

Approved By: 

Date: 5/7/03

DATA SHEET 7
RESTRAINING BARRIER FORCE/DEFLECTION TEST

Test Vehicle: **2003 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
Test Date: **3/24/03**

BARRIER IDENTIFICATION: B28

1. Seat cushion width of seat immediately rearward of restraining barrier = 990 mm
 $W = (\text{Seat Cushion Width})/381 \text{ mm (round to nearest whole number)} = (3)$
2. Location of SRP of seat rearward of restraining barrier is: (Description of location as supplied by the manufacturer): 473.1 mm Up From Floor, 239.3 mm Back From Front Mounting Hole
3. Location of lower loading bar is 0 mm above/below the SRP.
(Requirement: between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
Length of loading bar = 889 mm
Width of barrier at SRP = 990 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) = NR mm. (NR = Not Recorded)
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 = 775 mm
Width of seat at 406 mm above the SRP = 905 mm
9. Reason for stopping restraining barrier deflection:
 Reached 356 mm maximum
 Separation was about to occur
 Interference with door operation
10. Maximum deflection of barrier back 350 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

		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

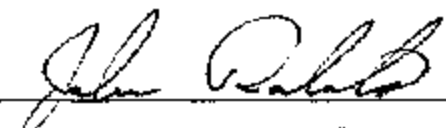
3. Include the x-y plot of force vs. deflection for the upper loading bar with boundaries of Figure 14 (OVSC TP-222-3) superimposed.

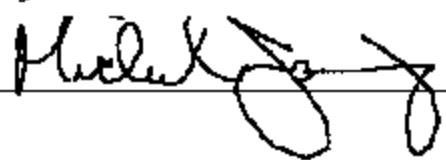
		PASS/FAIL
14.	Does the forward force vs. deflection trace of the barrier back lie within the unshaded area? (S5.2.3(a))	PASS

15. Include a deflection vs. time plot for the upper loading bar.
 16. The area within the force vs. deflection curve = 1661 joules
 17. 452W = 1356 joules (S5.2.3) (S5.1.3.4)

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

Comments:

Recorded By: 

Approved By: 

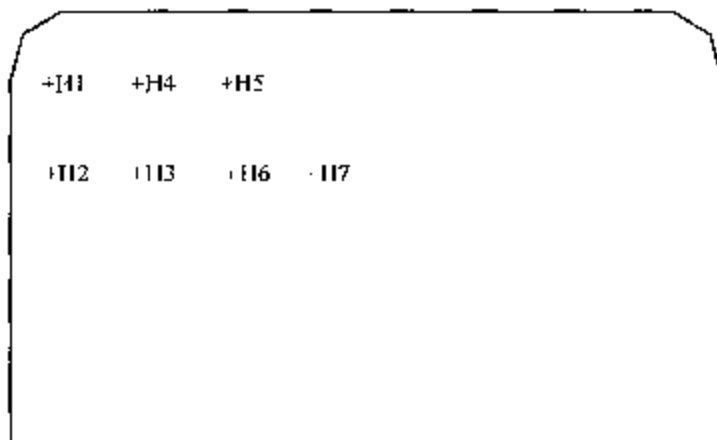
Date: 5/7/03

DATA SHEET 8
HEAD FORM IMPACT CONTACT AREA REQUIREMENT

Test Vehicle: **2003 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
Test Date: **3/24/03**

SEAT NUMBER: S7



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) Head Impact & Test #	(2) Location			(3) Speed Trap Impact Velocity** mps	(4)* Derived Velocity mps	(5) Contact Area (CA) mm ²	(6)	(7)
	X	Y	Angle				CA > 1935 mm ²	Yes- Pass
H1	Data not recorded for this event.							
H2	955	800	0	1.53	1.56	5826	PASS	
H3	835	800	0	1.59	1.47	5677	PASS	
H4	835	910	0	1.51	1.33	6542	PASS	
H5	740	910	0	1.55	1.60	6432	PASS	
H6	740	800	0	1.61 (b)	1.70	5871	PASS	
H7	628	800	0	1.58	1.58	5471	PASS	

* Contact Velocity from Item 7 below

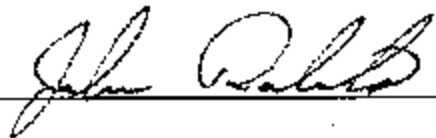
** Velocity Range = 1.52 mps, +0.08, -0 mps

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.

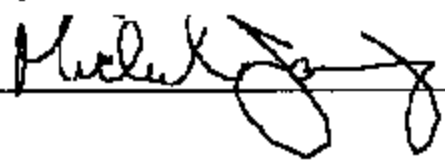
Comments: (a) Impact velocity lower than allowed, but contact area passes.

(b) Impact velocity higher than allowed.

Recorded By: _____



Approved By: _____



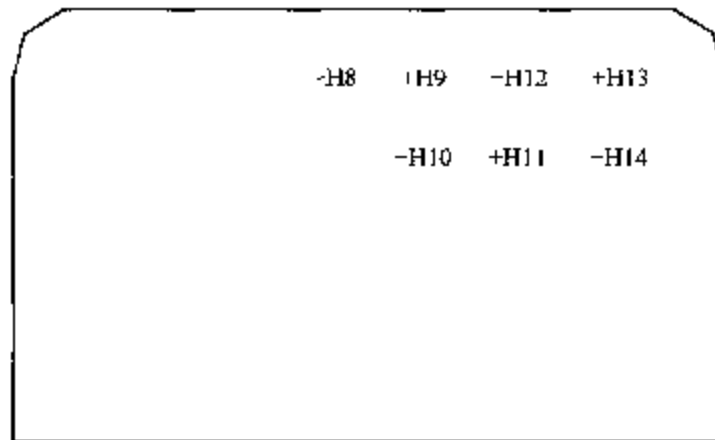
Date: 5/7/03

DATA SHEET 9
HEAD FORM IMPACT ENERGY REQUIREMENT

Test Vehicle: **2003 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
Test Date: **3/24/03**

SEAT NUMBER: S7



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:

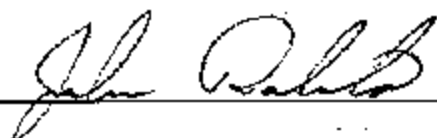
(1) Head impact & Test #	(2) Location			(3) Speed Trap Impact Velocity ** mps	(4)* Derived Velocity ** mps	(5) Max HIC	(6) Engy Reqd Joules	(7) Column 5 < 1000		(8) Column 6 > 4.5 joules	
	X	Y	Angle					Yes- Pass	No- Fail	Yes- Pass	No- Fail
H8	628	910	0	6.69	6.70	144	4.69	PASS		PASS	
H9	525	910	0	6.70 (a)	8.76	137	4.69	PASS		PASS	
H10	525	800	0	6.65	6.60	145	8.96	PASS		PASS	
H11	420	800	0	6.65	8.63	127	8.01	PASS		PASS	
H12	420	910	0	6.69	6.61	141	4.78	PASS		PASS	
H13	315	910	0	6.70 (a)	6.57	137	5.25	PASS		PASS	
H14	315	800	0	6.65	6.60	141	5.77	PASS		PASS	

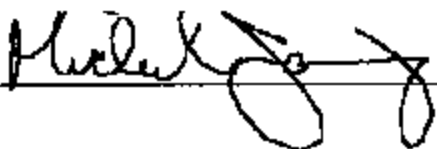
* Impact velocity from item No. 6 below

** 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) Impact velocity higher than allowed, but HIC and Energy pass requirements.

Recorded By: 

Approved By: 

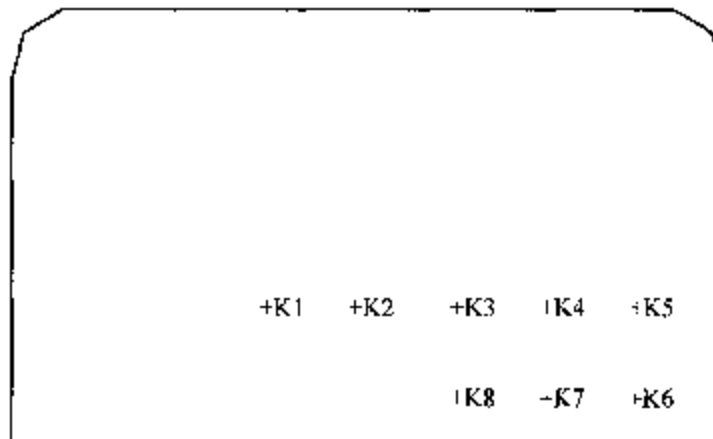
Date: 5/7/03

DATA SHEET 10
KNEE FORM IMPACT TEST

Test Vehicle: **2003 Blue Bird All American School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
Test Date: **3/24/03**

SEAT NUMBER: S7



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) Knee impact & Test #	(2) Location			(3) Speed Trap Impact Velocity ** mps	(4)* Derived Velocity ** mps	(5) Cont. Area mm ²	(6) Resist Force (N)	(7)		(8)	
	X	Y	Angle					Column 5 > 1935 mm ²		Column 6 < 2669N	
								Yes- Pass	No- Fail	Yes- Pass	No- Fail
K1	700	610	0	4.84 (a)	4.89	2967	N/A	PASS		N/A	
K2	583	610	0	4.85 (a)	4.87	3032	N/A	PASS		N/A	
K3	477	610	0	4.85 (a)	4.89	3290	N/A	PASS		N/A	
K4	370	610	0	4.84 (a)	4.94	3355	N/A	PASS		N/A	
K5	253	610	0	4.44 (b)	4.47	N/A	1739	N/A		PASS	
K6	253	450	0	4.83	4.80	N/A	2121	N/A		PASS	
K7	370	450	0	4.83	4.80	N/A	2041	N/A		PASS	
K8	477	450	0	4.82	4.83	N/A	1722	N/A		PASS	

* Impact velocity from item No. 7 below

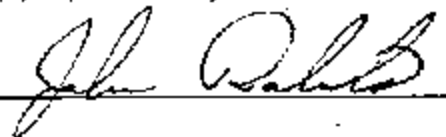
** Impact velocity range = 4.86 mps, +0.08, -0 mps for contact area, +0, -0.08 mps for force

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.

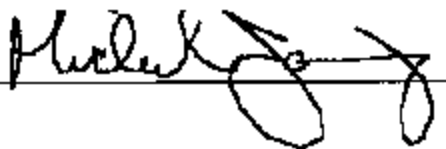
Comments: (a) Impact velocity lower than allowed, but contact area passes requirement.

(b) Impact velocity lower than allowed.

Recorded By: _____



Approved By: _____



Date: 5/7/03

DATA SHEET 11

WHEELCHAIR SECUREMENT ANCHORAGES AND DEVICES

WHEELCHAIR OCCUPANT RESTRAINT ANCHORAGES AND RESTRAINTS

Test Vehicle: 2003 Blue Bird All American School Bus
 Test Lab: MGA Research-Wisconsin Operations

NHTSA No.: C30900
 Test Date: 3/24/03

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	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
	RF					
	LR					
	RR					
	Upper Torso					
W-5	LF					
	RF					
	LR					
	RR					
	Upper Torso					

Comments: NONE

Recorded By: _____

Approved By: _____

Date: _____

**SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST**

Test Vehicle: **2003 Blue Bird All American School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30900**
 Test Date: **3/24/03**

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-7386Q- 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	12/18/02	6/16/03
Linear Motion Transducer	Ametek	P25A / 1102- 19182	12/18/02	6/16/03

**SECTION 5
PHOTOGRAPHS**

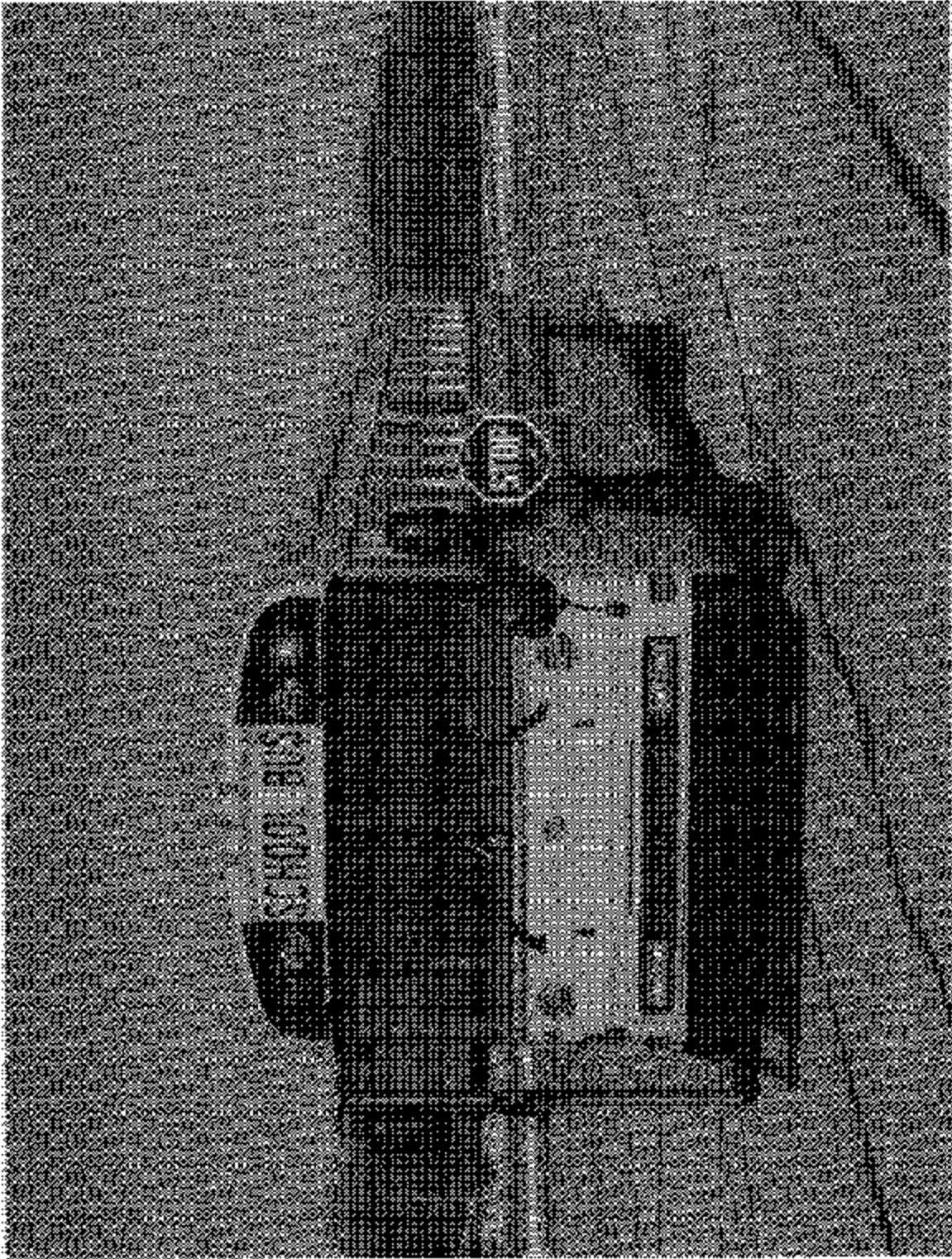
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Test Vehicle: 2003 Blue Bird All American School Bus

Procedure: FMVSS 222

NHTSA No.: CA0900

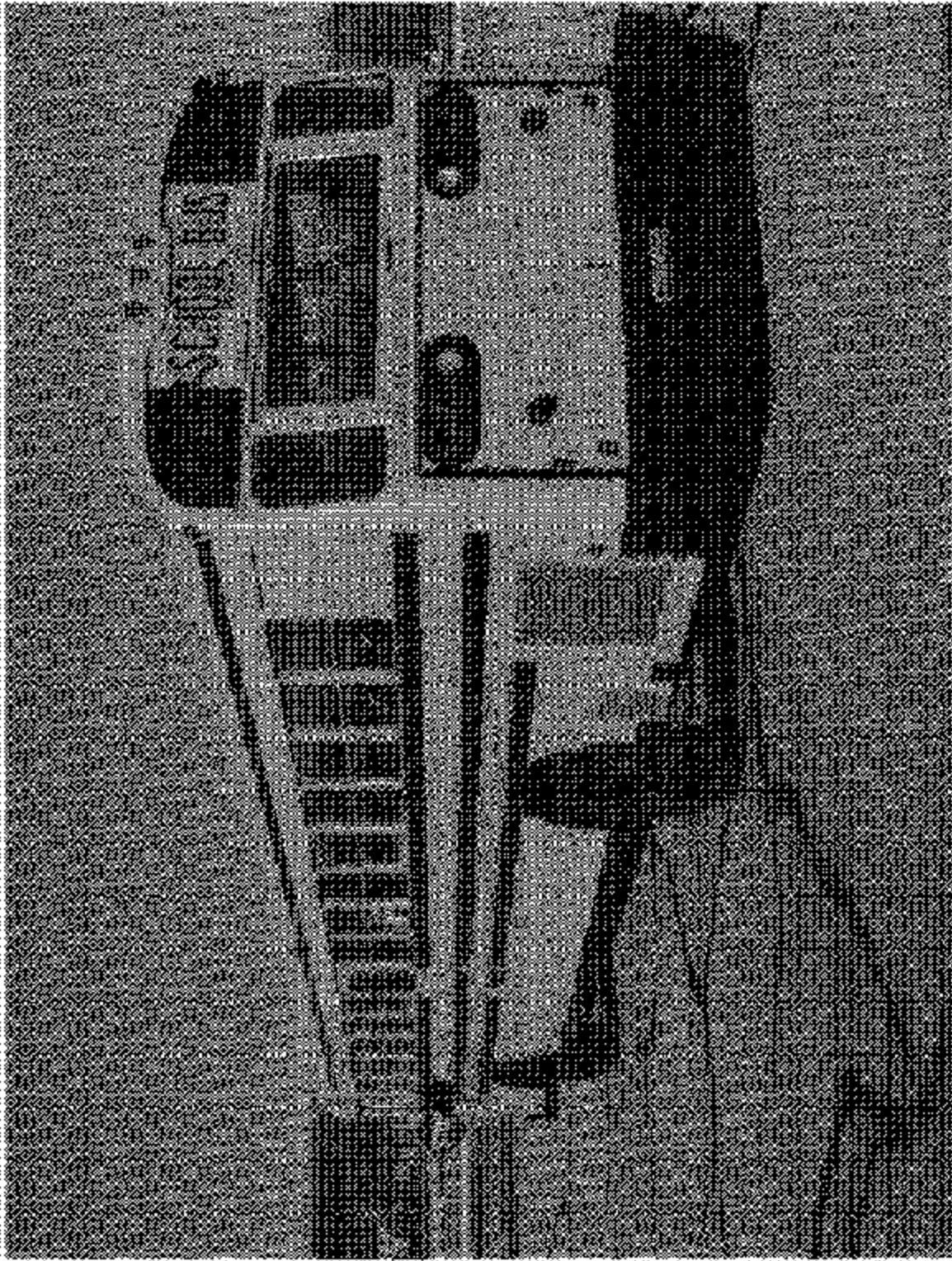


1/4 Front View From Left Side of School Bus

Test Vehicle: 2003 Blue Bird All American School Bus

Procedure: FMVSS 222

NHTSA No: C30900

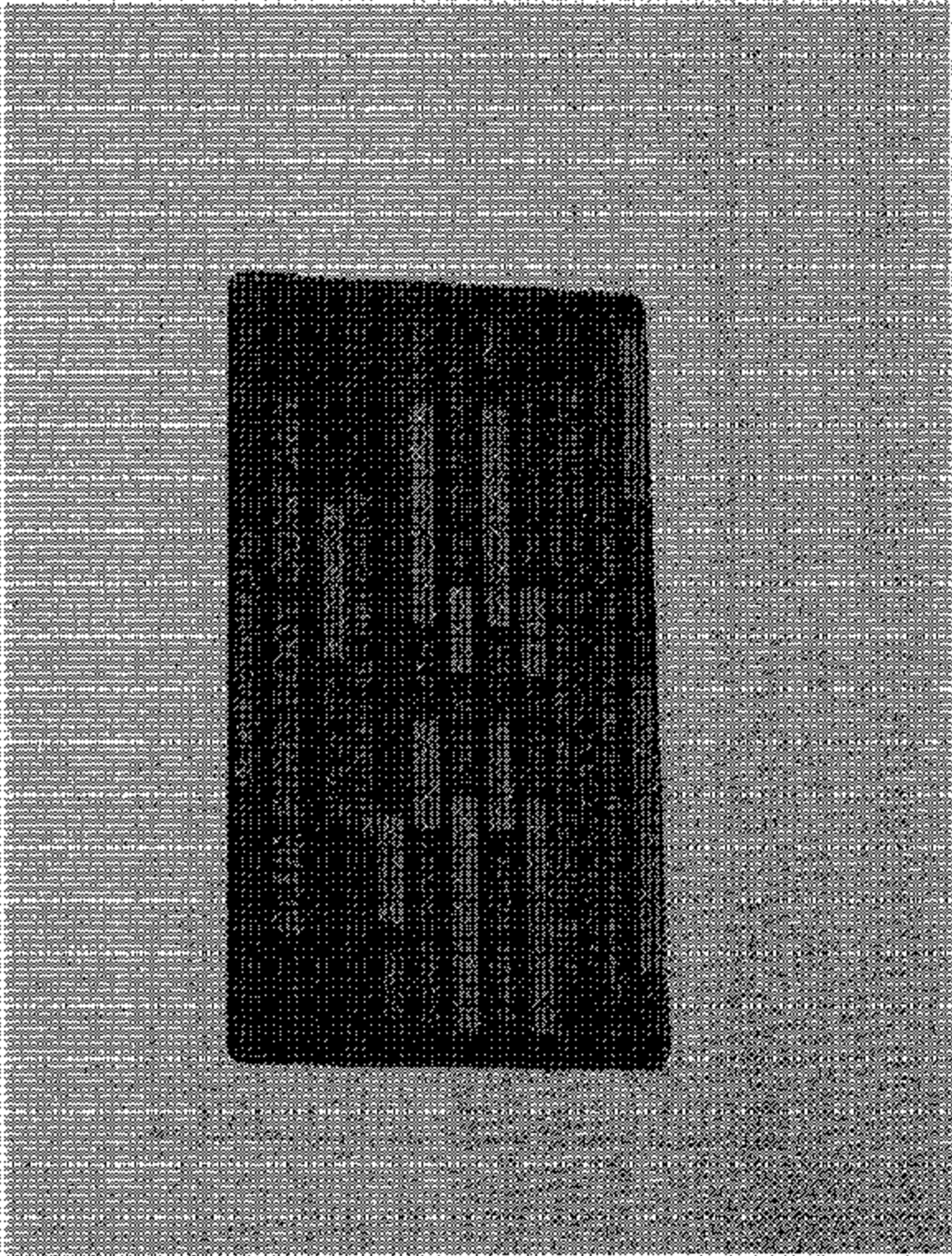


74. Rear View From Right Side of School Bus

Test Vehicle: 2005 Blue Bird All American School Bus

Procedure: FMVSS 223

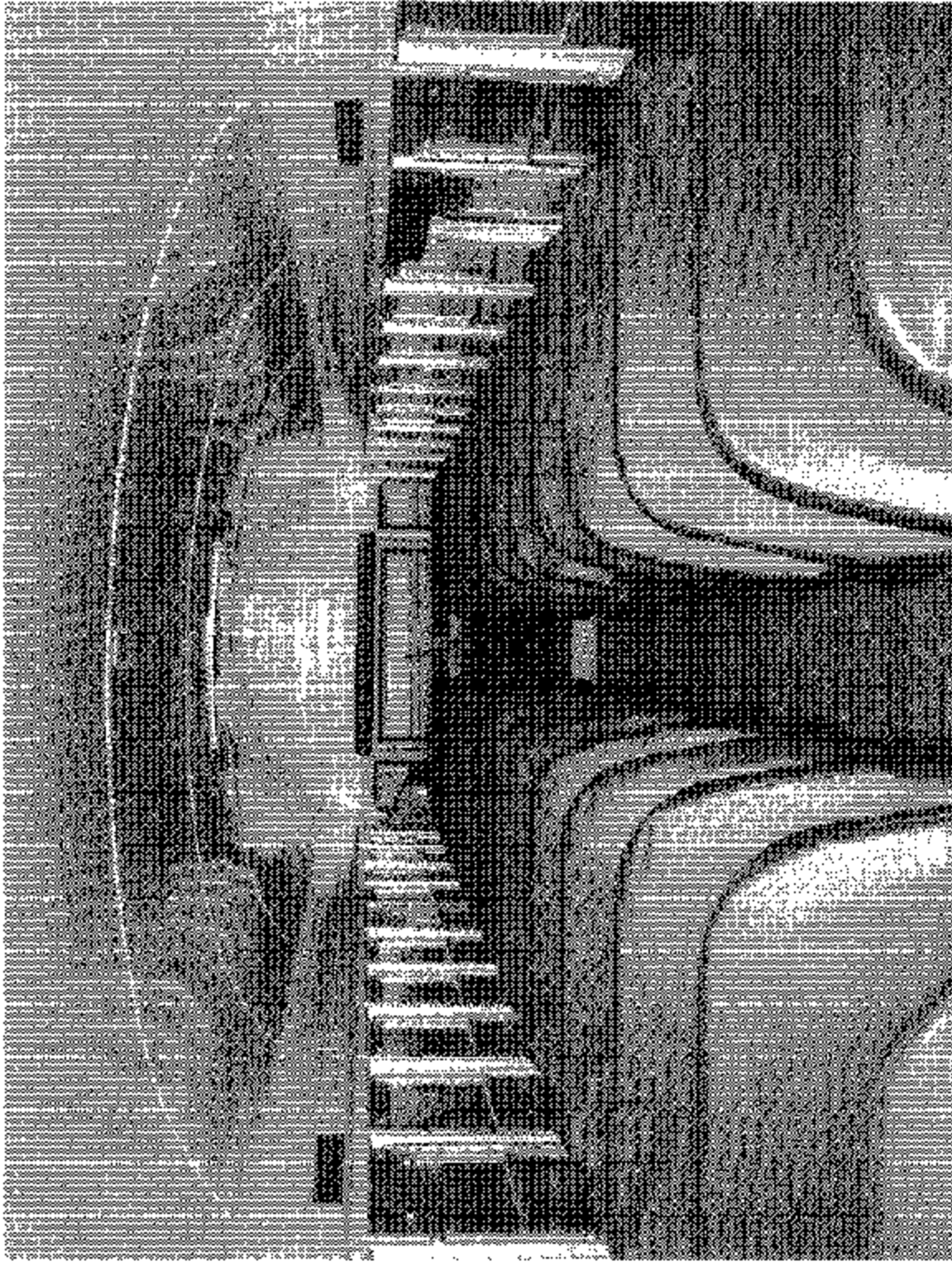
NHTSA No: C39900



Certification Label and Tire Information Label

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

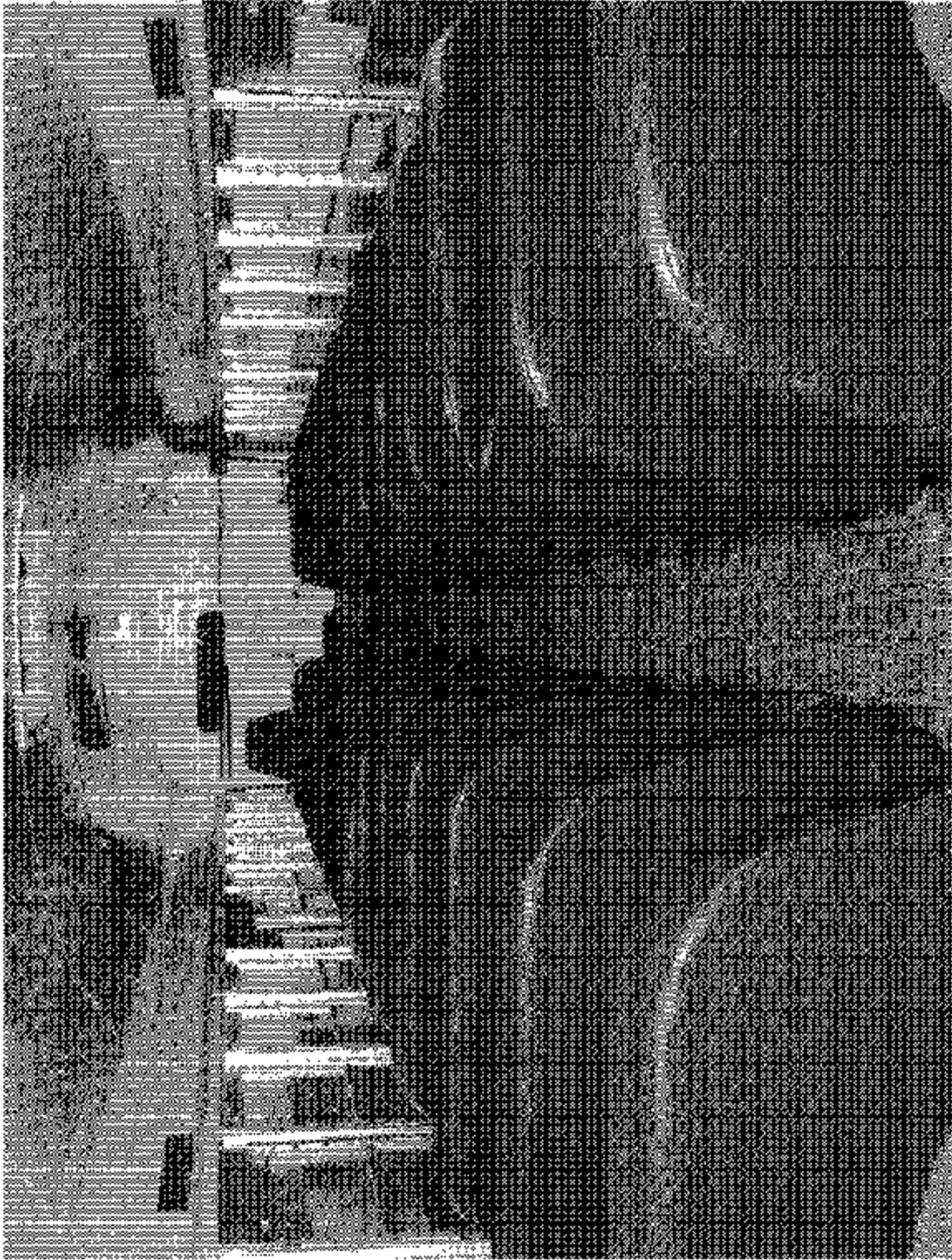
NHTSA No.: C30900



Vehicle Interior View From Front to Rear

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

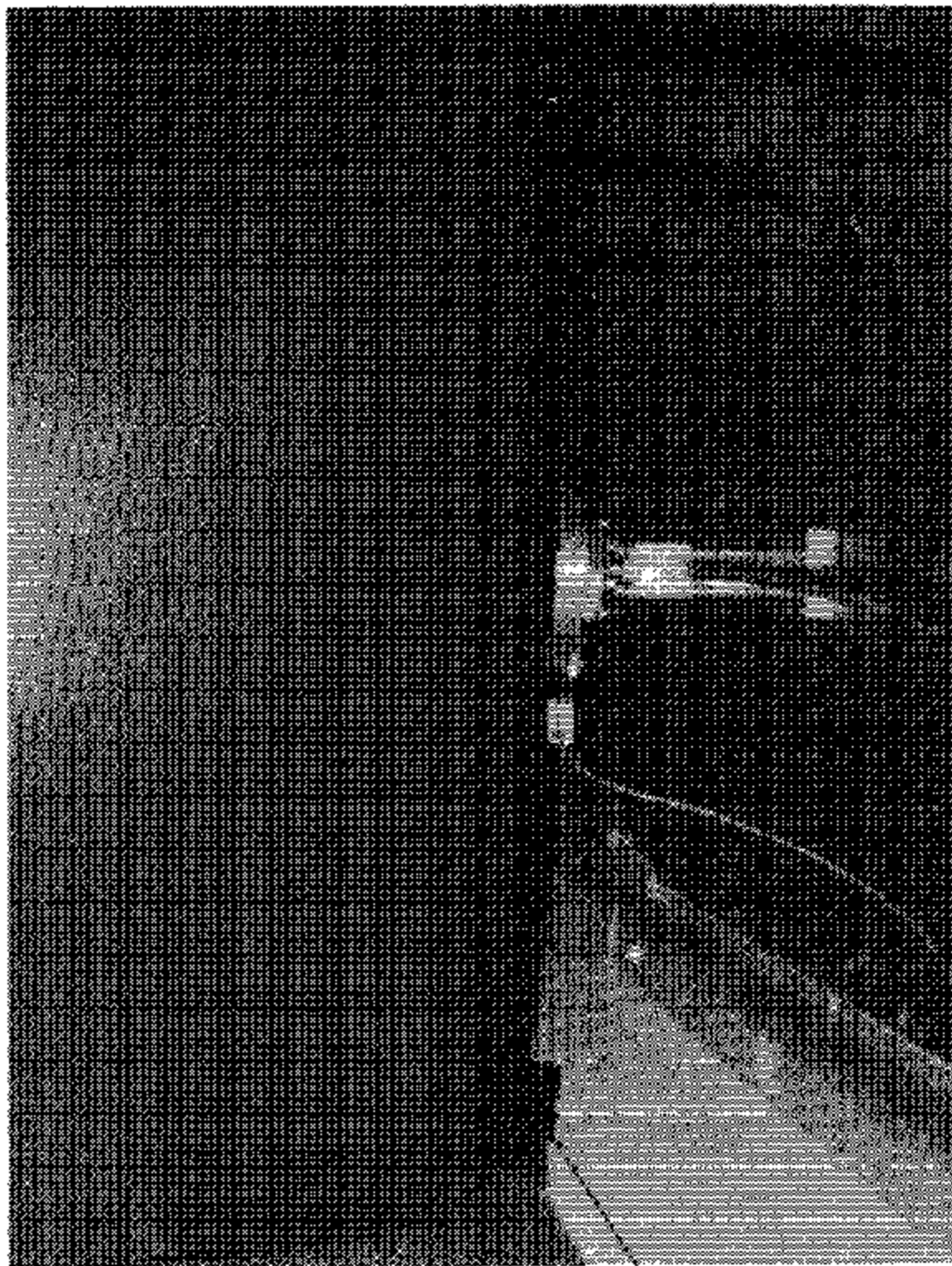
NHTSA No.: C30900



Vehicle Interior View From Rear to Front

Test Vehicle: 2003 Blue Blind All American School Bus
Procedure: FMVSS 222

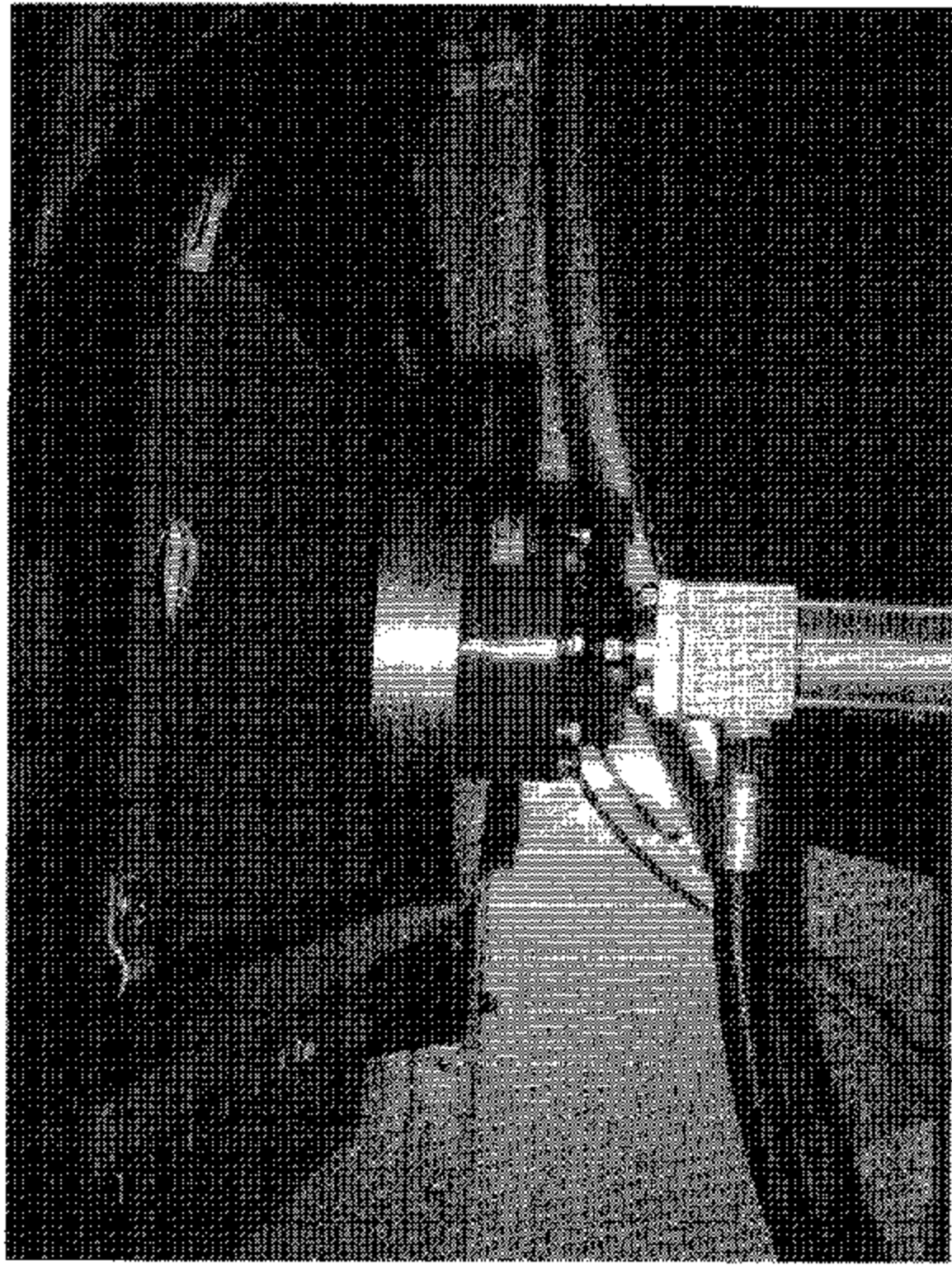
NHTSA No.: C30900



Typical Seat Cushion Test Setup

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

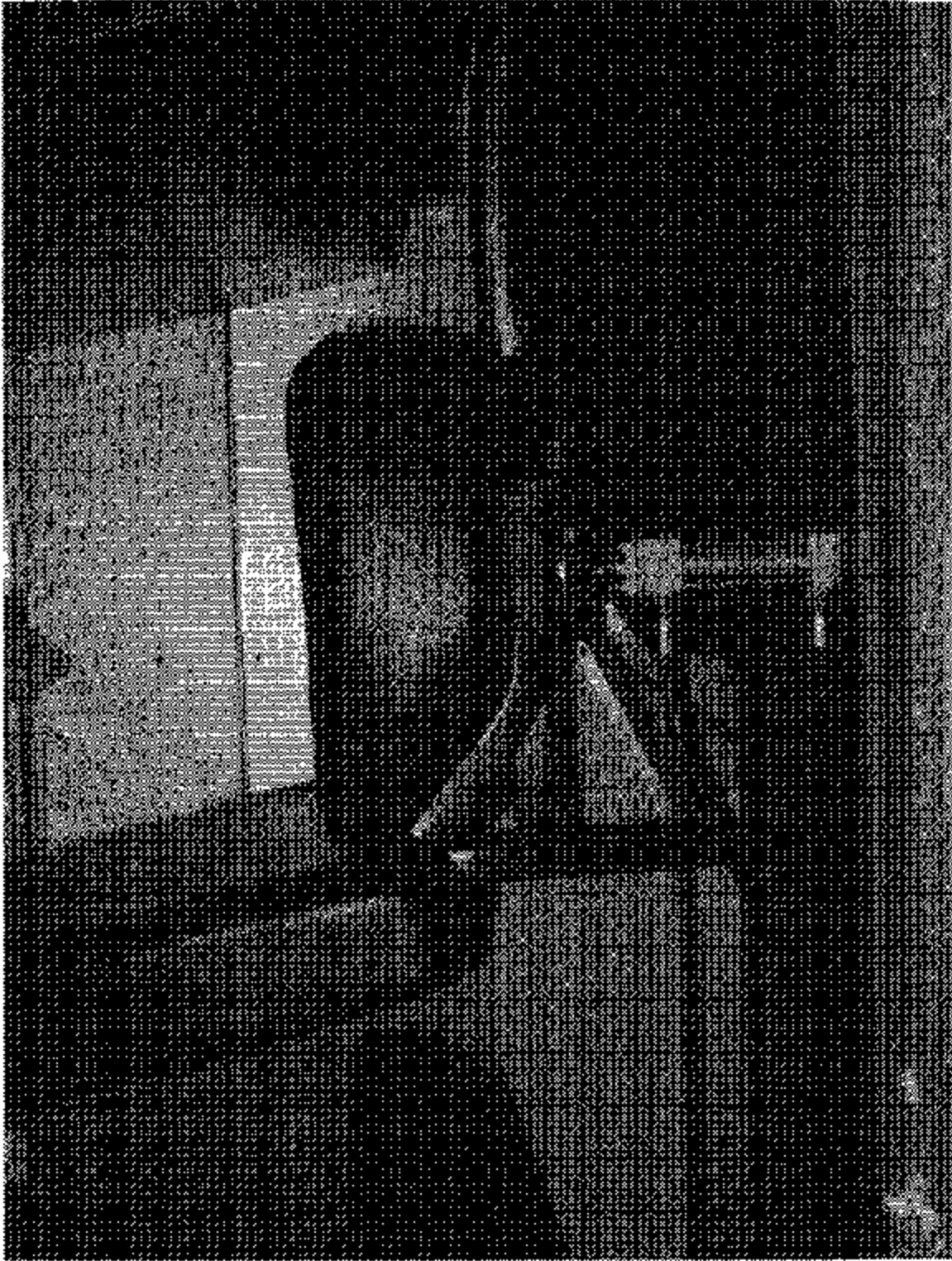
NHTSA No.: C30900



Pre-Test of Seat Cushion #2

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

NHTSA No.: C30900



Post-Test of Seat Cushion #2

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

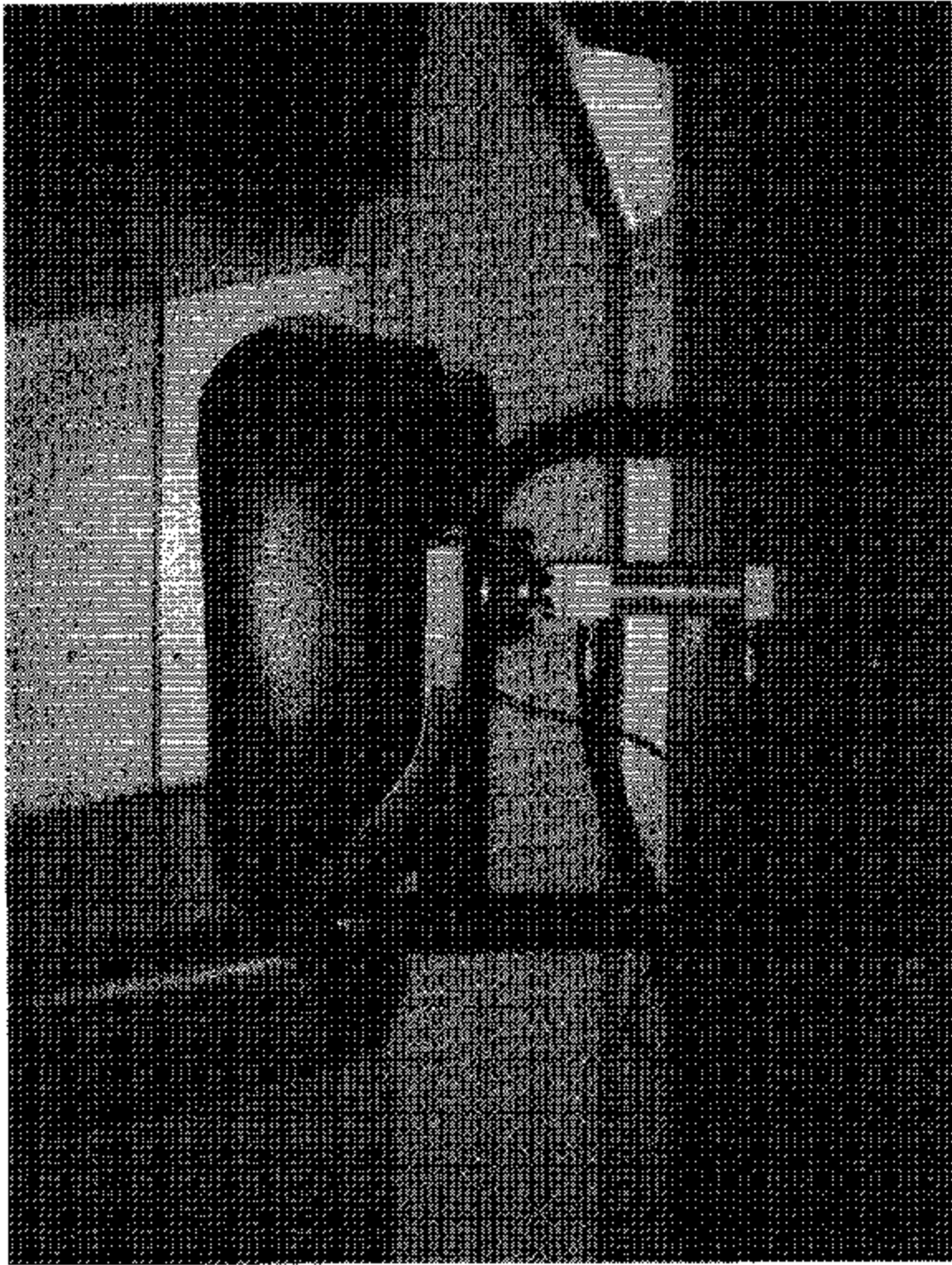
NHTSA No.: C30900



Pre-Test of Seat Cushion #3

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

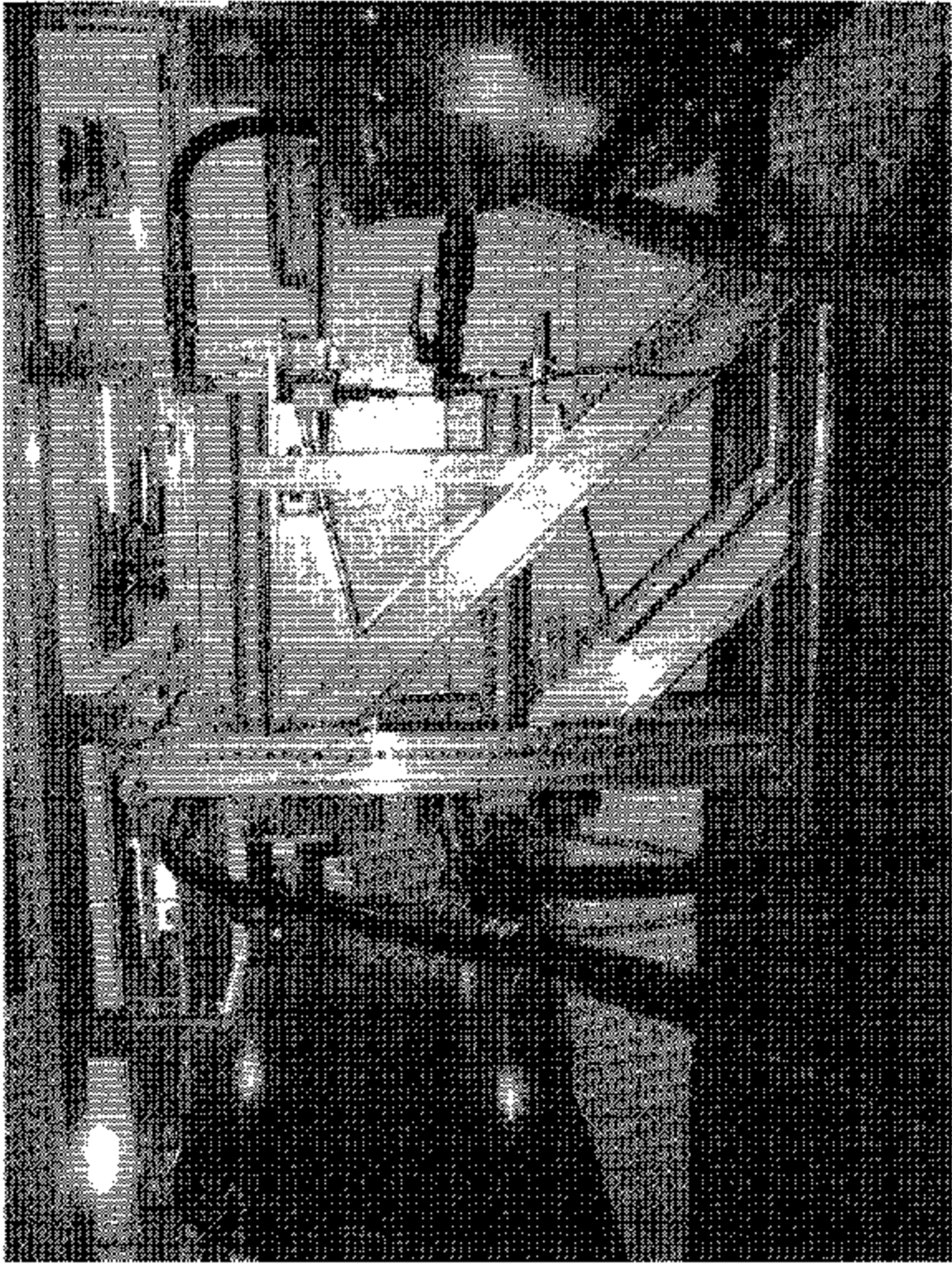
NHTSA No.: C30900



Post-Test of Seat Cushion #3

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

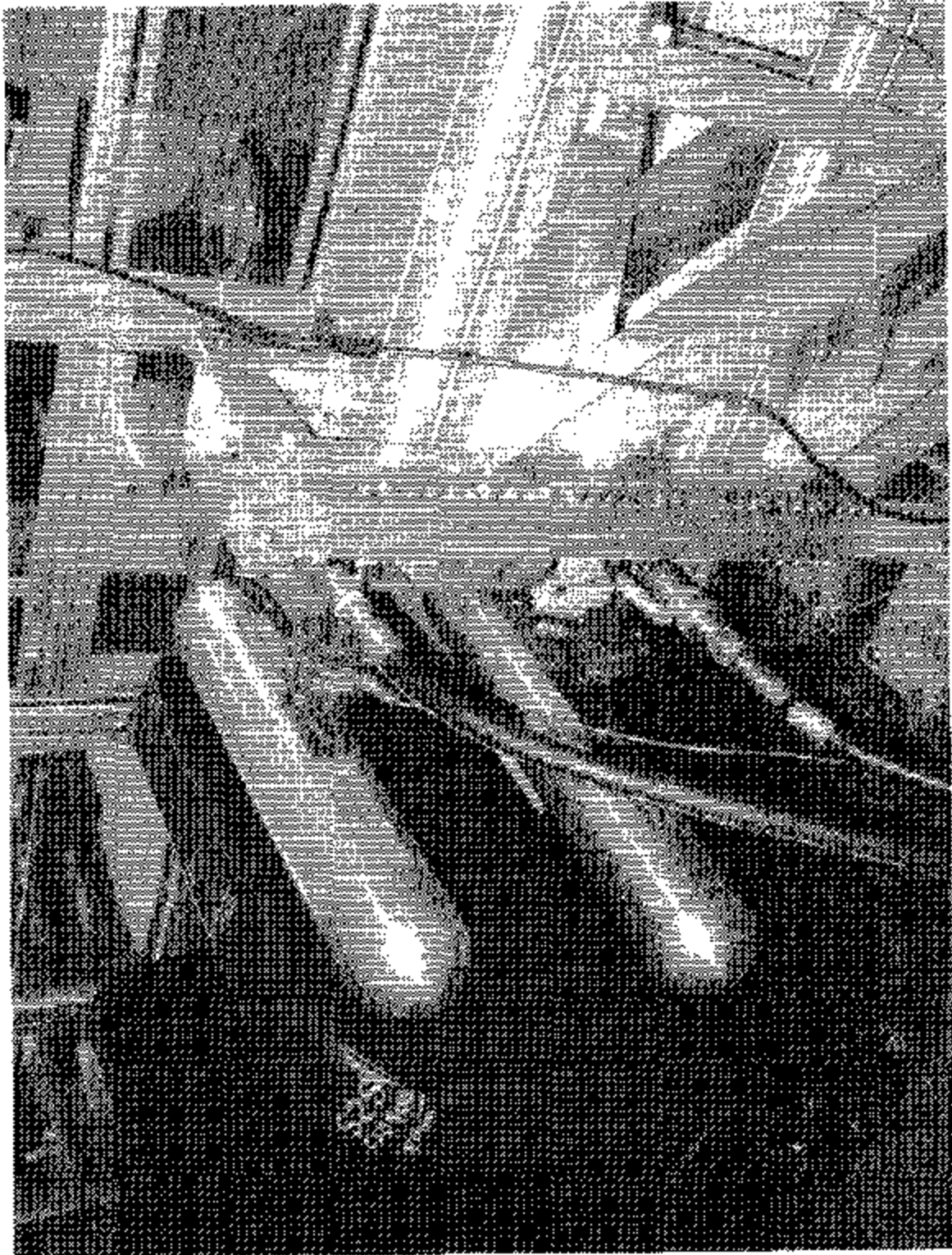
NHTSA No.: C30900



Typical Seat Back Force Deflection Forward Test Setup

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

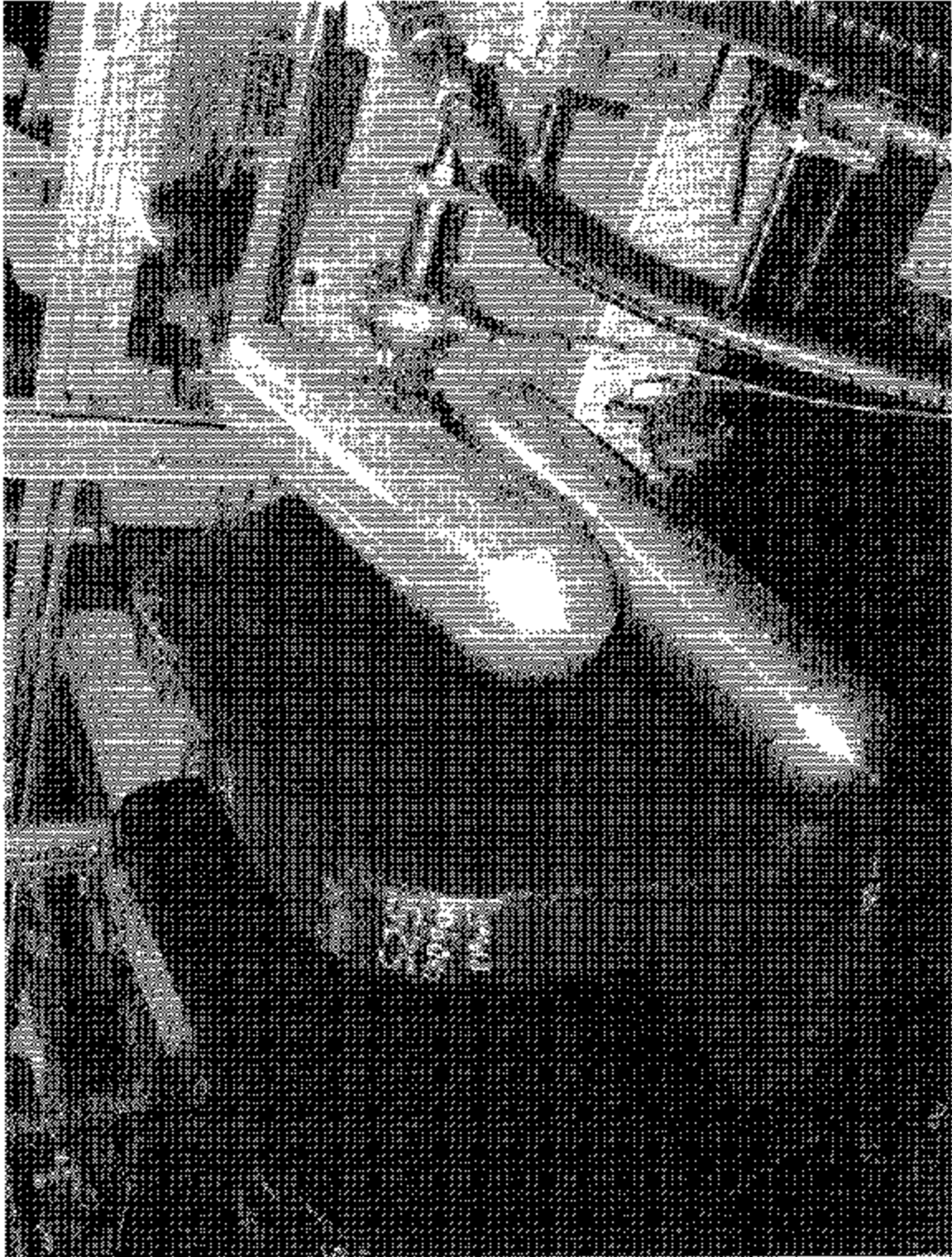
NHTSA No.: C30930



Pre-Test of Seat Back #25 Force Deflection Forward Test

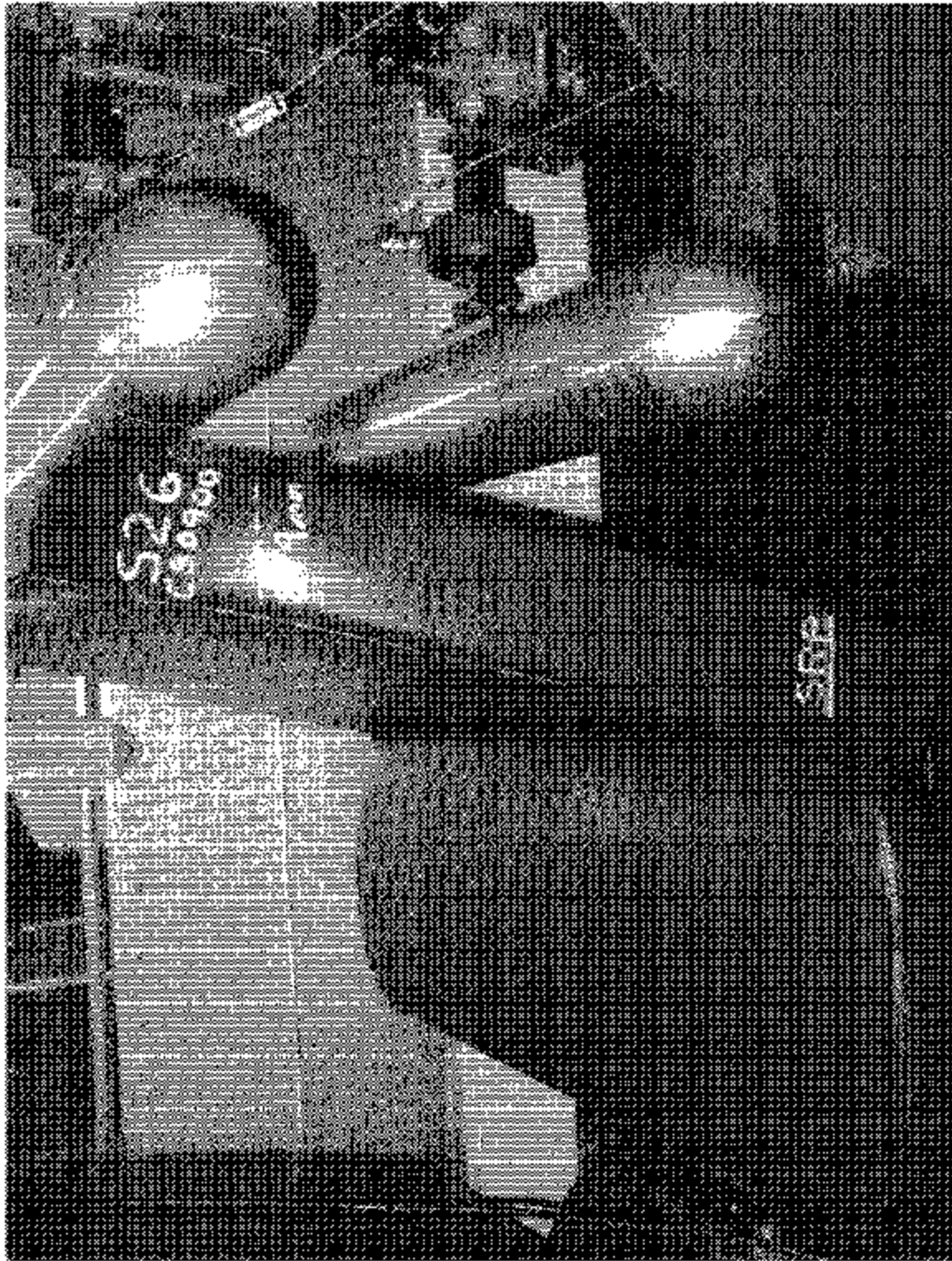
Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

NHTSA No.: C39506



Post-Test of Seat Back #25 Force Deflection Forward Test

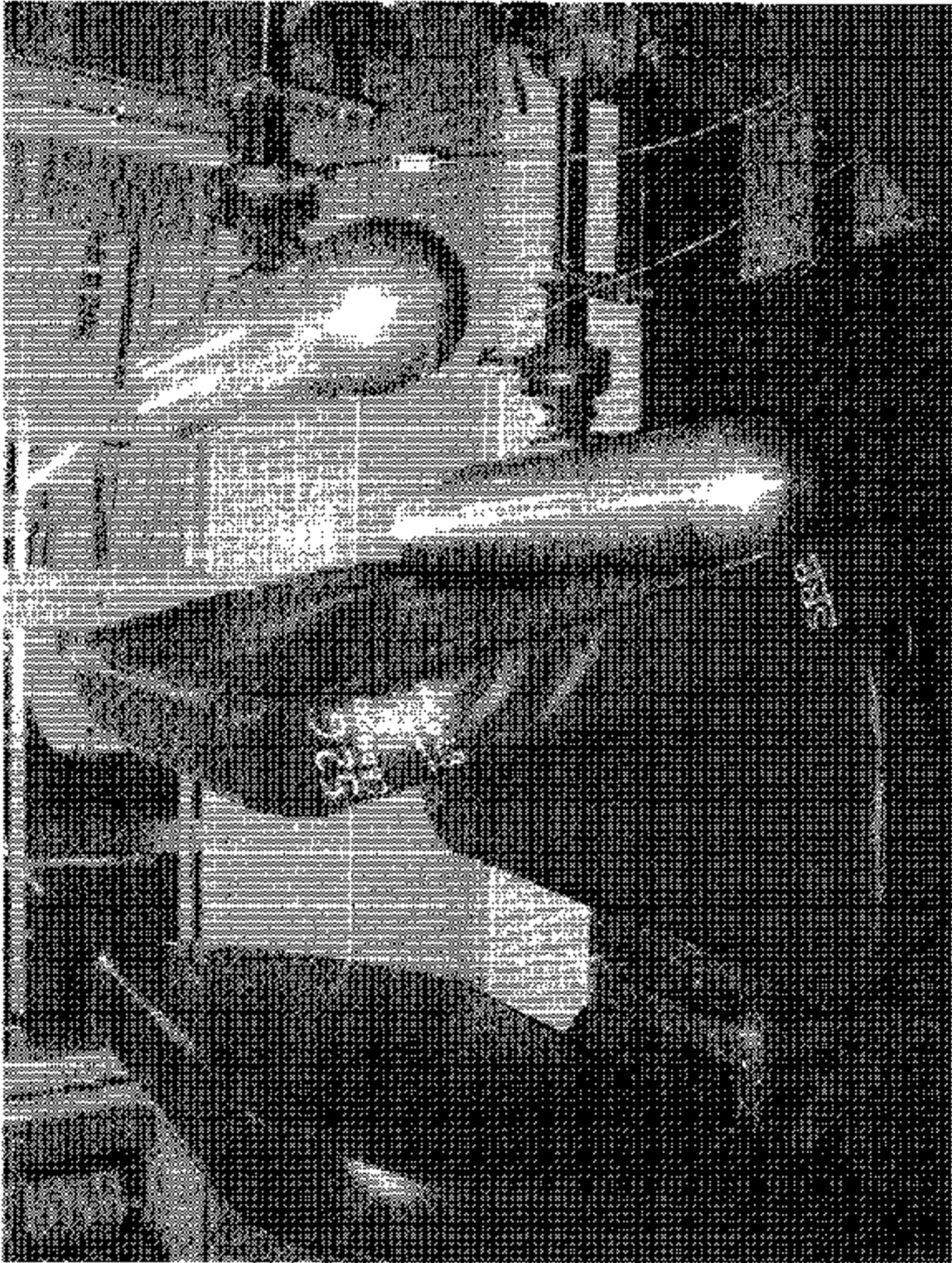
Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222
NHTSA No.: C30900



Pre-Test of Seat Back #26 Force Deflection Forward Test

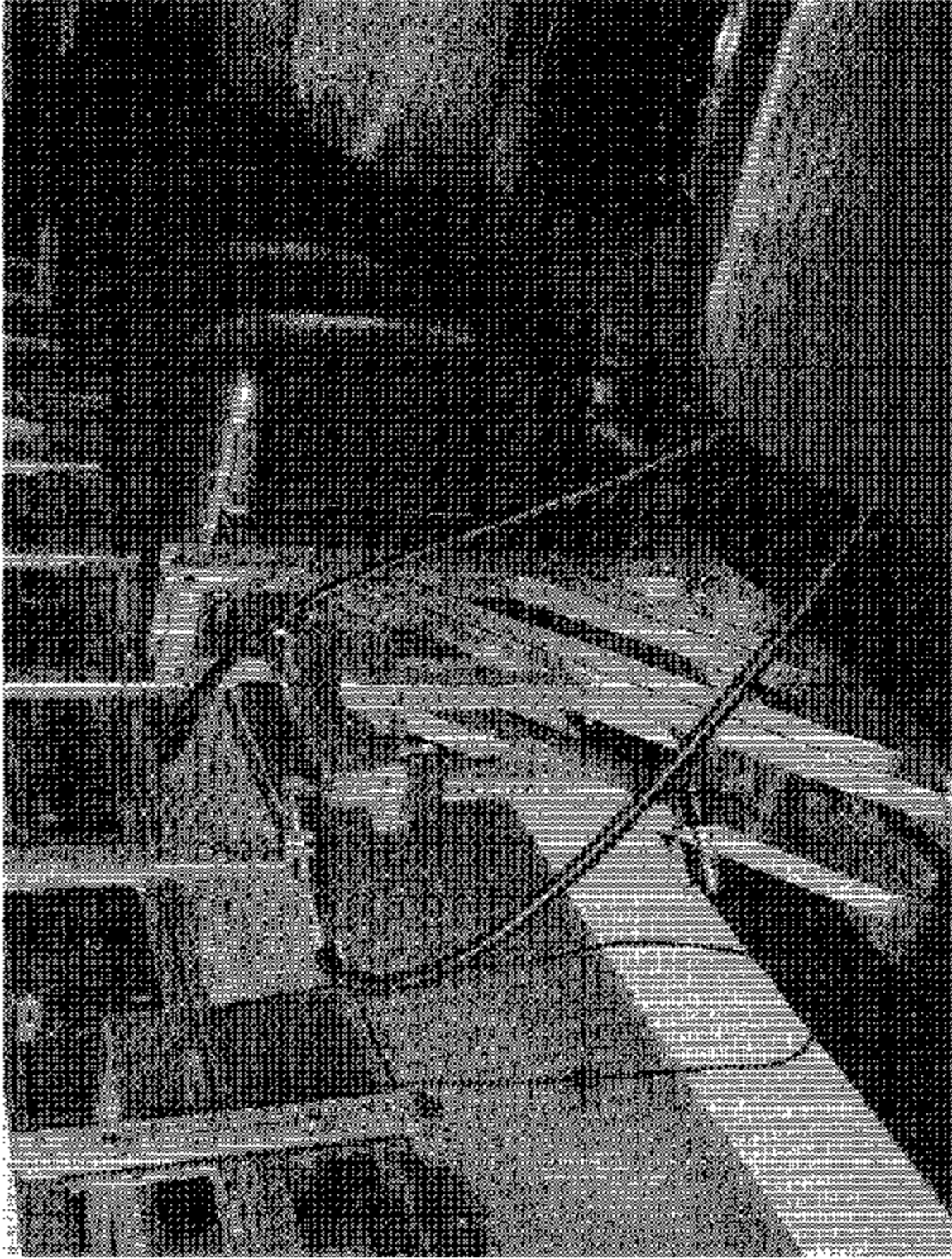
Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

NHTSA No.: C30900



Post-Test of Seat Back #26 Force Deflection Forward Test

Test Vehicle: 2003 Blue Bird All American School Bus NHTSA No.: C30900
Procedure: FMVSS 222



Typical Seat Back Force Deflection Rearward Test Setup

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

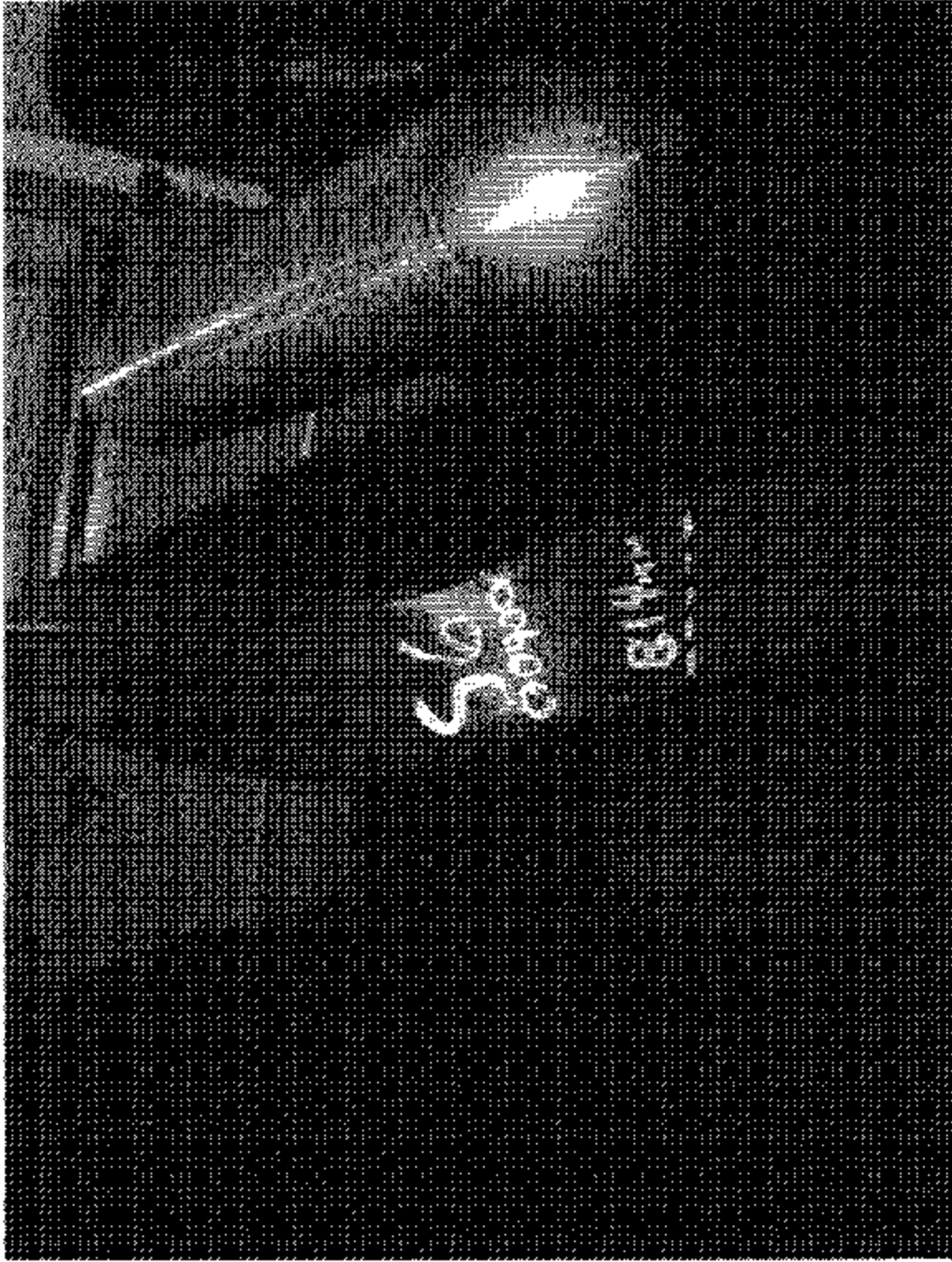
NHTSA No: C30900



Pre-Test of Seat Back #6 Force Deflection Rearward Test

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

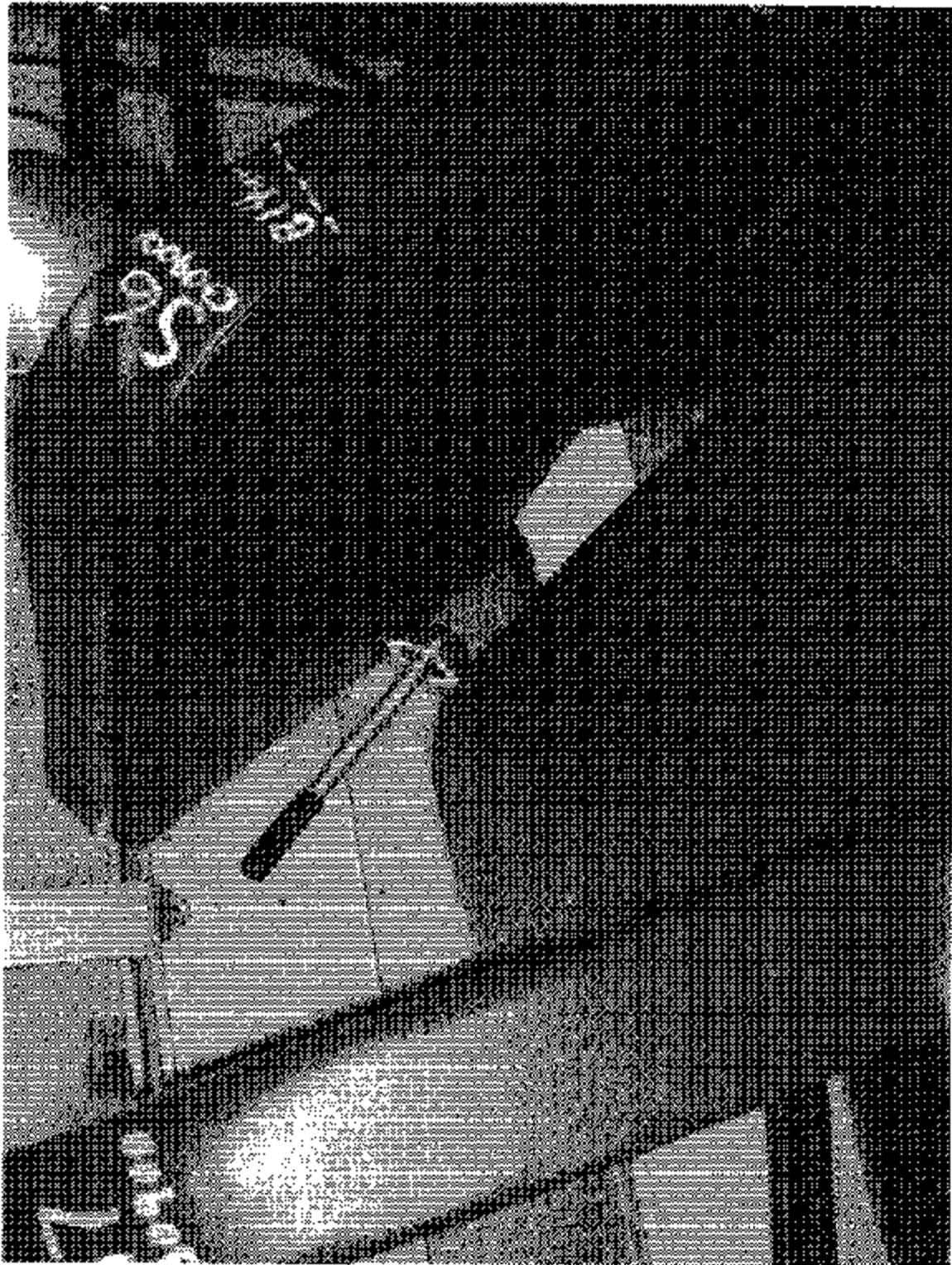
NHTSA No.: C30900



Post-Test of Seat Back #6 Force Deflection Rearward Test (View #1)

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

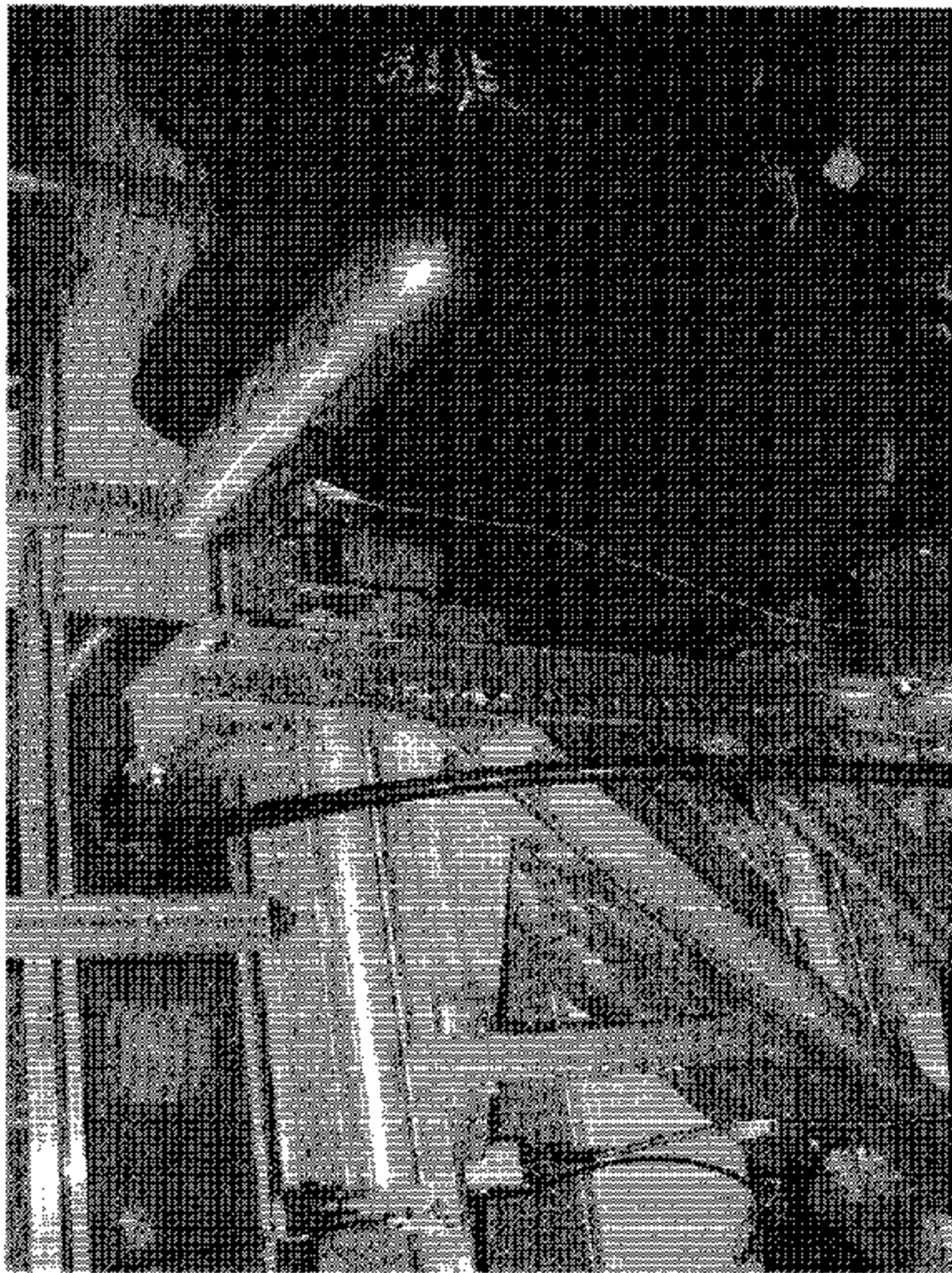
NHTSA No.: C30900



Post-Test of Seat Back #6 Force Deflection Rearward Test (View #2)

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

NHTSA No.: C30900



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

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

NHTSA No.: C30900



Post-Test of Seat Back #22 Force Deflection Rearward Test

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

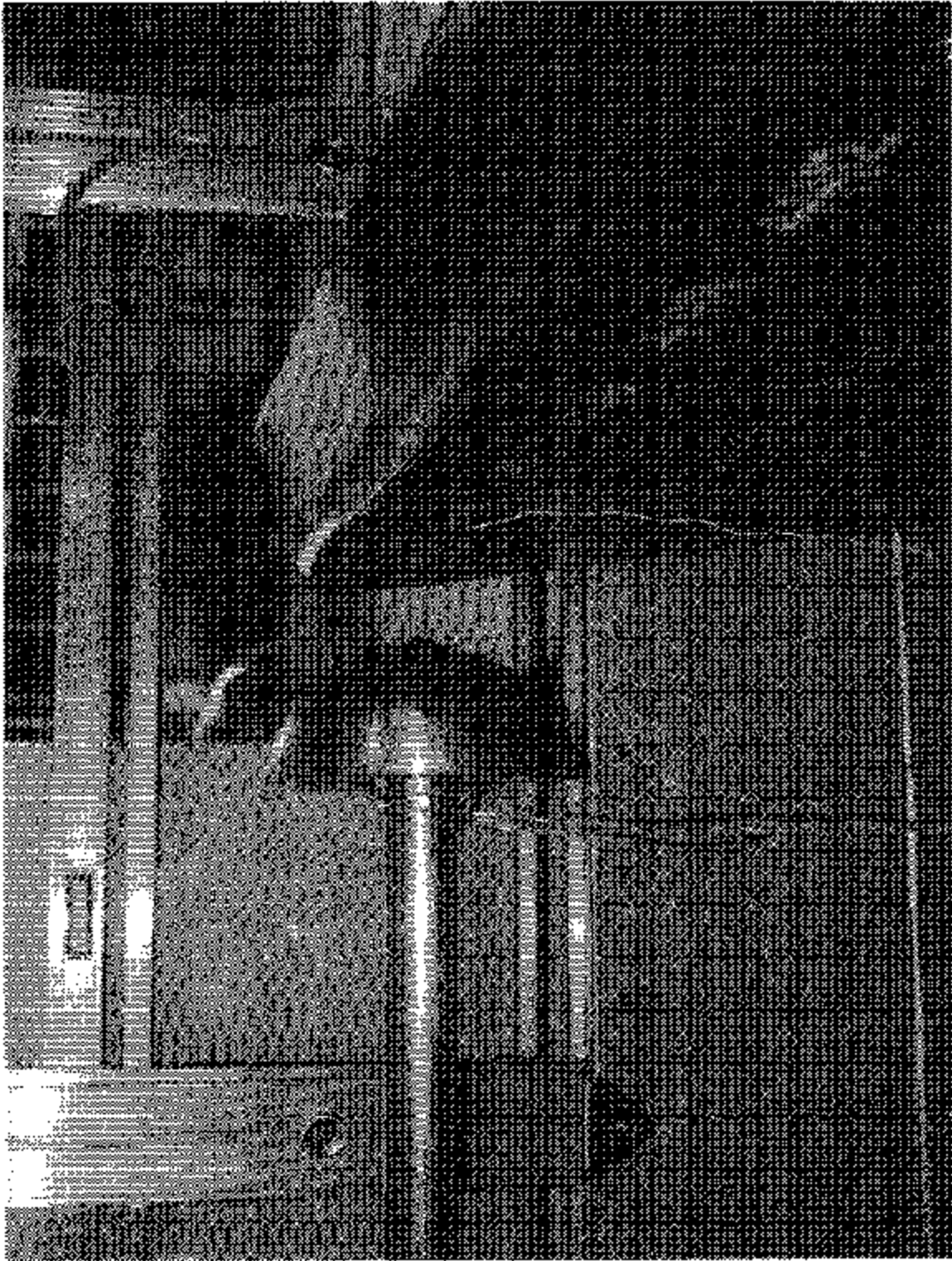
NHTSA No.: C30300



Typical Seat Cushion Construction

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

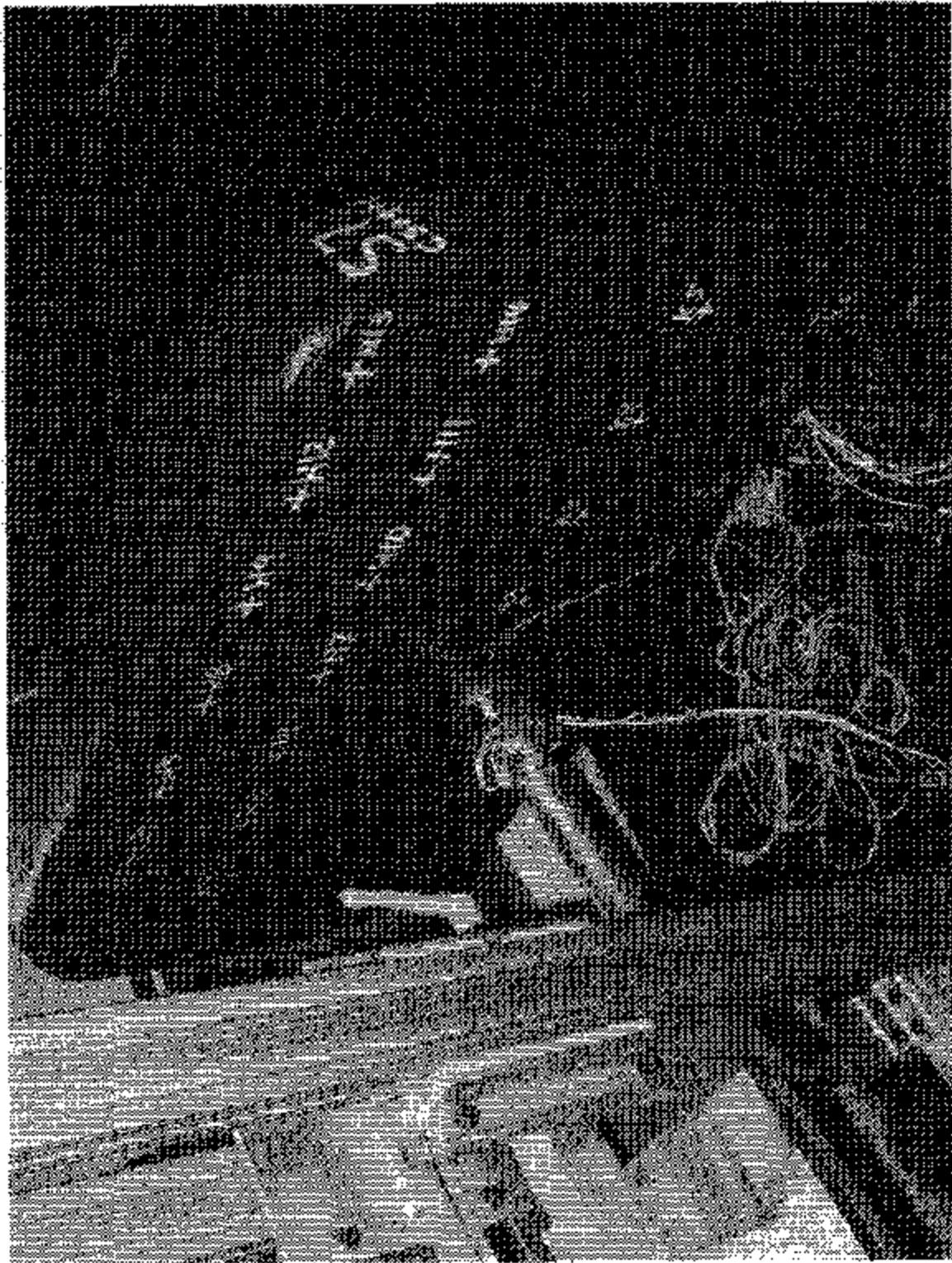
NHTSA No.: C30900



Typical Head Impactor Set at 0 Degrees

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

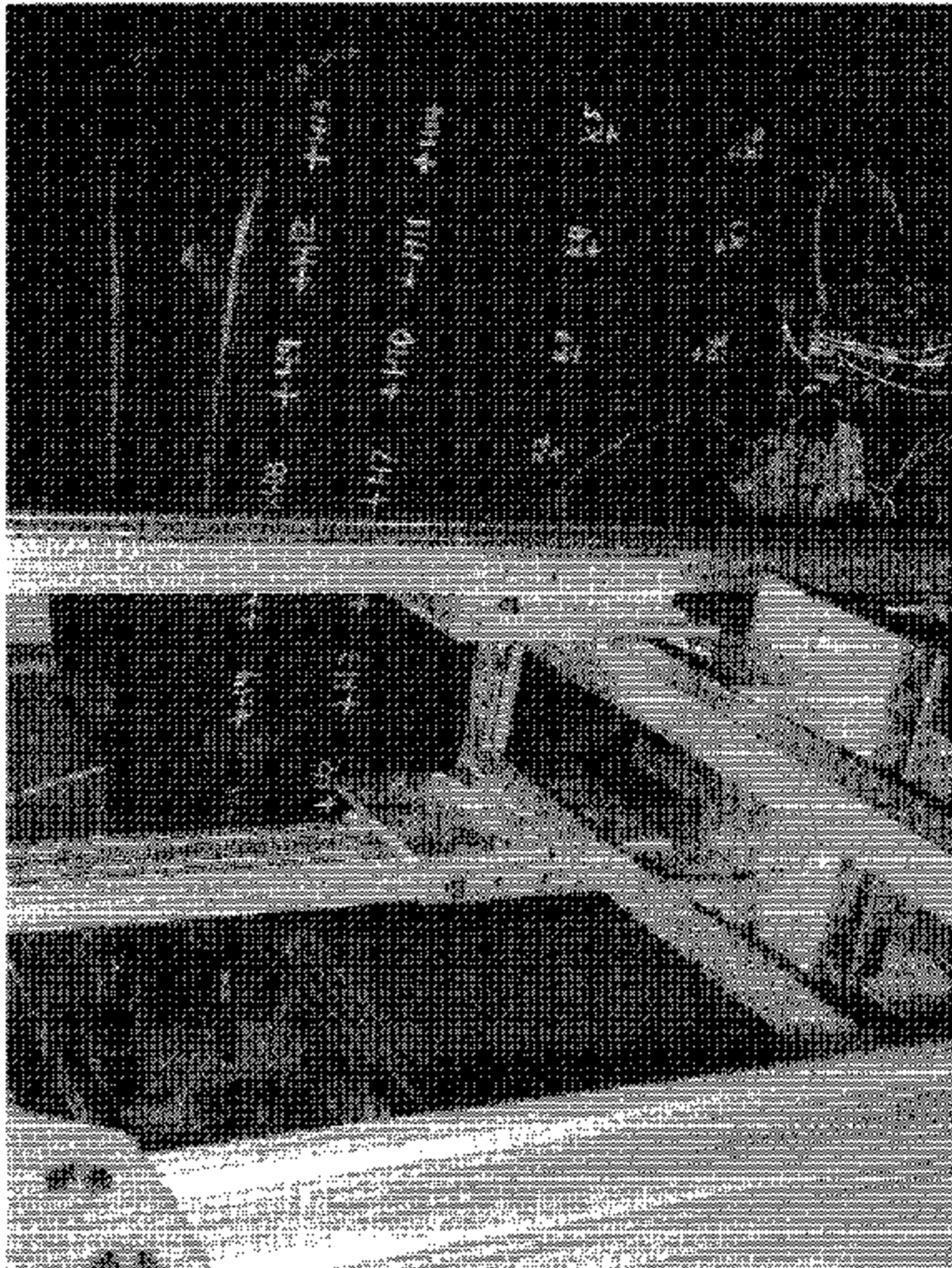
NHTSA No.: C30900



Typical Knee Impactor Set at 0 Degrees

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 221

NHTSA No: C30900



Pre-Test of Head and Knee Impact Location on Seat #7

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

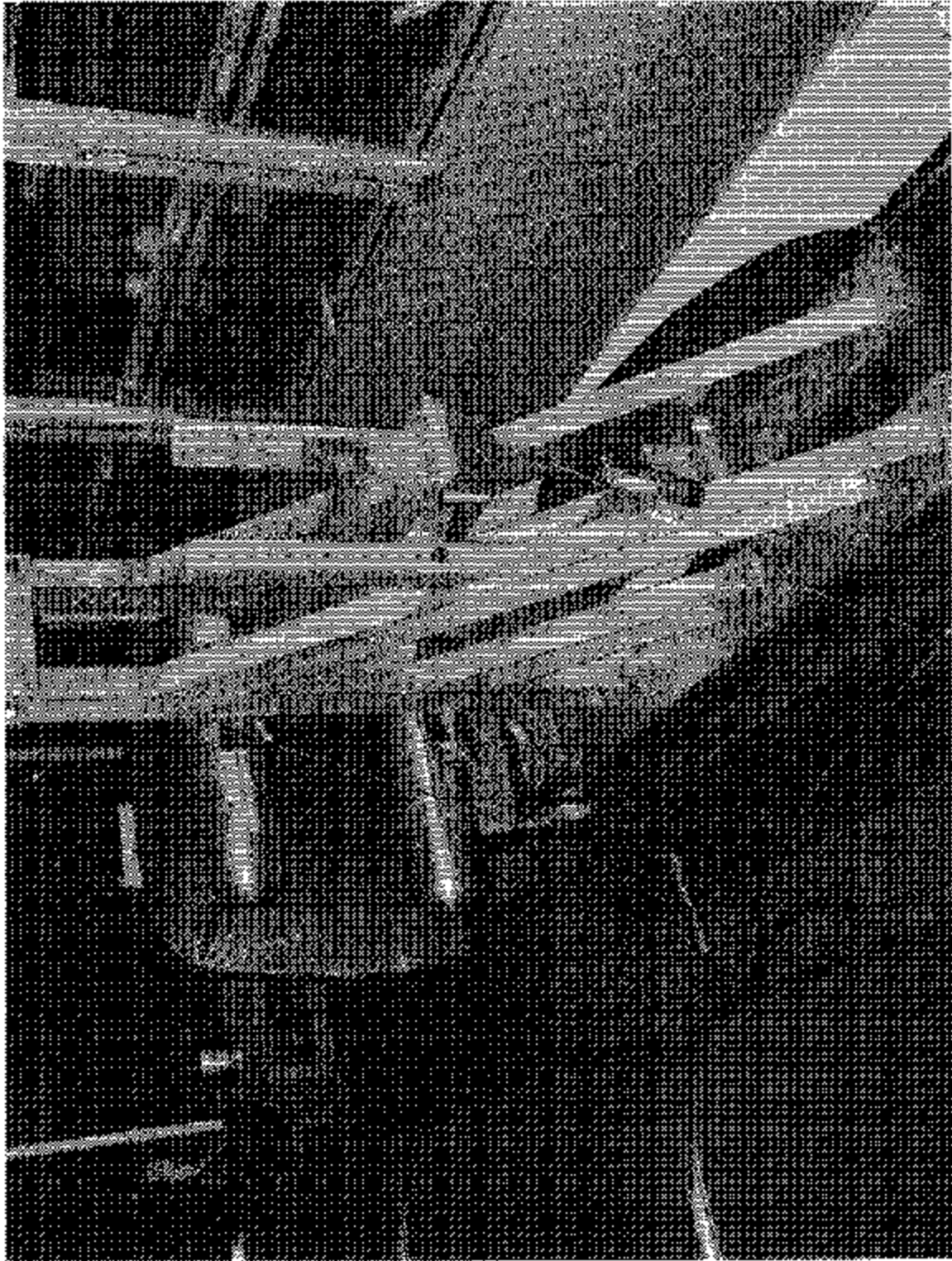
NHTSA No: C30900



Post-Test of Seat #7 Knee and Head Impact Locations

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

NHTSA No.: C30900



Typical Barrier Force Deflection Forward Test Setup

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

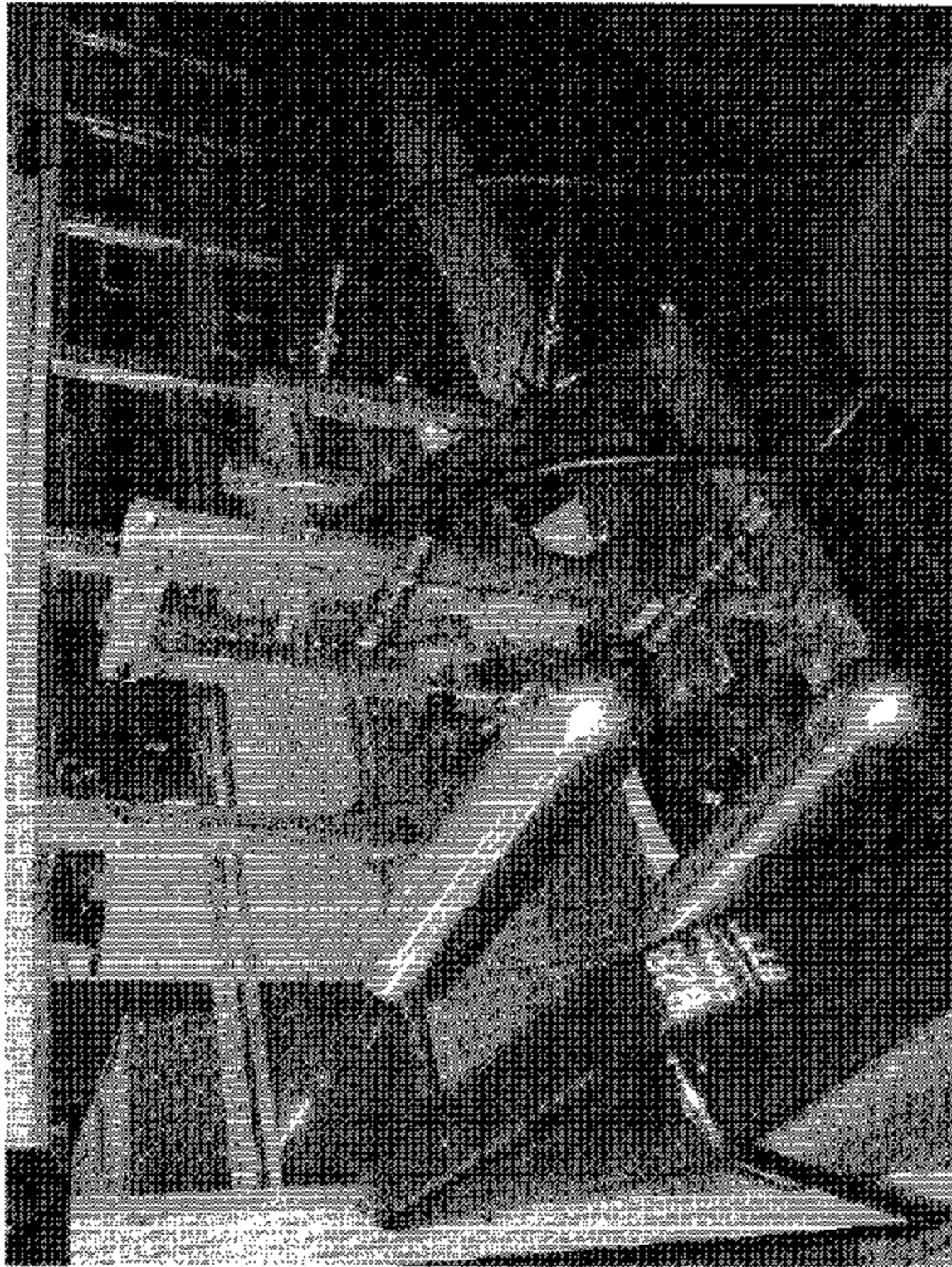
NHTSA No.: G30900



Pre-Test of Barrier #28 Force Deflection Forward Test

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

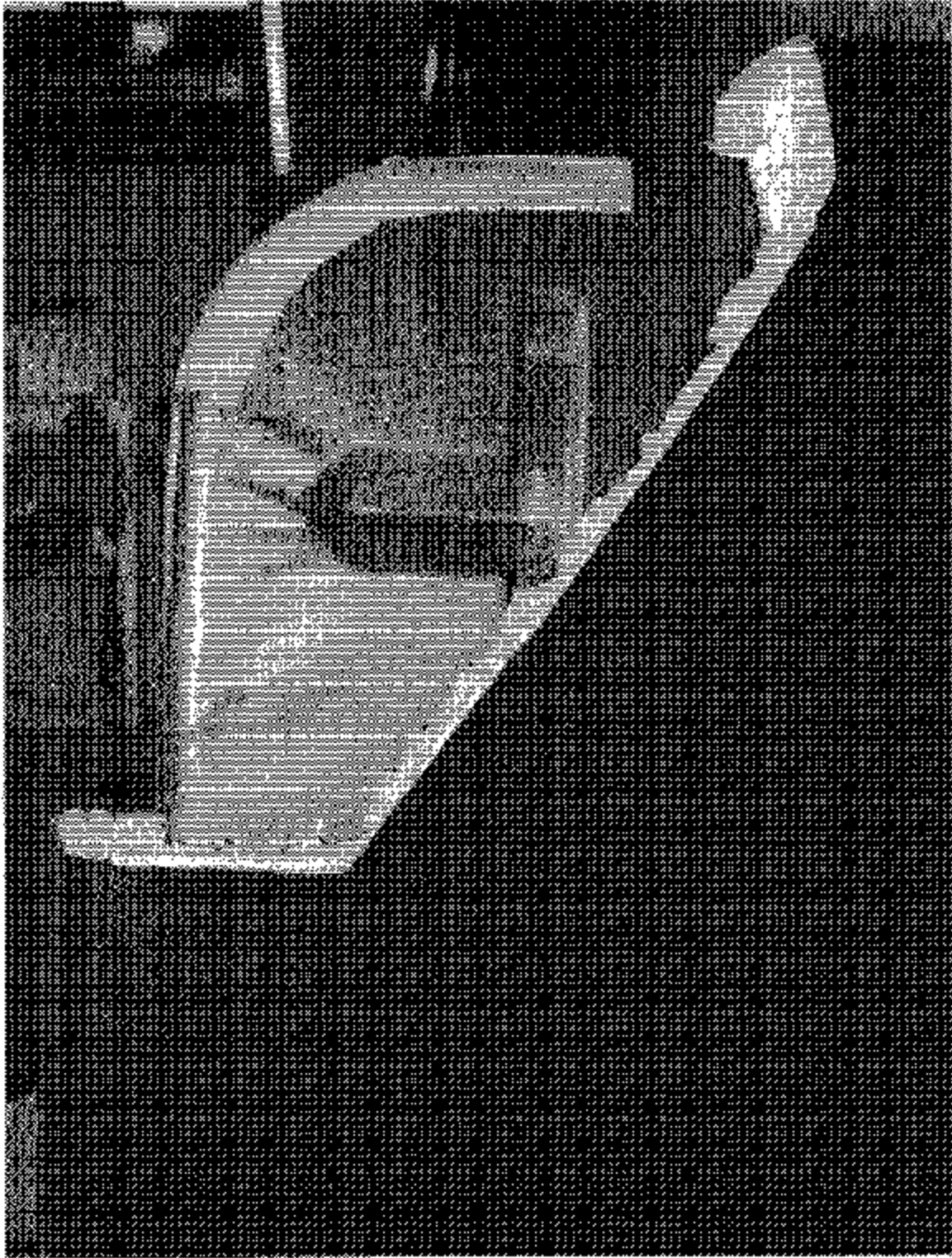
NHTSA No.: C30900



Post-Test of Barrier #28 Force Deflection Forward Test

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

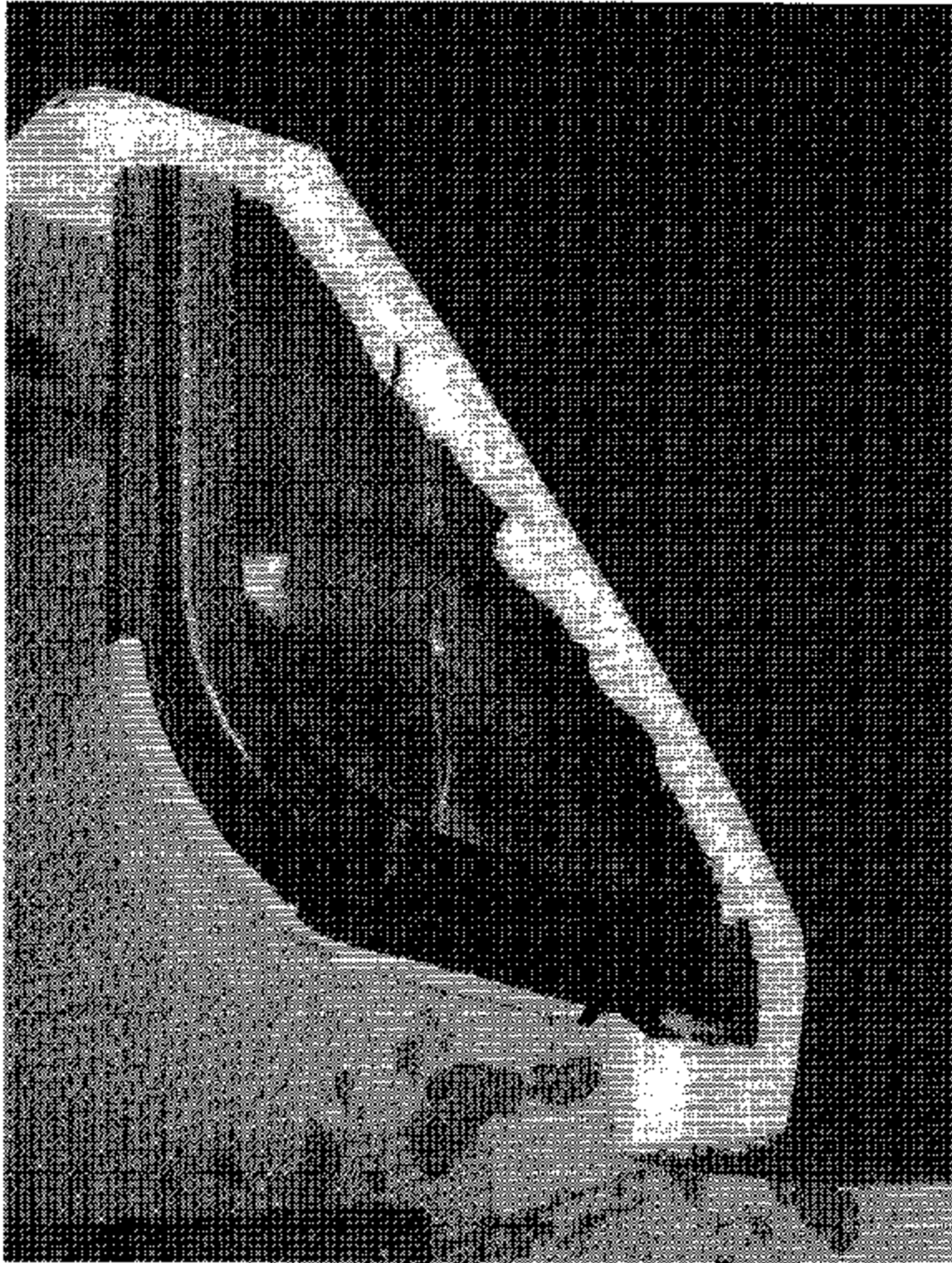
NHTSA No.: C30900



Typical Seat Back/Barrier Construction (Front View)

Test Vehicle: 2003 Blue Bird All American School Bus
Procedure: FMVSS 222

NHTSA No.: C30900



Typical Seat Back/Ganier Construction (Rear View)

**SECTION 6
TEST PLOTS**

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Test Desc: Seat S2 Cushion Retention

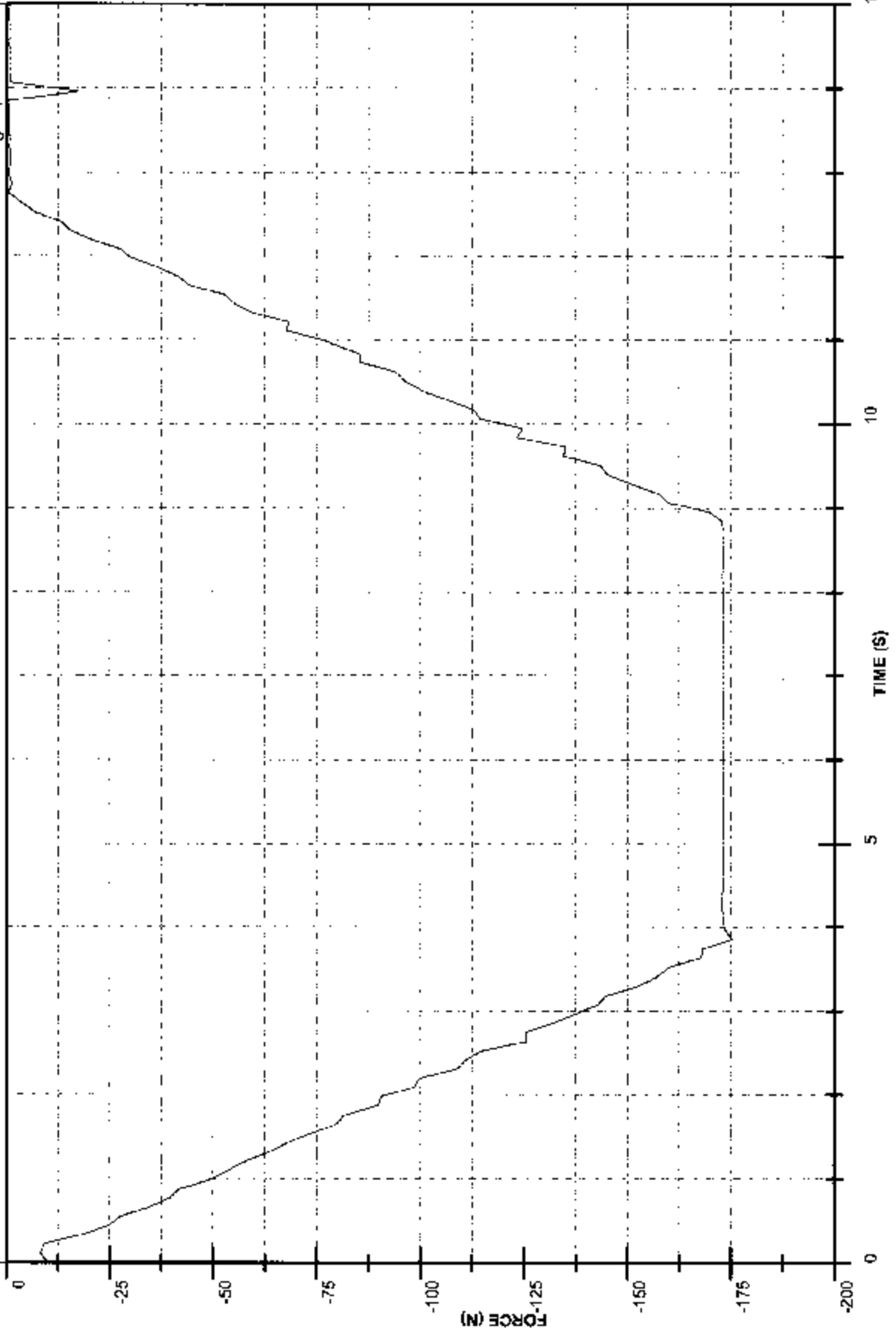
Test Date: 4-16-03

MGA Research Corp

Component ID: Blue Bird

NHTSA #: C30900

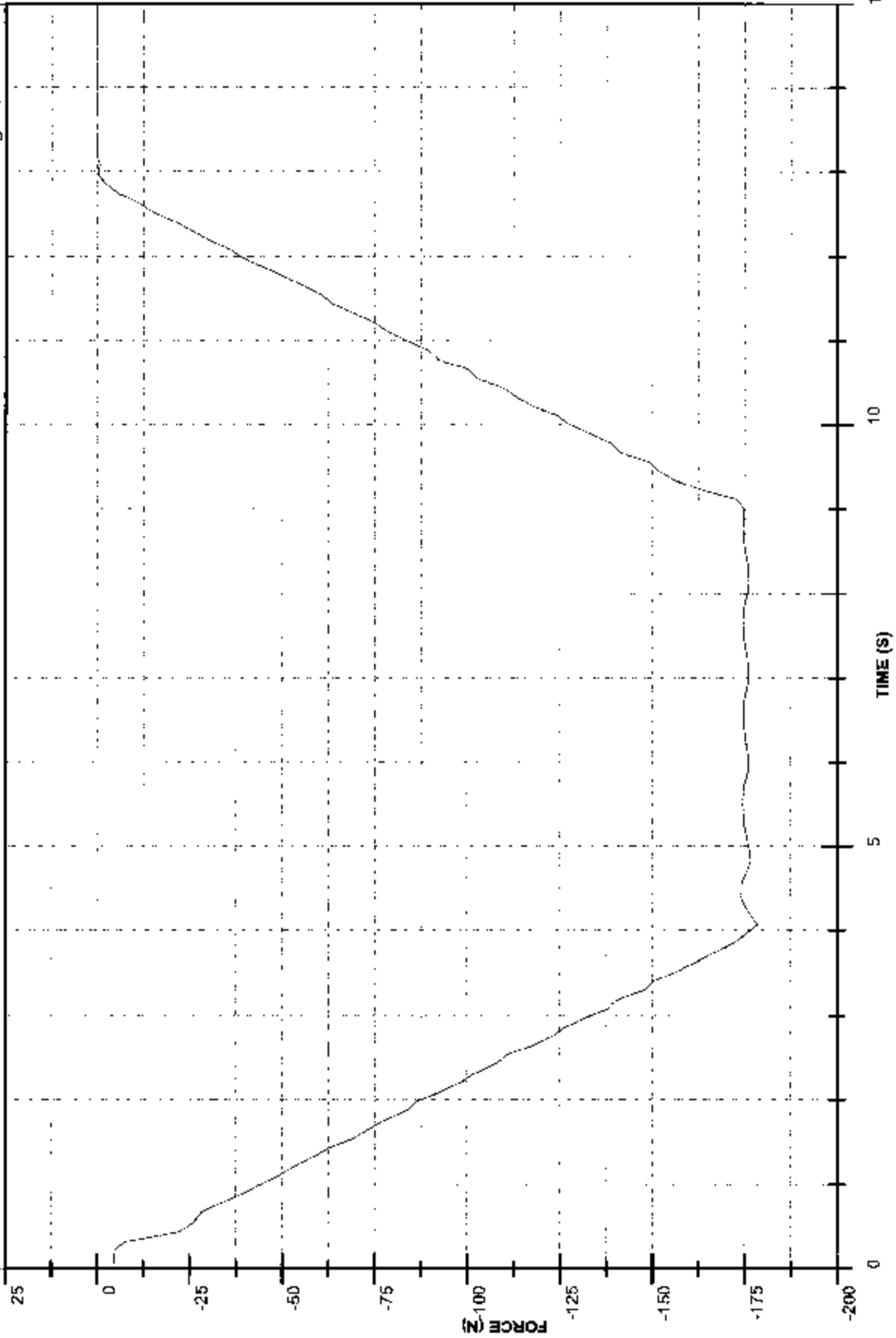
5000 Warren Road,
Burlington, WI 53105

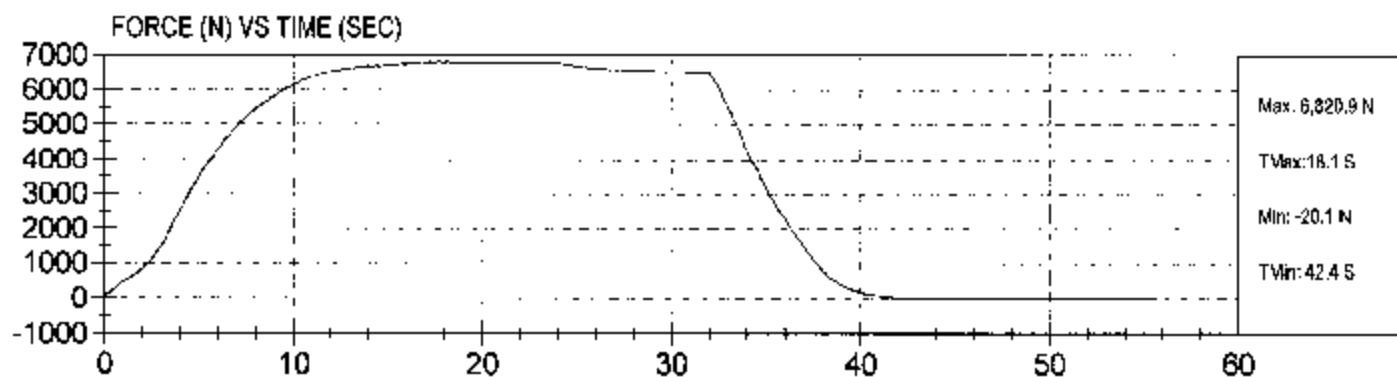
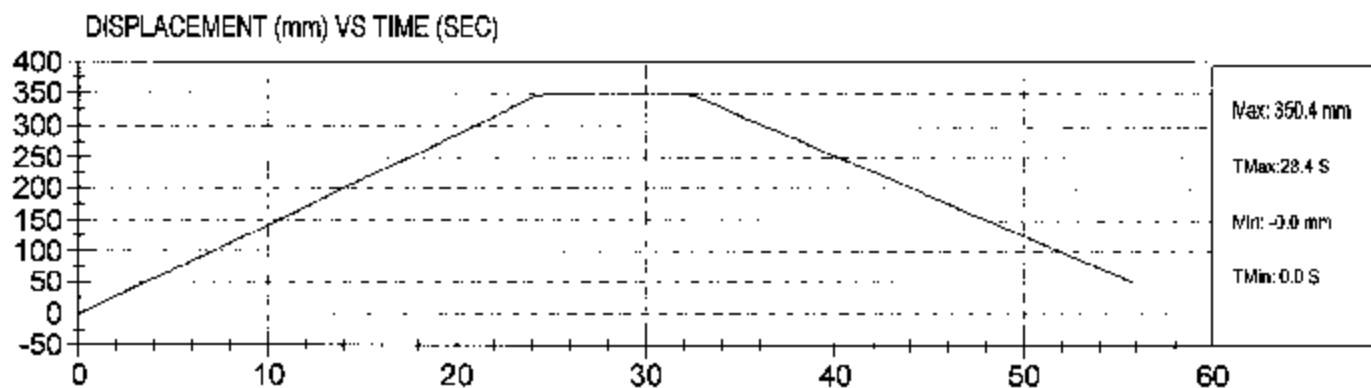
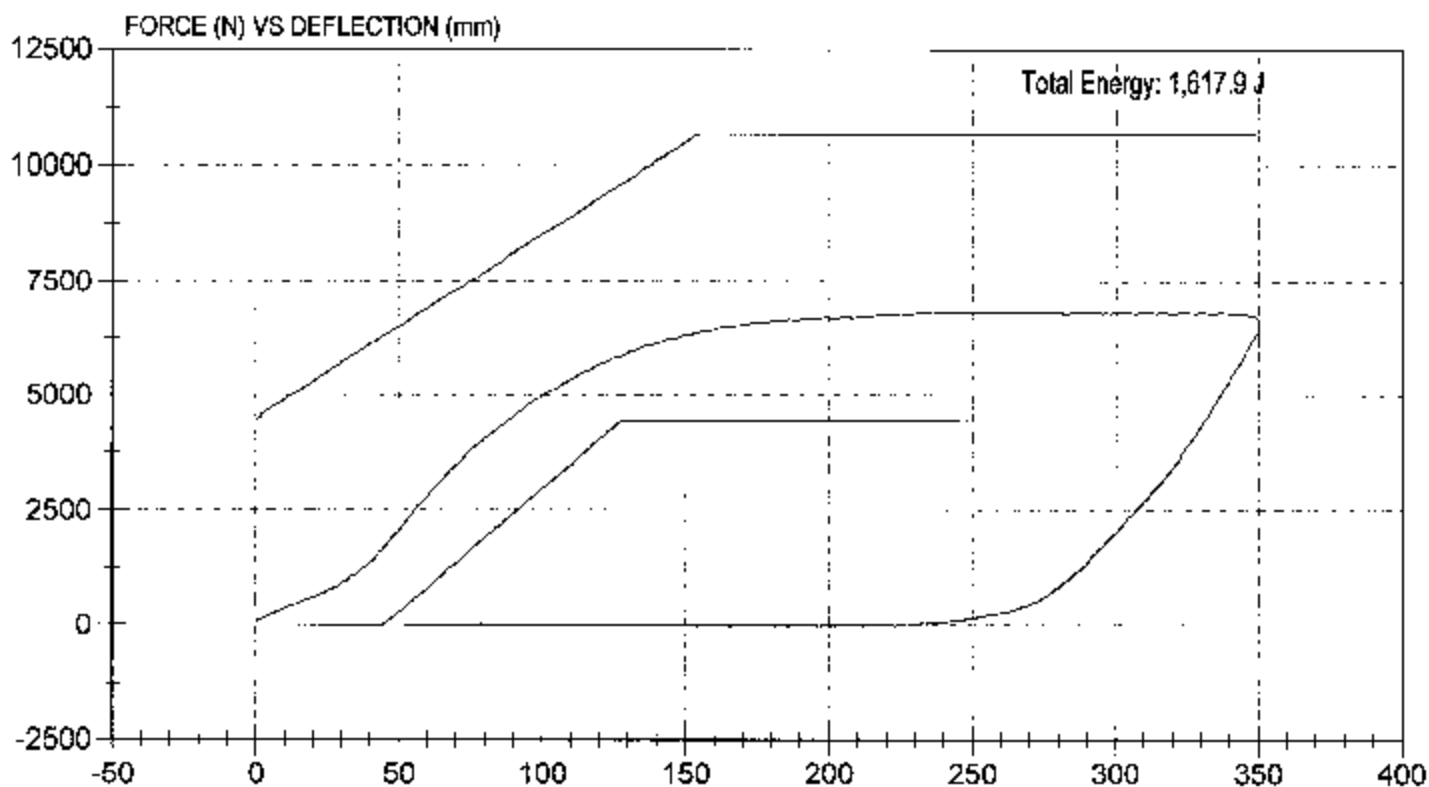


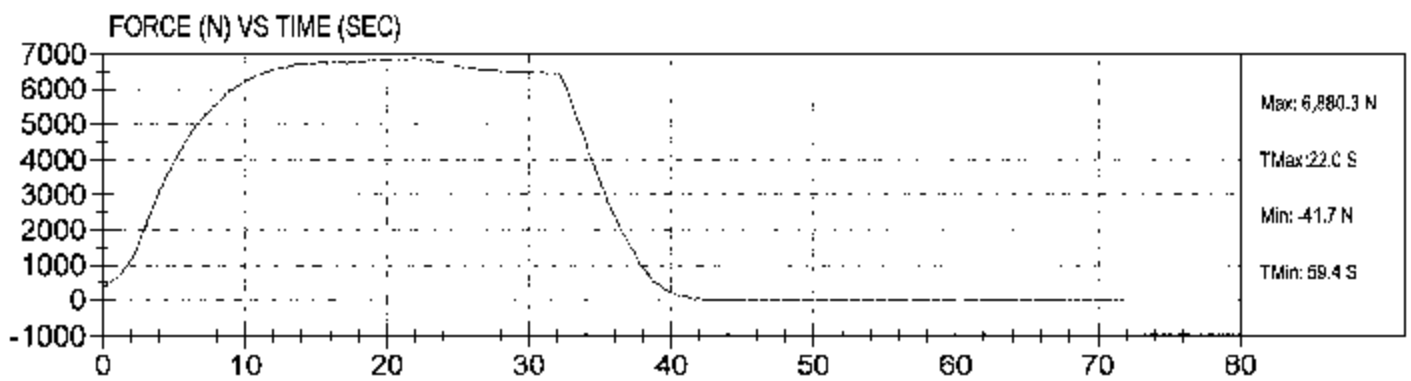
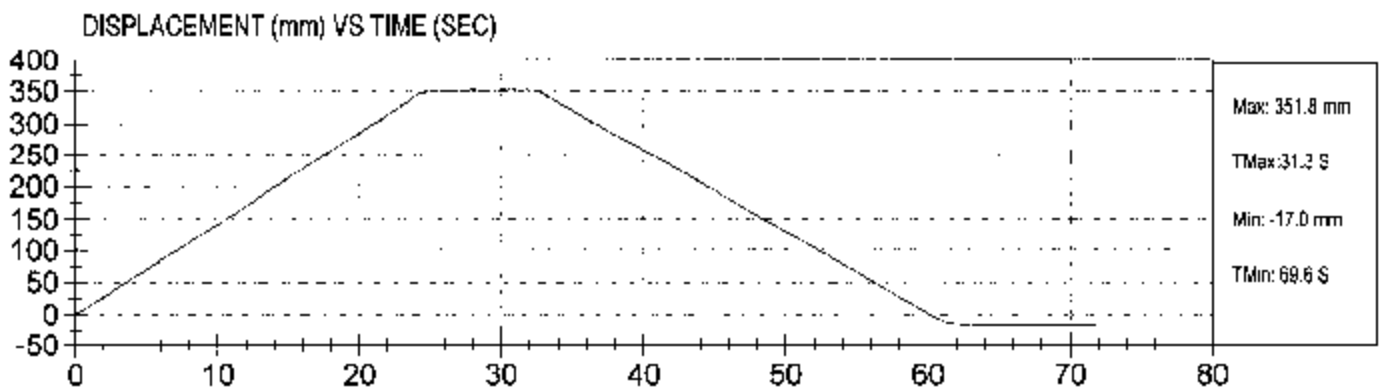
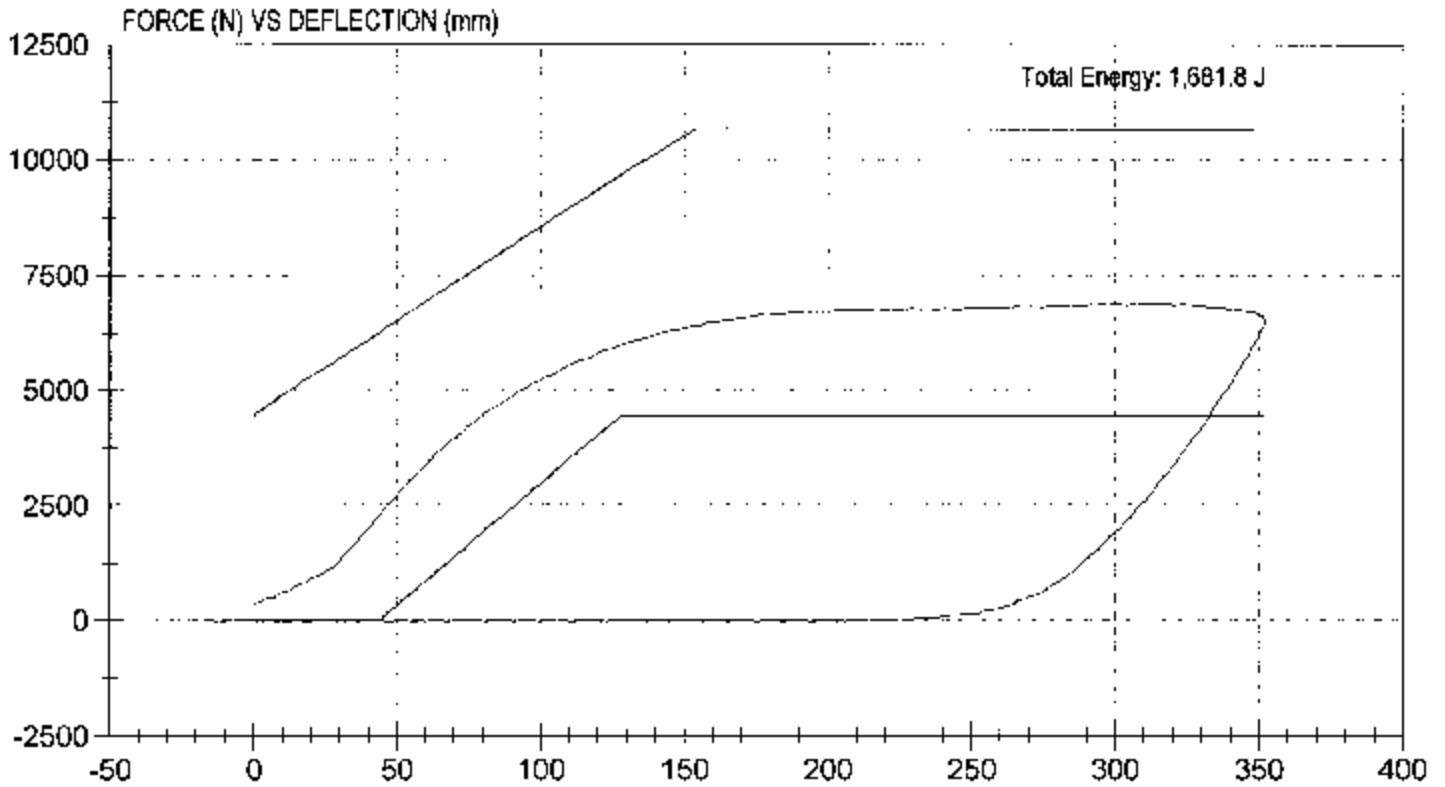
MGA Research Corp
5000 Warren Road,
Burlington, WI 53105

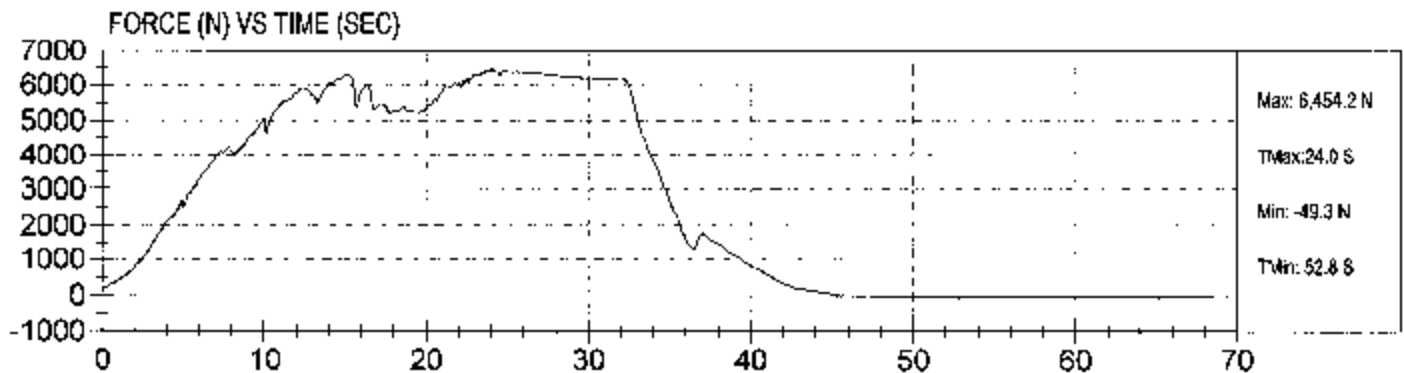
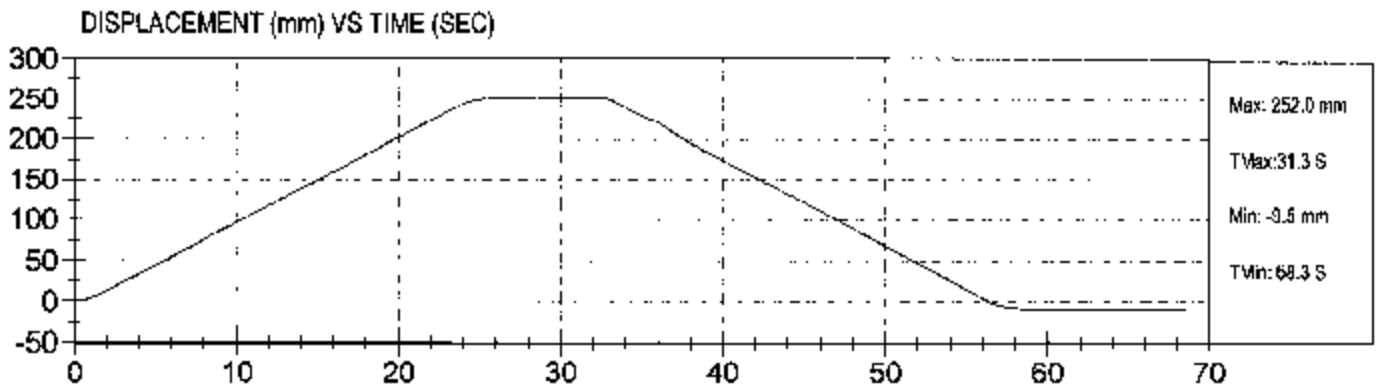
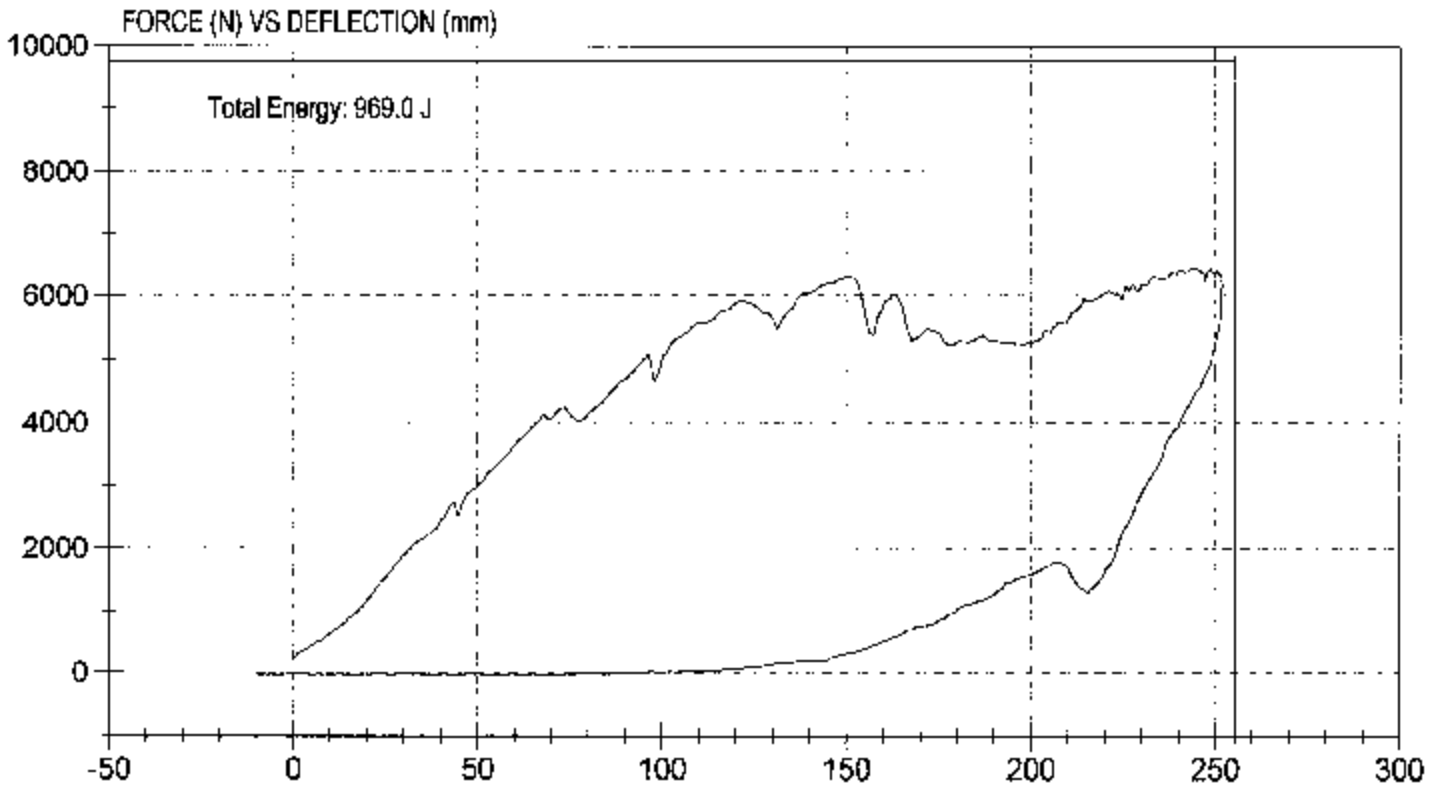
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NHTSA # C30900

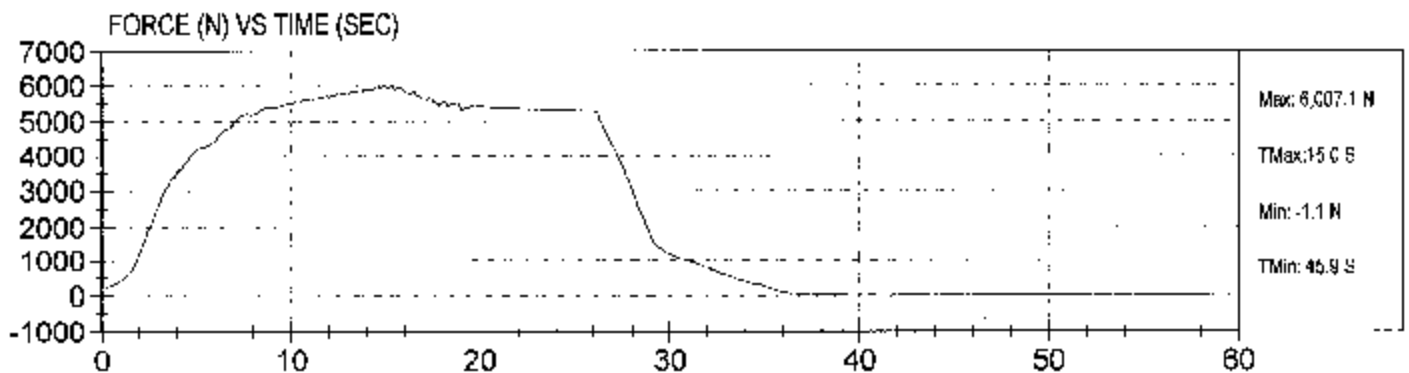
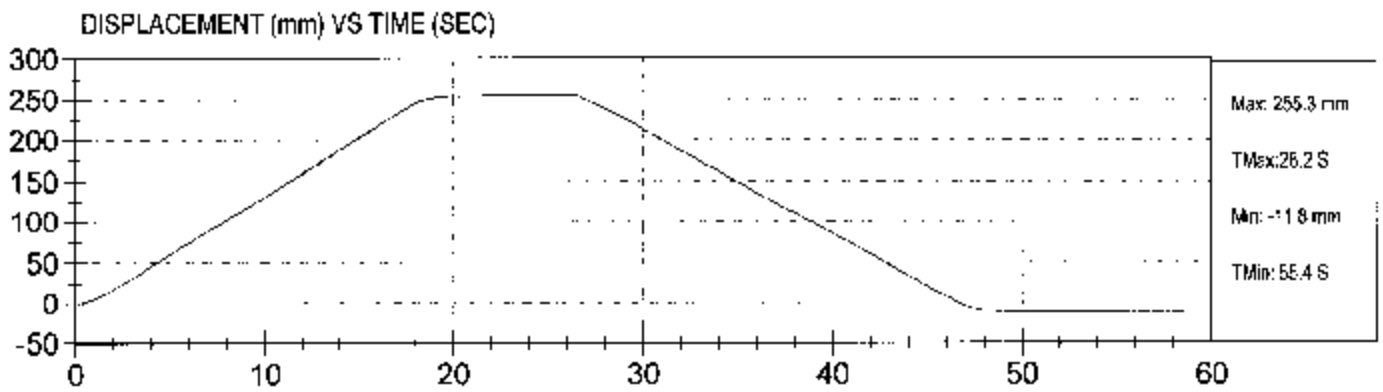
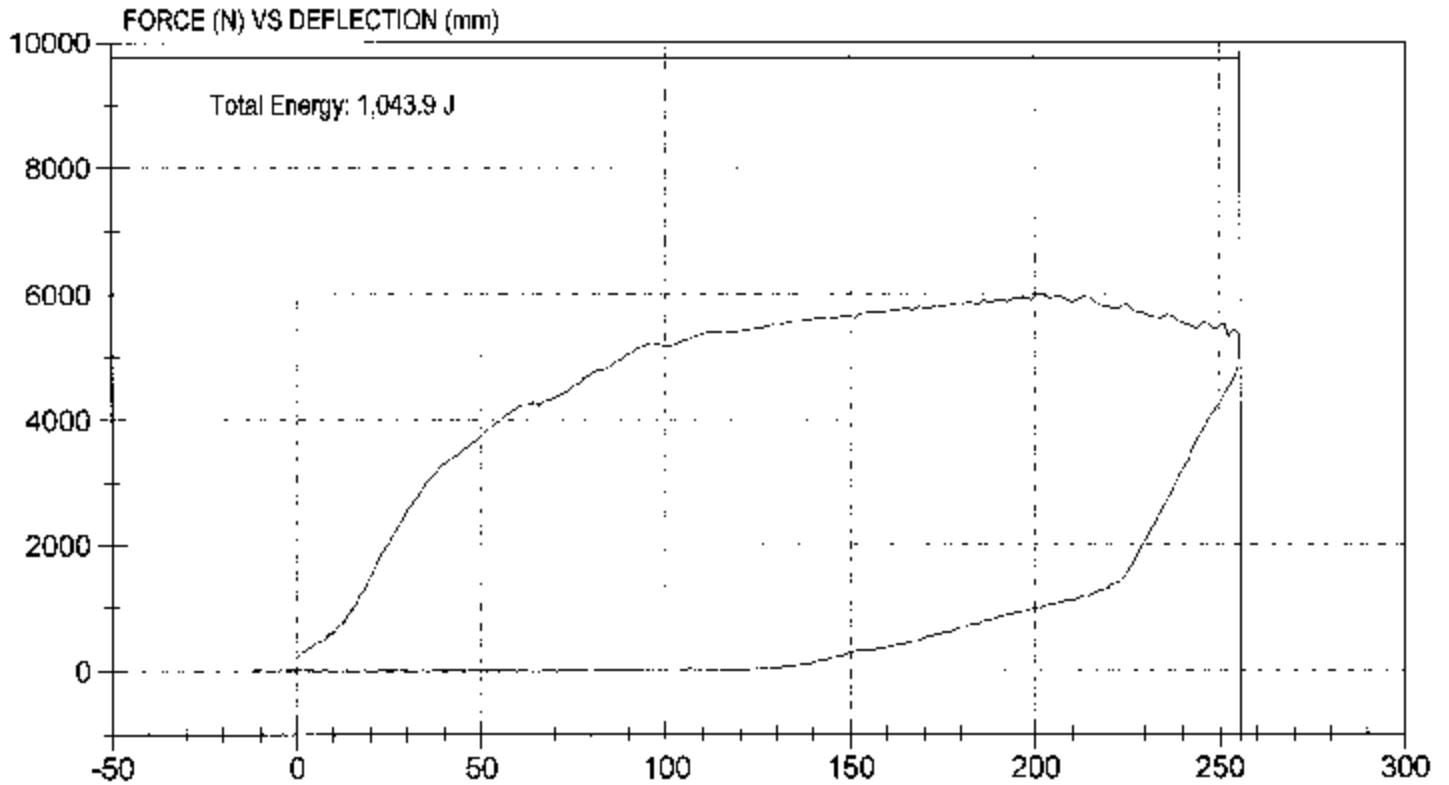
Test Desc: Seat S3 Cushion Retention
Component ID: Blue Bird

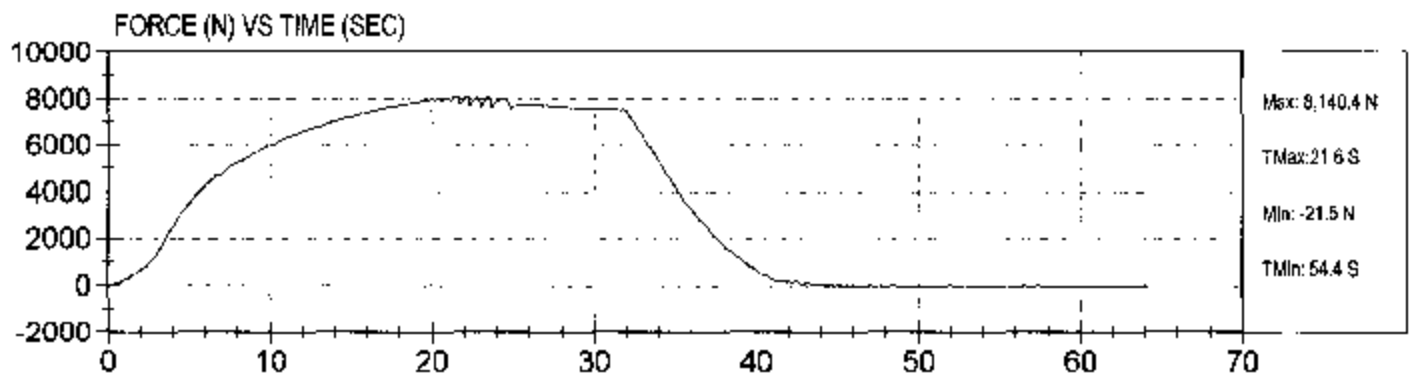
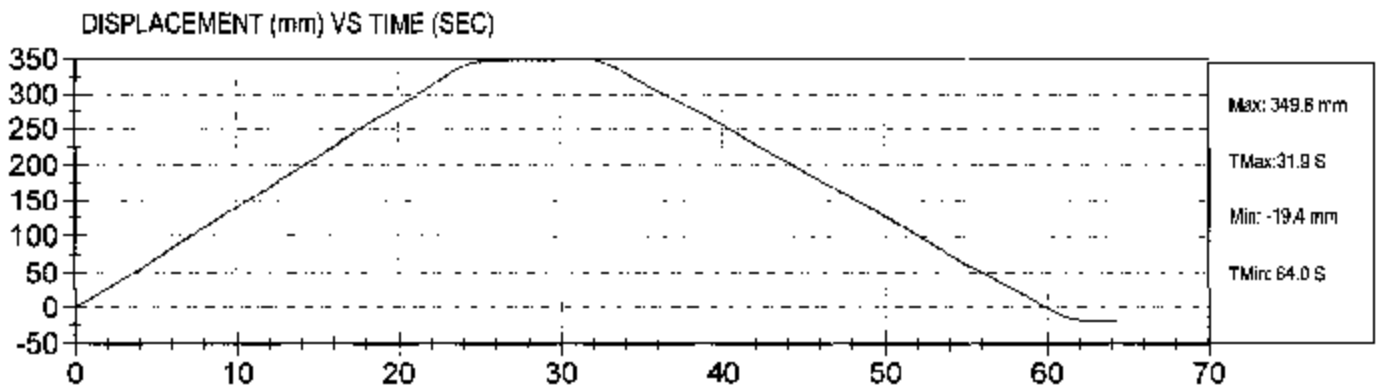
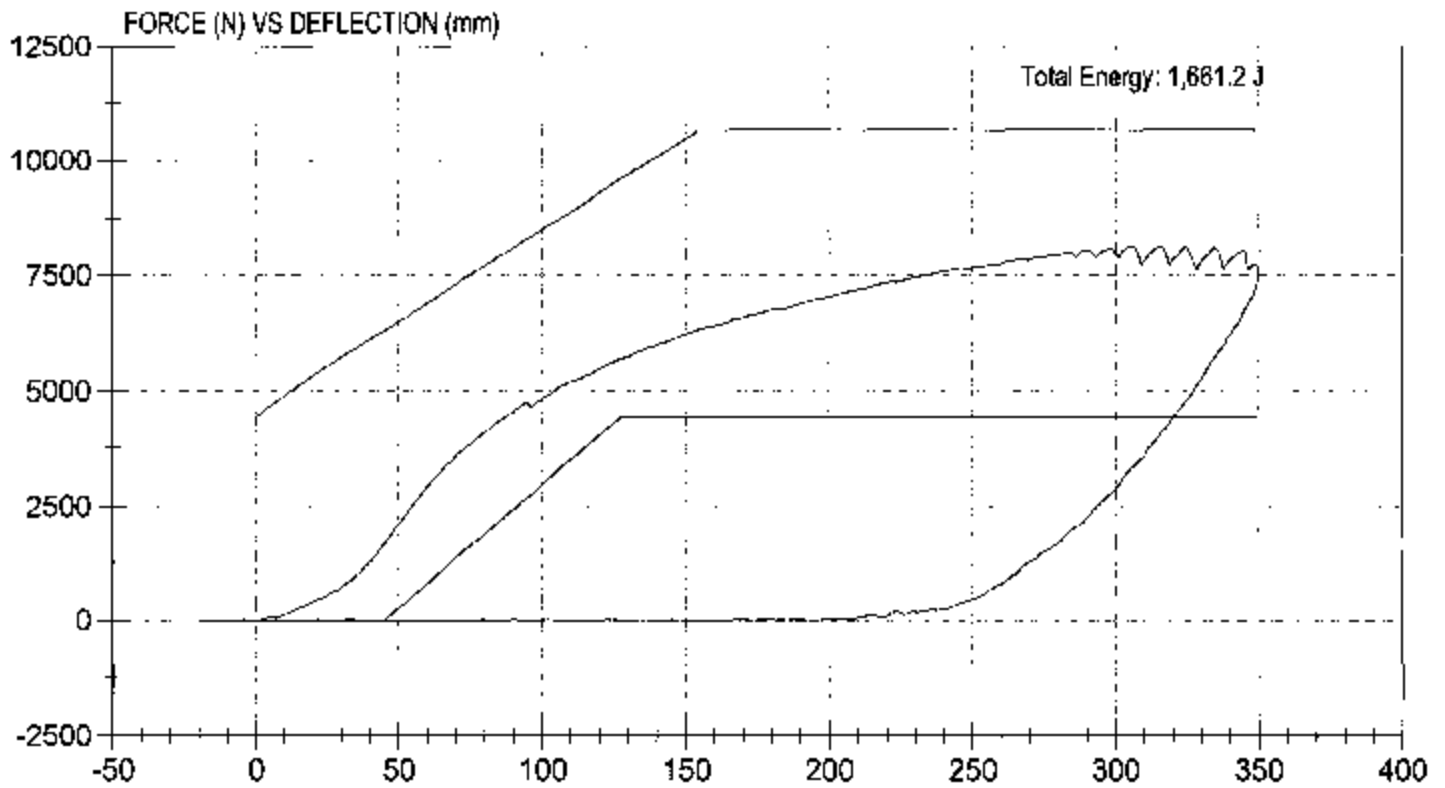














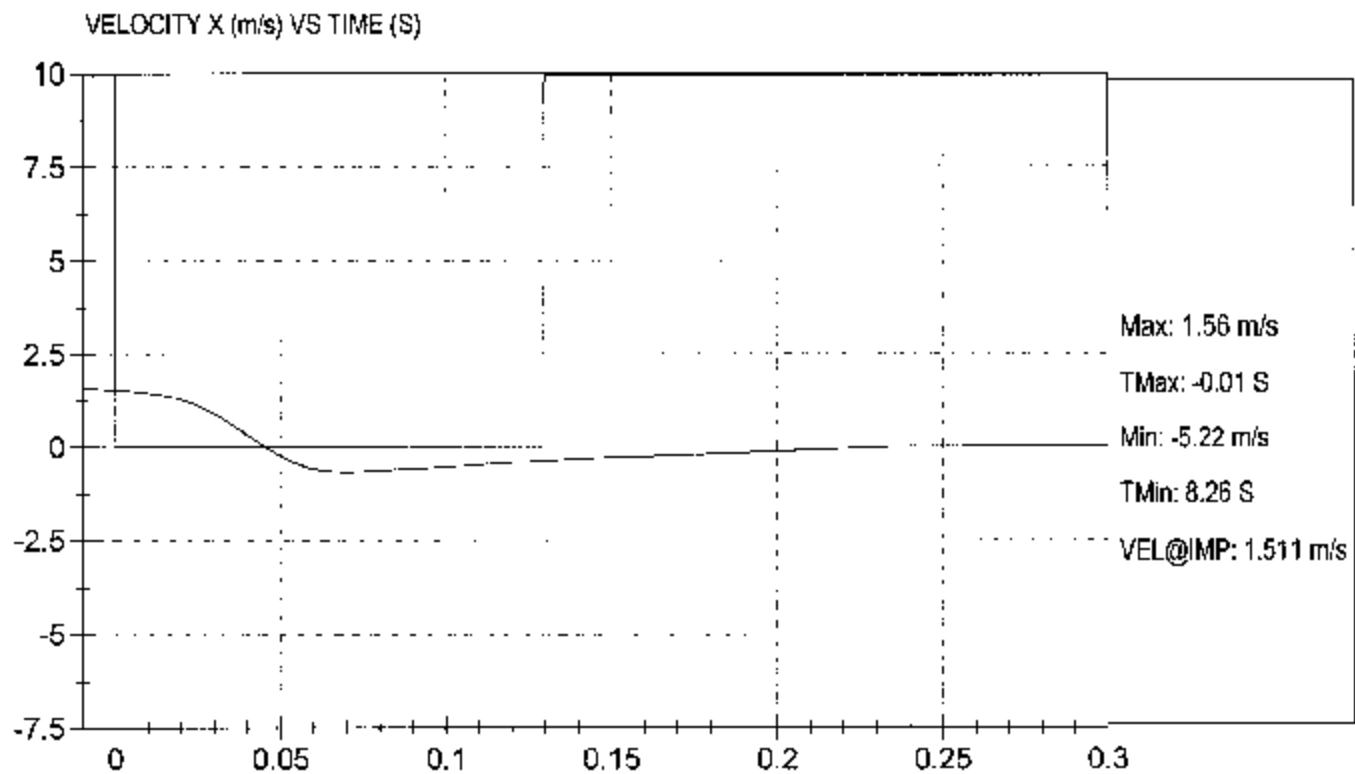
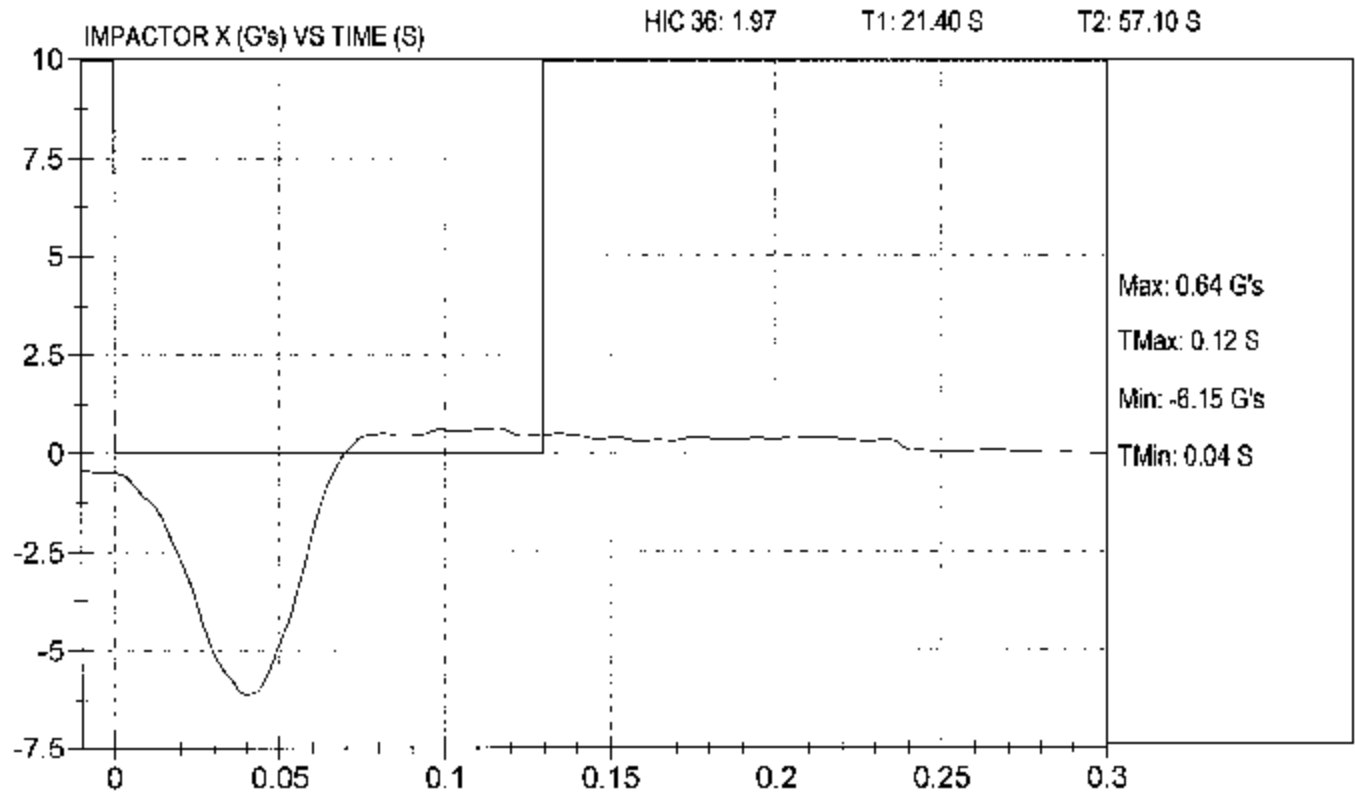
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)

Test Date: 3/28/03

Vehicle: Blue Bird All American

Location: H2

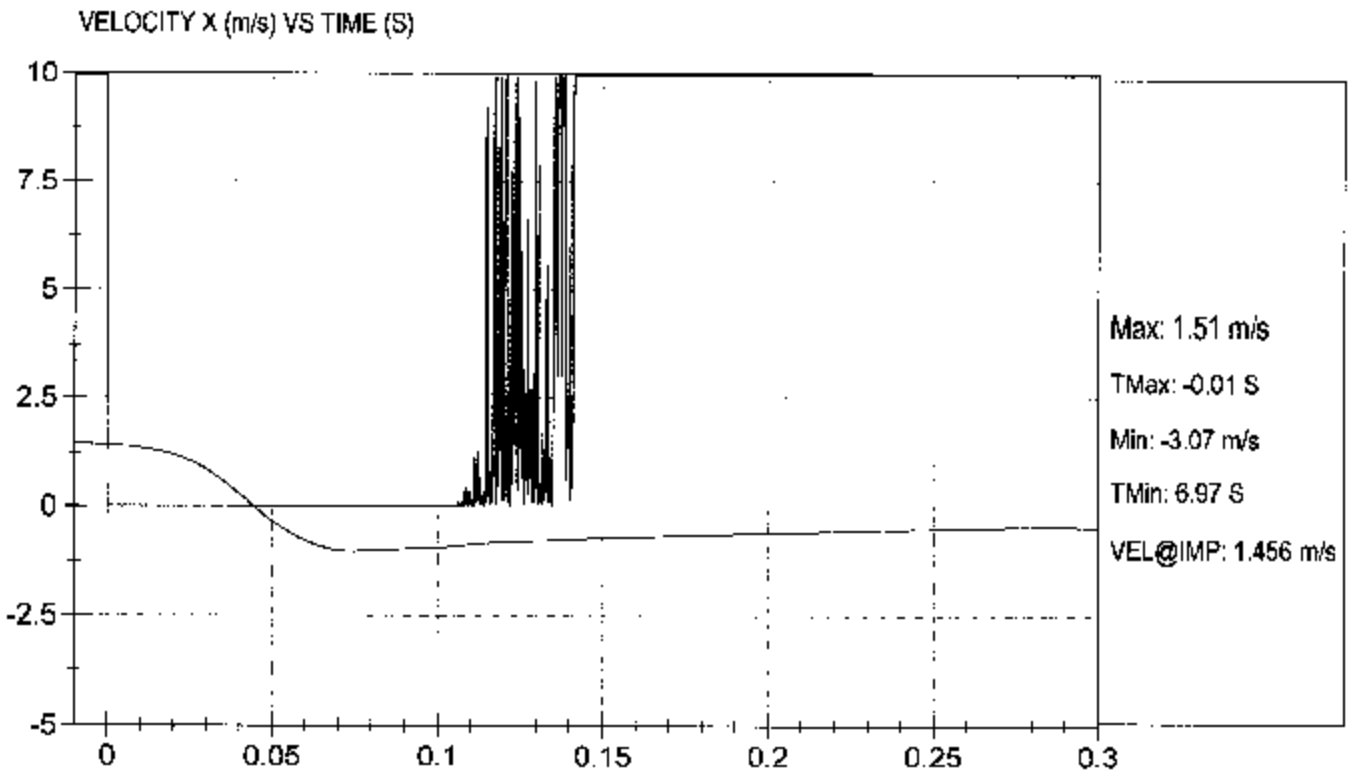
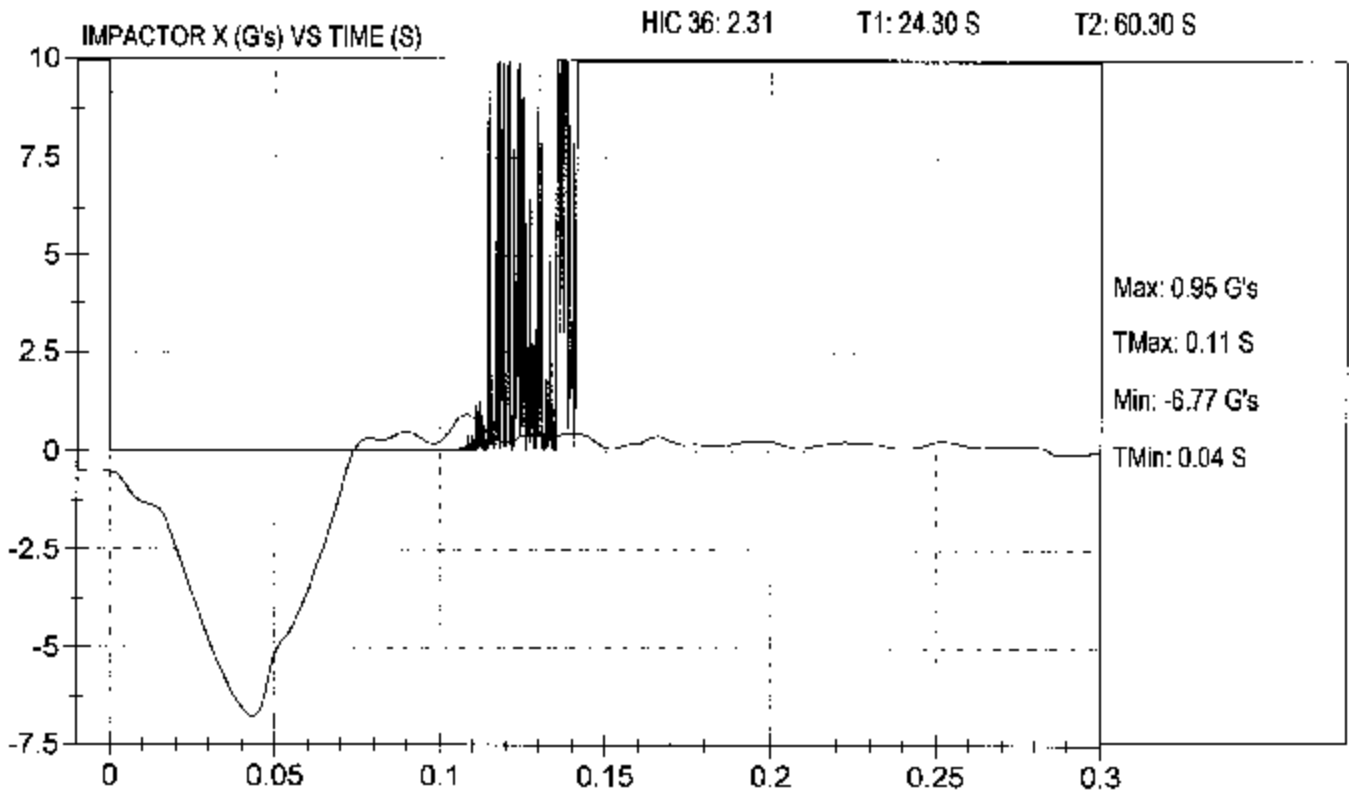
NHTSA #: C30900





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Blue Bird All American
NHTSA #: C30900

Test Date: 3/27/03
Location: H3





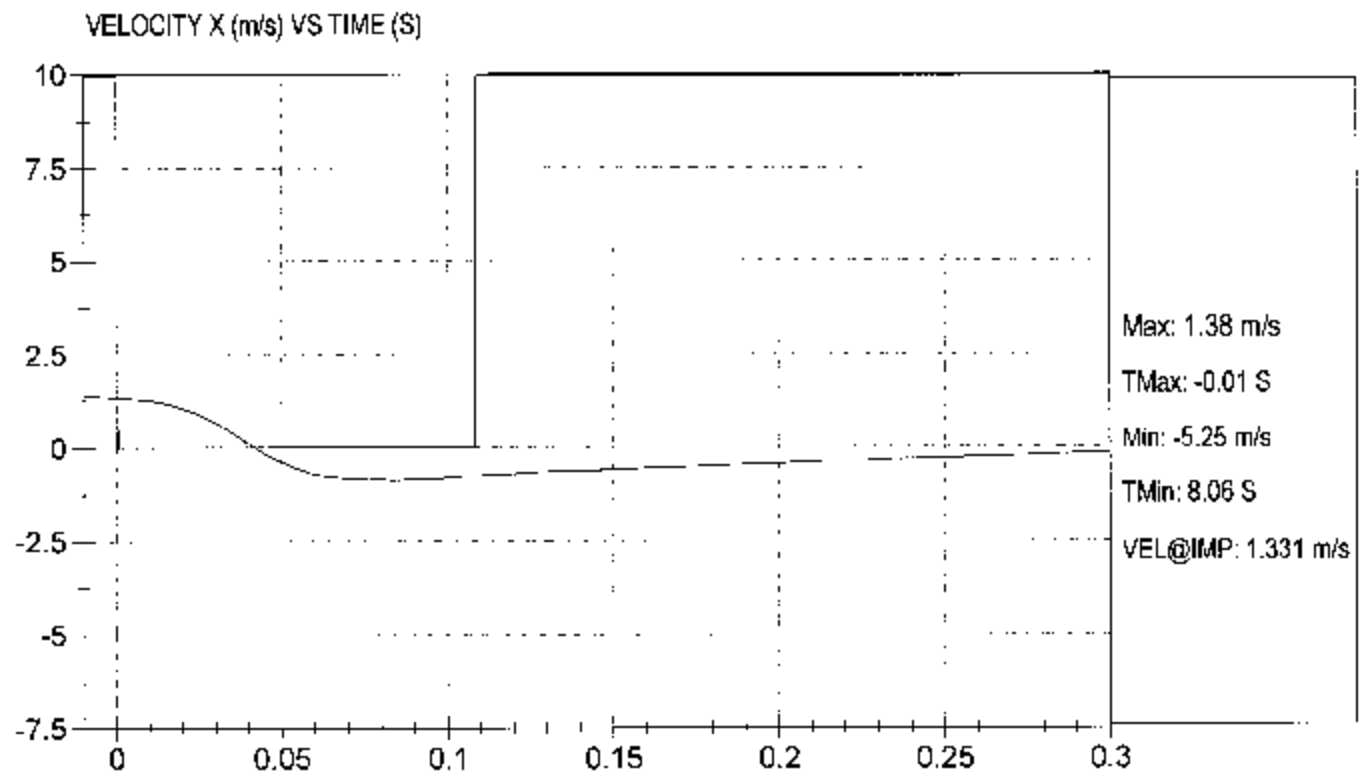
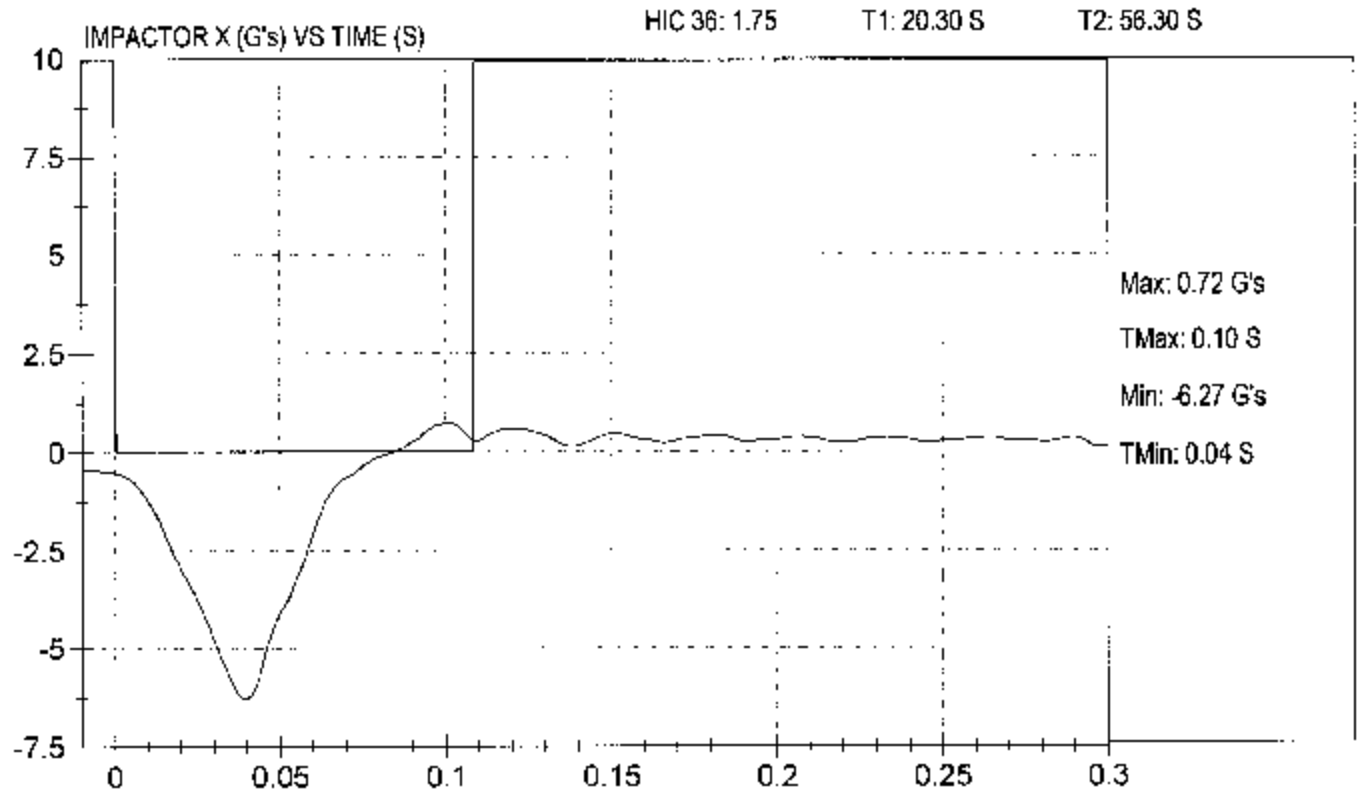
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)

Test Date: 3/27/03

Vehicle: Blue Bird All American

Location: H4

NHTSA #: C30900





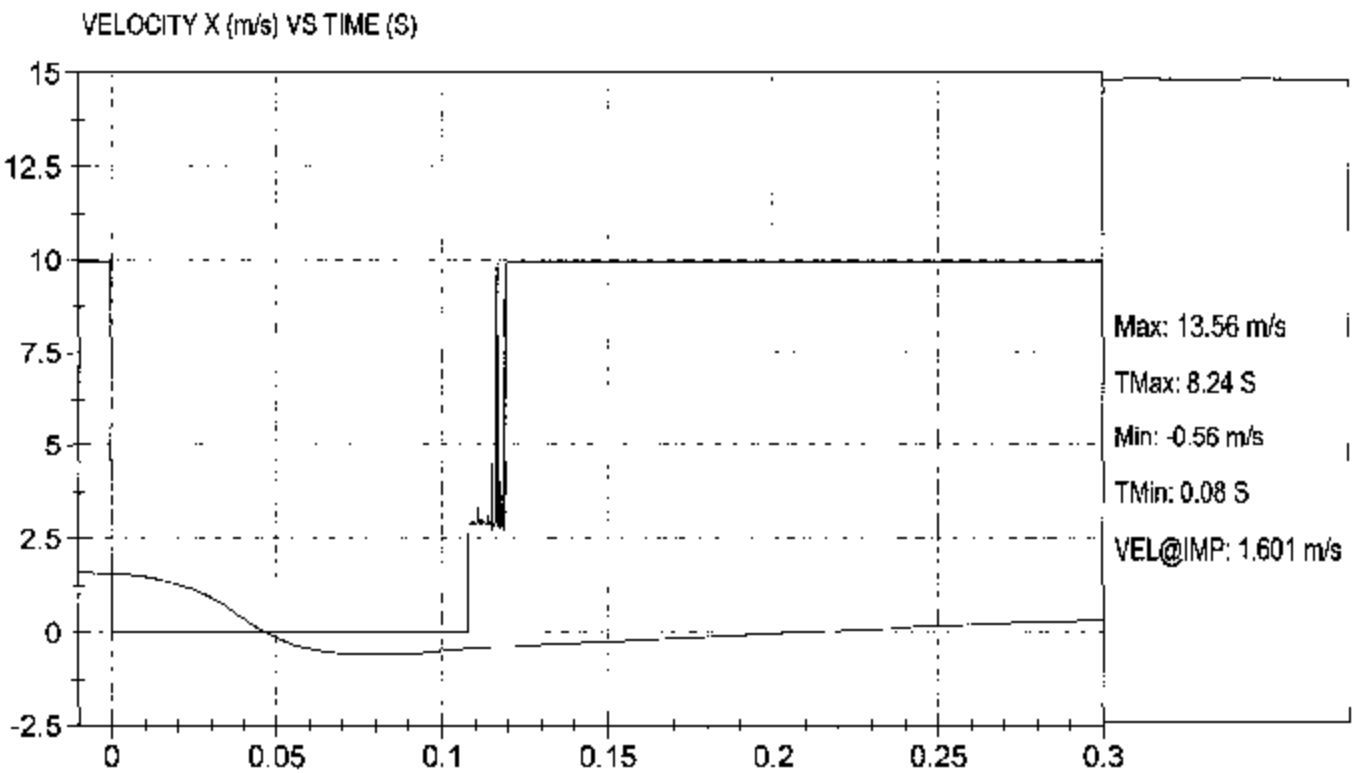
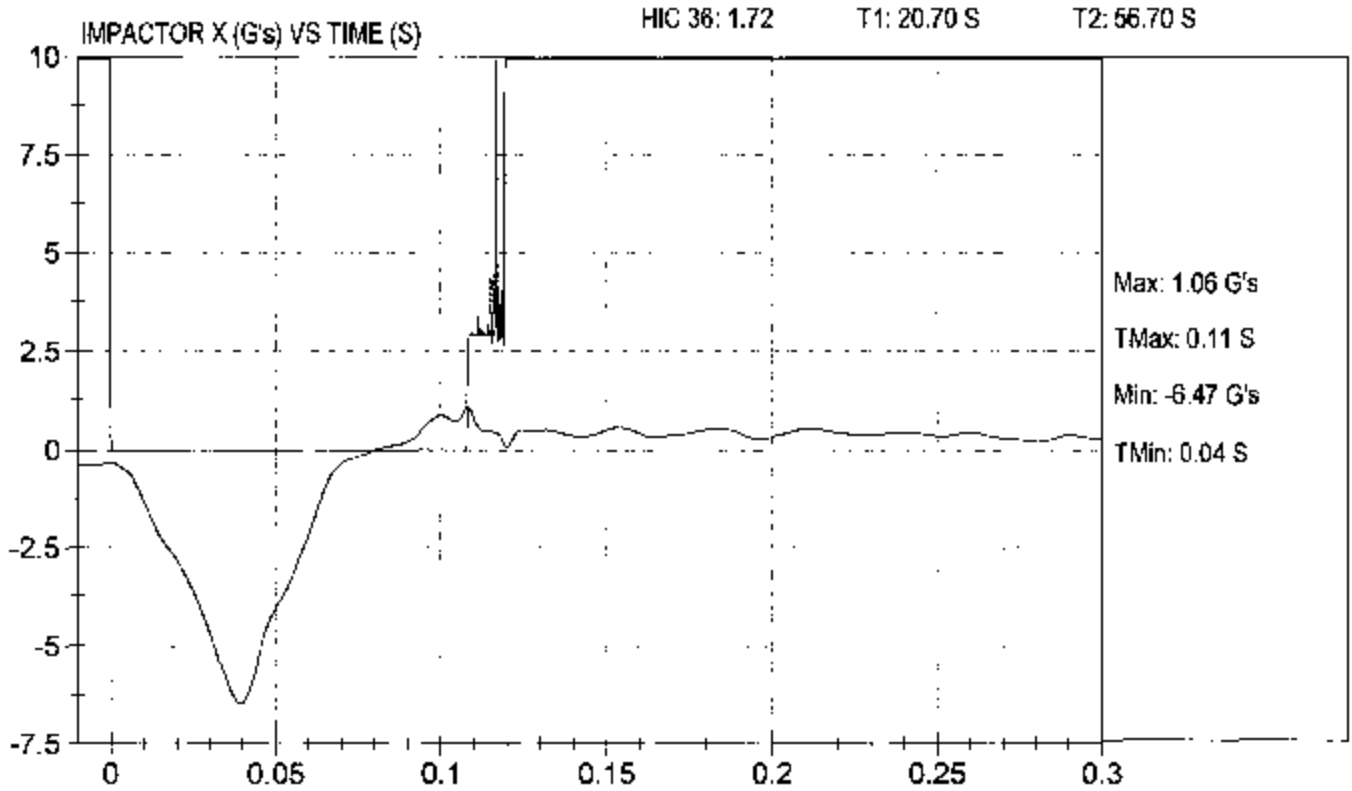
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)

Vehicle: Blue Bird All American

NHTSA #: C30900

Test Date: 3/27/03

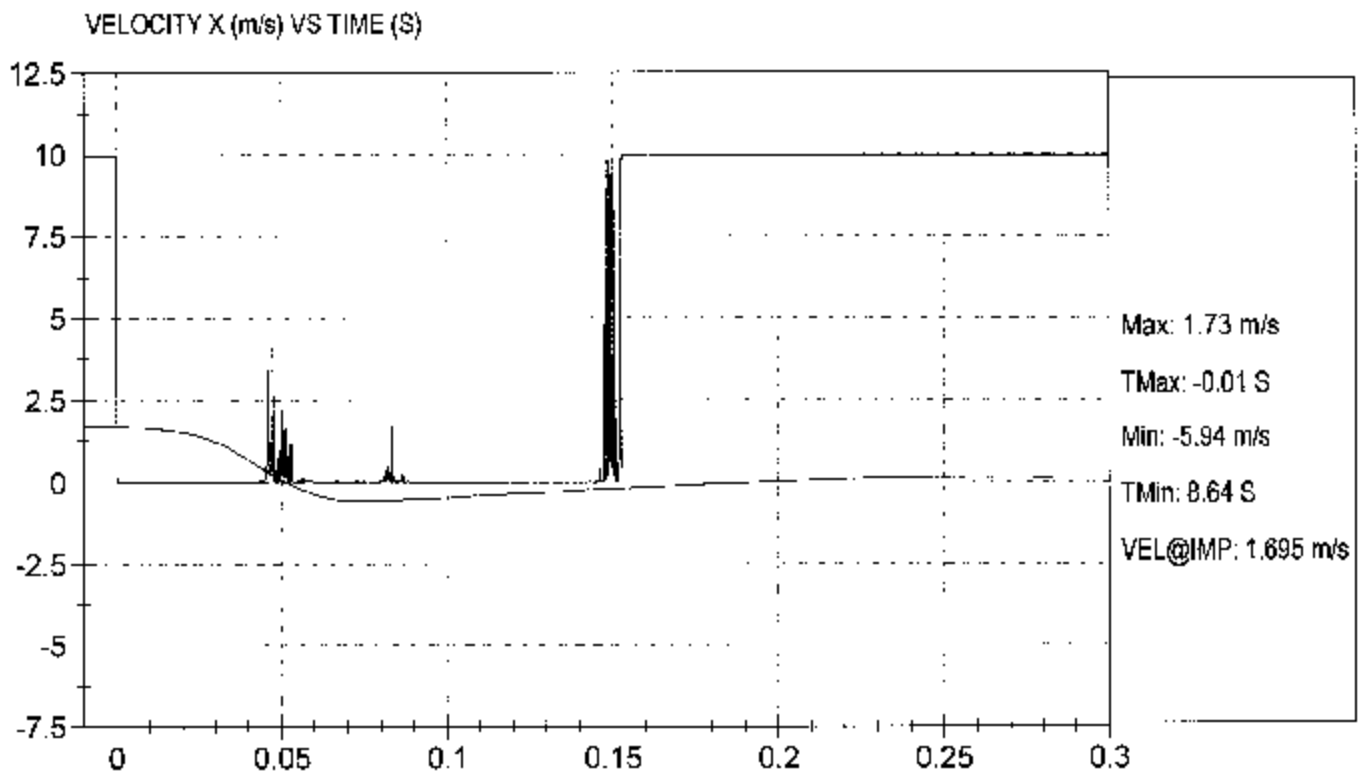
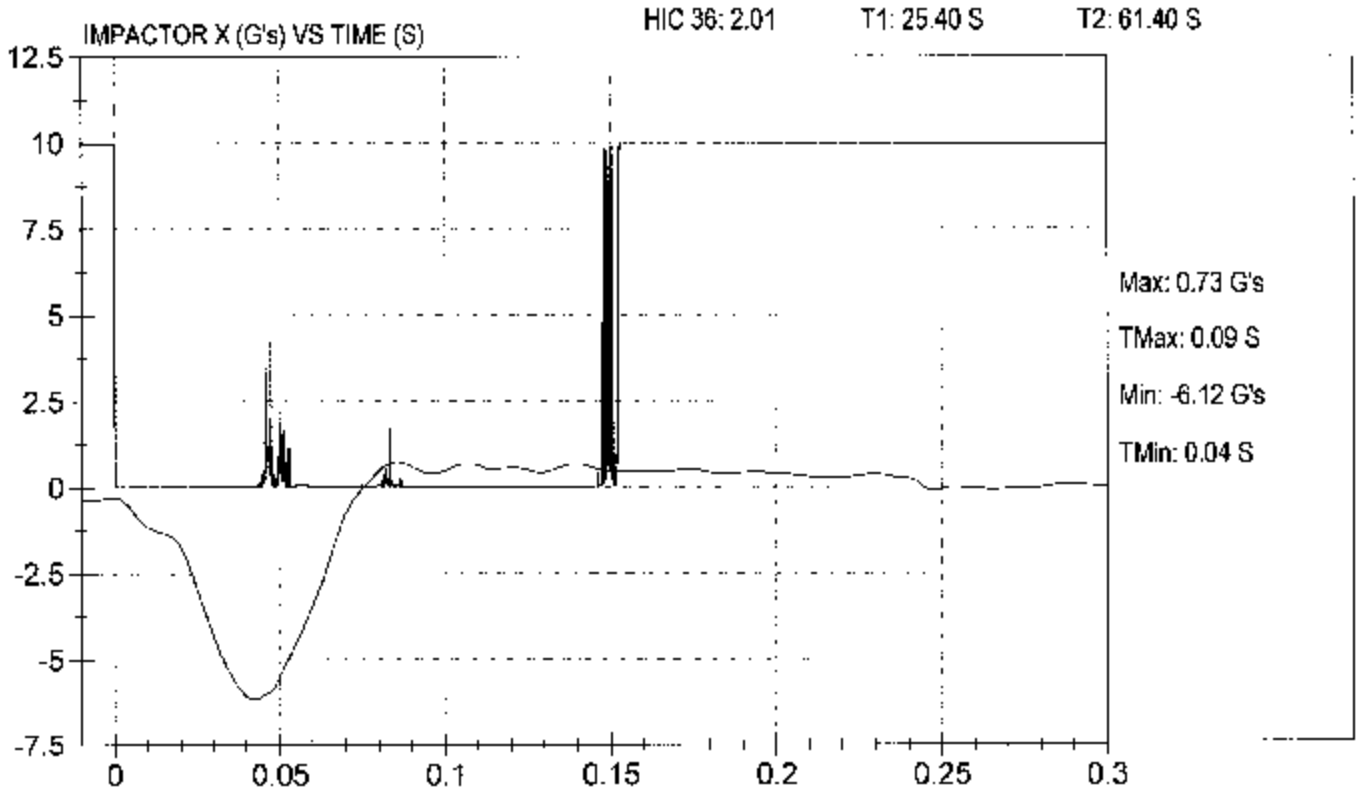
Location: H5





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Blue Bird All American
NHTSA #: C30900

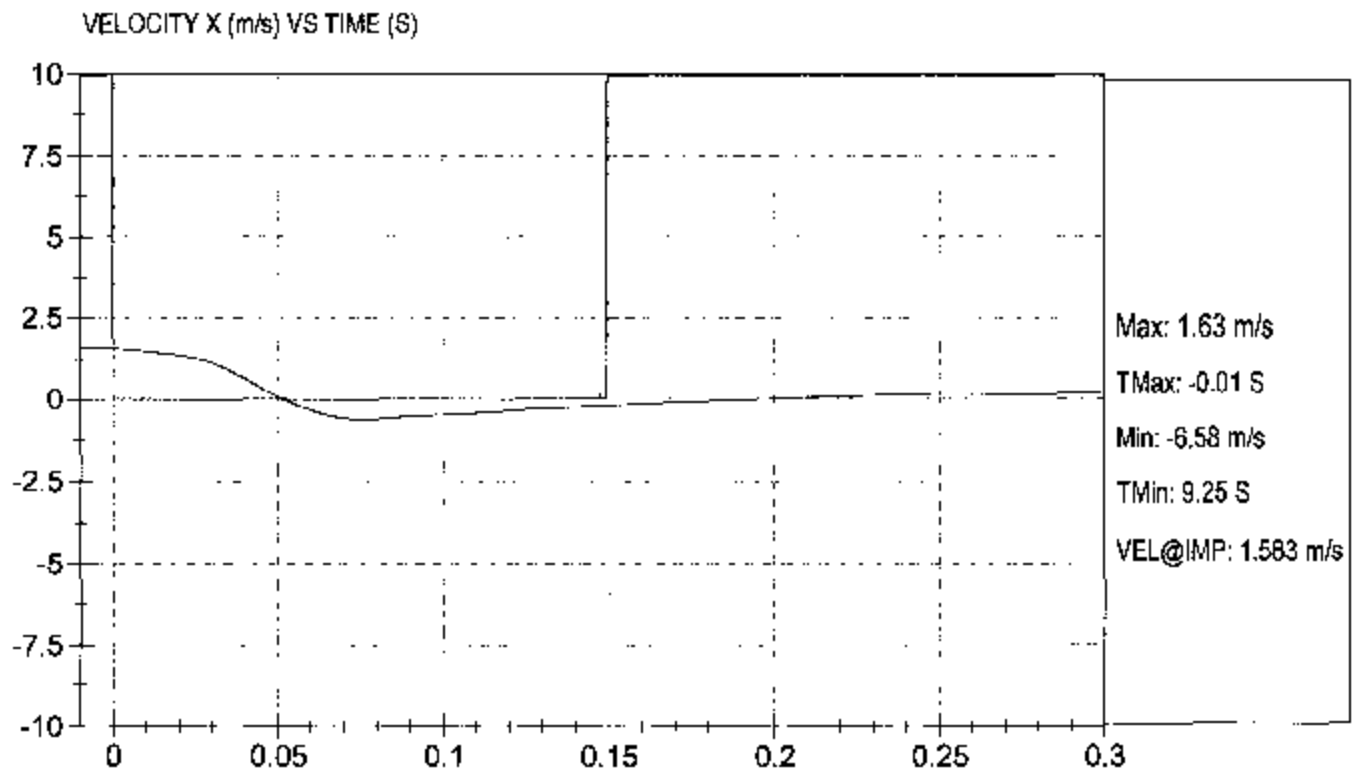
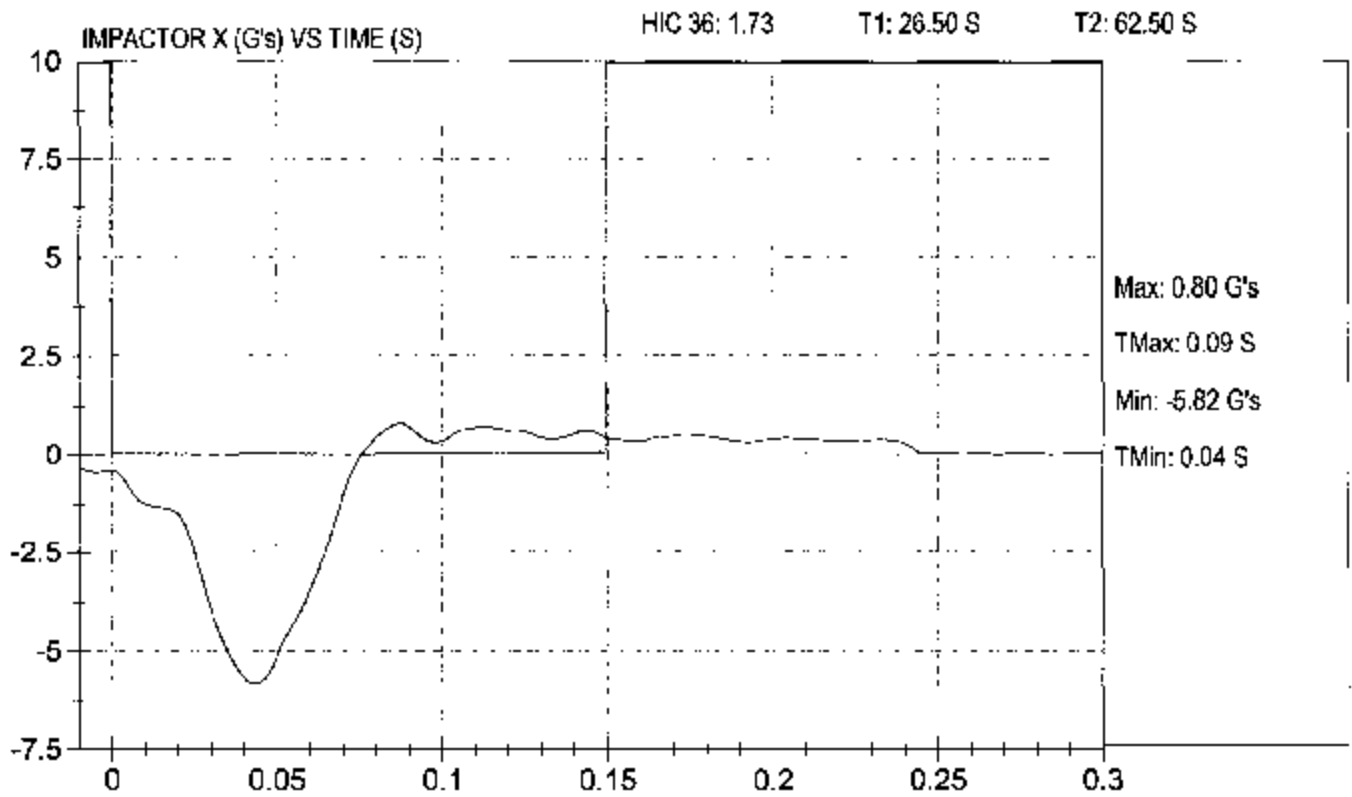
Test Date: 3/27/03
Location: H6





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Blue Bird All American
NHTSA #: C30900

Test Date: 3/27/03
Location: H7





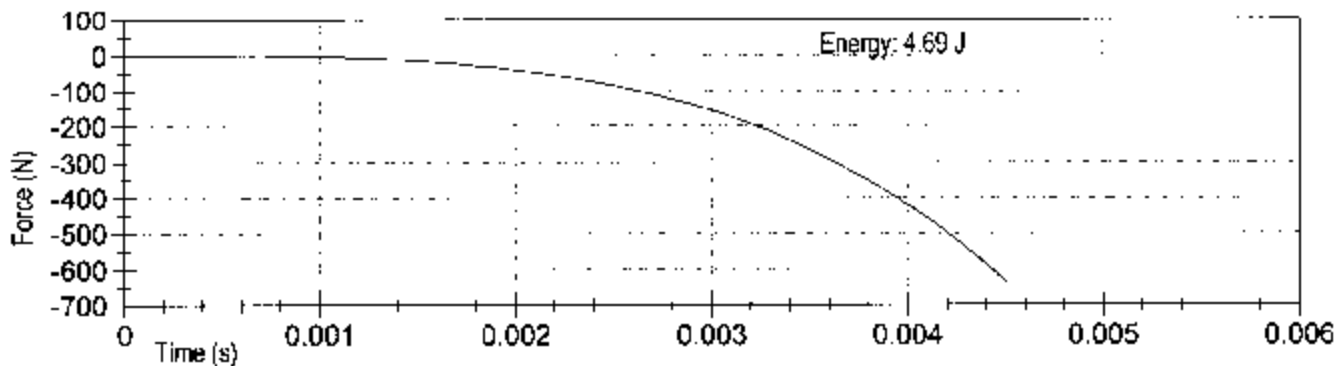
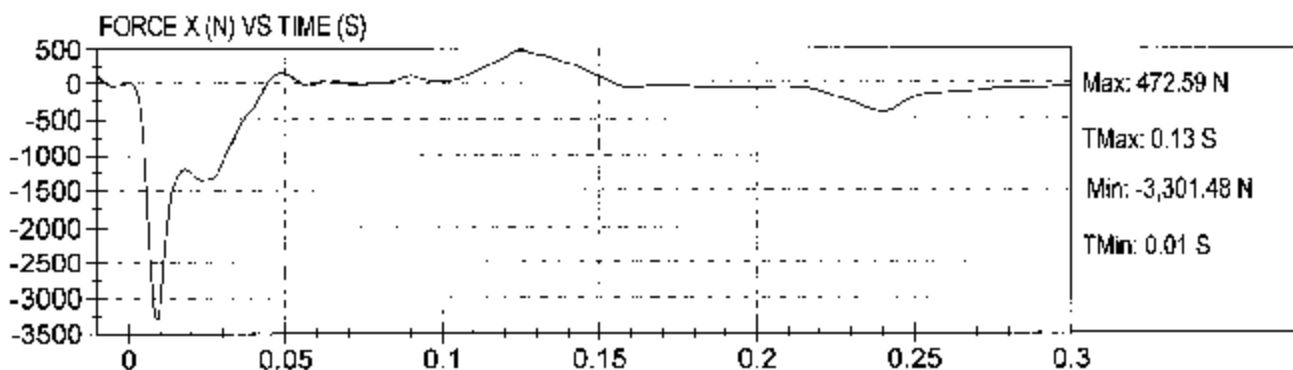
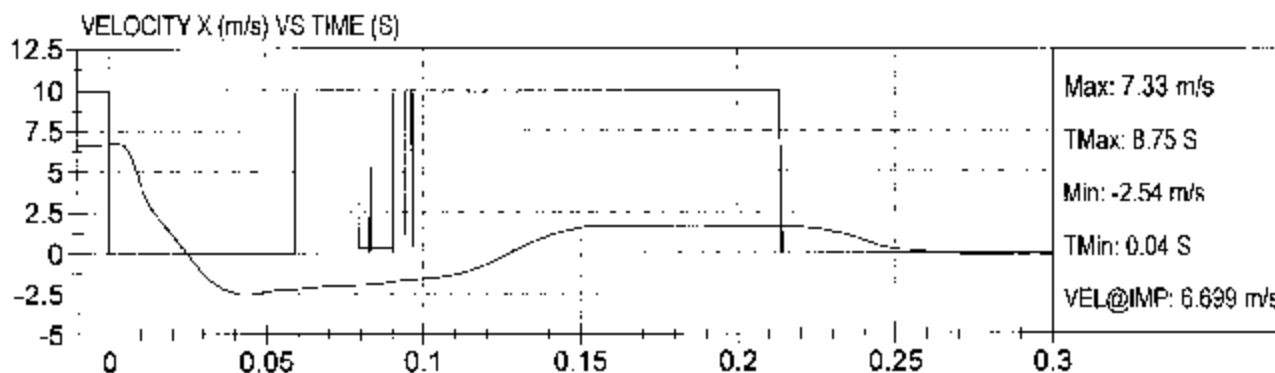
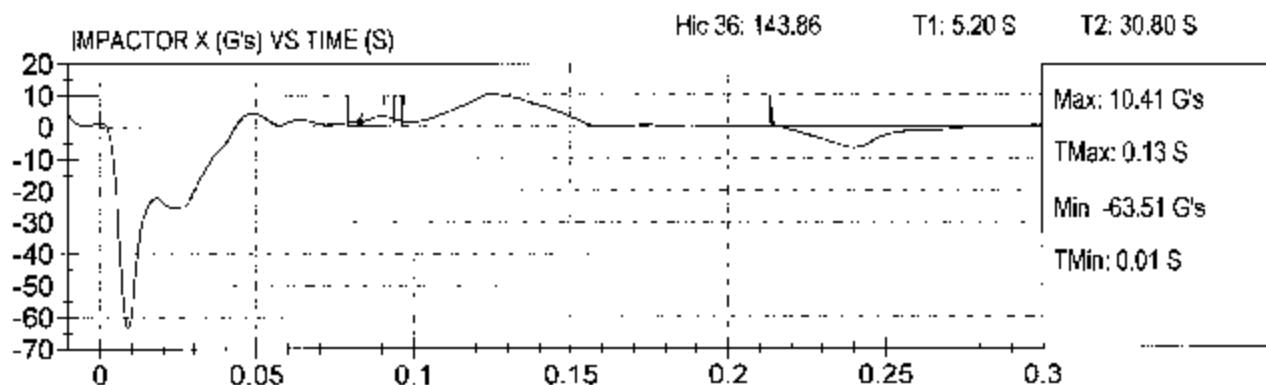
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)

Test Date: 3/31/03

Vehicle: BLUE BIRD ALL AMERICAN

Location: H8

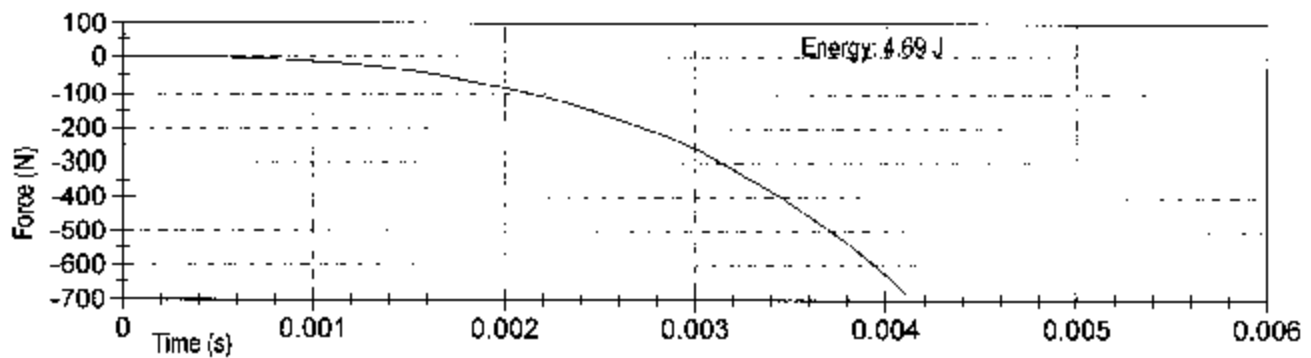
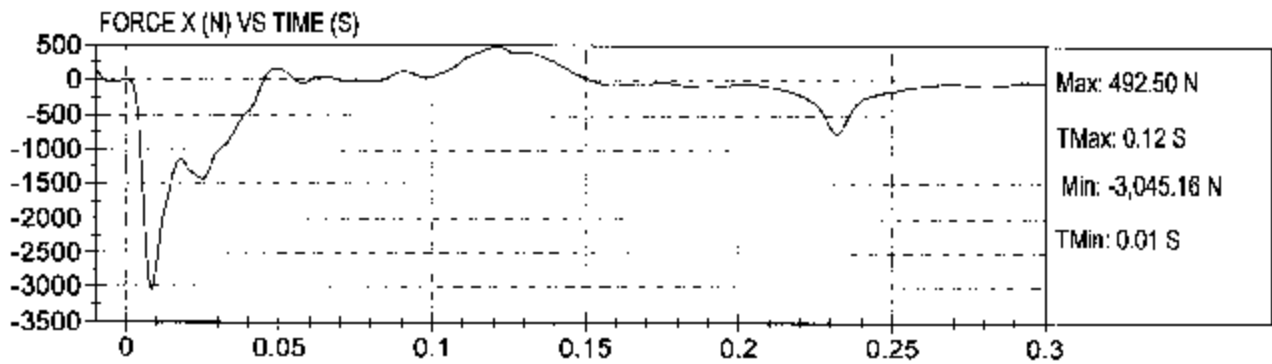
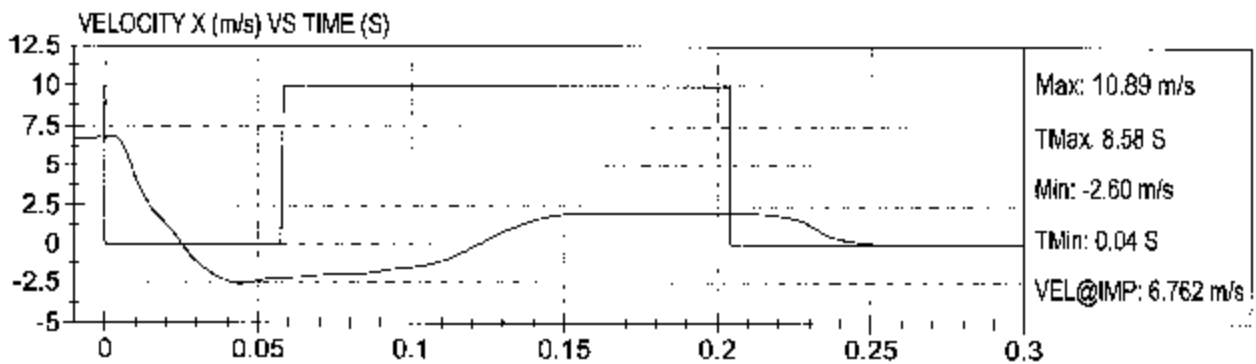
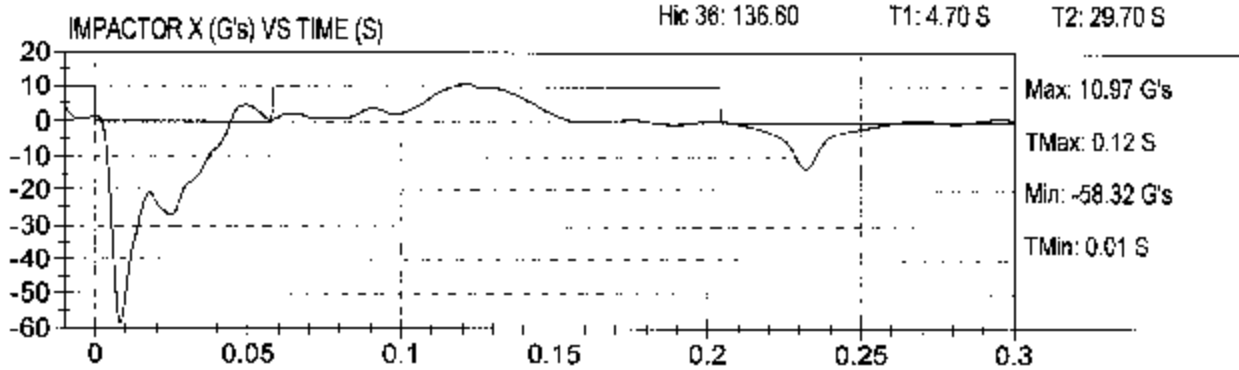
NHTSA #: C3C900





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: BLUE BIRD ALL AMERICAN
NHTSA #: C30900

Test Date: 4/21/03
Location: H9





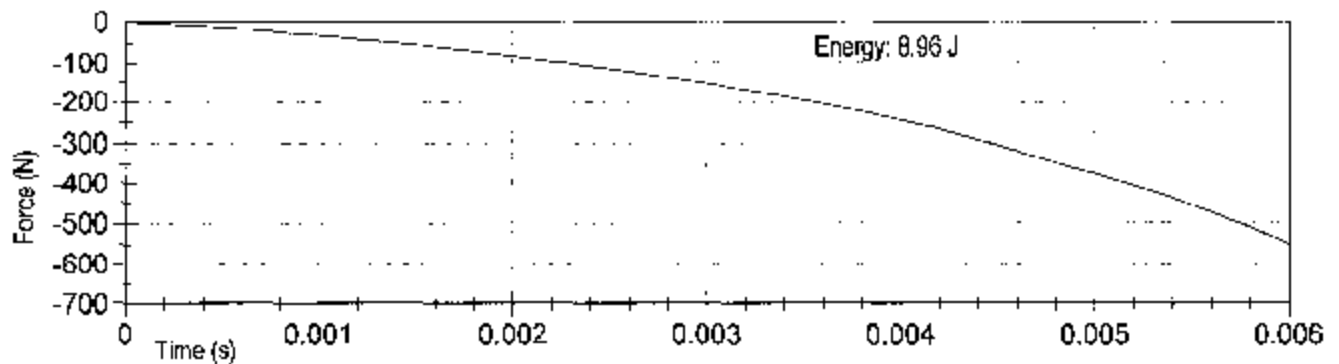
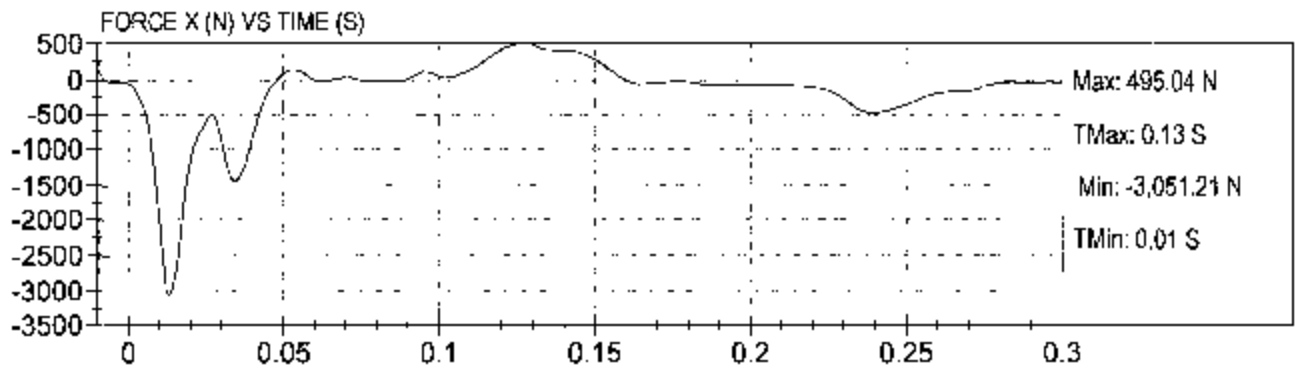
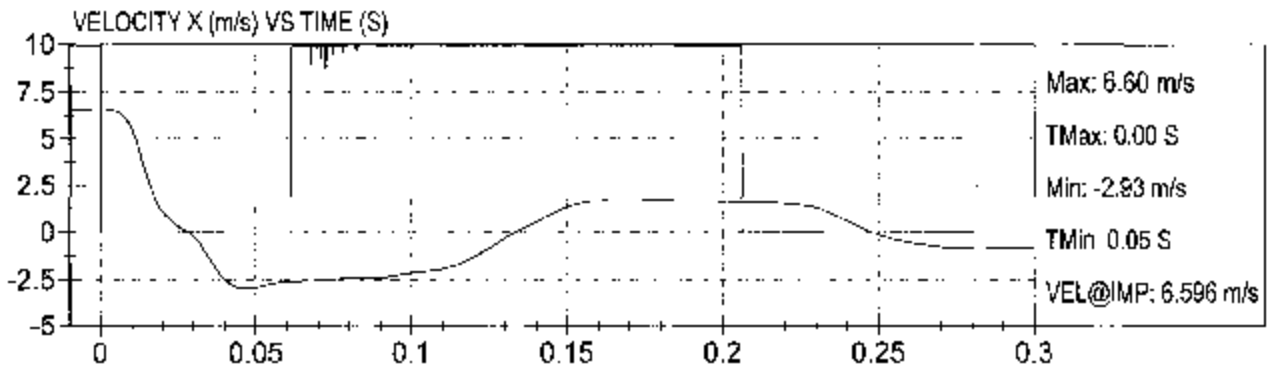
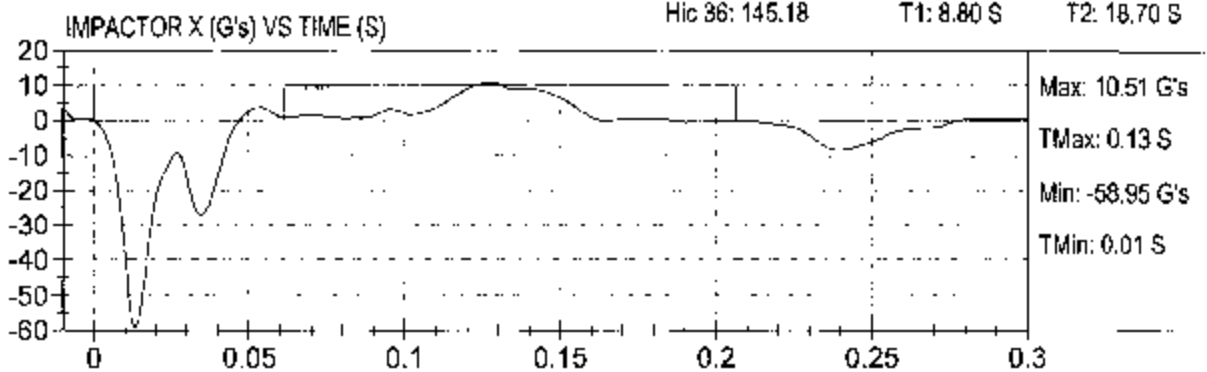
FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)

Vehicle: BLUE BIRD ALL AMERICAN

NHTSA #: C30900

Test Date: 4/21/03

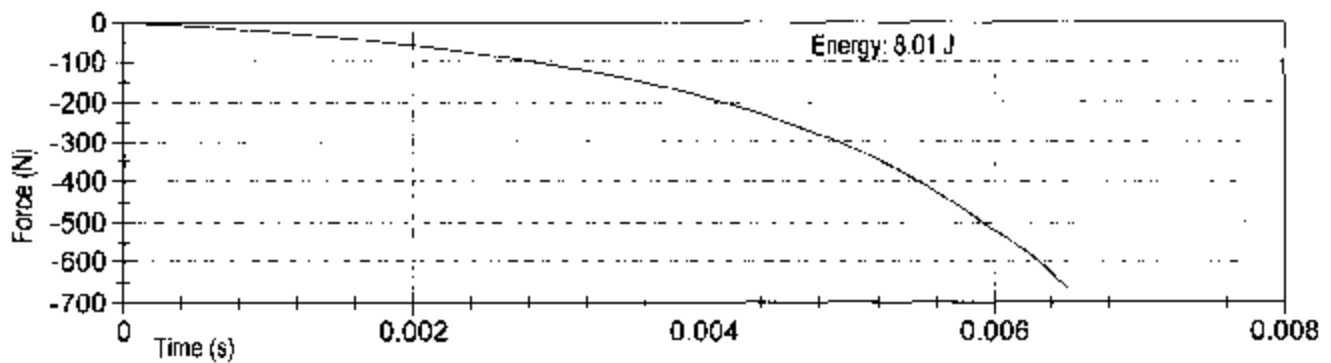
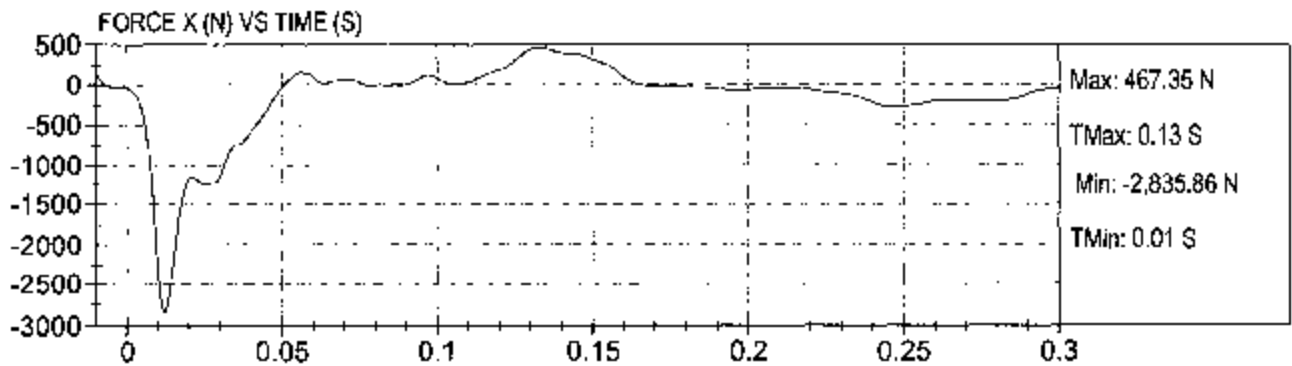
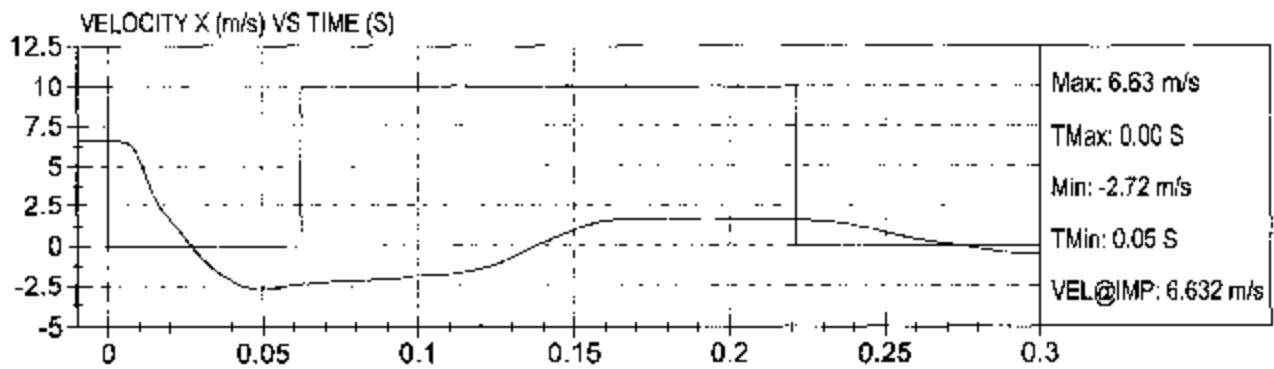
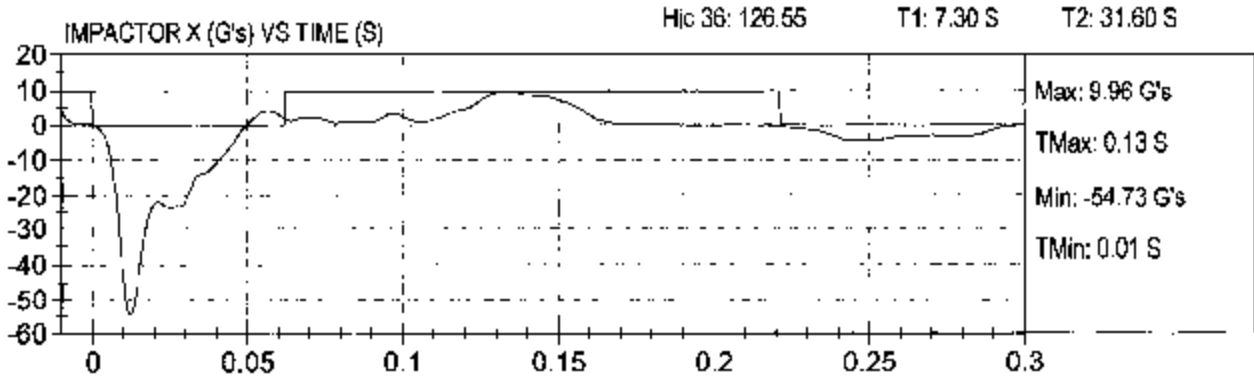
Location: H10





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: BLUE BIRD ALL AMERICAN
NHTSA #: C30900

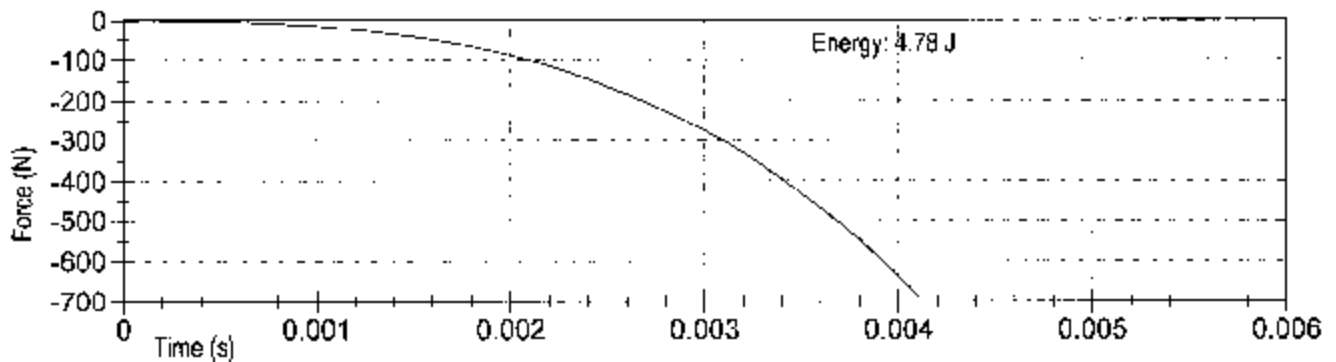
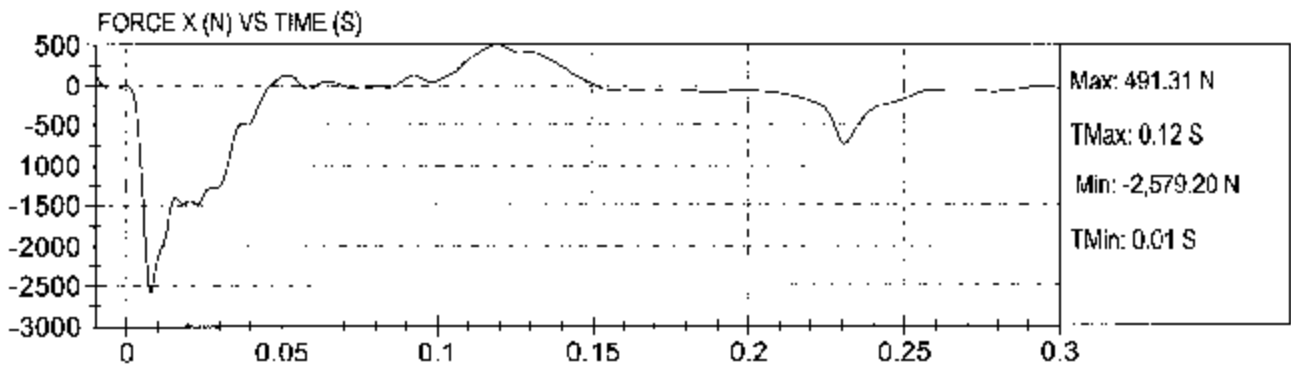
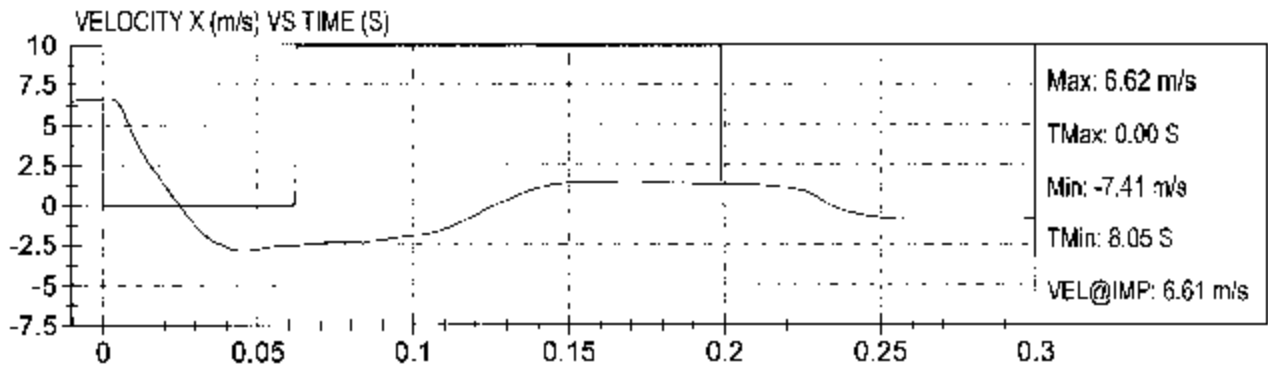
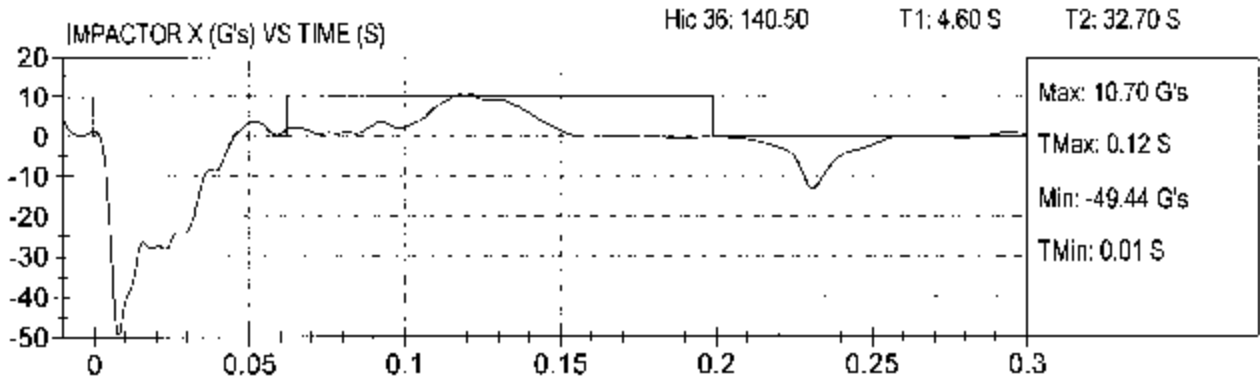
Test Date: 4/21/03
Location: H11





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: BLUE BIRD ALL AMERICAN
NHTSA #: C30900

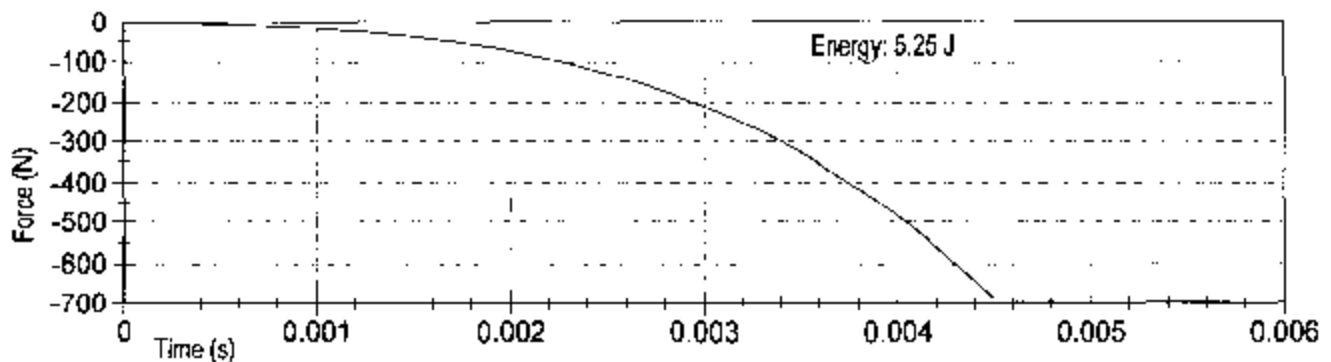
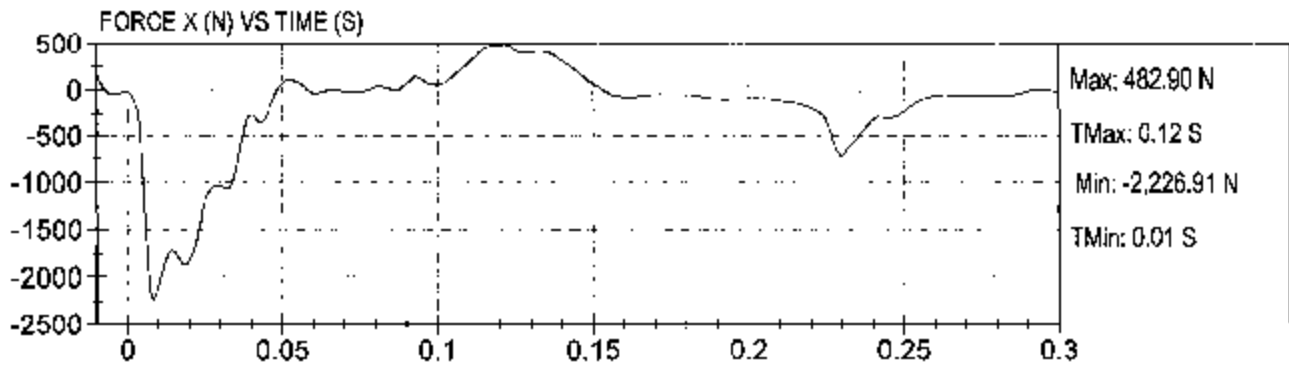
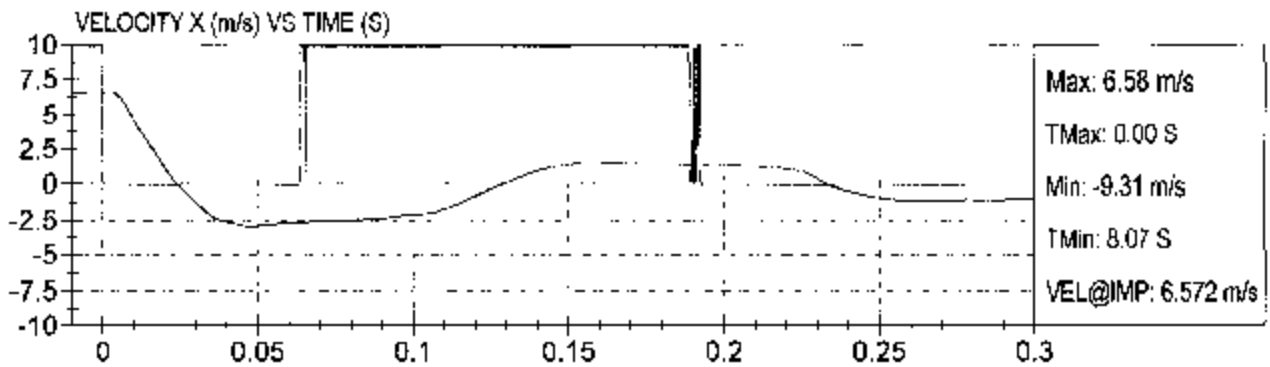
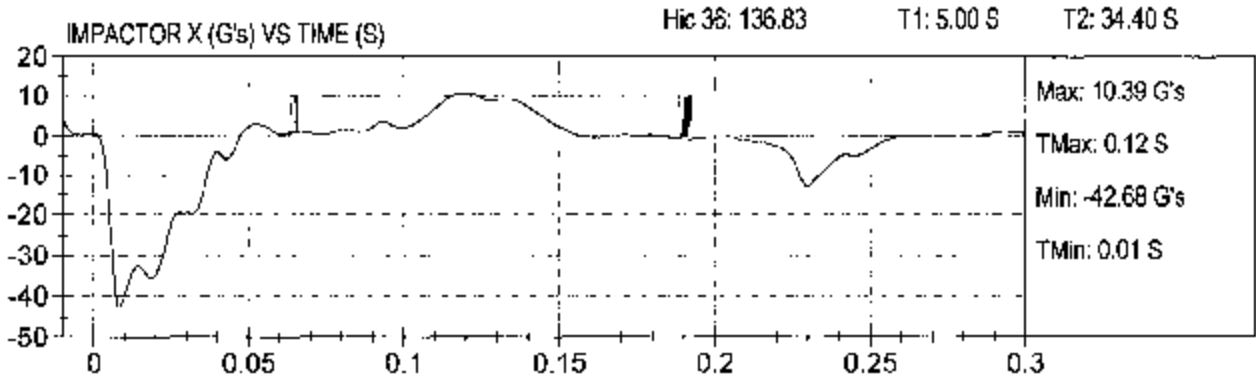
Test Date: 4/21/03
Location: H12





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: BLUE BIRD ALL AMERICAN
NHTSA #: C30900

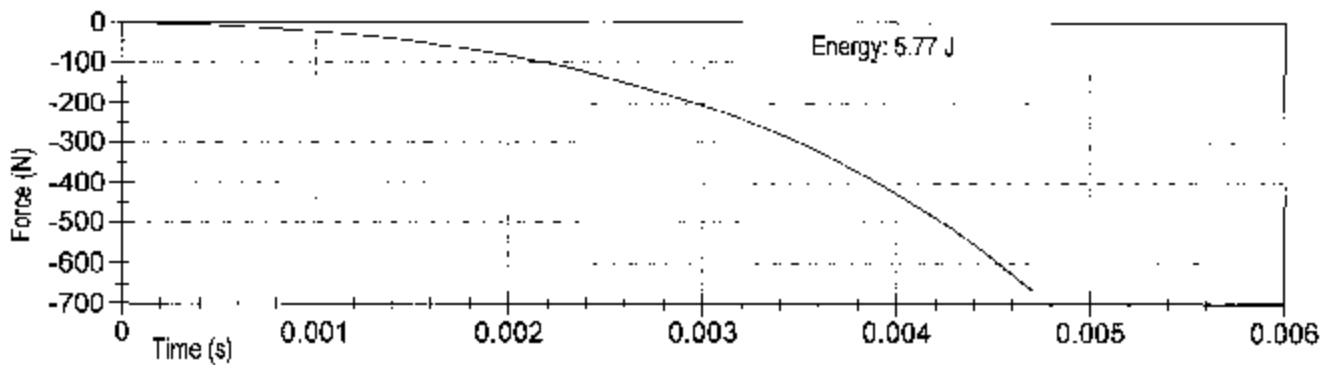
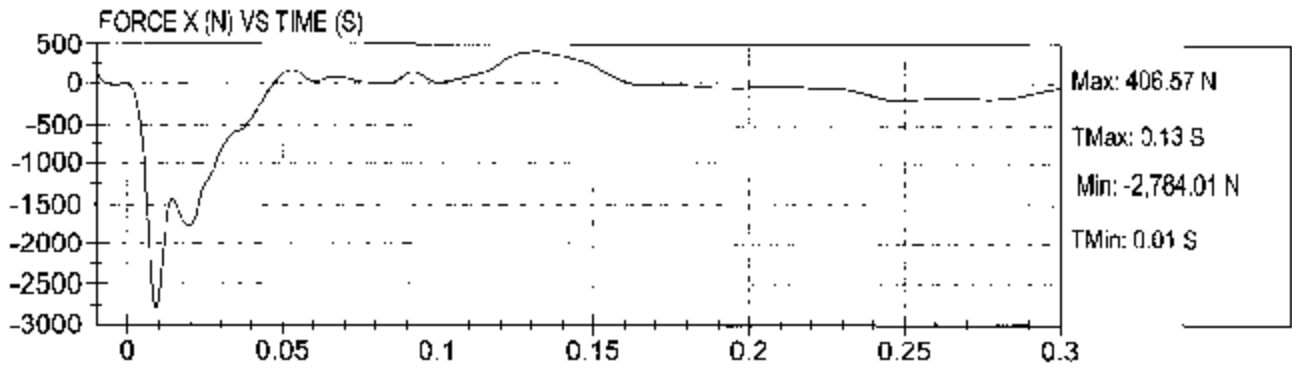
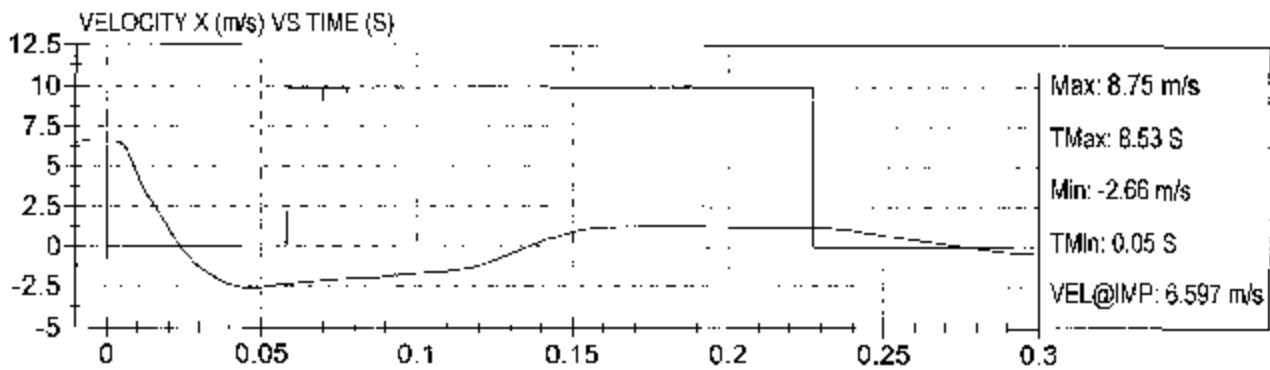
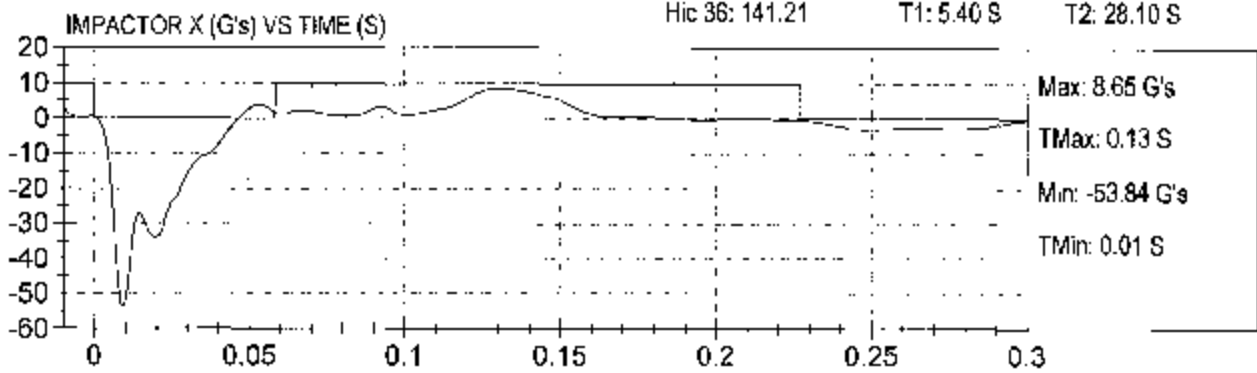
Test Date: 4/21/03
Location: H13





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)
Vehicle: BLUE BIRD ALL AMERICAN
NHTSA #: C30900

Test Date: 4/21/03
Location: H14





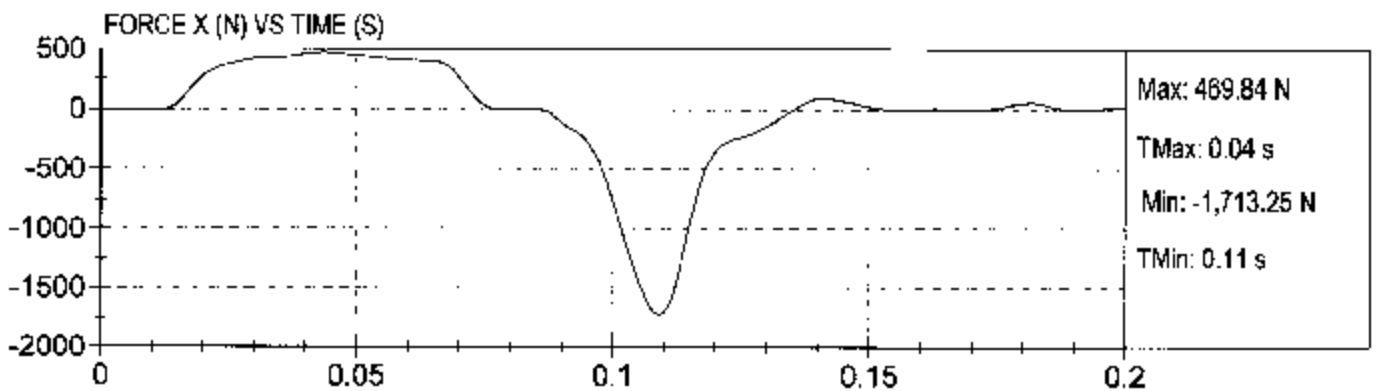
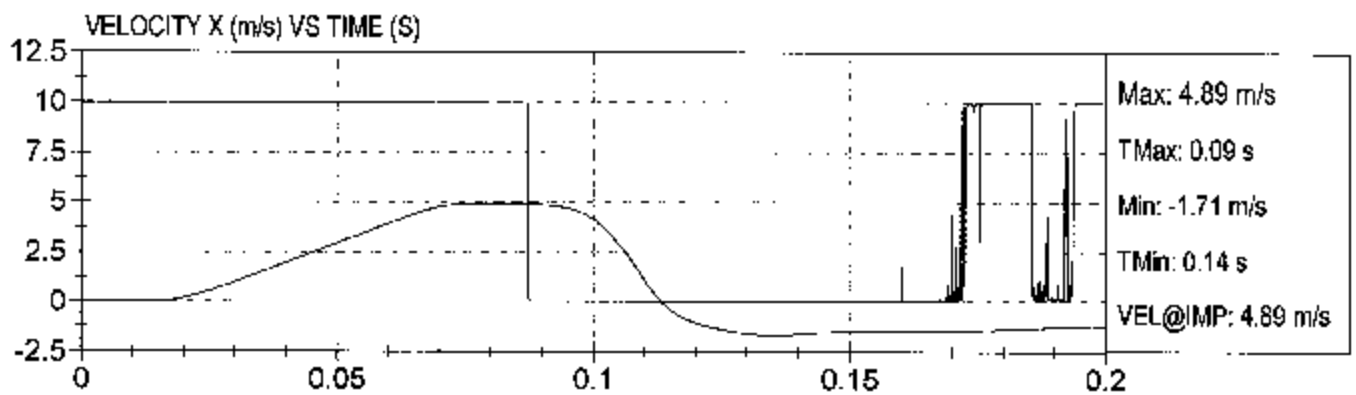
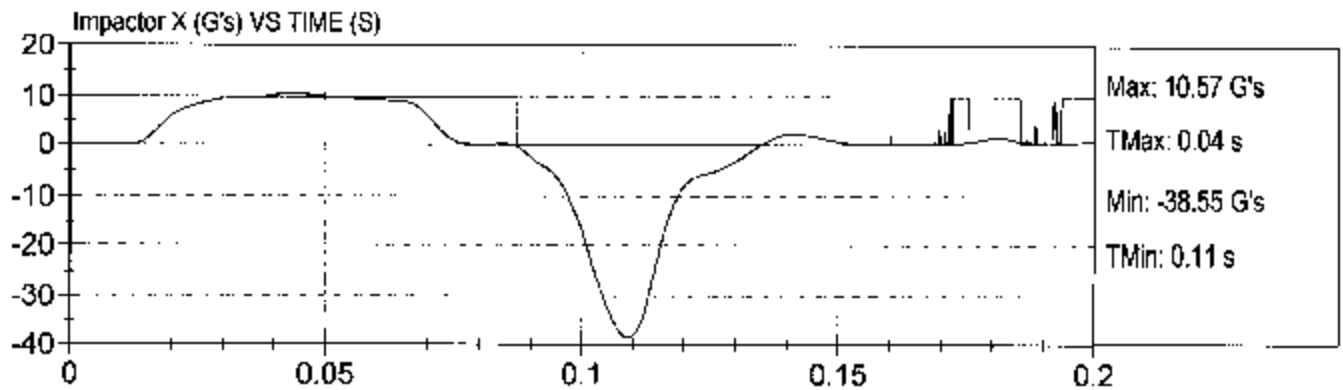
FMVSS 222 KNEE FORM IMPACTS

Vehicle: Blue Bird All American

NHTSA #: C30900

Test Date: 3/27/03

Location: K1

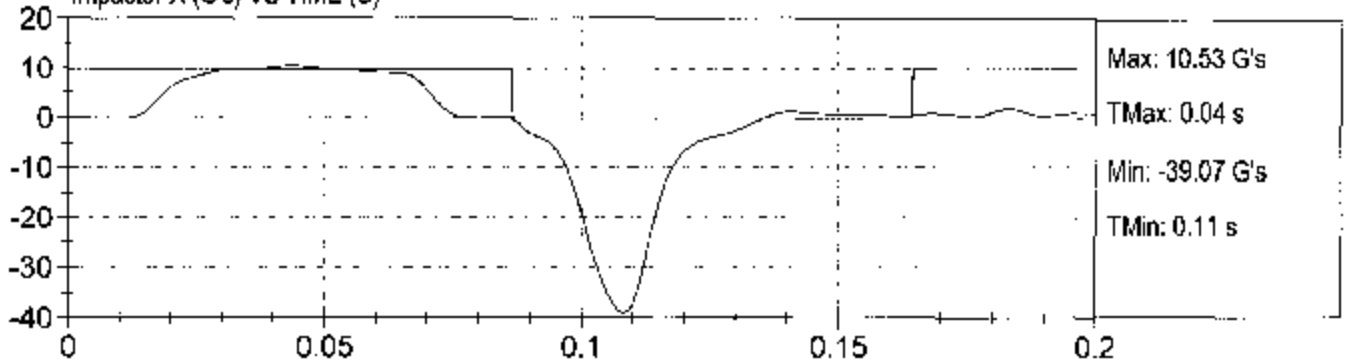




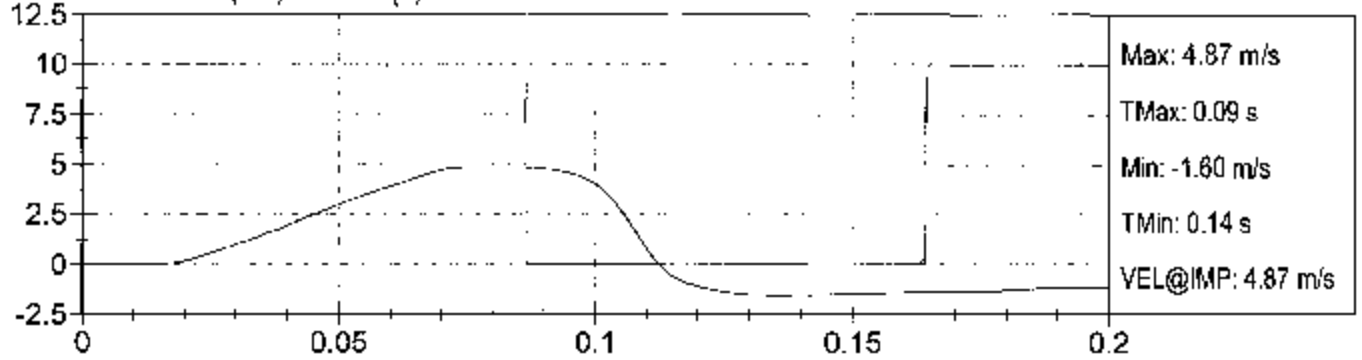
FMVSS 222 KNEE FORM IMPACTS
Vehicle: Blue Bird All American
NHTSA #: C30900

Test Date: 3/27/03
Location: K2

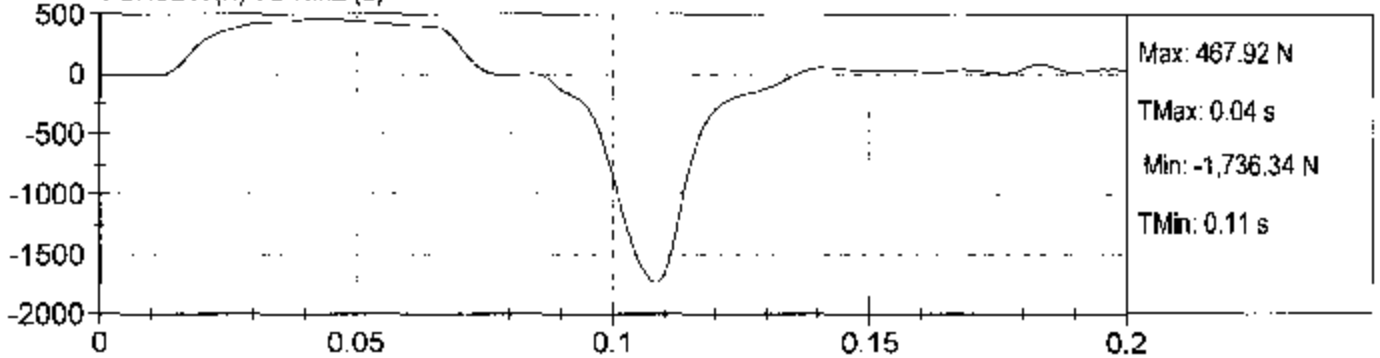
Impactor X (G's) VS TIME (S)



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



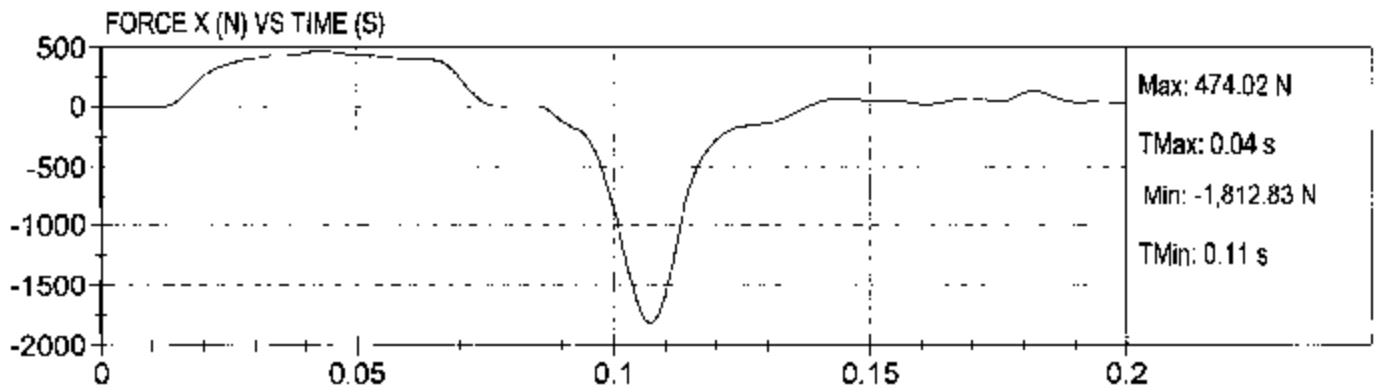
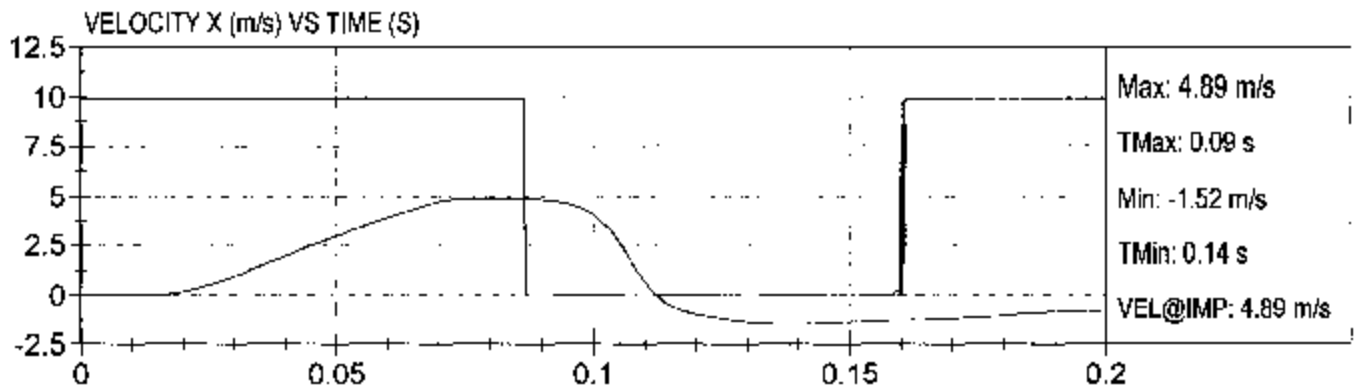
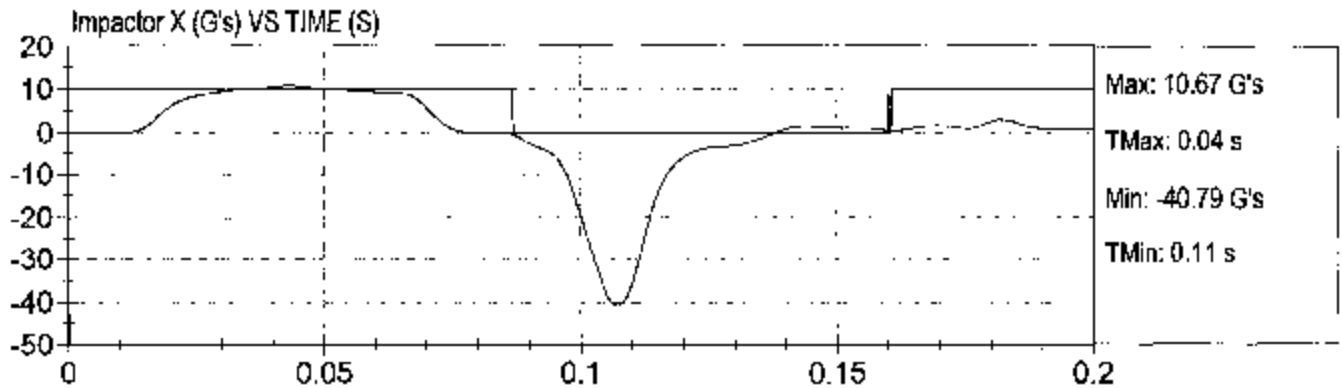
FORCE X (N) VS TIME (S)





FMVSS 222 KNEE FORM IMPACTS
Vehicle: Blue Bird All American
NHTSA #: C30900

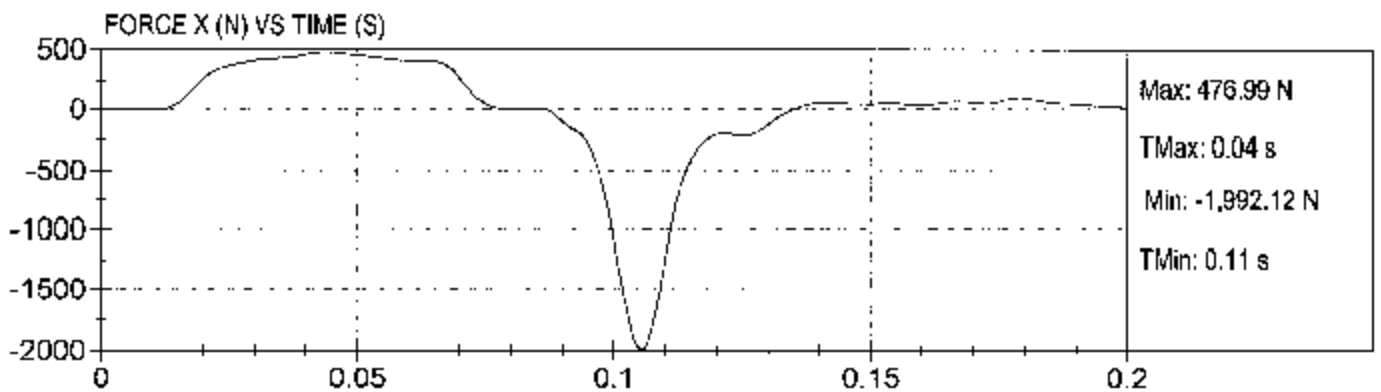
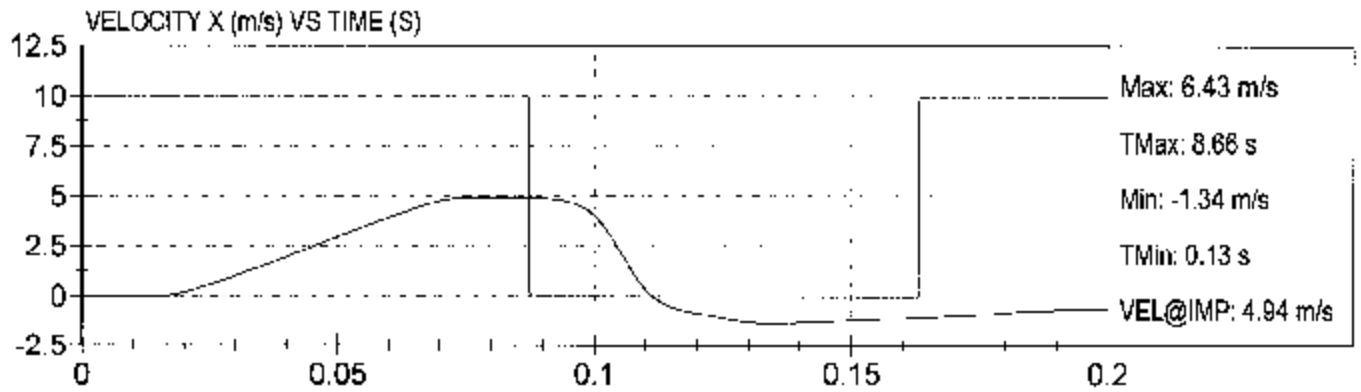
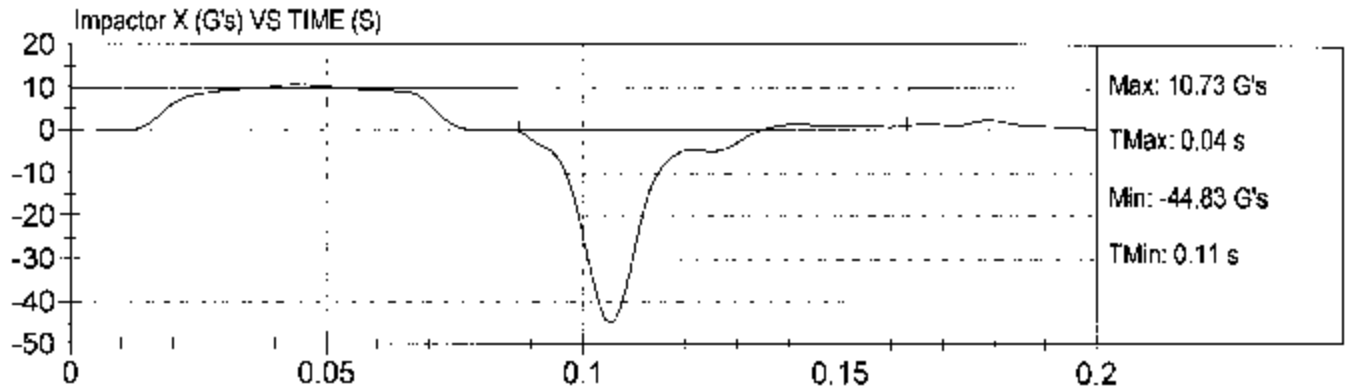
Test Date: 3/27/03
Location: K3





FMVSS 222 KNEE FORM IMPACTS
Vehicle: Blue Bird All American
NHTSA #: C30900

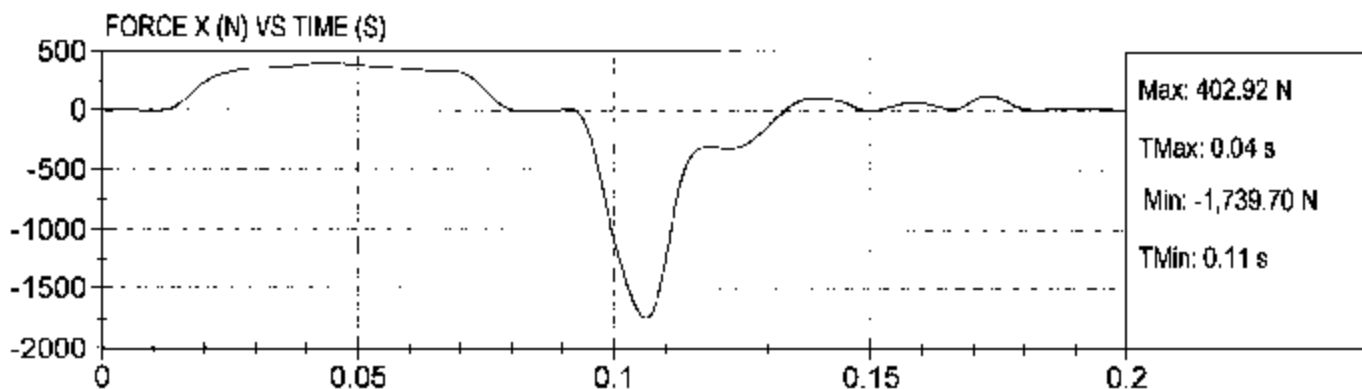
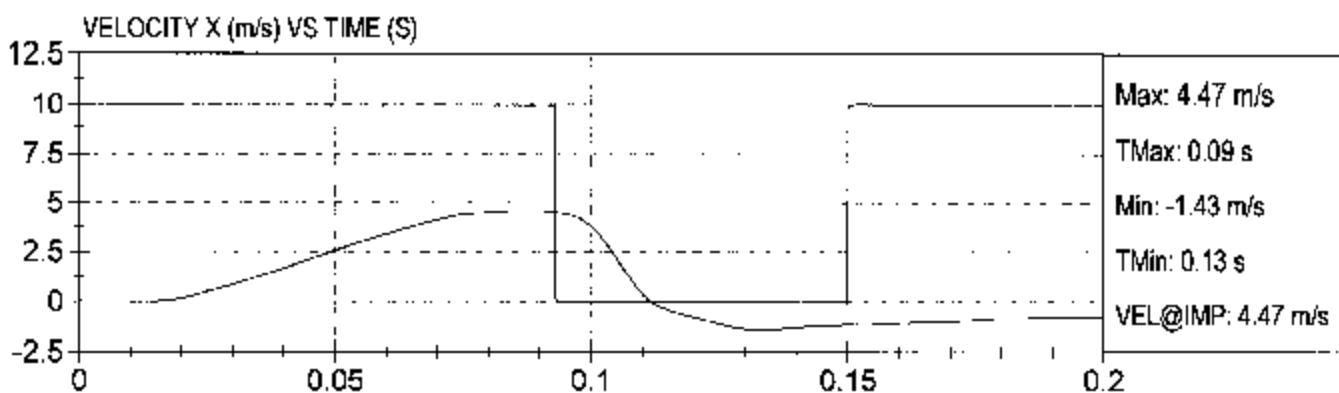
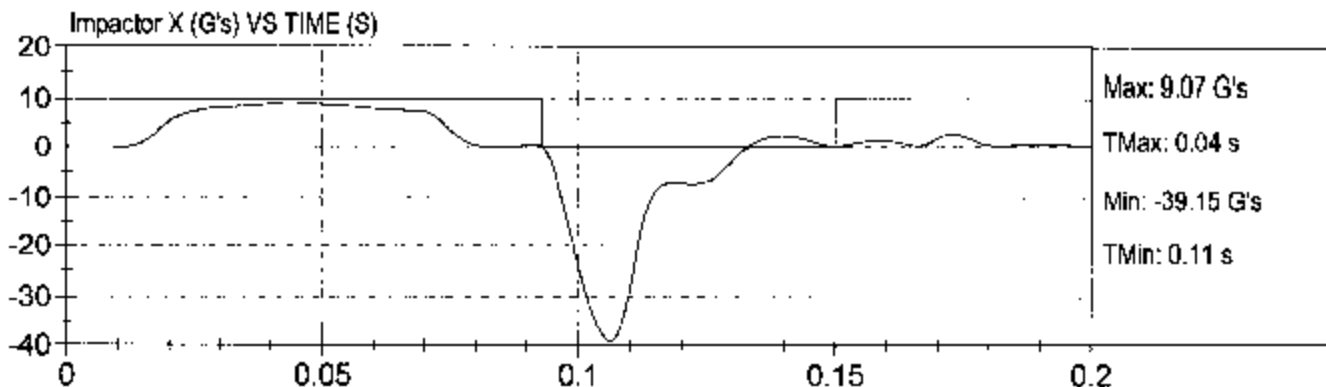
Test Date: 3/27/03
Location: K4





FMVSS 222 KNEE FORM IMPACTS
Vehicle: Blue Bird All American
NHTSA #: C30900

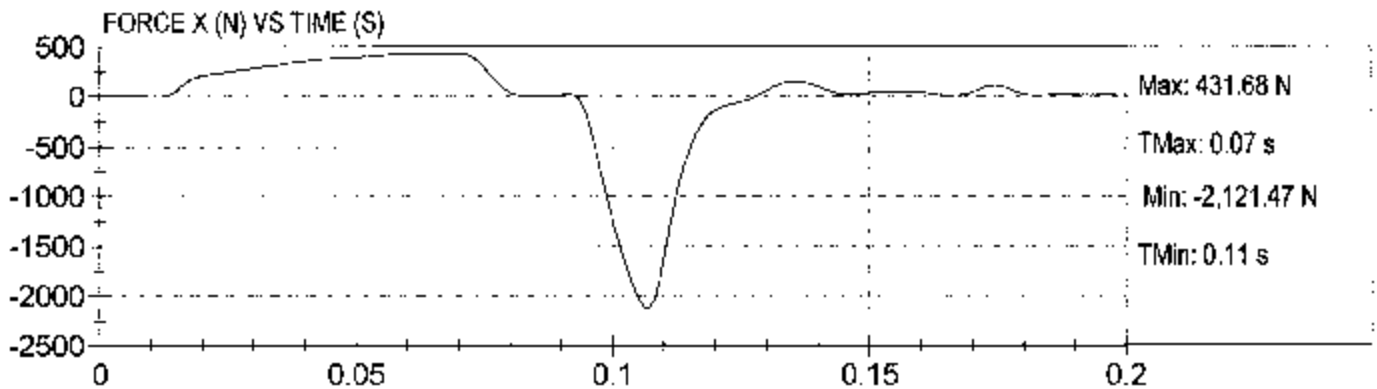
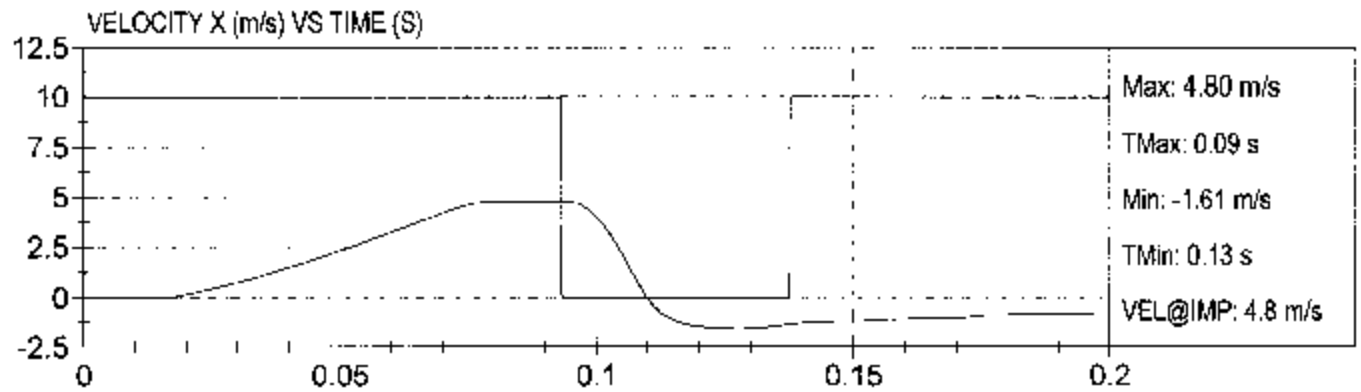
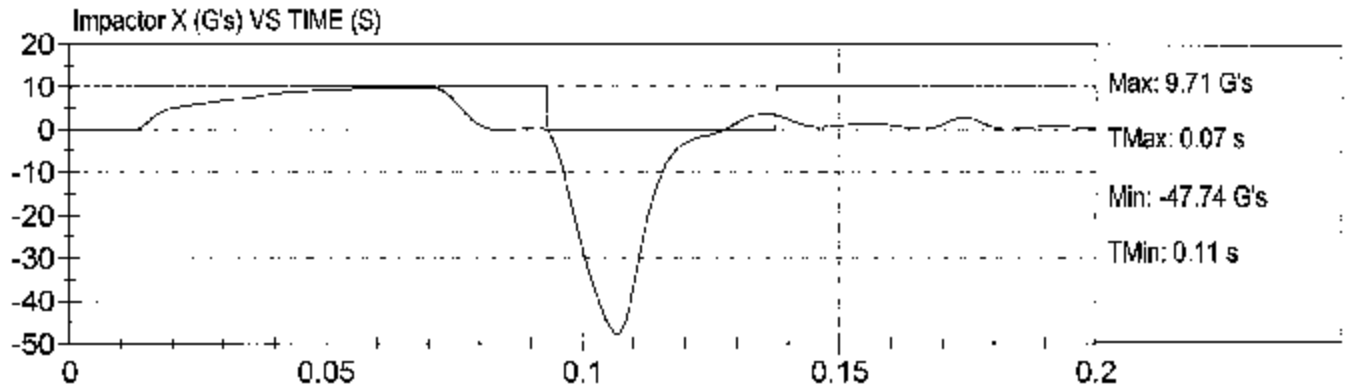
Test Date: 3/27/03
Location: K5





FMVSS 222 KNEE FORM IMPACTS
Vehicle: Blue Bird All American
NHTSA #: C30900

Test Date: 3/27/03
Location: K8

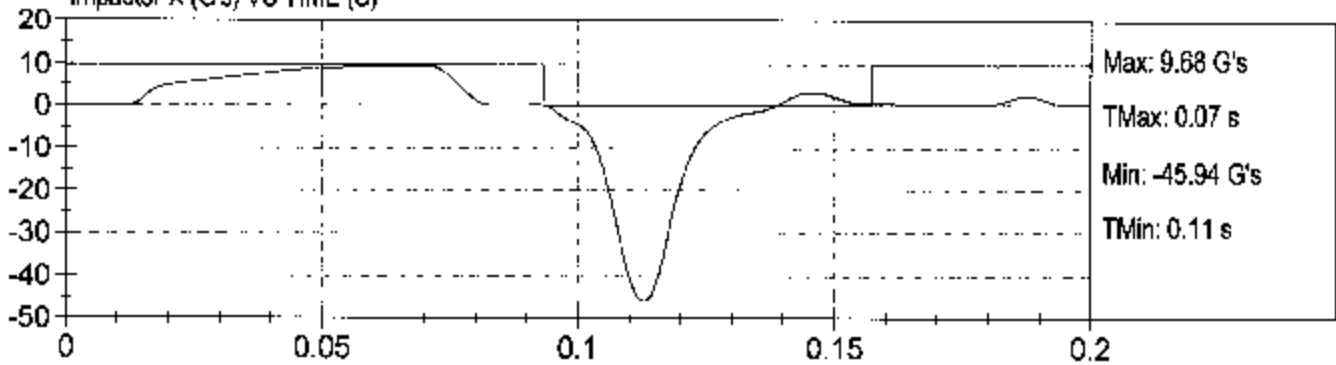




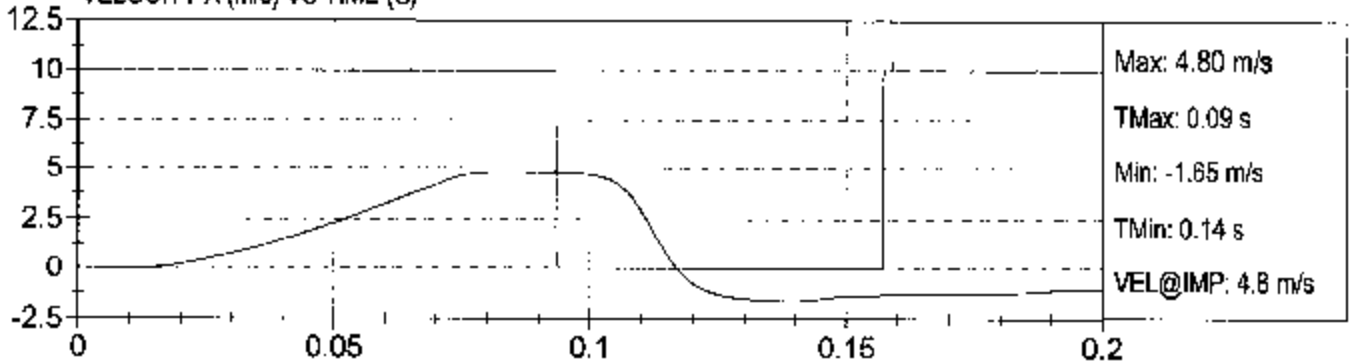
FMVSS 222 KNEE FORM IMPACTS
Vehicle: Blue Bird All American
NHTSA #: C30900

Test Date: 3/27/03
Location: K7

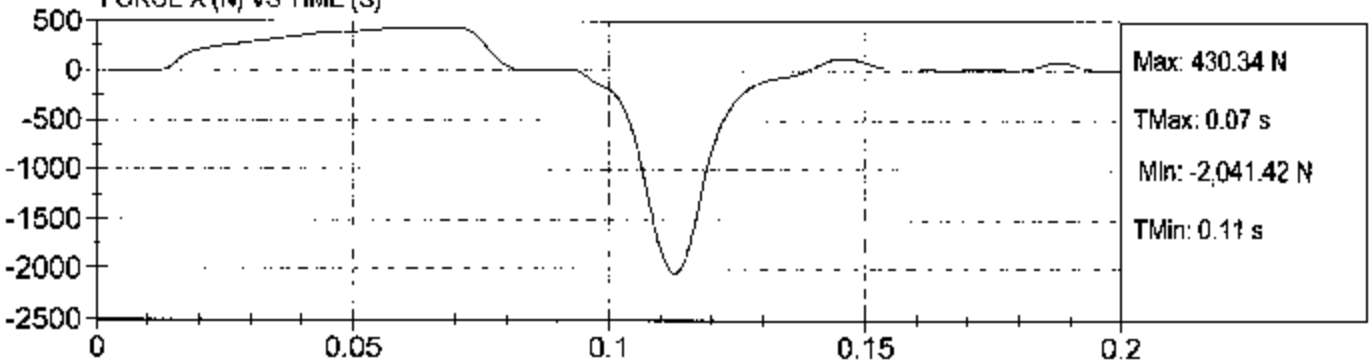
Impactor X (G's) VS TIME (S)



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



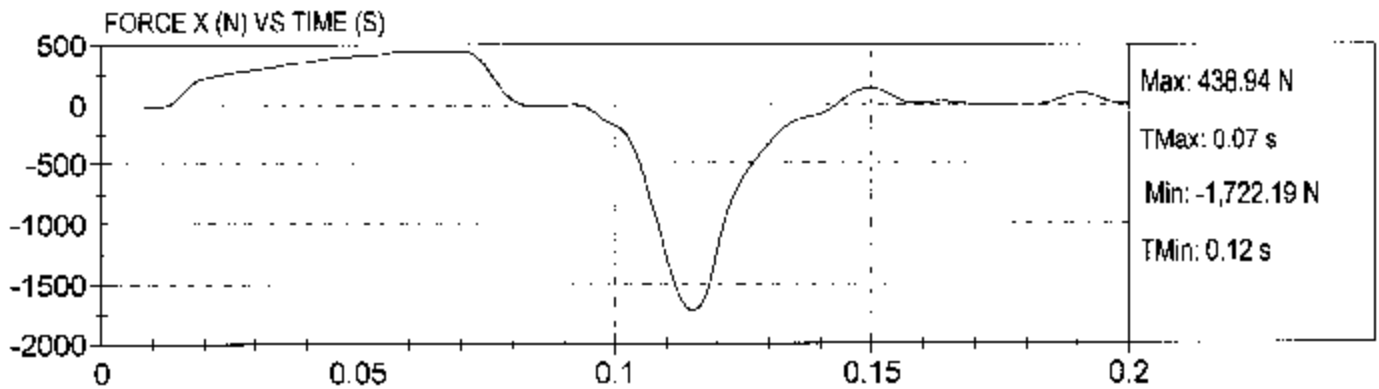
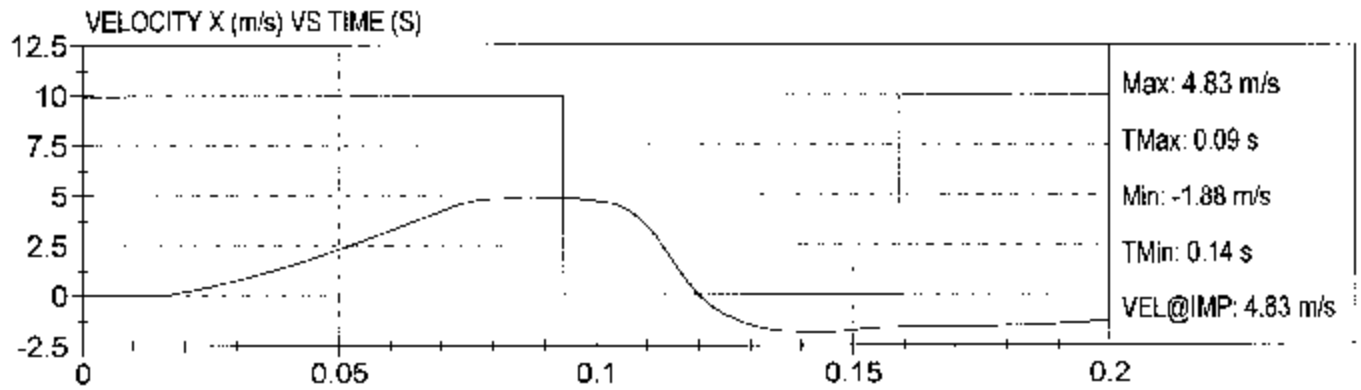
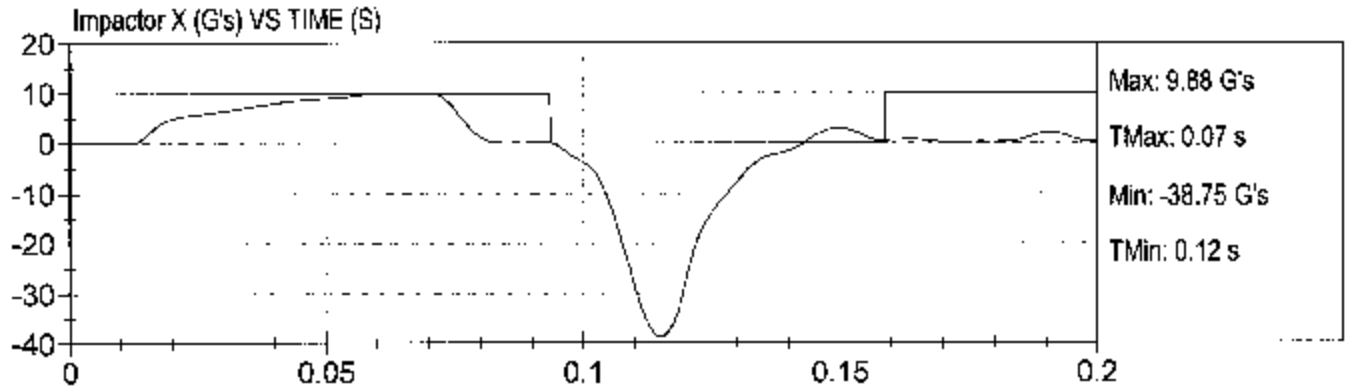
FORCE X (N) VS TIME (S)





FMVSS 222 KNEE FORM IMPACTS
Vehicle: Blue Bird All American
NHTSA #: C30900

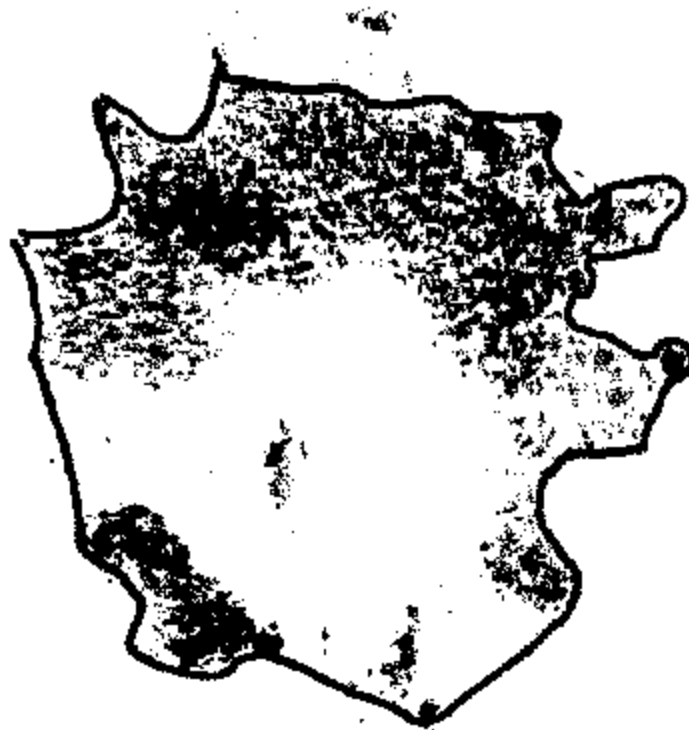
Test Date: 3/27/03
Location: K8



**SECTION 7
WELT CONTACT POINTS**

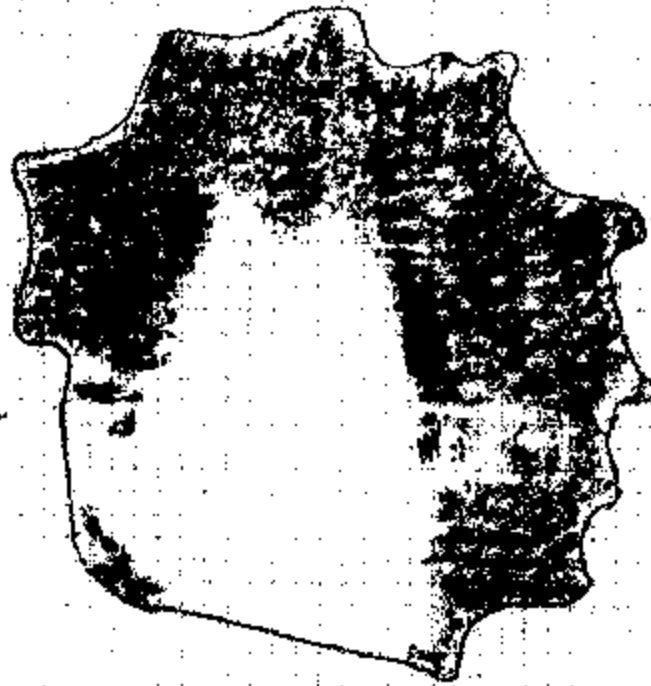
Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

H1 / Seat S7



Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

H2 / Seat S7



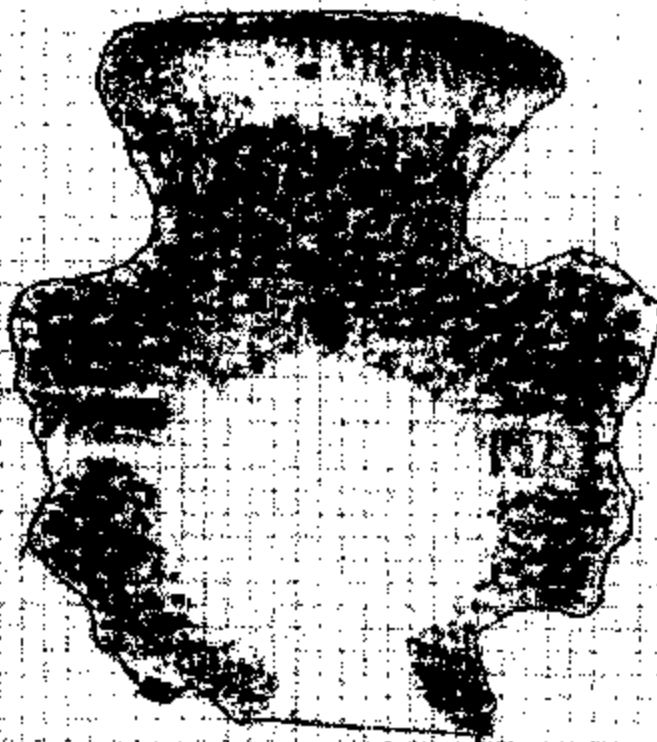
Test Vehicle:	2003 Blue Bird All American School Bus	
Procedure:	FMVSS 222	NHTSA No.: C30900

H3 / Seat S7



Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

H4 / Seat S7



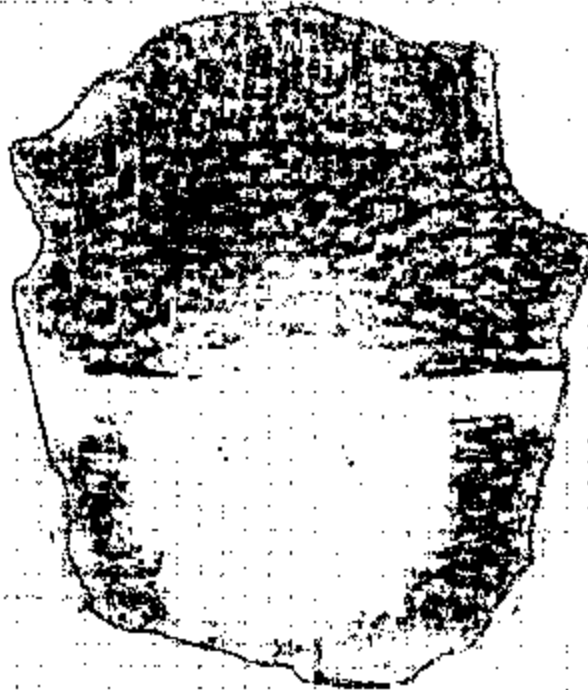
Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

H5 / Seat S7



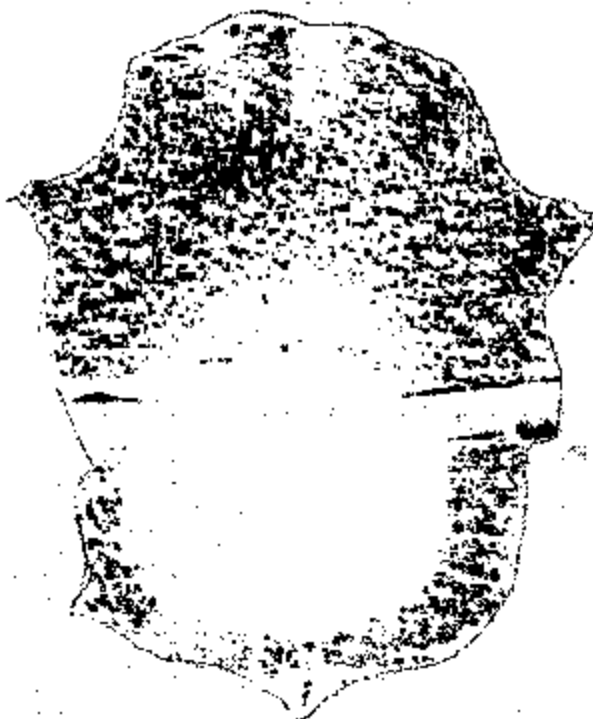
Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

H6 / Seat S7



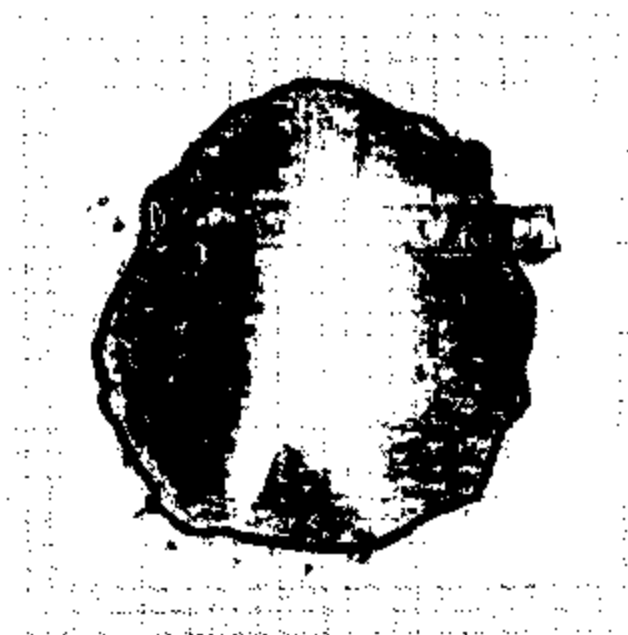
Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

H7 / Seat S7



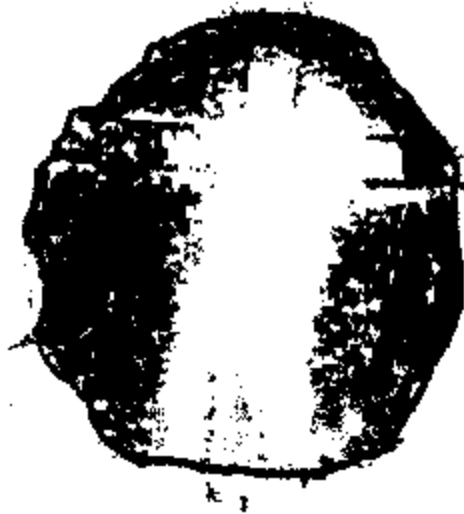
Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

K1 / Seat S7



Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

K2 / Seat S7



Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

K3 / Seat S7



Test Vehicle:	2003 Blue Bird All American School Bus		
Procedure:	FMVSS 222	NHTSA No.:	C30900

K4 / Seat S7



SECTION 8
BUS FLOOR PLAN

