638010

REPORT NUMBER: 222-MGA-05-001

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

Les Entreprises Michel Corbeil Inc.
2004 Corbeil 30 Passenger School Bus
NHTSA No. C40902

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

Final Report Date: August 30, 2005

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Prepared by: _____ Date: August 30, 2005
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FINAL REPORT ACCEPTED BY:

_____

9/2/2005
Date of Acceptance

Technical Report Documentation Page

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15. Supplementary Notes			
16. Abstract Compliance tests were conducted on the subject 2004 Corbeil 30 Passenger School Bus, NHTSA No. C40902 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: The front areas of the seat backs are not large enough in comparison to the seat benches to meet the requirement of FMVSS 222 Paragraph S5.1.2. The projected perimeter of both seats S1 and S10 do not fall completely within the perimeter of B1 and B10 restraining barriers as required in FMVSS 222 Paragraph S5.2.2.			
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PURPOSE OF COMPLIANCE TEST

Tests were conducted on a MY2004 Corbeil 30 Passenger School Bus, NHTSA No. C40902, 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 February through April 2005. The test vehicle, MY2004 Corbell 30 Passenger School Bus NHTSA No. C40902, did not appear to meet the requirements of FMVSS 222. Test failures are listed below. All of the tests were conducted by MGA Research Corporation at the Wisconsin Operations.

Test Failures:

1. The following requirement of FMVSS 222 was not met because the front areas of the seat backs are not large enough in comparison to the seat benches.

Paragraph S5.1.2: "Seat back height and surface area. Each school bus passenger seat shall be equipped with a seat back that, in the front projected view, has a front surface area above the horizontal plane that passes through the seating reference point, and below the horizontal plane 508 mm above the seating reference point, of not less than 90 percent of the seat bench width in millimeters multiplied by 508.

2. The following requirement of FMVSS 222 was not met because the projected perimeter of both seats S1 and S10 do not fall completely within the perimeter of B1 and B10 restraining barriers.

Paragraph S5.2.2: "Barrier position and rear surface area. The position and rear surface area of the restraining barrier shall be such that, in a front projected view of the bus, each point of the barrier's perimeter coincides with or lies outside of the perimeter of the seat back of the seat for which it is required."

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, 3, and 5 were measured in accordance with Section 12.1 of OVSC TP-222-03. As shown in Data Sheet 2 for Seat Nos: 1, 3, and 5, the seat back area is not 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 10 were measured in accordance with OVSC TP-222-03. As shown in Data Sheet 6 for Barrier No. 1, the surface area of the barrier is not equal to or greater than the seat back to the rear of the barrier.

SEAT CUSHION RETENTION

Seat Nos. 2 and 6 were tested in accordance with Section 12.3 of OVSC TP-222-03. Seat cushion weight was 4.08 kg. The maximum forces for Seat Cushion Nos. 2 and 6 were 205 N and 198 N. The lower time limit boundary (t1) was approximately 3 seconds with 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. 6.

SECTION 2 (CONTINUED)
TEST DATA SUMMARY

SEAT BACK FORCE/DEFLECTION TEST - FORWARD

Seat Nos. 8 and 9 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 996 mm. "W" was calculated to be 2.6 and rounded to the nearest whole number (3). The seating reference point (SRP) was 512 mm above the bus floor. The deflection of the seat back at conclusion of lower loading bar loading at 1557W N position was 77.6 mm on Seat No. 8 and 70.7 mm on Seat No. 9. 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 408 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 1408 joules for Seat No. 8 and 1457 joules for Seat No. 9. 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., 8 and 9 met the force deflection forward requirements. See Plot No. 3 and 4 for Seat No. 8 and Plot No. 5 and 6 for Seat No. 9.

SEAT BACK FORCE/DEFLECTION TEST - REARWARD

Seat Nos. 3 and 4 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. 3 and 992 mm for Seat No. 4. "W" was calculated to be 2.6 and rounded to the nearest whole number (3). The seating reference point (SRP) was 512 mm above the bus floor. The allowable maximum deflection without moving the seat back to within 102 mm of another seat or restraining barrier was 254 mm. The stroke rate of the upper loading bar was determined by the test engineer to be 14.4 mm/sec for Seat Nos. 3 and 4. The location of the loading bar was 343 mm above the SRP for both Seat Nos. 3 and 4. 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 1031 joules for Seat No. 3 and 1029 joules for Seat No. 4. 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. 3 and 4. See Plots 7 and 8.

RESTRAINING BARRIER FORCE/DEFLECTION TEST - FORWARD

Both front restraining barriers (B1, and B10) were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width of the aft seats was determined to be 985 mm for B1, and 990 for B10. "W" was calculated to be 2.6 and rounded to the nearest whole number (3). The SRP was 512 mm above the bus floor. The lower loading bar was 512 mm above the bus floor. The deflection of the restraining barrier at the conclusion of the lower loading bar loading at 1557W was 102 mm for B1 and104 mm for B10. The allowable maximum deflection without moving the restraining barriers 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 mm/sec. The location of the upper loading bar was 406 mm above the SRP. The tests were stopped when the maximum deflection of 356 mm was reached. The area under the force versus deflection curve of the upper loading bar was 1878 for B1 and 1567 joules for B10. 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 curves for the upper loading bar on both barriers does comply with the requirements for the area under the force versus deflection curve.

HEAD FORM IMPACT ZONE TESTS

Seat No. 10 was tested in accordance with Section 12.6 of OVSC TP-222-03. The mass of the head form was 5.21 kg. All head form contact area and impact energy criteria were met for the seat.

SECTION 2 (CONTINUED)
TEST DATA SUMMARY

KNEE FORM IMPACT ZONE TESTS

Seat No. 10 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

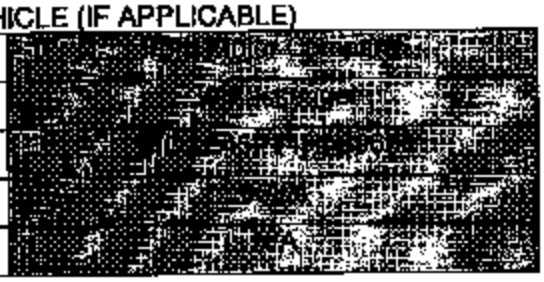
There were no wheelchair anchorages in this vehicle.

ADMINISTRATIVE DATA SHEET

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/21/05**

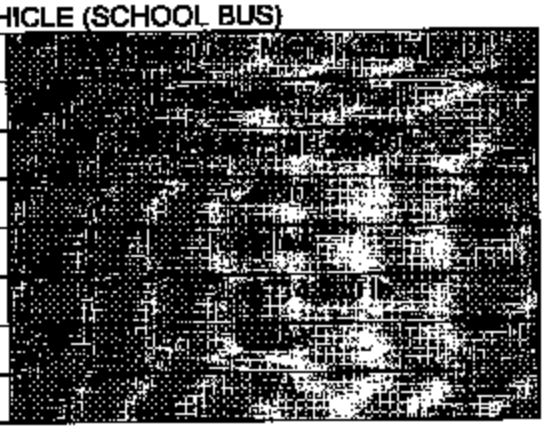
INCOMPLETE VEHICLE (IF APPLICABLE)

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



COMPLETED VEHICLE (SCHOOL BUS)

Manufacturer:	
Make/Model:	
VIN:	
NHTSA No.:	
Color:	
GVWR:	
Build Date:	
Certification Date:	



DATES

Vehicle Receipt:	
Start of Compliance Test:	
Completion of Compliance Test:	

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

Recorded By: _____

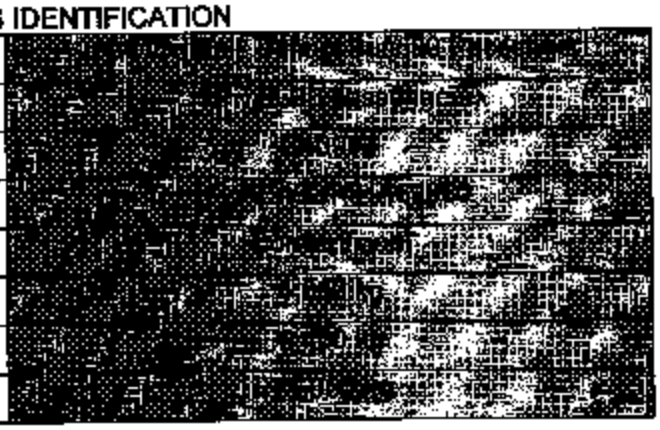
Approved By: _____ DATE: 05/11/05

GENERAL TEST DATA SHEET

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/21/05**

SCHOOL BUS IDENTIFICATION

Model Year/Mfr./Make/Model:	
Passenger Capacity:	
NHTSA No.:	
VIN:	
Conventional or Forward Control:	
GVWR (Certification Label) FRONT:	
GVWR (Certification Label) REAR:	
GVWR (Certification Label) TOTAL:	

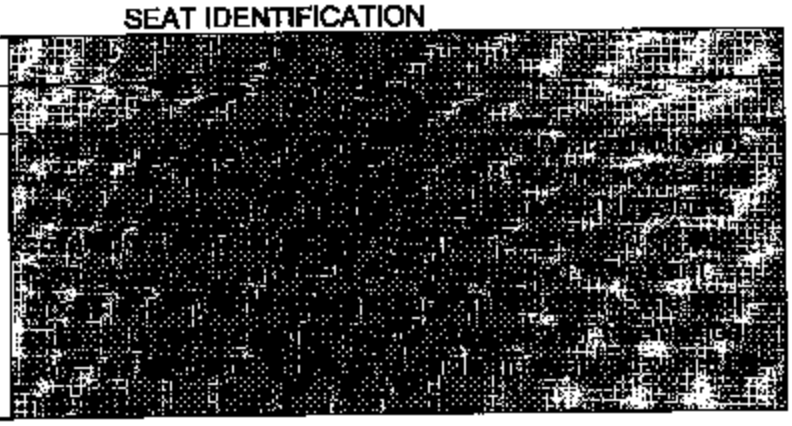


TEST CONDITIONS

Date(s) of Test:	
Ambient Temperature (°C):	
Required Temperature Range:	

SEAT IDENTIFICATION

Seat Manufacturer:	
Model Name & Number:	
Description of Seats:	



SECTION 3
COMPLIANCE TEST DATA

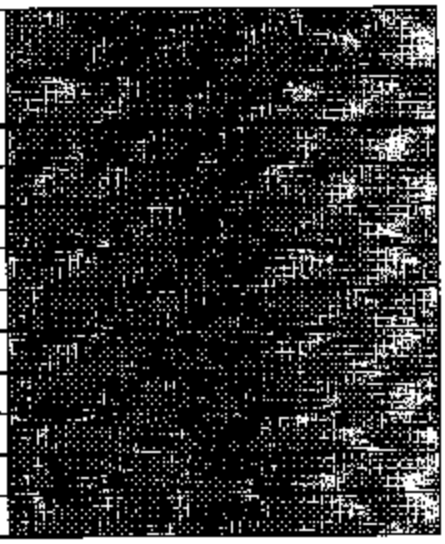
The following data sheets document the results of testing on the MY2004 Corbeil 30 Passenger School Bus, NHTSA No. C40902.

DATA SHEET 1

SEAT TO SEAT/BARRIER SPACING

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/21/05**

SEAT NUMBER	MEASUREMENT OF SPACING FROM SRP FORWARD TO SEAT/BARIER (mm)
1	540
2	537
3	540
4	537
5	539
6	541
7	538
8	530
9	542
10	527



Comments: NONE

Recorded By: _____

Approved By: _____ DATE: 05/11/05

DATA SHEET 2

SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40602**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/21/05**

SEAT NUMBER: S5

1.	Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)	[redacted]

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 = 775 mm width, b = 955 mm radius = NR mm

   Area = ½ (a+b) x 508 mm = 439,420 mm² – NR mm² = 439,420 mm²

   (NR= Not Recorded)

3. Measure the seat cushion width - W1 = 894 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 = 454,456.8 mm²

5.	Is item 2 greater than item 4? (S5.1.2)	[redacted]

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: 02/21/05

DATA SHEET 2 (CONTINUED)

SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

SEAT NUMBER: S1

1.	Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)	[redacted]

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 = 785 mm width, b = 955 mm radius = NR mm

   Area = ½ (a+b) x 508 mm = 441,960 mm² – *NR mm² = 441,960 mm²

   (NR= Not Recorded)

3. Measure the seat cushion width - W1 = 985 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 = 450,342 mm²

5.	Is Item 2 greater than item 4? (S5.1.2)	[redacted]

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: 02/21/05

DATA SHEET 2 (CONTINUED)

SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **03/09/05**

SEAT NUMBER: S3

1.	Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)	[redacted]

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 = 782 mm width, b = 965 mm radius = NR mm

   Area = ½ (a+b) x 508 mm = 443,738 mm^2 – *NR mm^2 = 443,738 mm^2

   (NR= Not Recorded)

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 x W1 x 508 mm = 452,628 mm^2

5.	Is item 2 greater than item 4? (S5.1.2)	[redacted]

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: 03/09/05

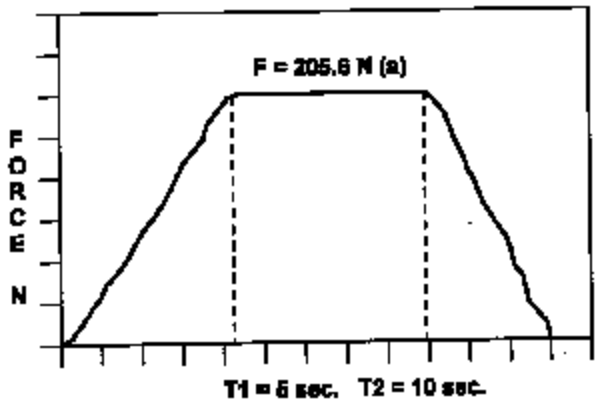
DATA SHEET 3

SEAT CUSHION RETENTION TEST

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **04/20/05**

SEAT NUMBER: S2

1. Cushion Weight/Mass = 4.08 kg
2. Cushion Weight x 5 = F = 200 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.

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

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

Comments: NONE

Recorded By: _____

Approved By: _____ DATE: 04/20/05

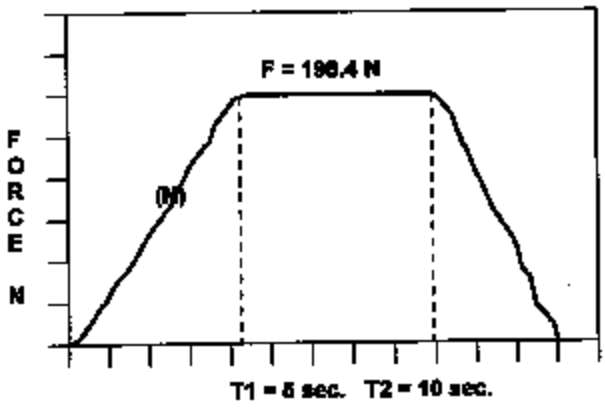
DATA SHEET 3 (CONTINUED)

SEAT CUSHION RETENTION TEST

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **04/20/05**

SEAT NUMBER: S6

1. Cushion Weight/Mass = 4.08 kg
2. Cushion Weight x 5 = F = 200 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.

4.	Did seat cushion separate from the seat structure at any attachment point? (S5.1.5)	[redacted]

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

Comments: NONE

Recorded By: _____

Approved By: _____ DATE: 04/20/05

DATA SHEET 4

SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/21/05**

SEAT NUMBER: S8

1. Seat Bench Width = 988 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): 512 mm above Floor, 128 mm forward from the Seat Back
2. 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 = 851 mm
   Seat Back width at SRP = 954 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) = 77.6 mm, at start of upper bar loading 77.6 mm, at end of upper bar loading 77.6 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 = 711 mm
   Width of seat back at 406 mm above SRP = 810 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
   ___ 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

10.	Is the seat in its final deflected position within 102 mm of the next seat or barrier?	[redacted]

11.	Does the forward force vs. deflection trace of the seat back lie within the unshaded area? (S6.1.3)	[redacted]

12. Include a deflection vs. time plot for the upper loading bar.
13. The area within the force vs. deflection curve = 1408 joules
14. 452W = 1356 joules (S5.1.3.4)

15.	Is item 14 greater than or equal to item 15? (S5.1.3.4)	[redacted]

Comments: NONE

Recorded By: _____

Approved By: _____ DATE: 02/21/05

DATA SHEET 4 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40802**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/22/05**

SEAT NUMBER: S9

1. Seat Bench Width = 996 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): 512 mm above Floor, 128 mm forward from Seat Back
2. 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 = 851 mm
   Seat Back width at SRP = 950 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) = 70.7 mm, at start of upper bar loading 70.7 mm, at end of upper bar loading 70.7 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 = 711 mm
   Width of seat back at 406 mm above SRP = 814 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
   ___ 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

10.	Is the seat in its final deflected position within 102 mm of the next seat or barrier?	[redacted]

11.	Does the forward force vs. deflection trace of the seat back lie within the unshaded area? (S5.1.3)	[redacted]

12. Include a deflection vs. time plot for the upper loading bar.
13. The area within the force vs. deflection curve = 1457 joules
14. 452W = 1356 joules (S5.1.3.4)

15.	Is item 14 greater than or equal to item 15? (S5.1.3.4)	[redacted]

Comments: NONE

Recorded By: _____

Approved By: _____ DATE: 02/22/05

DATA SHEET 5

SEAT BACK FORCE DEFLECTION TEST - REARWARD

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **03/09/05**

SEAT NUMBER: 53

1. Seat Bench Width = 990 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 = 758 mm
   Width of seat back at 343 mm above SRP = 860 mm
3. Deflection of seat back at 222 N preload = NR
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
   ___ 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.

8.	Does the force vs. deflection plot lie within the boundaries of Figure 18 (OVSC TP-222-03)?	[redacted]

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 = 1031.2 joules

DATA SHEET 5 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST – REARWARD

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

Comments: NONE

Recorded By: _____

Approved By: _____ DATE: 03/09/05

DATA SHEET 5 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST - REARWARD

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **03/09/05**

SEAT NUMBER: S4

1. Seat Bench Width = 992 mm
   W = (Seat Bench Width)/381 mm (round to nearest whole number) = (3)
2. Location of the loading bar is in a hortzontal plane 343 mm above the SRP of the test seat. (Requirement: 343 mm above the SRP) (S5.1.4.1)
   Length of loading bar = 758 mm
   Width of seat back at 343 mm above SRP = 857 mm
3. Deflection of seat back at 222 N preload = NR
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
   ___ 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.

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

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 = 1029.2 joules

DATA SHEET 5 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST – REARWARD

		[redacted]
12.	Is Item 11 greater than or equal to Item 10? (S5.1.4.2)	[redacted]

Comments: NONE

Recorded By: _____

Approved By: _____ DATE: 03/09/05

DATA SHEET 6

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/22/05**

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 = 550 mm

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

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

   D_t = 90 mm D_b = 3 mm

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

   C_t = 97 mm C_b = 10 mm

5.	Is D_b equal to or less than C_t?	

6.	Is D_b equal to or less than C_b?	

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

   E_t = 775 mm E_b = 955 mm

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

   A_t = 772 mm A_b = 967 mm

DATA SHEET 6 (CONTINUED)

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

9.	Is distance $E_i + D_i$ equal to or greater than distance $A_i + C_i$?	

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

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

U_i = 350 mm U_o = 352 mm

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

V_i = 355 mm V_o = 356 mm

13.	Is U_i equal to or less than V_i ?	

14.	Is U_o equal to or less than V_o ?	

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

S_i = 675 mm S_o = 675 mm

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

W_i = 670 mm W_o = 671 mm

17.	Is $S_i + U_i$ equal to or greater than $W_i + V_i$?	

18.	Is $S_o + U_o$ equal to or greater than $W_o + V_o$?	

DATA SHEET 6 (CONTINUED)

RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

19. Compute area (W x A) = 582,999.8 mm^2

20. Computer area (E x S) = 583,875 mm^2

21.	Is (W x A) equal to or less than (E x S)?	[redacted]

Comments: NONE

Recorded By: _____

Approved By: _____ DATE: 02/22/05

DATA SHEET 7

RESTRAINING BARRIER FORCE/DEFLECTION TEST

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/22/05**

BARRIER IDENTIFICATION: B1

1. Seat cushion width of seat immediately rearward of restraining barrier = 985 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): 512 mm above Floor, 128 mm forward of the Seat Back.
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 = 838 mm
   Width of barrier at SRP = 942 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) = 132 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 = 724 mm
   Width of Barrier at 406 mm above the SRP = 827 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 354.9 mm.
    (Requirement: maximum allowed is 356 mm) (S5.2.3(b))

DATA SHEET 7 (CONTINUED)

RESTRAINING BARRIER FORCE/DEFLECTION TEST

11.	Does the restraining barrier interfere with the normal operation of the door. (S5.2.3 (c))	[redacted]

12.	Did any separation of barrier component or the separation of the barrier from the vehicle occur? (S5.1.3 (d) & (e))	[redacted]

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

14.	Does the forward force vs. deflection trace of the barrier back lie within the unshaded area? (S5.2.3(a))	[redacted]

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

16. The area within the force vs. deflection curve = 1876 joules

17. .452W = 1356 joules (S5.2.3) (S5.1.3.4)

18.	Is item 16 greater than item 17?	[redacted]

Comments: * It was determined by NHTSA that the absorbed energy appeared to meet the requirement before the force vs. deflection trace went outside the corridor.

Recorded By: _____

Approved By: _____ DATE: 02/22/05

DATA SHEET 7 (CONTINUED)

RESTRAINING BARRIER FORCE/DEFLECTION TEST

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **03/09/05**

BARRIER IDENTIFICATION: B10

1. Seat cushion width of seat immediately rearward of restraining barrier = 990 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): 512 mm above Floor, 128 mm forward of the Seat Back.
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 = 838 mm
   Width of barrier at SRP = 938 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) = 103.9 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 hortzontal plane 406 mm above the SRP.
   (Requirement: 406 mm) (S5.1.3.3)
   Length of loading bar = 724 mm
   Width of Barrier at 406 mm above the SRP = 821 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 356 mm.
    (Requirement: maximum allowed is 356 mm) (S5.2.3(b))

DATA SHEET 7 (CONTINUED)
RESTRAINING BARRIER FORCE/DEFLECTION TEST

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

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

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

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

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

16. The area within the force vs. deflection curve = 1567 joules

17. 452W = 1356 joules (S5.2.3) (S5.1.3.4)

18.	Is item 24 greater than item 2517?	

Comments: * The force vs. deflection trace fell below the corridor only because the loading bar went over the barrier.

Recorded By: _____

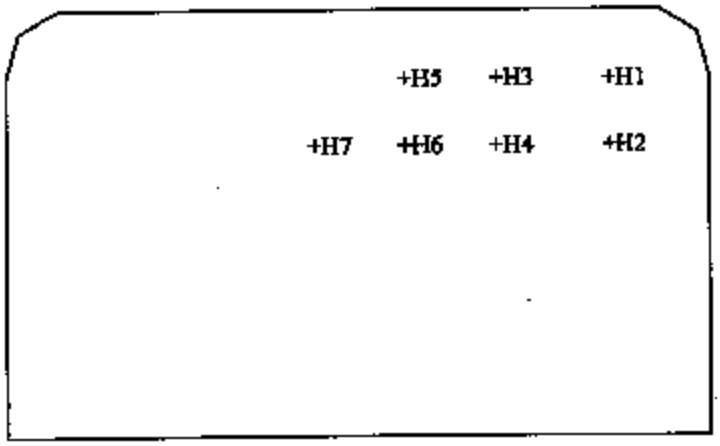
Approved By: _____ DATE: 03/09/05

DATA SHEET 8

HEAD FORM IMPACT CONTACT AREA REQUIREMENT

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/24/05**

SEAT NUMBER: 510



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:

   Reference Point = SRP and the Inboard edge of the seat

(1)	(2)			(3)	(4)*	(5)	(6)	(7)
Head Impact & Test #	Location			Speed Trap Impact Velocity** mps	Derived Velocity mps	Contact Area (CA) mm^2	CA ≥ 1935 mm^2	
	X	Y	Angle				Yes-Pass	No-Fail

* Contact Velocity from Item 7 below

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

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

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

(b) Impact velocity higher than allowed.

Recorded By: _____

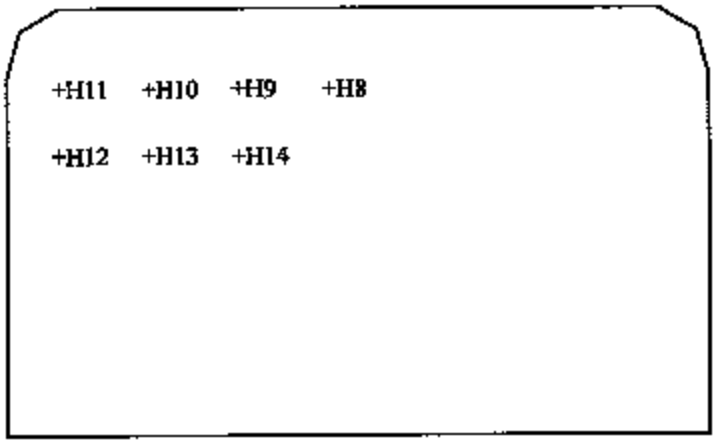
Approved By: _____ DATE: 02/24/05

DATA SHEET 9

HEAD FORM IMPACT ENERGY REQUIREMENT

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **03/04/05**

SEAT NUMBER: S10



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 (a)			Speed Trap Impact Velocity ** mps	Derived Velocity ** mps	Max HIC	Engy Reqd Joules	Column 5 < 1000		Column 6 > 4.5 joules	
	X	Y	Angle					Yes-Pass	No-Fail	Yes-Pass	No-Fail

* Impact velocity from item No. 6 below

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

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

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the inboard edge of the seat.
(b) Impact velocity higher than allowed, but HIC and Energy pass requirements.

Recorded By: _____

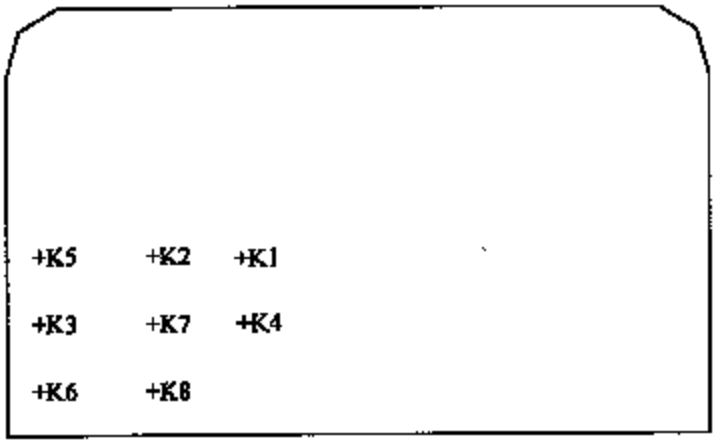
Approved By: _____ DATE: 03/04/05

DATA SHEET 10

KNEE FORM IMPACT TEST

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/23/05**

SEAT NUMBER: S10



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 (a)			Speed Trap Impact Velocity ** mps	Derived Velocity ** mps	Cont. Area mm^2	Resist Force (N)	Column 5 > 1935 mm^2		Column 6 < 2669N	
	X	Y	Angle					Yes-Pass	No-Fail	Yes-Pass	No-Fail
K1	340										
K2											
K3	45										
K4	290										
K5	50										
K6	70										
K7	165										
K8	190										

* Impact velocity from item No. 7 below

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

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

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the inboard edge of the seat.
(b) Impact velocity higher than allowed, but resistive force passes requirement.

Recorded By: _____

Approved By: _____ DATE: 02/24/05

DATA SHEET 11

WHEELCHAIR SECUREMENT ANCHORAGES AND DEVICES

WHEELCHAIR OCCUPANT RESTRAINT ANCHORAGES AND RESTRAINTS

Test Vehicle: **2004 Corbell 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/21/05**

WHEELCHAIR LOCATIONS: THERE WERE NO WHEELCHAIR ANCHORAGES

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

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)	

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

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 _____	

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

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: NONE

Recorded By:_____

Approved By:_____ DATE:

SECTION 4

INSTRUMENTATION AND EQUIPMENT LIST

Test Vehicle: **2004 Corbeil 30 Passenger School Bus** NHTSA No.: **C40902**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **02/21/05**

Equipment	Description	Model/Serial No.	Cal. Date	Next Cal. Date
Computer				
Test Fixture				
A/D Interface				
Load Cell				
Load Cell				
Inclinometer				
Steel Tape				
Impact Fixture				
Camera				
Planimeter				
Accelerometer				
Accelerometer				
Linear Motion Transducer				
Linear Motion Transducer				

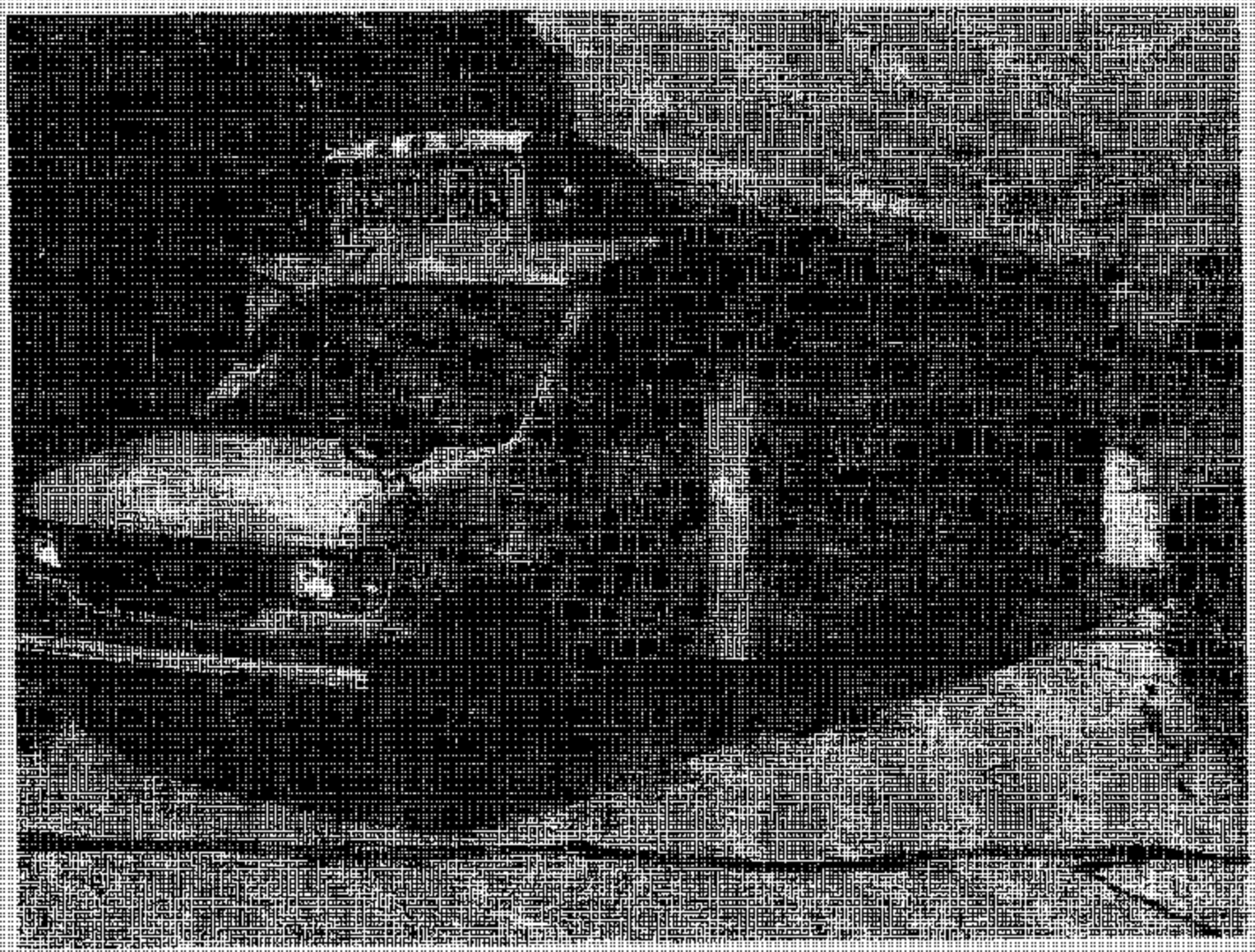
SECTION 5

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

Procedure: FMVSS 222 NHTSA No.: C40902



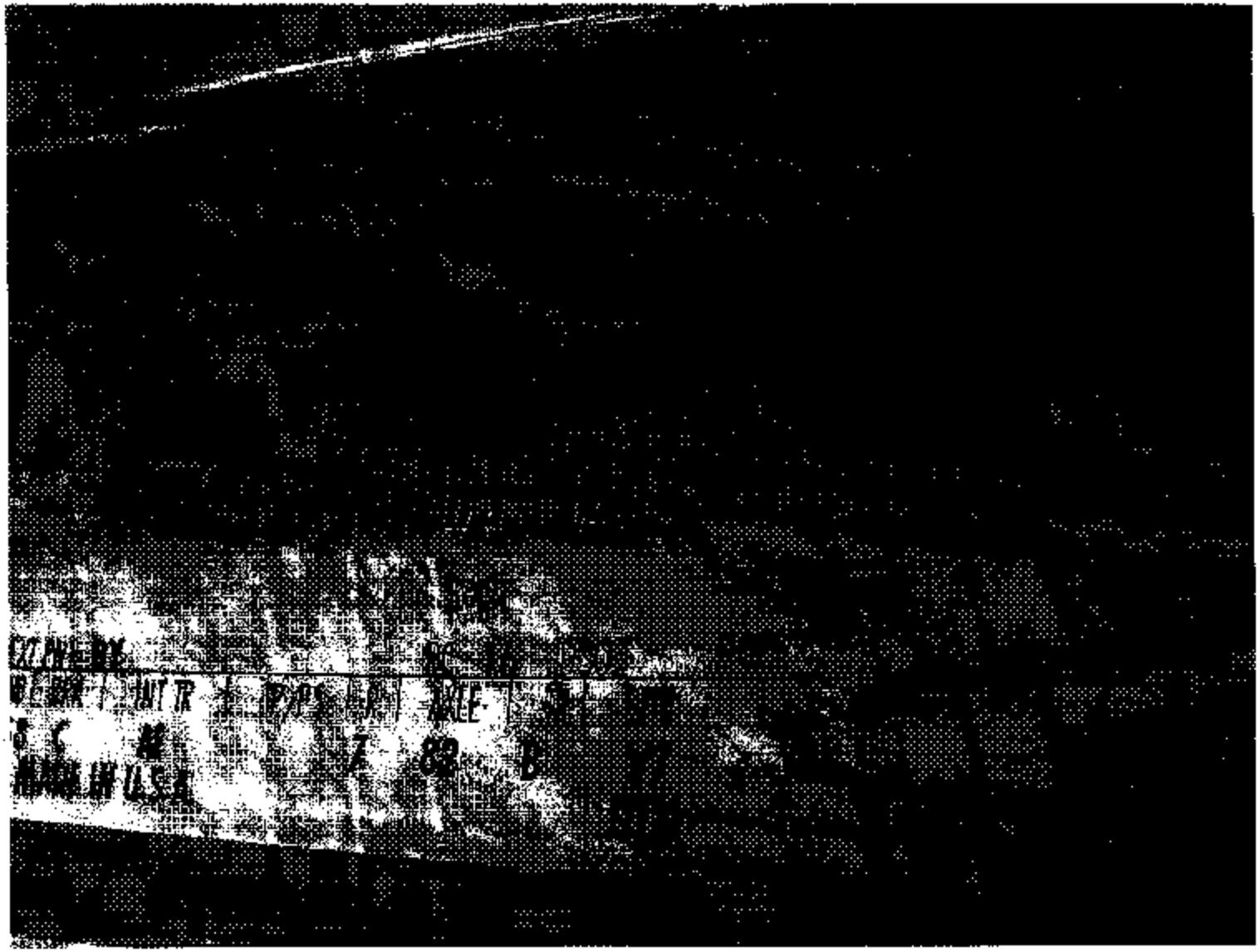
¾ Front View From Left Side of School Bus

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

Procedure: FMVSS 222 NHTSA No. C40902

¾ Rear View From Right Side of School Bus

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
Procedure: **FMVSS 222** NHTSA No.: **C40902**



Incomplete Vehicle Label

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
Procedure: **FMVSS 222** NHTSA No.: **C40902**

Certification and Tire Information Label

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

Procedure: FMVSS 222 NHTSA No. C40002

Vehicle Interior View From Front to Rear

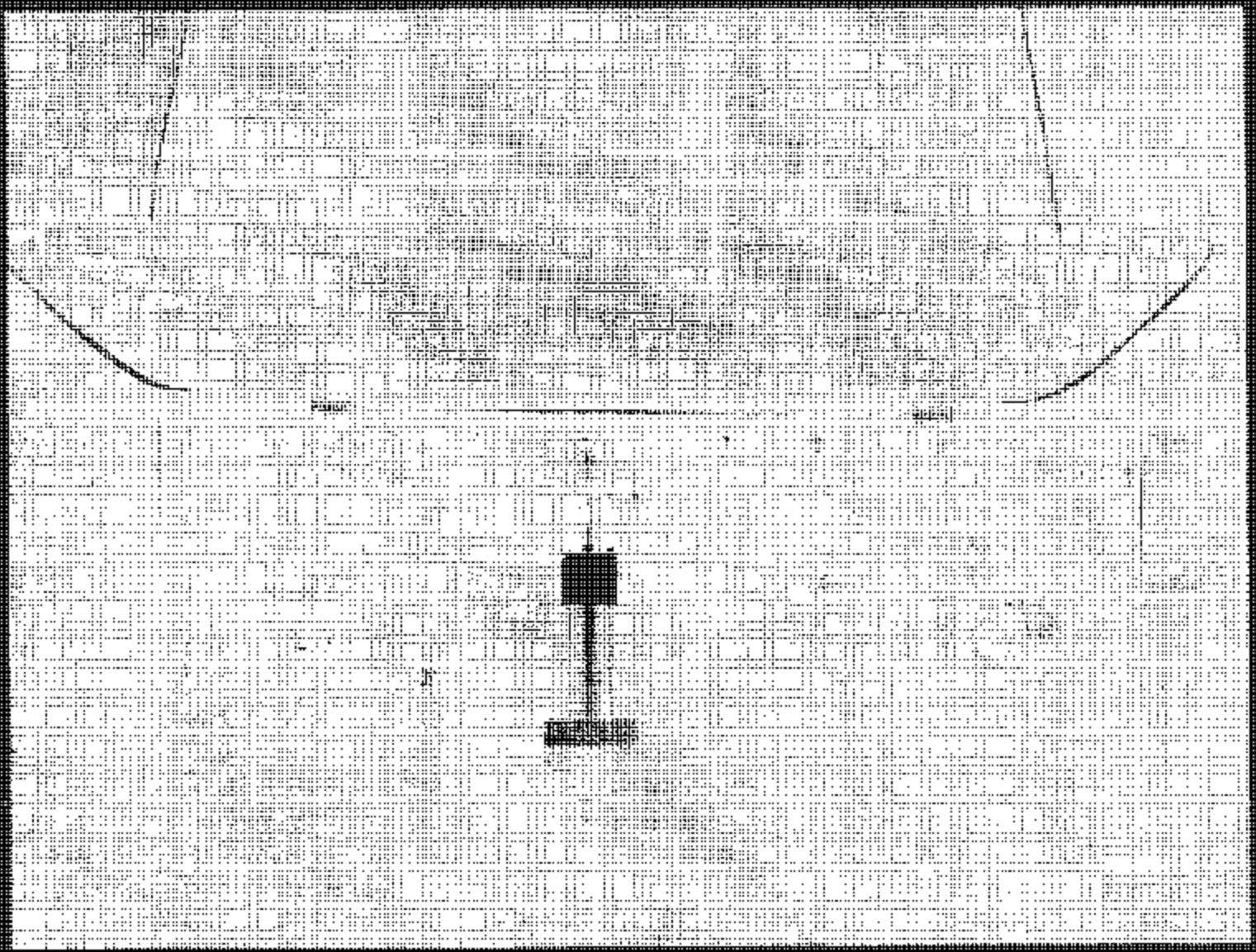
Test Vehicle: 2004 Corbeil 30 Passenger School Bus

Procedure: FMVSS 222 NHTSA No.: C40002

Vehicle Interior View From Rear to Front

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

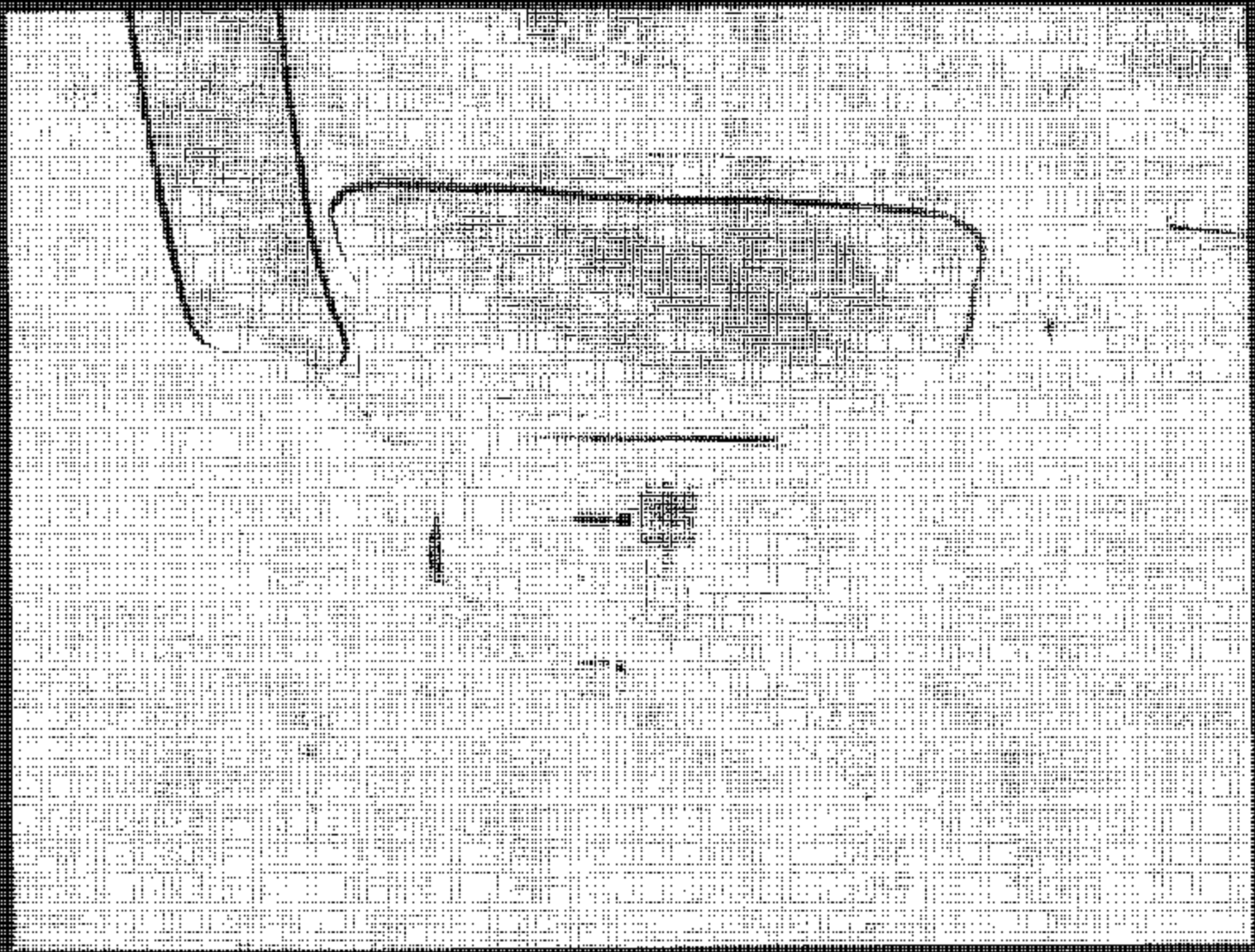
Procedure: FMVSS 222 NHTSA No.: C40902



Pre-Test of Seat Cushion #2

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

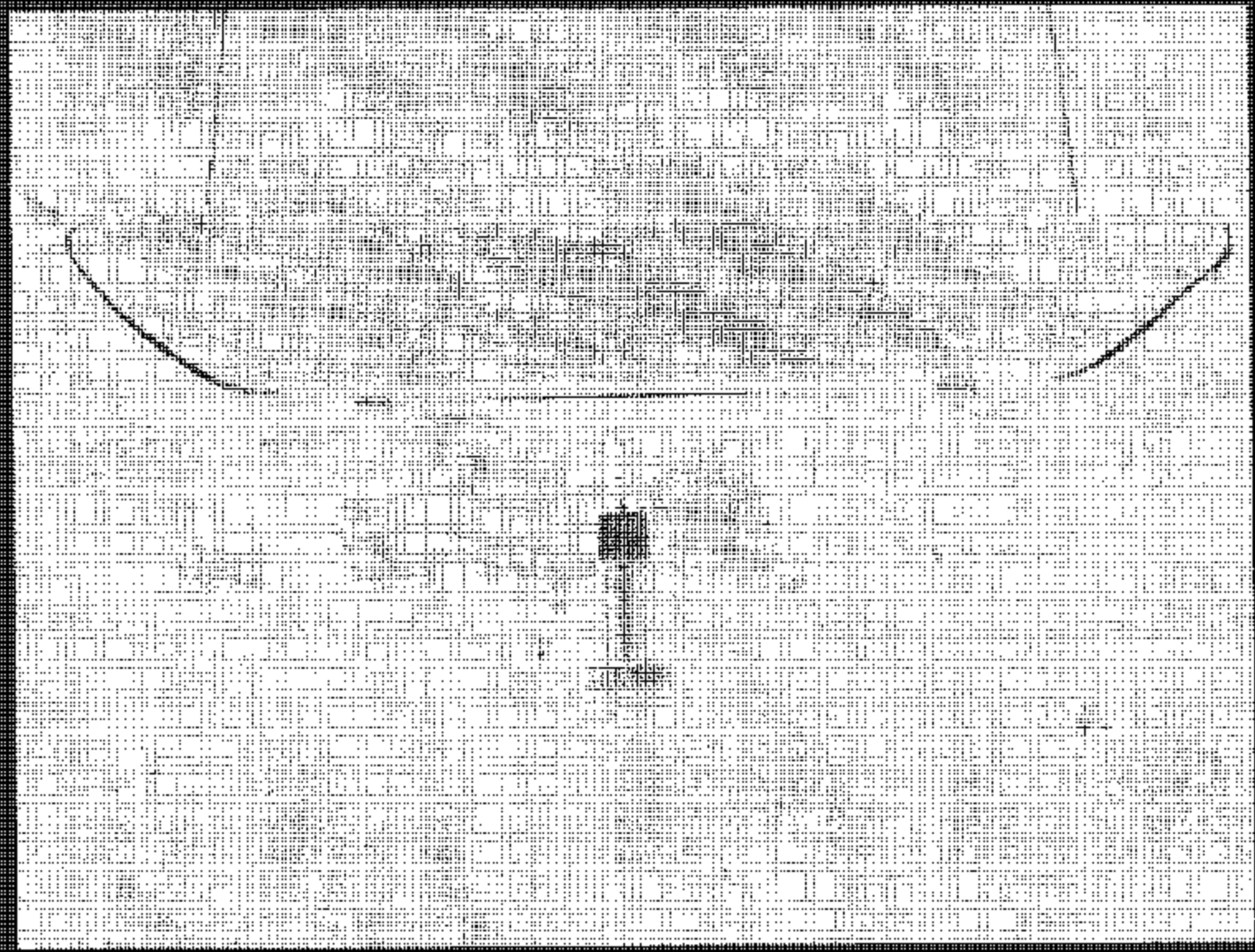
Procedure: FMVSS 222 NHTSA No.: C40902



Post Test of Seat Cushion #2

Test Vehicle: 2004 Corbeil 34 Passenger School Bus

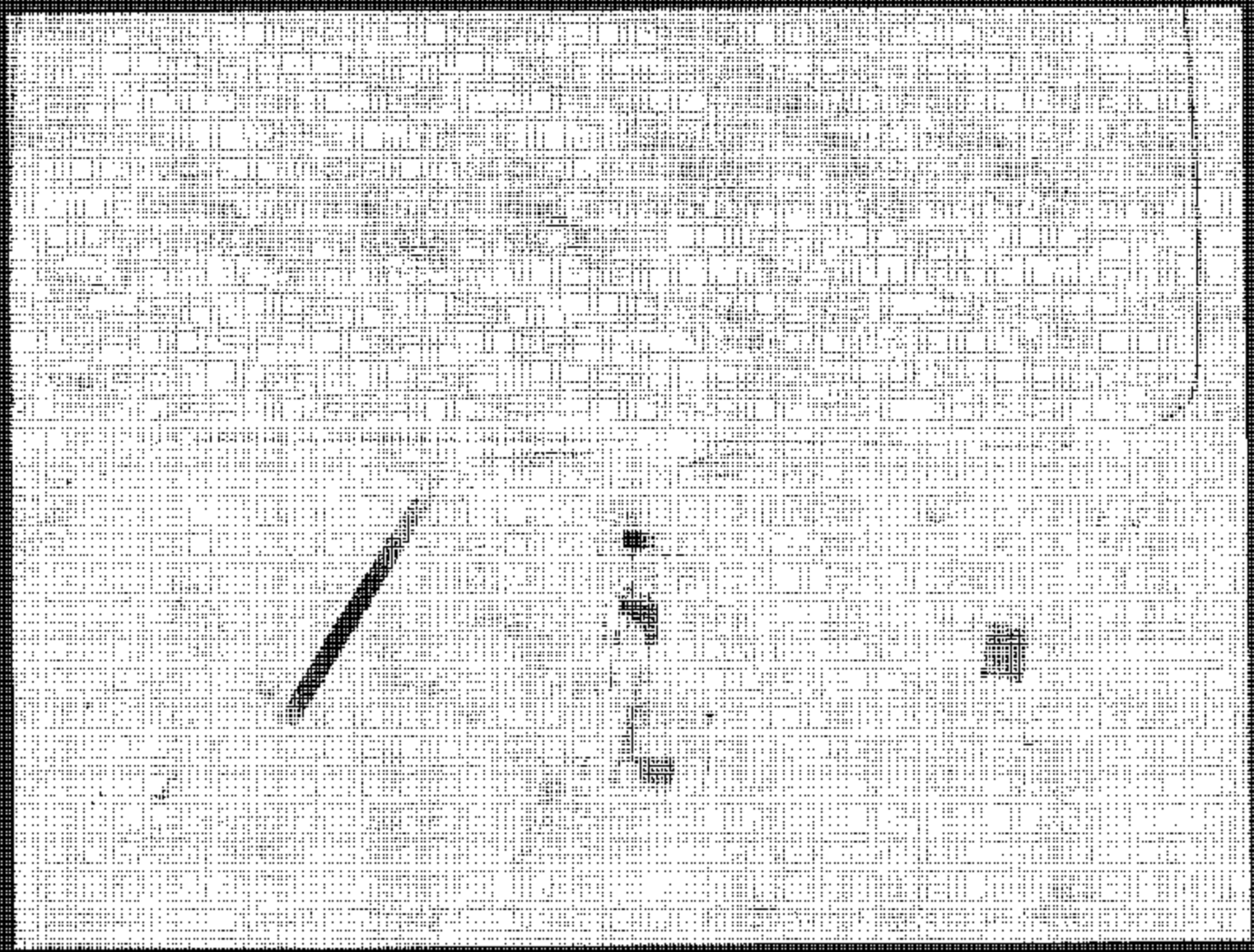
Procedure: FMVSS 222 NHTSA No.: C40901



Pre-Test of Seat Cushion #3

Test Vehicle: 2004 Corbett 30 Passenger School Bus

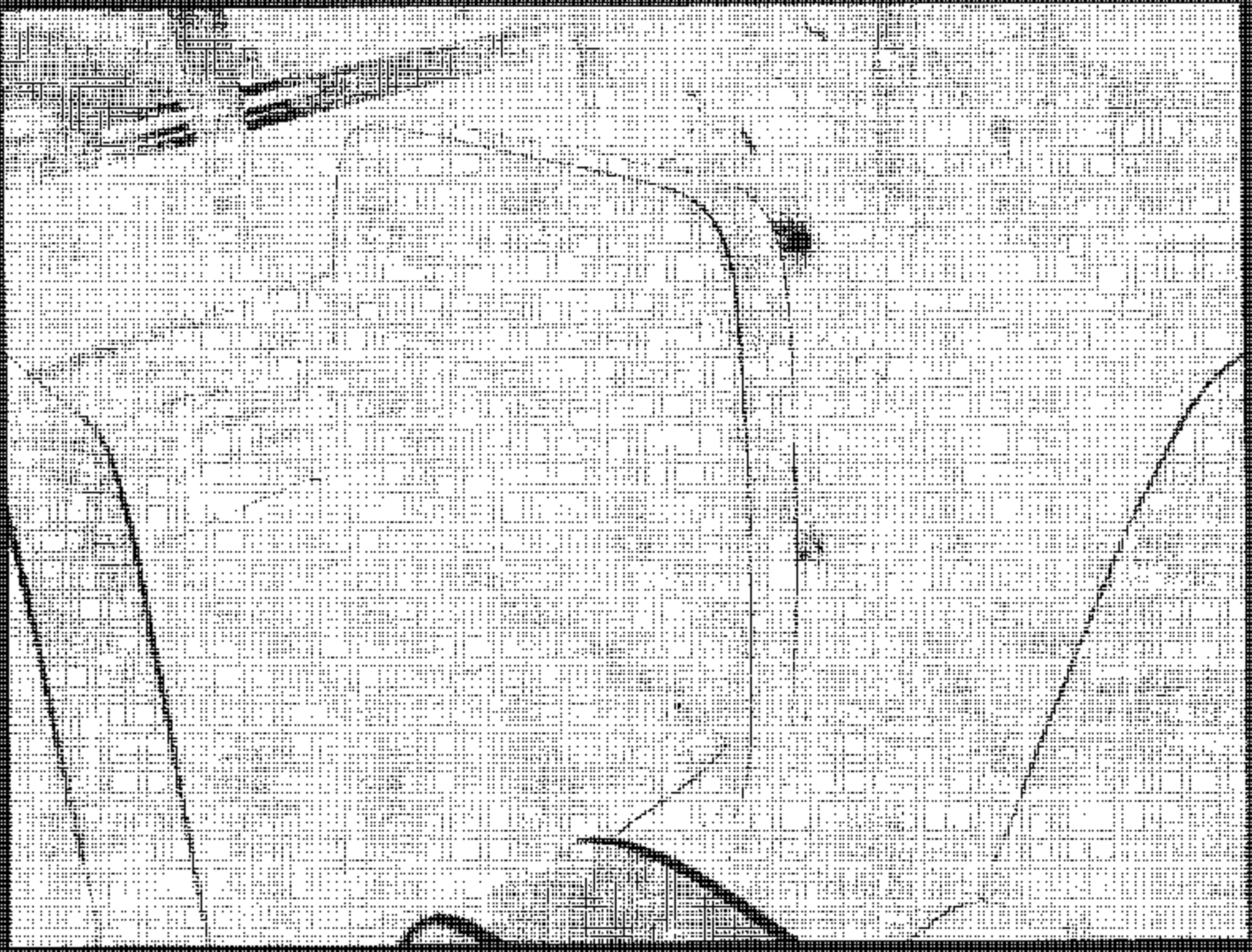
Procedure: FMVSS 222 NHTSA No.: C40802



Post Test of Seat Cushion #5

Test Vehicle: 2004 Corbett 30 Passenger School Bus

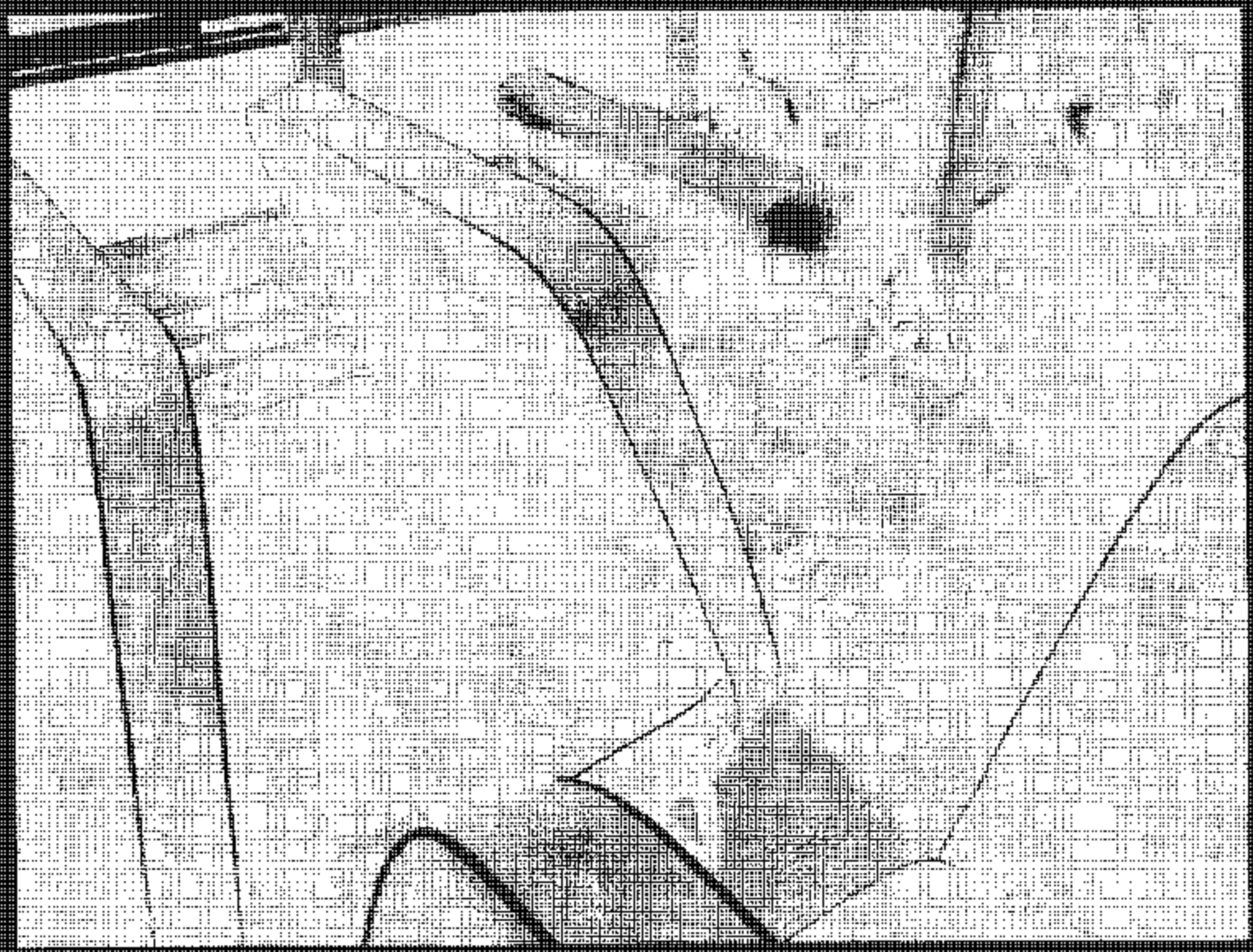
Procedure: FMVSS 222 NHTSA No.: C40002



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

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

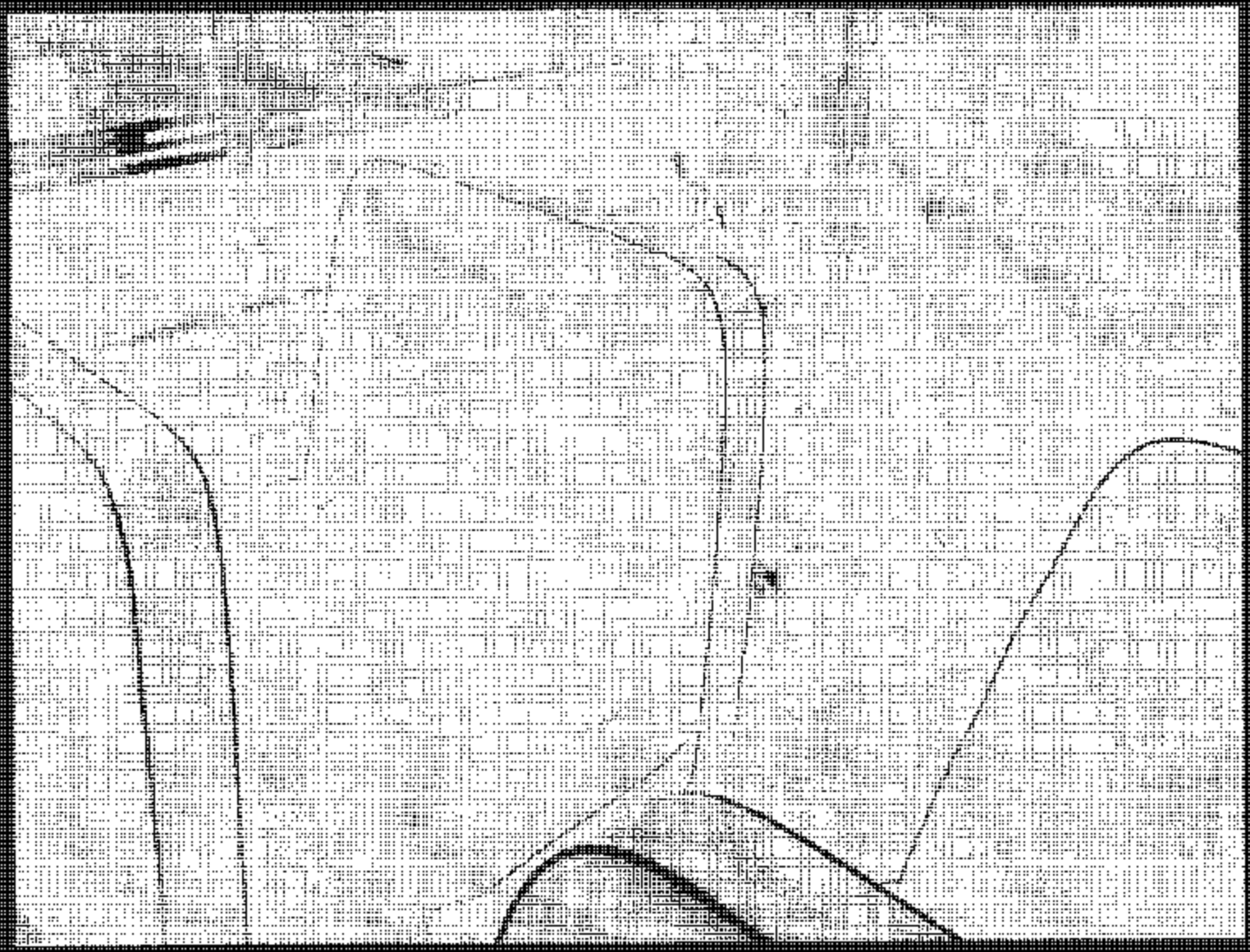
Procedure: FMVSS 222 NHTSA No.: C40902



Post-Test of Seat Back to Force Deflection Forward Test

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

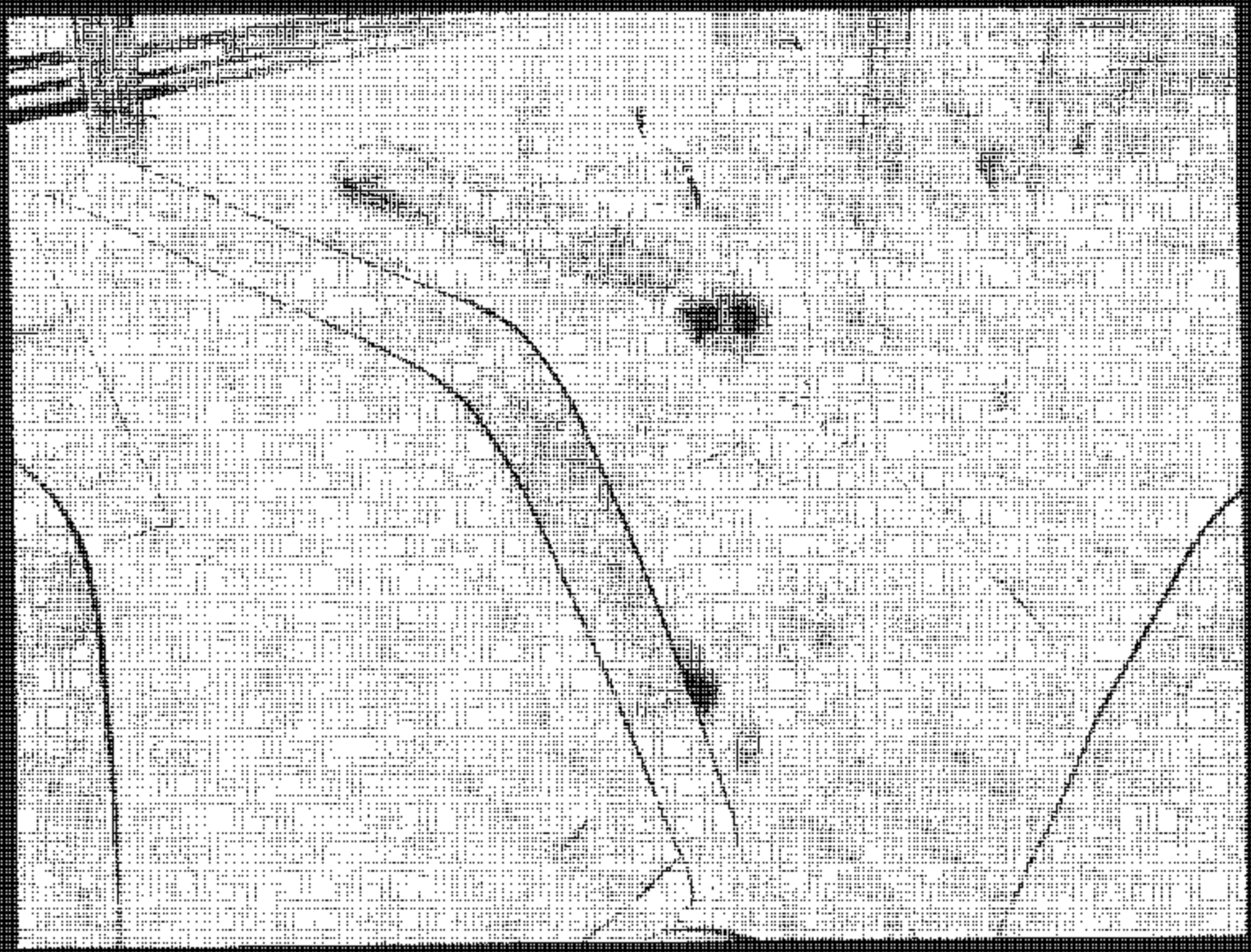
Procedure: FMVSS 222 NHTSA No.: C40502



Pre-Test of Seat Back #9 Force Deflection Forward Test

Test Vehicle: 2004 Corbeil 38 Passenger School Bus

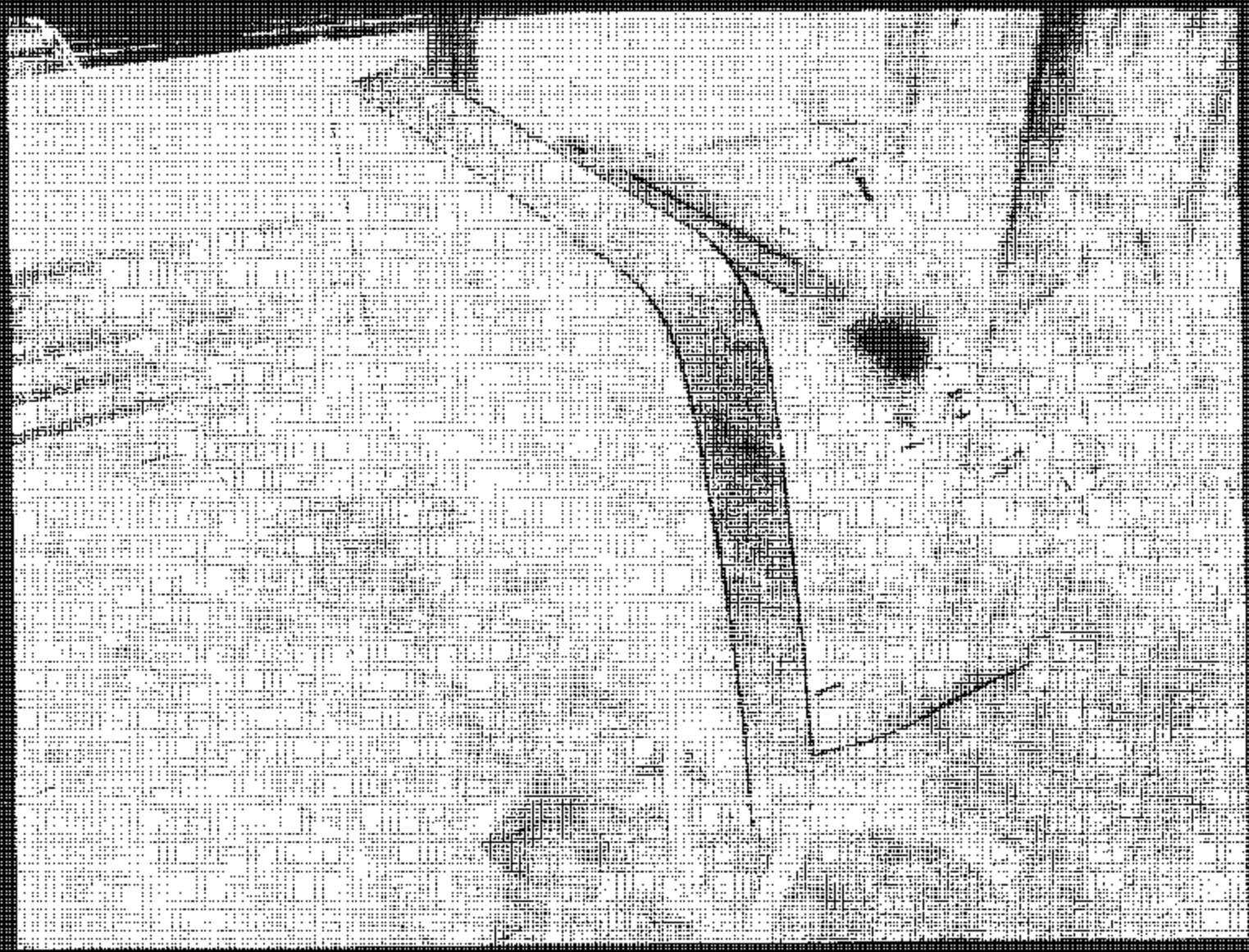
Procedure: FMVSS 222 NHTSA No.: C40002



Post-Test of Seat Back #3 Knee Deflection Forward Test

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

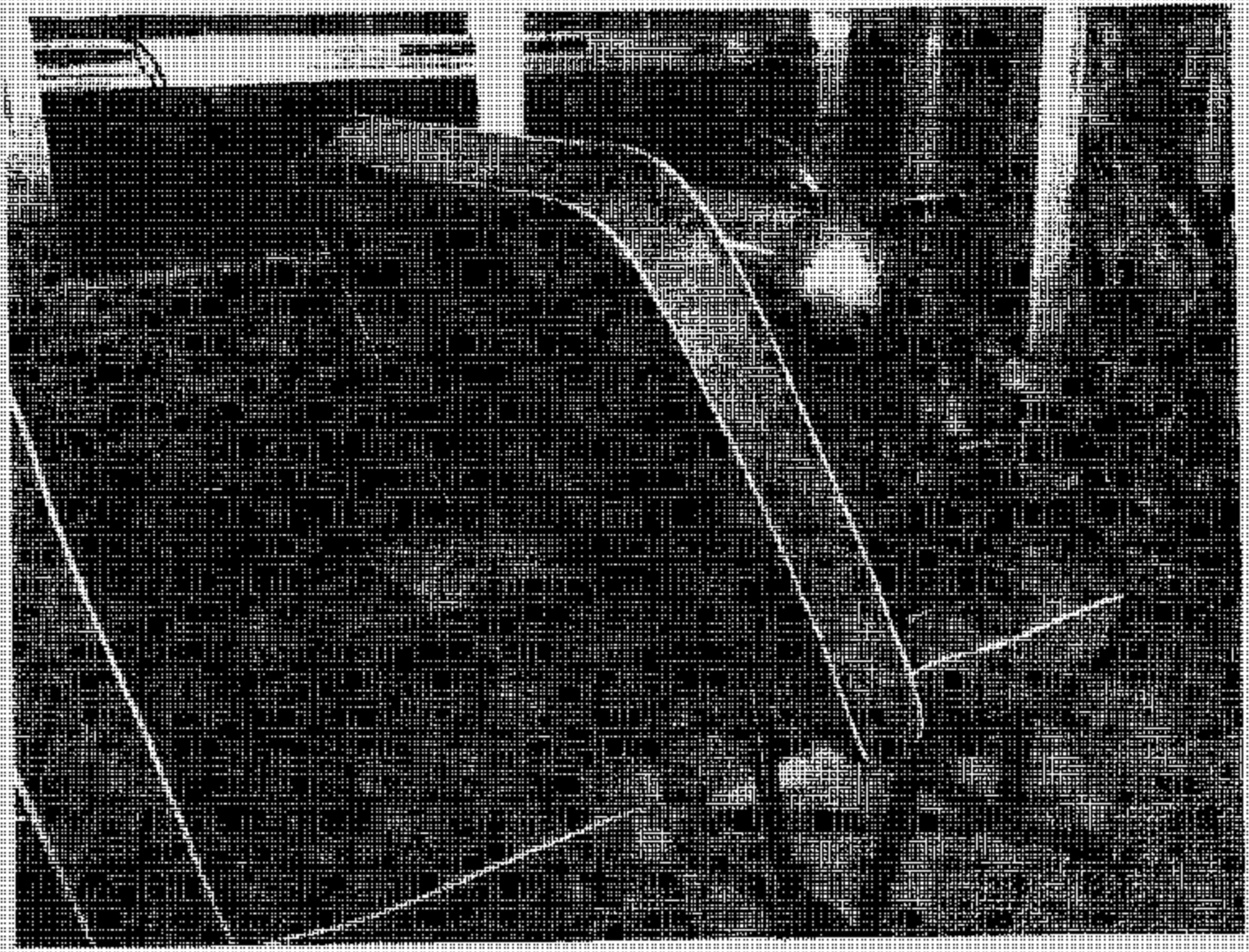
Procedure: FMVSS 222 NHTSA No. C40902



Pre-Test of Seat Back #3 Force Deflection Rearward Test

Test Vehicle: 2001 Corbeil 30 Passenger School Bus

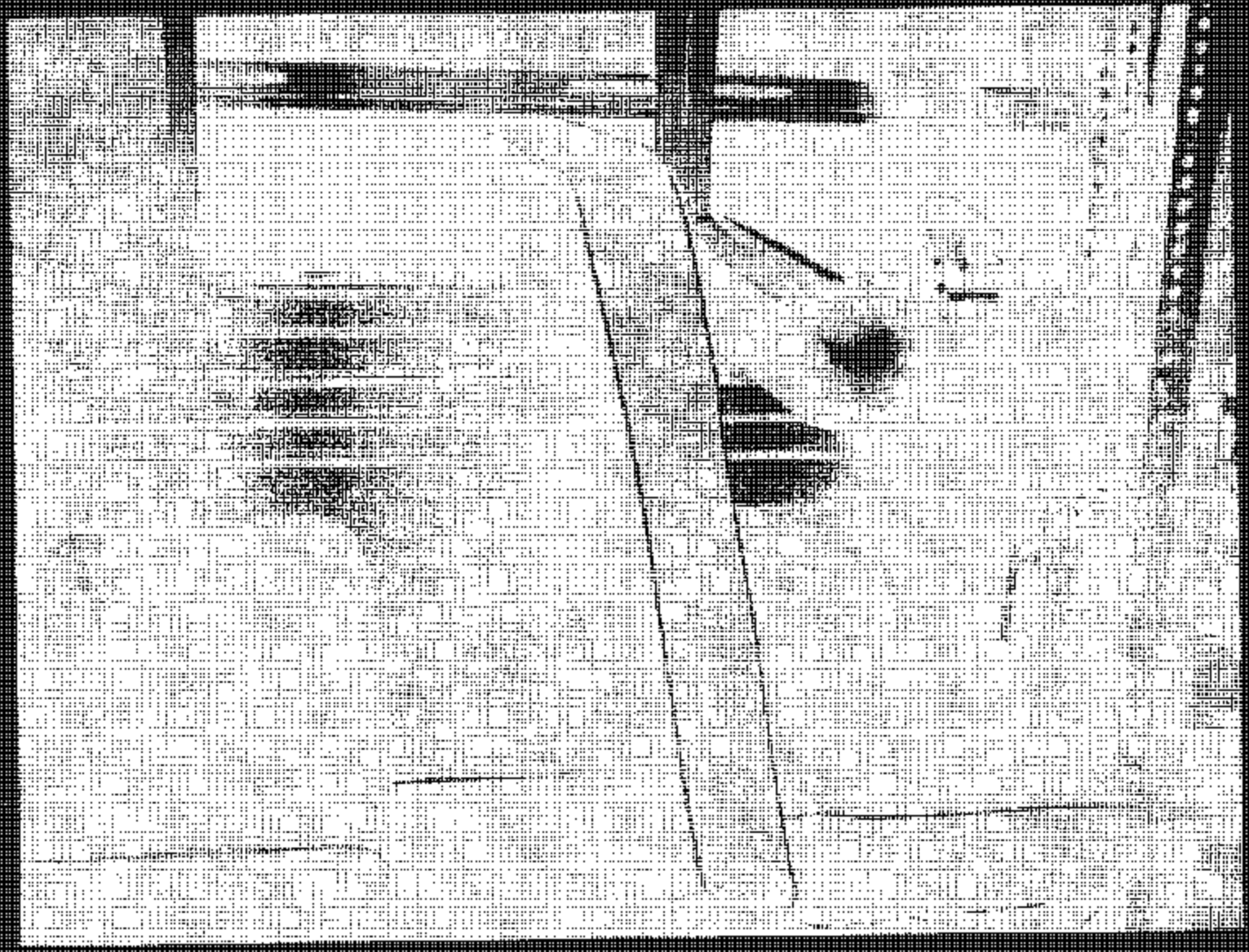
Procedure: FMVSS 222 NHTSA No.: C01002



Post-Test of Seat Back #3 Force Deflection Rearward Test

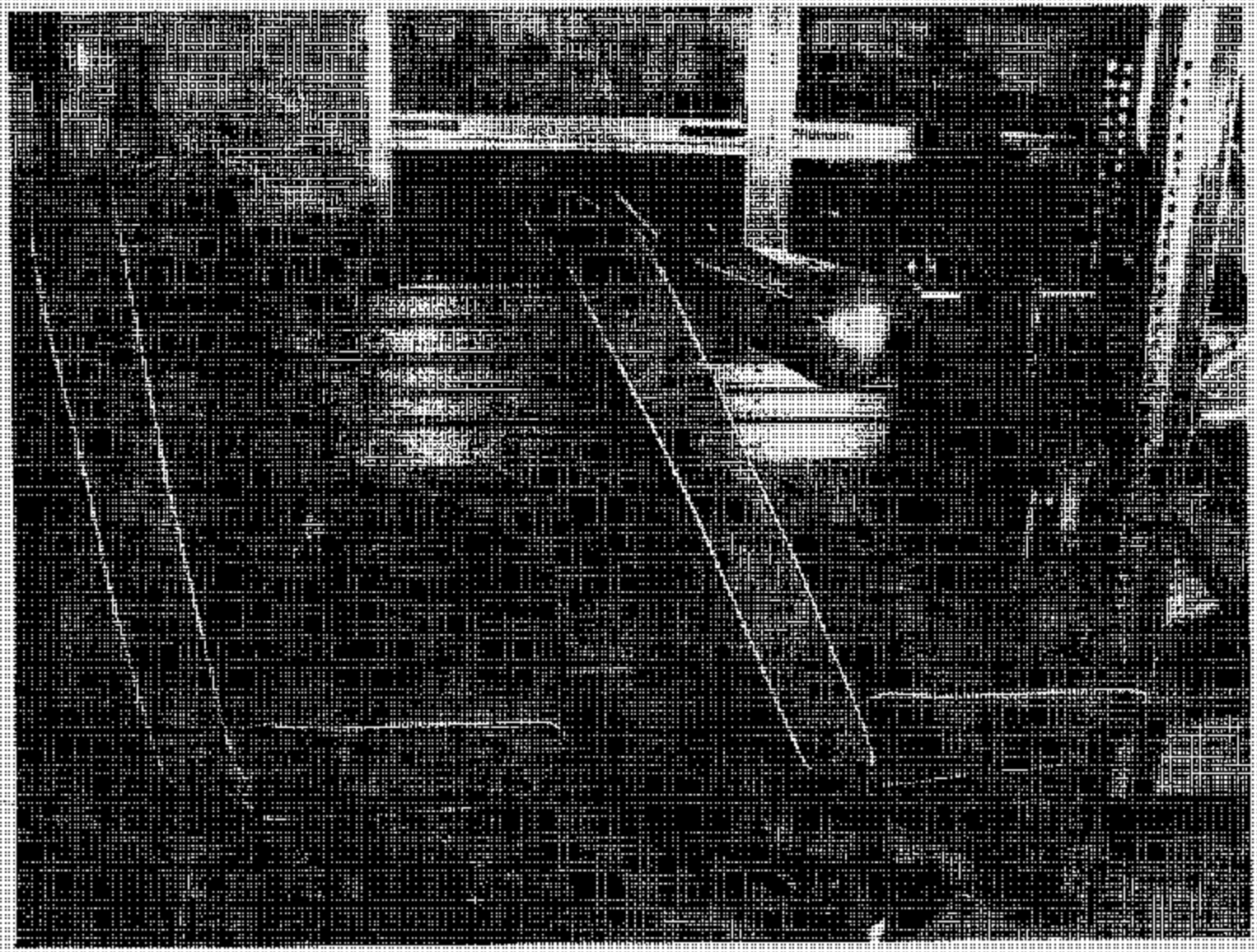
Test Vehicle: 2004 Gerbeli 31 Passenger School Bus

Procedure: FMVSS 222 NHTSA No.: 040102



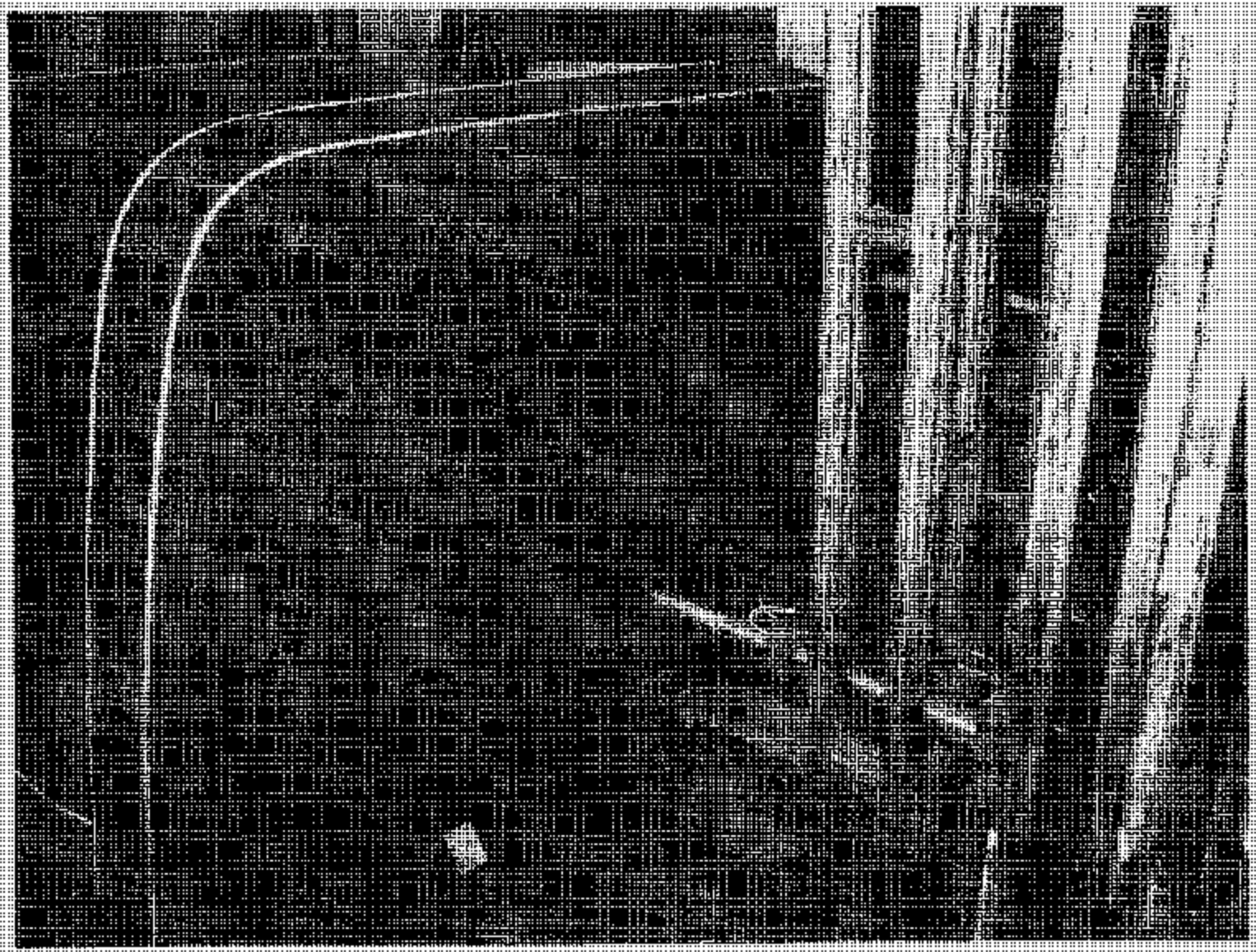
Pre-Test of Seat Back #4 Force Deflection Rearward Test

Test Vehicle: 2004 Corbeil 30 Passenger School Bus
Procedure: FMVSS 222 NHTSA No. C40902



Post-Test of Seat Back #4 Force Deflection Rearward Test

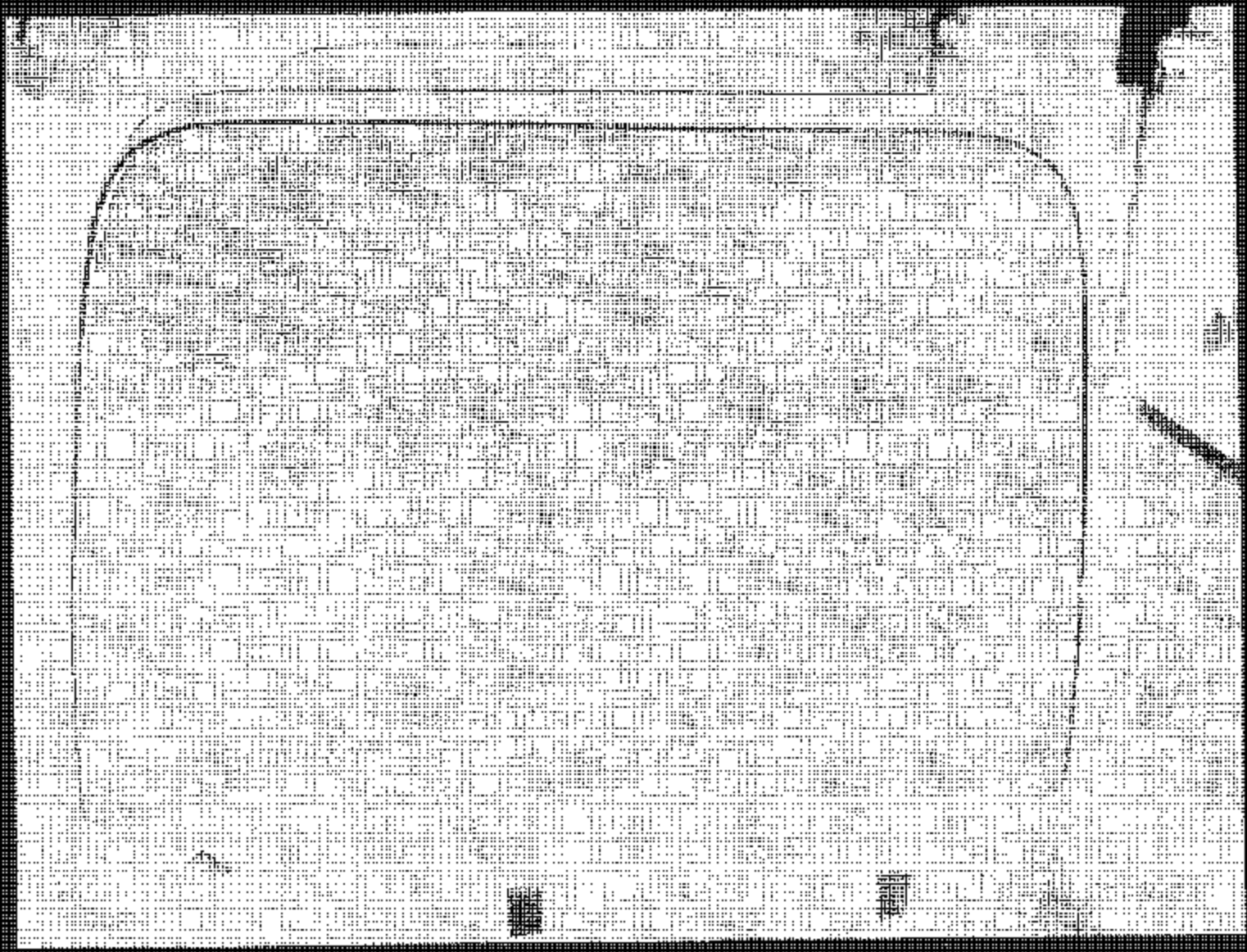
Test Vehicle: 2004 Gorbell 30 Passenger School Bus
Procedure: FMVSS 222 NHTSA No.: C40902



Pre-Test of Head and Knee Impact Location on Seat #10

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

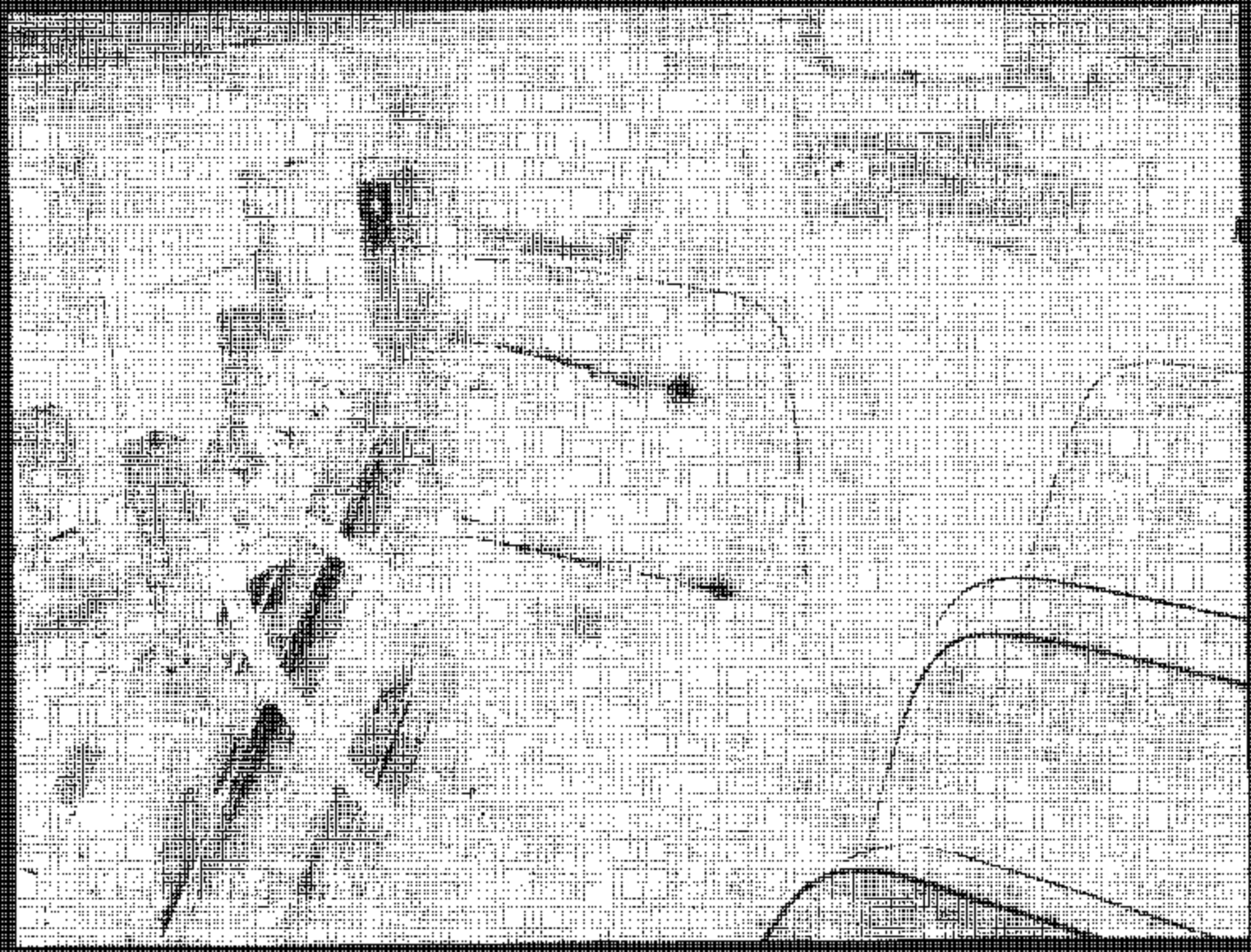
Procedure: FMVSS 222 NHTSA No.: C40602



Post-Test of Head and Knee Impact Locations on Seat #10

Test Vehicle: 2004 Carlisle 30 Passenger School Bus

Procedure: FMVSS 222 NHTSA No: C40902



Pre-Test of Barrier #1 Force Deflection Forward Test

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

Procedure: FMVSS 222 NHTSA No.: C40902

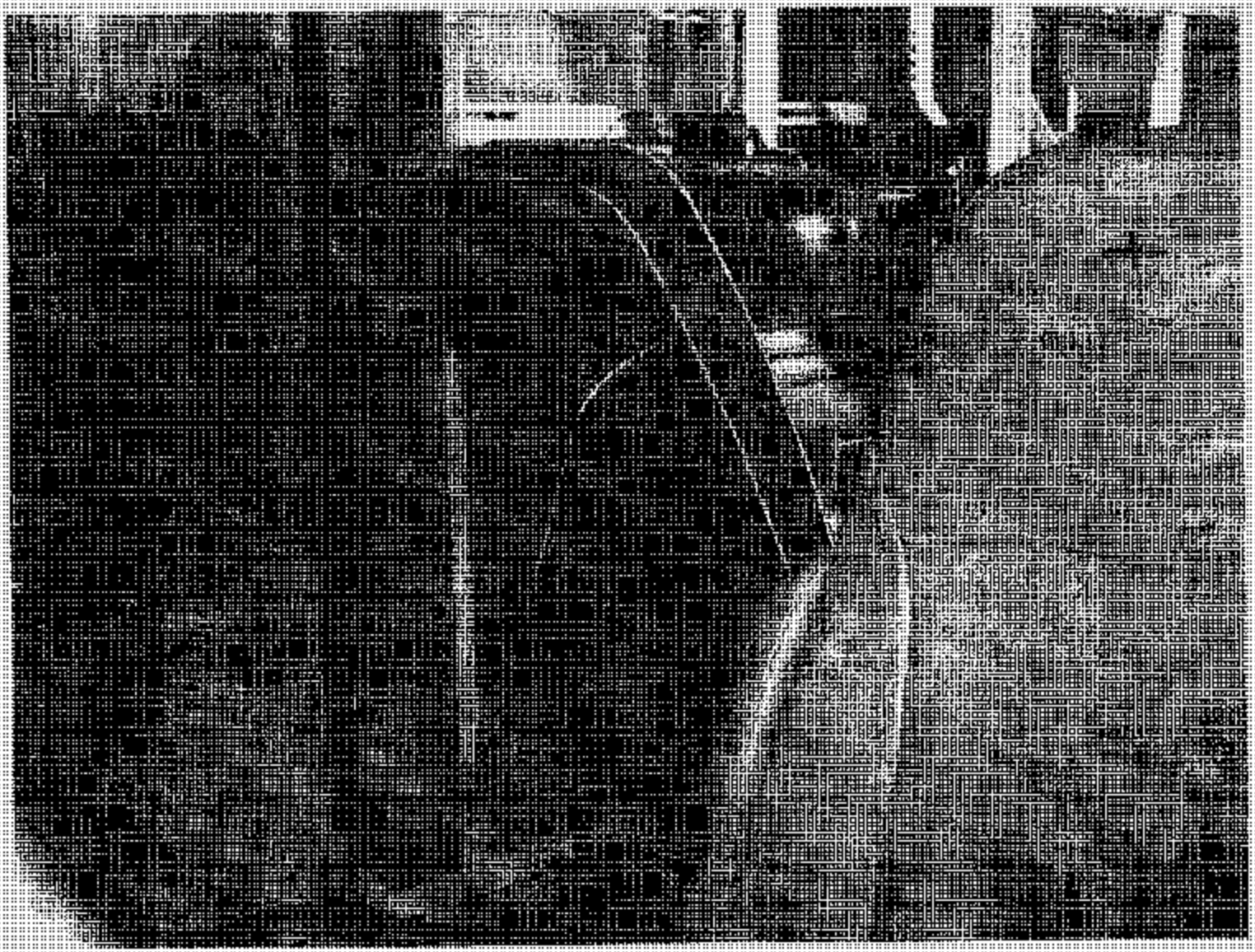
Post-Test of Barrier #1 Force Deflection Forward Test

Test Vehicle: 2004 Corbeil 30 Passenger School Bus

Procedure: FMVSS 222 NHTSA No.: C40302

Pre-Test of Barrier #10 Force Deflection Forward Test

Test Vehicle: 2004 Corbeil 30 Passenger School Bus
Procedure: FMVSS 222 NHTSA No. C40002



Post-Test of Barrier #10 Force Deflection Forward Test

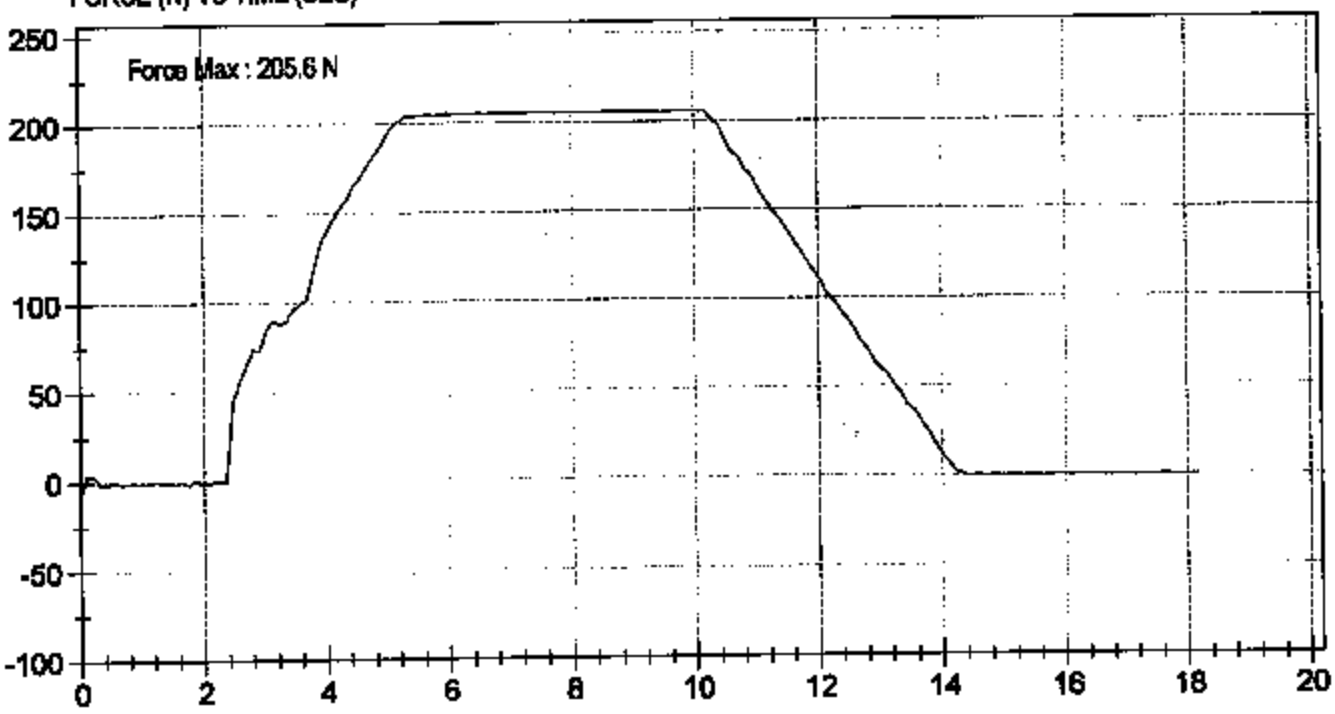
SECTION 6
TEST PLOTS

TABLE OF TEST PLOTS

Test Desc: S2 Cushion Retention
Componet ID: Corbeil

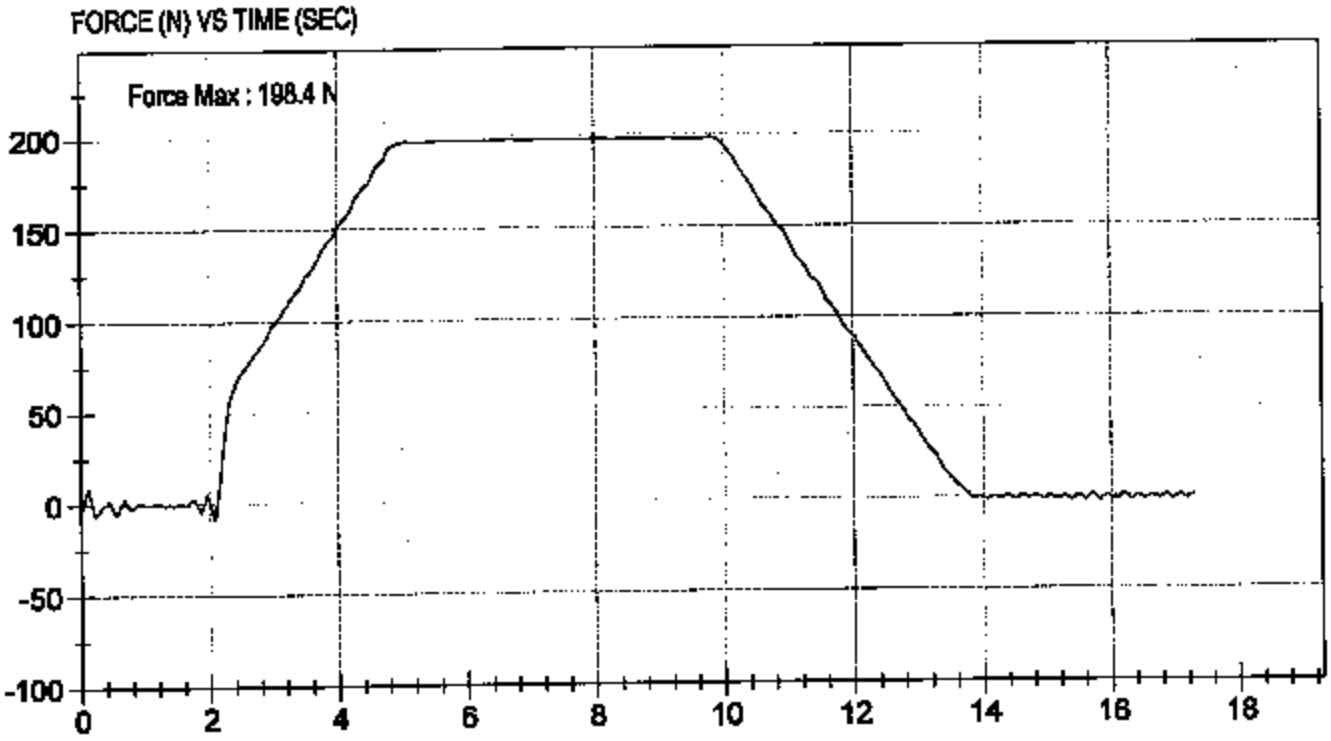
Test Date: 4/20/05
NHTSA #: C40902

FORCE (N) VS TIME (SEC)



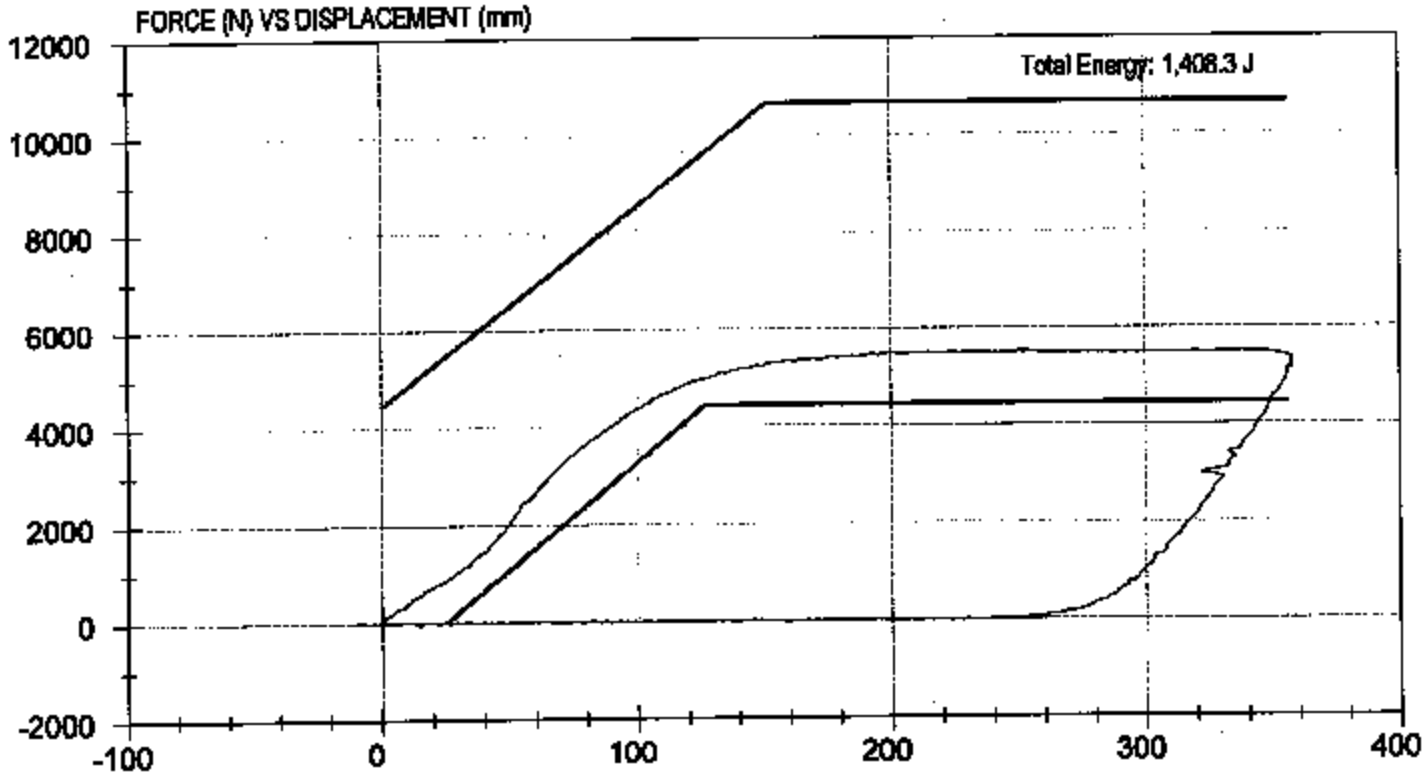
Test Desc: S6 Cushion Retention
Componet ID: Corbell

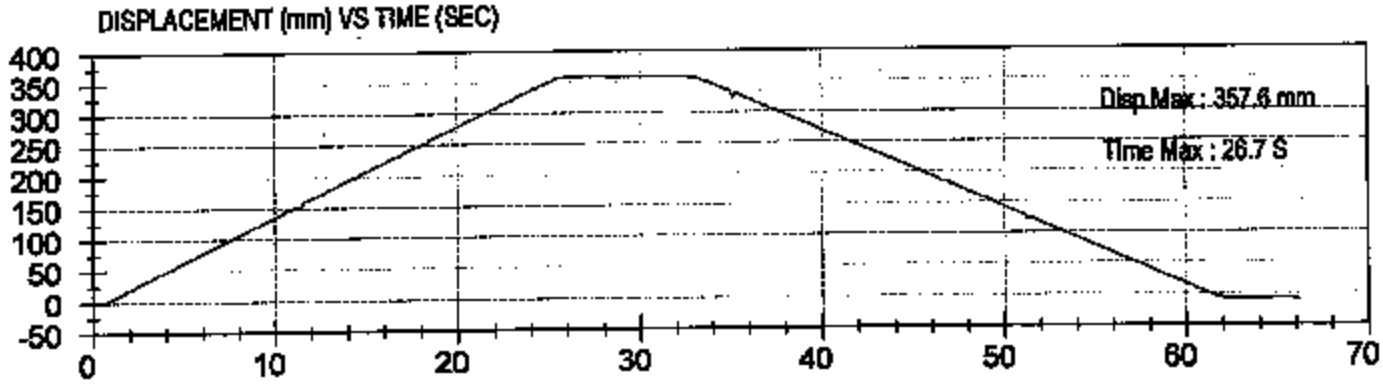
Test Date: 4/20/05
NHTSA #: C40902

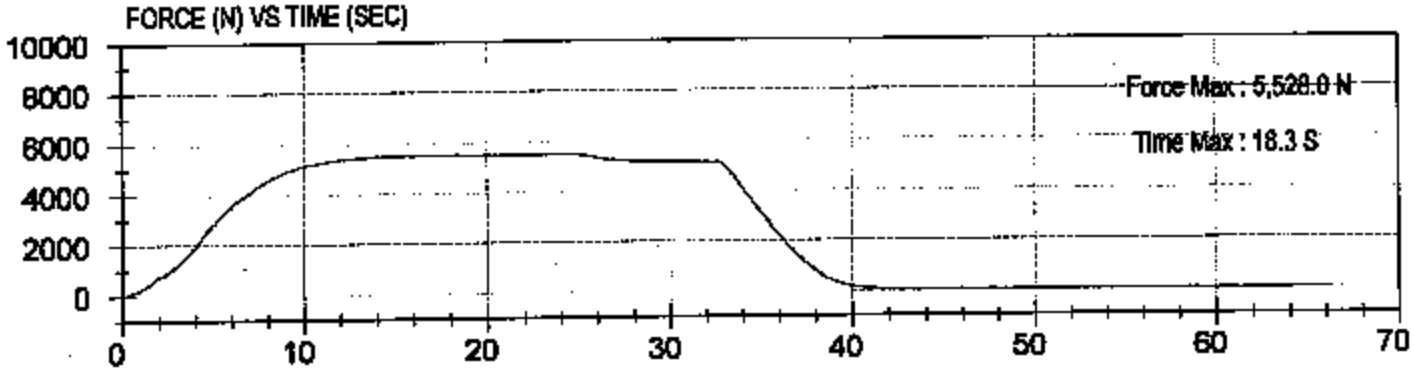


Test Desc: S8 Seat Deflection Forward (upper)
Component ID: Corbell

Test Date: 2/21/05
NHTSA #: C40902



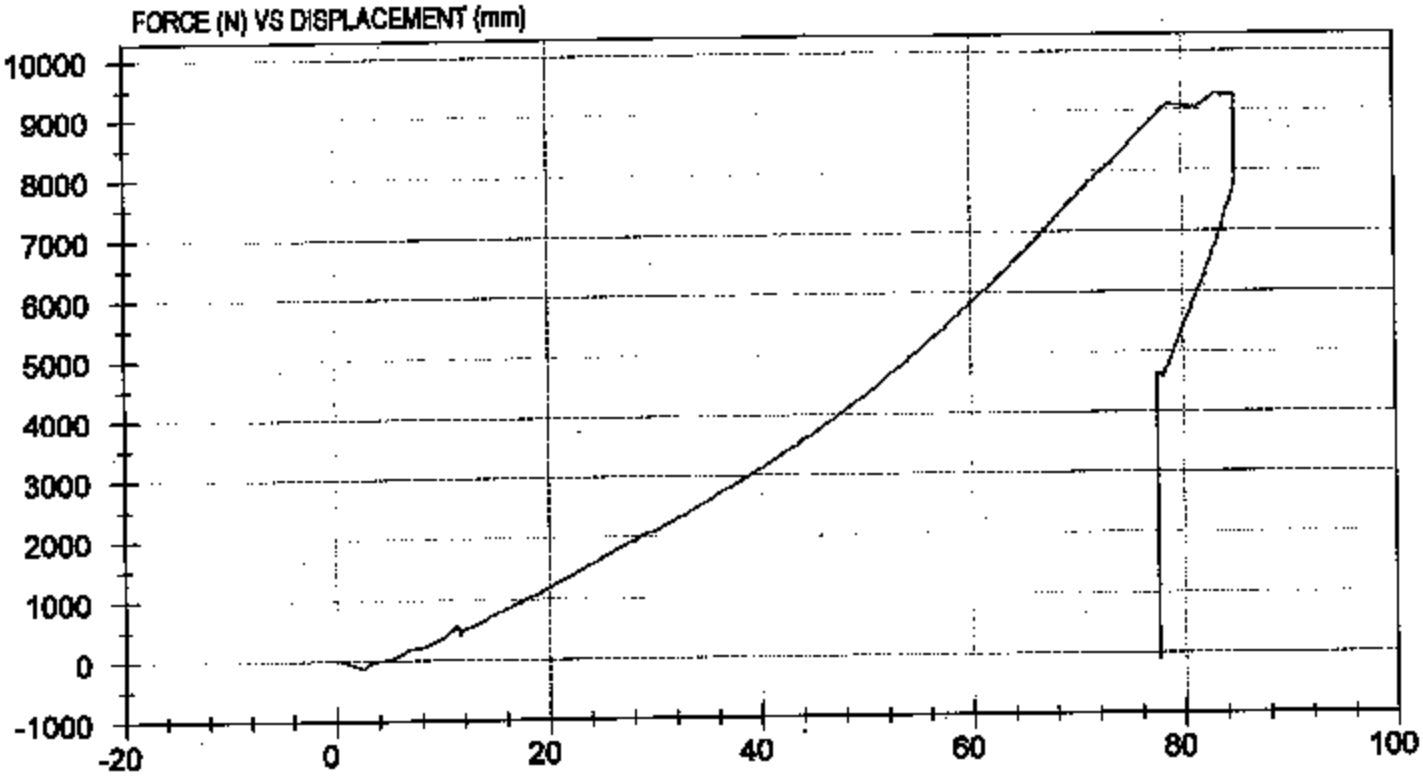




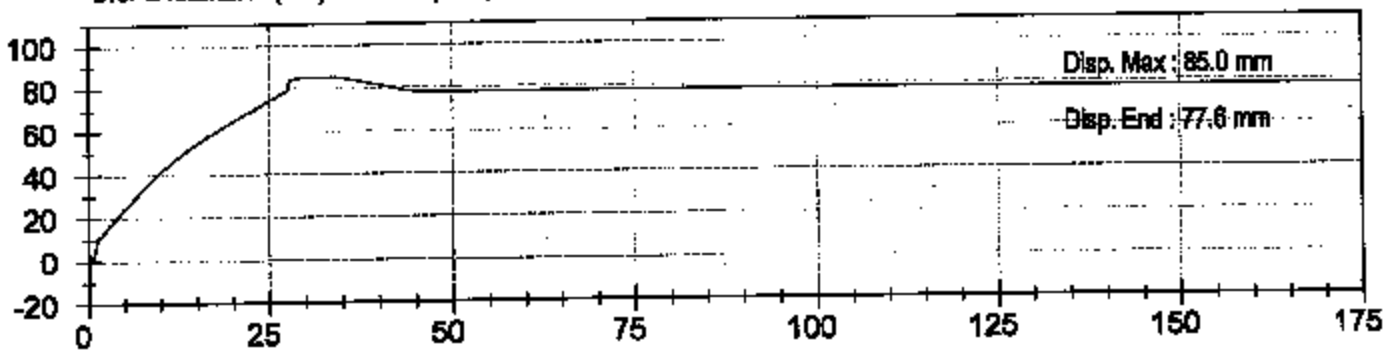
Test Desc: S8 Seat Deflection Forward (Lower)
Component ID: Corbell

Test Date: 2/21/05
NHTSA #: C40902

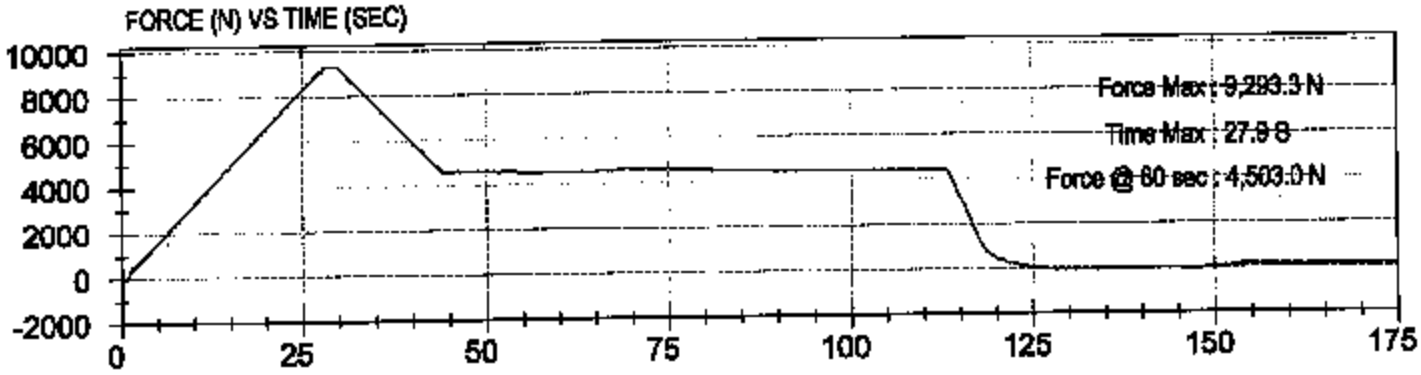
FORCE (N) VS DISPLACEMENT (mm)



DISPLACEMENT (mm) VS TIME (SEC)

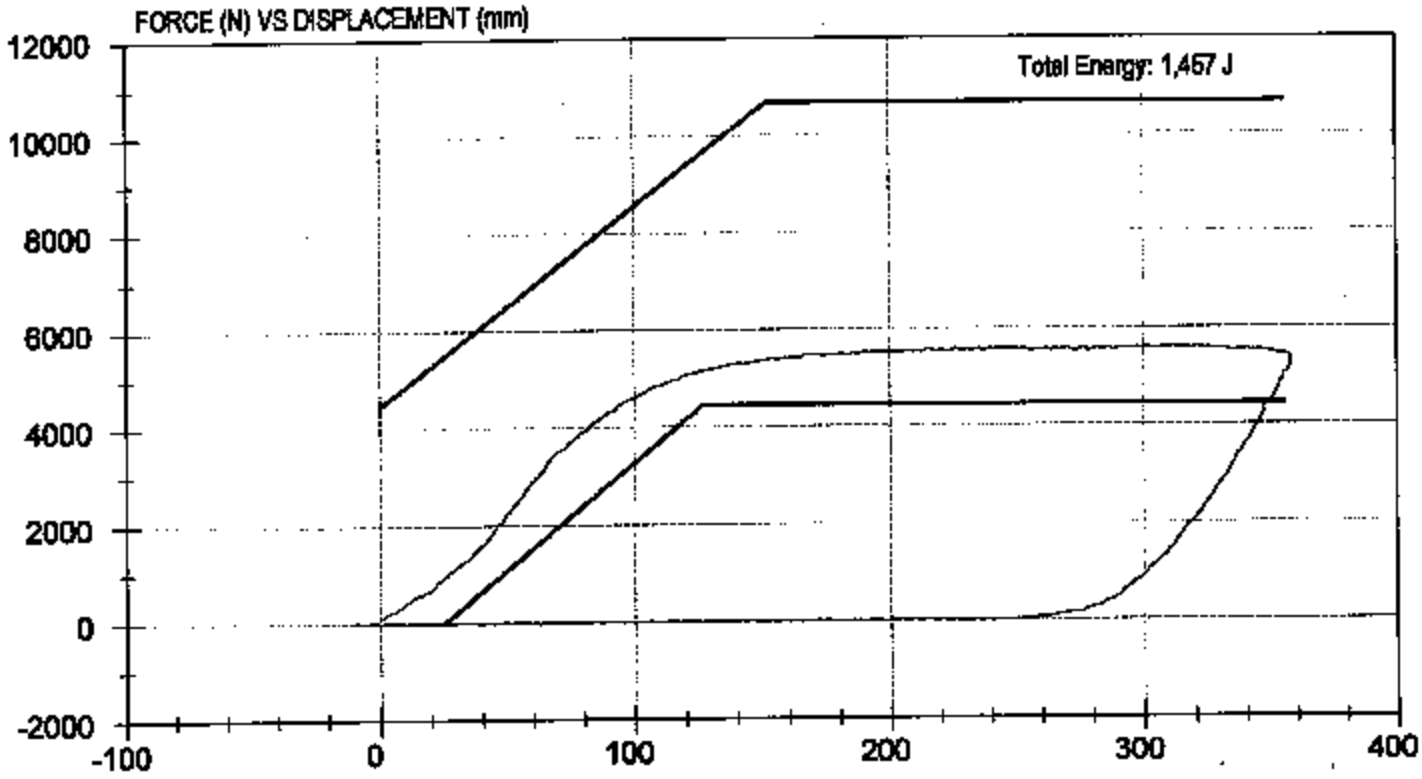


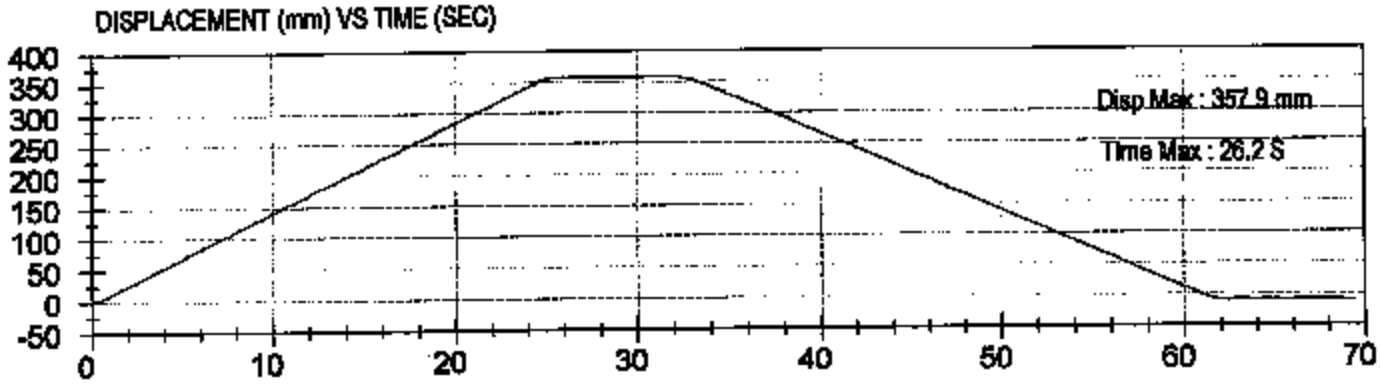
FORCE (N) VS TIME (SEC)

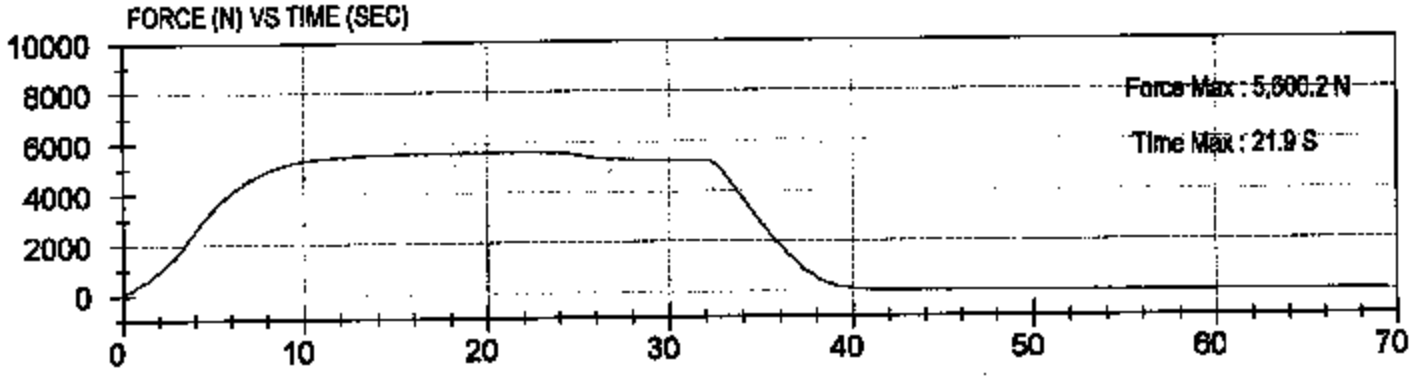


Test Desc: S9 Deflection Forward (upper)
Component ID: Corbeil

Test Date: 2/22/05
NHTSA #: C40902



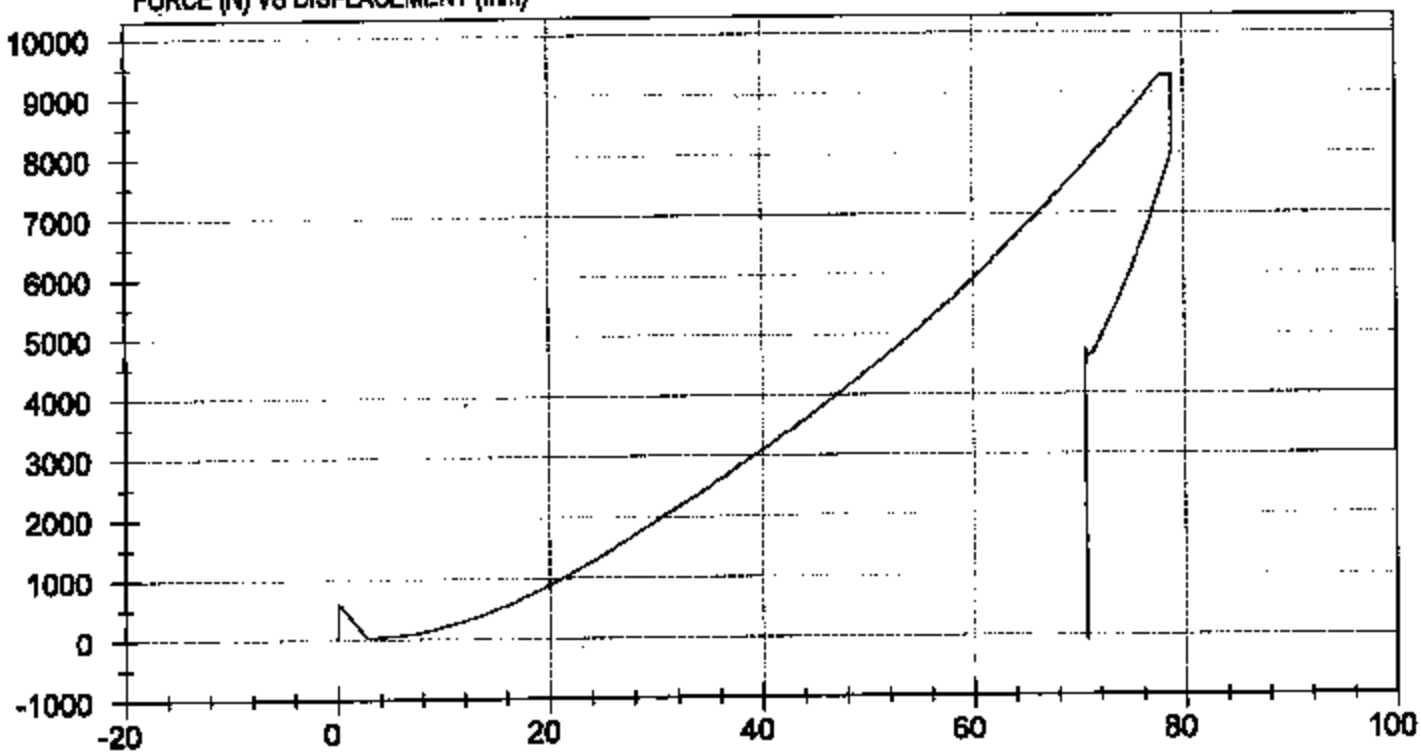




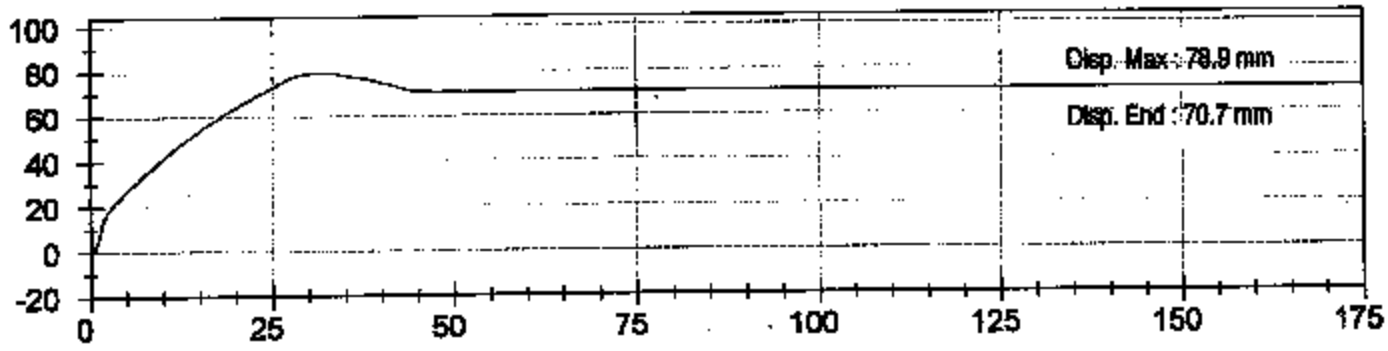
Test Desc: S9 Seat Deflection Forward (Lower)
Component ID: Corbel

Test Date: 2/22/05
NHTSA #: C40902

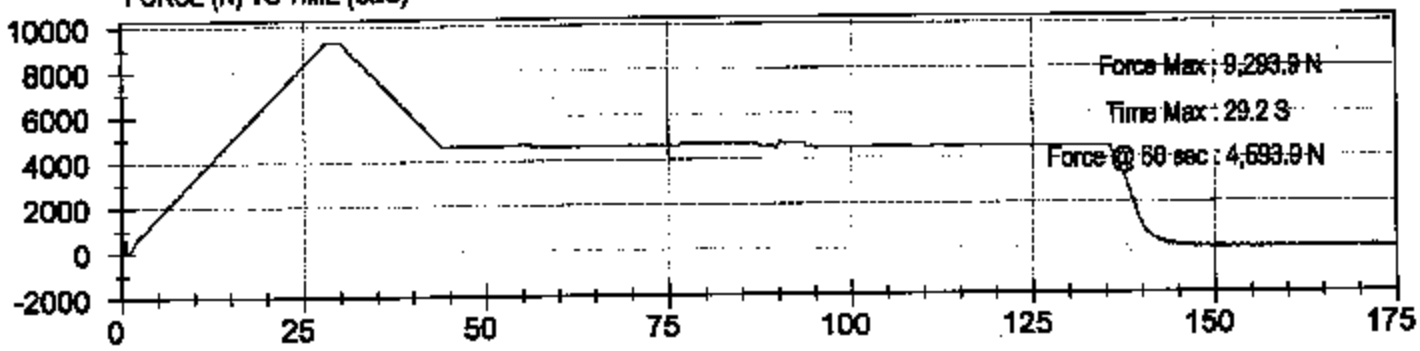
FORCE (N) VS DISPLACEMENT (mm)



DISPLACEMENT (mm) VS TIME (SEC)

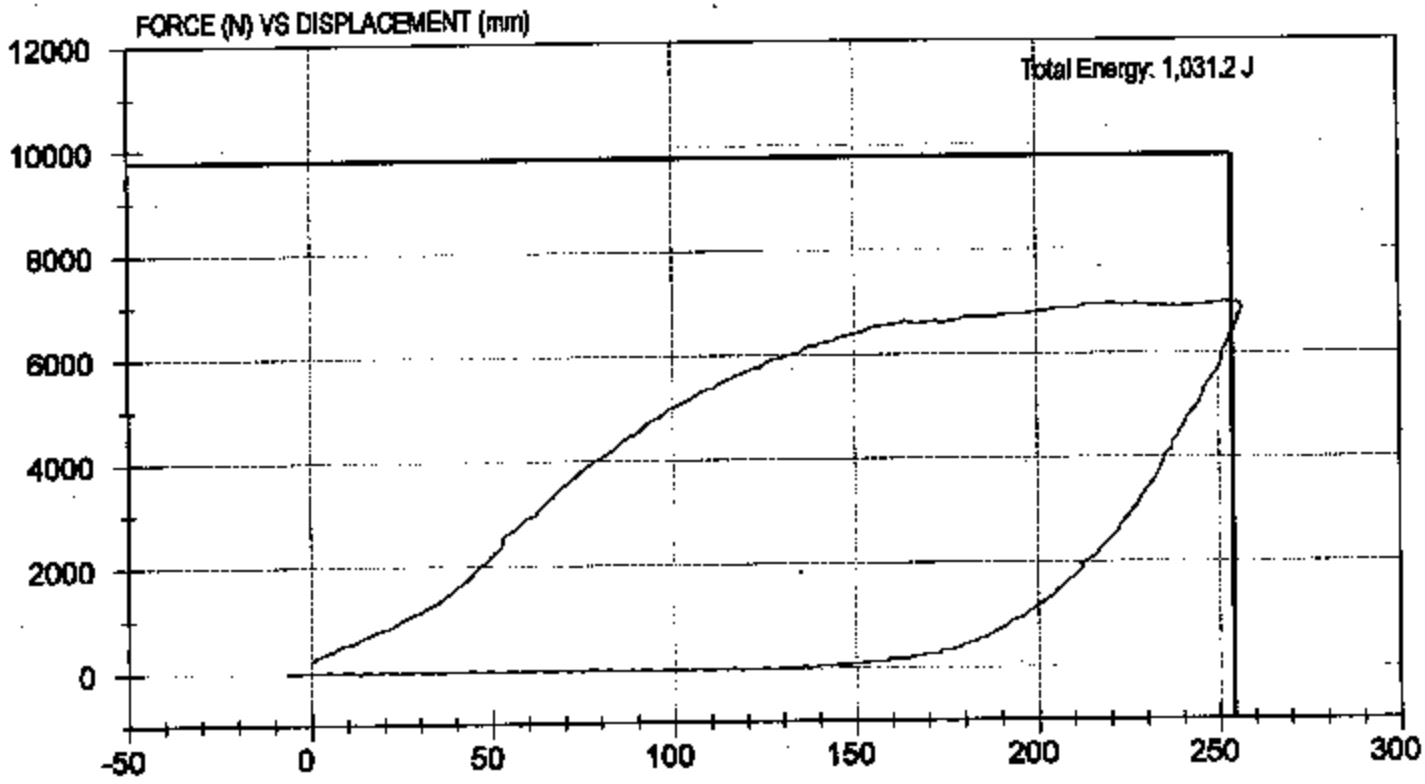


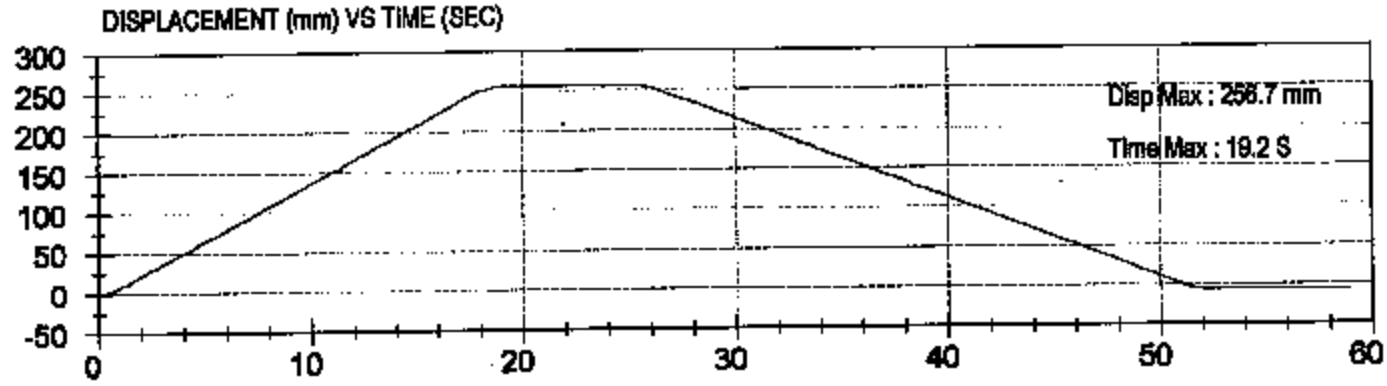
FORCE (N) VS TIME (SEC)

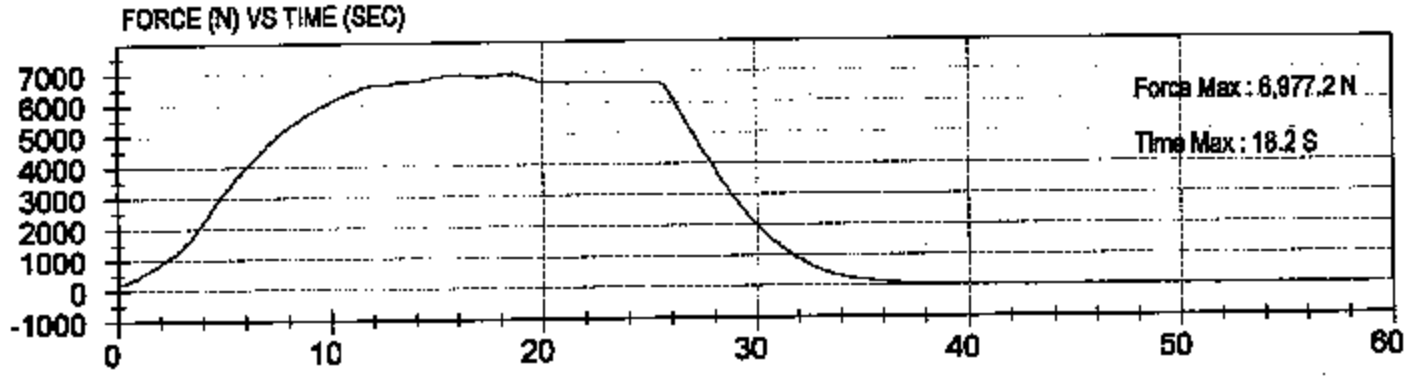


Test Desc: S3 Rearward Deflection
Component ID: Corbell

Test Date: 3-9-05
NHTSA #: C40902

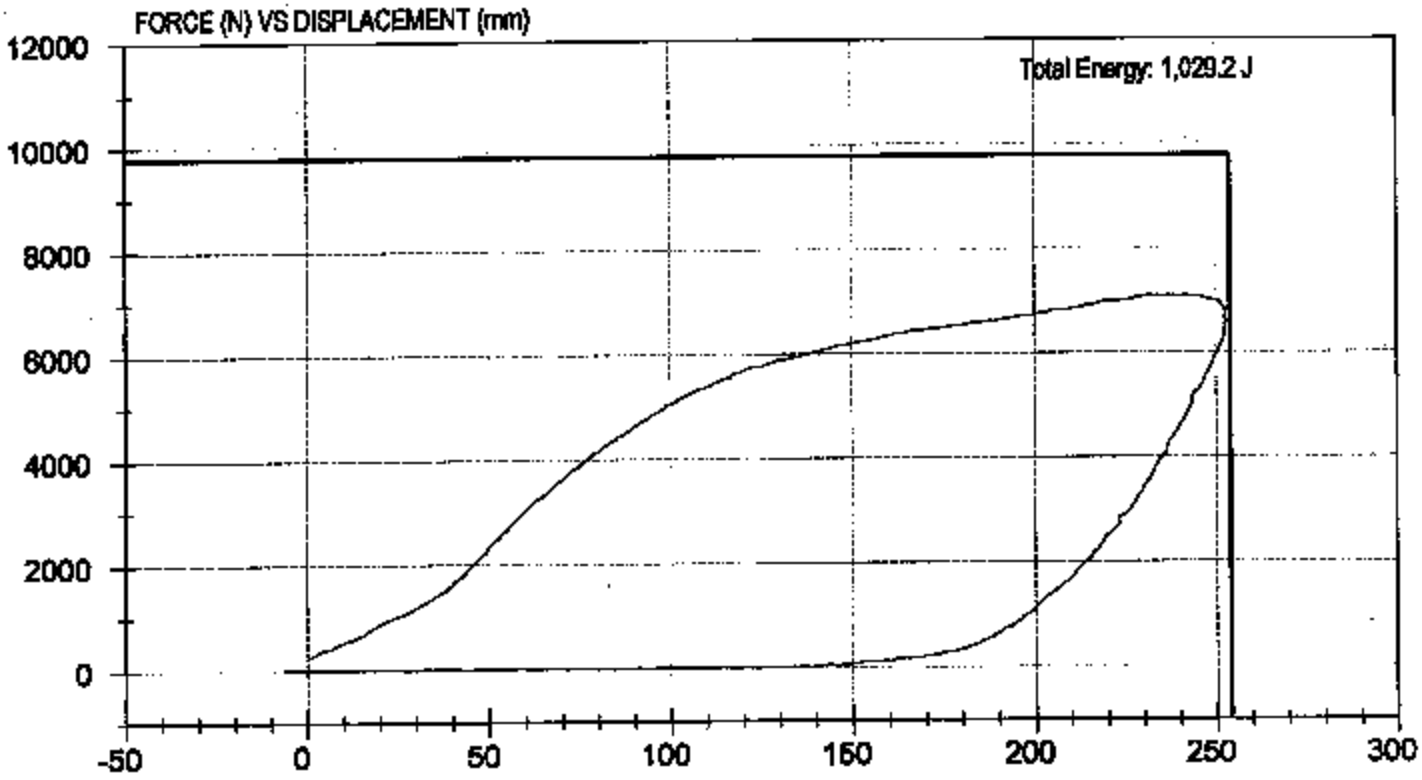


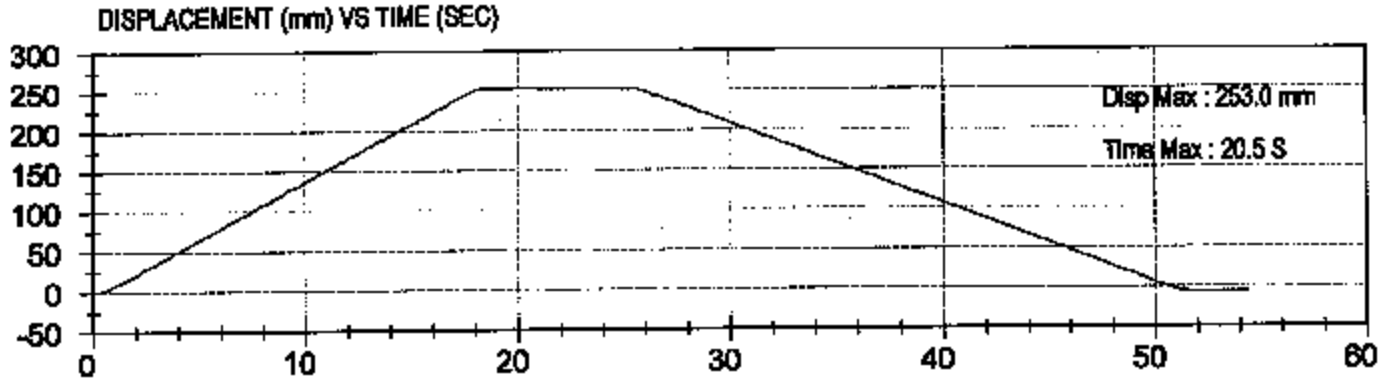


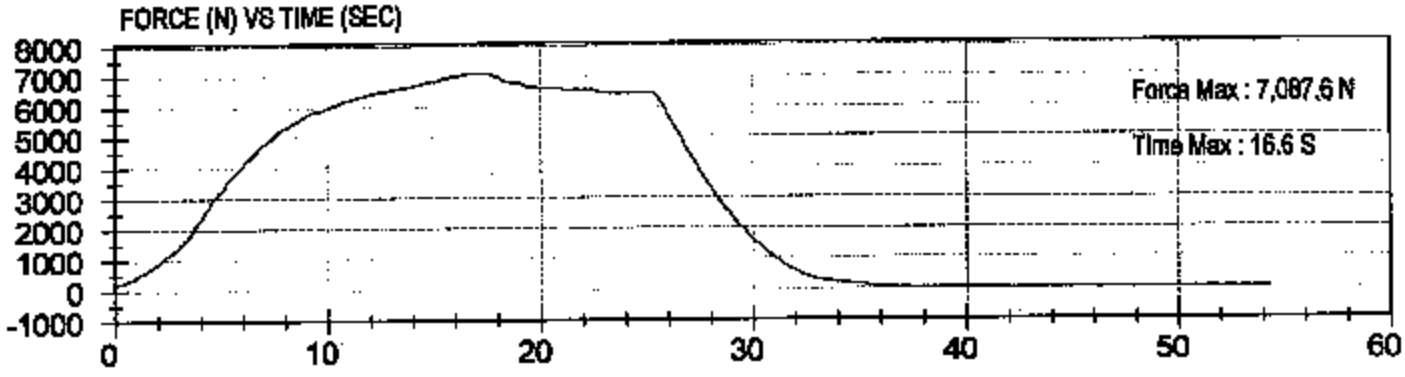


Test Desc: S4 Rearward Deflection
Component ID: Corbeil

Test Date: 3-9-05
NHTSA #: C40902



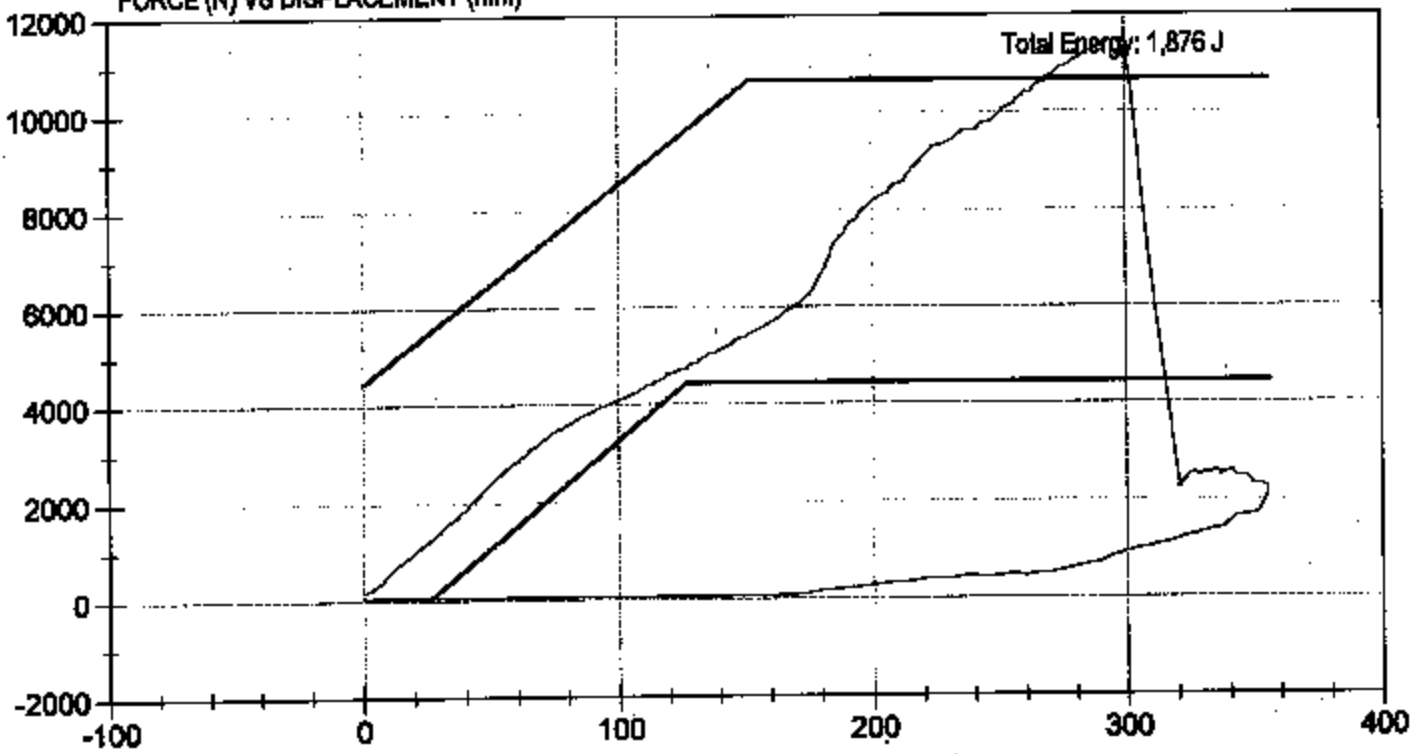




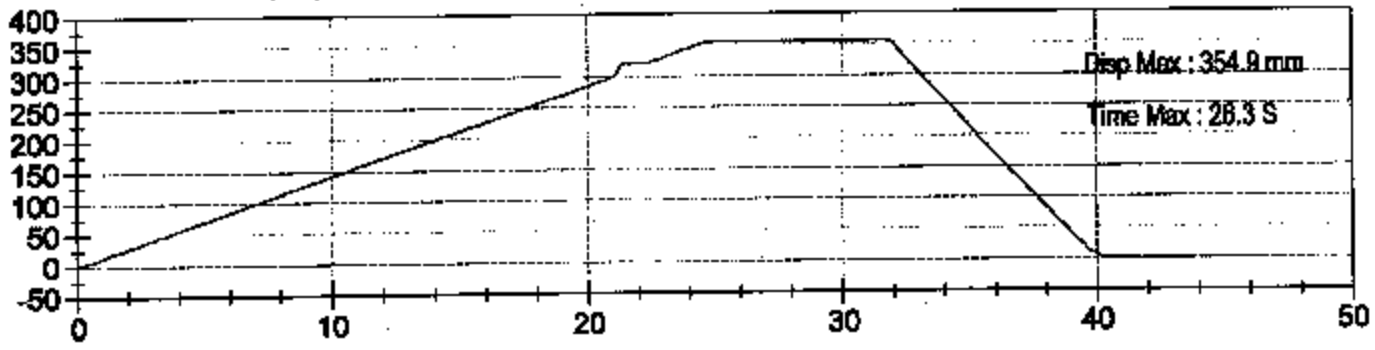
Test Desc: B1 Deflection Forward (Upper)
Component ID: Corbeil

Test Date: 2/22/05
NHTSA #: C40902

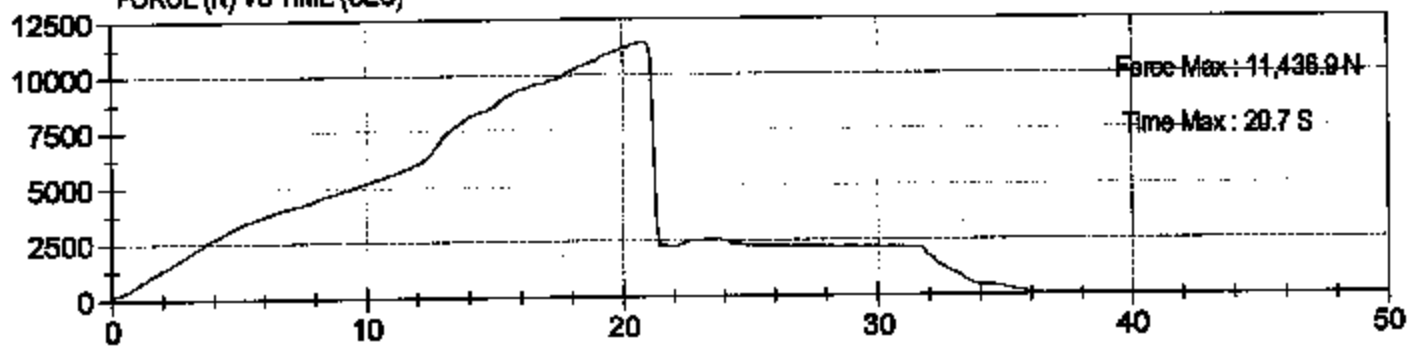
FORCE (N) VS DISPLACEMENT (mm)



DISPLACEMENT (mm) VS TIME (SEC)



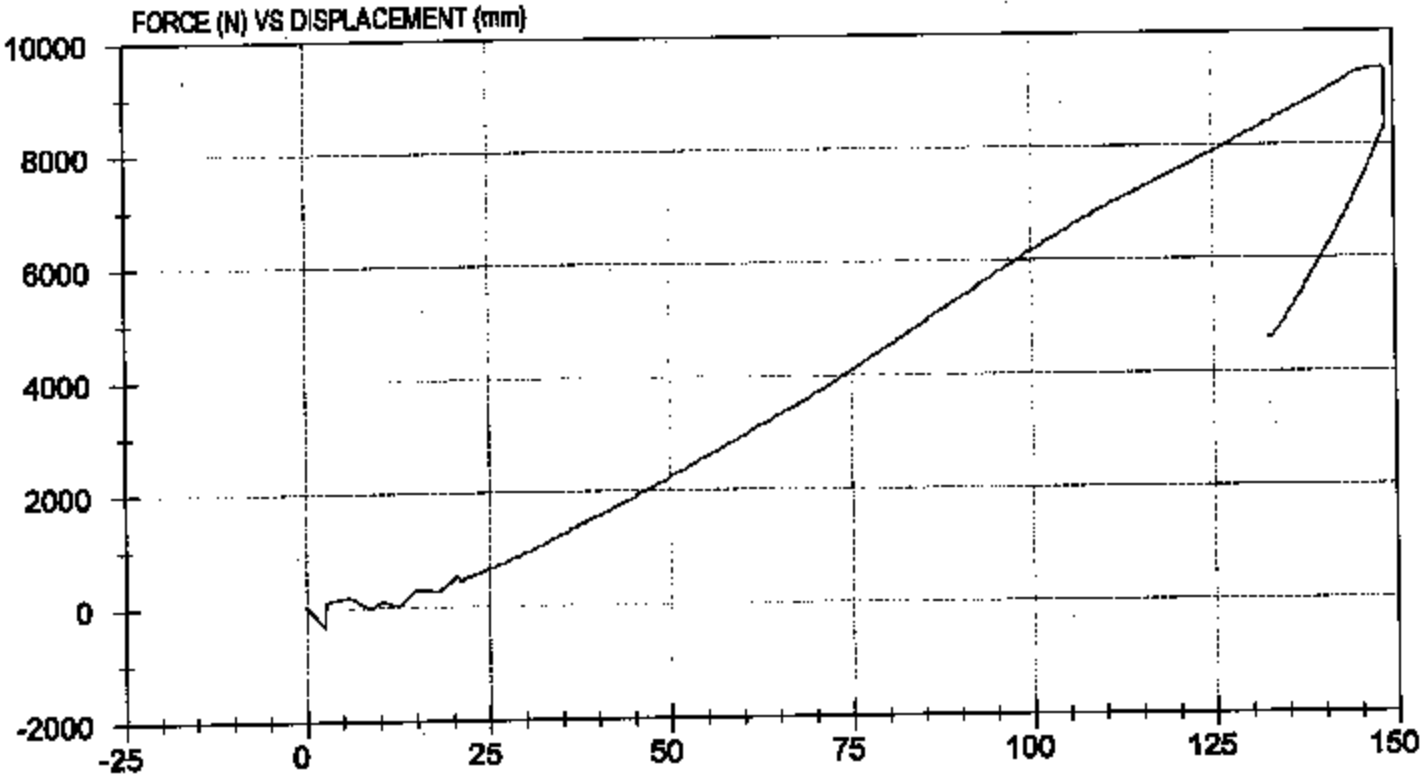
FORCE (N) VS TIME (SEC)



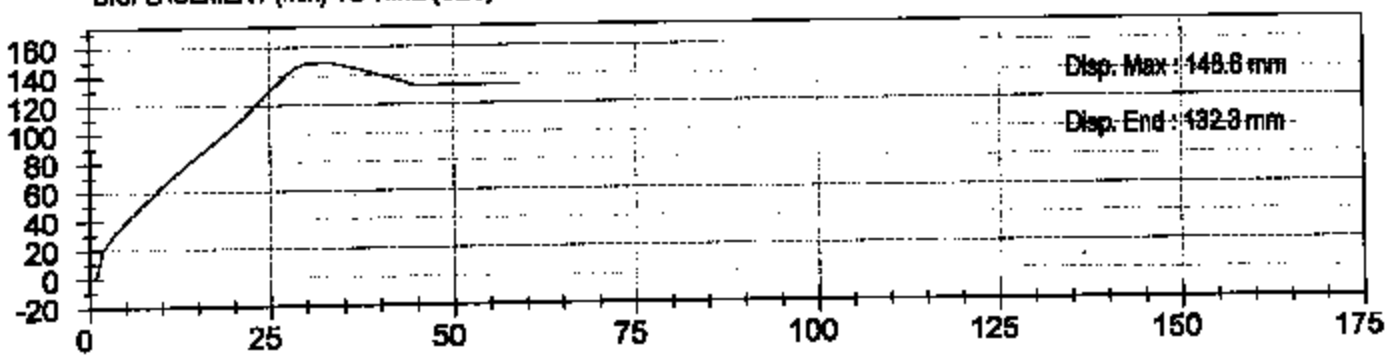
Test Desc: B1 Forward Deflection (Lower)
Component ID: Corbell

Test Date: 2/22/05
NHTSA #: C40902

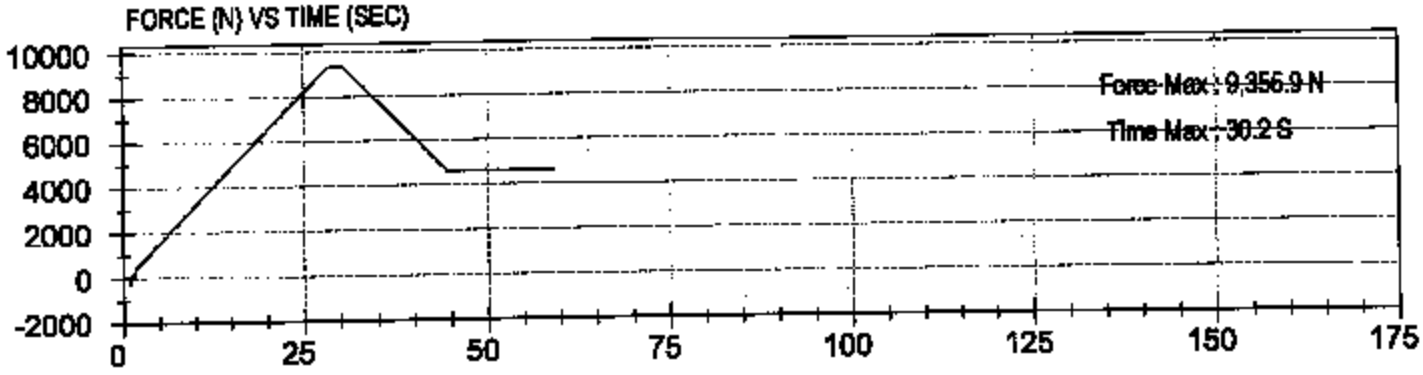
FORCE (N) VS DISPLACEMENT (mm)



DISPLACEMENT (mm) VS TIME (SEC)

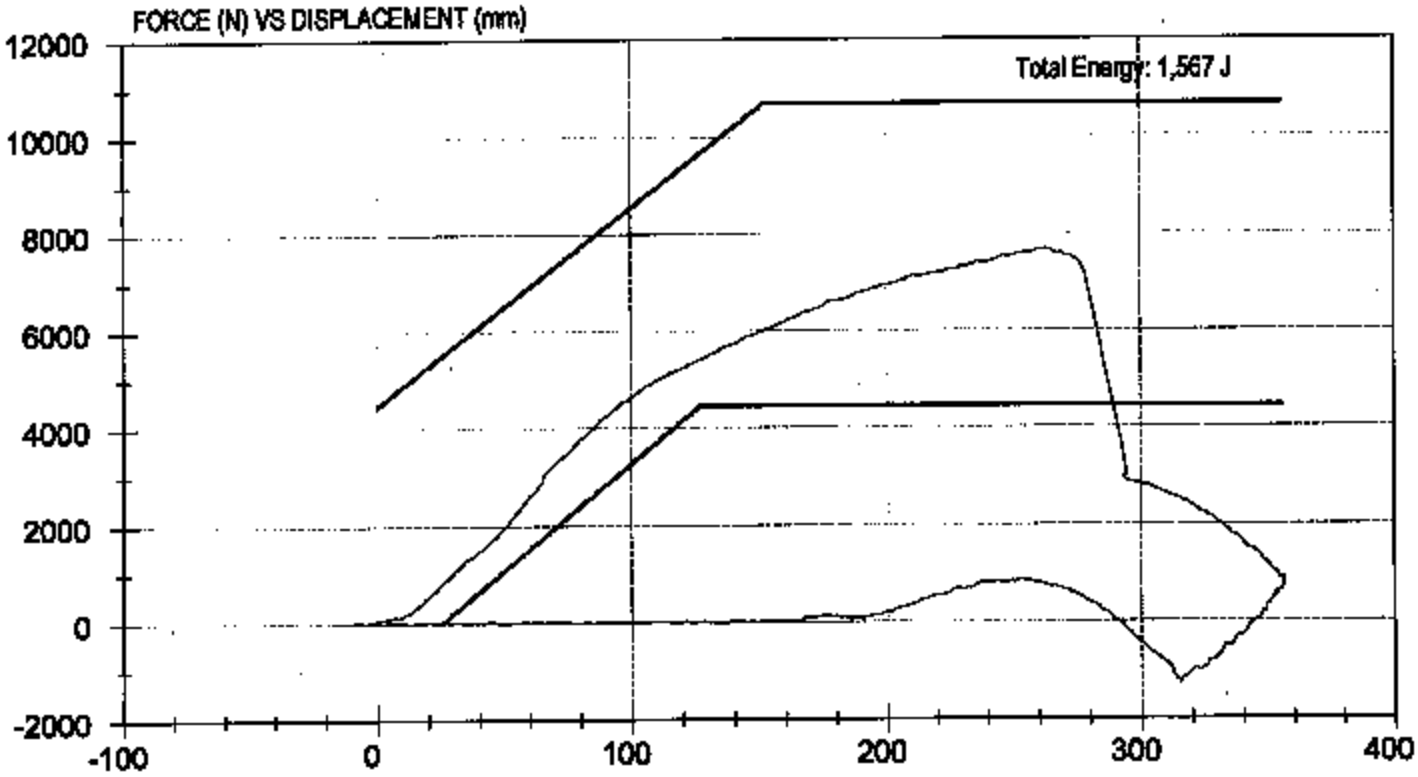


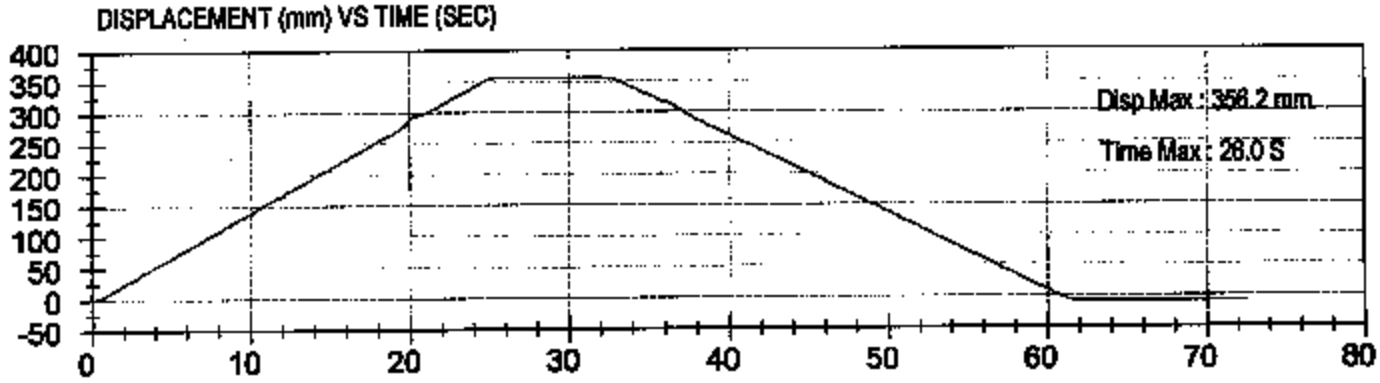
FORCE (N) VS TIME (SEC)

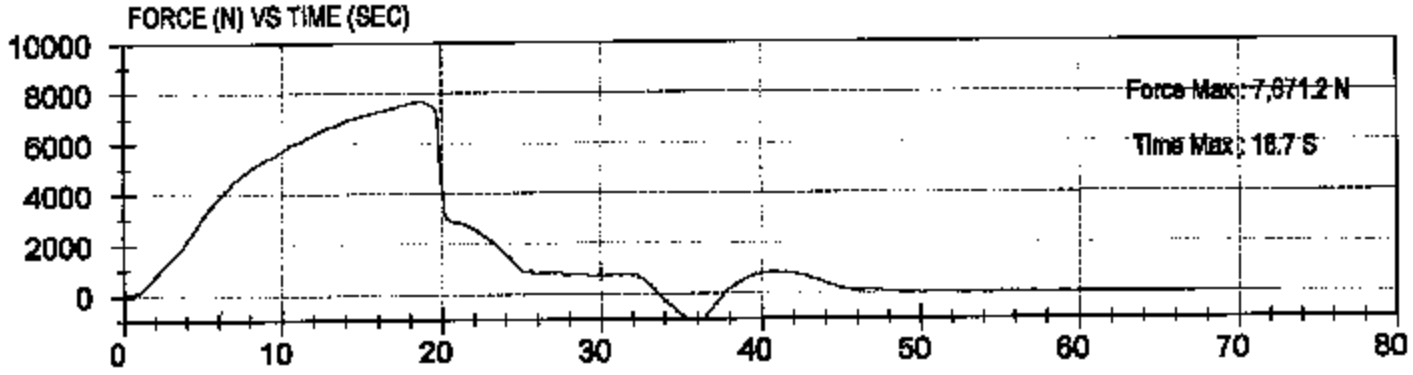


Test Desc: B10 Forward Deflection (Upper)
Component ID: Corbeil

Test Date: 3-9-05
NHTSA #: C40902



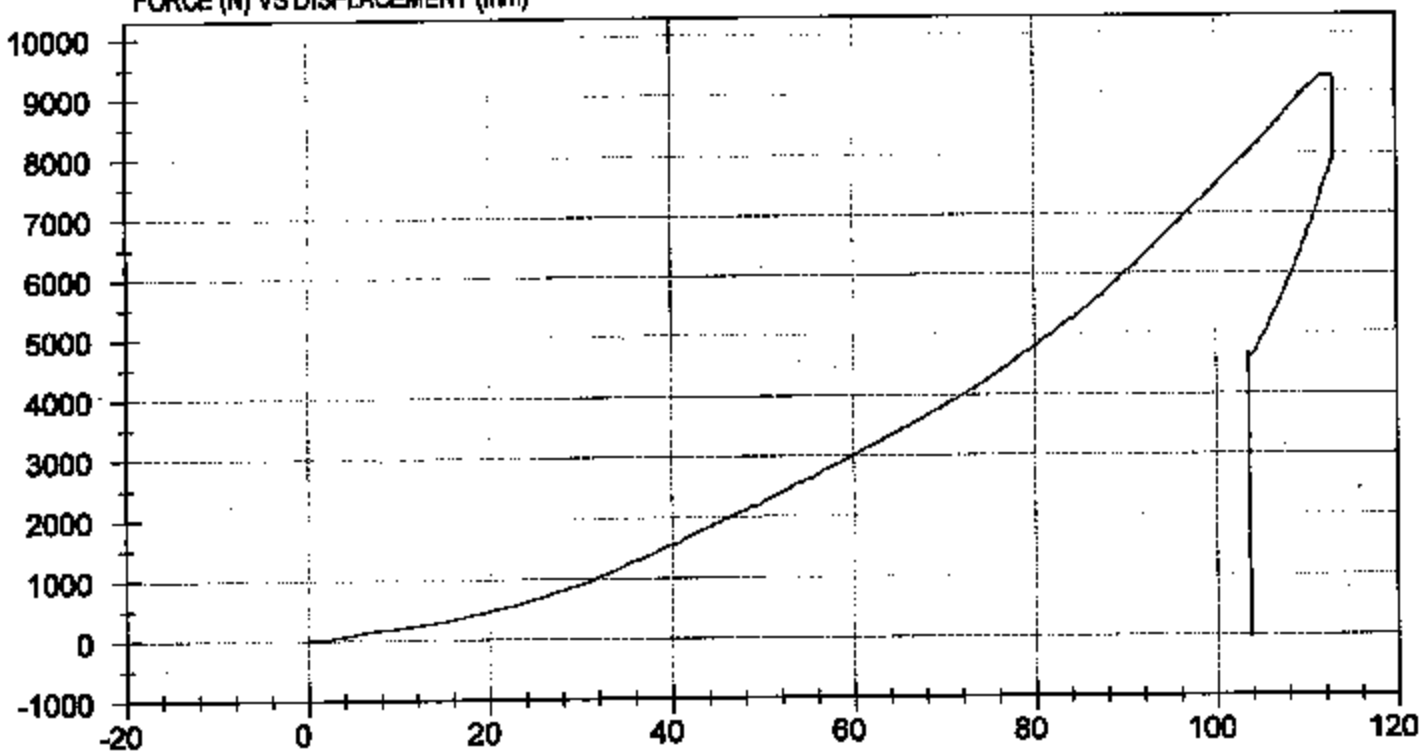




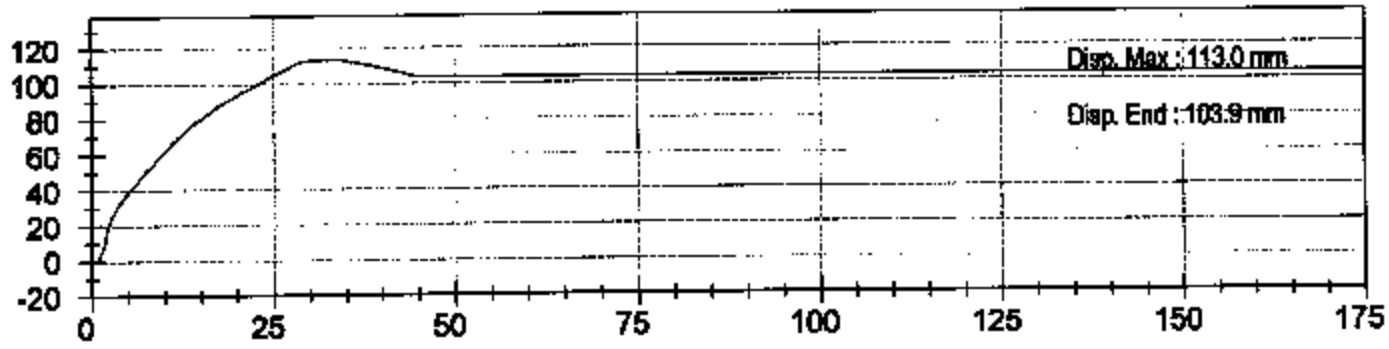
Test Desc: B10 Forward Deflection (Lower)
Component ID: Corbeil

Test Date: 3/9/05
NHTSA #: C40902

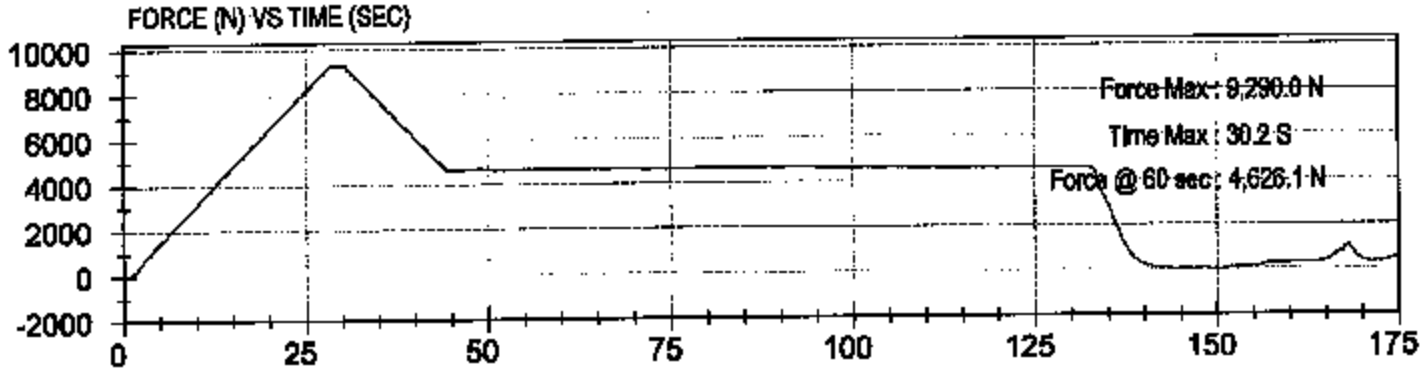
FORCE (N) VS DISPLACEMENT (mm)



DISPLACEMENT (mm) VS TIME (SEC)

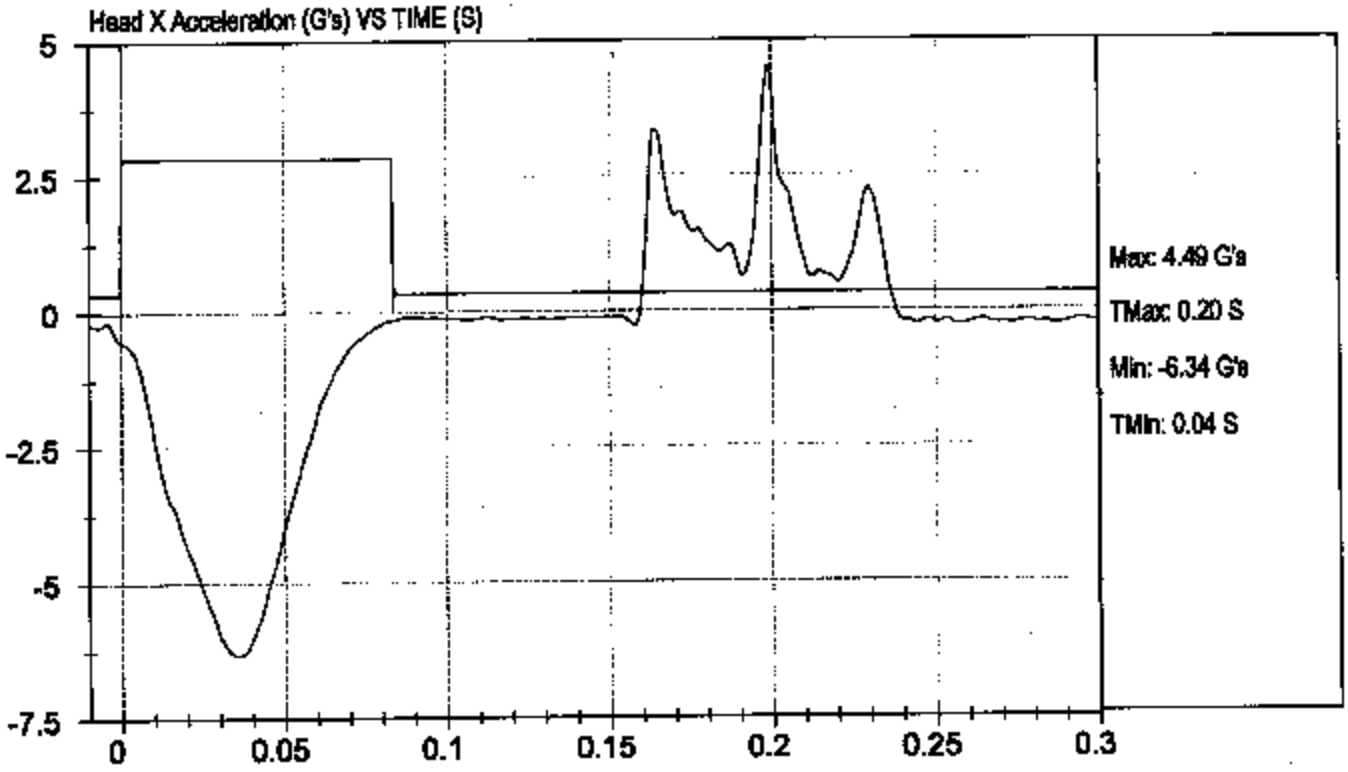


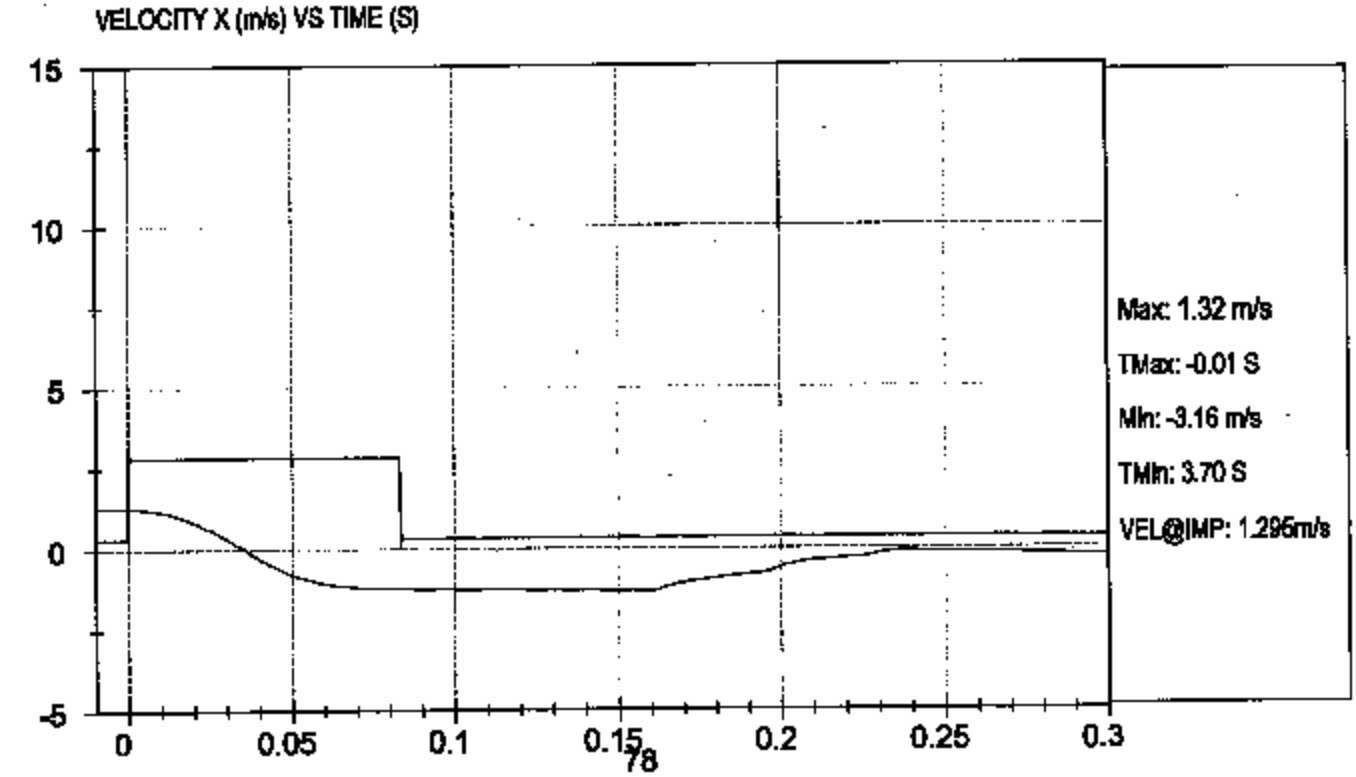
FORCE (N) VS TIME (SEC)



FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Corbell
NHTSA #: C40901

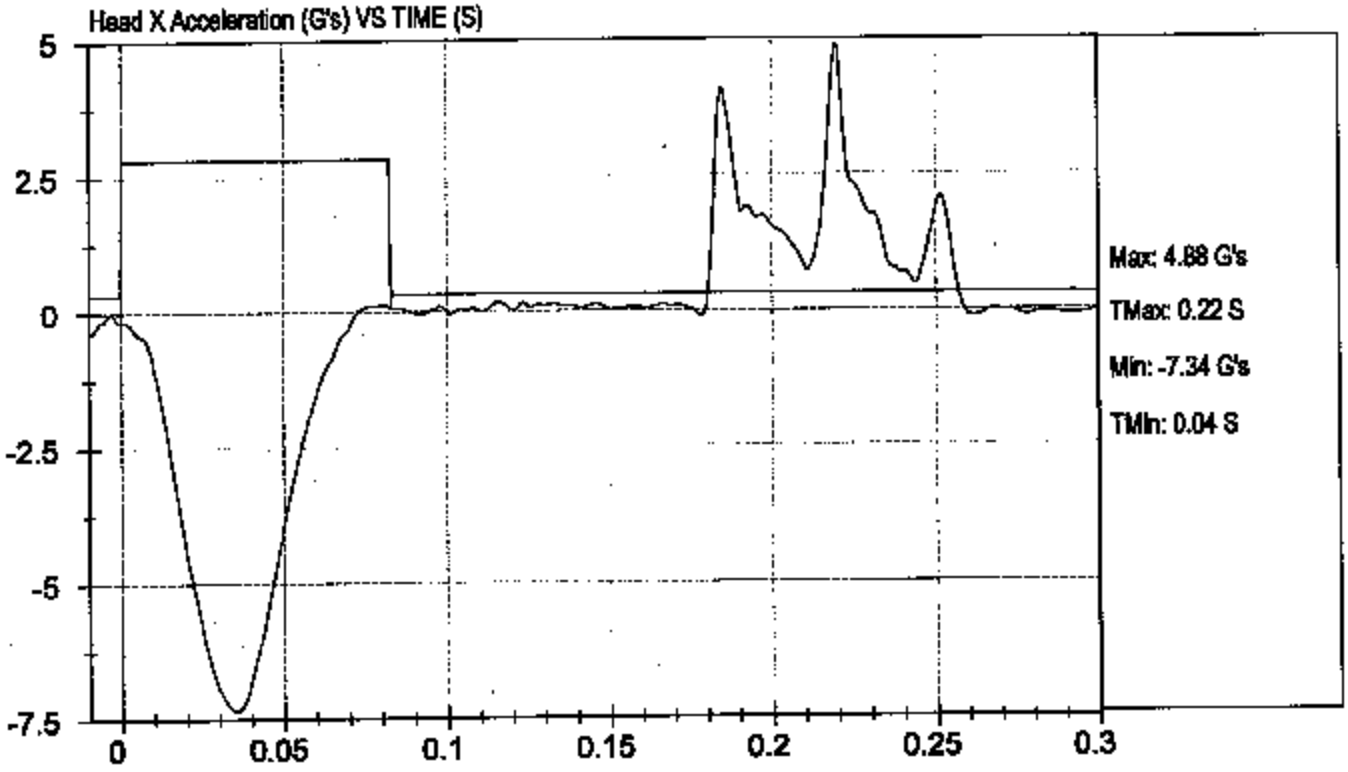
Test Date: 4/6/05
Location: H1

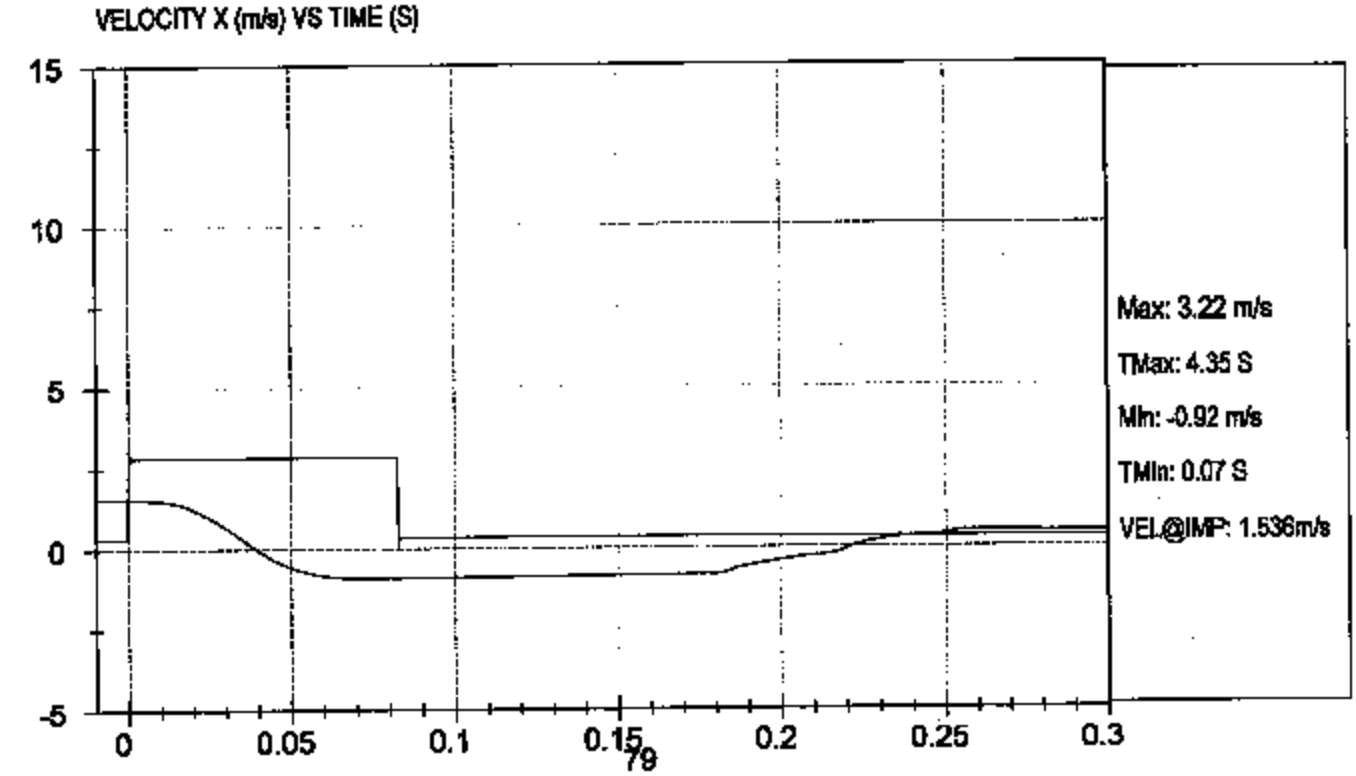




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Corbeil
NHTSA #: C40902

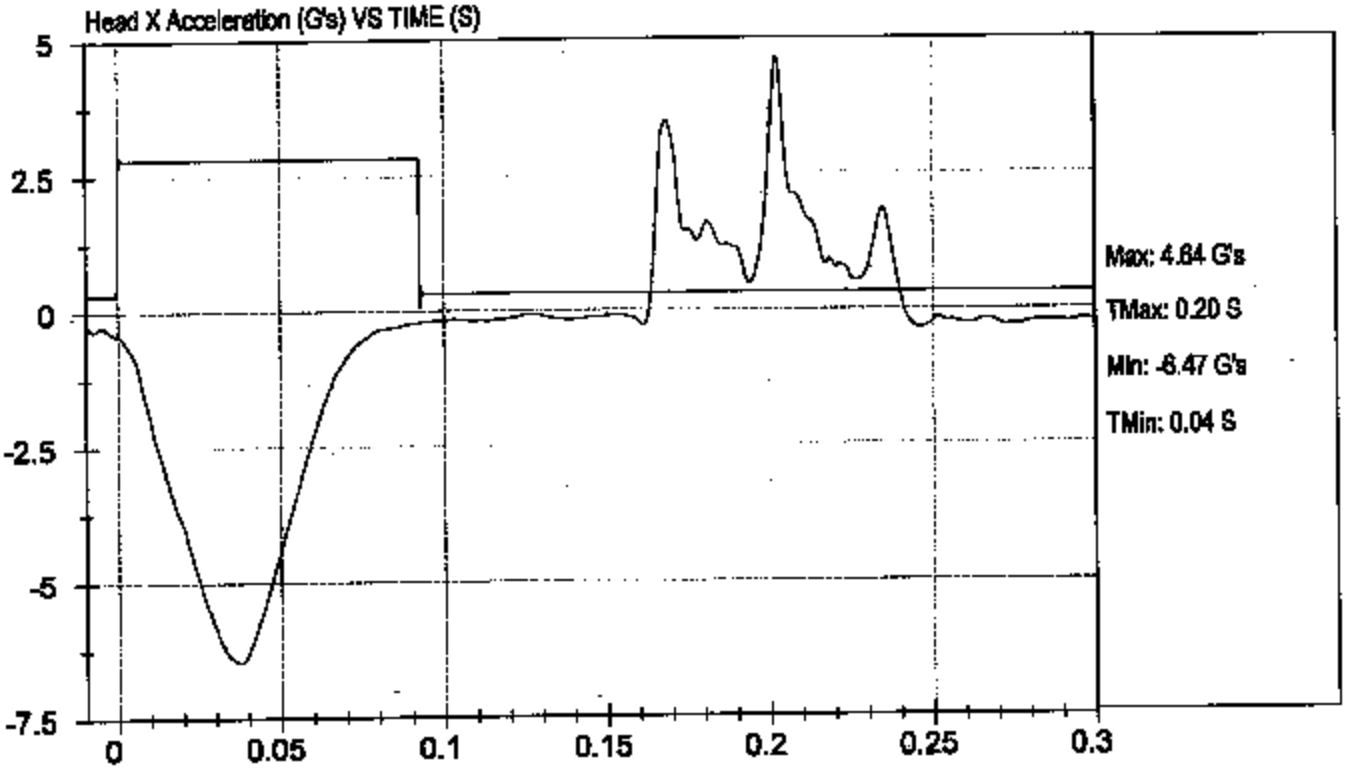
Test Date: 2/24/05
Location: H2

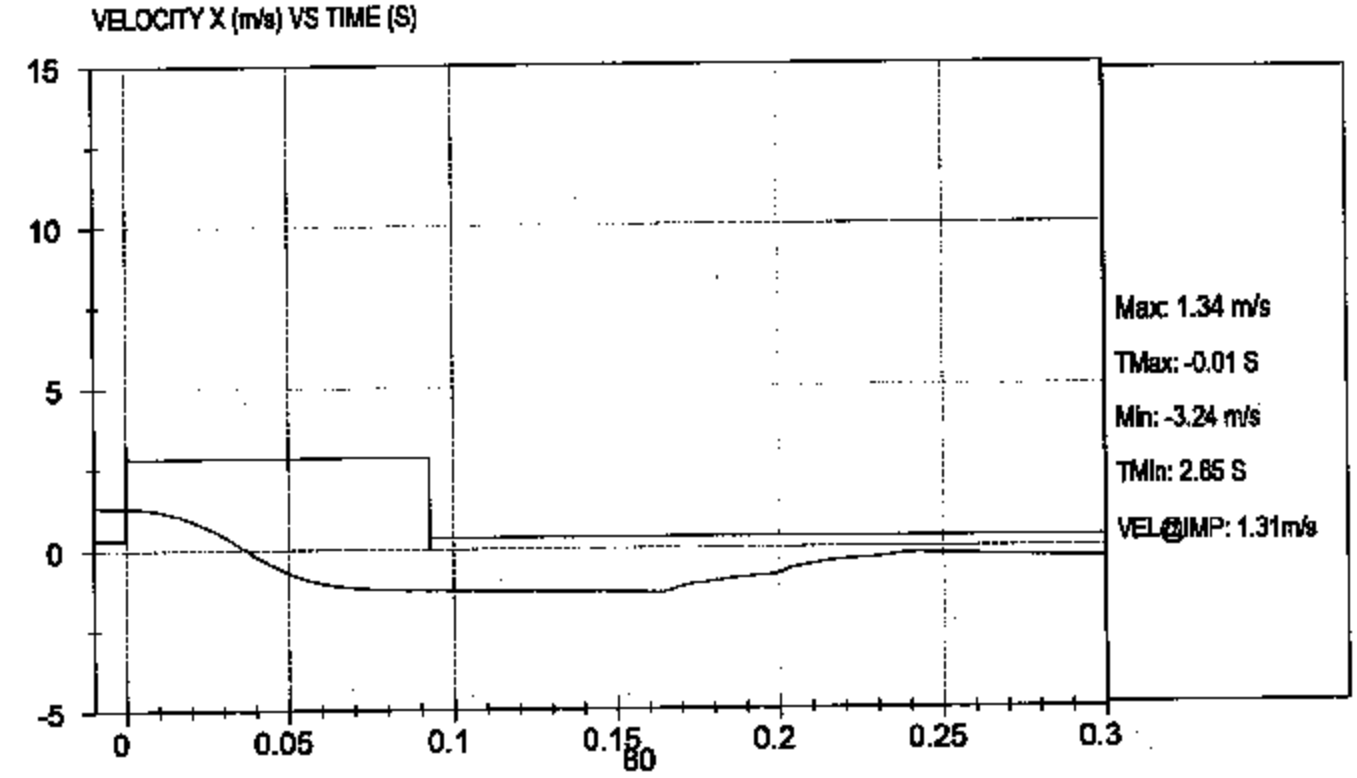




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Corbeli
NHTSA #: C40902

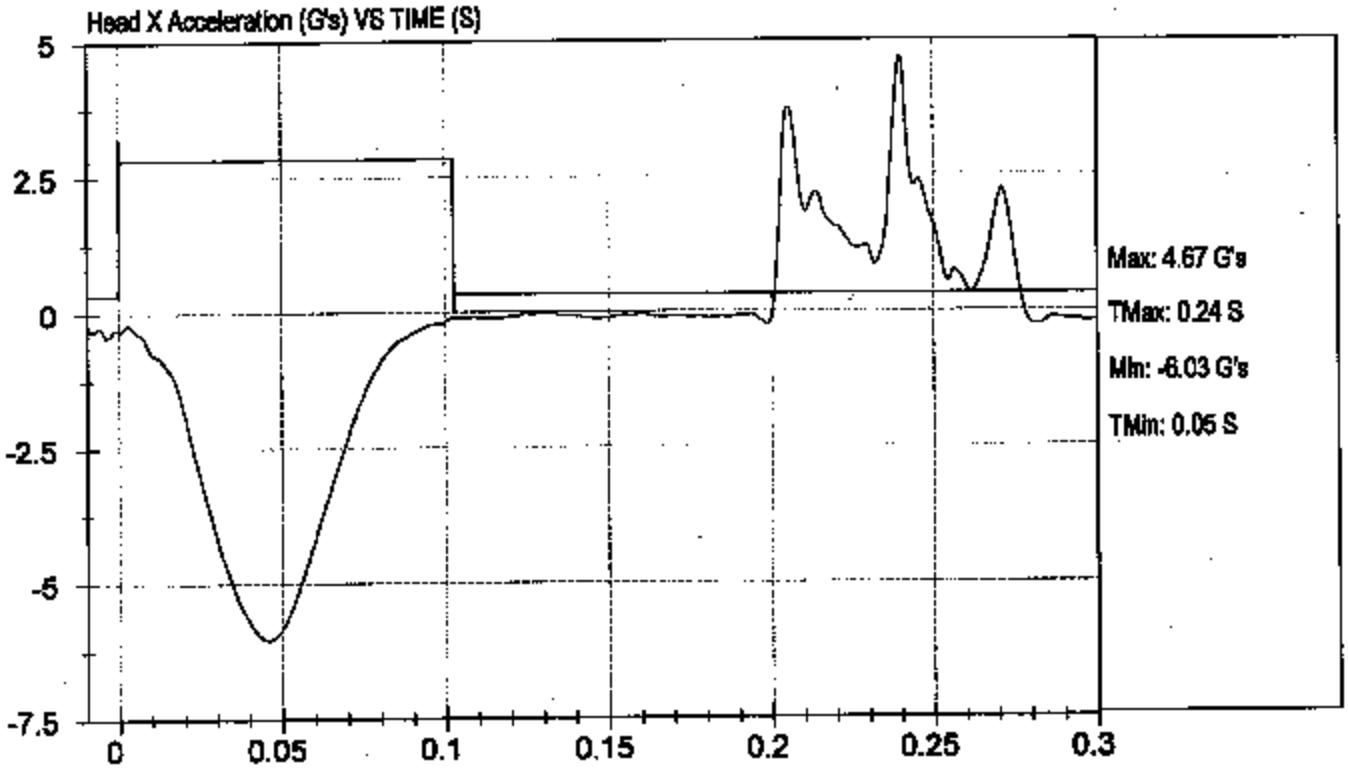
Test Date: 2/24/05
Location: H3

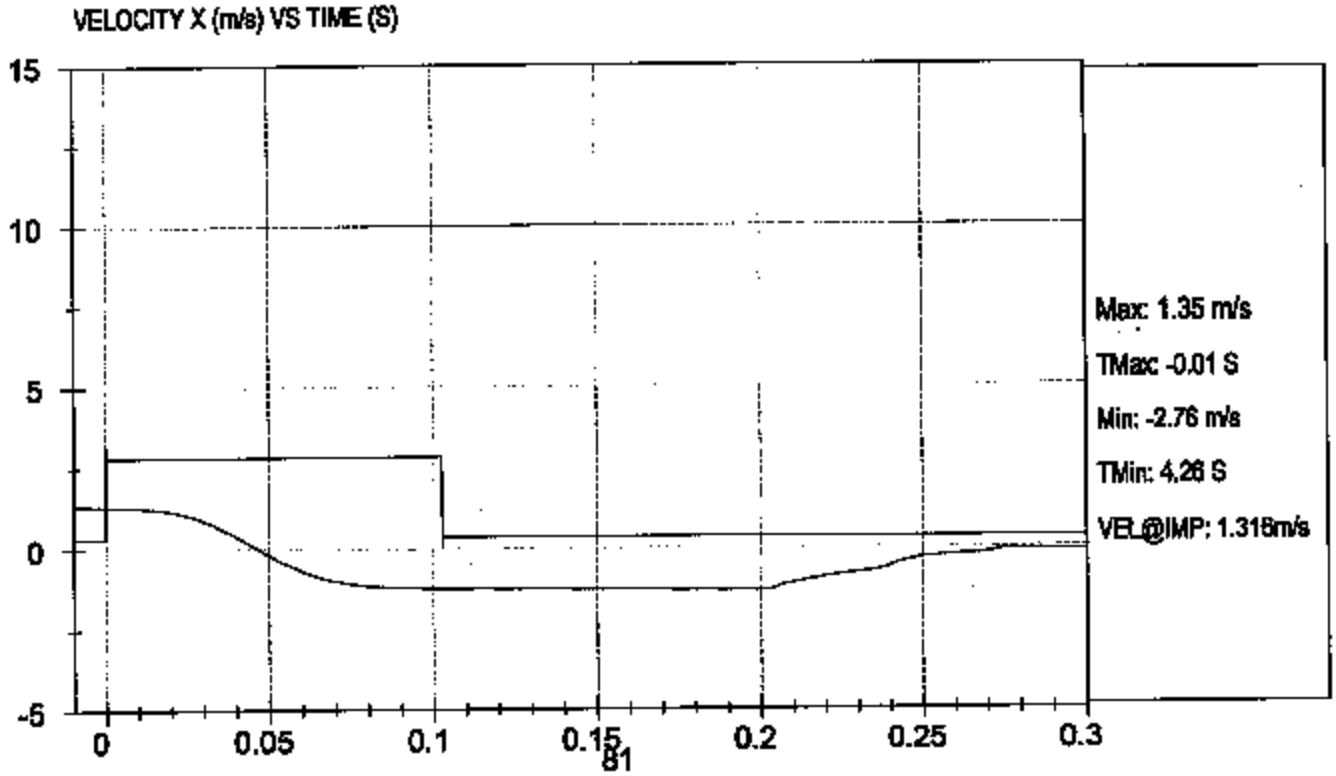




FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Corbeil
NHTSA #: C40902

Test Date: 2/24/05
Location: H4

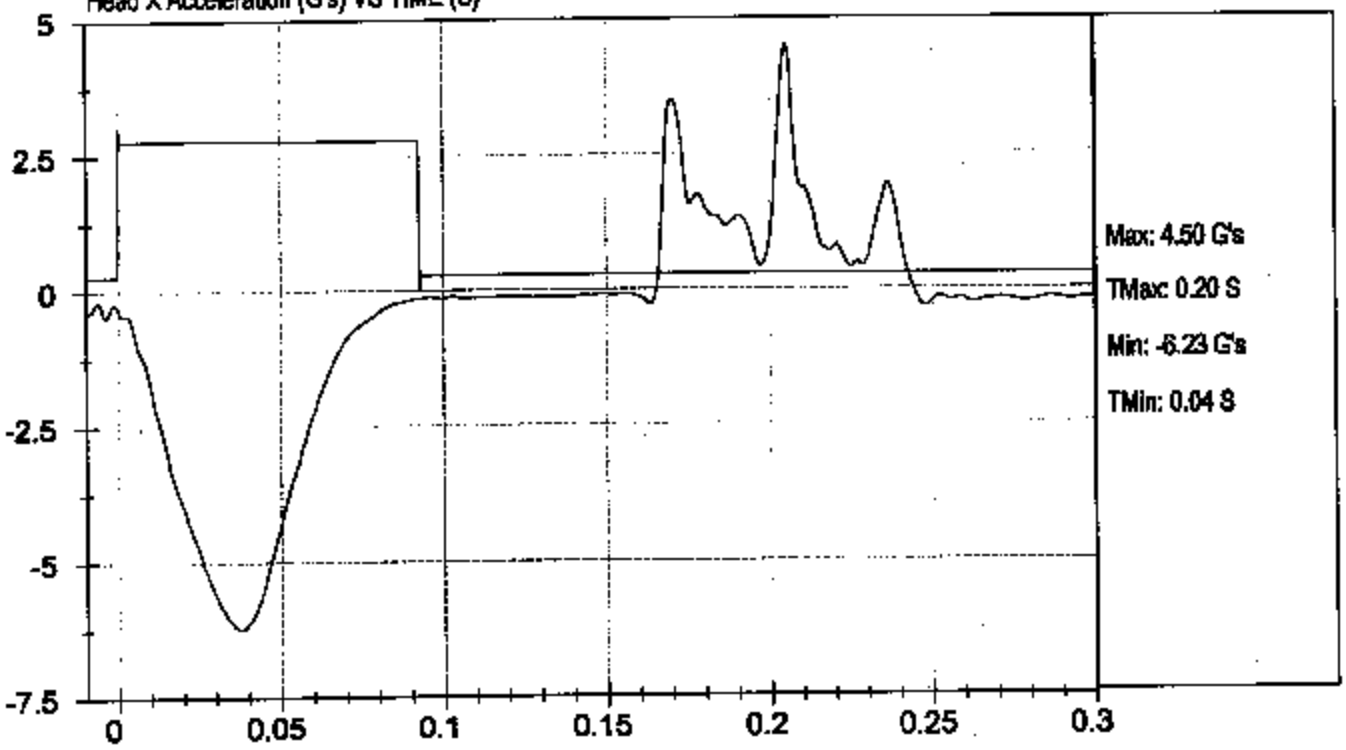




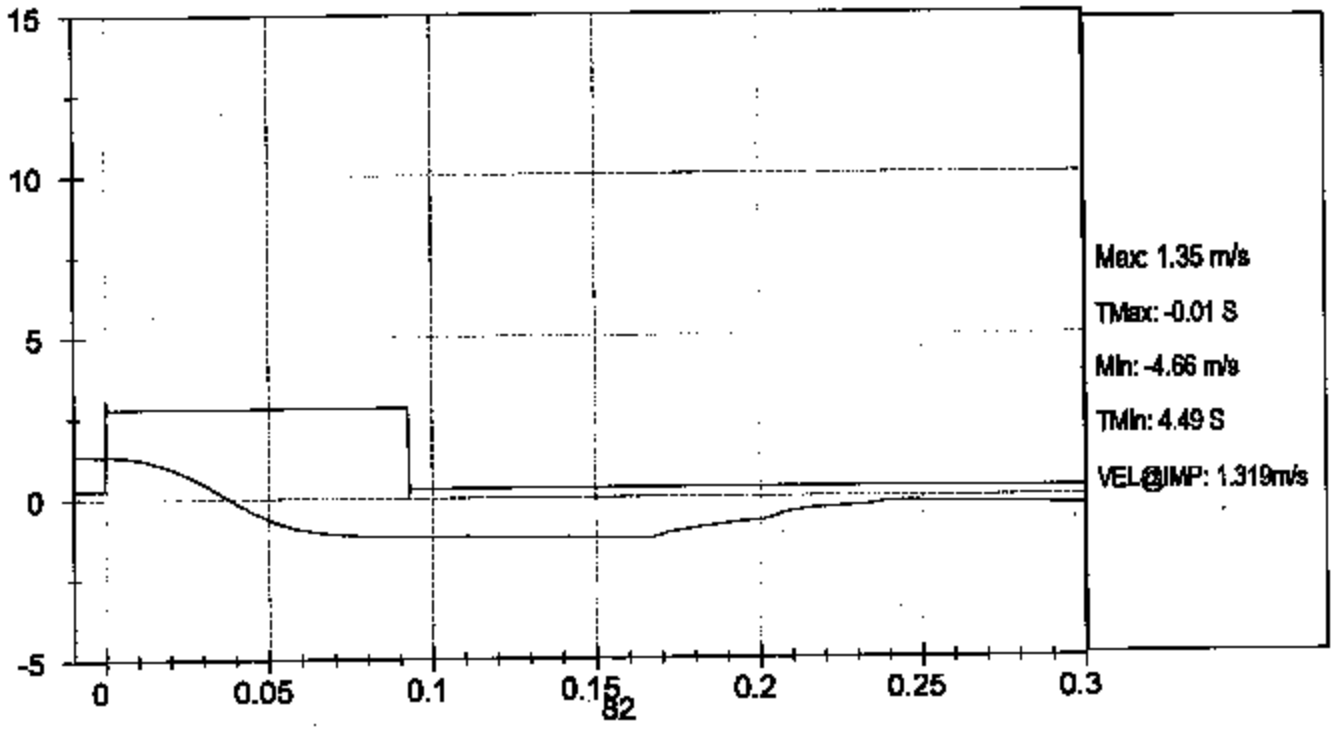
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Corbeil
NHTSA #: C40902

Test Date: 2-25-05
Location: H5

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



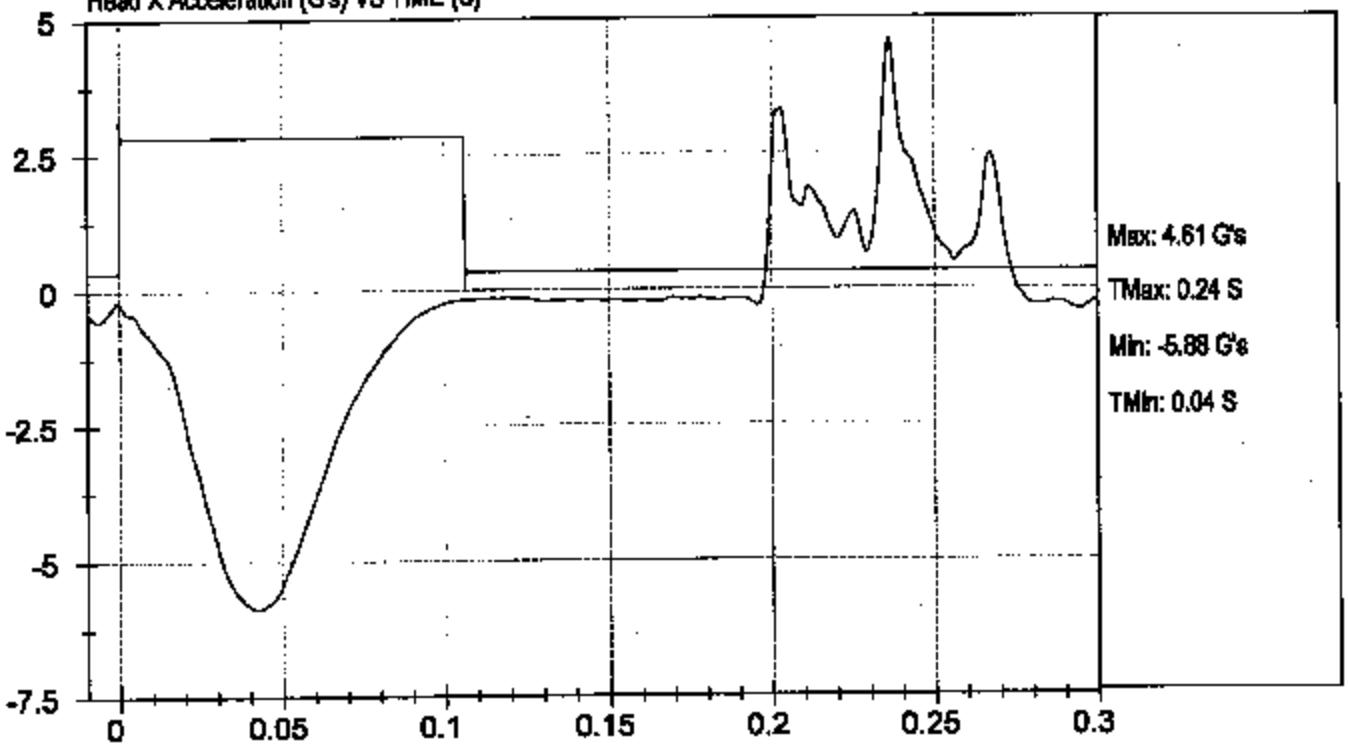
VELOCITY X (m/s) VS TIME (S)



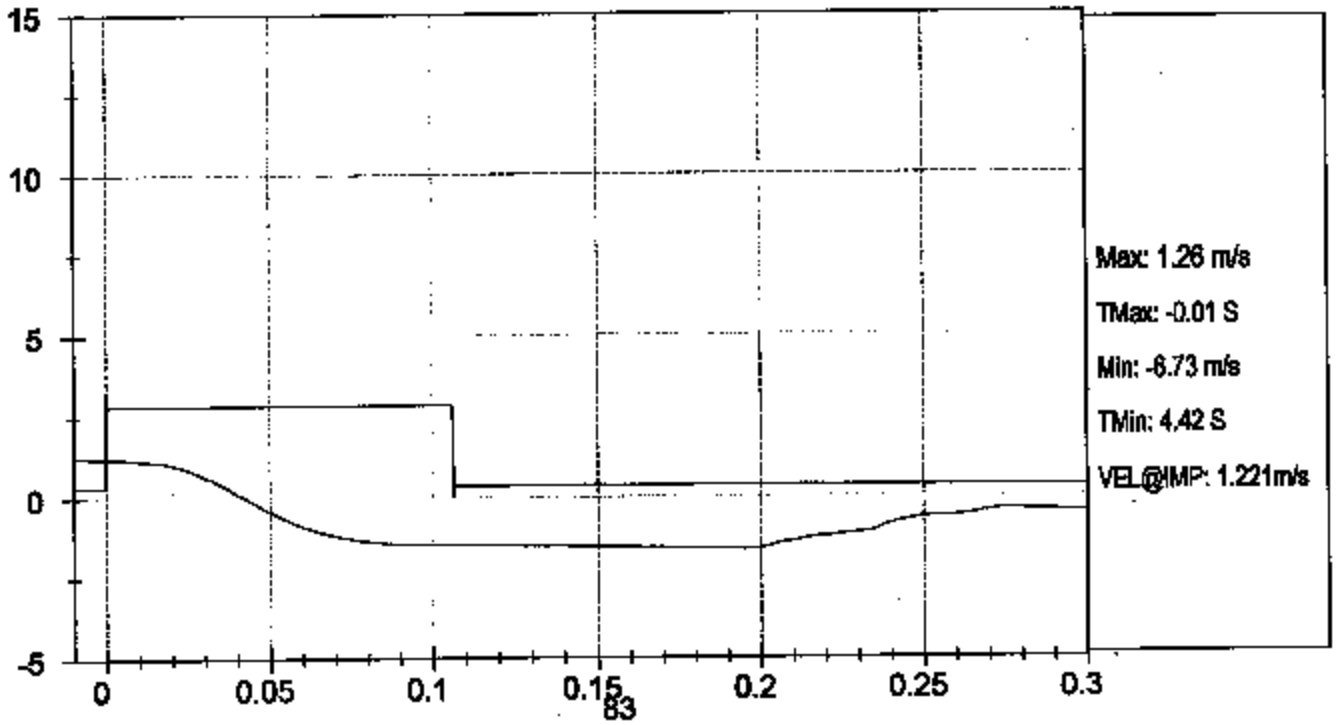
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Corbell
NHTSA #: C40802

Test Date: 2/24/05
Location: H6

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



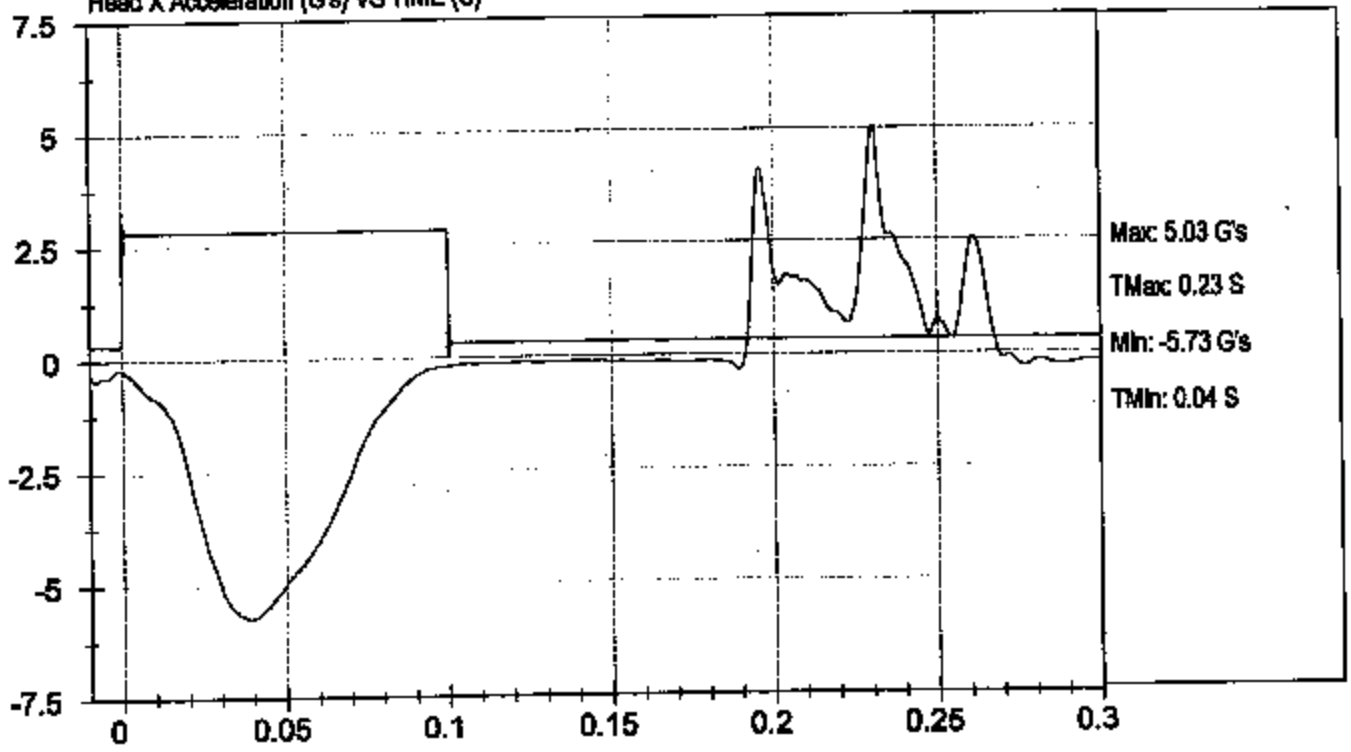
VELOCITY X (m/s) VS TIME (S)



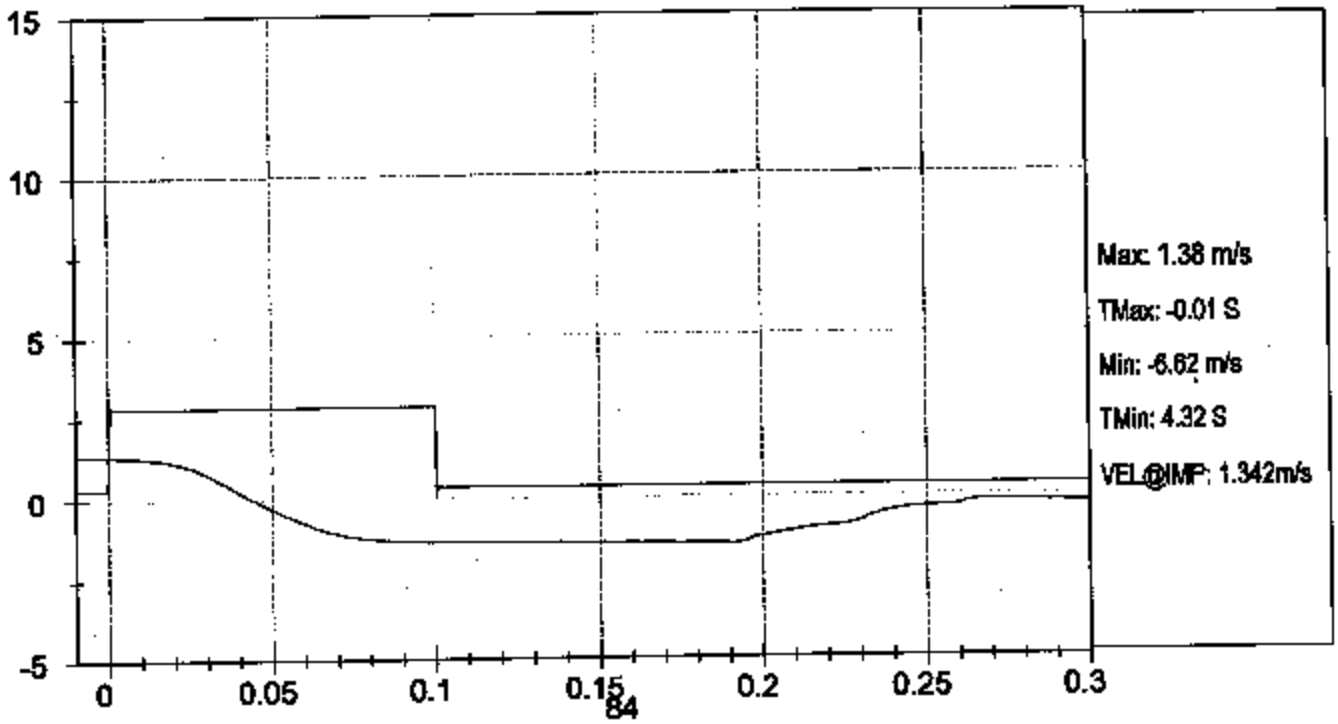
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Vehicle: Corbell
NHTSA #: C40902

Test Date: 2/24/06
Location: H7

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



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



HEAD FORM IMPACT (6.69 m/s)

Test Date: 3-4-05

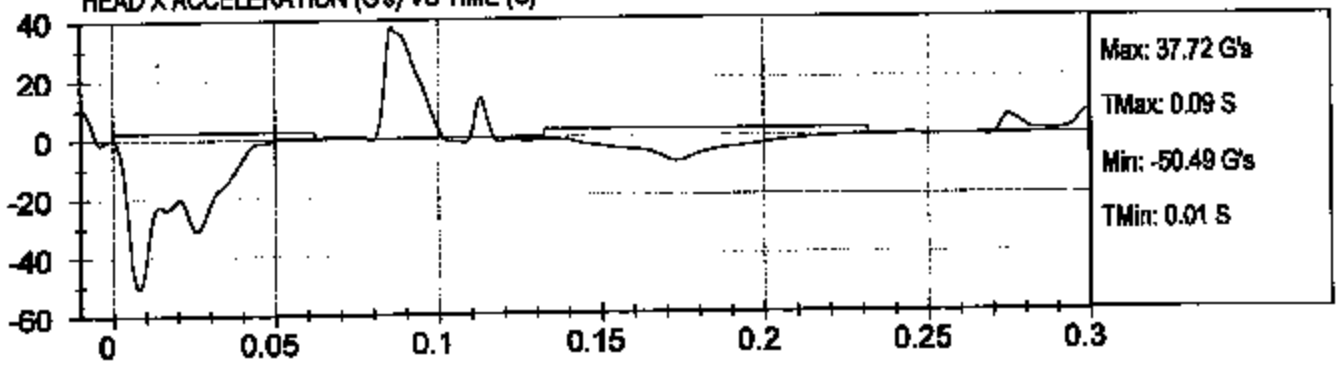
Component ID: Corbell

NHTSA#: C40902

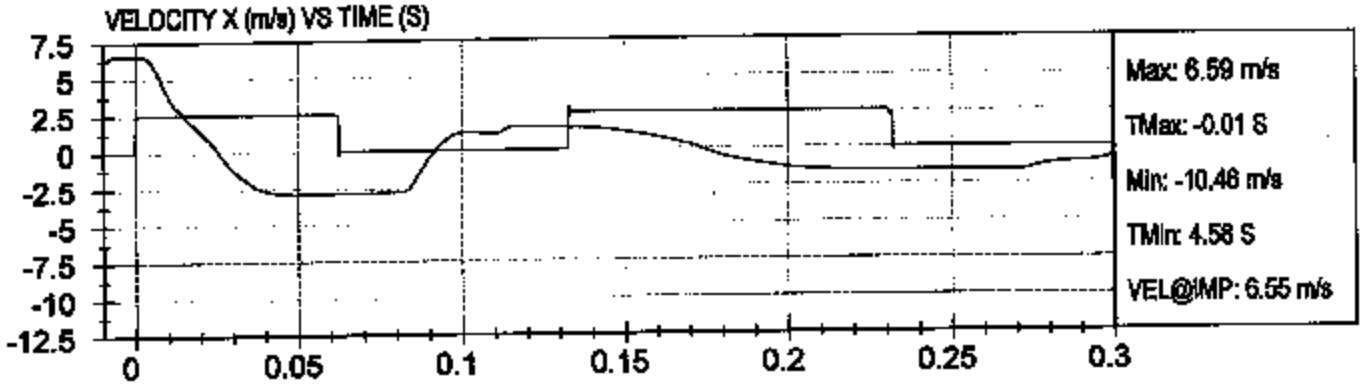
Location: H8

Hic: 126.92 T1: 3.80 ms T2: 32.80 ms

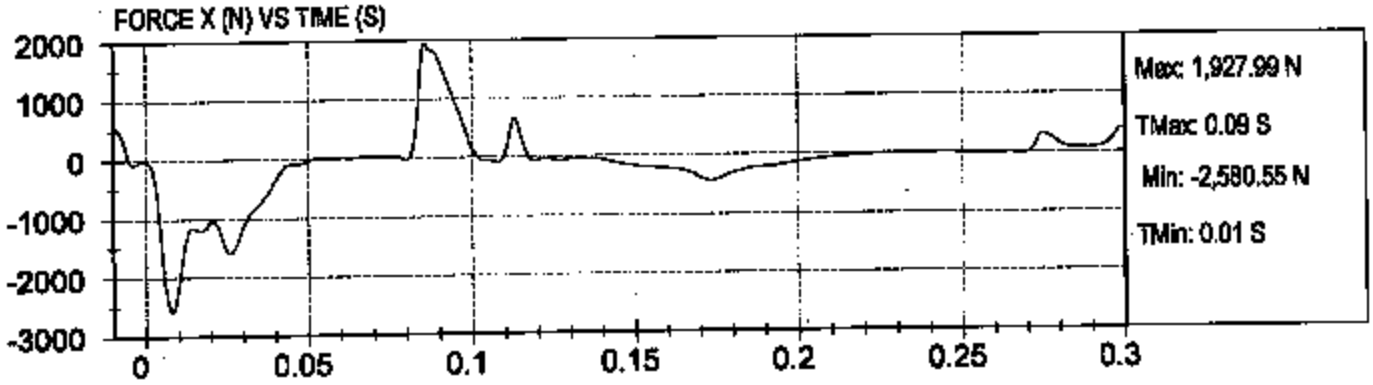
HEAD X ACCELERATION (G's) VS TIME (S)



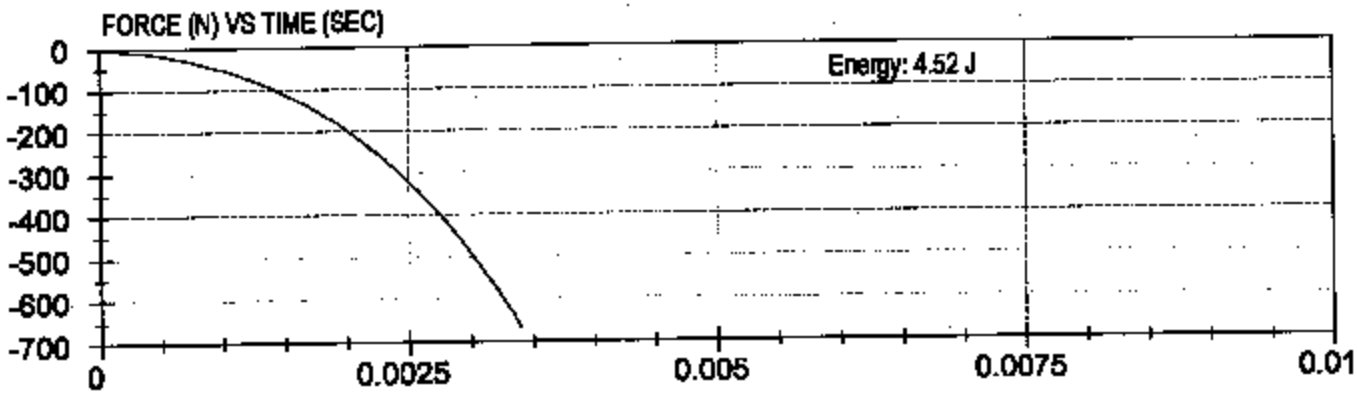
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



HEAD FORM IMPACT (6.69 m/s)

Test Date: 3-4-05

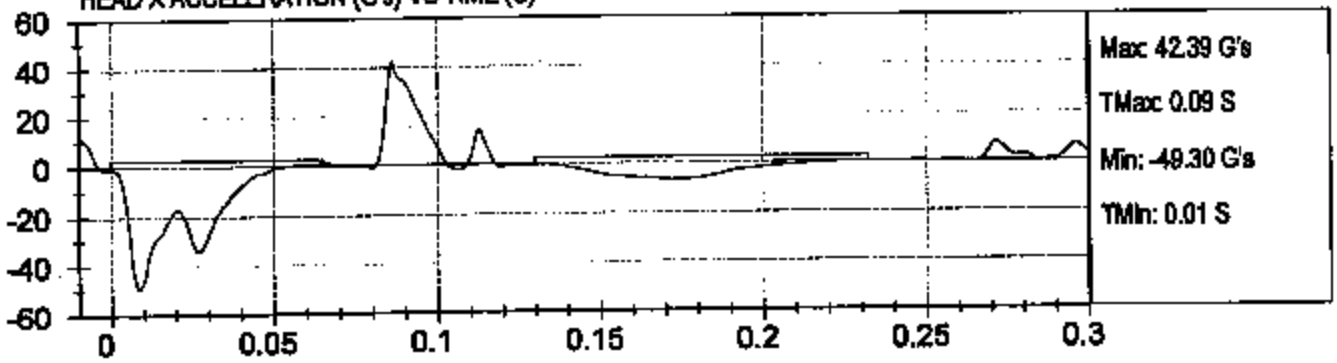
Component ID: Corbell

NHTSA#: C40902

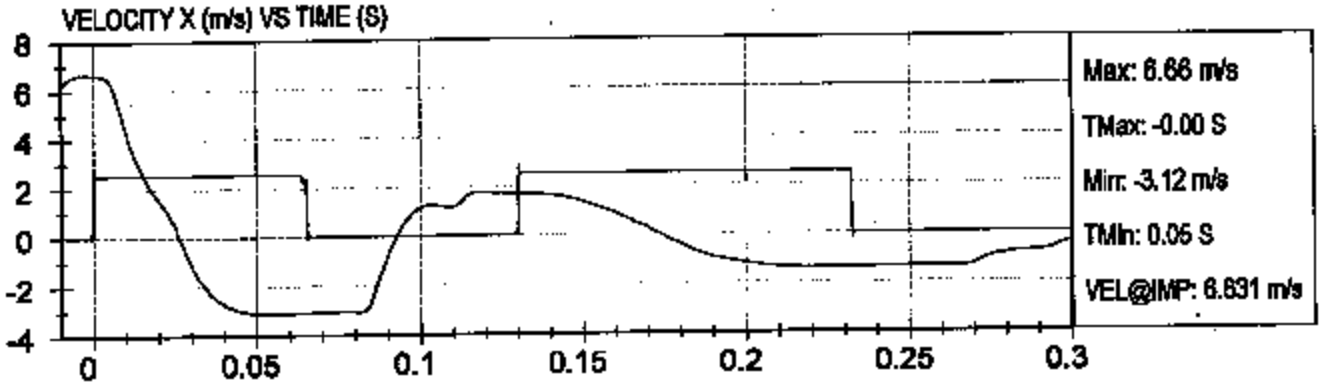
Location: H9

Hic: 134.78 T1: 4.70 ms T2: 33.90 ms

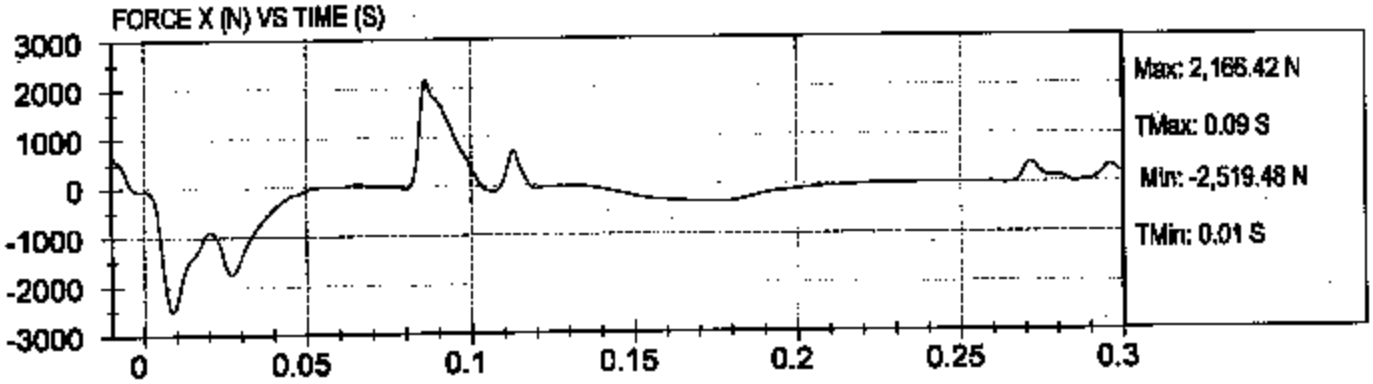
HEAD X ACCELERATION (G's) VS TIME (S)



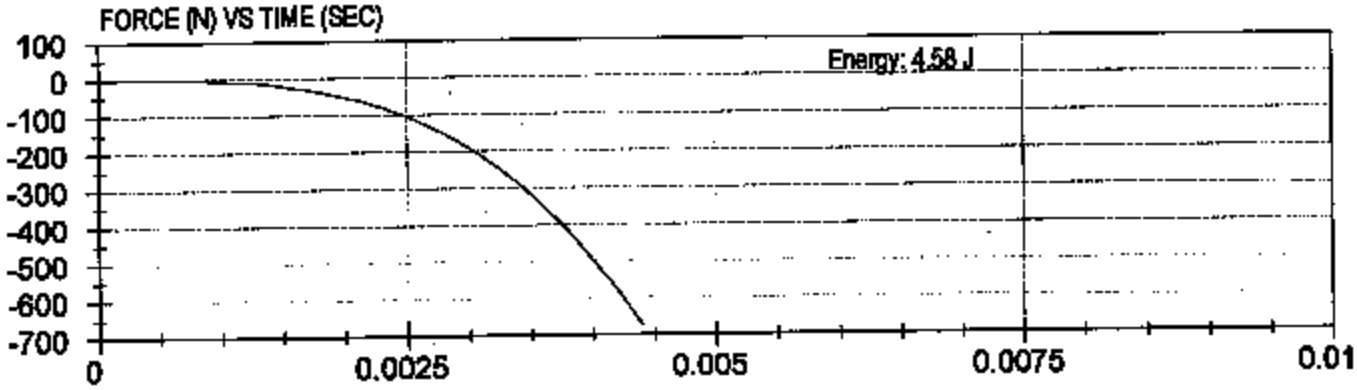
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



HEAD FORM IMPACT (6.69 m/s)

Test Date: 3-8-05

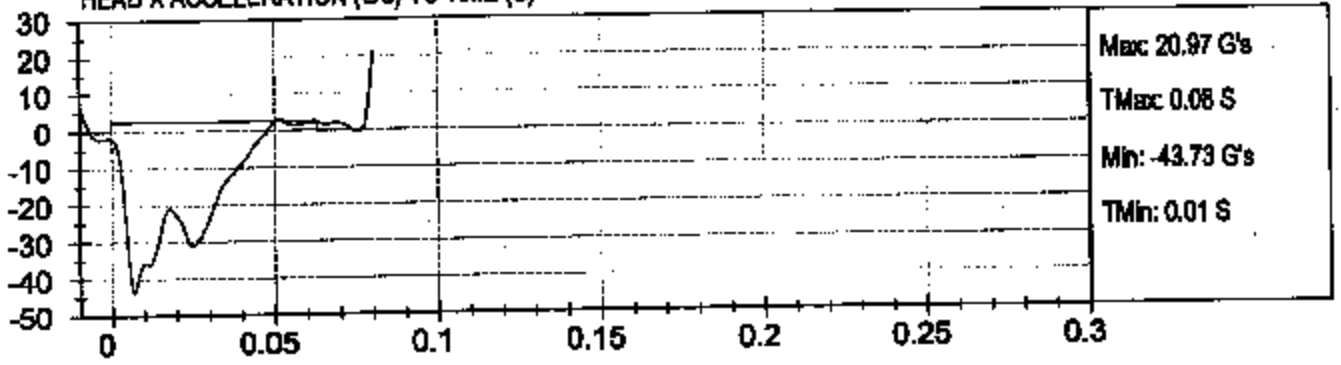
Component ID: Corbeil

NHTSA#: C40902

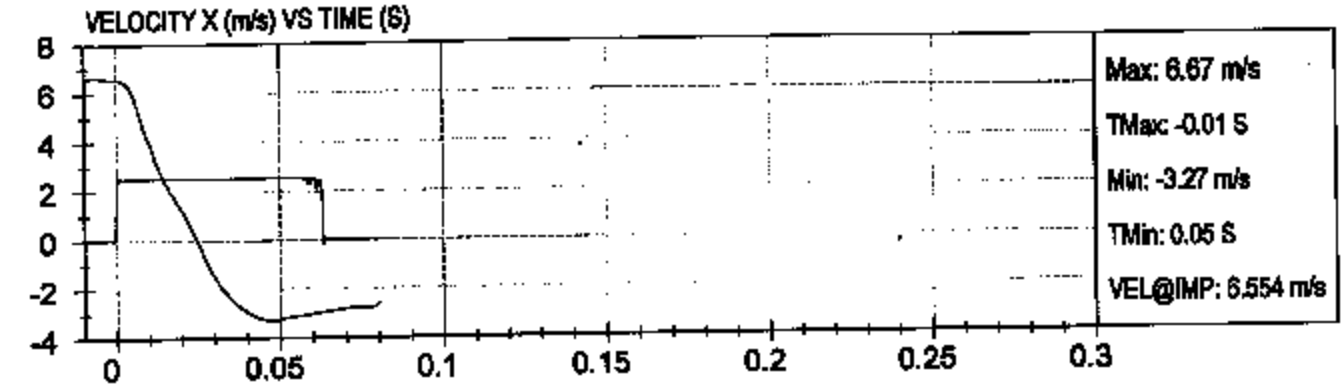
Location: H10

Hic: 134.18 T1: 3.60 ms T2: 32.70 ms

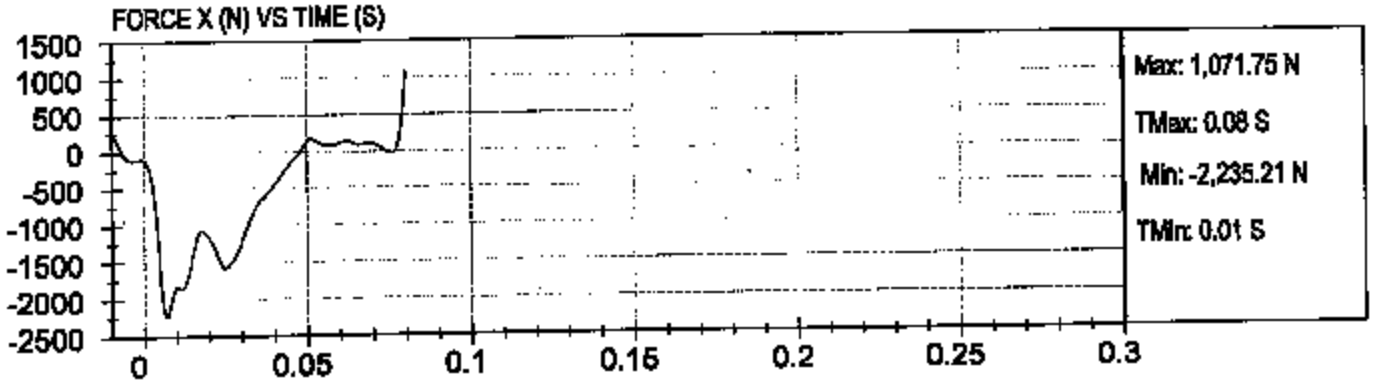
HEAD X ACCELERATION (G's) VS TIME (S)



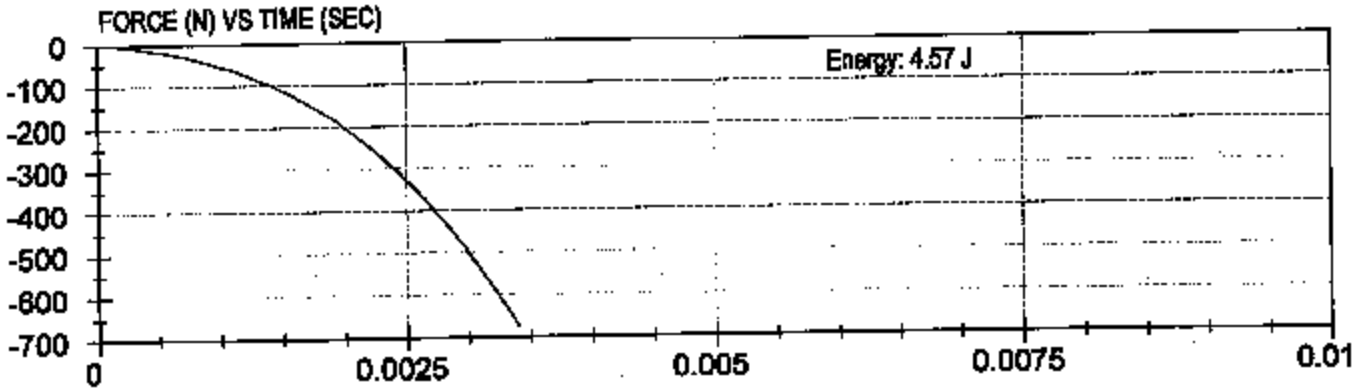
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



HEAD FORM IMPACT (6.69 m/s)

Test Date: 3-7-04

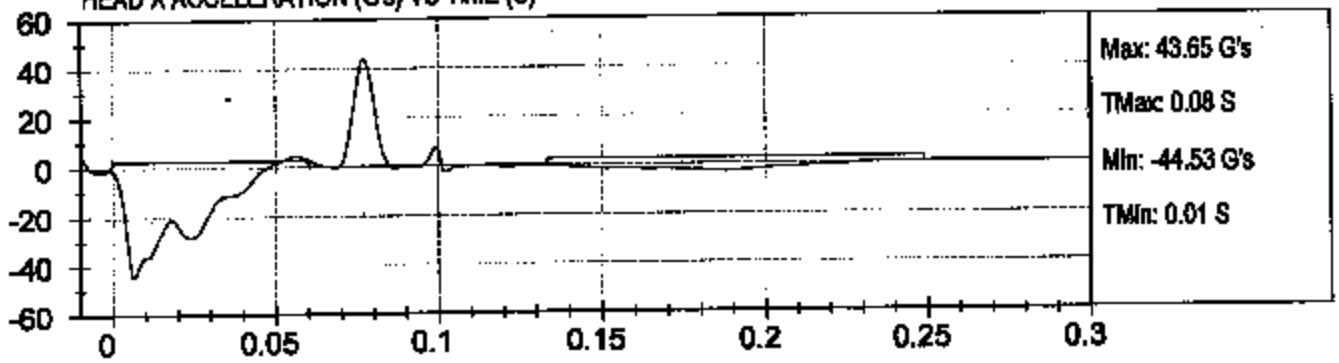
Component ID: Corbeil

NHTSA#: C40902

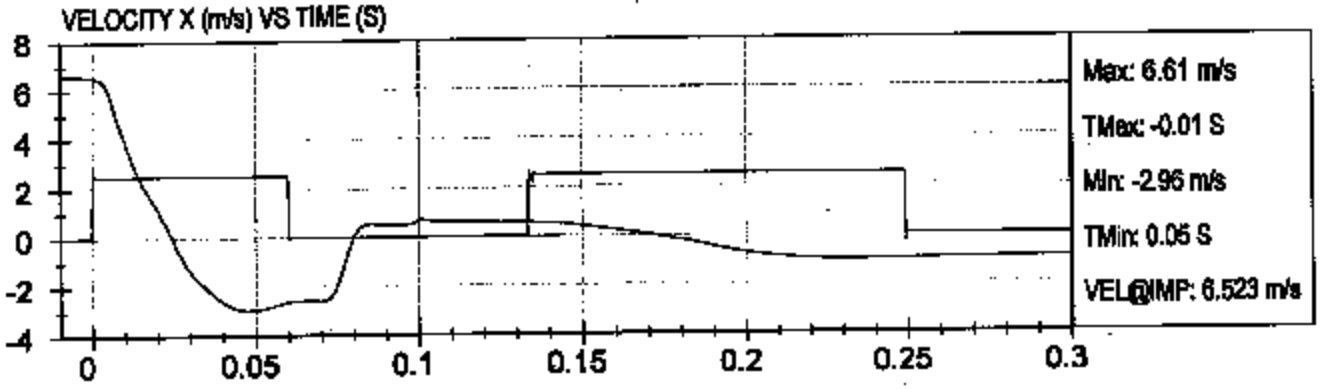
Location: H11

Hic: 125.18 T1: 3.40 ms T2: 30.30 ms

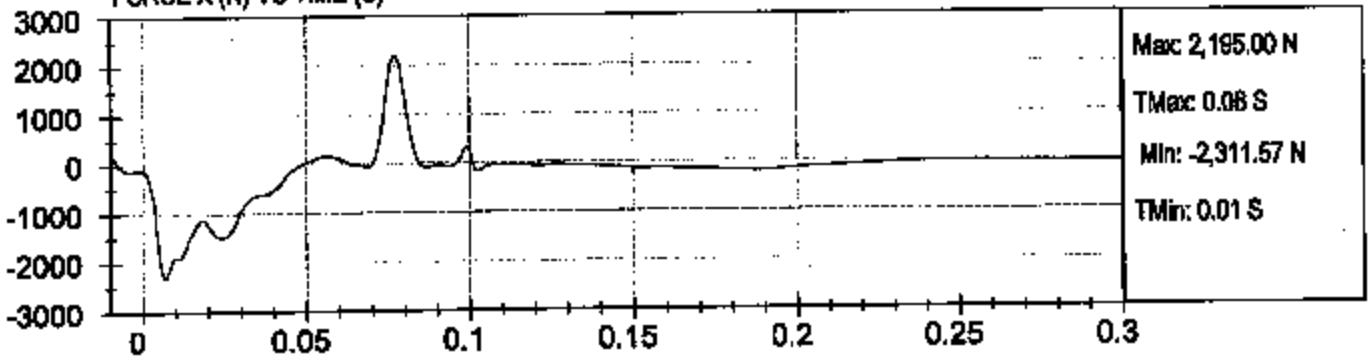
HEAD X ACCELERATION (G's) VS TIME (S)



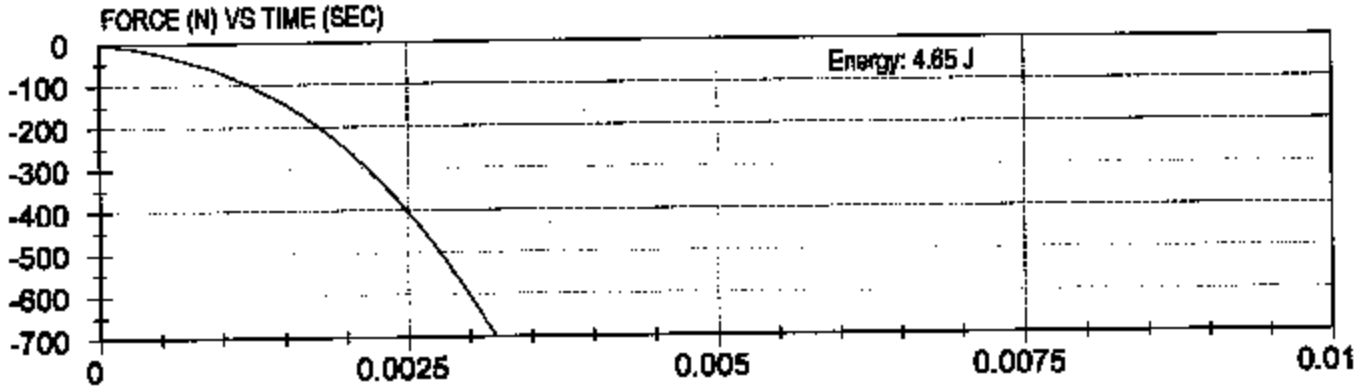
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



HEAD FORM IMPACT (6.69 m/s)

Test Date: 3-8-05

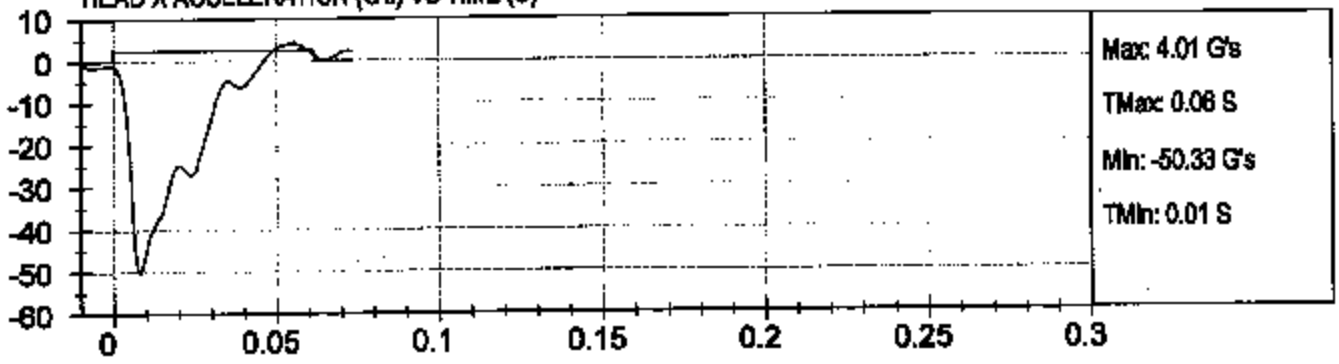
Component ID: Corbell

Location: H12

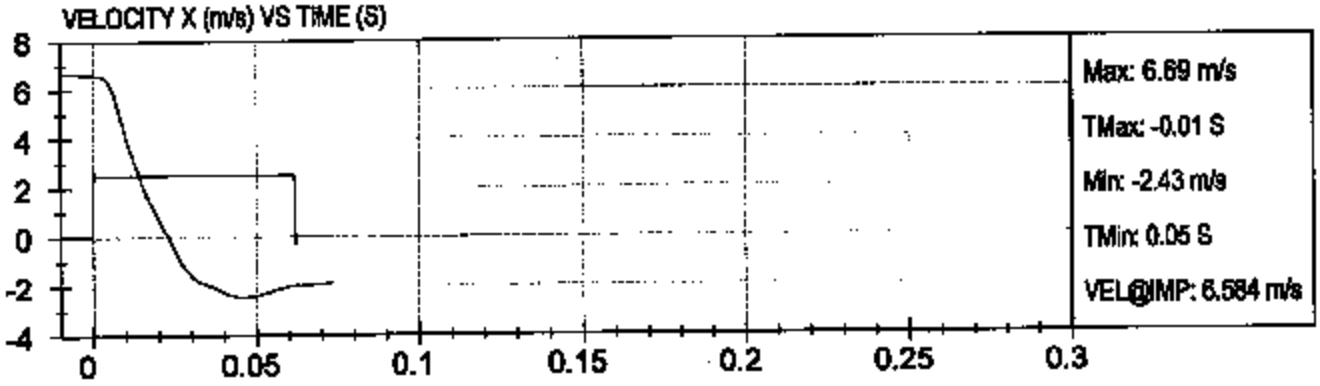
NHTSA#: C40902

Hic: 145.83 T1: 4.60 ms T2: 27.50 ms

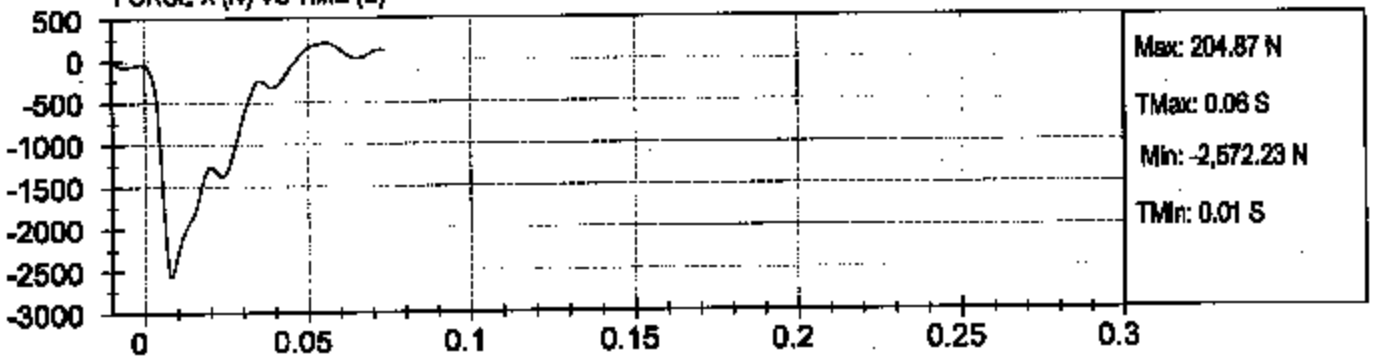
HEAD X ACCELERATION (G's) VS TIME (S)



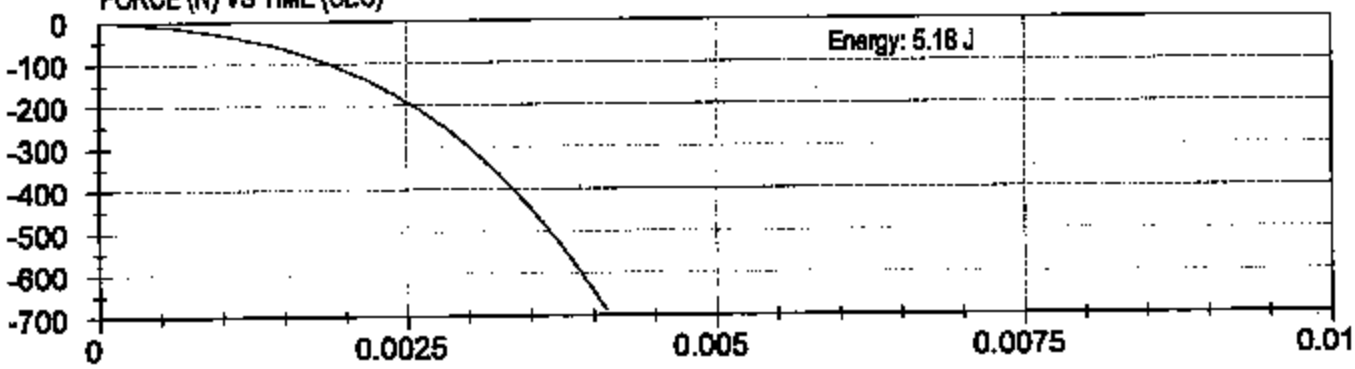
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



HEAD FORM IMPACT (6.69 m/s)

Test Date: 3-8-05

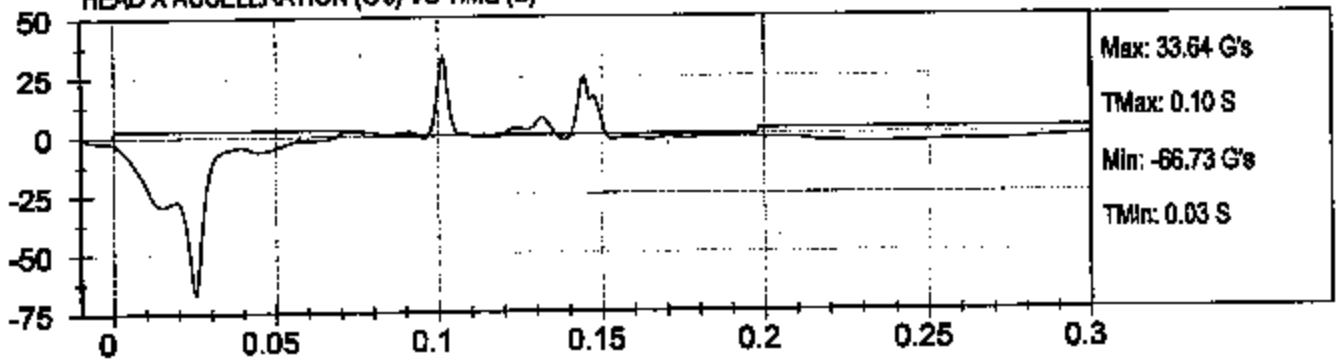
Component ID: Corbeil

NHTSA#: C40902

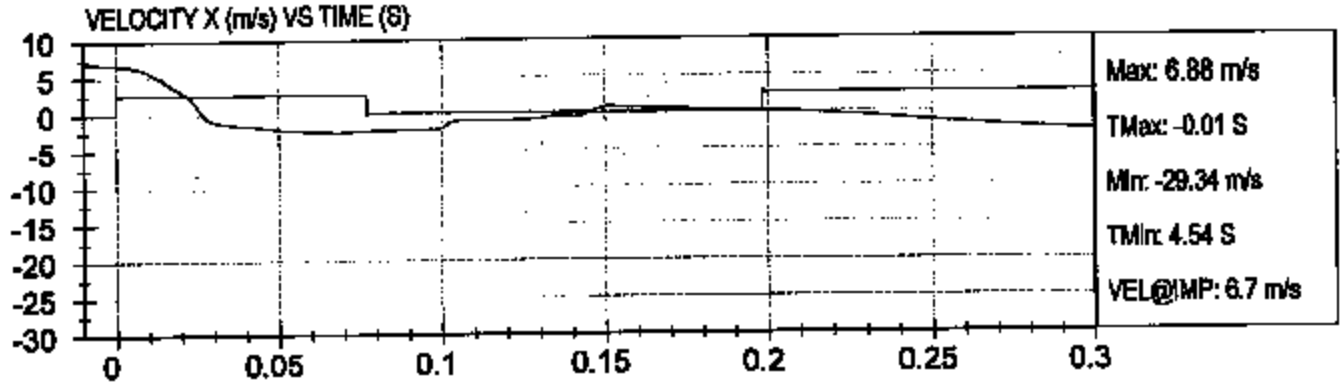
Location: H13

Hic: 139.62 T1: 10.30 ms T2: 28.70 ms

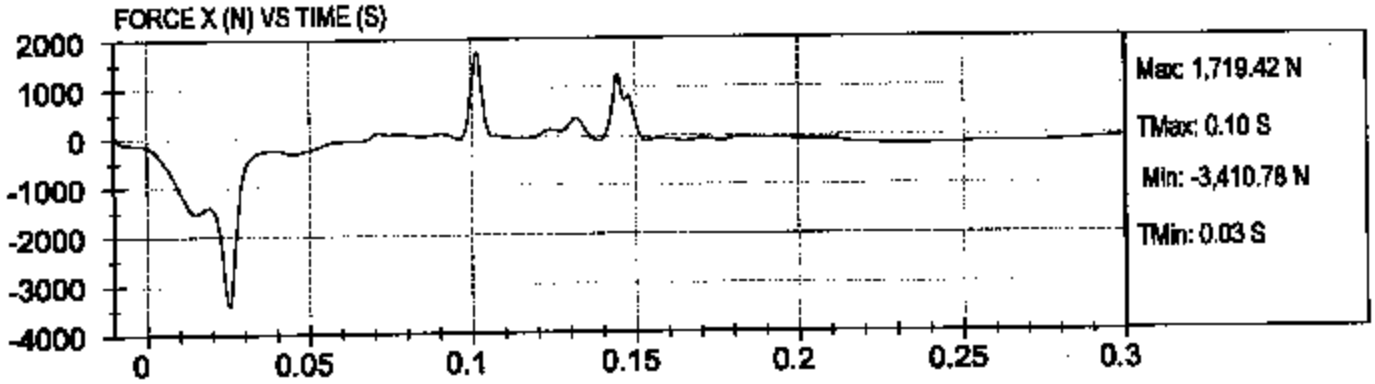
HEAD X ACCELERATION (G's) VS TIME (S)



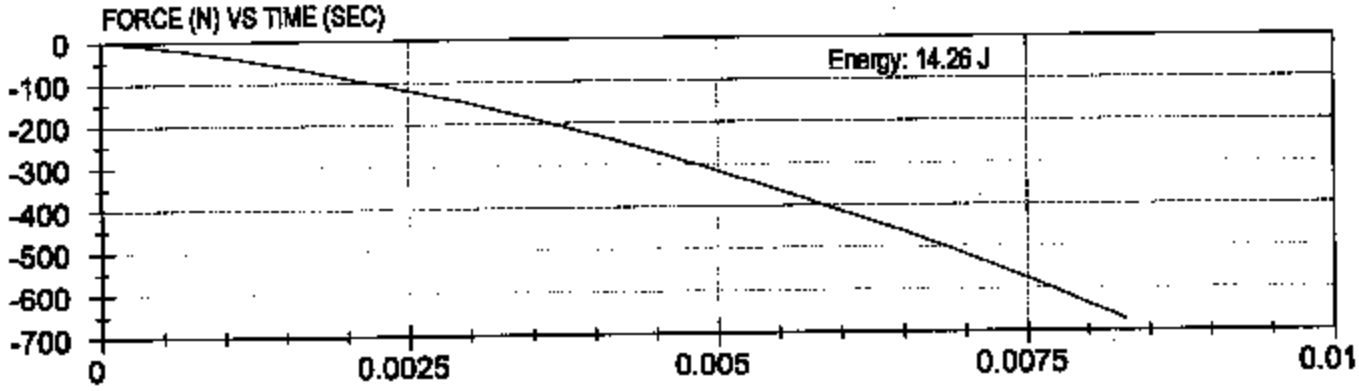
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)



FORCE (N) VS TIME (SEC)



HEAD FORM IMPACT (6.69 m/s)

Test Date: 3-8-05

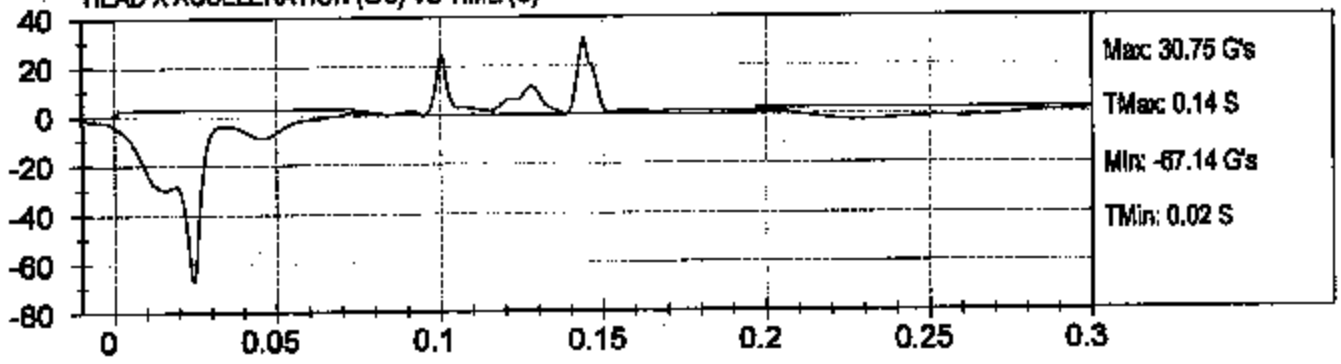
Component ID: Corbeil

Location: H14

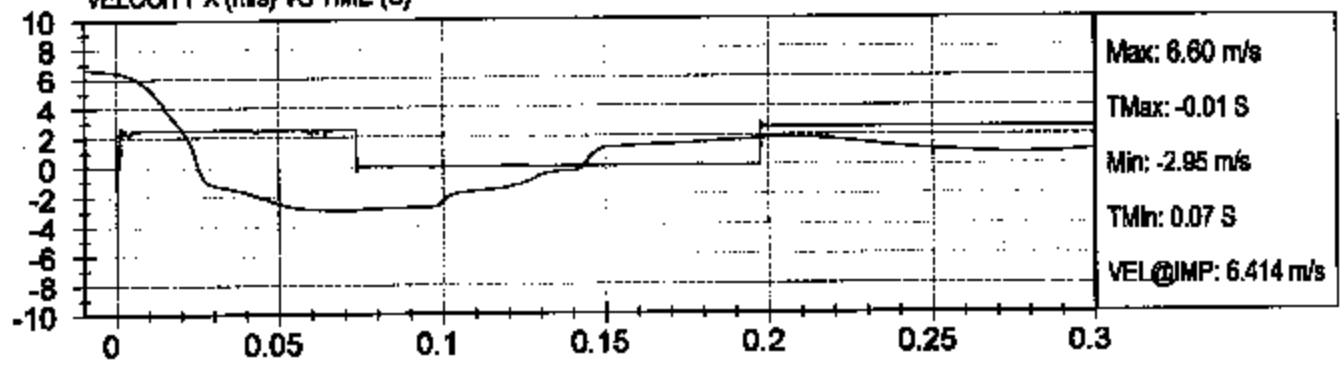
NHTSA#: C40902

Hic: 139.64 T1: 9.50 ms T2: 27.60 ms

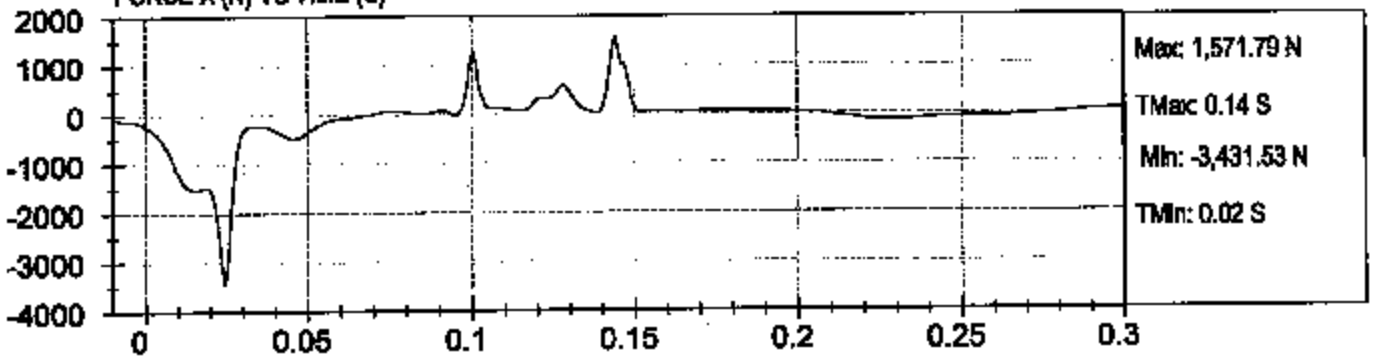
HEAD X ACCELERATION (G's) VS TIME (S)



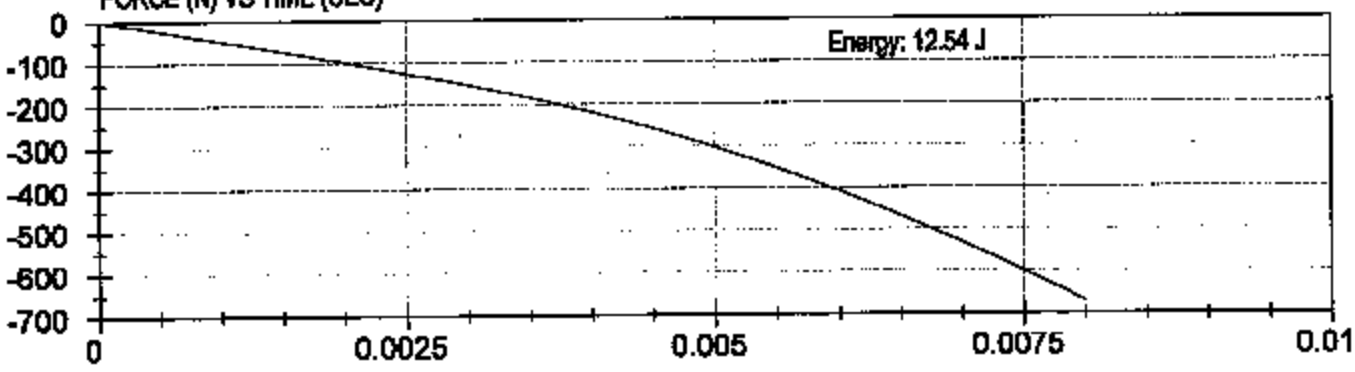
VELOCITY X (m/s) VS TIME (S)



FORCE X (N) VS TIME (S)

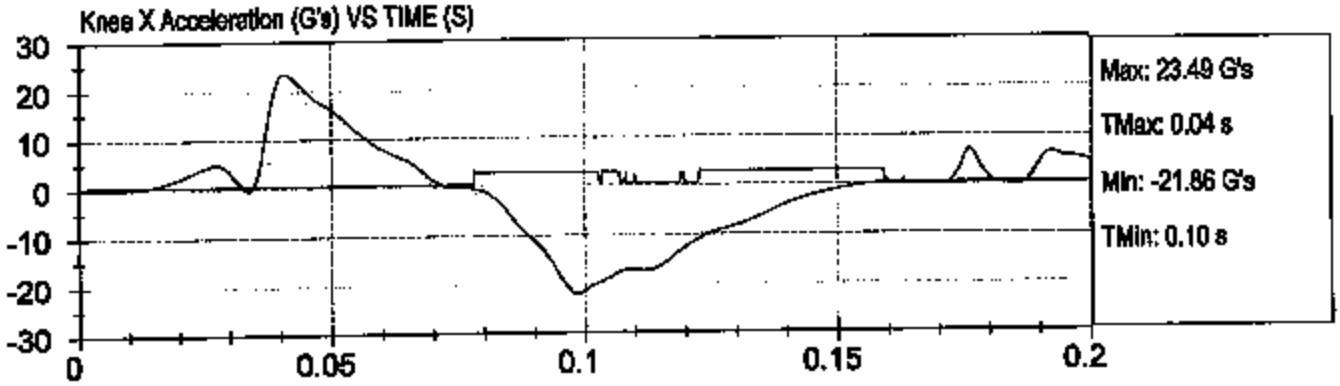


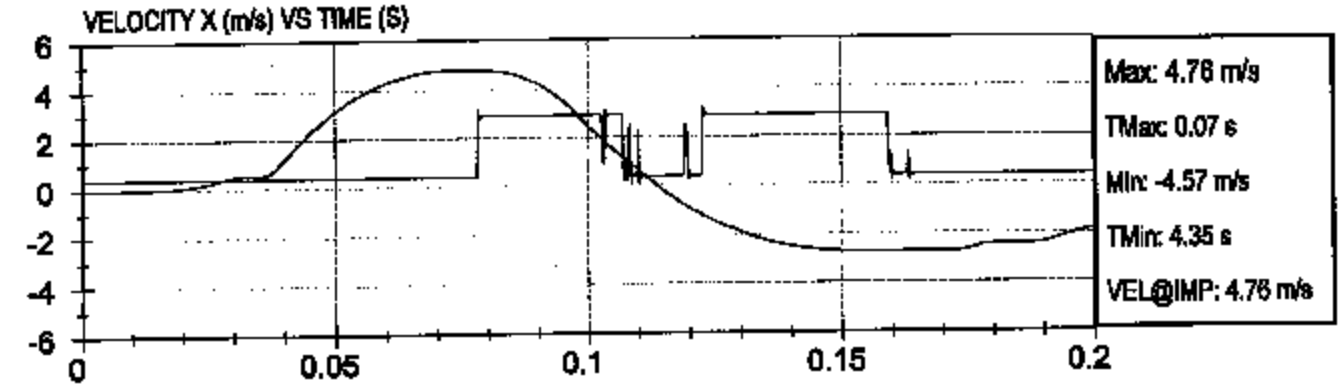
FORCE (N) VS TIME (SEC)

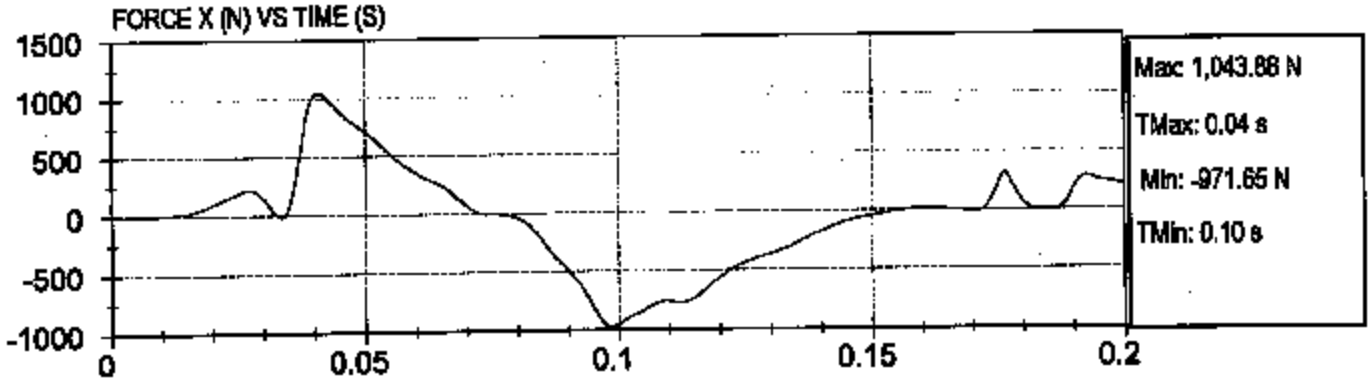


FMVSS 222 KNEE FORM IMPACTS
COMPONENT ID: Corbell
LOCATION: K1

Test Date: 2/23/05
NHTSA #: C40902

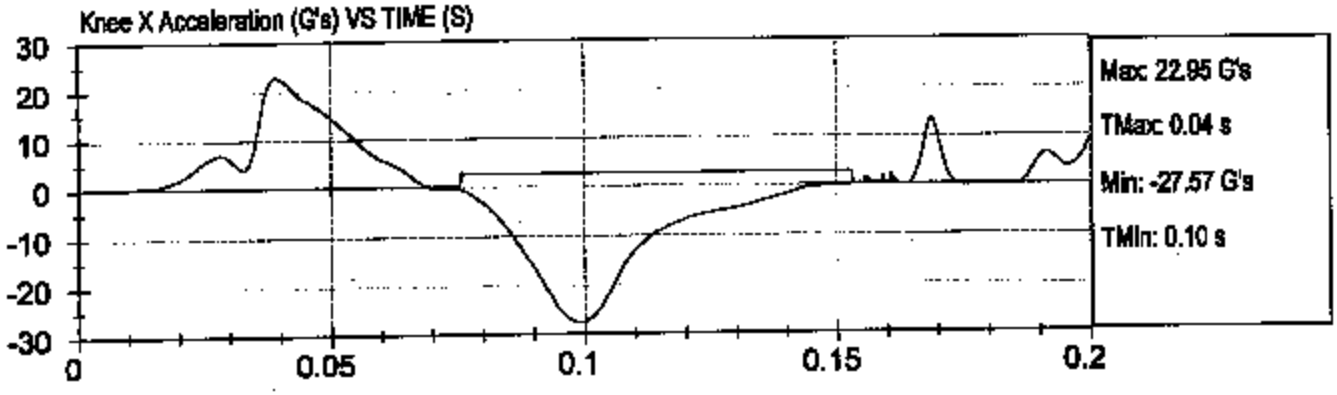


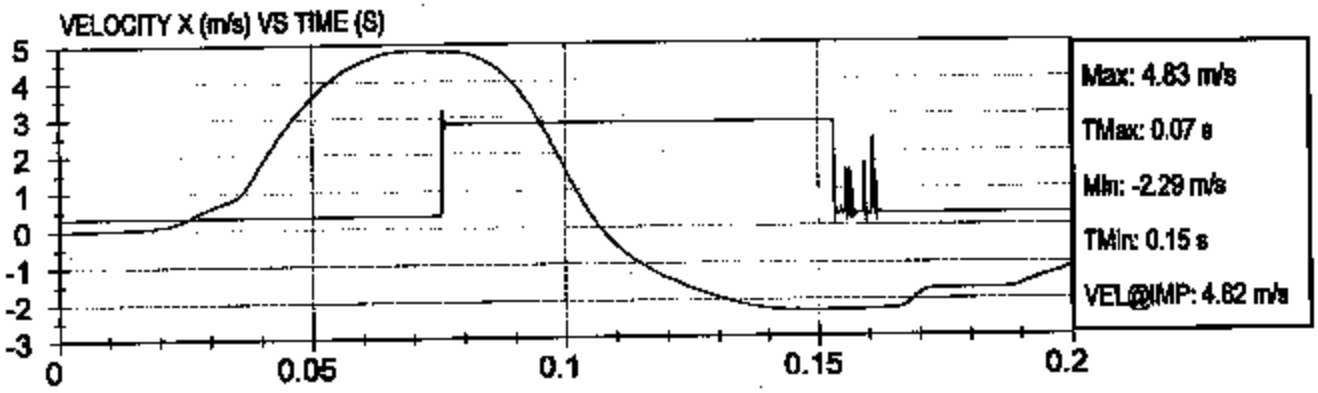


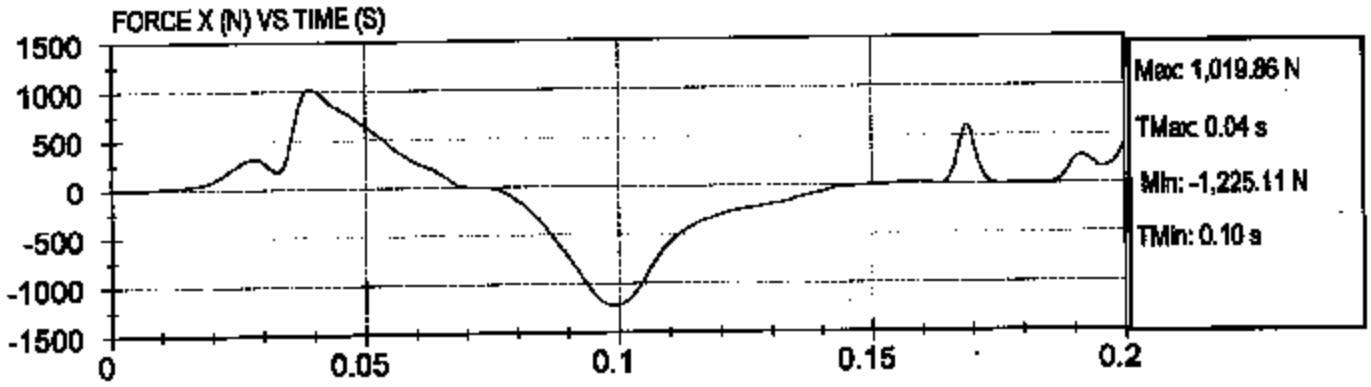


FMVSS 222 KNEE FORM IMPACTS
COMPONENT ID: Corbeil
LOCATION: K2

Test Date: 2/23/05
NHTSA #: C40902



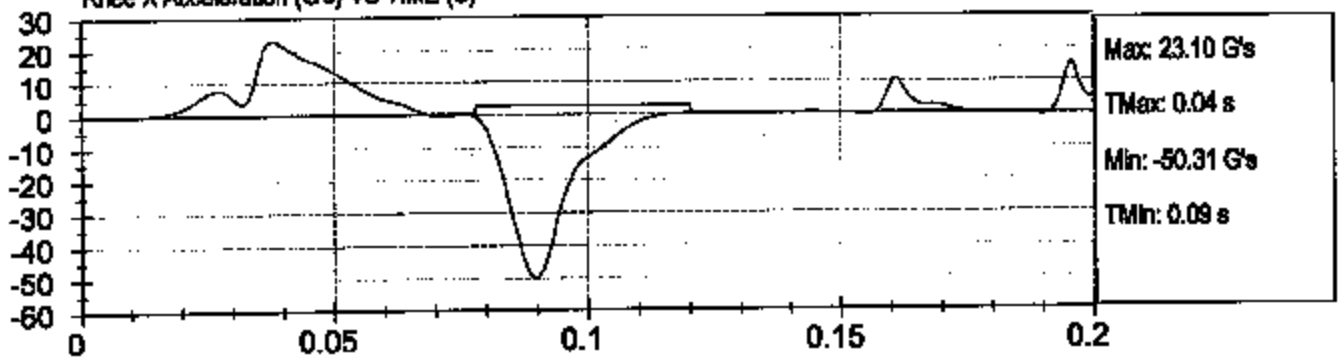




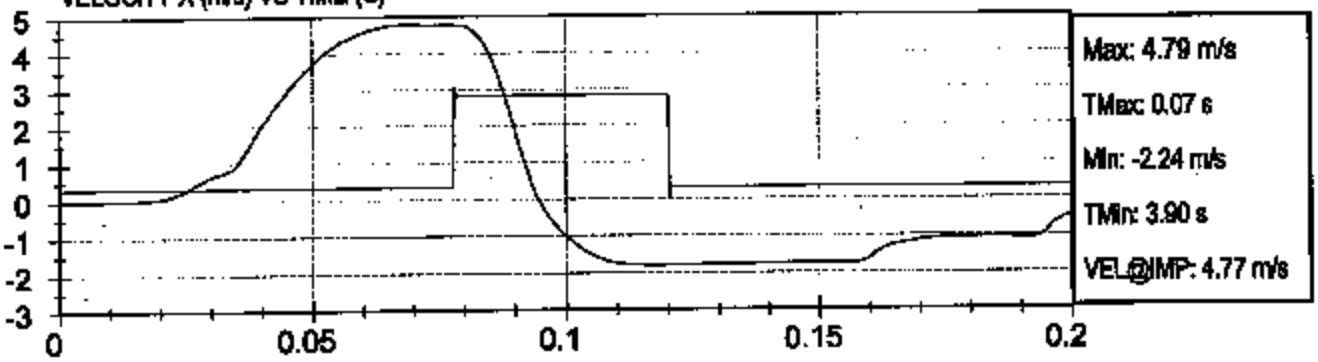
FMVSS 222 KNEE FORM IMPACTS
COMPONENT ID: Corbeil
LOCATION: K3

Test Date: 2/24/06
NHTSA #: C40902

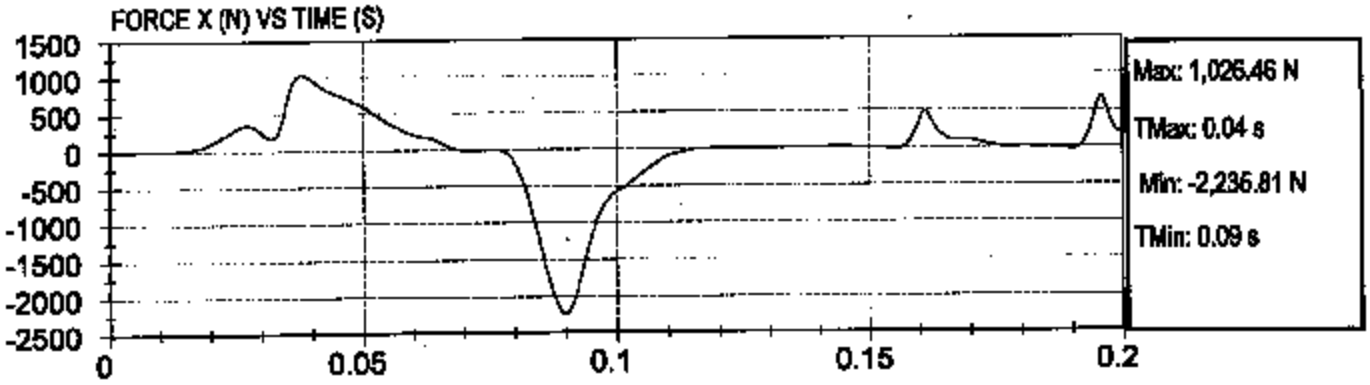
Knee X Acceleration (G's) VS TIME (S)



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

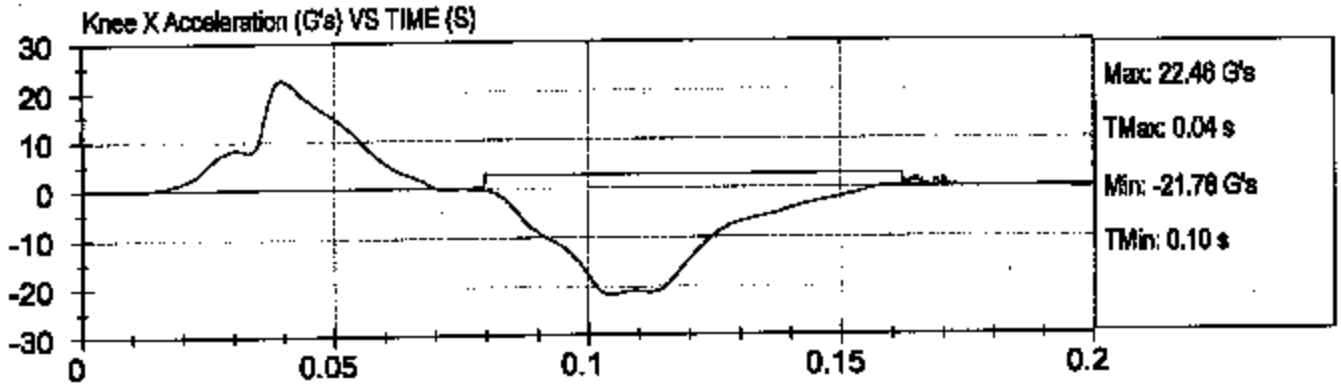


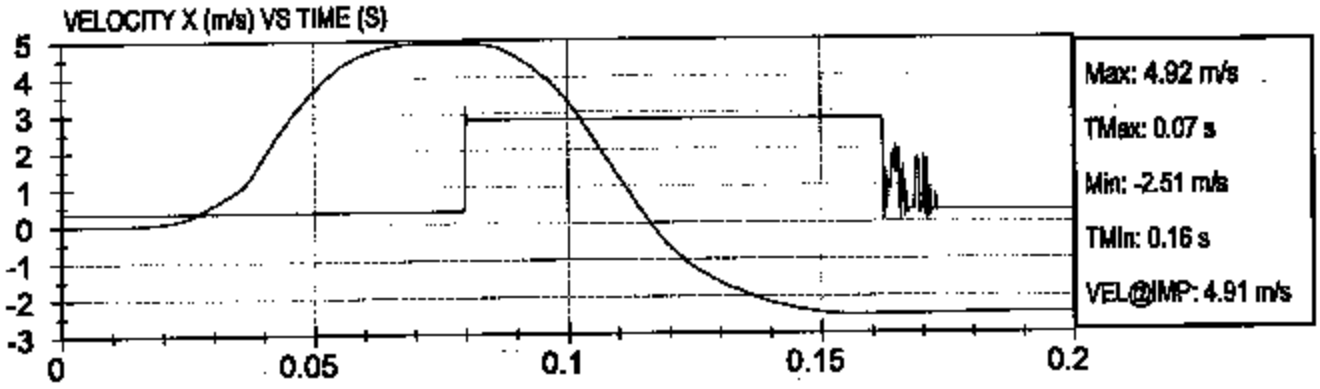
FORCE X (N) VS TIME (S)

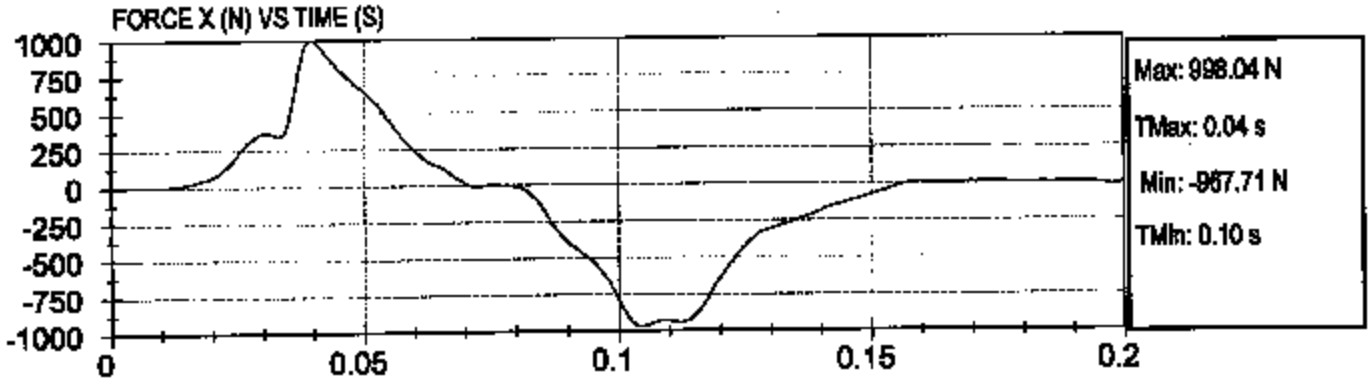


FMVSS 222 KNEE FORM IMPACTS
COMPONENT ID: Corbell
LOCATION: K4

Test Date: 2/23/05
NHTSA #: C40902

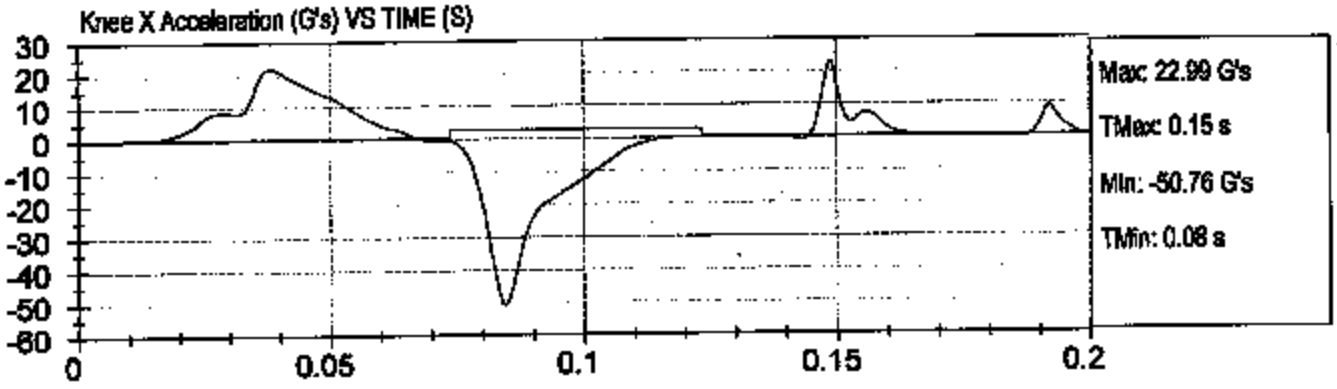


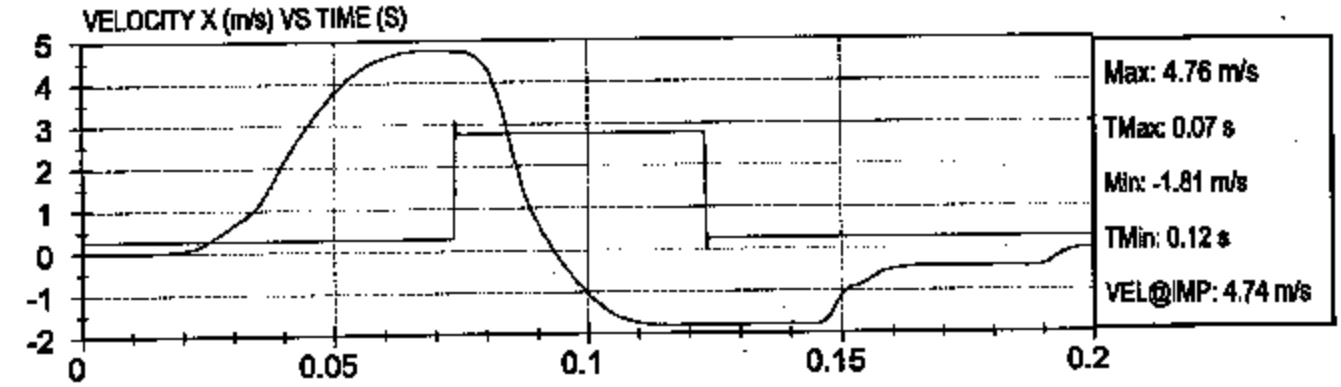


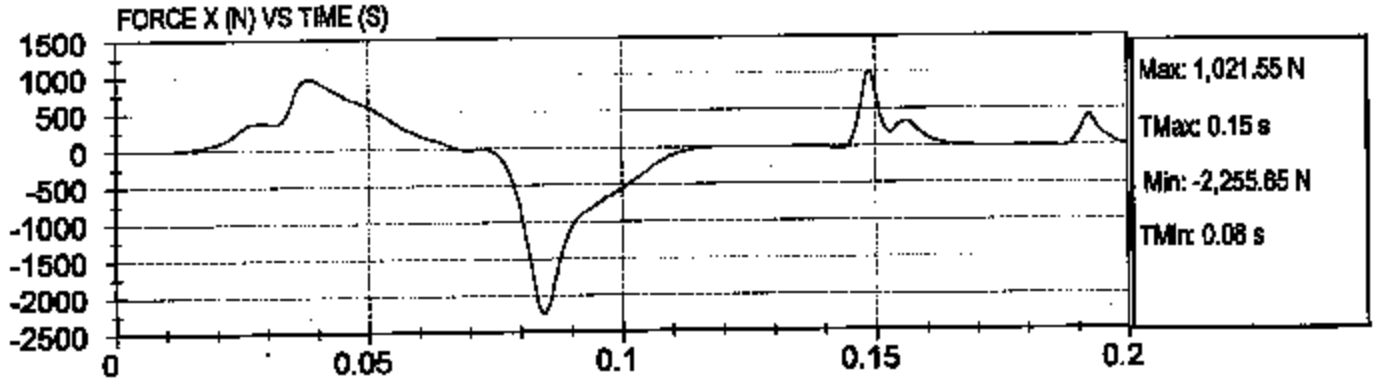


FMVSS 222 KNEE FORM IMPACTS
COMPONENT ID: Corbeil
LOCATION: K5

Test Date: 2/23/05
NHTSA #: C40902

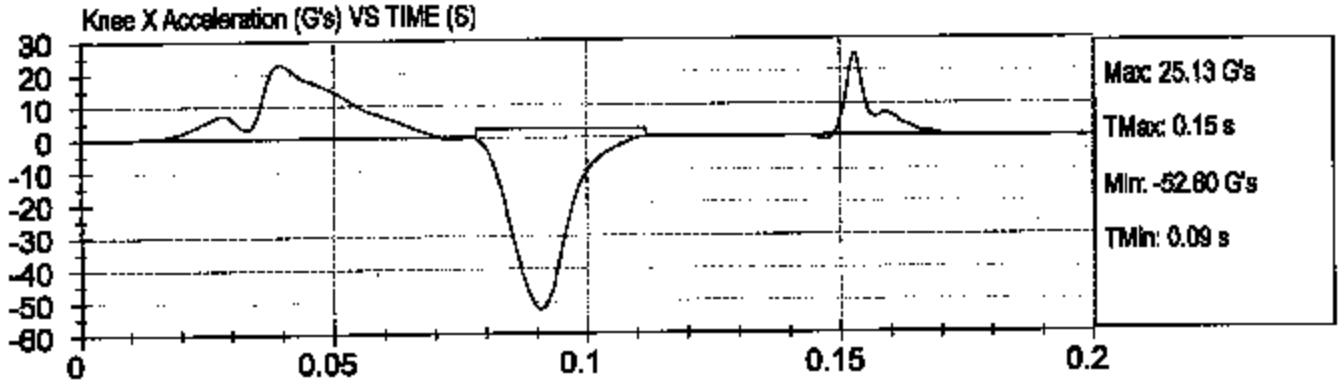


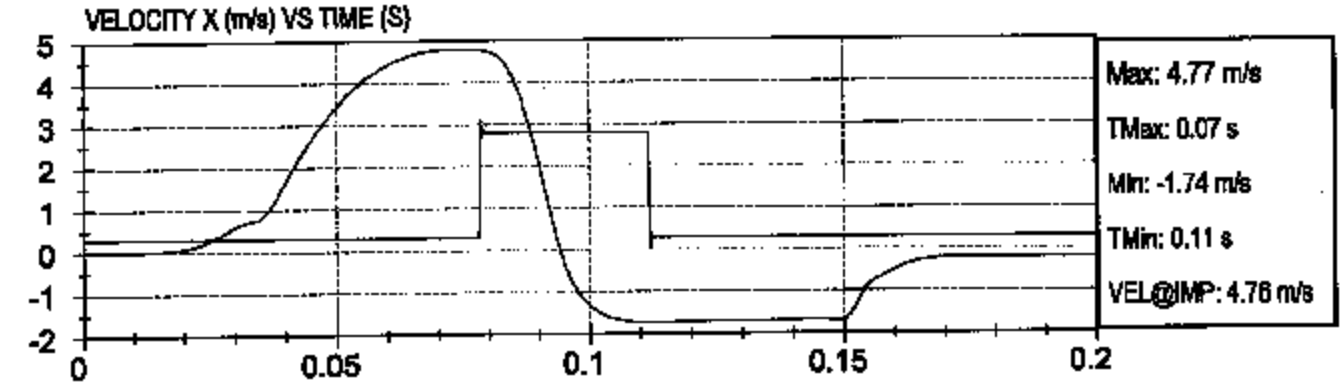


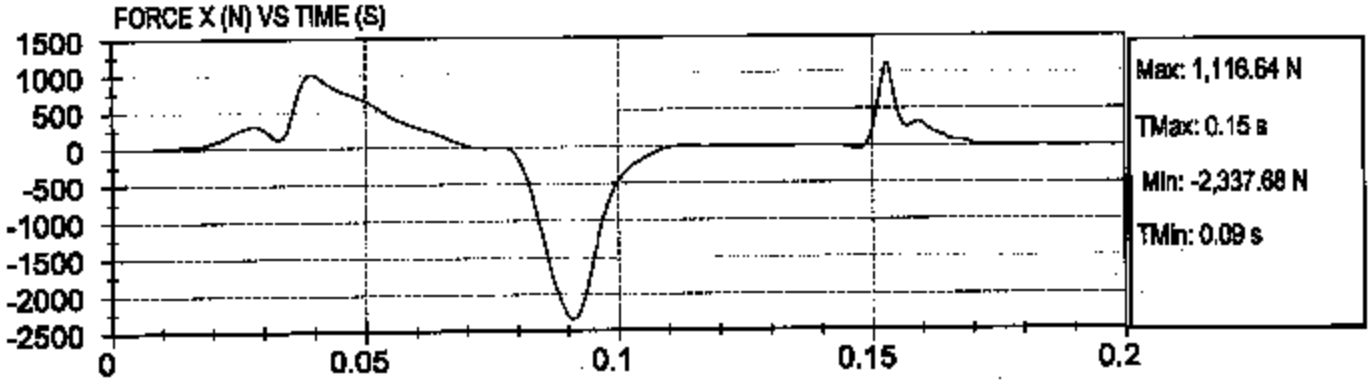


FMVSS 222 KNEE FORM IMPACTS
COMPONENT ID: Corbell
LOCATION: K6

Test Date: 2/23/05
NHTSA #: C40902

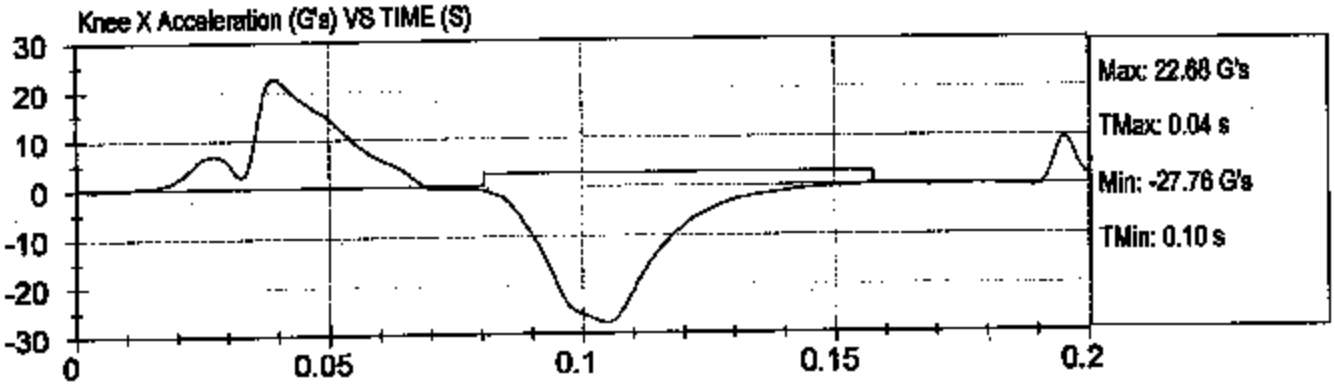


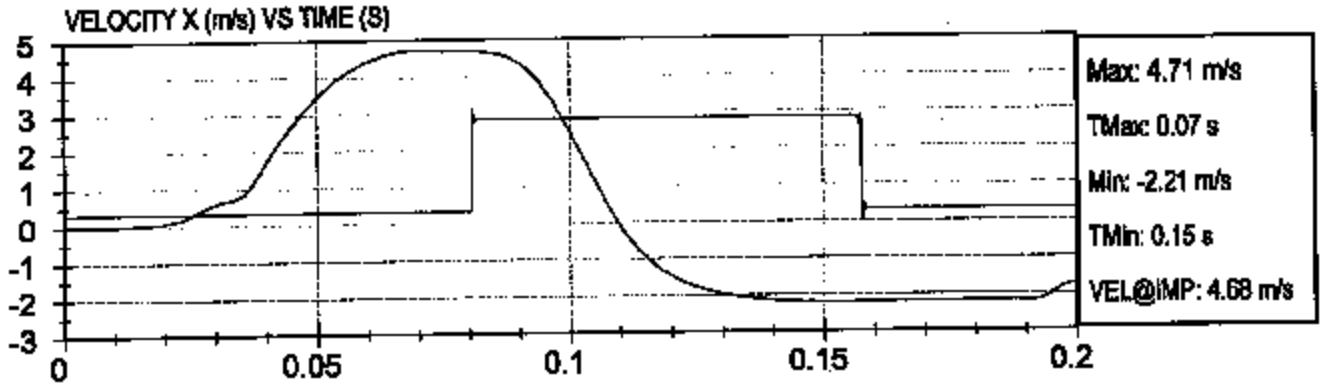


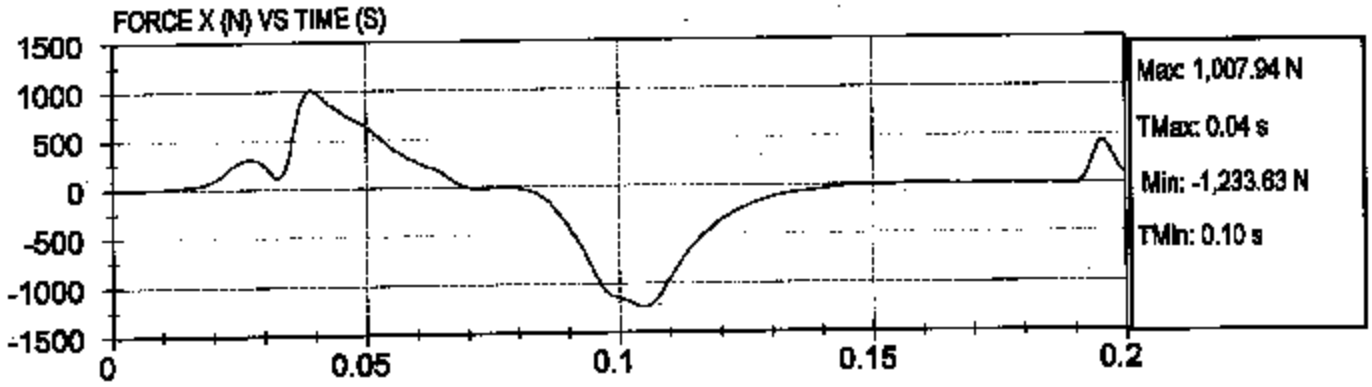


FMVSS 222 KNEE FORM IMPACTS
COMPONENT ID: Corbeil
LOCATION: K7

Test Date: 2/23/05
NHTSA #: C40902



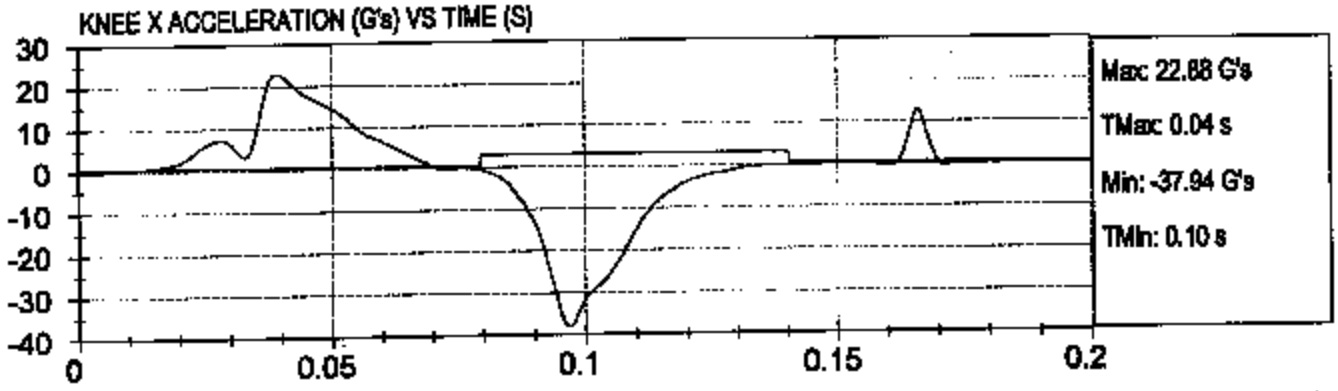


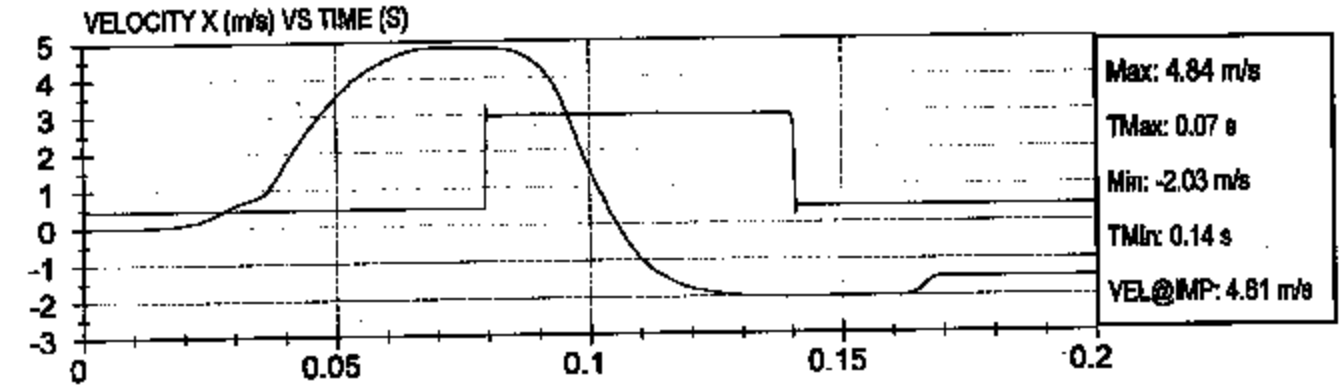


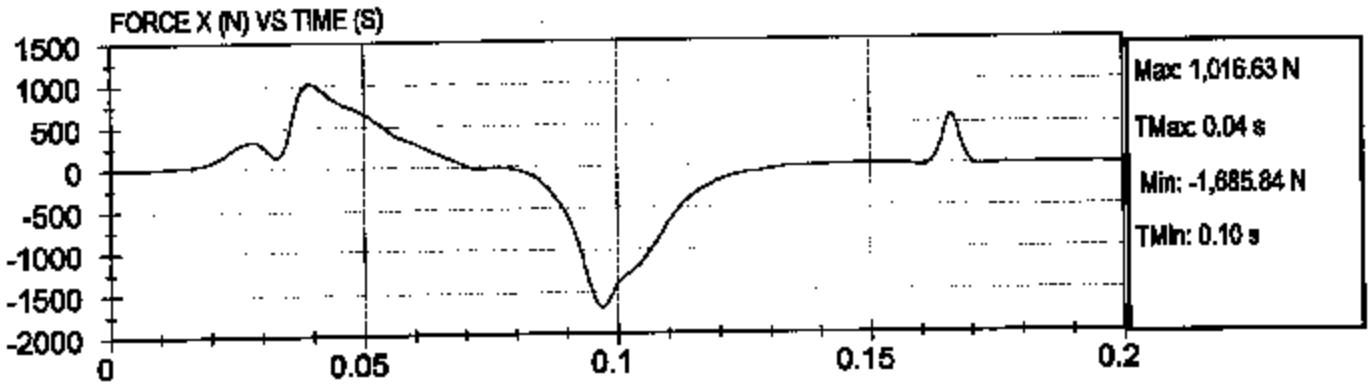
mga

FMVSS 222 KNEE FORM IMPACTS
COMPONENT ID: Corbeil
LOCATION: K8

Test Date: 2/23/05
NHTSA #: C40902





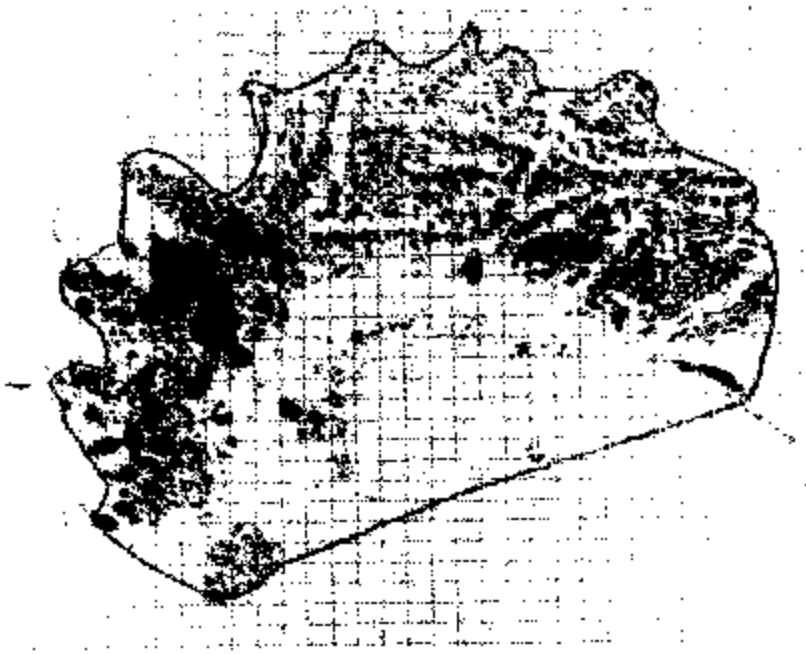


SECTION 7
WELT CONTACT POINTS

Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **04/06/05**

H1 / Seat S10



H1 Corbell 52.9 cm^2

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/24/05**

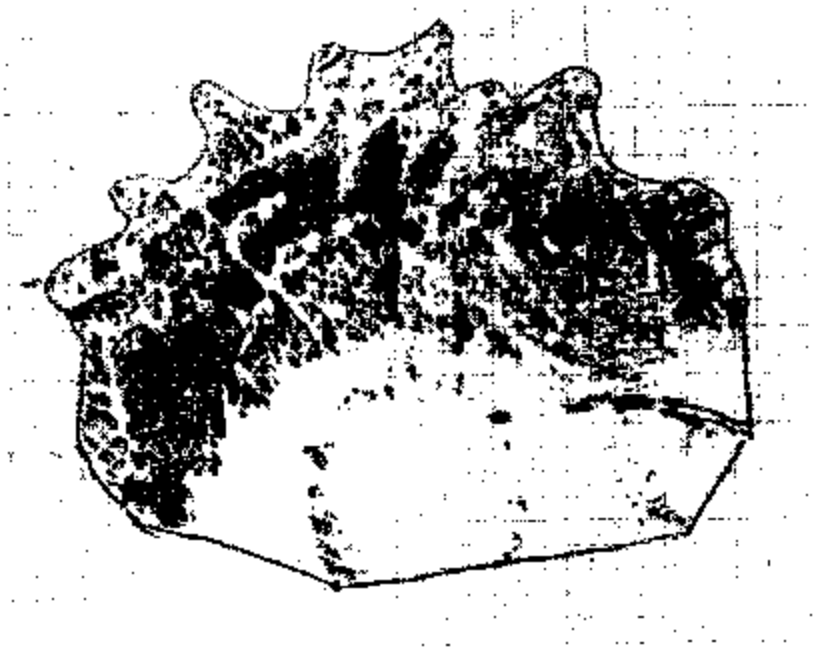
H2 / Seat S10

H2 Corbell 53.9 cm^2

Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/24/05**

H3 / Seat S10

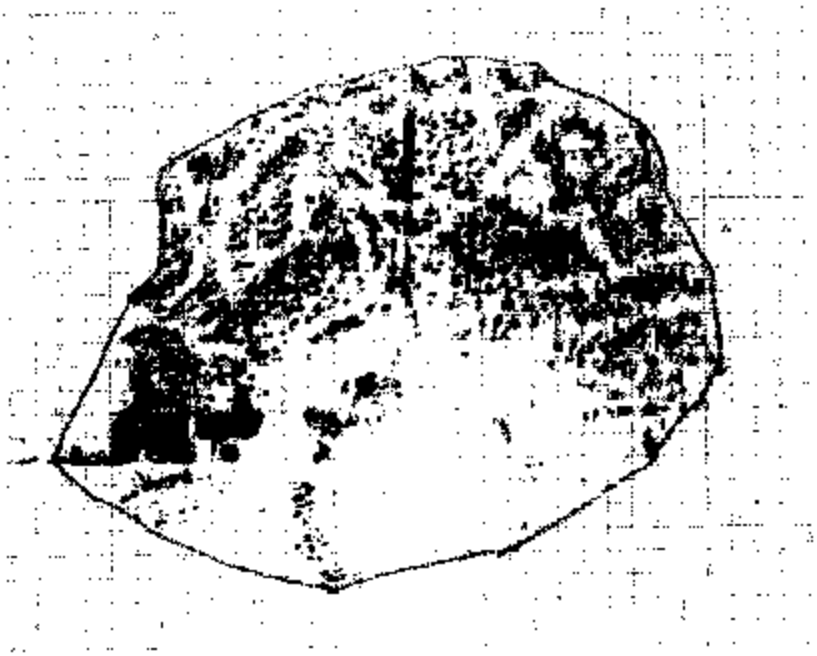


H3 Corbeil 48.1 cm^2

Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/24/05**

H4 / Seat S10

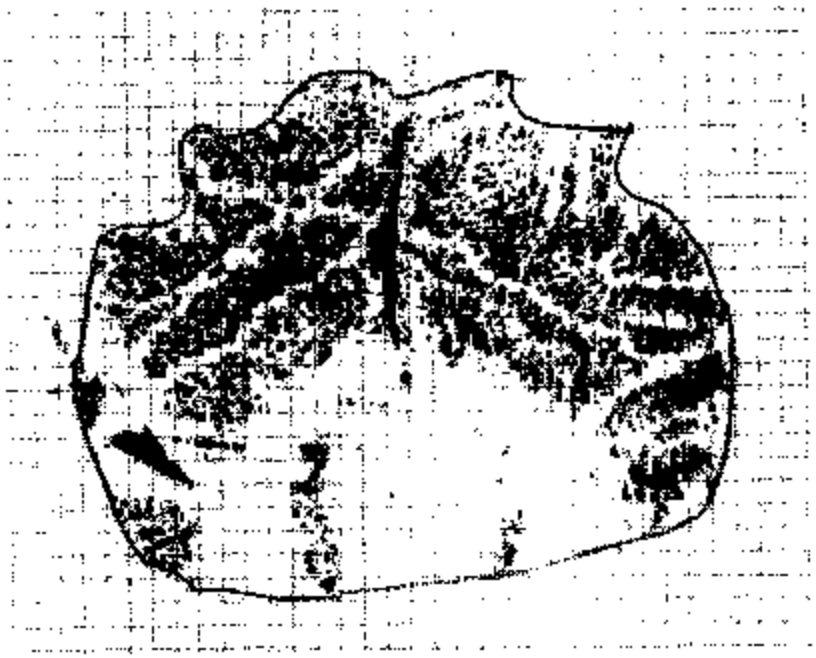


H4 Corbeil 43.1 cm^2

Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/25/05**

H5 / Seat S10

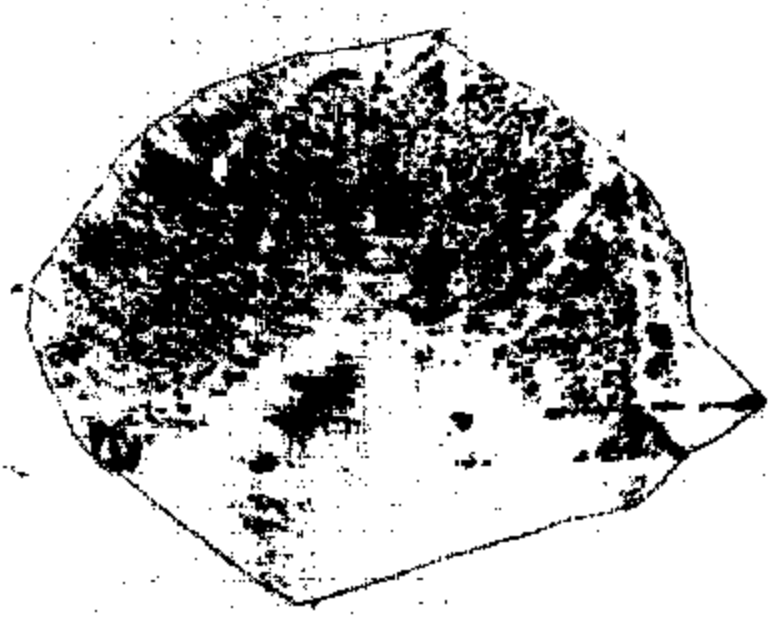


H5 Corbeil 48.5 cm^2

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/24/05**

H6 / Seat S10

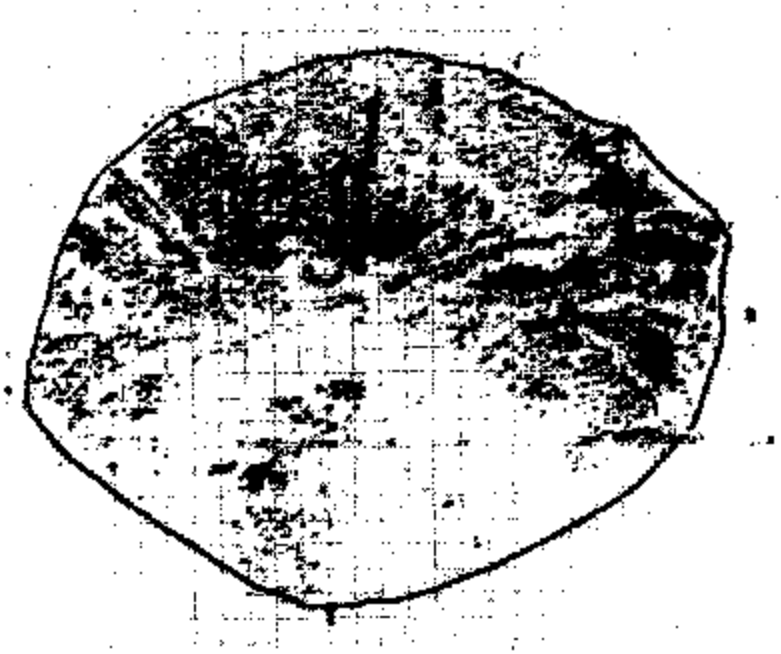


H6 Corbell 42.4 cm^2

Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/24/05**

H7 / Seat S10

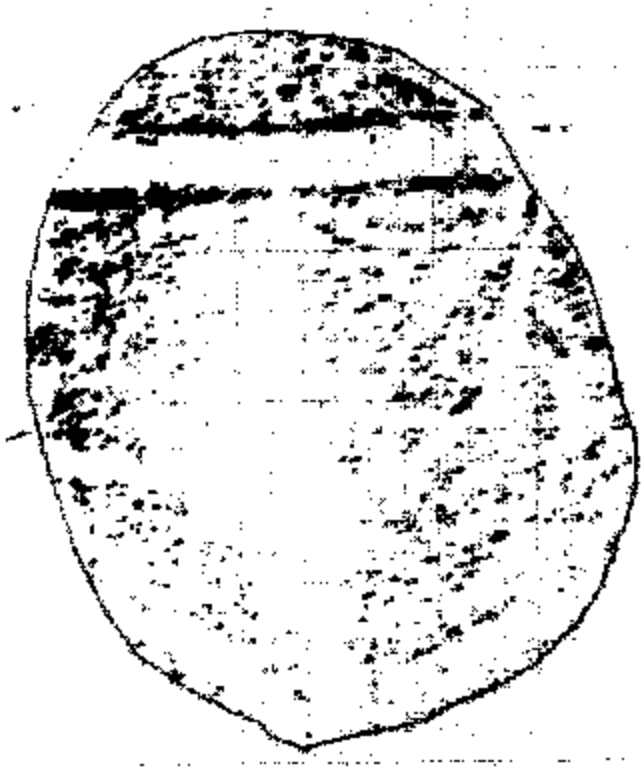


H7 Corbeil 43.1 cm^2

Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/23/05**

K1 / Seat S10

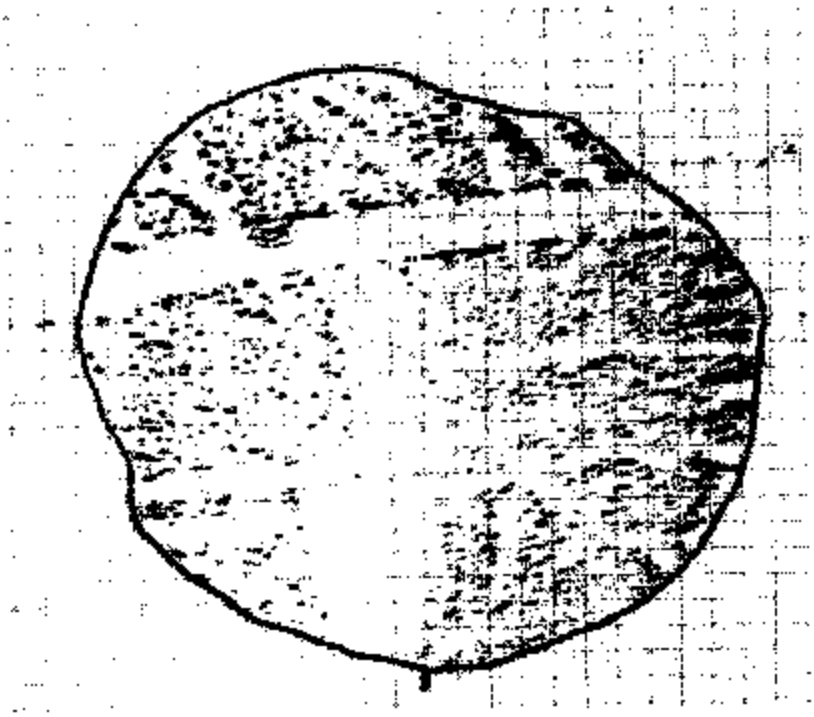


K1 Corbeil 33.8 cm^2

Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/23/05**

K2 / Seat S10

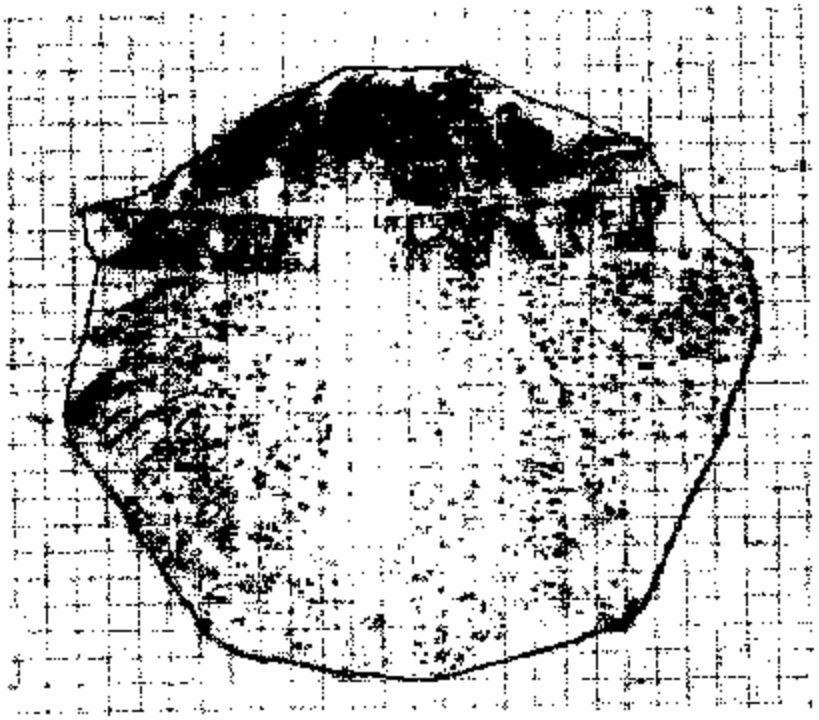


K2 Corbeil 38.2 cm^2

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/24/05**

K3 / Seat S10

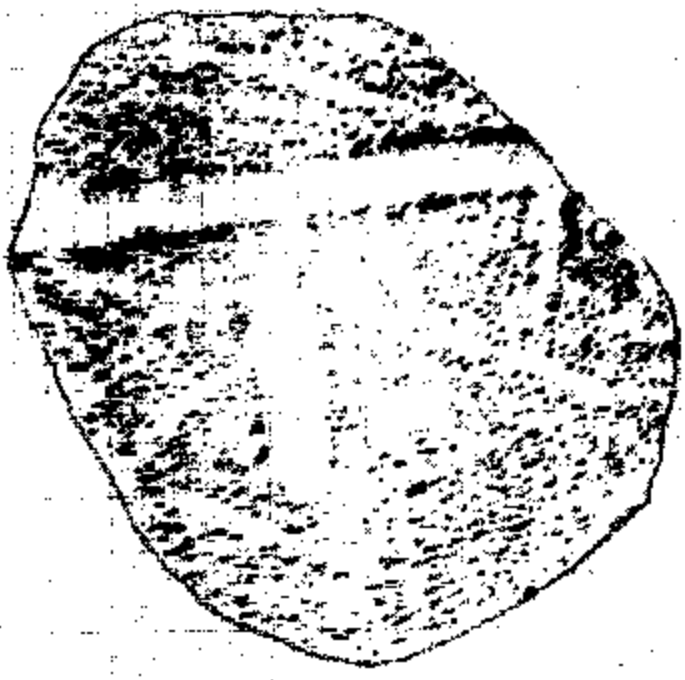


K3 Corbell 39.4 cm^2

Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **02/23/05**

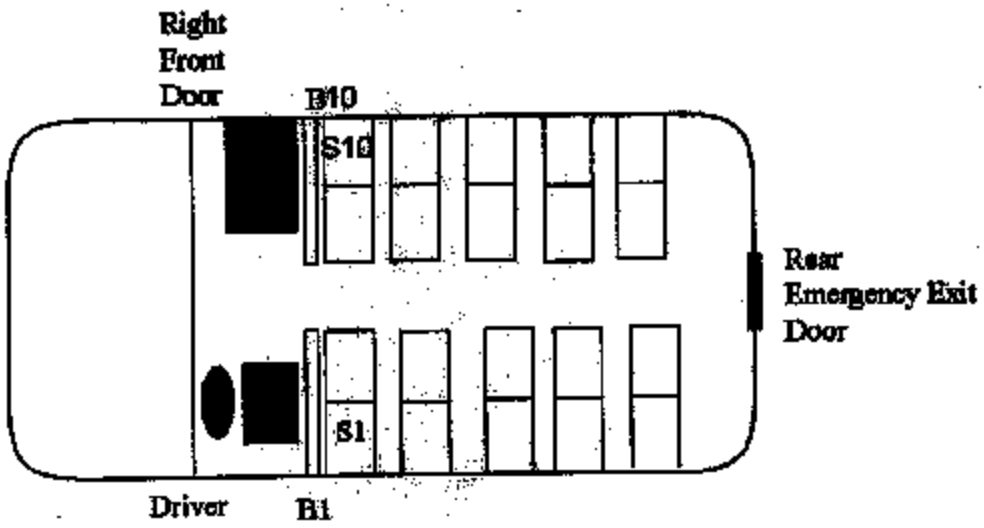
K4 / Seat S10



K4 Corbeil 37.4 cm^2

SECTION 8

BUS FLOOR PLAN



SECTION 9
LABORATORY NOTICE OF TEST FAILURE

mga research corporation

LABORATORY NOTICE OF TEST FAILURE TO OVSC

Test Procedure:	[redacted]	Test Date:	[redacted]
Test Vehicle:		Test Lab:	
NHTSA No.:		Project Engineer:	
Contract No.:		Delivery Order No.:	
MFR.:		VIN:	
Build Date:			

TEST FAILURE DESCRIPTION

The projected perimeter of both seats S1 and S10 do not fall completely within the perimeter of B1 and B10 restraining barriers.

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S5.2.2: "*Barrier position and rear surface area.* The position and rear surface area of the restraining barrier shall be such that, in a front projected view of the bus, each point of the barrier's perimeter coincides with or lies outside of the perimeter of the seat back of the seat for which it is required."

Remarks: No remarks.

Notification to NHTSA (COTR): John Finneran

Date: March 7, 2005

By: _____

mga research corporation

LABORATORY NOTICE OF TEST FAILURE TO OVSC

Test Procedure:	[redacted]	Test Date:	[redacted]
Test Vehicle:		Test Lab:	
NHTSA No.:		Project Engineer:	
Contract No.:		Delivery Order No.:	
MFR.:		VIN:	
Build Date:			

TEST FAILURE DESCRIPTION

The front areas of the seat backs are not large enough in comparison to the seat benches to meet the requirement of S5.1.2.

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S5.1.2: "*Seat back height and surface area.* Each school bus passenger seat shall be equipped with a seat back that, in the front projected view, has a front surface area above the horizontal plane that passes through the seating reference point, and below the horizontal plane 508 mm above the seating reference point, of not less than 90 percent of the seat bench width in millimeters multiplied by 508.

Remarks: No remarks.

Notification to NHTSA (COTR): John Finneran

Date: March 7, 2005

By: _____