

REPORT NUMBERS: 208-CAL-92-04  
212-CAL-92-04  
301-CAL-92-04

VEHICLE SAFETY COMPLIANCE TESTING FOR OCCUPANT CRASH PROTECTION,  
WINDSHIELD MOUNTING, WINDSHIELD ZONE INTRUSION (PARTIAL)  
AND FUEL SYSTEM INTEGRITY

GENERAL MOTORS CORPORATION  
1992 OLDSMOBILE 88 ROYALE  
4-DOOR SEDAN

NHTSA NUMBER: CN0102

CALSPAN TEST NUMBER: 7953-1

OCTOBER 9, 1991

CALSPAN CORPORATION  
ADVANCED TECHNOLOGY CENTER  
P.O. BOX 400  
BUFFALO, NEW YORK 14225



FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation  
National Highway Traffic Safety Administration  
ENFORCEMENT  
Office of Vehicle Safety Compliance  
400 Seventh Street, S.W.  
Room No. 6115 (NEF-30)  
Washington, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-90-C-01003. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Prepared: David J. Travale  
David J. Travale, Project Engineer

Approved: Walter E. Levan  
Walter E. Levan, Program Manager  
Transportation Sciences Center

FINAL REPORT ACCEPTED BY:

Charles J. Case  
Contracting Office's Technical Representative  
(COTR), NHTSA, Office of Vehicle Safety Compliance

2/27/92  
Date of Report Acceptance

**TECHNICAL REPORT STANDARD TITLE PAGE**

|  |  |  |  |  |           |
|--|--|--|--|--|-----------|
| 1. Report No. 208-CAL-92-04<br>212-CAL-92-04<br>301-CAL-92-04  |  | 2. Government Accession No.                              |  | 3. Recipient's Catalog No.   |           |
| 4. Title and Subtitle<br>Final Report of FMVSS 208, 212, 219 (Partial) and<br>301 Compliance Testing of a 1992 Oldsmobile 88<br>Royale 4-Door Sedan  |  |  |  | 5. Report Date<br>October 9, 1991  |           |
|  |  |  |  | 6. Performing Organization Code<br>CAL   |           |
| 7. Author(s) Vincent M. Paolini, Engineer<br>David J. Travale, Project Engineer<br>Walter E. Levan, Program Manager  |  |  |  | 8. Performing Organization Report No.<br>7953-1  |           |
| 9. Performing Organization Name and Address<br><br>Calspan Advanced Technology Center<br>P.O. Box 400<br>Buffalo, New York 14225   |  |  |  | 10. Work Unit No.<br>J86-010-1120  |           |
|  |  |  |  | 11. Contract or Grant No.<br>DTNH22-90-C-01003   |           |
| 12. Sponsoring Agency Name and Address<br>U.S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Vehicle Safety Compliance (NEF-30)<br>400 Seventh St., S.W., Rm. 6115, Washington, DC 20590   |  |  |  | 13. Type of Report and Period Covered<br>Final Report<br>October-November 1991   |           |
|  |  |  |  | 14. Sponsoring Agency Code<br>DOT/NHTSA/NEF/OVSC   |           |
| 15. Supplementary Notes  |  |  |  |  |           |
| 16. Abstract<br><br>A 30 mph vehicle safety compliance test was conducted on a 1992 Oldsmobile 88 Royale 4-Door Sedan.<br><br>This test was performed at the Calspan Advanced Technology Center in Buffalo, New York on October 9, 1991. The purpose of this test was to determine compliance with the performance requirements of the following Federal Motor Vehicle Safety Standards:<br><br>1. FMVSS No. 208, "Occupant Crash Protection"<br>2. FMVSS No. 212, "Windshield Mounting"<br>3. FMVSS No. 219 (partial), "Windshield Zone Intrusion"<br>4. FMVSS No. 301, "Fuel System Integrity"<br><br>The test mode was perpendicular (0°) and the impact velocity was 29.4 mph. The ambient temperature at the impact face was 68°F.<br><br>The subject test vehicle appears to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial) and 301.<br><br><u>Type of Restraint System:</u> The test vehicle was equipped with a driver side air bag and passenger side manual 3-point seat belt restraint. The driver side manual 3-point belt was not used for this test. |  |  |  |  |           |
| 17. Key Words<br>30 mph Vehicle Safety Compliance Testing<br>FMVSS 208, "Occupant Crash Protection"<br>FMVSS 212, "Windshield Mounting"<br>FMVSS 219, "Windshield Zone Intrusion"<br>FMVSS 301, "Fuel System Integrity"<br>Frontal Impact  |  |  |  | 18. Distribution Statement<br><br><u>Copies of this report are available from:</u><br>Technical Reference Division<br>National Highway Traffic Safety Admin.<br>Nassif Building, Room 5108 (NAD-52)<br>400 Seventh St., S.W., Washington, DC 20590 |           |
| 19. Security Classif. (of this report)<br><br>UNCLASSIFIED   |  | 20. Security Classif. (of this page)<br><br>UNCLASSIFIED |  | 21. No. of Pages   | 22. Price |

TABLE OF CONTENTS

| <u>Section</u> |   | <u>Page No.</u> |
|----------------|---|-----------------|
| 1              | PURPOSE AND TEST PROCEDURE  | 1-1             |
| 2              | SUMMARY OF FRONTAL BARRIER IMPACT TEST  | 2-1             |
| 3              | OCCUPANT AND VEHICLE INFORMATION  | 3-1             |
| 4              | SUMMARY OF RESULTS FOR:<br>FMVSS 208, "Occupant Crash Protection"<br>FMVSS 212, "Windshield Mounting"<br>FMVSS 219 (Partial), "Windshield Zone Intrusion"<br>FMVSS 301, "Fuel System Integrity" | 4-1             |
| APPENDIX A     | PHOTOGRAPHS   | A-1             |
| APPENDIX B     | VEHICLE AND DUMMY RESPONSE DATA   | B-1             |
| APPENDIX C     | VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT<br>SYSTEM INSTRUCTIONS  | C-1             |

LIST OF FIGURES

| <u>Figure No.</u> |  | <u>Page No.</u> |
|-------------------|--|-----------------|
| 1                 | TEST VEHICLE INFORMATION   | 3-2             |
| 2                 | PART 572 DUMMY IN-VEHICLE POSITION                                     | 3-3             |
| 3                 | OCCUPANT CLEARANCE DIMENSIONS  | 3-4             |
| 4                 | DRIVER DUMMY TO STEERING COLUMN/WHEEL<br>ASSEMBLY REFERENCE DIMENSIONS | 3-5             |
| 5                 | SEAT BELT POSITIONING DATA   | 3-6             |
| 6                 | VEHICLE ACCELEROMETER LOCATIONS  | 3-7             |
| 7                 | CAMERA POSITIONS FOR FRONTAL IMPACTS                                   | 3-9             |
| 8                 | VEHICLE TARGET LOCATIONS   | 3-11            |
| 9                 | TEST VEHICLE MEASUREMENTS  | 3-12            |
| 10                | FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA SHEET                       | 4-12            |
| 11                | FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE<br>INTRUSION" DATA SHEET    | 4-13            |

LIST OF TABLES

| <u>Table No.</u> |   | <u>Page No.</u> |
|------------------|---|-----------------|
| 1                | Crash Test Summary  | 2-2             |
| 2                | General Test and Vehicle Parameter Data                       | 2-3             |
| 3                | Post-Impact Data  | 2-5             |
| 4                | Vehicle Accelerometer Locations and Data Summary              | 3-8             |
| 5                | High Speed Camera Locations                                   | 3-10            |
| 6                | Vehicle Measurements  | 3-13            |
| 7                | Dummy Injury Criteria Values                                  | 4-2             |
| 8                | FMVSS No. 208 - Seat Belt Warning System check                | 4-3             |
| 9                | FMVSS No. 208 - Labeling and Driver's Manual Information      | 4-4             |
| 10               | FMVSS No. 208 - Readiness Indicator                           | 4-5             |
| 11               | FMVSS No. 208 - Comfort and Convenience Test Summary          | 4-6             |
| 12               | FMVSS No. 301 - "Fuel System Integrity" Post-Impact Test Data | 4-14            |
| 13               | FMVSS No. 301 - Static Rollover Data Sheet                    | 4-15            |
| 14               | Test Vehicle Noncompliance Notice                             | 4-19            |

Section 1

PURPOSE AND TEST PROCEDURE

This 30 mph frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (partial) and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by Calspan Advanced Technology Center under Contract No. DTNH22-90-C-01003. The purpose of this test was to determine if the subject vehicle, a 1992 Oldsmobile 88 Royale 4-Door Sedan, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS No. 212, "Windshield Mounting"; FMVSS No. 219 (partial), "Windshield Zone Intrusion"; and FMVSS No. 301, "Fuel System Integrity". This compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-208-08, dated September 8, 1989.

## Section 2

### SUMMARY OF TEST NUMBER CN0102

A frontal barrier was impacted by a 1992 Oldsmobile 88 Royale 4-Door Sedan at a velocity of 29.4 mph. The test was performed at the Calspan Corporation Advanced Technology Center on October 9, 1991. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 14 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right front passenger seating positions according to dummy placement instructions specified in the OVSC Laboratory Test Procedure.

Both ATDs were fully instrumented with head and chest triaxial accelerometers, chest displacement potentiometers and left/right femur load cells. These ATDs had been certified prior to the test.

The 25 channels of data were recorded on two 14-channel FM tape recorders. Appendix B contains the vehicle and dummy response data traces.

The driver's HIC was 219. The maximum chest deceleration over 3 milliseconds was 38.3 g's with 0.7 inches of displacement. The maximum force on the driver's left femur was 1013 pounds and 1157 pounds on the right femur.

The right front passenger's HIC was 309. The maximum chest deceleration over 3 milliseconds was 37.9 g's with 1.6 inches of displacement. Loads of 923 and 664 lbs. were recorded on the left and right femurs respectively.

Table 1

CRASH TEST SUMMARY

Vehicle NHTSA No.: CN0102 Test Mode: 30 mph Frontal Barrier

Test Date: October 9, 1991 Time: 13:40 Temperature: 68 °F

Vehicle Make/Model/Body Style: 1992 Oldsmobile 88 Royale 4-Door Sedan

Vehicle Test Weight: 3900 lbs.

Vehicle/Barrier Impact Angle: 0 °

Impact Velocity: 29.4 mph

Maximum Static Crush: 21.7 inches

Vehicle Rebound: 16.7 inches

DUMMIES:

DRIVER

PASSENGER

Type: Part 572E Part 572E

Restraint System: Airbag Manual 3-point seat belt

Number of Data Channels: 25

Number of Cameras: 1 Real Time

14 High Speed

DOOR OPENING DATA: Closed-Operable - Left Front

Closed-Operable - Right Front

Front Seat(s) Data:

DRIVER

PASSENGER

Seat Track Failure: 0.0 0.0

inches of shift

Seat Back Failure: None None

VISIBLE DUMMY CONTACT POINTS:

DRIVER

PASSENGER

Head: Airbag, rear of head with headrest Chin with chest; rear of head with headrest

Abdomen: Airbag No contact

Chest: Airbag No contact

Knees: Lower Instrument Panel Lower dash

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1992 Oldsmobile 88 Royale 4-Door Sedan  
NHTSA No.: CNO102; VIN: 1G3HN53LXNH324945; Color: Red  
Engine Data: 6 cylinders; - CID; 3.8 Liters; - cc  
Placement: - Longitudinal or In-Line; X Transverse or Lateral  
Transmission Data: 4 speeds; - Manual; X Automatic; X Overdrive  
Final Drive: - Rear Wheel Drive; X Front Wheel Drive; - Four Wheel Drive  
Major Options: X A/C; X Pwr.Strg.; X Pwr.Brakes  
X Pwr.Windows; - Pwr.Door Locks; X Tilt Wheel  
Date Received: 9-10-91; Odometer Reading 18.2 miles  
Selling Dealer: Mike Basil Oldsmobile, Inc.  
& Address 1540 Walden Avenue, Cheektowaga, NY 14225

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: General Motors Corporation  
Date of Manufacture: 8/91  
GVWR: 4519 lbs.; GAWR: 2494 lbs. FRONT; 2025 lbs. REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load: 35 psi FRONT  
35 psi REAR  
Recommended Tire Size: 205/70R15  
Recommended Cold Tire Pressure: 30 psi FRONT; 30 psi REAR  
Size of Tires on Test Vehicle: 205/70R15; Manufacturer: General

Vehicle Capacity Data:

Type of Front Seats: - Bench; - Bucket; X Split Bench  
Number of Occupants: 3 Front; 3 Rear; 6 Total  
Vehicle Capacity Weight (VCW) = 1076 lbs.  
No. of Occupants x 150 lbs. = 900 lbs.  
Rated Cargo/Luggage Weight (RCLW) = 176 lbs. (Difference)

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS) = UDW:

Right Front = 1080 lbs.      Right Rear = 630 lbs.  
Left Front = 1080 lbs.      Left Rear = 610 lbs.  
TOTAL FRONT = 2160 lbs.      TOTAL REAR = 1240 lbs.  
% of Total Vehicle Weight = 63.5 % of Total Weight = 36.5 %  
TOTAL DELIVERED WEIGHT = 3400 lbs.

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 3400 lbs.  
Rated Cargo/Luggage Weight (RCLW) = 176 lbs.  
Weight of 2 P.572E Dummies @ 167 ea. = 334 lbs.  
TARGET TEST WEIGHT = 3910 lbs. (sum)

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 0 POUNDS OF CARGO WEIGHT:

Right Front = 1140 lbs.      Right Rear = 810 lbs.  
Left Front = 1140 lbs.      Left Rear = 810 lbs.  
TOTAL FRONT = 2280 lbs.      TOTAL REAR = 1620 lbs.  
% of Total Weight = 58.5 %      % of Total Weight = 41.5 %  
TOTAL TEST WEIGHT = 3900 lbs.  
Weight of Ballast Secured in Vehicle Trunk Area = 75 lbs.  
Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimensions in inches):

AS DELIVERED:    RF 29.0"    LF 28.7"    RR 28.2"    LR 28.0"  
FULLY LOADED:    RF 27.8"    LF 27.5"    RR 25.4"    LR 25.3"  
AS TESTED:      RF 28.0"    LF 28.2"    RR 26.2"    LR 26.3"  
Vehicle's Wheel Base: 110.4 in.  
Location of Vehicle's C.G.: 45.9 inches reared of front wheel center.

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual = 18.0 gallons  
Usable Capacity Figure Furnished by COTR = 18.0 gallons  
Test Volume Range (92 to 94% of Usable Capacity) = 16.6 to 16.9 gallons  
ACTUAL TEST VOLUME = 16.7 gallons (with entire fuel system filled)

Table 3  
POST IMPACT DATA

TYPE OF TEST:

Type of Test: Frontal Barrier Impact Angle: 0°  
Test Date: October 9, 1991 Time: 13:40 Temperature: 68°F  
Vehicle NHTSA No.: CN0102  
Required Impact Velocity Range: 28.9 to 29.9 mph

BARRIER IMPACT VELOCITY: (Speed traps within 5 feet of impact plane.)

Trap No. 1 = 29.4 mph; Trap No. 2 = 29.4 mph  
Distance from vehicle to barrier: (1) entering trap = 52 inches  
(2) exiting trap = 12 inches

VEHICLE STATIC CRUSH: (For frontal and rear impacts only.)

Vehicle Length:

Pre-Test Right = 195.0; C/L = 200.2; Left = 195.1  
Post-Test Right = 175.1; C/L = 178.5; Left = 173.7  
Crush Right = 19.9; C/L = 21.7; Left = 21.4  
AVERAGE = 21.0 inches

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point:  
Right = 17.5; C/L = 14.6; Left = 18.1  
AVERAGE = 16.7 inches

DOOR OPENING:

|       | Left                   | Right                  |
|-------|------------------------|------------------------|
| Front | <u>Closed-Operable</u> | <u>Closed-Operable</u> |
| Rear  | <u>Closed-Operable</u> | <u>Closed-Operable</u> |

SEAT MOVEMENT:

|       | Seat Back Failure | Seat Shift  |
|-------|-------------------|-------------|
| Front | <u>None</u>       | <u>None</u> |
| Rear  | <u>-</u>          | <u>-</u>    |

Table 3

POST IMPACT DATA (cont.)

GLAZING DAMAGE: Windshield cracked near A-pillars.

---

---

---

---

OTHER NOTABLE IMPACT FEATURES: Steering column stroked.

---

---

---

---

Section 3  
OCCUPANT AND VEHICLE DATA

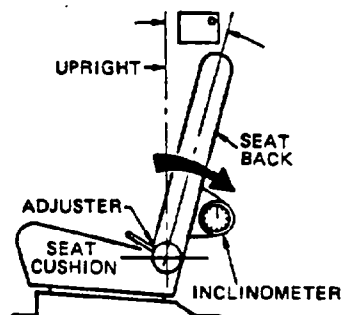
Figure 1

TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year: 1992 Vehicle Model: Oldsmobile 88 Royale Body Style: 4-Door Sedan

1. Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



LEFT SIDE VIEW

Seat back angle for driver's seat: \_\_\_\_\_

Measurement instructions: Nonadjustable seat back angle.

Seat back angle for passenger's seat: \_\_\_\_\_

Measurement instructions: Nonadjustable seat back angle.

2. Seat Fore and Aft Positioning

Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat: seat placed in mid-position of 21 total detents.

Positioning of the passenger's seat (if applicable): Same as driver.

3. Fuel Tank Capacity Data

A. "Usable Capacity" of the standard equipment fuel tank is 18 gallons

B. "Usable Capacity" of the optional equipment fuel tank is 18 gallons

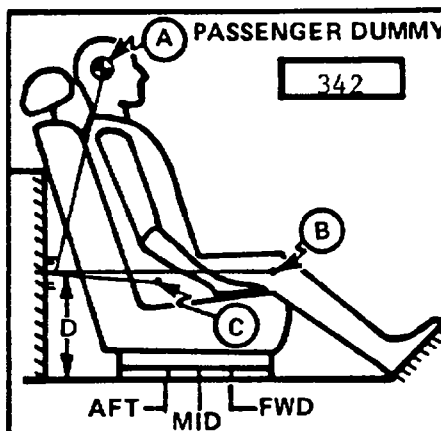
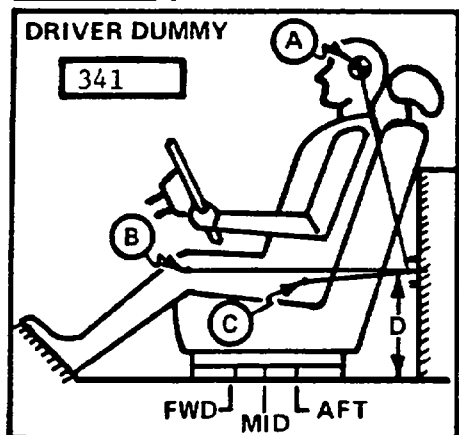
Additional Instructions: None

Figure 2

PART 572 DUMMY IN-VEHICLE POSITION

Test No.: CN0102 Vehicle: 1992 Oldsmobile 88 Royale

SEAT TYPE: ADJUSTER TYPE: SEAT BACK TYPE:  
- Bench X Manual X Fixed  
- Bucket - Power - Adjustable Reclining  
X Split Bench

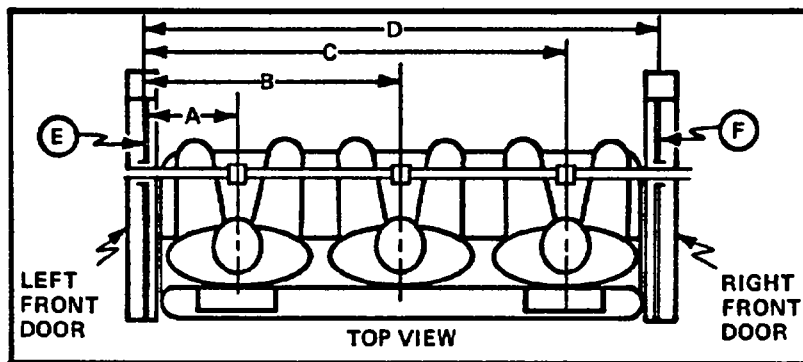


MEASUREMENT LOCATION

- A - Head Target
- B - Knee Joint
- C - Approximate 'H' Point
- D - Sill to Reference Point

A = 19.5 in. 15 Degrees  
 B = 24.7 in. 97 Degrees  
 C = 10.7 in. 132 Degrees  
 D = 13.9 in.

A = 20.3 in. 13 Degrees  
 B = 24.5 in. 96 Degrees  
 C = 10.5 in. 130 Degrees  
 D = 13.8 in.

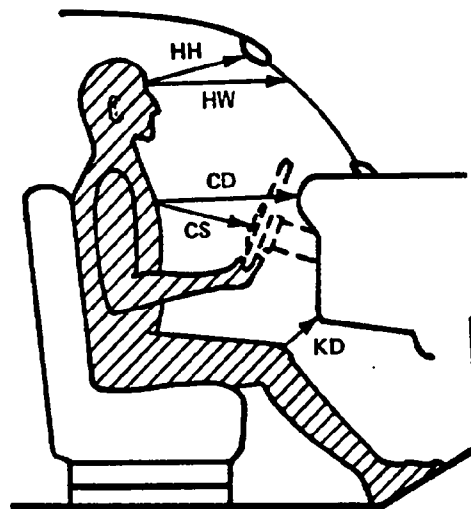


S/N 341 DUMMY ID S/N 342

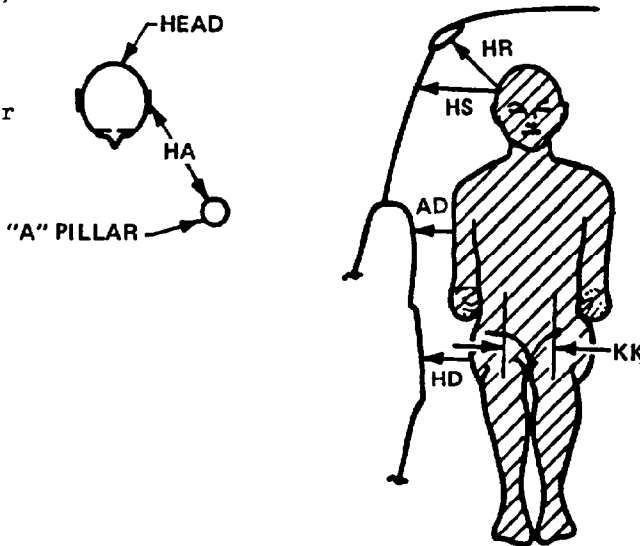
A = Left Door to Driver Centerline 15.1 in.  
 B = Left Door to Center Passenger Centerline - in.  
 C = Left Door to Right Passenger Centerline 44.0 in.  
 D = Left Door to Right Door 51.9 in.  
 E, F = Window Glass Height (Right and Left Must Be Equal) 9.6 in.

Figure 3  
OCCUPANT CLEARANCE DIMENSIONS  
(Dimensions in inches)

|     | DRIVER | PASSENGER |
|-----|--------|-----------|
| HH  | 12.5   | 12.5      |
| HW  | 22.0   | 22.1      |
| CD  | 18.6   | 19.2      |
| CS  | 9.7    | -         |
| KDL | 4.0    | 4.1       |
| KDR | 3.8    | 3.5       |
| SA  | Fixed  | Fixed     |
| PA  | 24°    | 24°       |



- HH = Head to Windshield Header
- HW = Head to Windshield
- CD = Chest to Dash
- CS = Chest to Steering Wheel
- KD(L/R) = Knee to Dash (Left/Right)
- SA = Seat Back Angle
- PA = Pelvic Angle
- HA = Head Target to "A" Pillar
- HR = Head to Side Roof
- HS = Head to Side Window
- AD = Arm to Door
- HD = Hip to Door
- KK = Knee to Knee



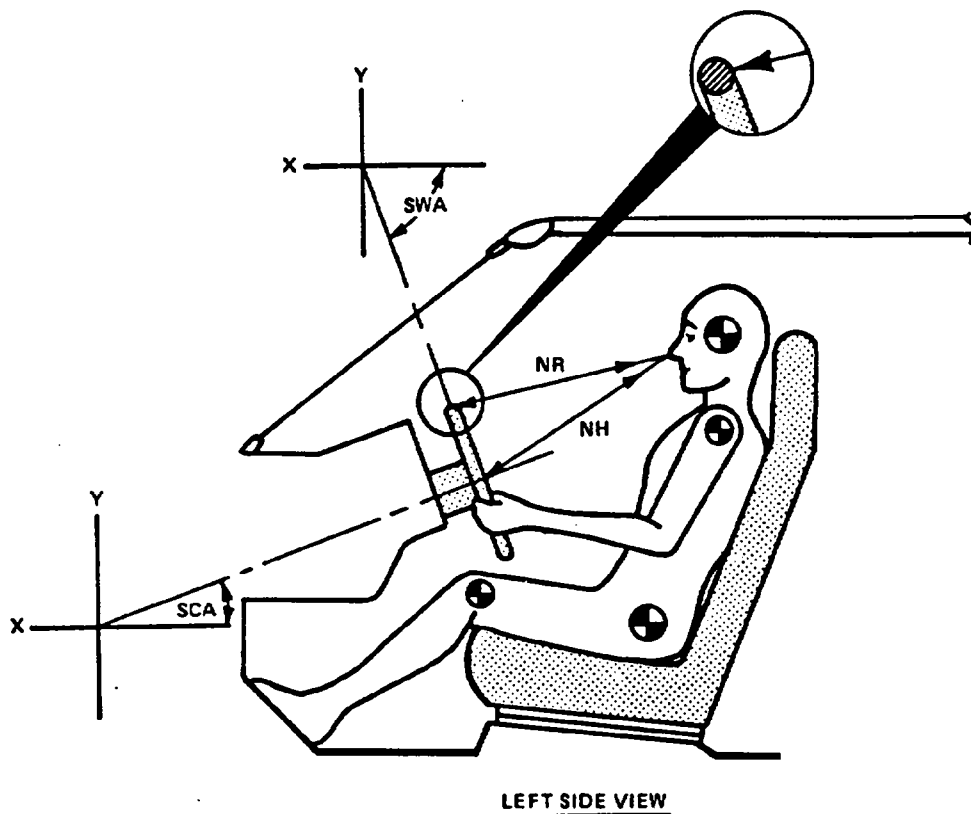
|    | DRIVER | PASSENGER |
|----|--------|-----------|
| HR | 8.2    | 8.1       |
| HS | 12.2   | 12.3      |
| AD | 5.6    | 5.8       |
| HD | 6.5    | 6.1       |
| KK | 8.3    | 8.4       |
| HA | 19.7   | 19.2      |

H-POINT LOCATION

|           | Target                  |                        | Relative to Target |       |
|-----------|-------------------------|------------------------|--------------------|-------|
|           | Long.                   | Vert.                  | Long.              | Vert. |
| Driver    | 8.8 in front of striker | 5.2 above plastic sill | +0.1               | -0.1  |
| Passenger | 9.0 in front of striker | 5.4 above plastic sill | -0.1               | +0.1  |

Figure 4

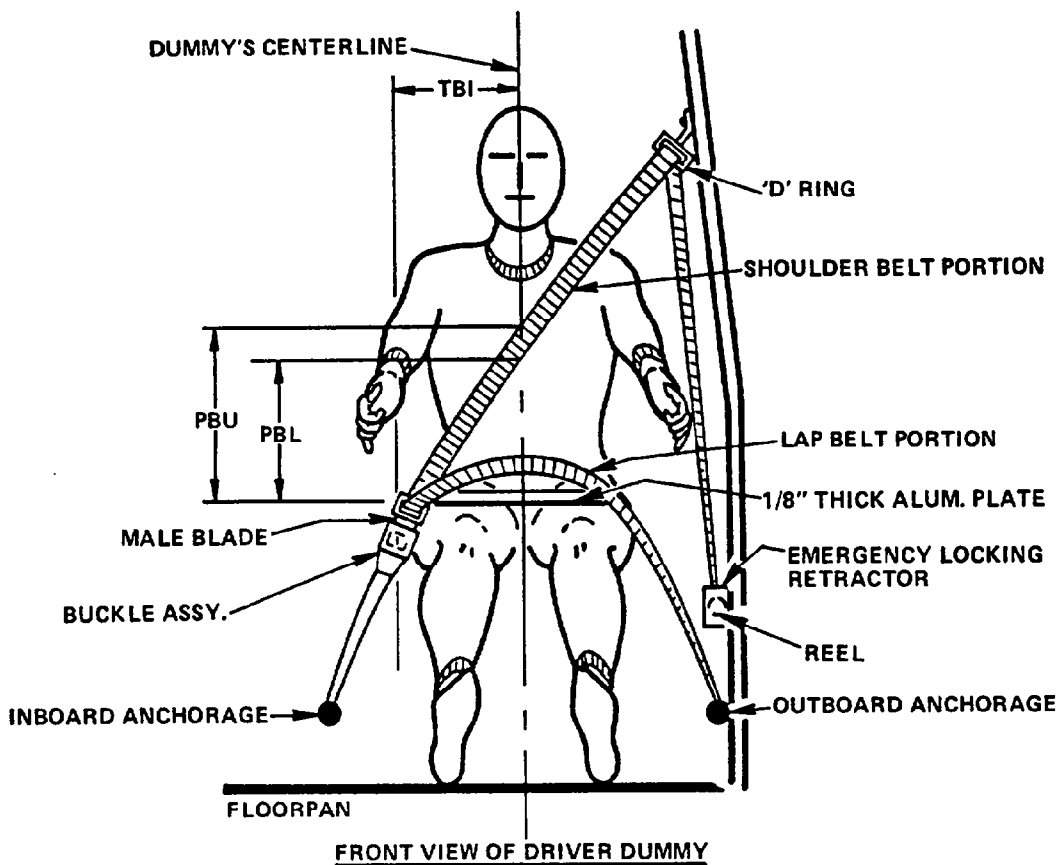
DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY REFERENCE DIMENSIONS



|  | MEASUREMENTS |         |
|--|--------------|---------|
| <u>NR</u> -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim | 13.3         | Inches  |
| <u>NH</u> -- Distance from tip of dummy's nose to center of steering wheel hub           | 14.2         | Inches  |
| <u>SCA</u> -- Angle of steering column relative to the horizontal X axis                 | 19*          | Degrees |
| <u>SWA</u> -- Angle of steering wheel relative to the horizontal X axis                  | -71*         | Degrees |

\*Adjustable tilt steering wheel set in second position up from full down. Full down = position 0.

Figure 5  
SEAT BELT POSITIONING DATA

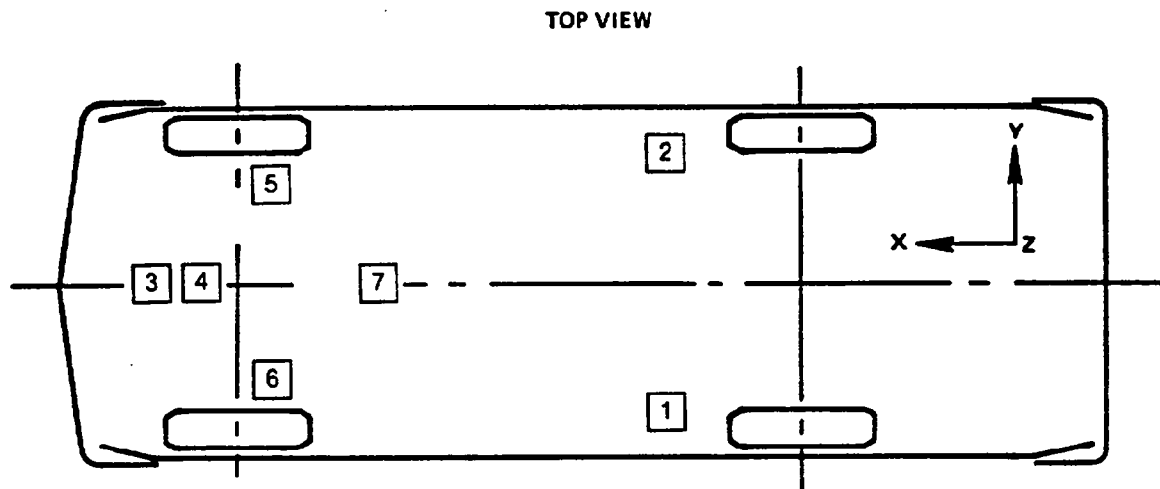


|   | DRIVER DUMMY<br>(inches) | PASSENGER DUMMY<br>(inches) |
|---|--------------------------|-----------------------------|
| <u>PBU</u> -- Top surface of alum. plate to upper edge      | *                        | 13.1**                      |
| <u>PBL</u> -- Top surface of alum. plate to belt lower edge | *                        | 10.2**                      |
| <u>TBI</u> -- Distance from torso centerline to buckle      | *                        | 9.0                         |

\*Driver side airbag, manual belt not used on driver for this test.

\*\*Adjustable B-pillar anchor set in mid-position per manufacturer's instructions.

Figure 6  
 VEHICLE ACCELEROMETER LOCATIONS



| ACCELEROMETER<br>NUMBER* | ACCELEROMETER LOCATION      | DIRECTION |   |   |
|--------------------------|-----------------------------|-----------|---|---|
|                          |                             | X         | Y | Z |
| 1                        | Left Rear Seat Crossmember  | X         |   |   |
| 2                        | Right Rear Seat Crossmember | X         |   |   |
| 3                        | Top of Engine               | X         |   |   |
| 4                        | Bottom of Engine            | X         |   |   |
| 5                        | Right Disc Brake Caliper    | X         |   |   |
| 6                        | Left Disc Brake Caliper     | X         |   |   |
| 7                        | Instrument Panel            | X         |   |   |

\*The accelerometer pack number can be correlated with the vehicle response data traces found in Appendix B.

Table 4  
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

| NO. | LOCATION                            |       | X*    | Y*    | Z*   | POSITIVE DIRECTION** |             | NEGATIVE DIRECTION** |             |
|-----|-------------------------------------|-------|-------|-------|------|----------------------|-------------|----------------------|-------------|
|     |                                     |       |       |       |      | MAX (g)              | TIME (msec) | MAX (g)              | TIME (msec) |
| 1   | REAR SEAT X-MEMBER<br>AT LEFT SIDE  | PRE:  | 74.5  | 18.3  | 17.2 |                      |             |                      |             |
|     |                                     | POST: | 74.5  | 18.3  | 16.6 |                      |             |                      |             |
|     | LONGITUDINAL<br>ACCELERATION        |       |       |       |      | 2                    | 171         | -21                  | 87          |
| 2   | REAR SEAT X-MEMBER<br>AT RIGHT SIDE | PRE:  | 74.5  | -18.3 | 17.2 |                      |             |                      |             |
|     |                                     | POST: | 74.5  | -18.3 | 17.4 |                      |             |                      |             |
|     | LONGITUDINAL<br>ACCELERATION        |       |       |       |      | 5                    | 16          | -24                  | 20          |
| 3   | TOP OF ENGINE BLOCK                 | PRE:  | 164.4 | -1.2  | 34.6 |                      |             |                      |             |
|     |                                     | POST: | 156.9 | -1.4  | 31.4 |                      |             |                      |             |
|     | LONGITUDINAL<br>ACCELERATION        |       |       |       |      | 26                   | 67          | -94                  | 49          |
| 4   | BOTTOM OF ENGINE                    | PRE:  | 163.5 | -9.5  | 9.6  |                      |             |                      |             |
|     |                                     | POST: | 157.7 | -9.6  | 6.6  |                      |             |                      |             |
|     | LONGITUDINAL<br>ACCELERATION        |       |       |       |      | 22                   | 58          | -69                  | 51          |
| 5   | BRAKE CALIPER AT<br>RIGHT SIDE      | PRE:  | 152.3 | -22.8 | 21.5 |                      |             |                      |             |
|     |                                     | POST: | 151.0 | -22.8 | 21.2 |                      |             |                      |             |
|     | LONGITUDINAL<br>ACCELERATION        |       |       |       |      | 6                    | 94          | -46                  | 63          |
| 6   | BRAKE CALIPER AT<br>LEFT SIDE       | PRE:  | 152.3 | 22.8  | 21.5 |                      |             |                      |             |
|     |                                     | POST: | 151.6 | 22.8  | 19.1 |                      |             |                      |             |
|     | LONGITUDINAL<br>ACCELERATION        |       |       |       |      | 12                   | 82          | -167                 | 65          |
| 7   | DASH PANEL                          | PRE:  | 123.2 | 0.3   | 31.0 |                      |             |                      |             |
|     |                                     | POST: | 123.2 | 0.3   | 30.4 |                      |             |                      |             |
|     | LONGITUDINAL<br>ACCELERATION        |       |       |       |      | 63                   | 104         | -78                  | 77          |

\*X + Forward from rear bumper  
 Y + Left from vehicle centerline  
 Z + Up from ground

\*\*  
 LONGITUDINAL:  
 LATERAL:  
 VERTICAL:

POSITIVE  
 FORWARD  
 LEFTWARD  
 UPWARD

NEGATIVE  
 REARWARD  
 RIGHTWARD  
 DOWNWARD

DISTANCE MEASUREMENTS IN INCHES

Figure 7

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 5.

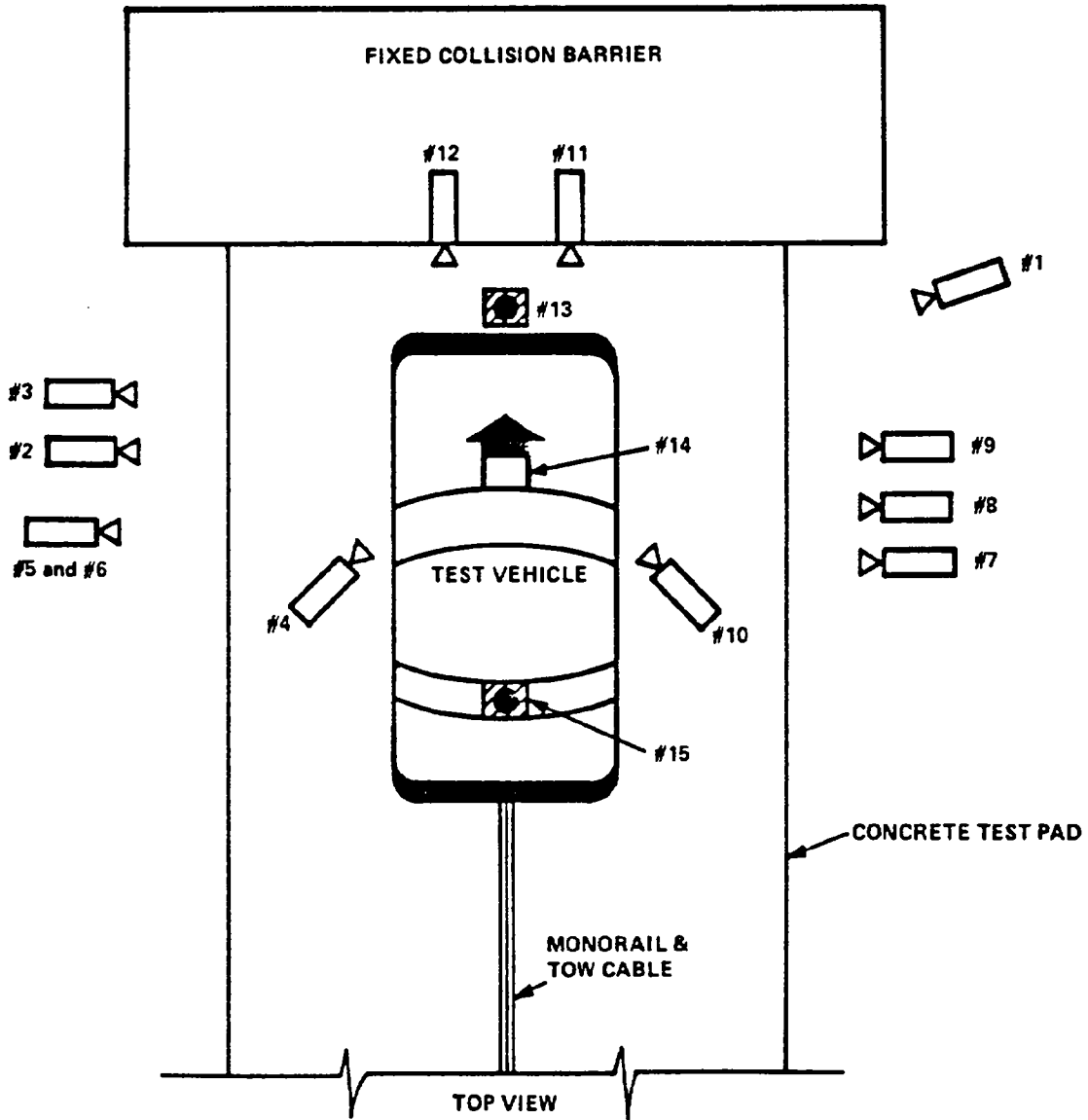


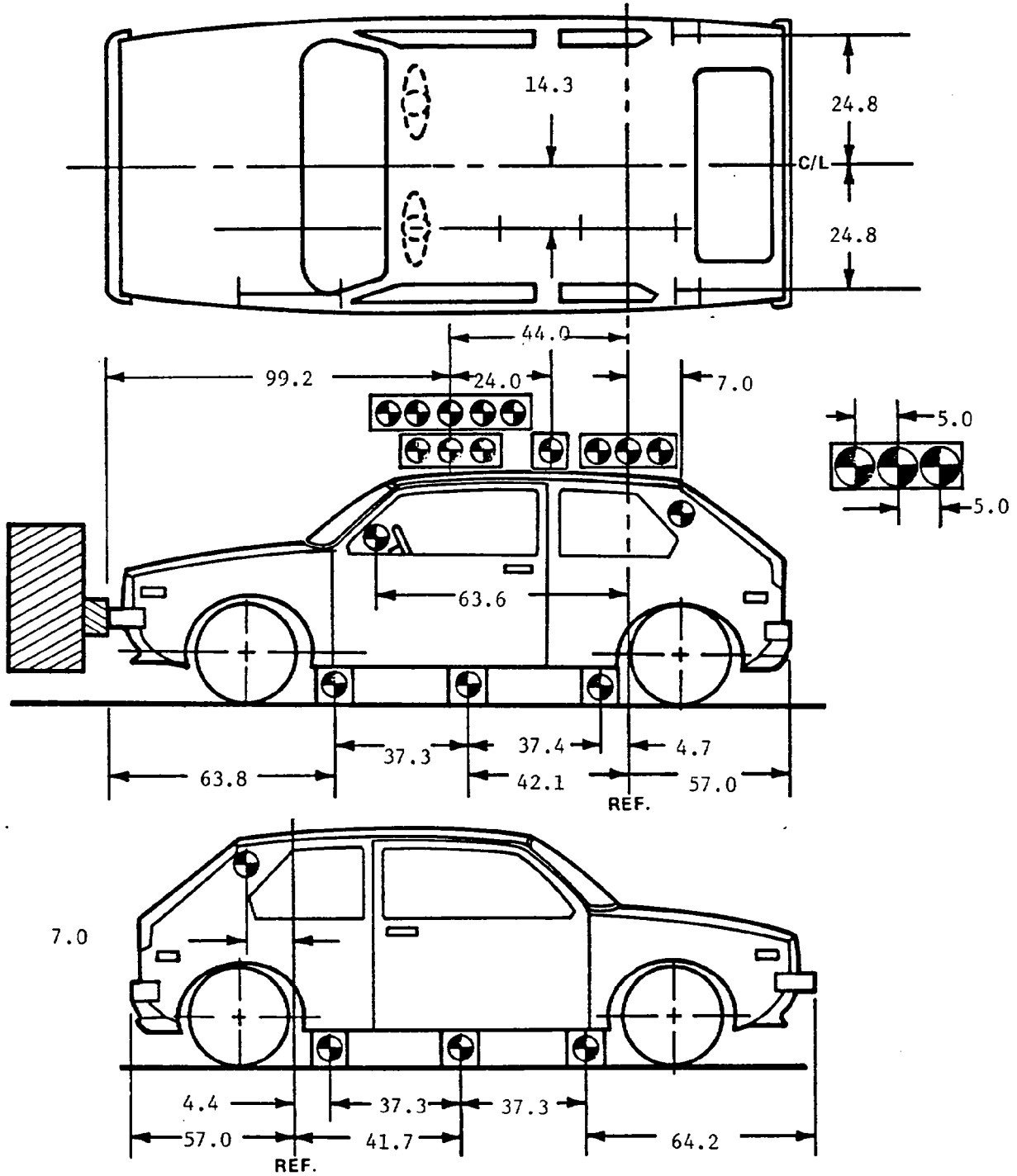
Table 5

## HIGH-SPEED CAMERA LOCATIONS

| CAMERA NO. | VIEW                        | CAMERA POSITIONS (in)* |     |     | ANGLE** (deg) | FILM PLANE TO HEAD TARGET | LENS (mm) | SPEED (fps) |
|------------|-----------------------------|------------------------|-----|-----|---------------|---------------------------|-----------|-------------|
|            |                             | X                      | Y   | Z   |               |                           |           |             |
| 1          | Real-Time Camera            | -                      | -   | -   | -             | -                         | 24        |             |
| 2          | Overall Left Side           | 238                    | 61  | 41  | -3            | 224.2                     | 550       |             |
| 3          | Left Side View              | 319                    | 44  | 41  | -3            | 305.2                     | 560       |             |
| 4          | Driver and Interior View    | 117                    | 105 | 67  | -15           | -                         | 590       |             |
| 5          | Steering Column (Bottom)    | 289                    | 75  | 46  | -4            | 275.2                     | 540       |             |
| 6          | Steering Column (Top)       | 289                    | 75  | 70  | -10           | 275.2                     | 525       |             |
| 7          | Overall Right Side          | 253                    | 76  | 42  | -2            | 239.2                     | 610       |             |
| 8          | Right Side View             | 323                    | 54  | 41  | 0             | 309.2                     | 590       |             |
| 9          | Right Passenger View        | 326                    | 81  | 55  | -3            | 312.2                     | 550       |             |
| 10         | Passenger and Interior View | 124                    | 112 | 67  | -11           | -                         | 500       |             |
| 11         | Passenger Front View        | 22                     | 18  | 76  | -42           | -                         | N.T.      |             |
| 12         | Driver Front View           | 22                     | 18  | 76  | -42           | -                         | N.T.      |             |
| 13         | Windshield View             | 0                      | 0   | 130 | -52           | -                         | 540       |             |
| 14         | Pit View of Engine          | 0                      | 24  | -84 | 90            | -                         | 740       |             |
| 15         | Pit View of Fuel Tank       | 0                      | 94  | -84 | 90            | -                         | 930       |             |

\*X = film plane to monorail centerline  
 Y = film plane to impact location  
 Z = film plan to ground  
 \*\* = referenced to horizontal plane

Figure 8  
VEHICLE TARGET LOCATIONS



(DIMENSIONS IN INCHES)

Figure 9

TEST VEHICLE MEASUREMENTS

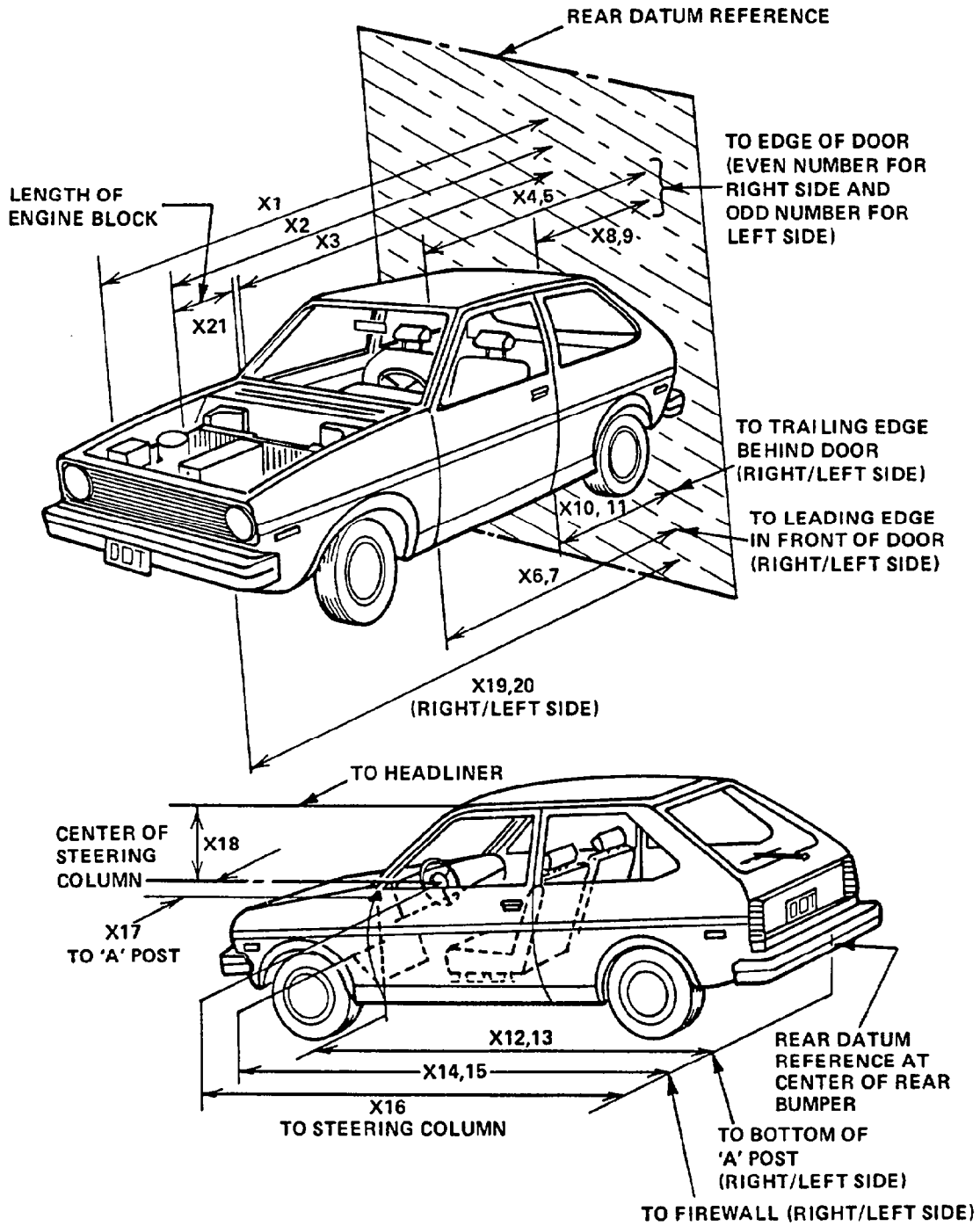


Table 6

## VEHICLE MEASUREMENTS

| No. |  | All Dimensions in Inches |           |             |
|-----|--|--------------------------|-----------|-------------|
|     |  | Pre-Test                 | Post-Test | Differences |
| X1  | Total Length of Vehicle at Centerline                        | 200.2                    | 178.5     | 21.7        |
| X2  | Rear Surface of Vehicle to Front of Engine                   | 174.5                    | 168.8     | 5.7         |
| X3  | Rear Surface of Vehicle to Firewall                          | 145.4                    | 145.1     | 0.3         |
| X4  | Rear Surface of Vehicle to Upper Leading Edge of Right Door  | 131.4                    | 131.2     | 0.2         |
| X5  | Rear Surface of Vehicle to Upper Leading Edge of Left Door   | 131.5                    | 131.2     | 0.3         |
| X6  | Rear Surface of Vehicle to Lower Leading Edge of Right Door  | 133.2                    | 132.9     | 0.3         |
| X7  | Rear Surface of Vehicle to Lower Leading Edge of Left Door   | 133.1                    | 132.6     | 0.5         |
| X8  | Rear Surface of Vehicle to Upper Trailing Edge of Right Door | 91.8                     | 91.5      | 0.3         |
| X9  | Rear Surface of Vehicle to Upper Trailing Edge of Left Door  | 91.8                     | 91.6      | 0.2         |
| X10 | Rear Surface of Vehicle to Lower Trailing Edge of Right Door | 91.9                     | 91.7      | 0.2         |
| X11 | Rear Surface of Vehicle to Lower Trailing Edge of Left Door  | 91.8                     | 91.2      | 0.6         |
| X12 | Rear Surface of Vehicle to Bottom of "A" Post of Right Side  | 133.2                    | 133.0     | 0.2         |
| X13 | Rear Surface of Vehicle to Bottom of "A" Post of Left Side   | 133.2                    | 132.9     | 0.3         |
| X14 | Rear Surface of Vehicle to Firewall, Right Side              | 144.0                    | 143.7     | 0.3         |
| X15 | Rear Surface of Vehicle to Firewall, Left Side               | 144.0                    | 143.5     | 0.5         |
| X16 | Rear Surface of Vehicle to Steering Column                   | 114.0                    | 117.0     | -3.0        |
| X17 | Center of Steering Column to "A" Post                        | 16.5                     | 16.8      | -0.3        |
| X18 | Center of Steering Column to Headliner                       | 17.0                     | 17.2      | -0.2        |
| X19 | Rear Surface of Vehicle to Right Side of Front Bumper        | 195.0                    | 175.1     | 19.9        |
| X20 | Rear Surface of Vehicle to Left Side of Front Bumper         | 195.1                    | 173.7     | 21.4        |
| X21 | Length of Engine Block                                       | 20.5                     | 20.5      | 0.0         |

Section 4

SUMMARY OF RESULTS OF FMVSS NOS. 208, 212, 219 AND 301-75

- "Occupant Crash Protection," FMVSS No. 208 Data
- "Windshield Mounting," FMVSS No. 212 Data
- "Windshield Zone Intrusion," FMVSS No. 219 (Partial) Data
- "Fuel System Integrity," FMVSS No. 301-75

Table 7

DUMMY INJURY CRITERIA VALUES

NHTSA No.: CN0102 Vehicle: 1992 Oldsmobile 88 Royale 4-Door Sedan

|           | MAXIMUM ACCELERATION (g's) |     |     |    |       |   |    |      |
|-----------|----------------------------|-----|-----|----|-------|---|----|------|
|           | HEAD                       |     |     |    | CHEST |   |    |      |
|           | X                          | Y   | Z   | R  | X     | Y | Z  | R*   |
| Dummy (1) | 71                         | -25 | -35 | 76 | -38   | 3 | 9  | 38.3 |
| Dummy (2) | -38                        | 7   | 34  | 40 | -38   | 9 | 11 | 37.9 |

|           | MAXIMUM FORCE - FEMUR LOAD (lbs.) |             |
|-----------|-----------------------------------|-------------|
|           | LEFT FEMUR                        | RIGHT FEMUR |
| Dummy (1) | 1013                              | 1157        |
| Dummy (2) | 923                               | 664         |

|           | HEAD INJURY CRITERIA** |                        |                       |   |
|-----------|------------------------|------------------------|-----------------------|---|
|           | HIC                    | 36 millisecond Maximum |                       | Avg. Acc. (g)<br>t <sub>1</sub> TO t <sub>2</sub> |
|           |                        | t <sub>1</sub> (msec)  | t <sub>2</sub> (msec) |   |
| Dummy (1) | 219.46                 | 43.320                 | 77.040                | 33.53   |
| Dummy (2) | 308.70                 | 98.040                 | 134.040               | 37.44   |

\*Defined as exceeding 0.003 sec. duration

\*\*As defined in FMVSS No. 208

Table 8

FMVSS NO. 208 - SEAT BELT WARNING SYSTEM CHECK

With occupant in driver's position, the lap belt in stowed position, and ignition switch placed in "Start/On" position:

Log time duration of audible warning signal = 6 sec.

Log time duration of reminder light operation = 6 sec.

With occupant in driver's position, lap belt in use, and the ignition switch placed in "Start/On" position:

Log time duration of audible warning signal = 0 sec.  
(audible warning should not operate)

Log time duration of reminder light operation = 6 sec.

Note wording of visual warning:

Fasten Seat Belt -

Fasten Belt -

Symbol 101-80 X

Table 9

FMVSS NO. 208 - LABELING AND DRIVER'S MANUAL INFORMATION

Locate label which describes manufacturers maintenance or replacement schedule for crash-deployed occupant protection system.

Describe location:

Located on driver side sunvisor.

The manufacturers recommended schedule is to take the vehicle to your GM Dealer if the SIR readiness light does not come on at ignition "ON", or if it comes on during vehicle operation. Regular maintenance of the SIR is not required.

Were appropriate instructions concerning maintenance and/or replacement of this system provided? YES  X  NO  -

Was a description of the functional operation of the system provided? YES  X  NO  -

Is there a reference to the instructions and description of the system on the label? YES  X  NO  -

Was an owner's manual provided? YES  X  NO  -

Did the owner's manual contain appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems? YES  X  NO  -

Table 10

FMVSS NO. 208 - READINESS INDICATOR

An occupant restraint system that deploys in the event of a crash shall have a monitoring system with a readiness indicator. A totally mechanical system is exempt from this requirement.

Is the system totally mechanical? YES - NO X

Describe the location of the readiness indicator:

Top left center of instrument cluster.

Is the readiness indicator clearly visible to the driver?

YES X NO -

Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided?

YES X NO -

Table 11

FMVSS NO. 208 - COMFORT AND CONVENIENCE TEST SUMMARY

Test Vehicle NHTSA No.: CN0102  
Make/Model: 1992 Oldsmobile 88 Royale  
Date of Comfort/Convenience Check: 10/8/91  
Technician Performing Check: DJT  
GVWR: 4519 lbs.

Seat belt comfort and convenience requirements cover vehicles manufactured on or after September 1, 1986, which have a gross vehicle weight rating of 10,000 pounds or less. Exemptions to this rule are belts installed in a walk-in, van-type vehicle and manual Type 2 belt systems installed in the front outboard seating positions of passenger automobiles. On or after September 1, 1989, the exemption of the type 2 manual seat belts installed in the front outboard seating positions of passenger automobiles will change depending on the states' enactment of mandatory usage laws.

Was vehicle built after or on September 1, 1986, and is it equipped with:

1. Automatic seat belts YES - NO X

If yes, go to requirements D1, D2 and D3

2. Manual seat belts\* YES X\*\* NO -

a. The seat belts, other than Type 2 lap/shoulder belts, are located in

the front outboard seating positions of a passenger automobile.

YES - NO X

(Go to requirements D3, D4, D5, and D6)

b. The seat belt system is Type 2 lap/shoulder belt in the front outboard seating positions or the seat belts are located in a walk-in van.

STOP

\*If the seat belts are voluntarily installed by the manufacturer they do not have to comply.

\*\*Driver side airbag used for test, manual belt not used for driver.

Table 11 (cont.)

D1

CONVENIENCE HOOKS

A convenience hook or other device is provided to stow seat belt webbing to facilitate entering or exiting the vehicle.

YES  X  NO  -

Check the option which applies to this test vehicle:

1. A convenience hook or other device automatically releases the webbing when the automatic belt system is operational and remains in the released mode as long as the vehicle's ignition switch is moved to the "on" or "start" position and the vehicle's drivetrain is engaged.

YES  X  NO  -

2. A convenience hook or other device automatically releases the webbing when the automatic belt system is operational and remains in the released mode as long as the vehicle's ignition switch is moved to the "on" or "start" position and the vehicle's parking brake is in the released mode (nonengaged).

YES  X  NO  -

D2

WEBBING TENSION - RELIEVING DEVICE

The seat belt assembly installed in the outboard designated seating position has either manual or automatic tension relieving devices permitting the introduction of slack in the webbing of the shoulder belt ("comfort clips" or "window shade" devices).

YES  -  NO  X

Check the owner's manual and determine the maximum amount of slack recommended by the manufacturer in inches. The recommended slack is  -  inches. Introduce this slack into the shoulder belt before testing the vehicle to comply with the requirements of FMVSS 208 S5.1. A warning is included in the owner's manual that introducing slack beyond the amount specified can significantly reduce the effectiveness of the shoulder belt.

YES  N/A  NO  N/A

(If NO, provide explanation.)

Check the option which applies to this test vehicle:

1. This vehicle is equipped with automatic seat belts and the tension relieving device is canceled each time the adjacent door is opened.

YES  N/A  NO  N/A

(If NO, provide explanation.)

Table 11 (cont.)

WEBBING TENSION - RELIEVING DEVICE (cont.)

2. This vehicle is equipped with manual belts, required to meet FMVSS 208 S4.6, and the tension relieving device is canceled each time one of the following options occurs:
- a. The adjacent door is opened. YES     N/A     NO     N/A
- b. The latch plate is released from the buckle. YES     N/A     NO     N/A
3. This is an open-body vehicle, without doors. Does the manual mean to cancel any shoulder belt slack introduced by a tension relieving device to operate properly?
- YES     N/A     NO     N/A

(If NO, provide explanation.)

D3

BELT CONTACT FORCE

1. Do not measure the belt contact force if the manual or automatic seat belt assemblies in this vehicle incorporate a webbing tension relieving device. Does the vehicle incorporate a tension relieving device?
- YES     -     NO     X
2. Seats are adjusted according to instructions in Appendix B.
- YES     X     NO     -
3. The test dummies are positioned according to dummy position placement instructions in Appendix B and Appendix C.
- YES     X     NO     -
4. Close the vehicle's adjacent door, pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest, then fasten the latch. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point, pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. Measure the contact force exerted by the belt webbing on the dummy's chest. The contact force is 0.3 pounds. Contact the COTR if the contact force exceeds 0.7 pounds.

Table 11 (cont.)

D4

LATCHPLATE ACCESSIBILITY

1. Position the test dummy in the driver's seat or passenger's seat in its forward most adjustment position.  
YES   X   NO   -
2. Attach the inboard and outboard reach string. YES   X   NO   -
3. Extend each line backward and outboard to generate arcs of the reach envelope of the test dummy's arms. With the latchplate in the normal stowed position, check to assure that the latchplates are within the reach envelope.  
YES   X   NO   -
4. Using the clearance test block, determine if there is sufficient clearance between the vehicle seat and the side of vehicle interior to allow the test block to move unhindered to the latchplate or buckle.  
YES   X   NO   -

D5

RETRACTION

1. Seats and seat backs are adjusted according to instructions in Appendix B "General Test Conditions" in TP-208-8.  
YES   X   NO   -
2. Use anthropomorphic test dummies whose arms have been removed and position the dummies in the front outboard designated seating positions according to instructions in Appendix B and restrain the dummies, using the belt systems for the positions being tested.  
YES   X   NO   -
3. Outboard armrests which are capable of being stowed on vehicle seats shall be placed in their stowed positions.  
YES   N/A   NO   N/A
4. Check the option which applies to this test vehicle:
  - a. The torso and lap belt webbing of the seat belt system automatically retract to a stowed position when the adjacent vehicle door is in an open position and the seat belt latch plate is released.  
YES   X   NO   -

Table 11 (cont.)

RETRACTION (cont.)

b. The torso and lap belt webbing of the seat belt system automatically retract when the seat belt latch plate is released.

YES   X   NO   -  

5. With the webbing and hardware in the stowed position, close the door to assure that the webbing and hardware are prevented from being pinched.

YES   X   NO   -  

6. If this test vehicle has an open body (without doors) and has a belt system with a tension-relieving device, check to assure that the belt system fully retracts when the tension-relief device is manually deactivated.

YES   N/A   NO   N/A  

D6

ACCESSIBILITY

The requirements for accessibility do not apply to:

1. Seats whose seat cushions are removable so that the seat back serves a function other than seating;
2. Seats which are removable;
3. Seats which are movable so that the space formerly occupied by the seat can be used for a secondary function.

If the seats in this vehicle are different than the criteria above, then determine if:

1. Each manual seat belt assembly whose webbing is designed to pass through the seat cushion or between the seat cushion and seat back has one of the following three parts (the seat belt latchplate, the buckle, or the seat belt webbing) on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant).

YES   X   NO   -  

2. The remaining two seat belt parts are accessible under normal conditions.

YES   X   NO   -

Table 11 (cont.)

ACCESSIBILITY (cont.)

3. The buckle and latchplate do not pass through the guides or conduits provided and fall behind the seat when the following events occur in order:

a. The belt is completely retracted or, if the belt is nonretractable, the belt is unattached.

YES     -     NO     X    

b. The seat is moved to any position to which it is designed to be adjusted.

YES     -     NO     X    

c. The seat back, if foldable, is folded forward as far as possible and then moved backward into positions.

YES     -     NO     X    

4. Is the inboard receptacle end of the seat belt assembly which is installed in the outboard designated seating position accessible with the center arm rest in any position to which it can be adjusted without moving the armrest?

YES     X     NO     -    

D7

LATCH MECHANISM

A seat belt assembly installed in a passenger car, except an automatic belt assembly, shall have a latch mechanism:

1. Whose components are accessible to a seated occupant in both the stowed and operational positions.

YES     X     NO     -    

2. That releases both the upper torso restraint and the lap belt simultaneously, if the assembly has a lap belt and an upper torso restraint that require unlatching for release of the occupant.

YES     X     NO     -    

3. That releases at a single point by a push button action.

YES     X     NO     -

Figure 10

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA SHEET

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

The windshield is bonded in place with 0.8 inch rubber and metal trim along the top, 0.8 inch rubber trim along the sides and two 0.5 inch wide clips along the bottom.

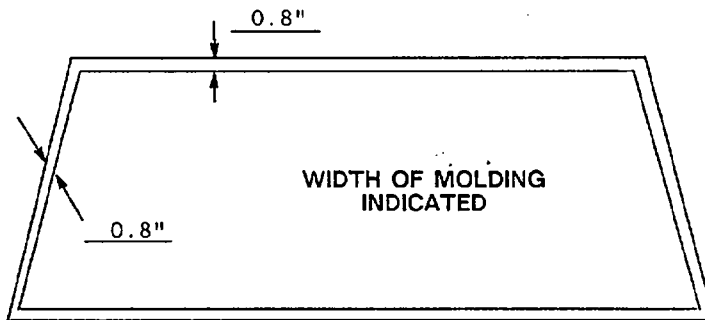
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

|            | WINDSHIELD PERIPHERY |                 | PERCENT RETENTION |
|------------|----------------------|-----------------|-------------------|
|            | PRE-TEST (in.)       | POST-TEST (in.) |                   |
| RIGHT SIDE | 91.65                | 91.65           | 100%              |
| LEFT SIDE  | 91.65                | 91.65           | 100%              |
| TOTAL      | 183.3                | 183.3           | 100%              |

AREA OF RETENTION FAILURE:



FRONT VIEW

FAILURE DETAILS:

None

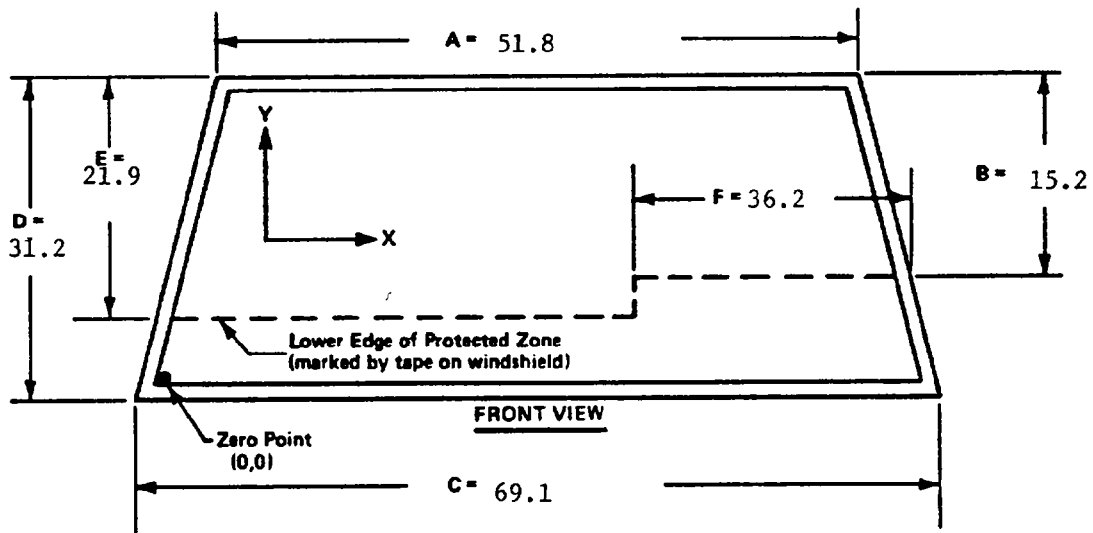
Figure 11

FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE INTRUSION" DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 TEST DATA: (Dimensions in inches.)



DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":

(Show location of penetration on above sketch)

|    | COORDINATES |   |
|----|-------------|---|
|    | X           | Y |
| 1. |             |   |
| 2. |             |   |
| 3. |             |   |
| 4. |             |   |



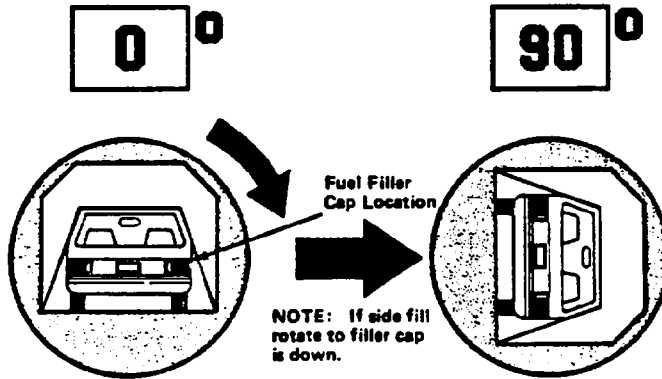
Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

Vehicle NHTSA ID No.:

CN0102



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

|  |  |
|--|--|
| Rollover Fixture 90° Rotation Time<br>(Spec. Range = 1 to 3 minutes) | _____ 2 _____ minutes _____ 03 _____ seconds |
| FMVSS 301 Position Hold Time +                                       | _____ 5 _____ minutes _____ 00 _____ seconds |
| TOTAL  | _____ 7 _____ minutes _____ 03 _____ seconds |
| Next whole minute interval   | _____ 8 _____ minutes                        |

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

|                                    |          |          |                      |
|------------------------------------|----------|----------|----------------------|
| First 5 min FROM onset of rotation | 6th min. | 7th min. | 8th min.<br>if reqd. |
|------------------------------------|----------|----------|----------------------|

(2) Maximum Allowable Solvent Spillage

|          |         |         |         |
|----------|---------|---------|---------|
| 5 ounces | 1 ounce | 1 ounce | 1 ounce |
|----------|---------|---------|---------|

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

|   |   |   |   |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

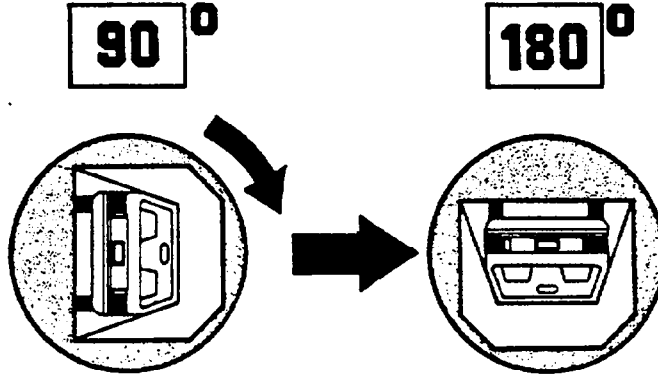
None

Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.:



CN0102

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time \_\_\_\_\_ 2 \_\_\_\_\_ minutes \_\_\_\_\_ 00 \_\_\_\_\_ seconds  
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + \_\_\_\_\_ 5 \_\_\_\_\_ minutes \_\_\_\_\_ 00 \_\_\_\_\_ seconds

TOTAL \_\_\_\_\_ 7 \_\_\_\_\_ minutes \_\_\_\_\_ 00 \_\_\_\_\_ seconds

Next whole minute interval \_\_\_\_\_ 7 \_\_\_\_\_ minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

|                                    |          |          |                      |
|------------------------------------|----------|----------|----------------------|
| First 5 min FROM onset of rotation | 6th min. | 7th min. | 8th min.<br>if reqd. |
|------------------------------------|----------|----------|----------------------|

(2) Maximum Allowable Solvent Spillage

|          |         |         |         |
|----------|---------|---------|---------|
| 5 ounces | 1 ounce | 1 ounce | 1 ounce |
|----------|---------|---------|---------|

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

|   |   |   |   |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

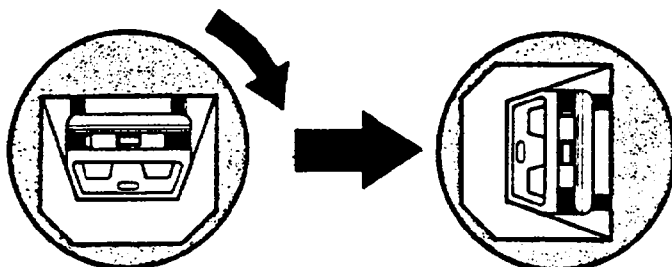
TEST PHASE:

**180°**

**270°**

Vehicle NHTSA ID No.:

CN0102



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

|  |  |
|--|--|
| Rollover Fixture 90° Rotation Time<br>(Spec. Range = 1 to 3 minutes) | _____ 1 _____ minutes _____ 51 seconds |
| FMVSS 301 Position Hold Time +                                       | _____ 5 _____ minutes _____ 00 seconds |
| TOTAL  | _____ 6 _____ minutes _____ 51 seconds |
| Next whole minute interval   | _____ 7 _____ minutes                  |

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

|                                    |          |          |                      |
|------------------------------------|----------|----------|----------------------|
| First 5 min FROM onset of rotation | 6th min. | 7th min. | 8th min.<br>if reqd. |
|------------------------------------|----------|----------|----------------------|

(2) Maximum Allowable Solvent Spillage

|          |         |         |         |
|----------|---------|---------|---------|
| 5 ounces | 1 ounce | 1 ounce | 1 ounce |
|----------|---------|---------|---------|

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

|   |   |   |   |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

Note: Record spillage for whole minute intervals only as determined above.

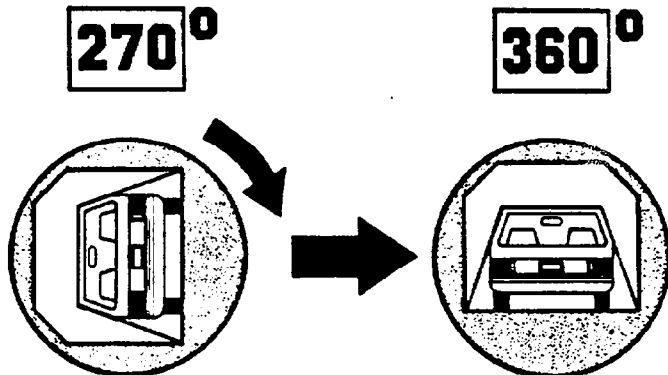
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:



Vehicle NHTSA ID No.:

CN0102

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time \_\_\_\_\_ 2 \_\_\_\_\_ minutes \_\_\_\_\_ 10 \_\_\_\_\_ seconds  
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + \_\_\_\_\_ 5 \_\_\_\_\_ minutes \_\_\_\_\_ 00 \_\_\_\_\_ seconds

TOTAL \_\_\_\_\_ 7 \_\_\_\_\_ minutes \_\_\_\_\_ 10 \_\_\_\_\_ seconds

Next whole minute interval \_\_\_\_\_ 8 \_\_\_\_\_ minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

|                                    |          |          |                      |
|------------------------------------|----------|----------|----------------------|
| First 5 min FROM onset of rotation | 6th min. | 7th min. | 8th min.<br>if reqd. |
|------------------------------------|----------|----------|----------------------|

(2) Maximum Allowable Solvent Spillage

|          |         |         |         |
|----------|---------|---------|---------|
| 5 ounces | 1 ounce | 1 ounce | 1 ounce |
|----------|---------|---------|---------|

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

|   |   |   |   |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 14

TEST VEHICLE NONCOMPLIANCE NOTICE

NHTSA Contract Lab: Calspan Advanced Technology Center

Lab Project Manager & Telephone No.: Walter E. Levan (716) 632-7500

Date of Test: October 9, 1991 Vehicle NHTSA No.: CN0102

Vehicle Manufacturer: General Motors Corporation

Model Year: 1992 VIN: 1G3HN53LXNH324945

Model: Oldsmobile 88 Royale Body Style: 4-Door Sedan Build Date: 8/91

Dummy Stabilized Temperature at Time of Test: 70 °F (Spec. = 66-78°F)

Impact Velocity: 29.4 mph Time of Test: 13:40

Type of Automatic Restraint System: Driver side airbag and passenger side manual 3-point seat belt.

Failure Details:

Vehicle appears to comply with the requirements of FMVSS Nos. 208, 212,

219 (Partial), and 301.

\_\_\_\_\_  
\_\_\_\_\_

Appendix A

PHOTOGRAPHS

LIST OF PHOTOGRAPHS

| <u>Figure</u> | <u>Photograph Title</u>                           | <u>Page No.</u> |
|---------------|---|-----------------|
| A-1           | PRE-TEST FRONT VIEW .....                         | A-3             |
| A-2           | POST-TEST FRONT VIEW .....                        | A-4             |
| A-3           | PRE-TEST LEFT SIDE VIEW .....                     | A-5             |
| A-4           | POST-TEST LEFT SIDE VIEW .....                    | A-6             |
| A-5           | PRE-TEST RIGHT SIDE VIEW .....                    | A-7             |
| A-6           | POST-TEST RIGHT SIDE VIEW .....                   | A-8             |
| A-7           | PRE-TEST RIGHT FRONT THREE-QUARTER VIEW .....     | A-9             |
| A-8           | POST-TEST RIGHT FRONT THREE-QUARTER VIEW .....    | A-10            |
| A-9           | PRE-TEST LEFT REAR THREE-QUARTER VIEW .....       | A-11            |
| A-10          | POST-TEST LEFT REAR THREE-QUARTER VIEW .....      | A-12            |
| A-11          | POST-TEST TOP VIEW .....                          | A-13            |
| A-12          | PRE-TEST WINDSHIELD VIEW .....                    | A-14            |
| A-13          | POST-TEST WINDSHIELD VIEW .....                   | A-15            |
| A-14          | PRE-TEST ENGINE COMPARTMENT VIEW .....            | A-16            |
| A-15          | POST-TEST ENGINE COMPARTMENT VIEW .....           | A-17            |
| A-16          | PRE-TEST FUEL FILLER CAP PHOTO .....              | A-18            |
| A-17          | POST-TEST FUEL FILLER CAP PHOTO .....             | A-19            |
| A-18          | PRE-TEST FRONT UNDERBODY VIEW .....               | A-20            |
| A-19          | POST-TEST FRONT UNDERBODY VIEW .....              | A-21            |
| A-20          | PRE-TEST FRONT SIDE UNDERBODY VIEW .....          | A-22            |
| A-21          | POST-TEST FRONT SIDE UNDERBODY VIEW .....         | A-23            |
| A-22          | PRE-TEST REAR UNDERBODY VIEW .....                | A-24            |
| A-23          | POST-TEST REAR UNDERBODY VIEW .....               | A-25            |
| A-24          | CERTIFICATION LABEL .....                         | A-26            |
| A-25          | TIRE PLACARD .....                                | A-27            |
| A-26          | PRE-TEST DRIVER DUMMY POSITION .....              | A-28            |
| A-27          | POST-TEST DRIVER DUMMY POSITION .....             | A-29            |
| A-28          | PRE-TEST PASSENGER DUMMY POSITION .....           | A-30            |
| A-29          | POST-TEST PASSENGER DUMMY POSITION .....          | A-31            |
| A-30          | PRE-TEST DRIVER DUMMY AND INTERIOR VIEW .....     | A-32            |
| A-31          | POST-TEST DRIVER DUMMY AND INTERIOR VIEW .....    | A-33            |
| A-32          | PRE-TEST PASSENGER DUMMY AND INTERIOR VIEW .....  | A-34            |
| A-33          | POST-TEST PASSENGER DUMMY AND INTERIOR VIEW ..... | A-35            |
| A-34          | POST-TEST DRIVER AIRBAG VIEW .....                | A-36            |
| A-35          | VEHICLE IMPACT .....                              | A-37            |
| A-36          | BALLAST PLACED IN LEFT REAR OF TRUNK .....        | A-38            |
| A-37          | BALLAST PLACED IN RIGHT REAR OF TRUNK .....       | A-39            |



FIGURE A-1 PRE-TEST FRONT VIEW

A-3

7953-1



Figure A-2 POST-TEST FRONT VIEW



Figure A-3 PRE-TEST LEFT SIDE VIEW

A-5

7953-1

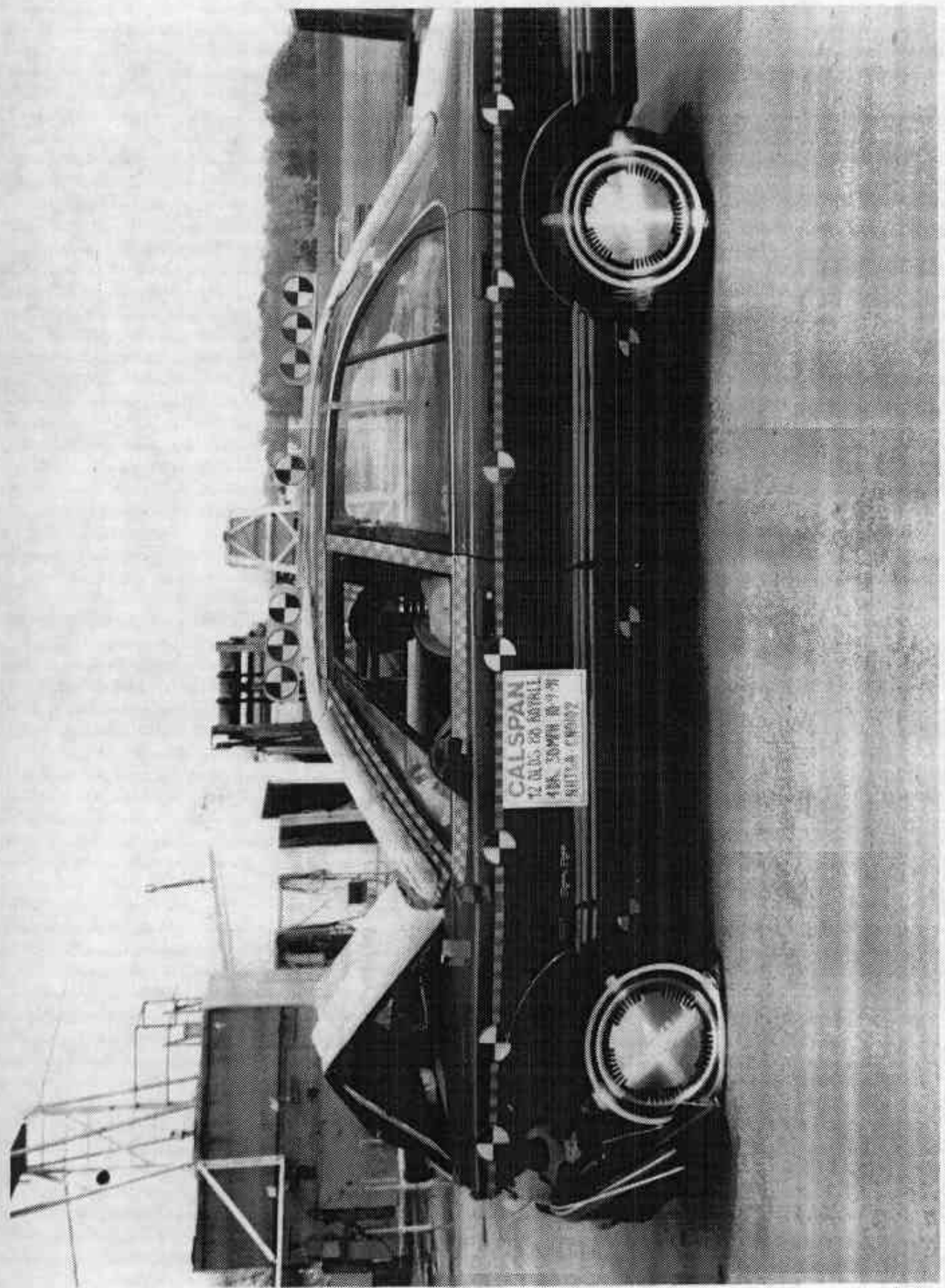


Figure A-4 POST-TEST LEFT SIDE VIEW

A-6

7953-1

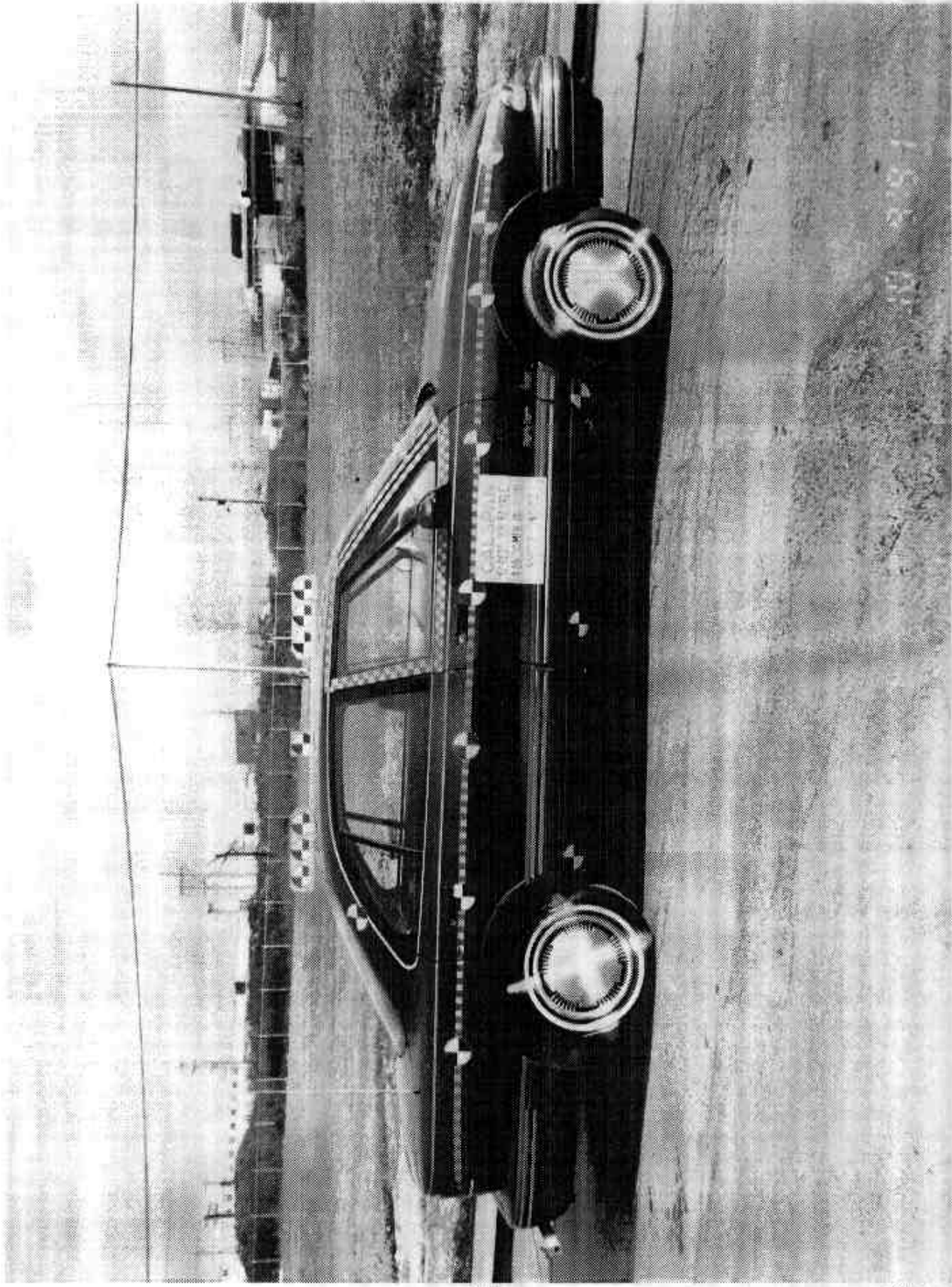


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-7

7053 1

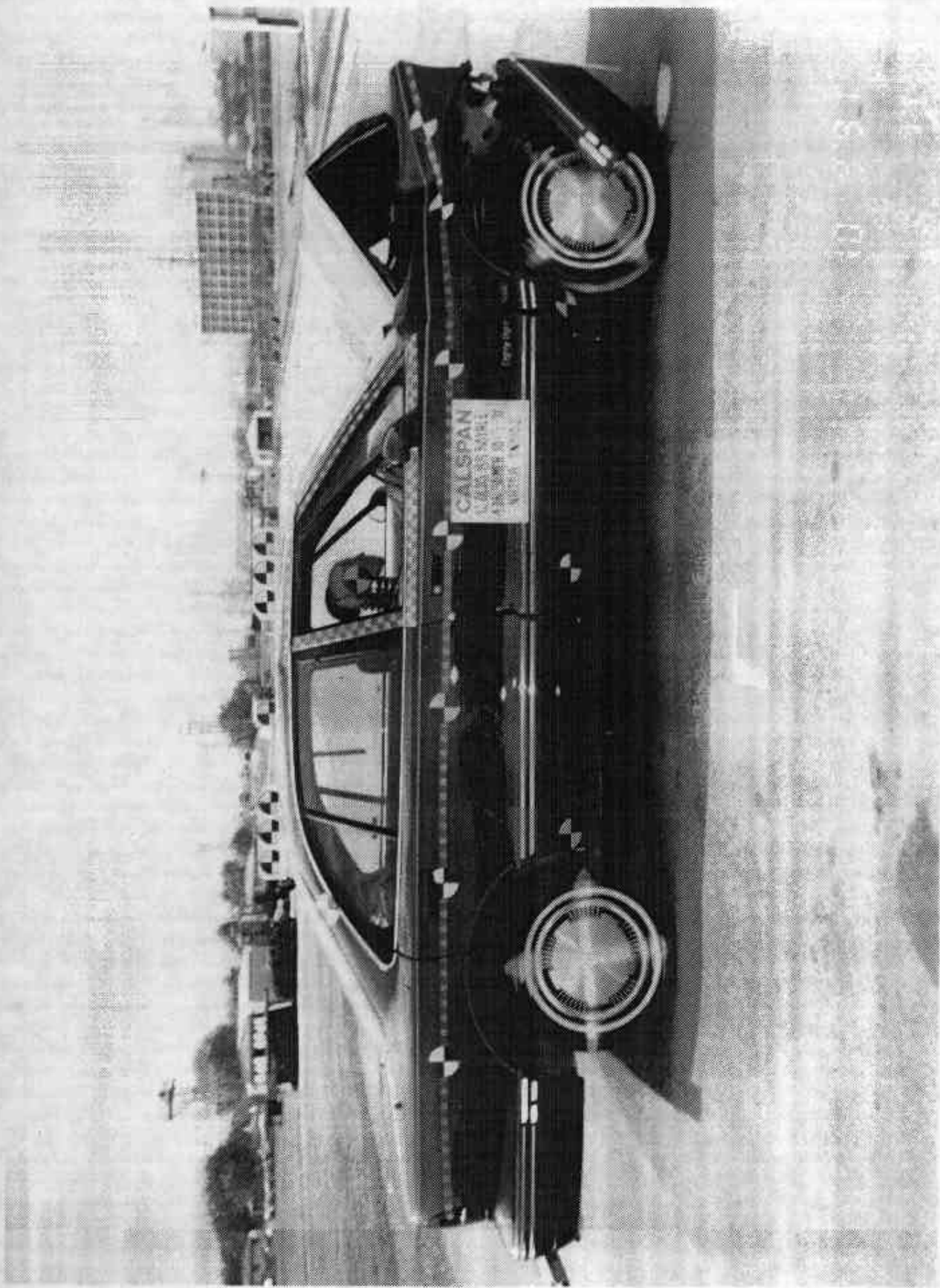


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-8

7953-1

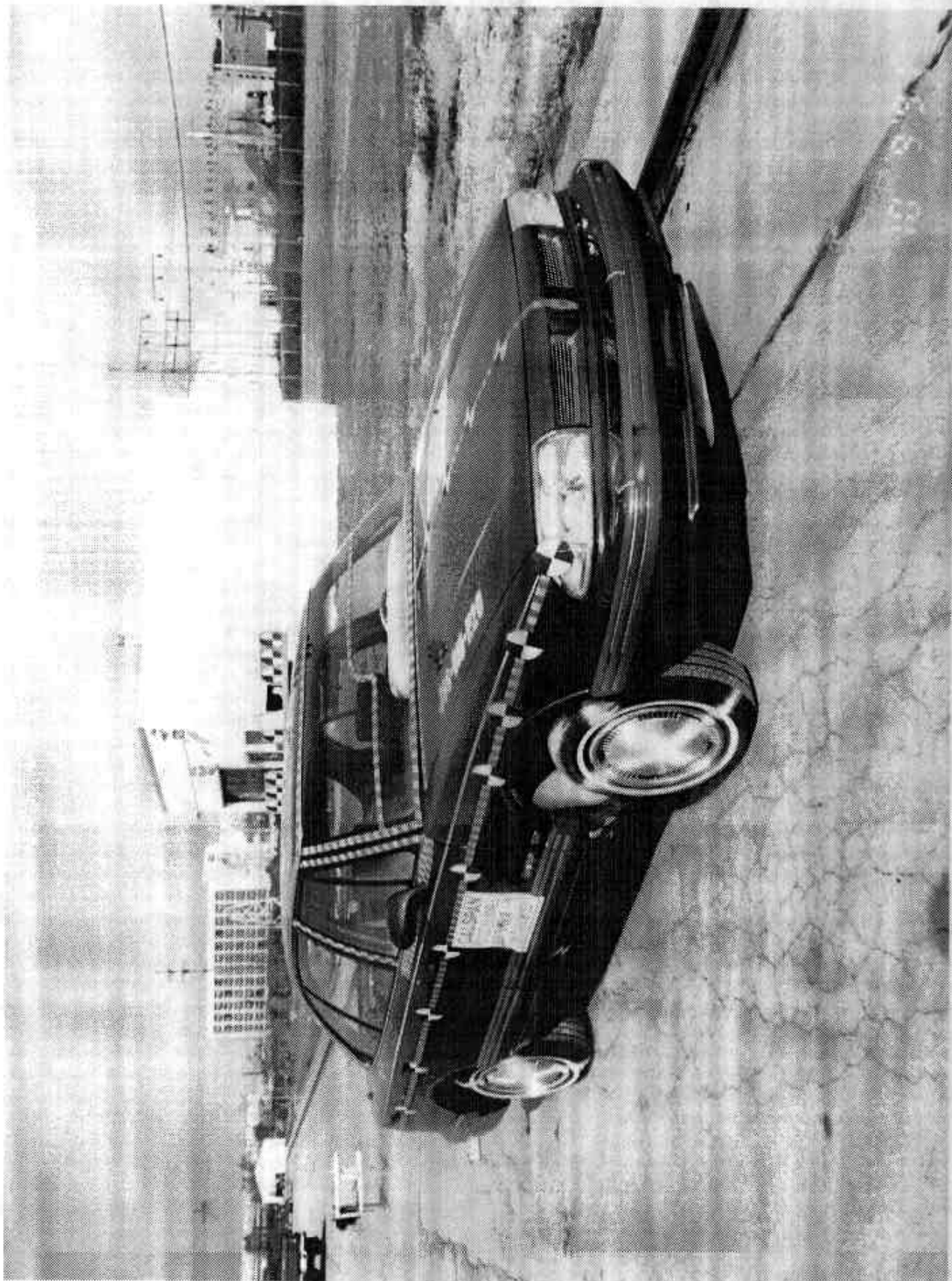


Figure A-7 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-9

7953-1

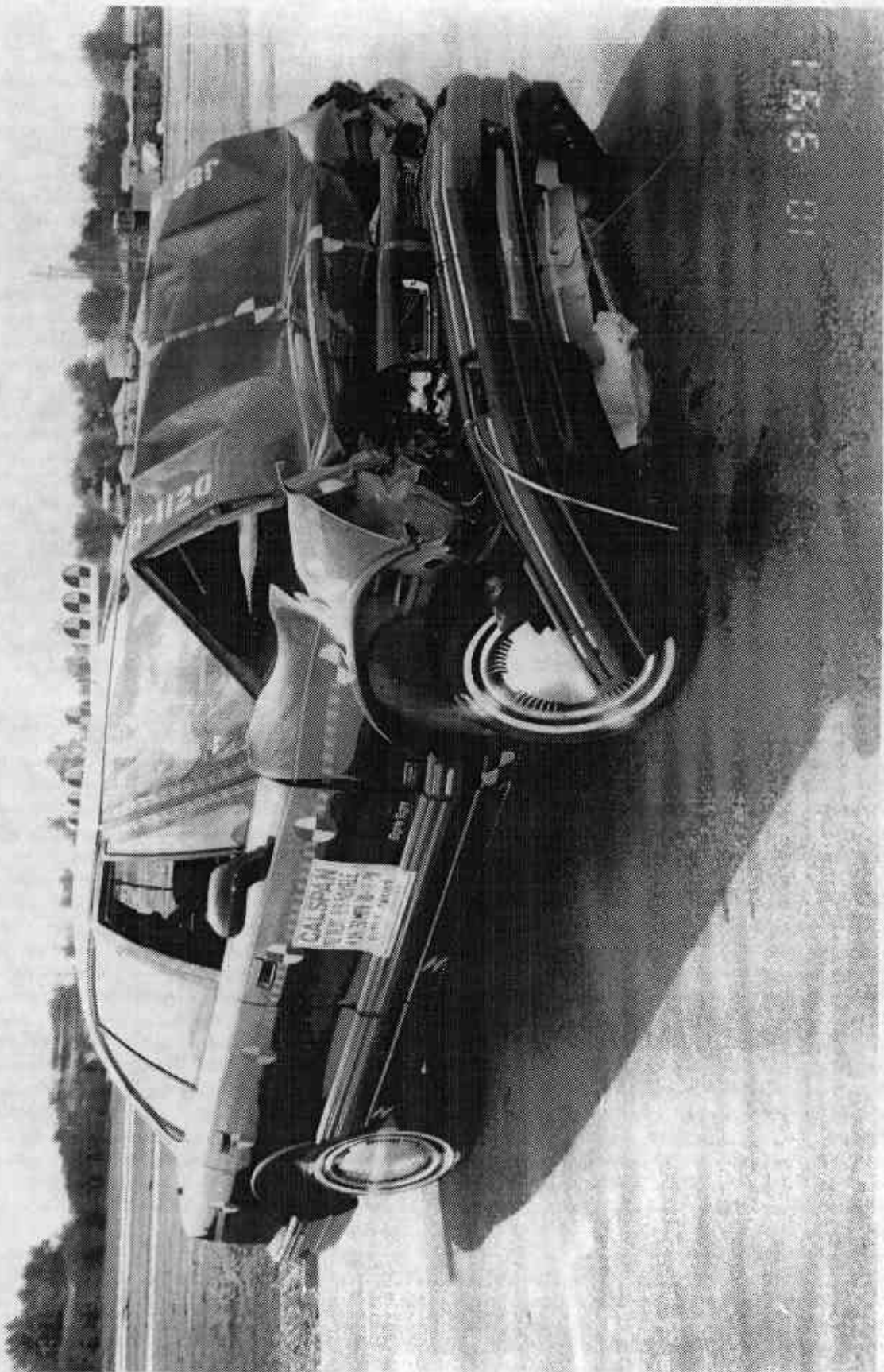
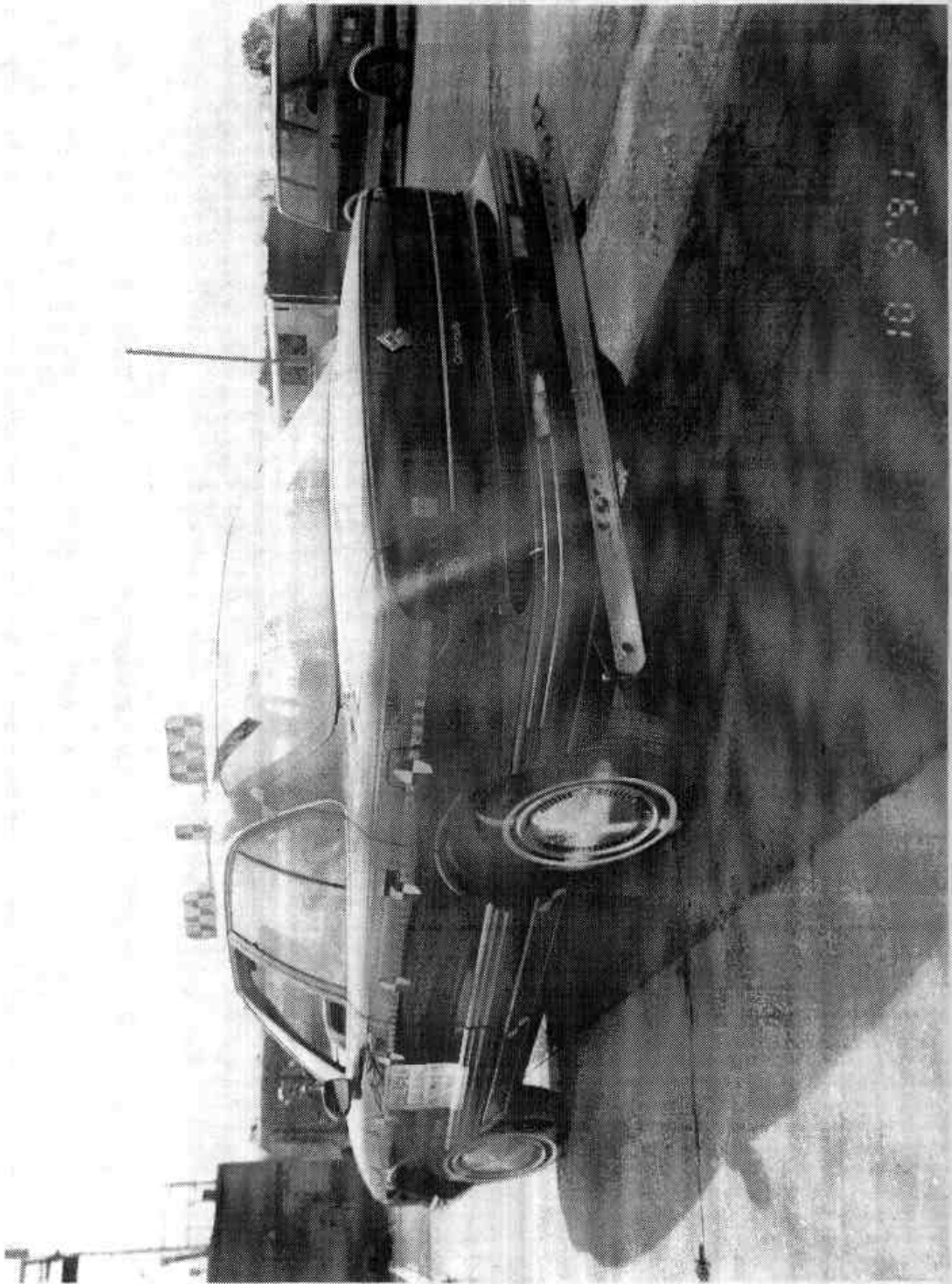


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-10

7953-1



100 3991

Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-11

7953-1



FIGURE A-10 POST-TEST LEFT REAR THREE-QUARTER VIEW

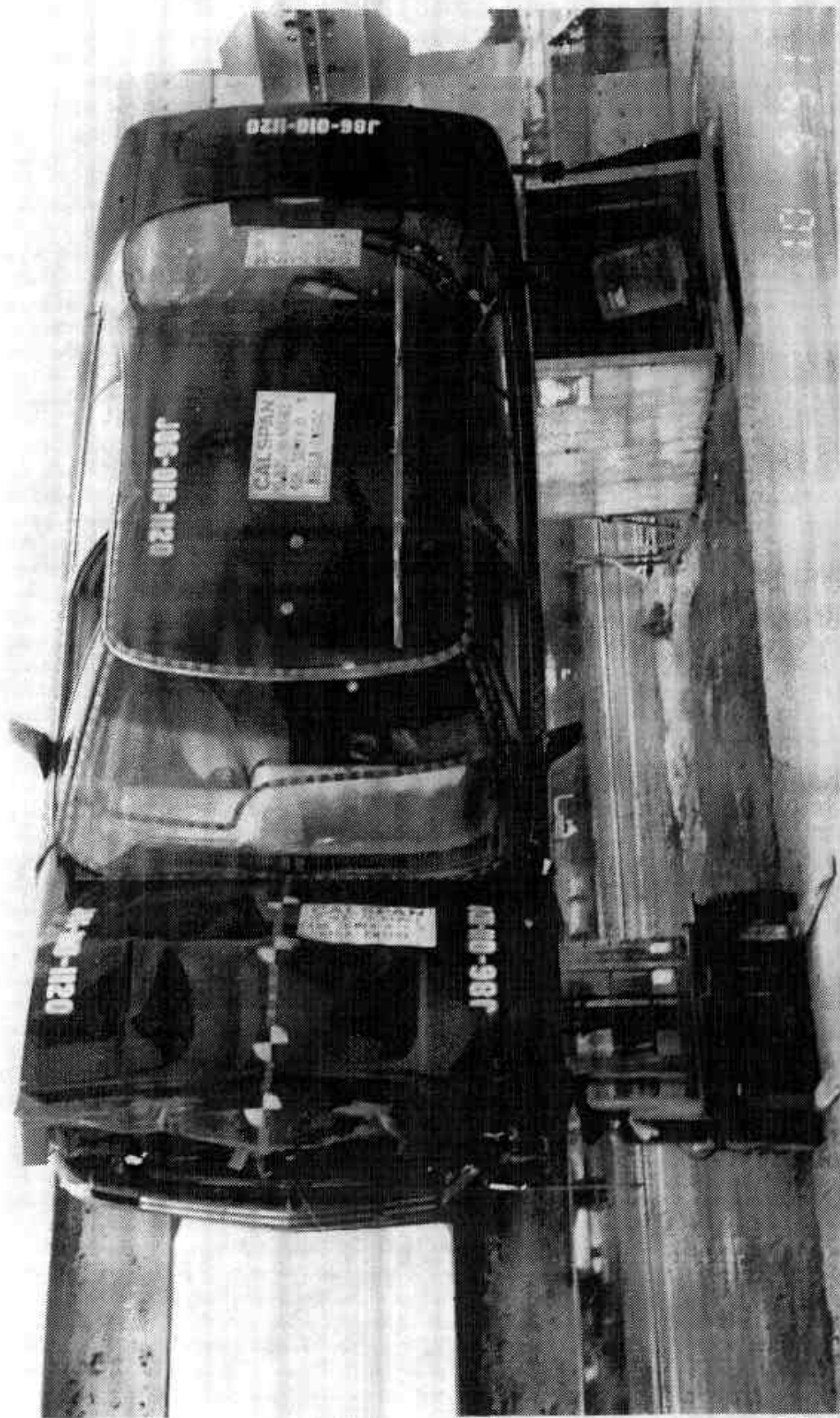


FIGURE A-11. POST-TEST TOP VIEW

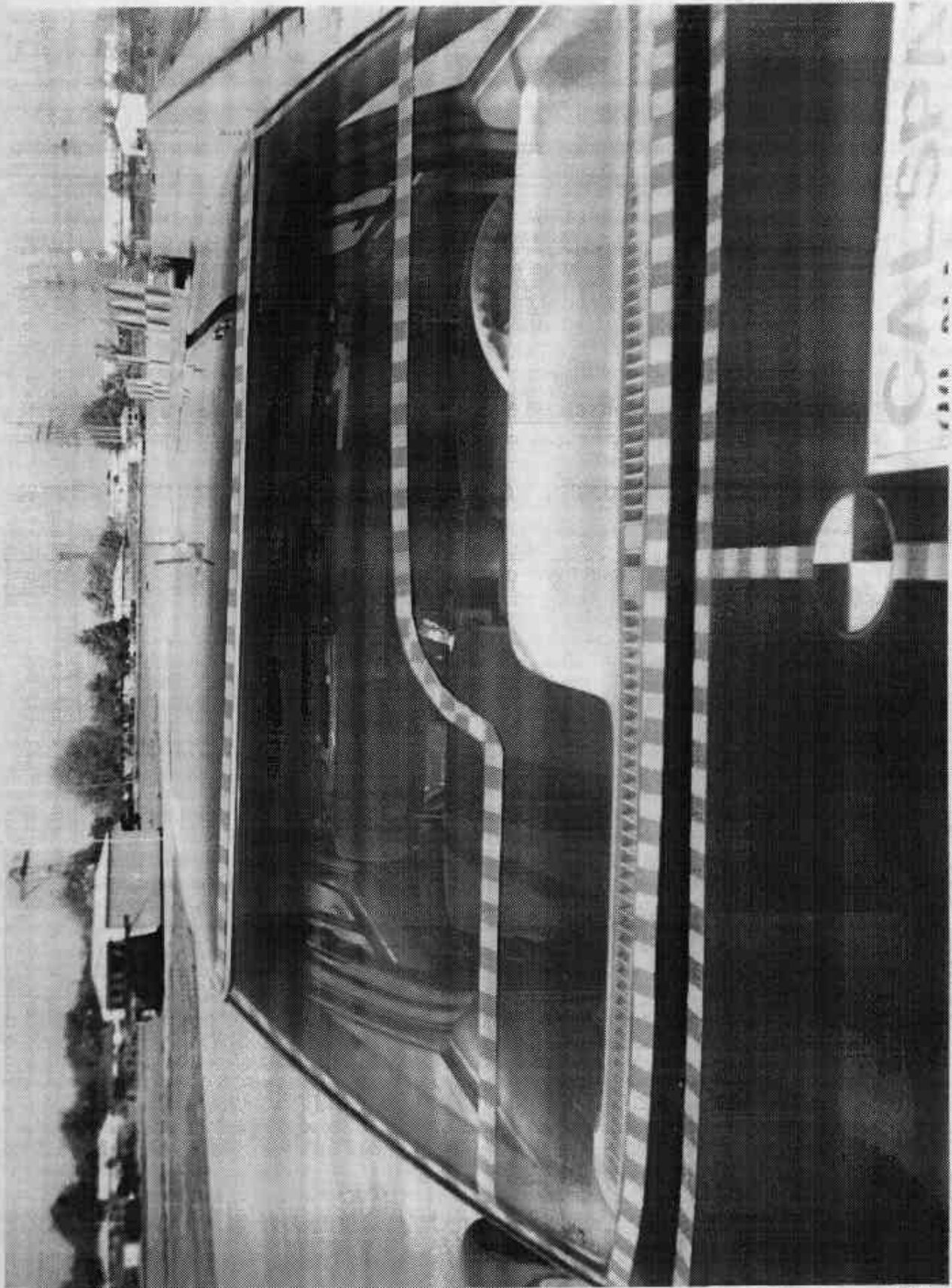


Figure A-12 PRE-TEST WINDSHIELD VIEW

A-14

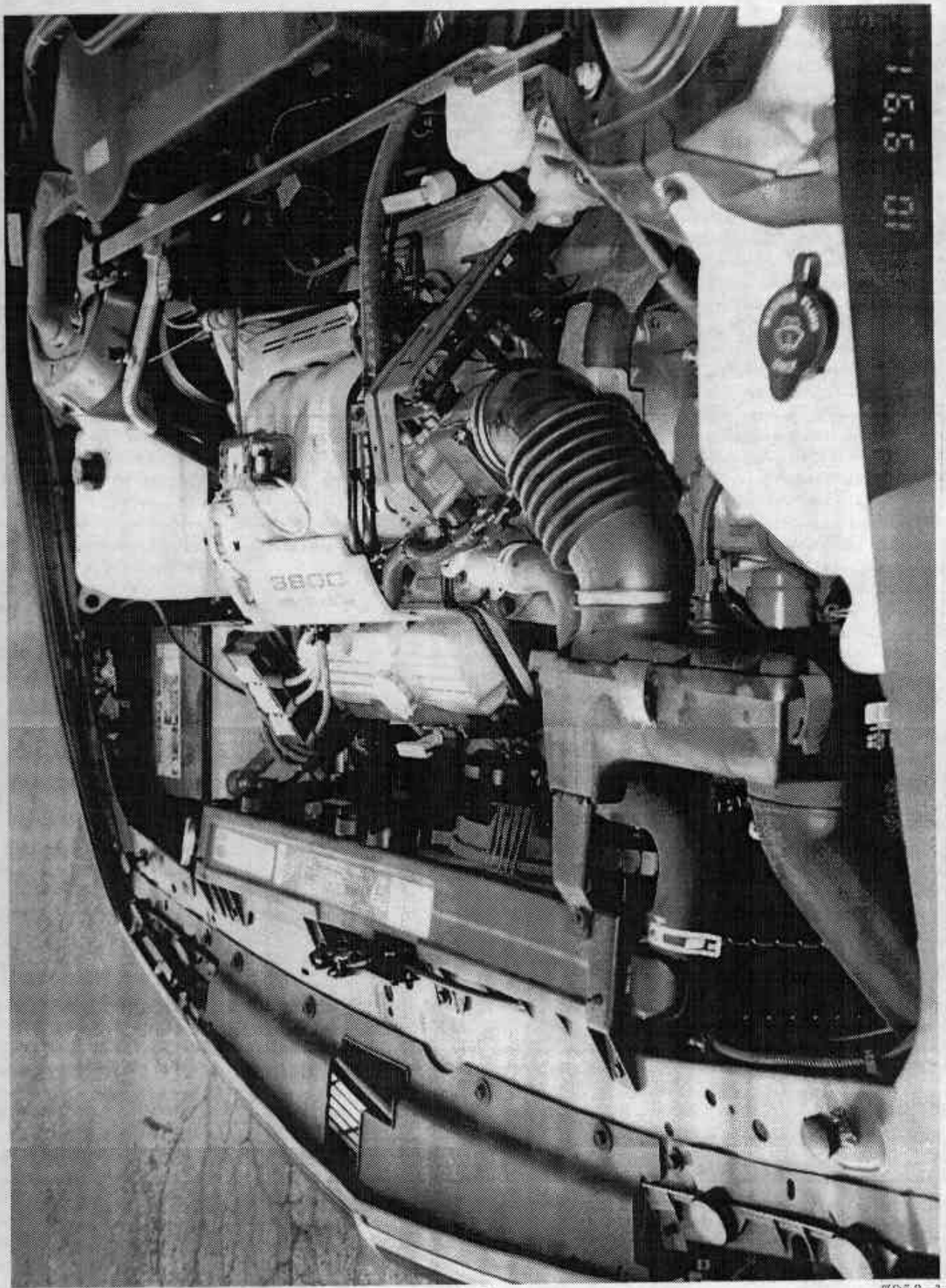
7953-1



Figure A-13 POST-TEST WINDSHIELD VIEW

A-15

7953-1



10 9'91

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

A-16

7953-1

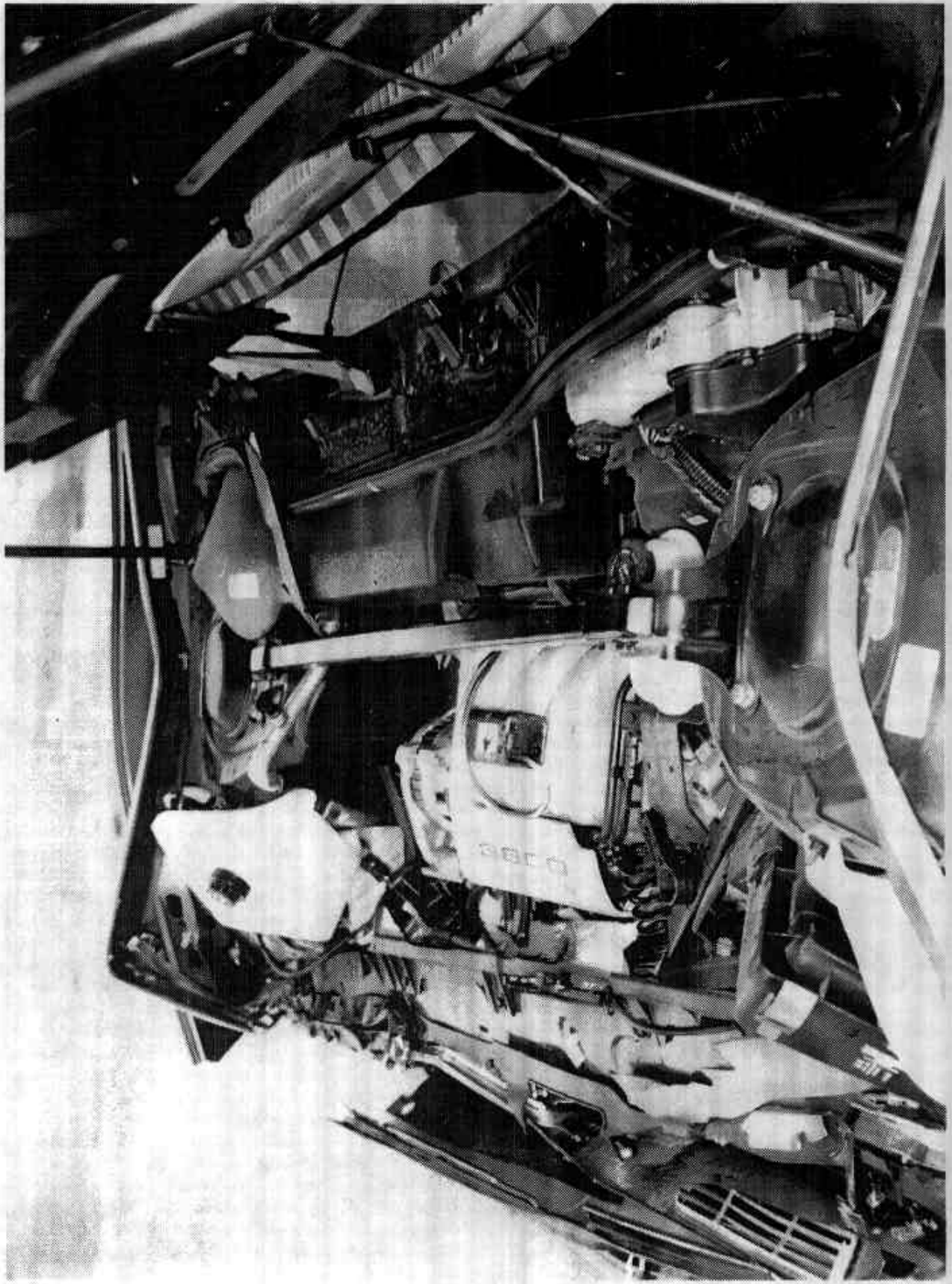


Figure A-15 FRONT-TEST ENGINE COMPARTMENT VIEW

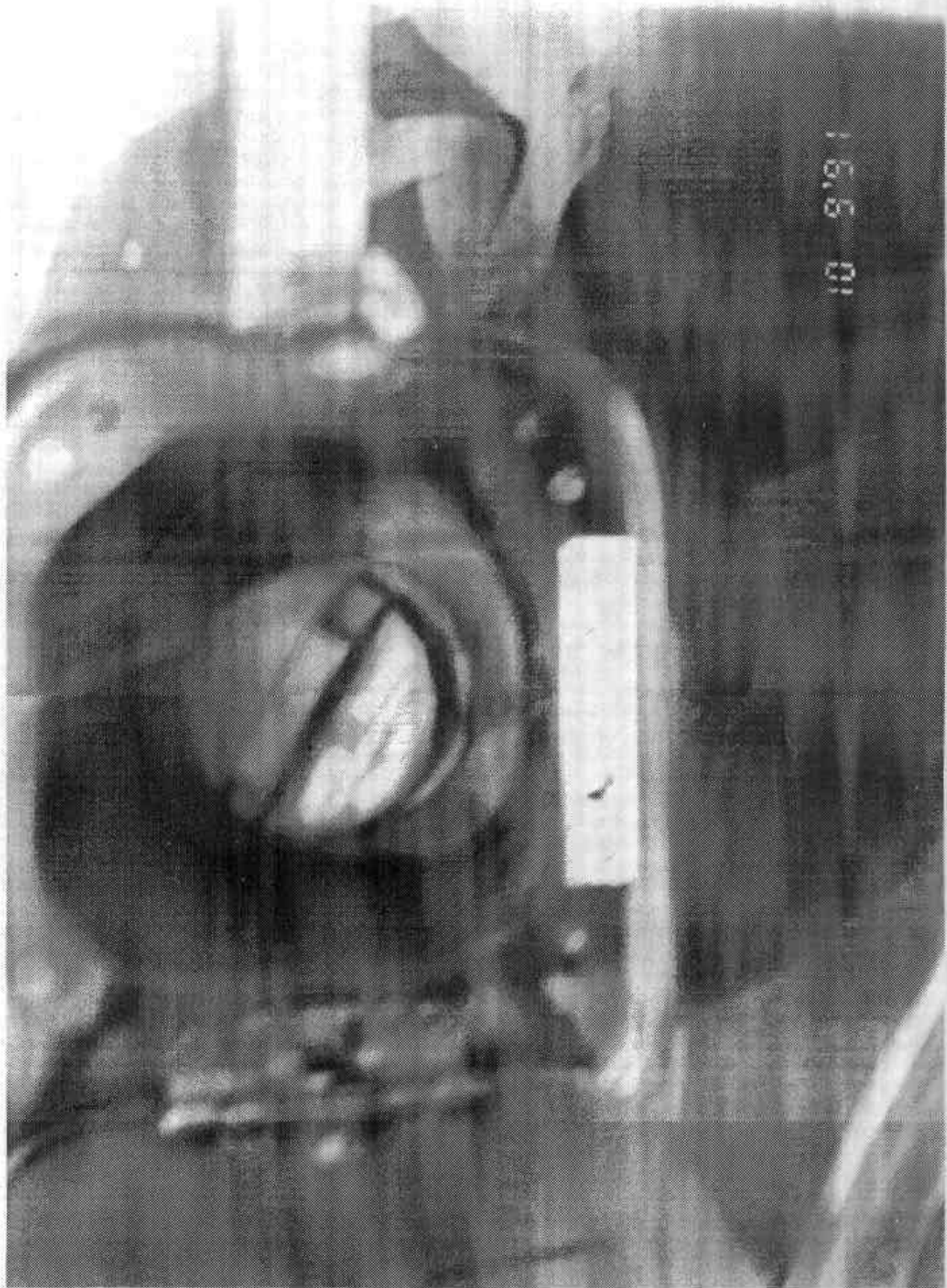
A-17

7953-1



10 9'91

FIGURE A-16 PRE-TEST FUEL FILLER CAP PHOTO



10 9'9 1

Figure A-17 POST-TEST FUEL FILLER CAP PHOTO

A-19

7953-1

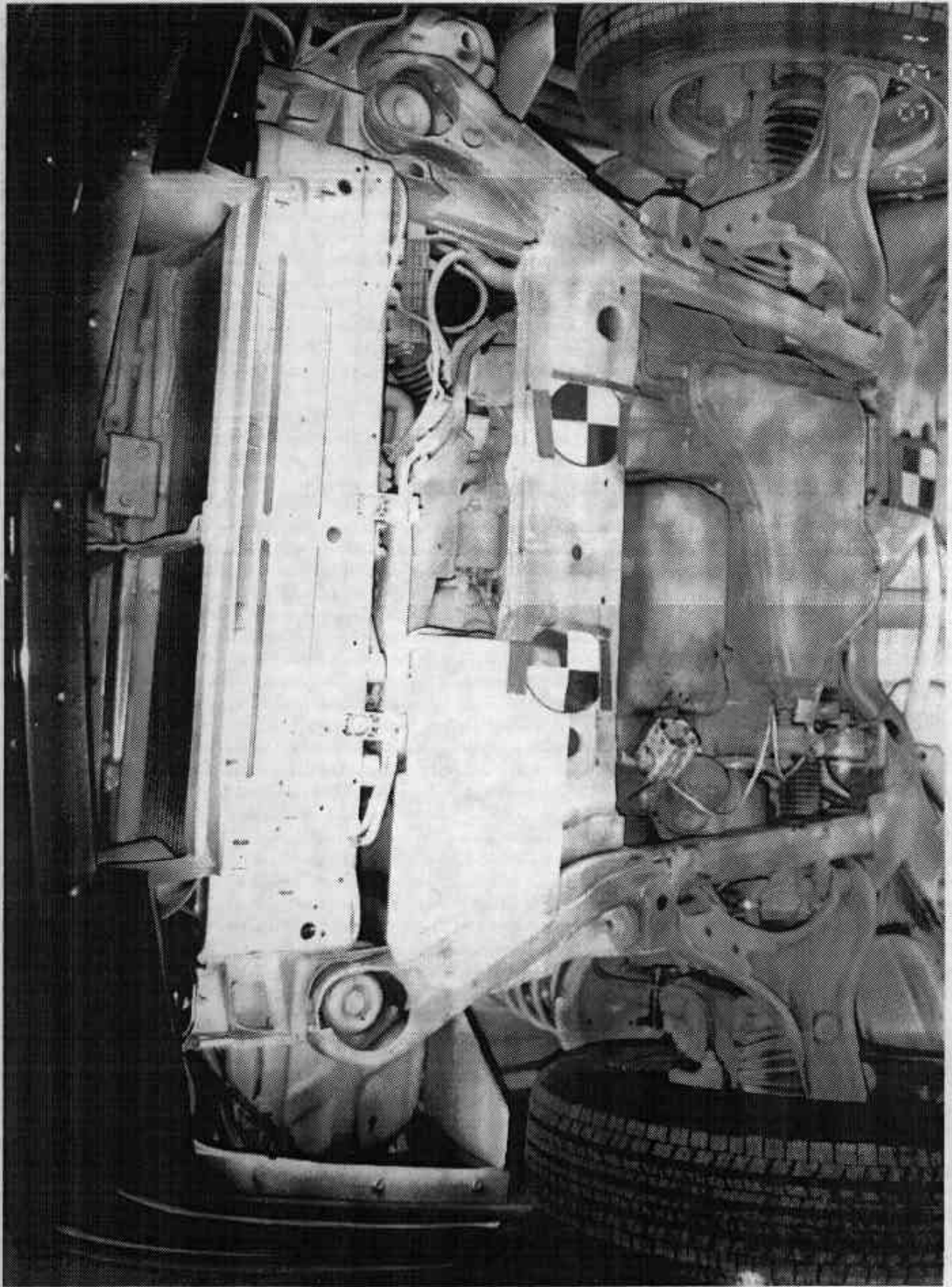


Figure A-18 PRE-TEST FRONT UNDERBODY VIEW

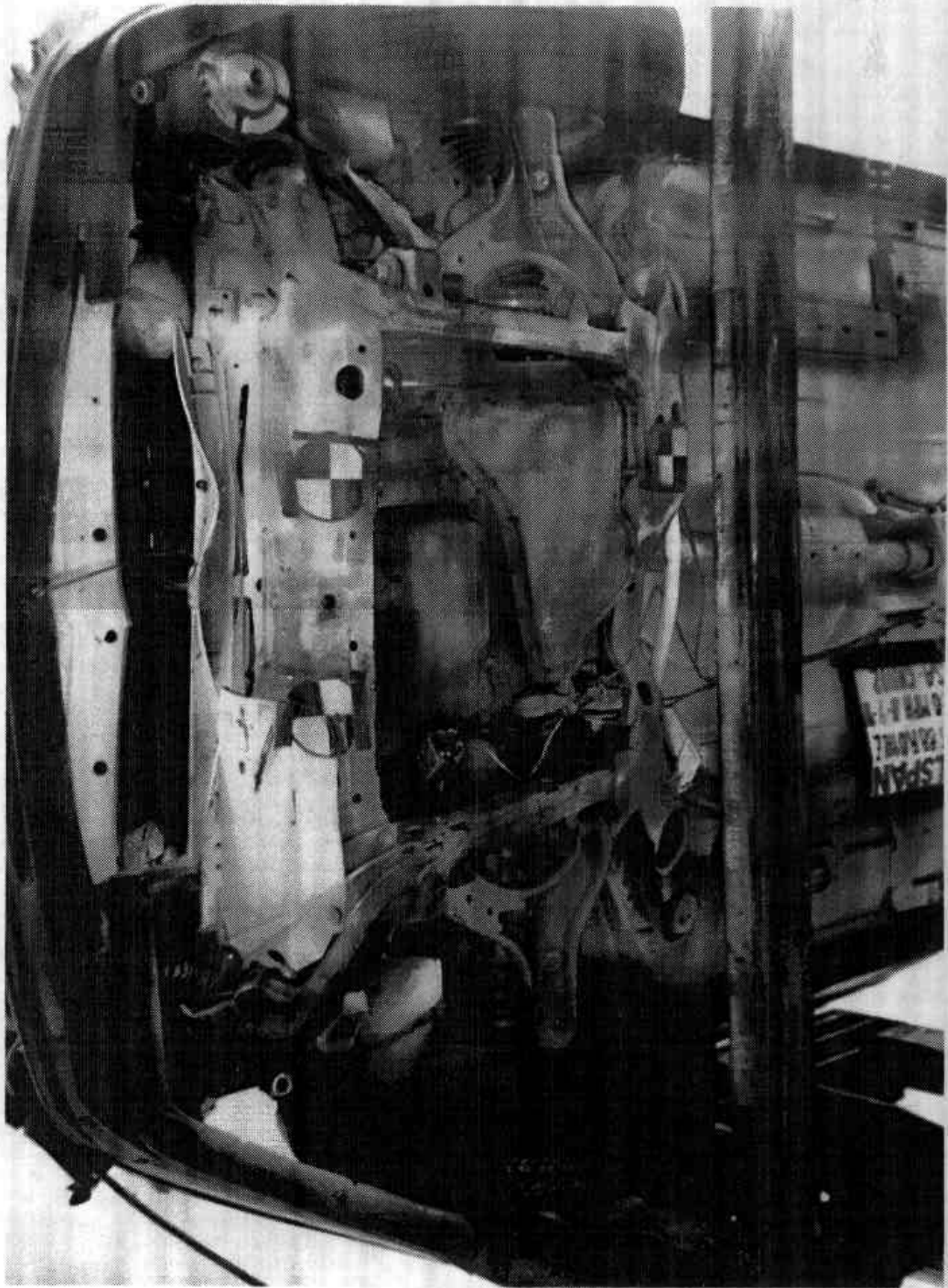


FIGURE A-19 POST-TEST FRONT UNDERBODY VIEW

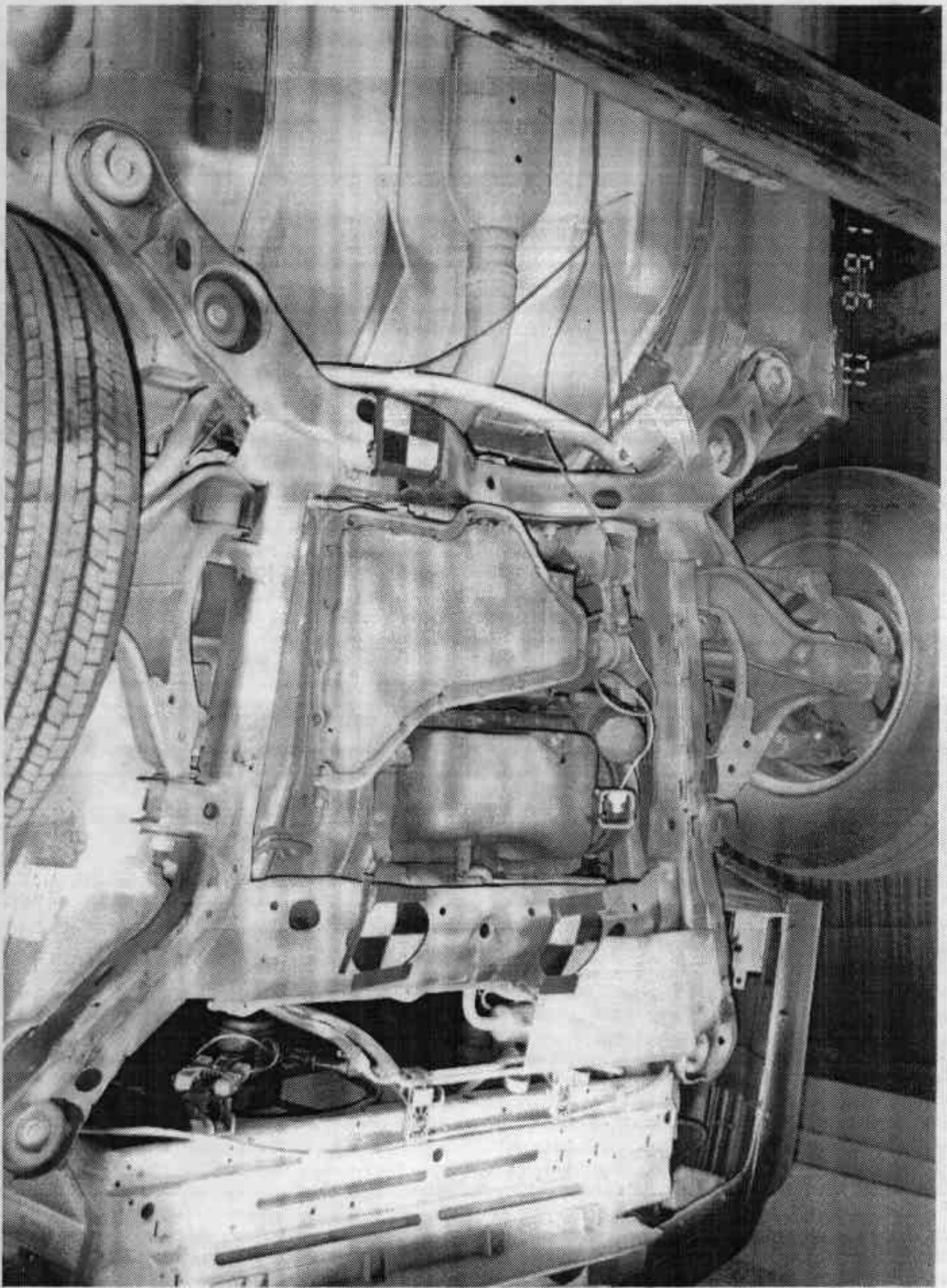


Figure A-20 PRE-TEST FRONT SIDE UNDERBODY VIEW

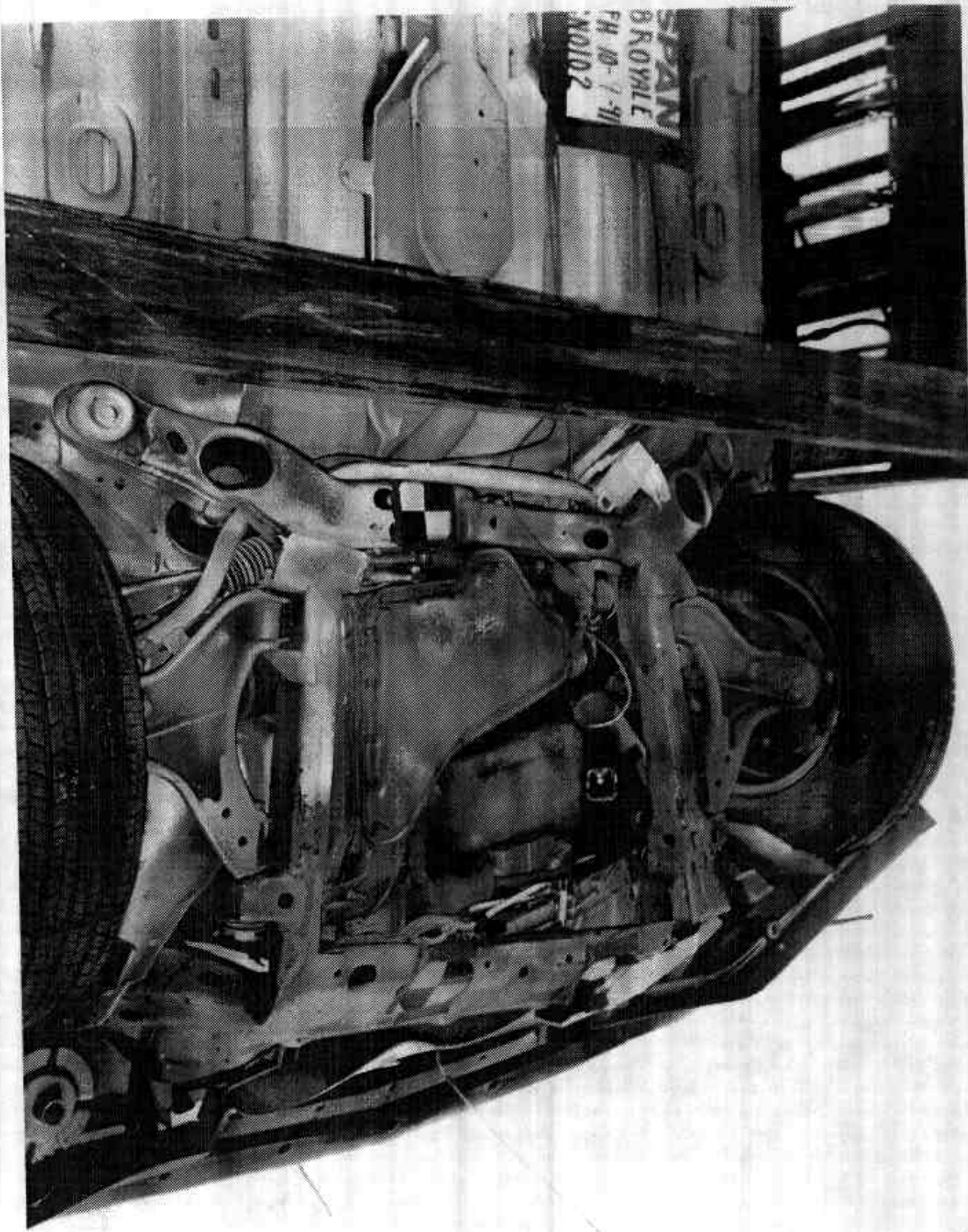


Figure A-21 POST-TEST FRONT SIDE UNDERBODY VIEW

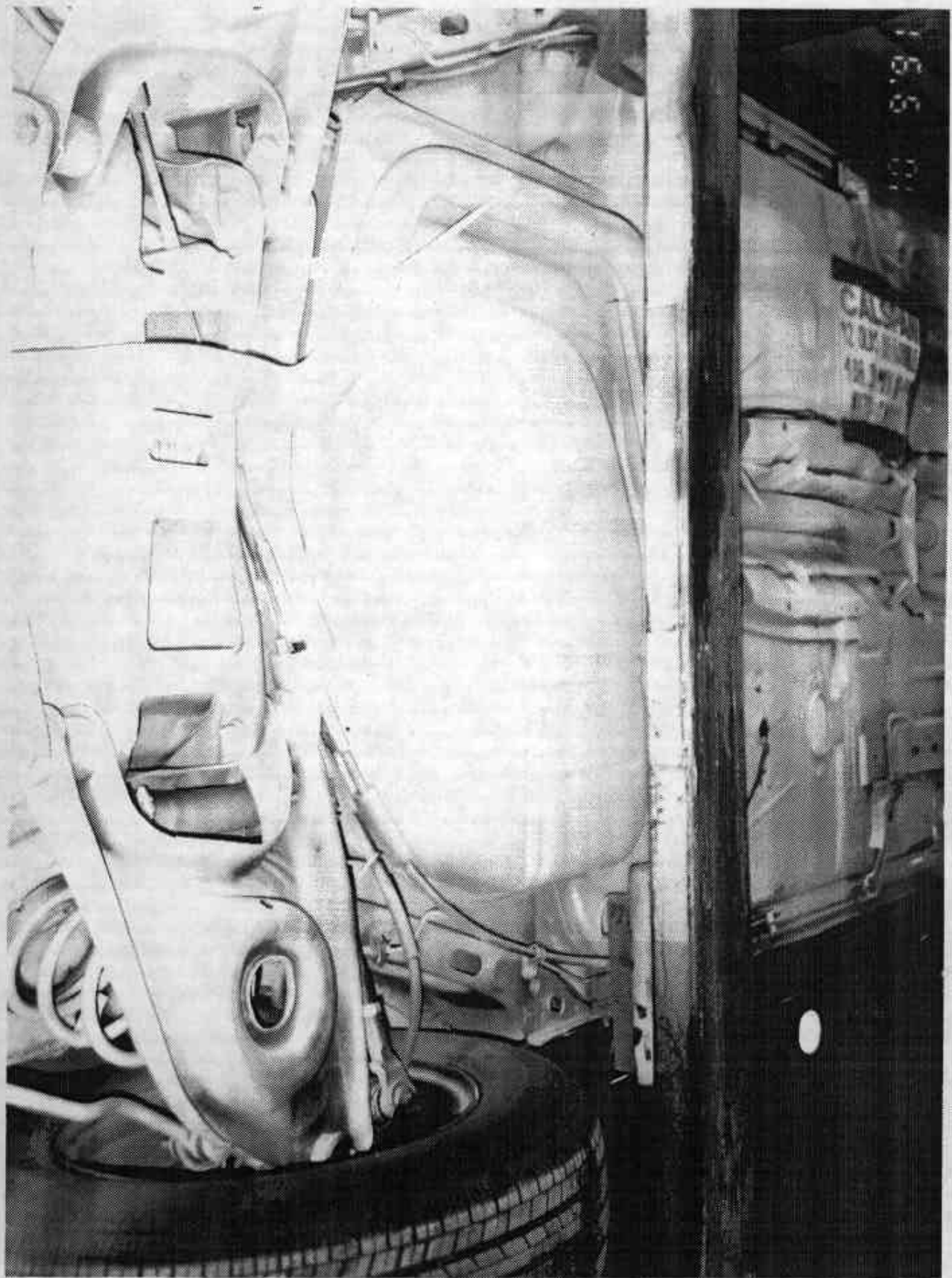


FIGURE A-22 PRE-TEST REAR UNDERBODY VIEW

A-24

7953-1



Figure A-23 FOST TEST REAR UNDERBODY VIEW

MFD BY GENERAL MOTORS CORP.

|       |         |          |         |
|-------|---------|----------|---------|
| DATE  | GVAR    | GMFR FRT | GMFR RR |
| 05/91 | 04519LB | 02494LB  | 02025LB |
|       | 02050KG | 01131KG  | 00919KG |

THIS VEHICLE CONFORMS TO ALL APPLICABLE  
 U.S. FEDERAL MOTOR VEHICLE SAFETY, BUMPER,  
 AND THEFT PREVENTION STANDARDS IN EFFECT  
 ON THE DATE OF MANUFACTURE SHOWN ABOVE.

1G3HU53L2NH324945

PASS CAR  
GM



10138434

TYPE-LOADING INFORMATION  
 OCCUPANTS 9  
 CTR 9  
 RR 9  
 TOTAL 9  
 VEHICLE CAP. WT  
 KG

FIGURE A-24 CERTIFICATION LABEL

|  |                             |  |  |
|--|-----------------------------|--|--|
| <input type="checkbox"/>                                   |                             | TIRE-LOADING INFORMATION<br>VEHICLE CAP. HT.   |  |
| OCCUPANTS<br>RR. 3   | TOTAL<br>LBS 1076<br>KG 488 | COLD TIRE<br>PRESSURE<br>PSI/KPa   |  |
| MAX. LOADING @ GVWR SAME AS VEHICLE<br>CAPACITY WEIGHT HCA |                             | 30/210<br>30/210<br>60/420   |  |
| TIRE SIZE  |                             | SPEED<br>RTG   |  |
| FRT P205/70R15<br>RR. P205/70R15<br>SPA T125/70D15         | S<br>S<br>H                 | IF TIRES ARE HOT, ADD +3 PSI/20KPa<br>SEE OWNER'S MANUAL FOR ADDITIONAL<br>INFORMATION |  |

10135543-B

Figure A-25 TIRE PLACARD

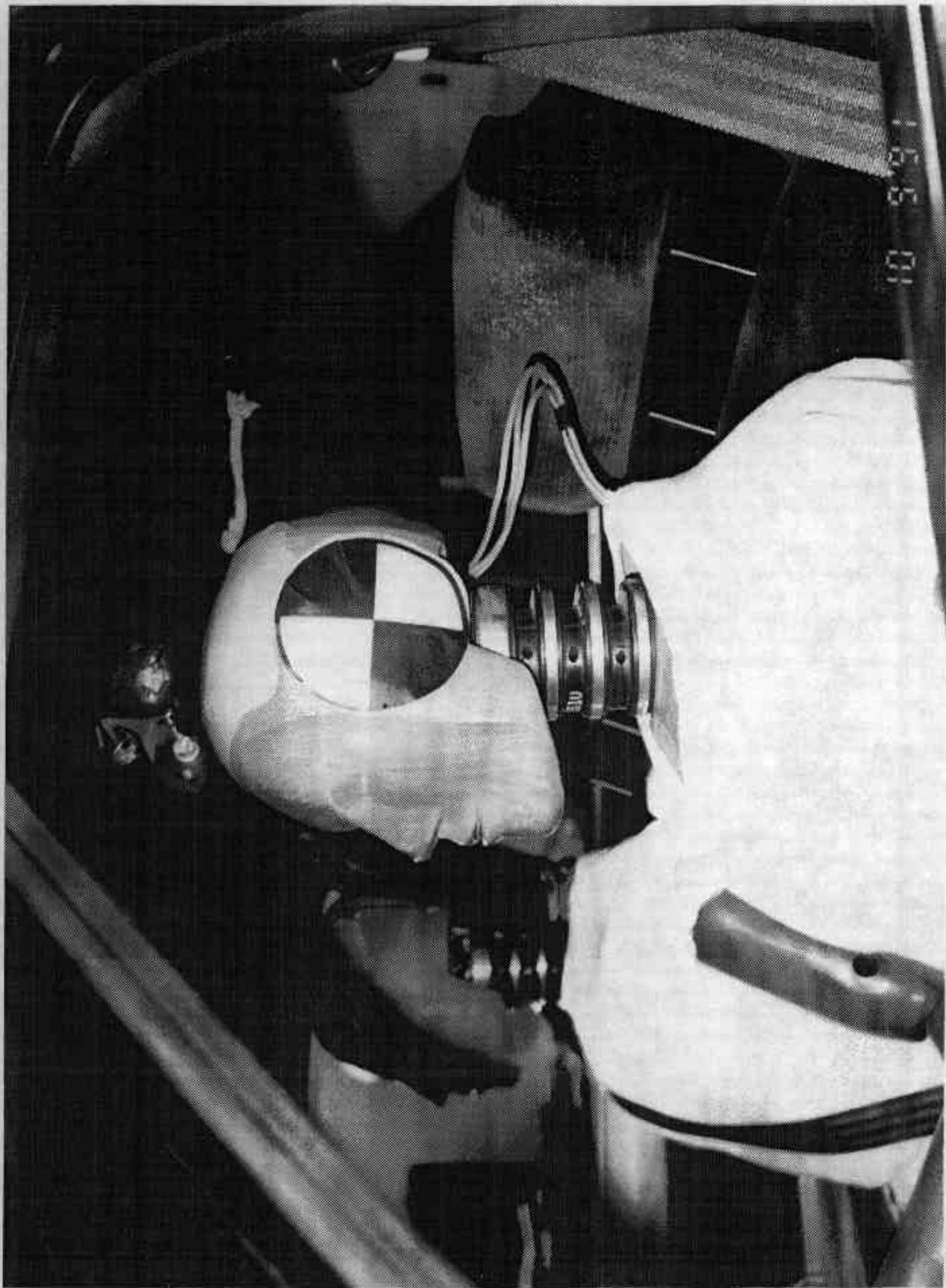


FIGURE A-26 PRE-TEST DRIVER DUMMY POSITION



FIGURE A-27 POST-TEST DRIVER DUMMY POSITION

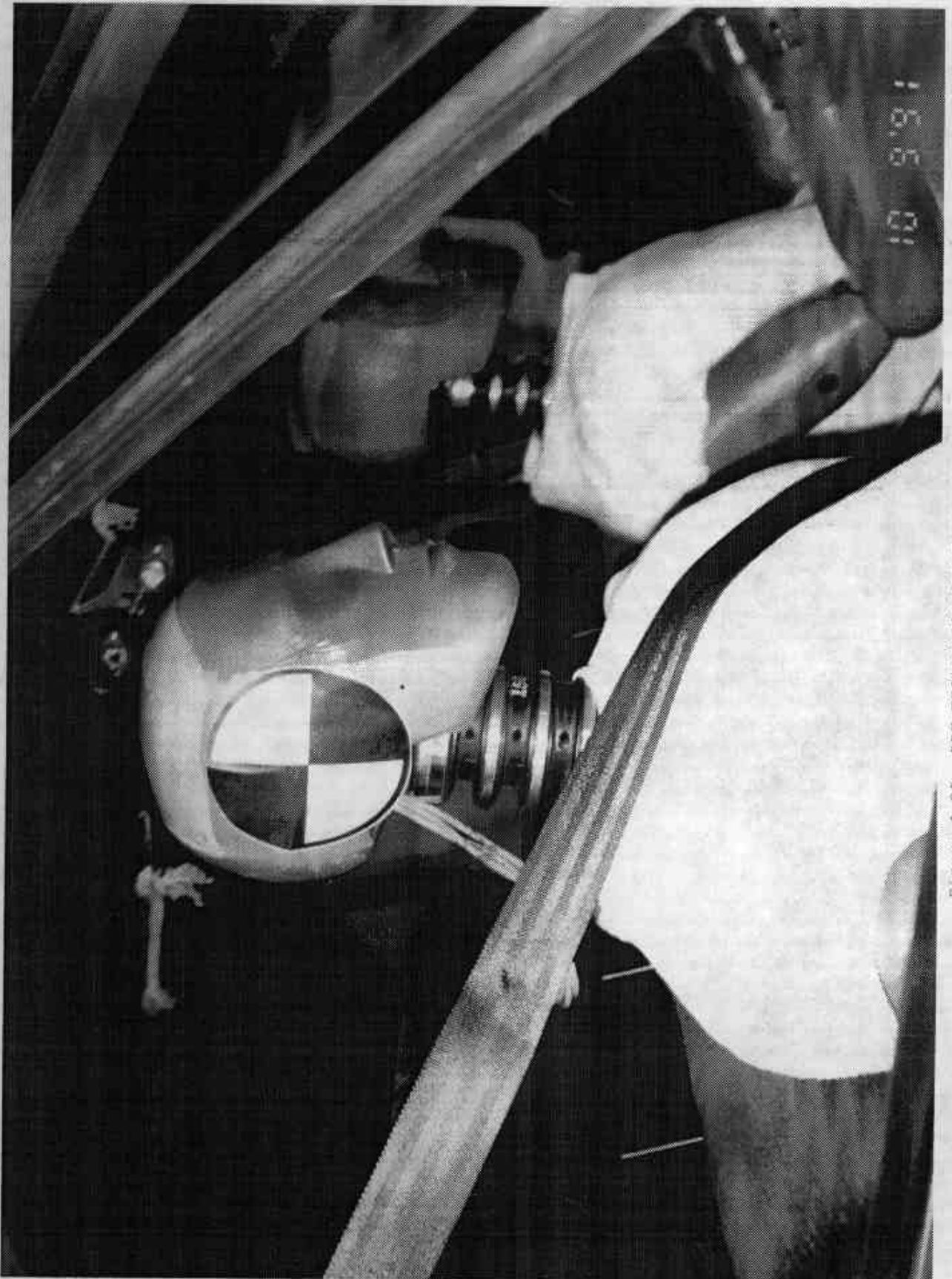


Figure A-28 PRE-TEST PASSENGER DUMMY POSITION

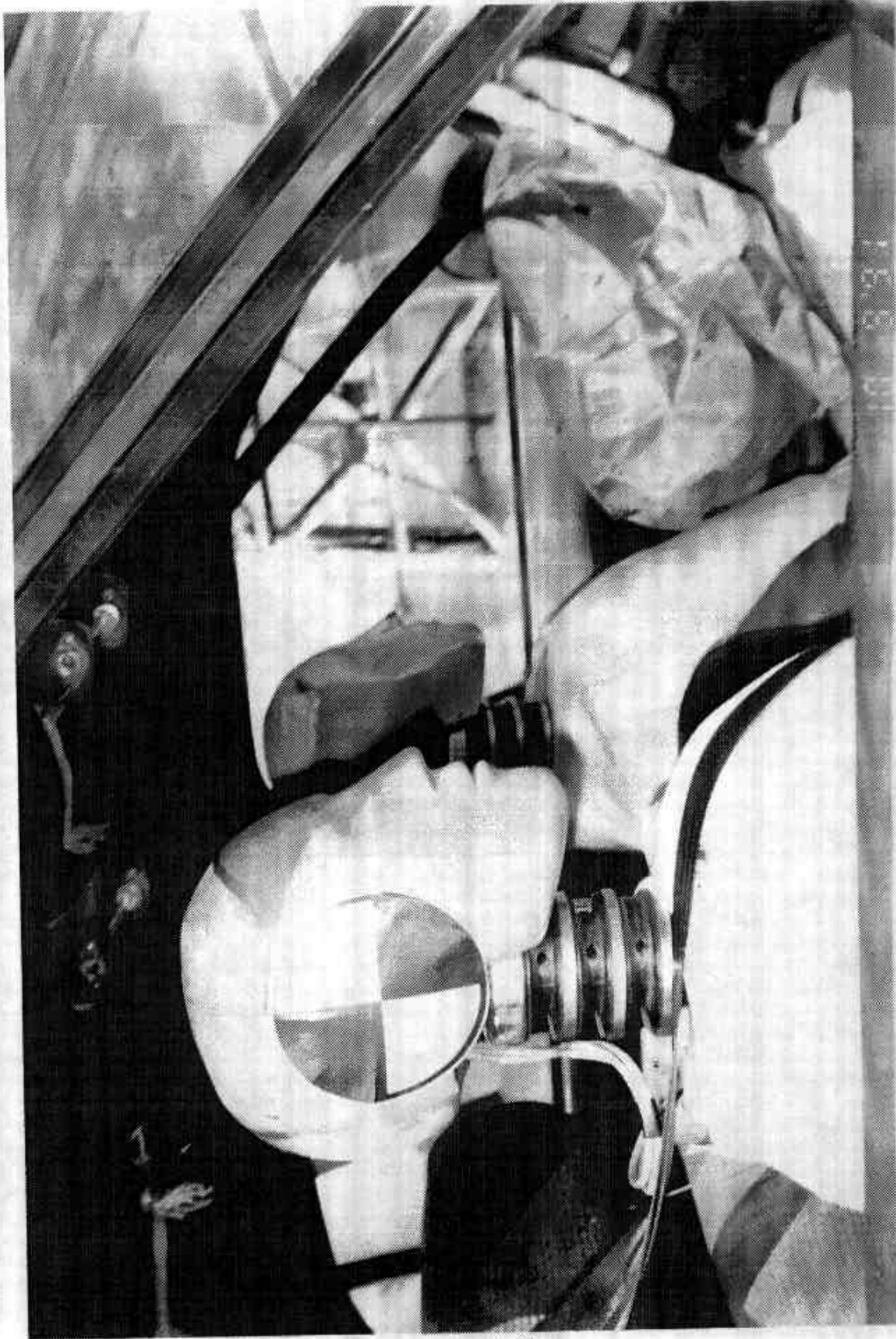


FIGURE A-29 POST-TEST PASSENGER DUMMY POSITION

A-31

7953-1

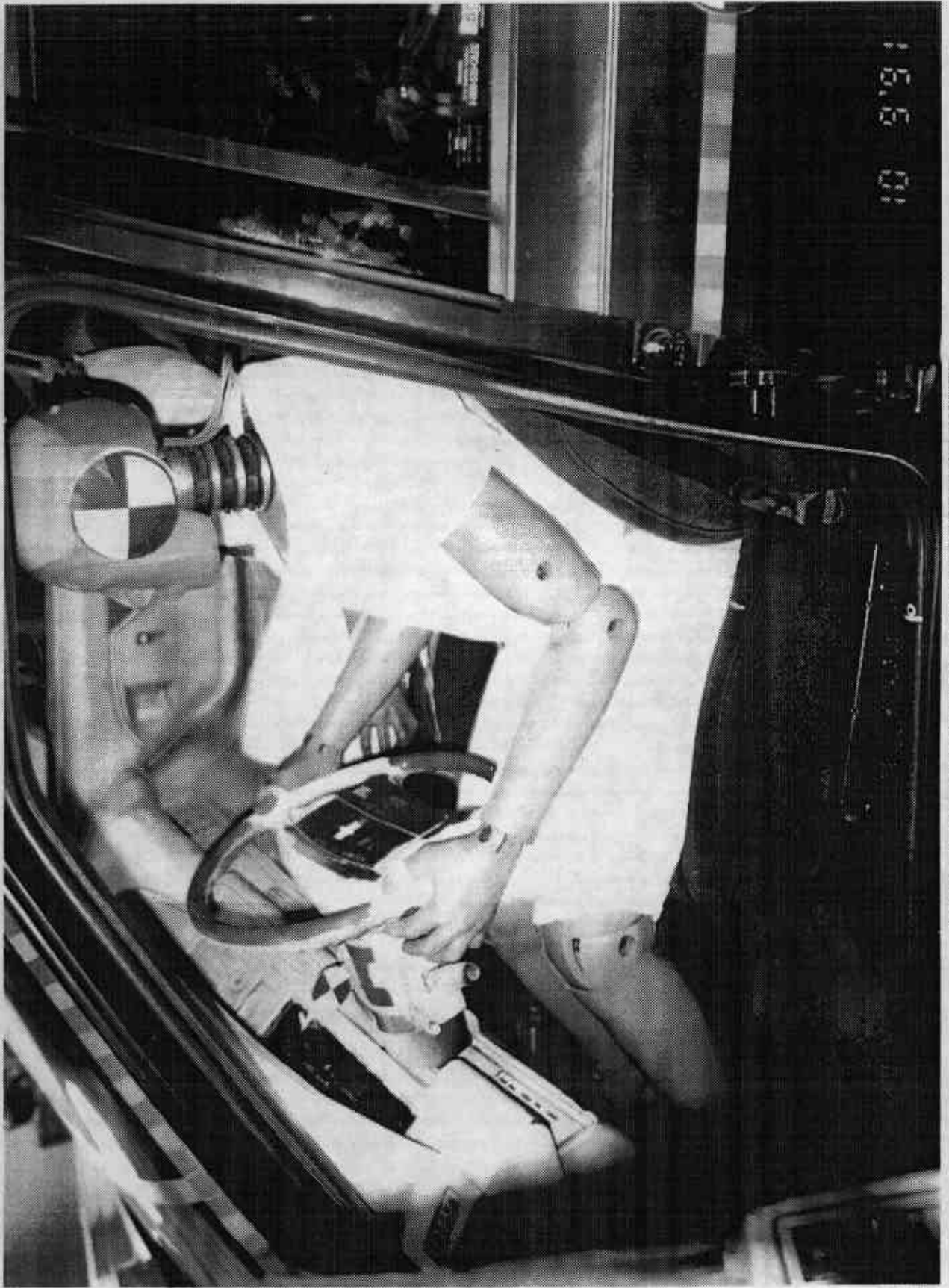


Figure A-30 PRE-TEST DRIVER DUMMY AND INTERIOR VIEW

A-32

7953-1



Figure A-31 POST-TEST DRIVER DUMMY AND INTERIOR VIEW

A-33

7953-1



FIGURE A-32 PRE-TEST PASSENGER DUMMY AND INTERIOR VIEW

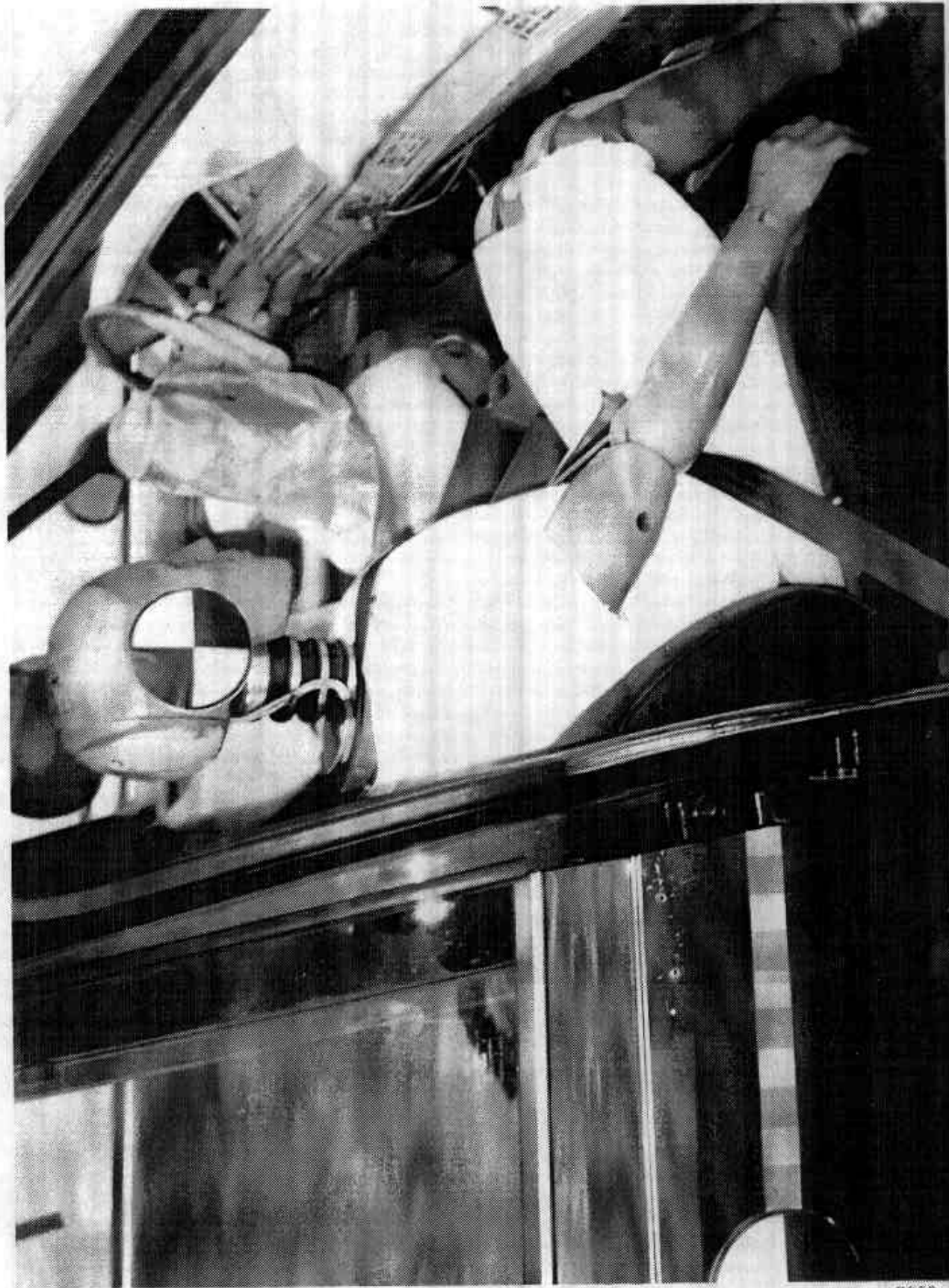


Figure A-33 POST-TEST PASSENGER DUMMY AND INTERIOR VIEW

A-35

7953-1

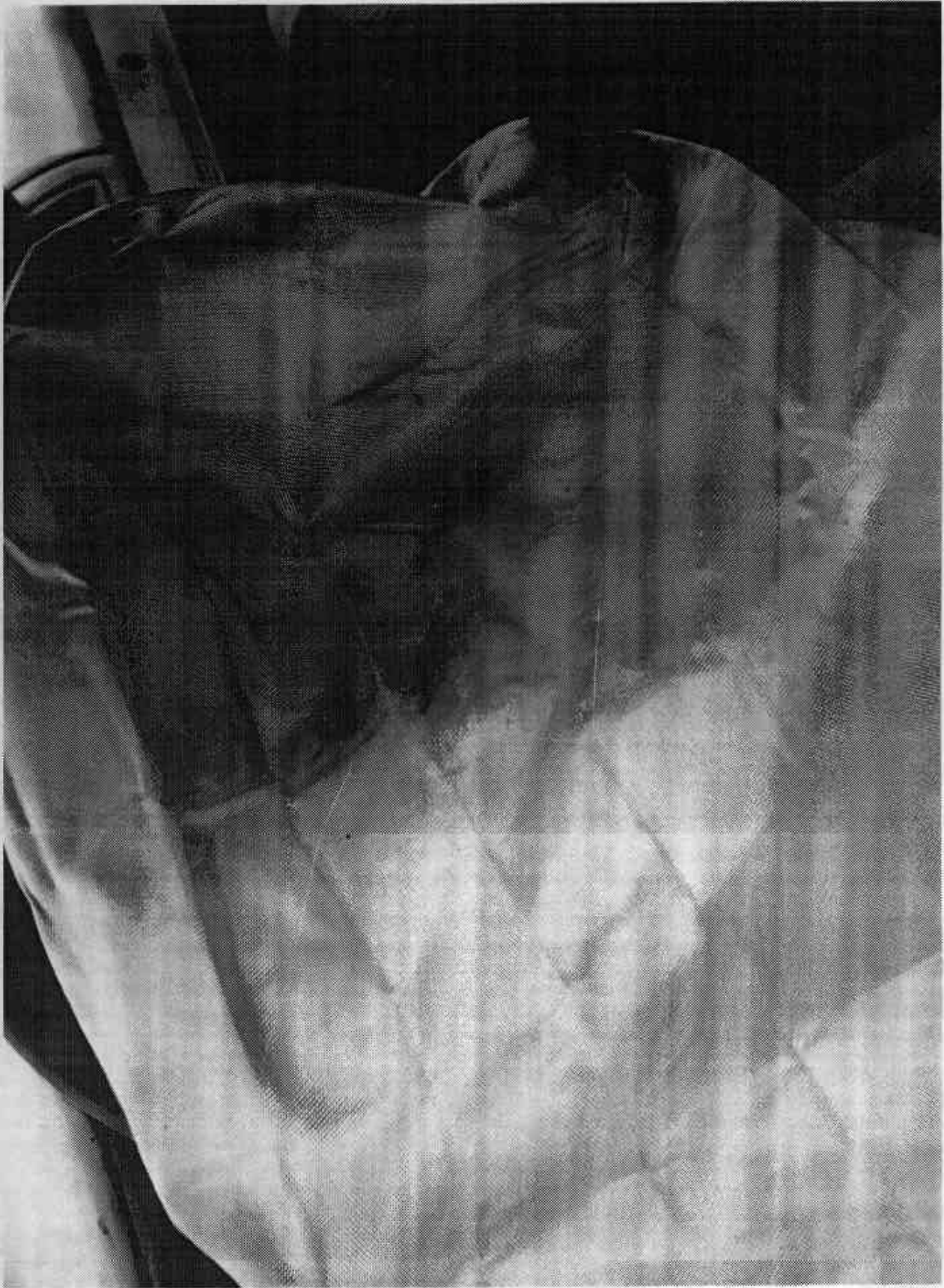


FIGURE A-34 POST-TEST DRIVER AIRBAG VIEW

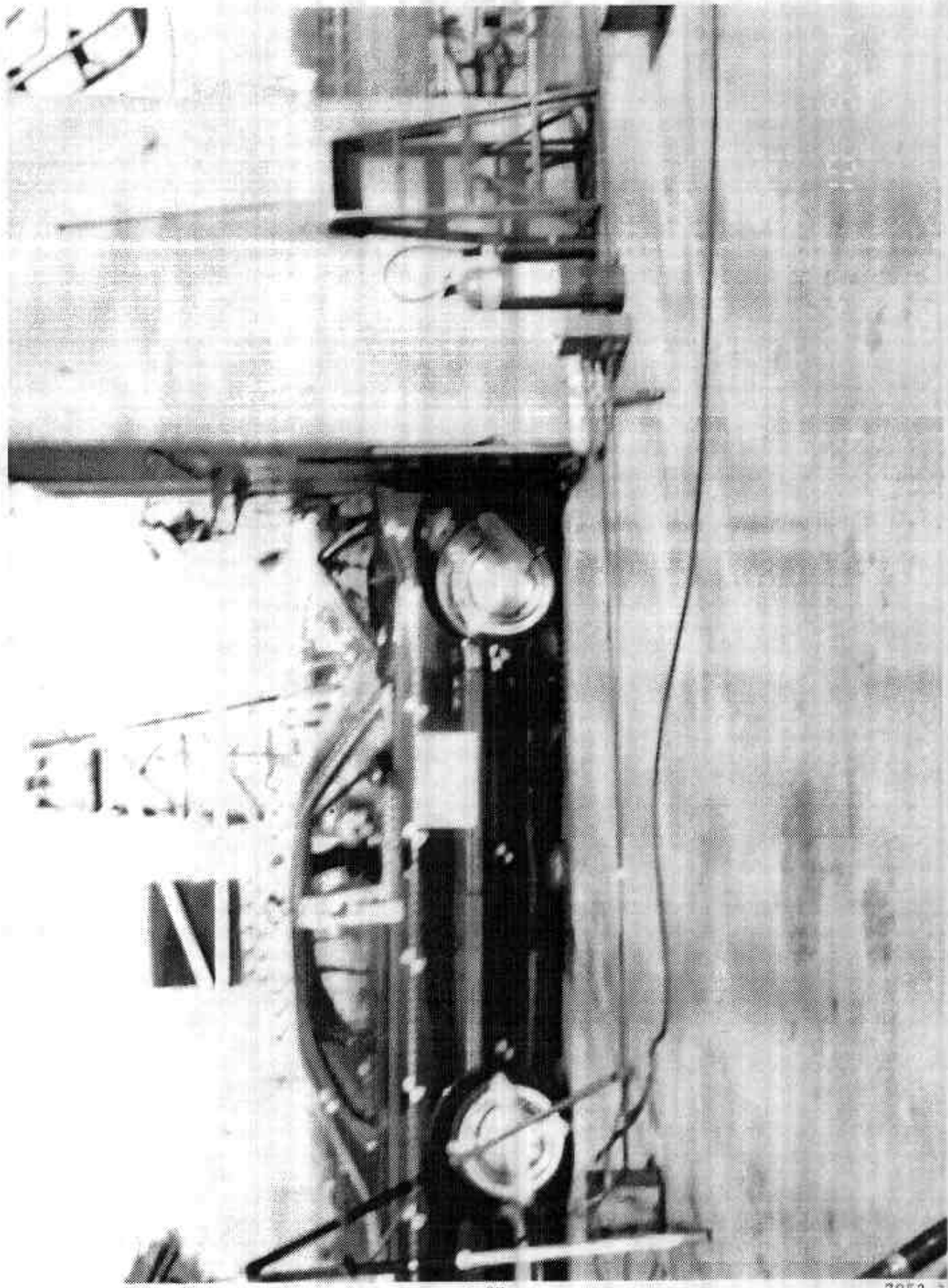


Figure A-35 VEHICLE IMPACT

A-37

7953-1

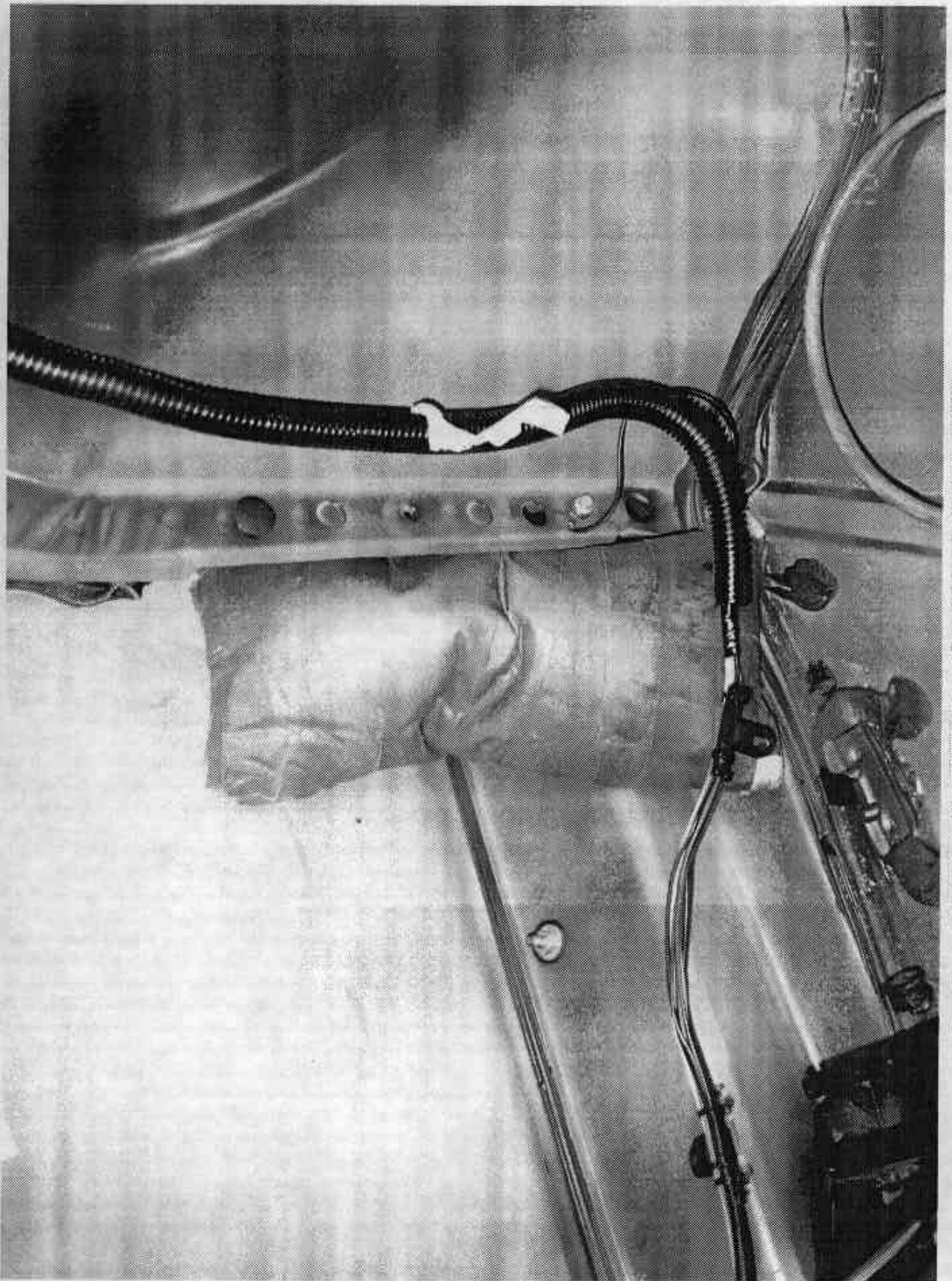


Figure A-36 BALLAST PLACED IN LEFT REAR OF TRUNK

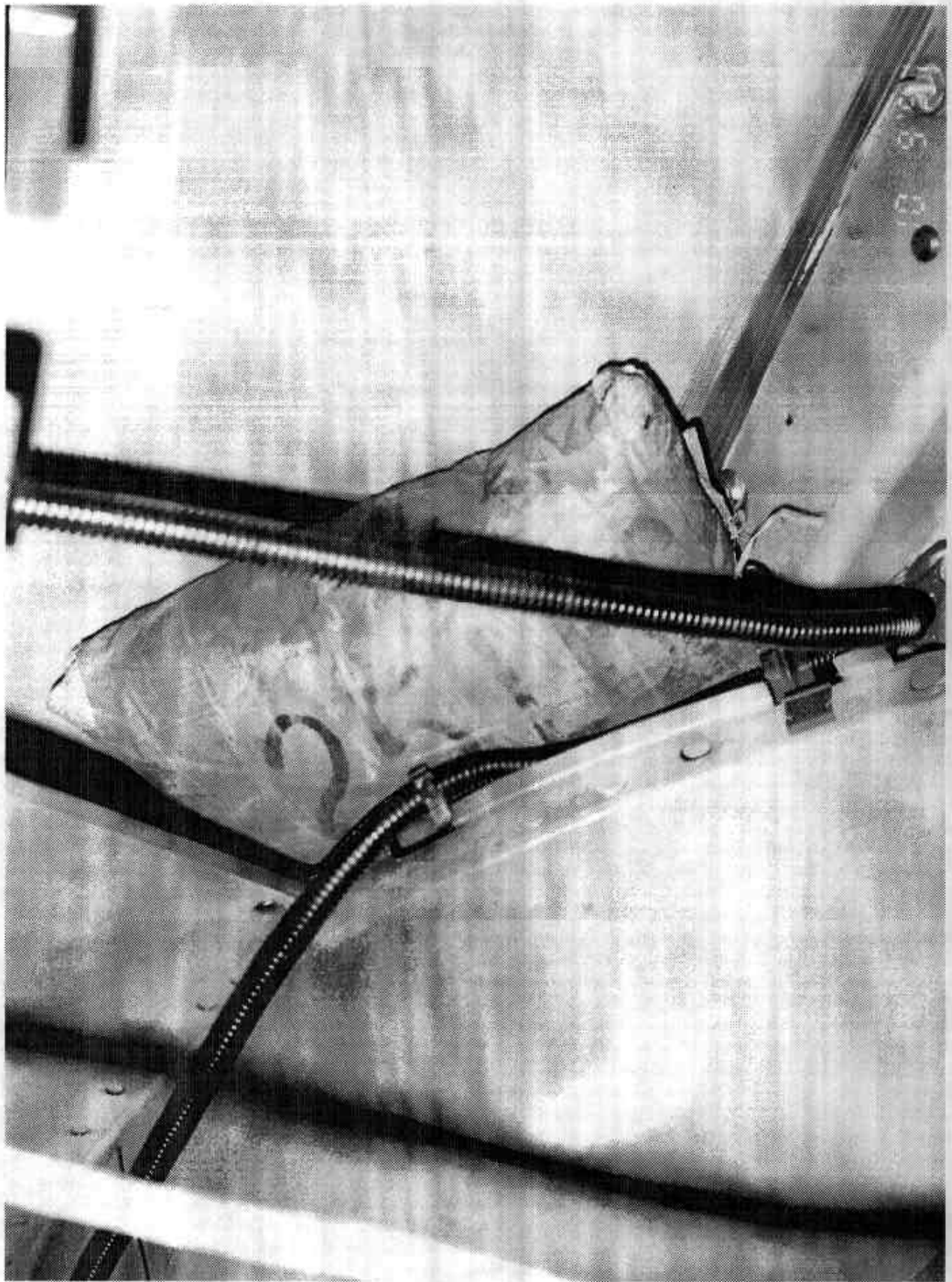


FIGURE A-37 BALLAST PLACED IN RIGHT REAR OF TRUNK

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

TEST NO. CN0102

VEHICLE DATA

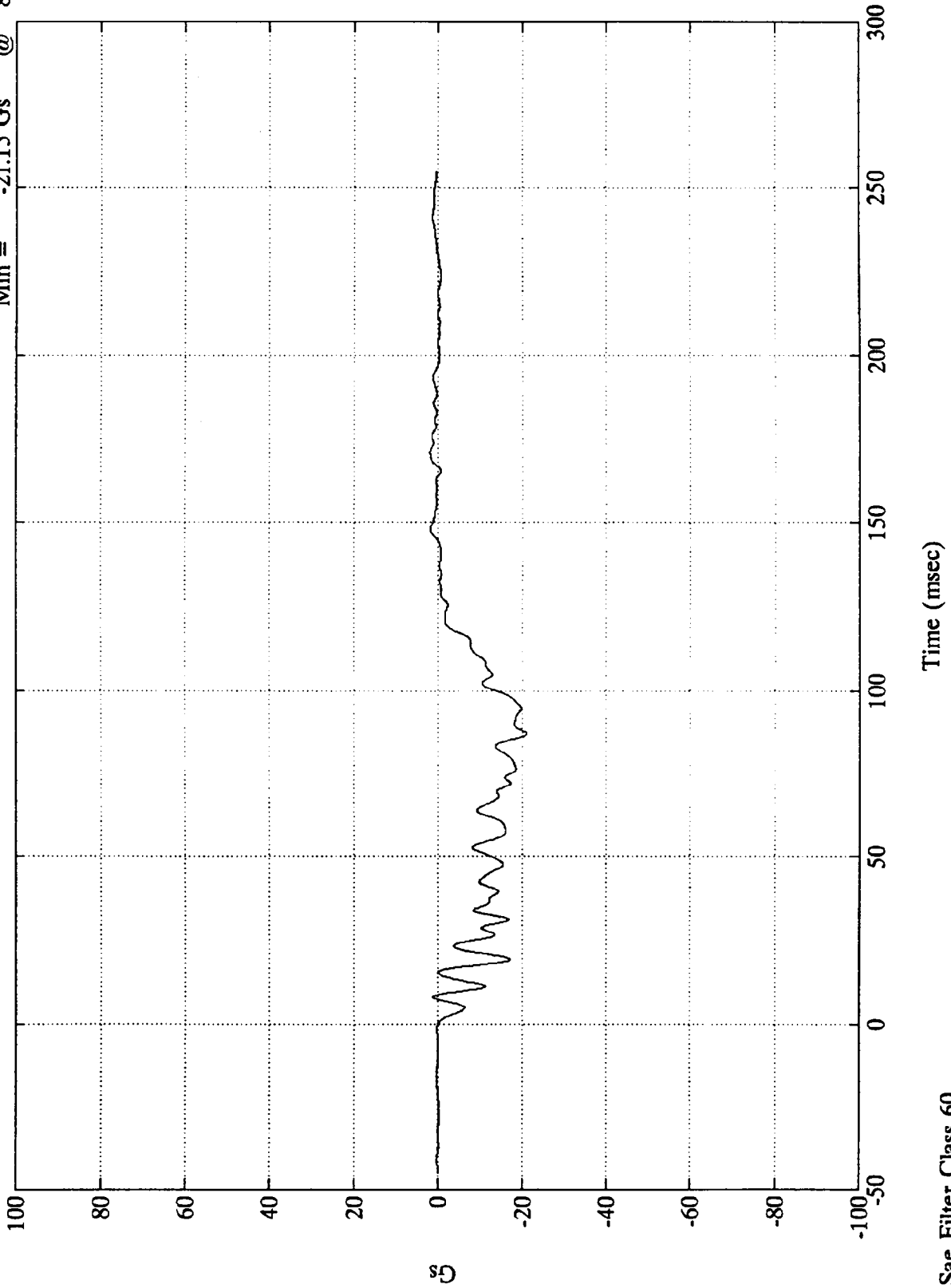
SAE FILTER CHANNEL CLASS

60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

L. Rear X-member X (#1)

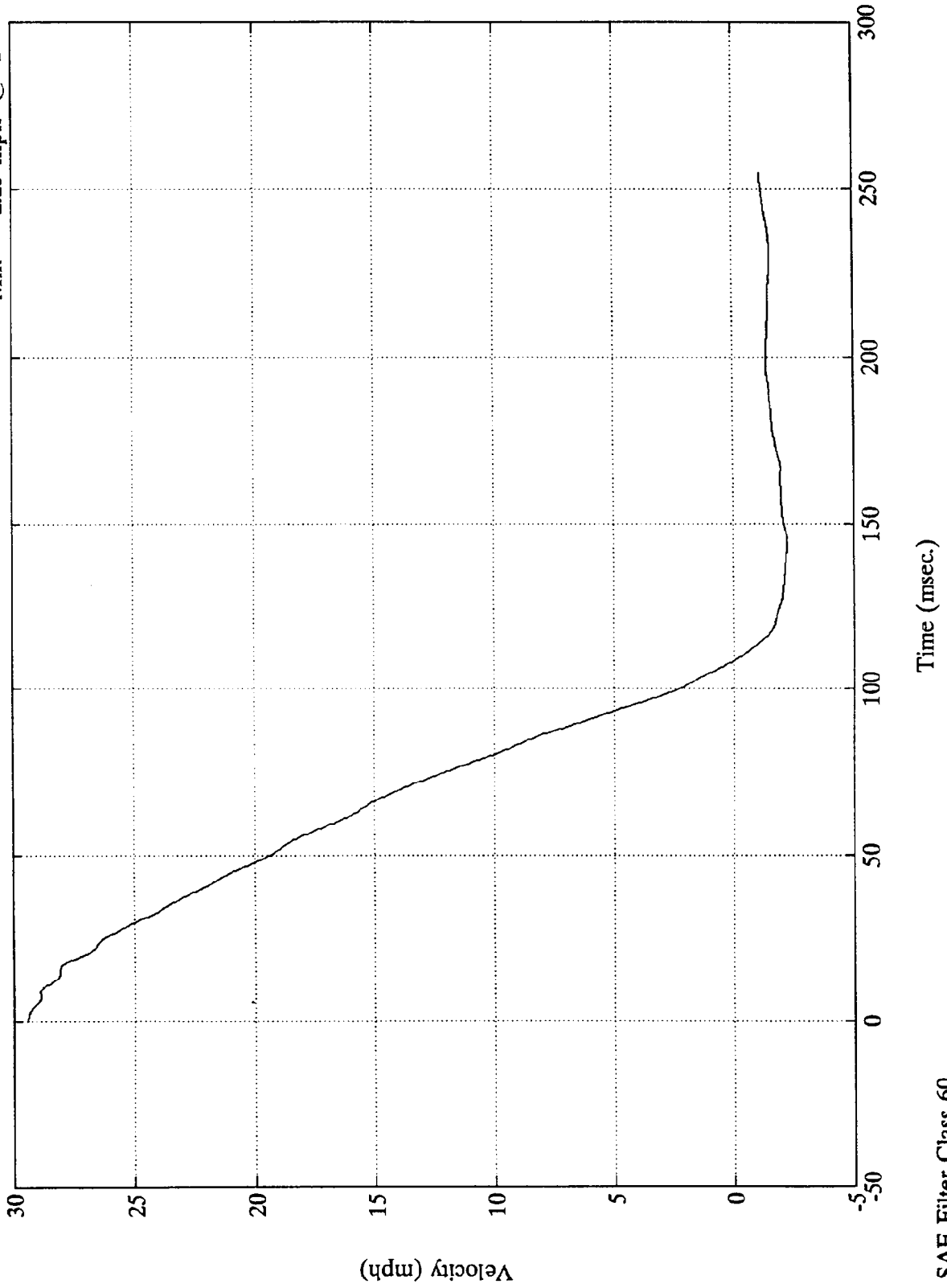
Max = 1.94 Gs @ 171.12 msec  
Min = -21.15 Gs @ 87.12 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

L. Rear X-member X (#1)

Max = 29.40 mph @ 0.72 msec  
Min = -2.23 mph @ 144.96 msec

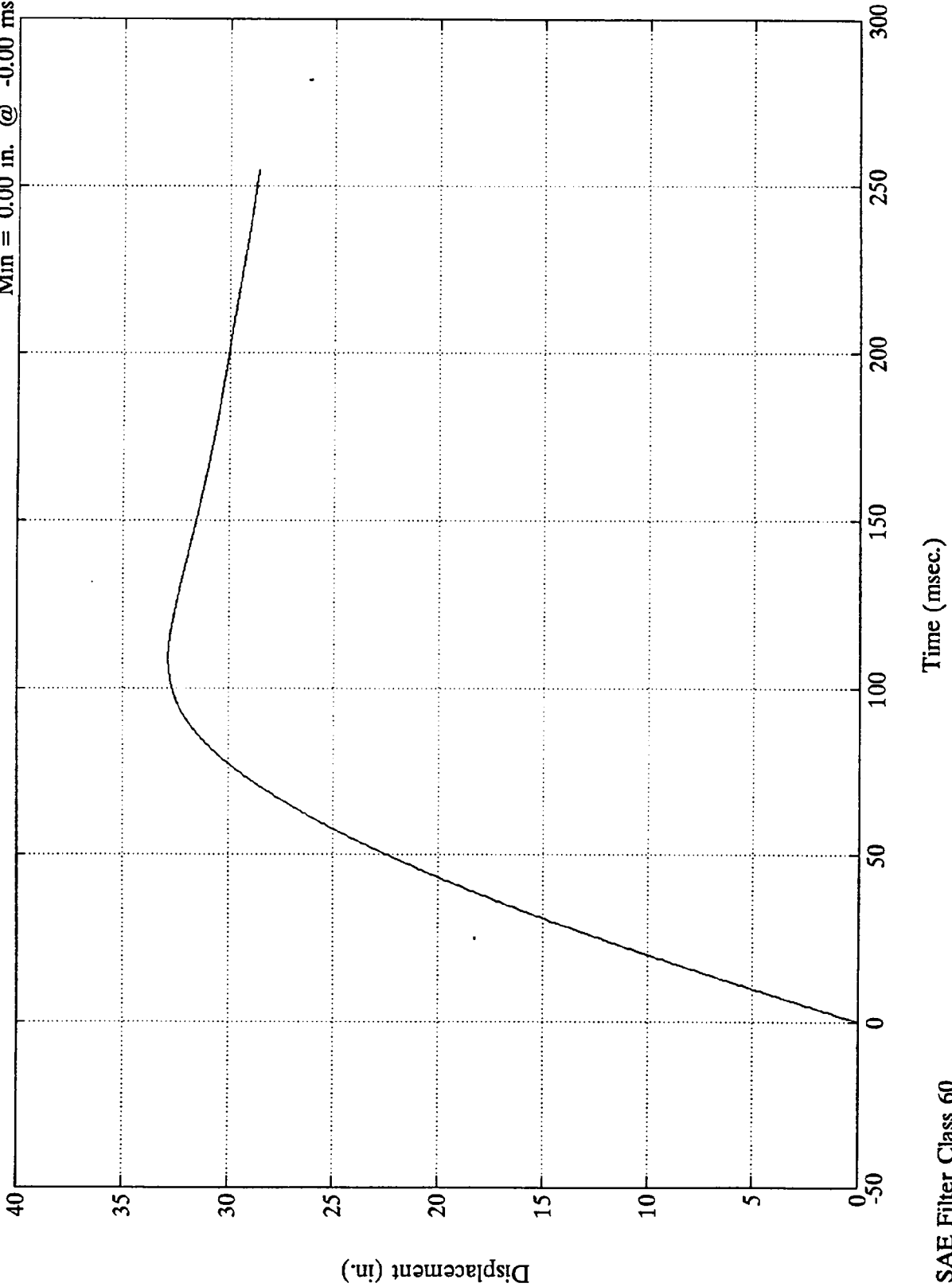


SAE Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

L. Rear X-member X (#1)

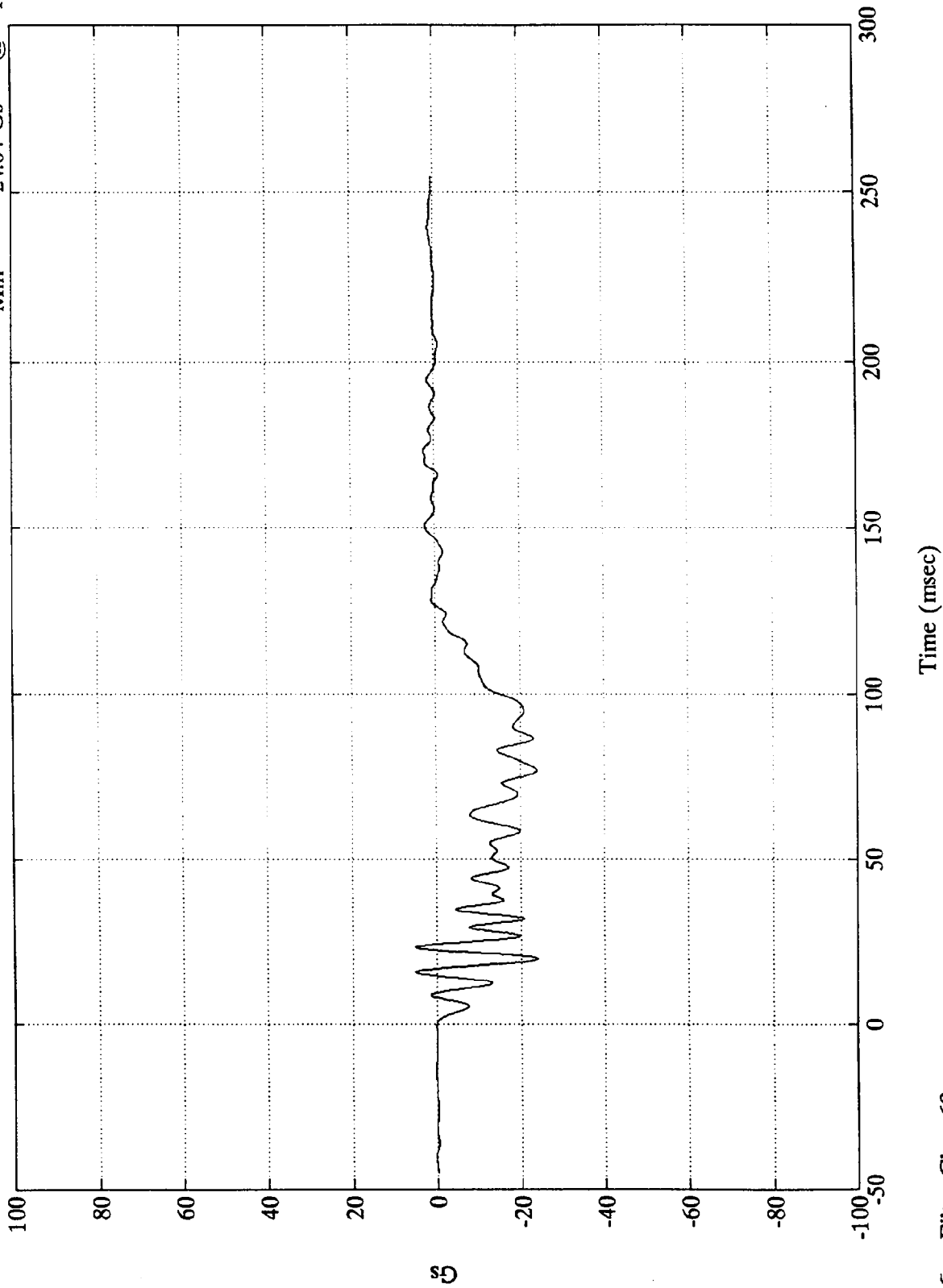
Max = 32.83 in. @ 110.64 msec  
Min = 0.00 in. @ -0.00 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

R. Rear X-member X (#2)

Max = 5.02 Gs @ 15.59 msec  
Min = -24.04 Gs @ 19.55 msec

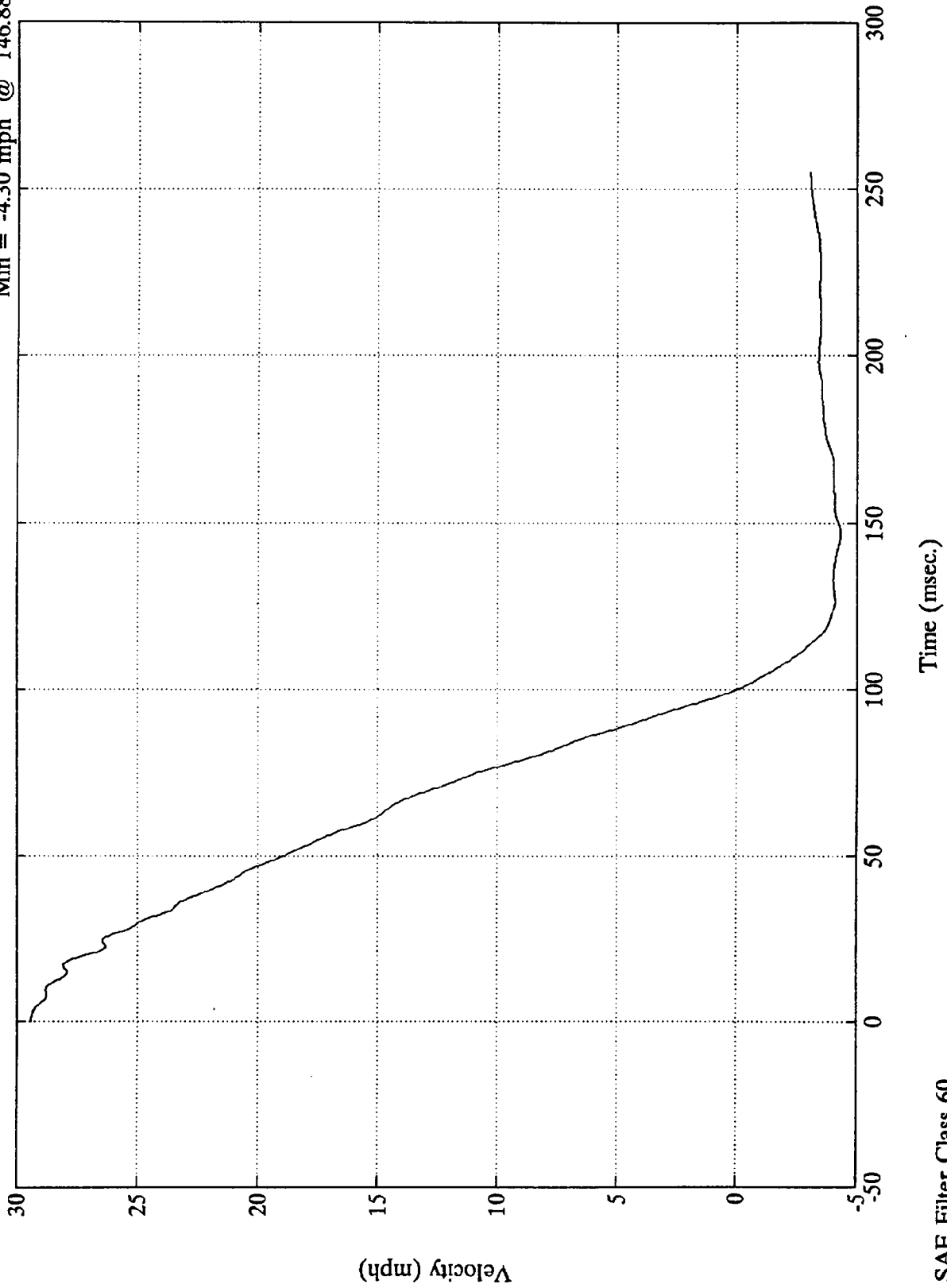


Sae Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

R. Rear X-member X (#2)

Max = 29.40 mph @ 0.96 msec  
Min = -4.30 mph @ 146.88 msec

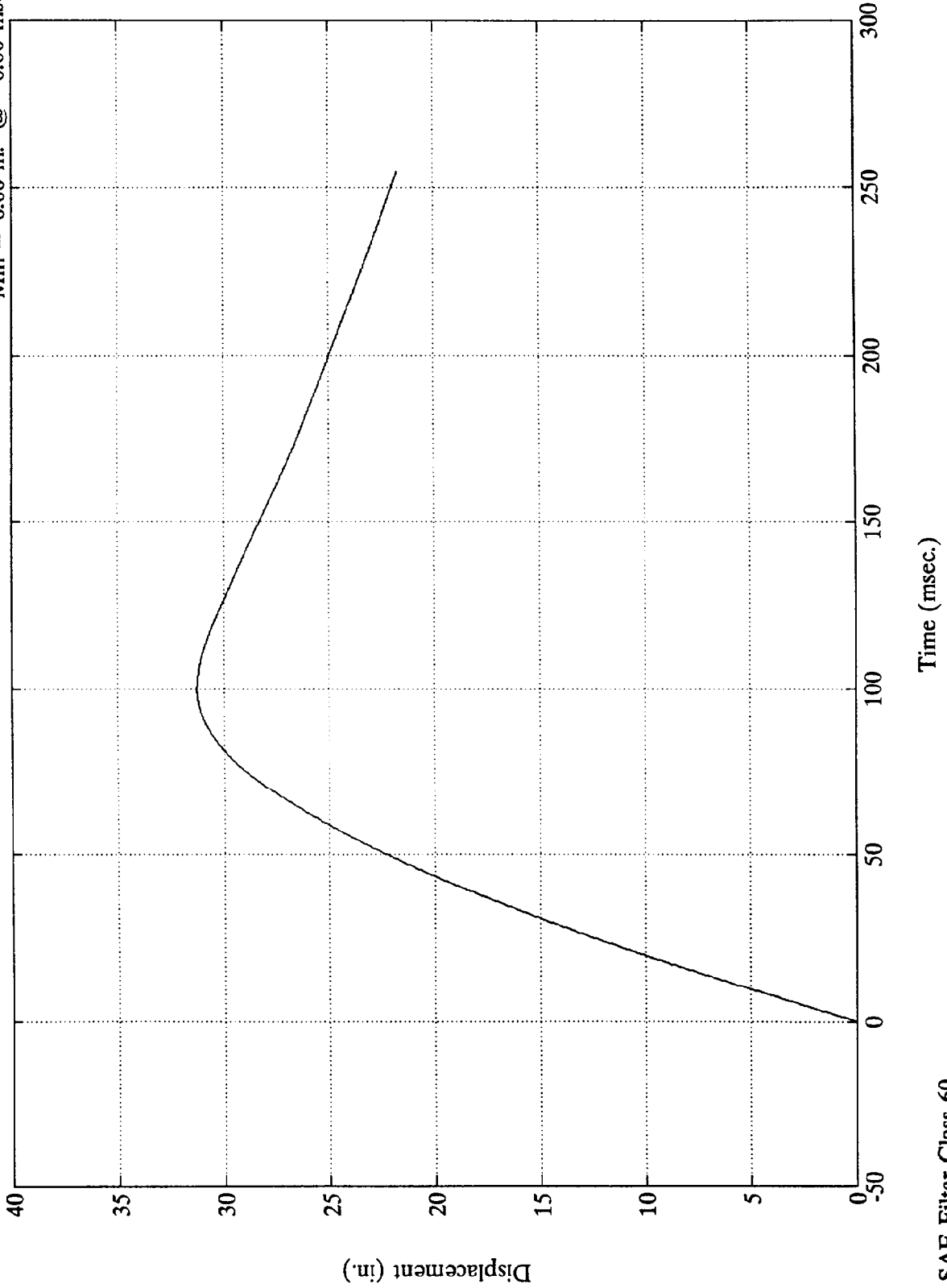


SAE Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

R. Rear X-member X (#2)

Max = 31.26 in. @ 100.80 msec  
Min = 0.00 in. @ -0.00 msec

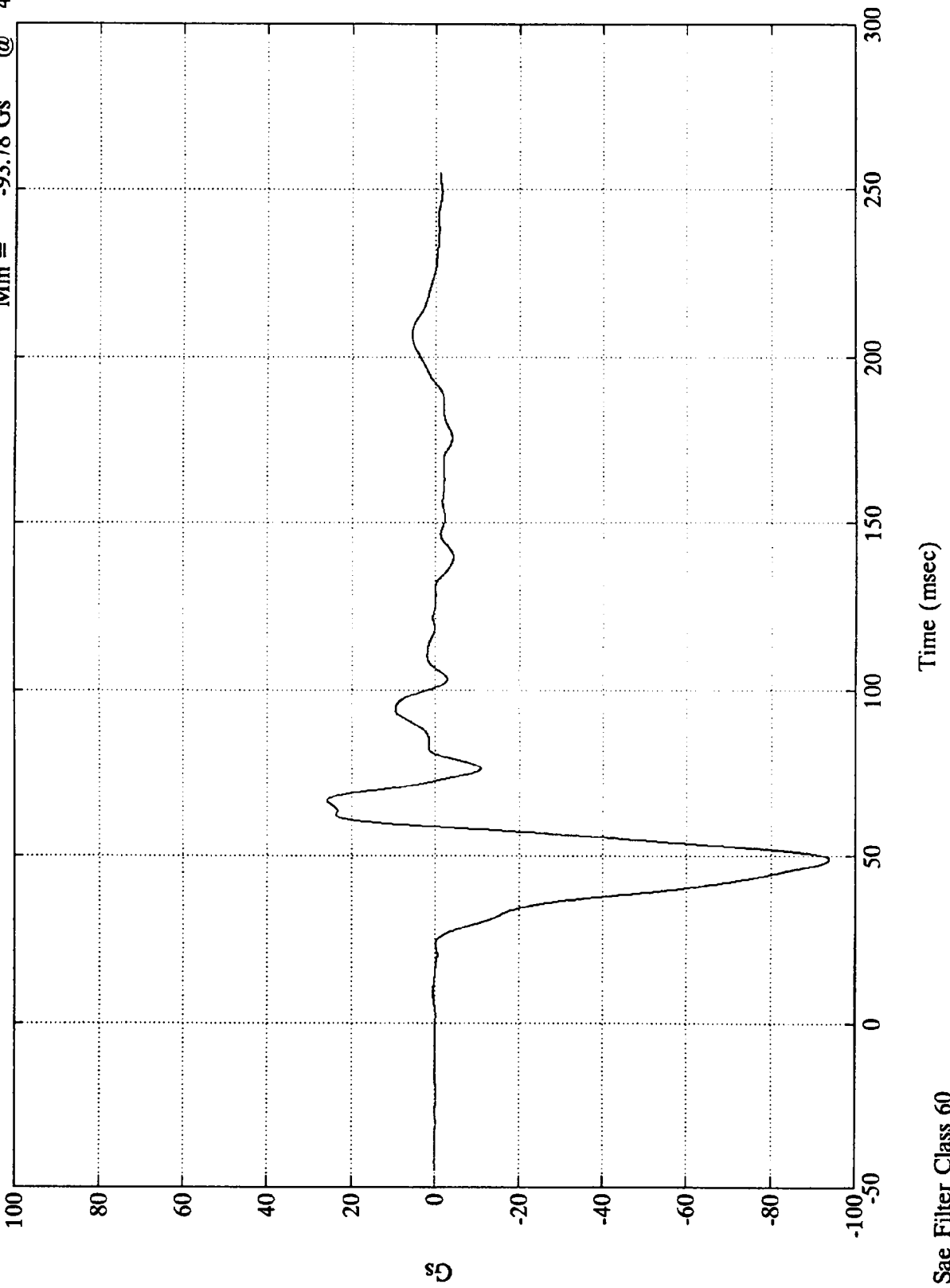


SAE Filter Class 60

7953-1

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

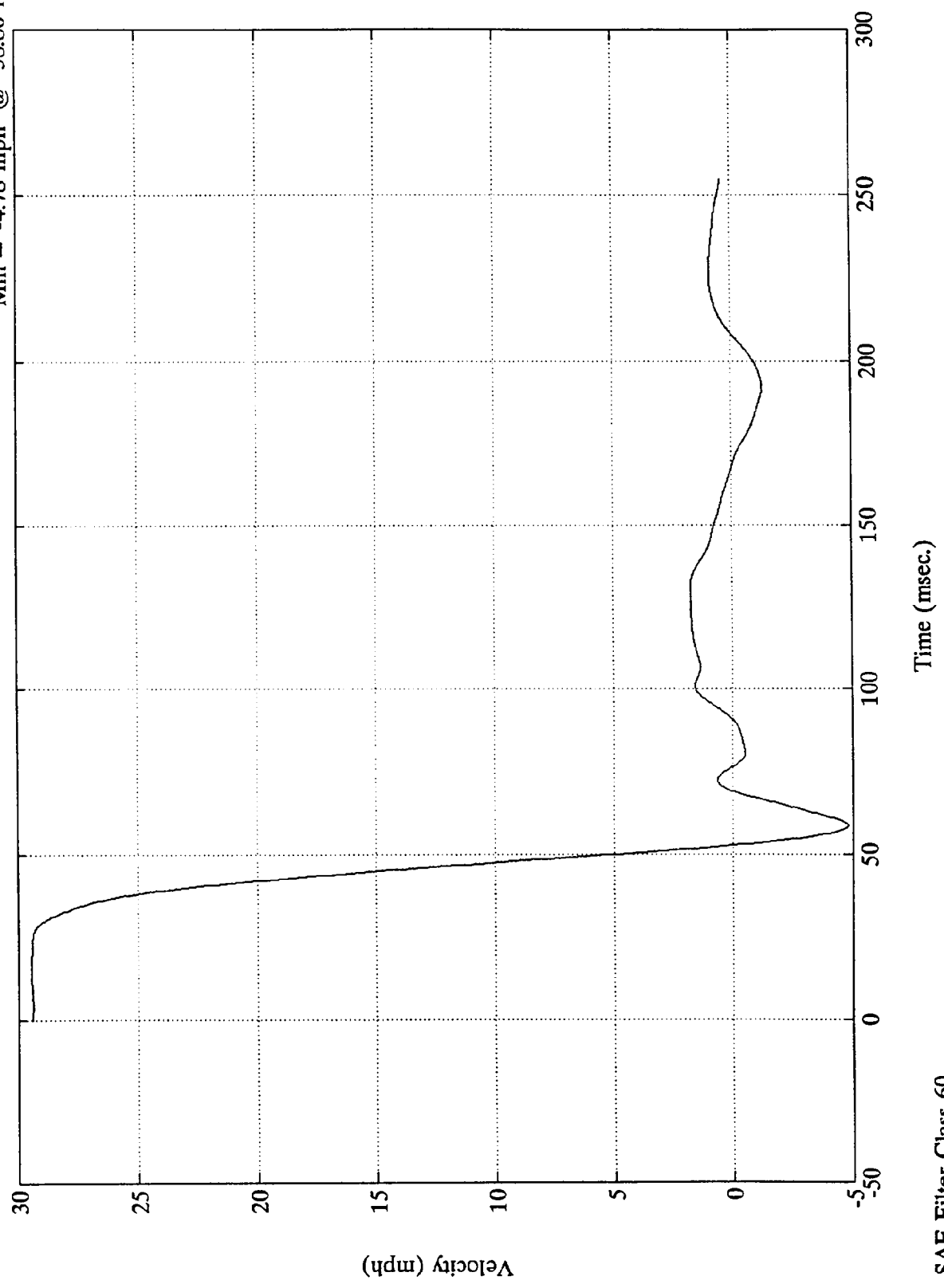
Engine Top X (#3)  
Max = 25.74 Gs @ 66.60 msec  
Min = -93.78 Gs @ 49.07 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Engine Top X (#3)

Max = 29.46 mph @ 16.08 msec  
Min = -4.78 mph @ 58.80 msec

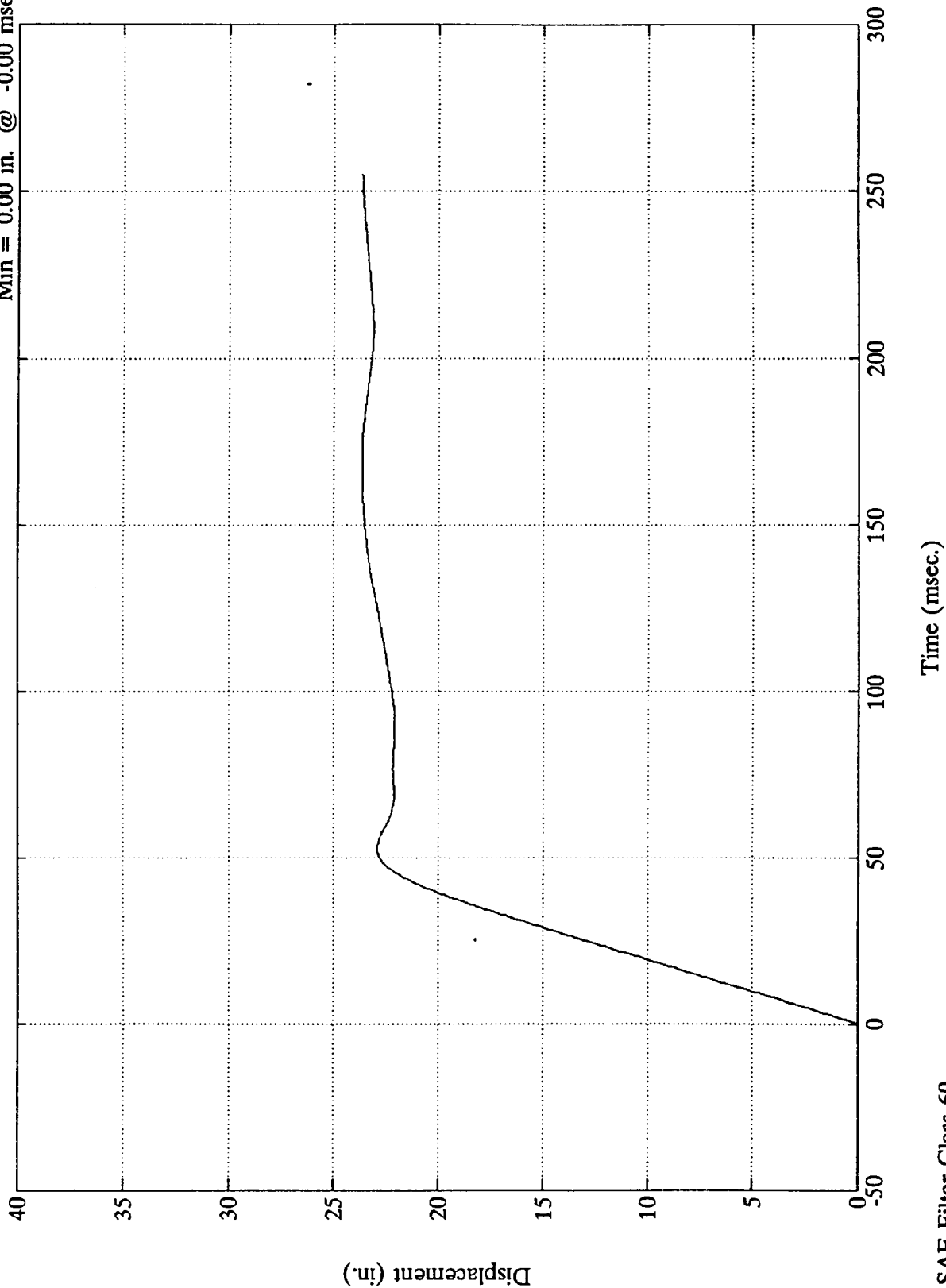


SAE Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Engine Top X (#3)

Max = 23.66 in. @ 254.88 msec  
Min = 0.00 in. @ -0.00 msec

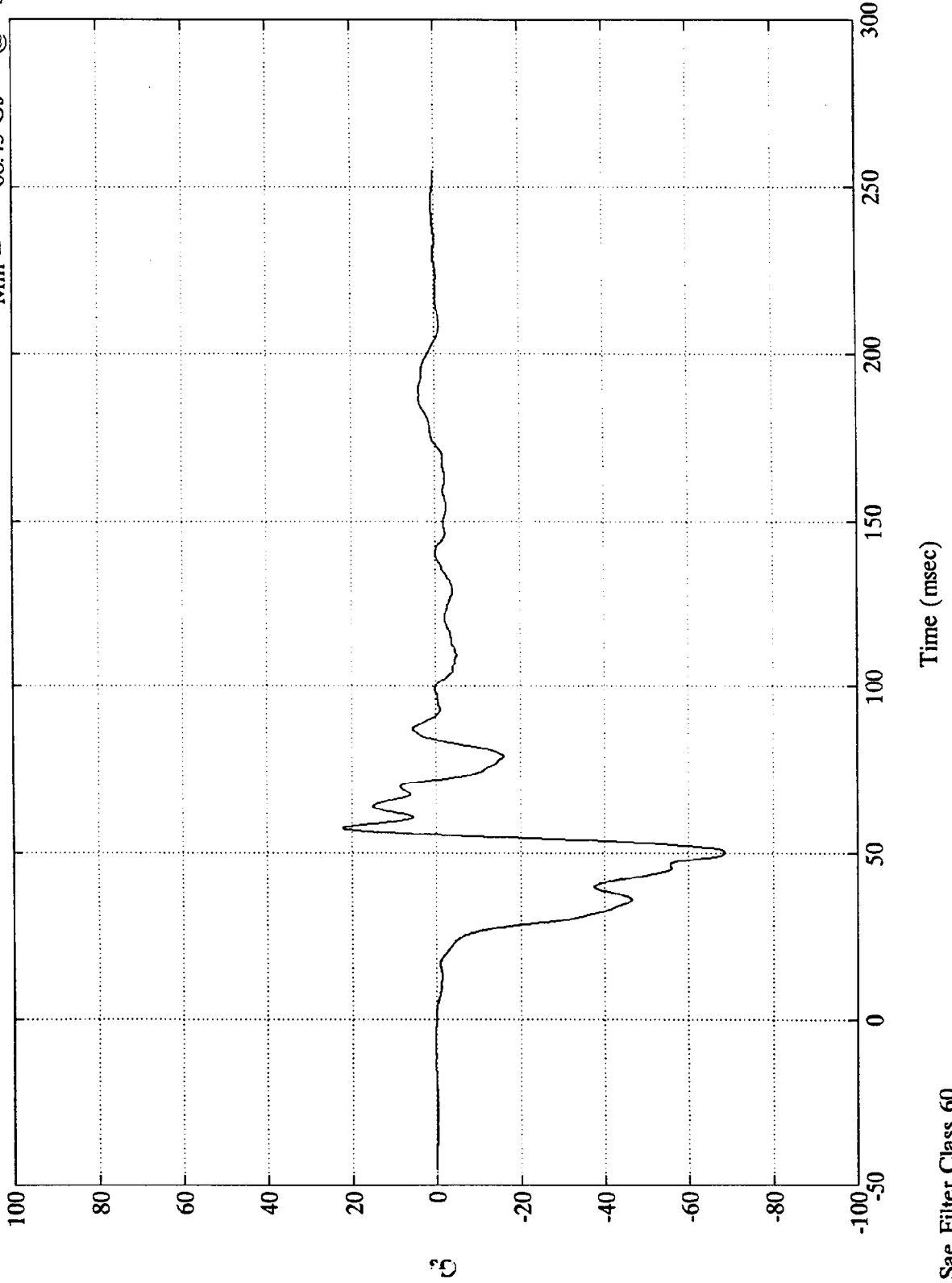


SAE Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Max = 22.22 Gs @ 57.47 msec  
Min = -68.45 Gs @ 50.64 msec

Engine Bottom X (#4)

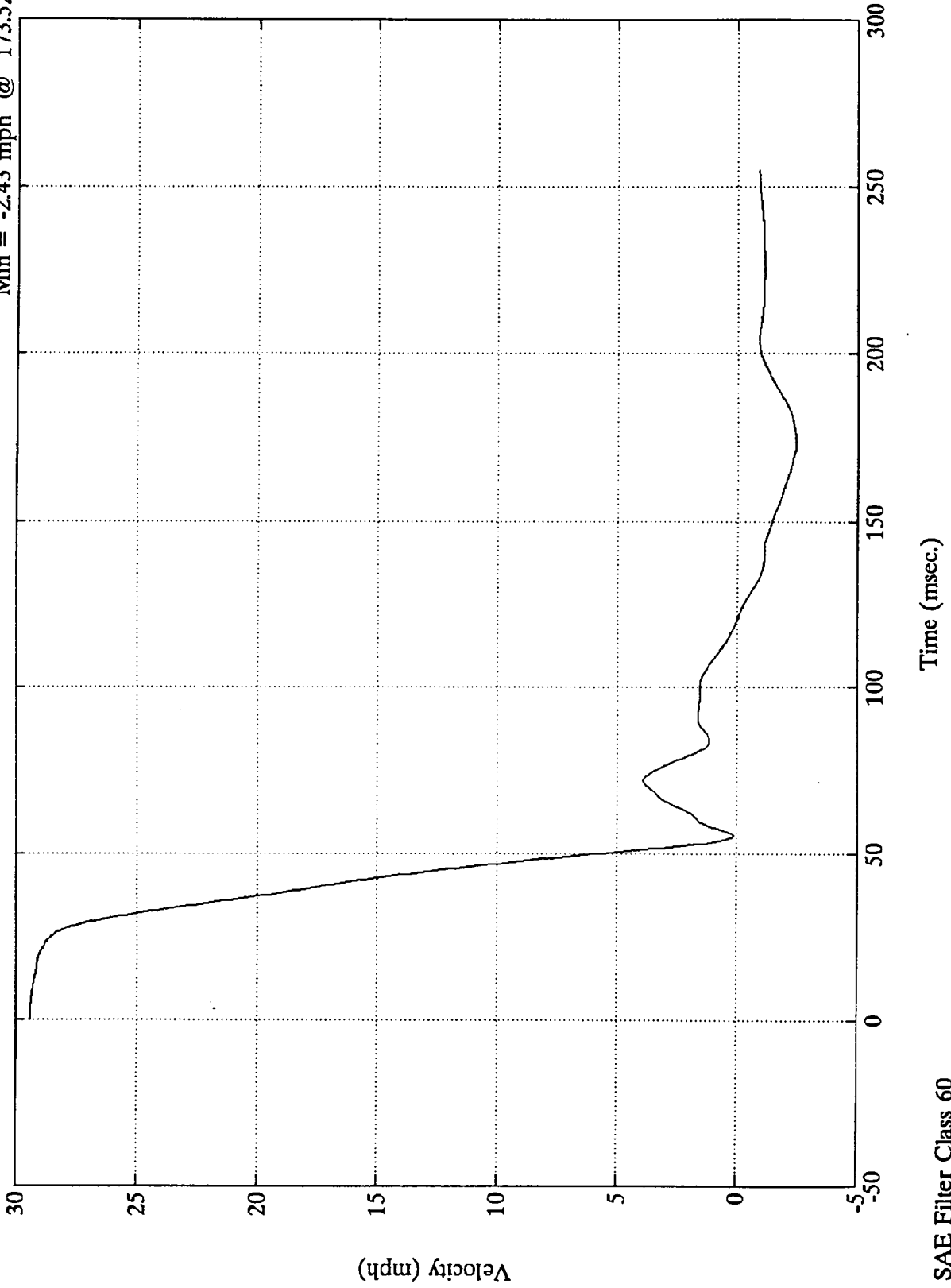


Sae Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Engine Bottom X (#4)

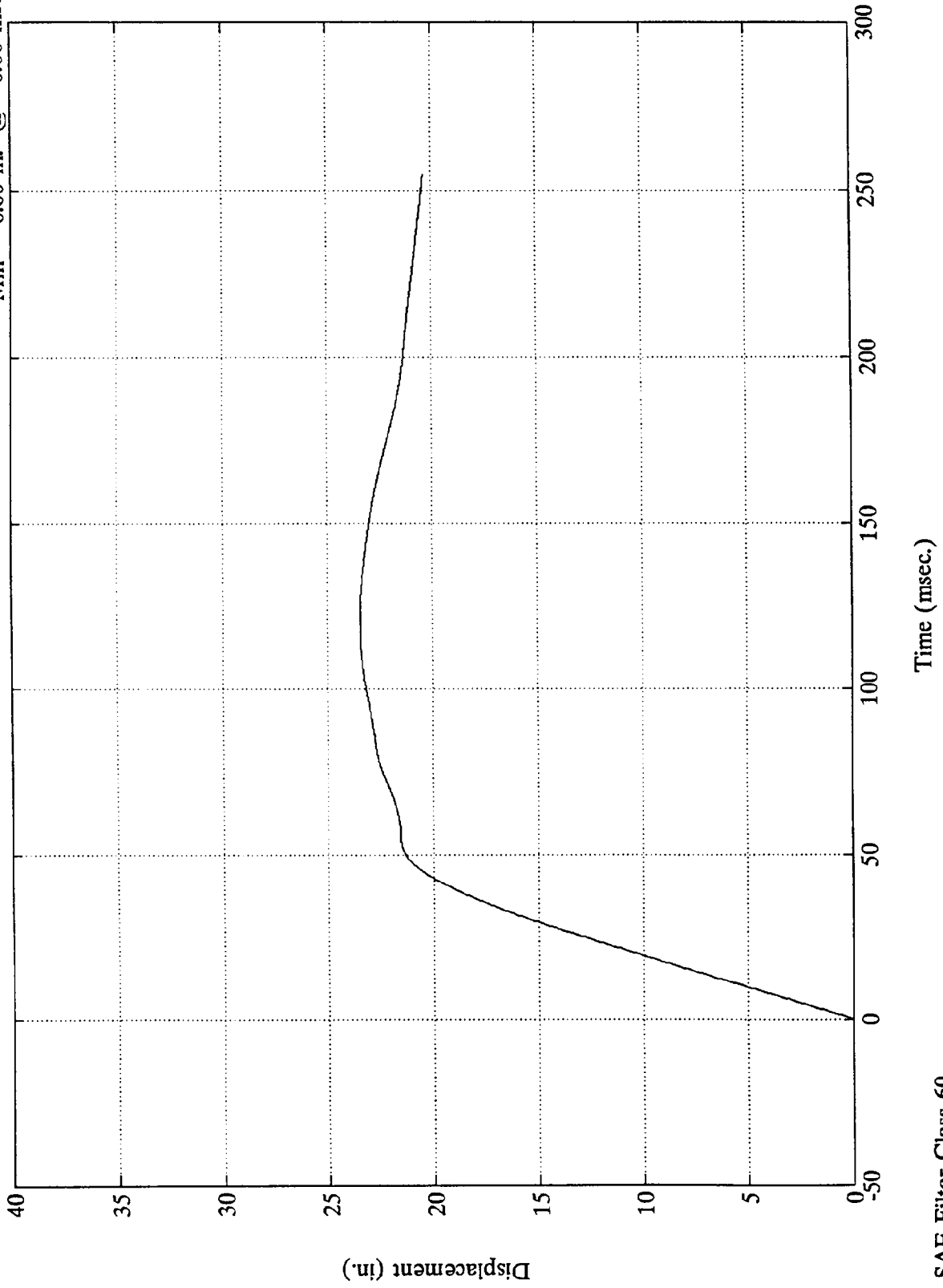
Max = 29.40 mph @ 4.32 msec  
Min = -2.43 mph @ 173.52 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Engine Bottom X (#4)

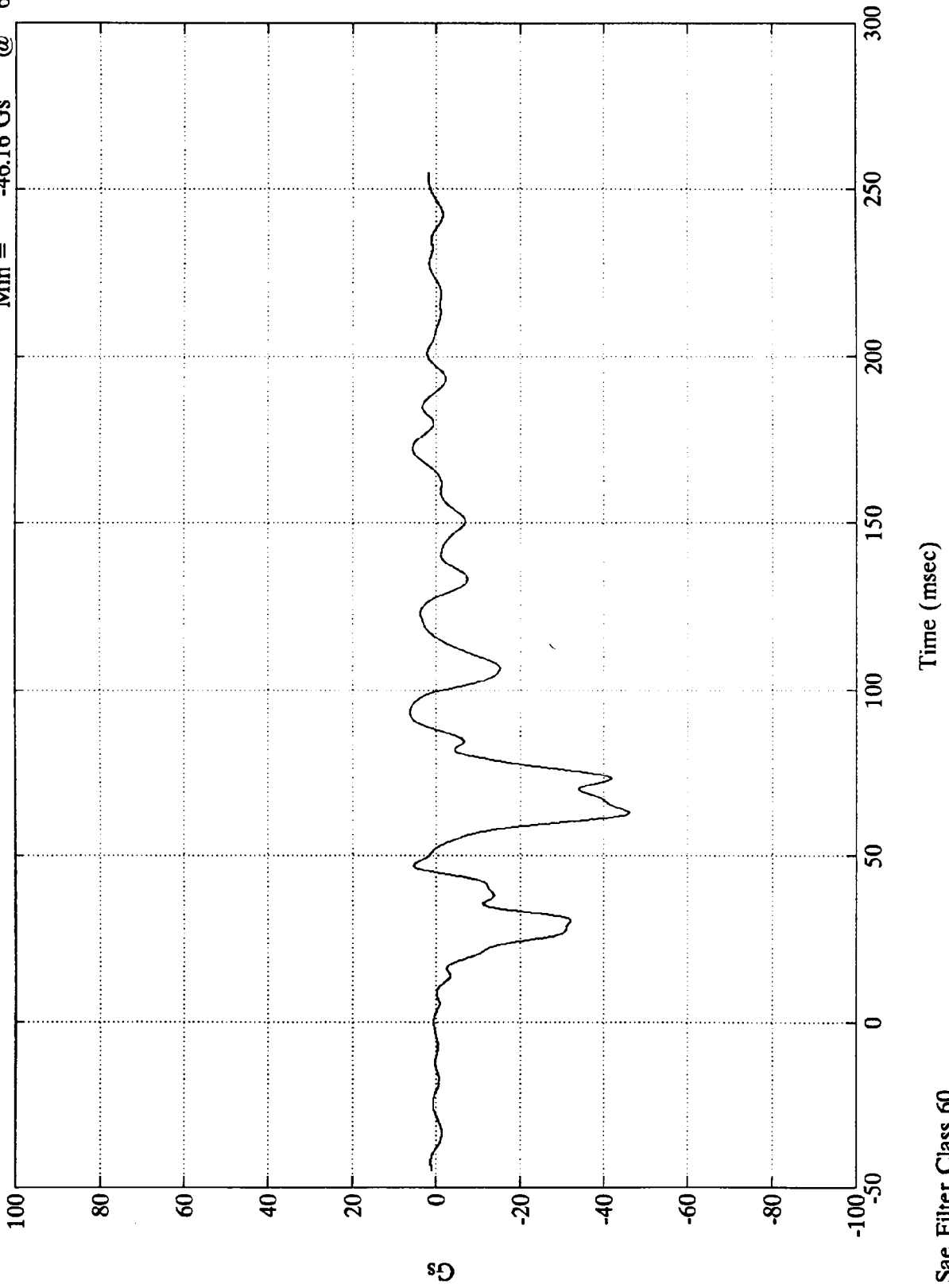
Max = 23.46 in. @ 124.80 msec  
Min = 0.00 in. @ -0.00 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

R. Brake Caliper X (#5)

Max = 6.26 Gs @ 93.48 msec  
Min = -46.16 Gs @ 62.76 msec

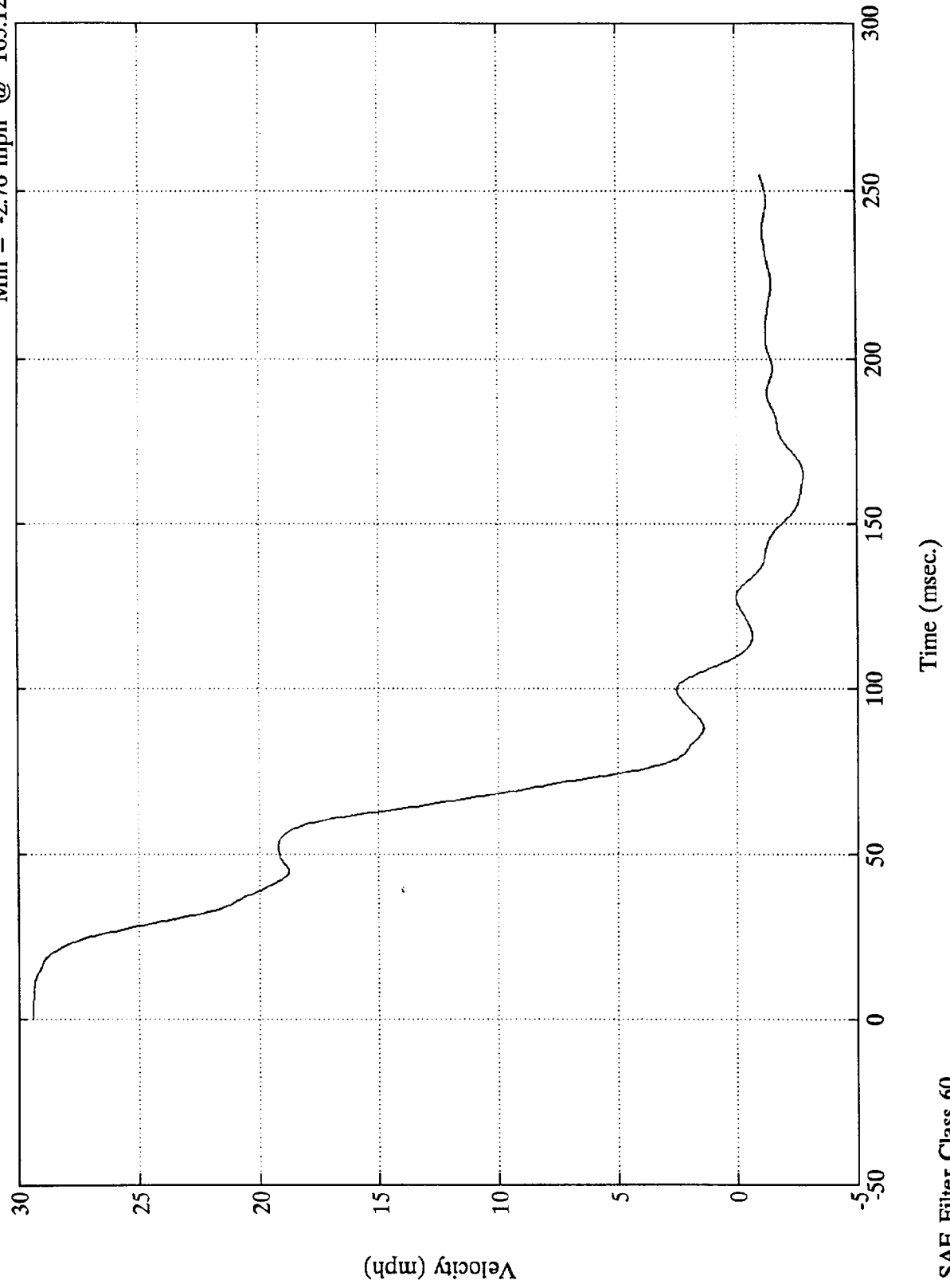


Sae Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

R. Brake Caliper X (#5)

Max = 29.43 mph @ 3.36 msec  
Min = -2.76 mph @ 165.12 msec



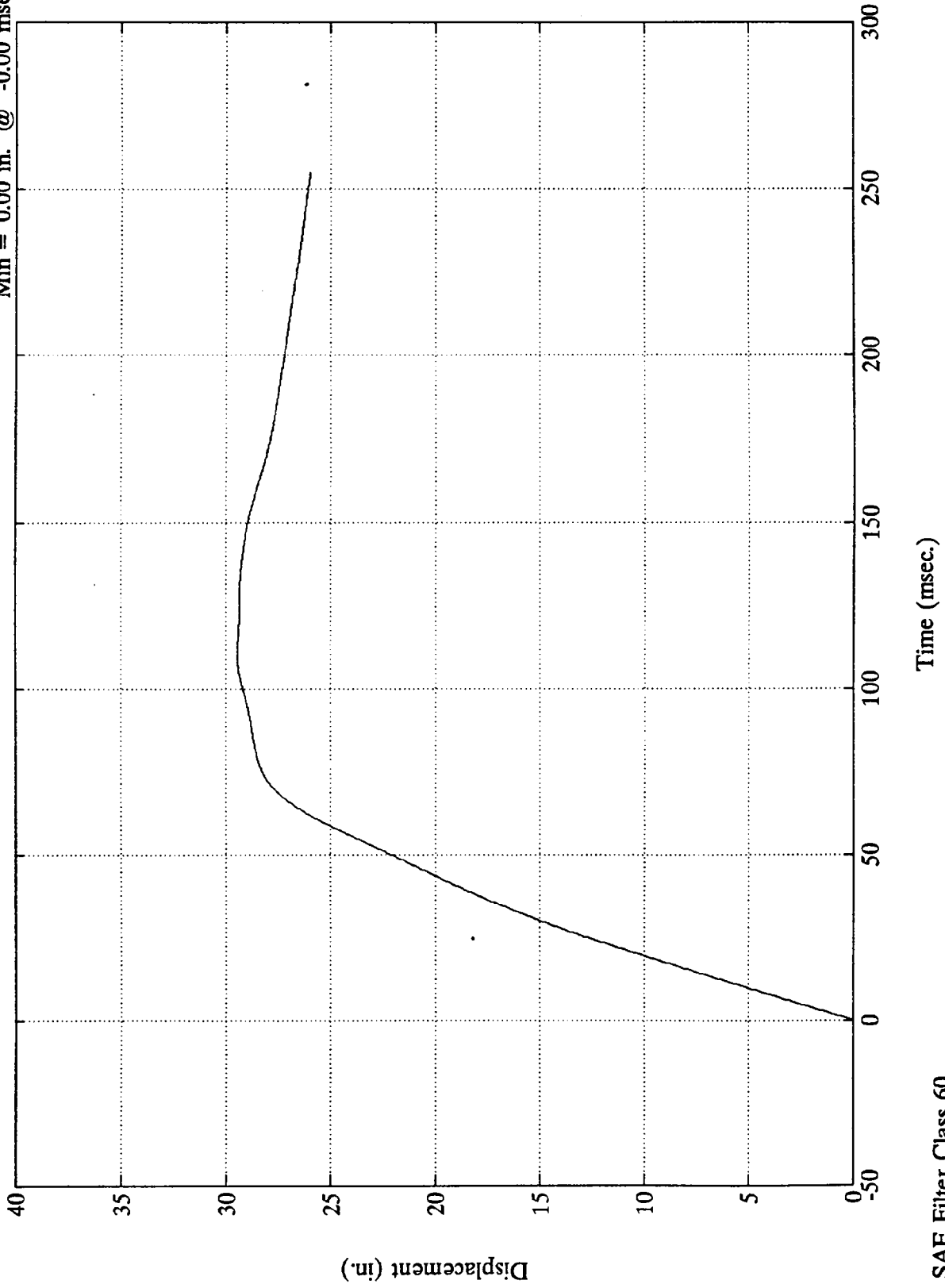
SAE Filter Class 60

7953-1

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

R. Brake Caliper X (#5)

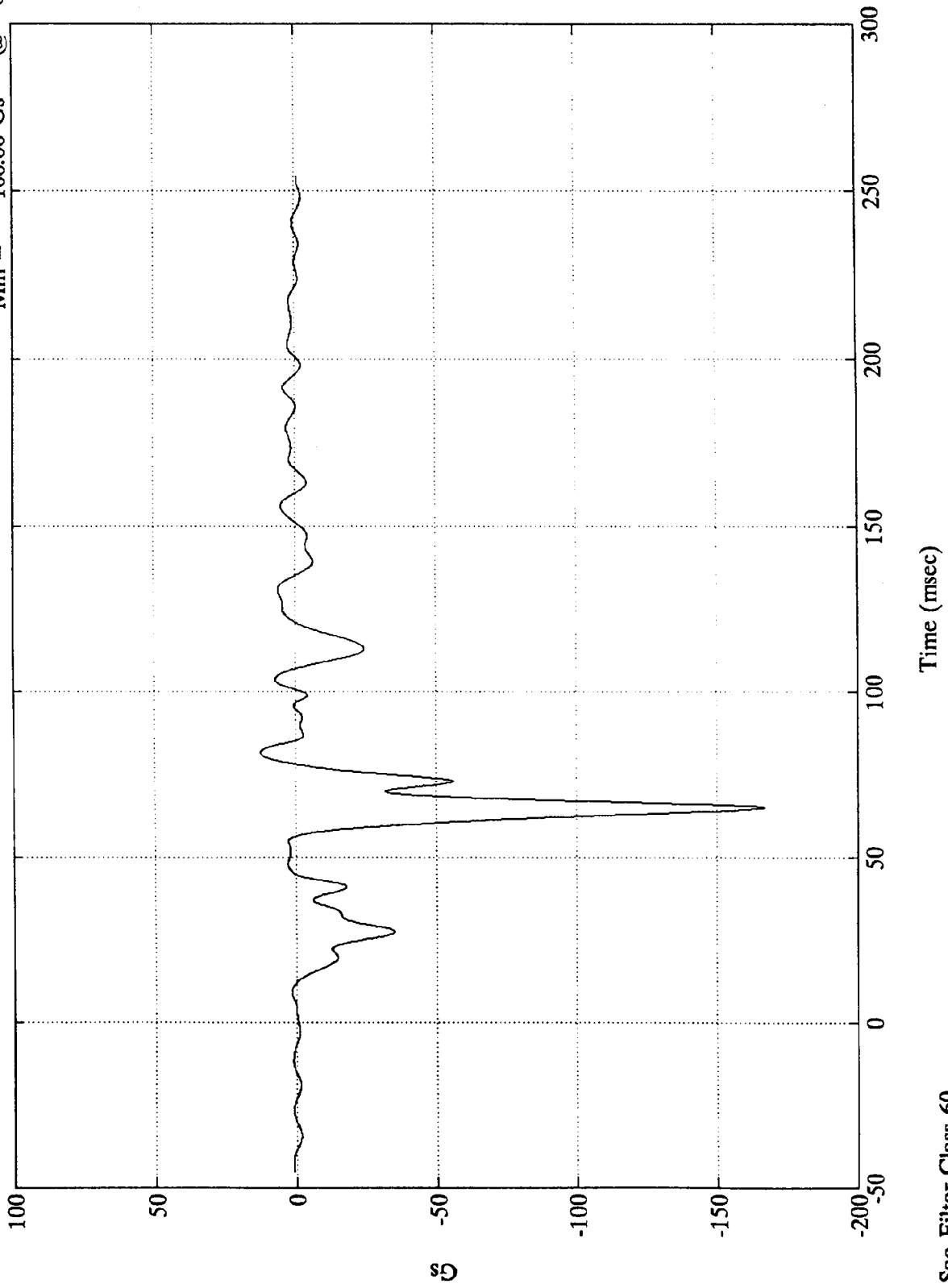
Max = 29.45 in. @ 111.60 msec  
Min = 0.00 in. @ -0.00 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

L. Brake Caliper X (#6)

Max = 12.37 Gs @ 81.95 msec  
Min = -166.66 Gs @ 65.40 msec

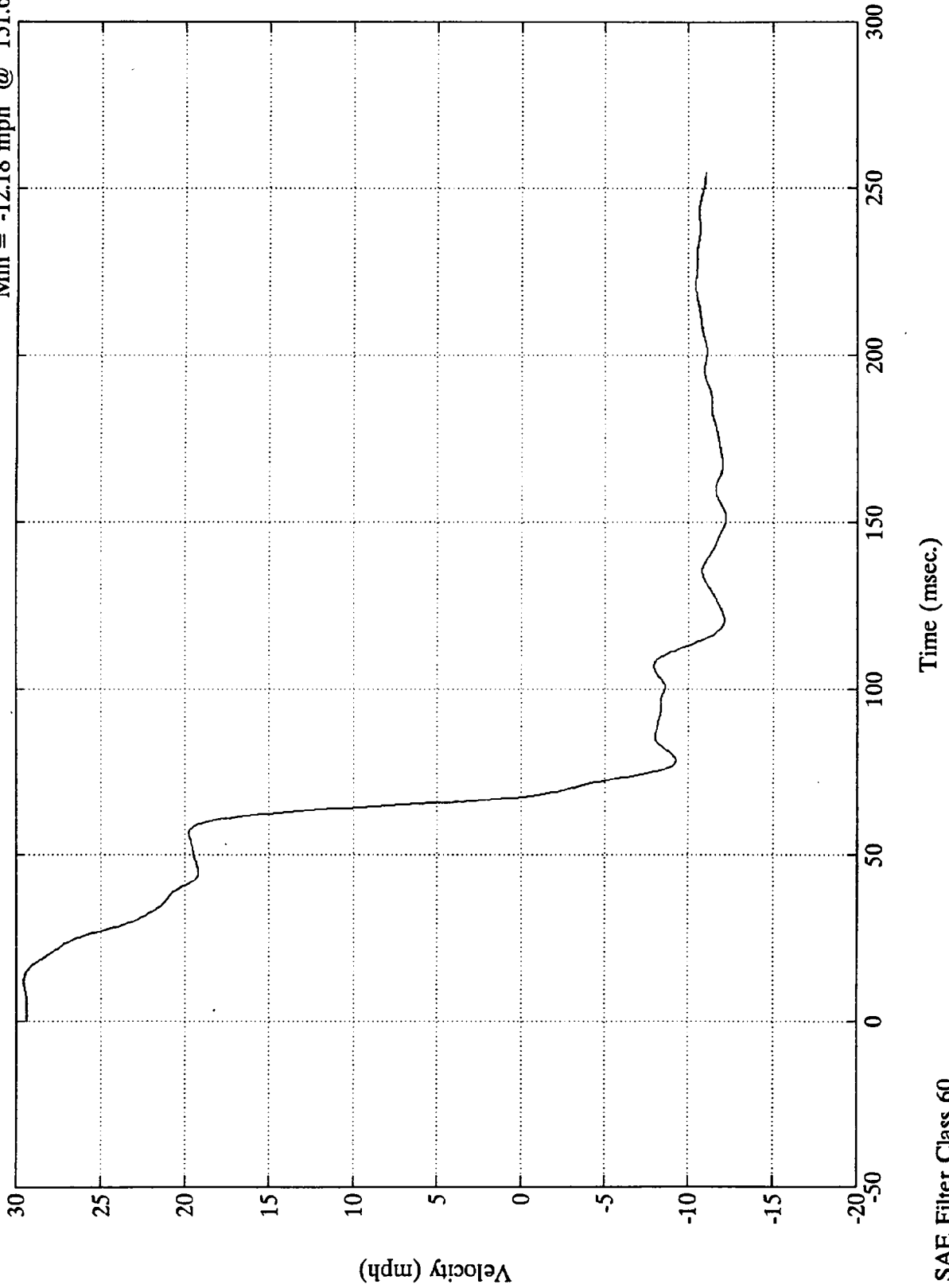


Sae Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

L. Brake Caliper X (#6)

Max = 29.55 mph @ 12.48 msec  
Min = -12.18 mph @ 151.68 msec

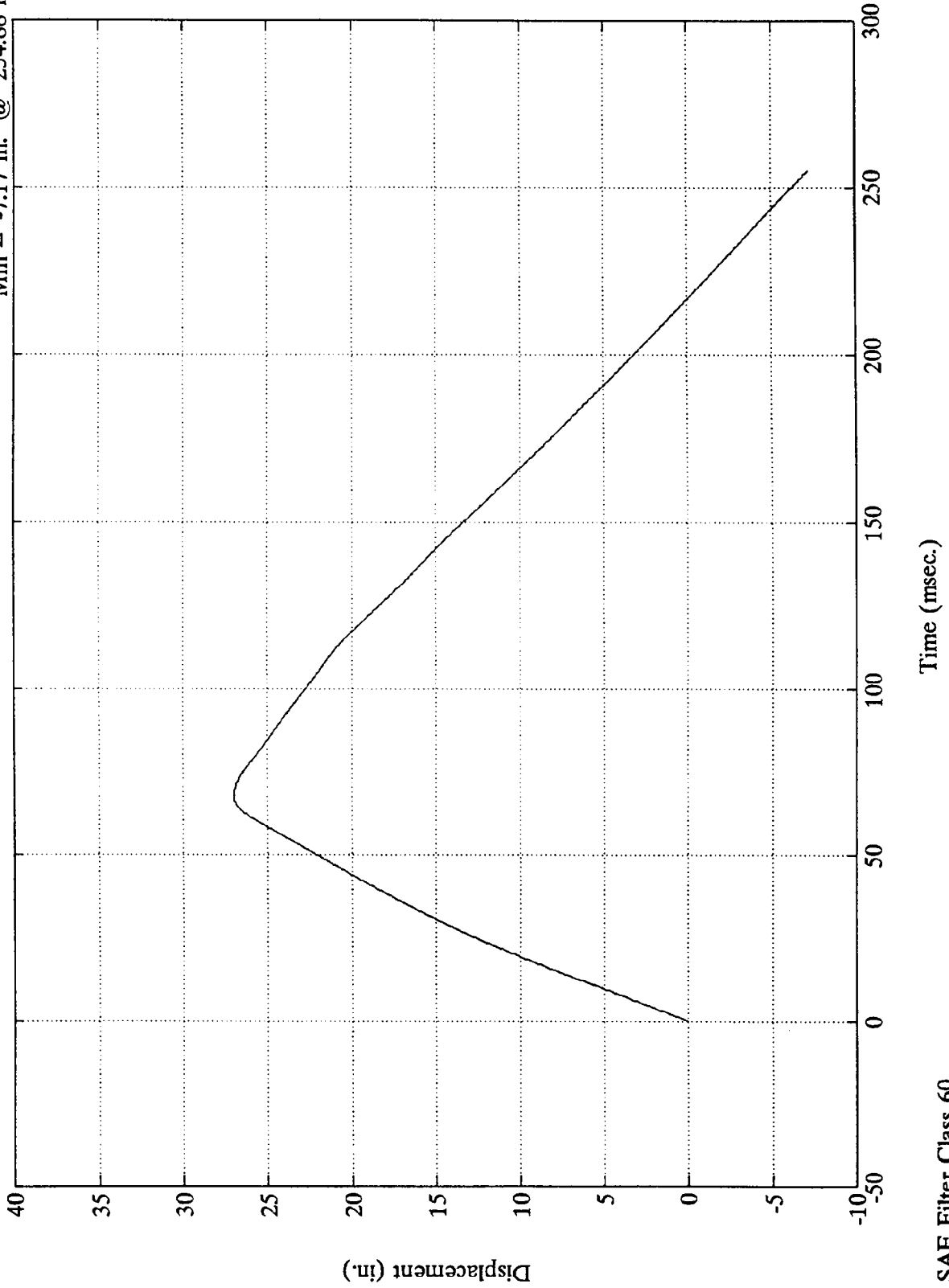


SAE Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

L. Brake Caliper X (#6)

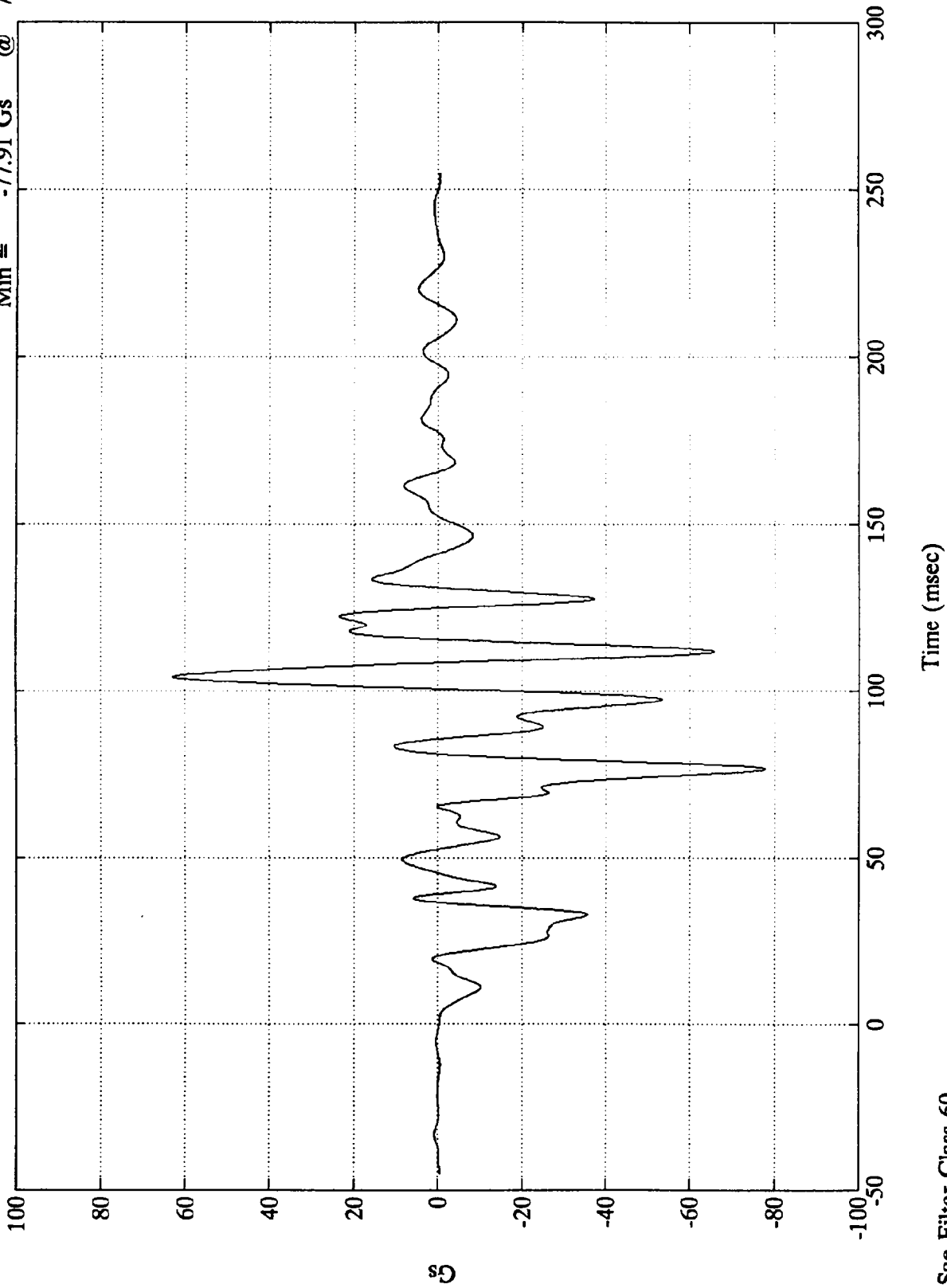
Max = 27.00 in. @ 67.92 msec  
Min = -7.17 in. @ 254.88 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Instrument Panel X (#7)

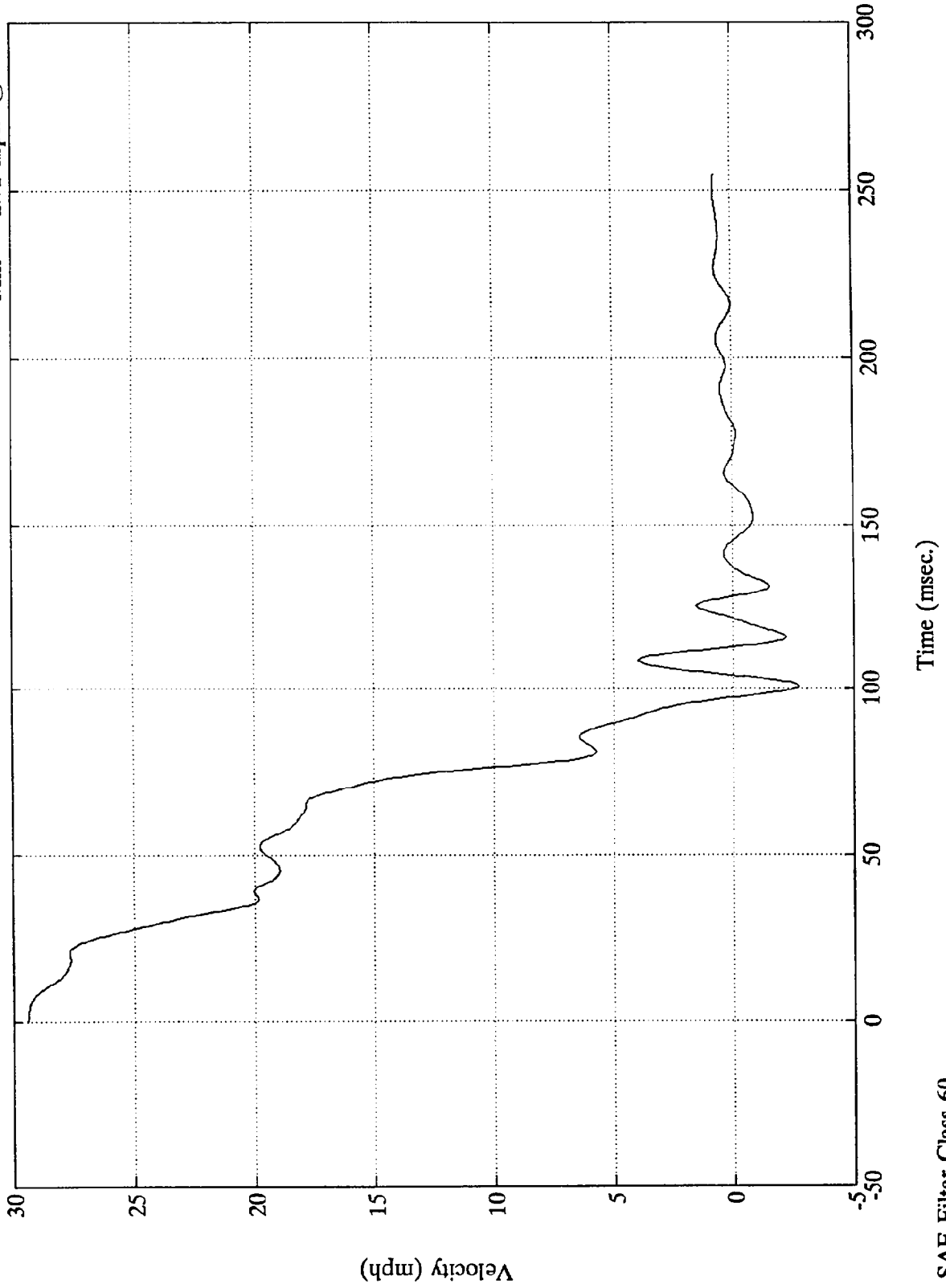
Max = 62.87 Gs @ 104.16 msec  
Min = -77.91 Gs @ 76.55 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Instrument Panel X (#7)

Max = 29.40 mph @ 0.24 msec  
Min = -2.71 mph @ 100.56 msec



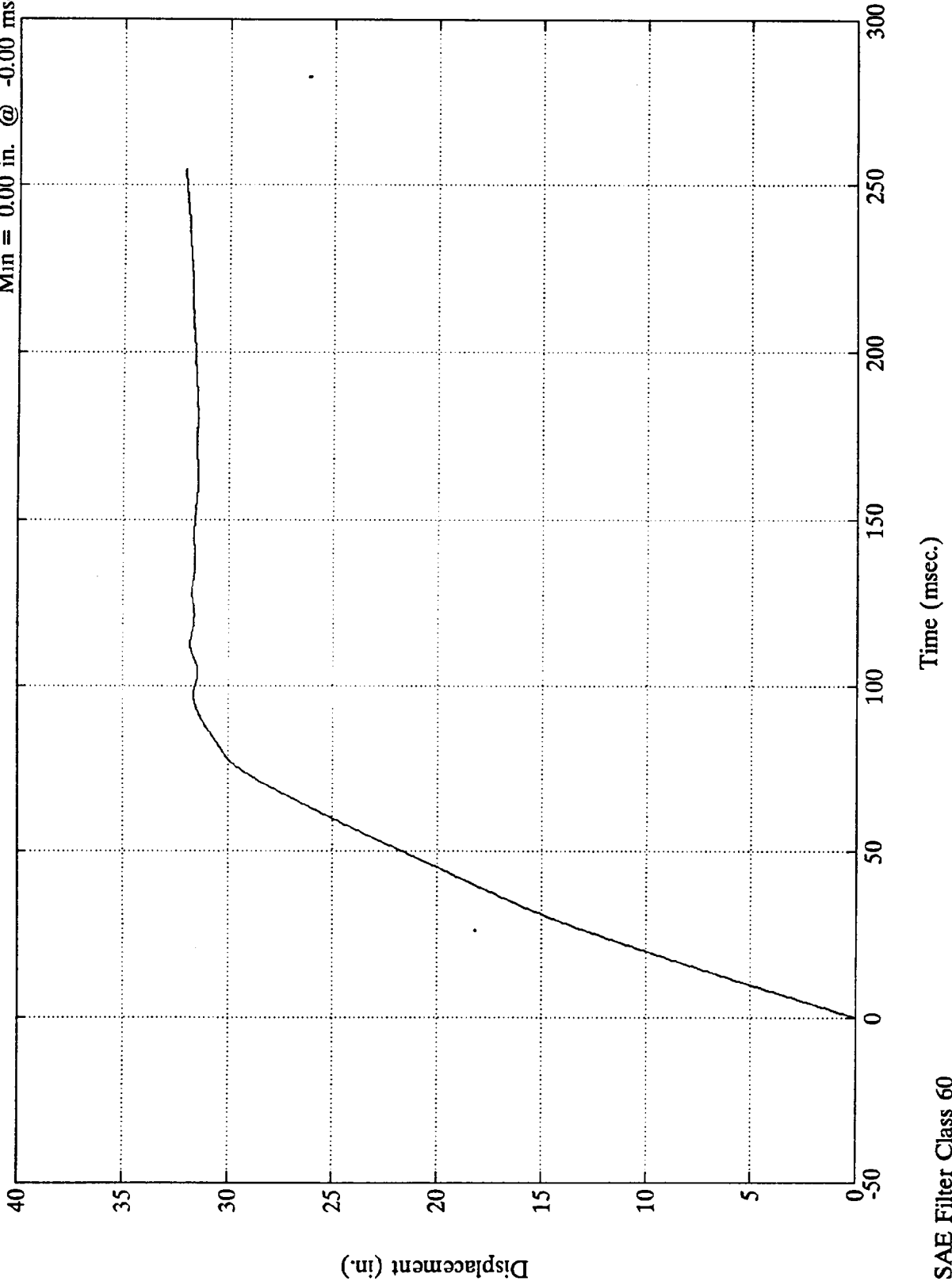
SAE Filter Class 60

7953-1

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Instrument Panel X (#7)

Max = 32.10 in. @ 254.88 msec  
Min = 0.00 in. @ -0.00 msec



SAE Filter Class 60

TEST NO. CN0102

| DUMMY DATA          | SAE FILTER CHANNEL CLASS |
|---------------------|--------------------------|
| Head Accelerations  | 1000                     |
| Chest Accelerations | 180                      |
| Femur Forces        | 600                      |

FACILITY: TAPE  
RUN #: 1120  
SERIES #: 4

TEST DATE: 09 Oct 1991  
TEST TIME: 13:12:41  
BOARD: A

TITLE: NHTSA 208 TEST #4 1992 OLDSMOBILE 88

HIC SUMMARY: Pos. 1 Head Resultant

hic: 219.46  
t1 = 43.320 msec  
t2 = 77.040 msec  
Average G's Over Hic Duration = 33.53

CLIP SUMMARY: Pos. 1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 38.330 G's  
Tstart = 107.6400 ms  
Tend = 110.7600 ms  
CSI = 259.666

HIC SUMMARY: Pos. 2 Head Resultant

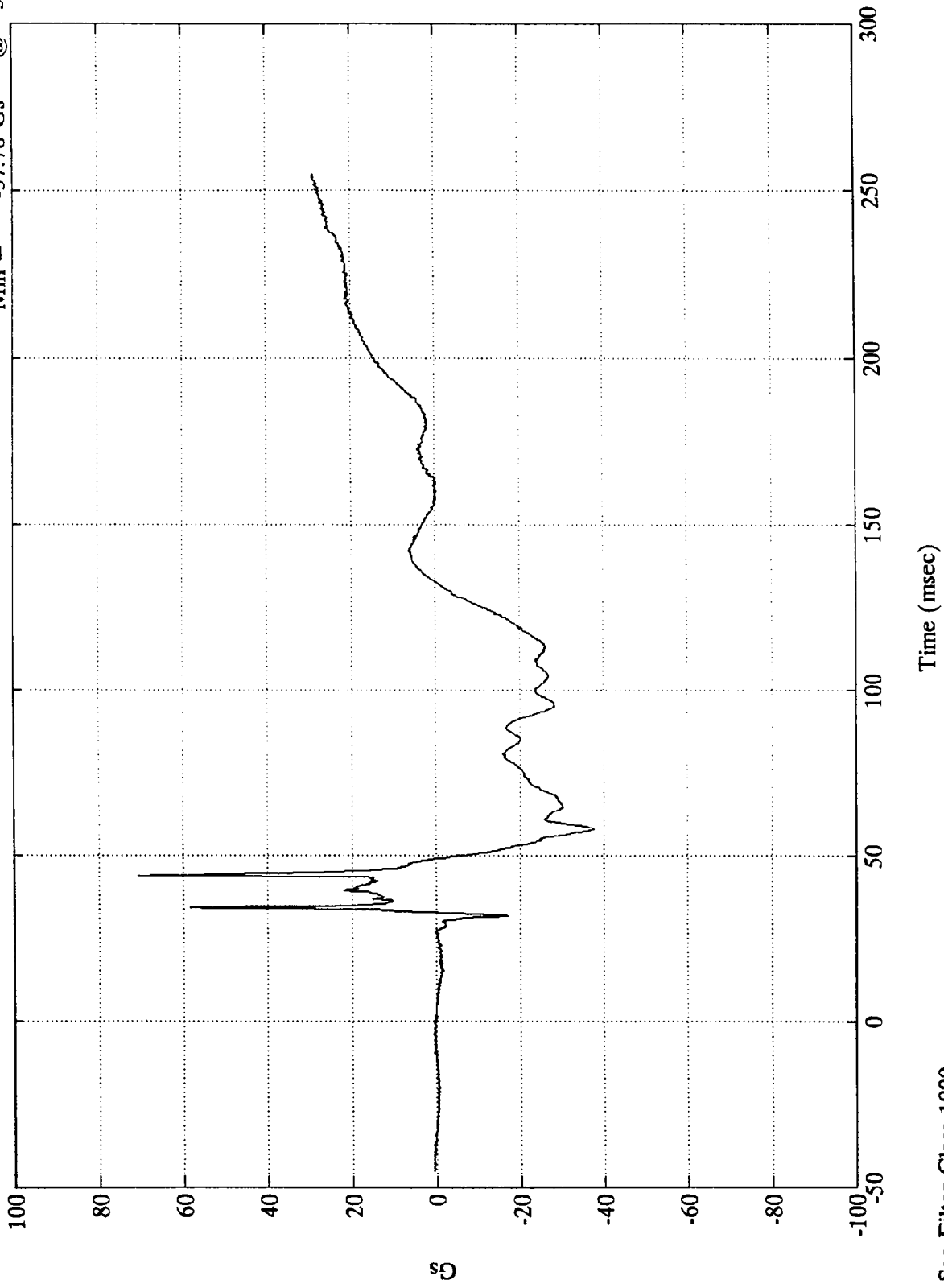
hic: 308.70  
t1 = 98.040 msec  
t2 = 134.040 msec  
Average G's Over Hic Duration = 37.44

CLIP SUMMARY: Pos. 2 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 37.907 G's  
Tstart = 92.8800 ms  
Tend = 96.0000 ms  
CSI = 219.178

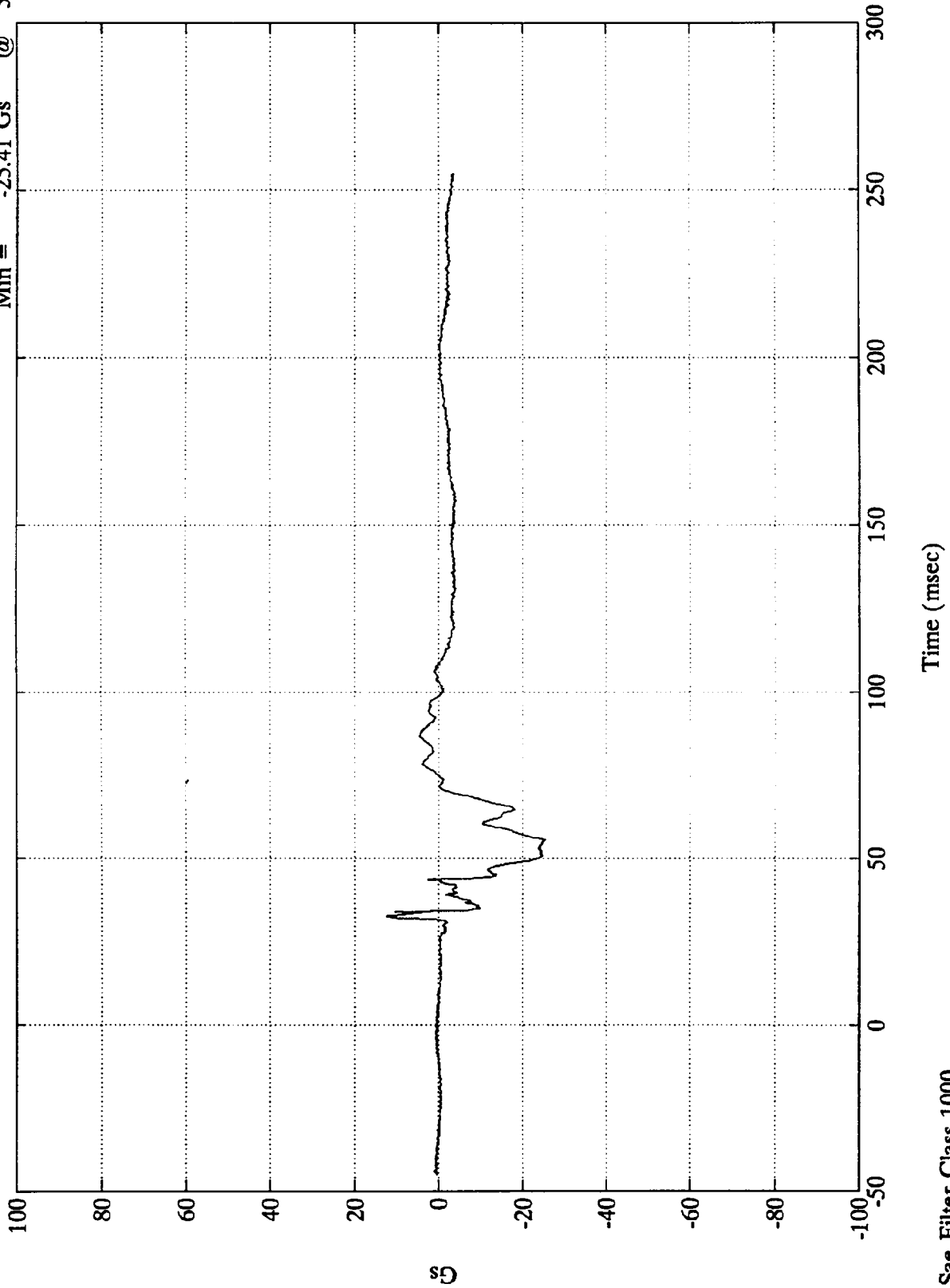
NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 1 Head X  
Max = 70.64 Gs @ 43.91 msec  
Min = -37.70 Gs @ 57.95 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

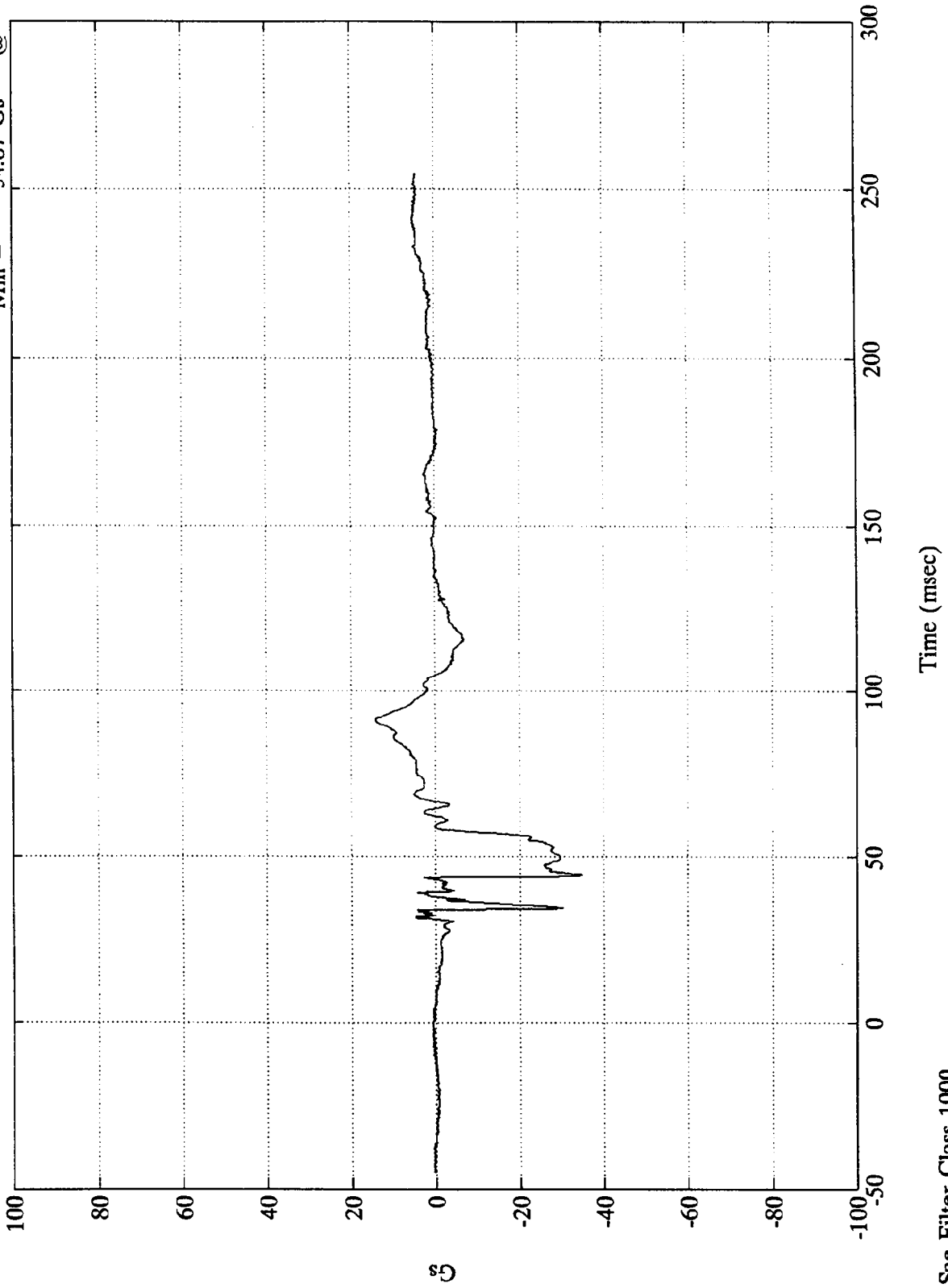
Pos. 1 Head Y  
Max = 12.28 Gs @ 32.52 msec  
Min = -25.41 Gs @ 55.56 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 1 Head Z

Max = 14.20 Gs @ 91.08 msec  
Min = -34.87 Gs @ 44.39 msec

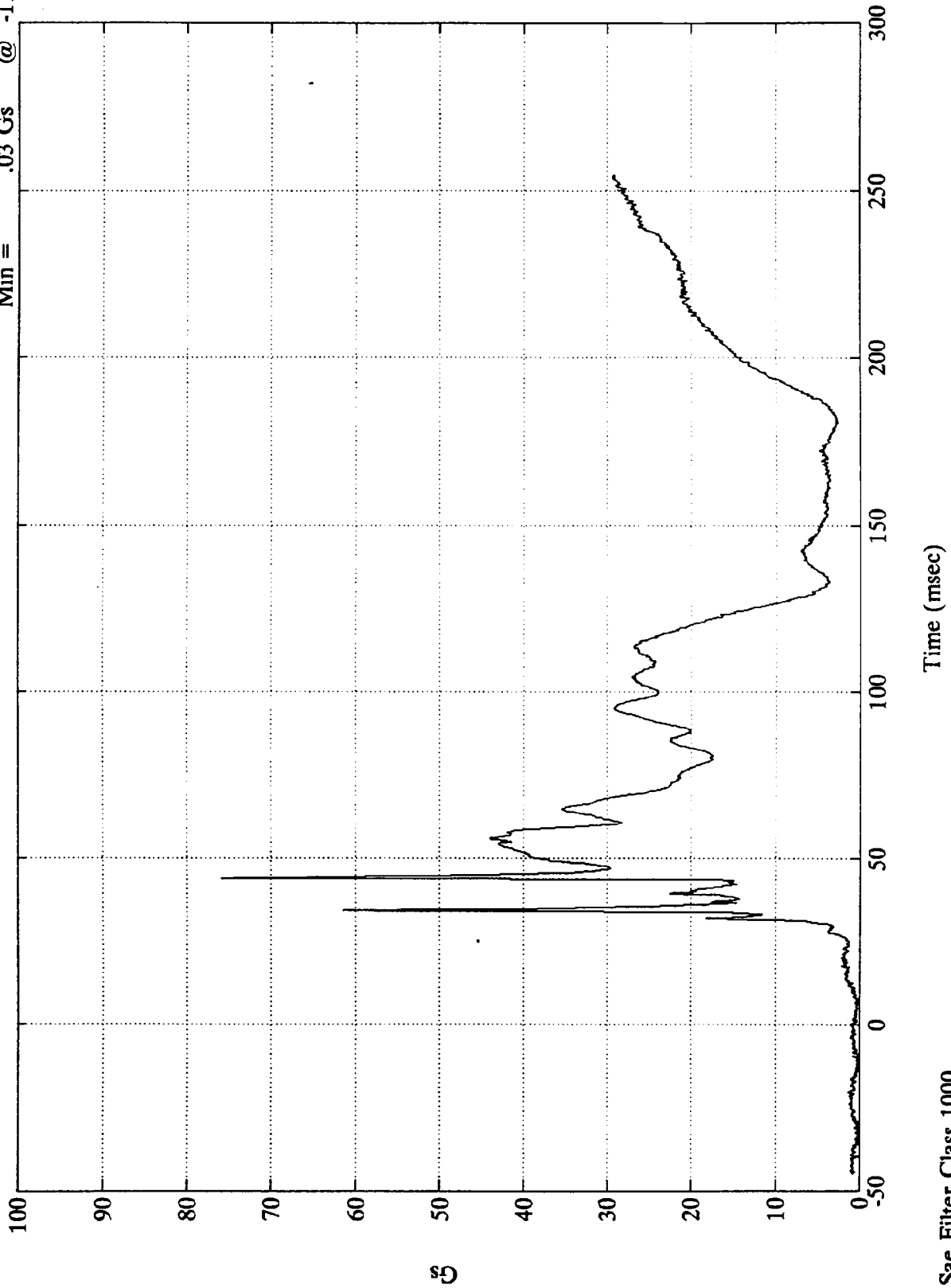


Sae Filter Class 1000

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 1 Head Resultant

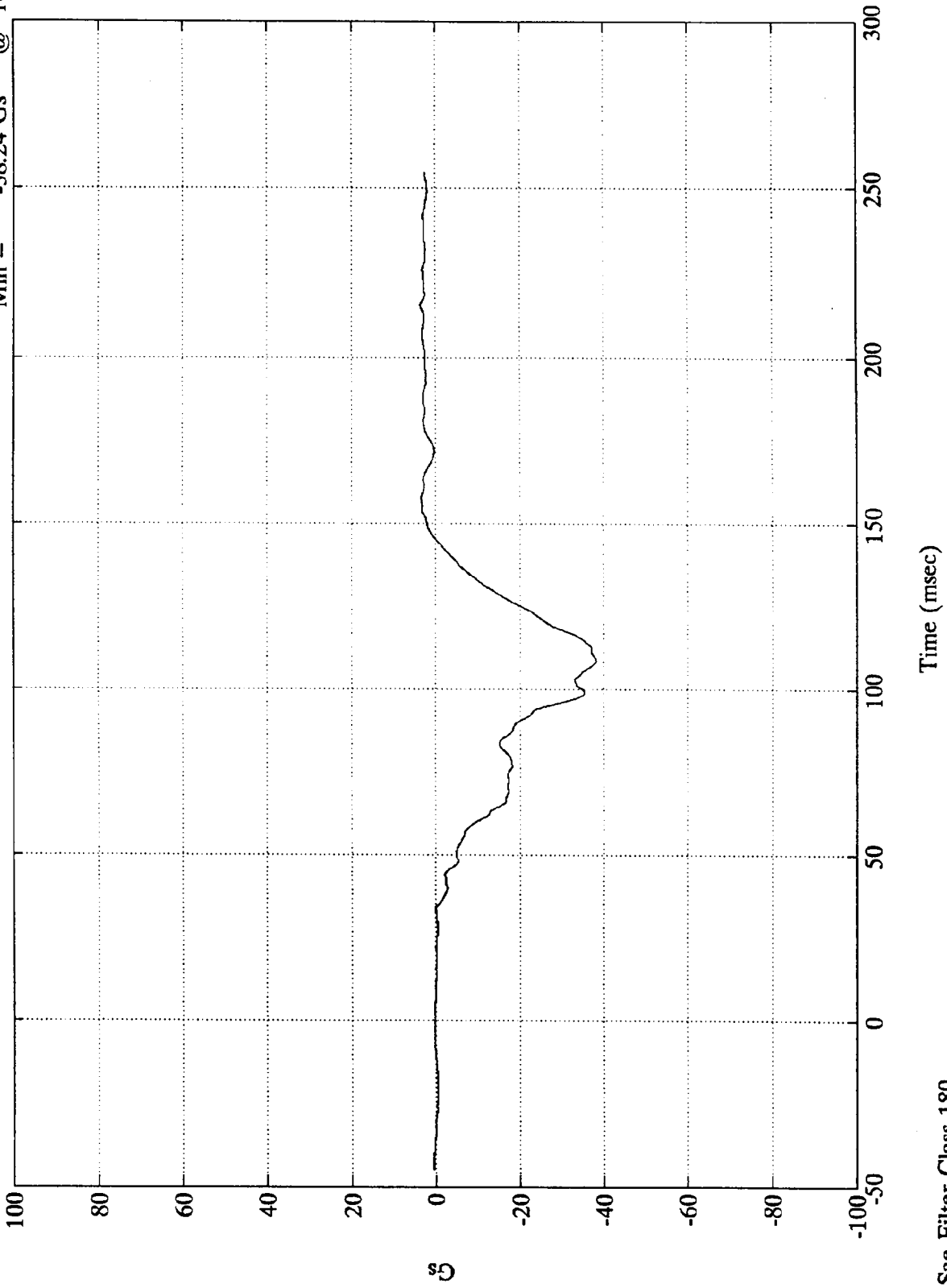
Max = 75.83 Gs @ 43.91 msec  
Min = .03 Gs @ -11.16 msec



Sae Filter Class 1000

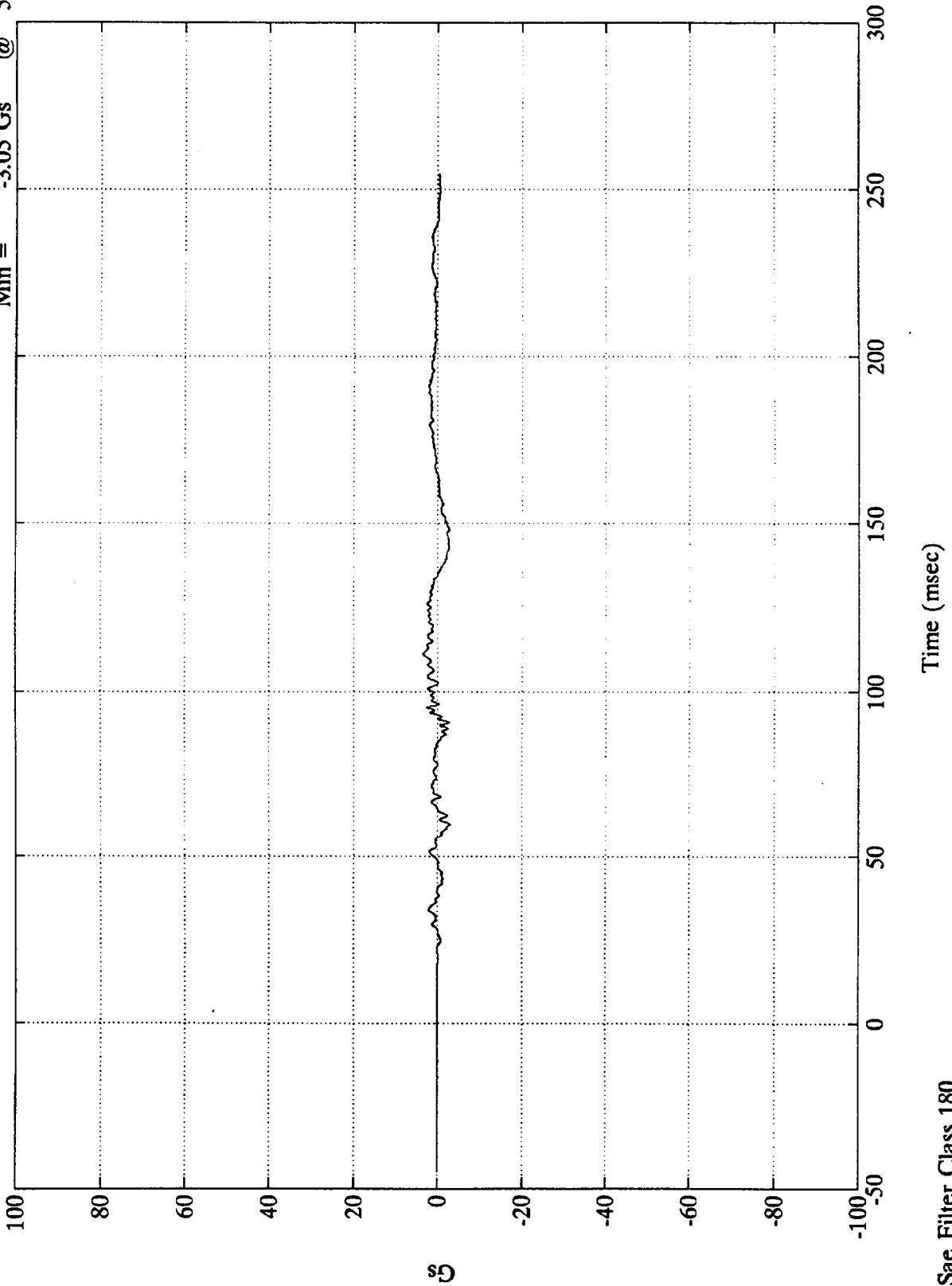
NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 1 Chest X  
Max = 3.51 Gs @ 215.64 msec  
Min = -38.24 Gs @ 109.08 msec



NHTSA 208 #4 1992 OLDSMOBILE 88

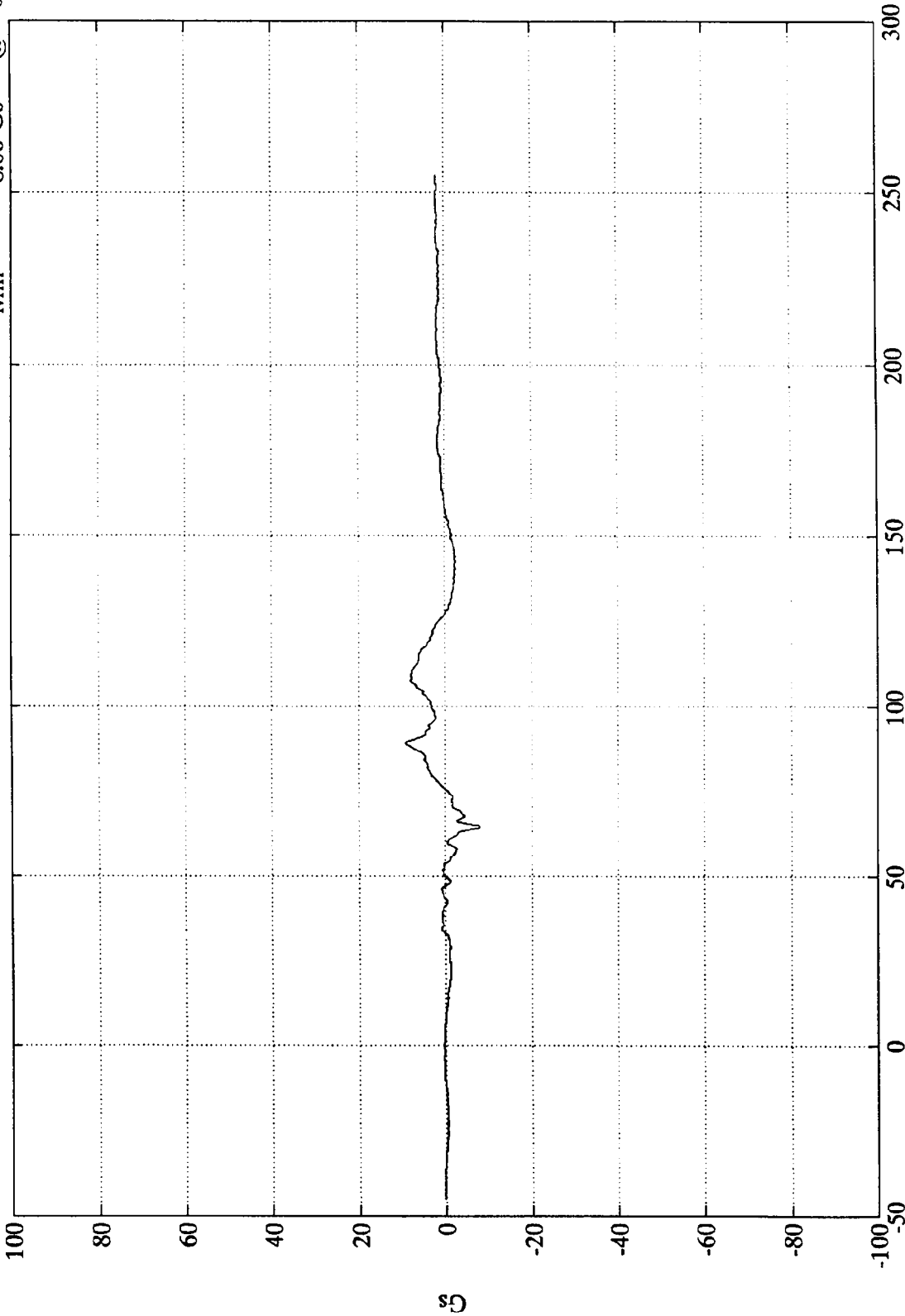
Pos. 1 Chest Y  
Max = 3.44 Gs @ 111.36 msec  
Min = -3.05 Gs @ 59.64 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Max = 9.18 Gs @ 89.27 msec  
Min = -8.06 Gs @ 64.56 msec

Pos. 1 Chest Z



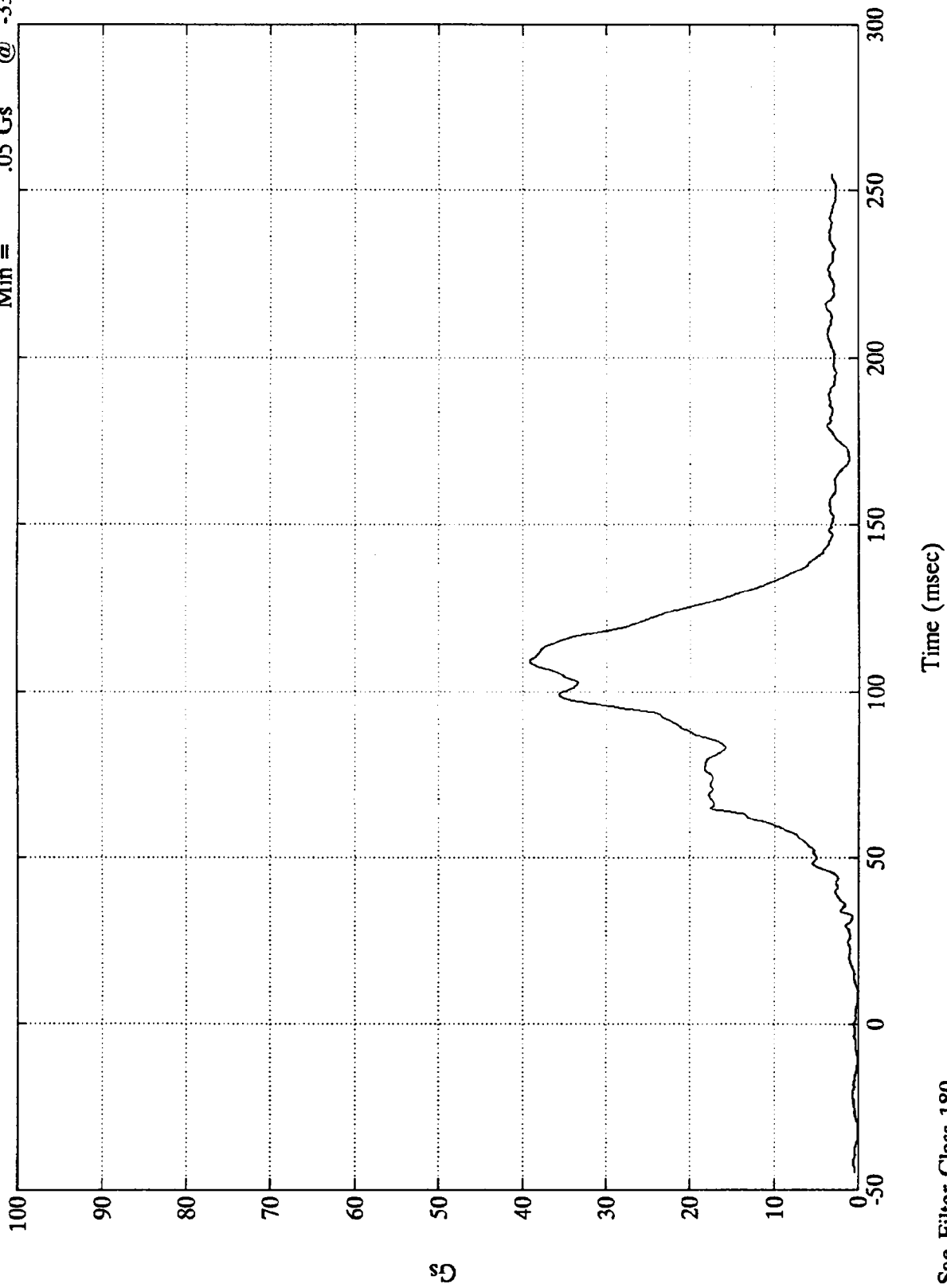
Time (msec)

Sae Filter Class 180

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 1 Chest Resultant

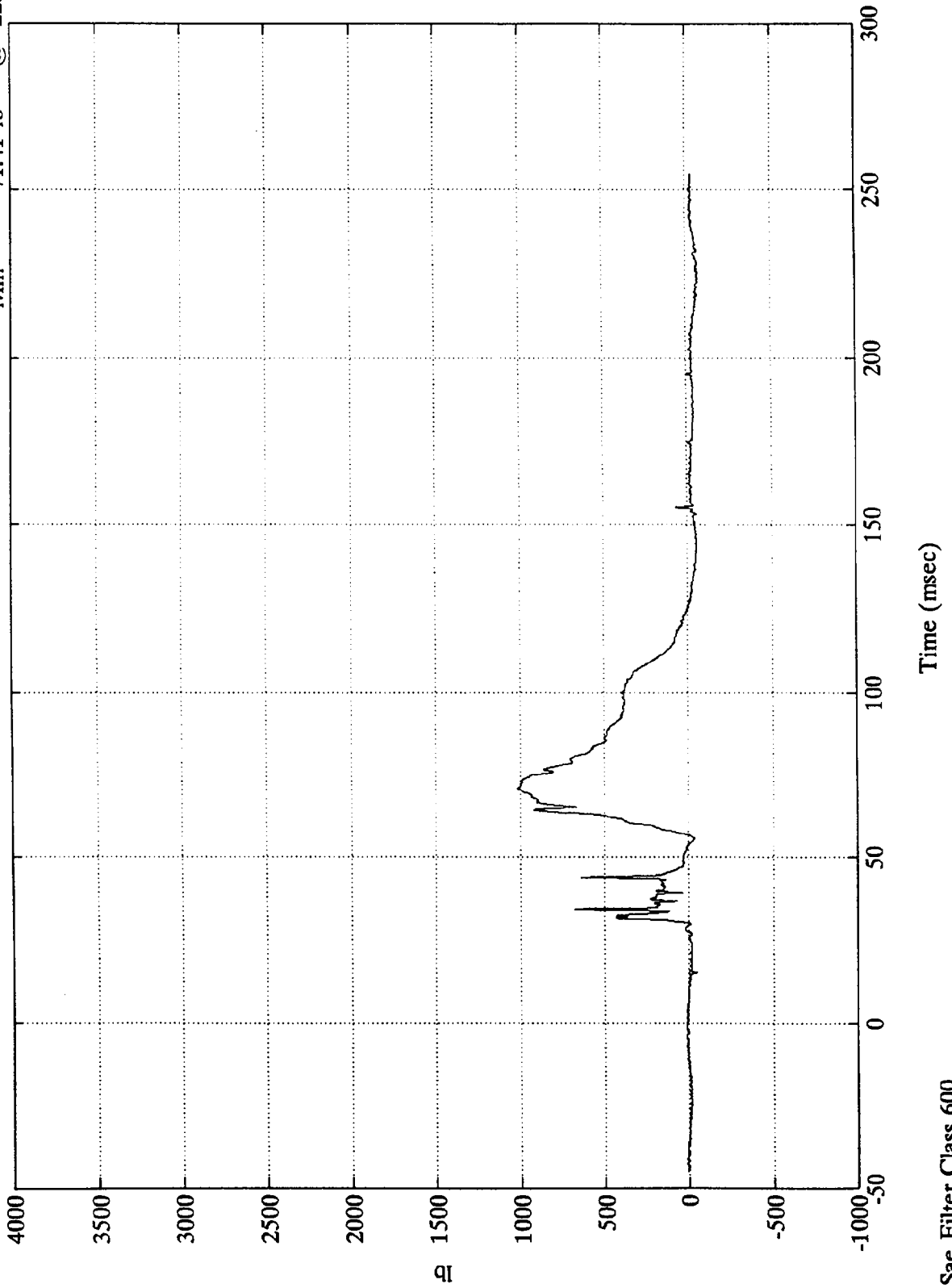
Max = 39.09 Gs @ 109.08 msec  
Min = .05 Gs @ -33.24 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 1 Left Femur

Max = 1013.11 lb @ 70.68 msec  
Min = -71.41 lb @ 225.36 msec

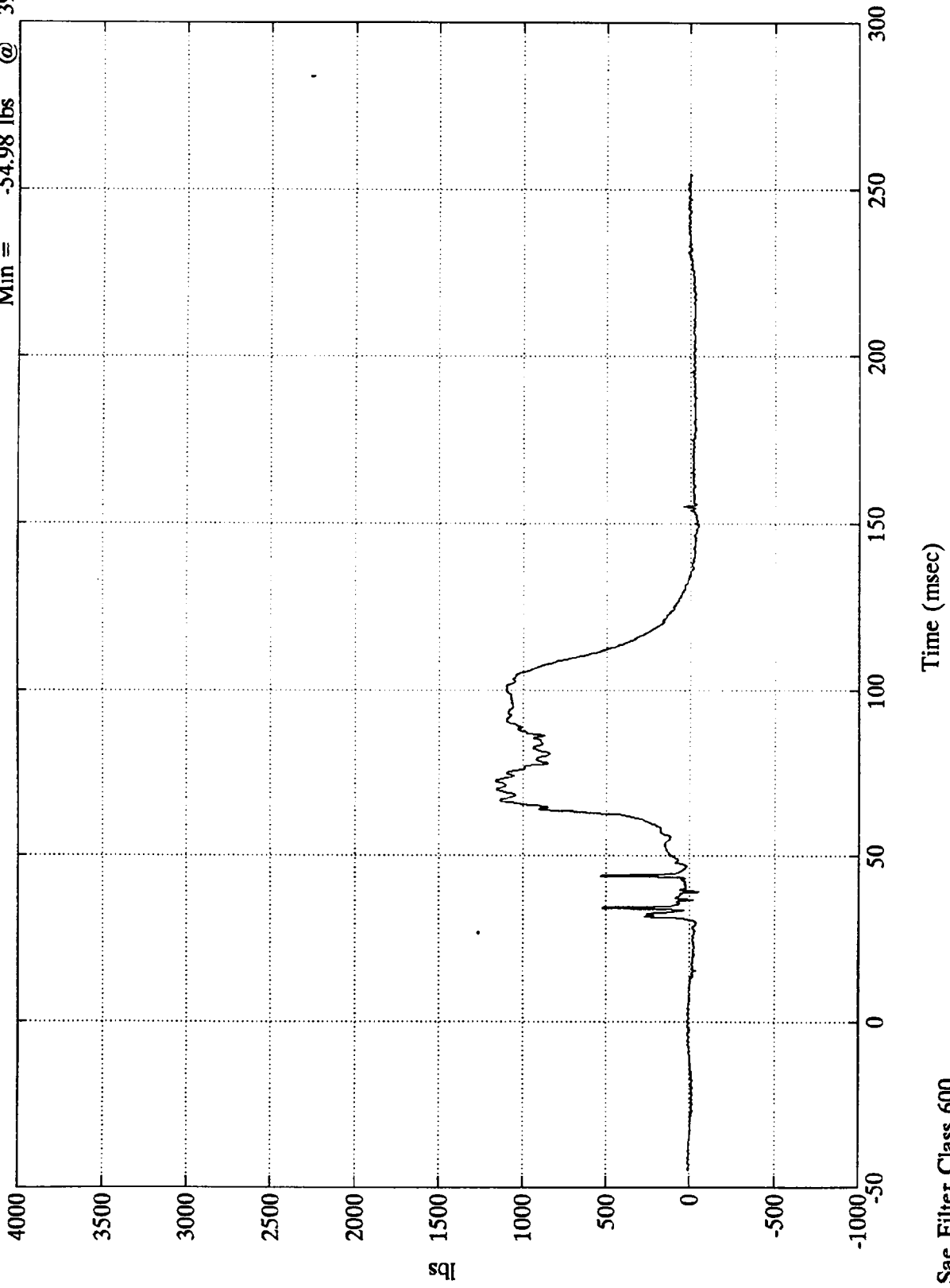


Sae Filter Class 600

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 1 Right Femur

Max = 1157.21 lbs @ 72.72 msec  
Min = -54.98 lbs @ 39.23 msec

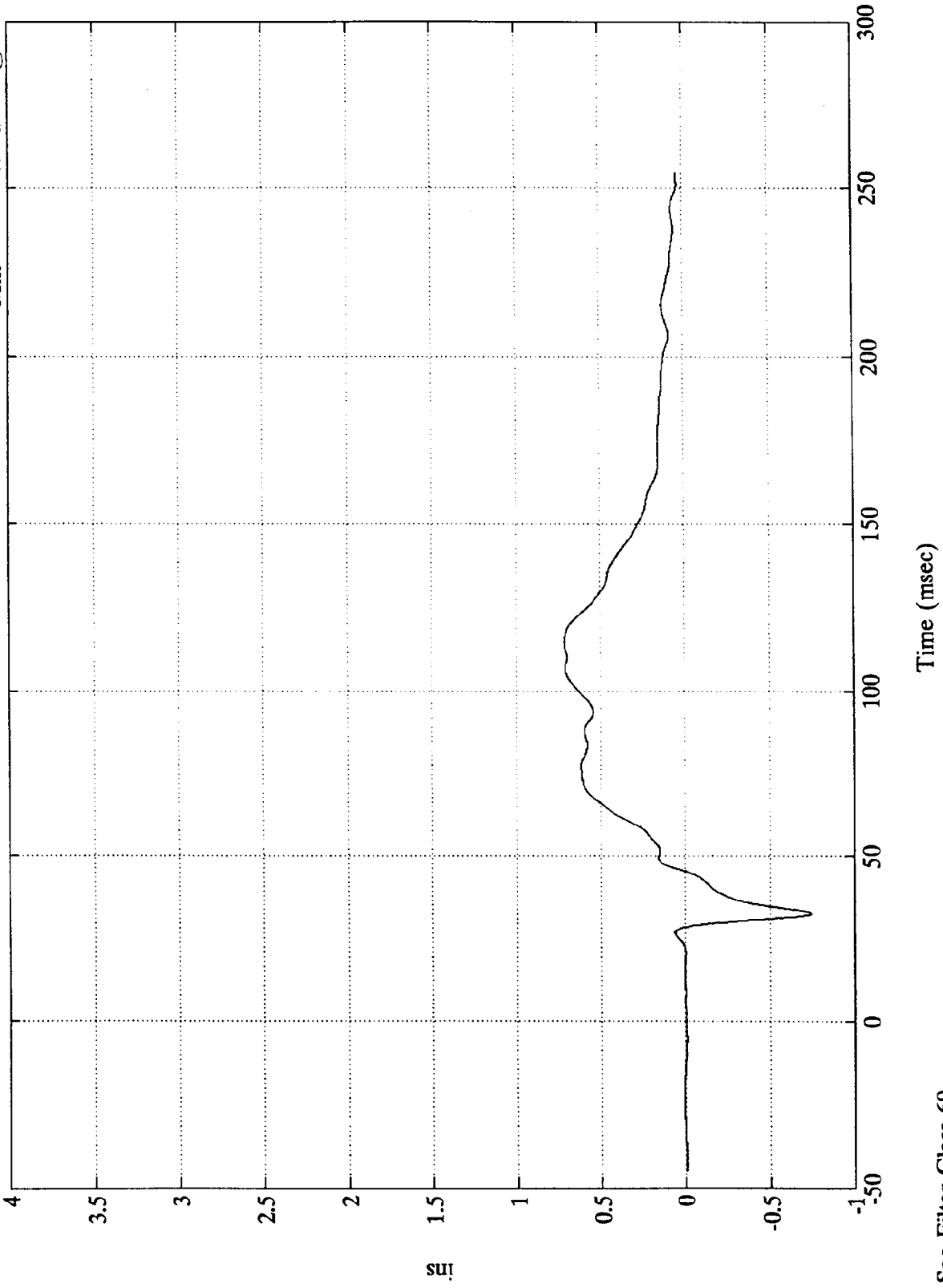


Sae Filter Class 600

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 1 Chest Disp.

Max = .71 ins @ 114.00 msec  
Min = -.74 ins @ 32.40 msec

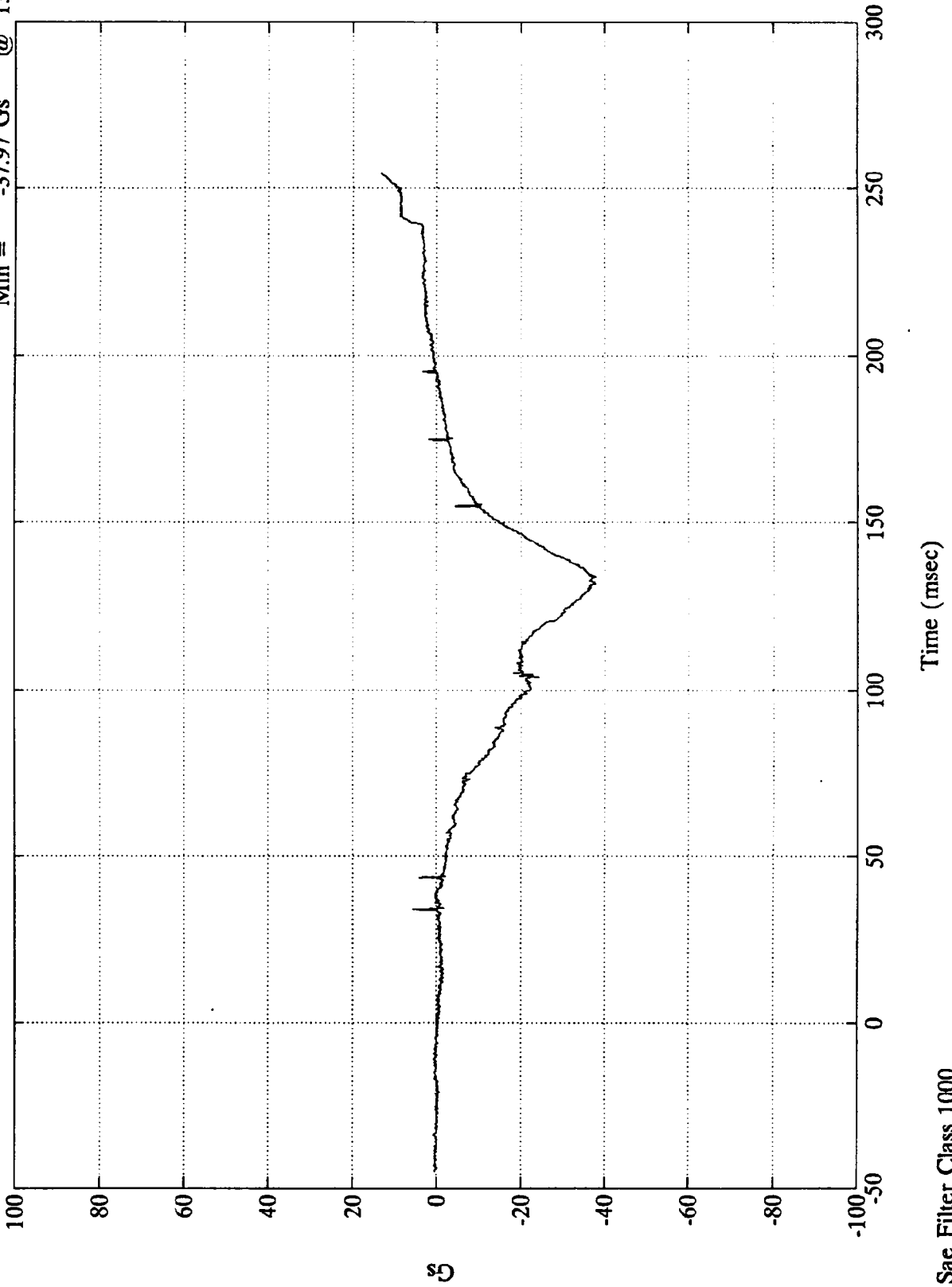


Sae Filter Class 60

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 2 Head X

Max = 13.14 Gs @ 254.88 msec  
Min = -37.97 Gs @ 133.68 msec

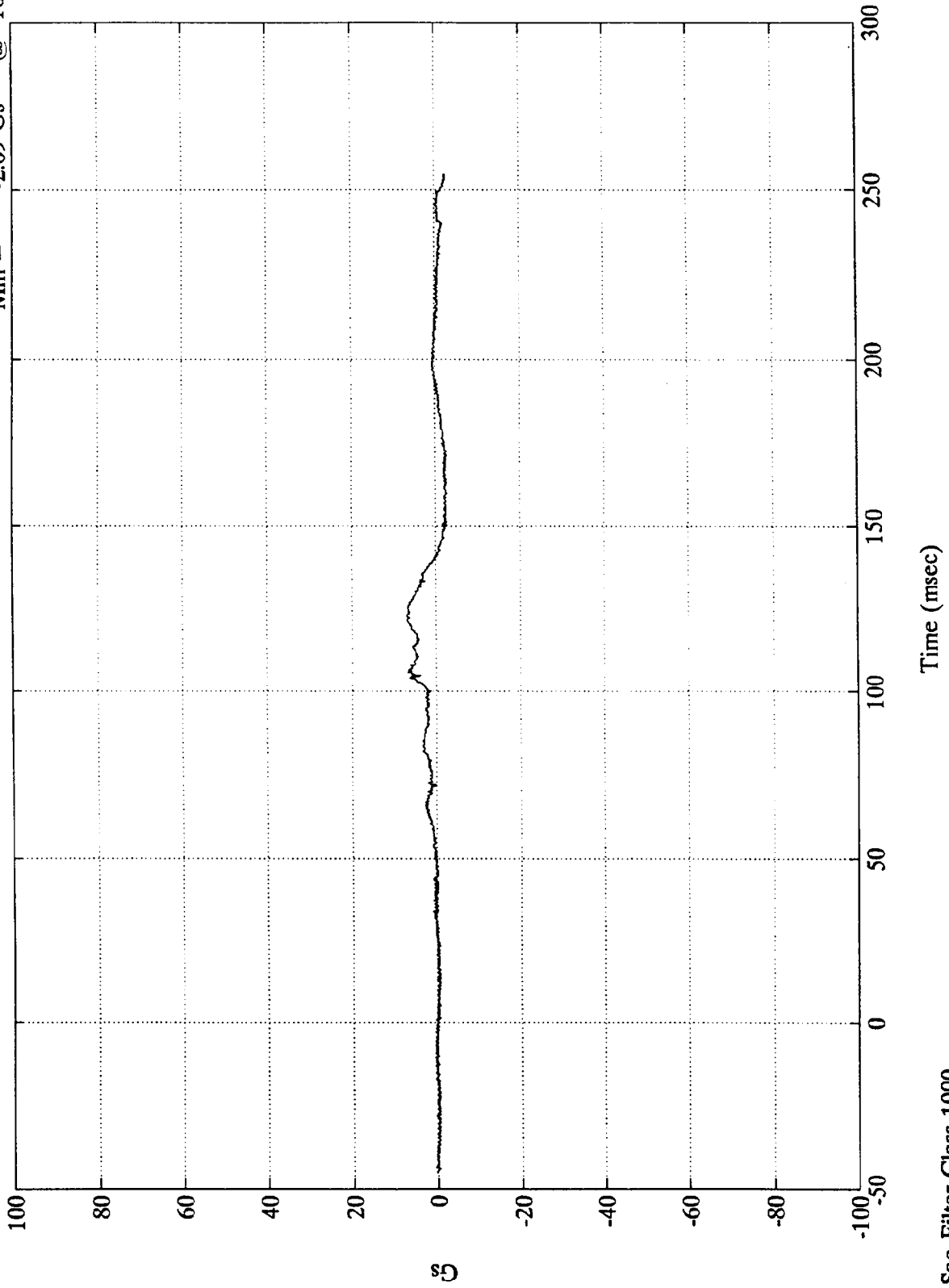


Sae Filter Class 1000

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Max = 6.92 Gs @ 122.88 msec  
Min = -2.69 Gs @ 163.32 msec

Pos. 2 Head Y

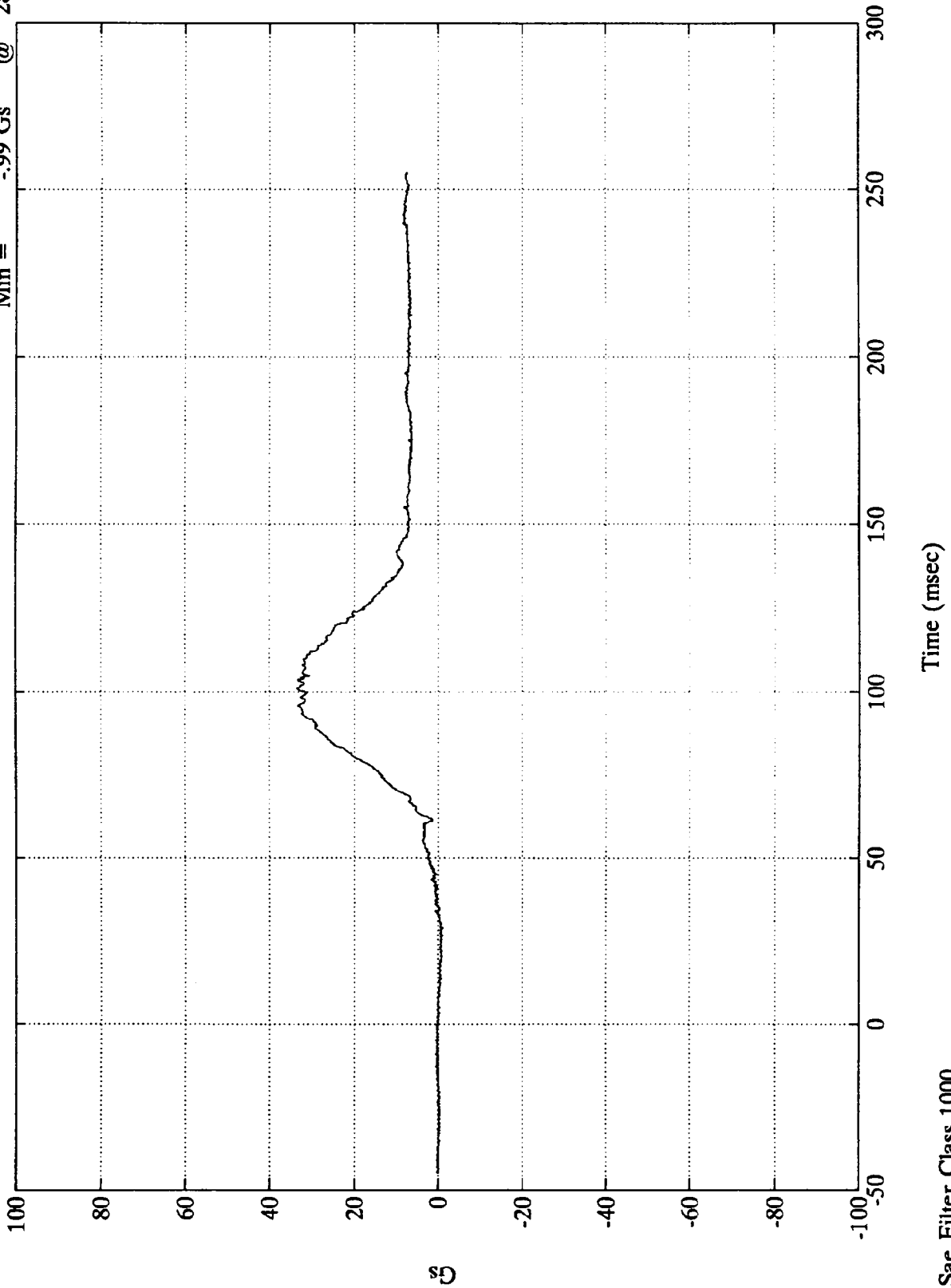


Sae Filter Class 1000

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Max = 33.55 Gs @ 101.04 msec  
Min = -99 Gs @ 28.68 msec

Pos. 2 Head Z

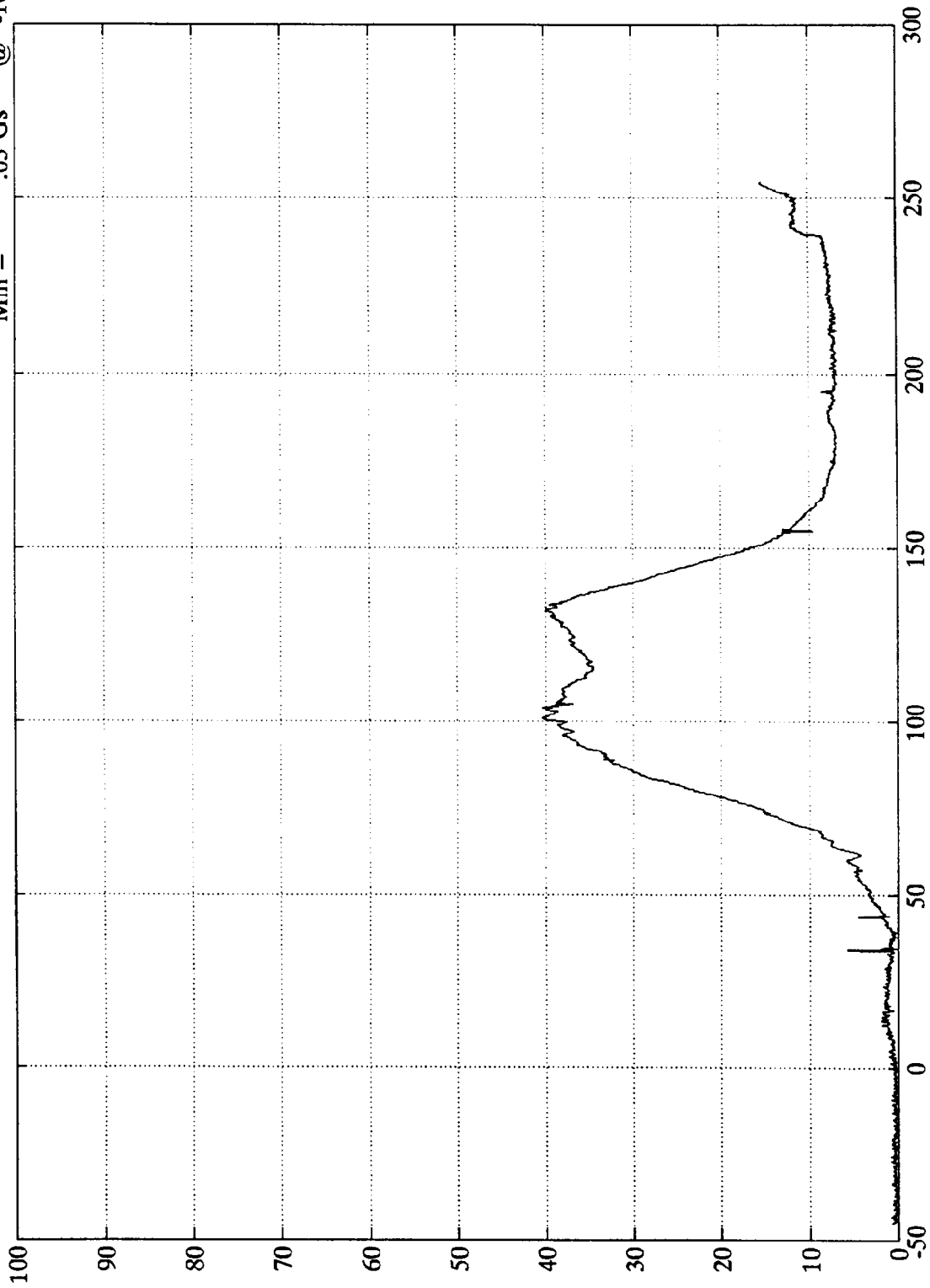


Sae Filter Class 1000

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 2 Head Resultant

Max = 40.29 Gs @ 103.92 msec  
Min = .03 Gs @ -16.32 msec



Time (msec)

Sae Filter Class 1000

5

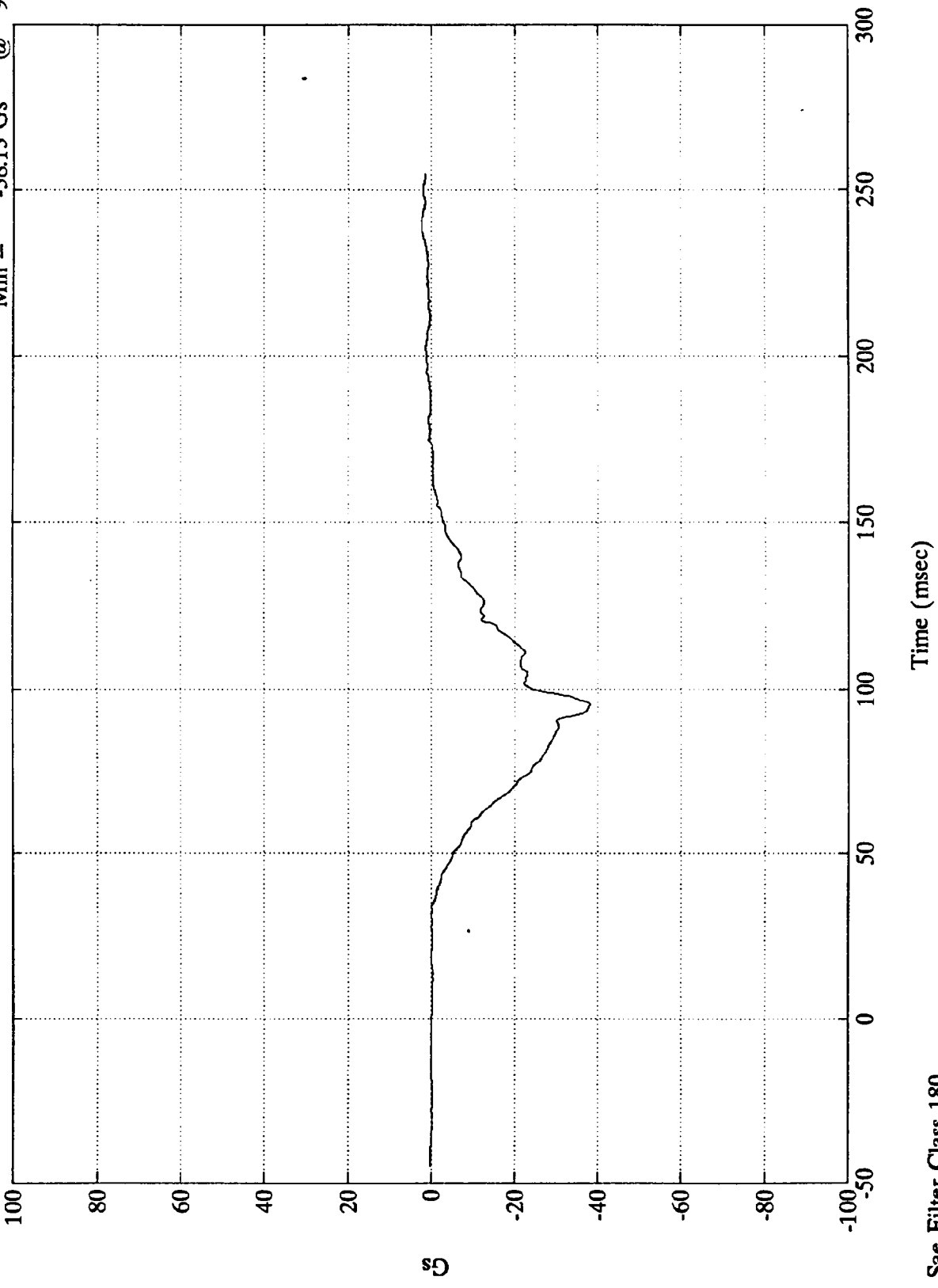
B-40

7953-1

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Max = 2.27 Gs @ 239.88 msec  
Min = -38.13 Gs @ 95.40 msec

Pos. 2 Chest X

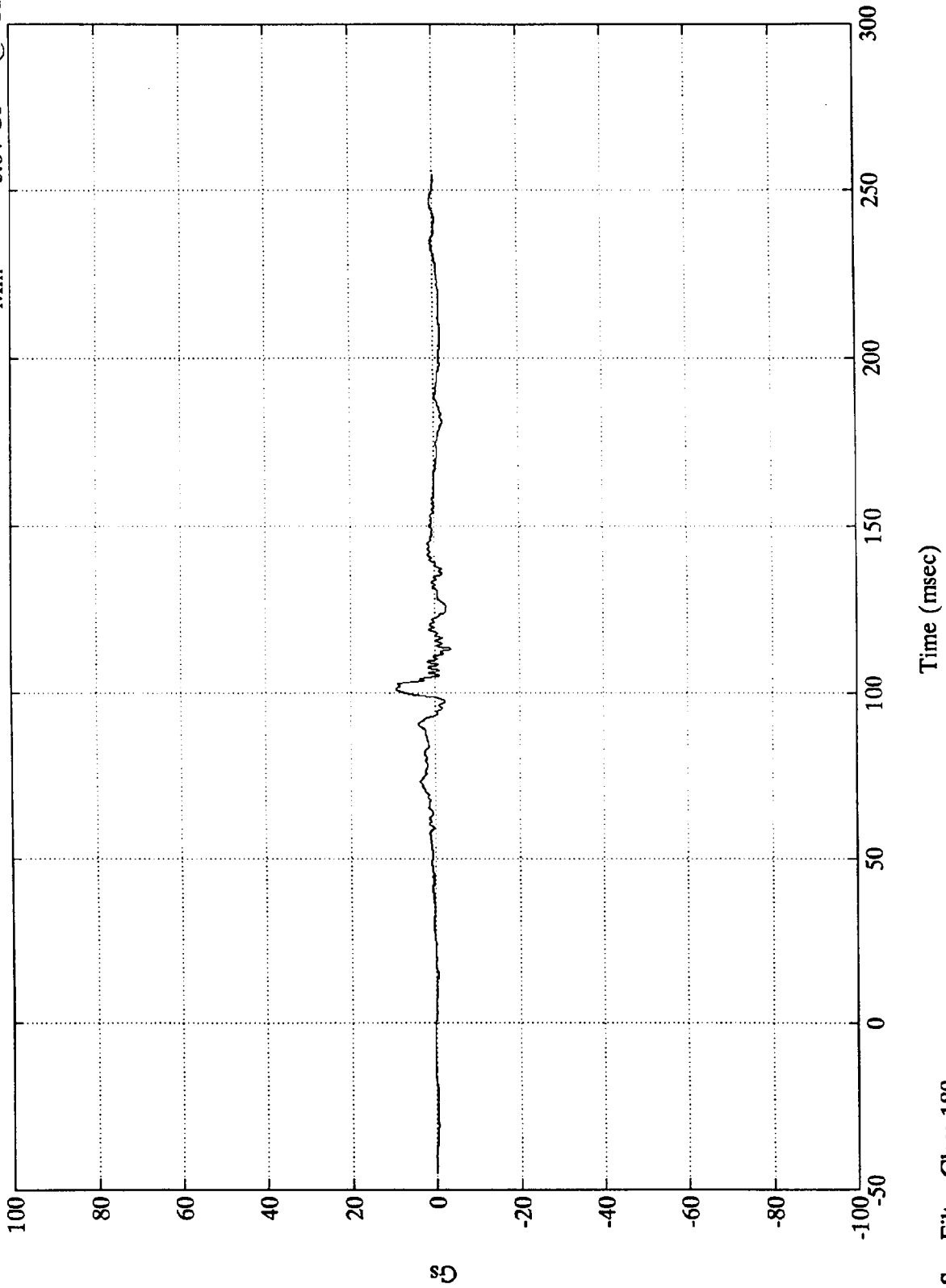


Sae Filter Class 180

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 2 Chest Y

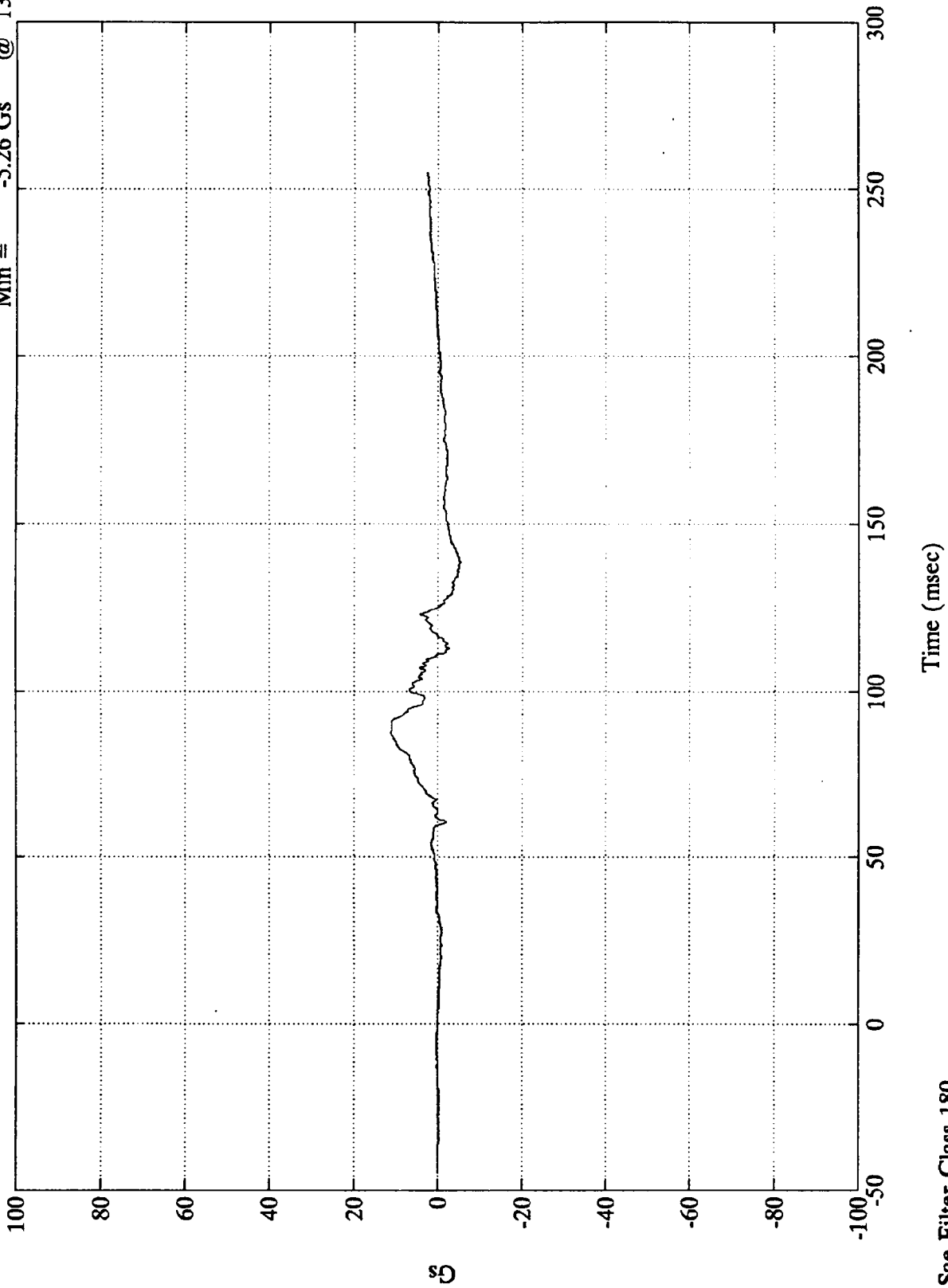
Max = 9.27 Gs @ 101.04 msec  
Min = -3.84 Gs @ 113.40 msec



NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Max = 11.16 Gs @ 87.48 msec  
Min = -5.26 Gs @ 138.48 msec

Pos. 2 Chest Z

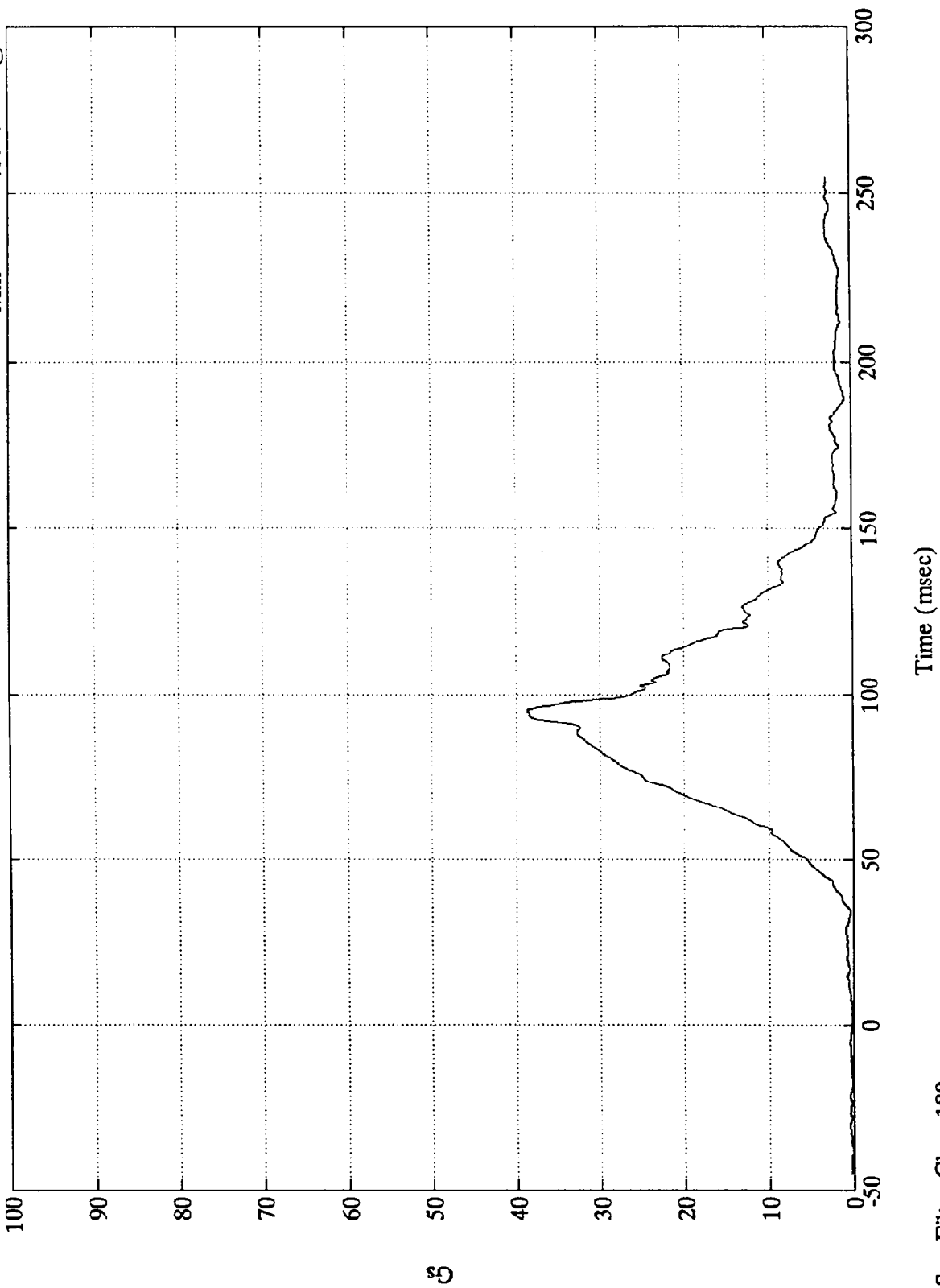


50

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 2 Chest Resultant

Max = 38.58 Gs @ 95.16 msec  
Min = .06 Gs @ -36.96 msec

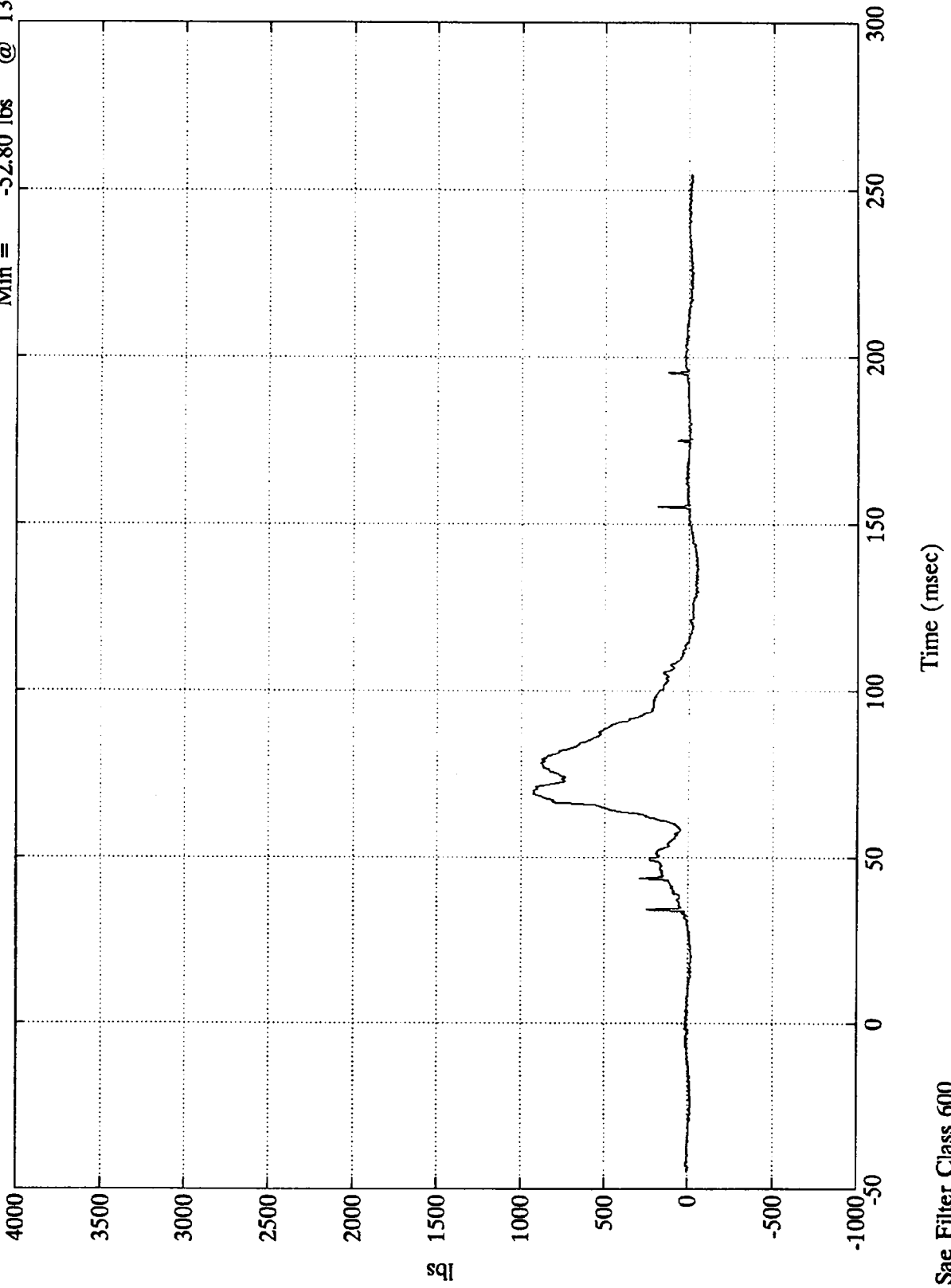


Sae Filter Class 180

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Max = 923.24 lbs @ 69.12 msec  
Min = -52.80 lbs @ 134.52 msec

Pos. 2 Left Femur

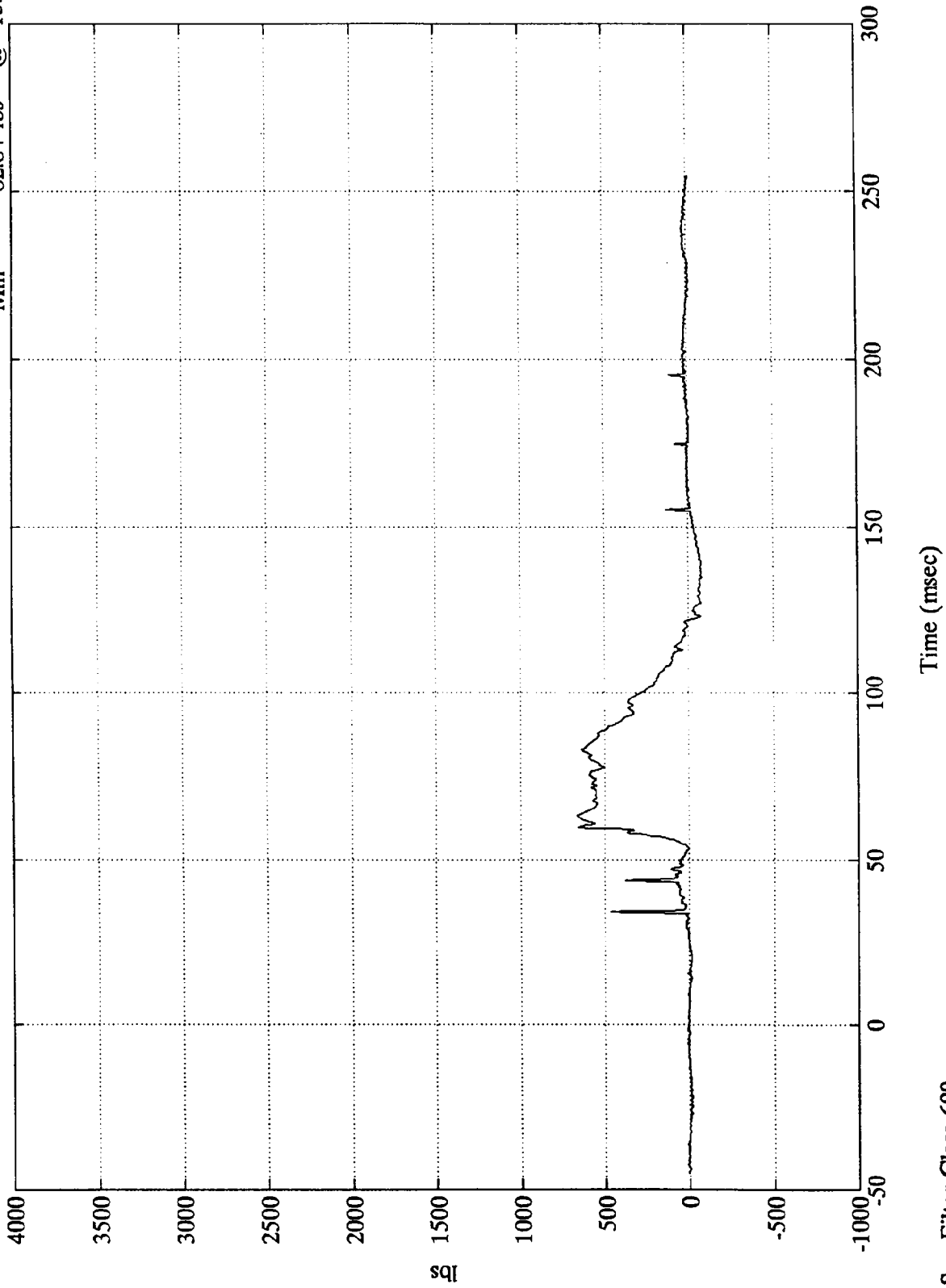


Sae Filter Class 600

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 2 Right Femur

Max = 664.02 lbs @ 63.11 msec  
Min = -82.84 lbs @ 135.12 msec

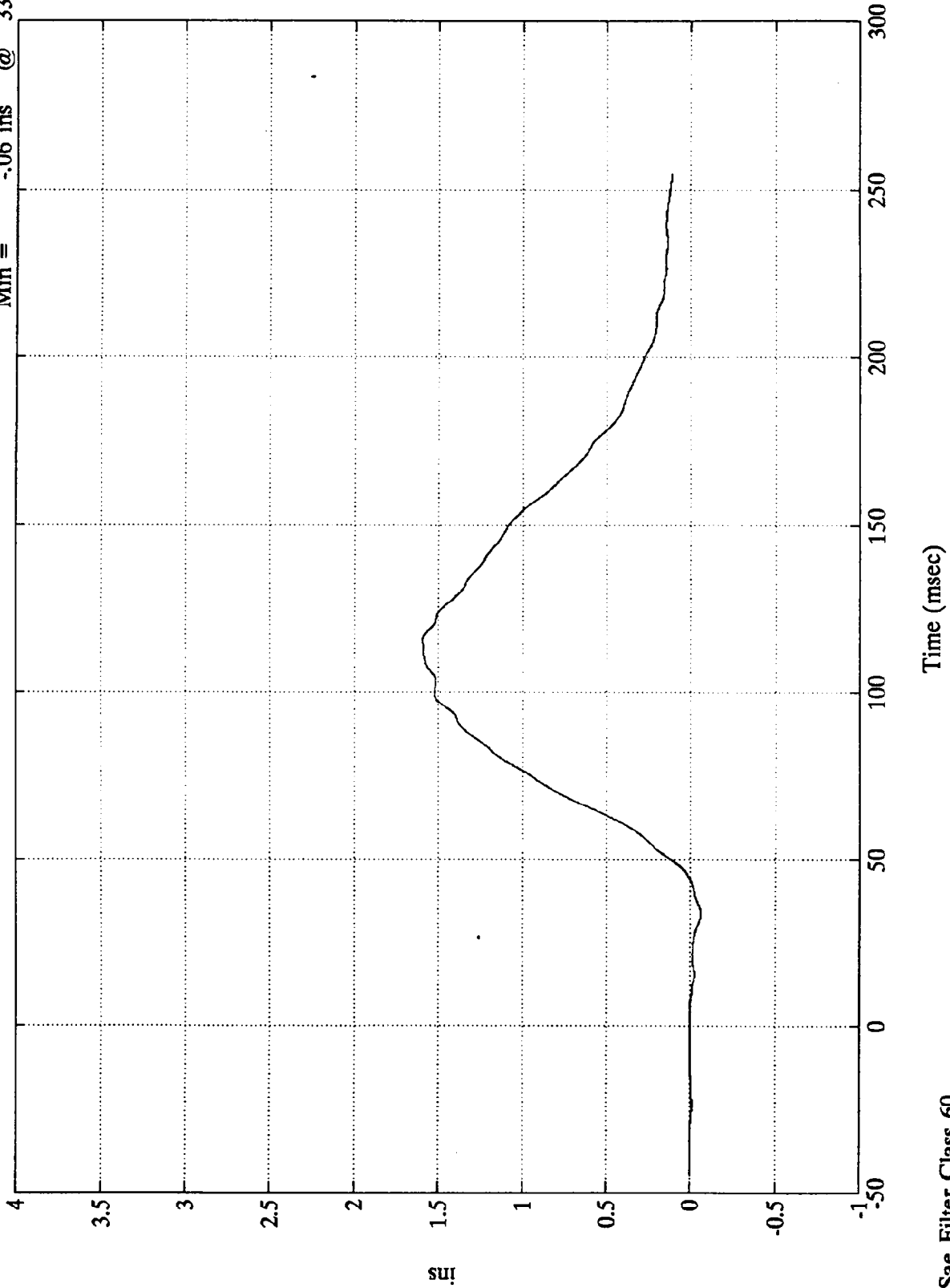


Sae Filter Class 600

NHTSA 208 TEST #4 1992 OLDSMOBILE 88

Pos. 2 Chest Disp.

Max = 1.59 ins @ 115.44 msec  
Min = -.06 ins @ 33.72 msec



Appendix C

VEHICLE OWNERS MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

# Seats & Safety Belts



## Manual Reclining Seatback (CONT.)

### CAUTION



(Continued)

bones. This could cause serious internal injuries.

For proper protection when the vehicle is in motion, have the seatback upright. Then sit well back in the seat and wear your safety belt properly.

## Head Restraints

Slide the head restraint up or down so that the top of the restraint is closest to the top of your ears.

This position reduces the chance of a neck injury in a crash.

## ■ Safety Belts:

### *They're For Everyone*

This part of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts. And it explains the Supplemental Inflatable Restraint, or "air bag" system.



### CAUTION



If you are in a crash and you're not wearing a safety belt, your injuries can be much worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be if you are buckled up.

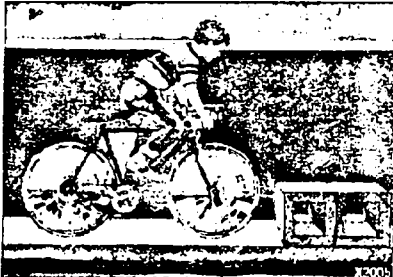
This figure lights up when you turn the key to Run or Start when your safety belt isn't buckled, and you'll hear a chime, too. It's the reminder to buckle up. In many states and Canadian provinces, the law says to wear safety belts. Here's why: **They work.**

You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

A few crashes are very mild. In them, you won't get hurt even if you're not buckled up. And some crashes can be so serious, like being hit by a train, that even buckled up a person wouldn't survive. But most crashes are in between. In many of them, people who buckle up can survive and sometimes walk away. Without belts they could be badly hurt or killed.

After 25 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter... a lot!

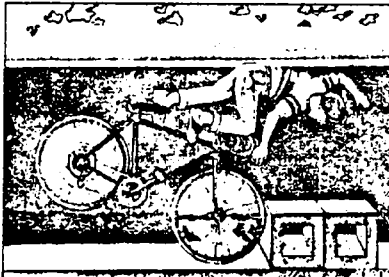
## Seats & Safety Belts



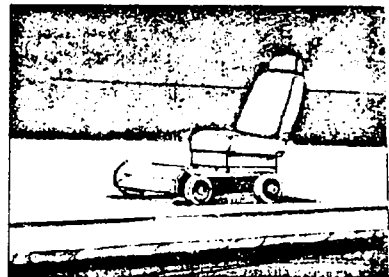
### Why Safety Belts Work

When you ride in or on anything, you go as fast as it goes.

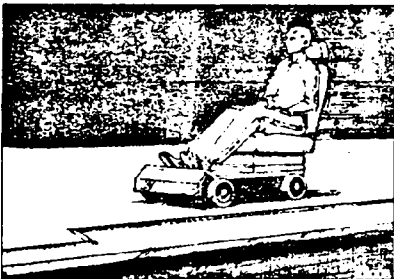
1. For example, if the bike is going 10 mph (16 km/h), so is the child.



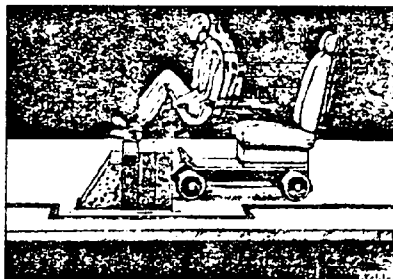
2. When the bike hits the block, it stops. But the child keeps going!



3. Take the simplest "car." Suppose it's just a seat on wheels.



4. Put someone on it.



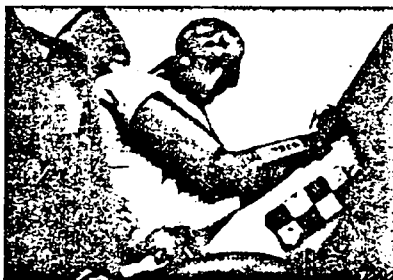
5. Get it up to speed. Then stop the "car." The rider doesn't stop.



6. The person keeps going until stopped by something. In a real vehicle, it could be the windshield...



7. or the instrument panel...



8. or the safety belts!

With safety belts, you slow down as the vehicle does. You get more time to stop. You stop over more distance, and your strongest bones take the forces. That's why safety belts make such good sense.

## Seats & Safety Belts

### Here Are Questions Many People Ask About Safety Belts—and the Answers

**Q:** Won't I be trapped in the vehicle after an accident if I'm wearing a safety belt?

**A:** You could be—whether you're wearing a safety belt or not. But you can easily unbuckle a safety belt, even if you're upside down. And your chance of being conscious during and after an accident, so you can unbuckle and get out, is much greater if you are belted.

**Q:** Why don't they just put in air bags so people won't have to wear safety belts?

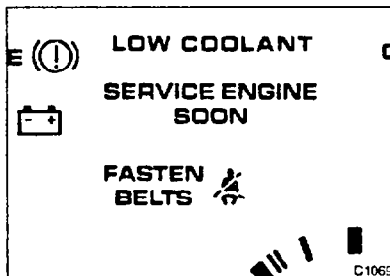
**A:** "Air bags," or Supplemental Inflatable Restraint systems, are in some vehicles today and will be in more of them in the future. But they are supplemental systems only—so they work with safety belts, not instead of them. Every "air bag" system ever offered for sale has required the use of safety belts. Even if you're in a vehicle that has "air bags," you still have to buckle up to get the most protection. That's true not only in frontal collisions, but especially in side and other collisions.

**Q:** If I'm a good driver, and I never drive far from home, why should I wear safety belts?

**A:** You may be an excellent driver, but if you're in an accident—even one that isn't your fault—you and your passengers can be hurt. Being a good driver doesn't protect you from things beyond your control, such as bad drivers.

Most accidents occur within 25 miles (40 km) of home. And the greatest number of serious injuries and deaths occur at speeds of less than 40 mph (65 km/h).

Safety belts are for everyone.



### Safety Belt Reminder Light

When the key is turned to Run or Start, a light will come on for about eight seconds to remind people to fasten their safety belts. Unless the driver's safety belt is buckled, a chime will also sound.

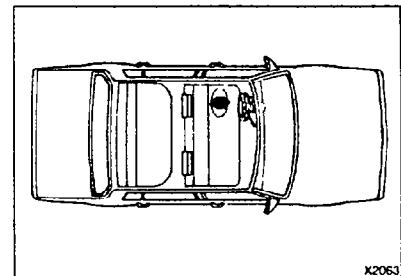
### How to Wear Safety Belts Properly—Adults

This section is only for people of adult size.

#### CAUTION

⚠ There are special things to know about safety belts and children. And there are different rules for babies and smaller children. If a child will be riding in your Oldsmobile, see the *Index* under *Children and Safety Belts*. Follow these rules for everyone's protection.

First, you'll want to know which restraint systems your vehicle has. We'll start with the driver position.



### Driver Position

This section describes the driver's restraint system.

## Seats & Safety Belts



### Lap-Shoulder Belt

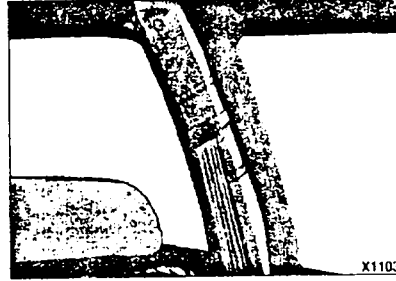
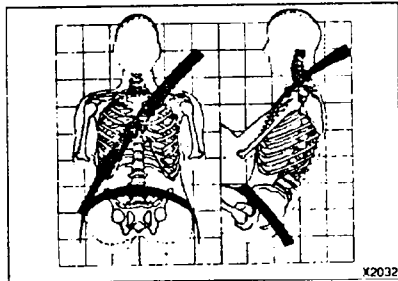
The driver has a lap-shoulder belt. Here's how to wear it properly.

1. Close and lock the door.
2. Adjust the seat (to see how, see the *Index* under *Seat Controls*) so you can sit up straight.

3. Pick up the latch plate and pull the belt across you. Don't let it get twisted.
4. Push the latch plate into the buckle until it clicks.

If the belt isn't long enough, see the *Index* under *Safety Belt Extender*.

Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.



The lap part of the belt should be low and snug below the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks only if there's a sudden stop or a crash.

### Shoulder Belt Height Adjuster

You can move the shoulder belt adjuster to the height that is right for you.

To move it up or down, squeeze the release handle. When you release the handle, try to move it down a little to make sure it has locked into position.

You can move the adjuster up from a lower position by pushing the bottom of the release handle.

Adjust the height so that the shoulder portion of the belt is properly positioned on your shoulder, away from your face and neck.

# Seats & Safety Belts



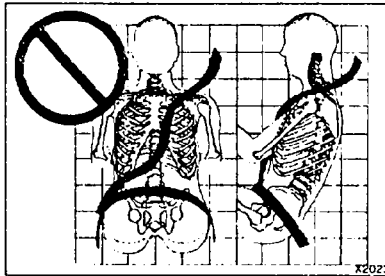
## Shoulder Belt Height Adjuster (CONT.)

To help you find a height that is right for you, follow these guidelines:

**For a Tall Person:** Use the upper or upper-middle position.

**For a Person of Average Height:** Use a position somewhere in the middle.

**For a Short Person:** Use the lower or lower-middle position.

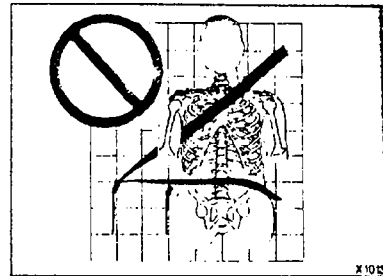


**Q: What's wrong with this?**

**A:** The shoulder belt is too loose. It won't give nearly as much protection this way.

### CAUTION

**!** You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.

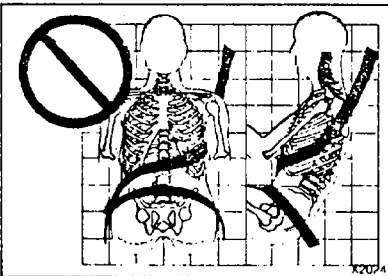


**Q: What's wrong with this?**

**A:** The belt is buckled in the wrong place.

### CAUTION

**!** You can be seriously injured if your belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.

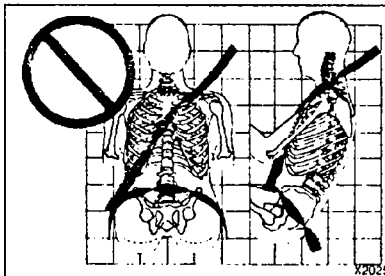


**Q: What's wrong with this?**

**A:** The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

### CAUTION

**!** You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.



**Q: What's wrong with this?**

**A:** The belt is twisted across the body.

### CAUTION

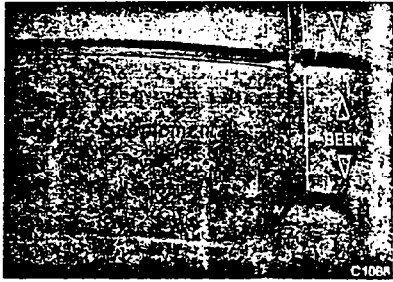
**!** You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to take impact forces. If a belt is twisted, make it straight so it can work properly, or ask your dealer to fix it.



To unclash the belt, just push the button on the buckle. The belt should go back out of the way.

Before you close the door, be sure the belt is out of the way. If you slam the door on it, you can damage both the belt and your vehicle.

# Seats & Safety Belts



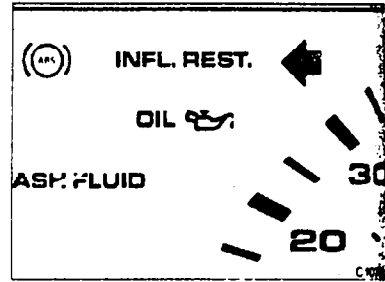
## ■ Supplemental Inflatable Restraint System

This section explains the driver's "air bag," or Supplemental Inflatable Restraint (SIR) system.

Here's the Most Important Thing to Know:

### CAUTION

⚠ If you are ever in a crash and you're not wearing a safety belt, your injuries may be much worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be if you're buckled up. That's true even when you have the SIR system. And, a driver whose body is against or very close to the steering wheel when the "air bag" inflates can be injured. For protection in frontal and all other collisions, everyone in the vehicle, including children, should be properly restrained.



## Supplemental Inflatable Restraint Light

There is an inflatable restraint light on the instrument panel. The system checks itself and the light tells you if there is a problem.

You will see this light flash for a few seconds when you turn your ignition to Run or Start. Then the light should go out, which means the system is ready.



### CAUTION

⚠ If the inflatable restraint light doesn't come on, or stays on, or comes on when you are driving, your inflatable restraint system may not work properly. Have your vehicle serviced right away.

## How the SIR System Works

The "air bag" part of the SIR system is in the middle of the steering wheel.

The SIR system is only for crashes where the front area of your vehicle hits something. If the collision is hard enough, the "air bag" inflates in a fraction of a second. It helps restrain the driver, and then it quickly deflates. Some gray "smoke" is normal when this happens, and some people have reported mild coughing and watery eyes from it. But all of these have been temporary. The "air bag" can give extra protection for the driver's upper body.

### CAUTION


- ⚠ • Don't attach anything to the steering wheel pad. It might injure the driver if the SIR inflates.
- The SIR is designed to inflate only once. After it inflates, if you don't get a new system, the SIR system won't be there to help protect you in another crash. A new system will include an inflator module, crash sensors, and possibly other parts, such as a new steering wheel and steering column.
- Let only qualified technicians work on your SIR system. Improper service can mean that your SIR system won't work properly. See your dealer for service.

# Seats & Safety Belts

## Servicing Your Oldsmobile with the SIR System

Please tell or remind anyone who works on your Oldsmobile that it has the SIR system. There are parts of the SIR system in several places around your vehicle. You don't want the system to inflate while someone is working on your vehicle. The SIR system does not need regular maintenance. Your Oldsmobile dealer and the 1992 Oldsmobile Service Manual have information about the SIR system, including repair or disposal.

### CAUTION

 For up to 10 minutes after the ignition key is turned off and the battery disconnected, an "air bag" can still inflate during improper service. You can be injured if you are close to an "air bag" when it inflates. Be sure to follow the proper service procedures.

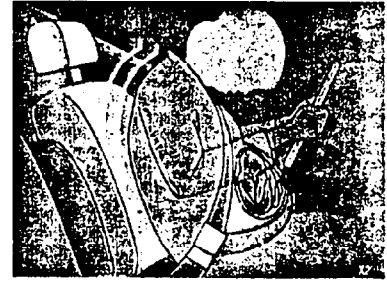
When electrical work is done under the hood or inside the vehicle, the ignition should be in **LOCK**, if possible.

Avoid wires wrapped with yellow tape, or yellow connectors. They are probably part of the SIR system.

But if the ignition has to be on for electrical work, or if the steering column is to be disassembled, the SIR system must be disconnected. To do this:

- Remove the SIR fuse (see the *Index* under *Fuses and Circuit Breakers*).
- Disconnect the yellow connector at the base of the steering column.

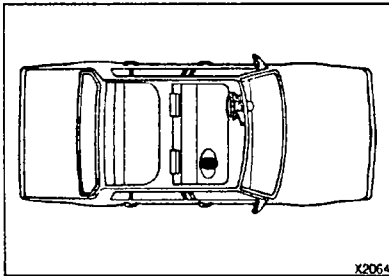
When the work is complete, if the SIR system was disconnected, be sure to reattach everything and replace the fuse before turning the ignition on. When you turn the ignition key on, be sure you see the inflatable restraint light on the instrument panel. If you don't see this light flash and then go out as usual, have your SIR system repaired.



## Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts. A pregnant woman should wear a lap-shoulder belt if at all possible. The lap portion should be worn as low as possible throughout the pregnancy.

The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.

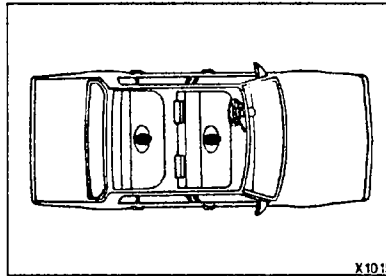


### Right Front Passenger Position

The right front passenger's safety belt works the same way as the driver's safety belt. See the *Index* under *Driver Position*.

When the lap belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again.

Be sure to use the correct buckle when buckling your lap-shoulder belt. If you find that the latch plate will not go fully into the buckle, see if you are using the buckle for the center passenger position.



### Center Passenger Position

If your vehicle has front and rear bench seats, someone can sit in the center positions.



### Lap Belt

When you sit in a center seating position, you have a lap safety belt, which has no retractor.

To make the belt longer, tilt the latch plate and pull it along the belt.

## Seats & Safety Belts



### Lap Belt (CONT.)

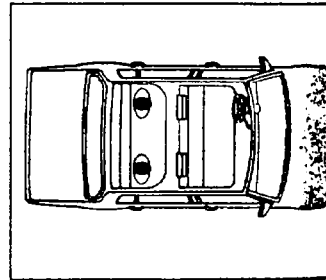
To make the belt shorter, pull its free end as shown until the belt is snug.

Buckle, position and release it the same way as a lap-shoulder belt. If the belt isn't long enough, see the *Index* under *Safety Belt Extender*. Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.

### Rear Seat Passengers

It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.



### Rear Seat—Outside Positions

The positions next to the windows use lap-shoulder belts.

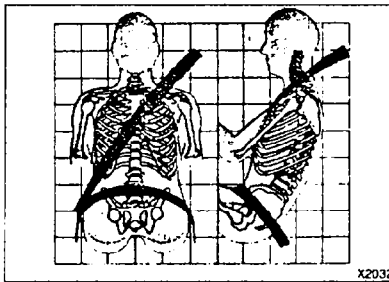


### Here's How to Wear One Properly:

1. Pick up the latch plate and pull it across you. Don't let it get twisted.
2. Push the latch plate into the buckle until it clicks.

When the lap belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again.


If the belt is not long enough, see the *Index* under *Safety Belt Extender*. Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.



The lap part of the belt should be low and snug below the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks only if there's a sudden stop or a crash.

### CAUTION

 You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could increase injury. The shoulder belt should fit against your body.

## Seats & Safety Belts



### Rear Seat—Outside Positions (CONT.)

To unlatch the belt, just push the button on the buckle.



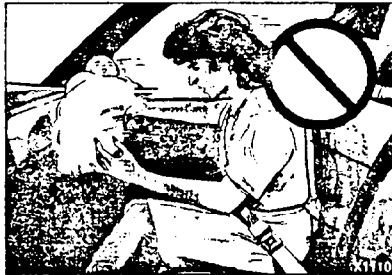
### Children

Everyone in a vehicle needs protection! That includes infants and all children smaller than adult size. In fact, the law in every state and Canadian province says children up to some age must be restrained while in a vehicle.

### Smaller Children and Babies

#### CAUTION

⚠ Smaller children and babies should always be restrained in a child or infant restraint. The instructions for the restraint will say whether it is the right type and size for your child. A very young child's hip bones are so small that a regular belt might not stay low on the hips, as it should. Instead, the belt will likely be over the child's abdomen. In a crash the belt would apply force right on the child's abdomen, which could cause serious or fatal injuries. So, be sure that any child small enough for one is always properly restrained in a child or infant restraint.



#### CAUTION

⚠ Never hold a baby in your arms while riding in a vehicle. A baby doesn't weigh much—until a crash. During a crash a baby will become so heavy you can't hold it. For example, in a crash at only 25 mph (40 km/h), a 12-pound (5.5 kg) baby will suddenly become a 240-pound (110 kg) force on your arms. The baby would be almost impossible to hold.

(Continued)



#### CAUTION

⚠ (Continued)  
Secure the baby in an infant restraint.

### Child Restraints

Be sure to follow the instructions for the restraint. You may find these instructions on the restraint itself or in a booklet, or both. These restraints use the belt system in your vehicle, but the child also has to be secured within the restraint to help reduce the chance of personal injury. The instructions that come with the infant or child restraint will show you how to do that.


# Seats & Safety Belts

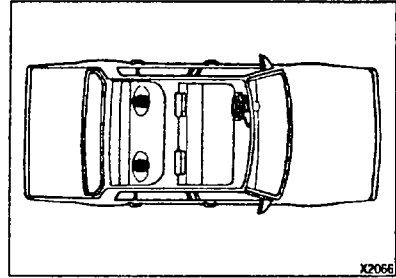
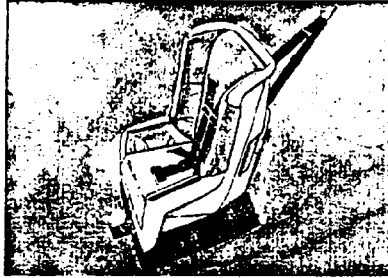
## Where to Put the Restraint

Accident statistics show that children are safer if they are restrained in the rear rather than the front seat. We at General Motors therefore recommend that you put your child restraint in the rear seat unless the child is an infant and you're the only adult in the vehicle. In that case, you might want to secure the restraint in the front seat where you can keep an eye on the baby.

Wherever you install it, be sure to secure the child restraint properly.

### CAUTION

 An unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle—even when no child is in it.



## Top Strap

If your child restraint has a top strap, it should be anchored. If you need to have an anchor installed, you can ask your Oldsmobile dealer to put it in for you. If you want to install an anchor yourself, your dealer can tell you how to do it.

Vehicles first sold in Canada have child restraint anchor bracket hardware in the glove box, along with instructions for installing it. This should be used only with a child restraint, and only to secure a child restraint at the center rear seating position. Additional anchor brackets for child restraints at one or both of the rear outside seating positions are available at Oldsmobile dealerships in Canada.

## Securing a Child Restraint in a Rear Outside Position

You'll be using the lap-shoulder belt. See the earlier section about the top strap if the child restraint has one.



1. Put the restraint on the seat. Follow the instructions for the child restraint.
2. Secure the child in the child restraint as the instructions say.
3. Pull out the vehicle's safety belt and run the lap part through or around the restraint. The child restraint instructions will show you how.

See if the shoulder belt would go in front of the child's face or neck. If so, put it behind the child restraint.

4. Buckle the belt. Make sure the release button faces upward or outward, so you'll be able to unbuckle it quickly if you ever need to.

5. Pull the rest of the lap belt all the way out of the retractor to set the lock.

## Seats & Safety Belts



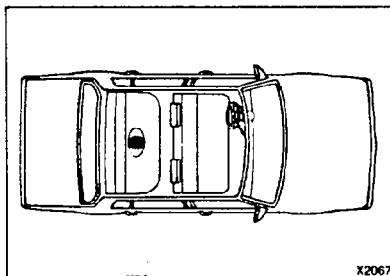
### Securing a Child Restraint in a Rear Outside Position (CONT.)

6. To tighten the belt, feed it into the retractor while you push down on the child restraint.



7. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

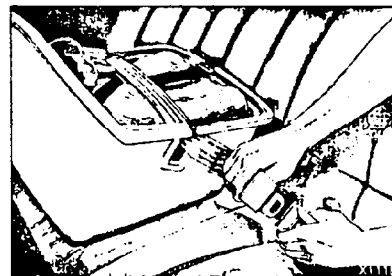


### Securing a Child Restraint in a Center Seat Position

When you secure a child restraint in a center seating position, you'll be using the lap belt. See the earlier section about the top strap if the child restraint has one.



1. Make the belt as long as possible by tilting the latch plate and pulling it along the belt.
2. Put the restraint on the seat. Follow the instructions for the child restraint.
3. Secure the child in the child restraint as the instructions say.



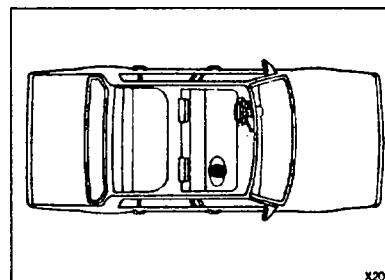
4. Run the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.
5. Buckle the belt. Make sure the release button faces upward or outward, so you'll be able to unbuckle it quickly if you ever need to.
6. To tighten the belt, pull its free end while you push down on the child restraint.

## Seats & Safety Belts

### **Securing a Child Restraint in a Center Seat Position (CONT.)**

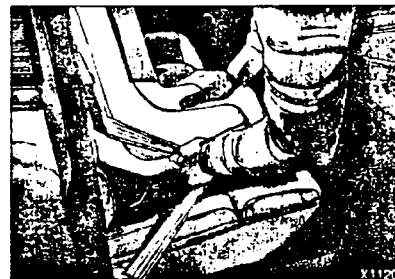
7. Push and pull the child restraint in different directions to be sure it is secure. If the child restraint isn't secure, turn the latch plate over and buckle it again. Then see if it is secure. If it isn't, secure the restraint in a different place in the vehicle and contact the child restraint maker for their advice.

To remove the child restraint, just unbuckle the vehicle's safety belt. It will be ready to work for an adult or larger child passenger.



### **Securing a Child Restraint in the Right Front Seat**

You'll be using the lap-shoulder belt. See the *Index* under *Top Strap* if the child restraint has one.



1. Put the restraint on the seat. Follow the instructions for the child restraint.
2. Secure the child in the child restraint as the instructions say.
3. Pull out the vehicle's safety belt and run the lap part through or around the restraint. The child restraint instructions will show you how.  
See if the shoulder belt would go in front of the child's face or neck. If so, put it behind the child restraint.

4. Buckle the belt. Make sure the release button faces upward or outward, so you'll be able to unbuckle it quickly if you ever need to.

5. Pull the rest of the lap belt all the way out of the retractor to set the lock.

## Seats & Safety Belts



### Securing a Child Restraint in the Right Front Seat (CONT.)

6. To tighten the belt, feed the lap belt back into the retractor while you push down on the child restraint.



7. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

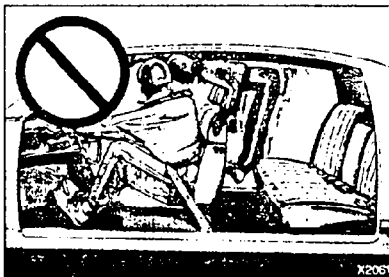


### Larger Children

Children who have outgrown child restraints should wear the vehicle's safety belts. If you have the choice, a child should sit next to a window so the child can wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide.

Accident statistics show that children are safer if they are restrained in the rear seat. But they need to use the safety belts properly.

- Children who aren't buckled up can be thrown out in a crash.



- Children who aren't buckled up can strike other people who are.



### CAUTION



Never do this.

Here two children are wearing the same belt. The belt can't properly spread the impact forces. In a crash, the two children can be crushed together and seriously injured. A belt must be used by only one person at a time.

## Seats & Safety Belts



### Larger Children (CONT.)

**Q:** What if a child is wearing a lap-shoulder belt, but the child is so small that the shoulder belt is very close to the child's face or neck?

**A:** Move the child toward the center of the vehicle, but be sure that the shoulder belt still is on the child's shoulder, so that in a crash the child's upper body would have the restraint that belts provide.

If the child is so small that the shoulder belt is still very close to the child's face or neck, you might want to place the child in the center seat position, the one that has only a lap belt.

### CAUTION



**Never do this.**

Here a child is sitting in a seat that has a lap-shoulder belt, but the shoulder part is behind the child. If the child wears the belt in this way, in a crash the child might slide under the belt. The belt's force would then be applied right on the child's abdomen. That could cause serious or fatal injuries.

Wherever the child sits, the lap portion of the belt should be worn low, snug below the hips, and just touching the child's thighs. This applies belt force to the child's pelvic bones in a crash.

### Safety Belt Extender

If the vehicle's safety belt will fasten around you, you should use it. But if a safety belt isn't long enough to fasten, your dealer will order you an extender. It's free. When you go in to order it, take the heaviest coat you will wear, so the extender will be long enough for you. The extender will be just for you, and just for the seat in your vehicle that you choose. Don't let someone else use it, and use it only for the seat it is made to fit. To wear it, just attach it to the regular safety belt.

### Checking Your Restraint Systems

Now and then, make sure all your belts, buckles, latch plates, retractors, anchorages and reminder systems are working properly. Look for any loose parts or damage. If you see anything that might keep a restraint system from doing its job, have it repaired.

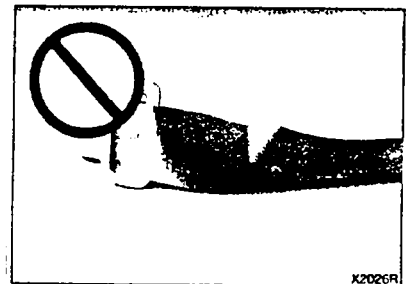
### Replacing Safety Belts After a Crash

If you've had a crash, do you need new belts?

After a very minor collision, nothing may be necessary. But if the belts were stretched, as they would be if worn during a more severe crash, then you need new belts.

If belts are cut or damaged, replace them. Collision damage also may mean you will have to have safety belt parts, like the retractor, replaced or anchorage locations repaired—even if the belt wasn't being used at the time of the collision.

If your seat adjuster won't work after a crash, the special part of the safety belt that goes through the seat to the adjuster may need to be replaced.



**Q:** What's wrong with this?

**A:** The belt is torn.

### CAUTION



Torn or frayed belts may not protect you in a crash. They can rip apart under impact forces. If a belt is torn or frayed, get a new one right away.