

REPORT NO. 6525-V-1

DOT 0001

NEW CAR ASSESSMENT AND STANDARDS

ENFORCEMENT INDICANT TESTING

FMVSS NOS. 212, 219 AND 301-75

General Motors Corporation  
1980 Chevrolet Citation 5-Door Hatchback  
NHTSA 308-T1-430

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



June 6, 1979

FINAL REPORT

Prepared For

U. S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
Enforcement  
Office of Vehicle Safety Compliance  
2100 Second Street, S. W., Transpoint Building  
Washington, D. C. 20590

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FINAL REPORT ACCEPTED BY:

Contract Technical Manager

Date of Report Acceptance

**TECHNICAL REPORT STANDARD TITLE PAGE**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                      |                                                                                                                                                  |                                                   |  |
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| 16. Abstract<br>Frontal barrier tests of a 1980 Chevrolet Citation, 5-Door Hatchback, were performed at Calspan Corporation, Advanced Technology Center, Transportation Research Department facility for the New Car Assessment and Standards Enforcement Inducant Testing for FMVSS 212 - Windshield Mounting; FMVSS 219 - Windshield Zone Intrusion; FMVSS No. 301 - Fuel Standard Integrity for the Office of Vehicle Safety Compliance and for the Office of Automotive Ratings and for Research and Development.<br><br>The impact speed was 39.93 mph.<br><br>The post-test vehicle crush was 27.9".<br><br>The vehicle complied in all respects with FMVSS No. 212 and FMVSS 301-75. There was a noncompliance on FMVSS 219 - Windshield Intrusion - the hood of the vehicle intruded into the protected zone.<br><br>The driver exceeded FMVSS 208 injury criteria for the head and femurs and the right front passenger exceeded the injury criteria for the head. |  |                                                      |                                                                                                                                                  |                                                   |  |
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## TABLE OF CONTENTS

|                                                                   | <u>Page No.</u> |
|-------------------------------------------------------------------|-----------------|
| Section 1 Purpose and Test Procedure                              | 1-1             |
| Section 2 Summary of Results of Barrier Test                      | 2-1             |
| Section 3 Summary of Results of FMVSS Nos. 212, 219<br>and 301-75 | 3-1             |
| Appendix A Photographs                                            | A-1             |
| Appendix B Vehicle and Dummy Response Data                        | B-1             |
| Appendix C Dummy Certification Tests                              | C-1             |

## LIST OF FIGURES

| <u>Figure No.</u> |                                                | <u>Page No.</u> |
|-------------------|------------------------------------------------|-----------------|
| 1                 | PRE-TEST AND POST-TEST MEASUREMENT POINTS      | 2-6             |
| 2                 | OCCUPANT CLEARANCE DIMENSIONS                  | 2-8             |
| 3                 | CAMERA POSITIONS FOR FRONTAL/OBLIQUE IMPACTS   | 2-9             |
| 4                 | VEHICLE ACCELEROMETER LOCATIONS                | 2-11            |
| 5                 | WINDSHIELD ZONE INTRUSION FMVSS 219 DATA SHEET | 3-5             |
| 6                 | PROTECTED ZONE                                 | 3-6             |
| 7                 | SUMMARY OF FMVSS 212 DATA                      | 3-7             |

## APPENDIX A

|     |                                                                    |      |
|-----|--------------------------------------------------------------------|------|
| 1A  | FULL FRONT, SIDE, REAR AND THREE-QUARTER EXTERIOR VIEW             | A-2  |
| 2A  | FULL VIEW OF WINDSHIELD WITH AND WITHOUT STYROFOAM TEMPLATE        | A-3  |
| 3A  | PRE- AND POST-TEST NO. 308-T1-430 1980 CHEVROLET CITATION EXTERIOR | A-4  |
| 4A  | POST-TEST VIEW FRONT AND SIDE                                      | A-5  |
| 5A  | ENGINE BLOCK ACCELEROMETER - VELOCITY TRAP COUNTER DISPLAY         | A-5  |
| 6A  | PRE- AND POST-TEST VIEWS OF WINDSHIELD AND RETENTION LOSS          | A-6  |
| 7A  | FUEL/VAPOR LINES AND FILLER PIPE                                   | A-7  |
| 8A  | PRE- AND POST-TEST VIEW OF FRONT UNDER BODY                        | A-8  |
| 9A  | PRE- AND POST-TEST VIEW OF REAR UNDER BODY                         | A-8  |
| 10A | PRE- AND POST-TEST VIEW OF FUEL LINES                              | A-9  |
| 11A | PRE- AND POST-TEST VIEW OF FILL AND VENT LINES                     | A-9  |
| 12A | PRE- AND POST-DRIVER AND PASSENGER FINAL POSITION                  | A-10 |
| 13A | POST-TEST DRIVER AND PASSENGER FINAL POSITION AND DEFORMATION      | A-11 |

LIST OF FIGURES (continued)

Figure No.

Page No.

APPENDIX C

|     |                                           |      |
|-----|-------------------------------------------|------|
| C-1 | LUMBAR SPINE TEST APPARATUS               | C-13 |
| C-2 | ABDOMEN PRESS TEST APPARATUS              | C-13 |
| C-3 | HEAD DROP TEST APPARATUS                  | C-13 |
| C-4 | KNEE IMPACT TEST APPARATUS                | C-14 |
| C-5 | THORAX IMPACT TEST APPARATUS              | C-14 |
| C-6 | NECK IMPACT TEST APPARATUS                | C-14 |
| C-7 | PART 572 TEST DUMMY - FRONT AND SIDE VIEW | C-15 |
| C-8 | ELECTRONIC TEST EQUIPMENT                 | C-16 |

## LIST OF TABLES

| <u>Table No.</u> |                                                                    | <u>Page No.</u> |
|------------------|--------------------------------------------------------------------|-----------------|
| 1                | CRASH TEST SUMMARY                                                 | 2-2             |
| 2                | VEHICLE TEST WEIGHTS AS TESTED                                     | 2-4             |
| 3                | DUMMY INJURY CRITERIA VALUES                                       | 2-5             |
| 4                | VEHICLE MEASUREMENTS                                               | 2-7             |
| 5                | HIGH SPEED CAMERA INFORMATION                                      | 2-10            |
| 6                | SUMMARY OF TEST CONDITIONS                                         | 3-2             |
| 7                | POST IMPACT DATA FOR STANDARDS 219 AND 301                         | 3-4             |
| 8                | "FUEL SYSTEM INTEGRITY" POST-IMPACT TEST DATA,<br>FMVSS NO. 301-75 | 3-8             |

## SECTION 1

### PURPOSE AND TEST PROCEDURE

PURPOSE: The purpose of this test was to determine whether the subject vehicle (a 1980 Chevrolet Citation 5-door hatchback) meets the requirements of FMVSS Nos. 212, 219 and 301-75 at a higher test speed and also to obtain structural and dummy criteria values for Research and Development and the Office of Automotive Ratings of the NHTSA. This test is part of the New Car Assessment Program B.O.A., Task 2, sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract DOT-HS-8-01938.

TEST PROCEDURE: The Calspan Corporation, Advanced Technology Center, Transportation Research Department Test Procedure for the New Car Assessment Crash Tests submitted to, and approved by, the Contract Technical Manager (CTM) contains the specific procedures used to perform this test.

With the exception of a higher test speed, this procedure is not in conflict with any portion of FMVSS Procedures issued by the Office of Standard Enforcement and the amendments in effect as noted by the applicable contract.

SECTION 2  
SUMMARY OF RESULTS OF BARRIER TEST

Table 1

CRASH TEST SUMMARY

TEST NO. 308-T1-430

PROJECT: NEW CAR ASSESSMENT PROGRAM

DATE: 6-6-79

TIME: 15:20

TEMP: 73°F

VEHICLE Chevrolet Citation 5-Door Hatchback

TEST WEIGHT (lbs) 3120

IMPACT ANGLE (deg)\* 0

IMPACT VELOCITY (MPH)\*\* 39.93

MAX. CRUSH (in) 29

MAX. INTRUSION (in) 10.8

DUMMIES

TYPE HYBRID II, PART 572

LOCATION LF(1), RF(2)

RESTRAINT PRODUCTION 3-POINT SYSTEM

NUMBER OF DATA CHANNELS 31

NUMBER OF HIGH SPEED CAMERAS 7 + 1 Real Time

---

\* With respect to tow track Centerline

\*\* Speed trap measurement ( $\pm$  .05% accuracy)

### GENERAL COMMENTS

- (1) The hood of the vehicle buckled up and intruded into the protected zone of the windshield. This would result in a noncompliance of FMVSS 219 under normal speed conditions.
- (2) This vehicle complied with the requirements of FMVSS Nos. 212 and 301-75.
  - There was 82.6% retention of the windshield after impact.
  - There was no gas leakage after impact.
- (3) The chest y-component of electronic data for the right front dummy was lost after 85 milliseconds due to a broken wire. As a result, the chest resultant data was computed using only the chest X and Z component of acceleration.
- (4) The high speed camera that views the windshield from the right side (camera #2) did not operate.

Table 2  
VEHICLE TEST WEIGHTS AS TESTED

Left Front        940 lbs  
Right Front      910 lbs  
Total Front      1850 lbs

Left Rear        650 lbs  
Right Rear      620 lbs  
Total Rear      1270 lbs

Total Weight = 1850 lbs + 1270 lbs = 3120 lbs

Wheel Base = 105 inches

$$Cg_{F.W.} = \frac{1270 \text{ lbs} \cdot 105 \text{ inches}}{3120 \text{ lbs}} = 42.74 \text{ inches}$$

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight  
UDW = Unloaded Delivered Weight (2680 lbs)  
VCW = Vehicle Capacity Weight (895 lbs)  
DSC = Designated Seating Capacity (5)

$$RCLW = VCW - 150 (DSC)$$

$$RCLW = 895 - 150(5) = 145 \text{ lbs}$$

$$TEST \text{ WEIGHT} = UDW + RCLW + \text{No. of DUMMIES} \times 164 \text{ lbs.}$$

$$TEST \text{ WEIGHT} = 2680 \text{ lbs} + 145 \text{ lbs} + 2 (164 \text{ lbs})$$

$$TEST \text{ WEIGHT} = 3153 \text{ lbs}$$

Table 3

DUMMY INJURY CRITERIA VALUES

|           | MAXIMUM ACCELERATION ("G") * |       |    |     |       |     |     |    |        |   |   |   |
|-----------|------------------------------|-------|----|-----|-------|-----|-----|----|--------|---|---|---|
|           | HEAD                         |       |    |     | CHEST |     |     |    | PELVIS |   |   |   |
|           | X                            | Y     | Z  | R   | X     | Y   | Z   | R  | X      | Y | Z | R |
| DUMMY (1) | 80                           | -12.5 | 55 | 100 | -59   | -15 | 6.5 | 60 |        |   |   |   |
| DUMMY (2) | -58                          | -11   | 70 | 86  | -37   | *** | 14  | 38 | ****   |   |   |   |
| DUMMY (3) |                              |       |    |     |       |     |     |    |        |   |   |   |
| DUMMY (4) |                              |       |    |     |       |     |     |    |        |   |   |   |

|           | MAXIMUM FORCE-FEMUR LOAD (LBS) |            |
|-----------|--------------------------------|------------|
|           | RIGHT FEMUR                    | LEFT FEMUR |
| DUMMY (1) | 750                            | 2500       |
| DUMMY (2) | 300                            | 350        |
| DUMMY (3) |                                |            |
| DUMMY (4) |                                |            |

|           | MAXIMUM FORCE-SEAT BELTS LOADS (LBS) |                              |                             |
|-----------|--------------------------------------|------------------------------|-----------------------------|
|           | SHOULDER STRAP<br>UPPER BELT LOAD    | LAP STRAP<br>RIGHT BELT LOAD | LAP STRAP<br>LEFT BELT LOAD |
| DUMMY (1) | 1560                                 |                              |                             |
| DUMMY (2) | 1280                                 |                              |                             |
| DUMMY (3) |                                      |                              |                             |
| DUMMY (4) |                                      |                              |                             |

|           | HEAD INJURY CRITERIA** |                      |                      |                                                   | SEVERITY INDEX |       |
|-----------|------------------------|----------------------|----------------------|---------------------------------------------------|----------------|-------|
|           | HIC                    | t <sub>1</sub> (SEC) | t <sub>2</sub> (SEC) | AVE. ACC. (g)<br>t <sub>1</sub> TO t <sub>2</sub> | HEAD           | CHEST |
| DUMMY (1) | 1039                   | .069                 | .096                 | 68.3                                              | 1596           |       |
| DUMMY (2) | 1117                   | .068                 | .109                 | 59.6                                              | 1683           |       |
| DUMMY (3) |                        |                      |                      |                                                   |                |       |
| DUMMY (4) |                        |                      |                      |                                                   |                |       |

\*DEFINED AS EXCEEDING 0.003 SEC. DURATION

\*\*AS DEFINED IN FMVSS NO. 208

\*\*\* DATA LOST AFTER 85 MILLISECONDS

\*\*\*\* CHEST RESULTANT COMPUTED WITH X AND Z COMPONENT OF CHEST ACCELERATION ONLY.

FIGURE 1

PRE-TEST AND POST-TEST MEASUREMENT POINTS

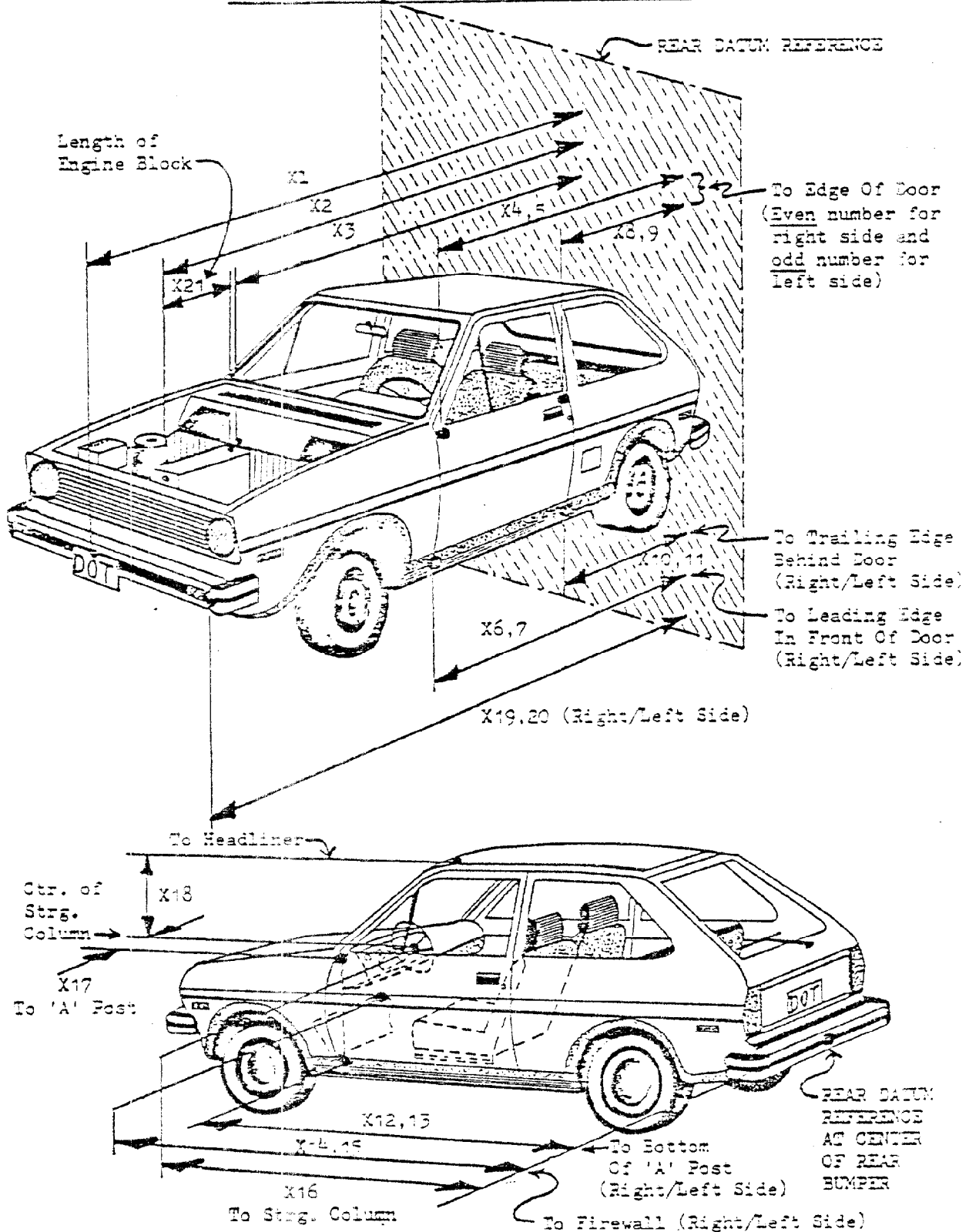
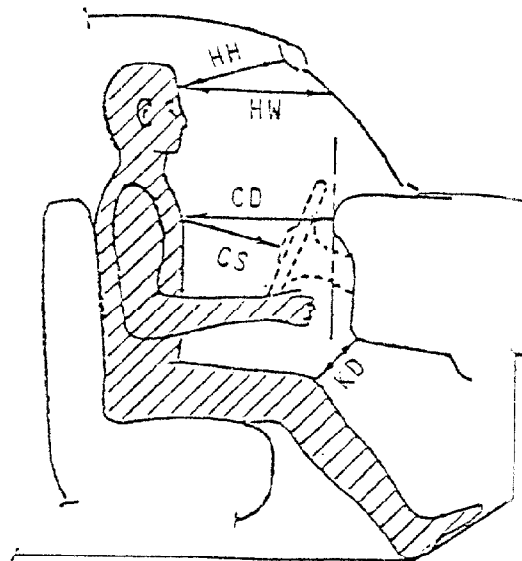


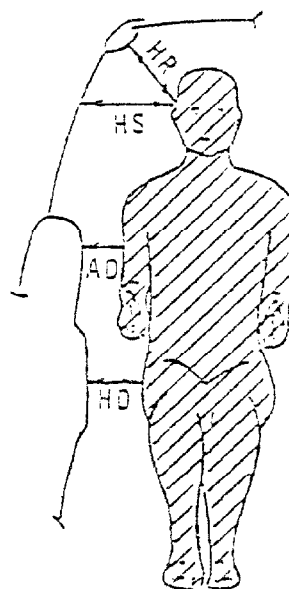
Table 4

| NO. | TYPE OF MEASUREMENT                                          | ALL DIMENSIONS<br>IN INCHES |              |
|-----|--------------------------------------------------------------|-----------------------------|--------------|
|     |                                                              | PRE-<br>TEST                | POST<br>TEST |
| X1  | Total Length of Vehicle at Centerline                        | 177-1/2                     | 149-1/4      |
| X2  | Rear Surface of Vehicle to Front of Engine                   | 160-3/8                     | 142-5/8      |
| X3  | Rear Surface of Vehicle to Firewall                          | 133                         | 127-1/4      |
| X4  | Rear Surface of Vehicle to Upper Leading Edge of Right Door  | 122-1/2                     | 118-1/2      |
| X5  | Rear Surface of Vehicle to Upper Leading Edge of Left Door   | 122-1/2                     | 121-3/4      |
| X6  | Rear Surface of Vehicle to Lower Leading Edge of Right Door  | 121-1/4                     | 117-3/4      |
| X7  | Rear Surface of Vehicle to Lower Leading Edge of Left Door   | 121-1/4                     | 121-1/8      |
| X8  | Rear Surface of Vehicle to Upper Trailing Edge of Right Door | 80-1/2                      | 79           |
| X9  | Rear Surface of Vehicle to Upper Trailing Edge of Left Door  | 80-3/4                      | 80-1/8       |
| X10 | Rear Surface of Vehicle to Lower Trailing Edge of Right Door | 82                          | 81-3/4       |
| X11 | Rear Surface of Vehicle to Lower Trailing Edge of Left Door  | 82-1/4                      | 81-1/2       |
| X12 | Rear Surface of Vehicle to Bottom of "A" Post of Right Side  | 120-7/8                     | 117-1/4      |
| X13 | Rear Surface of Vehicle to Bottom of "A" Post of Left Side   | 120-3/4                     | 120-1/4      |
| X14 | Rear Surface of Vehicle to Firewall - Right Side             | 133-1/8                     | 122-1/4      |
| X15 | Rear Surface of Vehicle to Firewall - Left Side              | 132-3/4                     | 124-1/2      |
| X16 | Rear Surface of Vehicle to Steering Column                   | 105                         | 102          |
| X17 | Center of Steering Column to "A" Post                        | 15-1/2                      | 14-1/2       |
| X18 | Center of Steering Column to Headliner                       | 15-7/8                      | 17-1/8       |
| X19 | Rear Surface of Vehicle to Right Side of Front Bumper        | 175-1/4                     | 148-1/4      |
| X20 | Rear Surface of Vehicle to Left Side of Front Bumper         | 174-1/2                     | 145-3/4      |
| X21 | Length of Engine Block                                       | 19                          | 17-1/2       |

|     | <u>DRIVER</u> | <u>PASS</u> |
|-----|---------------|-------------|
| HH  | 13.5          | 14.9        |
| HW  | 19.5          | 22.5        |
| CD  | 23.7          | 26.5        |
| CS  | 15.2          | --          |
| KDL | 6.7           | 7.6         |
| KDR | 6.5           | 8.0         |



|    | <u>DRIVER</u> | <u>PASS</u> |
|----|---------------|-------------|
| HR | 7.7           | 7.6         |
| HS | 9.6           | 9.5         |
| AD | 5.0           | 5.5         |
| HD | 7.5           | 6.5         |



NOTE: ALL DIMENSIONS  
IN INCHES

FIGURE 2 OCCUPANT CLEARANCE DIMENSIONS

FIGURE 3  
CAMERA POSITIONS FOR FRONTAL/OBLIQUE IMPACTS

Note: Camera information shown in Table 5 on next page.

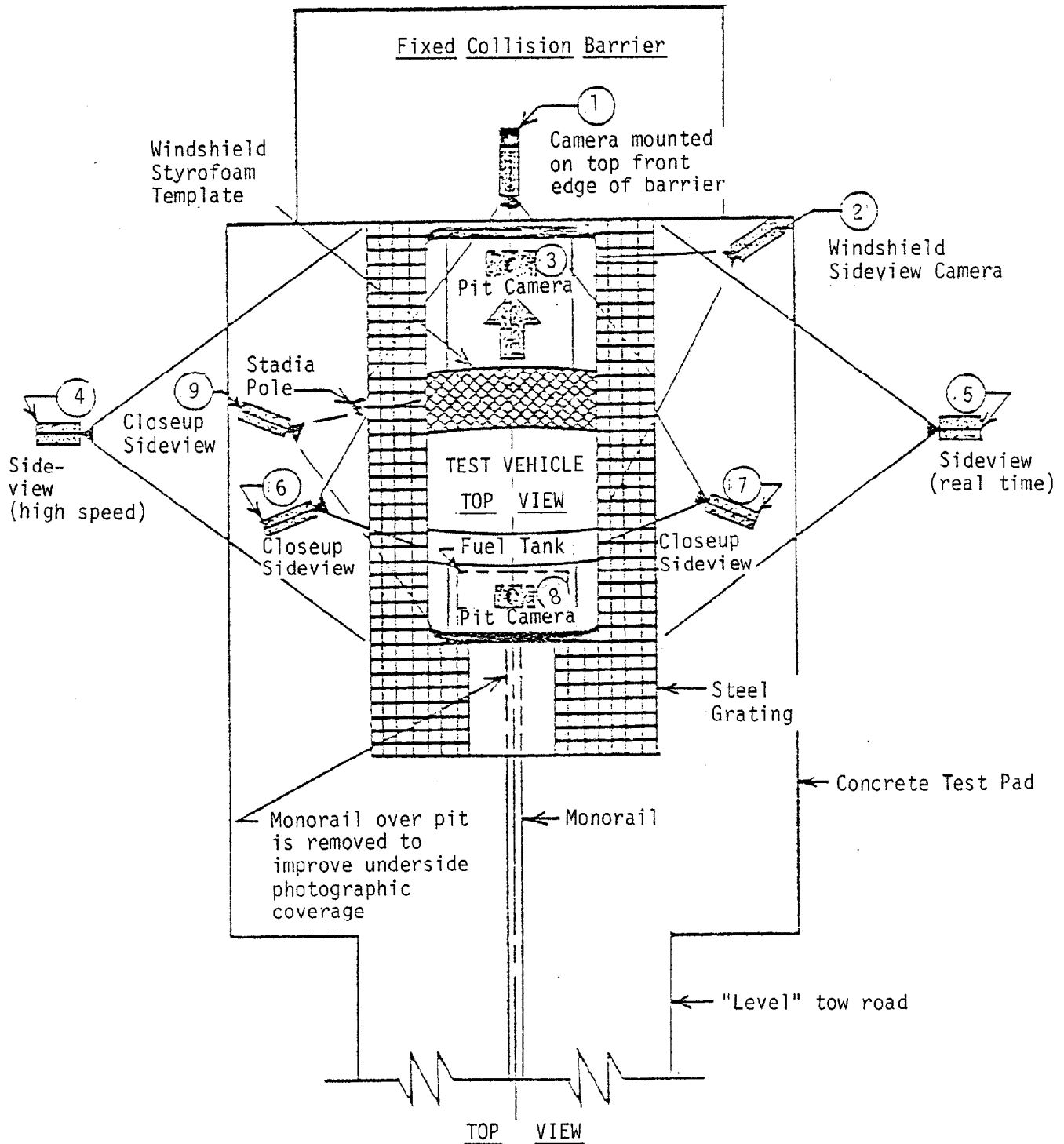


Table 5  
HIGH SPEED CAMERA INFORMATION

| CAMERA NO. | VIEW                        | TYPE                    | LENS (mm) | SPEED (fps) |
|------------|-----------------------------|-------------------------|-----------|-------------|
| 1          | WINDSHIELD/HOOD AREA        | PHOTOSONIC              | 8         | 1000        |
| 2          | WINDSHIELD FROM RIGHT SIDE  | (DID NOT RUN)           | -         | --          |
| 3          | UNDERBODY IN ENGINE AREA    | PHOTOSONIC              | 13        | 600         |
| 4          | LEFT PROFILE                | PHOTOSONIC              | 13        | 400         |
| 5          | DOCUMENTATION               | REAL TIME               | -         | 24          |
| 6          | DRIVER                      | PHOTOSONIC              | 13        | 750         |
| 7          | RIGHT FRONT PASSENGER       | PHOTOSONIC              | 13        | 900         |
| 8          | UNDERBODY IN FUEL TANK AREA | PHOTOSONIC              | 13        | 1000        |
| 9          | REAR SEATED CHILD PASSENGER | (NOT USED ON THIS TEST) |           |             |

(24 fps) REAL TIME MOVIE FILM COVERAGE OF PRE-CRASH, POST-CRASH AND CRASH EVENT SPLICED AT START AND END OF FILM.

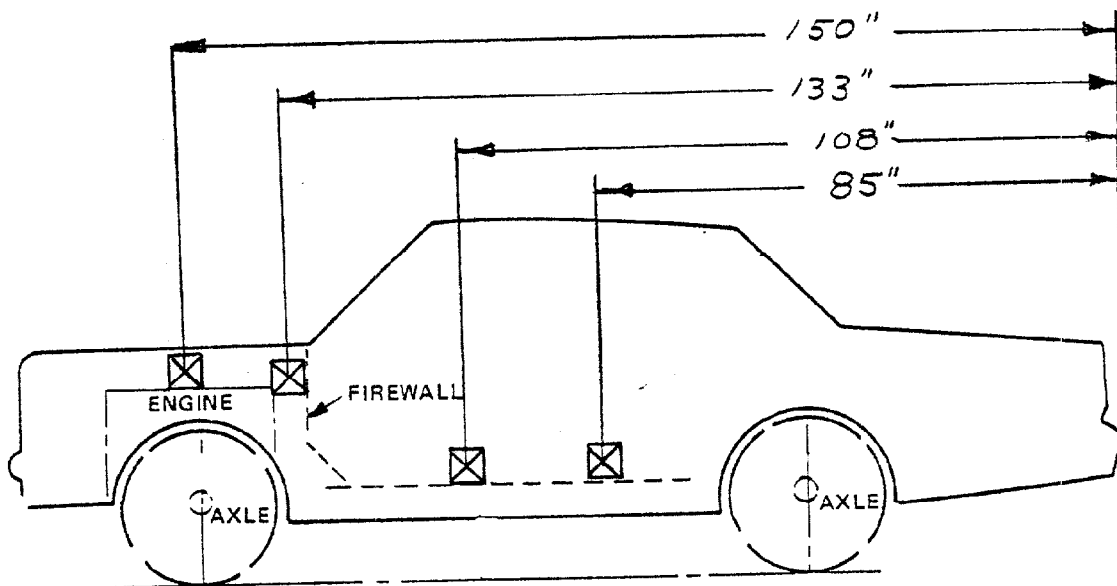
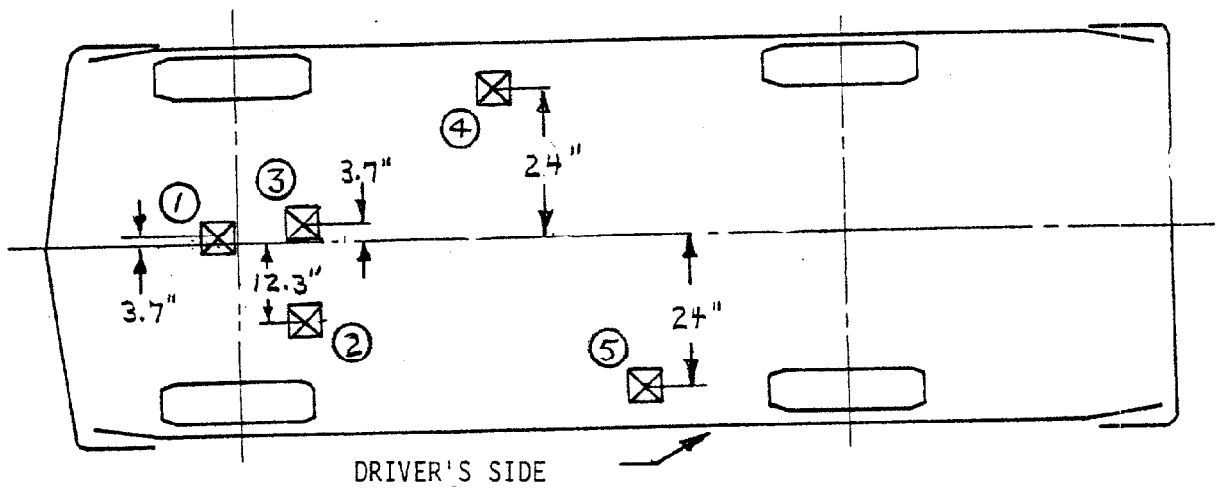


FIGURE 4 VEHICLE ACCELEROMETER LOCATIONS

## SECTION 3

### SUMMARY OF RESULTS OF FMVSS NOS. 212, 219 and 301-75

- Summary of Test Conditions
- Post Impact Data
- Windshield Zone Intrusion, FMVSS 219
- Protected Zone
- Summary of FMVSS Data
- Fuel System Integrity Post-Impact

Table 6  
SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION:

Vehicle Manufacturer: GENERAL MOTORS  
 Make/Model: CITATION 1XX68  
 Body Style: 5 Door Hatchback; Model Year: 1980  
 VIN: \*1X687 AT106262; Build Date: March 1979  
 NHISA No.: 308-T1-430; Color: LT. BLUE  
 Engine Data: 6 cylinders; 28 LTR in<sup>3</sup>/cc displacement  
 Transmission Data: 3 speed ( ) Manual/ ( X ) Automatic  
 Date Vehicle Received by Laboratory: 6-4-79  
 Dealer's Name & Address: J. K. J. CHEVROLET VIENNA VA.

DATA FROM CERTIFICATION LABEL ON LEFT DOOR REAR FACE OR 'B' POST:

Vehicle Manufactured By: GENERAL MOTORS  
 Date of Manufacture: March 1979; VIN: 1X687AT106262  
 GVWR: 3580 lbs.; GAWR: Front = 1945 lbs.; Rear = 1635 lbs

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVE BOX, ETC.:

|                |               |               |                        |              |
|----------------|---------------|---------------|------------------------|--------------|
| Vehicle Load:  | FRONT         | REAR          | RECOMMENDED TIRE SIZE: | LOAD RANGE:  |
| Up to Capacity | <u>26</u> psi | <u>26</u> psi | P185/80R 13            | B <u>C</u> D |

Vehicle Capacity:

|                 |                                           |                       |                |
|-----------------|-------------------------------------------|-----------------------|----------------|
| Type of Seats - | <input checked="" type="checkbox"/> Bench | Number of Occupants = | <u>2</u> Front |
|                 | <input type="checkbox"/> Bucket           |                       | <u>3</u> Rear  |
|                 | <input type="checkbox"/> Split Bench      |                       | <u>5</u> Total |

CARGO LOAD = 895 lbs.  
 TOTAL = 0145 lbs.

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with max. fluids):

Right Front = 820 lbs.      Right Rear = 510 lbs.  
 Left Front = 870 lbs.      Left Rear = 480 lbs.  
 TOTAL FRONT WEIGHT = 1690 lbs. ( 63.1% of Total Vehicle Weight)  
 TOTAL REAR WEIGHT = 990 lbs. ( 36.9% of Total Vehicle Weight)  
 TOTAL DELV. WEIGHT = 2680 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 0 lbs. CARGO:

Right Front = 910 lbs.      Right Rear = 620 lbs.  
 Left Front = 940 lbs.      Left Rear = 650 lbs.  
 TOTAL FRONT WEIGHT = 1850 lbs. ( 59.3% of Total Vehicle Weight)  
 TOTAL REAR WEIGHT = 1270 lbs. ( 40.7% of Total Vehicle Weight)  
 TOTAL TEST WEIGHT = 3120 lbs.

Weight of ballast secured in vehicle trunk area = 000 lbs.

TEST CONDITIONS:

Date of Test: 6-6-79; Time of Test: 1430 am/pm  
 Ambient Temperature: 74 °F at impact area.  
 Temp. In Occ. Comp.: 74 °F.; W/Shld. Mldg. Temp.: 80 °F.

Table 6 - continued

VEHICLE ATTITUDE: (all dimensions in inches)

Delivered Attitude: RF 27" ; LF 26-3/4; RR 26-3/4; LR 26-1/2

Test Attitude: RF 26-3/8; LF 26-1/4; RR 24-1/4; LR 24-5/8

VEHICLE TIRE DATA:

Recommended Cold Tire Pressure: Front = 26 psi

Rear = 26 psi

Recommended Tire Size: P185/80R-13

Load Range: C

Tires on Vehicle: GENERAL

Is Spare Tire a "Space Saver": YES (yes/no)

Is Spare Tire standard equipment: YES (yes/no)

TEST FLUID DATA:

Test Fluid Type: Red Stoddard Solvent ; Spec. Grav.: 0.764

Kinematic Viscosity: 0.96 CENTISTOKES

Spill Point Volume: 14.15 Gallons (SPV)

Test Volume: 12.74 Gallons (90 to 91% of SPV)

Fuel System Capacity (data from Owner's Manual): 14 gal.

Details of fuel system: \_\_\_\_\_

Electric Fuel Pump:    Yes; X No; Fuel Injection:    Yes; X No

Does electric fuel pump operate with ignition switch "on" and the engine not operating:    Yes;    No

VEHICLE REBOUND AND CRUSH:

Overall Length of Test Vehicle: Pre-Test = R175.2/L174.5 inches

CRUSH=R 27.0 /L 28.8 Post-Test= R148.2/L145.7 inches

FOR FRONTAL IMPACTS, distance from front of test vehicle to the barrier after impact = 10.2 inches

\*With entire fuel system filled from fuel tank through carburetor bowl.

Table 7

POST IMPACT DATA - STDS. 219 & 301

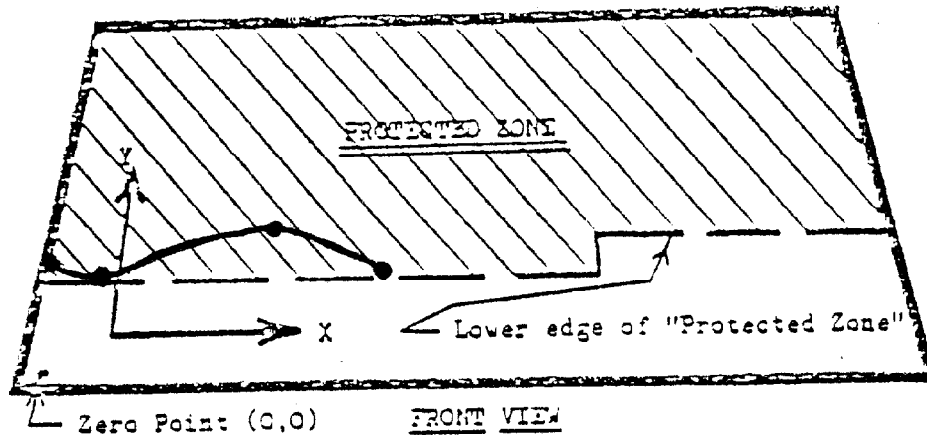
DATA SHEET

- ① TYPE OF TEST: ☒ Frontal (90°) Impact  
☐ Oblique (\_\_\_°) Impact on ☐ Left (Driver's) Side  
☐ Right Side  
☐ Lateral or Side Impact on ☐ Left (Driver's) Side  
☐ Right Side  
☐ Rear Impact
- ② DATE OF TEST: 6-6-79; TIME: 1520; TEMP.: 73 °F.
- ③ VEH. NHTSA NO.: 308-T1-430; VIN: 1X687 AT106262
- ④ REQUIRED VEH. VELOCITY RANGE: 39.5 to 40.5 mph
- ⑤ IMPACT VELOCITY: (traps within 5 feet of impact event)  
 Trap #1 = 39.92 mph; Trap #2 = 39.94 mph  
 Distance from the vehicle's front bumper to the barrier face  
 entering the vehicle velocity measurement device = 64 inch  
 exiting the vehicle velocity measurement device = 24 inch
- ⑥ VEH. STATIC CRUSH: (for Frontal and Rear Impacts Only)  
 Driver's Side = 28.8 in.; Passenger's Side = 27.0 in.  
 Average = 27.9 inches  
 Crush Details:  
 NONE
- ⑦ VEH. STATIC CRUSH: (for Side Impacts Only)  
 Amount of Crush = \_\_\_\_\_ inches on \_\_\_\_\_ side  
 Crush Details:
- ⑧ VEH. REBOUND: (from rigid barrier only)  
 Driver's Side = 11.4 inches; Pass. Side = 9.1 inches  
 Average = 10.2 inches
- ⑨ REMARKS:

FIGURE 5

WINDSHIELD ZONE INTRUSION, FMVSS 219

DATA SHEET



With the zero coordinate for the X-Y grid located at the lower right corner (passenger side) of the windshield, record the following positions:

- (A) The area that the "Protected Zone" template was penetrated more than .25 inches by a vehicle component other than one which is normally in contact with the windshield.

Coordinates

| X      | Y     |
|--------|-------|
| 15-1/4 | 8-1/2 |
| 11-1/2 | 9-1/2 |
| 5      | 8     |
| 1      | 8-3/4 |

- (B) The area beneath the "Protected Zone" that the inner surface of the windshield was penetrated by a vehicle component.

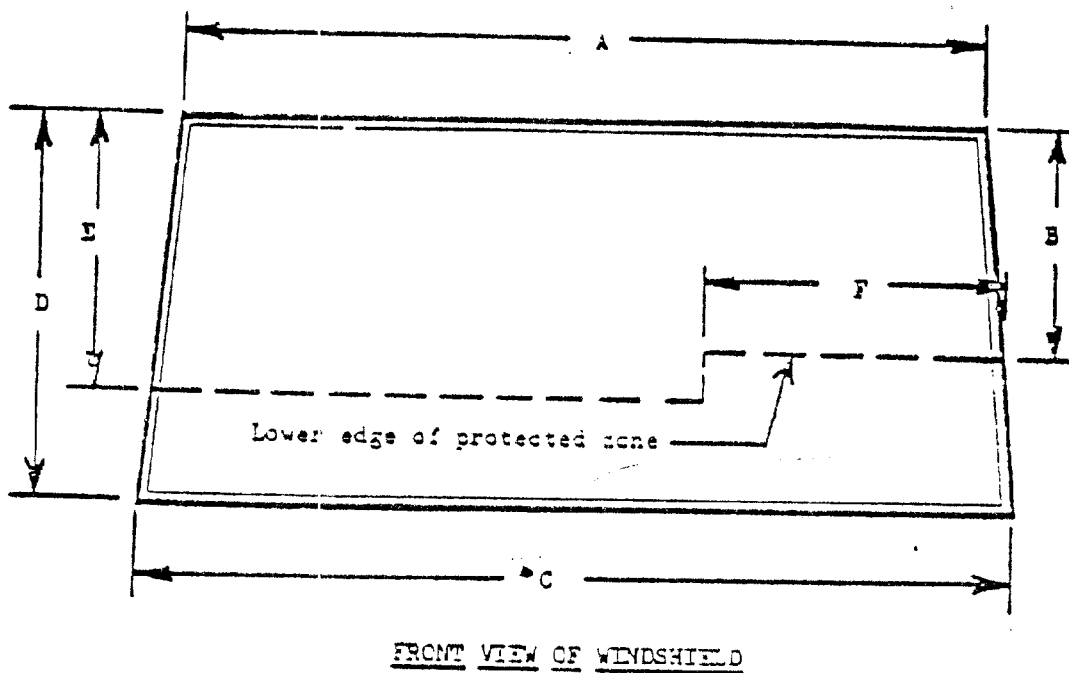
Coordinates

| X | Y |
|---|---|
|   |   |
|   |   |
|   |   |

- (C) Record any windshield retention clips or brackets used to insure that the windshield would not disengage from the body.

NONE

FIGURE 6 PROTECTED ZONE



Provide all dimensions necessary to reproduce the protected zone.

Method of adhering styrofoam to the windshield:

Construction adhesive applied to the window surface and to  
the back side of the styrofoam, then clamped in place until dry.

FIGURE 7 SUMMARY OF FMVSS 212 DATA

Details of windshield mounting (method of retention, type of trim, etc.):

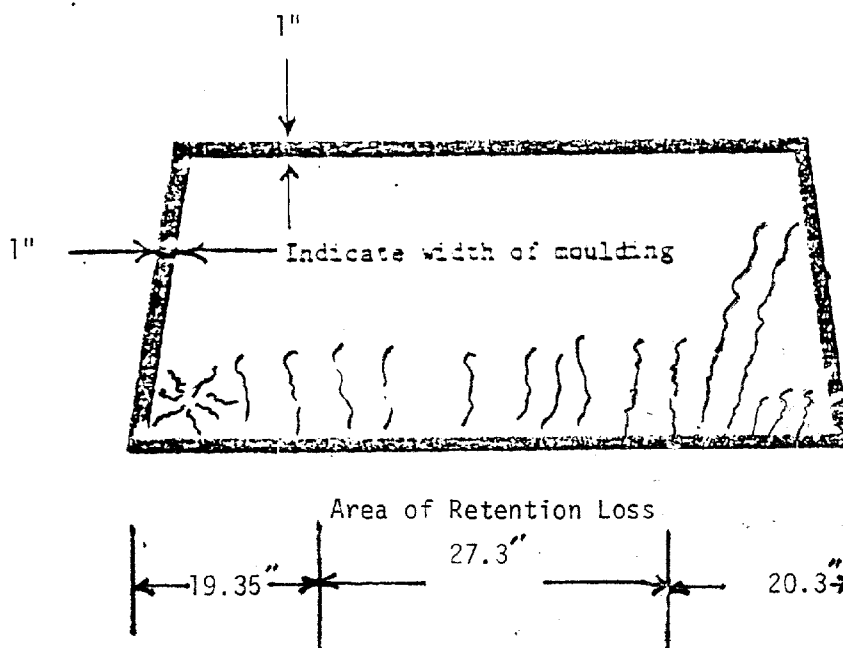
The windshield is bonded in place and has chrome trim piece around the perimeter of the window.

|             | WINDSHIELD PERIPHERY |           |
|-------------|----------------------|-----------|
|             | PRETEST              | POST TEST |
| RIGHT SIDE  | 78.5                 | 65.1      |
| LEFT SIDE   | 78.5                 | 64.6      |
| ***TOTAL*** | 157.0                | 129.7     |

82.6%  
Retention

The standard requires that POST TEST be a minimum of 75 percent of the PRETEST total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

AREA OF RETENTION FAILURE:



6525-V-1

Table 8

"FUEL SYSTEM INTEGRITY" POST-IMPACT  
TEST DATA, FMVSS No. 301-75

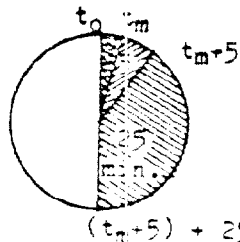
TEST VEHICLE NHTSA NO.: 3 0 8 T 1 4 3 0; TEST DATE: 6-6-79

VEH. MFR./MAKE/MODEL: 1980 CHEVROLET CITATION

Test vehicle fuel tank filled to 90-91% of capacity with Stoddard Solvent and with electric fuel pump operating (if it will operate without engine operation. Part 572 test dummies located at each front designated seating position.

- A. TEST VEHICLE IMPACT TYPE: ☒ Frontal (40 mph)  
☐ Oblique (35 mph) with \_\_\_\_° barrier face first contacting \_\_\_\_ (driver/passenger) side.  
☐ Rear Moving Barrier (35 mph)  
☐ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT - - -



|                                                       | ACTUAL | MAX. ALLOW. |
|-------------------------------------------------------|--------|-------------|
| 1. From impact until vehicle motion ceases - - - - -  | 0      | 1 oz.       |
| 2. For 5 minute period after veh. motion ceases - - - | 0      | 5 oz.       |
| 3. For next 25 minutes - - -                          | 0      | 1 oz./1 min |

B. TEST VEHICLE STATIC ROLLOVER:

TEST INFORMATION WILL BE ADDED TO THE FOLLOWING STATIC ROLLOVER DATA SHEETS:

- (1) FIGURE 8A - Rollover data for 0° to 90° test phase.
- (2) FIGURE 8B - Rollover data for 90° to 180° test phase.
- (3) FIGURE 8C - Rollover data for 180° to 270° test phase.
- (4) FIGURE 8D - Rollover data for 270° to 360° test phase.

C. SOLVENT SPILLAGE DETAILS:

NONE

Table 8A

VEH. NHTSA ID NO.

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

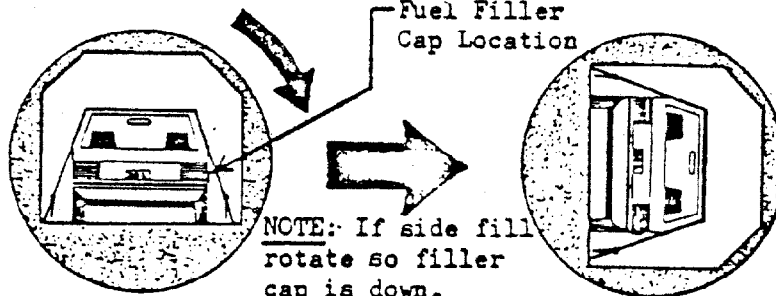
3 0

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 8 | T | 1 | 4 | 3 | 0 |
|---|---|---|---|---|---|

TEST PHASE:

0°

90°

Start 4.4 min  
from eventI. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time - - = 2 minutes, 51 seconds  
(Spec. Range = 1 to 3 minutes)

FMVSS 301-75 Position Hold Time - - - = 5 minutes, 00 seconds

TOTAL - - - - - = 7 minutes, 51 seconds

Next Whole Minute Interval - - - - - = 8 minutes

II. FMVSS 301-75 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 8B

VEH. NHTSA ID NO.:

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

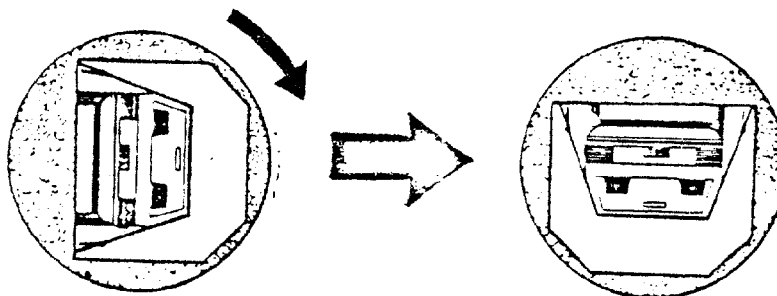
3 0

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 8 | T | 1 | 4 | 3 | 0 |
|---|---|---|---|---|---|

TEST PHASE:

90°

180°

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:
 Rollover Fixture 90° Rotation Time-- = 2 minutes, 58 seconds  
 (Spec. Range = 1 to 3 minutes)

FMVSS 301-75 Position Hold Time-- = 5 minutes, 00 seconds

TOTAL-- = 7 minutes, 58 seconds

Next Whole Minute Interval-- = 8 minutes

II. FMVSS 301-75 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

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

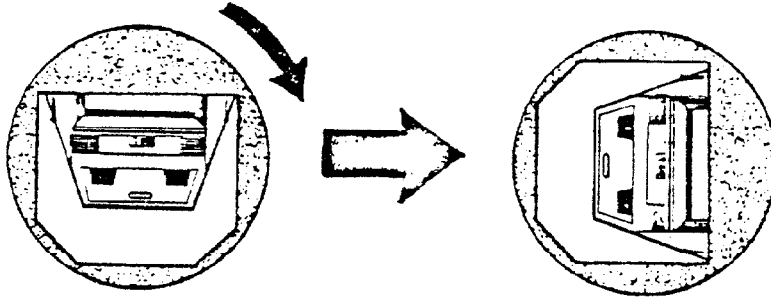
3 0

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 8 | T | 1 | 4 | 3 | 0 |
|---|---|---|---|---|---|

TEST PHASE:

180°

270°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time - - = 2 minutes, 57 seconds  
(Spec. Range = 1 to 3 minutes)

FMVSS 301-75 Position Hold Time - - - = 5 minutes, 00 seconds

TOTAL - - - - - = 7 minutes, 57 seconds

Next Whole Minute Interval - - - - - = 8 minutes

II. FMVSS 301-75 REQUIREMENTS:

(1) Time Period--

|                                     |           |           |                    |
|-------------------------------------|-----------|-----------|--------------------|
| First 5 min. FROM onset of rotation | 6th. min. | 7th. min. | 8th. min. 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 8D

VEH. NHTSA ID NO.

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

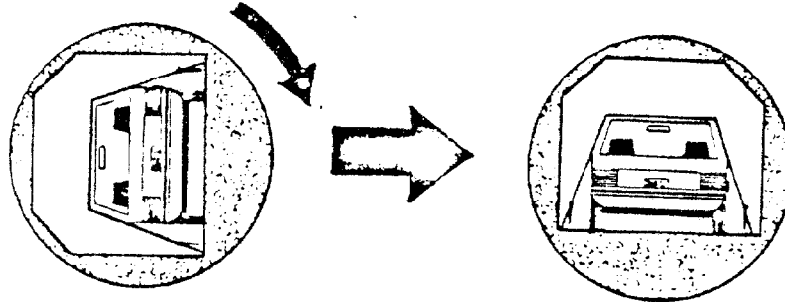
3 0

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 8 | T | 1 | 4 | 3 | 0 |
|---|---|---|---|---|---|

TEST PHASE:

270°

360°

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:
 Rollover Fixture 90° Rotation Time - - =  minutes,   seconds  
 (Spec. Range = 1 to 3 minutes)

 FMVSS 301-75 Position Hold Time - - - =  minutes,   seconds

 TOTAL - - - - - =  minutes,   seconds

 Next Whole Minute Interval - - - - - =  minutes
II. FMVSS 301-75 REQUIREMENTS:

(1) Time Period--

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

(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

APPENDIX A  
STILL PHOTOGRAPHS

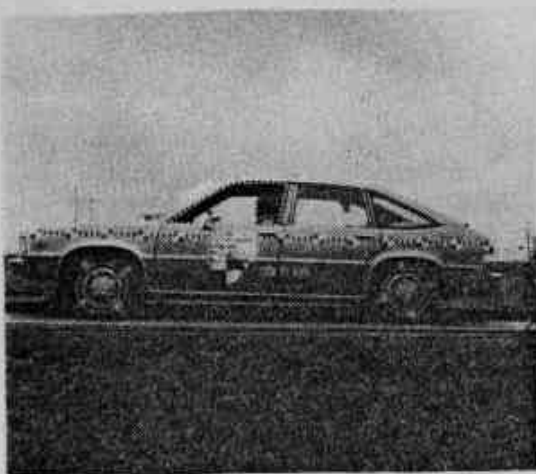
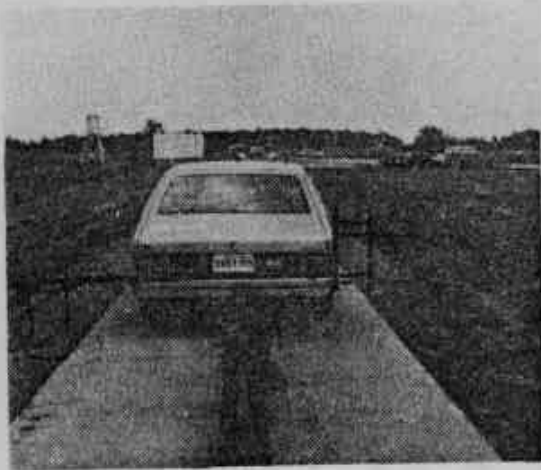


FIGURE 1A FULL FRONT, SIDE, REAR AND THREE-QUARTER EXTERIOR VIEW

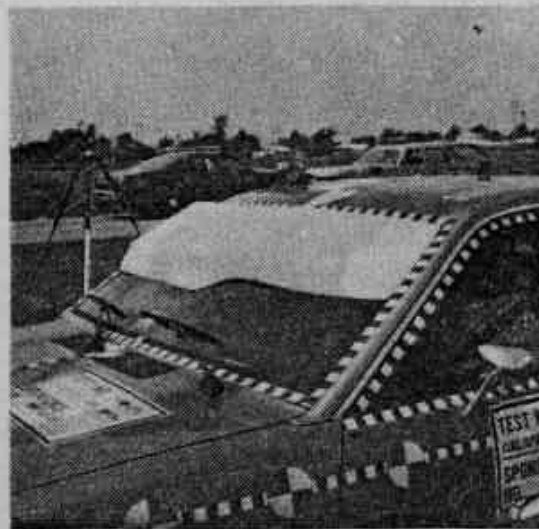
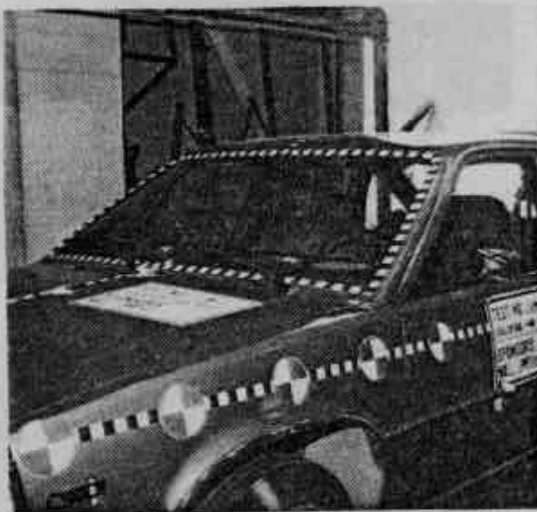
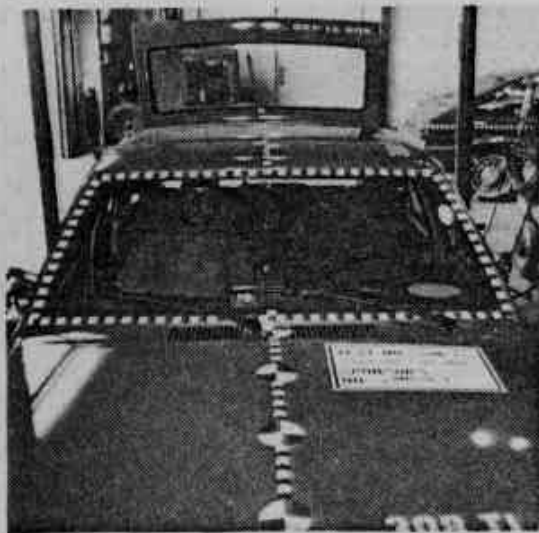


FIGURE 2A FULL VIEW OF WINDSHIELD WITH AND WITHOUT STYROFOAM TEMPLATE



FIGURE 3A PRE- AND POST-TEST NO. 308-T1-430 1980 CHEVROLET CITATION EXTERIOR

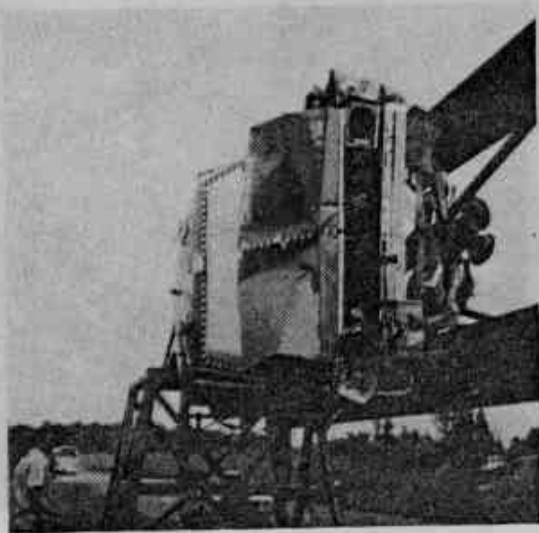


FIGURE 4A POST-TEST VIEW FRONT AND SIDE

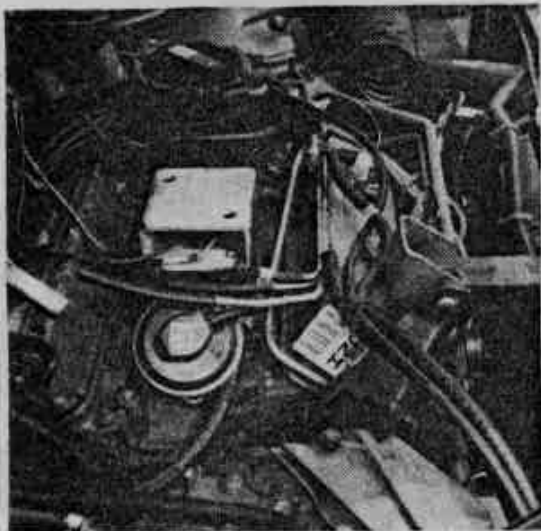


FIGURE 5A ENGINE BLOCK ACCELEROMETER

VELOCITY TRAP COUNTER DISPLAY

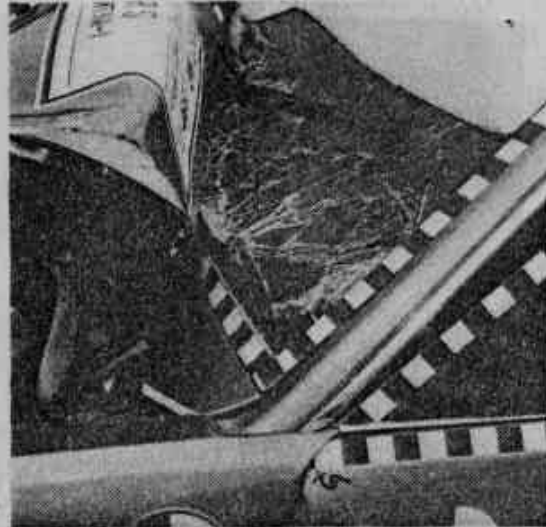
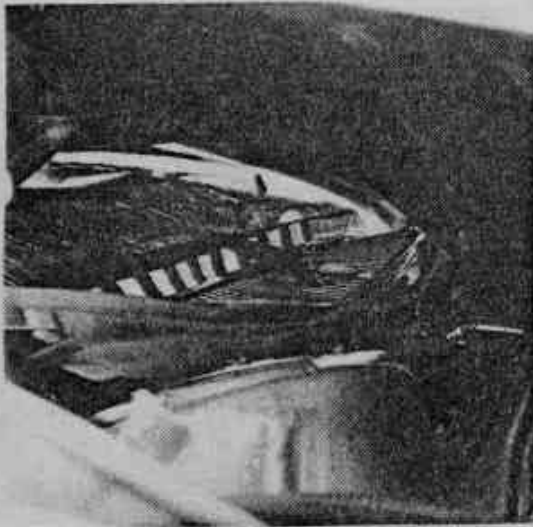
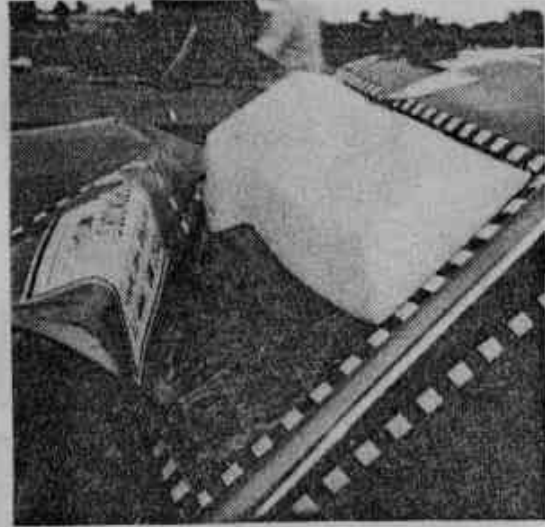
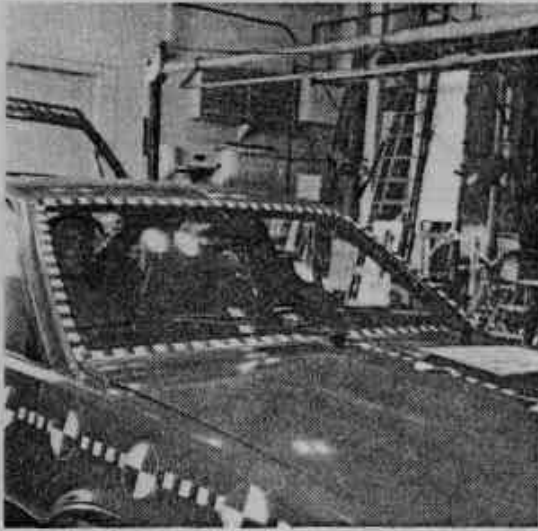


FIGURE 6A PRE- AND POST-TEST VIEWS OF WINDSHIELD AND RETENTION LOSS

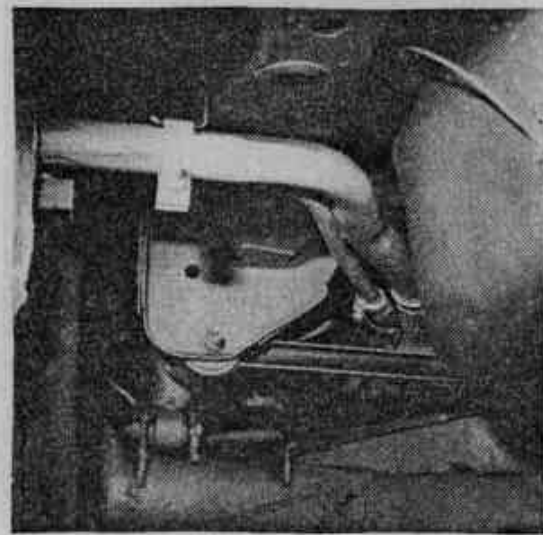
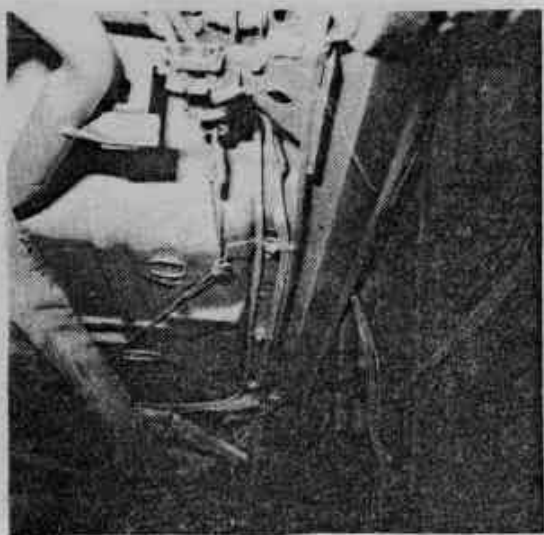
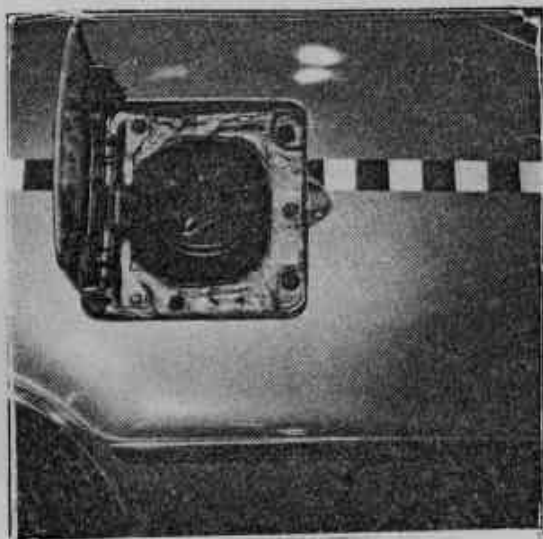
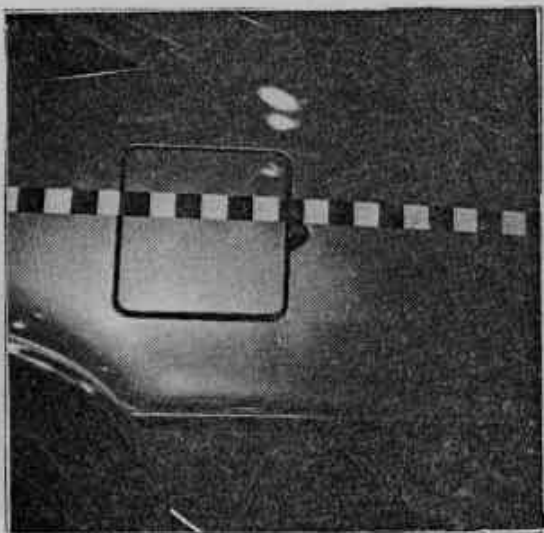


FIGURE 7A FUEL/VAPOR LINES AND FILLER PIPE

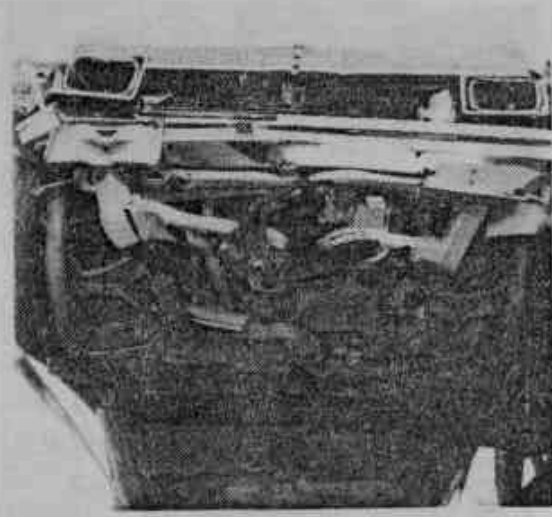
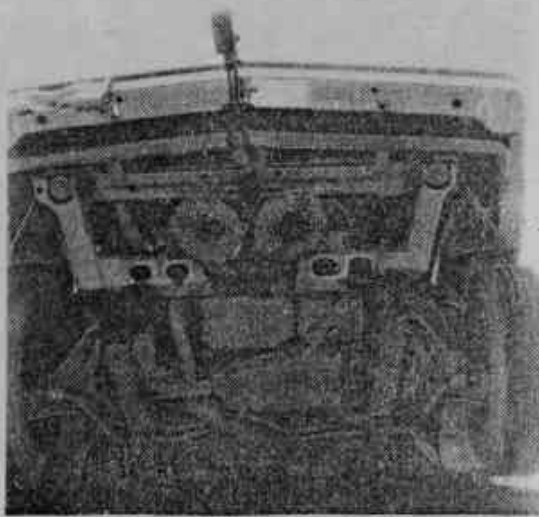


FIGURE 8A PRE- AND POST-TEST VIEW OF FRONT UNDER BODY

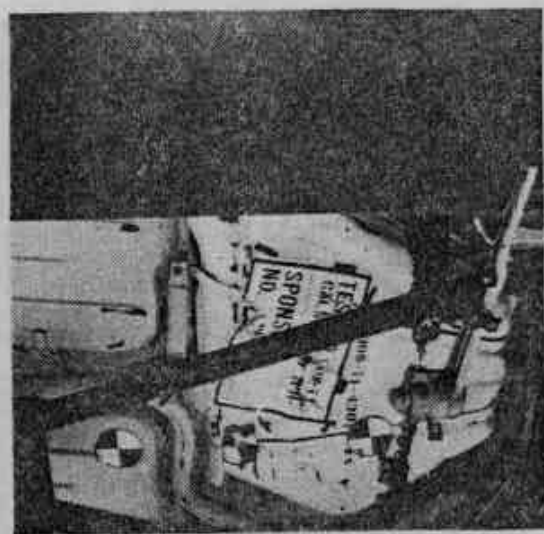
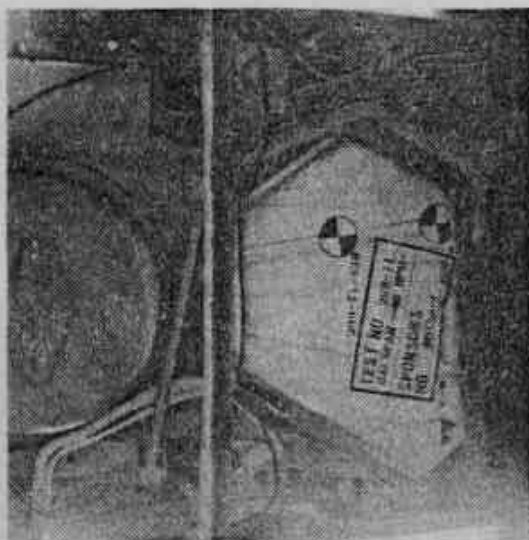


FIGURE 9A PRE- AND POST-TEST VIEW OF REAR UNDER BODY

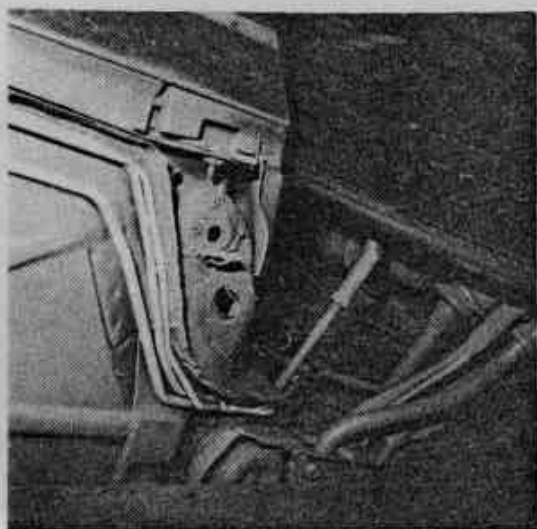


FIGURE 10A PRE- AND POST-TEST VIEW OF FUEL LINES

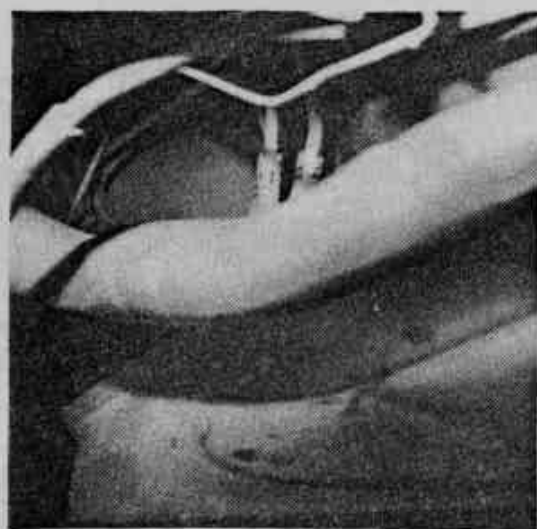


FIGURE 11A PRE- AND POST-TEST VIEW OF FILL AND VENT LINES



FIGURE 12A PRE- AND POST TEST DRIVER AND PASSENGER POSITION

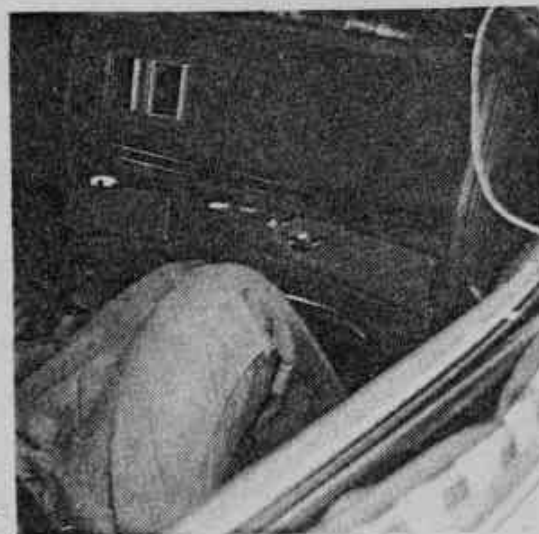
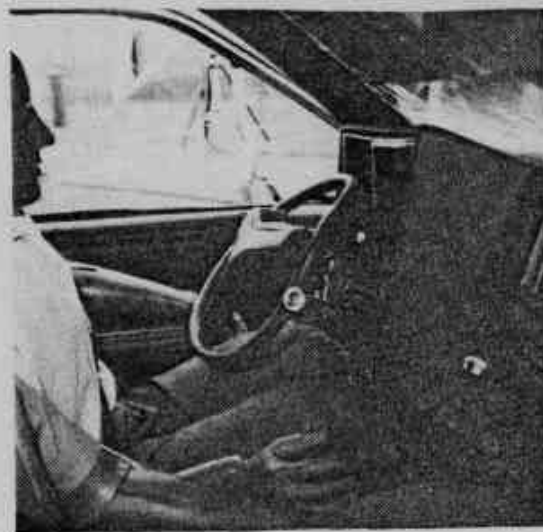


FIGURE 13A POST-TEST DRIVER AND PASSENGER FINAL POSITION AND DEFORMATION

## APPENDIX B

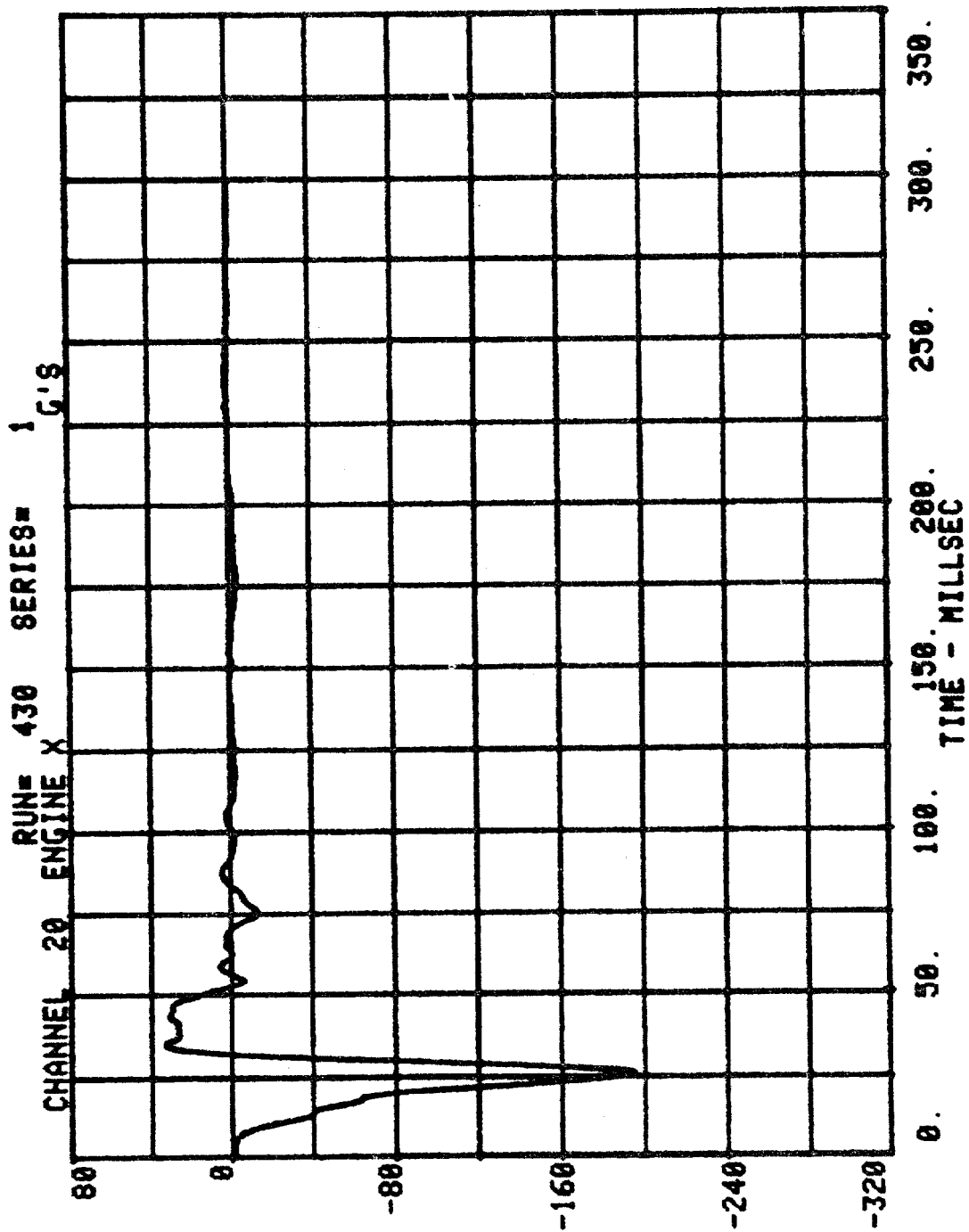
### VEHICLE AND DUMMY RESPONSE DATA

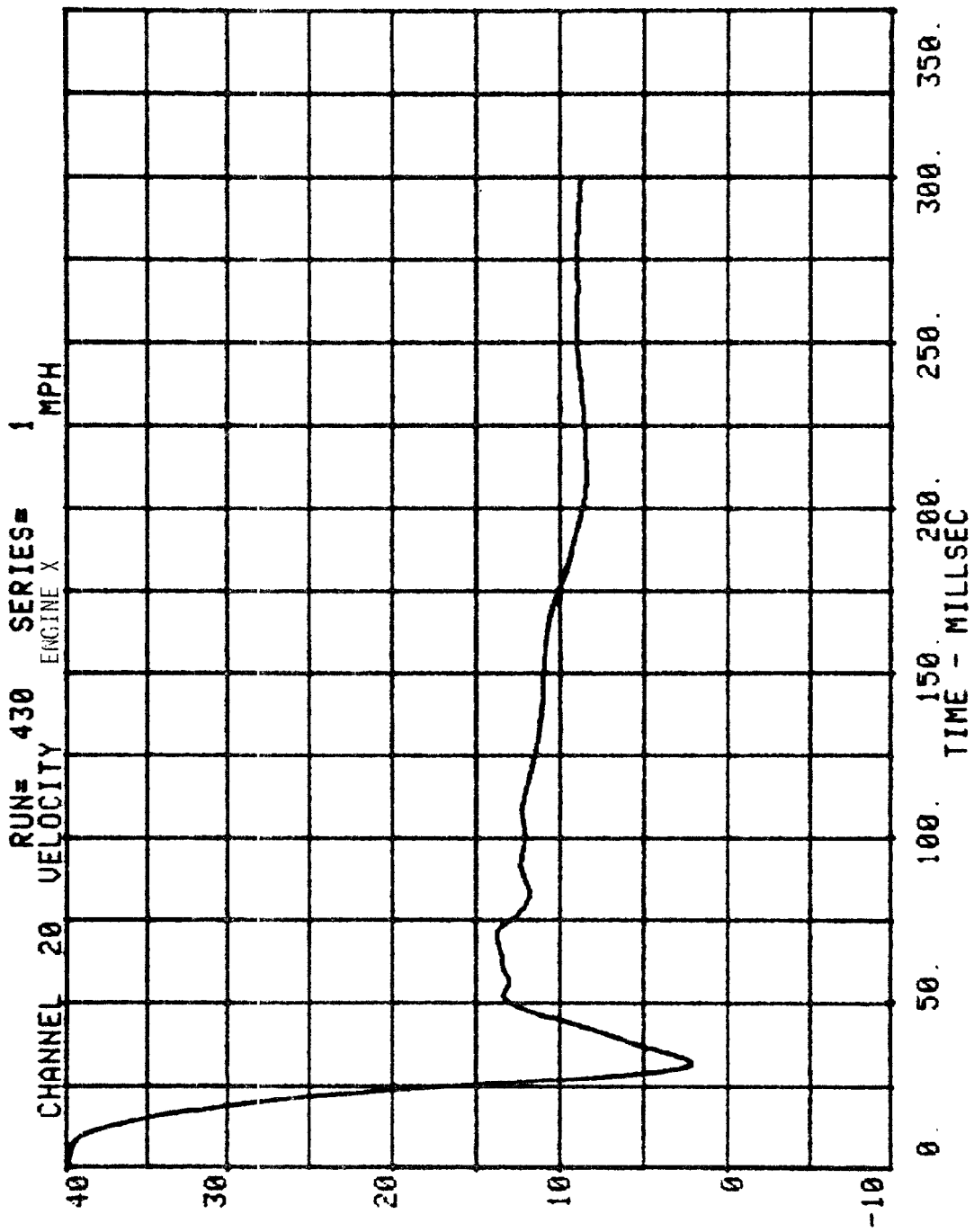
TEST NO. 308-T1-430  
1980 CHEVROLET CITATION  
VEHICLE DATA

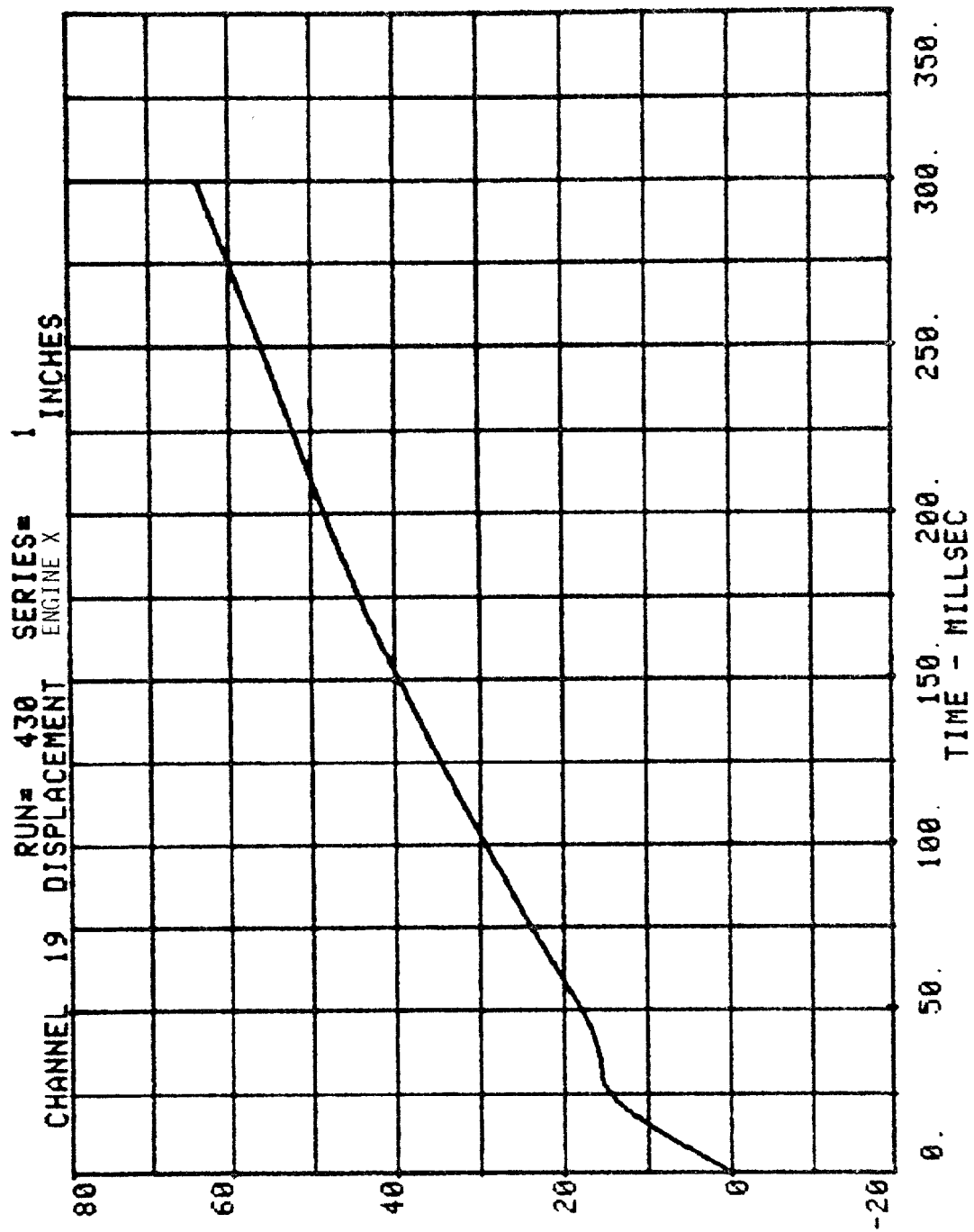
FILTER CHANNEL CLASS

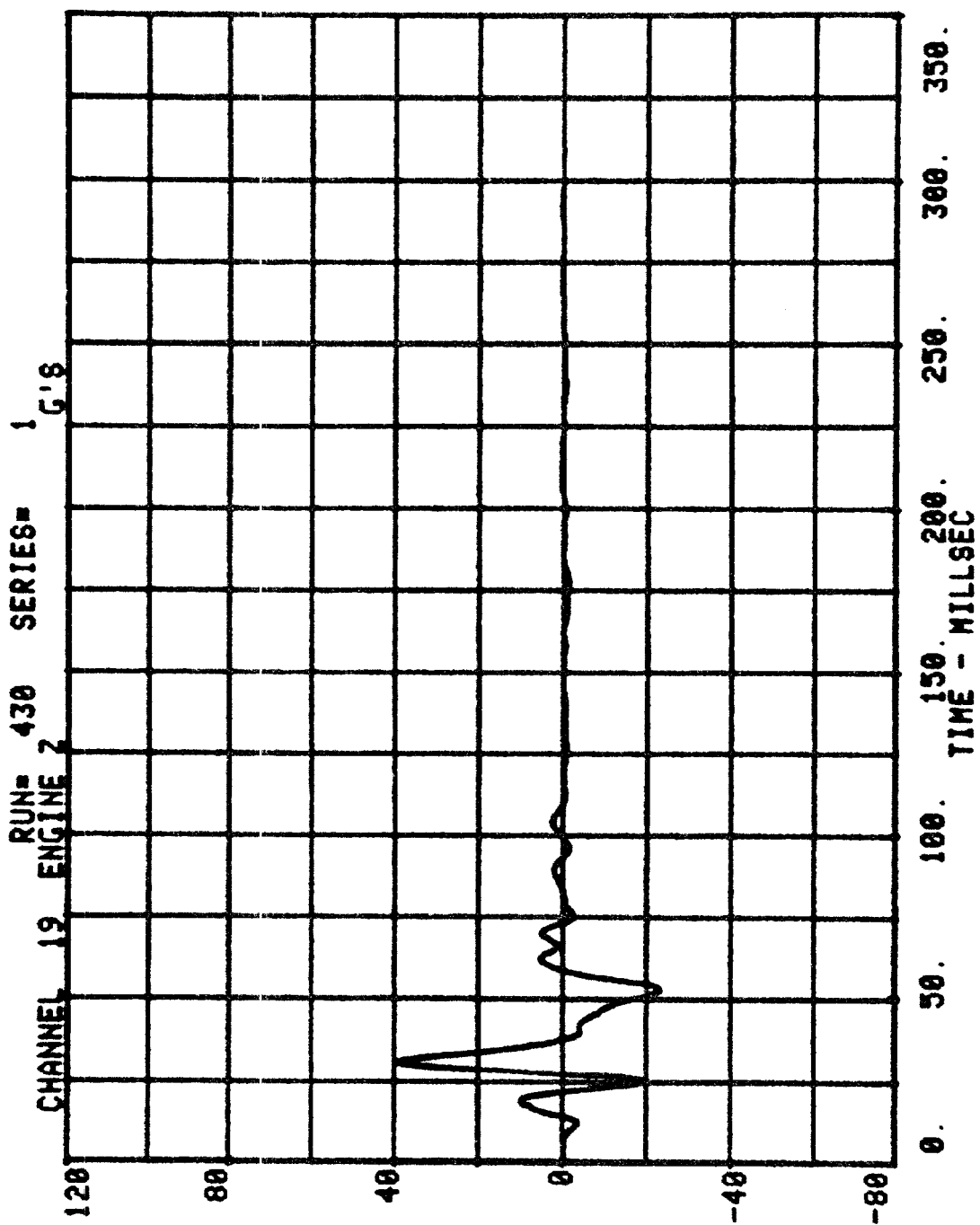
VEHICLE DATA

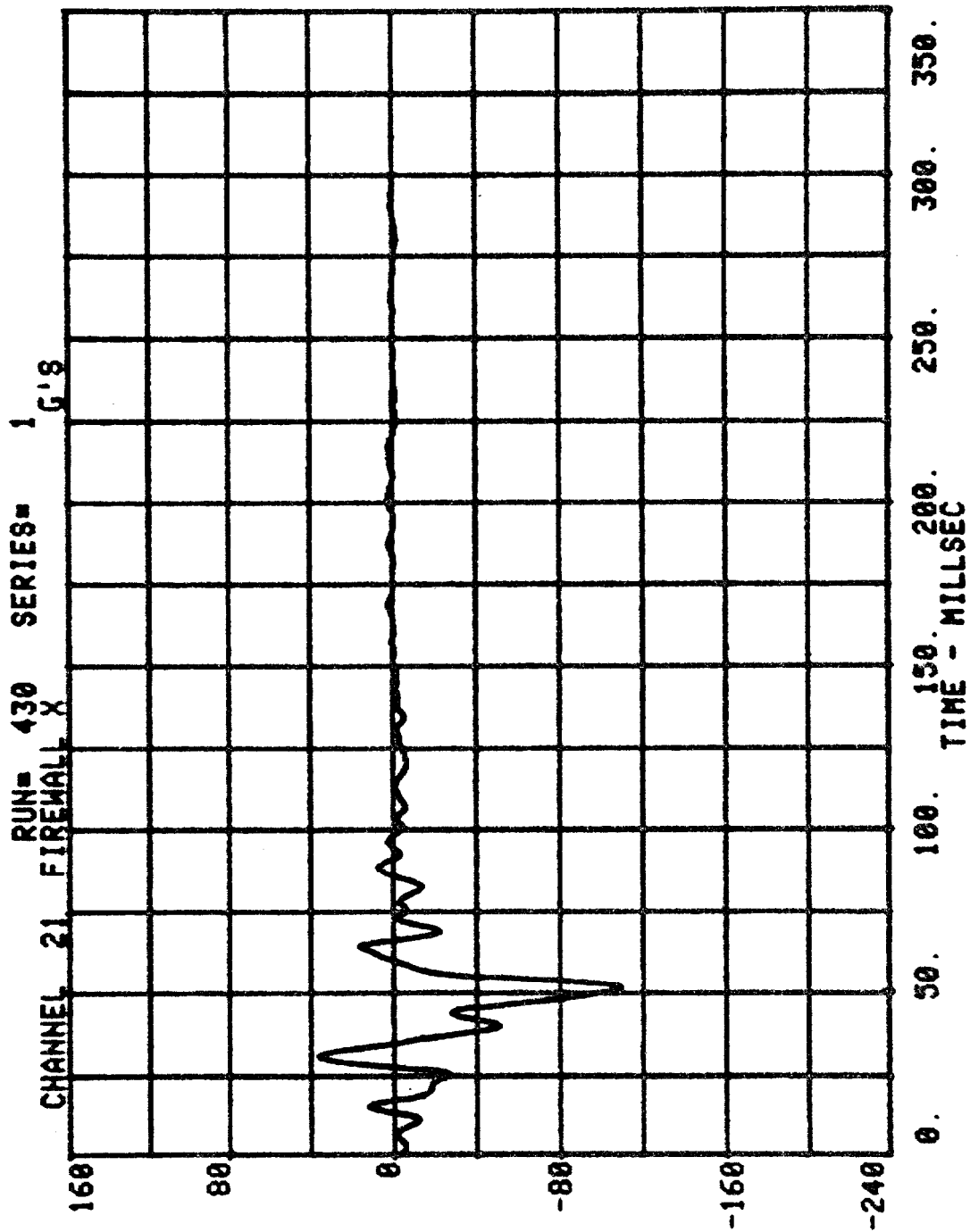
60

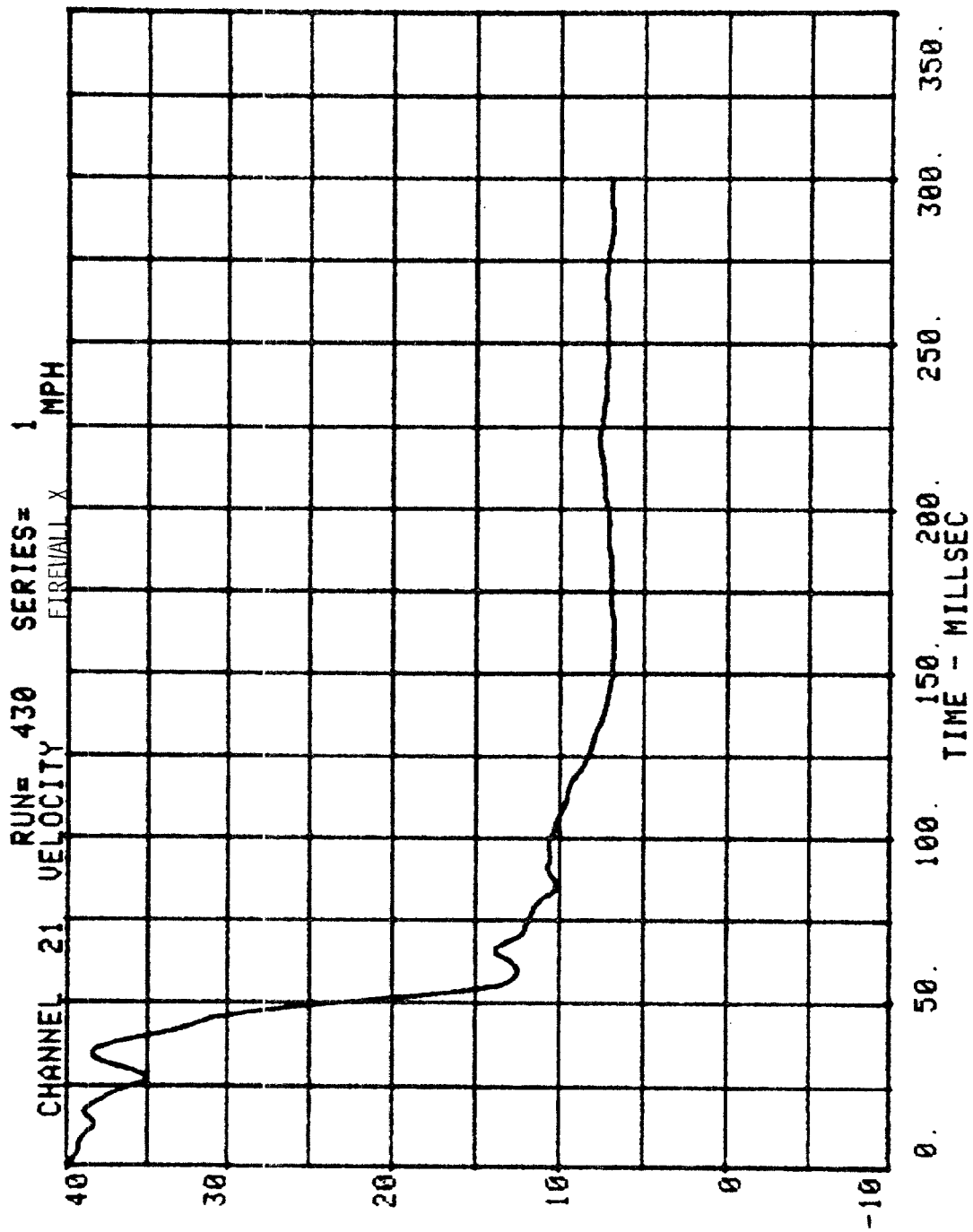


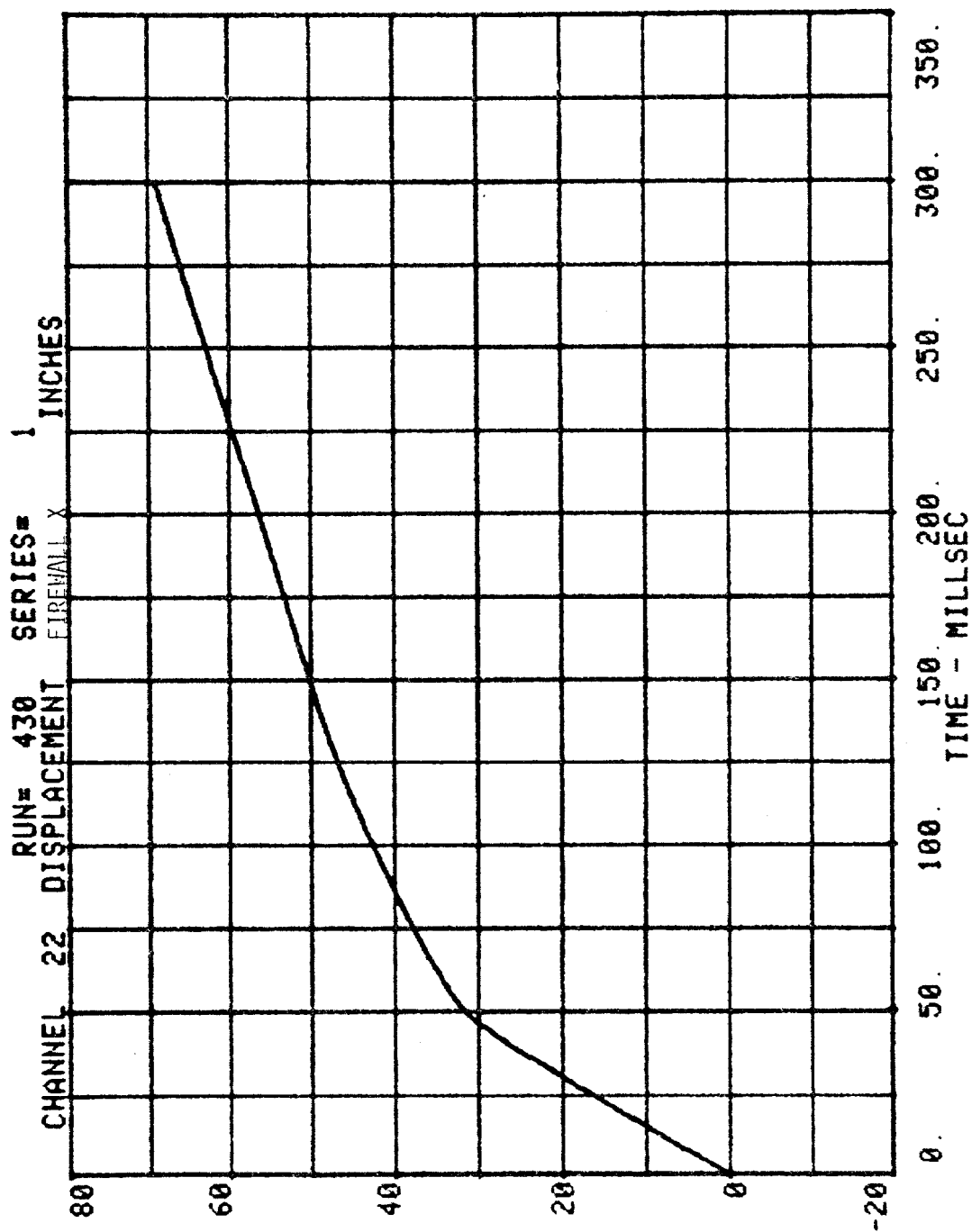


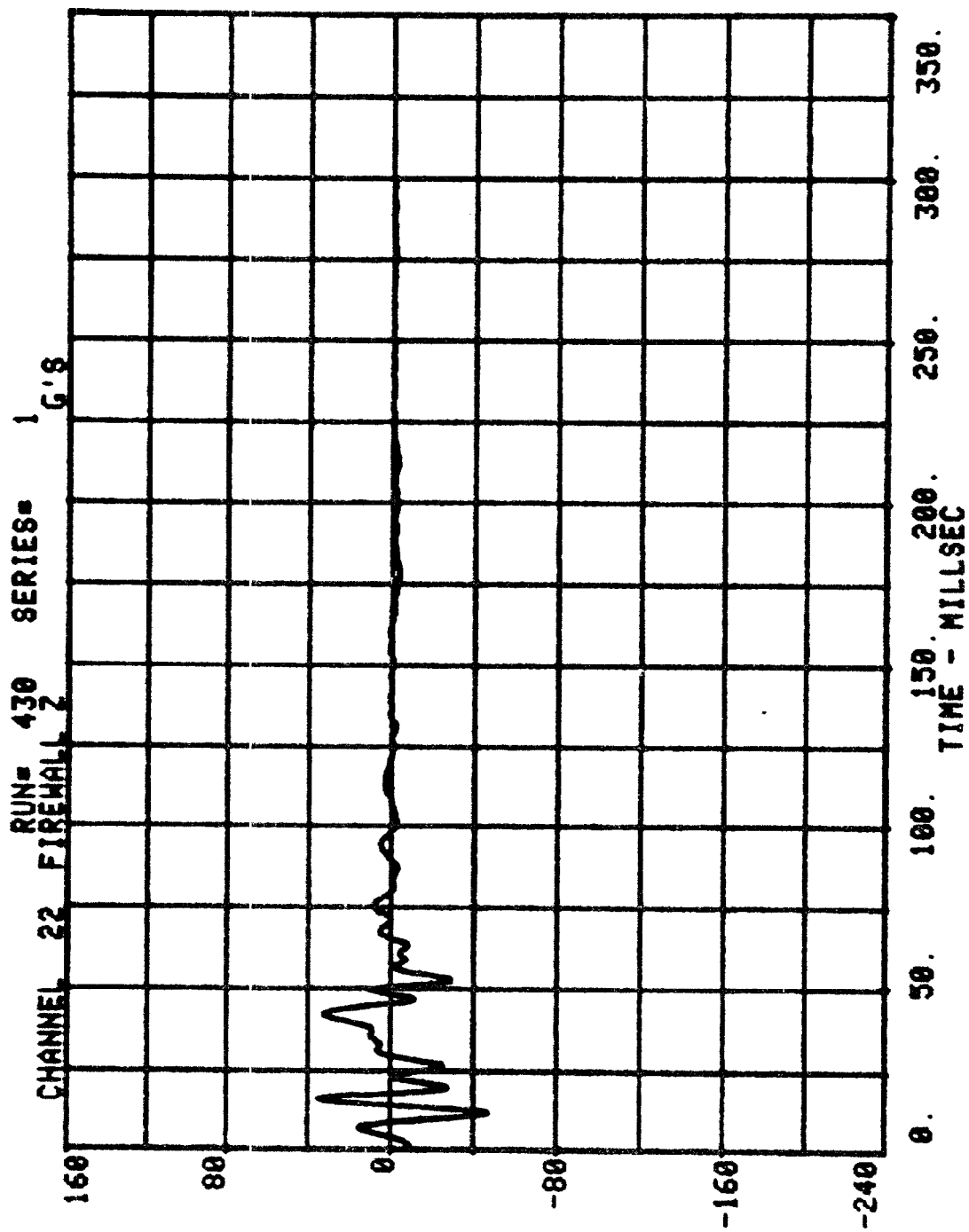


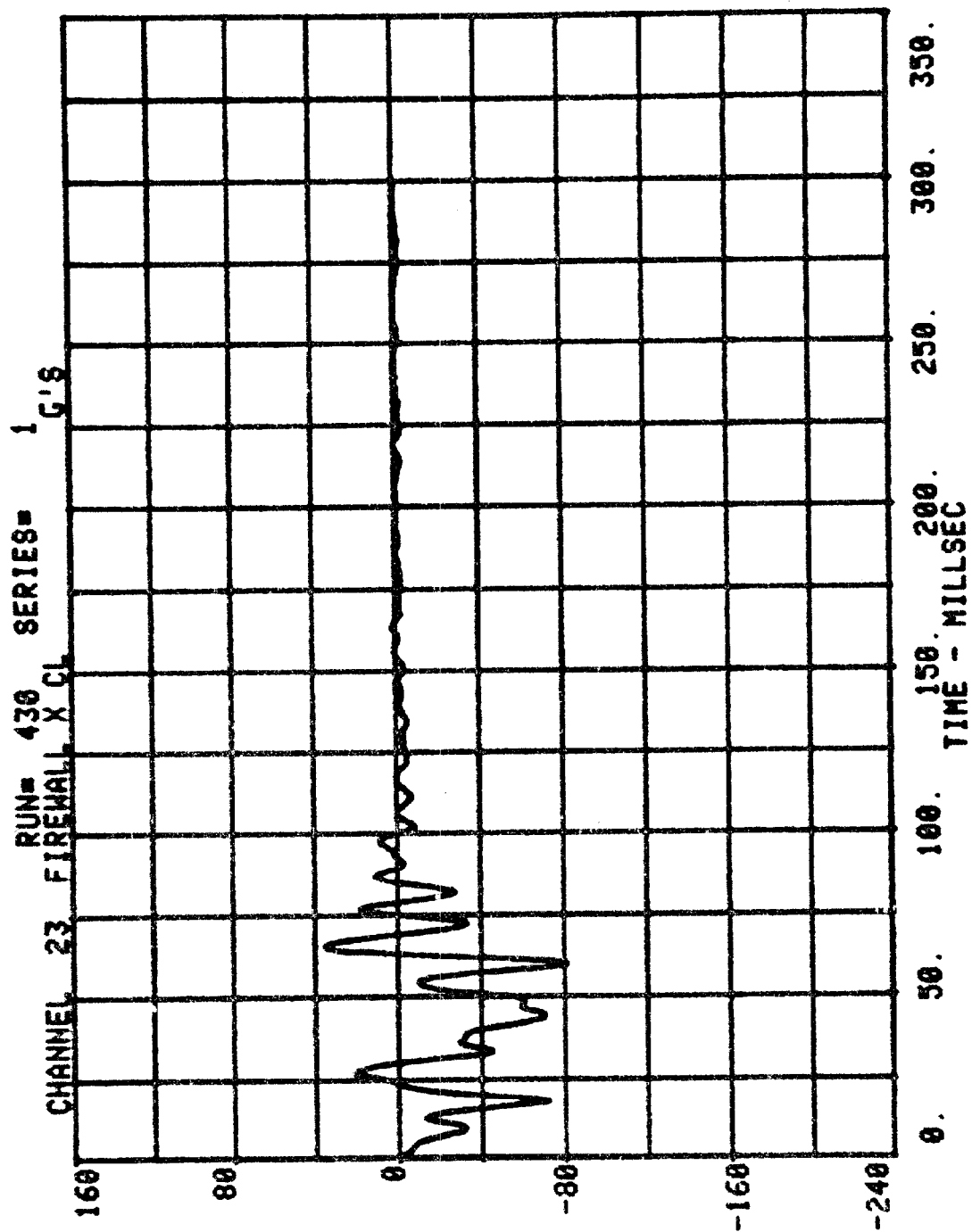


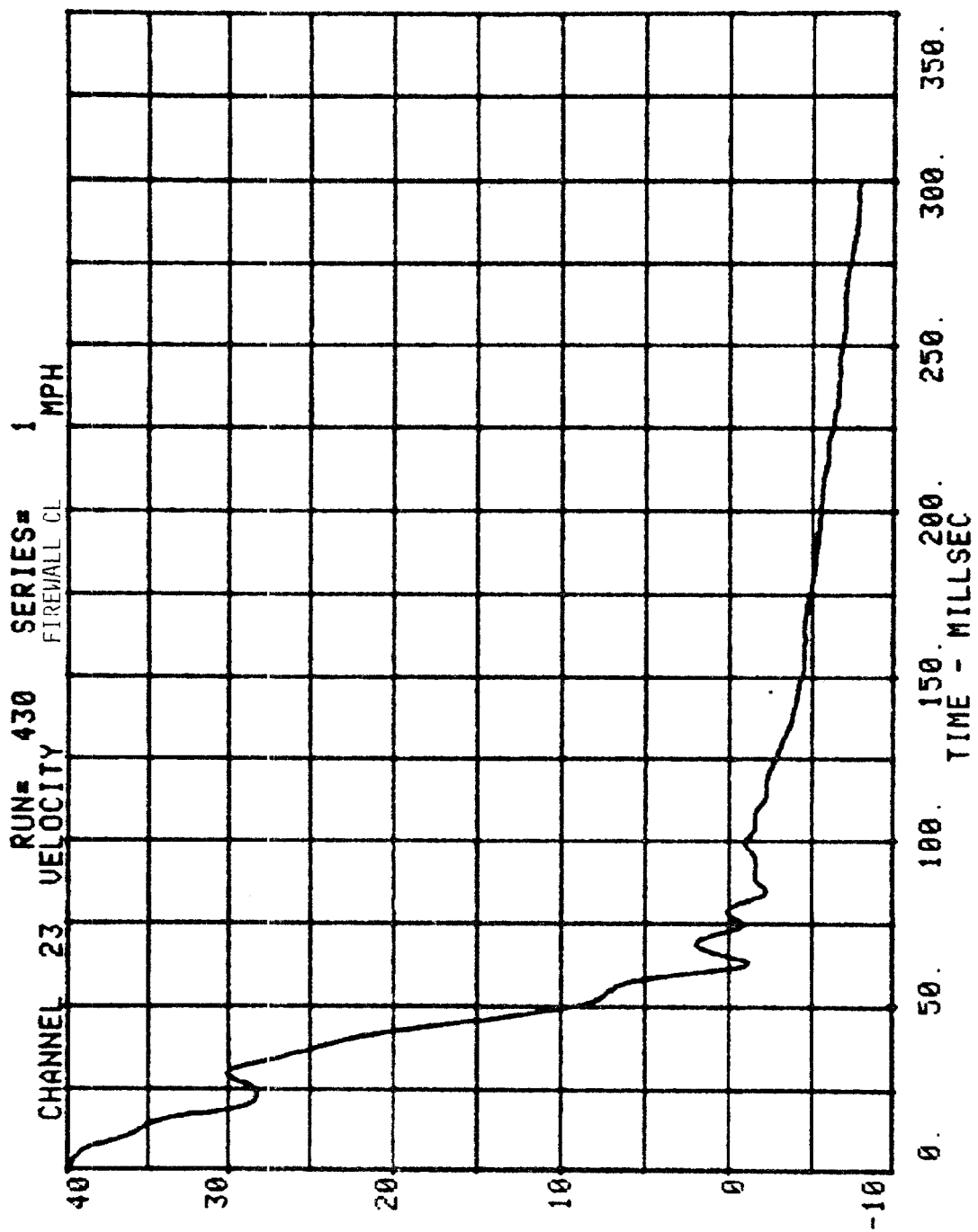


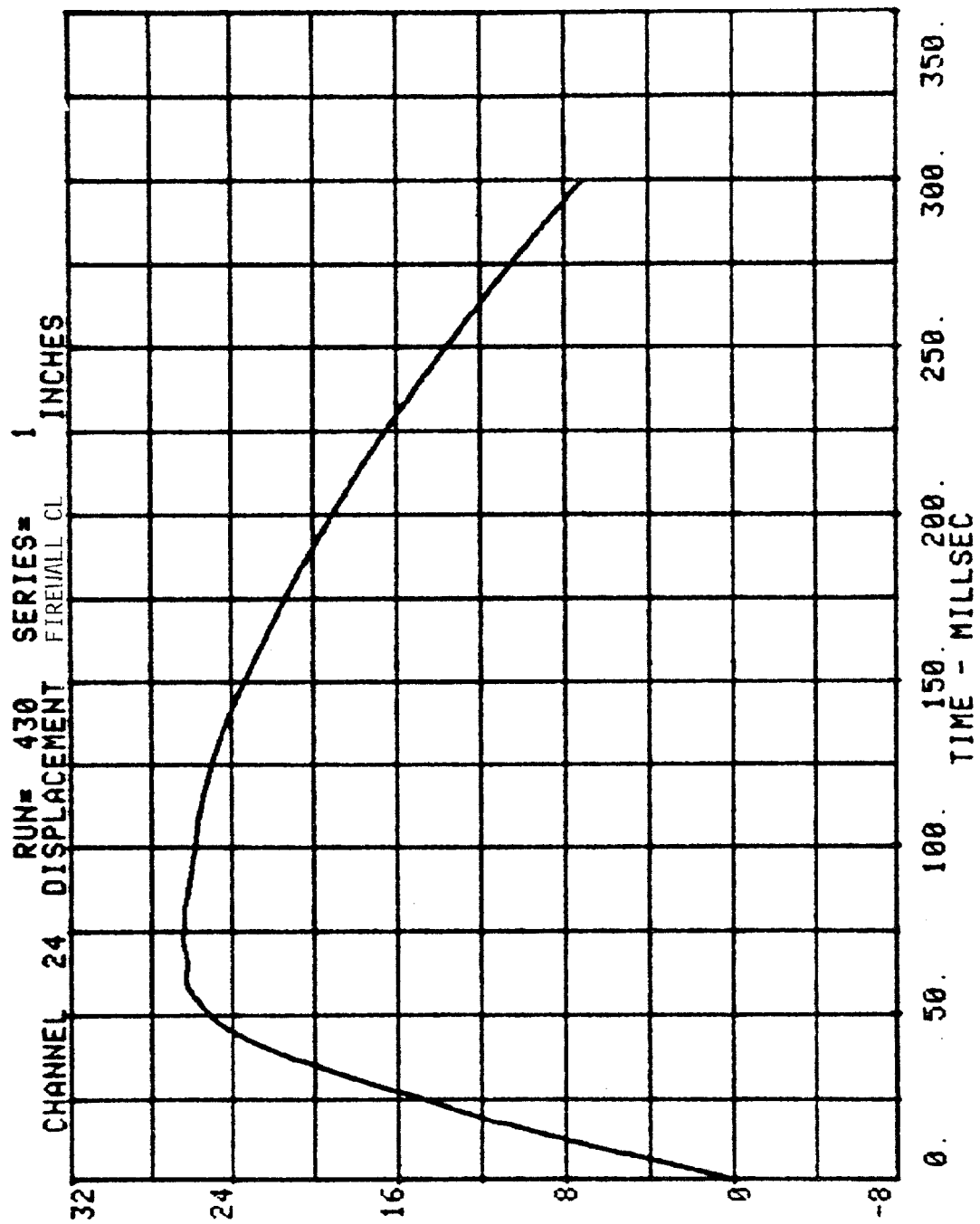


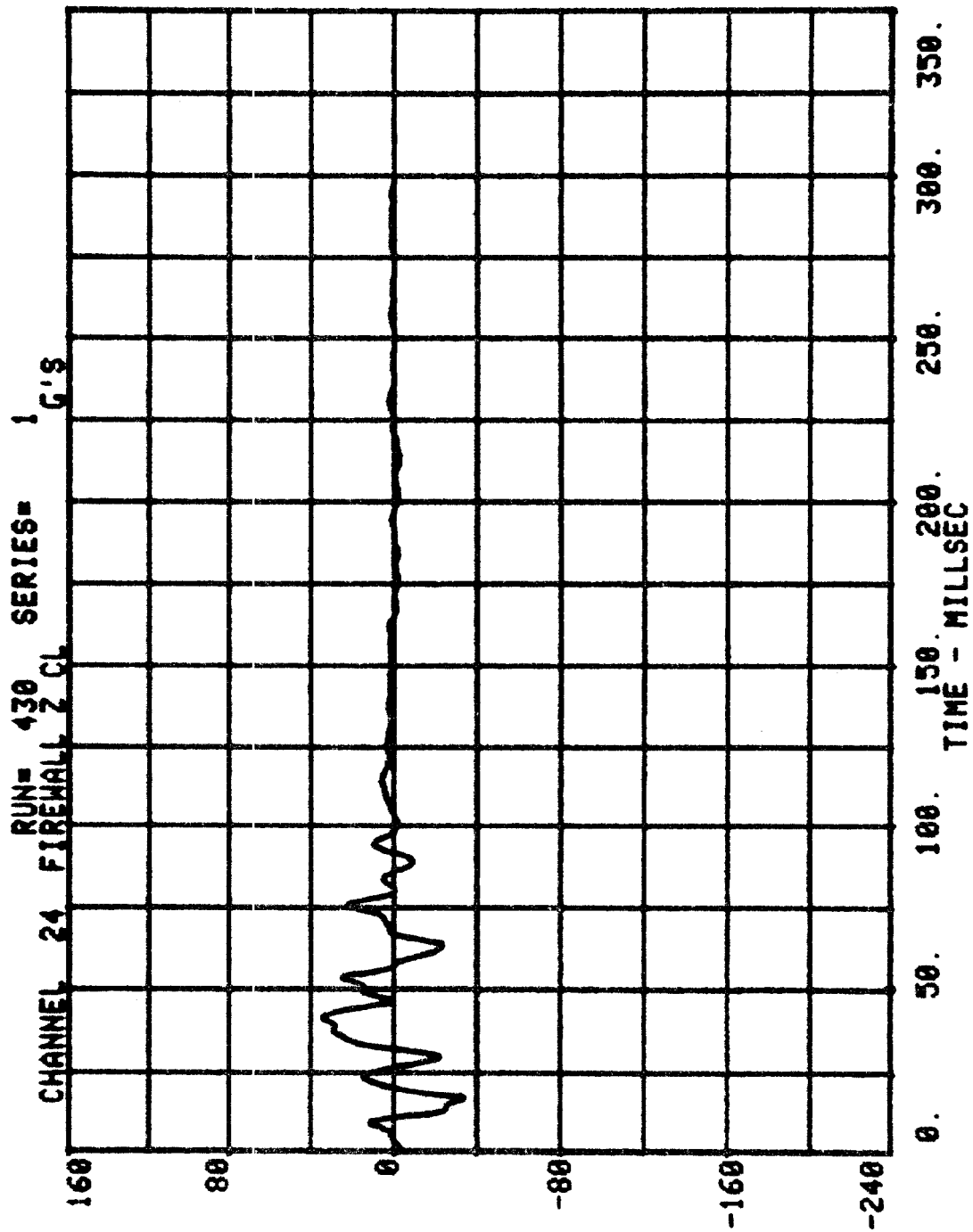


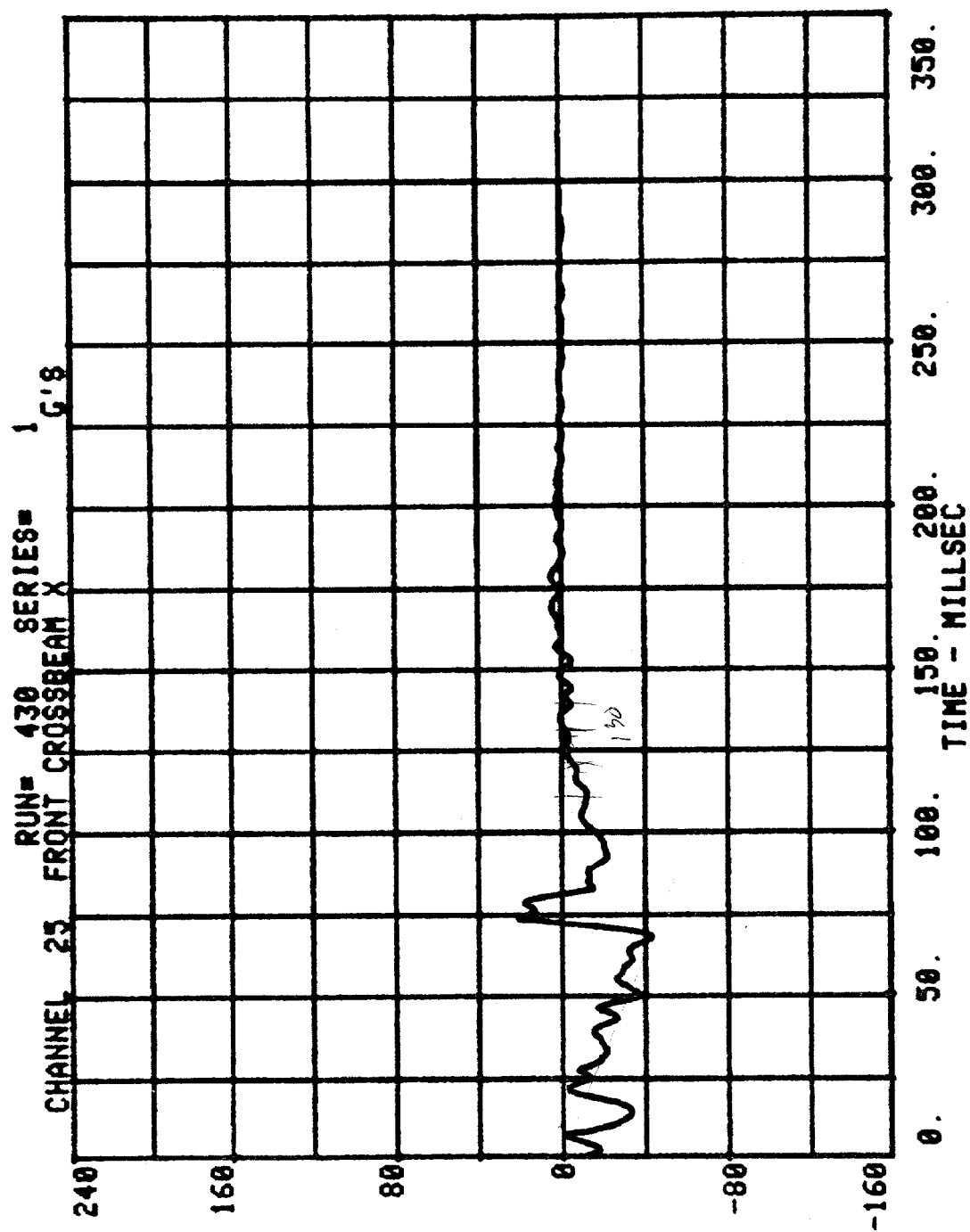


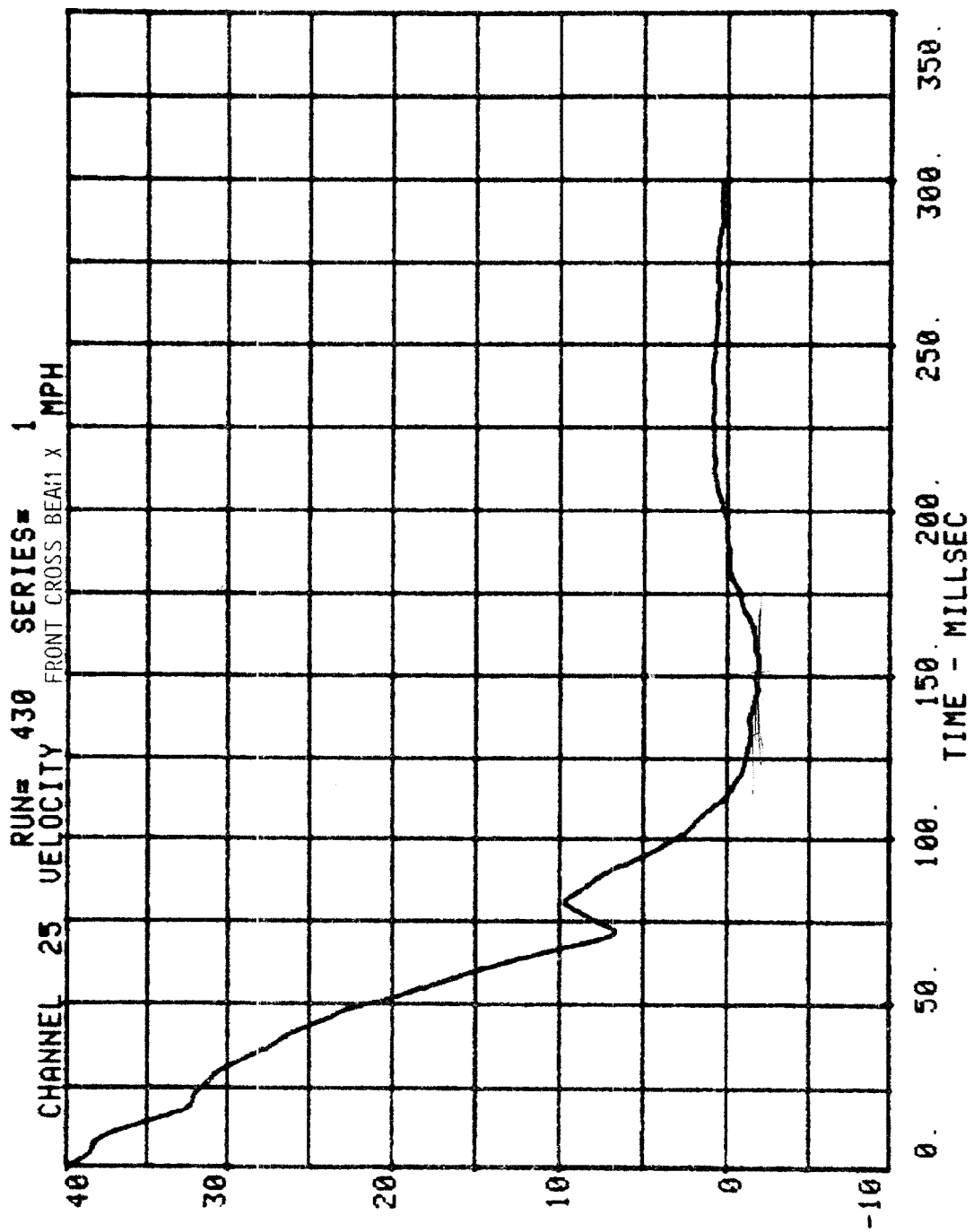


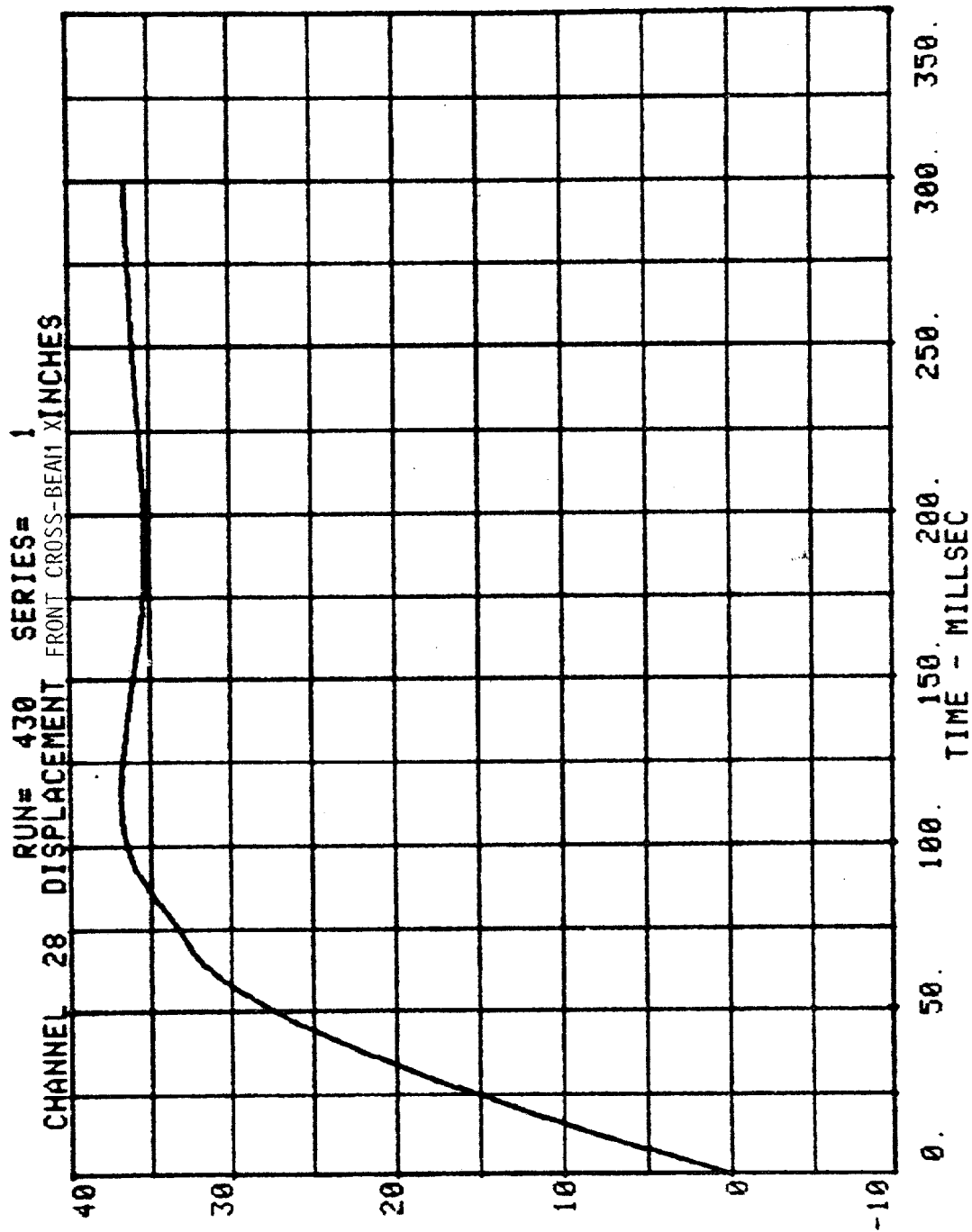


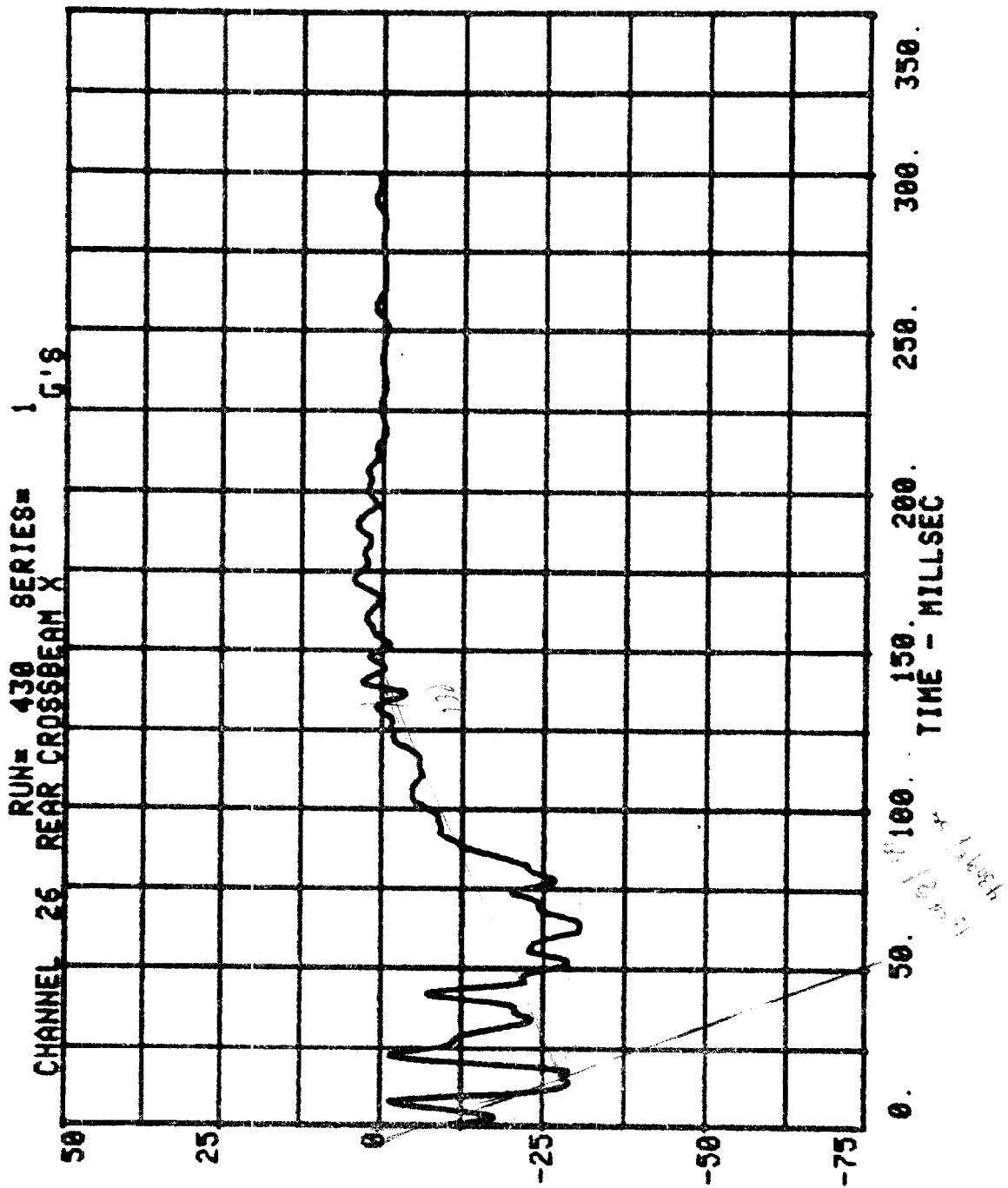


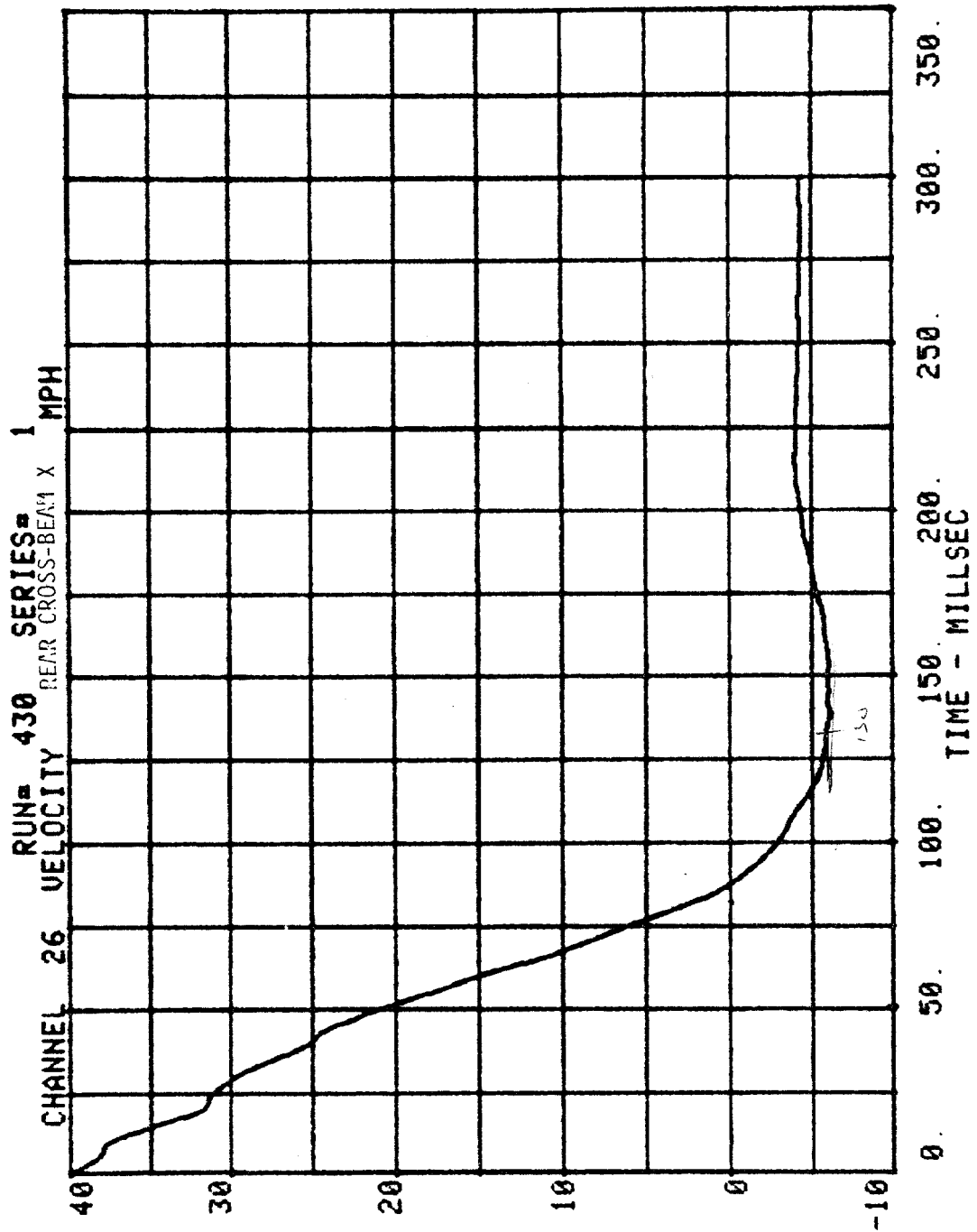


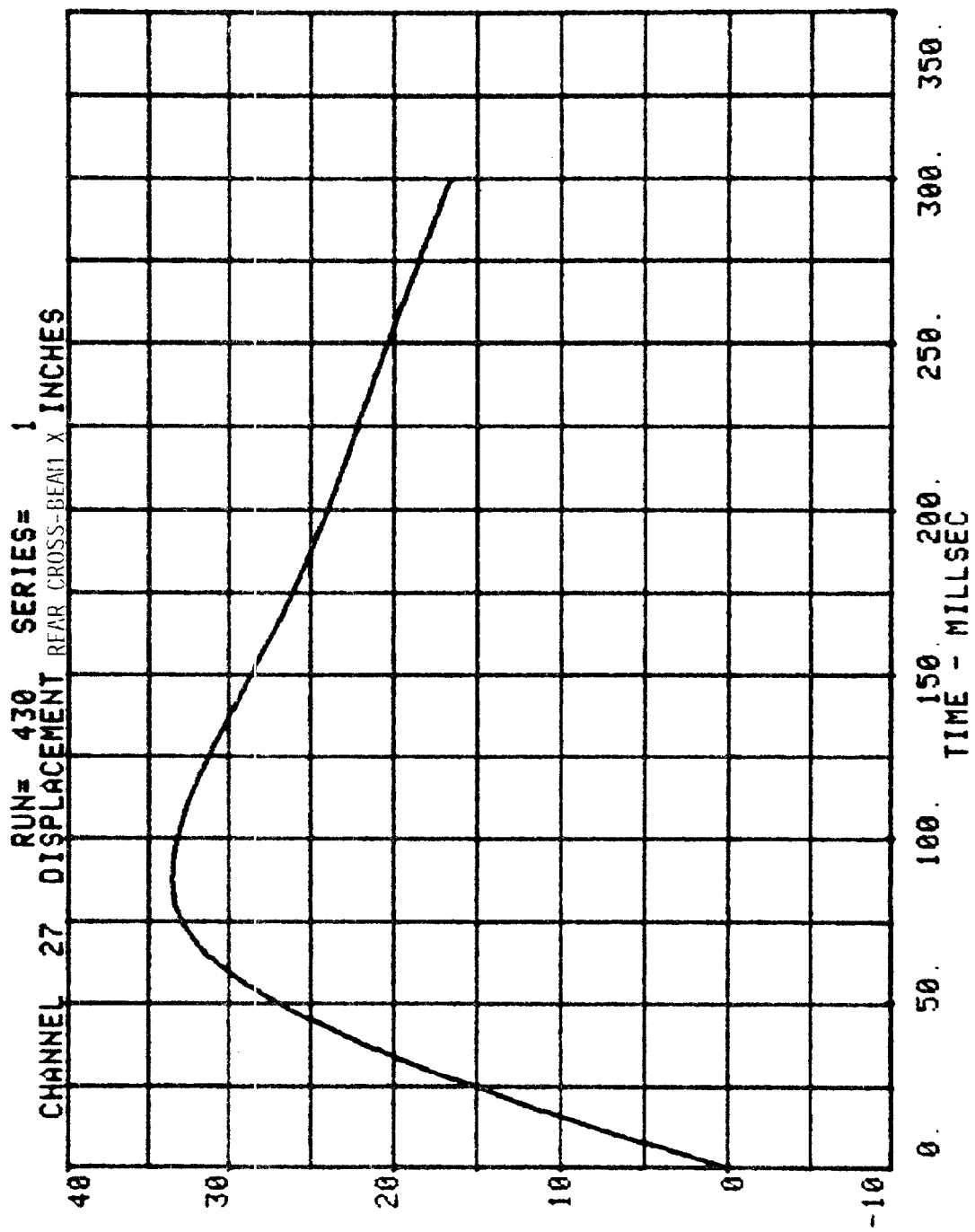


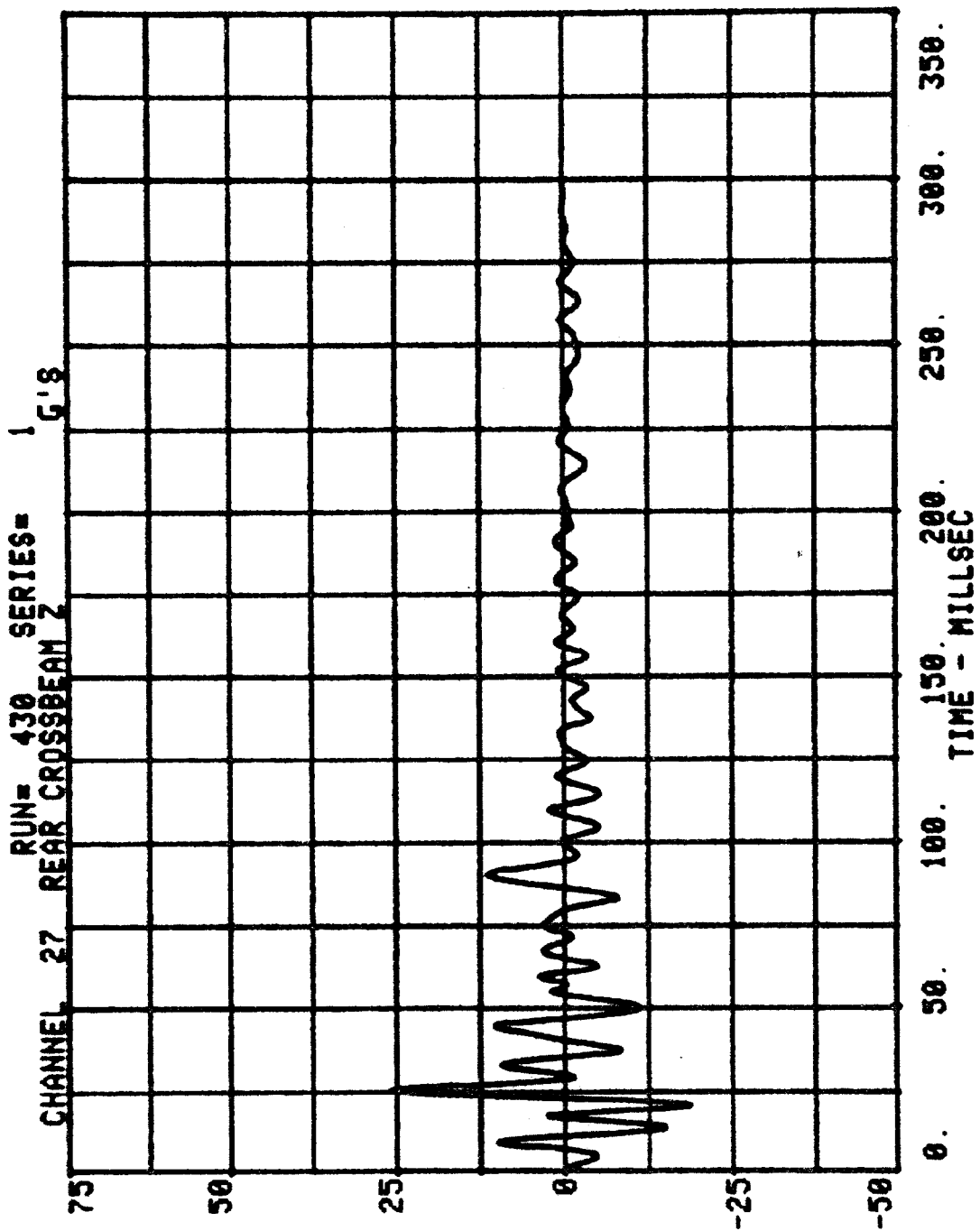


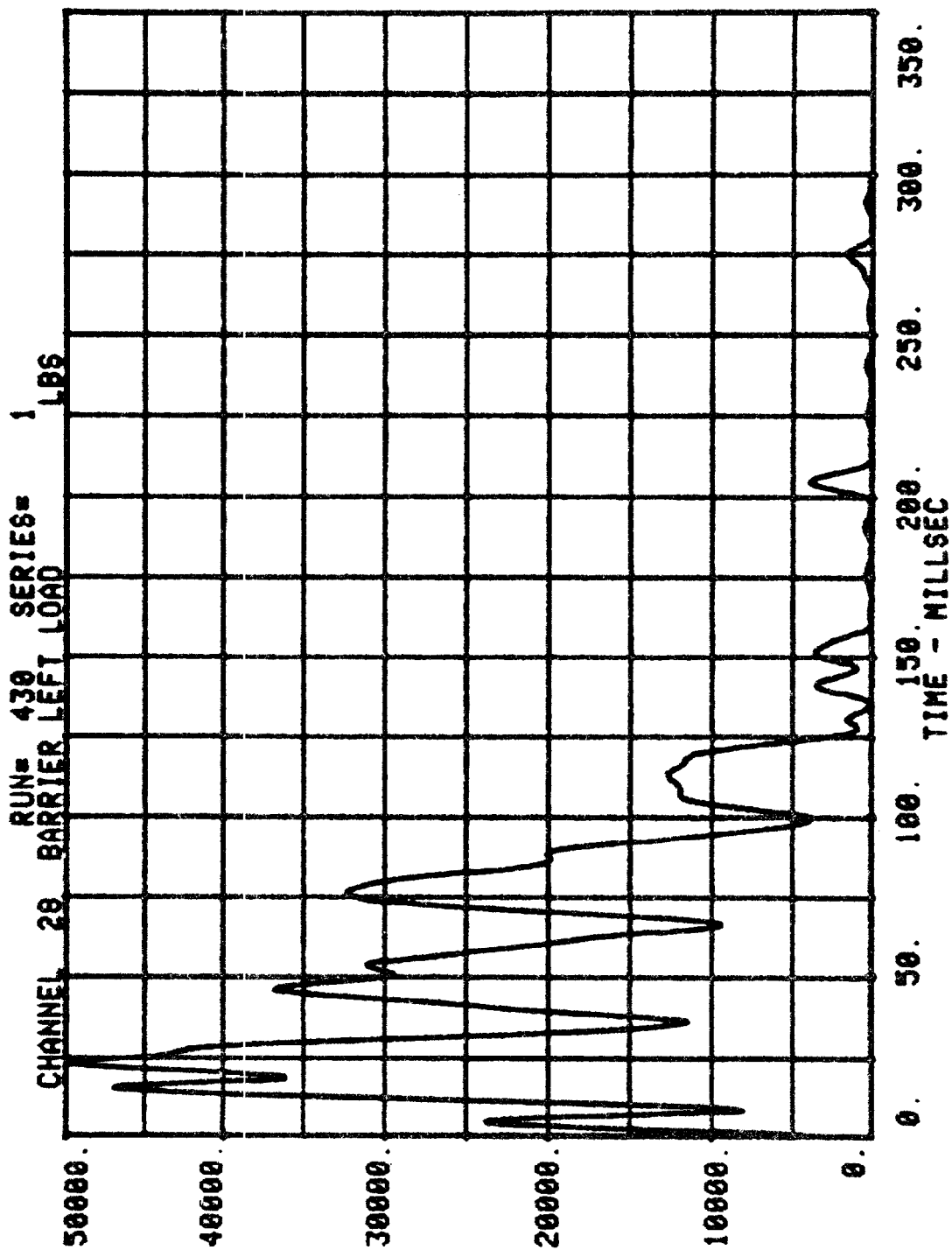


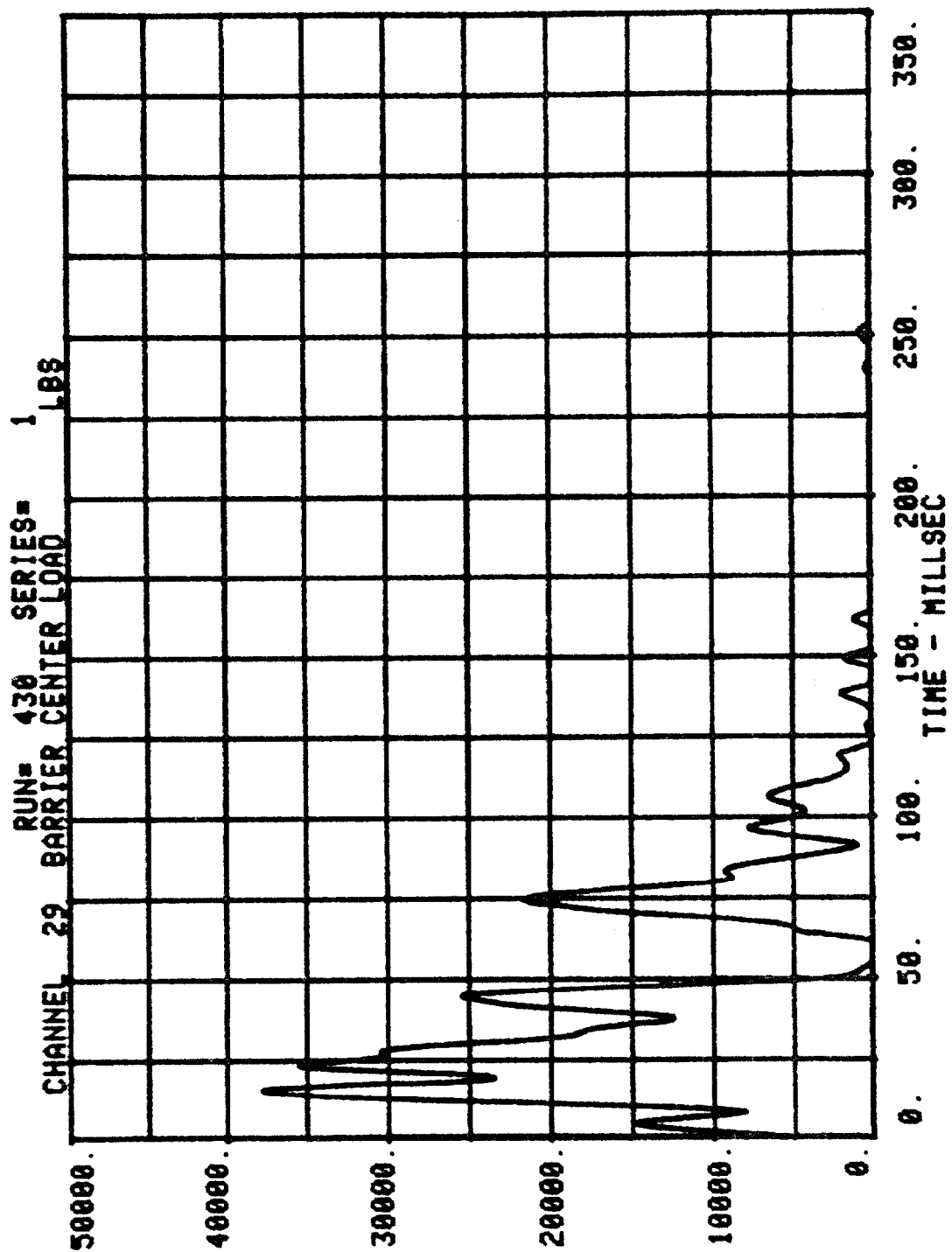


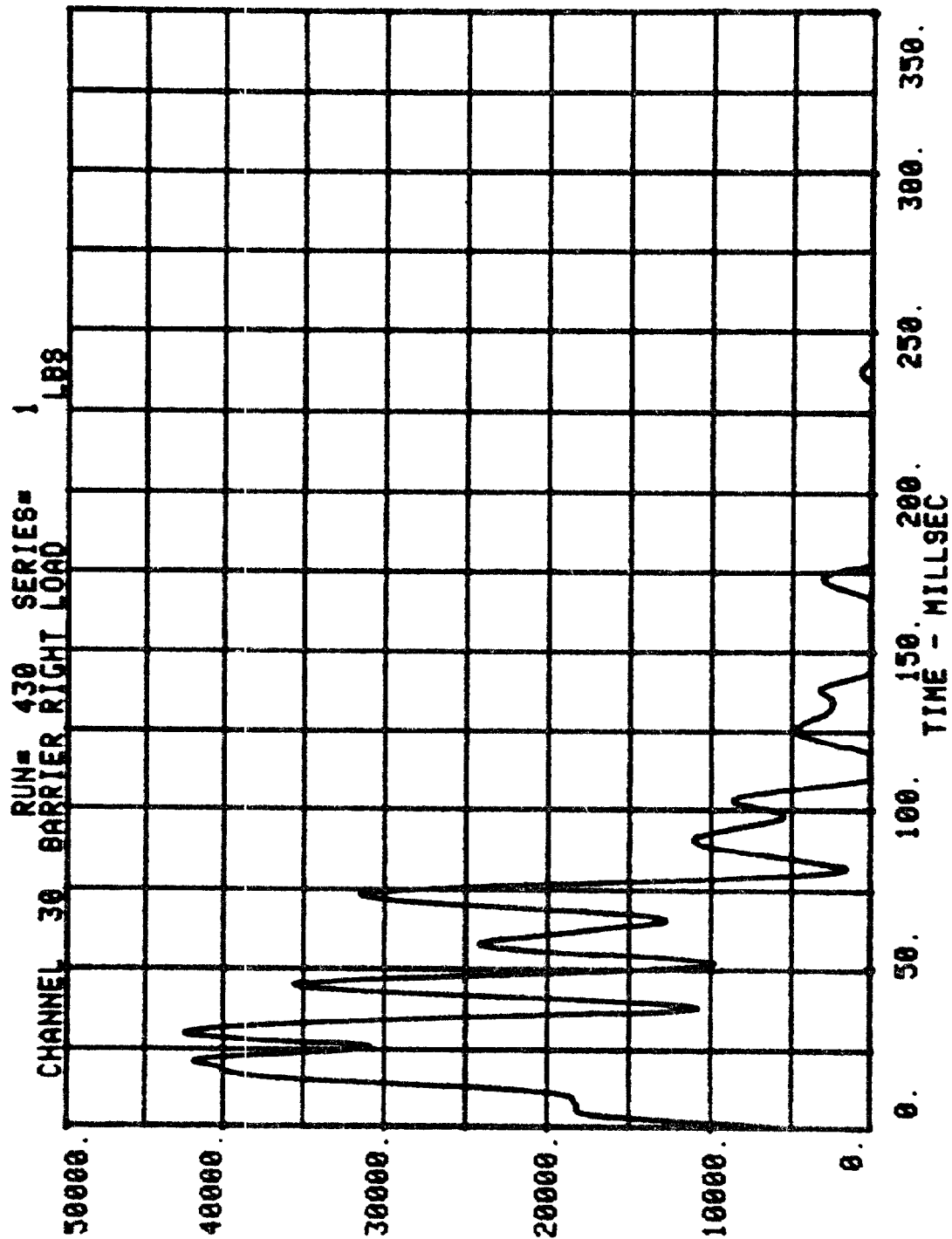


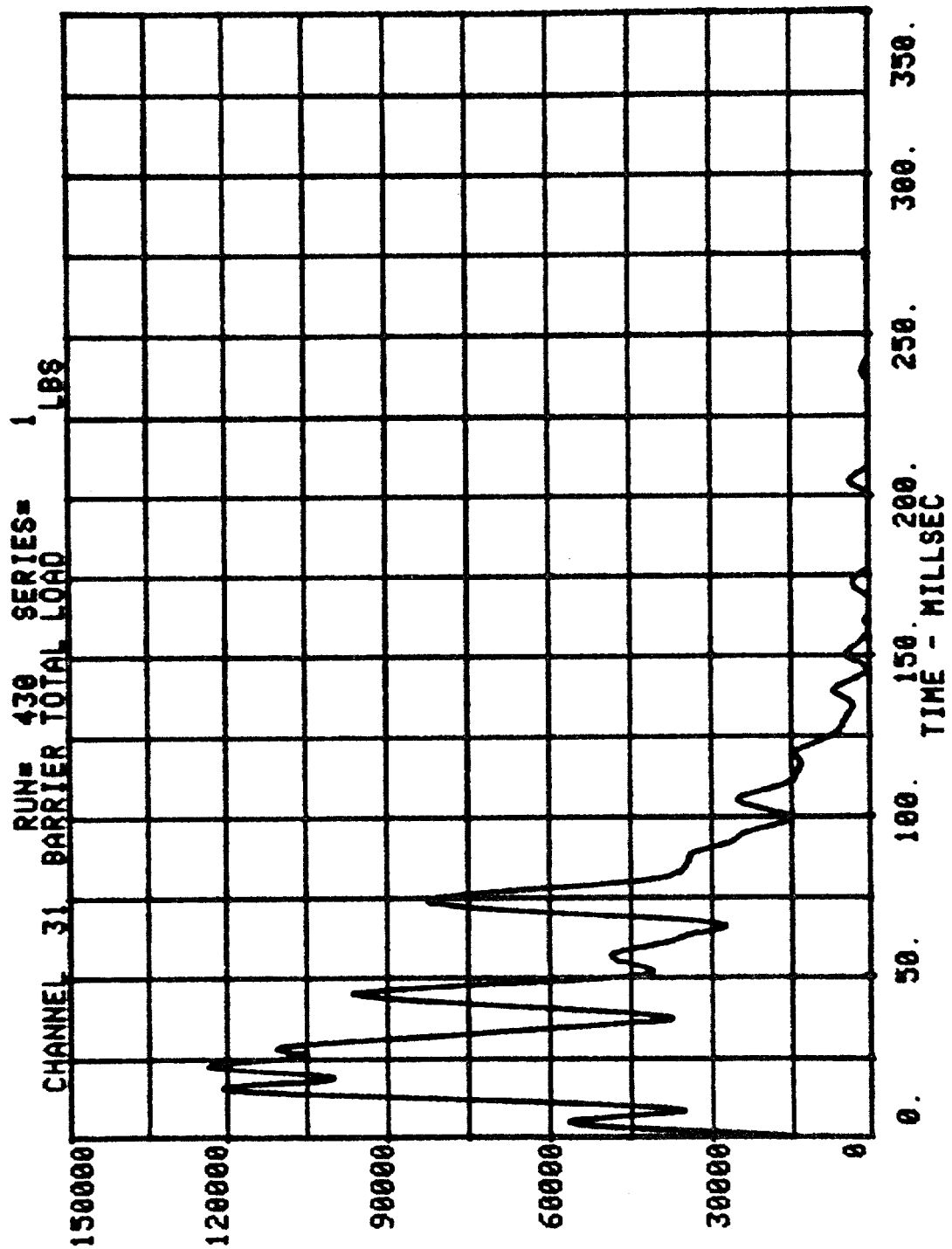












TEST NO. 308-T1-430  
1980 CHEVROLET CITATION  
DUMMY DATA

FILTER CHANNEL CLASS

|                    |      |
|--------------------|------|
| HEAD ACCELERATION  | 1000 |
| CHEST ACCELERATION | 180  |
| FEMUR FORCES       | 600  |
| BELT LOADS         | 60   |

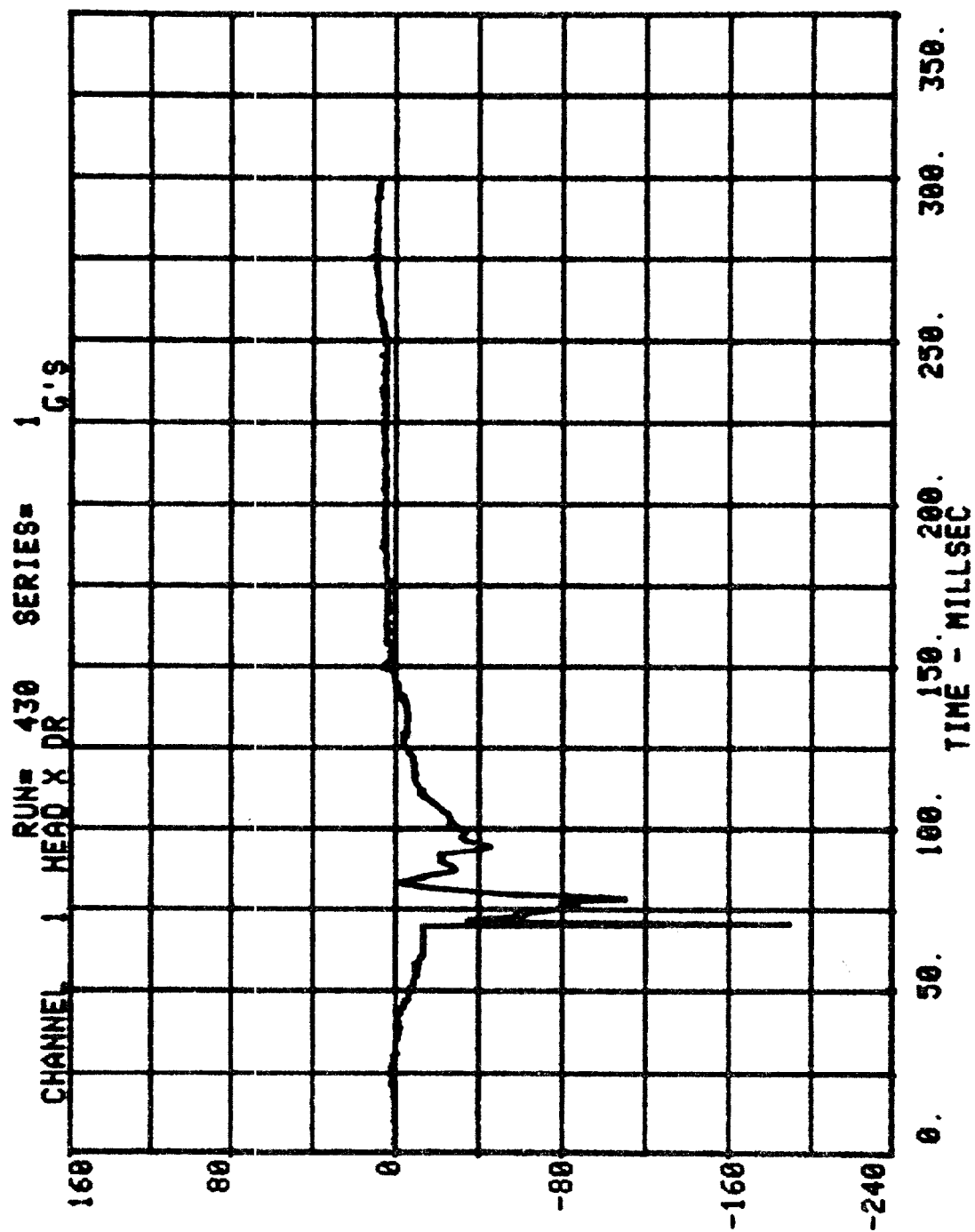
HEAD INJURY CRITERION  
HEAD SEVERITY INDEX

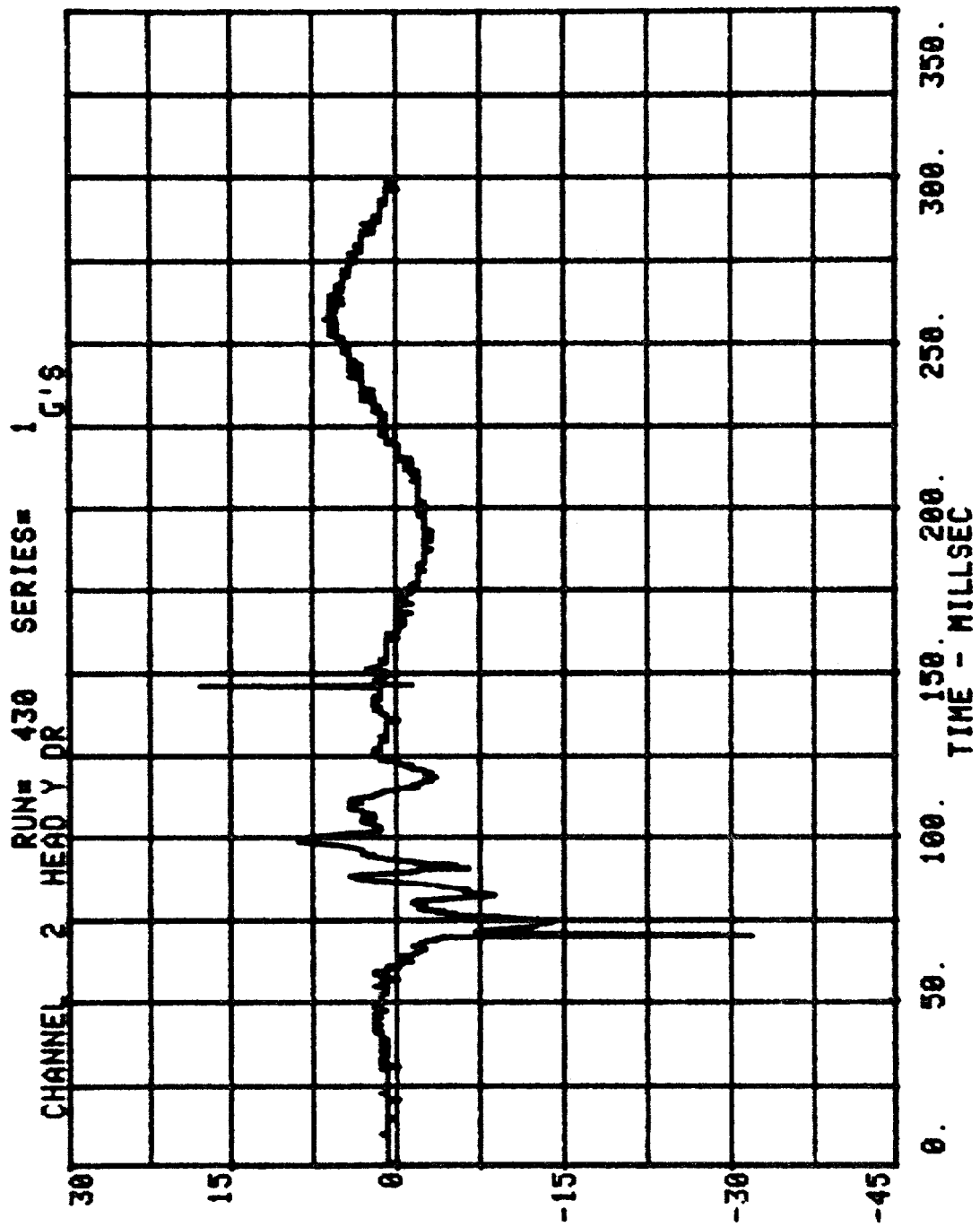
CITATION

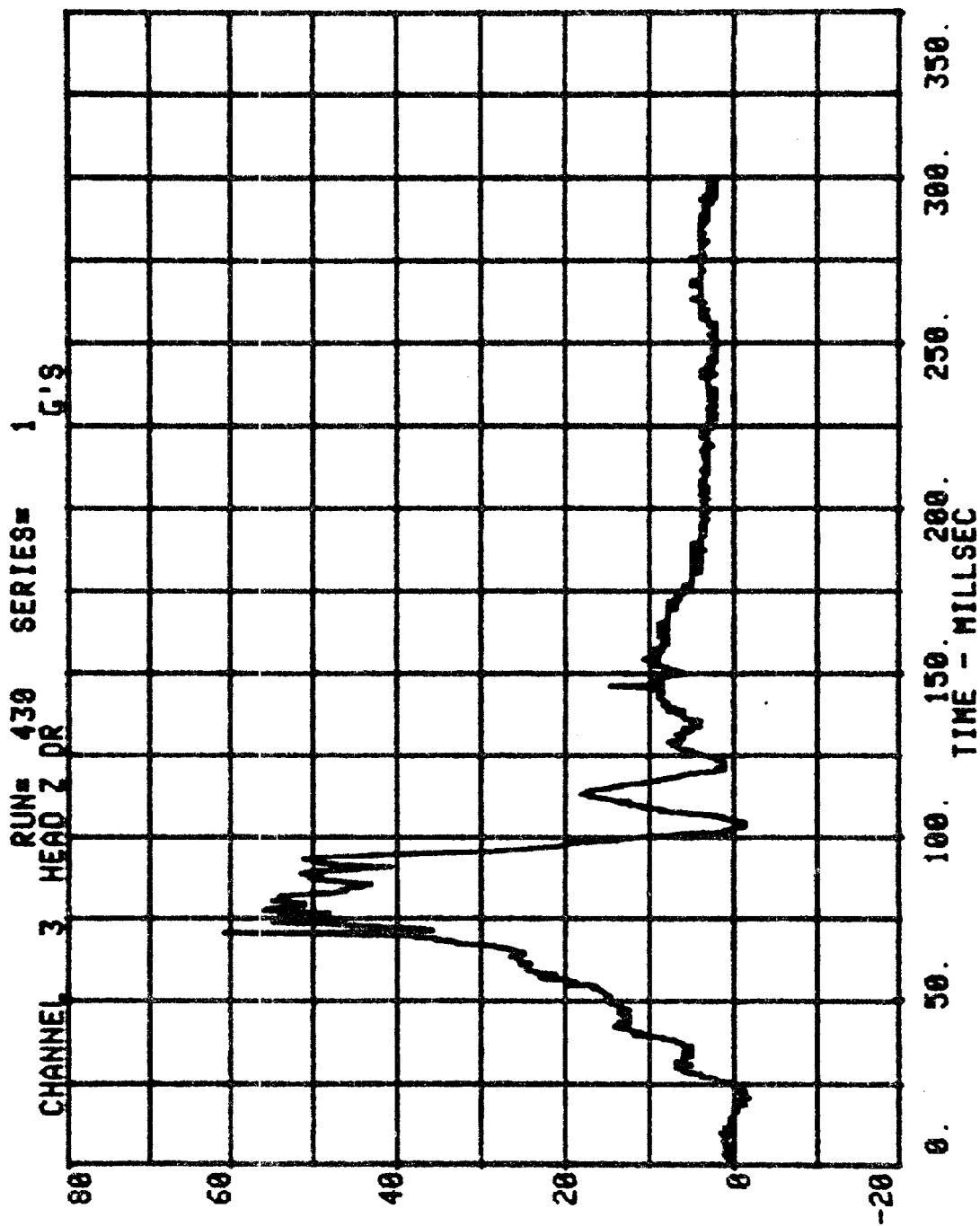
RUN= 430

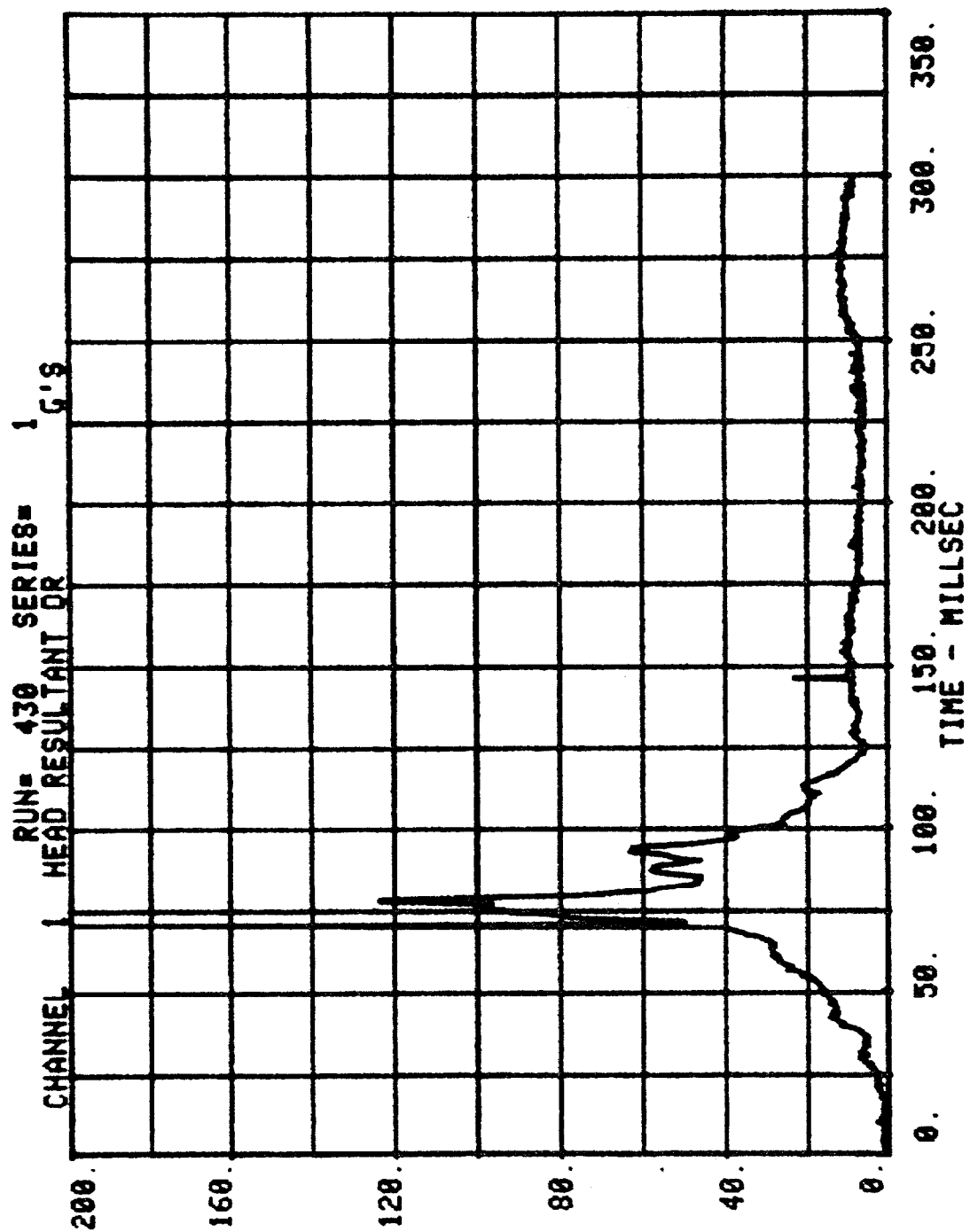
HEAD RESULTANT DR

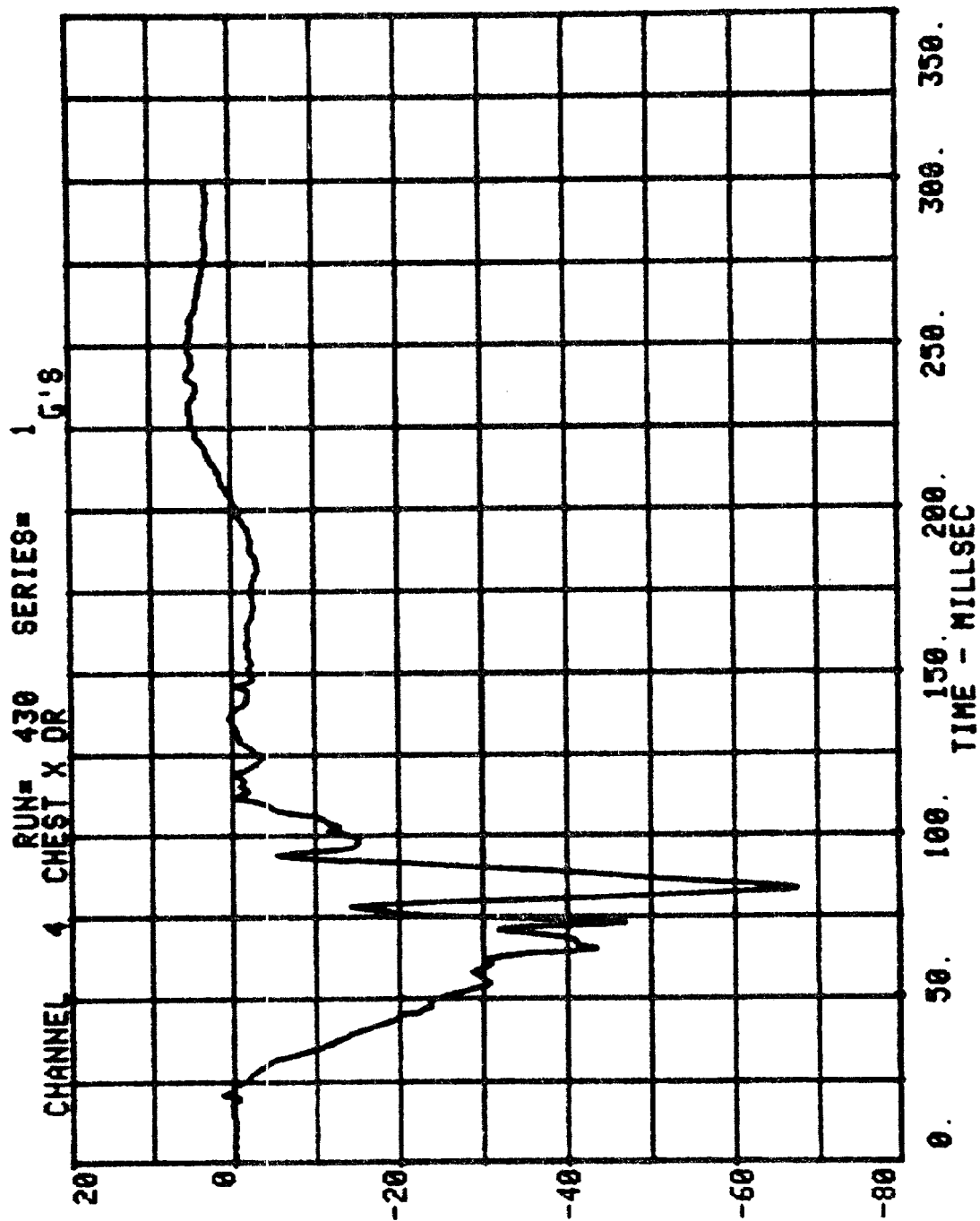
HIC=1039.6 FROM T1= .06960 TO T2= .09660  
AVERAGE ACCELERATION BETWEEN T1 AND T2= 68.3G'S  
EVENT TIME= 300.0 MSEC  
SEVERITY INDEX=1596.4

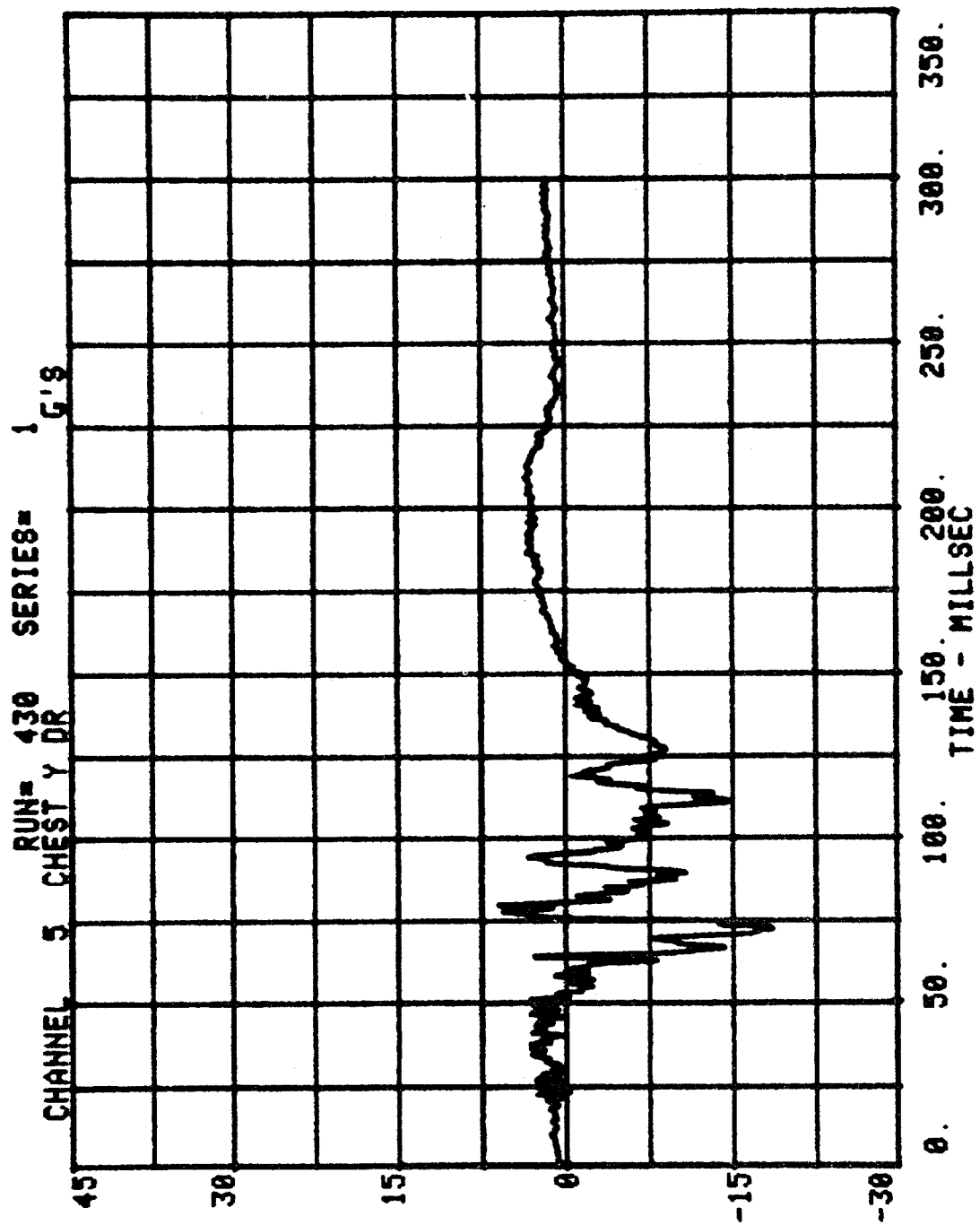


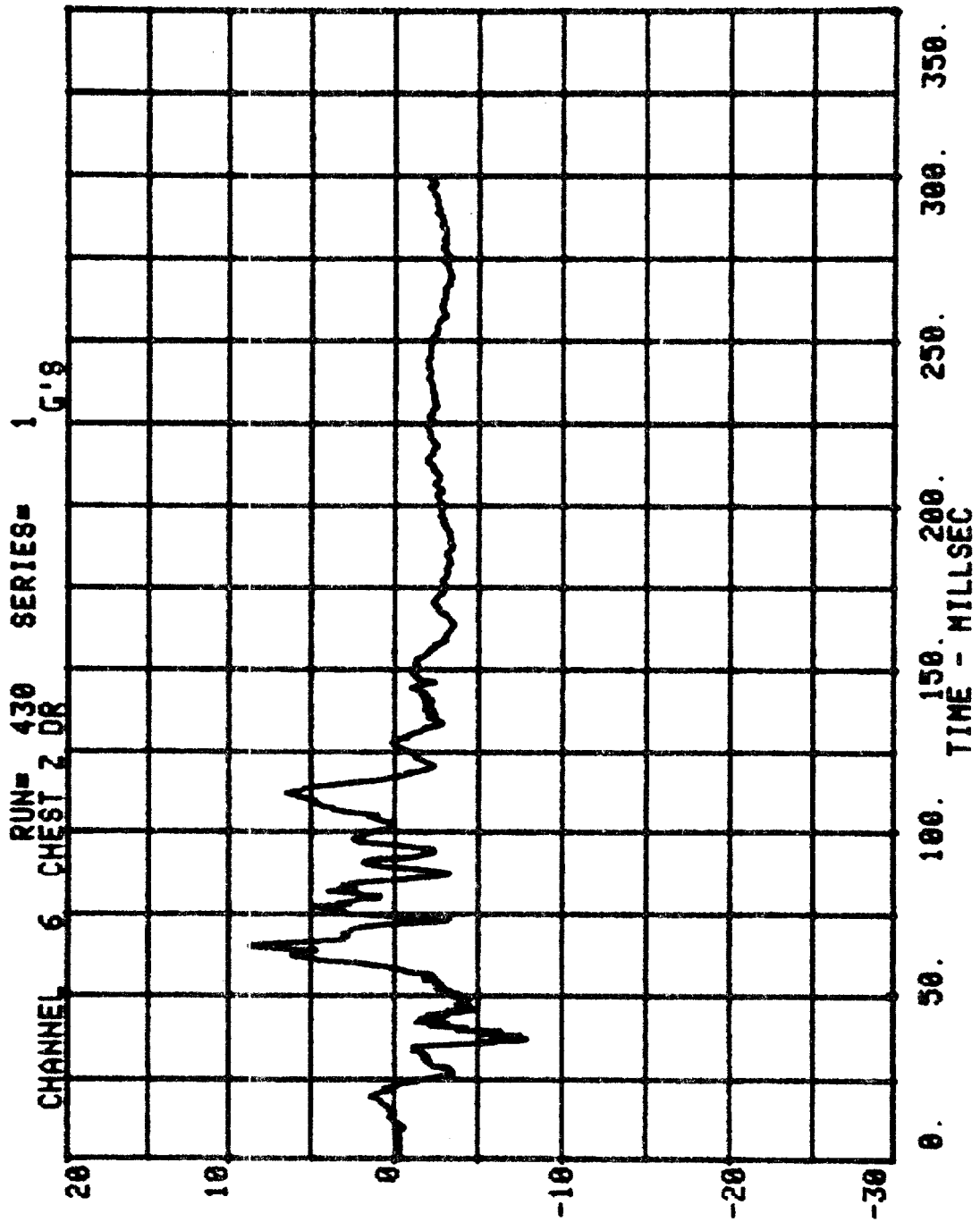


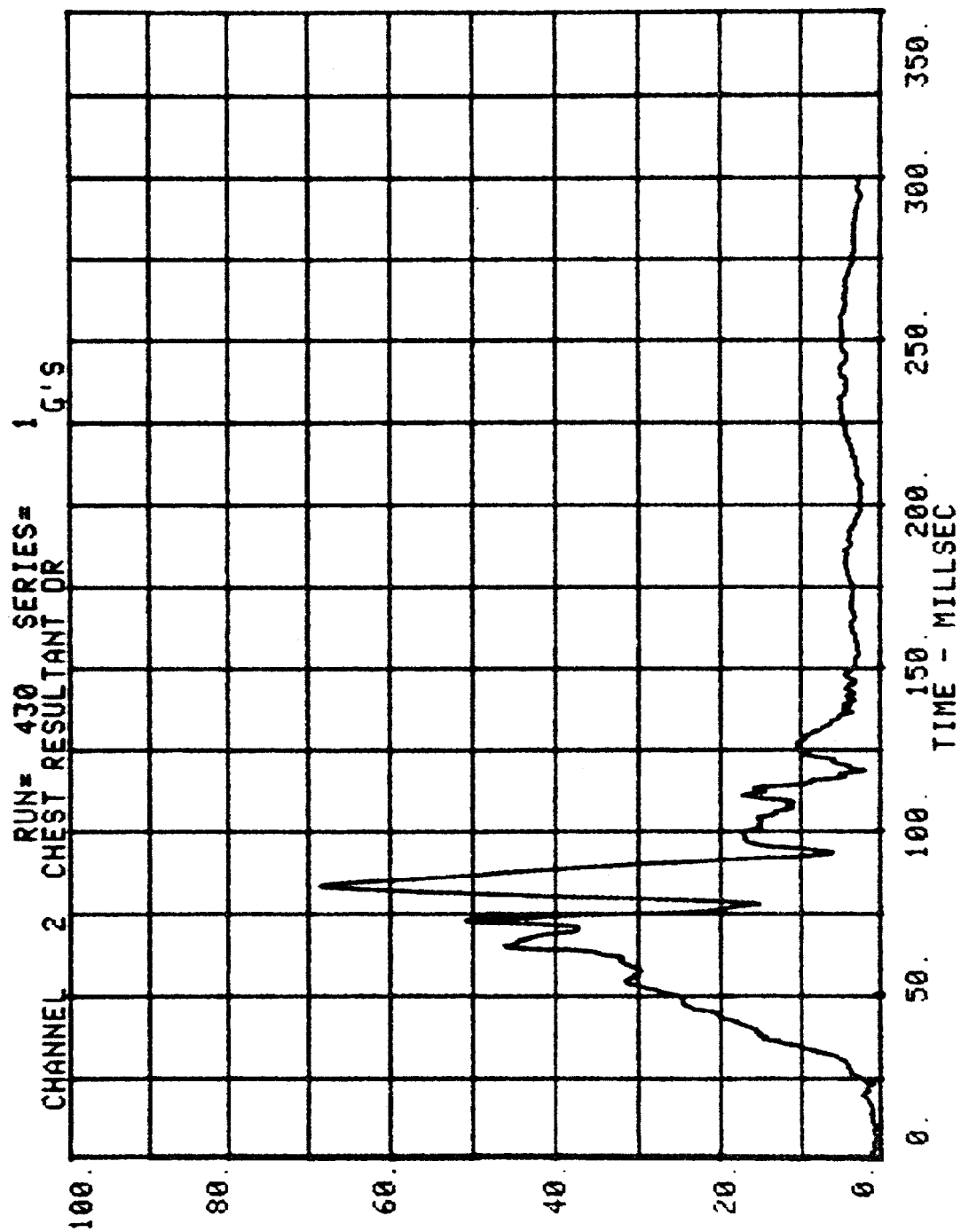


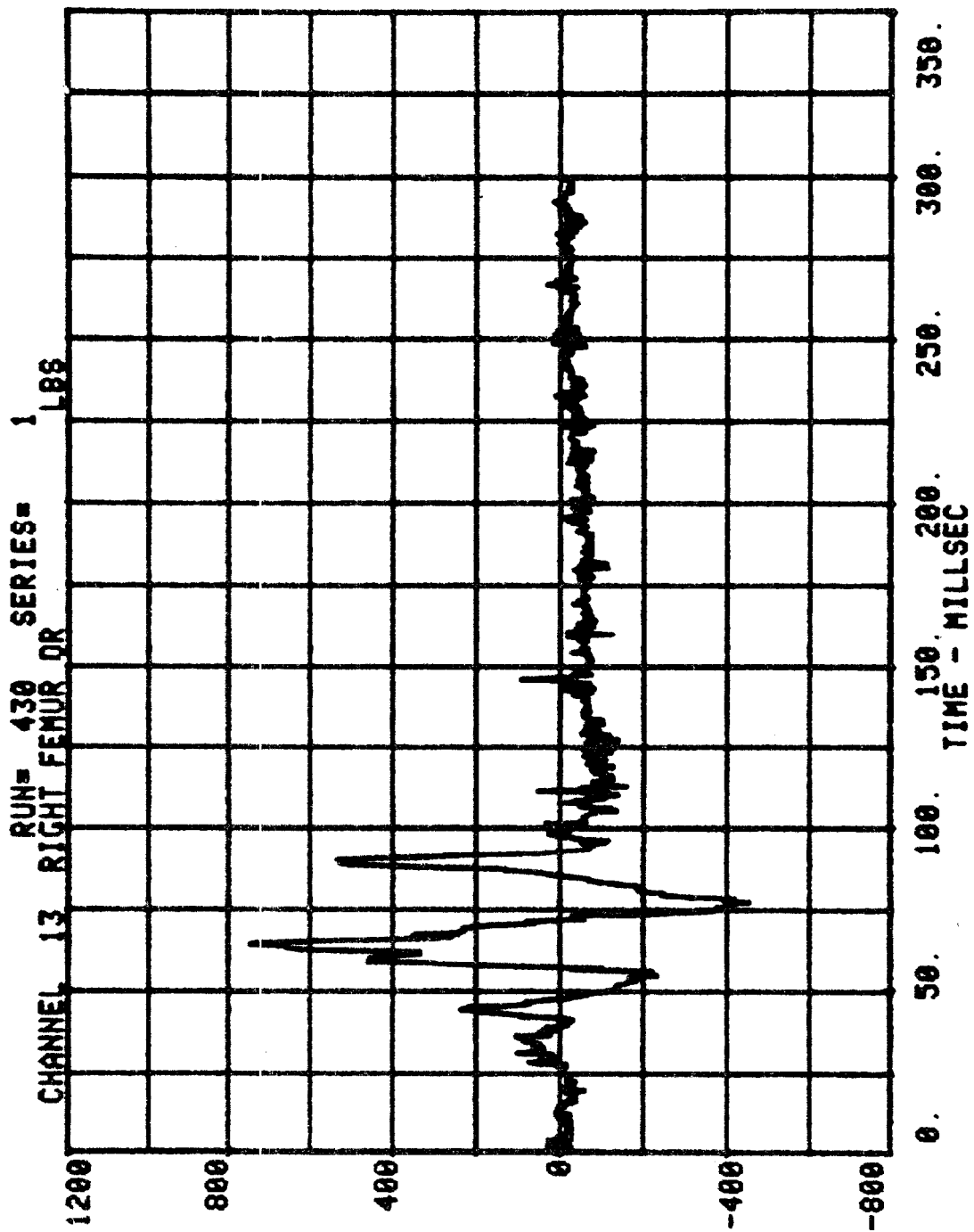


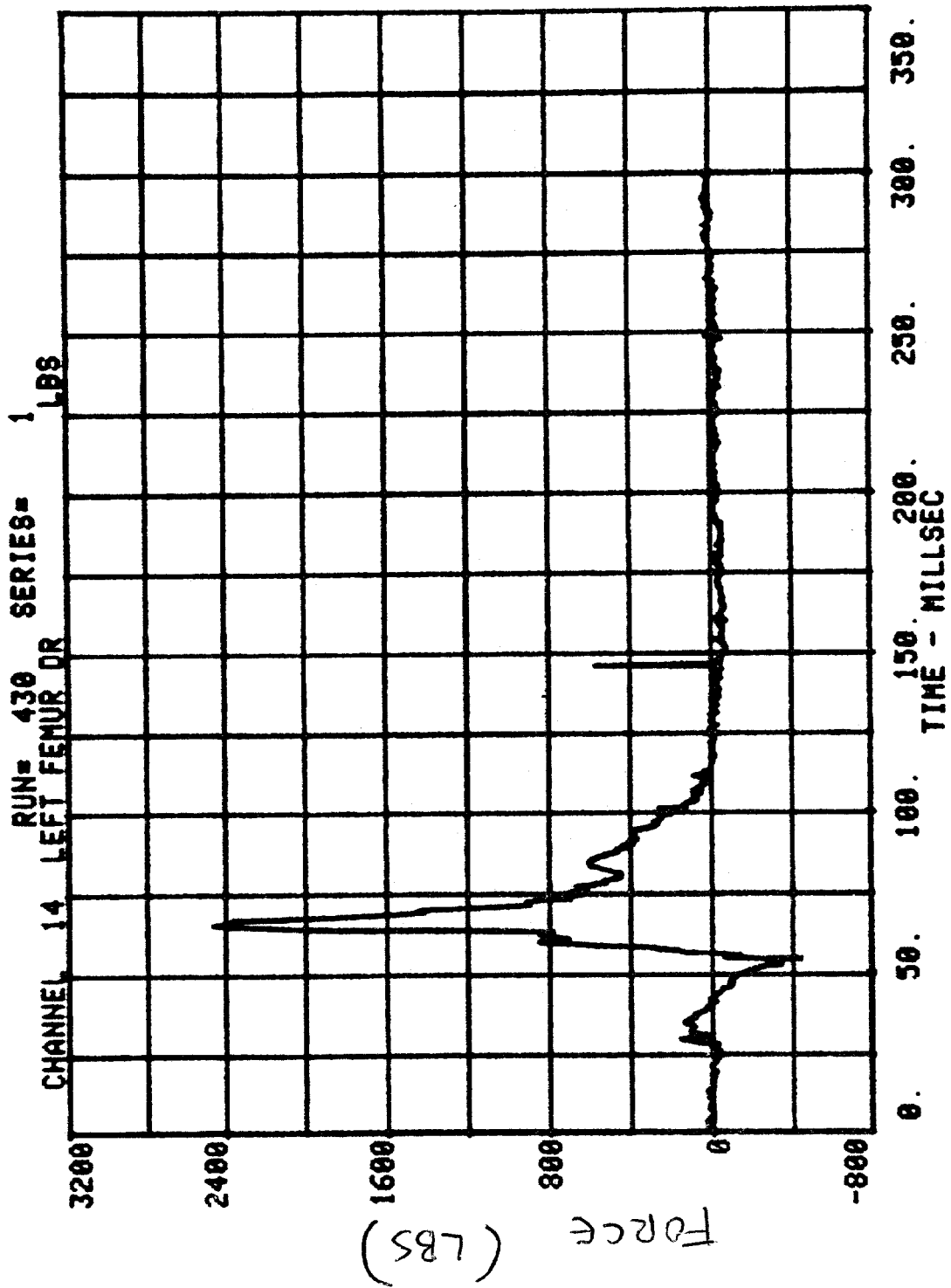


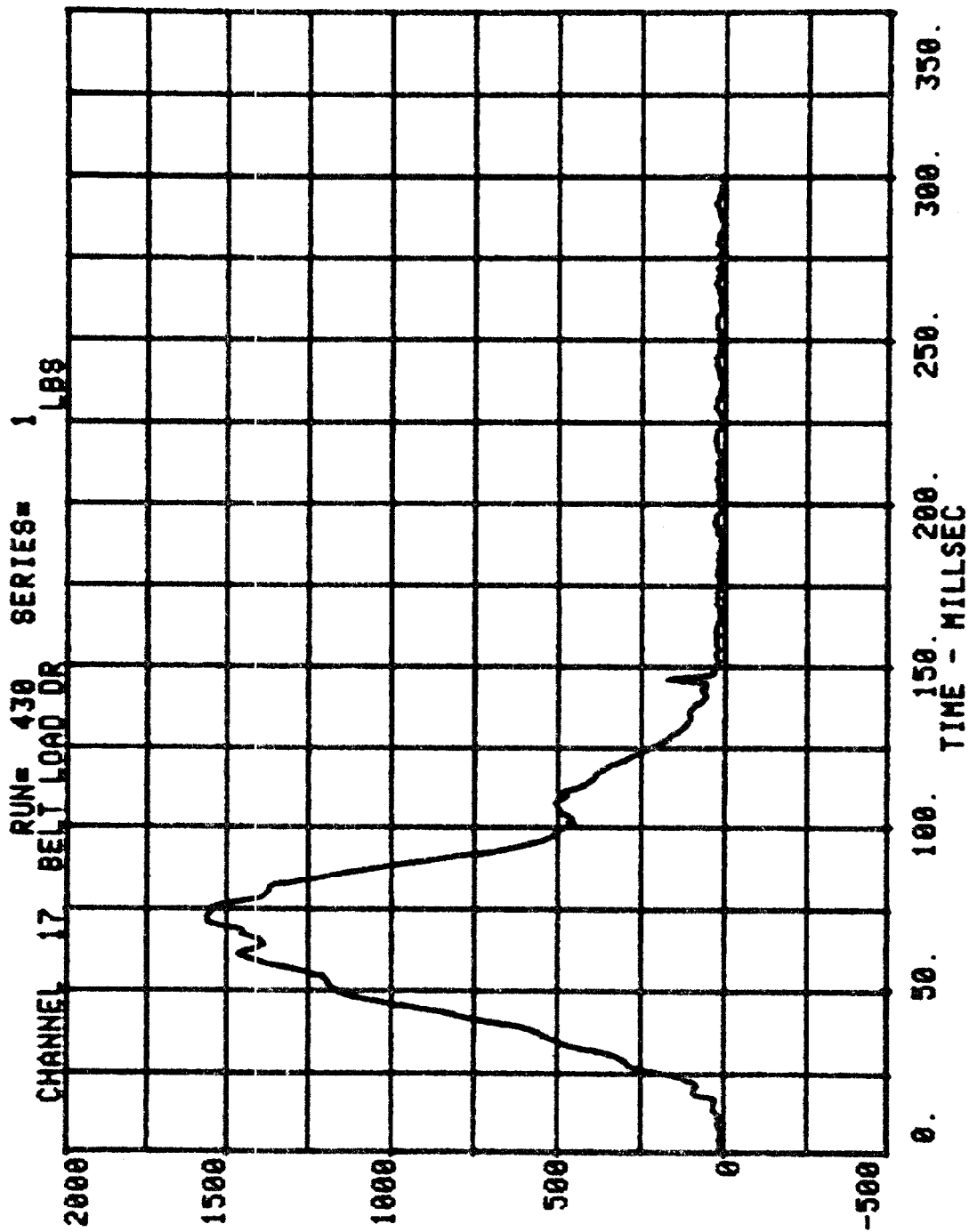












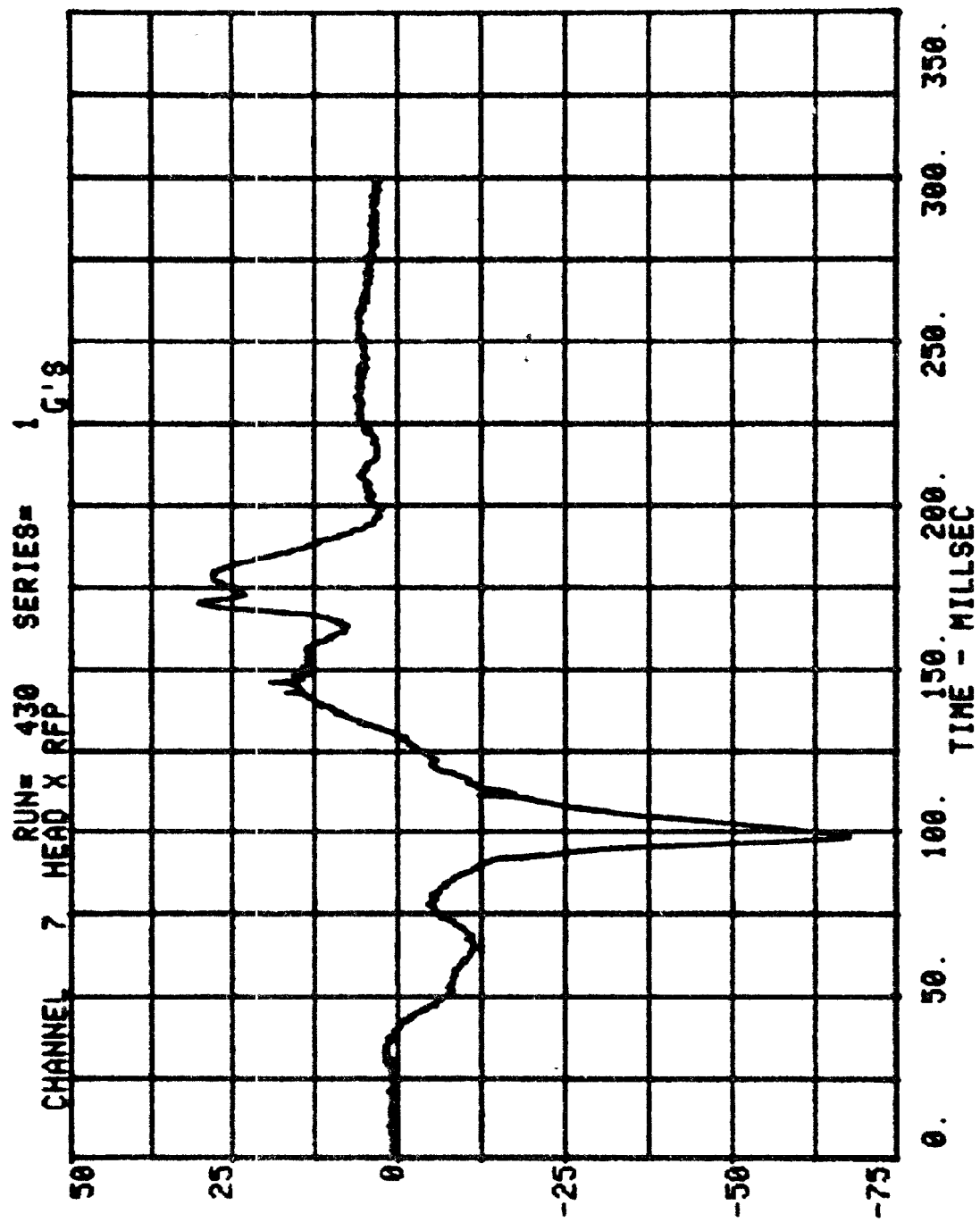
HEAD INJURY CRITERION  
HEAD SEVERITY INDEX

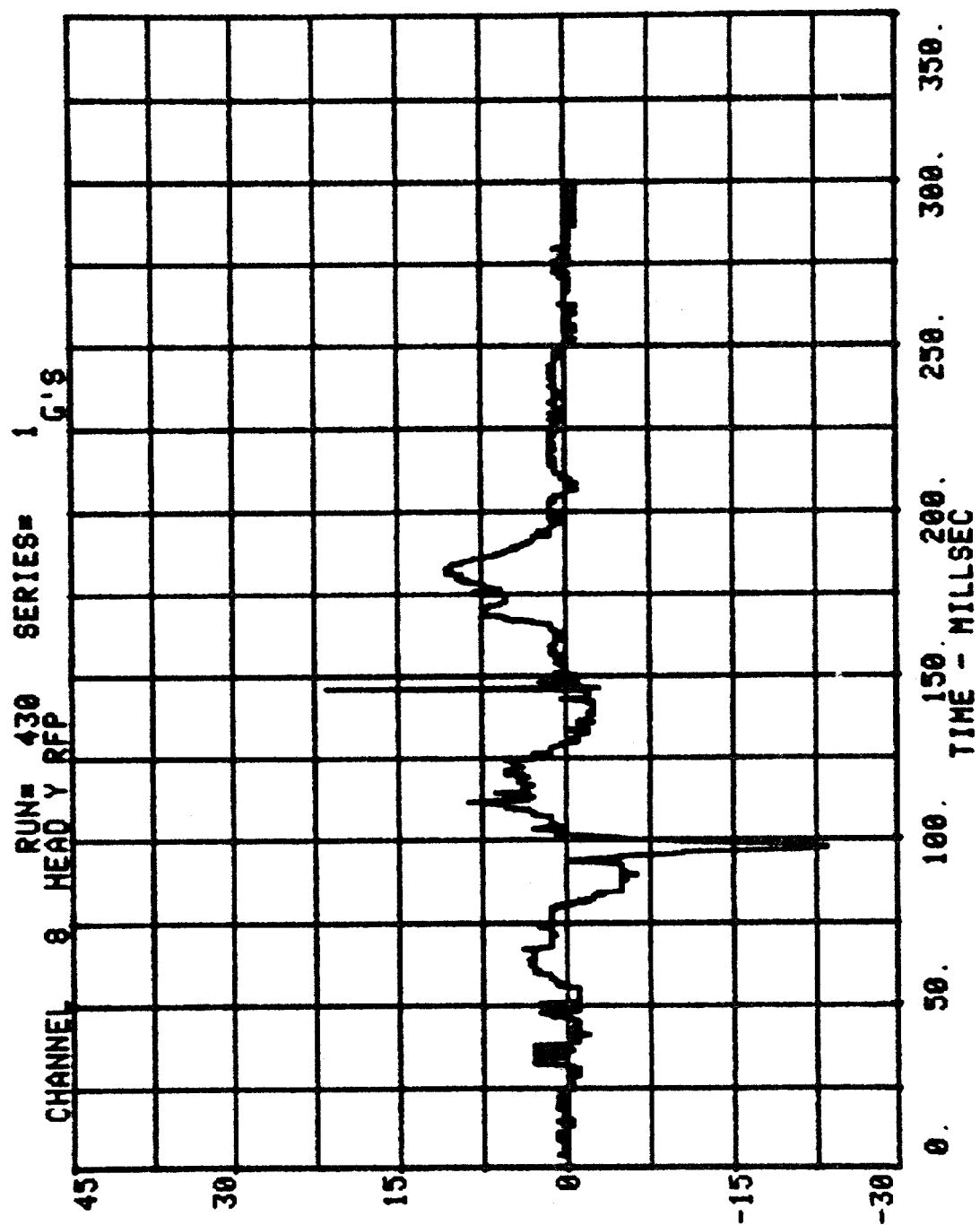
CITATION

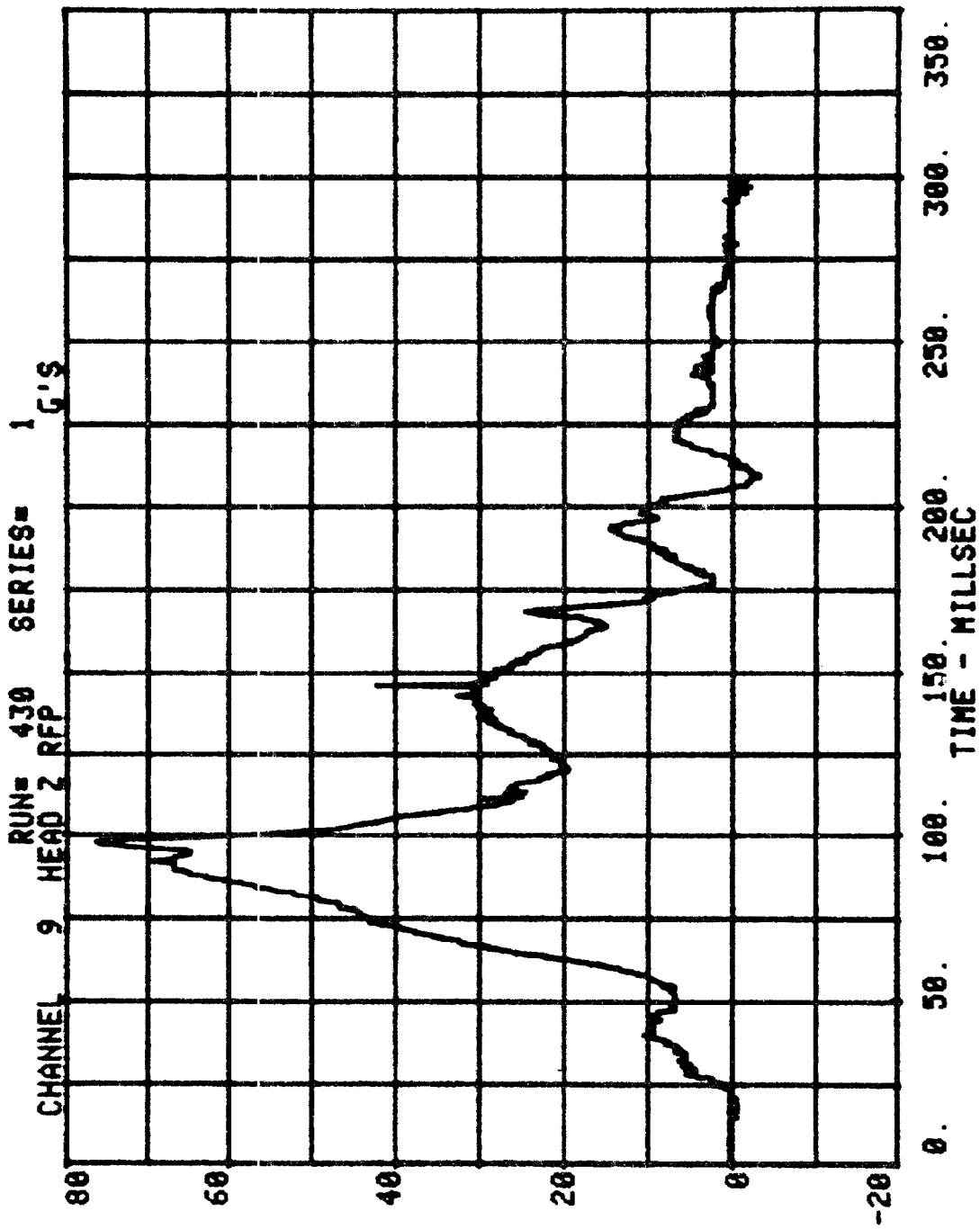
RUN= 430

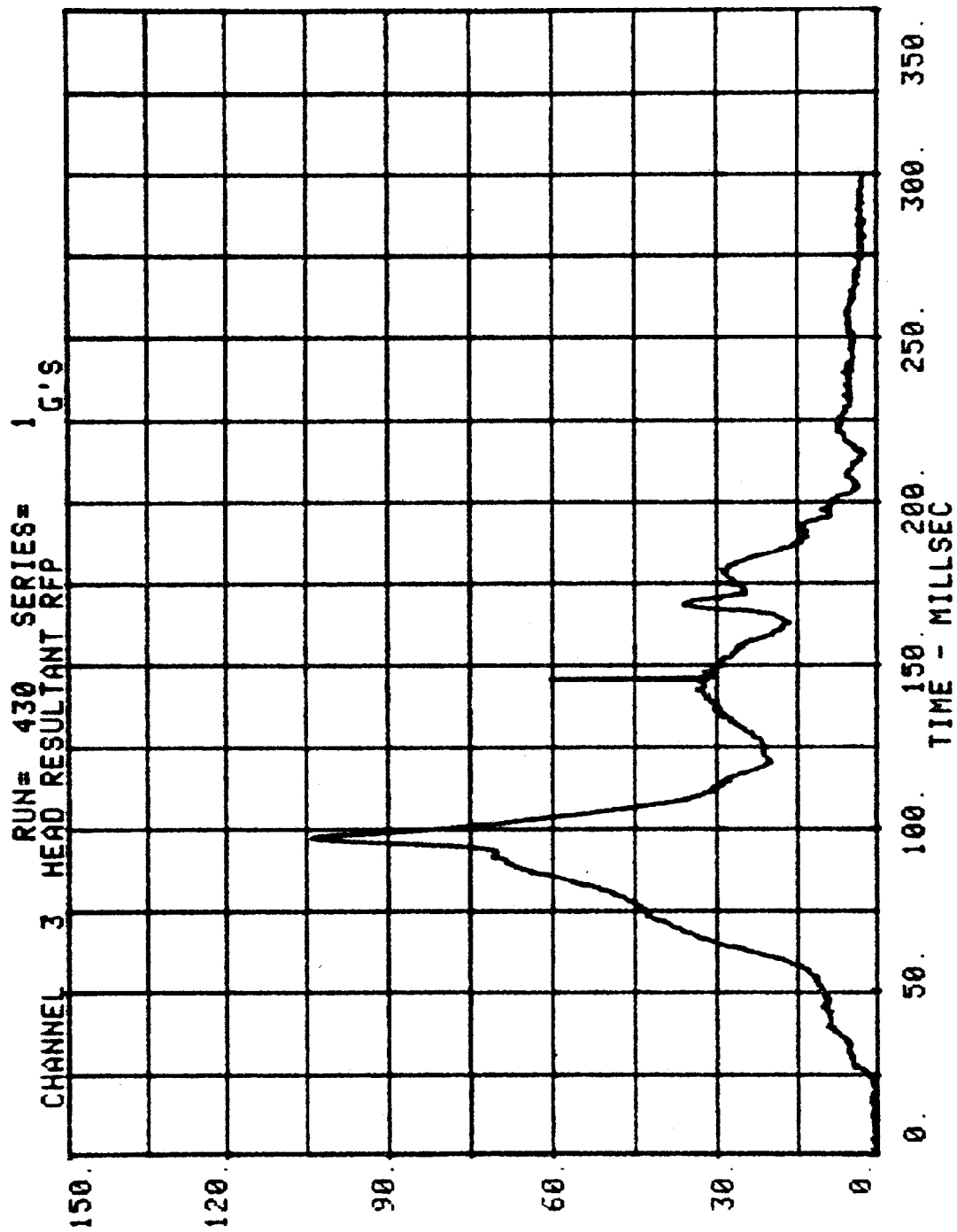
HEAD RESULTANT RFP

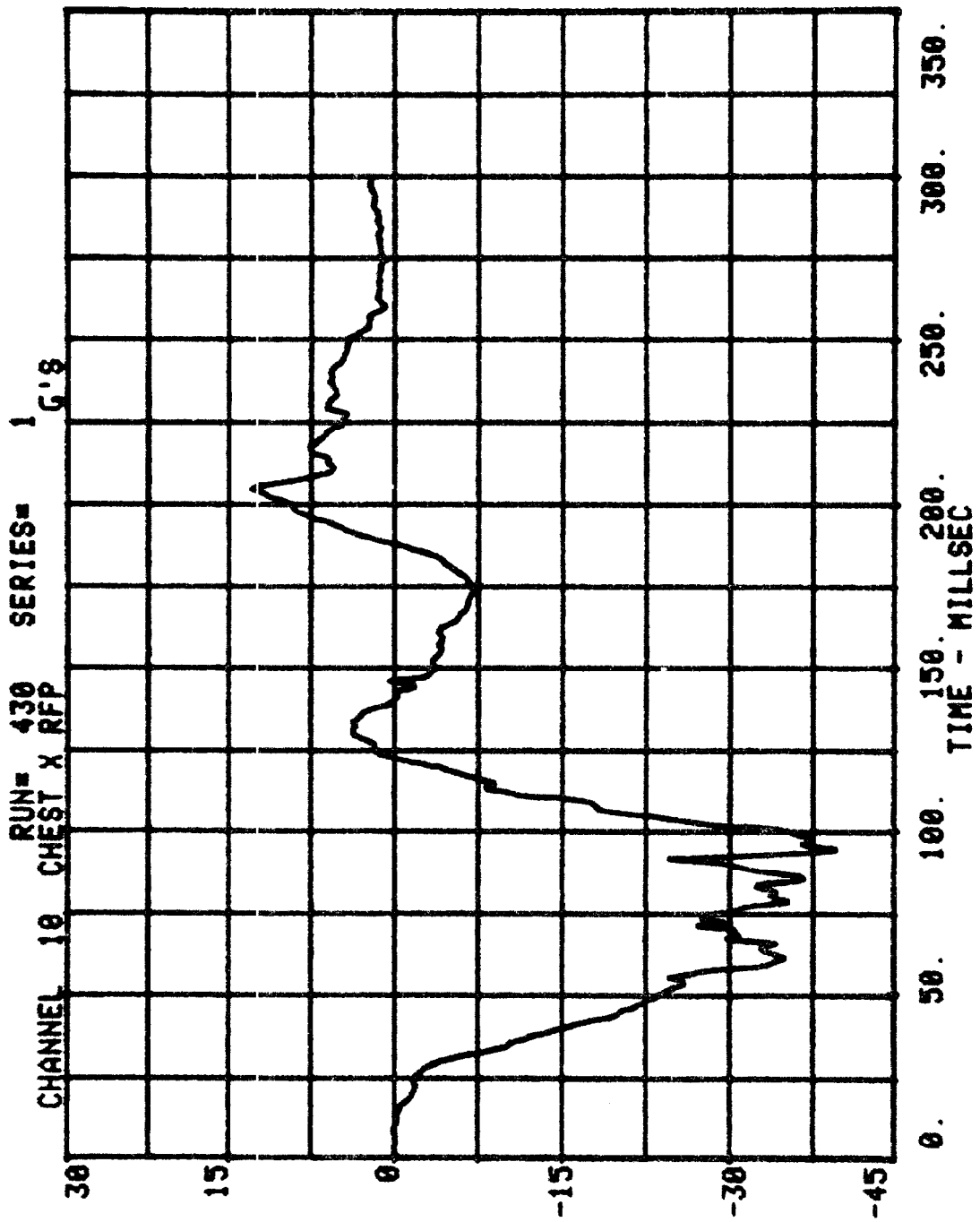
HIC=1117.0 FROM T1= .06840 TO T2= .10920  
AVERAGE ACCELERATION BETWEEN T1 AND T2= 59.6G'S  
EVENT TIME= 300.0 MSEC  
SEVERITY INDEX=1683.0

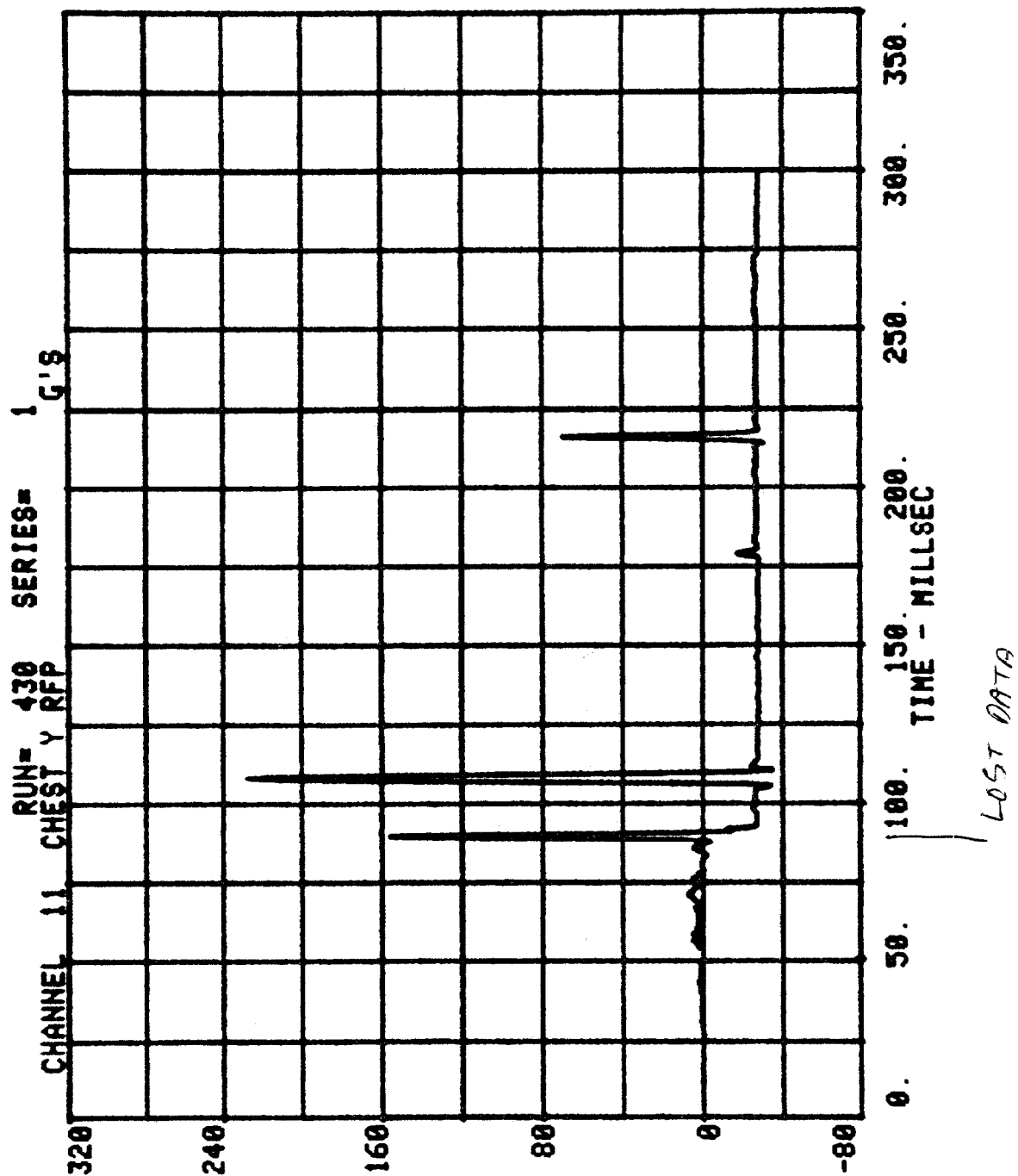


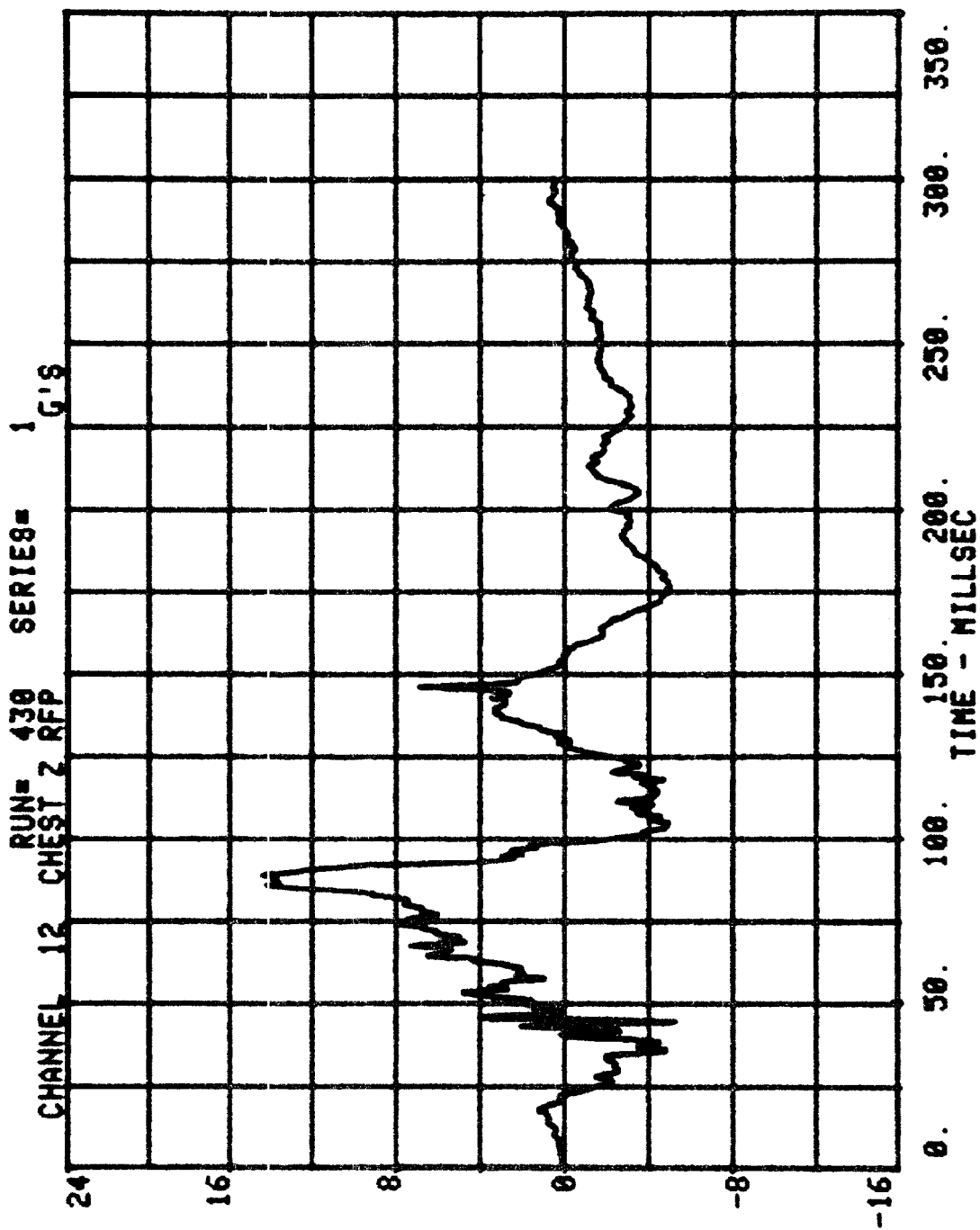


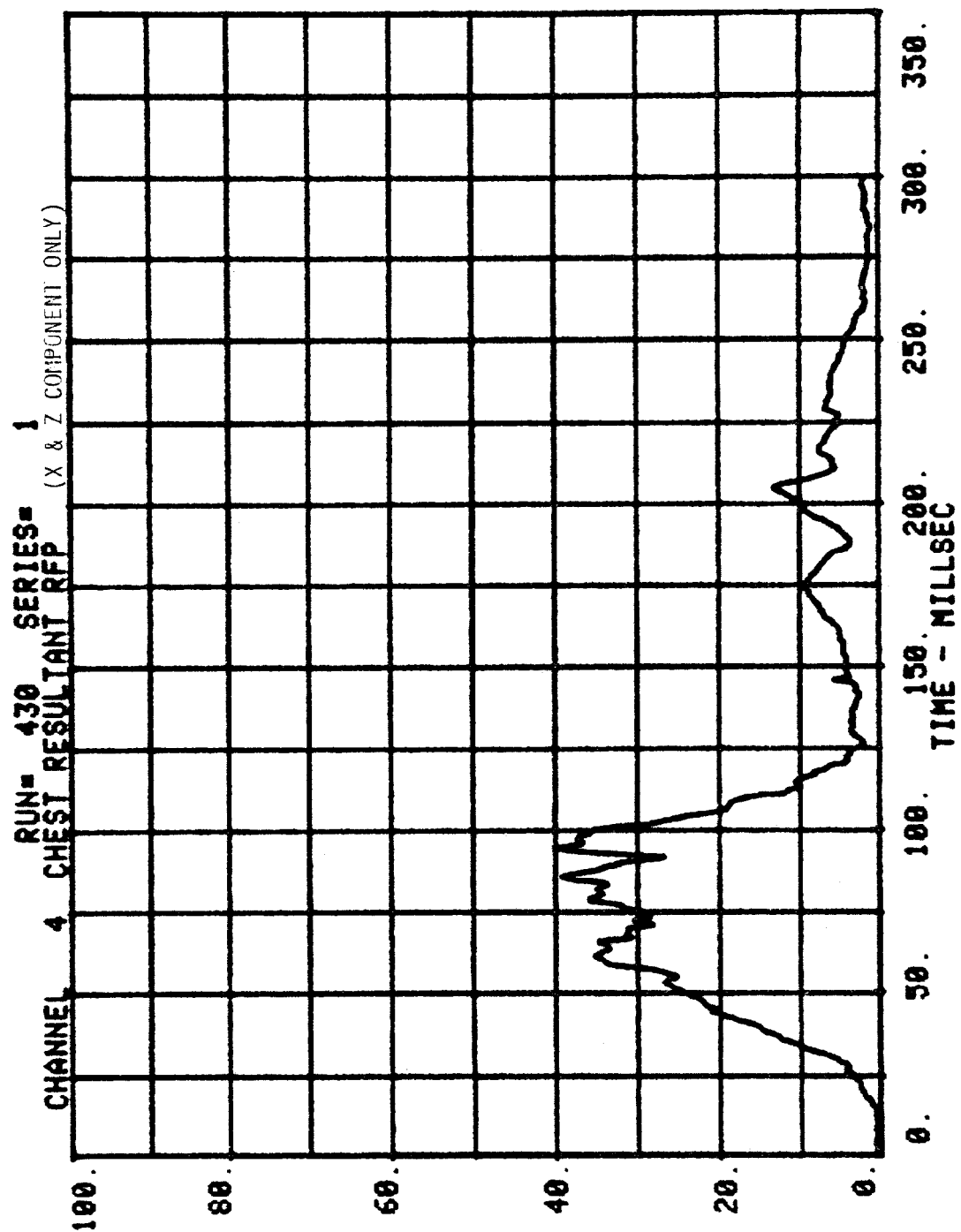


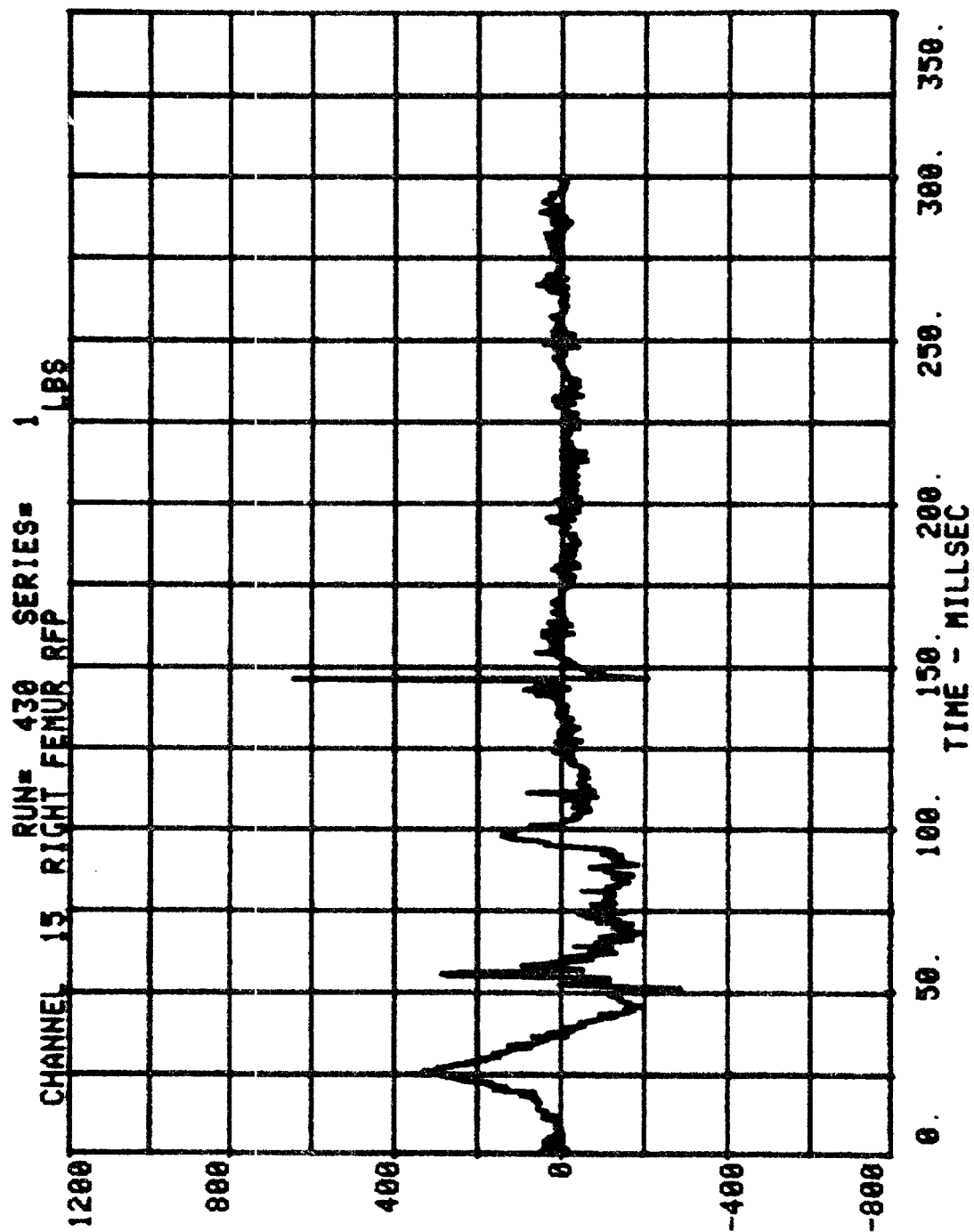


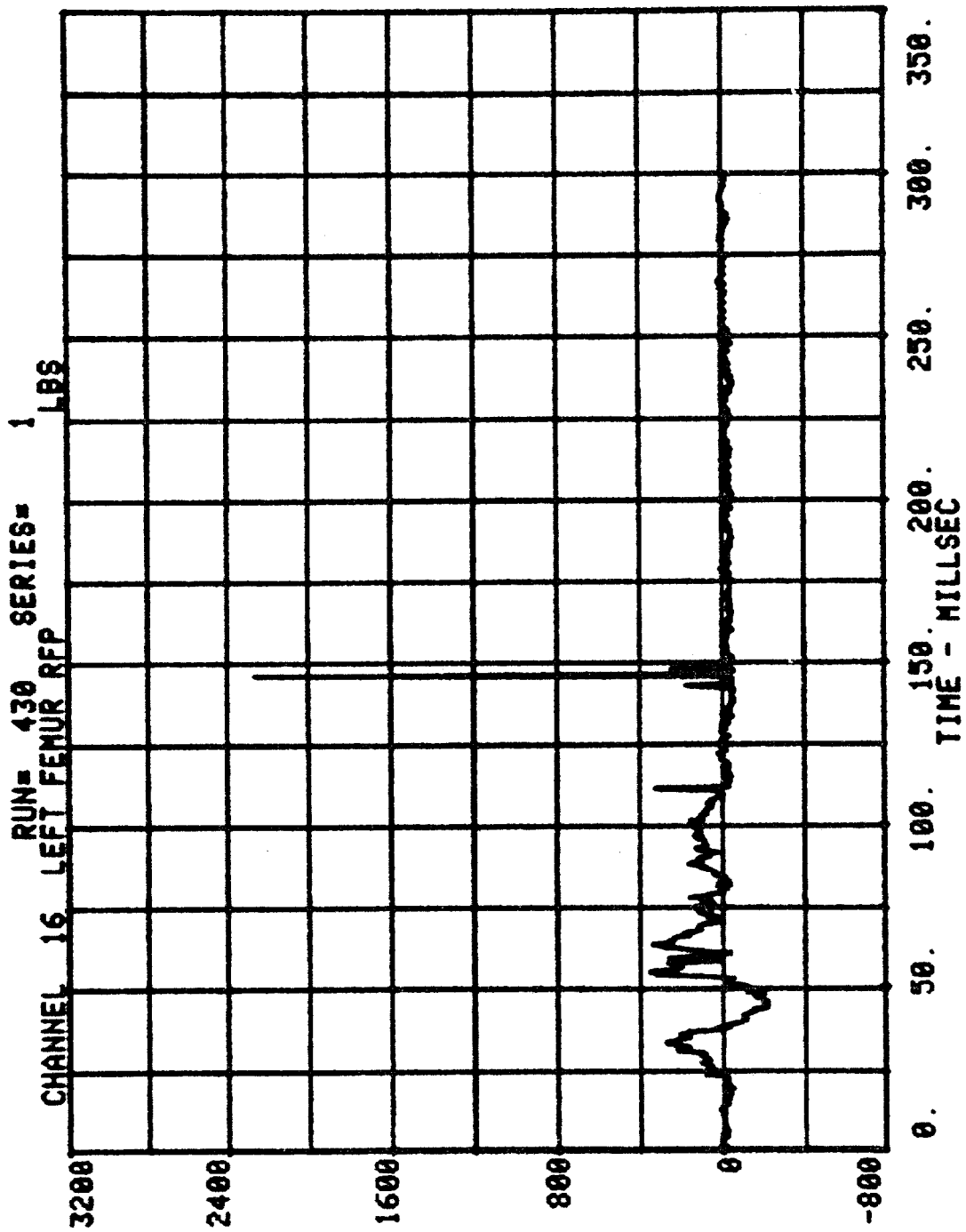


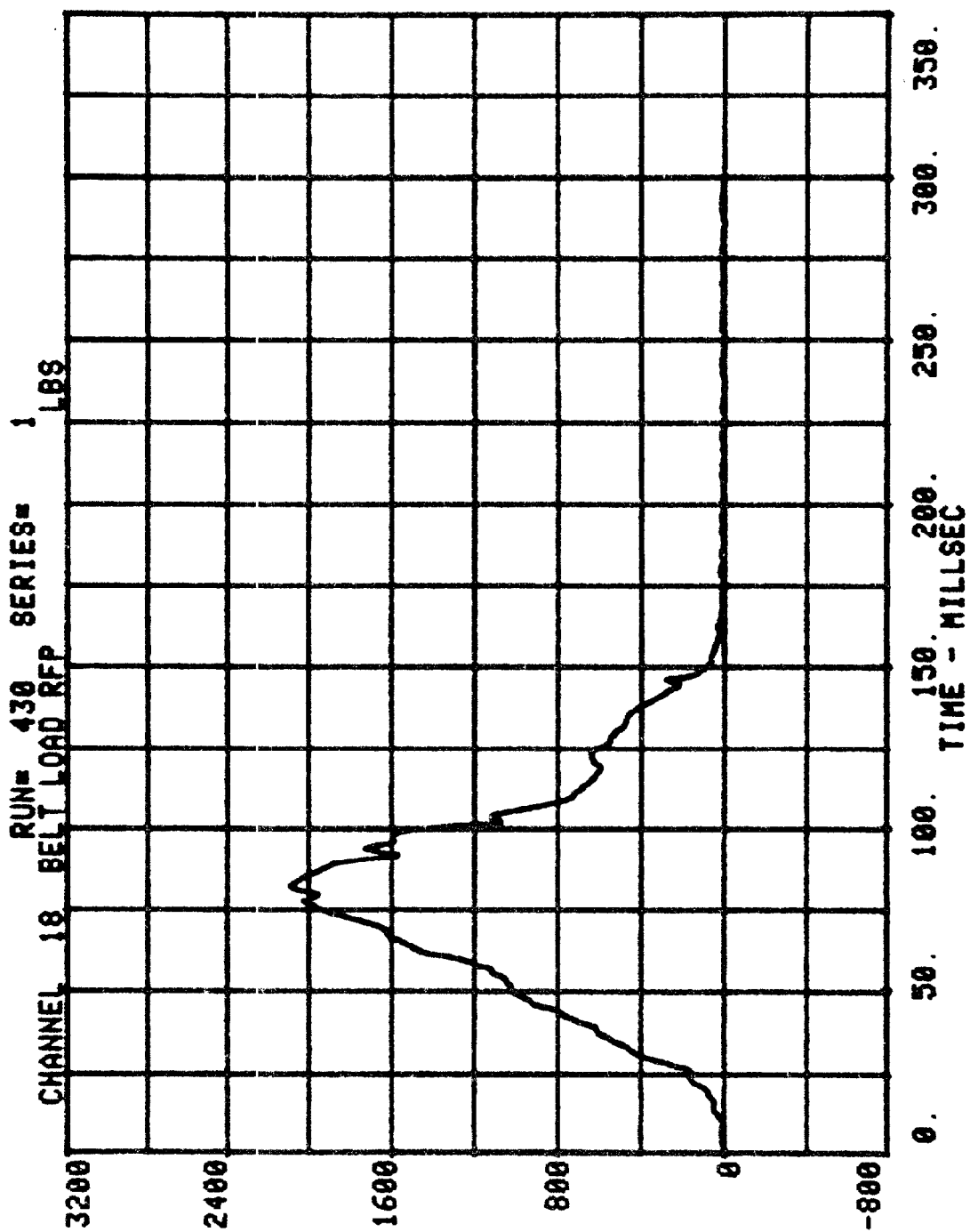












APPENDIX C

DUMMY CERTIFICATION TESTS

This test report contains results from certification tests performed on Alderson Research Laboratories Model ATD 30034, 50th percentile anthropomorphic test dummies, Serial Nos. 319, 320, which were completed on June 1, 1979. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Vol. 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan Corporation, Advanced Technology Center. A summary of the test results is presented in the following tables, Table 1C through 8C along with the Part 572 requirements.

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY I.D. NO.:

|   |   |   |
|---|---|---|
| 3 | 1 | 9 |
|---|---|---|

LABORATORY TECHNICIAN: FRED JULIANO

APPROVED BY: J. Alianello

|                                                     |                  | Pre-Test Calibration | Post-Test Calibration |
|-----------------------------------------------------|------------------|----------------------|-----------------------|
| Date of Dummy Calibration - - - - -                 |                  | 6/1/79               |                       |
| Calibration Sequential Number for Dummy - - - -     |                  | 1                    |                       |
| Temperature in Lab. (Spec. = 66 to 78°F) - - - -    |                  | 76                   |                       |
| Relative Humidity in Lab. (Spec. = 10 to 70%) -     |                  | 64%                  |                       |
| TEST PARAMETER                                      | SPECIFICATION    |                      |                       |
| <b>1. HEAD DROP TEST:</b>                           |                  |                      |                       |
| a. Peak Resultant Accel. -                          | 210 to 260G      | 216                  |                       |
| b. Peak Lateral Accel. - -                          | ≤10G             | 8                    |                       |
| c. Time above 100G - - - -                          | 0.9 to 1.5 ms    | 1.2                  |                       |
| <b>2. NECK BENDING TEST:</b>                        |                  |                      |                       |
| a. Pendulum Speed - - - -                           | 21.5 to 25.5 fps | 23.8                 |                       |
| b. Pendulum Avg. Decel. (over $t_3 - t_2$ ) - - - - | 20 to 24G        | 21                   |                       |
| c. Peak Resultant Head Acceleration - - - -         | 26G maximum      | 25                   |                       |
| d. Pendulum Decel. ( $t_2 - t_1$ ) - - - -          | ≤3 ms            | 1.9                  |                       |
| e. Pendulum Decel. ( $t_3 - t_2$ ) - - - -          | 25 to 30 ms      | 25.5                 |                       |
| f. Pendulum Decel. ( $t_4 - t_3$ ) - - - -          | ≤10 ms           | 7.5                  |                       |
| g. Pendulum Direction Reversal Time - - - -         | ≥123 ms          | 112                  |                       |
| h. Max. Head Rotation - -                           | 63 to 73°        | 64                   |                       |
| i. Chordal Displacement:                            |                  |                      |                       |
| Head Rotation Angle - -                             |                  |                      |                       |
| 0°                                                  | Time             | -2 to 2 ms           | 0                     |
|                                                     | Displ.           | -.5 to .5 in         | 0                     |
| 30°                                                 | Time             | 25.6 to 34.4 ms      | 28                    |
|                                                     | Displ.           | 2.1 to 3.1 in.       | 2.75                  |
| 60°                                                 | Time             | 40.3 to 51.7 ms      | 46                    |
|                                                     | Displ.           | 4.3 to 5.3 in.       | 5.25                  |
| Maximum (°)                                         | Time             | 53.2 to 66.8 ms      | 55                    |
|                                                     | Displ.           | 5.0 to 6.0 in.       | 5.5                   |

Continued

P. 572 DUMMY CALIBRATION TEST DATA .... Continued:

Dummy I.D. No.:

|   |   |   |
|---|---|---|
| 3 | 1 | 9 |
|---|---|---|

| TEST PARAMETER                             | SPECIFICATION     | Pre-Test Calibration | Post-Test Calibration |
|--------------------------------------------|-------------------|----------------------|-----------------------|
| <b>2. NECK BENDING TEST .... Continued</b> |                   |                      |                       |
| i. Chordal Displacement:                   |                   |                      |                       |
| Head Rotation Angle --                     |                   |                      |                       |
| 60°                                        | Time              | 67.0 to 83.0 ms      | 67                    |
|                                            | Displ.            | 4.3 to 5.3 in.       | 5.15                  |
| 30°                                        | Time              | 85.4 to 104.6 ms     | 88                    |
|                                            | Displ.            | 2.1 to 3.1 in.       | 2.5                   |
| 0°                                         | Time              | 101.0 to 123.0 ms    | 104                   |
|                                            | Displ.            | -.5 to 0.5 in.       | .2                    |
| <b>3. ABDOMINAL COMPRESSION TEST:</b>      |                   |                      |                       |
| (Preload = 10 pounds)                      |                   |                      |                       |
| a. Force @ 1" - - - - -                    | 50 to 63 lbs.     | 56                   |                       |
| b. Force @ 1.3" - - - - -                  | 73 to 88 lbs.     | 77                   |                       |
| <b>4. LUMBAR FLEXION TEST:</b>             |                   |                      |                       |
| a. Force @ 20° - - - - -                   | 22 to 34 lbs.     | 29.5                 |                       |
| b. Force @ 30° - - - - -                   | 34 to 46 lbs.     | 40                   |                       |
| c. Force @ 40° - - - - -                   | 46 to 58 lbs.     | 55                   |                       |
| d. Return Angle - - - - -                  | 12° maximum       | 10.1°                |                       |
| <b>5. CHEST IMPACT TESTS:</b>              |                   |                      |                       |
| a. High Speed                              |                   |                      |                       |
| (1) Probe Speed - - - - -                  | 21.78-22.22 fps   | 21.8                 |                       |
| (2) Peak Deflection - - - - -              | 1.7" maximum      | 1.7                  |                       |
| (3) Peak Resistive Force - - - - -         | 2250 lbs. maximum | 1924                 |                       |
| (4) Internal Hysteresis - - - - -          | 50 to 70%         | 54°                  |                       |
| b. Low Speed                               |                   |                      |                       |
| (1) Probe Speed - - - - -                  | 13.86-14.14 fps   | 13.9                 |                       |
| (2) Peak Deflection - - - - -              | 1.1" maximum      | .8                   |                       |
| (3) Peak Resistive Force - - - - -         | 1450 lbs. maximum | 1095                 |                       |
| (4) Internal Hysteresis - - - - -          | 50 to 7%          | 54°                  |                       |

P.572 DUMMY CALIBRATION TEST DATA .....Continued:

Dummy I.D. No.:

|   |   |   |
|---|---|---|
| 3 | 1 | 9 |
|---|---|---|

| TEST PARAMETER               | SPECIFICATION     | Pre-Test Calibration | Post-Test Calibration |
|------------------------------|-------------------|----------------------|-----------------------|
| 6. <u>KNEE IMPACT TESTS:</u> |                   |                      |                       |
| a. Right Side --             |                   |                      |                       |
| (1) Probe Speed - - -        | 6.76 to 7.04 fps  | 6.97                 |                       |
| (2) Maximum Force - -        | 1850 to 2500 lbs  | 2310                 |                       |
| (3) Time Above 1000#         | 1.7 ms minimum    | 1.9                  |                       |
| b. Left Side --              |                   |                      |                       |
| (1) Probe Speed - - -        | 6.76 to 7.04 fps  | 6.94                 |                       |
| (2) Maximum Force - -        | 1850 to 2500 lbs. | 2225                 |                       |
| (3) Time Above 1000#         | 1.7 ms minimum    | 1.7                  |                       |

# INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

|   |   |   |
|---|---|---|
| 3 | 1 | 9 |
|---|---|---|

CALIB. SEQ. NOS. FOR DUMMY: \_\_\_\_\_ & \_\_\_\_\_

## A. DUMMY INSTRUMENTS:

### 1. Head Accelerometers--

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal ( $A_x$ ) -

(2) Lateral ( $A_y$ ) - - -

(3) Vertical ( $A_z$ ) - - -

### 2. Chest Accelerometers-- (Vehicle Crash Test Usage)

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal ( $A_x$ ) -

(2) Lateral ( $A_y$ ) - - -

(3) Vertical ( $A_z$ ) - - -

### 3. Chest Potentiometer - - - -

### 4. Femur Load Cells--

a. Right Side - - - - -

b. Left Side

## B. CALIB. LAB. INSTRUMENTS:

1. Pendulum Accelerometer - -

2. Test Probe Accelerometer -

3. Lumbar Flexion Test Push  
Force Gauge - - - - -

4. Abdominal Compression Test  
Force Gauge - - - - -

5. Abdominal Compression Test  
Displacement Gauge - - - -

| MANUFACTURER       | SERIAL<br>NUMBER | DATE LAST<br>CALIBRATED | DATE OF<br>NEXT<br>CALIBRATION |
|--------------------|------------------|-------------------------|--------------------------------|
|                    |                  |                         |                                |
| ENDEVCO            | CS09             | 1/79                    |                                |
| ENDEVCO            | CS41             | 1/79                    |                                |
| ENDEVCO            | CU62             | 1/79                    |                                |
|                    |                  |                         |                                |
| BELL &<br>HOWELL   | A72              | 1/79                    |                                |
| ENDEVCO            | CS75             | 4/79                    |                                |
| BELL &<br>HOWELL   | A56              | 1/79                    |                                |
| OHMITE             | JAIN 200p        | 6/79                    |                                |
|                    | 310              |                         |                                |
| GSE                |                  | 1/79                    |                                |
| GSE                | 306              | 1/79                    |                                |
| BELL &<br>HOWELL   | 17547            | 2/79                    |                                |
| BELL &<br>HOWELL   | 16928            | 1/79                    |                                |
| BLH<br>ELECTRONICS | 72952            | 6/79                    |                                |
| BLH<br>ELECTRONICS | 72952            | 6/79                    |                                |
| BOURNS             | 108              | 6/79                    |                                |
| C-6                |                  | 6525-V-1                |                                |

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY I.D. NO.:

|   |   |   |
|---|---|---|
| 3 | 2 | 0 |
|---|---|---|

LABORATORY TECHNICIAN: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

|                                                        |                  | Pre-Test Calibration | Post-Test Calibration |
|--------------------------------------------------------|------------------|----------------------|-----------------------|
| Date of Dummy Calibration - - - - -                    |                  | 6/1/79               |                       |
| Calibration Sequential Number for Dummy - - -          |                  | 1                    |                       |
| Temperature in Lab. (Spec. = 66 to 78°F) - - -         |                  | 76                   |                       |
| Relative Humidity in Lab. (Spec. = 10 to 70%) -        |                  | 64                   |                       |
| TEST PARAMETER                                         | SPECIFICATION    |                      |                       |
| <b>1. HEAD DROP TEST:</b>                              |                  |                      |                       |
| a. Peak Resultant Accel. -                             | 210 to 260G      | 212                  |                       |
| b. Peak Lateral Accel. - -                             | ≤10G             | 5                    |                       |
| c. Time above 100G - - -                               | 0.9 to 1.5 ms    | 1.2                  |                       |
| <b>2. NECK BENDING TEST:</b>                           |                  |                      |                       |
| a. Pendulum Speed - - - -                              | 21.5 to 25.5 fps | 24.5                 |                       |
| b. Pendulum Avg. Decel.<br>(over $t_3 - t_2$ ) - - - - | 20 to 24G        | 23                   |                       |
| c. Peak Resultant Head<br>Acceleration - - - -         | 26G maximum      | 21.5                 |                       |
| d. Pendulum Decel. ( $t_2 - t_1$ )                     | ≤3 ms            | 2.0                  |                       |
| e. Pendulum Decel. ( $t_3 - t_2$ )                     | 25 to 30 ms      | 26                   |                       |
| f. Pendulum Decel. ( $t_4 - t_3$ )                     | ≤10 ms           | 9.9                  |                       |
| g. Pendulum Direction<br>Reversal Time - - - -         | ≥123 ms          | 115                  |                       |
| h. Max. Head Rotation - -                              | 63 to 73°        | 65°                  |                       |
| i. Chordal Displacement:                               |                  |                      |                       |
| Head Rotation Angle - -                                |                  |                      |                       |
| 0°                                                     | Time             | -2 to 2 ms           | 0                     |
|                                                        | Displ.           | -.5 to .5 in         | 0                     |
| 30°                                                    | Time             | 25.6 to 34.4 ms      | 29                    |
|                                                        | Displ.           | 2.1 to 3.1 in.       | 2.85                  |
| 60°                                                    | Time             | 40.3 to 51.7 ms      | 47                    |
|                                                        | Displ.           | 4.3 to 5.3 in.       | 5.3                   |
| Maximum<br>( °)                                        | Time             | 53.2 to 66.8 ms      | 60                    |
|                                                        | Displ.           | 5.0 to 6.0 in.       | 5.65                  |

Continued

P. 572 DUMMY CALIBRATION TEST DATA .... Continued:

Dummy I.D. No.:

3 2 0

| TEST PARAMETER                             | SPECIFICATION     | Pre-Test Calibration | Post-Test Calibration |
|--------------------------------------------|-------------------|----------------------|-----------------------|
| <b>2. NECK BENDING TEST .... Continued</b> |                   |                      |                       |
| i. Chordal Displacement:                   |                   |                      |                       |
| Head Rotation Angle --                     |                   |                      |                       |
| 60°                                        | Time              | 67.0 to 83.0 ms      | 69                    |
|                                            | Displ.            | 4.3 to 5.3 in.       | 5.2                   |
| 30°                                        | Time              | 85.4 to 104.6 ms     | 91                    |
|                                            | Displ.            | 2.1 to 3.1 in.       | 2.9                   |
| 0°                                         | Time              | 101.0 to 123.0 ms    | 107                   |
|                                            | Displ.            | -.5 to 0.5 in.       | .15                   |
| <b>3. ABDOMINAL COMPRESSION TEST:</b>      |                   |                      |                       |
| (Preload = 10 pounds)                      |                   |                      |                       |
| a. Force @ 1" - - - -                      | 50 to 63 lbs.     | 55                   |                       |
| b. Force @ 1.3" - - - -                    | 73 to 80 lbs.     | 75                   |                       |
| <b>4. LUMBAR FLEXION TEST:</b>             |                   |                      |                       |
| a. Force @ 20° - - - -                     | 22 to 34 lbs.     | 25.5                 |                       |
| b. Force @ 30° - - - -                     | 34 to 46 lbs.     | 36.5                 |                       |
| c. Force @ 40° - - - -                     | 46 to 58 lbs.     | 46.0                 |                       |
| d. Return Angle - - - -                    | 12° maximum       | 7.5                  |                       |
| <b>5. CHEST IMPACT TESTS:</b>              |                   |                      |                       |
| a. High Speed                              |                   |                      |                       |
| (1) Probe Speed - -                        | 21.78-22.22 fps   | 21.9                 |                       |
| (2) Peak Deflection -                      | 1.7" maximum      | 1.6"                 |                       |
| (3) Peak Resistive Force - - - - -         | 2250 lbs. maximum | 2020                 |                       |
| (4) Internal Hysteresis - - - -            | 50 to 70%         | 53%                  |                       |
| b. Low Speed                               |                   |                      |                       |
| (1) Probe Speed - - -                      | 13.86-14.14 fps   | 13.9                 |                       |
| (2) Peak Deflection -                      | 1.1" maximum      | .8                   |                       |
| (3) Peak Resistive Force - - - - -         | 1450 lbs. maximum | 1114                 |                       |
| (4) Internal Hysteresis - - - -            | 50 to 7%          | 54%                  |                       |

P.572 DUMMY CALIBRATION TEST DATA .....Continued:

Dummy I.D. No.:

|   |   |   |
|---|---|---|
| 3 | 2 | 0 |
|---|---|---|

| TEST PARAMETER               | SPECIFICATION     | Pre-Test Calibration | Post-Test Calibration |
|------------------------------|-------------------|----------------------|-----------------------|
| <b>6. KNEE IMPACT TESTS:</b> |                   |                      |                       |
| a. Right Side --             |                   |                      |                       |
| (1) Probe Speed - - -        | 6.76 to 7.04 fps  | 6.87                 |                       |
| (2) Maximum Force - -        | 1850 to 2500 lbs  | 2205                 |                       |
| (3) Time Above 1000#         | 1.7 ms minimum    | 2.0                  |                       |
| b. Left Side --              |                   |                      |                       |
| (1) Probe Speed - - -        | 6.76 to 7.04 fps  | 6.99                 |                       |
| (2) Maximum Force - -        | 1850 to 2500 lbs. | 2125                 |                       |
| (3) Time Above 1000#         | 1.7 ms minimum    | 2.0                  |                       |

# INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

|   |   |   |
|---|---|---|
| 3 | 2 | 0 |
|---|---|---|

CALIB. SEQ. NOS. FOR DUMMY: \_\_\_\_\_ & \_\_\_\_\_

## A. DUMMY INSTRUMENTS:

### 1. Head Accelerometers--

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal ( $A_x$ ) -

(2) Lateral ( $A_y$ ) - - -

(3) Vertical ( $A_z$ ) - - -

### 2. Chest Accelerometers-- (Vehicle Crash Test Usage)

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal ( $A_x$ ) -

(2) Lateral ( $A_y$ ) - - -

(3) Vertical ( $A_z$ ) - - -

### 3. Chest Potentiometer - - - -

### 4. Femur Load Cells--

a. Right Side - - - - -

b. Left Side

## B. CALIB. LAB. INSTRUMENTS:

1. Pendulum Accelerometer - -

2. Test Probe Accelerometer -

3. Lumbar Flexion Test Push  
Force Gauge - - - - -

4. Abdominal Compression Test  
Force Gauge - - - - -

5. Abdominal Compression Test  
Displacement Gauge - - - -

| MANUFACTURER       | SERIAL<br>NUMBER | DATE LAST<br>CALIBRATED | DATE OF<br>NEXT<br>CALIBRATION |
|--------------------|------------------|-------------------------|--------------------------------|
|                    |                  |                         |                                |
|                    | CL60             |                         |                                |
| ENDEVCO            |                  | 1/79                    |                                |
| ENDEVCO            | CG34             | 1/79                    |                                |
|                    | CK11             |                         |                                |
| ENDEVCO            |                  | 1/79                    |                                |
|                    |                  |                         |                                |
| BELL &<br>HOWELL   | 18118            | 4/79                    |                                |
| ENDEVCO            | AA07             | 4/79                    |                                |
| BELL &<br>HOWELL   | 22292            | 4/79                    |                                |
|                    |                  |                         |                                |
| OHMITE             | JAIN 200p        | 6/79                    |                                |
|                    |                  |                         |                                |
| GSE                | 312              | 1/79                    |                                |
| GSE                | 311              | 1/79                    |                                |
|                    |                  |                         |                                |
| BELL &<br>HOWELL   | 17547            | 2/79                    |                                |
| BELL &<br>HOWELL   | 16928            | 1/79                    |                                |
| BLH<br>ELECTRONICS | 72952            | 6/79                    |                                |
| BLH<br>ELECTRONICS | 72952            | 6/79                    |                                |
|                    |                  |                         |                                |
| BOURNS             | 108              | 6/79                    |                                |
|                    |                  |                         |                                |
| C-10               |                  | 6525-V-T                |                                |

## Electronic Test Equipment

The complement of signal conditioning recording and display equipment used in conjunction with dummy certification testing is shown in Figure 8.

- Data Acquisition - Sangamo Mod 3500 14 channel FM Tape Transport (recording Speed: 60 in/sec).
- Data Reduction - Brush Mark 260 6-channel recorder or Pace X-Y plotter.
- Signal Conditioning - Calspan designed and fabricated bridge amplifiers providing gain, balance, and shunt calibration of all sensor inputs.
- Computational Equipment - Calspan designed and fabricated analog computer consisting of operational amplifiers in circuit configurations providing continuous computation of acceleration vector magnitude and Severity Index relationships.
- Signal Filtering - Calspan designed and fabricated second order active filters (6 channels) with selectable frequency responses consistent with SAE J211b Class 60, 180, 600, and 1000 requirements. Filters are compensated for 32:1 real time expansion resulting from data recording at 60 in/sec and playback at 1-7/8 in/sec.
- Real Time Reference - Tektronix Time Mark Generator; 1 and 10 millisecond is synchronously recorded with all certification data and reproduced at playback on all strip chart records.

- The data acquisition, reproduction, and time reference equipment is maintained by Calspan's Equipment and Standards Laboratory (ESL), which is an NBS traceable calibration facility. Other special purpose equipment is maintained by qualified test facility personnel using support equipment maintained and standardized by ESL.

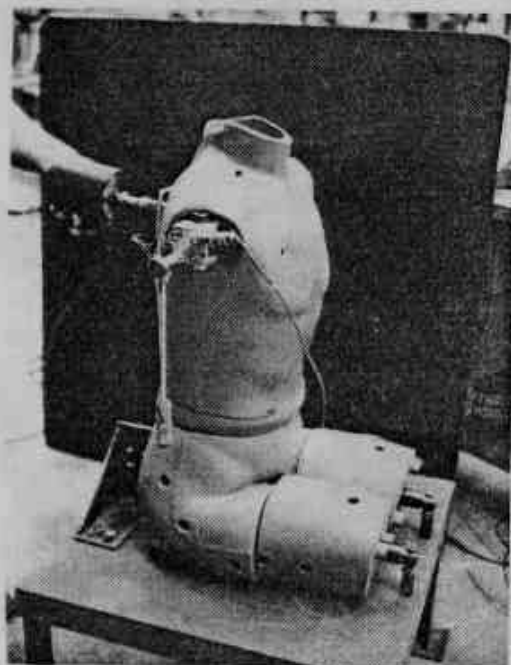


FIGURE C-1

LUMBAR SPINE FLEXION TEST APPARATUS

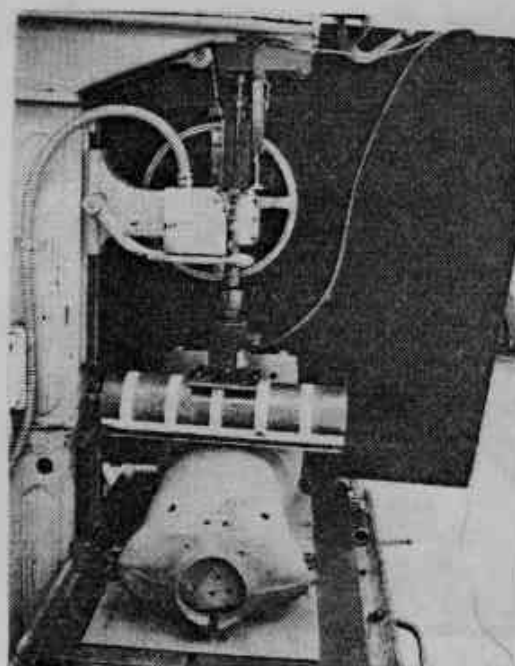


FIGURE C-2

ABDOMEN PRESS TEST APPARATUS

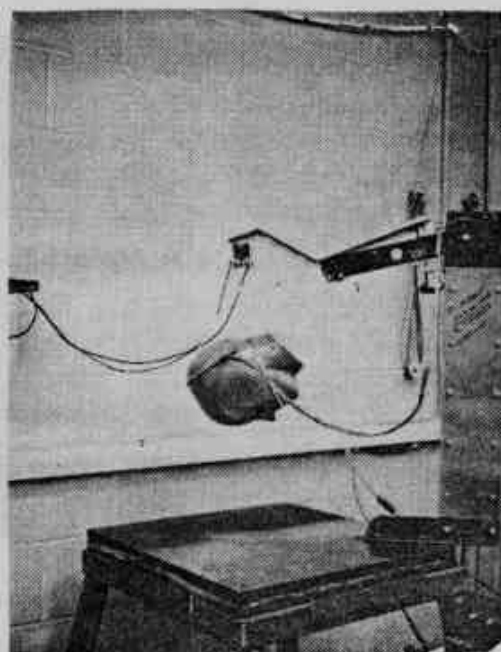


FIGURE C-3

HEAD DROP TEST APPARATUS

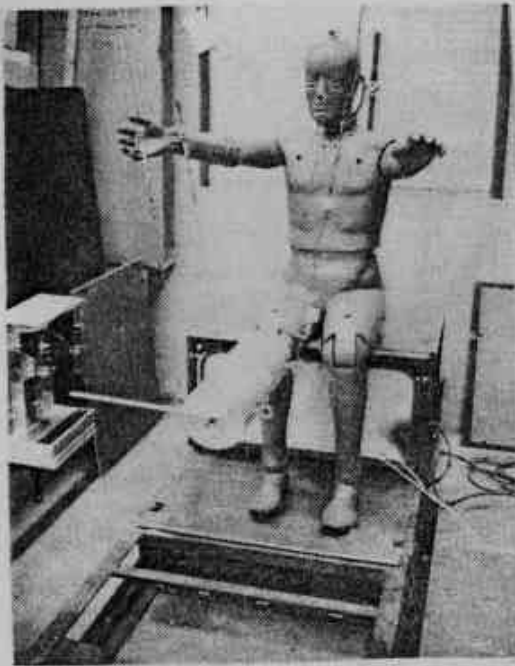


FIGURE C-4  
KNEE IMPACT TEST APPARATUS

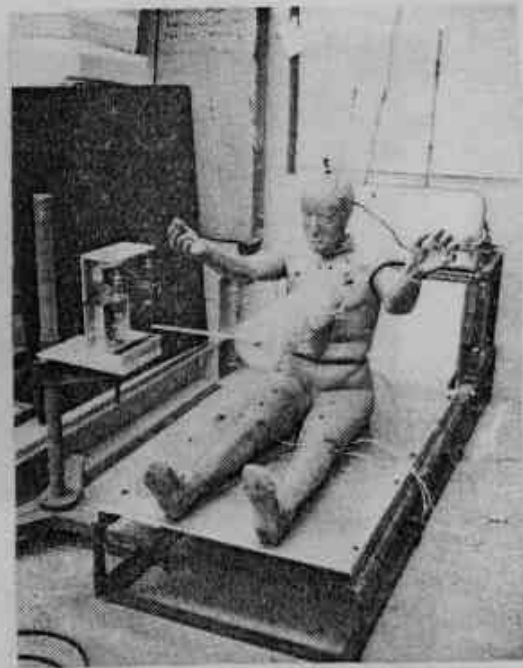


FIGURE C-5  
THORAX IMPACT TEST APPARATUS

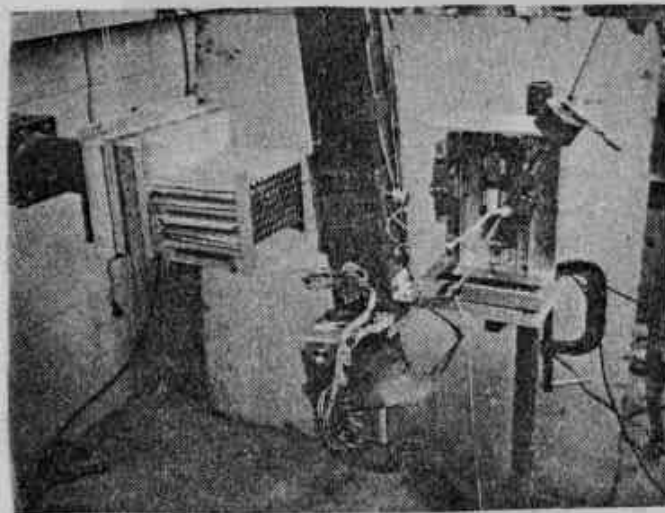


Figure C-6  
NECK IMPACT TEST APPARATUS

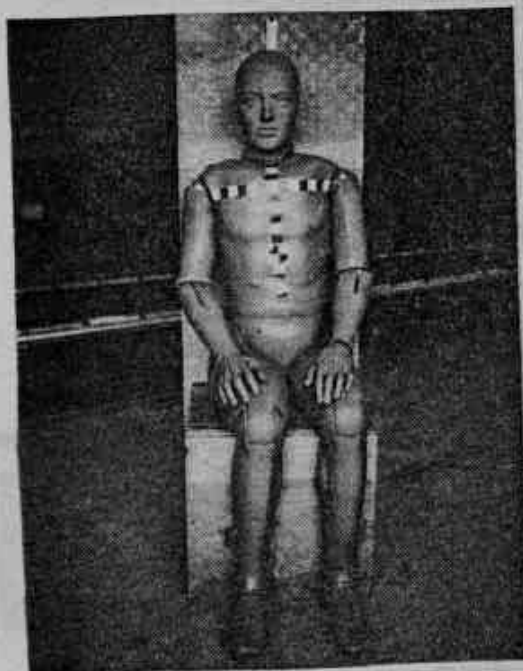


FIGURE C-7



FIGURE C-7  
PART 572 TEST DUMMY  
FRONT & SIDE VIEW

C-15

6525-V-1

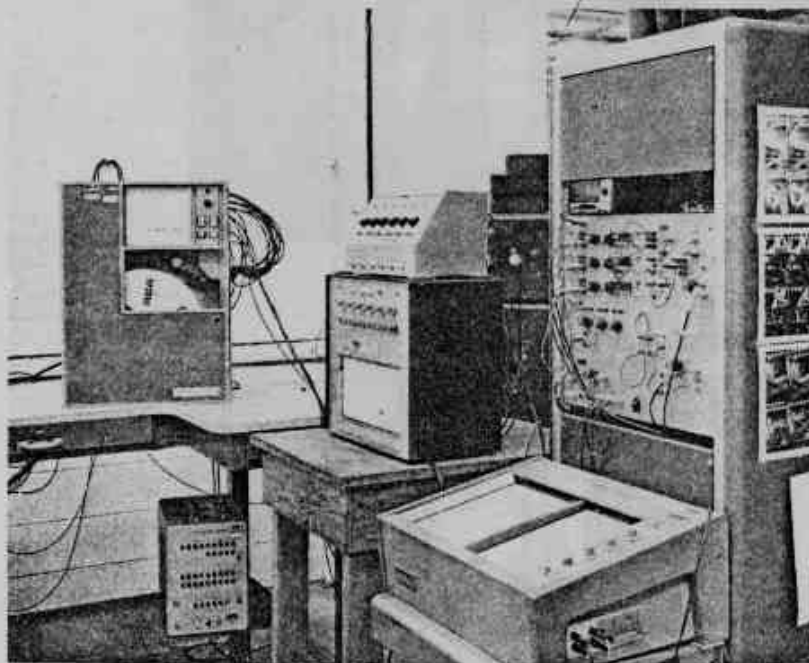


Figure C-8. ELECTRONIC TEST EQUIPMENT