

DOT 644

REPORT NOS. 212-CAL-84-040  
301-CAL-84-040

NHTSA NEW VEHICLE ASSESSMENT AND  
STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS 212 AND 301-75  
FORD MOTOR COMPANY  
1984 FORD LTD  
4-DOOR STATION WAGON

NHTSA NO. CE0207  
CALSPAN TEST NO. 7209-4

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FINAL REPORT

Prepared for:

U. S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
ENFORCEMENT  
OFFICE VEHICLE SAFETY COMPLIANCE  
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| 16. Abstract  |  |  |  |                            |           |
| <p>A frontal load cell barrier test of a 1984 Ford LTD 4-door station wagon was performed at Calspan Corporation, Advanced Technology Center, Transportation Research/Physical Sciences Department facility for the New Car Assessment and Standards Enforcement Testing of FMVSS 212, "Windshield Mounting" and FMVSS 301-75, "Fuel System Integrity" for the Office of Vehicle Safety Compliance, the Office of Market Incentives (OMI) and for Research and Development.</p> <p>Impact speed was 34.62 mph. Ambient temperature on the test date was 58°F. The post-test vehicle crush was 28.2 inches and intrusion of the firewall into compartment was 12.9 inches.</p> <p>The test vehicle appeared to comply with the following vehicle performance standards:</p> <p>FMVSS 212 - Windshield Retention<br/>FMVSS 301-75 - Fuel System Integrity</p> <p>With regard to occupant injury criteria (FMVSS 208) the drive dummy appeared to satisfy the criteria while the passenger dummy appeared to exceed the chest acceleration maximum limit (70.2 g's).</p> |  |  |  |                            |           |
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SECTION 1  
PURPOSE AND TEST PROCEDURE

This frontal barrier test is part of the Composite FY 84 Vehicle Barrier Impact Testing, sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract DTNH22-82-C-01140. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint performance data for impact speeds in excess of the current FMVSS requirements.

The test was performed in accordance with the Office of Automotive Ratings Laboratory Procedure No. IP-212-02 dated April 4, 1980. Indicant test data for FMVSS 212, "Windshield Mounting," and FMVSS 301-75, "Fuel System Integrity," as well as occupant performance data for a nominal 35 mph impact is provided herein.

## SECTION 2

### SUMMARY OF TEST NUMBER CE0207

A load cell barrier consisting of 36 load cells (Figure 4) was impacted by a 1984 Ford LTD 4-door station wagon at a velocity of 34.62 mph. The test was performed at the Calspan Corporation Advanced Technology Center on November 7, 1983. Pre- and post-test photographs of the vehicle and occupants can be found in Appendix A. Table 1 presents pertinent crash test information.

Two Part 572, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions, according to dummy placement procedures specified in Laboratory Procedure for Vehicle Assessment IP-212-02.

The occupant dummies were instrumented with head and chest triaxial accelerometers and femur load cells. Load cells were also placed on the lap and shoulder belts to measure dummy torso and lap loading. The driver ATD (Serial No. 1021) had been certified prior to this test. The right-front passenger ATD (Serial No. 819) had been used in two previous tests (CE0206 and CE0106). The FMVSS Injury Criteria Values were not exceeded in those tests. Certification details, along with instrumentation calibration data, are found in Appendix C.

The crash event was recorded by one real-time camera and 15 high-speed cameras. Camera locations and other pertinent camera information are found in Section 4 of this report.

The 69 channels of data were recorded on six 14-channel FM tape recorders. Appendix B contains the vehicle and dummy response data traces. The Injury Criteria Values are presented in summary form in Table 10.

Table 1

CRASH TEST SUMMARY

TEST NO. CE0207 PROJECT: FY-84 New Car Assessment Program  
FMVSS No. 208/212/301-75  
 DATE: 11/7/83 TIME: 1143 hrs. TEMP: 58°F.

VEHICLE 1984 Ford LTD 4-Door Station Wagon  
 TEST WEIGHT (lbs) 3680  
 IMPACT ANGLE (deg)\* 0  
 IMPACT VELOCITY (mph)\*\* 34.62  
 MAX. CRUSH (in) static 28.2  
 MAX. INTRUSION (in) 12.9

DUMMIES

|           |   |   |
|-----------|---|---|
| TYPE      | <u>Hybrid II Part 572</u>                 | <u>Hybrid II Part 572</u>                 |
| LOCATION  | <u>LF(1) Serial 1021</u>                  | <u>RF(2) Serial 819</u>                   |
| RESTRAINT | <u>production 3-point<br/>belt system</u> | <u>production 3-point<br/>belt system</u> |

NUMBER OF DATA CHANNELS 67  
 NUMBER OF HIGH SPEED CAMERAS 15 + 1 real time

\*With respect to tow track Centerline

\*\*Speed trap measurement (± .05% accuracy)

### General Comments

The 1984 Ford LTD 4-door station wagon was equipped with a 3.8 liter, 6-cylinder engine, three-speed automatic transmission, power brakes and power steering. The total test weight with two 50th percentile male dummies, instrumentation and two on-board cameras was 3680 pounds.

The 1984 Ford LTD station wagon which was involved in a frontal load cell barrier crash at a velocity of 34.62 mph appeared to comply with FMVSS Nos. 212, "Windshield Mounting," and 301-75 "Fuel System Integrity." There was 100 percent windshield retention and no fuel leakage after impact or any phase of the rollover test.

The vehicle sustained 28.2 inches of static crush and approximately 32.2 inches of dynamic crush. Maximum firewall intrusion into the occupant compartment was 12.9 inches. The maximum load cell barrier force measured by the 36 load cells was 93,750 pounds at 38 milliseconds.

The passenger side D-ring pulled off the B-pillar anchor stud during the test event. Post-test photographs of this are included in Appendix A (see Figures A-30 and A-31).

The driver's head struck the steering wheel and upper instrument panel while the knees contacted the lower portion of the dash panel. A HIC value of 646.2 and a maximum chest deceleration value of 57.6 g's were recorded for the driver. It is noted that zero shifts contaminated the left and right femur data for the driver. Both channels checked out before and after the test. Those data have been included in Appendix B.

The passenger position dummy struck the windshield and upper instrument panel with its head while the femurs contacted the glove box door. An acceptable HIC value of 647.3 was recorded. Right and left femur loads were also acceptable (590 and 1850 lbs.). The chest resultant acceleration over 3 milliseconds in duration was unacceptable at 70.2 g's.

Table 2  
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION

Make/Model Ford LTD Body Style 4-door station wagon  
Model Year 1984 NHTSA No. CE0207 Color Silver  
Engine Data: 6 cylinders, 3.8 liter  
Transmission Data: 3 speed, ( ) manual (x) automatic  
Date Rec'd 9/28/83 Air Cond. No Pw. Str. yes Pw. Brks. yes  
Dealer's Name & Address Muck Motors, Getzville, NY 14068  
Odometer Reading 11

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

Vehicle Manufactured by: Ford Motor Company  
Date of Manufacture 8/83 VIN 1FABP4035EG117941  
GVRW 4520 lbs., GAWR: front 2158 lbs., rear 2410 lbs.

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

Vehicle Load (up to capacity): front 28 psi  
rear 35 psi  
Recommended Tire Size P185-75R14 Load Range X B    C    D  
Recommended Cold Tire Pressure: front 30 psi, rear 35 psi  
Tires on Vehicle P185-75R14  
Is Spare Tire a "Space Saver?"    yes X no  
Is Spare Tire Standard Equipment? X yes    no  
Vehicle Capacity: Types of Seats:    bench, X bucket,    split bench  
Number of Occupants (Designated Seating Capacity): 2 front  
3 rear  
5 TOTAL  
RCLW Cargo Load: 150 lbs.  
VCW Total = 900 lbs.

Table 2 (cont'd)

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = 870 lbs.      Right Rear = 750 lbs.  
Left Front = 830 lbs.      Left Rear = 760 lbs.  
TOTAL FRONT WEIGHT = 1700 lbs. ( 53 % of Total Vehicle Weight)  
TOTAL REAR WEIGHT = 1510 lbs. ( 47 % of Total Vehicle Weight)  
TOTAL DELIVERY WEIGHT = 3210 lbs.

CALCULATION FOR TARGET TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight  
UDW = Unloaded Delivered Weight ( 3210 lbs.)  
VCW = Vehicle Capacity Weight ( 900 lbs.)  
DSC = Designated Seating Capacity ( 5 )  
RCLW = VCW - 150 (DSC) = 150 lbs.  
Target Test Weight = UDW + RCLW + (2 dummies X 164 lbs./dummy)  
Target Test Weight = 3688 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 142 POUNDS CARGO

Right Front = 940 lbs.      Right Rear = 900 lbs.  
Left Front = 930 lbs.      Left Rear = 910 lbs.  
TOTAL FRONT WEIGHT = 1870 lbs. ( 50.8 % of Total Vehicle Weight)  
TOTAL REAR WEIGHT = 1810 lbs. ( 49.2 % of Total Vehicle Weight)  
TOTAL TEST WEIGHT = 3680 lbs.  
Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches)

|                     |    |             |    |             |    |             |    |             |
|---------------------|----|-------------|----|-------------|----|-------------|----|-------------|
| Delivered Attitude: | RF | <u>26.1</u> | LF | <u>26.2</u> | RR | <u>25.1</u> | LR | <u>25.1</u> |
| Test Attitude:      | RF | <u>25.5</u> | LF | <u>25.4</u> | RR | <u>24.0</u> | LR | <u>24.0</u> |

Remarks: Wheel Base = 105 inches

C.G. = 51.6 inches rearward of front wheel C/L

Table 2 (cont'd)

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA

Type of Test frontal barrier Impact Angle 0 °  
 Date of Test 11/7/85 Time of Test 1143 hrs.  
 Ambient Temperature 58 °F at impact area  
 Temperature in Occupant Compartment 67 °F  
 Windshield Molding Temperature 60 °F  
 Required Impact Velocity Range: 34.5 to 35.5 mph  
 Impact Velocity: primary = 34.62 mph, secondary 34.7 mph

VEHICLE REBOUND AND CRUSH (inches)

Vehicle Length: Pre-test = R 192.1 C 195.4 L 192.0  
 Post-test = R 166.1 C 167.2 L 166.6  
 Crush = R 26.0 C 28.2 L 25.4  
 Distance from front of test vehicle to point of impact:  
 R 0 C/L 0 L 0

VISIBLE DUMMY CONTACT POINTS

|              | <u>Driver</u>                      | <u>Passenger</u>                 |
|--------------|------------------------------------|----------------------------------|
| Head         | <u>dash and steering wheel rim</u> | <u>dash panel and windshield</u> |
| Chest        | <u>steering wheel</u>              | <u>none</u>                      |
| Abdomen      | <u>none</u>                        | <u>none</u>                      |
| Left Knee    | <u>dash panel</u>                  | <u>glove compartment door</u>    |
| Right Knee   | <u>dash panel</u>                  | <u>glove compartment door</u>    |
|              | <u>Front</u>                       |                                  |
|              | <u>Left</u>                        | <u>Right</u>                     |
| Door Opening | <u>not operable</u>                | <u>not operable</u>              |
|              | <u>Rear</u>                        |                                  |
|              | <u>Left</u>                        | <u>Right</u>                     |
|              | <u>operable</u>                    | <u>operable</u>                  |

Table 2 (cont'd)

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

| <u>Seat Movement</u> | <u>Front</u>        |                     |
|----------------------|---------------------|---------------------|
|                      | <u>Left</u>         | <u>Right</u>        |
| Seat Back Failure    | <u>Intact</u>       | <u>Intact</u>       |
| Seat Shift (in.)     | <u>1.2" forward</u> | <u>1.2" forward</u> |

Glazing Damage

Backlight/Windshield \_\_\_\_\_

Other notable impact effects: "D" ring on passenger belt pulled out. See  
Figures A-30 and A-31.

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

### SECTION 3

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

- Summary of FMVSS 212, and 301 Data
- Post-Impact Data for FMVSS Nos. 212, and 301-75
- Windshield Retention, FMVSS No. 212 Data
- Fuel System Integrity, FMVSS No. 301-75 Data

Table 3  
SUMMARY OF FMVSS 212, AND 301 DATA

PRE-IMPACT DATA

Make/Model: Ford LTD  
Body Style: 4-door wagon Model Year: 1984  
NHTSA No.: CE0207 Color: silver

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Ford Motor Company  
Date of Manufacture: 8/83 VIN: 1FABP4035EG117941  
GVWR: 4520 lbs., GAWR: Front 2158 lbs., Rear 2410 lbs.

POST-IMPACT DATA

Type of Test: Frontal load cell barrier impact  
Date of Test: 11/7/83 Time: 1143 hrs. Temp.: 58 °F  
Required Impact Velocity Range: 34.5 to 35.5 mph  
Impact Velocity: Primary = 34.62 mph, Secondary = 34.7 mph  
Test Weight 3680 lbs., Static Crush max. 28.2 in., Rebound 0 in.

FUEL SYSTEM DATA

Test Fluid Type: Red Stoddard Solvent #2, Spec. Grav.: 0.764  
Kinematic Viscosity 0.96 Centistokes  
EPA Capacity\* 16.0 gal.  
Test Volume 14.8 gal. (93% of EPA Capacity)  
Fuel System Capacity (data from Owner's Manual) 16 gal.  
Electric Fuel Pump? yes  no, Fuel Injection? yes  no  
Does electric fuel pump operate with ignition switch "on" and the engine  
not operating? no yes no

Test vehicle fuel tank filled to 93% of "usable" capacity  
with Stoddard Solvent and with electric fuel pump operating (if it will  
operate without engine operation) until start of static roll.

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

SUMMARY OF FMVSS 212, AND 301 DATA (cont'd)

Details of fuel system: Engine-operated fuel pump. The fuel tank is  
located aft of rear wheels and held in place by two tank straps. The fuel  
filler tube is on the right side of vehicle and sealed by a screw-type cap  
which is concealed by a hinged door.



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

Windshield is bonded in place and has a one inch chrome strip along the top and sides.

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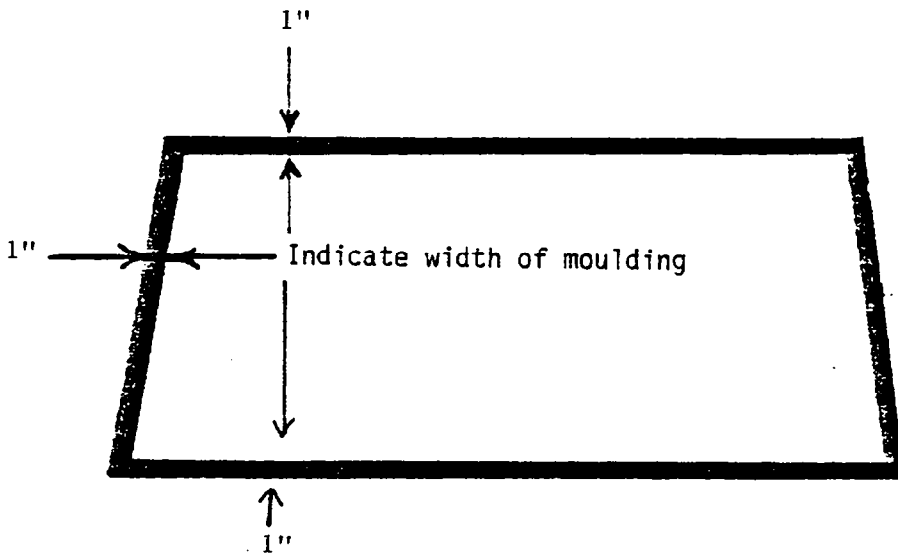


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|            | Windshield Periphery |                 | Retention % |
|------------|----------------------|-----------------|-------------|
|            | Pre-Test (in.)       | Post-Test (in.) |             |
| Right Side | 80.5                 | 80.5            | 100%        |
| Left Side  | 80.5                 | 80.5            | 100%        |
| TOTAL      | 161                  | 161             | 100%        |

The standard requires that Post-Test be a minimum of 75 percent of the Pre-Test total periphery measurement for vehicle 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



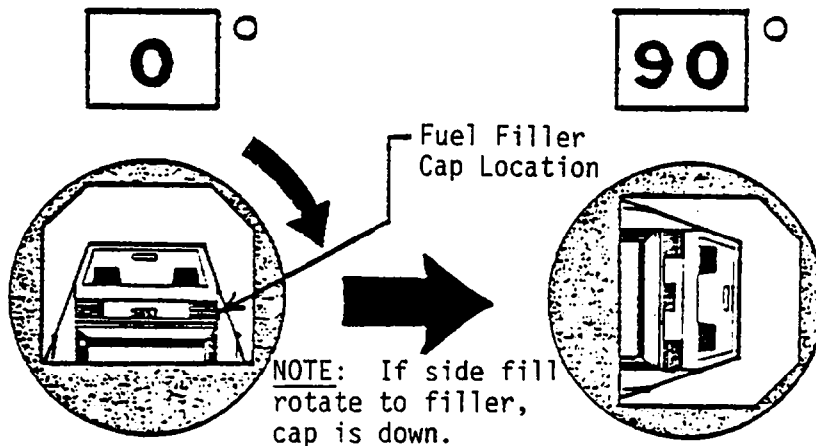
FRONT VIEW

Figure 1 WINDSHIELD RETENTION, FMVSS NO. 212 DATA



Table 6  
FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

|   |   |                  |                   |
|---|---|------------------|-------------------|
| Rollover Fixture 90° Rotation Time<br>(Spec. Range = 1 to 3 min.) | = | <u>2</u> minutes | <u>47</u> seconds |
| FMVSS 301-75 Position Hold Time                                   | = | <u>5</u> minutes | <u>00</u> seconds |
| TOTAL   | = | <u>7</u> minutes | <u>47</u> seconds |
| Next Whole Minute Interval  | = | <u>8</u> minutes |                   |

FMVSS 301-75 REQUIREMENTS

Time Period

|  |          |          |                   |
|--|----------|----------|-------------------|
| First 5 min. <u>from</u> onset of rotation | 6th min. | 7th min. | 8th min. if reqd. |
|--|----------|----------|-------------------|

Maximum Allowable Solvent Spillage

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

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

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

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

SOLVENT SPILLAGE LOCATION(S)

None

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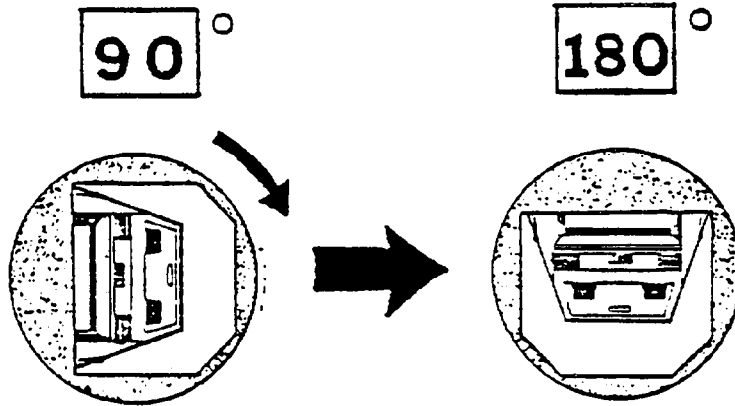
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VEHICLE NHTSA ID NO. CE0207

Table 6 (cont'd)

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 51 seconds  
(Spec. Range = 1 to 3 min.)  
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds  
TOTAL = 7 minutes 51 seconds  
Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

|  |          |          |                   |
|--|----------|----------|-------------------|
| First 5 min. <u>from</u> onset of rotation | 6th min. | 7th min. | 8th min. if reqd. |
|--|----------|----------|-------------------|

Maximum Allowable Solvent Spillage

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

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

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

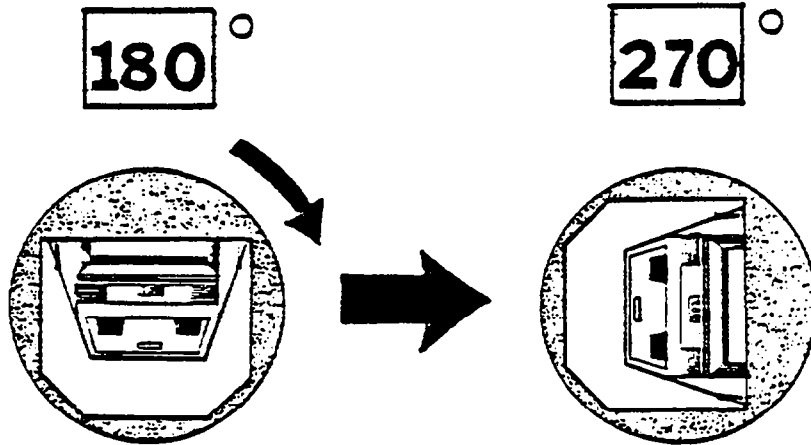
NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

None  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 57 seconds  
 (Spec. Range = 1 to 3 min.)  
 FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds  
 TOTAL = 7 minutes 57 seconds  
 Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

|  |          |          |                   |
|--|----------|----------|-------------------|
| First 5 min. <u>from</u> onset of rotation | 6th min. | 7th min. | 8th min. if reqd. |
|--|----------|----------|-------------------|

Maximum Allowable Solvent Spillage

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

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

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

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

SOLVENT SPILLAGE LOCATION(S)

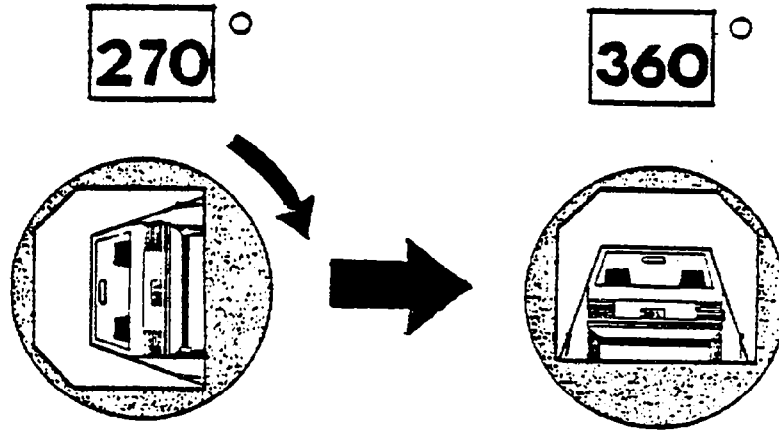
None  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

VEHICLE NHTSA ID NO. CE0207

Table 6 (cont'd)

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 57 seconds  
(Spec. Range = 1 to 3 min.)  
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds  
TOTAL = 7 minutes 57 seconds  
Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

|  |          |          |                   |
|--|----------|----------|-------------------|
| First 5 min. <u>from</u> onset of rotation | 6th min. | 7th min. | 8th min. if reqd. |
|--|----------|----------|-------------------|

Maximum Allowable Solvent Spillage

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

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

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

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

SOLVENT SPILLAGE LOCATION(S)

None  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## SECTION 4

### OCCUPANT AND VEHICLE INFORMATION (OMI AND AID DATA)

- Vehicle Measurements
- Vehicle Accelerometer Locations
- Load Cell Barrier-Load Cells Locations
- AID Data Summary
- Camera Positions and Locations
- Owner's Manual Seat Belt Instructions
- Dummy In-Vehicle Positioning
- Dummy Injury Criteria Values
- Belt Related Data

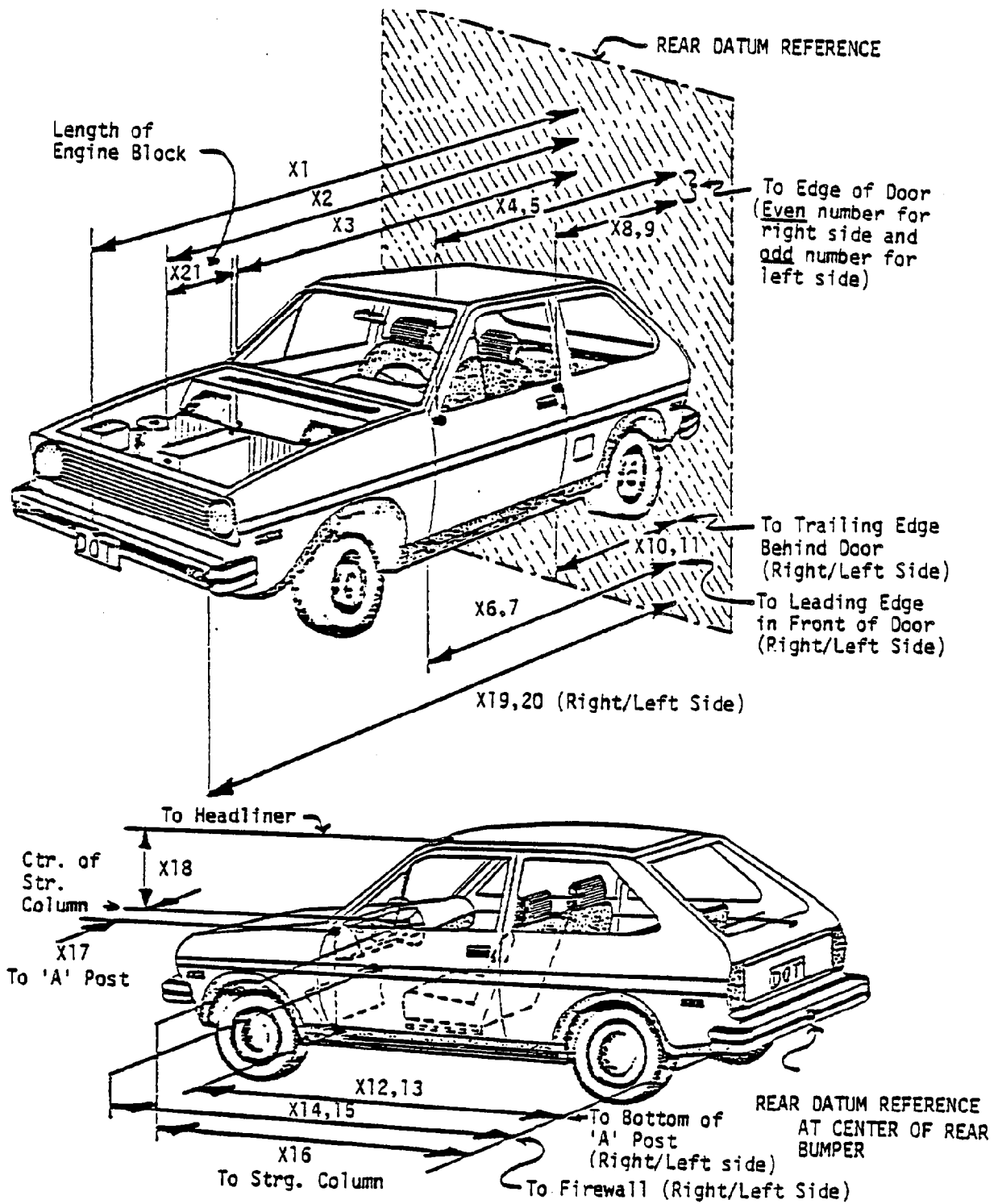
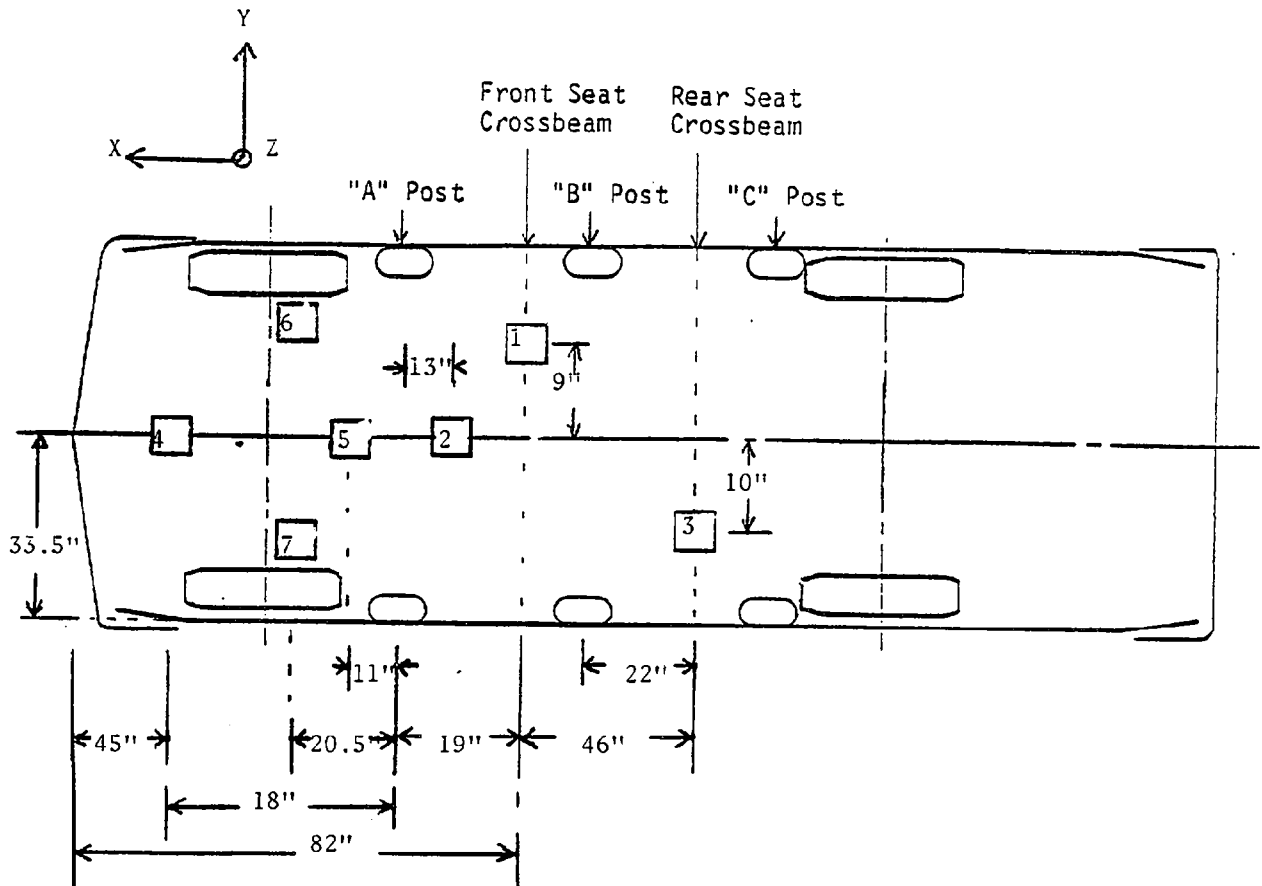


Figure 2 PRE- AND POST-TEST MEASUREMENT POINTS

Table 7

VEHICLE MEASUREMENTS

|     |  | All Dimensions in Inches |           |            |
|-----|--|--------------------------|-----------|------------|
| No. |  | Pre-Test                 | Post-Test | Difference |
| X1  | Total Length of Vehicle at Centerline                        | 195.4                    | 167.2     | 28.2       |
| X2  | Rear Surface of Vehicle to Front of Engine                   | 163.4                    | 154.1     | 9.3        |
| X3  | Rear Surface of Vehicle to Firewall                          | 143.9                    | 136.7     | 7.2        |
| X4  | Rear Surface of Vehicle to Upper Leading Edge of Right Door  | 127.9                    | 127.9     | 0          |
| X5  | Rear Surface of Vehicle to Upper Leading Edge of Left Door   | 127.9                    | 128.0     | -0.1       |
| X6  | Rear Surface of Vehicle to Lower Leading Edge of Right Door  | 130.9                    | 130.0     | 0.9        |
| X7  | Rear Surface of Vehicle to Lower Leading Edge of Left Door   | 131.0                    | 130.9     | 0.1        |
| X8  | Rear Surface of Vehicle to Upper Trailing Edge of Right Door | 91.3                     | 91.2      | 0.1        |
| X9  | Rear Surface of Vehicle to Upper Trailing Edge of Left Door  | 91.3                     | 91.2      | 0.1        |
| X10 | Rear Surface of Vehicle to Lower Trailing Edge of Right Door | 89.6                     | 88.9      | 0.7        |
| X11 | Rear Surface of Vehicle to Lower Trailing Edge of Left Door  | 89.8                     | 89.5      | 0.3        |
| X12 | Rear Surface of Vehicle to Bottom of "A" Post of Right Side  | 129.7                    | 128.4     | 1.3        |
| X13 | Rear Surface of Vehicle to Bottom of "A" Post of Left Side   | 129.6                    | 129.6     | 0          |
| X14 | Rear Surface of Vehicle to Firewall, Right Side              | 149.4                    | 136.5     | 12.9       |
| X15 | Rear Surface of Vehicle to Firewall, Left Side               | 150.5                    | 139.5     | 11.0       |
| X16 | Rear Surface of Vehicle to Steering Column                   | 115.2                    | 115.4     | -0.2       |
| X17 | Center of Steering Column to "A" Post                        | 16.0                     | 15.2      | 0.8        |
| X18 | Center of Steering Column to Headliner                       | 17.5                     | 21.2      | -3.7       |
| X19 | Rear Surface of Vehicle to Right Side of Front Bumper        | 192.1                    | 166.1     | 26         |
| X20 | Rear Surface of Vehicle to Left Side of Front Bumper         | 192.0                    | 166.6     | 25.4       |
| X21 | Length of Engine Block                                       | 15.2                     | 15.2      | 0          |



| ACCELEROMETER NUMBER * | ACCELEROMETER LOCATION    | DIRECTION |   |   |
|------------------------|---------------------------|-----------|---|---|
|                        |                           | X         | Y | Z |
| 1                      | Front Seat Crossmember    | X         |   |   |
| 2                      | Vehicle C.G.              | X         |   |   |
| 3                      | Rear Seat Crossmember     | X         |   |   |
| 4                      | Top of Engine             | X         |   |   |
| 5                      | Bottom of Engine          | X         |   |   |
| 6                      | Right Front Brake Caliper | X         |   |   |
| 7                      | Left Front Brake Caliper  | X         |   |   |

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

FIGURE 3 VEHICLE ACCELEROMETER LOCATIONS

36 LOAD CELLS  
 4 ROWS  
 9 COLUMNS

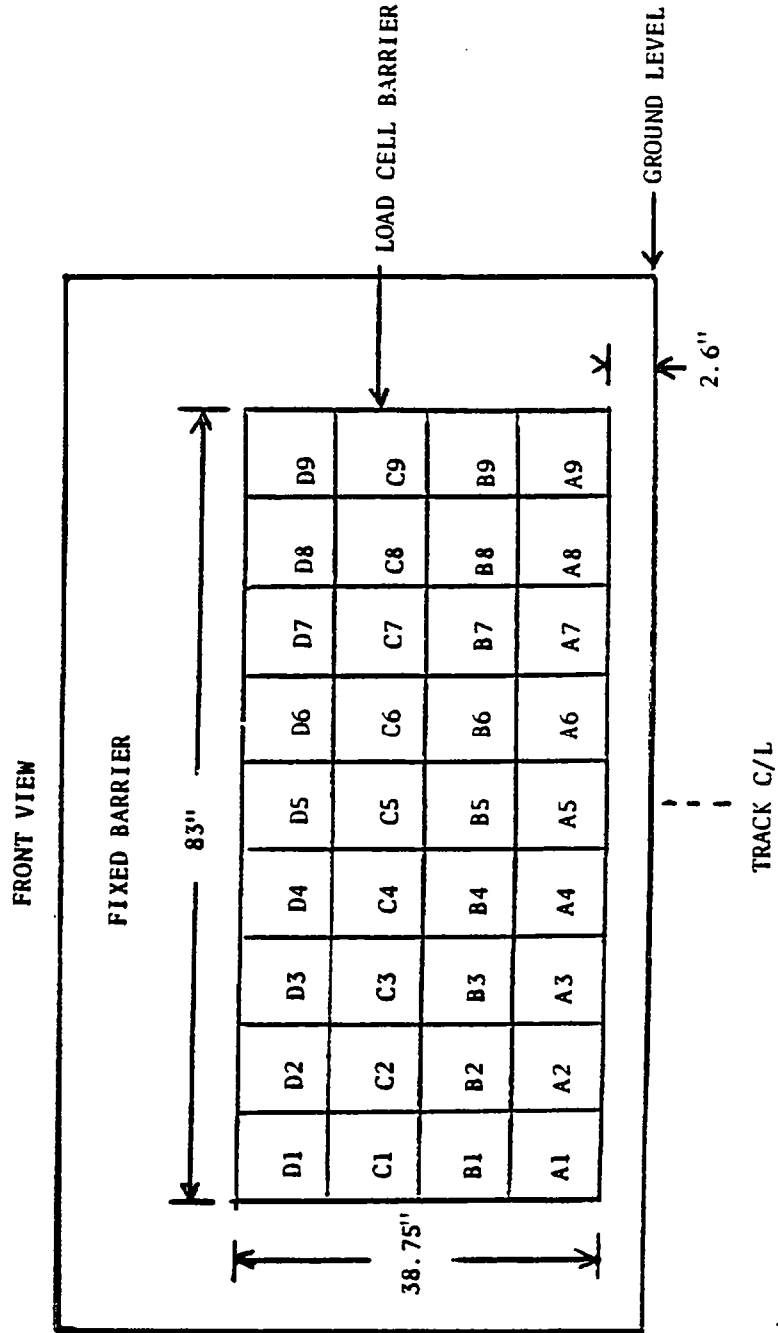


Figure 4 FIXED LOAD CELL BARRIER-LOAD CELL LOCATIONS

Table 8  
 ACCIDENT INVESTIGATION DIVISION  
Data Summary

Test No. CE0207  
 Date 11/7/83

Vehicle No. 1

|                         |   |
|-------------------------|---|
| Impact Description      | <u>Frontal load* cell barrier</u>         |
| Make                    | <u>Ford LTD</u>                           |
| Model                   | <u>4-door station wagon</u>               |
| Year                    | <u>1984</u>                               |
| Size Category           | <u>Full size</u>                          |
| Test Weight (lbs.)      | <u>3680</u>                               |
| Wheelbase (in.)         | <u>105</u>                                |
| Front Overhang (in.)    | <u>32.1</u>                               |
| Overall Width (in.)     | <u>71.0</u>                               |
| Accelerometer Location  | <u>51.6 inches aft of front wheel C/L</u> |
| Calibration Procedure   | <u>Shaker table/least squares</u>         |
| Accelerometer Linearity | <u>± 0.75%</u>                            |
| Integration Algorithm   | <u>Hybrid Simpson - Newton 3/8</u>        |
| Impact Speed            | <u>34.62 mph</u>                          |
| Time of Separation      | <u>136.4 msec.</u>                        |
| Velocity Change         | <u>42.65 mph</u>                          |
| CDC                     | <u>12 FDEW3</u>                           |
| Damage Length (in.)     | L: <u>195.4</u>                           |
| Crush Dimensions        | C1: <u>25.5</u>                           |
|                         | C2: <u>27.7</u>                           |
|                         | C3: <u>29.1</u>                           |
|                         | C4: <u>29.25</u>                          |
|                         | C5: <u>27.9</u>                           |
|                         | C6: <u>26.75</u>                          |
| Midpoint of Damage      | D: <u>0</u>                               |

National Accident Sampling System – Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

1984 FORD LTD WAGON CP0207 961-040-598

| Complete When Applicable   |  |
|--|--|
| End Damage   | Side Damage  |
| Undeformed end width <u>62.25</u><br><br>Corner shift: A1 _____<br><br>A2 _____<br><br>End shift at frame (CDC)<br>(check one)<br>< 4 inches _____<br>≥ 4 inches _____ | Bowing: B1 _____ X1 _____<br><br>B2 _____ X2 _____<br><br>Bowing constant<br><br>$\frac{X1 + X2}{2} =$ _____ |

Note: Measure C1 to C6 from Driver to Passenger side in Front or Rear impacts—  
Rear to Front in Side impacts.

12FDEW3

| Specific Impact Number  | Plane* of C-Measurements | Direct Damage |              | Field L** | C <sub>1</sub> | C <sub>2</sub> | C <sub>3</sub> | C <sub>4</sub> | C <sub>5</sub> | C <sub>6</sub> | ±D |
|---|--------------------------|---------------|--------------|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----|
|   |                          | Width** (CDC) | Max*** Crush |           |                |                |                |                |                |                |    |
| 1   | Bumper                   | 62.25         | 29.25        | 62.25     | 29.0           | 29.4           | 29.1           | 29.25          | 29.6           | 30.25          | 0  |
|   | Free/space               |               | 0            |           | 3.5            | 1.7            | 0              | 0              | 1.7            | 3.5            |    |
| 1   | ACTUAL CRUSH             | 62.25         | 29.25        |           | 25.5           | 27.7           | 29.1           | 29.25          | 27.9           | 26.75          | 0  |
| NOTE: Free/space corrected to Bumper, 1.5" Bumper guards ignored for Crush Measurements |                          |               |              |           |                |                |                |                |                |                |    |

\*Identify the plane at which the C-measurements are taken (e.g., at bumper, above bumper, at sill, above sill, at beltline, etc.) or label adjustments (e.g., free space).

Free space value is defined as the distance between the baseline and the original body contour taken at the individual C locations. This may include the following: bumper lead, bumper taper, side protrusion, side taper, etc. Record the value for each C-measurement and maximum crush.

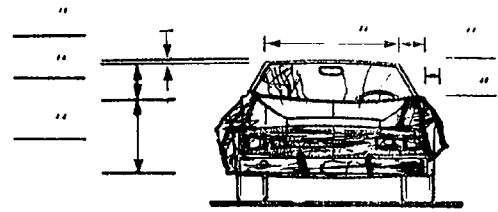
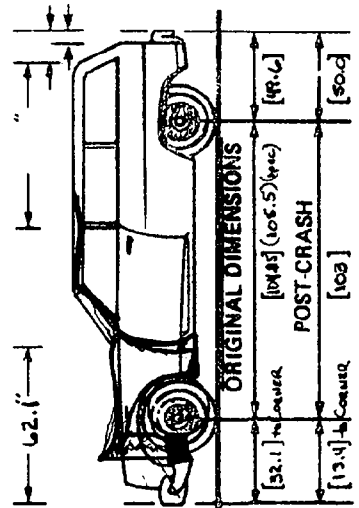
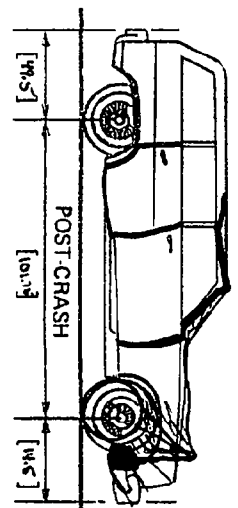
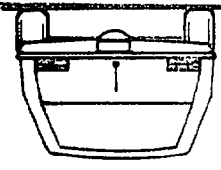
\*\*Measure and document on the vehicle diagram the beginning or end of the direct damage width and field L (e.g., side damage with respect to undamaged axle).

\*\*\*Measure and document on the vehicle diagram the location of the maximum crush.

Note: Use as many lines/columns as necessary to describe each damage profile.

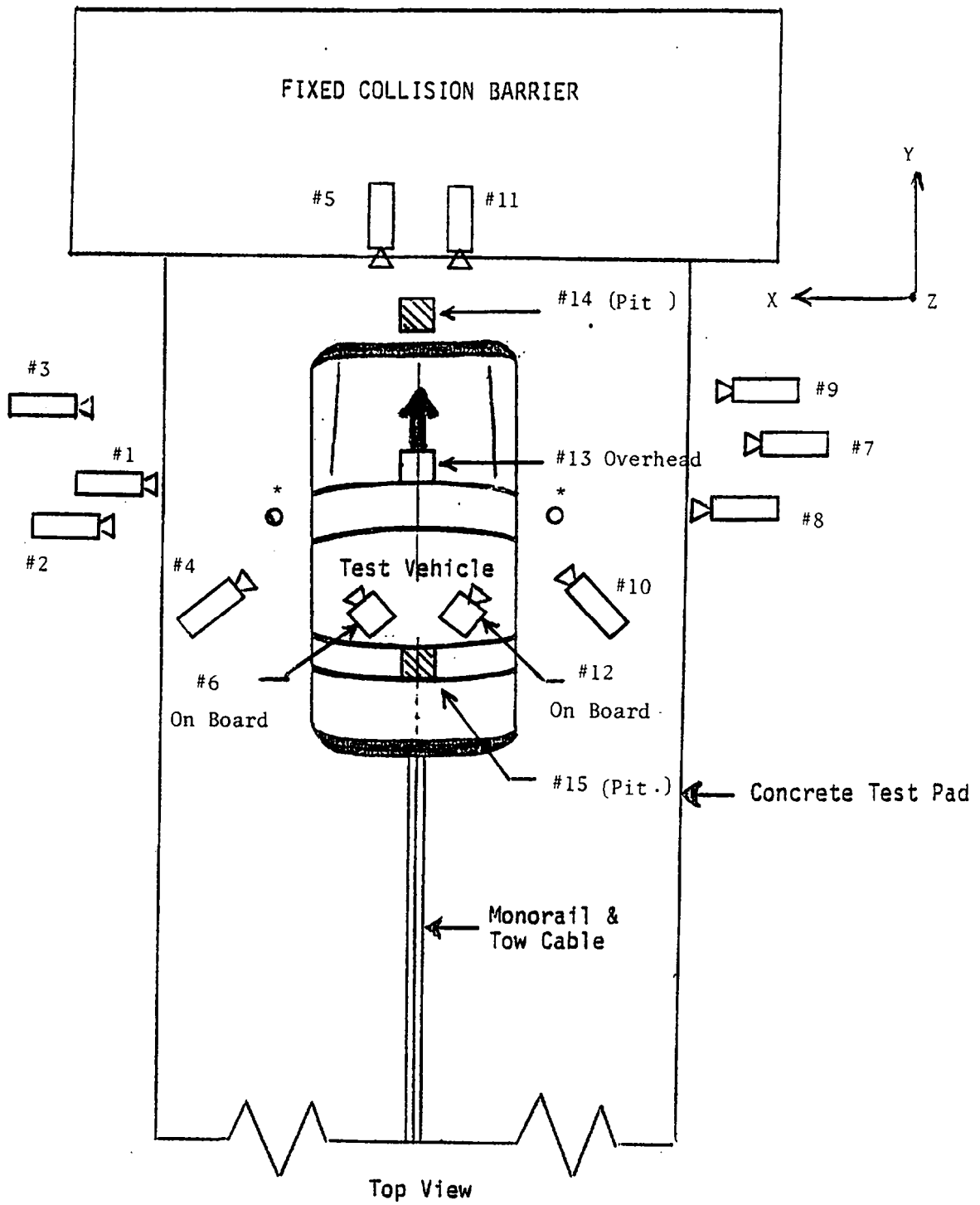
|  |  |   |
|--|--|---|
| <b>DAMAGE DESCRIPTION</b><br><br>Tire—Wheel Damage<br>a. Rotation physically restricted<br>RF <u>2</u><br>LF <u>2</u><br>RR <u>2</u><br>LR <u>2</u><br><br>(1) Yes, (2) No, (8) NA, (9) Unk. | <b>TYPE OF TRANSMISSION</b><br>3sp<br>___ Manual <input checked="" type="checkbox"/> Automatic   | <b>WHEEL STEER ANGLES</b><br>(For locked front wheels or displaced rear axles only)<br><br>RF ± <u>N/A</u> °<br>LF ± <u>N/A</u> °<br>RR ± <u>N/A</u> °<br>LR ± <u>N/A</u> °<br><br>Within ± 5 degrees |
|  | Average Track: <u>56.6/57.0</u><br>Maximum Width: <u>71.0</u><br>TEST Curb Weight: <u>3680</u><br>Overall Length: <u>195.4"</u><br>Engine Size: cyl. <u>V-6</u><br>displ. <u>232</u> |   |

Vehicle No.: 1



Note: Sketch new perimeter and cross hatch direct damage and single hatch induced damage on all views. Annotate observations which might be useful in reconstructing the accident (e.g., grass in tire bead, direction of striations, scuff on sidewall, etc.)  
 If pulling trailer sketch type of trailer and damage received on reverse side.  
 Annotate any damage caused by extrication such as component removal by torching, prying or hydraulic shears.

NOTE: Camera Information Shown on Table 9



\* Stadia Pole 72 inches from Barrier Face

Figure 6 -- CAMERA POSITION FOR FRONTAL IMPACTS

Table 9  
HIGH-SPEED CAMERA LOCATIONS

Test No. CE0207 Vehicle 1984 Ford LTD 4-Door Station Wagon

| CAMERA NO. | VIEW                 | CAMERA POSITIONS (in) * |     |      | ANGLE** (deg) | FILM PLANE TO HEAD TARGET | LENS (mm) | SPEED (fps) |
|------------|----------------------|-------------------------|-----|------|---------------|---------------------------|-----------|-------------|
|            |                      | X                       | Y   | Z    |               |                           |           |             |
| 1          | Vehicle Left Side    | 230                     | 54  | 56   | -6            | -                         | 13        | No Timing   |
| 2          | Driver               | 246                     | 72  | 48   | -0            | 208                       | 35        | 890         |
| 3          | Driver               | 315                     | 26  | 59   | -3            | 277                       | 50        | 890         |
| 4          | Driver               | 90                      | 108 | 72   | -22           | -                         | 13        | 880         |
| 5          | Driver (Barrier)     | 20                      | 0   | 70   | -30           | -                         | 13        | 860         |
| 6          | Left Belt Retractor  | -                       | -   | -    | -             | -                         | 8         | 500         |
| 7          | Vehicle Right Side   | 281                     | 41  | 48   | -2            | -                         | 13        | 880         |
| 8          | Passenger            | 268                     | 66  | 45   | -3            | 230                       | 35        | 960         |
| 9          | Passenger            | 228                     | 24  | 44   | -3            | 274                       | 50        | 1070        |
| 10         | Passenger            | 90                      | 104 | 69   | -21           | -                         | 13        | 870         |
| 11         | Passenger (Barrier)  | 20                      | 0   | 70   | -30           | -                         | 13        | 890         |
| 12         | Right Belt Retractor | -                       | -   | -    | -             | -                         | 8         | 430         |
| 13         | Overhead             | 0                       | 40  | 216  | -90           | -                         | 25        | 990         |
| 14         | Engine (Pit.)        | 0                       | 36  | -120 | 90            | -                         | 25        | 850         |
| 15         | Fuel Tank (Pit.)     | 0                       | 140 | -120 | 90            | -                         | 25        | 820         |

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

## BEFORE DRIVING YOUR VEHICLE

### OCCUPANT RESTRAINT SYSTEMS

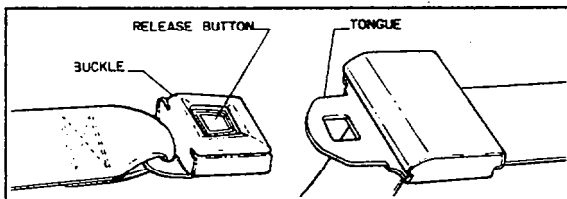
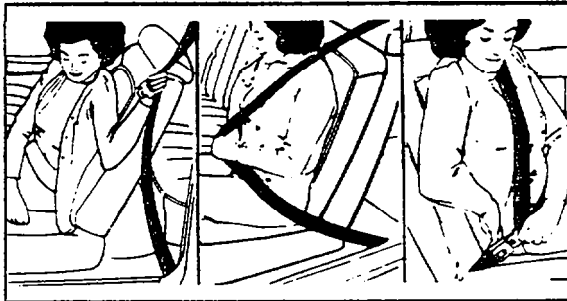
Ford Motor Company recommends that you always "buckle up". In some areas seat belt use is required by law.

**WARNING** — Passengers should not be allowed to ride in the cargo area of any vehicle. Persons who are not riding in a seat with a fastened seat belt are much more likely to suffer serious bodily injury in the event of a collision.

#### Front Lap-Shoulder Belts

The belt system allows freedom of movement, locking tight only on hard braking or impacts of approximately 5 mph (8 km/h) or more. The system cannot be made to lock by jerking on the belt.

After entering your vehicle, close the door and adjust the front seat to obtain the best position for your driving comfort, access to controls, and visibility. Then pull the lap-shoulder belt from the retractor so the shoulder portion of the belt crosses your shoulder and chest and insert the belt tongue into the proper buckle until you hear a snap and feel it latch.



As you drive and settle into a comfortable seating position, slight movements will cause the lap and shoulder portions of the belt to adjust automatically to a snug position. If the shoulder belt is uncomfortably tight, a tension reliever is provided in the shoulder belt retractor to reduce belt pressure against your chest. The shoulder belt is adjusted much like a window shade to maintain a small amount of slack in the belt. The adjacent door must be closed to use this comfort feature.

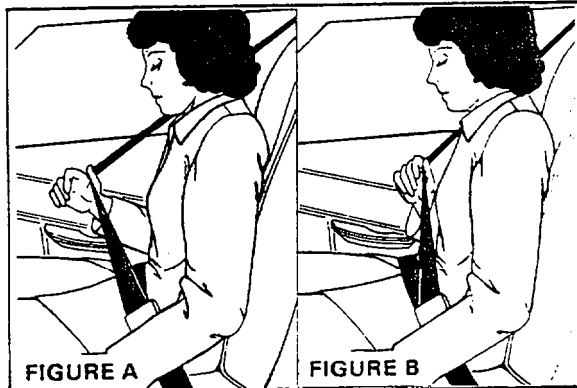
#### Adjustment Procedure

To set the tension reliever, the shoulder belt initially should be positioned against the chest. If the belt is not snug, the tension reliever may be engaged. Disengagement should be accomplished by the following procedure:

**Figure A** — Pull the shoulder belt outward 4 or 5 inches (10 to 13 cm), then release it and allow belt to fully retract. Repeat procedure if belt is not snug to the chest.

**Figure B** — Now the belt tension may be adjusted by pulling down slightly on the shoulder belt and releasing. The least amount of slack needed to relieve tension, but not more than 1½ inches (3.8 cm), should be chosen when using the tension reliever system.

- If the desired setting is not achieved or excess slack develops as you change seat position, repeat the above procedure.
- When the door is opened, the tension reliever will automatically release, permitting the lap-



shoulder belt to retract. After unbuckling the belt it is recommended that you guide the tongue during retraction to prevent it from striking you or the vehicle.

**WARNING** — Never allow more than 1½ inches (3.8 cm) of slack to be introduced into your seat belt system. Never wear the shoulder belt under the arm. Never swing it around your neck over the inside shoulder. Never use a single belt for more than one person. Be sure the lap portion of the belt is fitted snugly around the hips, not on the waist. Use shoulder belt on outside shoulder only. Failure to follow these precautions could increase the chance and/or severity of injury in an accident.

Figure 7 OWNER'S MANUAL SEAT BELT INSTRUCTIONS

Figure 8  
PART 572 DUMMY IN-VEHICLE POSITION

Test No. CE0207

Vehicle 1984 Ford LTD 4-Door Wagon

SEAT TYPE:

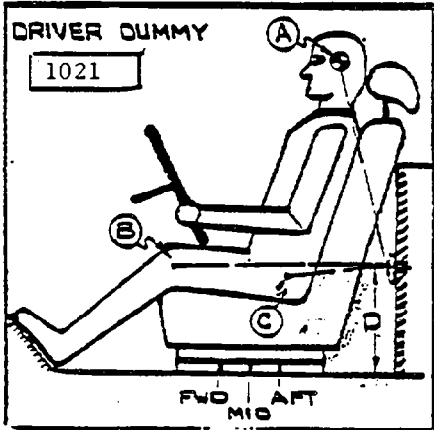
- Bench  
 Bucket  
 Split Bench

ADJUSTER TYPE:

- Manual  
 Power

BUCKET SEAT BACK TYPE:

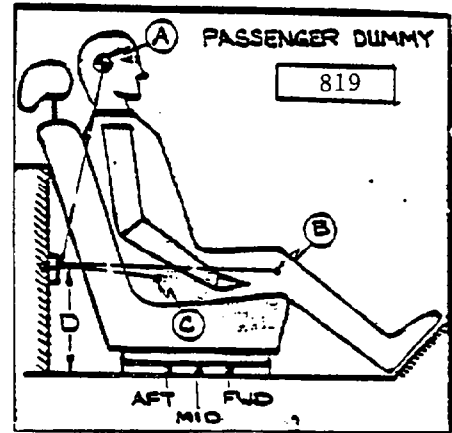
- Fixed  
 Adjustable Reclining



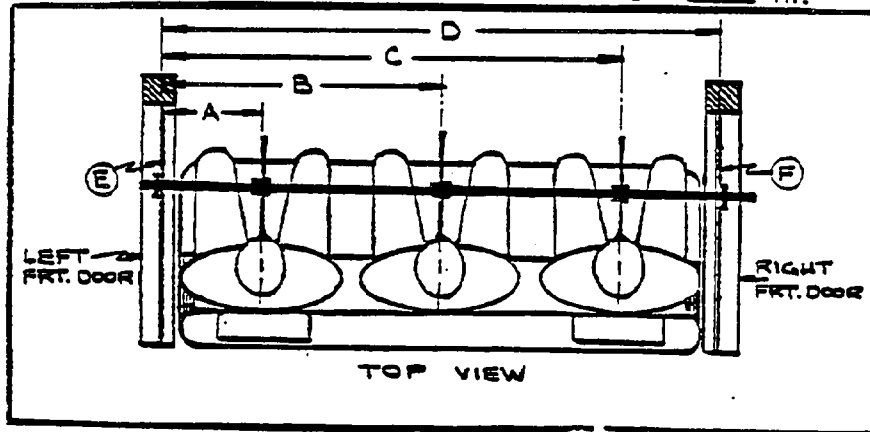
- A = 20.2 in. 5 Degrees  
 B = 23.9 in. 100 Degrees  
 C = 10.2 in. 132 Degrees  
 D = 15.2 in.

MEASUREMENT LOCATION

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



- A = 20.2 in. 5 Degrees  
 B = 24.2 in. 100 Degrees  
 C = 10.4 in. 130 Degrees  
 D = 15.2 in.



DUMMY ID

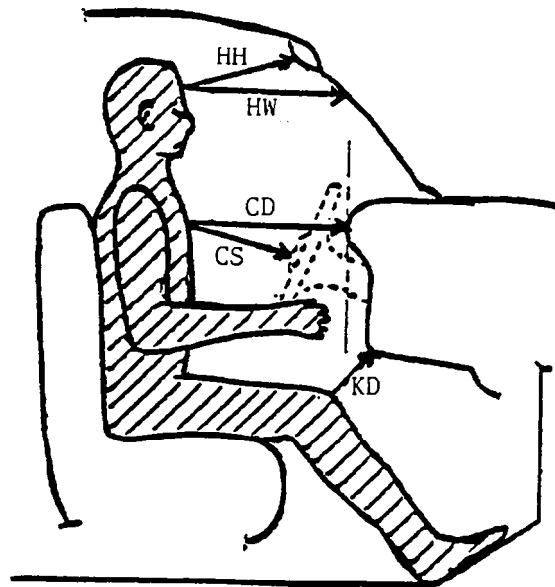
1021

--

819

- |      |   |  |                 |
|------|---|--|-----------------|
| A    | = | Left Door to Driver Centerline                     | <u>12</u> in.   |
| B    | = | Left Door to Center Passenger Centerline           | <u>--</u> in.   |
| C    | = | Left Door to Right Passenger Centerline            | <u>41.0</u> in. |
| D    | = | Left Door to Right Door                            | <u>52.7</u> in. |
| E, F | = | Window Glass Height (Right and Left Must be Equal) | <u>12</u> in.   |

|     | DRIVER | PASSENGER |
|-----|--------|-----------|
| HH  | 12.5"  | 12.3"     |
| HW  | 19.3"  | 19.0"     |
| CD  | 20.7"  | 20.6"     |
| CS  | 13.4"  | --        |
| KDL | 7"     | 7.3"      |
| KDR | 7.2"   | 7.3"      |
| SA  | 25°    | 25°       |
| TA  | 23°    | 23°       |



HH = Head to Windshield Header  
 HW = Head to Windshield  
 CD = Chest to Dash  
 CS = Chest to Steering Wheel  
 KD = Knee to Dash  
 SA = Seat Back Angle  
 TA = Torso Angle

HR = Head to Side Roof  
 HS = Head to Side Window  
 AD = Arm to Door  
 HD = Hip to Door

|    | DRIVER | PASSENGER |
|----|--------|-----------|
| HR | 5.6"   | 5.5"      |
| HS | 8"     | 7.7"      |
| AD | 4.2"   | 4.2"      |
| HD | 4"     | 4.2"      |

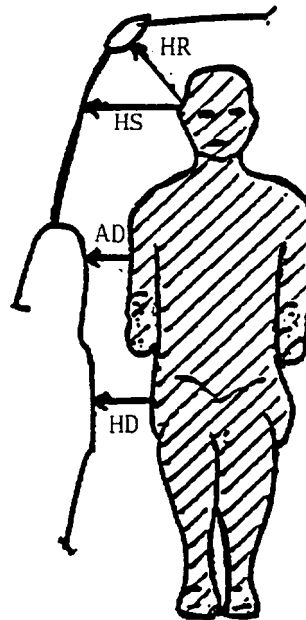


Figure 9 OCCUPANT CLEARANCE DIMENSIONS

Table 10  
DUMMY INJURY CRITERIA VALUES

|           | MAXIMUM ACCELERATION ("G") |     |     |     |       |     |    |      |
|-----------|----------------------------|-----|-----|-----|-------|-----|----|------|
|           | HEAD                       |     |     |     | CHEST |     |    |      |
|           | X                          | Y   | Z   | R   | X     | Y   | Z  | R*   |
| DUMMY (1) | -37                        | -22 | 61  | 65  | -59   | -24 | 20 | 57.6 |
| DUMMY (2) | 124                        | 42  | -83 | 153 | -73   | 34  | 26 | 70.2 |
| DUMMY (3) |                            |     |     |     |       |     |    |      |
| DUMMY (4) |                            |     |     |     |       |     |    |      |

|           | MAXIMUM FORCE-FEMUR LOAD (LBS) |            |
|-----------|--------------------------------|------------|
|           | RIGHT FEMUR                    | LEFT FEMUR |
| DUMMY (1) | ***                            | ***        |
| DUMMY (2) | 590                            | 1350       |
| DUMMY (3) |                                |            |
| DUMMY (4) |                                |            |

|           | MAXIMUM FORCE-SEAT BELTS LOADS (LBS) |                           |                          |
|-----------|--------------------------------------|---------------------------|--------------------------|
|           | SHOULDER STRAP UPPER BELT LOAD       | LAP STRAP RIGHT BELT LOAD | LAP STRAP LEFT BELT LOAD |
| DUMMY (1) | 1675                                 | --                        | 1175                     |
| DUMMY (2) | 1940                                 | 1325                      |                          |
| 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           |
| DUMMY (1) | 646.2                  | .0768                | .1287                | 43.5  | 774.9          |
| DUMMY (2) | 647.3                  | .10815               | .12593               | 66.8  | 1040.1         |
| DUMMY (3) |                        |                      |                      |   |                |
| DUMMY (4) |                        |                      |                      |   |                |

\*DEFINED AS EXCEEDING 0.003 SEC. DURATION

\*\*AS DEFINED IN FMVSS NO. 208

\*\*\* Zero shift in data. Values are not discernible.

Table 11  
BELT RELATED DATA

|                                      | <u>Driver</u> | <u>Passenger</u>    |
|--------------------------------------|---------------|---------------------|
| Belt Spool-off (in.)                 |               |                     |
| film                                 | 3.0"          | 2.4" <sup>(4)</sup> |
| electronic                           | --            | --                  |
| Belt Strain <sup>(1)</sup>           | --            | --                  |
| Belt Length Data (in.)               |               |                     |
| total length <sup>(2)</sup>          | 108.5"        | 108.5"              |
| retractor to "D" ring <sup>(3)</sup> | 25.5"         | 25.5"               |
| torso belt <sup>(3)</sup>            | 31"           | 31"                 |
| lap belt <sup>(3)</sup>              | 30"           | 30"                 |
| remainder on spool                   | 22"           | 22"                 |

---

(1) as measured between retractor and "D" ring

(2) retractor spool to bolt hole anchor point for unibelts

(3) as measured on Part 572 dummy

(4) "D" ring pulled out of "B" pillar attachment

APPENDIX A  
PHOTOGRAPHS

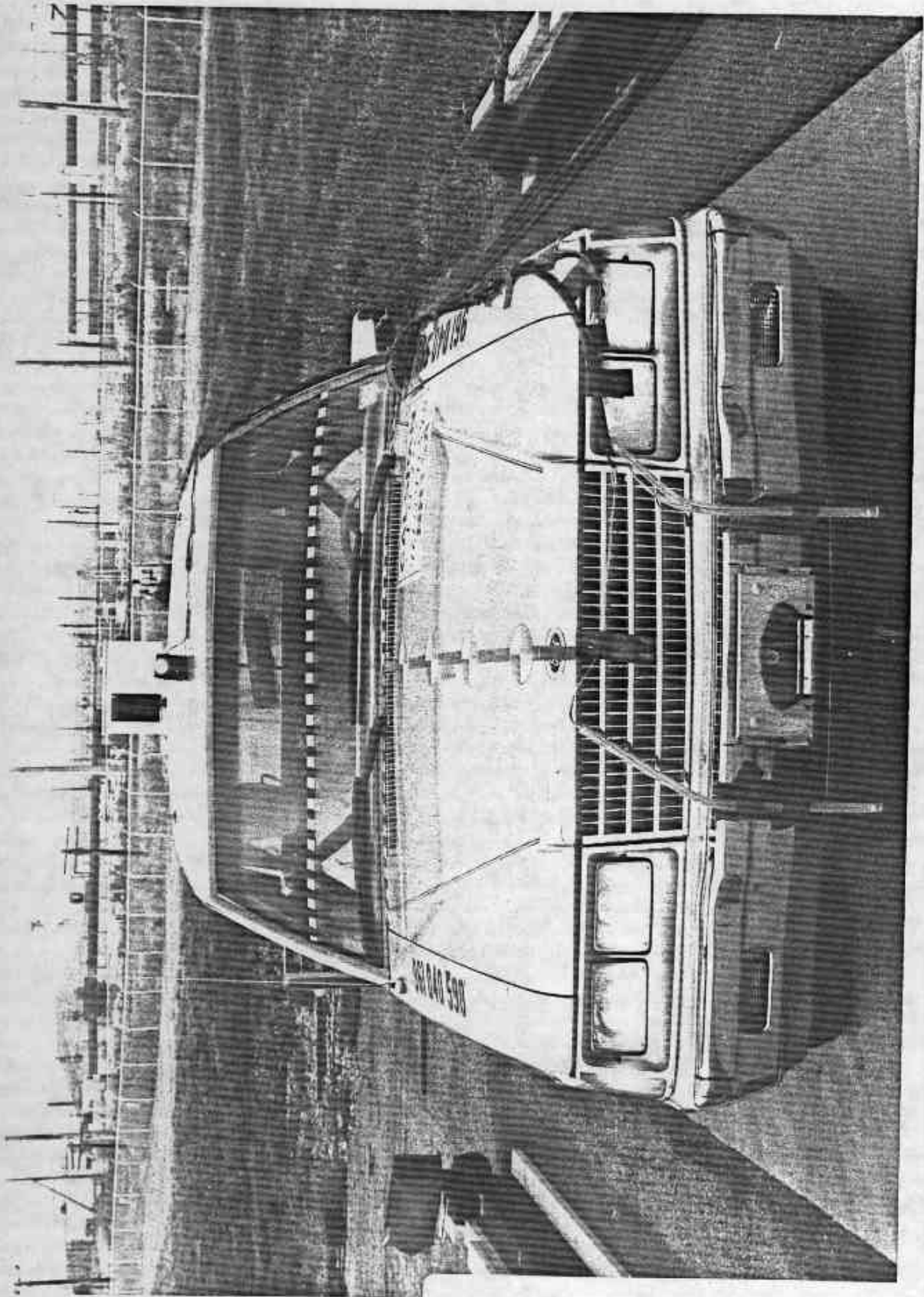


Figure A-1 PRE-TEST FRONT VIEW

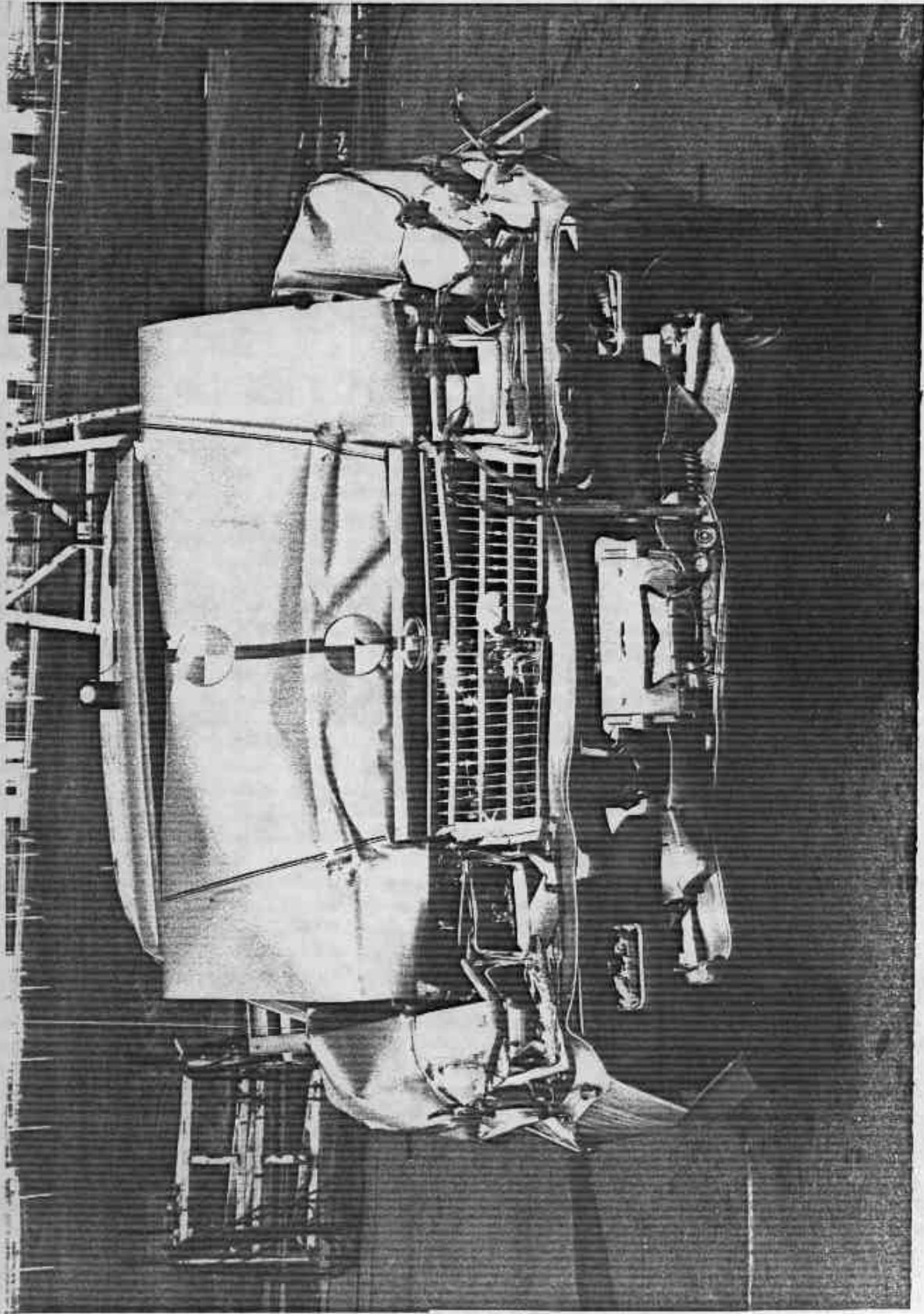
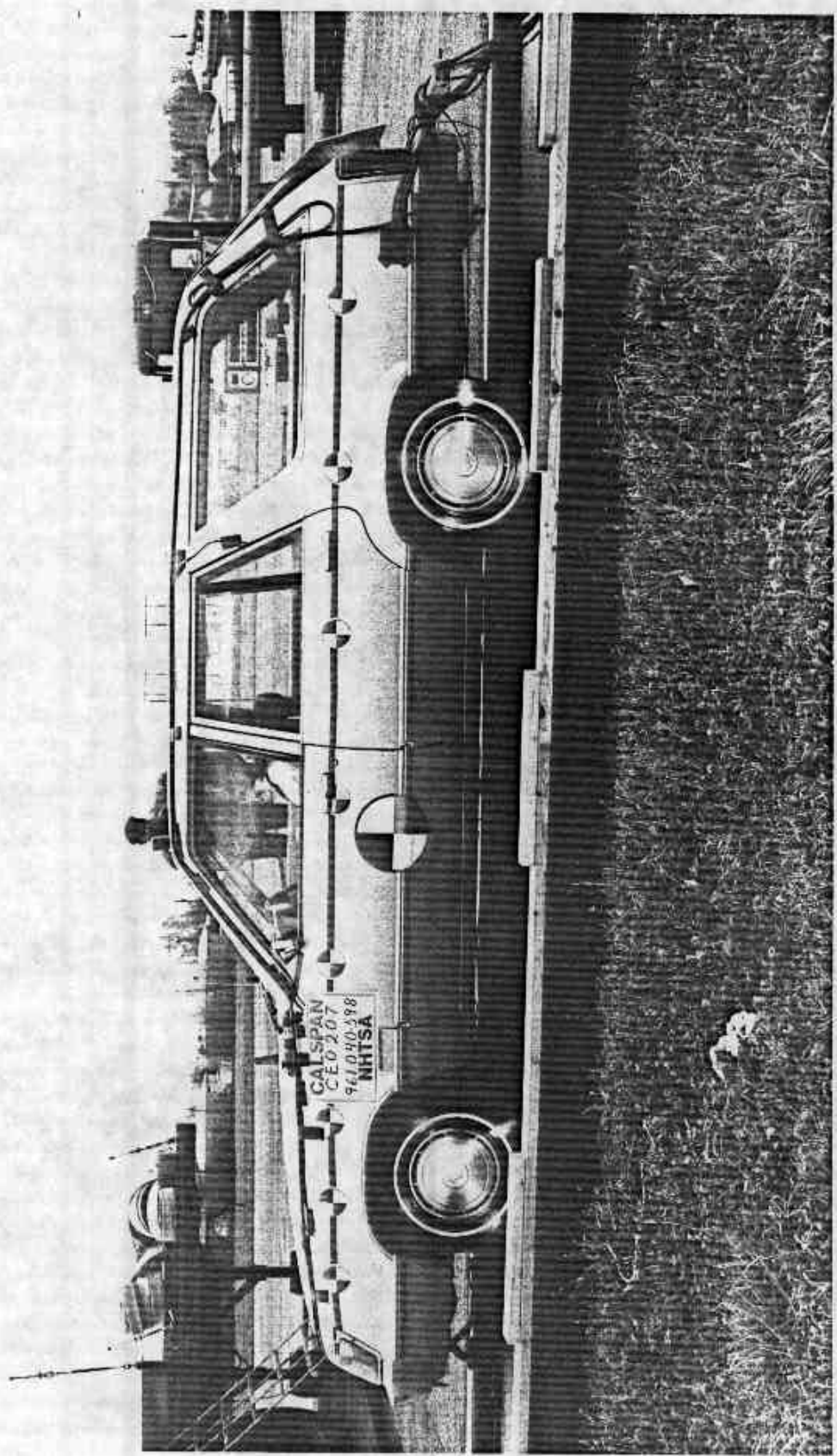


Figure A-2 POST-TEST FRONT VIEW

A-3

7209-4



A-4

7209-4

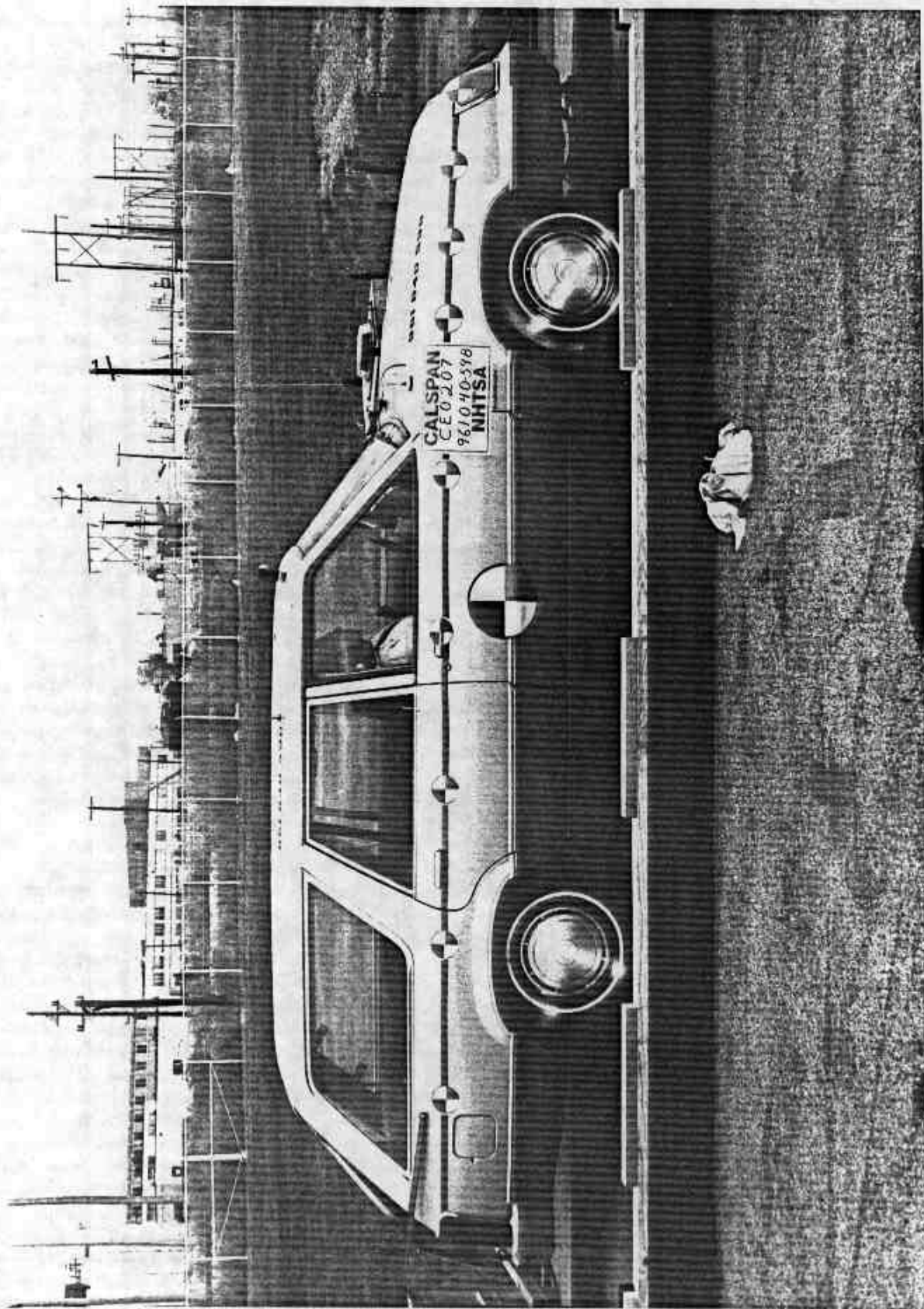
Figure A-3 PRE-TEST LEFT SIDE VIEW



Figure A-4 POST-TEST LEFT SIDE VIEW

A-5

7209-4



A-6

7209-4

Figure A-5 PRE-TEST RIGHT SIDE VIEW

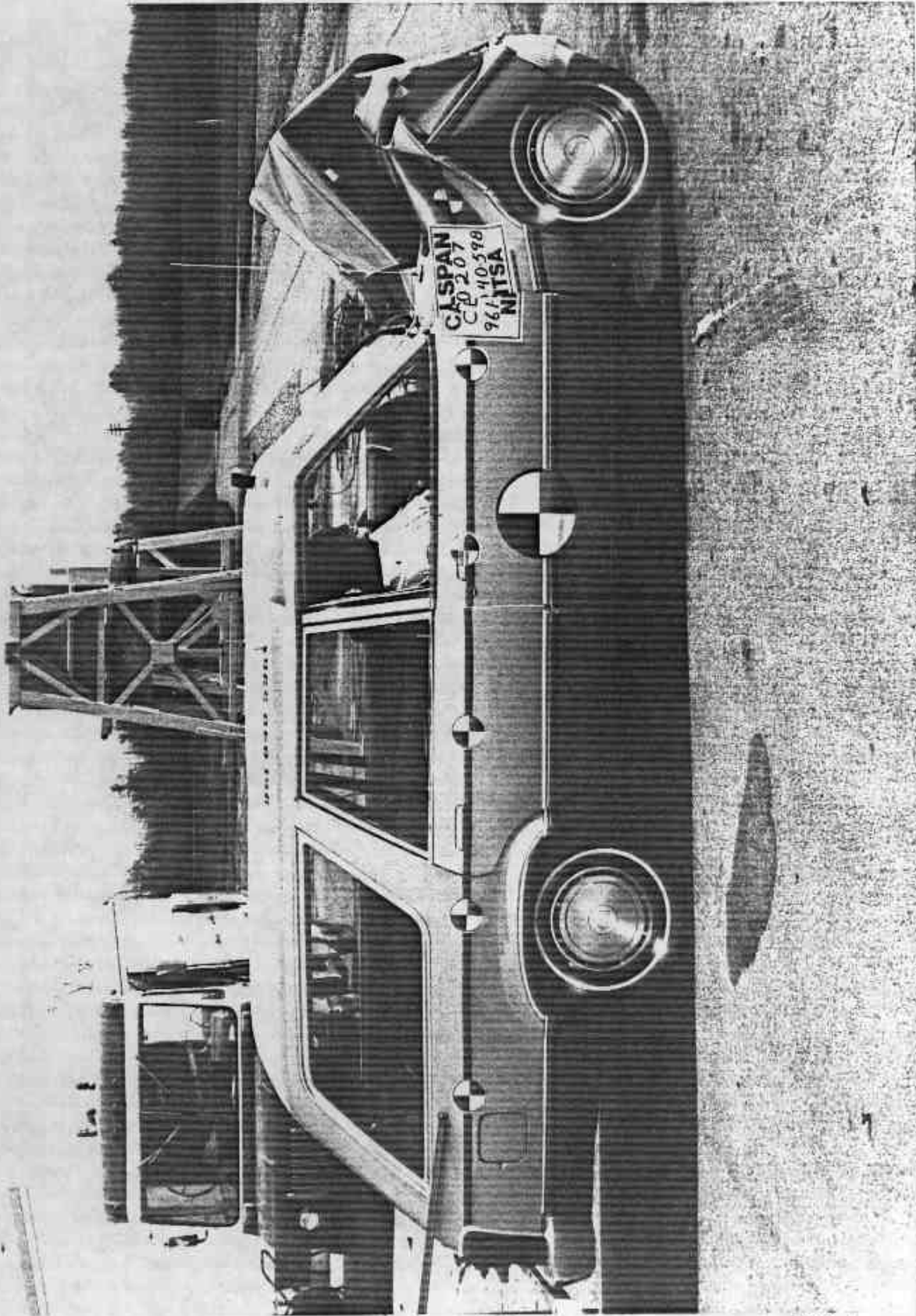


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-7

7209-4

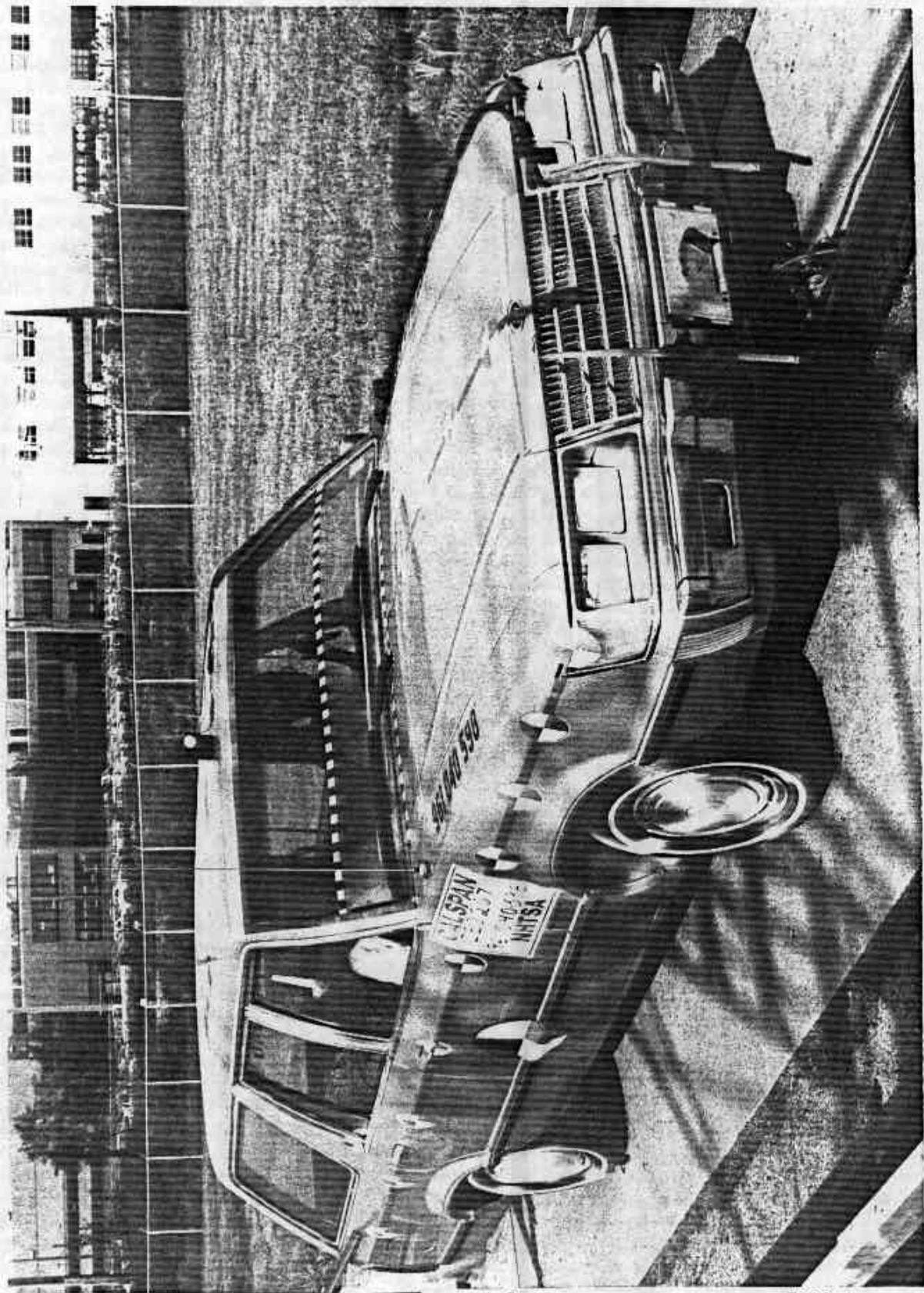


Figure A-7 PRE-TEST RIGHT FRONT THREE QUARTER VIEW

A-8

7209-4

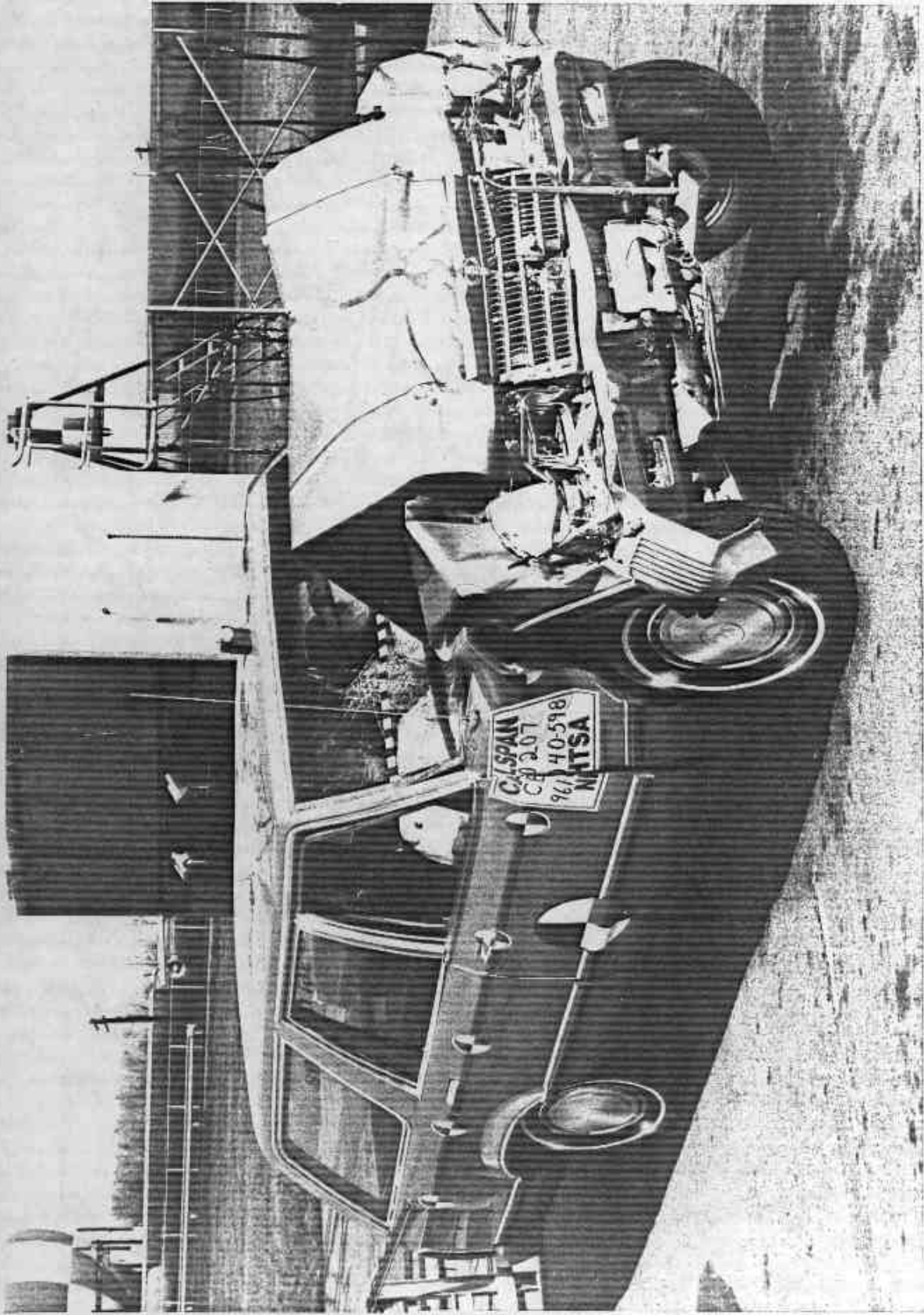


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-9

7209-4

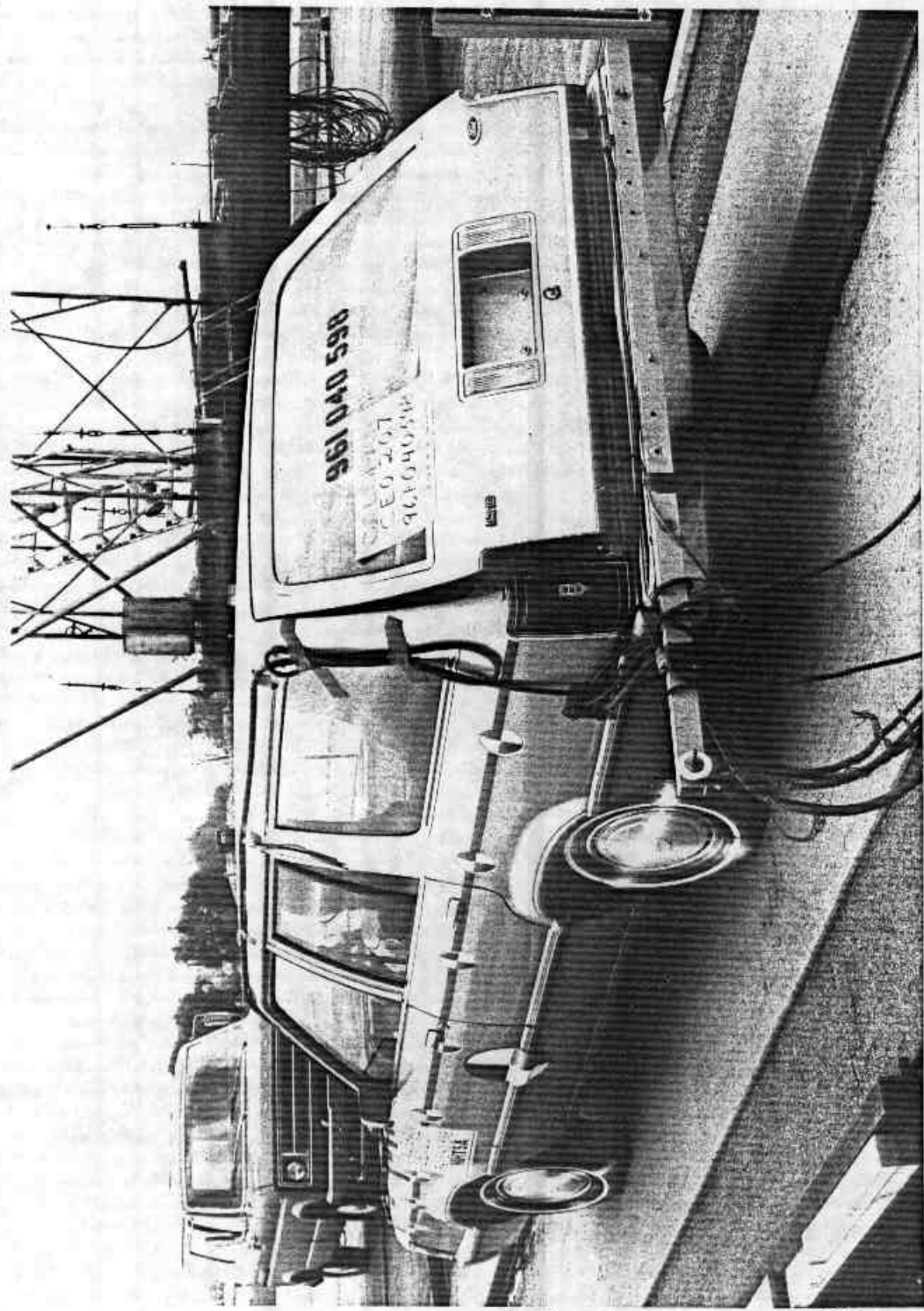


Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-10

7209-4



A-11

7209-4

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

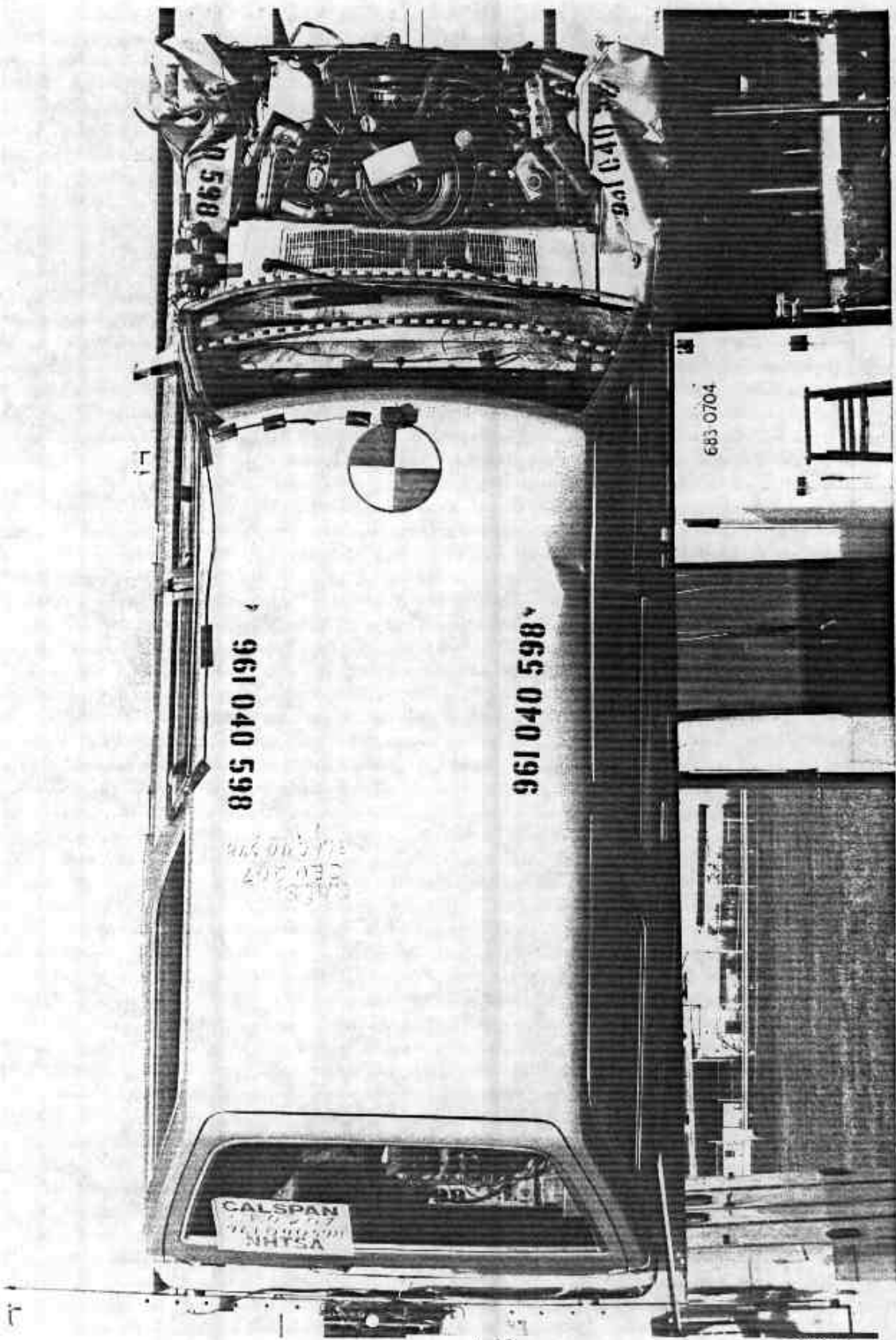


Figure A-11 POST-TEST TOP VIEW

A-12

7209-4

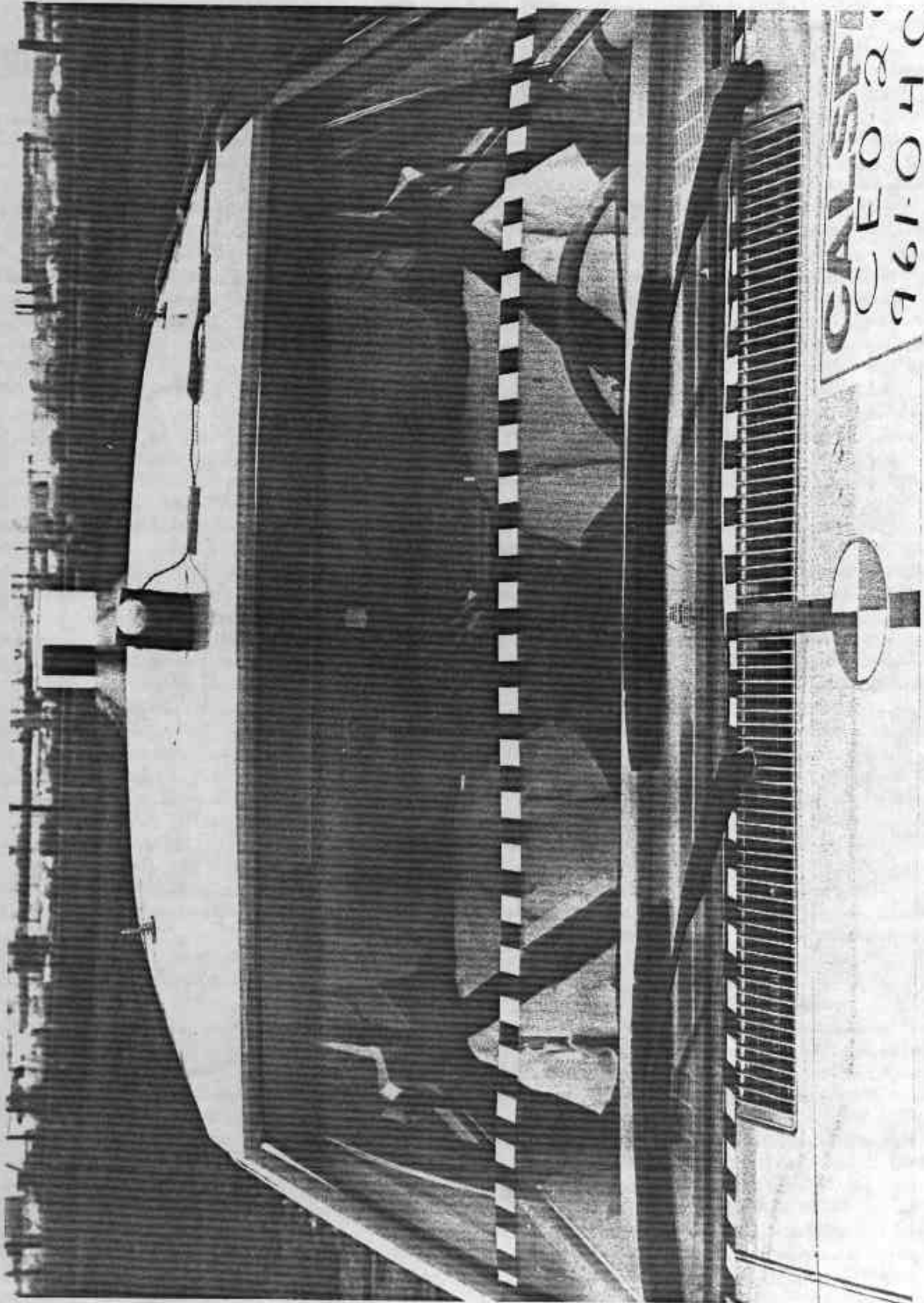
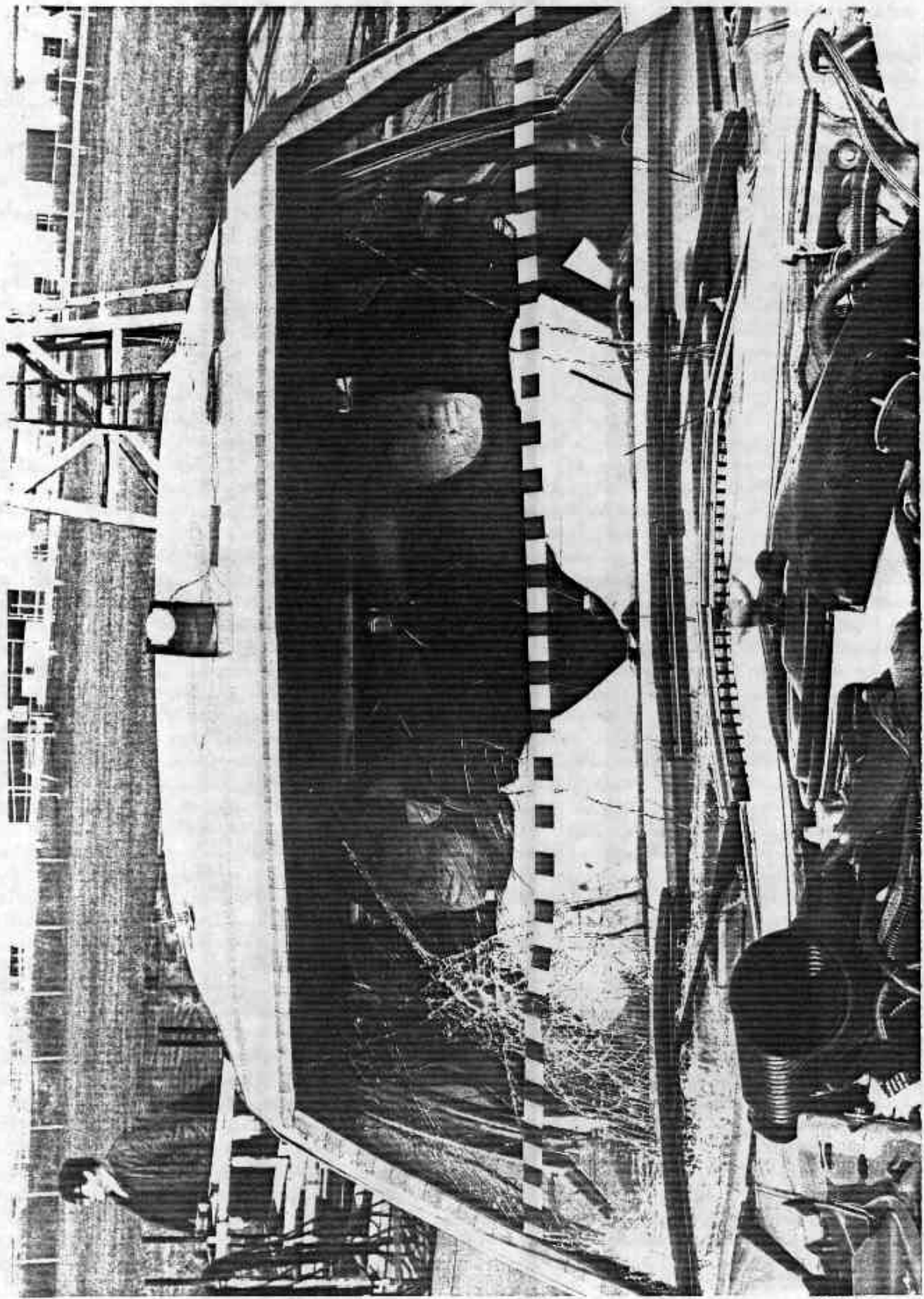


Figure A-12 PRE-TEST WINDSHIELD VIEW

A-13

7209-4



A-14

7209-4

Figure A-13 POST-TEST WINDSHIELD VIEW

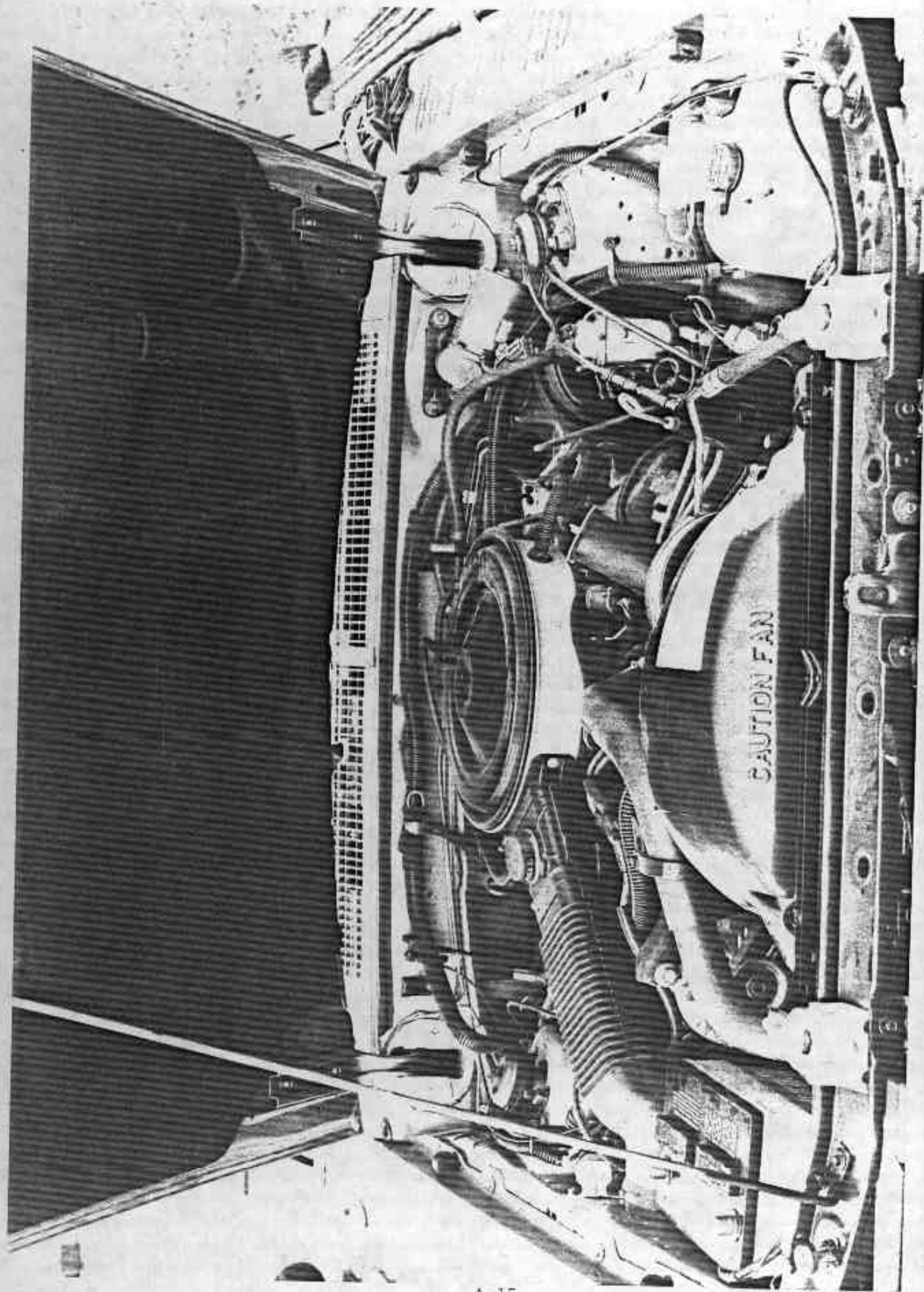


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

A-15

7209-4

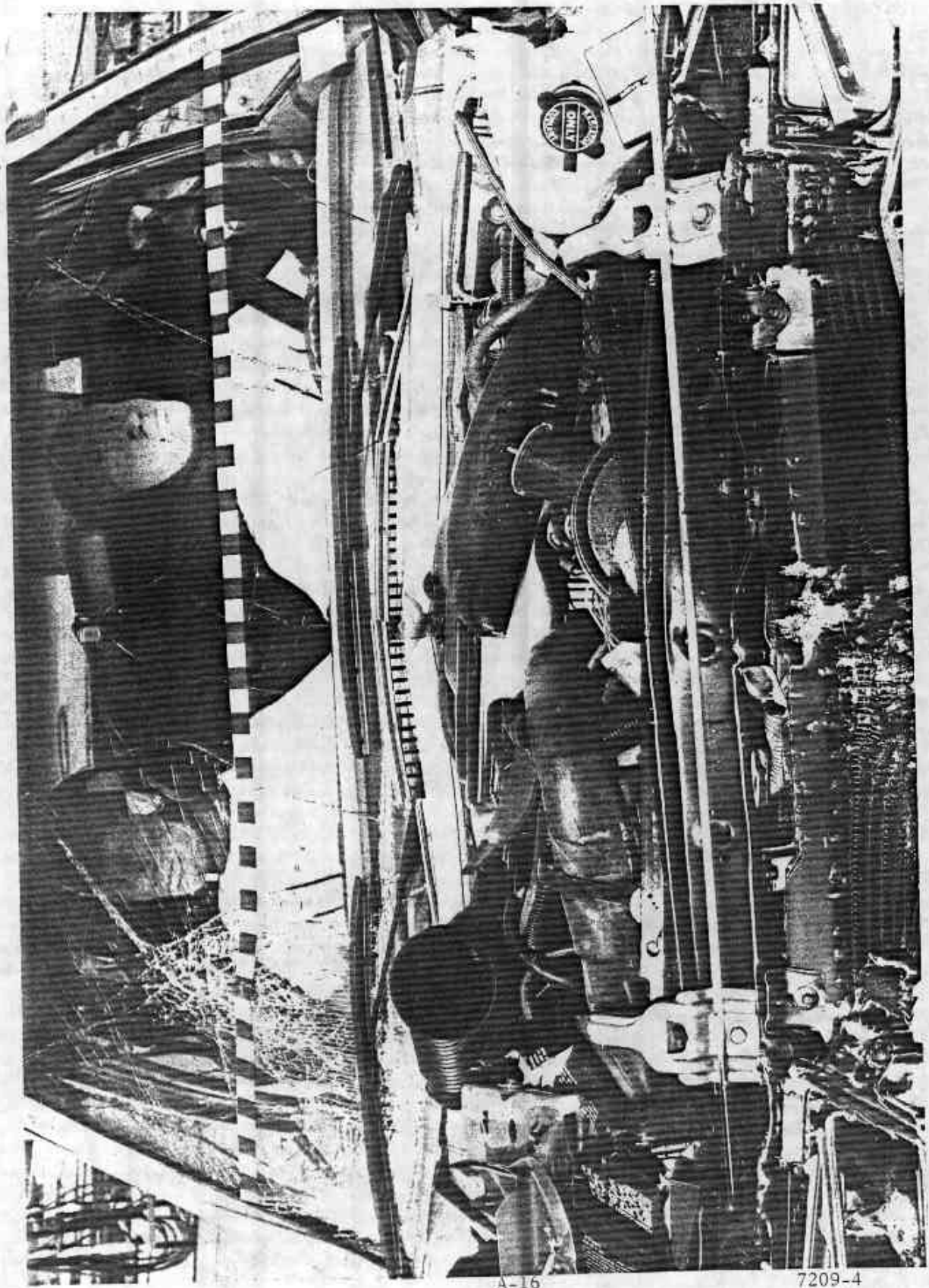


Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

A-16

7209-4

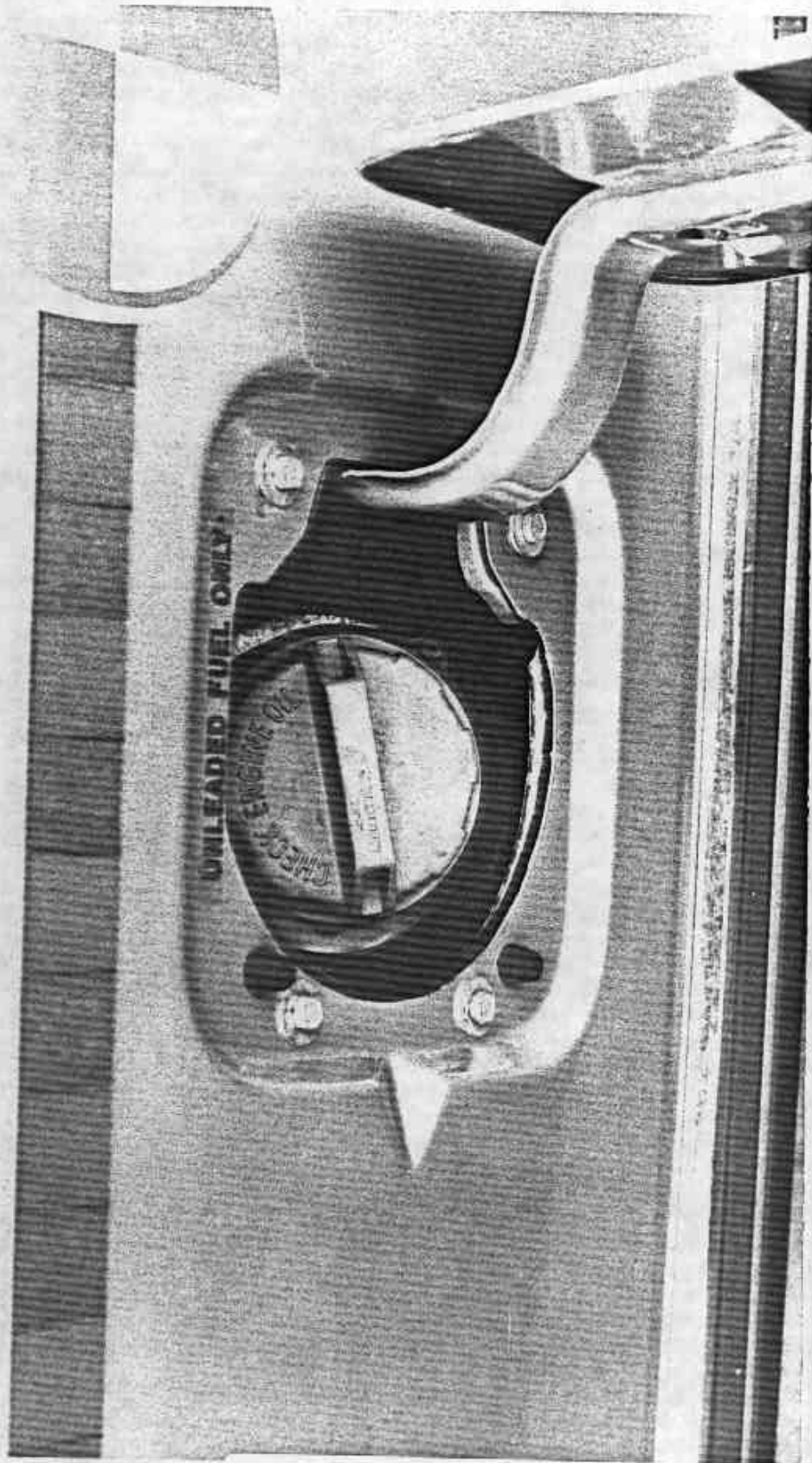


Figure A-16 PRE-TEST FILLER TUBE VIEW

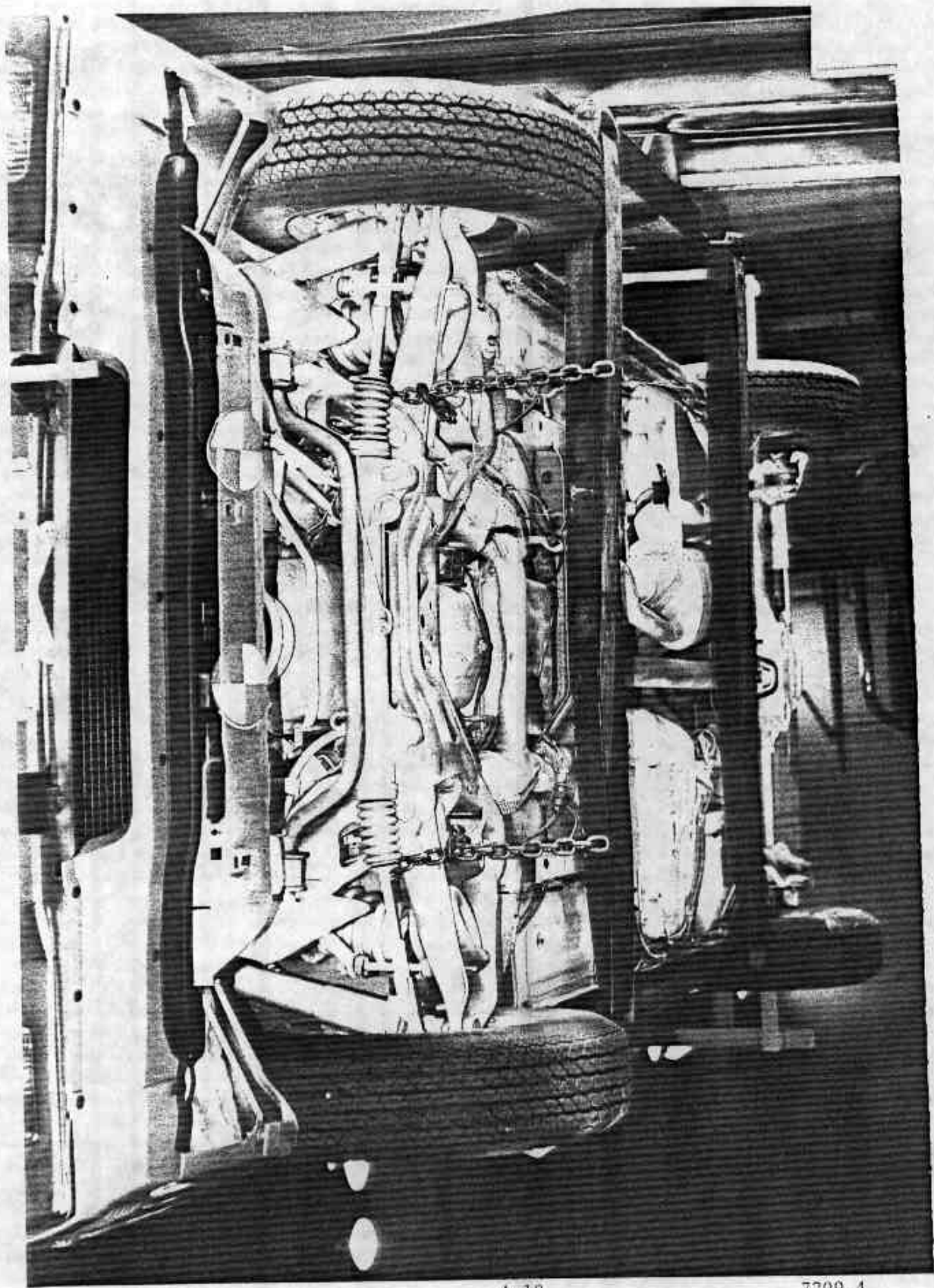


Figure A-17 PRE-TEST FRONT UNDERBODY VIEW

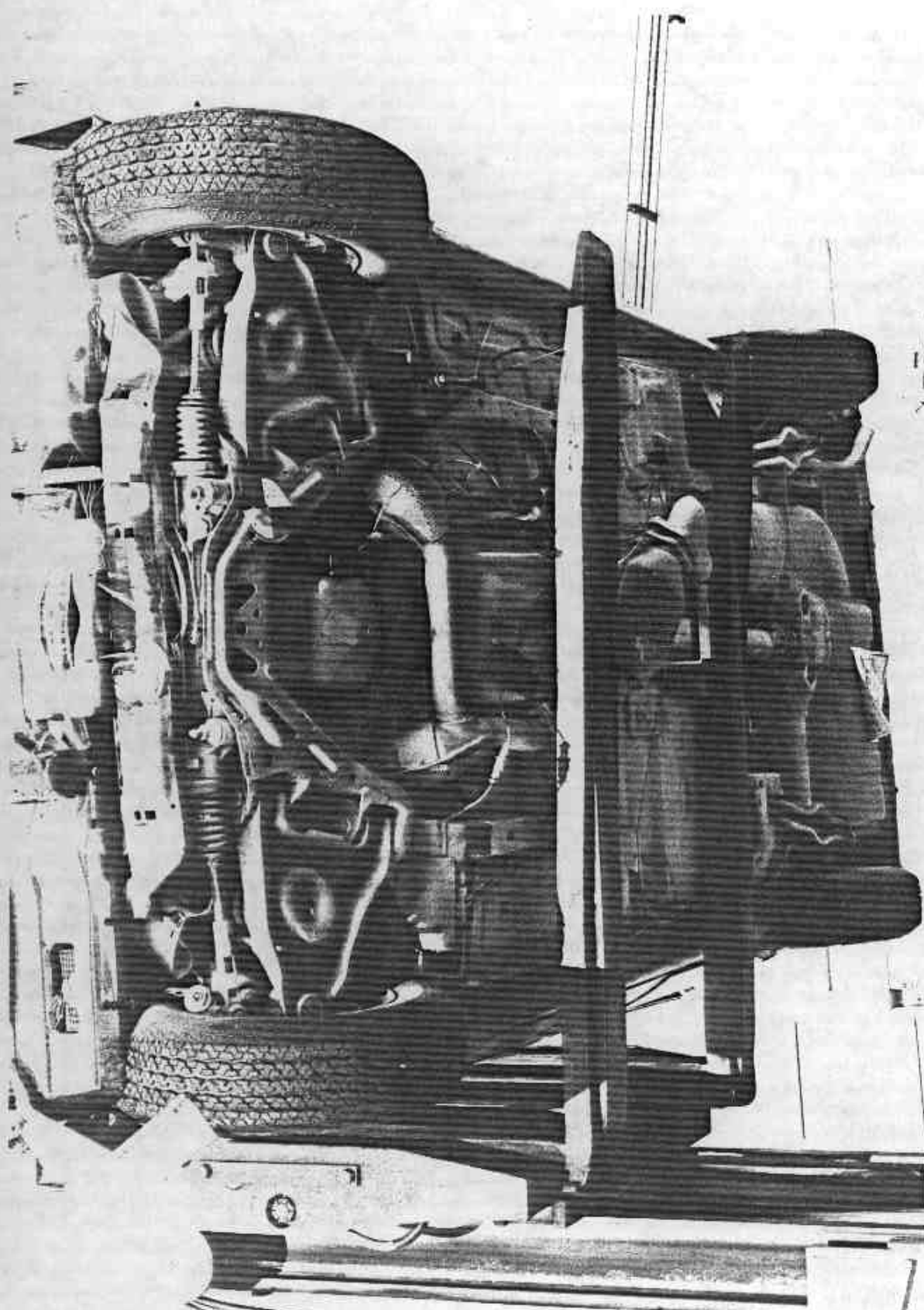


Figure A-18 POST-TEST FRONT UNDERBODY VIEW

A-19

7209-4

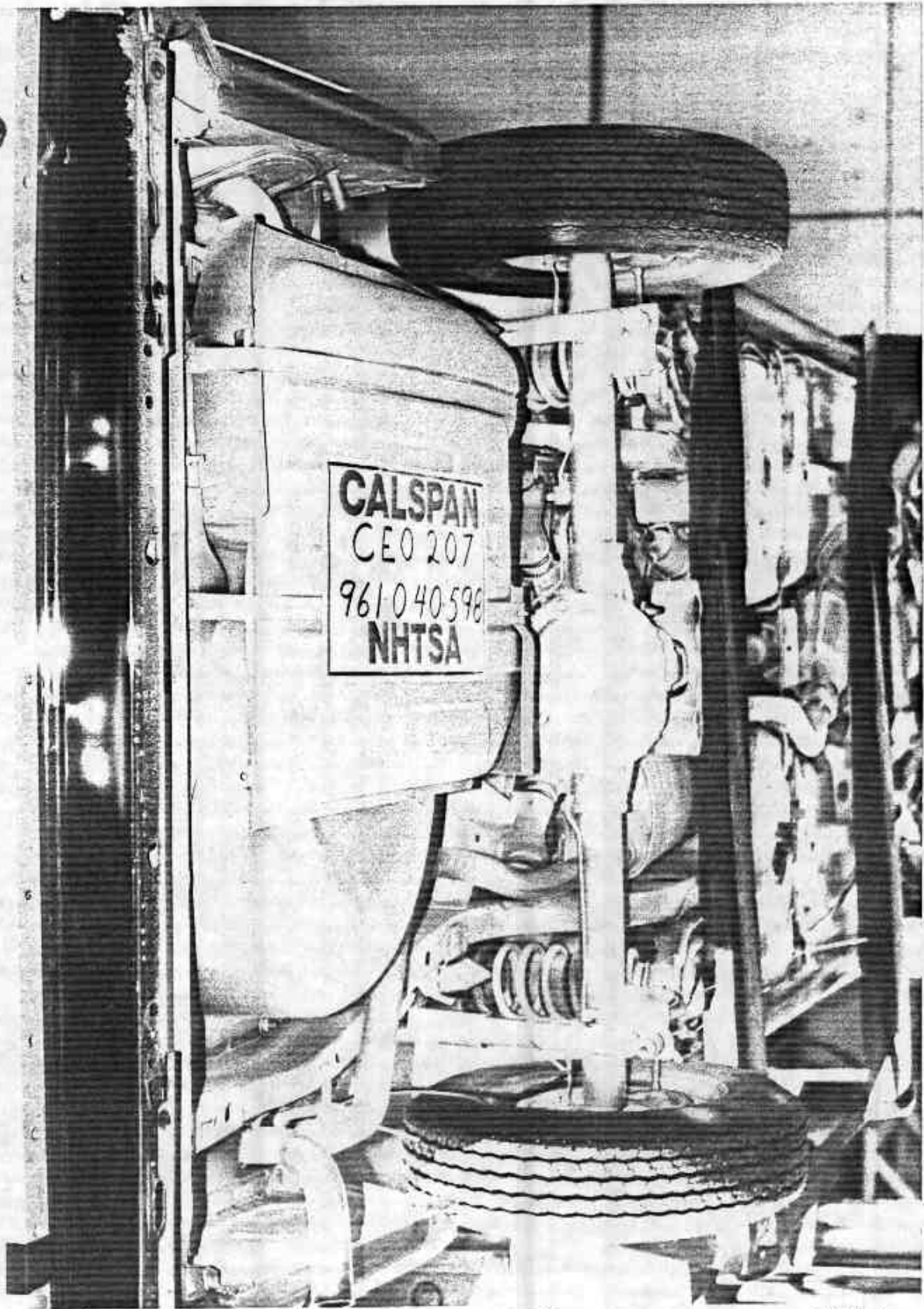


Figure A-19 PRE-TEST REAR UNDERBODY VIEW



Figure A-20 POST-TEST REAR UNDERBODY VIEW



Figure A-21 PRE-TEST DRIVER POSITION VIEW

A-22

7209-4



Figure A-22 POST-TEST DRIVER POSITION VIEW

A-25

7209-4

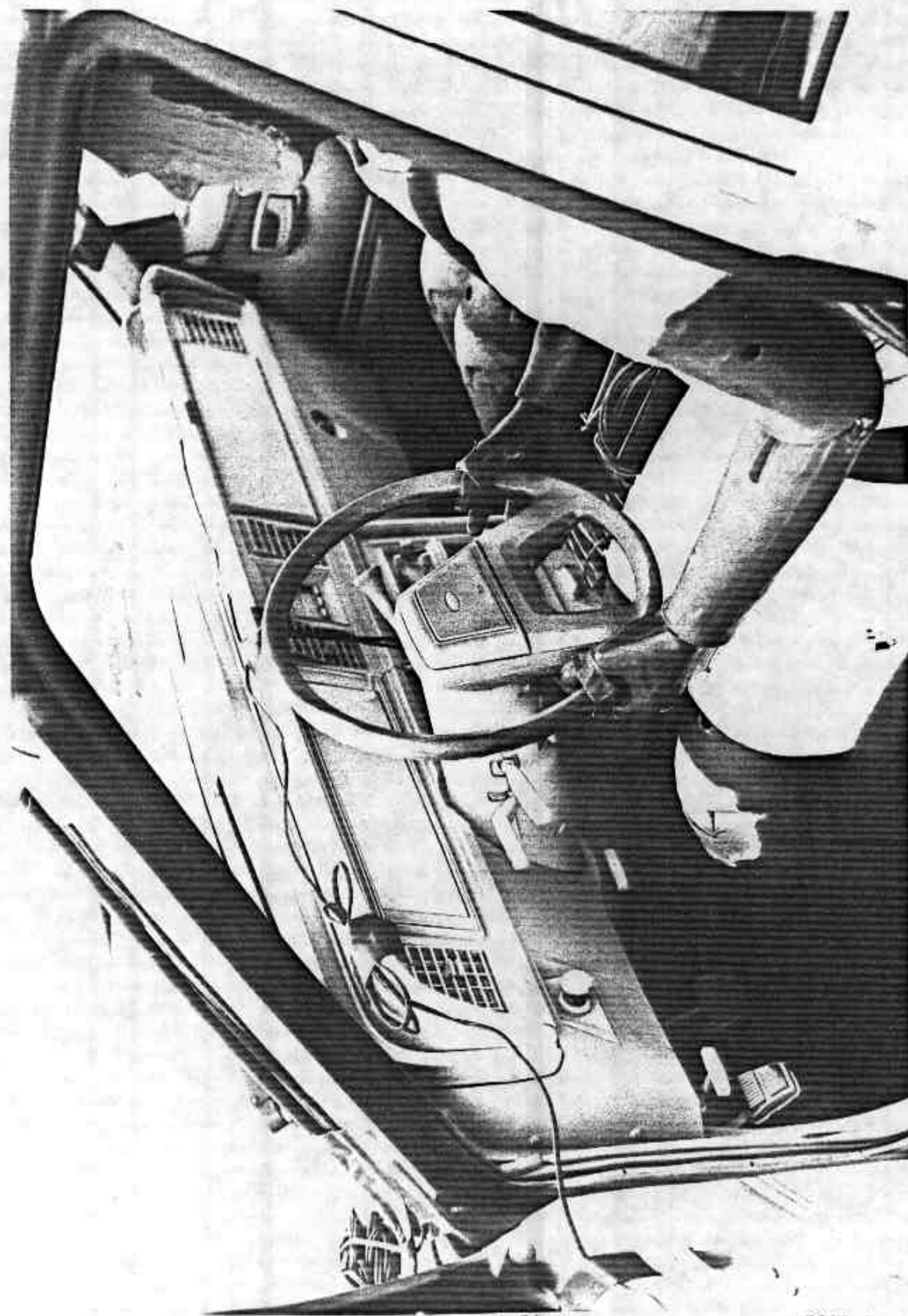


Figure A-23 PRE-TEST DRIVER AND INTERIOR VIEW

A-24

7209-4

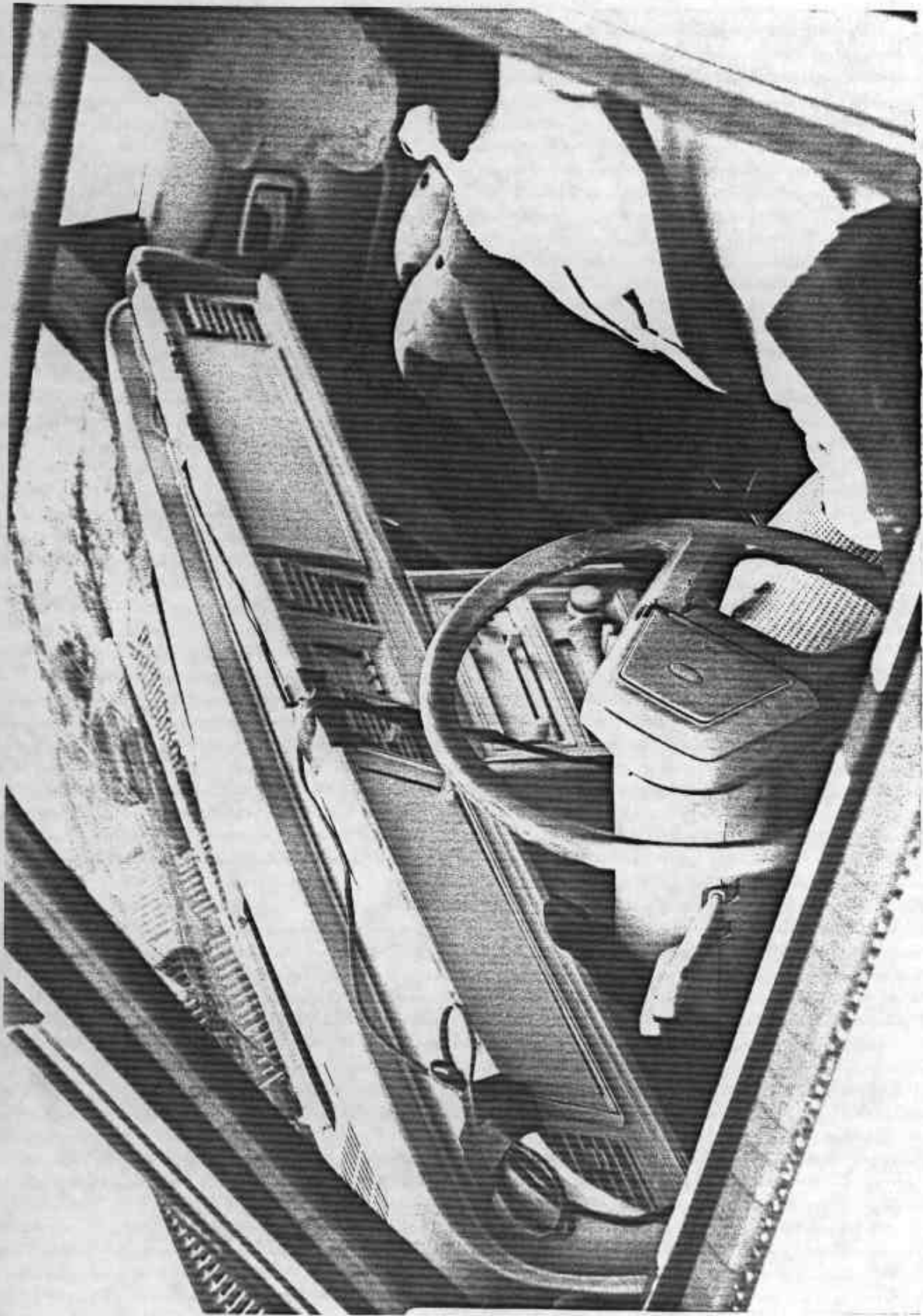


Figure A-24 POST-TEST DRIVER AND INTERIOR VIEW

A-25

7209-4



Figure A-25 PRE-TEST PASSENGER POSITION VIEW

A-26

7209-4



Figure A-26 POST-TEST PASSENGER POSITION VIEW

A-27

7209-4

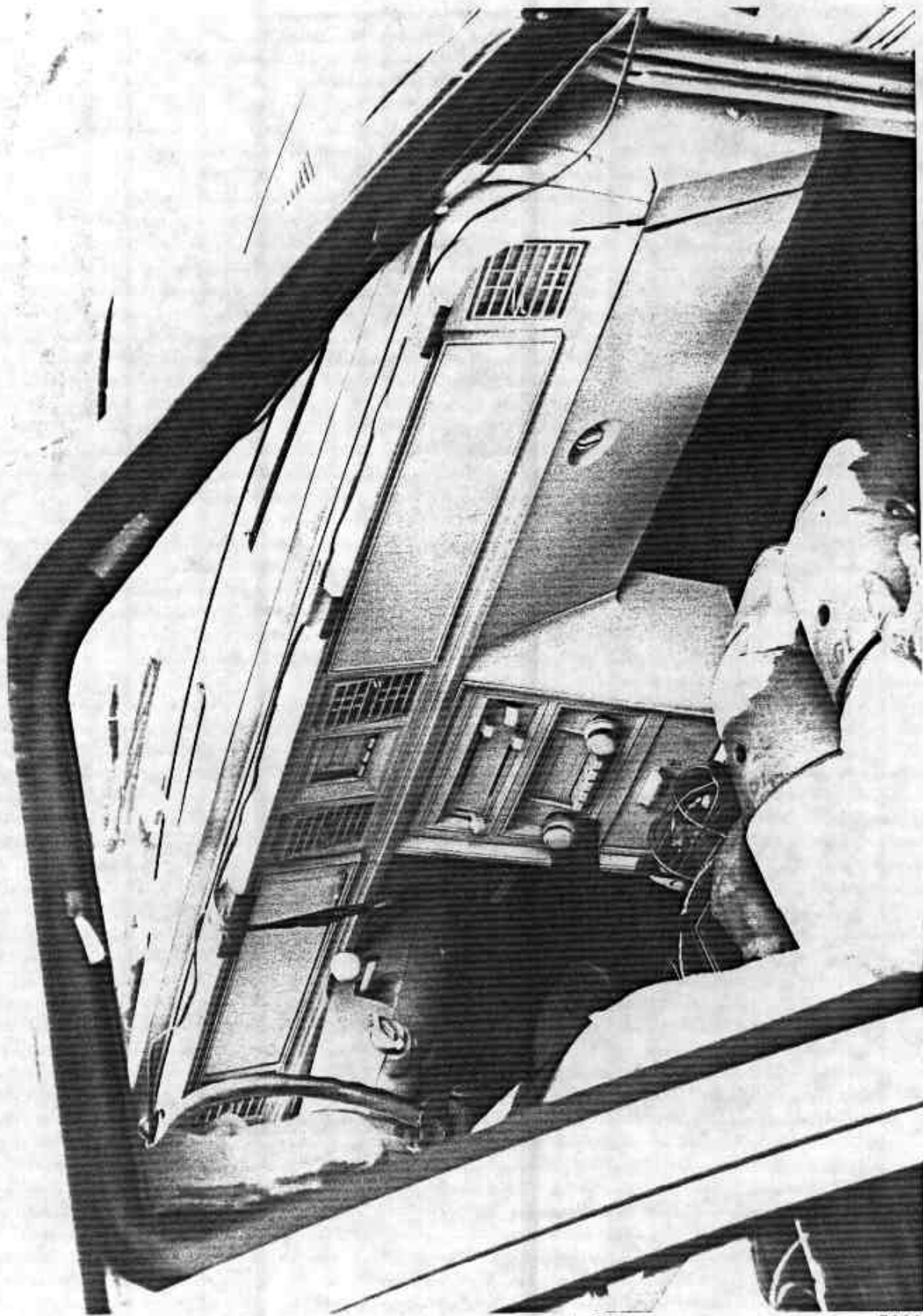


Figure A-27 PRE-TEST PASSENGER AND INTERIOR VIEW

A-28

7209-4

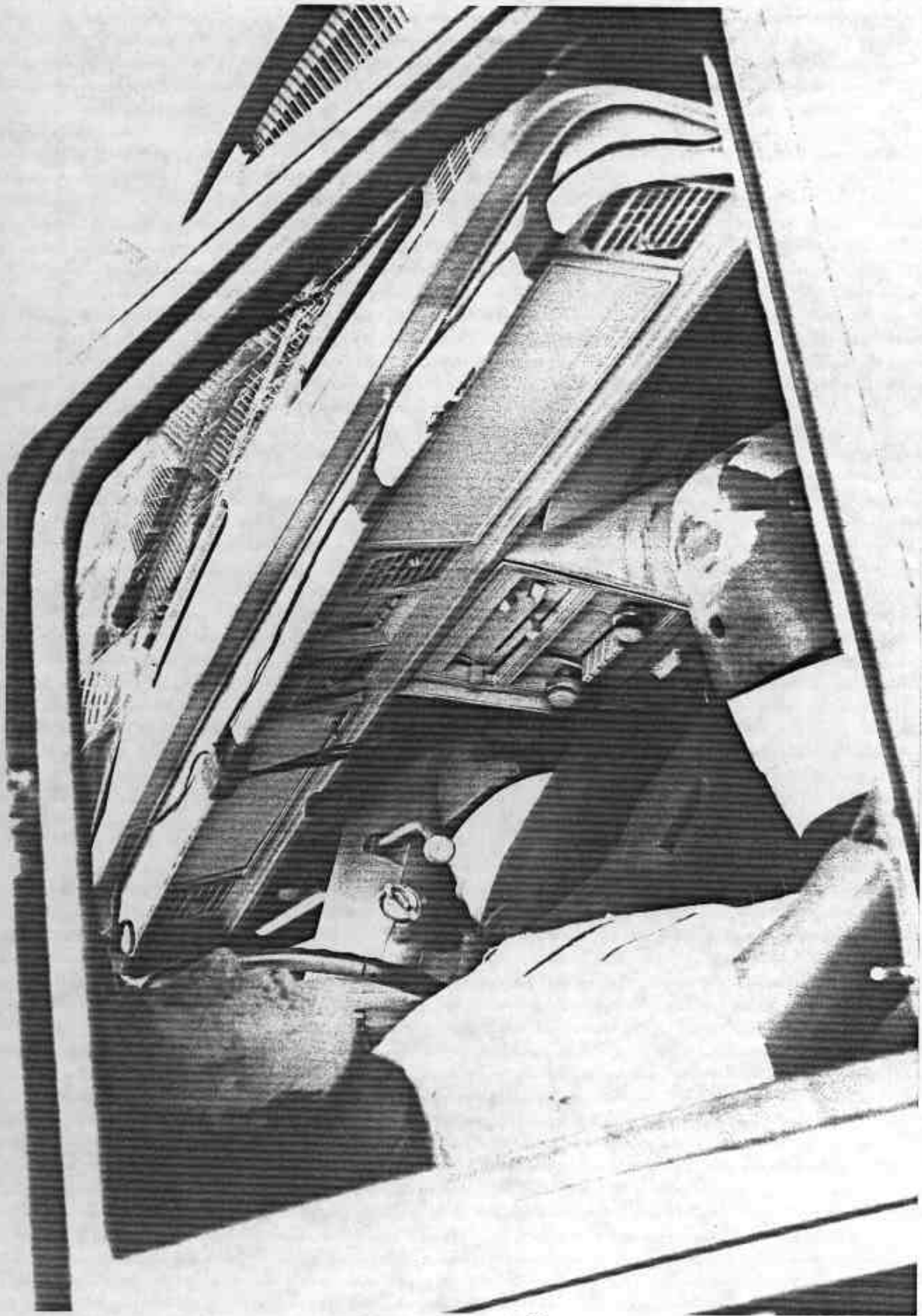


Figure A-28 POST-TEST PASSENGER AND INTERIOR VIEW

A-29

7209-4



Figure A-29 POST-TEST PASSENGER HEAD CONTACT WITH WINDSHIELD AND DASH

A-30

7209-4

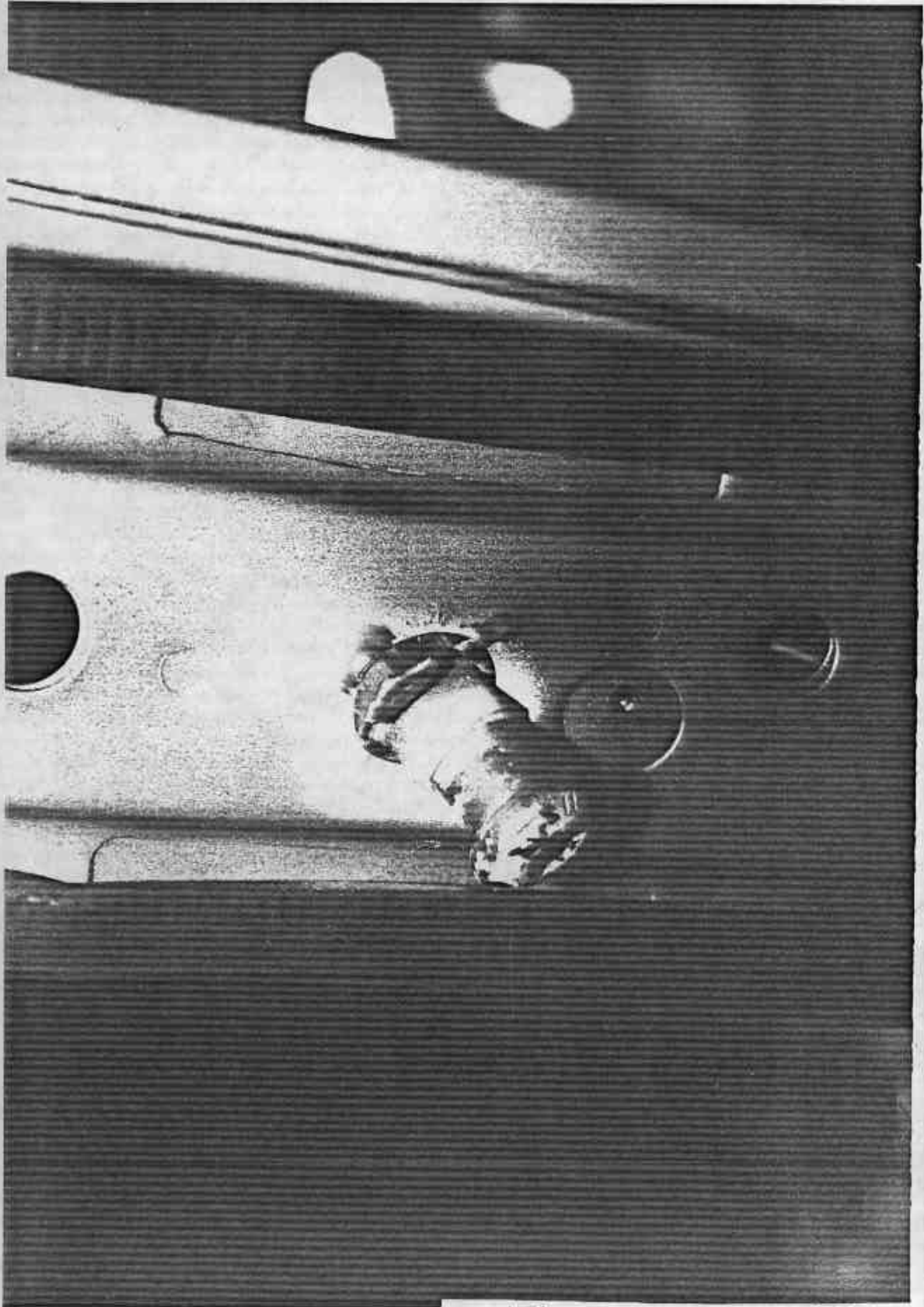


Figure A-30 POST-TEST 'D' RING ANCHOR BOLD VIEW



Figure A-31 POST-TEST "D" RING VIEW

APPENDIX B  
VEHICLE AND DUMMY RESPONSE DATA

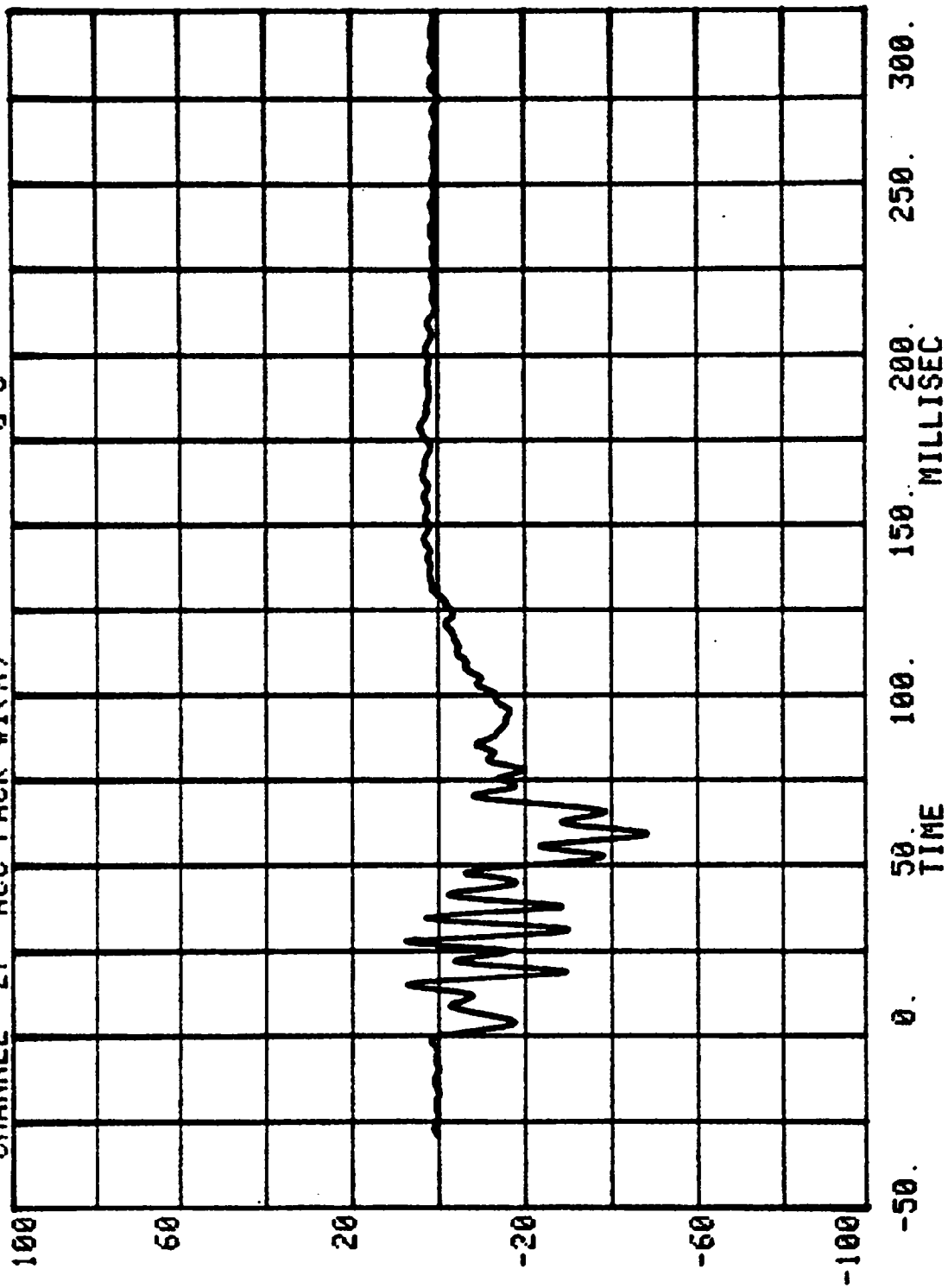
TEST NO. CE0207

VEHICLE DATA

FILTER CHANNEL CLASS

60

CHANNEL 27 ACC PACK #1(X) RUN= 598 SERIES= 207 G'S

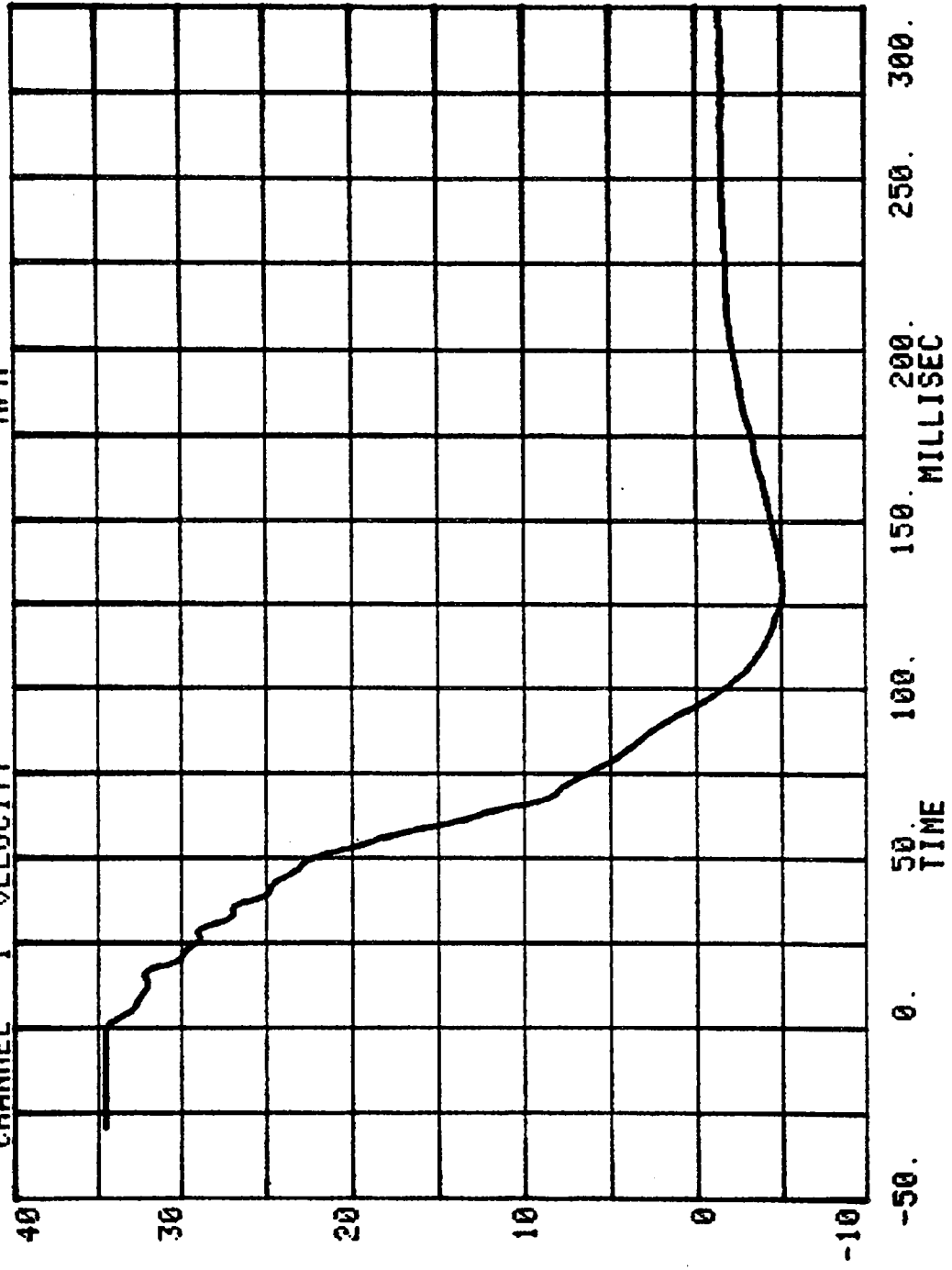


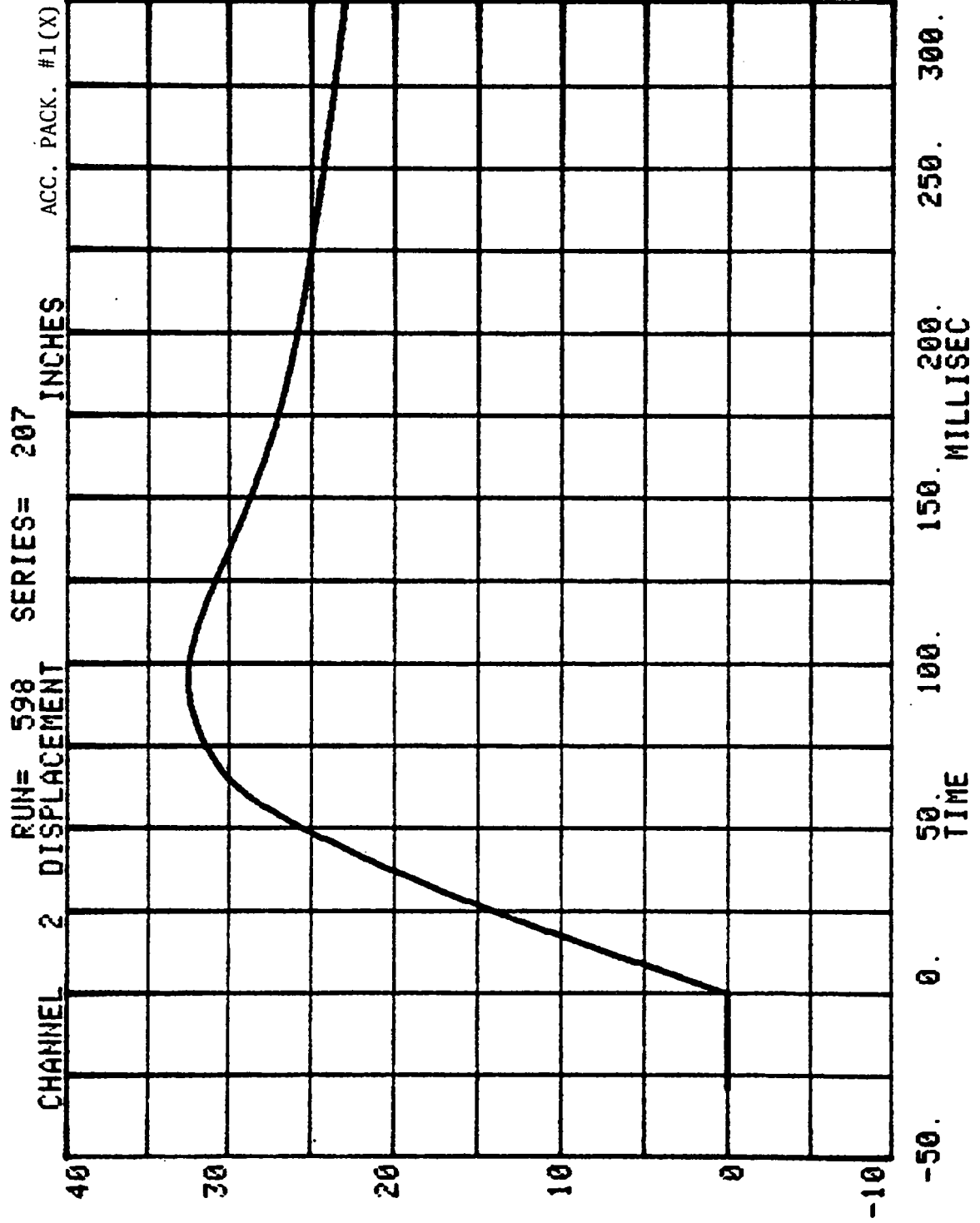
ACC. PACK. #1(X)

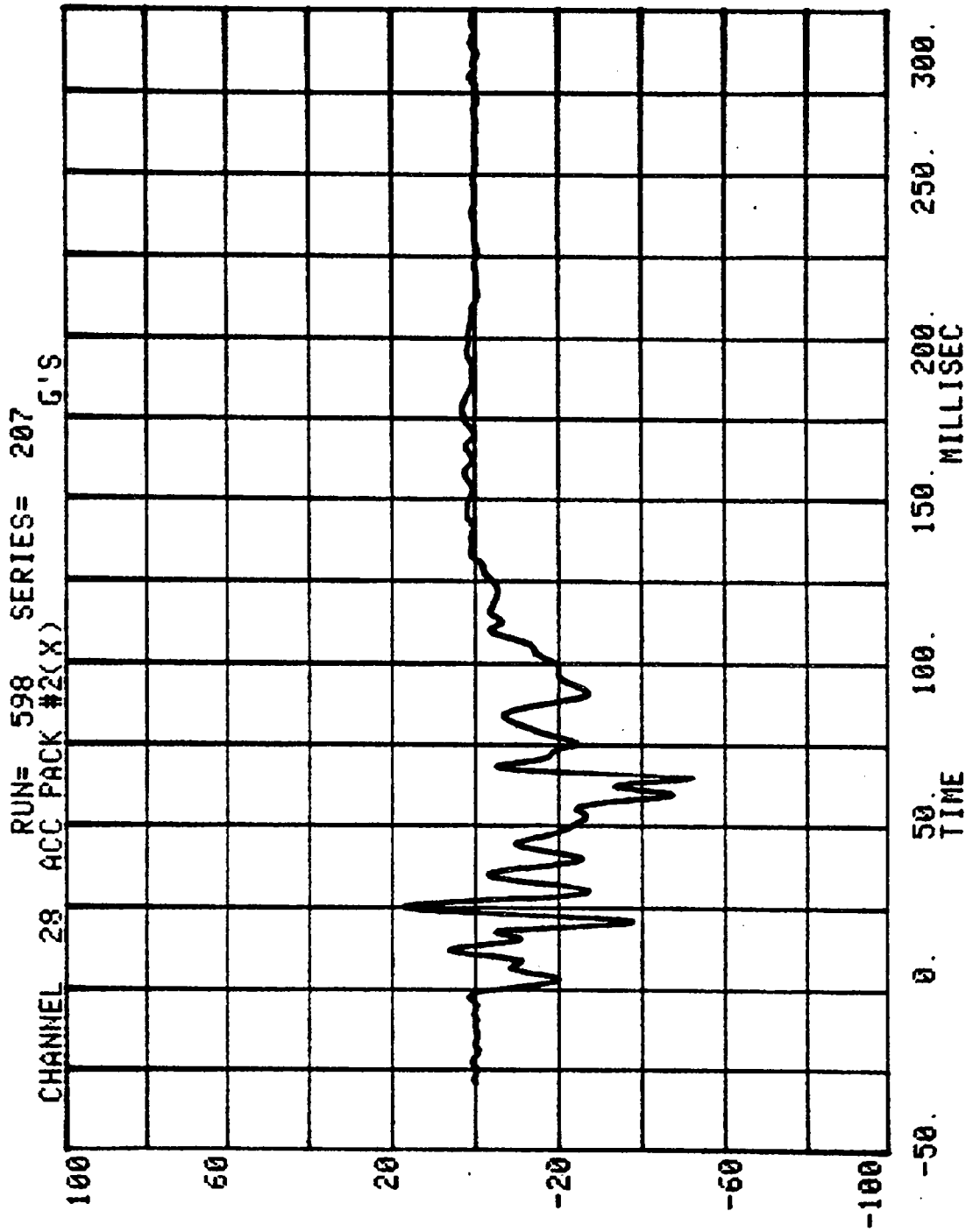
SERIES= 207 MPH

RUN= 598

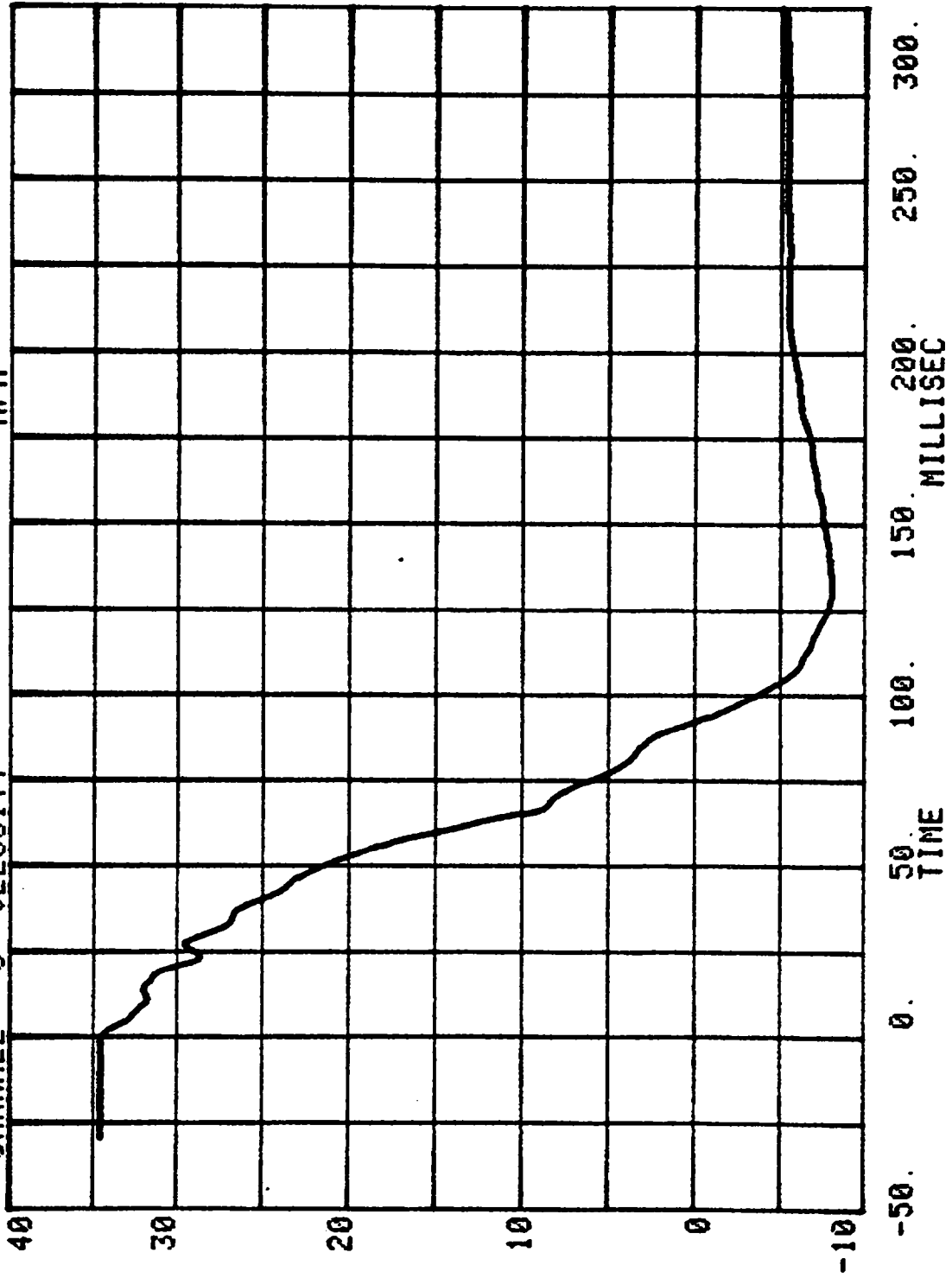
CHANNEL 1 VELOCITY





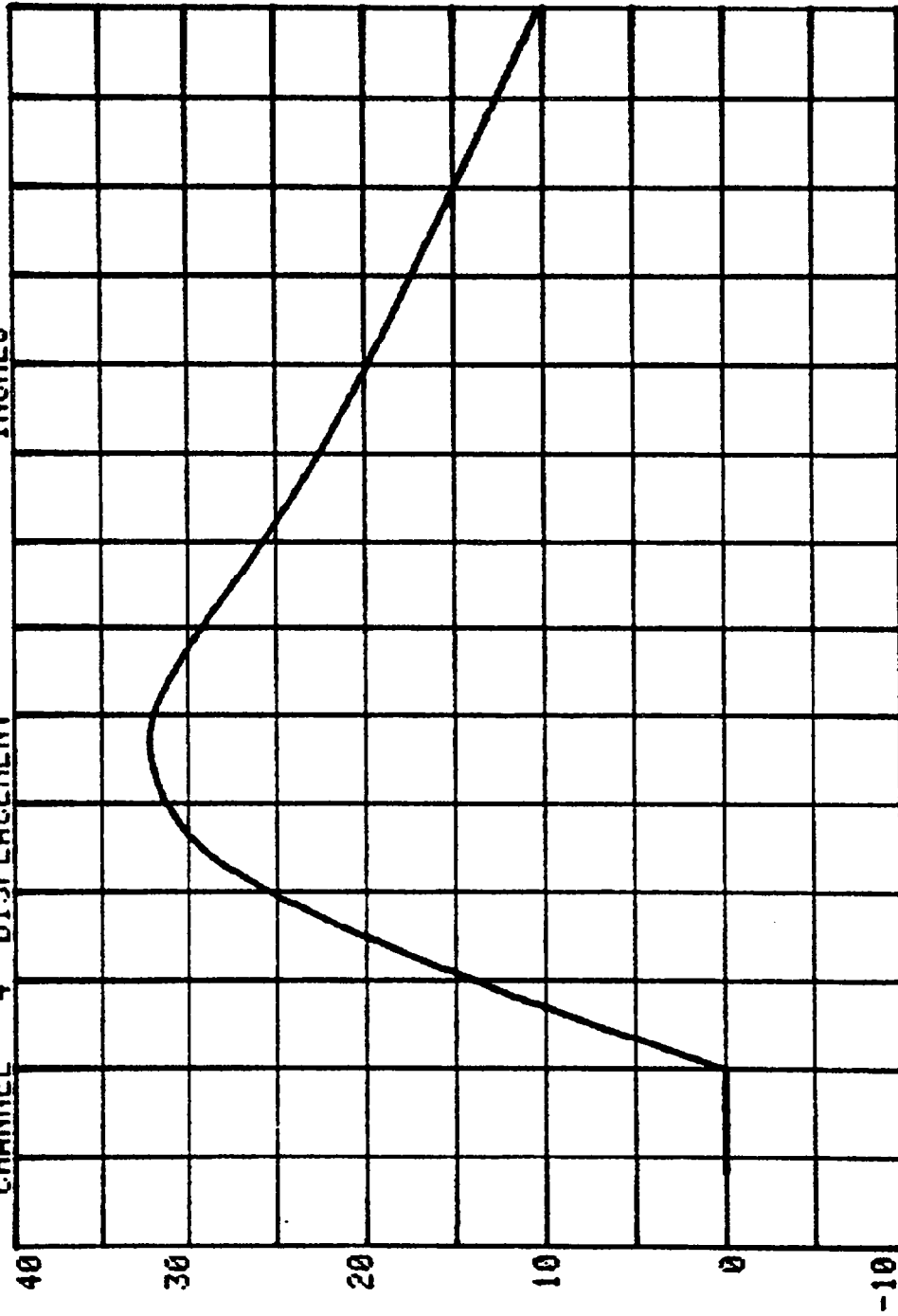


CHANNEL 3 VELOCITY  
RUN= 598 SERIES= 207 MPH  
ACC. PACK. #2(X)



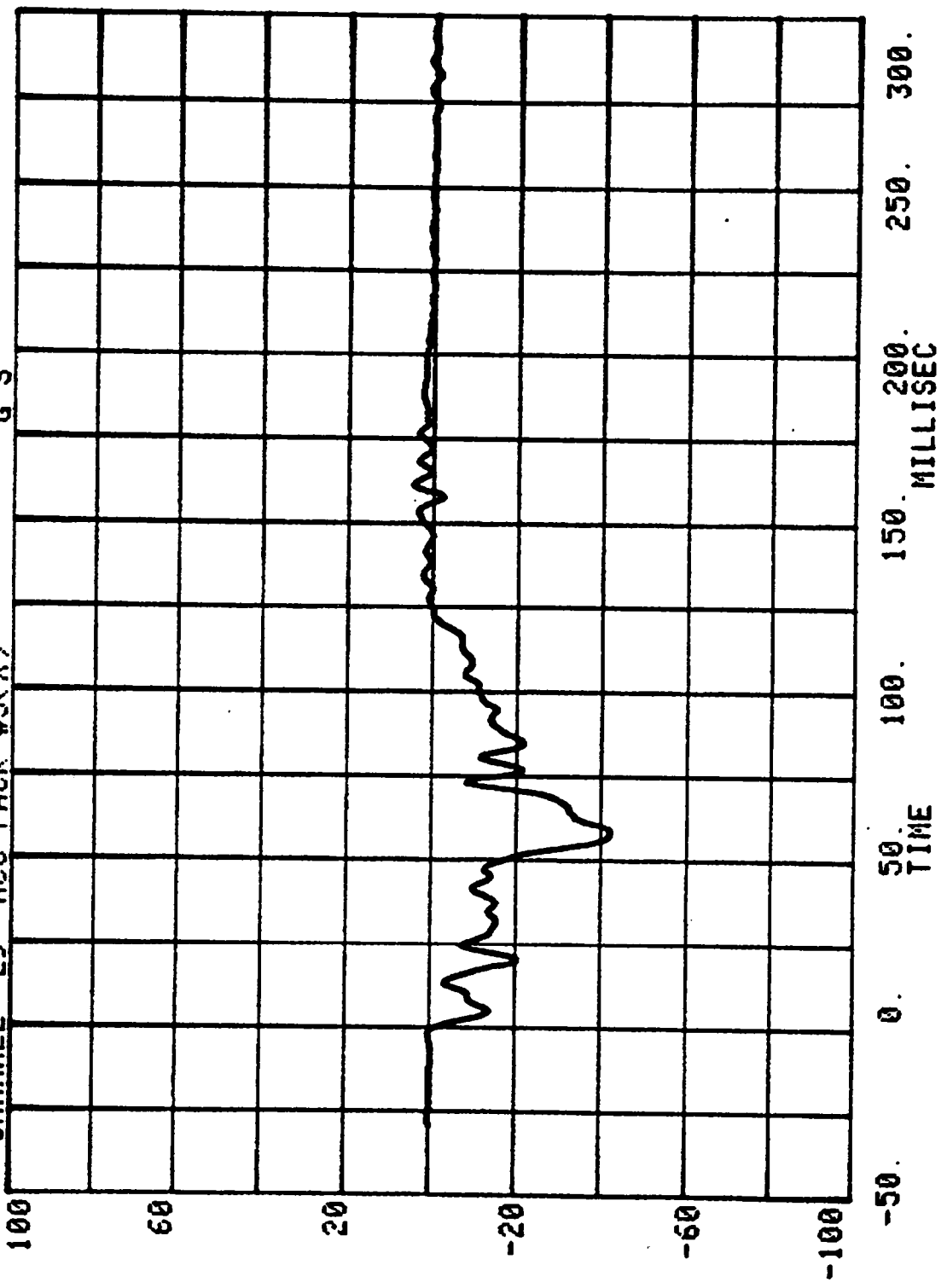
CHANNEL 4 DISPLACEMENT SERIES= 207 INCHES ACC. PACK. #2(X)

RUN= 598



CHANNEL 29 ACC PACK #3(X) G'S

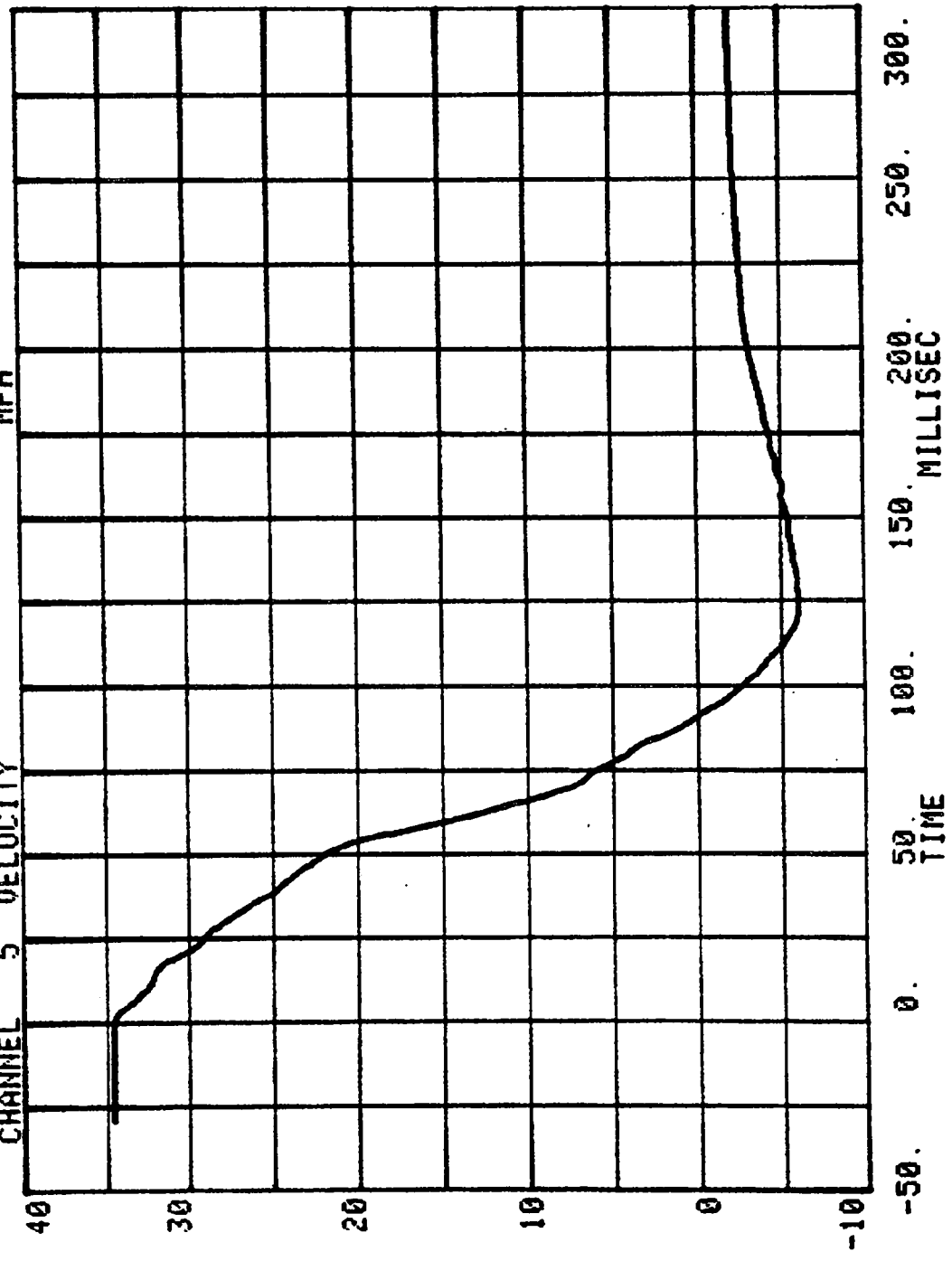
RUN= 598 SERIES= 207



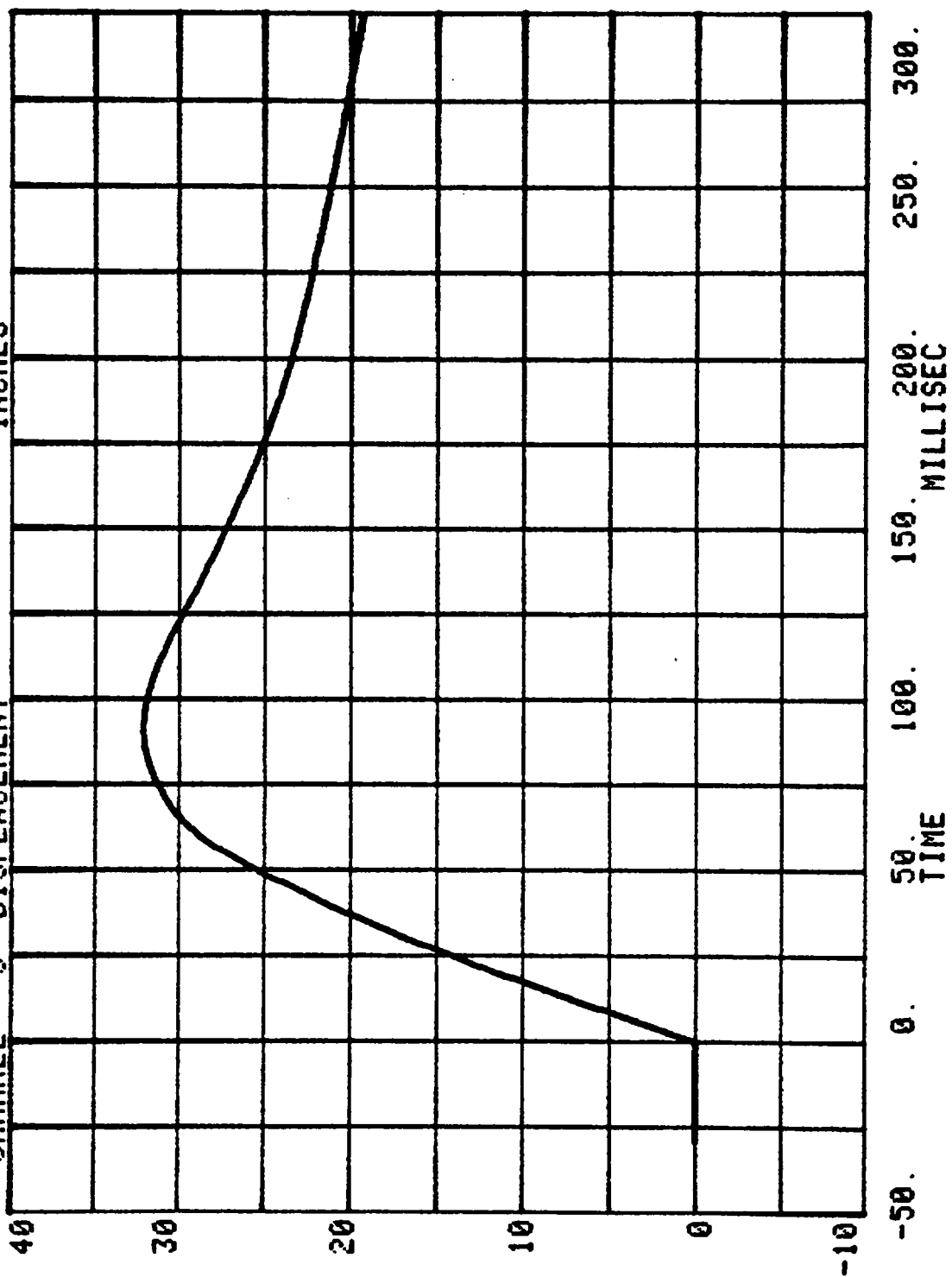
ACC. PACK. #3(X)

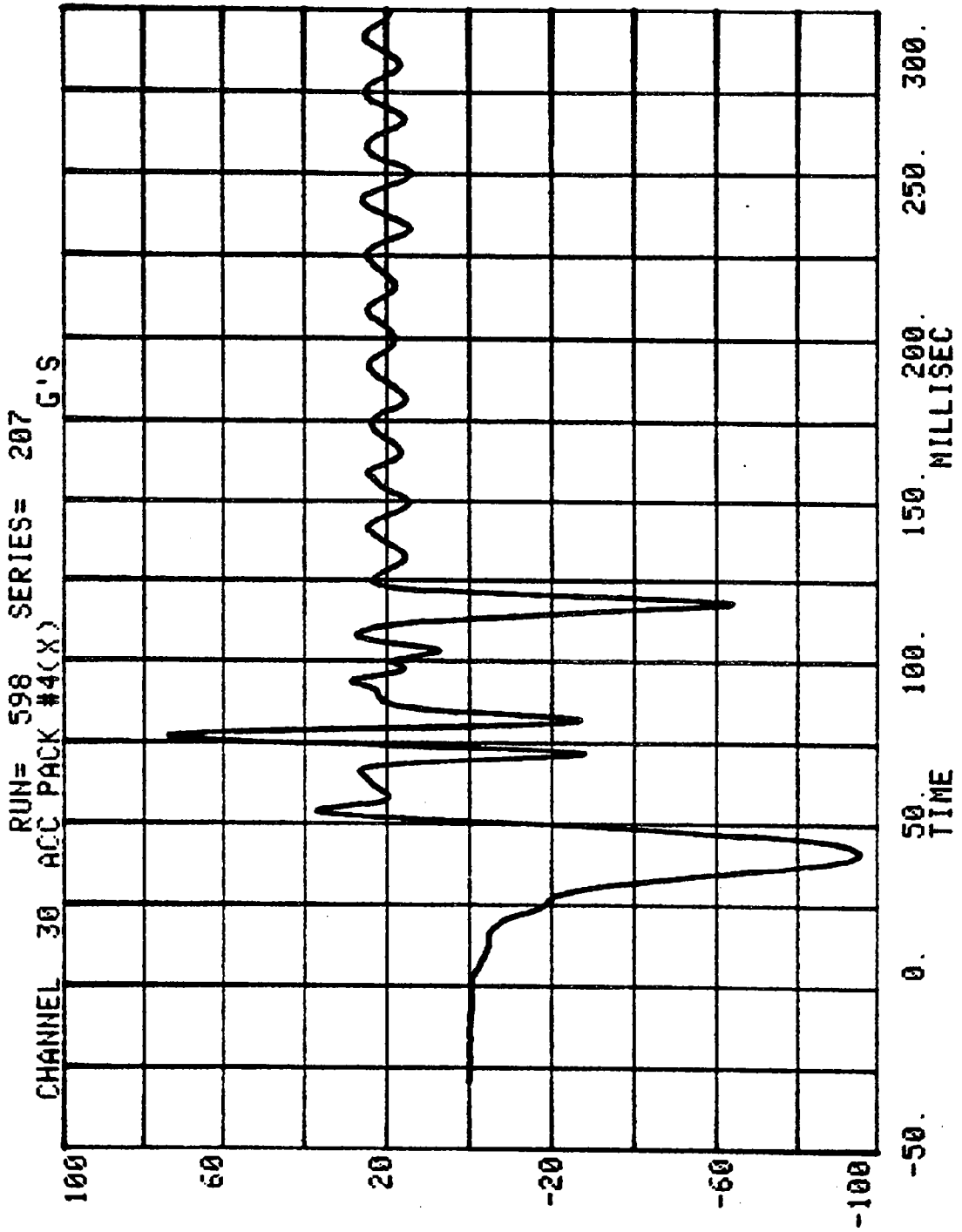
CHANNEL 5 VELOCITY SERIES= 207 MPH

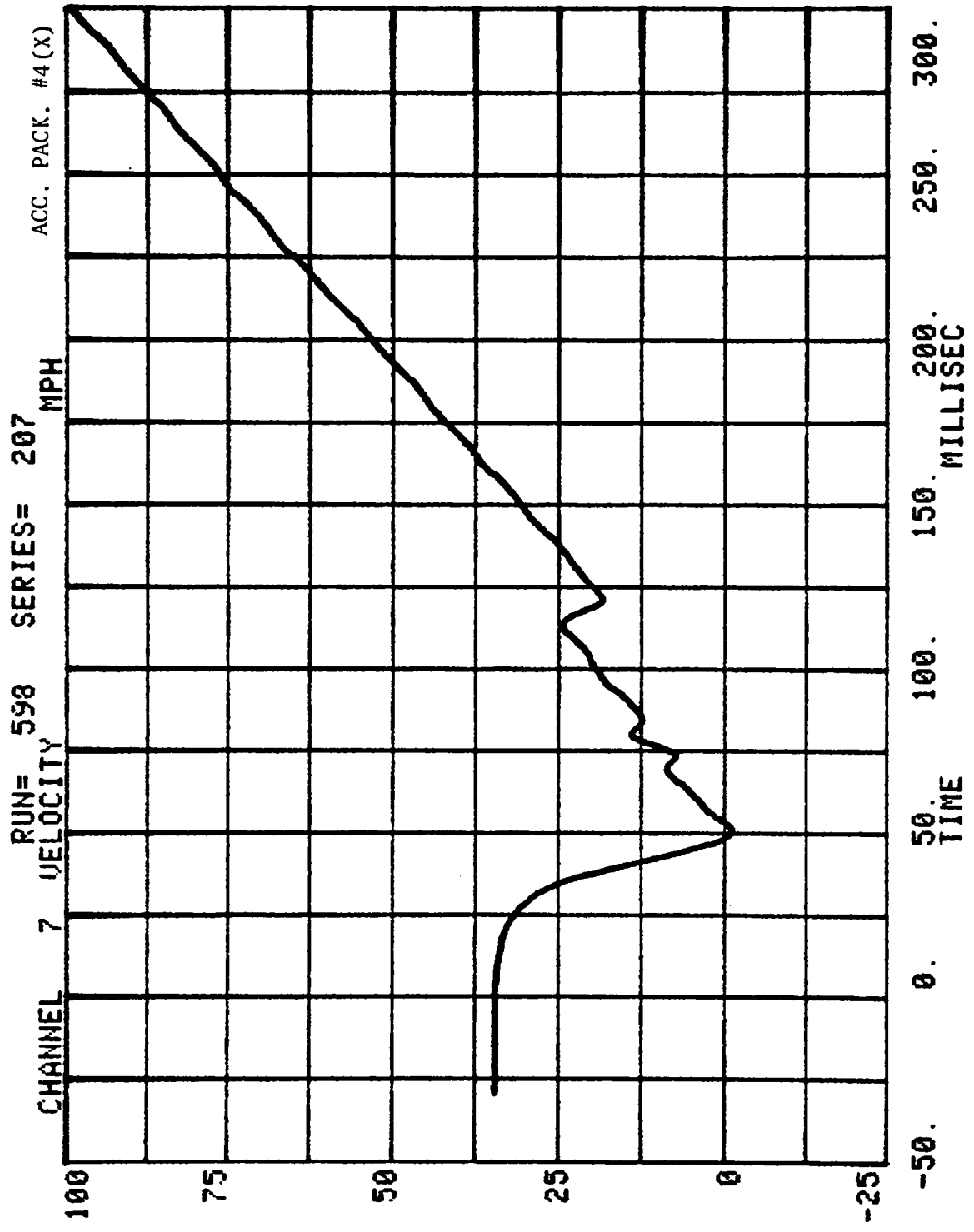
RUN= 598



CHANNEL 6 DISPLACEMENT      RUN= 598      SERIES= 207      INCHES      ACC. PACK. #3(X)





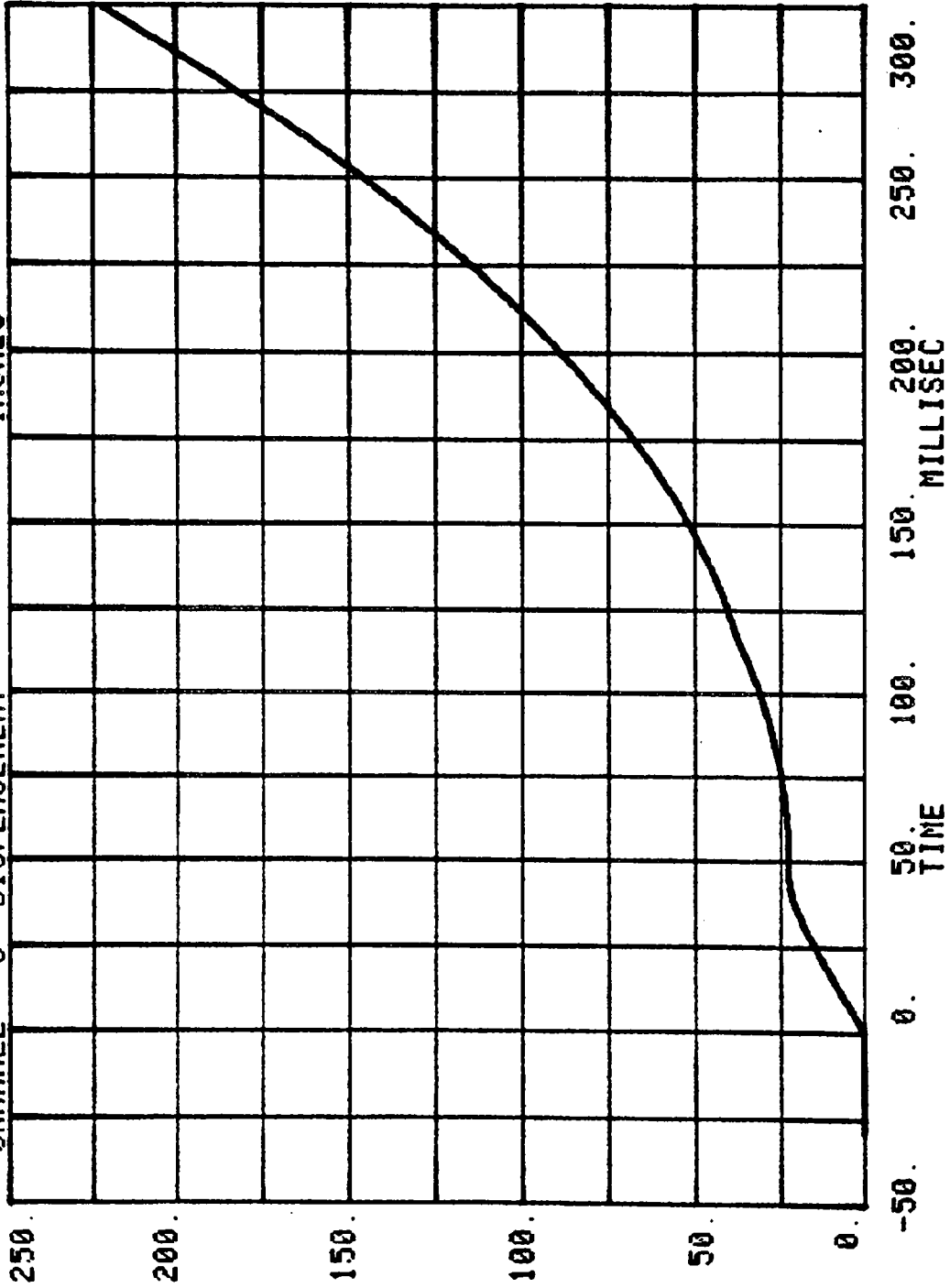


ACC. PACK. #4 (X)

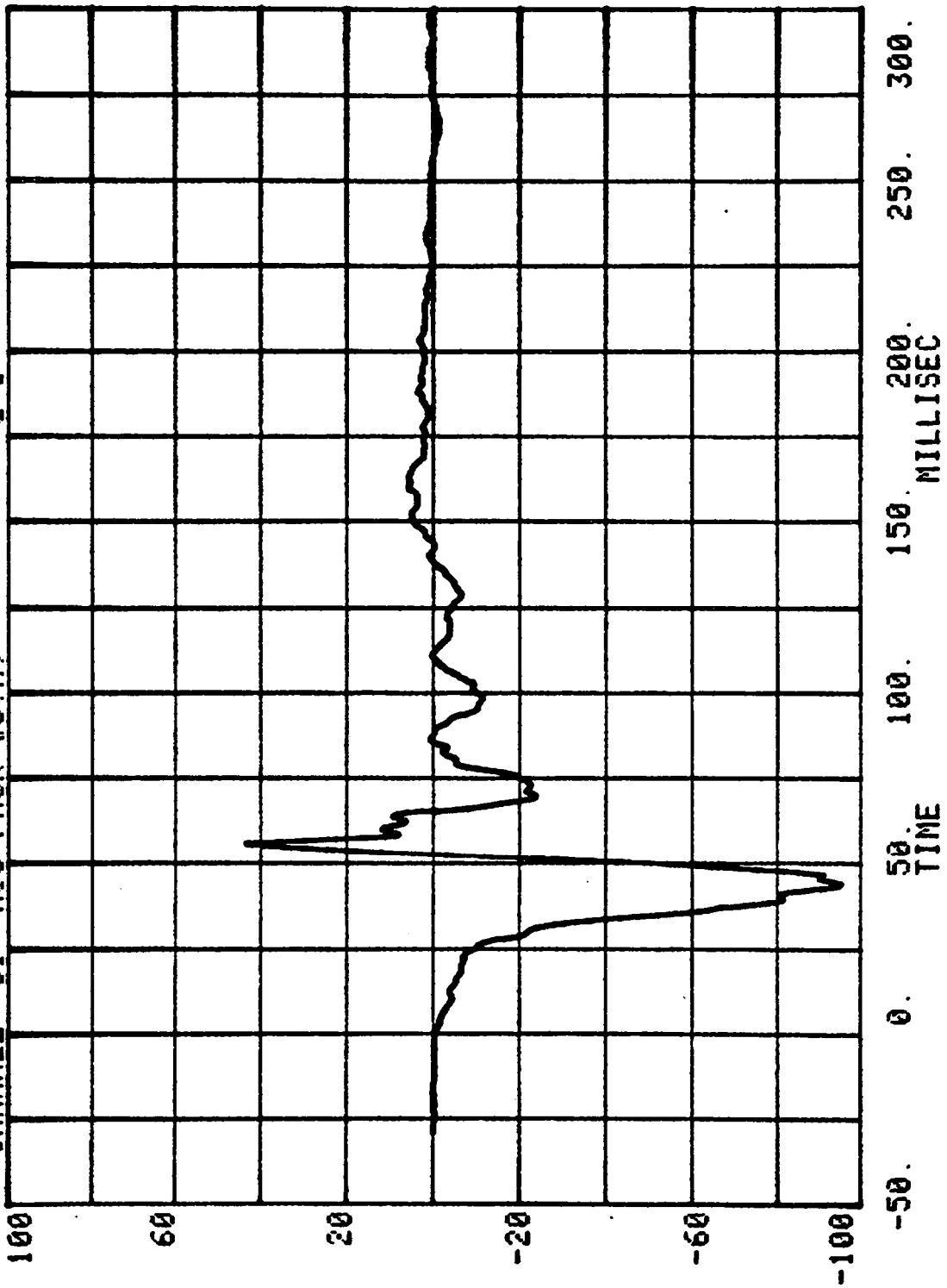
SERIES= 207 INCHES

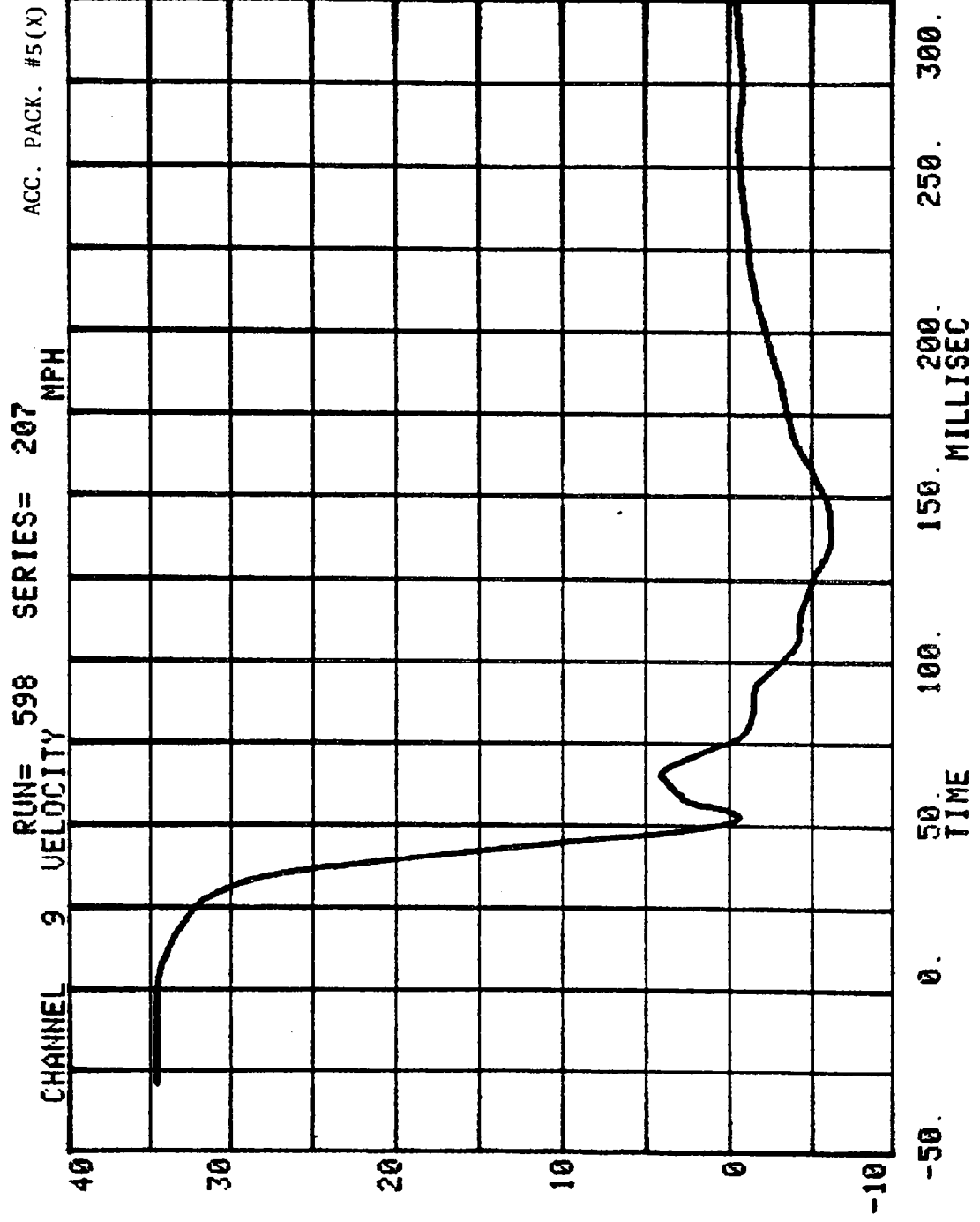
RUN= 598

CHANNEL 8 DISPLACEMENT

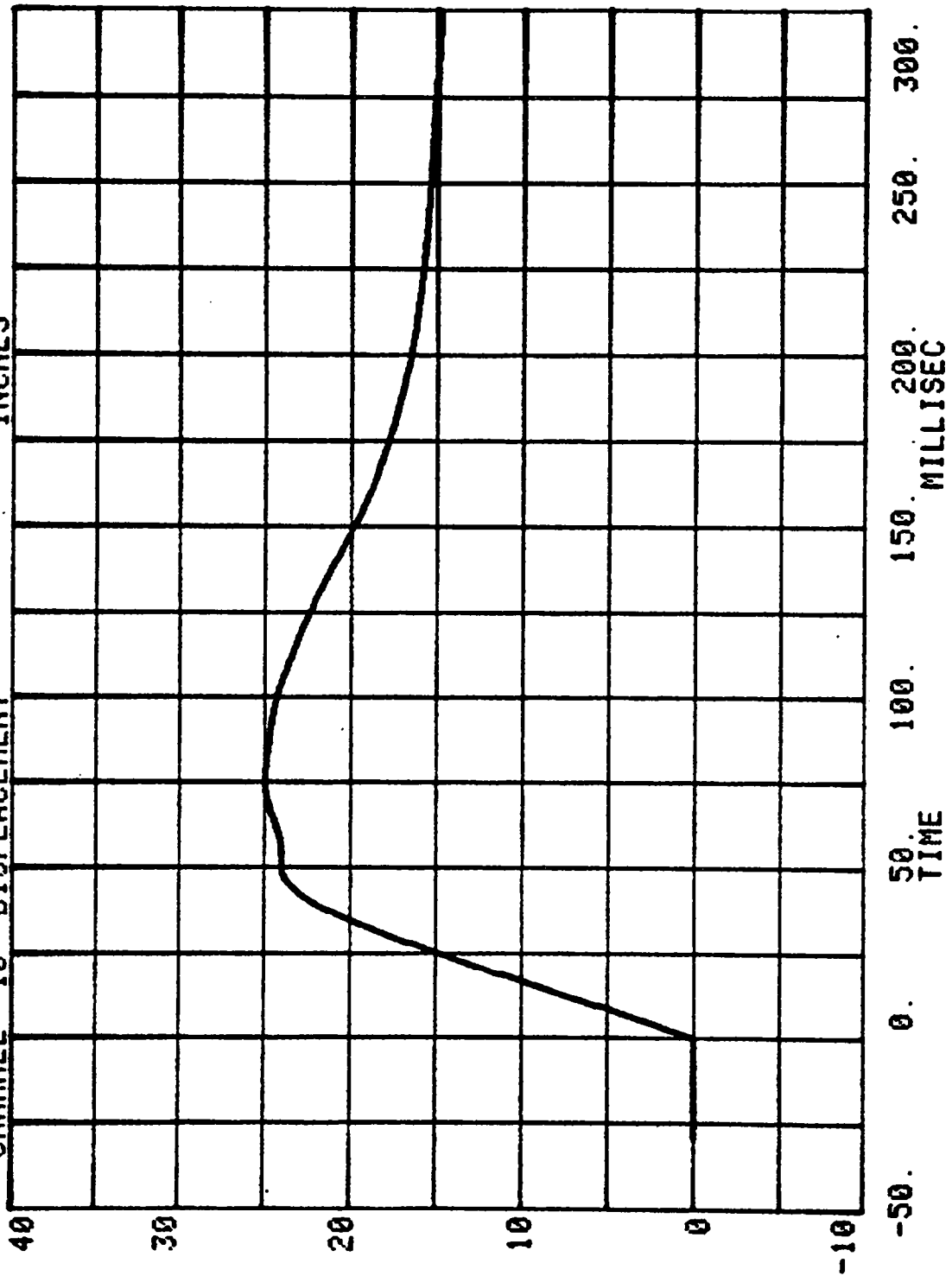


CHANNEL 31 ACC PACK #5(X) RUN= 598 SERIES= 207 G'S

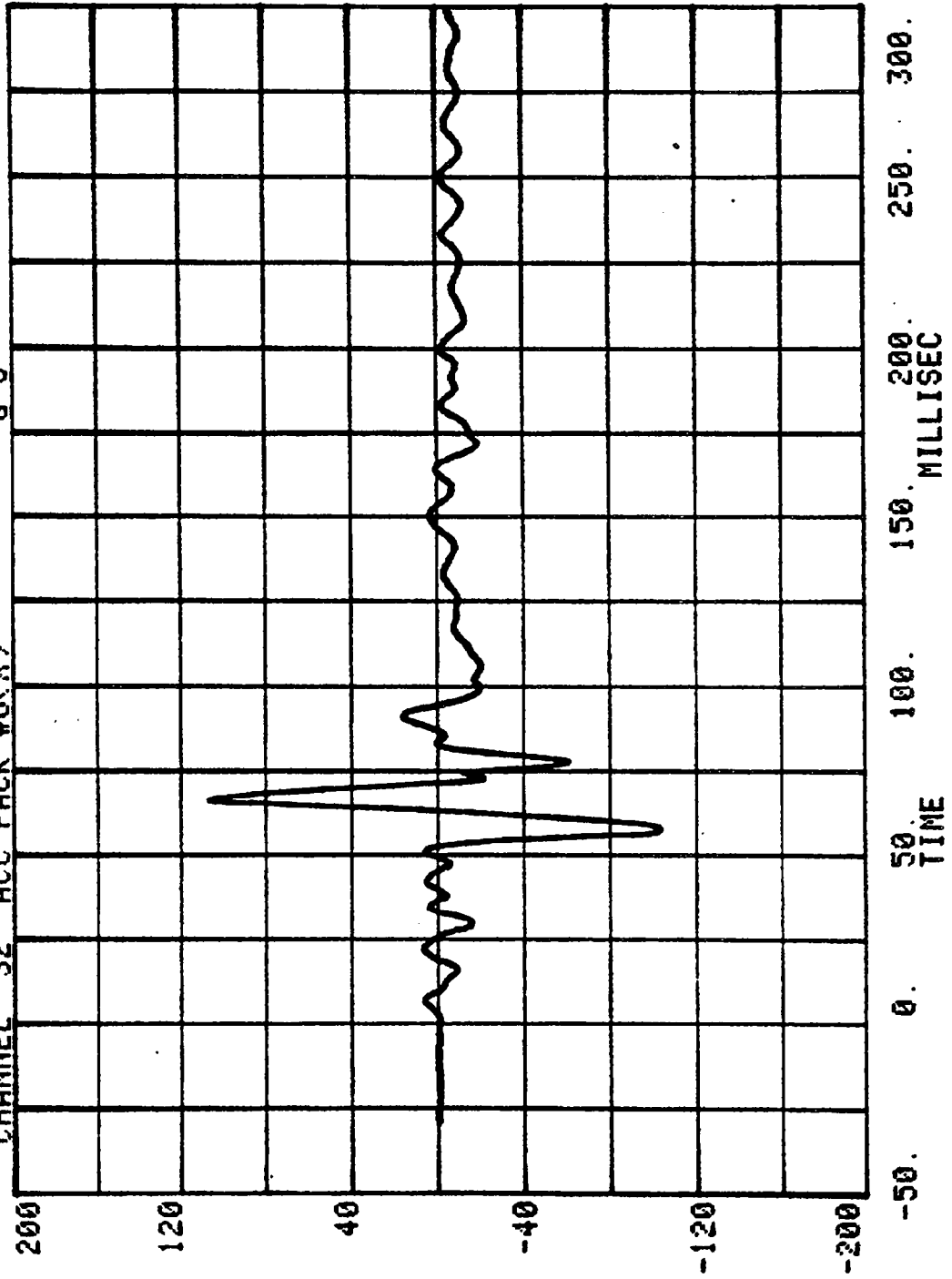




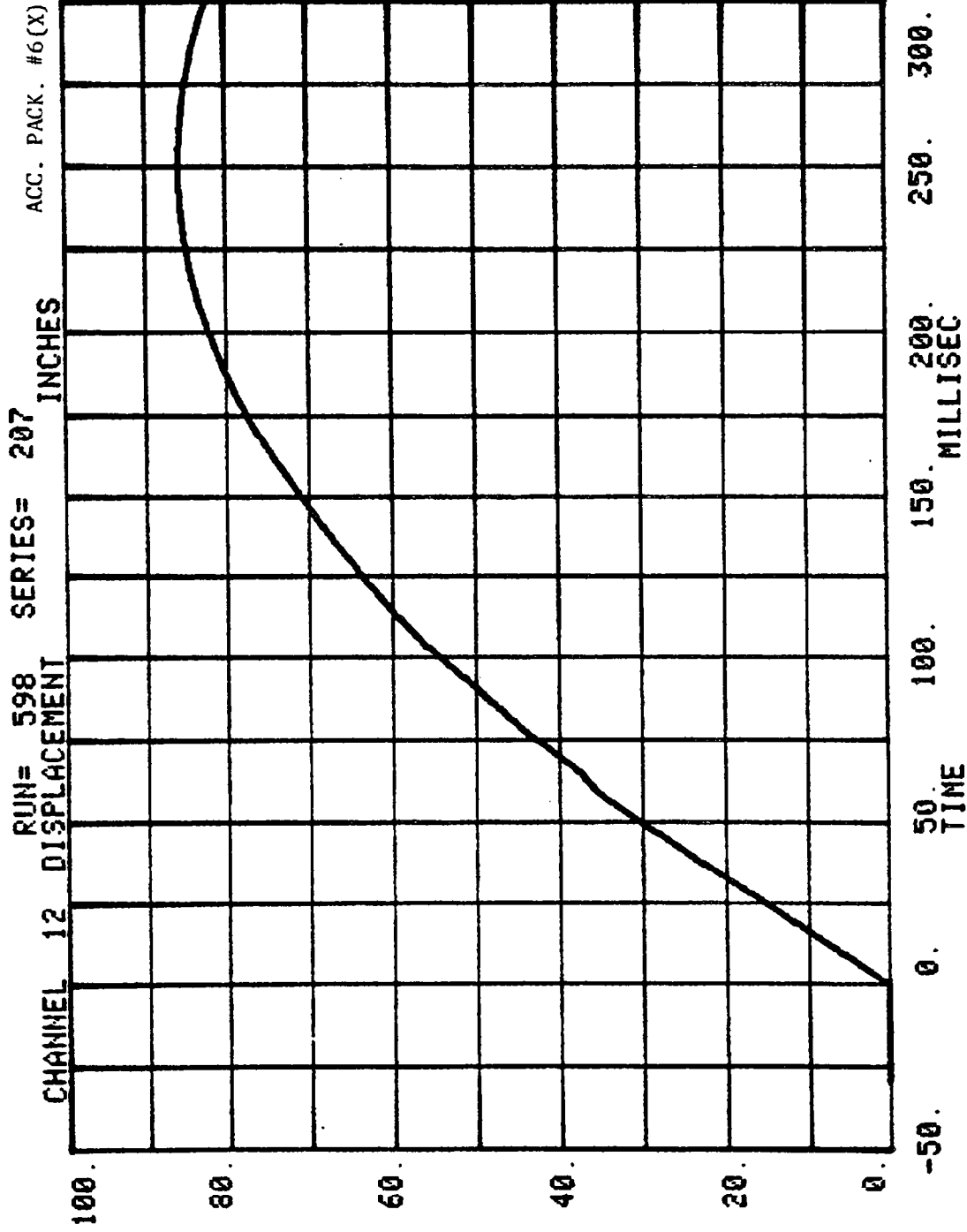
CHANNEL 10 DISPLACEMENT      RUN= 598      SERIES= 207      INCHES      ACC. PACK. #5(X)



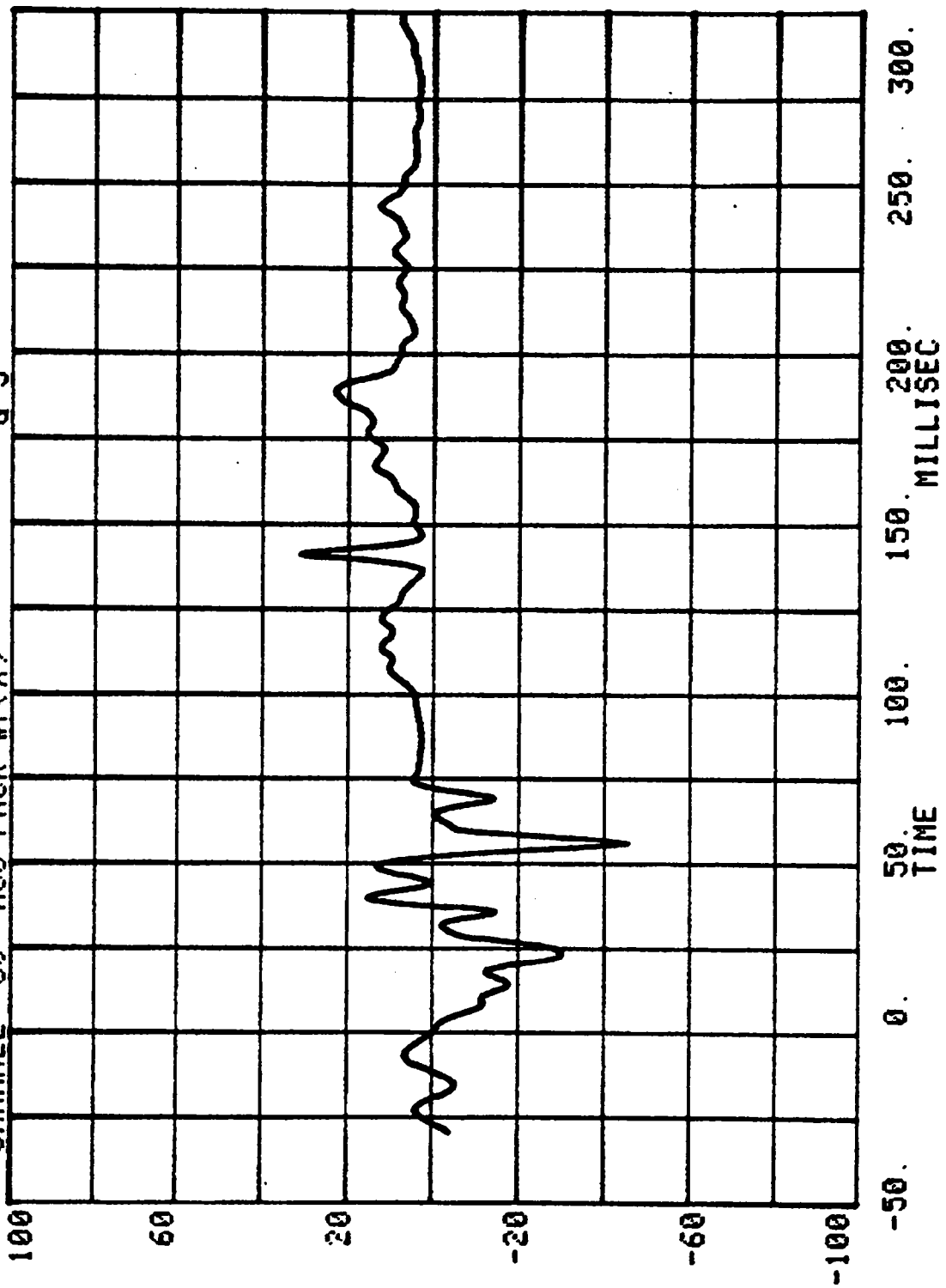
CHANNEL 32 ACC PACK #6(X) RUN= 598 SERIES= 207 G'S

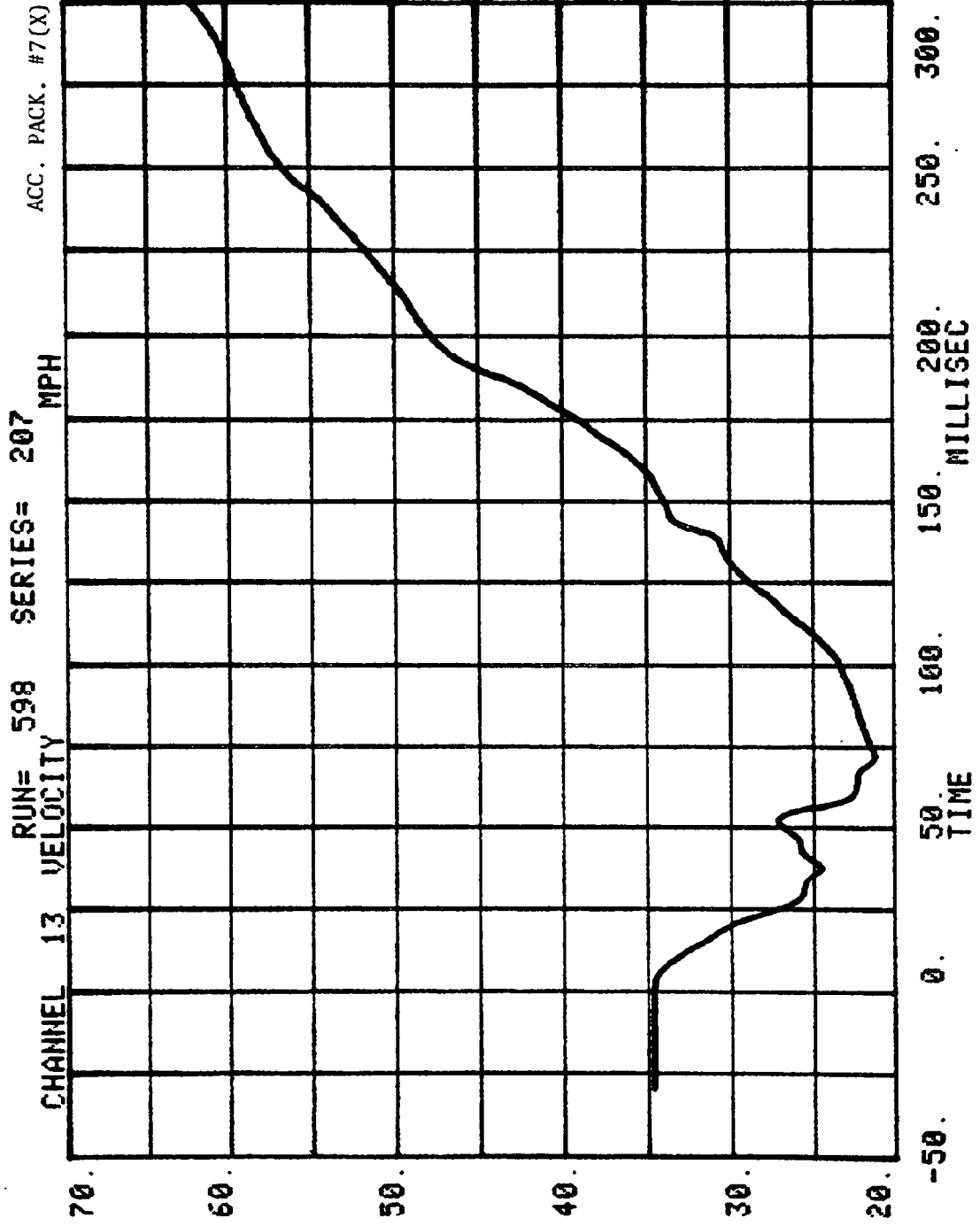


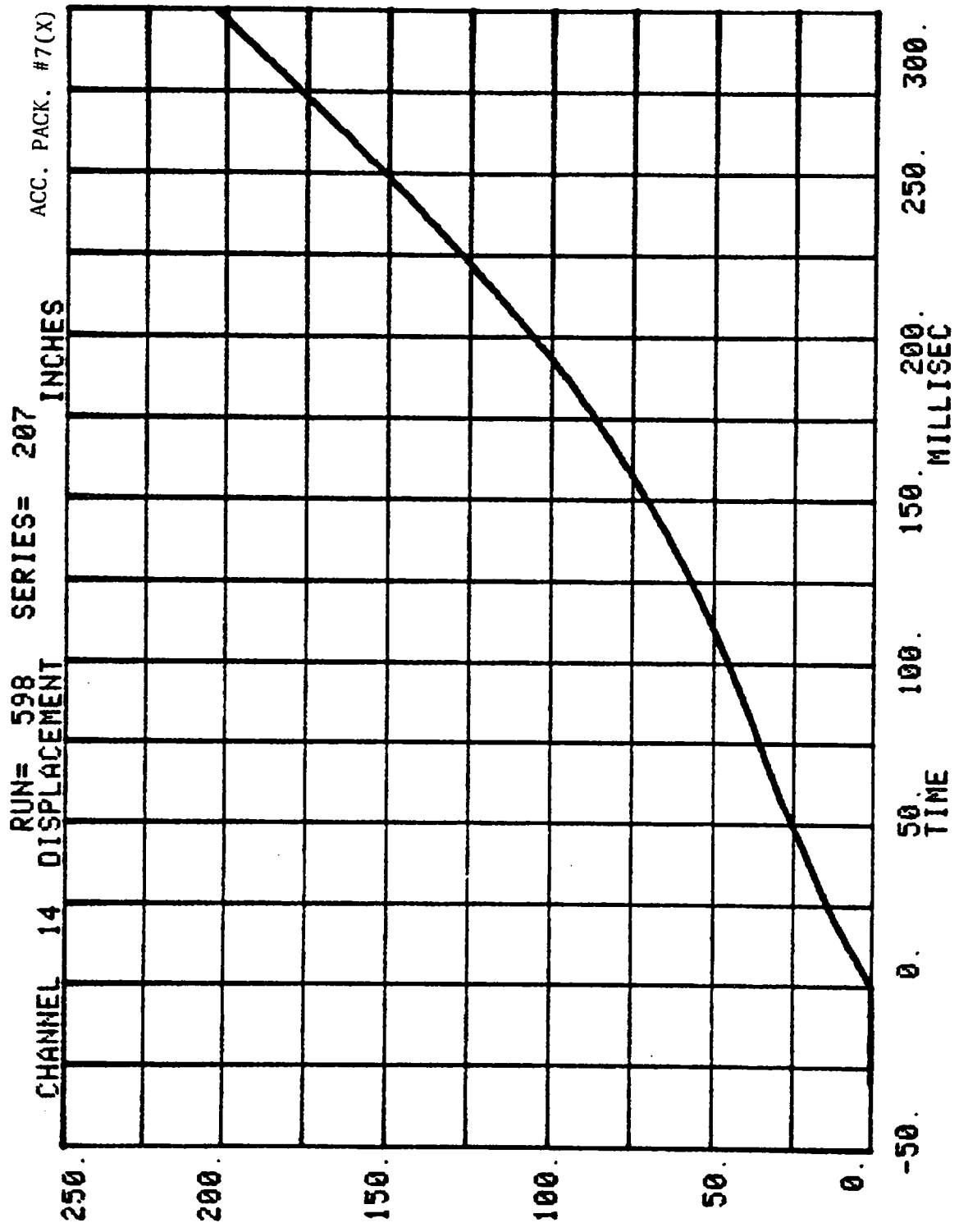




CHANNEL 33 ACC PACK #7(X) RUN= 598 SERIES= 207 G'S







TEST NO. CE0207

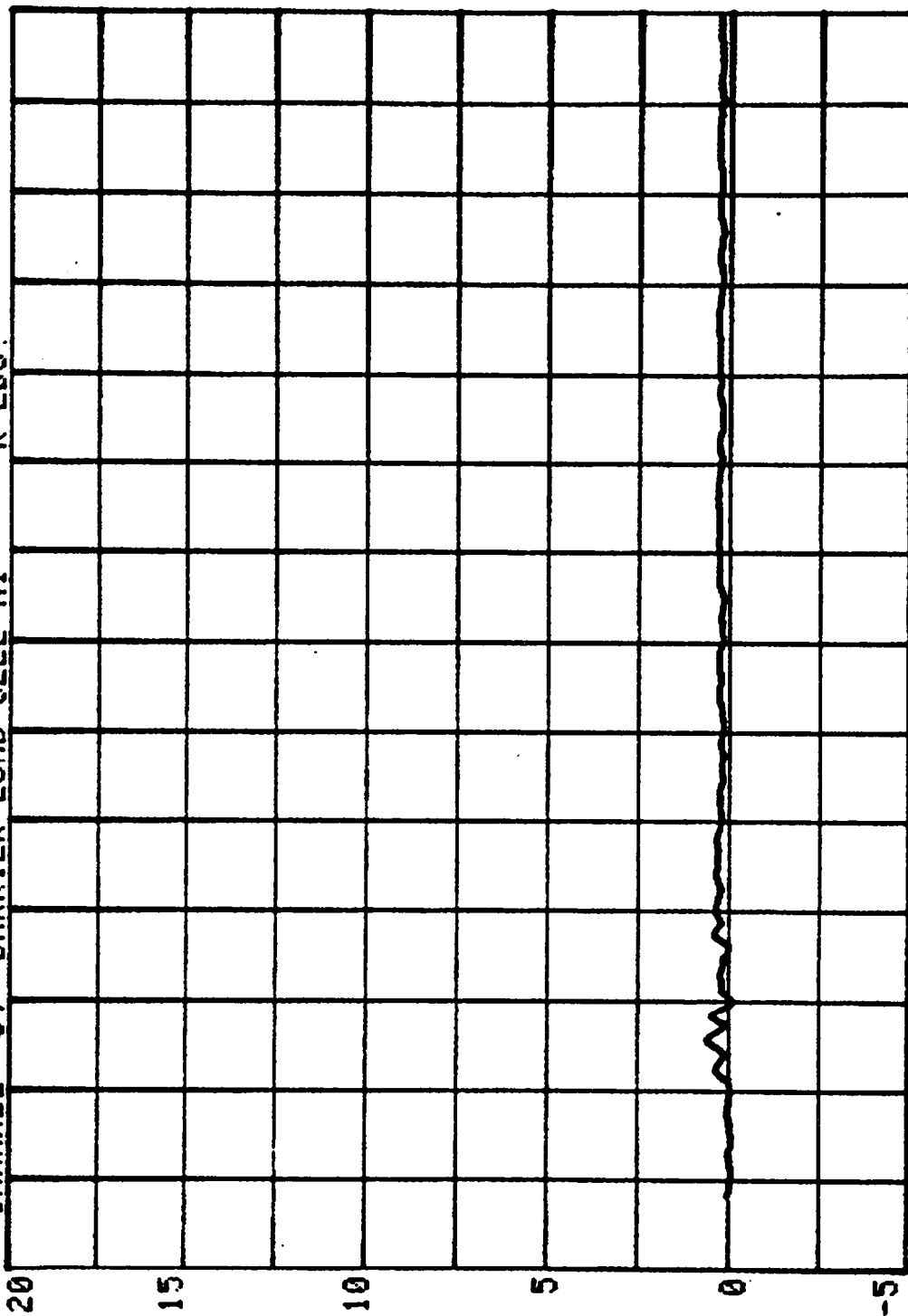
LOAD CELL BARRIER DATA  
FILTER CHANNEL CLASS

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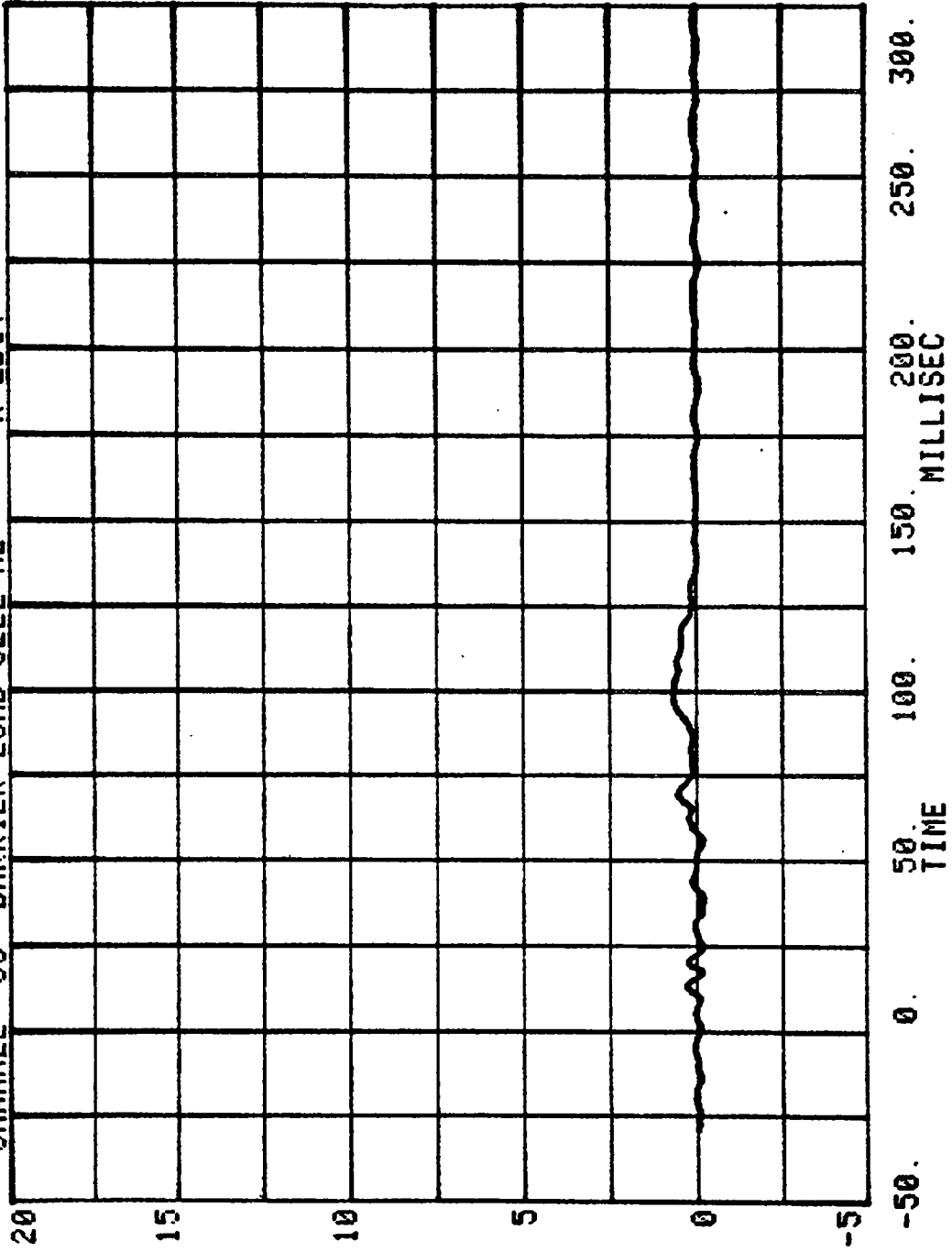
CHANNEL 34 BARRIER LOAD CELL A1

RUN= 598 SERIES= 207

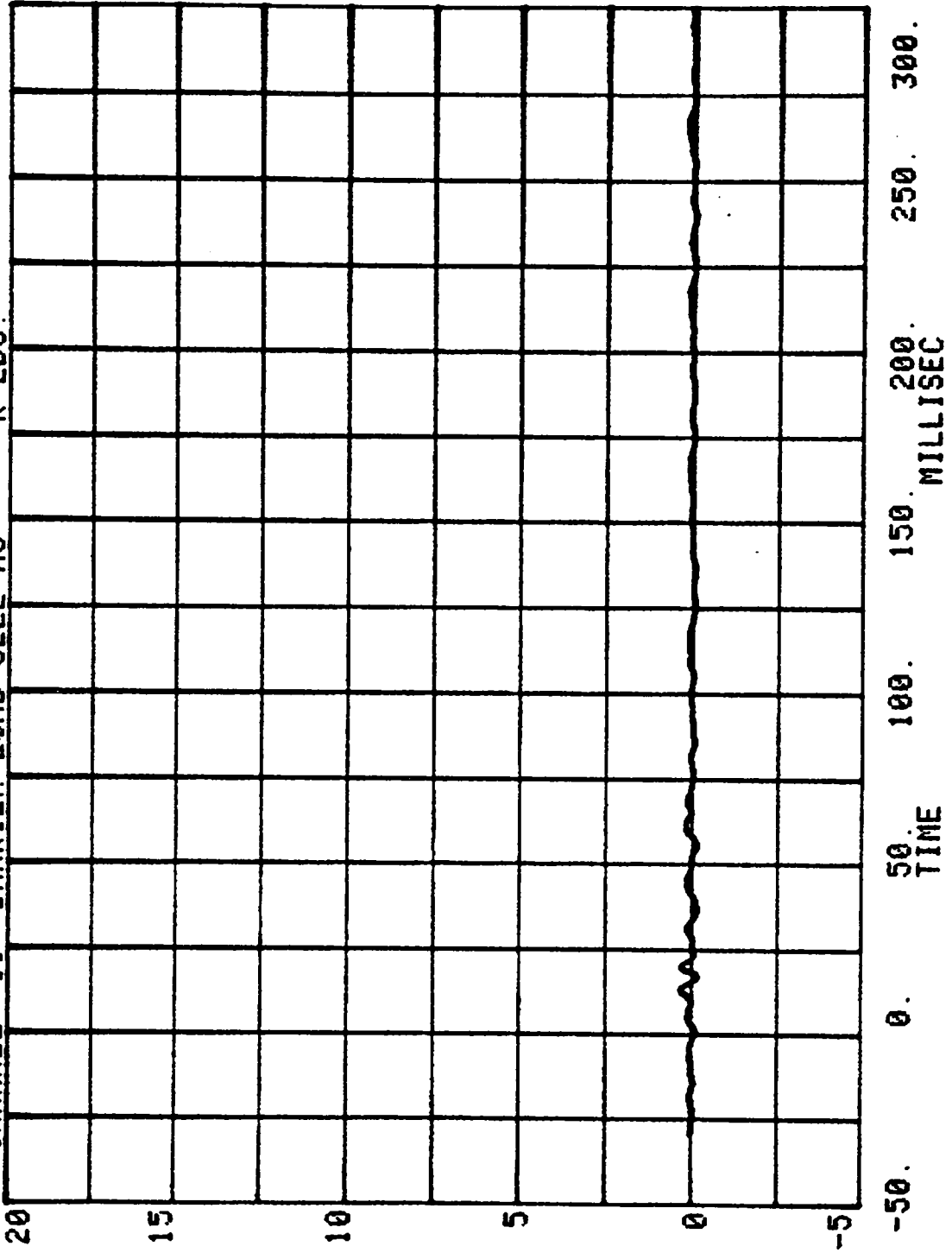
K LBS.



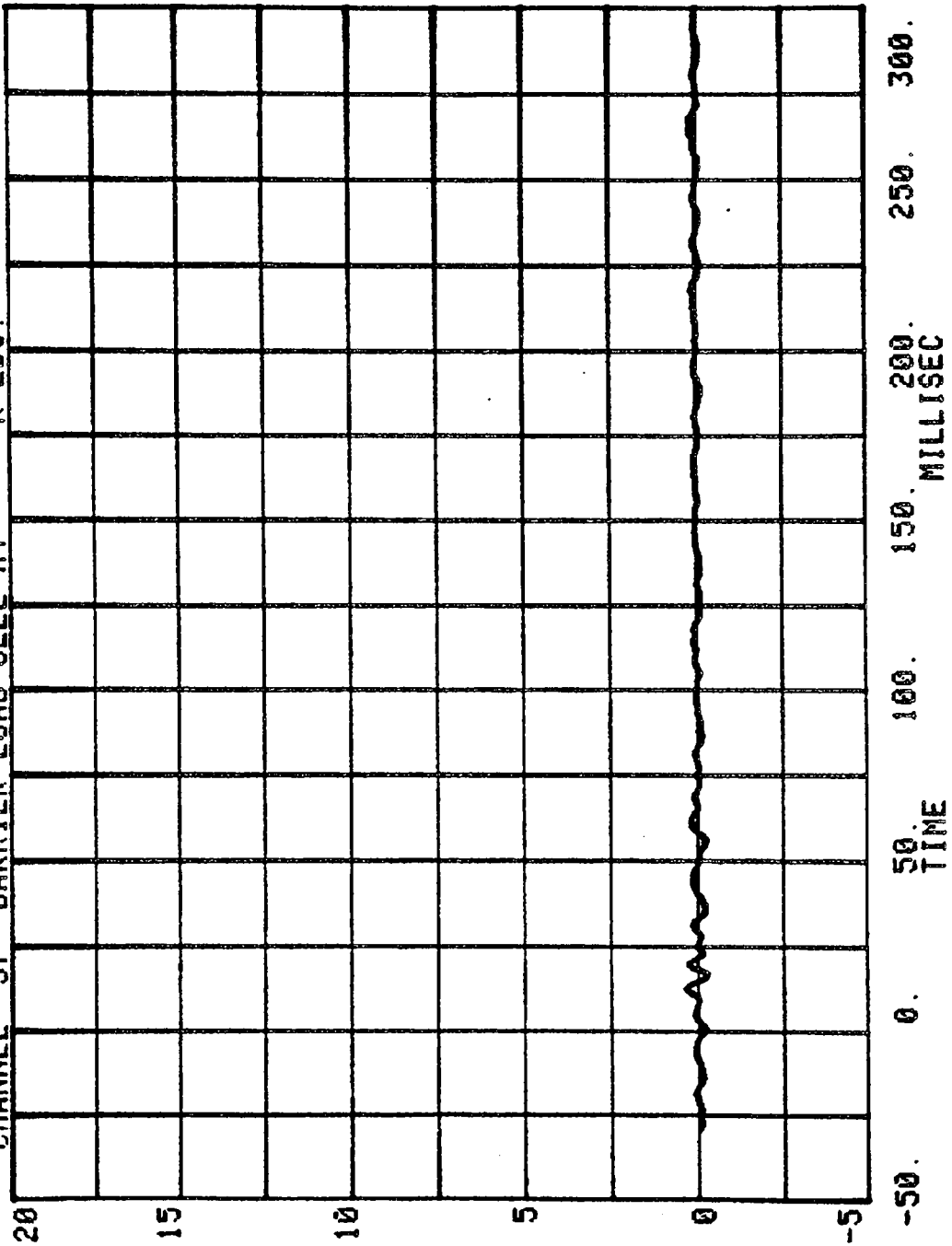
CHANNEL 35 BARRIER LOAD CELL A2  
RUN= 598 SERIES= 207 K LBS.



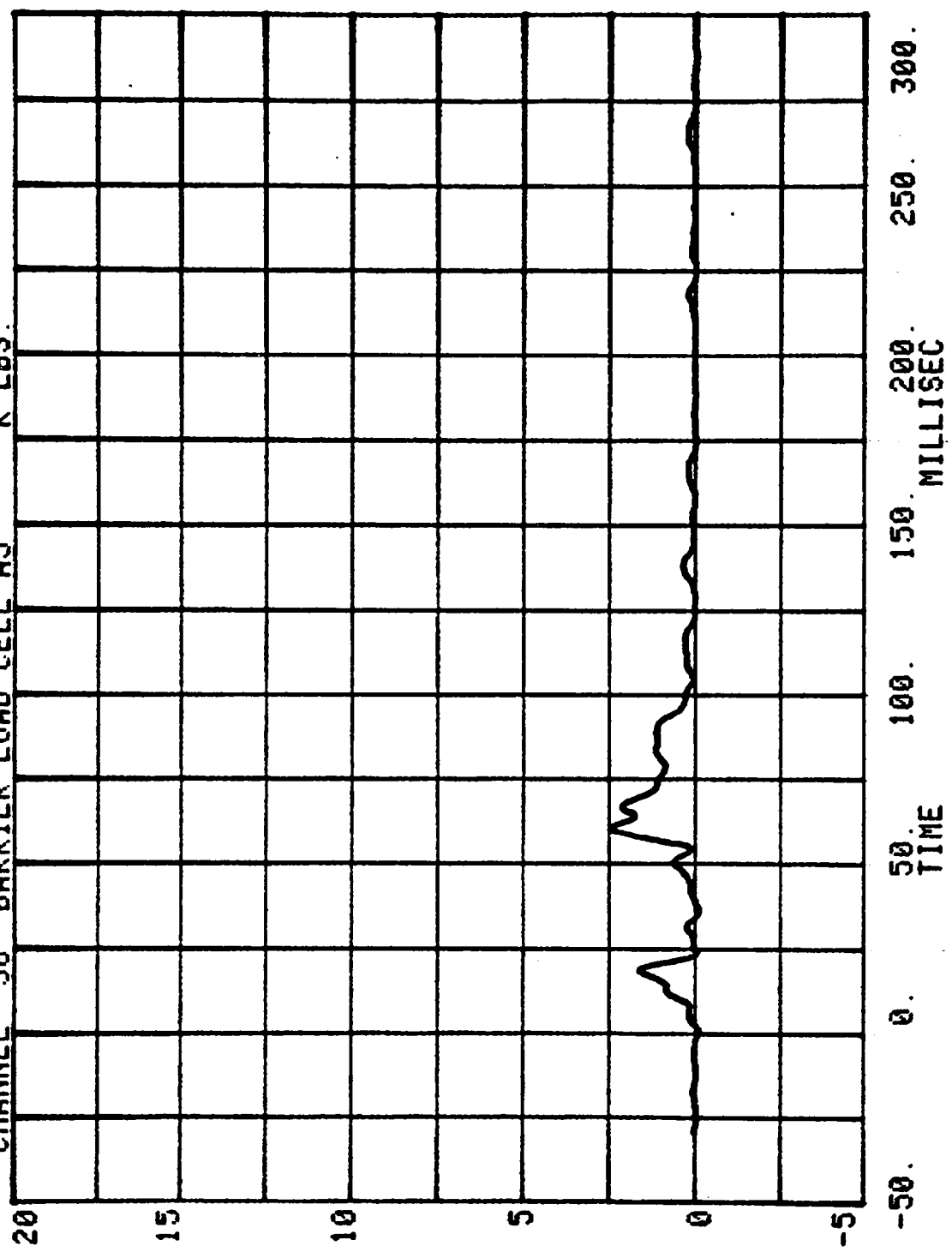
CHANNEL 36 BARRIER LOAD CELL A3 RUN= 598 SERIES= 207 K LBS.



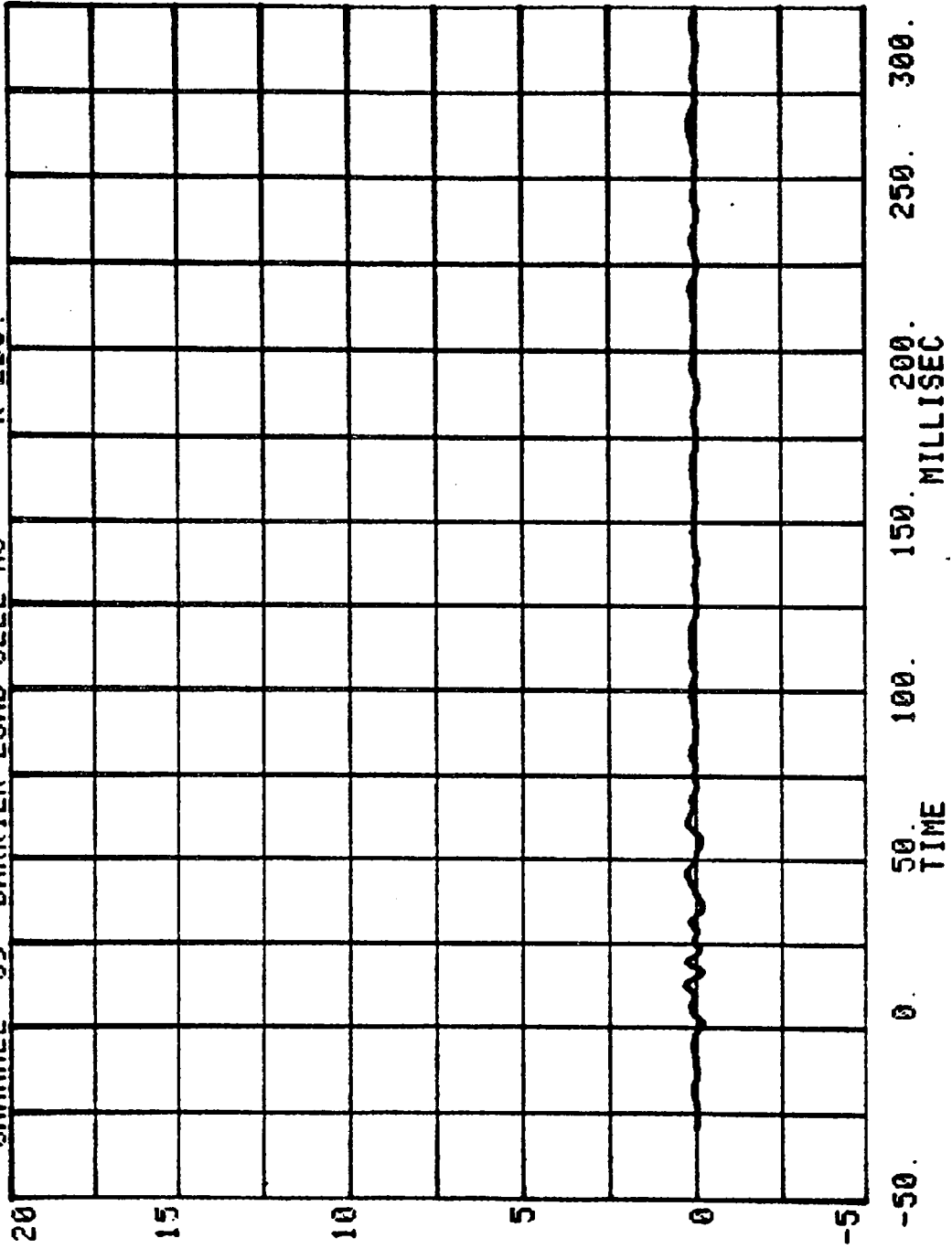
CHANNEL 37 BARRIER LOAD CELL A4  
RUN= 598 SERIES= 207 K LBS.



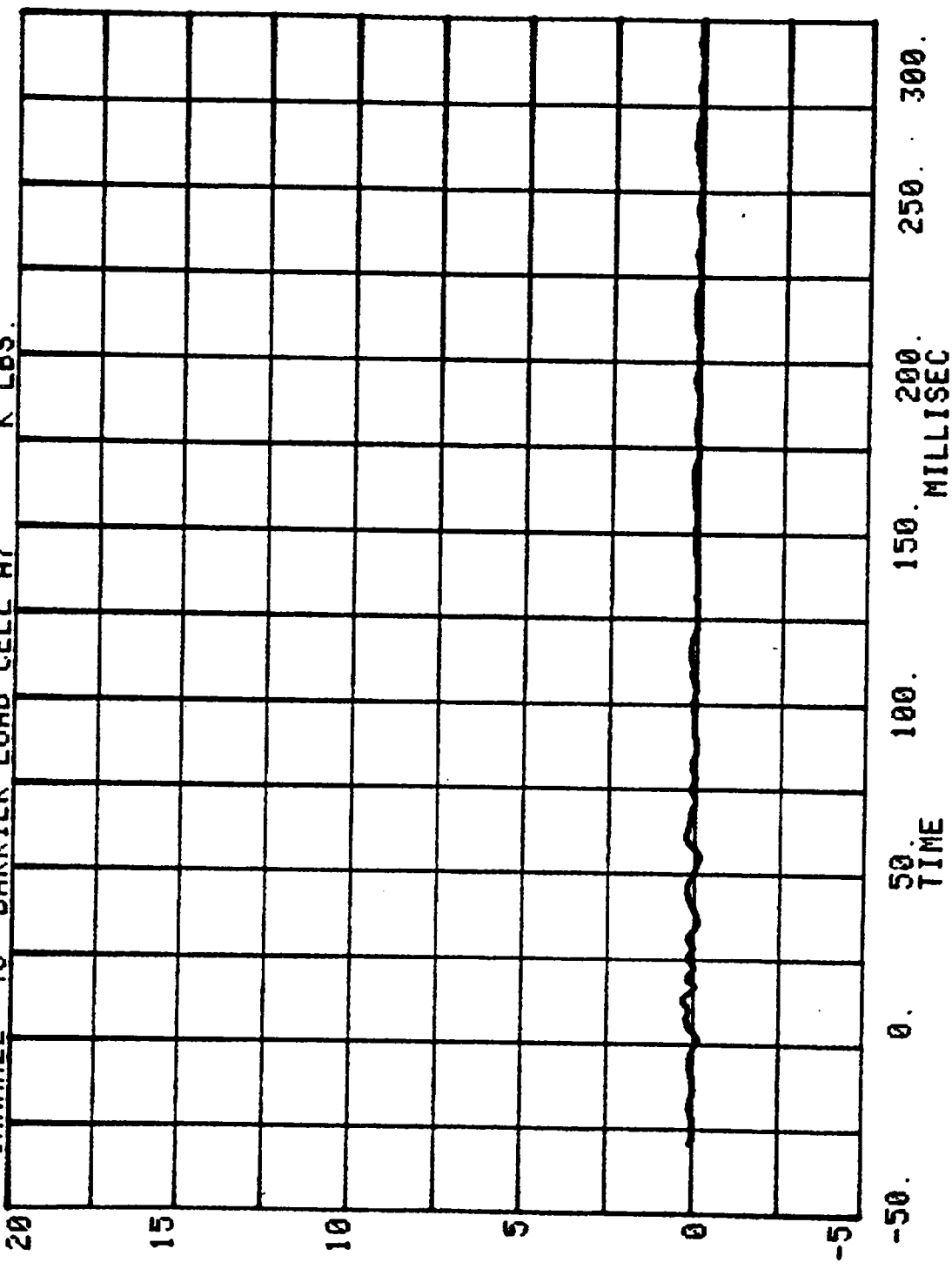
CHANNEL 38 BARRIER LOAD CELL AS  
RUN= 598 SERIES= 207 K LBS.



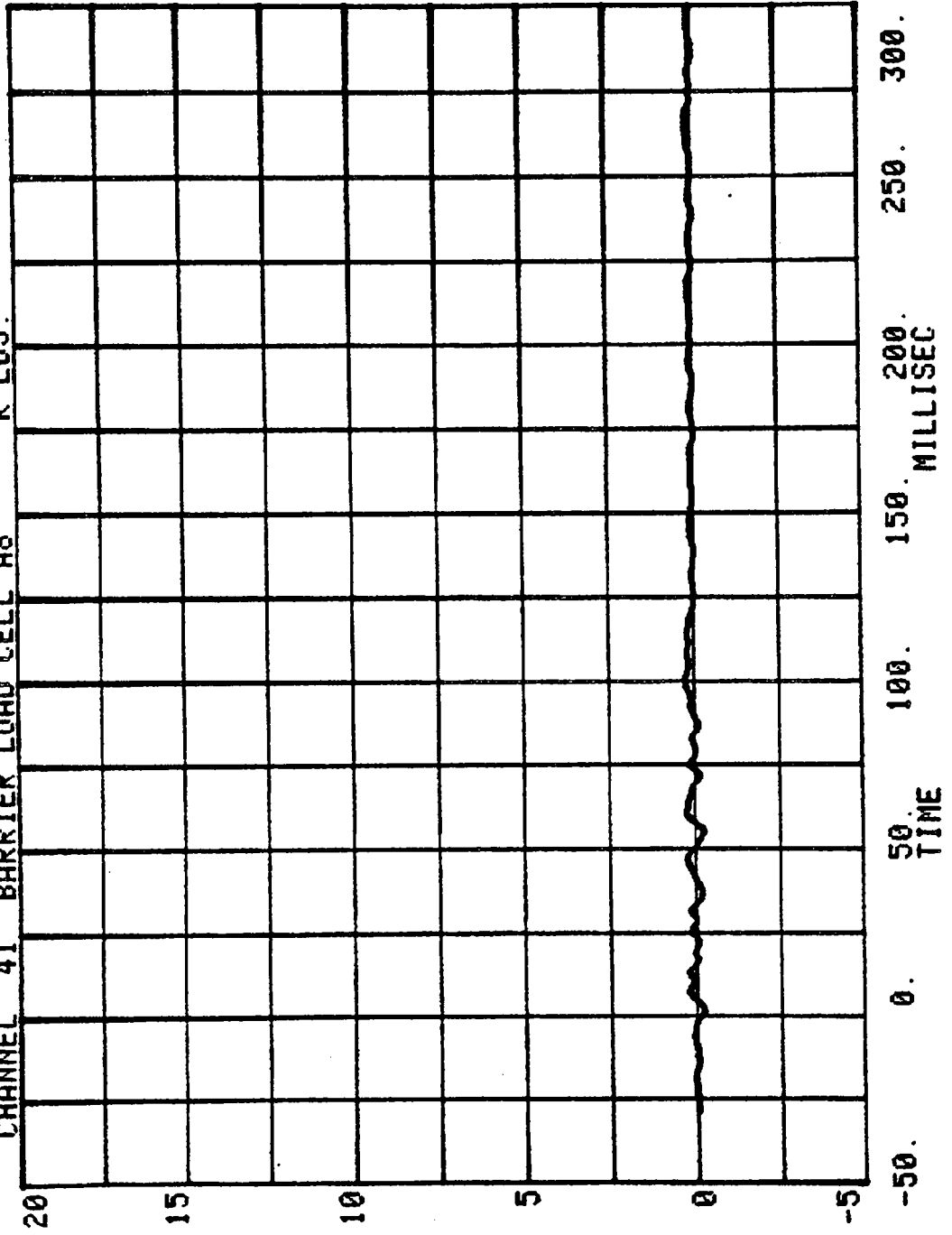
CHANNEL 39 BARRIER LOAD CELL A6  
RUN= 598 SERIES= 207  
K LBS.



CHANNEL 40 BARRIER LOAD CELL A7  
RUN= 598 SERIES= 207 K LBS.

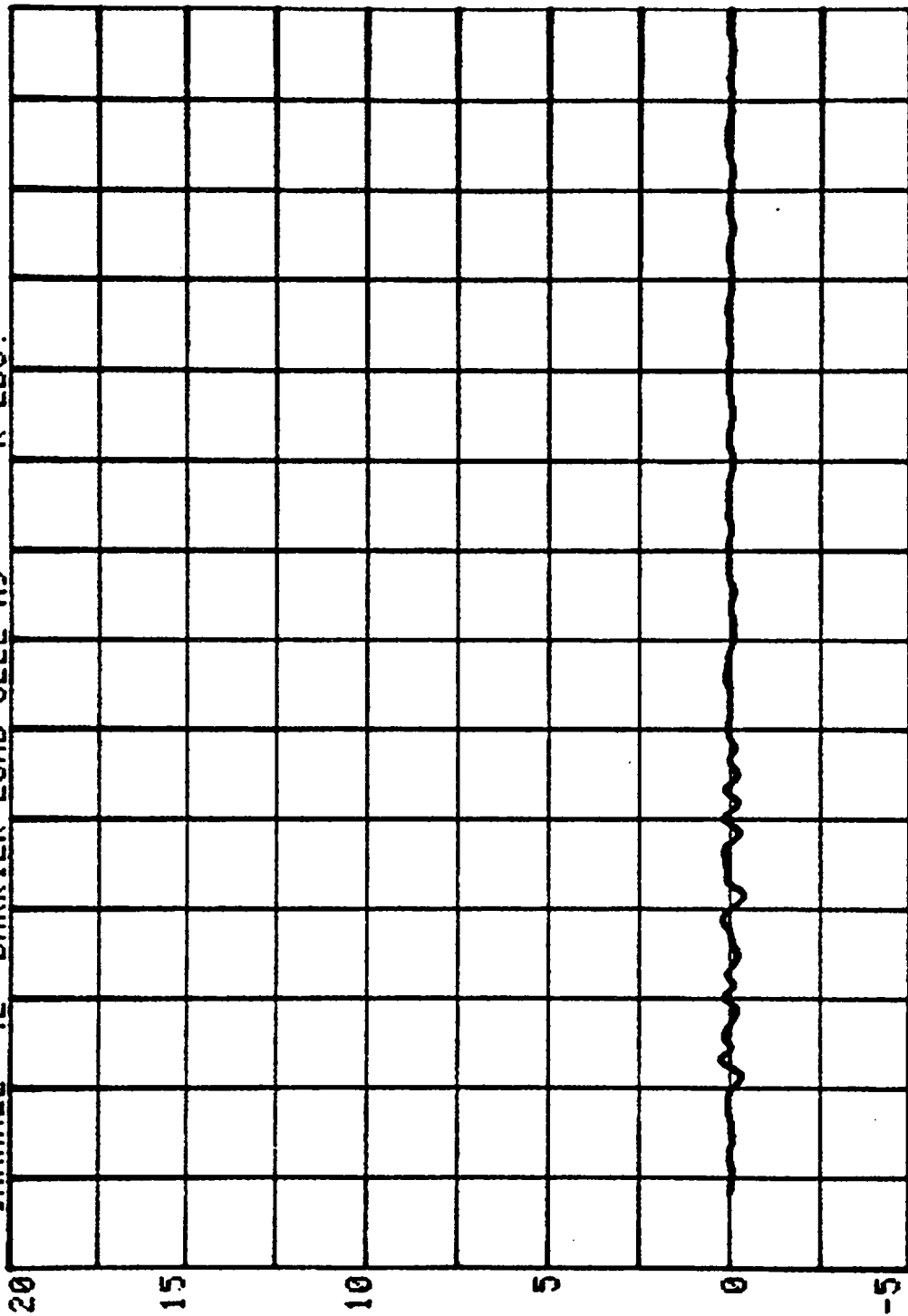


CHANNEL 41 BARRIER LOAD CELL A8 RUN= 598 SERIES= 207 K LBS.

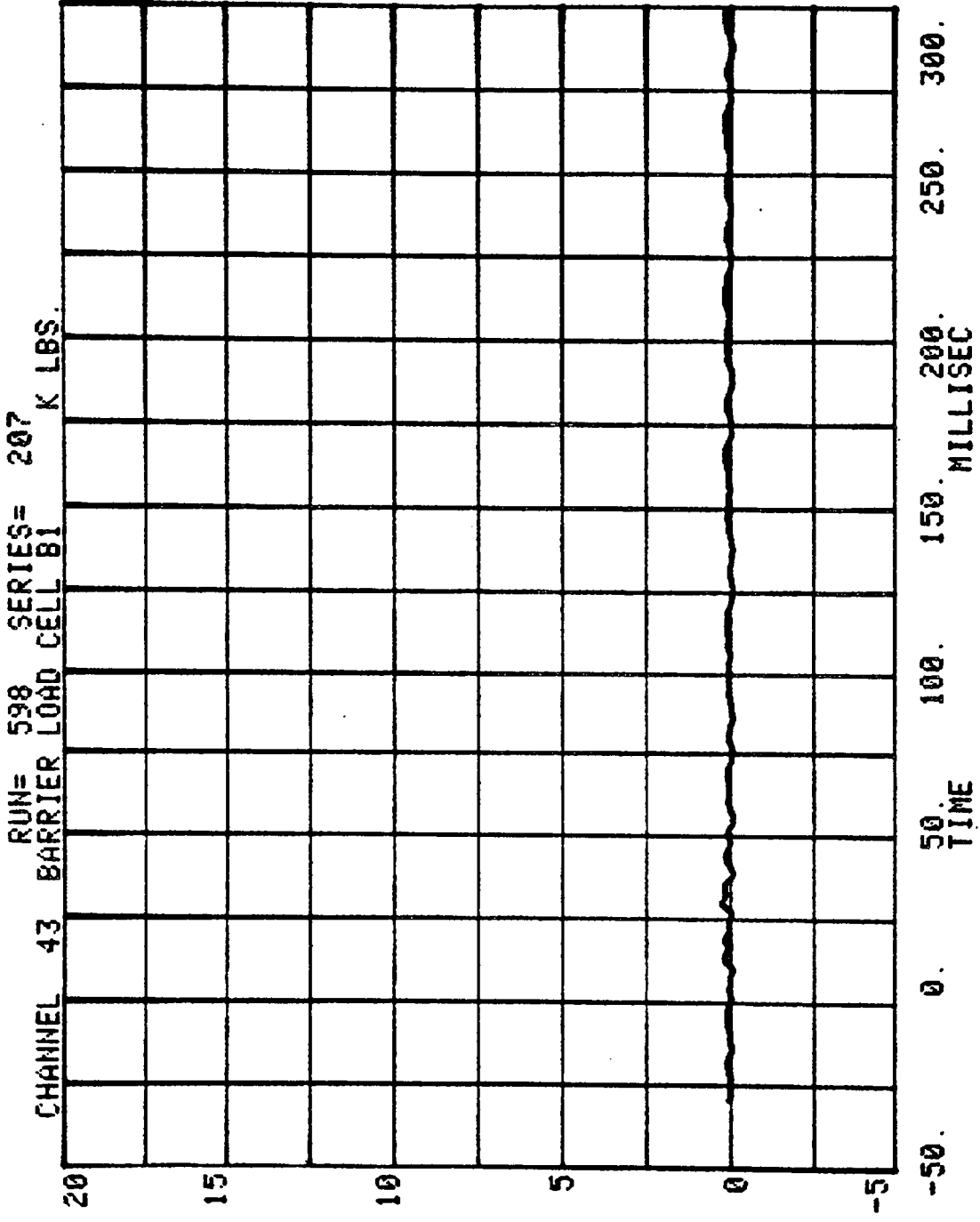


CHANNEL 42 BARRIER LOAD CELL A9 K LBS.

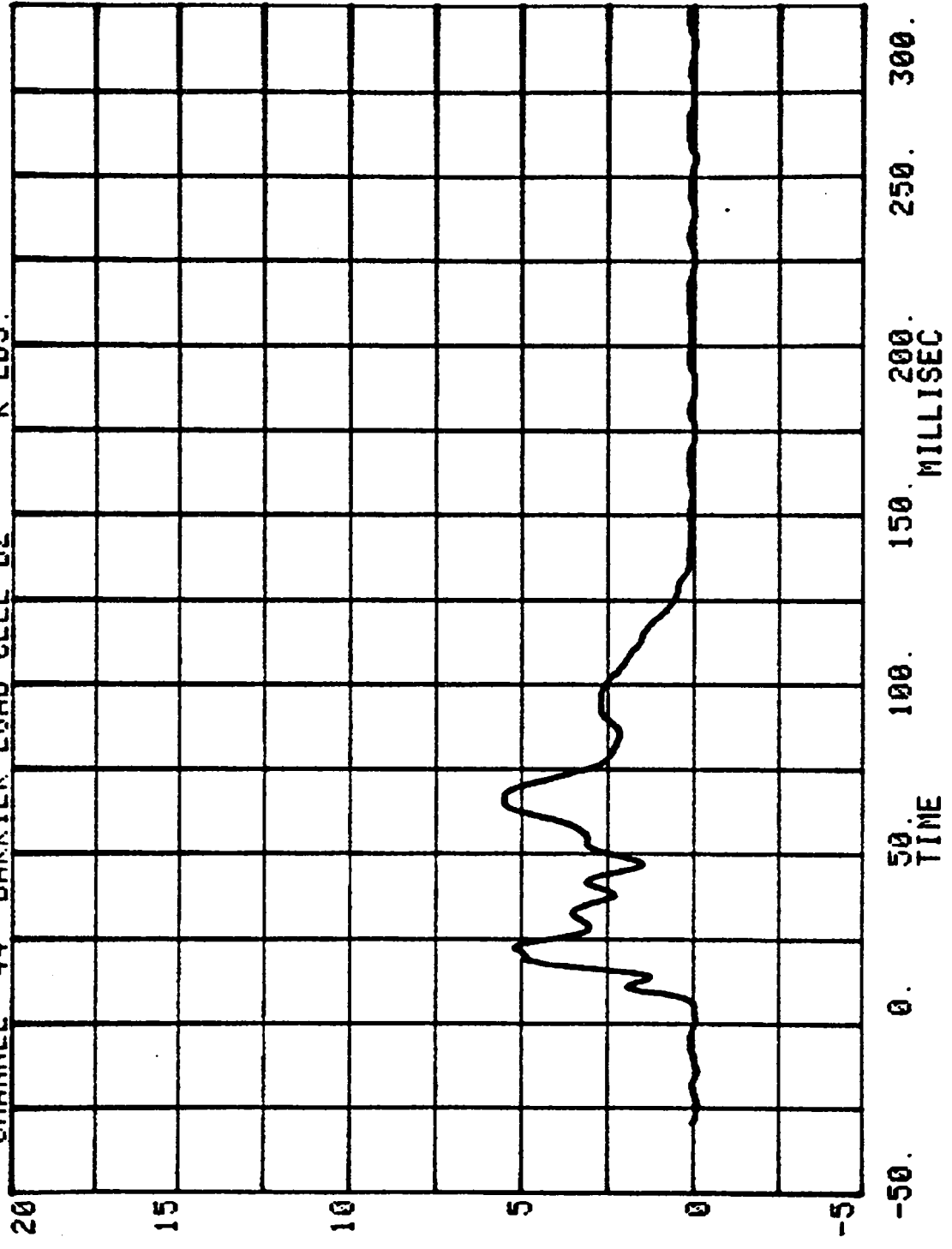
RUN= 598 SERIES= 207



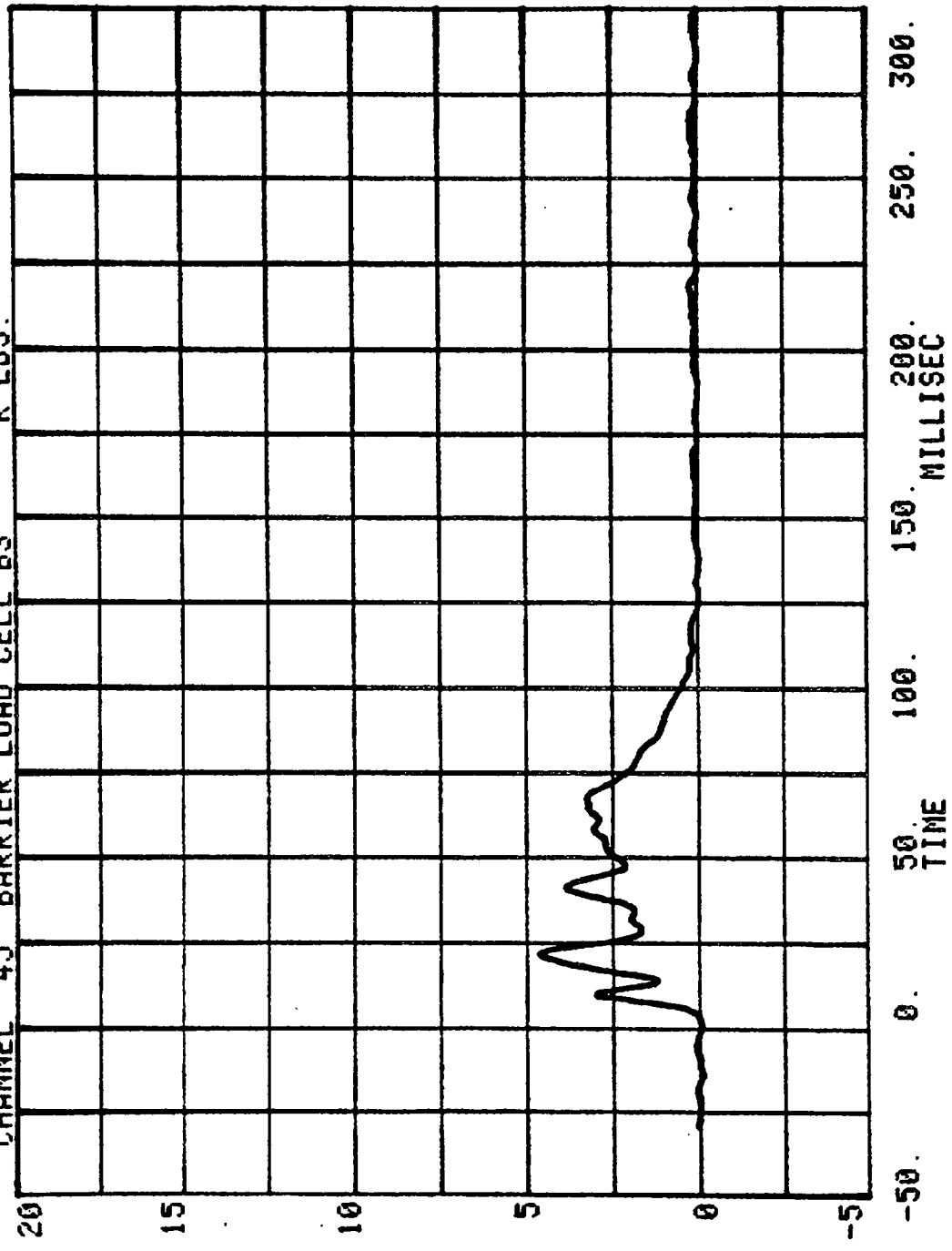
TIME MILLISEC



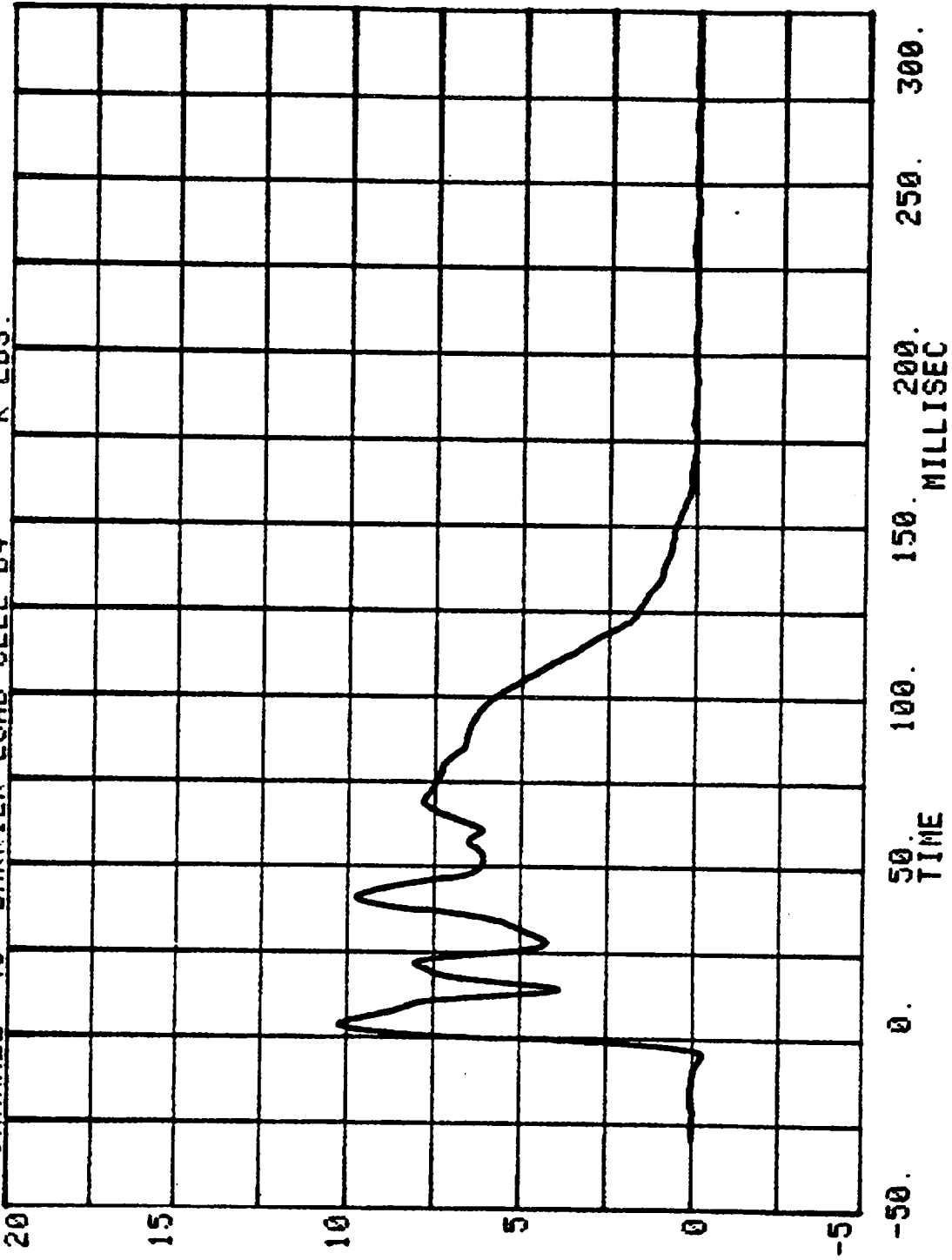
CHANNEL 44 BARRIER LOAD CELL B2  
RUN= 598 SERIES= 207 K LBS.



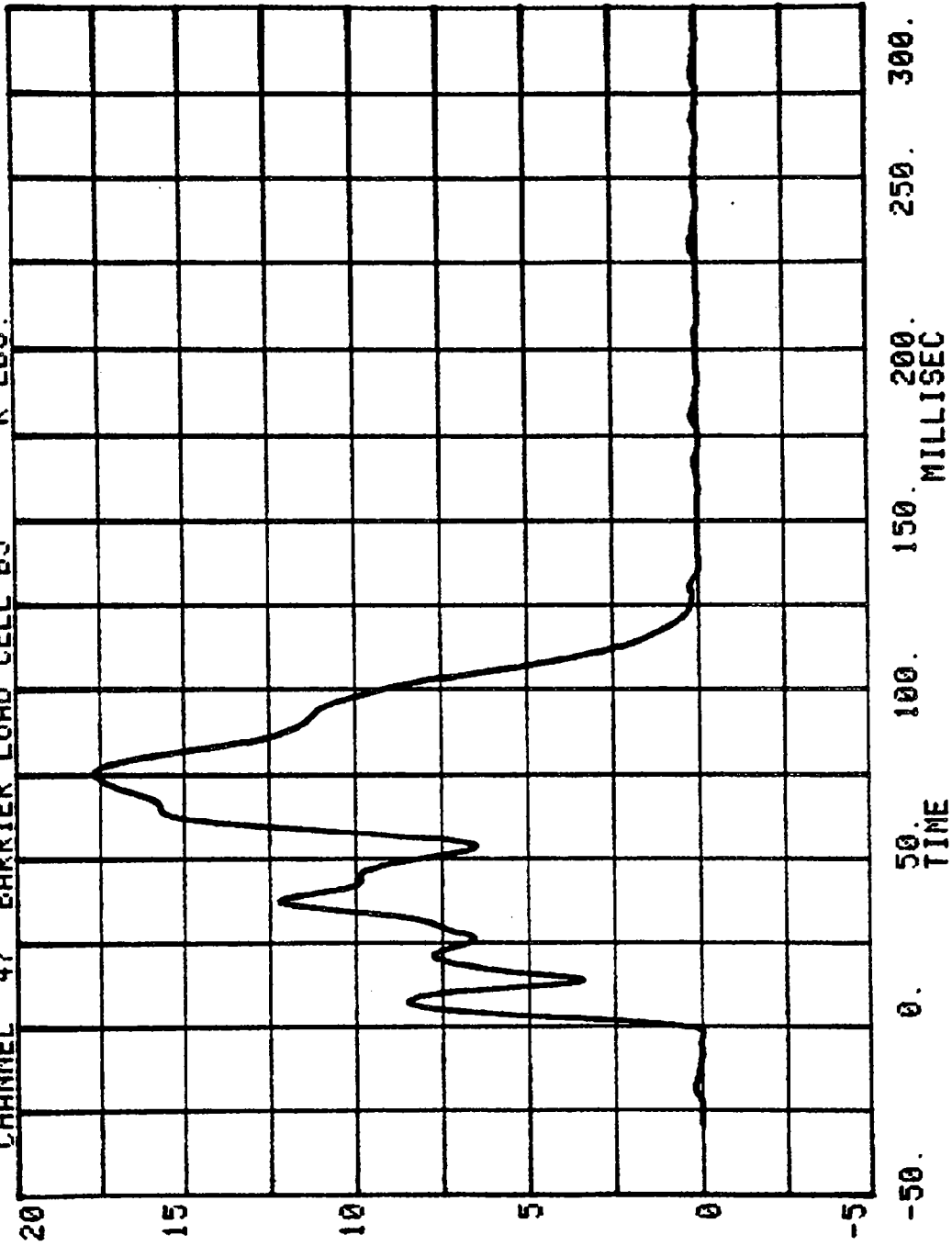
CHANNEL 45 BARRIER LOAD CELL B3  
RUN= 598 SERIES= 207  
K LBS.



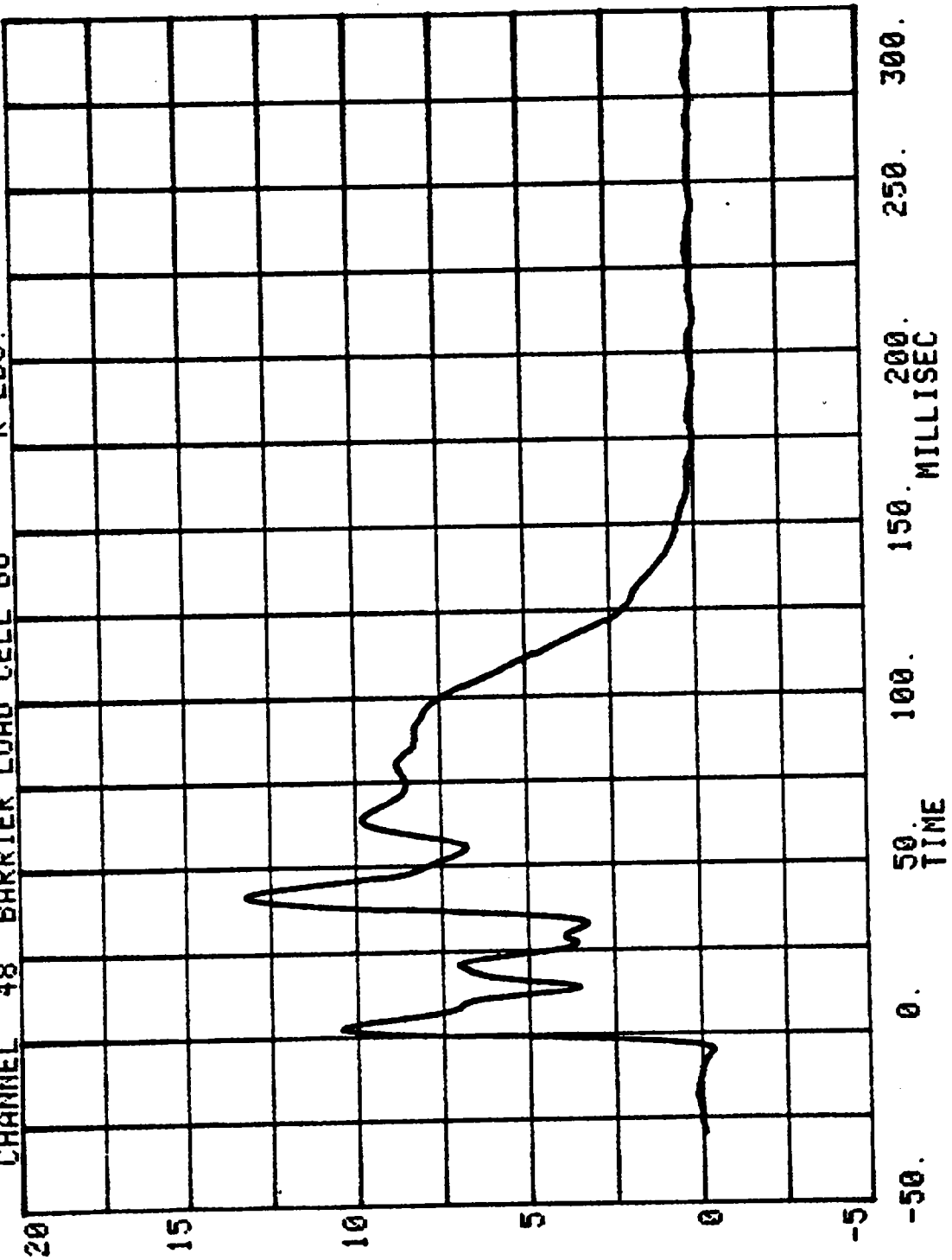
CHANNEL 46 BARRIER LOAD CELL B4  
RUN= 598 SERIES= 207 K LBS.



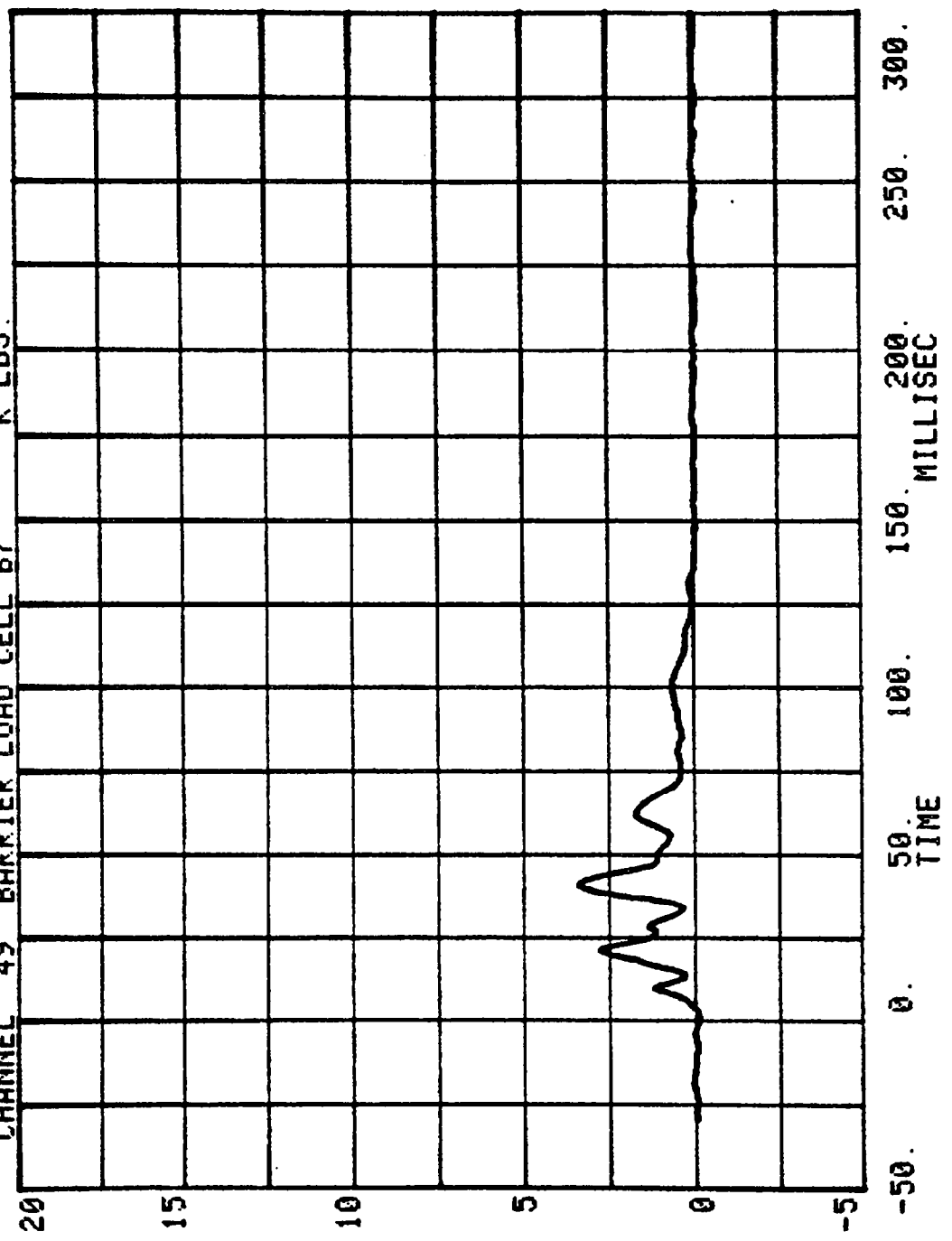
CHANNEL 47 BARRIER LOAD CELL B5  
RUN= 598 SERIES= 207 K LBS.



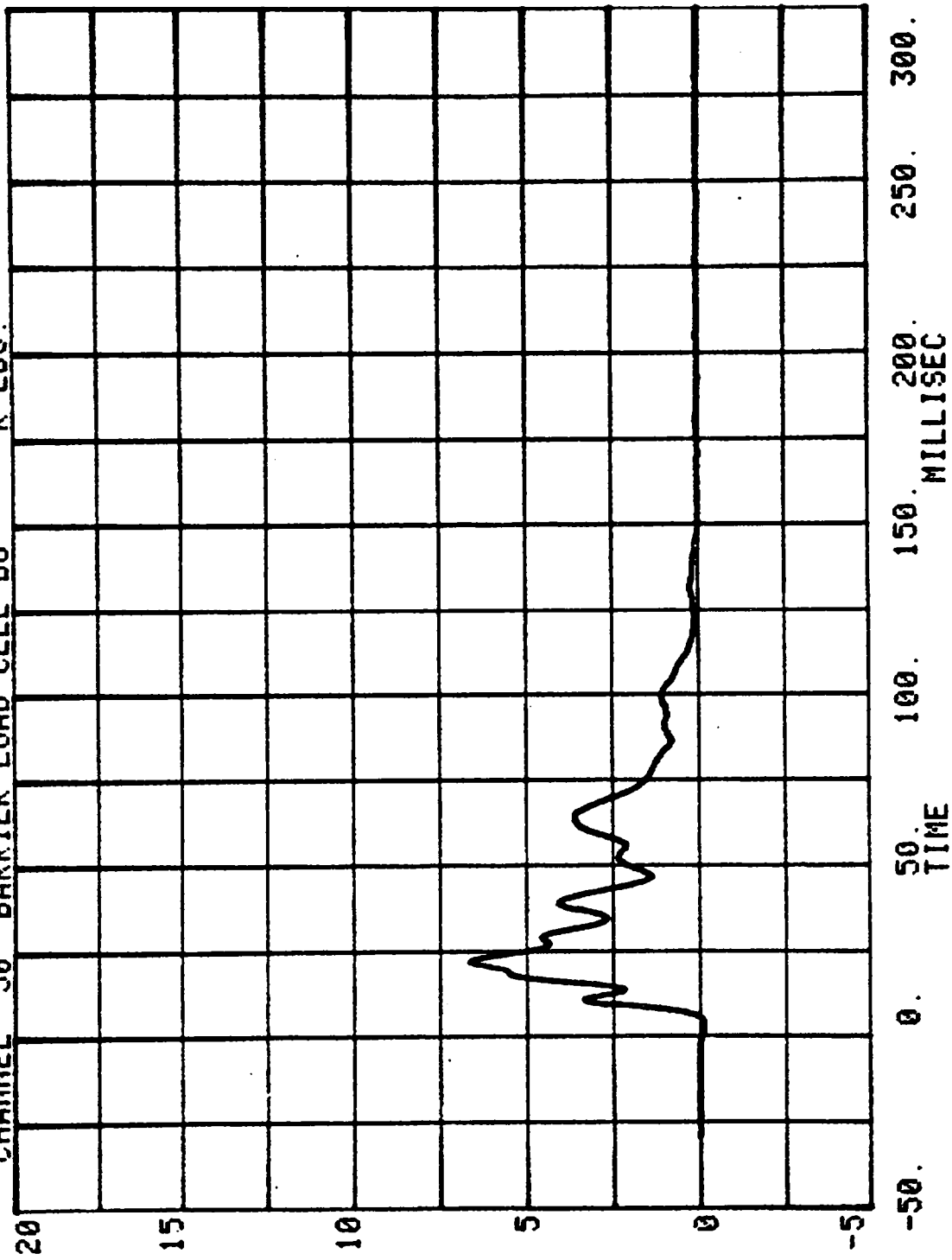
CHANNEL 48 BARRIER LOAD CELL B6 RUN= 598 SERIES= 207 K LBS.

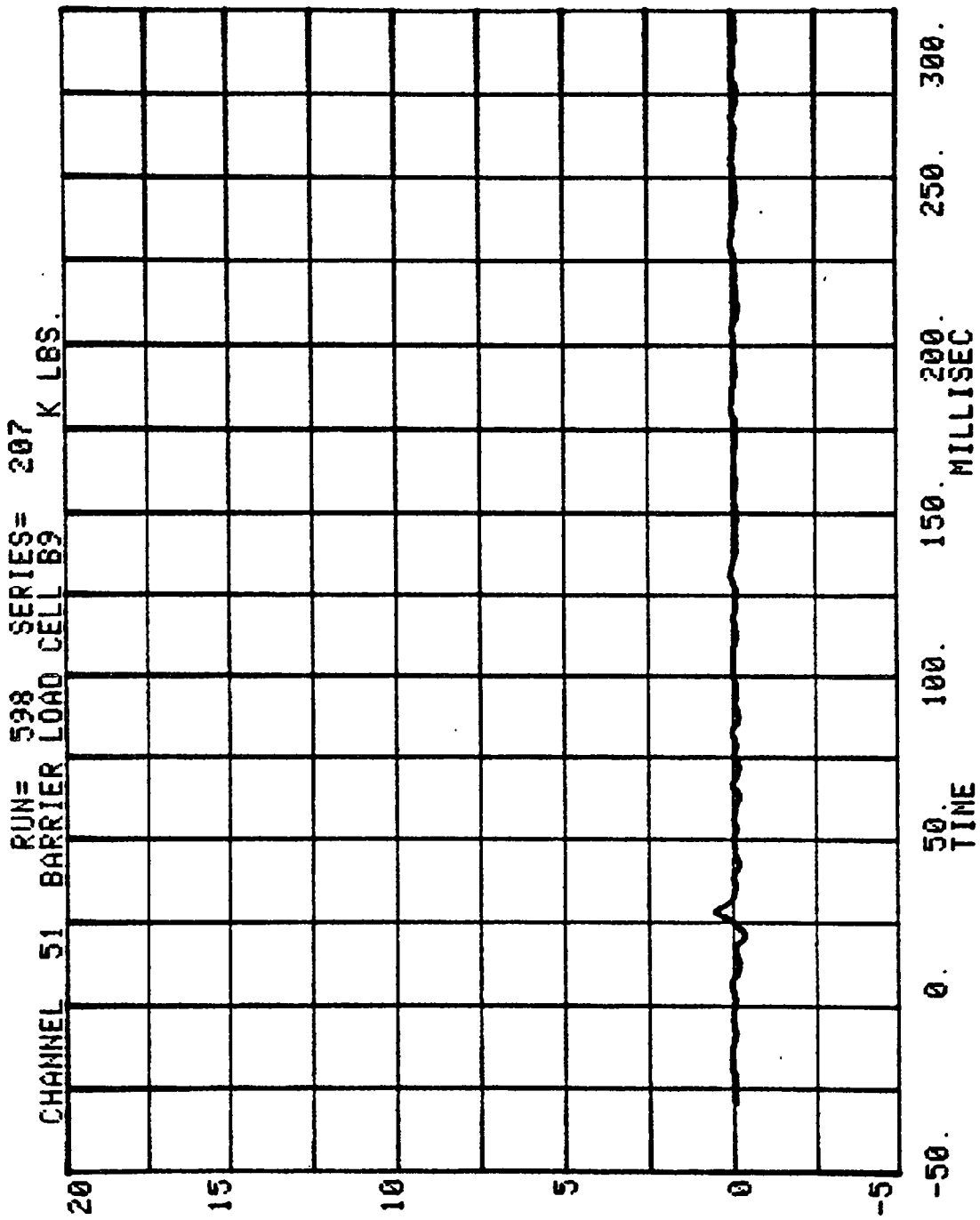


CHANNEL 49 BARRIER LOAD CELL B7  
RUN= 598 SERIES= 207  
K LBS.

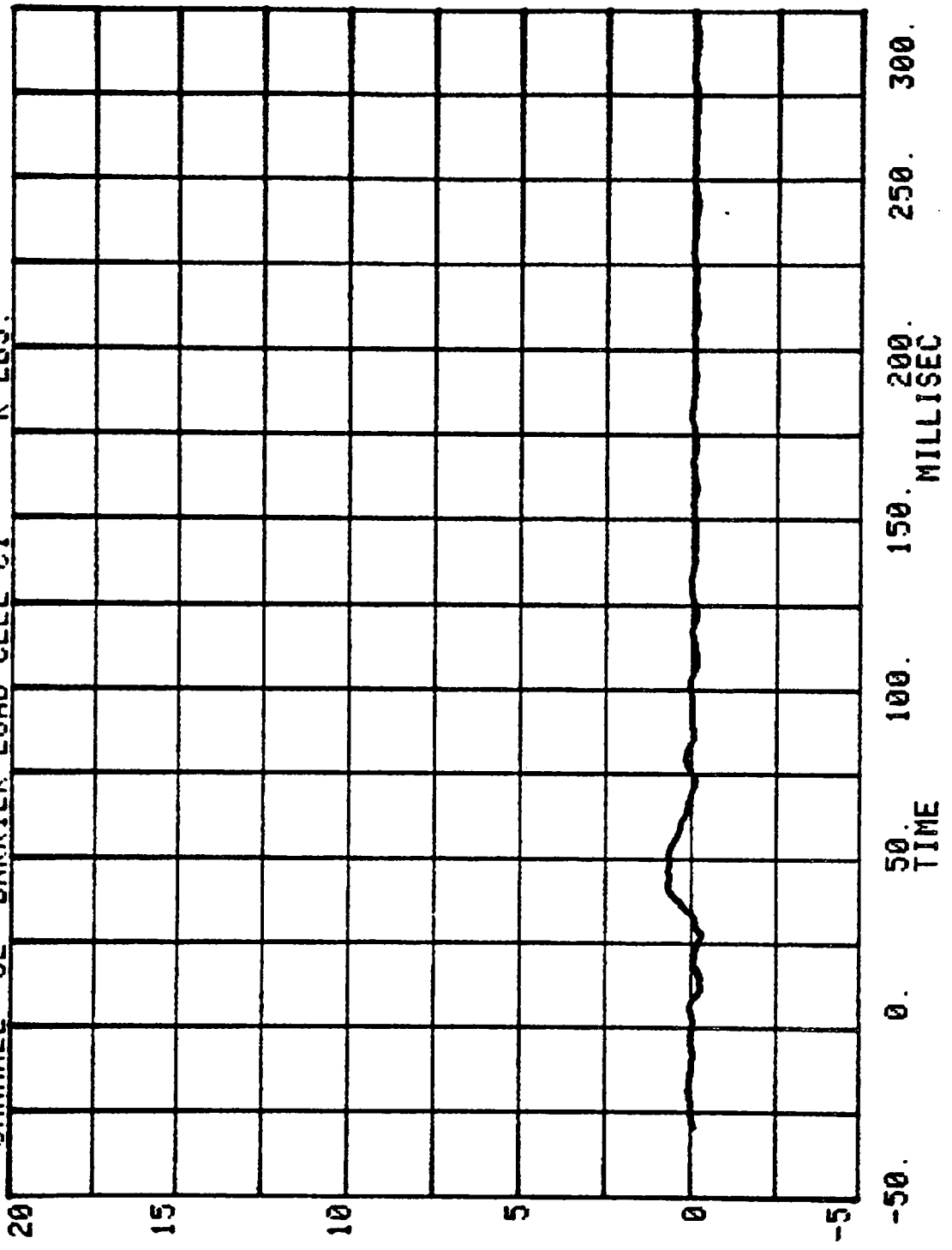


CHANNEL 50 BARRIER LOAD CELL B8 RUN= 598 SERIES= 207 K LBS.

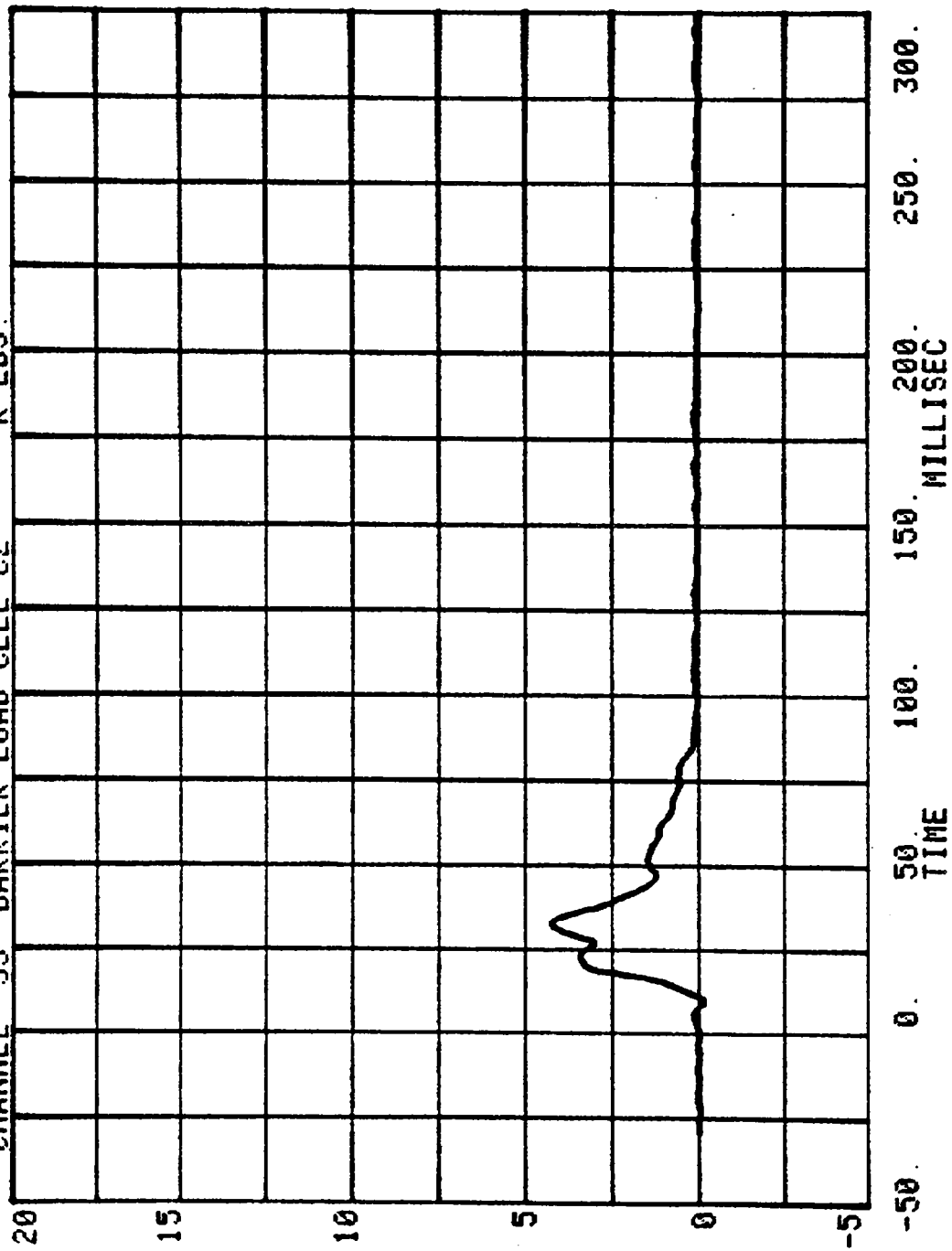




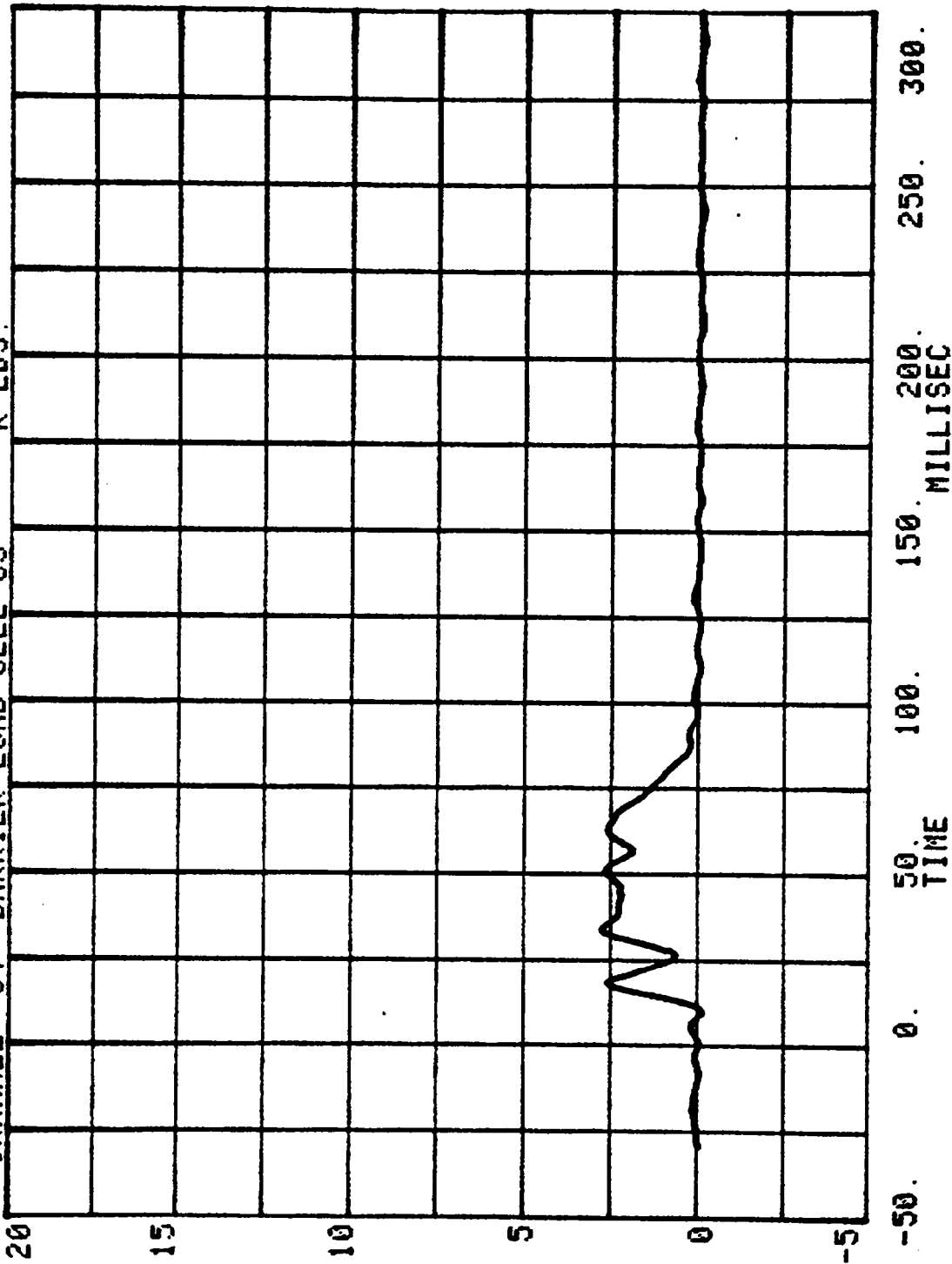
CHANNEL 52 BARRIER LOAD CELL C1  
RUN= 598 SERIES= 207  
K LBS.



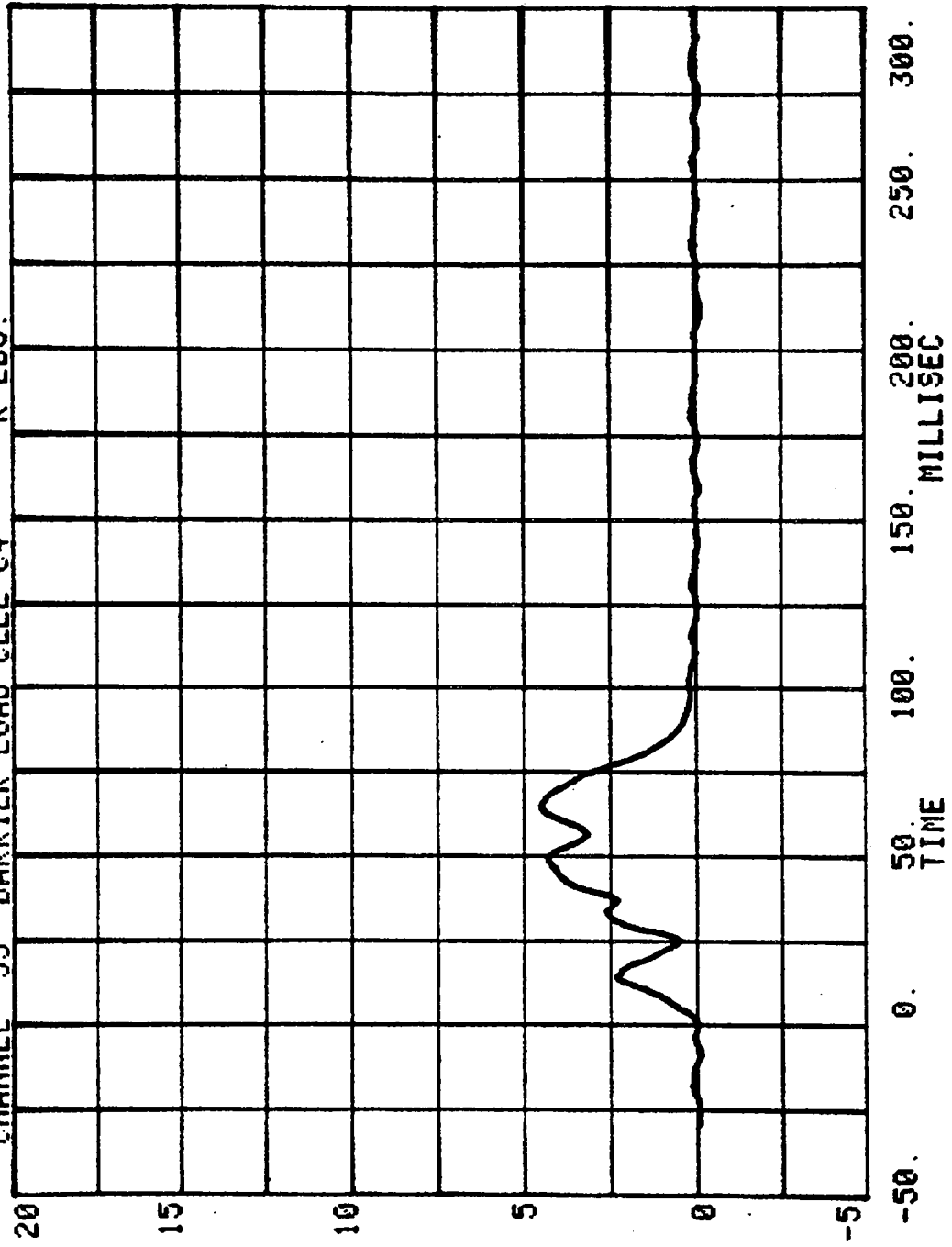
CHANNEL 53 BARRIER LOAD CELL C2  
RUN= 598 SERIES= 207 K LBS.



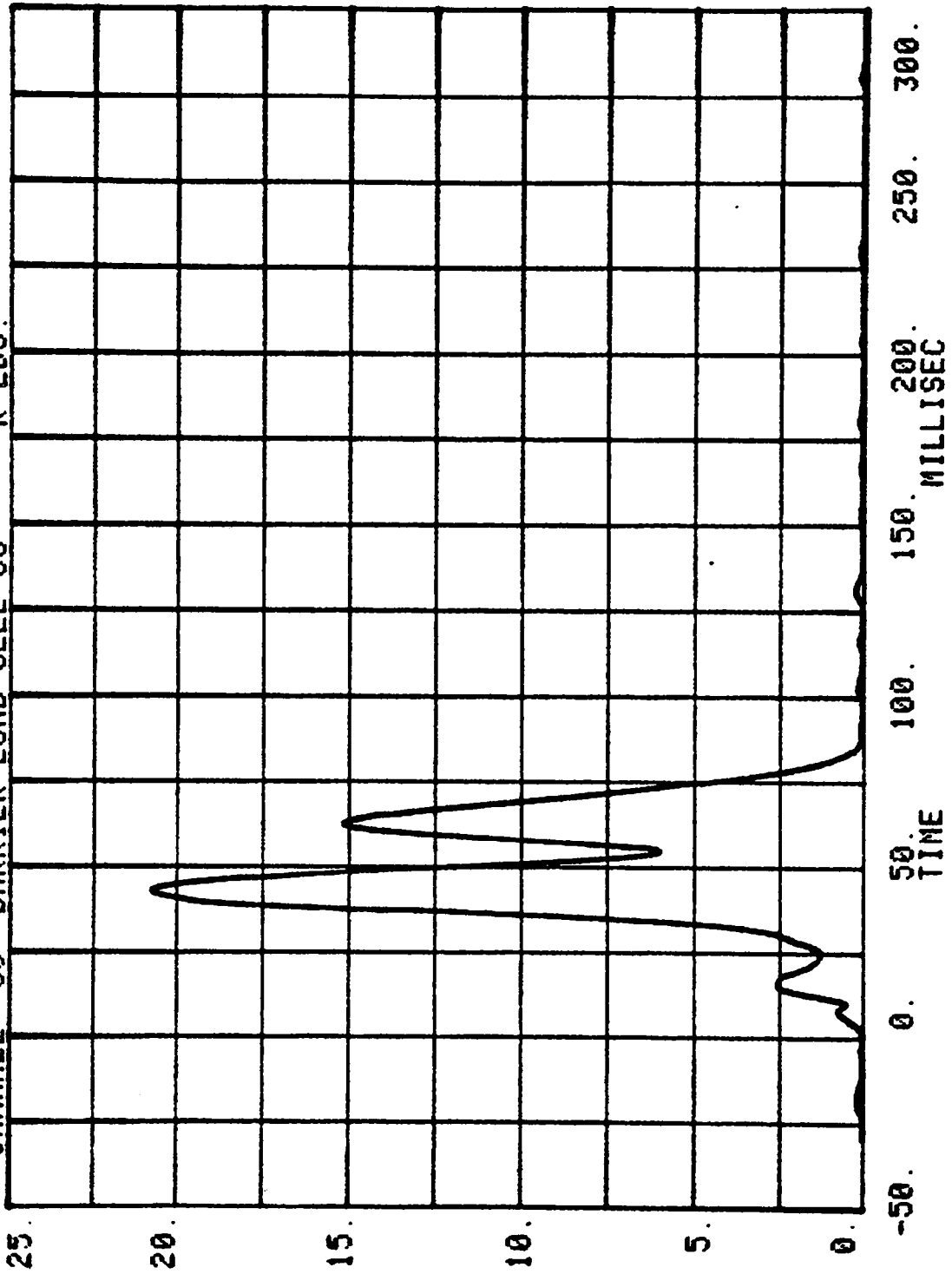
CHANNEL 54 BARRIER LOAD CELL C3  
RUN= 598 SERIES= 207 K LBS.



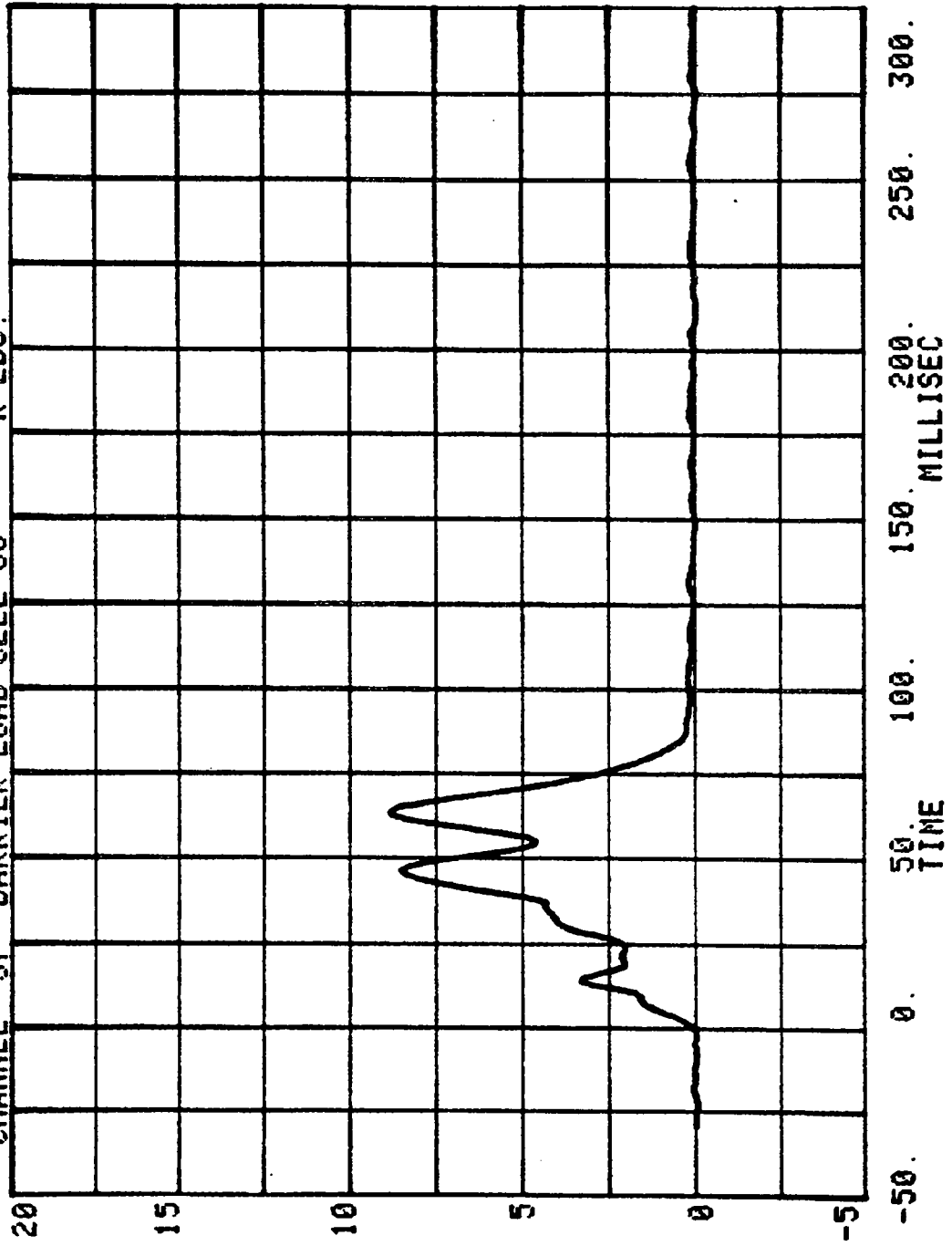
CHANNEL 55 BARRIER LOAD CELL C4 K LBS.  
RUN= 598 SERIES= 207



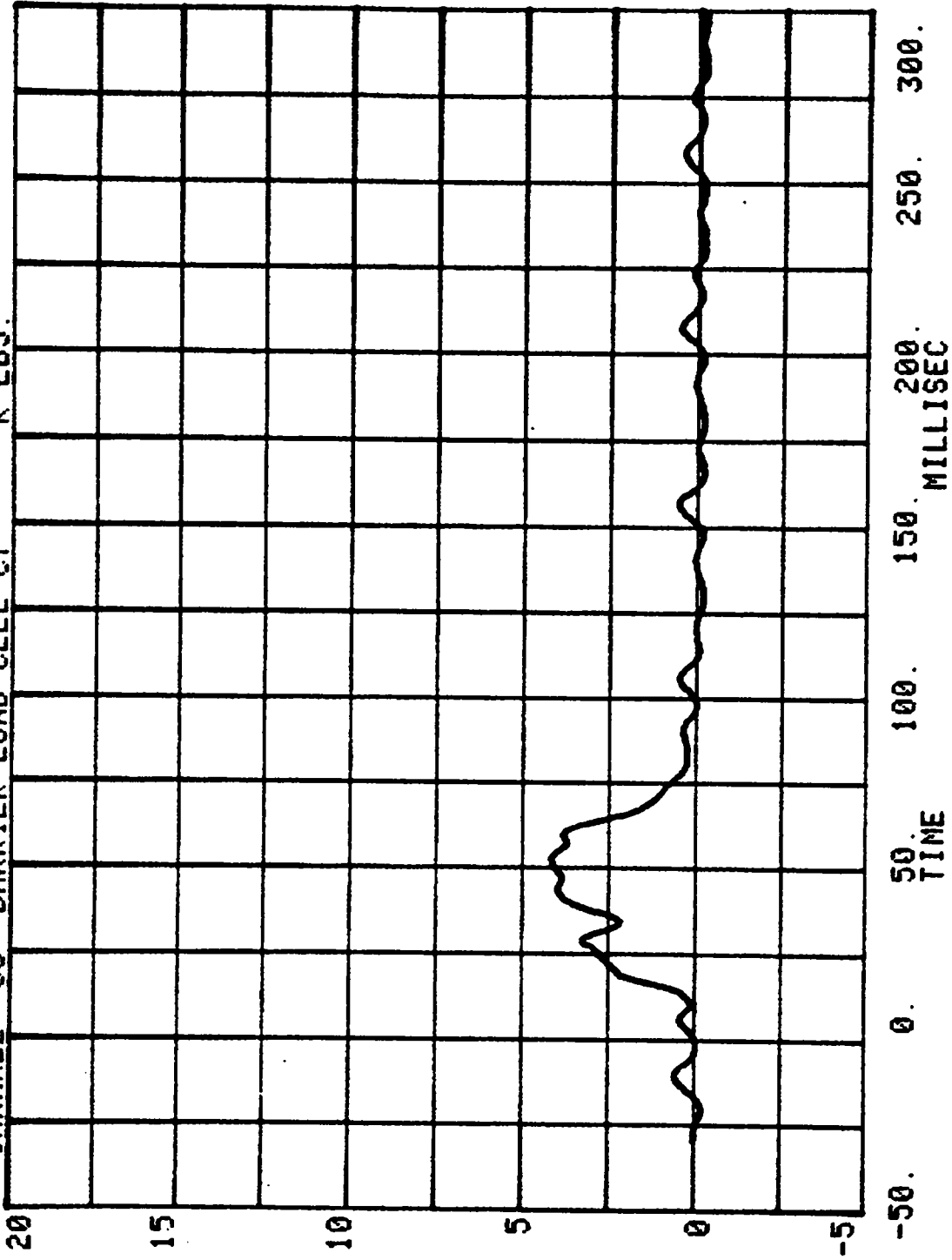
CHANNEL 56 BARRIER LOAD CELL C5 RUN= 598 SERIES= 207 K LBS.



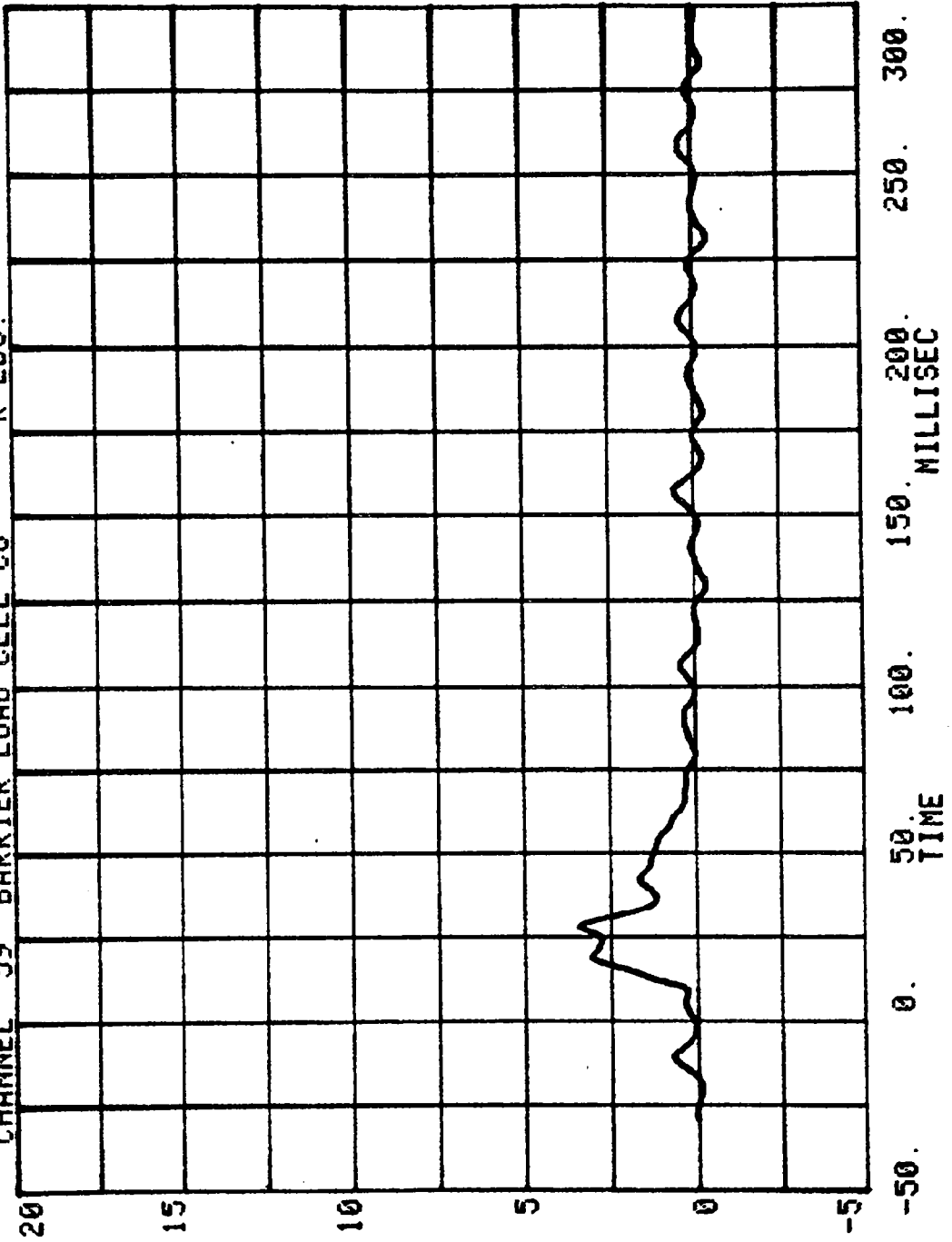
CHANNEL 57 BARRIER LOAD CELL C6  
RUN= 598 SERIES= 207 K LBS.



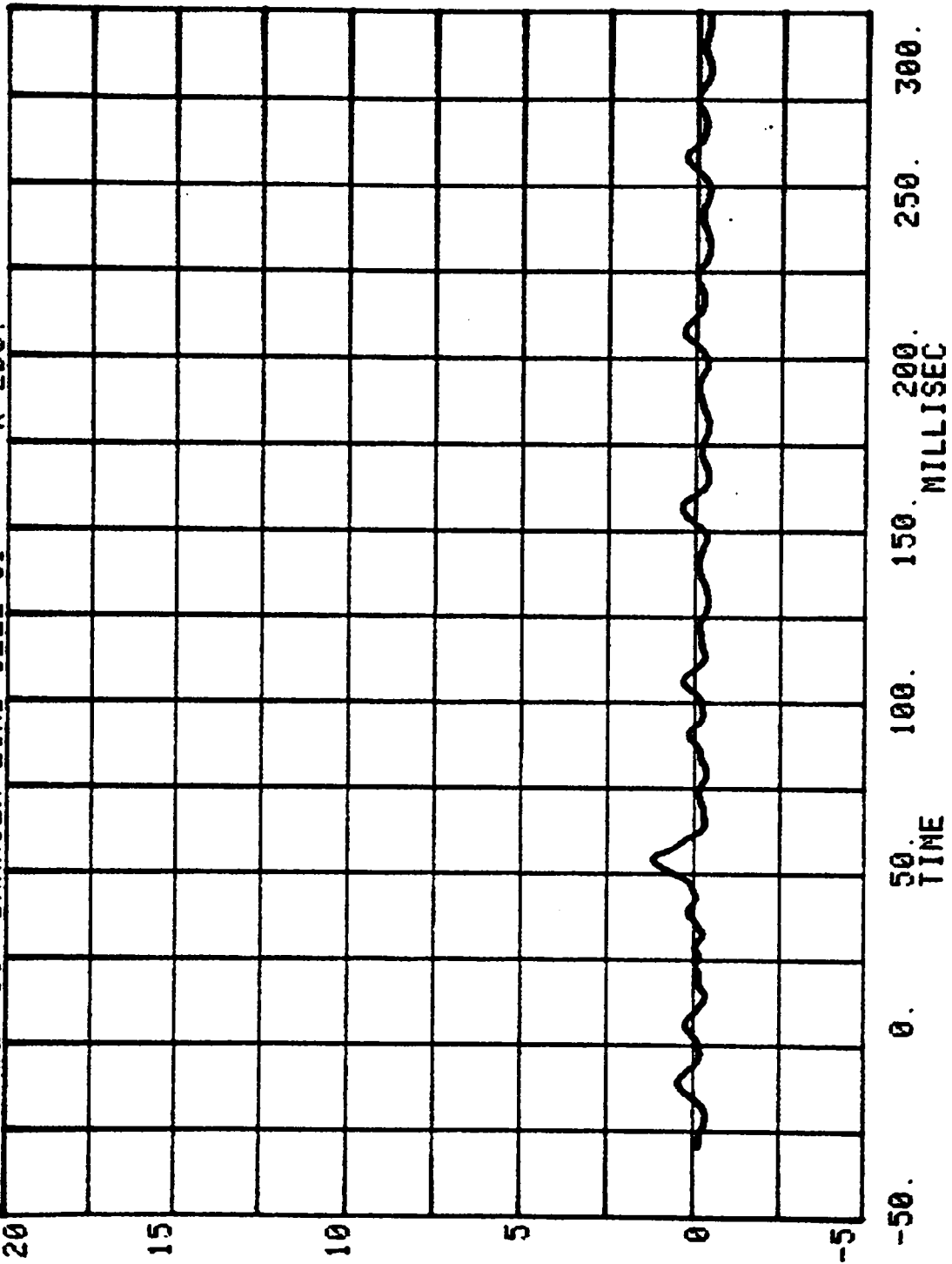
CHANNEL 58 BARRIER LOAD CELL C7  
RUN= 598 SERIES= 207 K LBS.



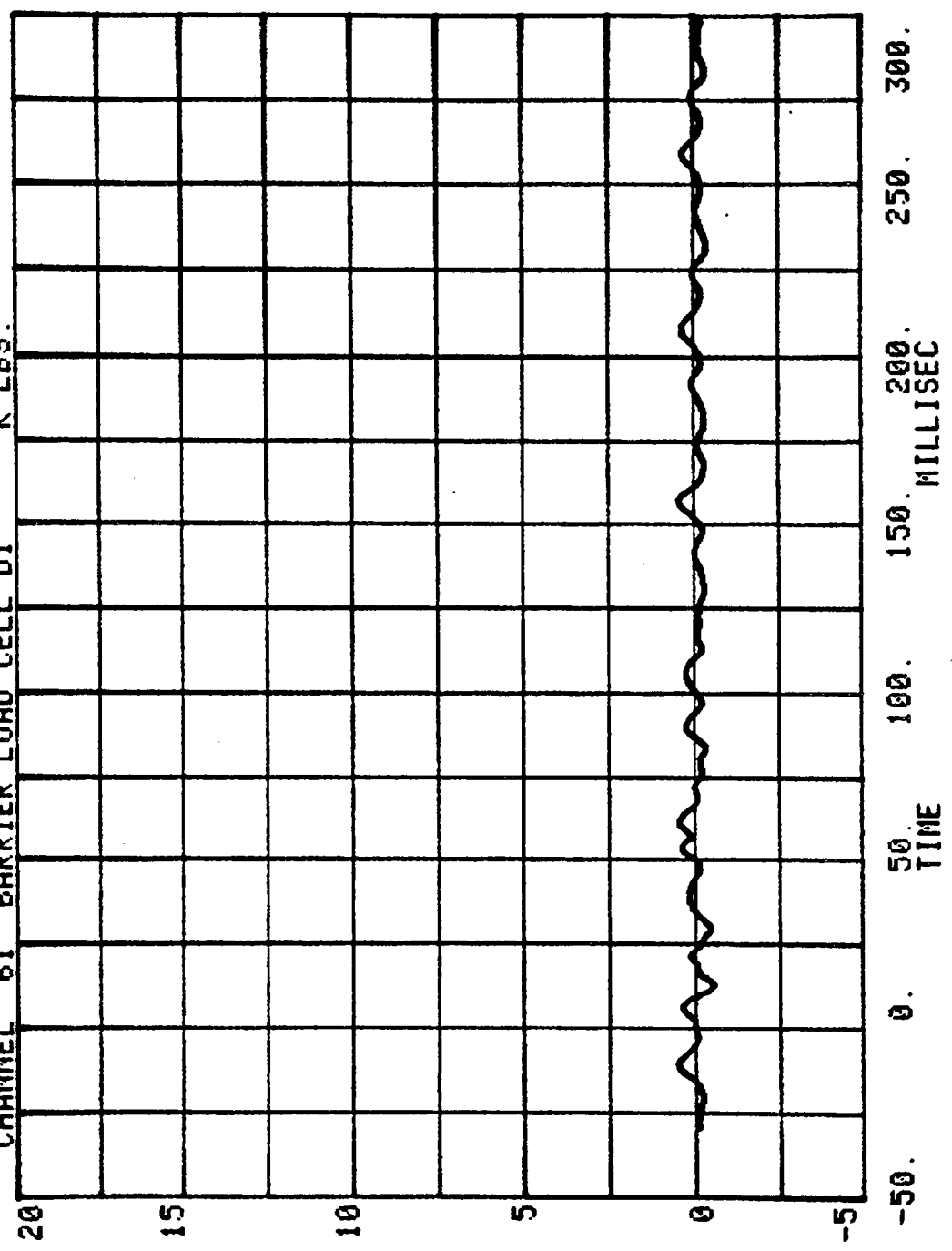
CHANNEL 59 BARRIER LOAD CELL C8 K LBS.  
RUN= 598 SERIES= 207



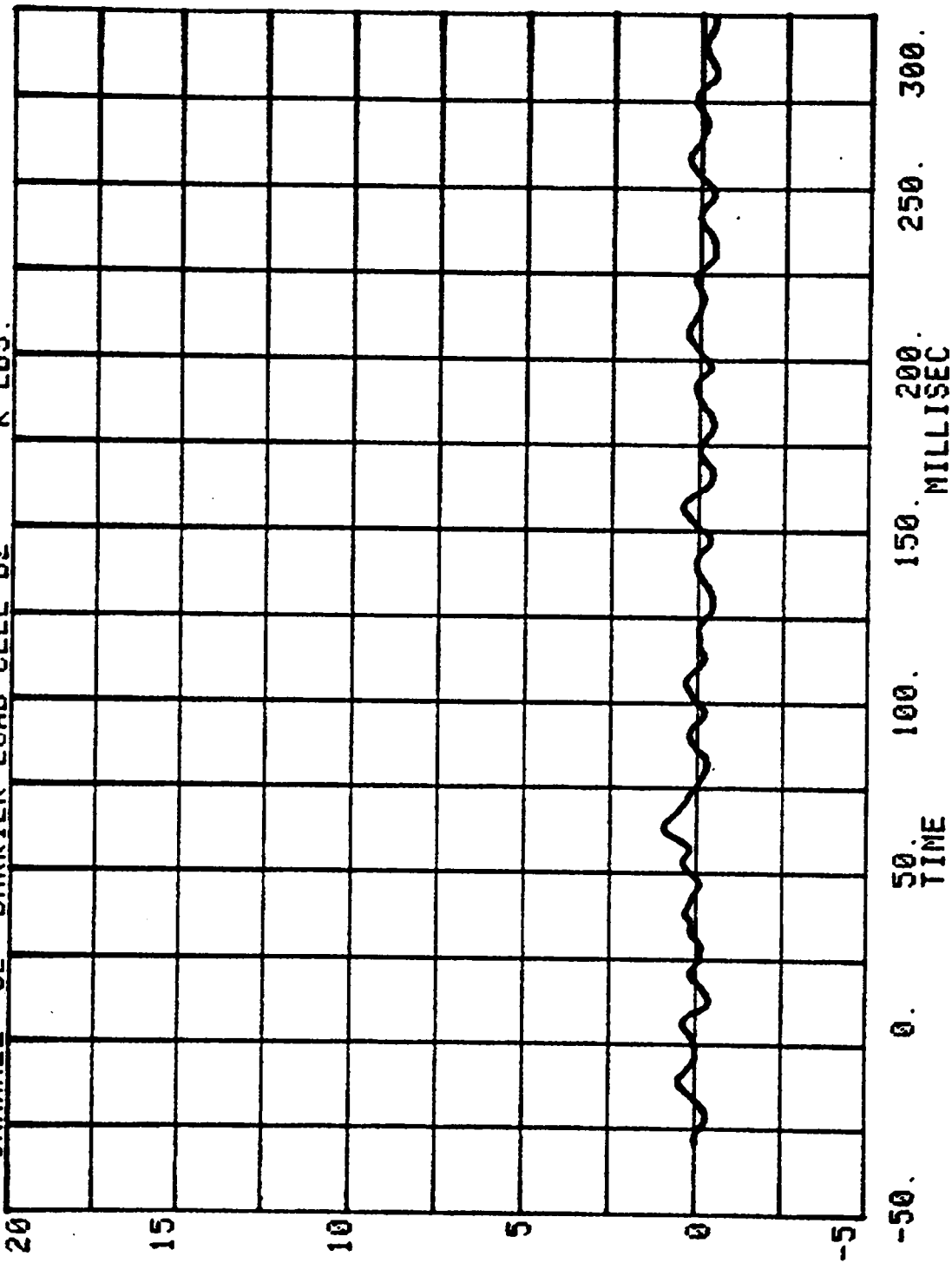
CHANNEL 60 BARRIER LOAD CELL C9 RUN= 598 SERIES= 207 K LBS.



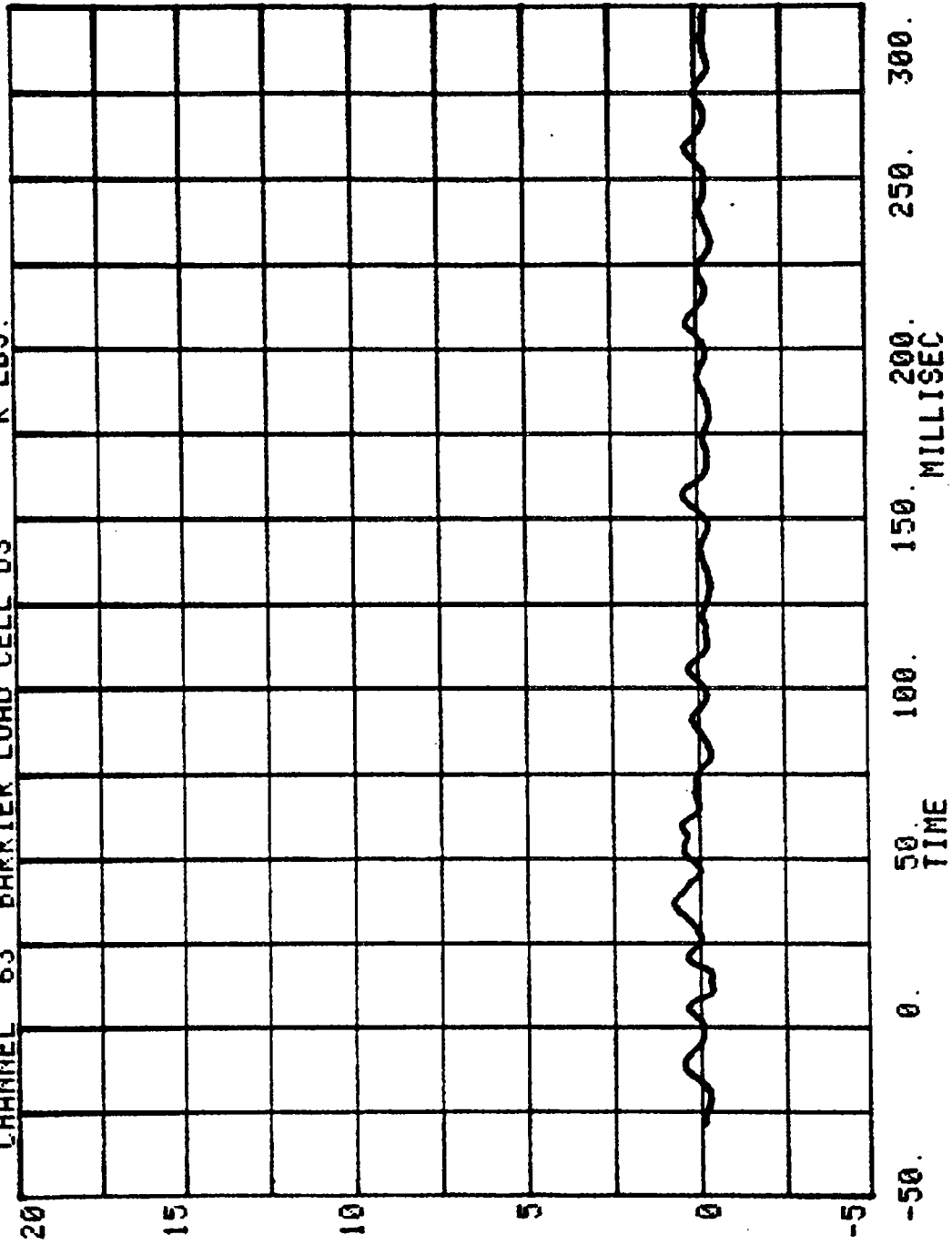
CHANNEL 61 BARRIER LOAD CELL 01  
RUN= 598 SERIES= 207 K LBS.



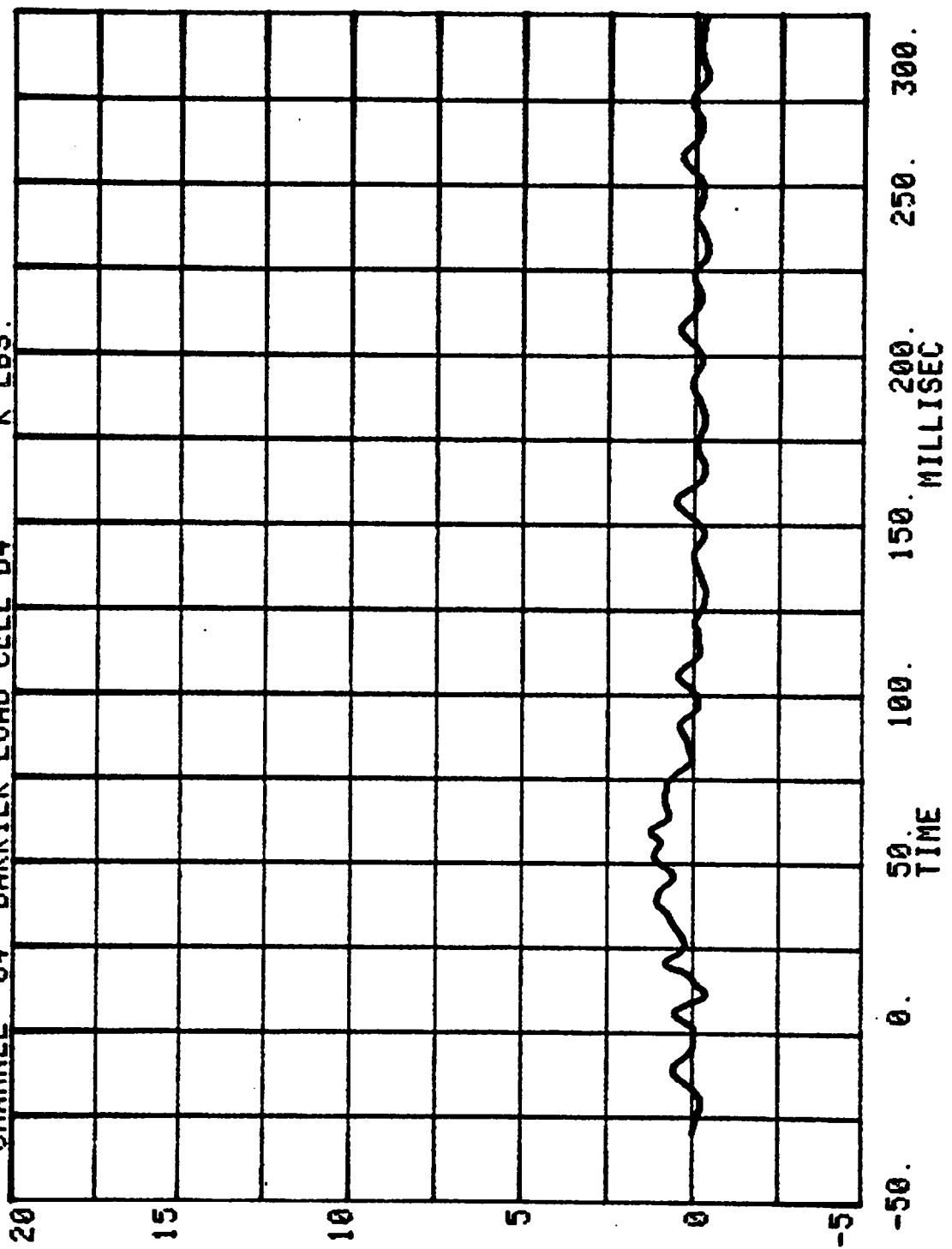
CHANNEL 62 BARRIER LOAD CELL D2  
RUN= 598 SERIES= 207 K LBS.



CHANNEL 63 RUN= 598 SERIES= 207 K LBS.  
BARRIER LOAD CELL 03



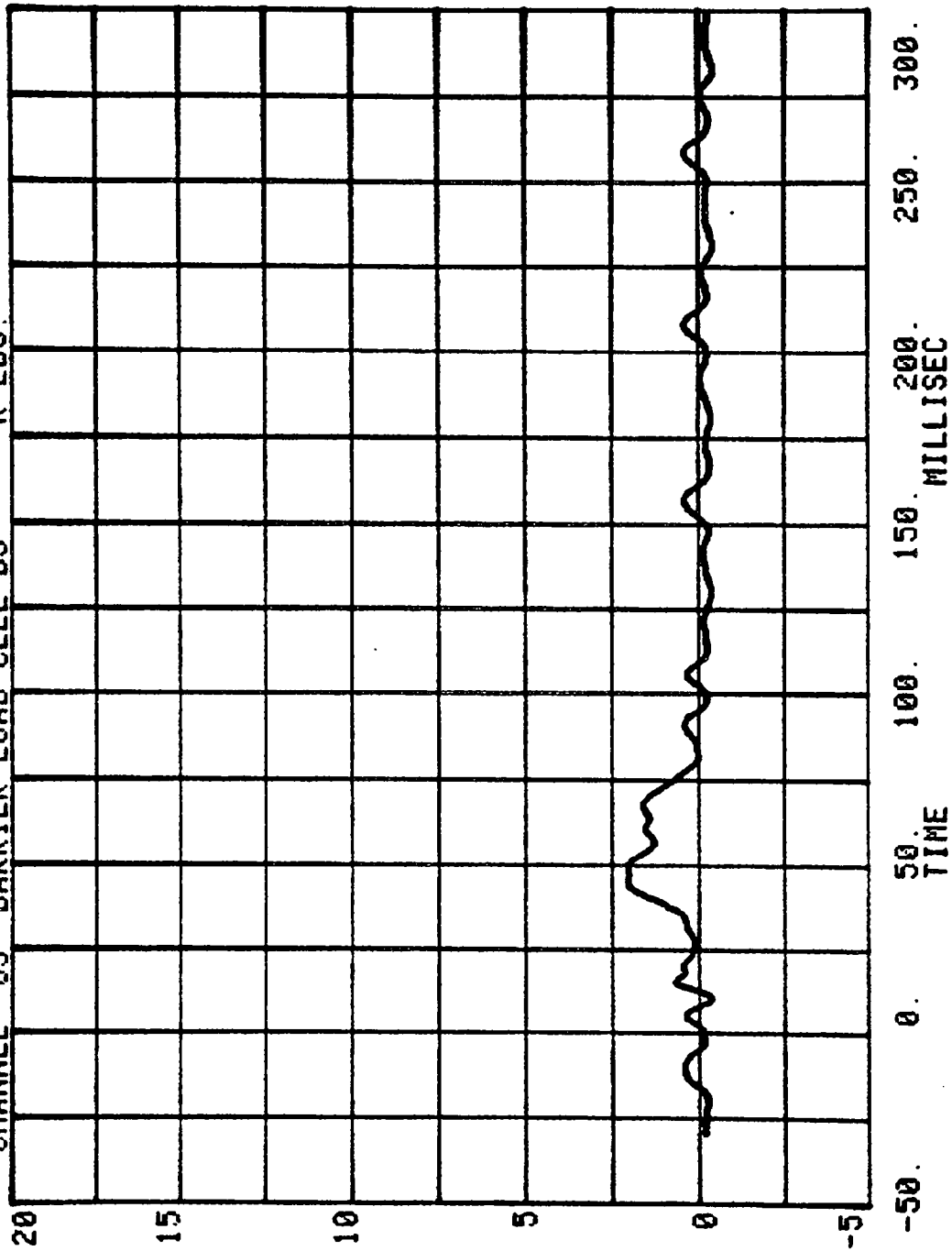
CHANNEL 64 BARRIER LOAD CELL D4  
RUN= 598 SERIES= 207 K LBS.



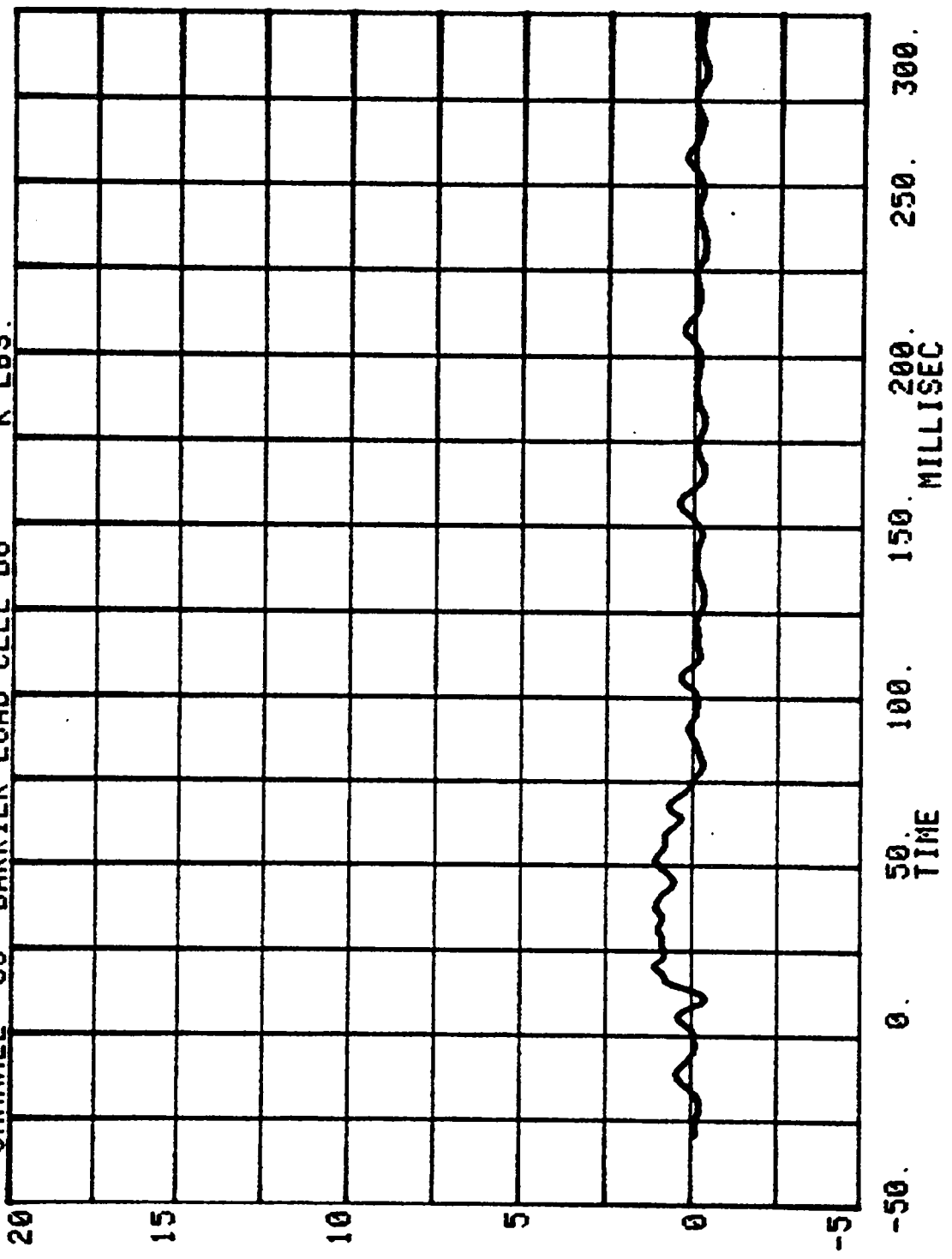
CHANNEL 65 BARRIER LOAD CELL D5

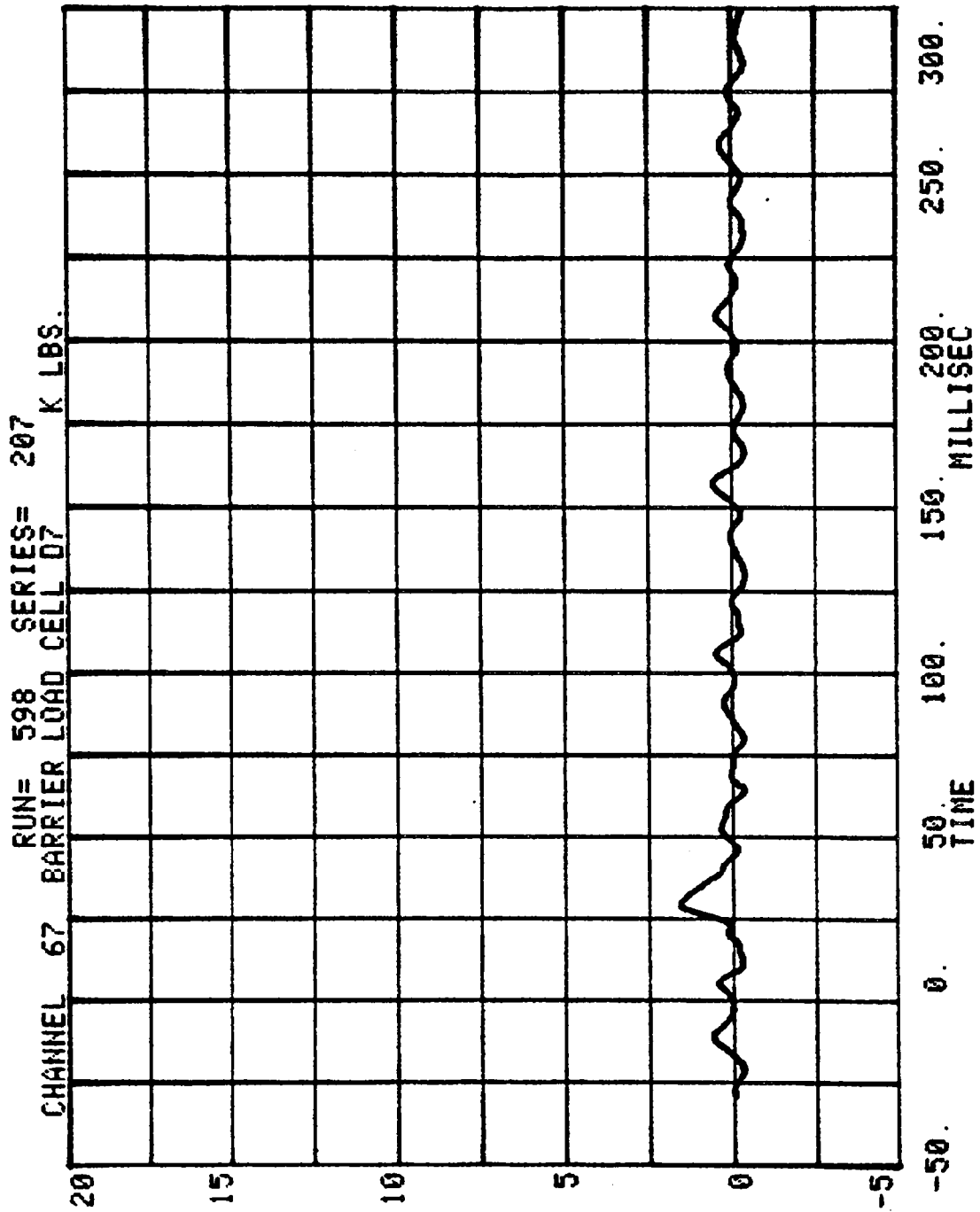
RUN= 598 SERIES= 207

K LBS.

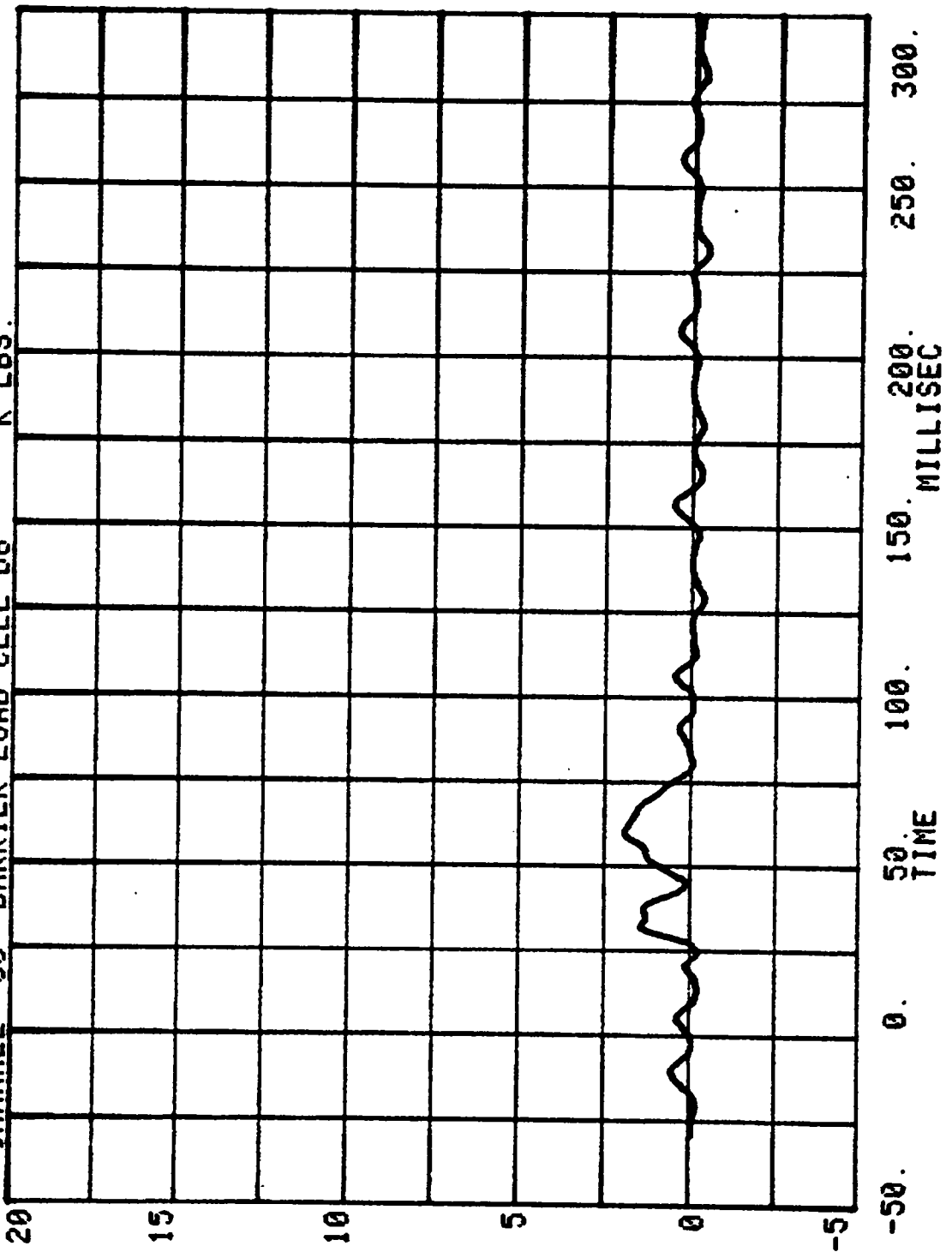


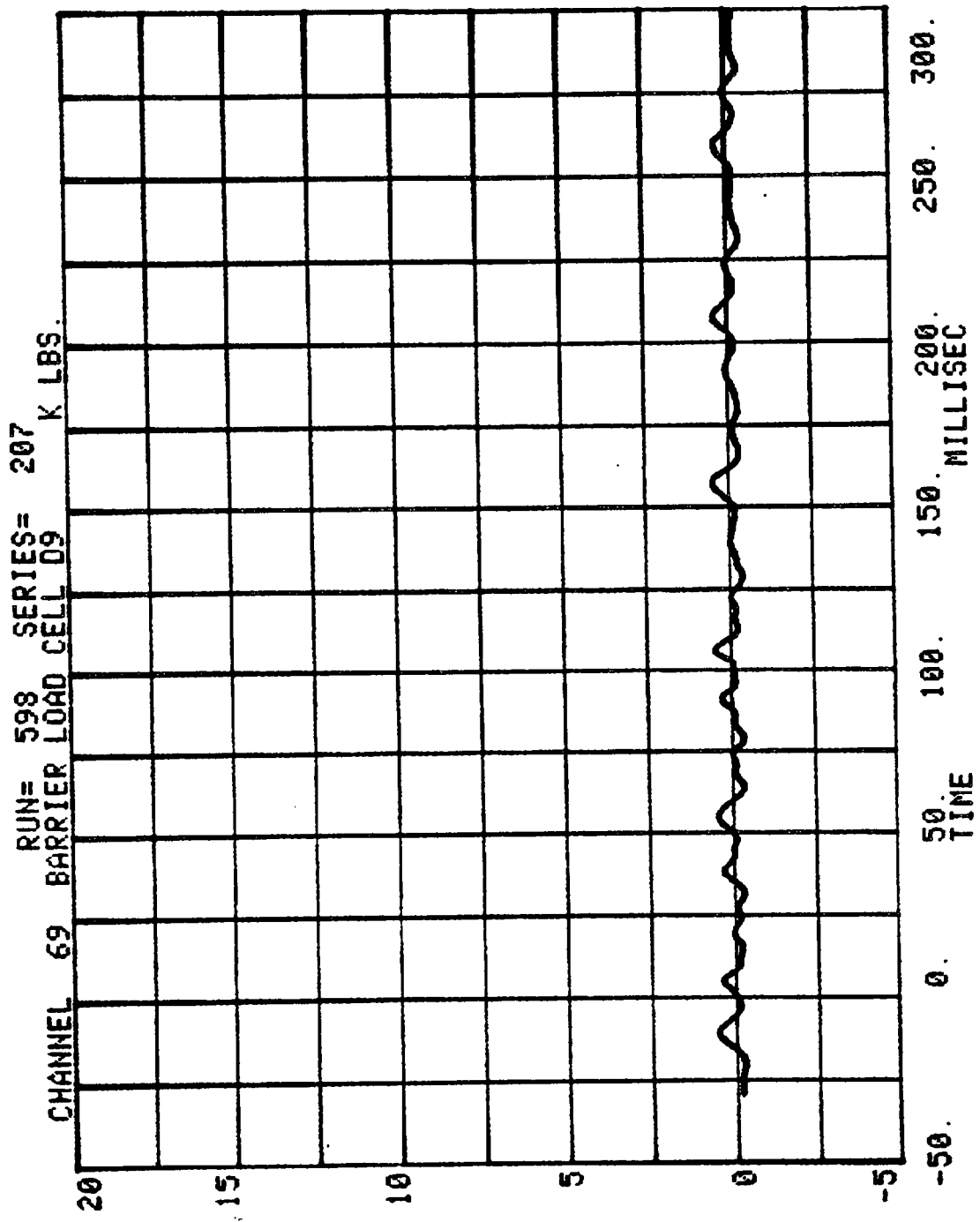
CHANNEL 66 BARRIER LOAD CELL D6 K LBS.  
RUN= 598 SERIES= 207



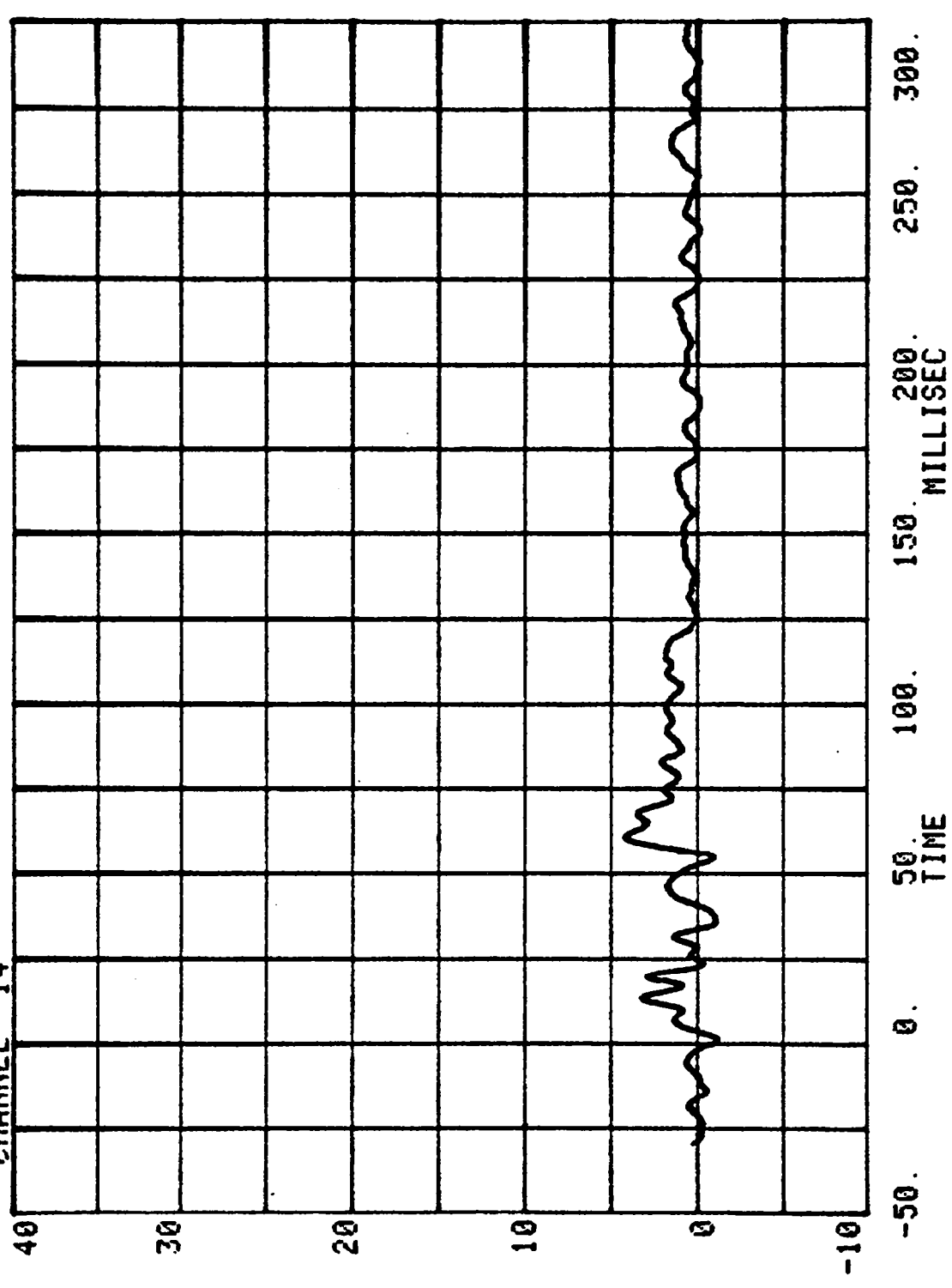


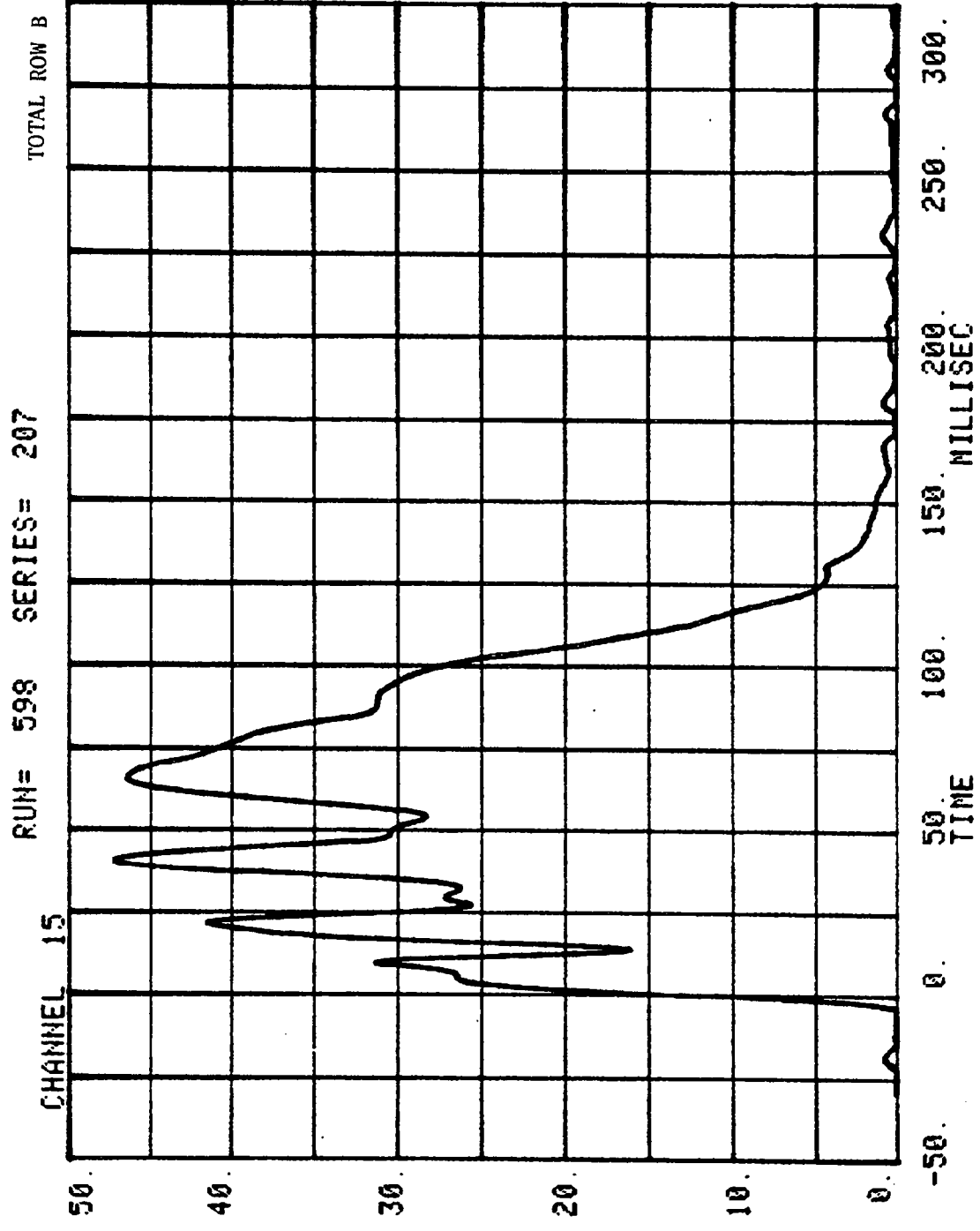
CHANNEL 68 BARRIER LOAD CELL 08 K LBS.  
RUN= 598 SERIES= 207

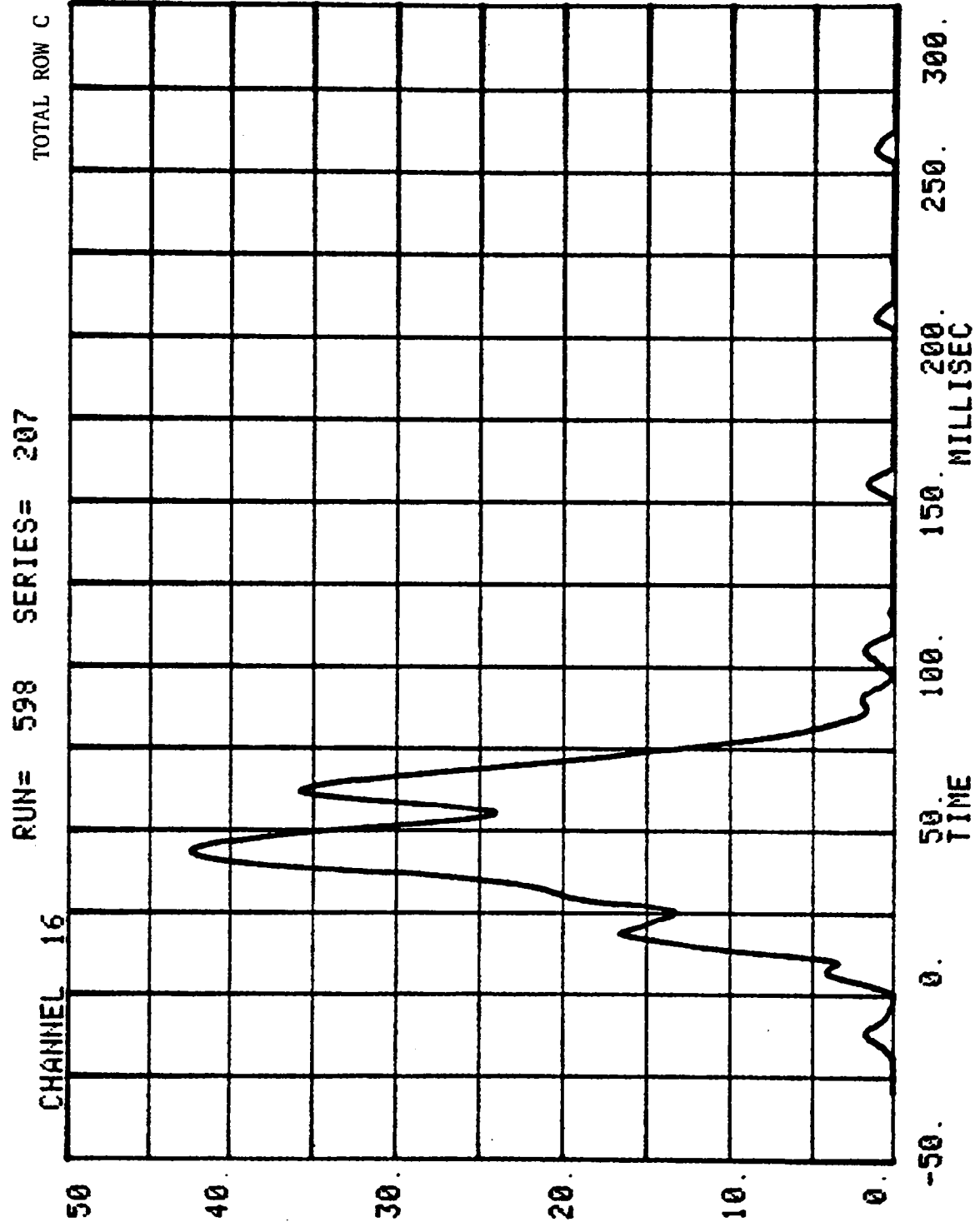




CHANNEL 14 RUN= 598 SERIES= 207 TOTAL ROW A



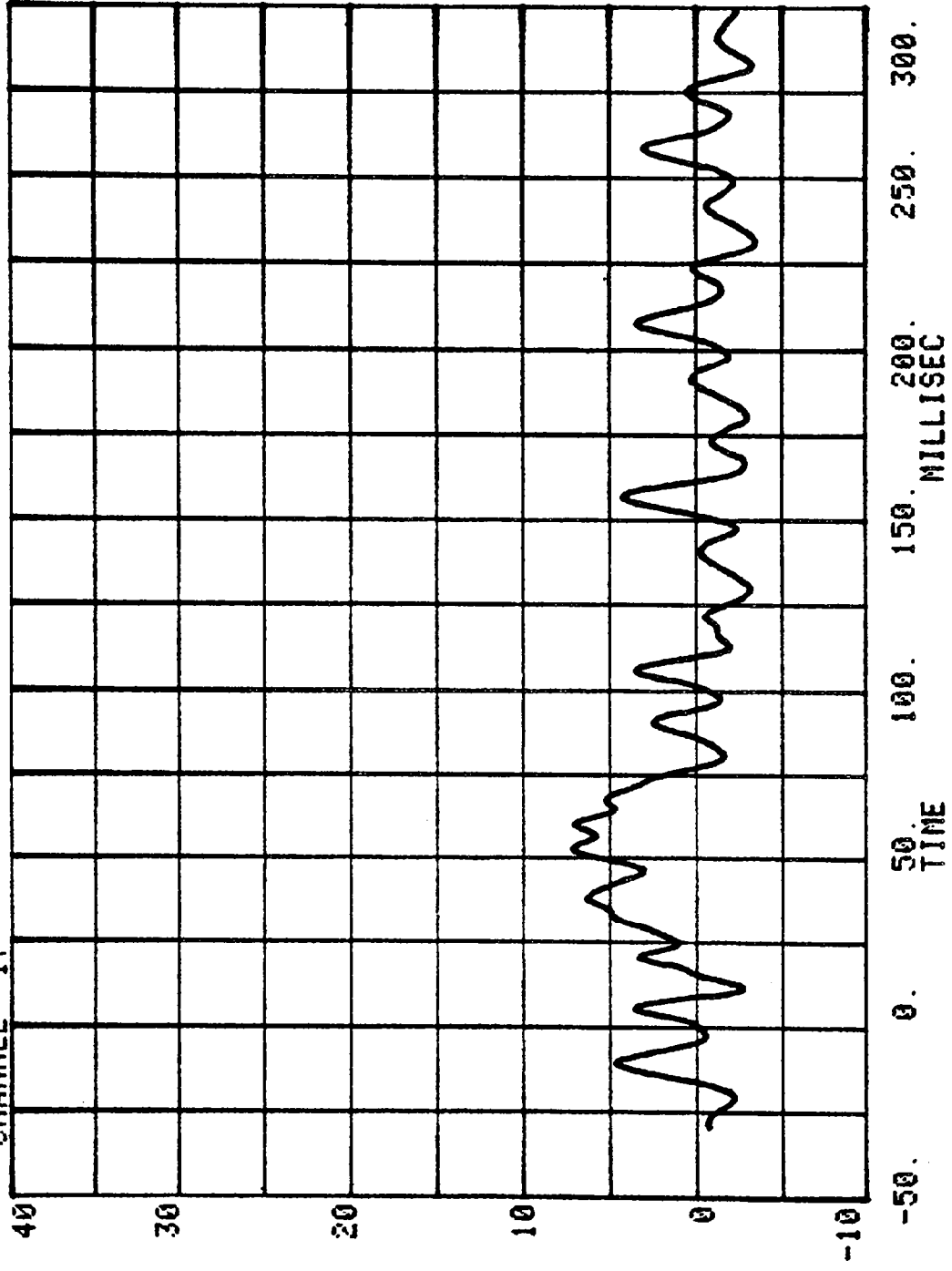


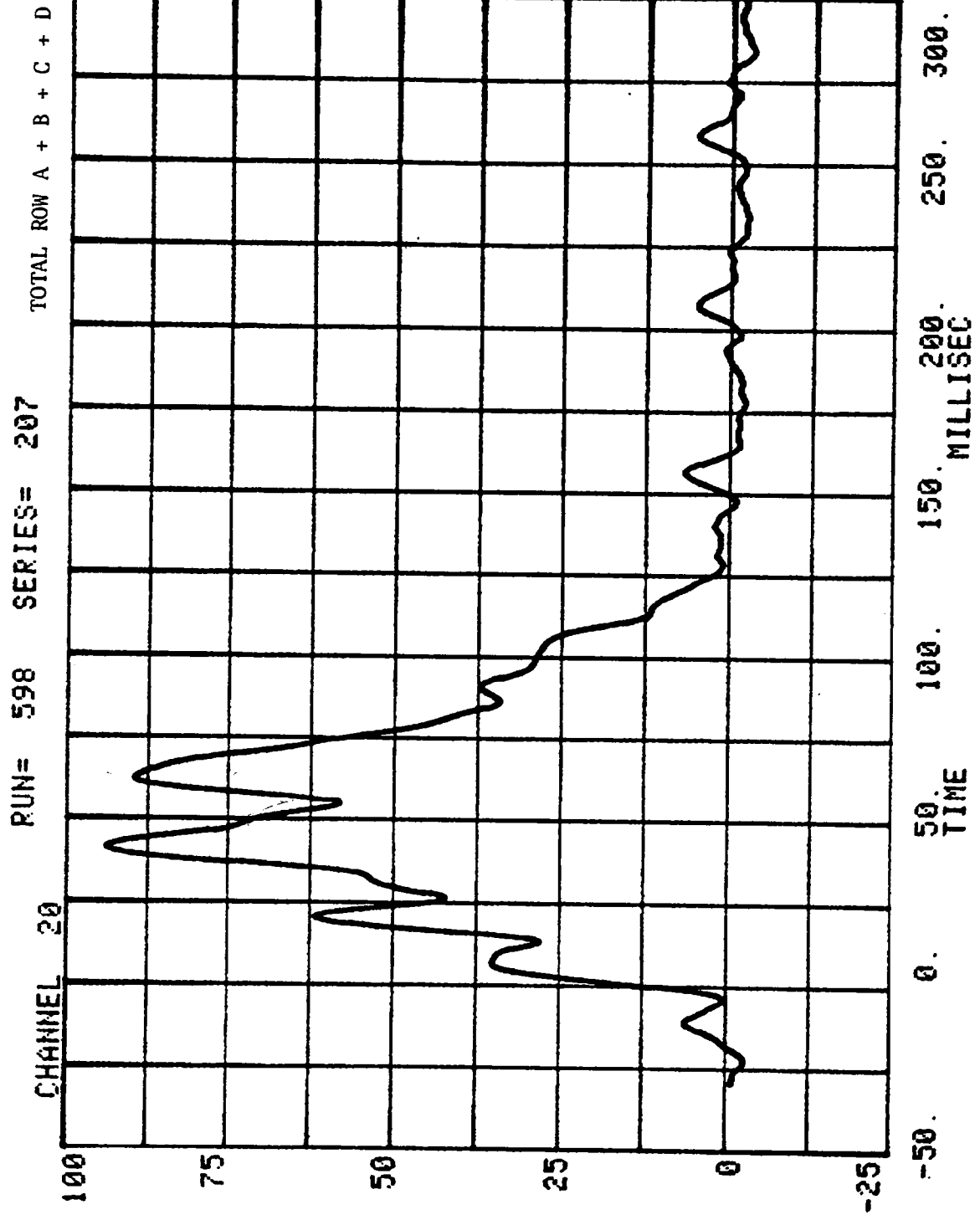


TOTAL ROW D

RUN= 598 SERIES= 207

CHANNEL 17





TEST NO. CE0207

DUMMY DATA

|                     | FILTER CHANNEL CLASS |
|---------------------|----------------------|
| HEAD ACCELERATIONS  | 1000                 |
| CHEST ACCELERATIONS | 180                  |
| FEMUR FORCES        | 600                  |
| BELT LOADS          | 60                   |

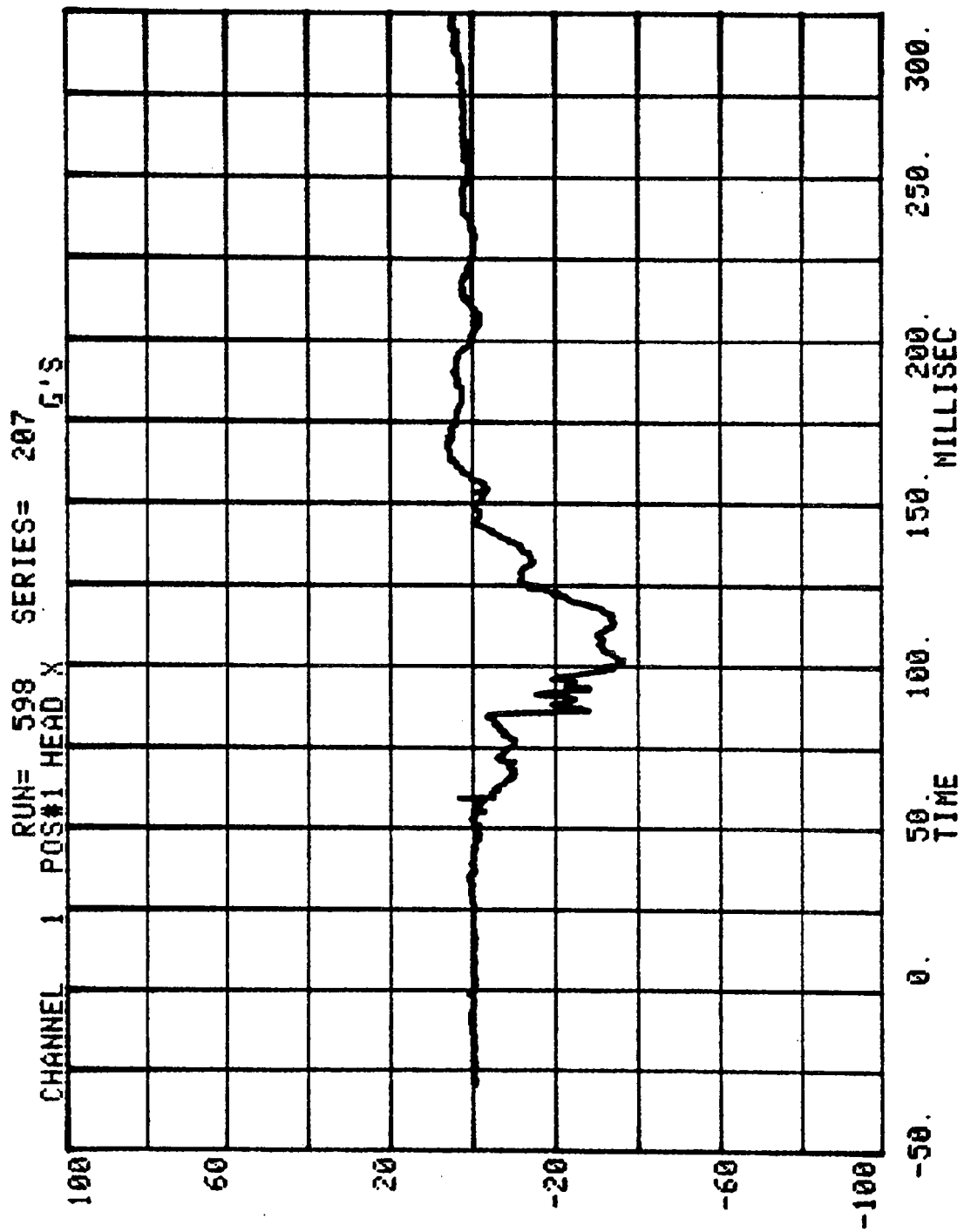
HEAD INJURY CRITERION  
HEAD SEVERITY INDEX

CAR TO LOAD CELL BARRIER

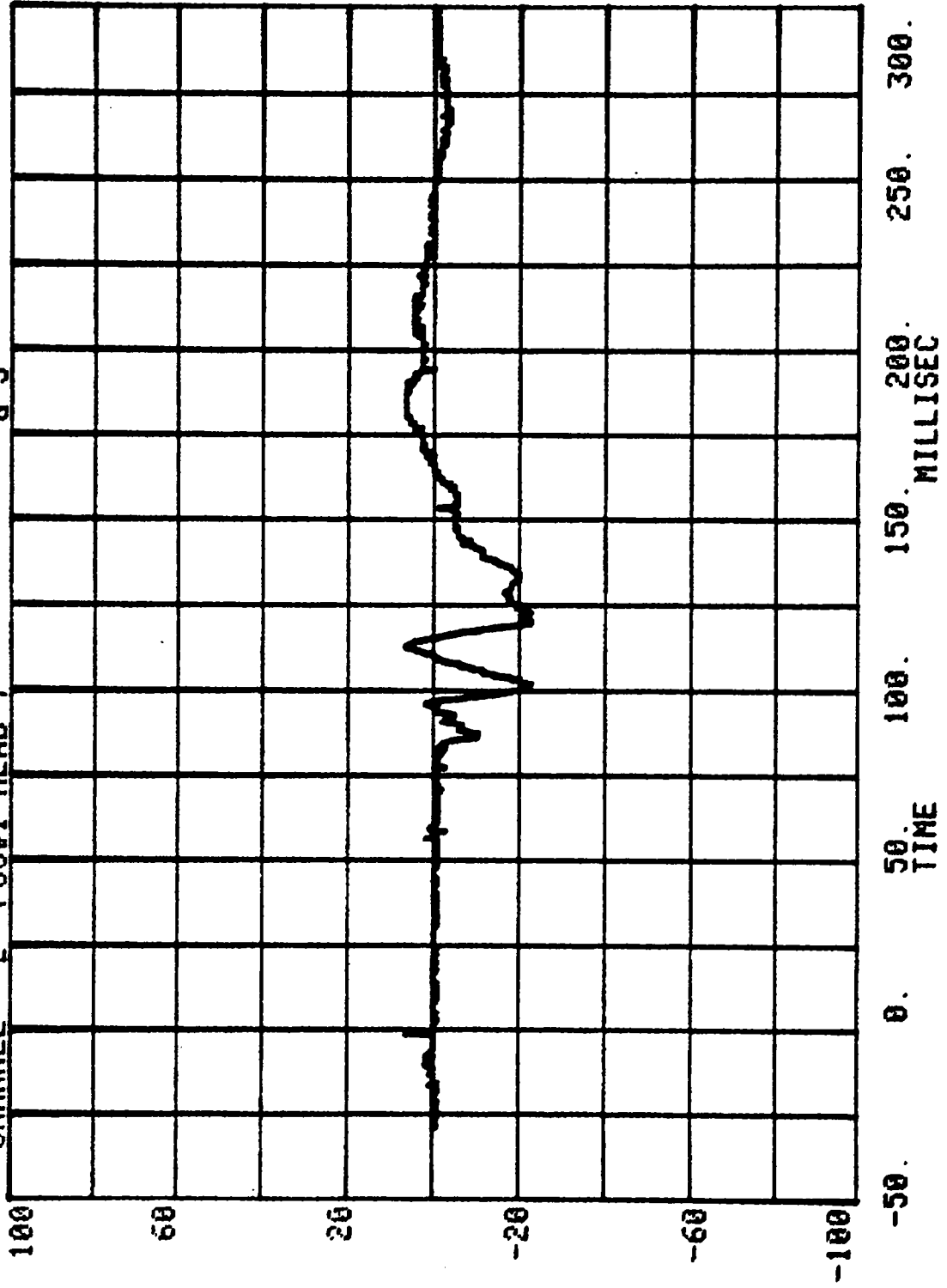
RUN= 598

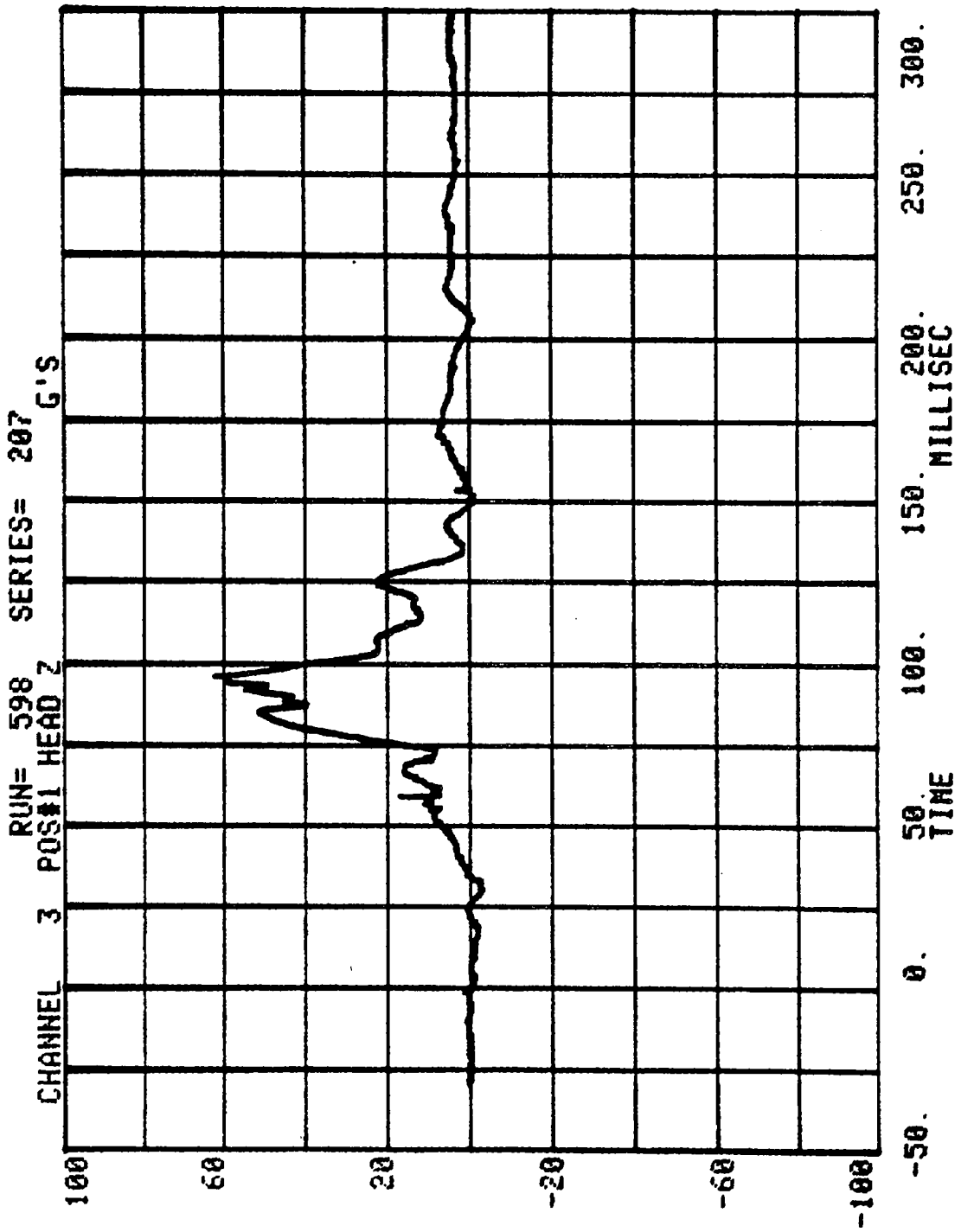
POS#1 HEAD RESULTANT

HIC= 646.2 FROM T1= .07680 TO T2= .12870  
AVERAGE ACCELERATION BETWEEN T1 AND T2= 43.5G'S  
EVENT TIME= 300.0 MSEC  
SEVERITY INDEX= 774.9



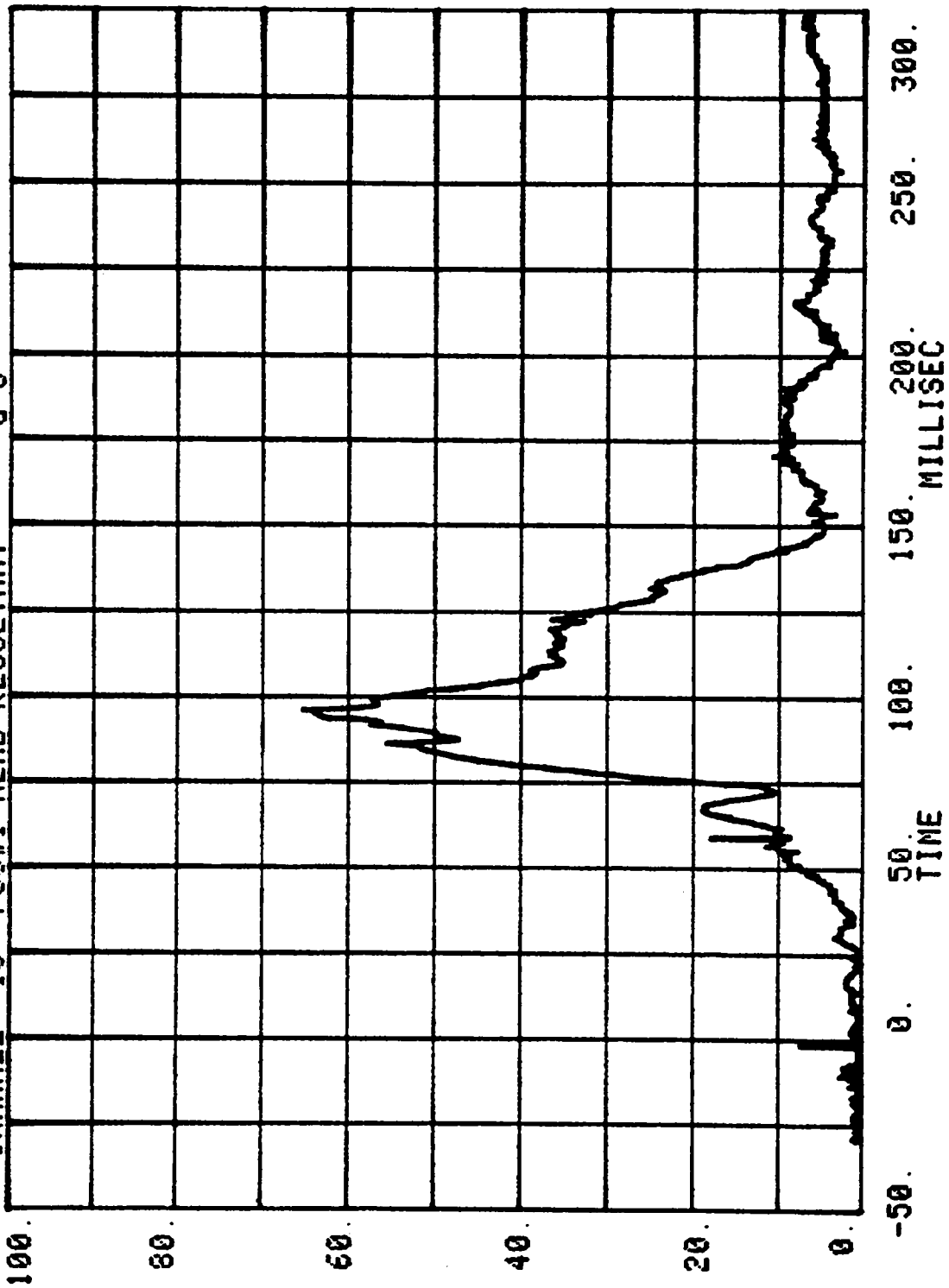
CHANNEL 2 POS#1 HEAD Y  
RUN= 598 SERIES= 207 G'S

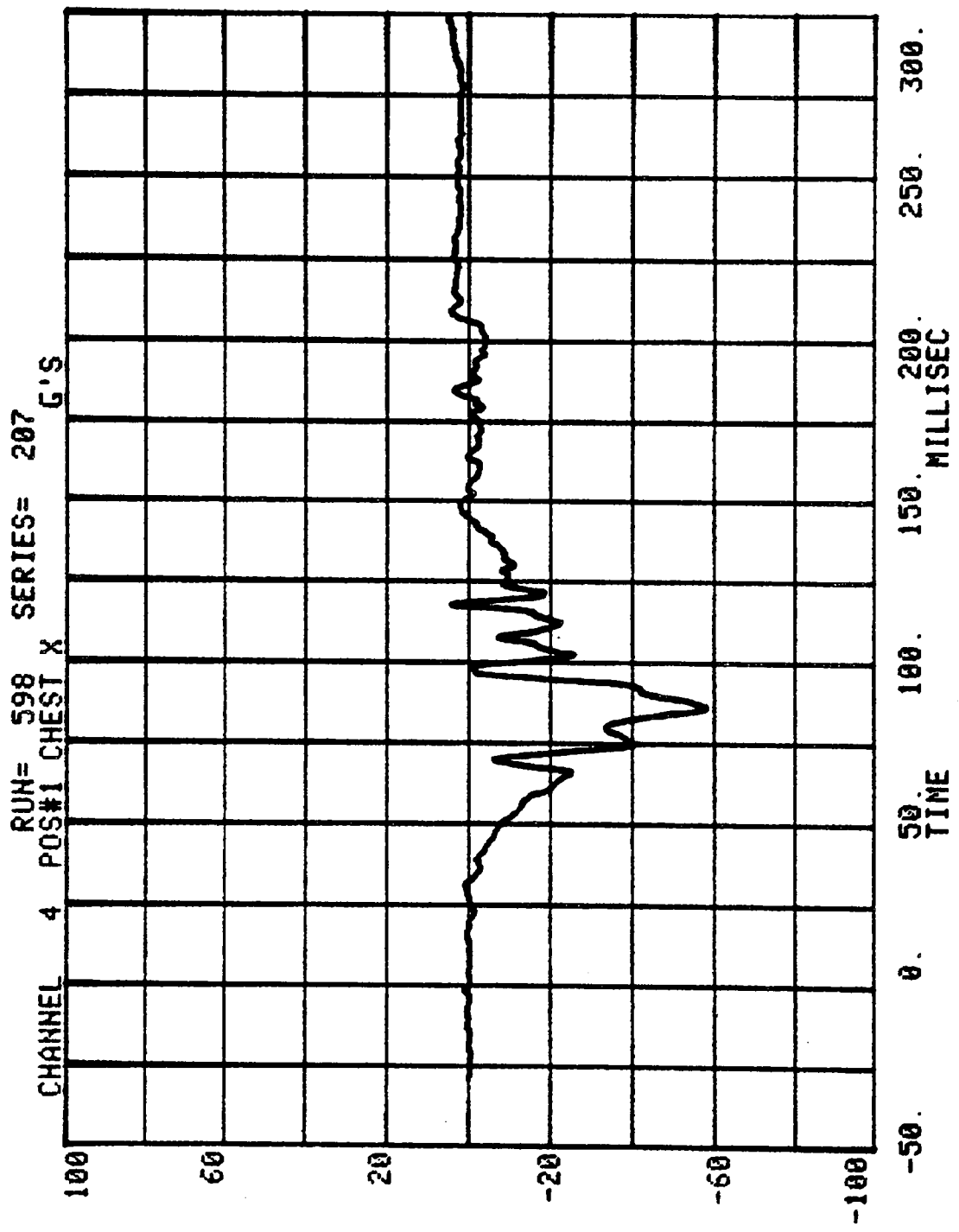




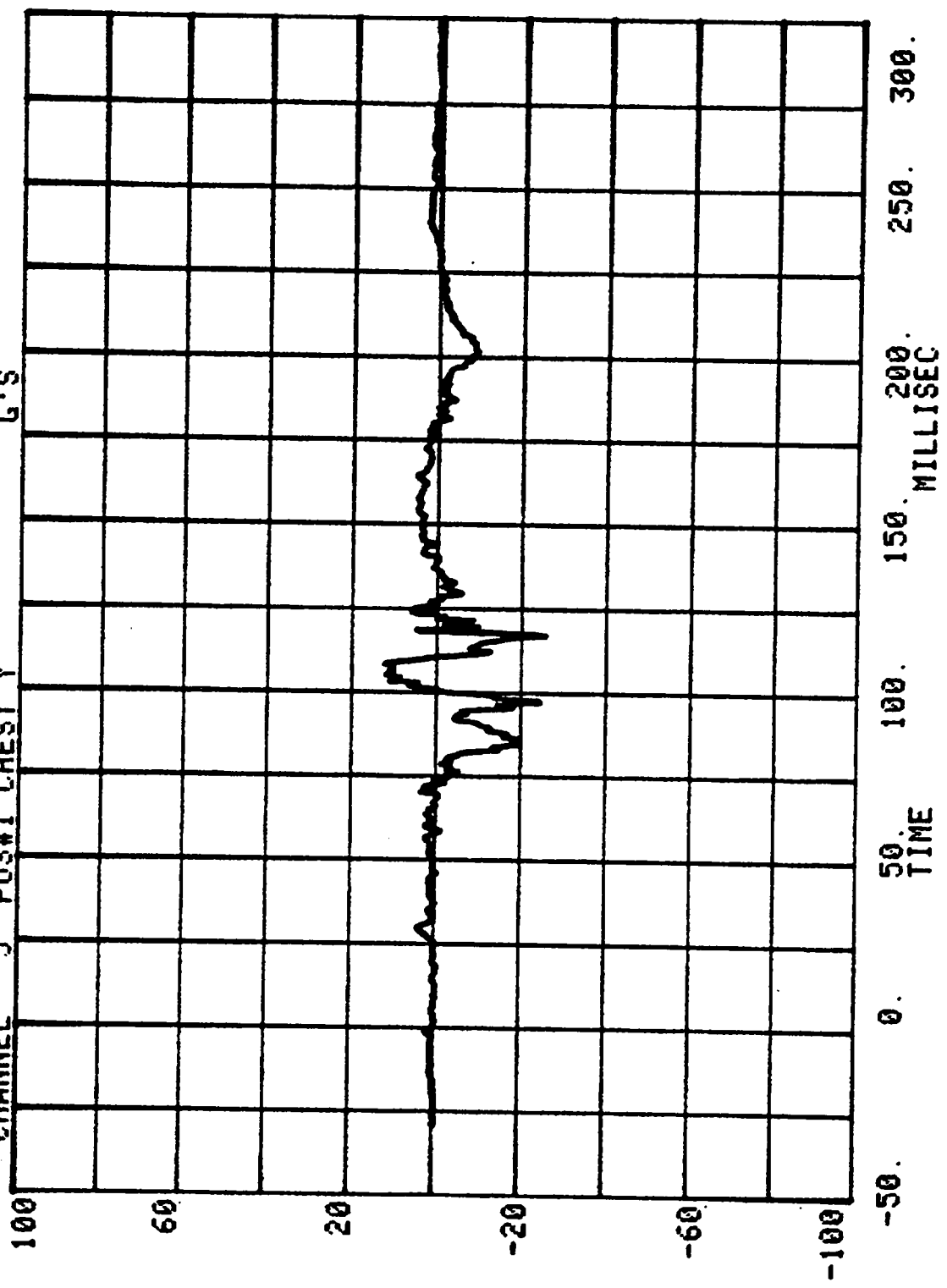
CHANNEL 10 POS#1 HEAD RESULTANT G'S

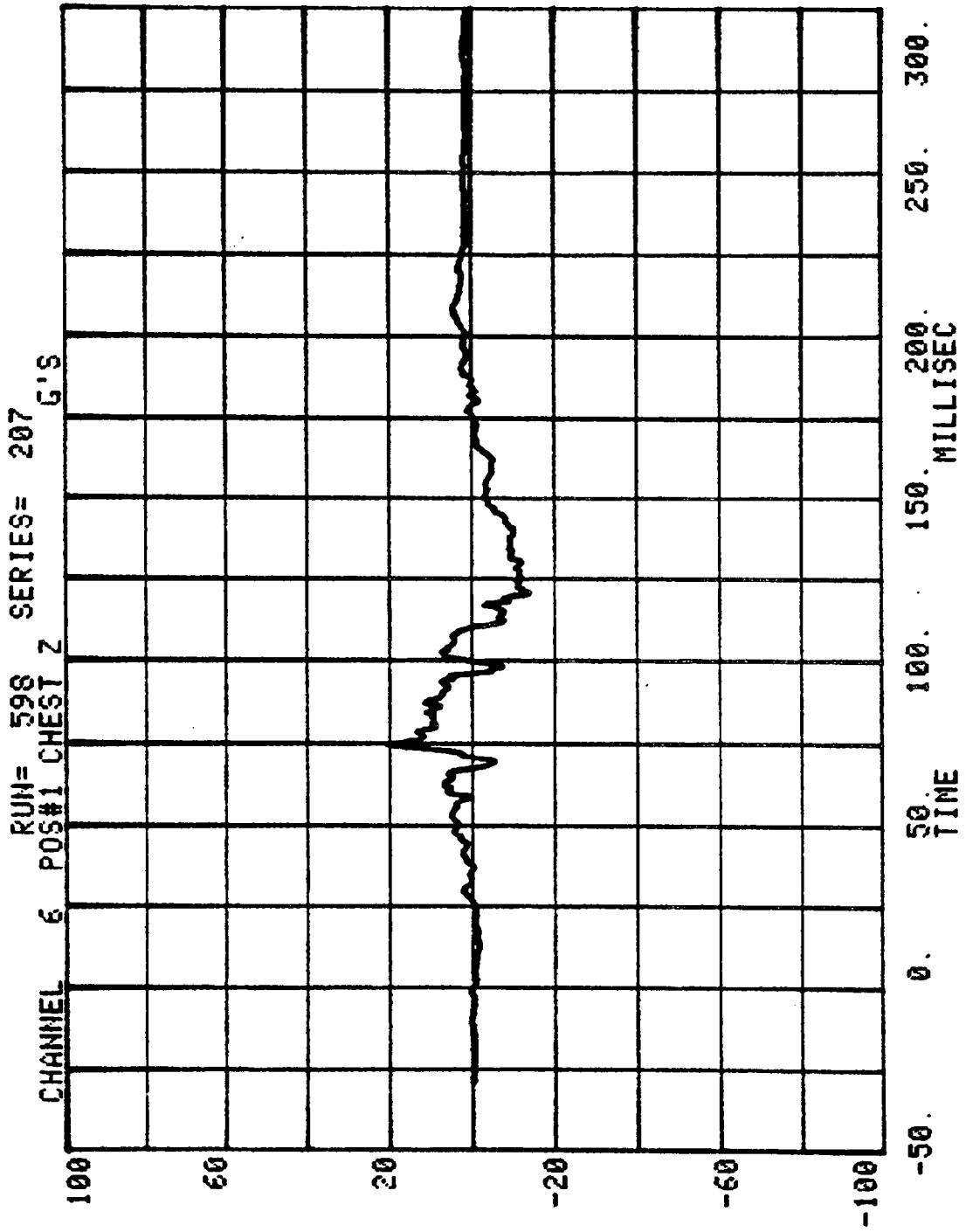
RUN= 598 SERIES= 207



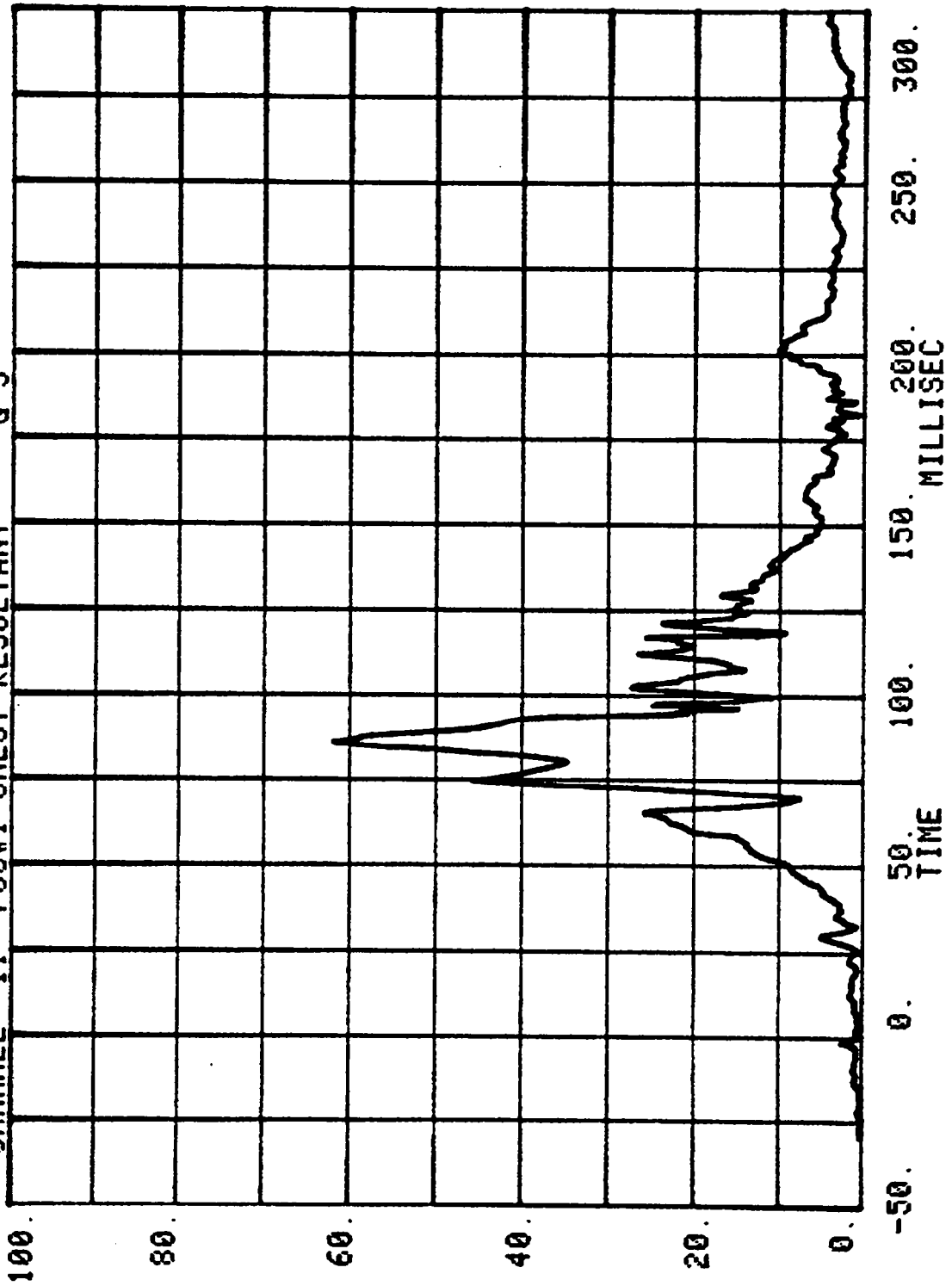


CHANNEL 5 POS#1 CHEST Y  
RUN= 598 SERIES= 207 G'S



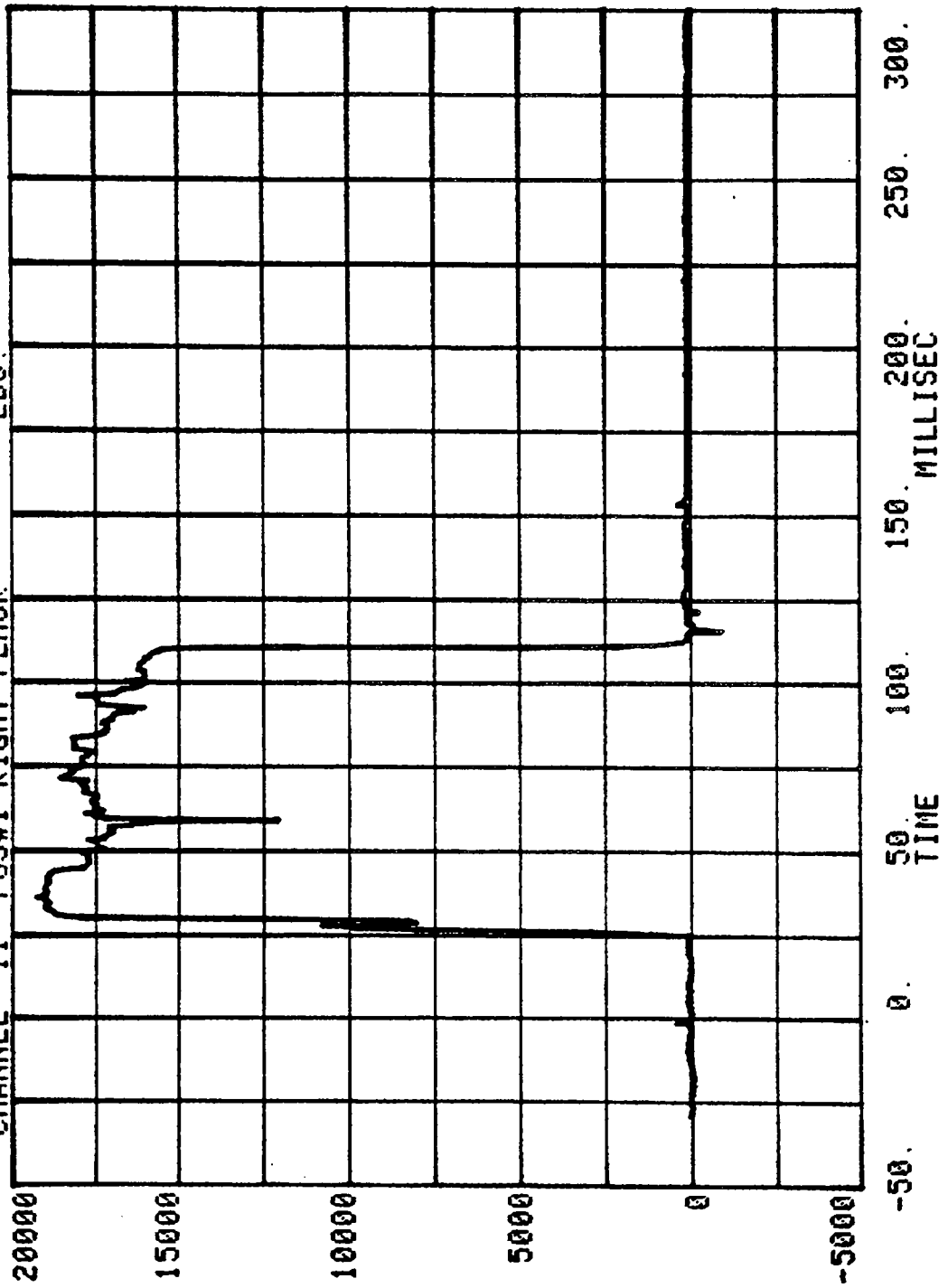


CHANNEL 11 RUN= 598 SERIES= 207 G'S  
POS#1 CHEST RESULTANT



(DATA CONTAINS ZERO SHIFTS)

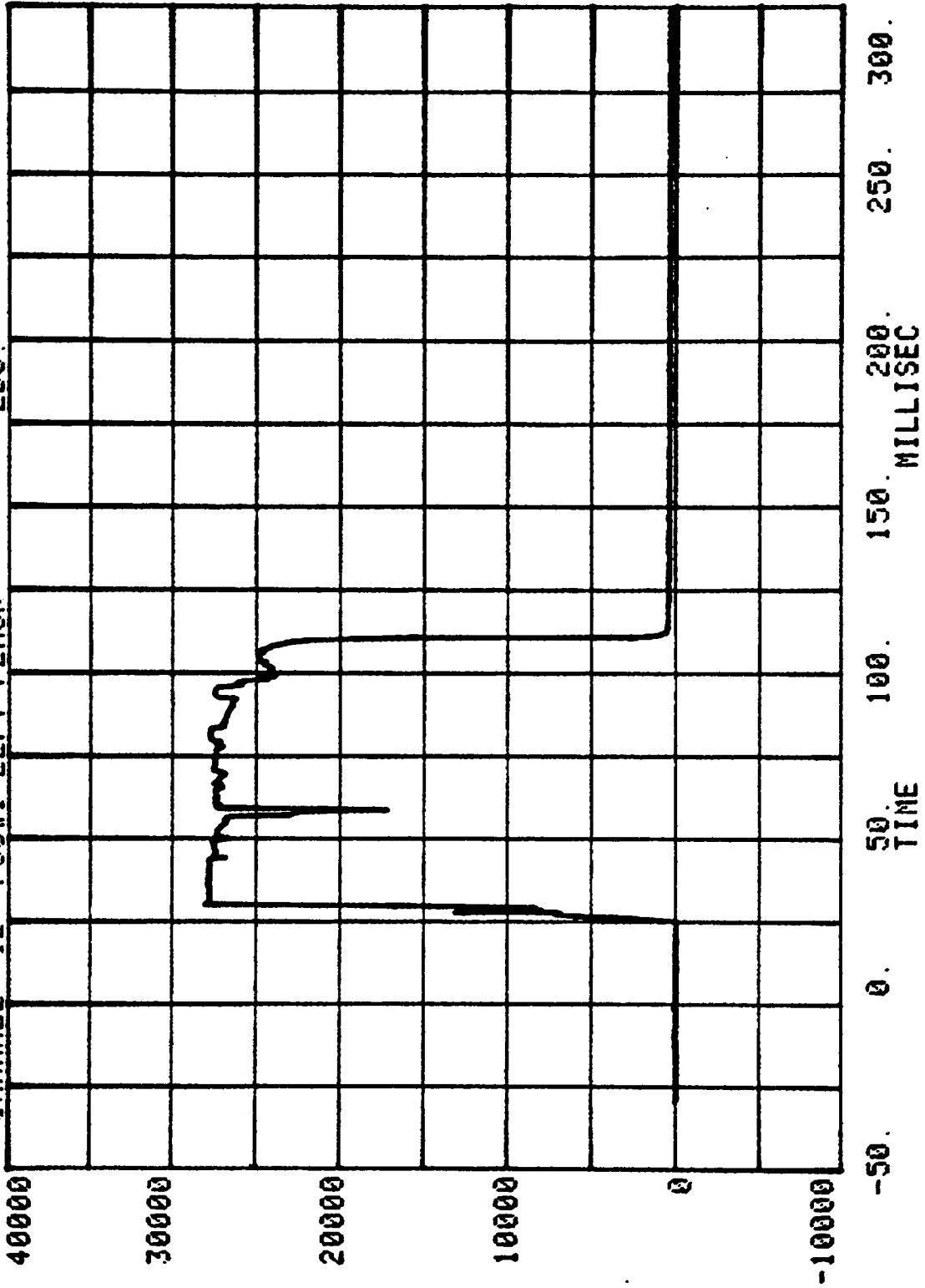
CHANNEL 11 POS#1 RIGHT FEMUR  
RUN= 598 SERIES= 207 LBS.

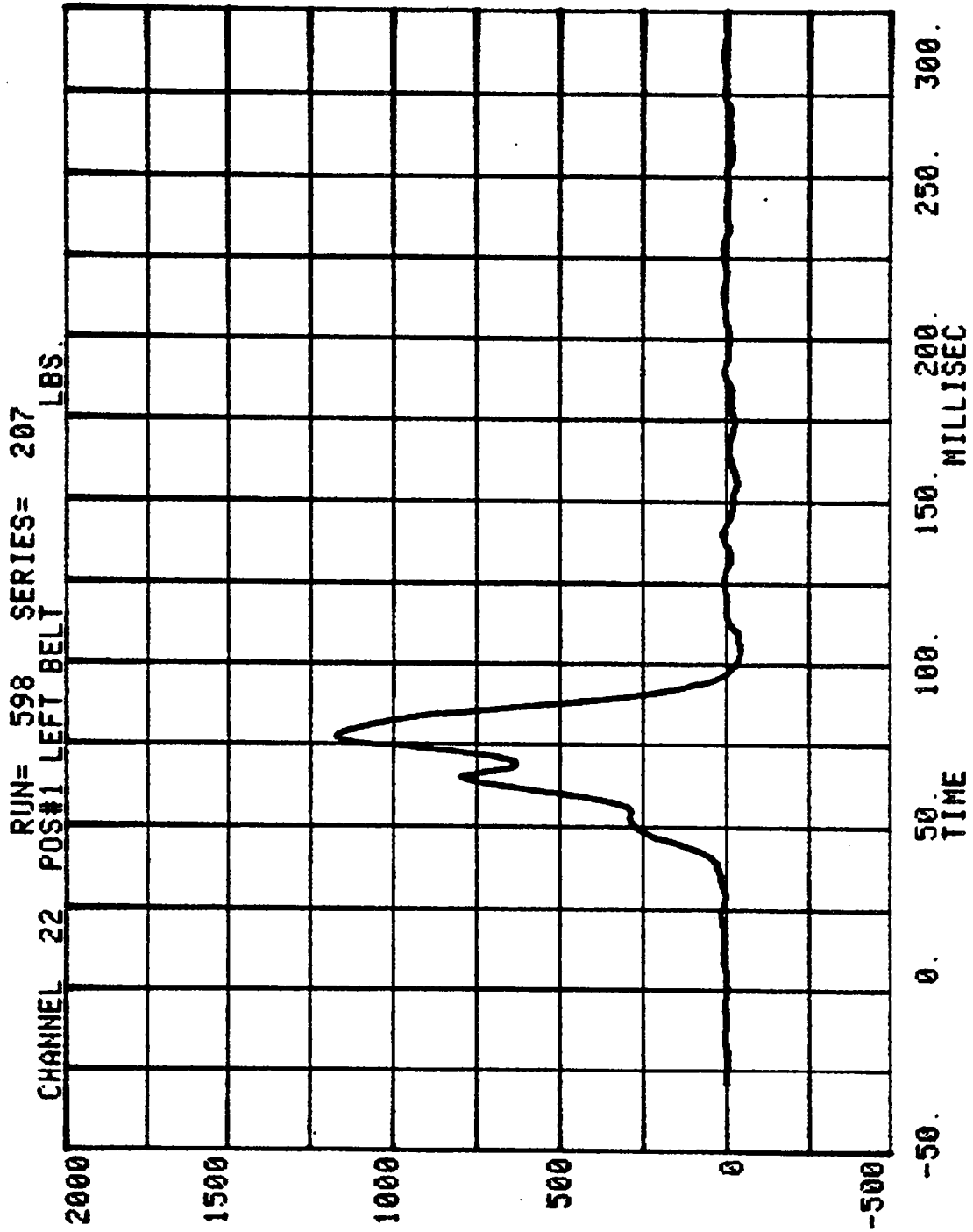


(DATA CONTAINS ZERO SHIFTS)

CHANNEL 12 POS#1 LEFT FEMUR LBS.

RUN= 598 SERIES= 207



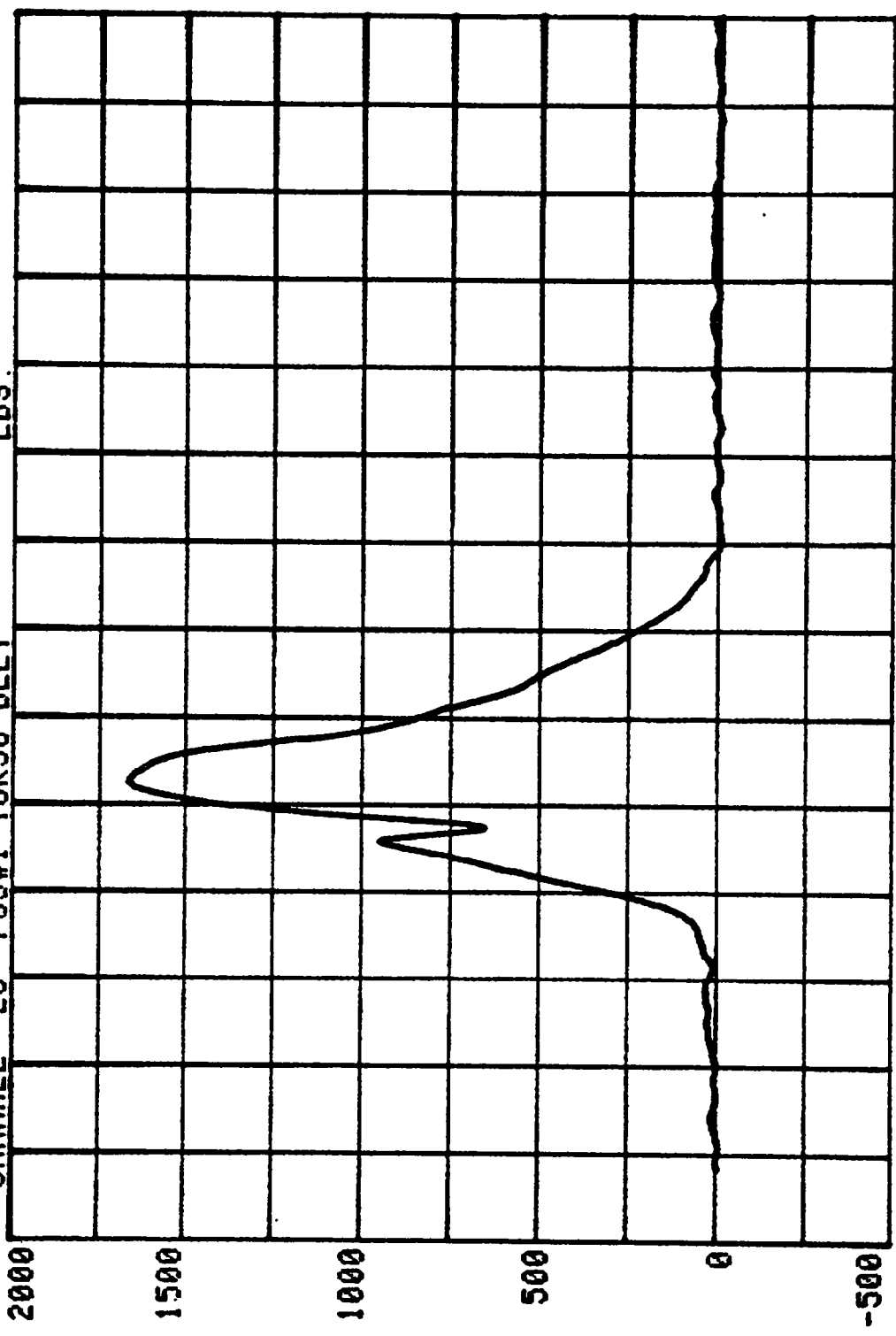


CHANNEL 23 POS#1 TORSO BELT

RUN= 598

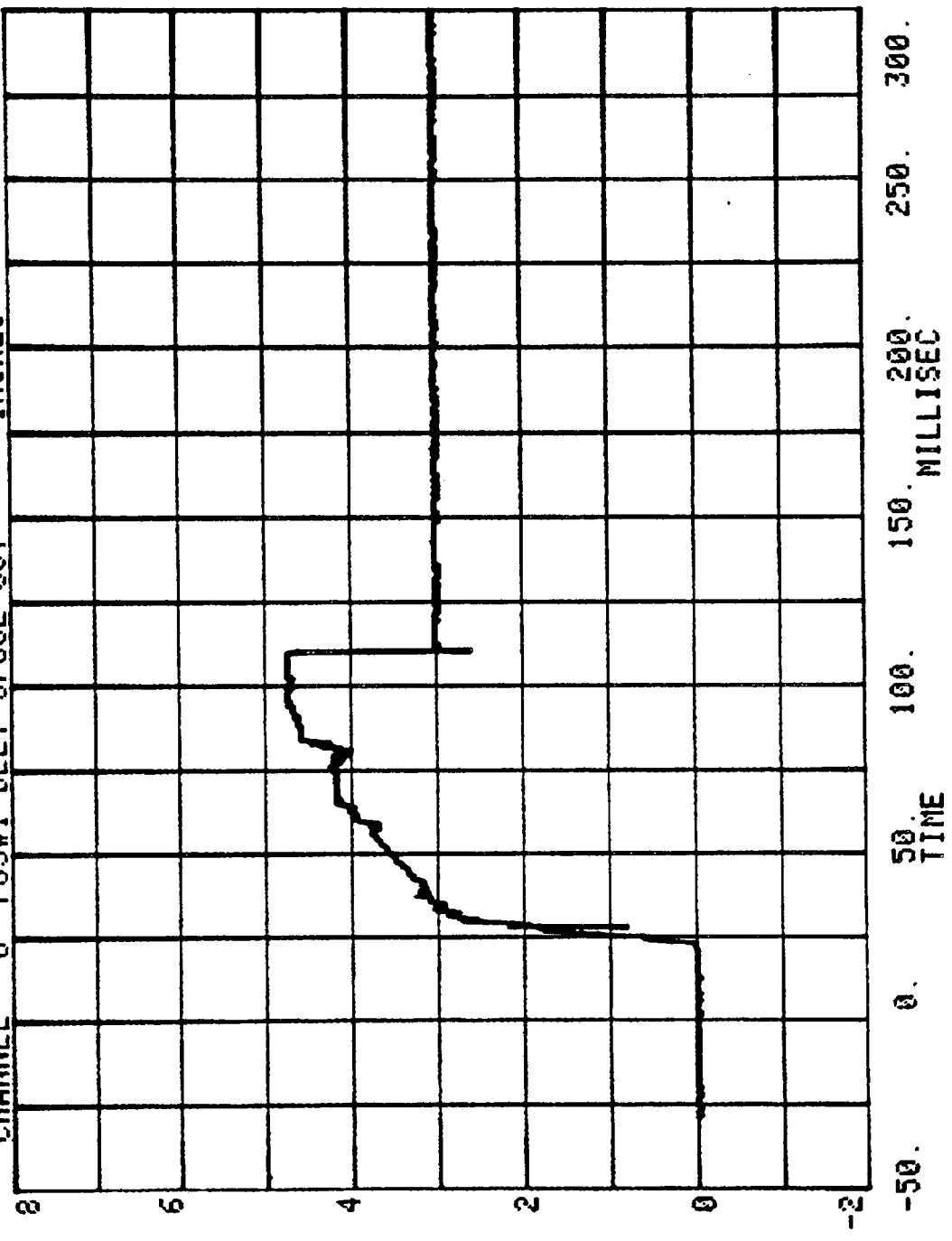
SERIES= 207

LBS.



-50. 0. 50. 100. 150. 200. 250. 300.  
TIME MILLISEC

RUN= 598 SERIES= 207 INCHES  
CHANNEL 8 POS#1 BELT SPOOL OUT



HEAD INJURY CRITERION  
HEAD SEVERITY INDEX

CAR TO LOAD CELL BARRIER

RUN= 598

POS#2 HEAD RESULTANT

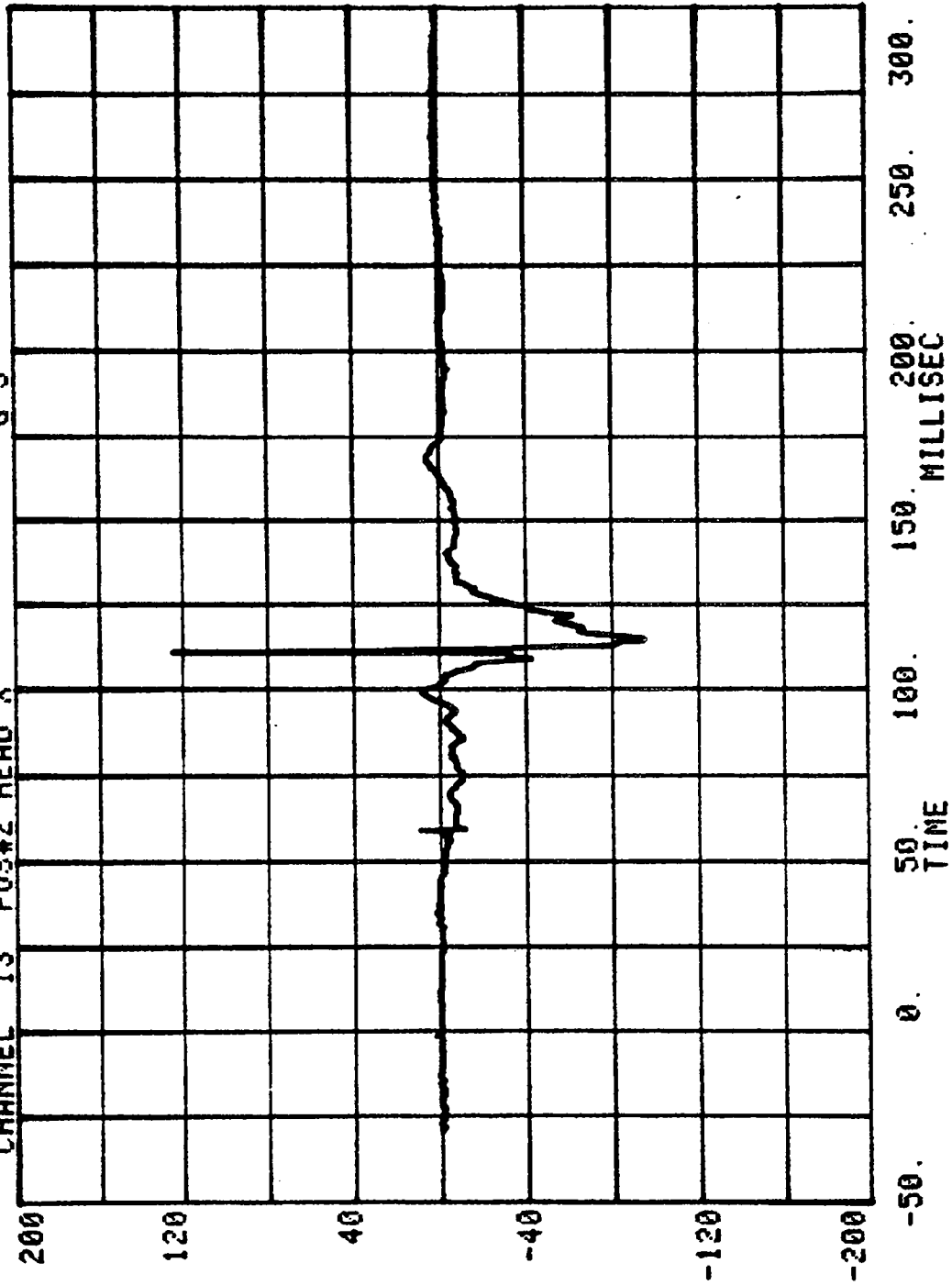
HIC= 647.3 FROM T1= .10815 TO T2= .12593

AVERAGE ACCELERATION BETWEEN T1 AND T2= 66.8G'S

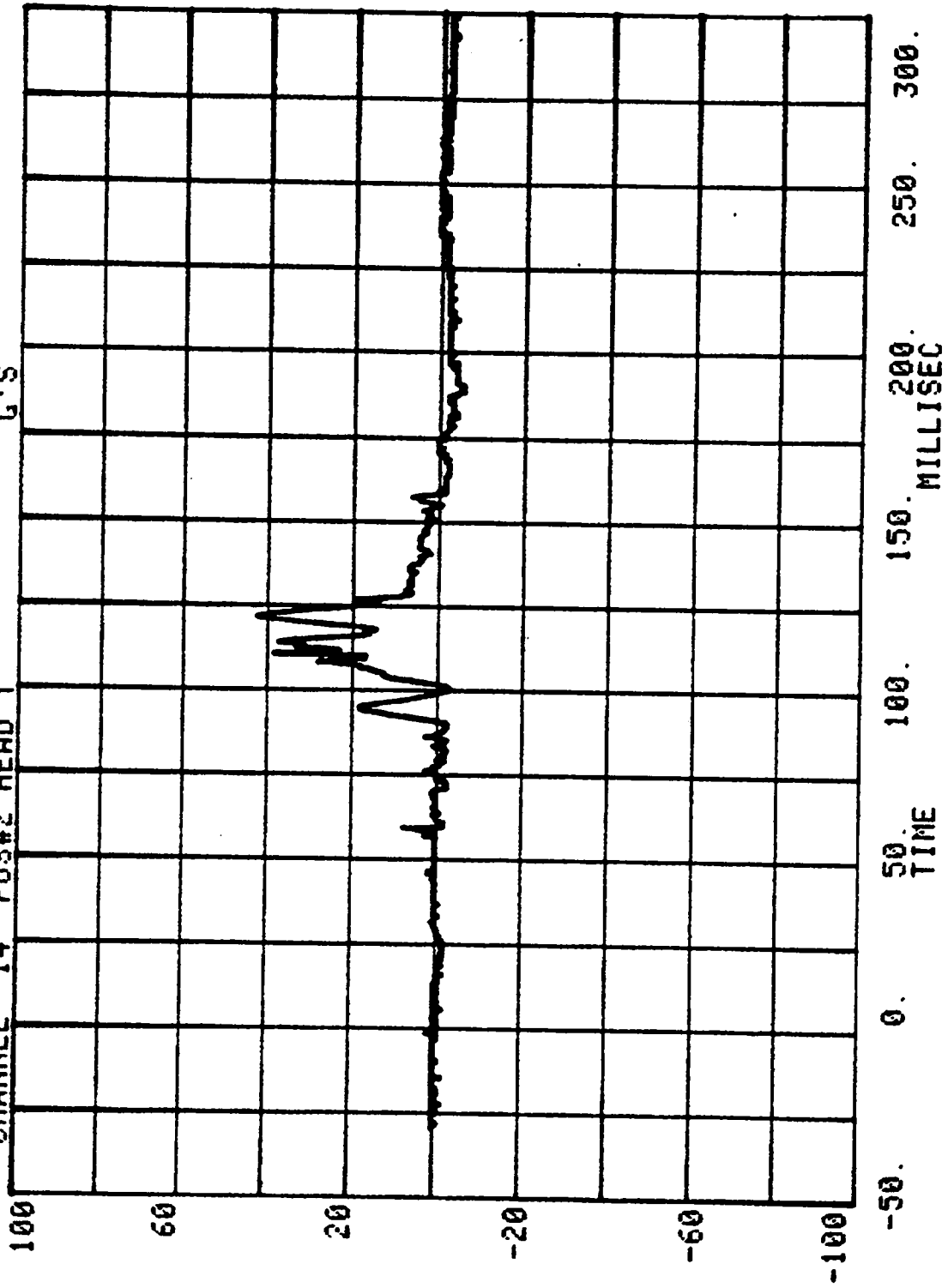
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1040.1

CHANNEL 13 POS#2 HEAD X  
RUN= 598 SERIES= 207 G'S



CHANNEL 14 POS#2 HEAD Y  
RUN= 598 SERIES= 207 G'S

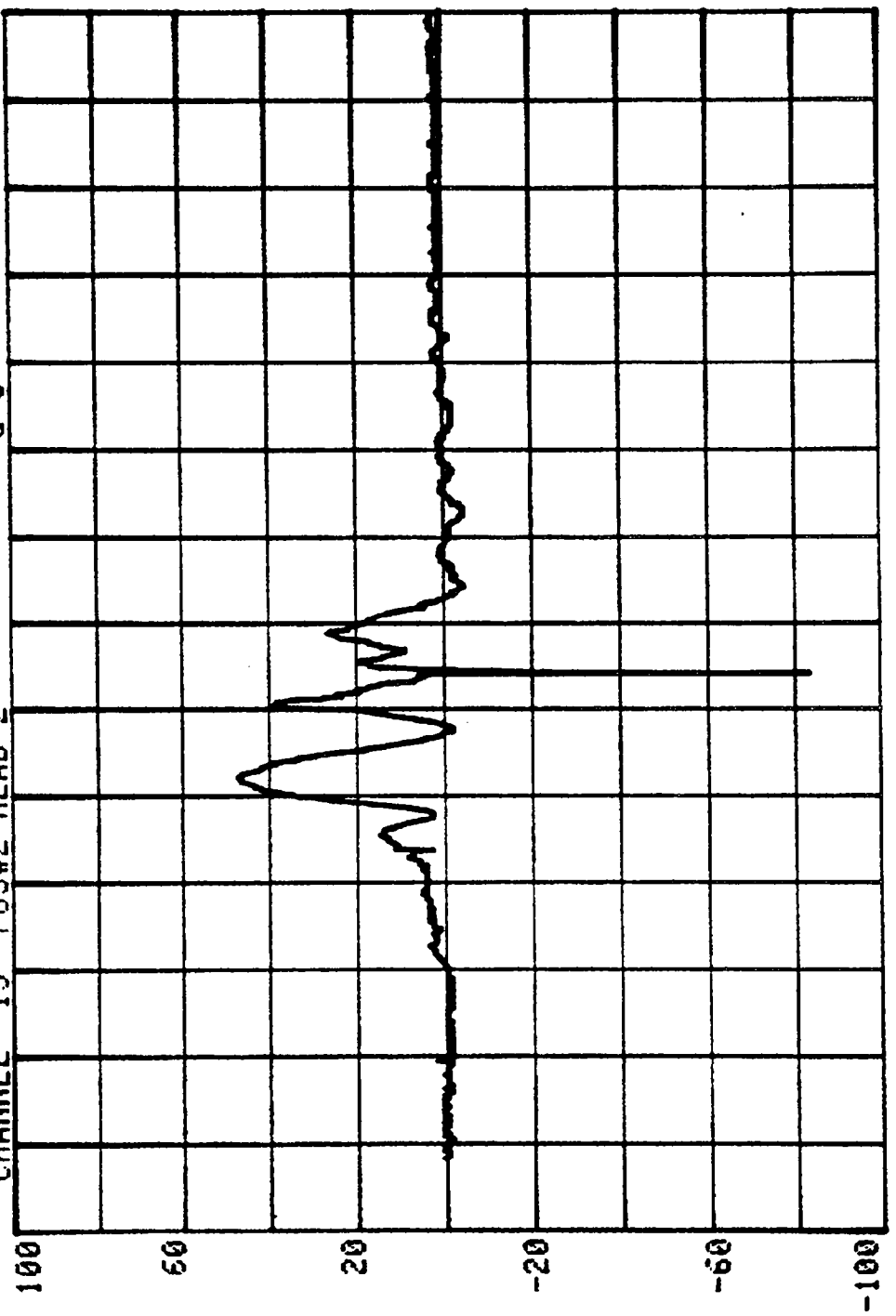


CHANNEL 15 POS#2 HEAD Z

RUN= 598

SERIES= 207

G'S

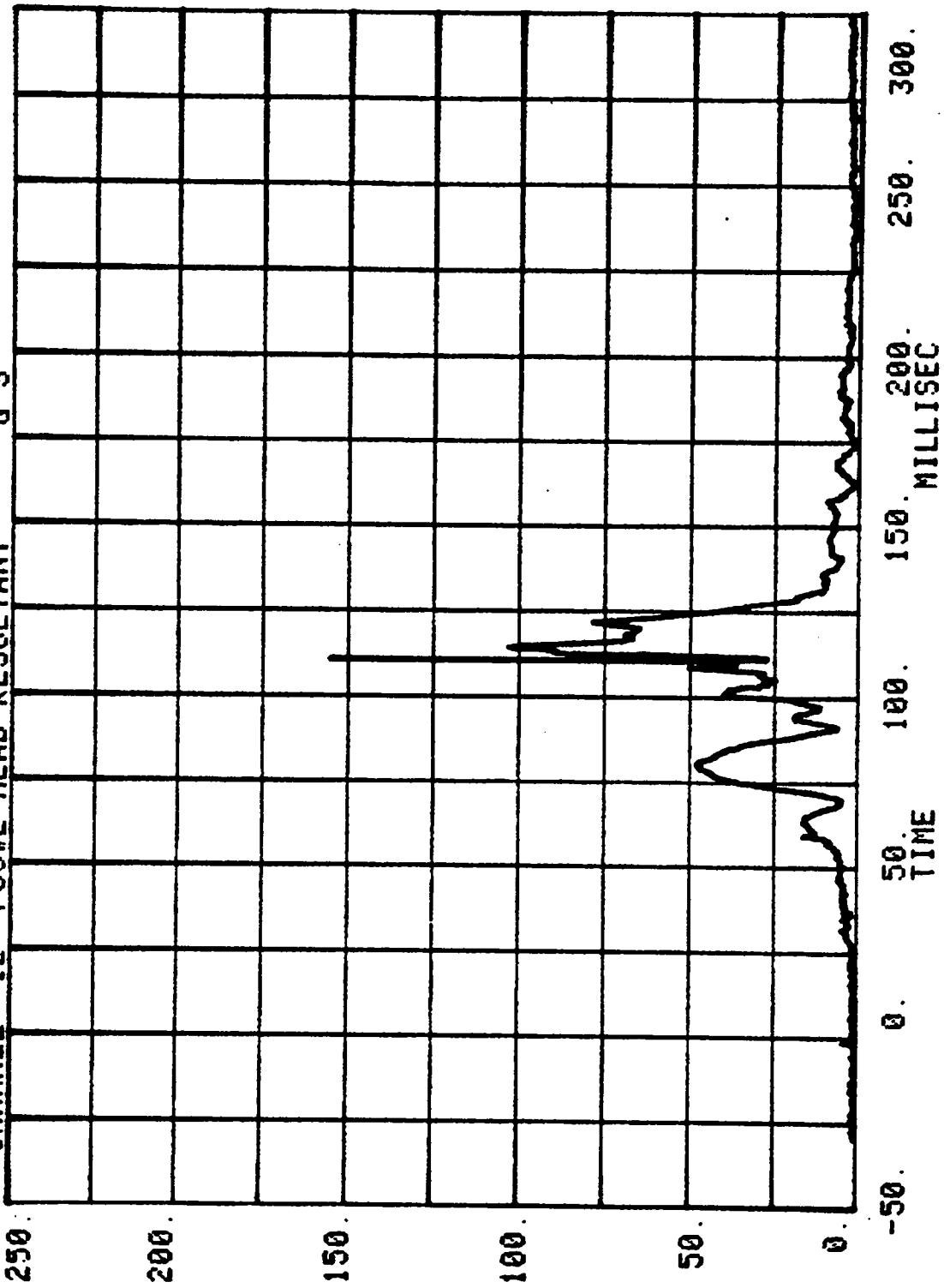


100  
60  
20  
-20  
-60  
-100

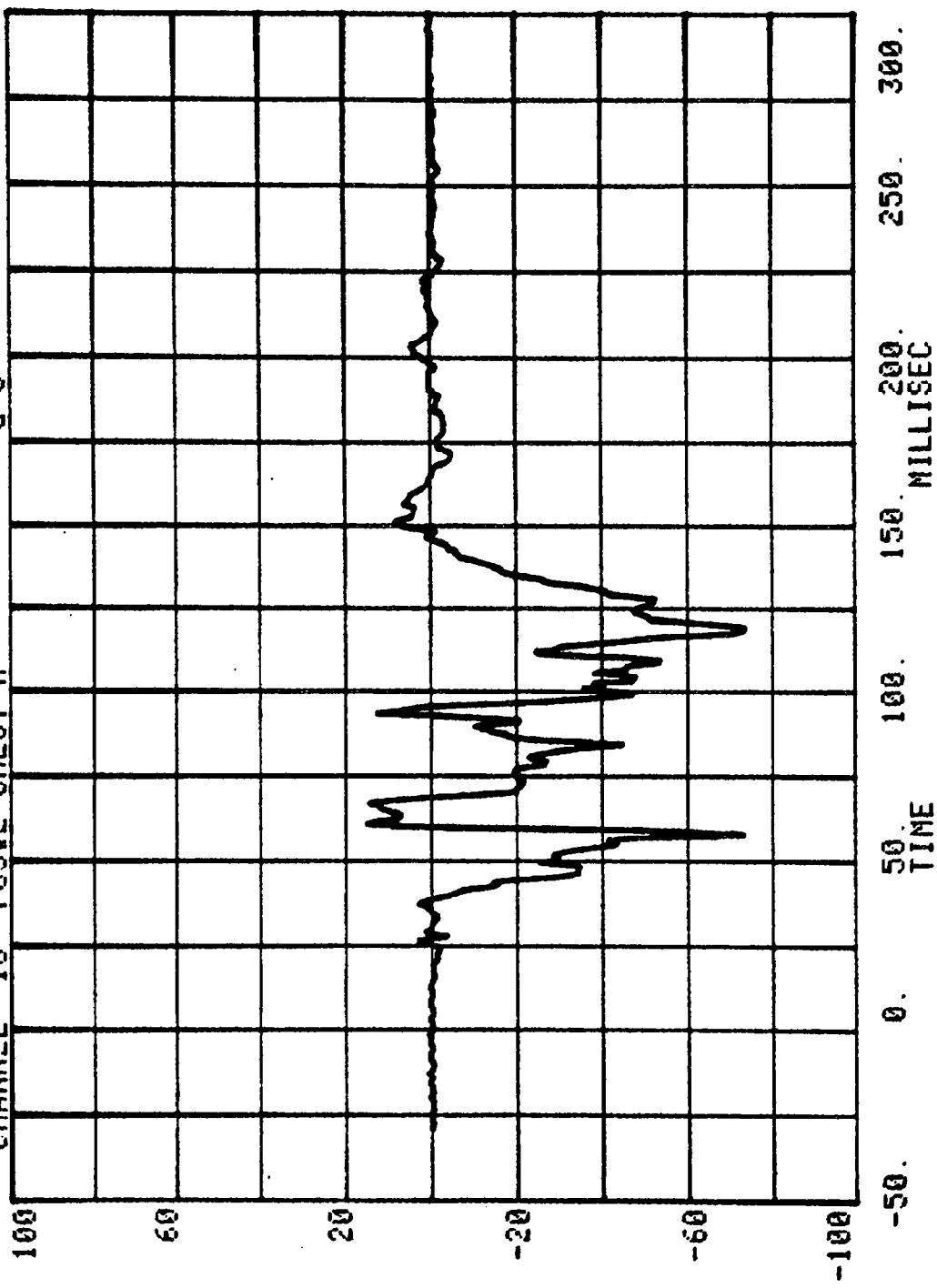
0. 50. 100. 150. 200. 250. 300.

TIME  
MILLISEC

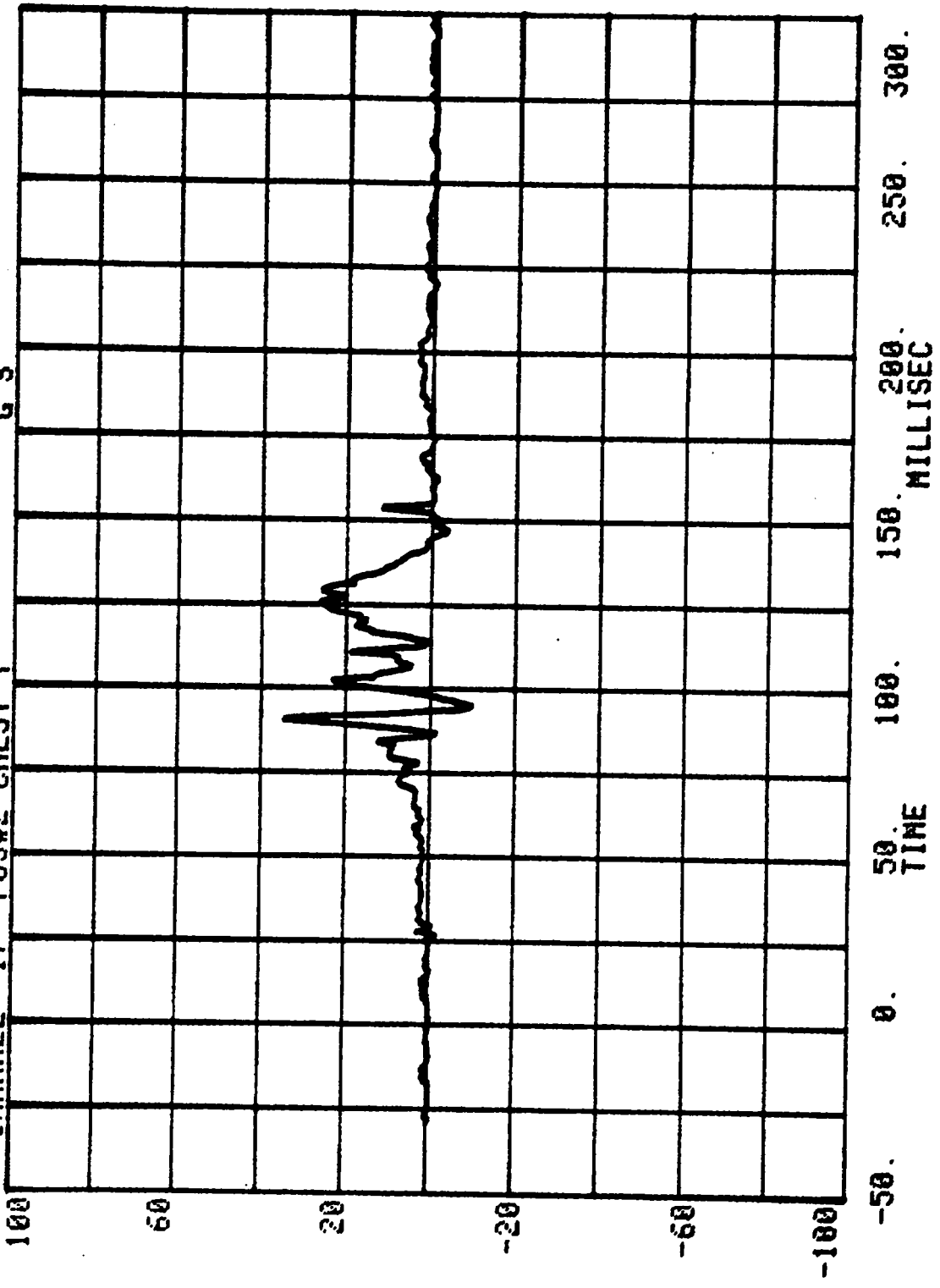
CHANNEL 12 POS#2 HEAD RESULTANT SERIES= 207 G'S



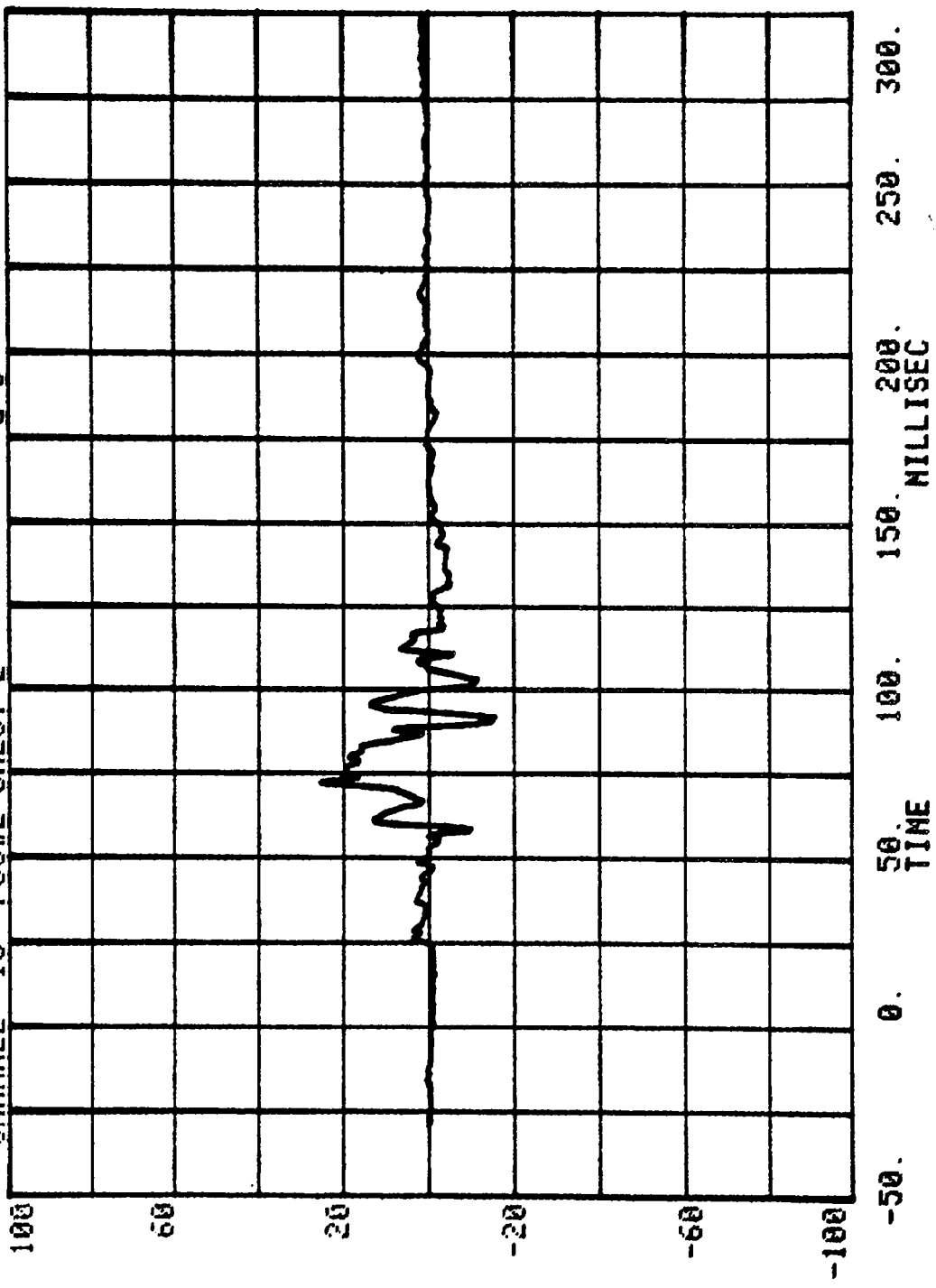
CHANNEL 16 POS#2 CHEST X  
RUN= 598 SERIES= 207 G'S



CHANNEL 17 POS#2 CHEST Y  
RUN= 598 SERIES= 207 G'S

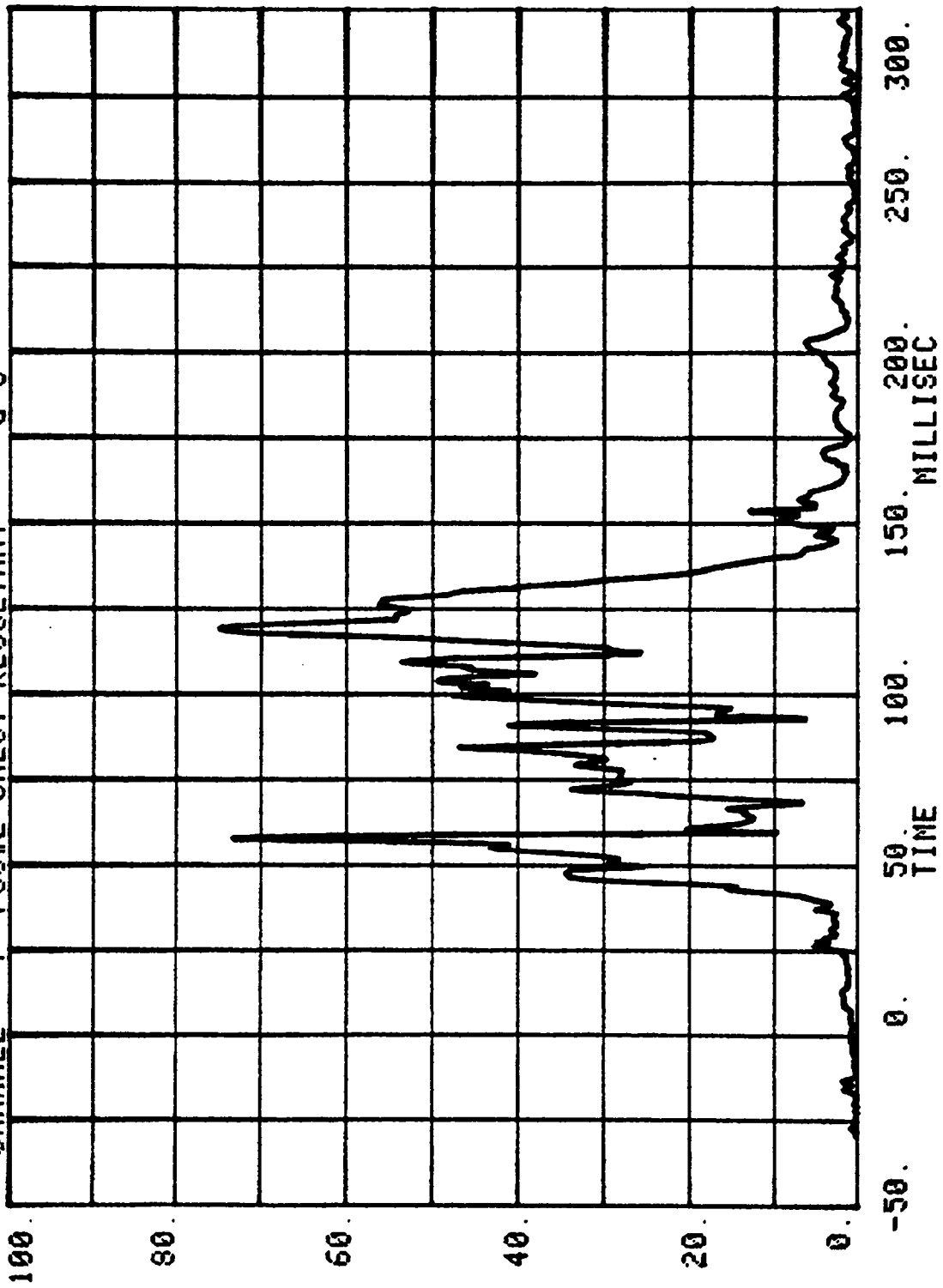


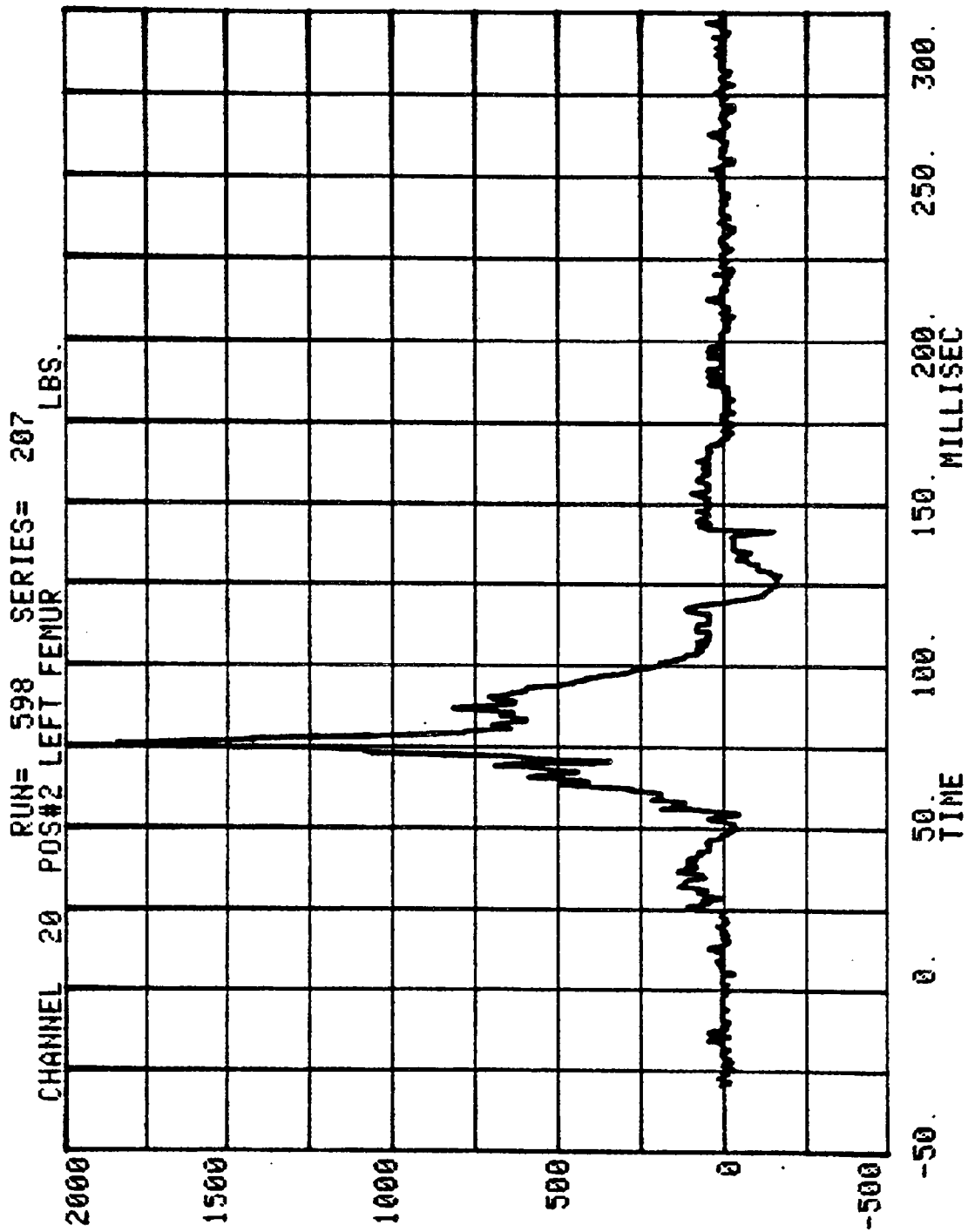
RUN= 598 SERIES= 207 G'S  
CHANNEL 18 POS#2 CHEST Z



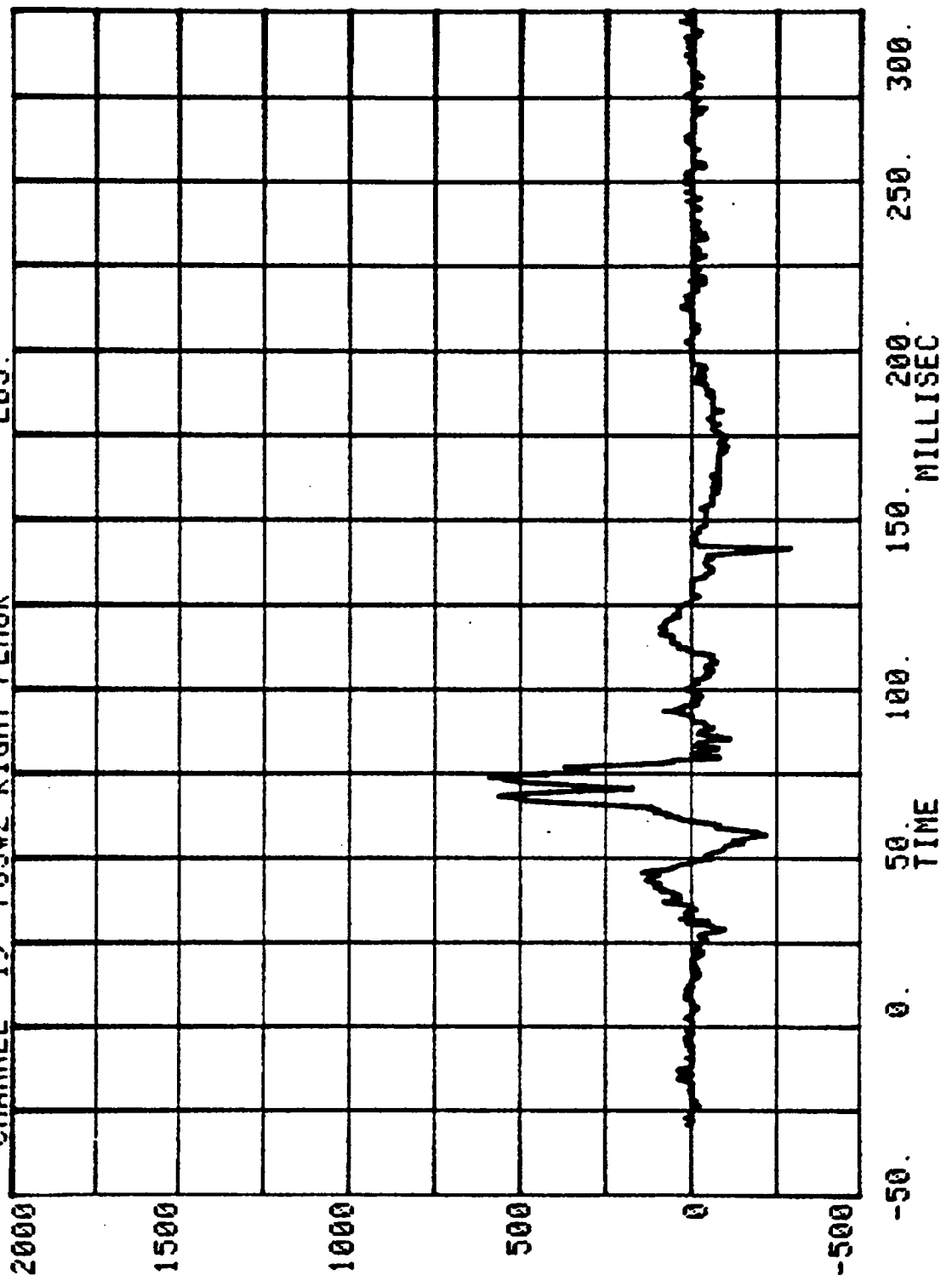
CHANNEL 4 POS#2 CHEST RESULTANT G'S

RUN= 598 SERIES= 207

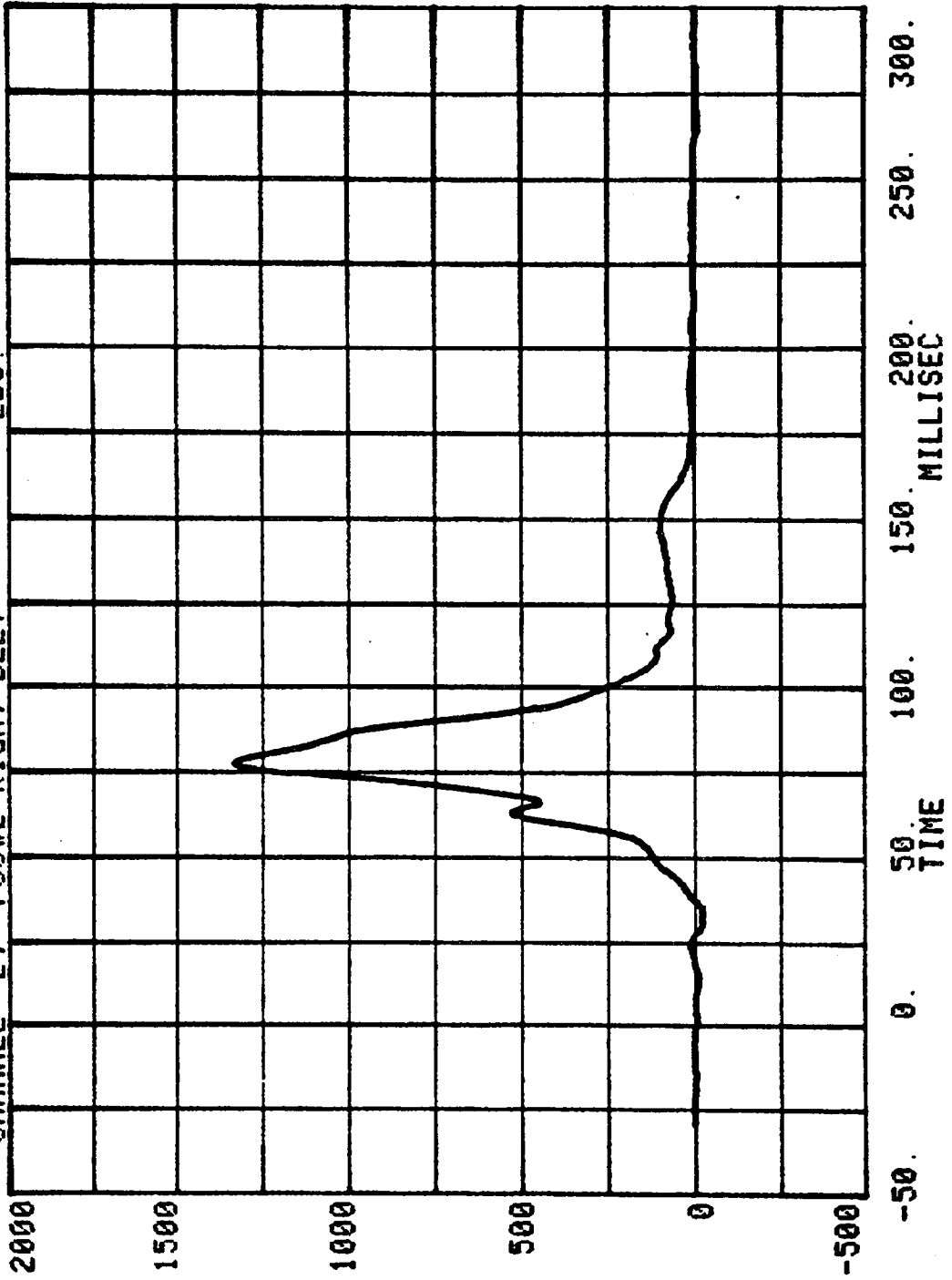




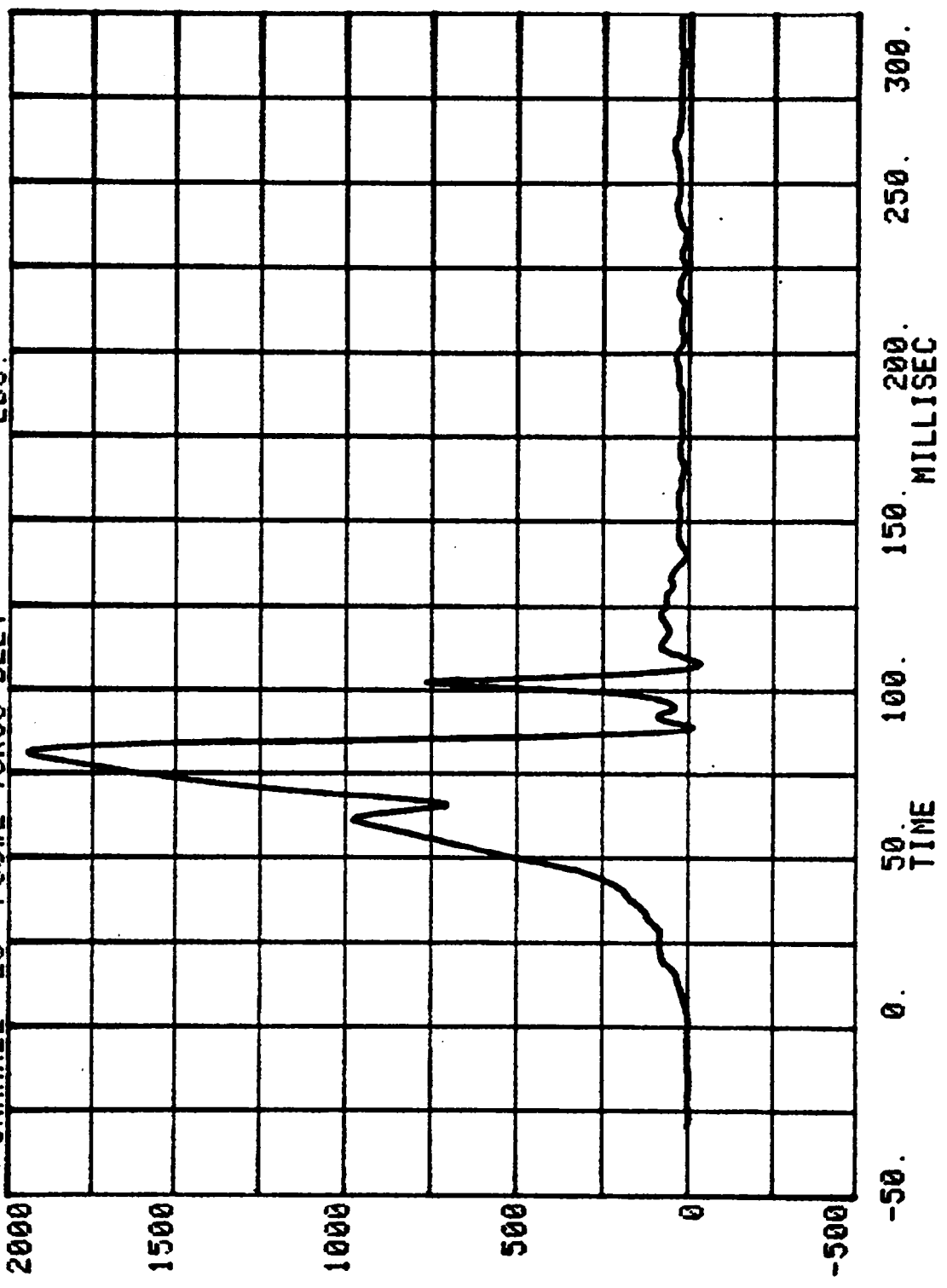
CHANNEL 19 POS#2 RIGHT FEMUR  
RUN= 598 SERIES= 207 LBS.



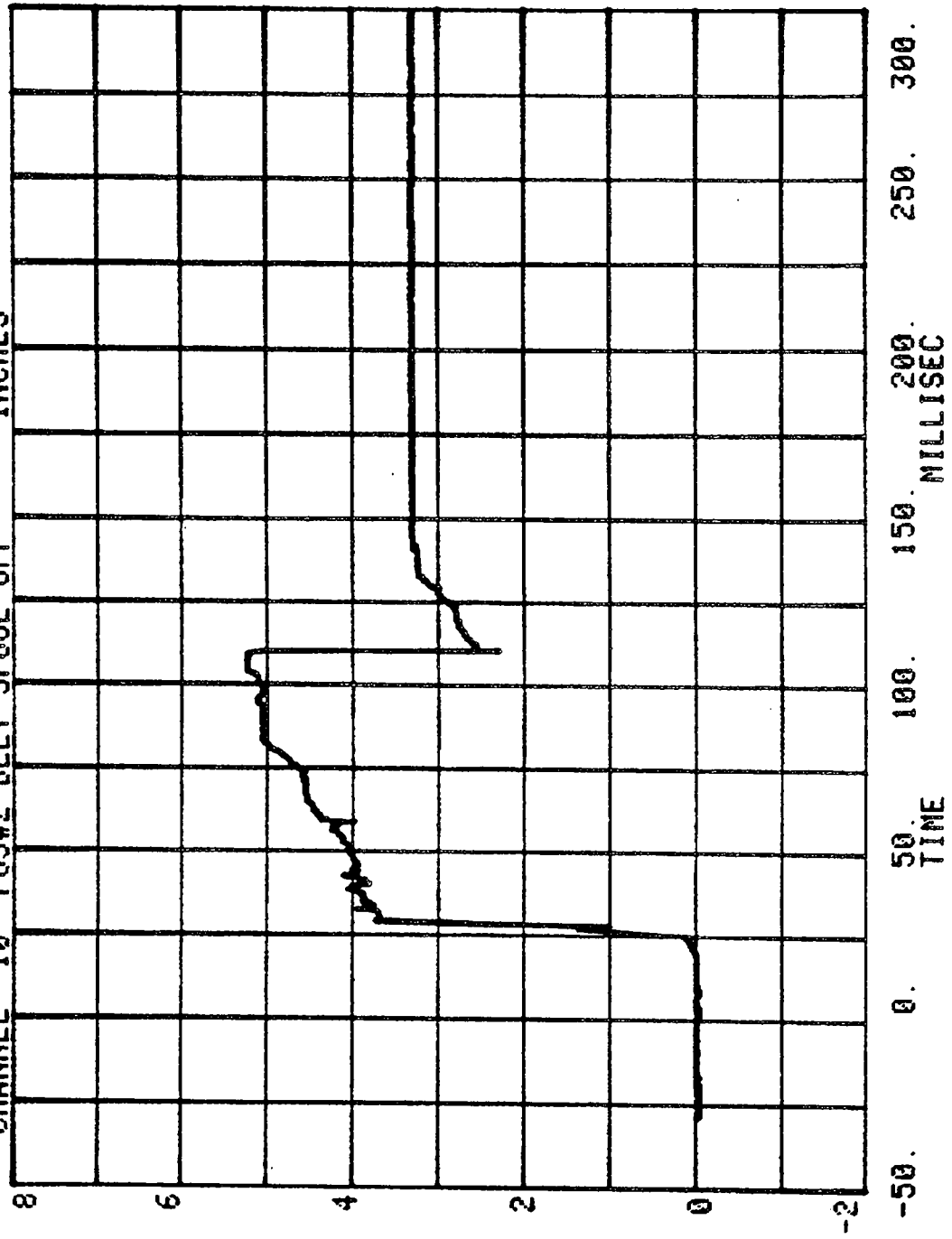
CHANNEL 24 POS#2 RIGHT BELT  
RUN= 598 SERIES= 207 LBS.



CHANNEL 26 POS#2 TORSO BELT  
RUN= 598 SERIES= 207 LBS.



RUN= 598 SERIES= 207 INCHES  
CHANNEL 10 POS#2 BELT SPOOL OFF



APPENDIX C  
DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropometric test devices utilized for this crash test. 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, Volume 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, Part 572 specifications and instrument calibration information is included in this Appendix.

Dummy serial numbers and certification dates are:

| <u>Serial No.</u> | <u>Completion Date</u> |
|-------------------|------------------------|
| 819               | 9/20/83                |
| 1021              | 11/1/83                |

#### Electronic Test Equipment

The complement of signal conditioning recording and display equipment in conjunction with dummy certification testing can be found in New Car Assessment and Standards Indicant Testing Final Report, Report No. 6525-V-1.

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 1021

LABORATORY TECHNICIAN: Gary Gestwick

| APPROVED BY: <u>R. Alicanella</u>                                       |                  | Pre-Test Calibration | Post-Test Calibration |
|---|------------------|----------------------|-----------------------|
| Date of Dummy Calibration - - - - -                                     |                  | 10/31/83-11/1/83     |                       |
| Calibration Sequential Number for Dummy - - - -                         |                  | 3                    |                       |
| Temperature in Lab. (Spec. = 66 to 78°F)- - - -                         |                  | 70° - 74°            |                       |
| Relative Humidity in Lab. (Spec. = 10 to 70%) -                         |                  | 26% - 32%            |                       |
| TEST PARAMETER  | SPECIFICATION    |                      |                       |
| <b>1. HEAD DROP TEST:</b>   |                  |                      |                       |
| a. Peak Resultant Accel. -  | 210 to 260G      | 240 g                |                       |
| b. Peak Lateral Accel. - -  | ≤10G             | 2 g                  |                       |
| c. Time above 100G - - - -  | 0.9 to 1.5 ms    | 1.1 ms.              |                       |
| <b>2. NECK BENDING TEST:</b>  |                  |                      |                       |
| a. Pendulum Speed - - - -   | 21.5 to 25.5 fps | 22.36 fps            |                       |
| b. Pendulum Avg. Decel. (over t <sub>3</sub> - t <sub>2</sub> ) - - - - | 20 to 24G        | 23 g                 |                       |
| c. Peak Resultant Head Acceleration - - - -                             | 26G maximum      | 19 g                 |                       |
| d. Pendulum Decel. (t <sub>2</sub> -t <sub>1</sub> )                    | ≤ 3 ms           | 2.8 ms.              |                       |
| e. Pendulum Decel. (t <sub>3</sub> -t <sub>2</sub> )                    | 25 to 30 ms      | 26.9 ms.             |                       |
| f. Pendulum Decel. (t <sub>4</sub> -t <sub>3</sub> )                    | ≤10 ms           | 4.4 ms.              |                       |
| g. Pendulum Direction Reversal Time - - - -                             |                  | 117 ms.              |                       |
| h. Max. Head Rotation - -   | 63 to 73°        | 73°                  |                       |
| i. Chordal Displacement:  |                  |                      |                       |
| Head Rotation Angle - -   |                  |                      |                       |
| 0°  | Time             | -2 to 2 ms           | 0 ms.                 |
|   | Displ.           | -.5 to .5 in         | 0.0 in.               |
| 30°   | Time             | 25.6 to 34.4 ms      | 29.5 ms.              |
|   | Displ.           | 2.1 to 3.1 in.       | 2.8 in.               |
| 50°   | Time             | 40.3 to 51.7 ms      | 43 ms.                |
|   | Displ.           | 4.3 to 5.3 in.       | 4.7 in.               |
| Maximum (73°)   | Time             | 53.2 to 66.8 ms      | 57 ms.                |
|   | Displ.           | 5.0 to 6.0 in.       | 5.6 in.               |

Continued

| TEST PARAMETER                        | SPECIFICATION     | Pre-Test Calibration | Post-Test Calibration |
|---------------------------------------|-------------------|----------------------|-----------------------|
| <b>2. NECK BENDING TEST ....</b>      |                   |                      |                       |
| <u>Continued</u>                      |                   |                      |                       |
| i. Chordal Displacement:              |                   |                      |                       |
| Head Rotation Angle --                |                   |                      |                       |
| 60°                                   | Time              | 67.0 to 83.0 ms      | 79 ms.                |
|                                       | Displ.            | 4.3 to 5.3 in.       | 4.6 in.               |
| 30°                                   | Time              | 85.4 to 104.6 ms     | 95.5 ms.              |
|                                       | Displ.            | 2.1 to 3.1 in.       | 2.5 in.               |
| 0°                                    | Time              | 101.0 to 123.0 ms    | 110 ms.               |
|                                       | Displ.            | -.5 to 0.5 in.       | 0.0 in.               |
| <b>3. ABDOMINAL COMPRESSION TEST:</b> |                   |                      |                       |
| (Preload = 10 pounds)                 |                   |                      |                       |
| a. Force @ 1" - - - -                 | 50 to 63 lbs.     | 55 lbs.              |                       |
| b. Force @ 1.3" - - - -               | 73 to 88 lbs.     | 88 lbs.              |                       |
| <b>4. LUMBAR FLEXION TEST:</b>        |                   |                      |                       |
| a. Force @ 20° - - - -                | 22 to 34 lbs.     | 28.0 lbs.            |                       |
| b. Force @ 30° - - - -                | 34 to 46 lbs.     | 34.5 lbs.            |                       |
| c. Force @ 40° - - - -                | 46 to 58 lbs.     | 47.5 lbs.            |                       |
| d. Return Angle - - -                 | 12° maximum       | 9°                   |                       |
| <b>5. CHEST IMPACT TESTS:</b>         |                   |                      |                       |
| a. High Speed                         |                   |                      |                       |
| (1) Probe Speed - -                   | 21.78-22.22 fps   | 21.98 fps            |                       |
| (2) Peak Deflection -                 | 1.7" maximum      | 1.68 in.             |                       |
| (3) Peak Resistive Force - - - - -    | 2250 lbs. maximum | 1940 lbs.            |                       |
| (4) Internal Hysteresis - - - -       | 50 to 70%         | 59.3%                |                       |
| b. Low Speed                          |                   |                      |                       |
| (1) Probe Speed - - -                 | 13.86-14.14 fps   | 14.04 fps            |                       |
| (2) Peak Deflection -                 | 1.1" maximum      | 1.1 in.              |                       |
| (3) Peak Resistive Force - - - - -    | 1450 lbs. maximum | 1210 lbs.            |                       |
| (4) Internal Hysteresis - - - -       | 50 to 70%         | 56.1%                |                       |

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

NHTSA DUMMY ID NO. 1021

| 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  | 6.95 fps             |                       |
| (2) Maximum Force - -        | 1850 to 2500 lbs  | 2250 lbs.            |                       |
| (3) Time Above 1000#         | 1.7 ms minimum    | 2.0 ms.              |                       |
| b. Left Side --              |                   |                      |                       |
| (1) Probe Speed - - -        | 6.76 to 7.04 fps  | 6.89 fps             |                       |
| (2) Maximum Force - -        | 1850 to 2500 lbs. | 2000 lbs.            |                       |
| (3) Time Above 1000#         | 1.7 ms minimum    | 2.16 ms.             |                       |

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1021

CALIB. SEQ. NOS. FOR DUMMY: 3 & \_\_\_\_\_

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 NUMBER | DATE LAST CALIBRATED | DATE OF NEXT CALIBRATION |
|----------------|---------------|----------------------|--------------------------|
|                |               |                      |                          |
| ENDEVCO        | DB47          | 7/83                 | 1/84                     |
| ENDEVCO        | CX05          | 7/83                 | 1/84                     |
| ENDEVCO        | CJ54          | 7/83                 | 1/84                     |
|                |               |                      |                          |
|                |               |                      |                          |
|                |               |                      |                          |
|                |               |                      |                          |
| GSE            | 312           | 7/83                 | 1/84                     |
| GSE            | 311           | 7/83                 | 1/84                     |
| CEC            | 22707         | 7/83                 | 1/84                     |
| CEC            | 22958         | 7/83                 | 1/84                     |
| TRANSDUCER INC | 20051         | 7/83                 | 1/84                     |
| BLH            | 72952         | 7/83                 | 1/84                     |
| CIC            | 567-11        | 7/83                 | 1/84                     |
|                |               |                      |                          |

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 819

LABORATORY TECHNICIAN: Gary R. Gestwick

APPROVED BY: N. Albanello Pre-Test Calibration      Post-Test Calibration

|  |              |  |
|--|--------------|--|
| Date of Dummy Calibration - - - - -              | 9/13-9/20/83 |  |
| Calibration Sequential Number for Dummy - - - -  | 3            |  |
| Temperature in Lab. (Spec. = 66 to 78°F) - - - - | 72° - 76°    |  |
| Relative Humidity in Lab. (Spec. = 10 to 70%) -  | 44% - 60%    |  |

| TEST PARAMETER   | SPECIFICATION    |                 |         |
|--|------------------|-----------------|---------|
| <b>1. HEAD DROP TEST:</b>  |                  |                 |         |
| a. Peak Resultant Accel. -   | 210 to 260G      | 240G            |         |
| b. Peak Lateral Accel. - -   | ≤10G             | 9G              |         |
| c. Time above 100G - - - -   | 0.9 to 1.5 ms    | 1.07 ms         |         |
| <b>2. NECK BENDING TEST:</b>   |                  |                 |         |
| a. Pendulum Speed - - - -  | 21.5 to 25.5 fps | 22.7 fps        |         |
| b. Pendulum Avg. Decel.<br>(over t <sub>3</sub> - t <sub>2</sub> ) - - - - | 20 to 24G        | 24G             |         |
| c. Peak Resultant Head<br>Acceleration - - - -                             | 26G maximum      | 26G             |         |
| d. Pendulum Decel. (t <sub>2</sub> -t <sub>1</sub> )                       | ≤ 3 ms           | 1.9 ms          |         |
| e. Pendulum Decel. (t <sub>3</sub> -t <sub>2</sub> )                       | 25 to 30 ms      | 26.9 ms         |         |
| f. Pendulum Decel. (t <sub>4</sub> -t <sub>3</sub> )                       | ≤10 ms           | 3.1 ms          |         |
| g. Pendulum Direction<br>Reversal Time - - - -                             |                  | 110 ms          |         |
| h. Max. Head Rotation - -  | 63 to 73°        | 68°             |         |
| <b>i. Chordal Displacement:</b>  |                  |                 |         |
| Head Rotation Angle - -  |                  |                 |         |
| 0°   | Time             | -2 to 2 ms      | 0 ms    |
|  | Displ.           | -.5 to .5 in    | 0.0 in  |
| 30°  | Time             | 25.6 to 34.4 ms | 29 ms   |
|  | Displ.           | 2.1 to 3.1 in.  | 2.9 in. |
| 60°  | Time             | 40.3 to 51.7 ms | 43.5 ms |
|  | Displ.           | 4.3 to 5.3 in.  | 4.7 in. |
| Maximum<br>(68°)   | Time             | 53.2 to 66.8 ms | 53.5 ms |
|  | Displ.           | 5.0 to 6.0 in.  | 5.2 in. |

| TEST PARAMETER                        | SPECIFICATION     | Pre-Test Calibration | Post-Test Calibration |
|---------------------------------------|-------------------|----------------------|-----------------------|
| <b>2. NECK BENDING TEST ....</b>      |                   |                      |                       |
| <u>Continued</u>                      |                   |                      |                       |
| i. Chordal Displacement:              |                   |                      |                       |
| Head Rotation Angle --                |                   |                      |                       |
| 60°                                   | Time              | 67.0 to 83.0 ms      | 67 ms                 |
|                                       | Displ.            | 4.3 to 5.3 in.       | 4.8 in.               |
| 30°                                   | Time              | 85.4 to 104.6 ms     | 88 ms                 |
|                                       | Displ.            | 2.1 to 3.1 in.       | 2.6 in.               |
| 0°                                    | Time              | 101.0 to 123.0 ms    | 104 ms                |
|                                       | Displ.            | -.5 to 0.5 in.       | +0.2 in.              |
| <b>3. ABDOMINAL COMPRESSION TEST:</b> |                   |                      |                       |
| (Preload = 10 pounds)                 |                   |                      |                       |
| a. Force @ 1" - - - - -               | 50 to 63 lbs.     | 57 lbs.              |                       |
| b. Force @ 1.3" - - - - -             | 73 to 88 lbs.     | 88 lbs.              |                       |
| <b>4. LUMBAR FLEXION TEST:</b>        |                   |                      |                       |
| a. Force @ 20° - - - - -              | 22 to 34 lbs.     | 29 lbs.              |                       |
| b. Force @ 30° - - - - -              | 34 to 46 lbs.     | 38 lbs.              |                       |
| c. Force @ 40° - - - - -              | 46 to 58 lbs.     | 47.5 lbs.            |                       |
| d. Return Angle - - -                 | 12° maximum       | 8°                   |                       |
| <b>5. CHEST IMPACT TESTS:</b>         |                   |                      |                       |
| a. High Speed                         |                   |                      |                       |
| (1) Probe Speed - -                   | 21.78-22.22 fps   | 21.90 fps            |                       |
| (2) Peak Deflection -                 | 1.7" maximum      | 1.32"                |                       |
| (3) Peak Resistive Force - - - - -    | 2250 lbs. maximum | 1900 lbs.            |                       |
| (4) Internal Hysteresis - - - - -     | 50 to 70%         | 62.3%                |                       |
| b. Low Speed                          |                   |                      |                       |
| (1) Probe Speed - - -                 | 13.86-14.14 fps   | 13.99 fps            |                       |
| (2) Peak Deflection -                 | 1.1" maximum      | 1.08 "               |                       |
| (3) Peak Resistive Force - - - - -    | 1450 lbs. maximum | 1220 lbs.            |                       |
| (4) Internal Hysteresis - - - - -     | 50 to 70%         | 59.8%                |                       |

| 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  | 7.01 fps             |                       |
| (2) Maximum Force - -        | 1850 to 2500 lbs  | 1950 lbs.            |                       |
| (3) Time Above 1000#         | 1.7 ms minimum    | 2.2 ms               |                       |
| b. Left Side --              |                   |                      |                       |
| (1) Probe Speed - - -        | 6.76 to 7.04 fps  | 6.99 fps             |                       |
| (2) Maximum Force - -        | 1850 to 2500 lbs. | 2300 lbs.            |                       |
| (3) Time Above 1000#         | 1.7 ms minimum    | 2.0 ms               |                       |

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 819

CALIB. SEQ. NOS. FOR DUMMY: 3 & \_\_\_\_\_

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 NUMBER | DATE LAST CALIBRATED | DATE OF NEXT CALIBRATION |
|-----------------|---------------|----------------------|--------------------------|
|                 |               |                      |                          |
| ENDEVCO         | DB47          | 7/83                 | 1/84                     |
| ENDEVCO         | CX05          | 7/83                 | 1/84                     |
| ENDEVCO         | CJ54          | 7/83                 | 1/84                     |
|                 |               |                      |                          |
|                 |               |                      |                          |
|                 |               |                      |                          |
|                 |               |                      |                          |
| GSE             | 312           | 7/83                 | 1/84                     |
| GSE             | 311           | 7/83                 | 1/84                     |
| CEC             | 22707         | 7/83                 | 1/84                     |
| CEC             | 22958         | 7/83                 | 1/84                     |
| TRANSDUCER INC. | 20051         | 7/83                 | 1/84                     |
| BLH             | 72952         | 7/83                 | 1/84                     |
| CIC             | 567-11        | 7/83                 | 1/84                     |
|                 |               |                      |                          |