

REPORT NOS. 212-CAL-84-070

301-CAL-84-070

NHTSA NEW VEHICLE ASSESSMENT AND  
STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS 212 AND 301-75

MITSUBISHI MOTOR CORPORATION  
1984 PLYMOUTH COLT VISTA  
4-DOOR WAGON

NHTSA NO. CE0303  
CALSPAN TEST NO. 7209-7

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FINAL REPORT

Prepared for:

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16. Abstract  <p>A frontal load cell barrier test of a 1984 Plymouth Colt Vista 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 35.4 mph. Ambient temperature on the test data was 45°F. The post-test vehicle crush was 21.4 inches and intrusion of the firewall into compartment was 10.8 inches.</p> <p>The test vehicle appeared to comply with the following vehicle performance standards:</p> <p>FMVSS 212 - Windshield Retention FMVSS 301-75 - Fuel System Integrity</p> <p>With regard to occupant injury criteria (FMVSS 208), both the driver and passenger dummy head HIC responses appeared to exceed the 1000 limit. The driver also exceeded the chest criteria with a 3 millisecond chest resultant of 71.7 g's and the left femur load criteria (2950 lbs.).</p>					
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SECTION 1  
PURPOSE AND TEST PROCEDURE

This frontal barrier test is part of the Composite FY 83 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 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 nominally 35 mph impact are provided herein.

SECTION 2  
SUMMARY OF TEST NUMBER CE0303

A load cell barrier consisting of 36 load cells (Figure 4) was impacted by a 1984 Plymouth Colt Vista wagon at a velocity of 35.4 mph. The test was performed at the Calspan Corporation, Advanced Technology Center on November 11, 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 1984 Plymouth Colt Vista wagon in the driver and right-front passenger seating positions, according to dummy placement procedures specified in Laboratory Procedures 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. 749) and the right-front passenger ATD (Serial No. 162) had been used in a previous test (CE1301). The FMVSS 208 Injury Criteria Values were not exceeded in that test. Dummy certification details along with instrumentation calibration data are found in Appendix C of this report.

The crash test 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 67 channels of data were recorded on six 14-channel FM tape recorders. Appendix B contains the vehicle, load cell barrier and dummy response data traces. The Injury Criteria values are presented in Table 10.

Table 1

CRASH TEST SUMMARY

TEST NO. CE0303 PROJECT: FY-84 New Car Assessment Program  
EMVSS No. 208/212/301-75

DATE: 11/18/83 TIME: 1145 hrs. TEMP: 45°F.

VEHICLE 1984 Plymouth Colt Vista 4-Door Wagon

TEST WEIGHT (lbs) 2980

IMPACT ANGLE (deg)\* 0

IMPACT VELOCITY (mph)\*\* 35.4

MAX. CRUSH (in) static 21.4

MAX. INTRUSION (in) 10.8

DUMMIES

TYPE Hybrid II Part 572 Hybrid II Part 572

LOCATION LF (1) Serial 749 RF (2) Serial 162

RESTRAINT production 3-point production 3-point  
belt system belt system

NUMBER OF DATA CHANNELS 67

NUMBER OF HIGH SPEED CAMERAS 15 plus 1 real time

\*With respect to tow track Centerline

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

## GENERAL COMMENTS

The 1984 Plymouth Colt Vista 4-door wagon was equipped with a 121.9 cubic inch, 4-cylinder engine, four-speed manual transmission, power brakes and power steering. The total test weight with two 50th percentile male dummies, instrumentation and two on-board cameras was 2980 pounds.

The 1984 Plymouth Colt Vista wagon which was involved in a frontal load cell barrier crash at a velocity of 35.4 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 21.4 inches of static crush and approximately 29 inches of dynamic crush. Maximum firewall intrusion into the occupant compartment was 10.8 inches. The maximum load cell barrier force measured by the 36 load cells was 102,000 at 26 milliseconds.

At impact the steering column and wheel moved rearward and upward striking the driver head and chest (Figures A-23 and A-25). The driver exceeded the FMVSS 208 Injury Criteria for the head and chest with a HIC number of 1530.3 and a maximum chest deceleration over 3 milliseconds of 71.1 g's. The left femur also exceeded the criteria with a femur load of 2950 pounds.

The right-front passenger head struck the dash panel (Figure A-29) and thus did not meet the FMVSS 208 Head Injury Criteria (HIC 1003.6) but did meet all other criteria. A maximum chest deceleration over 3 milliseconds of 44.7 g's and femur loads of 830 and 640 pounds were recorded.

Belt related data for each occupant are presented in Table 11 of this report.



Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = 720 lbs.      Right Rear = 550 lbs.  
 Left Front = 720 lbs.      Left Rear = 550 lbs.  
 TOTAL FRONT WEIGHT = 1440 lbs. ( 56.7 % of Total Vehicle Weight)  
 TOTAL REAR WEIGHT = 1100 lbs. ( 43.3 % of Total Vehicle Weight)  
 TOTAL DELIVERY WEIGHT = 2540 lbs.

CALCULATION FOR TARGET TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight  
 UDW = Unloaded Delivered Weight ( 2540 lbs.)  
 VCW = Vehicle Capacity Weight ( 1158 lbs.)  
 DSC = Designated Seating Capacity ( 7 )  
 RCLW = VCW - 150 (DSC) = 108 lbs.  
 Target Test Weight = UDW + RCLW + (2 dummies X 164 lbs./dummy)  
 Target Test Weight = 2976 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 112 POUNDS CARGO

Right Front = 830 lbs.      Right Rear = 670 lbs.  
 Left Front = 800 lbs.      Left Rear = 680 lbs.  
 TOTAL FRONT WEIGHT = 1630 lbs. ( 54.7 % of Total Vehicle Weight)  
 TOTAL REAR WEIGHT = 1350 lbs. ( 45.3 % of Total Vehicle Weight)  
 TOTAL TEST WEIGHT = 2980 lbs.  
 Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 26.2 LF 26.1 RR 25.6 LR 26.2  
 Test Attitude: RF 25.9 LF 25.7 RR 24.5 LR 24.3  
 Remarks: Wheel Base = 103.4  
C/G = 46.8 inches aft of front wheel C/L

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA

Type of Test Frontal Impact Impact Angle 0 °  
 Date of Test 11/18/83 Time of Test 1145 hrs.  
 Ambient Temperature 45° °F at impact area  
 Temperature in Occupant Compartment 68 °F.  
 Windshield Molding Temperature 46 °F  
 Required Impact Velocity Range: 34.5 to 35.5 mph  
 Impact Velocity: primary = 35.4 mph, secondary 35.22 mph

VEHICLE REBOUND AND CRUSH (inches)

Vehicle Length: Pre-test = R 172.5 C 175.0 L 172.5  
 Post-test = R 152.2 C 153.6 L 152.7  
 Crush = R 20.3 C 21.4 L 19.8  
 Distance from front of test vehicle to point of impact:  
 R 16.3 C/L 15.8 L 15.7

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>steering wheel hub</u>	<u>dash panel</u>
Chest	<u>steering wheel</u>	<u>--</u>
Abdomen	<u>--</u>	<u>--</u>
Left Knee	<u>under dash panel</u>	<u>dash panel</u>
Right Knee	<u>under dash panel</u>	<u>dash panel</u>

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Door Opening	<u>not operable</u>	<u>not operable</u>	<u>operable</u>	<u>operable</u>

Table 2 (cont'd)

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	<u>Front</u>	
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>no</u>	<u>no</u>
Seat Shift (in.)	<u>no</u>	<u>no</u>

Glazing Damage

Backlight/Windshield Windshield shattered along the bottom

Other notable impact effects: None

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### 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: Plymouth Colt Vista  
Body Style: 4-door wagon Model Year: 1984  
NHTSA No.: CE0303 Color: cream

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Mitsubishi Motor Corporation  
Date of Manufacture: July, 1983 VIN: JP3BG39D7E2400328  
GVWR: 3807 lbs., GAWR: Front 1874 lbs., Rear 1933 lbs.

POST-IMPACT DATA

Type of Test: Load cell barrier - frontal impact  
Date of Test: 11/18/83 Time: 1145 hrs. Temp.: 45 °F  
Required Impact Velocity Range: 34.5 to 35.5 mph  
Impact Velocity: Primary = 35.4 mph, Secondary = 35.22 mph  
Test Weight 2980 lbs., Static Crush Max. 21.4 in., Rebound 16.3 in.

FUEL SYSTEM DATA

Test Fluid Type: Red Stoddard Solvent #2, Spec. Grav.: 0.764  
Kinematic Viscosity 0.96 Centistokes  
EPA Capacity\* 13.2 gal.  
Test Volume 12.3 gal. (93% of EPA Capacity)  
Fuel System Capacity (data from Owner's Manual) 13.2 gal.  
Electric Fuel Pump? yes  no, Fuel Injection? yes  no  
Does electric fuel pump operate with ignition switch "on" and the engine  
not operating? N/A yes N/A 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

Table 3 .

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

Details of fuel system: The fuel tank is located between rear wheels and held in place with 6 bolts. The filler tube is on the left side of vehicle and sealed by a twist type cap which is concealed by a hinged door.

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Table 4

POST-IMPACT DATA - FMVSS NOS. 212, AND 301-75

DATA SHEET

TYPE OF TEST  X  Frontal (0°) Impact  
  Oblique (  °) Impact on   Left (Driver's) Side  
  Right Side  
  Lateral or Side Impact on   Left (Driver's) Side  
  Right Side  
  Rear Impact

DATE OF TEST  11/18/83  TIME  1145 hrs.  TEMP  45  °F

VEHICLE NHTSA NO.  CE0303  VIN  JP3BG39D7E2400328

REQUIRED VEHICLE VELOCITY RANGE  34.5  to  35.5  mph

IMPACT VELOCITY (traps within 5 feet of impact event)  5

Trap No. 1 =  35.4  mph Trap No. 2 =  35.22  mph

Distance from the vehicle's front bumper to the barrier face entering  
the vehicle velocity measurement device =  58

exiting the vehicle velocity measurement device =  18

VEHICLE STATIC CRUSH (for frontal and rear impacts only)

Driver's Side =  19.8  in Passenger's Side =  20.3  in  
C/L =  21.4  in. Average =  20.5  in.

Crush Details:

VEHICLE STATIC CRUSH (for side impacts only)

Amount of Crush =  --  inches on  --  side

Crush Details:

VEHICLE REBOUND (from rigid barrier only)

Driver's Side =  15.7  in Passenger's Side =  16.3  in  
C/L =  15.8  in. Average =  15.9  in.

REMARKS

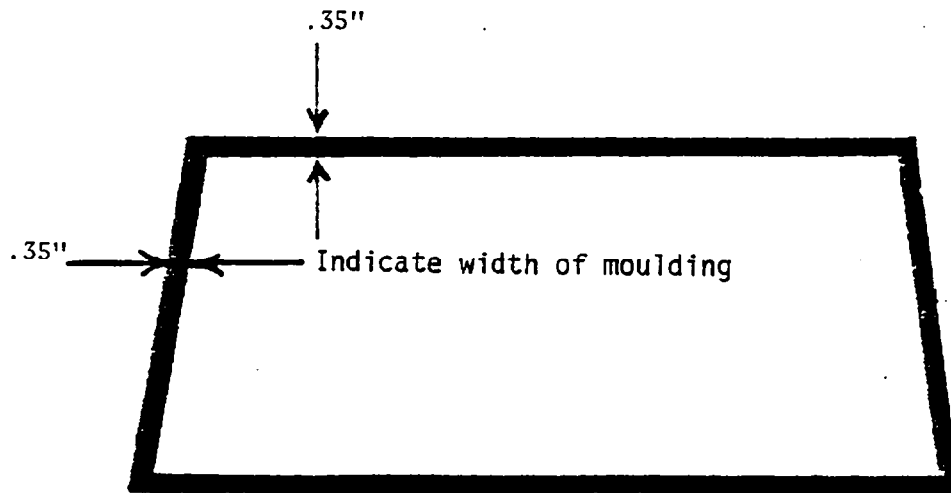
Details of windshield mounting (method of retention, type of trim, etc.):

Windshield is bonded in place and has a .35 inch plastic strip along the top and sides.

	Windshield Periphery		Retention %
	Pre-Test (in.)	Post-Test (in.)	
Right Side	79.25	79.25	100
Left Side	79.25	79.25	100
TOTAL	158.5	158.5	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 5

"FUEL SYSTEM INTEGRITY" POST-IMPACT TEST DATA

FMVSS No. 301-75

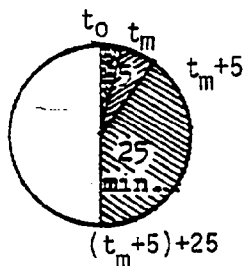
TEST VEHICLE NHTSA NO. CE0303 Test Date 11/18/83  
 Vehicle Manufacture/Make/Model 1984 Plymouth Colt Vista 4-door wagon

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

TEST VEHICLE IMPACT TYPE

- Frontal (35 mph)
- Oblique (30 mph) with \_\_\_\_\_° barrier face first contacting  
     \_\_\_\_\_ driver \_\_\_\_\_ passenger side
- Rear Moving Barrier (35 mph)
- Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT



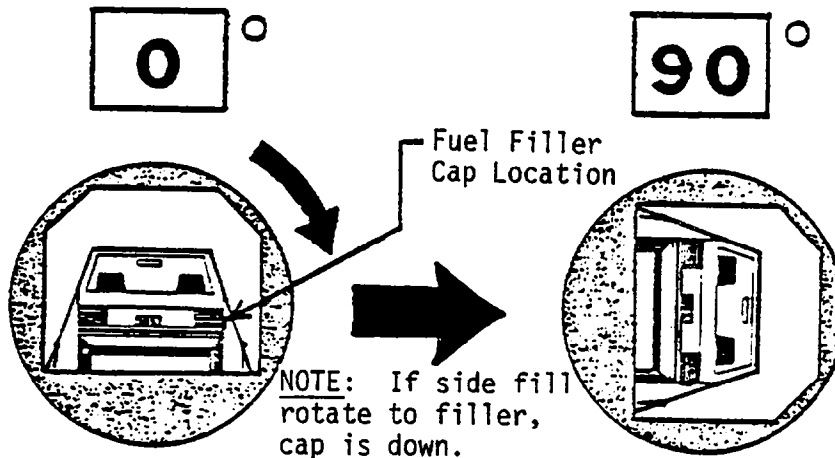
	Actual	Max. Allow.
From impact until vehicle motion ceases	0	1 oz
For 5 min. period after vehicle motion ceases	0	5 oz
For next 25 min.	0	1 oz/1 min

SOLVENT SPILLAGE DETAILS

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

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

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time	=	<u>2</u> minutes	<u>44</u> seconds
(Spec. Range = 1 to 3 min.)			
FMVSS 301-75 Position Hold Time	=	<u>5</u> minutes	<u>00</u> seconds
TOTAL	=	<u>7</u> minutes	<u>44</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
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ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
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NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

None

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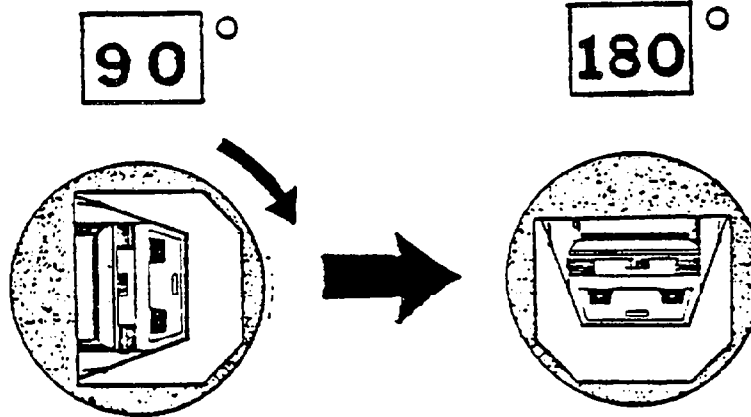
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VEHICLE NHTSA ID NO. CE0303

Table 6 (cont'd)

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Roll-over 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.
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Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
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ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
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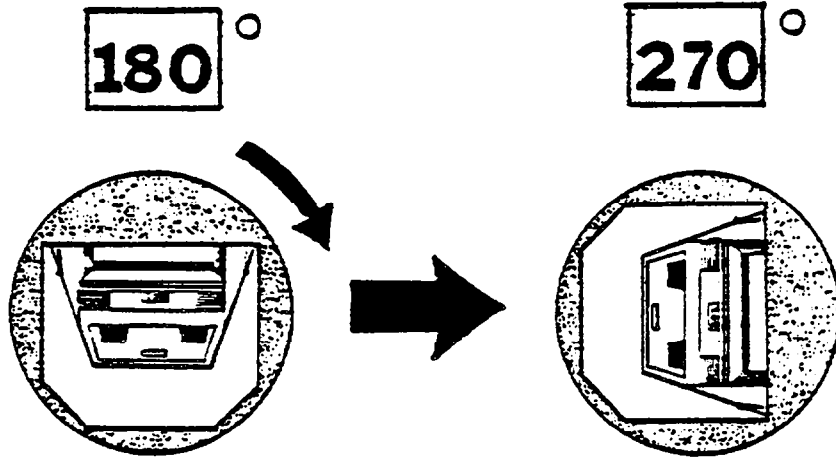
NOTE: Record spillage for whole minute intervals only as determined above.

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 (Spec. Range = 1 to 3 min.)	=	<u>2</u> minutes	<u>56</u> seconds
FMVSS 301-75 Position Hold Time	=	<u>5</u> minutes	<u>00</u> seconds
TOTAL	=	<u>7</u> minutes	<u>56</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
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ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
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NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

None

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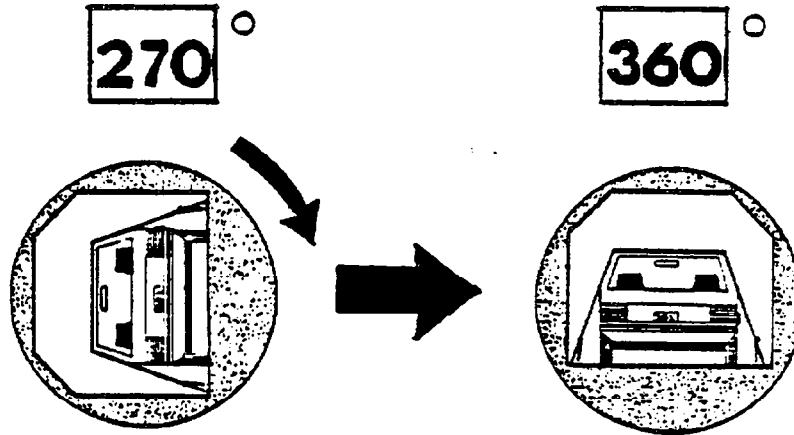
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VEHICLE NHTSA ID NO. CE0303

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 54 seconds  
(Spec. Range = 1 to 3 min.)  
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds  
TOTAL = 7 minutes 54 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
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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

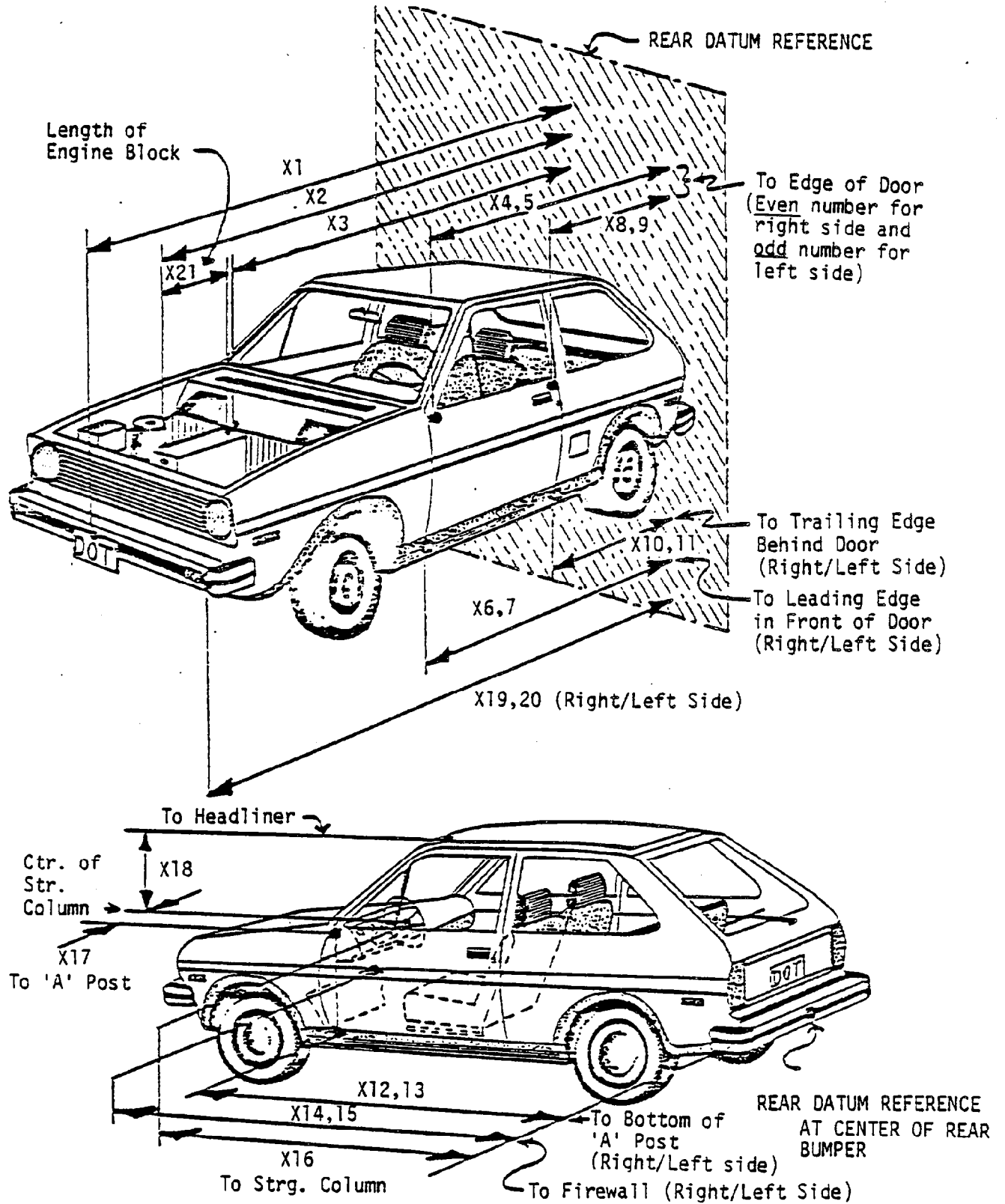
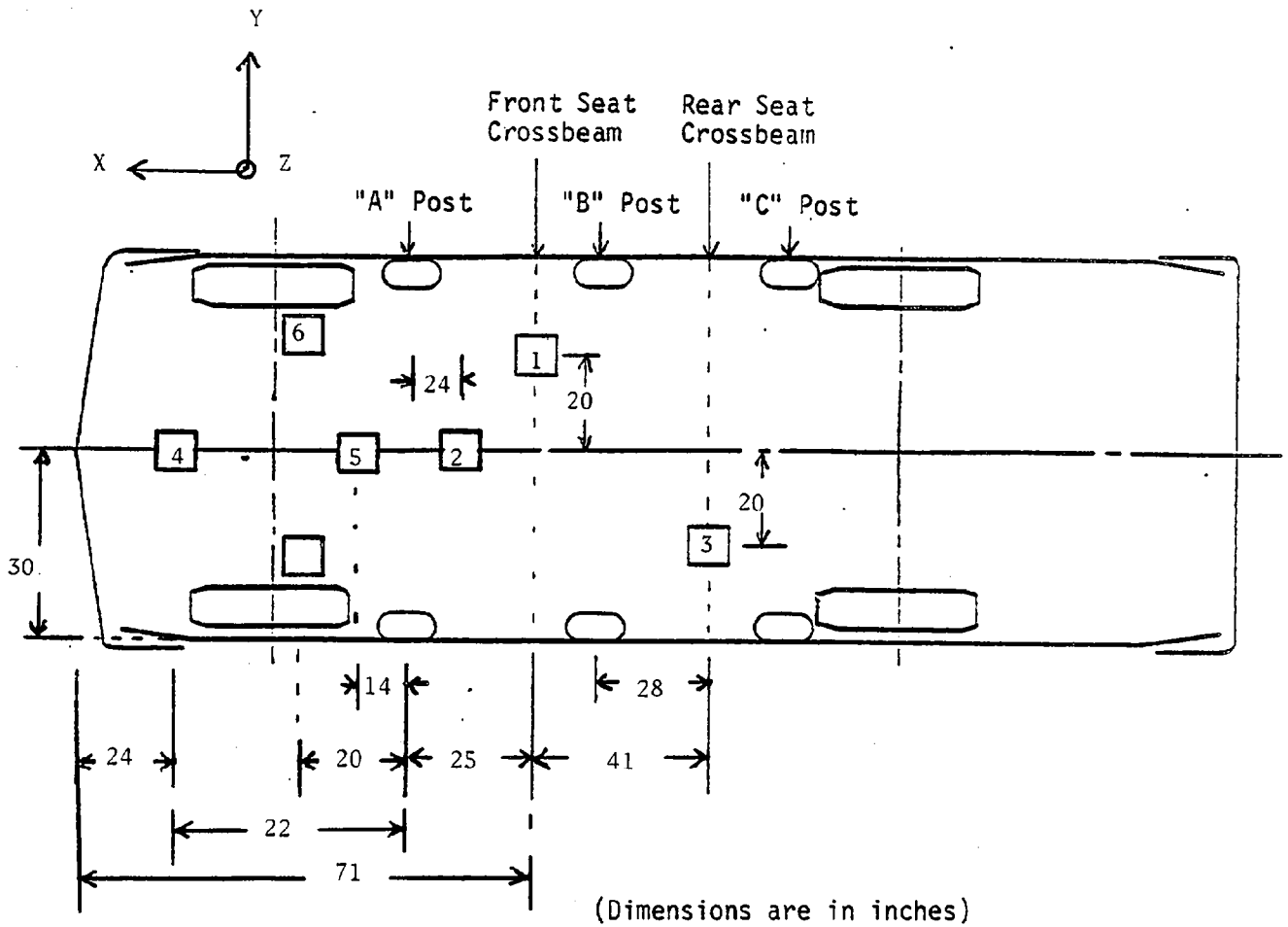


Figure 2 PRE- AND POST-TEST MEASUREMENT POINTS

Table 7

## VEHICLE MEASUREMENTS

		All Dimensions in Inches		
No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	175.0	153.6	21.4
X2	Rear Surface of Vehicle to Front of Engine	150.7	142.9	7.8
X3	Rear Surface of Vehicle to Firewall	132.1	129.1	3.0
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	126.5	125.4	1.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	126.6	125.9	.9
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	123.6	122.9	.7
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	123.7	123.2	.5
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	87.0	86.5	.5
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	87.0	86.9	.1
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	86.9	86.1	.8
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	86.9	86.5	.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	124.2	123.7	.5
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	124.4	124.0	.4
X14	Rear Surface of Vehicle to Firewall, Right Side	132.5	121.9	10.6
X15	Rear Surface of Vehicle to Firewall, Left Side	132.0	121.2	10.8
X16	Rear Surface of Vehicle to Steering Column	111.7	107.6	4.1
X17	Center of Steering Column to "A" Post	16.5	17.0	-.5
X18	Center of Steering Column to Headliner	18.2	15.0	3.2
X19	Rear Surface of Vehicle to Right Side of Front Bumper	172.5	152.2	20.3
X20	Rear Surface of Vehicle to Left Side of Front Bumper	172.5	152.7	19.8
X21	Length of Engine Block	18.5	18.5	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

FRONT VIEW

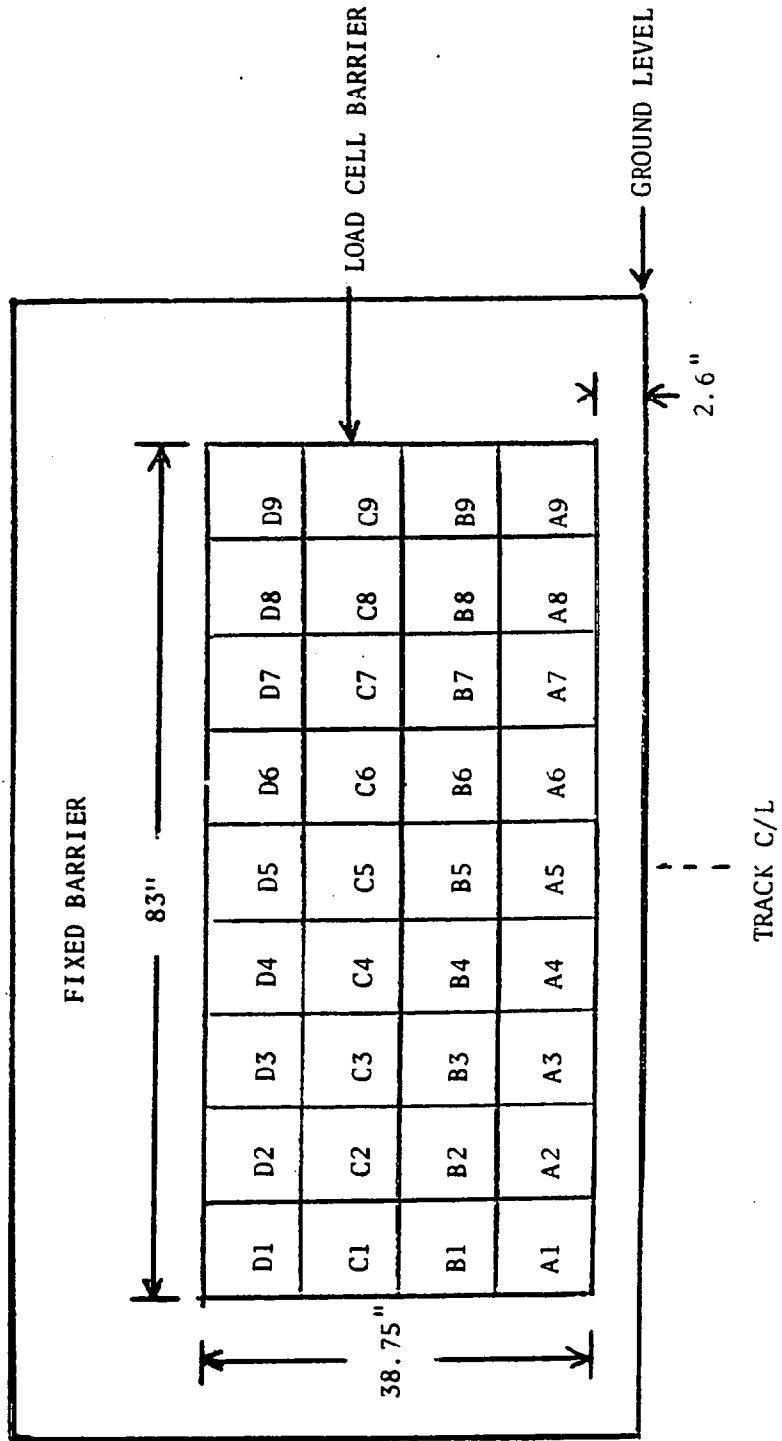


Figure 4 FIXED LOAD CELL BARRIER-LOAD CELL LOCATIONS

Table 8  
 ACCIDENT INVESTIGATION DIVISION  
Data Summary

Test No. CE0303  
 Date 11/18/83

Vehicle No. 1

Impact Description	<u>frontal load cell barrier</u>
Make	<u>Plymouth Colt Vista</u>
Model	<u>4-door wagon</u>
Year	<u>1984</u>
Size Category	<u>mid-size</u>
Test Weight (lb.)	<u>2980</u>
Wheelbase (in.)	<u>103.4</u>
Front Overhang (in.)	<u>35.3</u>
Overall Width (in.)	<u>64.6</u>
Accelerometer Location	<u>46.8 in. 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 (mph)	<u>35.4</u>
Time of Separation (msec)	<u>156</u>
Velocity Change (mph)	<u>42.0</u>
CDC	<u>12 FDEW3</u>
Damage Length (in.)	L: <u>52.5</u>
Crush Dimensions (in.)	C1: <u>19.75</u>
	C2: <u>20.1</u>
	C3: <u>20.5</u>
	C4: <u>20.5</u>
	C5: <u>20.75</u>
	C6: <u>20.3</u>
Midpoint of Damage	D: <u>0</u>

National Accident Sampling System – Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

1984 Plymouth Colt Vista Wagon

Complete When Applicable

<p>End Damage</p> <p>Undeformed end width <u>52.5</u></p> <p>Corner shift: A1 _____</p> <p>A2 _____</p> <p>End shift at frame (CDC) (check one)</p> <p>&lt; 4 inches _____</p> <p>≥ 4 inches _____</p>	<p>Side Damage</p> <p>Bowing: B1 _____ X1 _____</p> <p>B2 _____ X2 _____</p> <p>Bowing constant</p> <p><math>\frac{X1 + X2}{2} =</math> _____</p>
--	---

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

12 FDEW3

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	52.5	21.4	52.5	22.35	21.6	21.5	21.6	22.35	22.8	0
1	Free Space		0		2.5	1.5	1.0	1.0	1.5	2.5	
1	ACTUAL CRUSH		21.4	52.5	19.75	20.1	20.5	20.5	20.75	20.3	0

\*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).

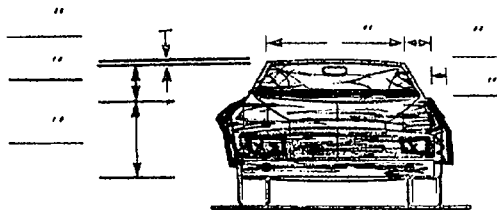
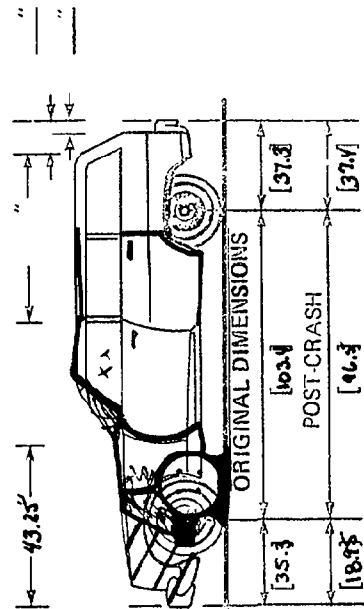
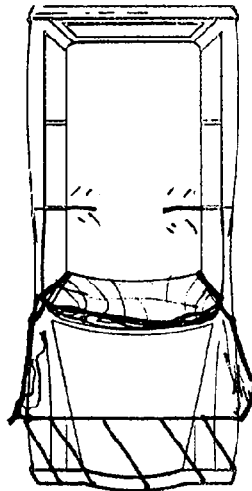
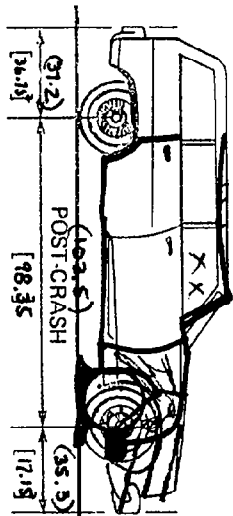
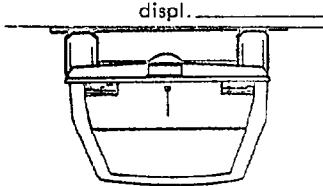
\*\*\*Measure and document on the vehicle diagram the location of the maximum crush.

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

Vanagon Cont.

<b>DAMAGE DESCRIPTION</b> Tire—Wheel Damage a. Rotation physically restricted RF <u>1</u> LF <u>1</u> RR <u>2</u> LR <u>2</u> b. Tire deflated RF <u>1</u> LF <u>1</u> RR <u>2</u> LR <u>2</u> (1) Yes, (2) No, (8) NA, (9) Unk.	<b>TYPE OF TRANSMISSION</b> <input checked="" type="checkbox"/> <sup>top</sup> Manual <input type="checkbox"/> Automatic Average Track: _____ Maximum Width: <u>N/A</u> <sup>TEST</sup> Curb Weight: <u>2980</u> Overall Length: <u>175.0</u> Engine Size: cyl. <u>4</u> displ. _____	<b>WHEEL STEER ANGLES</b> (For locked front wheels or displaced rear axles only) RF ± <u>02</u> ° LF ± <u>00</u> ° RR ± <u>N/A</u> ° LR ± <u>N/A</u> ° Within ± 5 degrees
--	--	---

Vehicle No.: 1

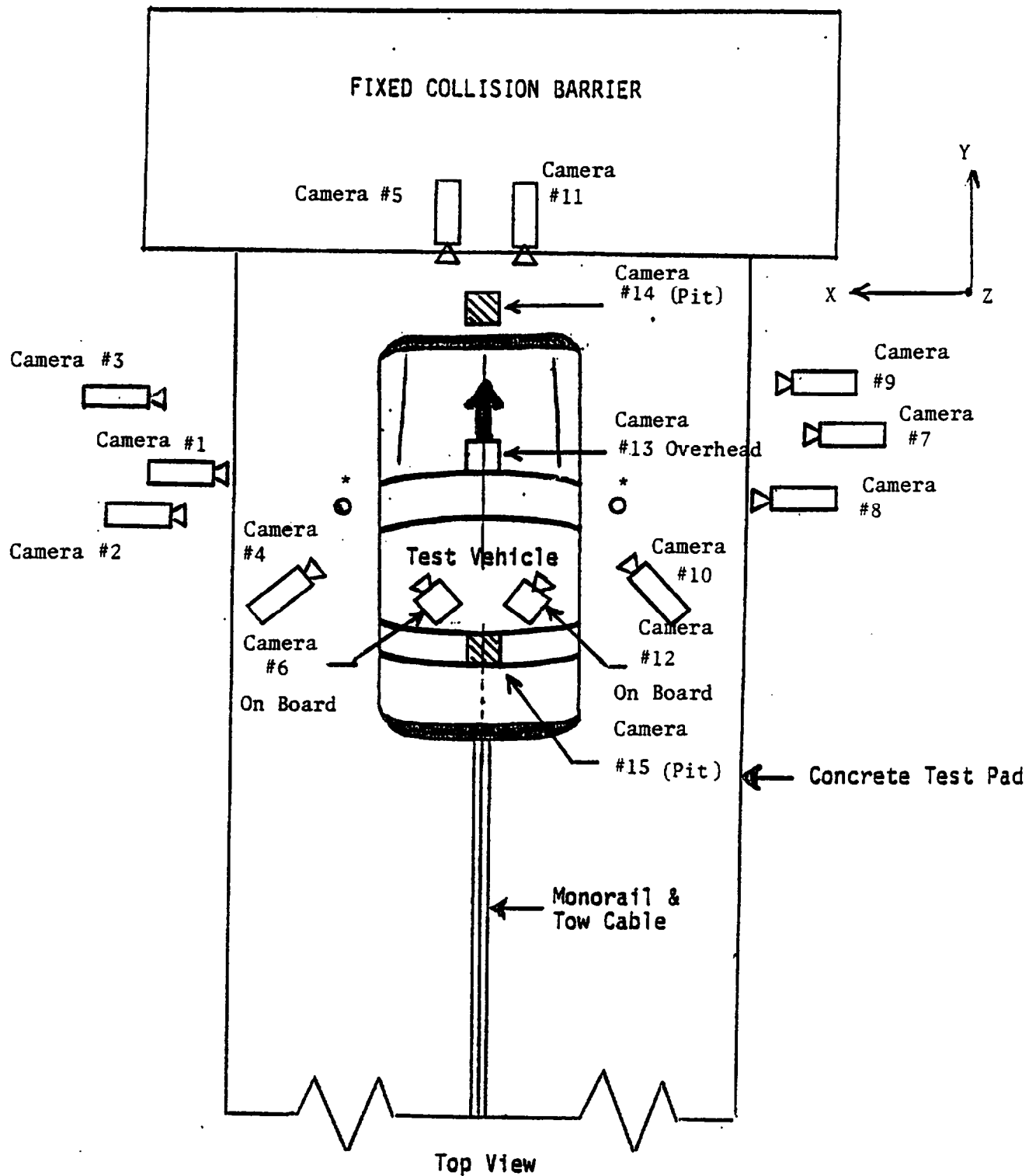


Note: Sketch new perimeter and cross hatch direct damage and single hatch induced damage on all views. Annotate observations which might be useful in reconstructing the accident (e.g., grass in tire bead, direction of striations, scuff on sidewall, etc.)

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. CE0303 Vehicle 1984 Plymouth Colt Vista

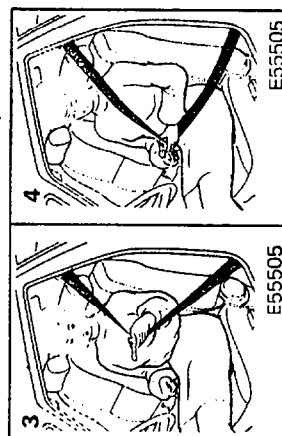
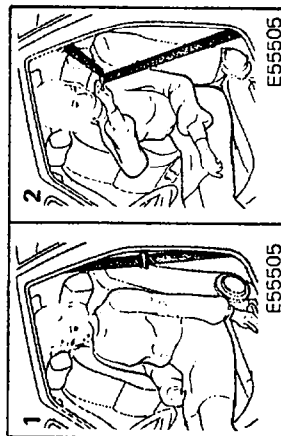
CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Vehicle Left Side	230	54	56	-6	-	13	890
2	Driver	246	72	48	-0	205	35	890
3	Driver	315	26	59	-3	274	50	900
4	Driver	90	108	72	-22	-	13	No Timing
5	Driver (Barrier)	20	0	70	-30	85	13	890
6	Left Belt Retractor	-	-	-	-	-	8	1100
7	Vehicle Right Side	281	41	48	-2	-	13	870
8	Passenger	268	66	45	-3	227	35	1040
9	Passenger	228	24	44	-3	271	50	1070
10	Passenger	90	104	69	-21	-	13	890
11	Passenger (Barrier)	20	0	70	-30	85	13	890
12	Right Belt Retractor	-	-	-	-	-	8	No Timing
13	Overhead	0	40	216	-90	-	25	990
14	Engine (Pit.)	0	36	-120	90	-	25	970
15	Fuel Tank (Pit.)	0	140	-120	90	-	25	920

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

### Seat Belts

Seat belts are installed in your car for the protection of the driver and passengers. Use the seat belts. In the event of an accident, injury to the driver and passenger may be reduced if seat belts are properly used.

The following pages contain the recommended procedure for fastening, adjusting, and wearing the belts for comfort and safety.



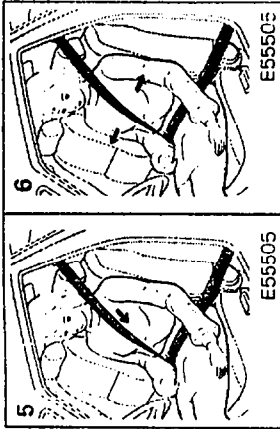
### Seat Unibelt Restraint System

Front seats and both side of the second seat are equipped with a UNIBELT system which uses a single belt and an emergency locking retractor. This system is designed to provide for comfort and safety by permitting full extension and automatic retraction of the belts during normal vehicle operation.

A sensing device inside the belt retractor is designed to lock the retractor in the event of an abrupt change in vehicle motion or if the seat belt is pulled out suddenly. When buckling the seat belts, pull the belt slowly out of the retractor.

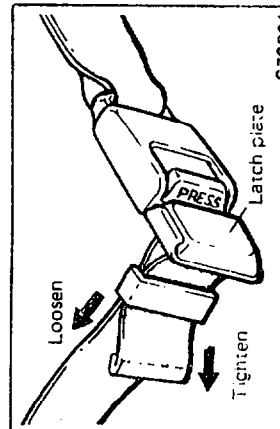
### Unibelt Instructions

1. Get in the car and adjust the seat.
2. Grasp the movable latch plate and slide it up the webbing as far as necessary so that it will be easy to pull across your body.  
After a couple of tries this will become an automatic one-handed operation.
3. Pull the webbing, and move the movable latch plate toward the buckle. This system will not lock up if you stop or hesitate, so relax and continue to "buckle-up". Push the latch plate into the buckle until a "click" is heard.



4. The lap belt will not tighten during use; therefore you can set it right now to safe, comfortable snugness. Check the belt slackness. The belt will retain the small amount of slack necessary for comfort when you return to your normal seating position.
5. If the belt is still too tight, pull 6" or 8" of webbing, let it return to your chest, and repeat the adjustment.

6. The shoulder belt will allow unrestricted movement under normal conditions. The belt will lock in event of an accident.  
To release the belt, push the button on the buckle. To return the belt to its stowed position, pull the shoulder belt down slightly and release immediately.



### Second Seat Center Belt

The center belt should be adjusted holding the belt and latch plate at right angles to each other, and then pulling the belt as illustrated above to a snug fit around the occupant.

**NEVER USE THE SAME LAP BELT ON MORE THAN ONE PERSON AT A TIME.**

Figure 7 OWNER'S MANUAL SEAT BELT INSTRUCTIONS

Figure 8  
PART 572 DUMMY IN-VEHICLE POSITION

Test No. CE0303

Vehicle 1984 Plymouth Colt Vista Wagon

SEAT TYPE:

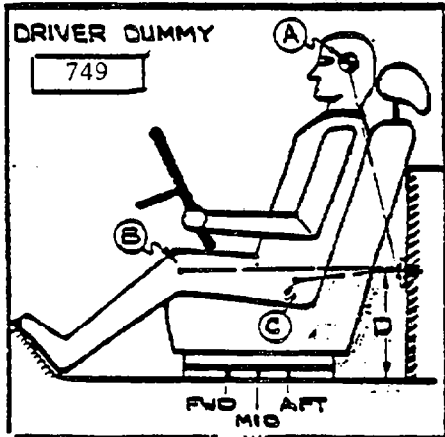
- Bench  
 Bucket  
 Split Bench

ADJUSTER TYPE:

- Manual  
 Power

BUCKET SEAT BACK TYPE:

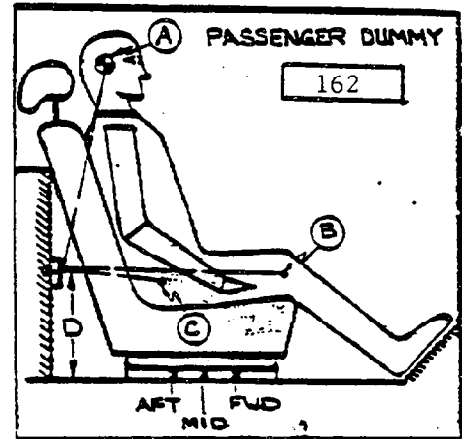
- Fixed  
 Adjustable Reclining



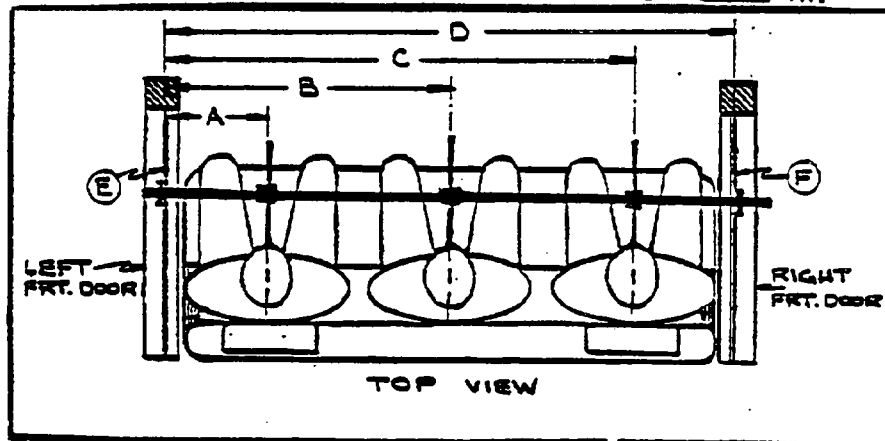
- A = 23.8 in. 5 Degrees  
B = 22.5 in. 95 Degrees  
C = 7.0 in. 126 Degrees  
D = 16.1 in.

MEASUREMENT LOCATION

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



- A = 23.7 in. 6 Degrees  
B = 21.8 in. 99 Degrees  
C = 6.2 in. 131 Degrees  
D = 16.1 in.



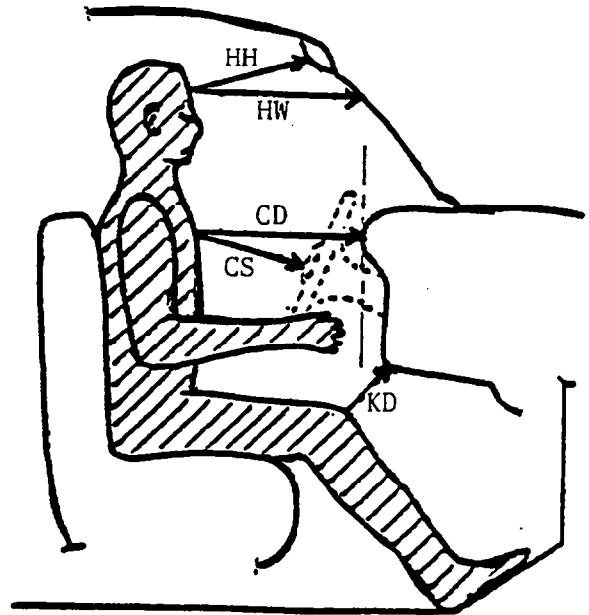
749

162

- |      |   |  |                 |
|------|---|--|-----------------|
| A    | = | Left Door to Driver Centerline                     | <u>11.6</u> in. |
| B    | = | Left Door to Center Passenger Centerline           | <u>--</u> in.   |
| C    | = | Left Door to Right Passenger Centerline            | <u>38.6</u> in. |
| D    | = | Left Door to Right Door                            | <u>50.0</u> in. |
| E, F | = | Window Glass Height (Right and Left Must be Equal) | <u>12</u> in.   |

Both Front Seat Backs Adjusted to the 8th Notch Back

	DRIVER	PASSENGER
HH	13.5"	13.8"
HW	20.0"	20.1"
CD	23.5"	24.0"
CS	14.2"	--
KDL	6.7"	9.0"
KDR	8.1"	9.0"
SA	8th Notch Back	8th Notch Back
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	7.2"	7.3"
AD	2.7"	3.5"
HD	6.0"	5.7"

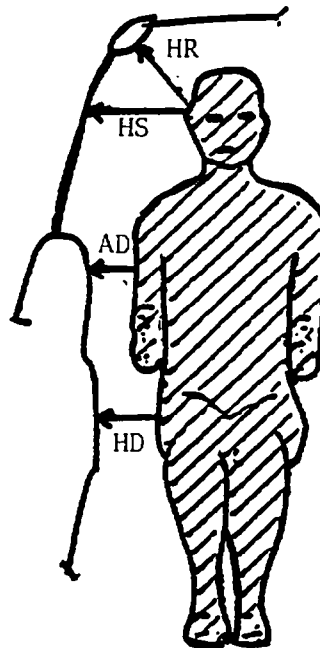


Figure 9 OCCUPANT CLEARANCE DIMENSIONS

Table 10  
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-149	44	156	173	79	12	23	71.1
DUMMY (2)	-78	21	71	93	-53	27	11	44.7
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	450	2950
DUMMY (2)	830	640
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)	1475	--	950
DUMMY (2)	1800	1415	--
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t <sub>1</sub> (SEC)	t <sub>2</sub> (SEC)	AVE. ACC. (g) t <sub>1</sub> TO t <sub>2</sub>	HEAD
DUMMY (1)	1530.3	.06615	.07770	111.9	1935.5
DUMMY (2)	1003.6	.08062	.10815	66.8	1280.4
DUMMY (3)					
DUMMY (4)					

\*DEFINED AS EXCEEDING 0.003 SEC. DURATION

\*\*AS DEFINED IN FMVSS NO. 208

Table 11  
BELT RELATED DATA

	<u>Driver</u>	<u>Passenger</u>
Belt Spool-off (in.)		
film	5.0	4.8
electronic	attachment to belt broke	4.6
 Belt Length Data (in.)		
total length <sup>(1)</sup>	120.2	120.7
retractor to "D" ring (2)	32.5	32.5
torso belt (2)	33.2	33.2
lap belt (2)	35.5	35
remainder on spool	19.0	20.0

---

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

(2) as measured on Part 572 dummy

APPENDIX A  
PHOTOGRAPHS



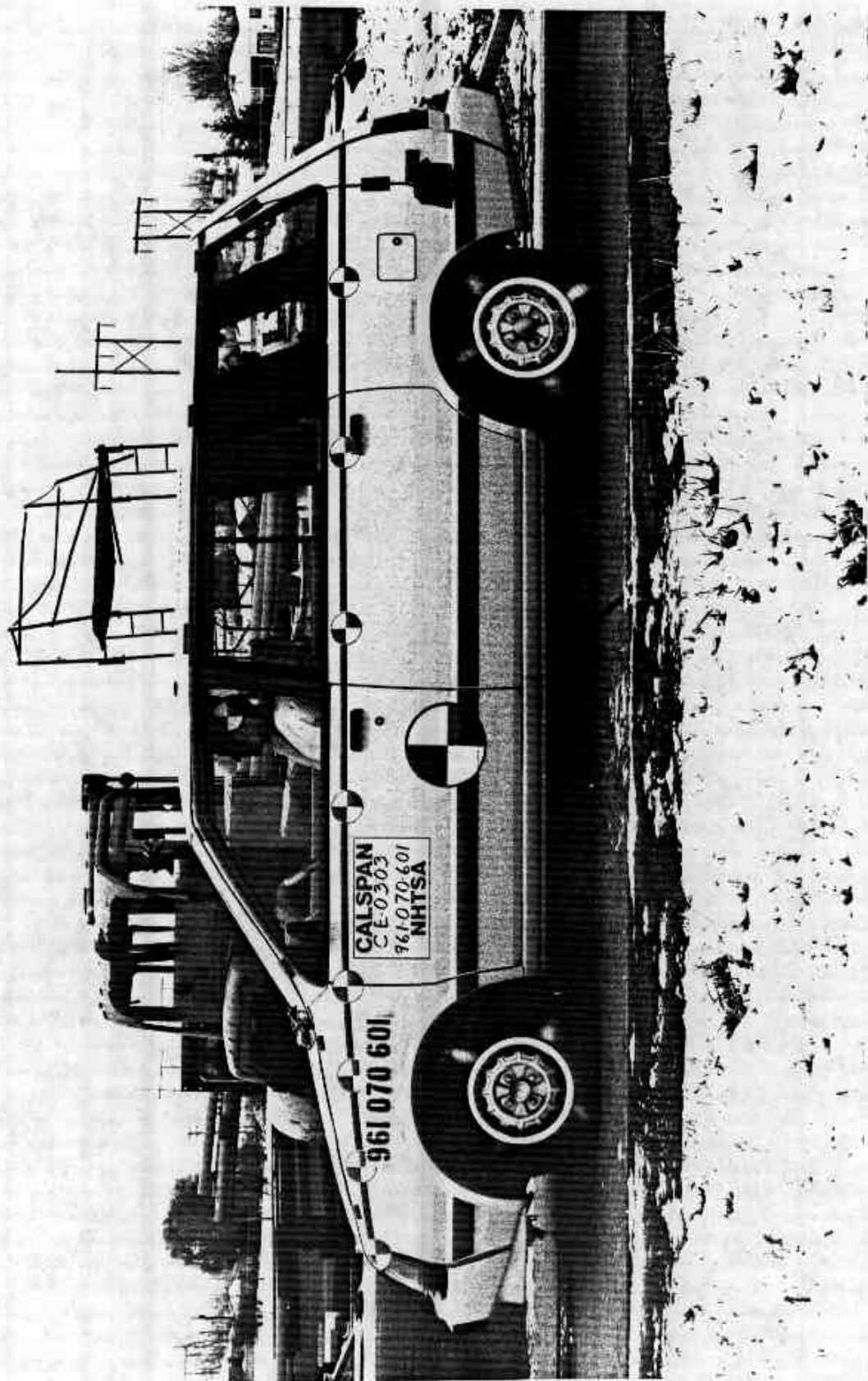
Figure A-1 PRE-TEST FRONT VIEW



Figure A-2 POST-TEST FRONT VIEW

A-3

7209-7



A-4

7209-7

Figure A-3 PRE-TEST LEFT SIDE VIEW

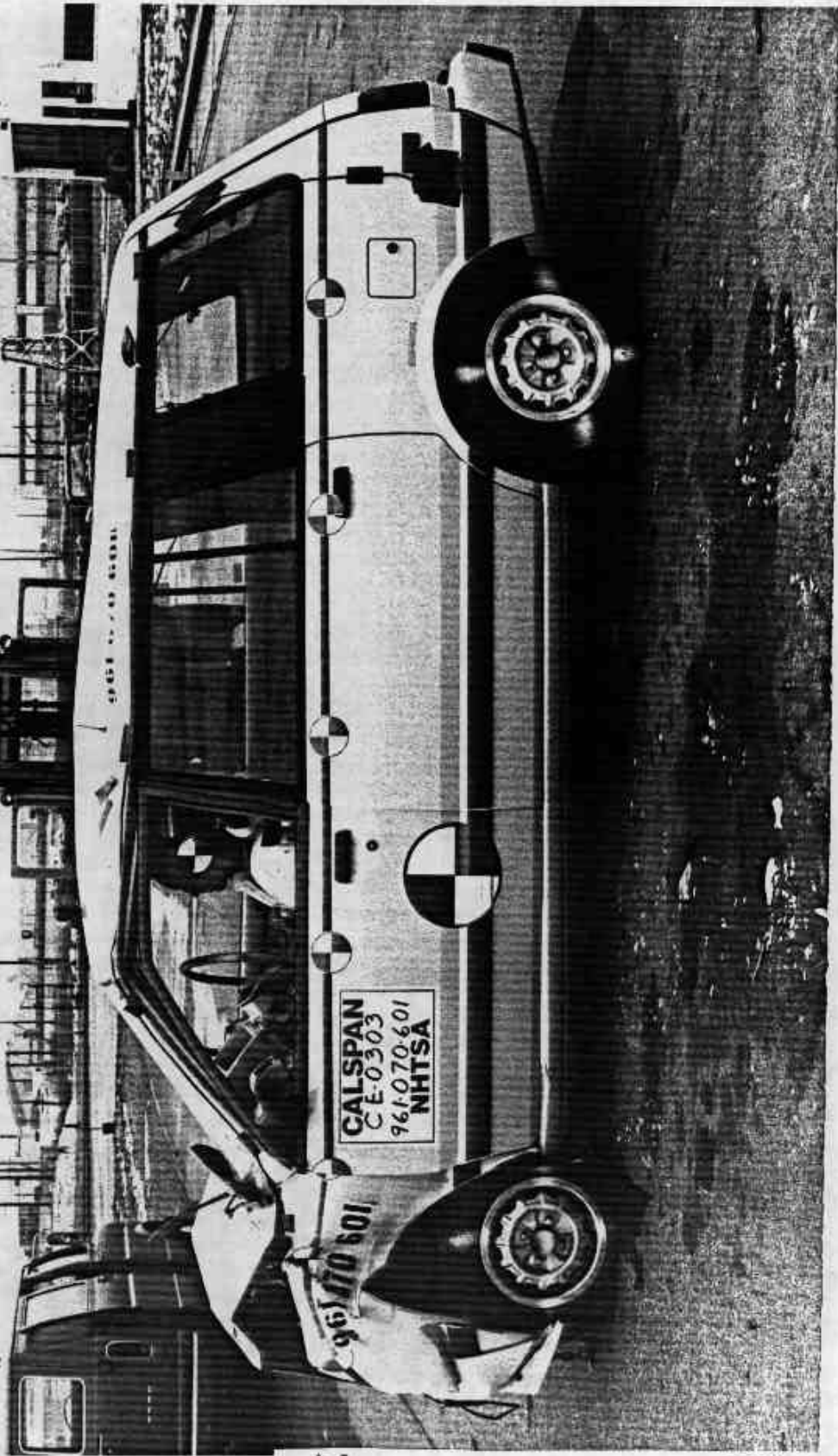
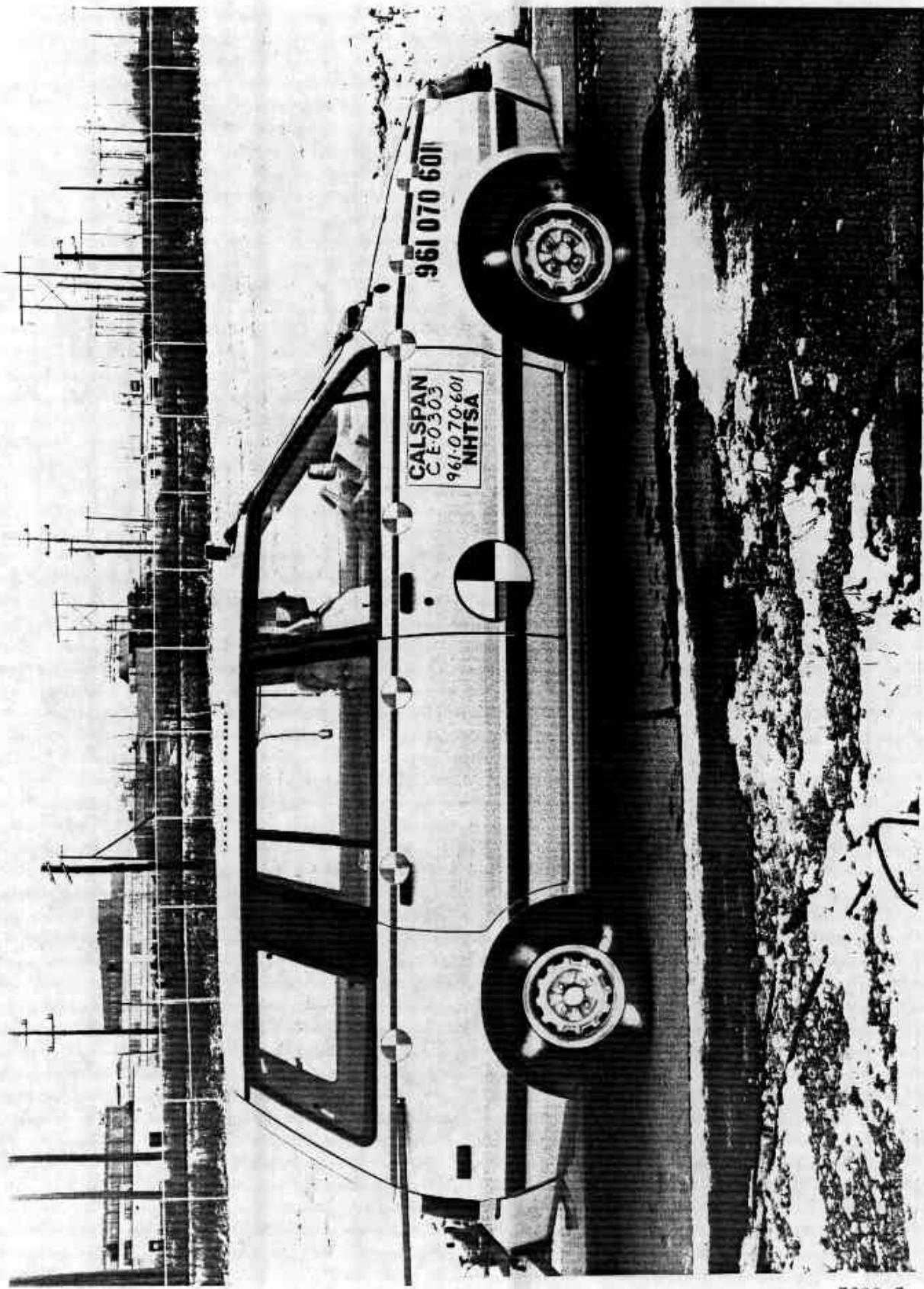


Figure A-4 POST-TEST LEFT SIDE VIEW

A-5

7209-7



A-6

7209-7

Figure A-5 PRE-TEST RIGHT SIDE VIEW

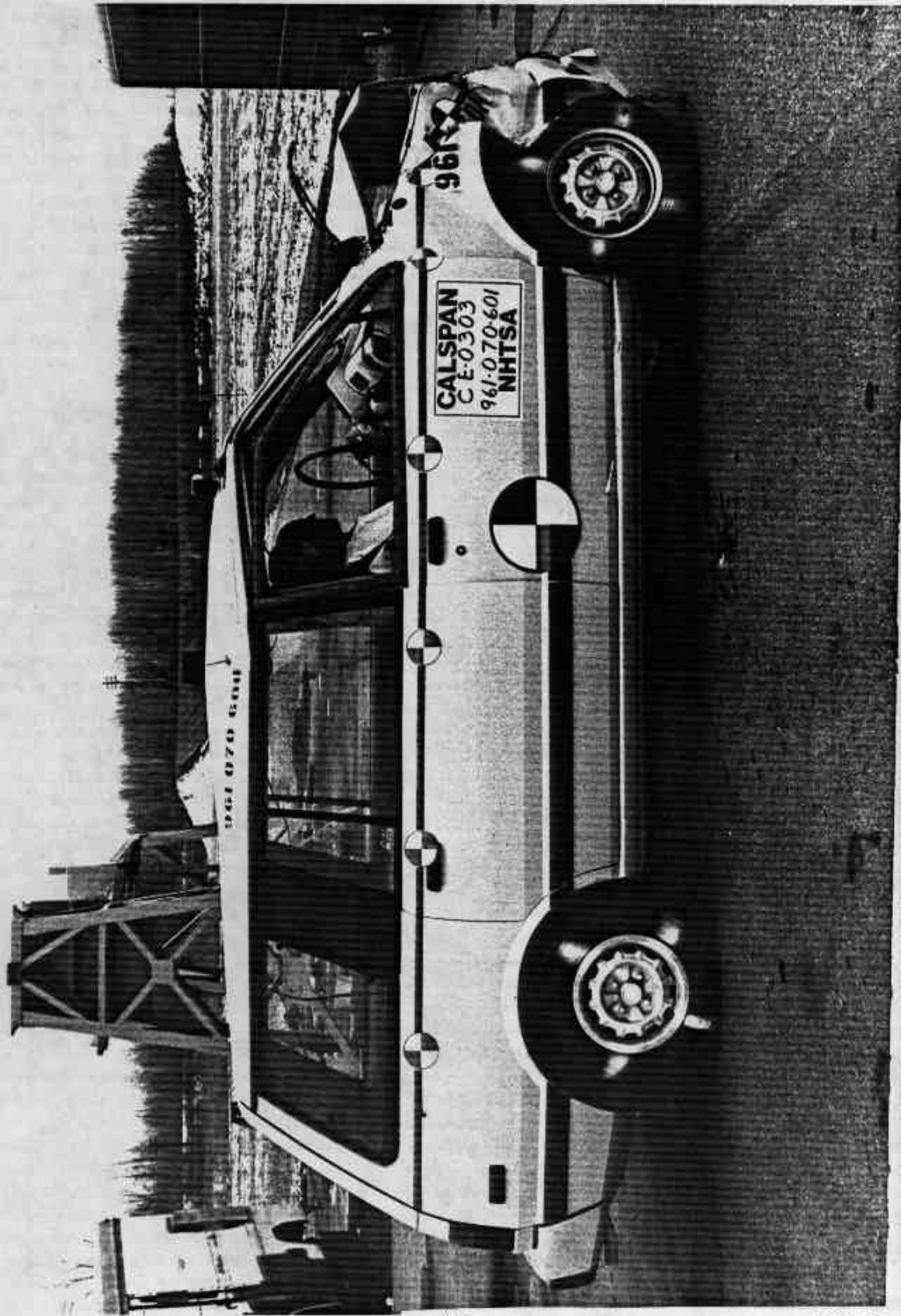


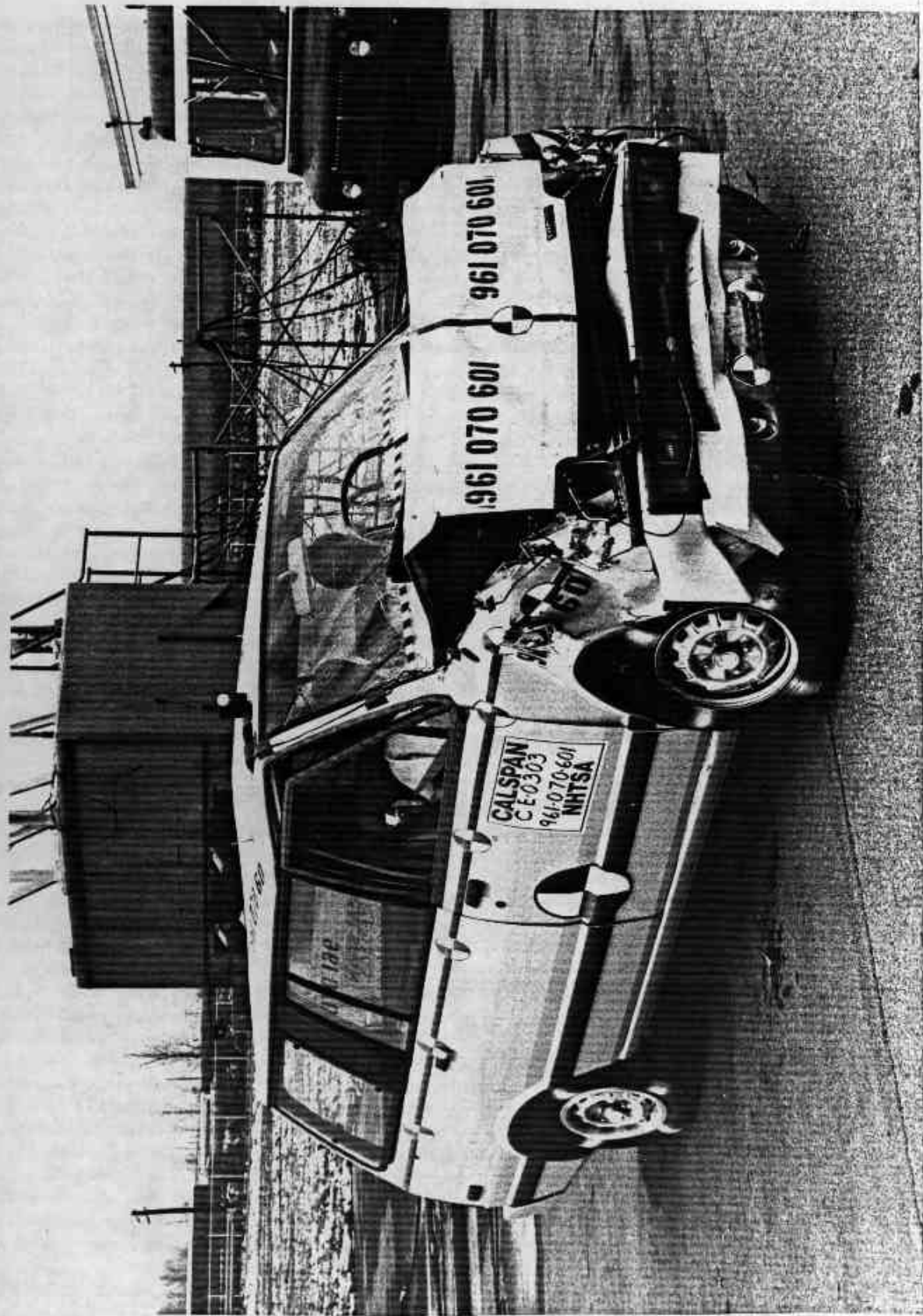
Figure A-6 POST-TEST RIGHT SIDE VIEW

A-7

7209-7



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



A-9

7209-7

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



A-10

7209-7

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



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

A-11

7209-7

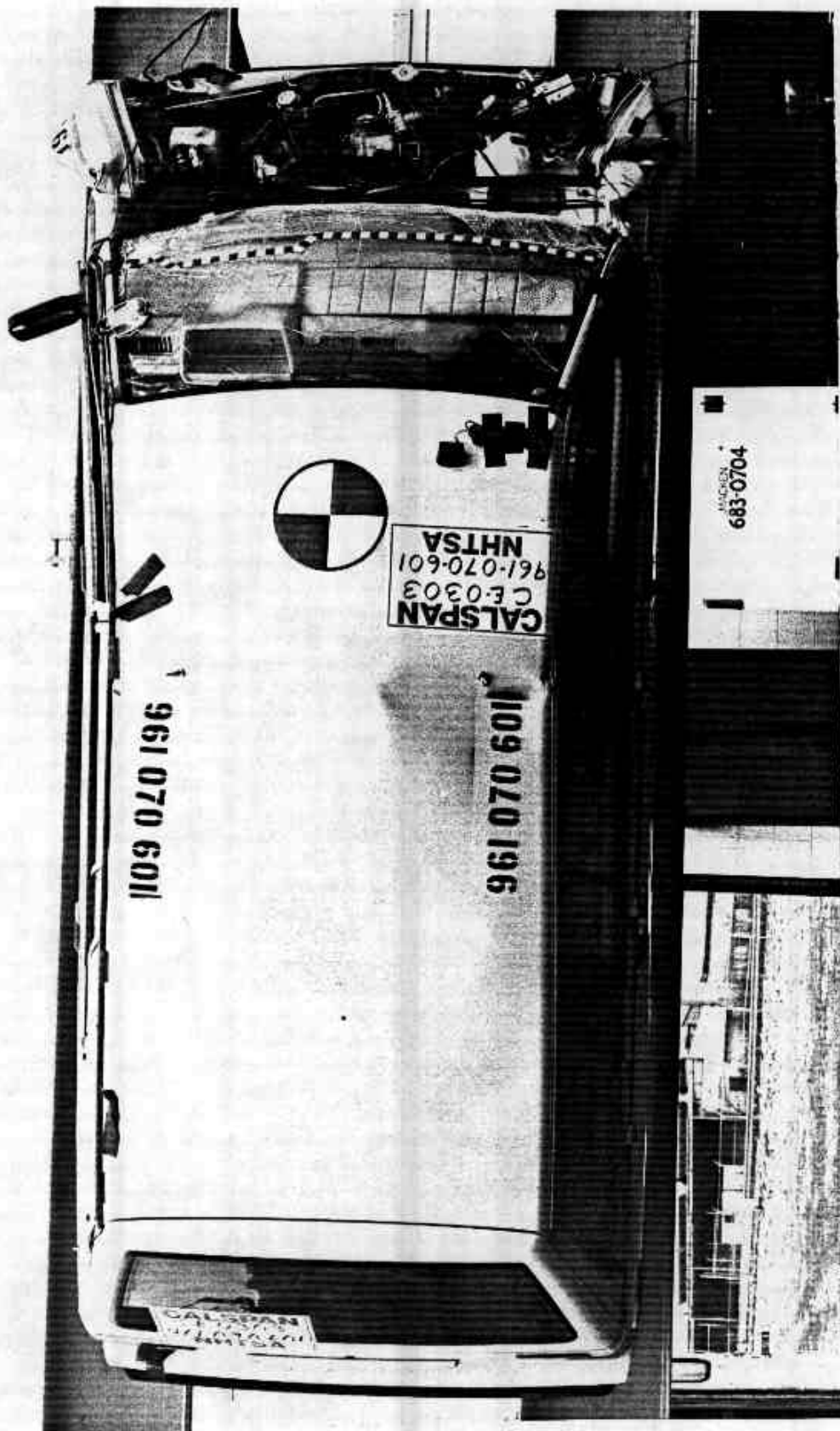


Figure A-11 POST-TEST TOP VIEW

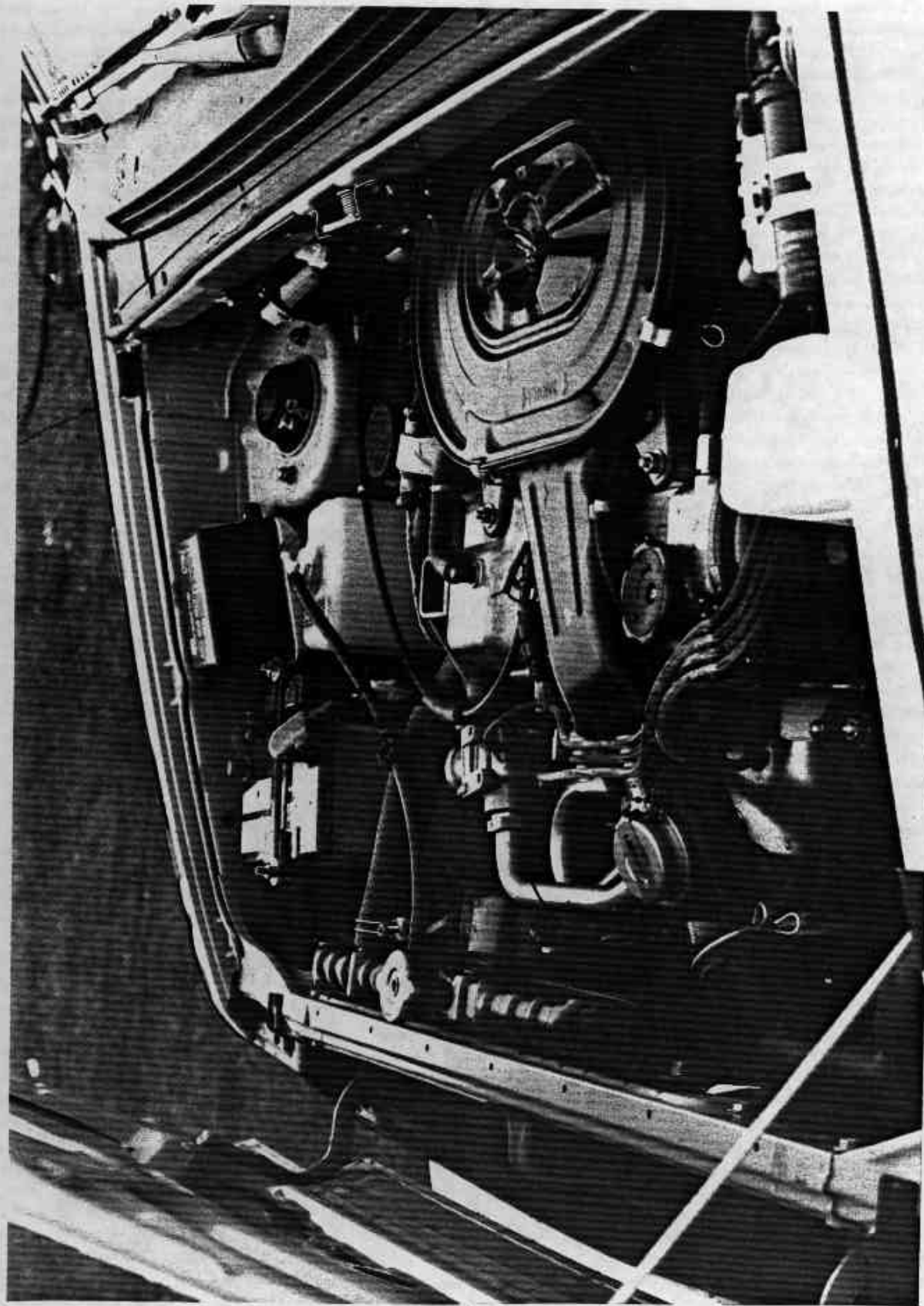


Figure A-12 PRE-TEST ENGINE COMPARTMENT VIEW

A-13

7209-7

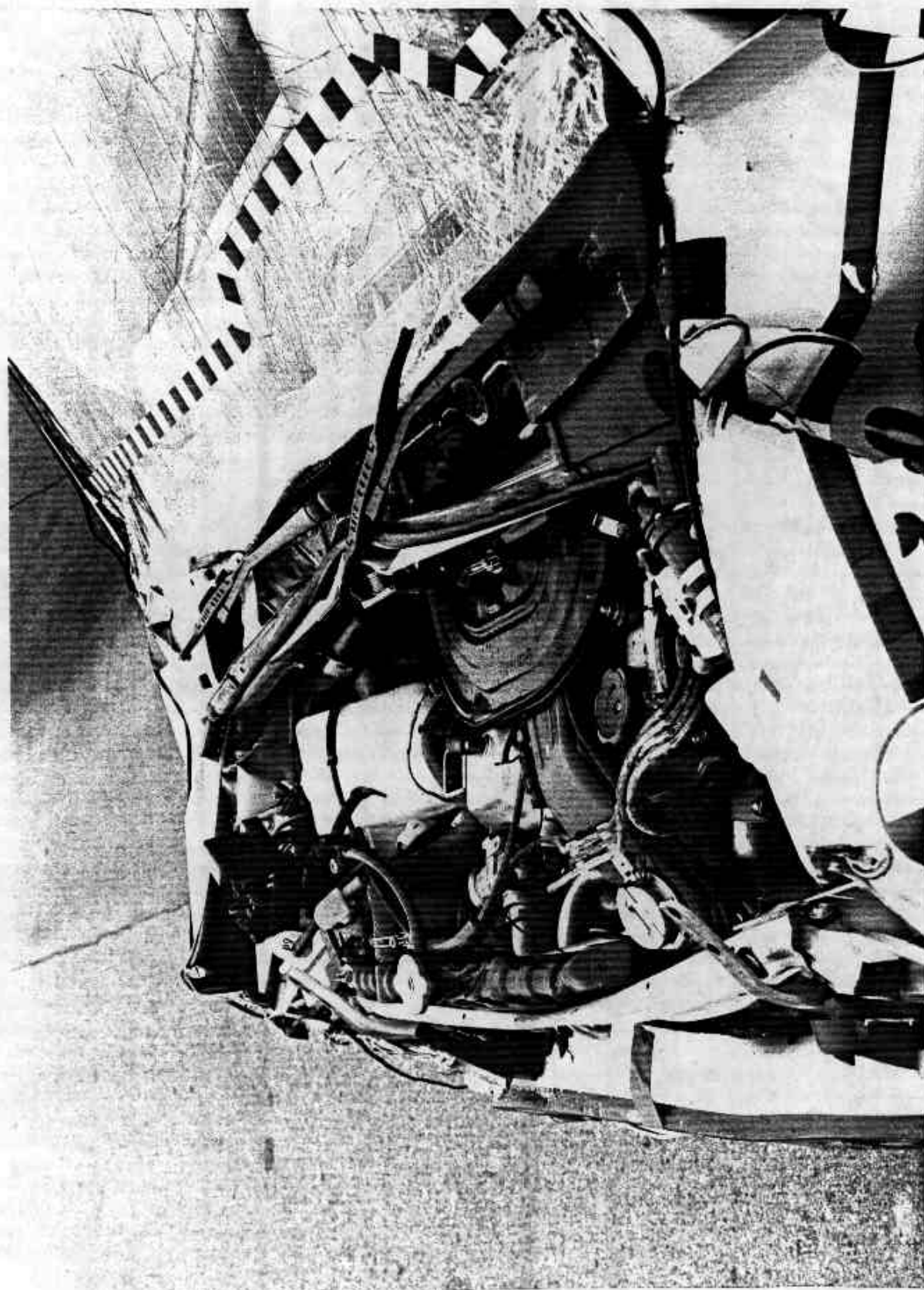
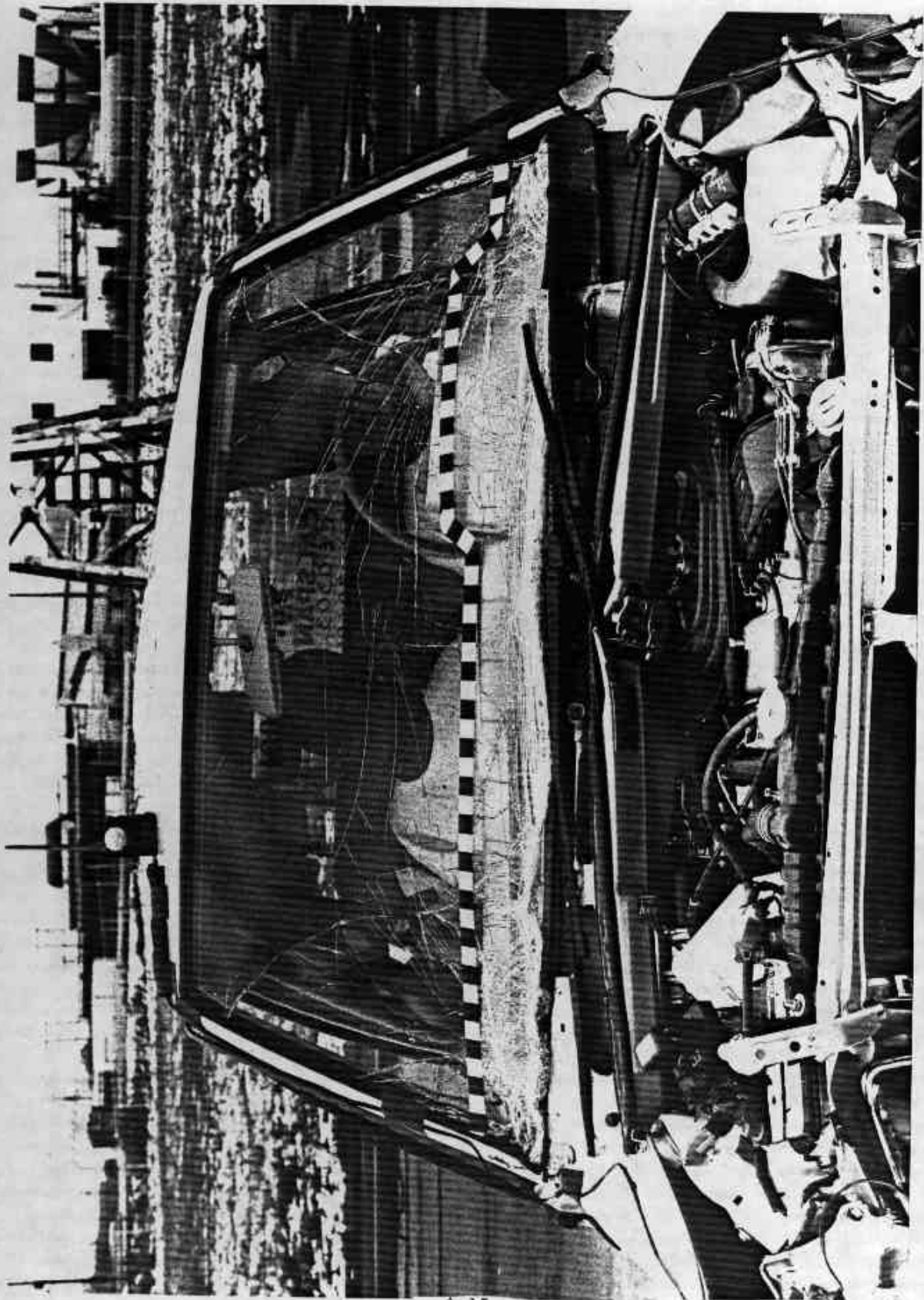


Figure A-13 POST-TEST ENGINE COMPARTMENT VIEW

A-14

7209-7



A-15

7209-7

Figure A-14 POST-TEST WINDSHIELD VIEW



ONLY

A-16

7209-7

Figure A-15 PRE-TEST FILLER CAP VIEW

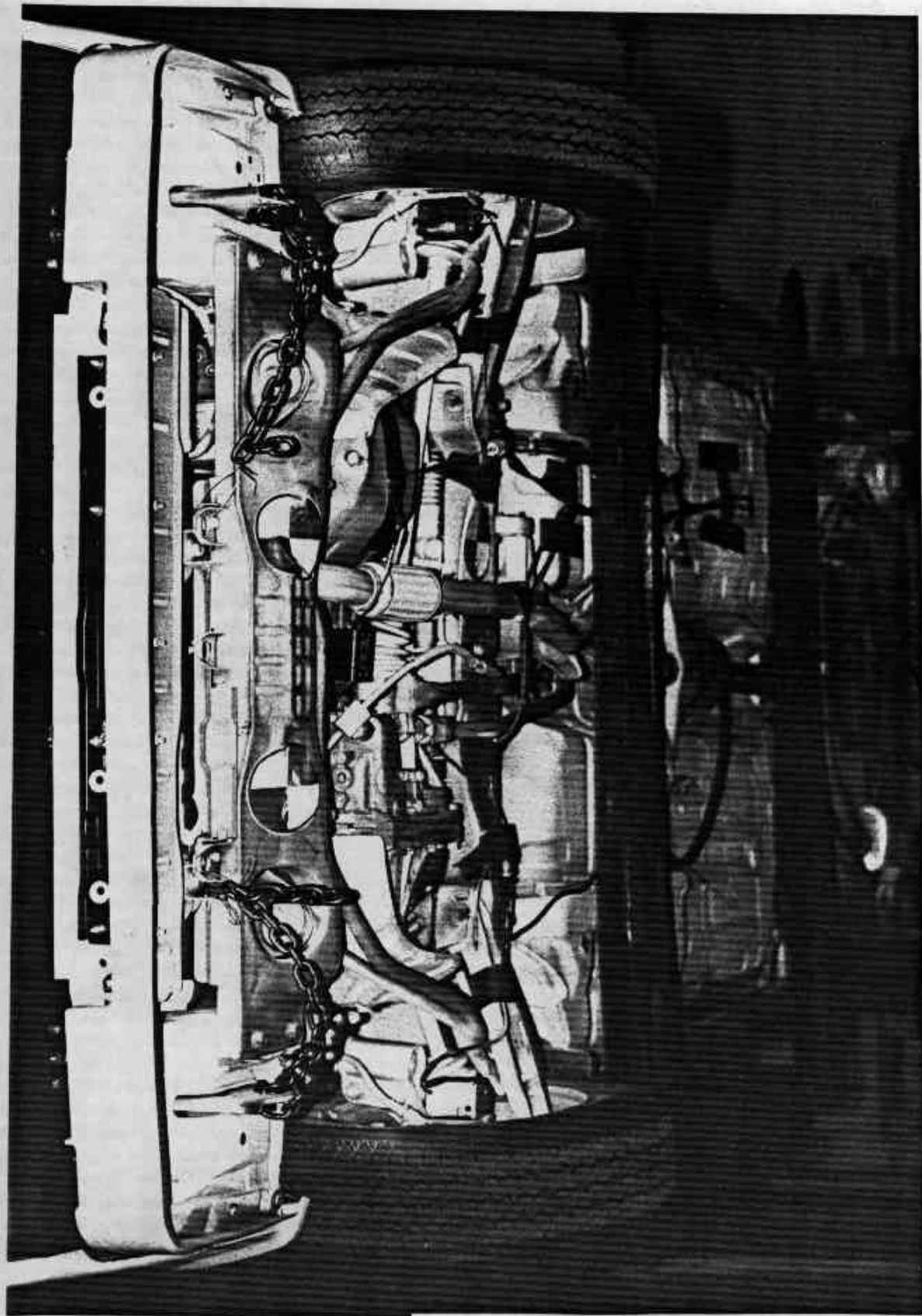


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

A-17

7209-7

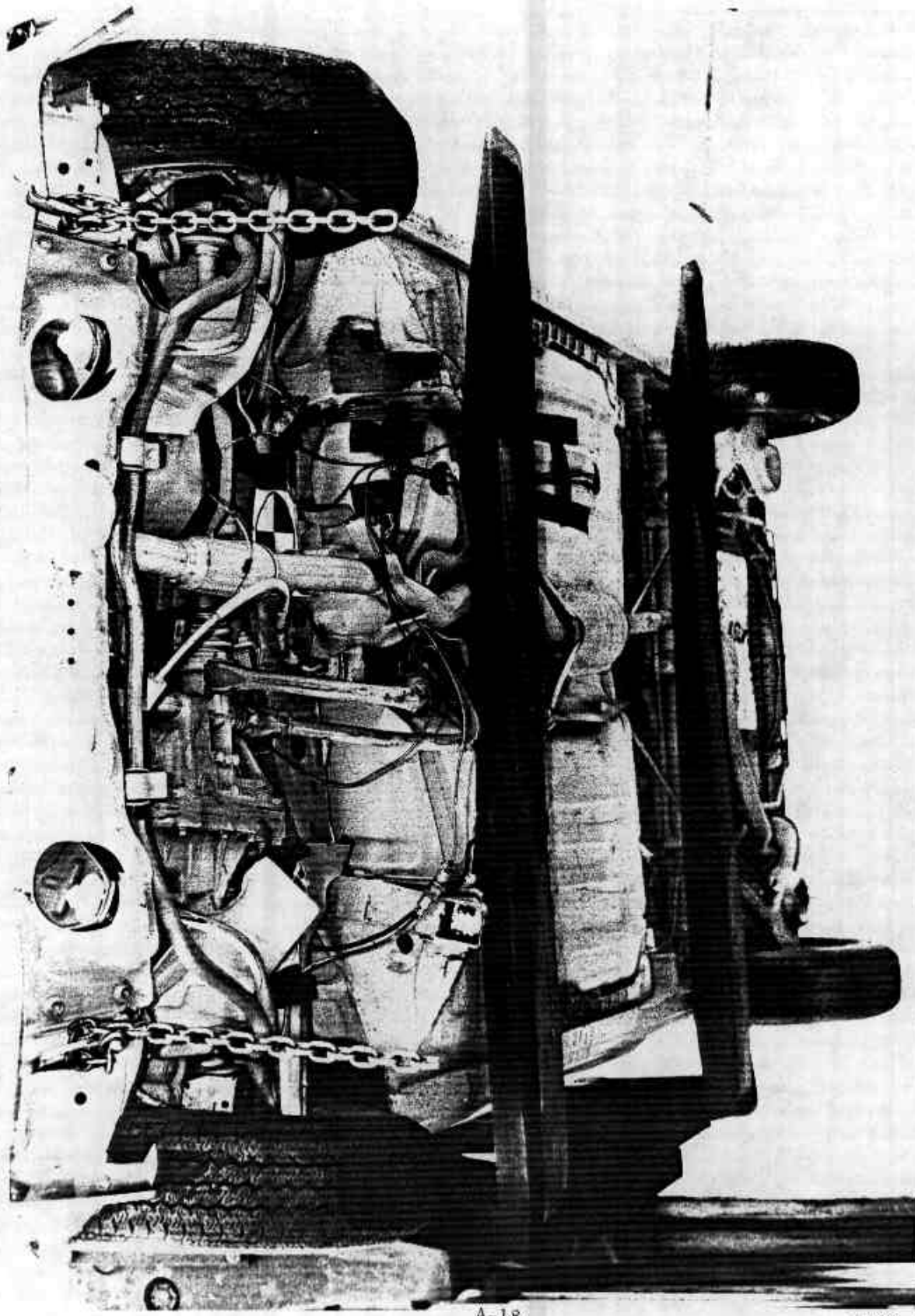


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

A-18

7209-7

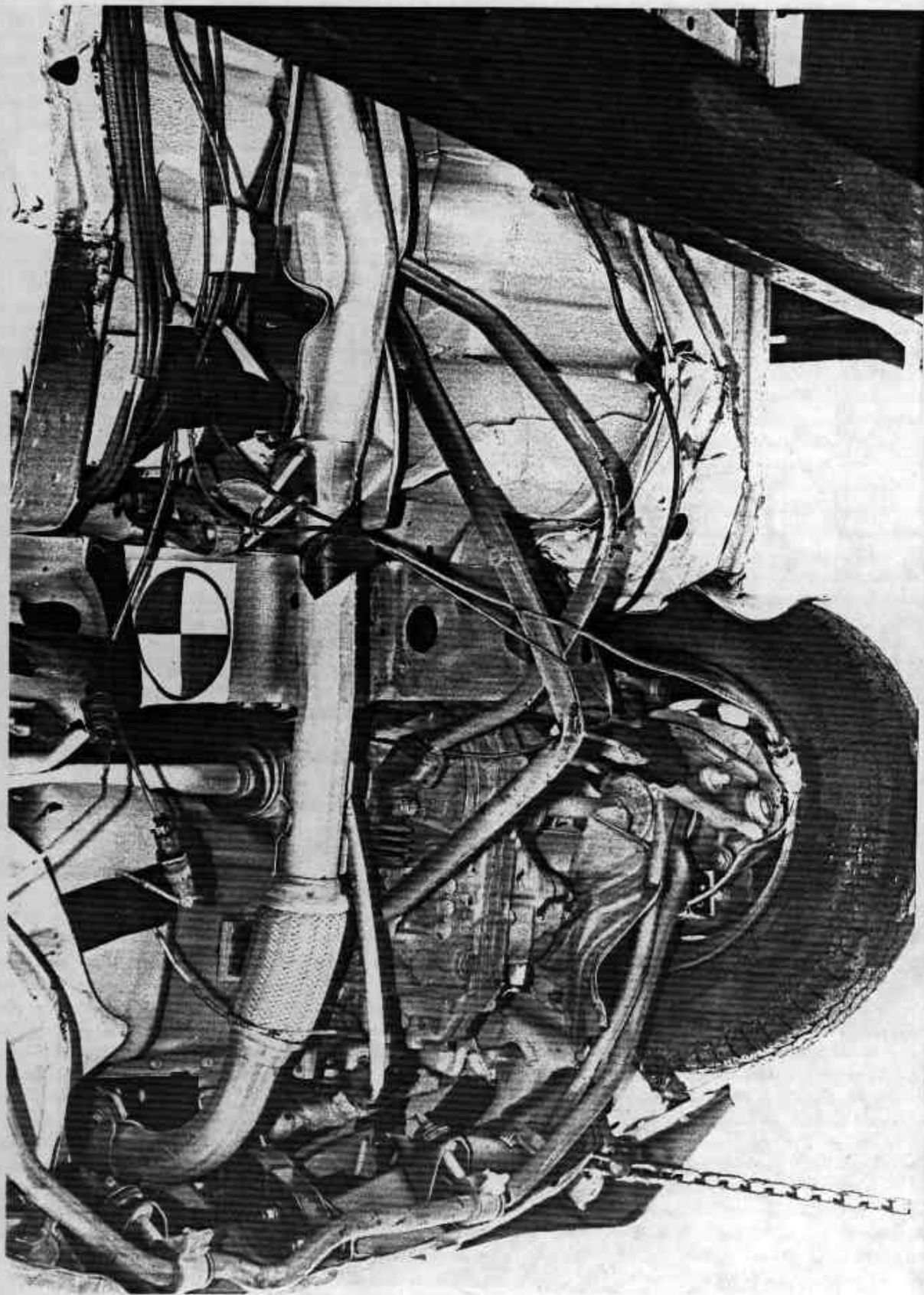


Figure A-18 POST-TEST FRONT QUARTER UNDERBODY VIEW

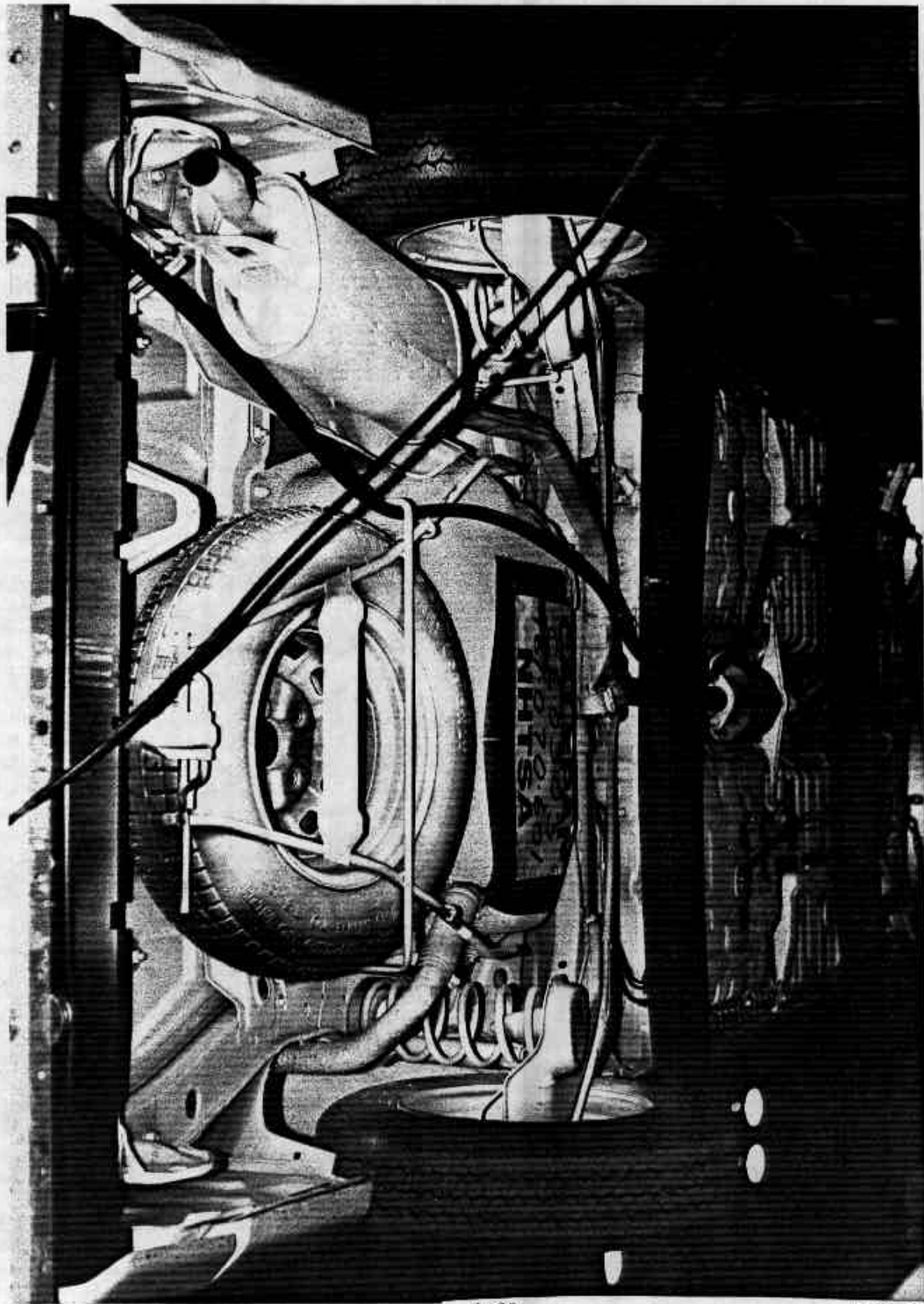


Figure A-19 PRE-TEST REAR UNDERBODY VIEW

A-20

7209-7

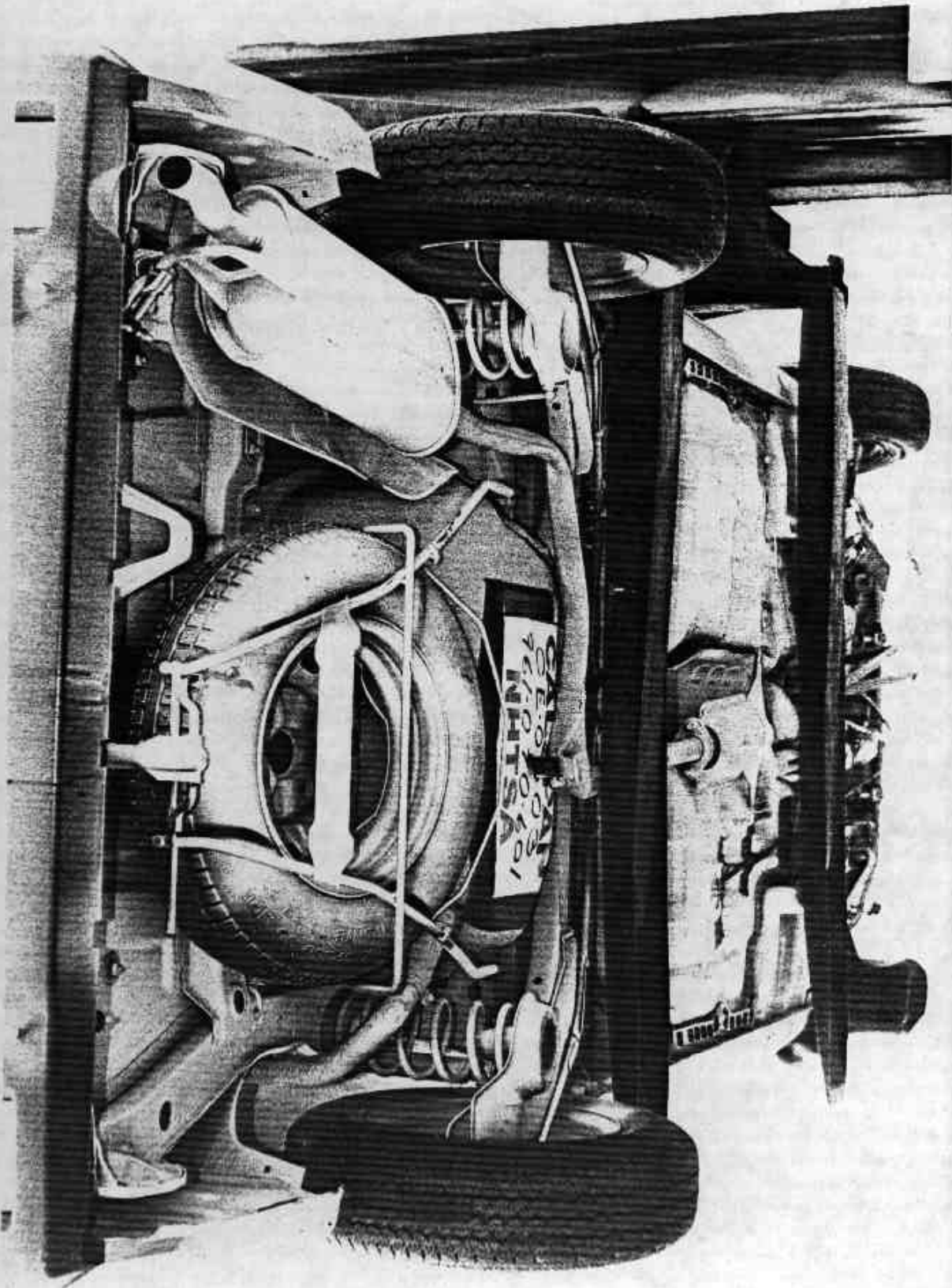


Figure A-20 POST-TEST REAR UNDERBODY VIEW



Figure A-21 POST-TEST FUEL TANK AND BROKEN EXHAUST SUPPORT STRAP



Figure A-22 PRE-TEST DRIVER POSITION VIEW

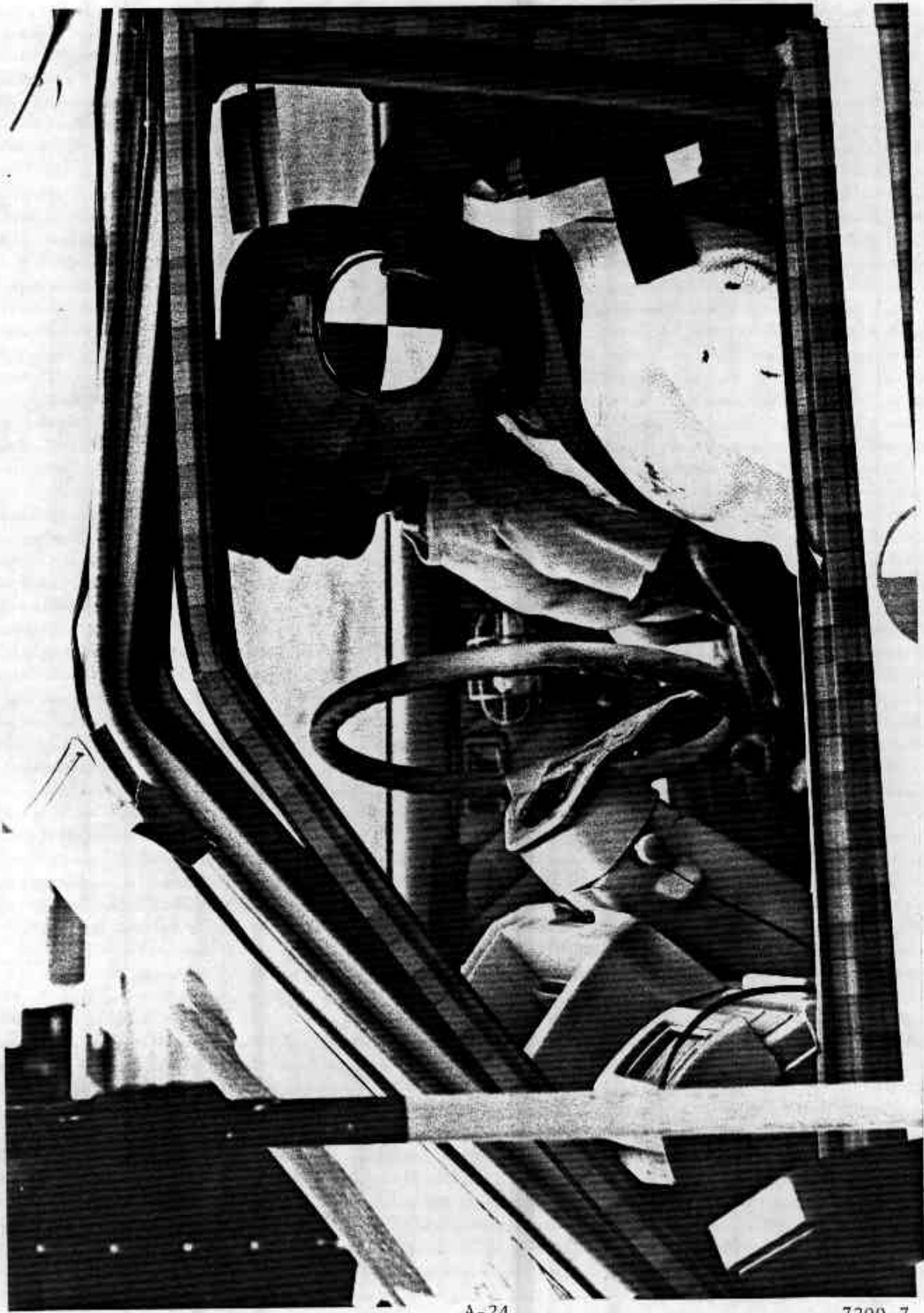


Figure A-23 POST-TEST DRIVER POSITION VIEW

A-24

7209-7



Figure A-24 PRE-TEST DRIVER AND INTERIOR VIEW

A-25

7209-7



Figure A-25 POST-TEST DRIVER AND INTERIOR VIEW

A-26

7209-7

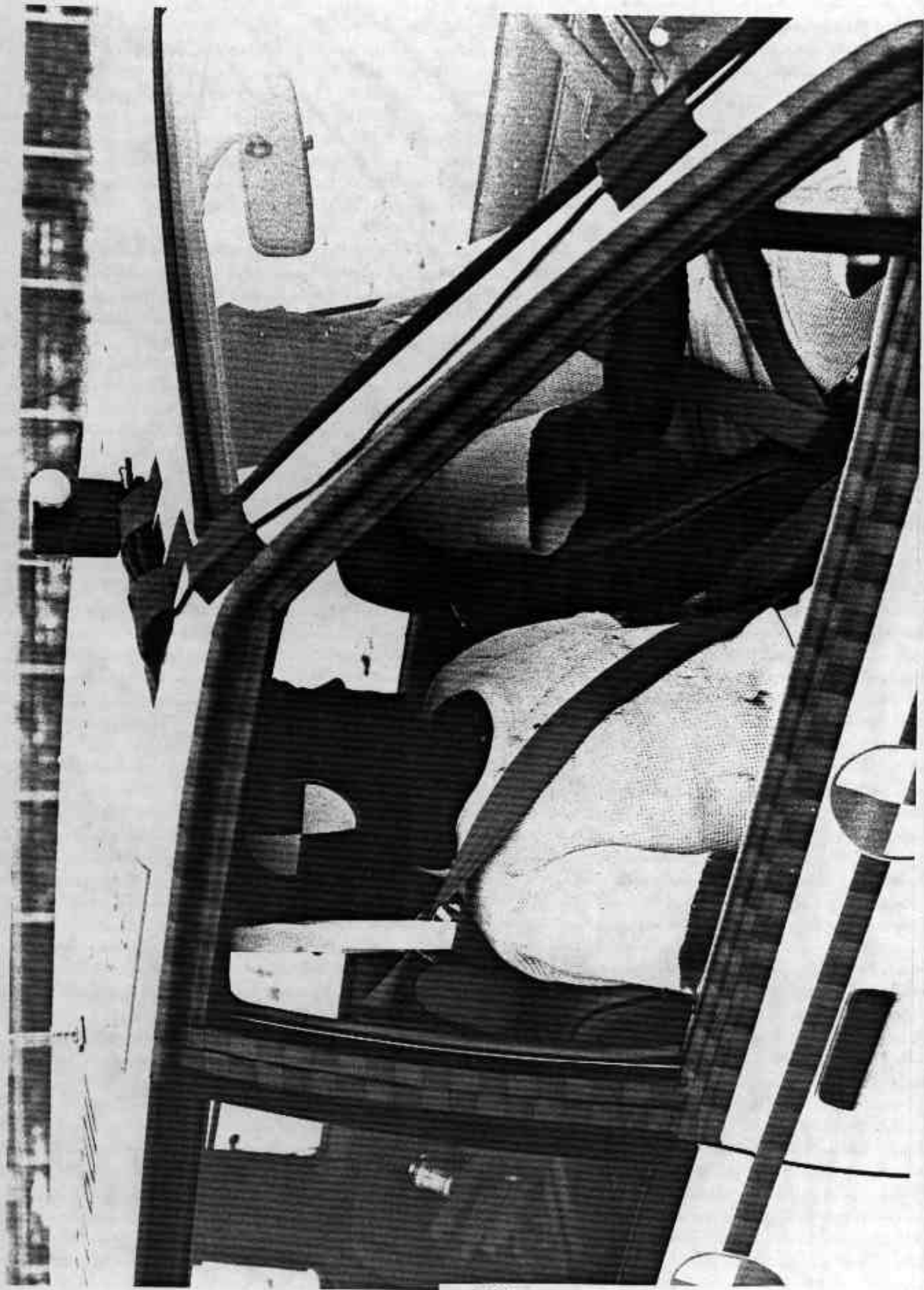


Figure A-26 PRE-TEST PASSENGER POSITION VIEW

A-27

7209-7

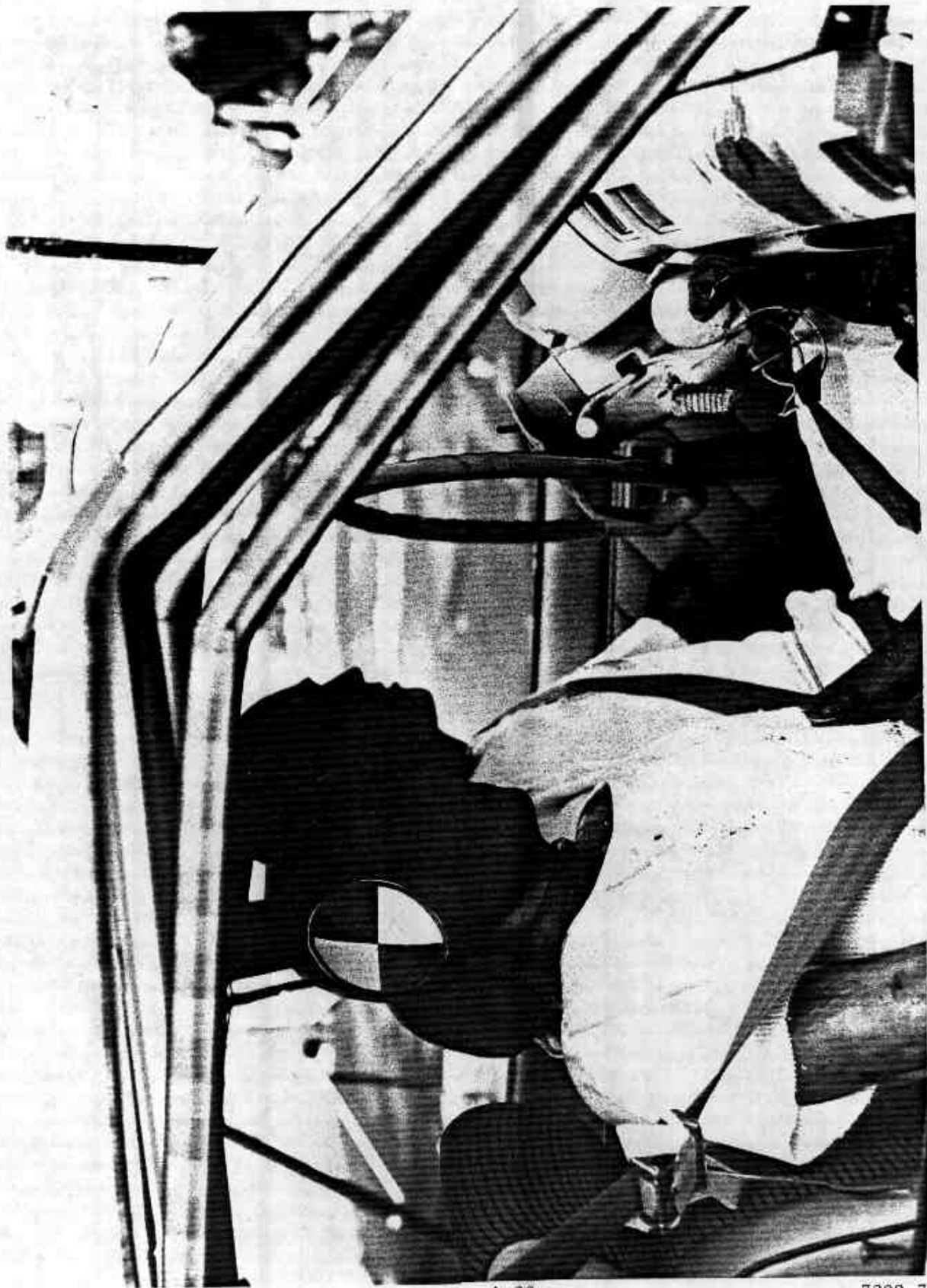


Figure A-27 POST-TEST PASSENGER POSITION VIEW

A-28

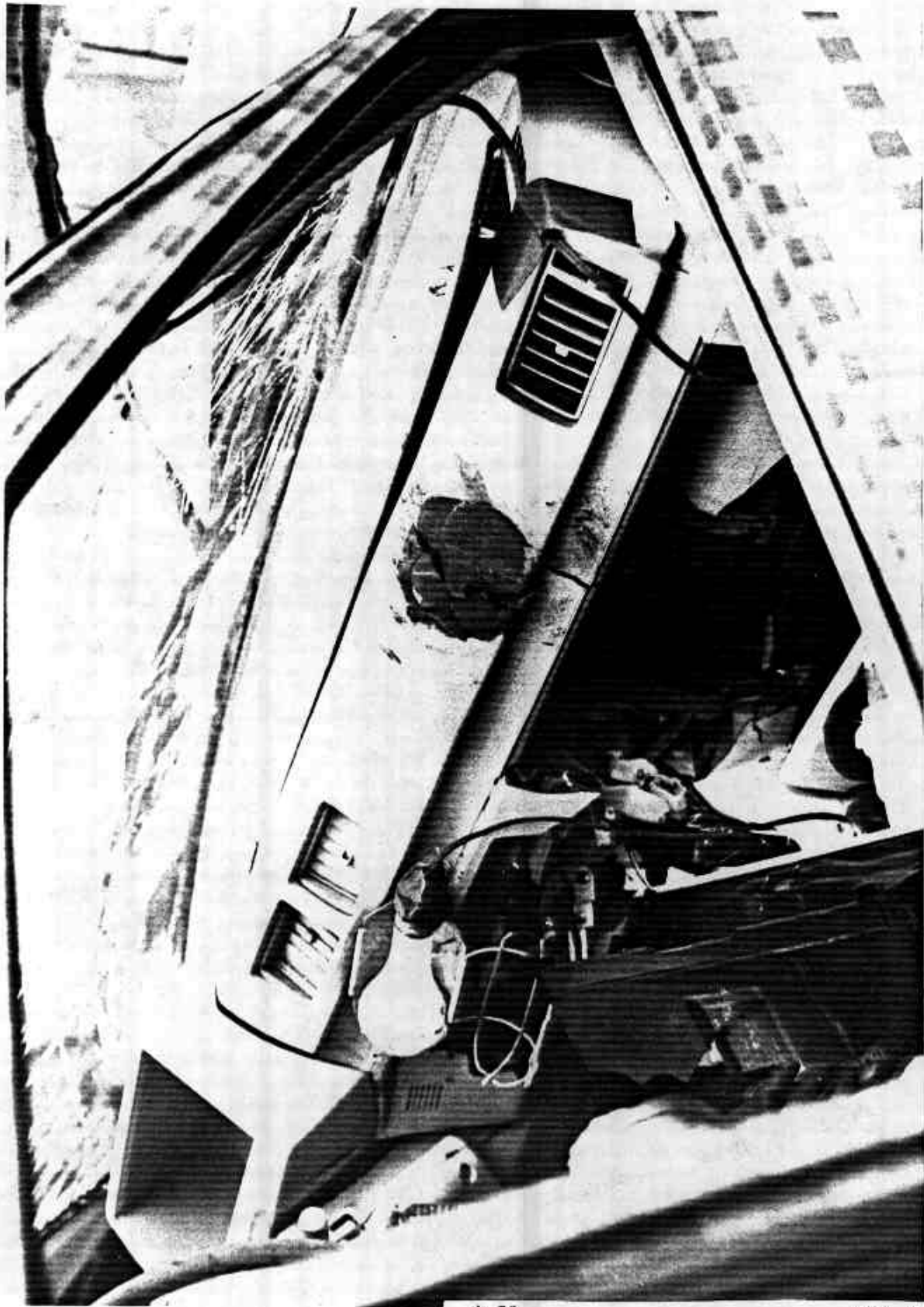
7209-7



Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

A-29

7209-7



A-30

7209-7

Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

APPENDIX B  
VEHICLE AND DUMMY RESPONSE DATA

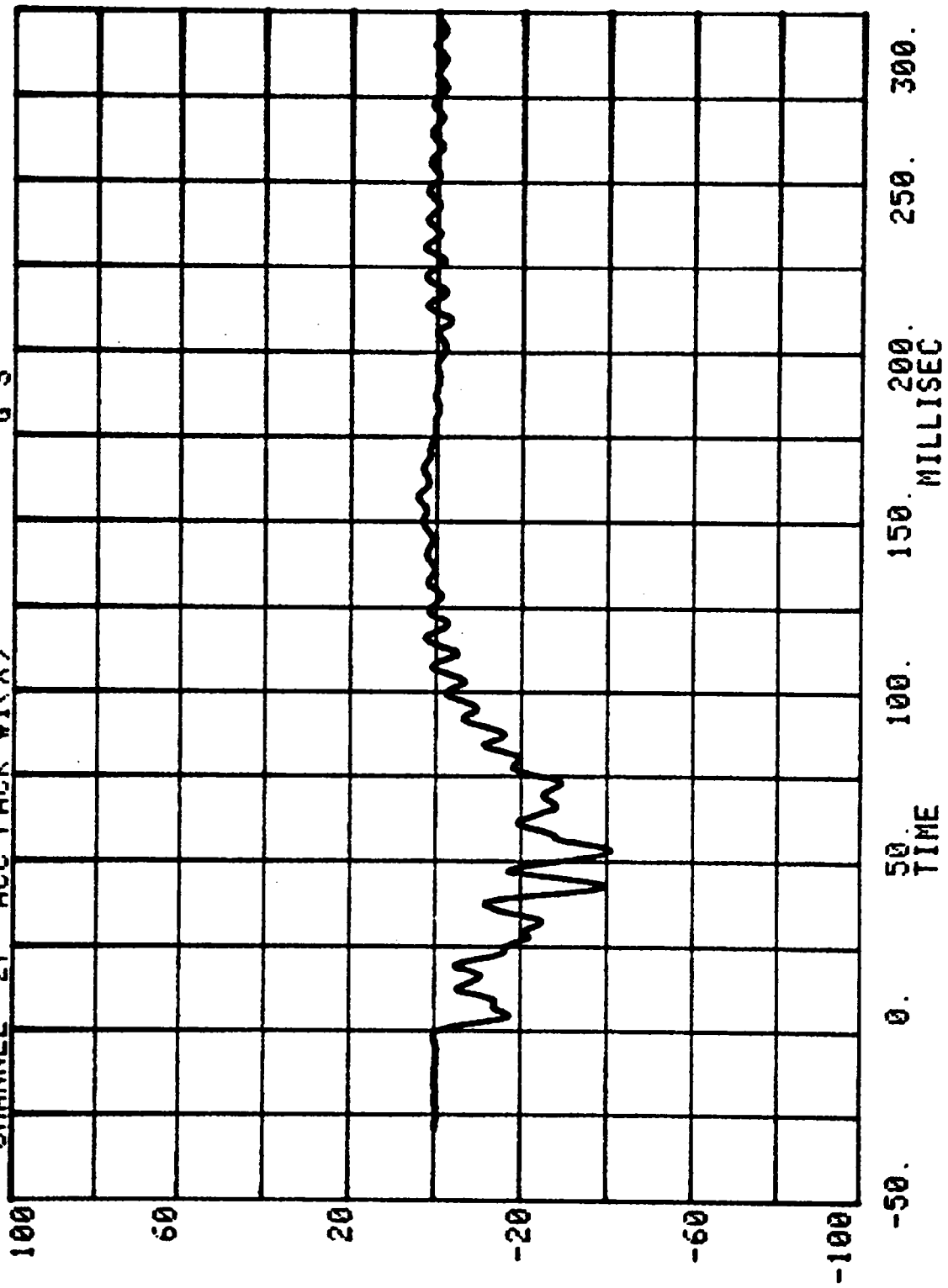
TEST NO. CE0303

VEHICLE DATA

FILTER CHANNEL CLASS

60

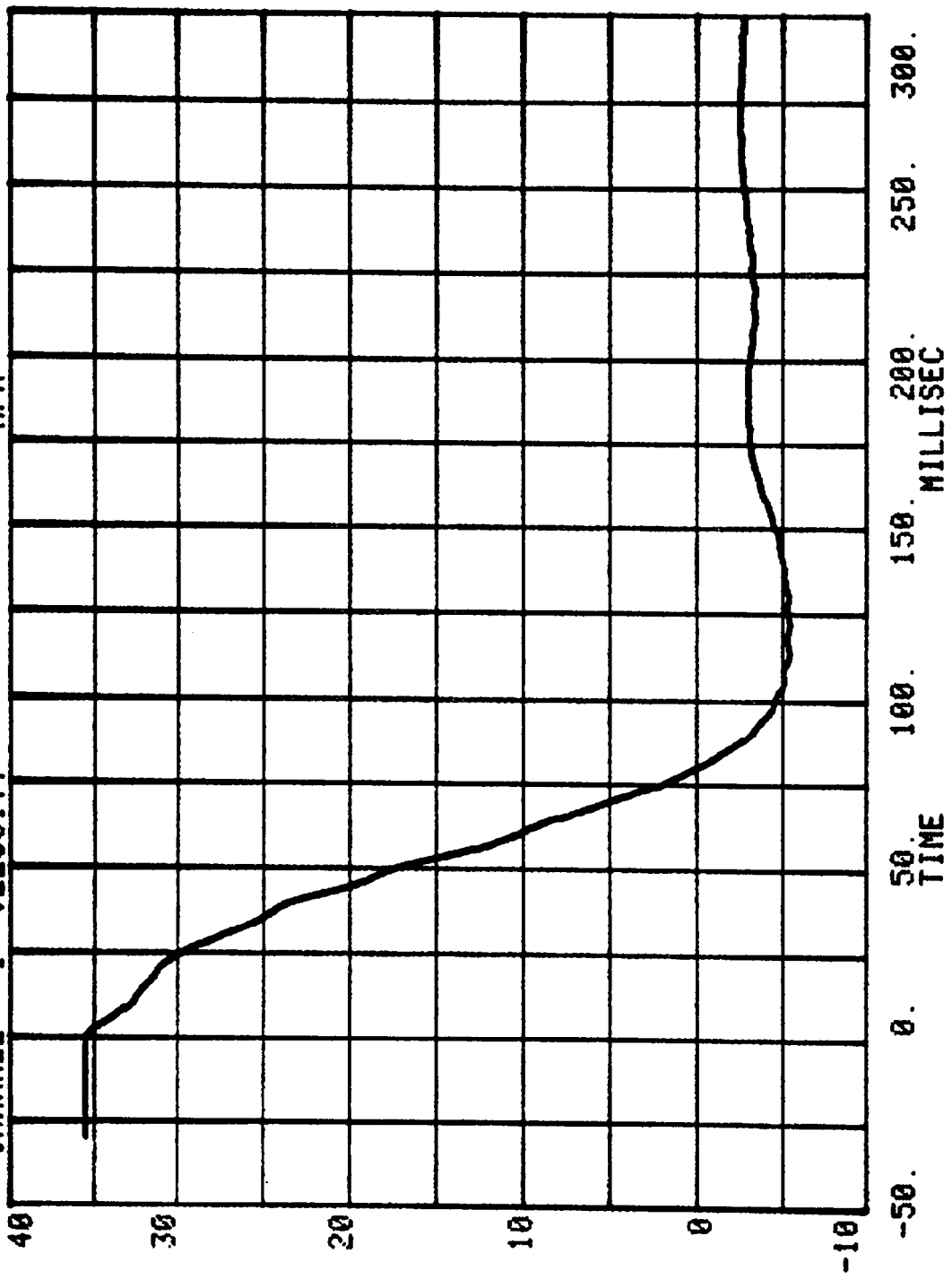
CHANNEL 27 ACC PACK #1(X) RUN= 601 SERIES= 303 G'S



ACC. PACK. #1 (X)

RUN= 601 SERIES= 303 MPH

CHANNEL 1 VELOCITY



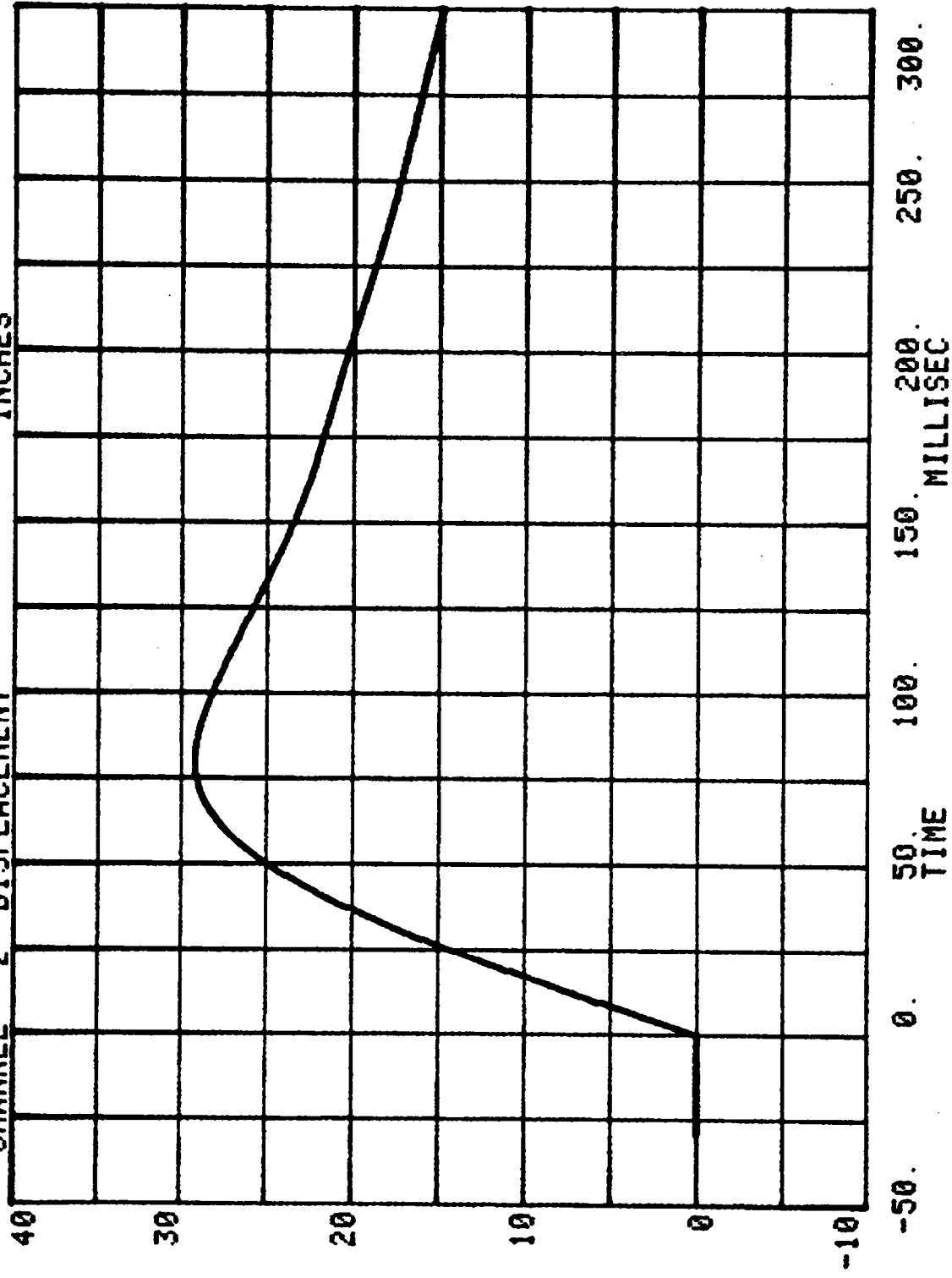
ACC. PACK. #1 (X)

CHANNEL 2 DISPLACEMENT

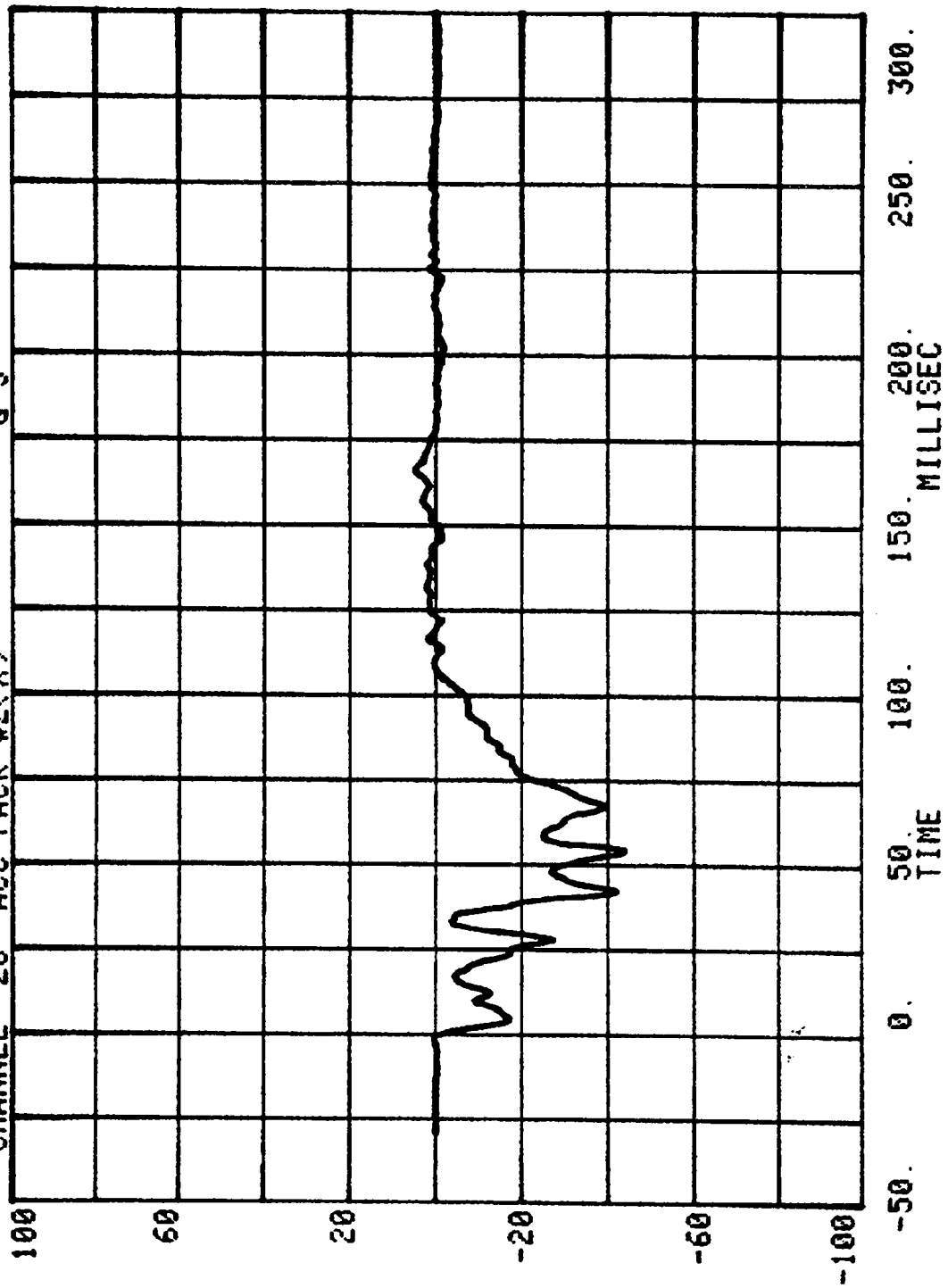
RUN= 601

SERIES= 303

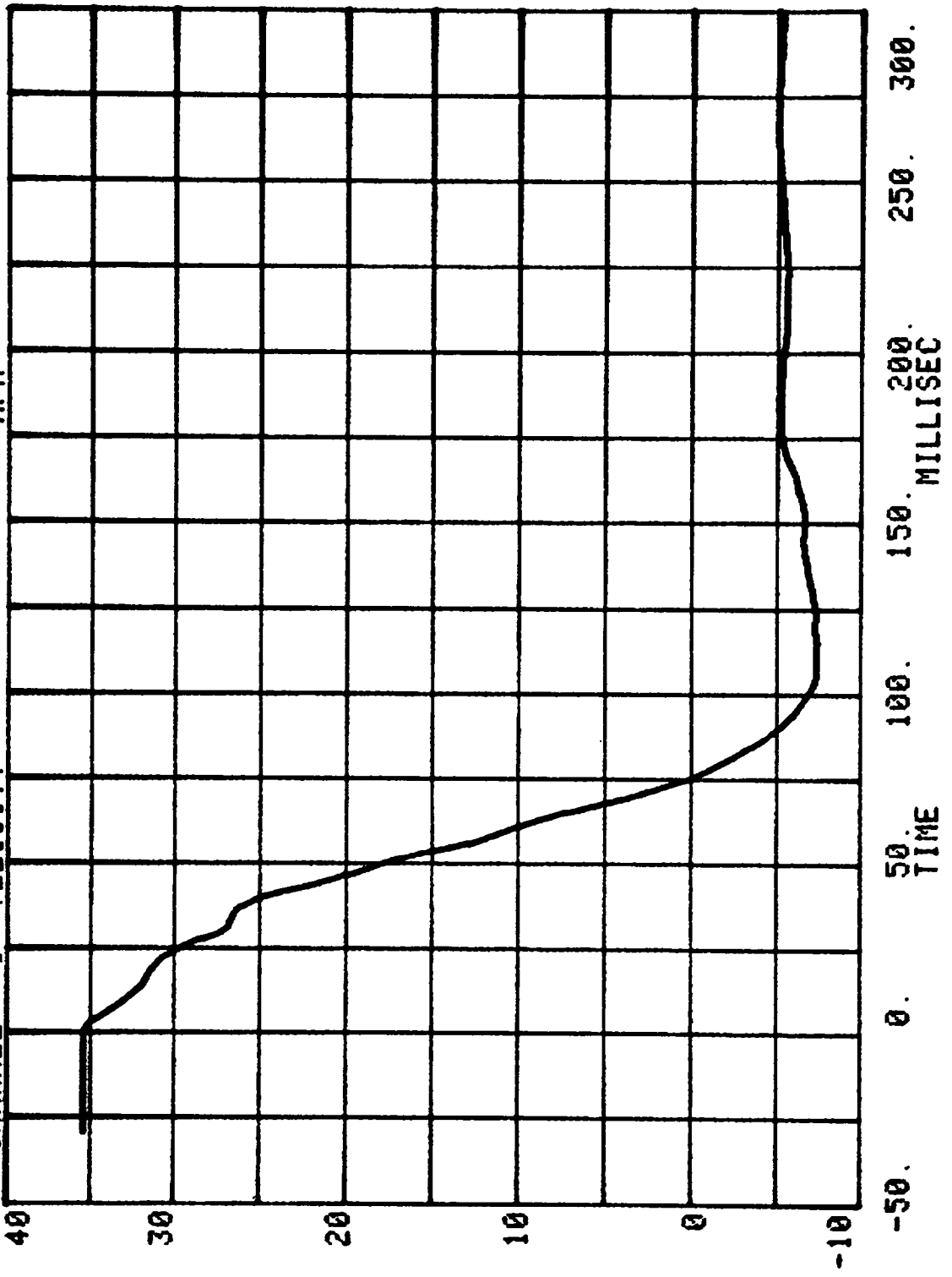
INCHES



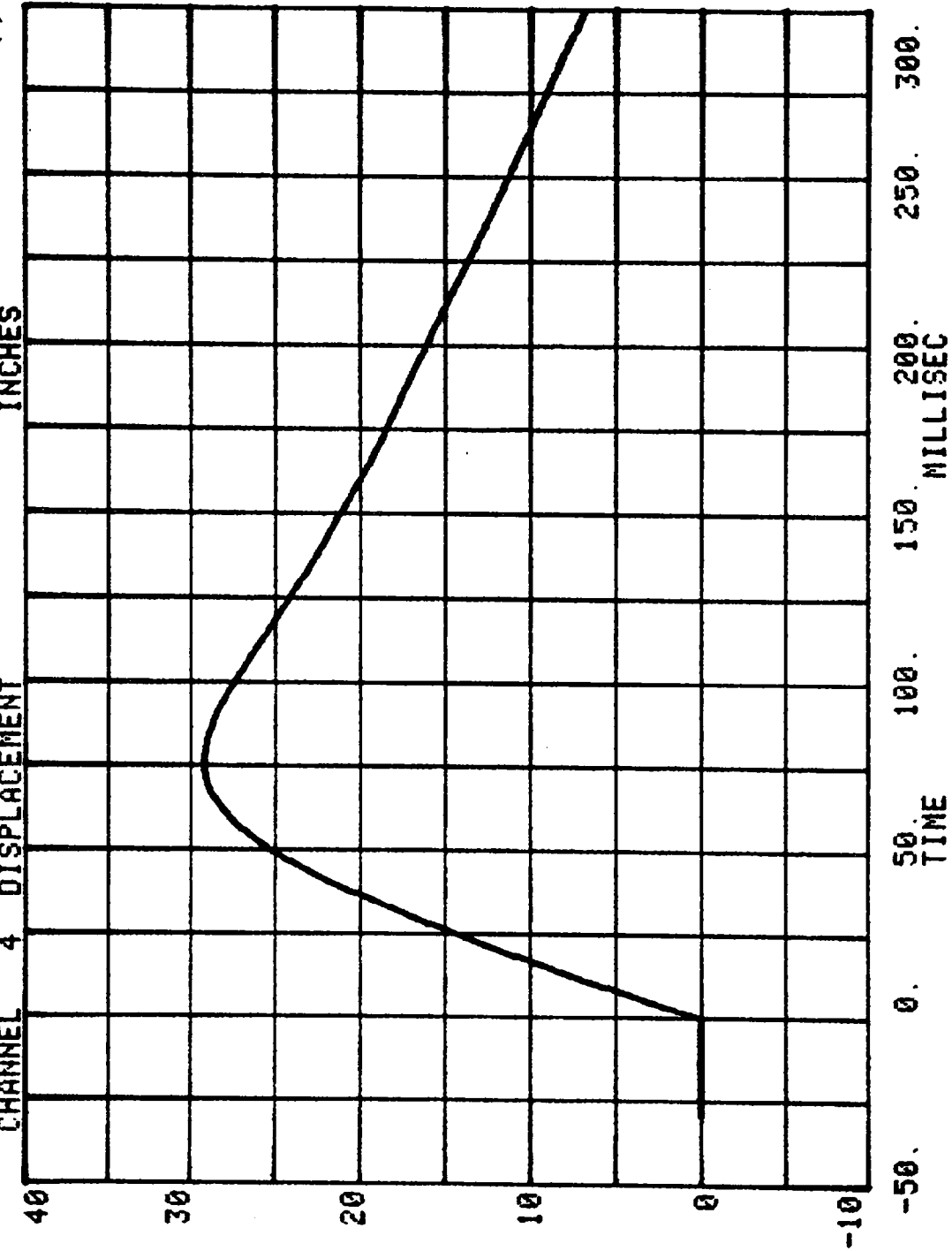
CHANNEL 28 ACC PACK #2(X) RUN= 601 SERIES= 303 G'S



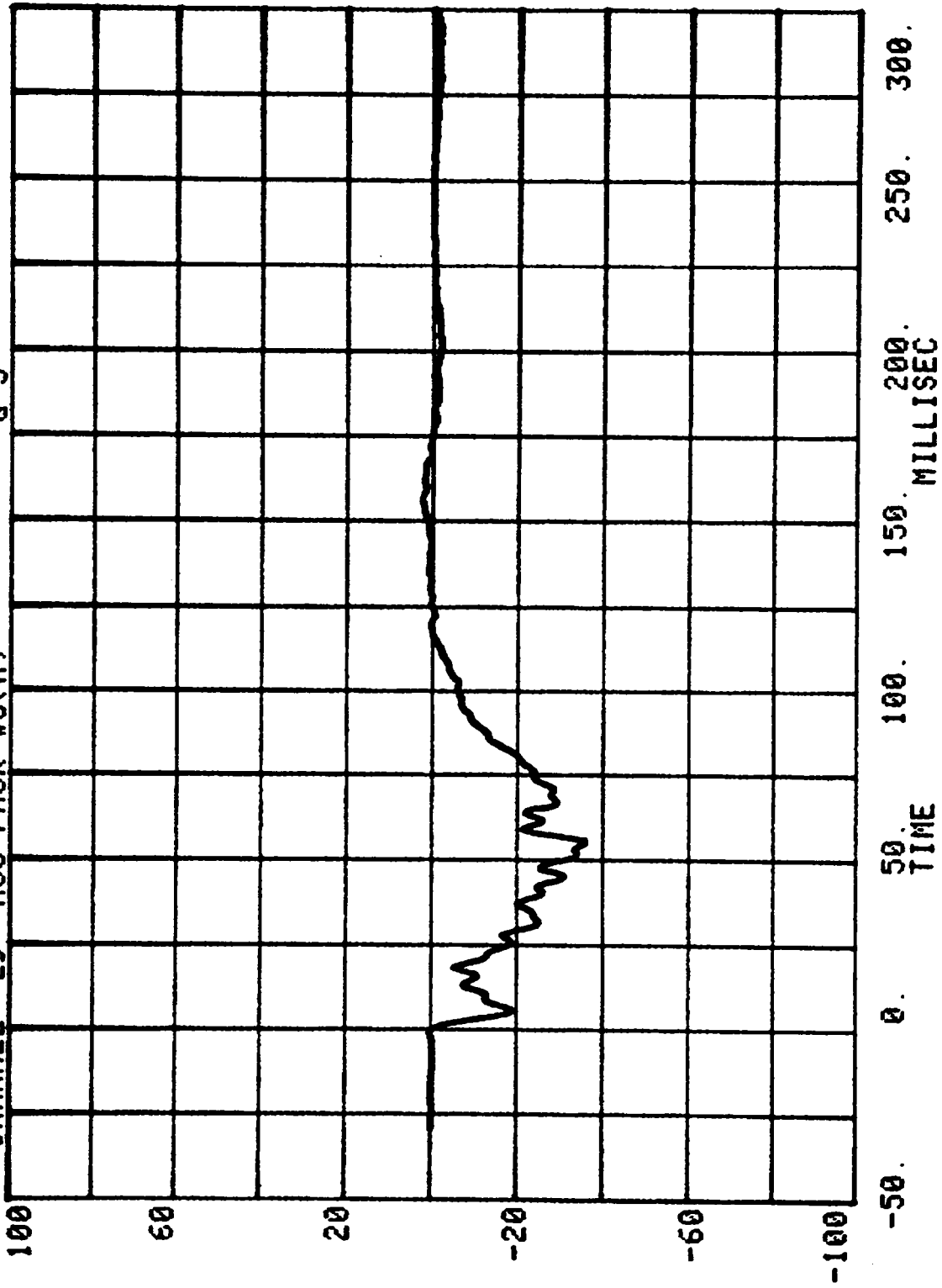
CHANNEL 3 VELOCITY      RUN= 601      SERIES= 303      ACC. PACK. #2 (X)



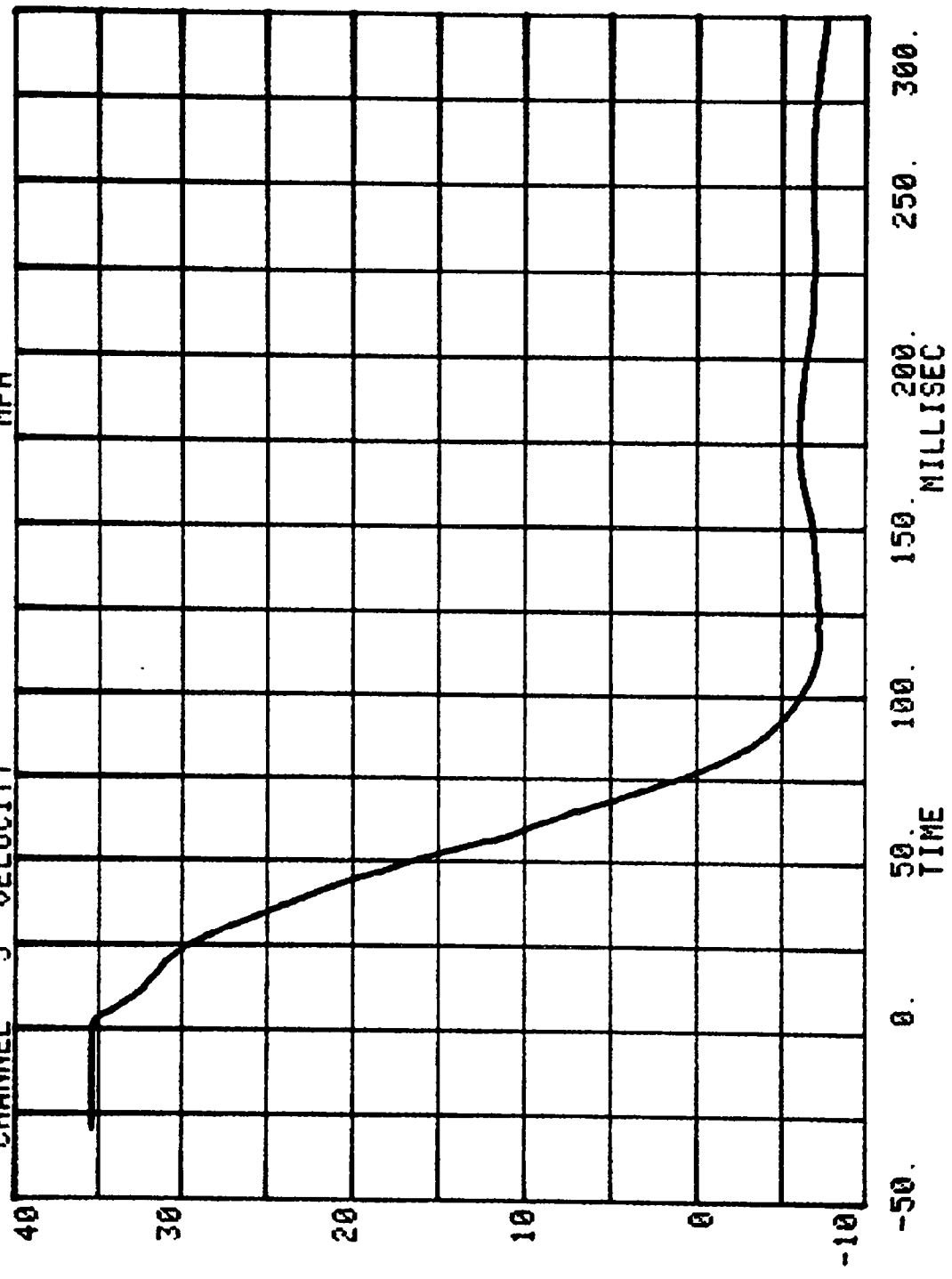
CHANNEL 4 DISPLACEMENT RUN= 601 SERIES= 303 INCHES ACC. PACK. #2 (X)



CHANNEL 29 ACC PACK #3(X) RUN= 601 SERIES= 303 G'S



CHANNEL 5 VELOCITY  
RUN= 601 SERIES= 303 MPH  
ACC. PACK. #3 (X)



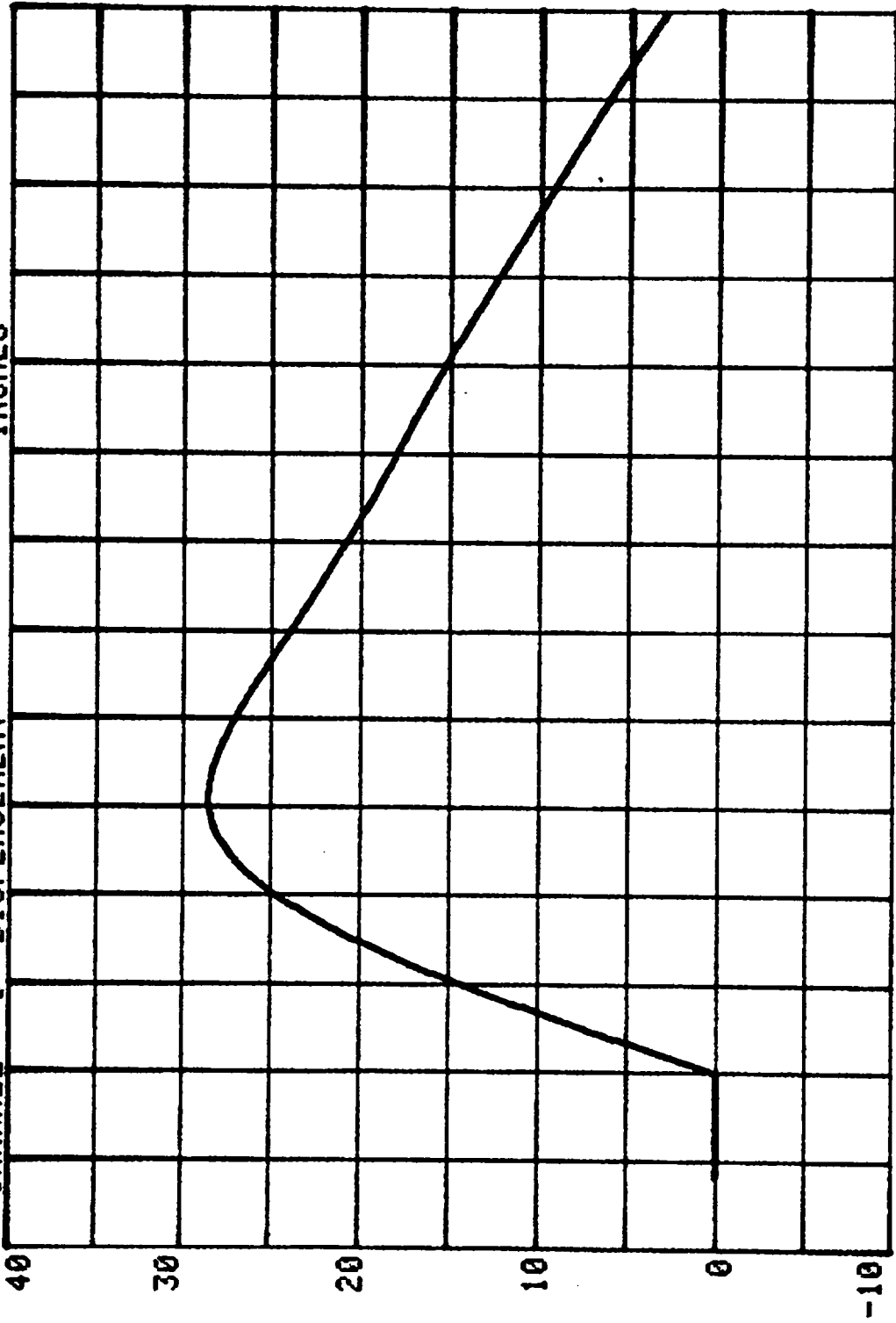
ACC. PACK. #3 (X)

CHANNEL 6 DISPLACEMENT

RUN= 601

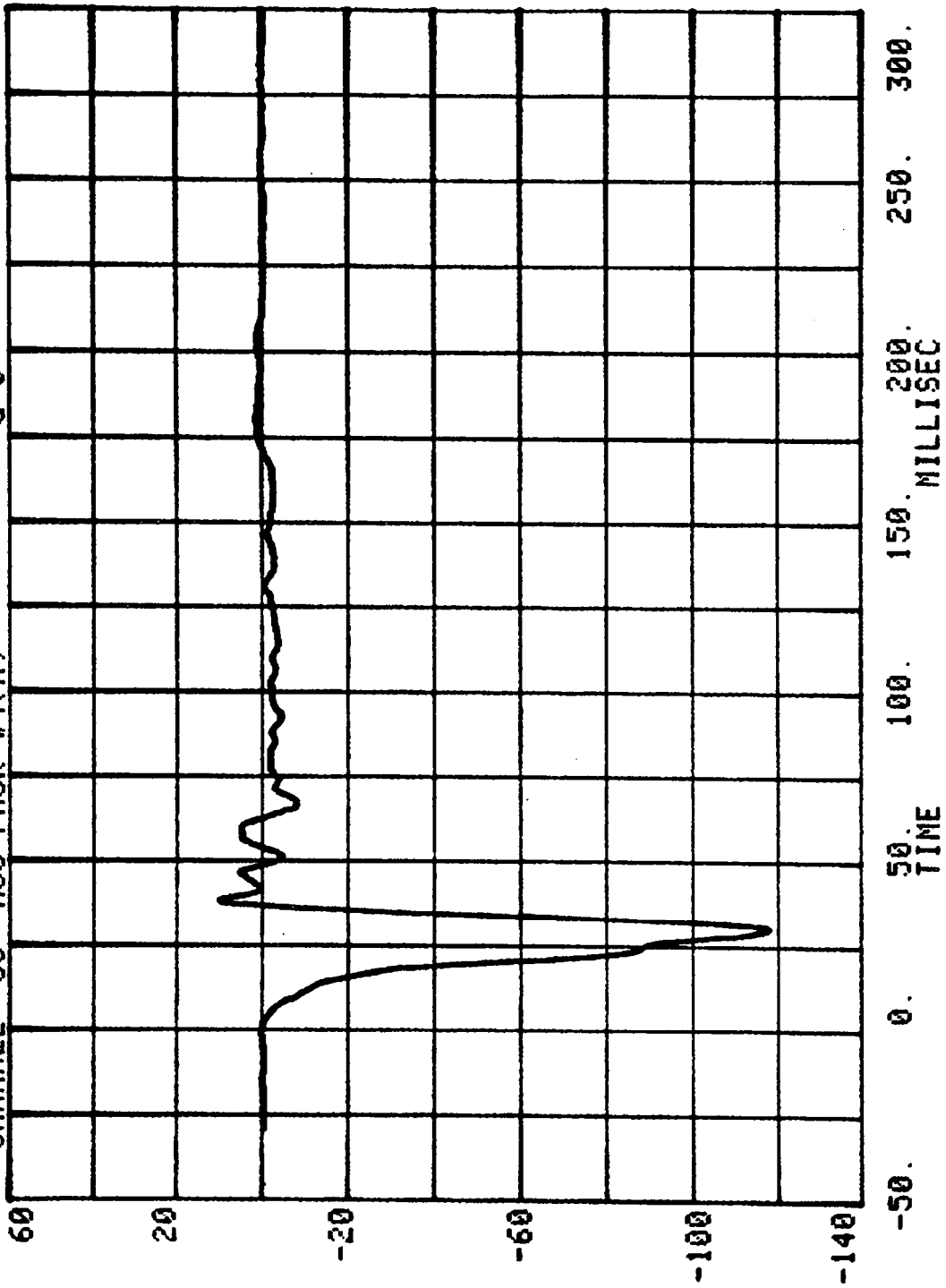
SERIES= 303

INCHES



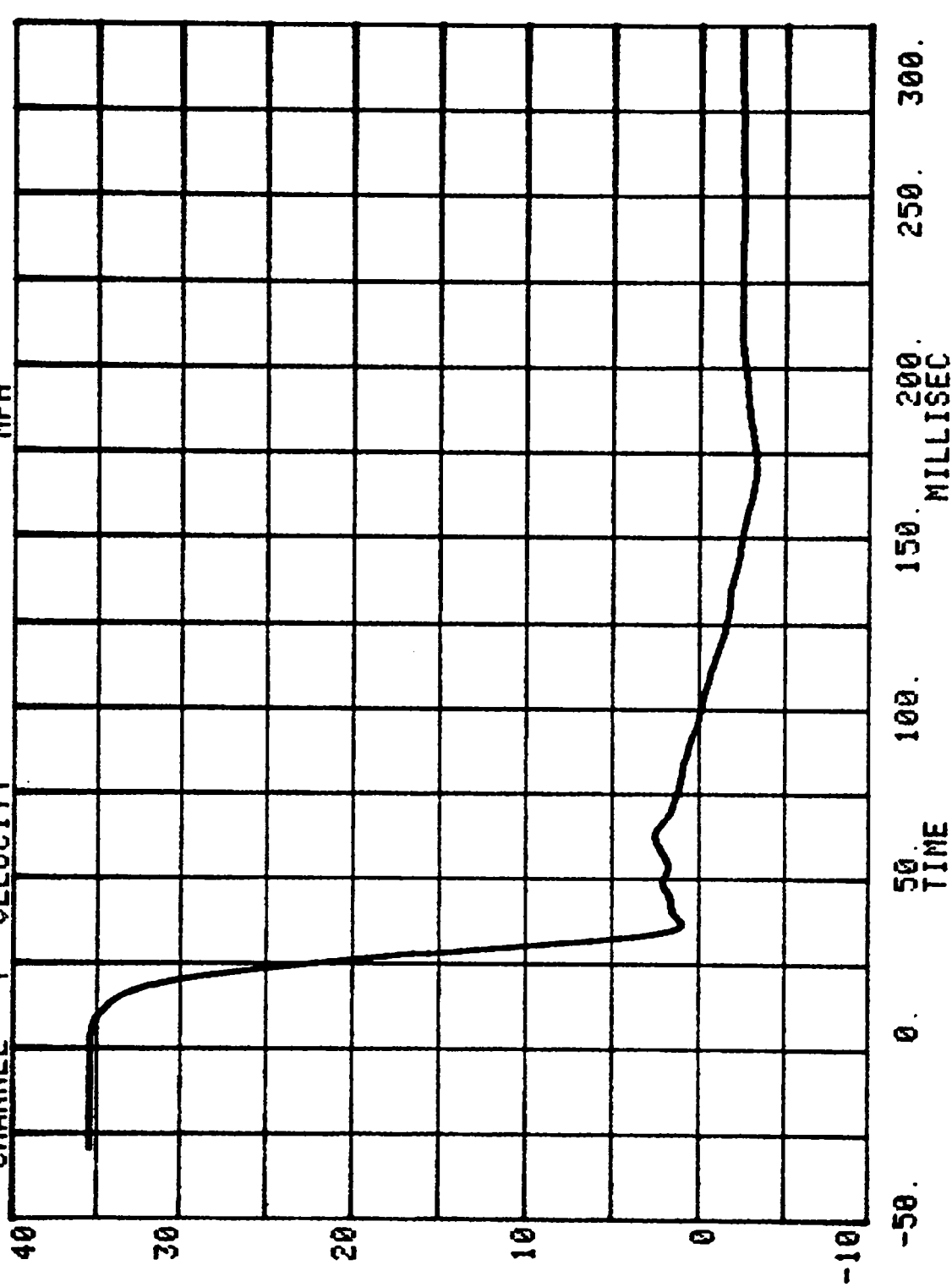
TIME  
-50. 0. 50. 100. 150. 200. 250. 300.  
MILLISEC

CHANNEL 30 ACC PACK #4(X) RUN= 601 SERIES= 303 G'S



ACC. PACK. #4 (X)

CHANNEL 7 VELOCITY  
RUN= 601 SERIES= 303 MPH

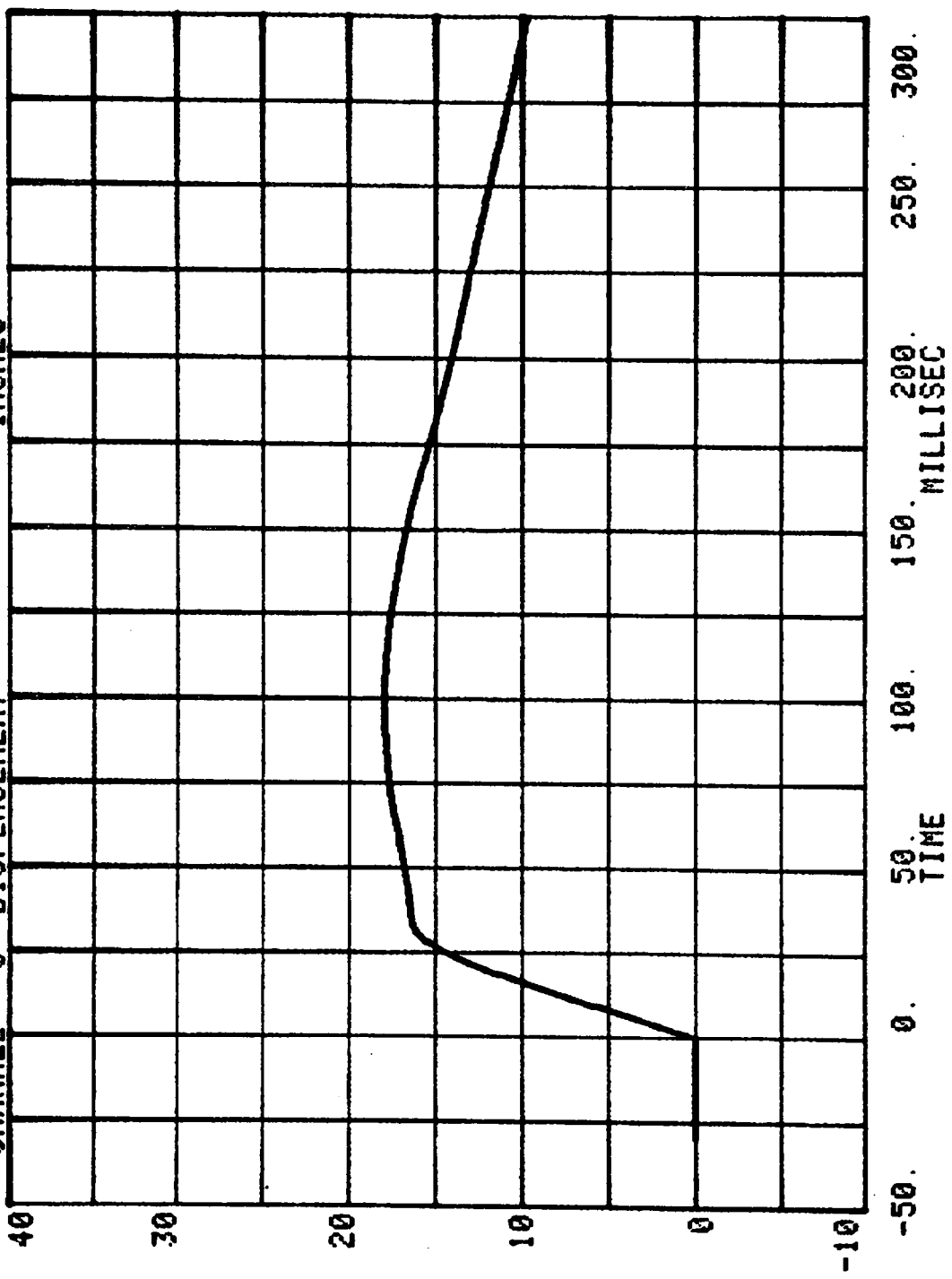


ACC. PACK. #4 (X)

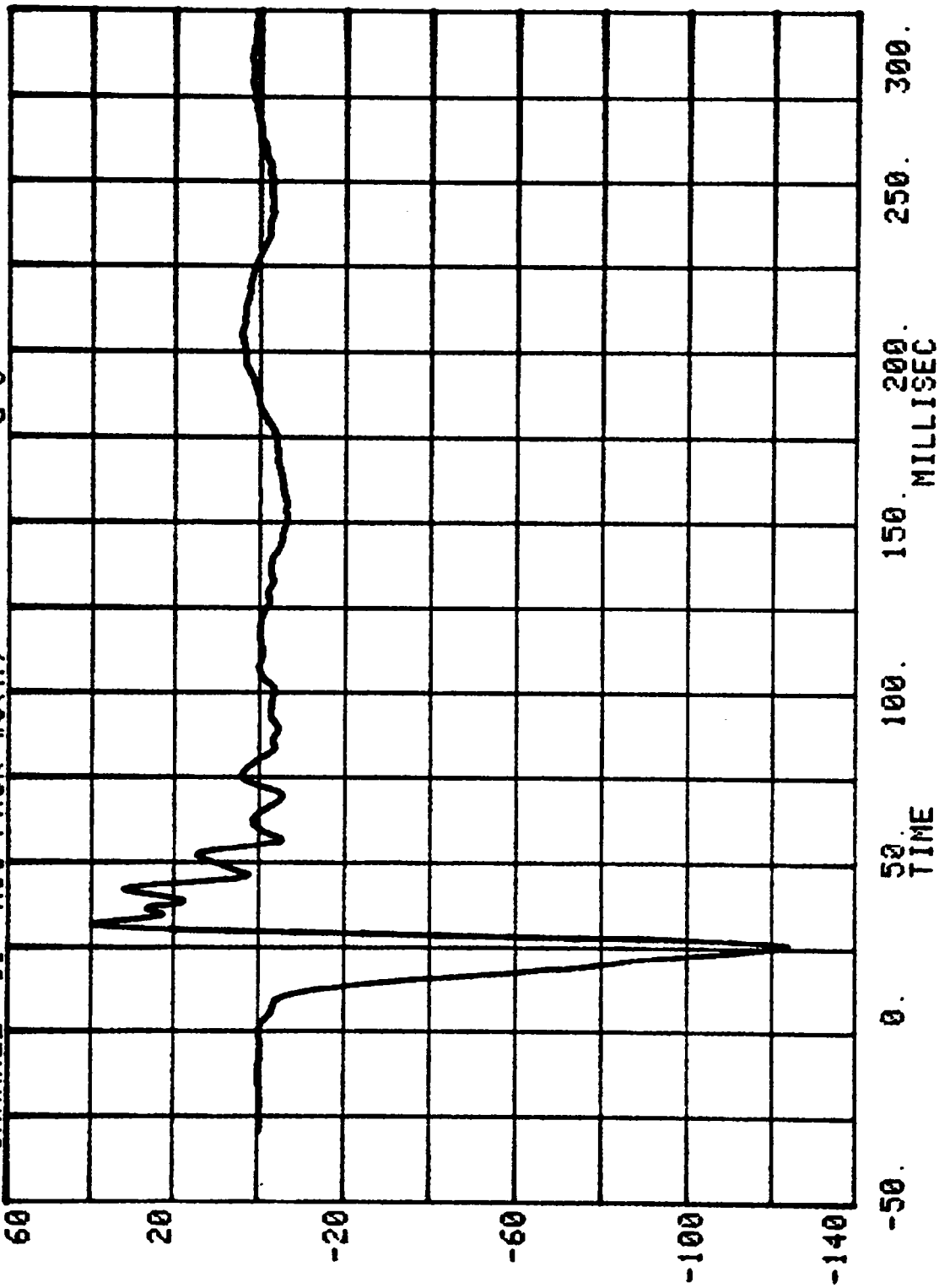
SERIES= 303 INCHES

RUN= 601 DISPLACEMENT

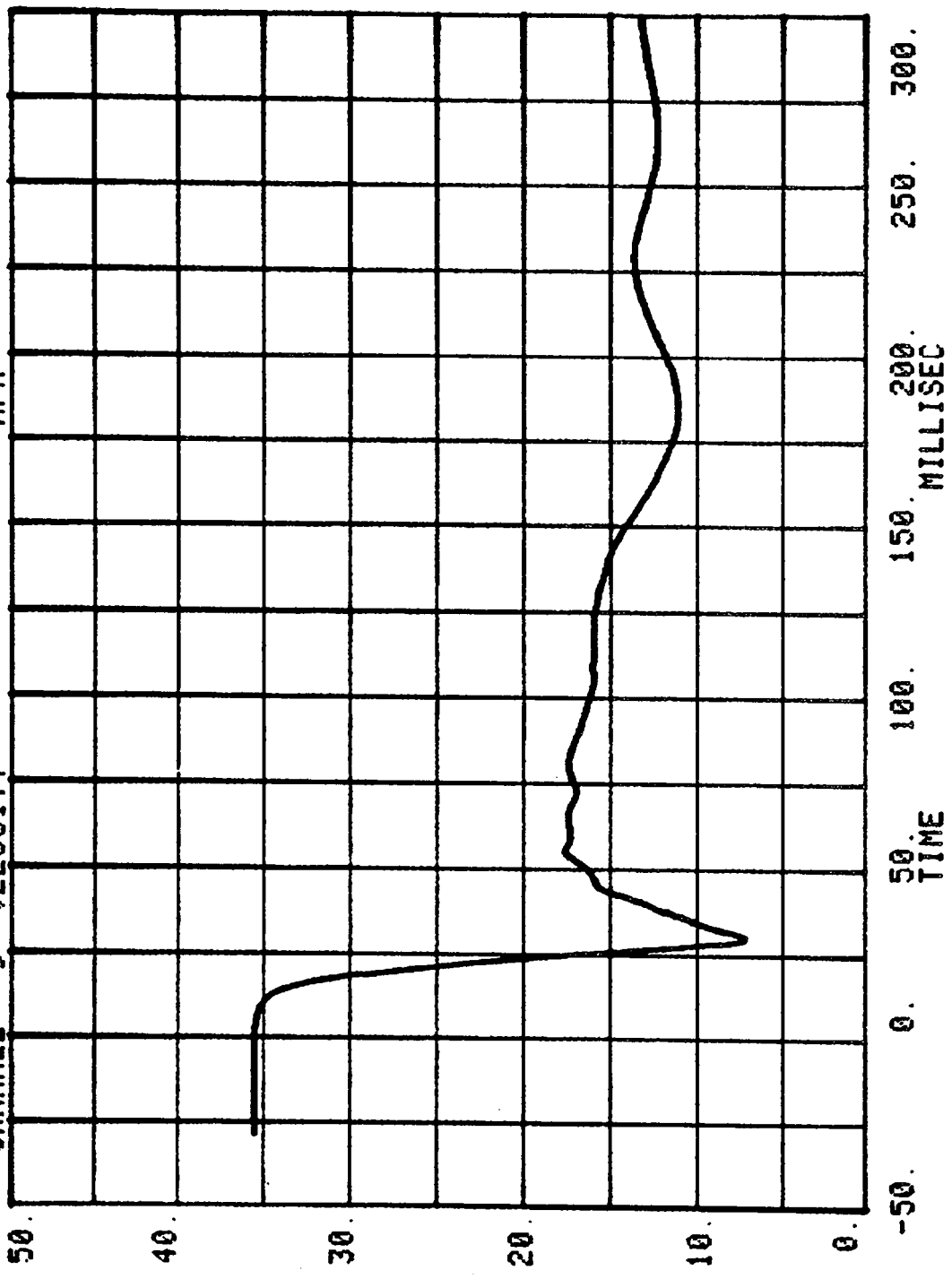
CHANNEL 8



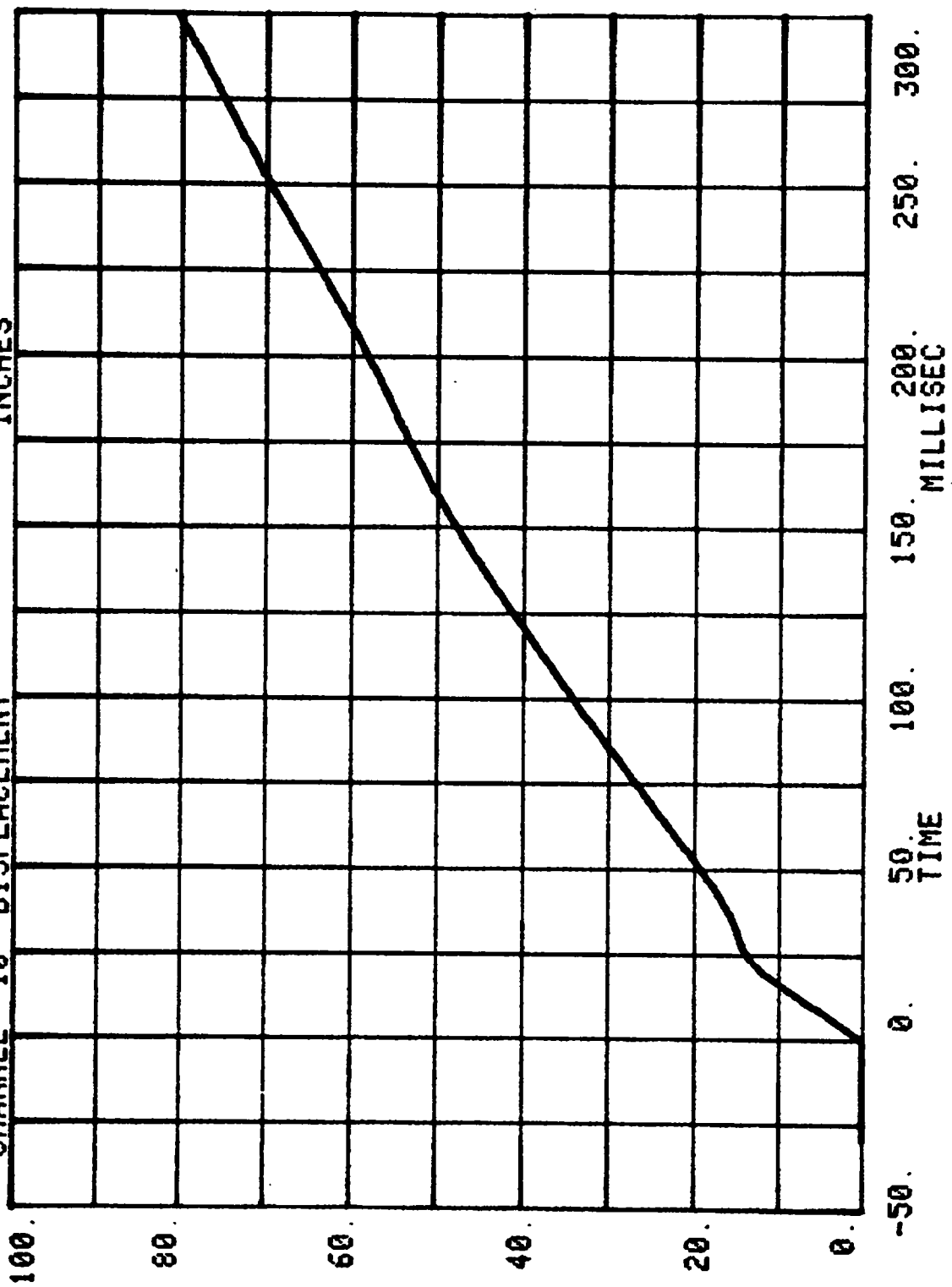
CHANNEL 31 ACC PACK #5(X) RUN= 601 SERIES= 303 G'S



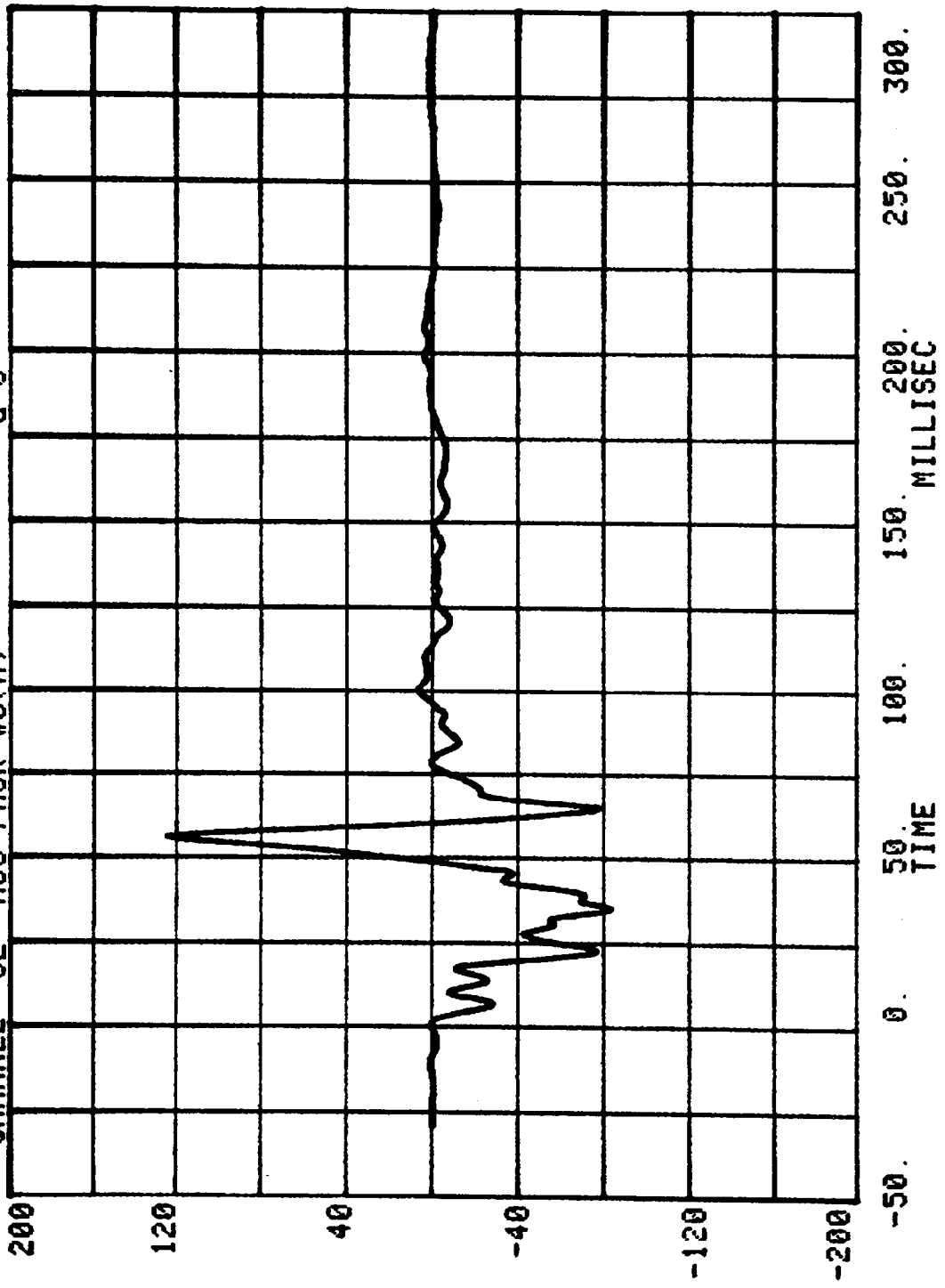
CHANNEL 9 VELOCITY  
RUN= 601 SERIES= 303 MPH  
ACC. PACK. #5 (X)



CHANNEL 10 DISPLACEMENT  
RUN= 601 SERIES= 303 INCHES  
ACC. PACK. #5 (X)

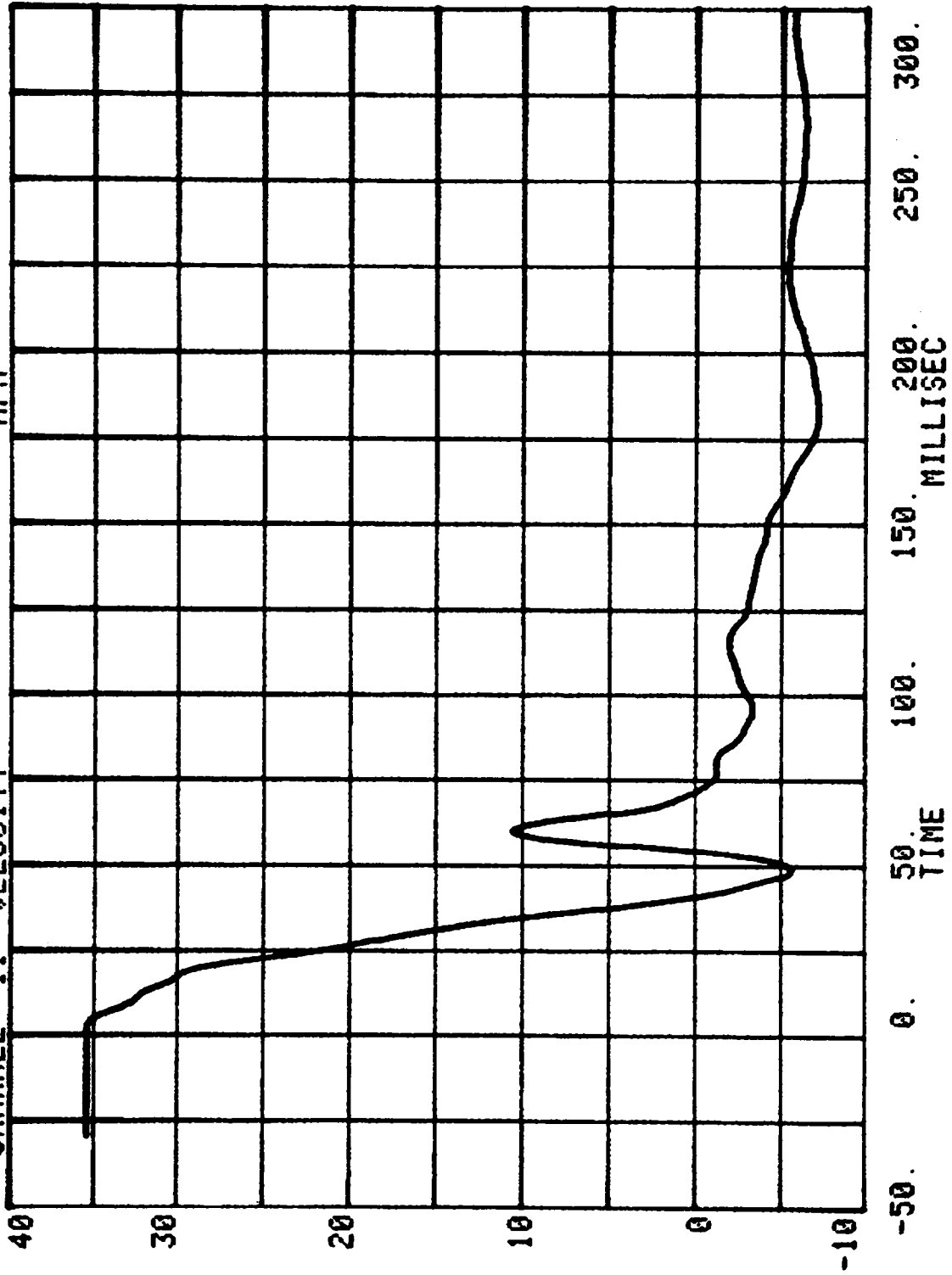


CHANNEL 32 ACC PACK #6(X) RUN= 601 SERIES= 303 G'S



ACC. PACK. #6 (X)

CHANNEL 11 VELOCITY  
RUN= 601 SERIES= 303 MPH



ACC. PACK. #6 (X)

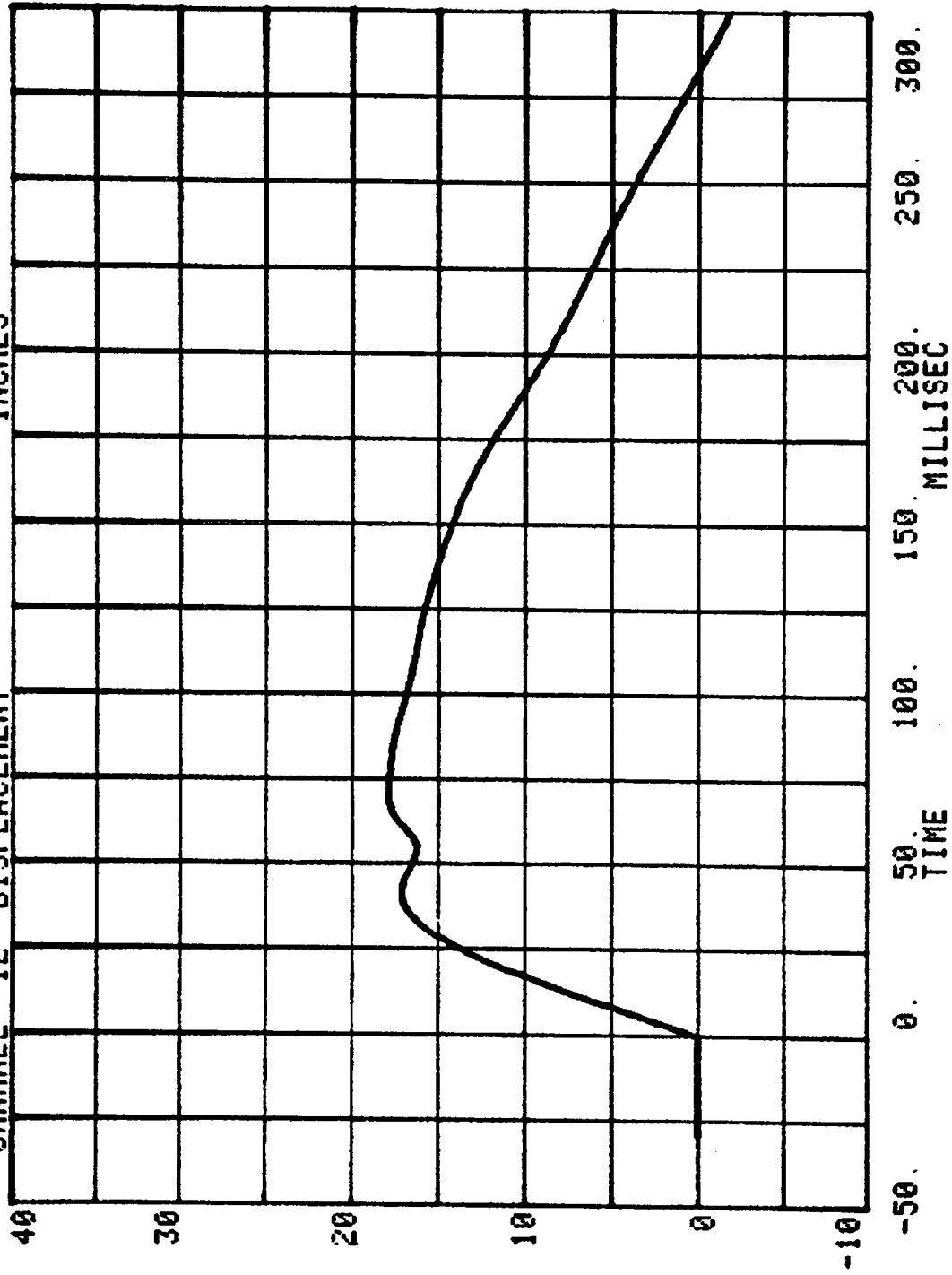
SERIES= 303

RUN= 601

CHANNEL 12

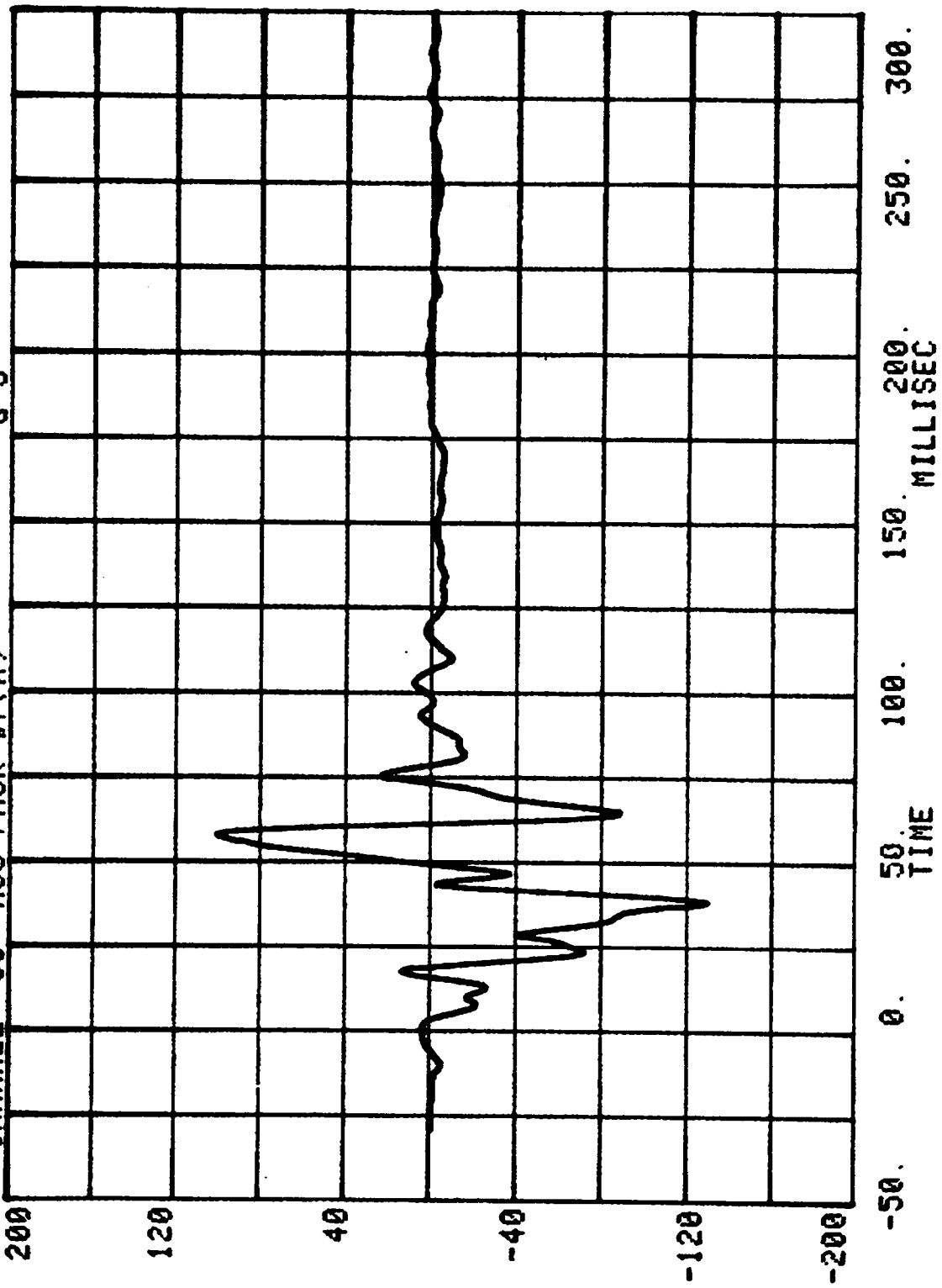
DISPLACEMENT

INCHES

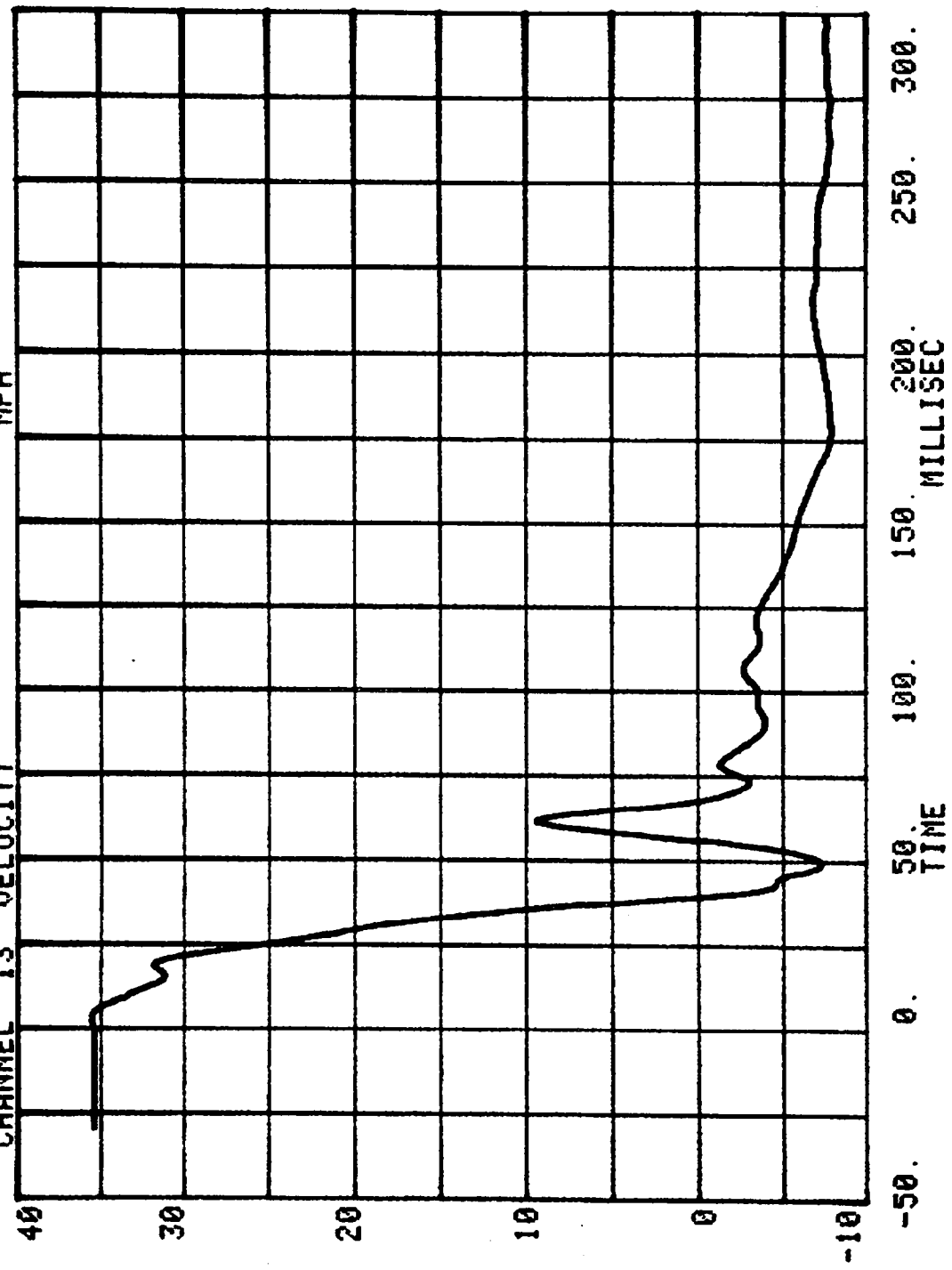


CHANNEL 33 ACC PACK #7(X) G'S

RUN= 601 SERIES= 303



CHANNEL 13 VELOCITY  
RUN= 601 SERIES= 303 MPH  
ACC. PACK. #7 (X)

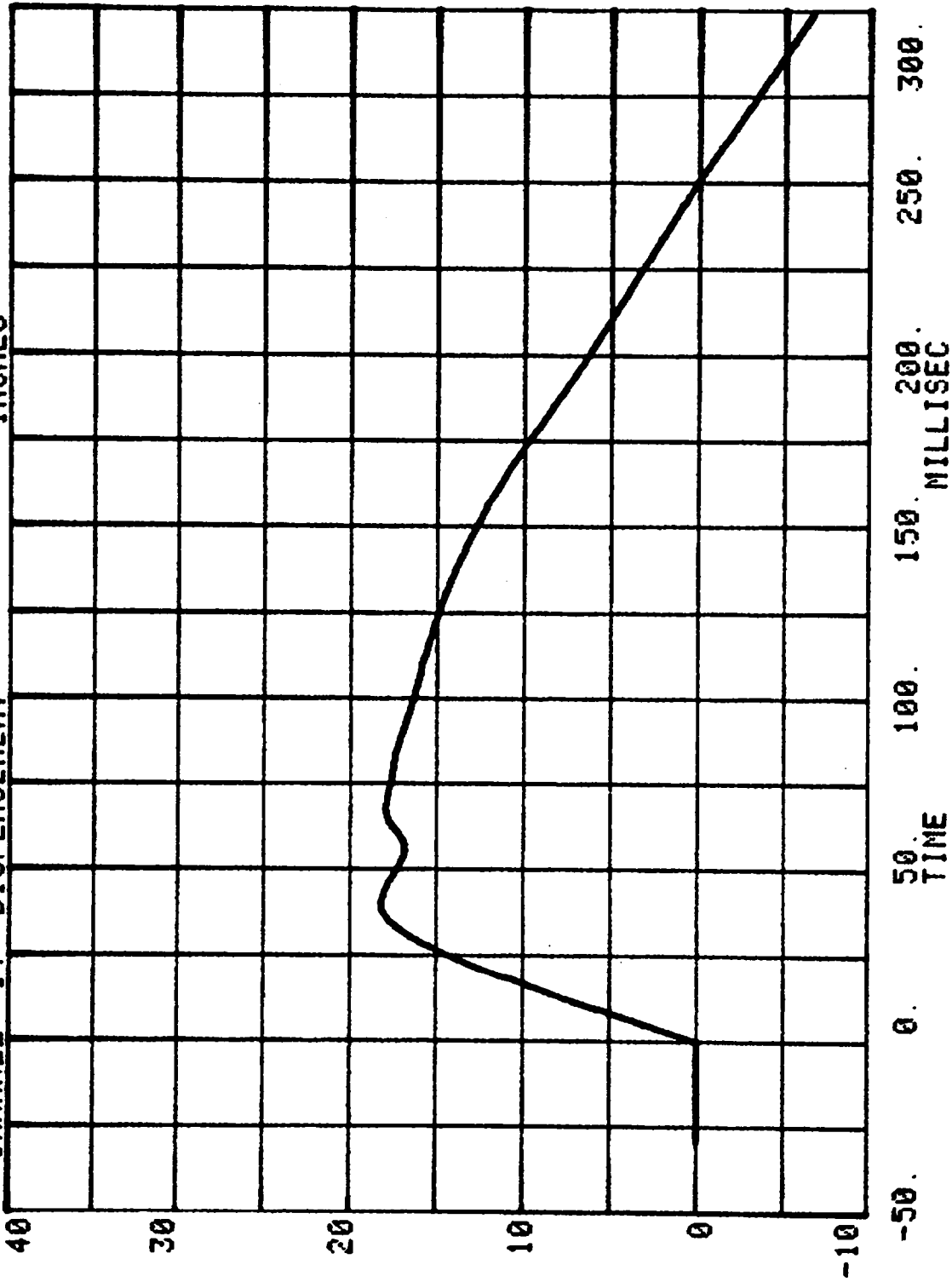


ACC. PACK. #7 (X)

SERIES= 303

RUN= 601

CHANNEL 14 DISPLACEMENT



TEST NO. CE0303

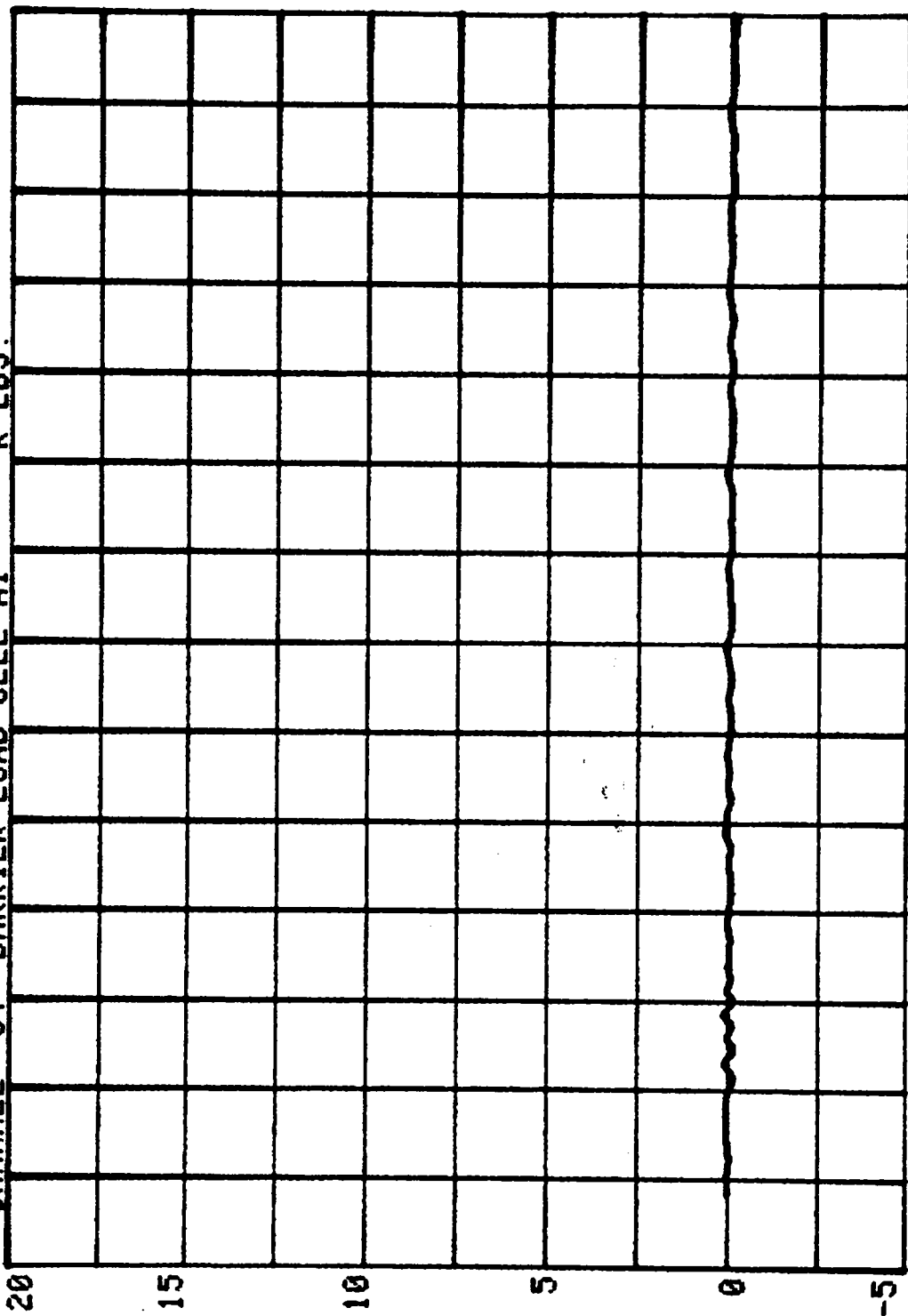
LOAD CELL BARRIER DATA  
FILTER CHANNEL CLASS

60

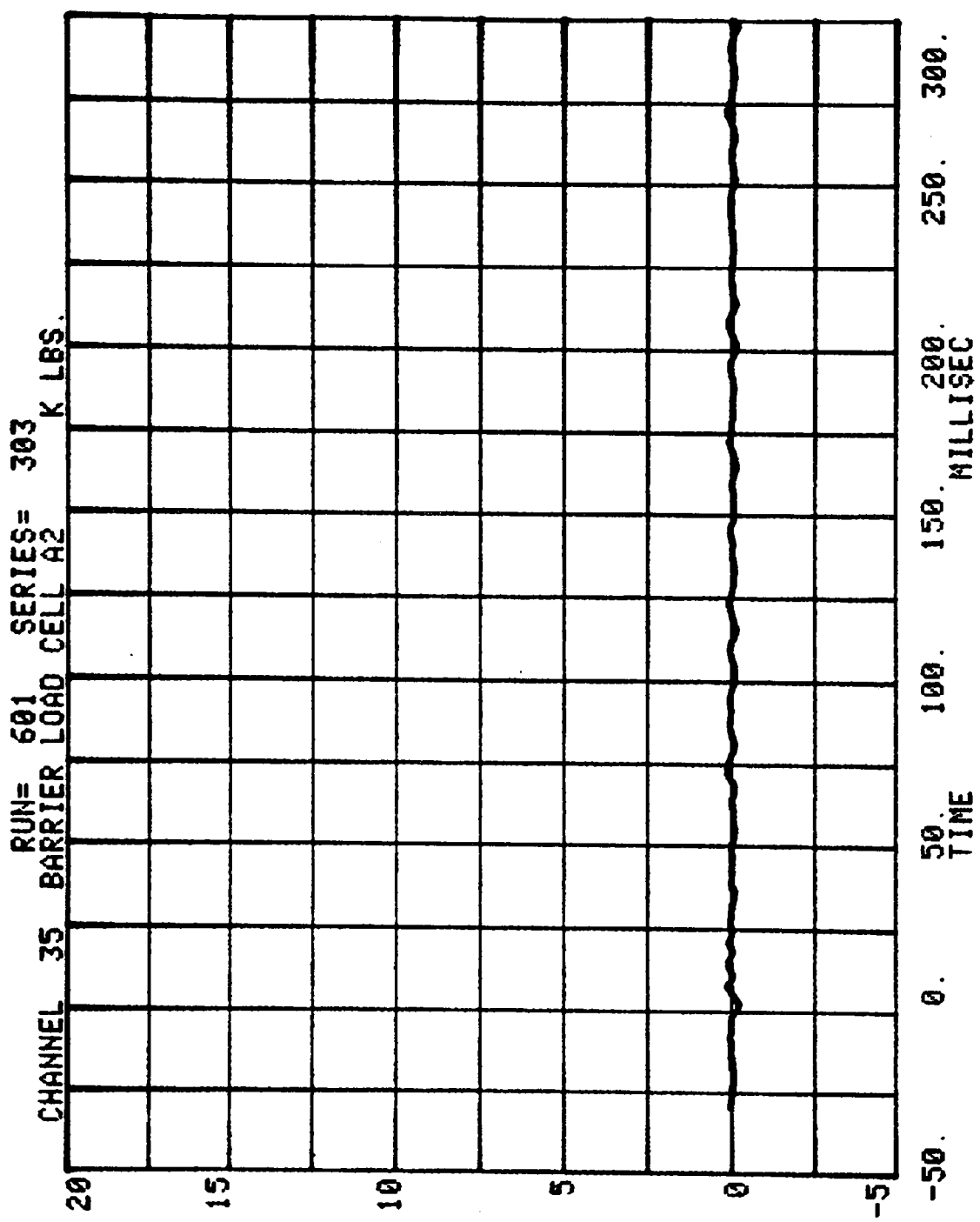
CHANNEL 34 BARRIER LOAD CELL A1

RUN= 601 SERIES= 303

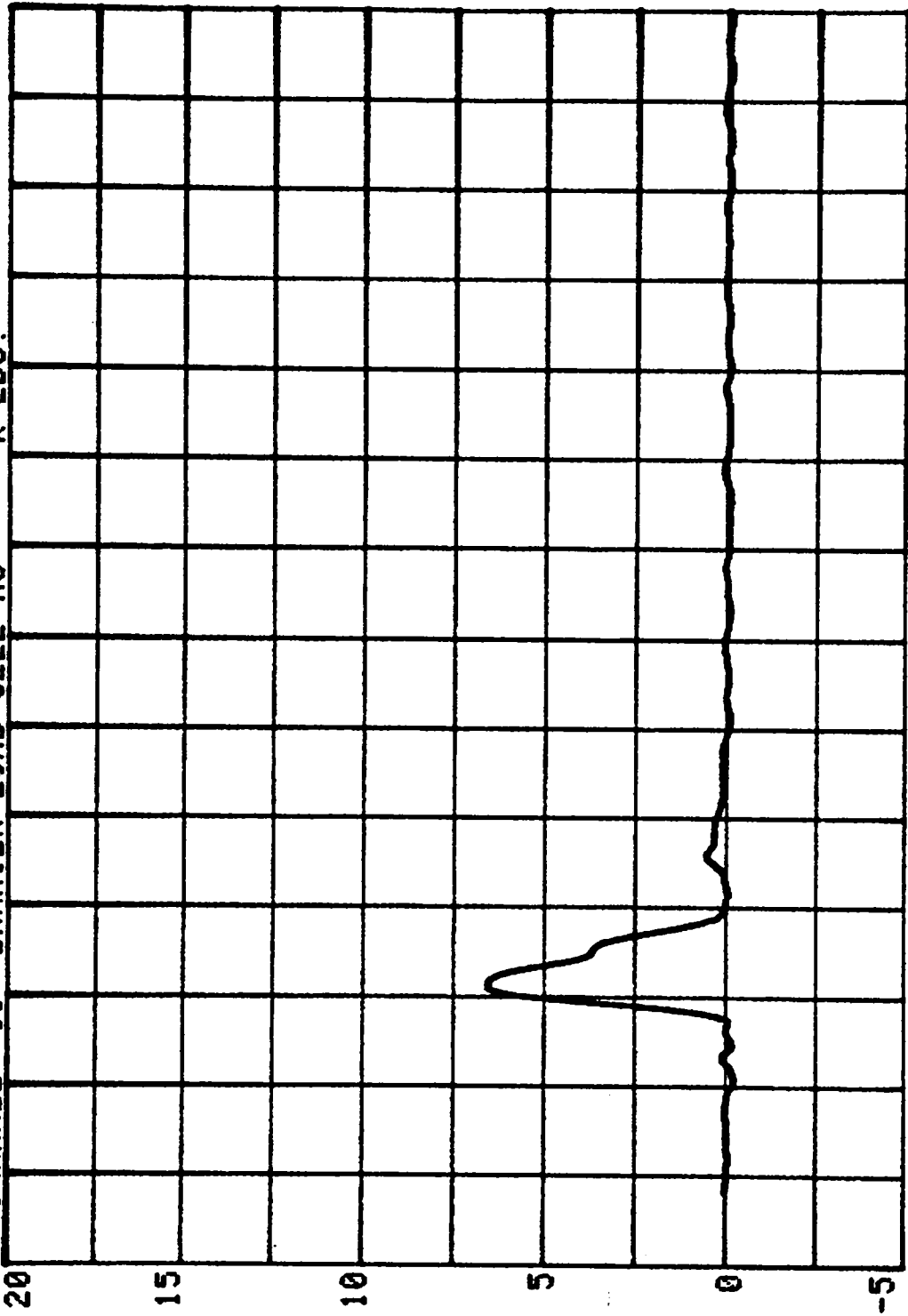
K LBS.



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

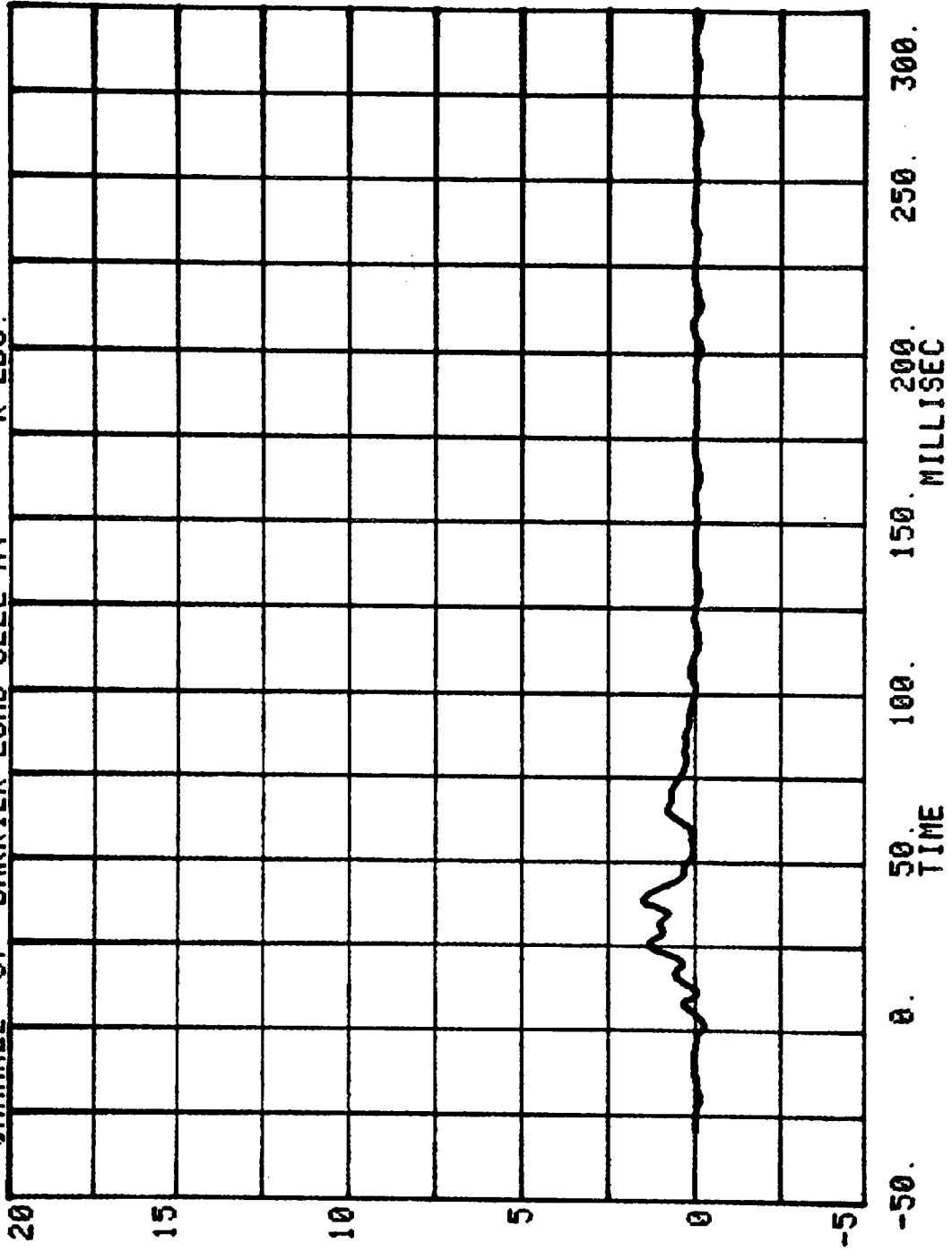


CHANNEL 36 BARRIER LOAD CELL A3  
RUN= 601 SERIES= 303 K LBS.

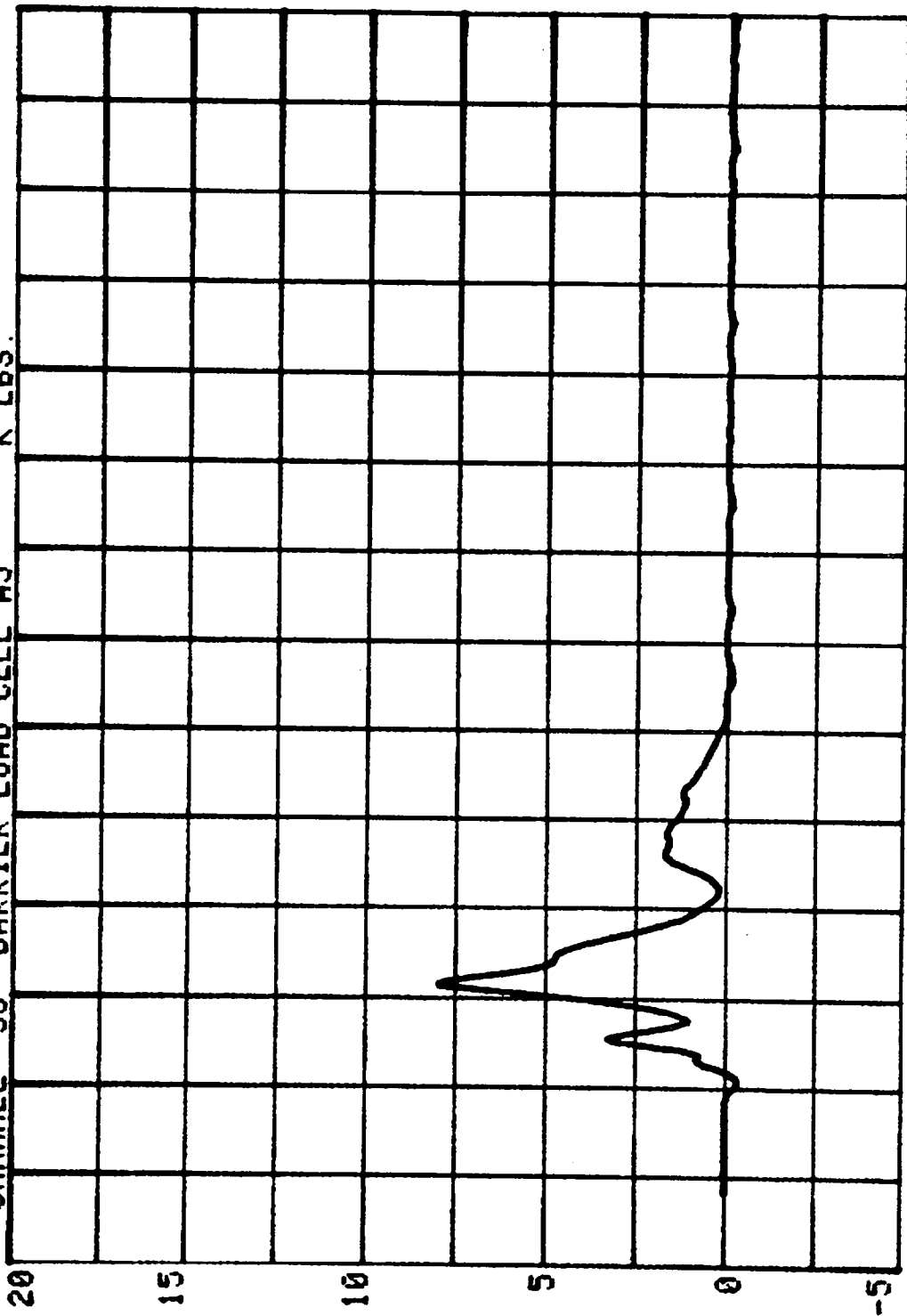


-50. 0. 50. 100. 150. 200. 250. 300.  
MILLISEC  
TIME

CHANNEL 37 BARRIER LOAD CELL A4 RUN= 601 SERIES= 303 K LBS.

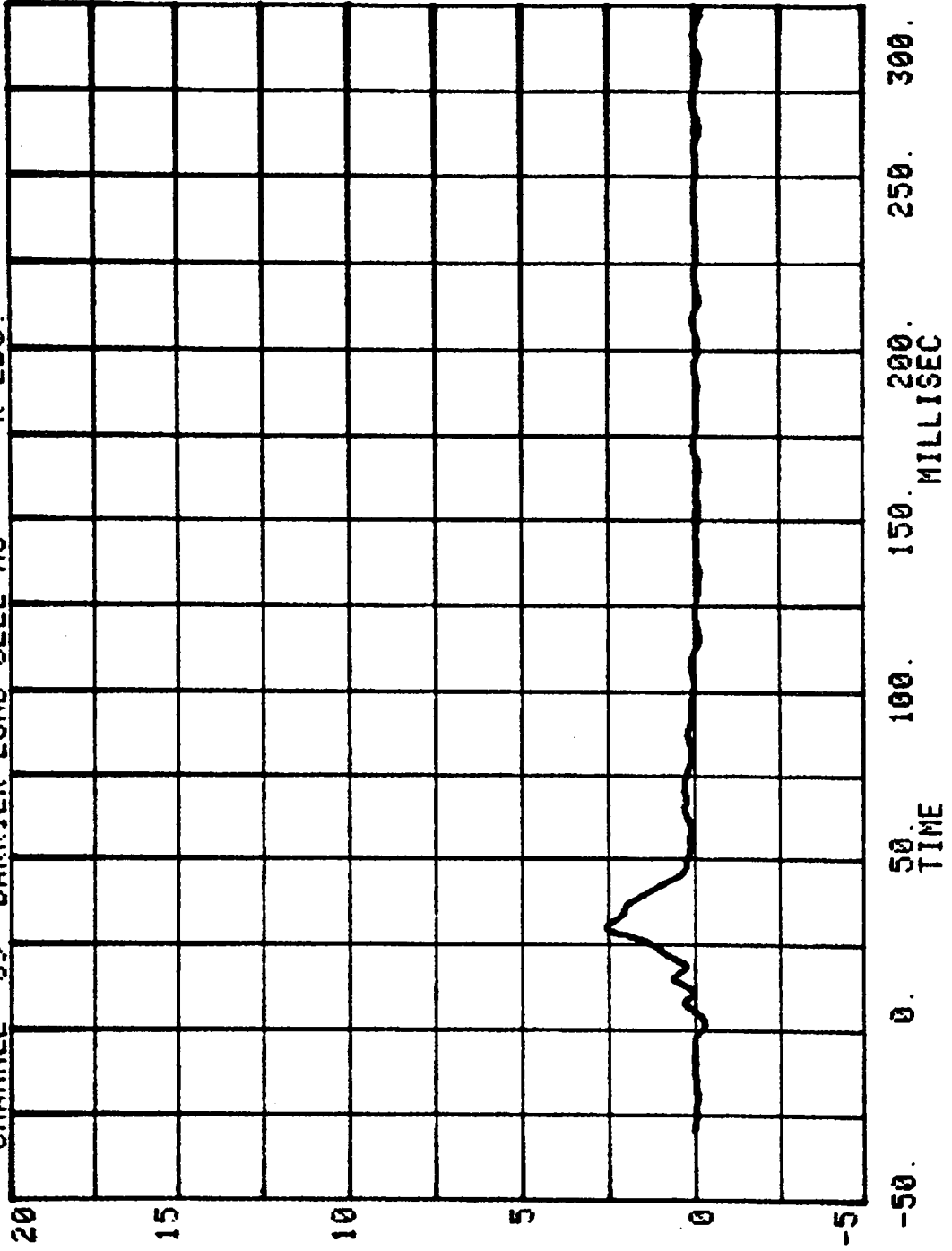


CHANNEL 38 BARRIER LOAD CELL A5  
RUN= 601 SERIES= 303 K LBS.

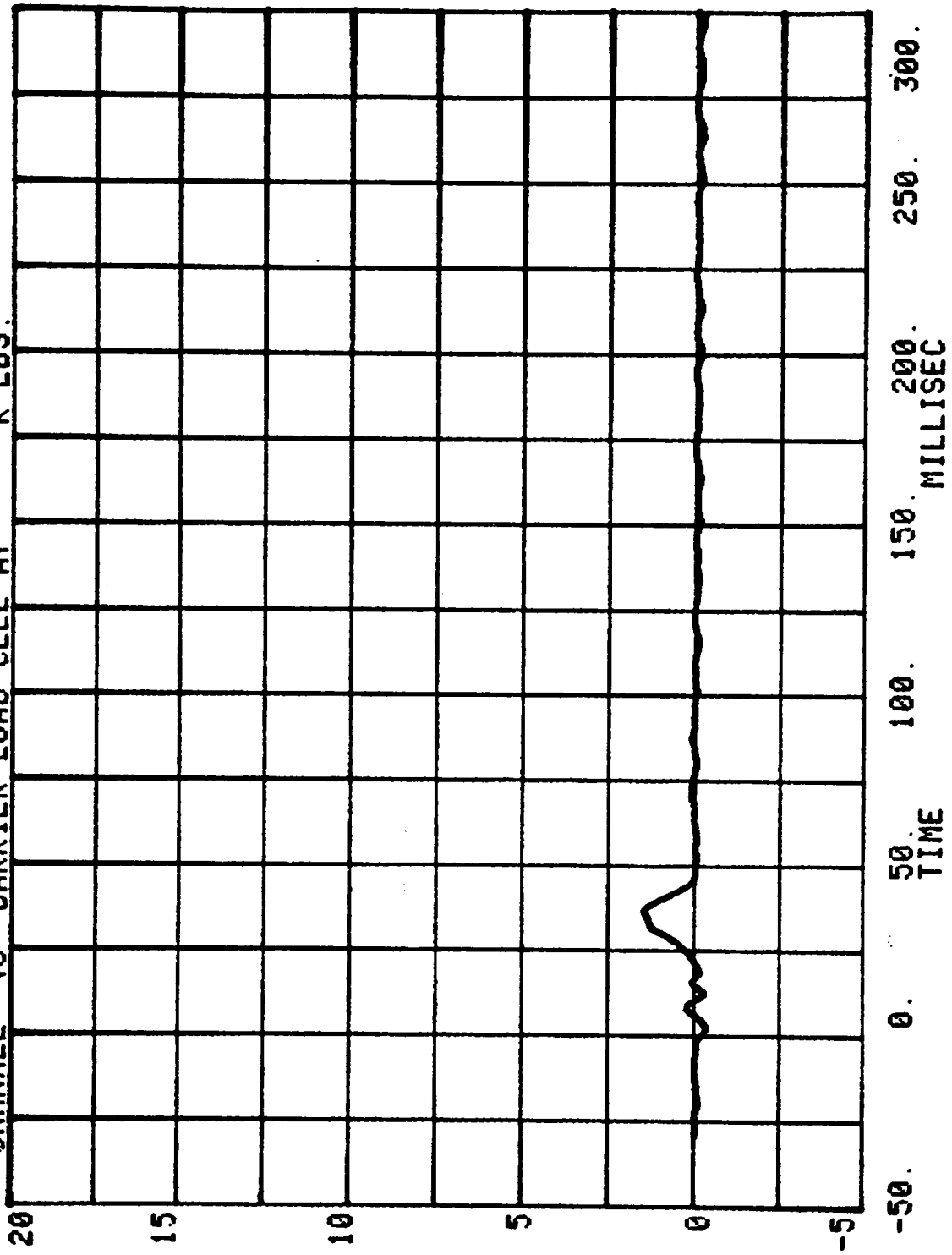


-50. 0. 50. 100. 150. 200. 250. 300.  
MILLISEC  
TIME

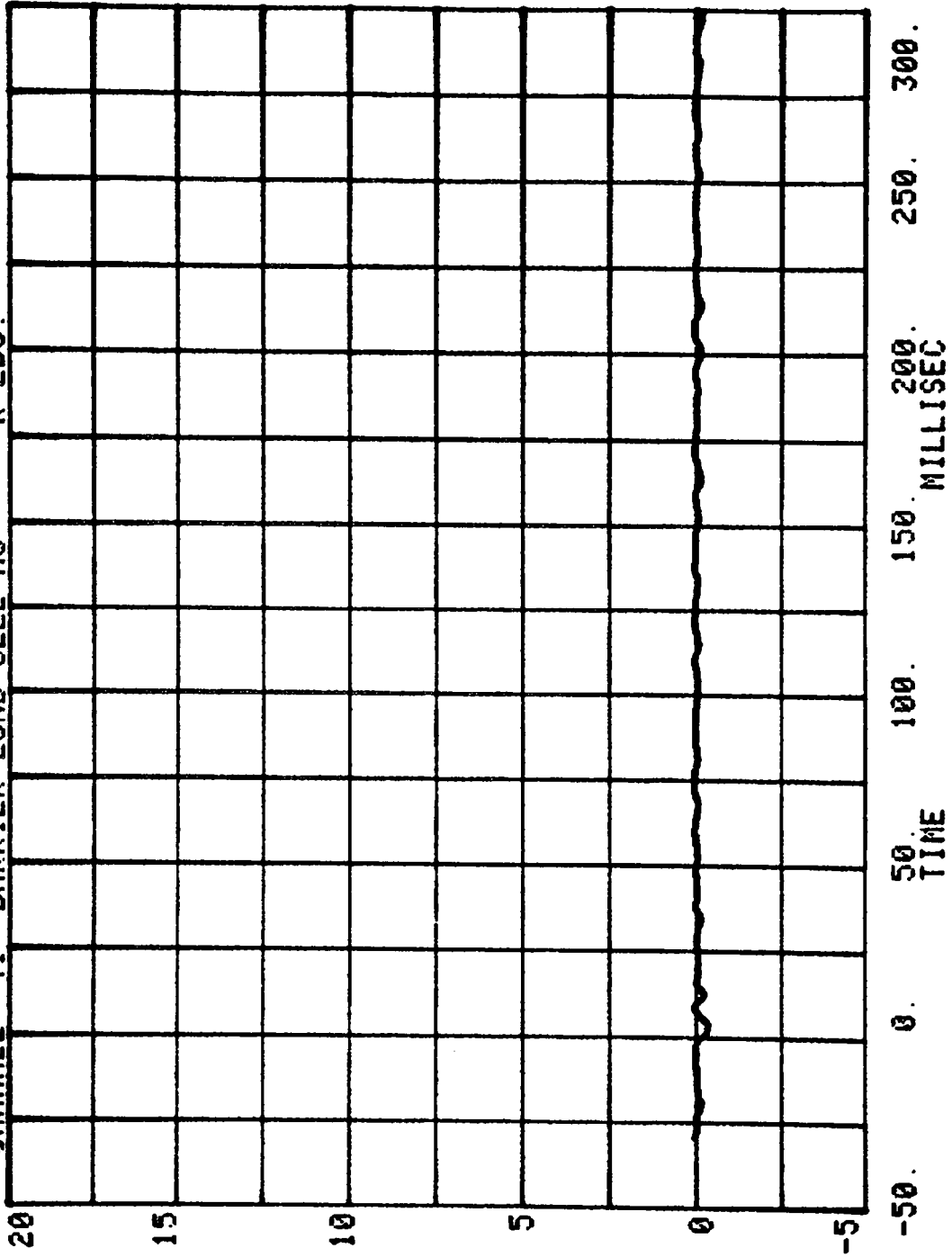
CHANNEL 39 BARRIER LOAD CELL A6  
RUN= 601 SERIES= 303 K LBS.



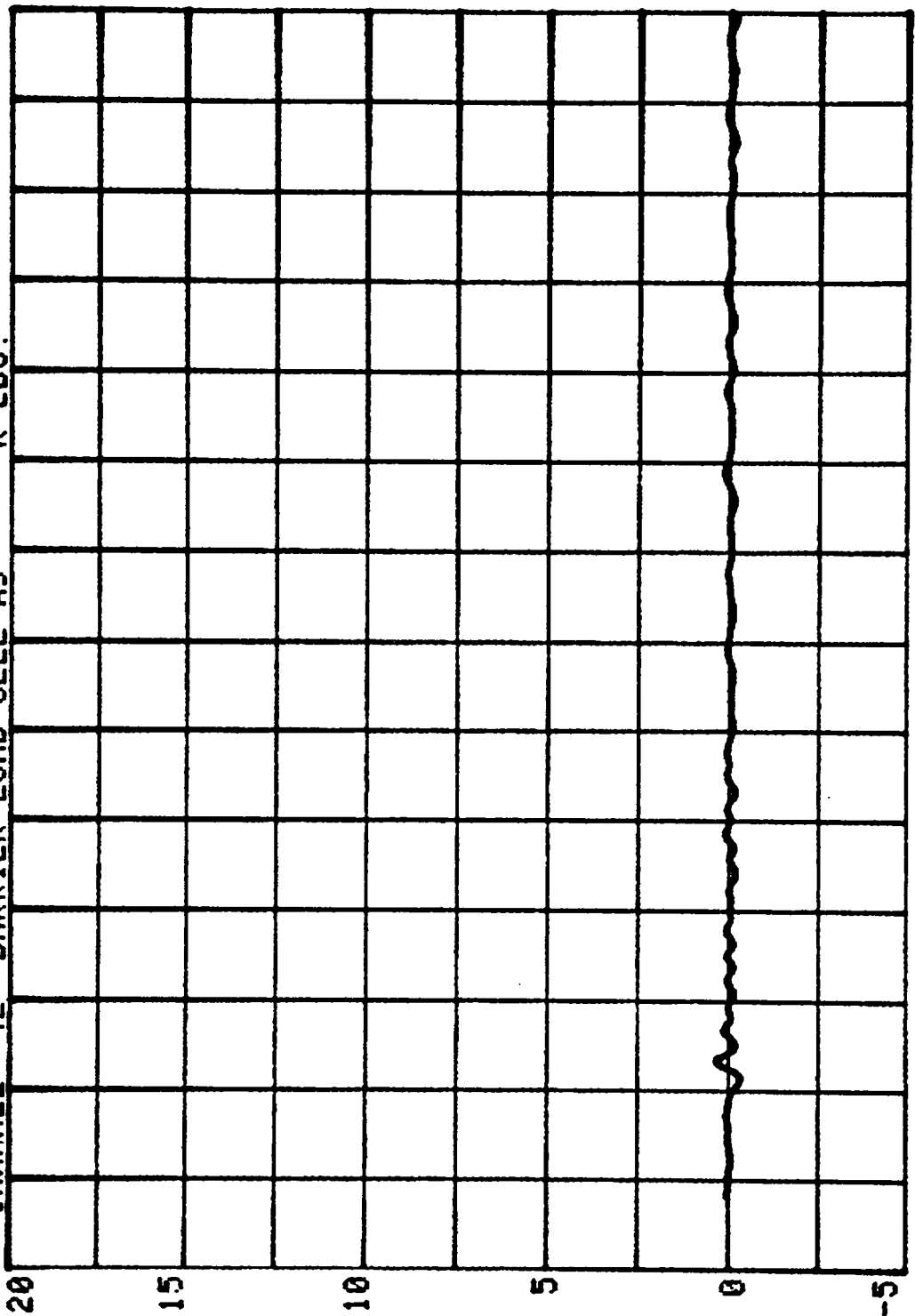
CHANNEL 40 BARRIER LOAD CELL A7  
RUN= 601 SERIES= 303 K LBS.



CHANNEL 41 BARRIER LOAD CELL A8 RUN= 601 SERIES= 303 K LBS.

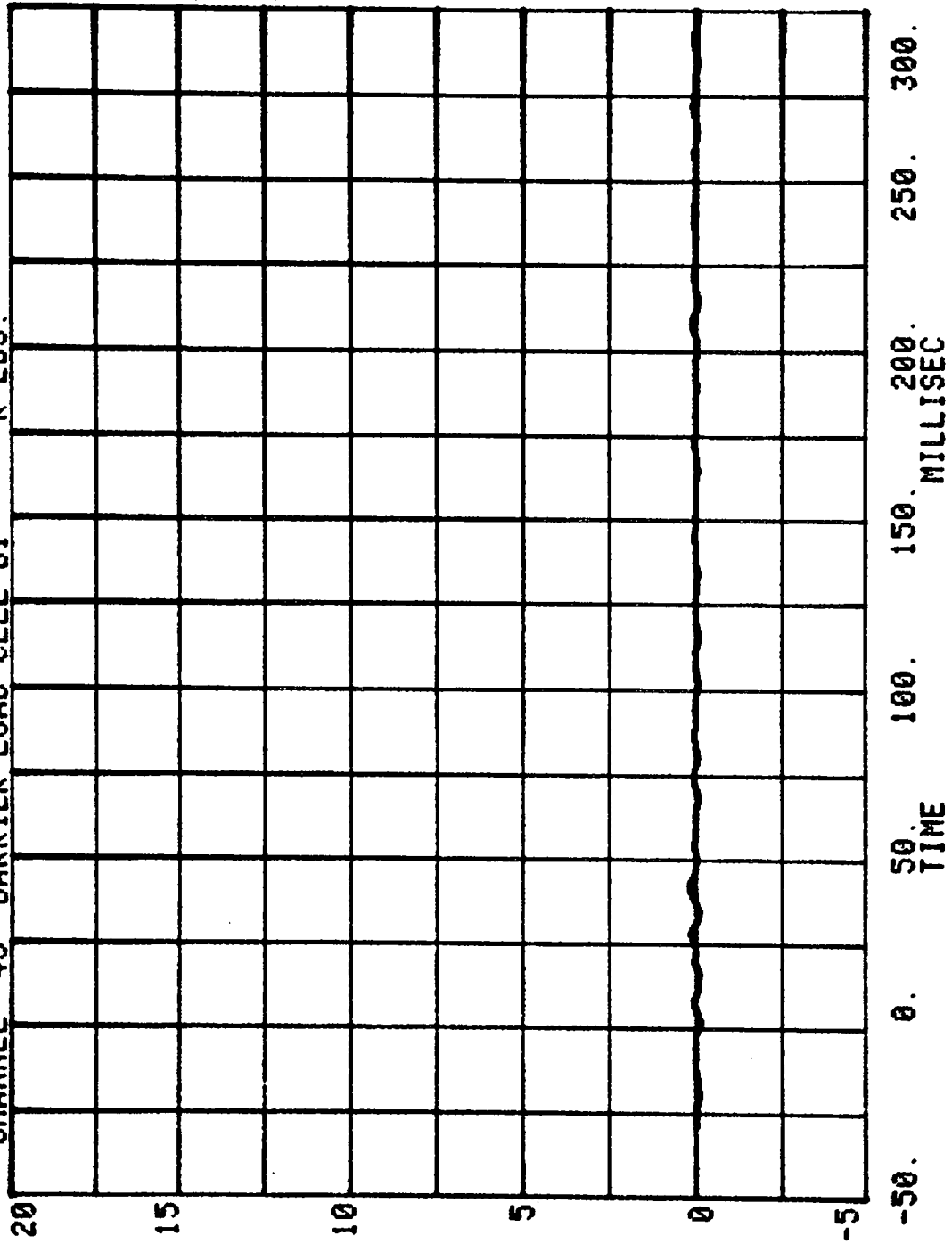


CHANNEL 42 BARRIER LOAD CELL A9  
RUN= 601 SERIES= 303  
K LBS.

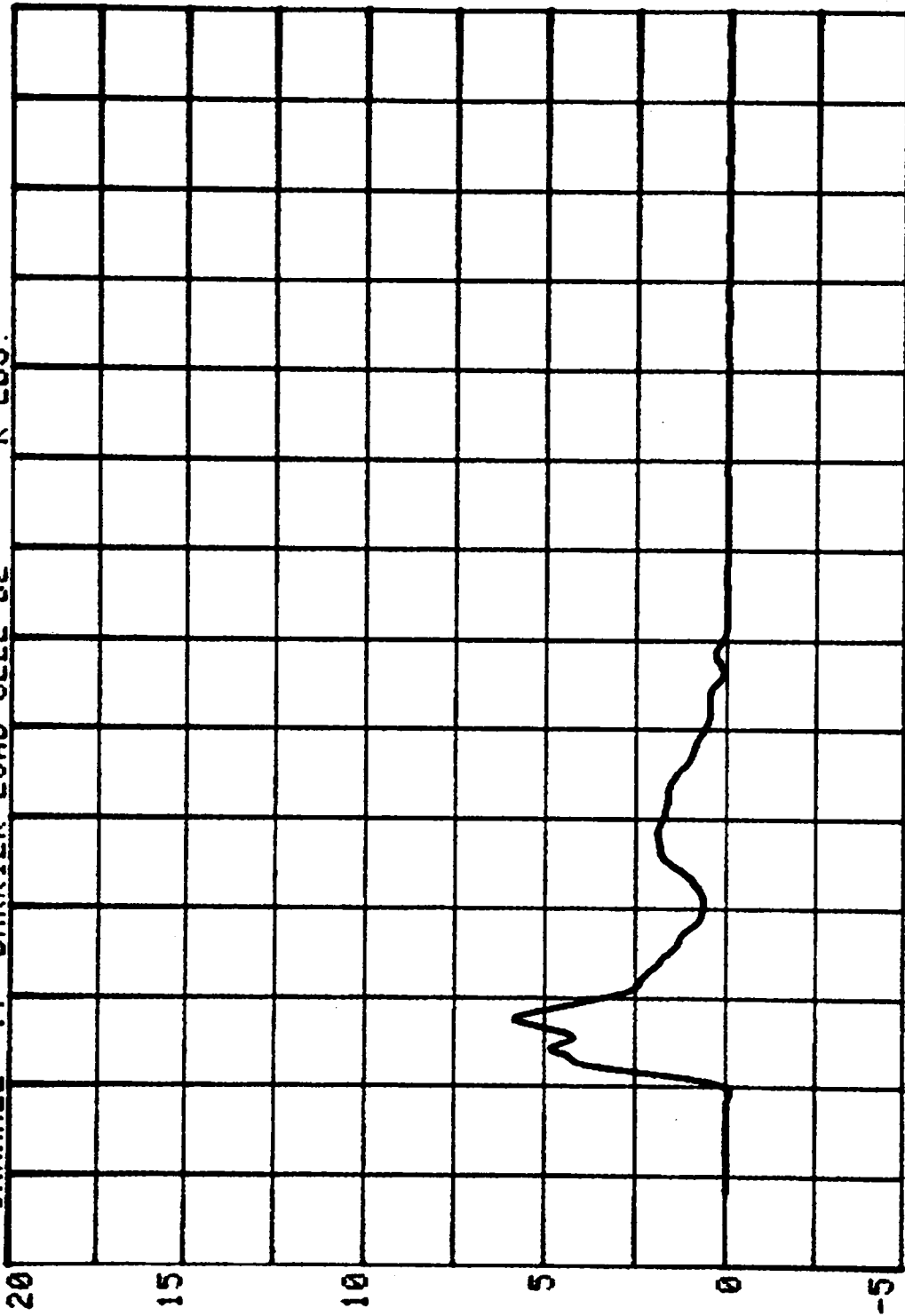


-50. 0. 50. 100. 150. 200. 250. 300.  
MILLISEC  
TIME

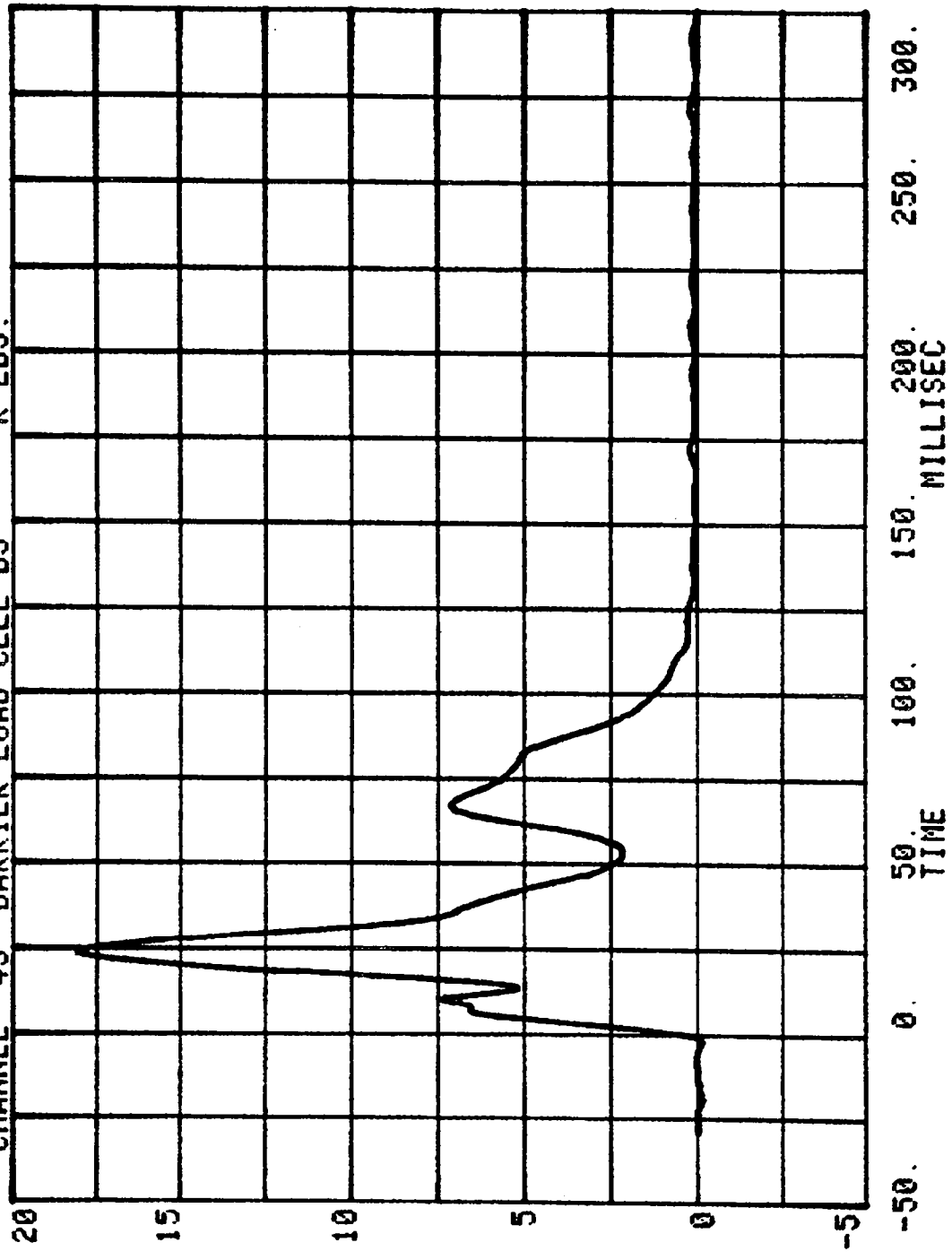
CHANNEL 43 BARRIER LOAD CELL 81  
RUN= 601 SERIES= 303 K LBS.



CHANNEL 44 BARRIER LOAD CELL B2  
RUN= 601 SERIES= 303 K LBS.



CHANNEL 45 BARRIER LOAD CELL B3  
RUN= 601 SERIES= 303 K LBS.



CHANNEL 46 BARRIER LOAD CELL B4

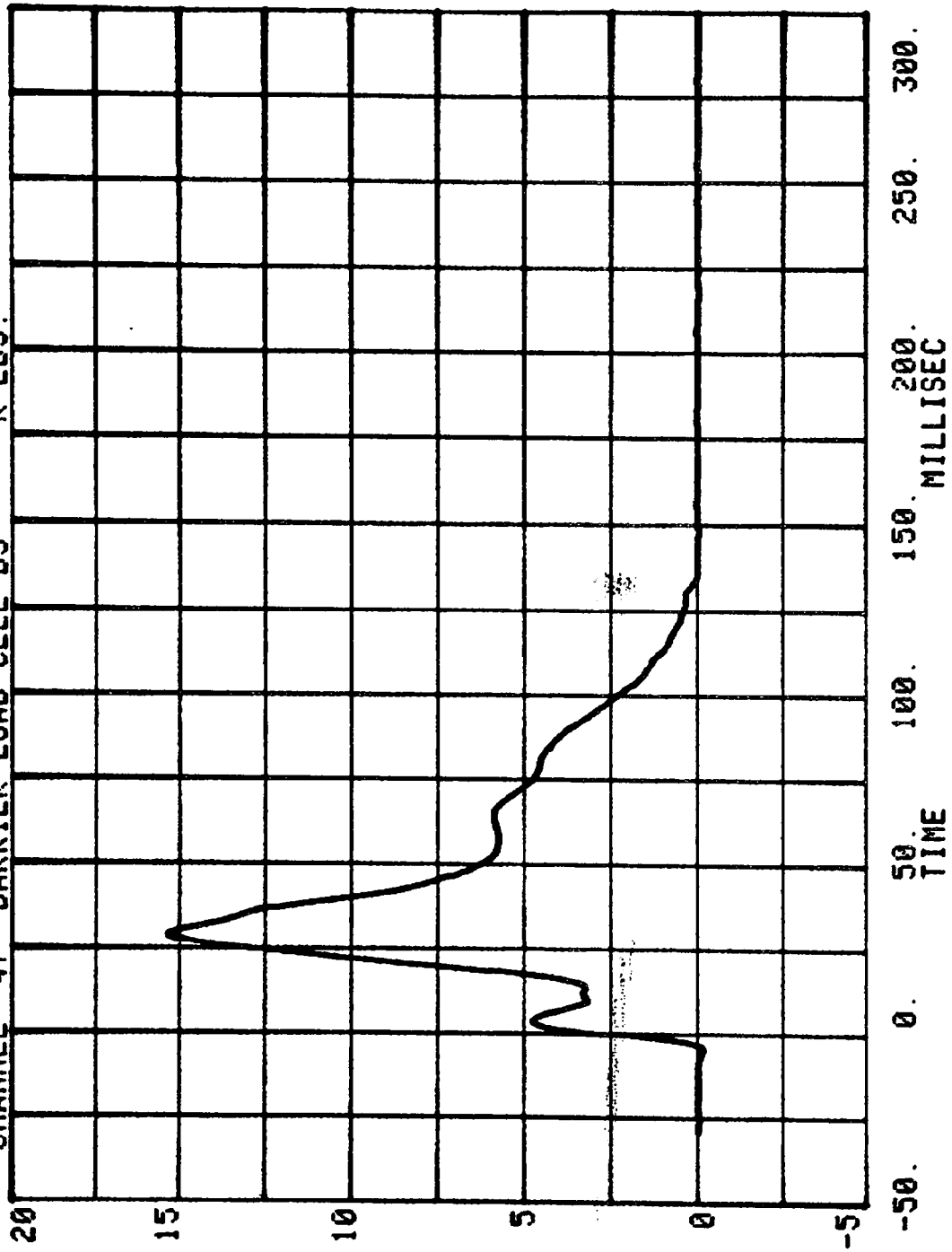
RUN= 601 SERIES= 303

K LBS.

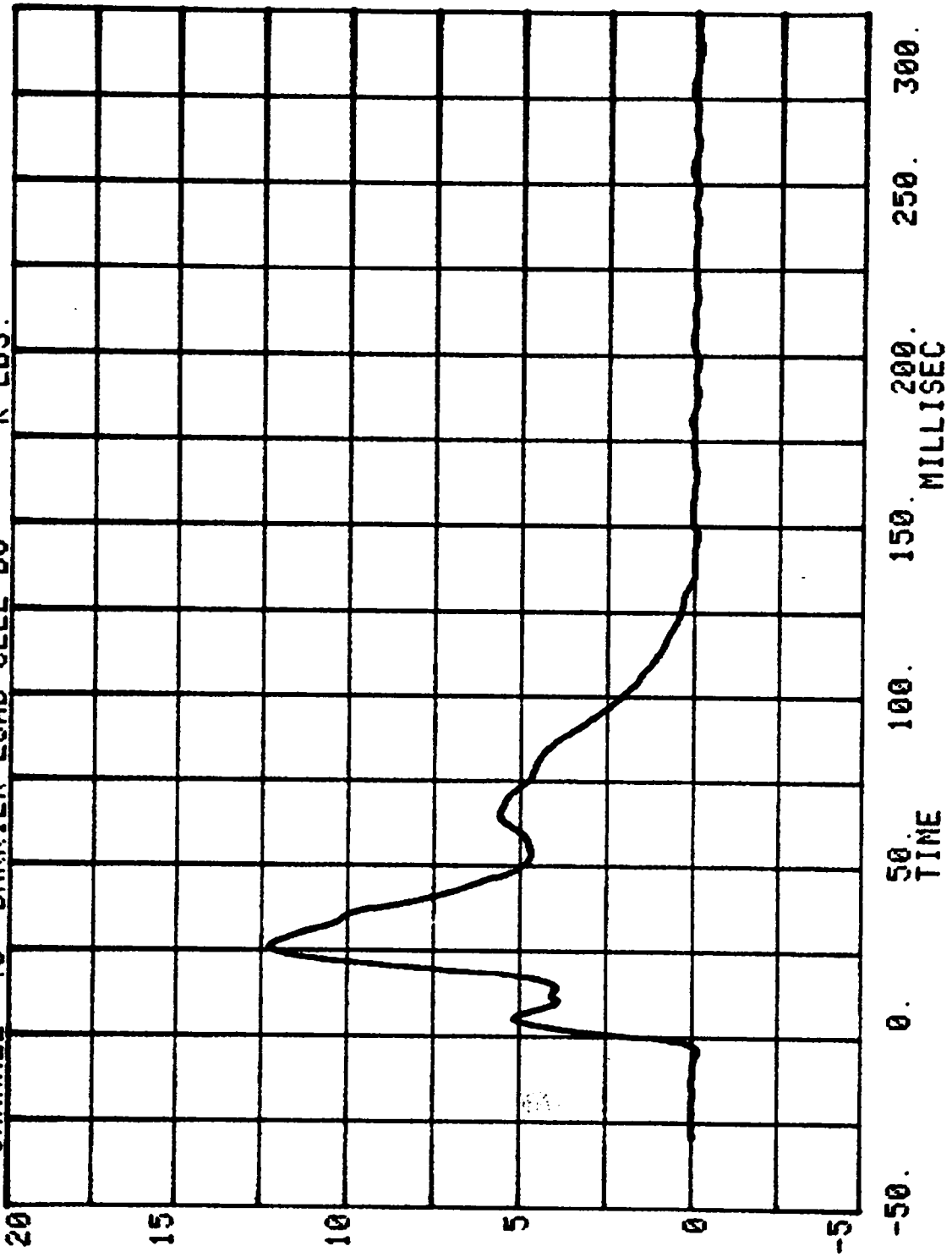


-50. 0. 50. 100. 150. 200. 250. 300. TIME

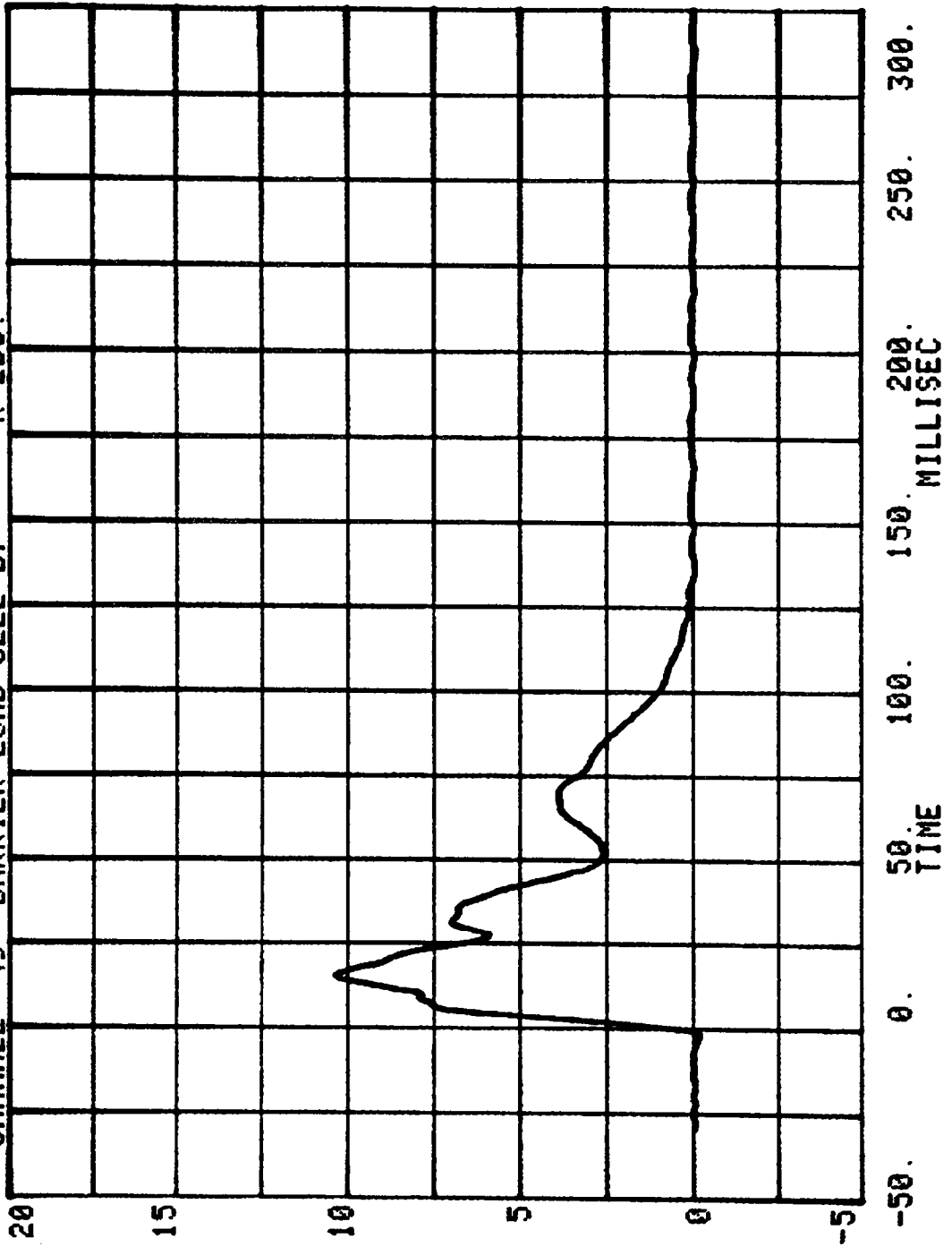
CHANNEL 47 BARRIER LOAD CELL B5  
RUN= 601 SERIES= 303  
K LBS.



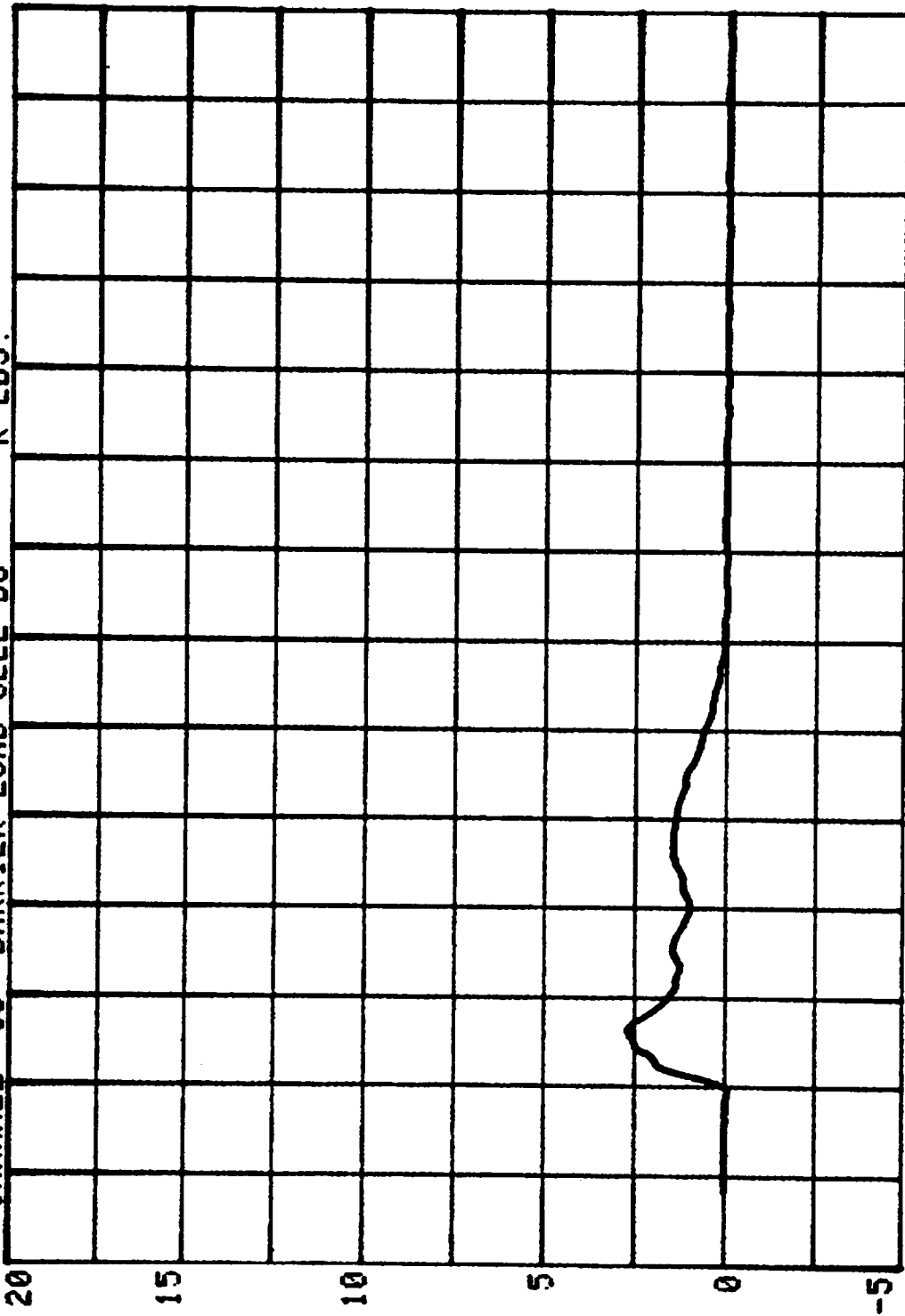
CHANNEL 48 BARRIER LOAD CELL B6 RUN= 601 SERIES= 303 K LBS.



CHANNEL 49 BARRIER LOAD CELL B7  
RUN= 601 SERIES= 303  
K LBS.

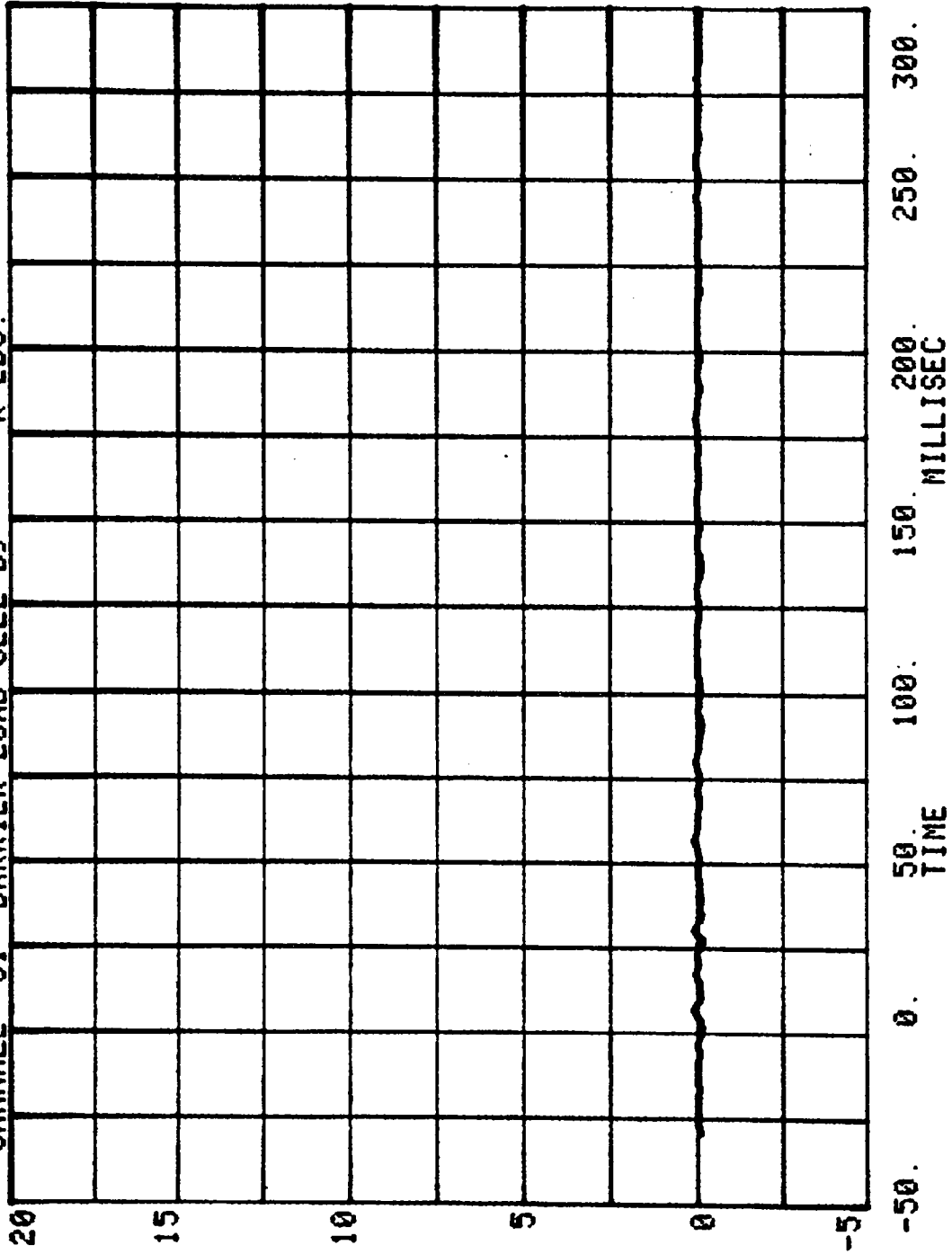


CHANNEL 50 BARRIER LOAD CELL 88  
RUN= 601 SERIES= 303 K LBS.

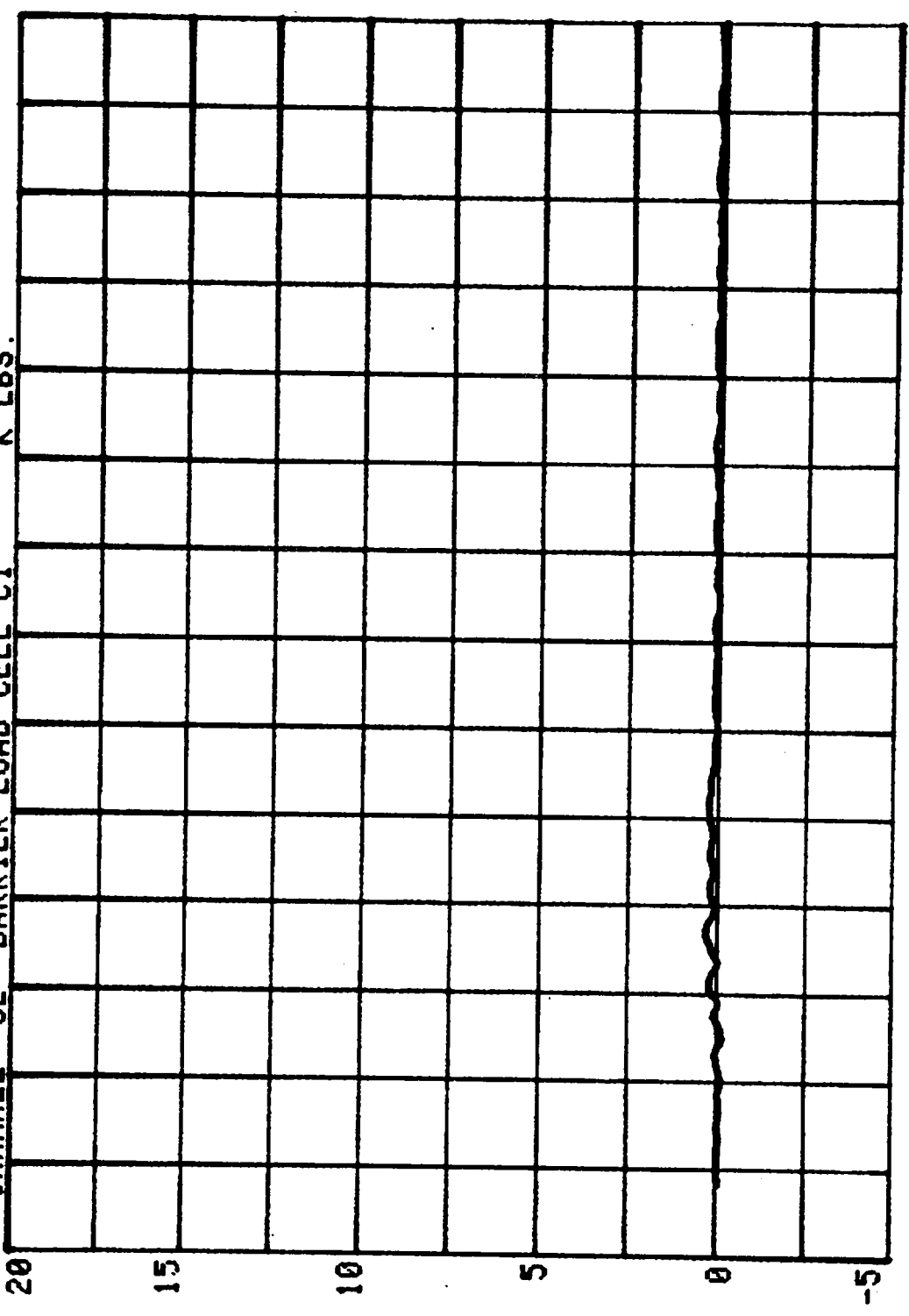


-50. 0. 50. 100. 150. 200. 250. 300.  
TIME MILLISEC

CHANNEL 51 BARRIER LOAD CELL B9 RUN= 601 SERIES= 303 K LBS.

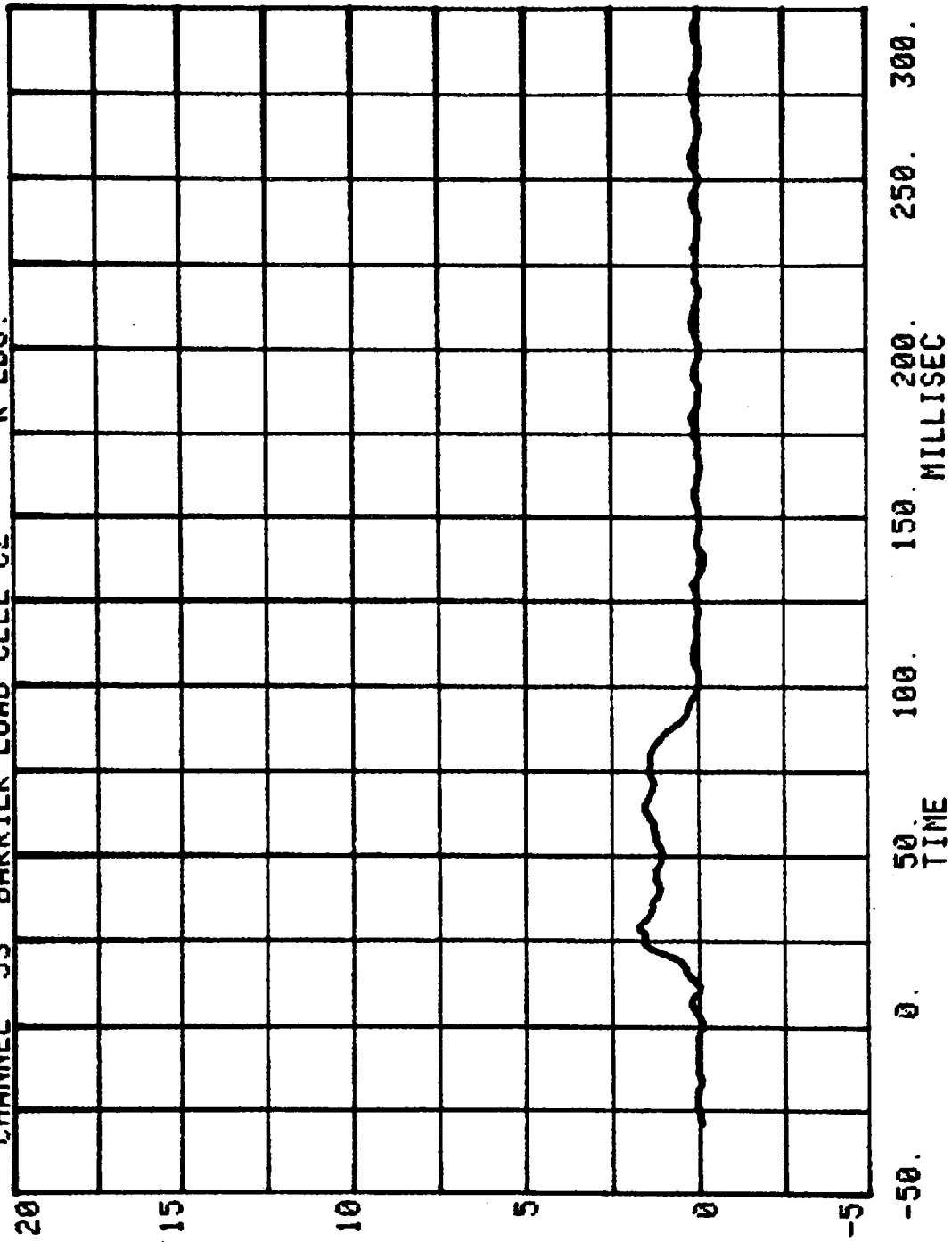


CHANNEL 52 RUN= 601 SERIES= 303 K LBS.  
BARRIER LOAD CELL C1

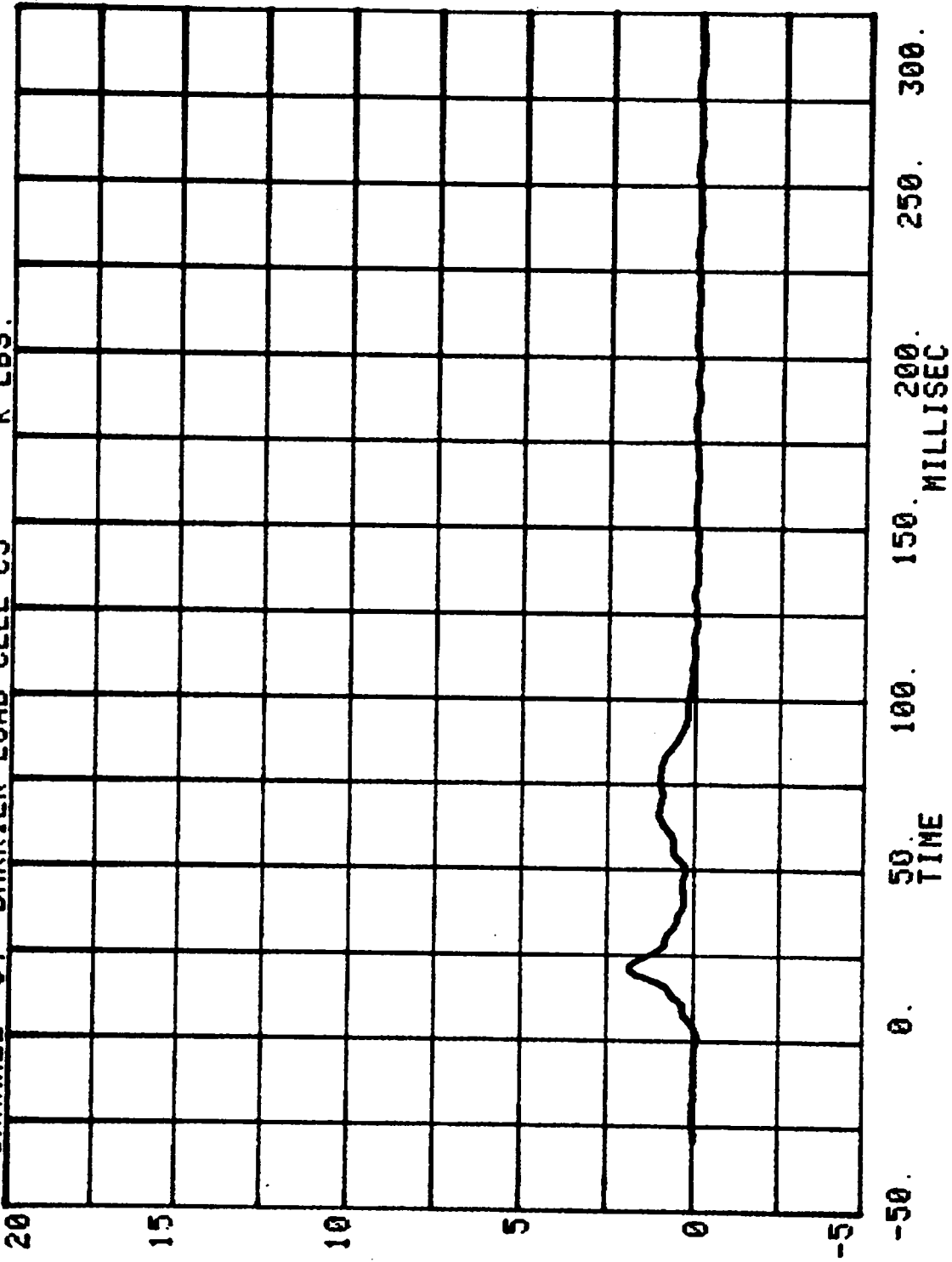


-50. 0. 50. 100. 150. 200. 250. 300.  
TIME MILLISEC

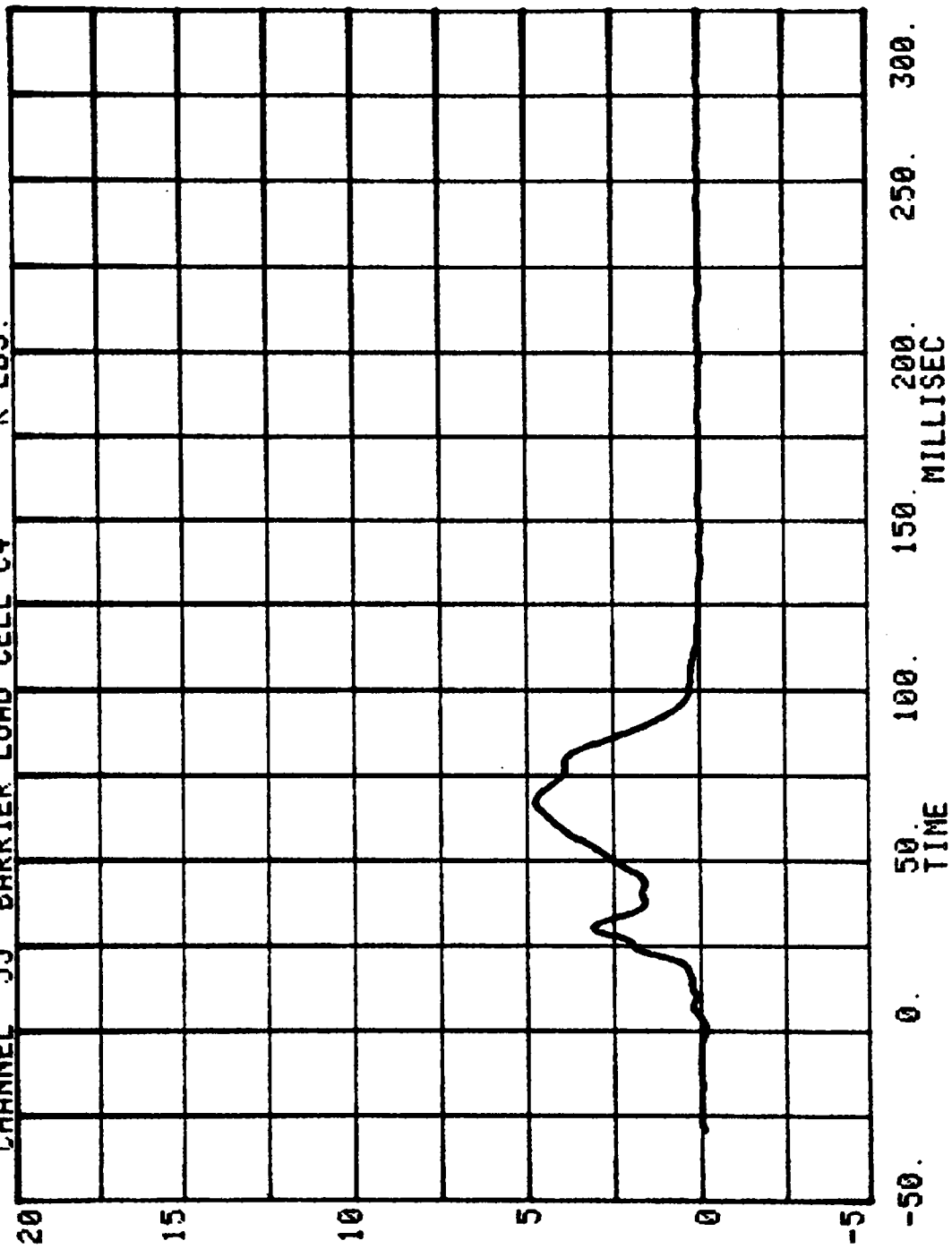
CHANNEL 53 BARRIER LOAD CELL C2  
RUN= 601 SERIES= 303 K LBS.



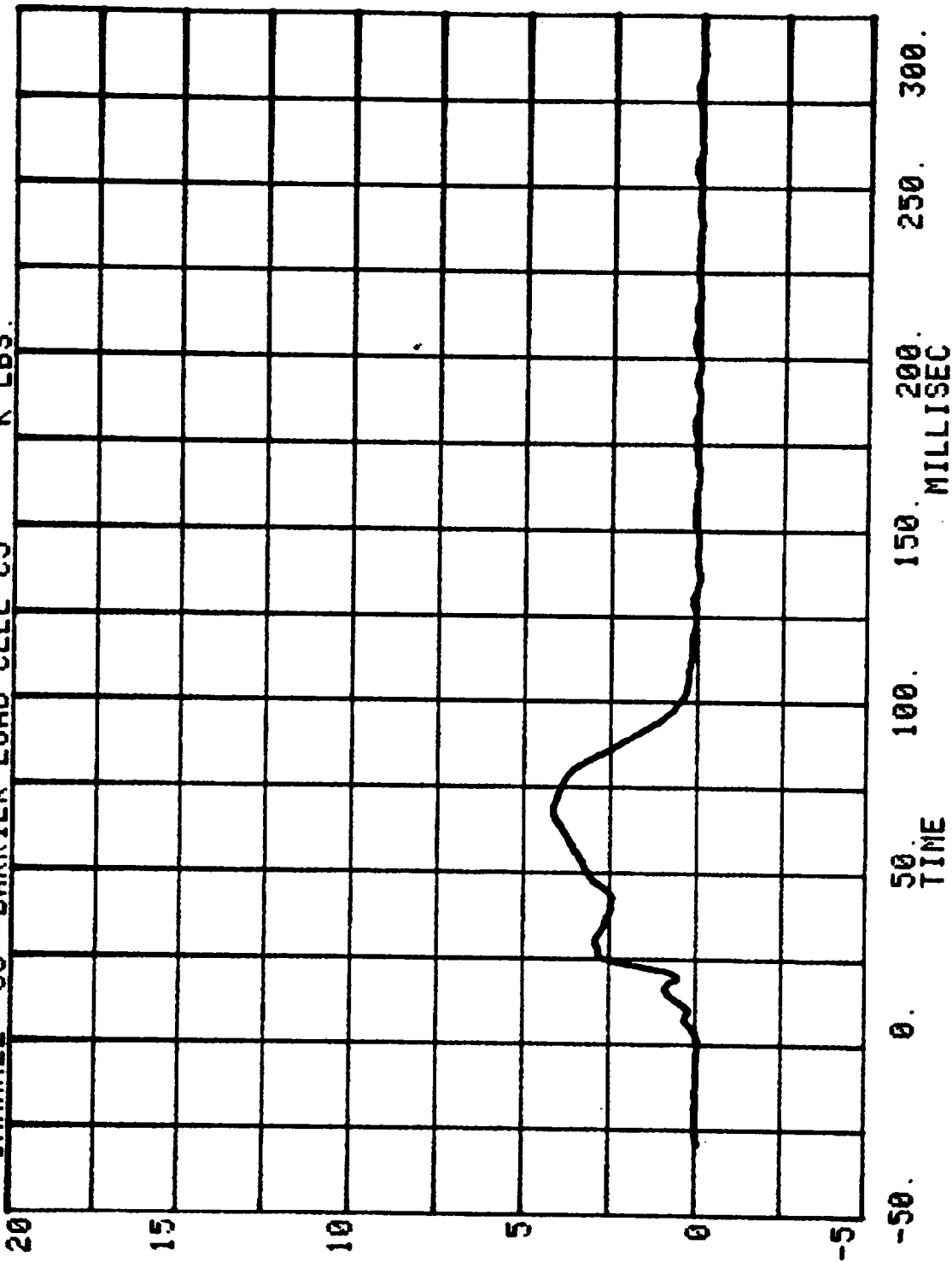
CHANNEL 54 BARRIER LOAD CELL C3  
RUN= 601 SERIES= 303  
K LBS.



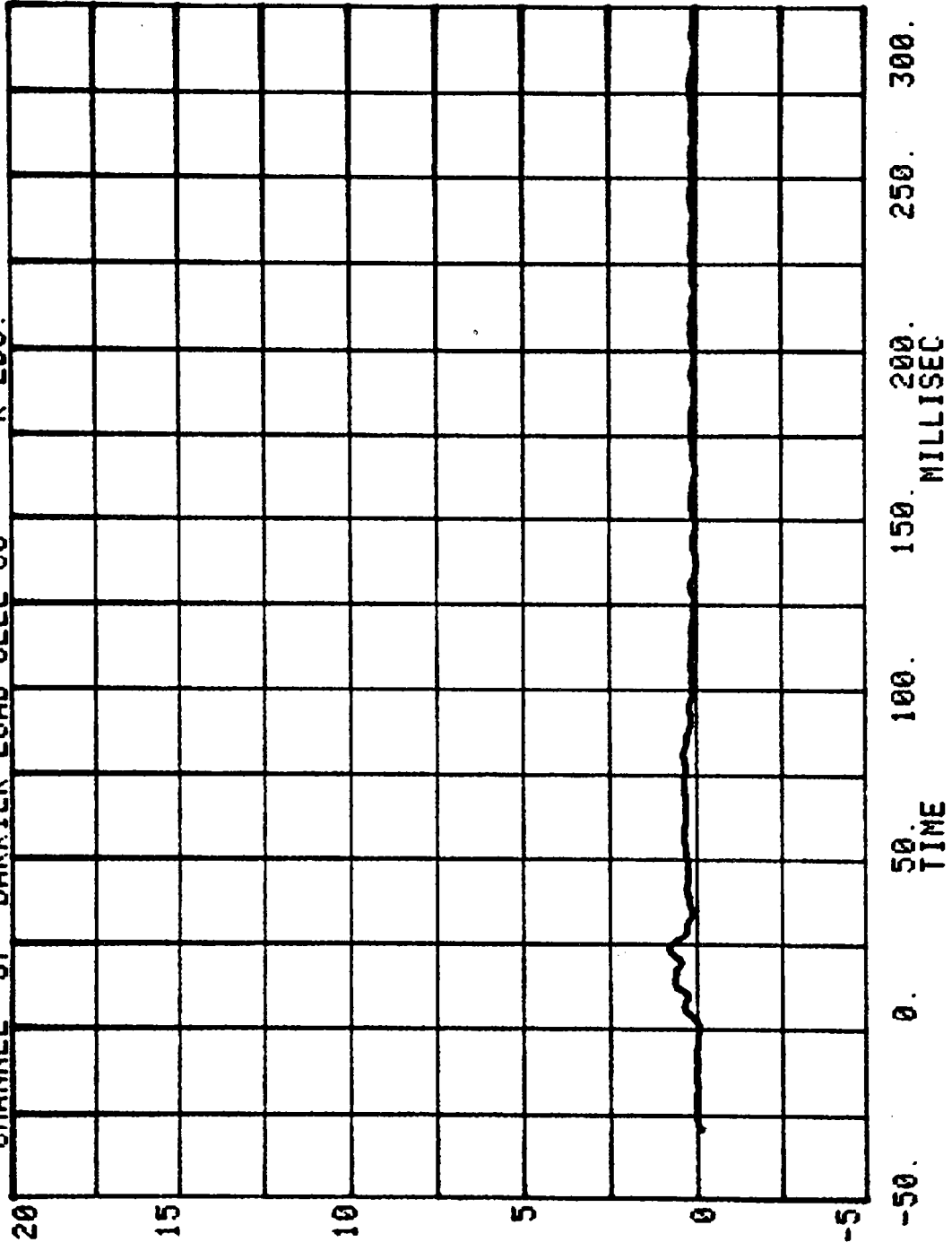
CHANNEL 55 BARRIER LOAD CELL C4  
RUN= 601 SERIES= 303 K LBS.



CHANNEL 56 BARRIER LOAD CELL C5  
RUN= 601 SERIES= 303 K LBS.



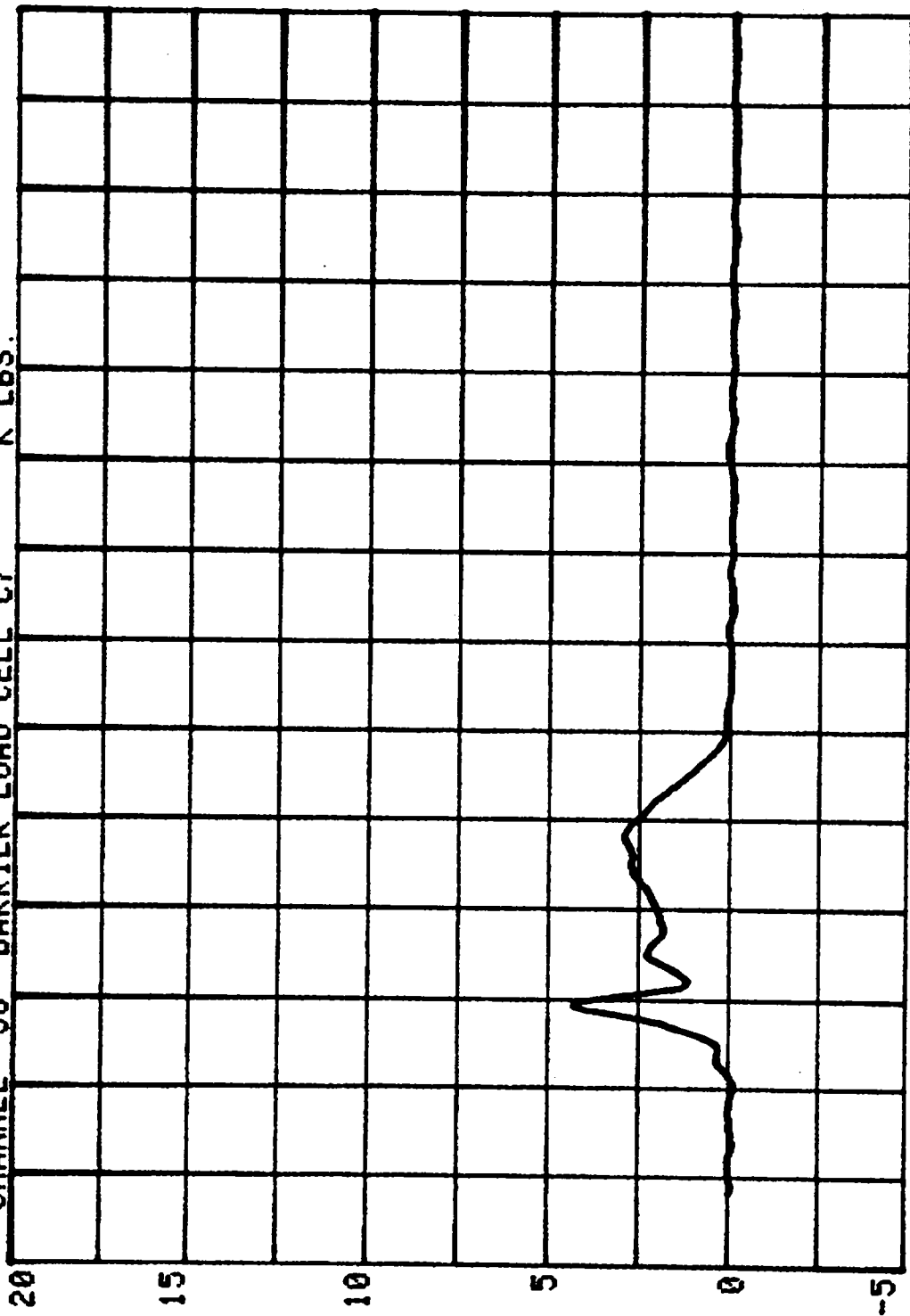
CHANNEL 57 BARRIER LOAD CELL C6 RUN= 601 SERIES= 303 K LBS.



CHANNEL 58 BARRIER LOAD CELL C7

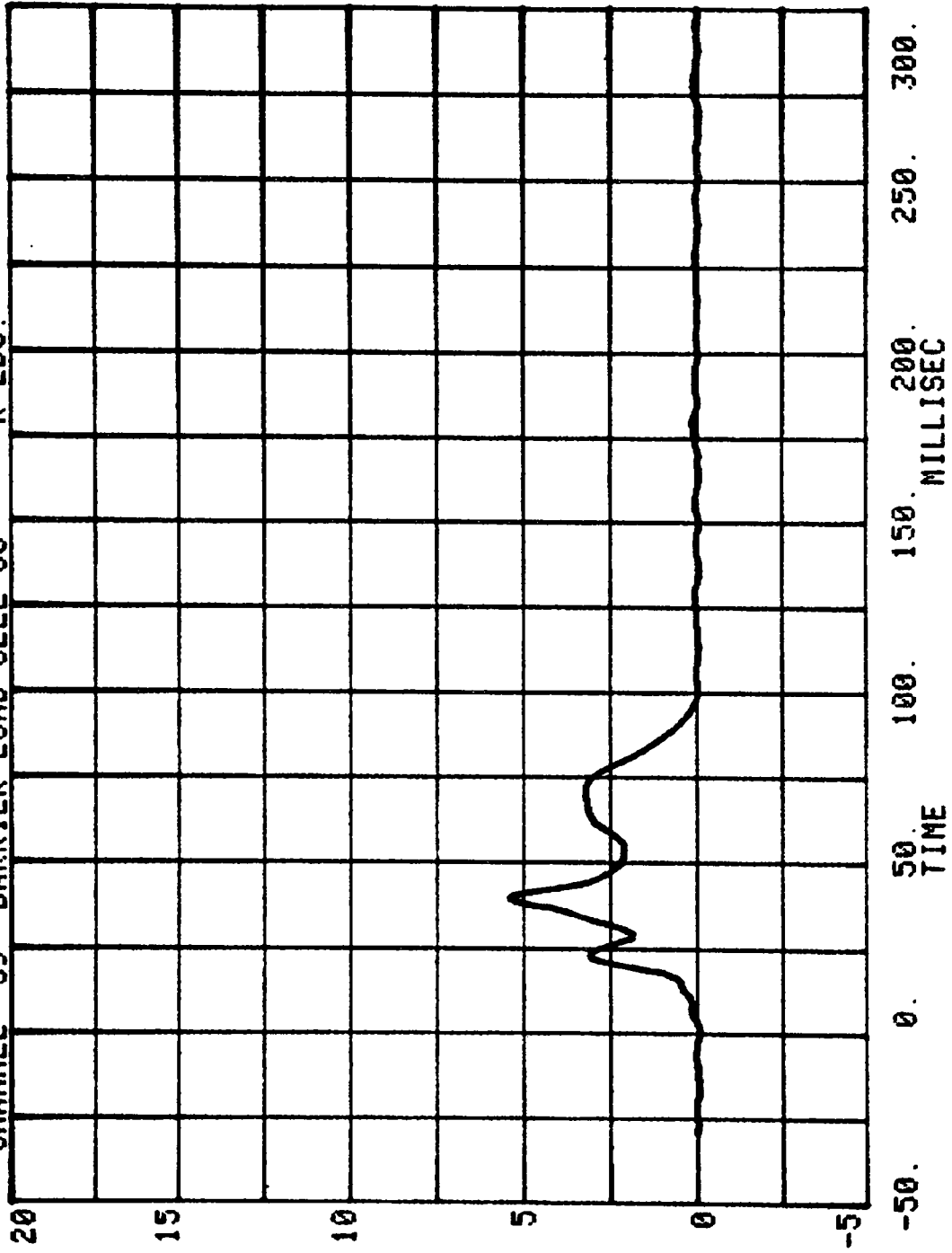
RUN= 601 SERIES= 303

K LBS.

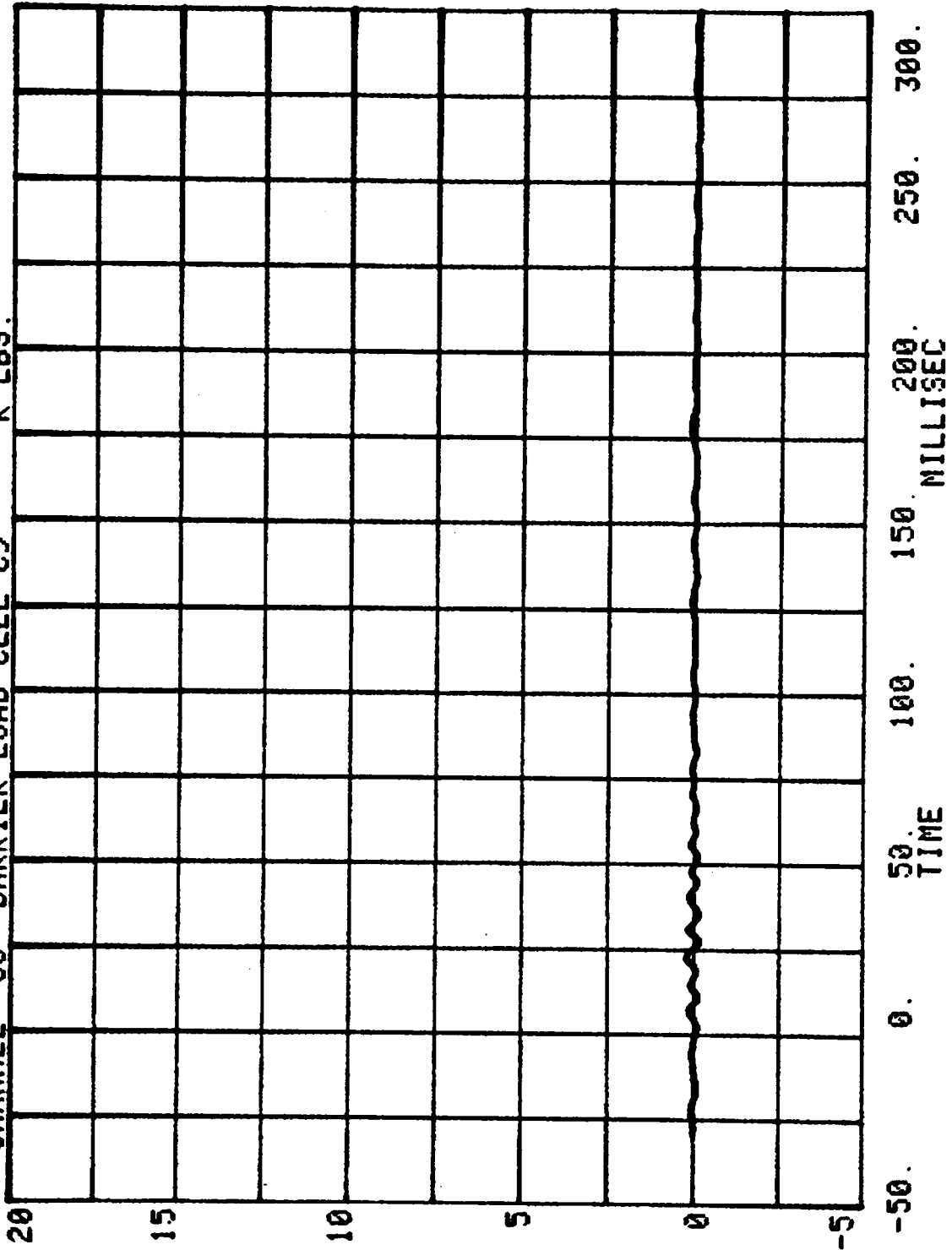


-50. 0. 50. 100. 150. 200. 250. 300.  
MILLISEC.  
TIME

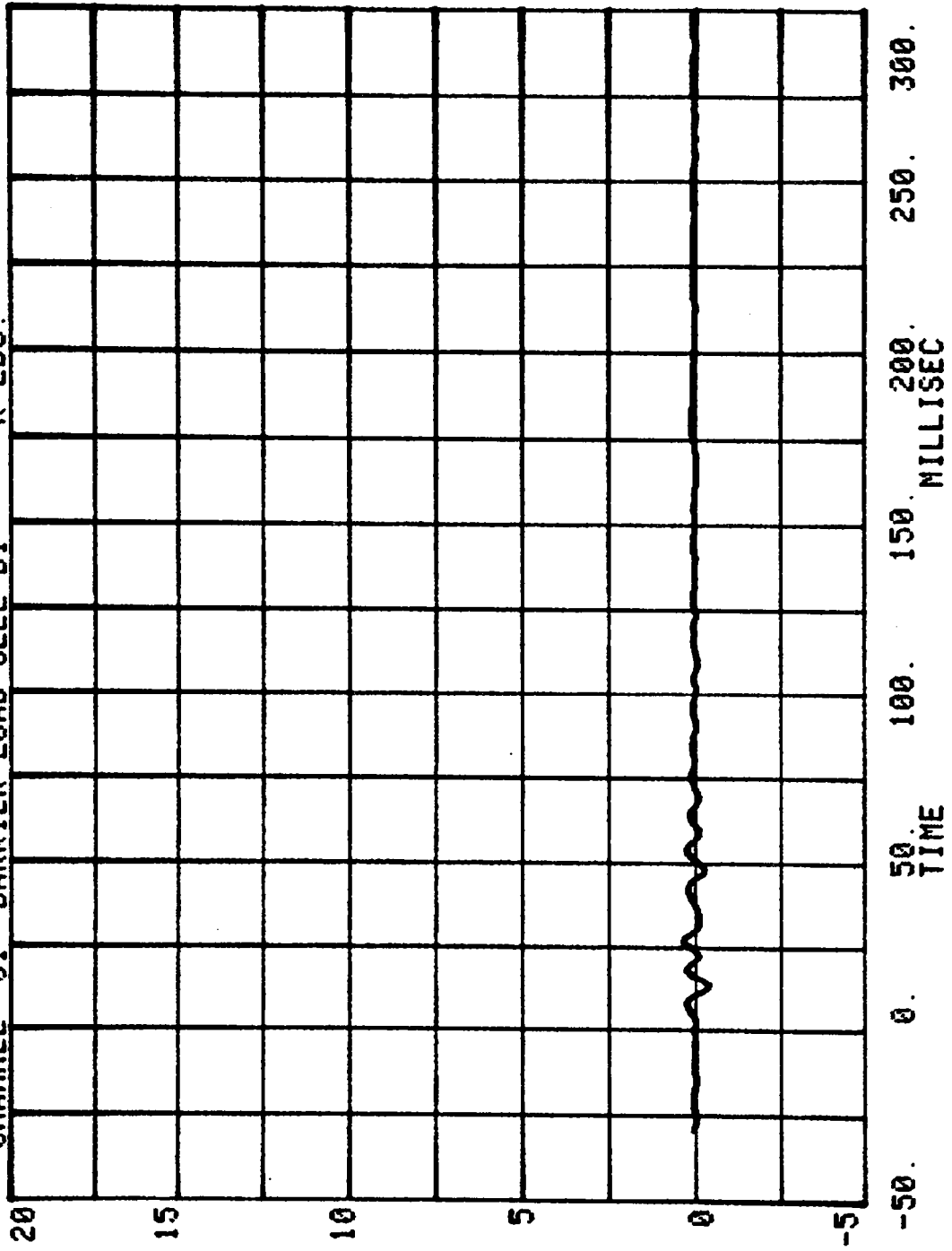
CHANNEL 59 BARRIER LOAD CELL C8  
RUN= 601 SERIES= 303 K LBS.



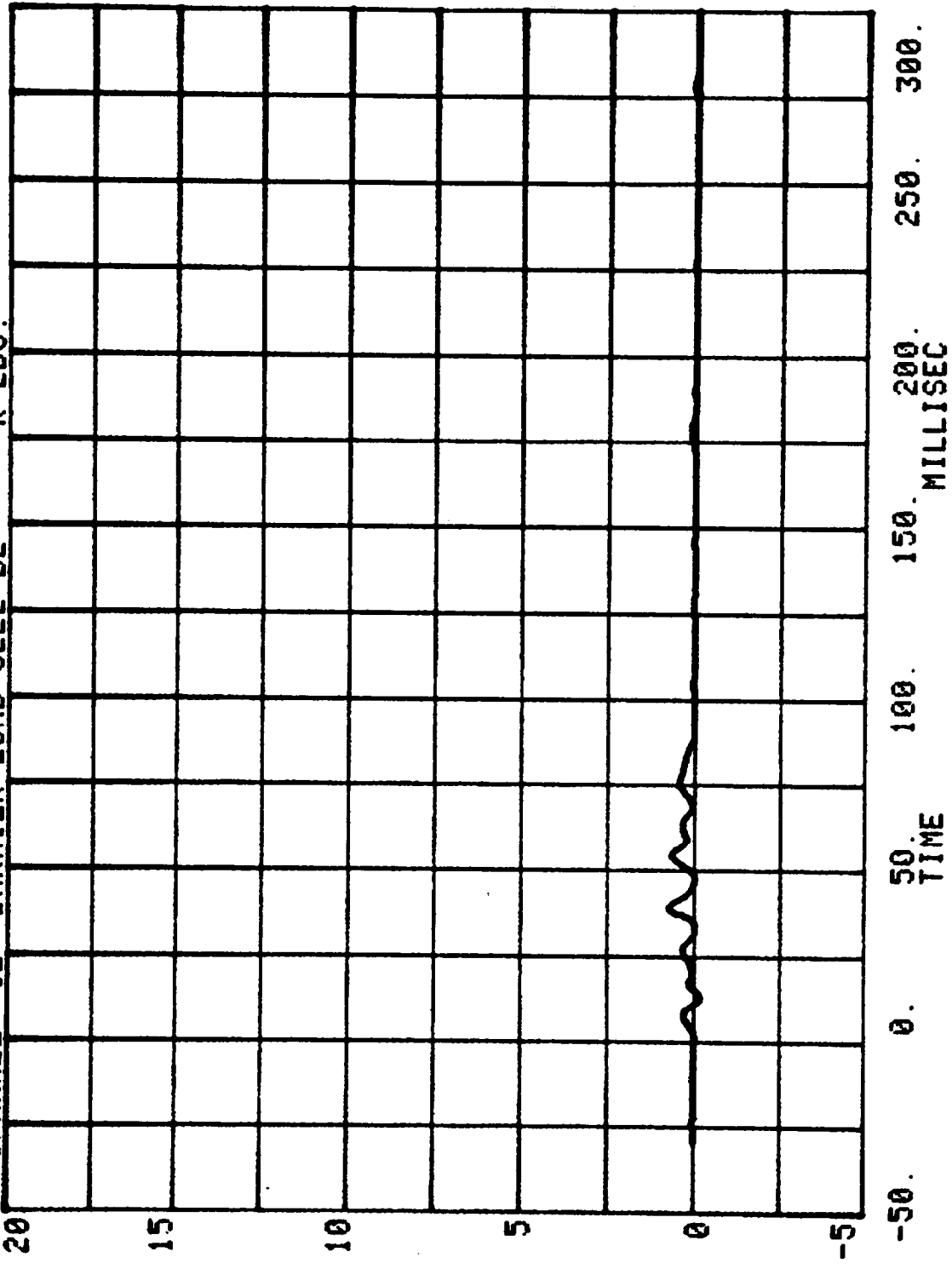
CHANNEL 60 BARRIER LOAD CELL C9  
RUN= 601 SERIES= 303 K LBS.

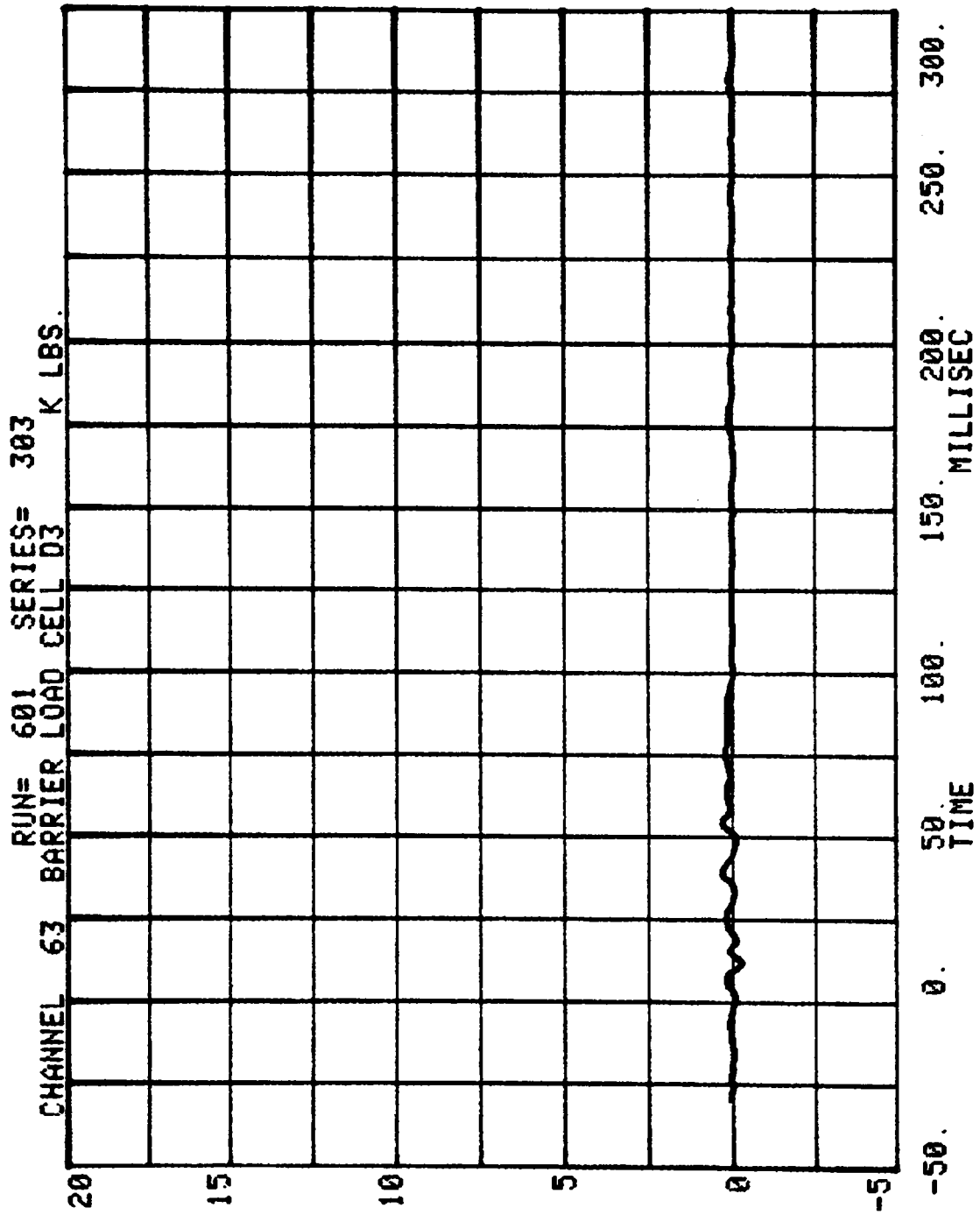


CHANNEL 61 BARRIER LOAD CELL D1  
RUN= 601 SERIES= 303 K LBS.

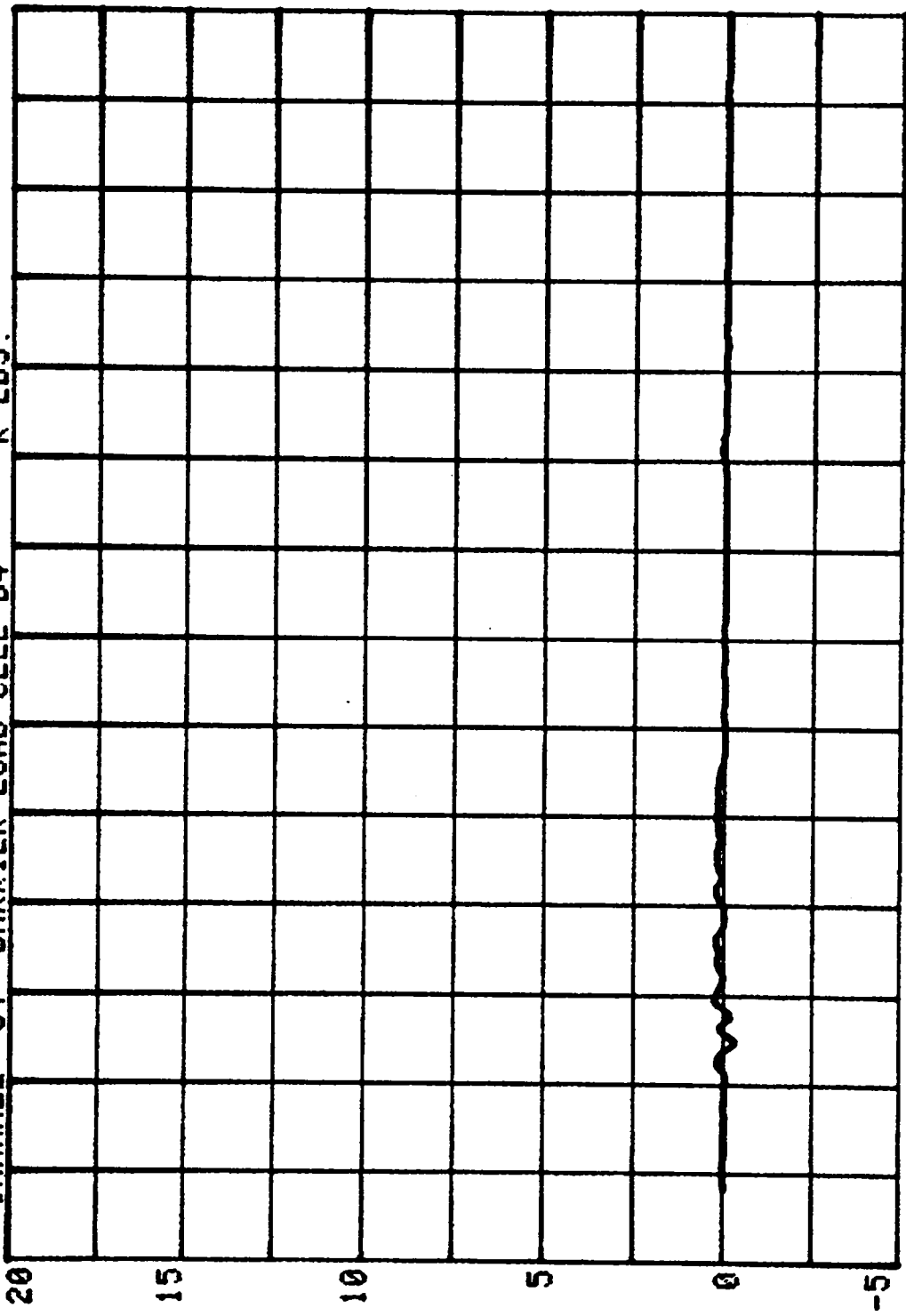


CHANNEL 62 BARRIER LOAD CELL D2  
RUN= 601 SERIES= 303 K LBS.



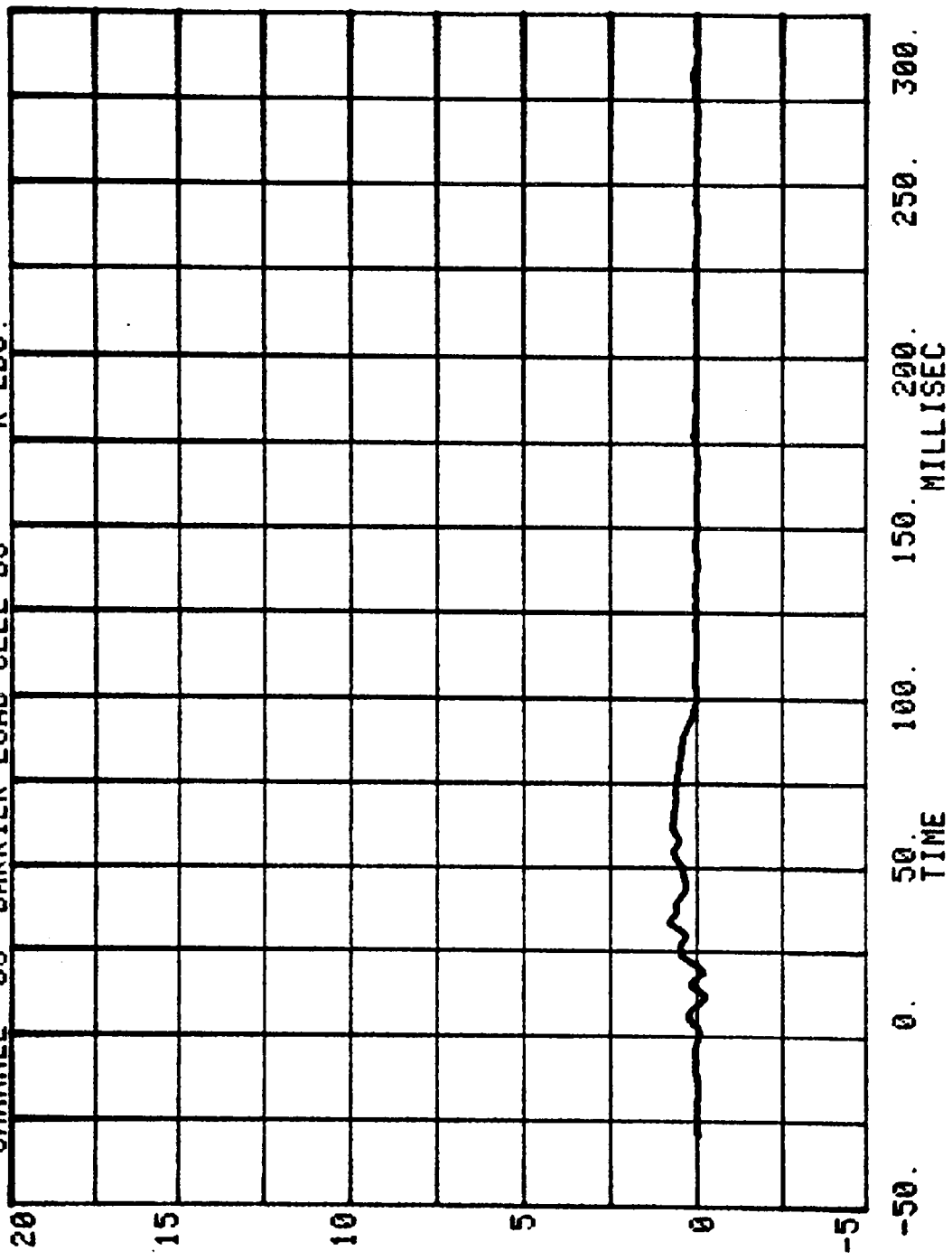


CHANNEL 64 BARRIER LOAD CELL D4  
RUN= 601 SERIES= 303 K LBS.

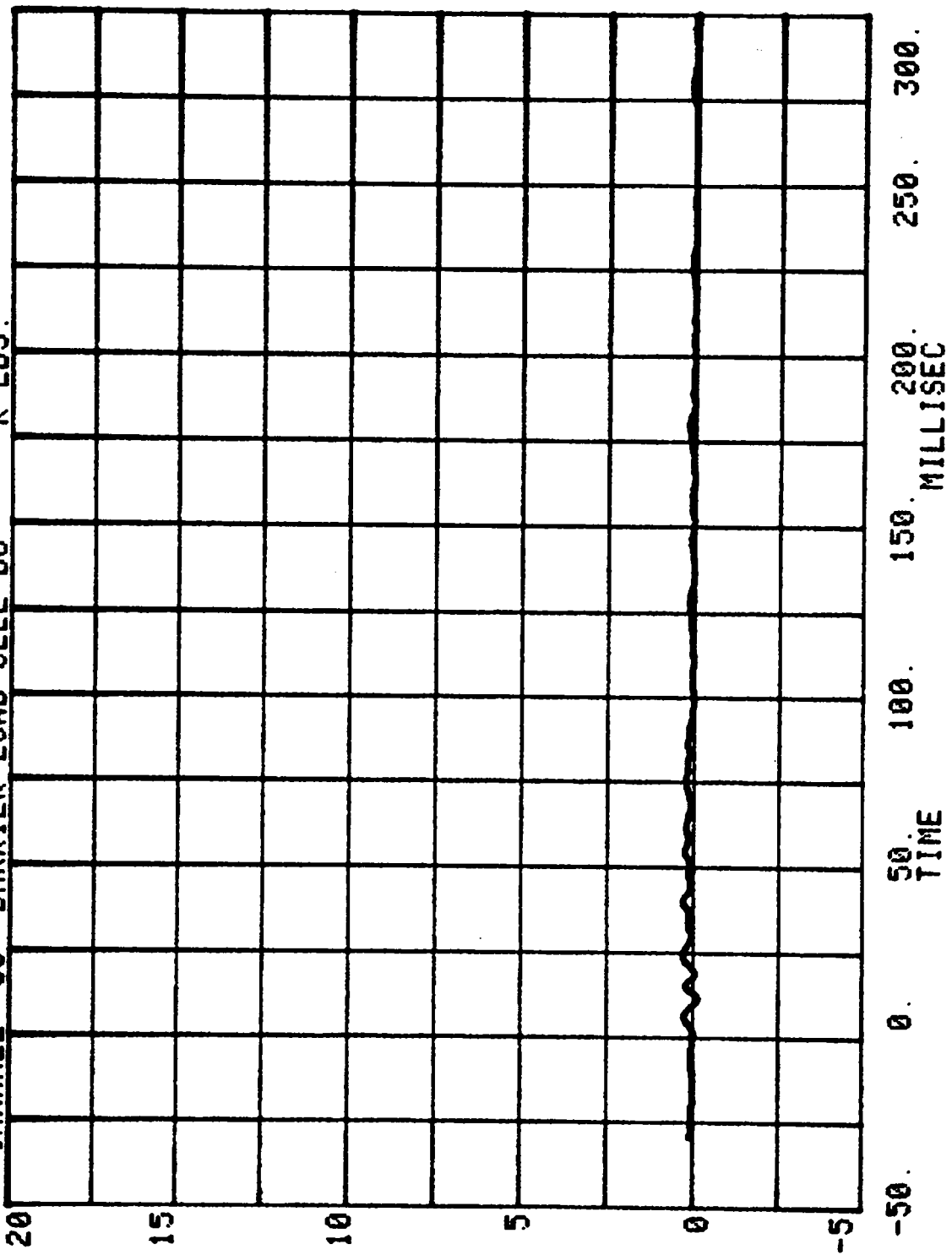


-50. 0. 50. 100. 150. 200. 250. 300.  
TIME MILLISEC

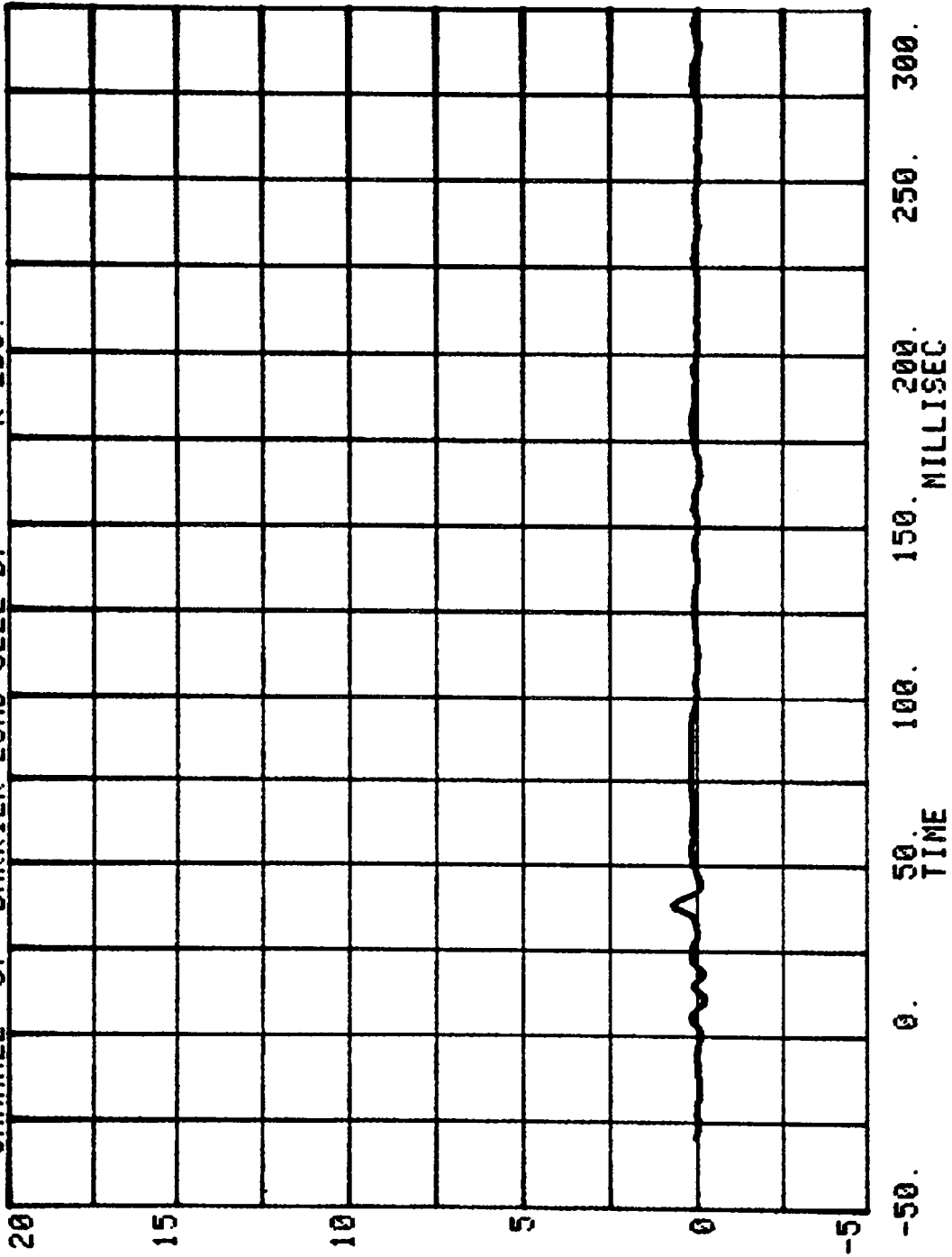
RUN= 601 SERIES= 303  
CHANNEL 65 BARRIER LOAD CELL 05 K LBS.



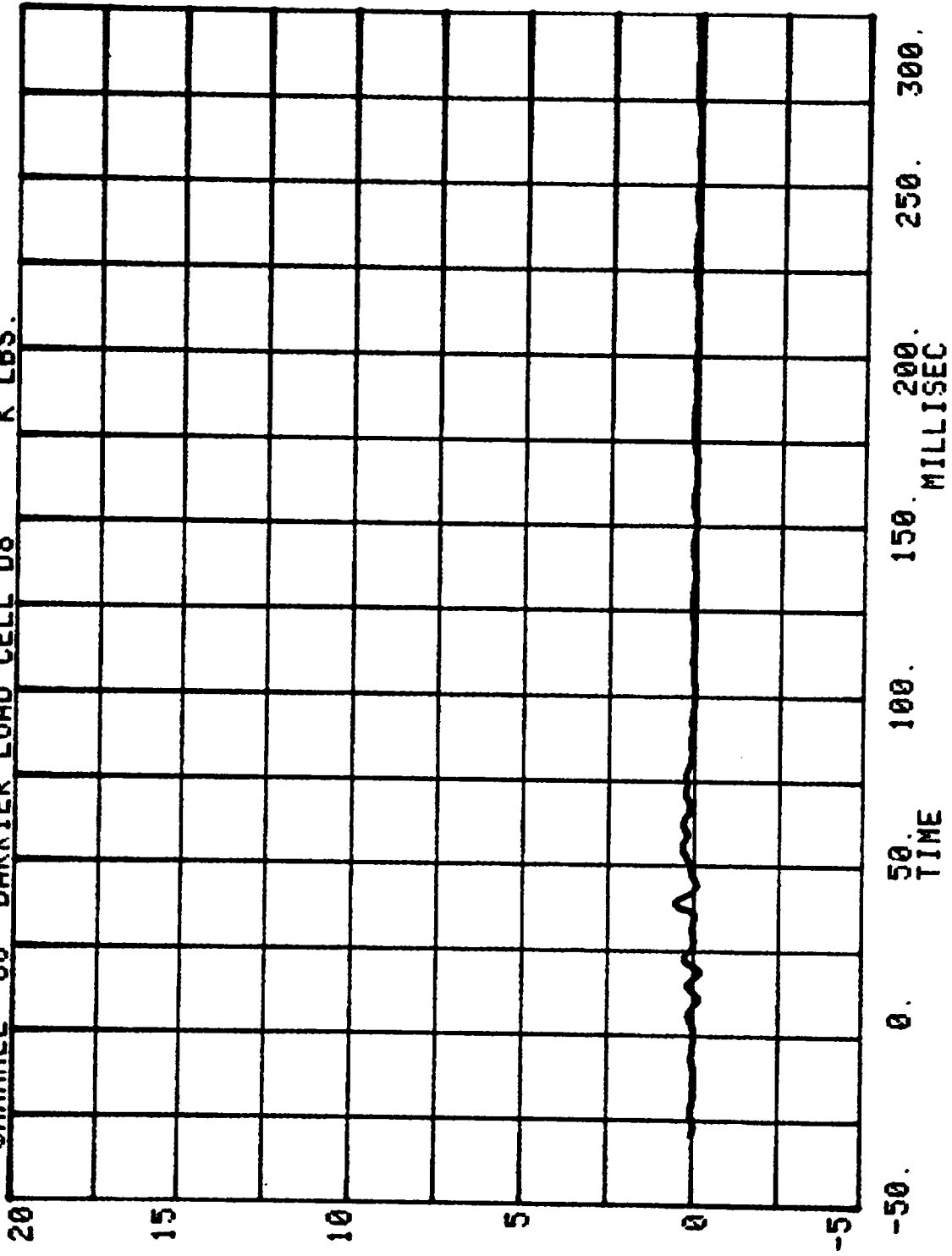
CHANNEL 66 BARRIER LOAD CELL D6  
RUN= 601 SERIES= 303 K LBS.



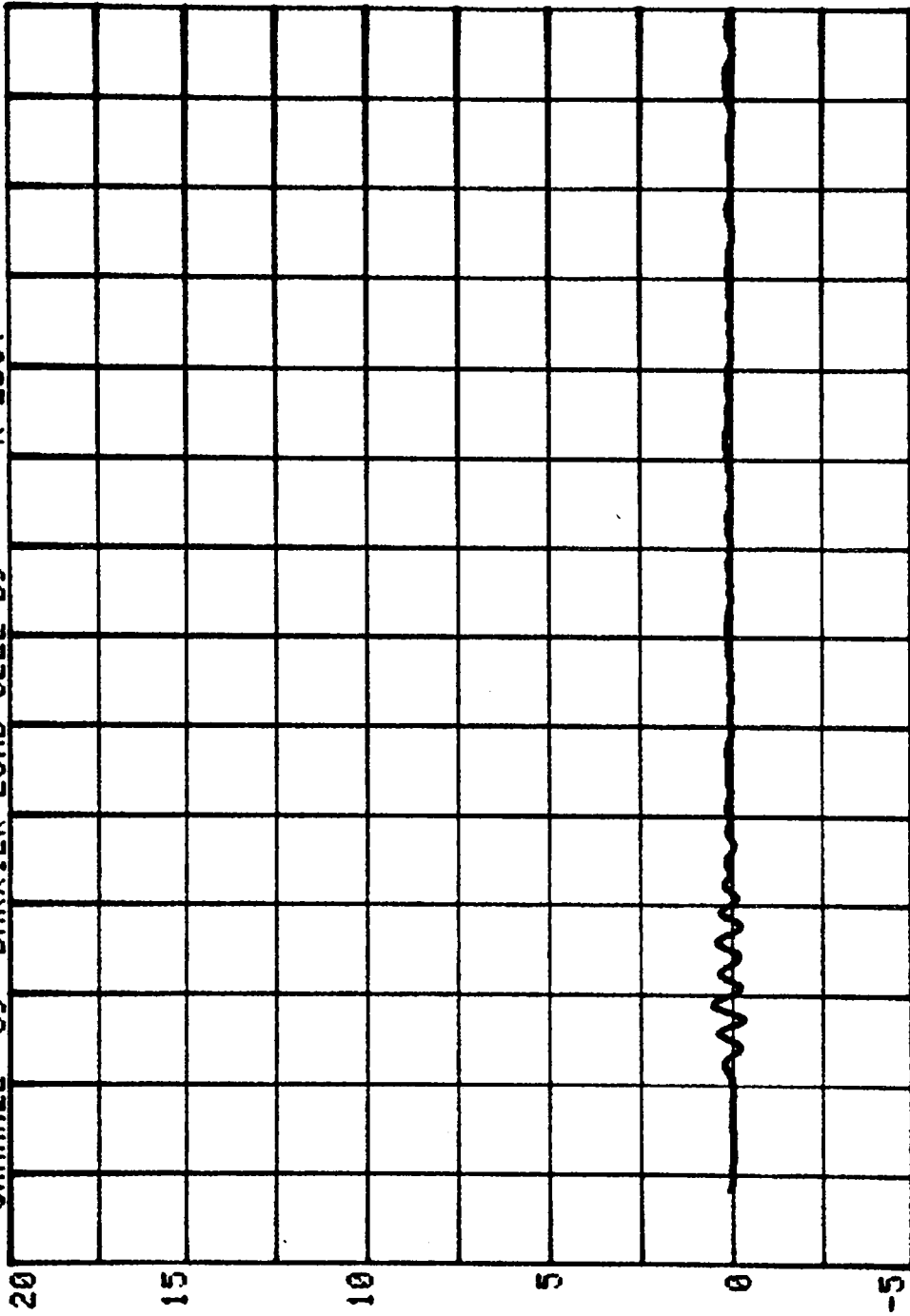
CHANNEL 67 BARRIER LOAD CELL D7  
RUN= 601 SERIES= 303  
K LBS.



CHANNEL 68 BARRIER LOAD CELL D8  
RUN= 601 SERIES= 303 K LBS.



CHANNEL 69 BARRIER LOAD CELL D9  
RUN= 601 SERIES= 303 K LBS.

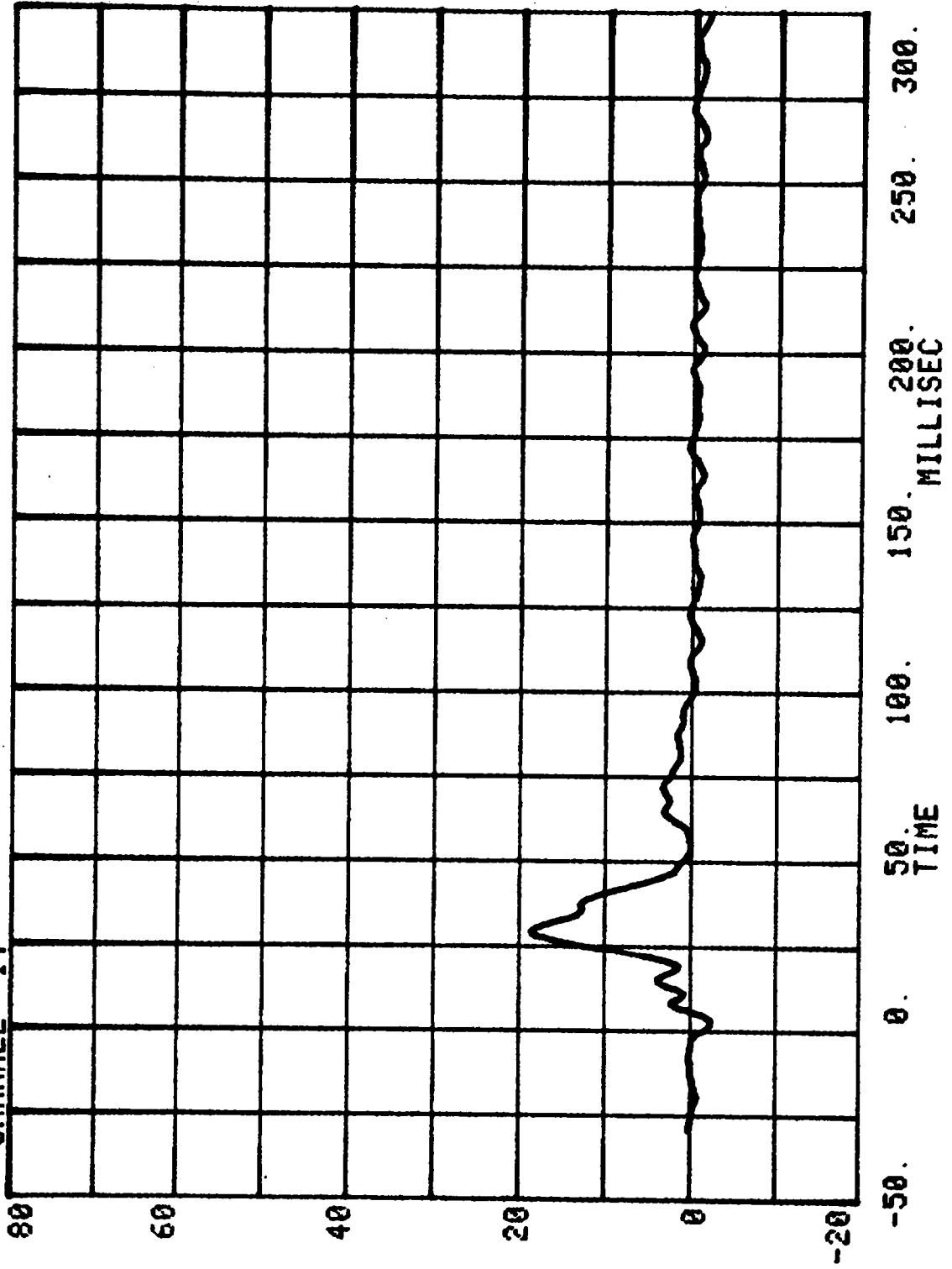


-50. 0 50. 100. 150. 200. 250. 300.  
MILLISEC  
TIME

TOTAL ROW A

RUN= 601 SERIES= 303

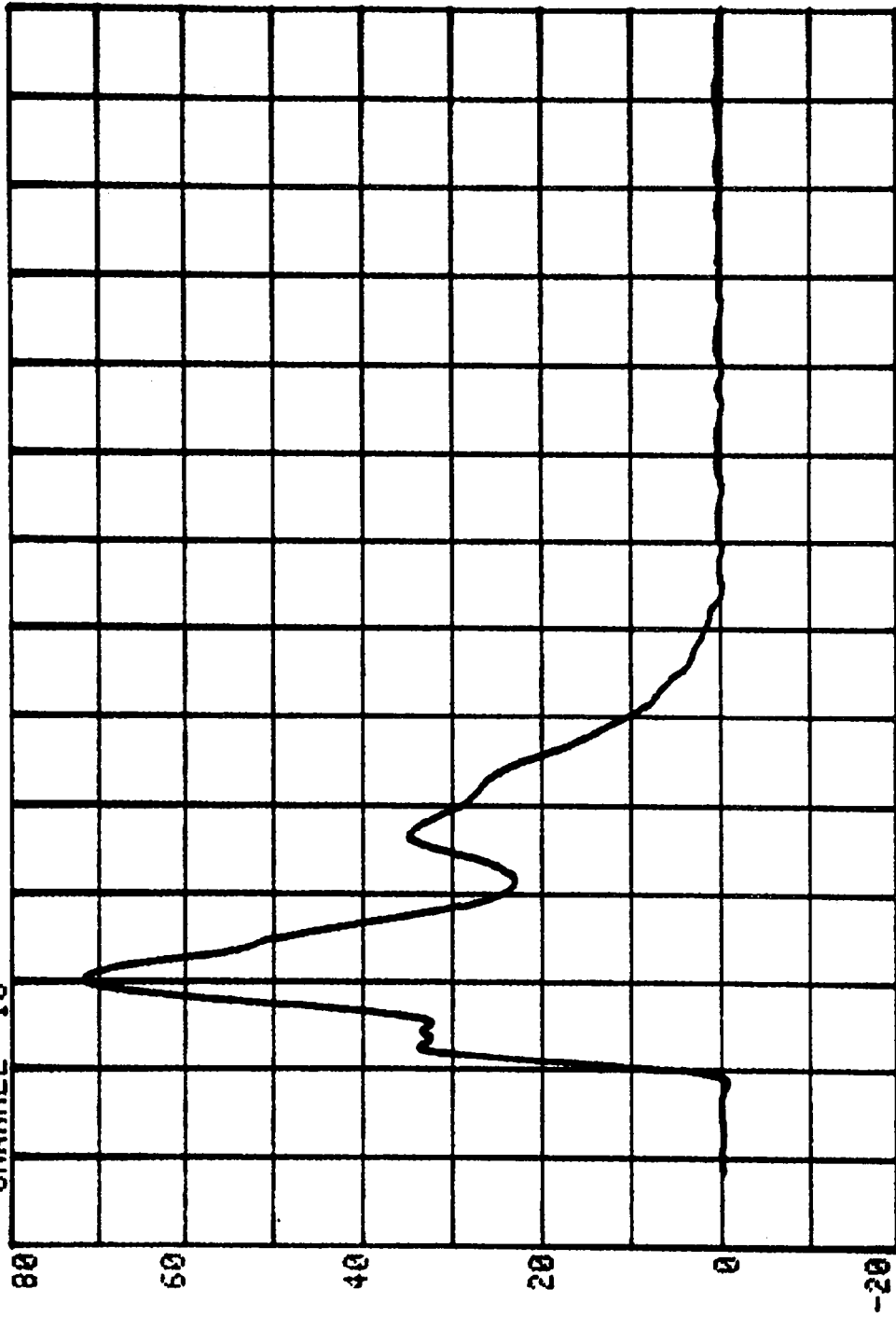
CHANNEL 14



TOTAL ROW B

RUN= 601 SERIES= 303

CHANNEL 15

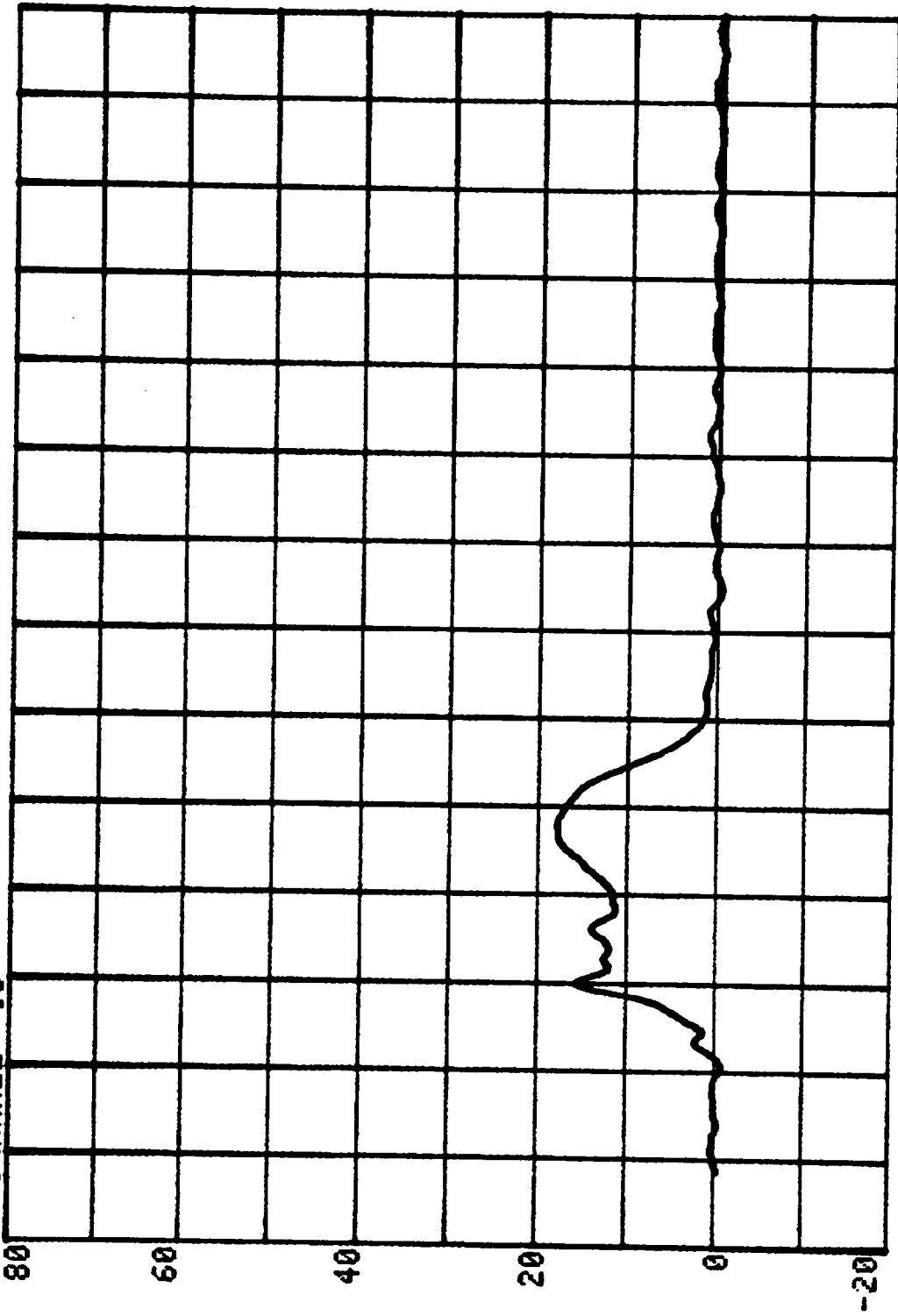


-50. 0. 50. 100. 150. 200. 250. 300.  
TIME  
MILLISEC

TOTAL ROW C

RUN= 601 SERIES= 303

CHANNEL 16

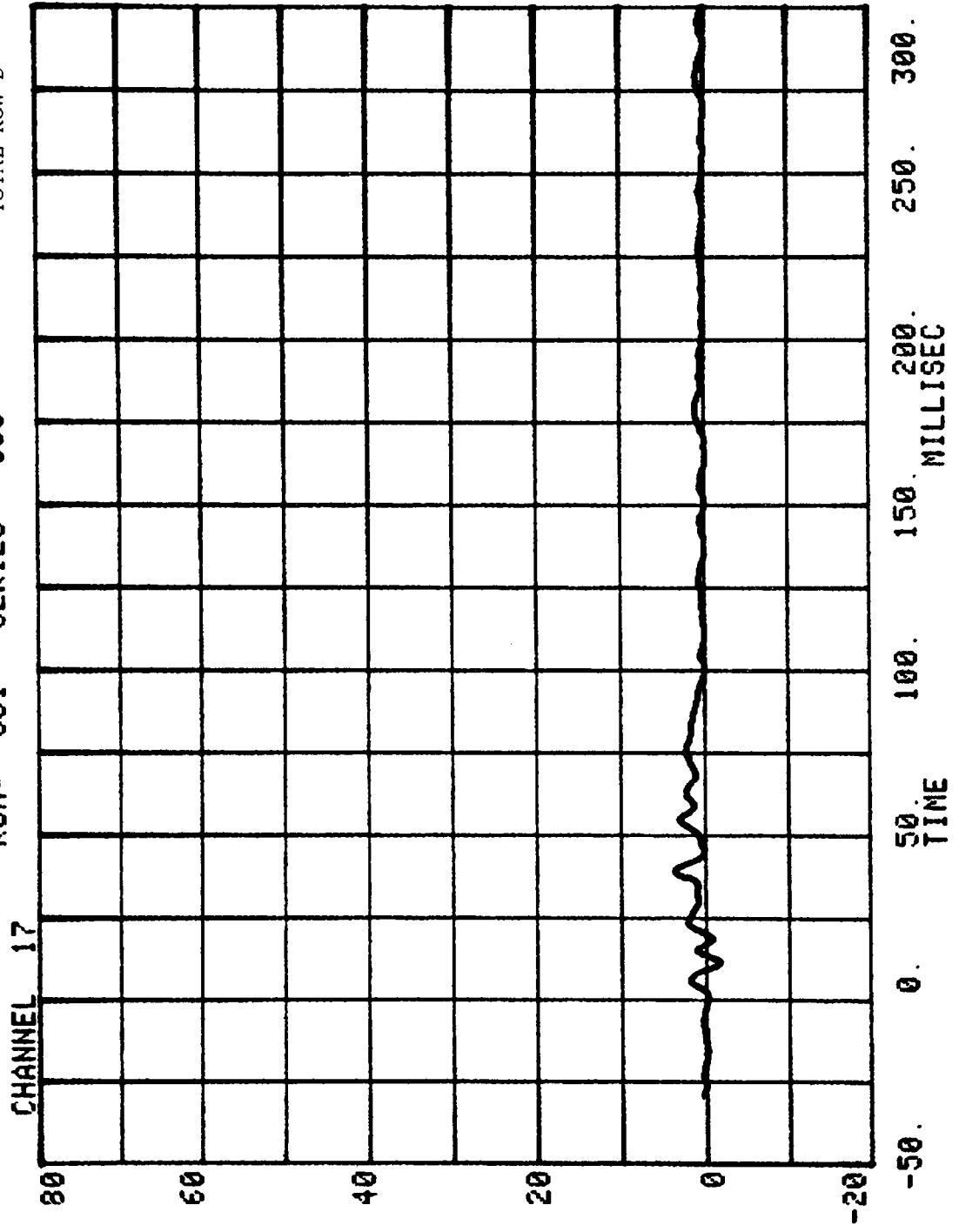


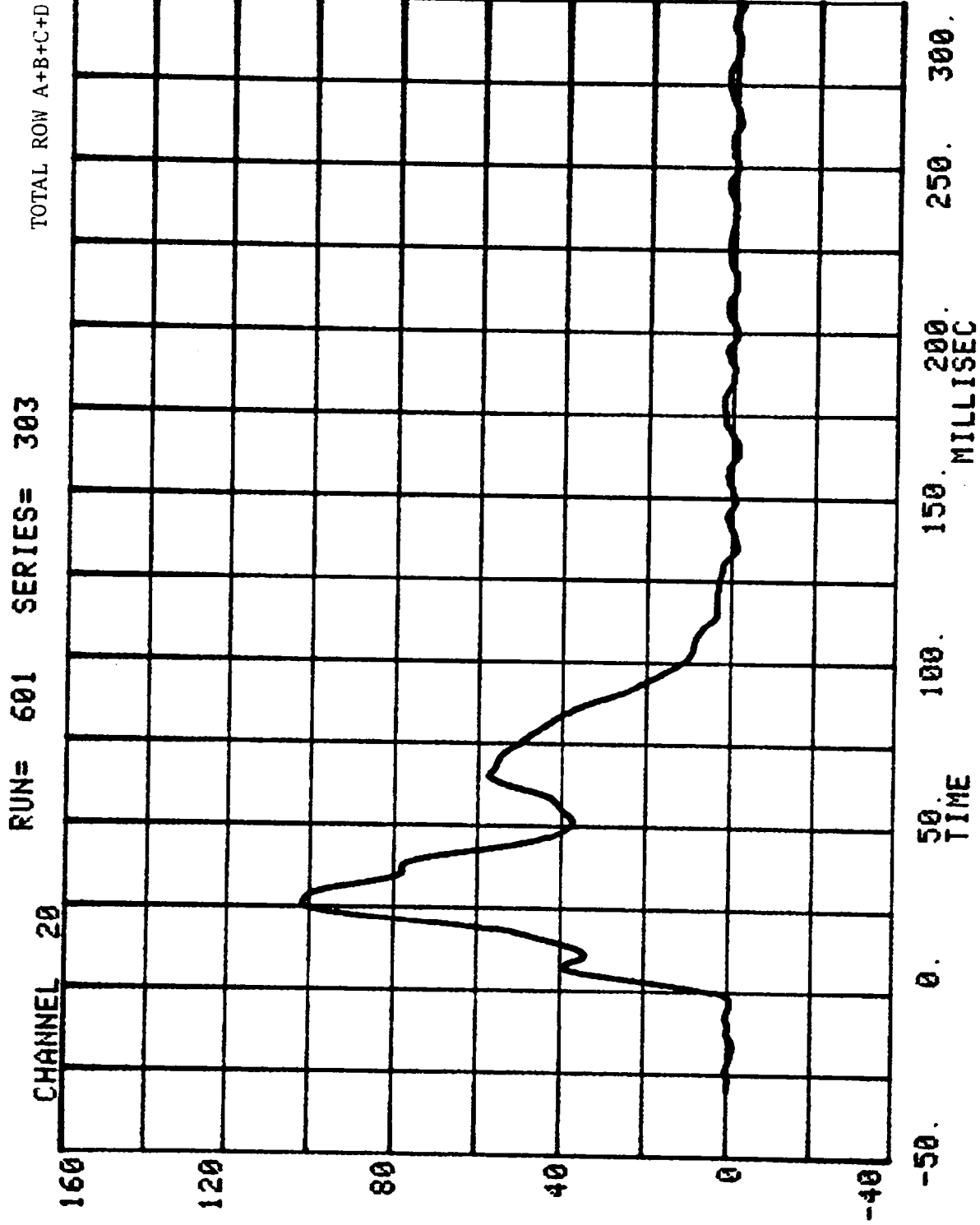
-50. 0. 50. 100. 150. 200. 250. 300.

MILLISEC

TIME

CHANNEL 17 RUN= 601 SERIES= 303 TOTAL ROW D





TEST NO. CE0303

DUMMY DATA

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

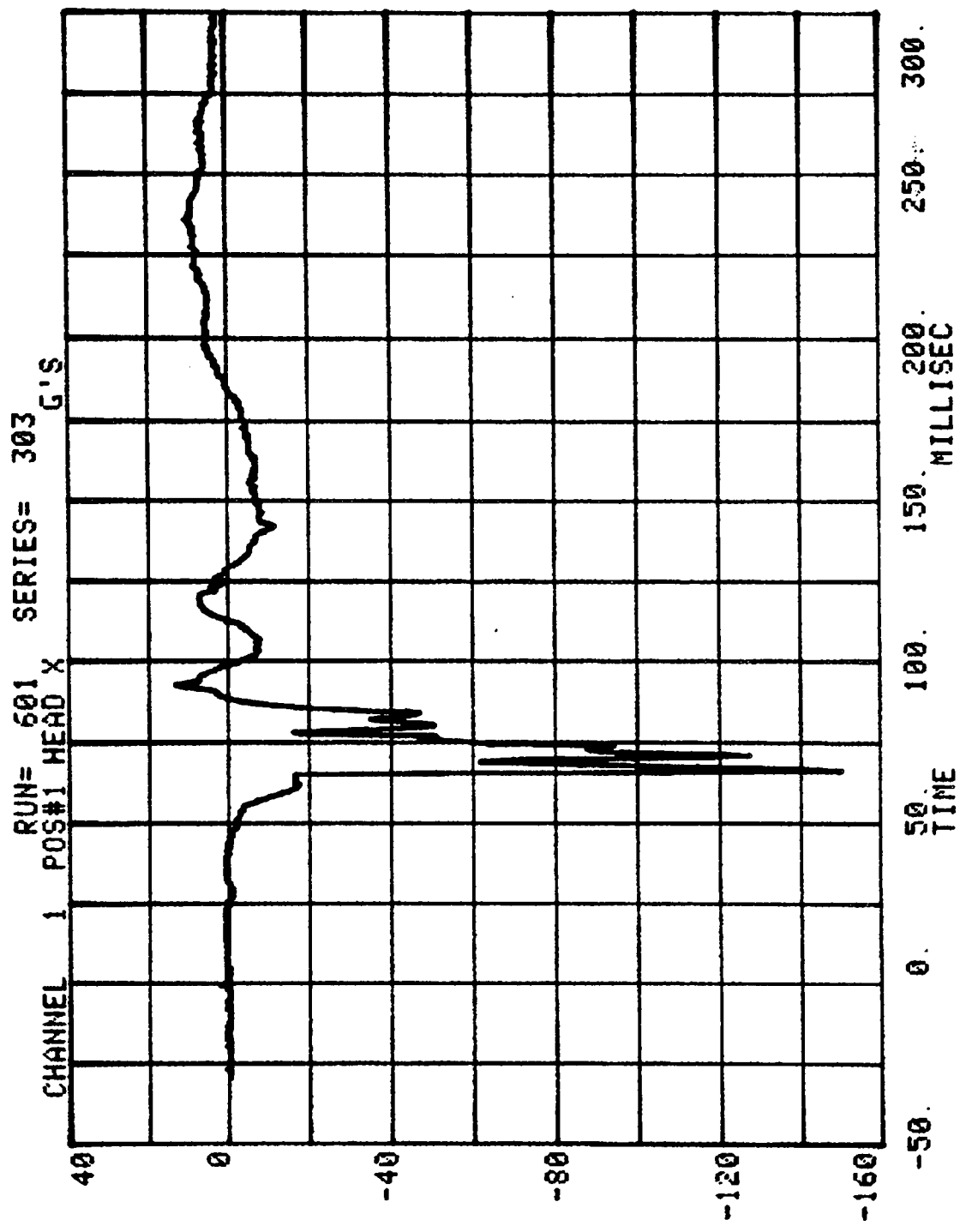
HEAD INJURY CRITERION  
HEAD SEVERITY INDEX

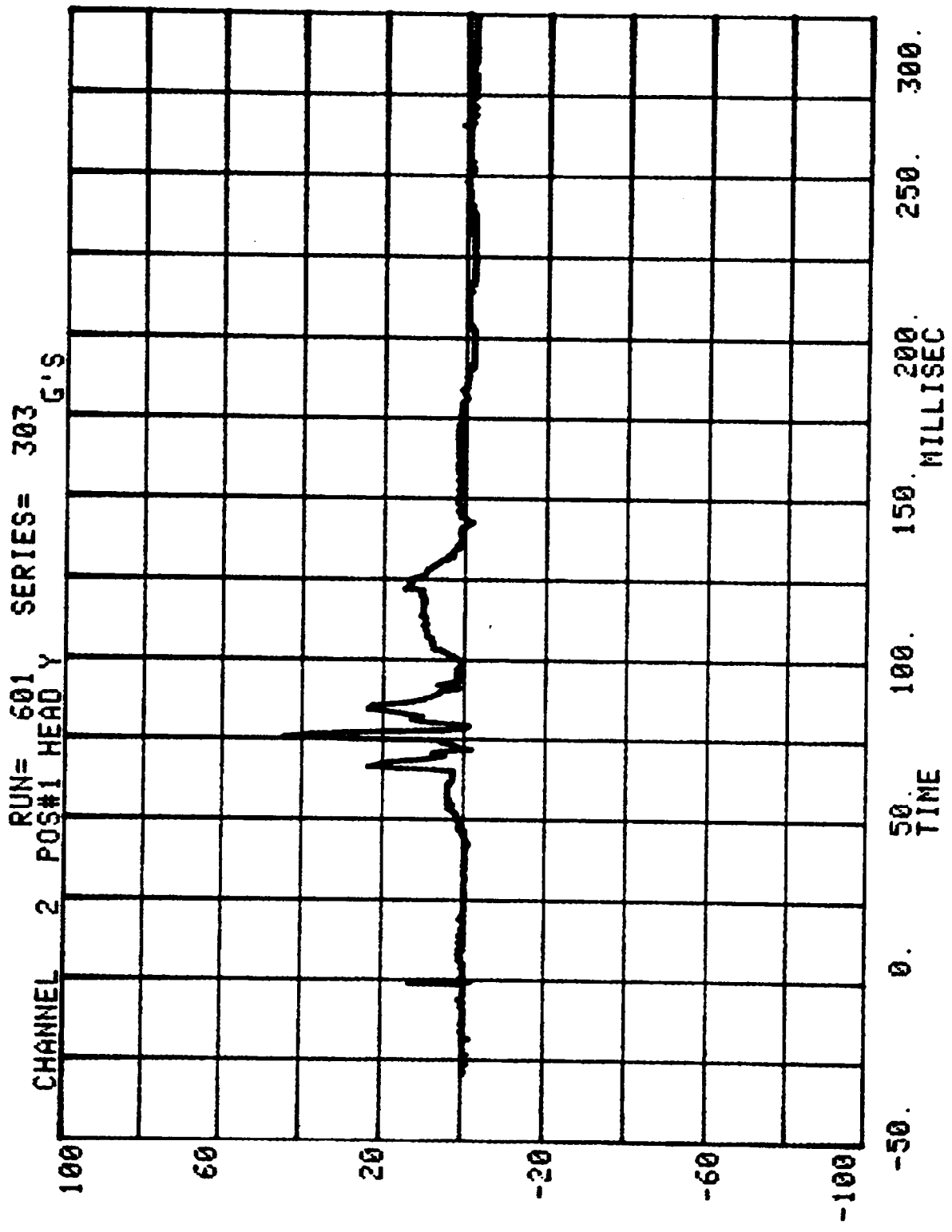
CAR TO LOAD CELL BARRIER

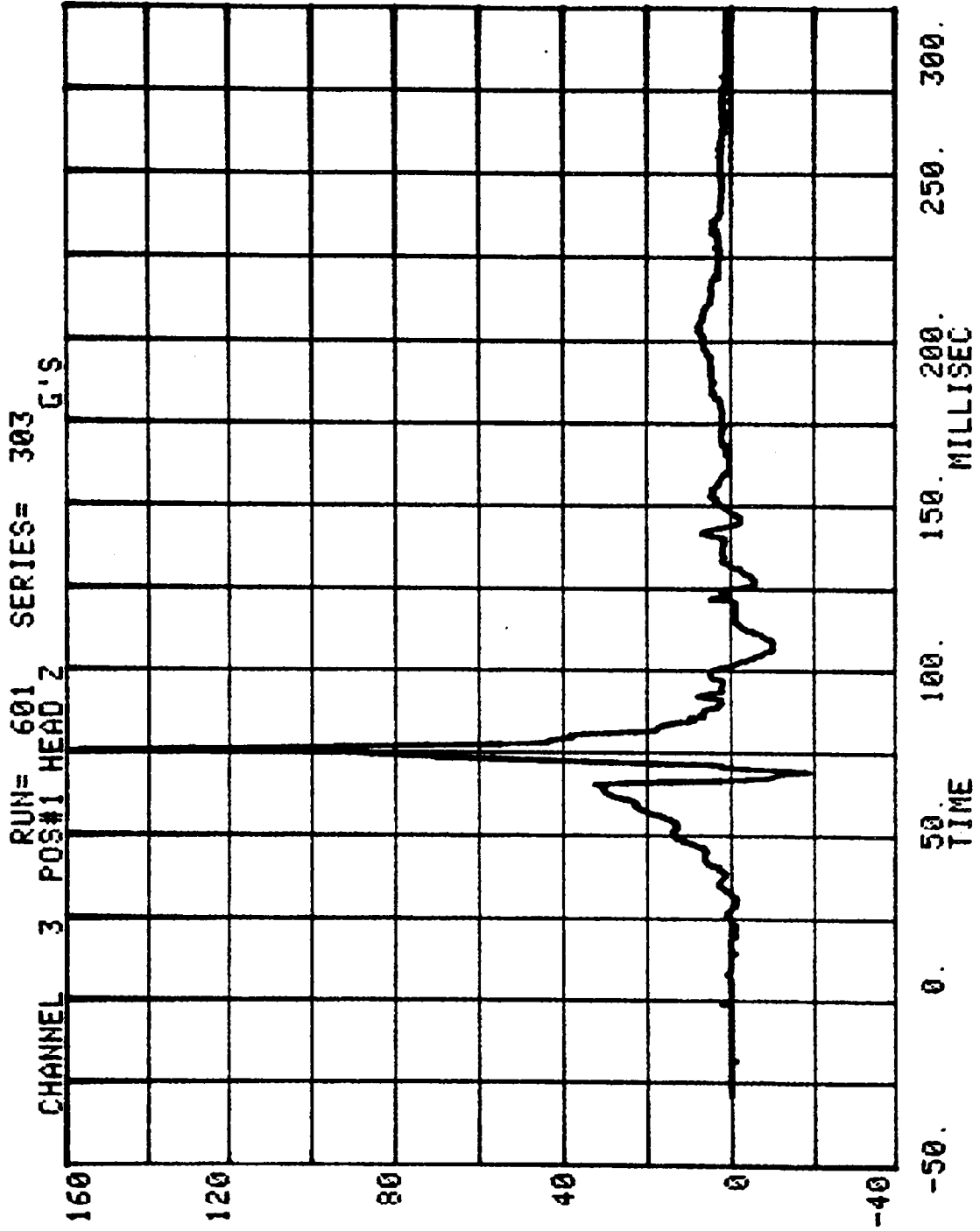
RUN= 601

POS#1 HEAD RESULTANT

HIC=1530.3 FROM T1= .06615 TO T2= .07770  
AVERAGE ACCELERATION BETWEEN T1 AND T2= 111.9G'S  
EVENT TIME= 300.0 MSEC  
SEVERITY INDEX=1935.5

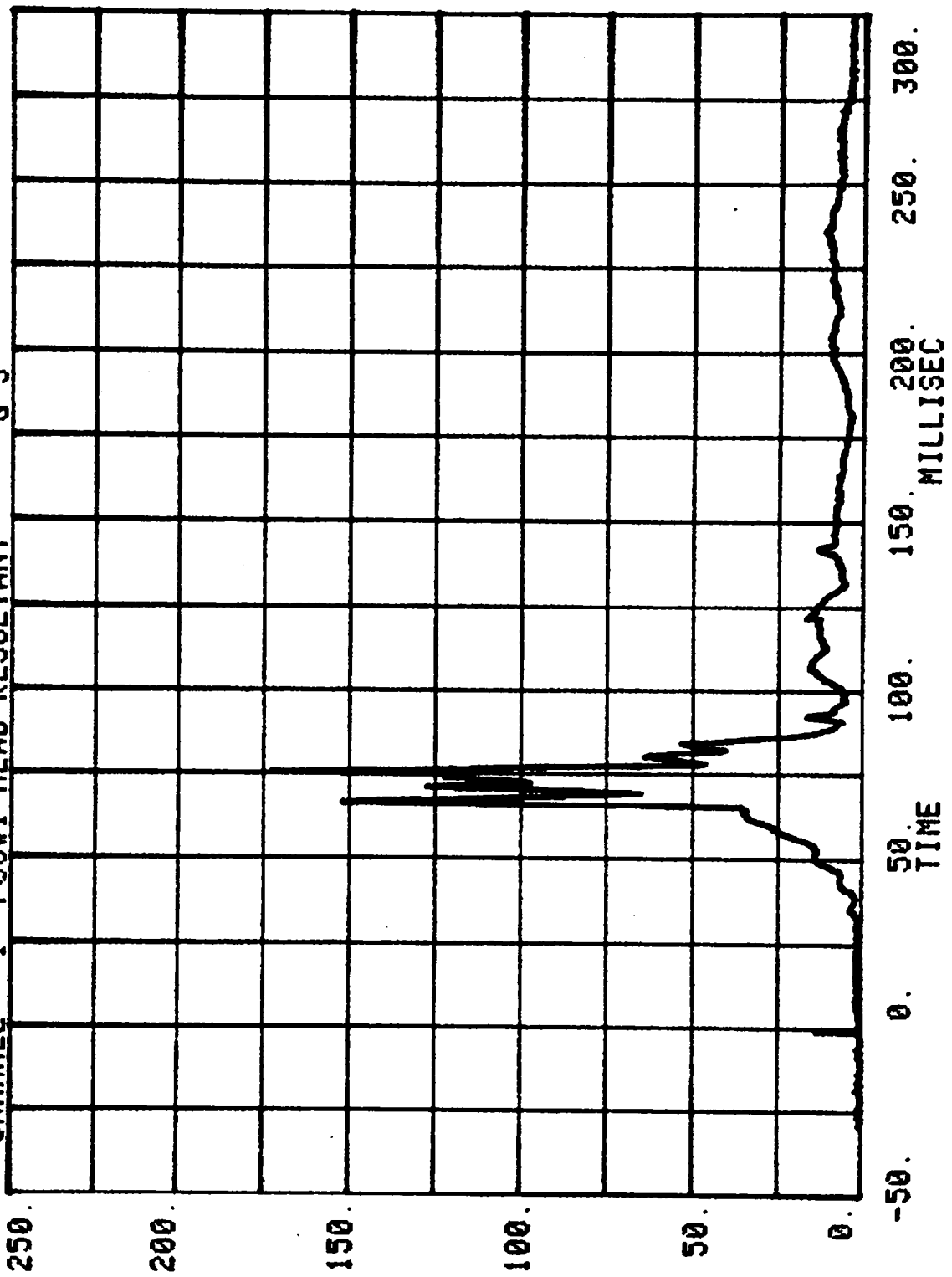


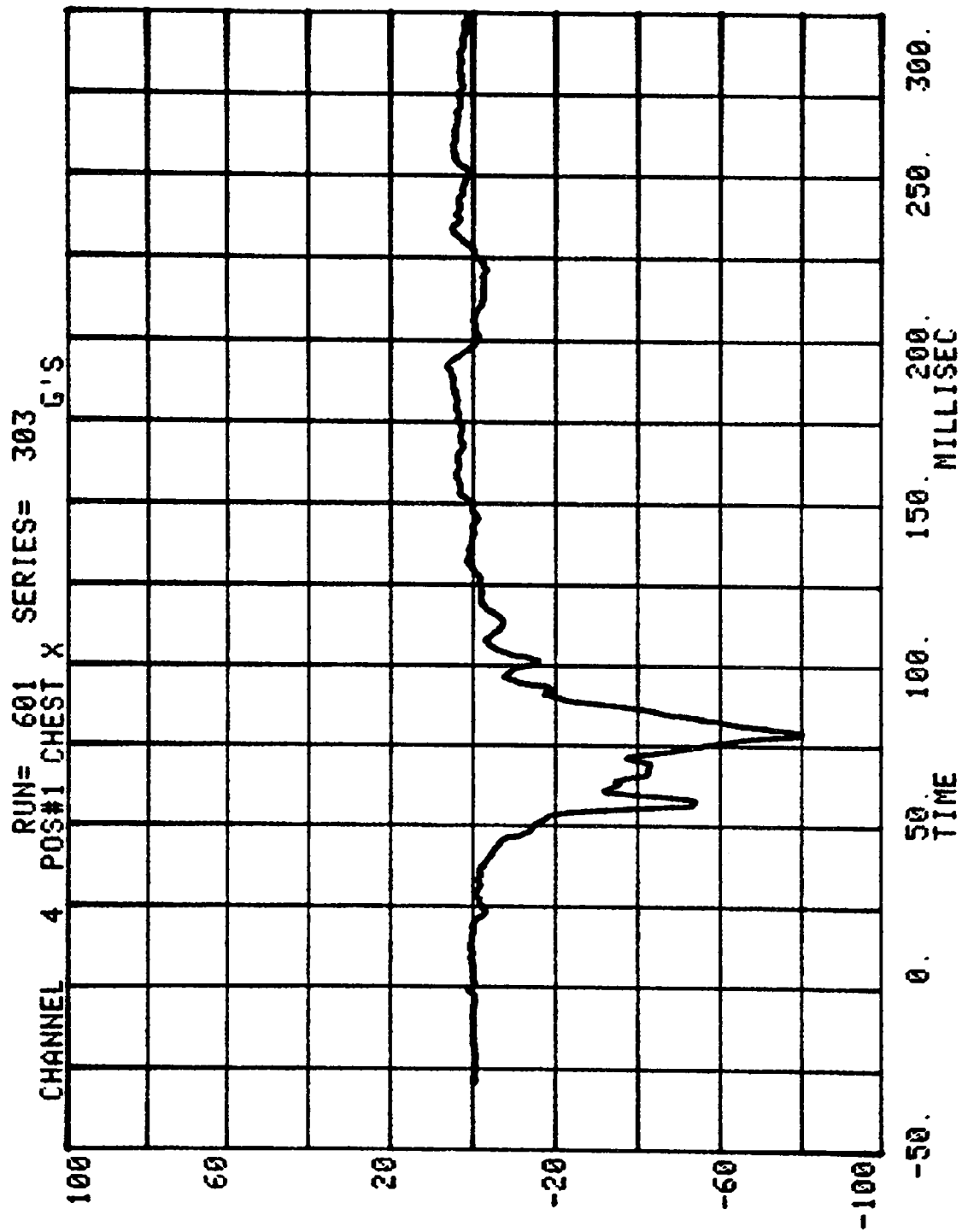


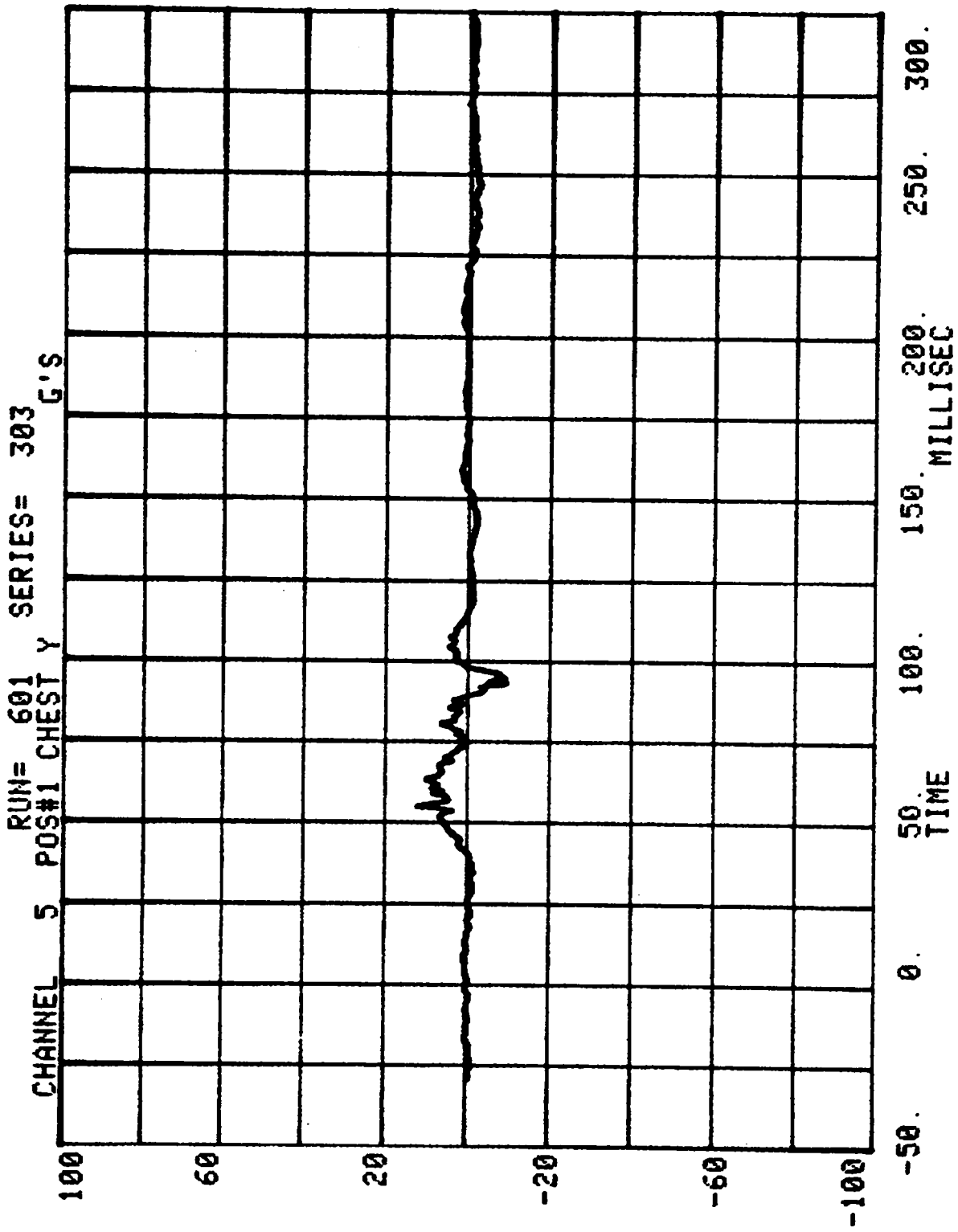


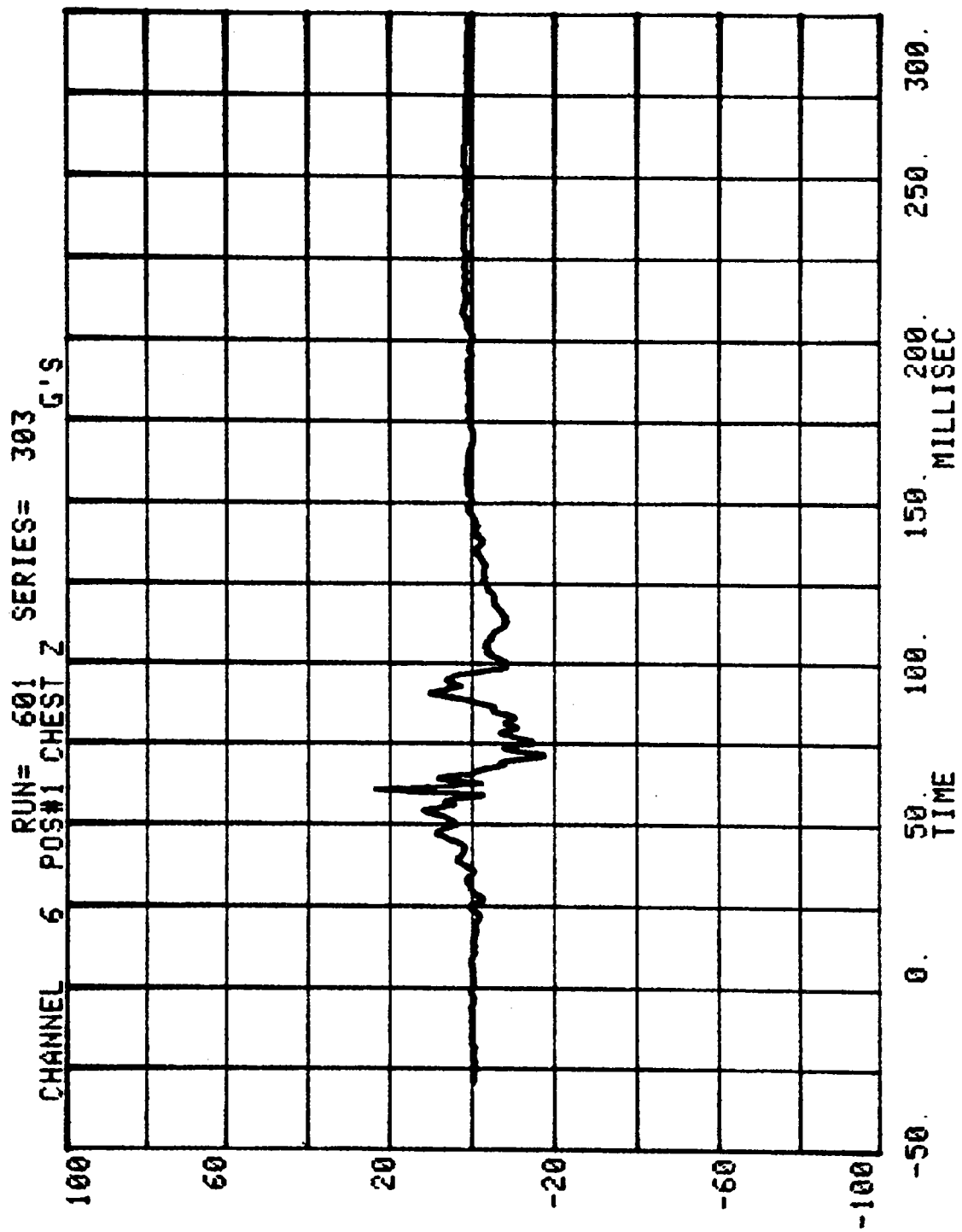
CHANNEL 1 POS#1 HEAD RESULTANT

RUN= 601 SERIES= 303 G'S







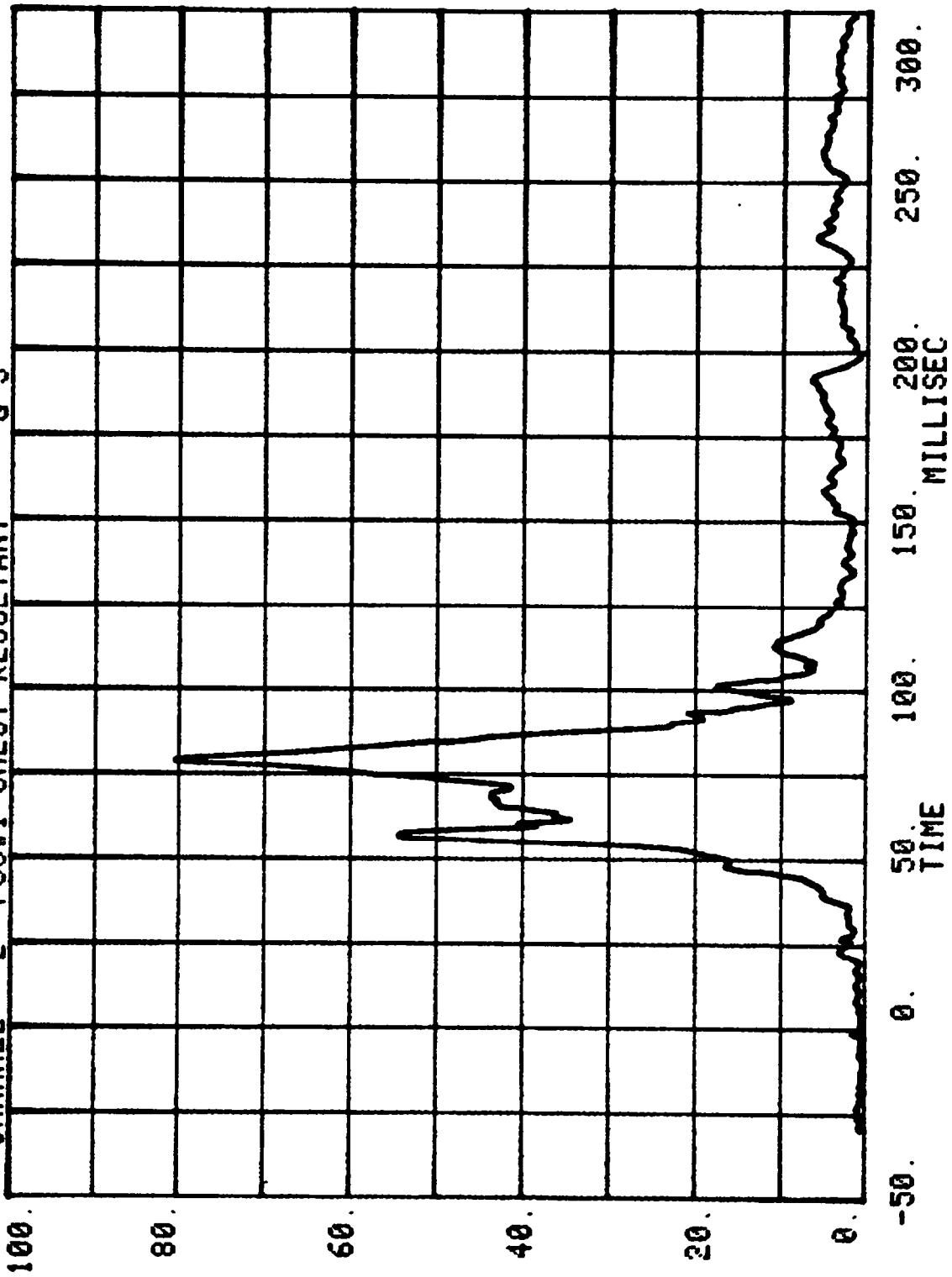


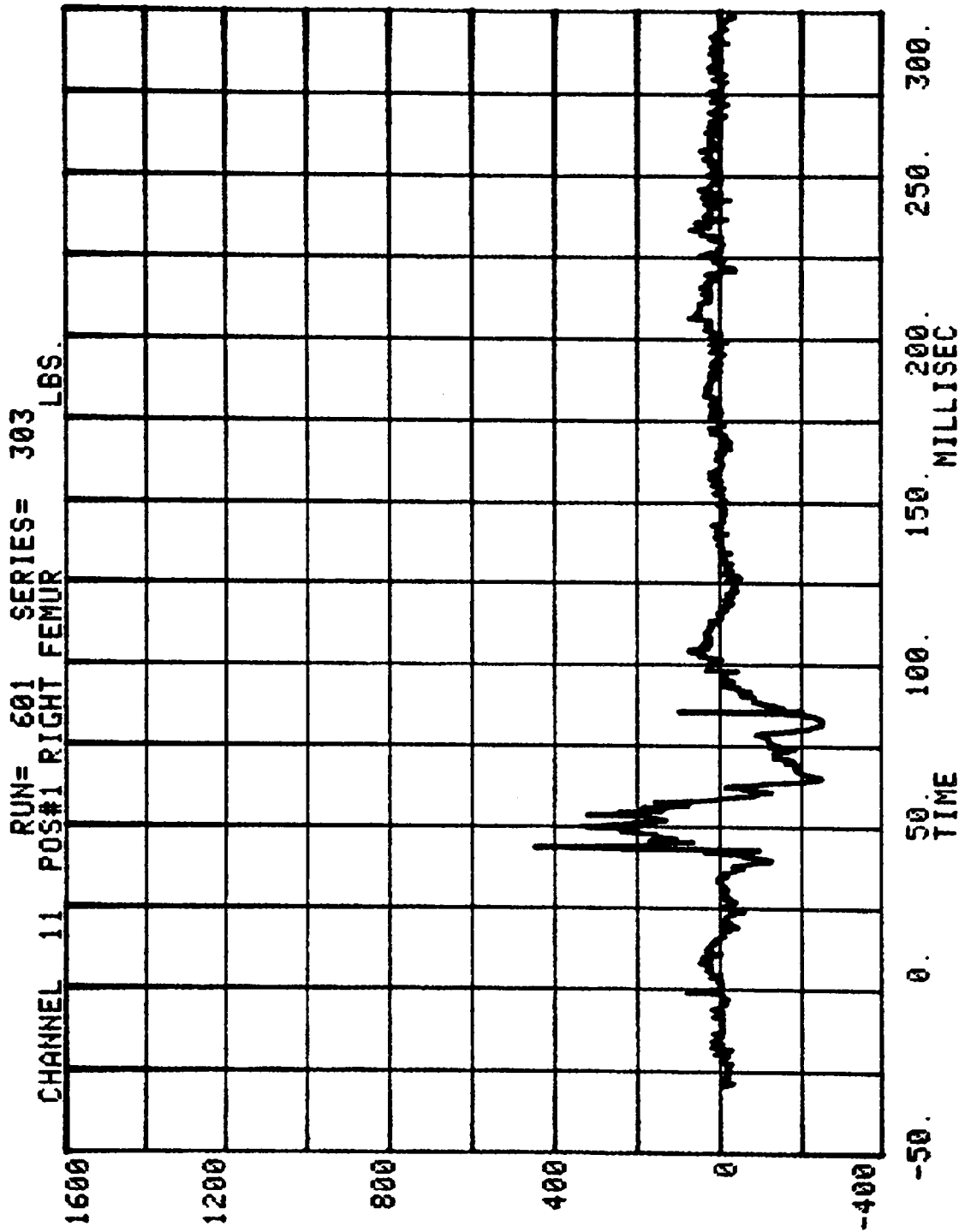
CHANNEL 2 POS#1 CHEST RESULTANT

RUN= 601

SERIES= 303

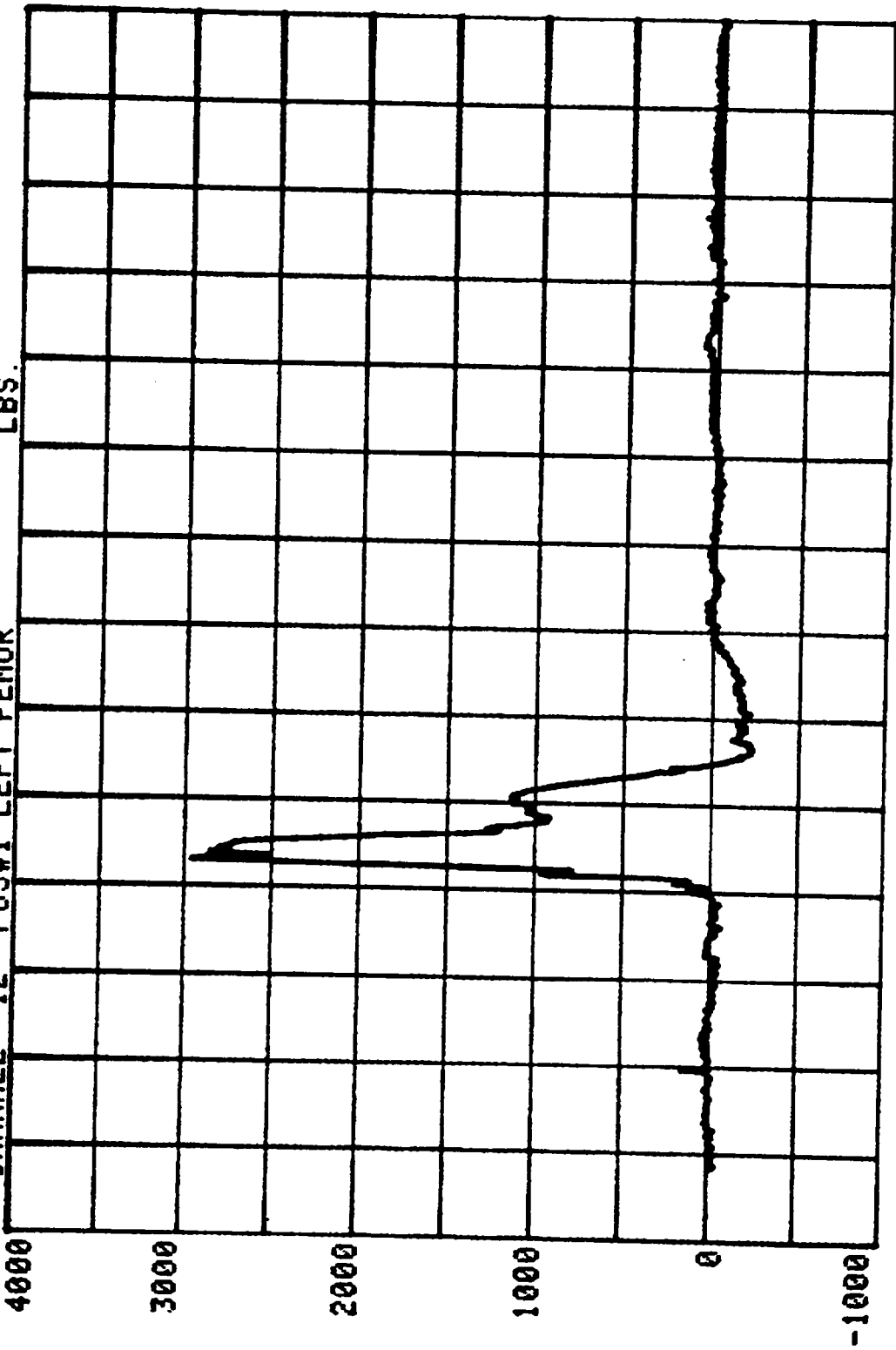
G'S

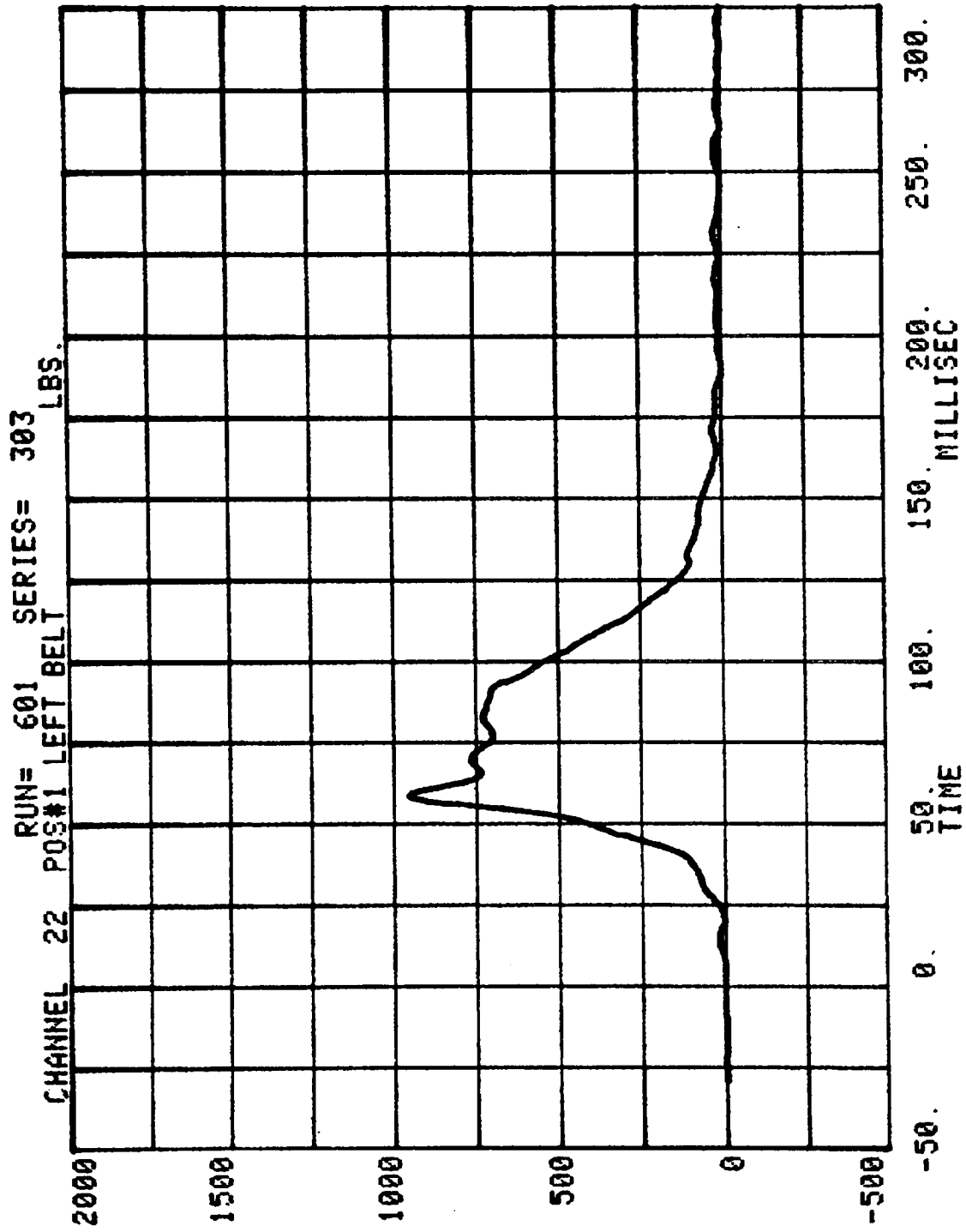




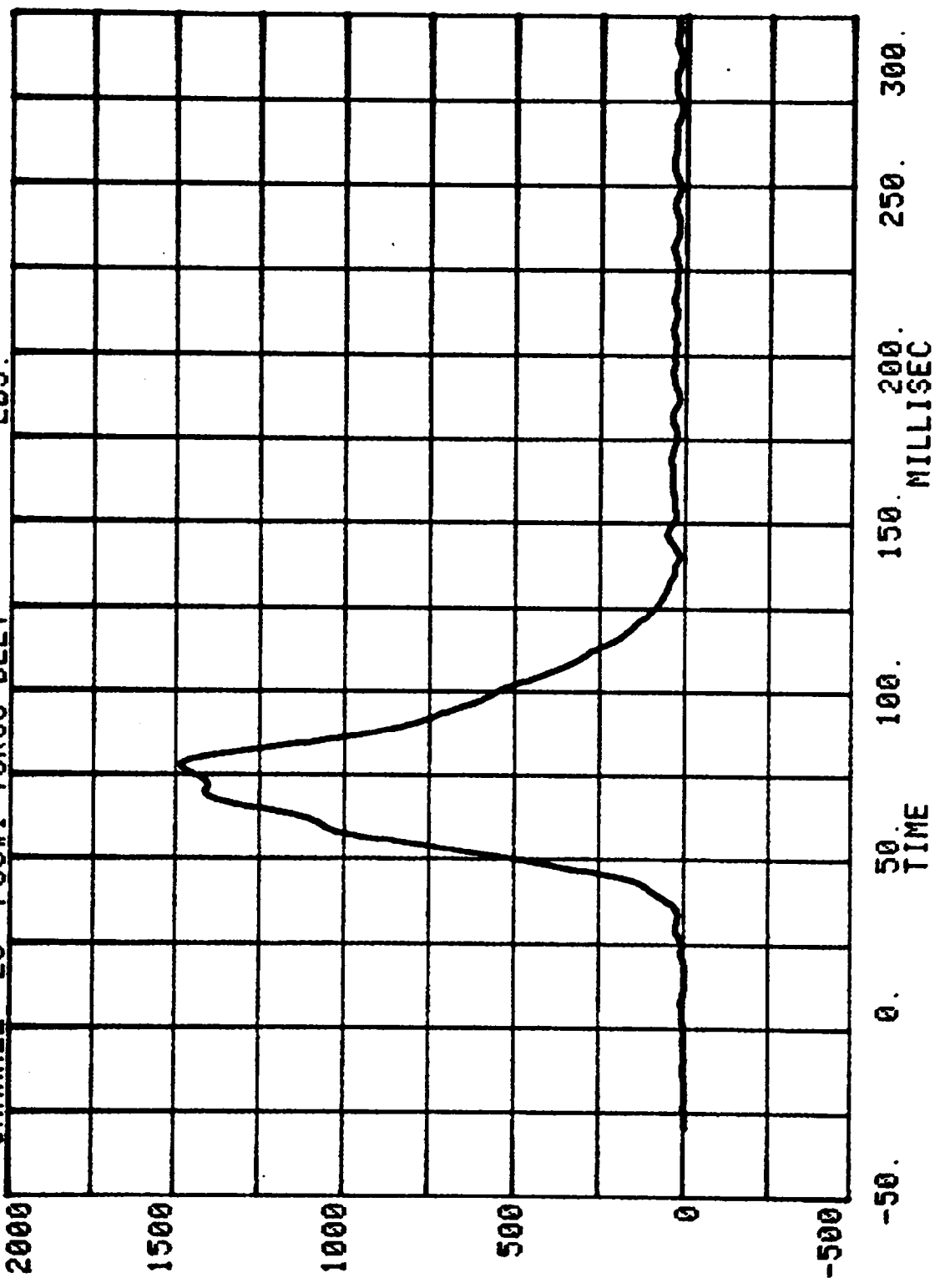
CHANNEL 12 POS#1 LEFT FEMUR LBS.

RUN= 601 SERIES= 303



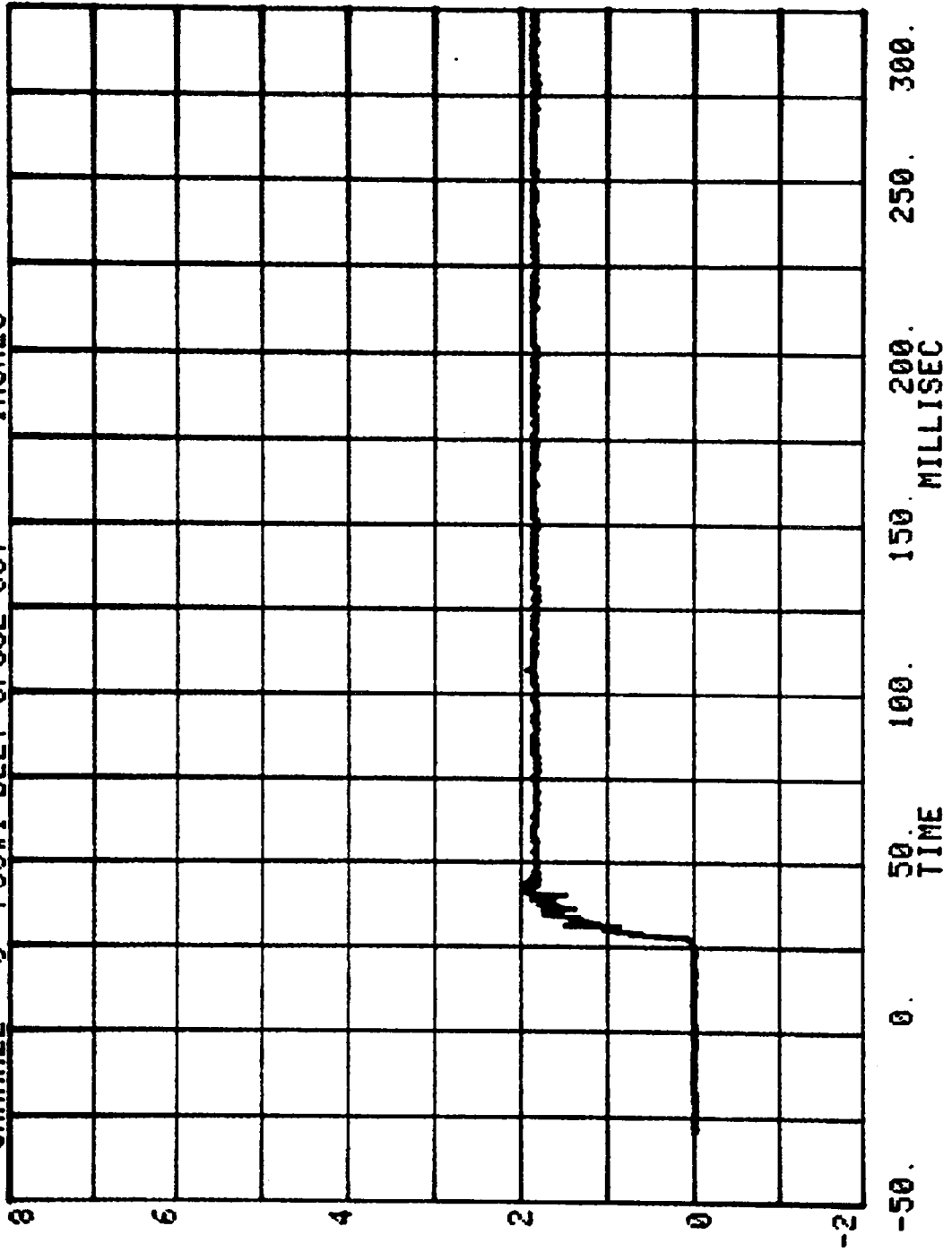


CHANNEL 23 POS#1 TORSO BELT  
RUN= 601 SERIES= 303 LBS.



CHANNEL 8 POS#1 BELT SPOOL OUT INCHES

RUN= 601 SERIES= 303



HEAD INJURY CRITERION  
HEAD SEVERITY INDEX

CAR TO LOAD CELL BARRIER

RUN= 601

POS#2 HEAD RESULTANT

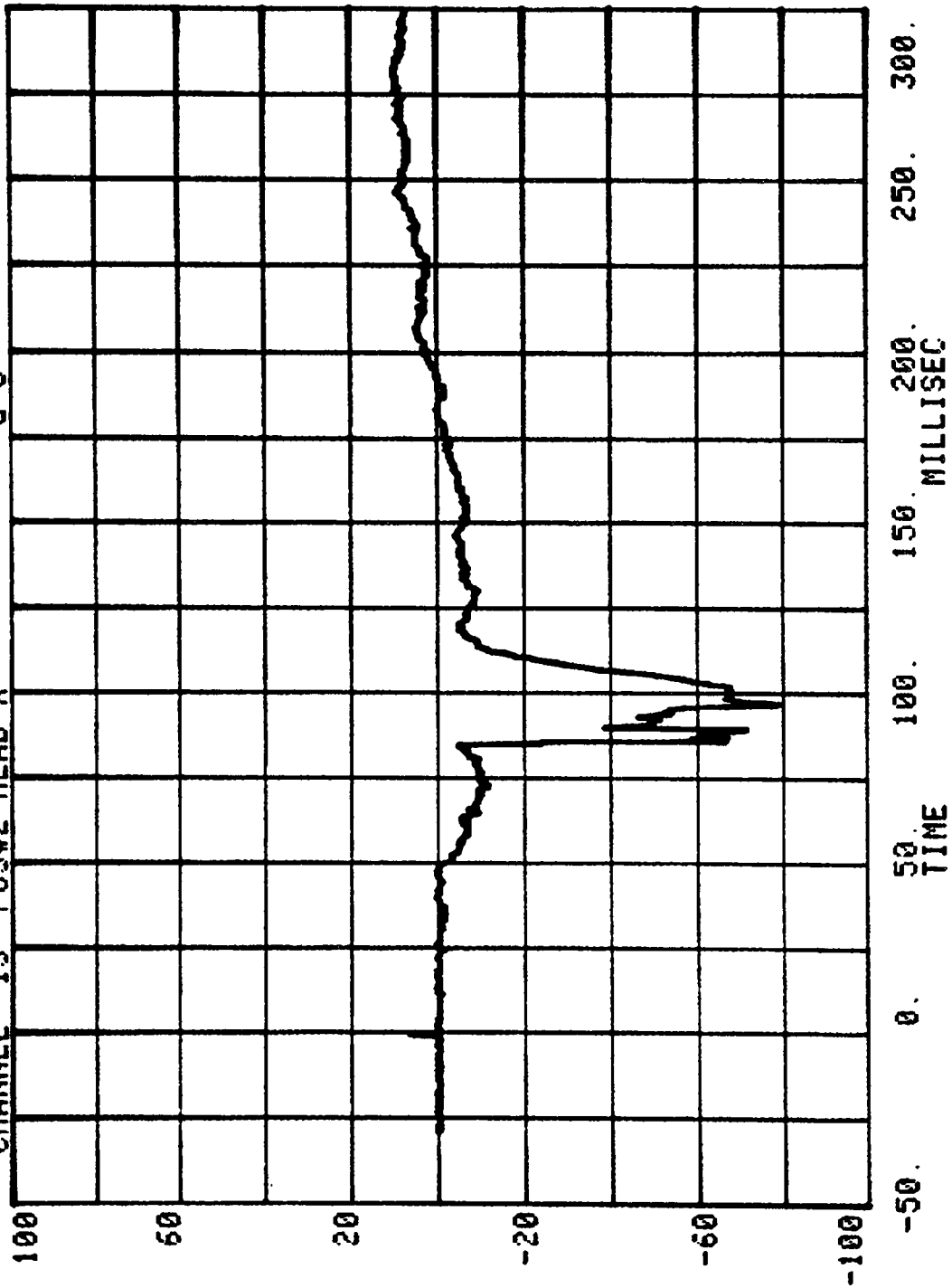
HIC=1003.6 FROM T1= .08062 TO T2= .10815

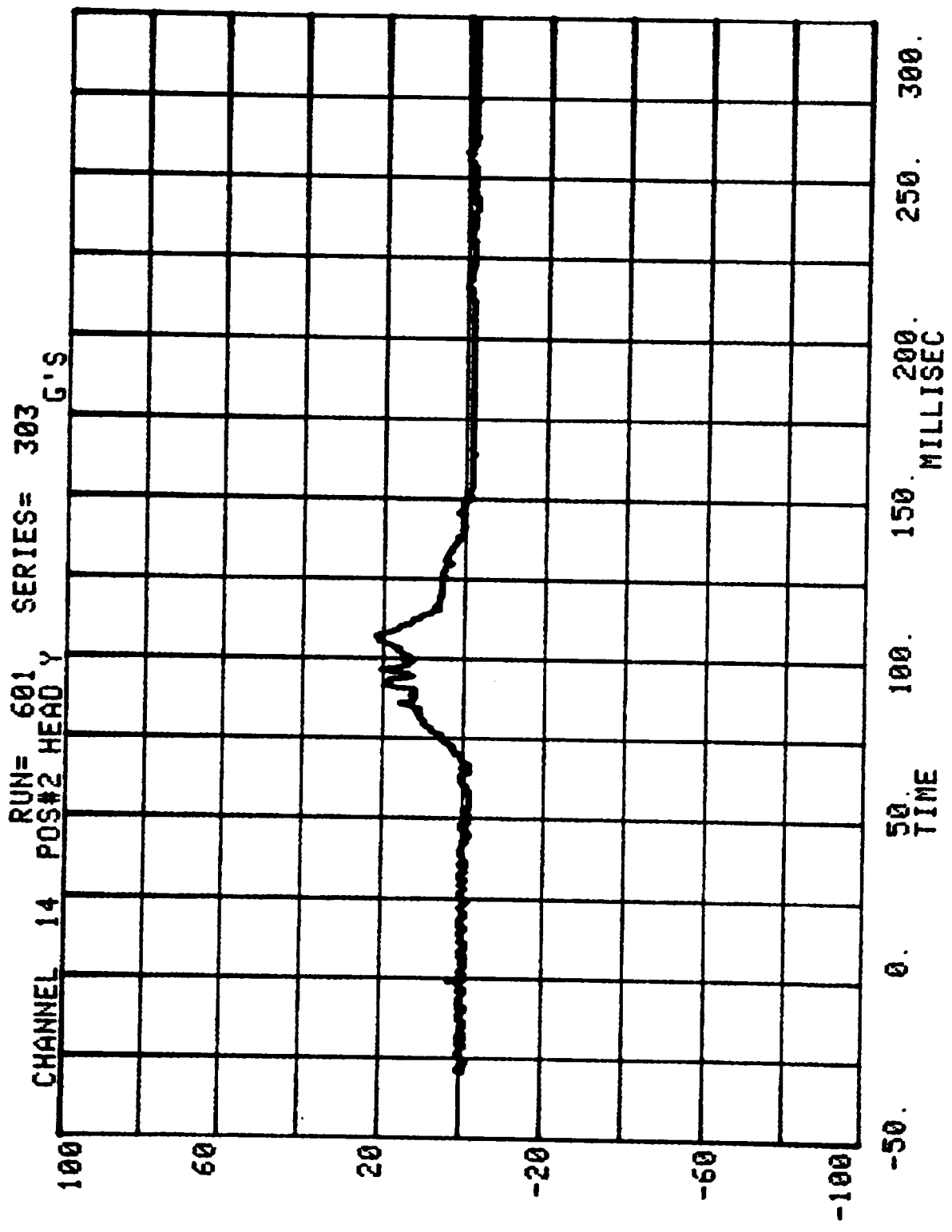
AVERAGE ACCELERATION BETWEEN T1 AND T2= 66.8G'S

EVENT TIME= 300.0 MSEC

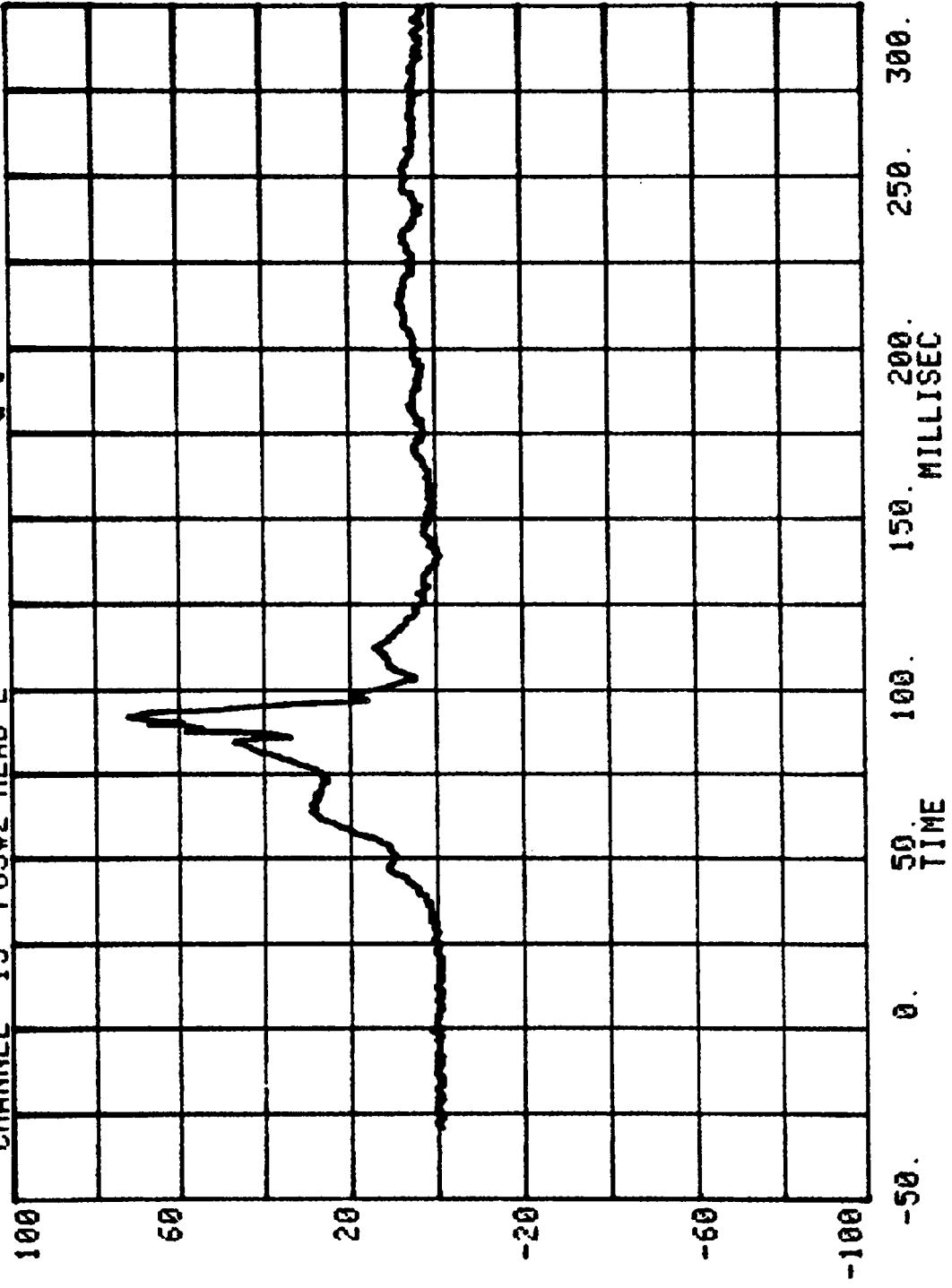
SEVERITY INDEX=1280.4

CHANNEL 13 POS#2 HEAD X  
RUN= 601 SERIES= 303 G'S

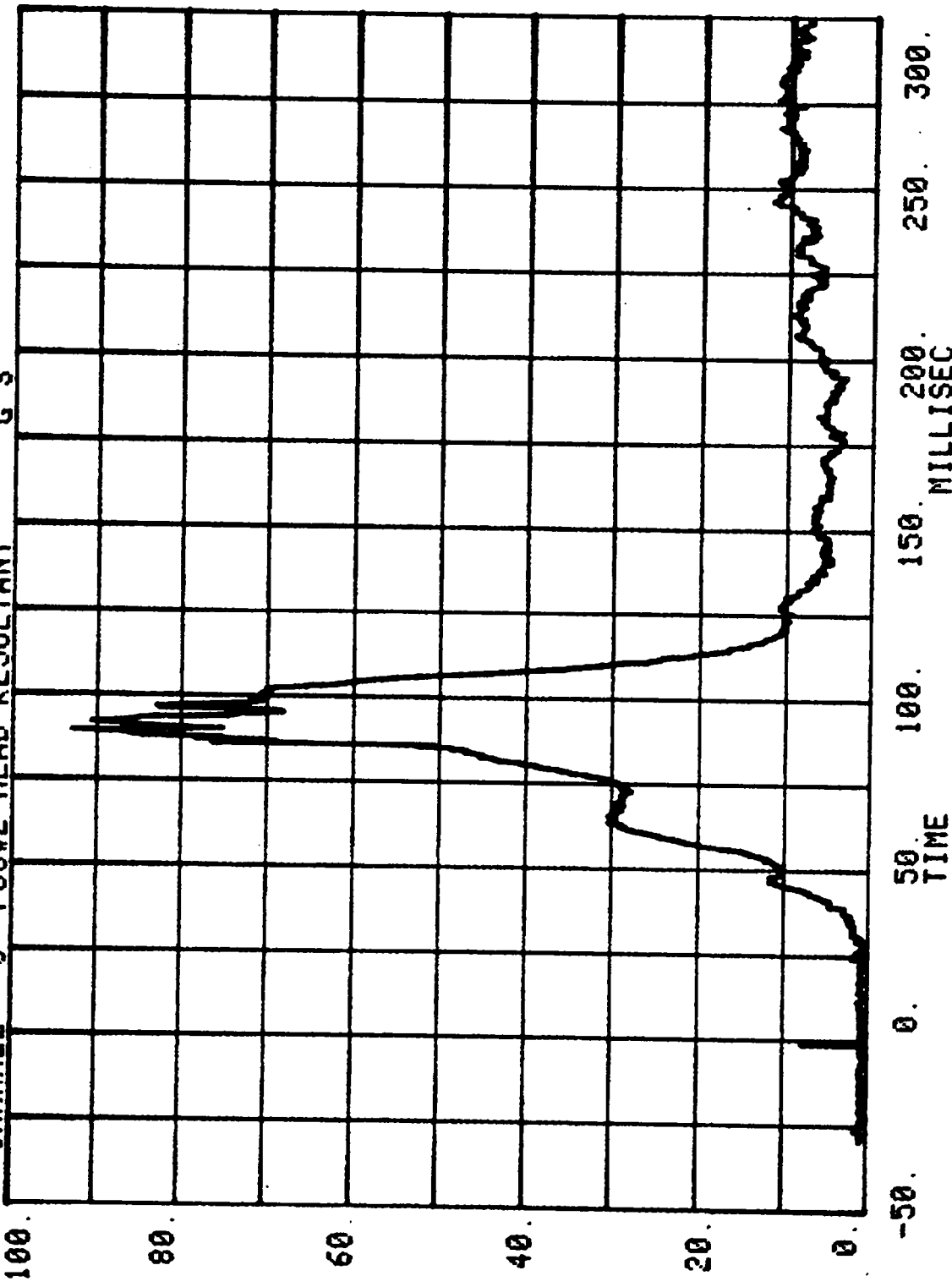


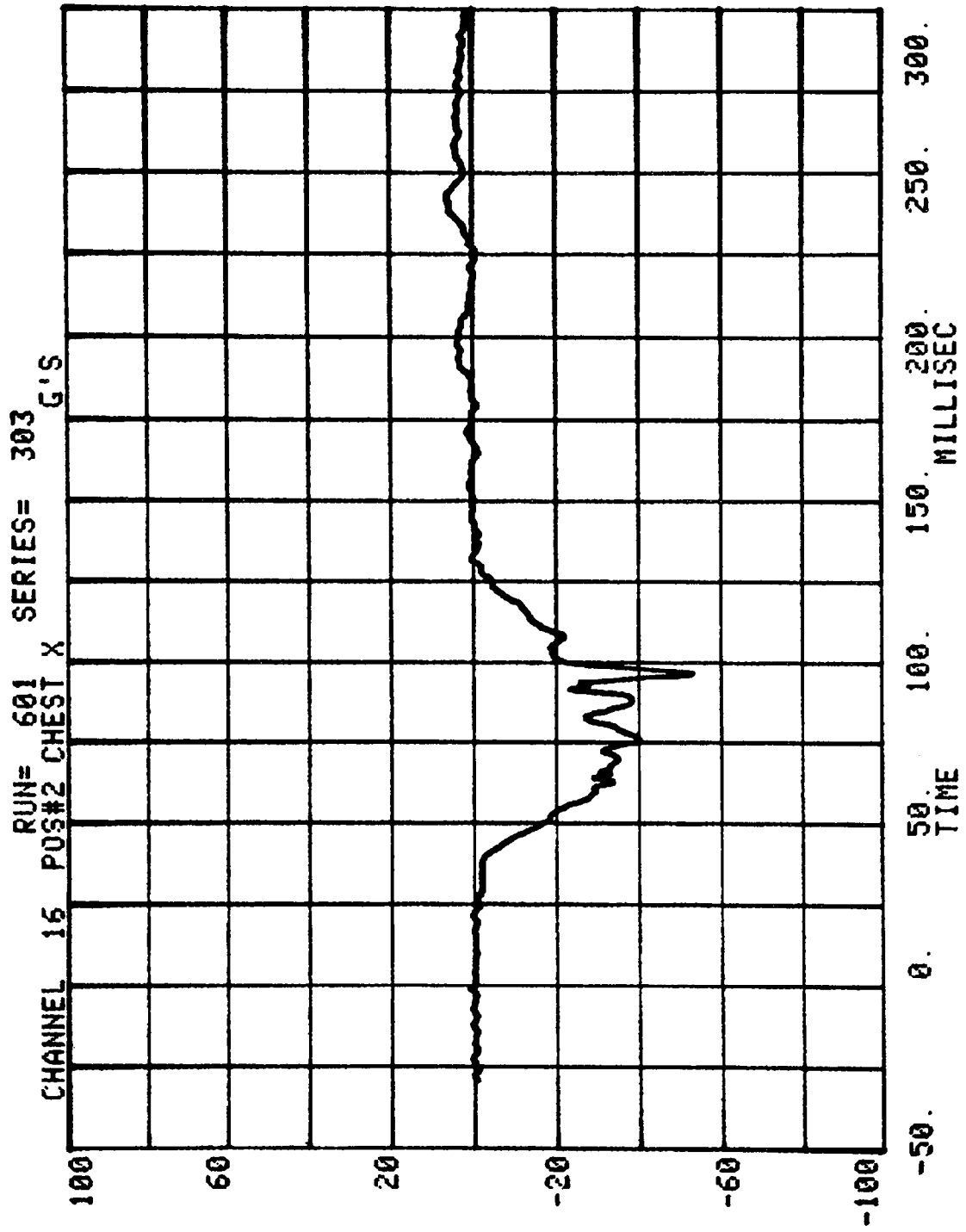


CHANNEL 15 POS#2 HEAD Z RUN= 601 SERIES= 303 G'S

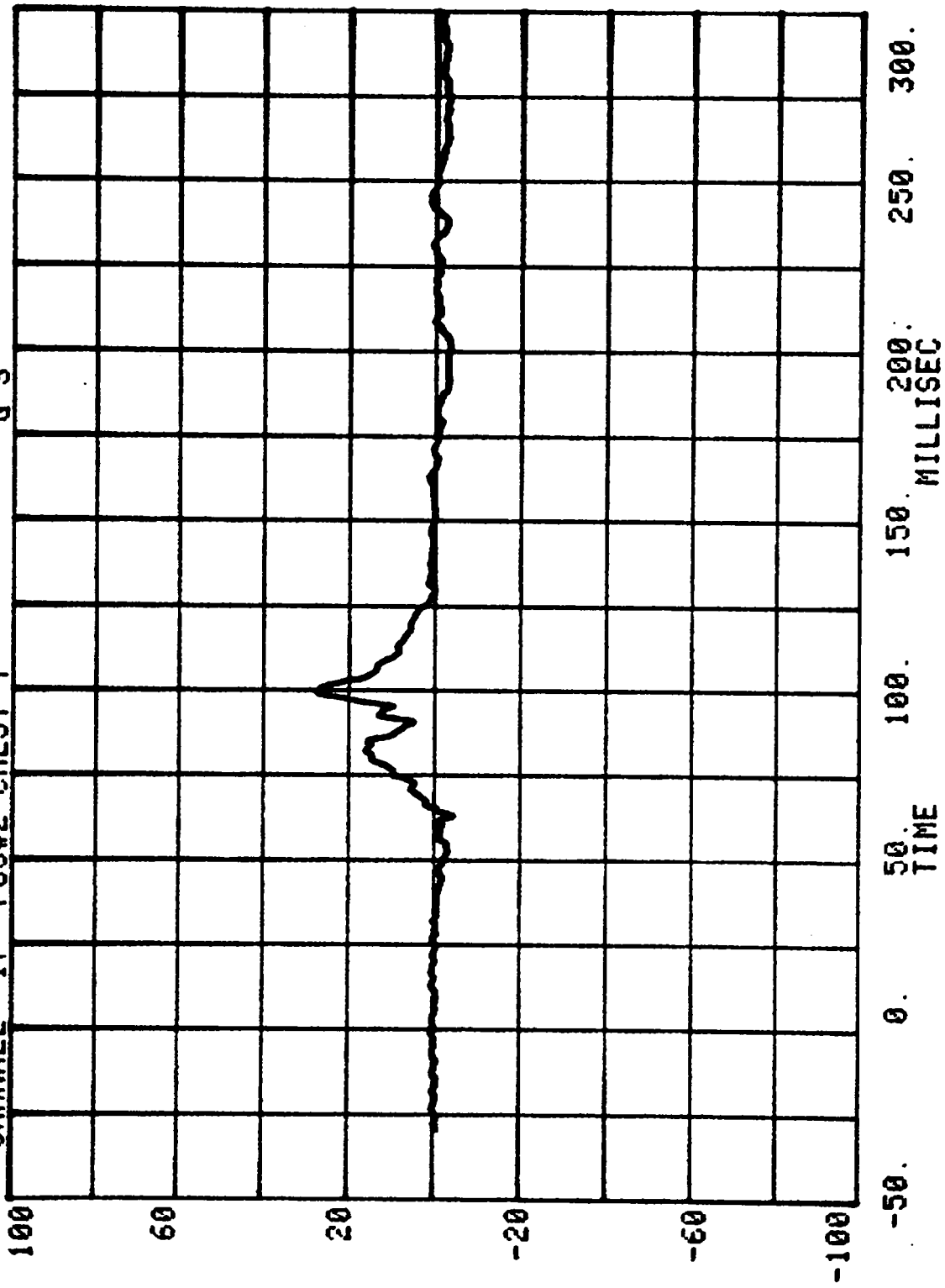


CHANNEL 3 POS#2 HEAD RESULTANT 303 G'S

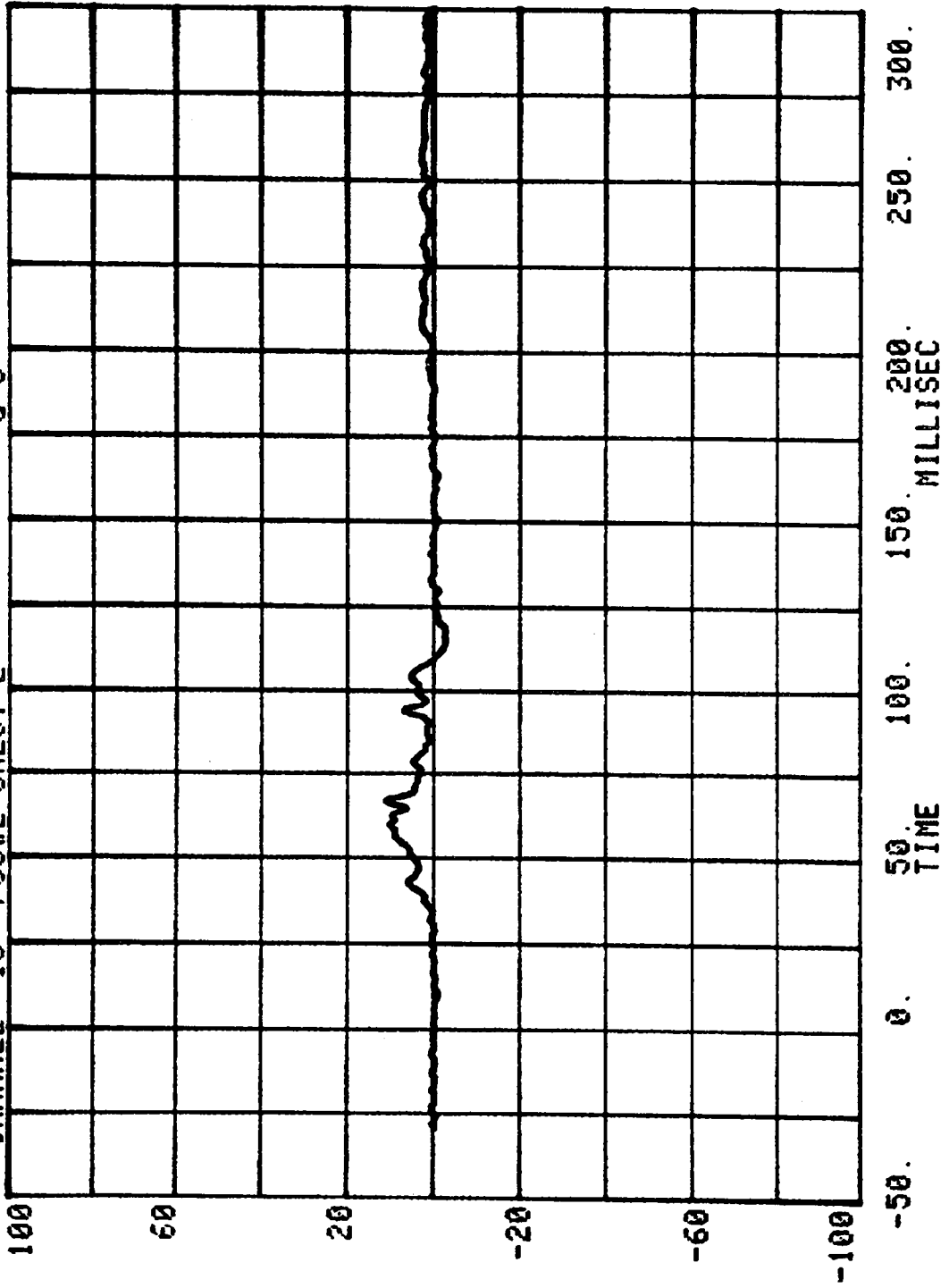




CHANNEL 17 POS#2 CHEST Y  
RUN= 601 SERIES= 303 G'S

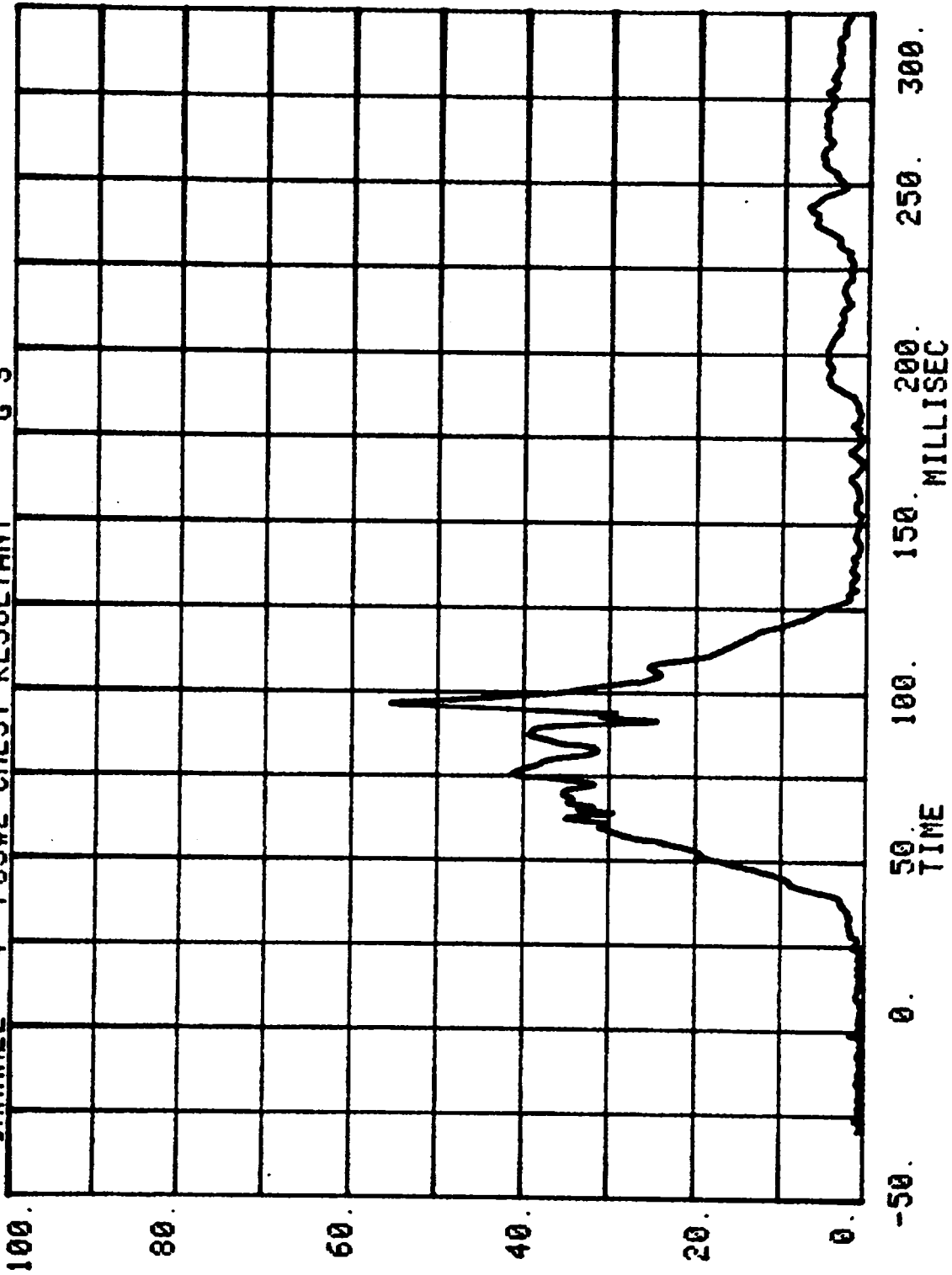


CHANNEL 18 POS#2 CHEST Z  
RUN= 601 SERIES= 303 G'S

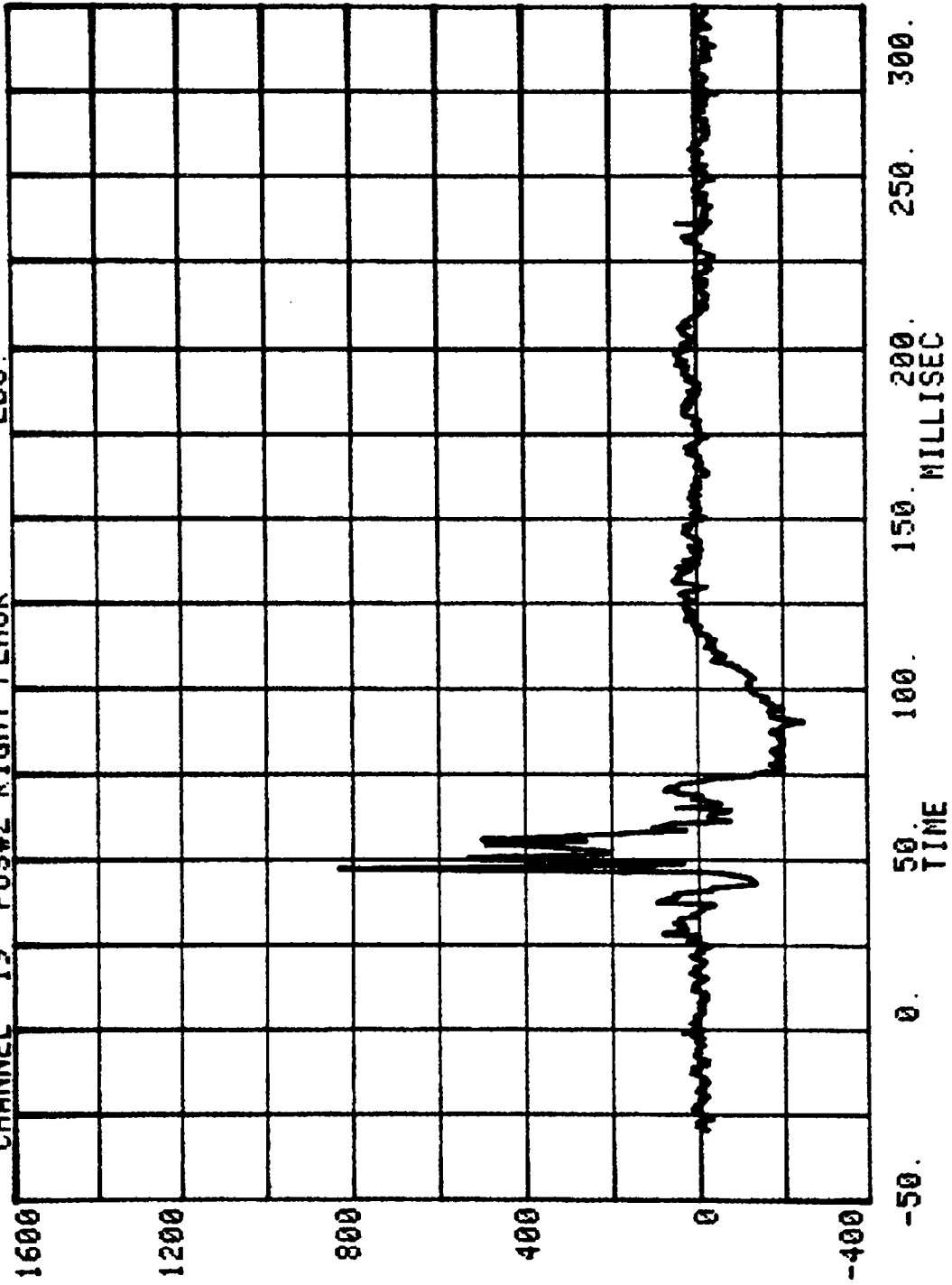


CHANNEL 4 POS#2 CHEST RESULTANT G'S

RUN= 601 SERIES= 303

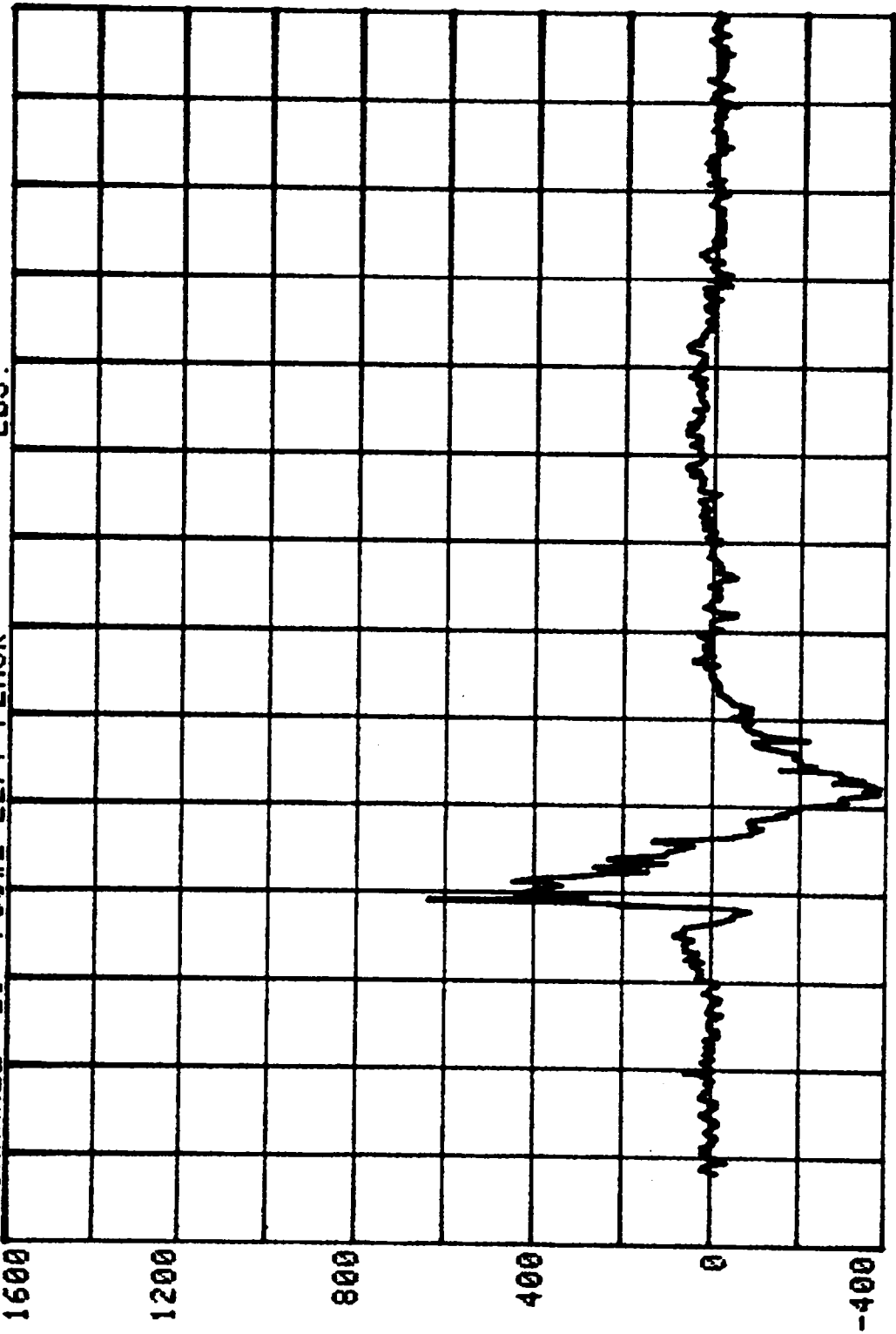


RUN= 601 SERIES= 303  
CHANNEL 19 POS#2 RIGHT FEMUR LBS.



CHANNEL 20 POS#2 LEFT FEMUR LBS.

RUN= 601 SERIES= 303

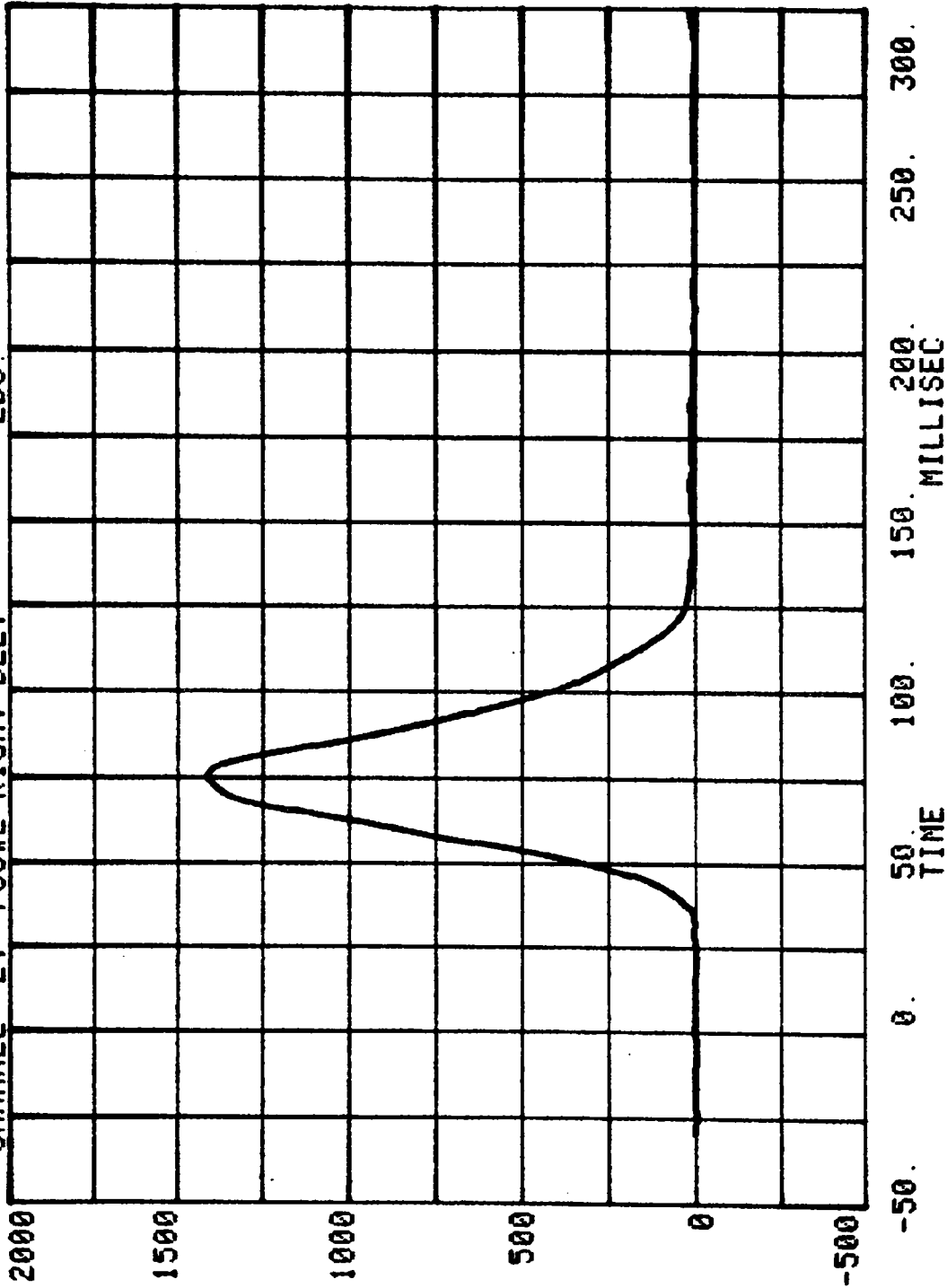


CHANNEL 24 POS#2 RIGHT BELT

RUN= 601

SERIES= 303

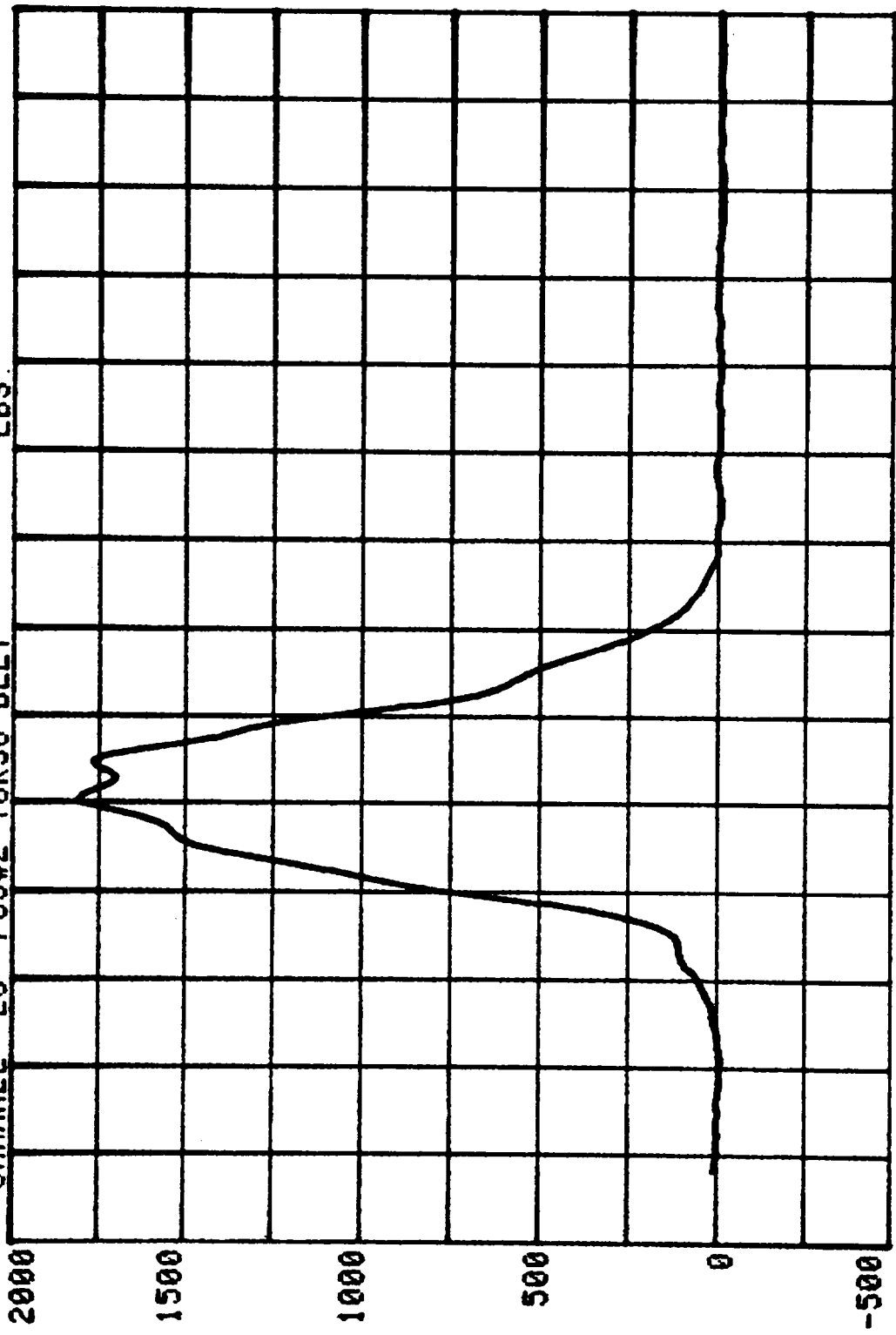
LBS.



CHANNEL 26 POS#2 TORSO BELT

RUN= 601 SERIES= 303

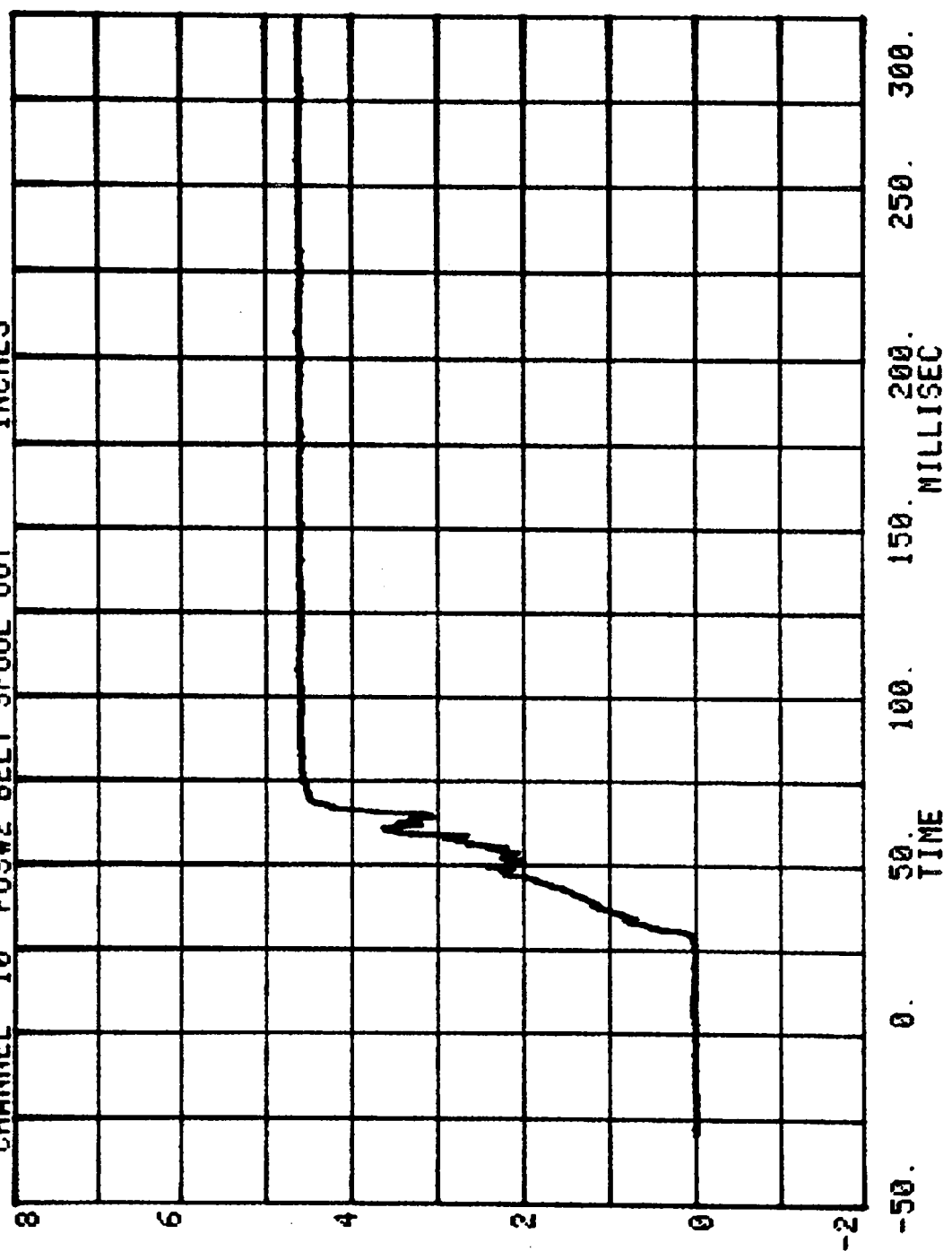
LBS.



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

CHANNEL 10 POS#2 BELT SPOOL OUT

RUN= 601 SERIES= 303 INCHES



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>
162	11/9/83
747	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. 162

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: *D. Alicanello*

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	11/7/83-11/9/83	
Calibration Sequential Number for Dummy - - - -	10	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	72° - 76°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	34% - 45%	

TEST PARAMETER	SPECIFICATION		
<b>1. HEAD DROP TEST:</b>			
a. Peak Resultant Accel. -	210 to 260G	245 g	
b. Peak Lateral Accel. - -	≤10G	5 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.25 ms	
<b>2. NECK BENDING TEST:</b>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.0 fps	
b. Pendulum Avg. Decel. (over t <sub>3</sub> - t <sub>2</sub> ) - - - -	20 to 24G	22.5	
c. Peak Resultant Head Acceleration - - - -	26G maximum	22	
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	6.6 ms	
g. Pendulum Direction Reversal Time - - - -		104 ms	
h. Max. Head Rotation - -	63 to 73°	64°	
<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	30 ms
	Displ.	2.1 to 3.1 in.	2.7 in
60°	Time	40.3 to 51.7 ms	47 ms
	Displ.	4.3 to 5.3 in.	4.7 in
Maximum (64°)	Time	53.2 to 66.8 ms	55.5 ms
	Displ.	5.0 to 6.0 in.	5.1 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	67 ms
	Displ.	4.3 to 5.3 in.	4.6 in
30°	Time	85.4 to 104.6 ms	86.5 ms
	Displ.	2.1 to 3.1 in.	2.4 in
0°	Time	101.0 to 123.0 ms	101 ms
	Displ.	-.5 to 0.5 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.	87 lbs.	
<b>4. LUMBAR FLEXION TEST:</b>			
a. Force @ 20° - - - - -	22 to 34 lbs.	32 lbs.	
b. Force @ 30° - - - - -	34 to 46 lbs.	43 lbs.	
c. Force @ 40° - - - - -	46 to 58 lbs.	54 lbs.	
d. Return Angle - - - - -	12° maximum	3°	
<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	1.65 in	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1945 lbs.	
(4) Internal Hysteresis - - - - -	50 to 70%	54.8%	
b. Low Speed			
(1) Probe Speed - - - - -	13.86-14.14 fps	14.01 fps	
(2) Peak Deflection - - - - -	1.1" maximum	.97 in	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1220 lbs.	
(4) Internal Hysteresis - - - - -	50 to 70%	52.4%	

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
6. <u>KNEE IMPACT TESTS:</u>			
a. Right Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.93 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2350 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.84 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.90 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1900 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 162 CALIB. SEQ. NOS. FOR DUMMY: 10 &         

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

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: *G. Alianella*

		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 260 g	230g	
b. Peak Lateral Accel. - -	≤10 g	4g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.05 ms	
<b>2. NECK BENDING TEST:</b>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.29 fps	
b. Pendulum Avg. Decel. (over t <sub>3</sub> - t <sub>2</sub> ) - - - -	20 to 24 g	23g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	21g	
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	26.3 ms	
f. Pendulum Decel. (t <sub>4</sub> -t <sub>3</sub> )	≤10 ms	7.2 ms	
g. Pendulum Direction Reversal Time - - - -		108 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 ms
	Displ.	2.1 to 3.1 in.	2.8 in.
60°	Time	40.3 to 51.7 ms	43.5 ms
	Displ.	4.3 to 5.3 in.	4.6 in.
Maximum (73°)	Time	53.2 to 66.8 ms	54 ms
	Displ.	5.0 to 6.0 in.	5.1 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	72 ms
	Displ.	4.3 to 5.3 in.	4.4 in.
30°	Time	85.4 to 104.6 ms	88 ms
	Displ.	2.1 to 3.1 in.	2.2 in.
0°	Time	101.0 to 123.0 ms	101.5 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.	51 lbs.	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	74 lbs.	
<b>4. LUMBAR FLEXION TEST:</b>			
a. Force @ 20° - - - - -	22 to 34 lbs.	32.0 lbs.	
b. Force @ 30° - - - - -	34 to 46 lbs.	41.5 lbs.	
c. Force @ 40° - - - - -	46 to 58 lbs.	50.0 lbs.	
d. Return Angle - - - - -	12° maximum	9°	
<b>5. CHEST IMPACT TESTS:</b>			
a. High Speed			
(1) Probe Speed - - - - -	21.78-22.22 fps	21.9 fps	
(2) Peak Deflection - - - - -	1.7" maximum	1.64 in.	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1900 lbs.	
(4) Internal Hysteresis - - - - -	50 to 70%	50.5%	
b. Low Speed			
(1) Probe Speed - - - - -	13.86-14.14 fps	14.00 fps	
(2) Peak Deflection - - - - -	1.1" maximum	1.07 in.	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1240 lbs.	
(4) Internal Hysteresis - - - - -	50 to 70%	50.8%	

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	6.99 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2475 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.76 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.94 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2050 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.08 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 749

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