

REPORT NO. CAL-88-N19

**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

KIA MOTOR CORPORATION
FORD FESTIVA
2-DOOR HATCHBACK

NHTSA NO. MJ0200
CALSPAN TEST NO. 7626-19

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MAY 11, 1988



FINAL REPORT

Prepared for:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
400 SEVENTH STREET, S.W.
ROOM NO. 5313 (NRM-20)
WASHINGTON, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-87-D-02012. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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Jul 28 1988

Date of Report Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. CAL-88-N19		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle NHTSA New Car Assessment Program (NCAP) Frontal Barrier Impact Test on 1988 Ford Festiva 2-Door Hatchback to Indicant Requirements of FMVSS 212, 219 (Partial), and 301-75.				5. Report Date May 11, 1988	
				6. Performing Organization Code CAL	
7. Author(s) Michael J. Kilgallon, Project Engineer Walter E. Levan, Program Manager				8. Performing Organization Report No. 7626-19	
9. Performing Organization Name and Address Calspan Advanced Technology Center P.O. Box 400 Buffalo, NY 14225				10. Work Unit No. 296-19-830	
				11. Contract or Grant No. DTNH22-87-D-02012	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Market Incentives (NRM-20) 400 Seventh Street, S.W., Washington, DC 20590				13. Type of Report and Period Covered Final Report May - June	
				14. Sponsoring Agency Code DOT/NHTSA/RM/OMI	
15. Supplementary Notes					
16. Abstract A frontal load cell barrier test of a 1988 Ford Festiva 2-Door Hatchback was performed at the Calspan Corporation Advanced Technology Center crash test facility in Buffalo, New York, on May 11, 1988. Impact speed was 34.8 mph, and the ambient temperature at the barrier face at the time of impact was 62°F. The maximum post-test vehicle crush was 17.3 inches. The test vehicle appeared to comply with the indicant requirements of the following Federal Motor Vehicle Safety Standard. 1. FMVSS No. 212, "Windshield Mounting" 2. FMVSS No. 219 (Partial), "Windshield Zone Intrusion" 3. FMVSS No. 301-75, "Fuel System Integrity" With regard to FMVSS 208, "Occupant Crash Protection", injury criteria, the driver dummy appears to exceed the head requirements and satisfy the chest and femur requirements. The passenger dummy appears to satisfy the head, chest, and femur requirements. <u>Type of Restraint System</u> The vehicle was equipped with a 3-point continuous webbing manual system at each front outboard seating position.					
17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP) FMVSS 212 Indicant Testing FMVSS 219 (Partial) Indicant Testing FMVSS 301-75 Indicant Testing			18. Distribution Statement Copies of this report are available from: Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 400 Seventh St., S.W., Washington, DC 20590		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages	
				22. Price	

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Section 1
PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 88 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-87-D-02012. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph FMVSS 212/219/301-75 requirements.

The 35 mph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test Procedure. Standards Enforcement Indicant Test Program data for FMVSS No. 212, "Windshield Mounting," FMVSS No. 219 (Partial), "Windshield Zone Intrusion," FMVSS No. 301-75, "Fuel System Integrity," as well as occupant performance data are provided herein.

Section 2
SUMMARY OF TEST NUMBER MJ0200

A load cell barrier consisting of 36 load cells was impacted by a 1988 Ford Festiva L Plus 2-Door Hatchback at a velocity of 34.8 mph. The test was performed at the Calspan Corporation Advanced Technology Center on May 11, 1988. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 16 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

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 instructions specified in Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 749) had been used in one previous test (MJ0202) and the Injury Criteria Values were not exceeded in that test. The passenger ATD (Serial No. 1019) was certified prior to the test. Certification details along with instrumentation calibration data, are found in Appendix C.

The 66 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. Accelerometer #5 failed to record.

The driver's head struck the steering wheel hub; the HIC was 1014. The maximum chest deceleration over 3 milliseconds was 52 g's and femur loads were 876 and 976 pounds.

The right front passenger's HIC was 822 and maximum chest deceleration over 3 milliseconds was 43 g's and femur loads were 251 and 747 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1988 Ford Festiva L Plus 2-door Hatchback

NHTSA NO.: MJ0200 VIN.: KNJBT06K0J6164126

BODY COLOR: Blue DATE OF MANUFACTURE: 1/88

Engine: 4 cylinders; - C.I.D.; 1.3 Liters; - CC
x Gas; - Diesel; - Turbocharged
- Longitudinal; x Transverse

Transmission: 4 Speed x Manual; - Automatic; x Overdrive
Final Drive: x Front Wheel; - Rear Wheel; - Four Wheel

Date Received: 3/29/88 Odometer Reading: 28
- A/C; - P/S; x P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint: 3-point continuous belt system

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 32 psi, Rear 32 psi

Recommended Tire Size: 145 SR 12

Recommended Cold Tire Pressure: Front 32 psi, Rear 32 psi

Tires on Vehicle: 145SR12; Manufacturer: Yokohama

Number of Occupants: 2 Front; 2 Rear; - 3rd Seat; 4 TOTAL

Type of Front Seats: x Bucket; - Bench; - Split Bench

Type of Front Seat Back: - Fixed; x Adj. With x Lever - Rot. Knob

Vehicle Capacity Weight (VCW) = 680 lbs. (A)

No. of Occupants x 150 lbs. = 600 lbs. (B)

Rated Cargo and Luggage Weight (RCLW) A-B = 80 lbs.

GVWR 2505 lbs. GAWR: Front 1390 lbs. Rear 1170 lbs.

Table 1
GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = <u>580</u> lbs.	Right Rear = <u>310</u> lbs.
Left Front = <u>520</u> lbs.	Left Rear = <u>350</u> lbs.
TOTAL FRONT WEIGHT = <u>1100</u> lbs. (<u>62</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>660</u> lbs. (<u>38</u> % of Total Vehicle Weight)	
TOTAL DELIVERY WEIGHT = <u>1760</u> lbs.	

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (1760 lbs.)
VCW = Vehicle Capacity Weight (680 lbs.)
DSC = Designated Seating Capacity (4)
RCLW = VCW - 150 (DSC) = 80 lbs.
Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
Target Test Weight = 2168 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 102 POUNDS CARGO:

Right Front = <u>620</u> lbs.	Right Rear = <u>460</u> lbs.
Left Front = <u>620</u> lbs.	Left Rear = <u>490</u> lbs.
TOTAL FRONT WEIGHT = <u>1240</u> lbs. (<u>57</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>950</u> lbs. (<u>43</u> % of Total Vehicle Weight)	
TOTAL TEST WEIGHT = <u>2190</u> lbs.	
Weight of ballast secured in vehicle trunk area = <u>0</u> lbs.	

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude:	RF	<u>24.9</u>	LF	<u>23.7</u>	RR	<u>24.2</u>	LR	<u>24.5</u>
Test Attitude:	RF	<u>24.0</u>	LF	<u>23.6</u>	RR	<u>22.1</u>	LR	<u>21.8</u>

Wheel Base: 90.4 in.; C.G. = 39.2 in. rearward of front wheel C/L

Remarks: Hatchback was removed in order to achieve test weight.

Table 1
GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0 °
 Date of Test: 5/11/88 Time of Test: 14:00
 Ambient Temperature: 62 °F at impact area
 Temperature in Occupant Compartment: 68 °F.
 Windshield Molding Temperature: 68 °F.
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 34.8 mph, secondary = 34.7 mph
 Distance From Front Bumper to Barrier Face When Entering Speed Trap: 52
 inches; Exiting Speed Trap: 12 inches

VEHICLE REBOUND AND CRUSH (inches):

Vehicle Length:	Pre-test	= R	<u>136.9</u>	C _L	<u>140.1</u>	L	<u>137.1</u>
	Post-test	= R	<u>119.7</u>	C _L	<u>122.8</u>	L	<u>121.9</u>
	Crush	= R	<u>17.2</u>	C _L	<u>17.3</u>	L	<u>15.2</u>

Distance from front of test vehicle to point of impact:

R 16.7 C/L 17.0 L 17.7

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Steering Hub</u>	<u>None</u>
Chest	<u>None</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>Dash</u>	<u>Dash</u>
Right Knee	<u>Dash</u>	<u>Dash</u>

Table 1
GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	<u>Front</u>	
	<u>Left</u>	<u>Right</u>
Door Opening	<u>Operable</u>	<u>Operable</u>

	<u>Front</u>	
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>None</u>	<u>None</u>
Seat Shift (in.)	<u>0.0</u>	<u>0.0</u>

Glazing Damage

Backlight/Windshield	<u>Remained Intact</u>
----------------------	------------------------

Section 3

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

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

Figure 1

FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

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

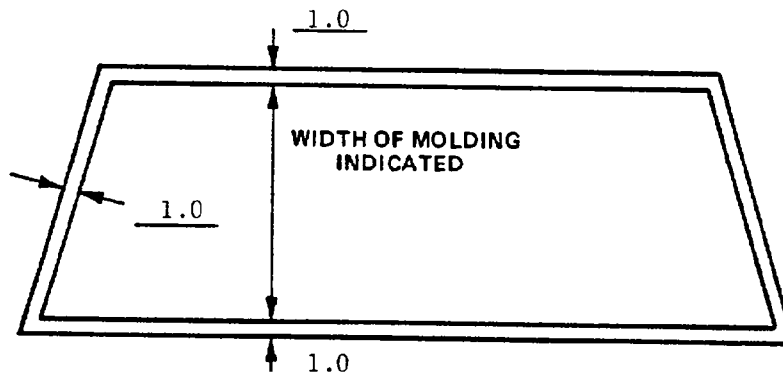
Windshield is bonded in place and covered with 1.0 inch molding.

FMVSS 212 REQUIREMENTS: The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	74.65	74.65	100%
LEFT SIDE	74.65	74.65	100%
TOTAL	149.3	149.3	100%

AREA OF RETENTION FAILURE:



FRONT VIEW

FAILURE DETAILS:

NONE

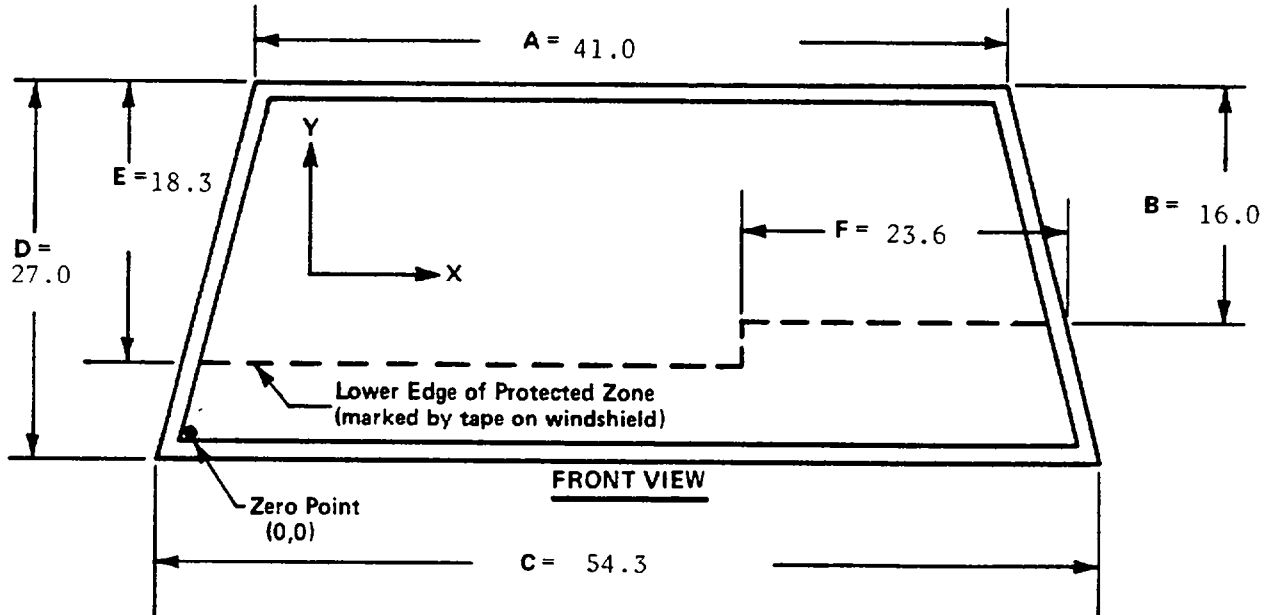
Figure 2

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

PROTECTED ZONE LOWER EDGE REQUIREMENT:

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

FMVSS 219 TEST DATA:



DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":
(Show location of penetration on above sketch)

NONE.

	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

Figure 3

FMVSS NO. 301-75, "FUEL SYSTEM INTEGRITY," DATA SHEETS

TEST VEHICLE NHTSA NO.: MJ0200 ; TEST DATE: 5/11/88

VEHICLE MAKE/MODEL/BODY STYLE: 1988 Ford Festiva 2-Door Hatchback

USABLE CAPACITY OF VEHICLE'S FUEL TANK: 9.46 Gallons (figure furnished by vehicle manufacturer)

TEST REQUIREMENTS:

Test vehicle's engine operated to "run dry" condition, and then a small amount of Stoddard solvent which has been dyed RED shall be added to the vehicle's fuel tank. Operate the fuel pump enough to completely fill the fuel system ahead of the fuel tank, and add 92 to 94% of the stated USABLE CAPACITY to the fuel tank.

AMOUNT OF STODDARD SOLVENT ADDED TO VEHICLE'S FUEL TANK:

8.8 Gallons which is 93 % of the Stated USABLE CAPACITY.

SOLVENT SPILLAGE MEASUREMENT AFTER 35 MPH FRONTAL BARRIER IMPACT TEST:

	<u>Actual</u>	<u>Maximum Allowable</u>
From impact until vehicle motion ceases	<u>0</u>	1 oz.
For 5 min. period after vehicle motion ceases.	<u>0</u>	5 oz.
For next 25 minutes at barrier face.....	<u>0</u>	1 oz./1 minute

SOLVENT SPILLAGE DETAILS:

STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 minutes)

Time reqd. for machine to rotate 90° =	<u>2</u>	minutes,	<u>58</u>	seconds
FMVSS 301-75 Position Hold Time =	<u>5</u>	minutes,	<u>00</u>	seconds
TOTAL	<u>7</u>	minutes,	<u>58</u>	seconds
Next Whole Minute Interval....	8	minutes		

Figure 3

FMVSS NO. 301-75 TEST DATA....Continued:

VEHICLE STATIC ROLLOVER DATA:

	First 5 Minutes FROM ONSET OF ROTATION	6th. Minute	7th. Minute	8th. Minute
Maximum Allowable Solvent Spillage.....	5 oz.	1 oz.	1 oz.	1 oz.
0 to 90° (filler cap down).	0	0	0	0
90 to 180°	0	0	0	0
180 to 270°.....	0	0	0	0
270 to 360°.....	0	0	0	0

SOLVENT SPILLAGE LOCATION(S):

NONE

Section 4
OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

1. Dummy Injury Criteria Data Summary
2. Dummy Positioning Data
3. Seat Belt Positioning Data
4. Seat Belt Performance Assessment Data
5. Driver Dummy to Steering Column Dimensions
6. Camera Locations
7. Vehicle Target Locations

II. OVR DATA

1. Load Cell Barrier Data
2. Vehicle Accelerometer Data
3. Test Vehicle Measurements

Table 2
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-128	-27	80	149	-52	-17	-22	52
DUMMY (2)	-33	16	70	71	-41	11	-25	43
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	876	976
DUMMY (2)	251	747
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)	1667	-	953
DUMMY (2)	1920	1821	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	36 millisecond max.		AVE. ACC. (g) t ₁ TO t ₂
		t ₁ (SEC)	t ₂ (SEC)	
DUMMY (1)	1014	.06442	.08482	75.6
DUMMY (2)	822	.07560	.11160	55.4
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Figure 4

PART 572 DUMMY IN-VEHICLE POSITION

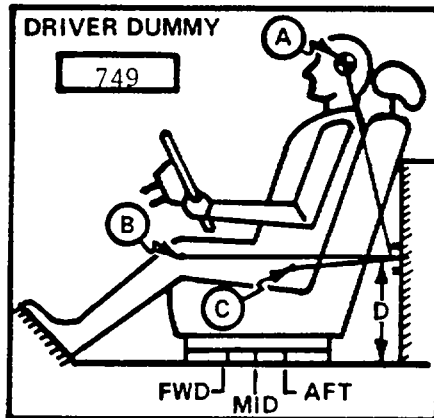
TEST NO.: MJ0200

VEHICLE: 1988 Ford Festiva

SEAT TYPE:
☐ Bench
☒ Bucket
☐ Split Bench

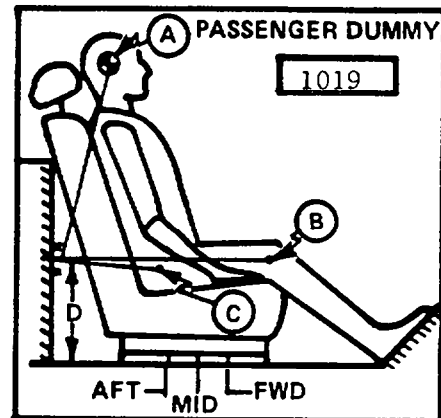
ADJUSTER TYPE:
☒ Manual
☐ Power

BUCKET SEAT BACK TYPE:
☐ Fixed
☒ Adjustable Reclining



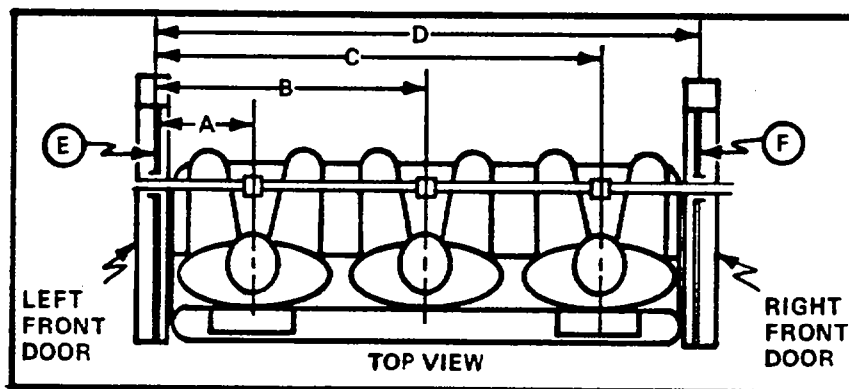
MEASUREMENT
LOCATION

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



A = 22.5 in. 16 Degrees
 B = 31.3 in. 94 Degrees
 C = 16.2 in. 107 Degrees
 D = 14.5 in.

A = 22.5 in. 14 Degrees
 B = 31.4 in. 93 Degrees
 C = 16.1 in. 107 Degrees
 D = 14.5 in.



DUMMY ID

749

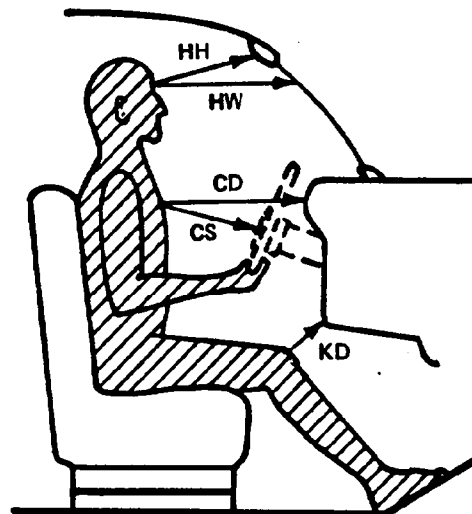
1019

A = Left Door to Driver Centerline 11.8 in.
 B = Left Door to Center Passenger Centerline - in.
 C = Left Door to Right Passenger Centerline 34.7 in.
 D = Left Door to Right Door 46.3 in.
 E, F = Window Glass Height (Right and Left Must Be Equal) 13.0 in.

Figure 5

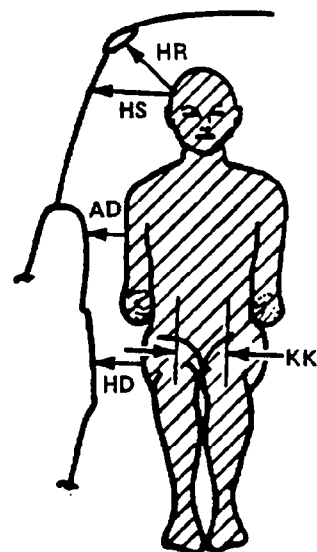
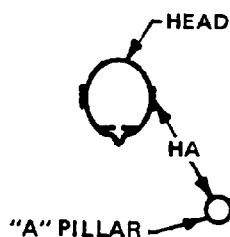
OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	17.4	17.8
HW	21.5	21.0
CD	23.5	25.2
CS	15.6	-
KDL	7.0	7.3
KDR	6.9	7.2
SA	26°	26°
TA	25°	25°



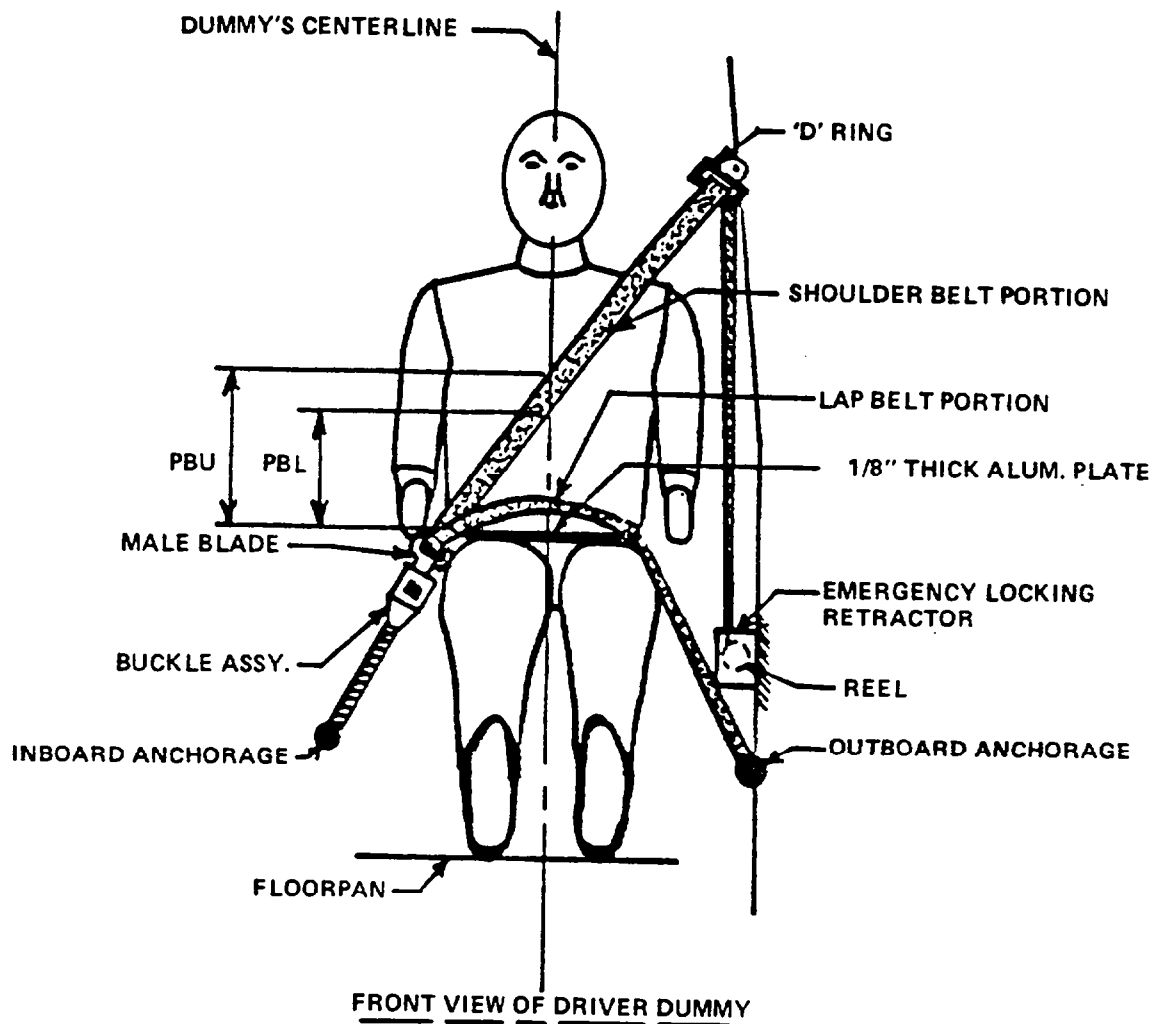
HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD(L/R) = Knee to Dash (Left/Right)
 SA = Seat Back Angle
 TA = Torso Angle

HA = Head Target to "A" Pillar
 HR = Head to Side Roof
 HS = Head to Side Window
 AD = Arm to Door
 HD = Hip to Door
 KK = Knee to Knee



	DRIVER	PASSENGER
HR	6.6	6.4
HS	8.5	8.3
AD	4.7	5.0
HD	6.3	6.7
KK	8.6	7.3
HA	23.0	22.8

Figure 6
SEAT BELT POSITIONING DATA



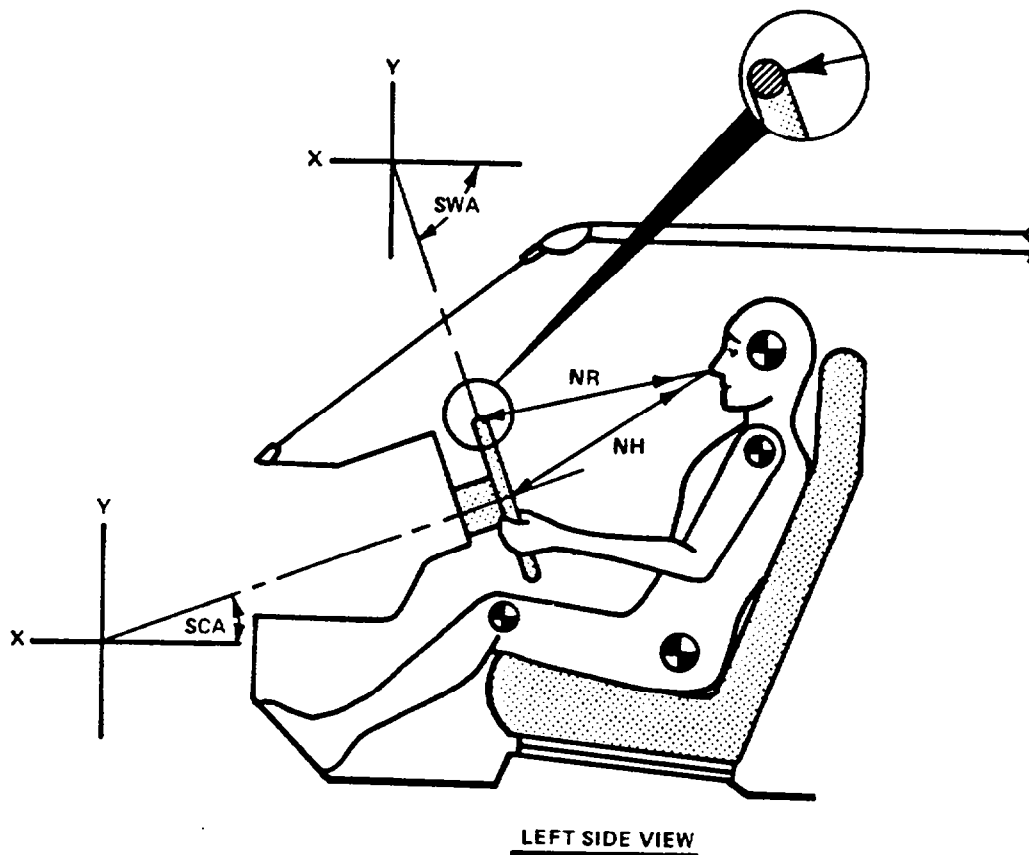
	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	14.8	14.7
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	11.5	11.5
<u>LAP BELT TENSION</u>	--	--
<u>SHOULDER BELT TENSION</u>	1.5 lbs	1.5 lbs

Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

<u>BELT LENGTH DATA:</u>	<u>Driver</u>	<u>Passenger</u>
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	<u>81.5"</u>	<u>81.5"</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>35.5"</u>	<u>36.0"</u>
Lap belt length as measured on Part 572 Dummy.	<u>35.0"</u>	<u>35.0"</u>
<u>BELT SPOOL-OFF DATA:</u>		
As determined by film analysis.	<u>1.5"</u>	<u>2.0"</u>
As determined mechanically.	<u>1.5"</u>	<u>1.5"</u>
As determined electronically.	<u>2.1"</u>	<u>2.4"</u>
<u>BELT STRETCH DATA:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>0.4 in/ft</u>	<u>0.9 in/ft</u>
Measured Mechanically	<u>0.0 in/ft</u>	<u>0.0 in/ft</u>

Figure 7
DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



	MEASUREMENTS	
<u>NR</u> -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	21.0	Inches
<u>NH</u> -- Distance from tip of dummy's nose to center of steering column hub	20.9	Inches
<u>SCA</u> -- Angle of steering column relative to the horizontal X axis	28	Degrees
<u>SWA</u> -- Angle of steering wheel relative to the horizontal X axis	-62	Degrees

Figure 8

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

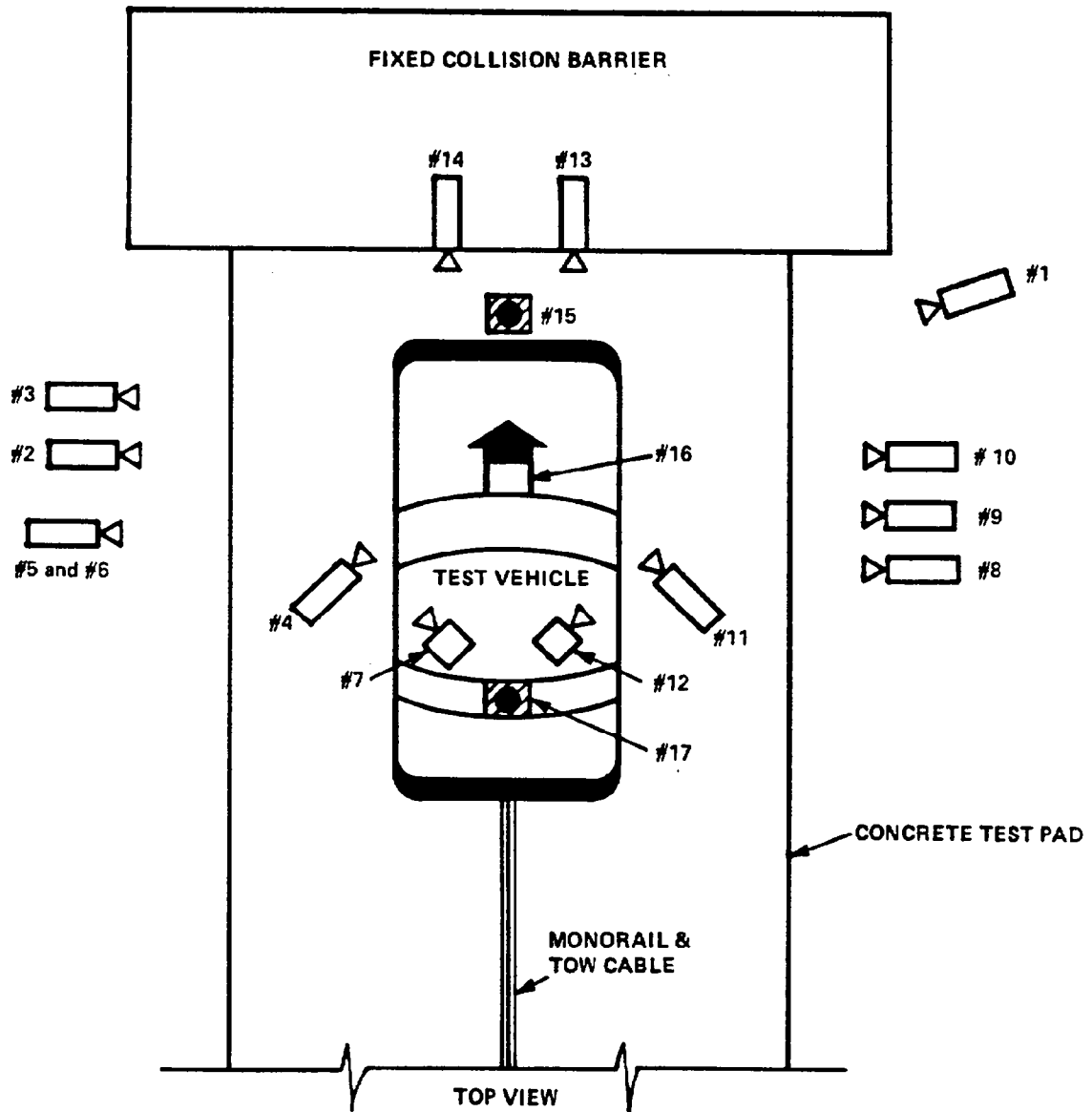


Table 4
HIGH-SPEED CAMERA LOCATIONS

Test No. MJ0200

Vehicle 1988 Ford Festiva

CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	268	56	42	-2	-	13	540
3	Left Side View	222	37	41	-4	-	25	530
4	Driver and Interior View	79	81	70	-17	64.5	13	800
5	Steering Column (Bottom)	288	81	48	-4	273.5	25	555
6	Steering Column (Top)	288	92	70	-10	-	25	550
7	Left Belt	-	-	-	-	-	8	360
8	Overall Right Side	230	63	43	-2	-	13	800
9	Right Side View	245	41	44	-3	230.5	25	775
10	Right Passenger View	270	64	54	-3	255.5	35	730
11	Passenger and Interior View	71	94	70	-17	-	25	600
12	Right Belt	-	-	-	-	-	8	660
13	Passenger Front View	24	-5	73	-35	-	13	550
14	Driver Front View	20	-5	73	-35	-	13	550
15	Windshield View	0	0	126	-58	-	13	525
16	Pit View of Engine	0	32	-120	90	-	13	850
17	Pit View of Fuel Tank	0	60	-120	90	-	13	790

* X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

** = referenced to horizontal plane

Figure 9

VEHICLE TARGET LOCATIONS

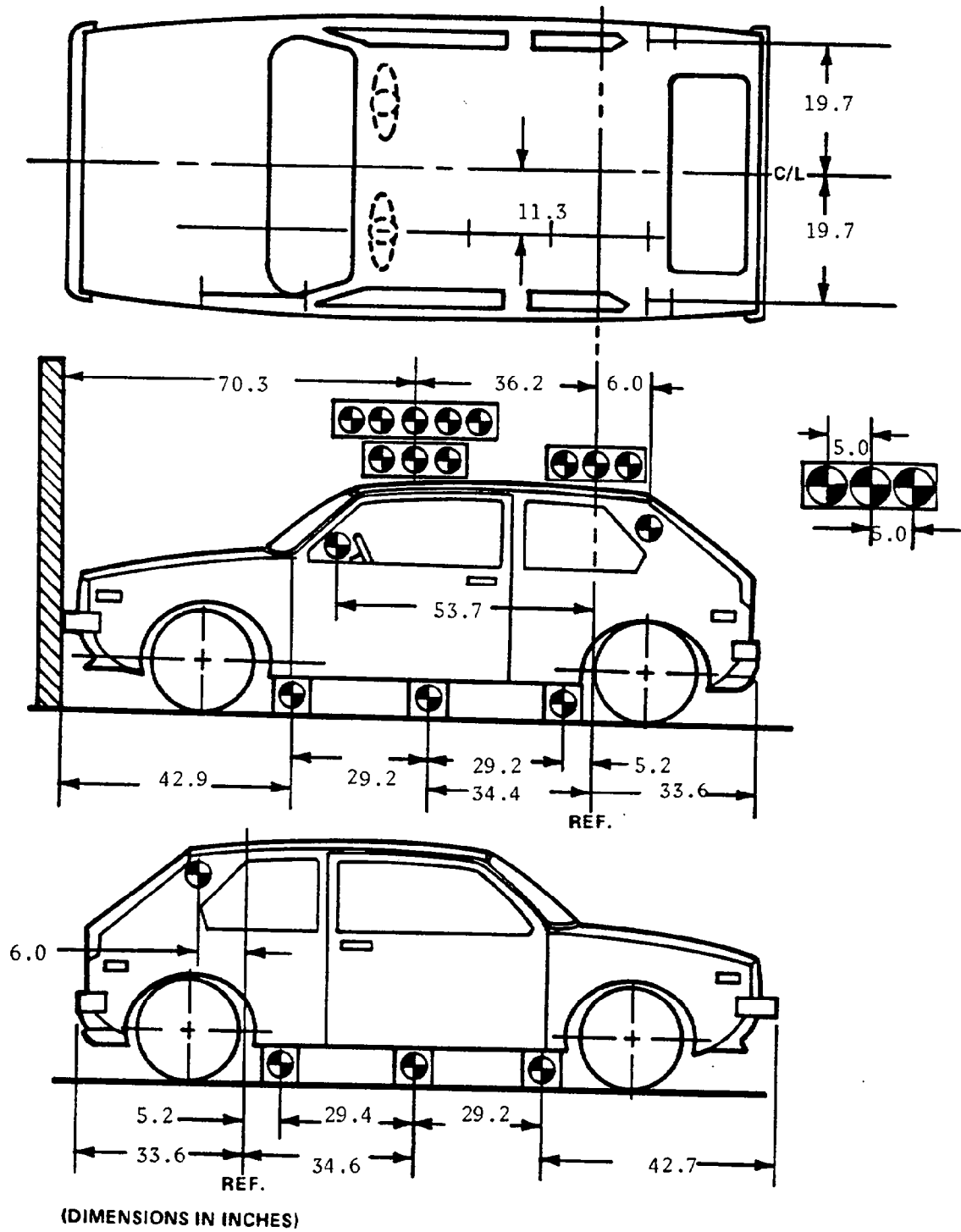
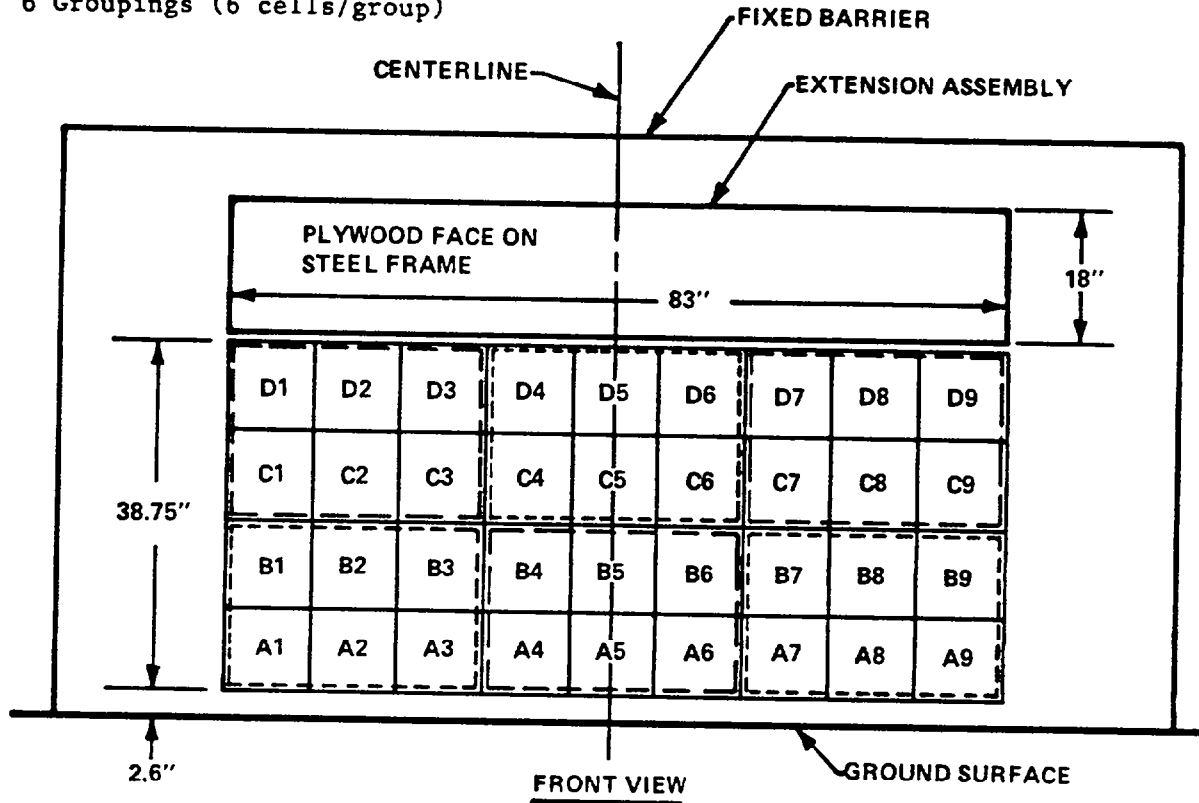


Figure 10

LOAD CELL LOCATIONS ON FIXED BARRIER

- 36 Load Cells
- 4 Rows
- 9 Columns
- 6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

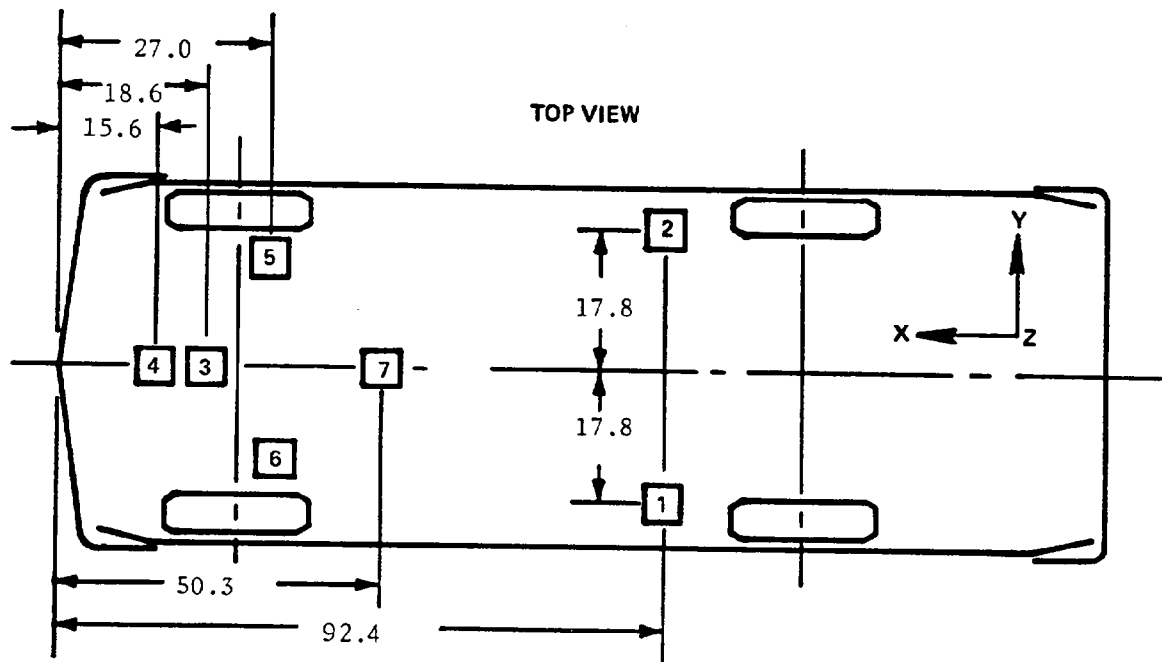
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

- (1) Data from 36 individual load cells
- (2) Total or Sum of 36 individual load cells
- (3) Data from 6 Groupings shown above (6 cells/group)

Figure 11

VEHICLE ACCELEROMETER LOCATIONS



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

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

Figure 12

TEST VEHICLE MEASUREMENTS

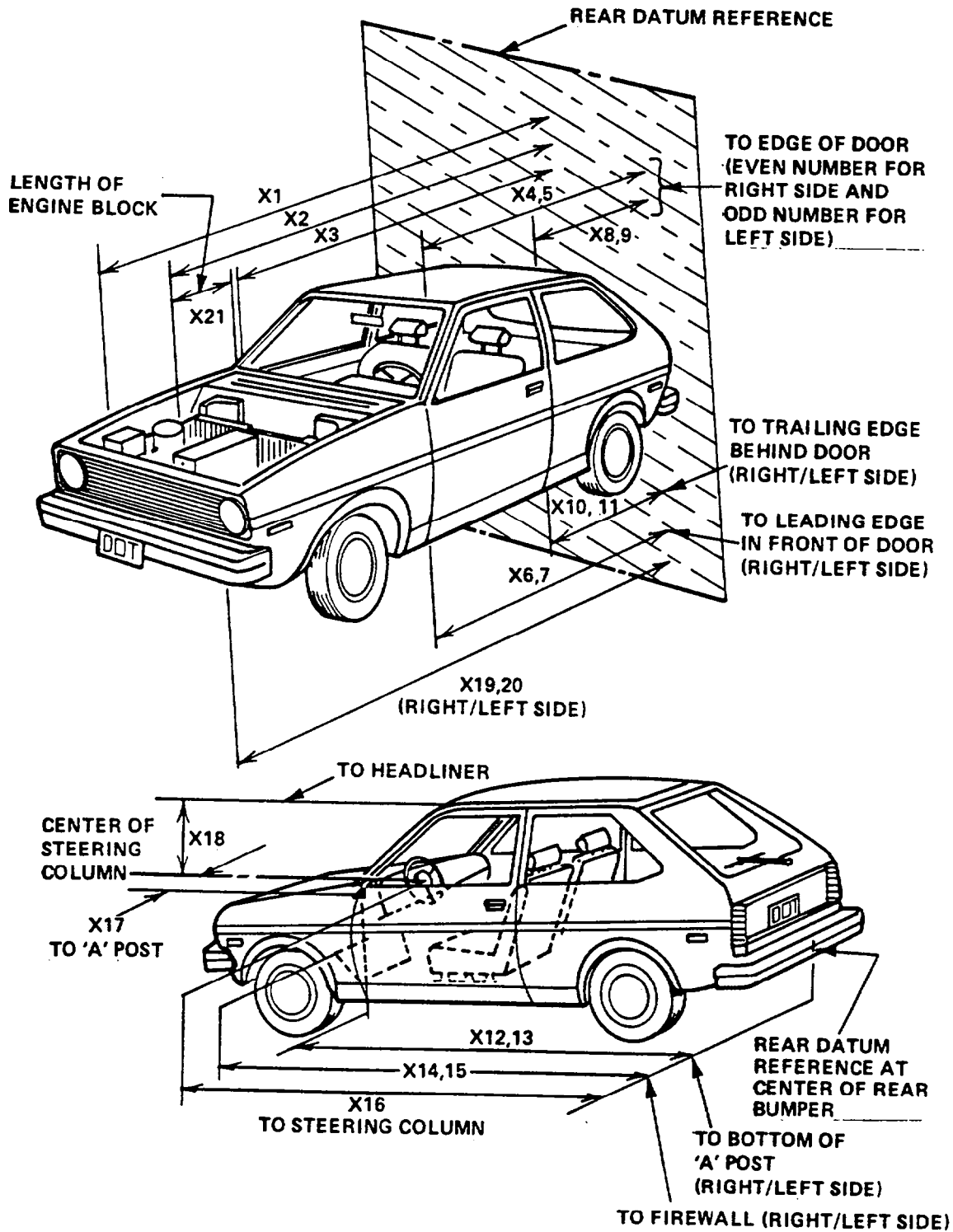


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	140.1	122.8	17.3
X2	Rear Surface of Vehicle to Front of Engine	122.3	113.5	8.8
X3	Rear Surface of Vehicle to Firewall	105.4	103.5	1.9
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	95.5	95.4	0.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	95.6	95.5	0.1
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	96.3	95.9	0.4
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	96.6	95.5	1.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	49.5	49.5	0.0
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	49.7	49.5	0.2
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	50.3	49.8	0.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	50.1	49.5	0.6
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	95.3	94.0	1.3
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	95.2	94.6	0.6
X14	Rear Surface of Vehicle to Firewall, Right Side	105.2	99.0	6.2
X15	Rear Surface of Vehicle to Firewall, Left Side	106.0	99.2	6.8
X16	Rear Surface of Vehicle to Steering Column	80.5	79.5	1.0
X17	Center of Steering Column to "A" Post	15.0	14.9	0.1
X18	Center of Steering Column to Headliner	16.3	12.5	3.8
X19	Rear Surface of Vehicle to Right Side of Front Bumper	136.9	119.7	17.2
X20	Rear Surface of Vehicle to Left Side of Front Bumper	137.1	121.9	15.2
X21	Length of Engine Block	16.7	16.7	0.0

Appendix A

PHOTOGRAPHS

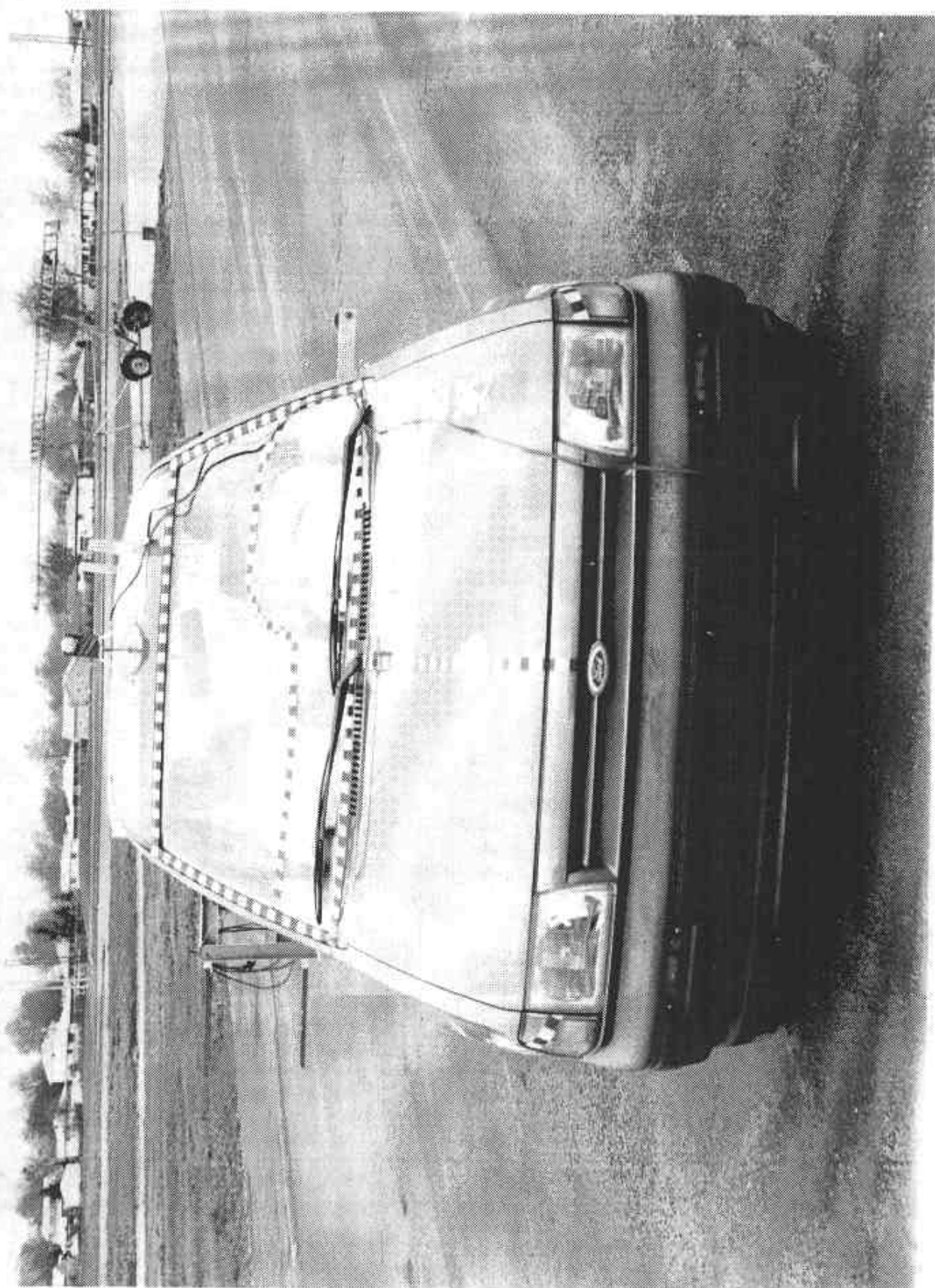


Figure A-1 PRE-TEST FRONT VIEW

A-2

7626-19

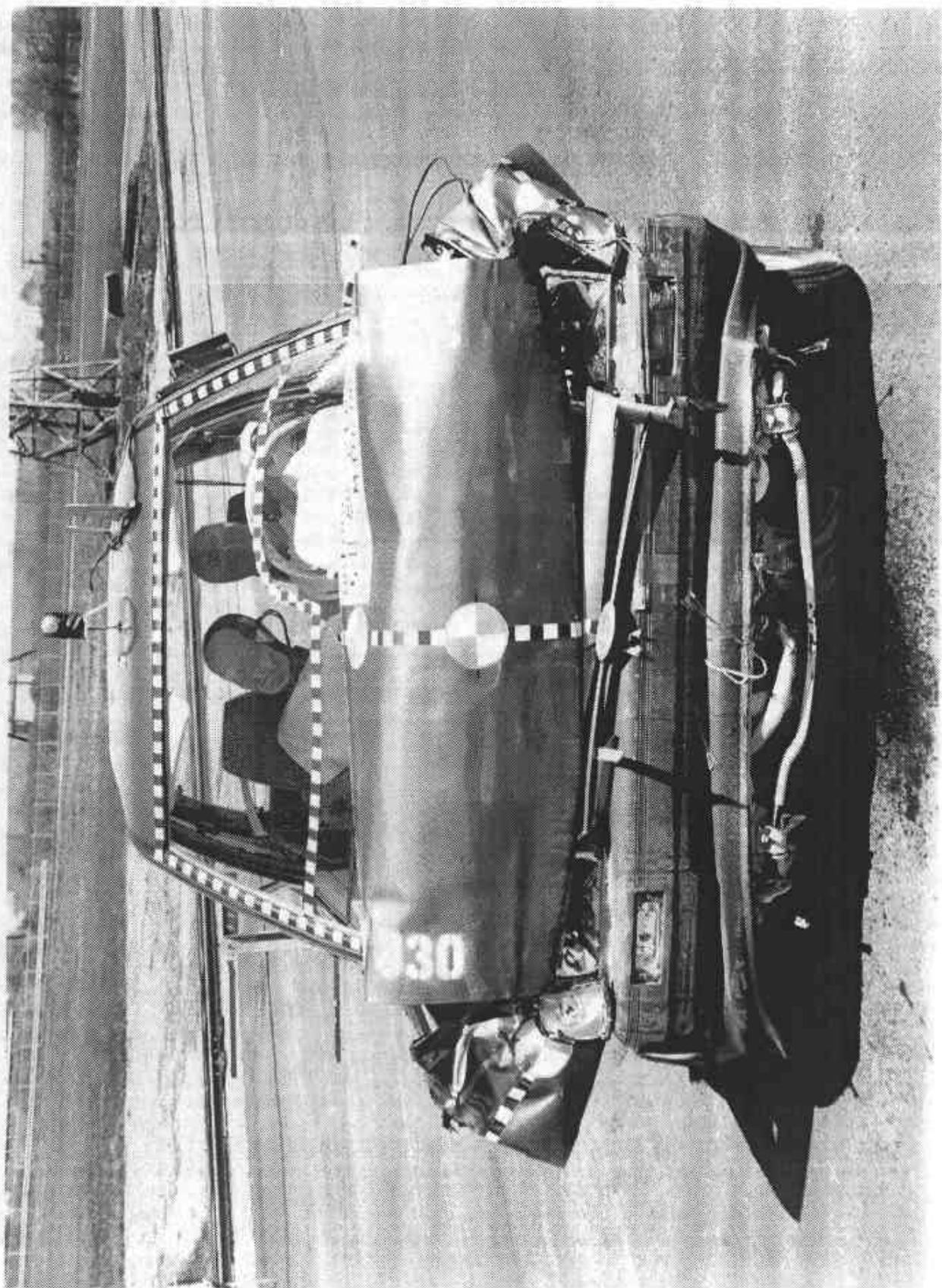


Figure A-2 POST-TEST FRONT VIEW

A-3

7626-19

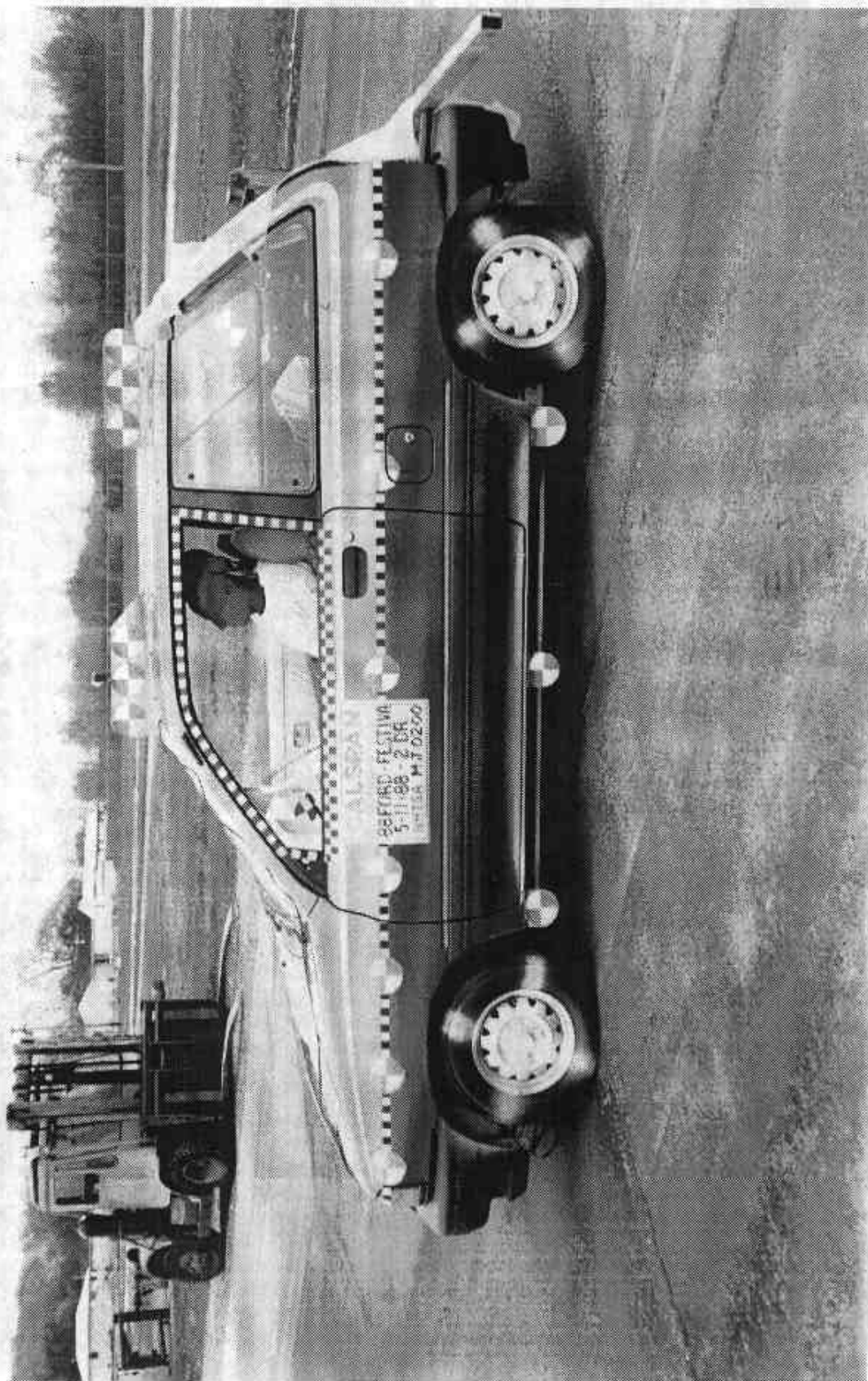


Figure A-3 PRE-TEST LEFT SIDE VIEW

A-4

7626-19



Figure A-4 POST-TEST LEFT SIDE VIEW

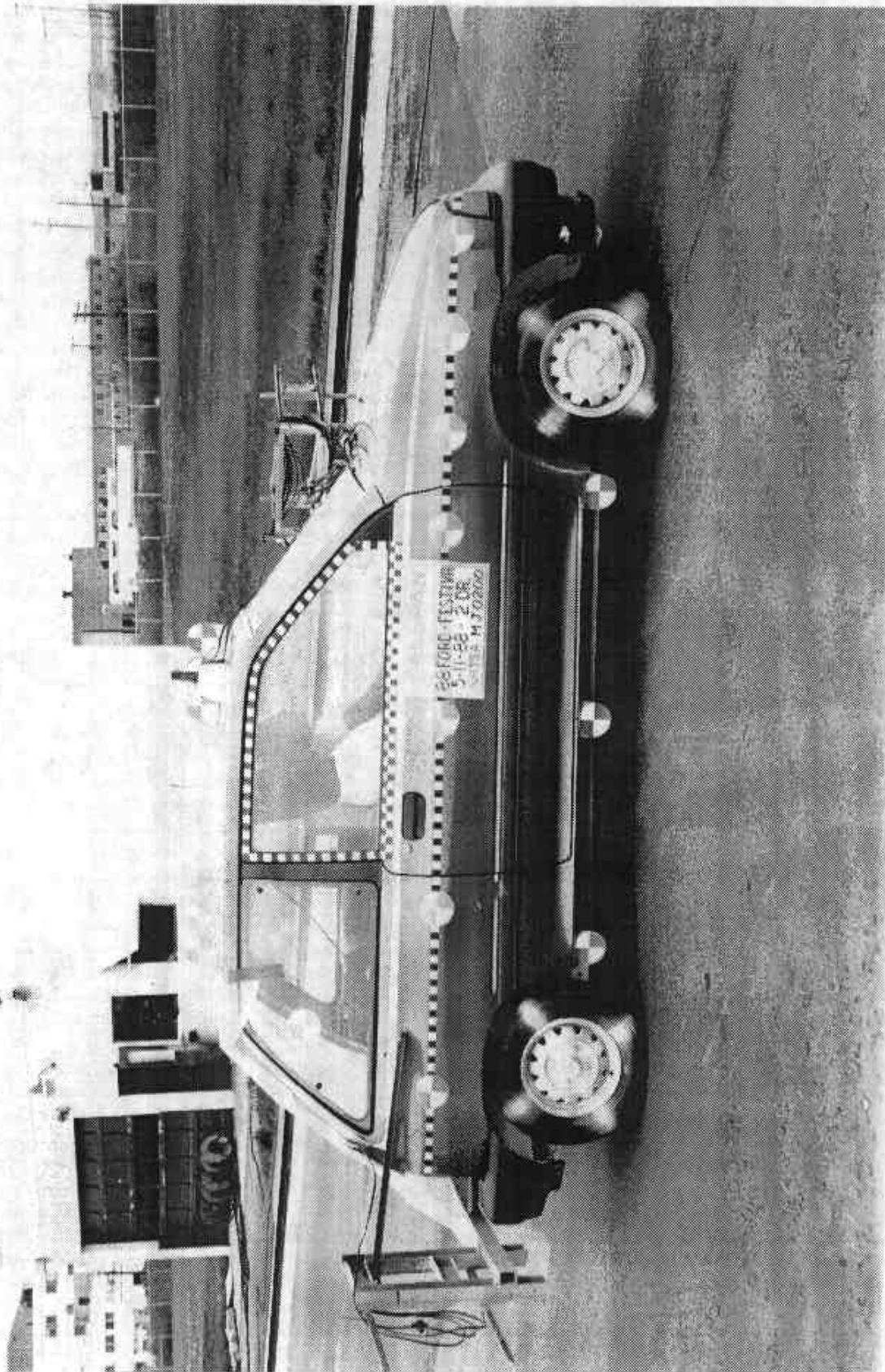


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-6

7626-19

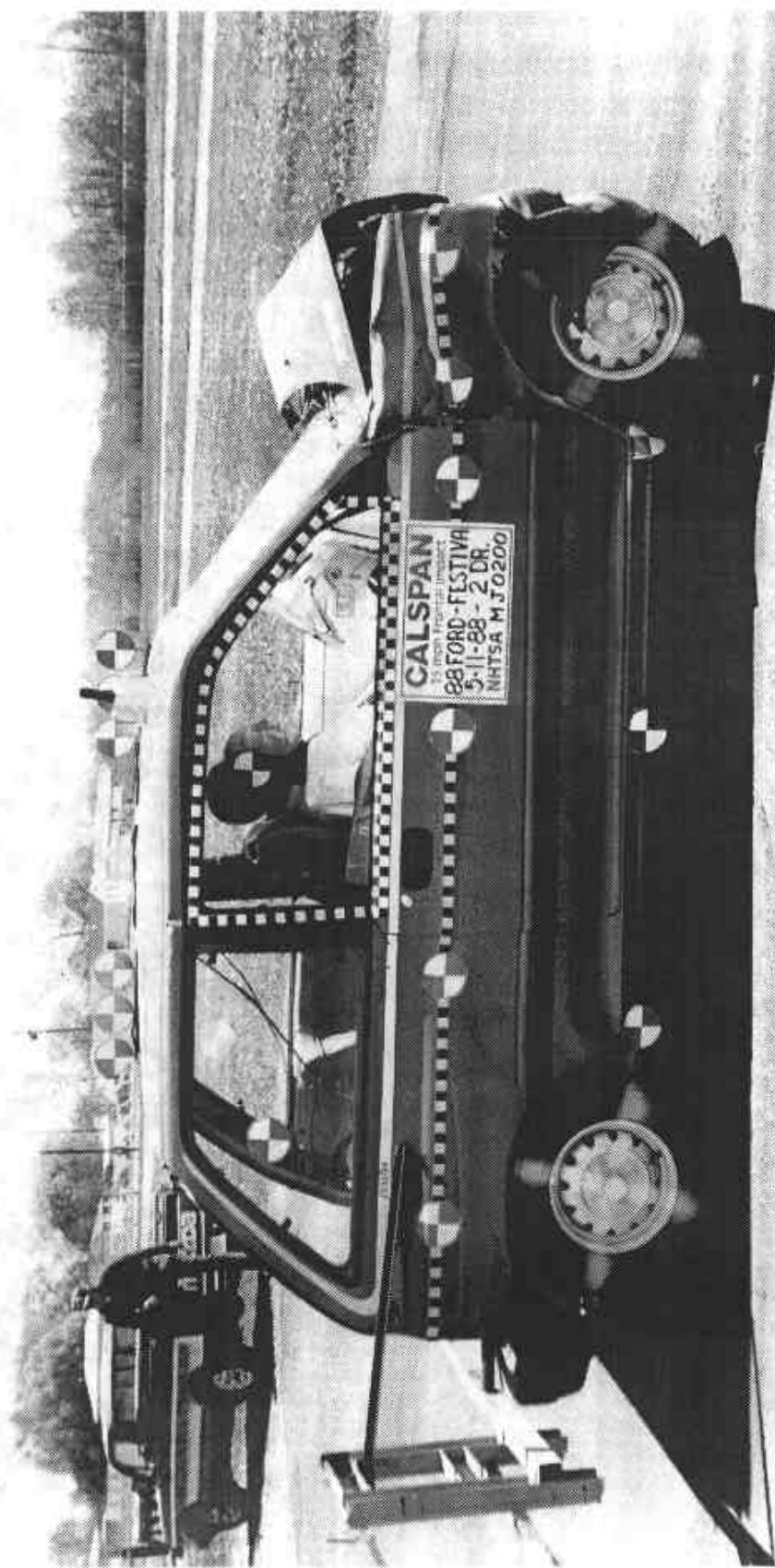


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-7

7626-19



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

A-8

7626-19



FIGURE A-8 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-9

7626-19

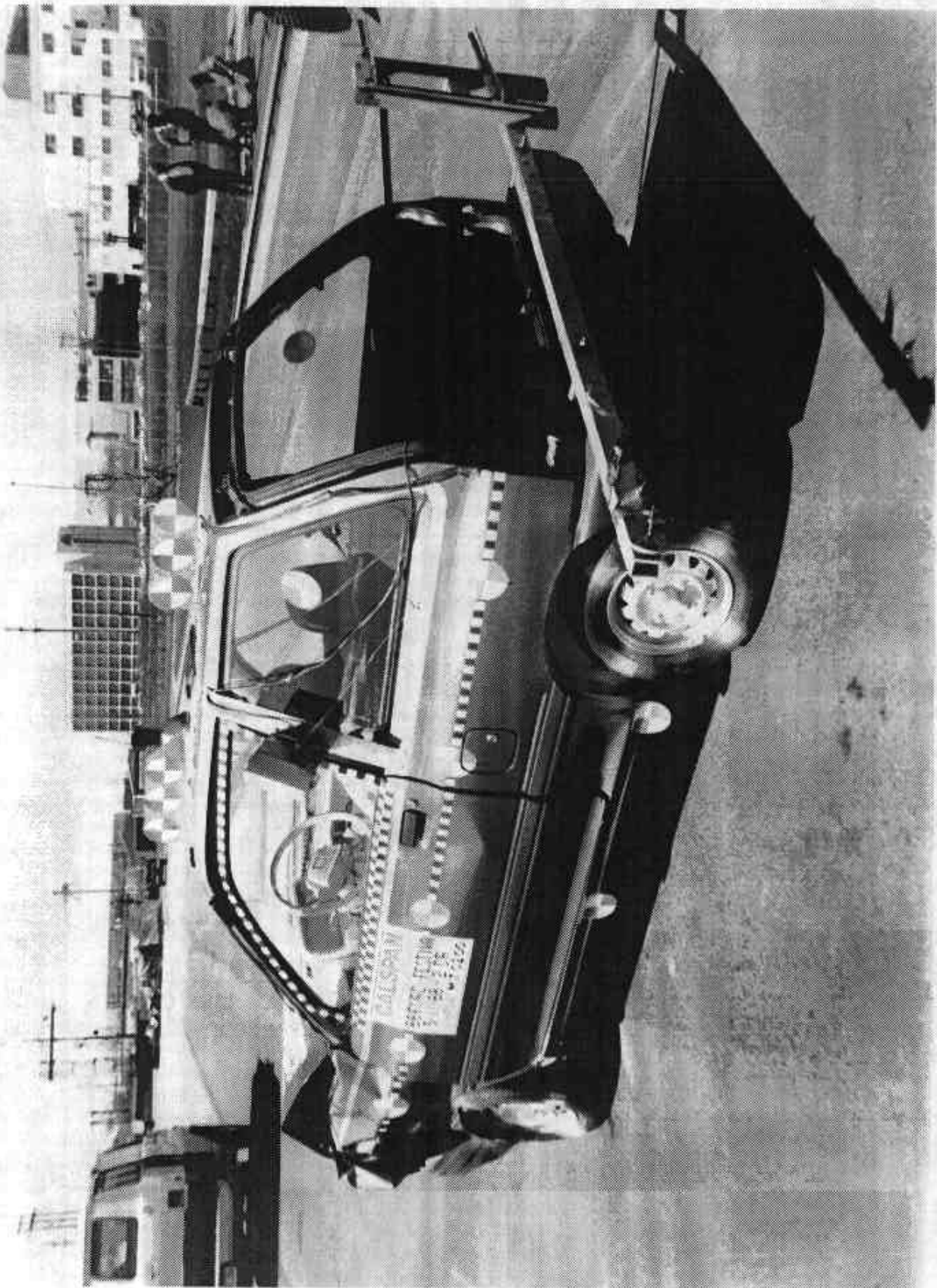


Figure A-9 POST-TEST LEFT REAR THREE-QUARTER VIEW

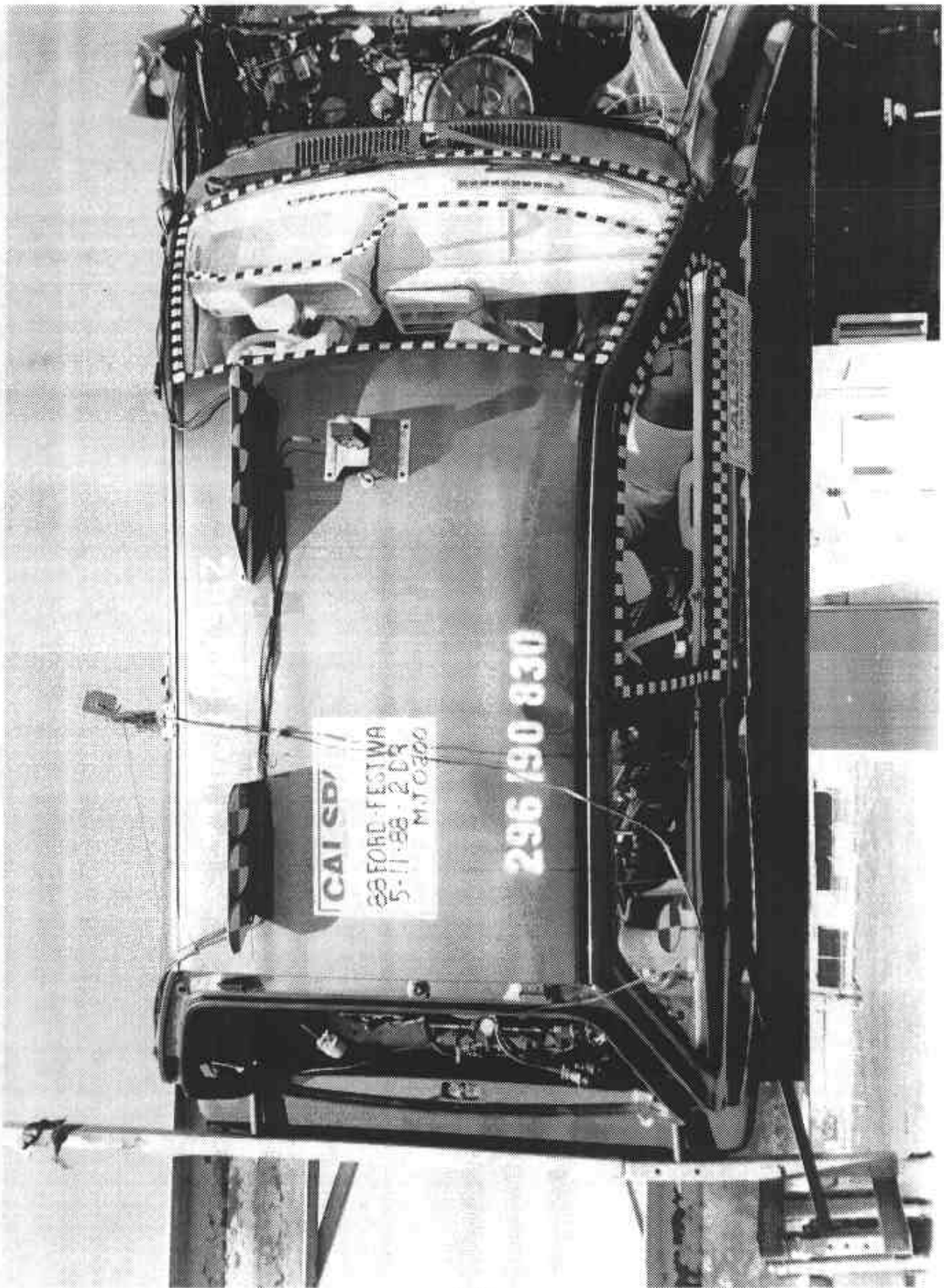


Figure A-10 POST-TEST TOP VIEW

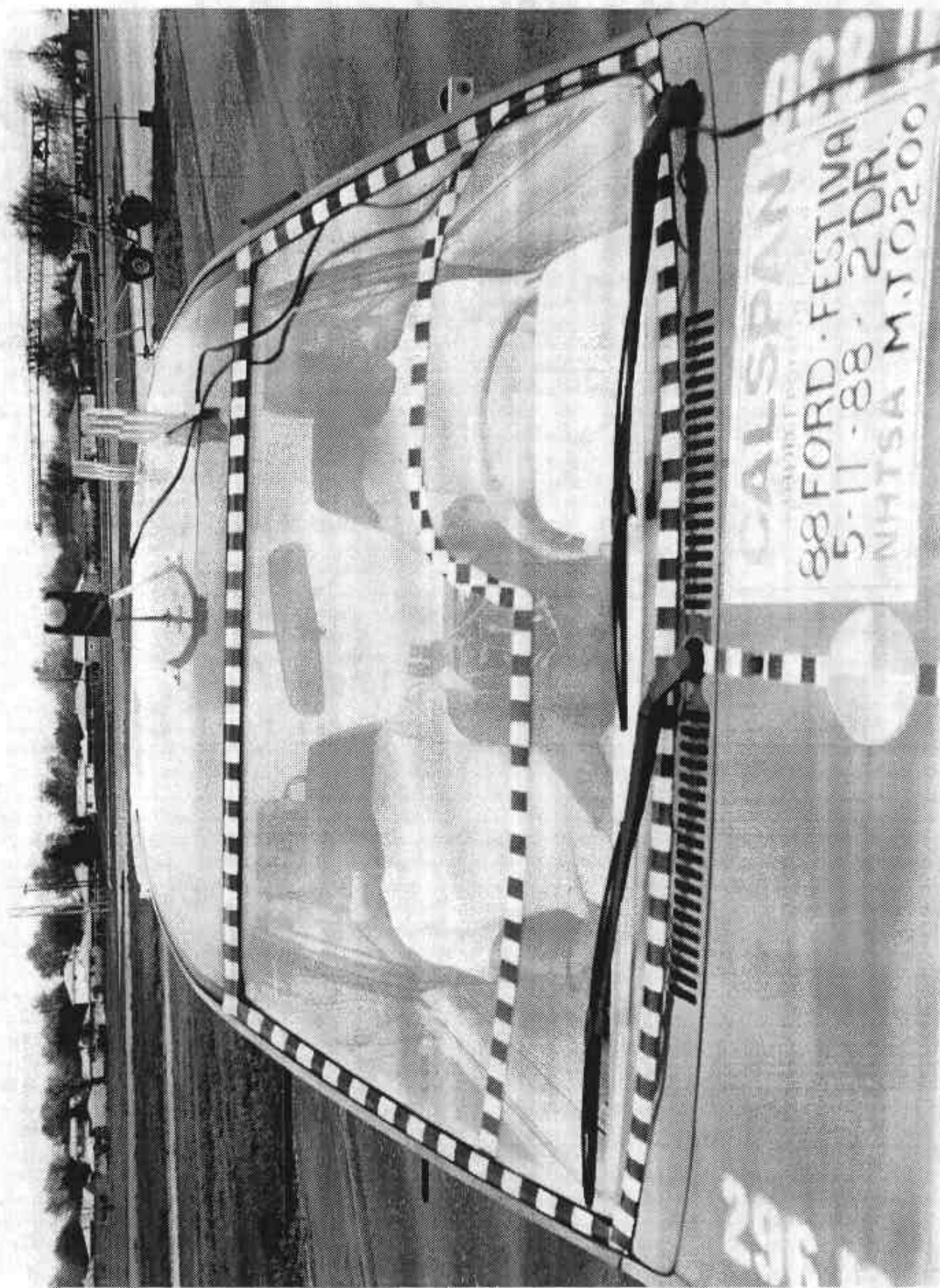


Figure A-11 PRE-TEST WINDSHIELD VIEW

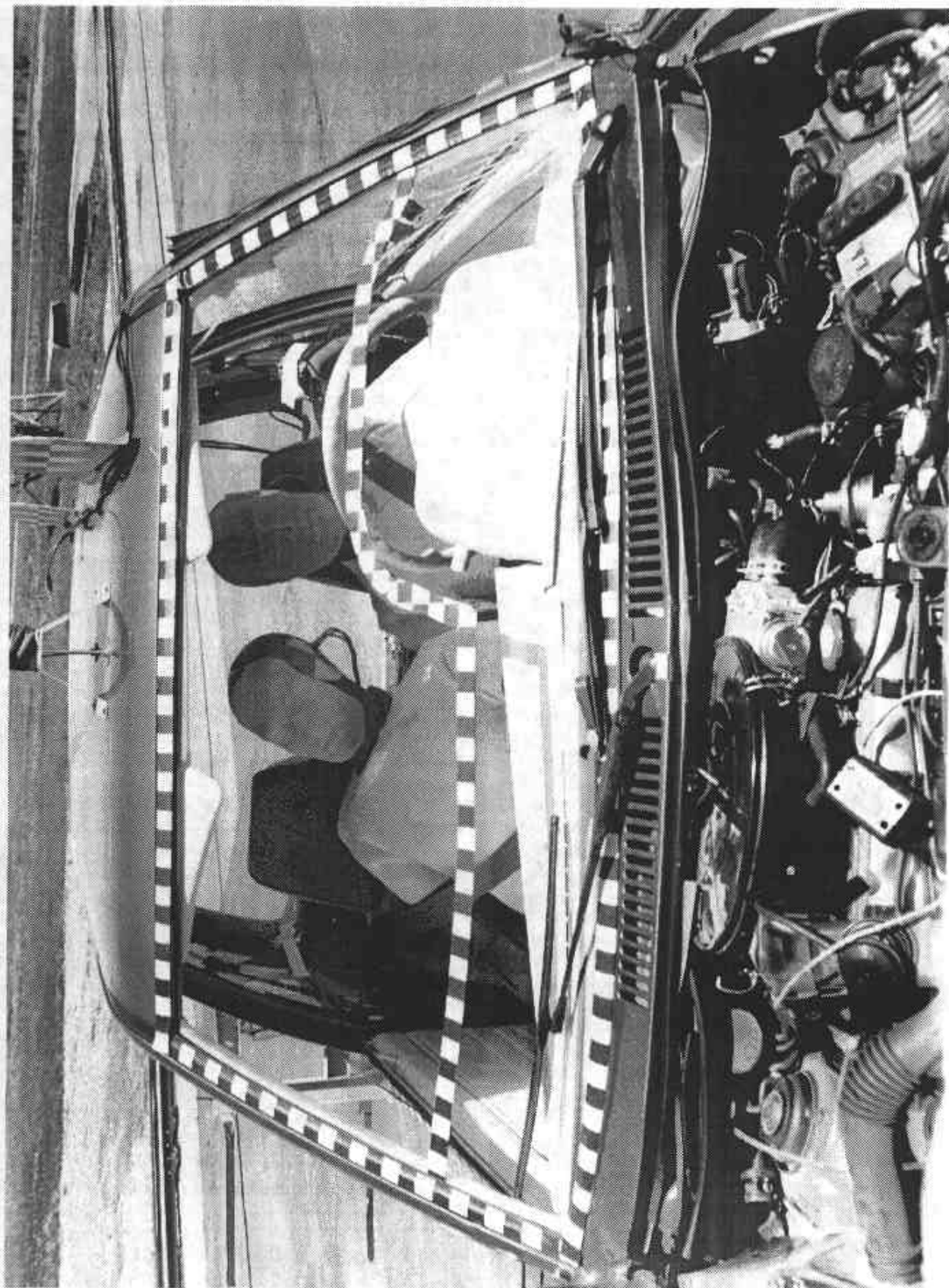


Figure A-12 POST-TEST WINDSHIELD VIEW

A-13

7626-19

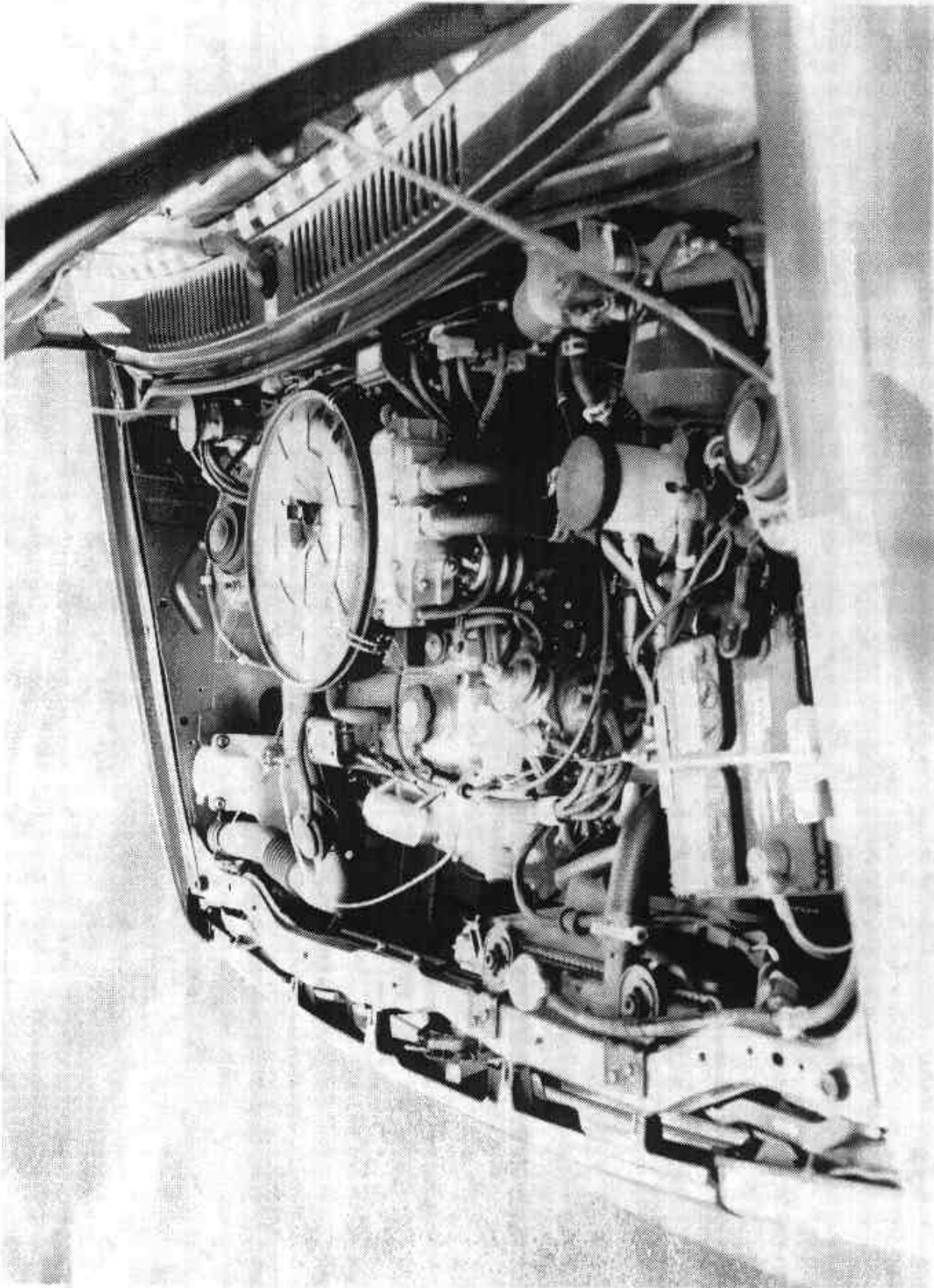


Figure A-13 PRE-TEST ENGINE COMPARTMENT VIEW

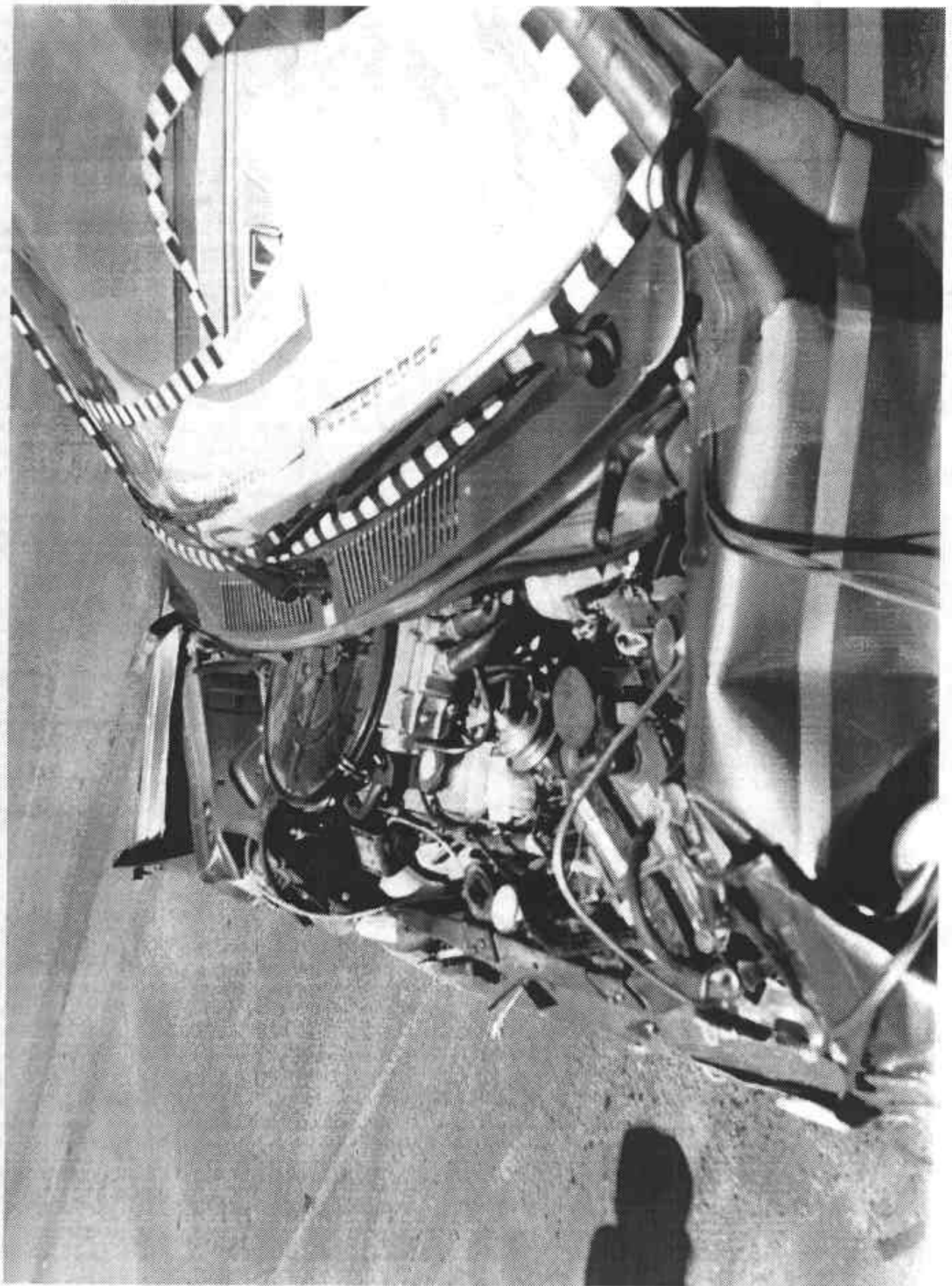


Figure A-14 POST-TEST ENGINE COMPARTMENT VIEW

A-15

7626-19

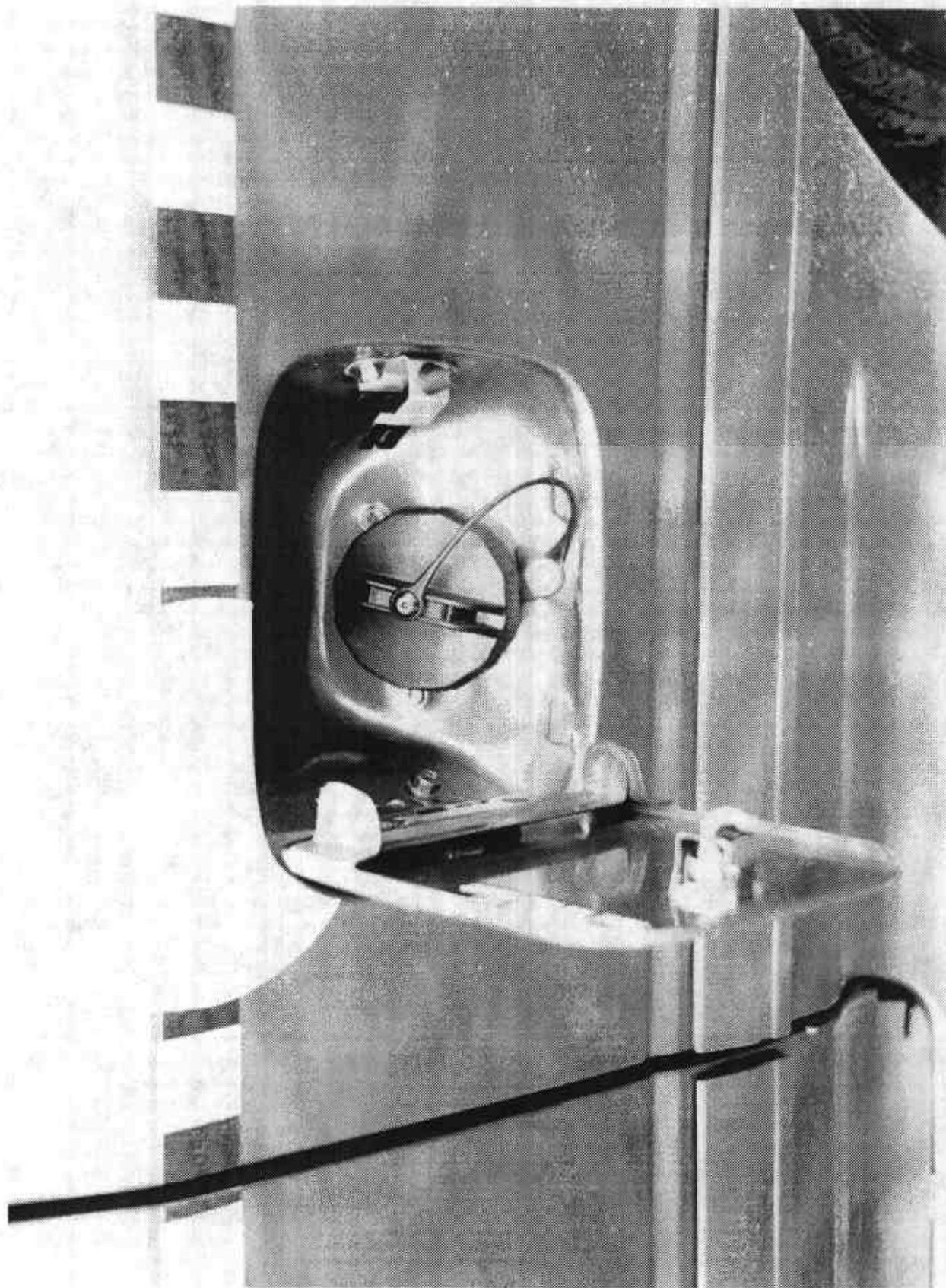


Figure A-15 PRE-TEST FUEL CAP VIEW

A-16

7626-19

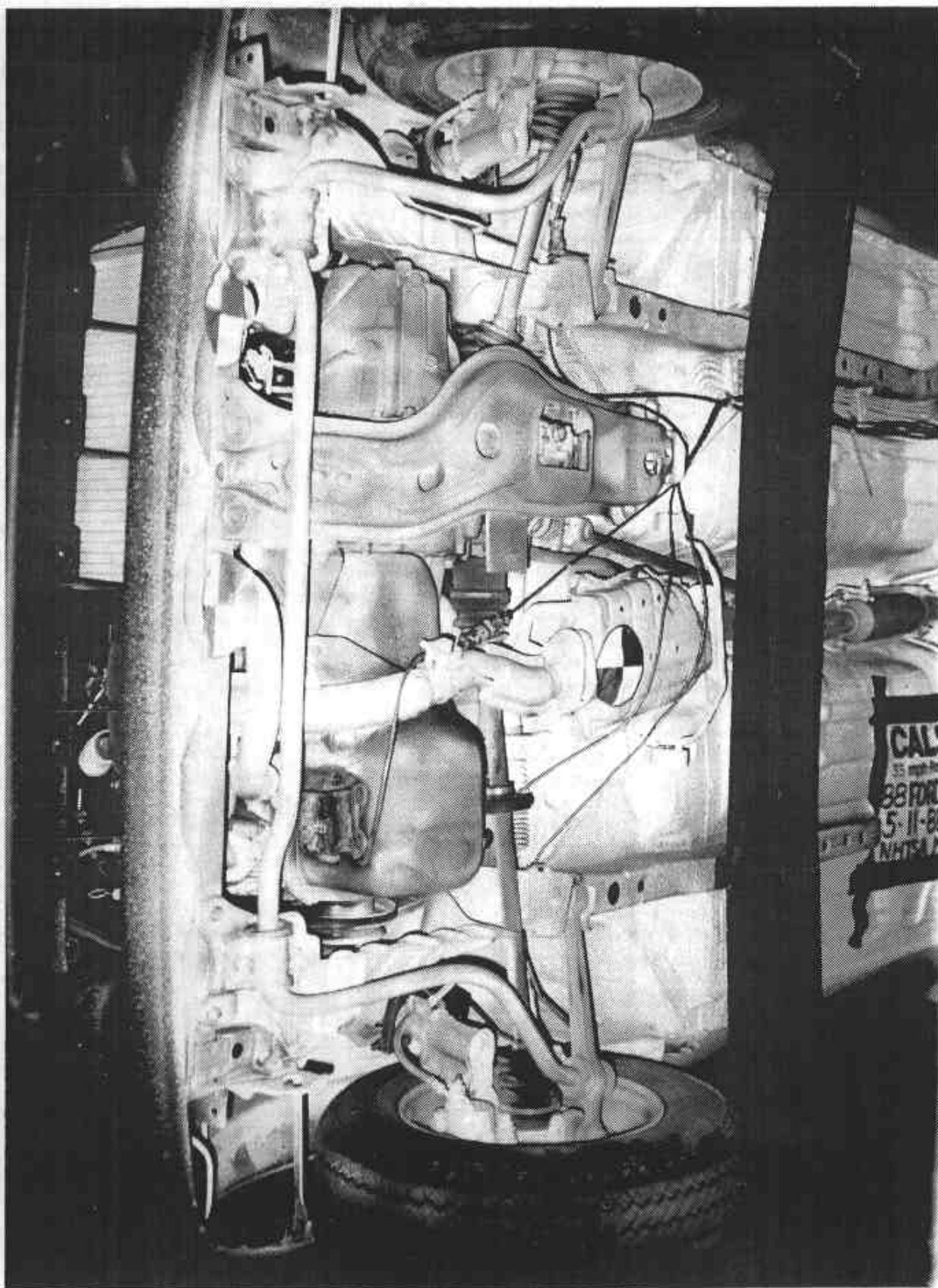


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

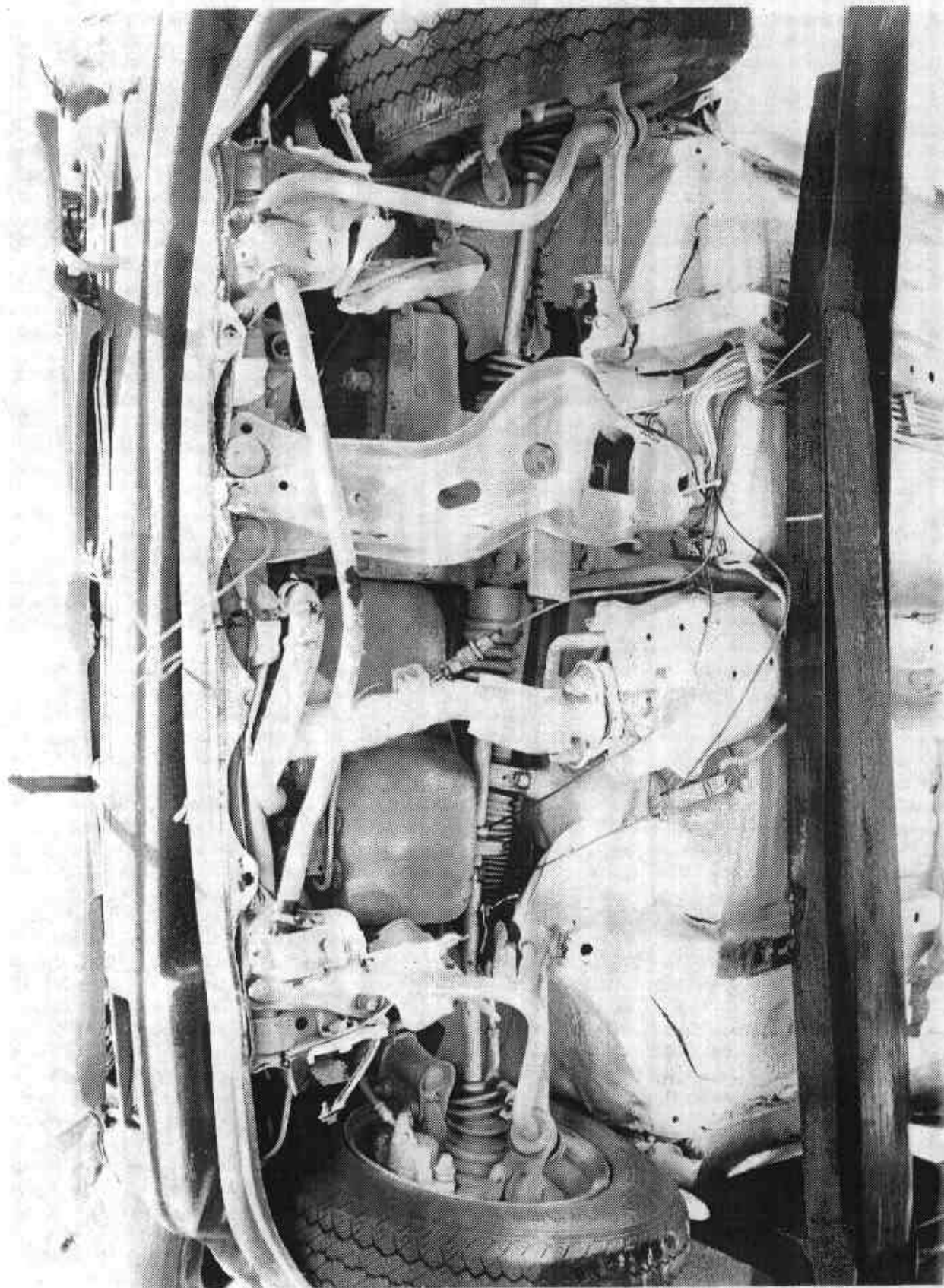


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

A-18

7626-19

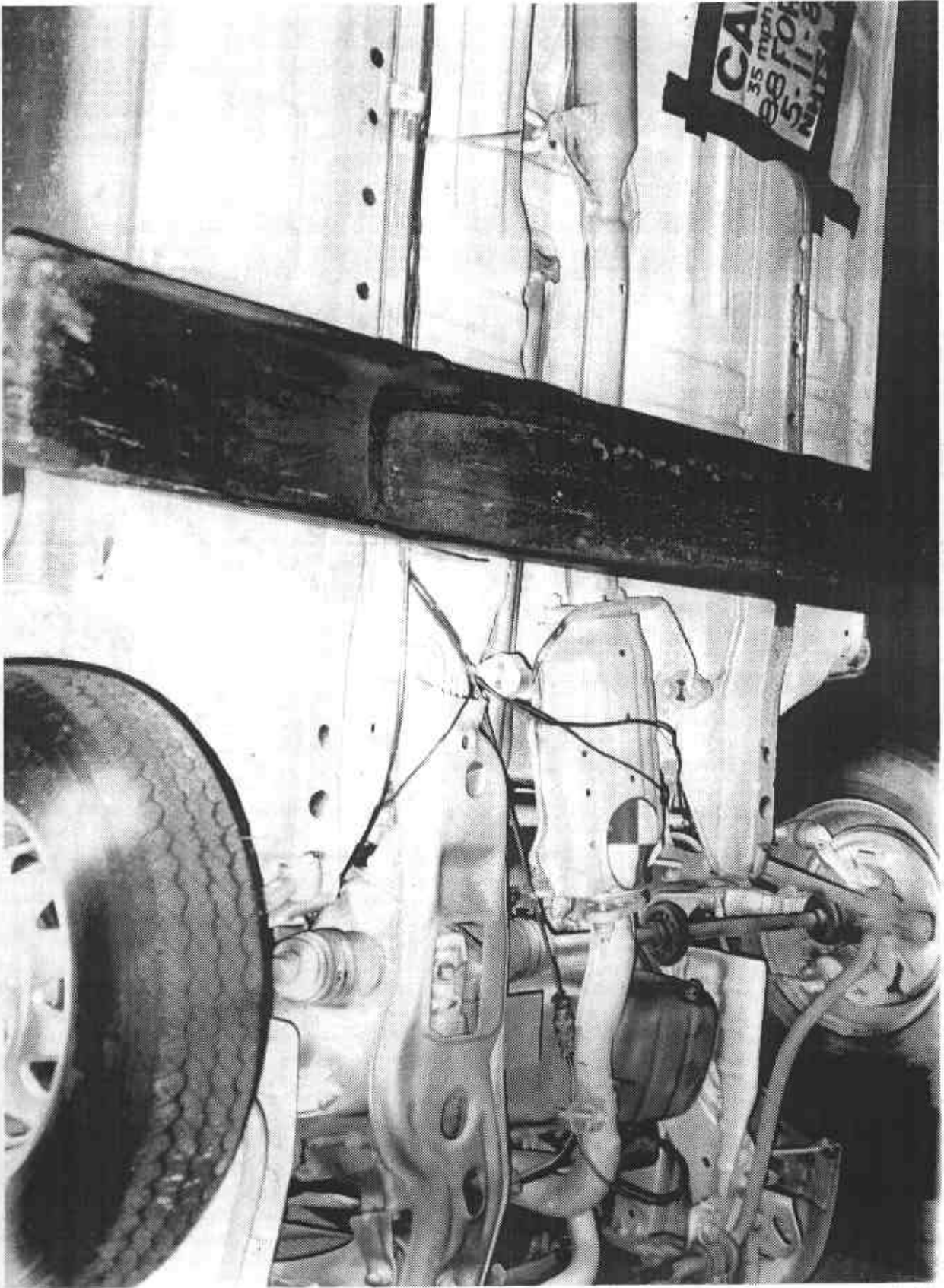


Figure A-18 PRE-TEST FRONT-SIDE UNDERBODY VIEW

A-19

7626-19

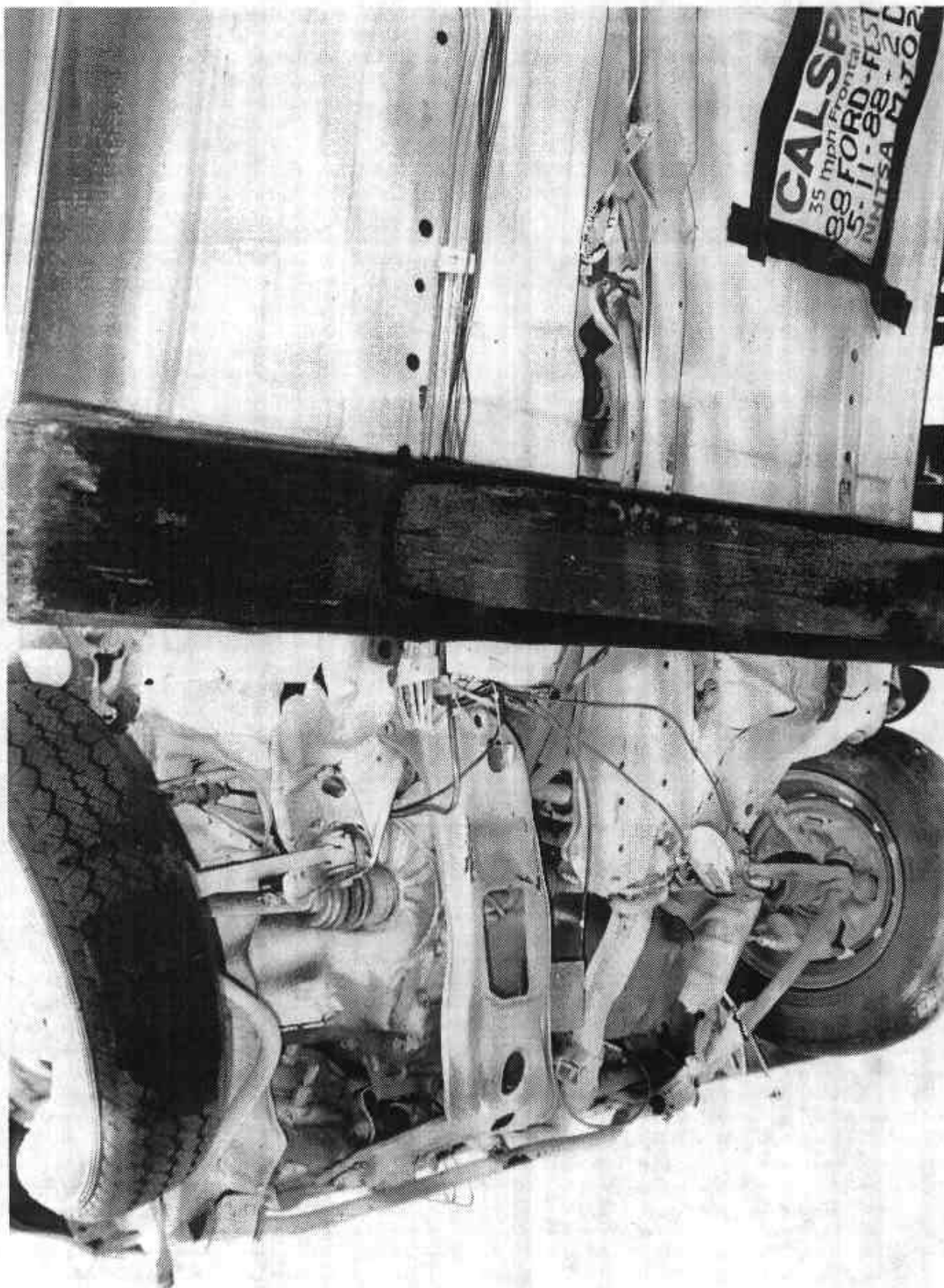


Figure A-19 POST-TEST FRONT-SIDE UNDERBODY VIEW

A-20

7626-19

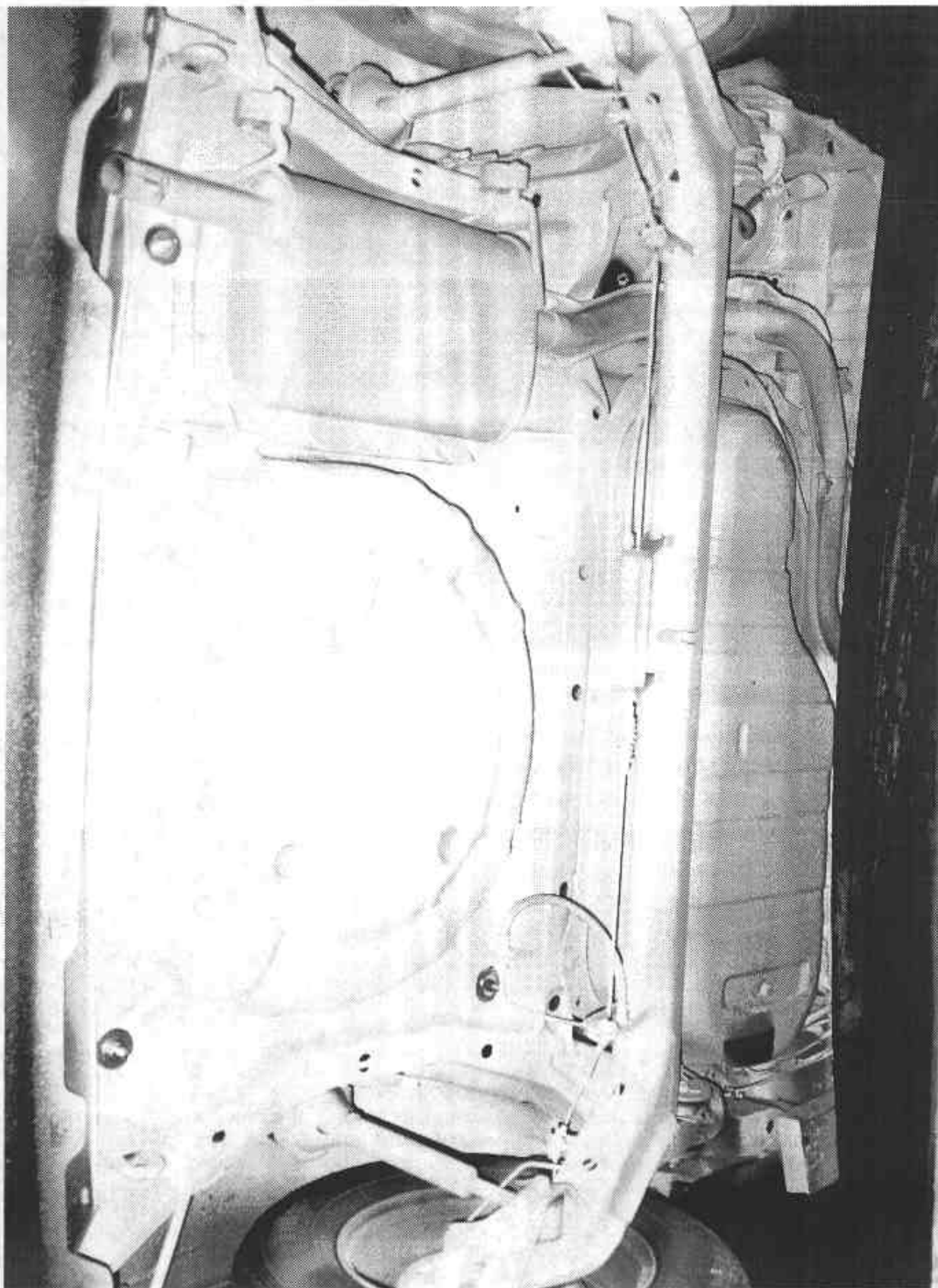


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

A-21

7626-19

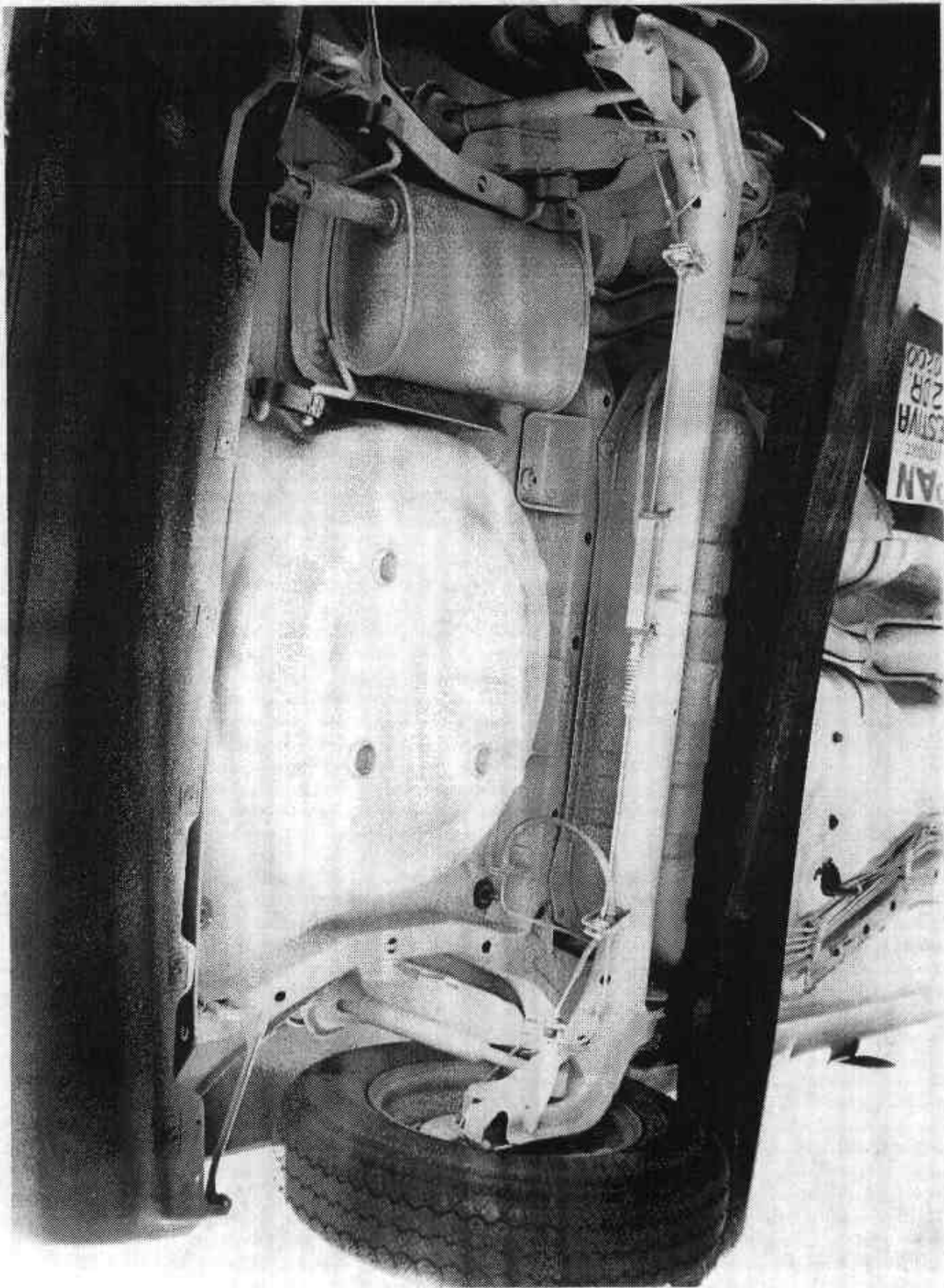


Figure A-21 POST-TEST REAR UNDERBODY VIEW

A-22

7626-19

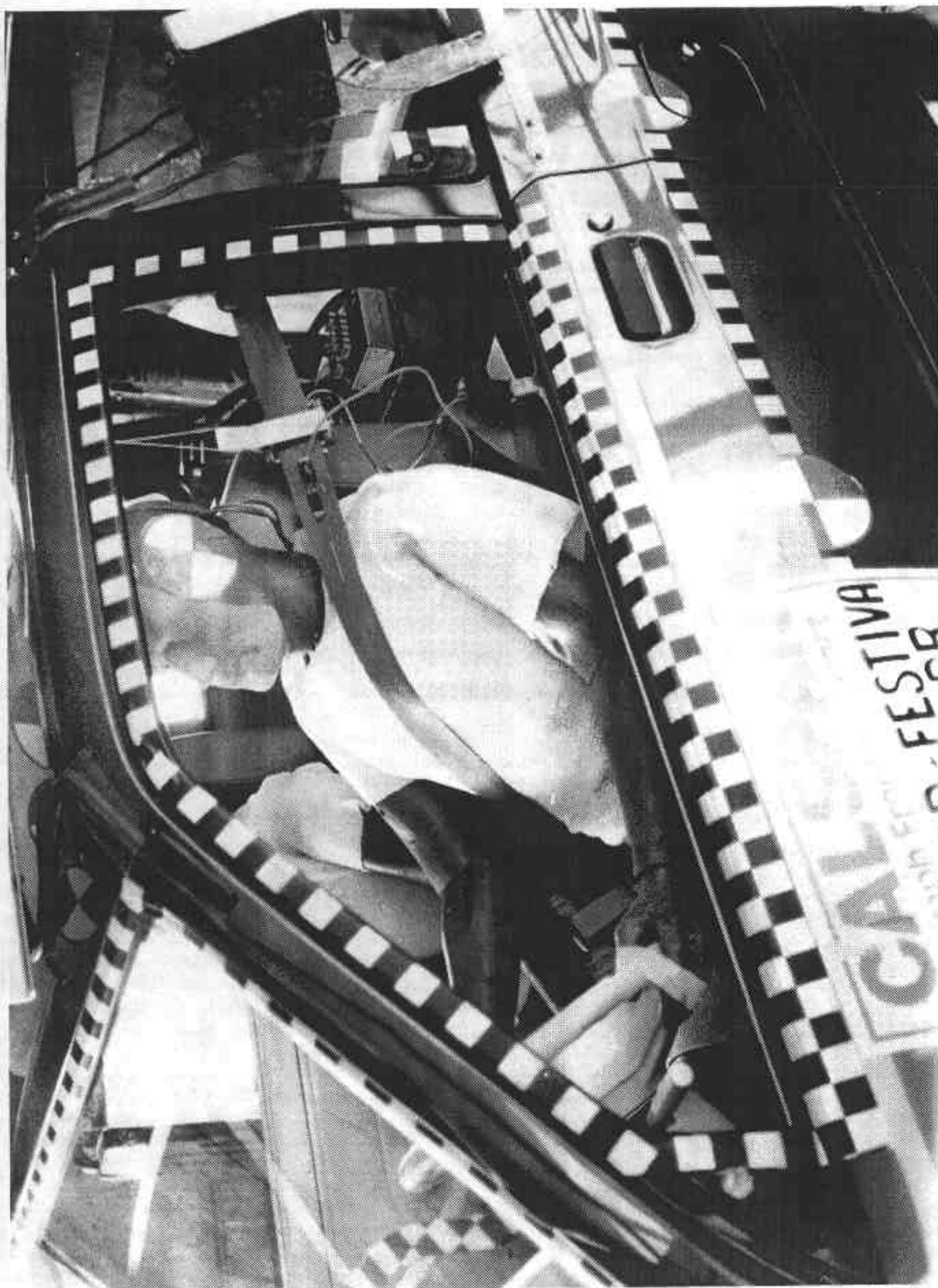


Figure A-22 PRE-TEST DRIVER POSITION VIEW

A-23

7626-19

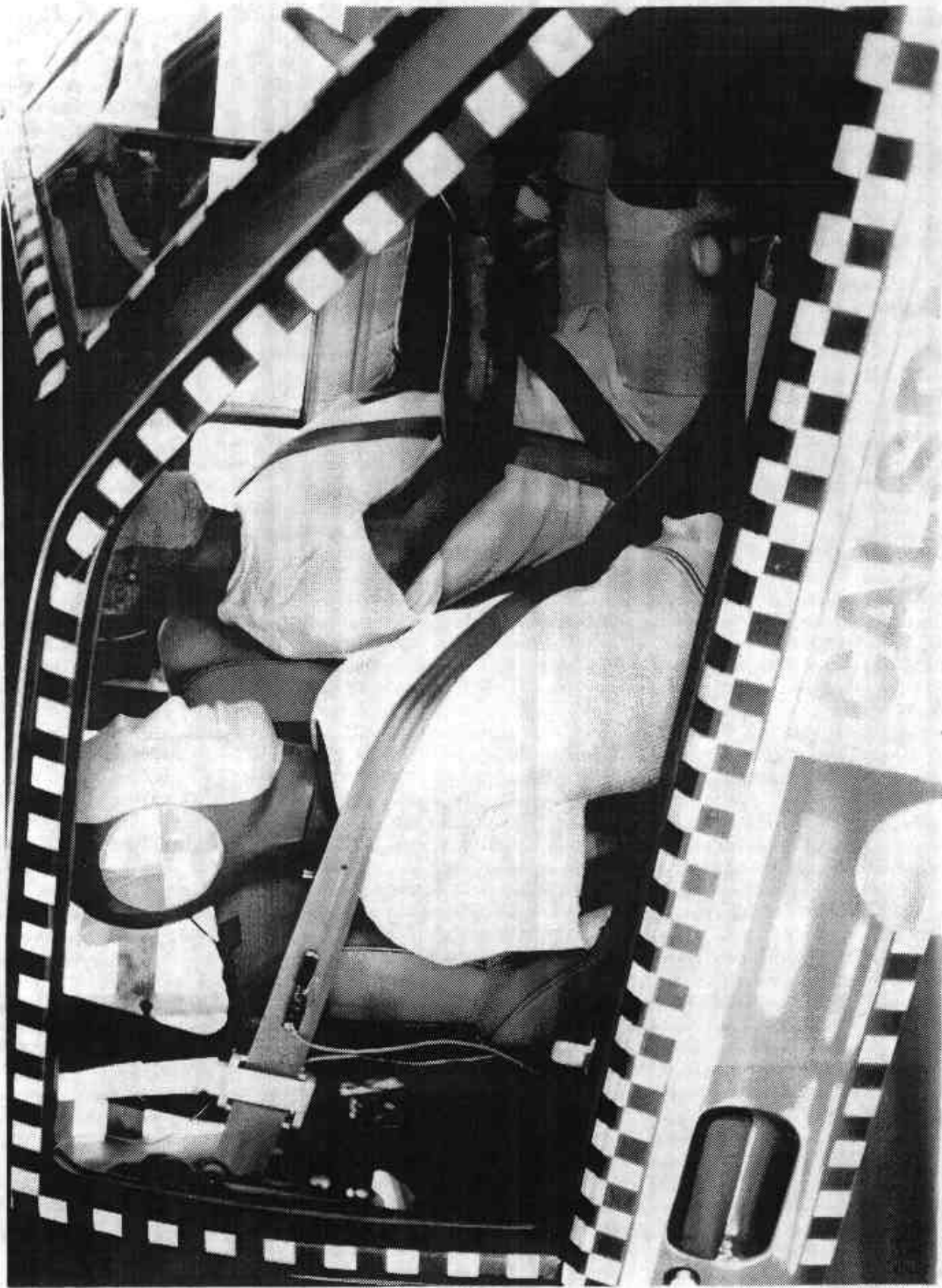


Figure A-23 PRE-TEST PASSENGER POSITION VIEW



Figure A-24 POST-TEST PASSENGER POSITION VIEW



Figure A-25 PRE-TEST DRIVER AND INTERIOR VIEW

A-26

7626-19



Figure A-26 POST-TEST DRIVER AND INTERIOR VIEW

A-27

7626-19



Figure A-27 PRE-TEST PASSENGER AND INTERIOR VIEW

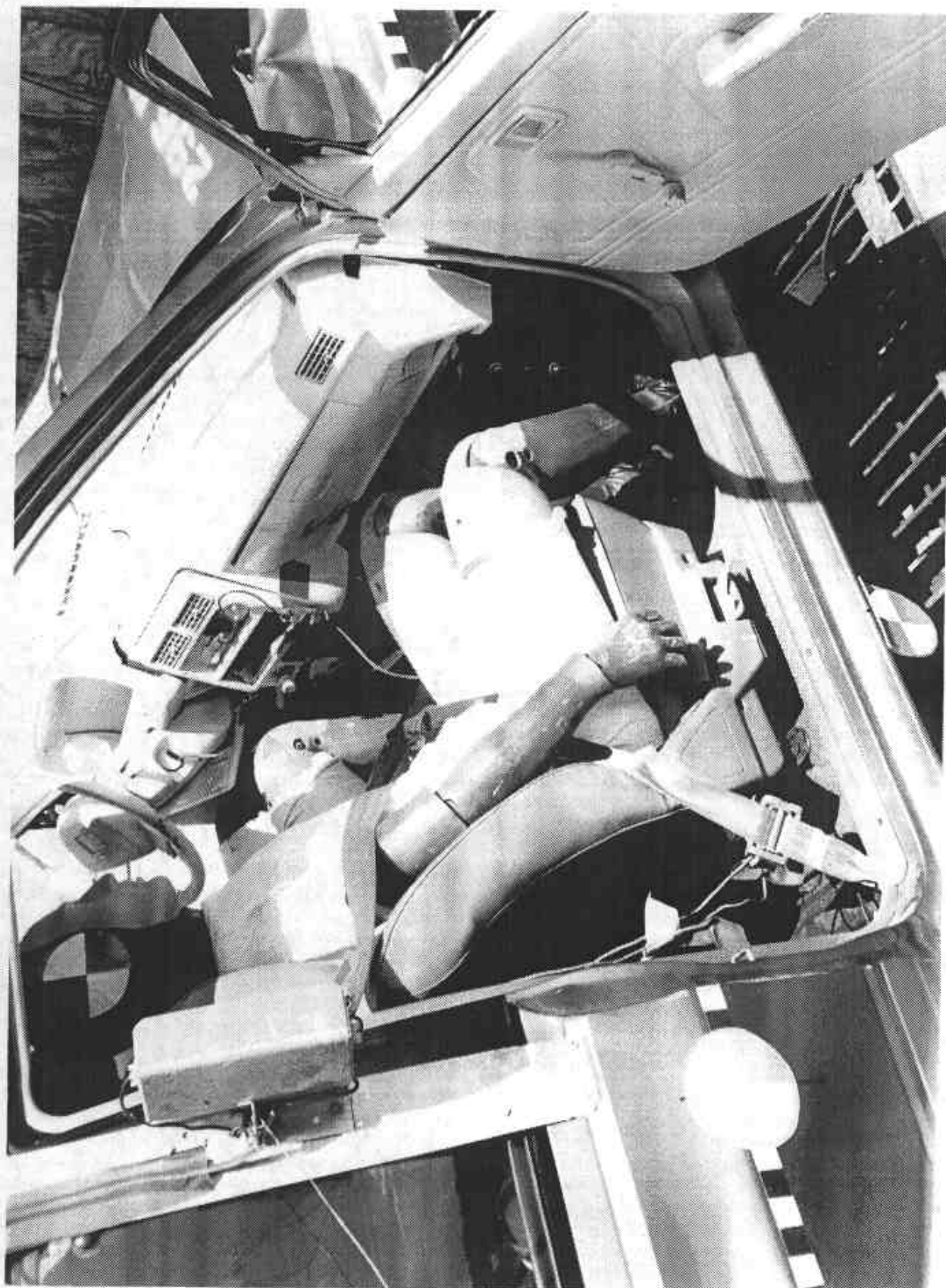


Figure A-28 POST-TEST PASSENGER AND INTERIOR VIEW

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

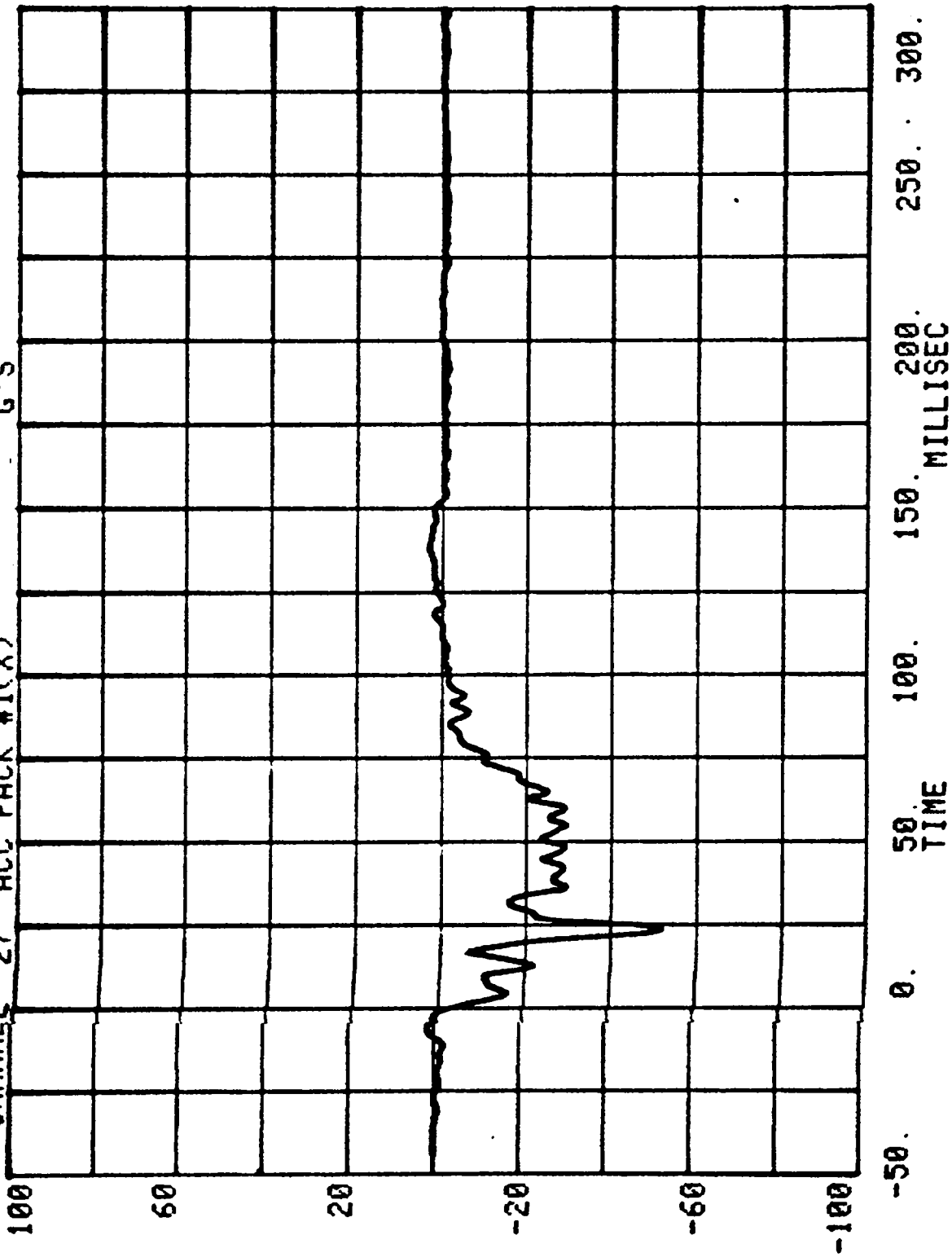
TEST NO. MJ0200

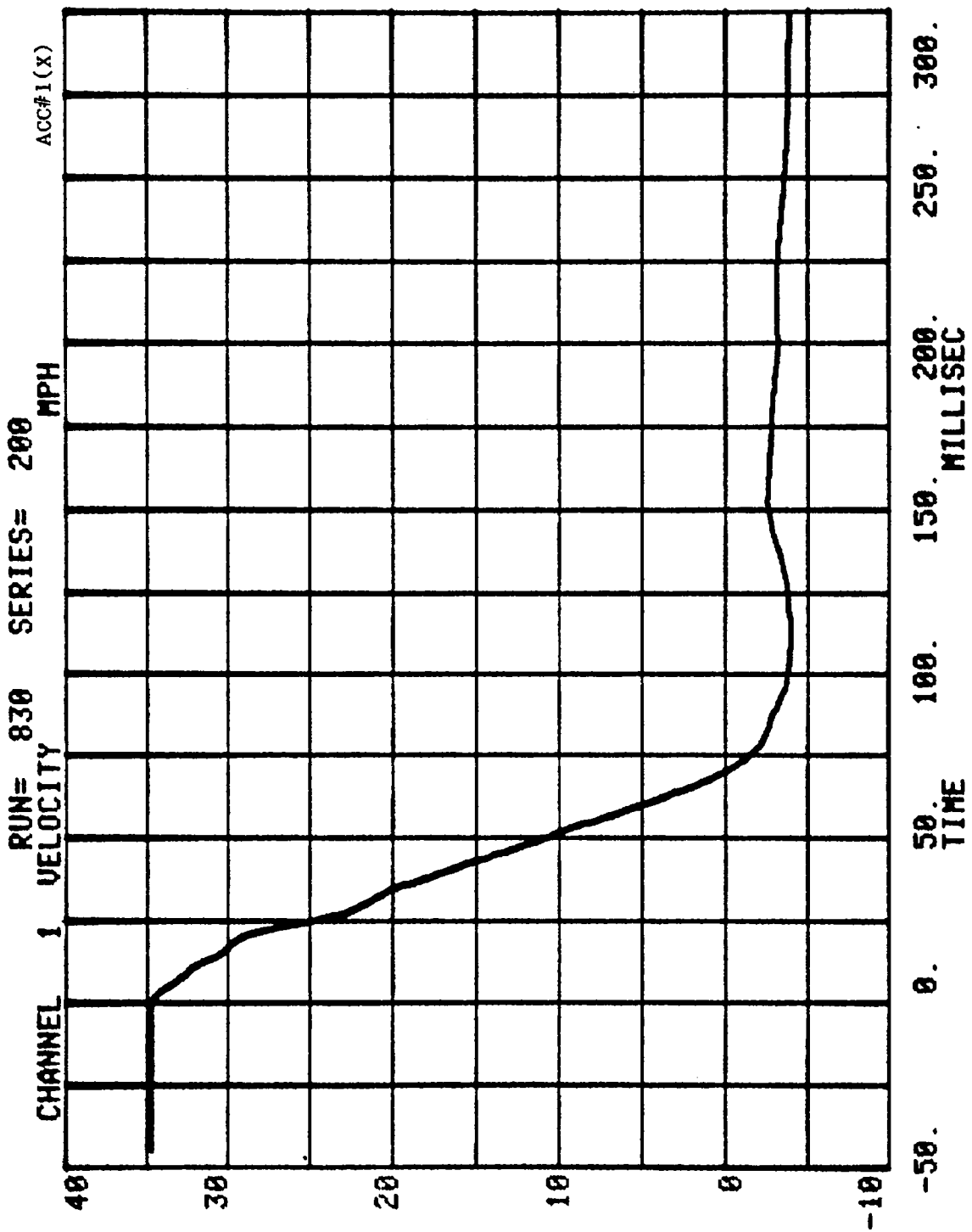
VEHICLE DATA

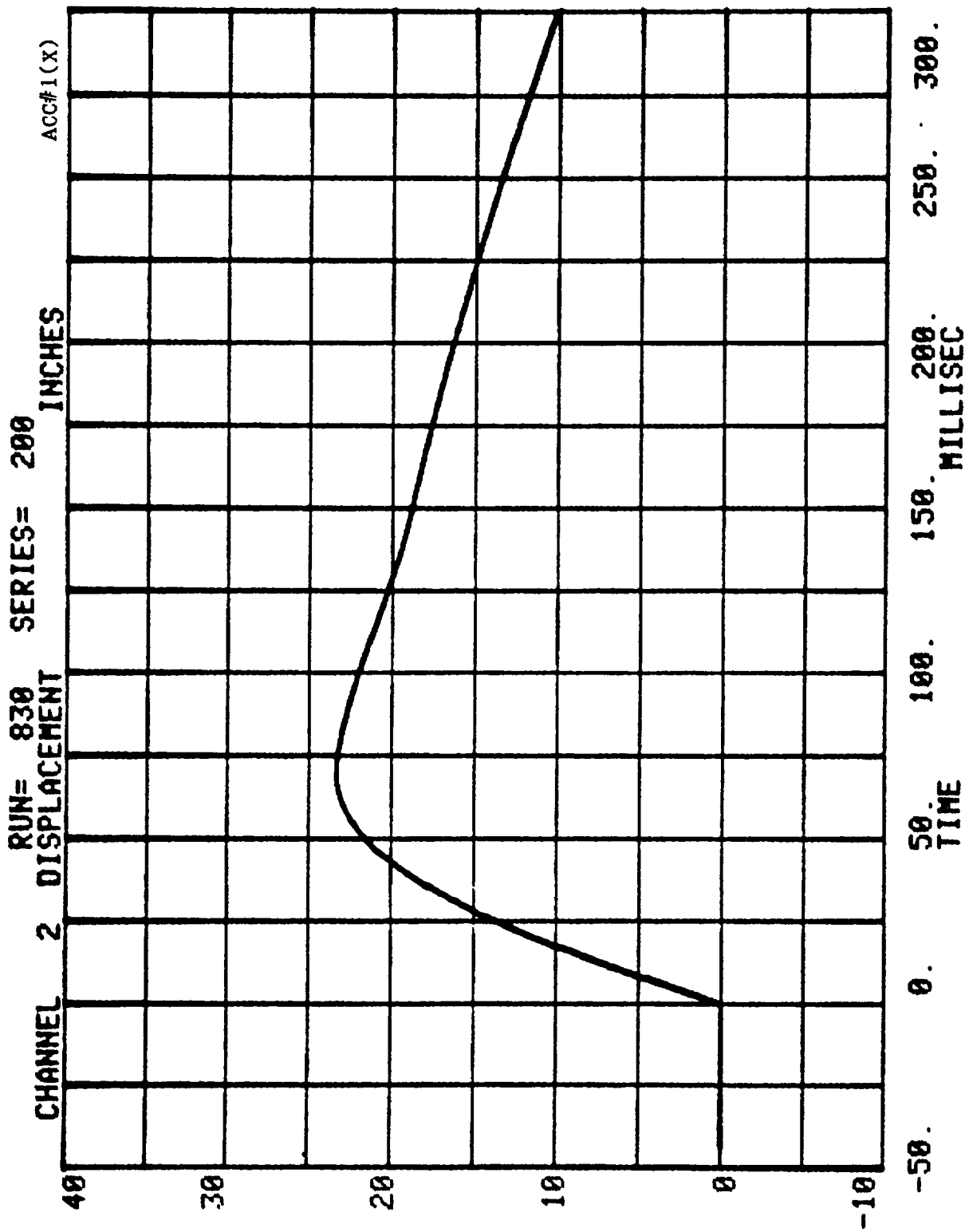
FILTER CHANNEL CLASS

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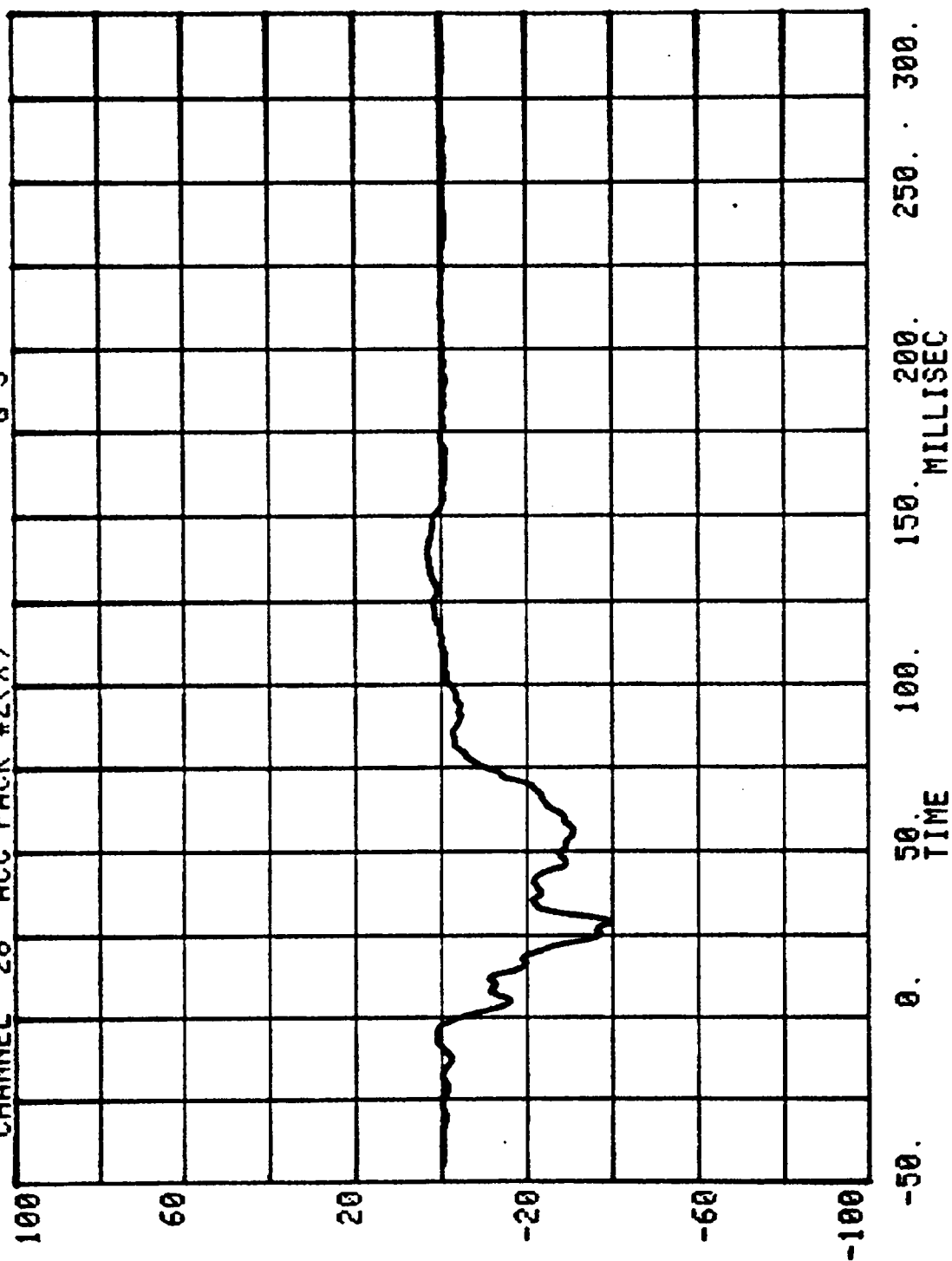
CHANNEL 27 ACC PACK #1(X) RUN= 830 SERIES= 200 G'S

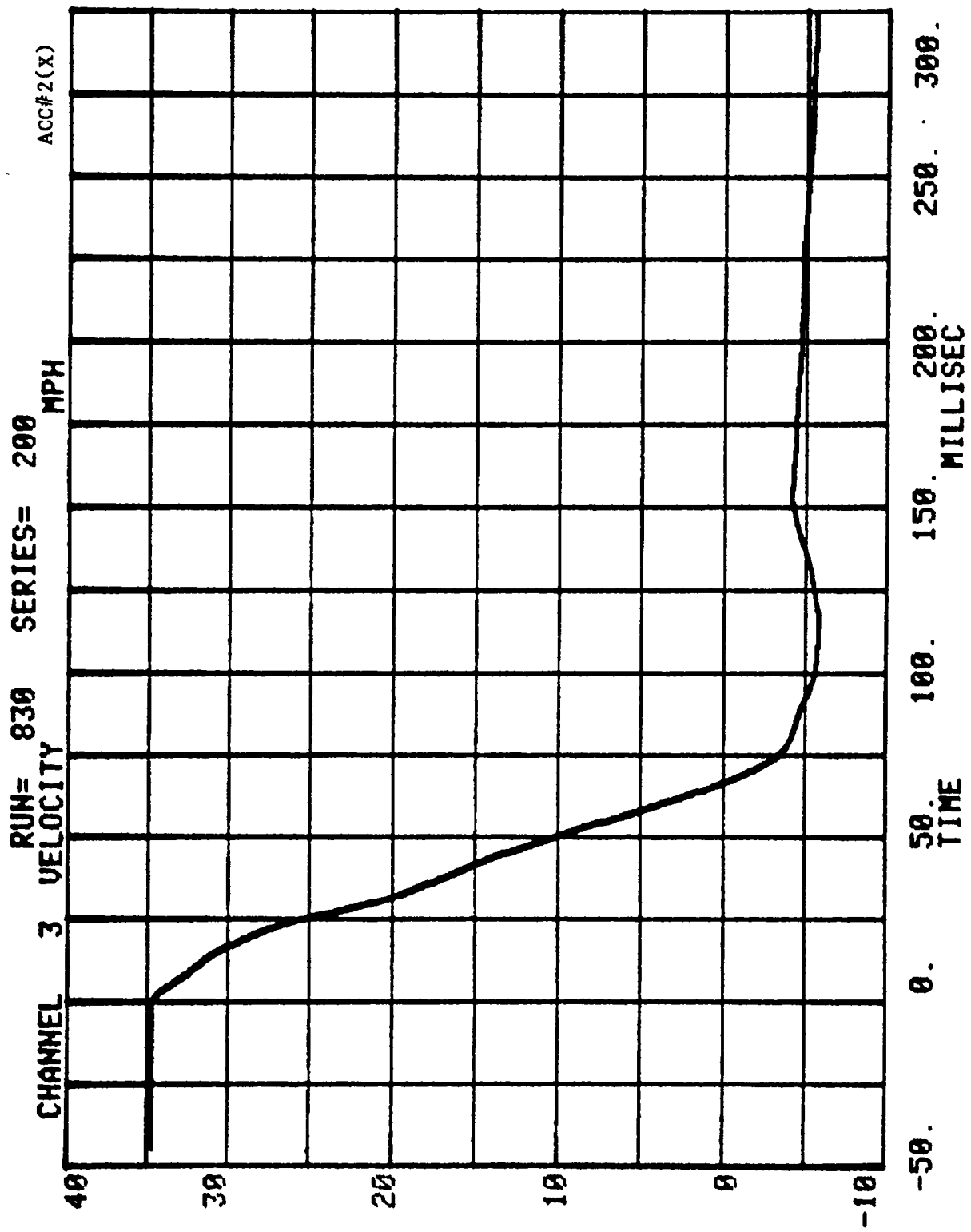


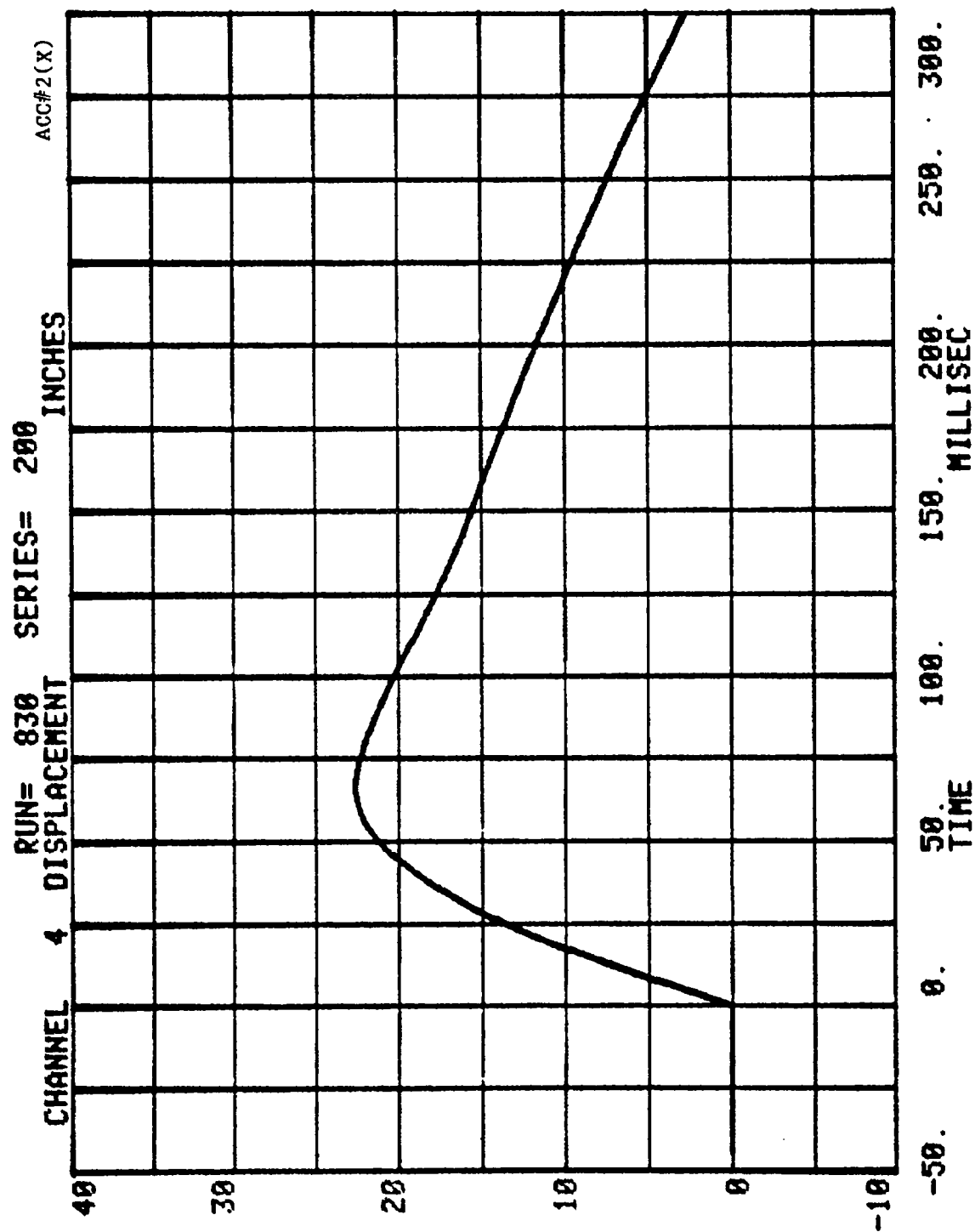




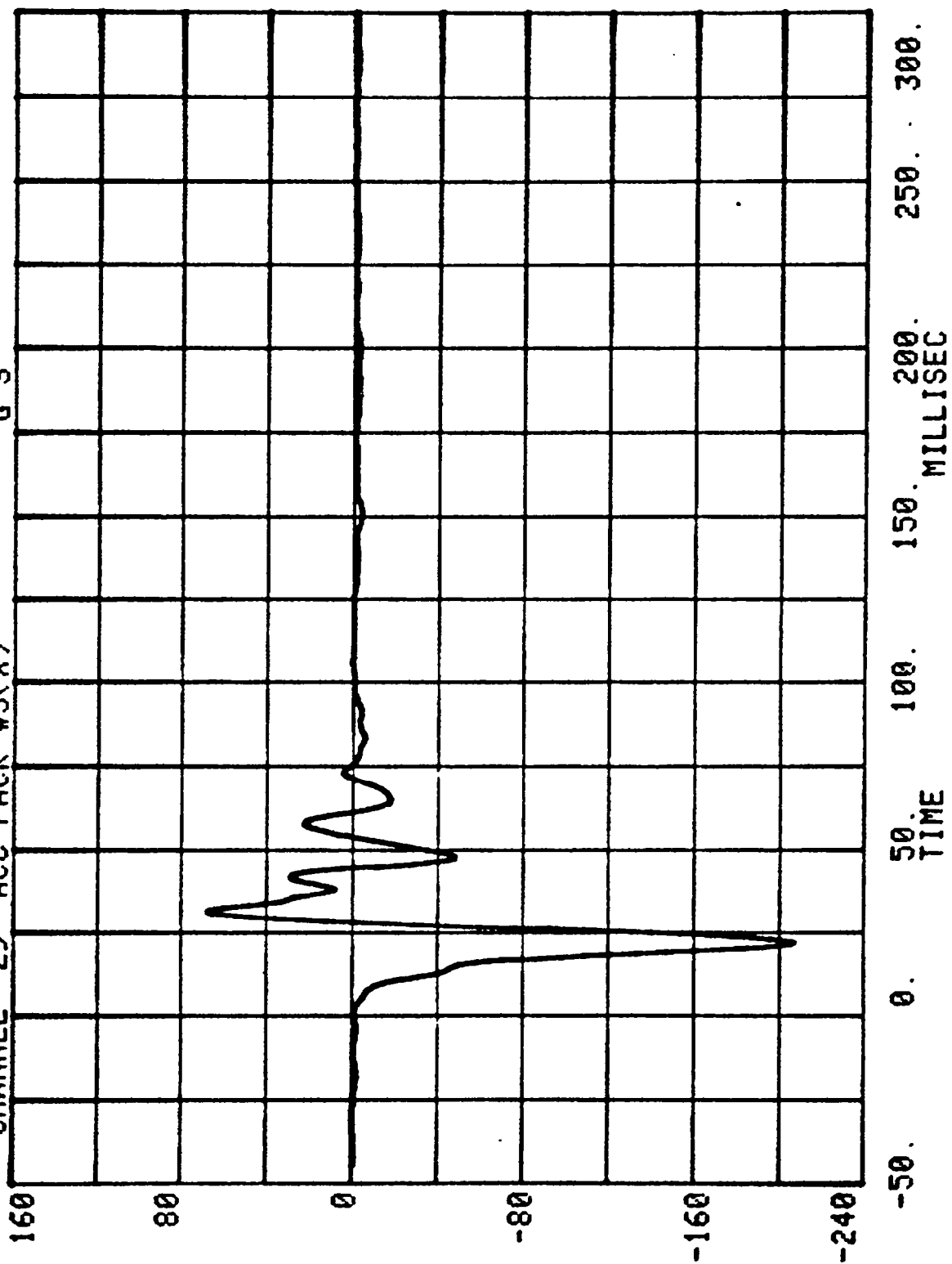
RUN= 830 SERIES= 200
CHANNEL 28 ACC PACK #2(X) G'S

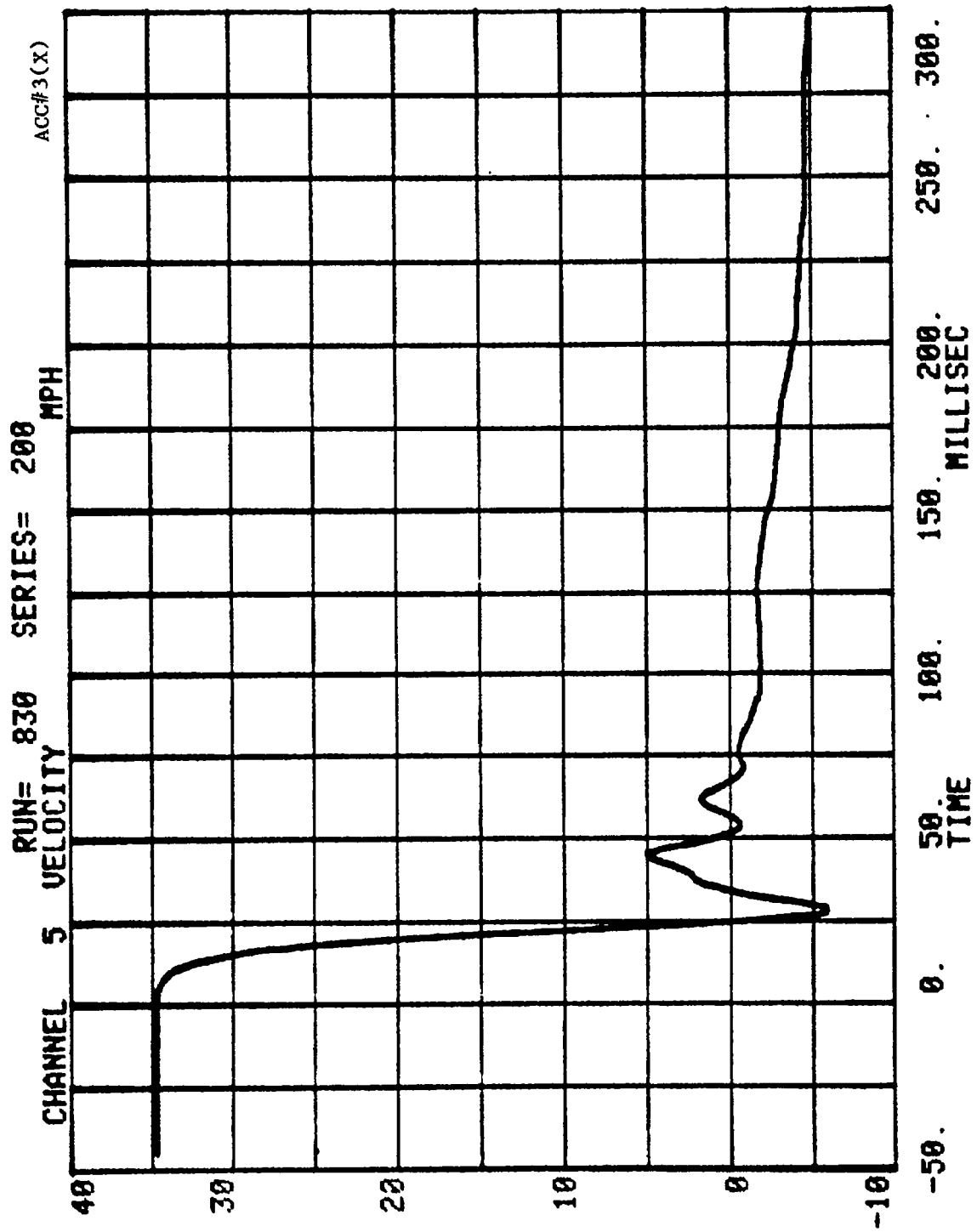


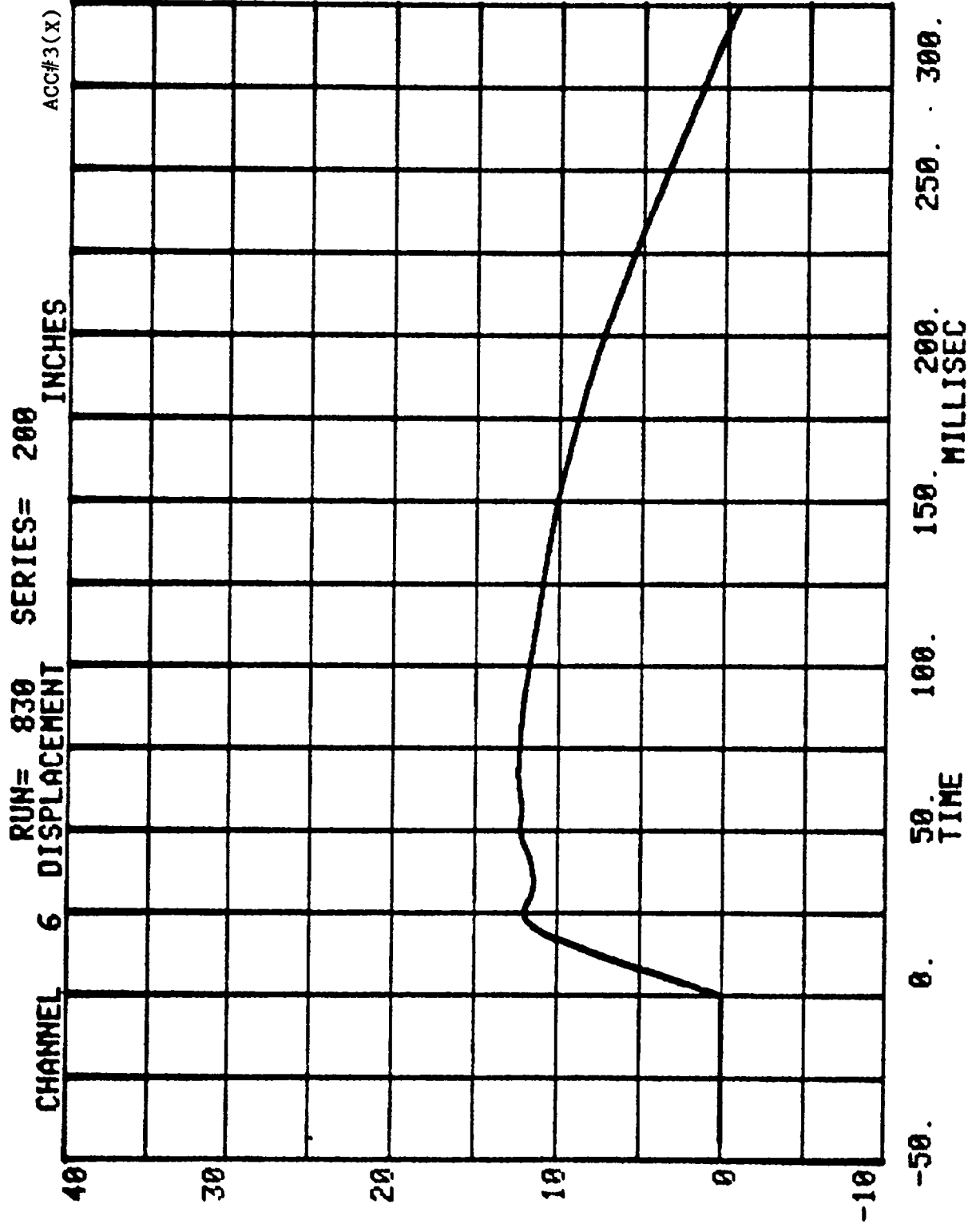


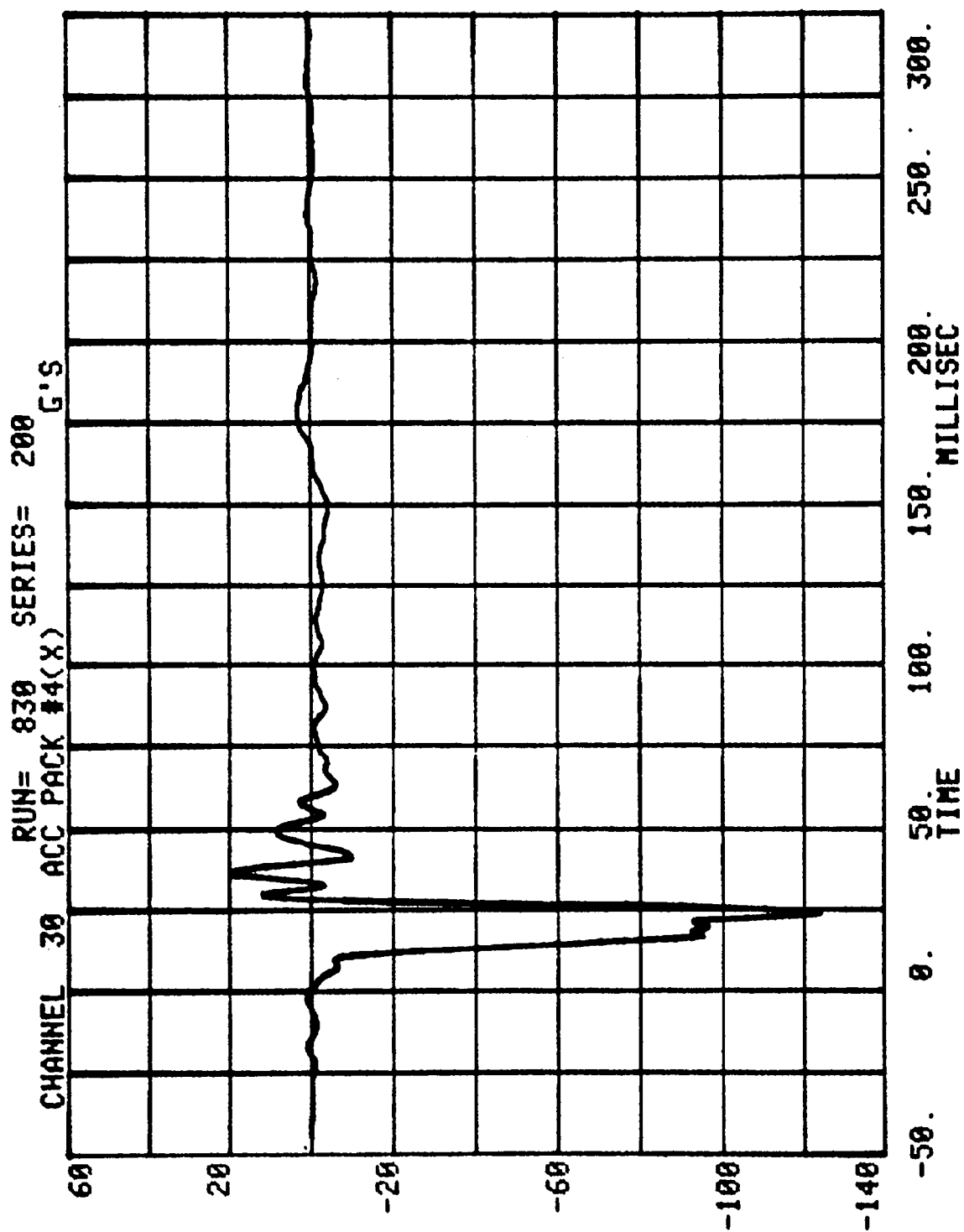


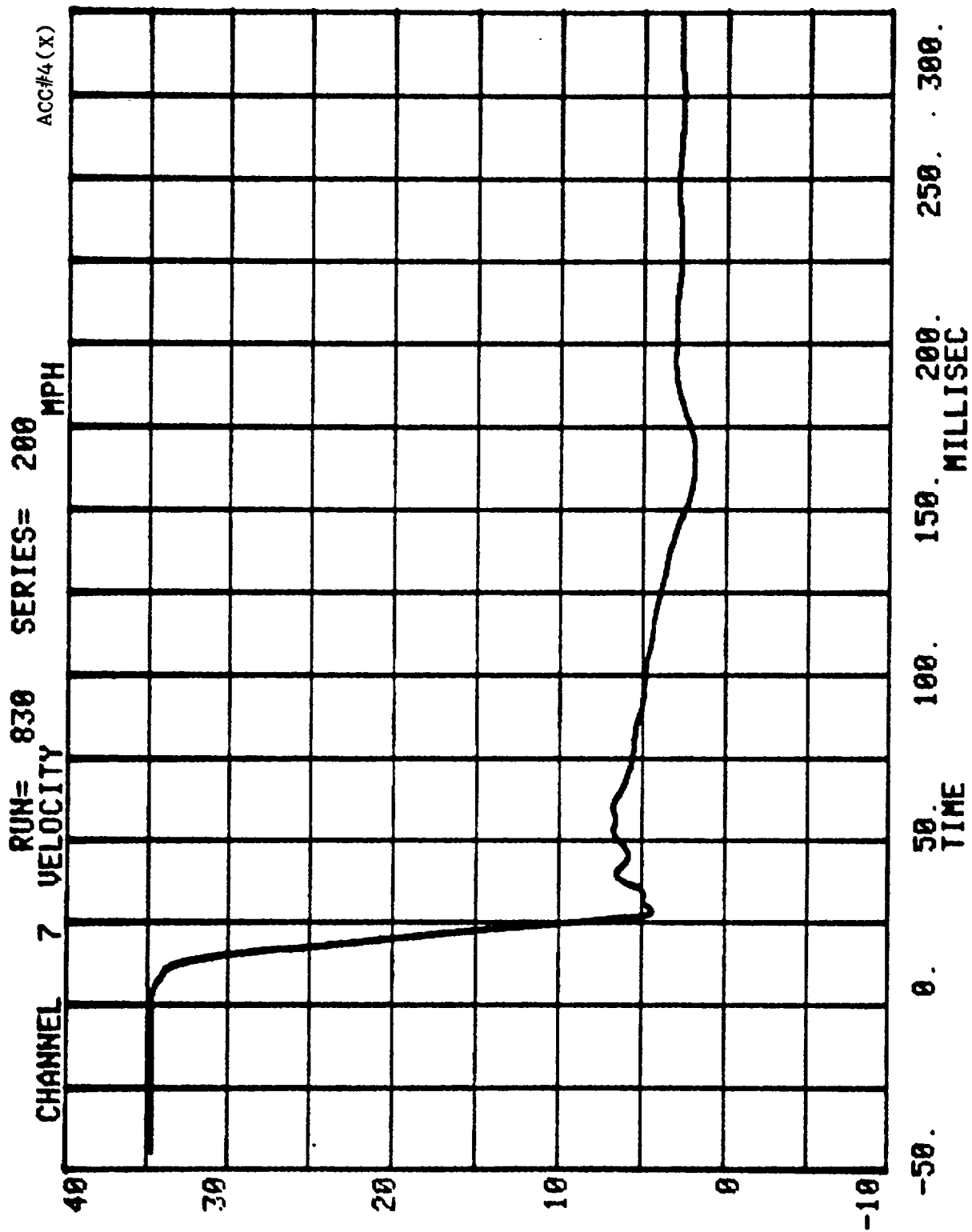
CHANNEL 29 ACC PACK #3(X) RUN= 830 SERIES= 200 G'S

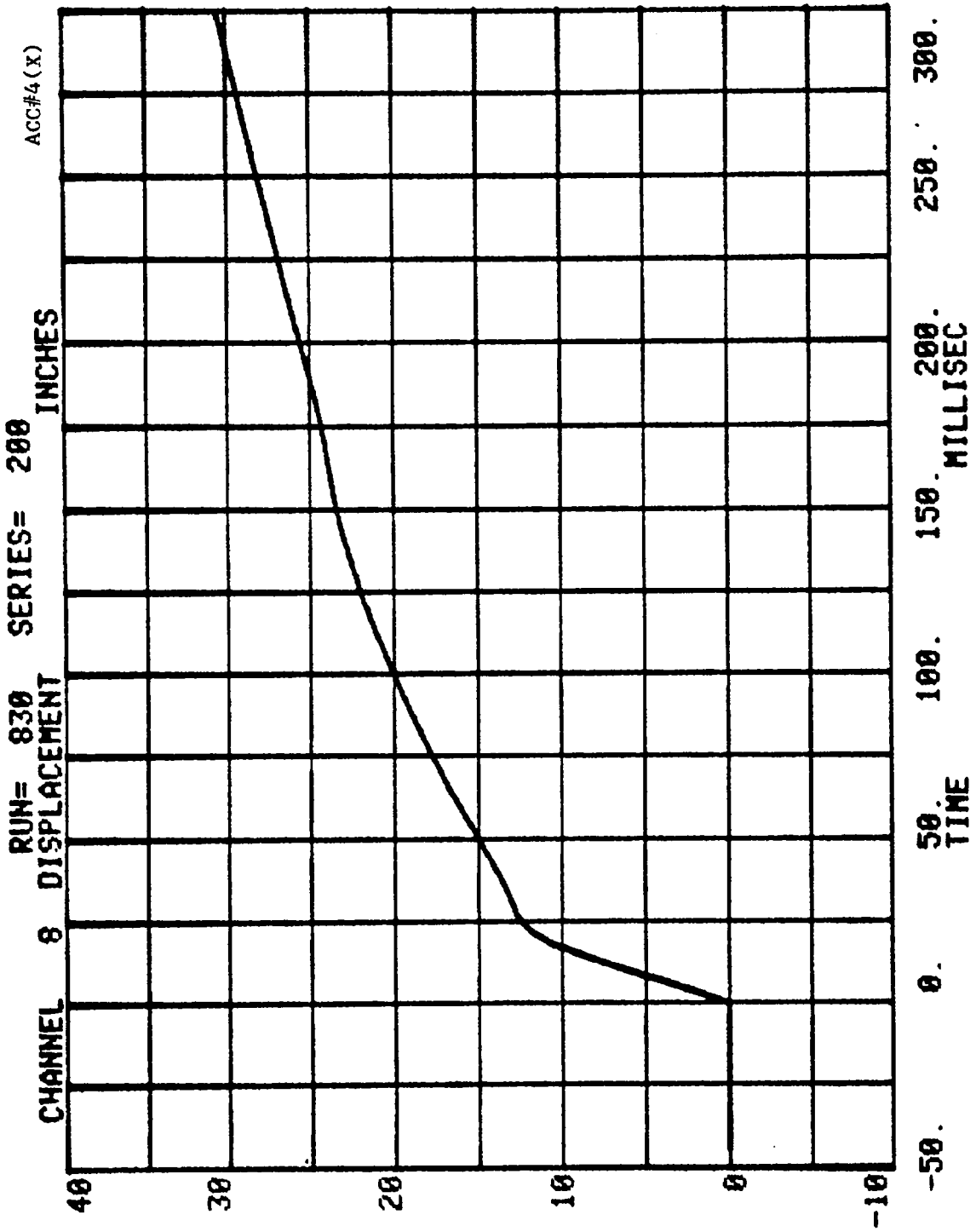




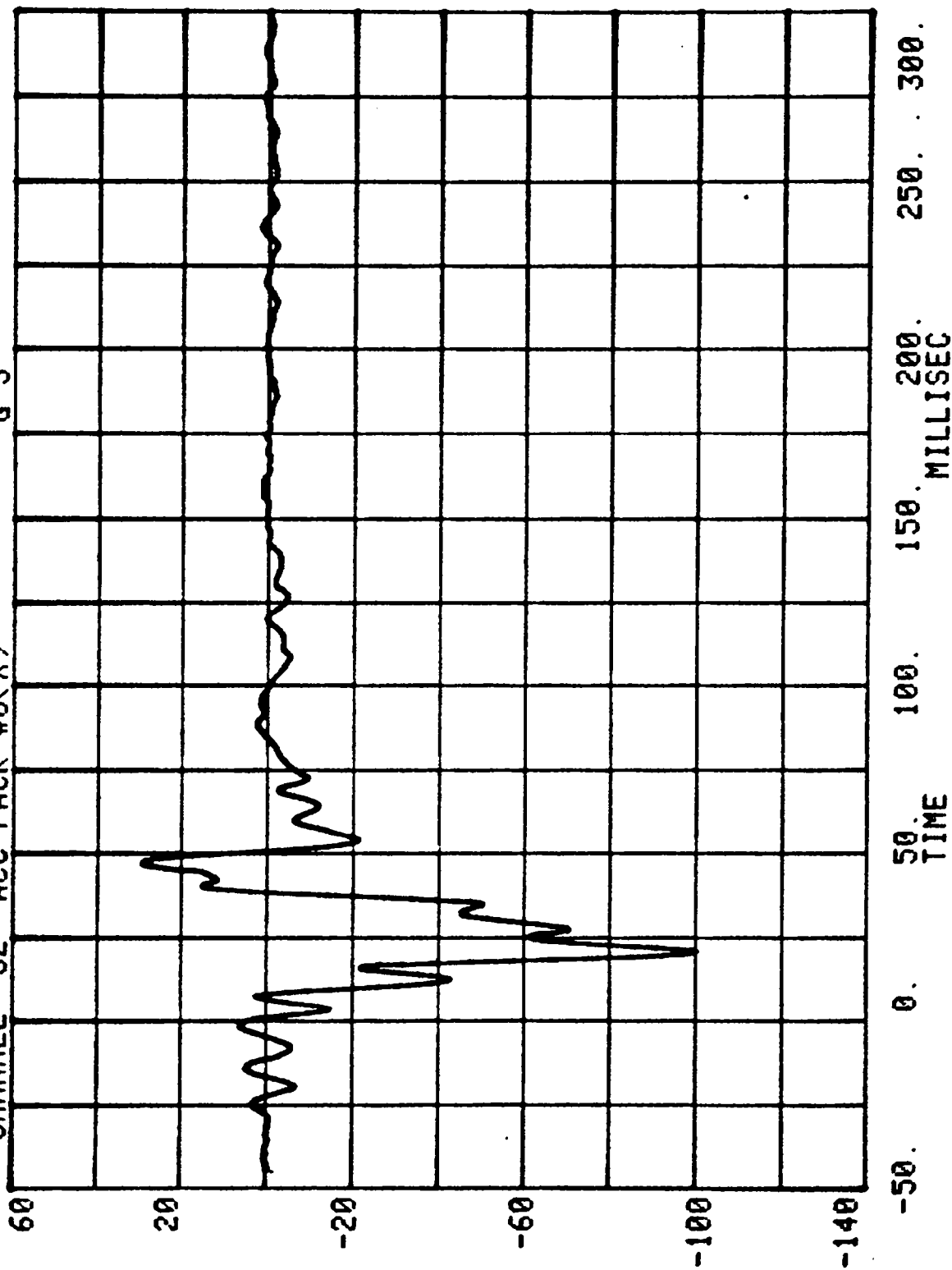


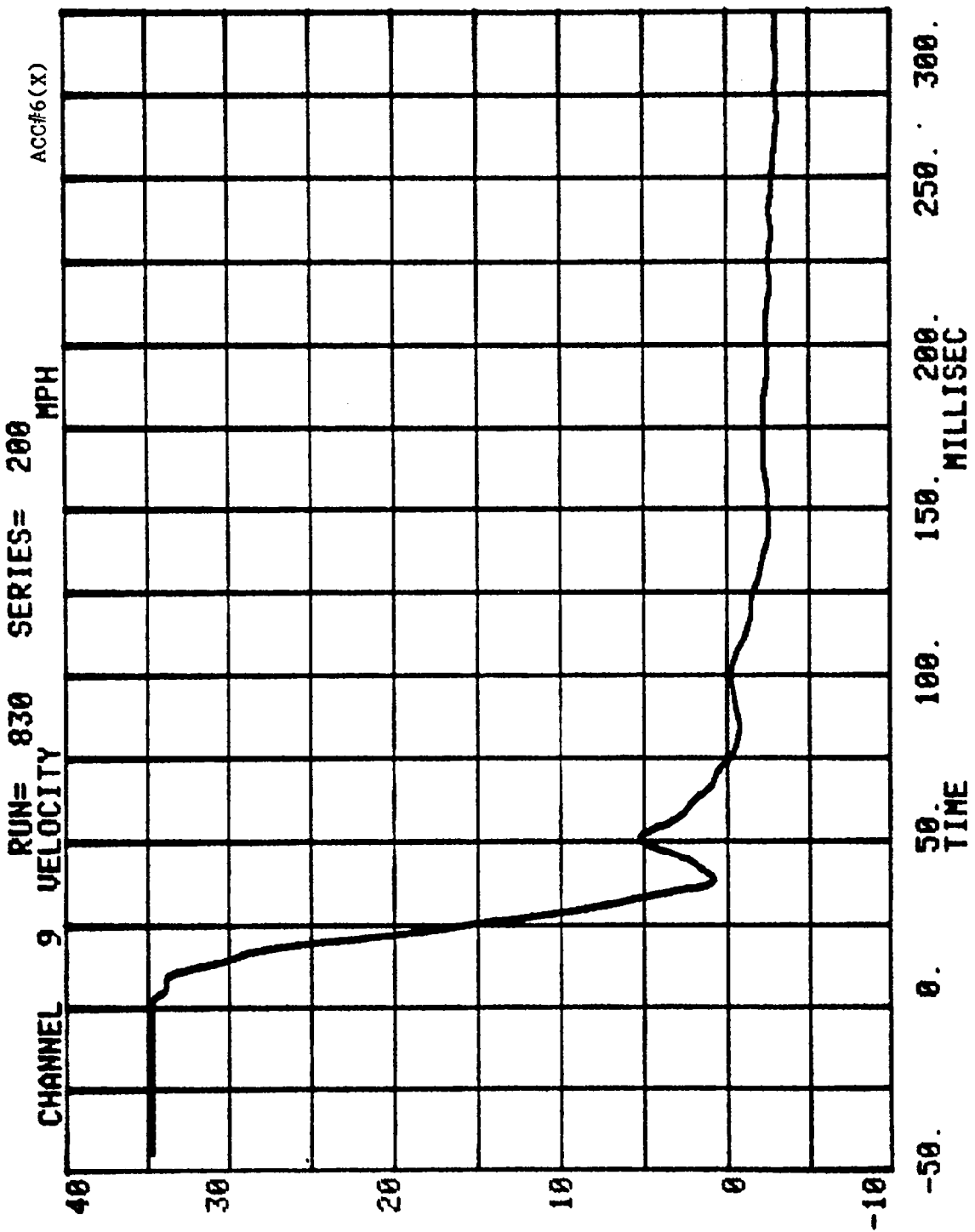


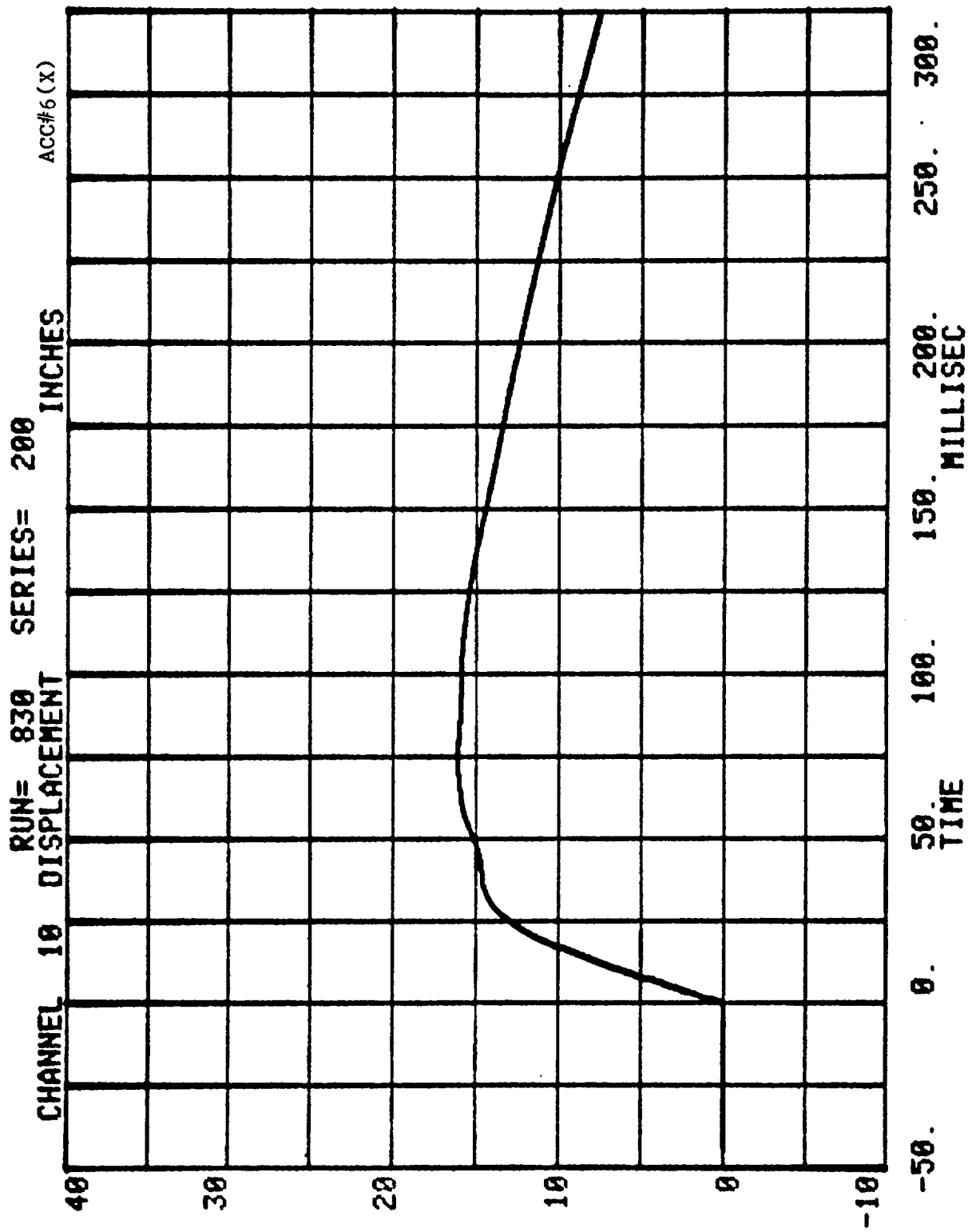


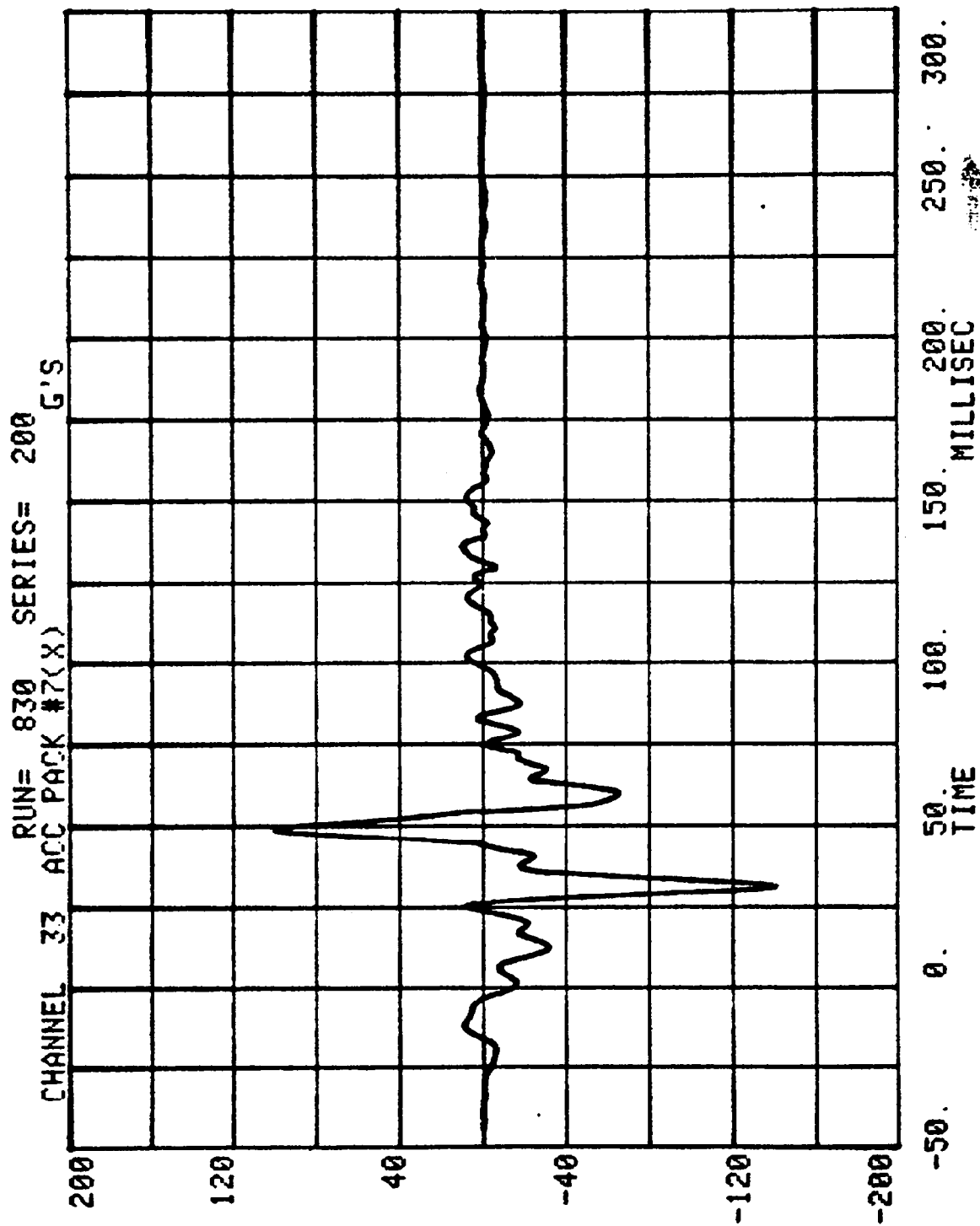


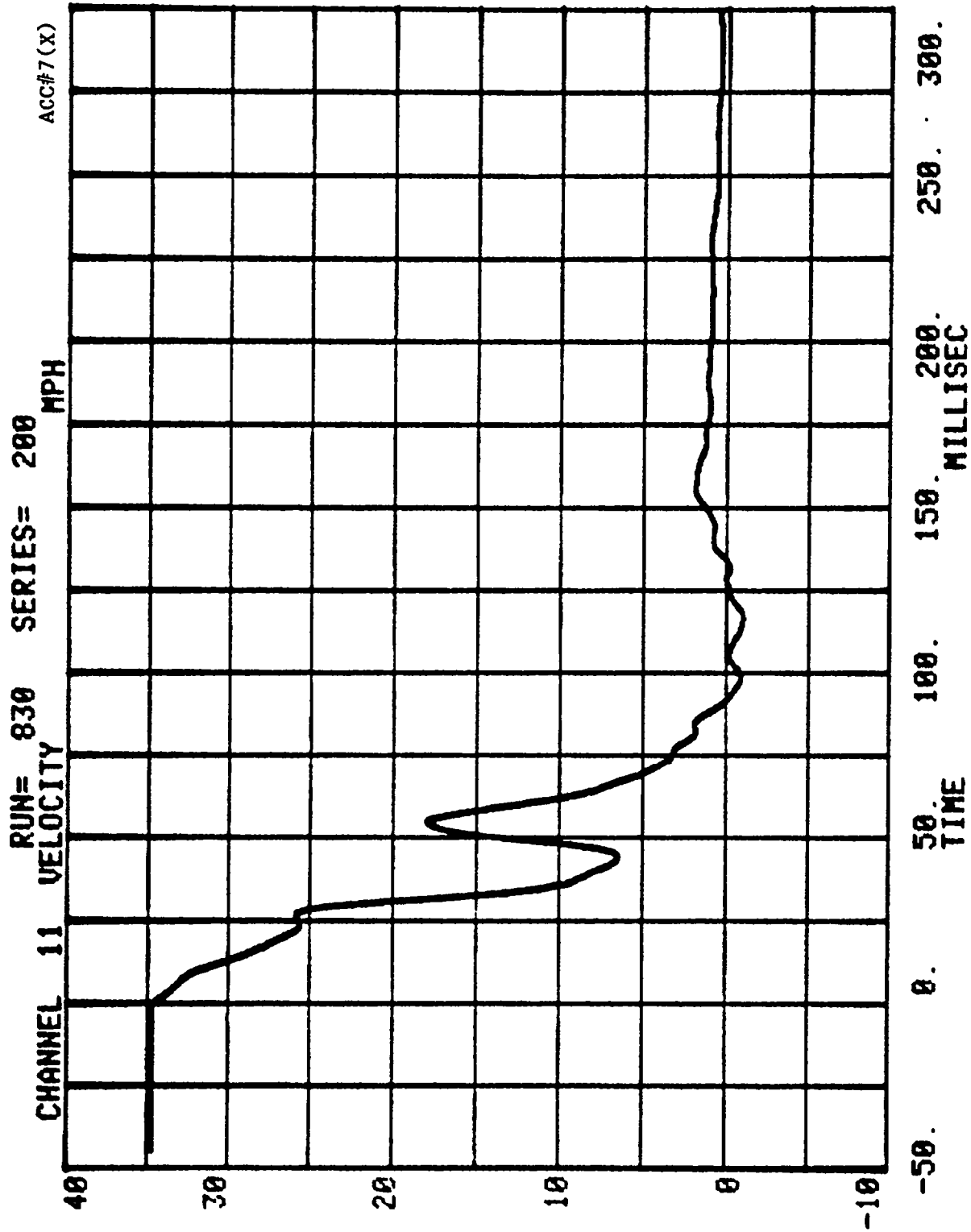
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CHANNEL 32 ACC PACK #6(X)

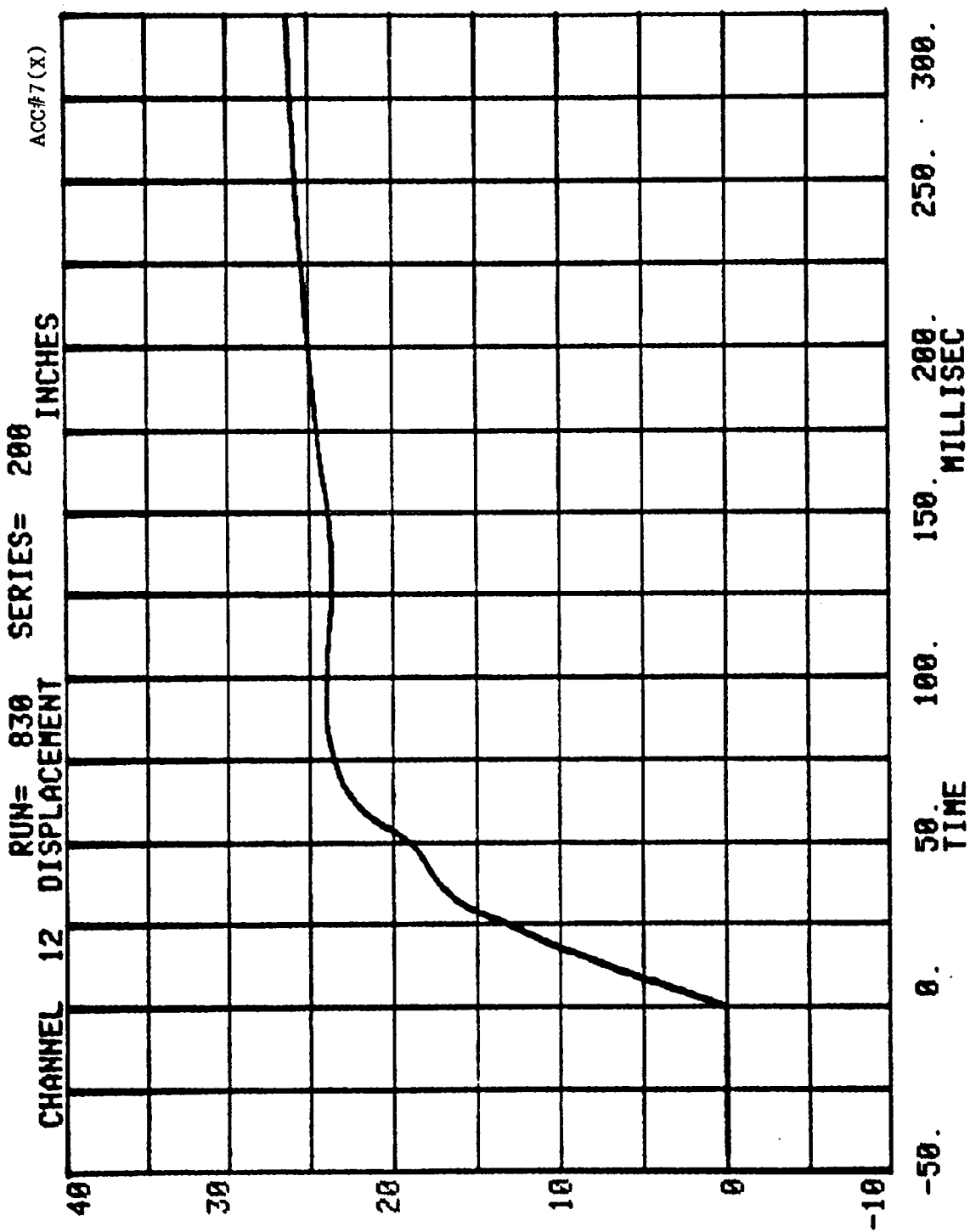












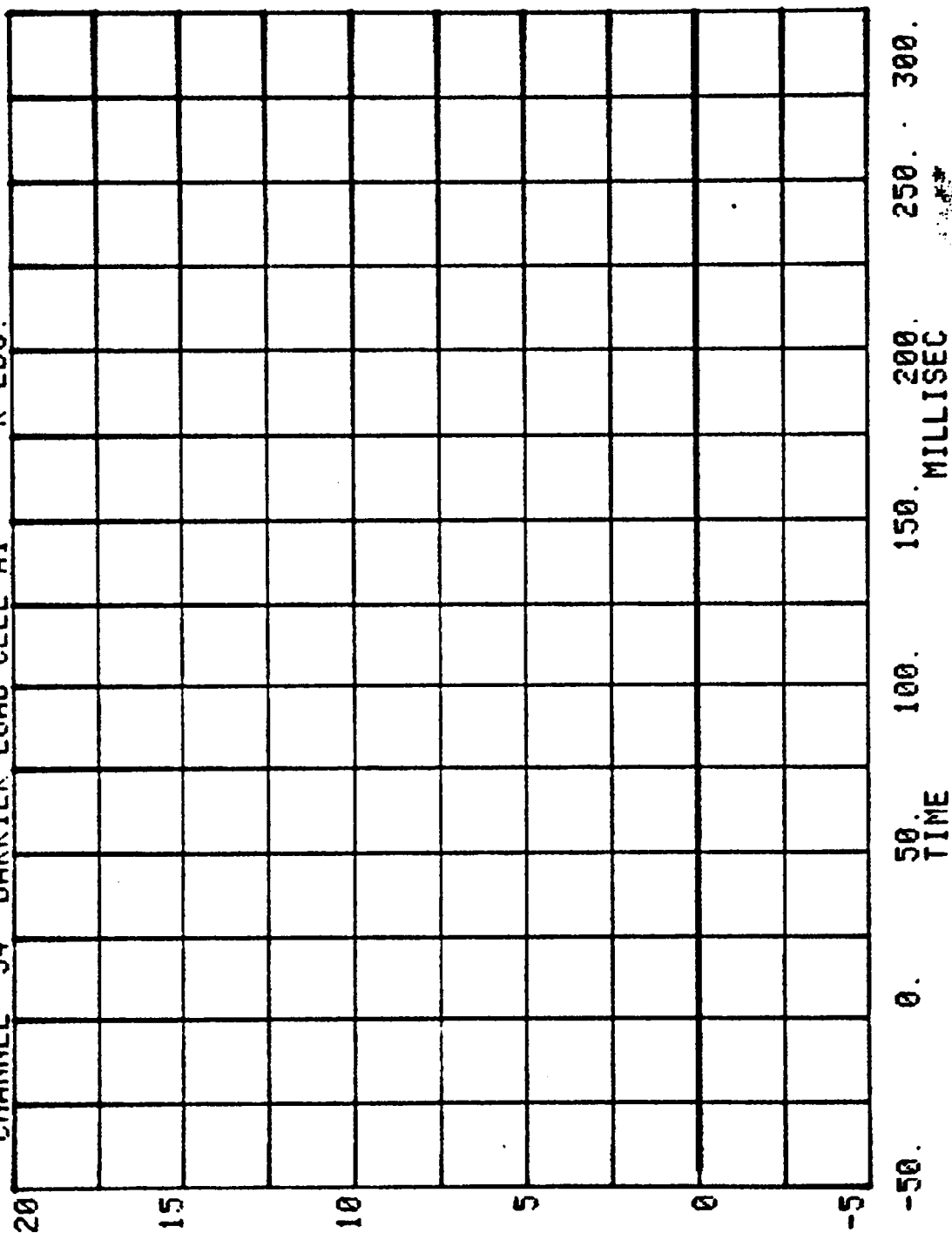
TEST NO. MJ0200

LOAD CELL BARRIER DATA

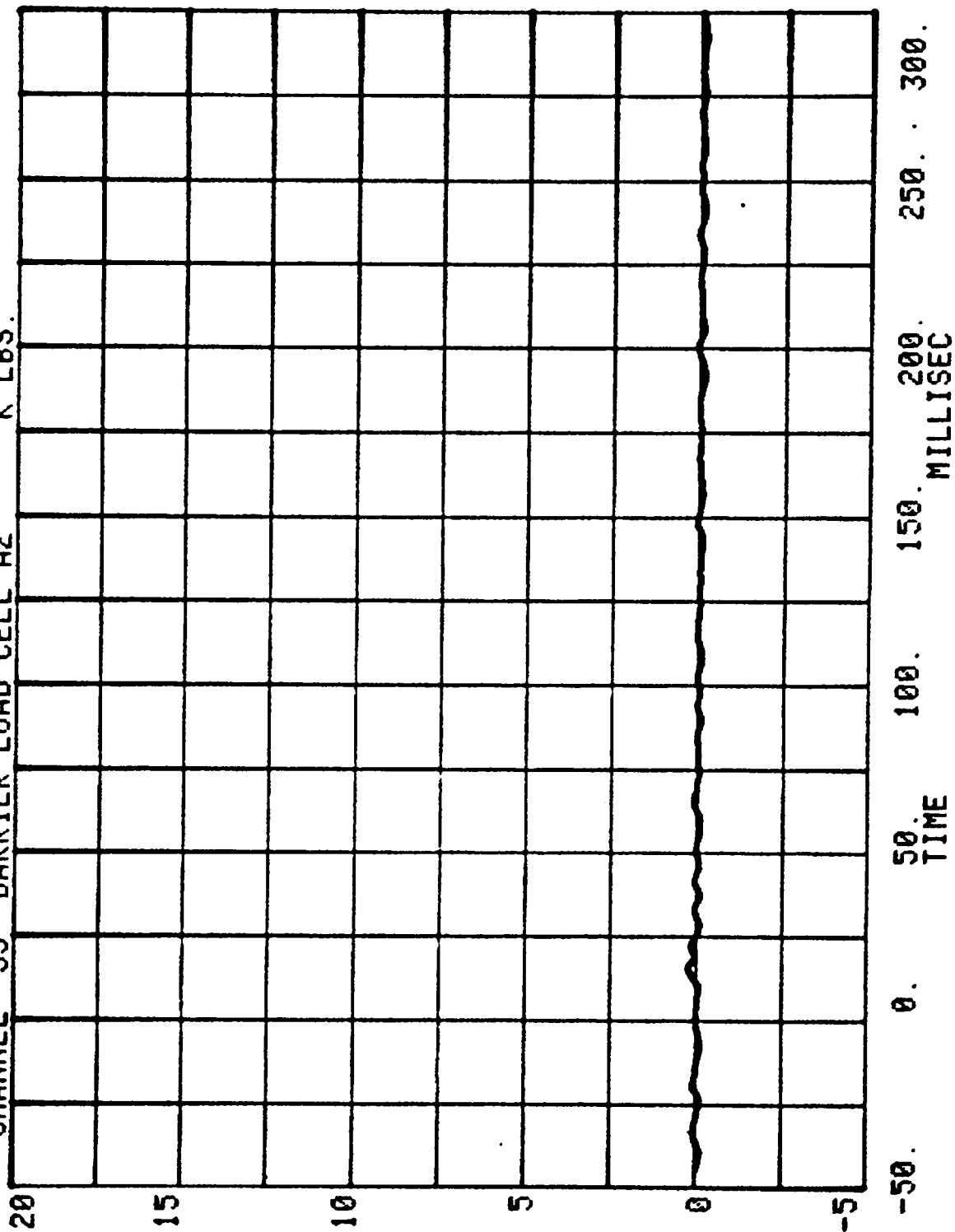
FILTER CHANNEL CLASS

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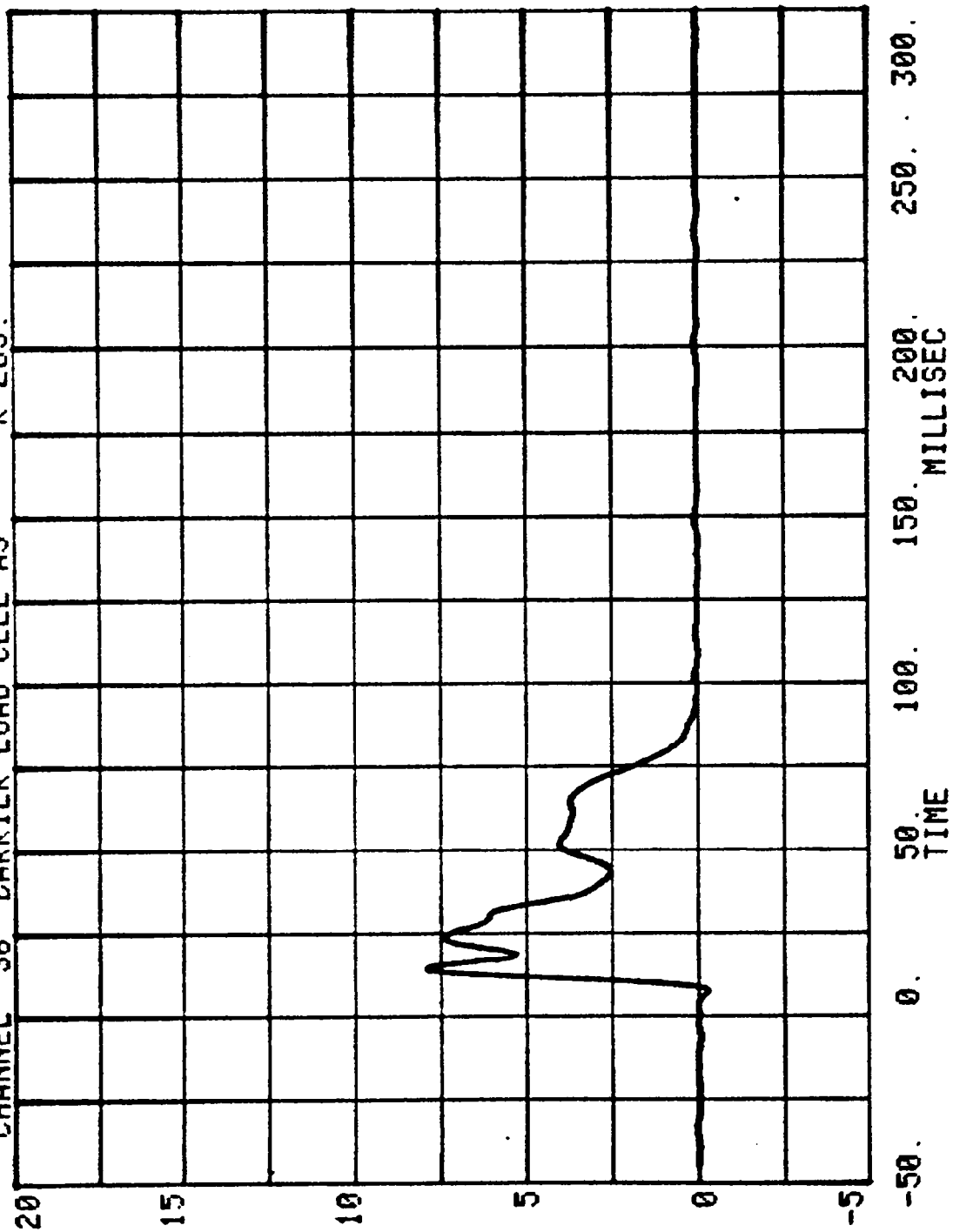
RUN= 830 SERIES= 200 K LBS.
CHANNEL 34 BARRIER LOAD CELL A1



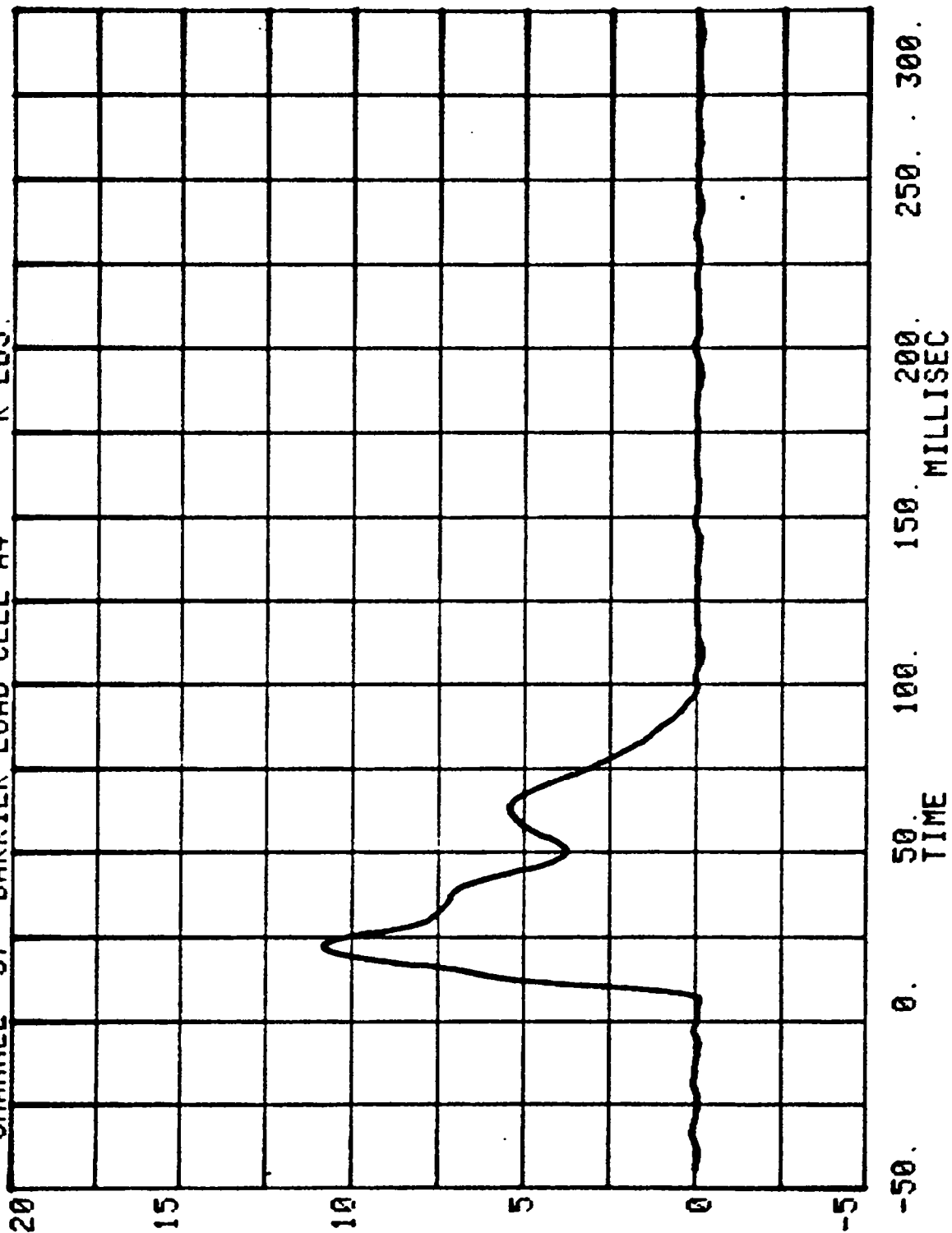
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CHANNEL 35 BARRIER LOAD CELL A2 K LBS.



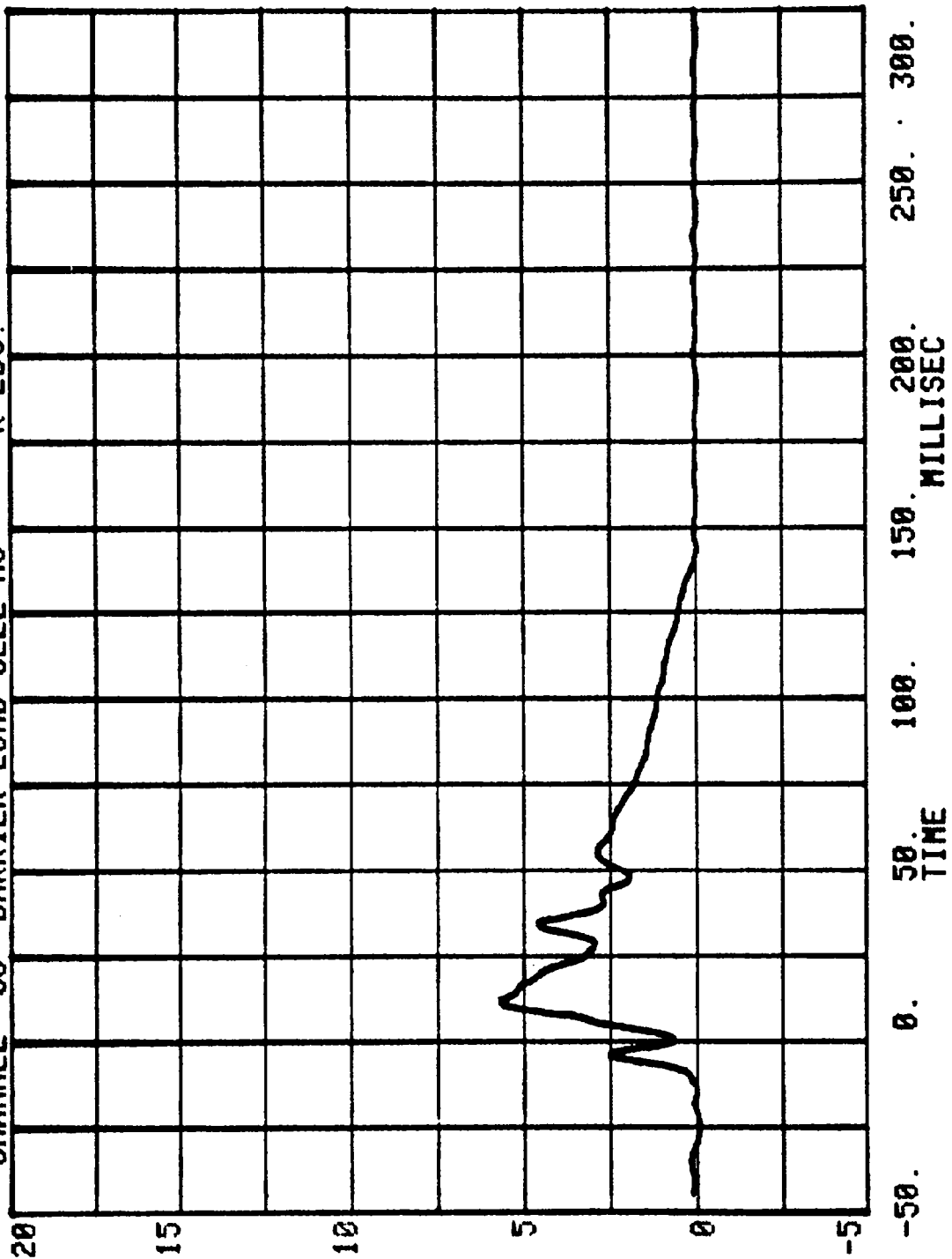
CHANNEL 36 BARRIER LOAD CELL A3 RUN= 830 SERIES= 200 K LBS.



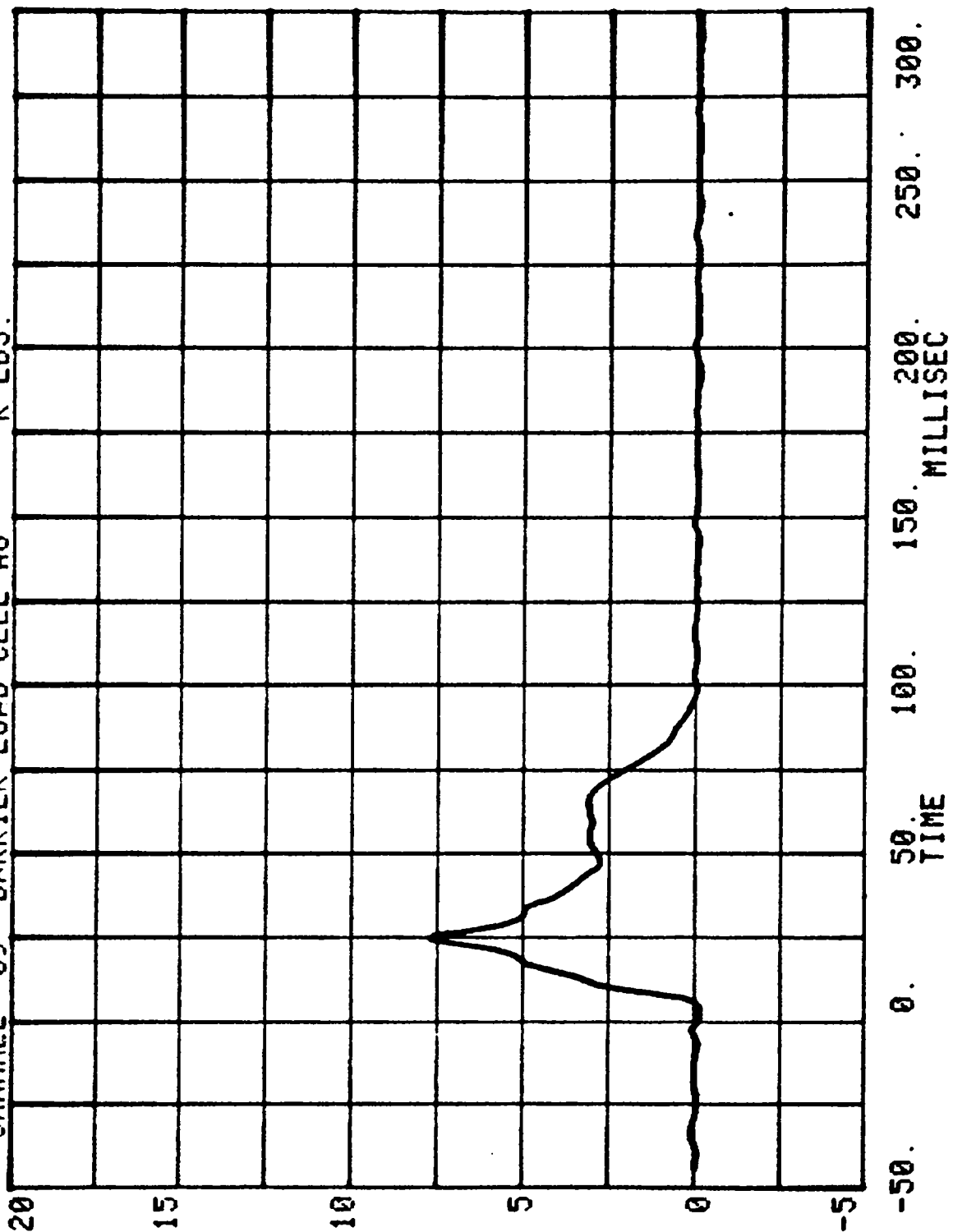
CHANNEL 37 BARRIER LOAD CELL A4 RUN= 830 SERIES= 200 K LBS.



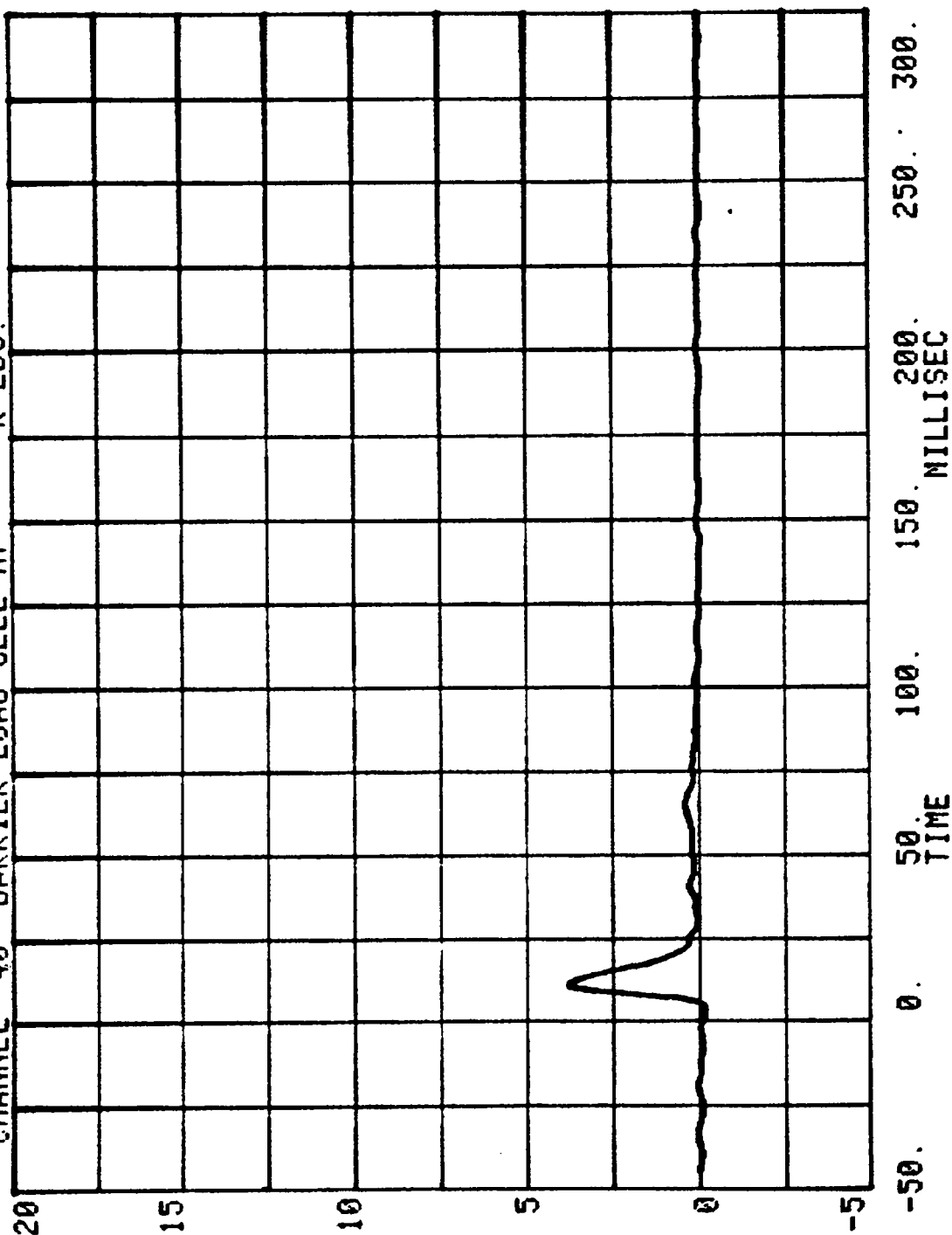
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CHANNEL 38 BARRIER LOAD CELL A5 K LBS.



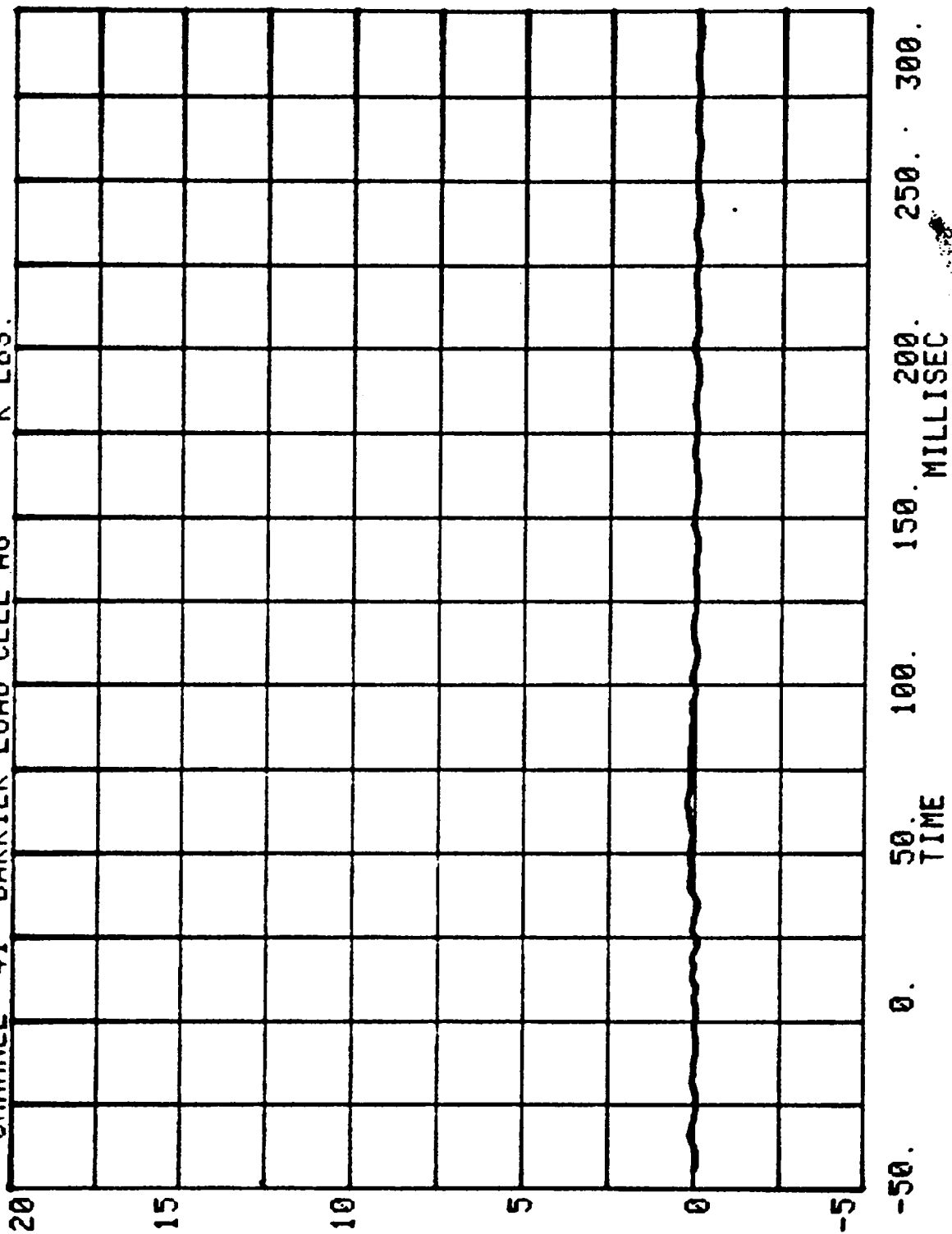
CHANNEL 39 BARRIER LOAD CELL A6 RUN= 830 SERIES= 200 K LBS.



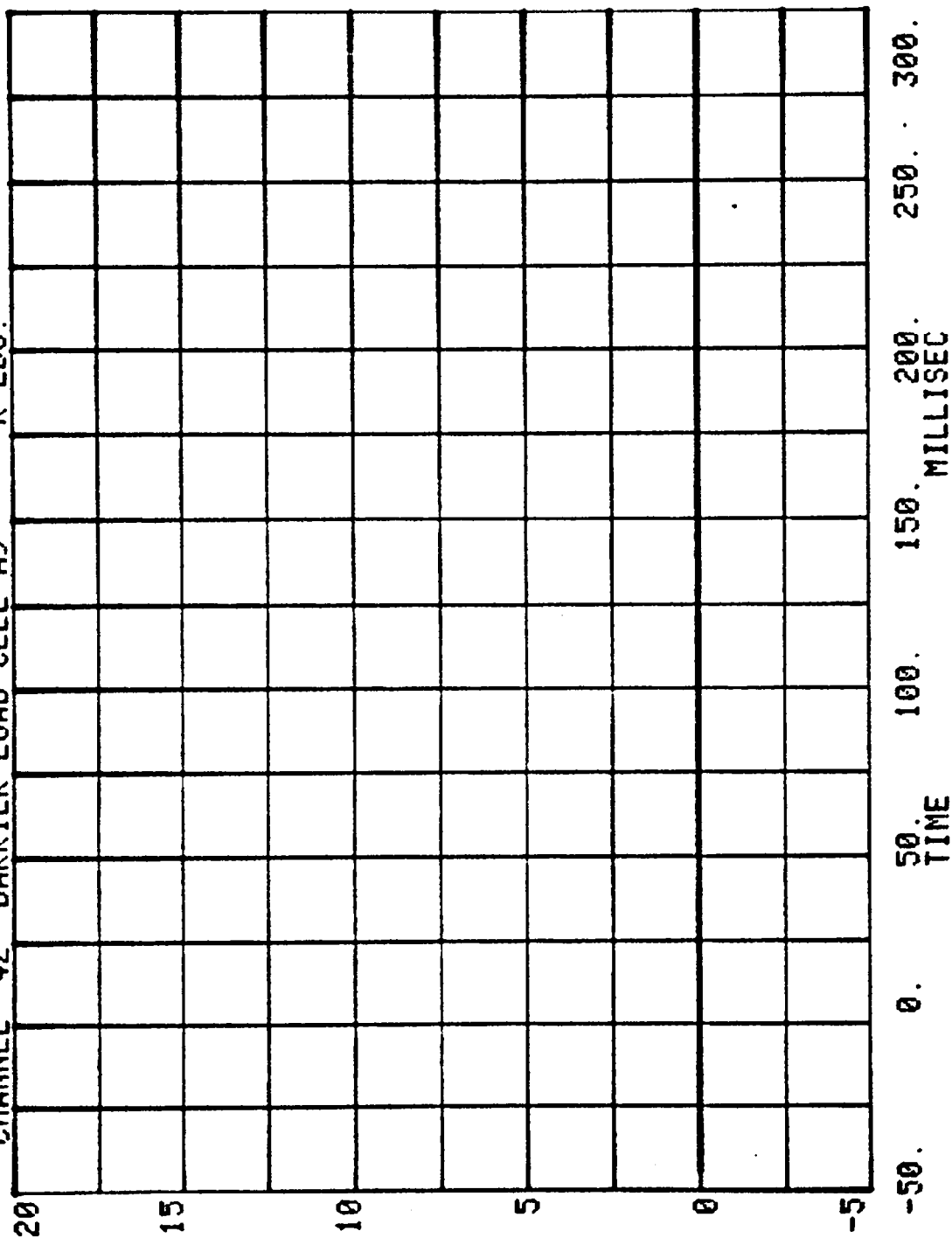
RUN= 830 SERIES= 200
CHANNEL 40 BARRIER LOAD CELL A7 K LBS.



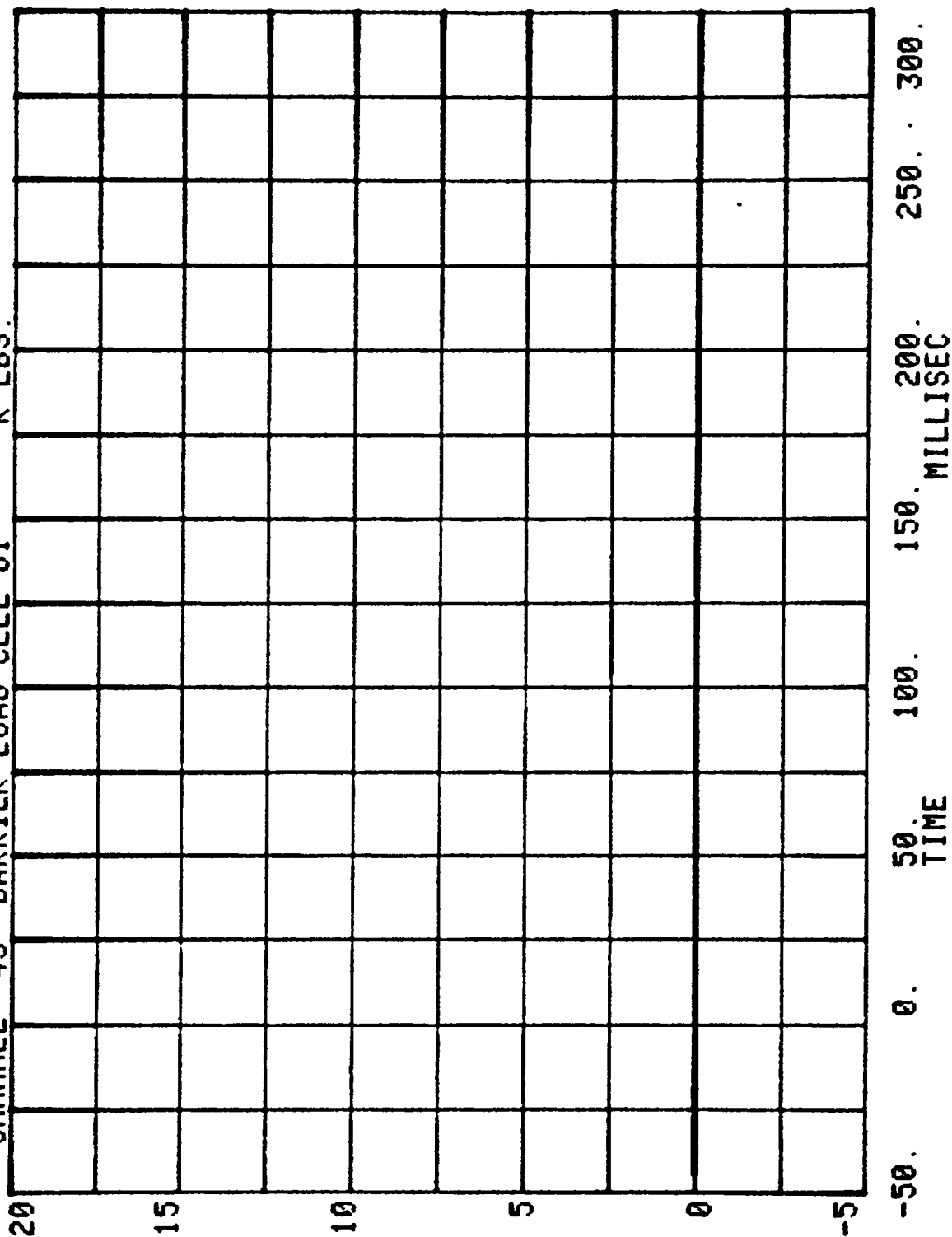
CHANNEL 41 BARRIER LOAD CELL A8 RUN= 830 SERIES= 200 K LBS.



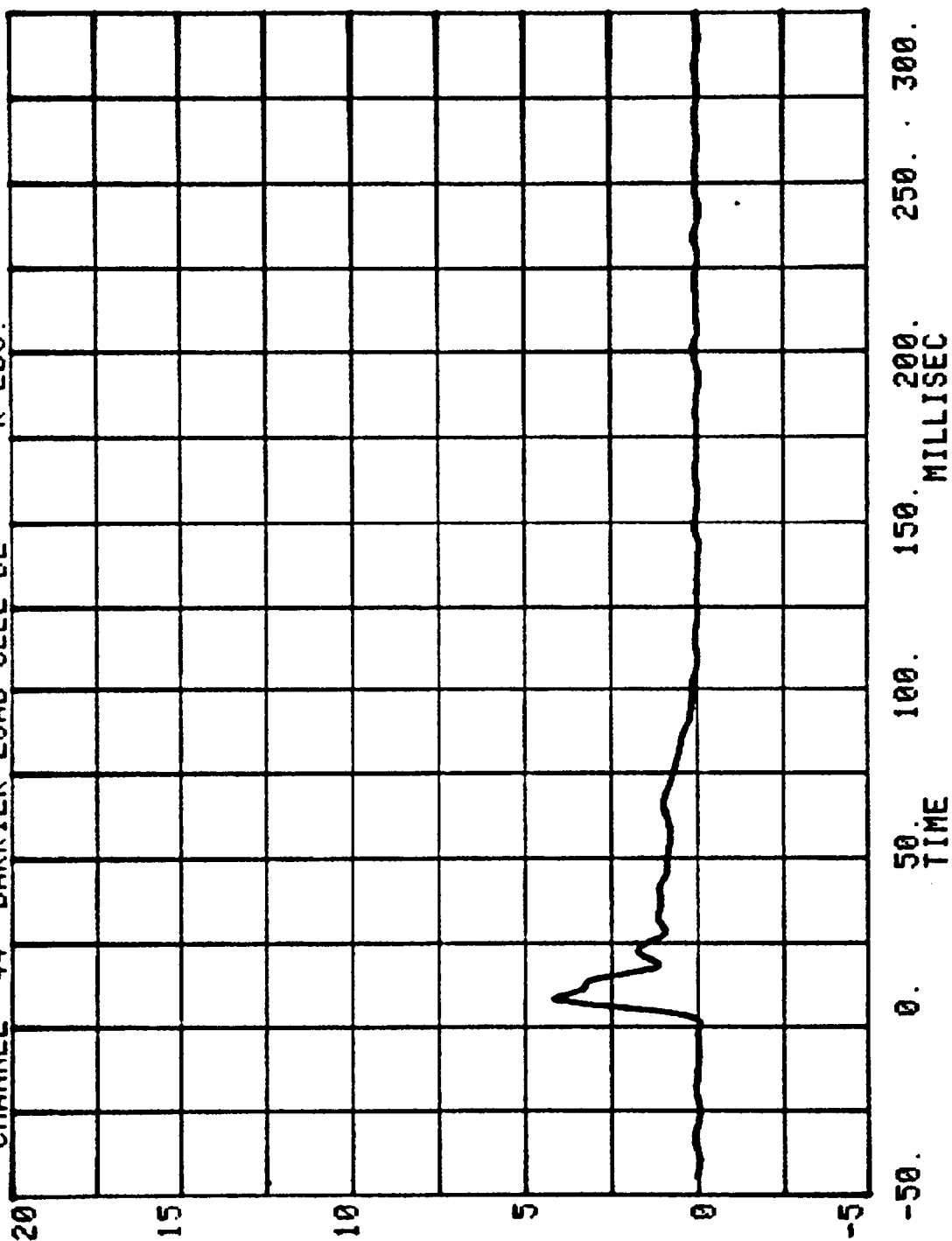
CHANNEL 42 BARRIER LOAD CELL A9 RUN= 830 SERIES= 200 K LBS.



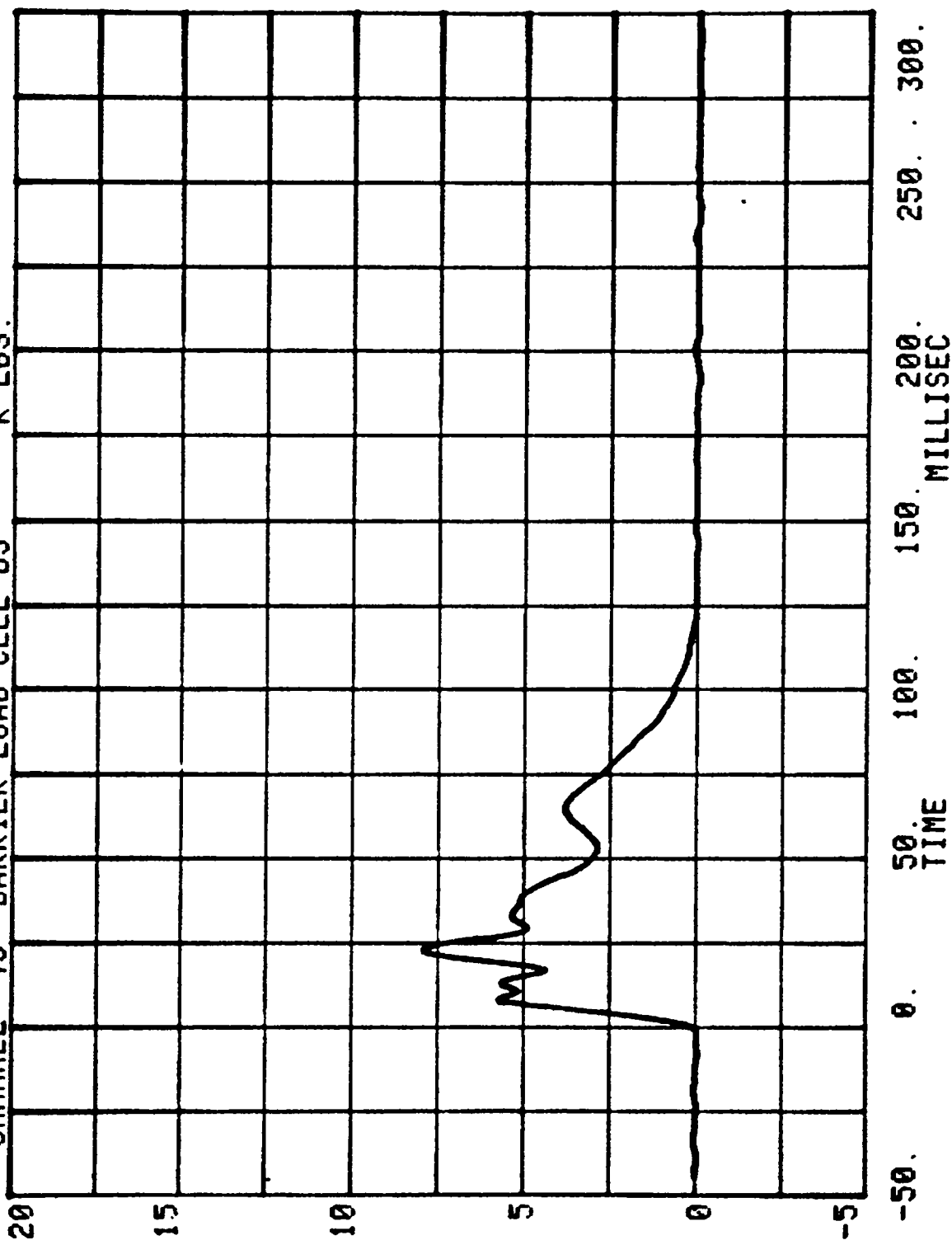
CHANNEL 43 BARRIER LOAD CELL 81 RUN= 830 SERIES= 200 K LBS.



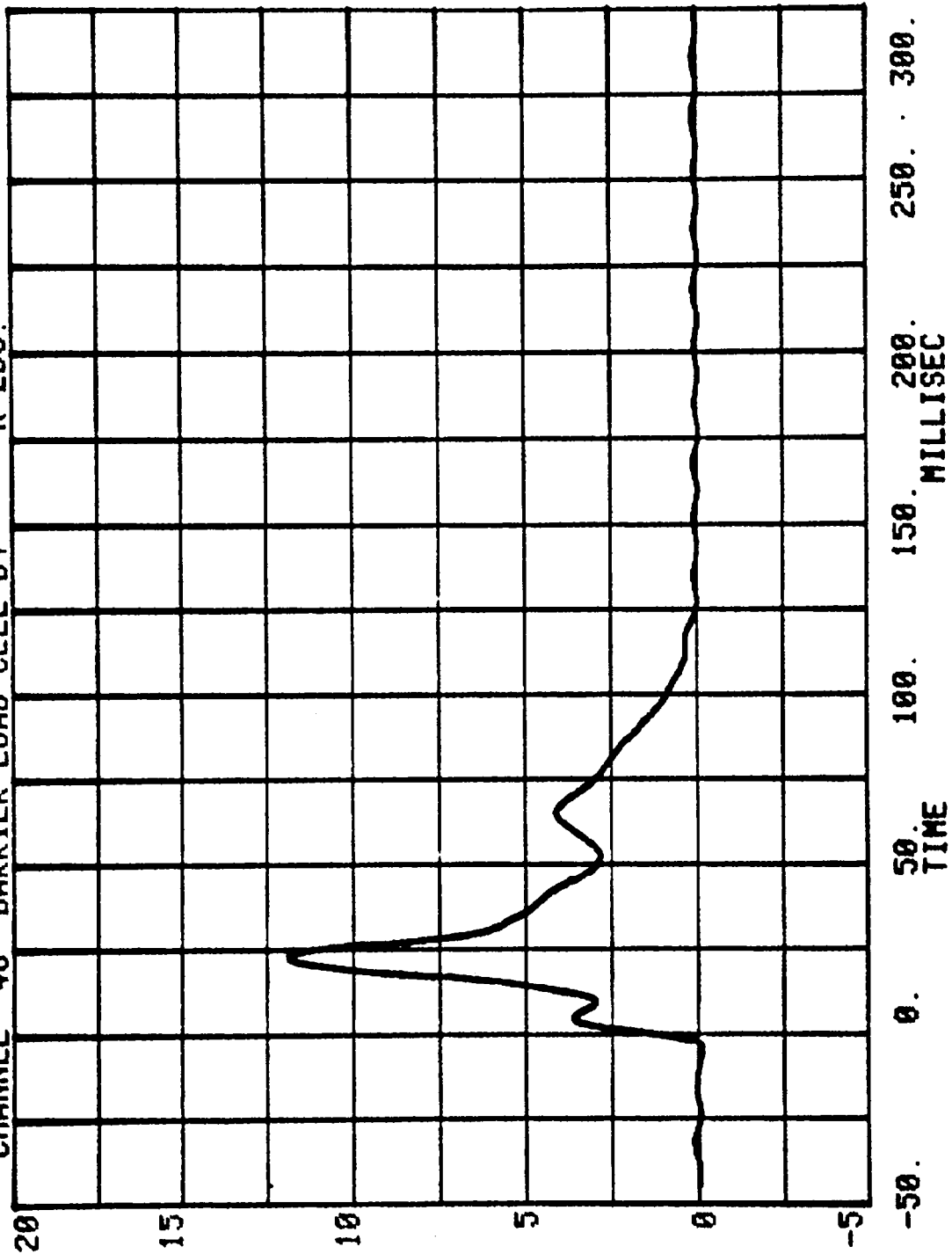
CHANNEL 44 BARRIER LOAD CELL B2 RUN= 830 SERIES= 200 K LBS.



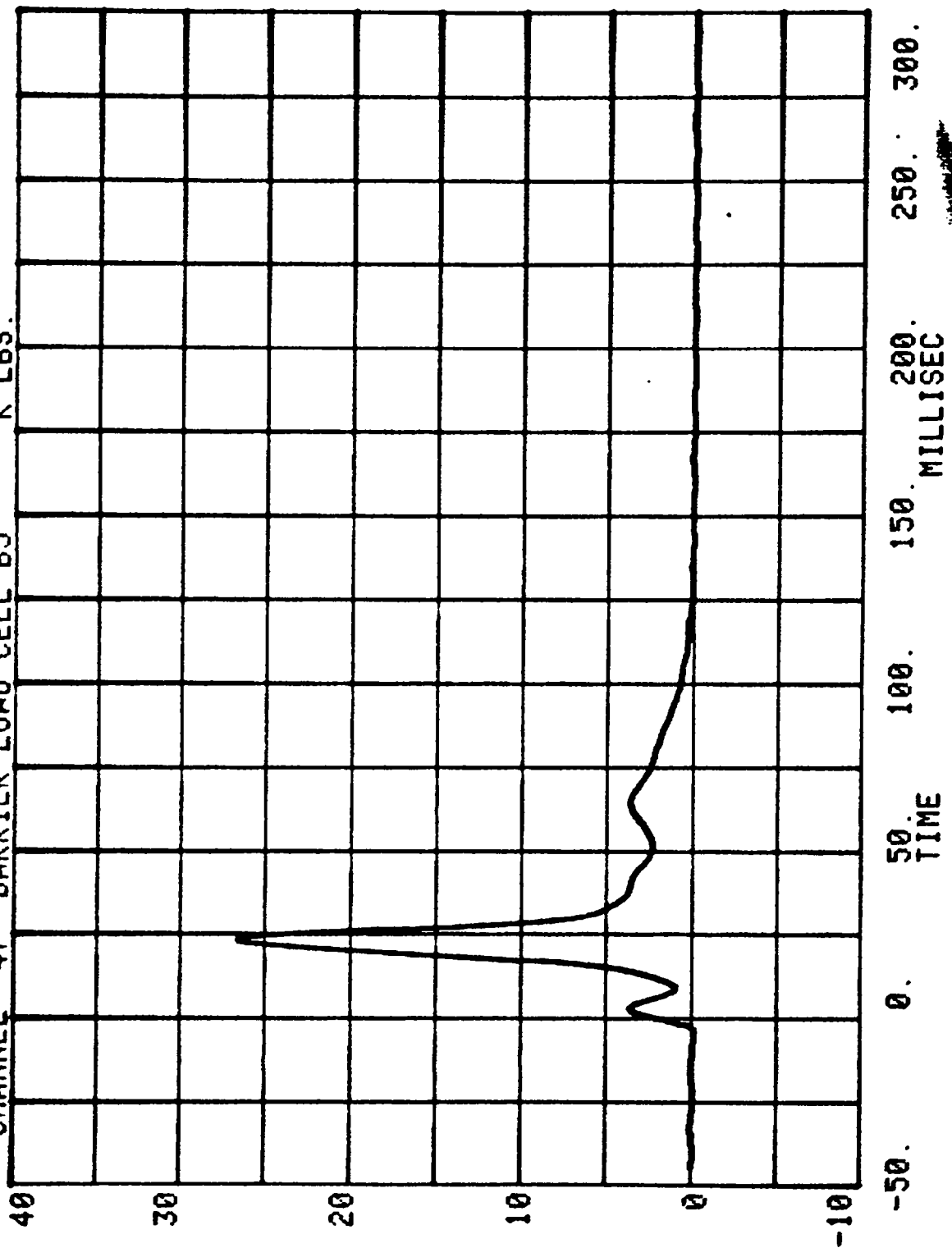
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CHANNEL 45 BARRIER LOAD CELL B3 K LBS.



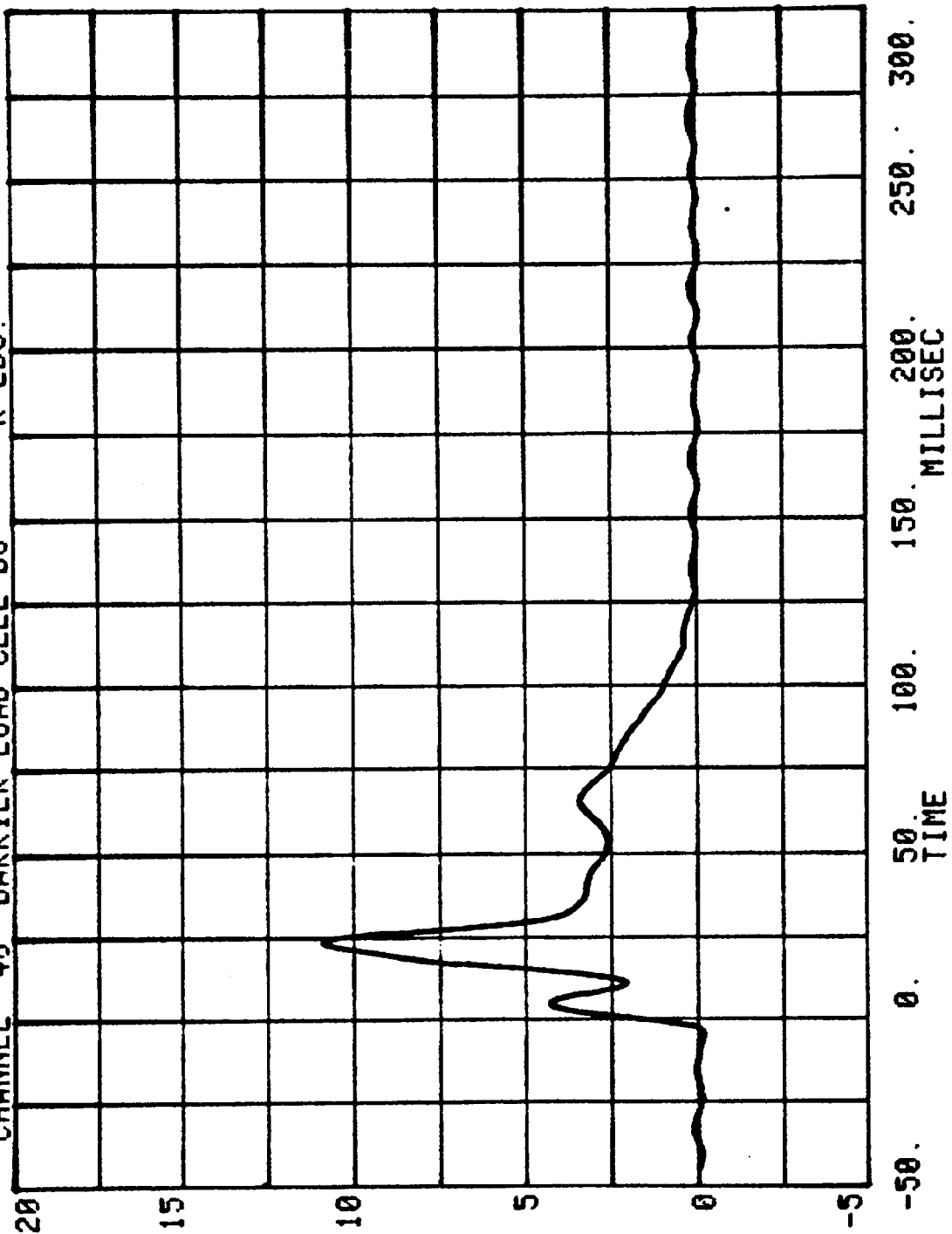
CHANNEL 46 BARRIER LOAD CELL B4 RUN= 830 SERIES= 200 K LBS.



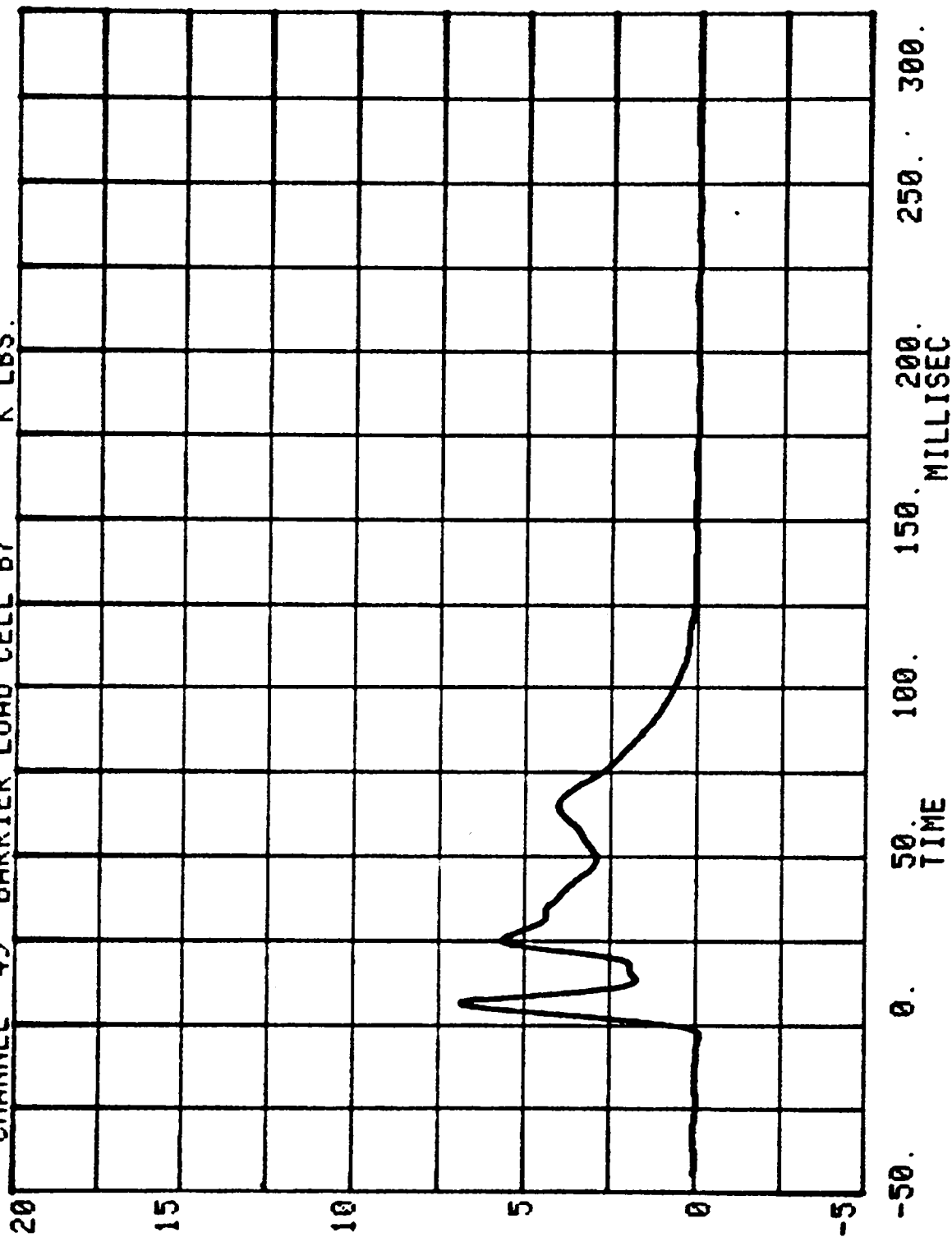
CHANNEL 47 RUN= 830 SERIES= 200 K LBS.



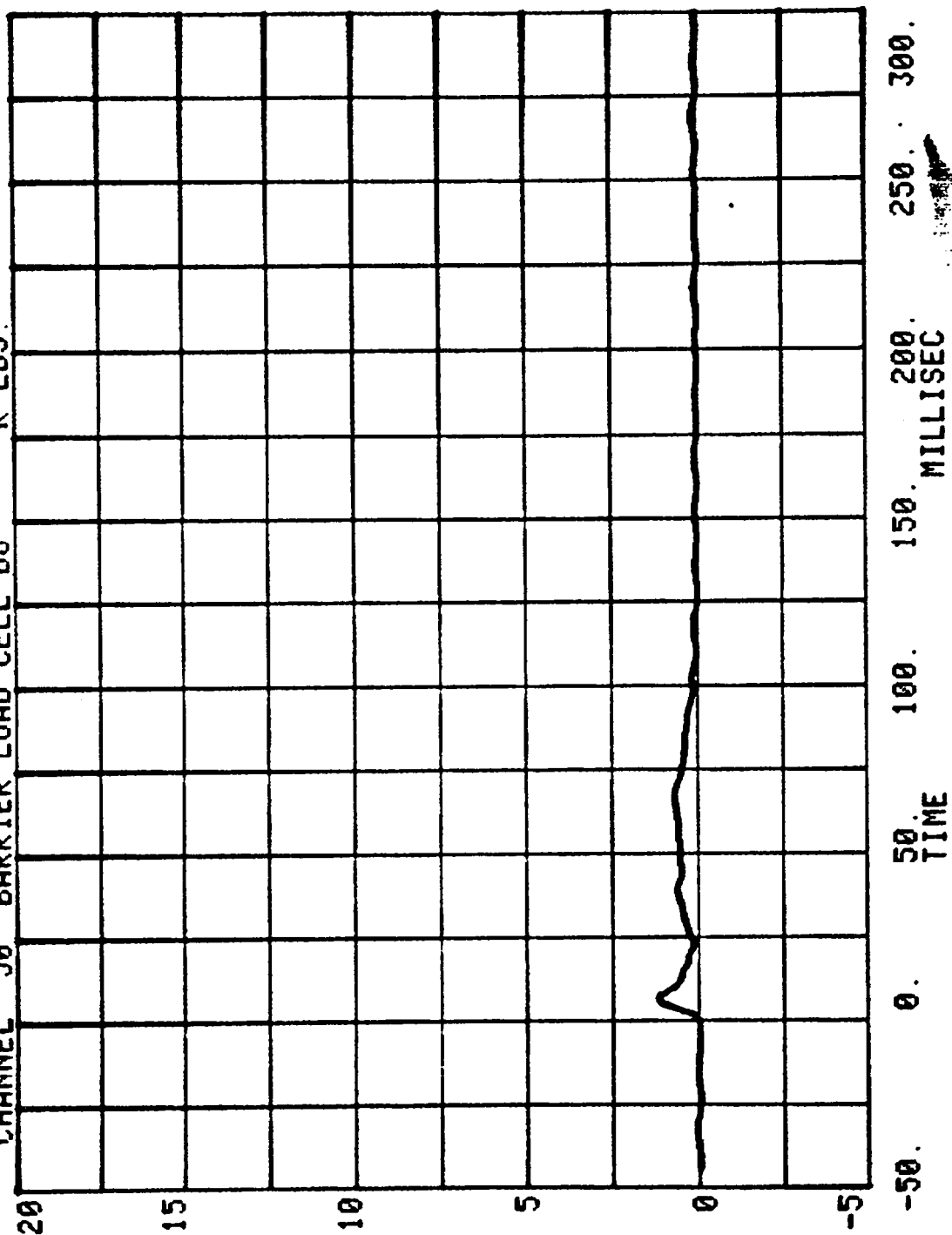
CHANNEL 48 BARRIER LOAD CELL B6 RUN= 830 SERIES= 200 K LBS.



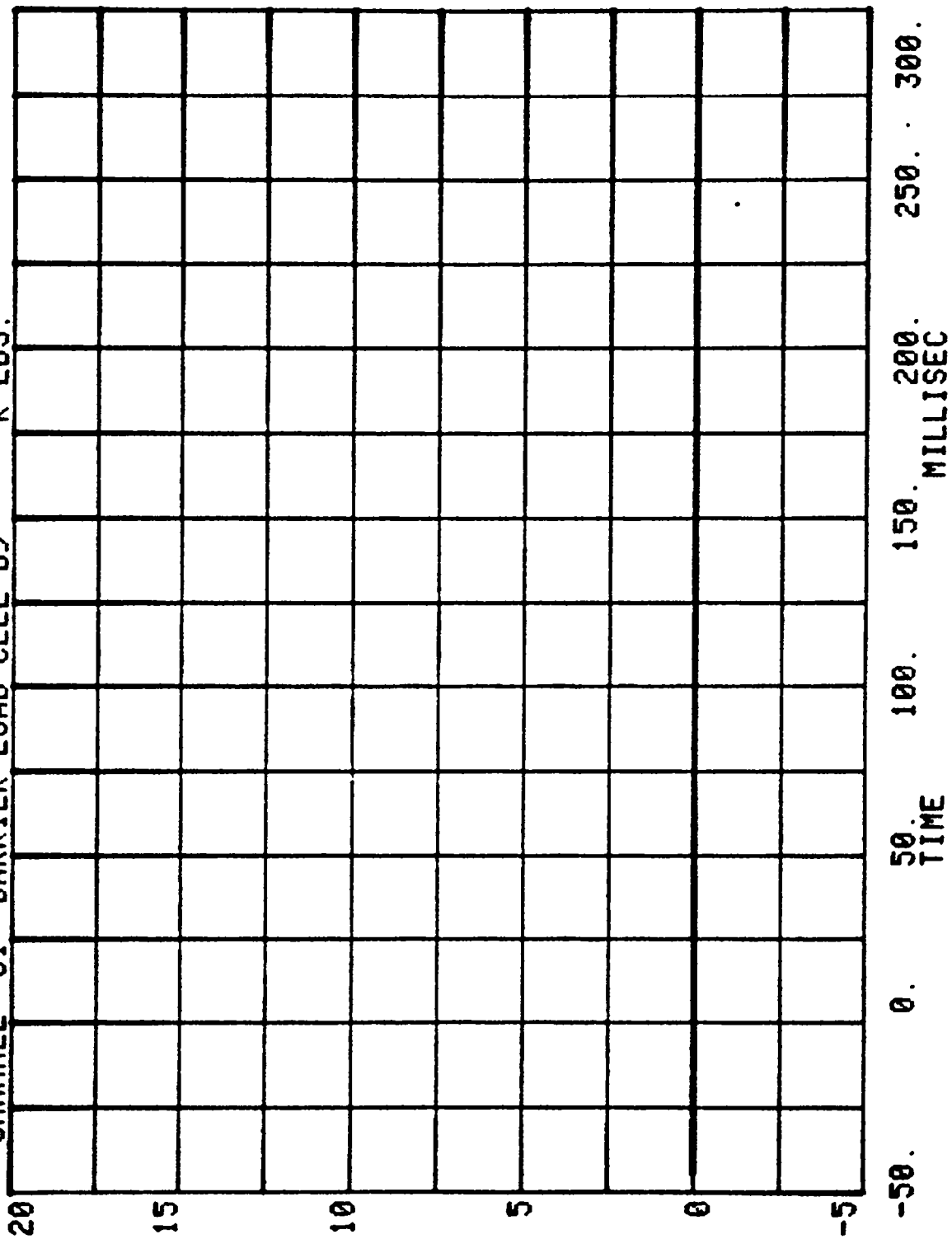
CHANNEL 49 RUN= 830 SERIES= 200
BARRIER LOAD CELL B7 K LBS.



RUN= 830 SERIES= 200 K LBS.
CHANNEL 50 BARRIER LOAD CELL B8

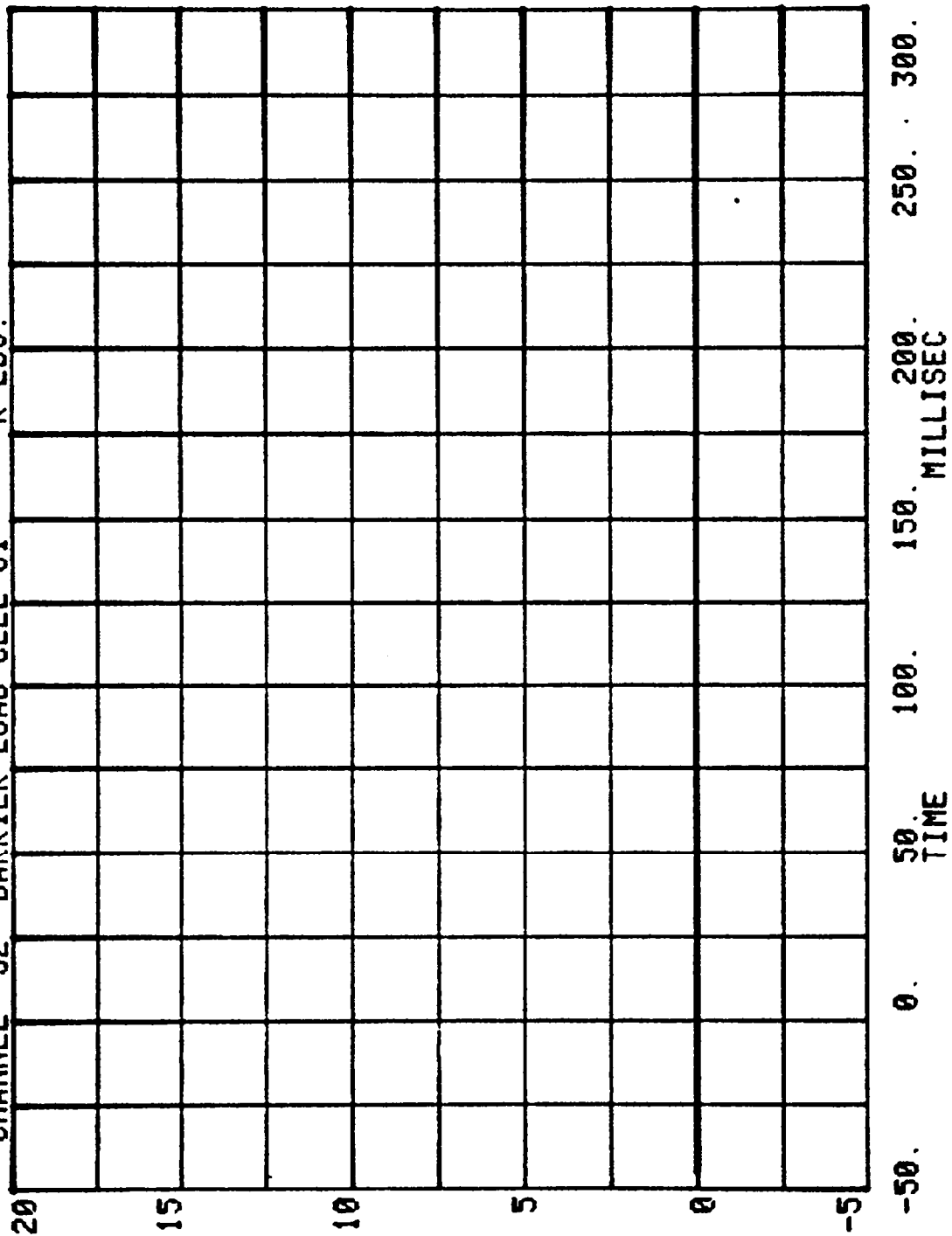


RUN= 830 SERIES= 200
 CHANNEL 51 BARRIER LOAD CELL B9 K LBS.

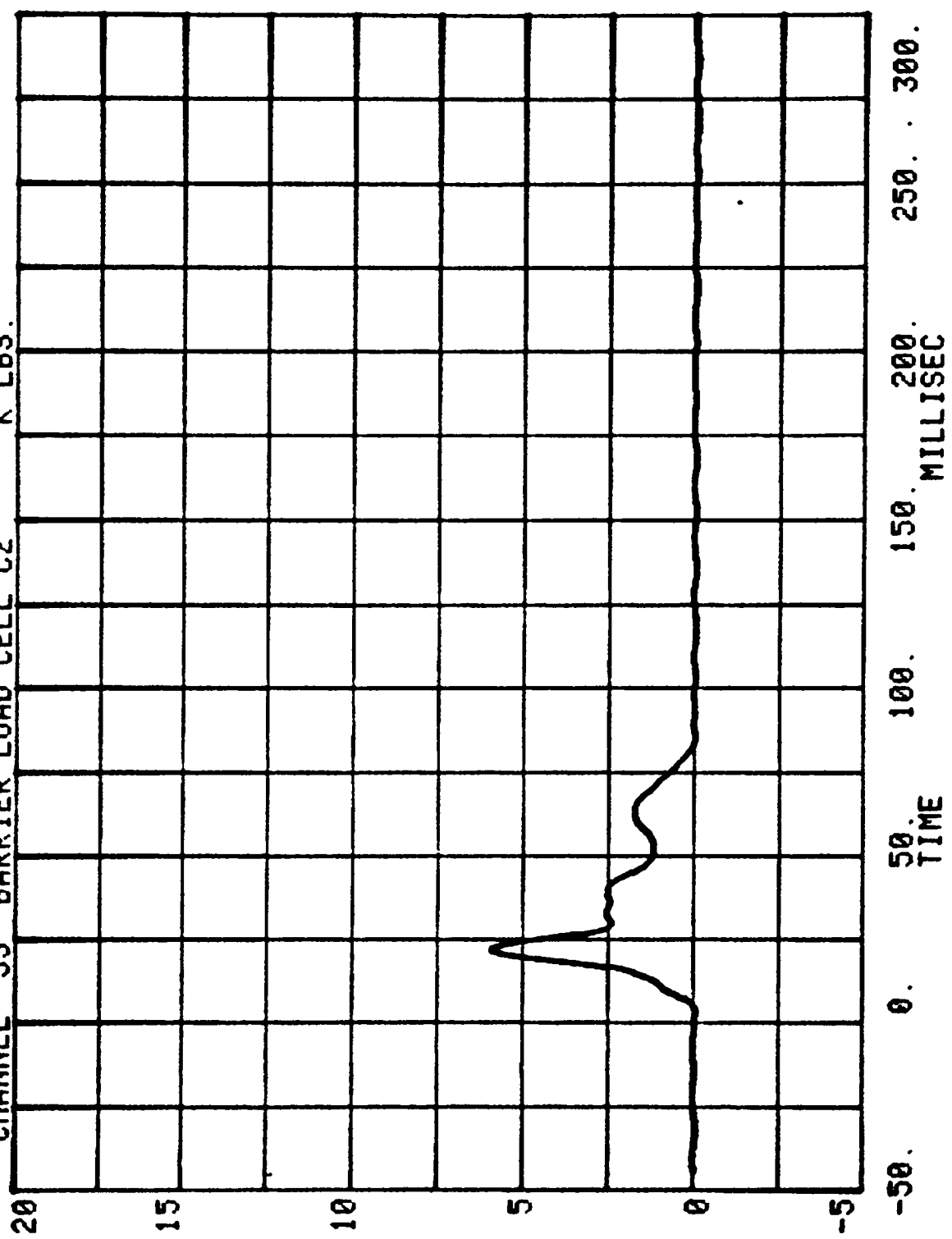


7626-19

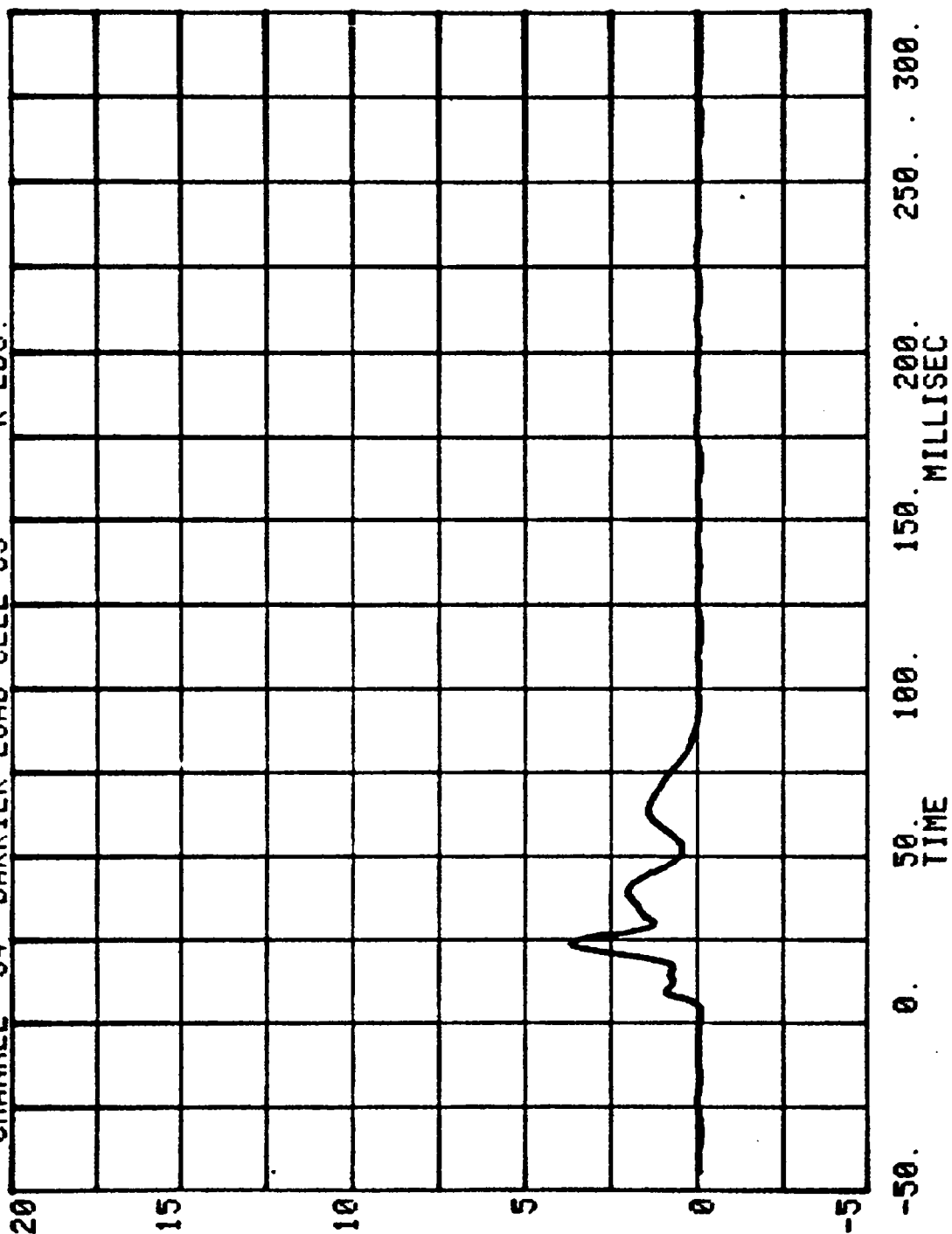
CHANNEL 52 BARRIER LOAD CELL C1 RUN= 830 SERIES= 200 K LBS.



CHANNEL 53 BARRIER LOAD CELL C2 RUN= 830 SERIES= 200 K LBS.



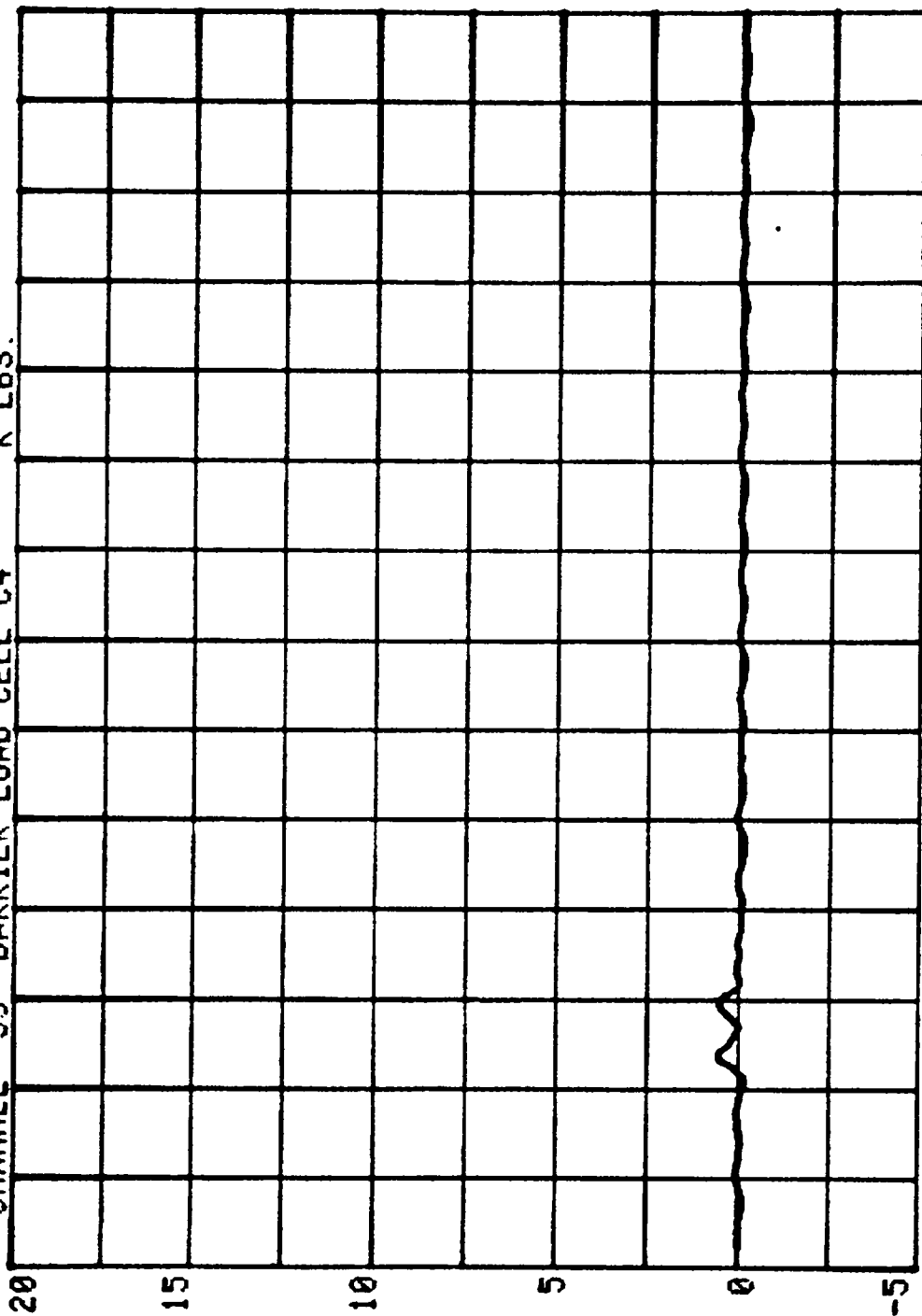
CHANNEL 54 BARRIER LOAD CELL C3 RUN= 830 SERIES= 200 K LBS.



CHANNEL 55 BARRIER LOAD CELL C4

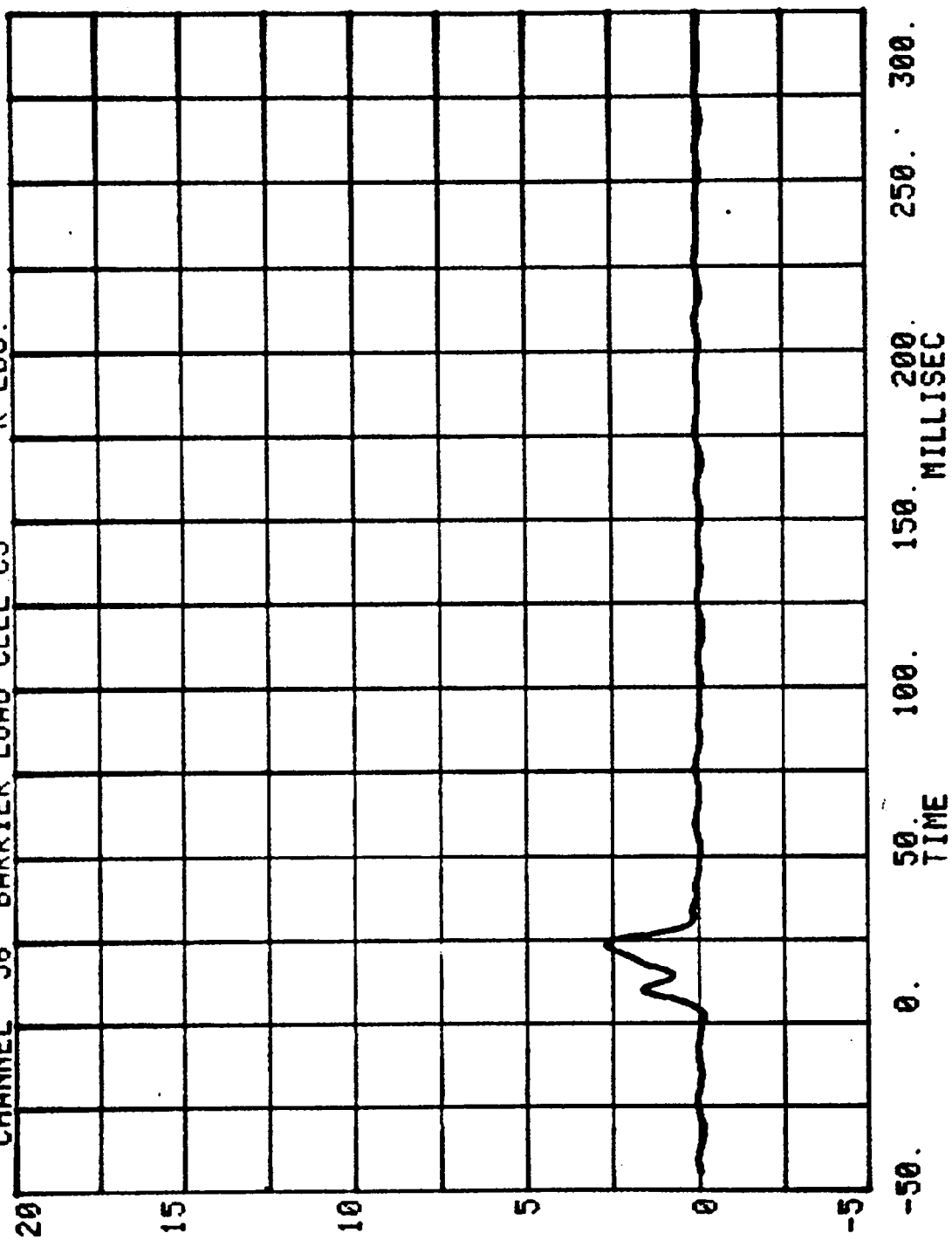
RUN= 830 SERIES= 200

K LBS.



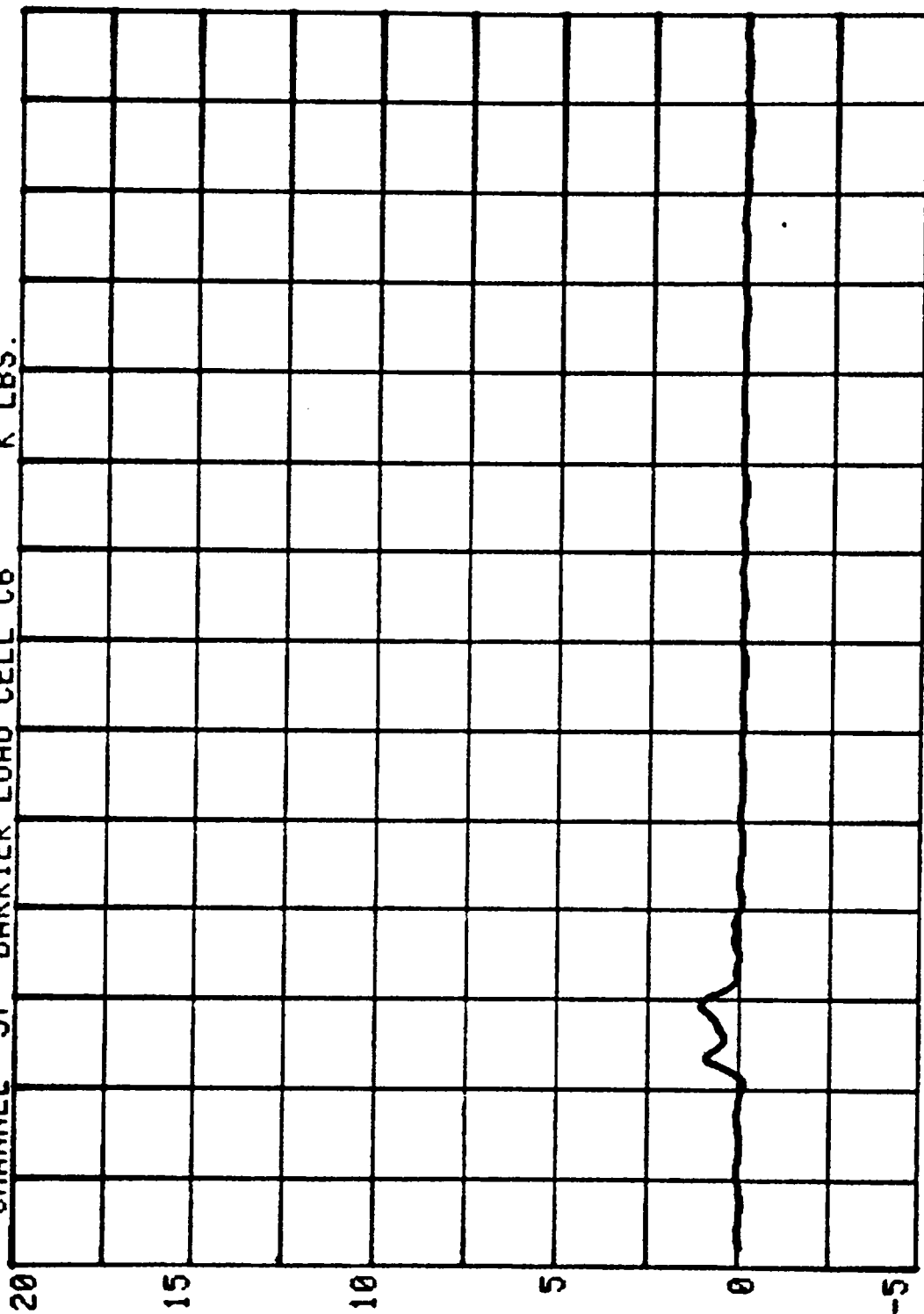
-50. 0. 50. 100. 150. 200. 250. 300.
TIME MILLISEC

CHANNEL 56 BARRIER LOAD CELL C5
RUN= 830 SERIES= 200 K LBS.

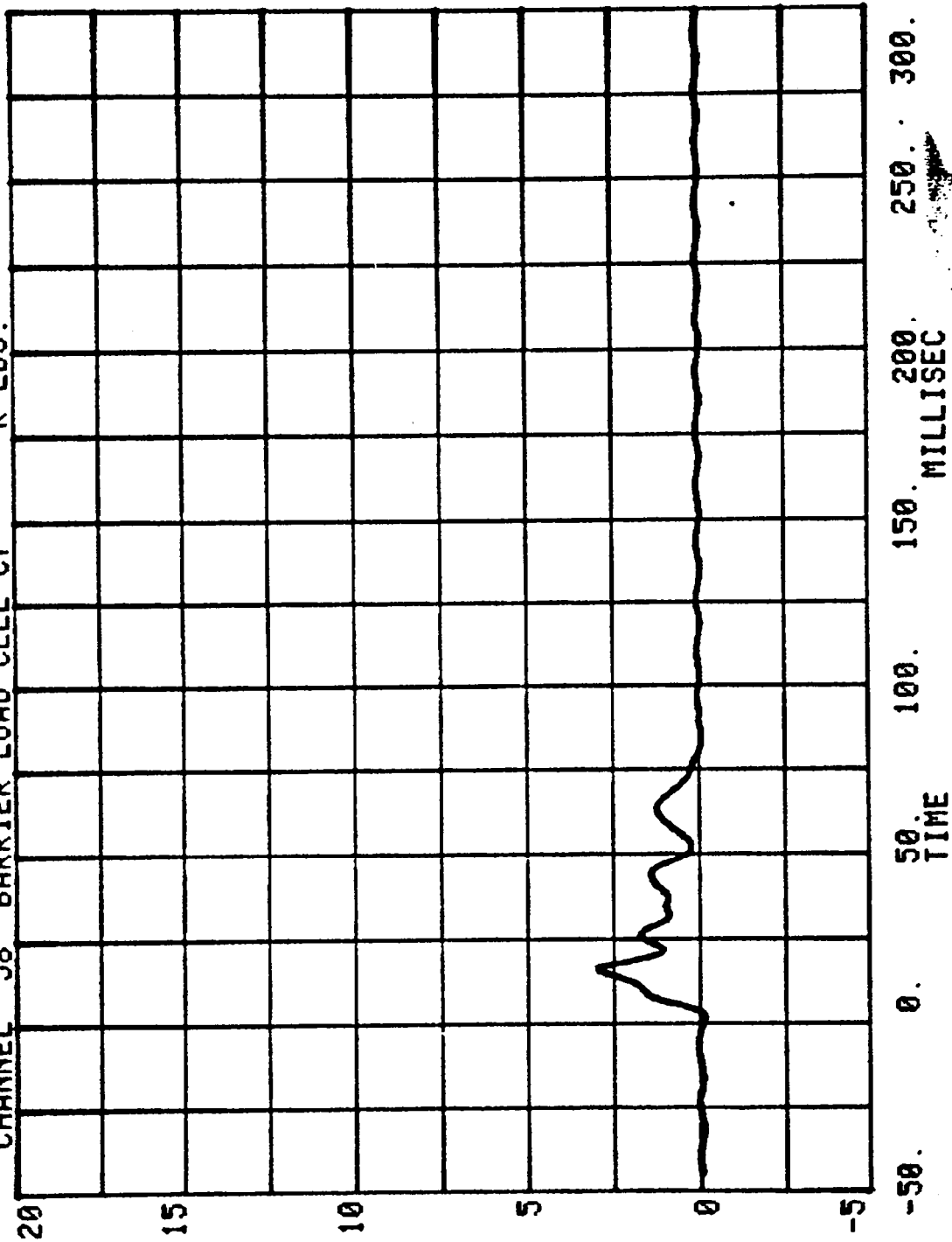


CHANNEL 57 BARRIER LOAD CELL C6 K LBS.

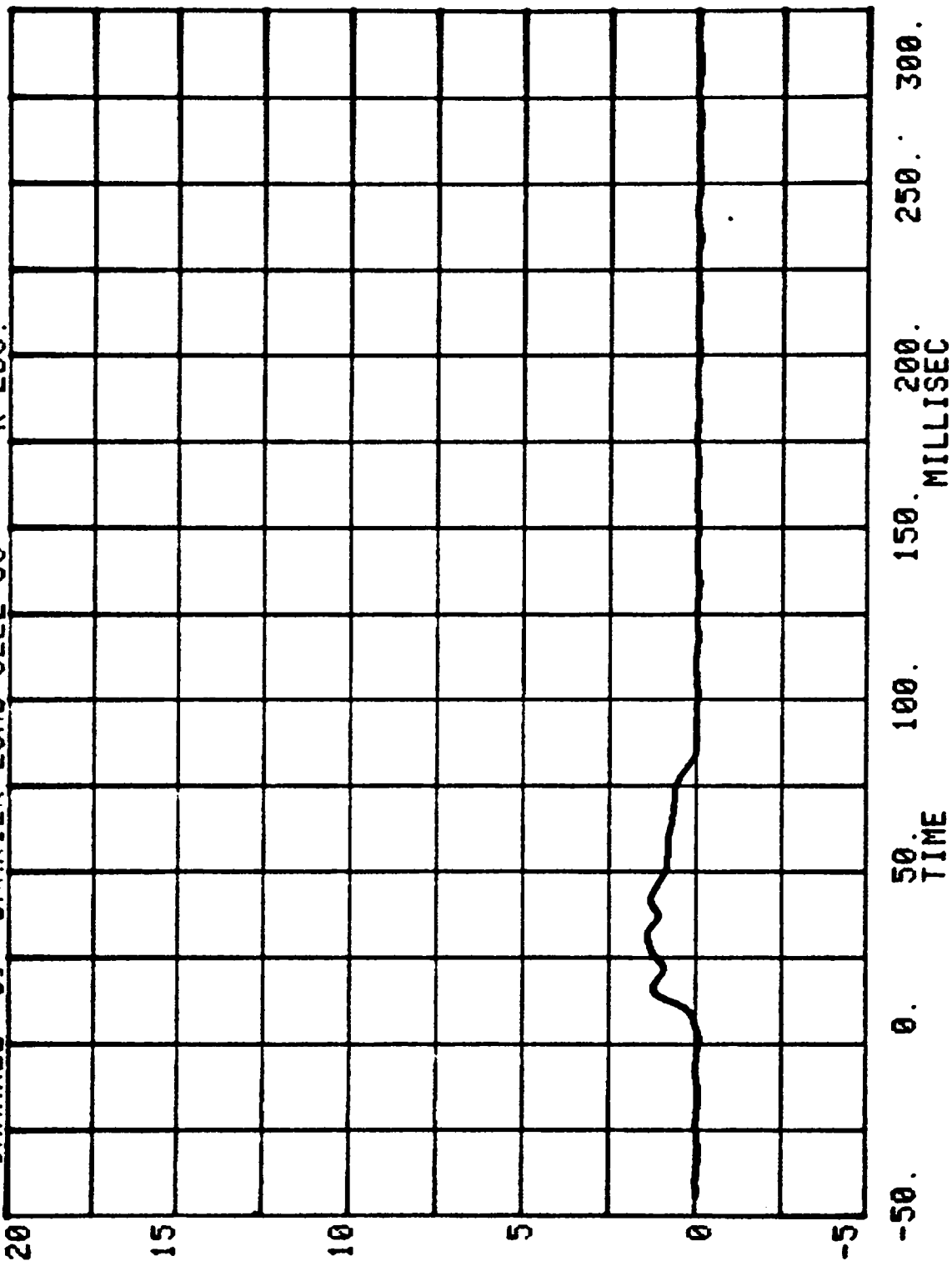
RUN= 830 SERIES= 200



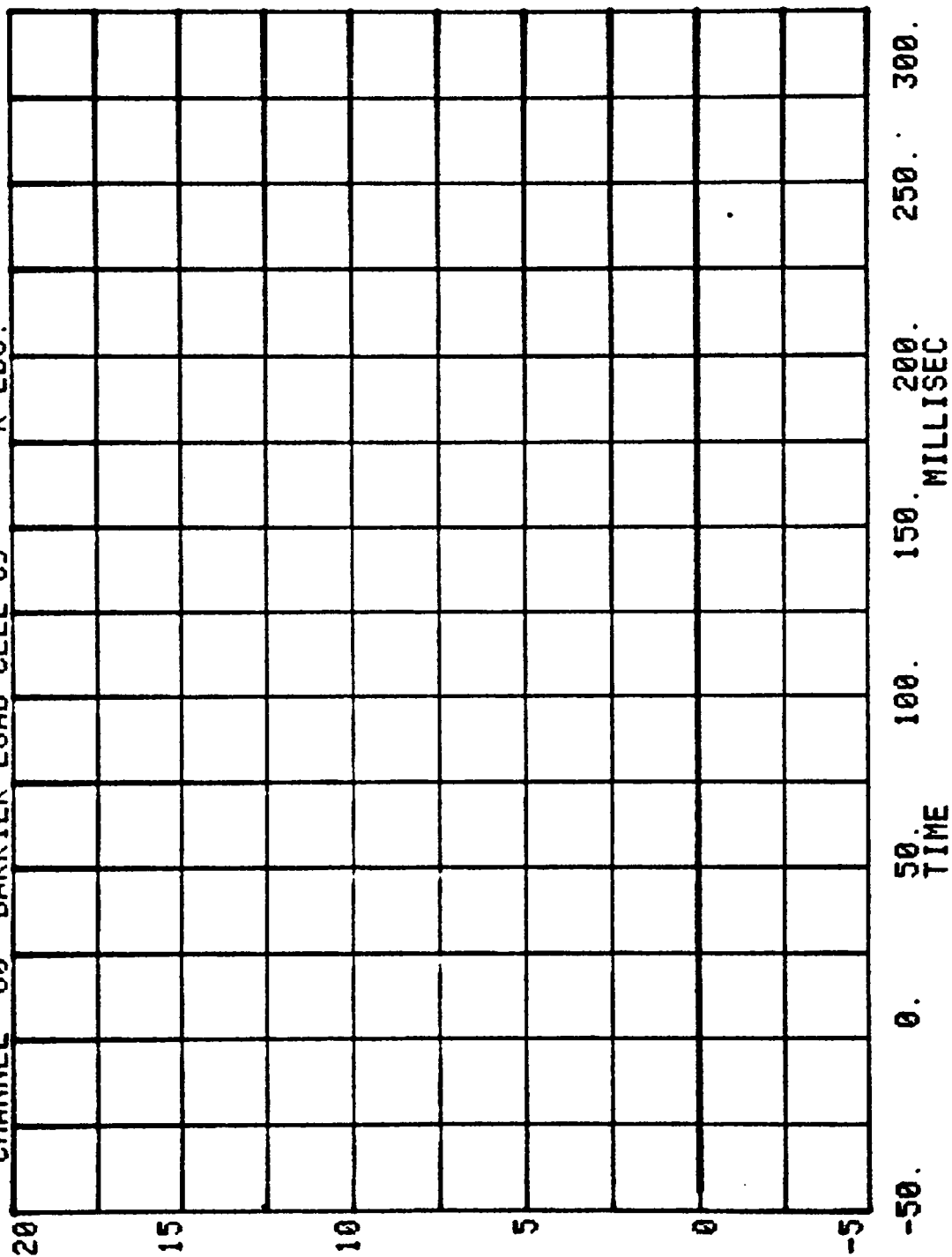
CHANNEL 58 BARRIER LOAD CELL C7 RUN= 830 SERIES= 200 K LBS.



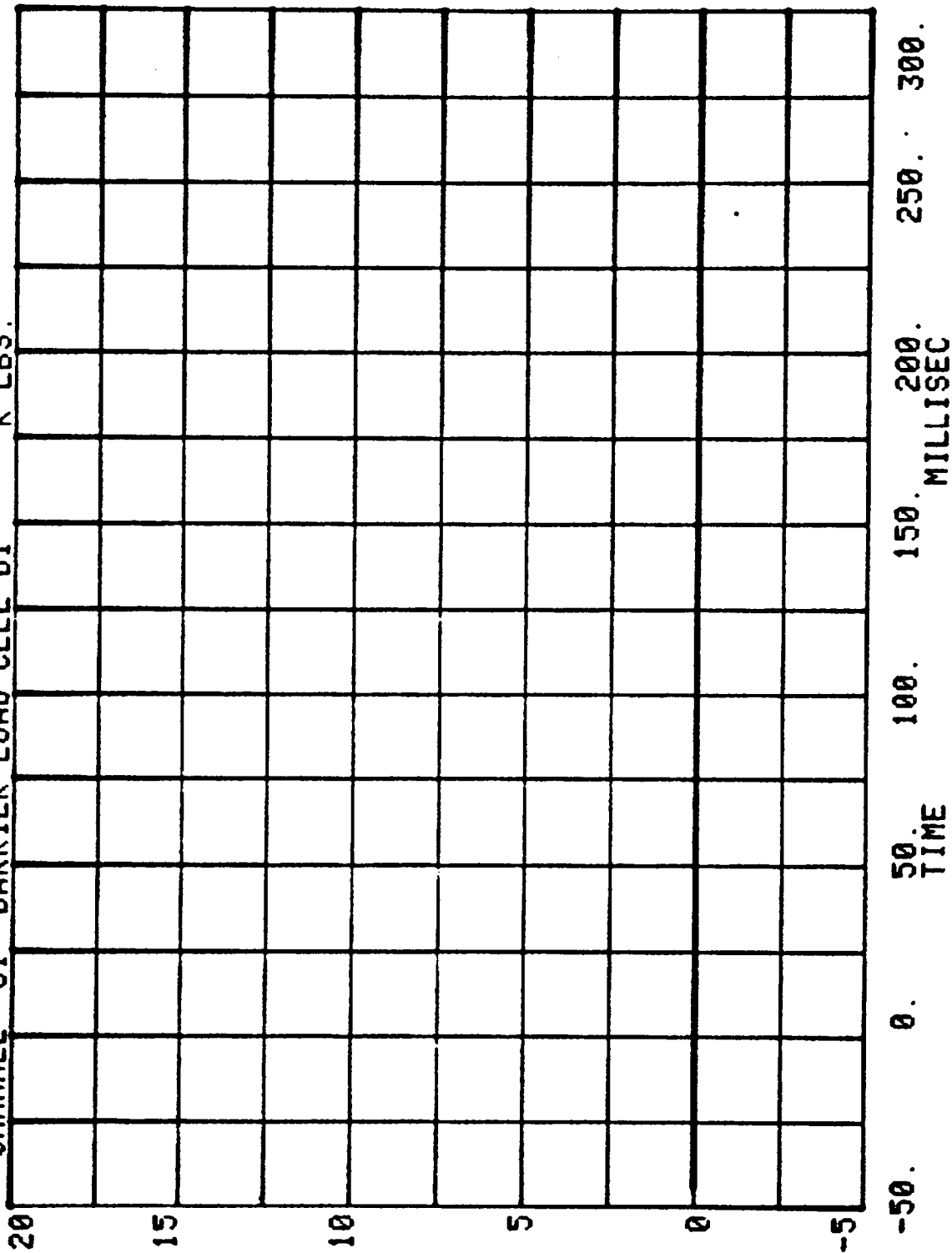
RUN= 830 SERIES= 200 K LBS.
CHANNEL 59 BARRIER LOAD CELL C8



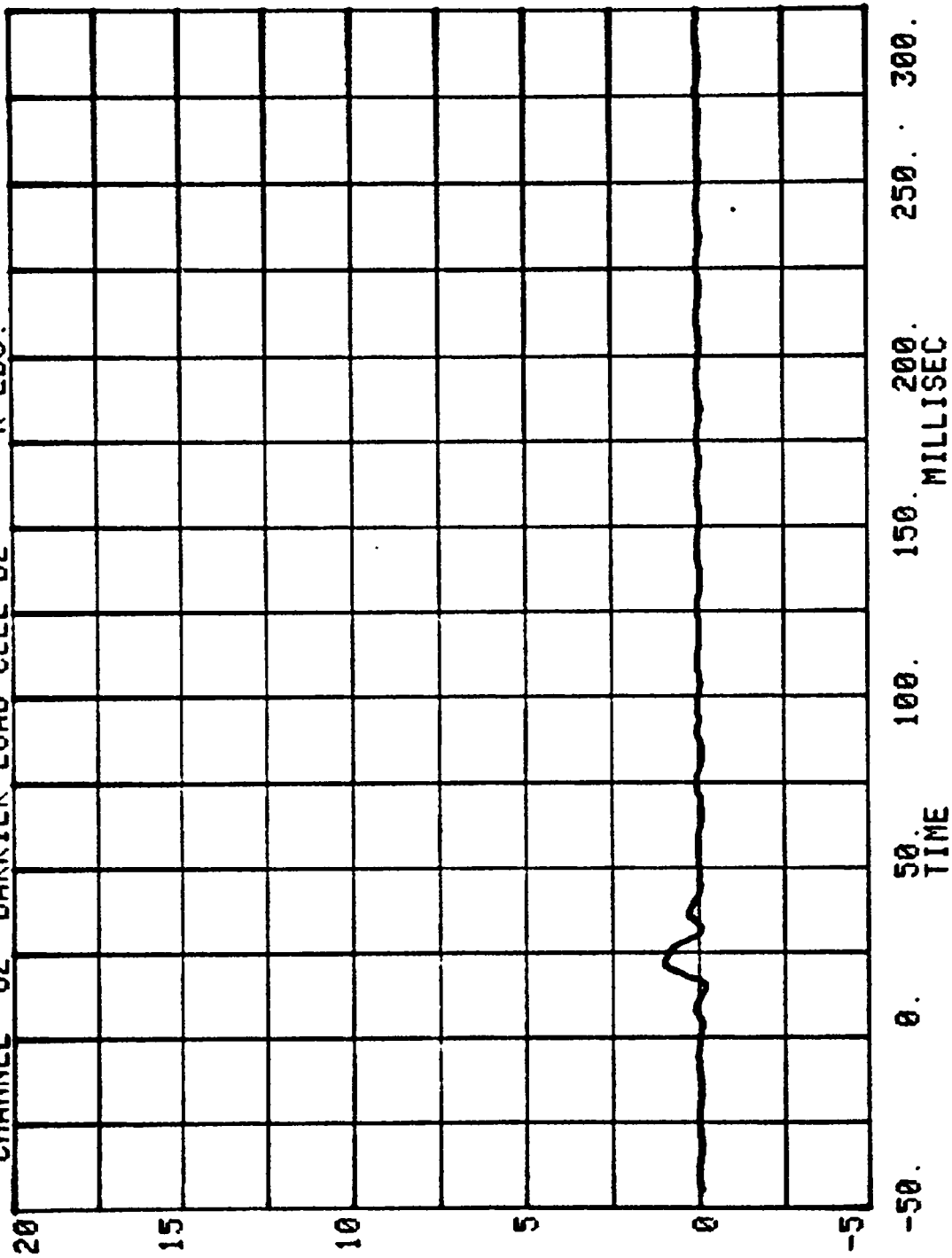
CHANNEL 60 BARRIER LOAD CELL C9 RUN= 830 SERIES= 200 K LBS.



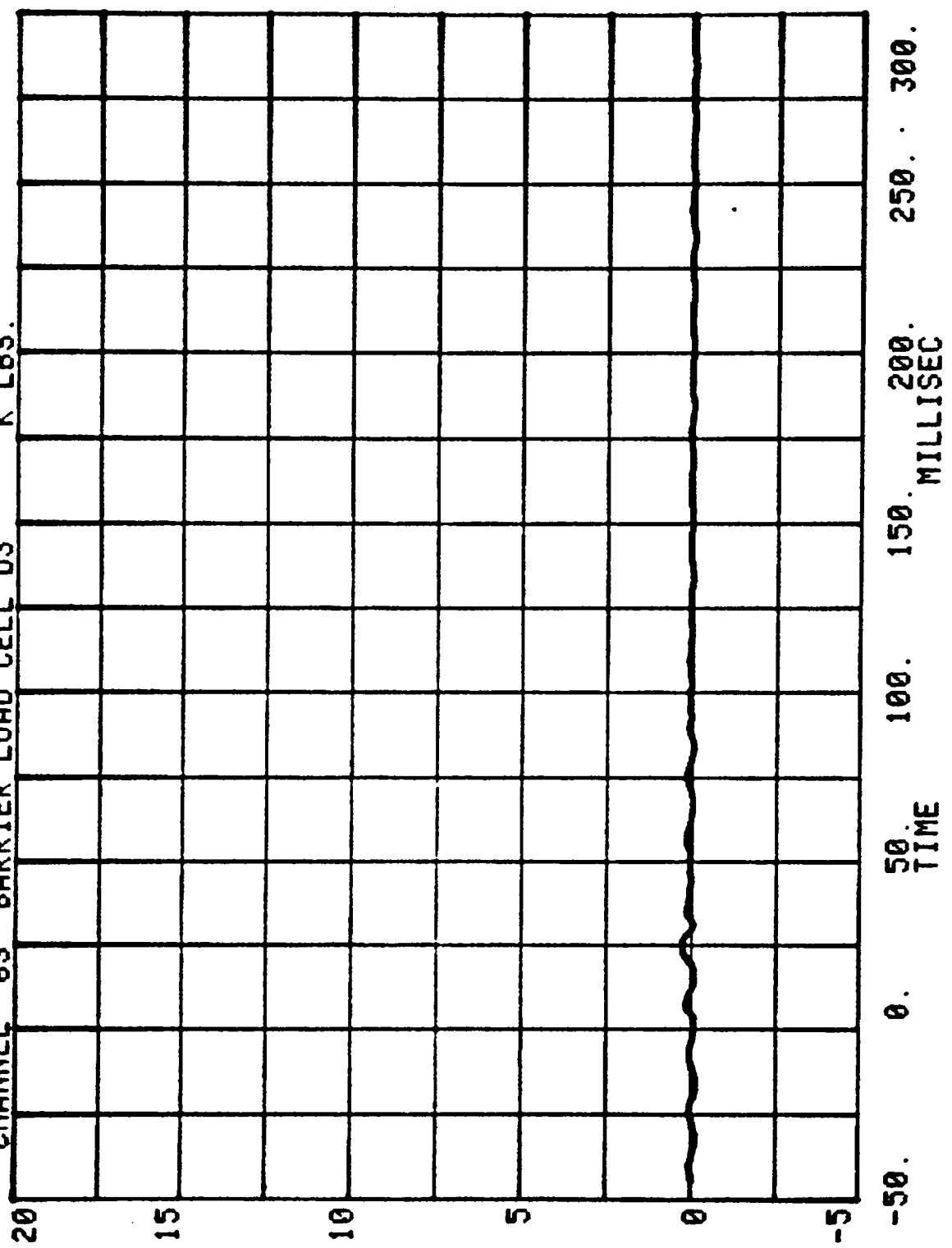
CHANNEL 61 RUN= 830 SERIES= 200 K LBS.
BARRIER LOAD CELL 01



CHANNEL 62 BARRIER LOAD CELL D2 RUN= 830 SERIES= 200 K LBS.

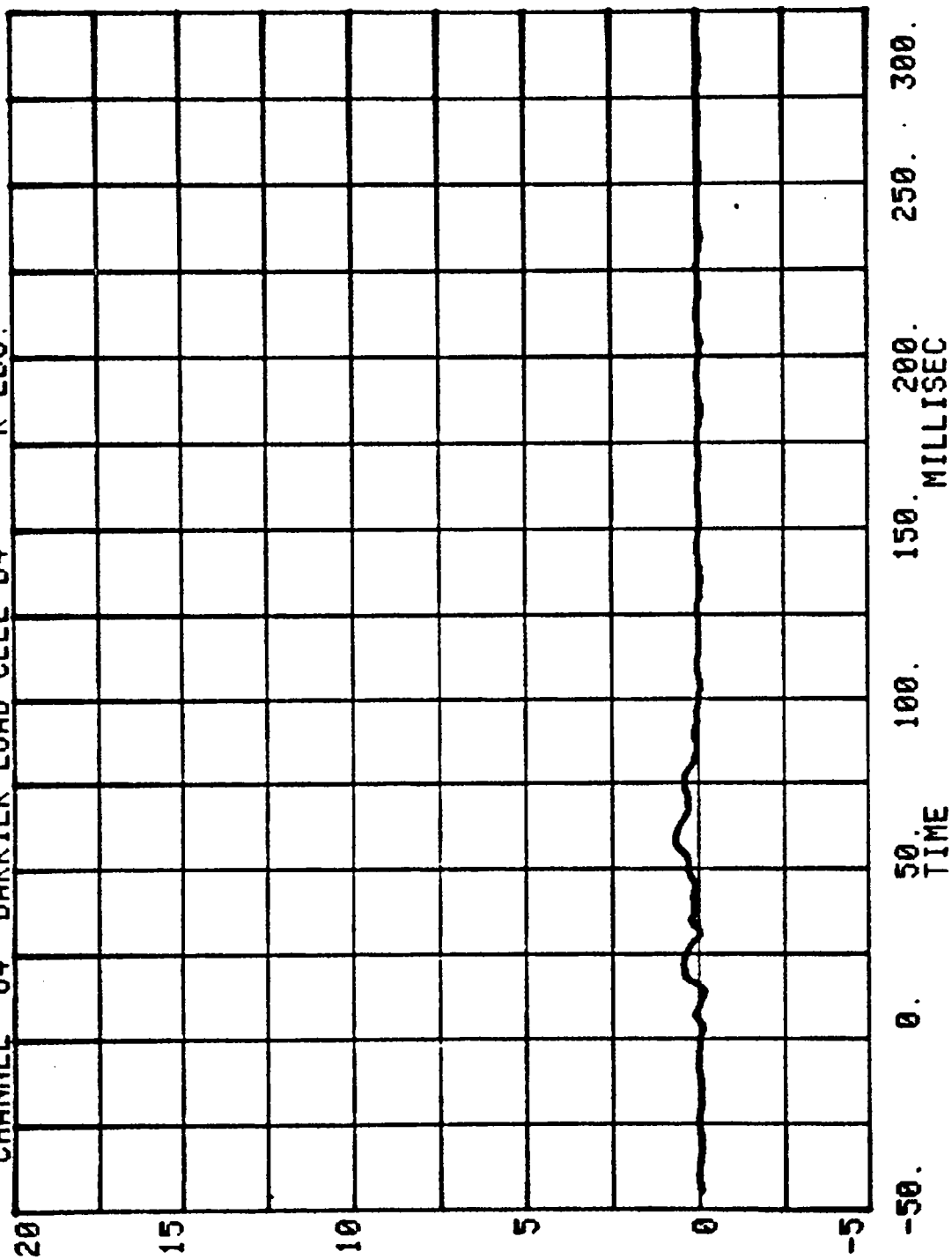


RUN= 830 SERIES= 200
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.

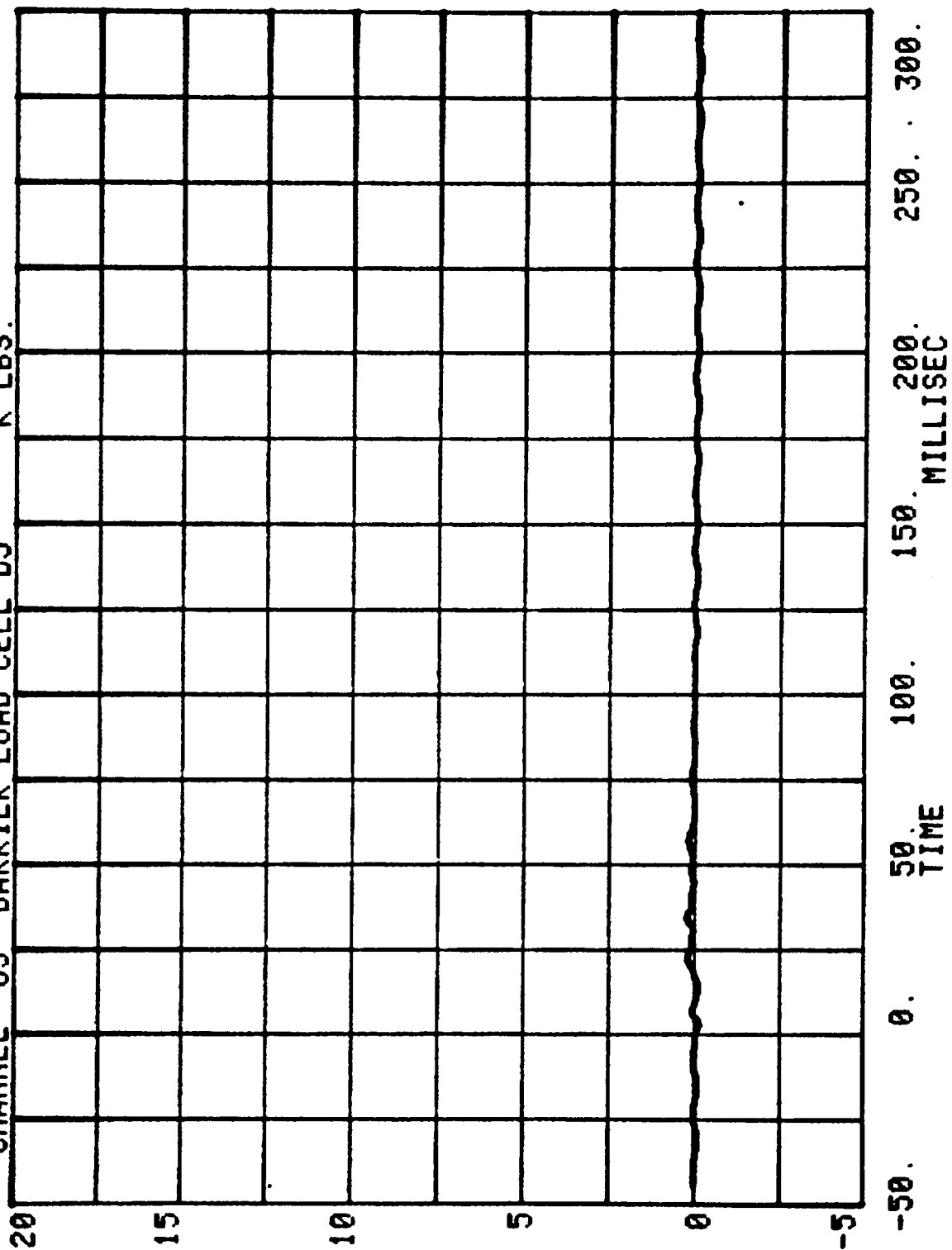


CHANNEL 64 BARRIER LOAD CELL D4 K LBS.

RUN= 830 SERIES= 200

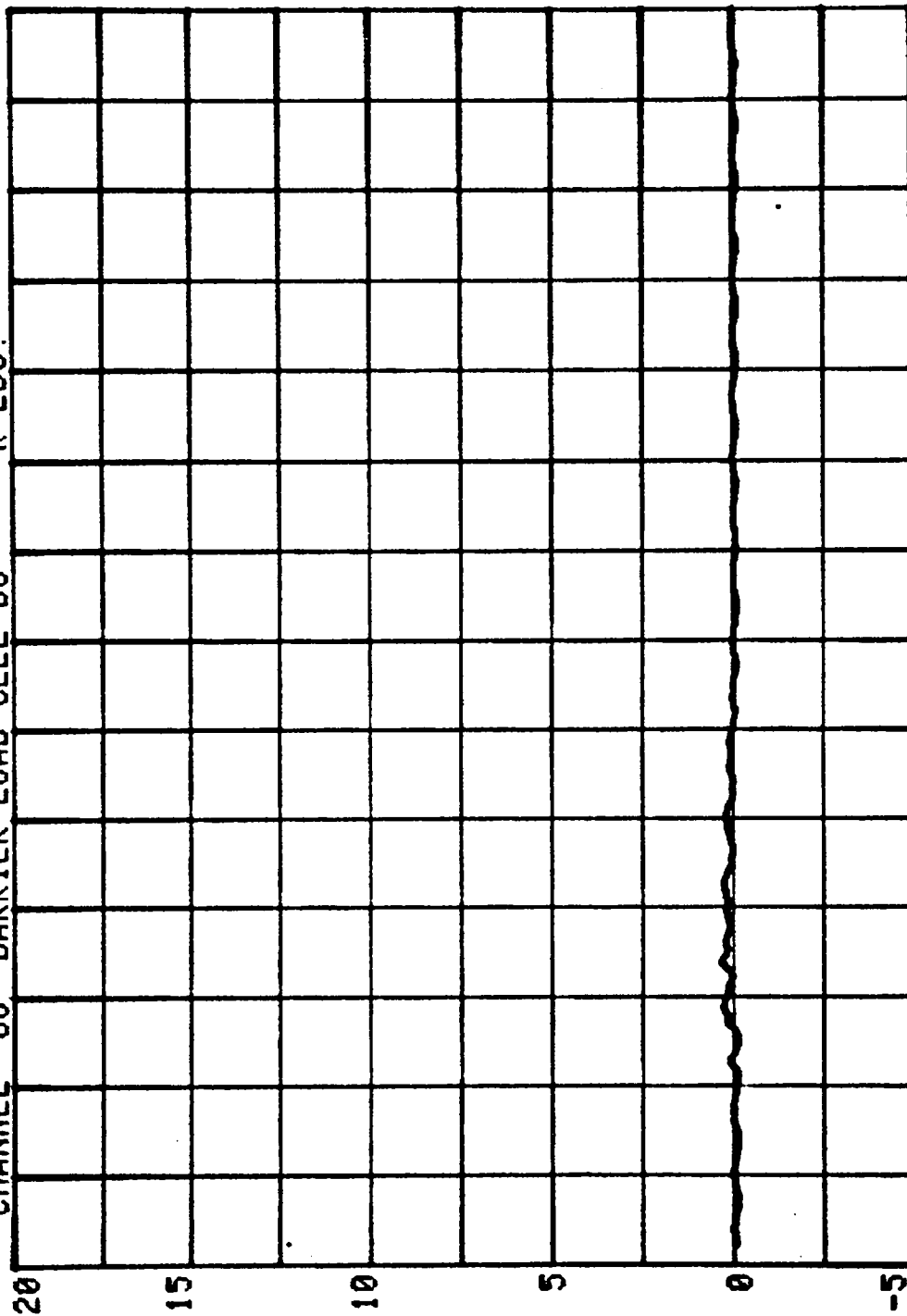


RUN= 830 SERIES= 200
CHANNEL 65 BARRIER LOAD CELL D5 K LBS.

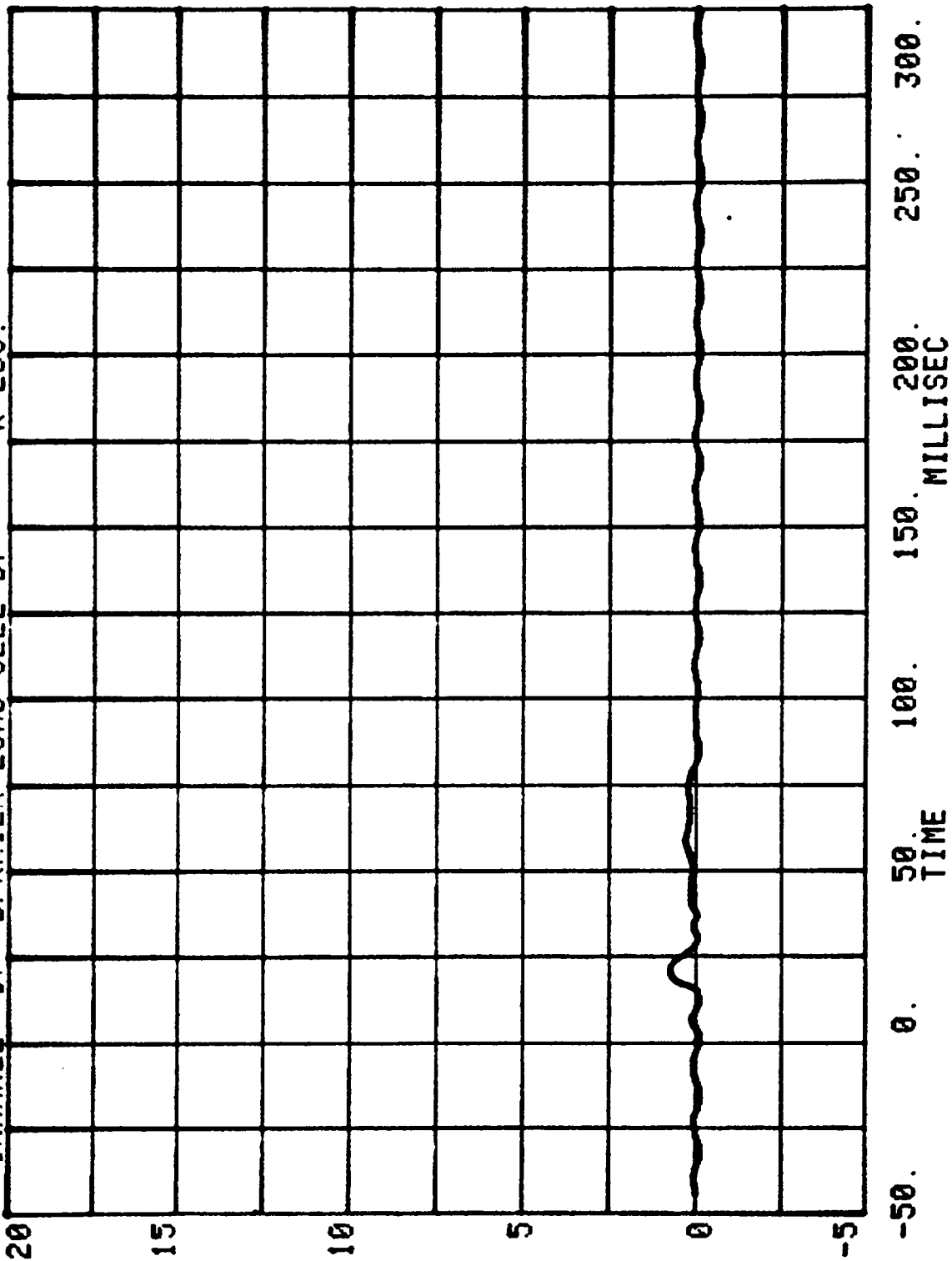


CHANNEL 66 BARRIER LOAD CELL D6 K LBS.

RUN= 830 SERIES= 200

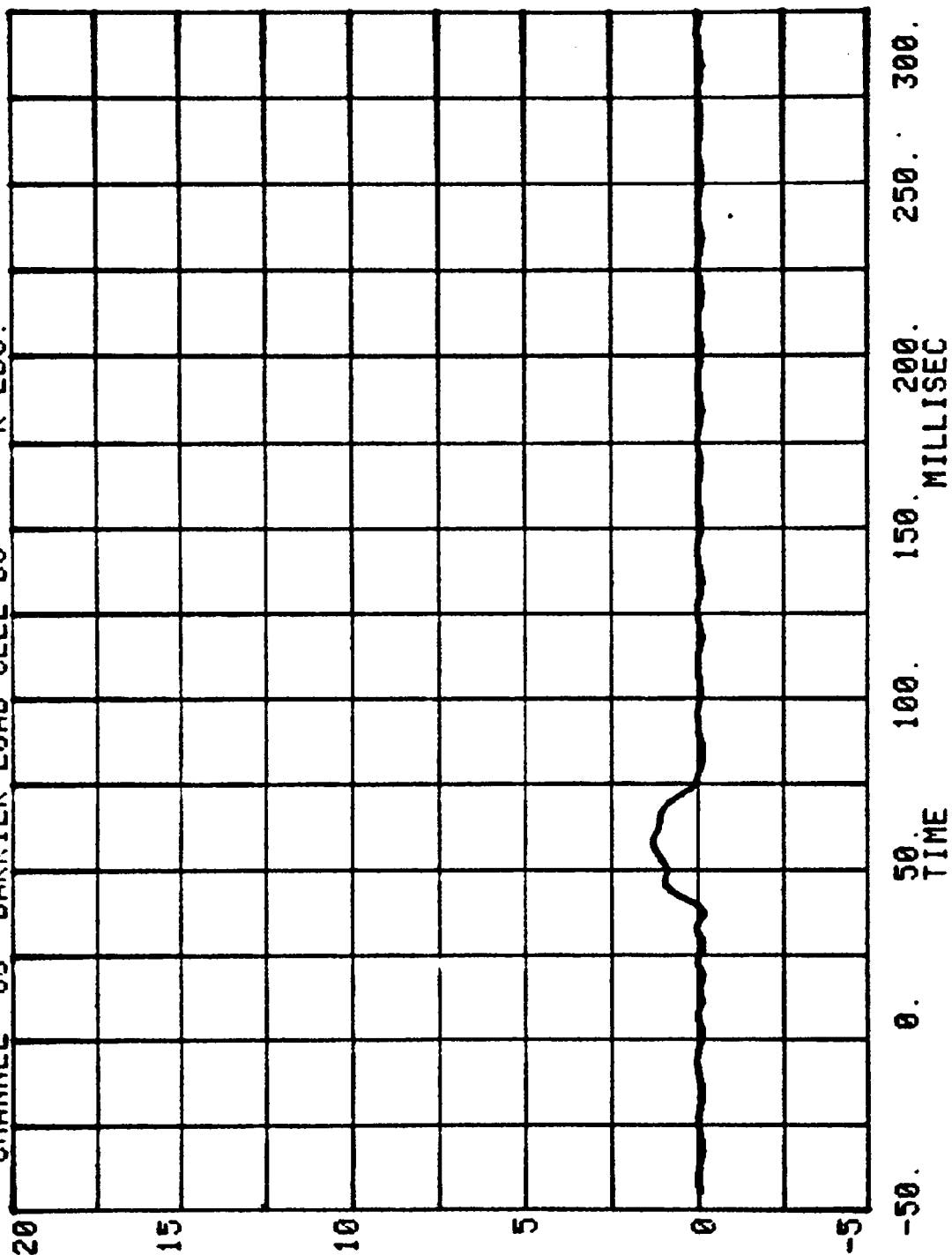


CHANNEL 67 RUN= 830 SERIES= 200 K LBS.

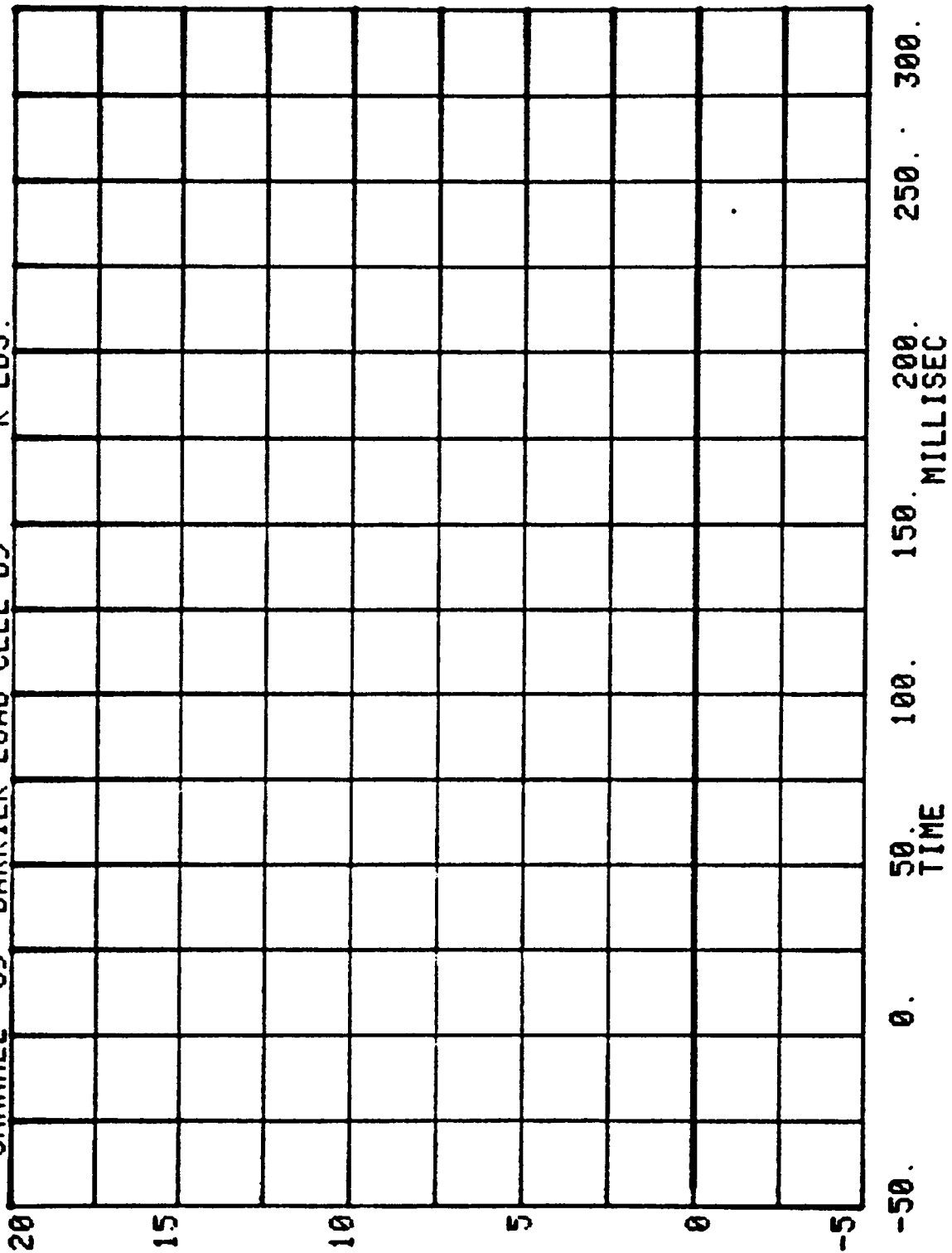


CHANNEL 68 BARRIER LOAD CELL 08 K LBS.

RUN= 830 SERIES= 200



CHANNEL 69 BARRIER LOAD CELL 09 SERIES= 200 K LBS.



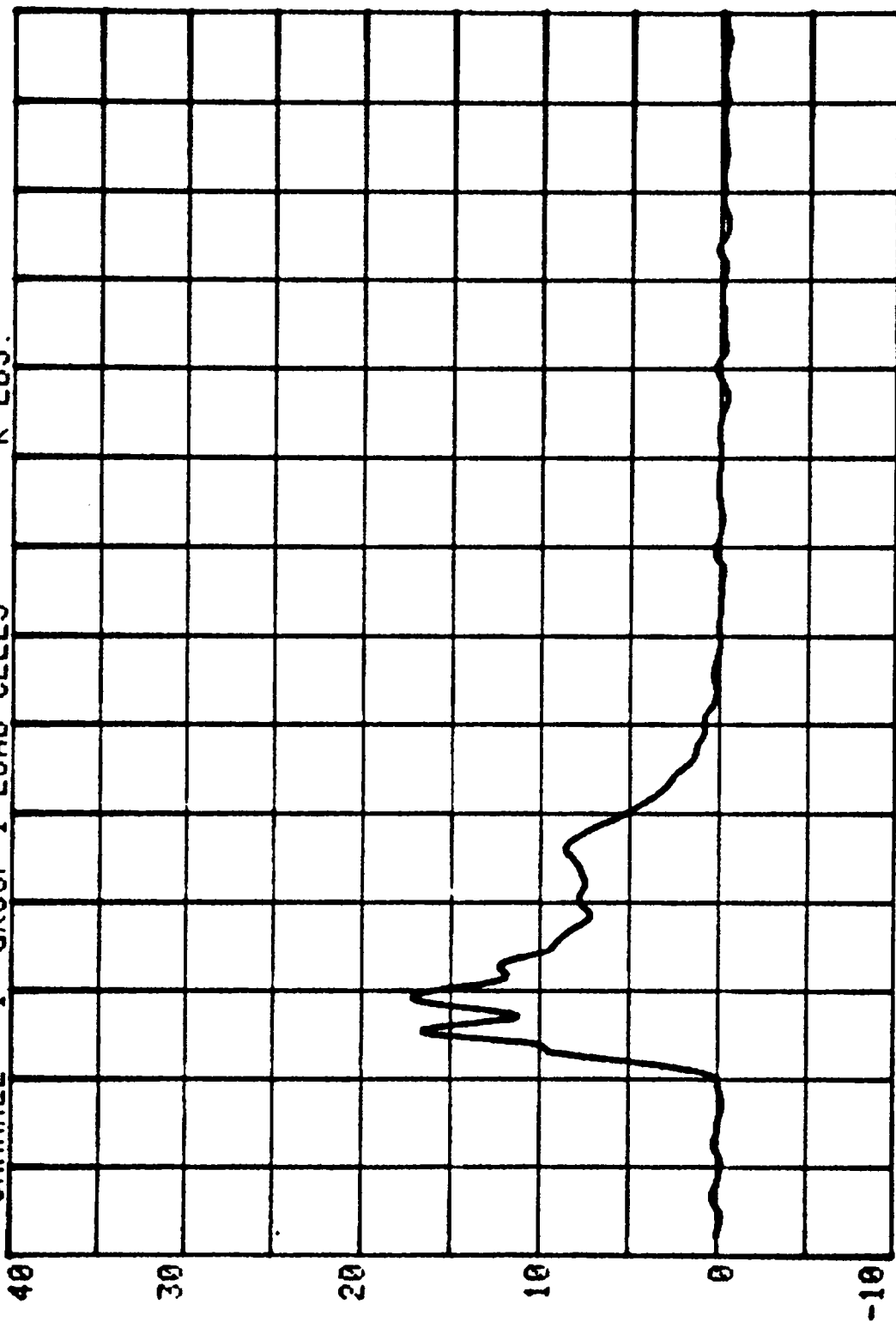
NEW CAR ASSESSMENT BARRIER TEST - 1988

CHAN	TITLE	MINIMUM	MAXIMUM
1 GROUP	1 LOAD CELLS	-.293	17.132 K LBS.
2 GROUP	2 LOAD CELLS	-.452	70.956 K LBS.
3 GROUP	3 LOAD CELLS	-.191	8.382 K LBS.
4 GROUP	4 LOAD CELLS	-.316	10.522 K LBS.
5 GROUP	5 LOAD CELLS	-.716	5.143 K LBS.
6 GROUP	6 LOAD CELLS	-.437	4.247 K LBS.
7 TOTAL	LOAD CELL SUM	-.717	111.994 K LBS.

CHANNEL 1 GROUP 1 LOAD CELLS

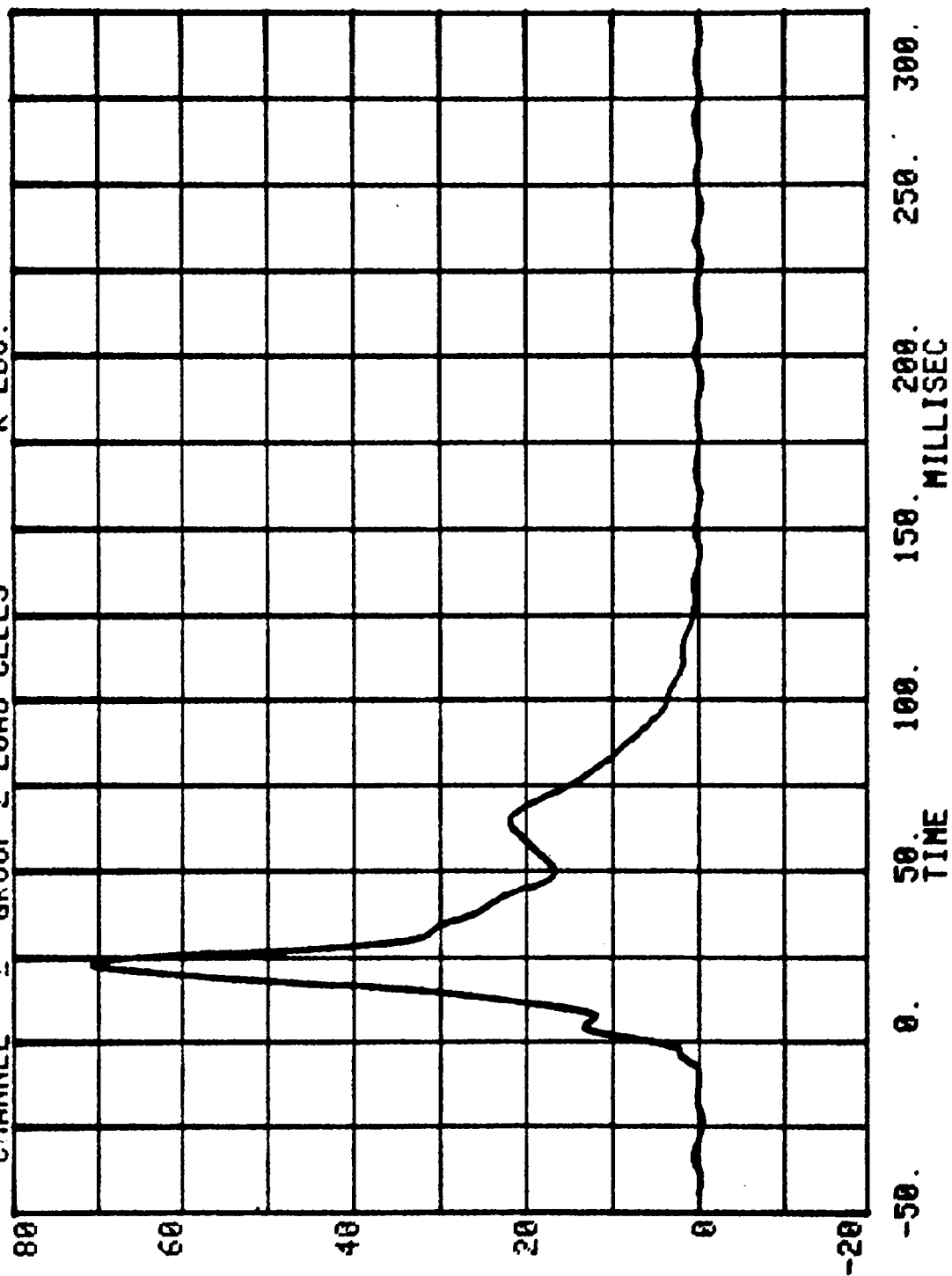
RUN= 830 SERIES= 200

K LBS.



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

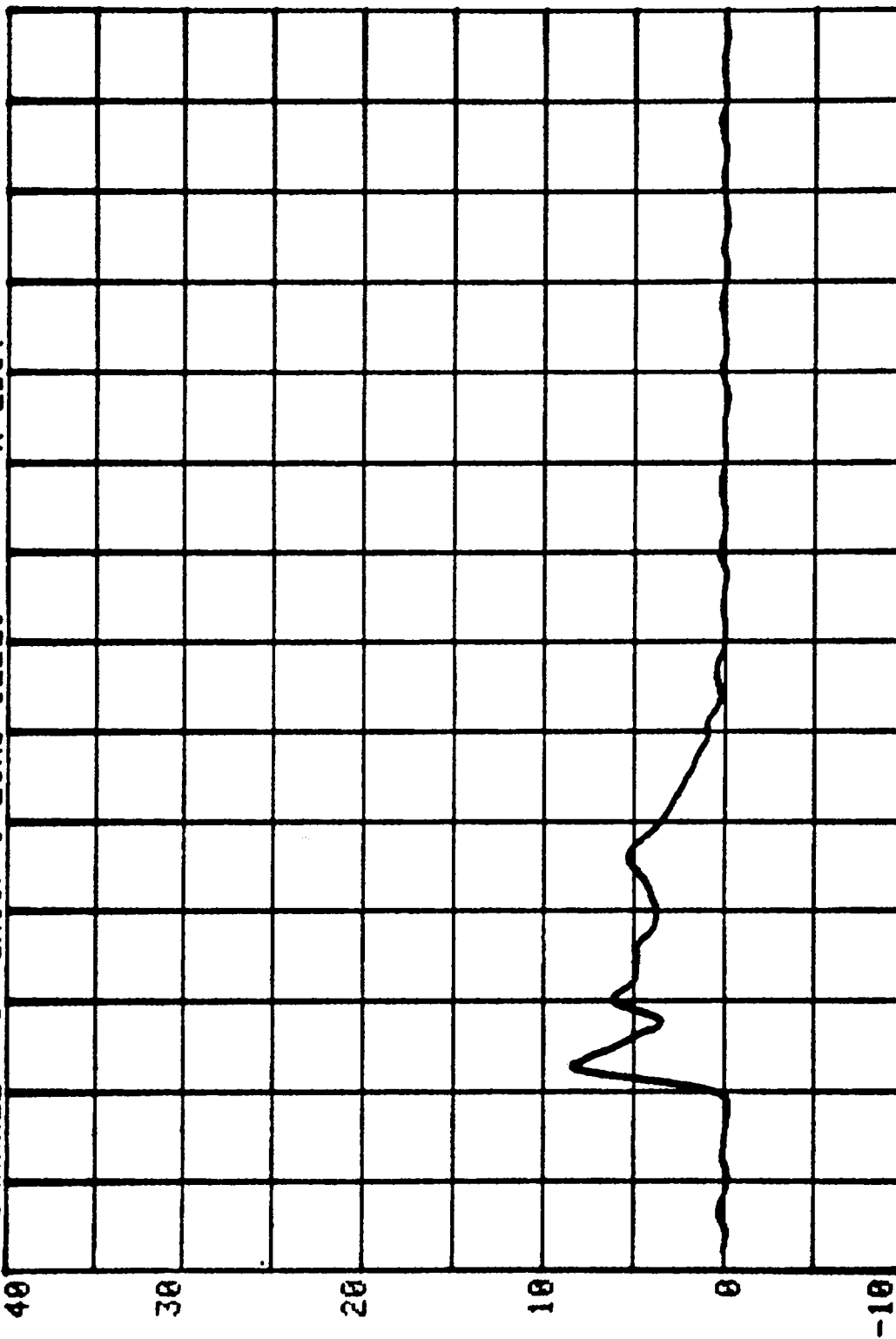
CHANNEL 2 GROUP 2 LOAD CELLS RUN= 830 SERIES= 200 K LBS.



CHANNEL 3 GROUP 3 LOAD CELLS

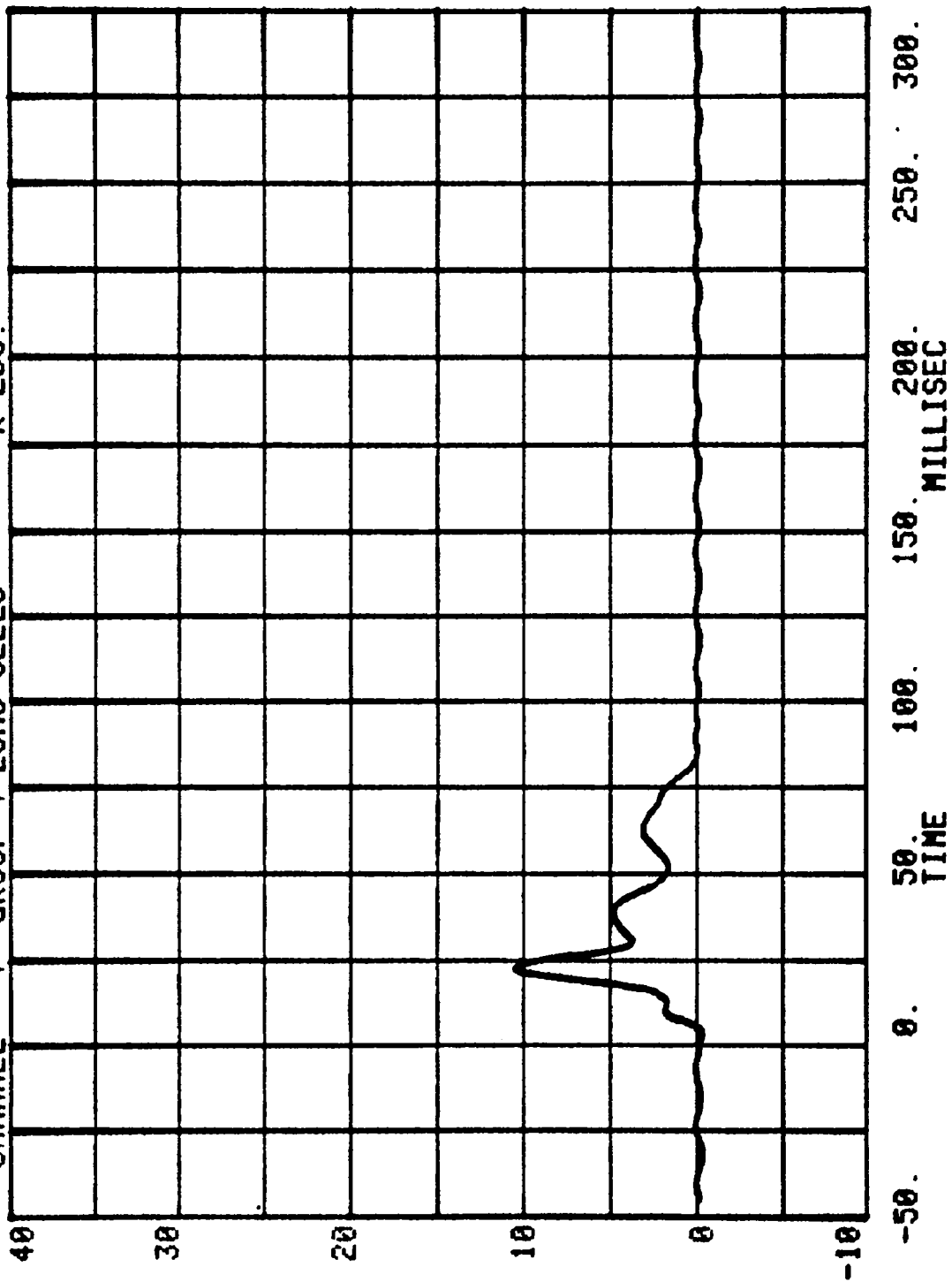
RUN= 830 SERIES= 200

K LBS.

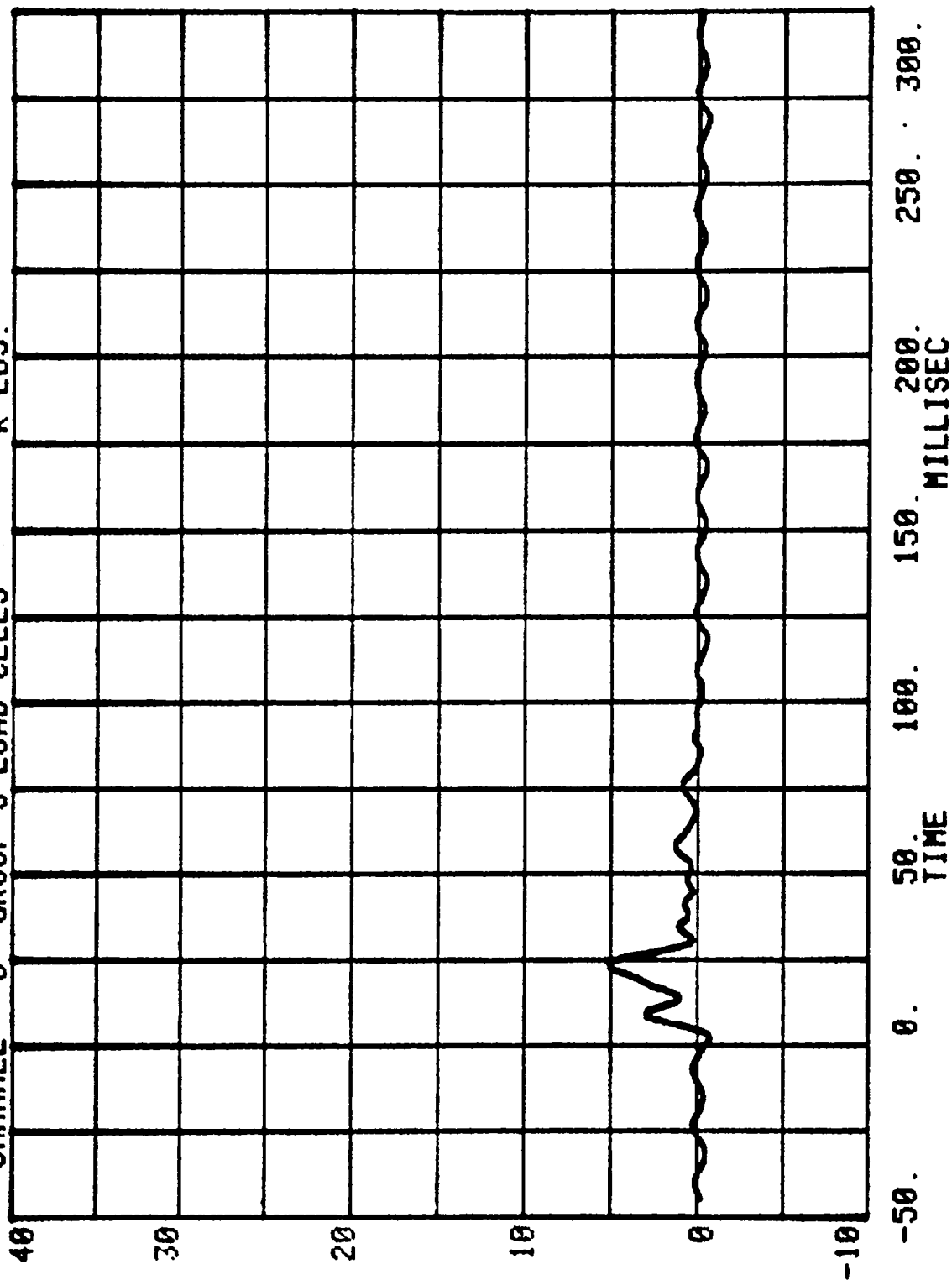


-50. 0. 50. 100. 150. 200. 250. 300.
TIME

CHANNEL 4 GROUP 4 LOAD CELLS RUN= 830 SERIES= 200 K LBS.



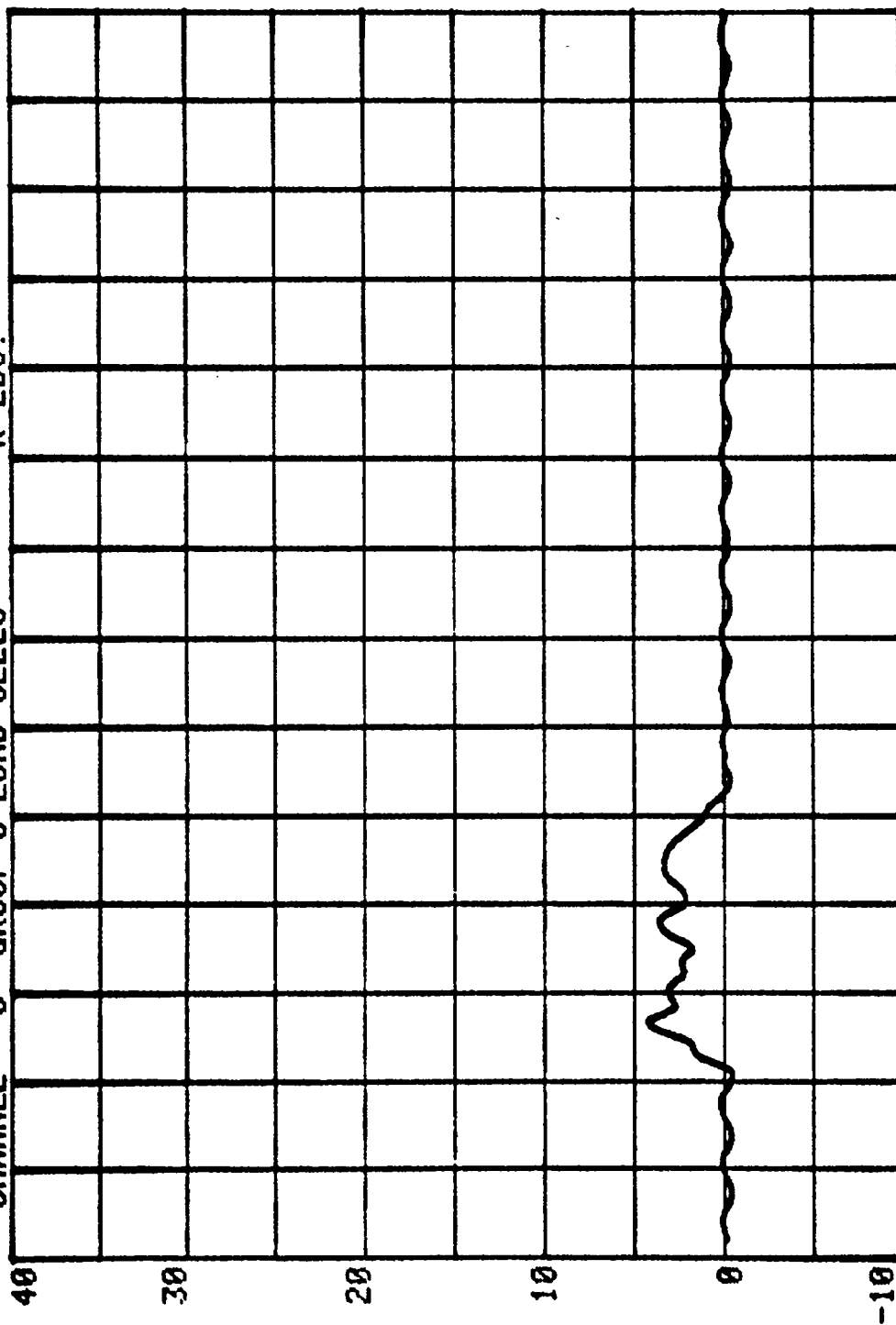
RUN= 830 SERIES= 200
CHANNEL 5 GROUP 5 LOAD CELLS K LBS.



CHANNEL 6 GROUP 6 LOAD CELLS

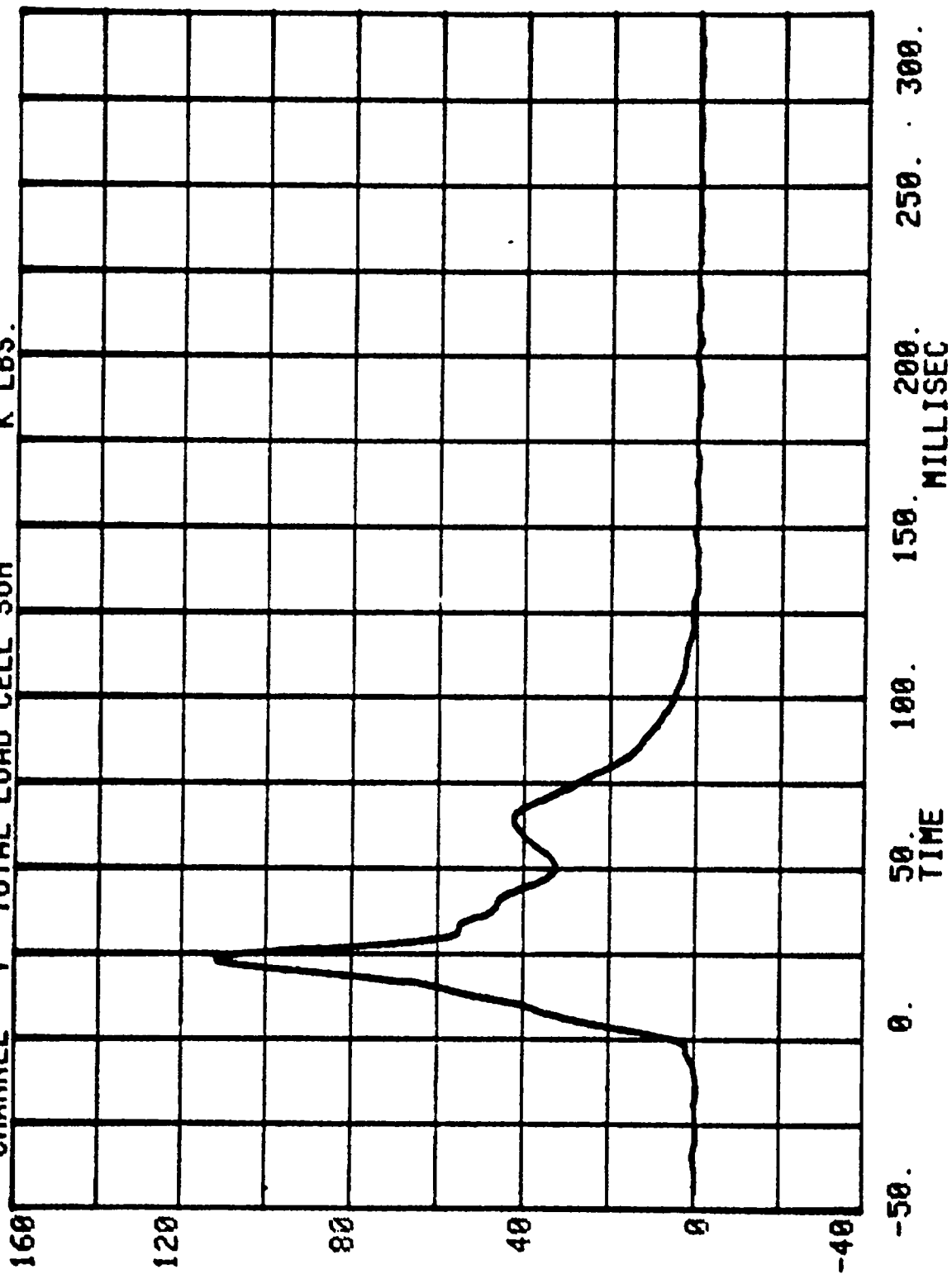
RUN= 830 SERIES= 200

K LBS.



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

RUN= 830 SERIES= 200
CHANNEL 7 TOTAL LOAD CELL SUM K LBS.



TEST NO. MJ0200

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NEW CAR ASSESSMENT BARRIER TEST - 1988

RUN= 830

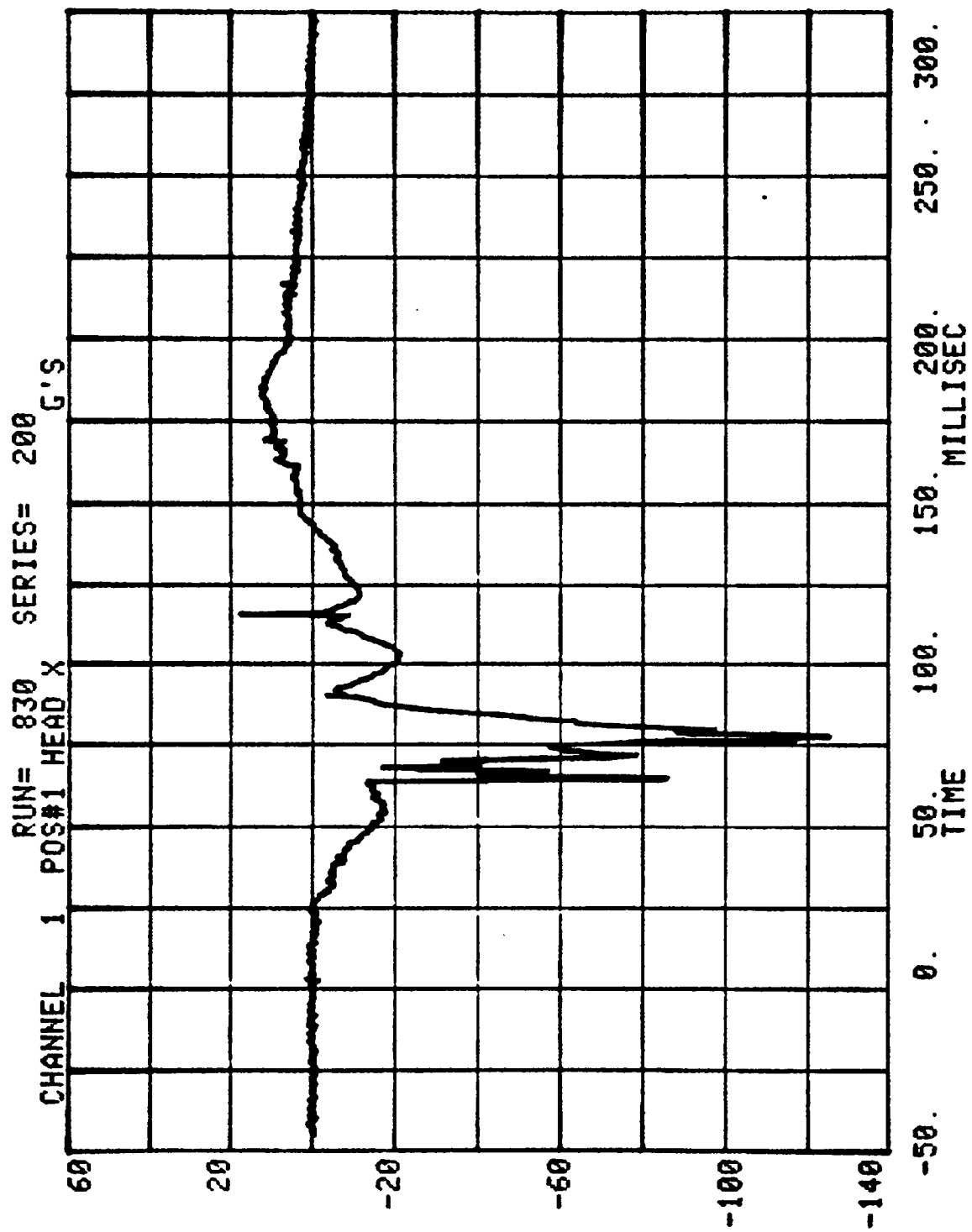
POS#1 HEAD R

HIC=1014.3 FROM T1= .06442 TO T2= .08482

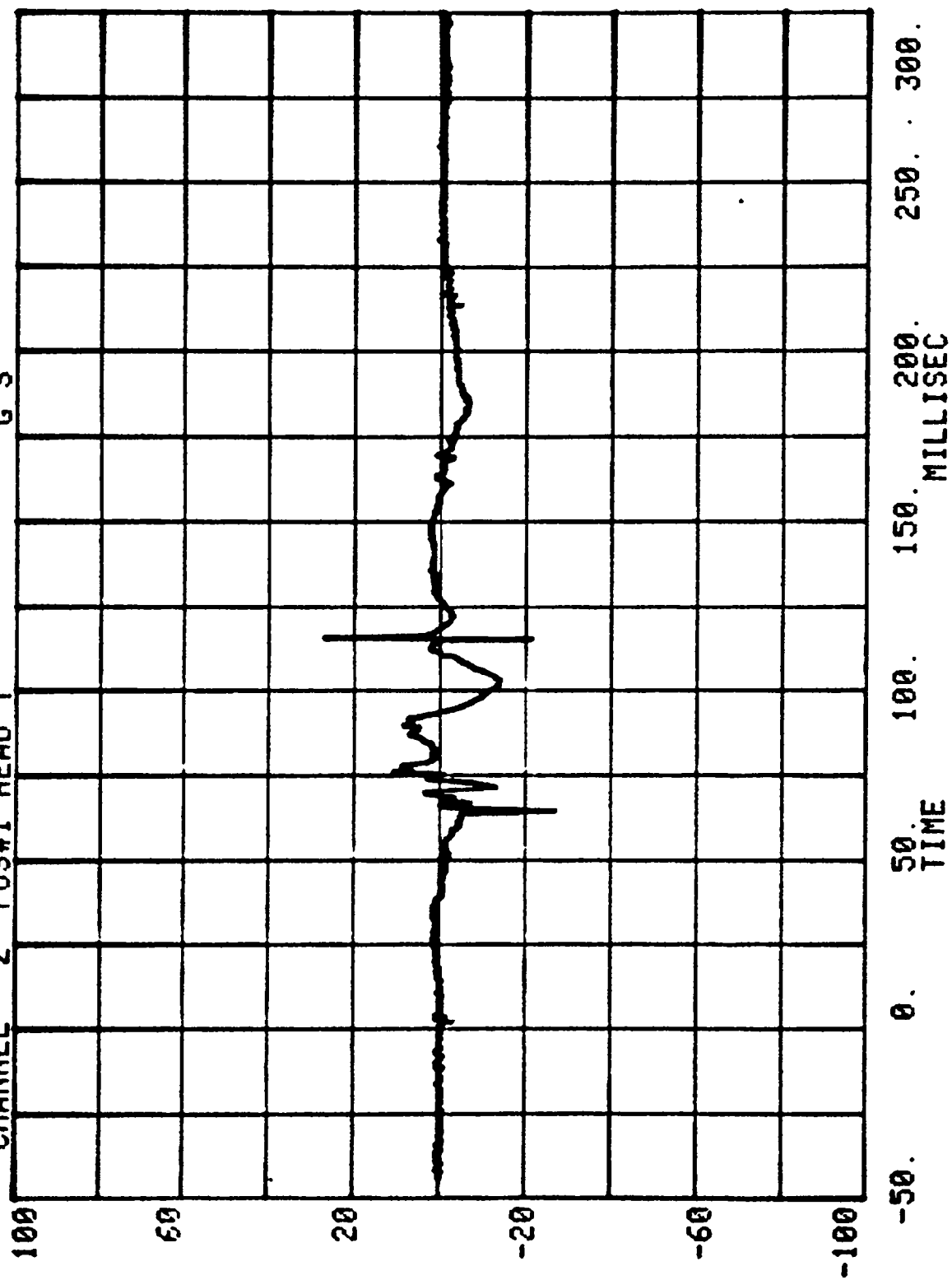
AVERAGE ACCELERATION BETWEEN T1 AND T2= 75.6G'S

EVENT TIME= 300.0 MSEC

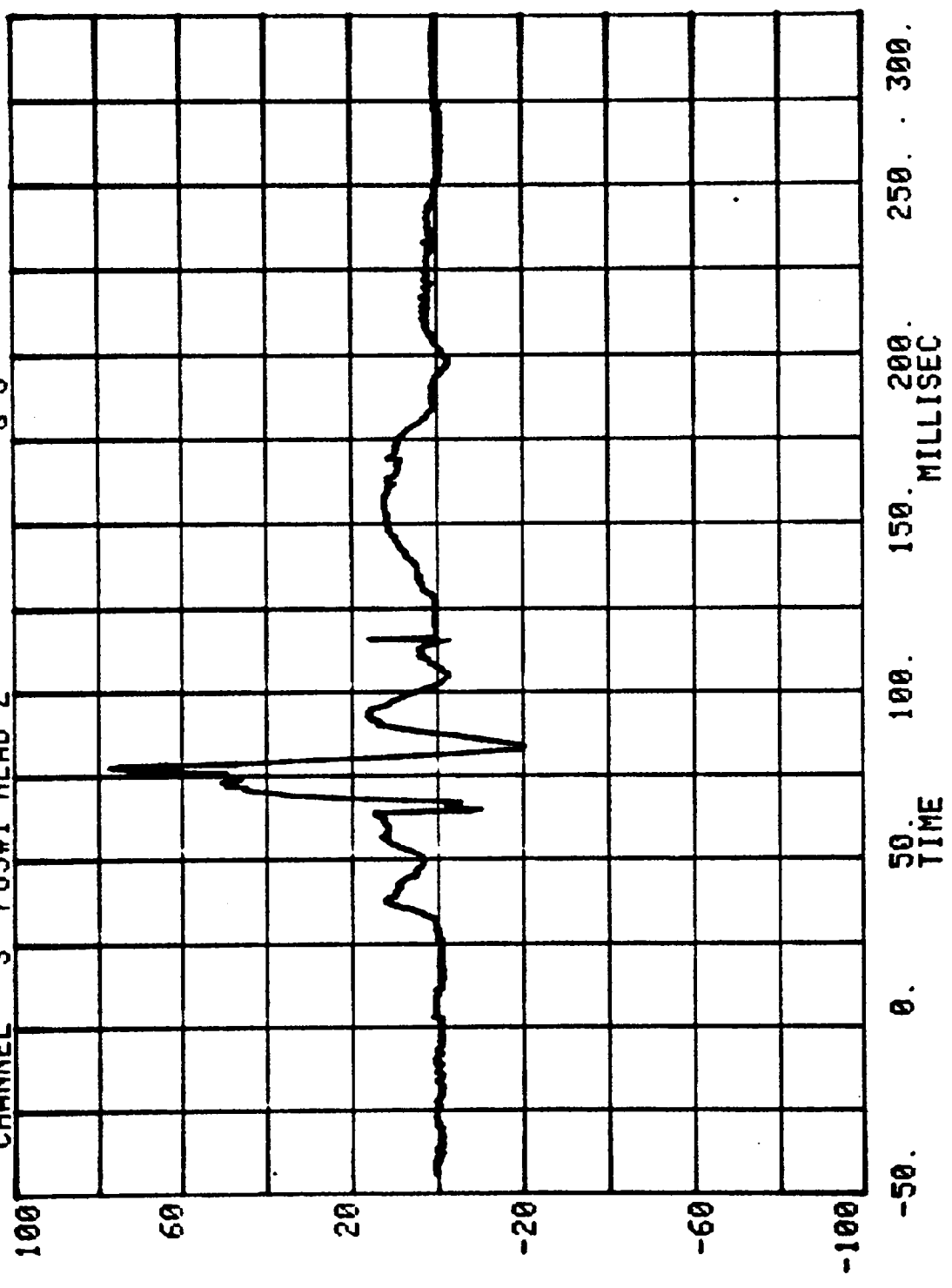
SEVERITY INDEX=1419.4



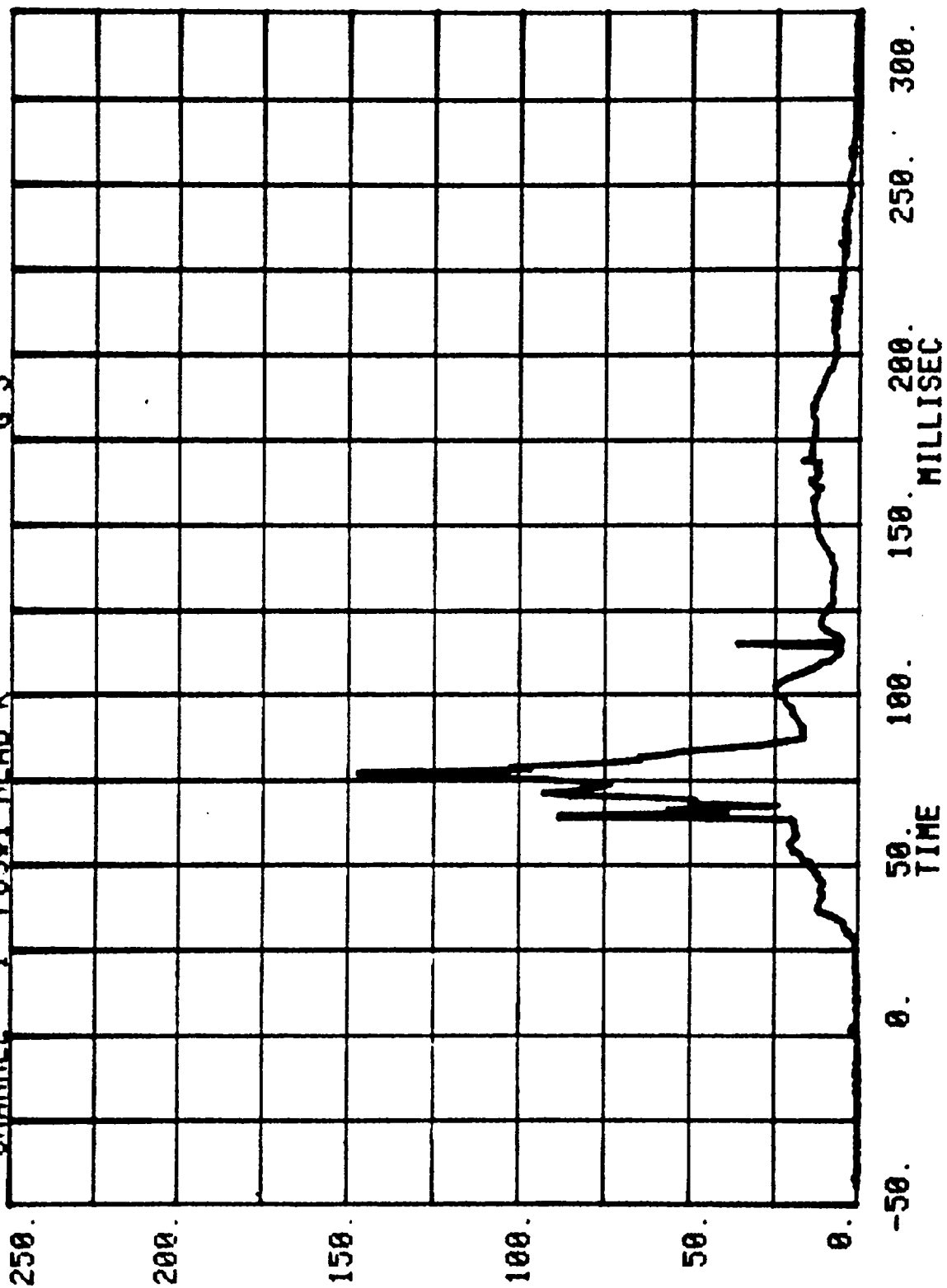
CHANNEL 2 POS#1 HEAD Y RUN= 830 SERIES= 200 G'S

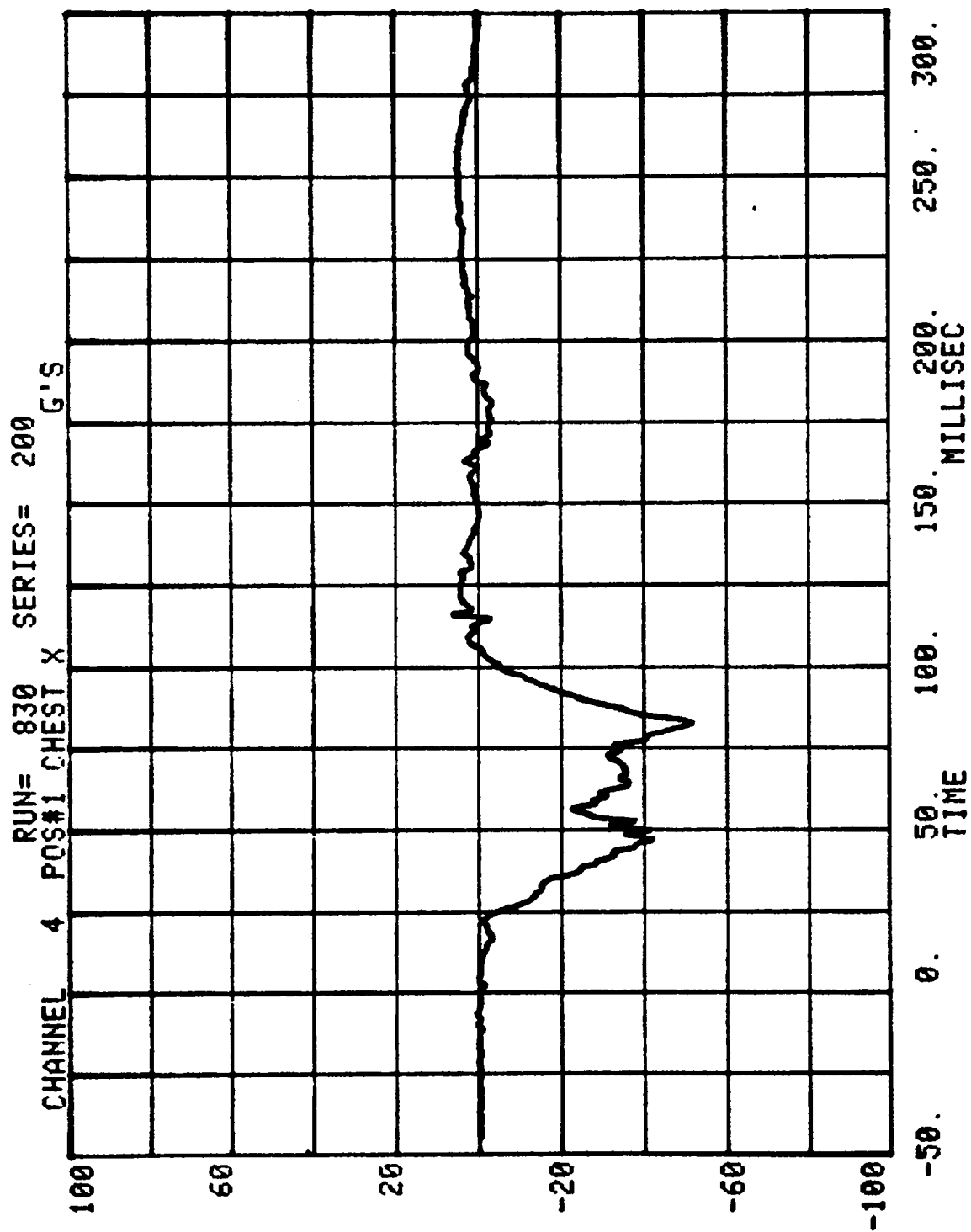


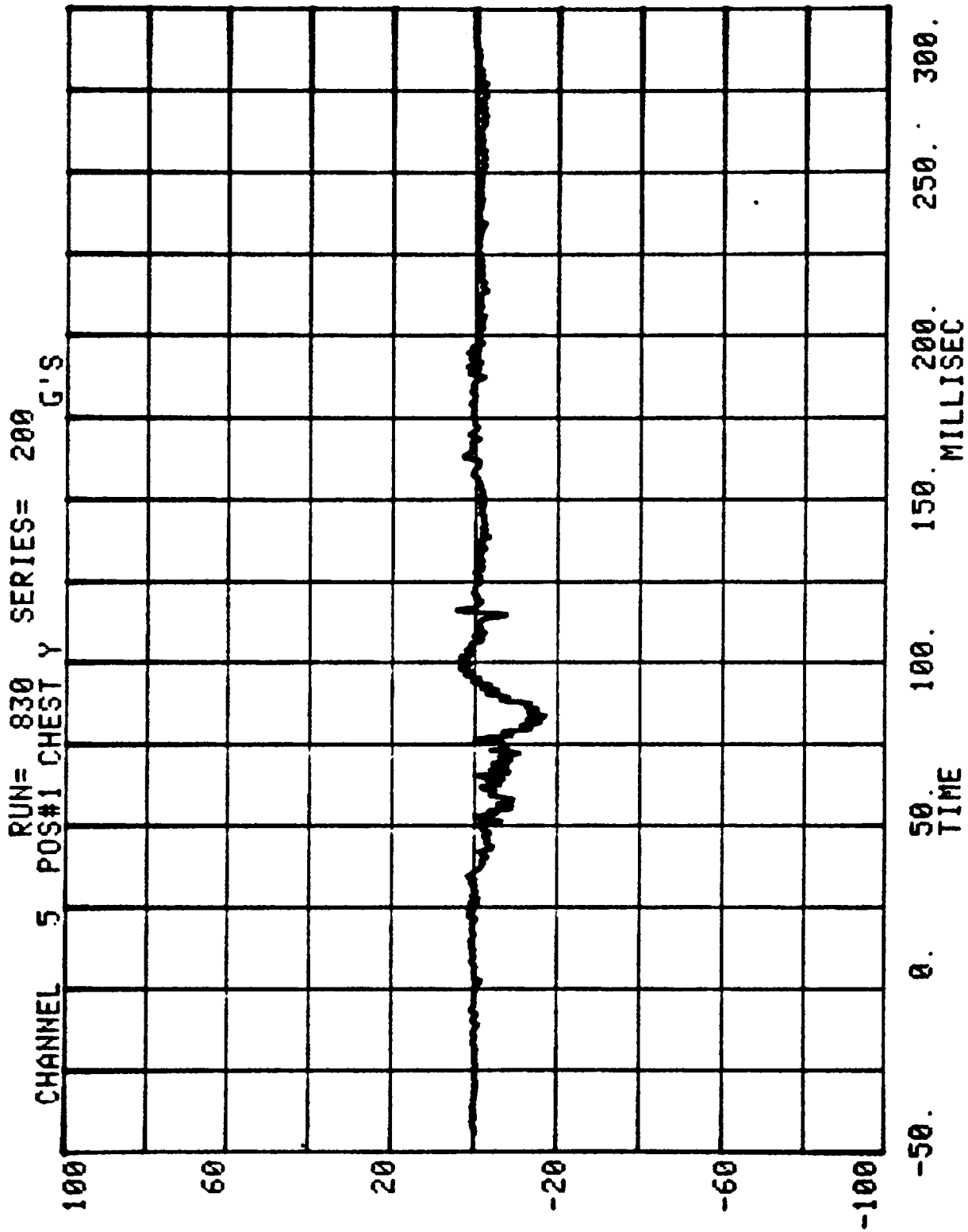
CHANNEL 3 POS#1 HEAD 2 RUN= 830 SERIES= 200 G'S



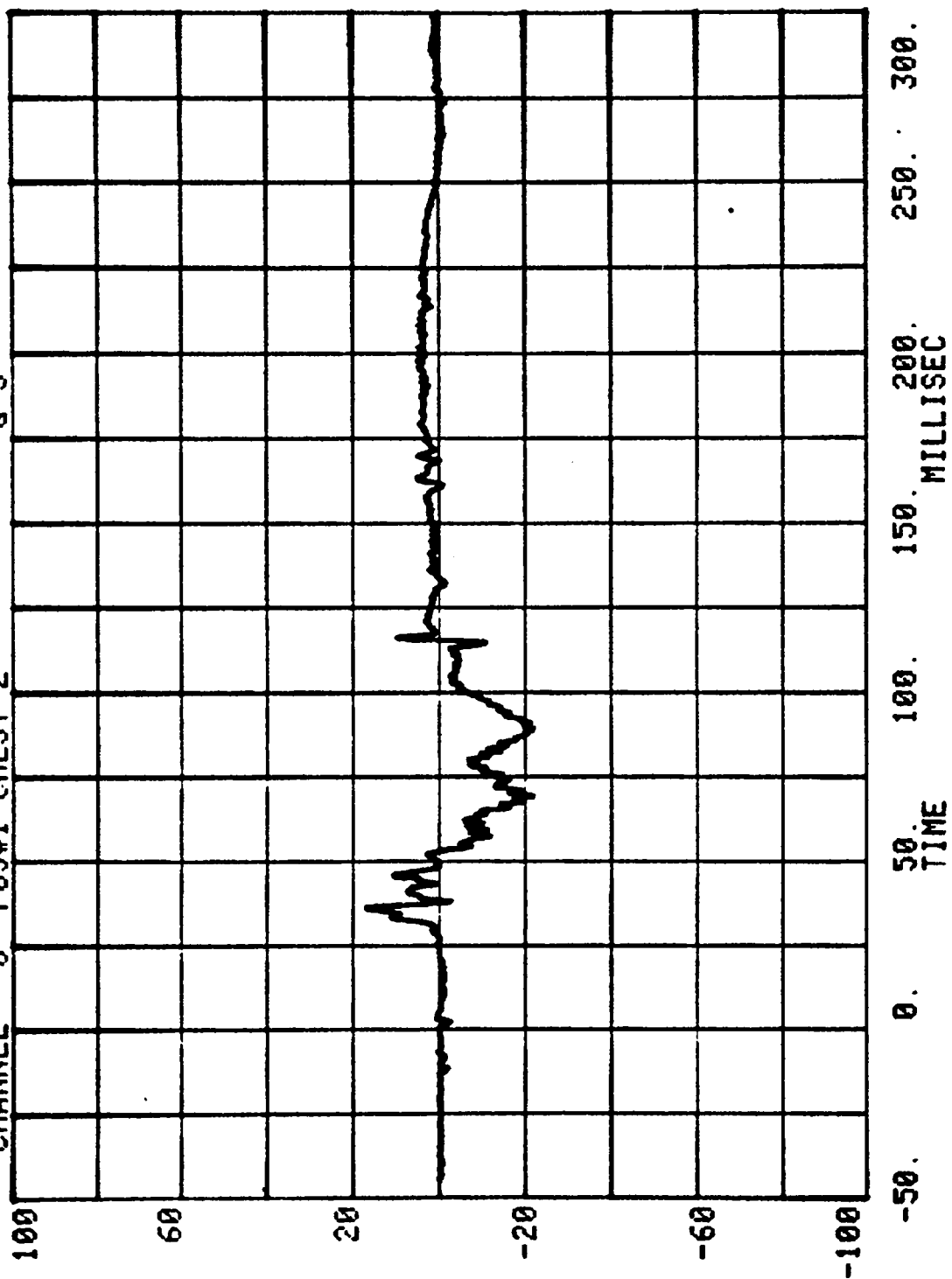
CHANNEL 1 POS#1 HEAD R RUN= 830 SERIES= 200 G'S

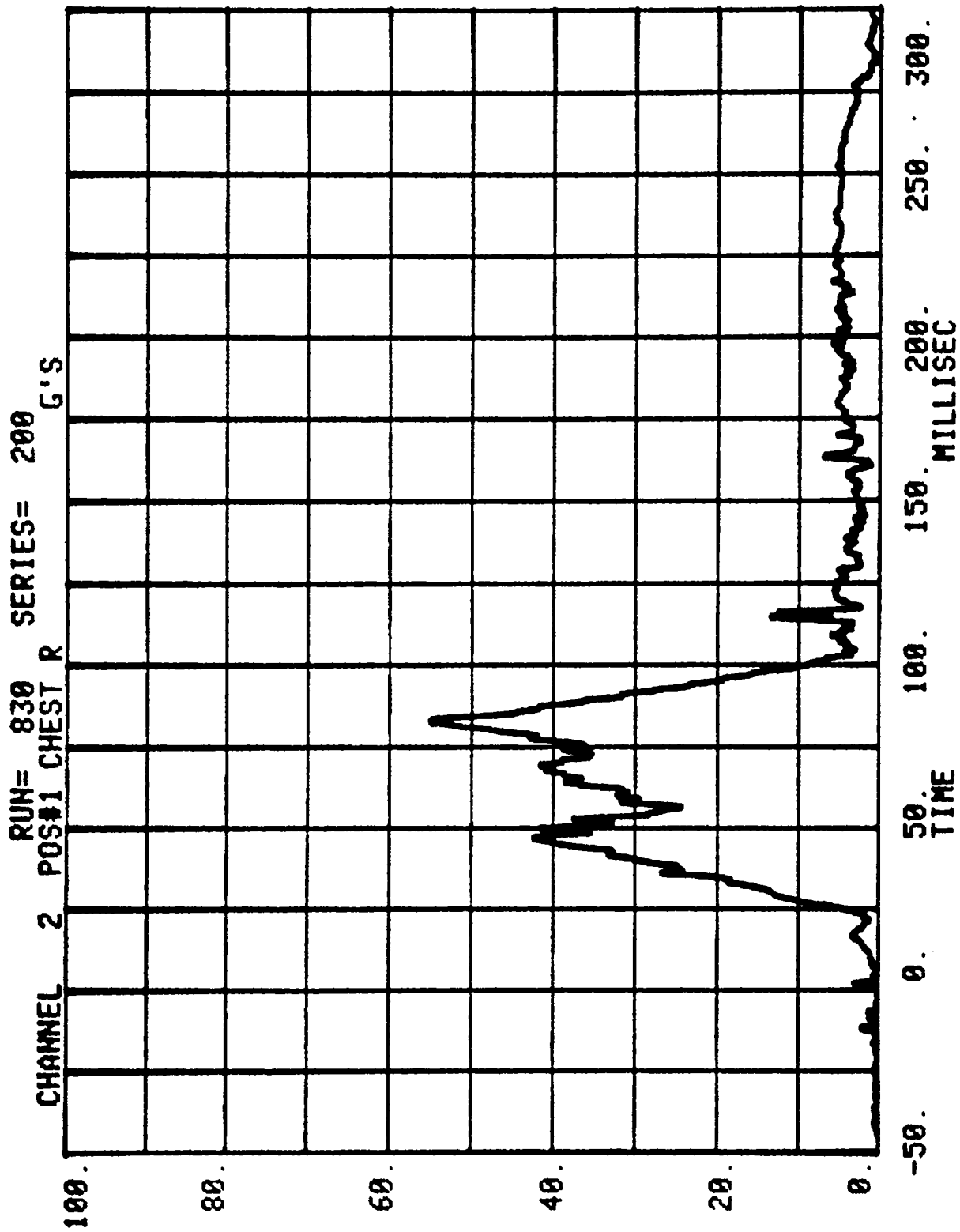






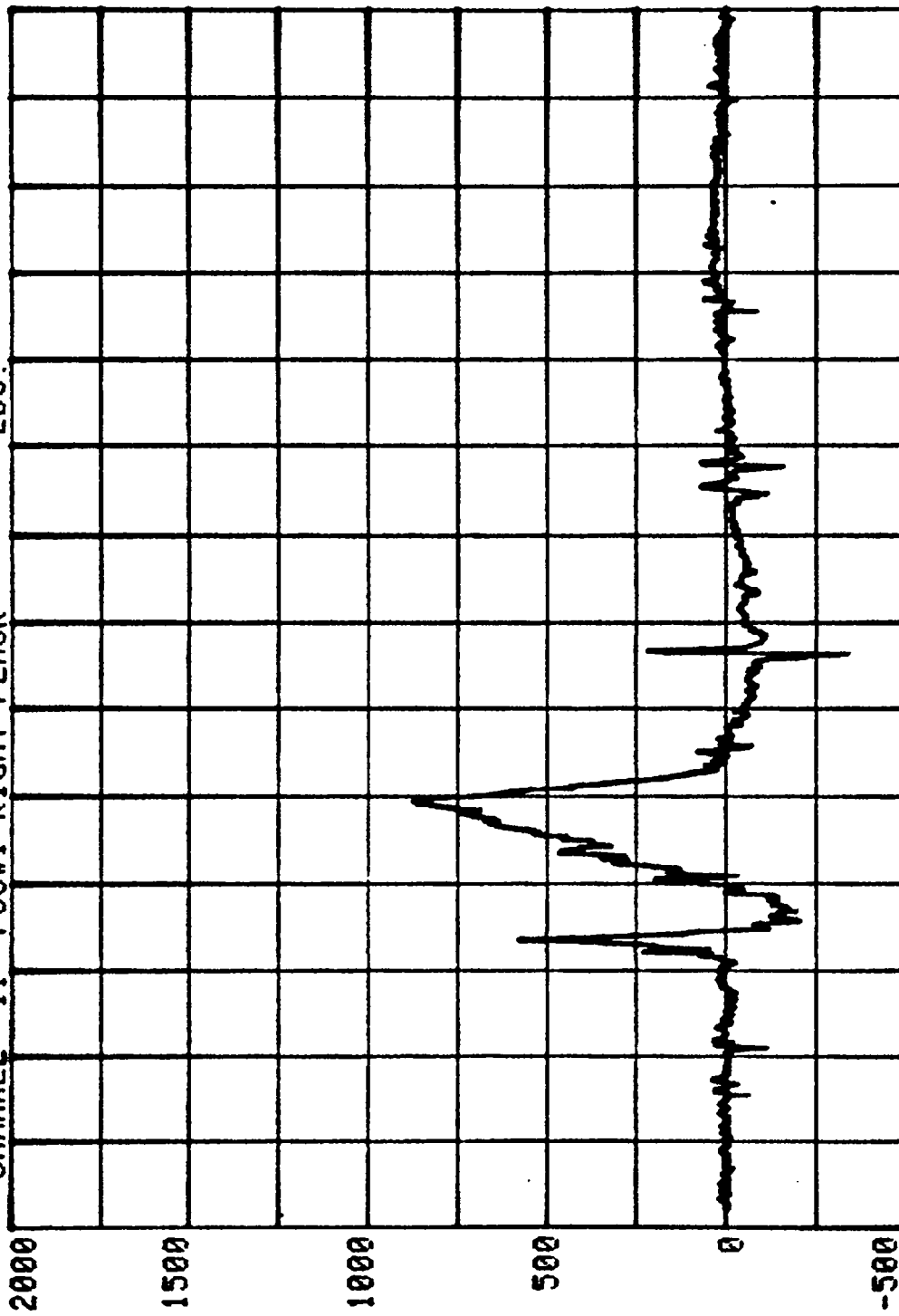
CHANNEL 6 POS#1 CHEST Z RUN= 830 SERIES= 200 G'S





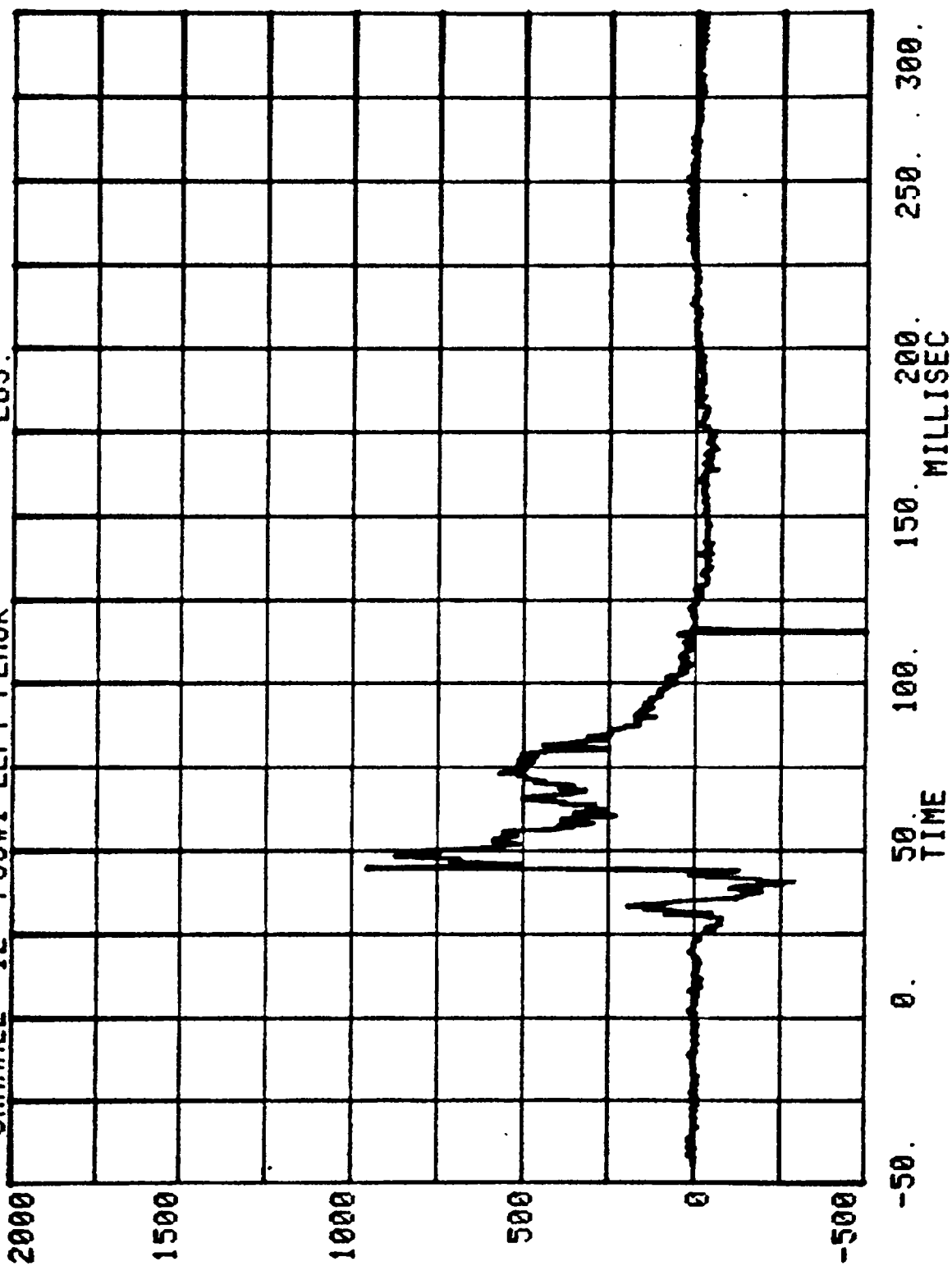
CHANNEL 11 POS#1 RIGHT FEMUR LBS.

RUN= 830 SERIES= 200

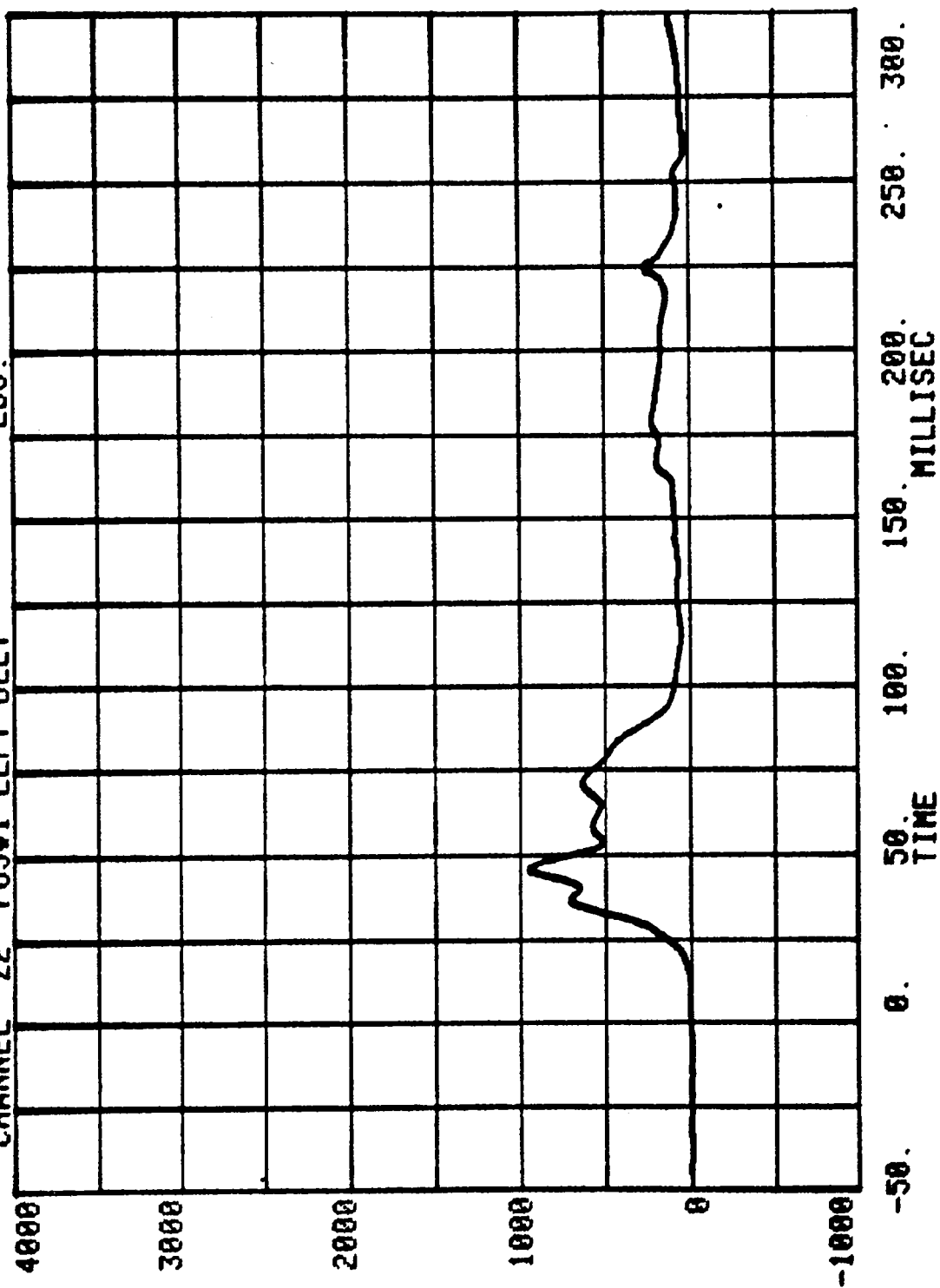


-50. 0. 50. 100. 150. 200. 250. 300.
TIME MILLISEC

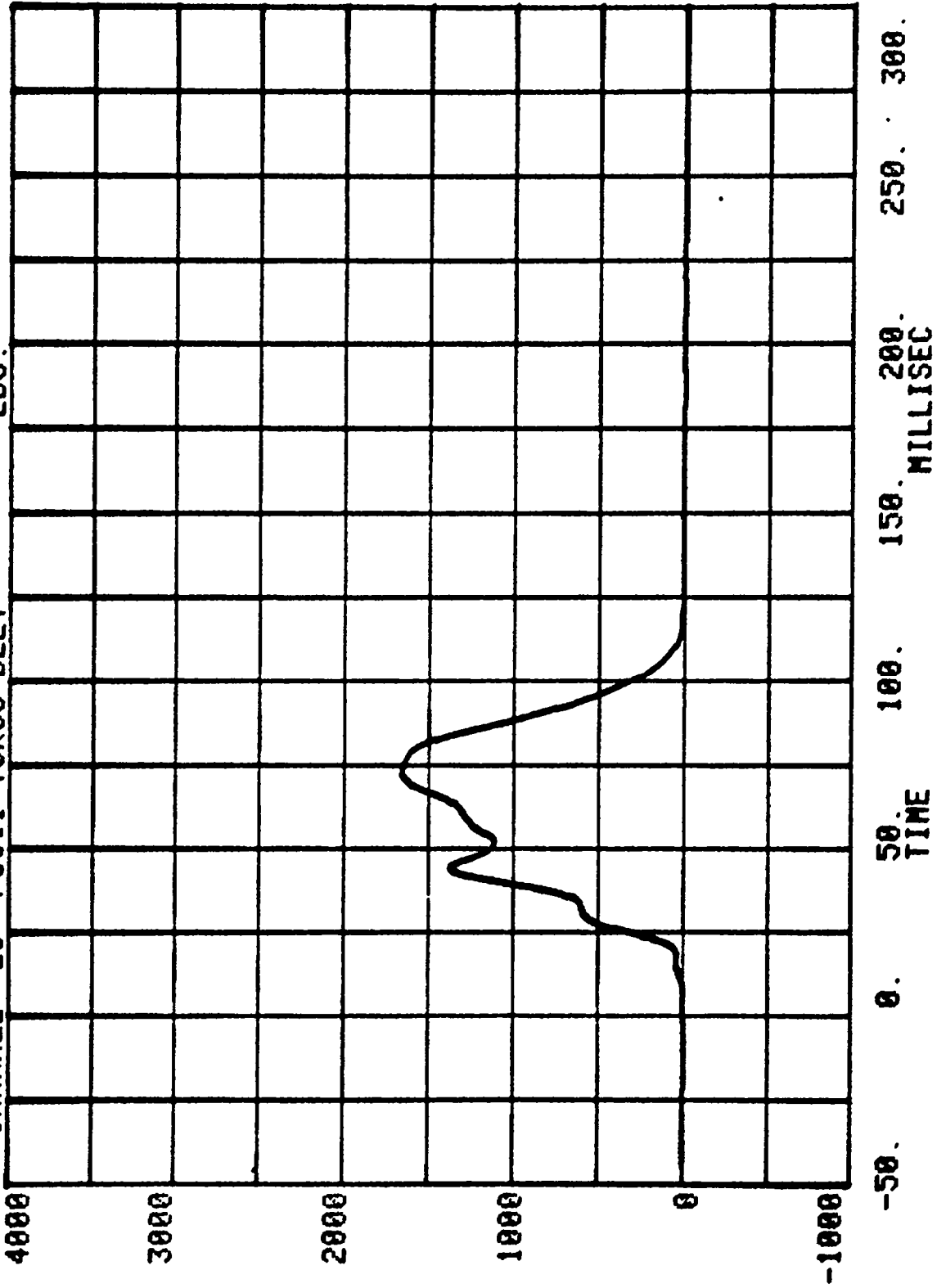
RUN= 830 SERIES= 200 LBS.
CHANNEL 12 POS#1 LEFT FEMUR

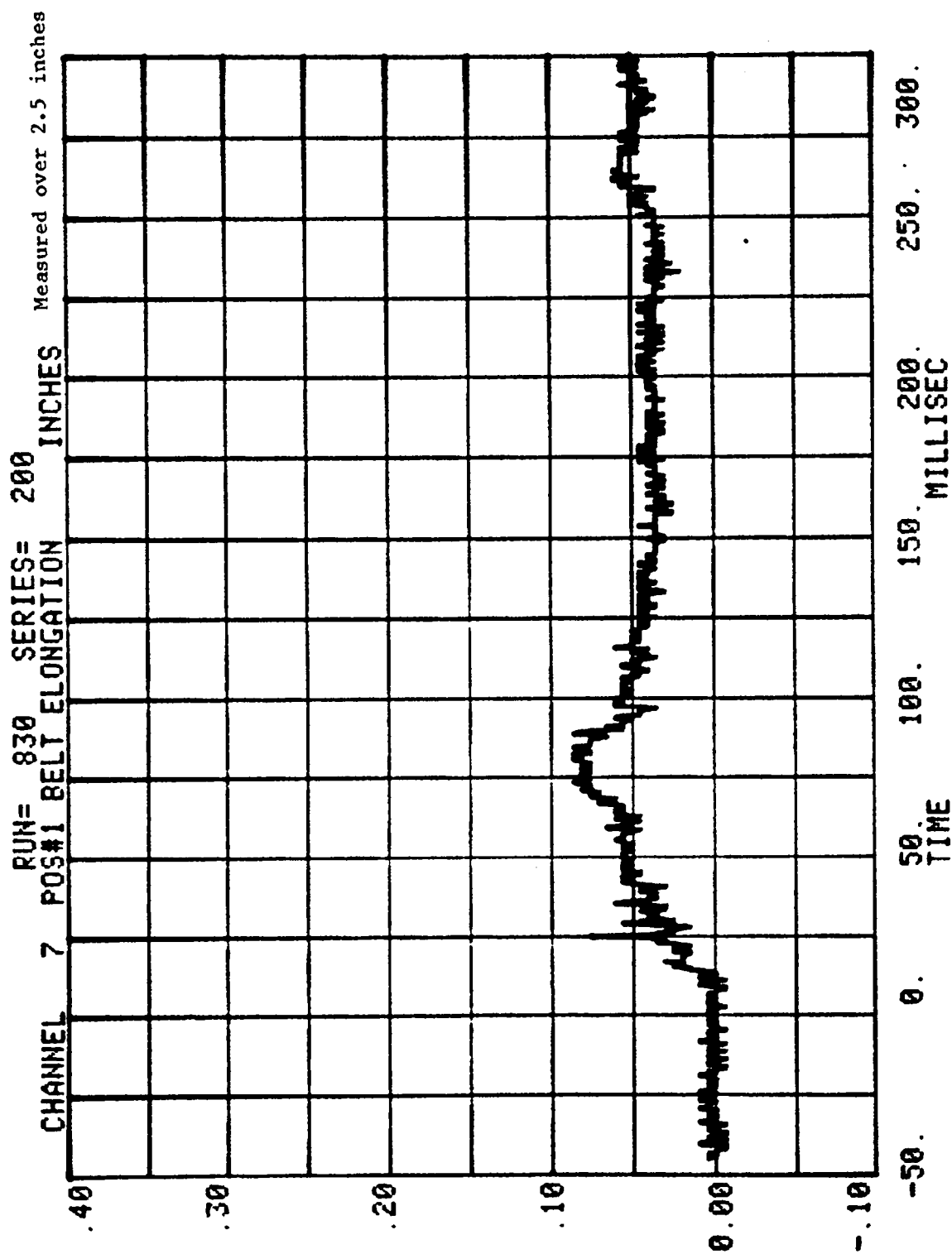


RUN= 830 SERIES= 200 LBS.
CHANNEL 22 POS#1 LEFT BELT

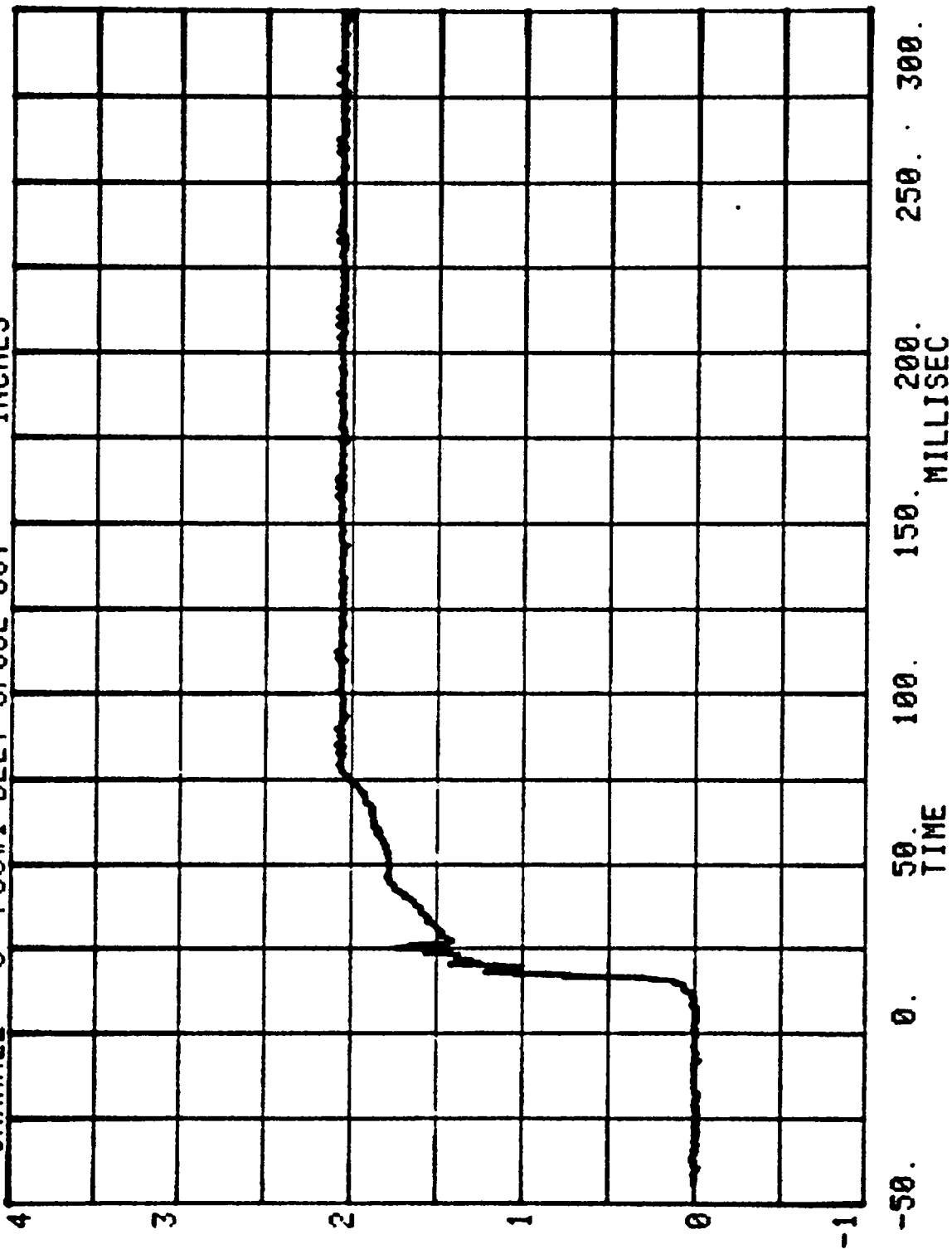


RUN= 830 SERIES= 200 LBS.
CHANNEL 23 POS#1 TORSO BELT





RUN= 830 SERIES= 200
CHANNEL 8 POS#1 BELT SPOOL OUT INCHES



HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NEW CAR ASSESSMENT BARRIER TEST - 1988

RUN= 830

POS#2 HEAD R

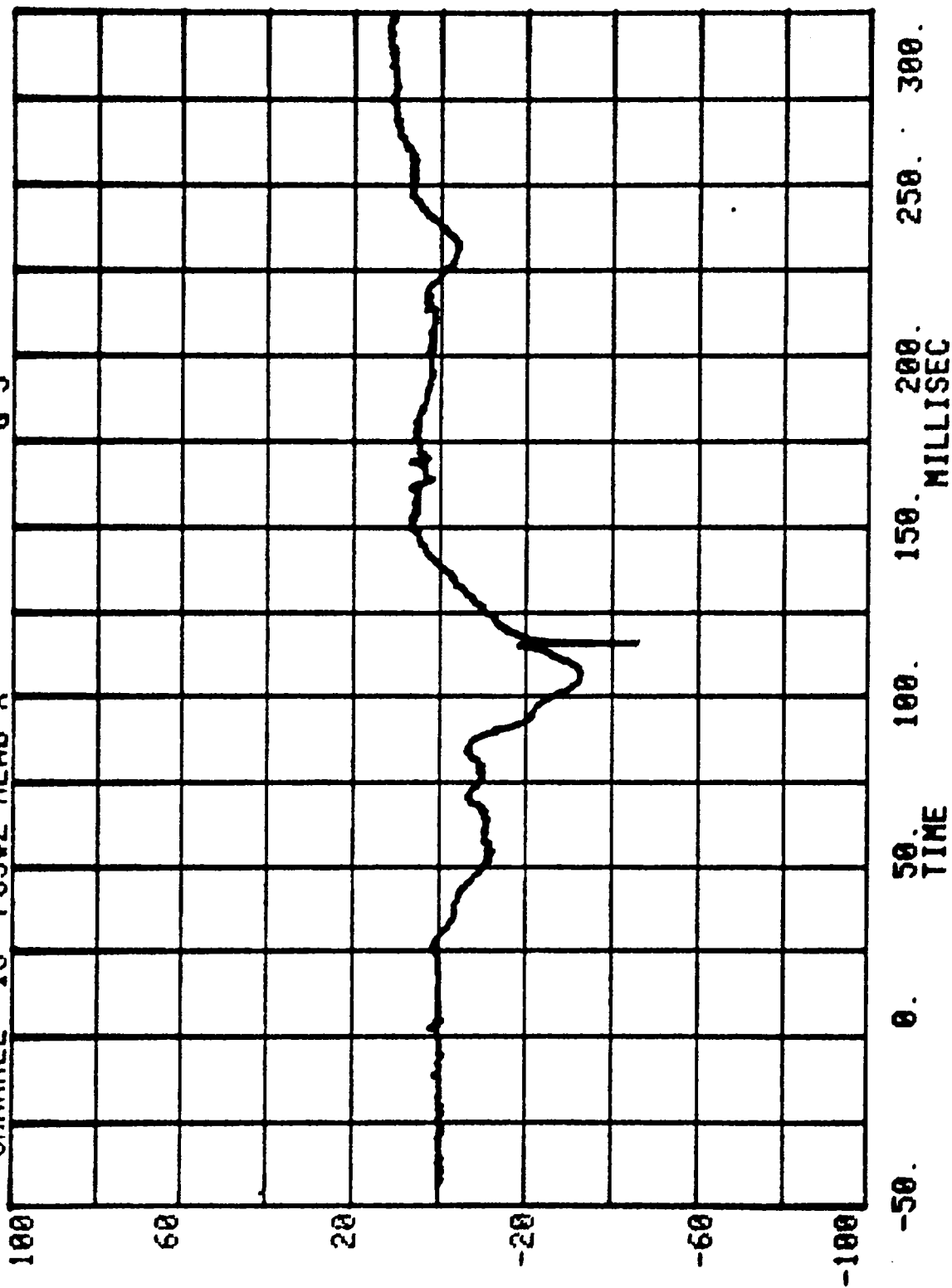
HIC= 821.6 FROM T1= .07560 TO T2= .11160

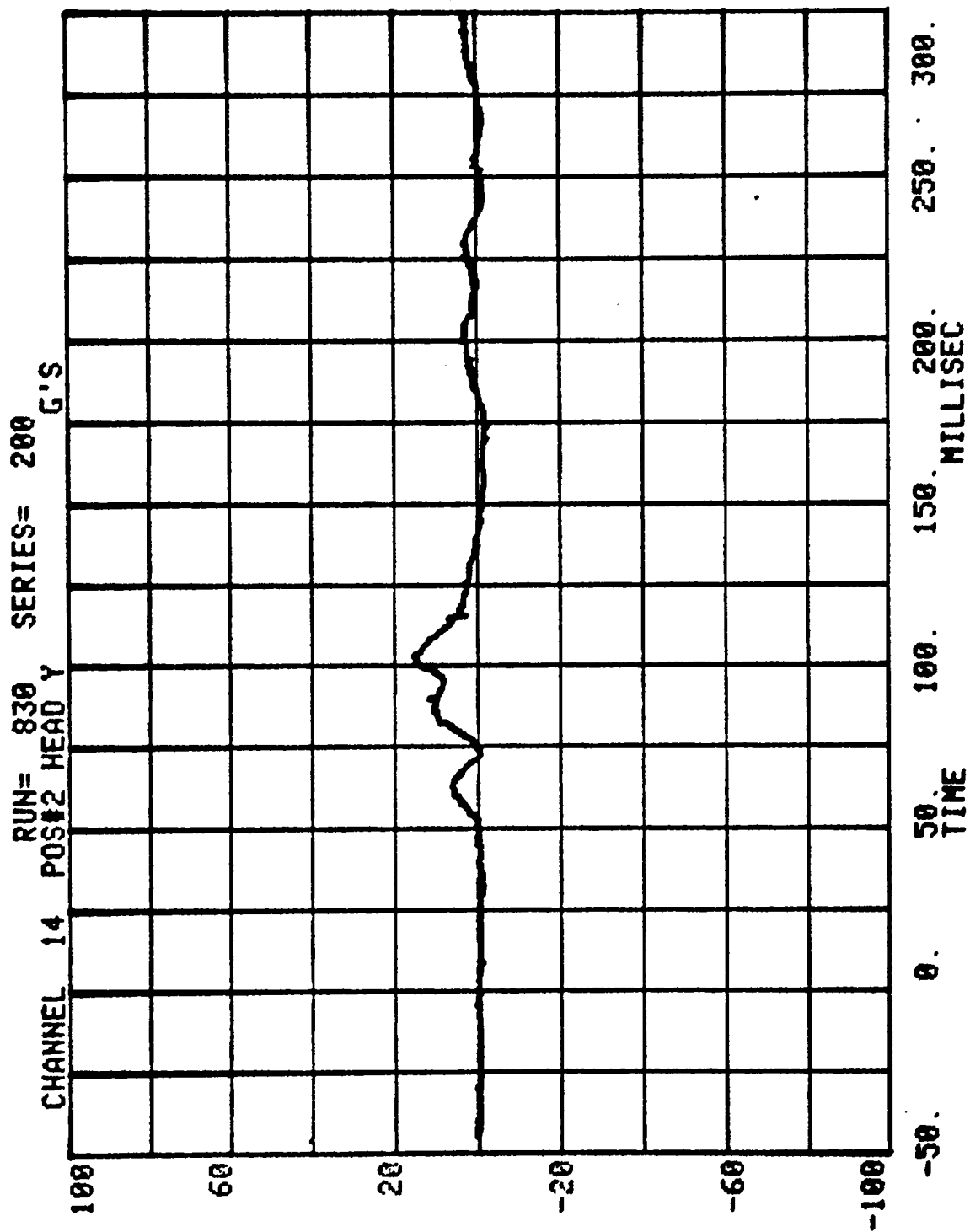
AVERAGE ACCELERATION BETWEEN T1 AND T2= 55.4G'S

EVENT TIME= 300.0 MSEC

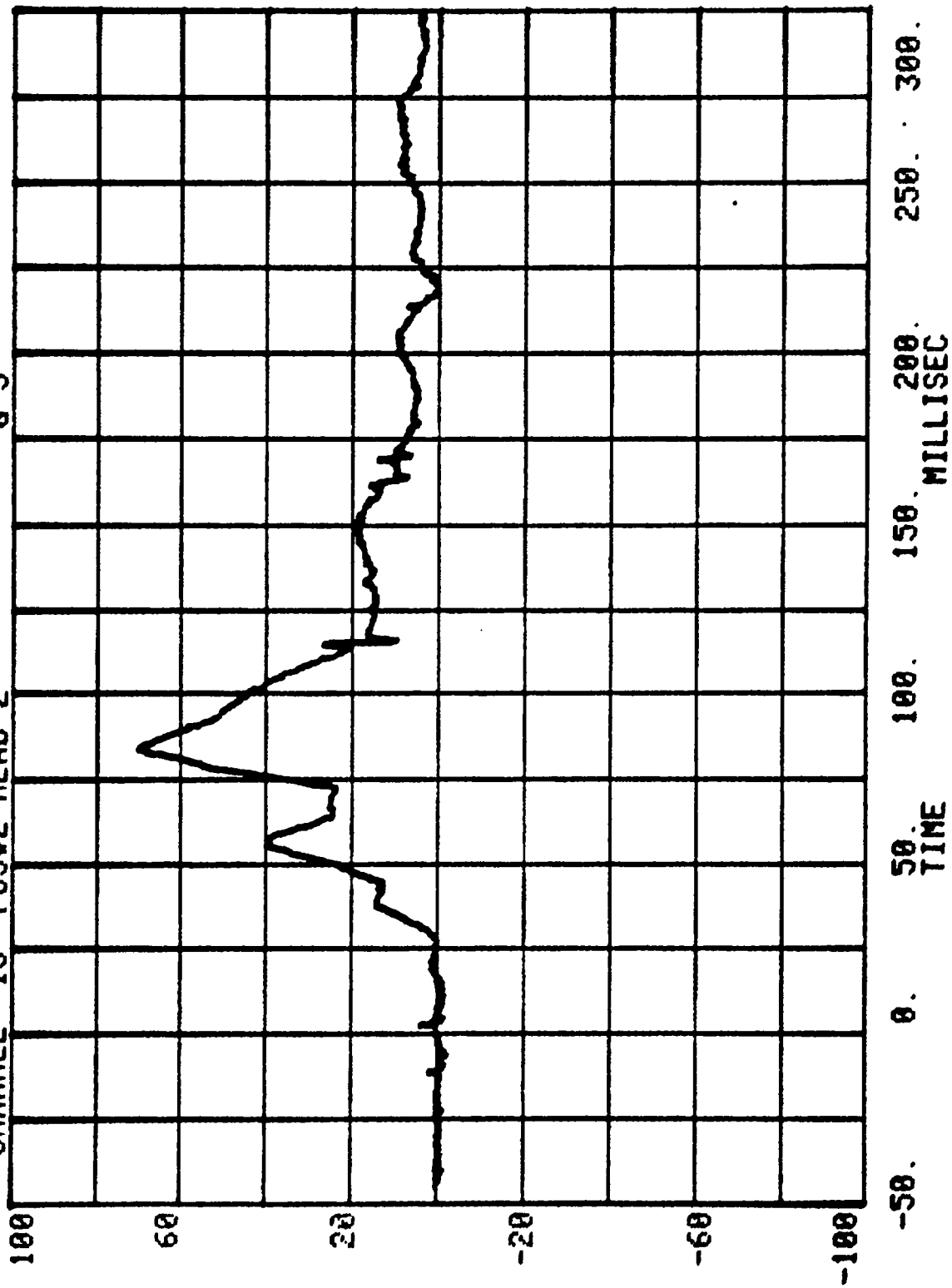
SEVERITY INDEX=1177.9

CHANNEL 13 POS#2 HEAD X
RUN= 830 SERIES= 200 G'S

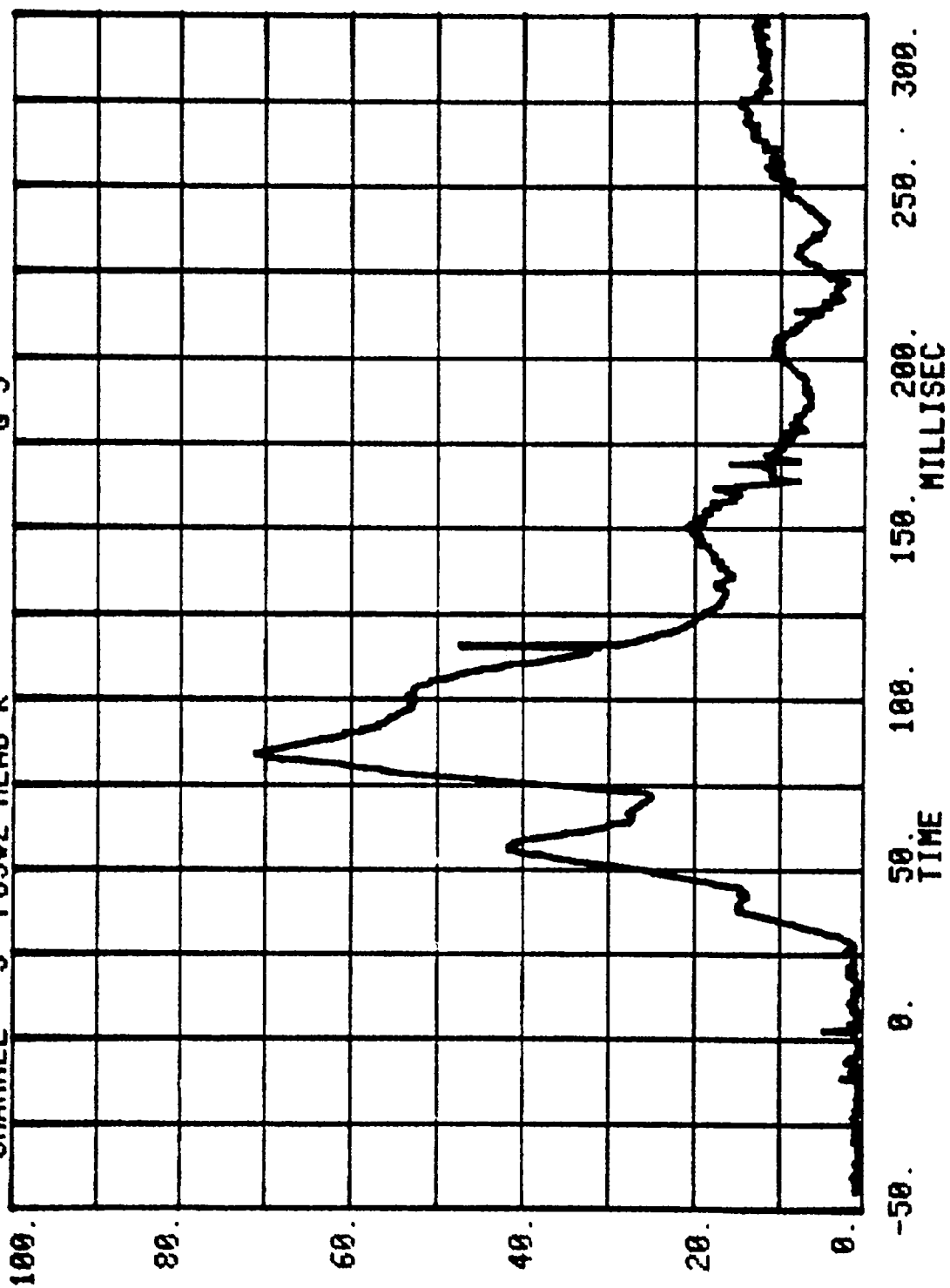




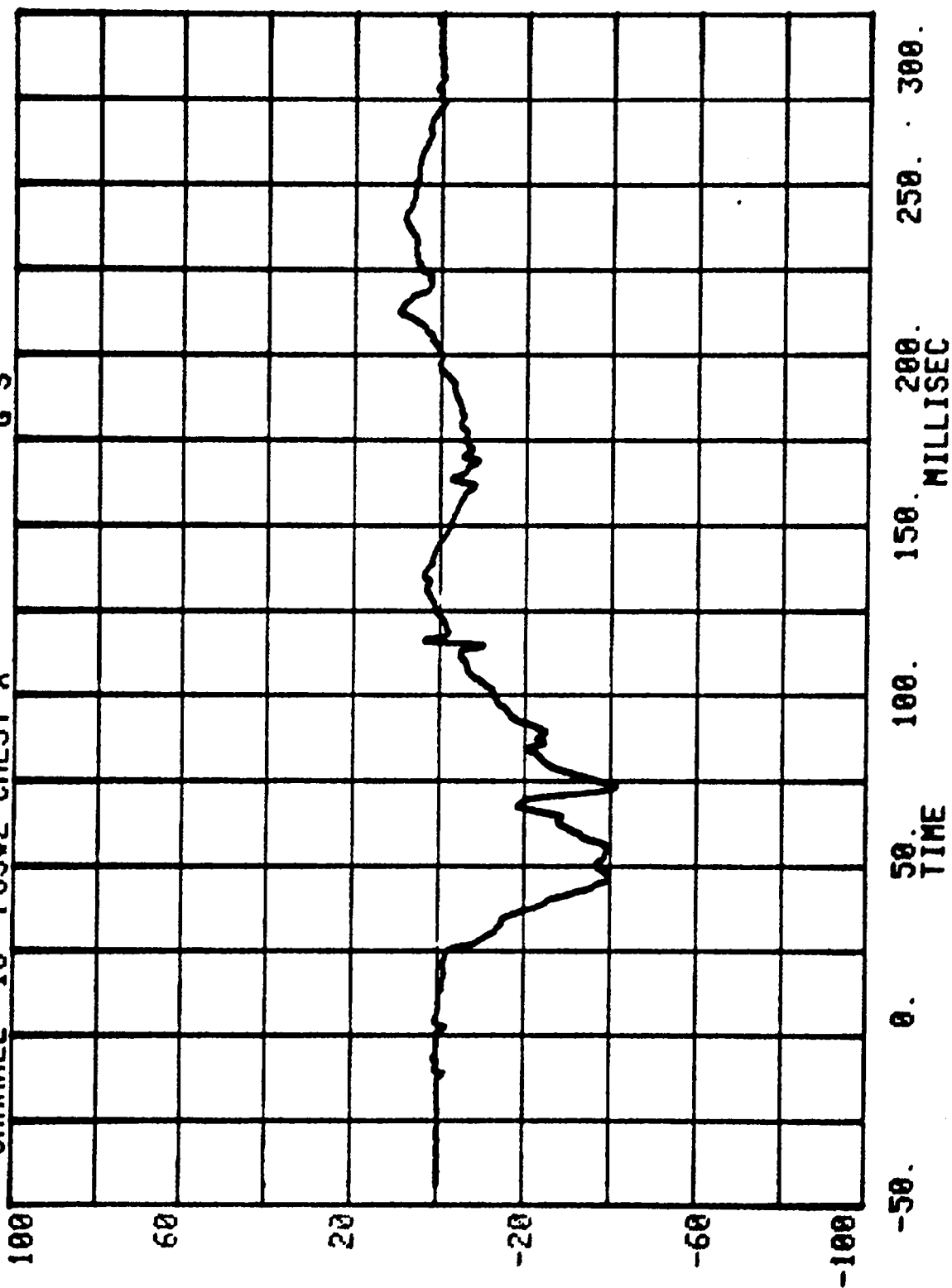
CHANNEL 15 POS#2 HEAD Z RUN= 830 SERIES= 200 G'S



CHANNEL 3 POS#2 HEAD R RUN= 830 SERIES= 200 G'S

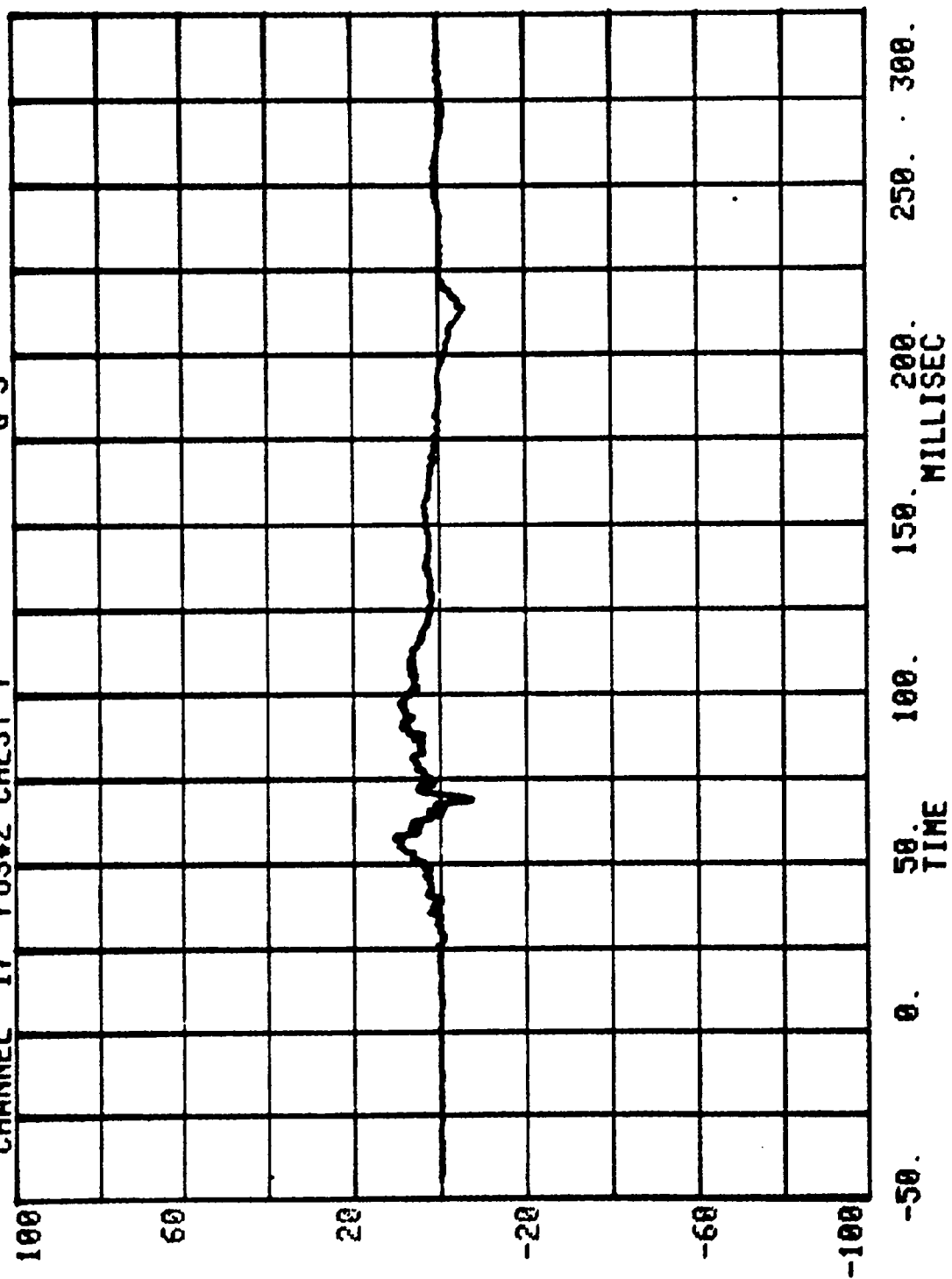


CHANNEL 16 POS#2 CHEST X
RUN= 830 SERIES= 200 G'S

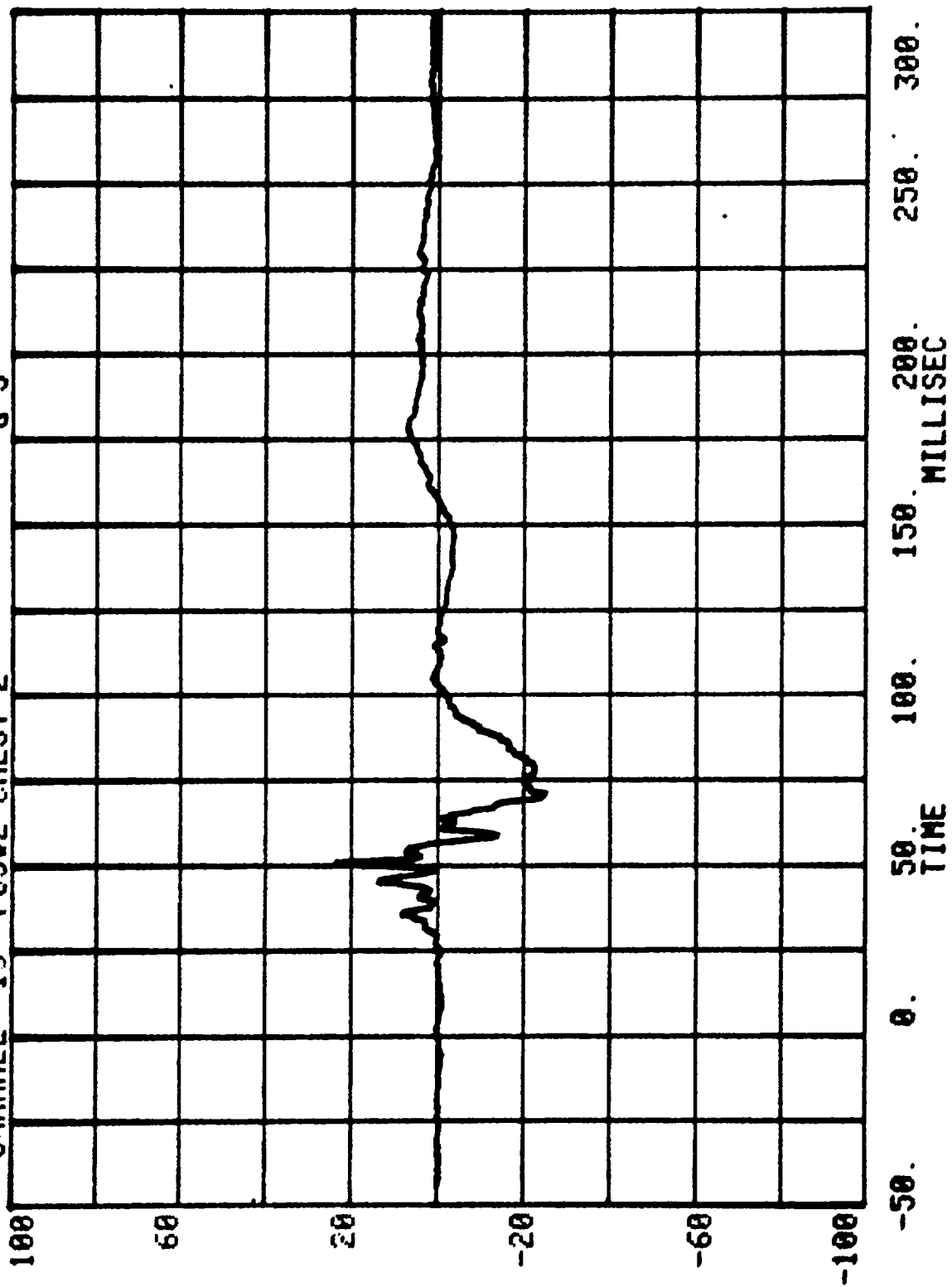


CHANNEL 17 POS#2 CHEST Y G'S

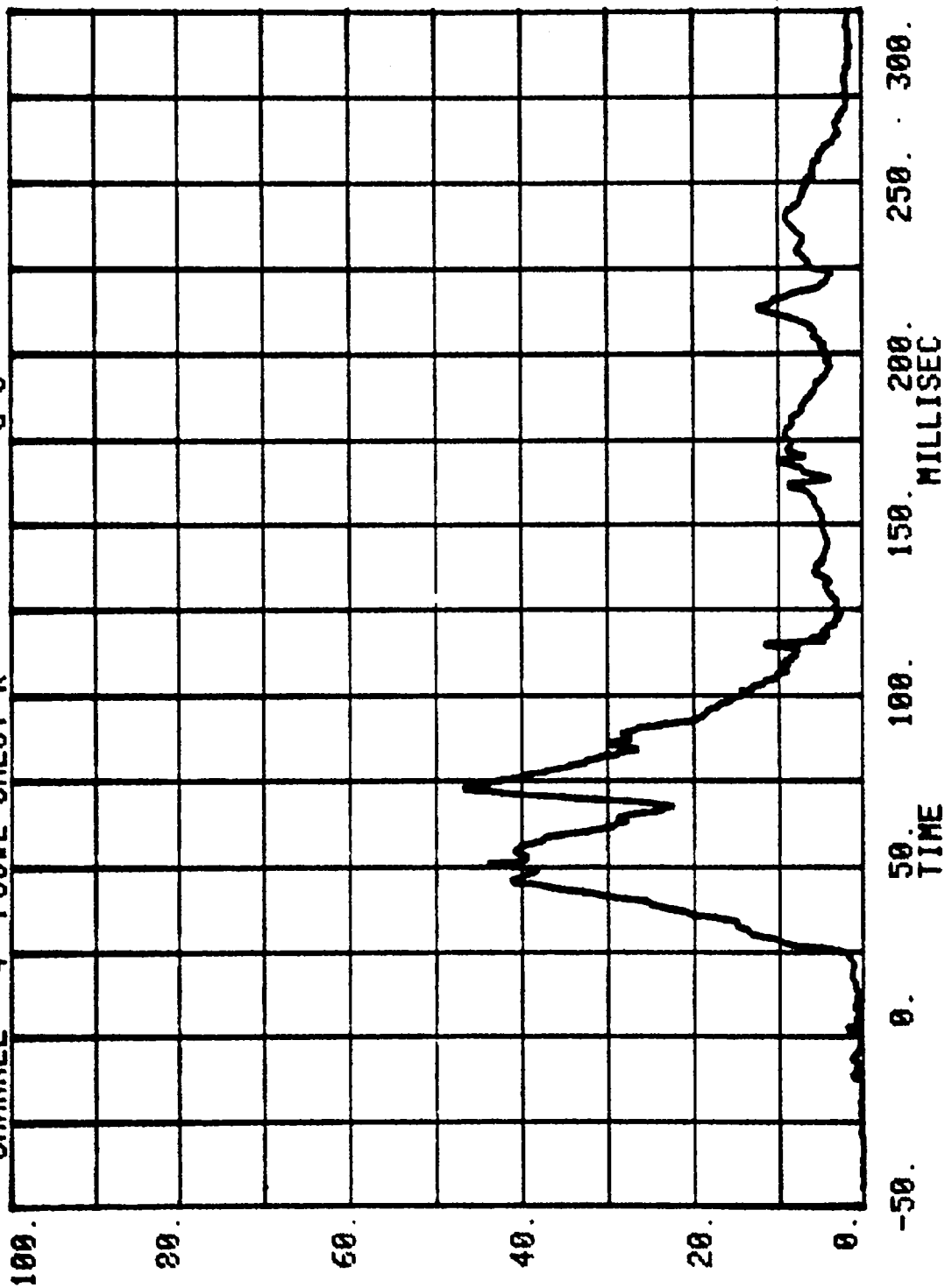
RUN= 830 SERIES= 200



RUN= 830 SERIES= 200
CHANNEL 19 POS#2 CHEST Z G'S



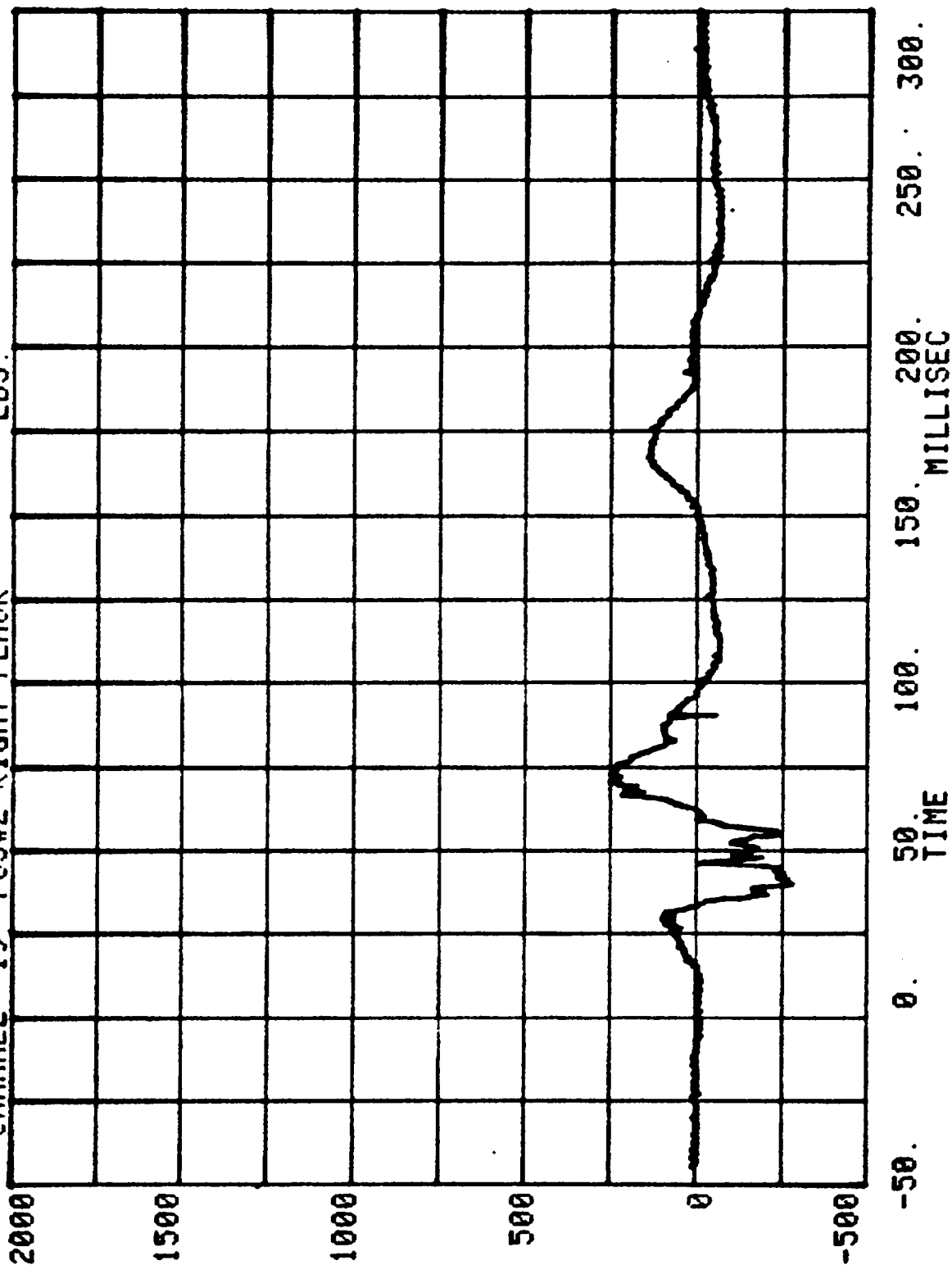
CHANNEL 4 POS#2 CHEST R RUN= 830 SERIES= 200 G'S



CHANNEL 19 POS#2 RIGHT FEMUR

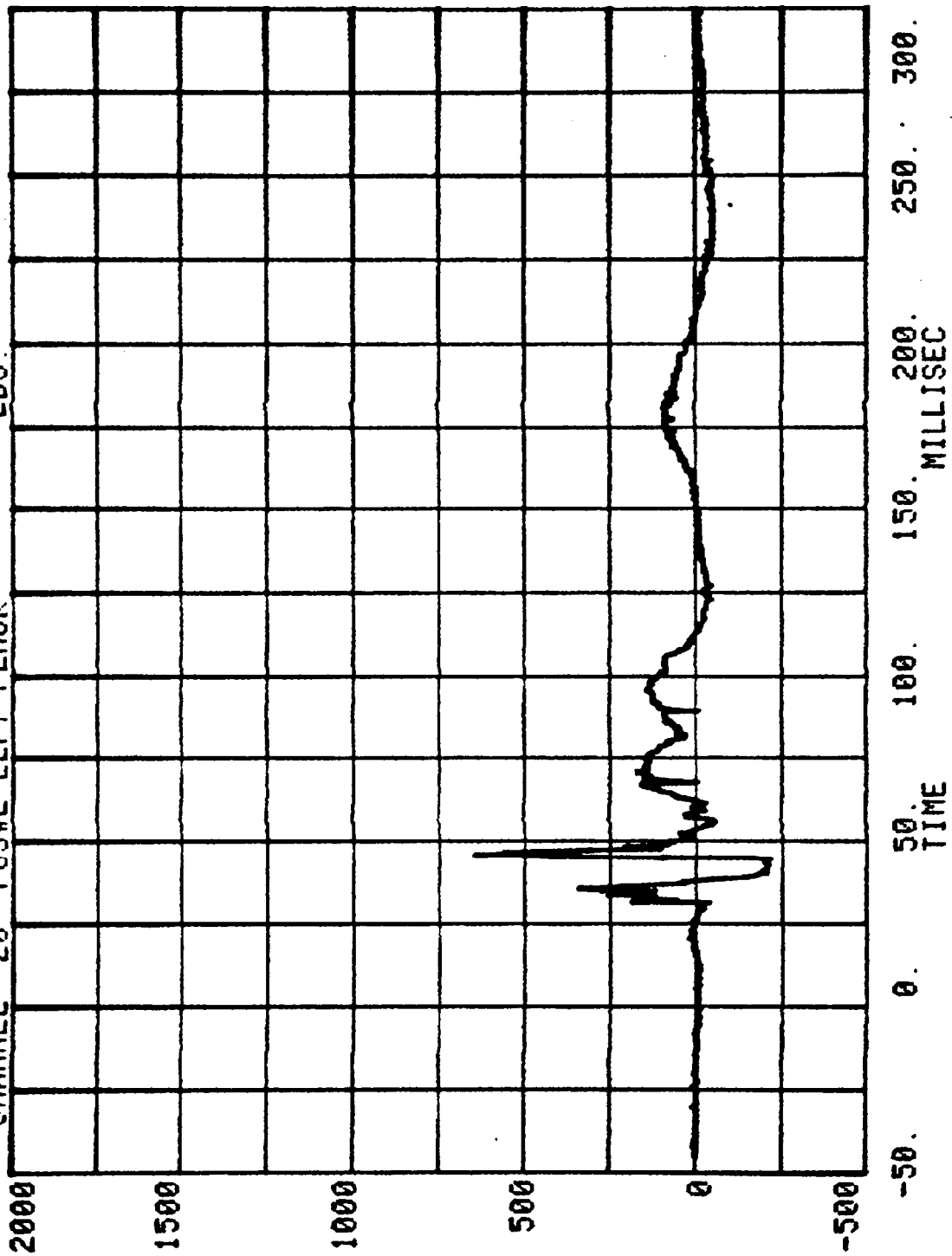
RUN= 830 SERIES= 200

LBS.



CHANNEL 20 POS#2 LEFT FEMUR LBS

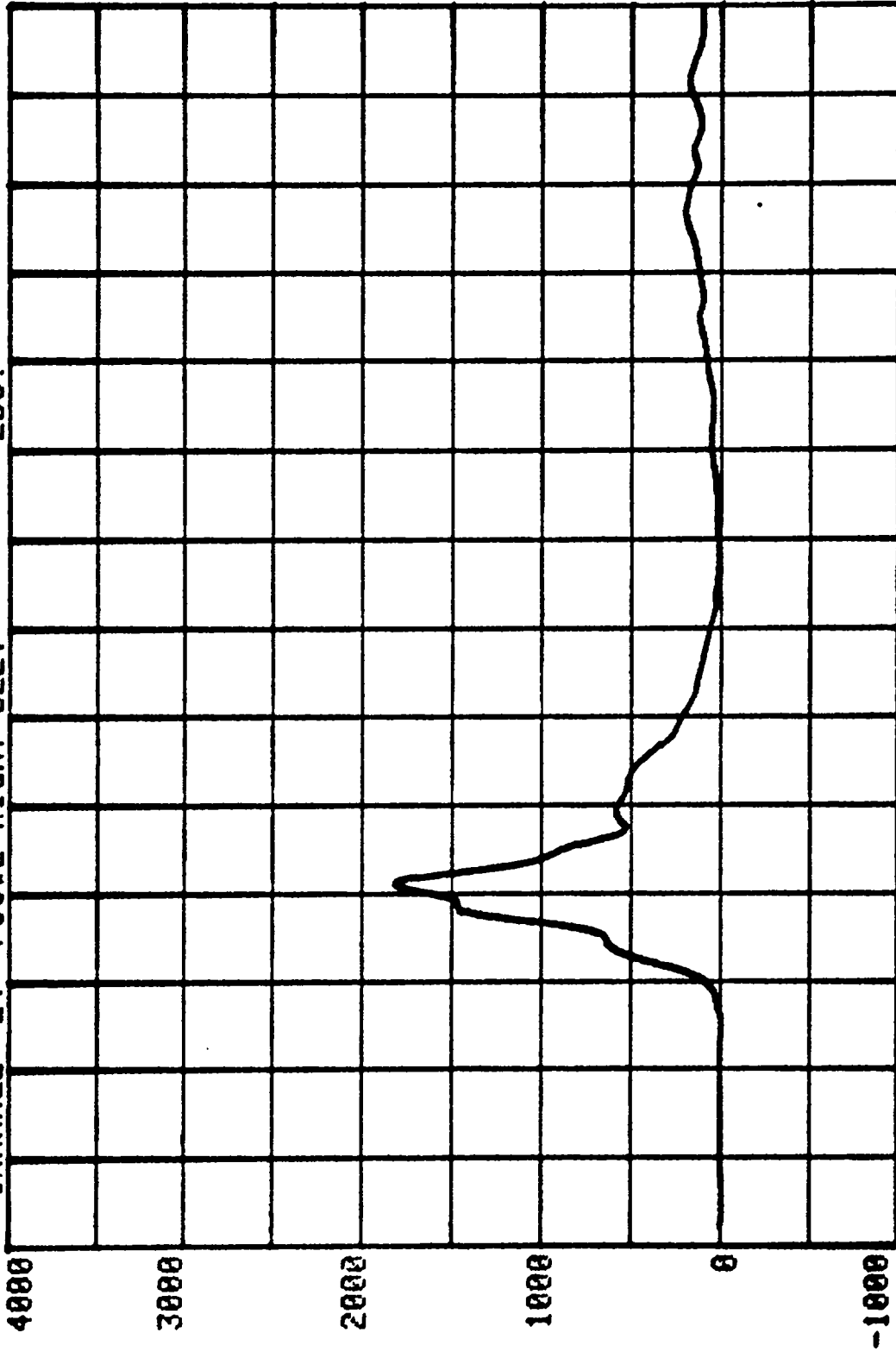
RUN= 830 SERIES= 200



CHANNEL 24 POS#2 RIGHT BELT

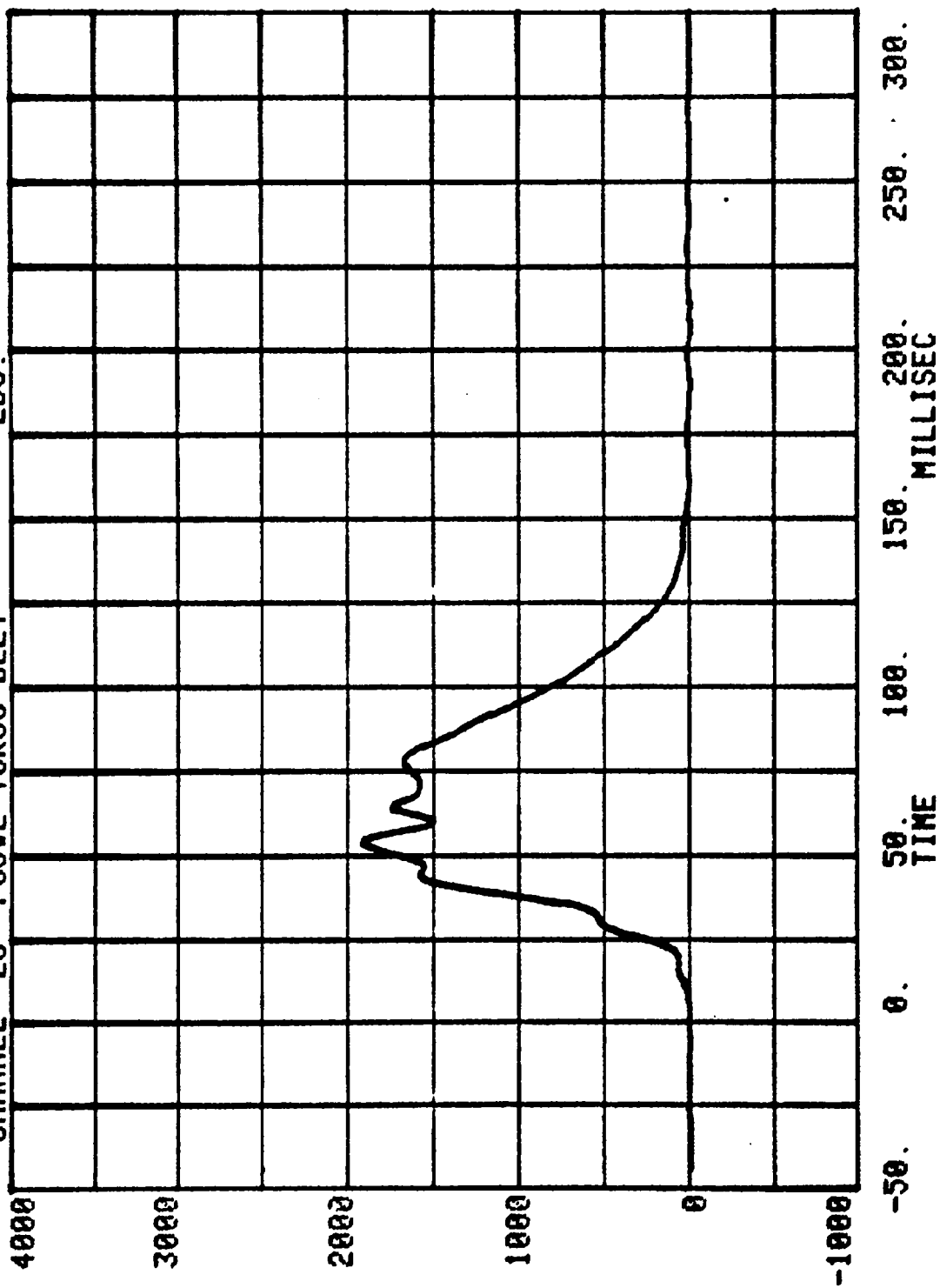
RUN= 830 SERIES= 200

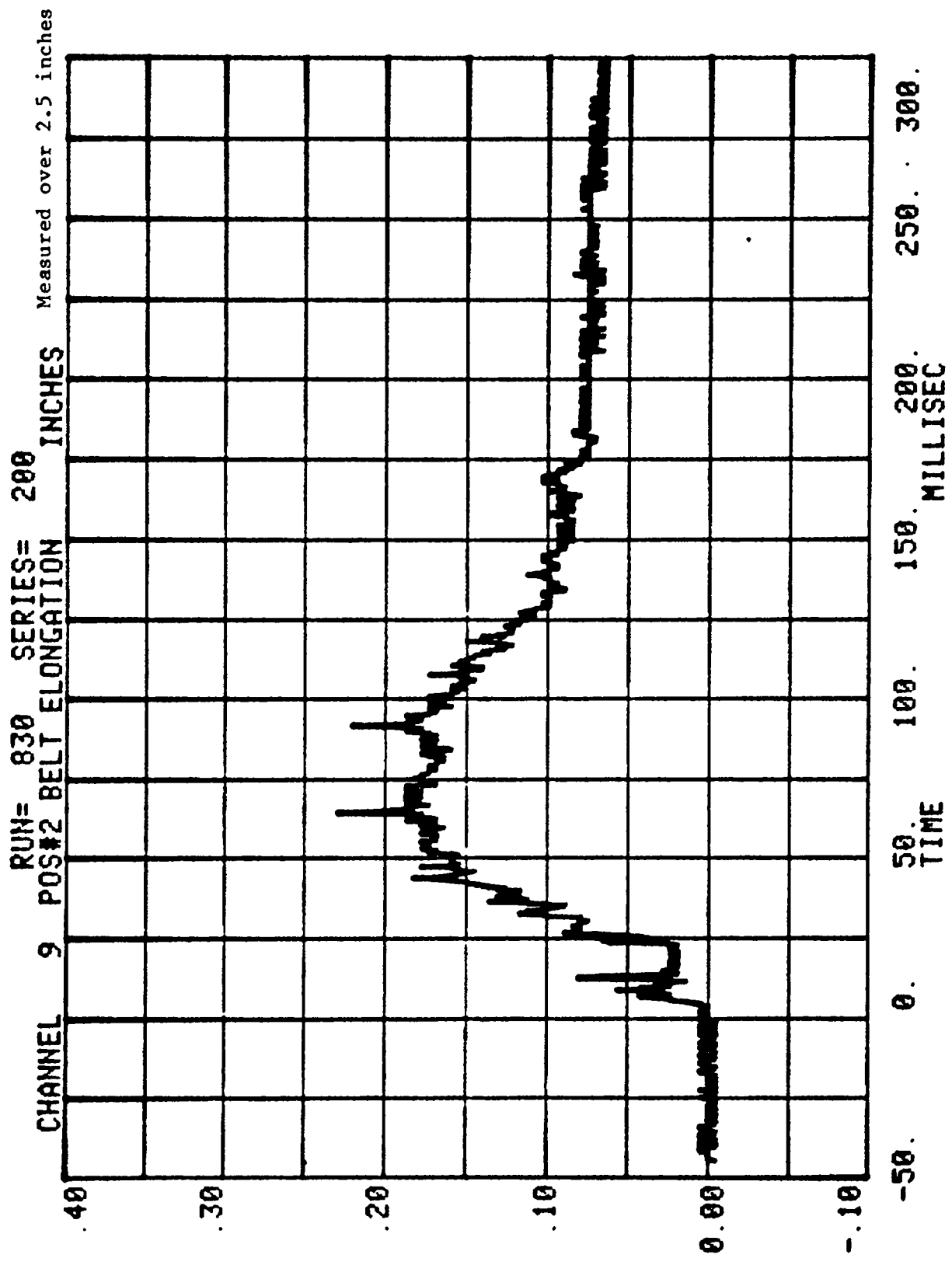
LBS.



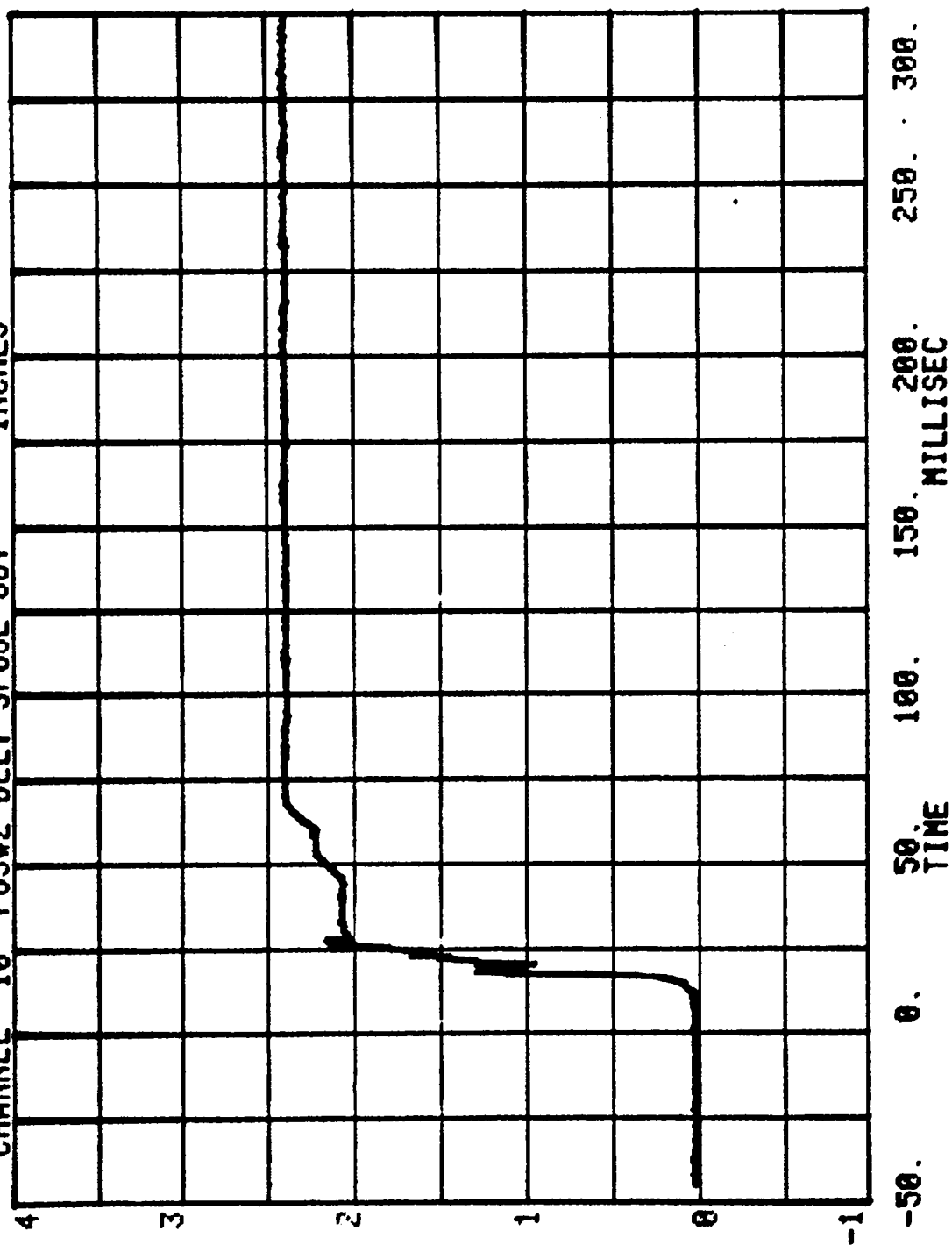
TIME
-50. 0. 50. 100. 150. 200. 250. 300.
MILLISEC

RUN= 830 SERIES= 200
CHANNEL 26 POS#2 TORSO BELT LBS.





RUN= 830 SERIES= 200
CHANNEL 10 POS#2 BELT SPOOL OUT INCHES



Appendix C

DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropomorphic 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.

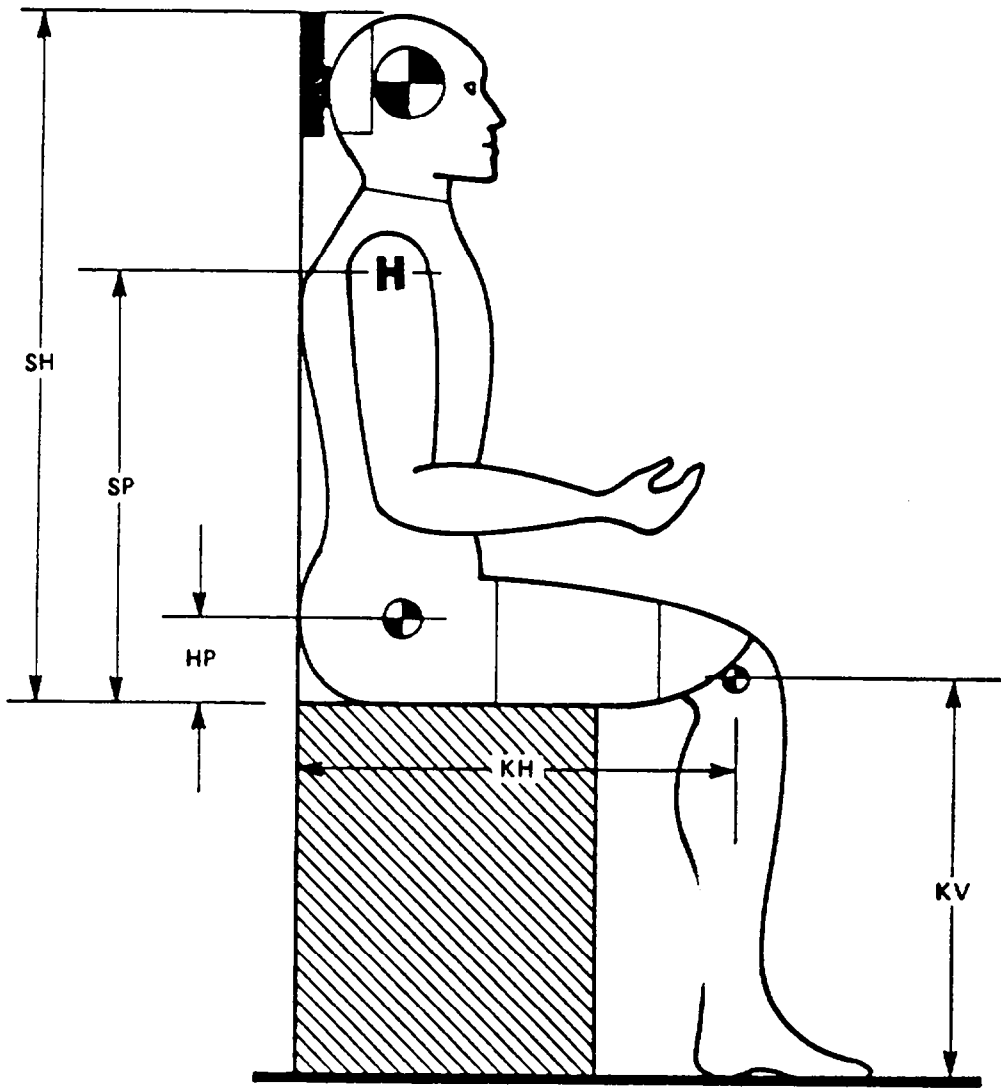
Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
749	5- 3-88
1019	5- 5-88

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 Inducant Testing Final Report, Report No. 6525-V-1.

Figure 13
DUMMY CONFIGURATION DIMENSIONS



PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 749

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXXX	5-3-88	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXXX	3	
SH - Seated Height	35.6 to 35.8"	35.6"	
SP - Shoulder Pivot Height	21.8 to 22.4"	22.1"	
HP - Hip Pivot Height	3.9" ref.	3.9"	
KH - Knee Pivot from Back Line	20.1 to 20.7"	20.5"	
KV - Knee Pivot from floor	19.3 to 19.9"	19.4	
SW - Shoulder Width	17.8 to 18.4"	18.0"	
HW - Hip Width	14.0 to 15.4"	14.8	

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		5-3-88	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		3	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		70-72 deg	
VERIFICATION LAB HUMIDITY (10 TO 70 %)		34-36 %	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	212.5 G's	
b. peak lateral accel.	<= 10 G's	2 G's	
c. Time above 100 G's	0.9 to 1.5 ms.	1.1ms	

* Sequential number beginning with "1" at the start of each fiscal years' crash test program.

TECHNICIAN'S NAME:

D.W. Hess

. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 749

EST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	22.5 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	22 G's	
c. Peak Resultant Head Acceleration		26 G's max.	22 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.1 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	25.6 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	3.4 ms	
g. Max. Head Rotation		63 to 73 deg.	67 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	30.1 ms	
	Displ.	2.1 to 3.1"	3.0 "	
60 deg.	Time	40.3 to 51.7 ms.	45.1 ms	
	Displ.	4.3 to 5.3"	5.0 "	
Maximum (67 deg)	Time	53.2 to 66.8 ms.	58.5 ms	
	Displ.	5.0 to 6.0"	5.6 "	
60 deg.	Time	67.0 to 83.0 ms.	71.3 ms	
	Displ.	4.3 to 5.3"	5.1 "	
30 deg.	Time	85.4 to 104.6 ms.	91.5 ms	
	Displ.	2.1 to 3.1"	2.1 "	
0 deg.	Time	101.0 - 123.0 ms.	108.2 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME:

D. W. Hess

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 749

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
3. ABDOMINAL COMPRESSION			
TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	25 lbs	
b. Force @ 0.75"	36 to 50 lbs.	38.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	55 lbs	
d. Force @ 1.3"	73 to 88 lbs.	82.5 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	30 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	45 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	56.5 lbs	
d. Return Angle	12 deg. maximum	9 deg	
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.8 fps	
(2) Peak Deflection	1.7" maximum	1.49 "	
(3) Peak Resistive Force	2250 lbs maximum	2106 lbs	
(4) Internal Hysteresis	50 to 70%	60.4 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	0.9 "	
(3) Peak Resistive Force	1450 lbs maximum	1352 lbs	
(4) Internal Hysteresis	50 to 70%	65.3 %	

TECHNICIAN'S NAME: D. H. H. H.

I. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 749

		PRE-TEST (if required)	POST-TEST (if required)
TEST PARAMETER	SPECIFICATION		
6. KNEE IMPACT TEST			
A.Right Side			
(1) Probe Speed	6.76 to 7.04 fps	7.02 fps	
(2) Maximum Force	1850 to 2500 lbs	2475 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.96 ms	
B. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.02 fps	
(2) Maximum Force	1850 to 2500 lbs	2150 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.8 ms	

REMARKS:

TECHNICIAN'S NAME: Dir H. 22

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER 749

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CL60	4-88	10-88
HY LATERAL--	ENDEVCO	CG34	4-88	10-88
HZ VERTICAL--	ENDEVCO	FL03	3-88	9-88
2. CHEST ACCELEROMETER--				
CX LONGITUDINAL--	CEC	A129	3-88	9-88
CY LATERAL--	ENDEVCO	CN64	3-88	9-88
CZ VERTICAL--	CEC	A56	3-88	9-88
3. FEMUR LOAD CELLS				
RIGHT SIDE	GSE	306	5-88	11-88
LEFT SIDE	GSE	310	5-88	11-88
CALIBRATION LABORATORY INSRUTMENTS--				
1. PENDULUM ACC.--	CEC	A144	12-87	6-88
2. TEST PROBE ACCELEROMETER--	CEC	A142	12-87	6-88
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS- DUCER INC	20051	5-88	11-88
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	5-88	11-88
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	5-88	11-88

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXXX	5-5-88	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXXX	4	
SH - Seated Height	35.6 to 35.8"	35.8 "	
SP - Shoulder Pivot Height	21.8 to 22.4"	22.1 "	
HP - Hip Pivot Height	3.9" ref.	3.9 "	
KH - Knee Pivot from Back Line	20.1 to 20.7"	20.5 "	
KV - Knee Pivot from floor	19.3 to 19.9"	19.7 "	
SW - Shoulder Width	17.8 to 18.4"	18.2 "	
HW - Hip Width	14.0 to 15.4"	15.1 "	

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		5-5-88	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		4	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		70-72 deg	
VERIFICATION LAB HUMIDITY (10 TO 70 %)		34-38 %	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	250 G's	
b. peak lateral accel.	<= 10 G's	9 G's	
c. Time above 100 G's	0.9 to 1.5 ms.	1.1 ms	

* Sequential number beginning with "1" at the start of each fiscal years' crash test program.

TECHNICIAN'S NAME:

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA...continued

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	22.5 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	22 G's	
c. Peak Resultant Head Acceleration		26 G's max.	23.3 G's	
d. Pendulum Decel. (t2-t1)		≤ 3 ms.	2 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	25.4 ms	
f. Pendulum Decel. (t4-t3)		≤ 10 ms.	3.9 ms	
g. Max. Head Rotation		63 to 73 deg.	66 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	28.7 ms	
	Displ.	2.1 to 3.1"	2.6 "	
60 deg.	Time	40.3 to 51.7 ms.	44.8 ms	
	Displ.	4.3 to 5.3"	4.9 "	
Maximum (66 deg)	Time	53.2 to 66.8 ms.	55.1 ms	
	Displ.	5.0 to 6.0"	5.5 "	
60 deg.	Time	67.0 to 83.0 ms.	69.7 ms	
	Displ.	4.3 to 5.3"	5.0 "	
30 deg.	Time	85.4 to 104.6 ms.	89.3 ms	
	Displ.	2.1 to 3.1"	2.1 "	
0 deg.	Time	101.0 - 123.0 ms.	105.4 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: D. H. ...

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

		PRE-TEST (if required)	POST-TEST (if required)
TEST PARAMETER	SPECIFICATION		
3. ABDOMINAL COMPRESSION			
TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	25 lbs	
b. Force @ 0.75"	36 to 50 lbs.	36 lbs	
c. Force @ 1.0"	50 to 63 lbs.	54 lbs	
d. Force @ 1.3"	73 to 88 lbs.	78 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	27.5 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	39.5 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	51.5 lbs	
d. Return Angle	12 deg. maximum	9.0 deg	
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.8 fps	
(2) Peak Deflection	1.7" maximum	1.44 "	
(3) Peak Resistive Force	2250 lbs maximum	2090 lbs	
(4) Internal Hysteresis	50 to 70%	58.8 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	.96 "	
(3) Peak Resistive Force	1450 lbs maximum	1326 lbs	
(4) Internal Hysteresis	50 to 70%	64.9 %	

TECHNICIAN'S NAME: T. W. H. 2-2

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

		PRE-TEST (if required)	POST-TEST (if required)
TEST PARAMETER	SPECIFICATION		
6. KNEE IMPACT TEST			
A. Right Side			
(1) Probe Speed	6.76 to 7.04 fps	6.8 fps	
(2) Maximum Force	1850 to 2500 lbs	1875 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.8 ms	
B. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2217 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	

REMARKS:

TECHNICIAN'S NAME: DLW/HV22

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER 1019

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CH83	4-88	10-88
HY LATERAL--	ENDEVCO	CU62	4-88	10-88
HZ VERTICAL--	ENDEVCO	CM86	4-88	10-88
2. CHEST ACCELEROMETER--				
CX LONGITUDINAL--	CEC	A143	12-87	6-88
CY LATERAL--	ENDEVCO	CE18	2-88	8-88
CZ VERTICAL--	CEC	A86	2-88	8-88
3. FEMUR LOAD CELLS				
RIGHT SIDE	GSE	1707	5-88	11-88
LEFT SIDE	GSE	1927	5-88	11-88
CALIBRATION LABORATORY INSRUTMENTS--				
1. PENDULUM ACC.--	CEC	A144	12-87	6-88
2. TEST PROBE ACCELEROMETER--	CEC	A142	12-87	6-88
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS- DUCER INC	20051	5-88	11-88
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	5-88	11-88
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	5-88	11-88

Appendix D

**VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT
SYSTEM INSTRUCTIONS**

BEFORE DRIVING YOUR VEHICLE

OCCUPANT RESTRAINT SYSTEMS

WARNING — Be sure to LOCK ALL DOORS before driving away. Locking the doors, along with using the safety belts provided, will minimize the risk of injury or ejection in an accident.

Ford Motor Company recommends that you always "buckle up." In some areas, restraint system 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 safety belt are much more likely to suffer serious bodily injury in the event of a collision.

WARNING — All vehicle occupants, including pregnant women, should wear their safety belts for maximum protection in the event of a collision. All vehicle occupants, including pregnant women, should be sure the lap belt, or lap belt portion of the lap-shoulder belt, is fitted snugly and as low as possible around the hips, not on the waist. Shoulder belts should also be properly adjusted for minimum slack. Failure to properly utilize the safety belts may increase the chance and/or severity of injury in the event of a collision.

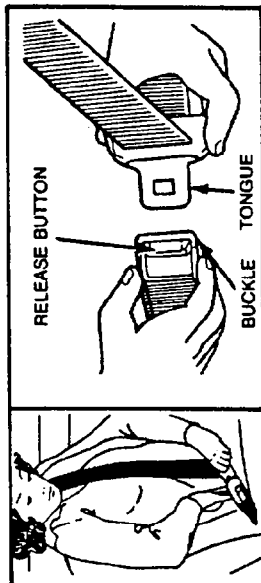
According to accident statistics, properly restrained children are safer in the rear seat than in the front seat. For young children, infant and child restraints should be obtained and used in accordance with the instructions provided by the manufacturer of the infant and child restraint. See Infant and Child Restraints in this section. Child restraints are required by law.

BEFORE DRIVING YOUR VEHICLE

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. This 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 outside shoulder and chest and insert the belt tongue into the proper buckle until you hear a snap and feel it latch.



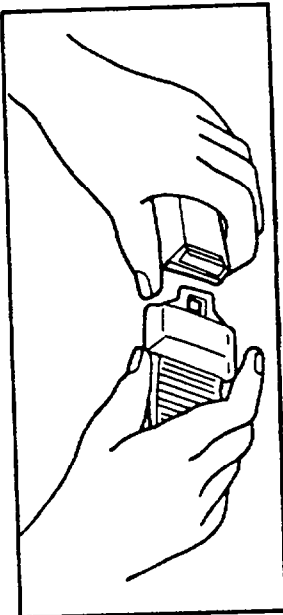
Pull on the shoulder portion of the belt to tighten the lap portion to a snug fit. Be sure the belt is as low on your hips as possible.

WARNING — Use the shoulder belt on the outside shoulder only. 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 and as low as possible around the hips, not on the waist. Failure to follow these precautions could increase the chance and/or severity of injury in an accident.

BEFORE DRIVING YOUR VEHICLE

Rear Lap Belts with Retractors

Pull the belt out of the retractor with a steady motion and insert the tongue into the buckle until you hear a snap and feel the latch engage.



WARNING — Be sure the lap belt is fitted snugly and as low as possible around the hips, not around the waist. Failure to do so may increase the chance of injury in the event of a collision.

If you should jam the lap belt retractor by allowing the belt to retract when it is twisted, you can free the webbing with this procedure:

- Pull on the belt with both hands to tighten it on the retractor spool.
- Feed the belt back into the retractor until it is completely retracted. Repeat previous step if necessary.
- Pull the belt out of the retractor as far as it will go. Remove any foreign matter or untwist the belt as necessary and let the belt retract.
- Extend and retract the belt several times to be sure the belt retractor operates properly.

Unfastening Safety Belts

Push the release button in the buckle and allow the belts to unlatch.

BEFORE DRIVING YOUR VEHICLE

Safety Belt Maintenance

Safety belt assemblies should be periodically inspected to assure that they have not become damaged and that they remain in proper operating condition, particularly if they have been subjected to severe stress.

WARNING — All safety belt assemblies, including retractors and attaching hardware, should be inspected after any collision. Ford recommends that all safety belt assemblies in use during a collision be replaced unless the collision was minor and the belts show no damage and continue to operate properly. Safety belt assemblies not in use during a collision should also be inspected and replaced if either damage or improper operation is noted.

Rear Seat Lap-Shoulder Belt Upper Anchorage Locations

Your vehicle is equipped, with two upper anchorages for rear lap-shoulder belts, one for each outboard rear seating position. Rear seat lap-shoulder belt assembly kits can be obtained and installed by your local Ford or Lincoln-Mercury dealer.

WARNING — In order to reduce the risk of personal injury in an accident, install only a lap-shoulder belt assembly kit especially designed for your vehicle, in accordance with the instructions provided with the kit.