

REPORT NUMBER: CAL-90-N15

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

**GENERAL MOTORS CORPORATION
1990 BUICK LeSABRE
2-DOOR SEDAN**

NHTSA NUMBER: ML0101

CALSPAN TEST NUMBER: 7776-15

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FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Market Incentives
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16. Abstract A frontal load cell barrier test of a 1990 Buick LeSabre 2-Door Sedan was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on April 6, 1990. The impact speed was 34.9 mph and the ambient temperature at the barrier face at the time of impact was 40°F. The maximum post-test vehicle crush was 29.2 inches. The test vehicle was equipped with a automatic 3-point continuous belt system at each of the front outboard seating positions. With regard to FMVSS 208-"Occupant Crash Protection," injury criteria, the passenger dummy appears to satisfy the head, chest and femur requirements. The driver dummy's head x accelerometer did not record accurately and a HIC value is not available for the dummy. The driver does, however, appear to satisfy the chest and femur requirements.					
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Section I

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 90 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 requirements.

The 35 mph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test procedure.

Section 2

SUMMARY OF TEST NUMBER ML0101

A load cell barrier consisting of 36 load cells was impacted by a 1990 Buick LeSabre 2-Door Sedan at a velocity of 34.9 mph. The test was performed at the Calspan Corporation Advanced Technology Center on April 6, 1990. 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 15 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 the 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. 1019) and the right-front passenger ATD (Serial No. 1022) had been used in one previous test (ML5202) and the Injury Criteria Values were not exceeded in that test. Certification details, along with instrumentation calibration data, are found in Appendix C.

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 driver dummy's head X accelerometer did not record accurately after 80 msec. HIC calculations are not available for this dummy. Vehicle accelerometer #5 experienced a zero offset approximately 50 msec into the event.

The driver's head struck the steering wheel rim and hub. The maximum chest deceleration over 3 milliseconds was 35.3 g's and femur loads were 1049.0 and 669 pounds.

The right front passenger's HIC was 426.4 and maximum chest deceleration over 3 milliseconds was 31.5 g's. Femur loads were 907.6 and 902.5 pounds.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1990 Buick LeSabre 2-Door Coupe
NHTSA No.: ML0101 VIN.: 1G4HP14C4LH411993
Body Color: Blue Date Of Manufacture: September 1989
Engine: 6 Cylinders; - C.I.D.; - Liters; 3800 CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse
Transmission: 4 Speed; - Manual; X Automatic; X Overdrive
Final Drive: X Front Wheel; - Rear Wheel; - Four Wheel
Date Received: 11-30-89 Odometer Reading: 42
X A/C; X P/S; X P/B; X P/wdo.; X Tilt Wheel
- P/seats; X Cruise Control
Type of Occupant Restraint: 3 Point Automatic Restraint System.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 30 psi, Rear 30 psi
Recommended Tire Size: P205/75R14
Recommended Cold Tire Pressure: Front 30 psi, Rear 30 psi
Tires on Vehicle: P205/75R14; Manufacturer: Uniroyal
Number of Occupants: 3 Front; 3 Rear; - 3rd Seat; 6 TOTAL
Type of Front Seats: - Bucket; - Bench; X Split Bench
Type of Front Seat Back: X Fixed; - Adj. With - Lever - Rot. Knob
Vehicle Capacity Weight (VCW) = 1067 lbs. (A)
No. of Occupants x 150 lbs. = 900 lbs. (B)
Rated Cargo and Luggage
Weight (RCLW) A-B = 167 lbs.
GVWR 4373 lbs. GAWR: Front 2409 lbs. Rear 1964 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 = 1050 lbs. Right Rear = 560 lbs.
 Left Front = 1050 lbs. Left Rear = 580 lbs.
 TOTAL FRONT WEIGHT = 2100 lbs. (65 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1140 lbs. (35 % of Total Vehicle Weight)
 TOTAL DELIVERY WEIGHT = 3240 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (3240 lbs.)
 VCW = Vehicle Capacity Weight (1067 lbs.)
 DSC = Designated Seating Capacity (6)
 RCLW = VCW - 150 (DSC) = 167 lbs.
 Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
 Target Test Weight = 3735 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 182 POUNDS CARGO:

Right Front = 1150 lbs. Right Rear = 690 lbs.
 Left Front = 1180 lbs. Left Rear = 730 lbs.
 TOTAL FRONT WEIGHT = 2330 lbs. (62 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1420 lbs. (38 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 3750 lbs.
 Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 28.8 LF 28.9 RR 29.9 LR 30.0
 Test Attitude: RF 27.5 LF 27.7 RR 26.7 LR 26.8
 Wheel Base: 111.1 in.; C.G. = 42.2 in. rearward of front wheel C/L
 Remarks: 16.7 gallons of stoddard solution has been placed in the fuel tank

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°
 Date of Test: April 6, 1990 Time of Test: 12:15
 Ambient Temperature: 40 °F at impact area
 Temperature in Occupant Compartment: 72 °F
 Windshield Molding Temperature: 70 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 34.9 mph, secondary = 34.8 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>193.2</u>	C _L <u>196.3</u>	L <u>193.1</u>
	Post-test	= R <u>166.7</u>	C _L <u>167.1</u>	L <u>166.7</u>
	Crush	= R <u>26.5</u>	C _L <u>29.2</u>	L <u>26.4</u>

Distance from front of test vehicle to point of impact:

R 13.6" C_L 15.0" L 13.8"

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Upper Steering Rim and Hub</u>	<u>Dash Panel</u>
Chest	<u>No Contact</u>	<u>No Contact</u>
Abdomen	<u>Lower Steering Rim</u>	<u>No Contact</u>
Left Knee	<u>Dash Panel</u>	<u>Dash Panel</u>
Right Knee	<u>Dash Panel</u>	<u>Dash Panel</u>

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Door Opening	<u>operable</u>	<u>operable</u>	<u>-</u>	<u>-</u>

	<u>Front</u>	
	<u>Left</u>	<u>Right</u>
<u>Seat Movement</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: The windshield sustained stress fractures, but remained intact.

Section 3
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

NHTSA No.: ML0101 Vehicle: 1990 Buick LeSabre 2-Door Sedan

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	Not Available	-21.5	115.3	Not Available
Position #2 - Passenger	-74.9	32.9	79.3	110.3

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-36.8	-16.3	-18.3	35.3
Position #2 - Passenger	-32.1	29.7	-11.4	31.5

The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	1049.0	669
Position #2 - Passenger	907.6	902.5

	MAXIMUM FORCE - SEAT BELT LOADS (lbs.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	1727.6	-	531.6
Position #2 - Passenger	1759.7	1149.8	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (SEC)	t ₂ (SEC)	Average Acceleration t ₁ TO t ₂
Position #2 - Passenger	426.4	.08925	.12525	42.6

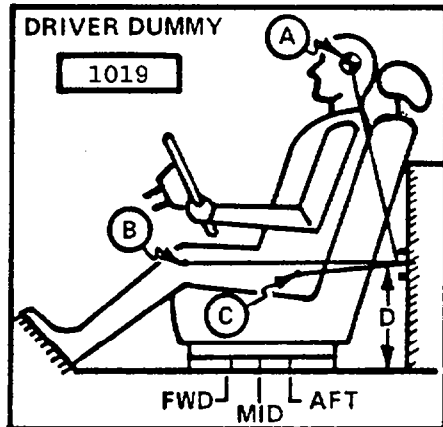
HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

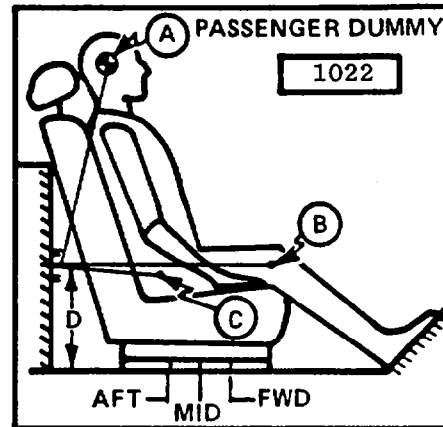
Test No.: ML0101 Vehicle: 1990 Buick LeSabre 2-Door Sedan

<u>SEAT TYPE:</u>	<u>ADJUSTER TYPE:</u>	<u>SEAT BACK TYPE:</u>
<u>-</u> Bench	<u>X</u> Manual	<u>X</u> Fixed
<u>-</u> Bucket	<u>-</u> Power	<u>-</u> Adjustable Reclining
<u>X</u> Split Bench		



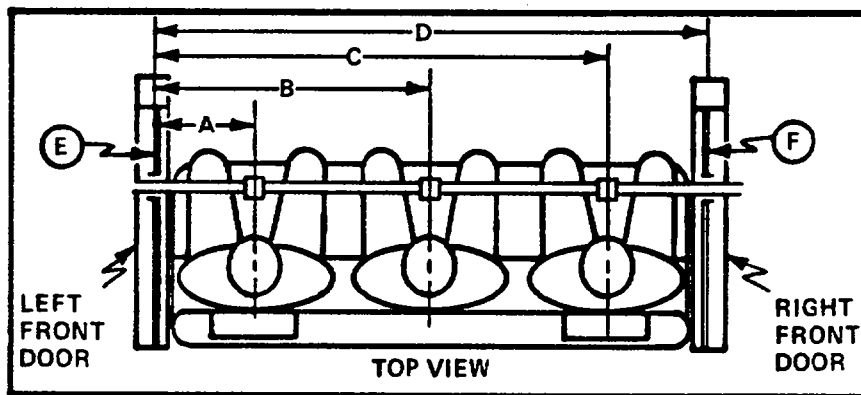
MEASUREMENT LOCATION

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



A = 26.5 in. 33 Degrees
 B = 37.7 in. 92 Degrees
 C = 22.8 in. 104 Degrees
 D = 12.5 in.

A = 26.7 in. 33 Degrees
 B = 37.9 in. 93 Degrees
 C = 22.8 in. 101 Degrees
 D = 12.5 in.



1019

DUMMY ID

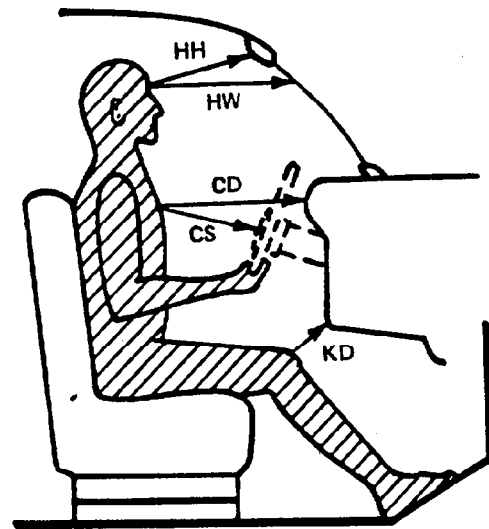
1022

A =	Left Door to Driver Centerline	<u>13.4</u> in.
B =	Left Door to Center Passenger Centerline	<u>-</u> in.
C =	Left Door to Right Passenger Centerline	<u>41.3</u> in.
D =	Left Door to Right Door	<u>54.7</u> in.
E,F =	Window Glass Height (Right and Left Must Be Equal)	<u>13.5</u> in.

Figure 2

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	18.3	18.2
HW	21.8	22.0
CD	24.6	24.2
CS	14.9	-
KDL	6.5	9.2
KDR	7.3	8.8
SA	Fixed	Fixed
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

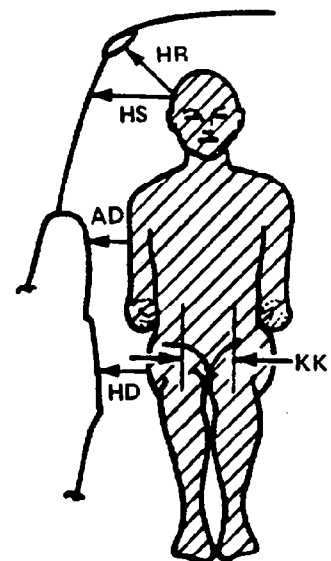
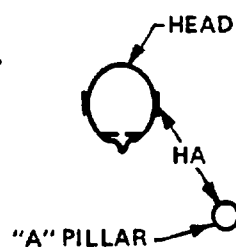
HR = Head to Side Roof

HS = Head to Side Window

AD = Arm to Door

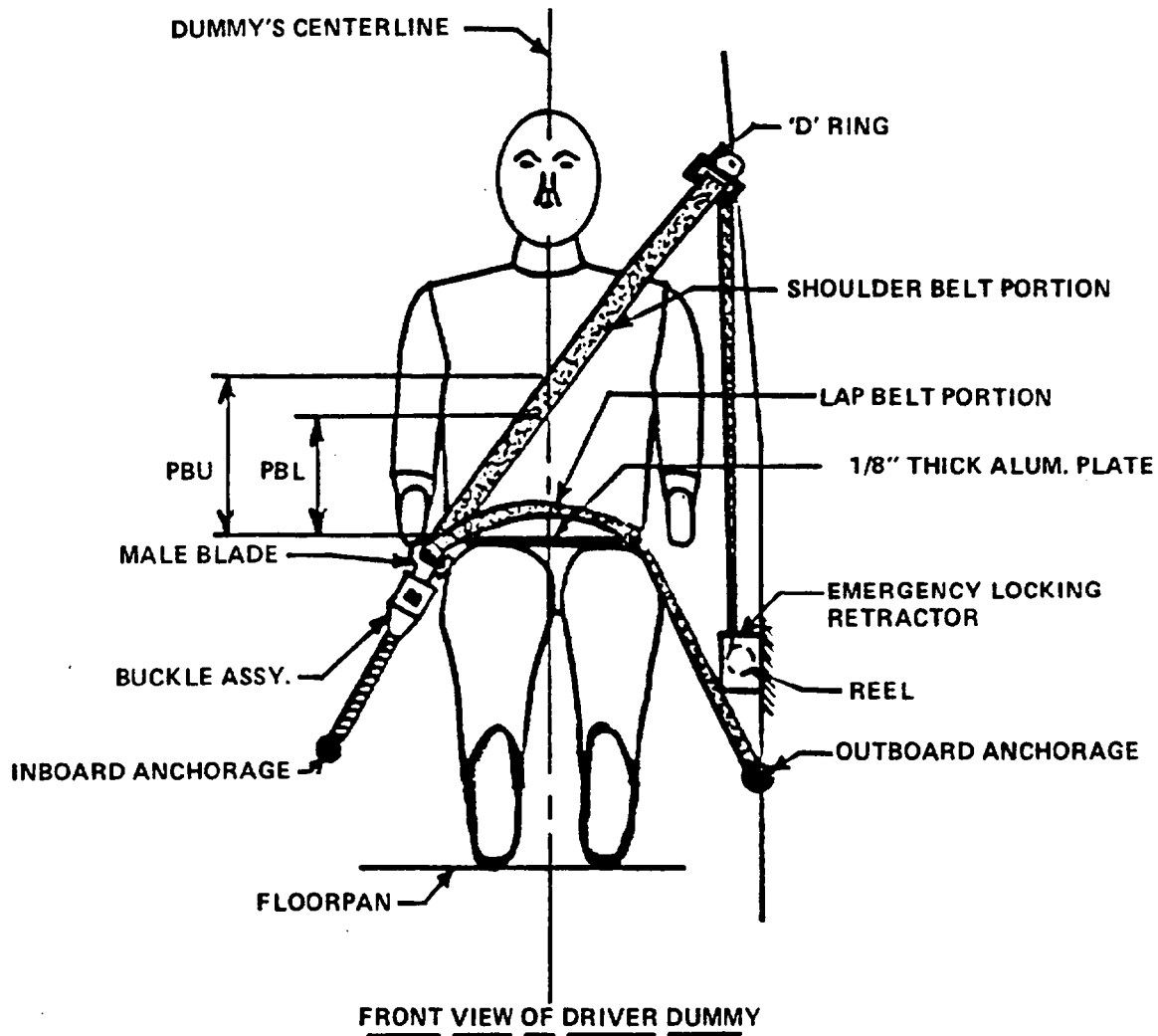
HD = Hip to Door

KK = Knee to Knee



	DRIVER	PASSENGER
HR	6.5	6.7
HS	10.4	10.4
AD	6.0	6.5
HD	5.5	5.2
KK	10.0	7.5
HA	19.5	19.1

Figure 3
SEAT BELT POSITIONING DATA



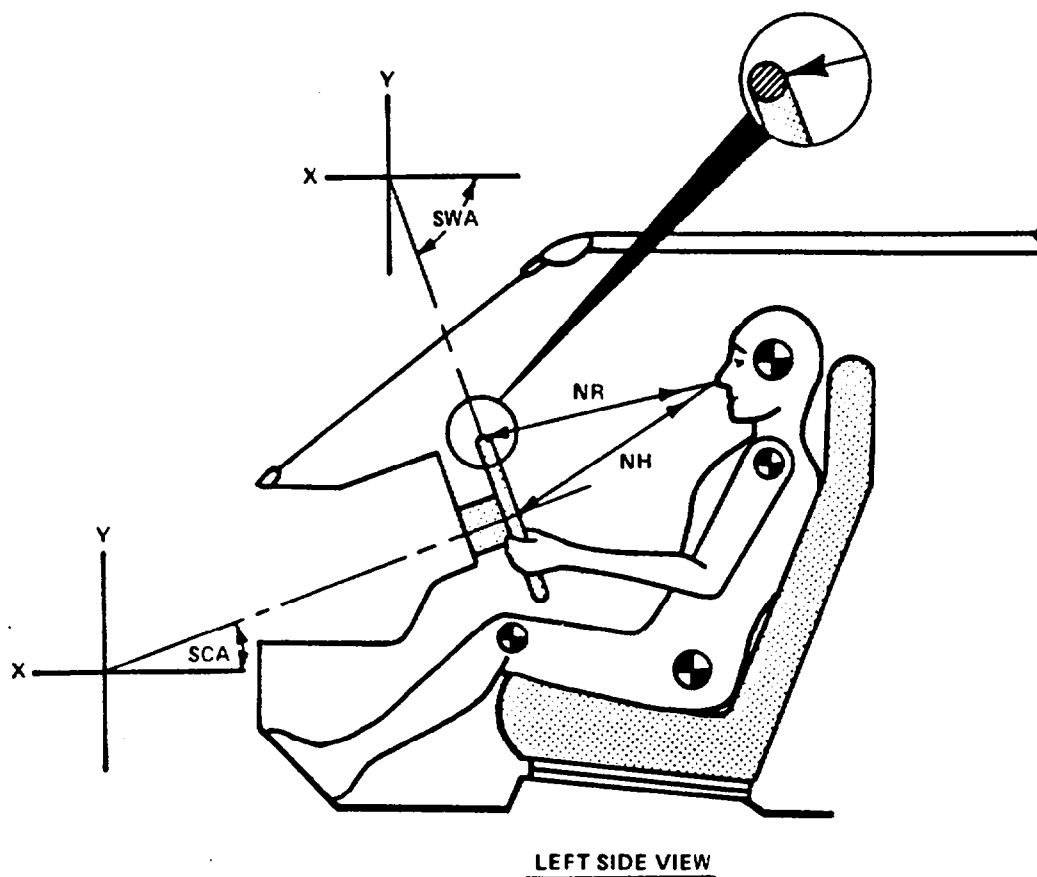
	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	12.0	12.0
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	15.0	15.0

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>76.0"</u>	<u>75.0"</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>39.5"</u>	<u>39.5"</u>
Lap belt length as measured on Part 572 Dummy.	<u>23.0"</u>	<u>22.0"</u>
<u>SHOULDER BELT SPOOL-OFF DATA:</u>		
As determined by film analysis.	<u>3.0"</u>	<u>3.0"</u>
As determined mechanically.	<u>2.7"</u>	<u>4.0"</u>
<u>BELT STRETCH DATA:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>0.7 in/ft</u>	<u>0.7 in/ft</u>
Measured mechanically	<u>0.1 in/ft</u>	<u>0.0 in/ft</u>

Figure 4

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	19.1	Inches
<u>NH</u>	-- Distance from tip of dummy's nose to center of steering column hub	21.3	Inches
<u>SCA</u>	-- Angle of steering column relative to the horizontal X axis	20	Degrees
<u>SWA</u>	-- Angle of steering wheel relative to the horizontal X axis	-70	Degrees

Figure 5
CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

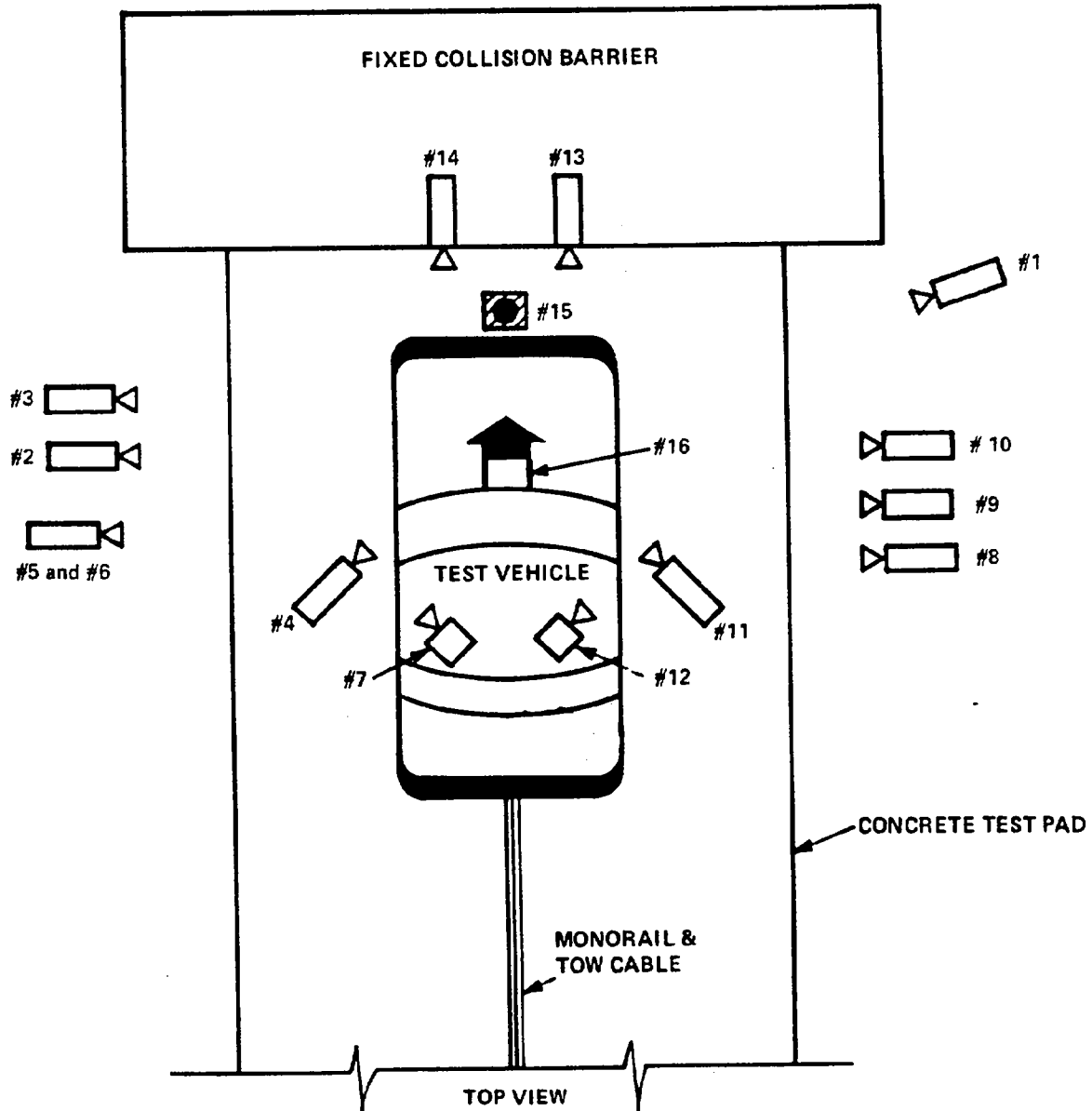


Table 4

HIGH-SPEED CAMERA LOCATIONS

Test No. ML0101 Vehicle: 1990 Buick LeSabre 2-Door Sedan

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	251	70	41	-4	234	13	540
3	Left Side View	342	37	41	-4	325	25	540
4	Driver and Interior View	132	119	74	-17	115	13	810
5	Steering Column (Bottom)	320	91	46	-3	303	25	575
6	Steering Column (Top)	320	91	70	-9	303	25	565
7	Left Belt	-	-	-	-	-	8	565
8	Overall Right Side	266	67	42	-2	249	13	800
9	Right Side View	352	35	41	-1	335	25	725
10	Right Passenger View	351	58	57	-3	334	35	690
11	Passenger and Interior View	134	116	76	-20	117	25	610
12	Right Belt	-	-	-	-	-	8	655
13	Passenger Front View	24	-5	73	-34	-	13	560
14	Driver Front View	24	-5	73	-33	-	13	535
15	Windshield View	0	0	126	-45	-	13	500
16	Pit View of Engine	0	32	-120	90	-	13	835

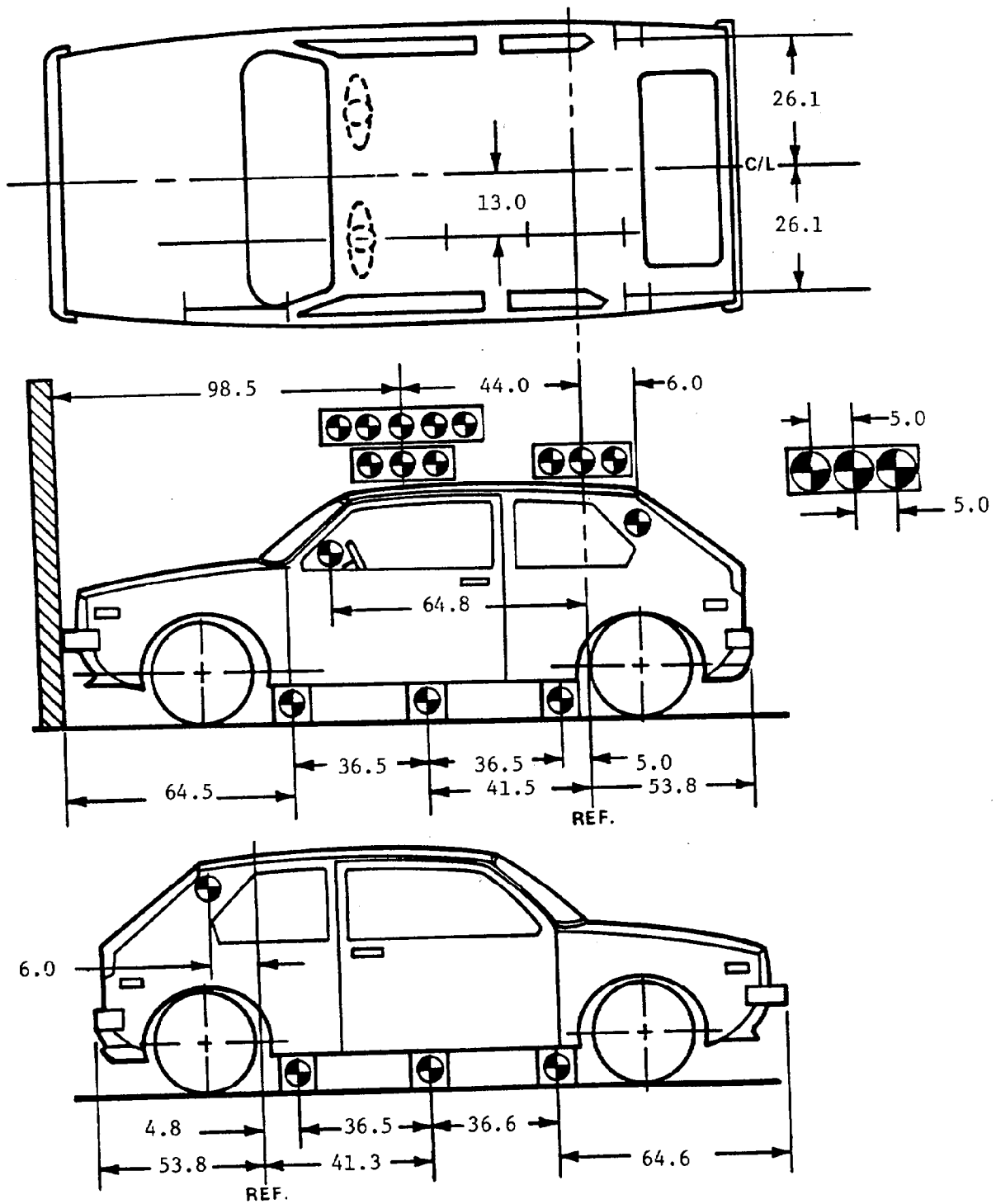
*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

** = referenced to horizontal plane

Figure 6
VEHICLE TARGET LOCATIONS

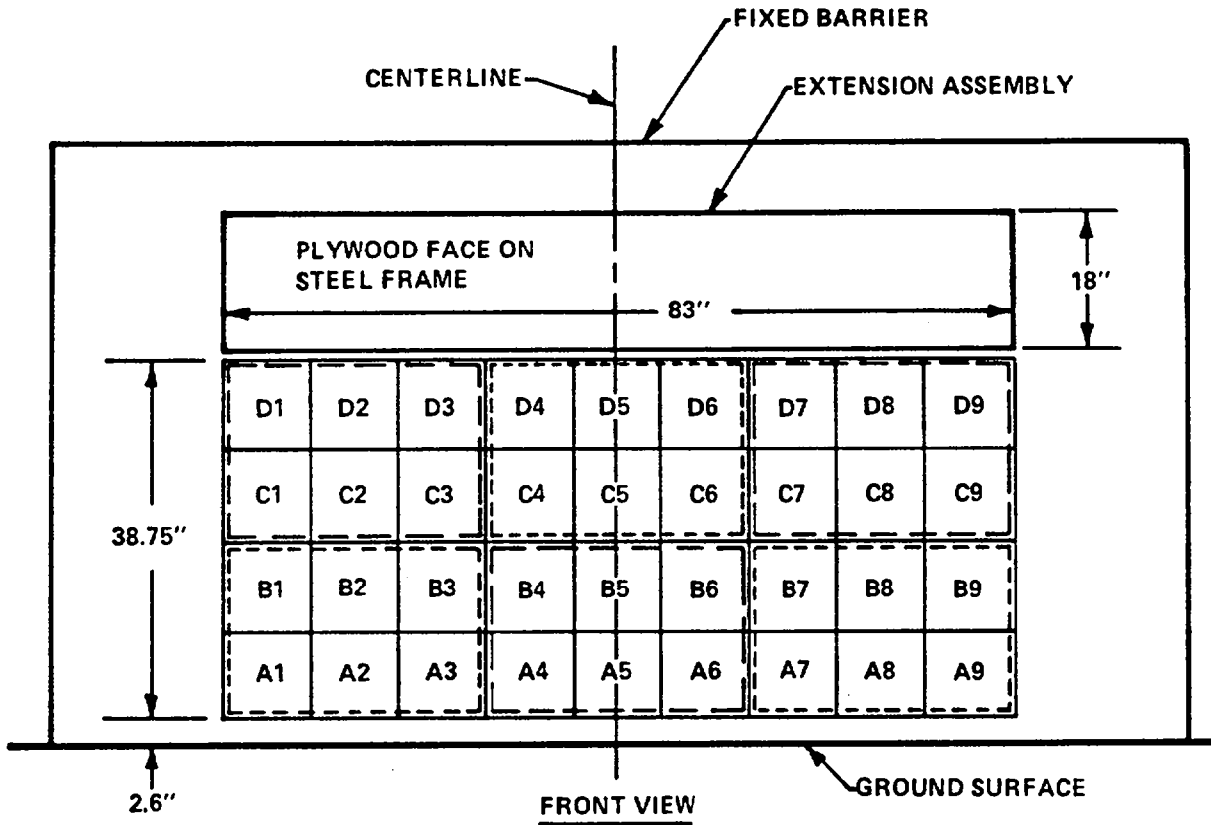


(DIMENSIONS IN INCHES)

Figure 7

LOAD CELL LOCATIONS ON FIXED BARRIER

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



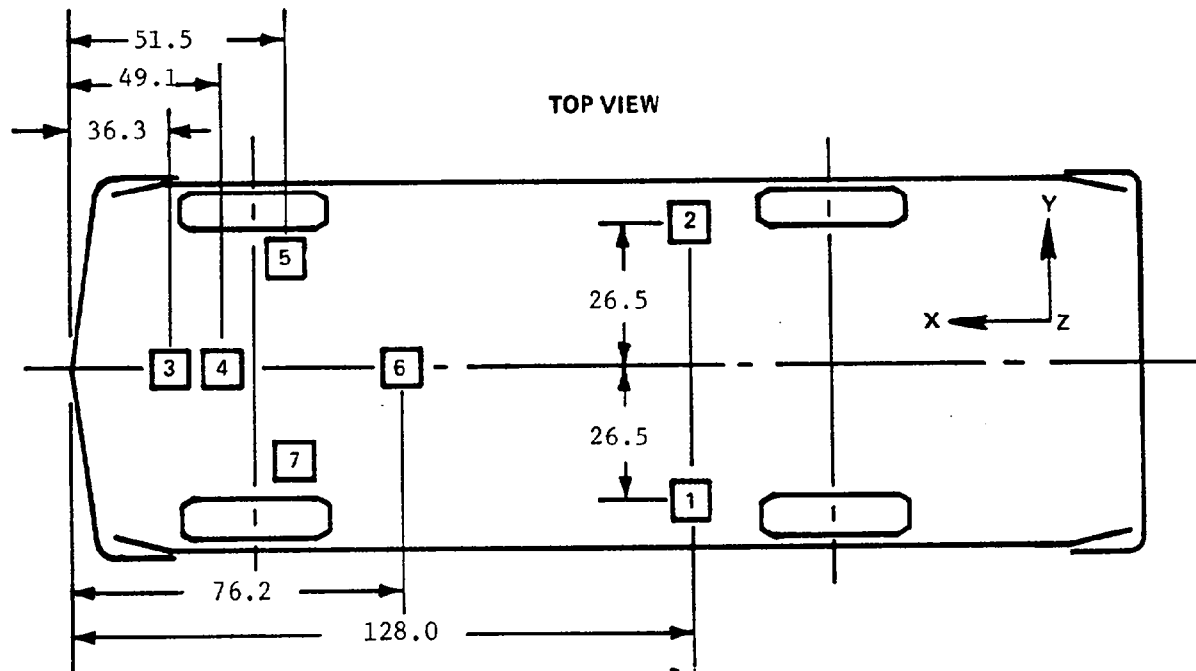
6 GROUPS OF 6 LOAD CELLS EACH

Group 4	Group 5	Group 6
C1 thru D3	C4 thru D6	C7 thru D9
Group 1	Group 2	Group 3
A1 thru B3	A4 thru B6	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 8
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	Instrument Panel	X		
7	Left Disc Brake Caliper	X		

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

Figure 9
TEST VEHICLE MEASUREMENTS

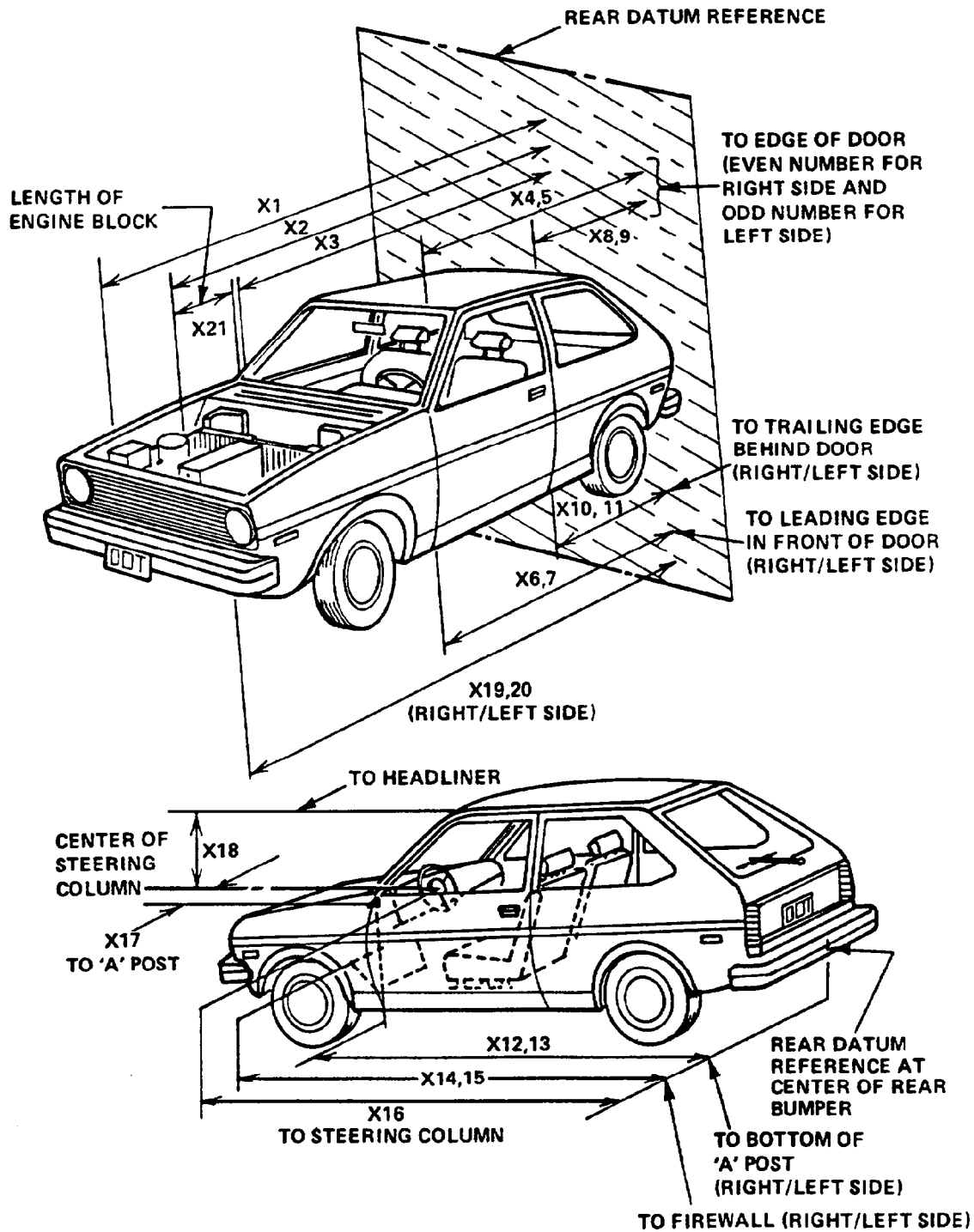


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	196.3	167.1	29.2
X2	Rear Surface of Vehicle to Front of Engine	172.5	162.4	10.1
X3	Rear Surface of Vehicle to Firewall	143.6	141.7	1.9
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	130.6	130.0	0.6
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	130.5	130.4	0.1
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	129.9	129.5	0.4
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	129.6	129.9	-0.3
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	76.4	75.5	0.9
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	76.1	76.3	-0.2
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	74.9	74.4	0.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	74.5	74.8	-0.3
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	130.0	129.7	0.3
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	129.4	129.5	-0.1
X14	Rear Surface of Vehicle to Firewall, Right Side	142.9	139.0	3.9
X15	Rear Surface of Vehicle to Firewall, Left Side	141.9	141.1	0.8
X16	Rear Surface of Vehicle to Steering Column	113.3	112.7	0.6
X17	Center of Steering Column to "A" Post	16.1	16.9	-0.8
X18	Center of Steering Column to Headliner	16.4	16.4	0.0
X19	Rear Surface of Vehicle to Right Side of Front Bumper	193.2	166.7	26.5
X20	Rear Surface of Vehicle to Left Side of Front Bumper	193.1	166.7	26.4
X21	Length of Engine Block	21.0	21.0	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	120.8	117.9	2.9
CD	Rear Surface of Vehicle to Center of Dash Panel	121.6	119.9	1.7
LD	Rear Surface of Vehicle to Left Side of Dash Panel	120.6	119.5	1.1

Appendix A

PHOTOGRAPHS

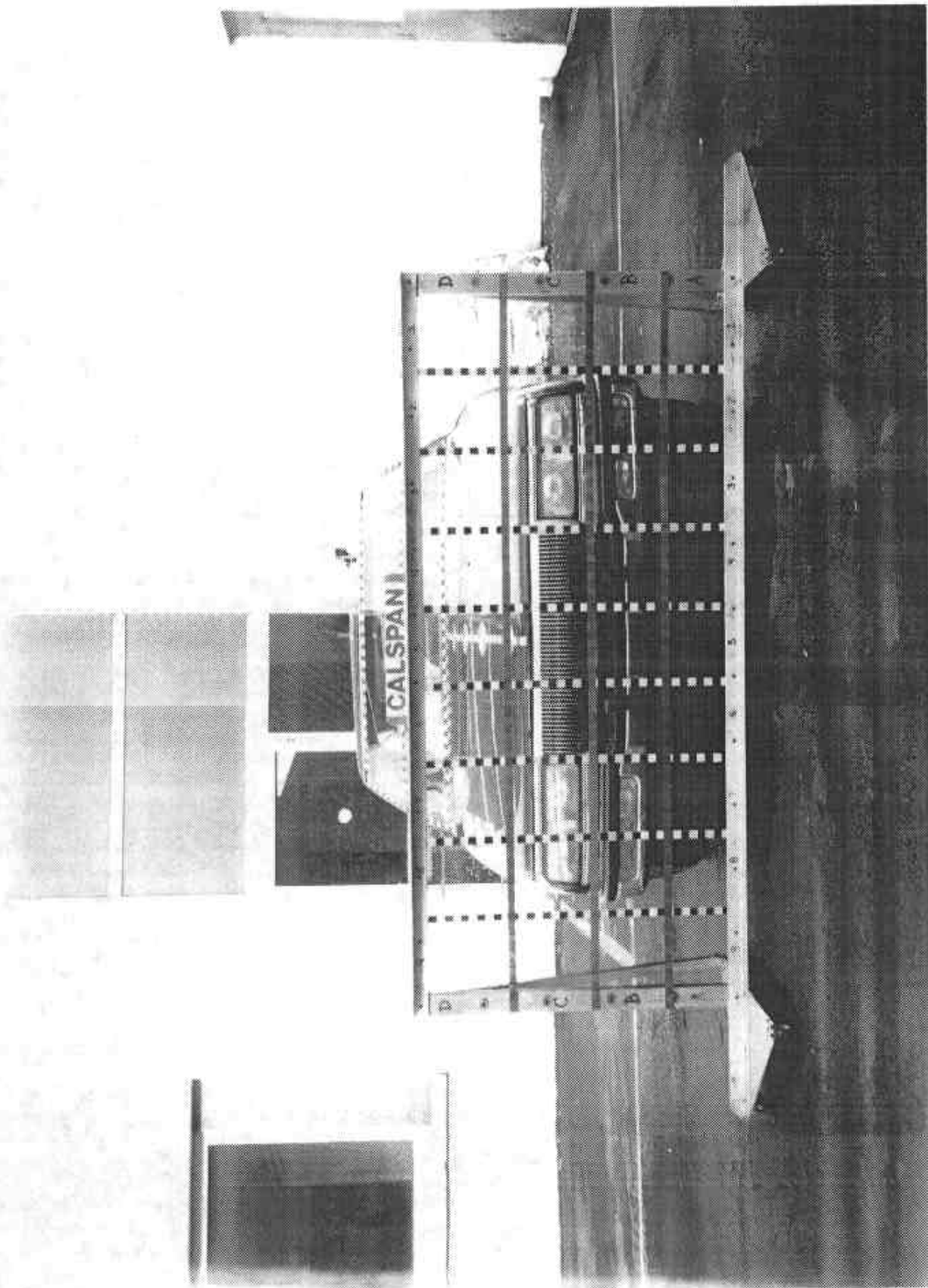


Figure A-1 LOAD CELL LOCATIONS



FIGURE A-2 PRE-TEST FRONT VIEW

A-3

7776-15

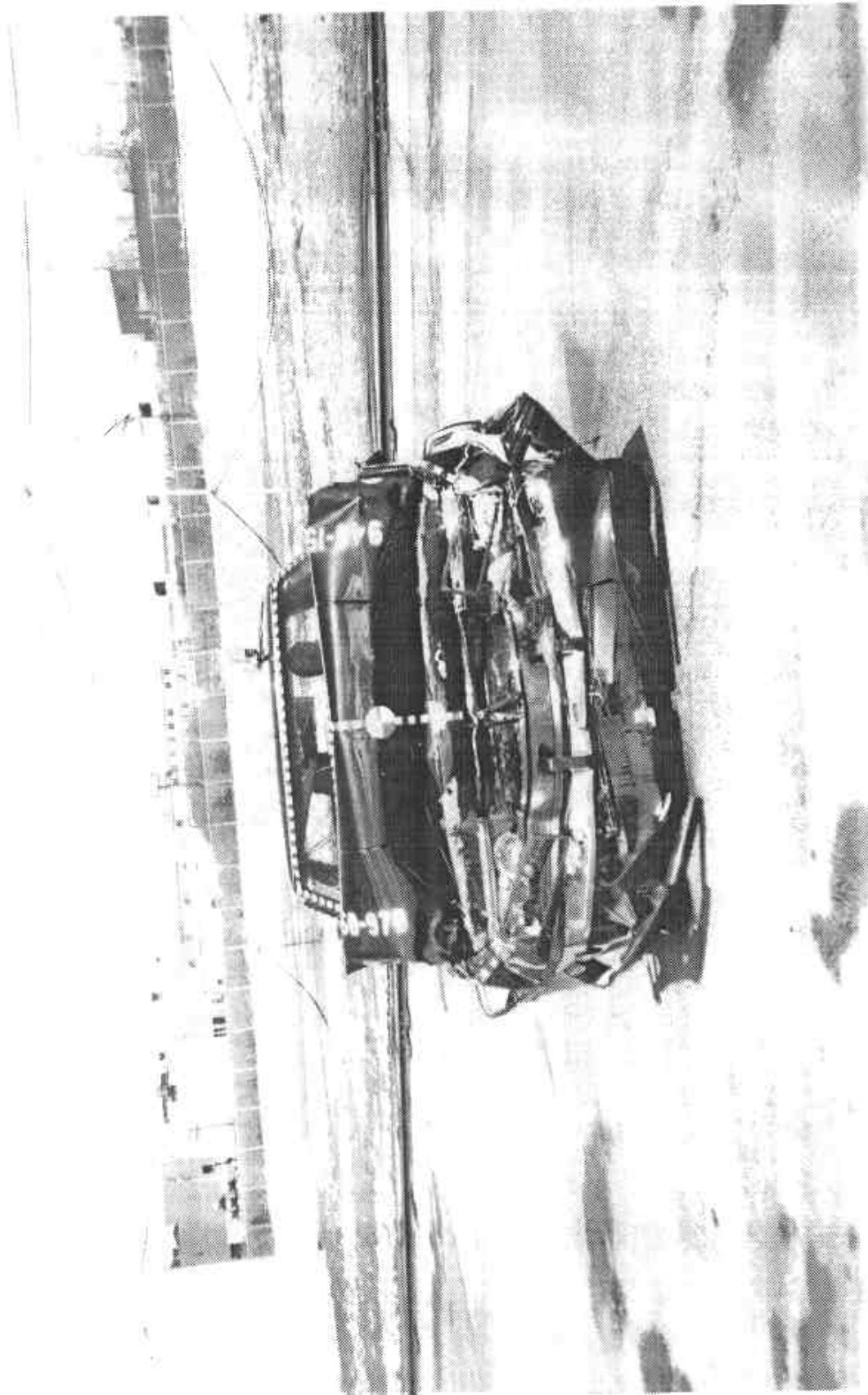


FIGURE A-3 POST TEST FRONT VIEW

A-4

7776-15

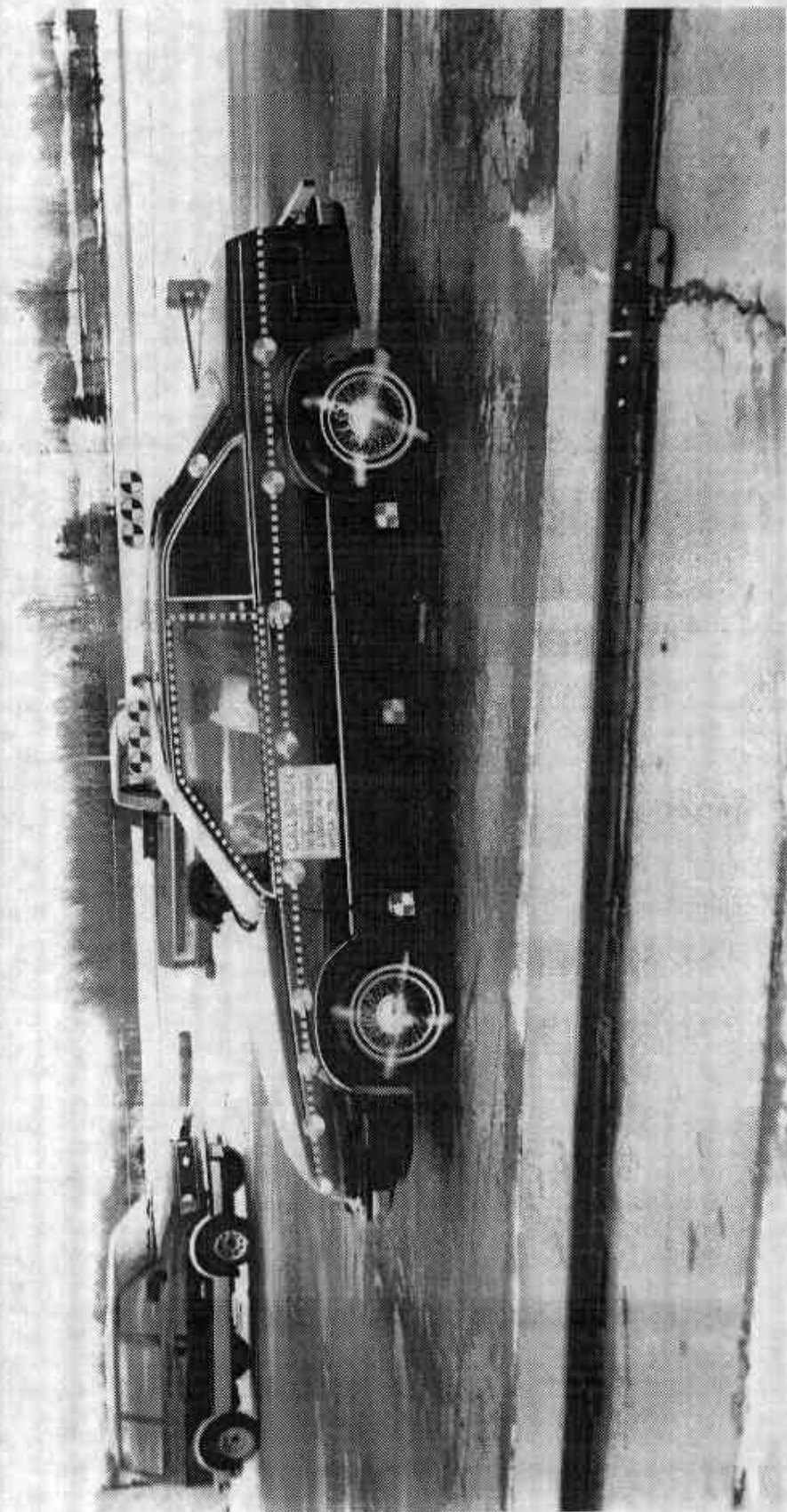


FIGURE A-4 PRE-TEST LEFT SIDE VIEW

A-5

7776-15

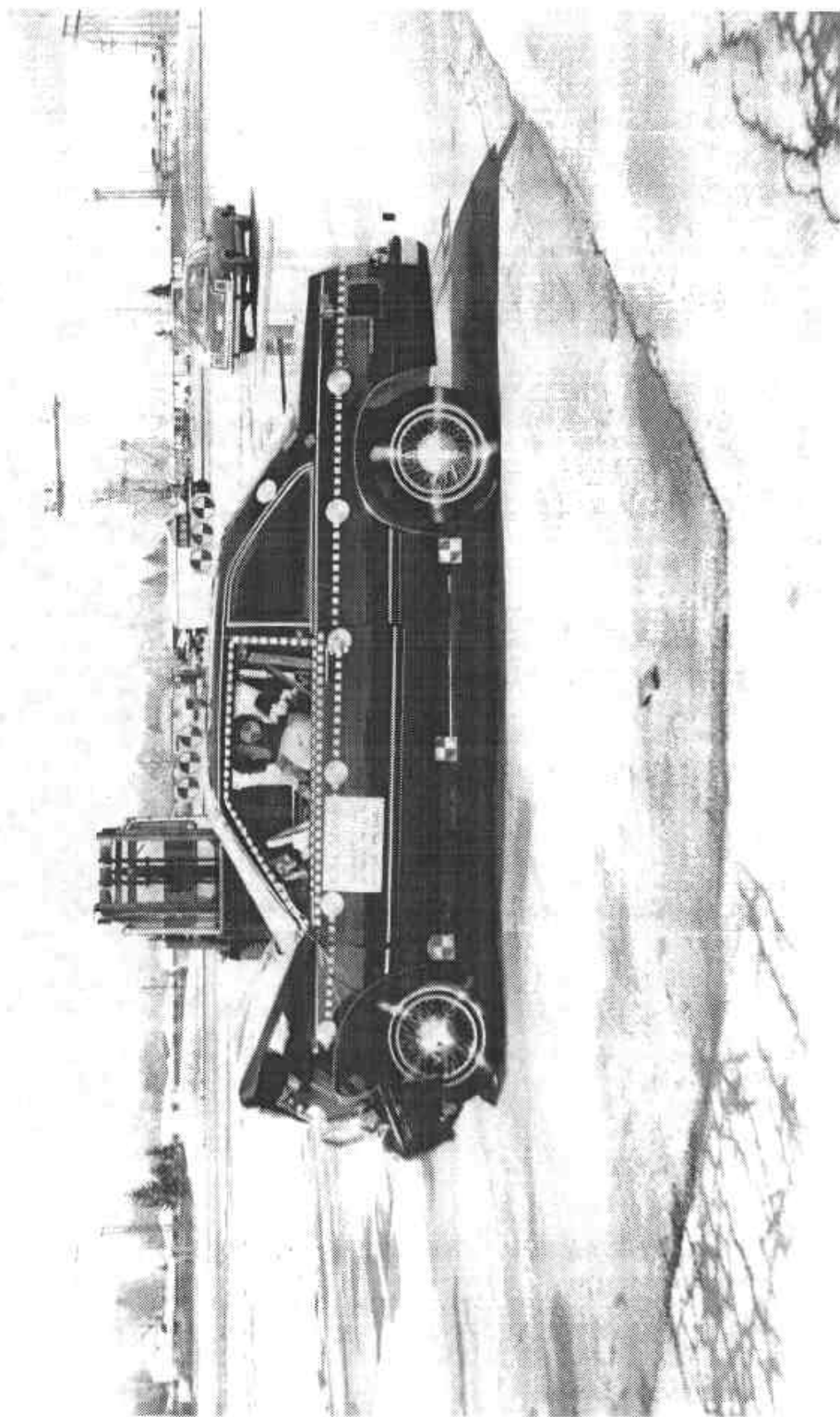


Figure A-5 POST TEST LEFT SIDE VIEW

A-6

7776-15

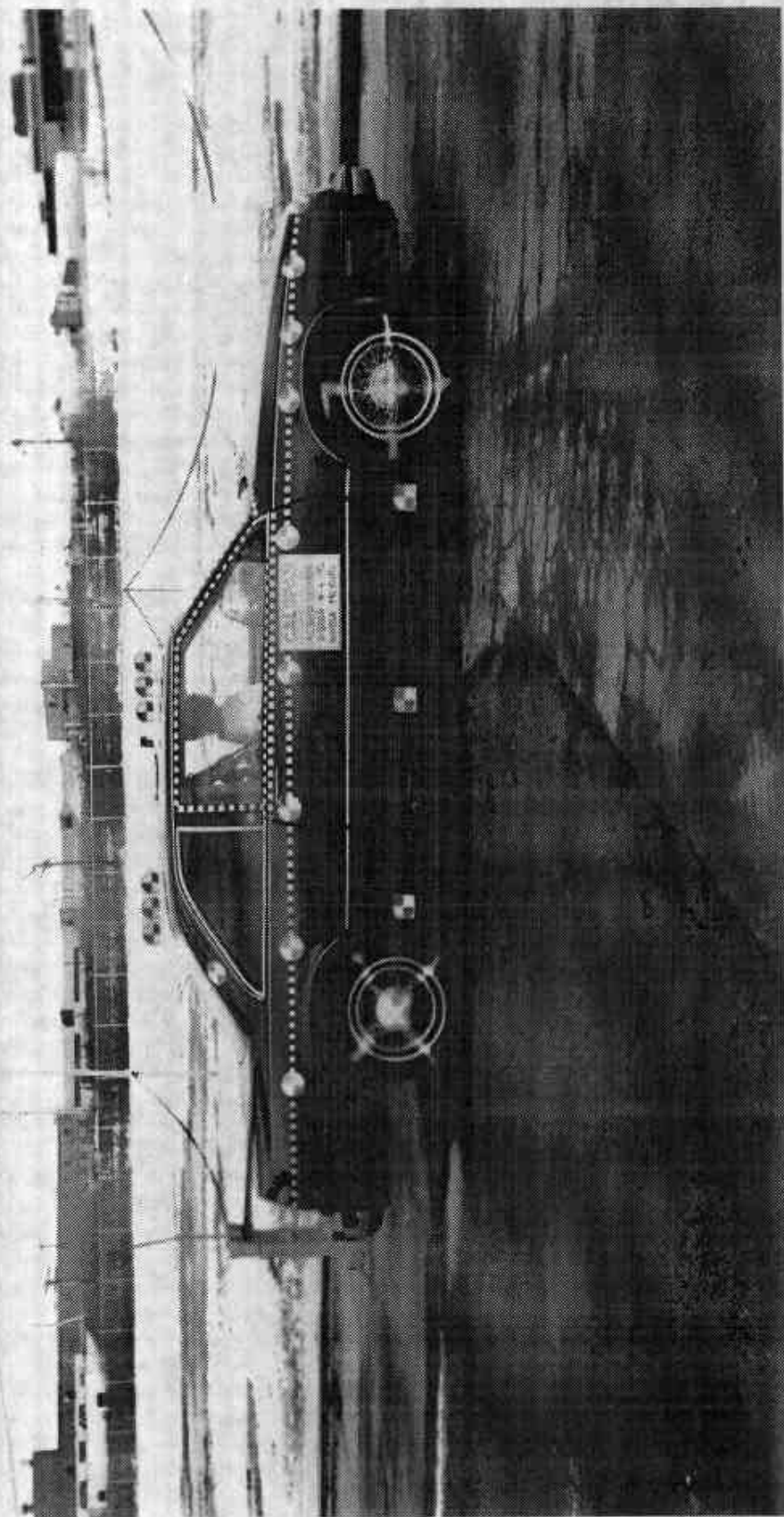


Figure A-6 PRE-TEST RIGHT SIDE VIEW

A-7

7776-15

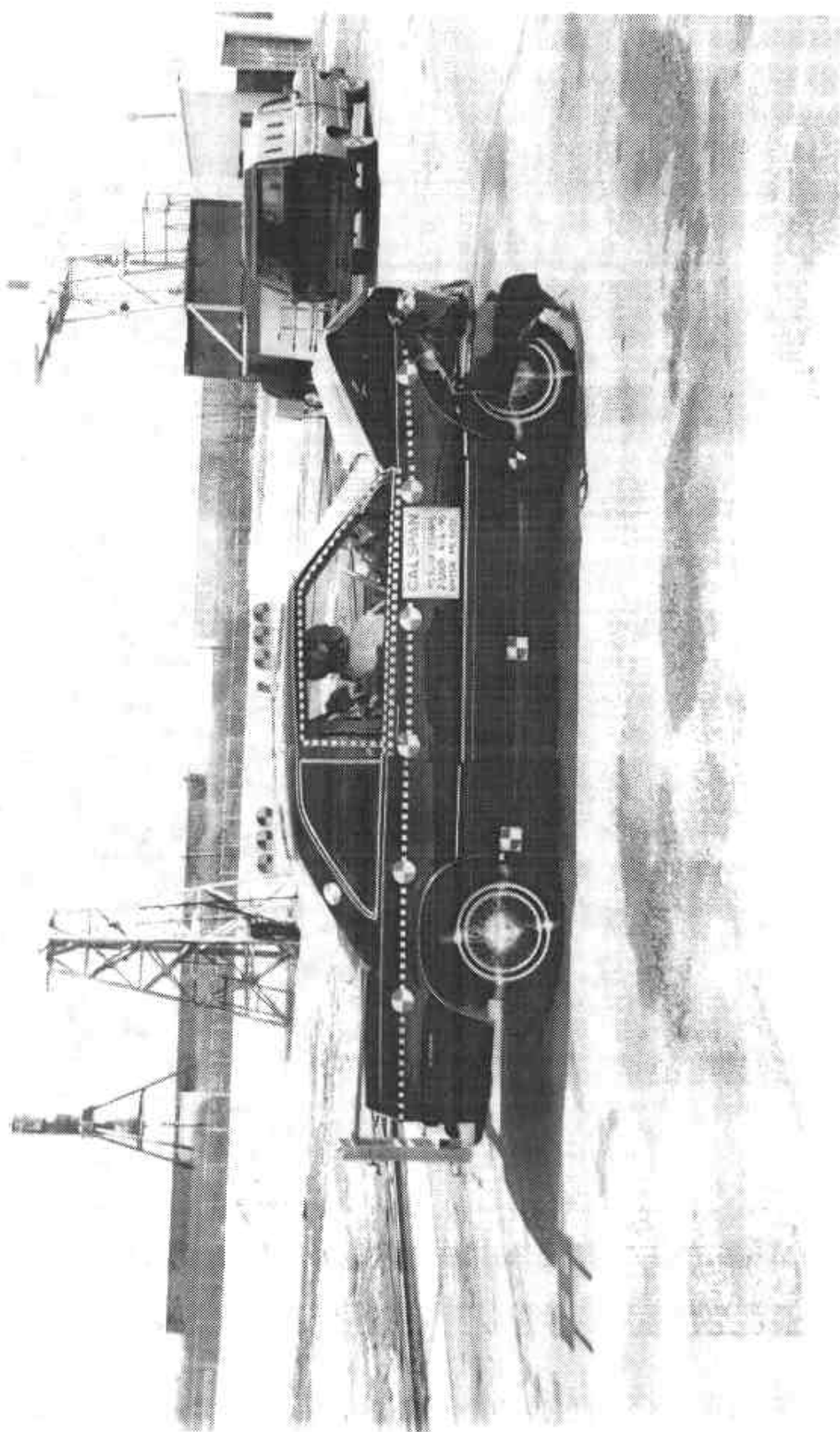


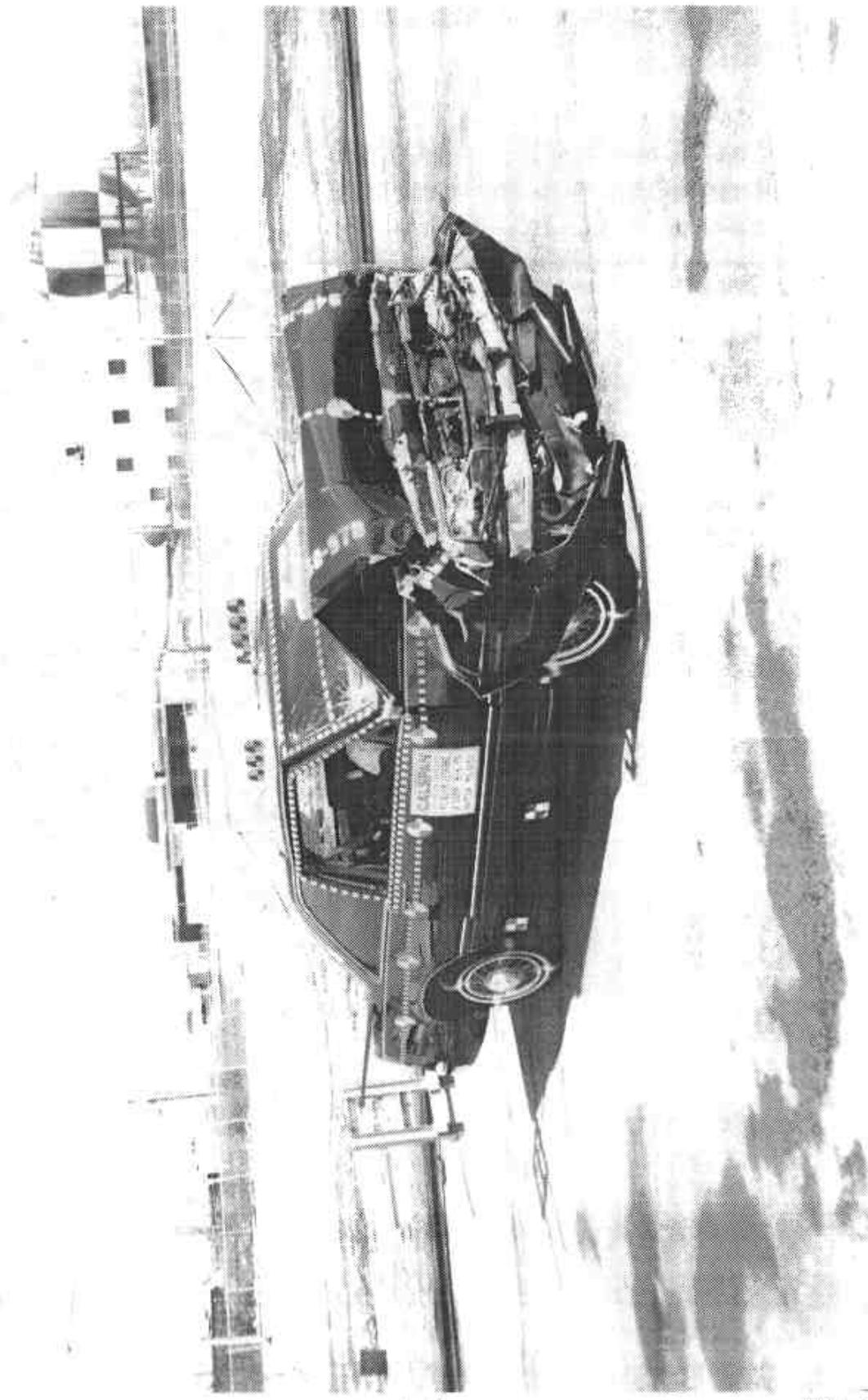
Figure A-7 POST-TEST RIGHT SIDE VIEW

A-8

7776-15



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



A-10

7776-15

Figure A-9 POST-TEST RIGHT FRONT THREE-QUARTER VIEW



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

A-11

7776-15

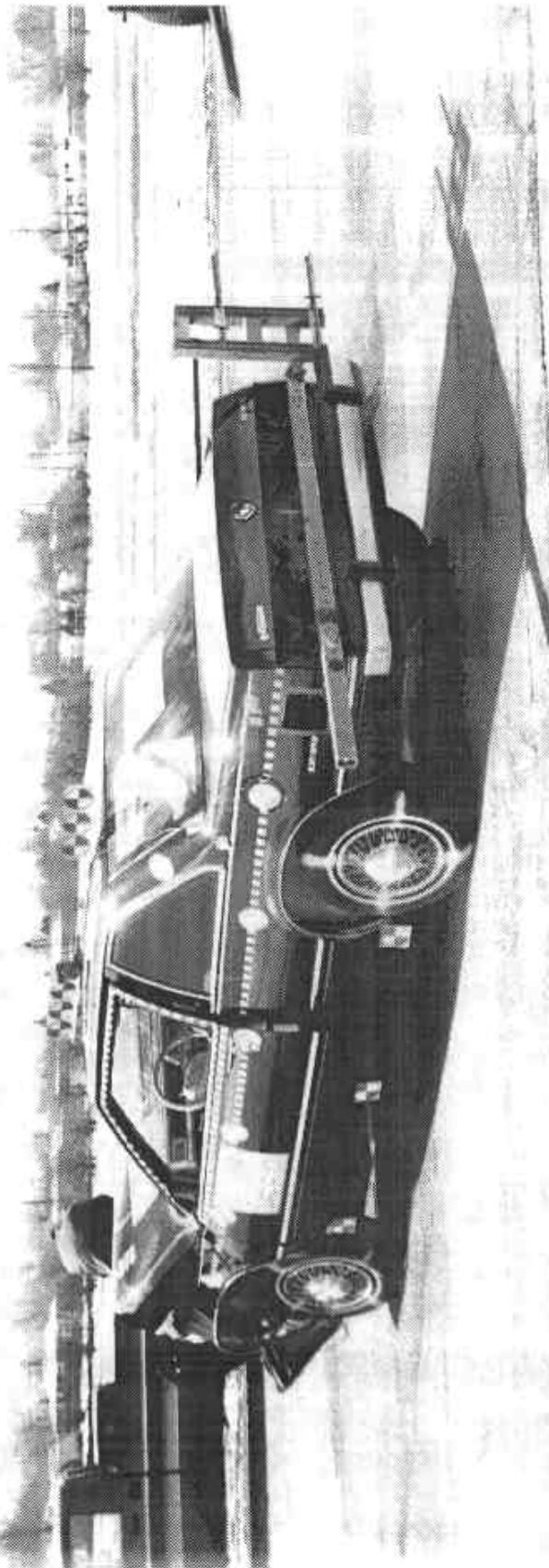


Figure A-11 POST-TEST LEFT REAR THREE-QUARTER VIEW

A-12

7776-15

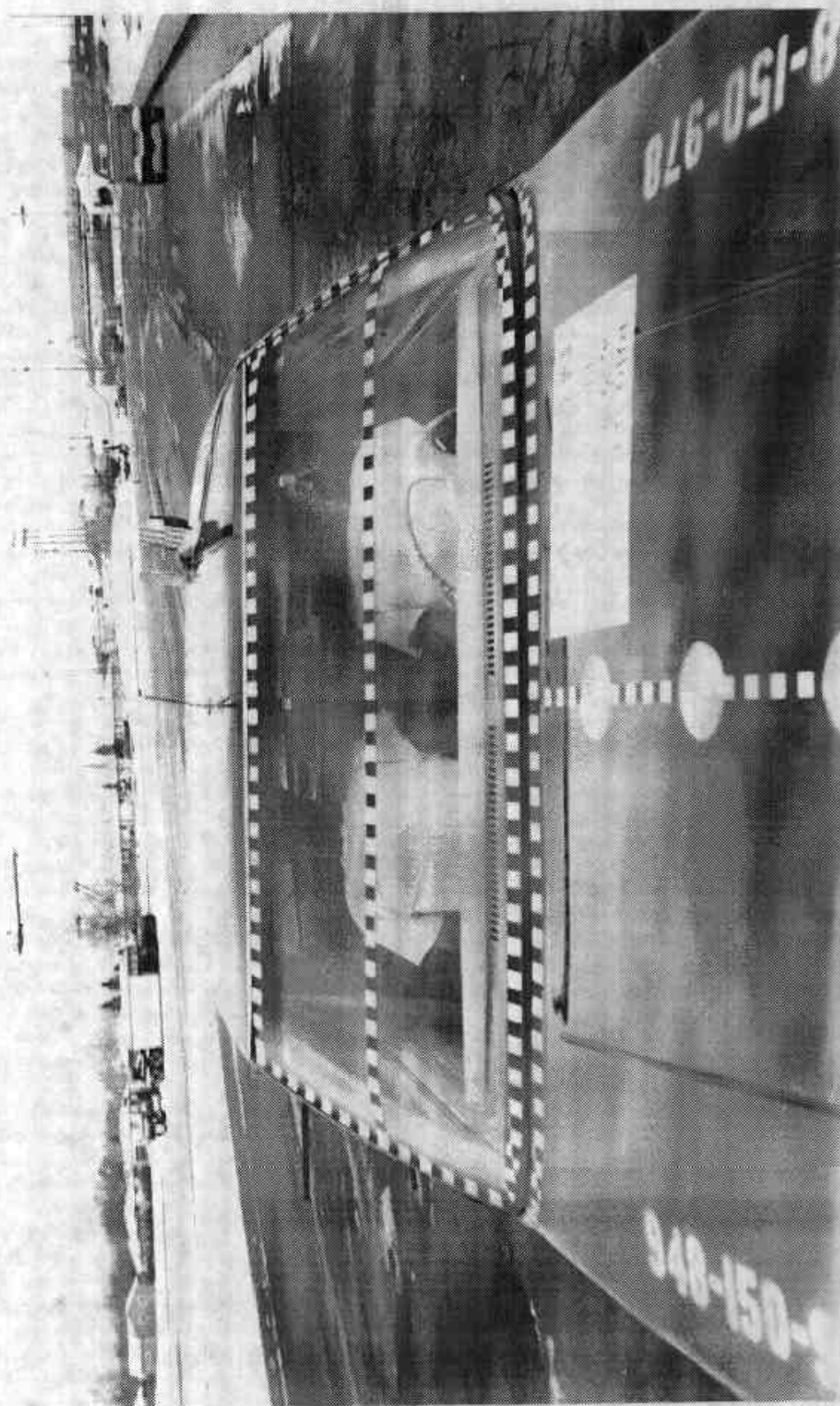


Figure A-12 PRE-TEST WINDSHIELD VIEW

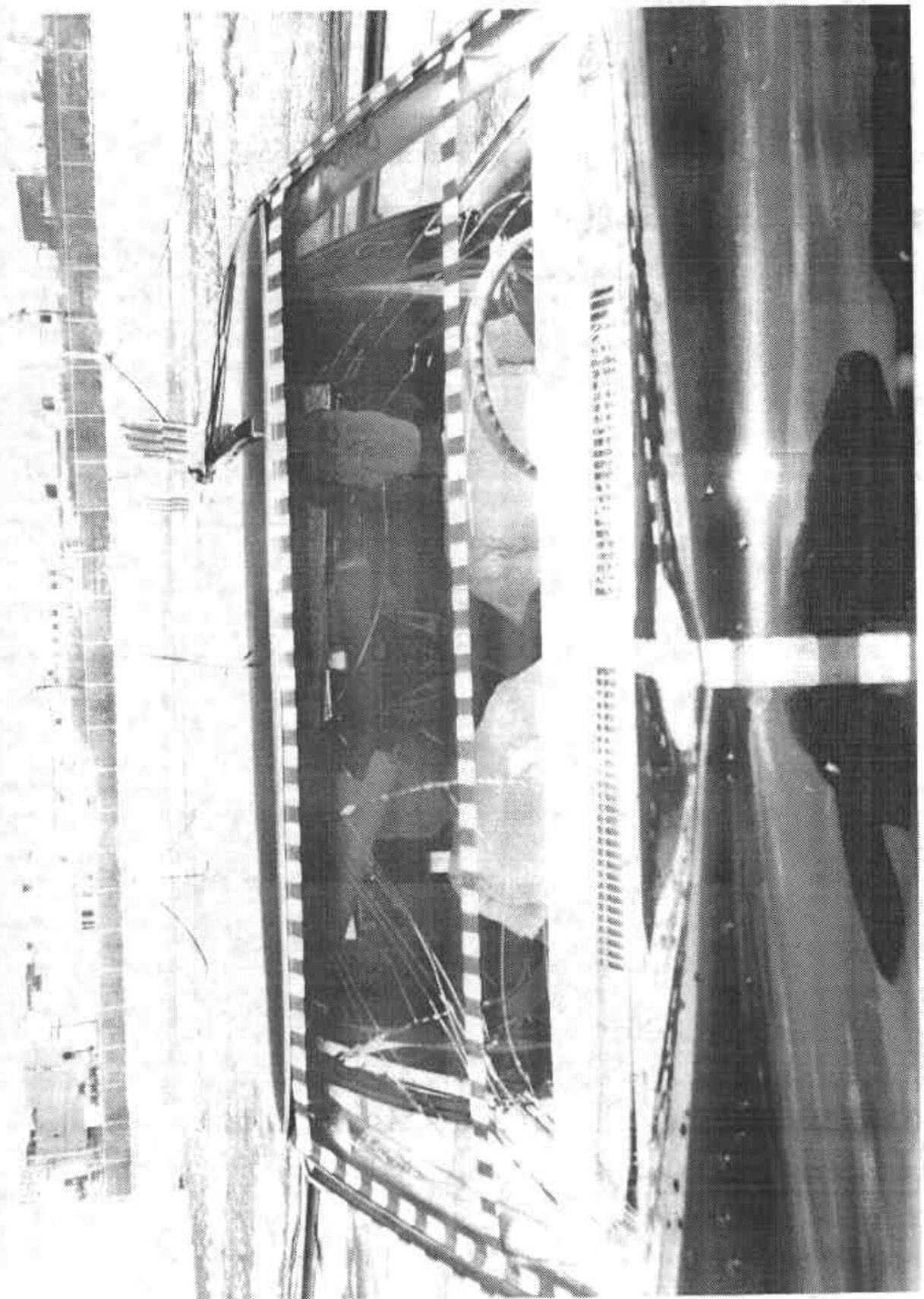


Figure A-13 POST-TEST WINDSHIELD VIEW

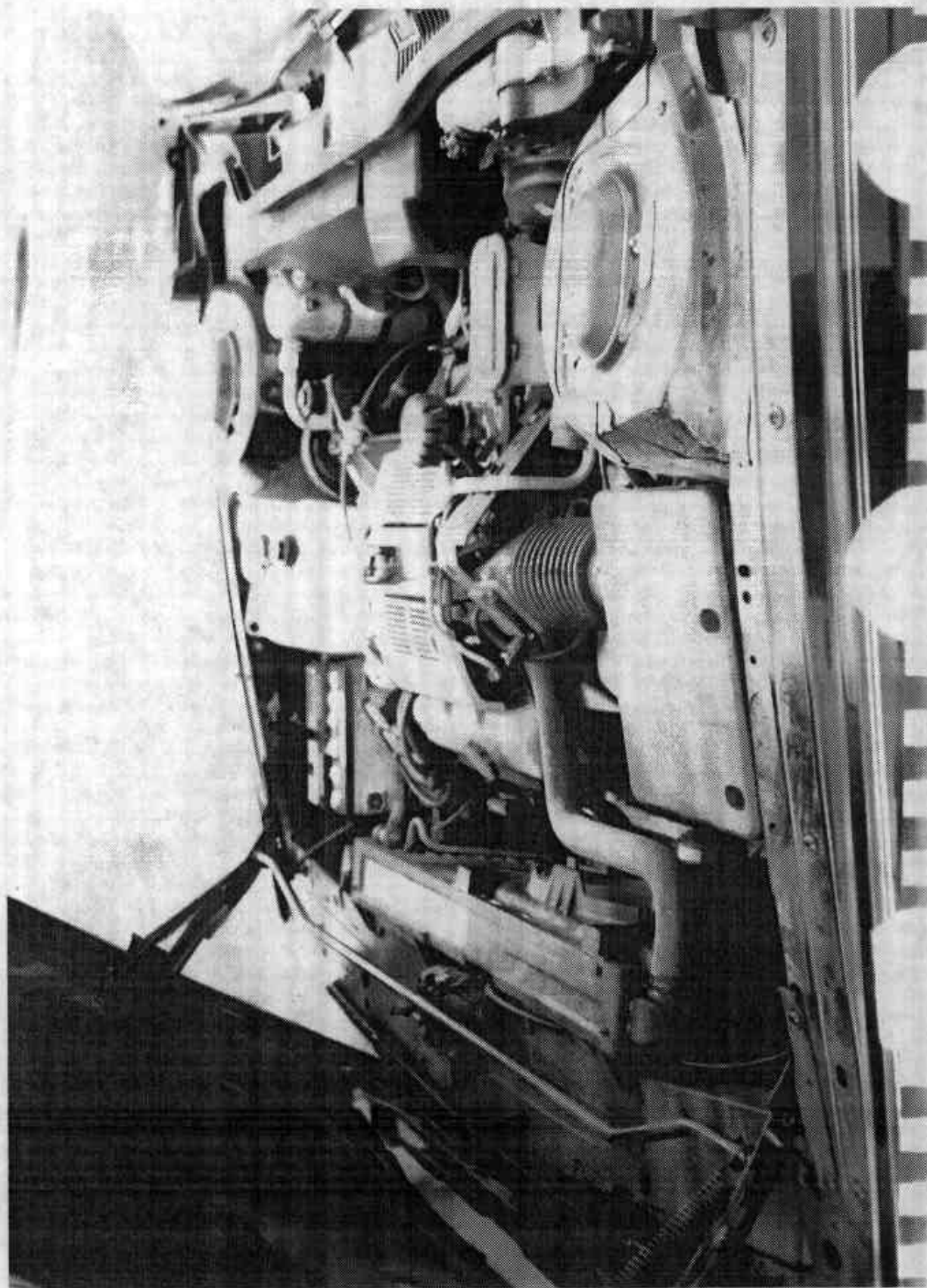


FIGURE A-14 PRE-TEST ENGINE COMPARTMENT VIEW

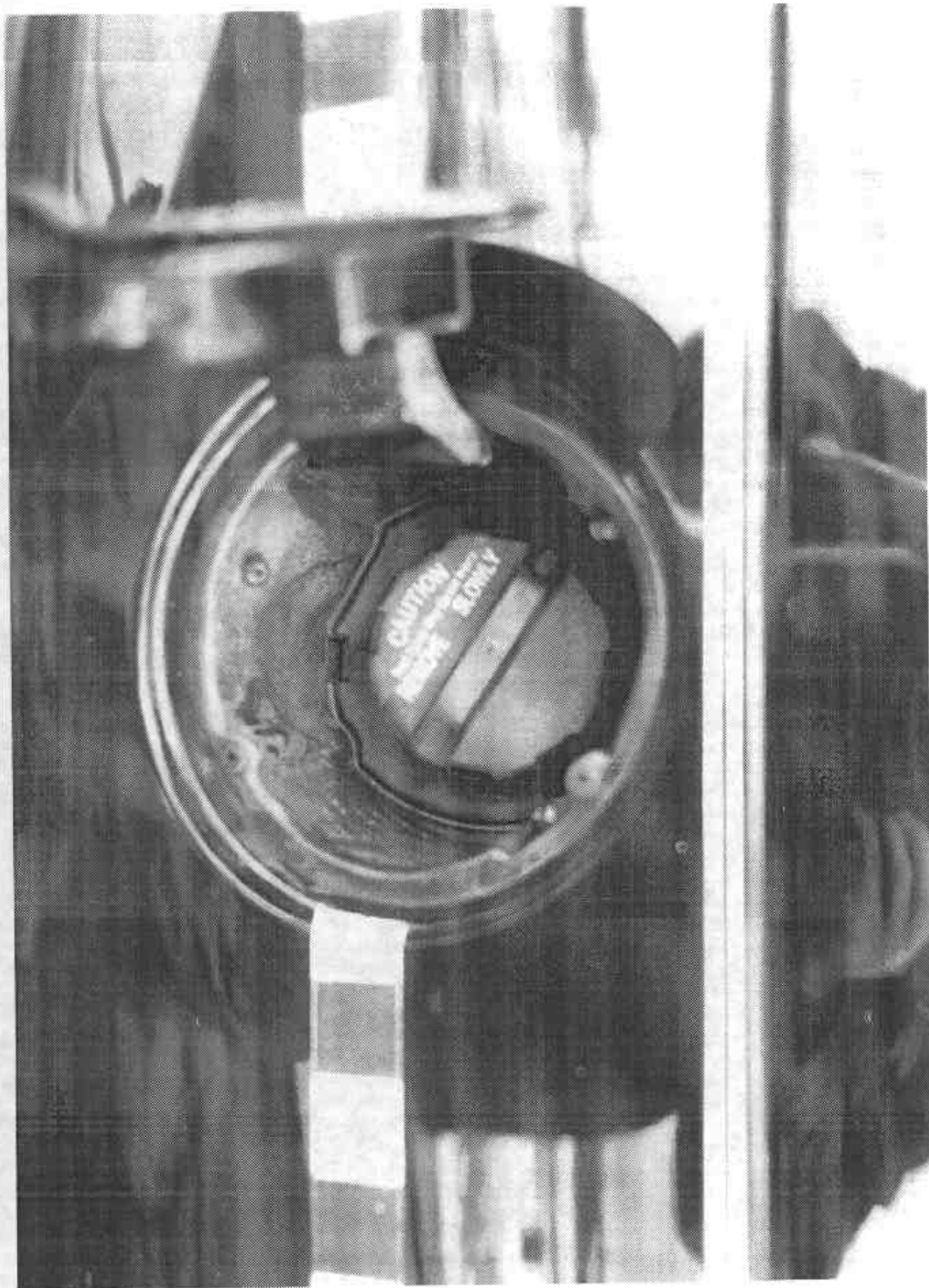


Figure A-15 PRE-TEST FUEL CAP VIEW

A-16

7776-15

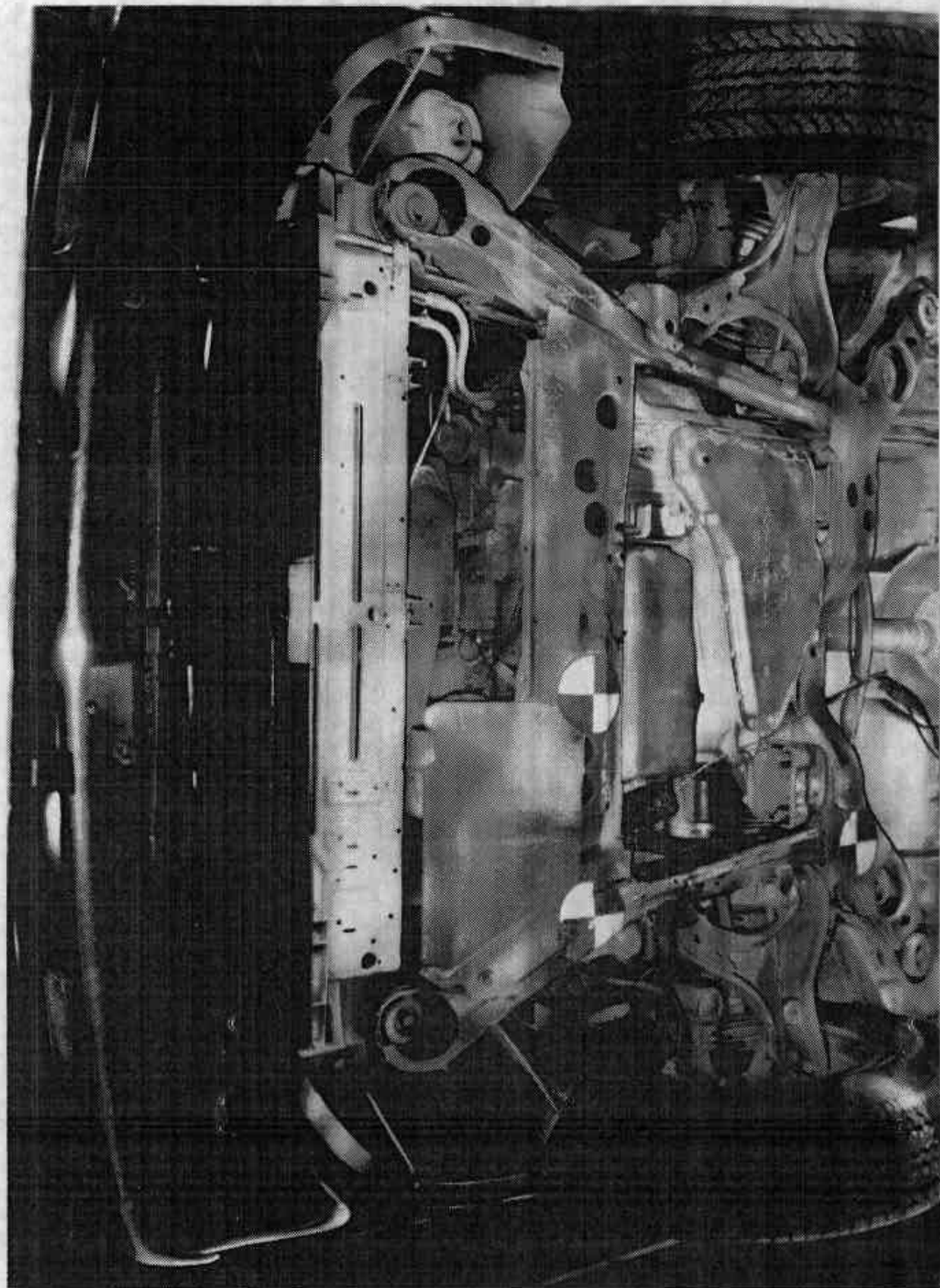


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

A-17

7776-15

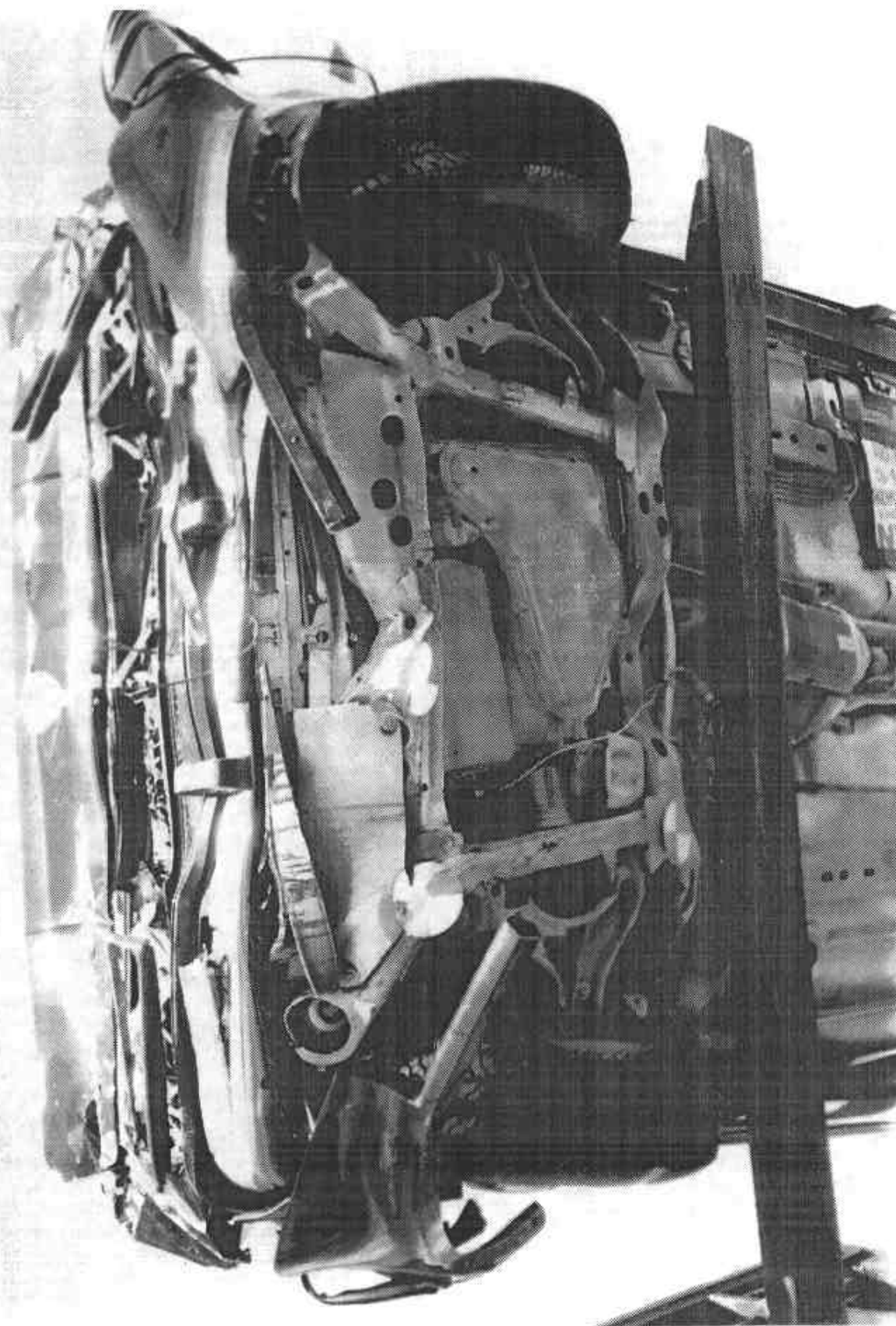


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

A-18

7778-15

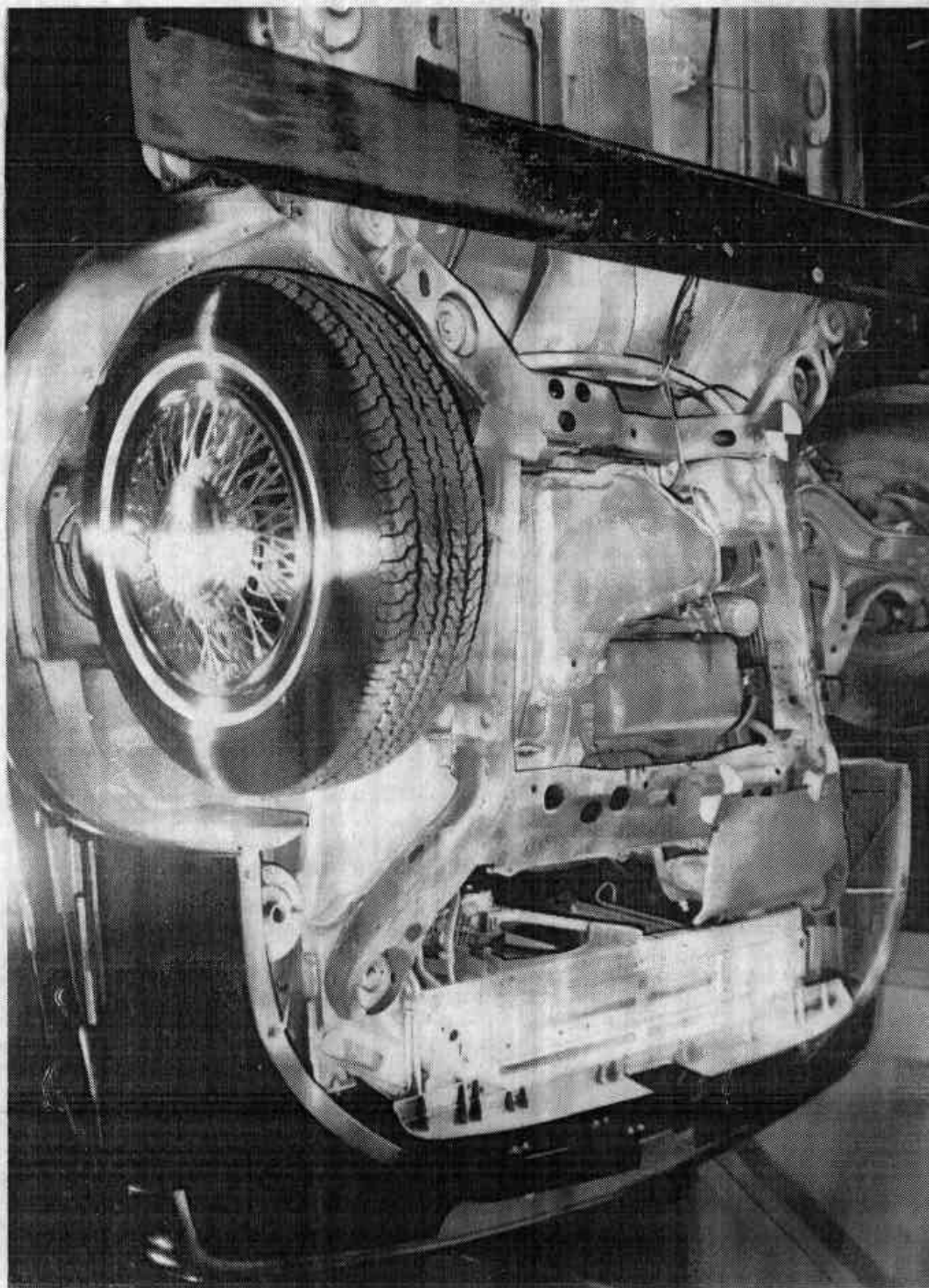


Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

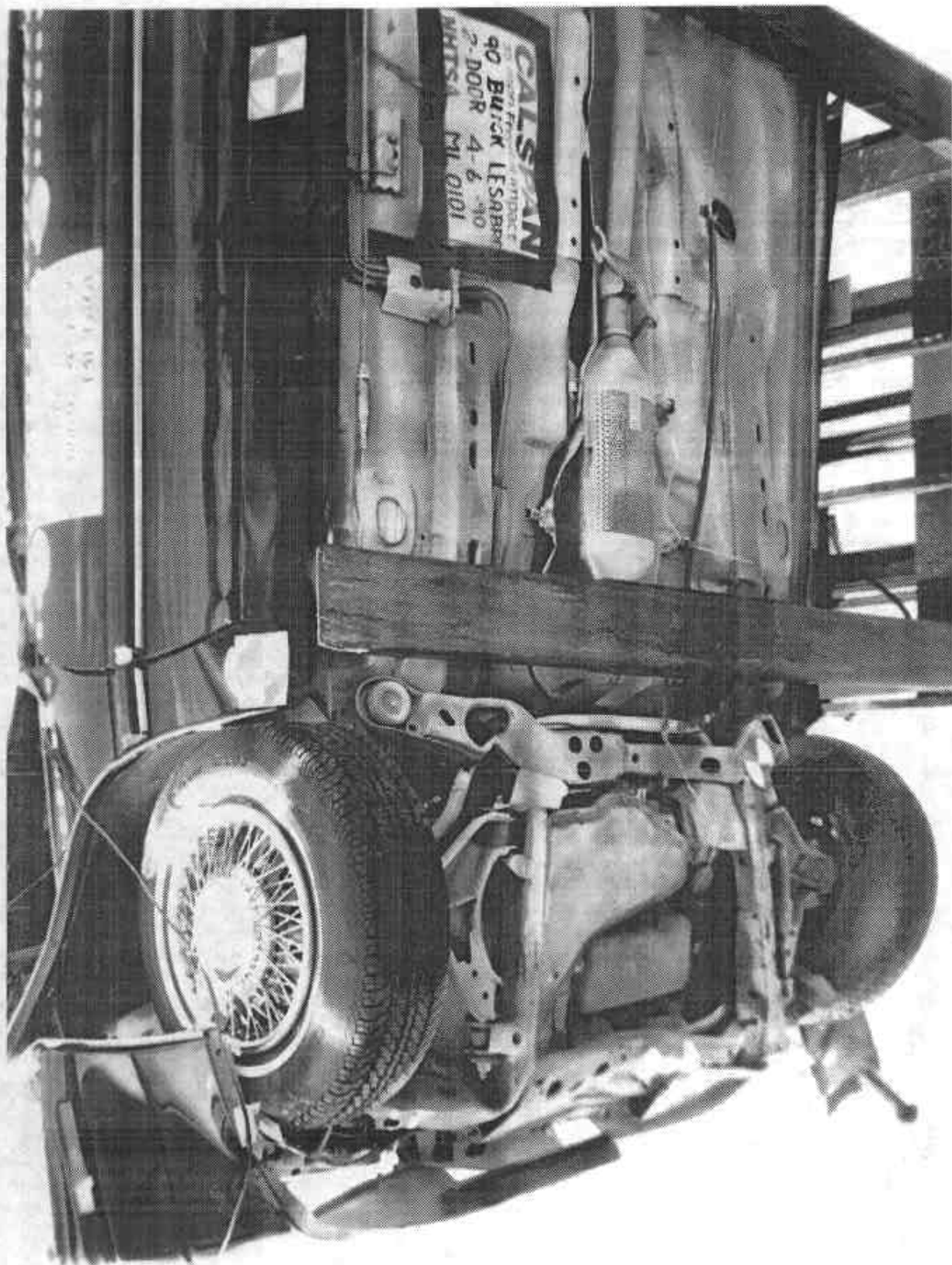


Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

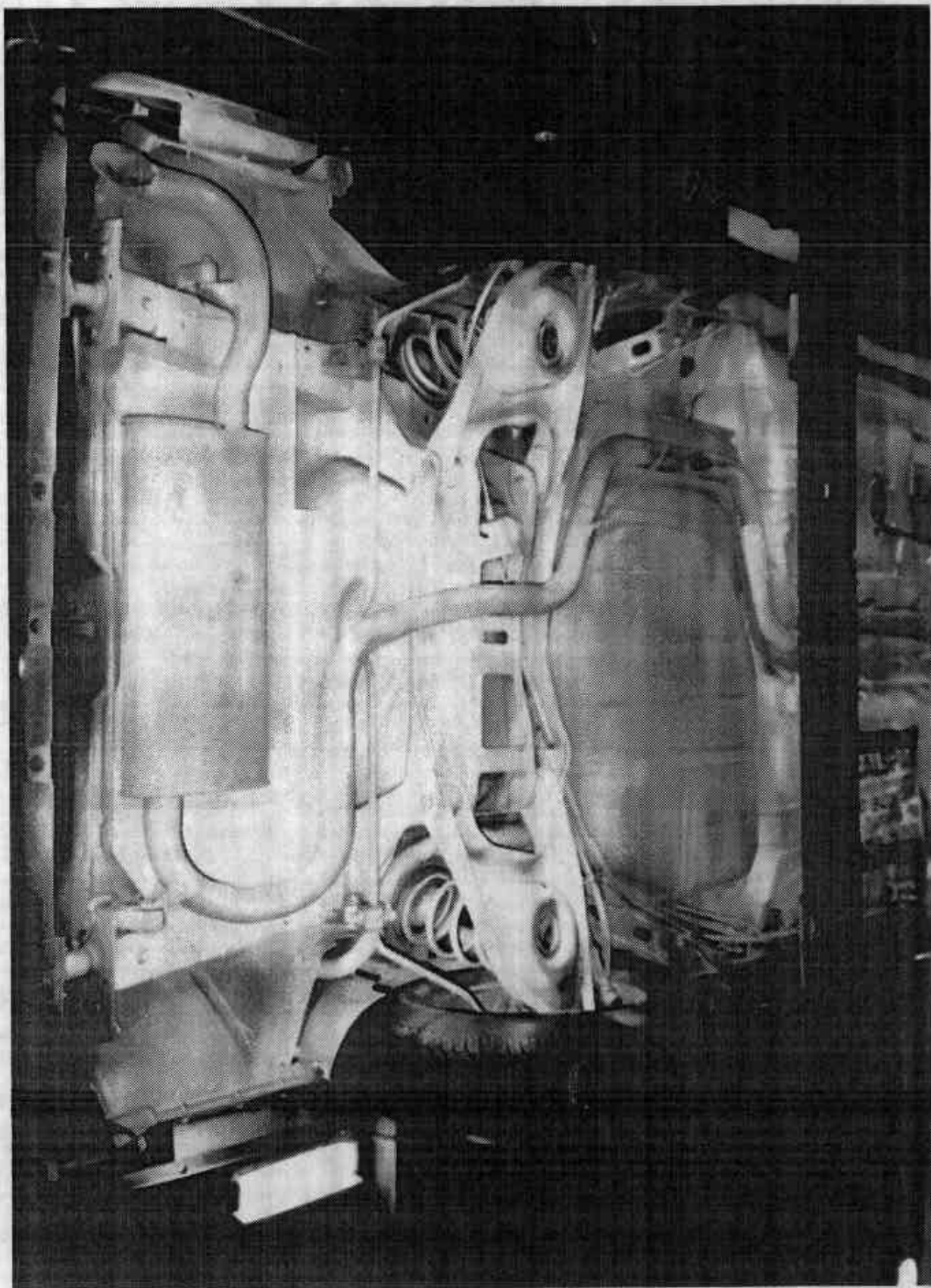


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

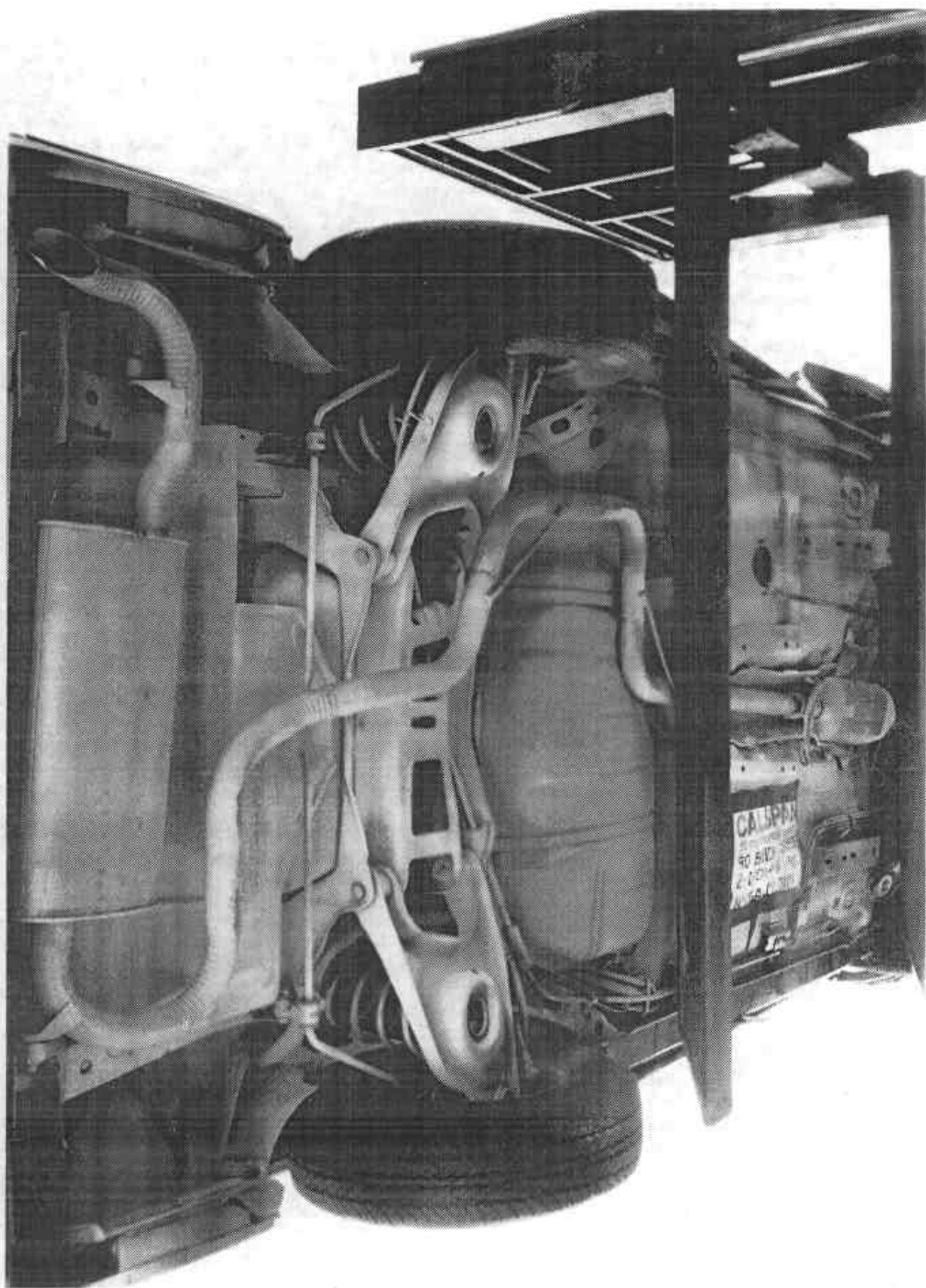


Figure A-21 POST-TEST REAR UNDERBODY VIEW

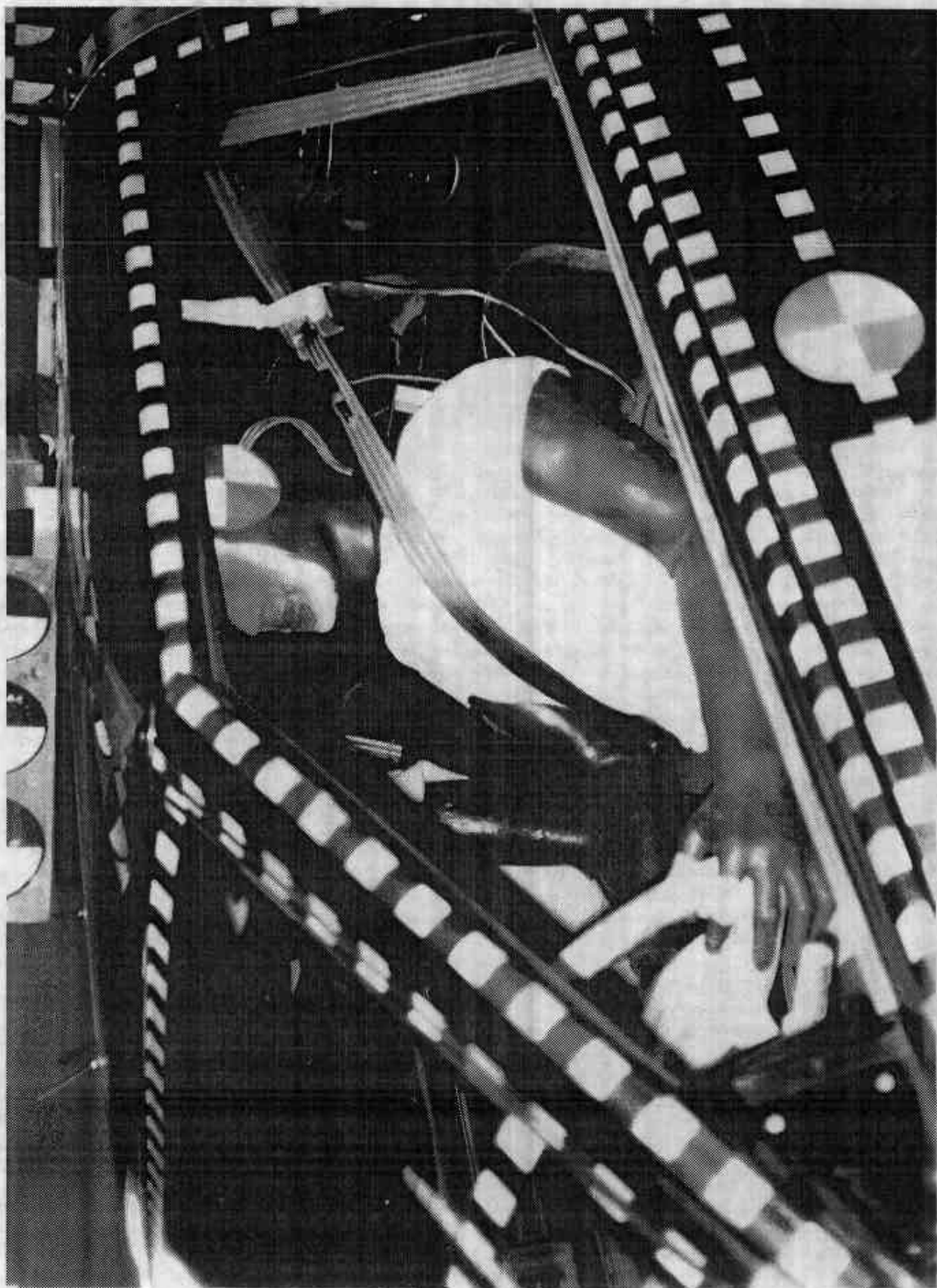


FIGURE A-22 PRE-TEST DRIVER POSITION VIEW

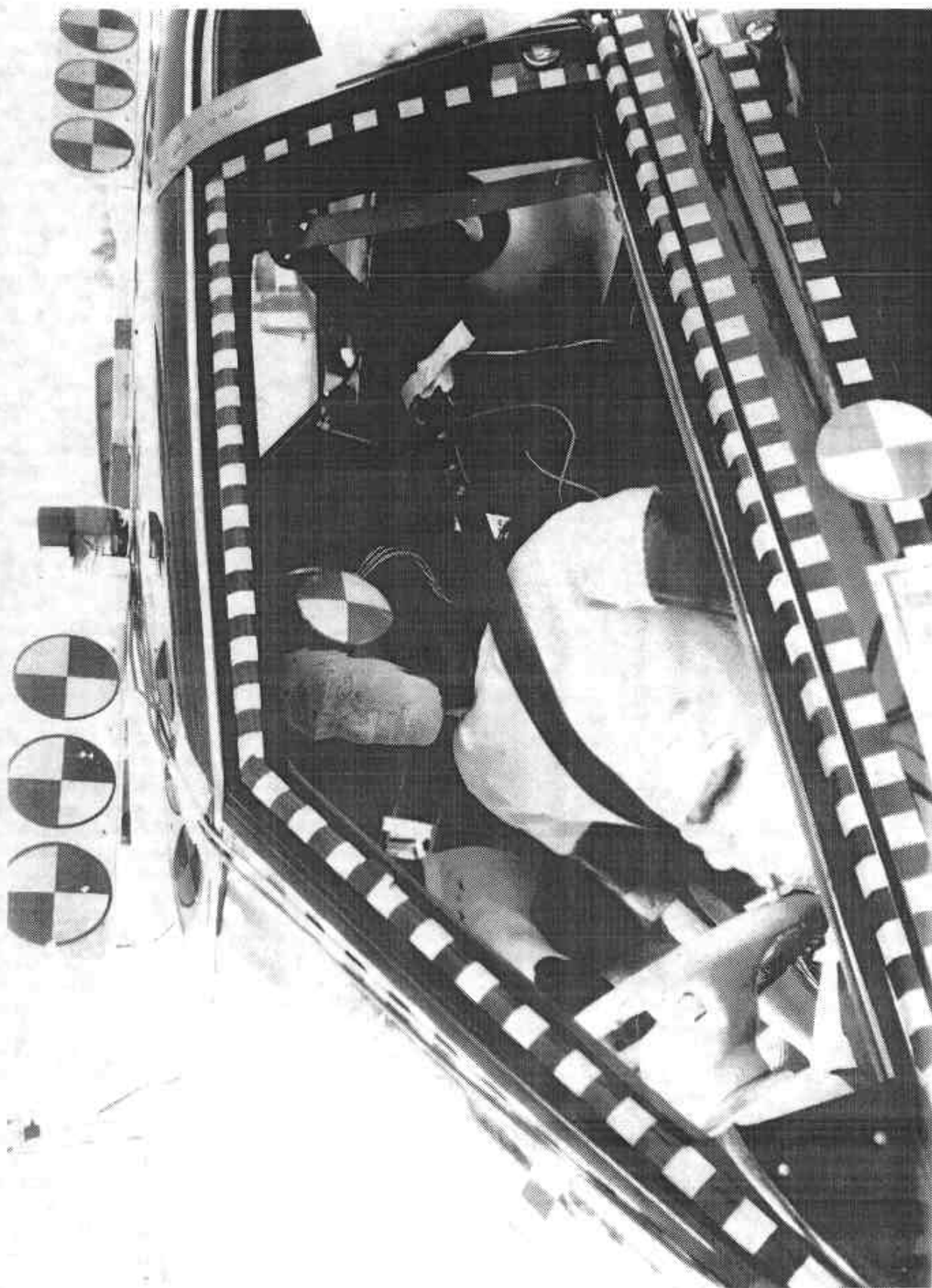


FIGURE A-23 POST-TEST DRIVER POSITION VIEW



FIGURE A-24 PRE-TEST PASSENGER POSITION VIEW



Figure A-25 POST-TEST PASSENGER POSITION VIEW



Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW



Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

A-28

7776-15

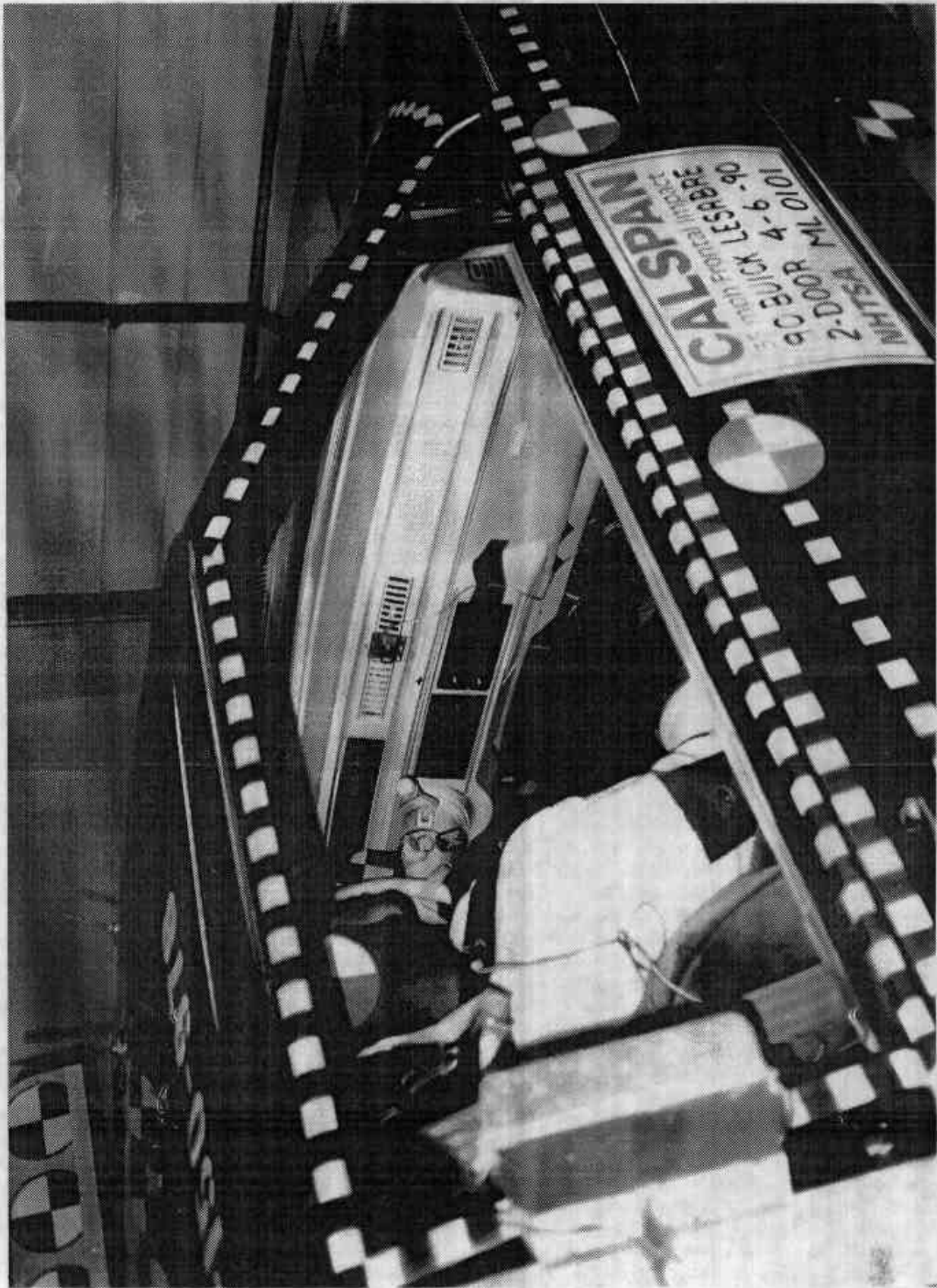


Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW



Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

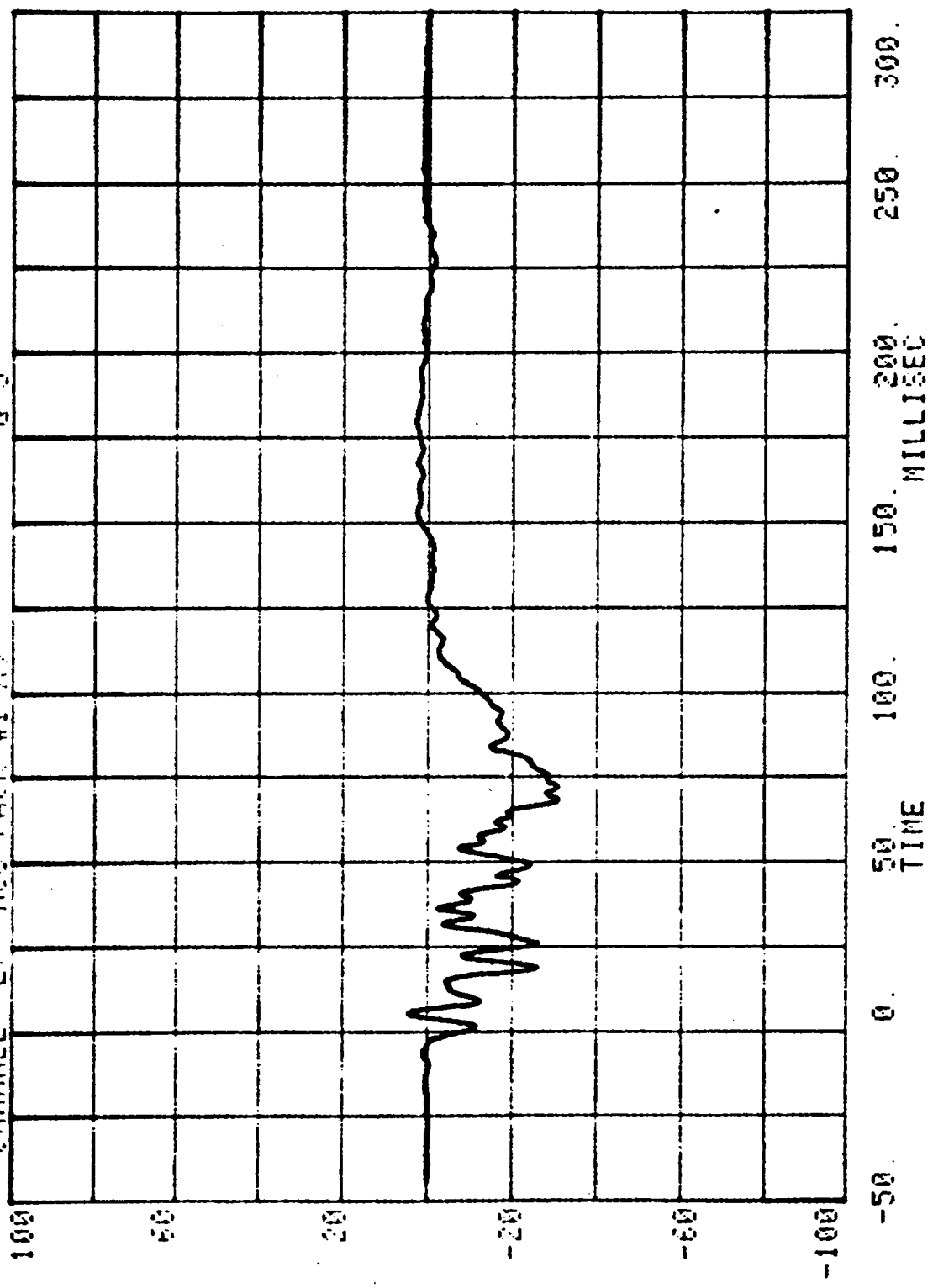
TEST NO. ML0101

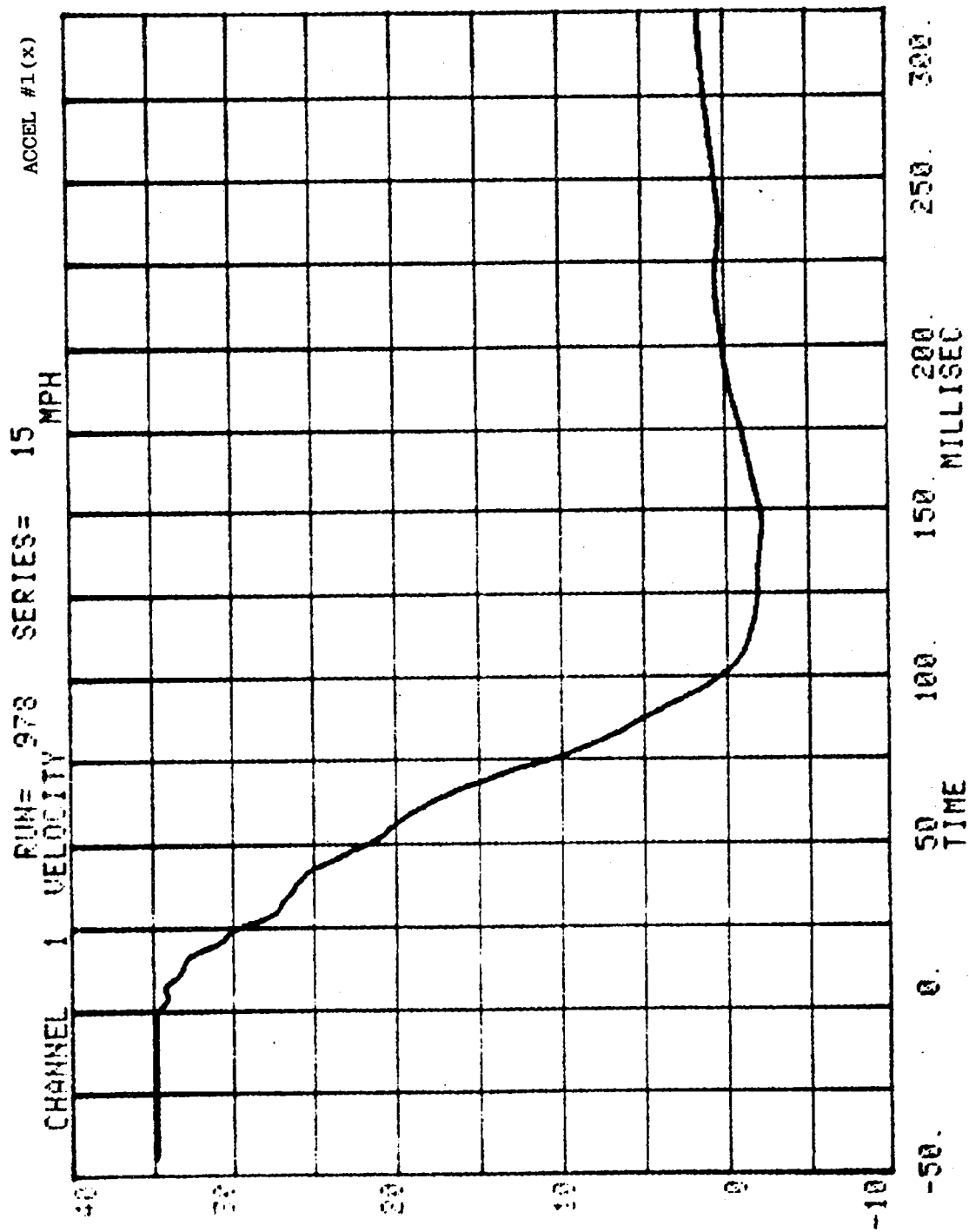
VEHICLE DATA

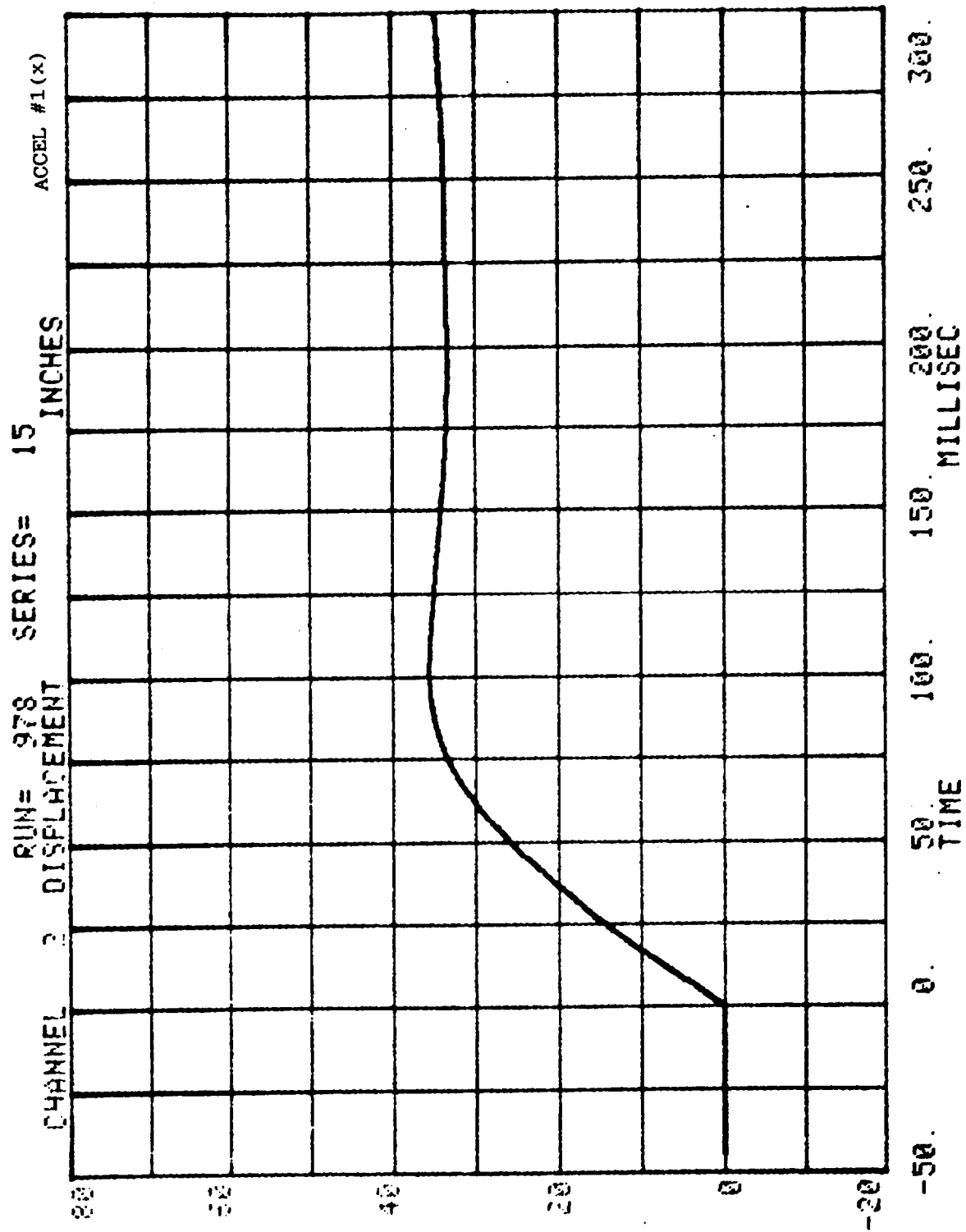
FILTER CHANNEL CLASS

60

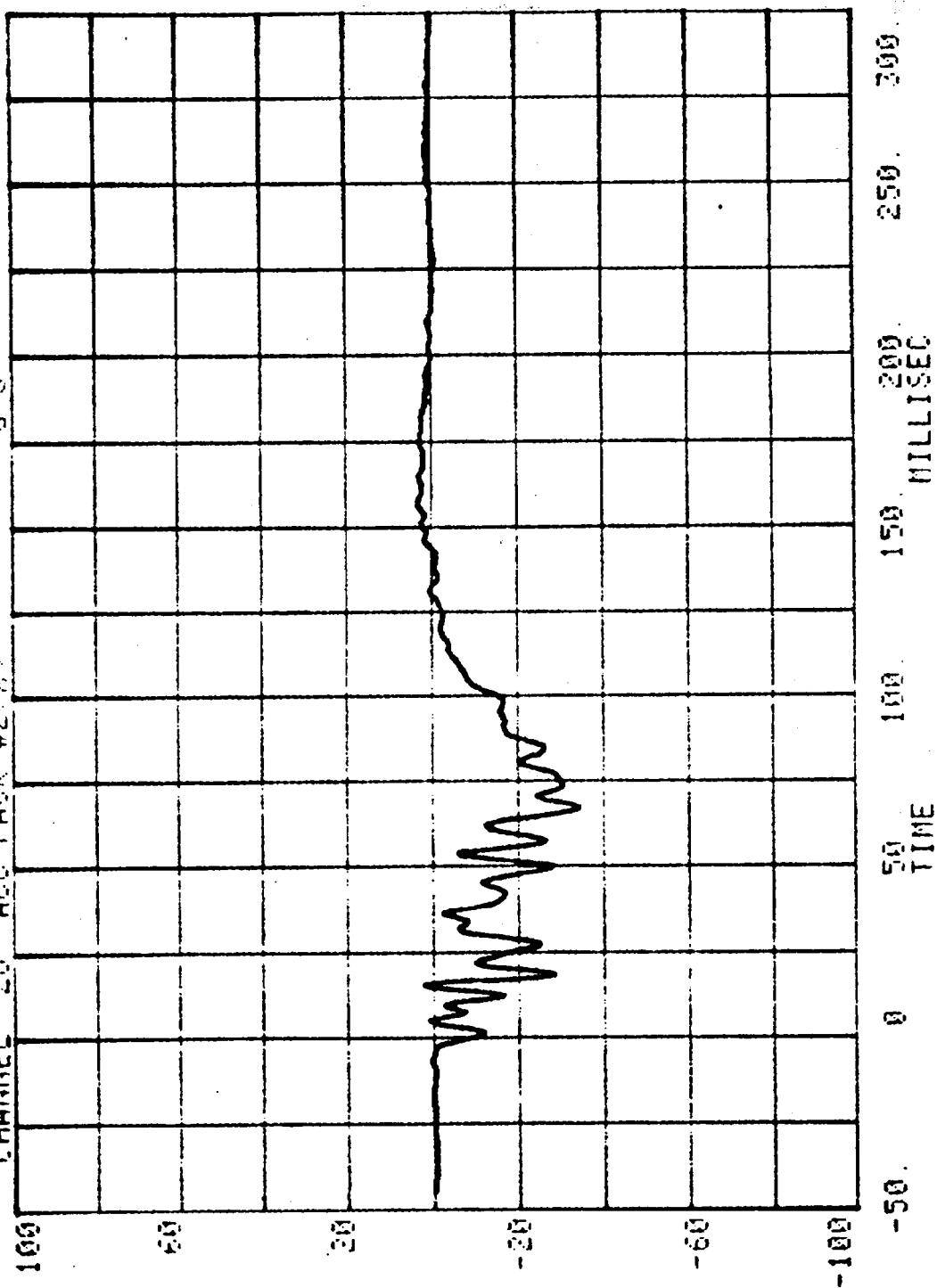
CHANNEL 27 RUN= 378 SERIES= 15
ACC PACK #1770 G'S

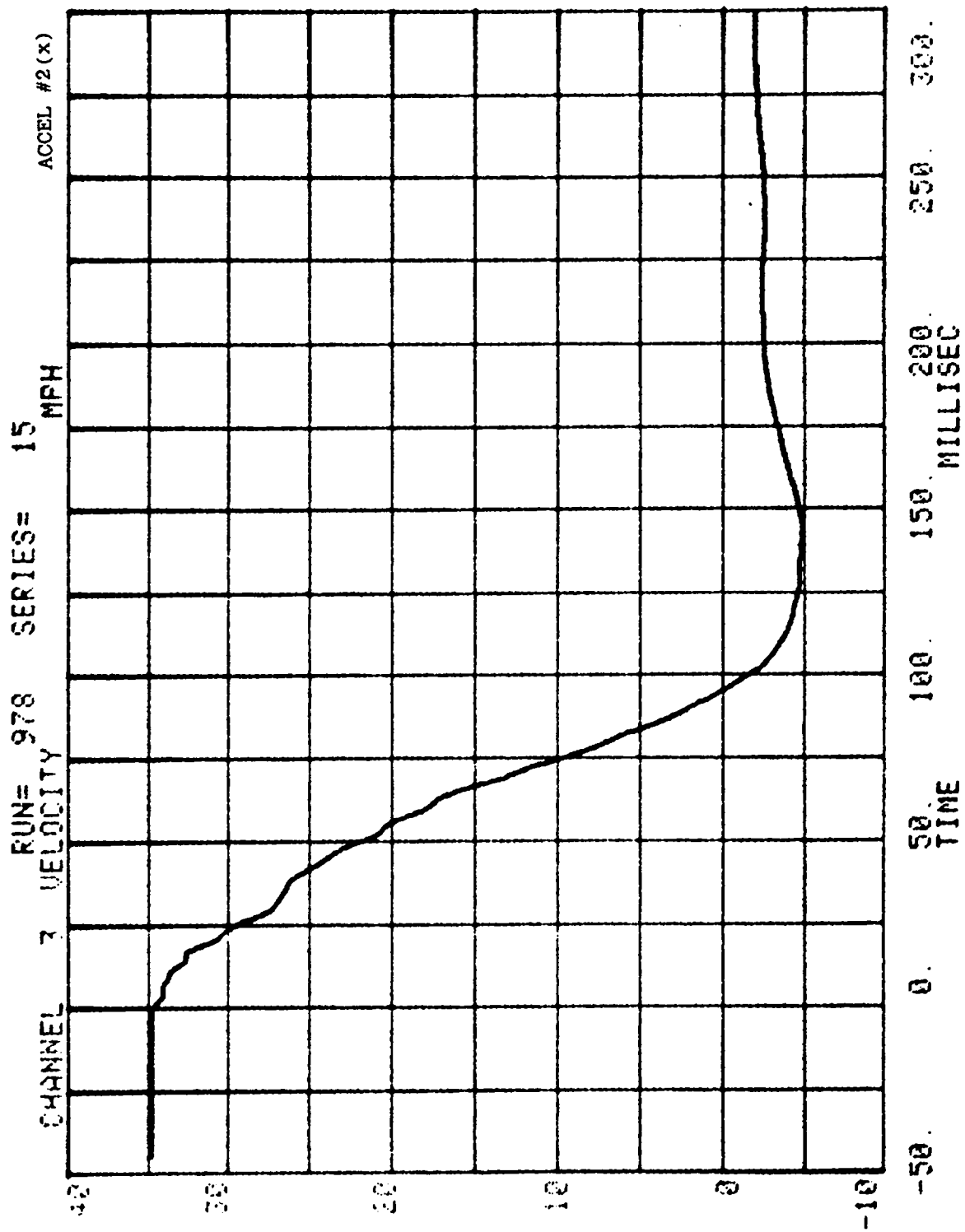


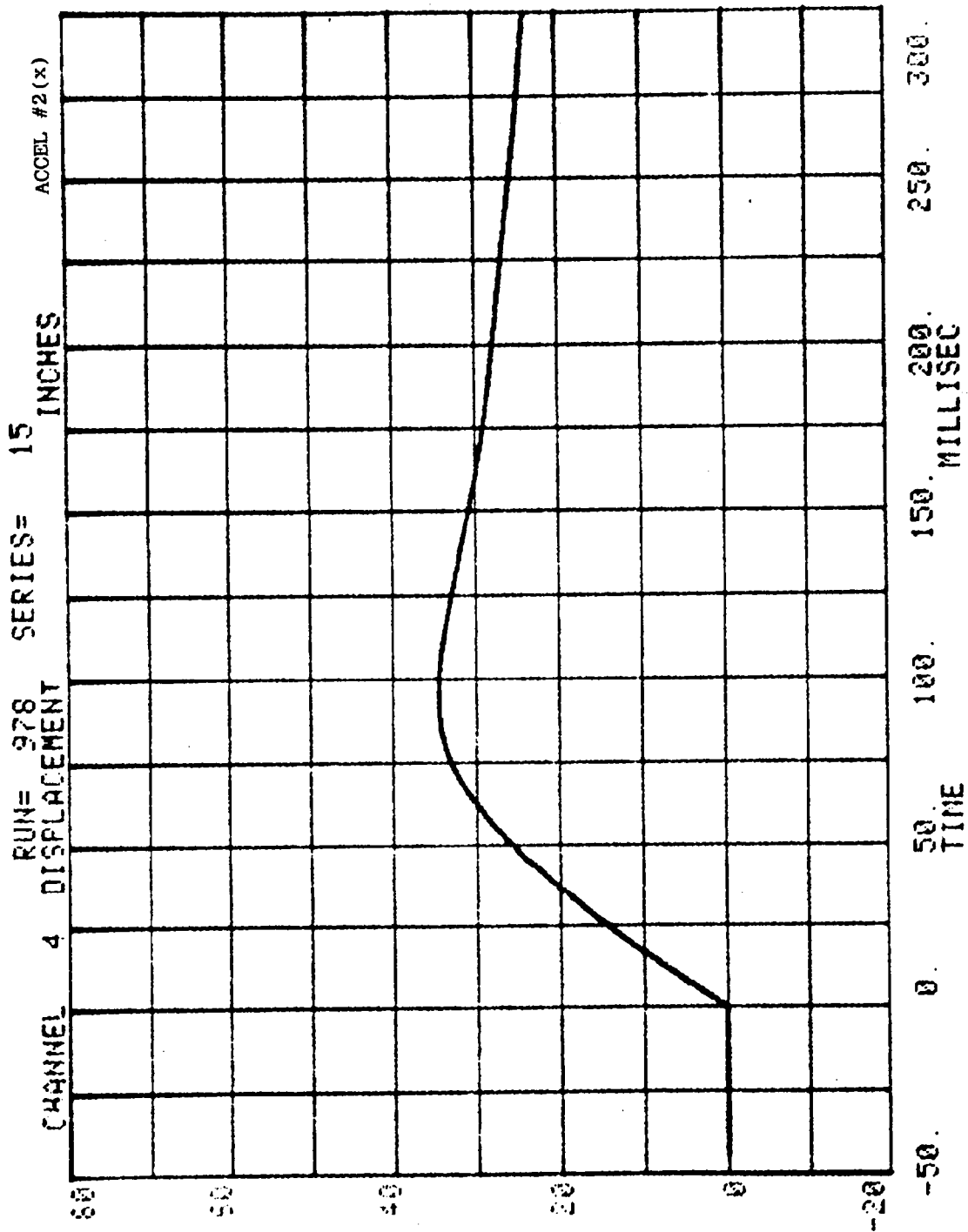




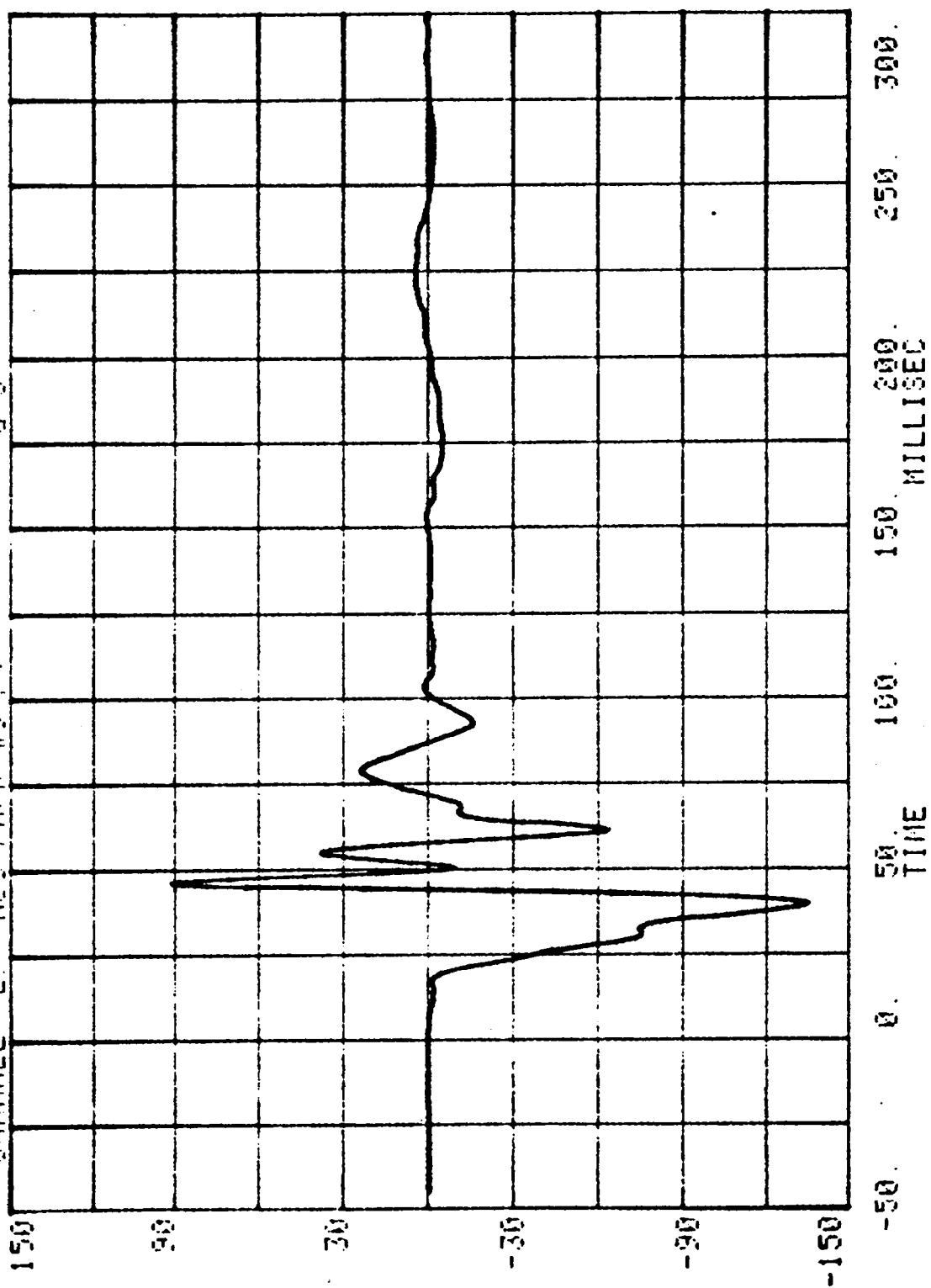
CHANNEL 28 ACQ PACK #2(X) RUN= 973 SERIES= 15 5'S

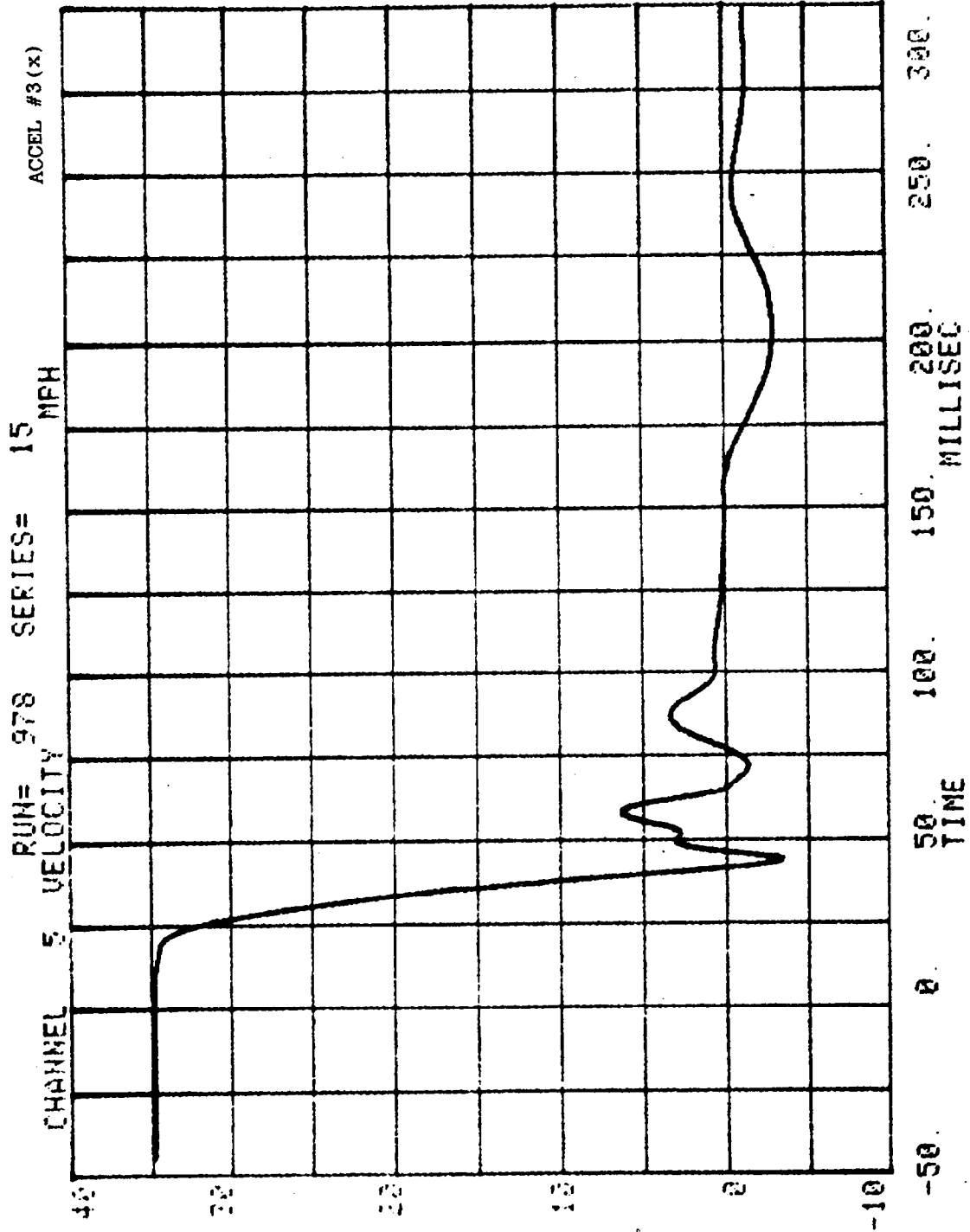


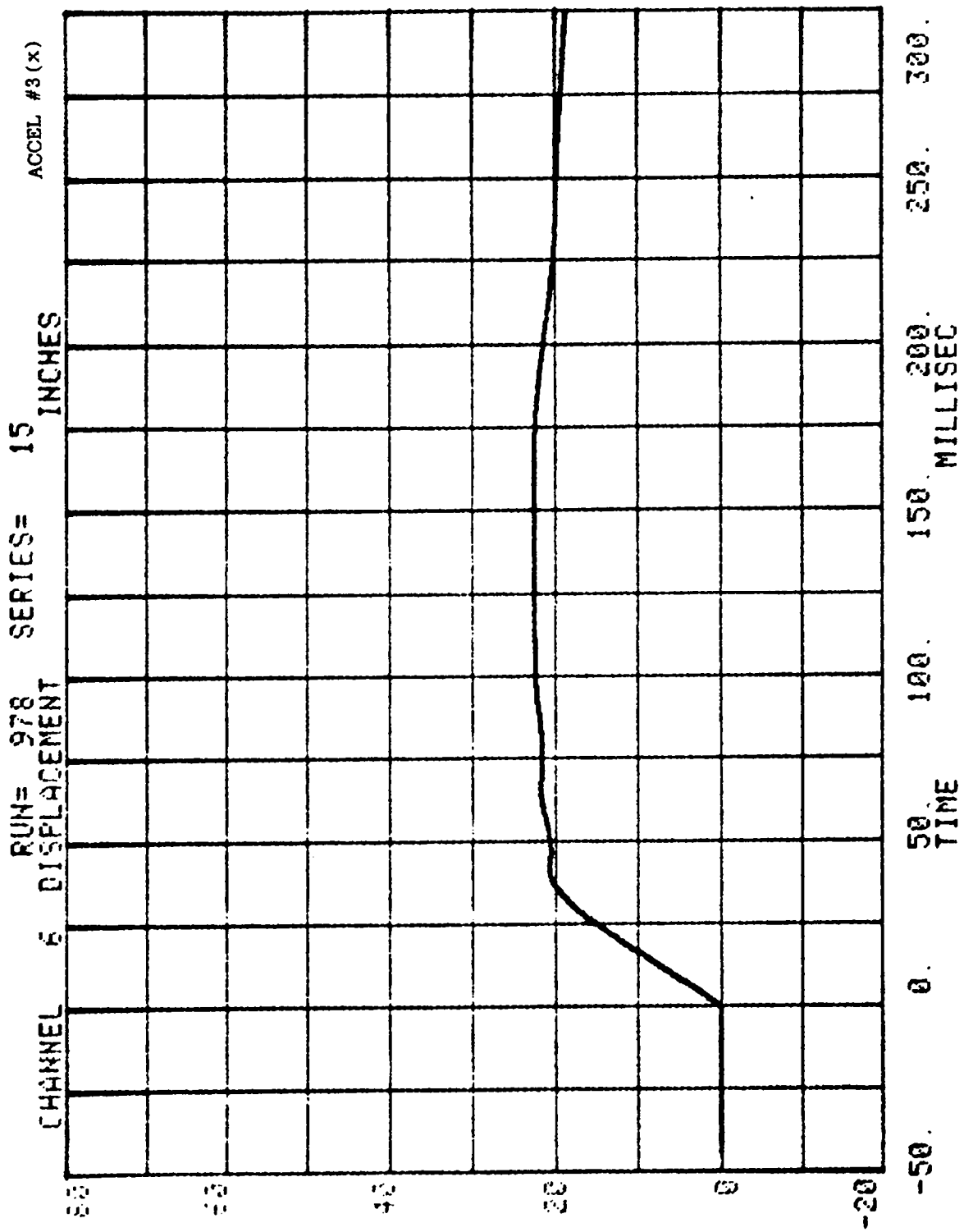




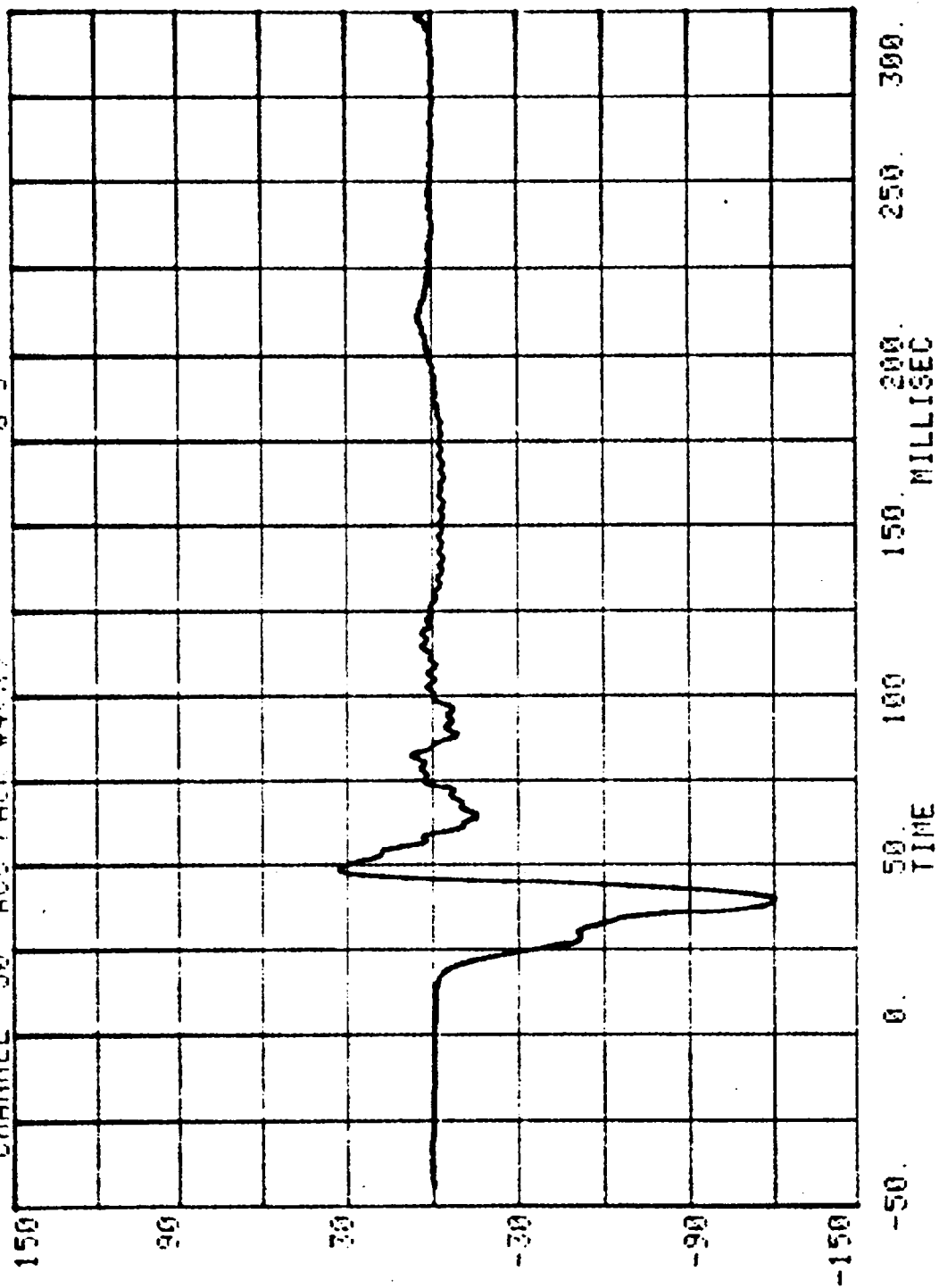
CHANNEL 29 HCC PAK #30% RUN= 978 SERIES= 15 5'S

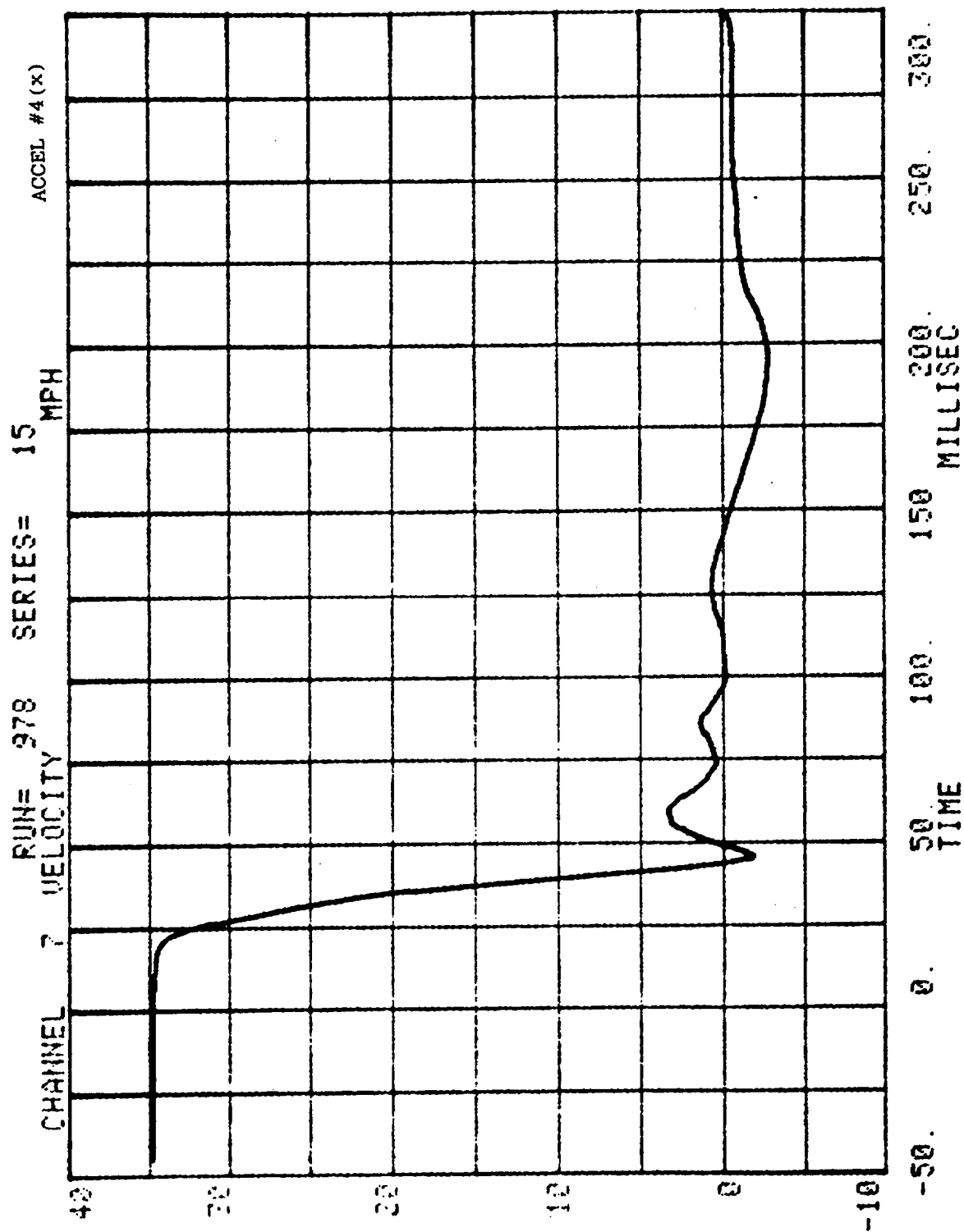


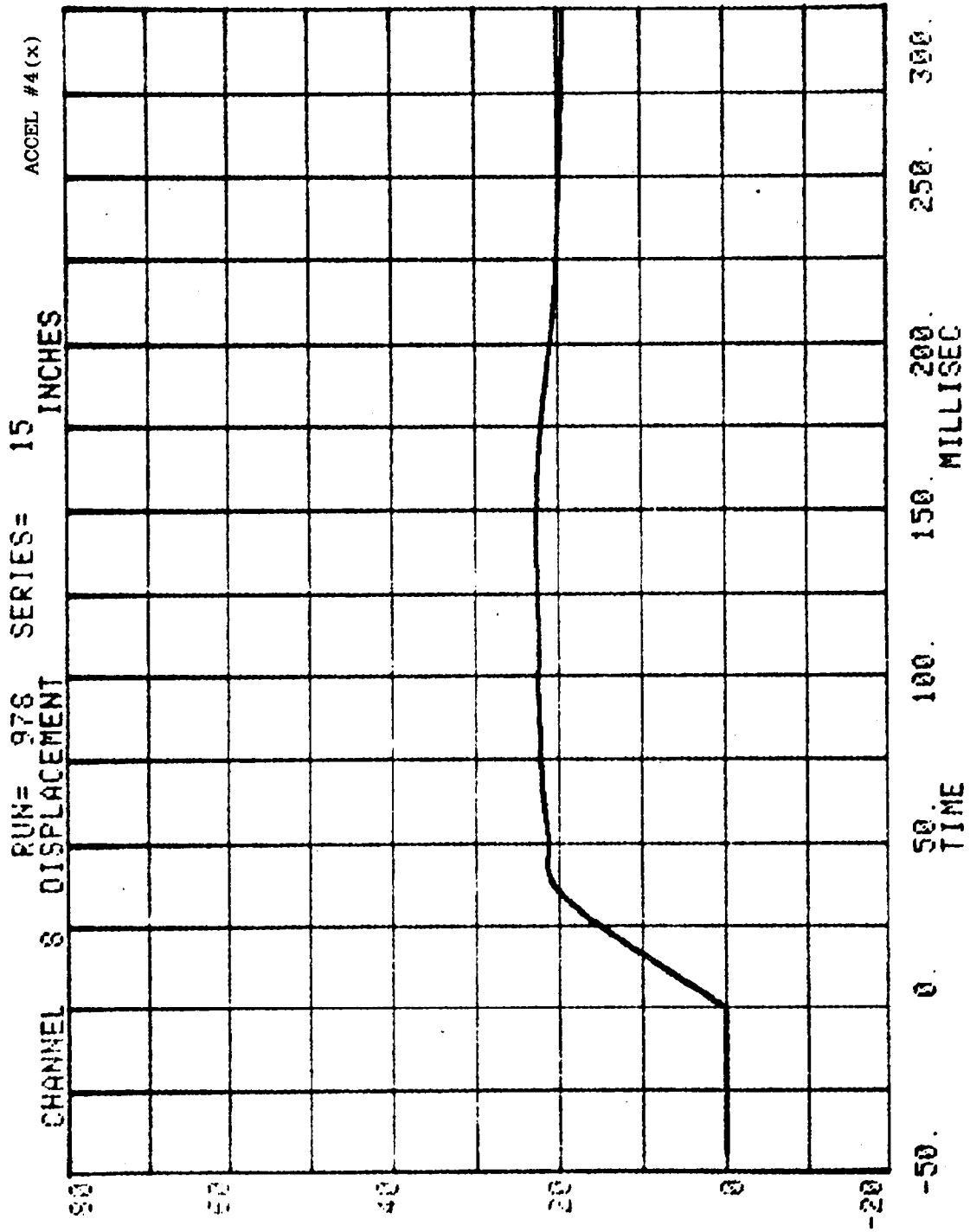




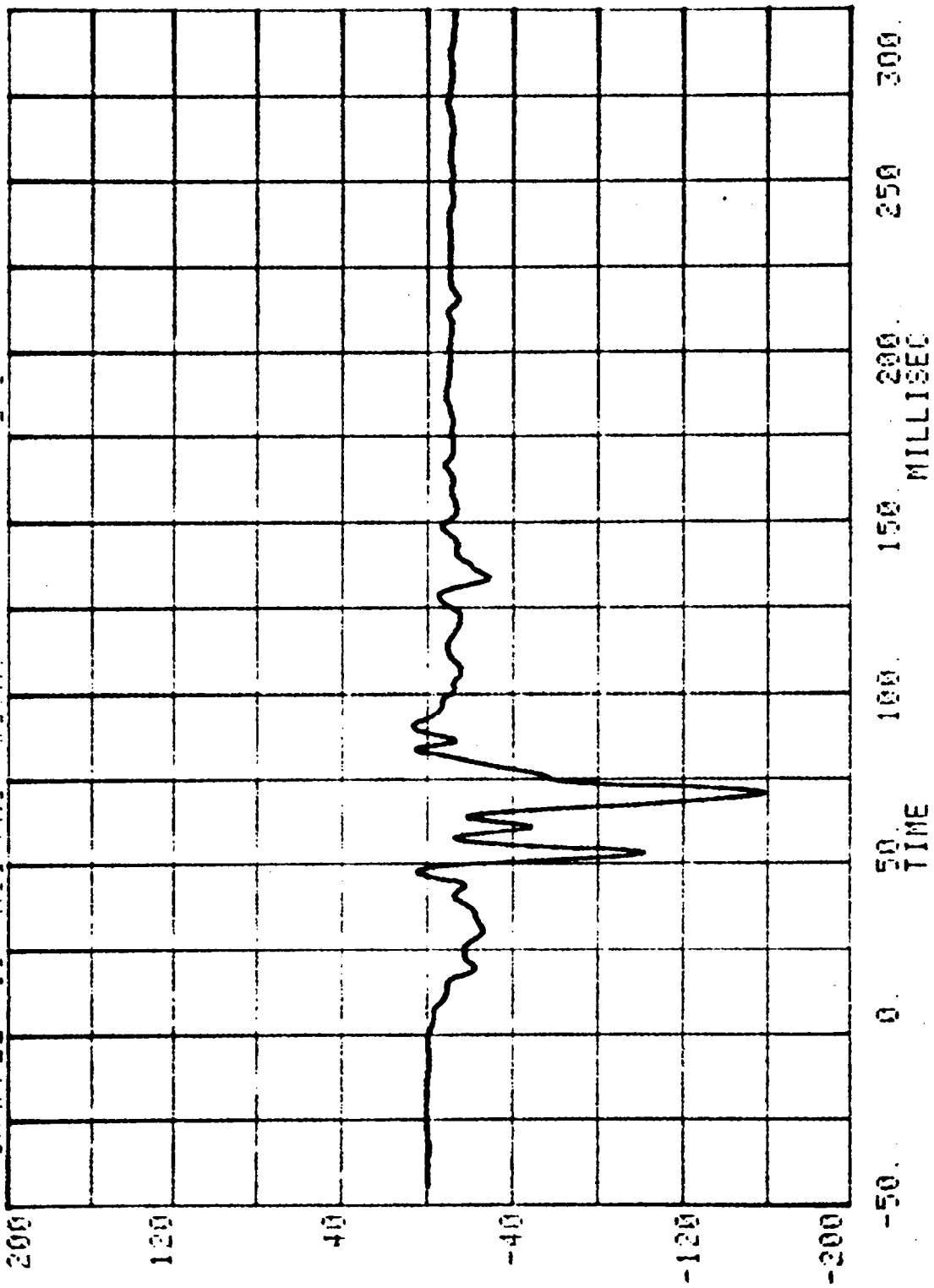
CHANNEL 30 ACC PACF #4(X) RUN= 973 SERIES= 15 6'S



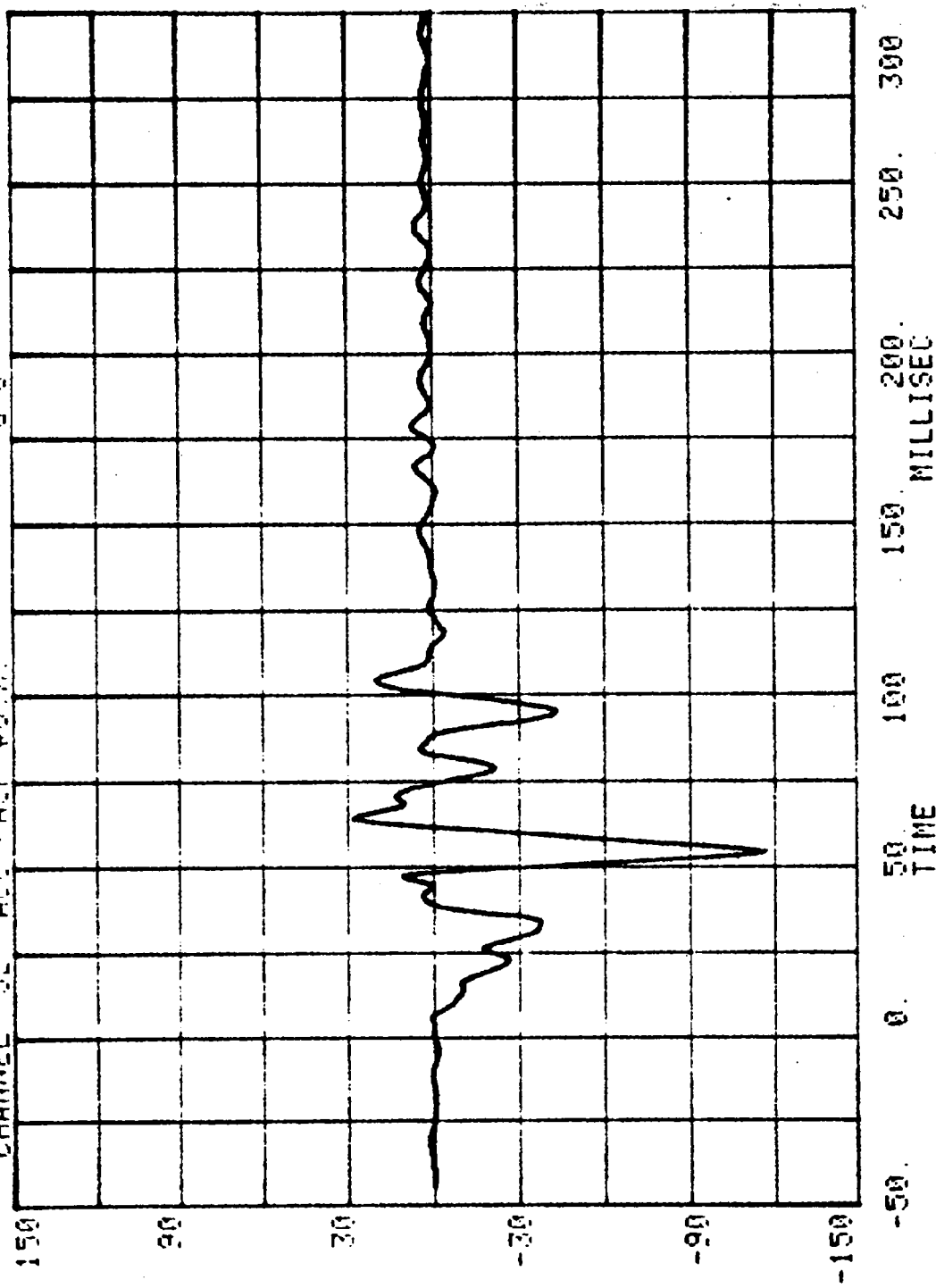


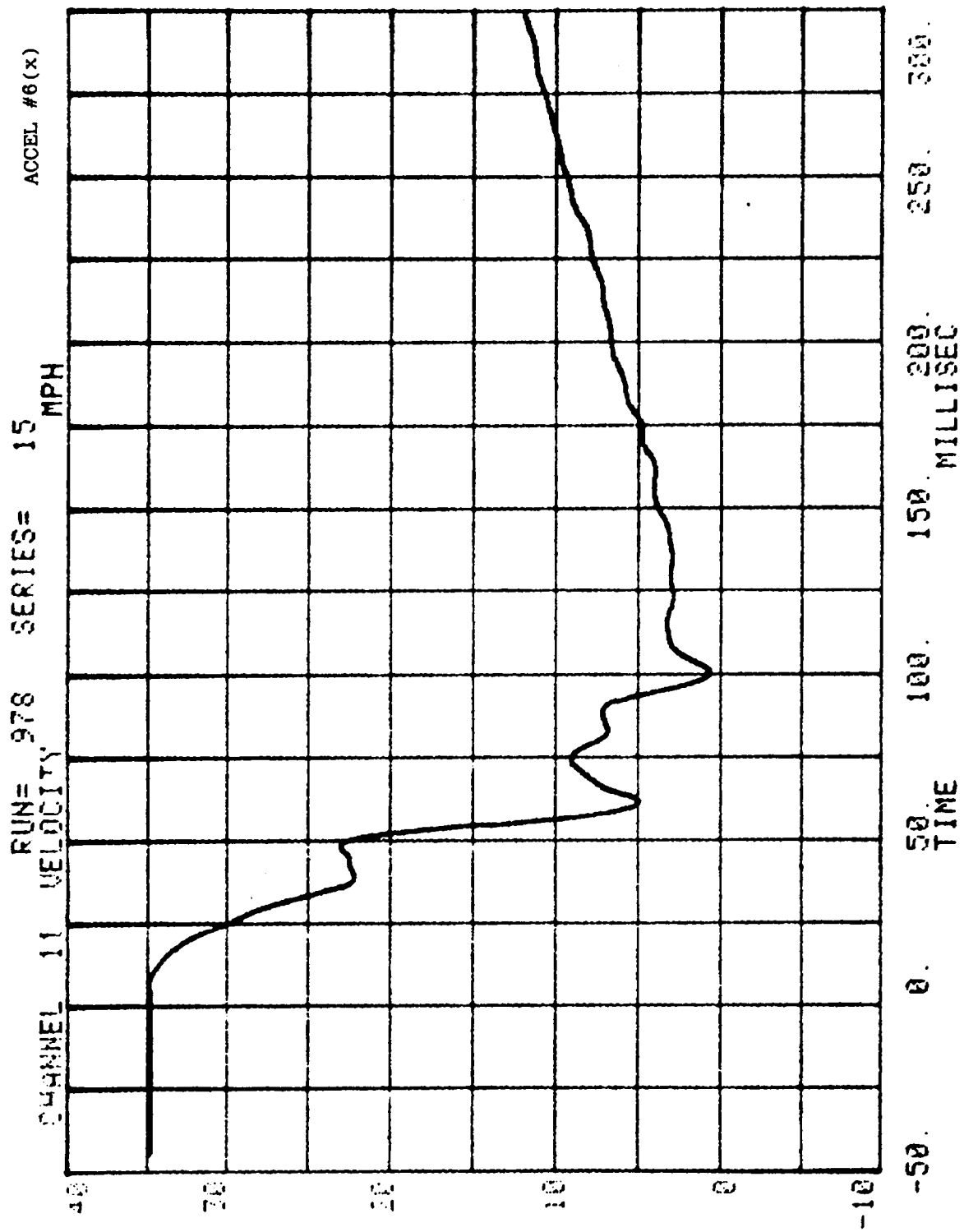


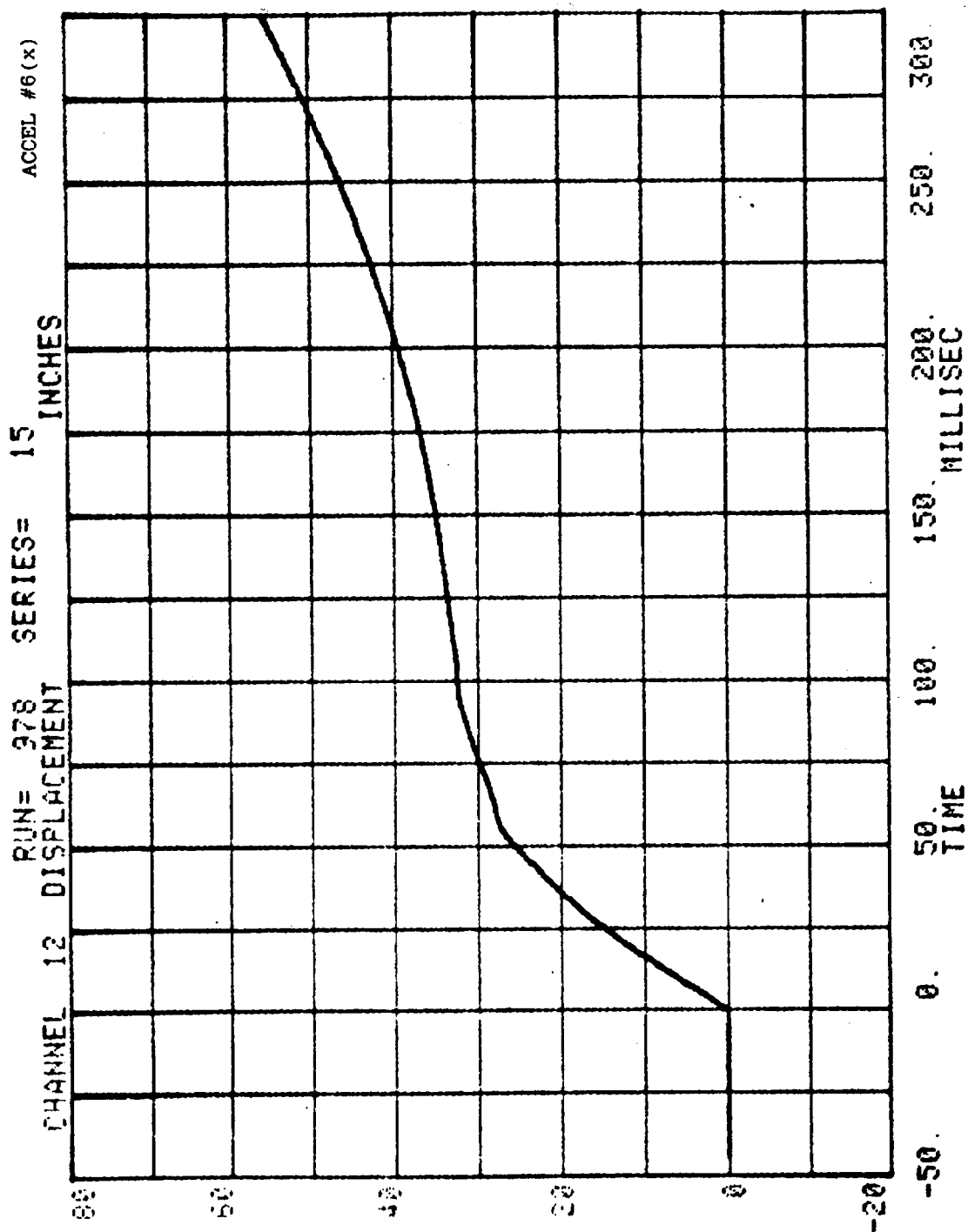
CHANNEL 31 ACC PACT #5(X) RUN= 978 SERIES= 15 5'S



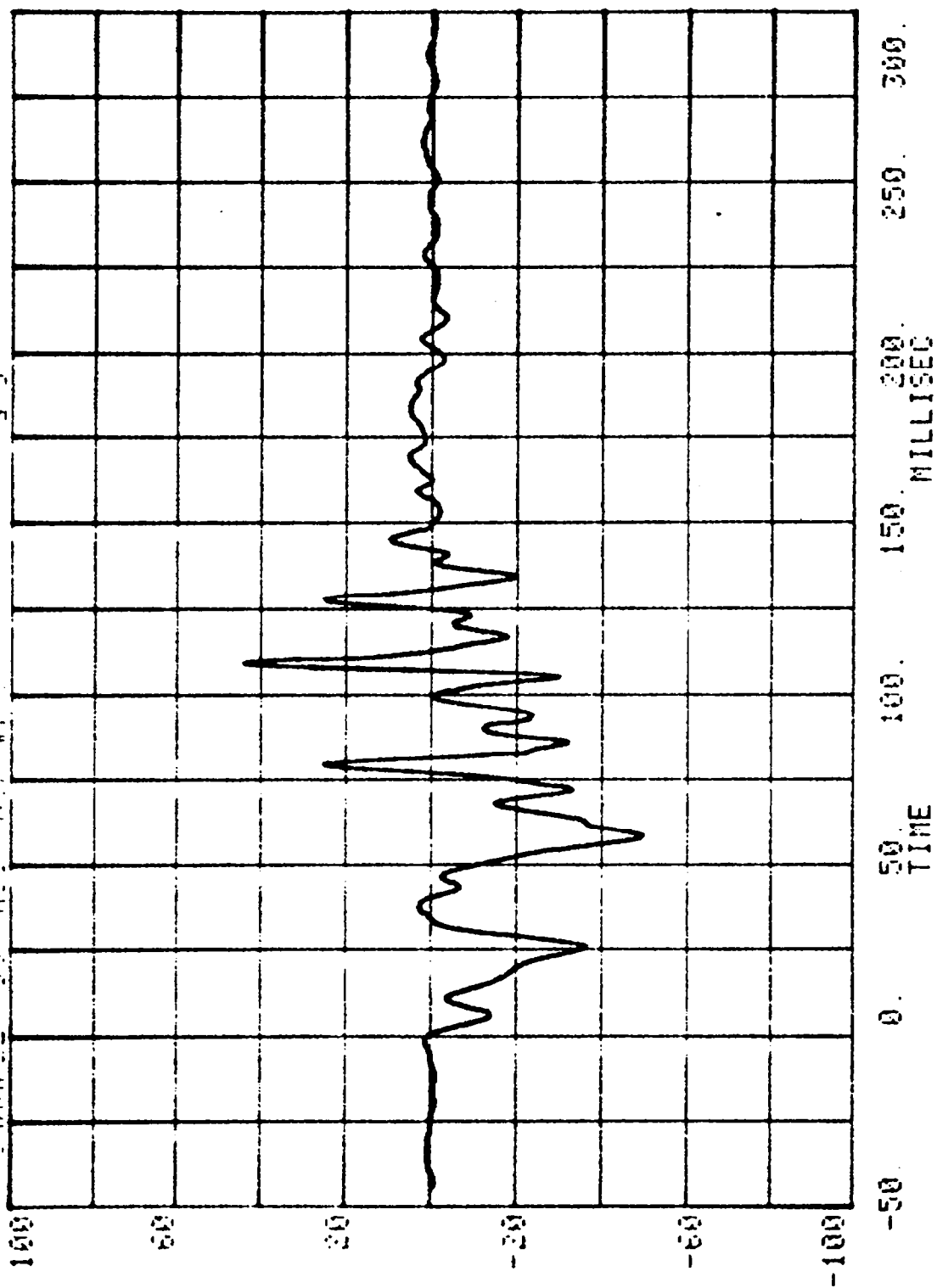
CHANNEL 32 ACC. PACE #6000
RUN= 978 SERIES= 15 G'S

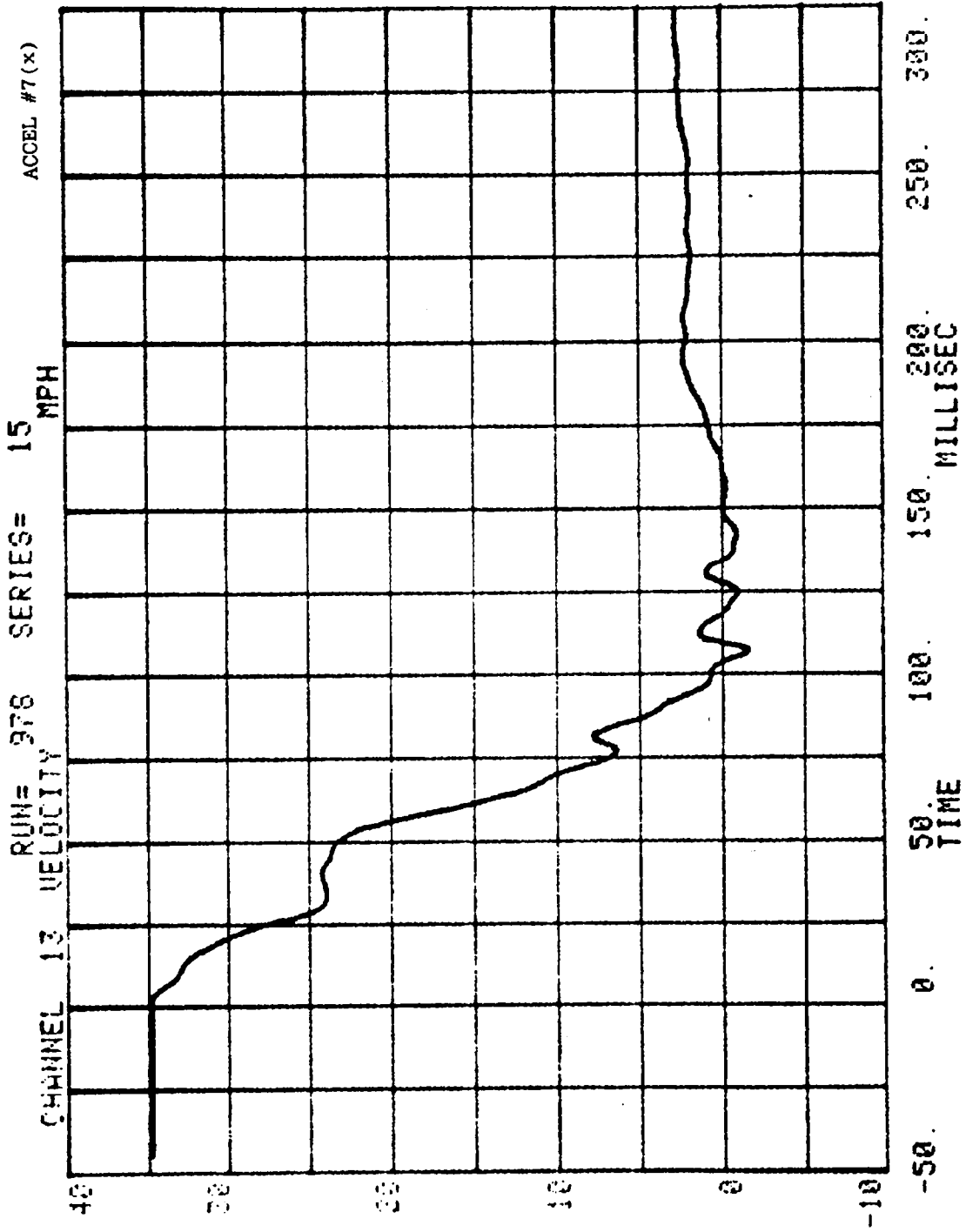


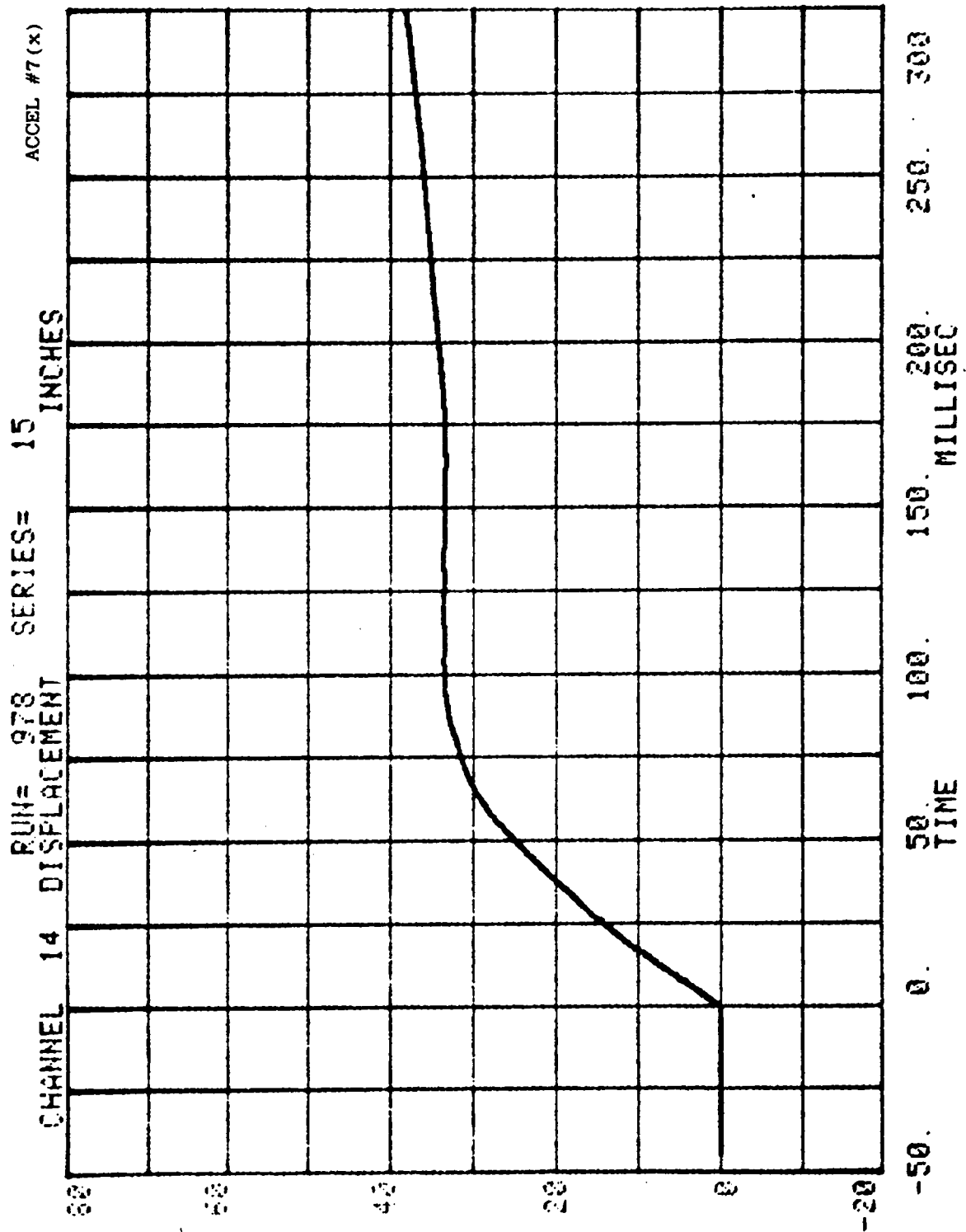




CHANNEL 33 ACC. PPKY #100V. RUN= 970. SERIES= 15 5'S







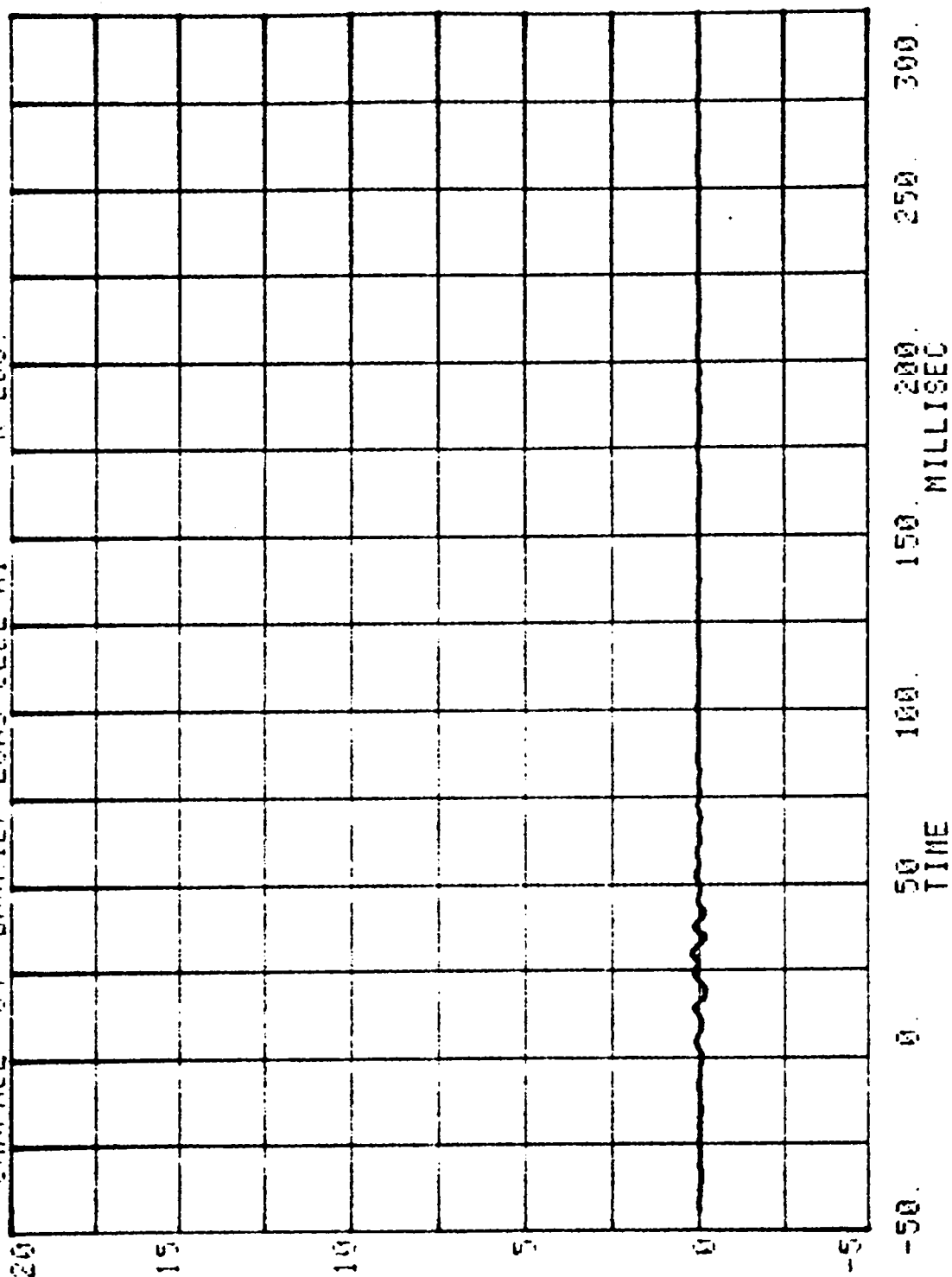
TEST NO. ML0101

LOAD CELL BARRIER DATA

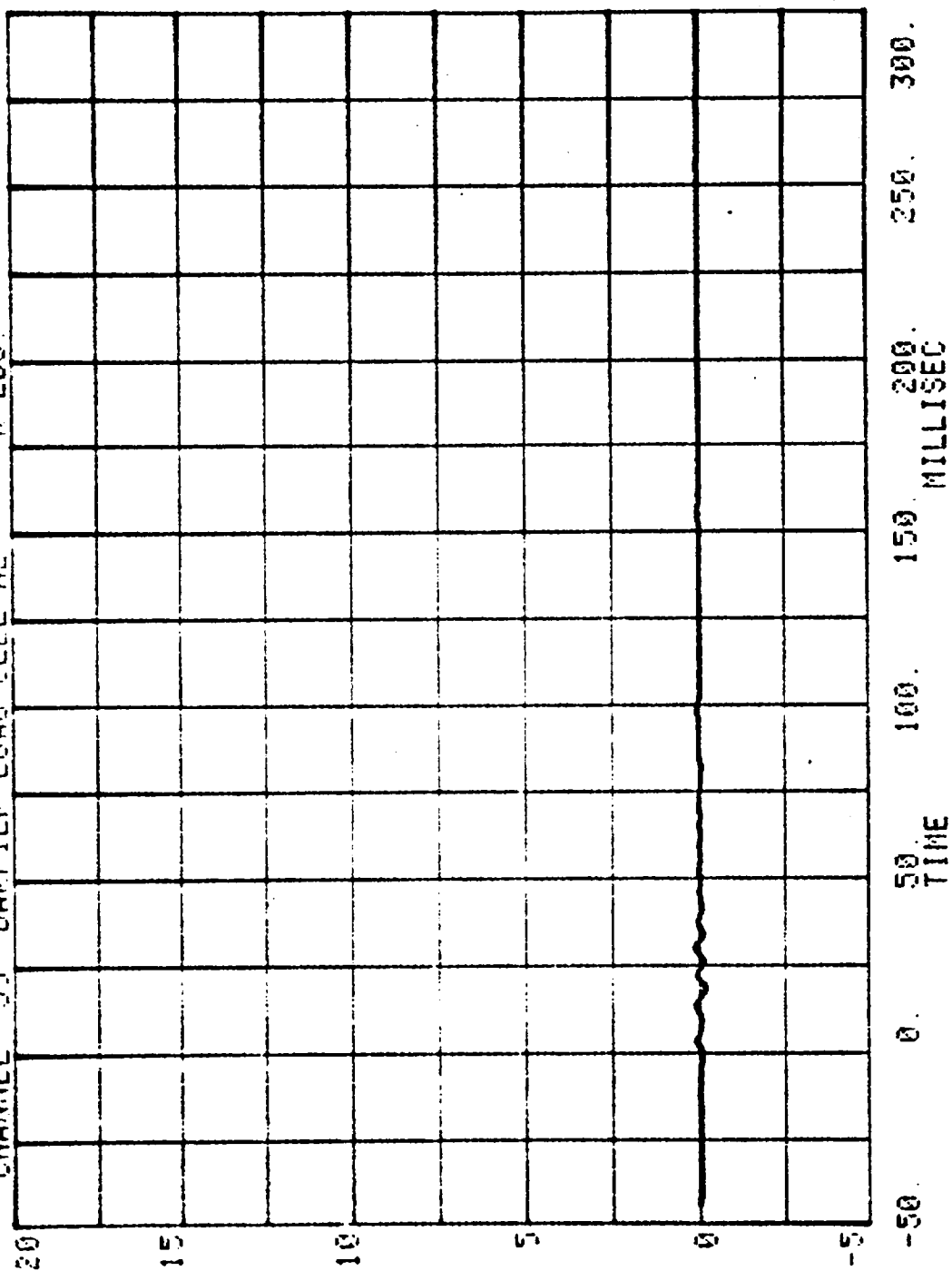
FILTER CHANNEL CLASS

60

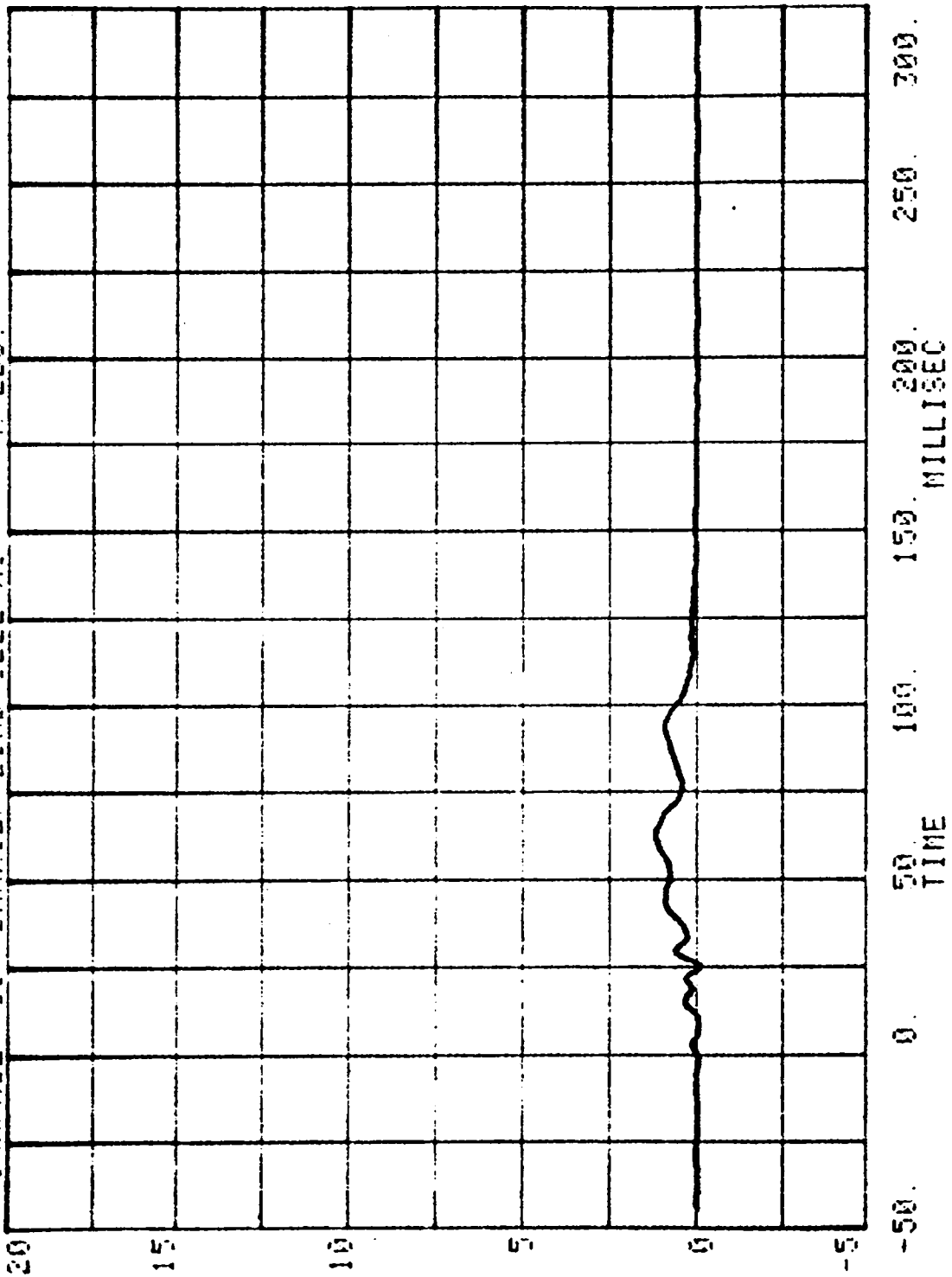
CHANNEL 34 BARRIER LOAD CELL A1 15 K LBS.



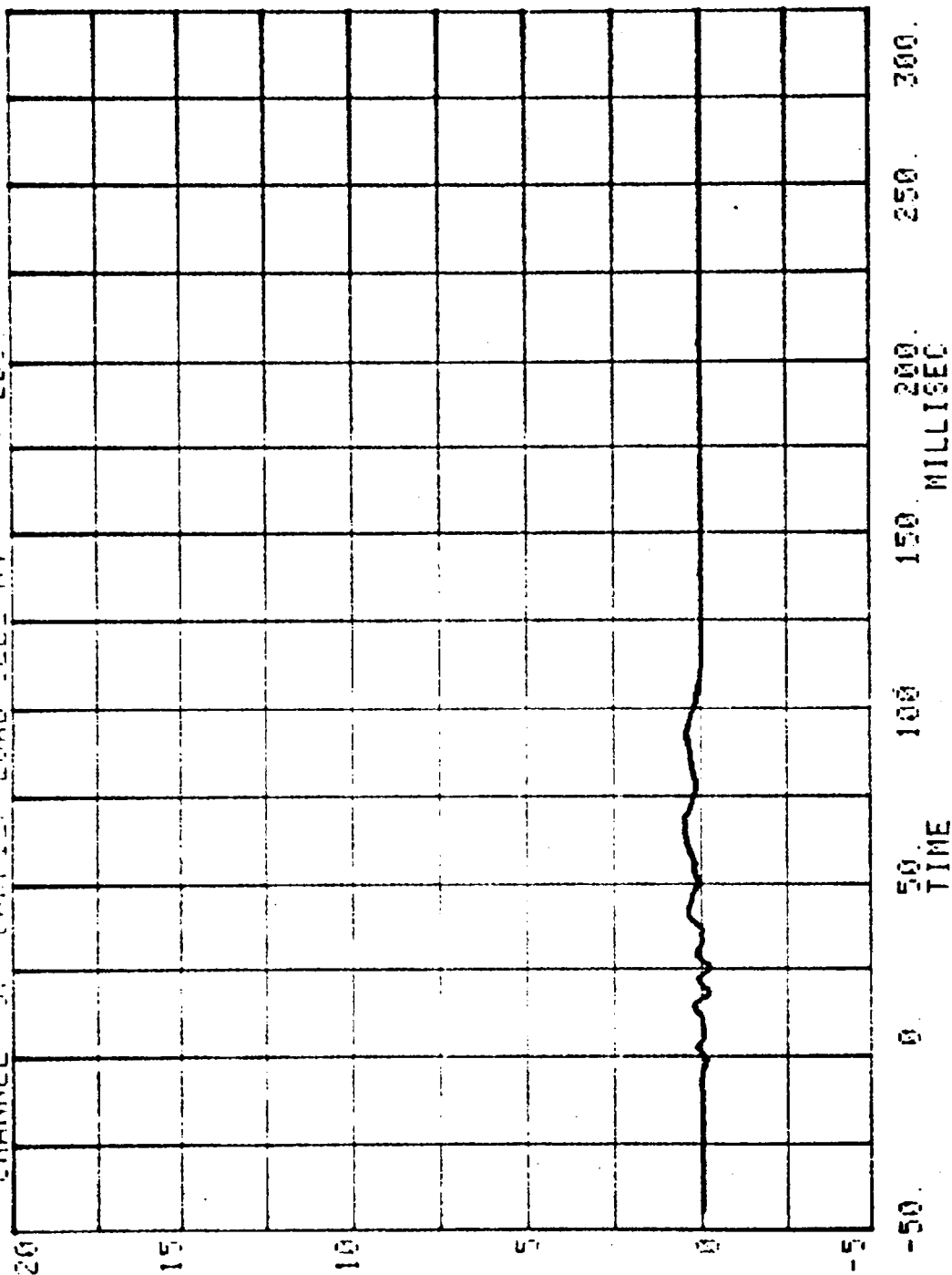
CHANNEL 35 BARRIER LOAD CELL A2
RUN= 978 SERIES= 15 K LBS.



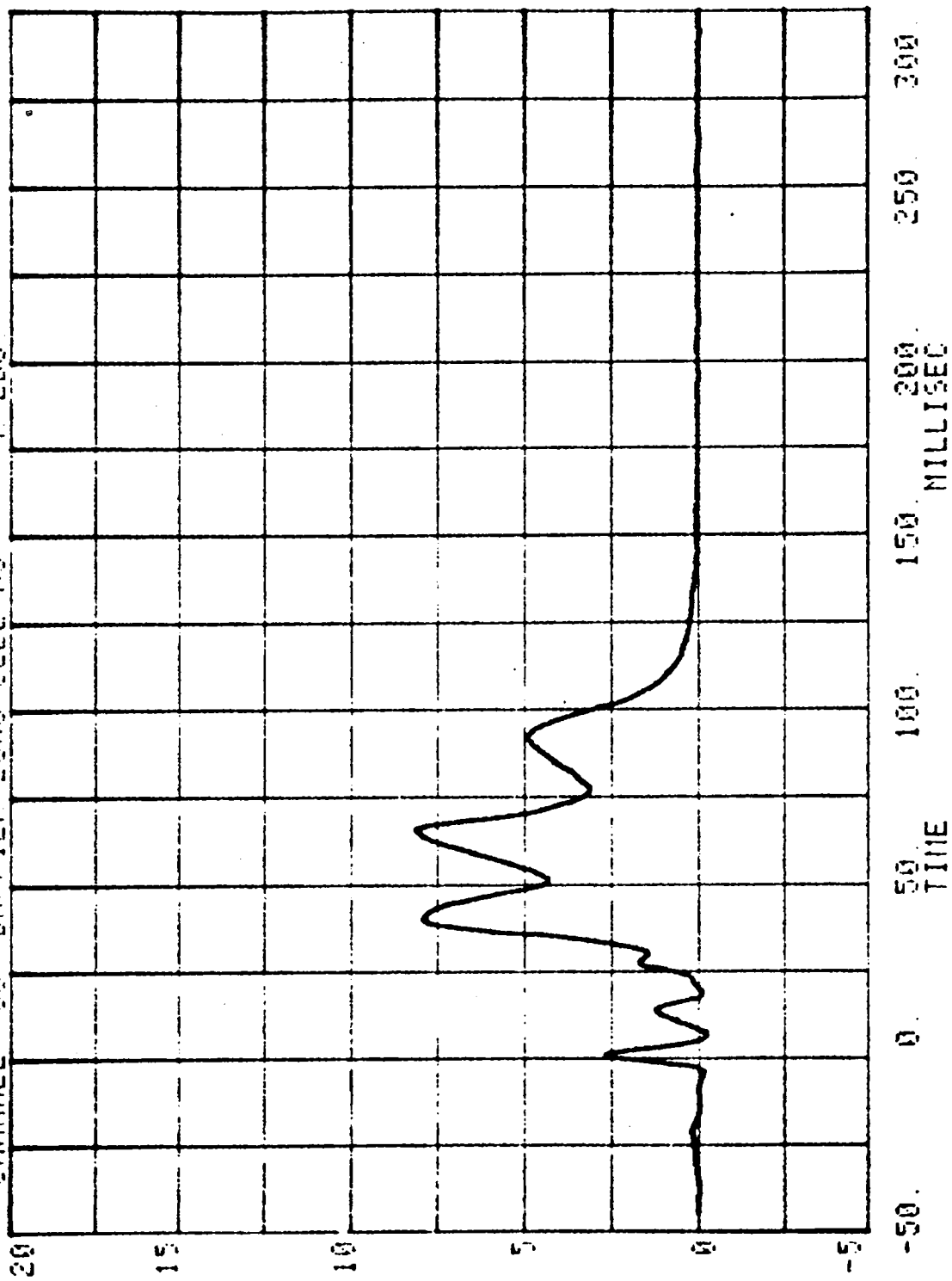
CHANNEL 36 BARRIER LOAD CELL A3 PUNCH= 278 SERIES= 15 K LBS.



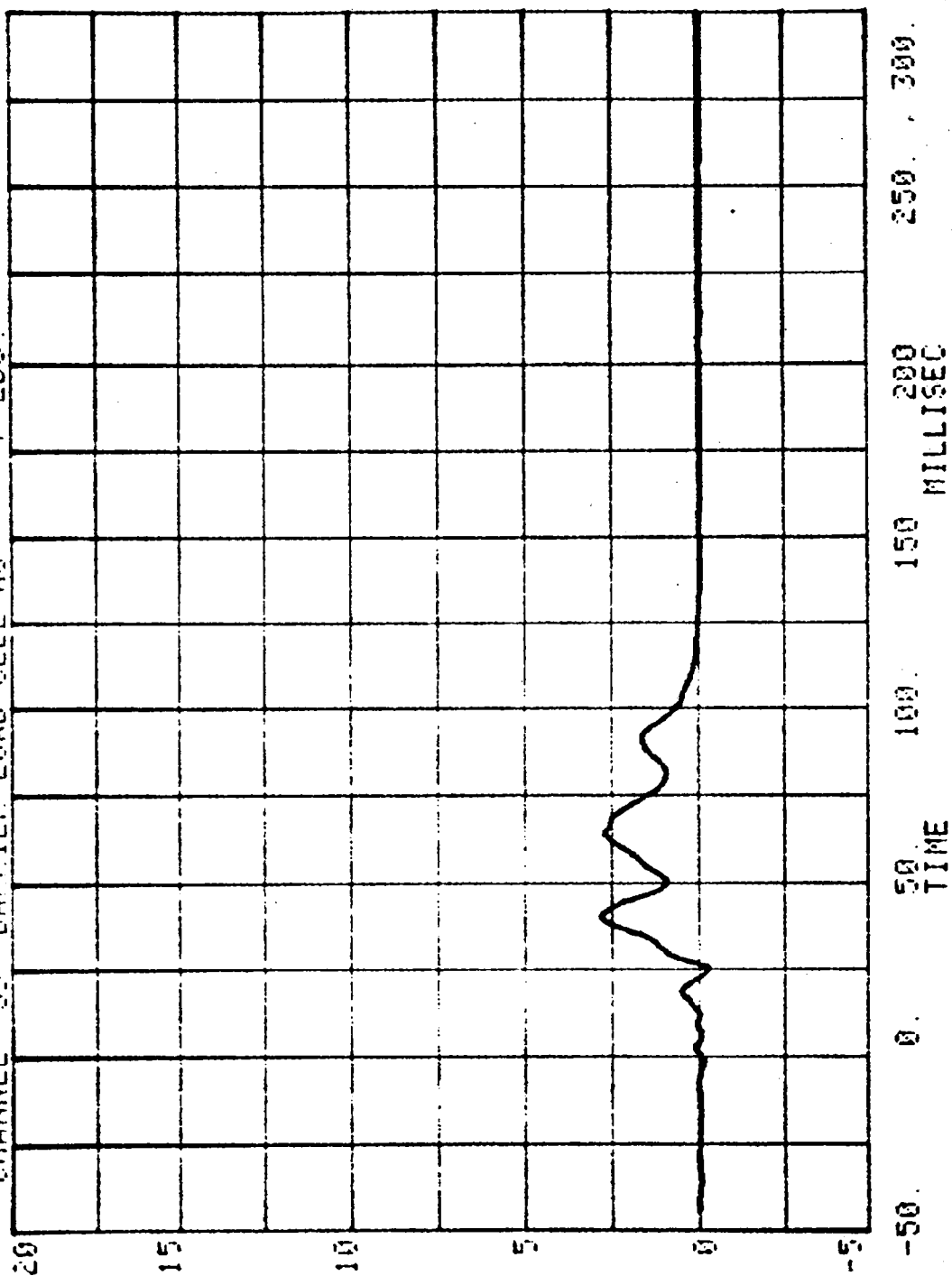
CHANNEL 37 CARRIER LOAD CELL A4 RUN= 979 SERIES= 15 LBS



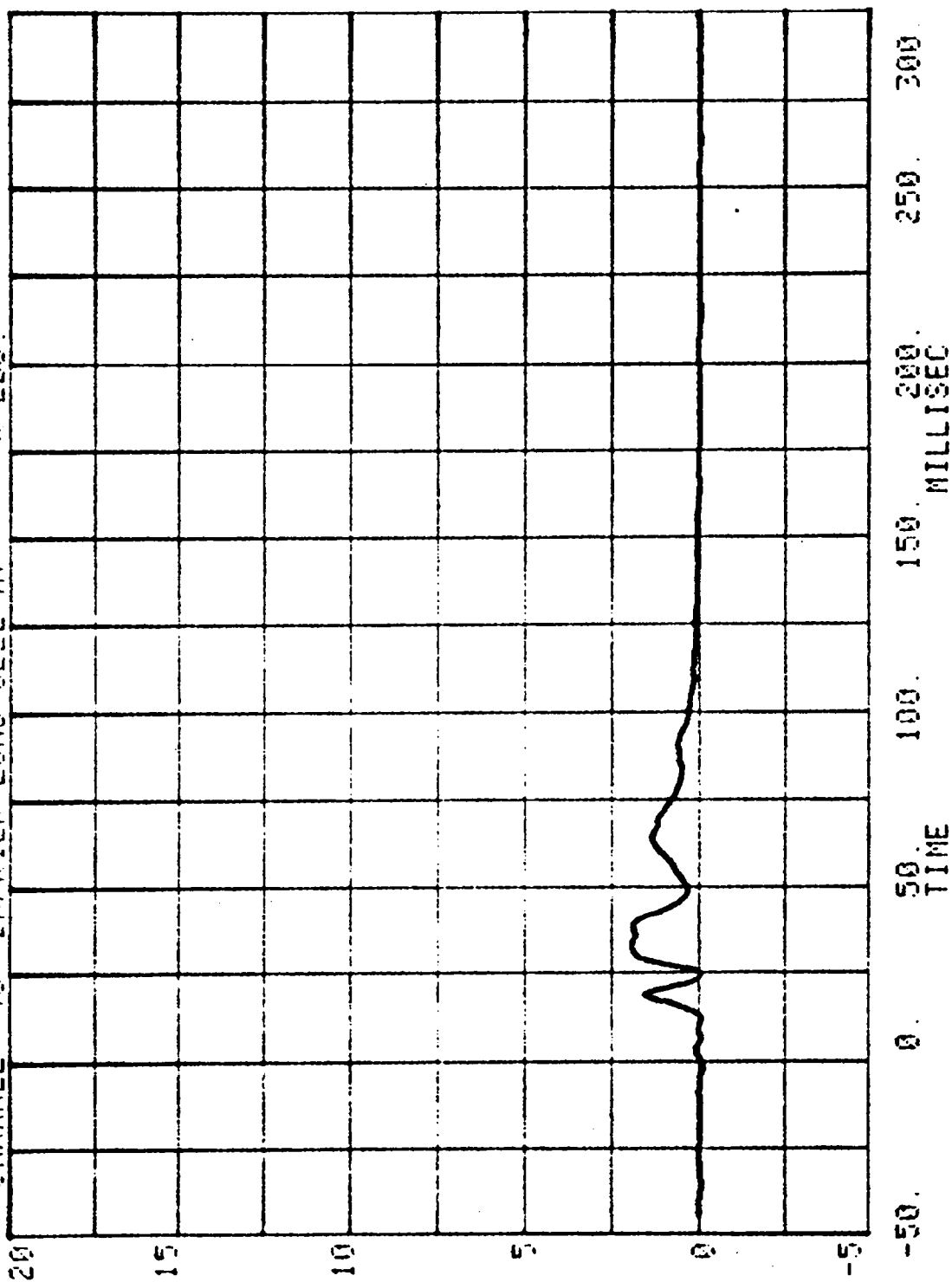
CHANNEL 38 BARRIER LOGO CELL A5 RUN= 978 SERIES= 15 1 LBS



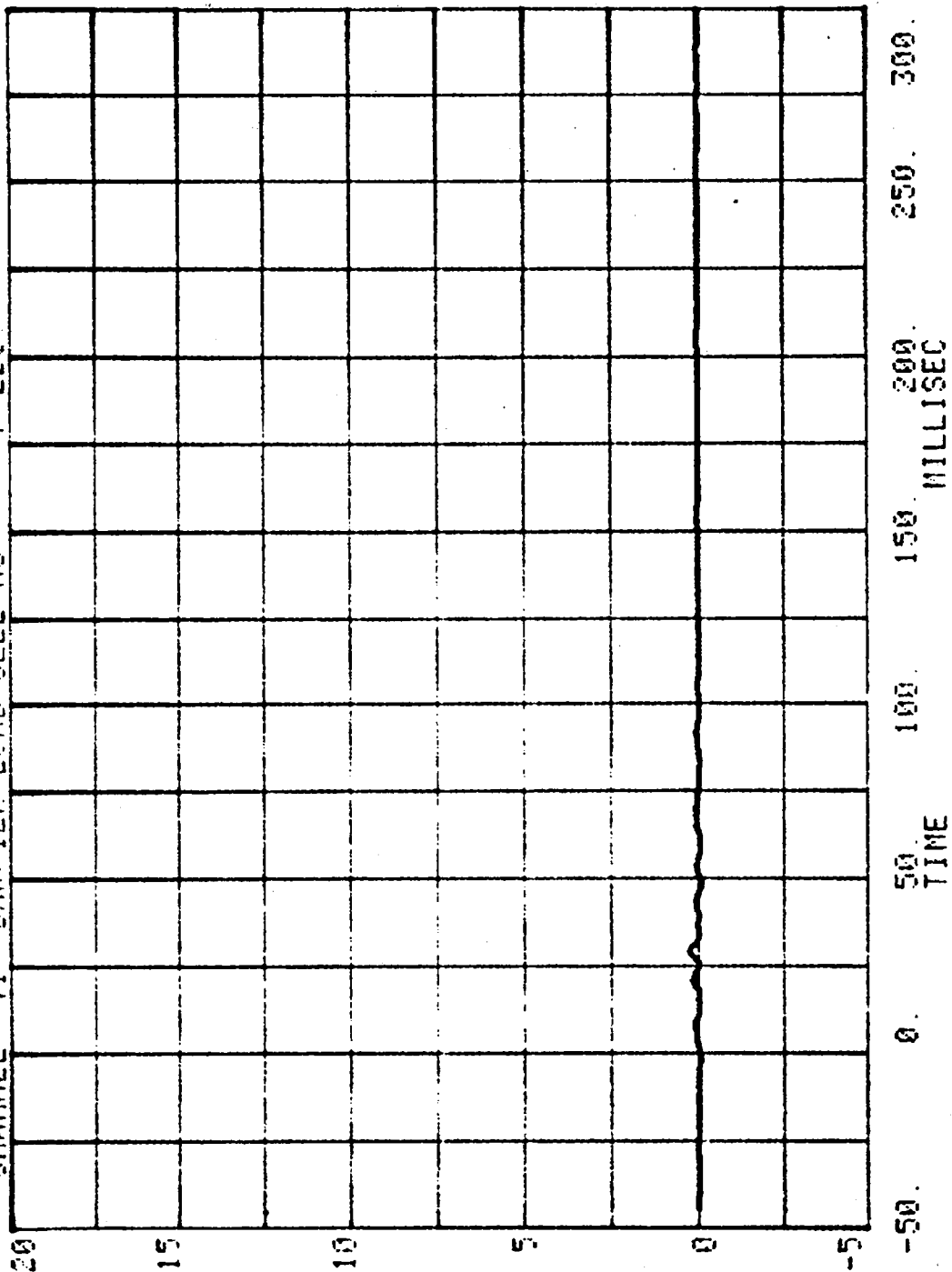
CHANNEL 39 BARRIER LOAD CELL A5 PUN= 273 SERIES= 15 P LBS.



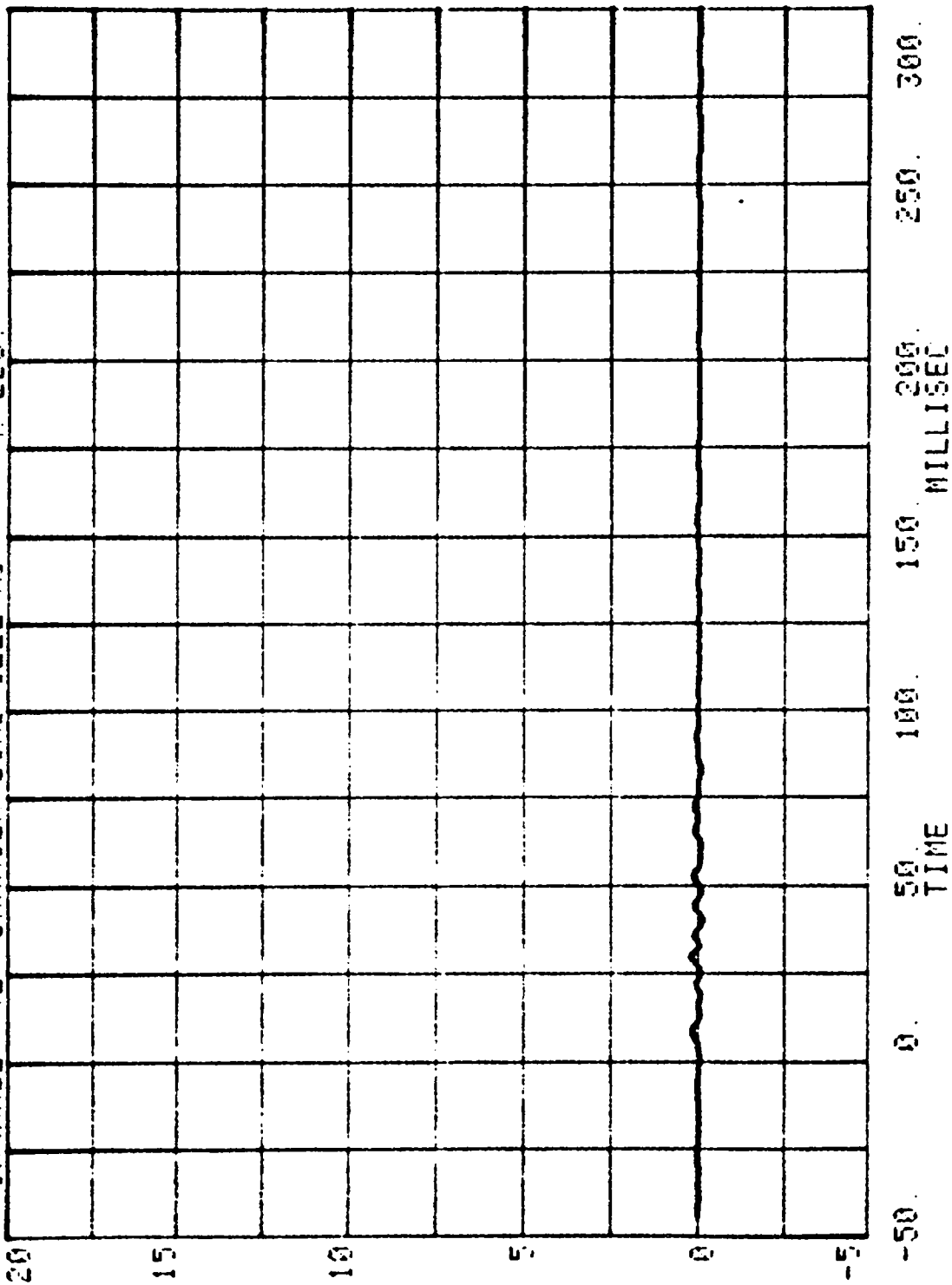
CHANNEL 40 EAPRIER LOWO CELL A7 RUN= 978 SERIES= 15 K LBS.



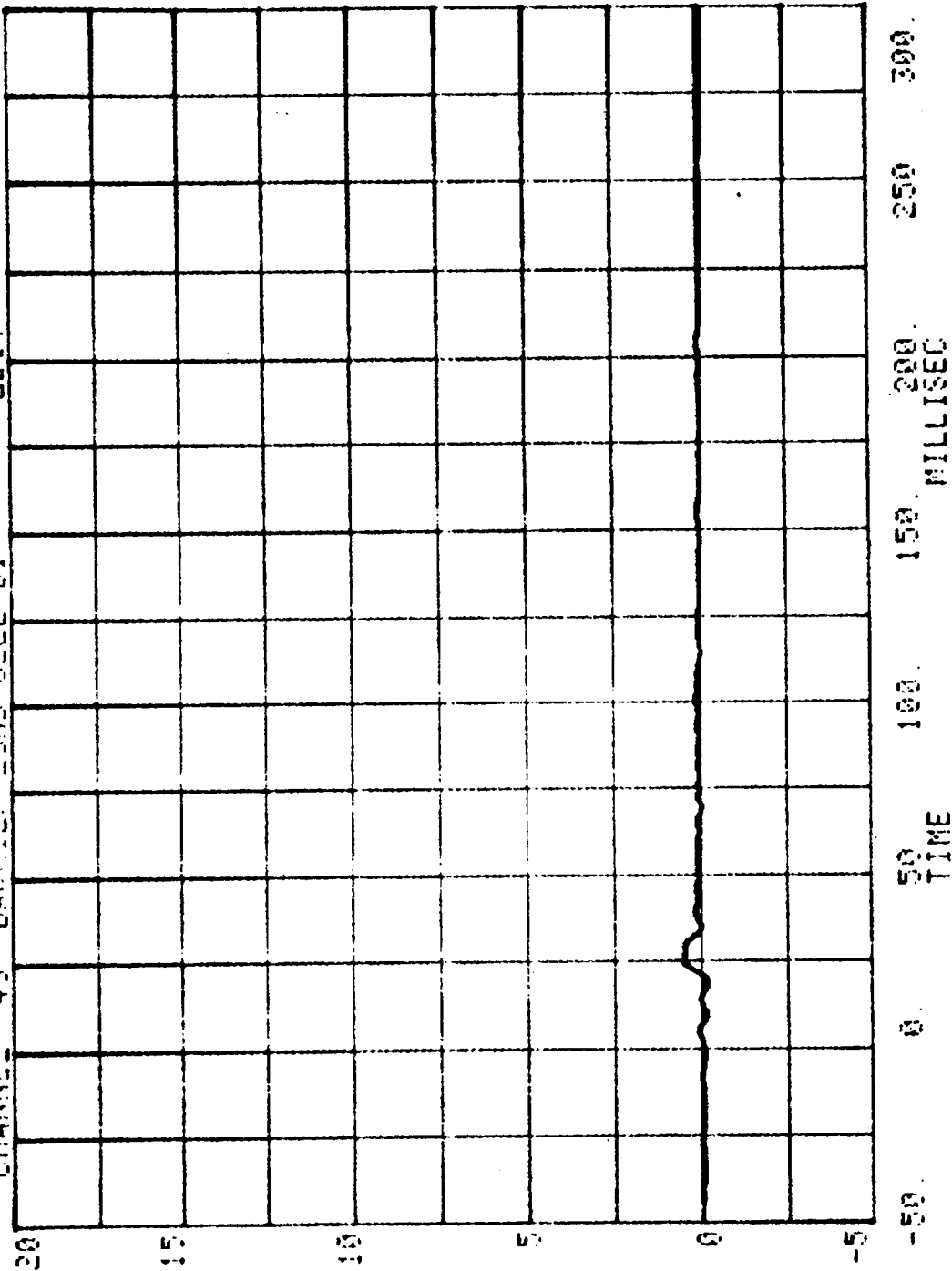
CHANNEL 41 BARRIER LOAD CELL A8 PUMP 978 SERIES= 15 LBS



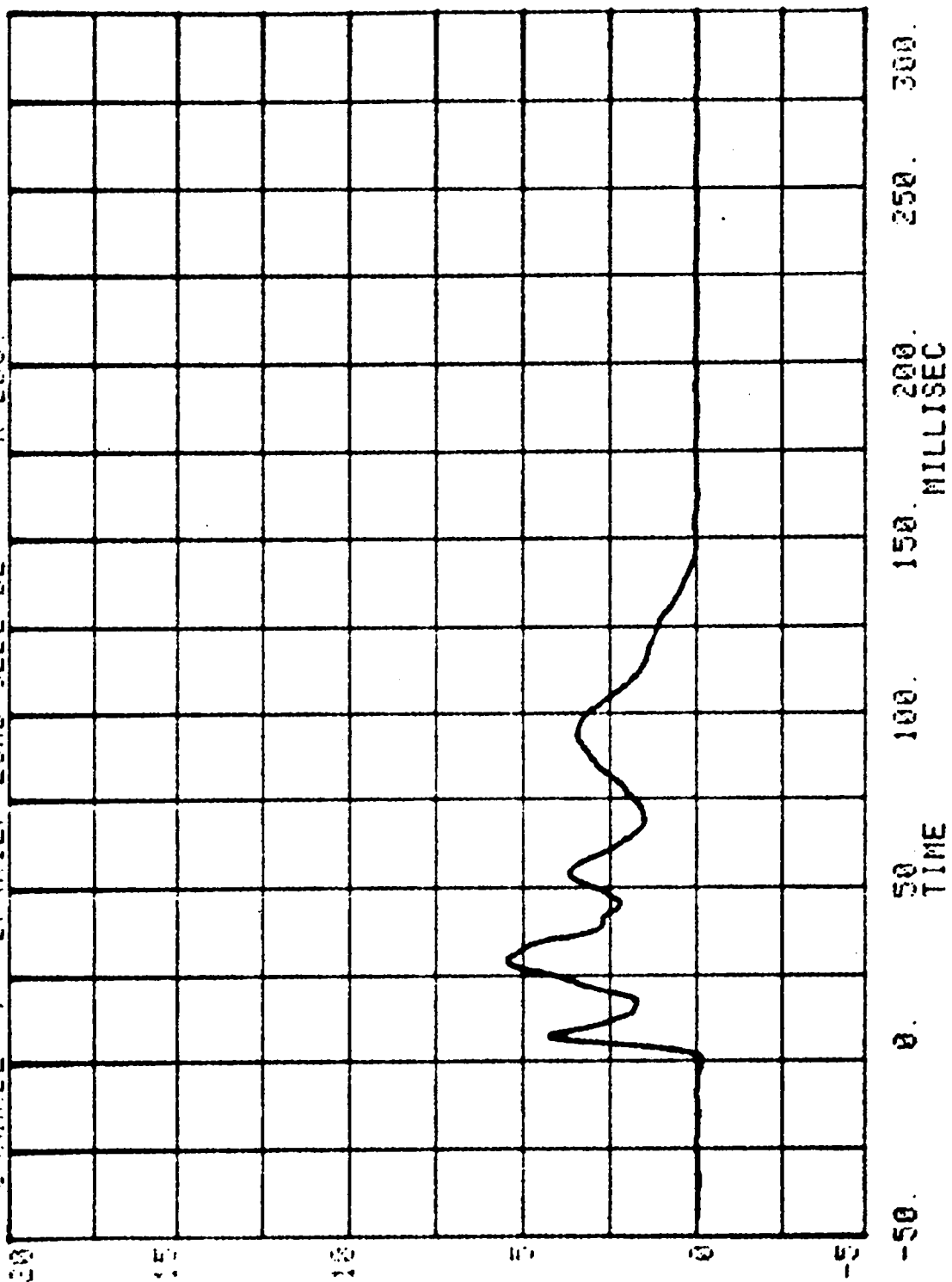
CHANNEL 42 BARRIER LOAD CELL A3 RUN= 978 SERIES= 15 K LBS.



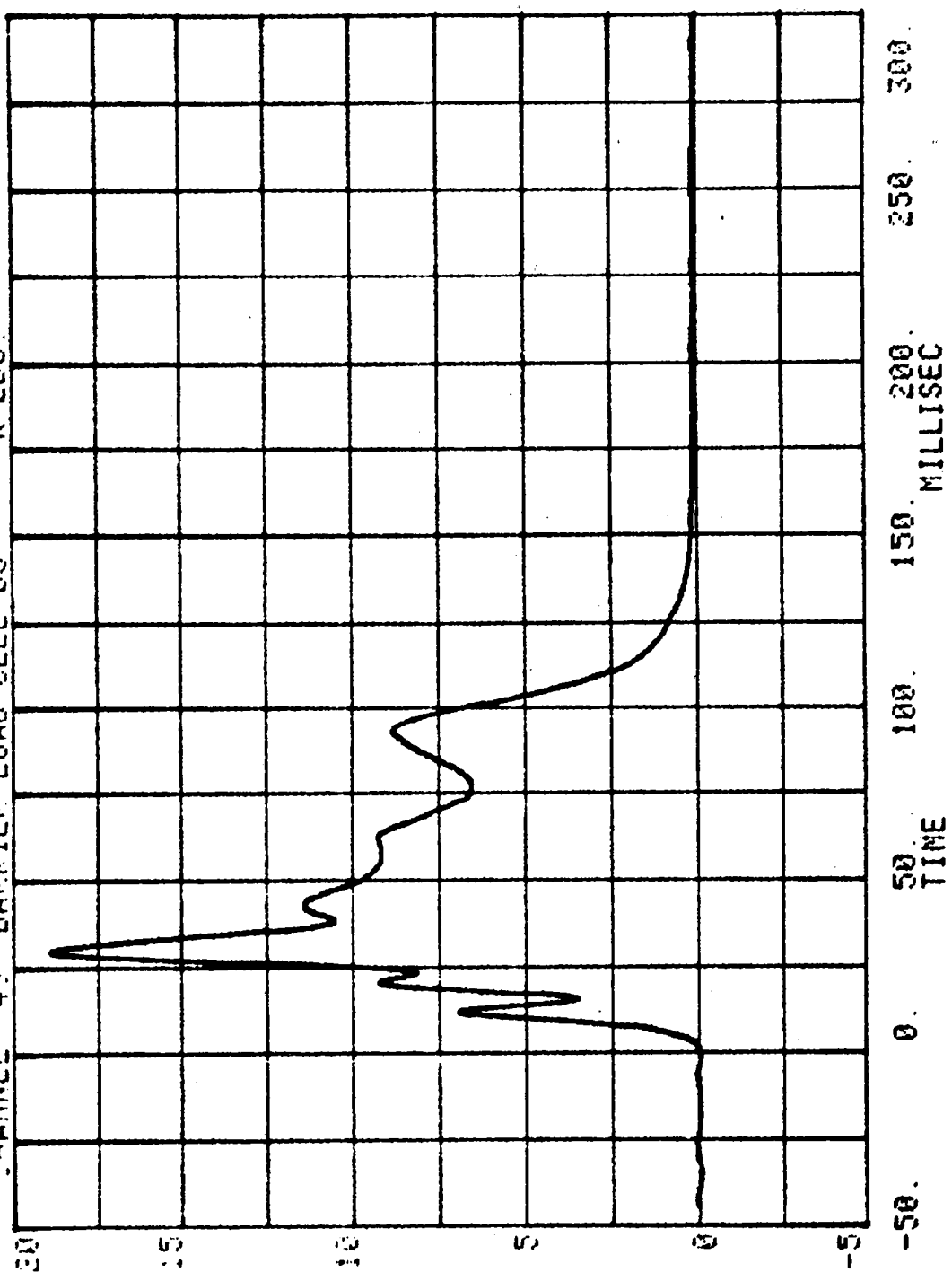
CHANNEL 43 BARRIER LOAD CELL B1
RUN= 973 SERIES= 15
K LBS.



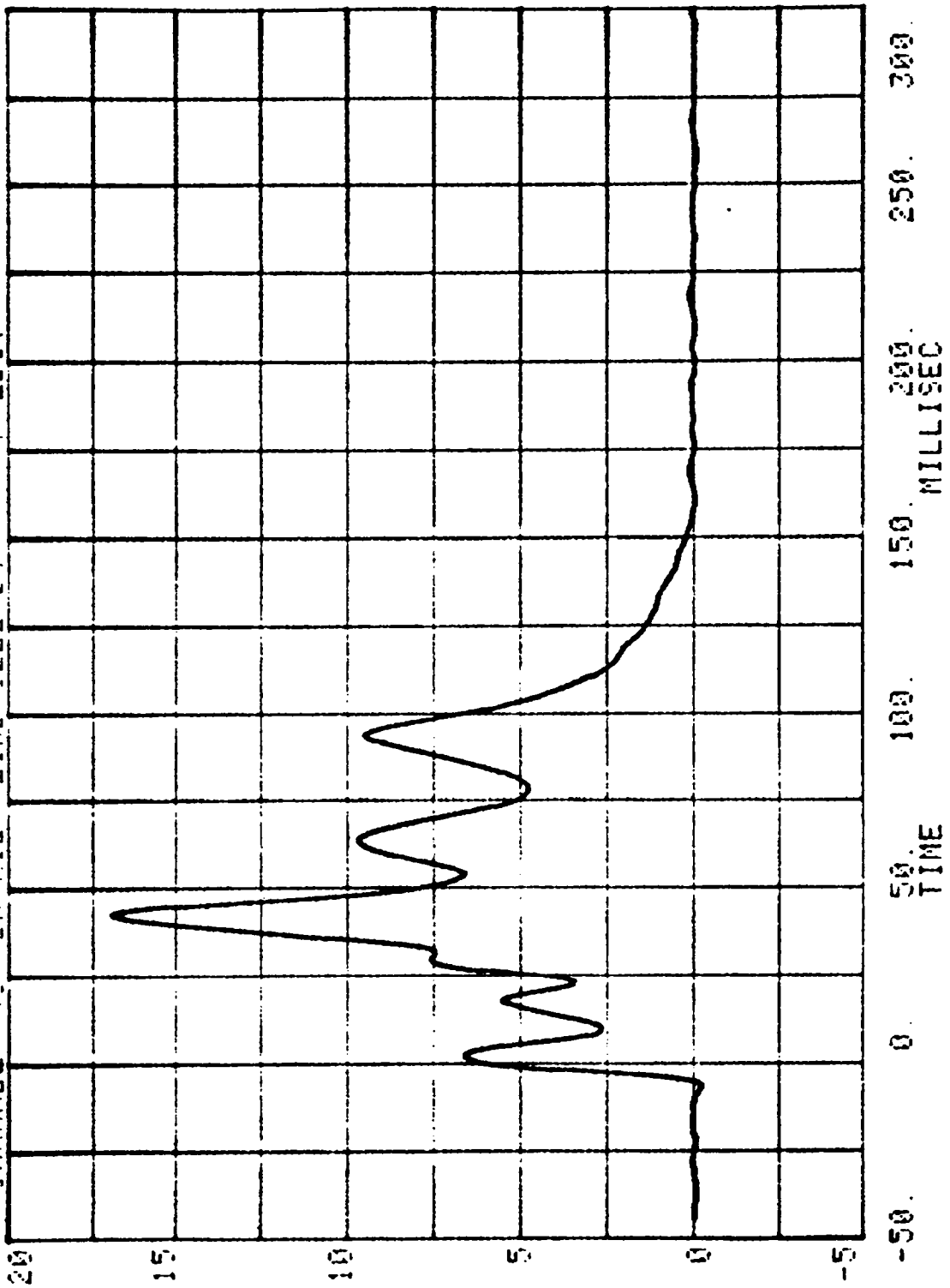
CHANNEL 44 RUN= 978 SERIES= 15 K LBS
BARRIER LOAD CELL B2



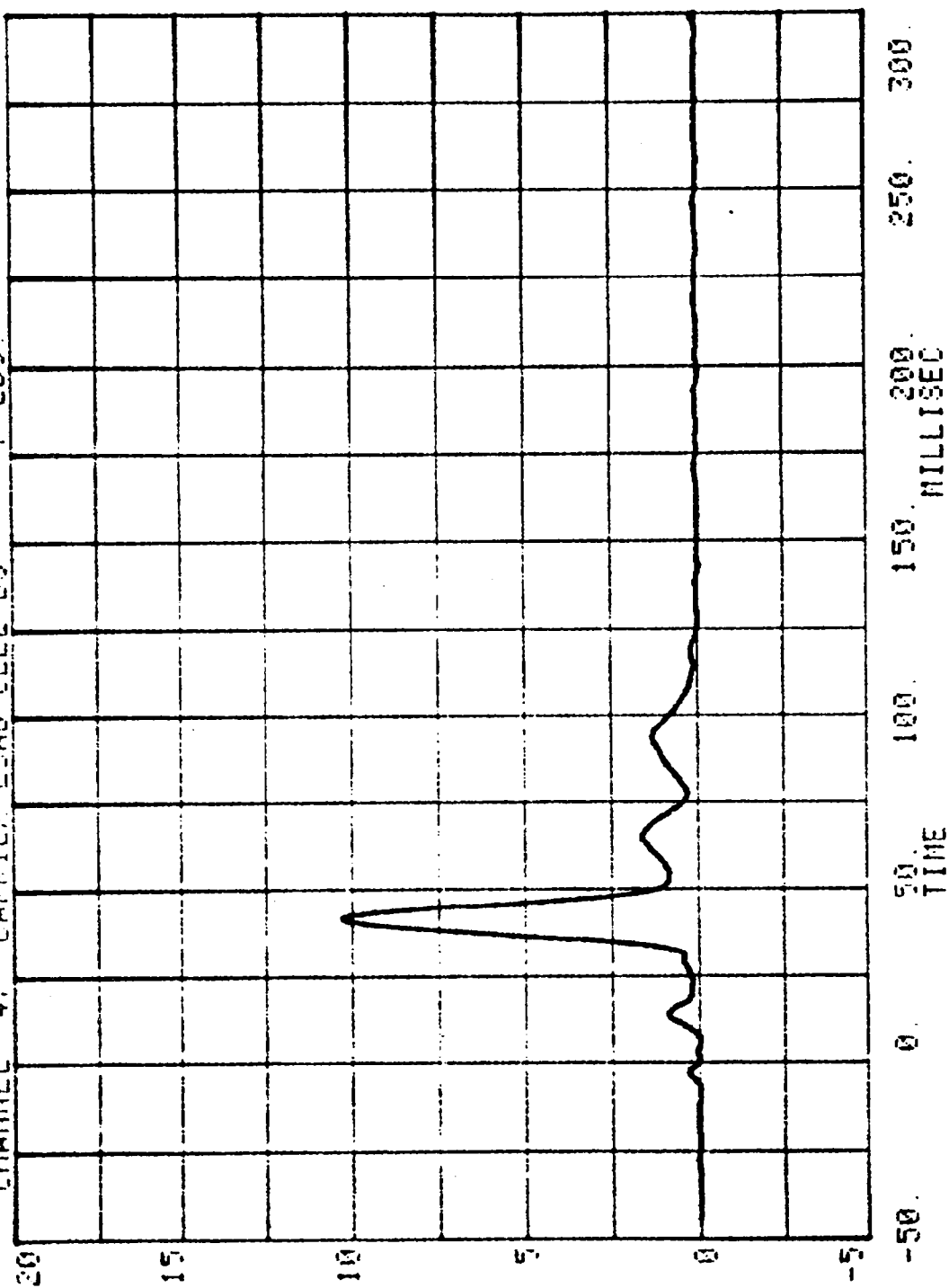
CHANNEL 45 BARRIER LOAD CELL B3
RUN= 978 SERIES= 15 K LBS.



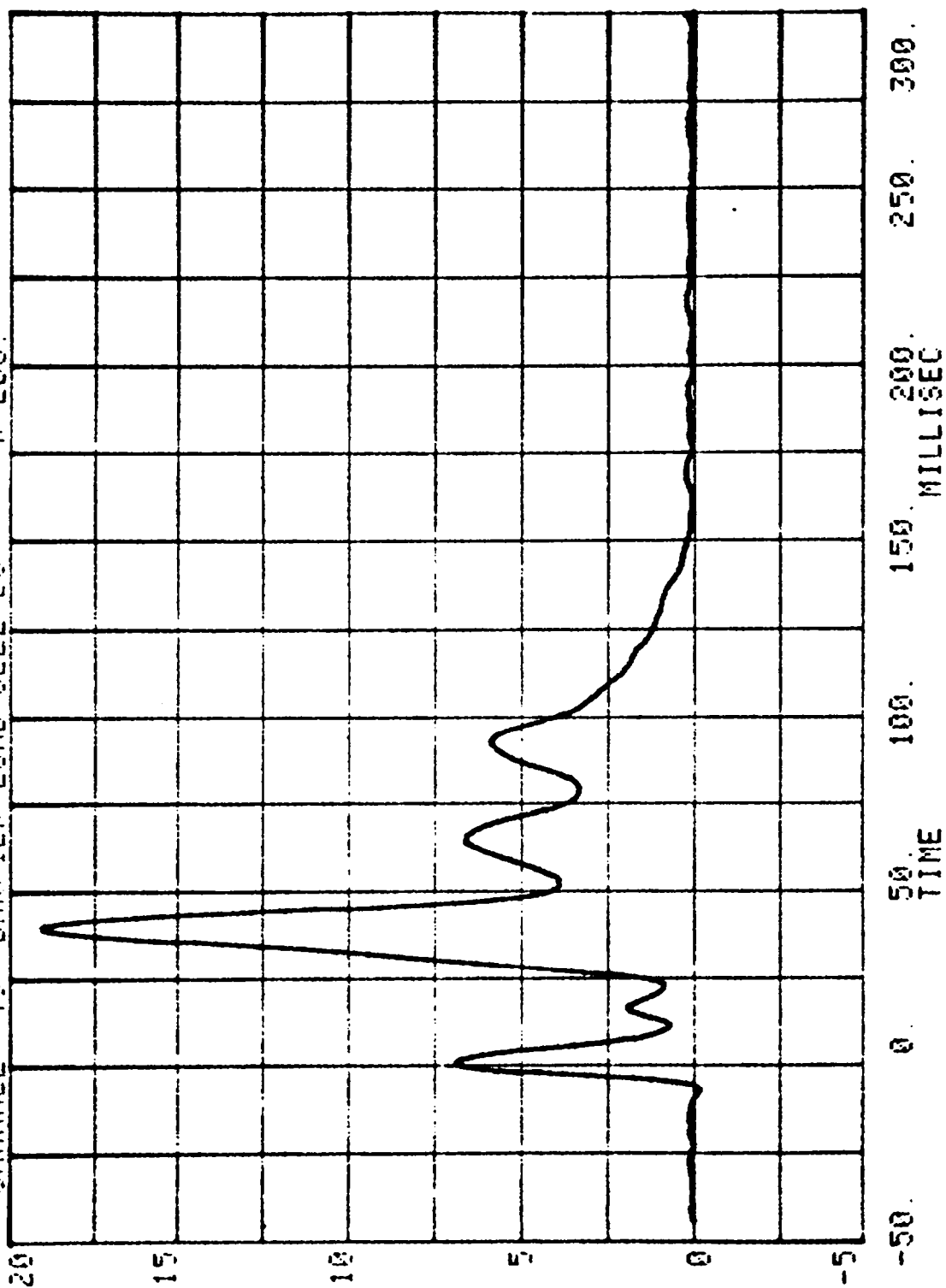
CHANNEL 46 BARFIEP LOAD CELL B4 15 K LBS.

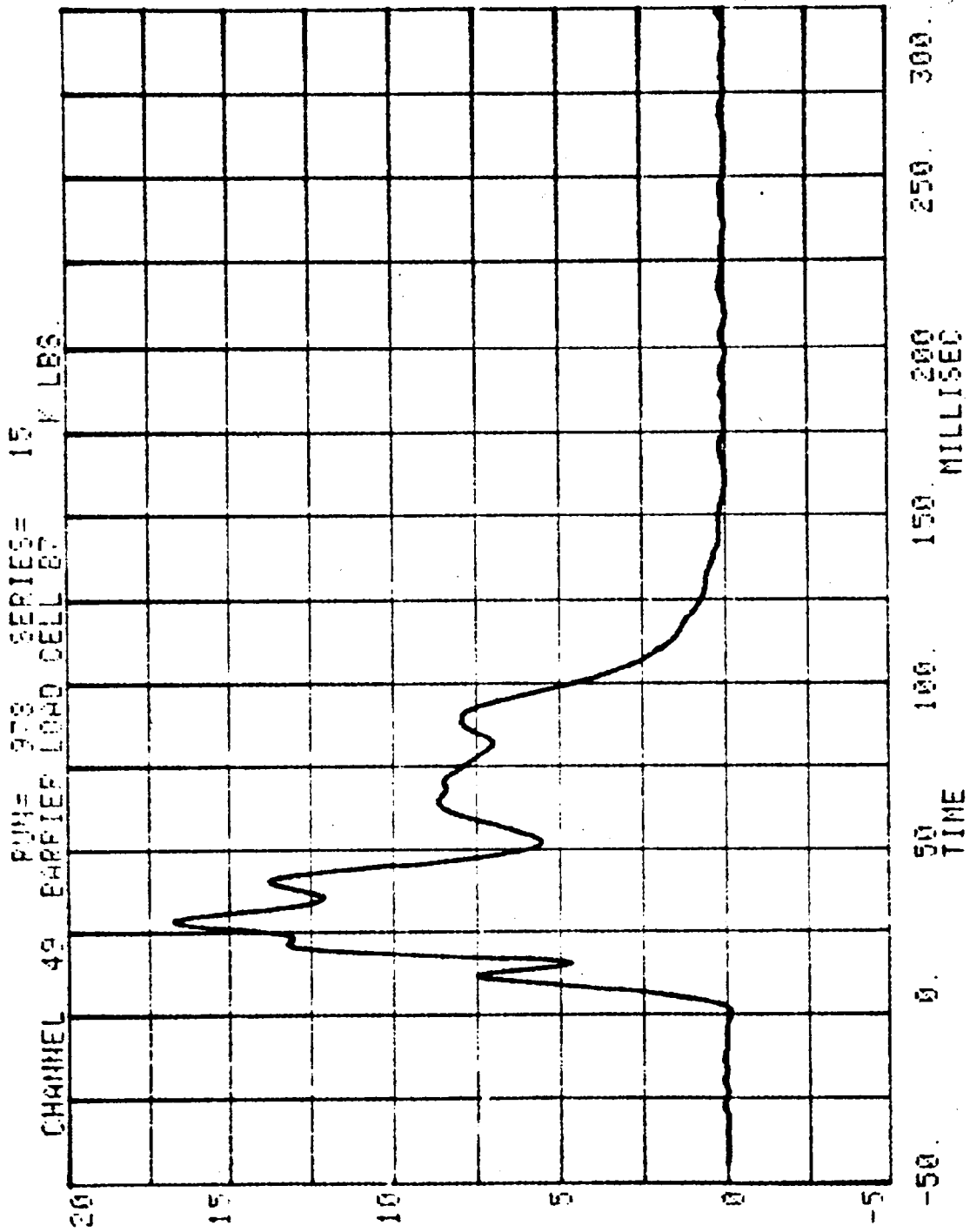


CHANNEL 47 BARRIER LOW CELL E5
FUN= 978 SERIES= 15
K LBS



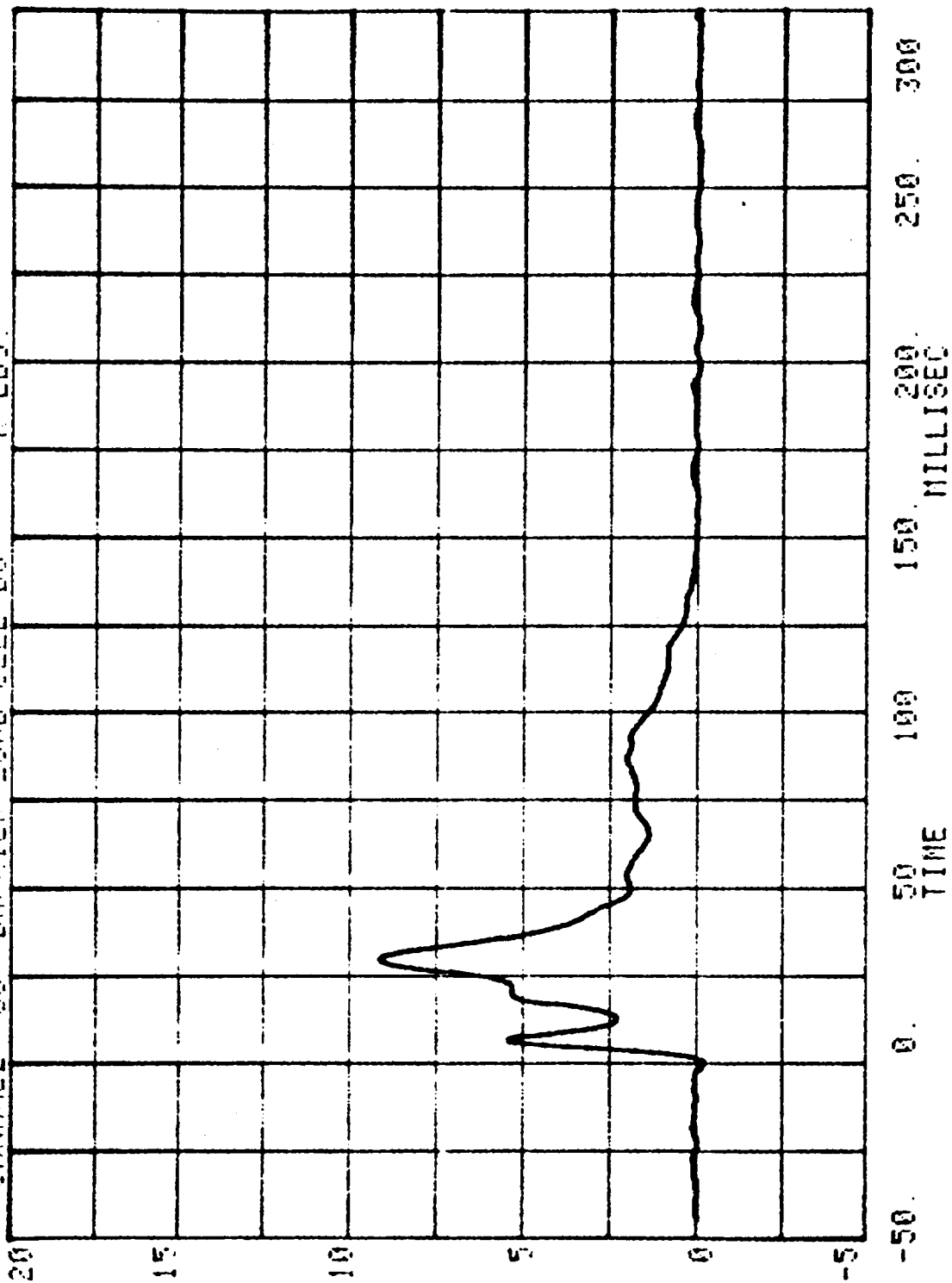
CHANNEL 49 BARRIER LOAD CELL 86
RUP= 978 SERIES= 15 K LBS.



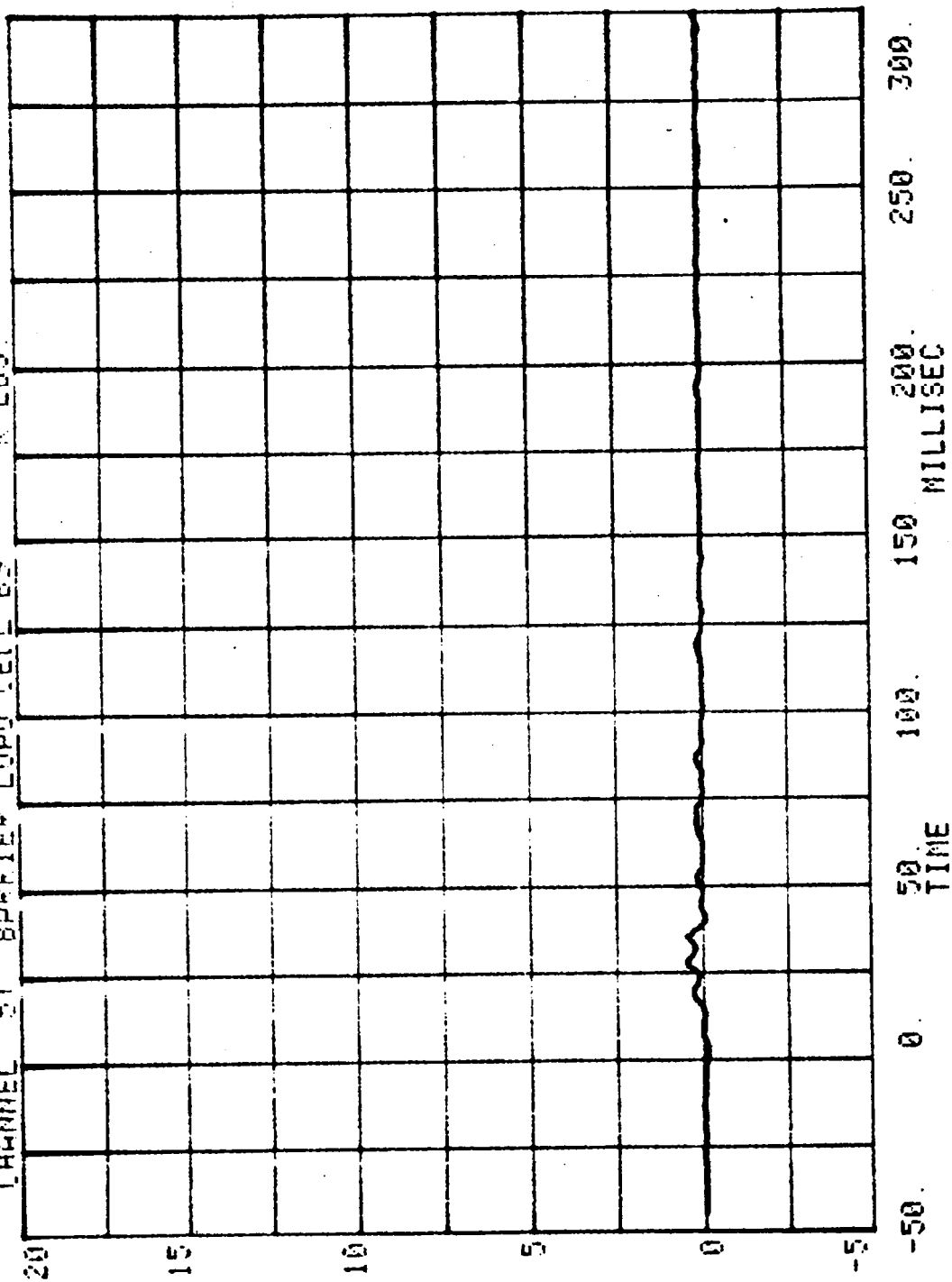


CHANNEL 50 BARREL LOAD CELL B3 K LBS.

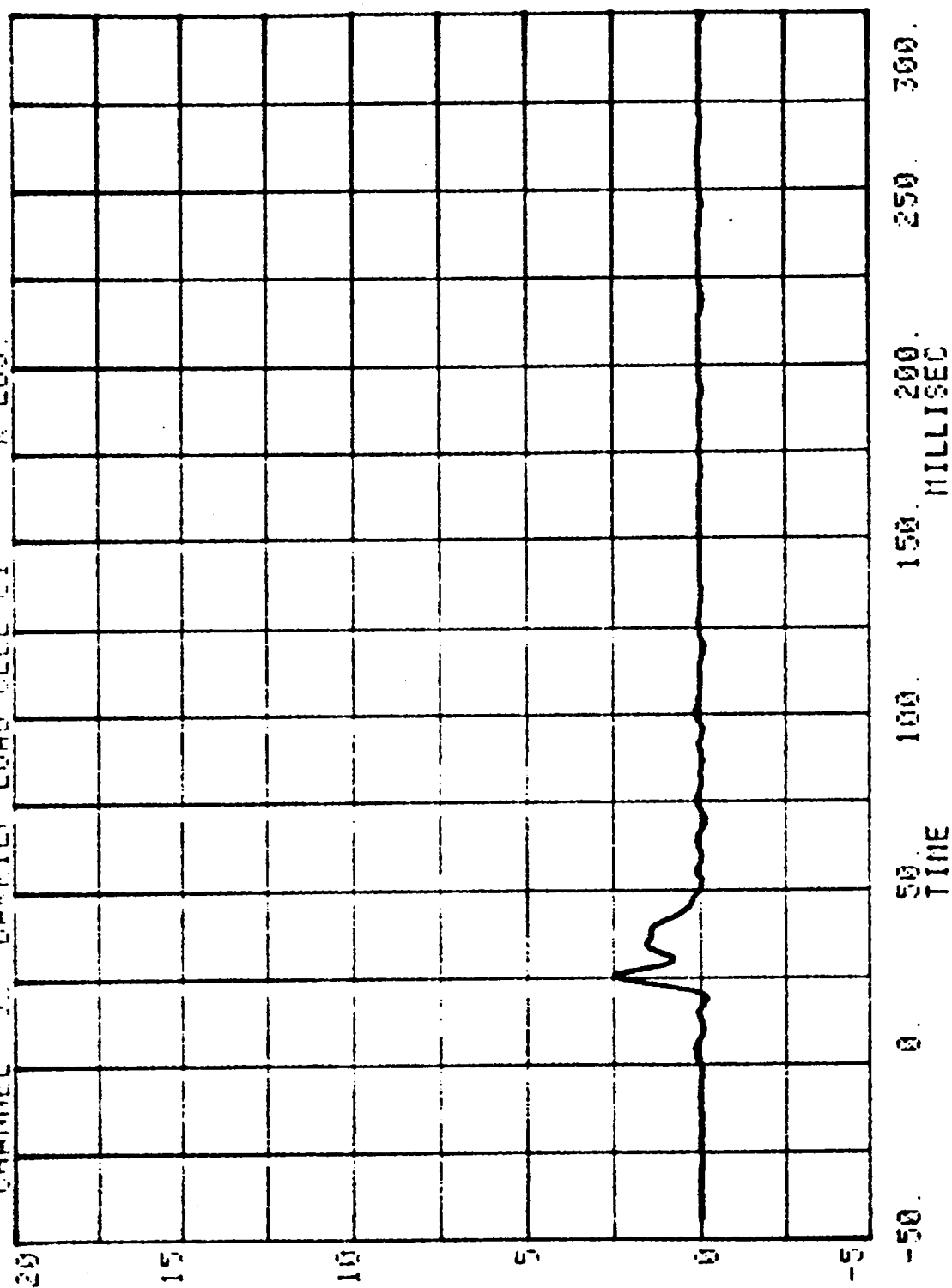
RUN= 973 SERIES= 15



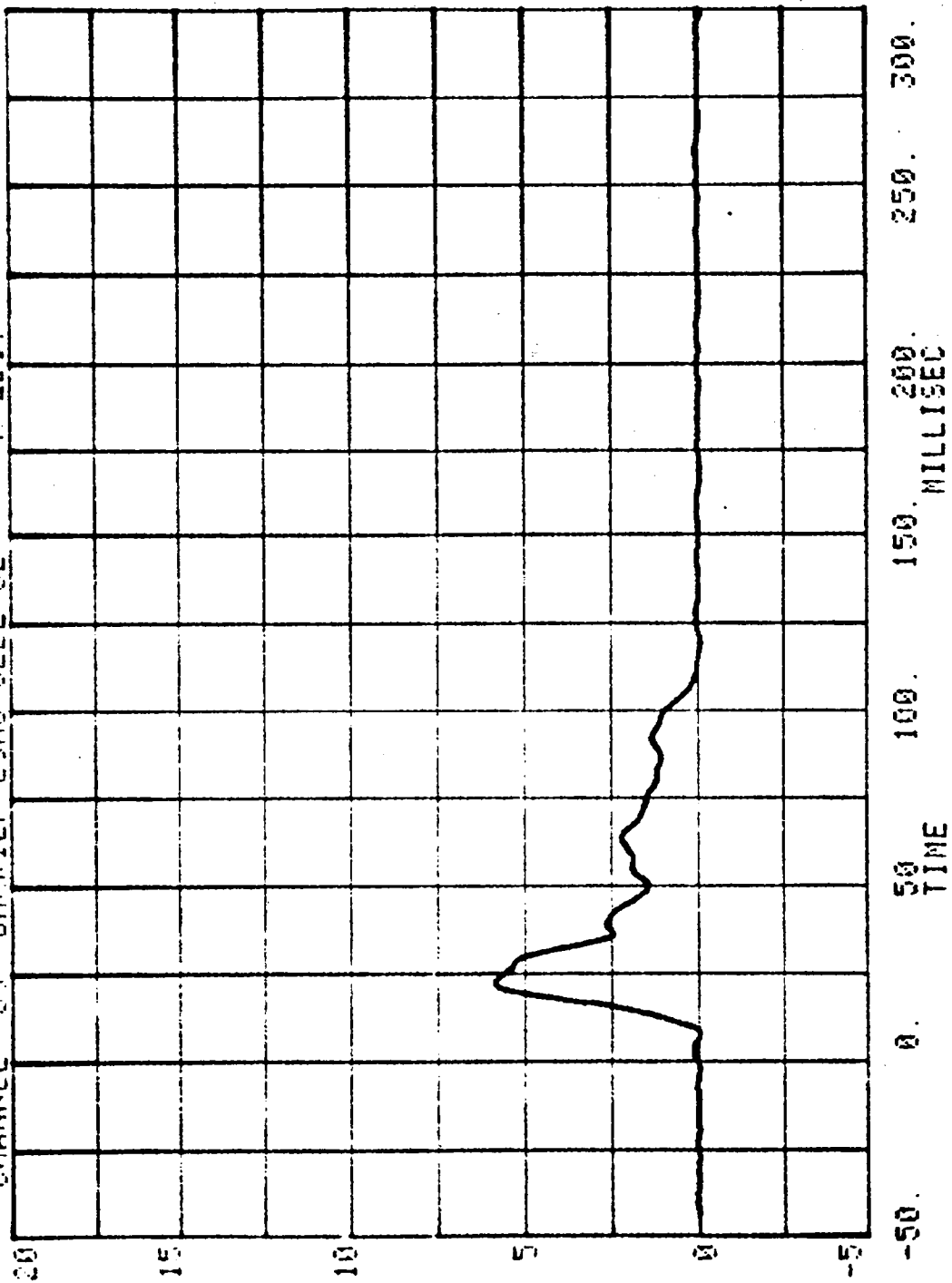
CHANNEL 51 BARRIER LOAD CELL B9
RUN= 978 SERIES= 15 K LBS.



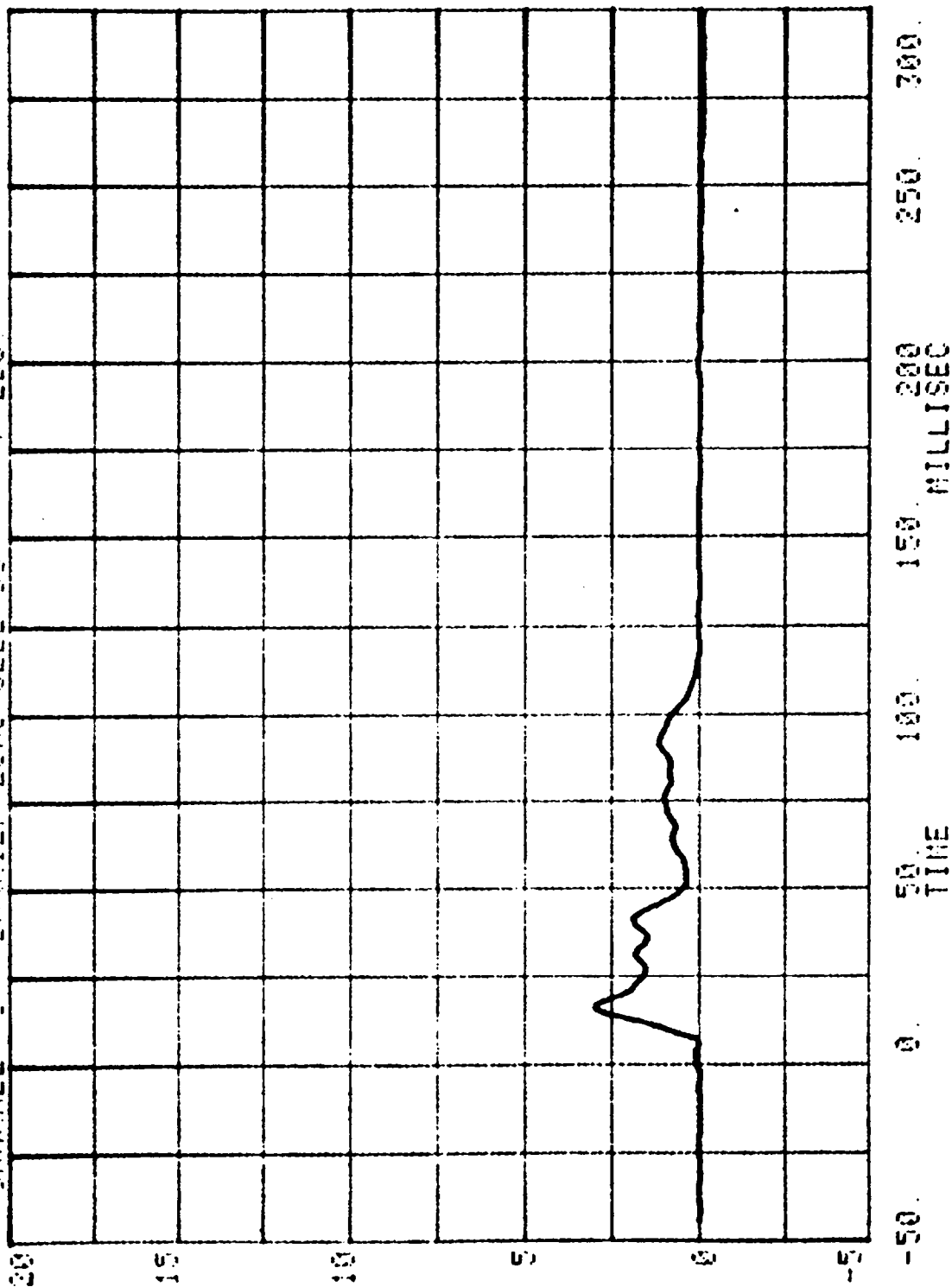
CHANNEL 53 BARRIER LOAD CELL 15 K LBS.



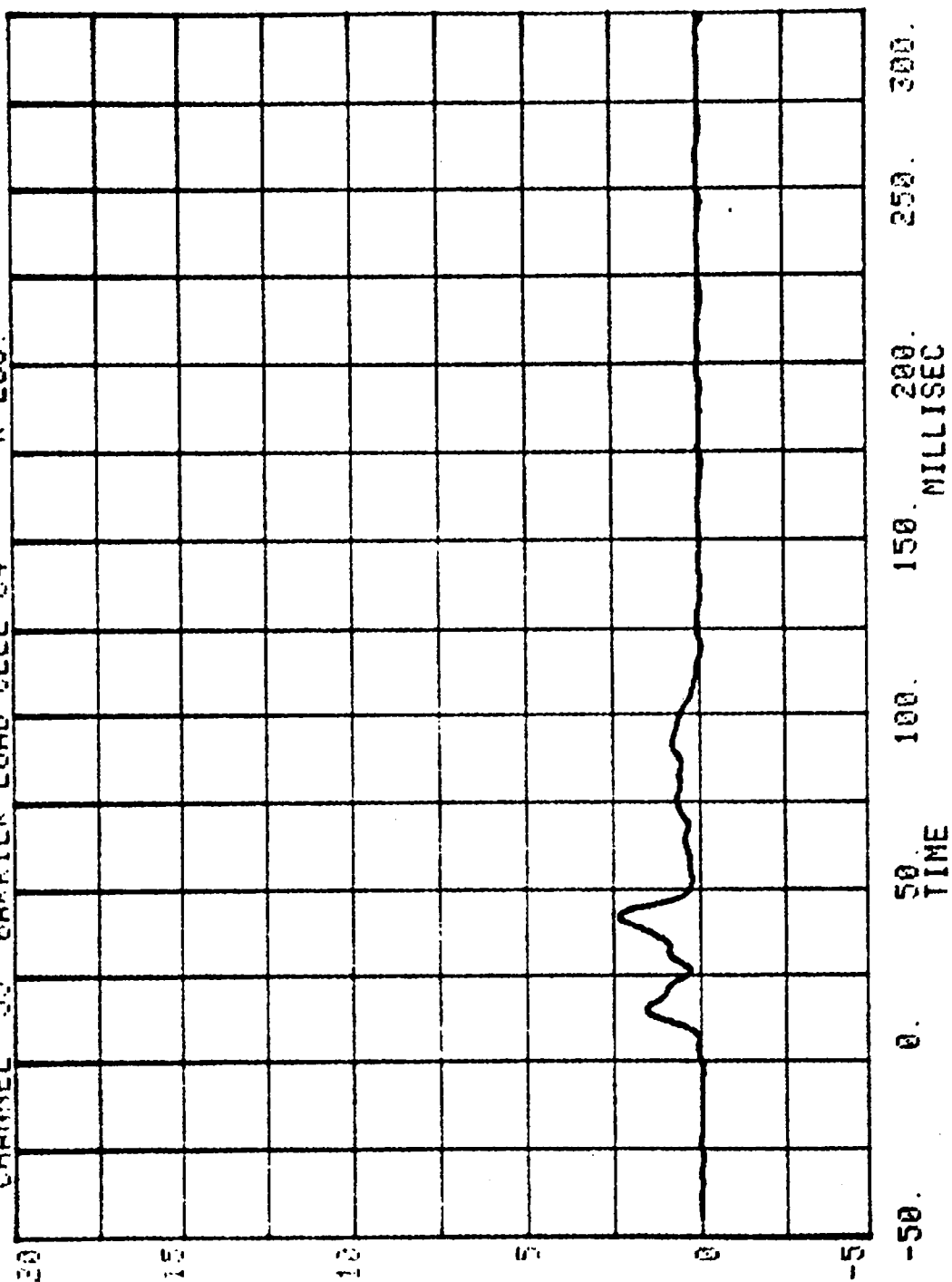
CHANNEL 53 BARRIER LOAD CELL 02 RUN= 978 SERIES= 15 K LBS.



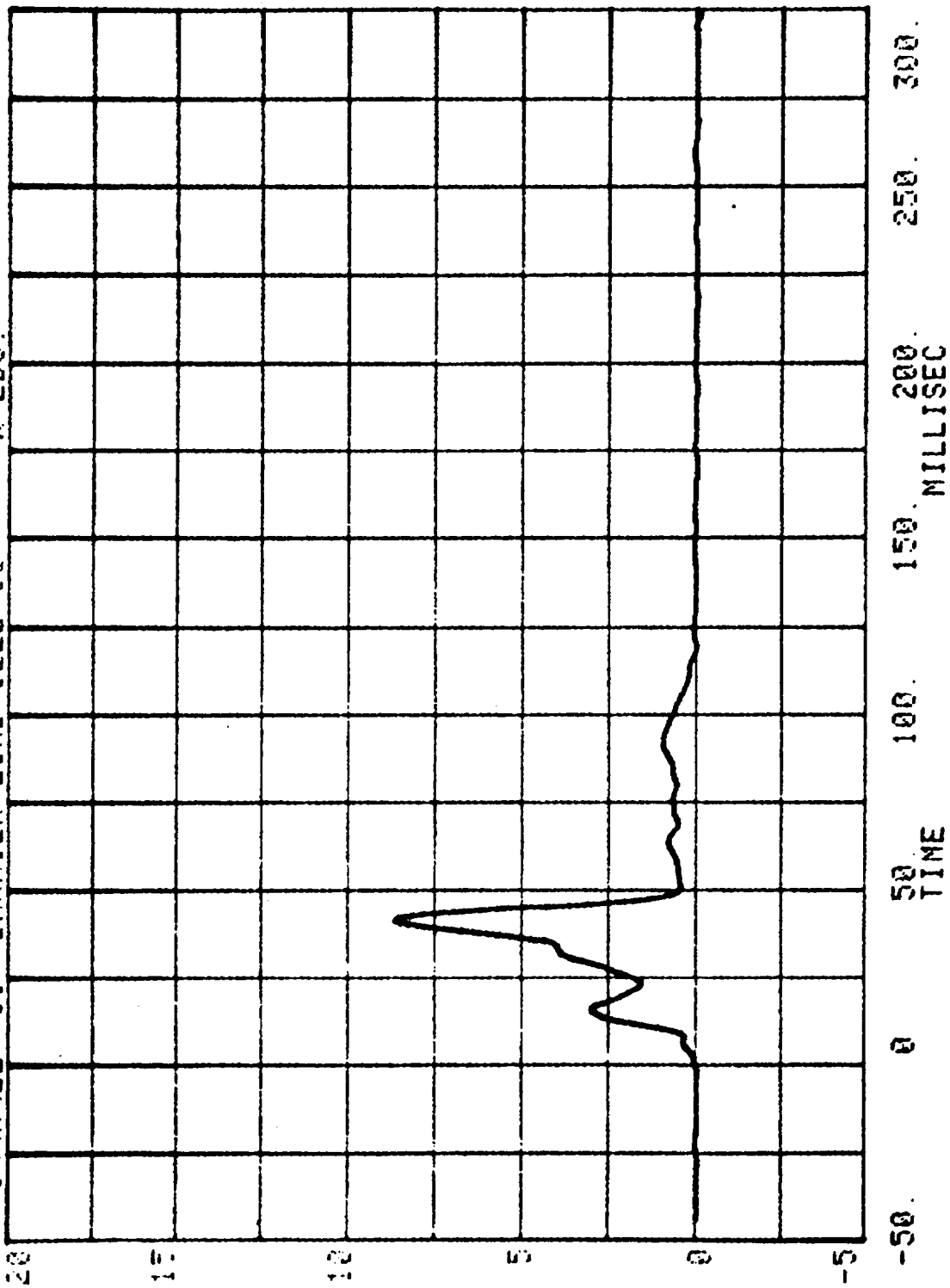
CHANNEL 54 BARRIER LOAD CELL 03
RUN= 978 SERIES= 15
15 LBS



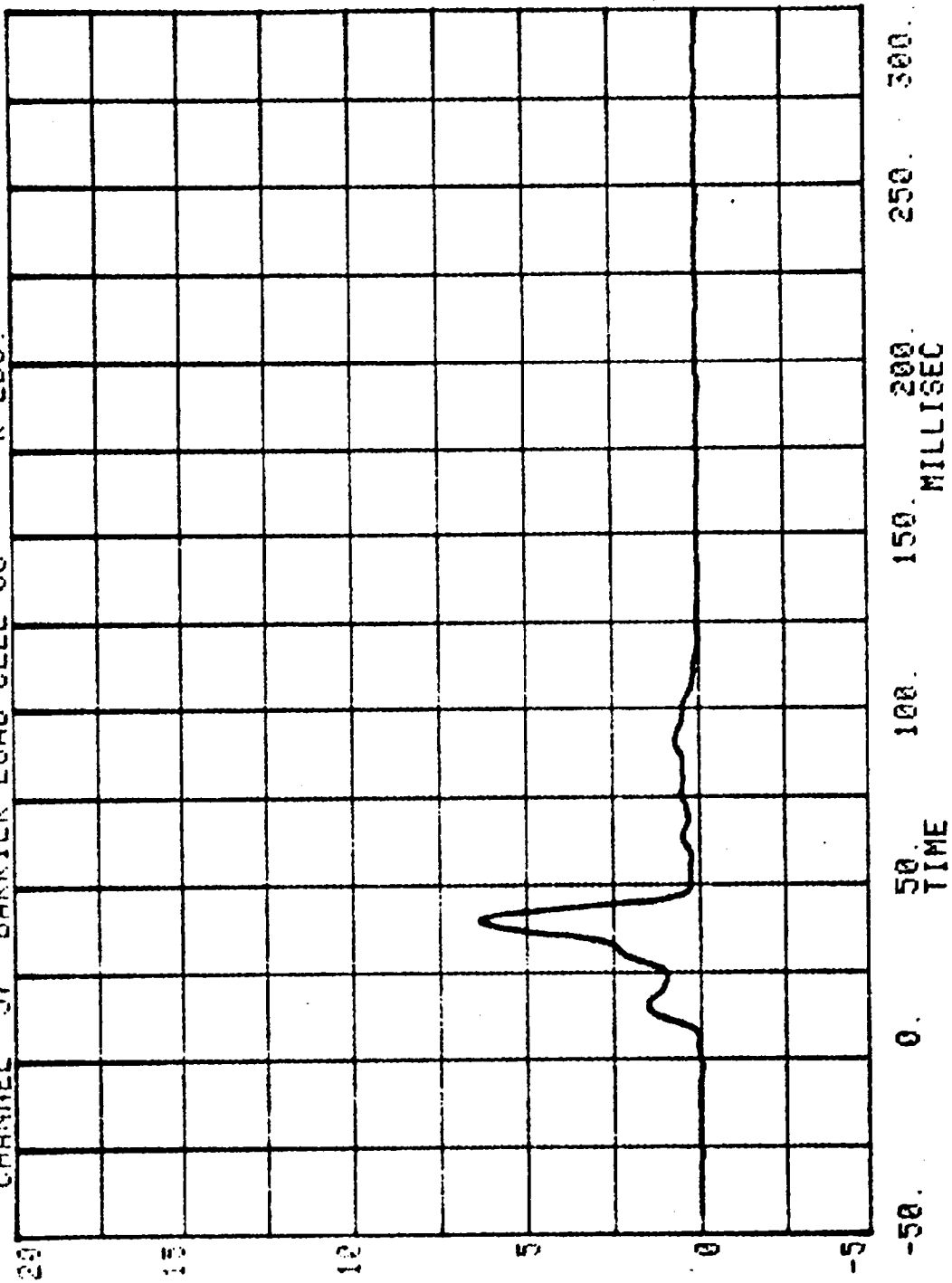
CHANNEL 55 BARRIER LOAD CELL C4 RUN= 978 SERIES= 15 K LBS.



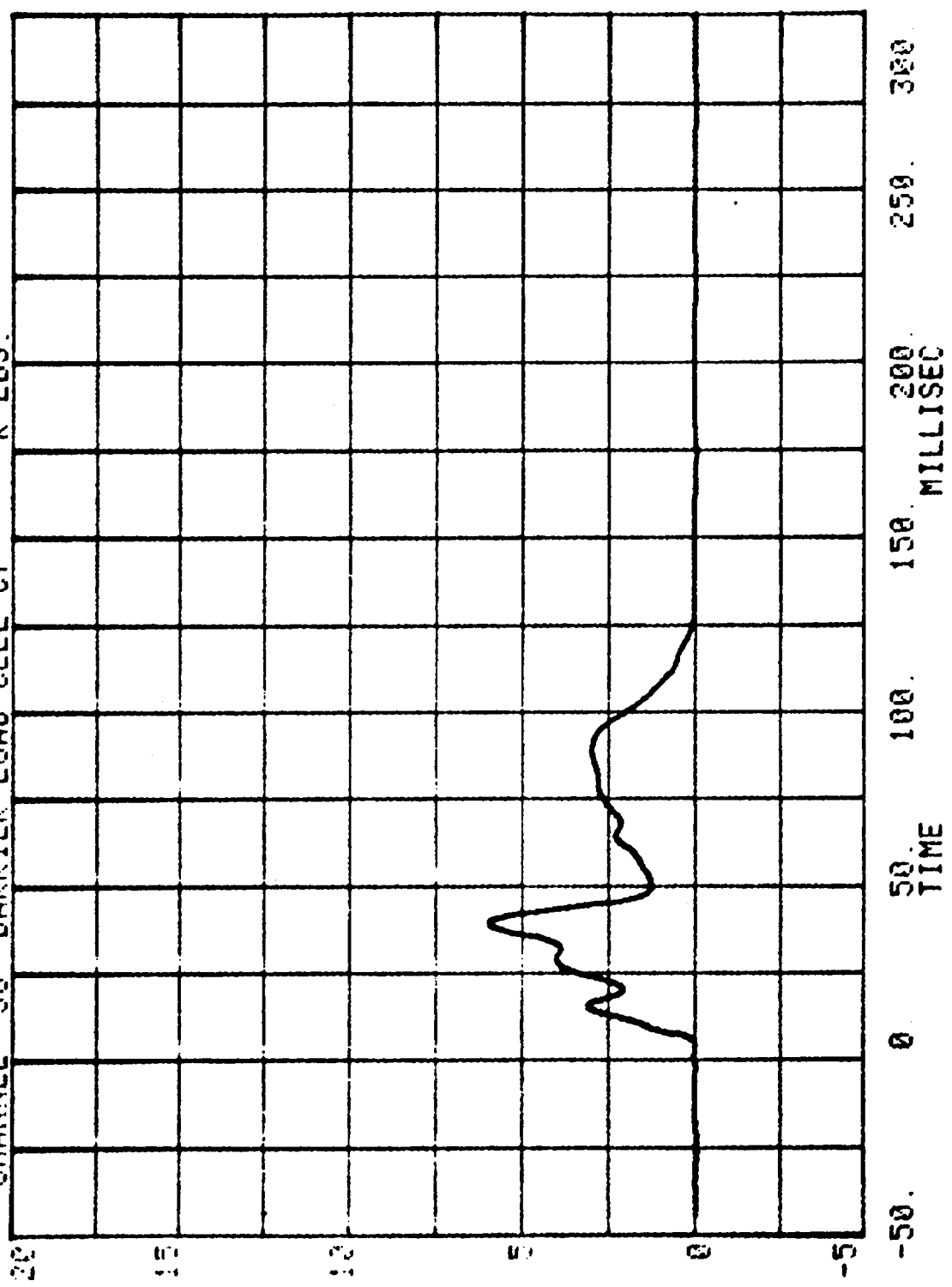
CHANNEL 56 BARRIER LOAD CELL C5
RUN= 978 SERIES= 15 K LBS.



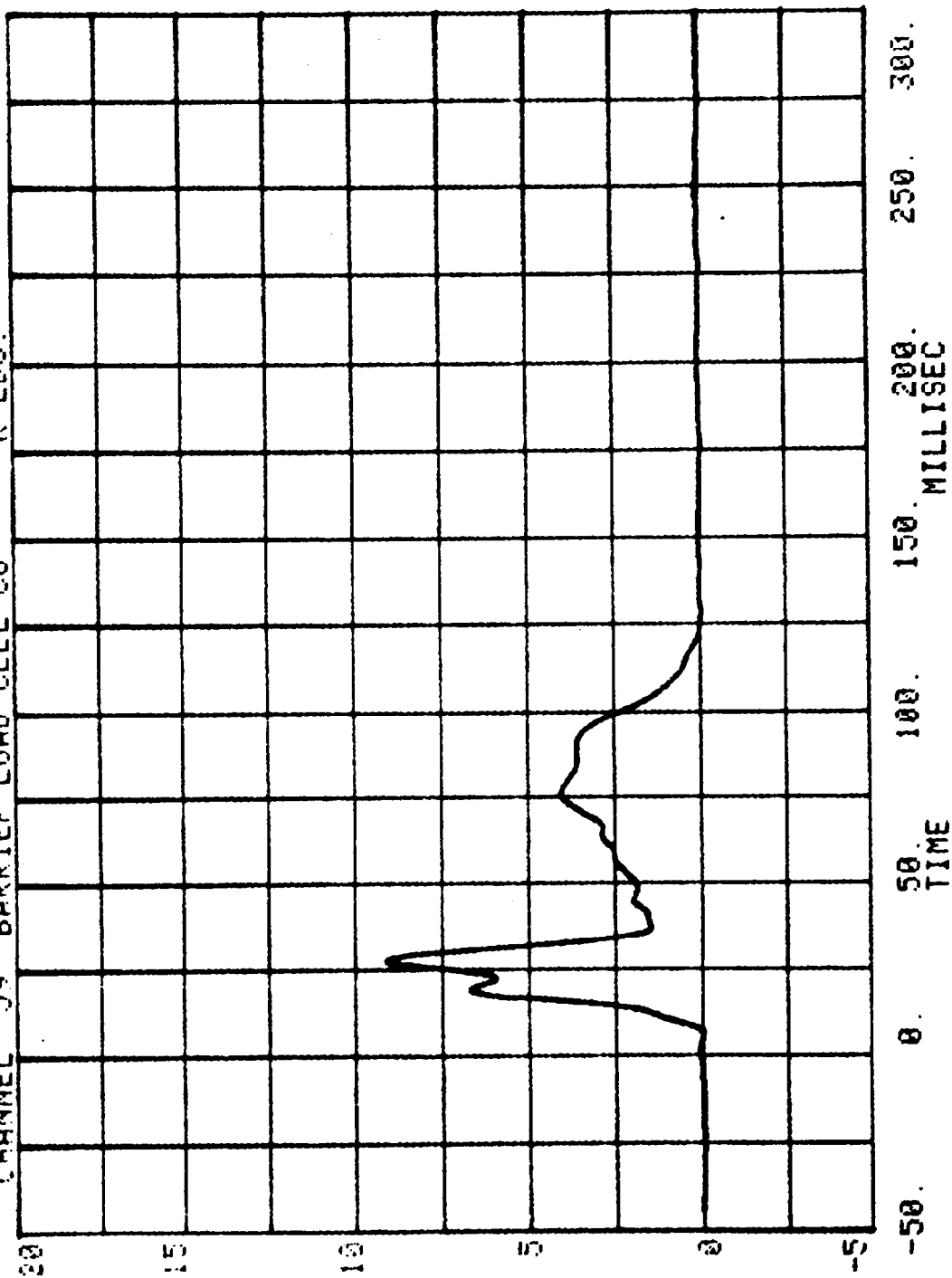
CHANNEL 57 BARRIER LOAD CELL C6 RUN= 978 SERIES= 15 K LBS.



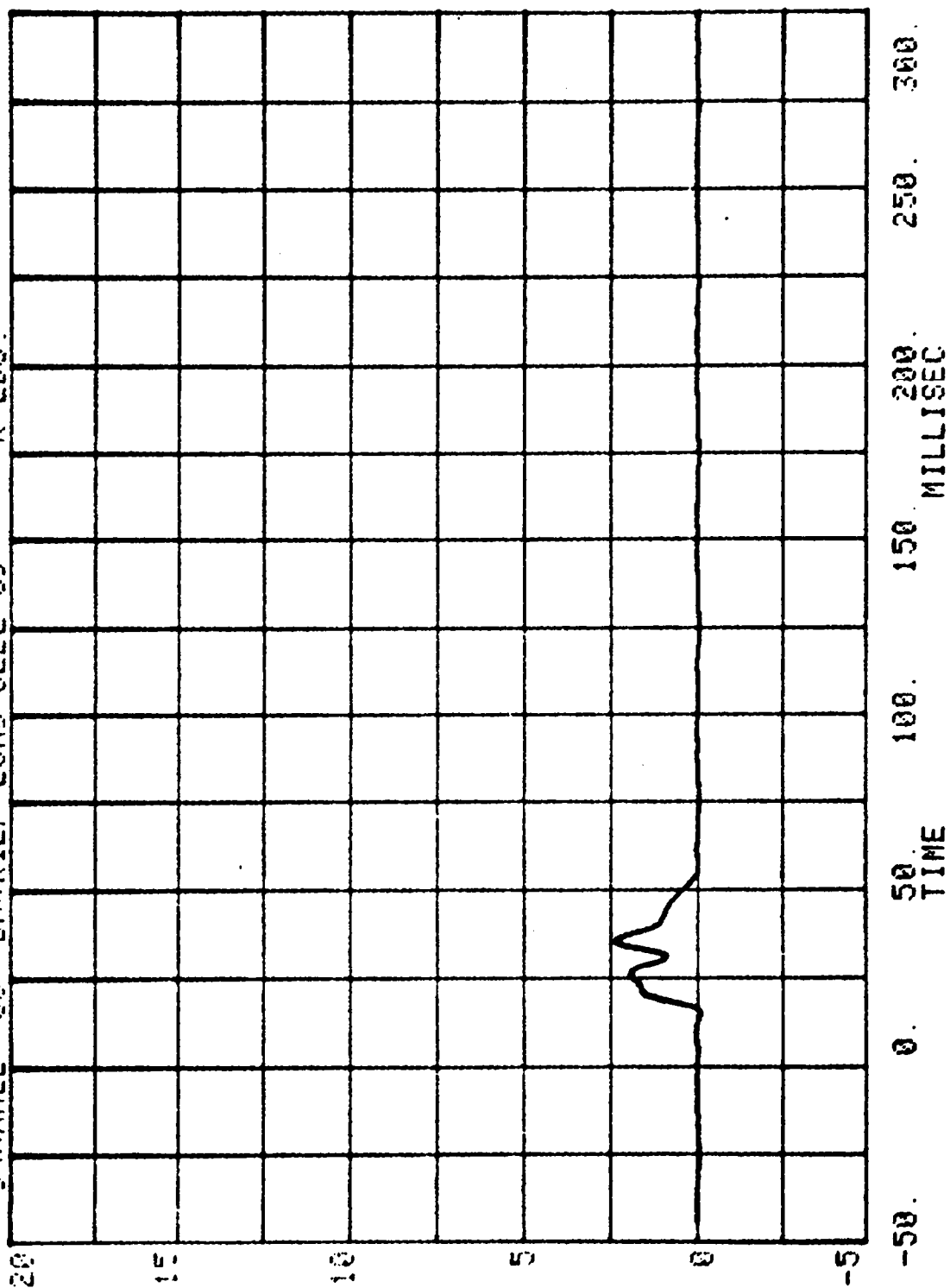
CHANNEL 58 RUN= 978 SERIES= 15 K LBS.
BARRIER LOAD CELL C7



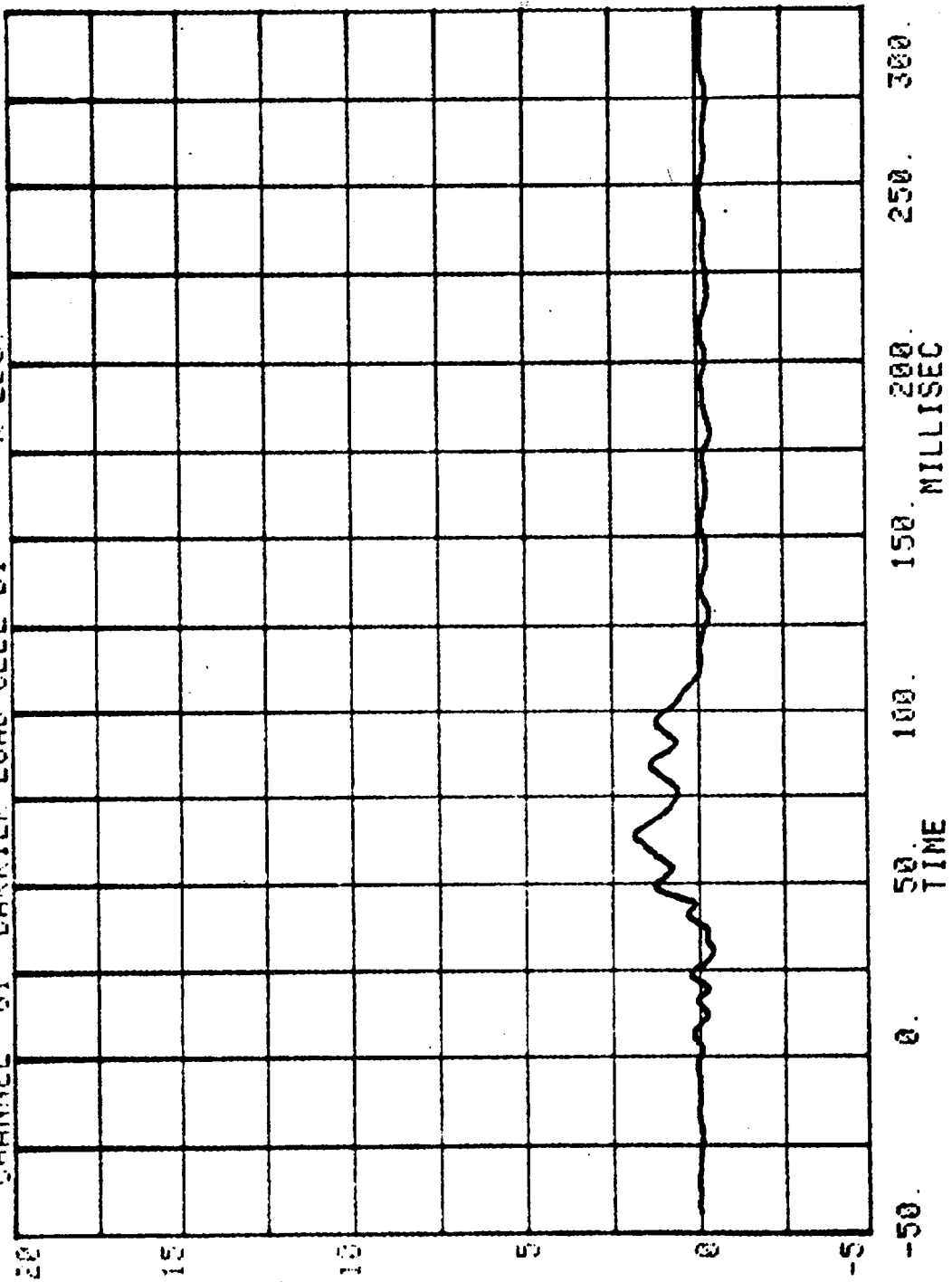
CHANNEL 59 BARRIER LOAD CELL C8 RUN= 978 SERIES= 15 K LBS.



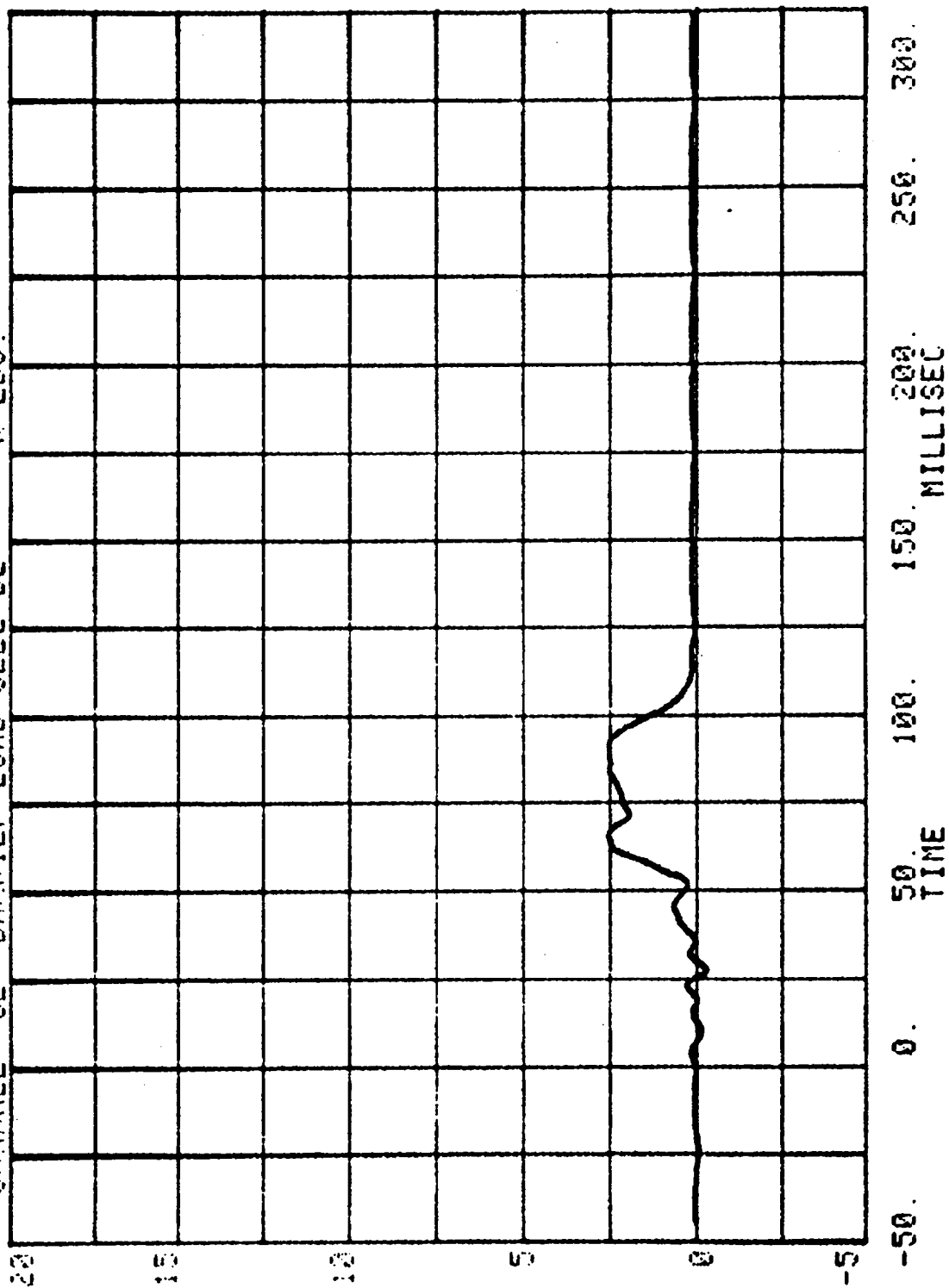
CHANNEL 60 RUN= 978 SERIES= 15 K LBS.
 BARRIER LOAD CELL C9



CHANNEL 61 BARRIER LOAD CELL D1 RUN= 978 SERIES= 15 K LBS.

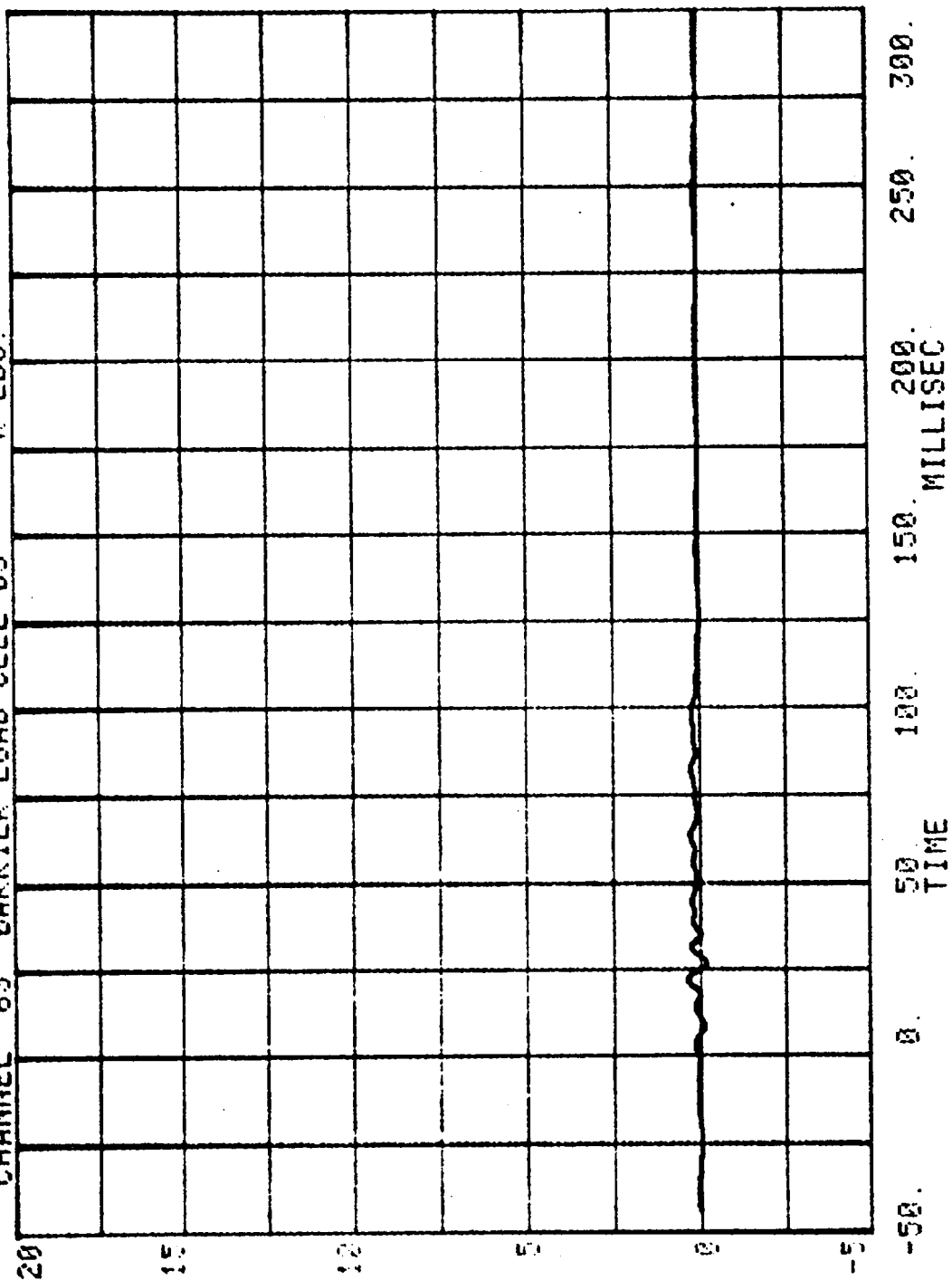


CHANNEL 62 BARRIER LOAD CELL D2 RUN= 978 SERIES= 15 K LBS.

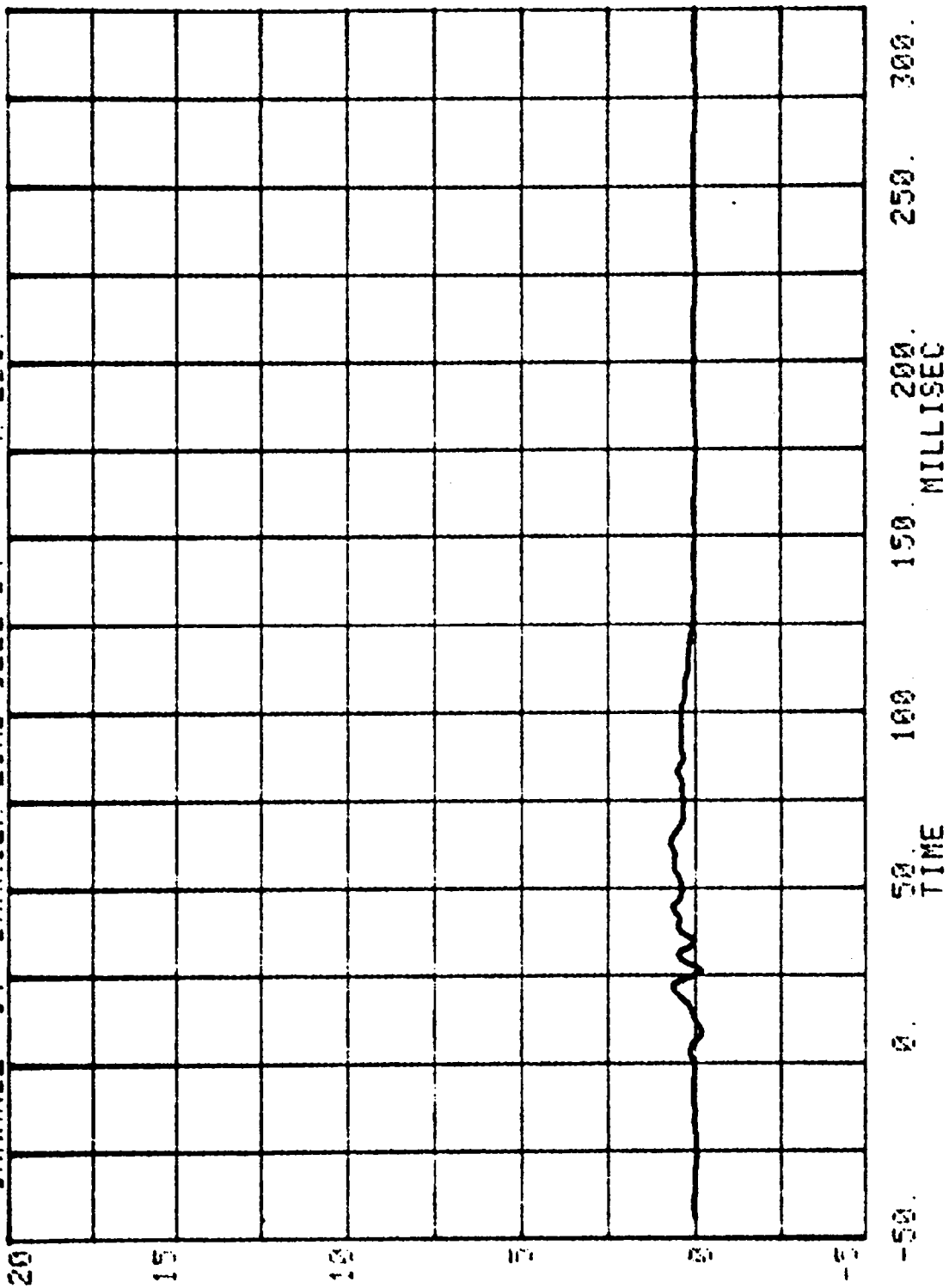


CHANNEL 63 BARRIER LOAD CELL 03 K LBS.

RUN= 978 SERIES= 15

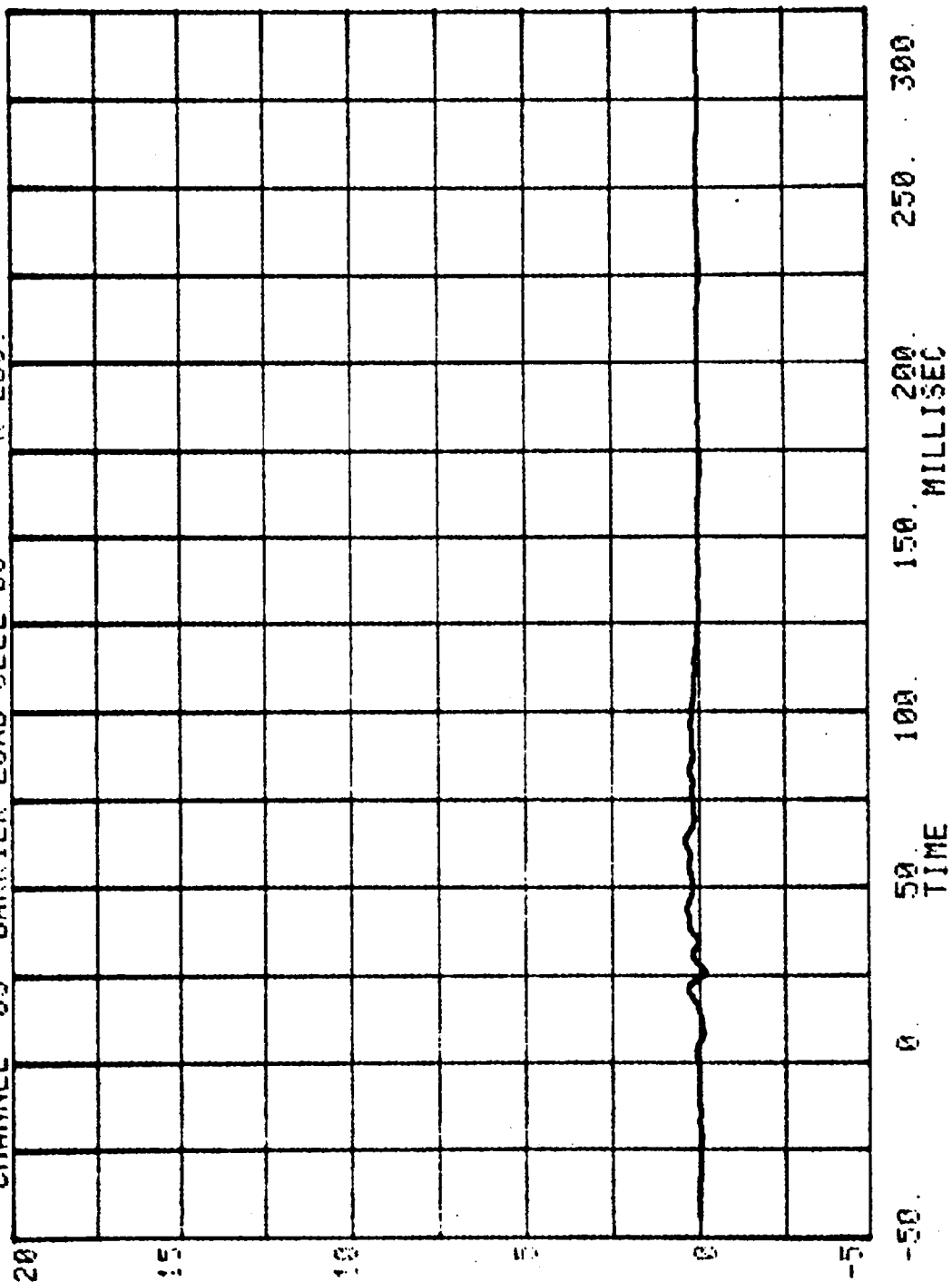


CHANNEL 64 BARRIER LOAD CELL 04 RUN= 978 SERIES= 15 K LBS.

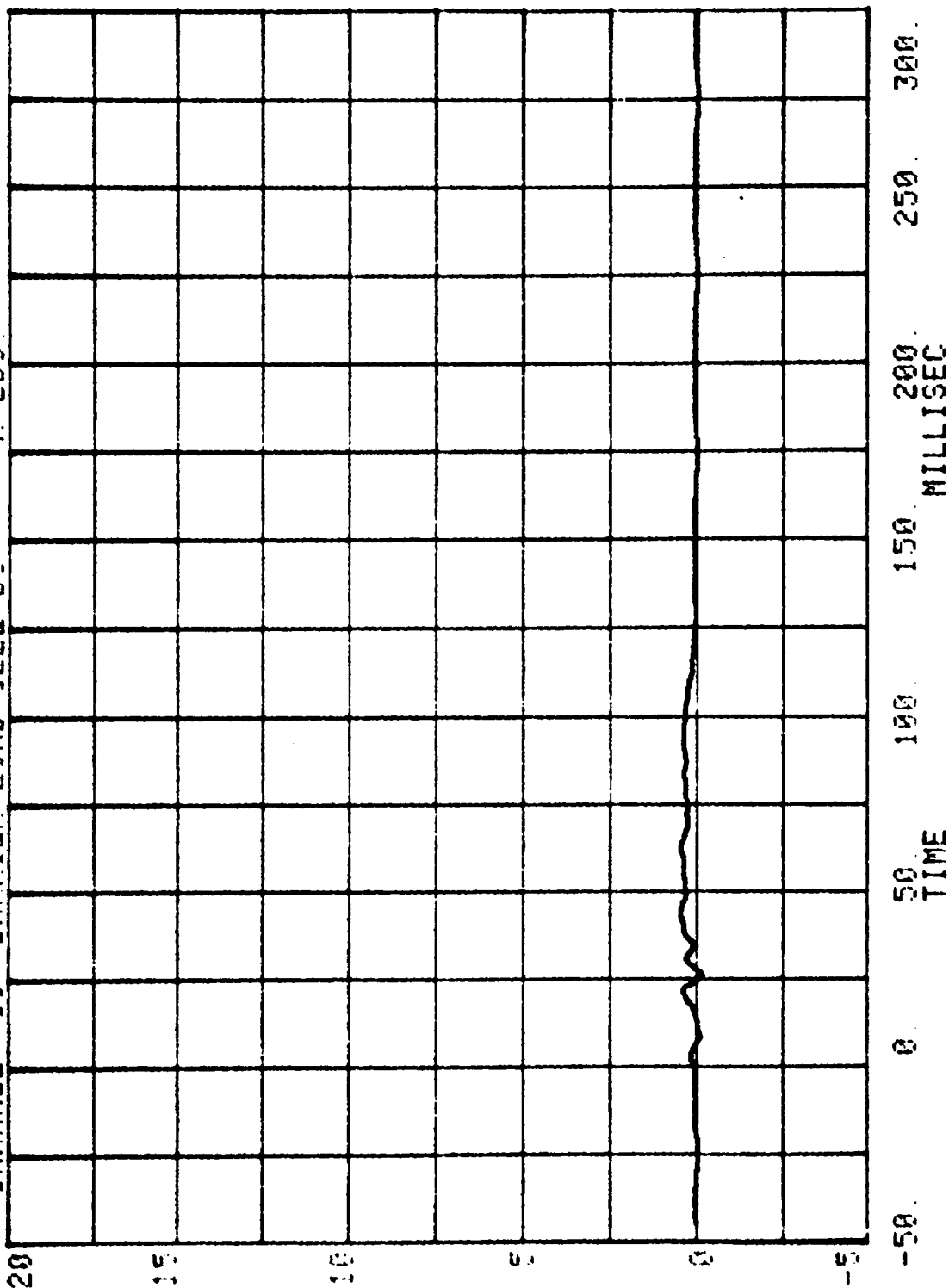


CHANNEL 65 BARRIER LOAD CELL D5 K LBS.

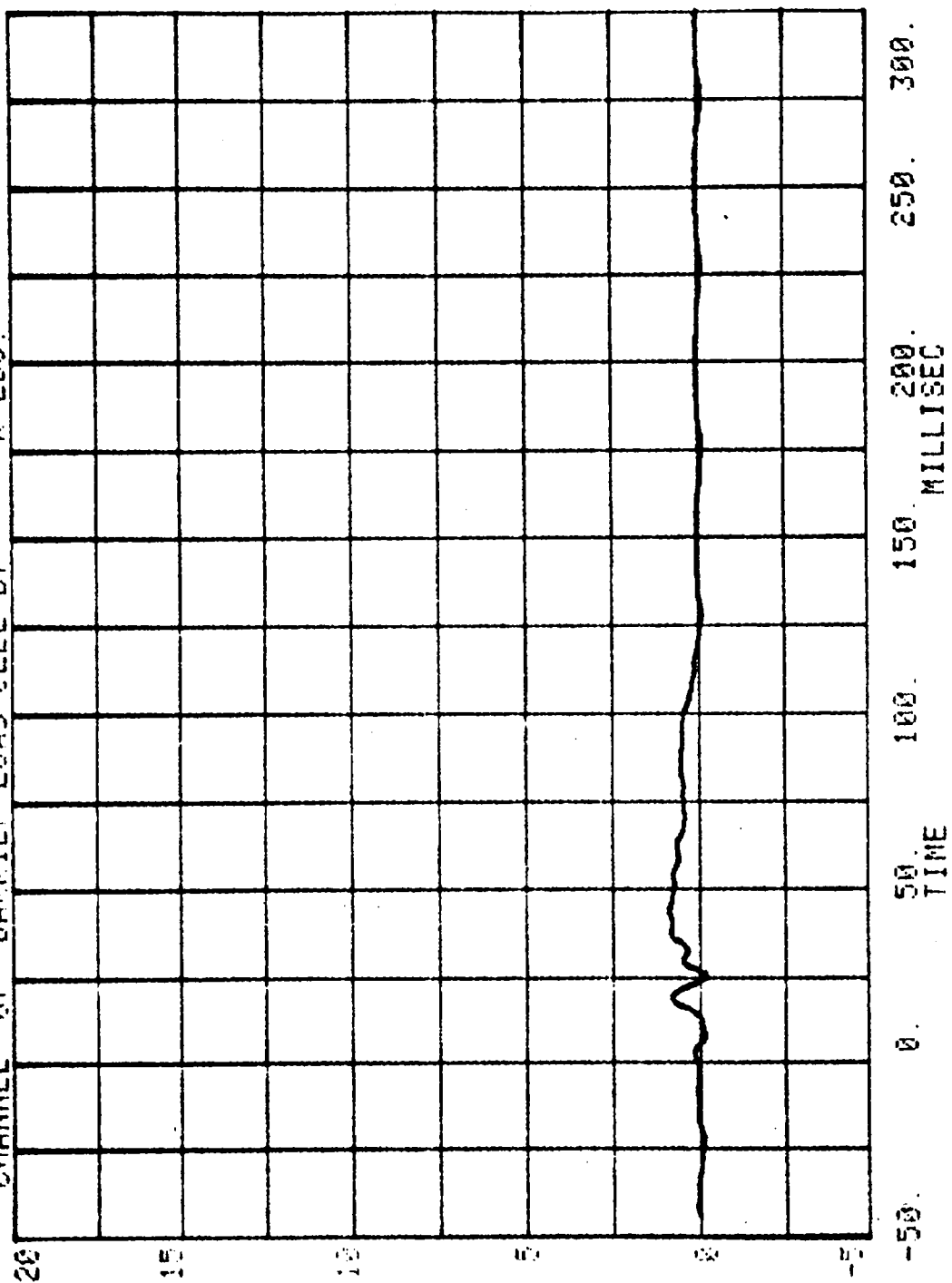
RUN= 978 SERIES= 15



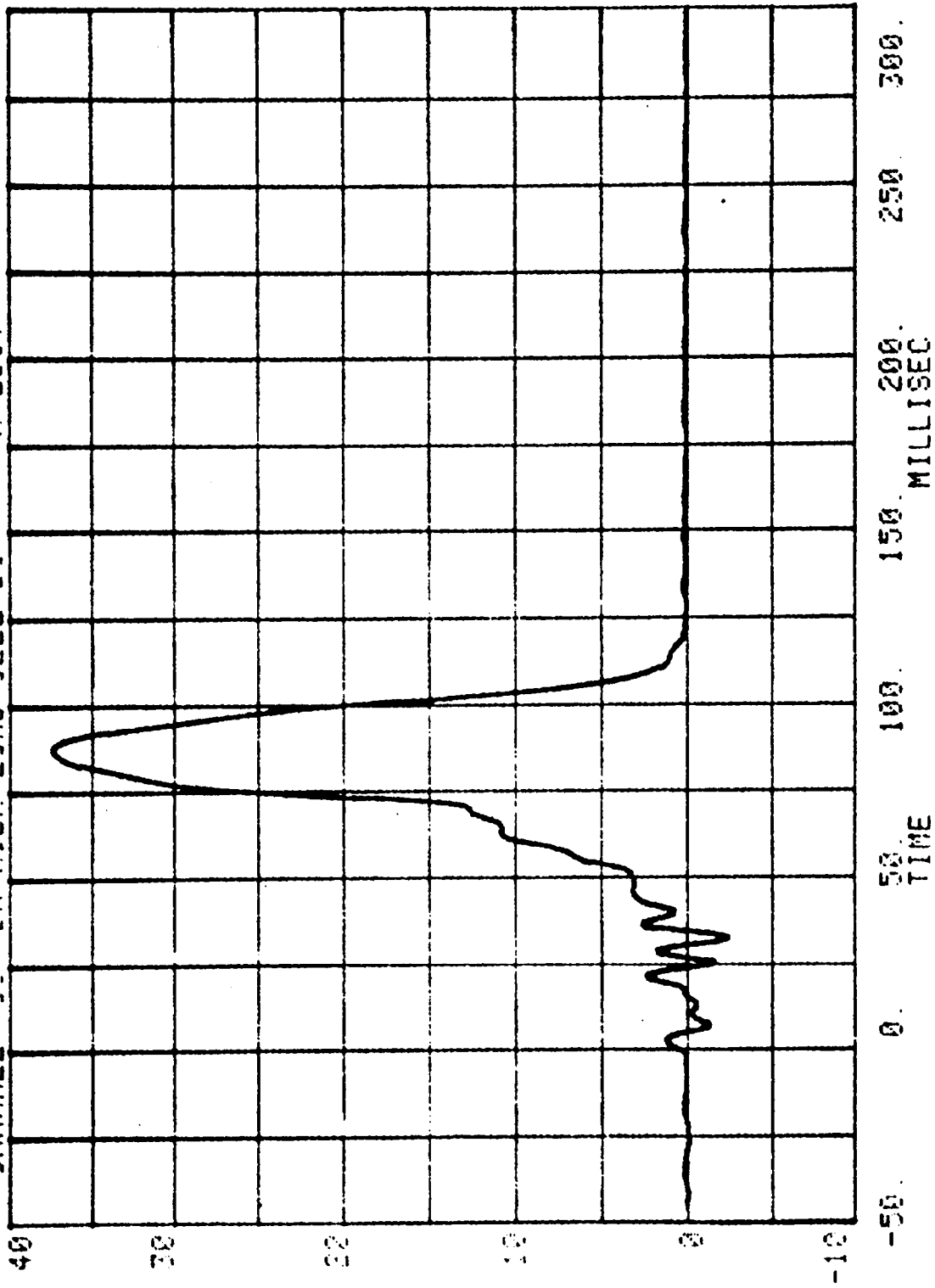
CHANNEL 66 BARRIER LOAD CELL D6 15 K LBS



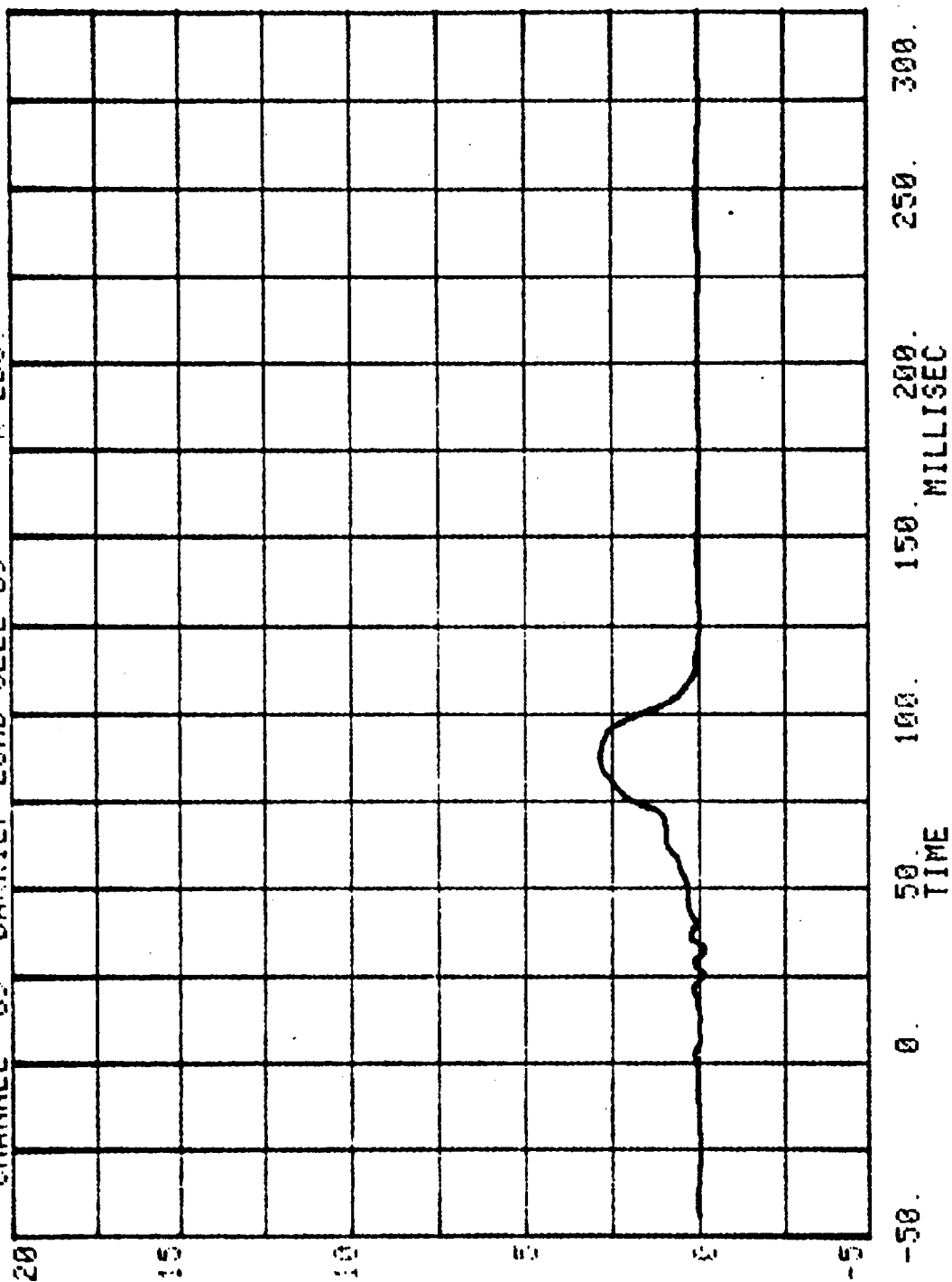
RUN= 978 SERIES= 15
CHANNEL 67 BARRIER LOAD CELL D7 K LBS.



CHANNEL 68 RUN= 978 SERIES= 15 K LBS.



CHANNEL 69 BARRIER LOAD CELL D9 15 K LBS.



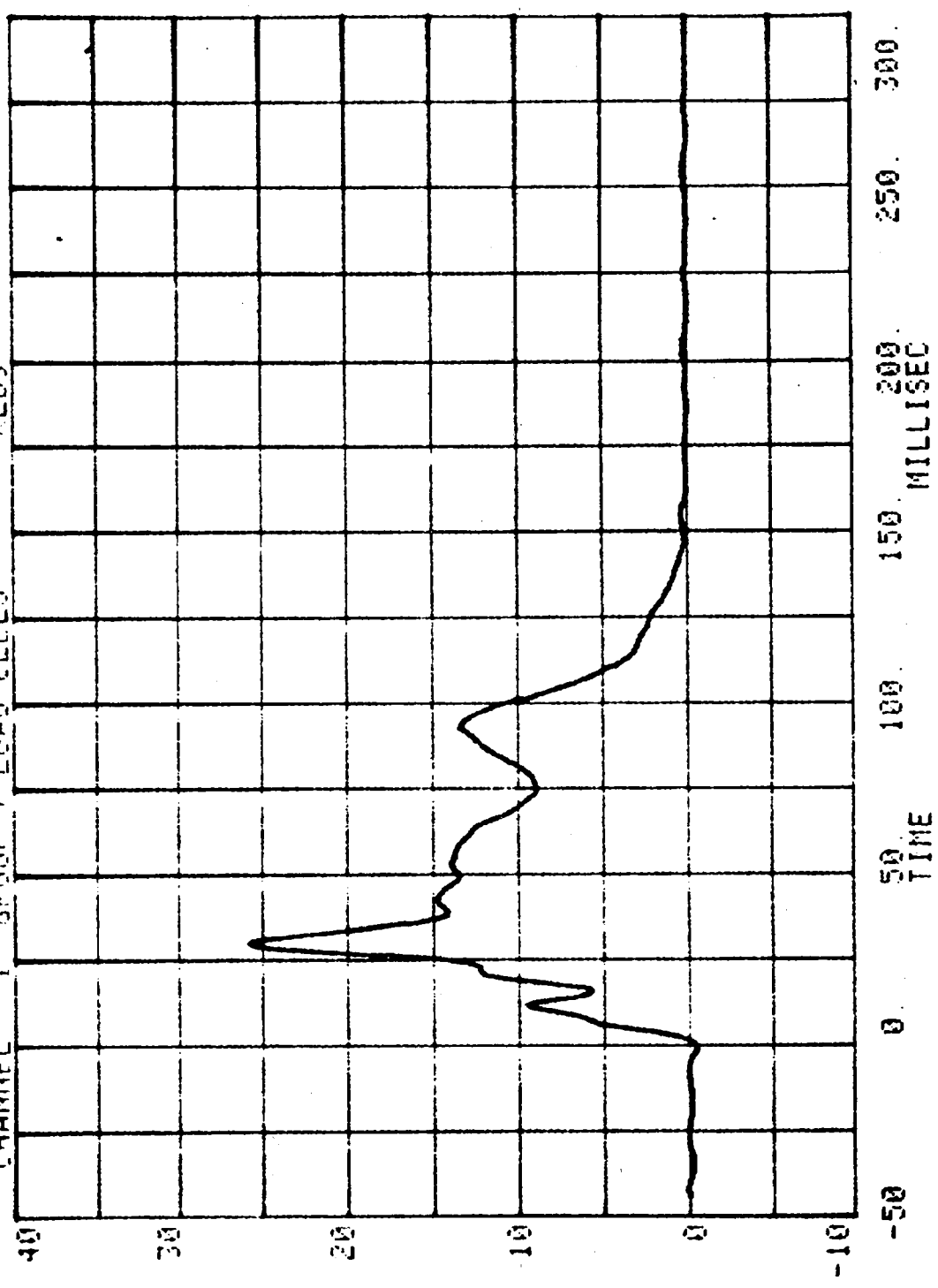
NCAP TEST #15

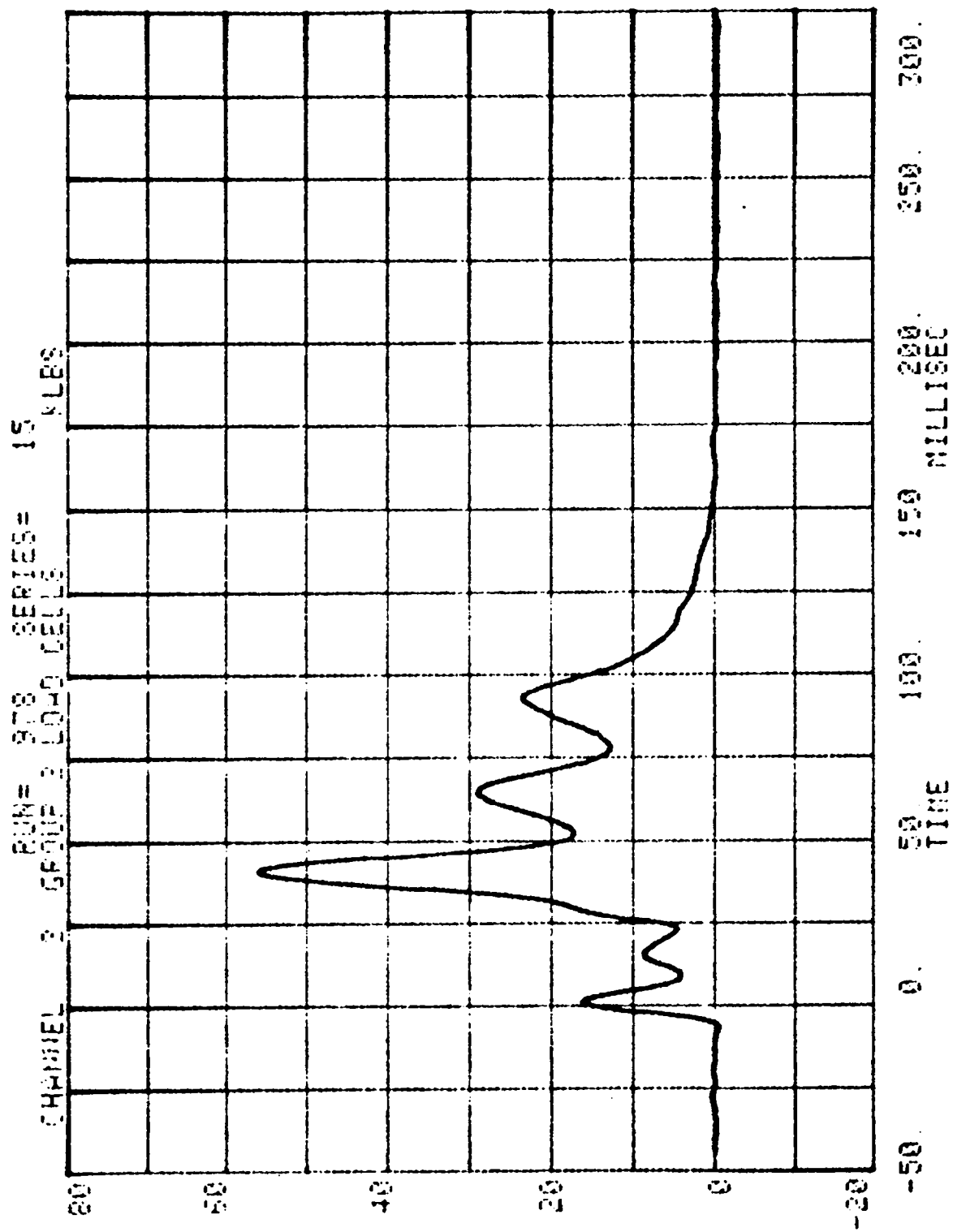
RUN # 272

SERIES = 15

CHAN	TITLE	MINIMUM	MAXIMUM	PT	TIME
1	GROUP 1 LOAD CELLS	-418	KLBS	-	98 MS.
		25.929	KLBS		29.85 MS.
2	GROUP 2 LOAD CELLS	-389	KLBS	-	60 MS.
		56.069	KLBS		41.17 MS.
3	GROUP 3 LOAD CELLS	-558	KLBS	-	97 MS.
		28.193	KLBS		29.10 MS.
4	GROUP 4 LOAD CELLS	-443	KLBS	-	92 MS.
		10.013	KLBS		24.15 MS.
5	GROUP 5 LOAD CELLS	-253	KLBS	-	20 MS.
		18.056	KLBS		40.95 MS.
6	GROUP 6 LOAD CELLS	-1.234	KLBS	-	60 MS.
		47.420	KLBS		87.30 MS.
7	TOTAL LOAD CELL SUM	-713	KLBS	-	90 MS.
		123.892	KLBS		41.02 MS.

CHANNEL 1 GROUP 1 LOAD CELLS RUN= 978 SERIES= 15 KLBS

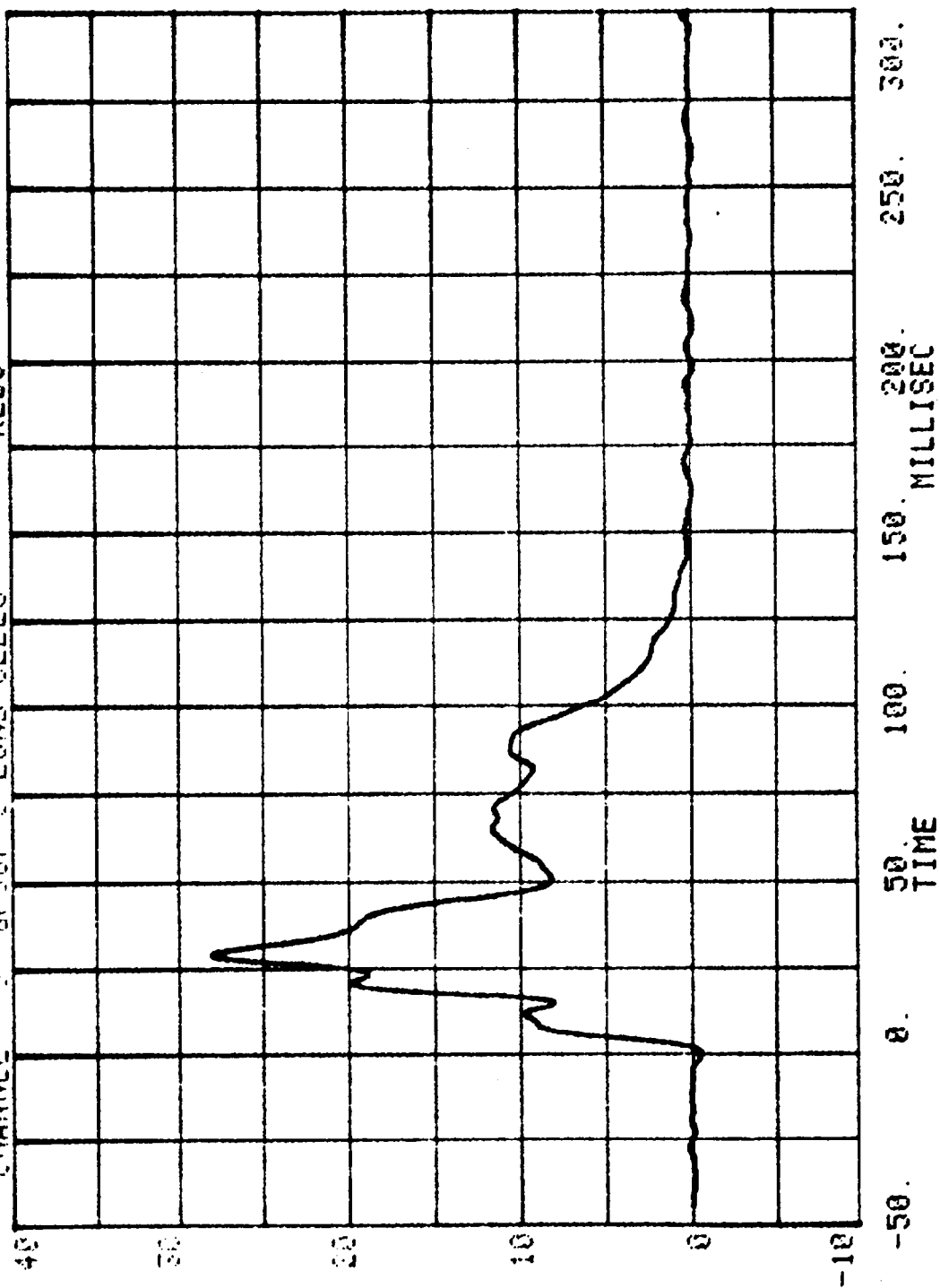




CHANNEL 3 GROUP 3 LOAD CELLS

RUN= 978 SERIES= 15

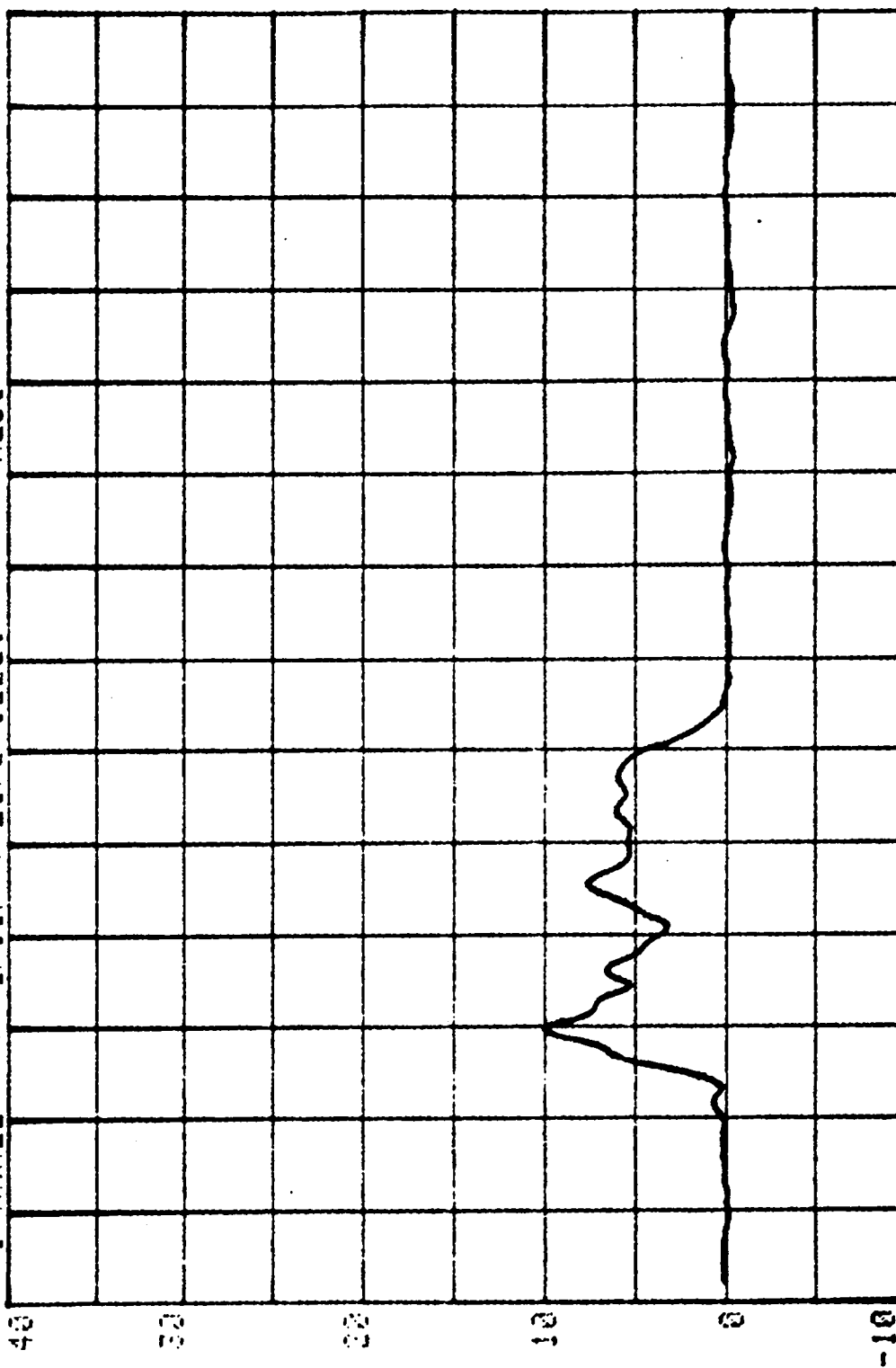
KLBS



CHANNEL 4 GROUP 4 LOAD CELLS

RUN= 978 SERIES= 15

KLBS

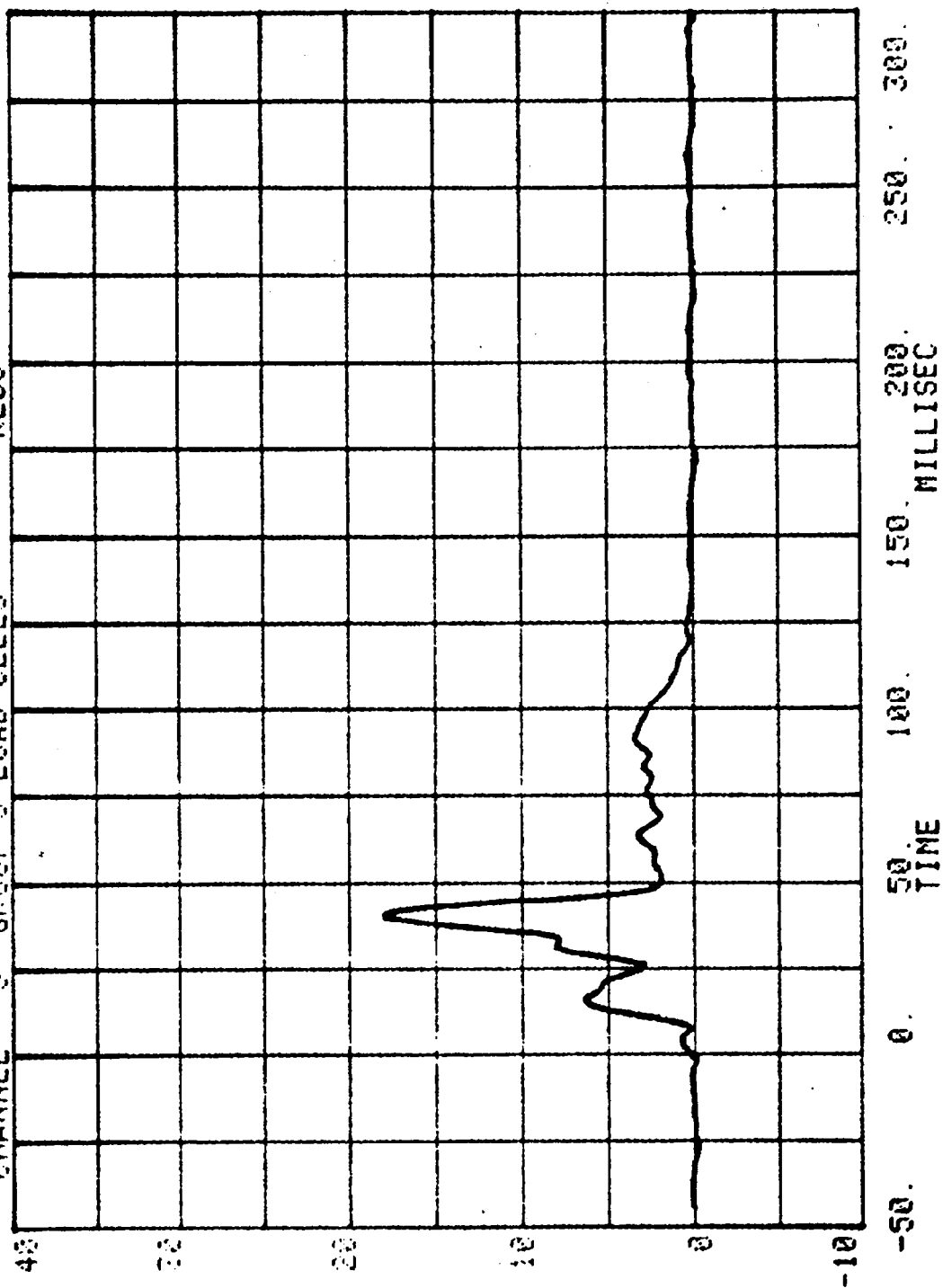


-50. 0. 50. 100. 150. 200. 250. 300.

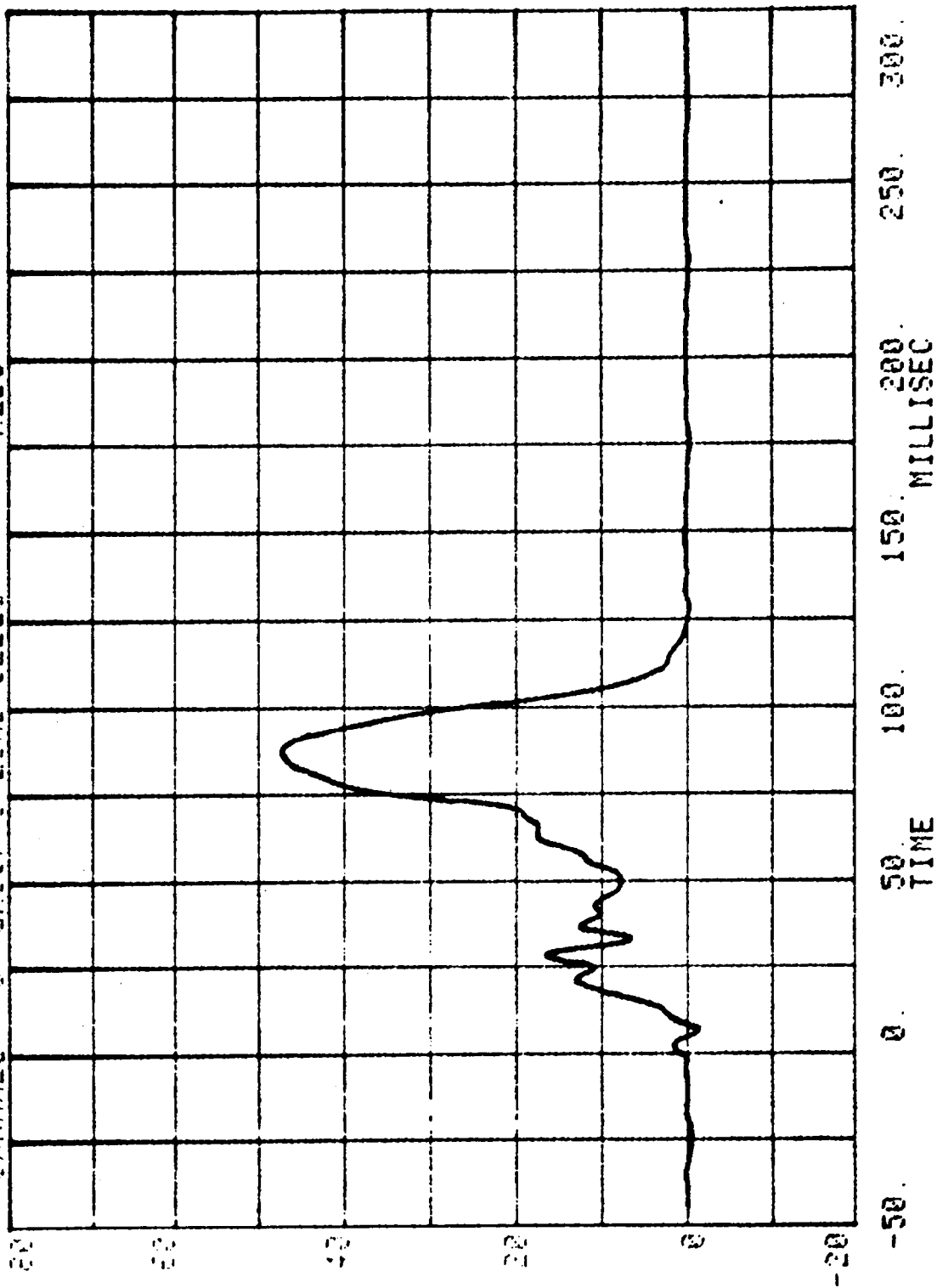
MILLISEC

TIME

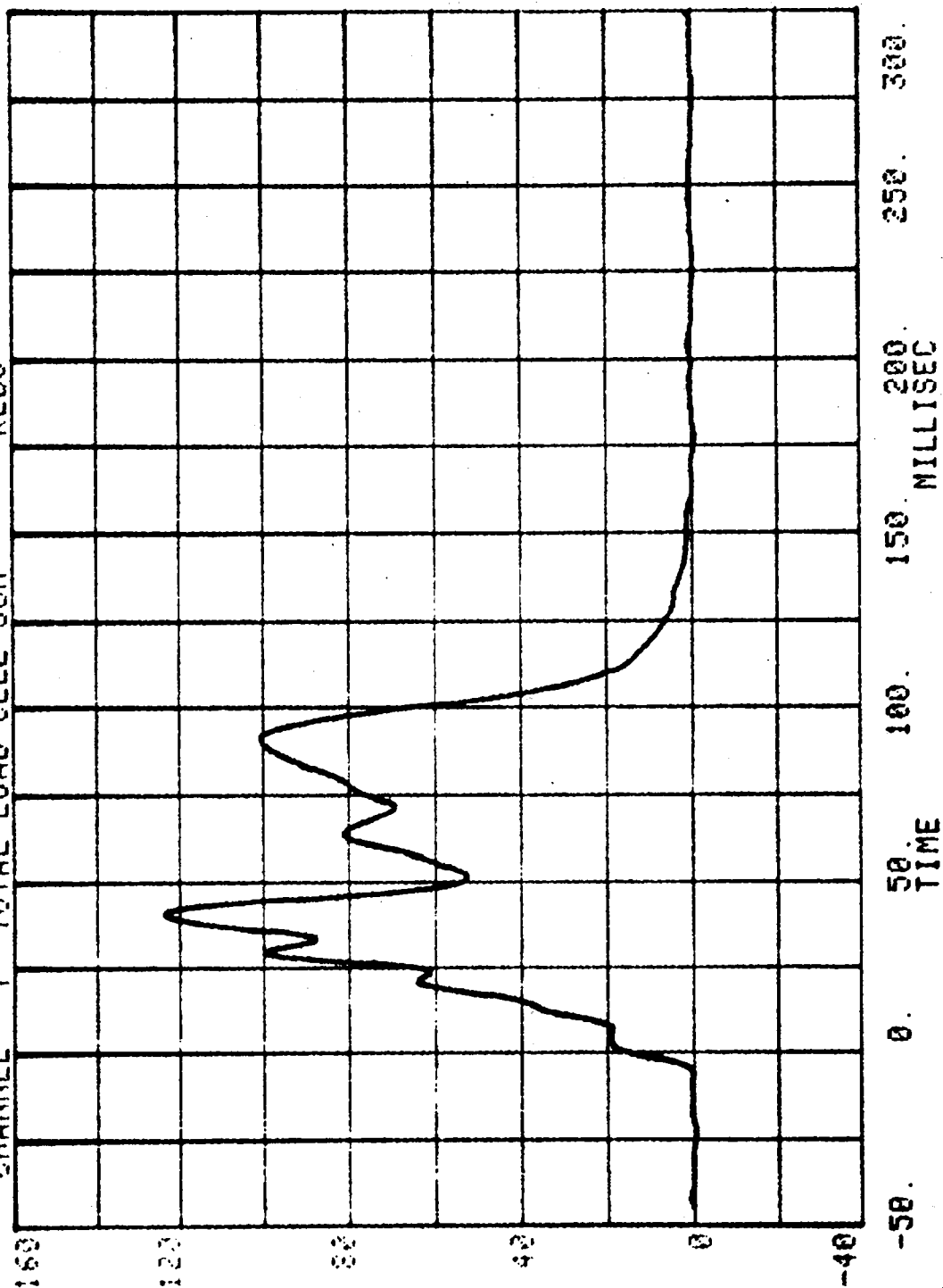
CHANNEL 5 GROUP 5 LOAD CELLS RUN= 978 SERIES= 15 KLBS



CHANNEL 6 GROUP 6 LOAD CELLS RUN= 973 SERIES= 15 KLBS



CHANNEL 7 TOTAL LOAD CELL SUM RUN= 978 SERIES= 15 KLBS

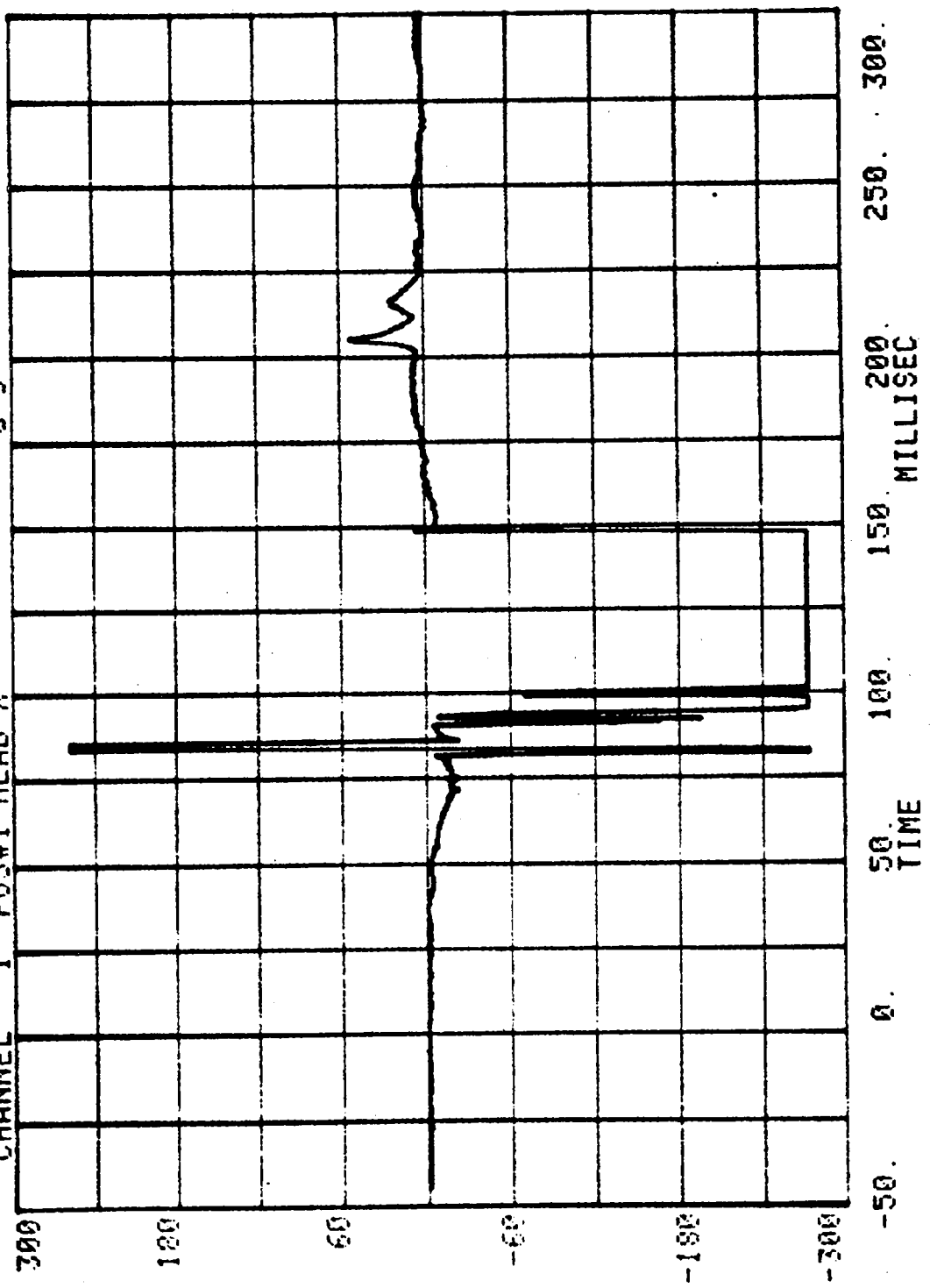


TEST NO. ML0101

DUMMY DATA

CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Femur Forces	600
Belt Loads	60

CHANNEL 1 POS#1 HEAD X
RUN= 978 SERIES= 15 G'S

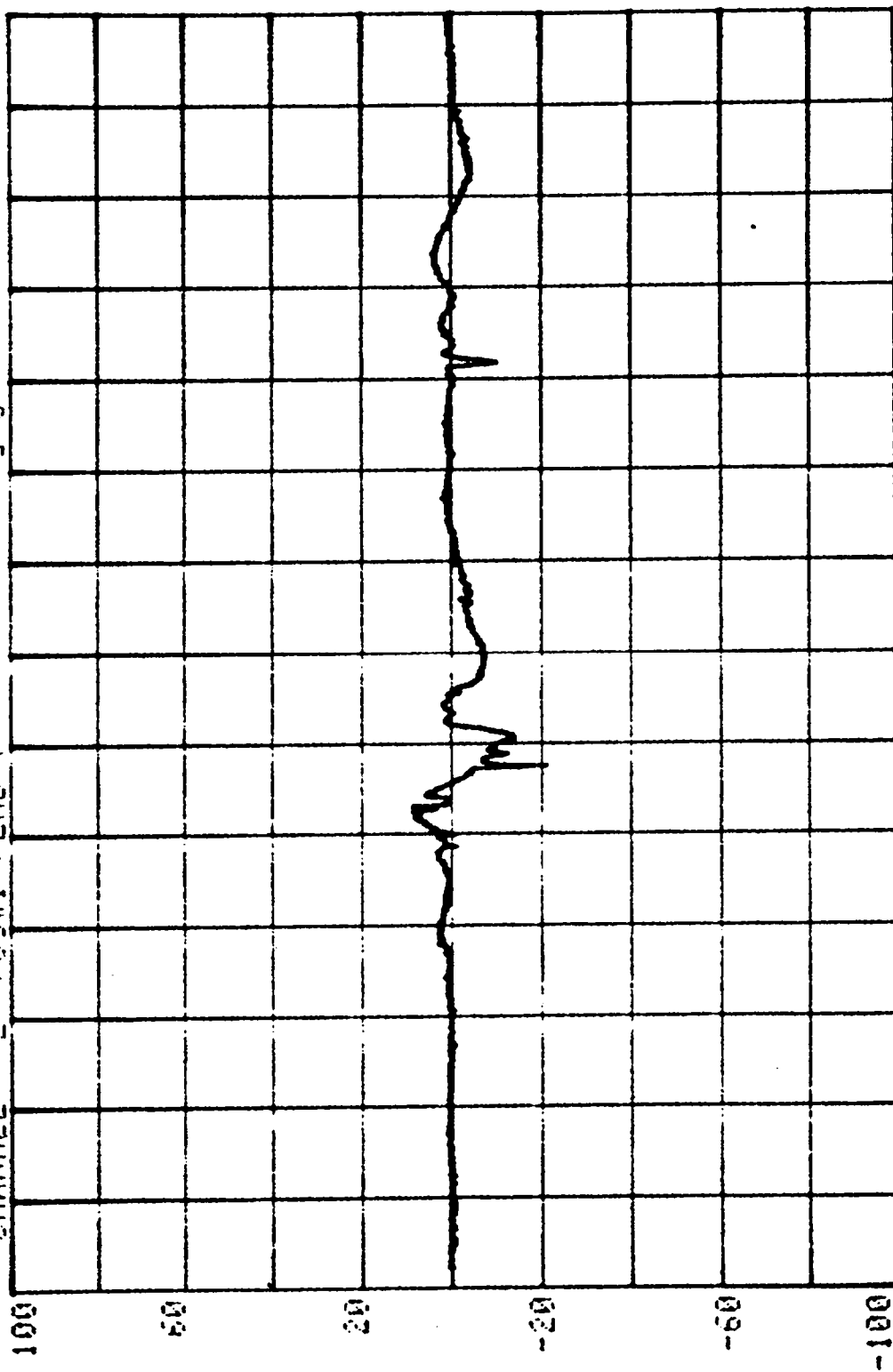


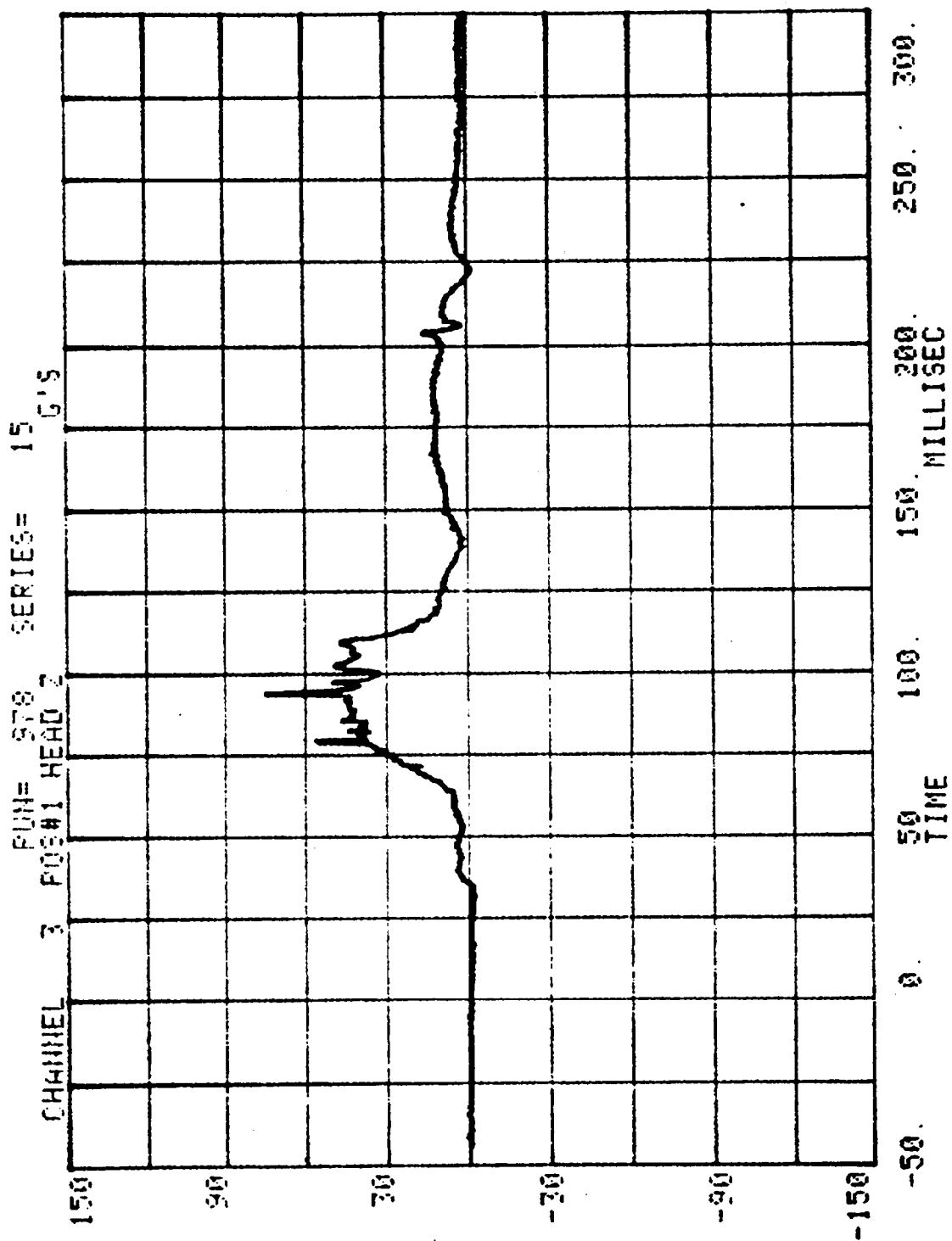
CHANNEL 2 POS#1 HEAD Y

RUN= 978

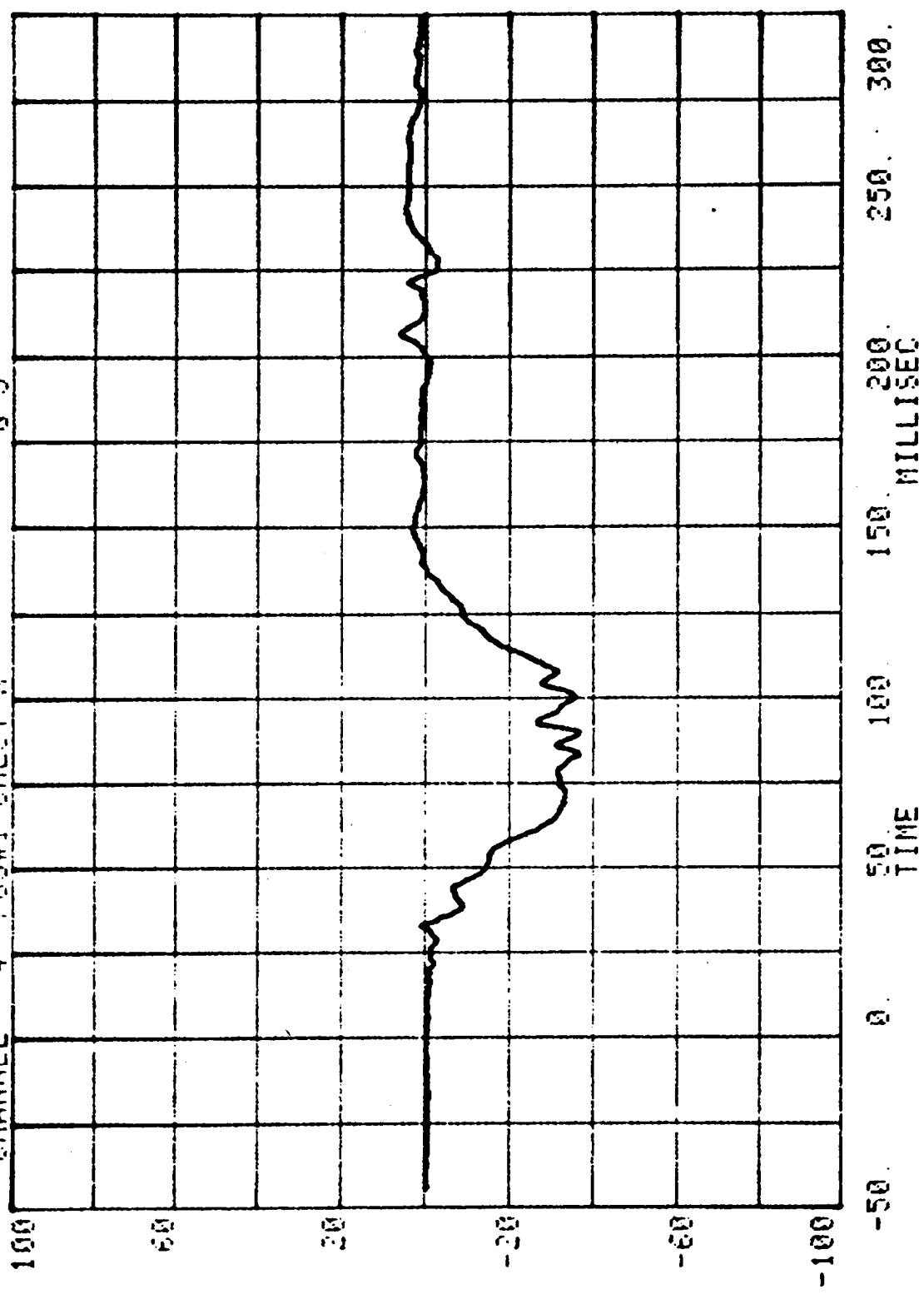
SERIES= 15

G'S

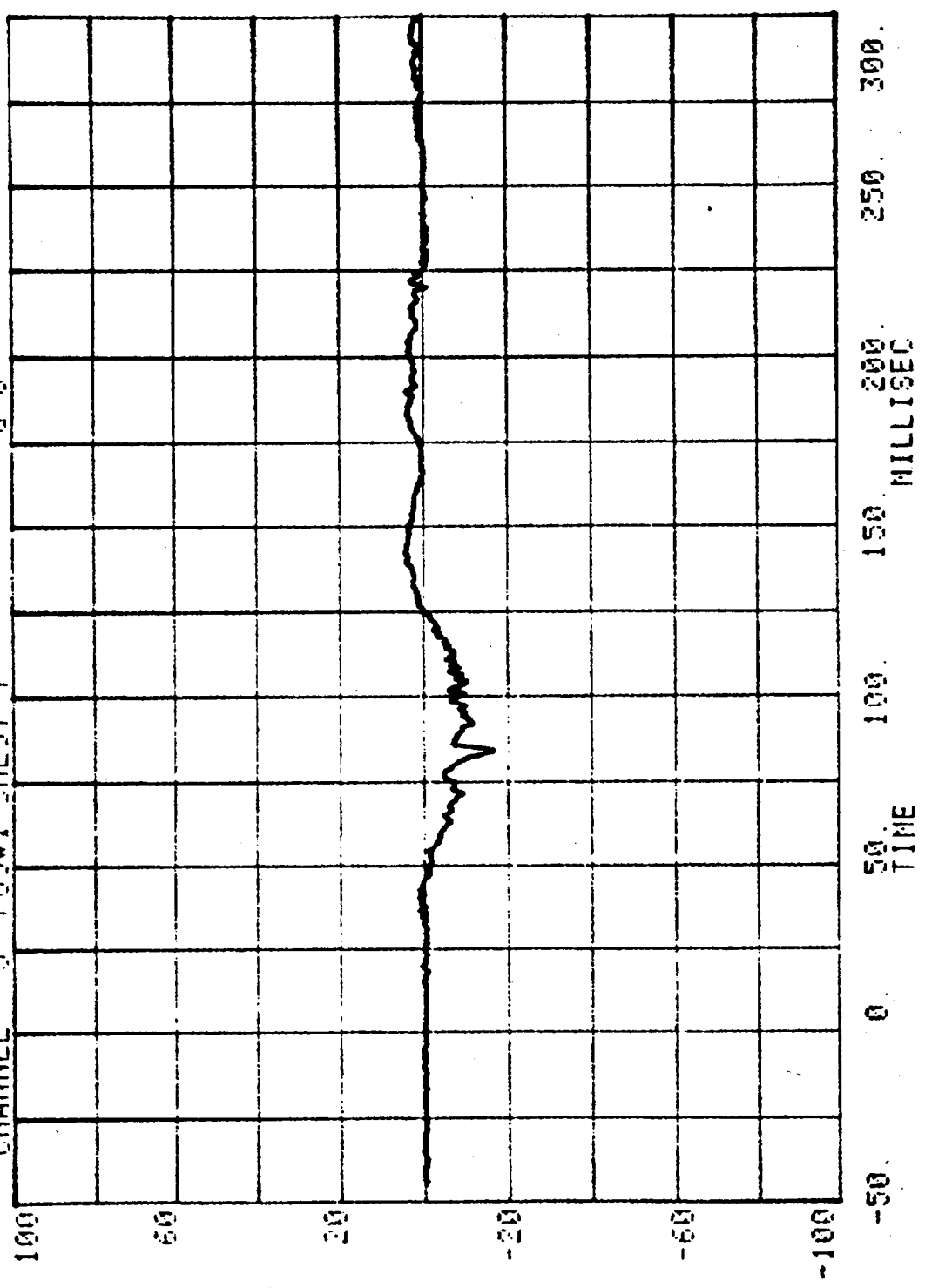




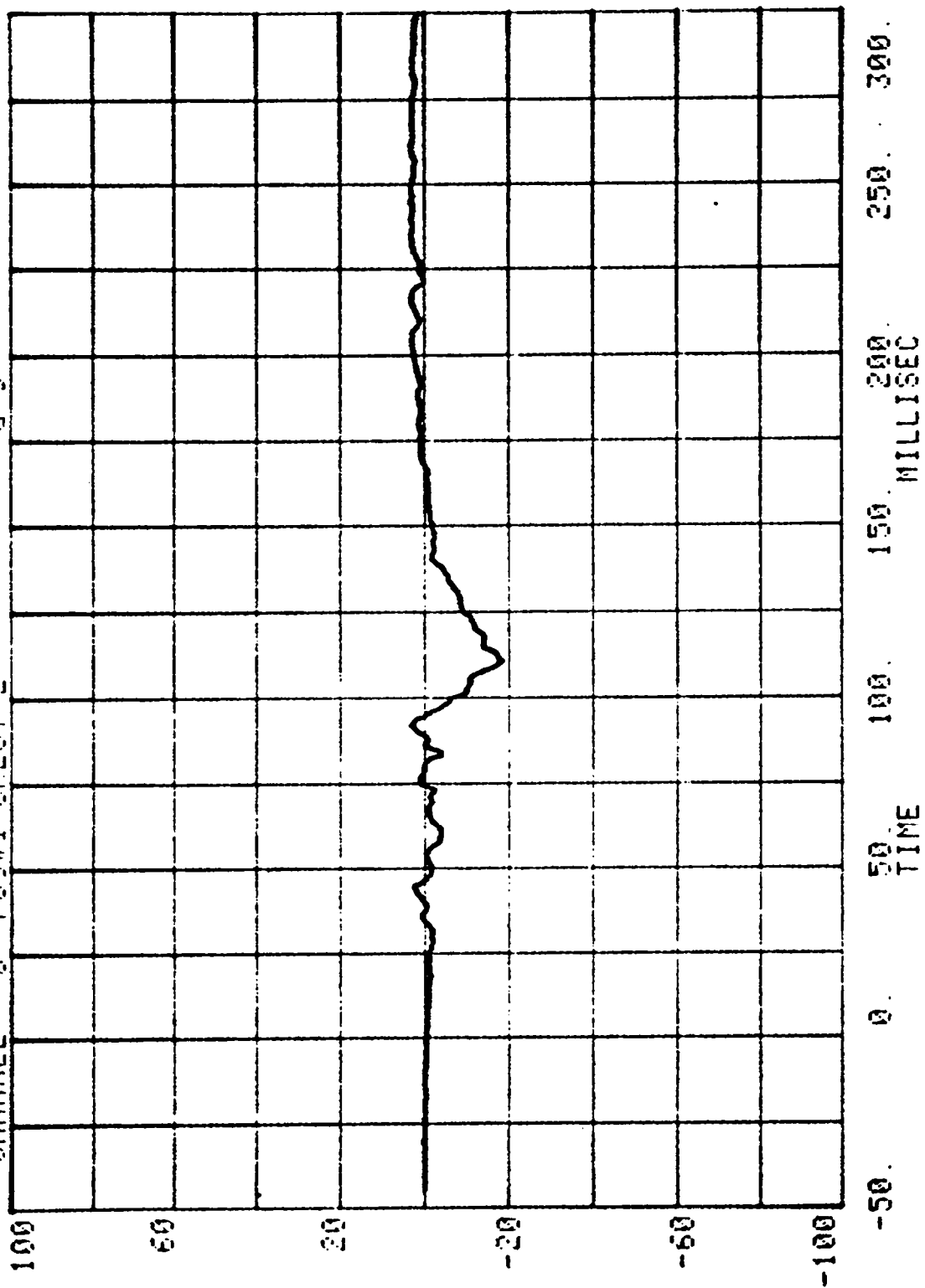
CHANNEL 4 P05#1 CHEST X RUP= 979 SERIES= 15 5'S



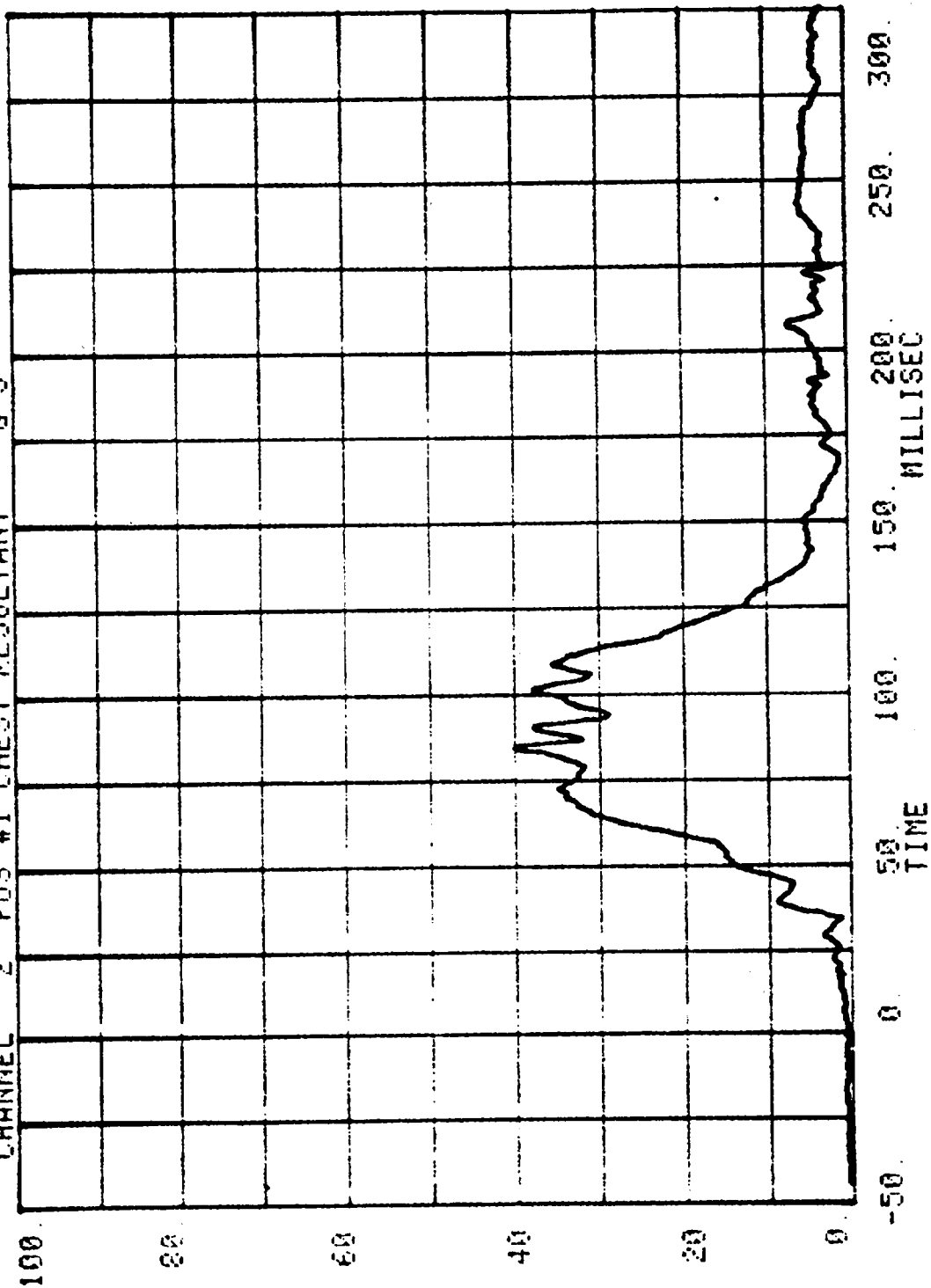
CHANNEL 5 P03#1 CHEST Y PUN= 979 SERIES= 15 5'S

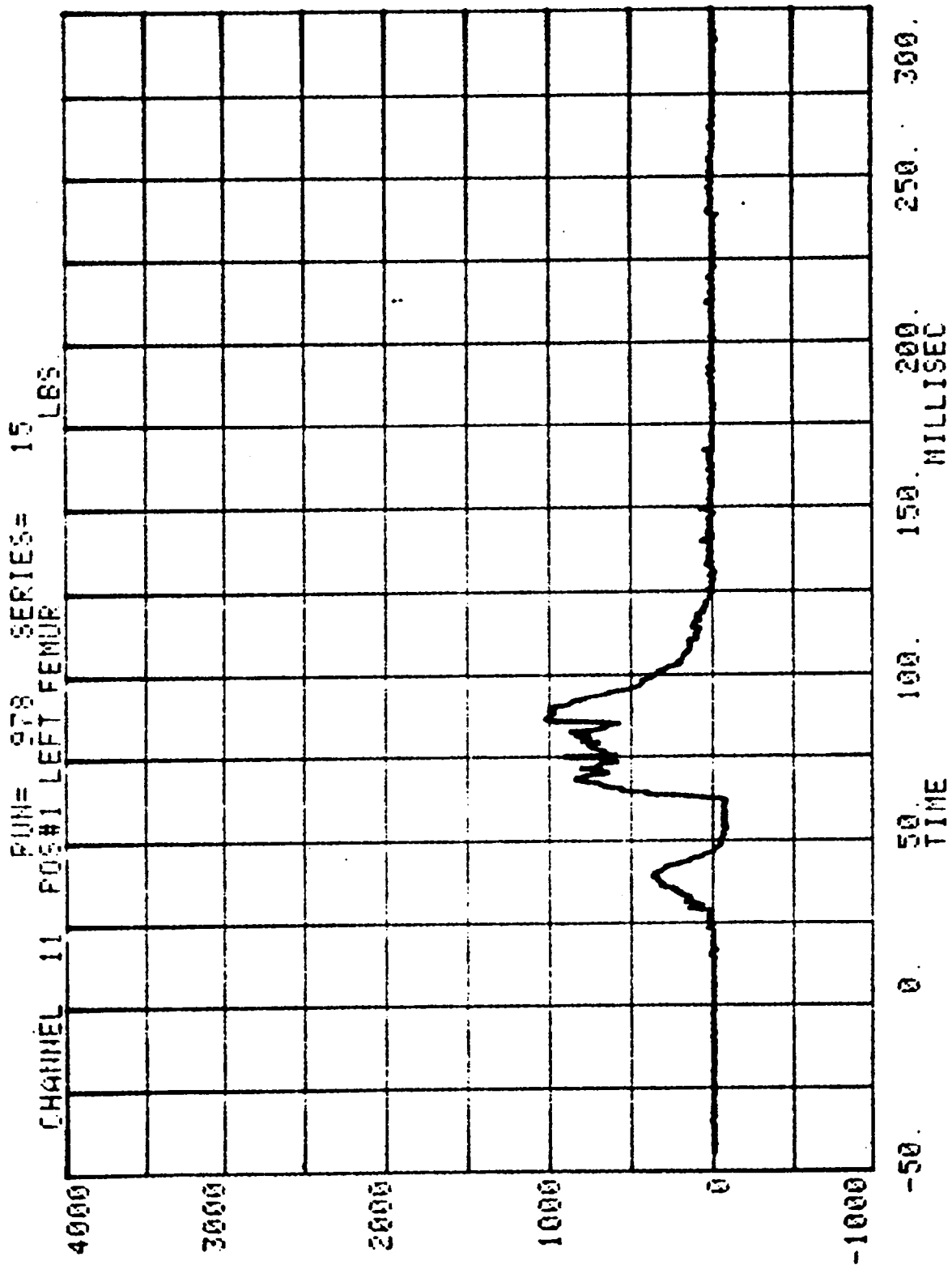


CHANNEL 6 POS#1 CHEST 2 FUH= 273 SERIES= 15 G'S

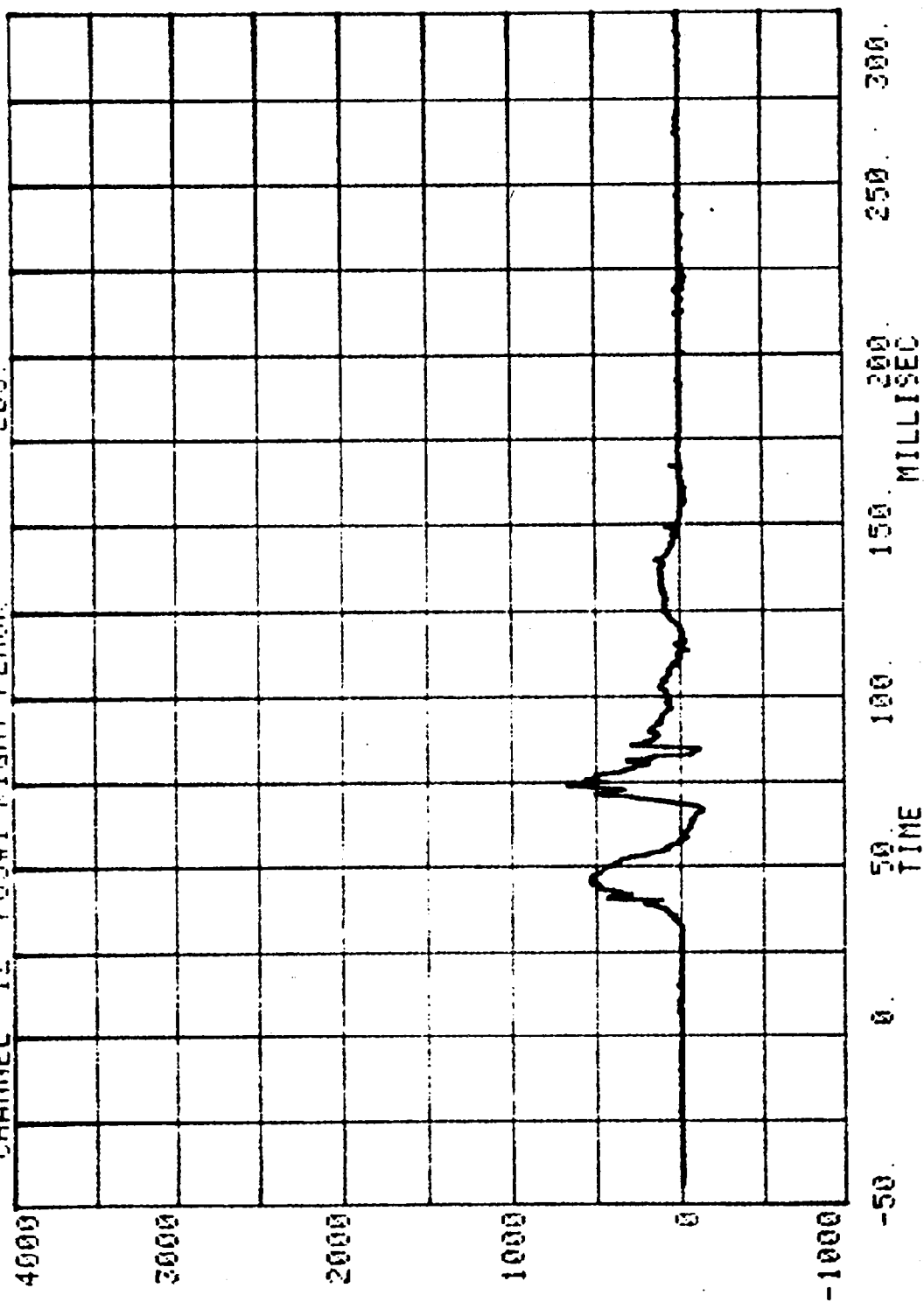


CHANNEL 2 POS #1 CHEST RESULTANT 15 G'S



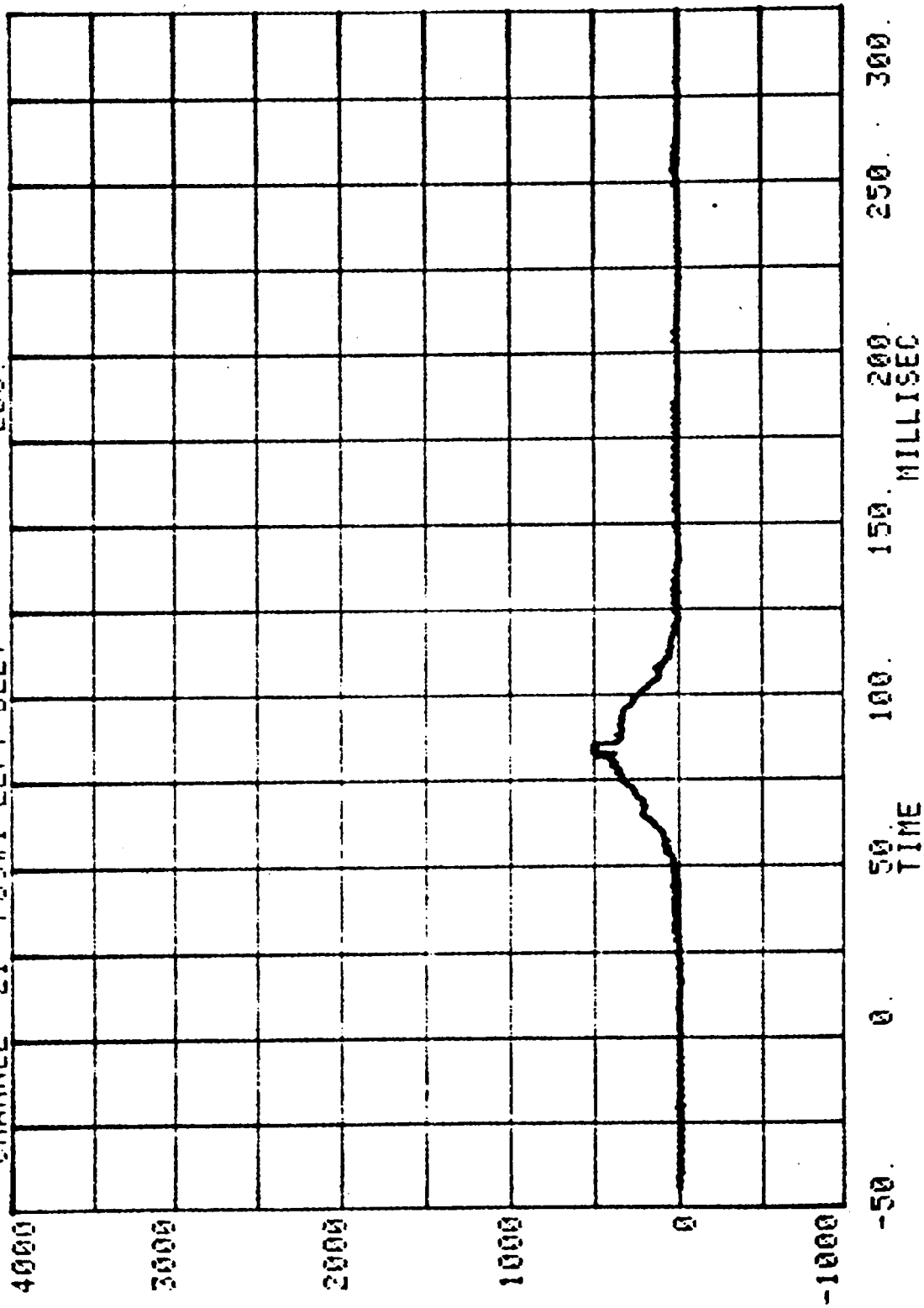


CHANNEL 12 POS#1 RIGHT FEMUR
RUN= 978 SERIES= 15 LBS.

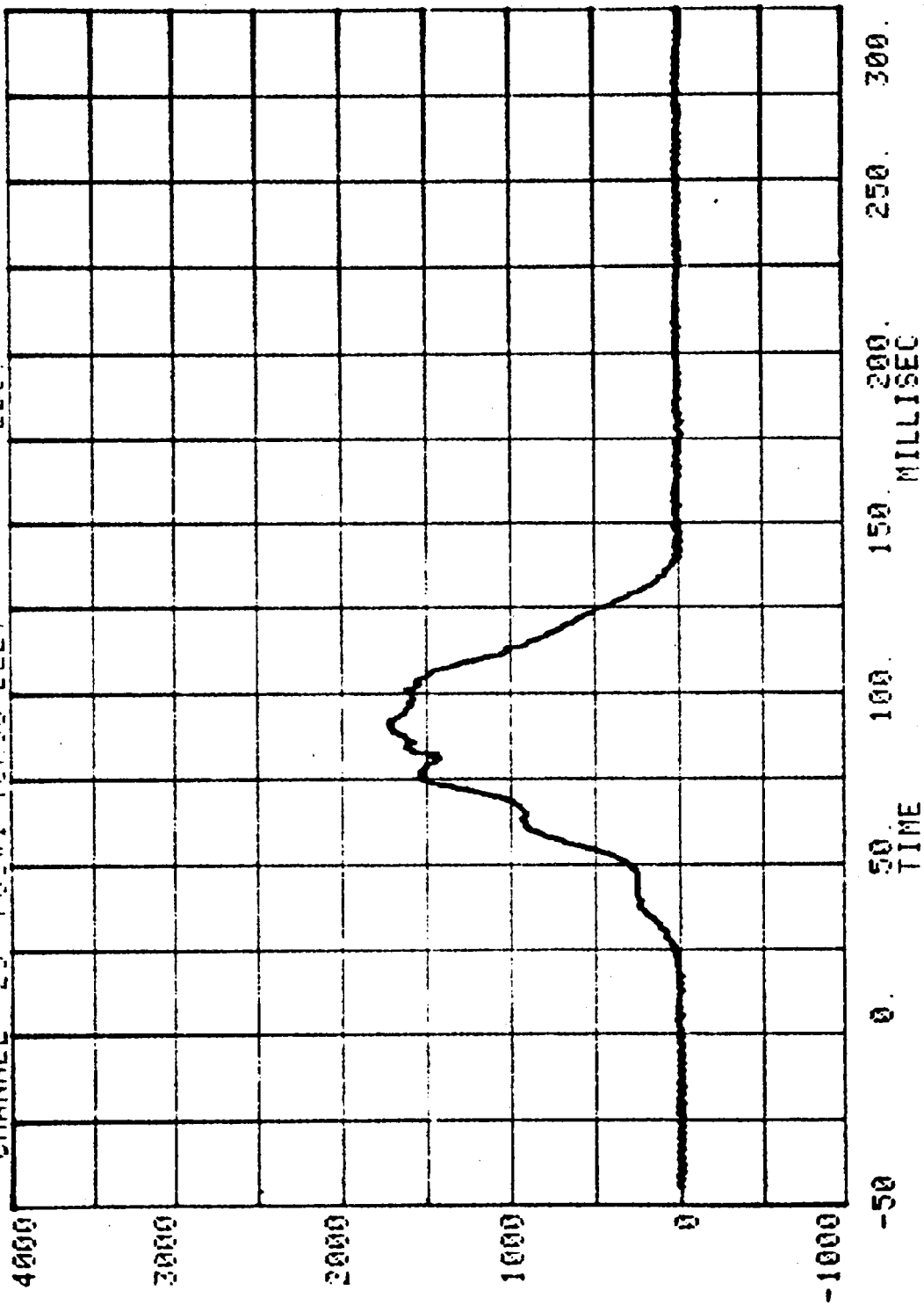


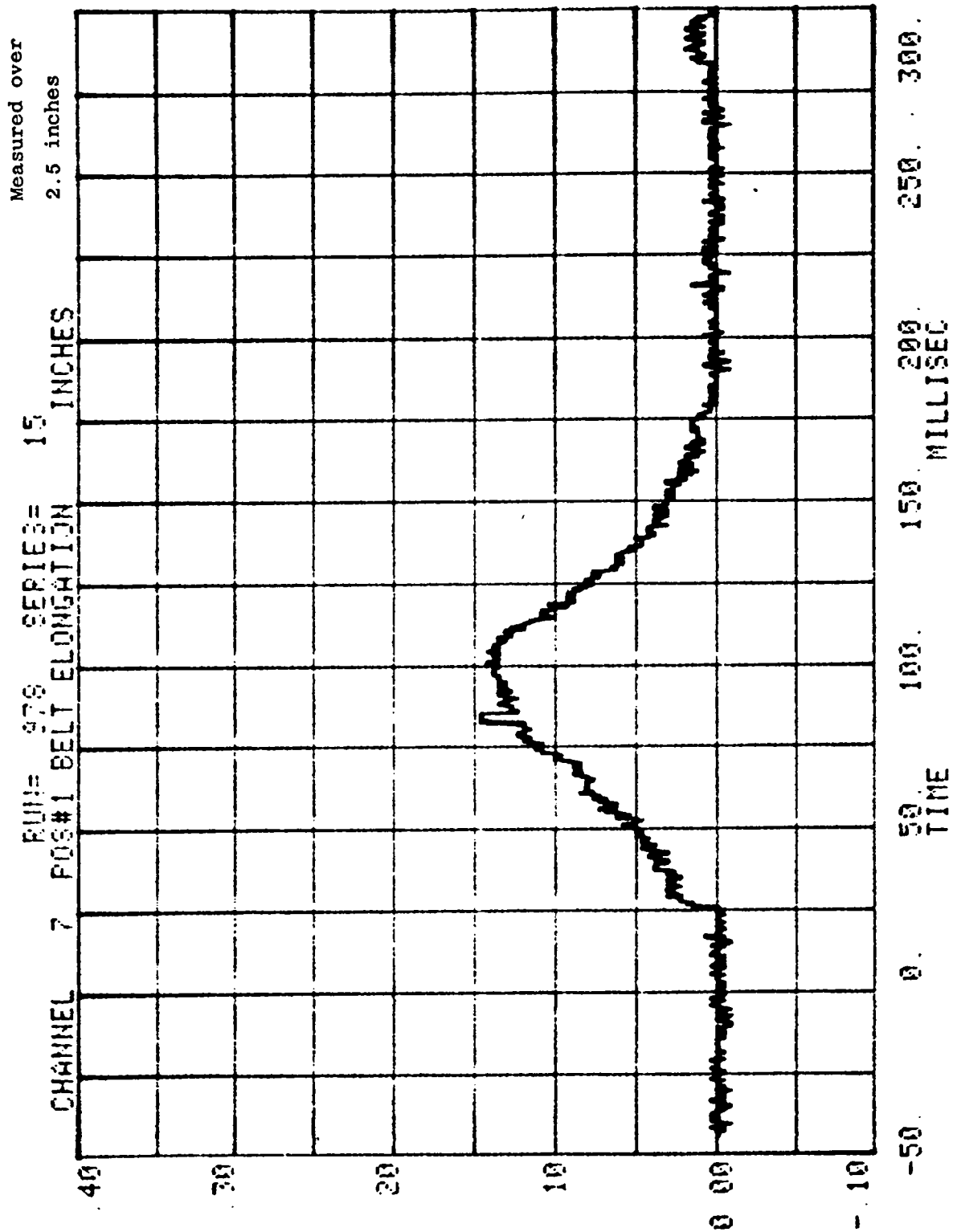
CHANNEL 21 F03#1 LEFT BELT 15 LBS.

RUN= 273 SERIES=



CHANNEL 23 POS#1 TOPSO BELT RUN= 978 SERIES= 15 L88





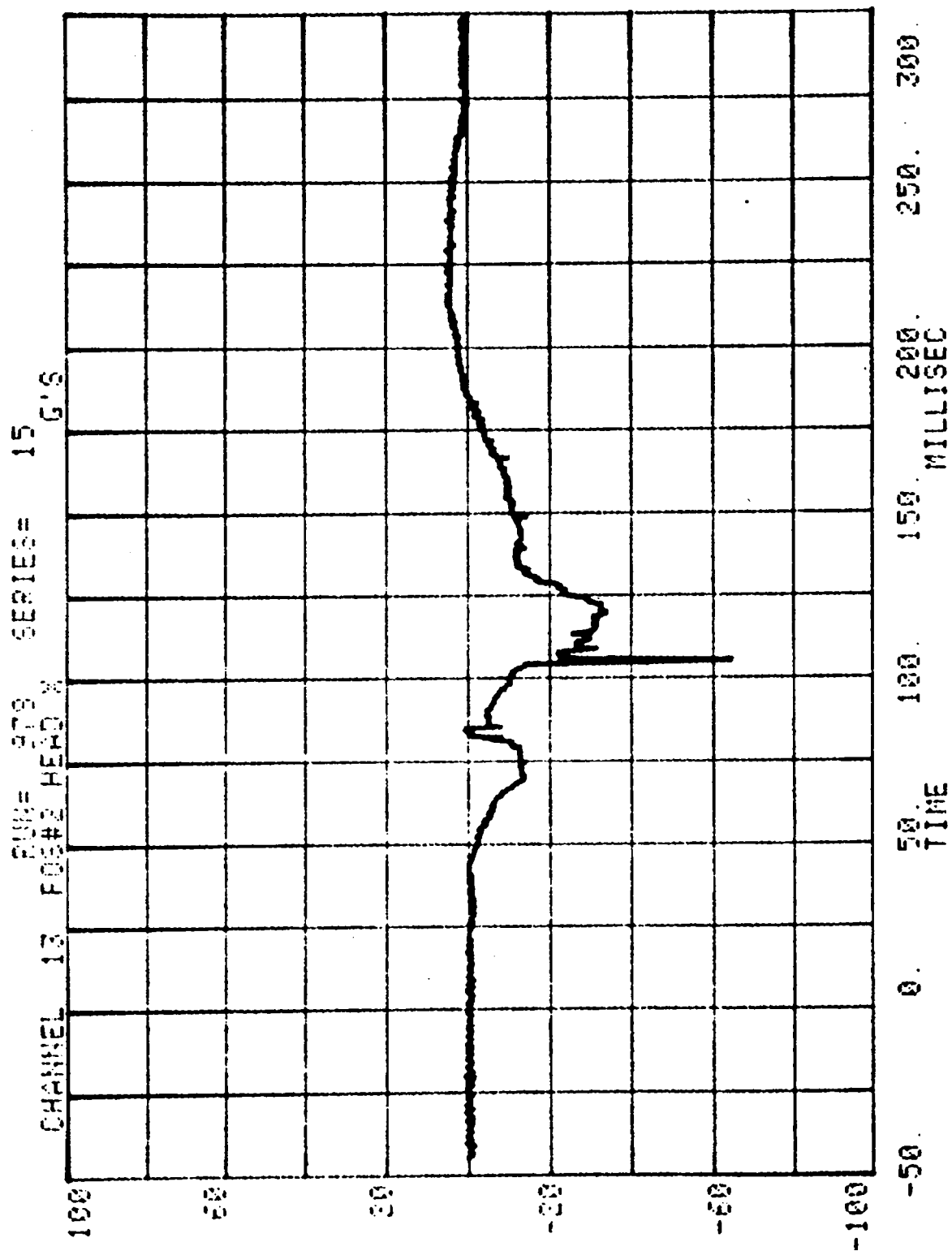
HEAD INJURY CRITERION
HEAD SEVERITY INDEX
35MS. MAXIMUM DURATION

NCAP 190

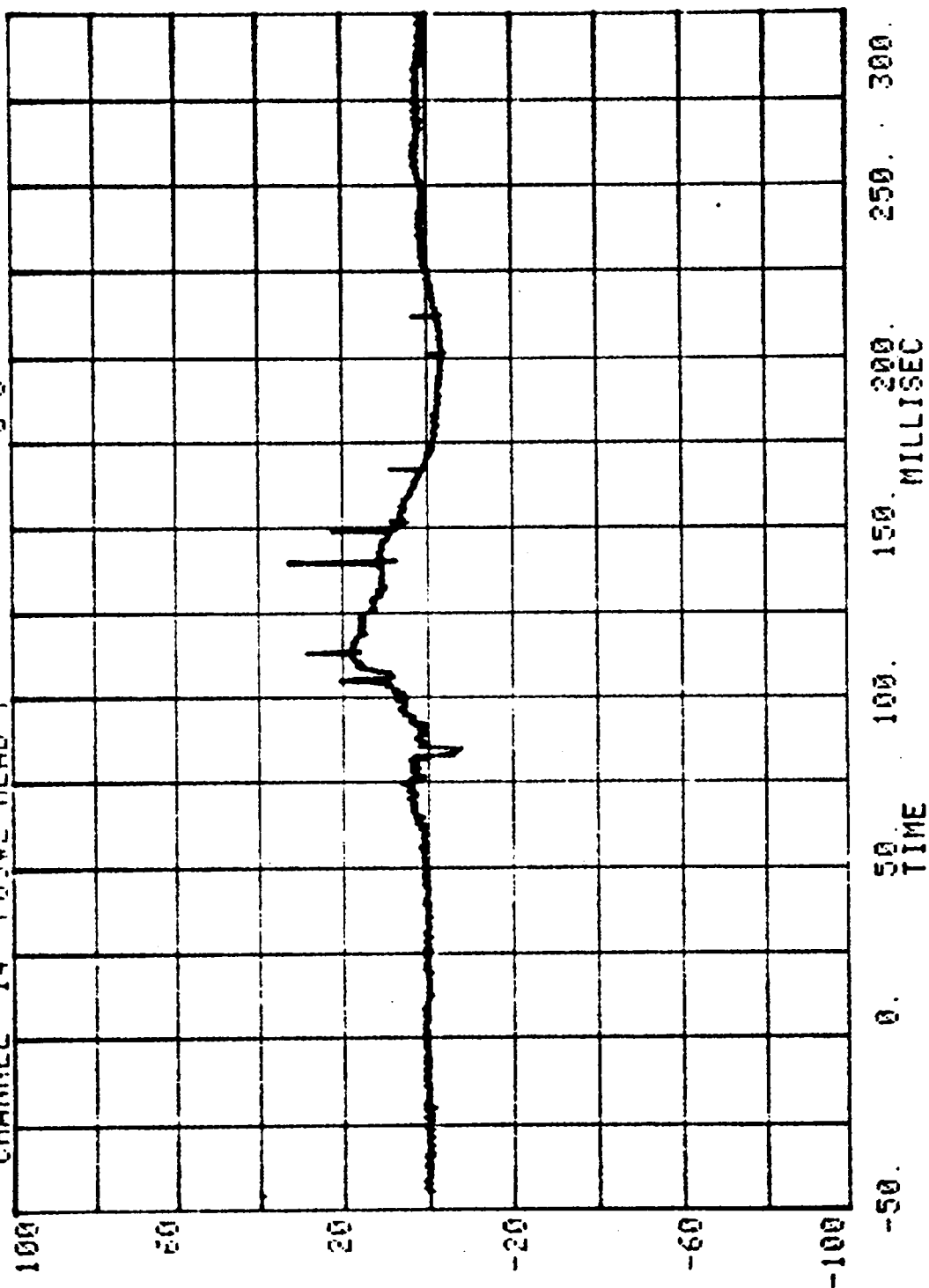
RUN= 978

POS #2 HEAD R

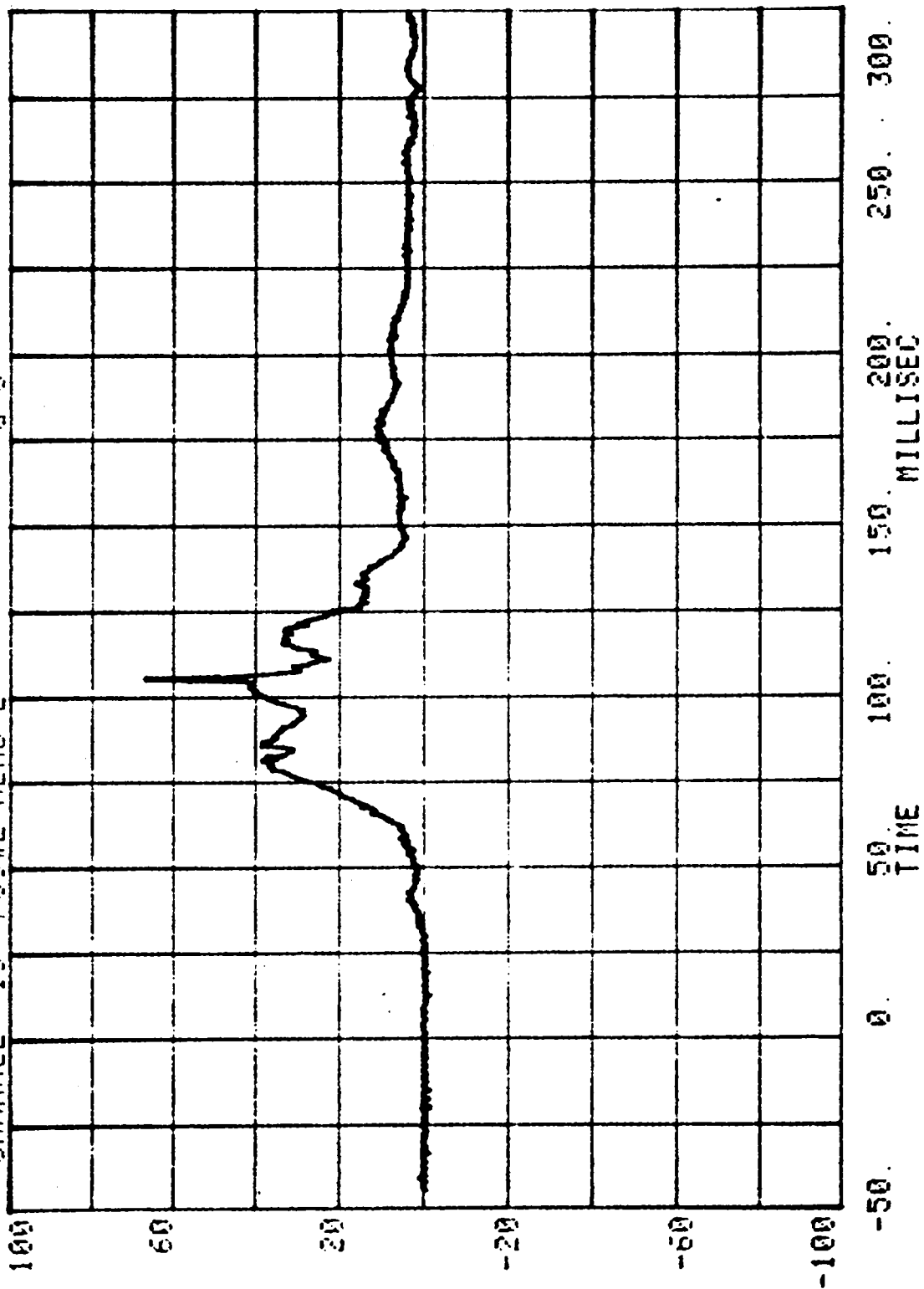
HIC= 426.4 FROM T1= .06925 TO T2= .12525
AVERAGE ACCELERATION BETWEEN T1 AND T2= 42 G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX= 705.6



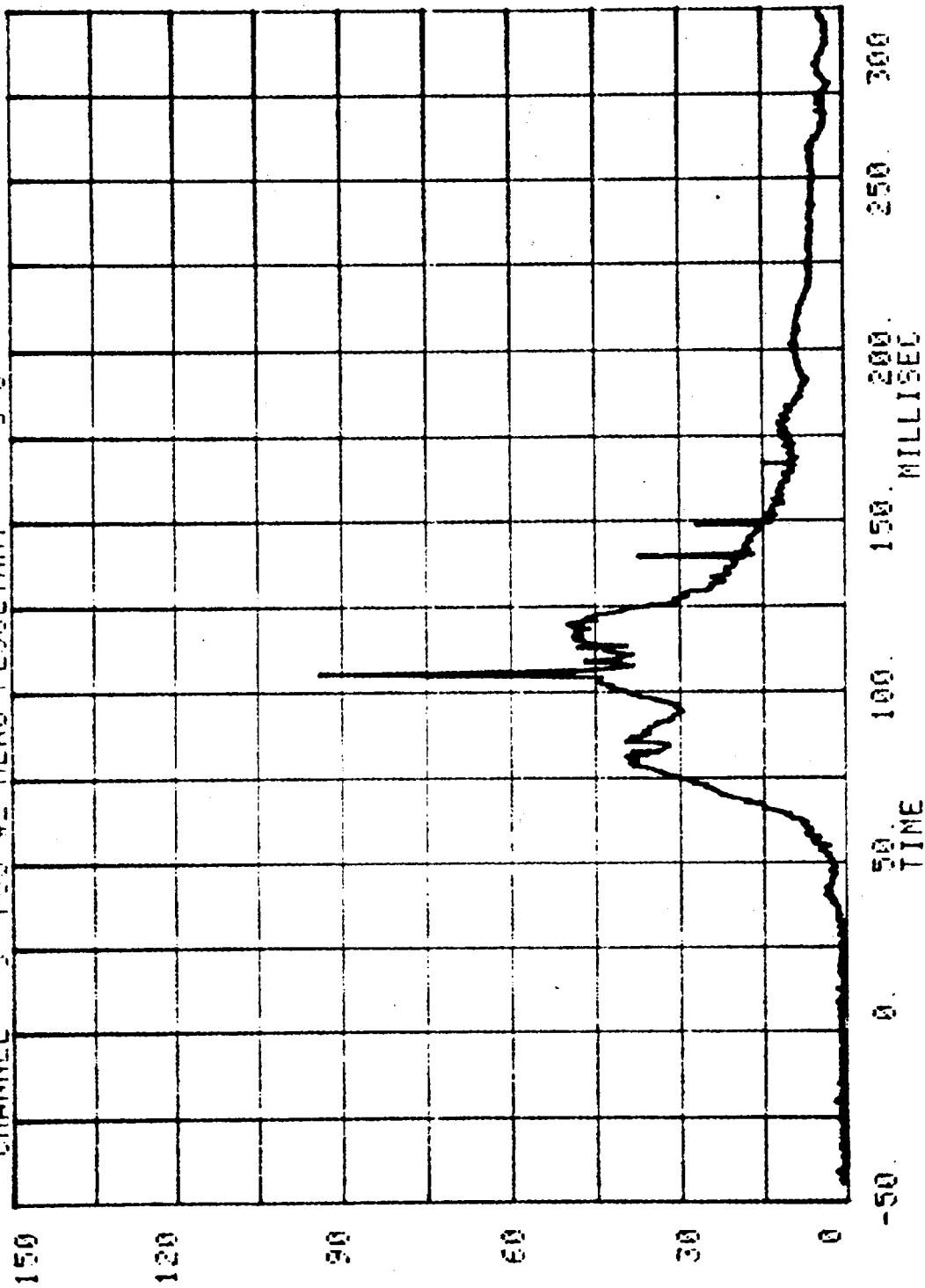
CHANNEL 14 RUN= 978 SERIES= 15
POS#2 HEAD Y G'S



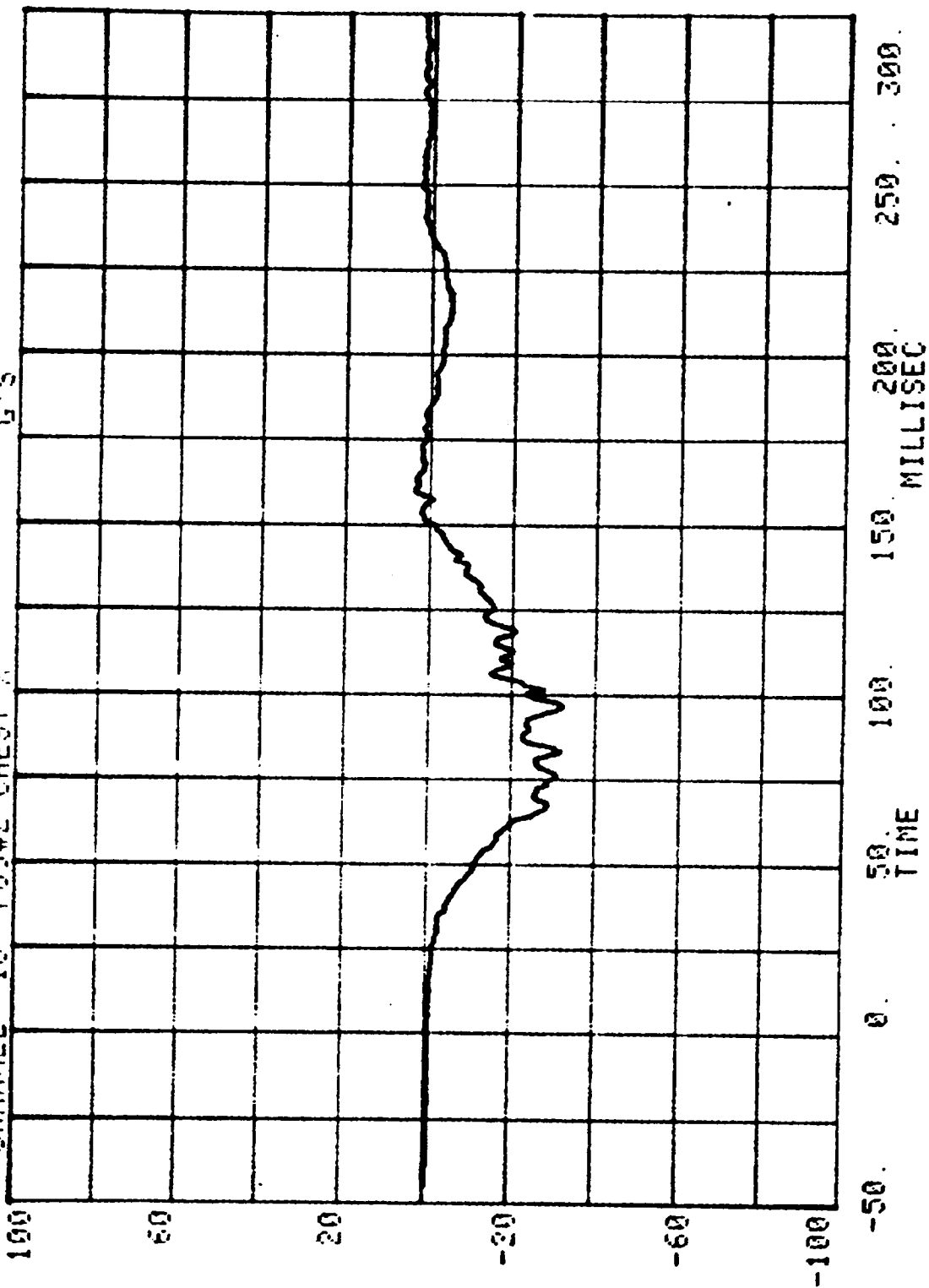
CHANNEL 15 RUN= 978 SERIES= 15 G'S
POS#2 HEAD 2



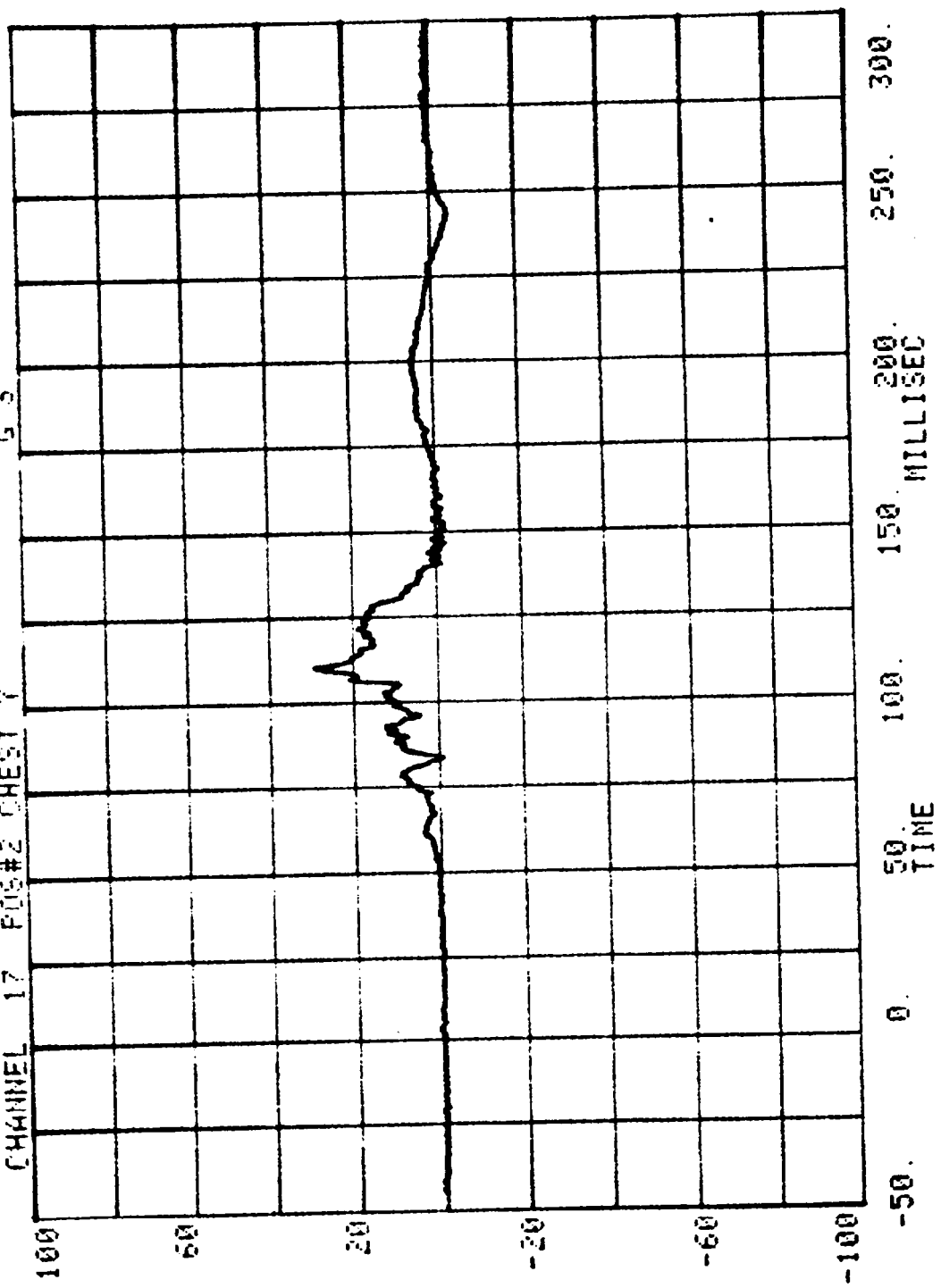
CHANNEL 3 POS #2 HEAD RESULTANT 15 5'S

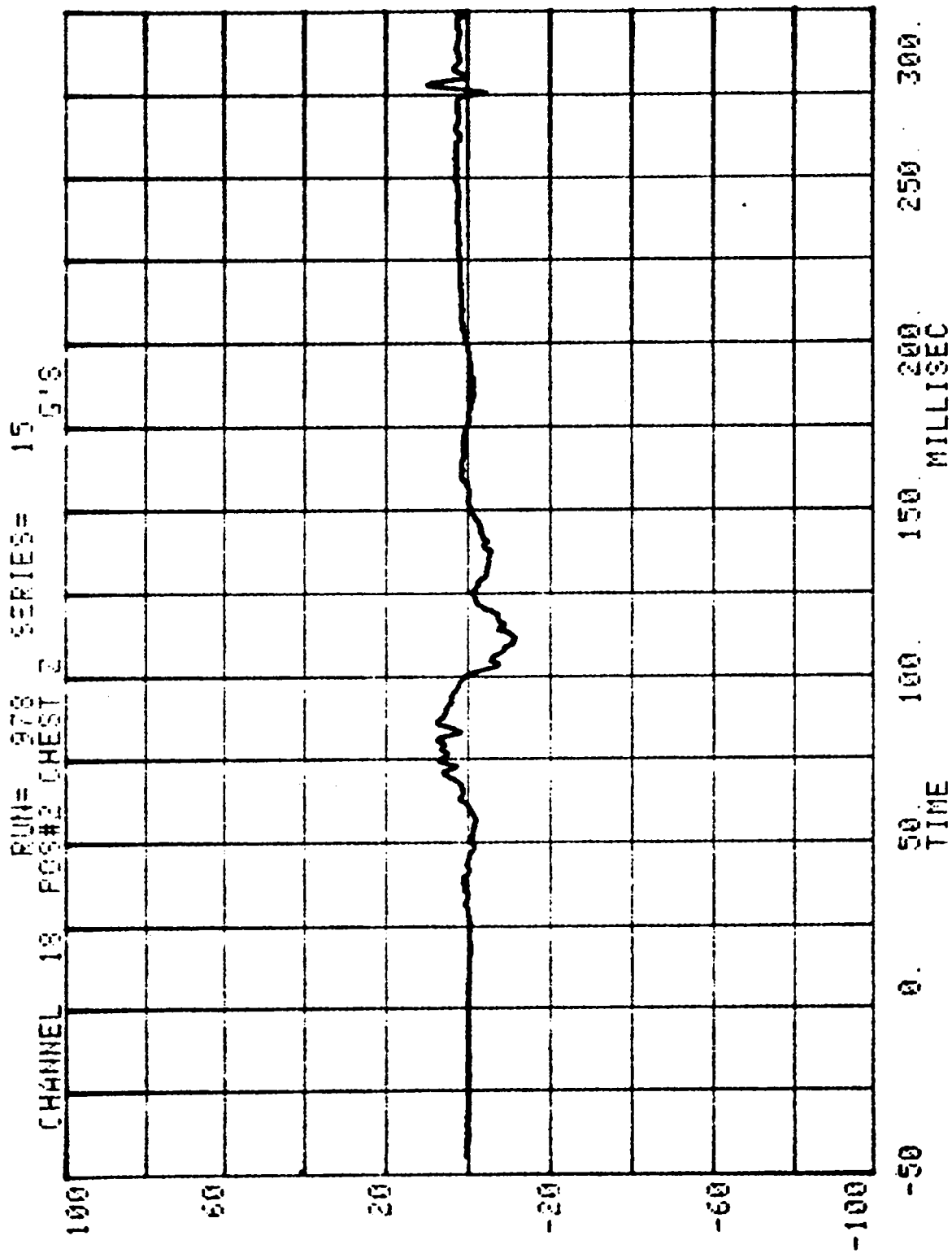


CHANNEL 16 RUN= 978 SERIES= 15
POS#2 CHEST X G'S

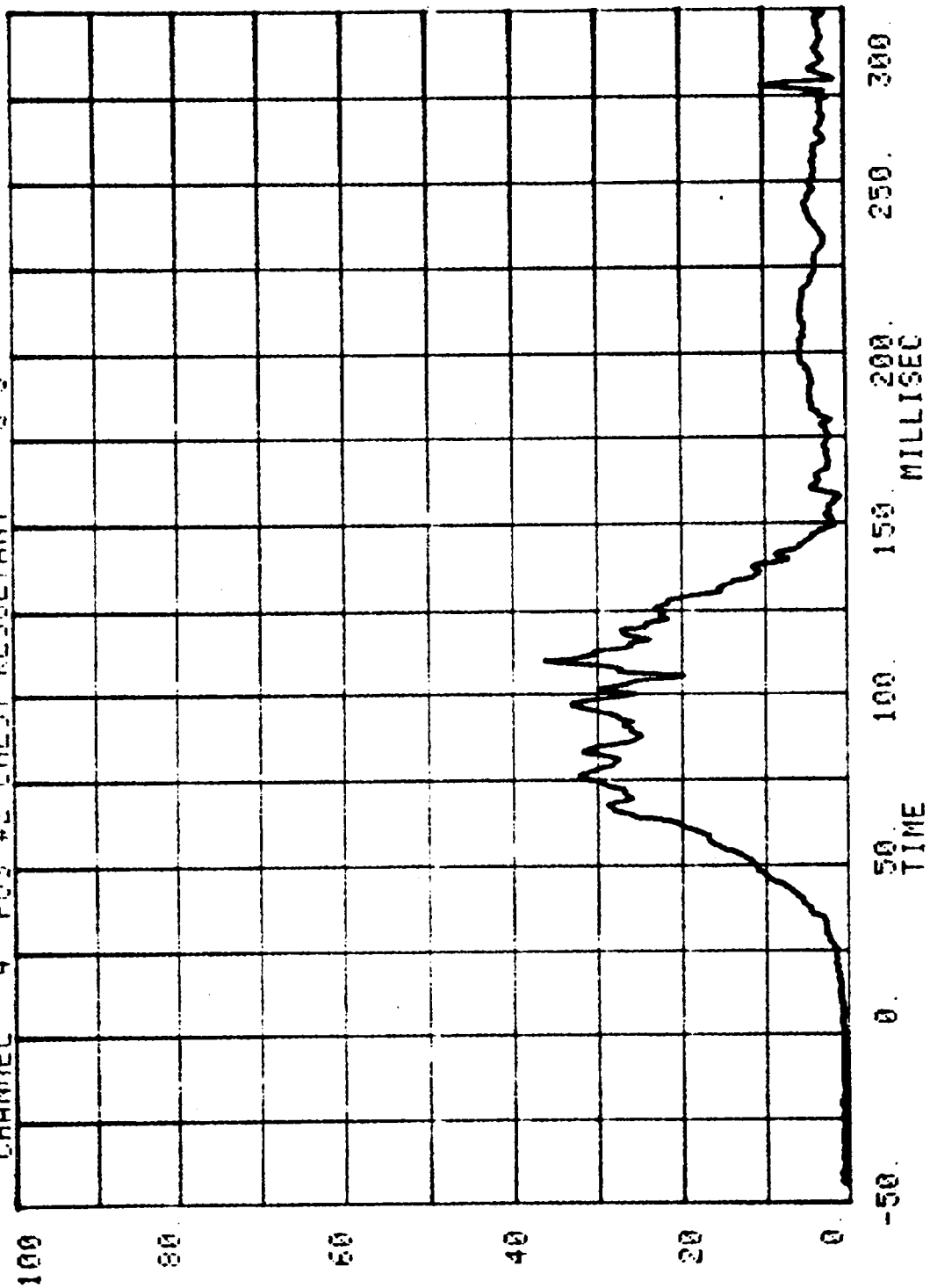


CHANNEL 17 RUN= 378 SERIES= 15
POS#2 CHEST Y G'S

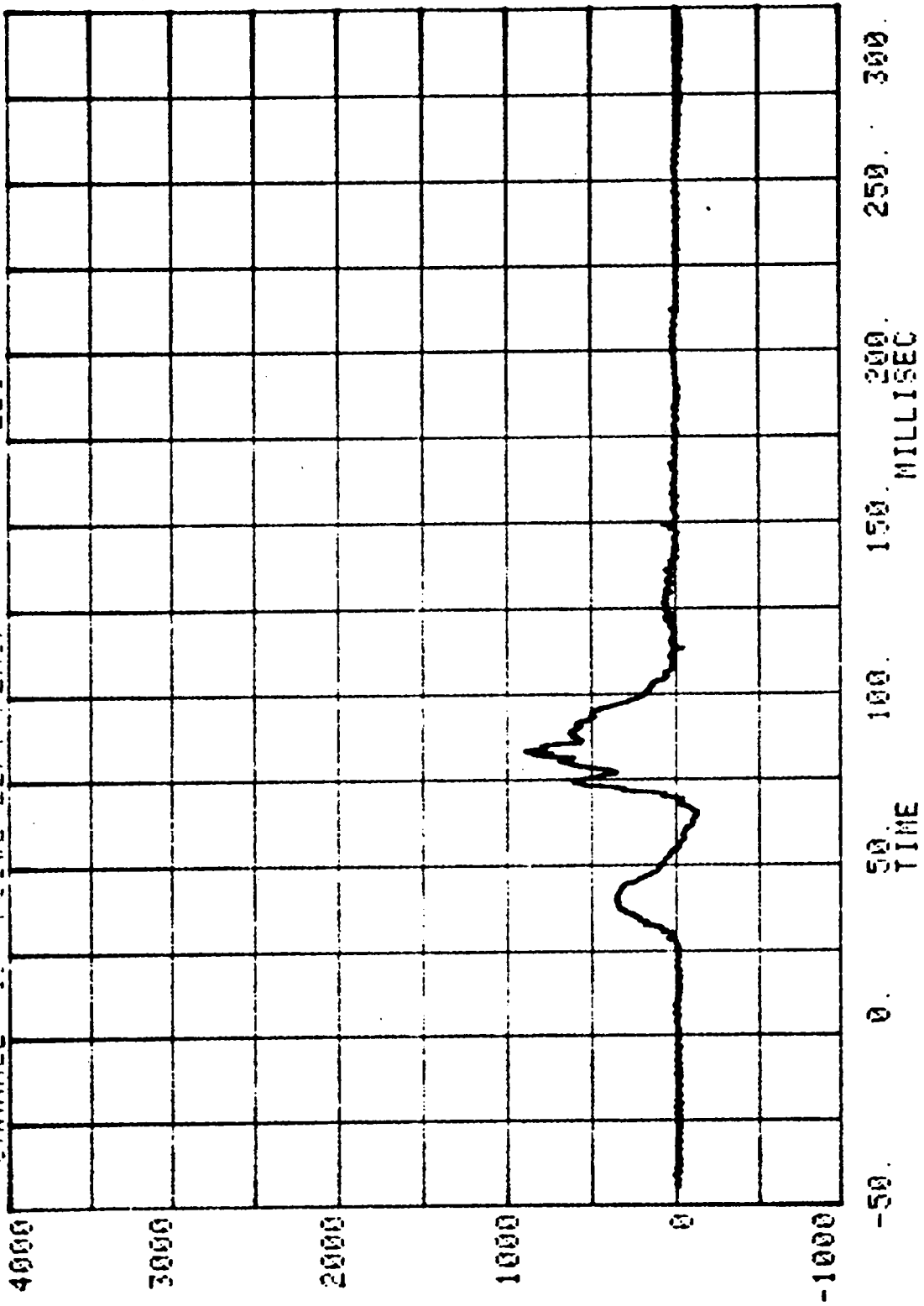




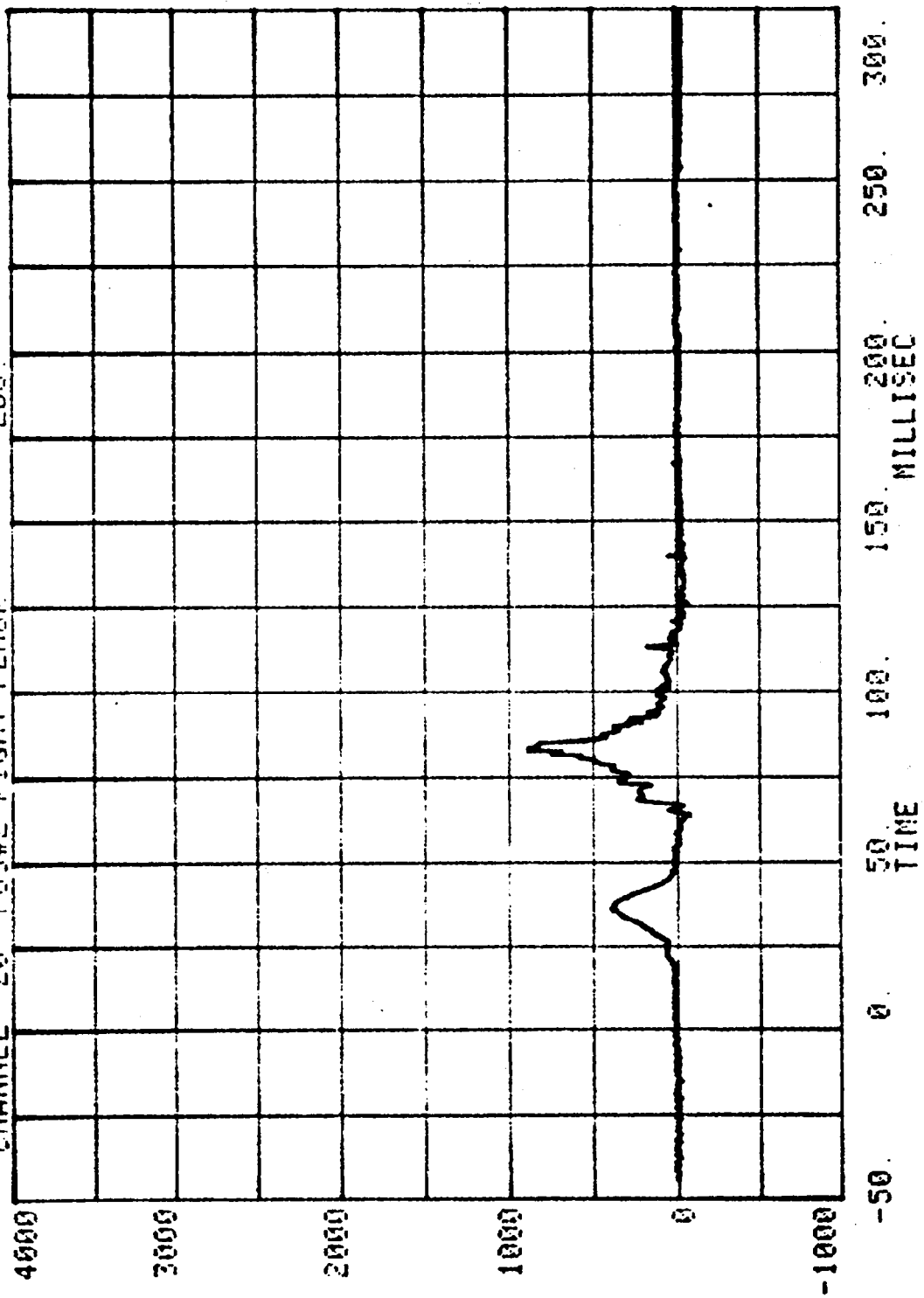
CHANNEL 4 POS #2 CHEST RESULTANT 5'S



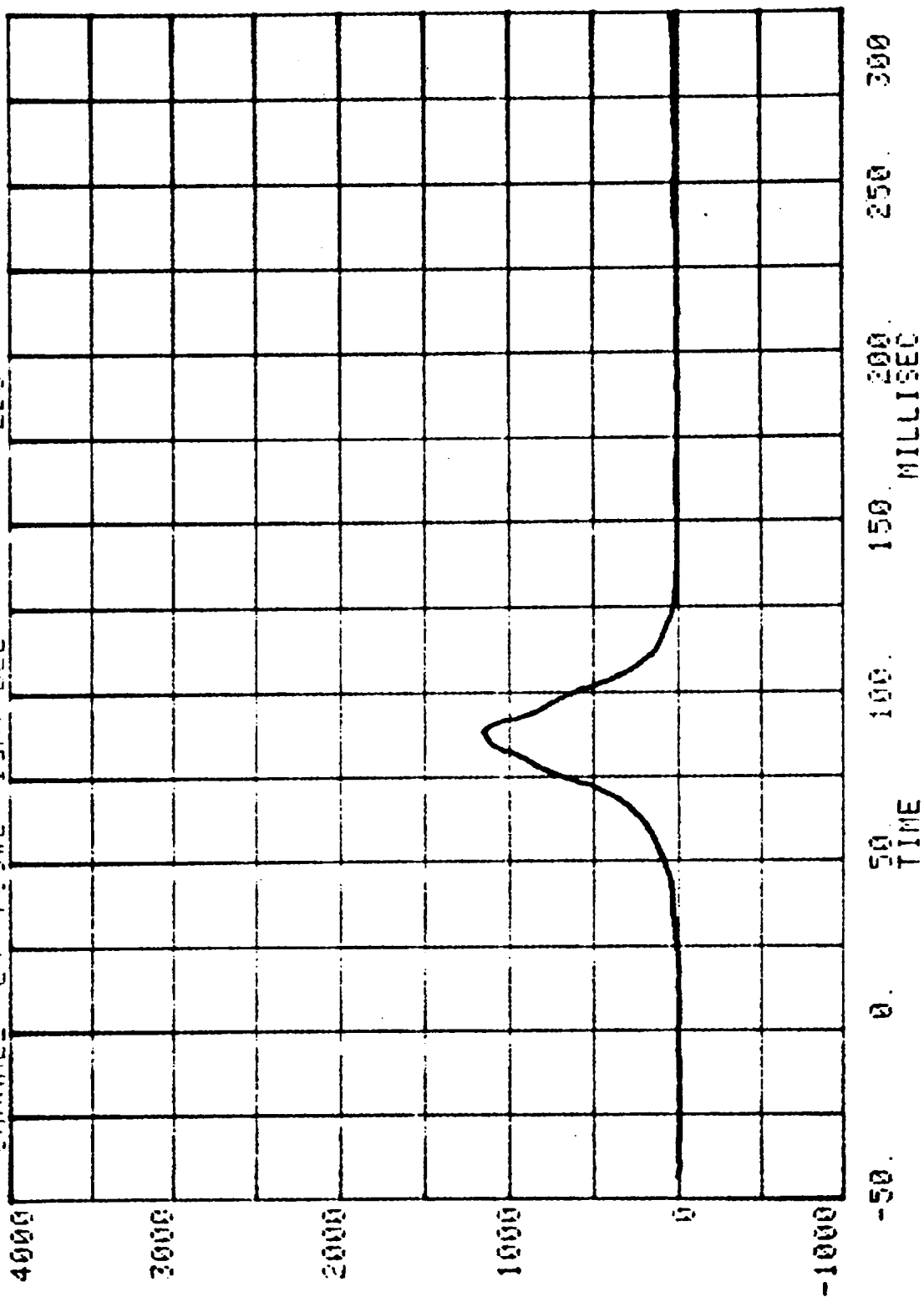
CHANNEL 19 FUN= 978 SERIES= 15
PCS#2 LEFT FEMUR LBS



CHANNEL 20 POS#2 RIGHT FEMUR
RUN= 978 SERIES= 15 LBS.

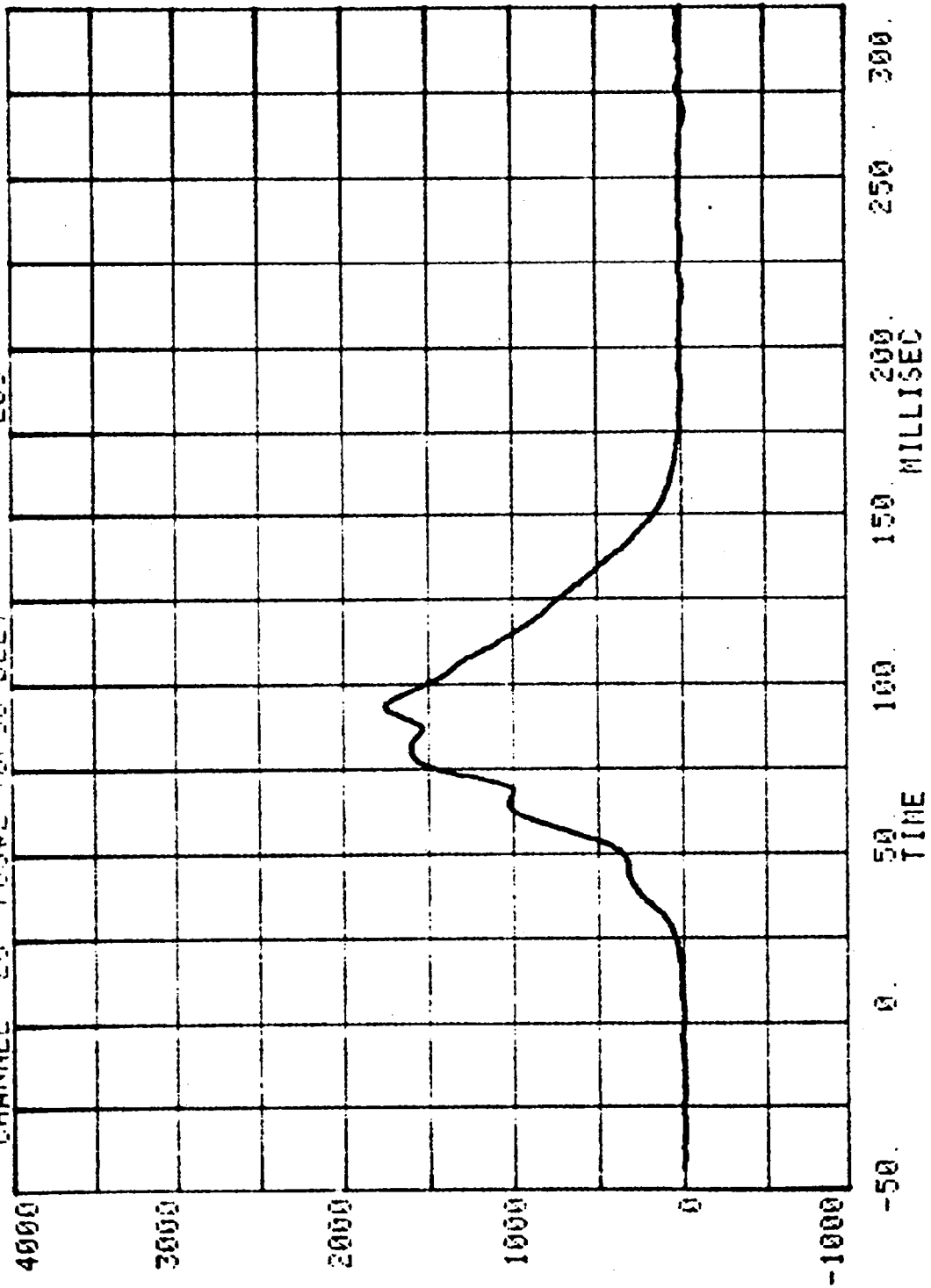


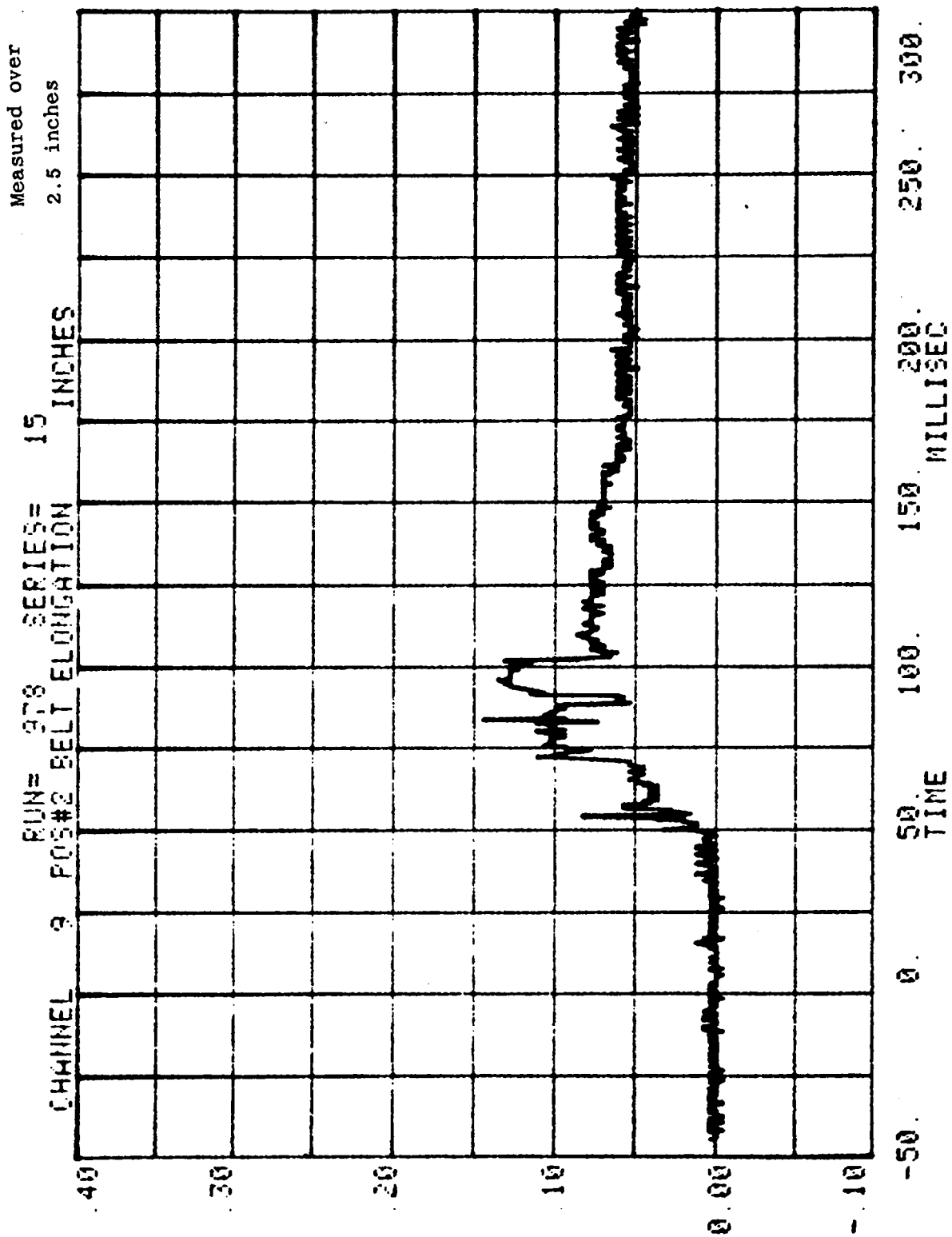
CHANNEL 25 POS#2 RIGHT BELT
RUN= 378 SERIES= 15 LBS

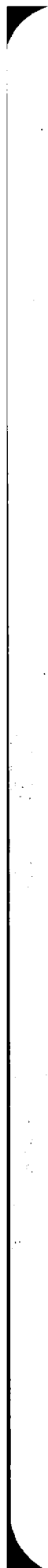


CHANNEL 26 POS#2 TOPSO BELT LBS

RUN= 978 SERIES= 15







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.

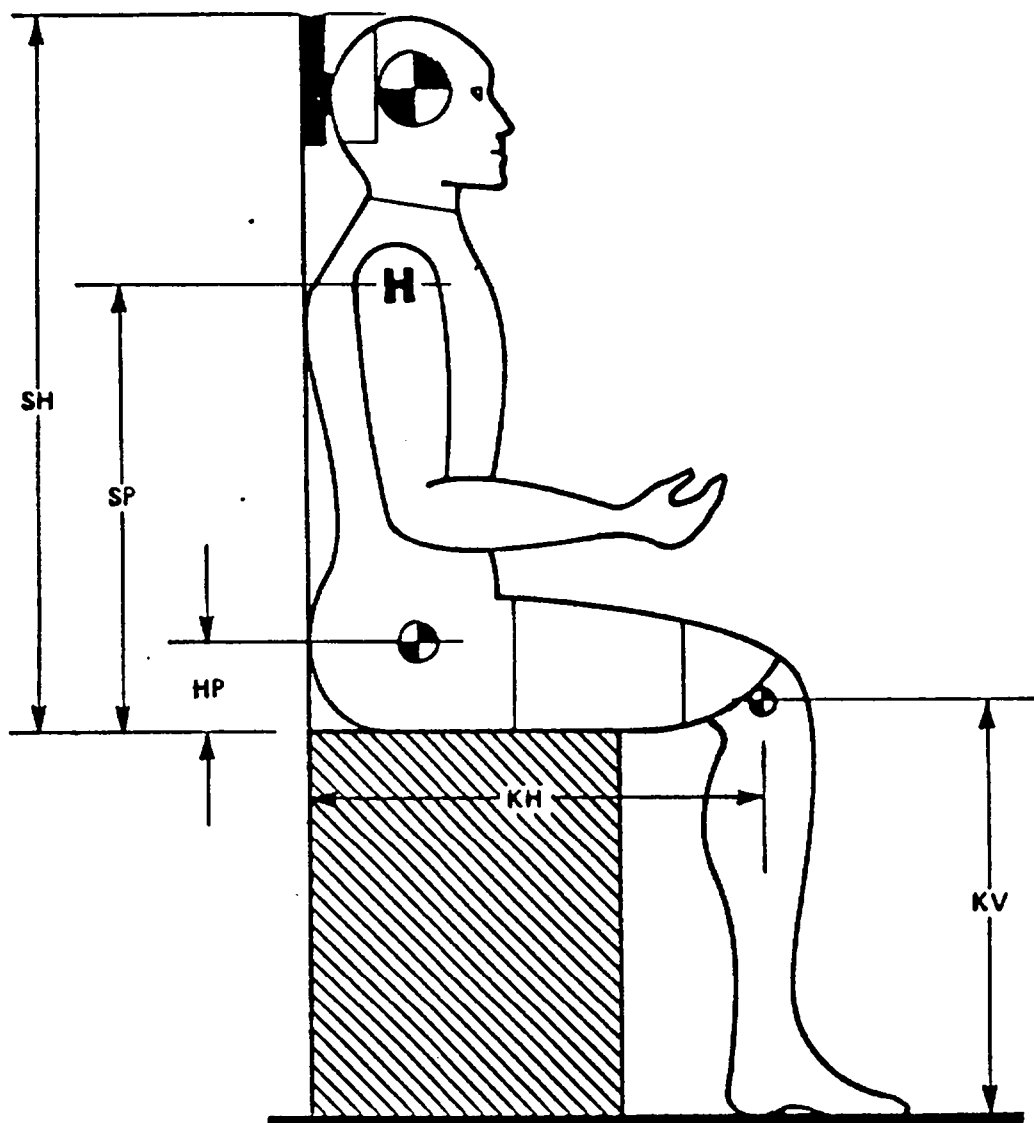
Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Data</u>
1019	04-05-90
1022	04-05-90

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 No. 6525-V-1.

Figure 10
DUMMY CONFIGURATION DIMENSIONS



PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 1019

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXXX	4-5-90	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXXX	1	
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"	20.4 "	"
KV - Knee Pivot from floor	19.3 to 19.9"	19.5 "	"
SW - Shoulder Width	17.8 to 18.4"	18.3 "	"
HW - Hip Width	14.0 to 15.4"	14.9 "	"

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		4-5-90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		1	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-70 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		33-40 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	255.2 G's	G's
b. peak lateral accel.	<= 10 G's	8.5 G's	G's
c. Time above 100 G's	0.9 to 1.5 ms.	1.13 ms	ms

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

TECHNICIAN'S NAME: IVAN MINKEWICZ

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.	23.5 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.1 G's	
c. Peak Resultant Head Acceleration		26 G's max.	25.45 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.6 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	27.16 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	6.32 ms	
g. Max. Head Rotation		63 to 73 deg.	71.38 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.	28.65 ms	
	Displ.	2.1 to 3.1"	2.64 "	
60 deg.	Time	40.3 to 51.7 ms.	43.77 ms	
	Displ.	4.3 to 5.3"	4.98 "	
Maximum	Time	53.2 to 66.8 ms.	57.17 ms	
	Displ.	5.0 to 6.0"	5.62 "	
60 deg.	Time	67.0 to 83.0 ms.	72.67 ms	
	Displ.	4.3 to 5.3"	4.86 "	
30 deg.	Time	85.4 to 104.6 ms.	90.4 ms	
	Displ.	2.1 to 3.1"	2.12 "	
0 deg.	Time	101.0 - 123.0 ms.	105.53 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: IVAN MINKEWICZ

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)
3. ABDOMINAL COMPRESSION			
TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	27.5 lbs	
b. Force @ 0.75"	36 to 50 lbs.	42.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	58.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	83 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	31 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	39 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	49 lbs	
d. Return Angle	12 deg. maximum	7.5 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	1.57 "	
(3) Peak Resistive Force	2250 lbs maximum	2189 lbs	
(4) Internal Hysteresis	50 to 70%	62.1 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	14.1 fps	
(2) Peak Deflection	1.1" maximum	.98 "	
(3) Peak Resistive Force	1450 lbs maximum	1365 lbs	
(4) Internal Hysteresis	50 to 70%	52.4 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

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. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2175 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.75 ms	
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2477 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	

REMARKS:

TECHNICIAN'S NAME: IVAN MINKEWICZ

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	CK54	1-90	7-90
HY LATERAL--	ENDEVCO	GD98	1-90	7-90
HZ VERTICAL--	ENDEVCO	CD75	1-90	7-90
2. CHEST ACCELEROMETER--				
CX LONGITUDINAL--	CEC	A115	1-90	7-90
CY LATERAL--	ENDEVCO	CS09	1-90	7-90
CZ VERTICAL--	CEC	A29	1-90	7-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	548	12-89	6-90
RIGHT SIDE	GSE	549	12-89	6-90
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A160	1-90	7-90
2. TEST PROBE ACCELEROMETER--	CEC	A161	1-90	7-90
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS- DUCER INC	20051	2-90	8-90
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	2-90	8-90
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	2-90	8-90

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXXX	4-5-90	
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"	20.4 "	"
KV - Knee Pivot from floor	19.3 to 19.9"	19.7 "	"
SW - Shoulder Width	17.8 to 18.4"	18.3 "	"
HW - Hip Width	14.0 to 15.4"	15.0 "	"

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		4-5-90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		3	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-70 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		33-40 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	217.6 G's	G's
b. peak lateral accel.	<= 10 G's	4.3 G's	G's
c. Time above 100 G's	0.9 to 1.5 ms.	1.25 ms	ms

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

TECHNICIAN'S NAME: IVAN MINKEWICZ

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1022

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST			
a. Pendulum Speed	21.5 to 25.5 fps.	23.6 fps	
b. Pend. Avg. Decel. over t3 to t2	20 to 24 G's	23.9 G's	
c. Peak Resultant Head Acceleration	26 G's max.	25.81 G's	
d. Pendulum Decel. (t2-t1)	≤ 3 ms.	2.6 ms	
e. Pendulum Decel. (t3-t2)	25 to 30 ms.	26.66 ms	
f. Pendulum Decel. (t4-t3)	≤ 10 ms.	6.45 ms	
g. Max. Head Rotation	63 to 73 deg.	72.95 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.	28.27 ms	
	Displ.	2.1 to 3.1"	2.44 "	
60 deg.	Time	40.3 to 51.7 ms.	42.66 ms	
	Displ.	4.3 to 5.3"	4.74 "	
Maximum	Time	53.2 to 66.8 ms.	57.54 ms	
	Displ.	5.0 to 6.0"	5.54 "	
60 deg.	Time	67.0 to 83.0 ms.	74.65 ms	
	Displ.	4.3 to 5.3"	4.71 "	
30 deg.	Time	85.4 to 104.6 ms.	91.89 ms	
	Displ.	2.1 to 3.1"	2.22 "	
0 deg.	Time	101.0 - 123.0 ms.	108.01 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: IVAN MINKEWICZ

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1022

		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.	26 lbs	
b. Force @ 0.75"	36 to 50 lbs.	40 lbs	
c. Force @ 1.0"	50 to 63 lbs.	56.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	80.5 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	29 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	41 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	52 lbs	
d. Return Angle	12 deg. maximum	10 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	1.6 "	
(3) Peak Resistive Force	2250 lbs maximum	2064 lbs	
(4) Internal Hysteresis	50 to 70%	54.5 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	1.09 "	
(3) Peak Resistive Force	1450 lbs maximum	1213 lbs	
(4) Internal Hysteresis	50 to 70%	50.2 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1022

		PRE-TEST (if required)	POST-TEST (if required)
TEST PARAMETER	SPECIFICATION		
6. KNEE IMPACT TEST			
A. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2108 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.875 ms	
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2104 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.875 ms	

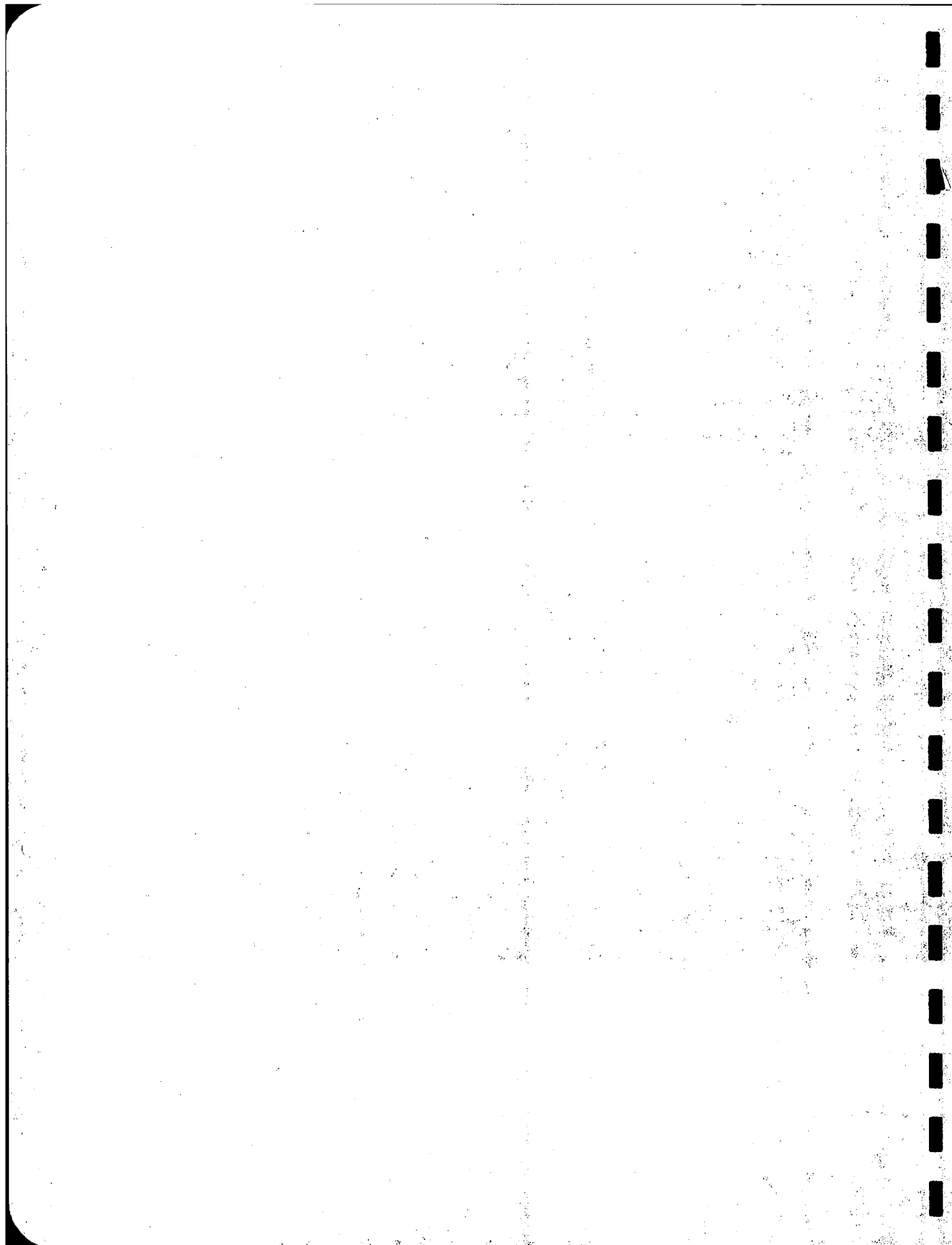
REMARKS:

TECHNICIAN'S NAME: IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER 1022

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CP30	3-90	9-90
HY LATERAL--	ENDEVCO	CX05	3-90	9-90
HZ VERTICAL--	ENDEVCO	DB47	3-90	9-90
2. CHEST ACCELEROMETER--				
CX LONGITUDINAL--	CEC	A74	11-89	5-90
CY LATERAL--	ENDEVCO	FH01	3-90	9-90
CZ VERTICAL--	CEC	A128	11-89	5-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	951	12-89	6-90
RIGHT SIDE	GSE	952	12-89	6-90
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A160	1-90	7-90
2. TEST PROBE ACCELEROMETER--	CEC	A161	1-90	7-90
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS- DUCER INC	20051	2-90	8-90
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	2-90	8-90
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	2-90	8-90



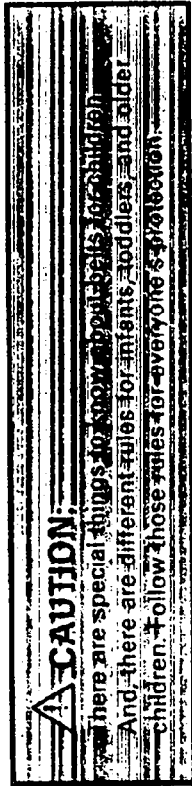
Appendix D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

HOW TO WEAR SAFETY BELTS PROPERLY

ADULTS

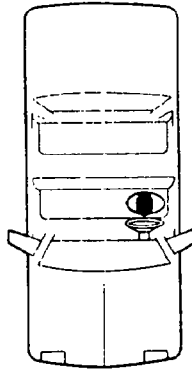
This part is only for people of adult size. If children will be riding in your Buick, see the section after this one, called "CHILDREN."



First, you'll want to know which restraint systems your car has. We'll start with the front seat and then go to the rear seat. Let's go right around your Buick.

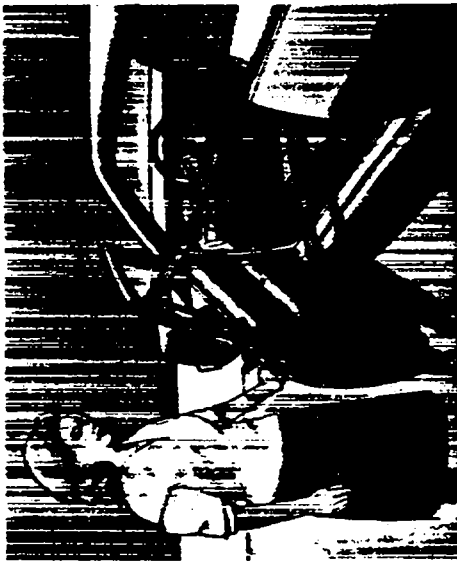
FRONT SEAT

Driver's Position



HOW TO WEAR SAFETY BELTS PROPERLY (Continued)

AUTOMATIC LAP-SHOULDER BELT



The driver has a door-mounted automatic lap-shoulder belt. It's called "automatic" because you don't have to buckle up when you get into your car.

D-3

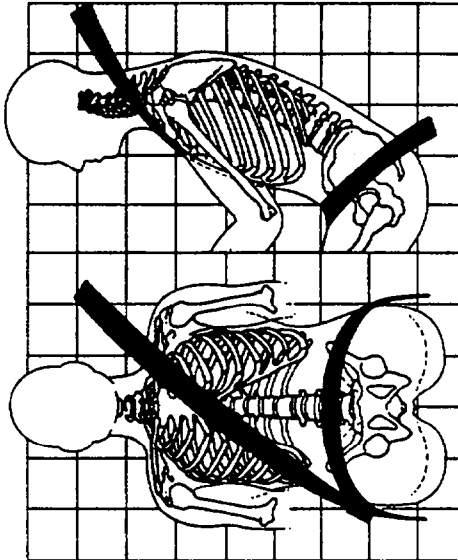
7776-15

And you don't have to unbuckle when you leave.



Just get in, close and lock your door. Adjust the seat (to see how, see Index under "Seats") so you can sit up straight.

The belt should fit like this...



HOW TO WEAR SAFETY BELTS PROPERLY (Continued)

The lap belt should be as low on the hips as possible. That applies belt force to the pelvic bones in a crash. And it means you'd be less likely to slide under the lap belt. If you slide under it, the belt would apply force at the abdomen. That could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces. The belt locks only if there's a sudden stop or a crash.

It's possible that an automatic belt could keep you from fully opening a door. That can happen if the door was slammed shut very hard. Just close the door all the way and then slowly open it. If that doesn't fix it, then your Buick needs service.

We hope you'll always want to keep your automatic belt buckled. However, you may need to unbuckle it in an emergency. And, you would need to unbuckle it to let someone get into the center front seat position, if your car has one. To unbuckle, just push the button here:



To reattach the automatic belt, just

- Close and lock the door.
- Adjust the seat (to see how, see Index under "Seat") so you can sit up straight.

- Pick up the latch plate.



- Pull the belt across you (don't let it get twisted).



- Push the latch into the buckle until it clicks.

HOW TO WEAR SAFETY BELTS PROPERLY (Continued)

If the shoulder belt is too tight, try this:

- Pull out the belt at least 5 inches (130 millimeters).

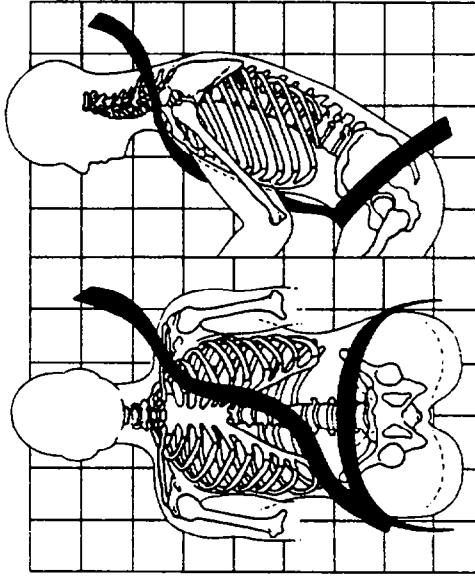


- You can add a small amount of slack. The system works like a window shade. To add a little slack, pull down on the shoulder belt - but no more than 1 inch (25 mm) - to make it not so tight.

If it's now too loose, pull it out as you did before and start again.

If you move around in the car and your shoulder belt becomes loose, be sure to make it tight again.

Q: What's Wrong With This?



- Let it go back all the way.



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

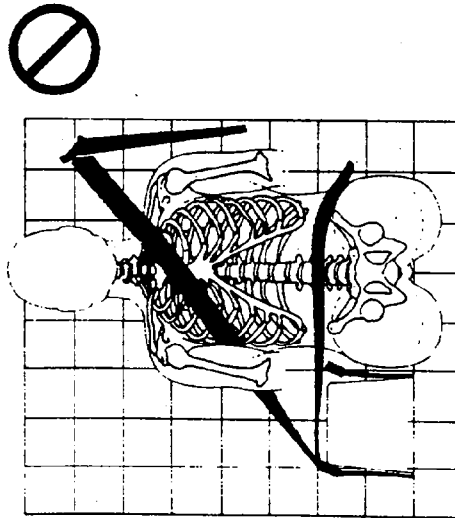
HOW TO WEAR SAFETY BELTS PROPERLY (Continued)

CAUTION:

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

Don't allow more than 1 inch (25 mm) of slack.

Q: What's Wrong With This?



A: The belt is buckled in the wrong place.

CAUTION:

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

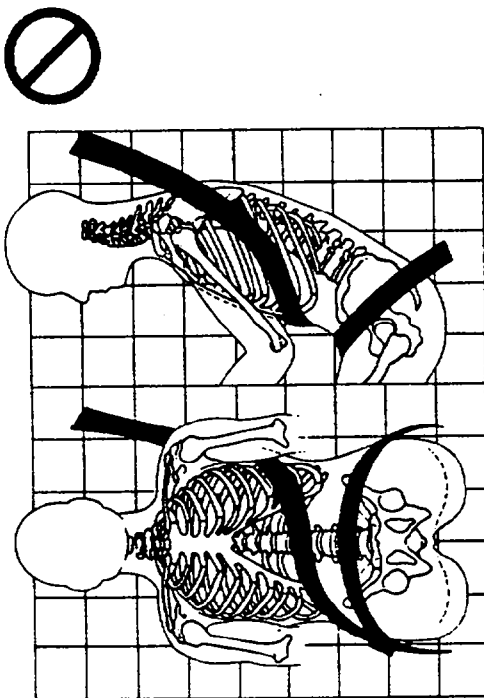
The safety belt light might come on as you're driving. Or, it might not go off after you start your Buick. If either of these happens to you, the safety belt retractor might not lock in a crash.

CAUTION:

If your safety belt light ever stays on, have your Buick fixed. If you don't you might not have the protection you'd need in a crash.

HOW TO WEAR SAFETY BELTS PROPERLY (Continued)

Q: What's Wrong With This?



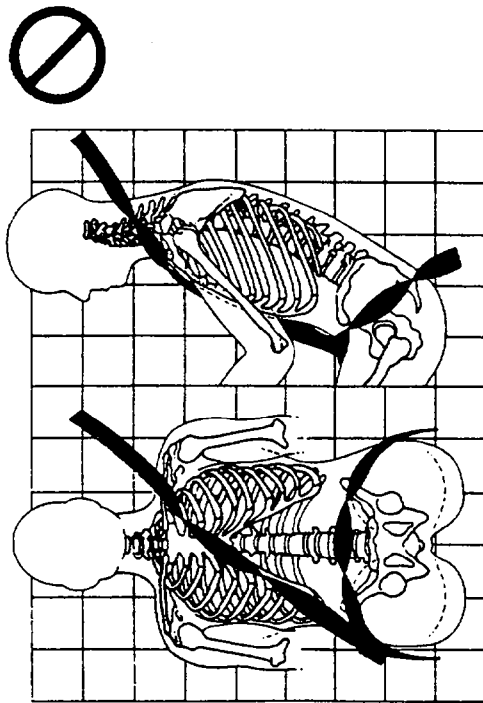
A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

CAUTION:

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

7776-15

Q: What's Wrong With This?



A: The belt is twisted across the person's body.

CAUTION:

You can be seriously injured by twisted belts. In a crash, you wouldn't have the full width of the belt to take impact forces. The twisted belt against your body could injure you. If a belt is twisted, make it straight (or ask your dealer to do that) so it can work properly.

HOW TO WEAR SAFETY BELTS PROPERLY (Continued)

Q: What's Wrong With This?

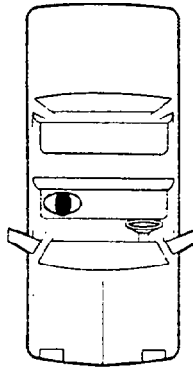


Remember, the best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus wouldn't be hurt in a crash. For pregnant women, it's important to wear the belt correctly. The belt should be worn across the hips and over the shoulder. It should be worn snugly and not be loose. It should be worn properly and not be worn incorrectly.

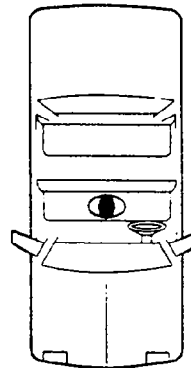


Right Front Passenger's Position

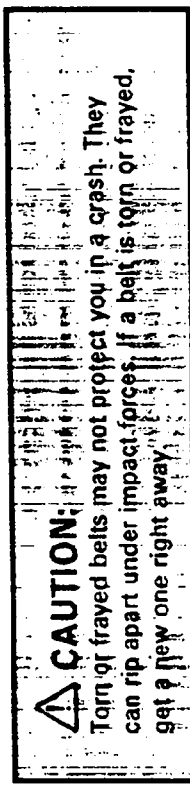
This position has an automatic lap-shoulder belt. To see how to make it work, please read the part above that says AUTOMATIC LAP-SHOULDER BELT.



Center Front Passenger's Position



A: The belt is torn.



CAUTION:

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

SAFETY BELT USE DURING PREGNANCY

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

LAP BELT



The position has a lap safety belt with no retractor. To make it longer, tilt the latch plate a little and pull it.

To make it shorter, pull the belt like this:



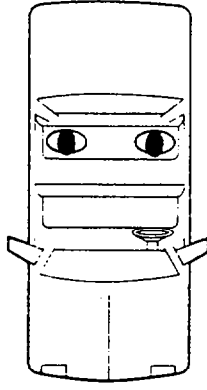
It is buckled, positioned, and released the same way as a lap-shoulder belt. When buckling, make sure the buckle faces upward or outward to allow quick release.

REAR SEAT

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

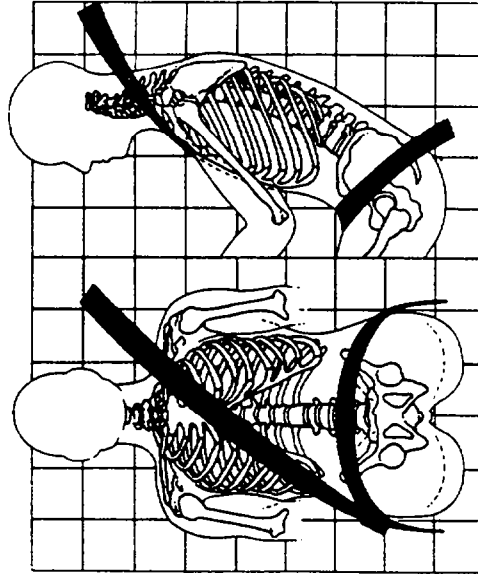
- People who aren't belted can be thrown out of the car in a crash.
- And, they can strike others in the car who are belted.

Outside Positions



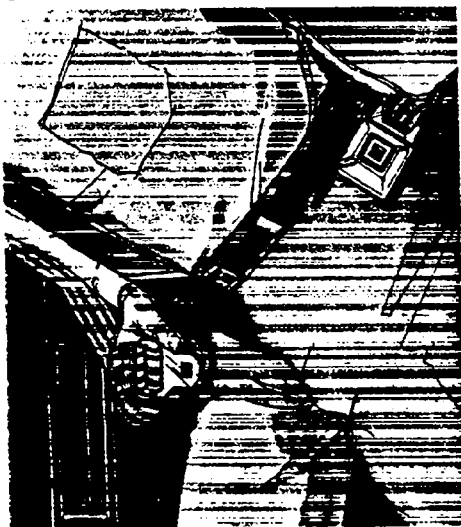
The two positions next to windows have lap-shoulder belts.

The belts should be worn like this:



HOW TO WEAR SAFETY BELTS PROPERLY (Continued)

- Pick up the latch plate.



- Pull the belt across you.



- Push the latch plate into the buckle until it clicks.

If the belt is not long enough, see "Safety Belt Extender" at the end of this section.

The lap part of the belt should be low. It needs to be snug below the hips, just touching the top of the thighs. If it's too loose, feed the lap part of the belt back into the retractor, near the door. This applies belt force to the pelvic bones. And it means you'd be less likely to slide under the lap belt in a crash. If you slide under it, the belt can apply force at the abdomen. That can cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take high belt forces.

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

CAUTION:

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

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

