

REPORT NUMBER: CAL-90-N11

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

ISUZU MOTORS LIMITED
1990 ISUZU AMIGO
2-DOOR MPV

NHTSA NUMBER: ML5700

CALSPAN TEST NUMBER: 7776-11

CALSPAN CORPORATION
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February 27, 1990



FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Market Incentives
400 Seventh Street, S.W.
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16. Abstract <p>A frontal load cell barrier test of a 1990 Isuzu Amigo 2-Door MPV was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on February 27, 1990.</p> <p>The impact speed was 35.0 mph and the ambient temperature at the barrier face at the time of impact was 31°F. The maximum post-test vehicle crush was 16.3 inches. The test vehicle was equipped with a manual 3-point continuous belt system at each of the front outboard seating positions.</p> <p>With regard to FMVSS 208-"Occupant Crash Protection," injury criteria, the passenger dummy appears to exceed the maximum chest criteria.</p>					
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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 ML5700

A load cell barrier consisting of 36 load cells was impacted by a 1990 Isuzu Amigo 2-Door MPV at a velocity of 35.0 mph. The test was performed at the Calspan Corporation Advanced Technology Center on February 27, 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 14 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. These ATDs had been used in previous tests, the driver (Serial No. 357), and the right front passenger (Serial No. 358) were used in tests ML5202 and ML0203. The Injury Criteria Values were not exceeded in these tests. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 65 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. Load cells B8 and D5 did not record accurately. These load cells were not used in the calculation of group sums.

The driver's head struck the steering wheel rim and hub; the HIC was 996.1. The maximum chest deceleration over 3 milliseconds was 55.7 g's and femur loads were 387.6 and 318.6 pounds.

The right front passenger's HIC was 743.5 and maximum chest deceleration over 3 milliseconds was 63.1 g's. Femur loads were 500.6 and 458.3 pounds.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1990 Isuzu Amigo 2-Door MPV
NHTSA No.: ML5700 VIN.: JAABLO1L4L5851063
Body Color: Black Date Of Manufacture: November 1989
Engine: 4 Cylinders; 138 C.I.D.; 2.3 Liters; - CC
X Gas; - Diesel; - Turbocharged
X Longitudinal; - Transverse
Transmission: 5 Speed; X Manual; - Automatic; - Overdrive
Final Drive: - Front Wheel; X Rear Wheel; - Four Wheel
Date Received: 2-1-90 Odometer Reading: 16 miles
- 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 26/29 psi, Rear 26/29 psi
Recommended Tire Size: P225/75R15
Recommended Cold Tire Pressure: Front 26 psi, Rear 26 psi
Tires on Vehicle: P225/75R15; Manufacturer: Yokohama
Number of Occupants: 2 Front; - Rear; - 3rd Seat; 2 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) = - lbs. (A)
No. of Occupants x 150 lbs. = - lbs. (B)
Rated Cargo and Luggage
Weight (RCLW) A-B = - lbs.
GVWR 3750 lbs. GAWR: Front 2200 lbs. Rear 2600 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 = 730 lbs. Right Rear = 690 lbs.
Left Front = 740 lbs. Left Rear = 740 lbs.
TOTAL FRONT WEIGHT = 1470 lbs. (51 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1430 lbs. (49 % of Total Vehicle Weight)
TOTAL DELIVERY WEIGHT = 2900 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2900 lbs.)
VCW = Vehicle Capacity Weight (- lbs.)
DSC = Designated Seating Capacity (2)
RCLW = VCW - 150 (DSC) = 300 lbs.
Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
Target Test Weight = 3528 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 312 POUNDS CARGO:

Right Front = 820 lbs. Right Rear = 940 lbs.
Left Front = 820 lbs. Left Rear = 960 lbs.
TOTAL FRONT WEIGHT = 1640 lbs. (46 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1900 lbs. (54 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3540 lbs.
Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 34.2 LF 33.5 RR 34.3 LR 33.7
Test Attitude: RF 33.7 LF 33.2 RR 33.2 LR 32.6
Wheel Base: 92.1 in.; C.G. = 49.7 in. rearward of front wheel C/L
Remarks: _____

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°
 Date of Test: February 27, 1990 Time of Test: 12:10
 Ambient Temperature: 31 °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 = 35.0 mph, secondary = 35.0 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>155.0</u>	C _L <u>157.5</u>	L <u>154.9</u>
	Post-test	= R <u>140.5</u>	C _L <u>141.2</u>	L <u>141.1</u>
	Crush	= R <u>14.5</u>	C _L <u>16.3</u>	L <u>13.8</u>

Distance from front of test vehicle to point of impact:

R 3.1" C_L 4.0" L 4.7"

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Steering Rim and Hub</u>	<u>No Contact</u>
Chest	<u>Lower Steering Rim</u>	<u>No Contact</u>
Abdomen	<u>No Contact</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>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
<u>Seat Movement</u>				
Seat Back Failure	<u>none</u>	<u>none</u>	<u>-</u>	<u>-</u>
Seat Shift (in.)	<u>0.0</u>	<u>0.0</u>	<u>-</u>	<u>-</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.: ML5700 Vehicle: 1990 Isuzu Amigo 2-Door MPV

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-241.0	-35.8	111.6	265.7
Position #2 - Passenger	-28.2	18.6	70.5	71.0

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-56.0	-24.3	22.2	55.7
Position #2 - Passenger	-60.8	28.5	23.8	63.1

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	387.6	318.6
Position #2 - Passenger	500.6	458.3

	MAXIMUM FORCE - SEAT BELT LOADS (lbs.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	2231.1	-	1938.4
Position #2 - Passenger	2355.5	2272.0	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (SEC)	t ₂ (SEC)	Average Acceleration t ₁ TO t ₂
Position #1 - Driver	996.1	.05385	.08812	61.0
Position #2 - Passenger	743.5	.05640	.09240	53.2

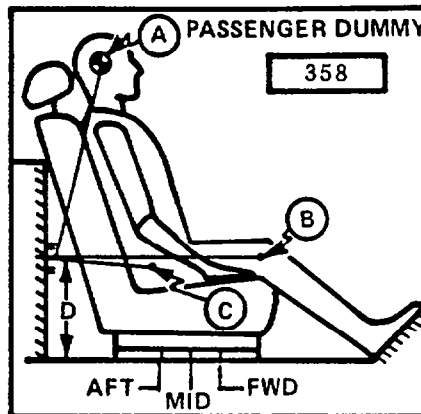
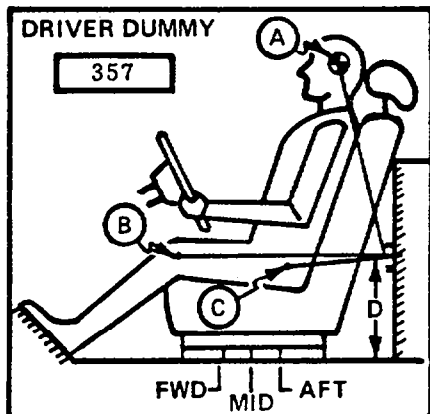
HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

Test No.: ML5700 Vehicle: 1990 Isuzu Amigo 2-Door MPV

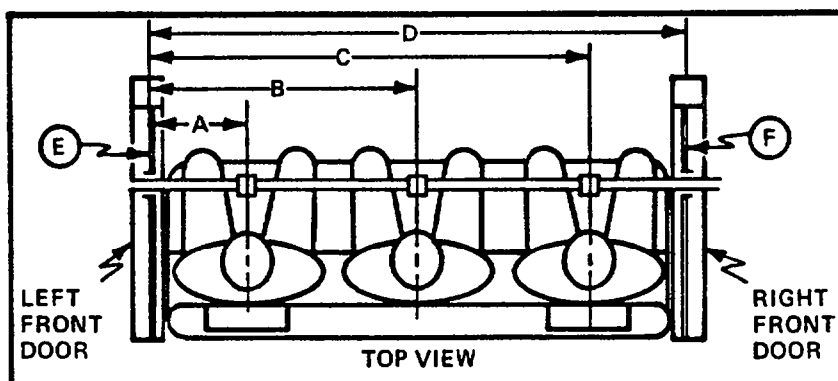
<u>SEAT TYPE:</u>	<u>ADJUSTER TYPE:</u>	<u>BUCKET SEAT BACK TYPE:</u>
<u> </u> - Bench	<u> X</u> Manual	<u> </u> - Fixed
<u> X</u> Bucket	<u> </u> - Power	<u> X</u> Adjustable Reclining
<u> </u> - Split Bench		



MEASUREMENT LOCATION

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

A = <u>23.5</u> in. <u>8</u> Degrees	A = <u>22.2</u> in. <u>8</u> Degrees
B = <u>25.2</u> in. <u>92</u> Degrees	B = <u>25.6</u> in. <u>93</u> Degrees
C = <u>9.8</u> in. <u>110</u> Degrees	C = <u>10.3</u> in. <u>110</u> Degrees
D = <u>14.5</u> in.	D = <u>14.5</u> in.



357

DUMMY ID

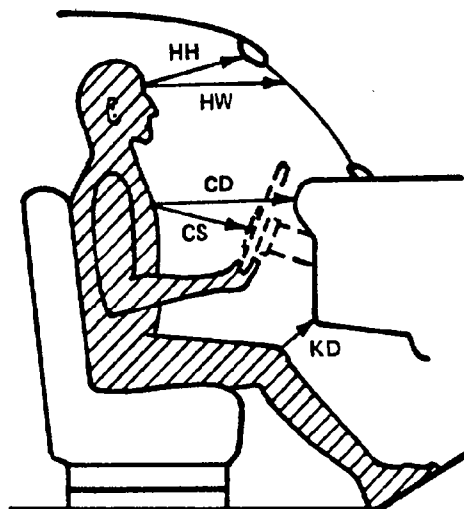
358

A = Left Door to Driver Centerline	<u>12.2</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>53.4</u> in.
E, F = Window Glass Height (Right and Left Must Be Equal)	<u>12.5</u> in.

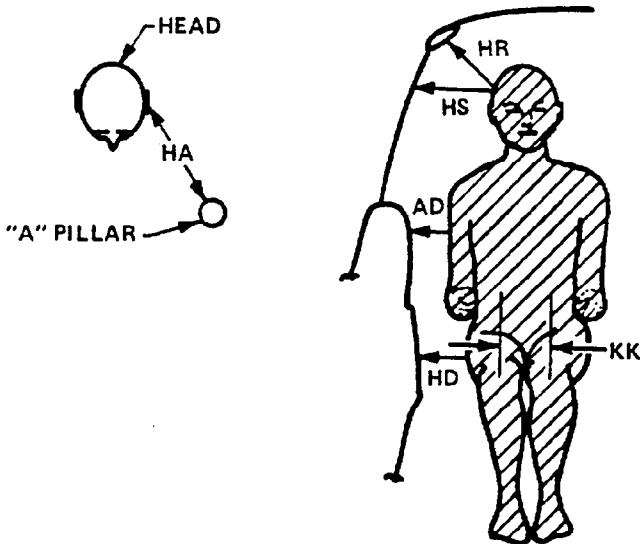
Figure 2

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	18.1	18.4
HW	22.3	22.7
CD	22.3	23.5
CS	15.2	-
KDL	6.7	5.9
KDR	7.5	5.9
SA	See Note	See Note
TA	21°	21°



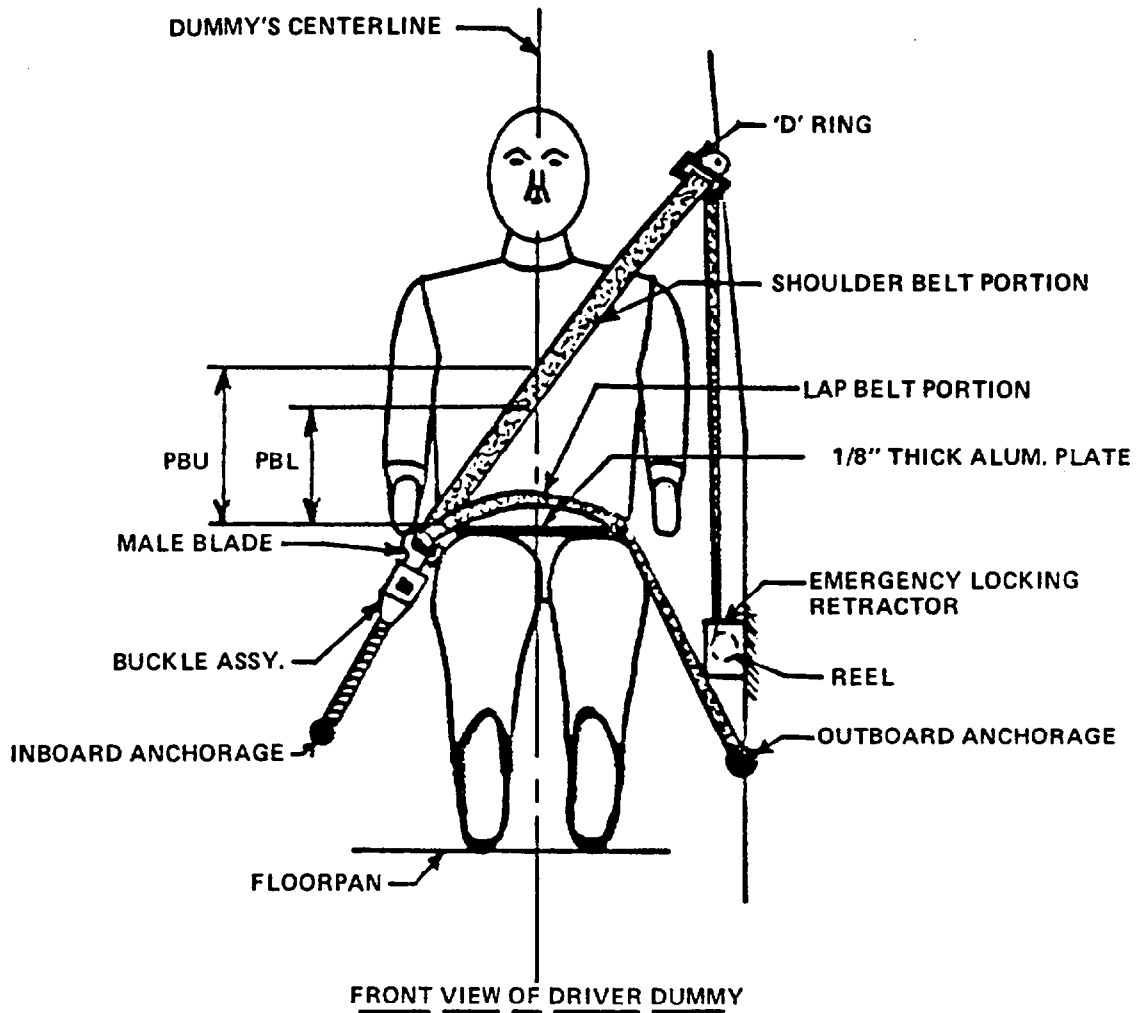
- HH = Head to Windshield Header
- HW = Head to Windshield
- CD = Chest to Dash
- CS = Chest to Steering Wheel
- KD(L/R) = Knee to Dash (Left/Right)
- SA = Seat Back Angle
- TA = Torso Angle
- HA = Head Target to "A" Pillar
- HR = Head to Side Roof
- HS = Head to Side Window
- AD = Arm to Door
- HD = Hip to Door
- KK = Knee to Knee



	DRIVER	PASSENGER
HR	7.2	7.3
HS	9.2	9.1
AD	3.6	3.8
HD	5.7	6.0
KK	9.1	7.8
HA	22.5	22.9

Note: Seat back angle was set in the 3rd notch from full upright.

Figure 3
SEAT BELT POSITIONING DATA



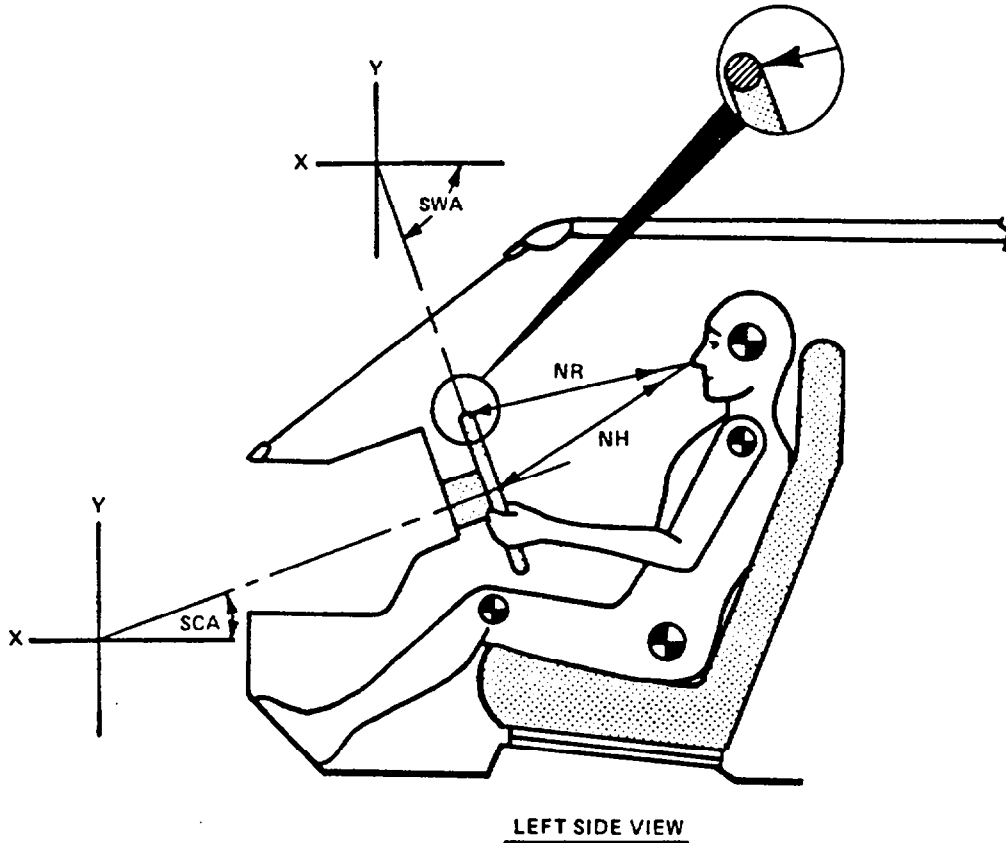
	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	14.3	14.2
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	11.3	11.2
<u>LAP BELT TENSION</u>	2 lbs	2 lbs.
<u>SHOULDER BELT TENSION</u>	-	-

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>95.0"</u>	<u>95.0"</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>34.0"</u>	<u>34.0"</u>
Lap belt length as measured on Part 572 Dummy.	<u>34.0"</u>	<u>34.0"</u>
<u>SHOULDER BELT SPOOL-OFF DATA:</u>		
As determined by film analysis.	<u>4.0"</u>	<u>3.0"</u>
As determined mechanically.	<u>3.3"</u>	<u>3.0"</u>
As determined electronically	<u>4.6"</u>	<u>3.2"</u>
<u>BELT STRETCH DATA:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>1.4 in/ft</u>	<u>1.9 in/ft</u>
Measured mechanically	<u>0.0 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	19.0	Inches
<u>NH</u> -- Distance from tip of dummy's nose to center of steering column hub	19.8	Inches
<u>SCA</u> -- Angle of steering column relative to the horizontal X axis	25	Degrees
<u>SWA</u> -- Angle of steering wheel relative to the horizontal X axis	-65	Degrees

Figure 5
CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

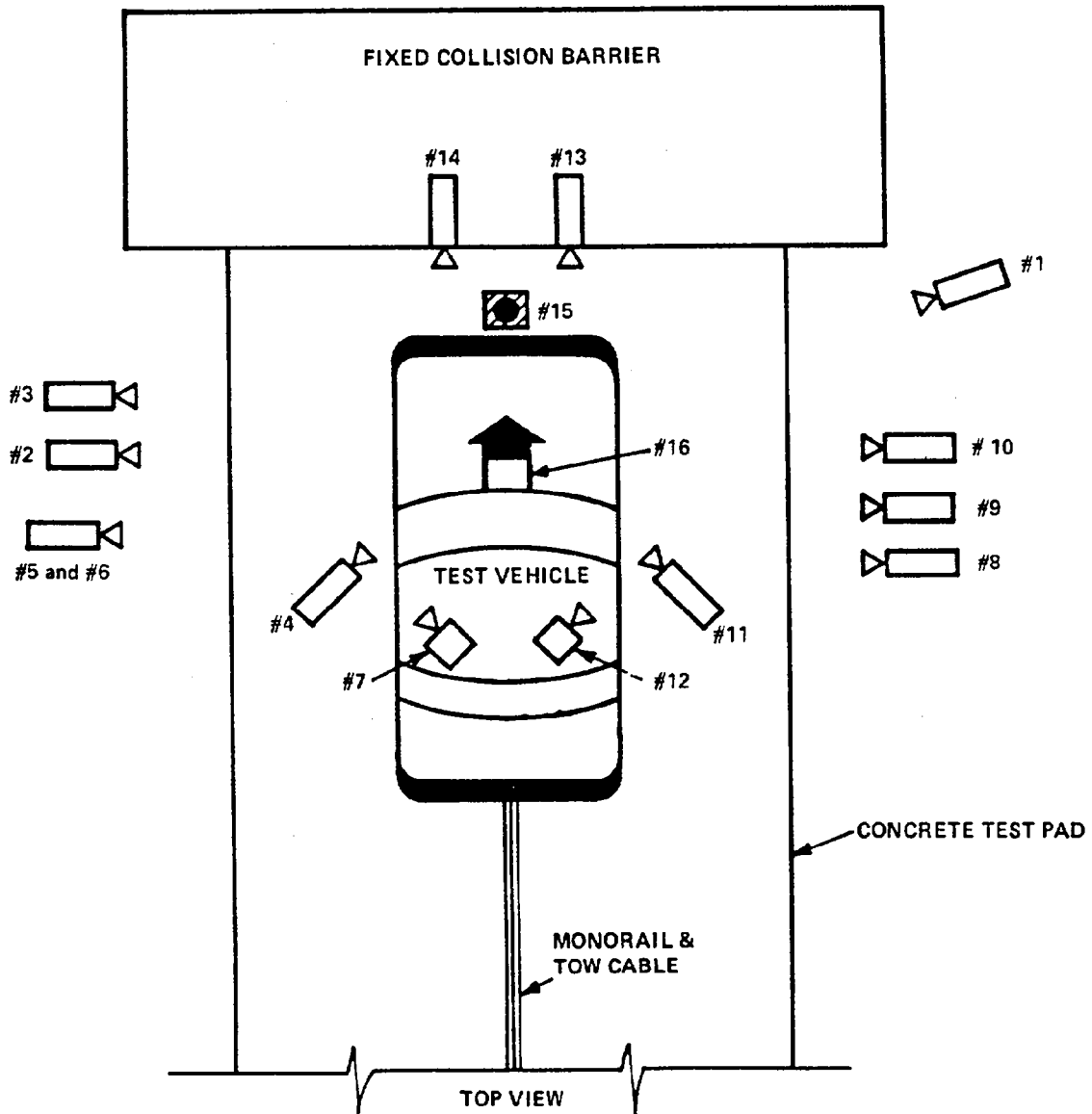


Table 4

HIGH-SPEED CAMERA LOCATIONS

Vehicle: 1990 Isuzu Amigo 2-Door MPV

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	214	55	42	-4	201	545	
3	Left Side View	303	29	41	-4	290	540	
4	Driver and Interior View	106	96	76	-19	93	780	
5	Steering Column (Bottom)	266	71	47	-3	253	575	
6	Steering Column (Top)	266	71	70	-9	253	575	
7	Left Belt	-	-	-	-	-	No Timing	
8	Overall Right Side	220	65	42	-3	207	800	
9	Right Passenger View	273	57	57	-4	260	680	
10	Passenger and Interior View	102	100	77	-20	89	610	
11	Right Belt	-	-	-	-	-	No Timing	
12	Passenger Front View	24	-5	73	-42	-	580	
13	Driver Front View	24	-5	73	-40	-	535	
14	Windshield View	0	0	126	45	-	505	
15	Pit View of Engine	0	32	-120	90	-	870	

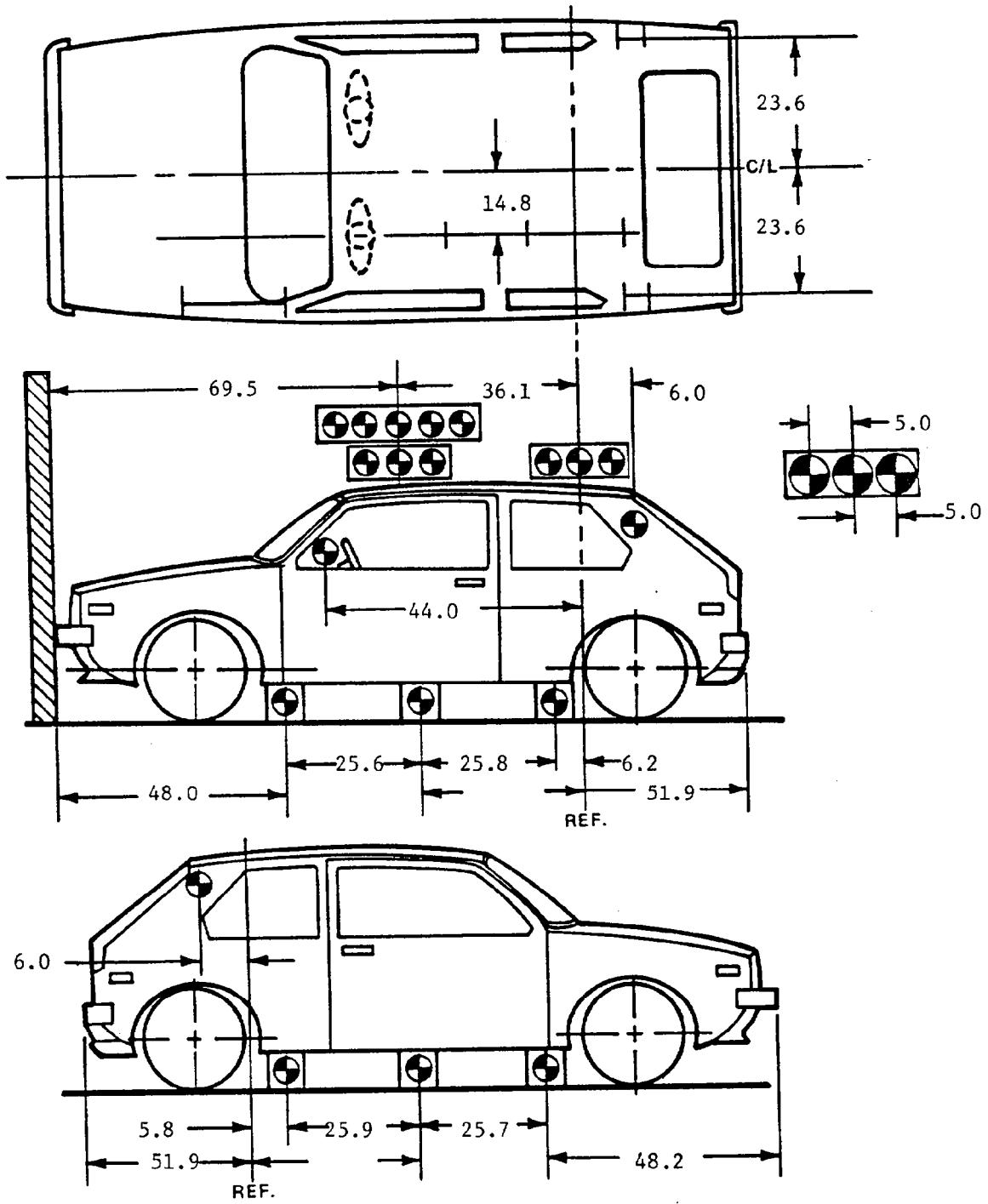
*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plan to ground

** = referenced to horizontal plane

Figure 6
VEHICLE TARGET LOCATIONS

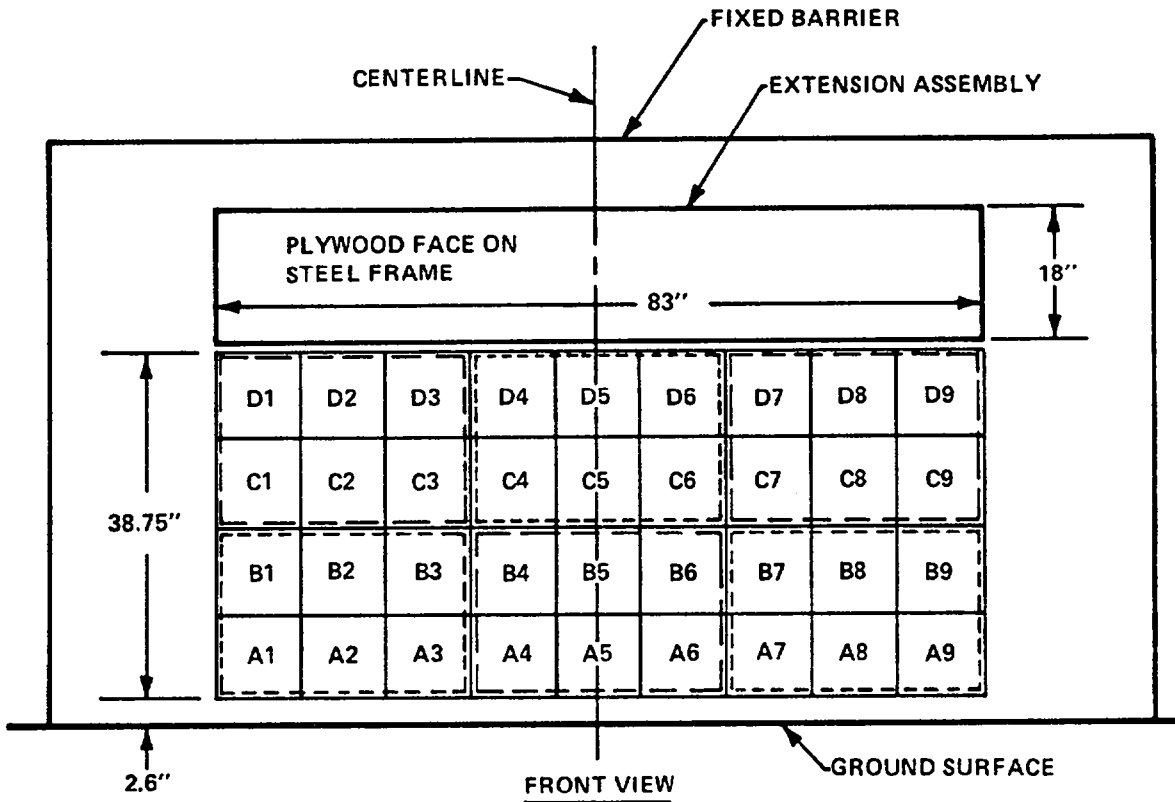


(DIMENSIONS IN INCHES)

Figure 7

LOAD CELL LOCATIONS ON FIXED BARRIER

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



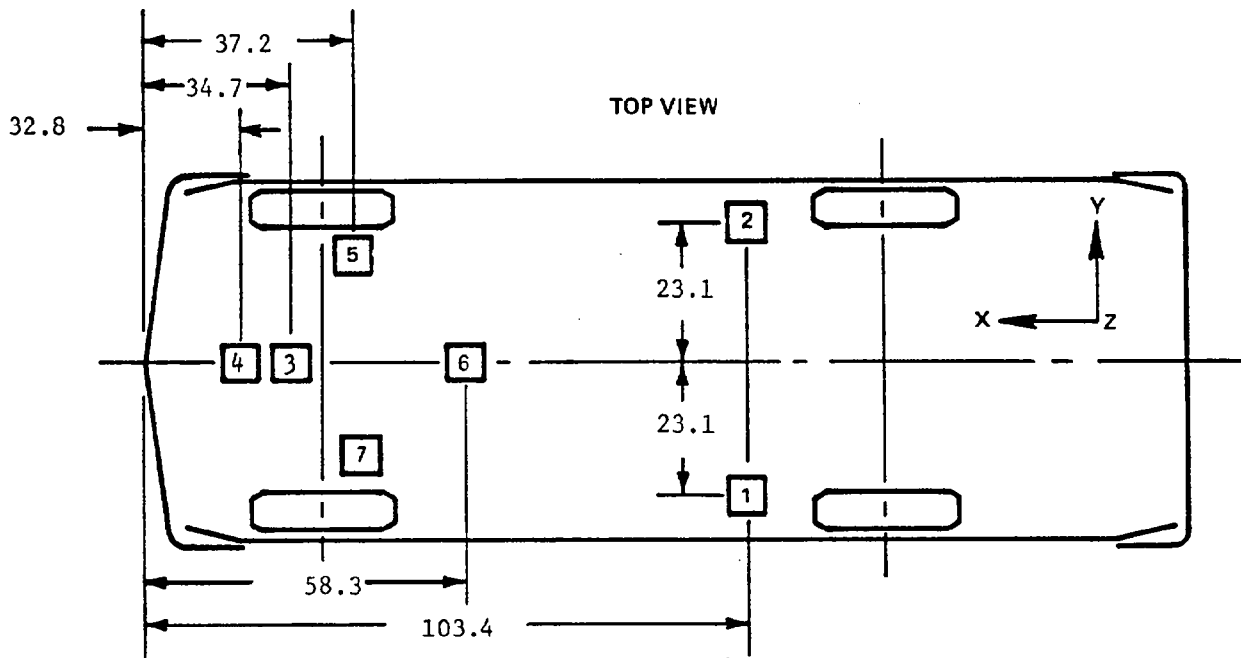
6 GROUPS OF 6 LOAD CELLS EACH

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

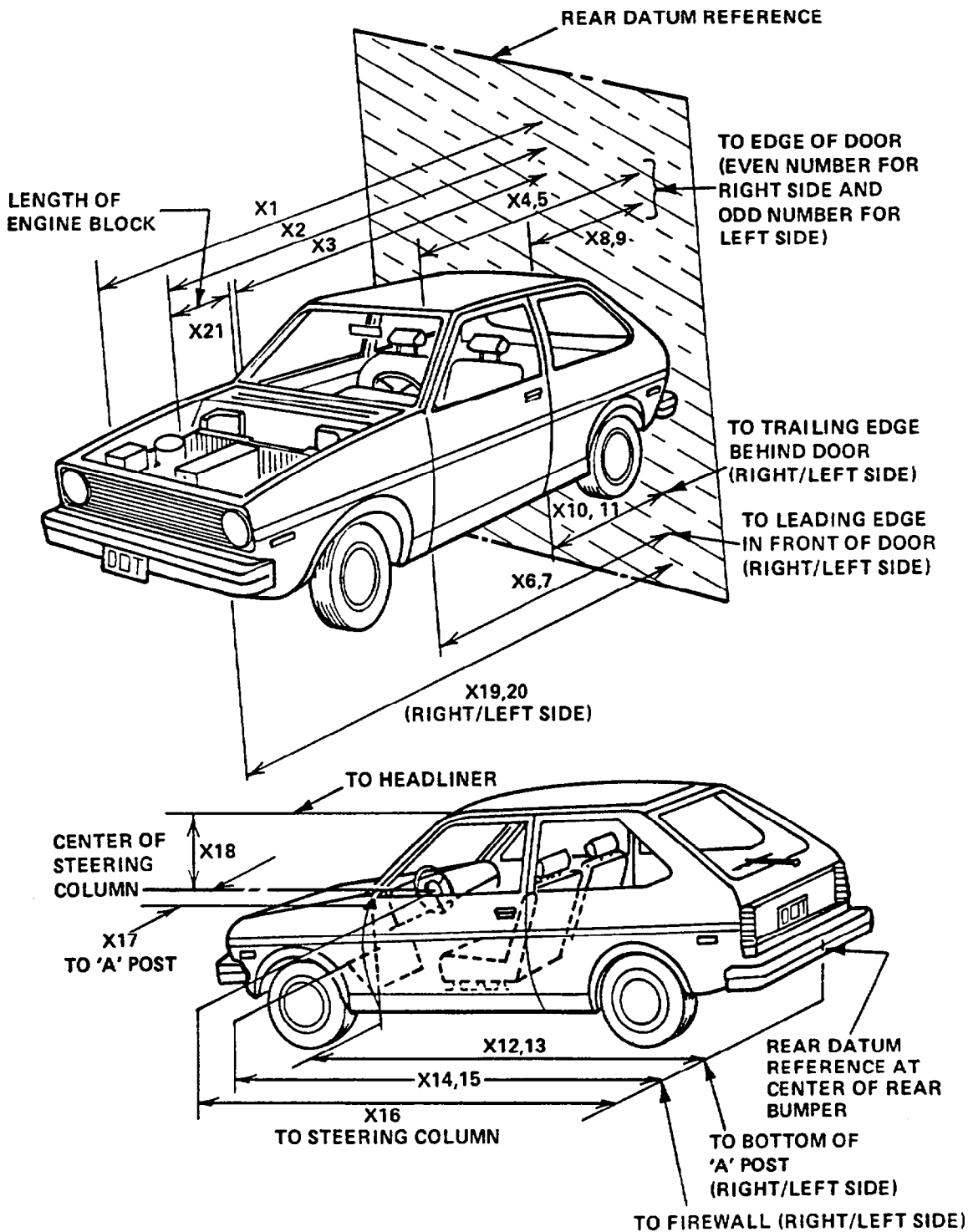


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	157.5	141.2	16.3
X2	Rear Surface of Vehicle to Front of Engine	137.5	134.8	2.7
X3	Rear Surface of Vehicle to Firewall	117.6	118.2	-0.6
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	108.4	108.1	0.3
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	108.3	108.2	0.1
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	108.2	107.8	0.4
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	107.9	108.3	-0.4
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	63.9	63.3	0.6
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	63.5	64.2	-0.7
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	63.3	62.8	0.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	63.0	63.3	-0.3
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	108.0	107.4	0.6
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	107.8	107.8	0.0
X14	Rear Surface of Vehicle to Firewall, Right Side	117.5	117.6	-0.1
X15	Rear Surface of Vehicle to Firewall, Left Side	117.0	117.2	-0.2
X16	Rear Surface of Vehicle to Steering Column	90.3	91.0	-0.7
X17	Center of Steering Column to "A" Post	14.9	13.9	1.0
X18	Center of Steering Column to Headliner	17.4	17.5	-0.1
X19	Rear Surface of Vehicle to Right Side of Front Bumper	155.0	140.5	14.5
X20	Rear Surface of Vehicle to Left Side of Front Bumper	154.9	141.1	13.8
X21	Length of Engine Block	18.0	18.0	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	98.6	98.4	0.2
CD	Rear Surface of Vehicle to Center of Dash Panel	98.5	98.3	0.2
LD	Rear Surface of Vehicle to Left Side of Dash Panel	98.4	98.0	0.4

Appendix A

PHOTOGRAPHS



FIGURE A-1 PRE-TEST FRONT VIEW

A-2

7778-11

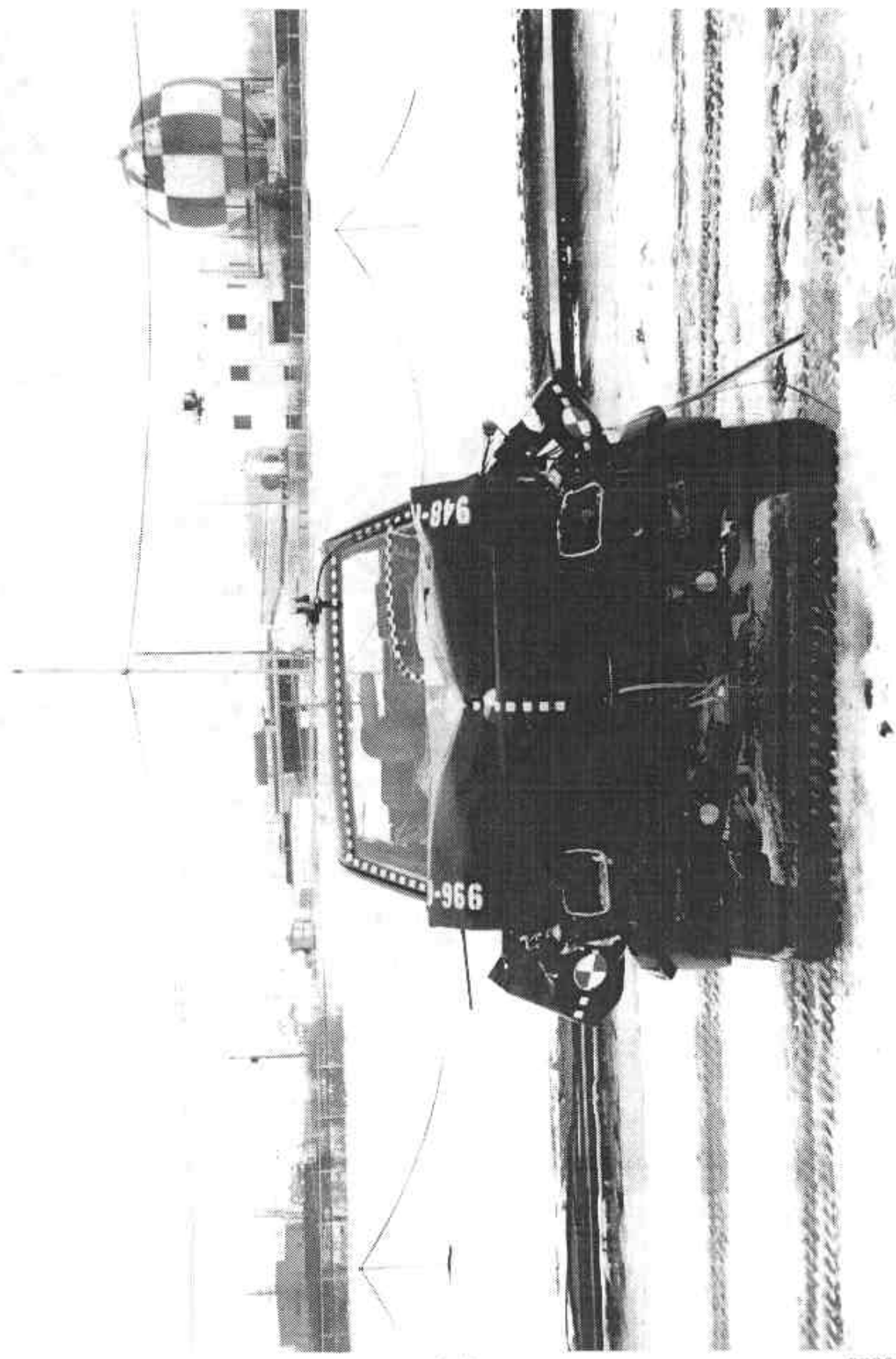


FIGURE A-2 POST TEST FRONT VIEW

A-3

7776-11

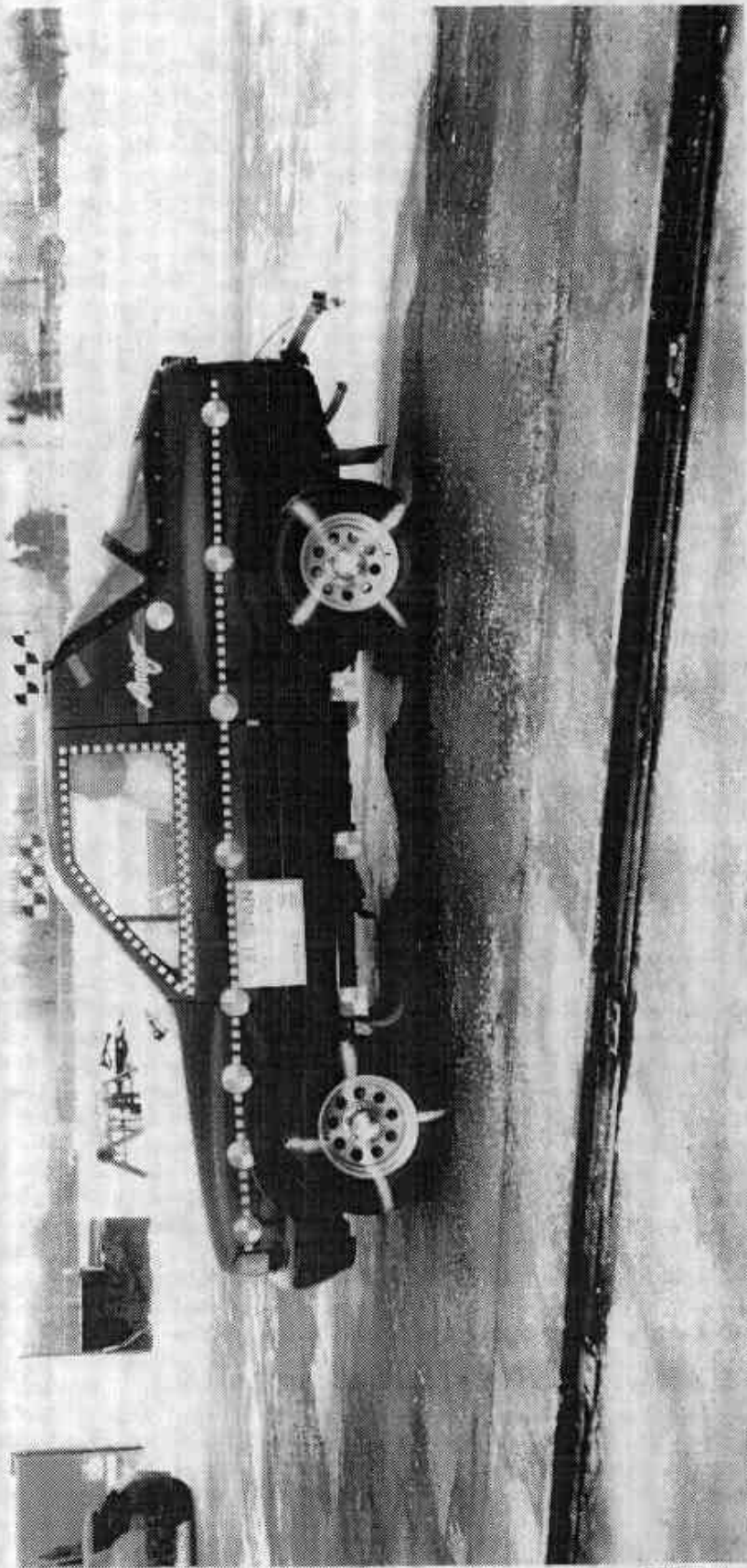


Figure A-3 PRE-TEST LEFT SIDE VIEW

A-4

7778-11



Figure A-4 POST TEST LEFT SIDE VIEW

A-5

7776-11

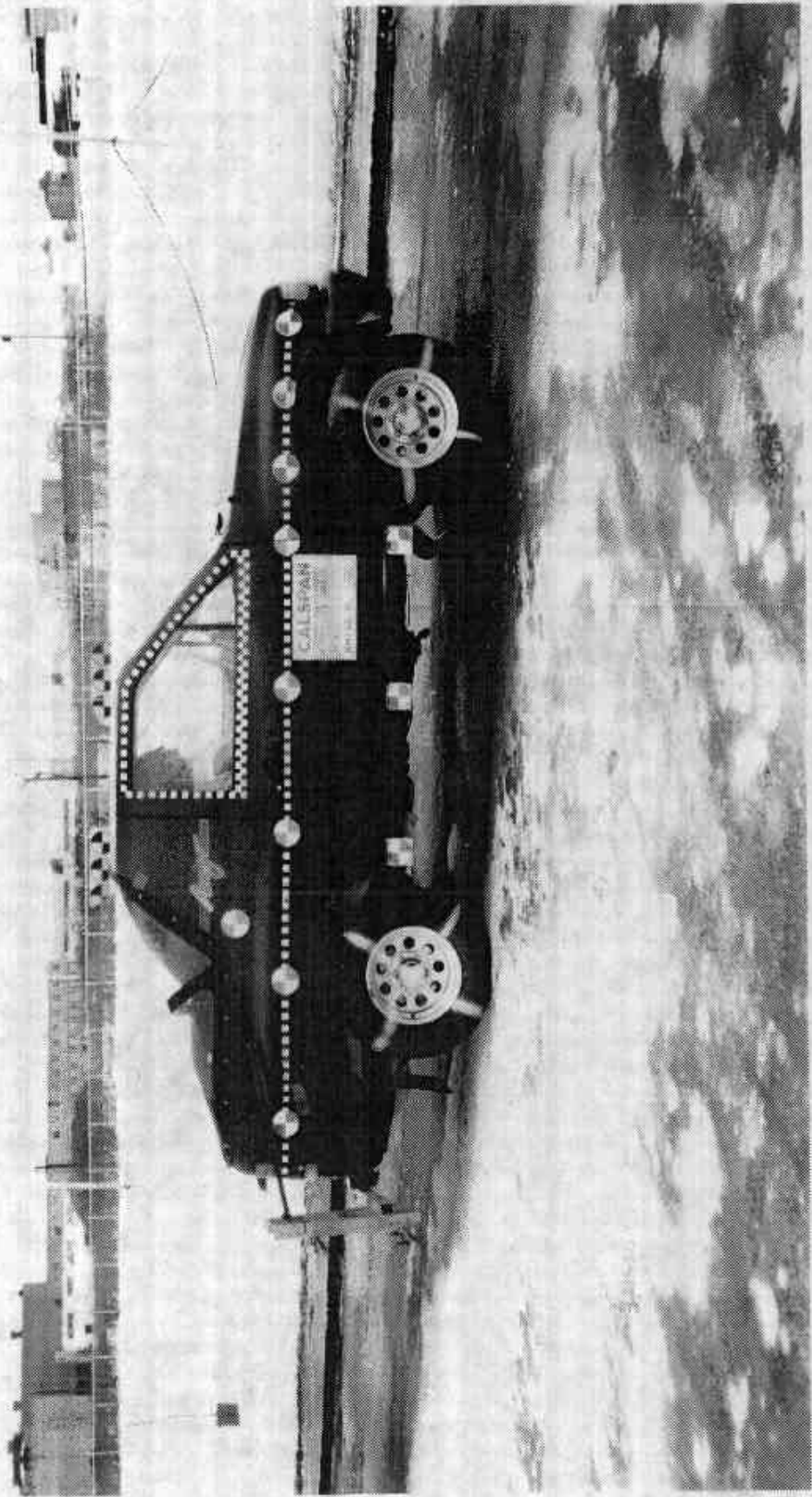


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-6

7776-11

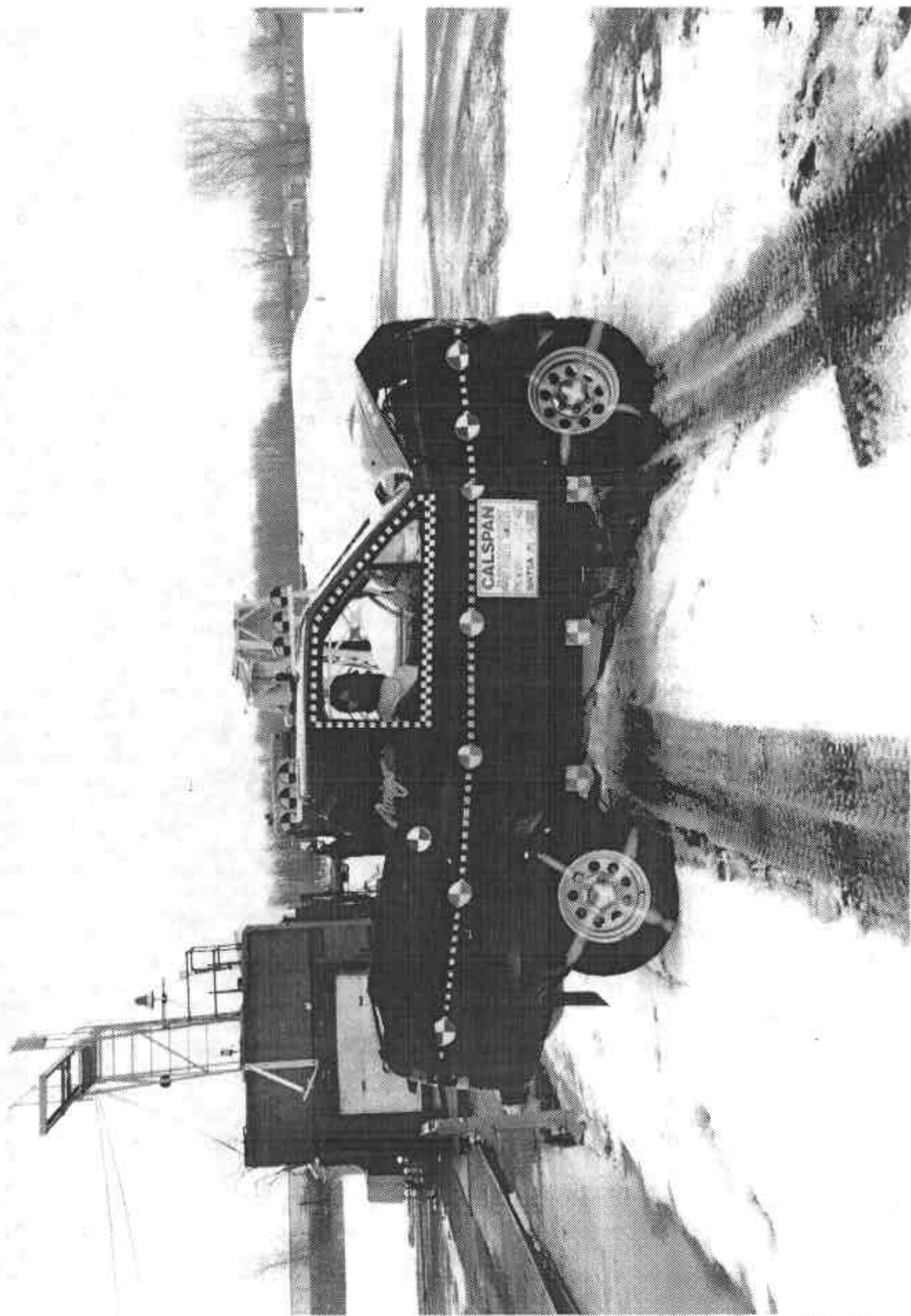


FIGURE A-6 POST-TEST RIGHT SIDE VIEW

A-7

7770-11



A-8

7776-11

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



A-9

7776-11

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

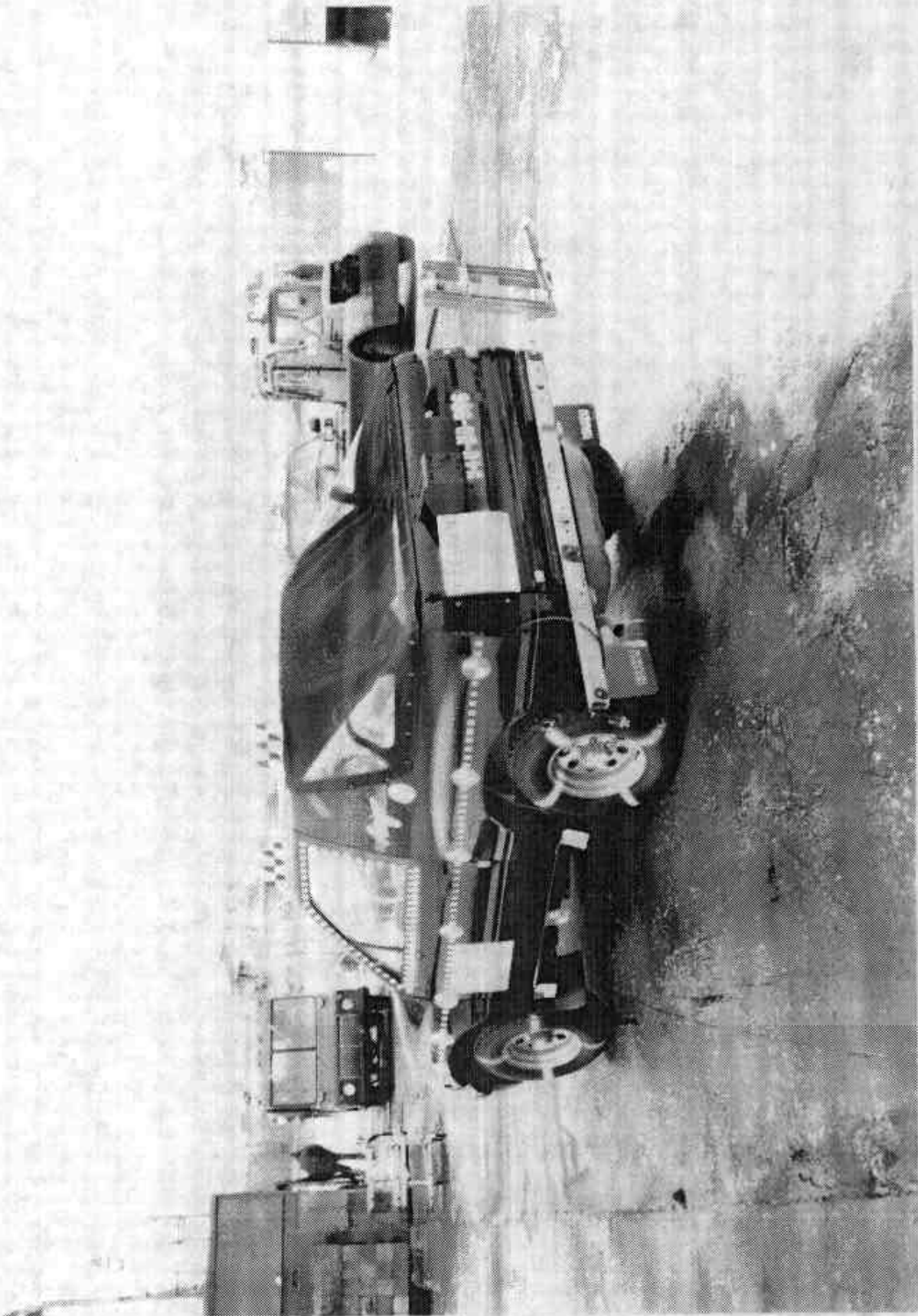


Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-10

7776-11

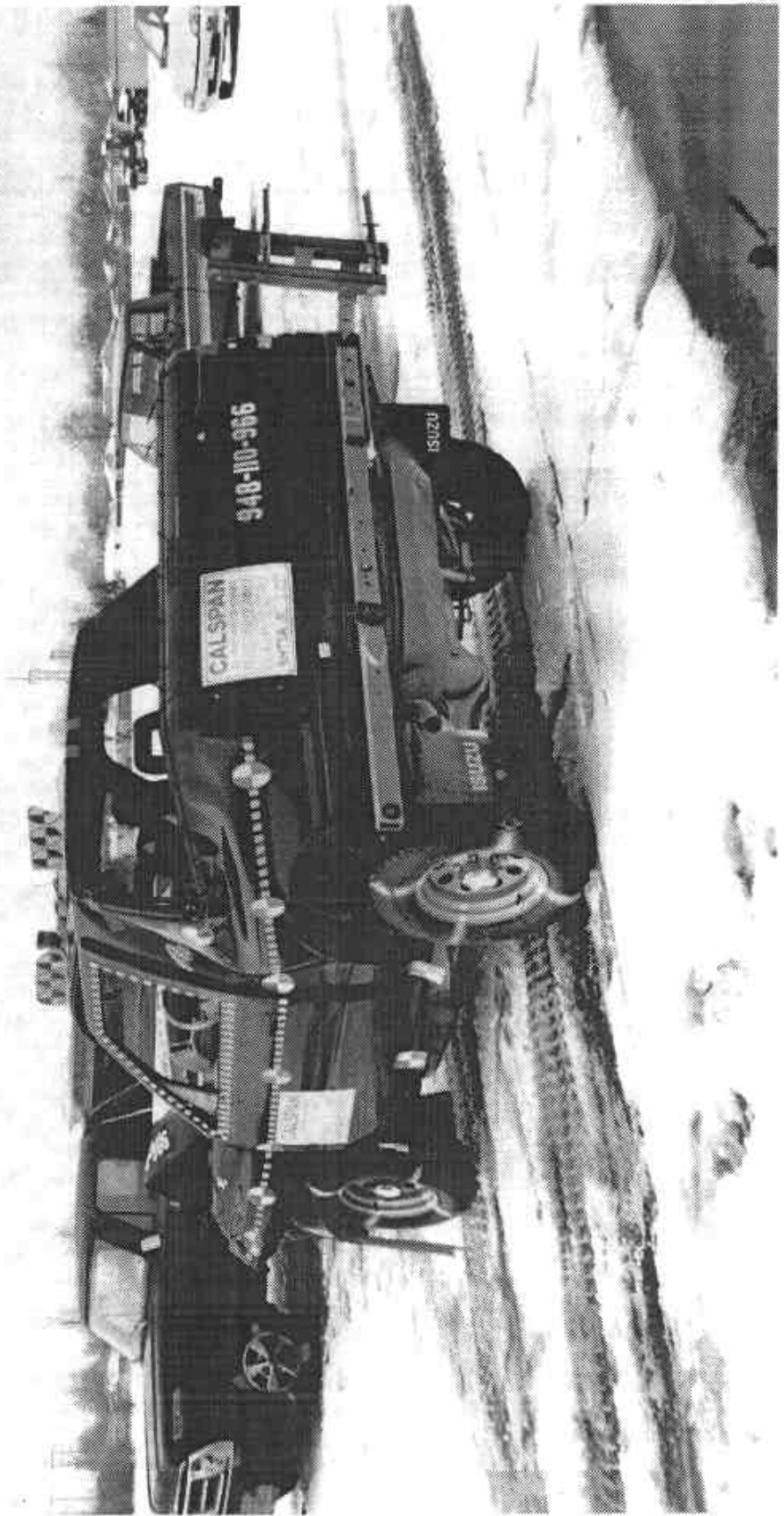


Figure A-10 POST-TEST LEFT REAR THREE-QUARTER VIEW

A-11

7776-11

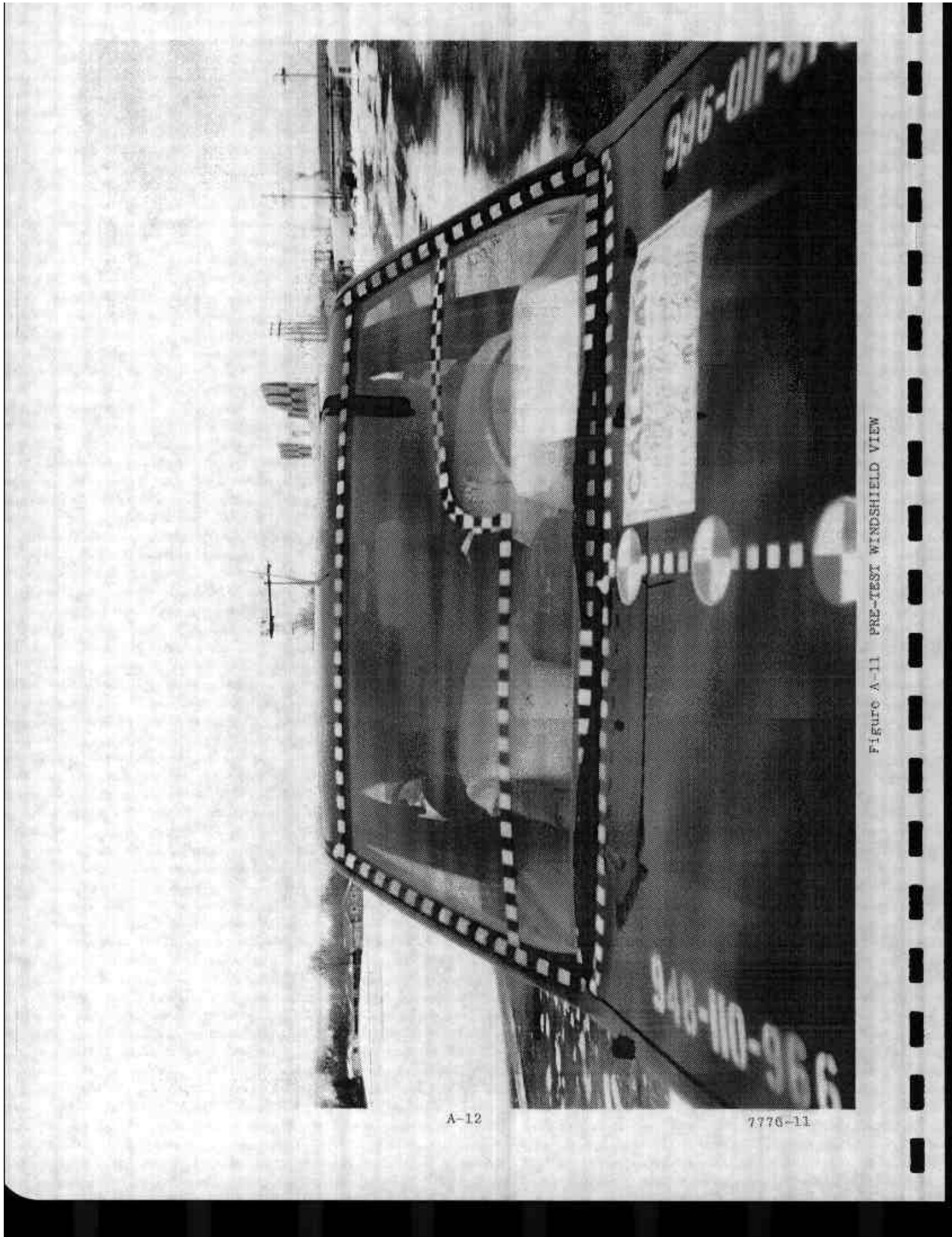


FIGURE A-11 PRE-TEST WINDSHIELD VIEW

A-12

7776-11

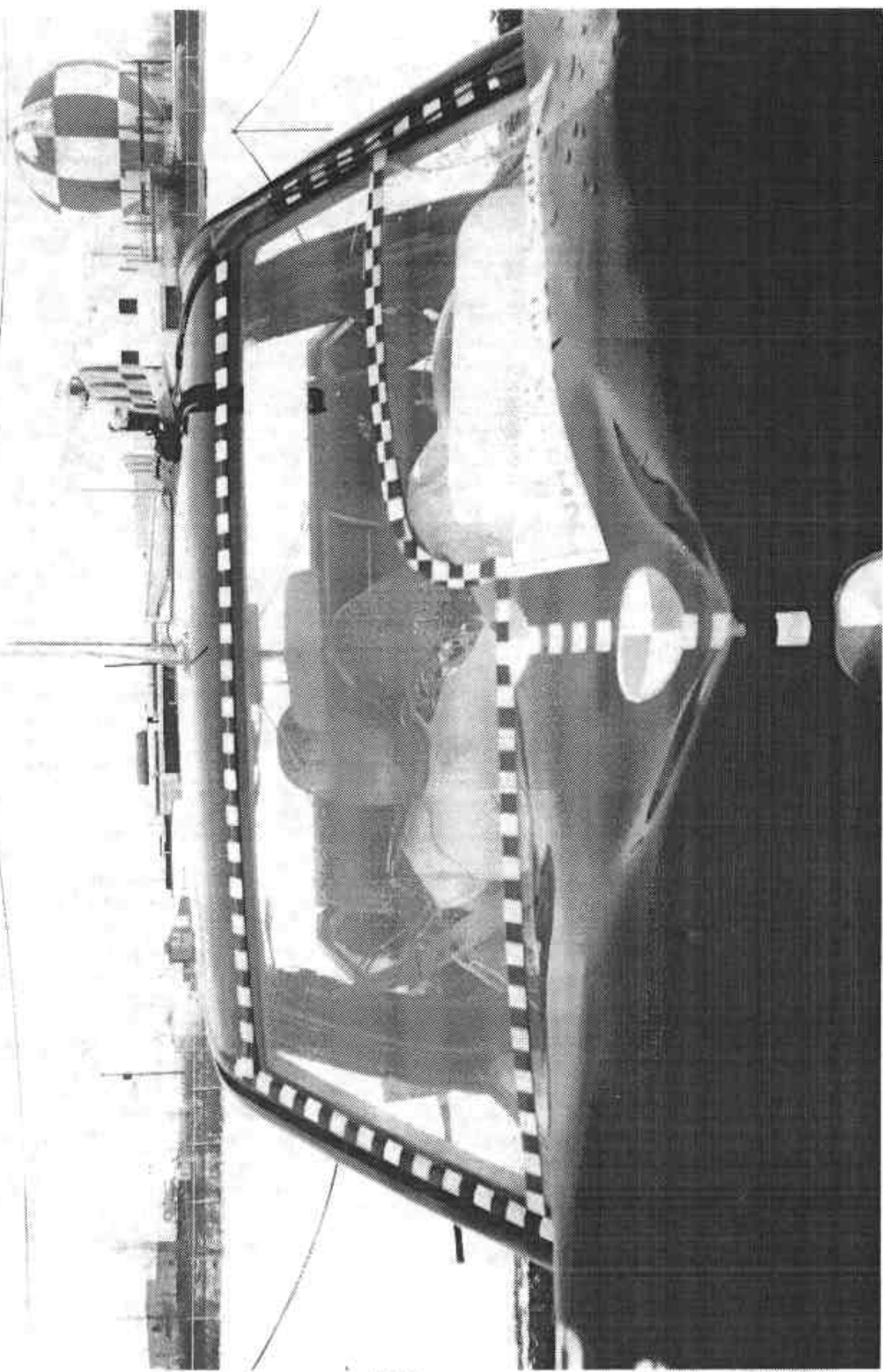
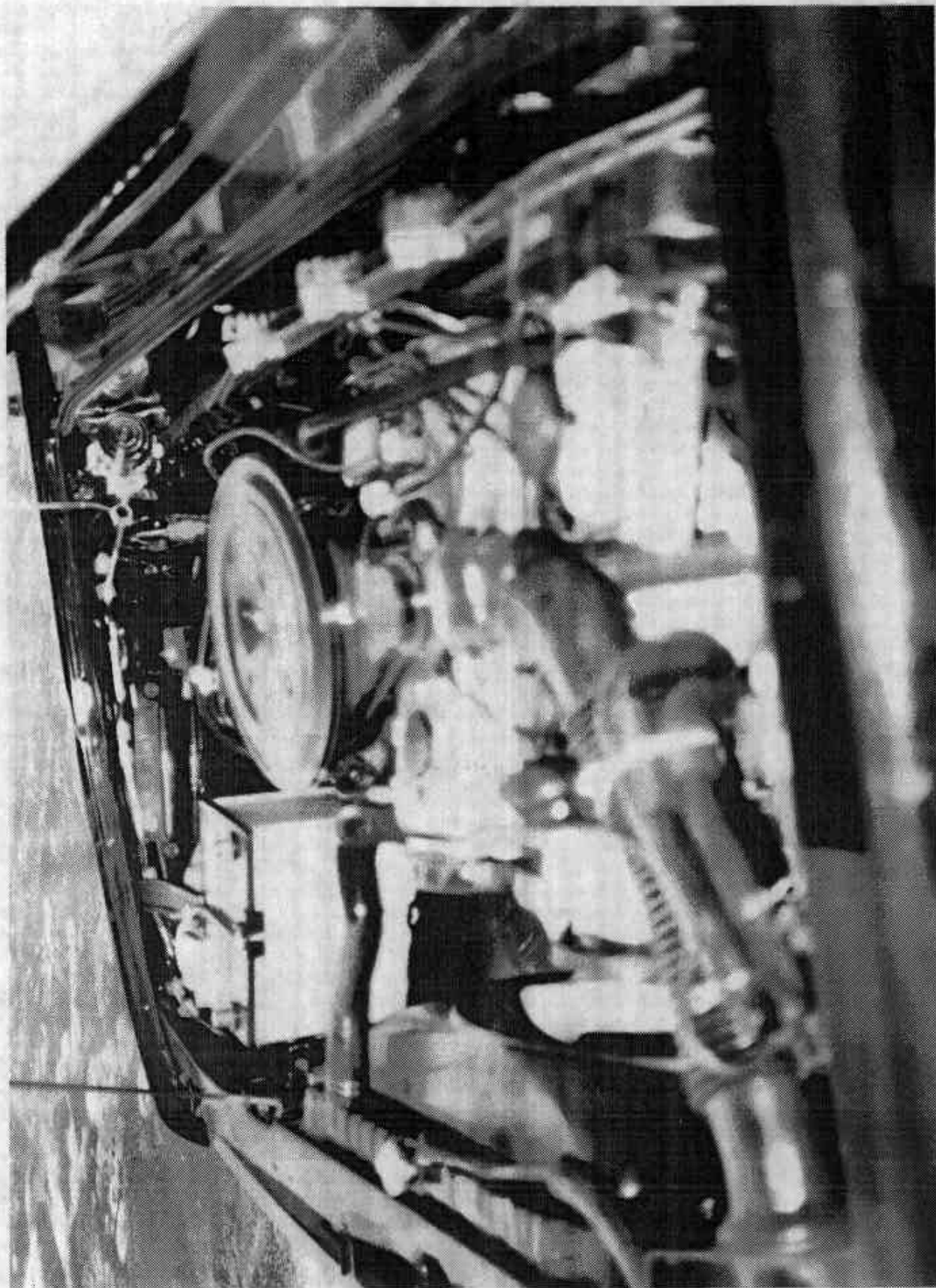


Figure A-12 POST-TEST WINDSHIELD VIEW

A-13

7776-11



A-14

7776-11

Figure A-13 PRE-TEST ENGINE COMPARTMENT VIEW

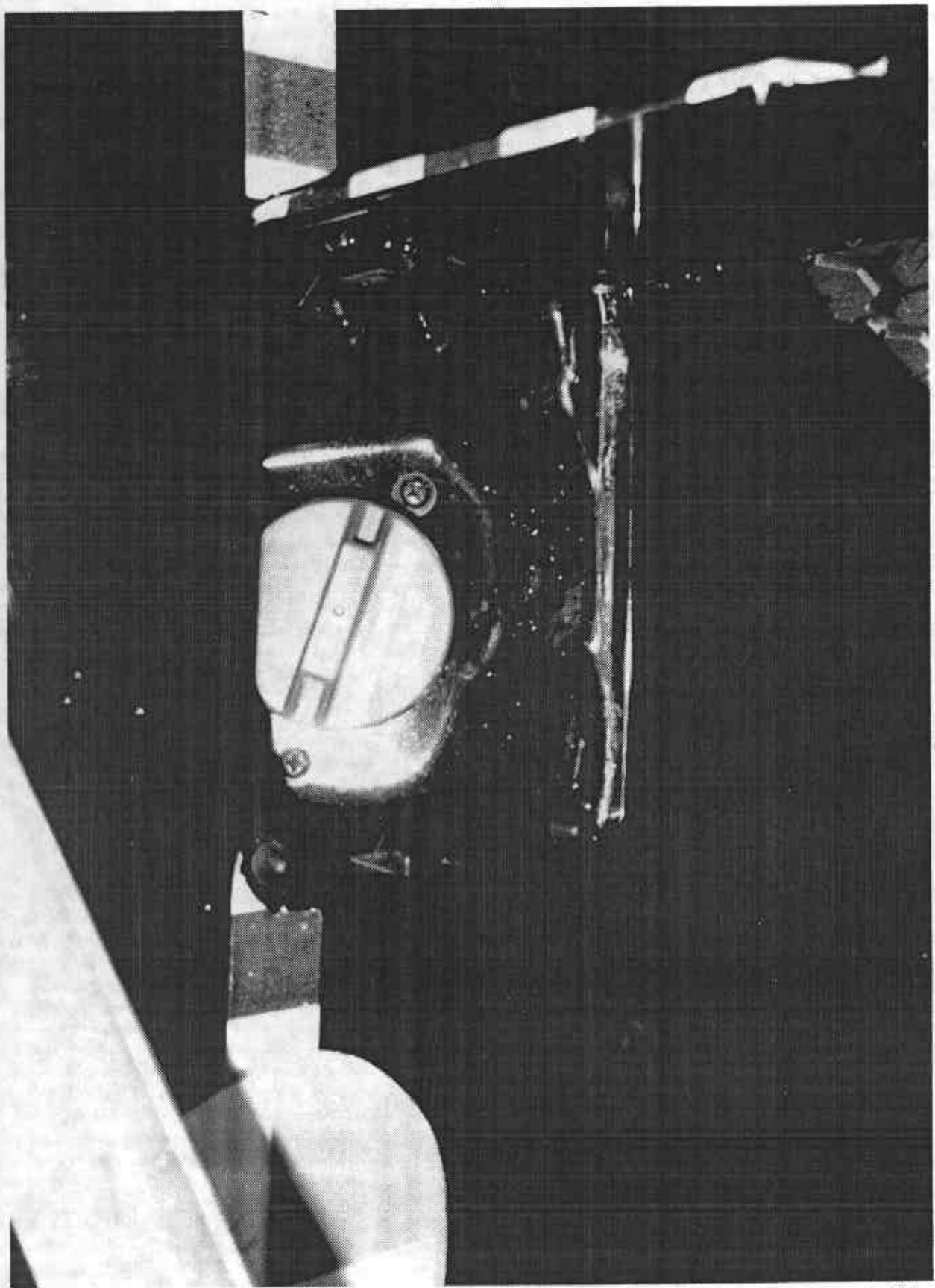


FIGURE A-14 PRE-TEST FUEL CAP VIEW

A-15

7776-11

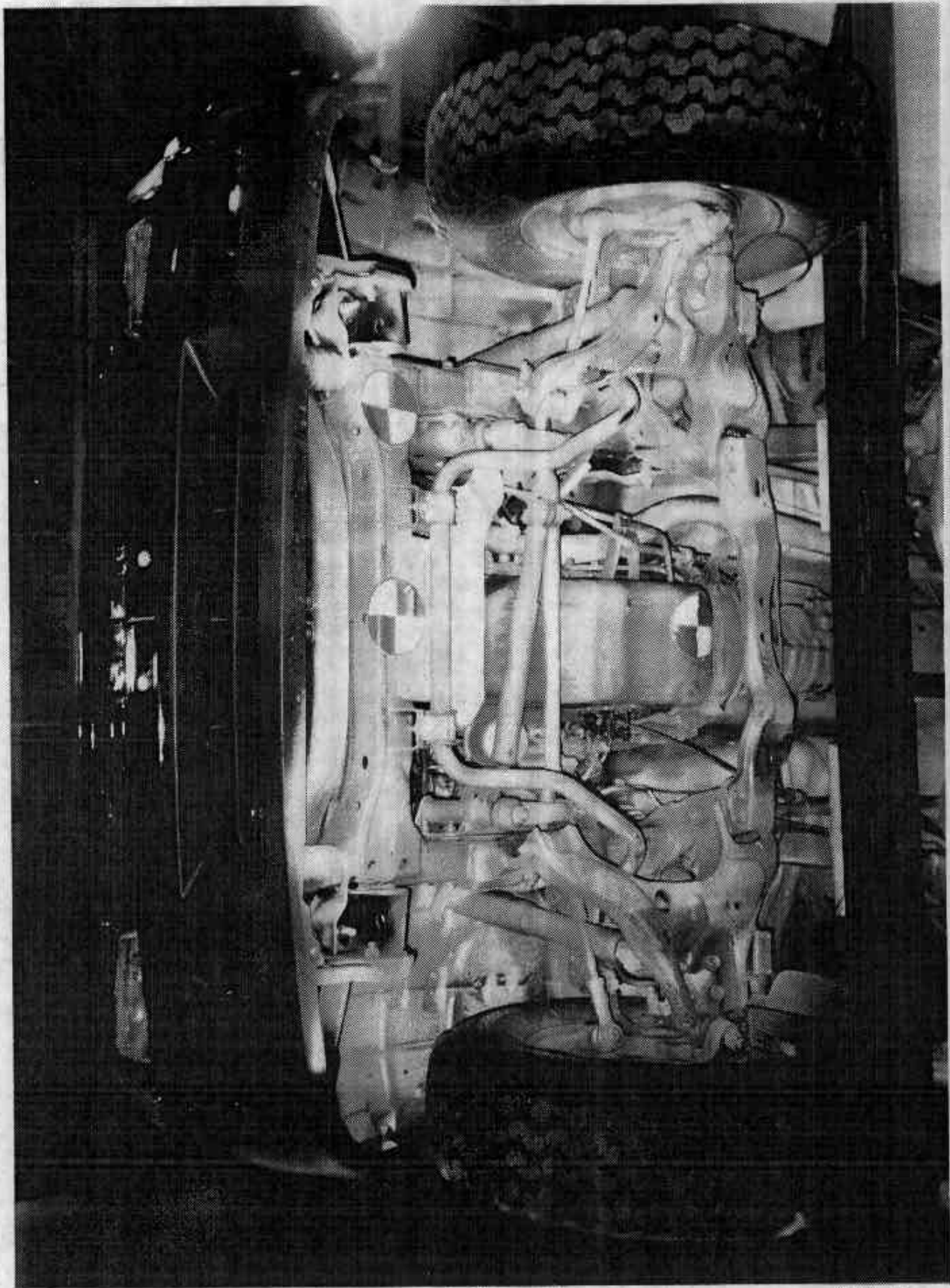


FIGURE A-15 PRE-TEST FRONT UNDERBODY VIEW

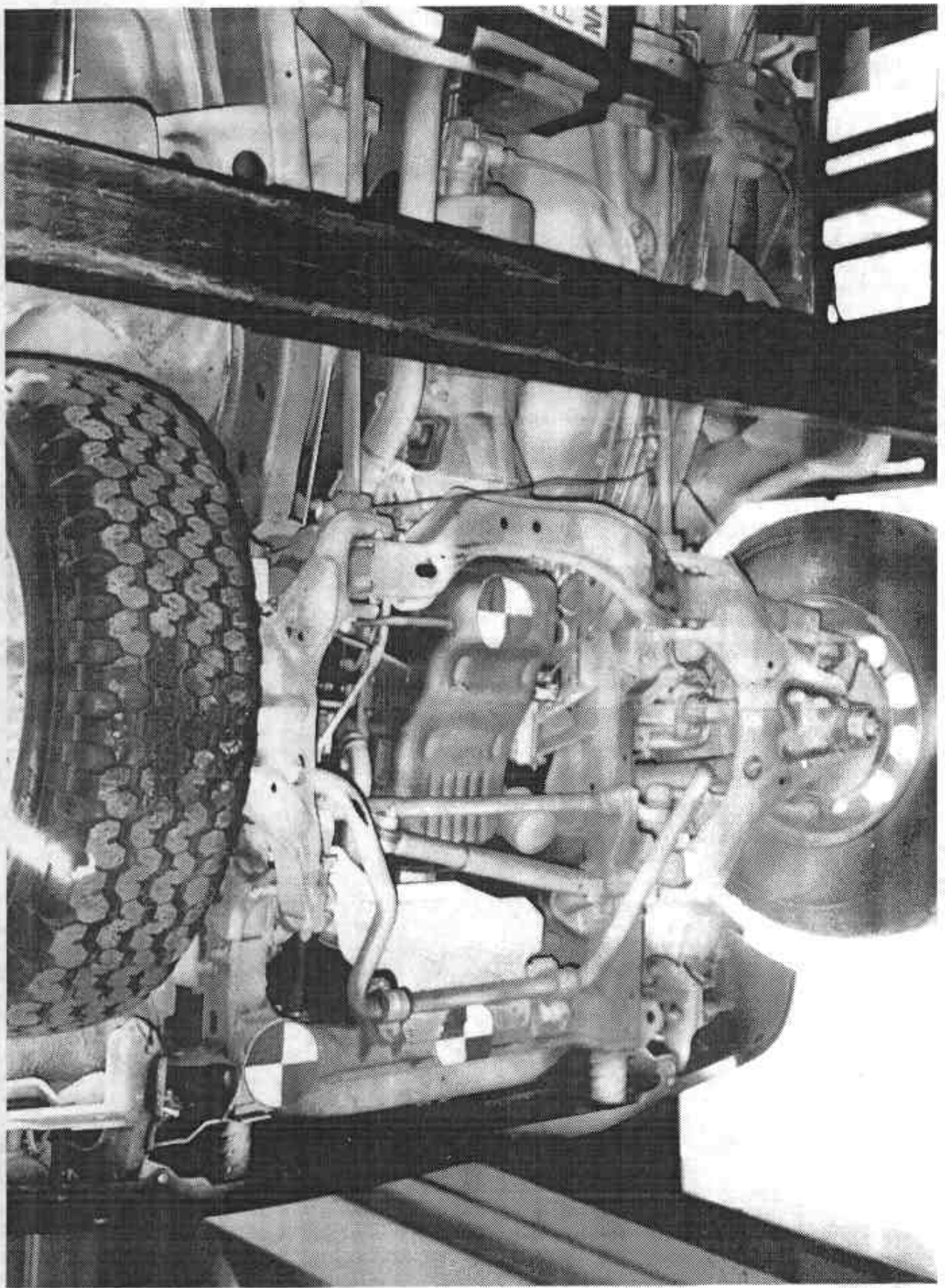


FIGURE A-17 PRE-TEST FRONT SIDE UNDERBODY VIEW

A-18

7776-11

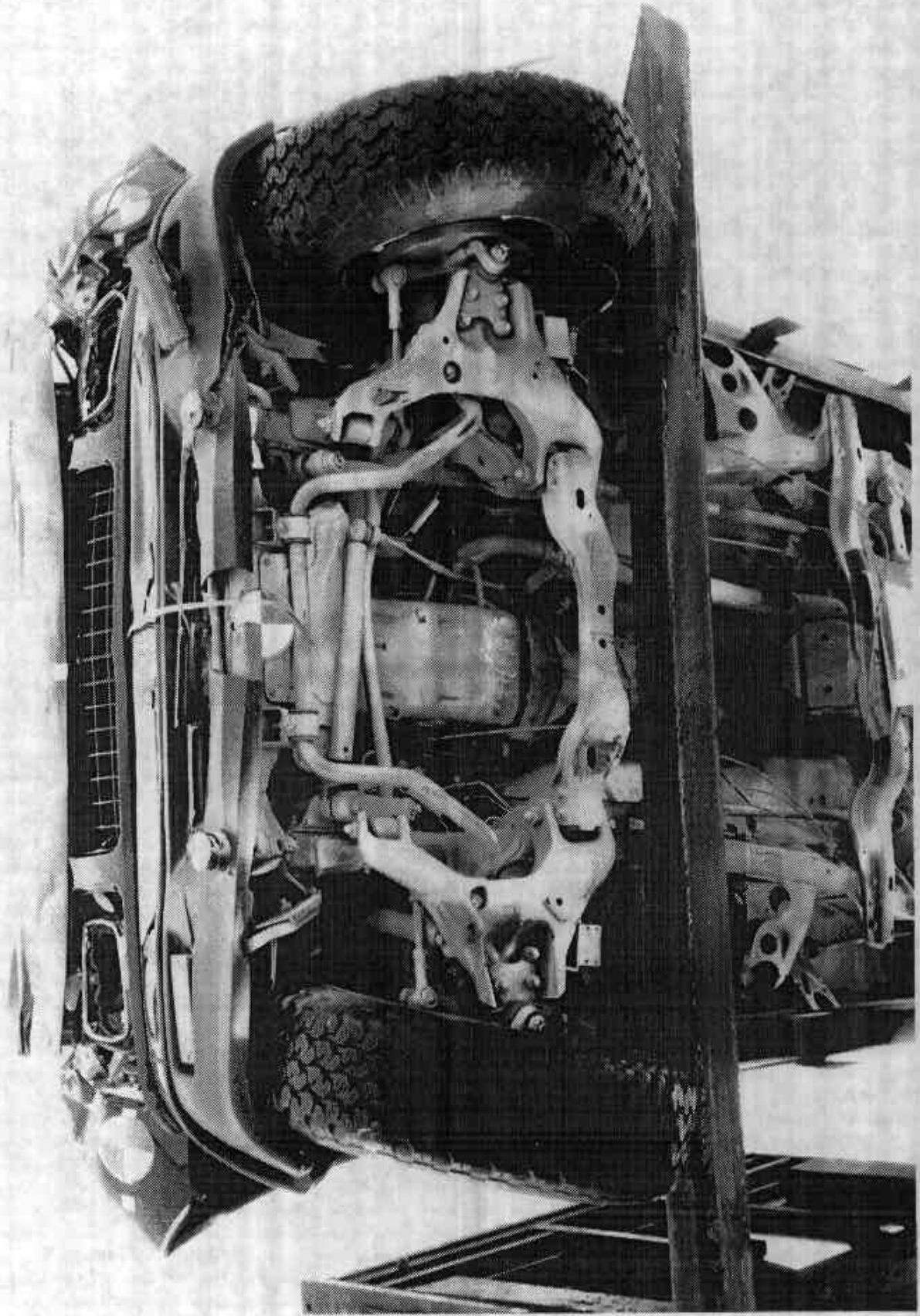


Figure A-16 POST-TEST FRONT UNDERBODY VIEW

A-17

7776-11

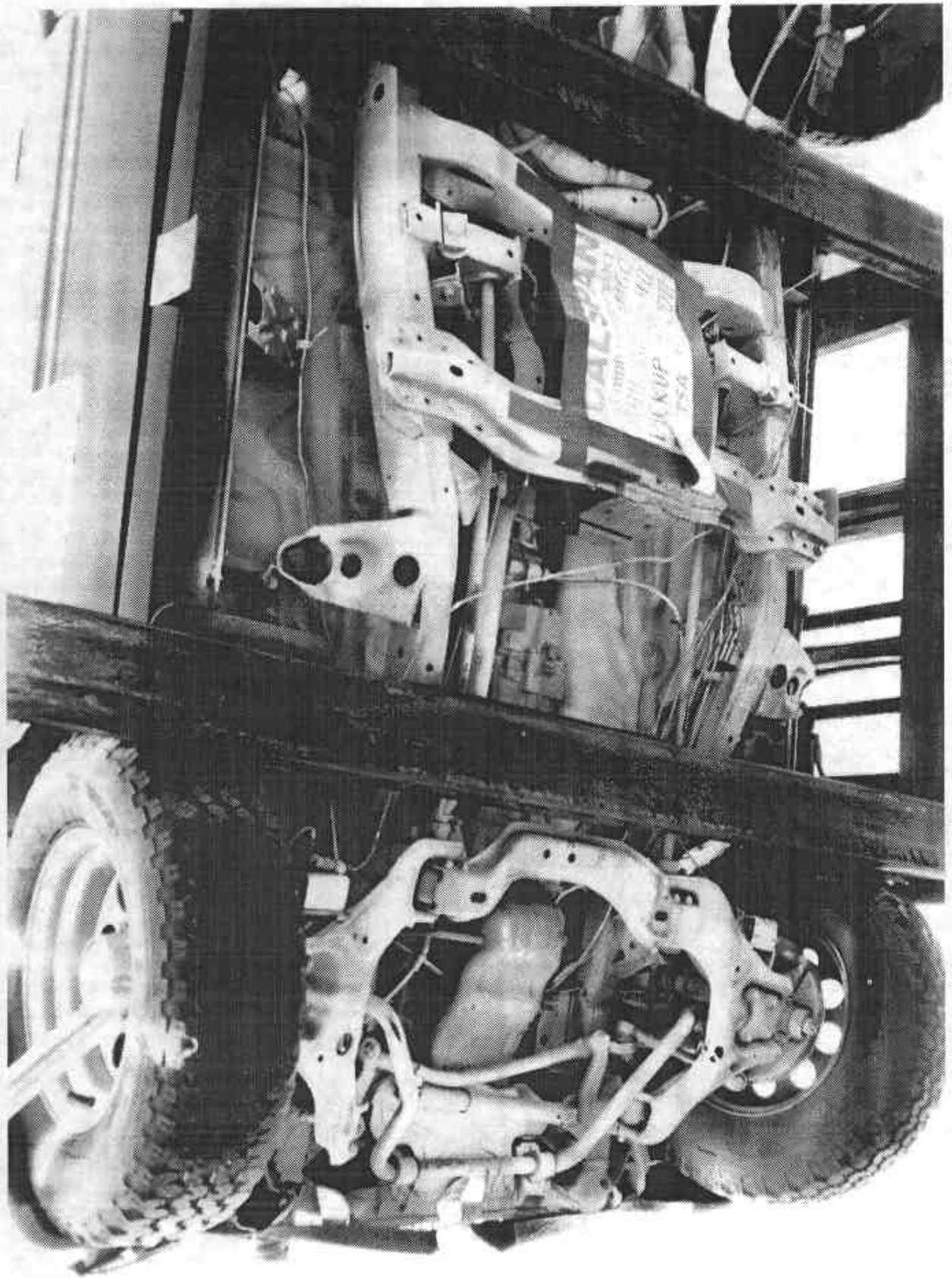


Figure A-18 POST-TEST FRONT SIDE UNDERBODY VIEW

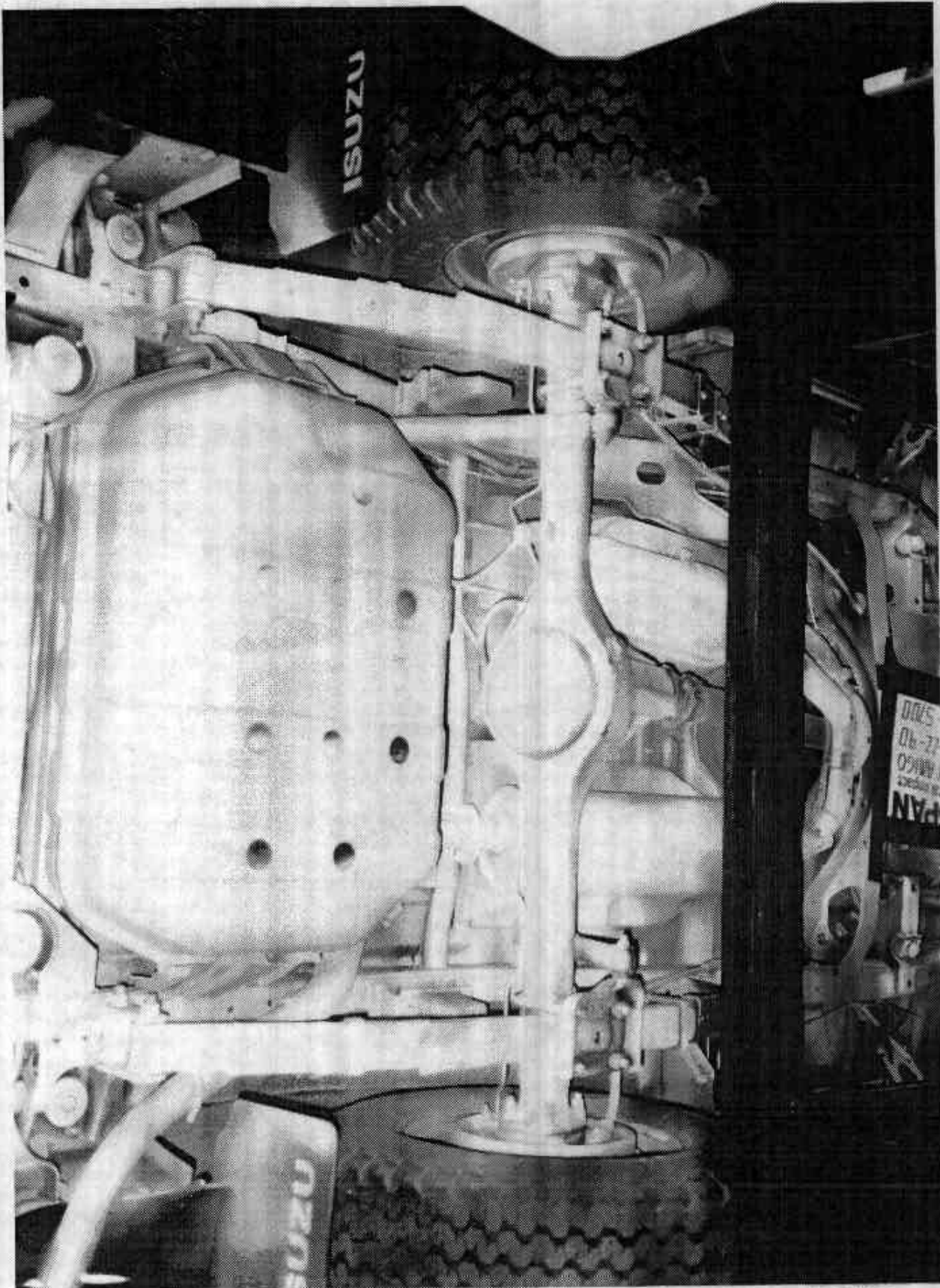


Figure A-19 PRE-TEST REAR UNDERBODY VIEW

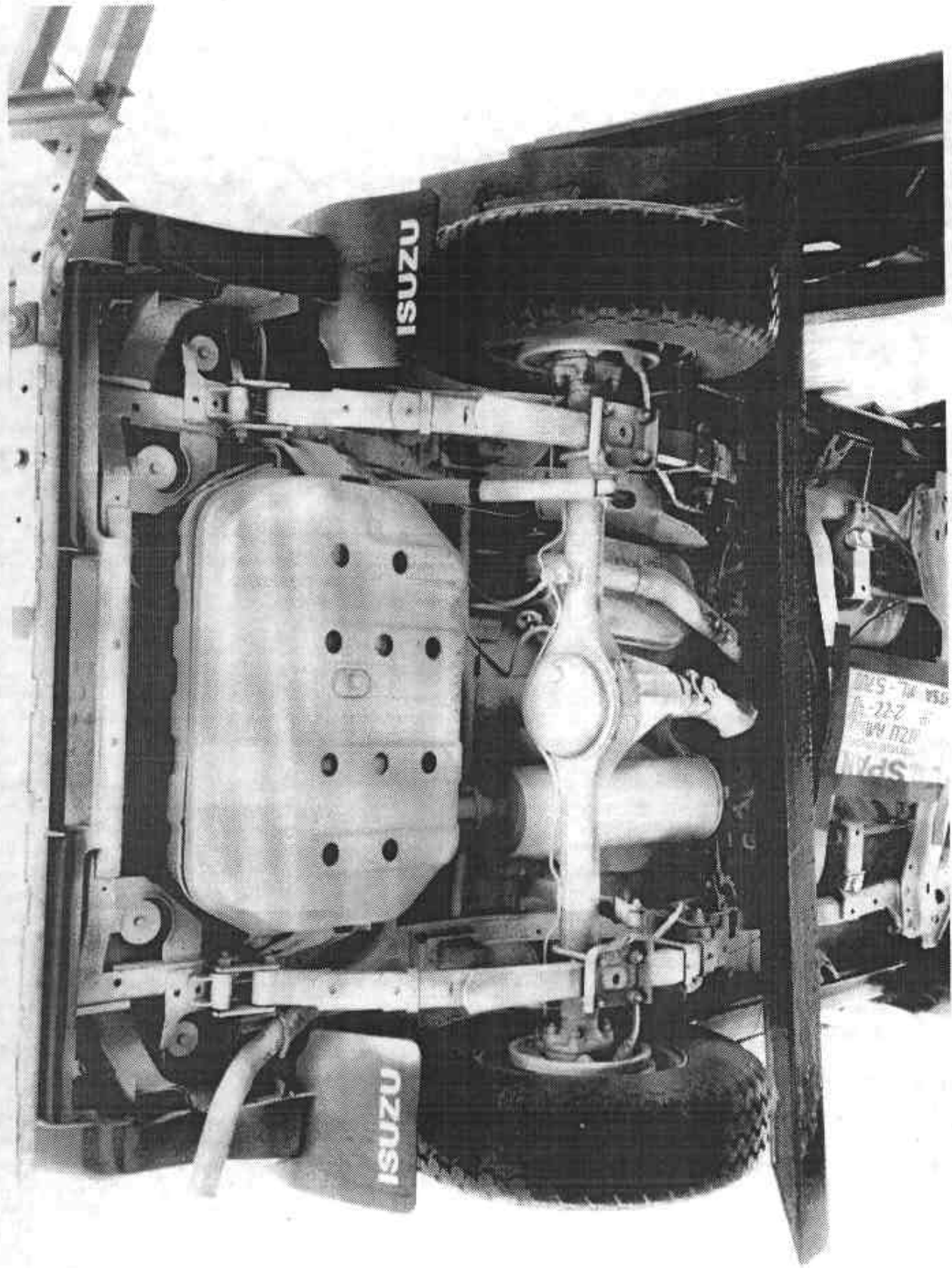


Figure A-20 POST-TEST REAR UNDERBODY VIEW

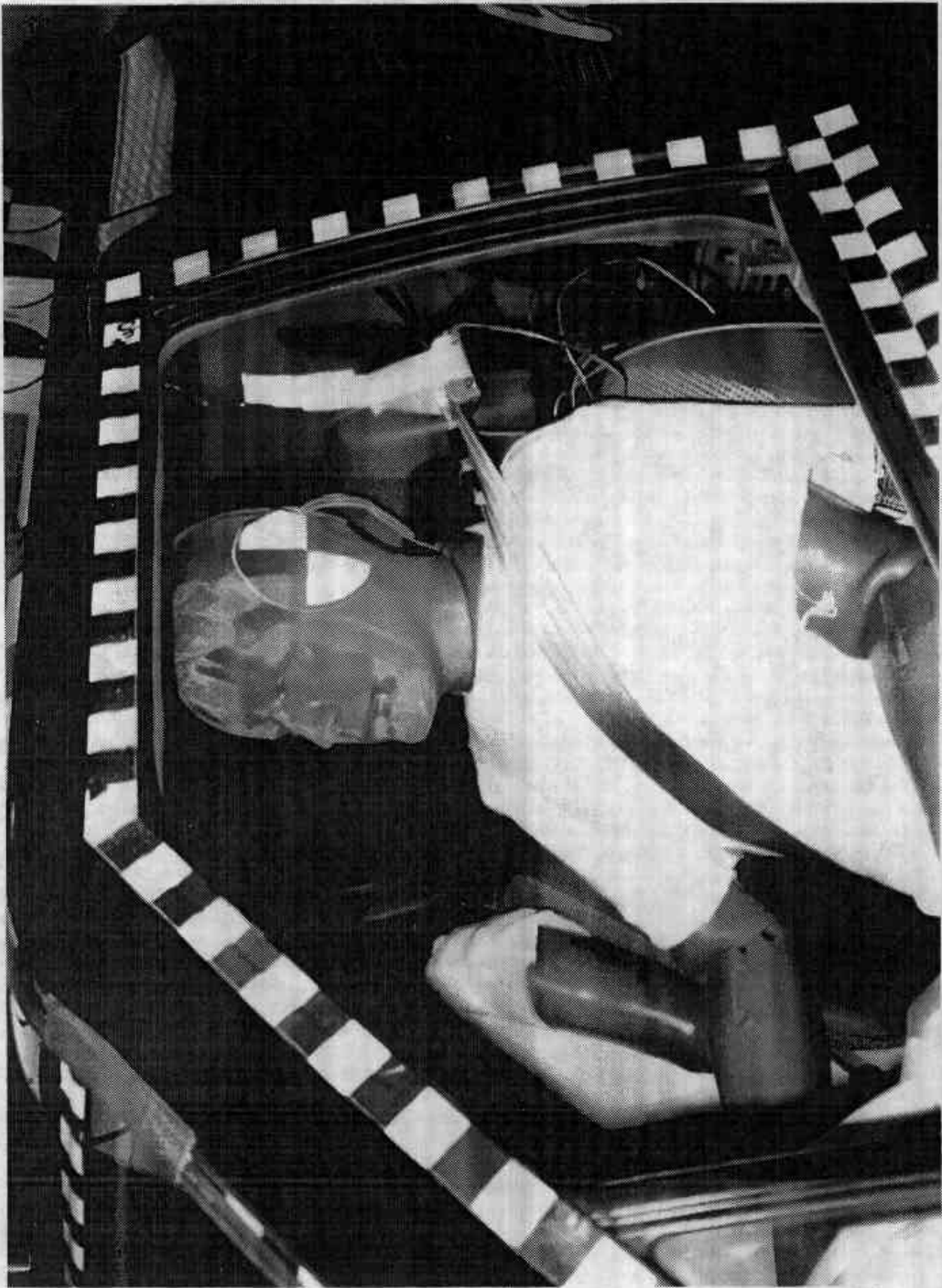


Figure A-21 PRE-TEST DRIVER POSITION VIEW



Figure A-22 POST-TEST DRIVER POSITION VIEW

A-23

7770-11

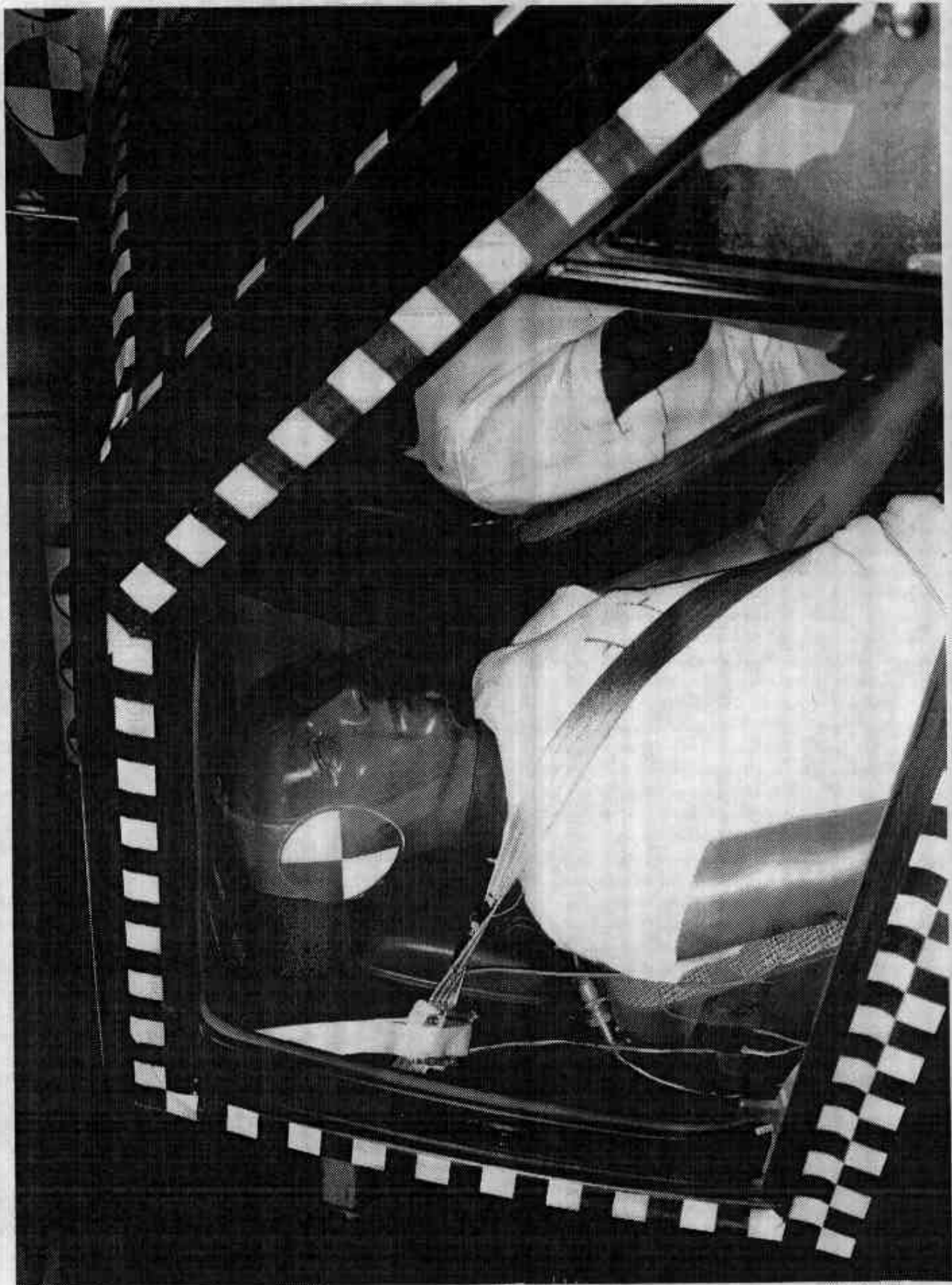


Figure A-23 PRE-TEST PASSENGER POSITION VIEW

A-24

7776-11



Figure A-24 POST-TEST PASSENGER POSITION VIEW

A-25

7776-11

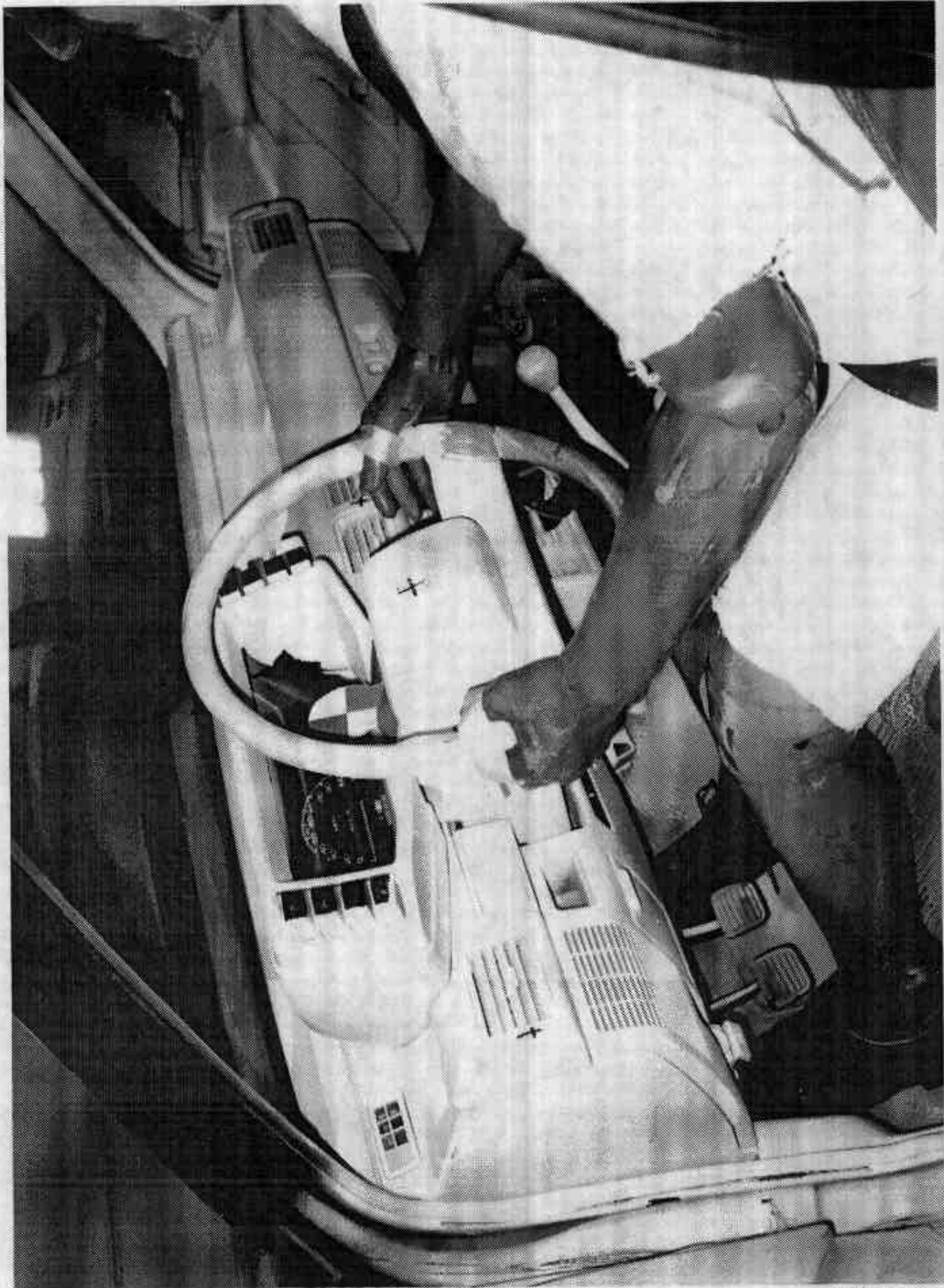


Figure A-25 PRE-TEST DRIVER AND INTERIOR VIEW

A-26

7776-11

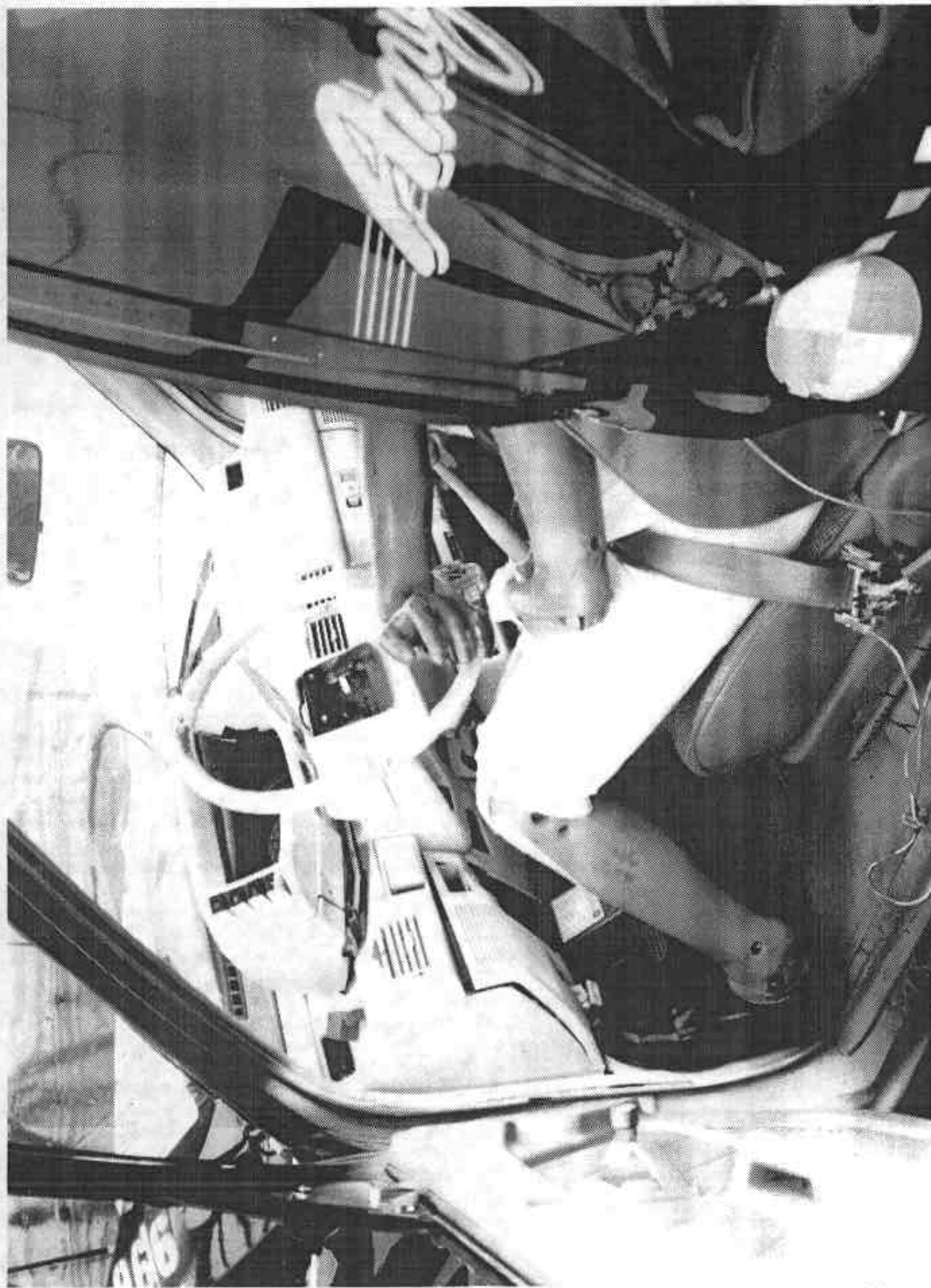


FIGURE A-26 POST-TEST DRIVER AND INTERIOR VIEW



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

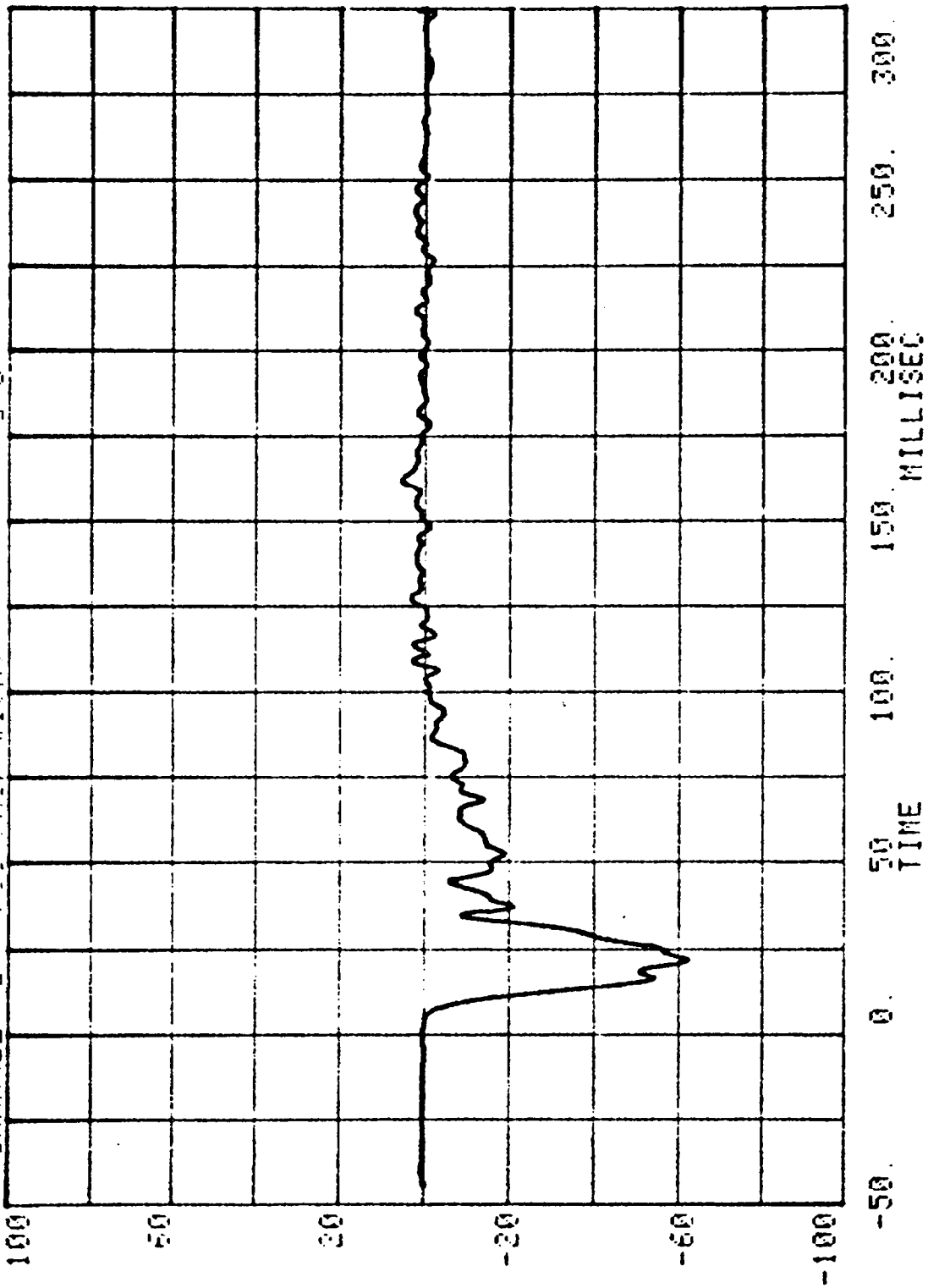
TEST NO. ML5700

VEHICLE DATA

FILTER CHANNEL CLASS

60

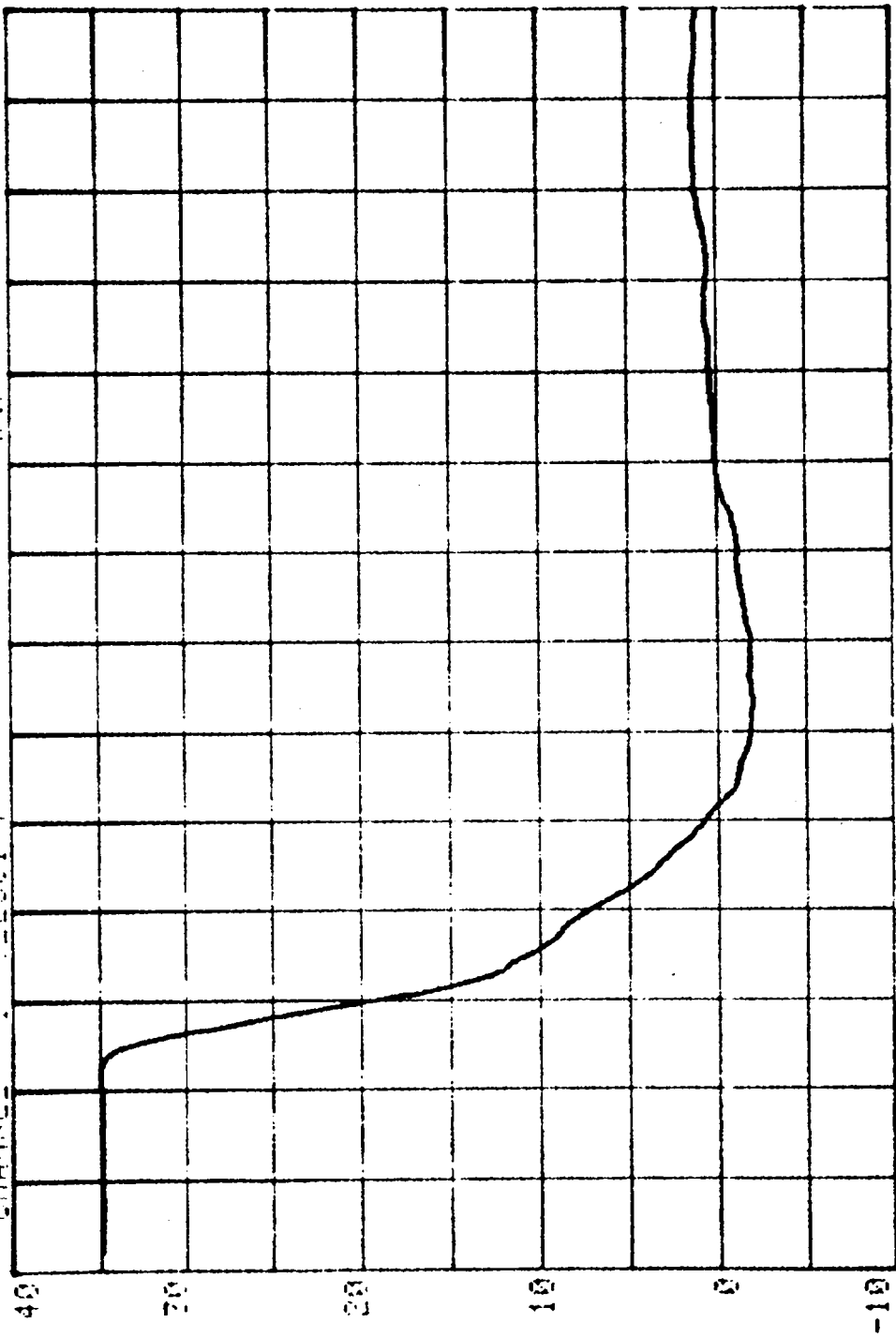
CHANNEL 27 ACC-PACK #1000
RUN= 966 SERIES= 11 G'S



ACCEL #1(x)

RUN# 966 SERIES# 11 MPH

CHANNEL 1 VELOCITY



300. 250. 200.

150. 100.

50. TIME

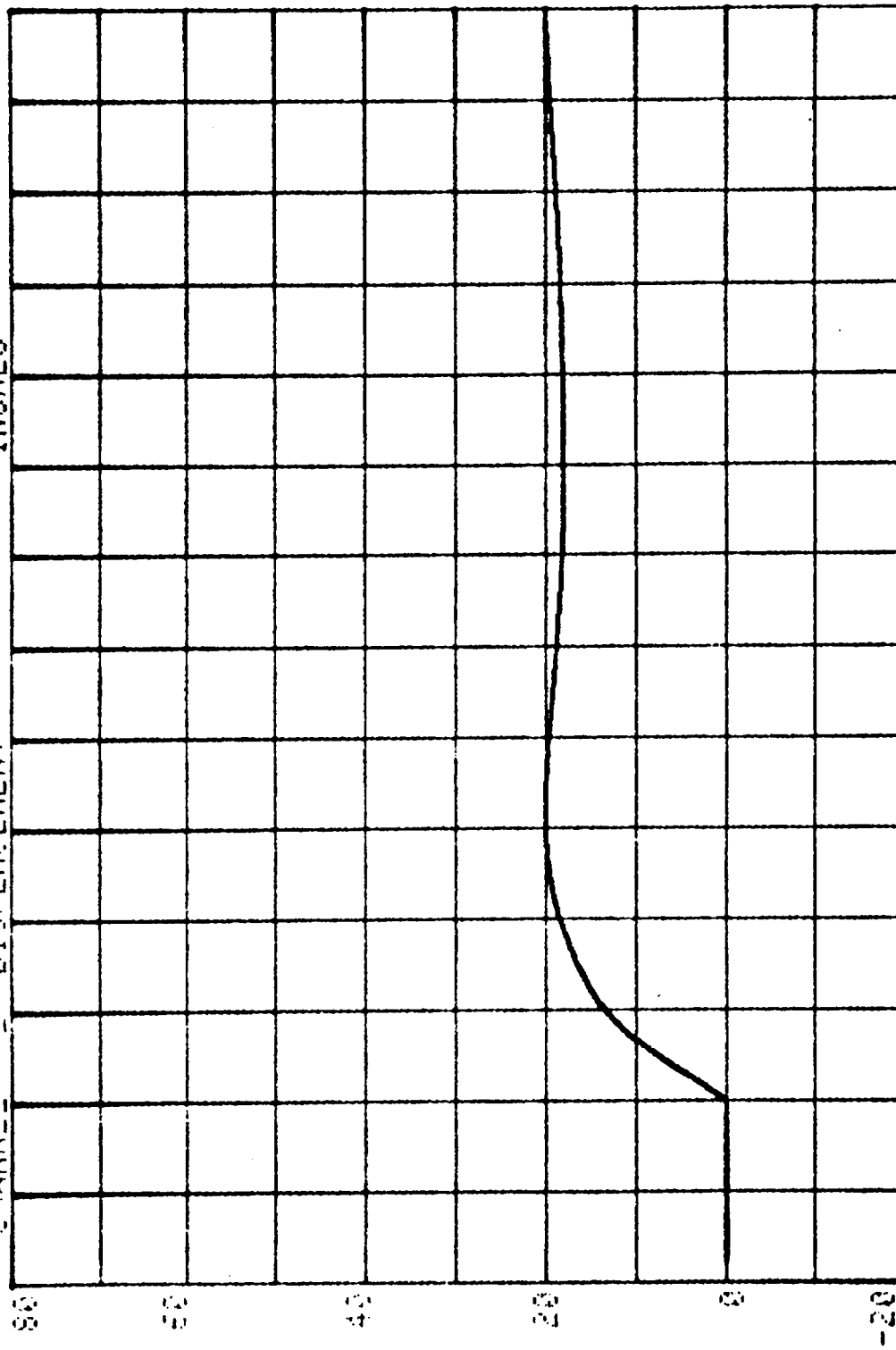
-50.

ACCEL #1 (x)

SERIES= 11 INCHES

RUN= 266 DISPLACEMENT

CHANNEL 2



300

250

200

150

100

50

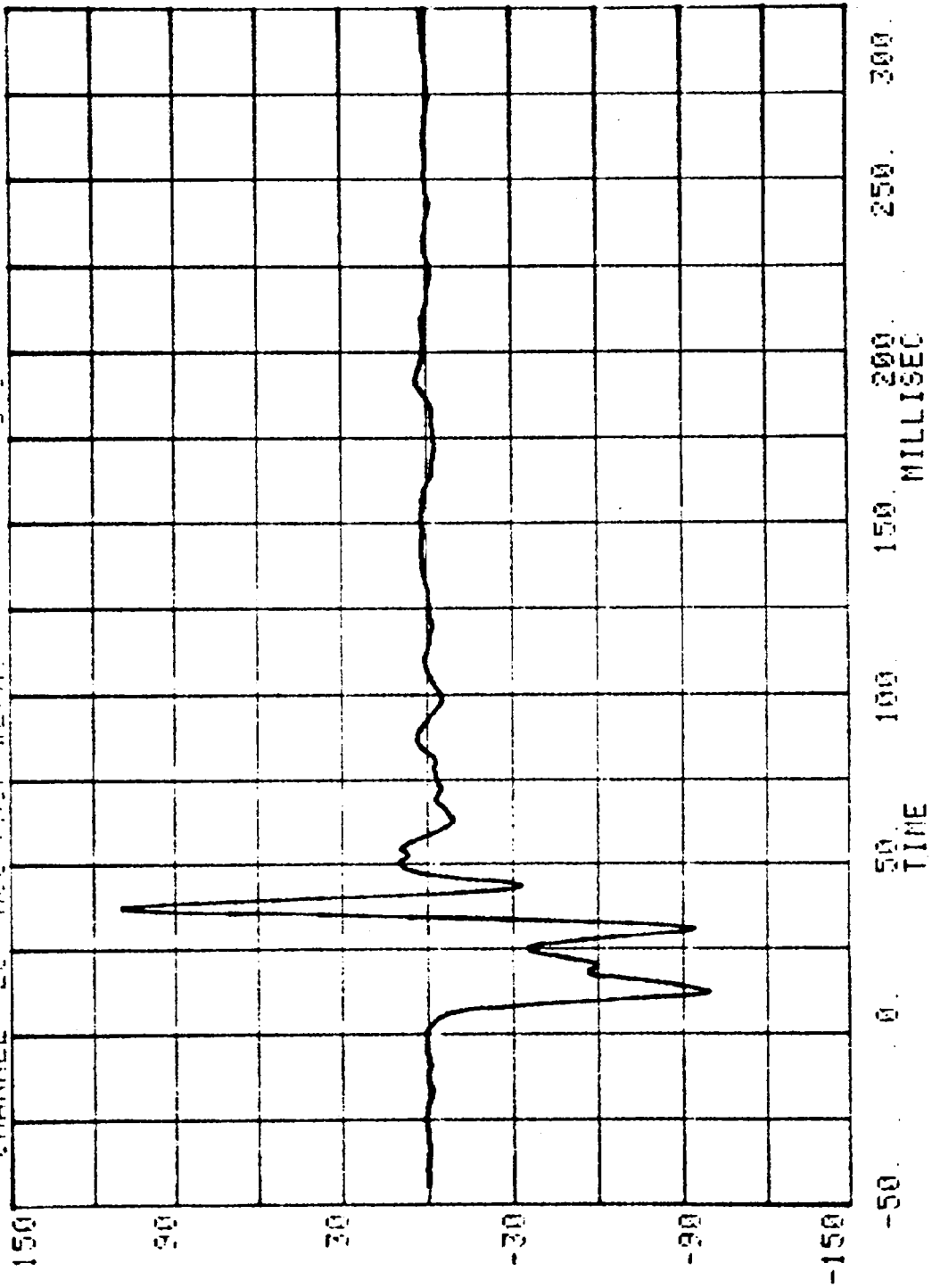
0

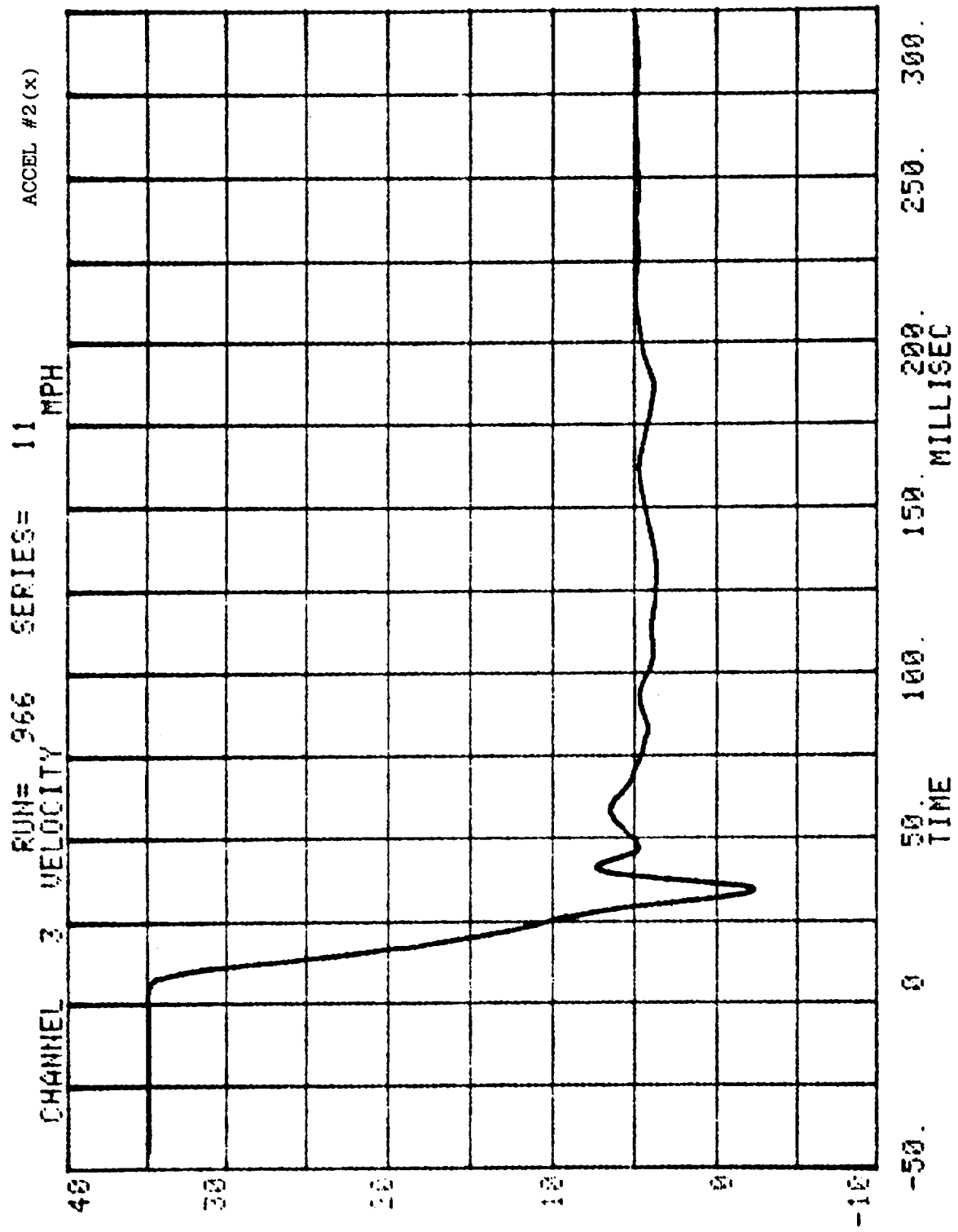
-50

MILLISEC

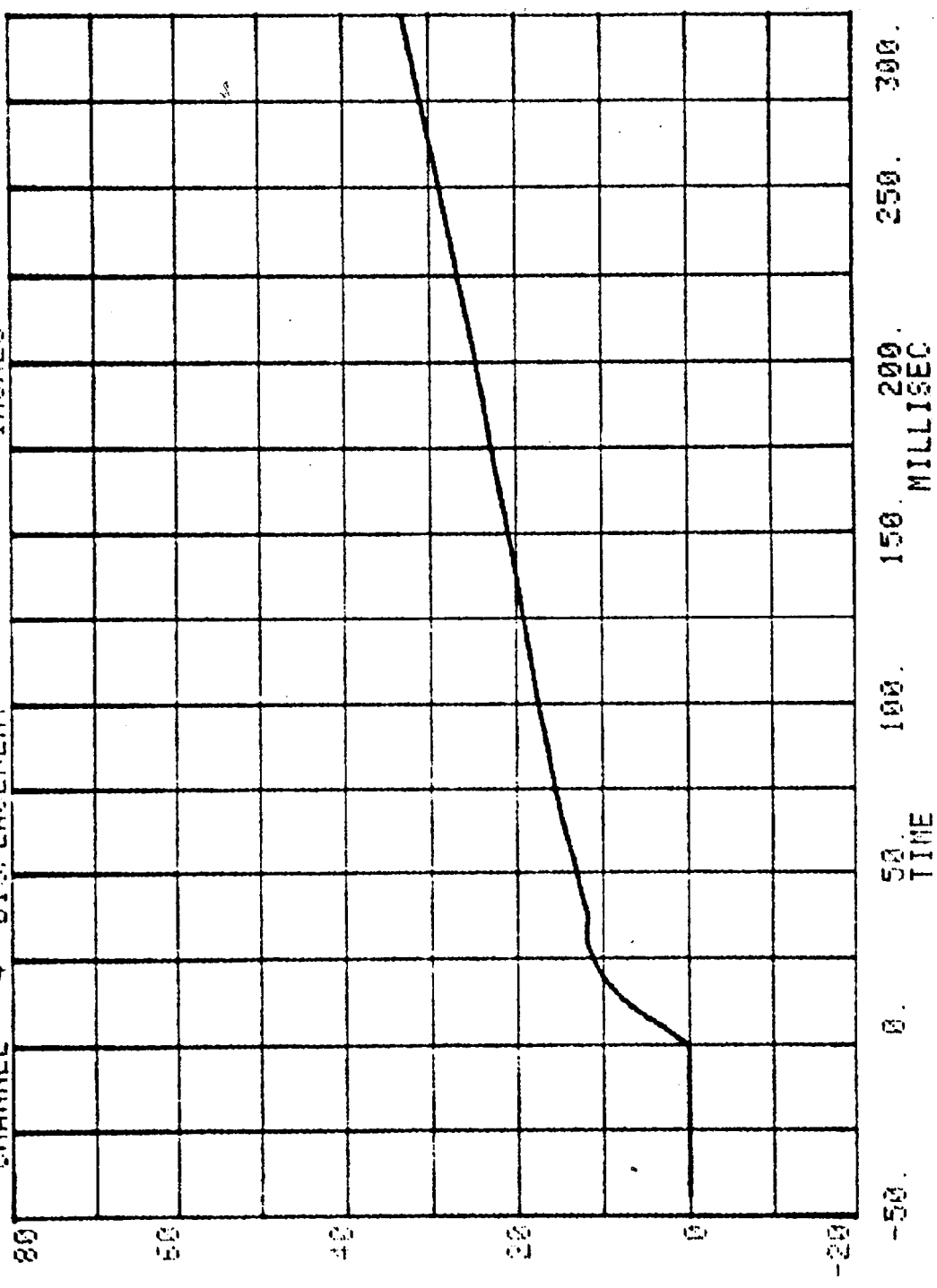
TIME

CHANNEL 28 ACC PRG# 2100
FUN# 999 SERIES# 11 B'S

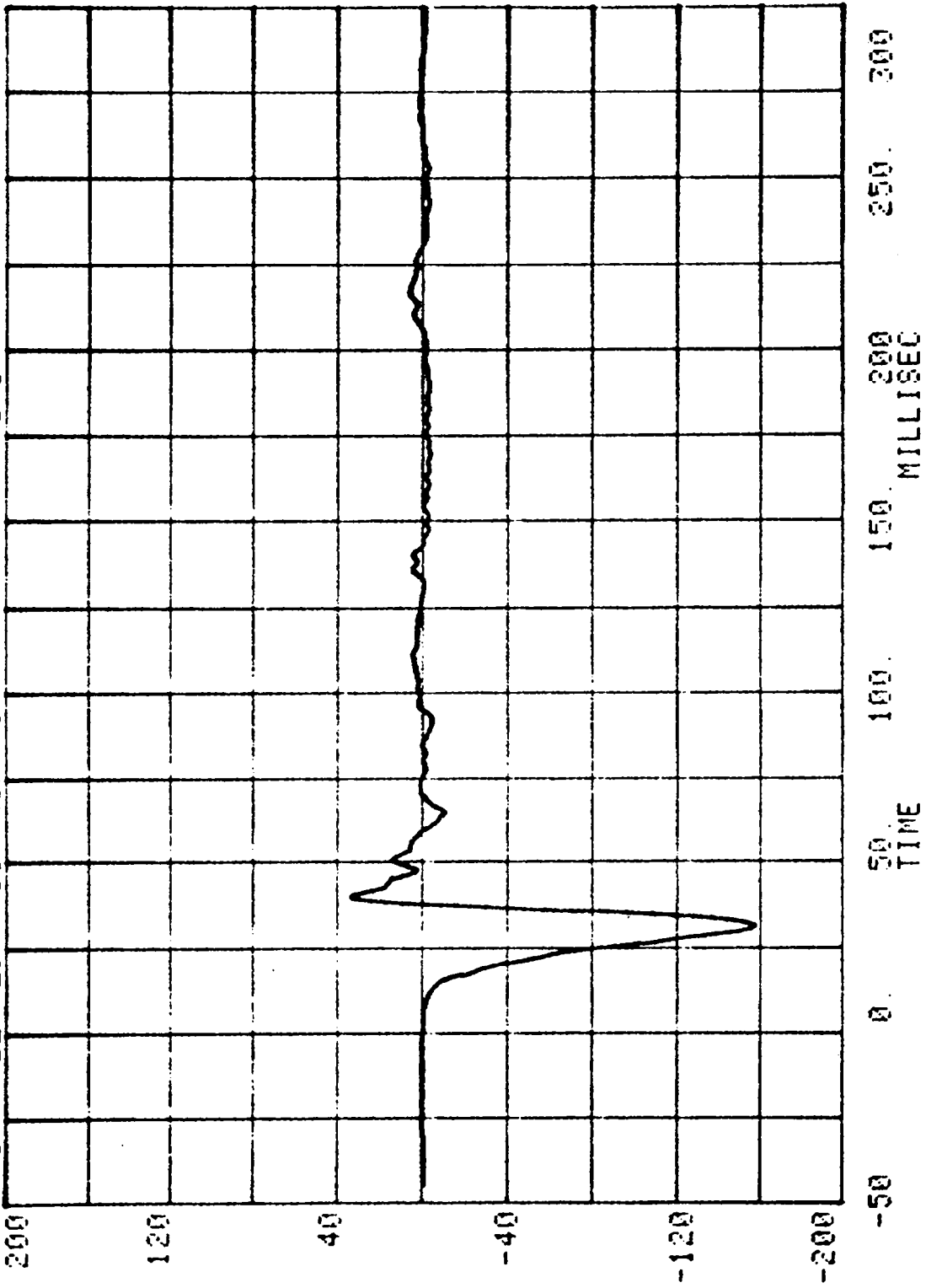




CHANNEL 4 DISPLACEMENT
RUM= 366
SERIES= 11 INCHES
ACCEL #2(x)



CHANNEL 29 ACQ PACK #3000 RUN# 966 SERIES# 11 0'S

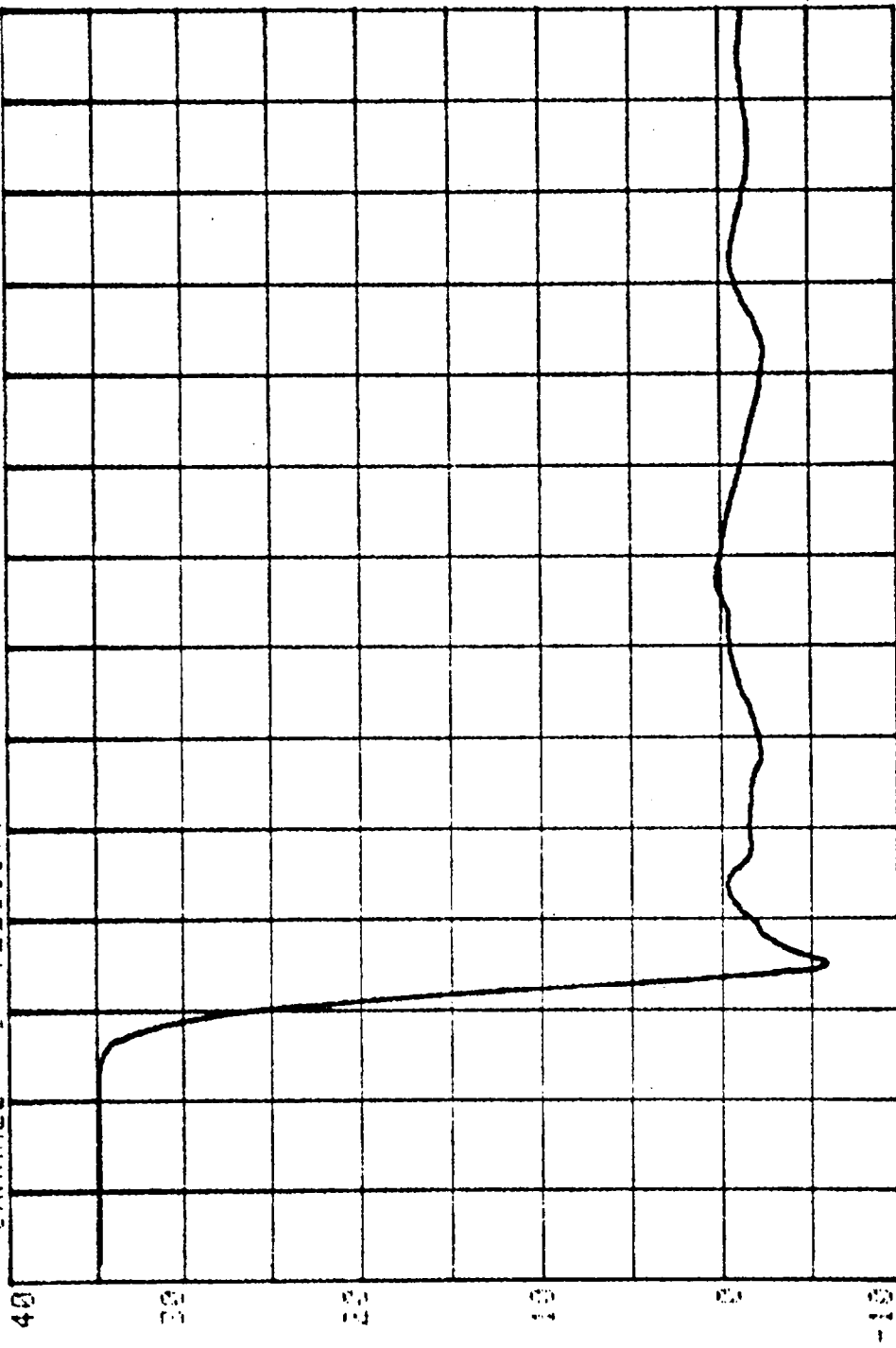


ACCEL #3 (x)

SERIES= 11 MPH

RUN= 966

CHANNEL 5 VELOCITY



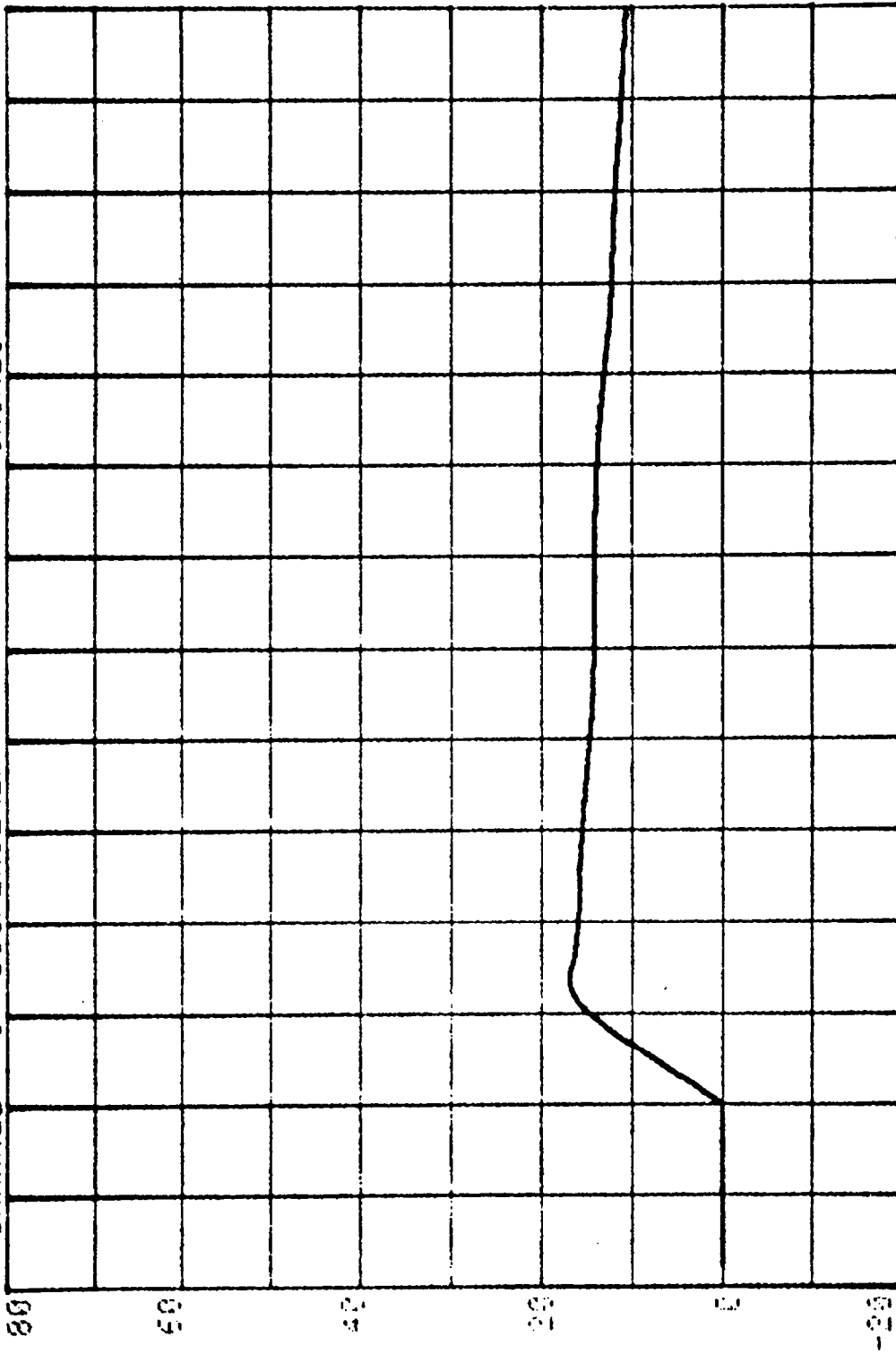
-50. 0. 50. 100. 150. 200. 250. 300.
TIME

ACCEL #3 (x)

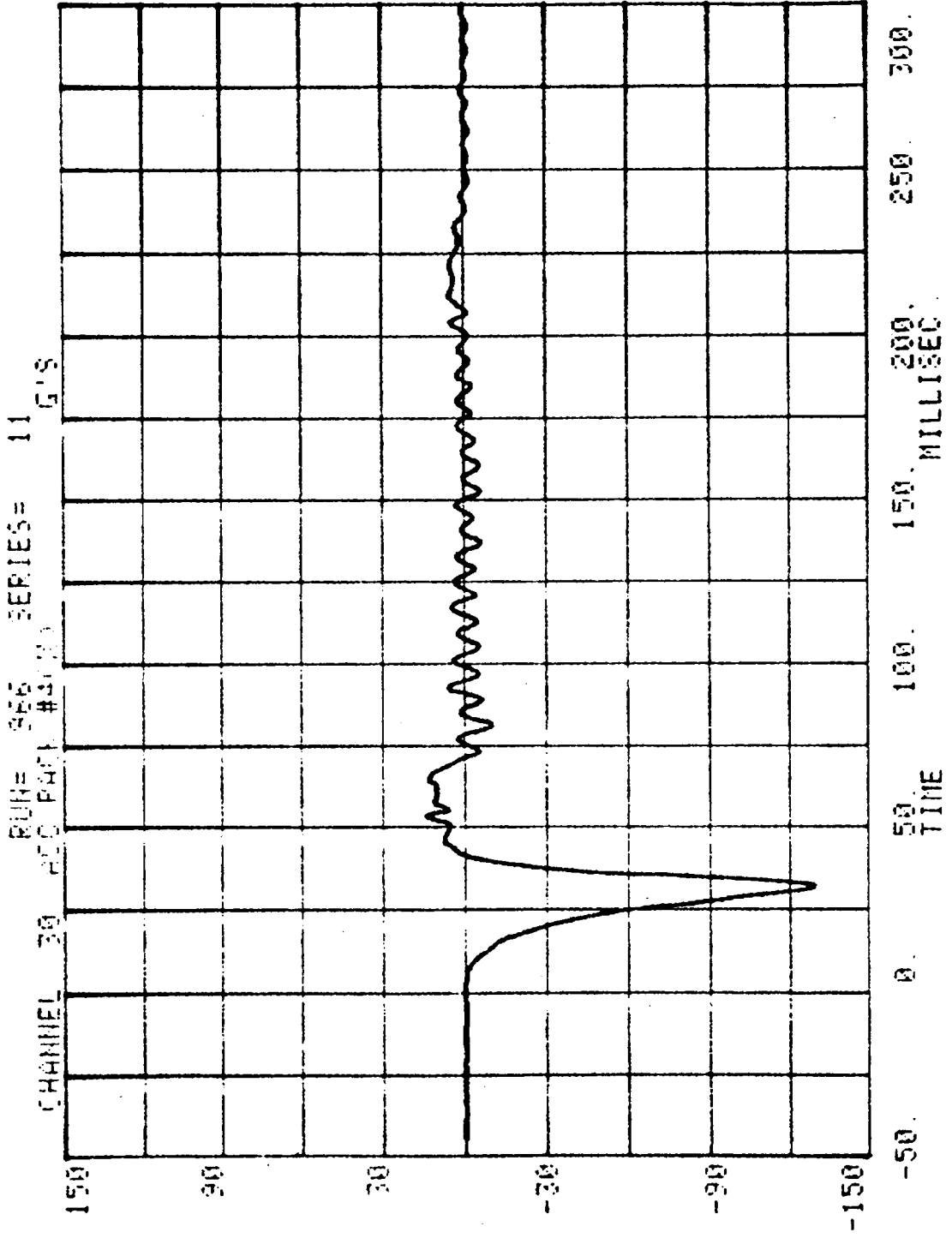
SERIES= 11 INCHES

RUN= 366 DISPLACEMENT

CHANNEL 6



80
60
40
20
0
-20
-50. 0. 50. 100. 150. 200. 250. 300.
TIME MILLISEC

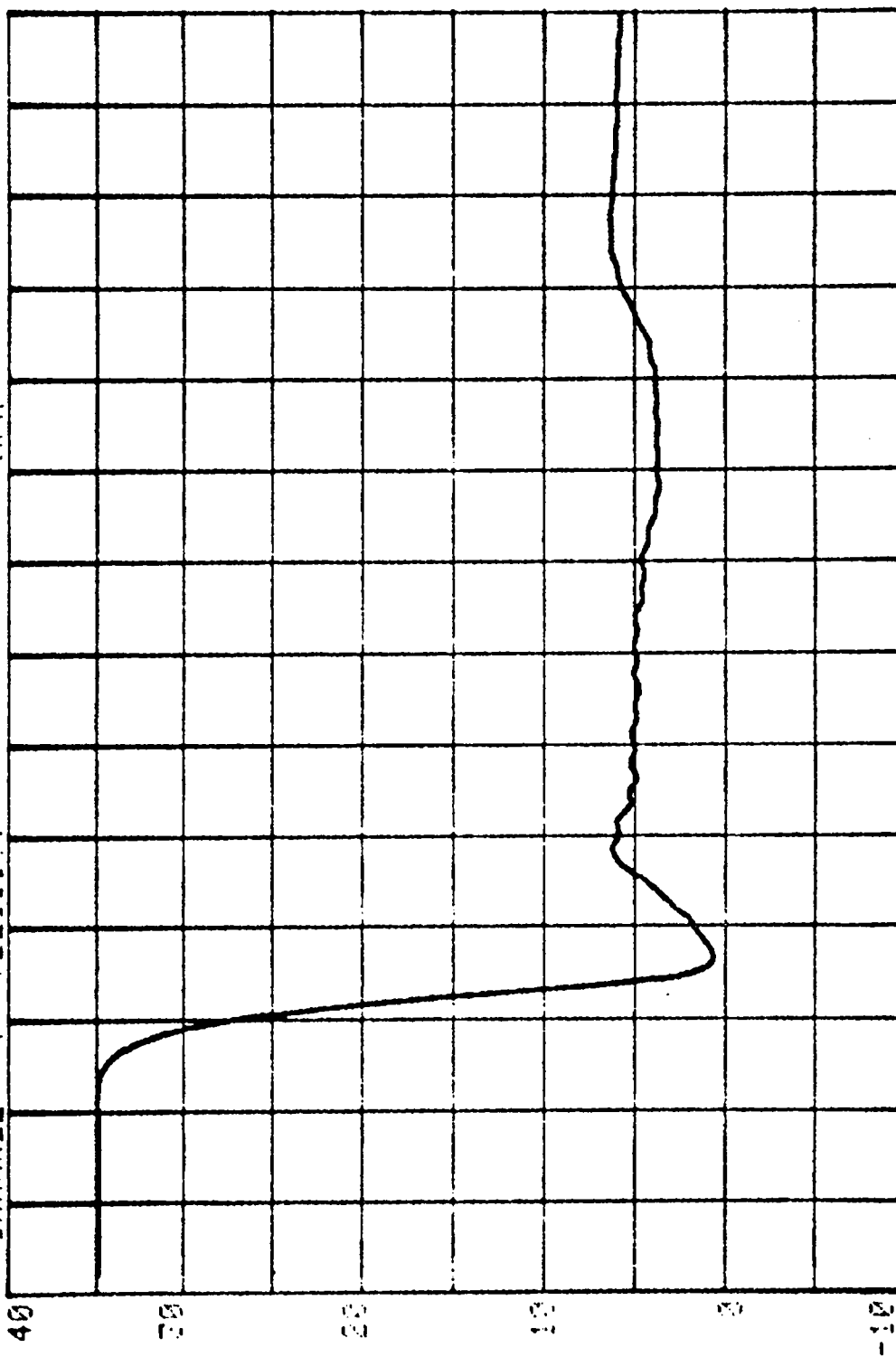


ACCEL #4 (x)

SERIES= 11 MPH

RUN= 966

CHANNEL 7 VELOCITY



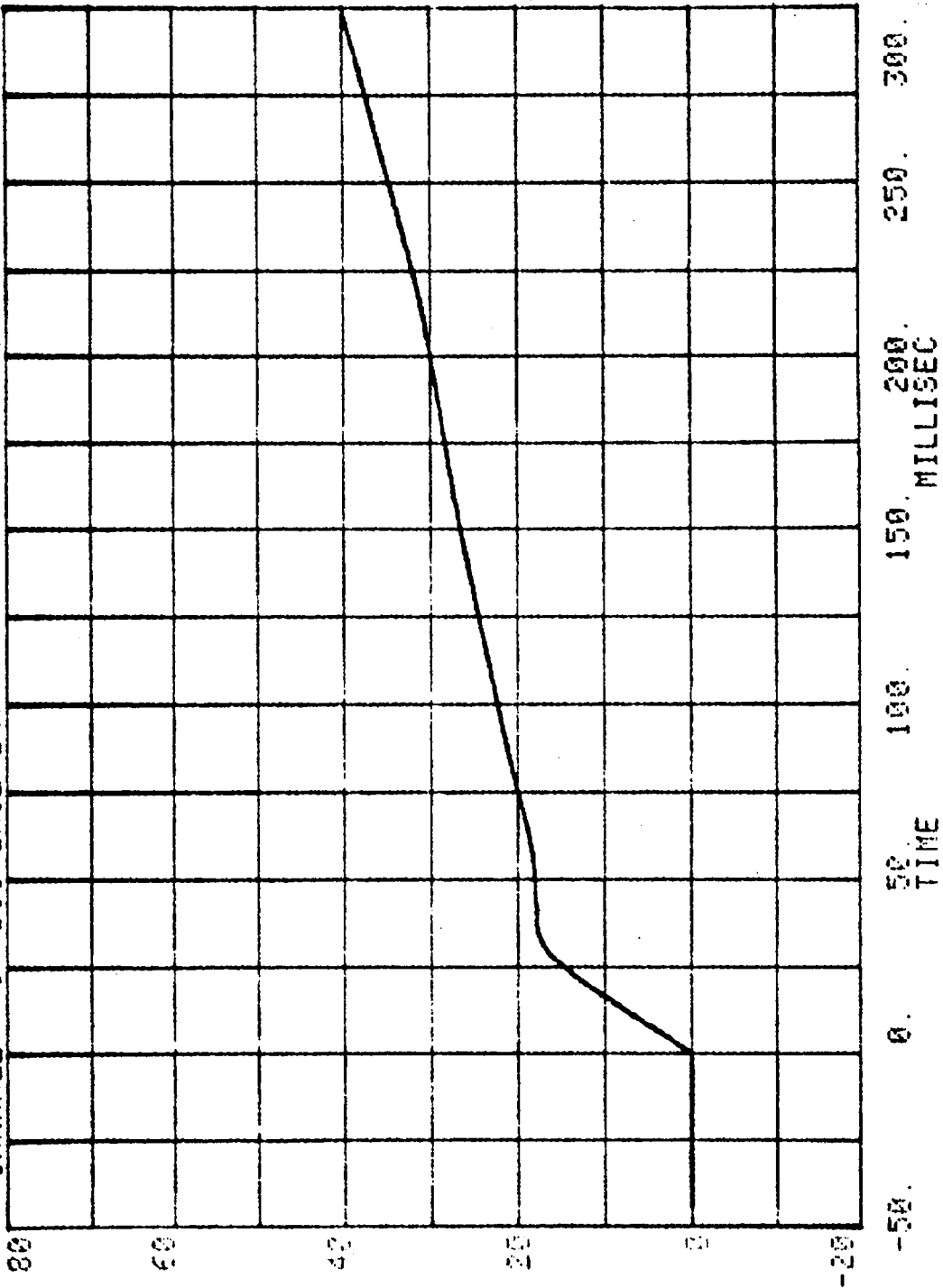
-50. 0. 50. 100. 150. 200. 250. 300.
TIME

ACCEL #4 (x)

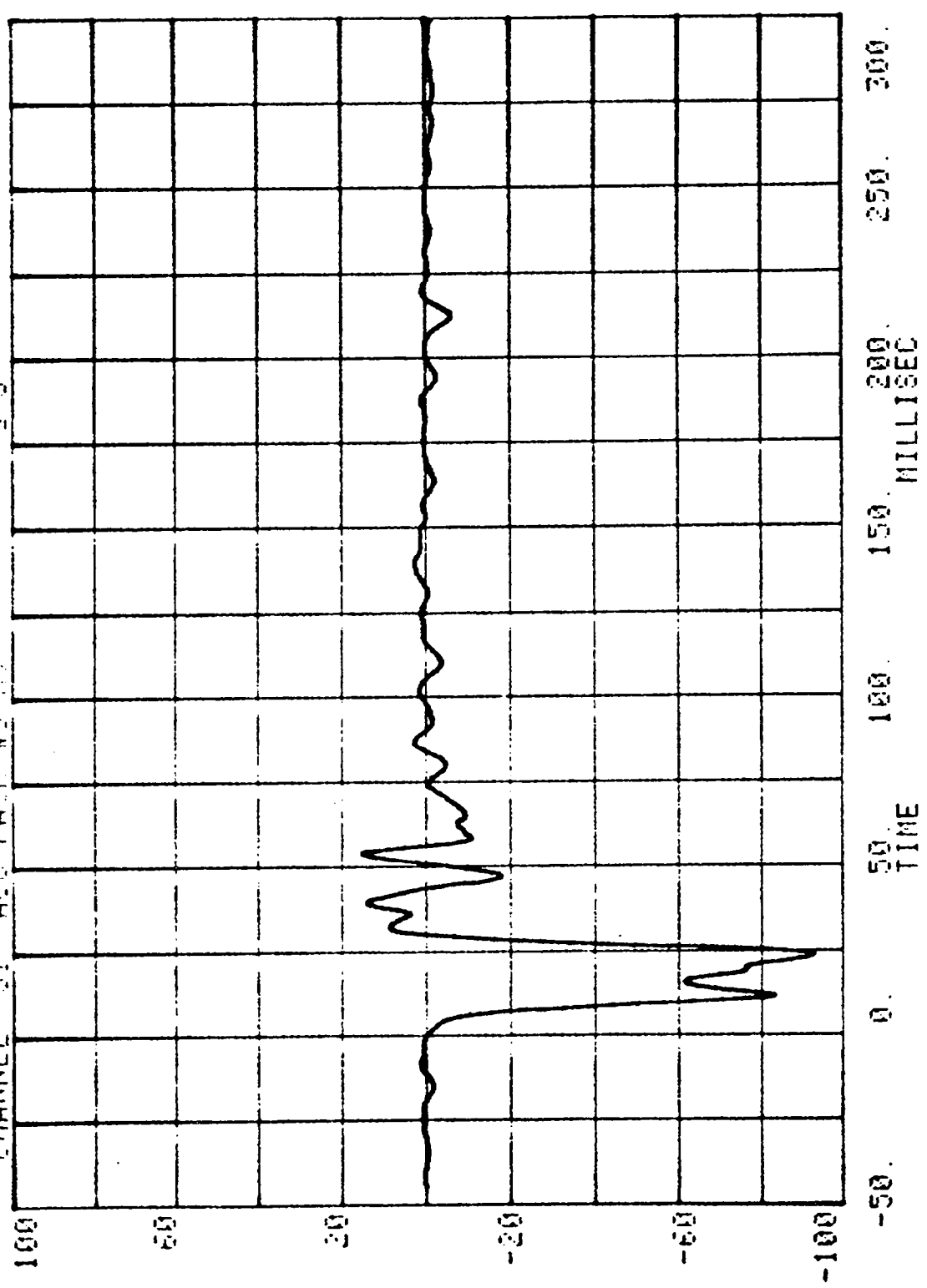
SERIES= 11 INCHES

RUN= 966

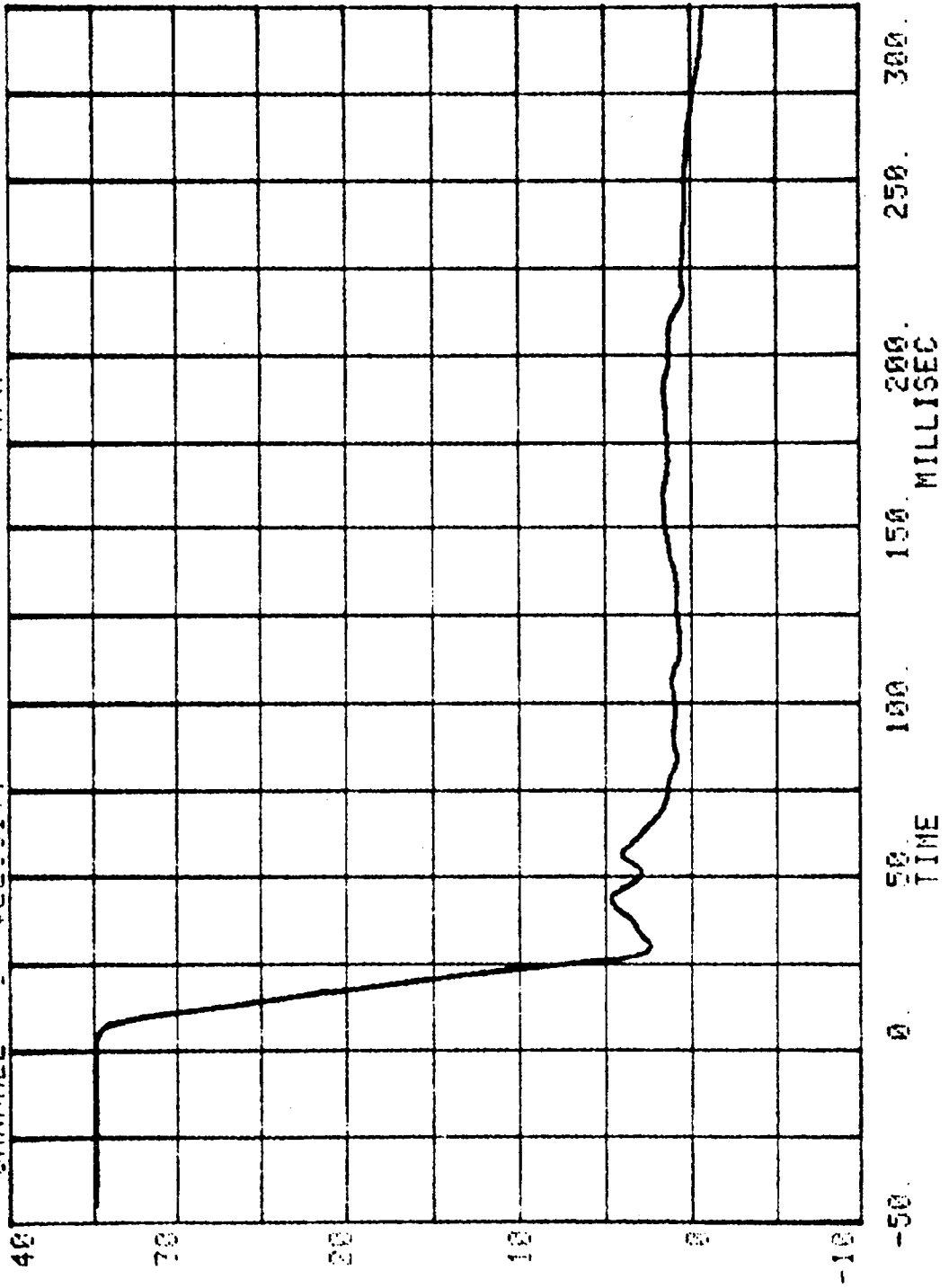
CHANNEL 8 DISPLACEMENT



CHANNEL 31 ACC PACT #50 V0
RUN= 926 SERIES= 11 G'S

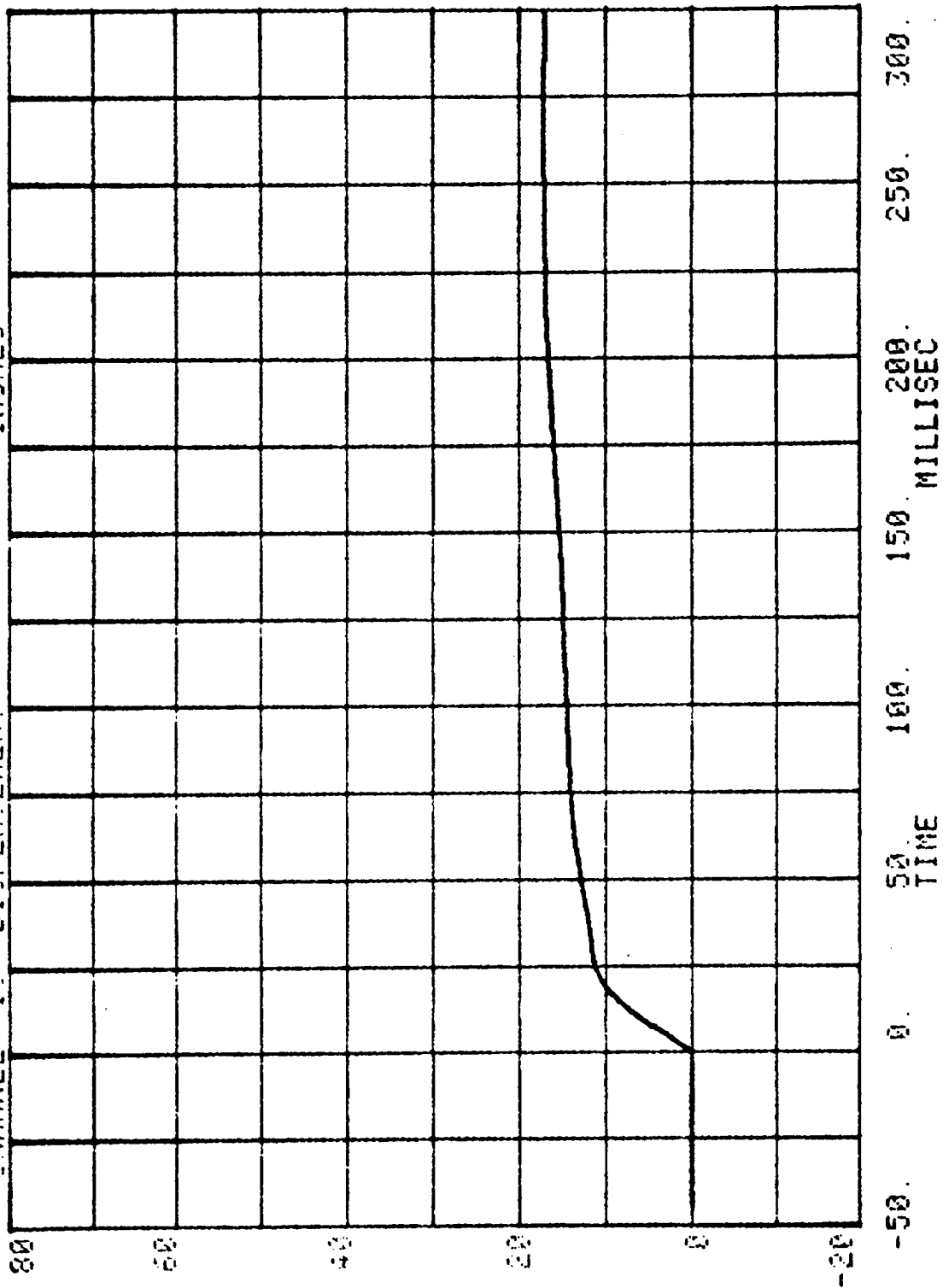


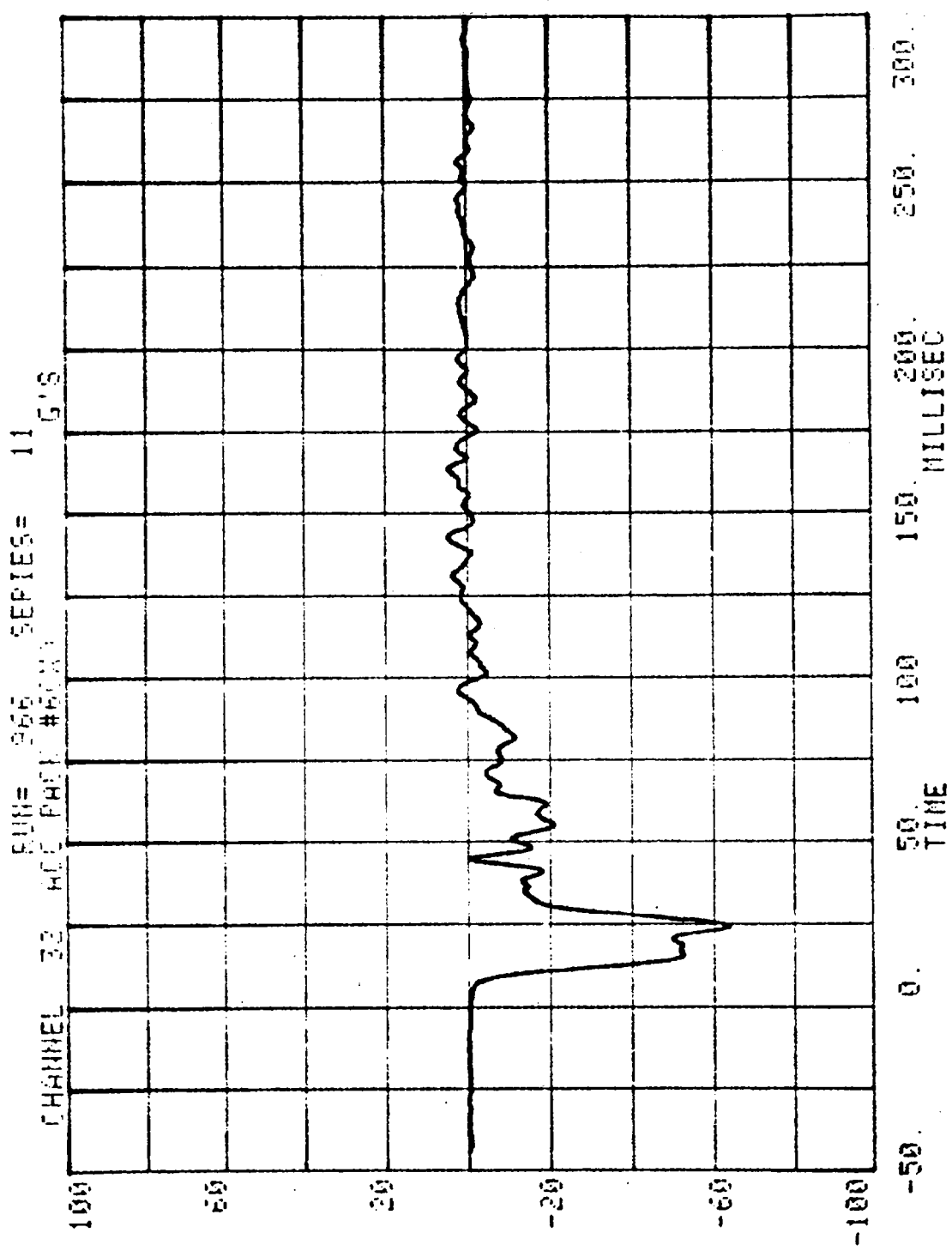
CHANNEL 3 VELOCITY RUN= 966 SERIES= 11 MPFH ACCEL #5(x)

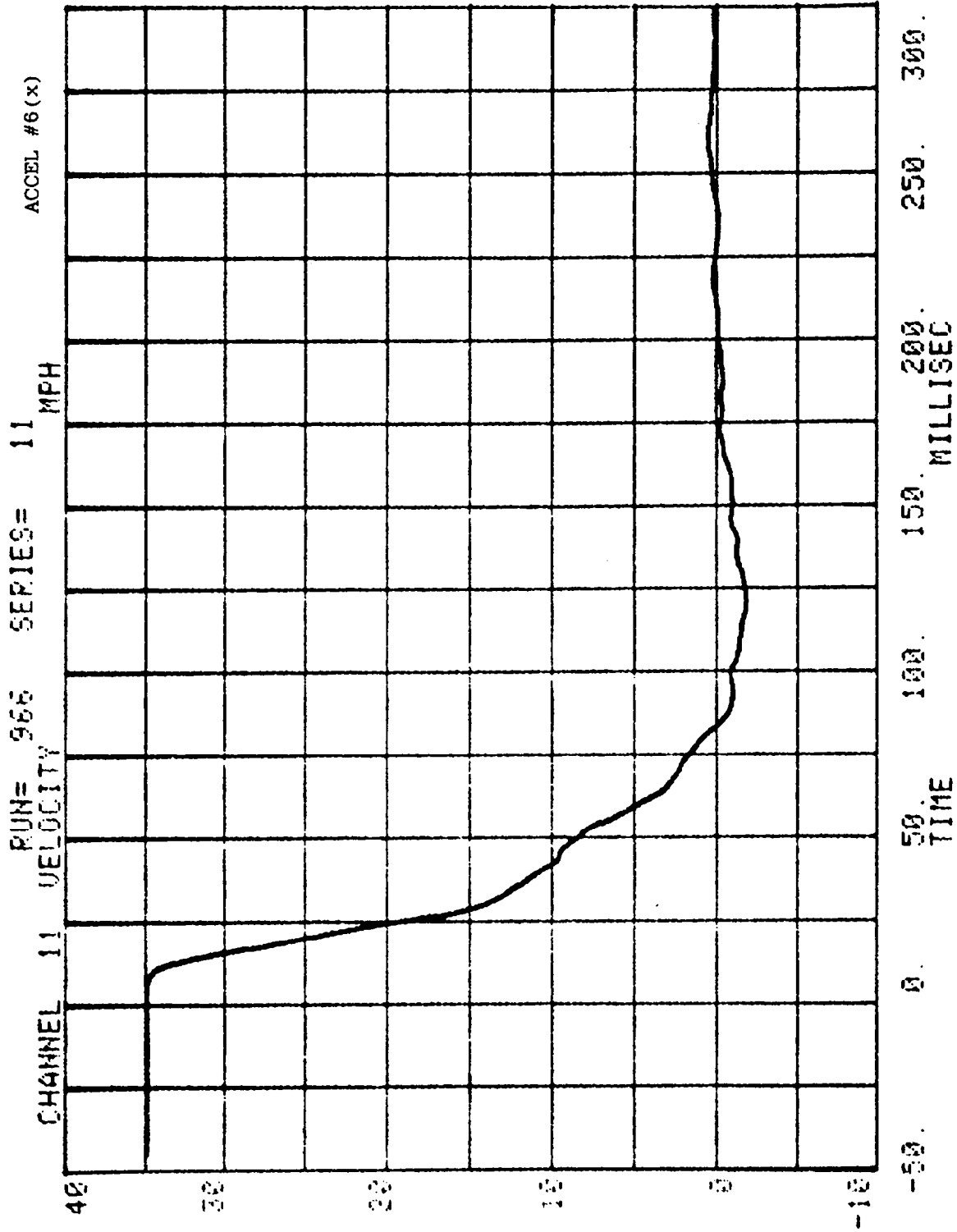


ACCEL #5 (x)

RUN= 966
CHANNEL 10 DISPLACEMENT
SERIES= 11 INCHES



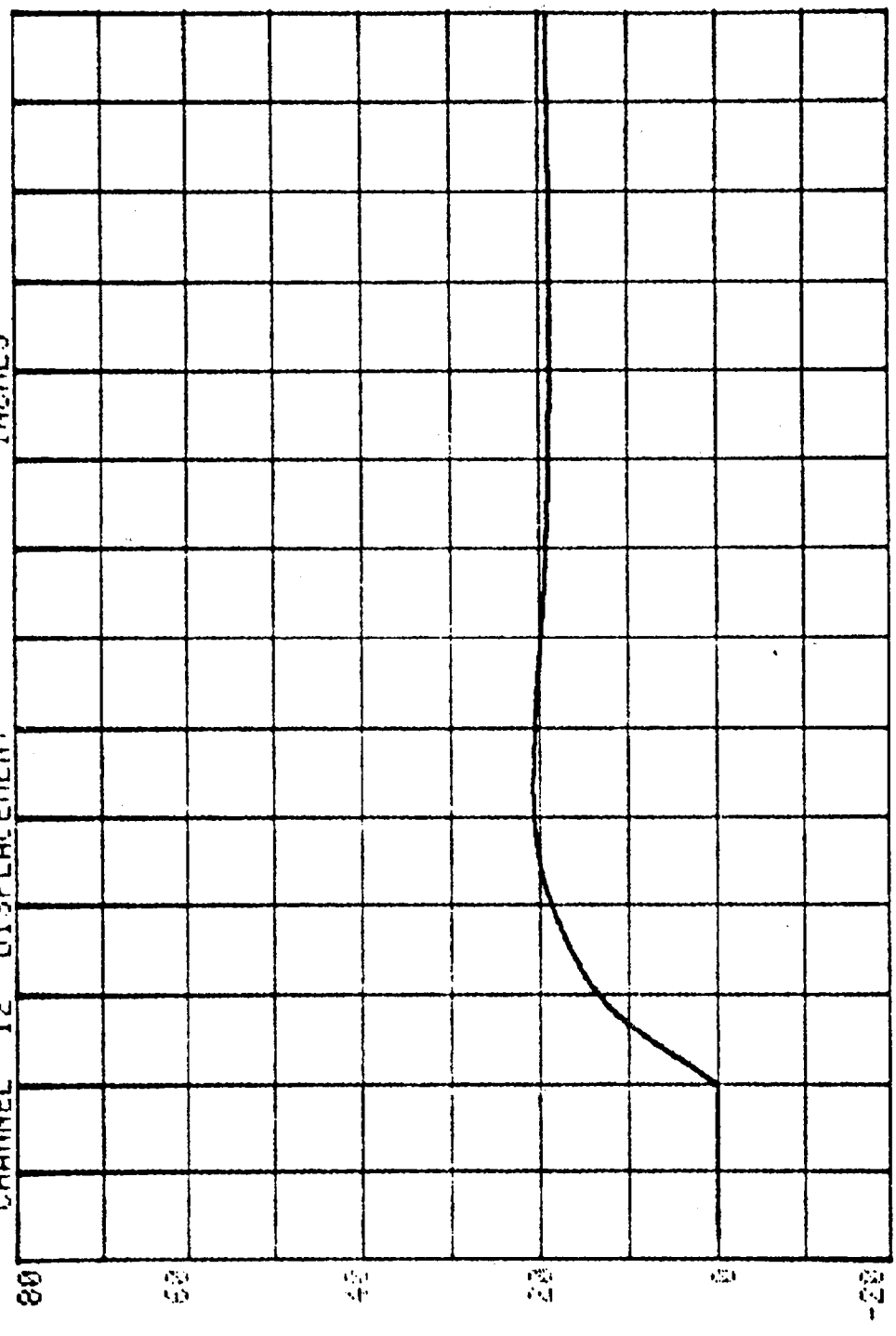




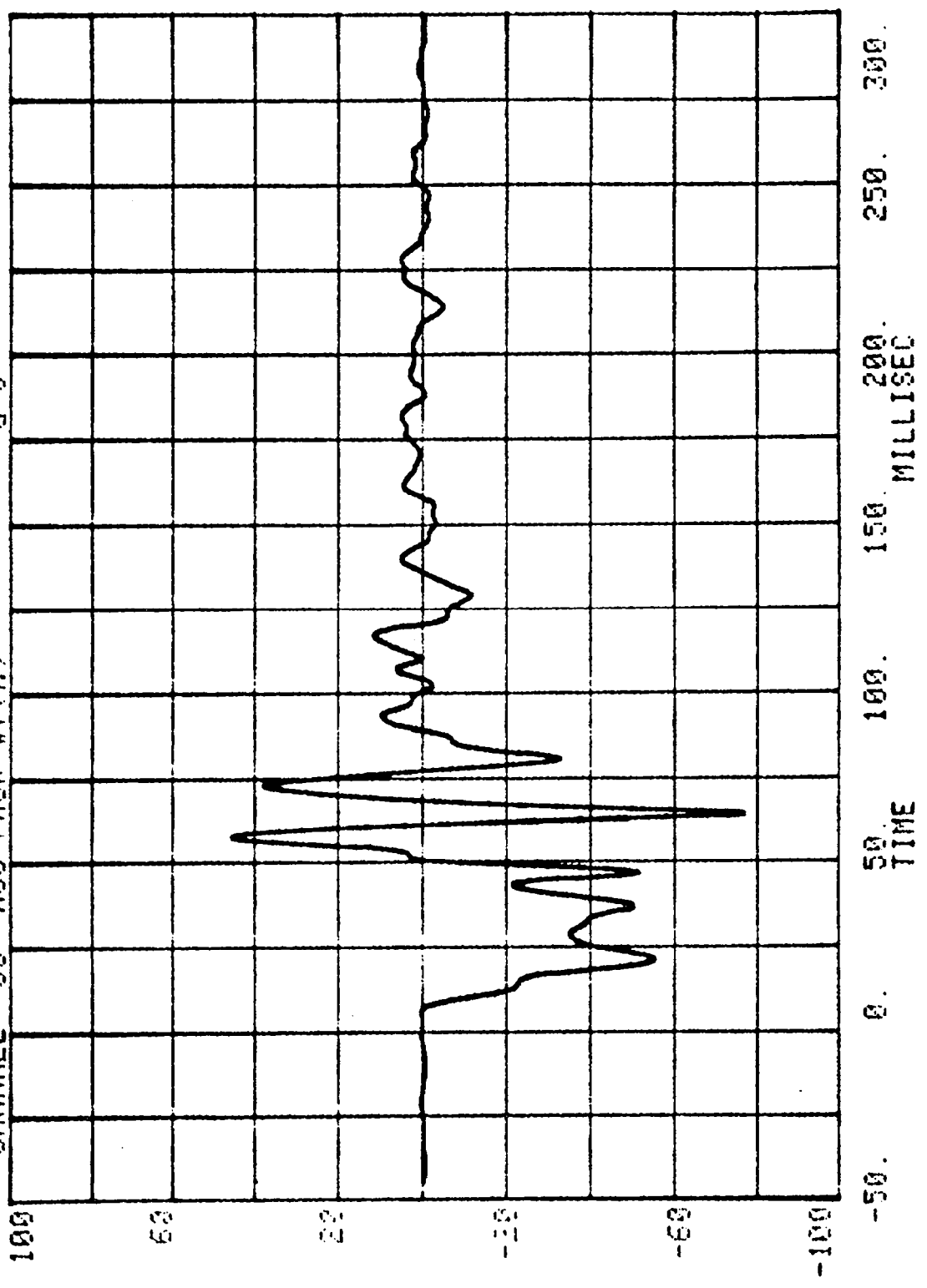
ACCEL #6 (x)

CHANNEL 12 DISPLACEMENT SERIES= 11 INCHES

RUN= 366

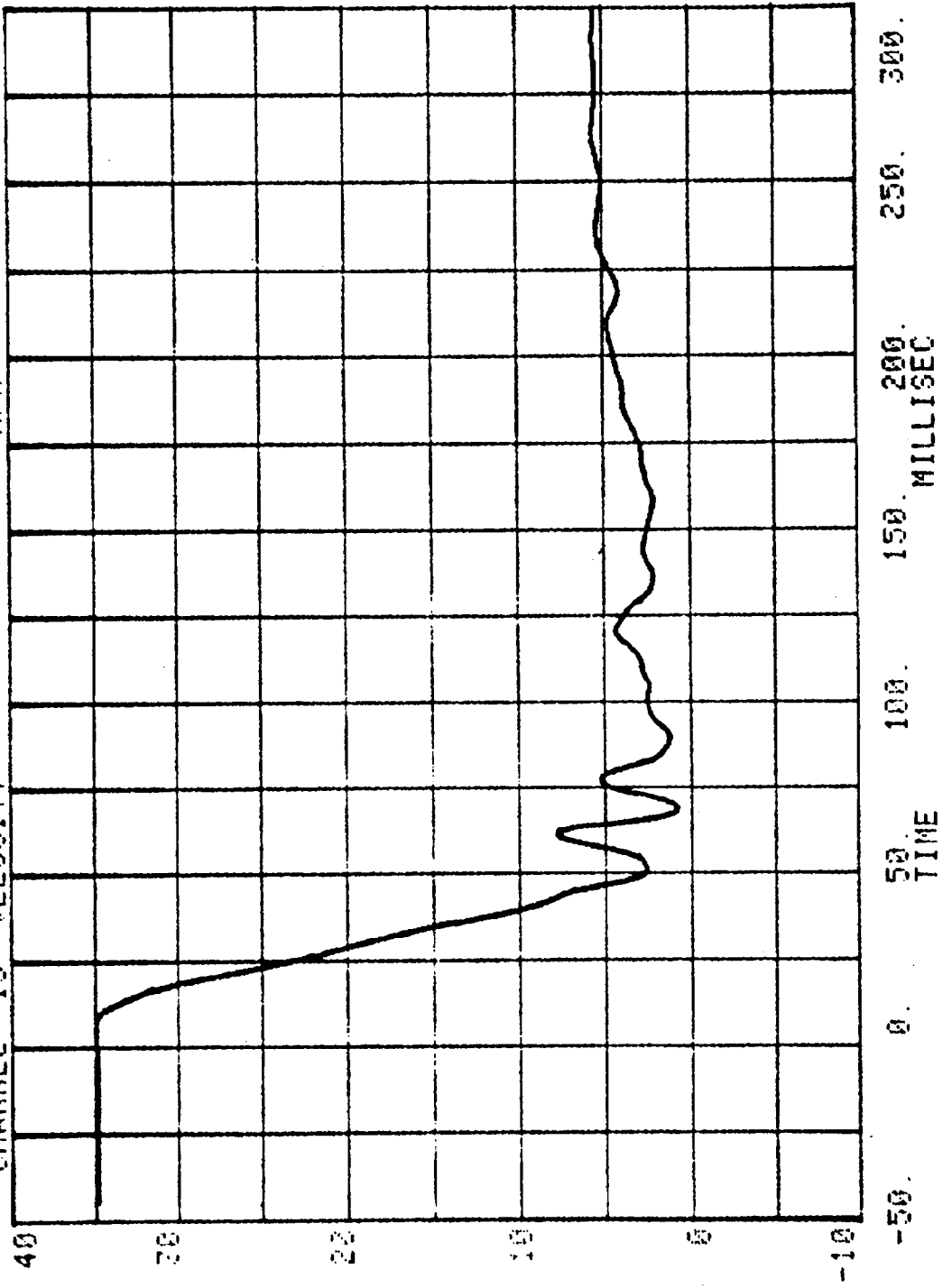


CHANNEL 33 ACC PACK #702) RUN= 956 SERIES= 11 G'S



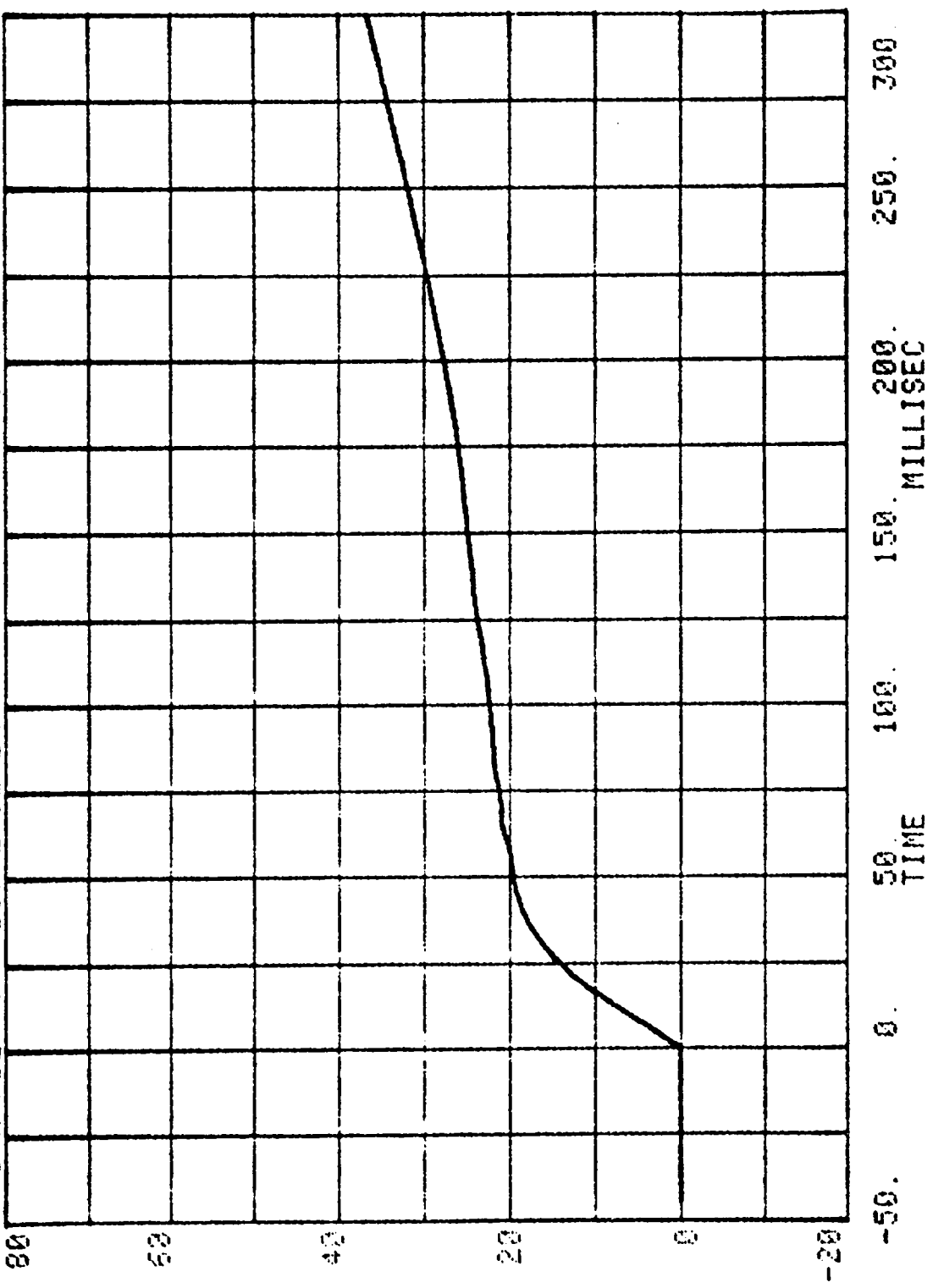
ACCEL #7(x)

CHANNEL 13 VELOCITY
RUN= 966 SERIES= 11 MPH



ACCEL #7 (x)

CHANNEL 14 DISPLACEMENT
RUH= 966
SERIES= 11 INCHES



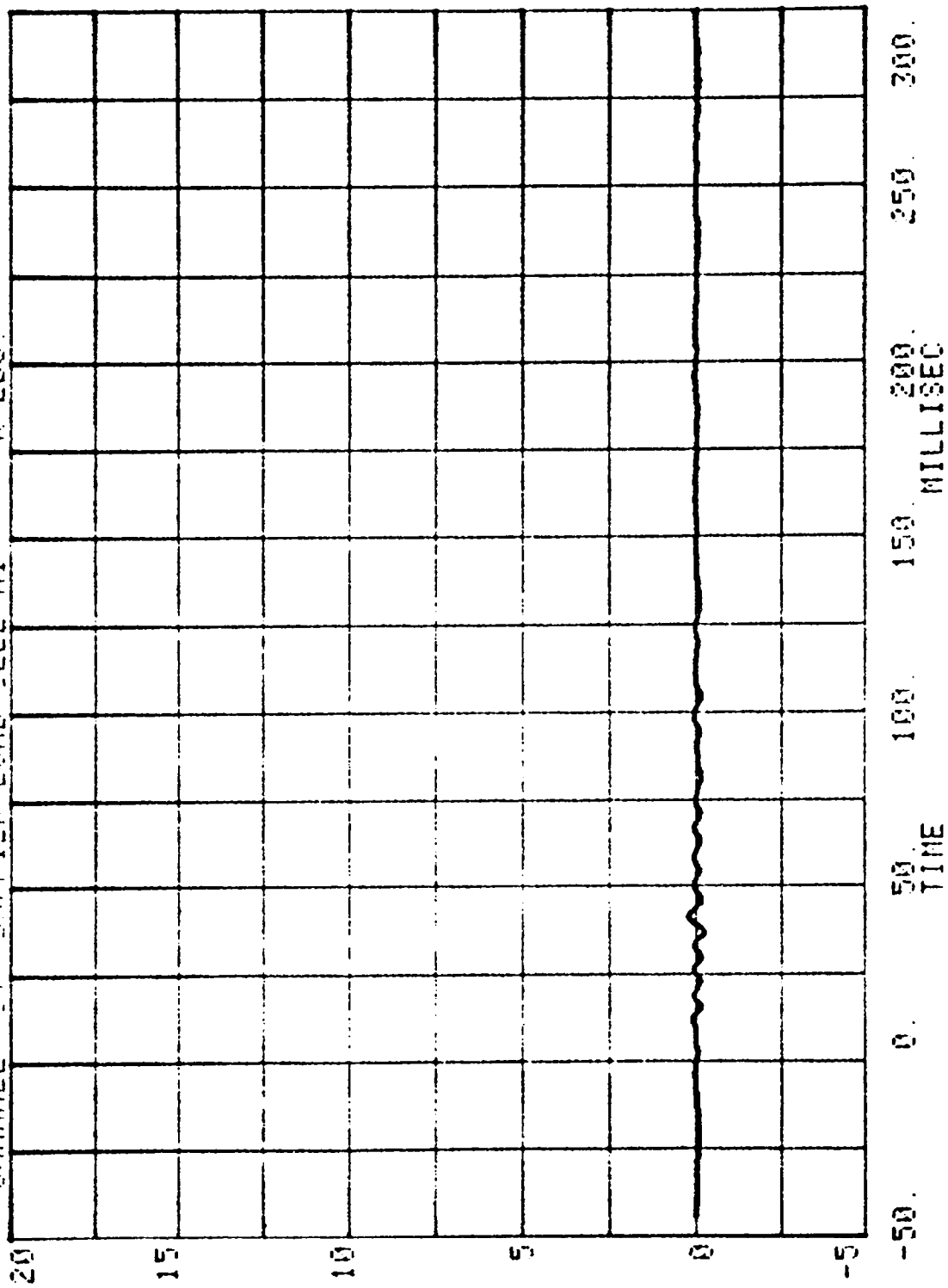
TEST NO. ML5700

LOAD CELL BARRIER DATA

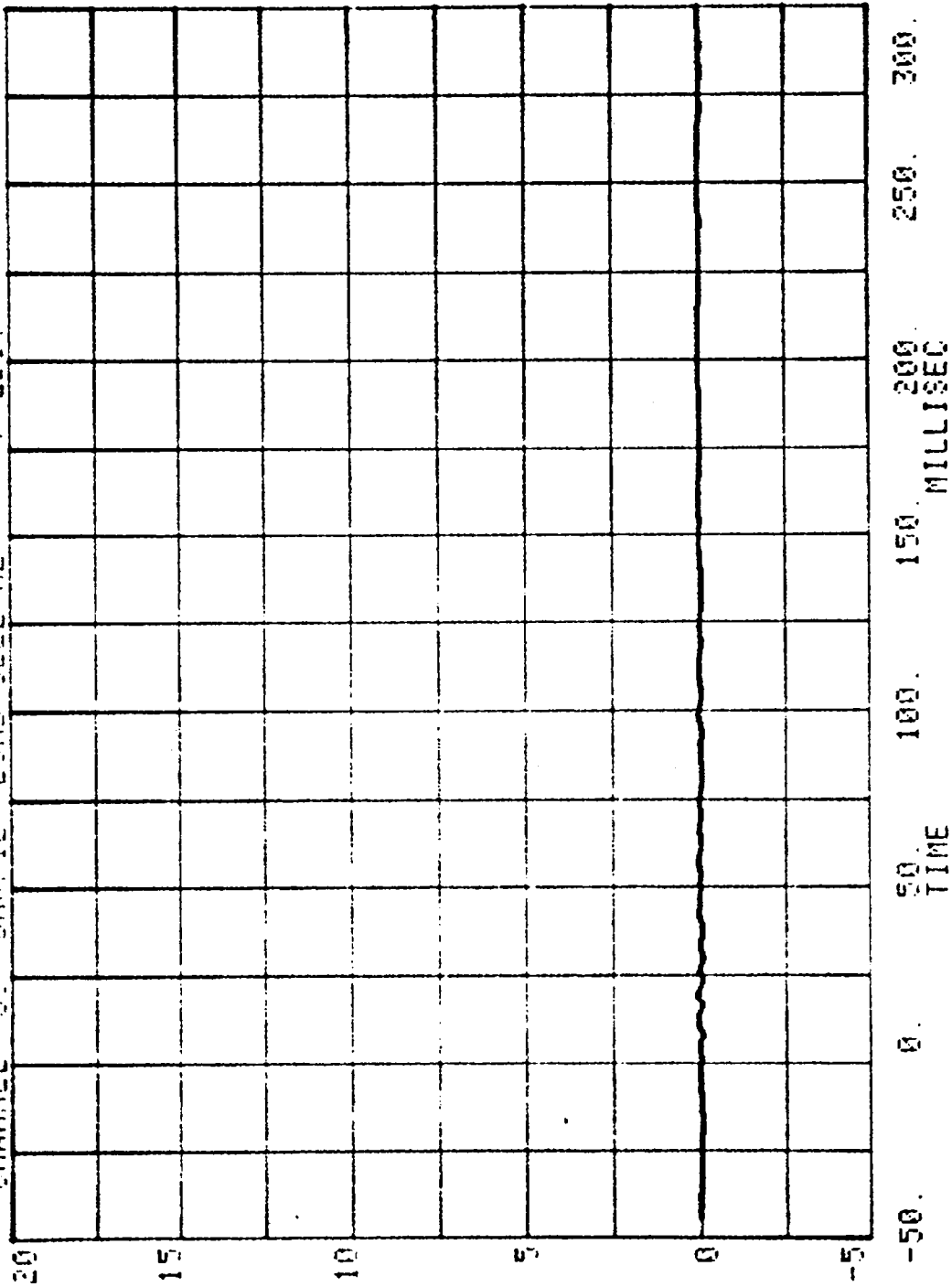
FILTER CHANNEL CLASS

60

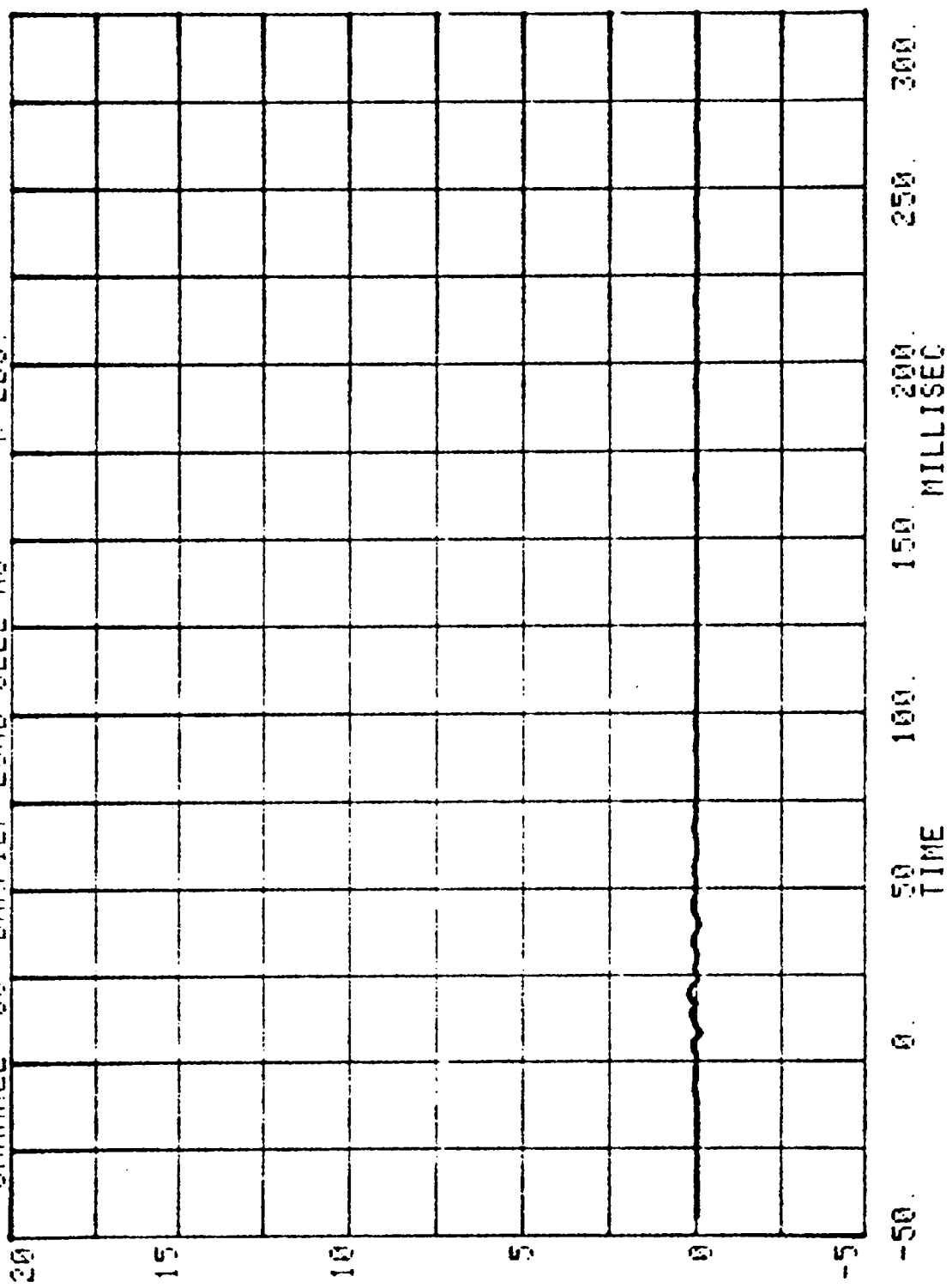
CHANNEL 34 BARRIER LOAD CELL #1 K LBS. RUN# 956 SERIES# 11



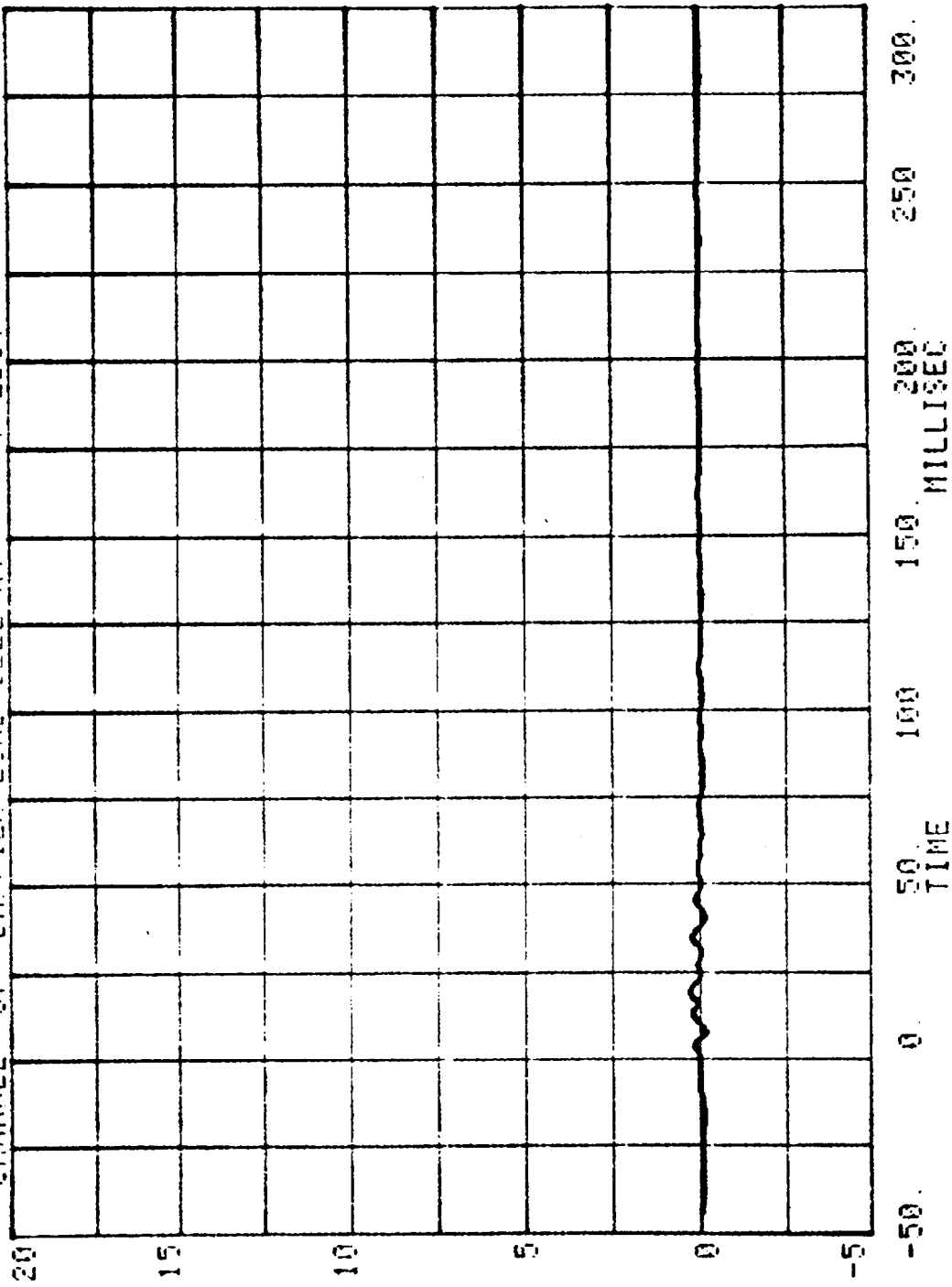
CHANNEL 35 BARRIER LOAD CELL A2 PUNE 966 SERIES= 11 Y LBS.



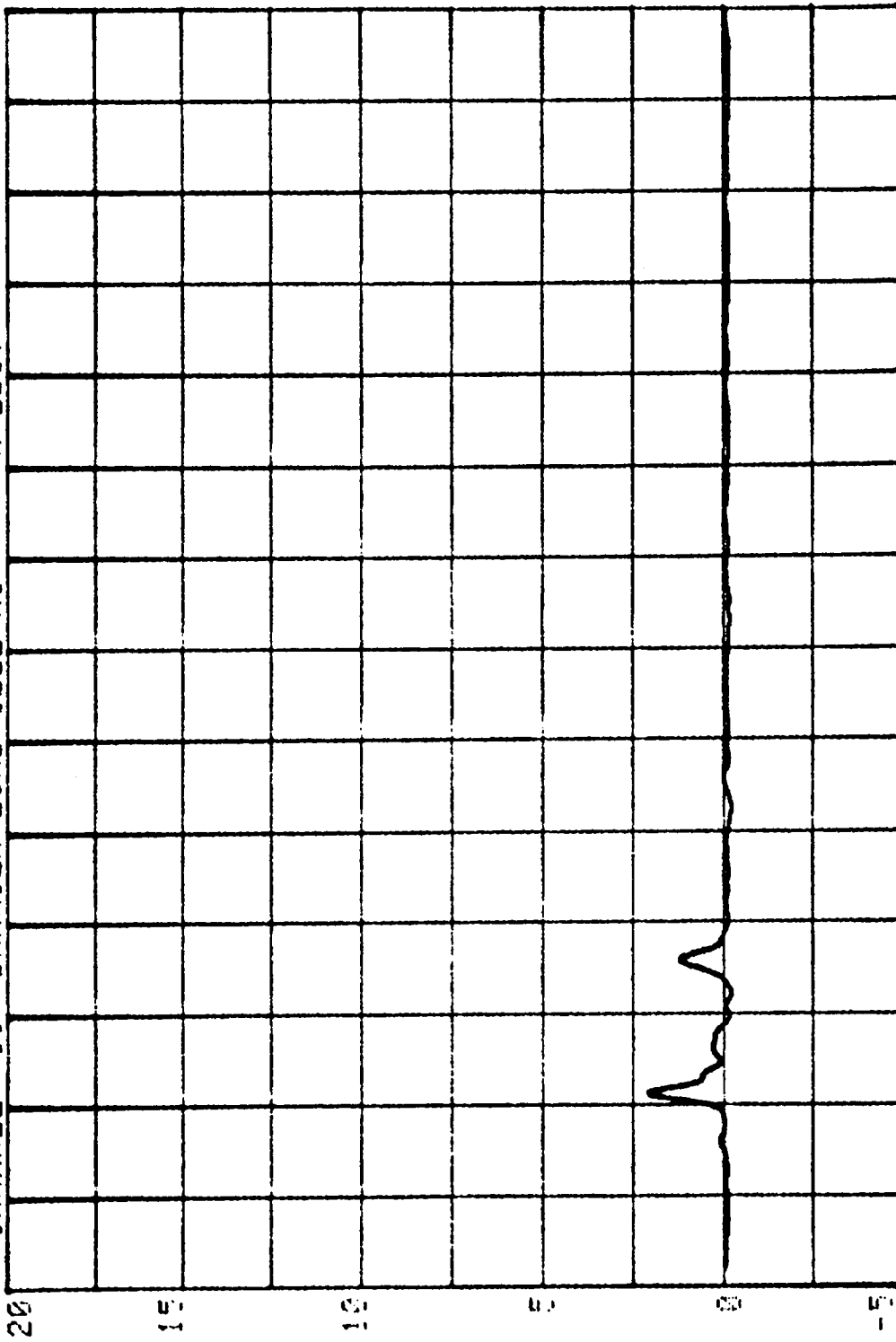
CHANNEL 36 BARRIER LOAD CELL A3 SERIES= 11 K LBS.



CHANNEL 37 BARRIER LOAD CELL A4 RUN# 966 SERIES# 11 K LBS.

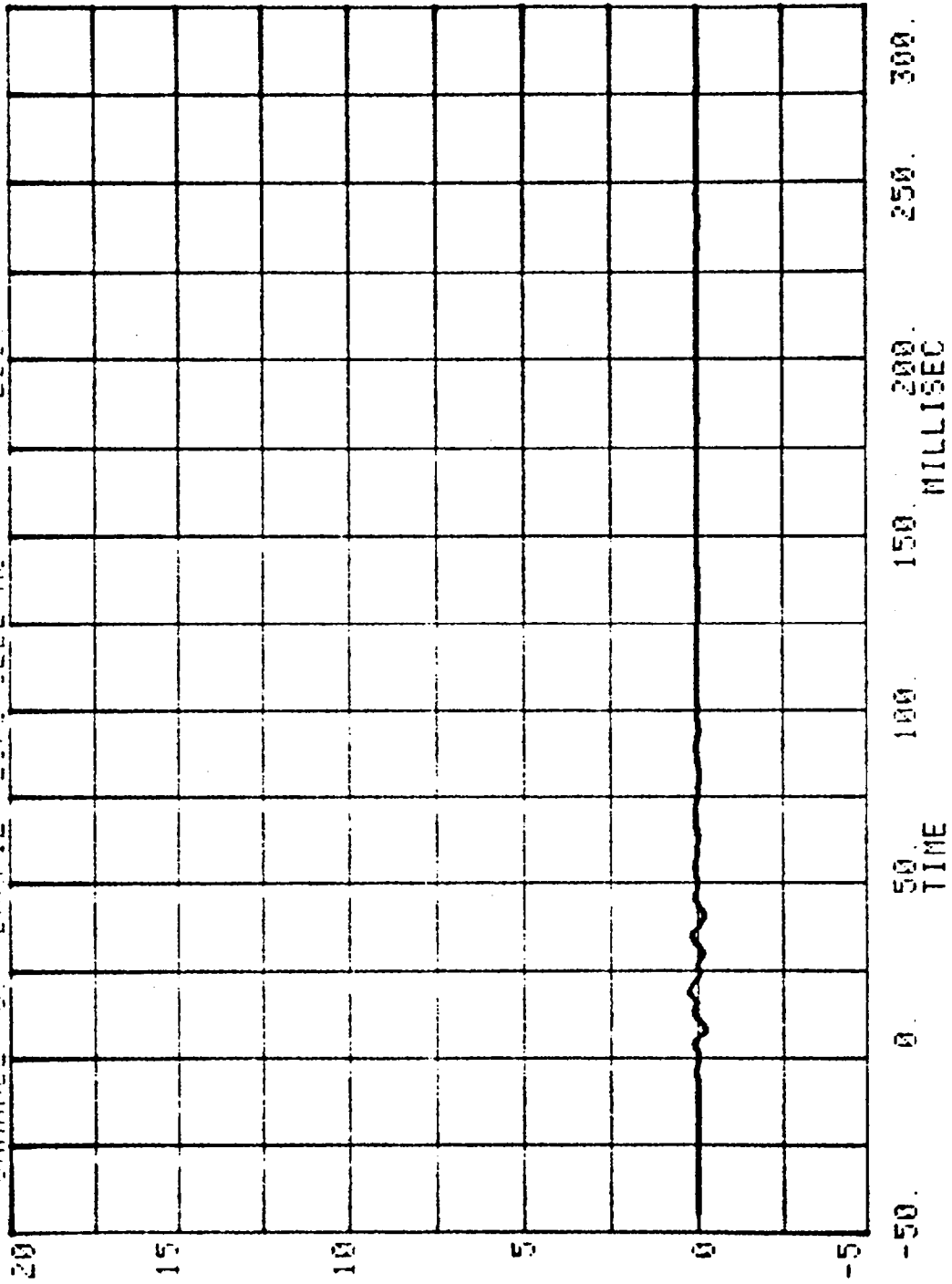


CHANNEL 38 BARRIER LOAD CELL A5
RUN= 966 SERIES= 11 K LBS.

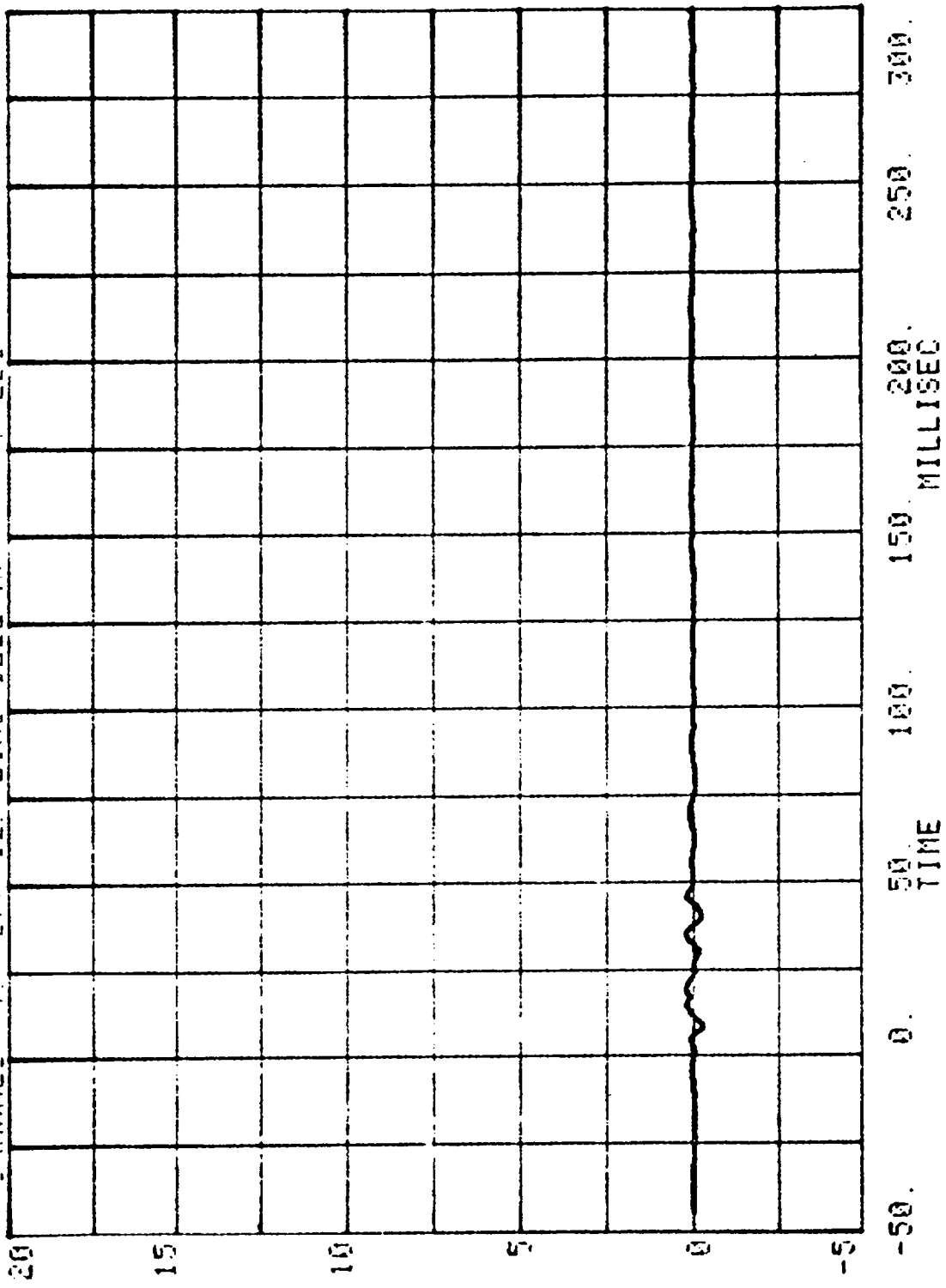


-50. 0. 50. 100. 150. 200. 250. 300.
MILLISEC
TIME

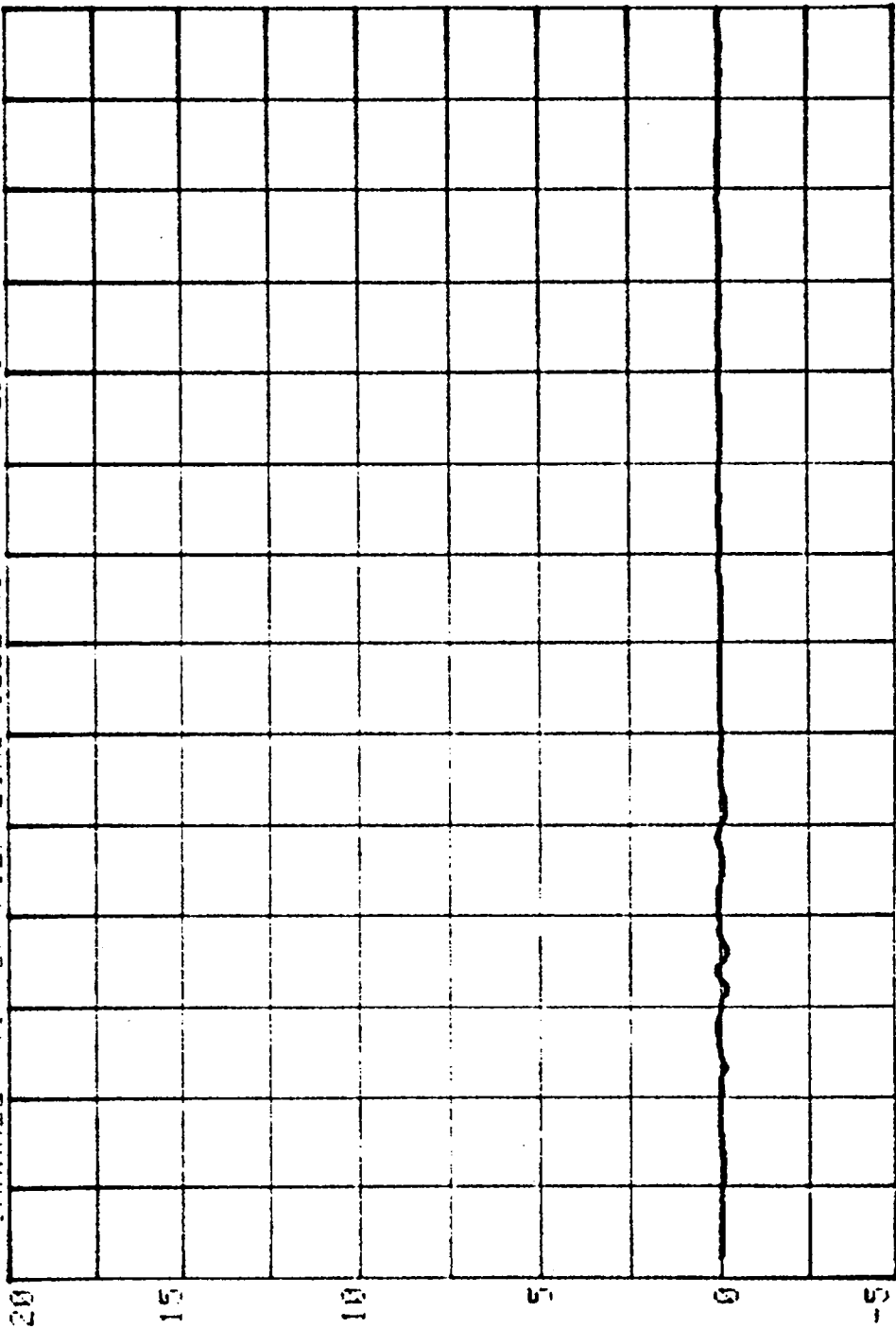
CHANNEL 39 BARRIER LOAD CELL #6
PULSE 358 SERIES= 11 K LBS



CHANNEL 40 BARRIER LOAD CELL #1 11 P LBS
RUN# 266 SERIES=

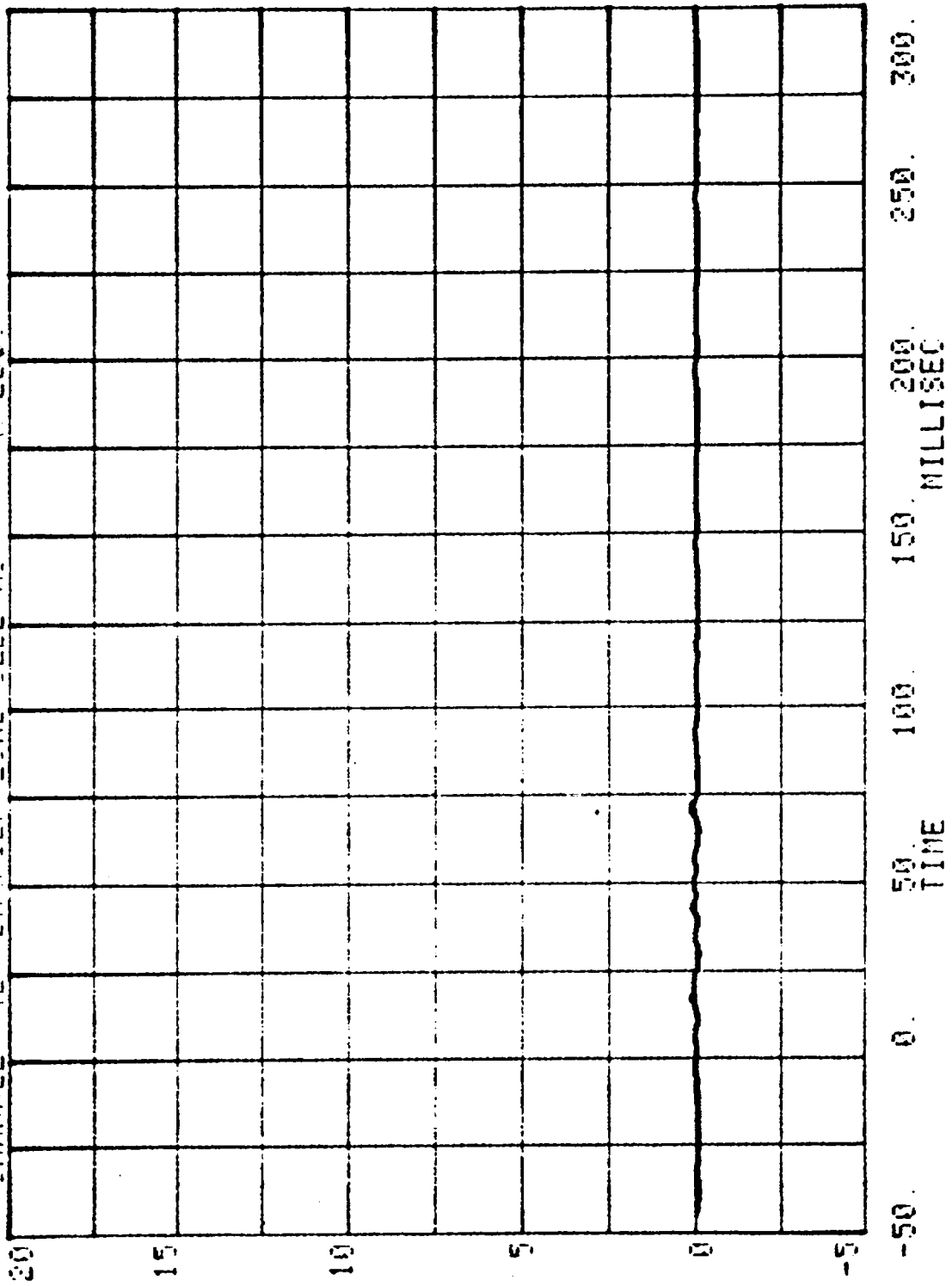


CHANNEL 41 BARRIER LOAD CELL A8 RUMF 255 SERIES= 11 K LBS.

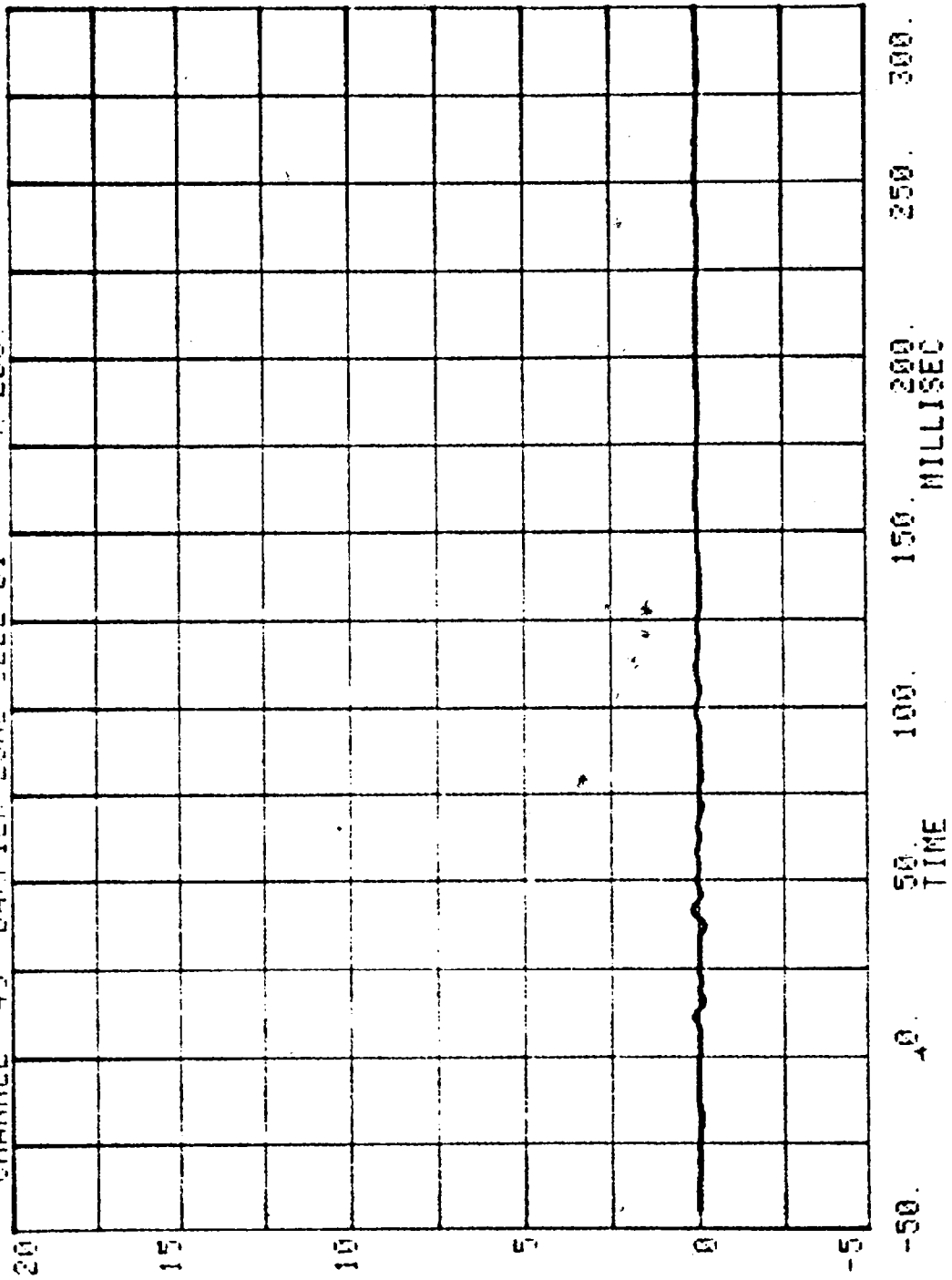


-50. 0. 50. 100. 150. 200. 250. 300.
TIME MILLISEC

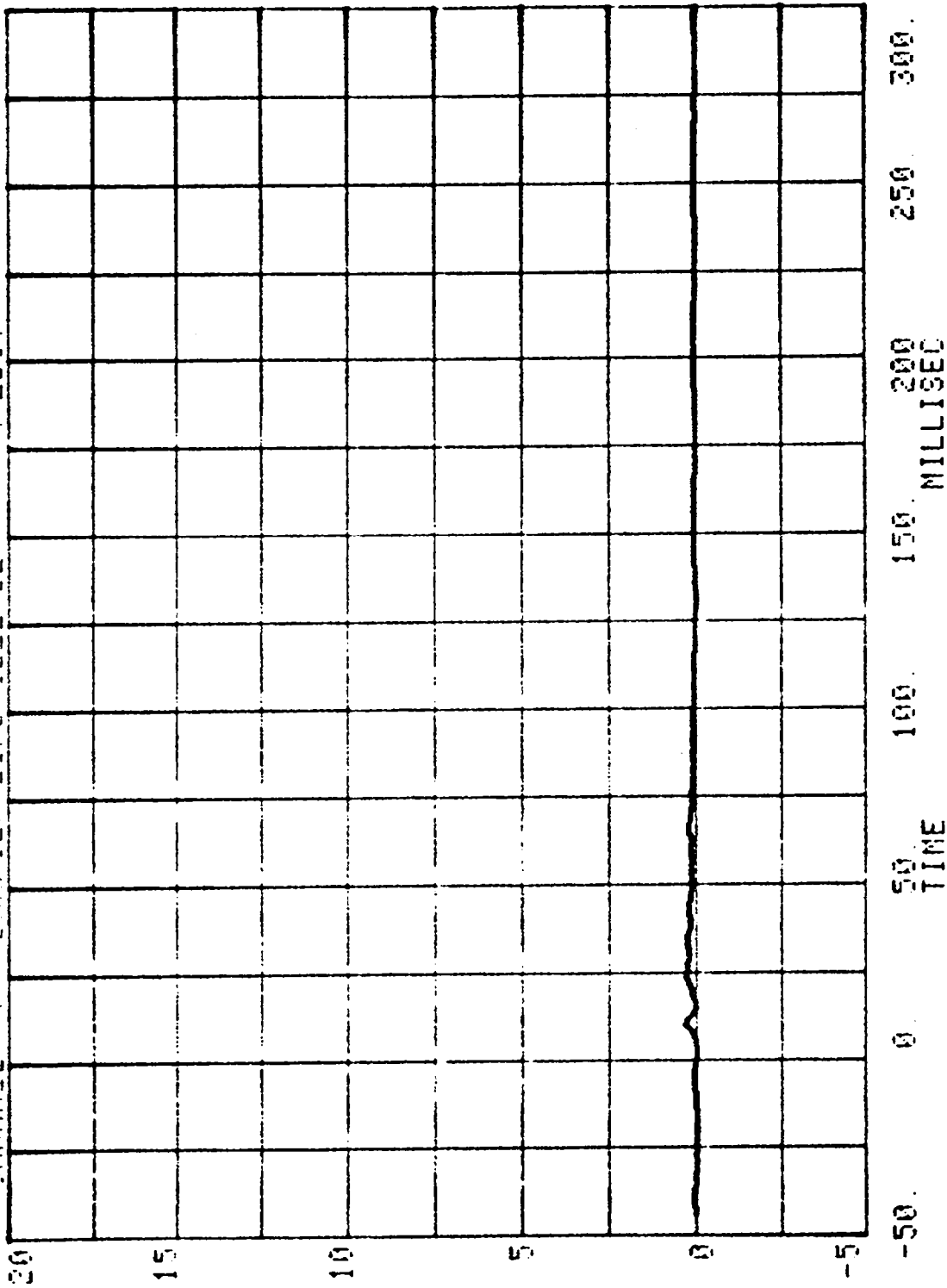
CHANNEL 42 BARRIET LOAD CELL A9 PUNE 996 SERIES= 11 LBS.



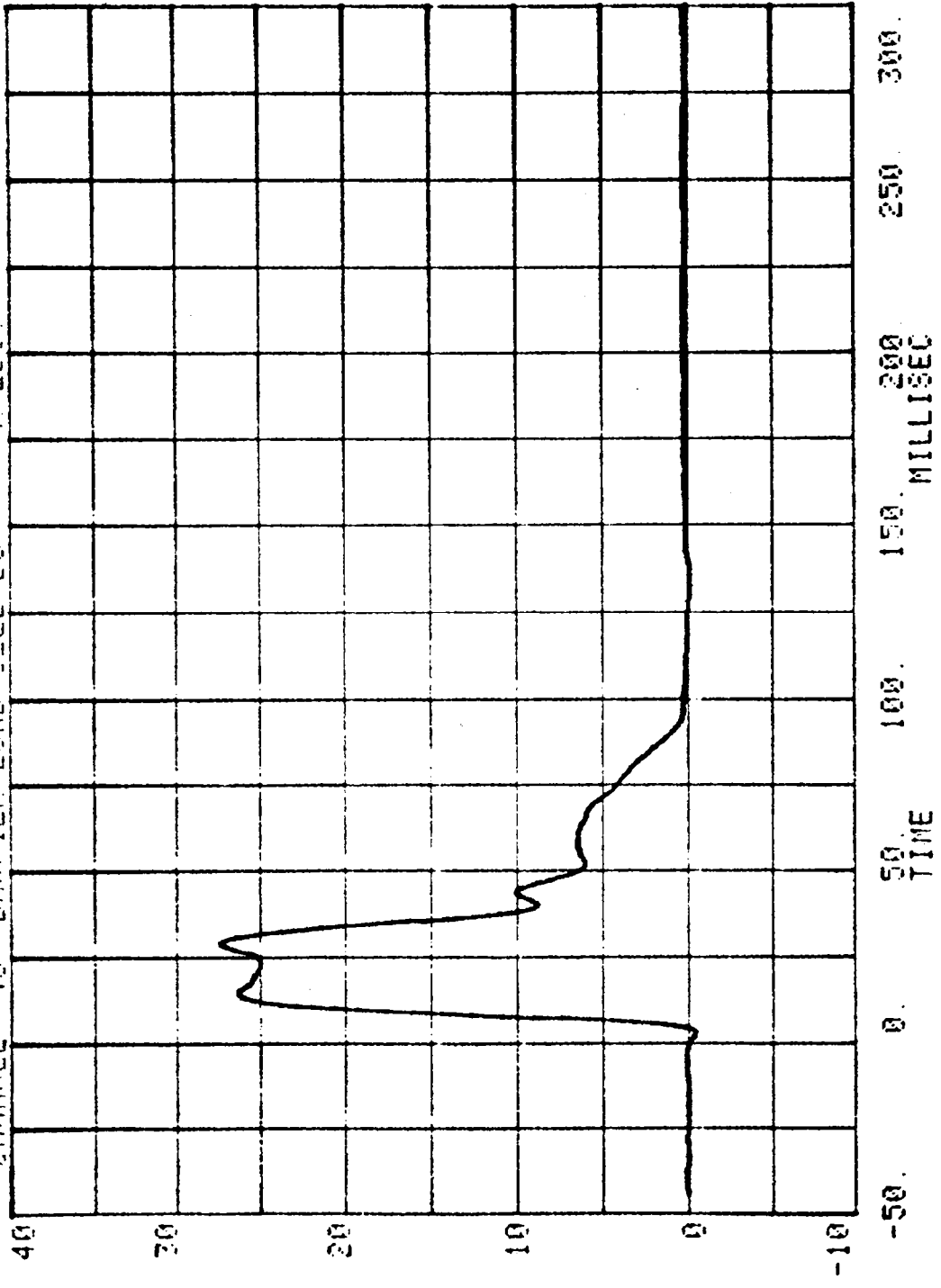
CHANNEL 43 BARRIER LOAD CELL B1
SERIES= 11
K LBS.



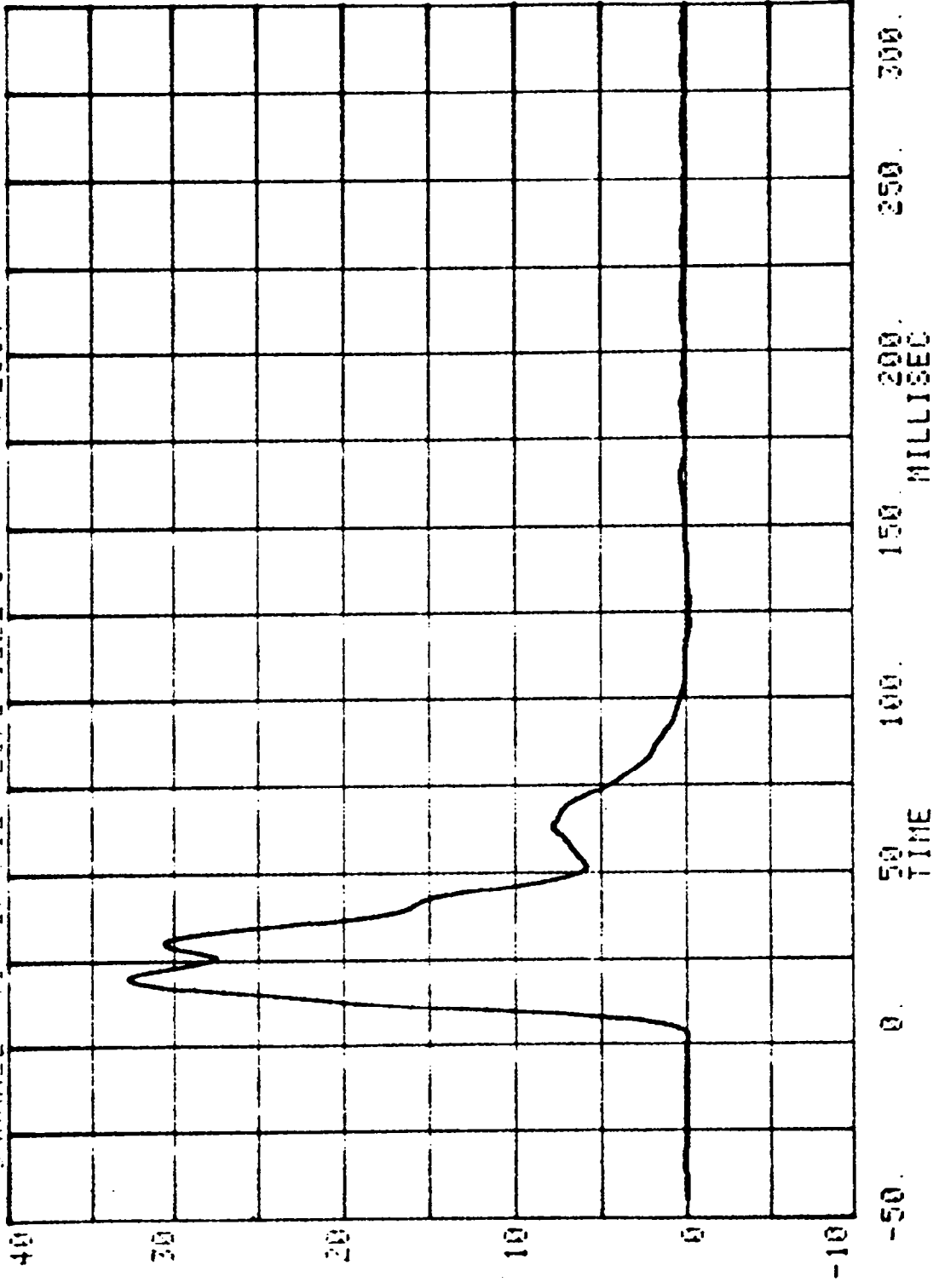
CHANNEL 44 BARRIER LOAD CELL B2 RUN# 968 SERIES# 11 K LBS.



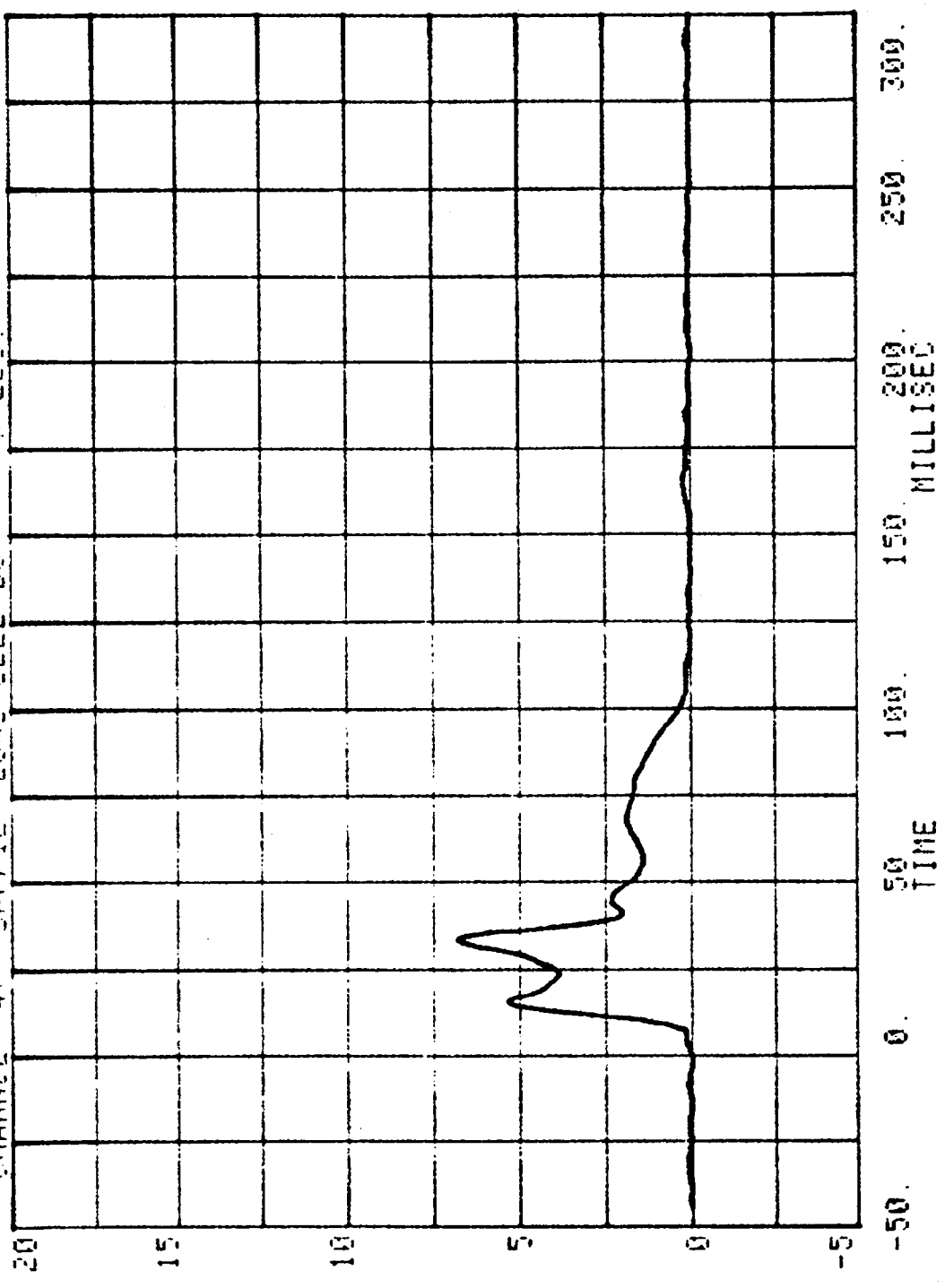
CHANNEL 45 BARRIER LOAD CELL B3 PUMP 955 SERIES= 11 K LBS.

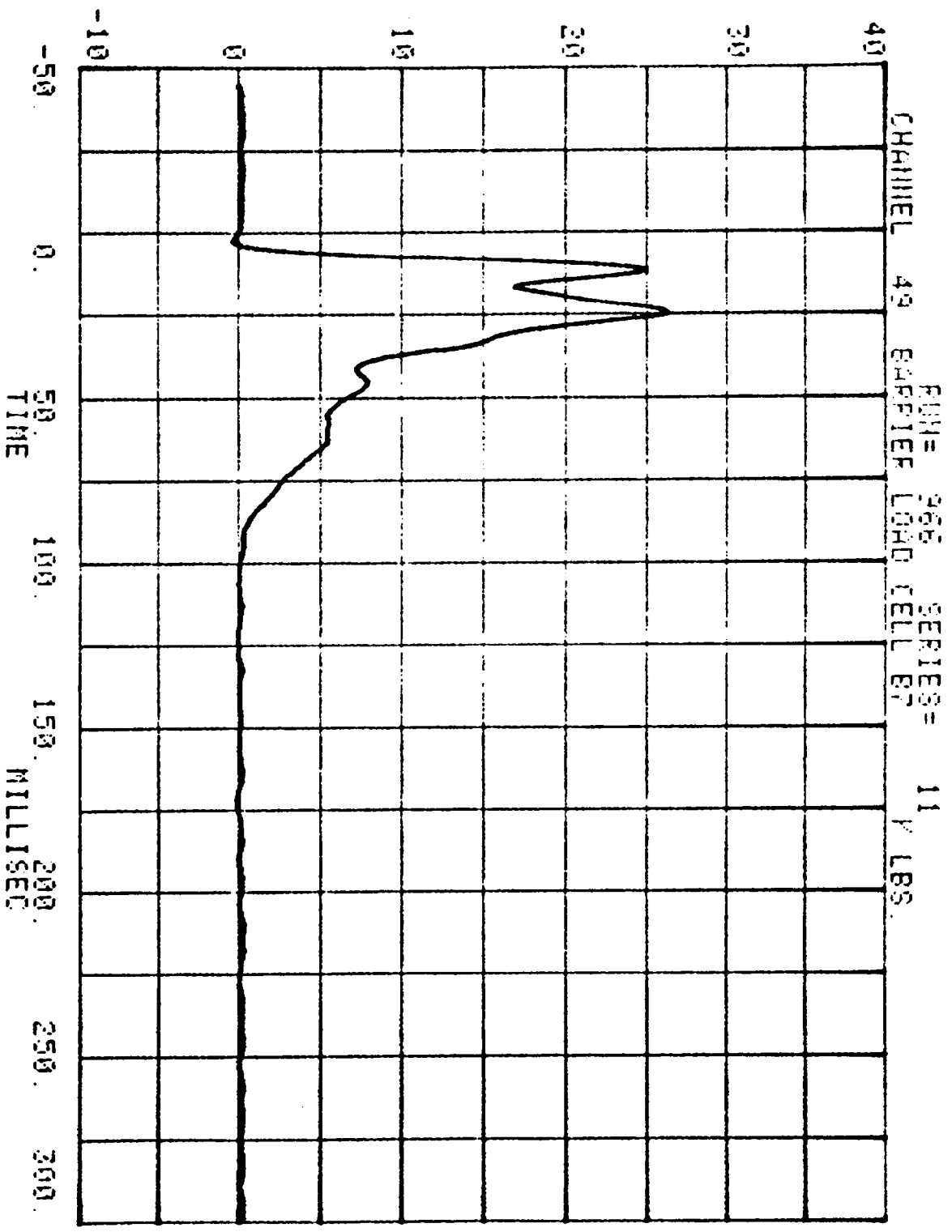


CHANNEL 46 BARRIERS LOAD CELL B3 RUN# 866 SERIES= 11 X LBS.



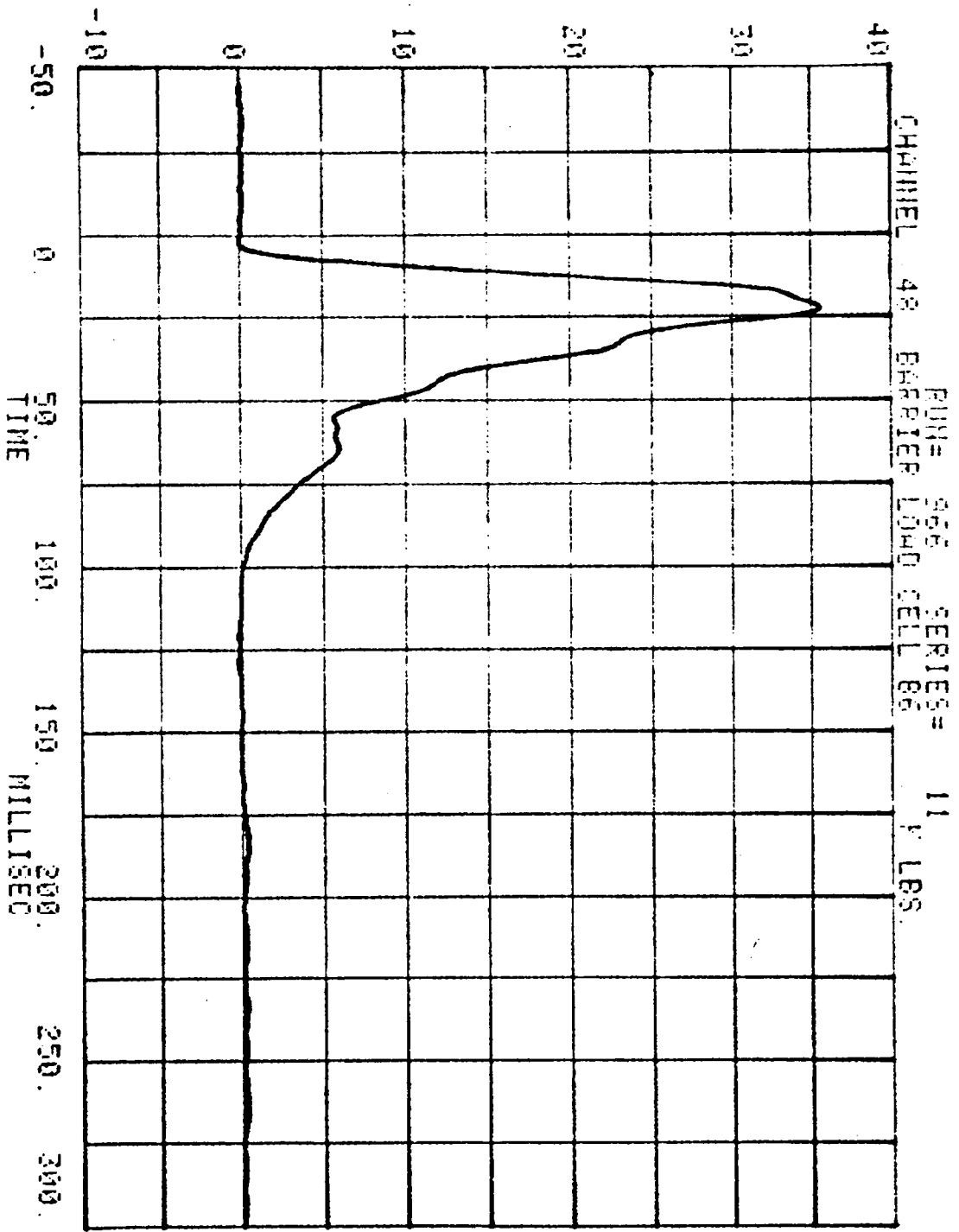
CHANNEL 47 BARRIER LO-LO CELL B5 PUNE 966 SERIES- 11 K LBS.



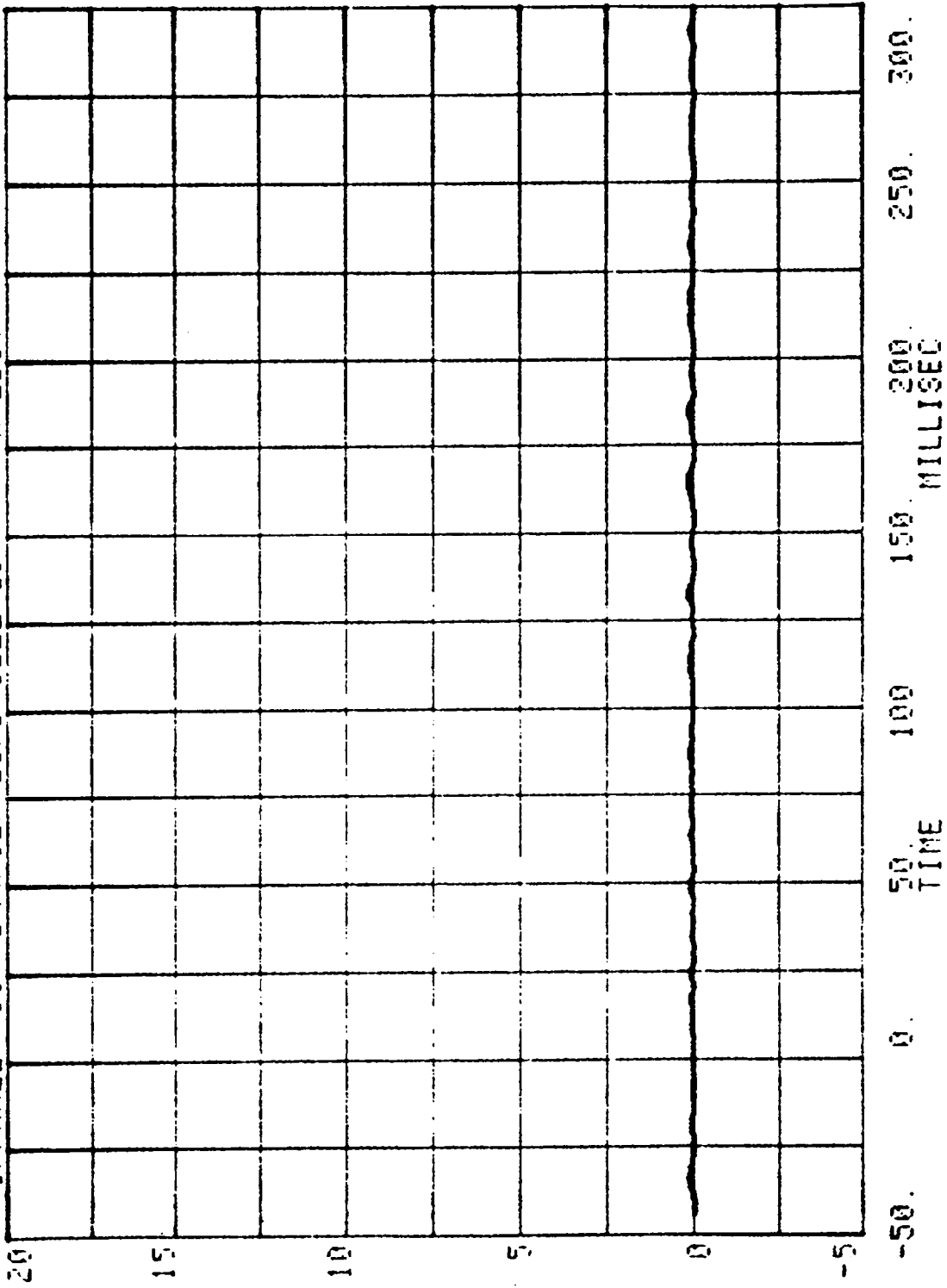


B-40

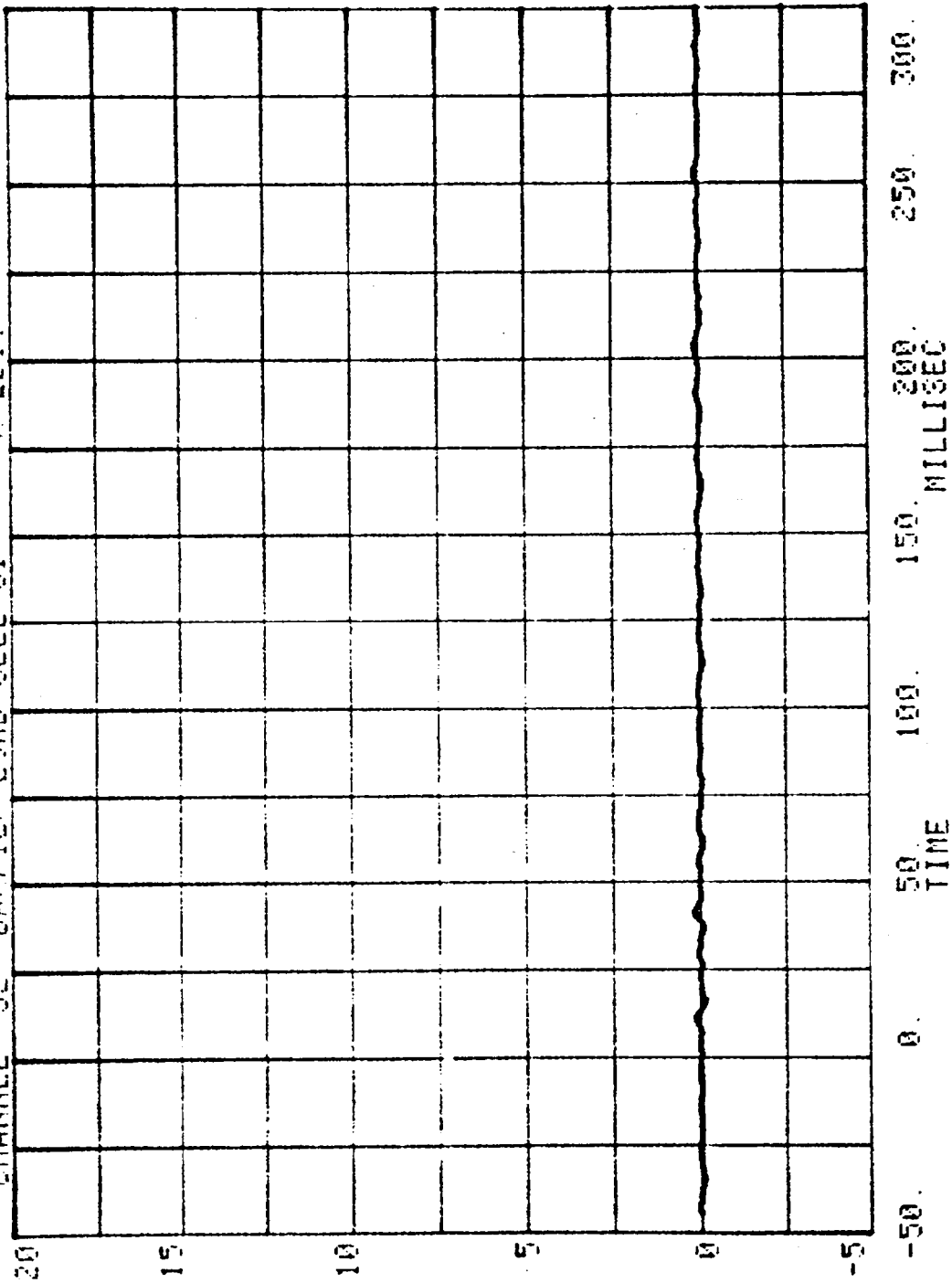
7776-11



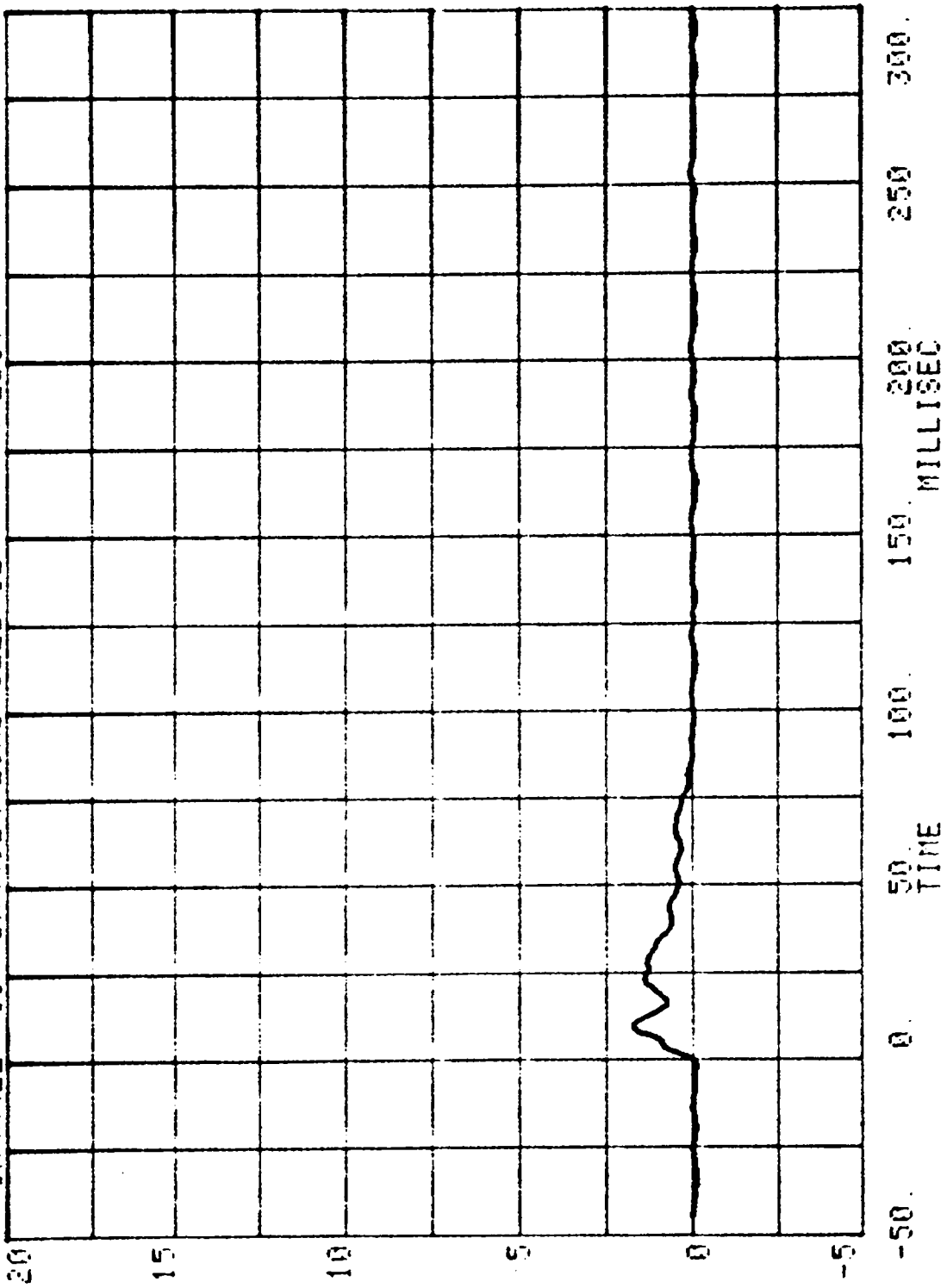
CHANNEL 51 BARRIER LOAD CELL 89 RUN# 956 SERIES# 11 K LBS.



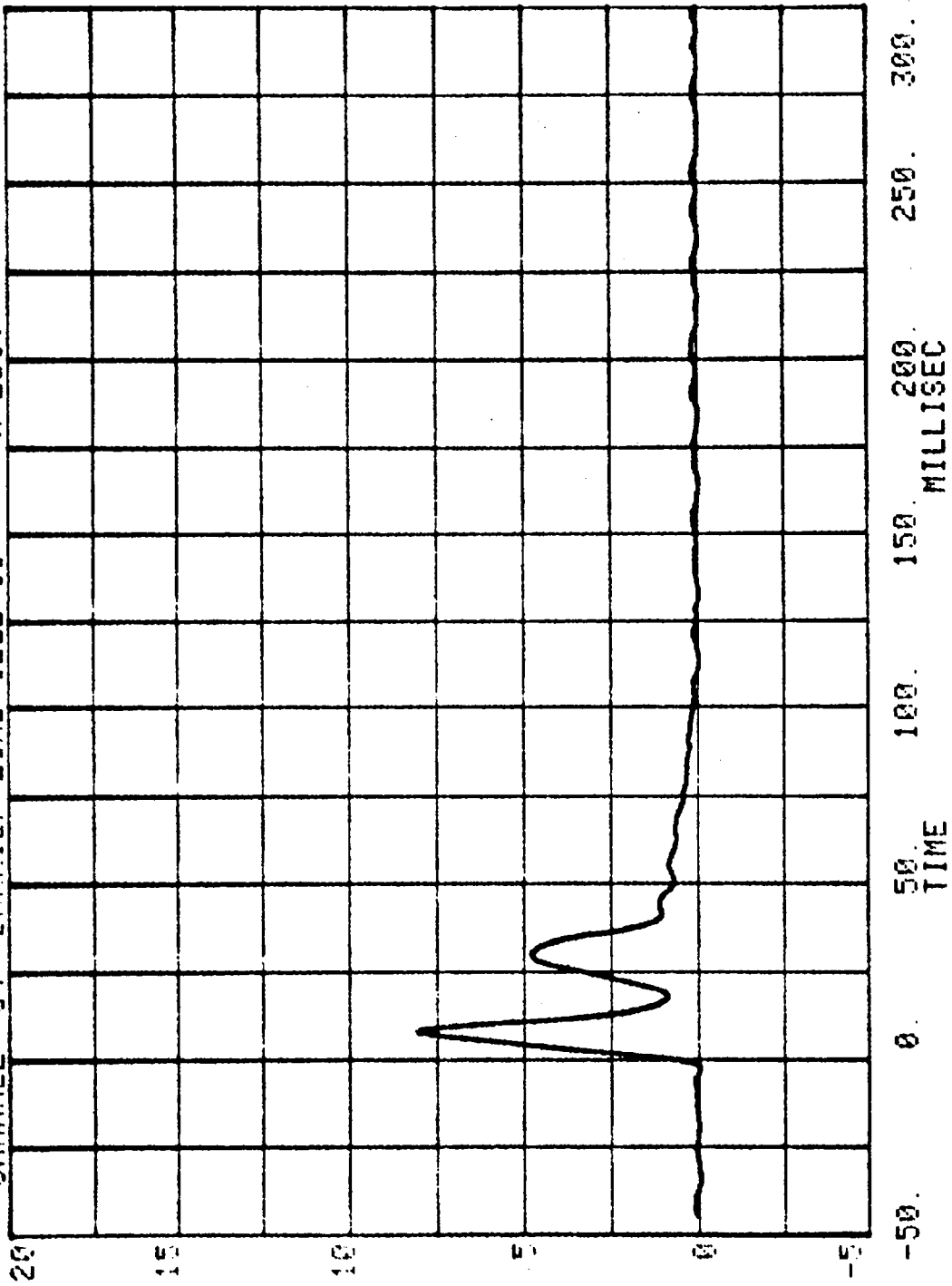
CHANNEL 52 BARRIER LOAD CELL 01 RUN# 966 SERIES# 11 K LBS.



CHANNEL 53 BARRIER LOAD CELL C2 RUN# 965 SERIES# 11 K LBS.

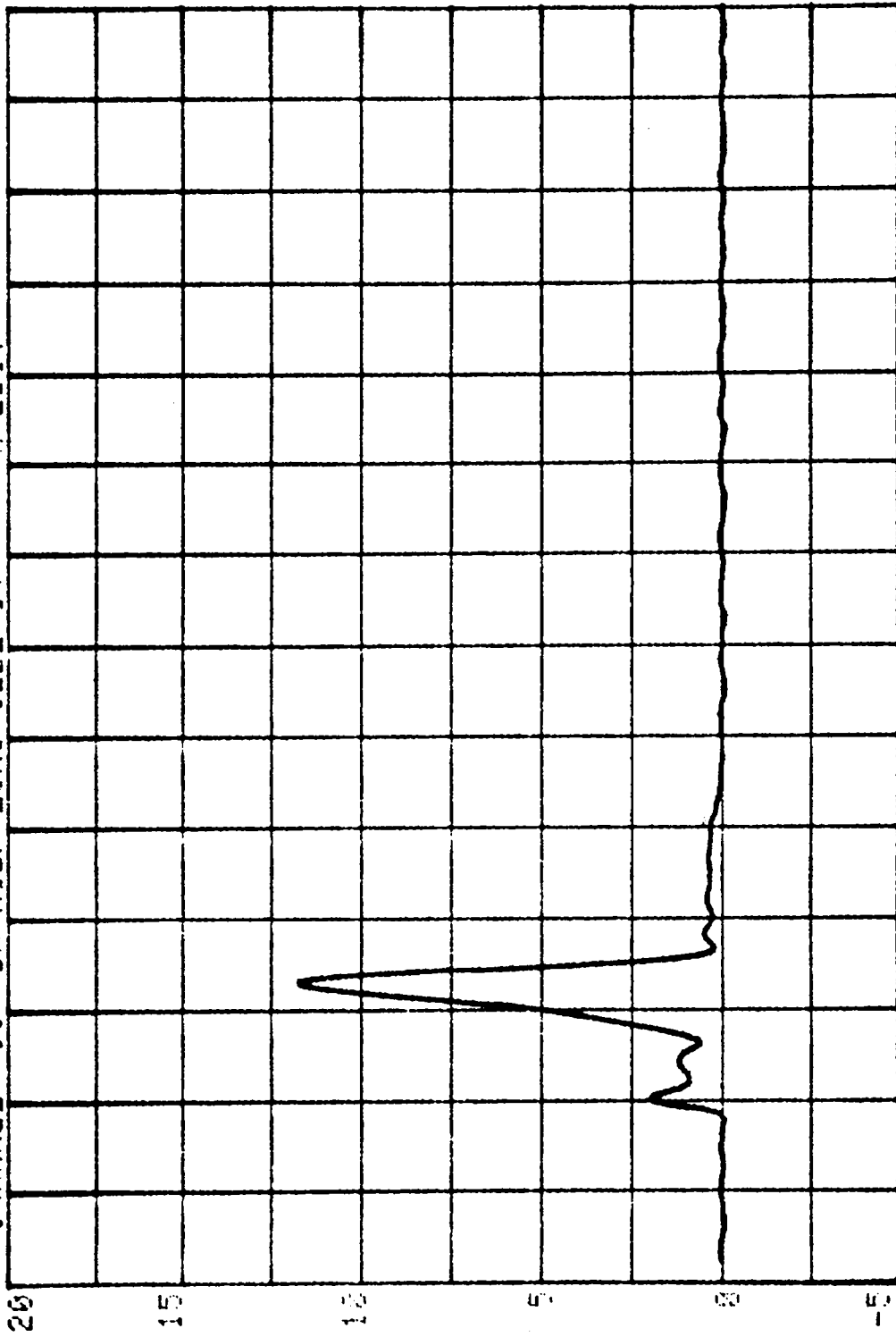


CHANNEL 54 BARRIER LOAD CELL C3
RUN= 966 SERIES= 11
K LBS.



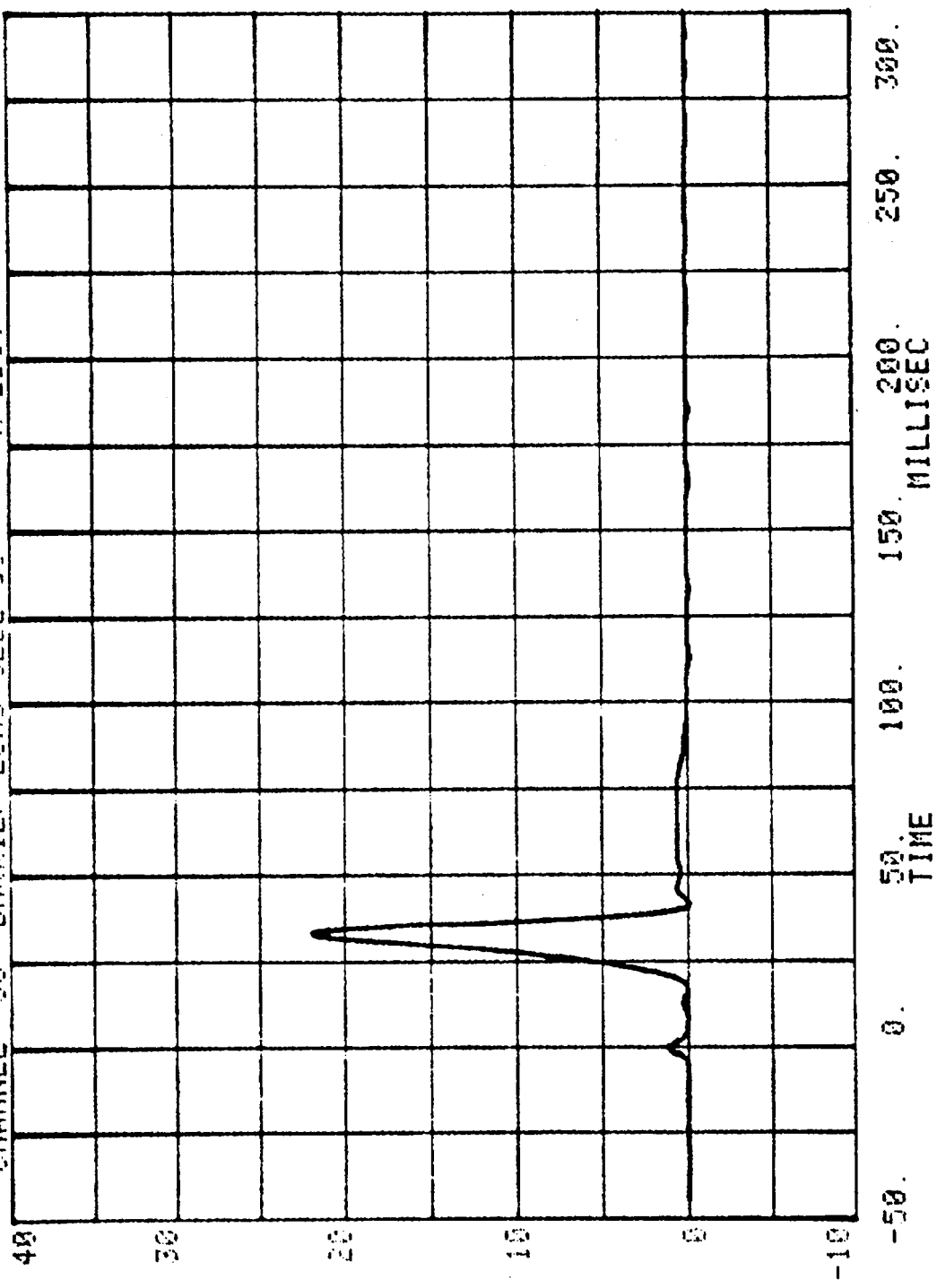
CHANNEL 55 BARRIER LOAD CELL C4 K LBS.

RUN= 966 SERIES= 11

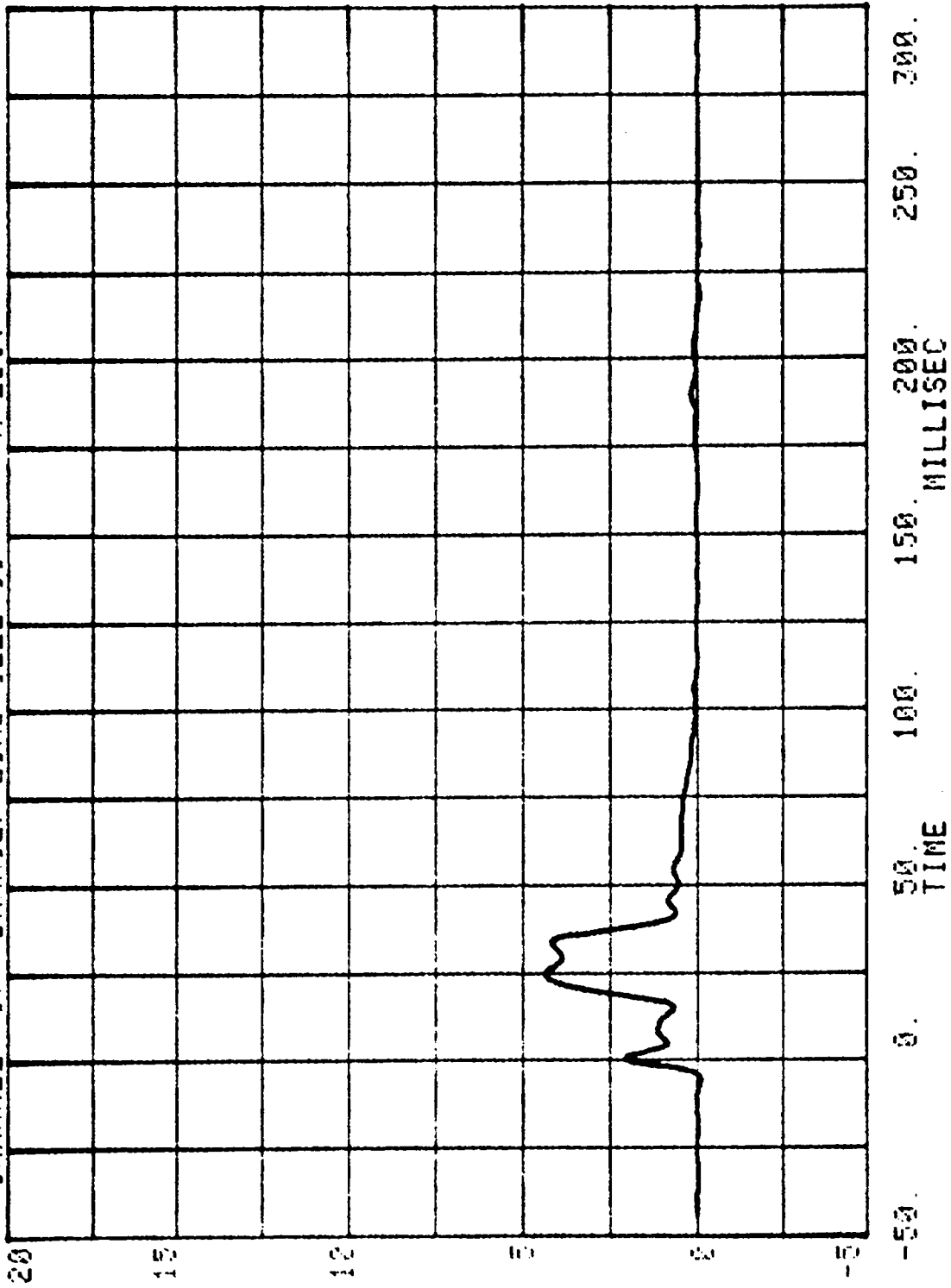


-50. 0. 50. 100. 150. 200. 250. 300.
MILLISEC
TIME

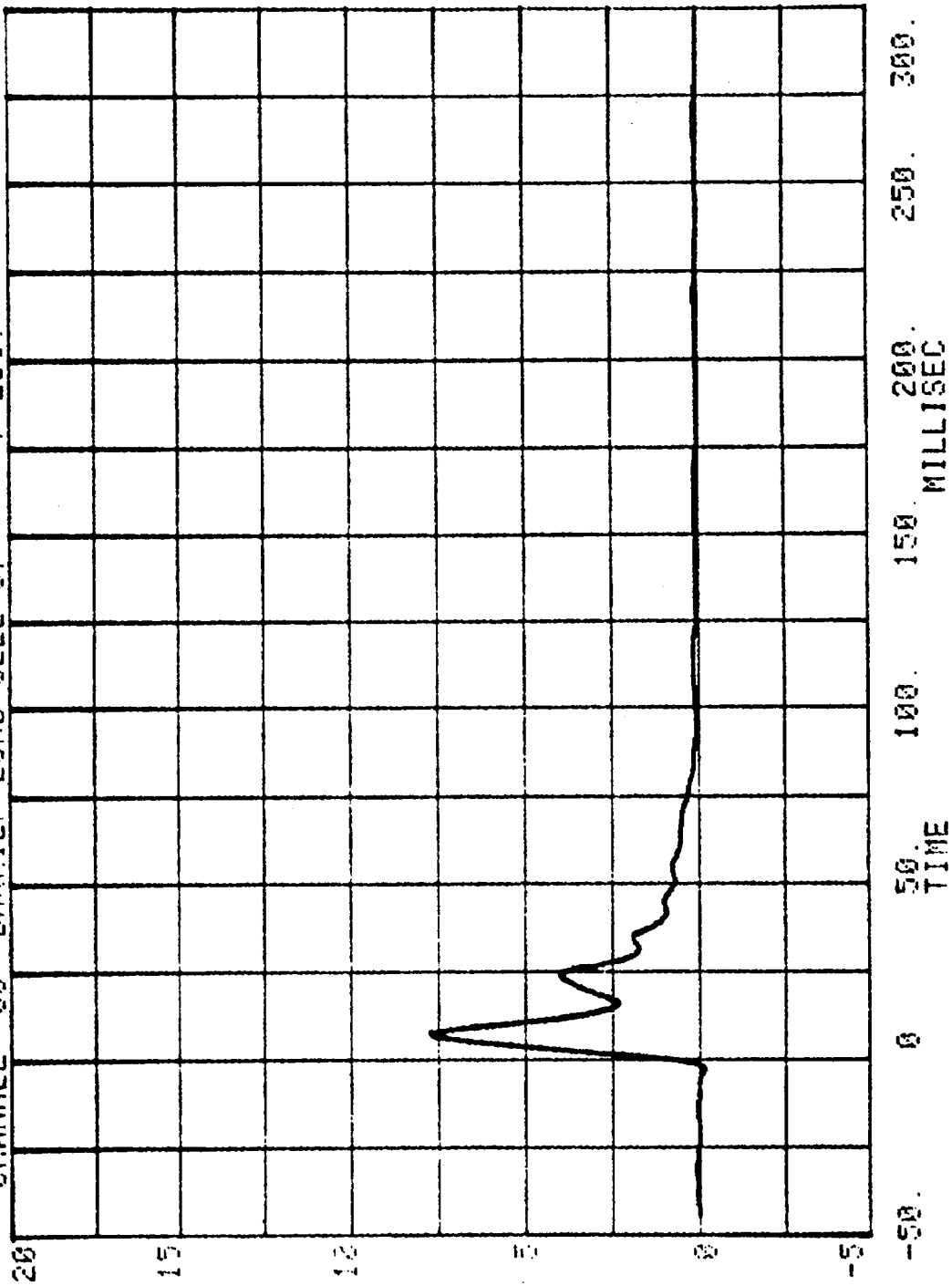
CHANNEL 56 BARRIER LOAD CELL D5
RUN= 966 SERIES= 11 K LBS.



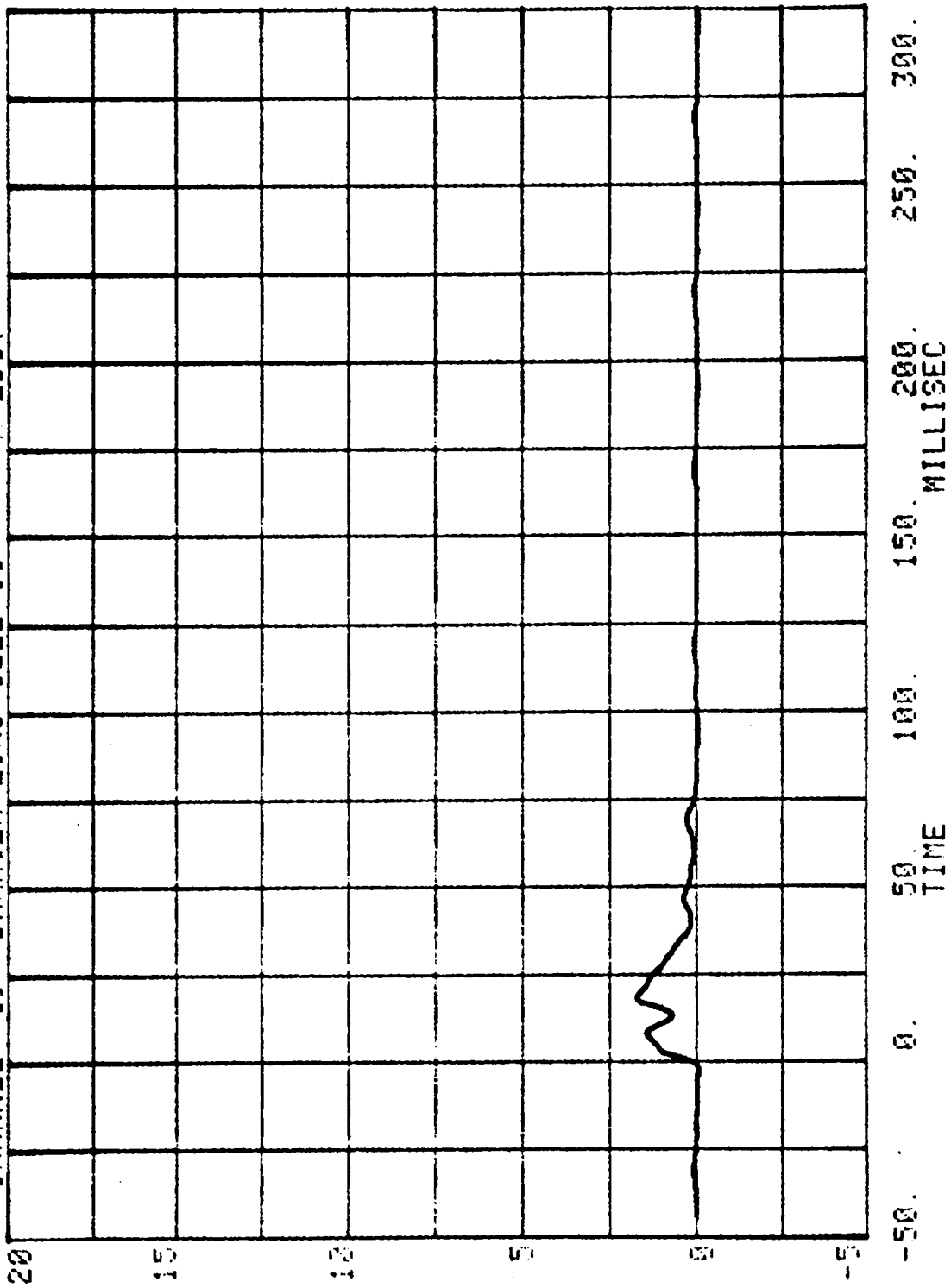
CHANNEL 57 BARRIER LOAD CELL C6 RUN# 966 SERIES= 11 K LBS.



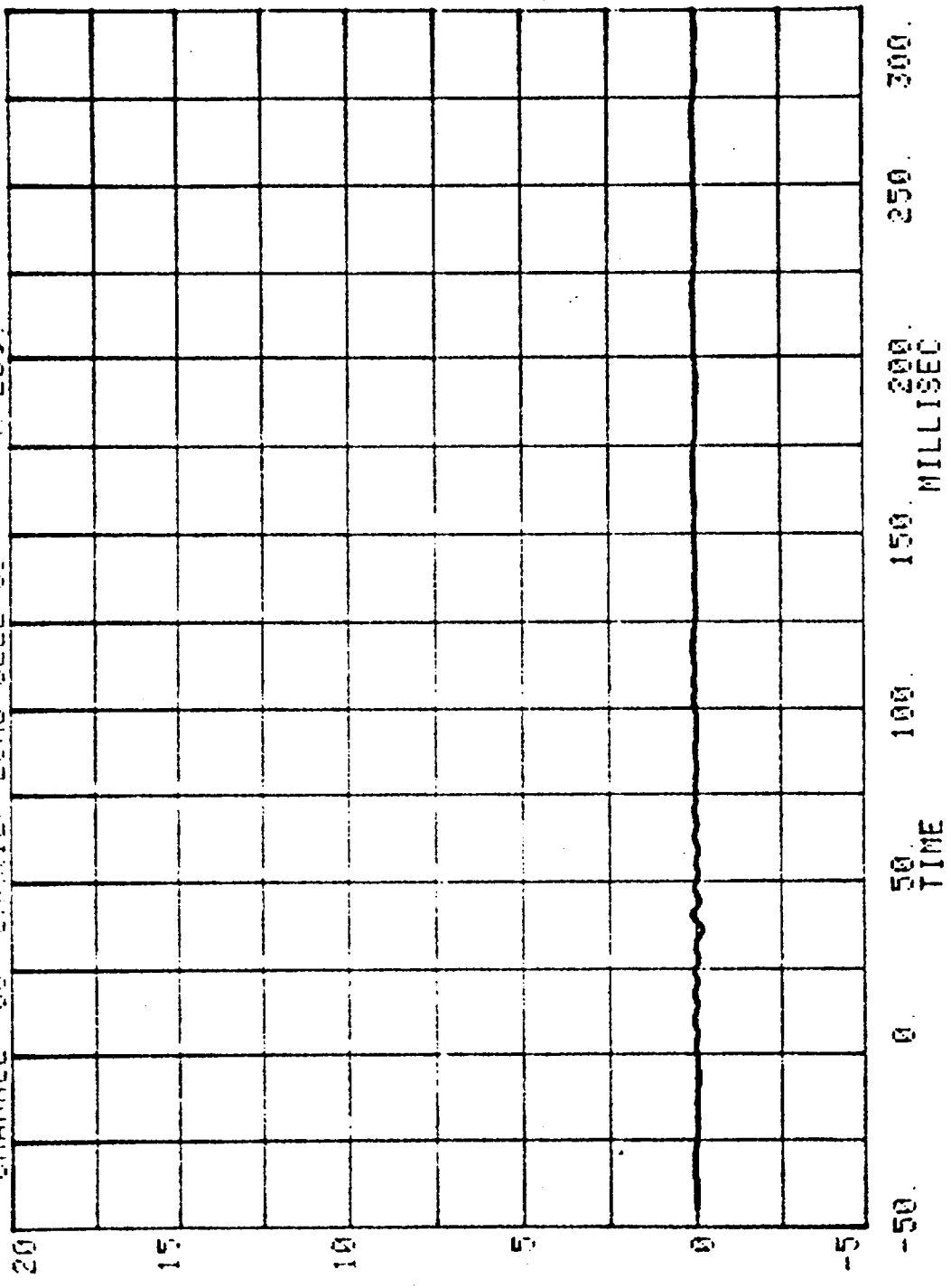
CHANNEL 58 BARRIER LOAD CELL C7
RUN= 966 SERIES= 11 K LBS.



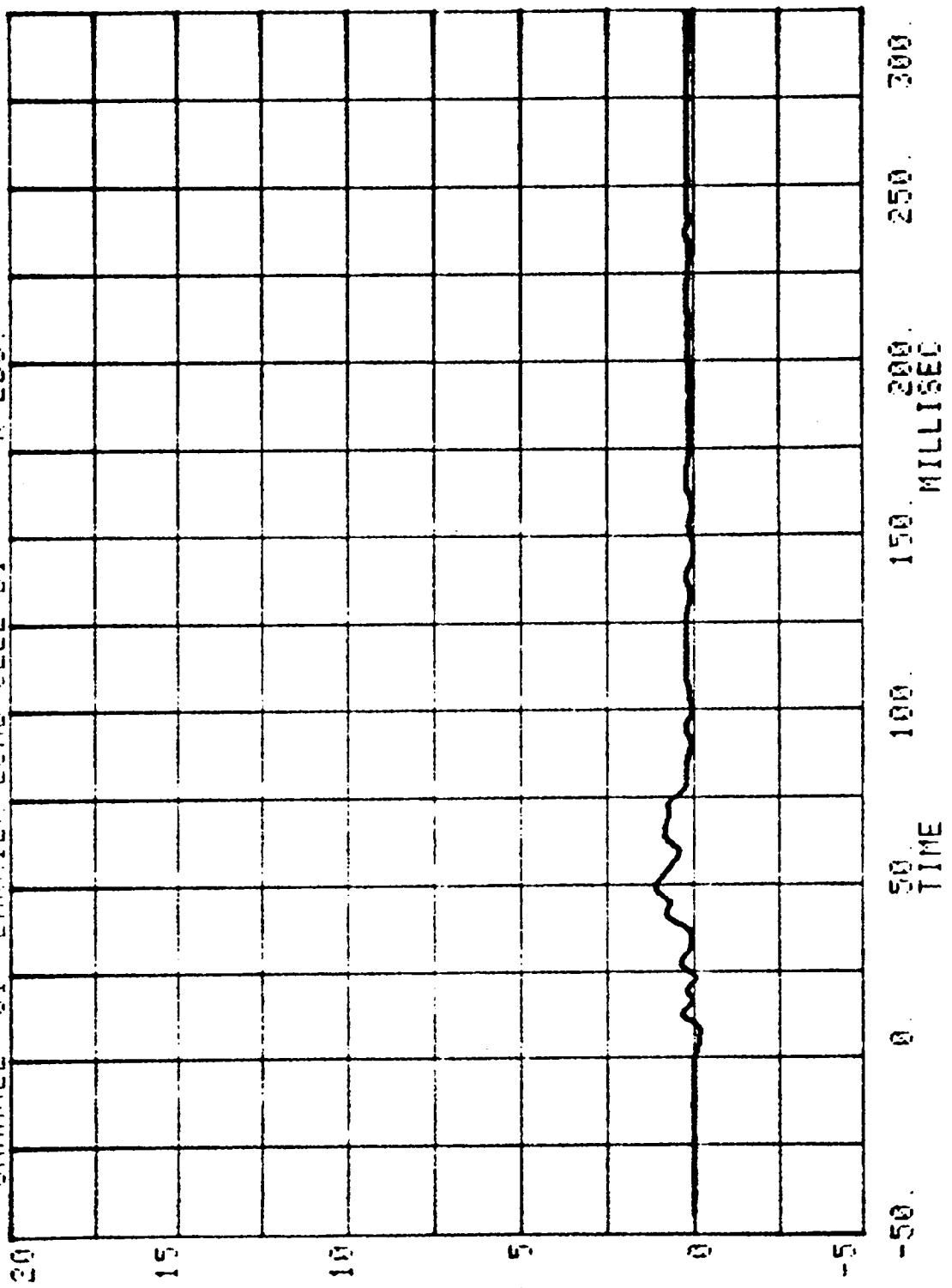
CHANNEL 59 BARRIER LOAD CELL C8
RUN= 966 SERIES= 11 K LBS.



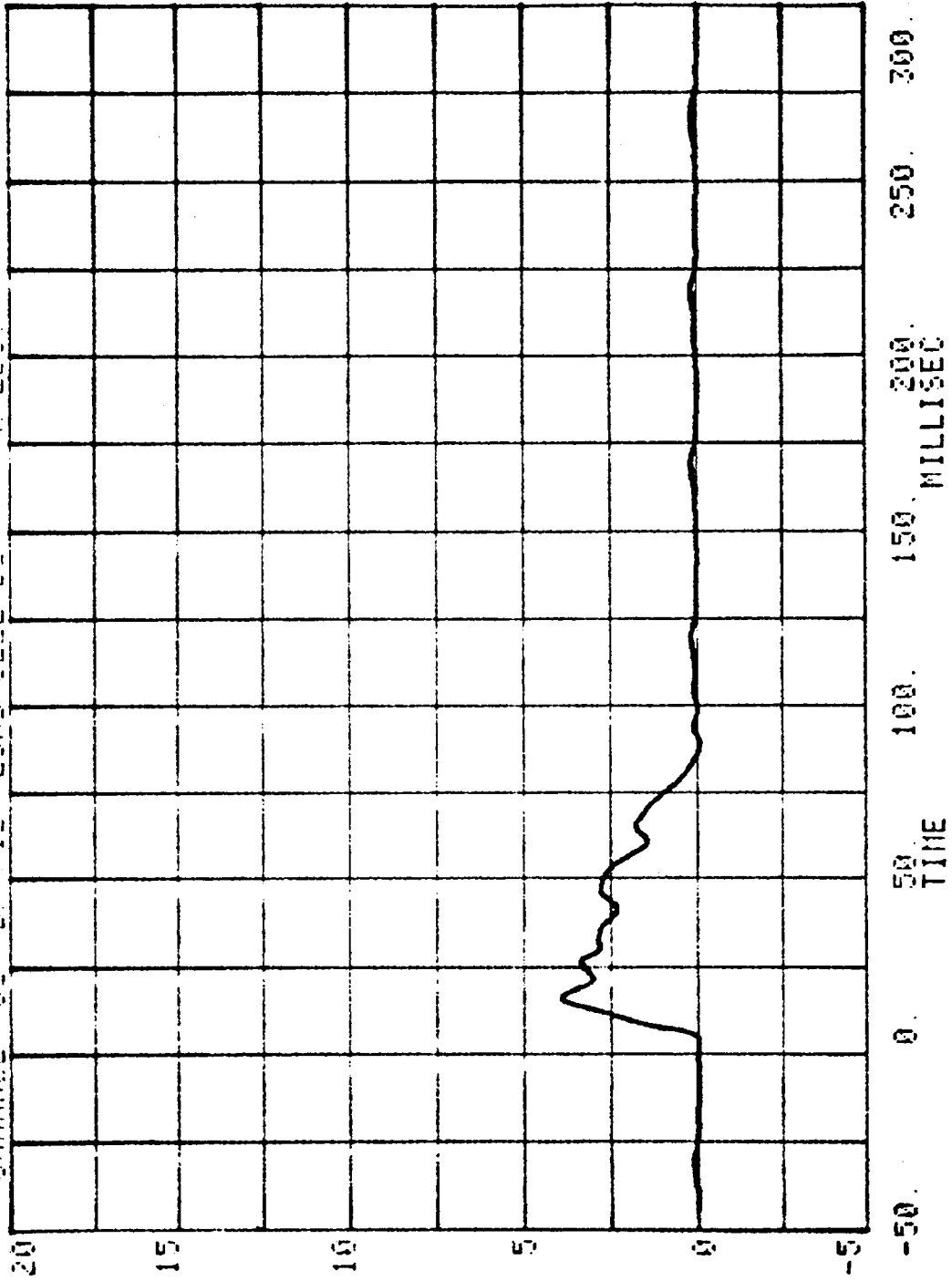
CHANNEL 60 CARRIER LOAD CELL 09 K LBS.
PUMP 966 SERIES= 11



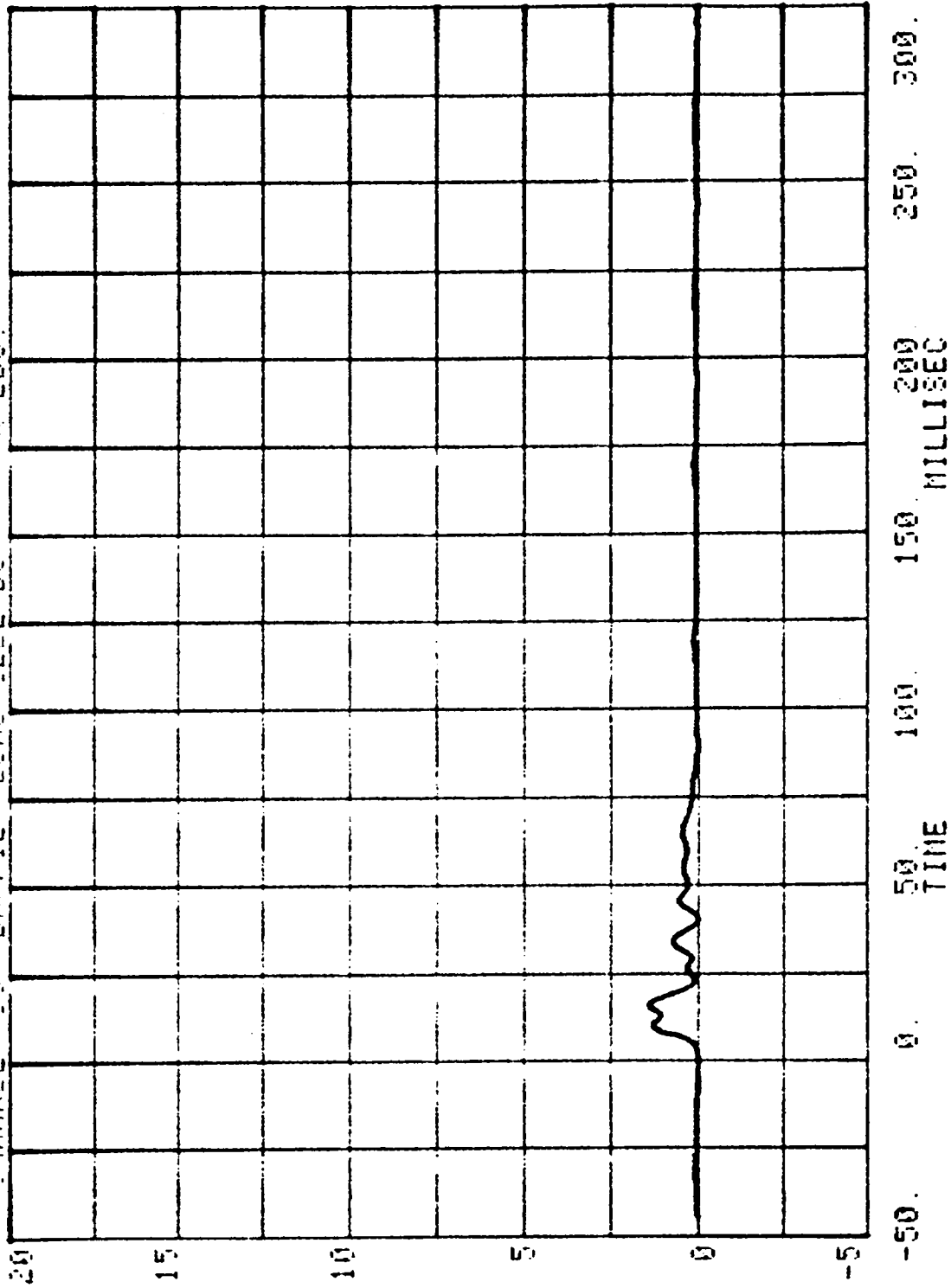
CHANNEL 61 BARRIER LOAD CELL 01 SERIES= 11 K LBS.



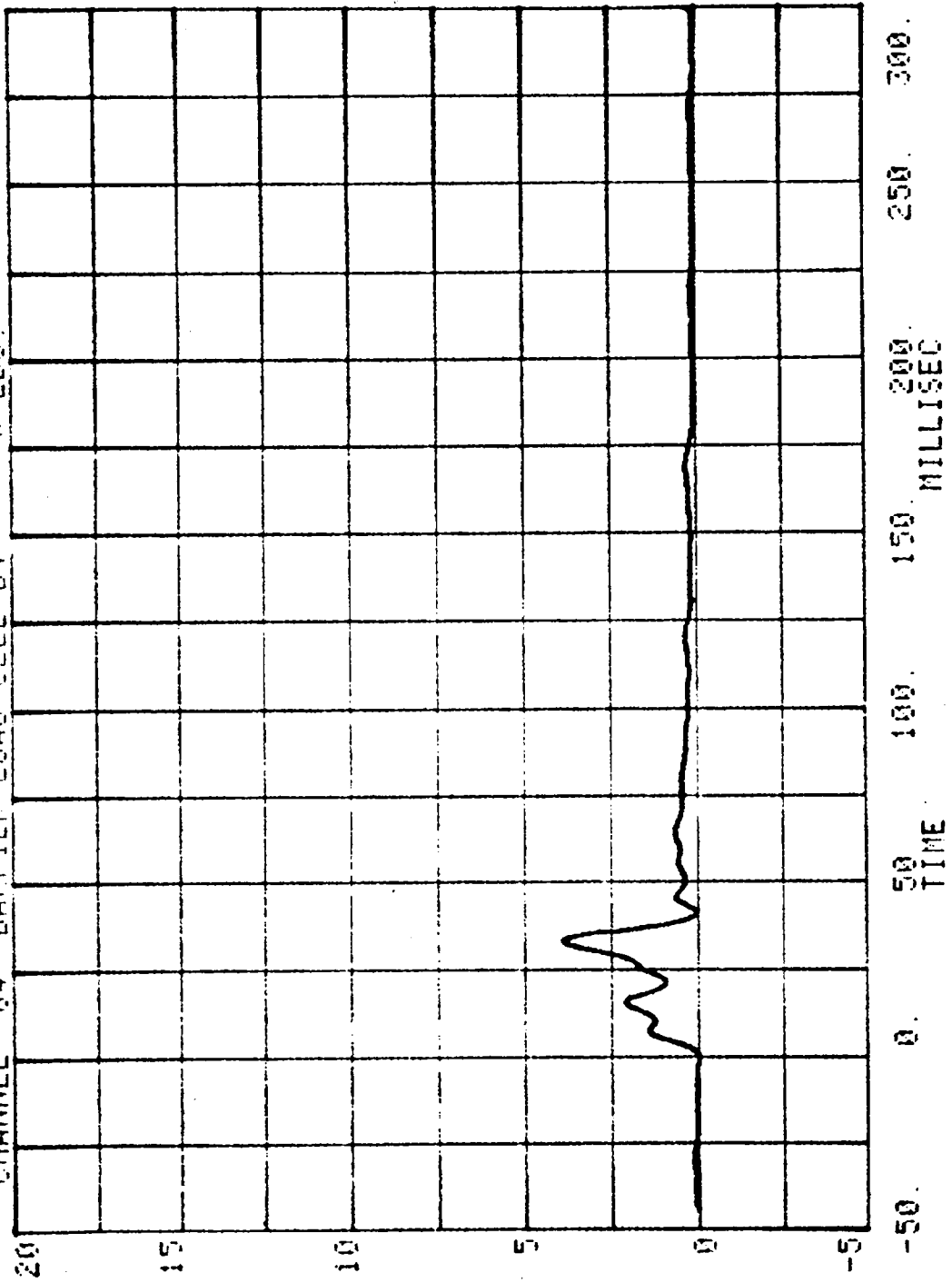
CHANNEL 62 BURRIER LOAD CELL 02
FUNE 966 SERIES= 11
K LBS.



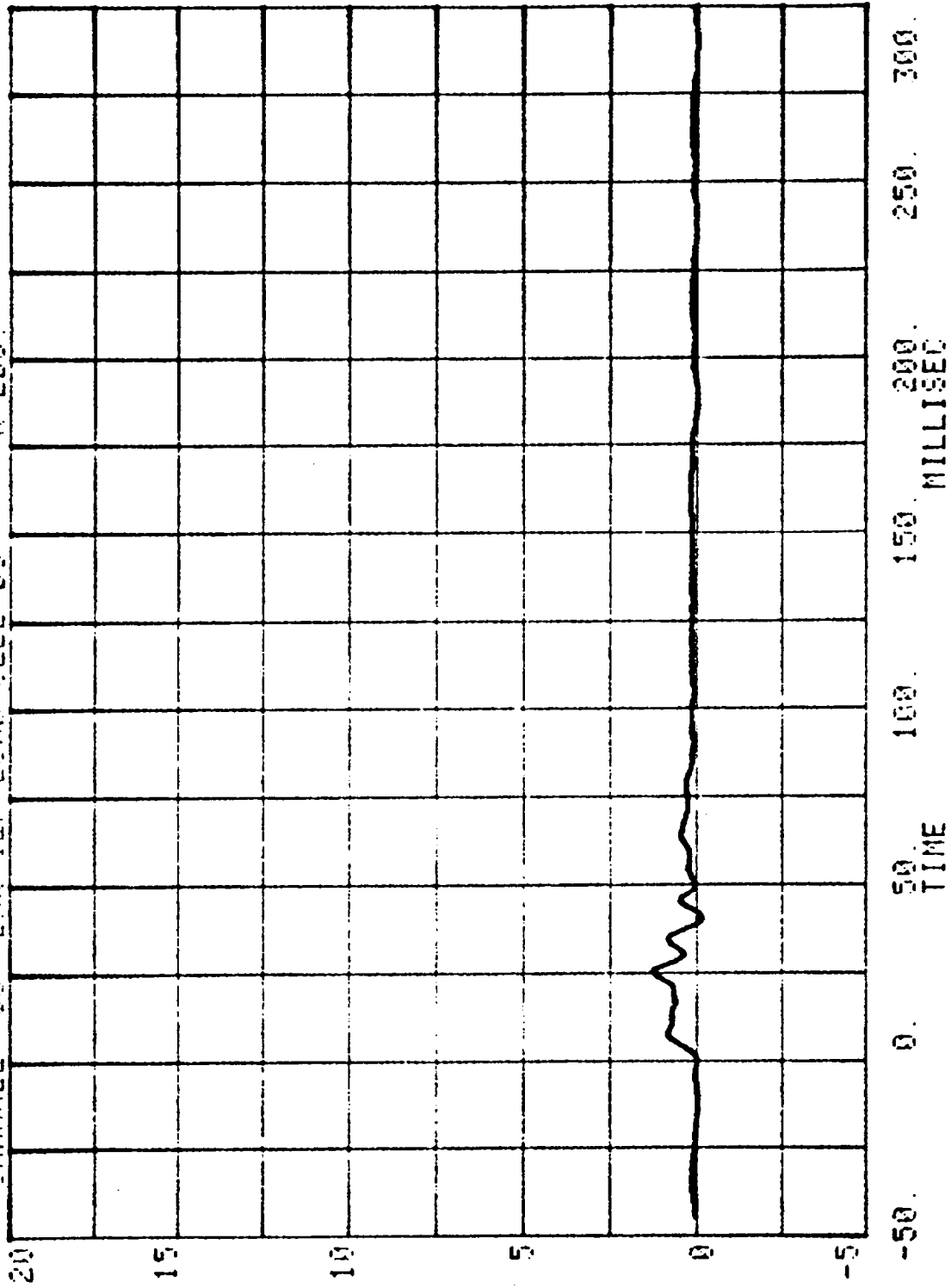
CHANNEL 63 BARRIER LOAD CELL D3 11 K LBS. SERIES=



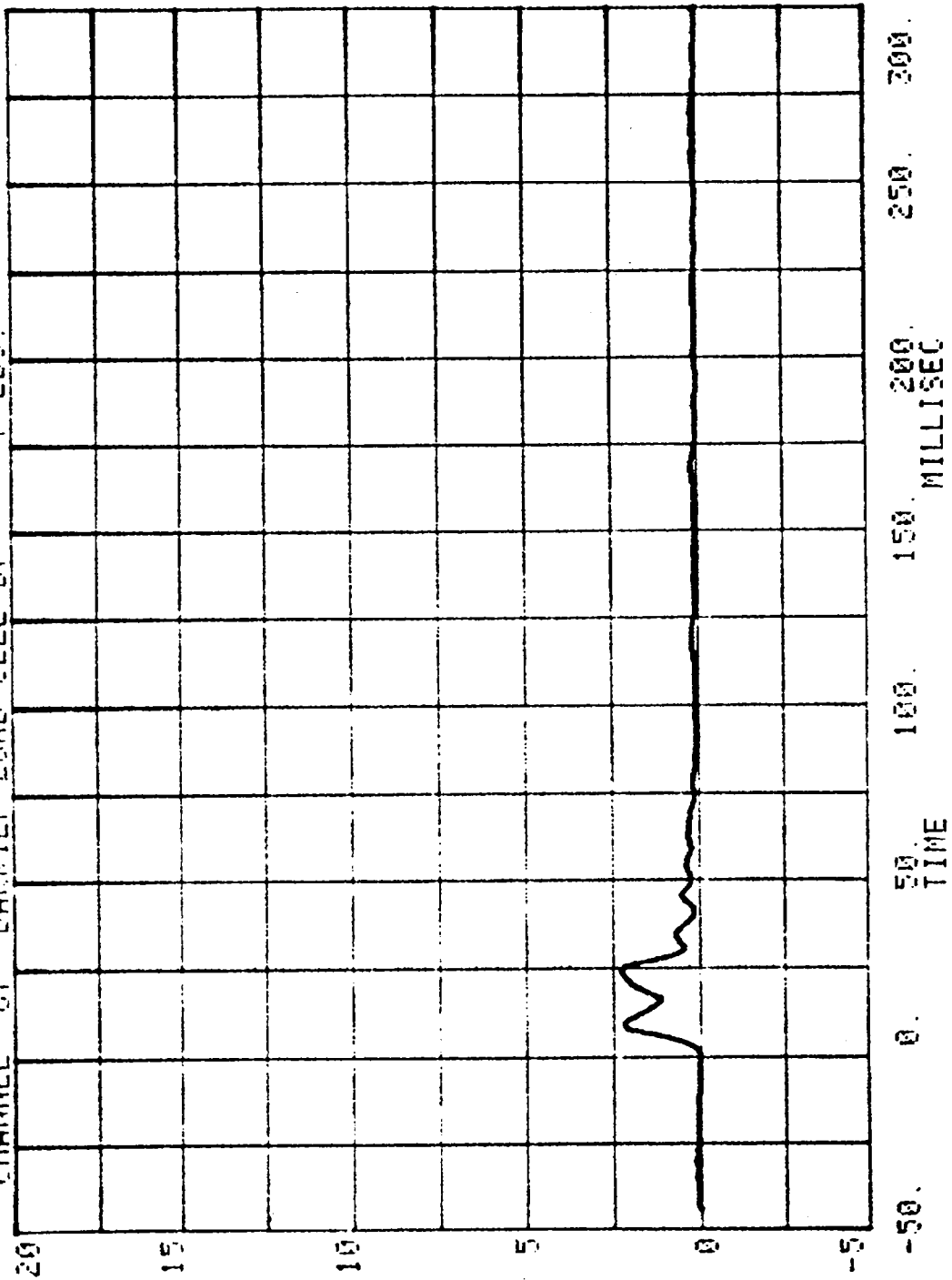
CHANNEL 84 BARRIER LOAD CELL 04 SERIES= 11 K LBS.



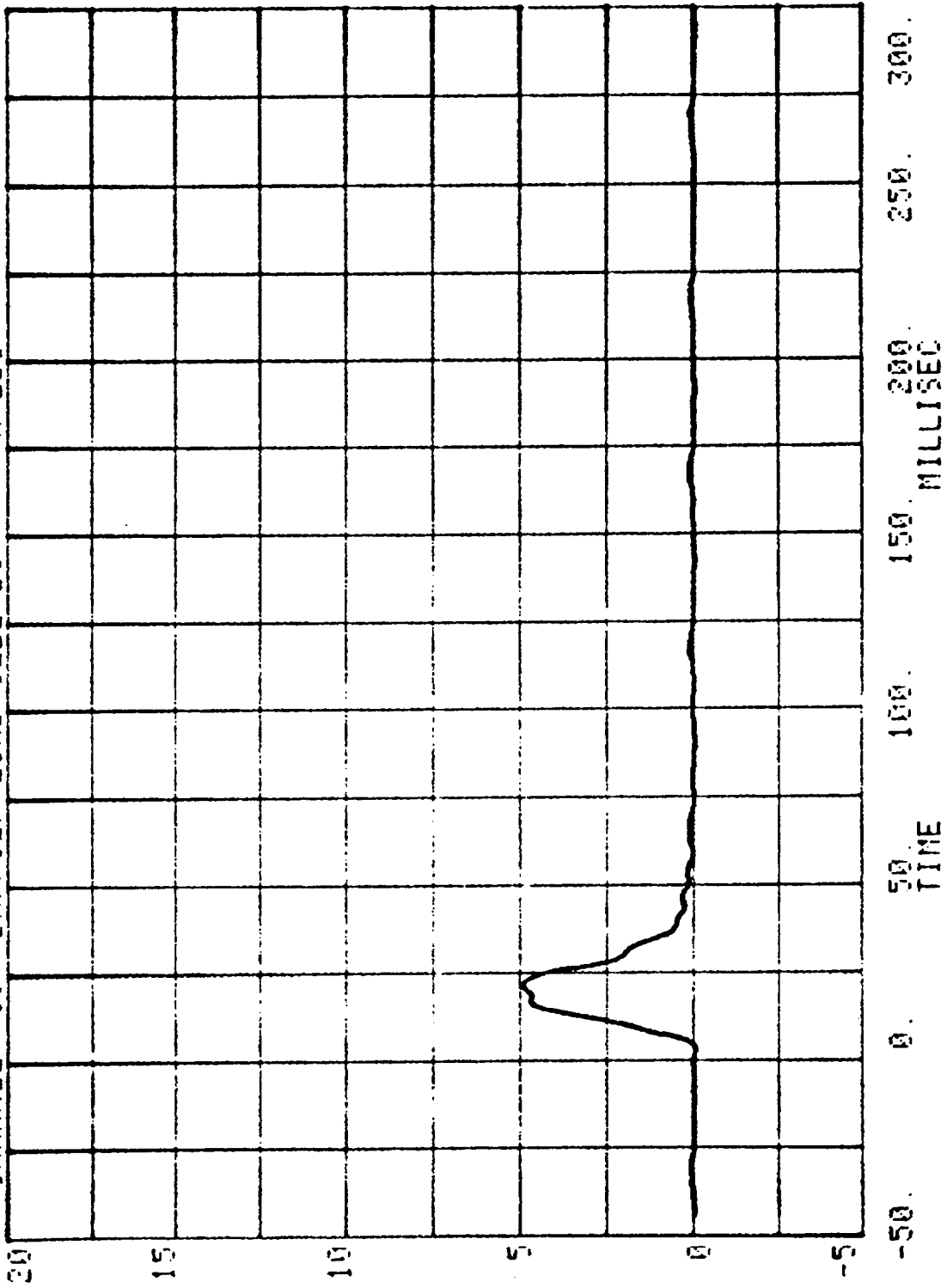
CHANNEL 66 BARPIER LOAD CELL 06 11 K LBS.
RUN= 966 SERIES=



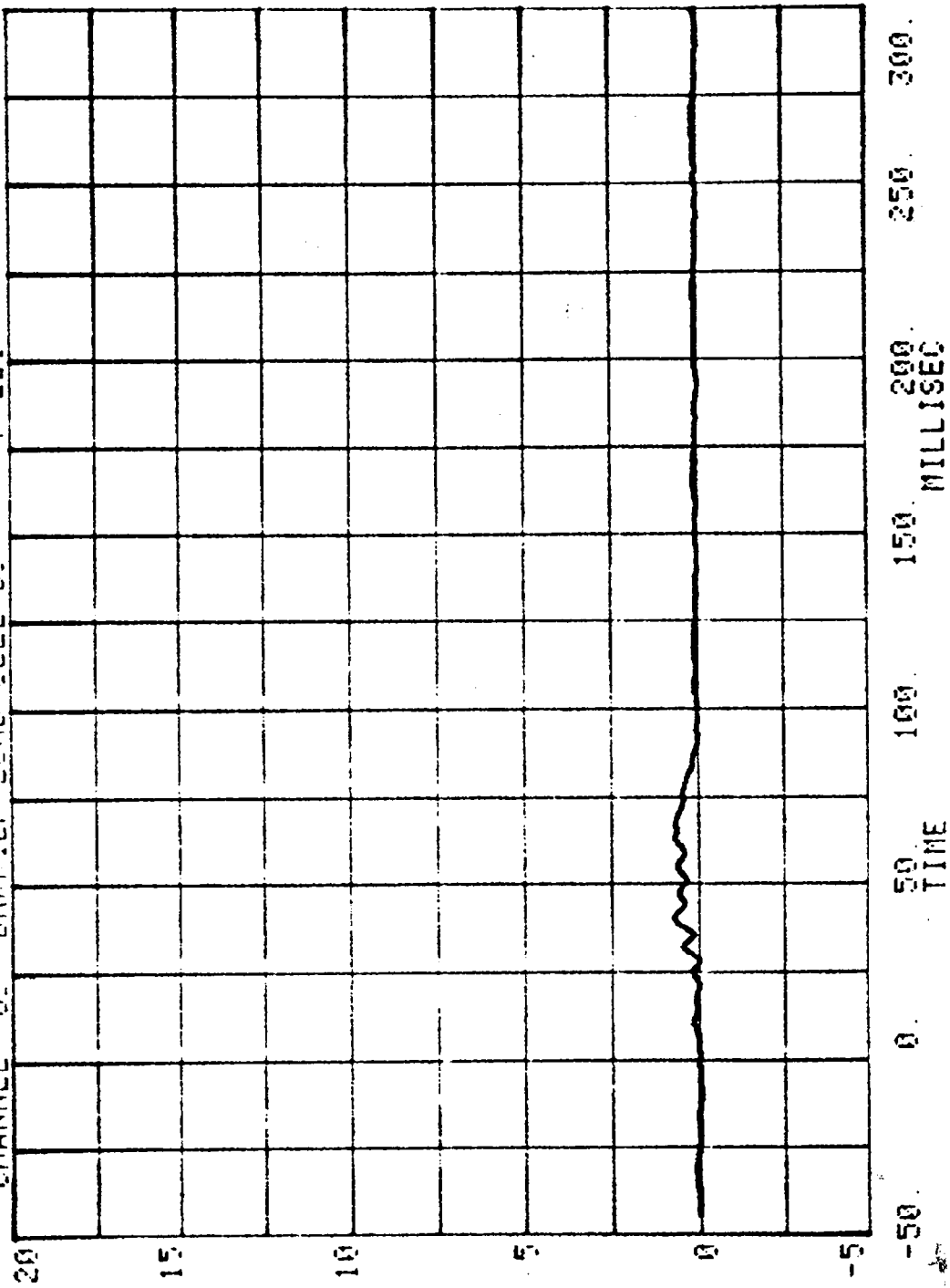
CHANNEL 67 BARRIER LOAD CELL 07
RUN= 966 SERIES= 11 Y LBS.



CHANNEL 68 BUUF 966 SERIES= 11 K LBS
BARRIER LOAD CELL D8



CHANNEL 89 PUMP 266 SERIES= 11 LBS
BARRIER LOAD CELL 09



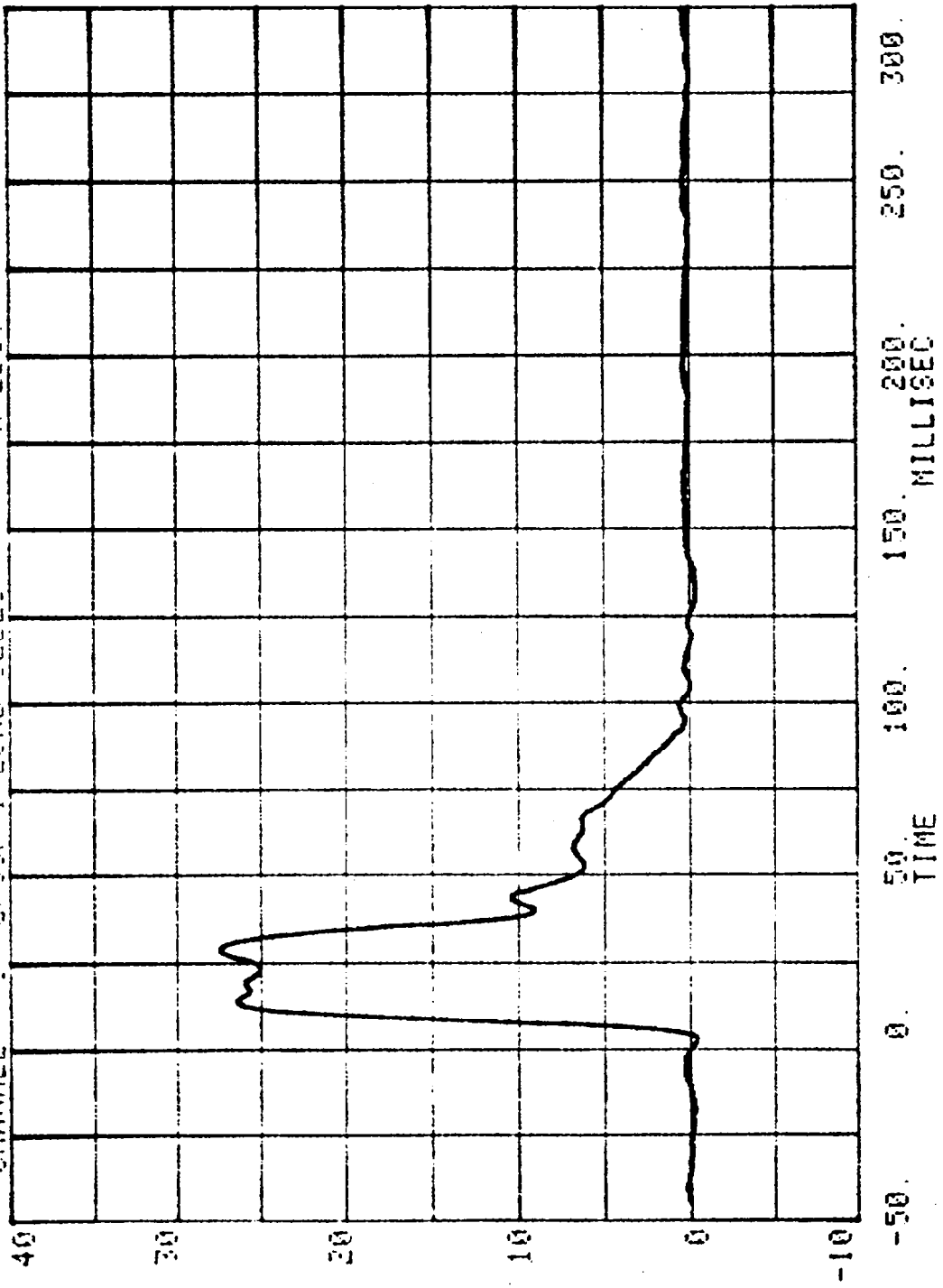
NEW CAR ASSESSMENT PROGRAM - 1990

FUN # 966

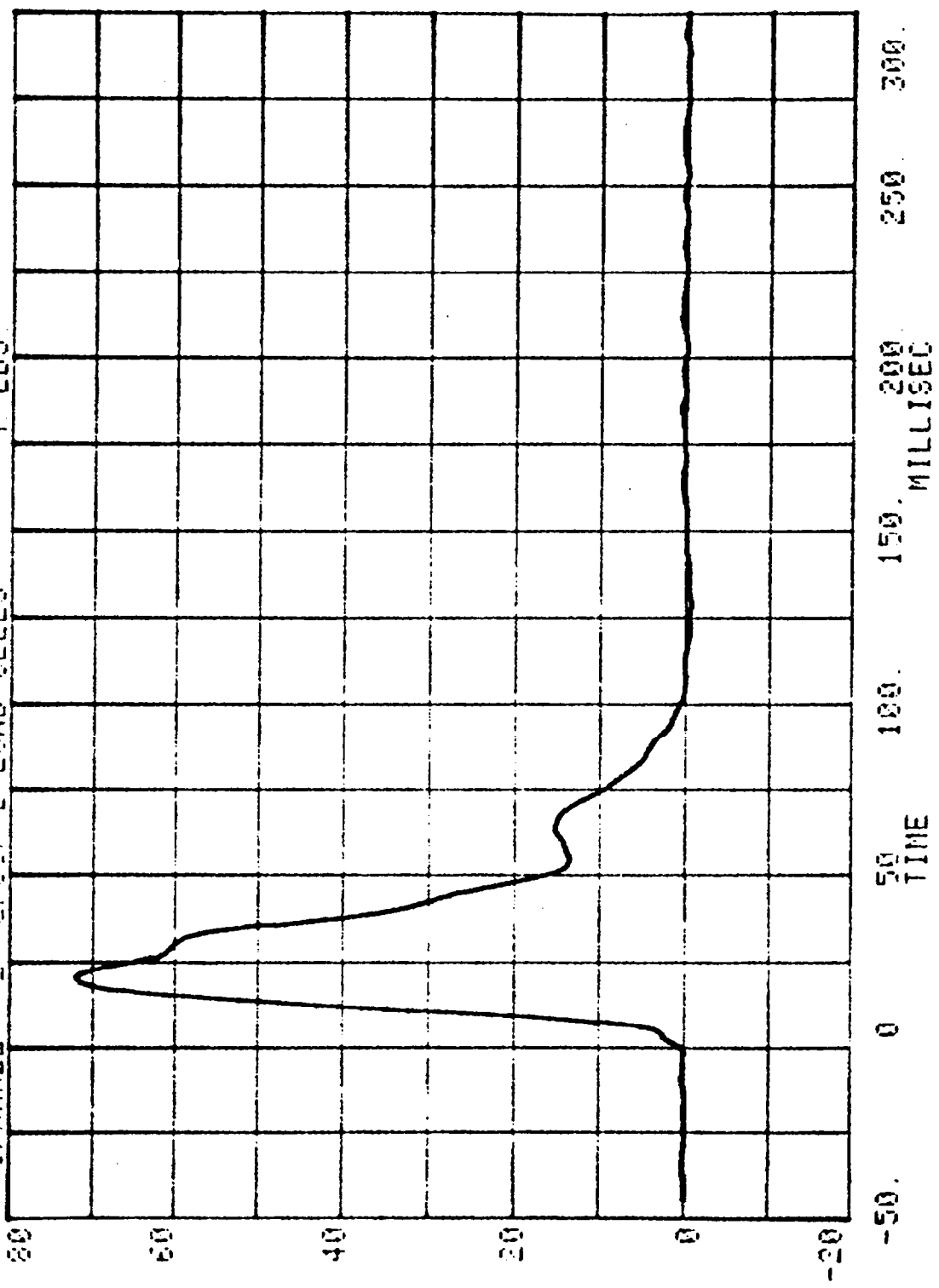
SERIES # 1:

CHAN	TITLE	MINIMUM	MAXIMUM	AT	TIME
1	GROUP 1 LOAD CELLS	27.503 K LBS	387 K LBS		28.95 MS
2	GROUP 2 LOAD CELLS	72.204 K LBS	651 K LBS		128.85 MS
3	GROUP 3 LOAD CELLS	25.408 K LBS	220 K LBS		24.32 MS
4	GROUP 4 LOAD CELLS	12.014 K LBS	121 K LBS		9.00 MS
5	GROUP 5 LOAD CELLS	42.728 K LBS	319 K LBS		233.10 MS
6	GROUP 6 LOAD CELLS	12.513 K LBS	205 K LBS		33.00 MS
7	TOTAL LOAD CELL SUM	155.262 K LBS	623 K LBS		23.47 MS
					130.80 MS
					24.75 MS

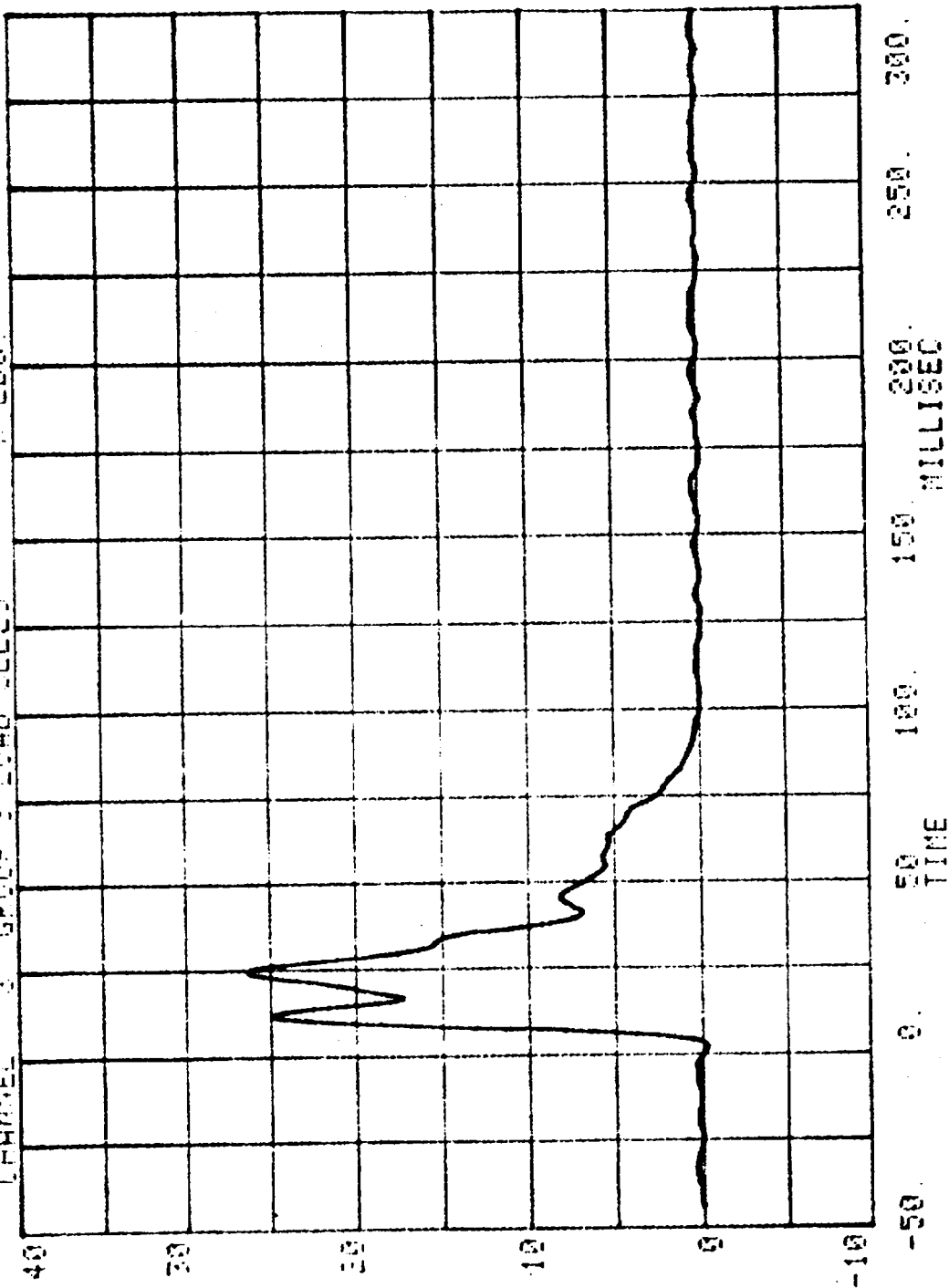
PUN= 266 SERIES= 11 K LBS.
CHANNEL 1 GROUP 1 LOAD CELLS



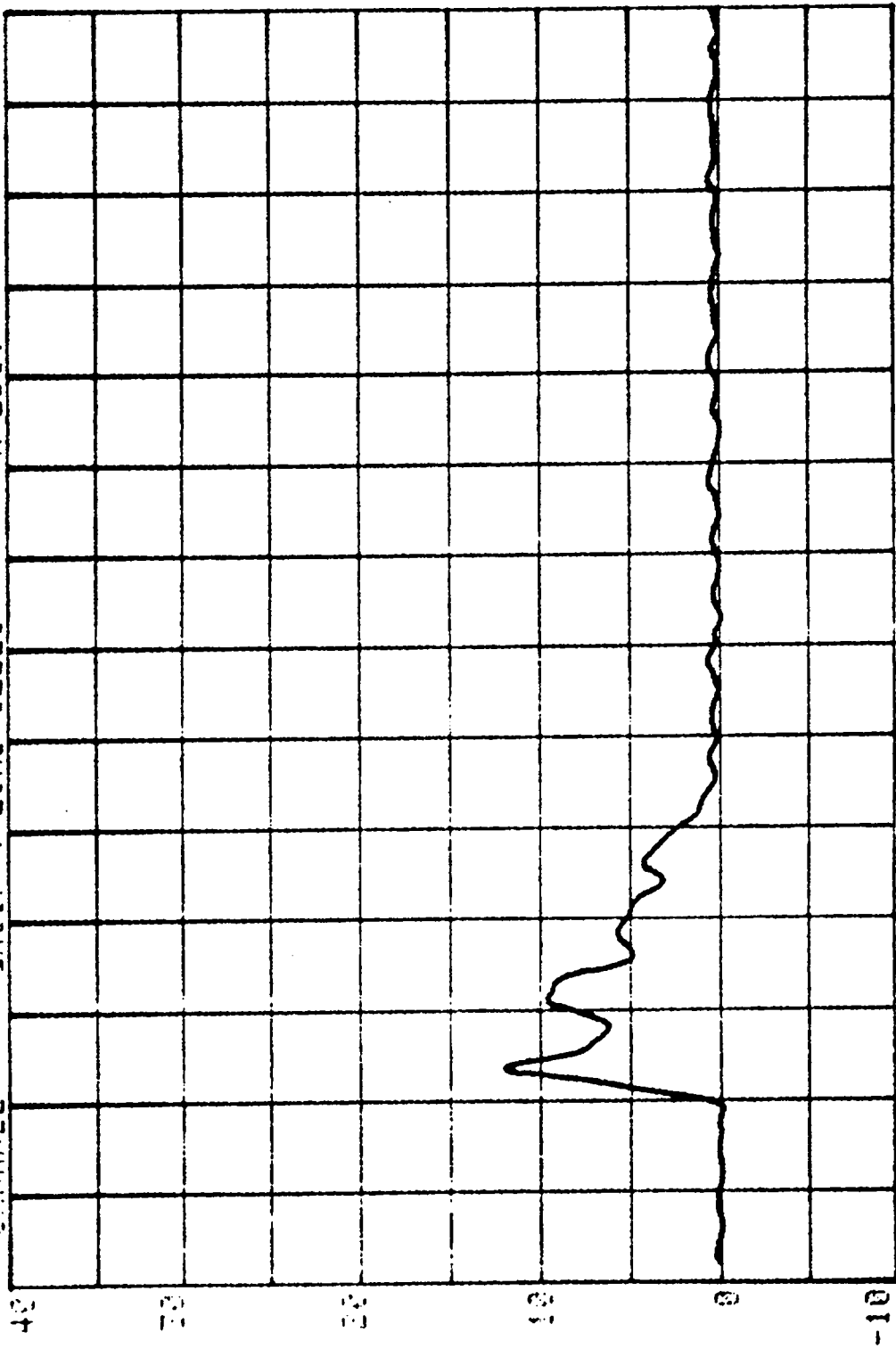
CHANNEL 2 SUN= 966 SERIES= 11 F LBS
GROUP 2 LOAD CELLS



CHANNEL 3 GROUP 7 LOAD CELLS RUN= 226 SERIES= 11 K LBS.

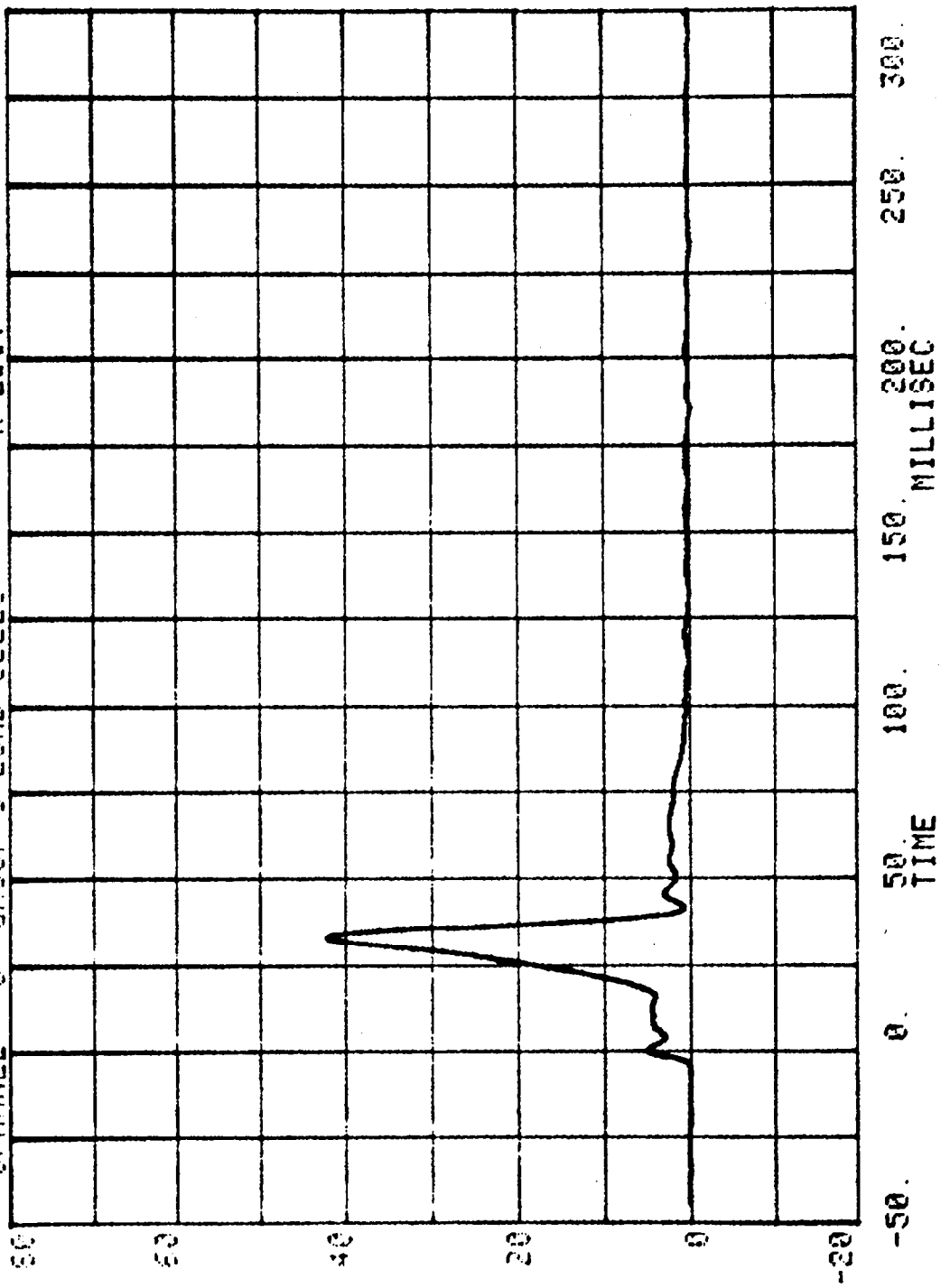


CHANNEL 4 GROUP 4 LOAD CELLS RUN= 966 SERIES= 11 K LBS.

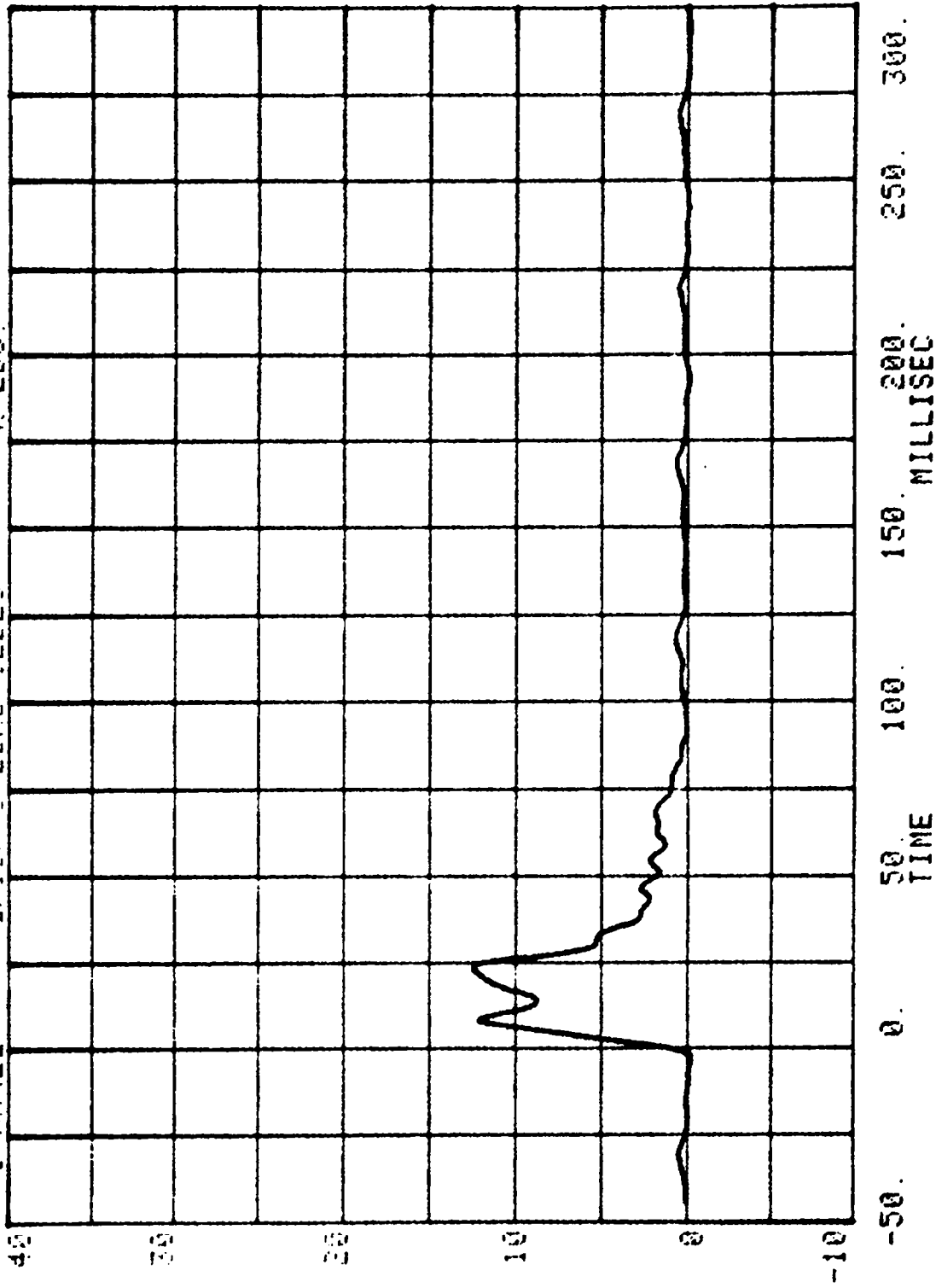


-50. 0. 50. 100. 150. 200. 250. 300.

CHANNEL 5 GROUP 5 LOAD CELLS
RUN= 966 SERIES= 11 K LBS.

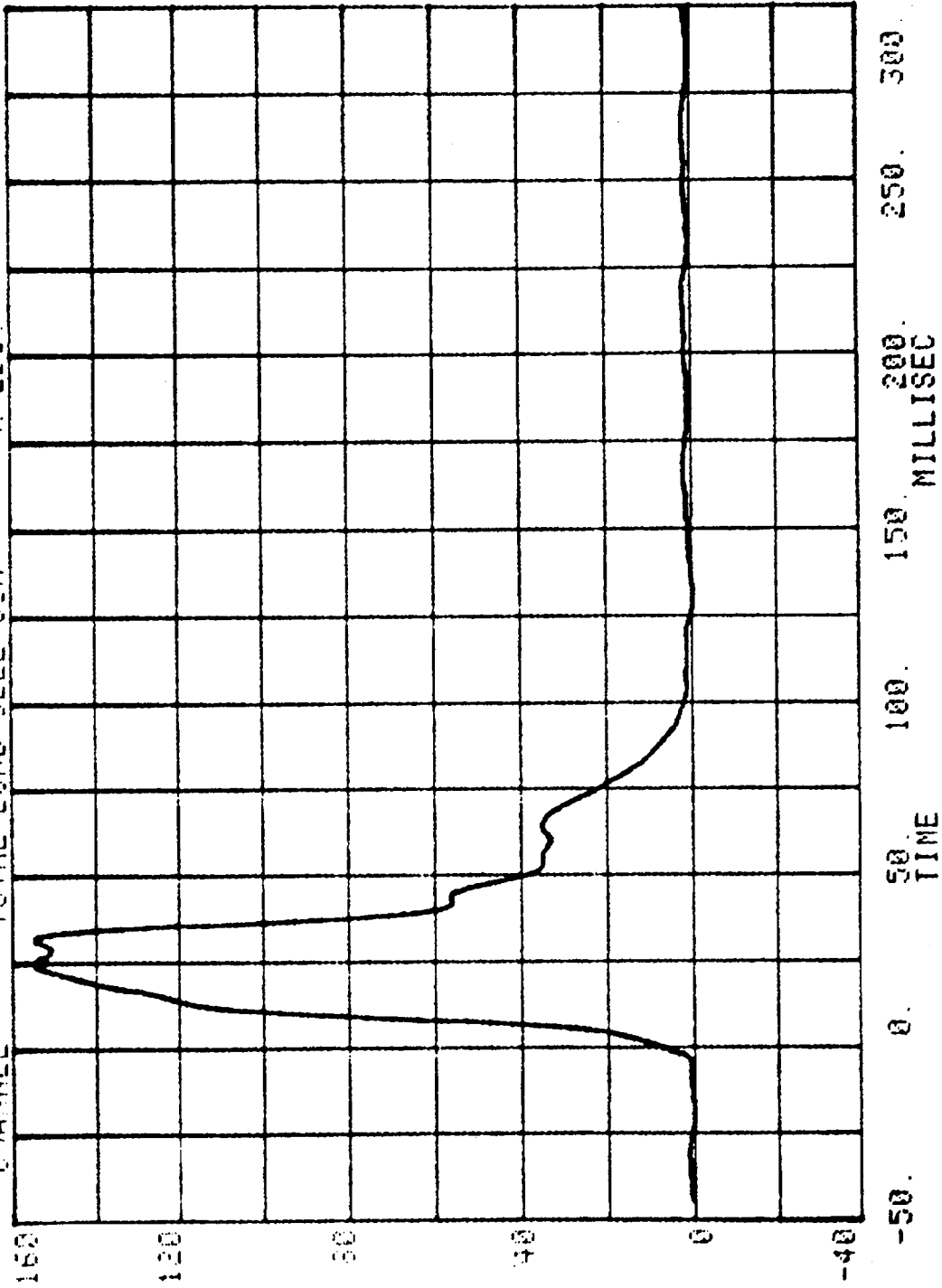


CHANNEL 5 GROUP 6 LOAD CELLS RUN= 966 SERIES= 11 K LBS.



CHANNEL 7 TOTAL LOAD CELL SUM 11 K LBS.

RUN= 966 SERIES=



TEST NO. ML5700

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
25MS. MAXIMUM CURATION

NEW CAR ASSESSMENT PROGRAM - 1990

RUN= 966

FOS #1 HEAD RESULTANT

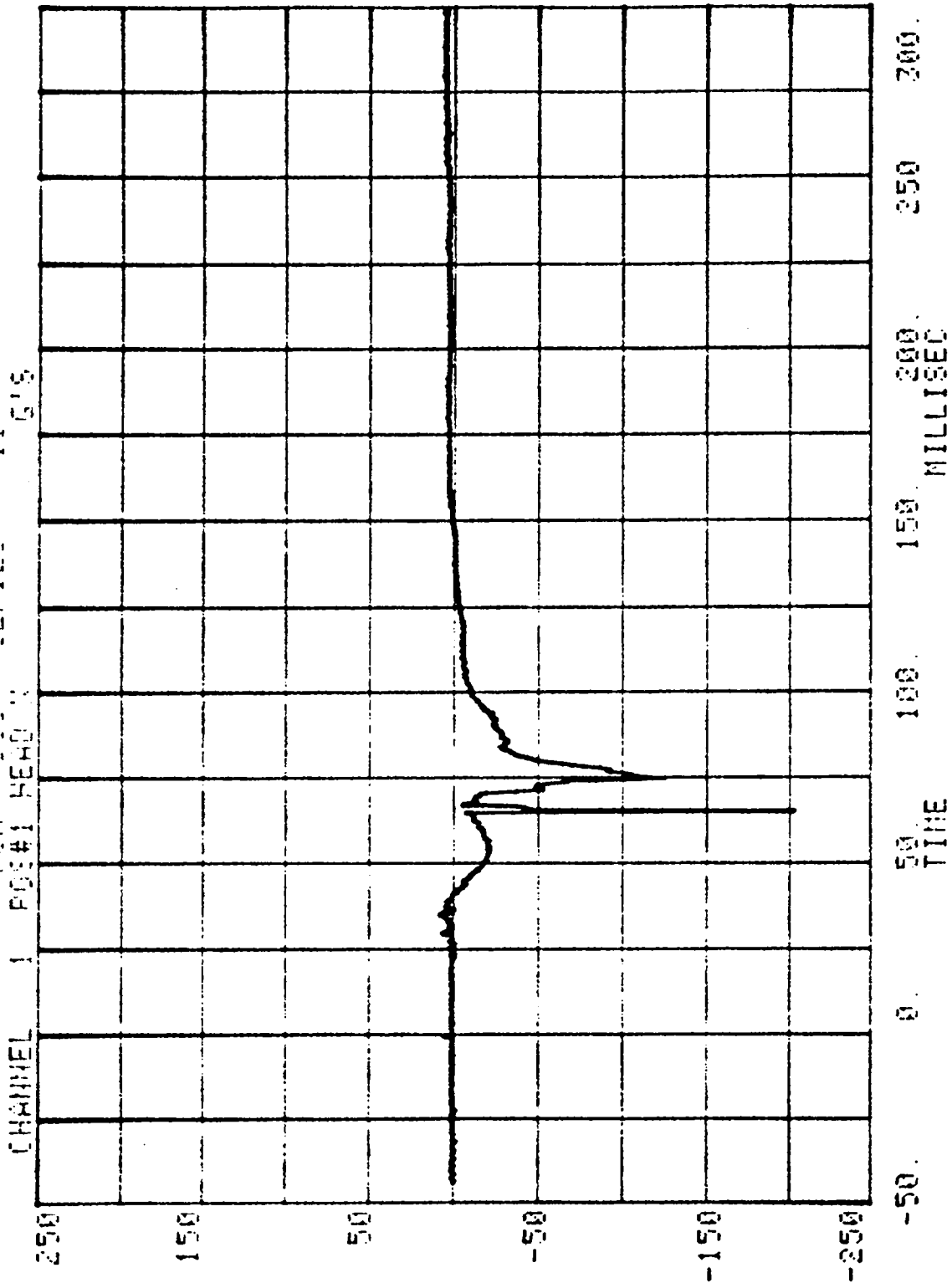
HIC= 995.1 FROM T1= .05385 TO T2= .08912

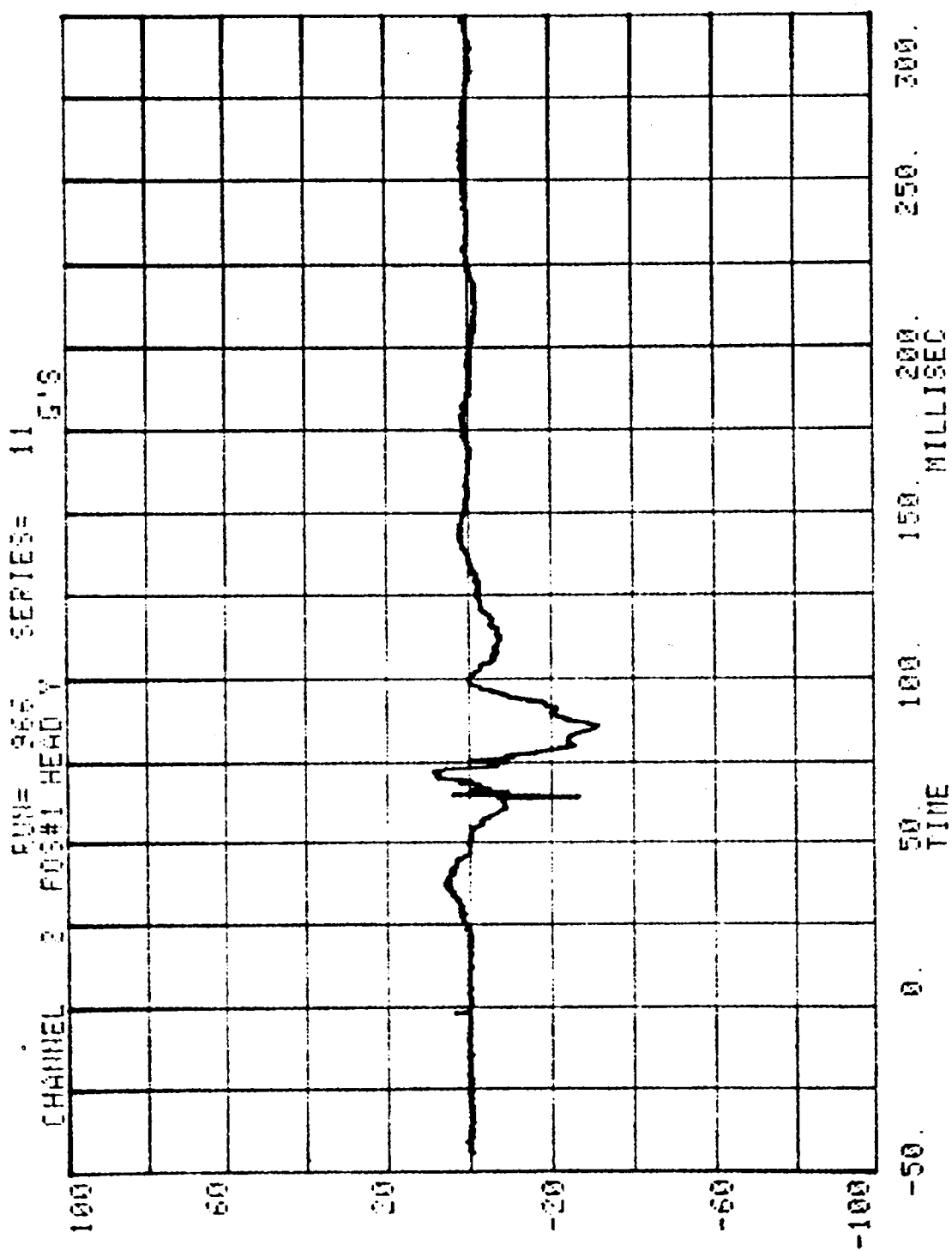
AVERAGE ACCELERATION BETWEEN T1 AND T2= 51.0G'S

EVENT TIME= 300.0 MSEC

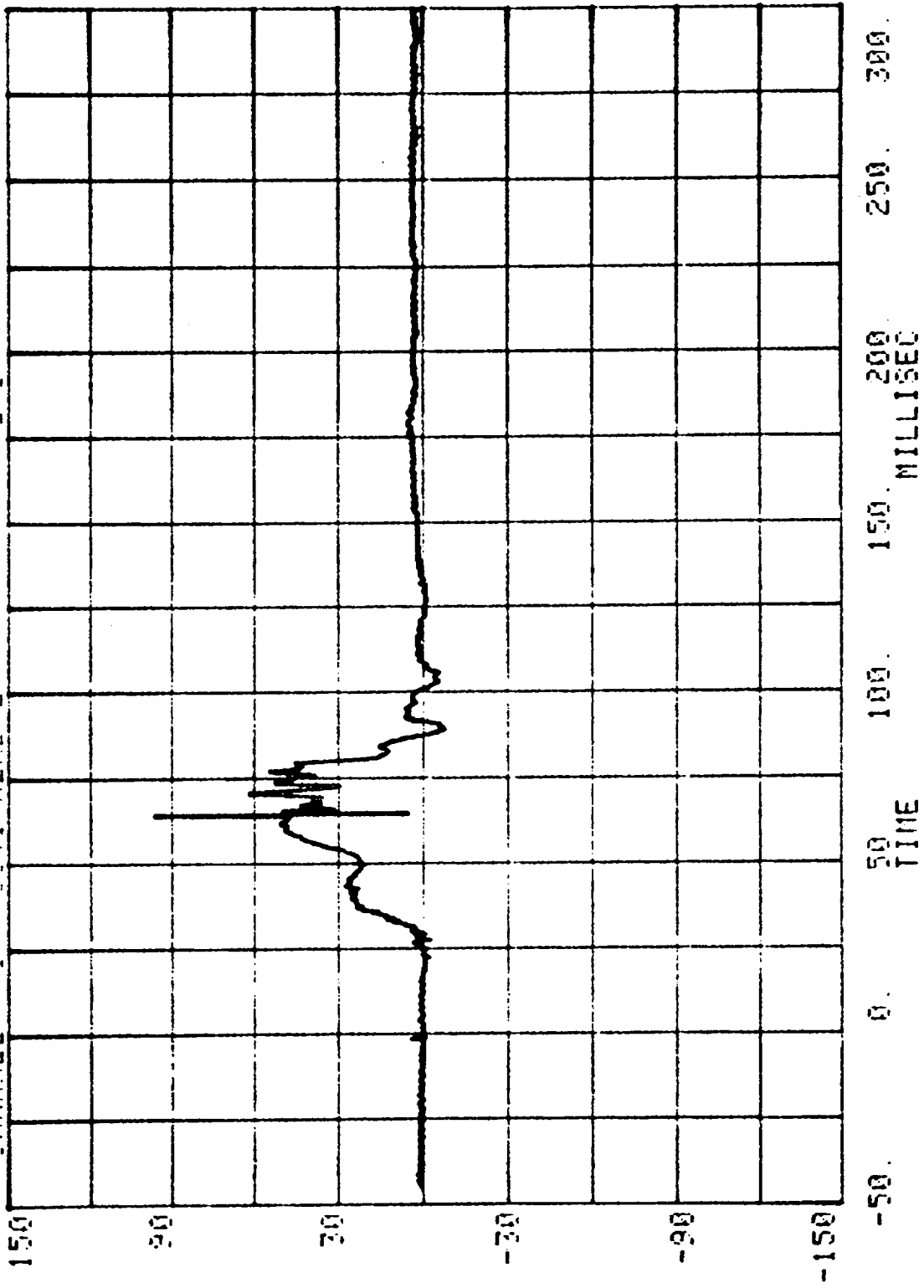
SEVERITY INDEX=1635.0

CHANNEL 1 RUN= 999 SERIES= 11 G'S

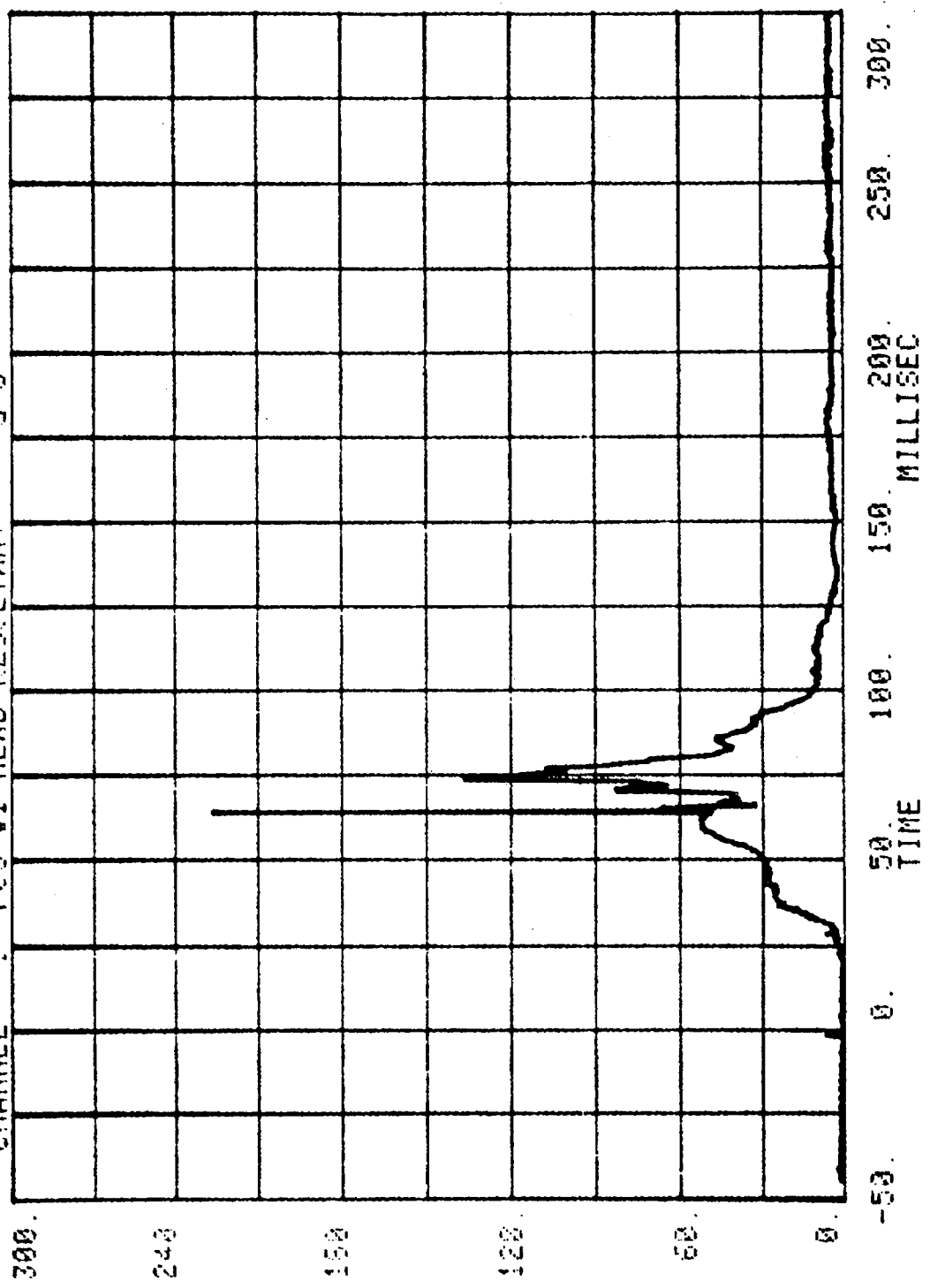




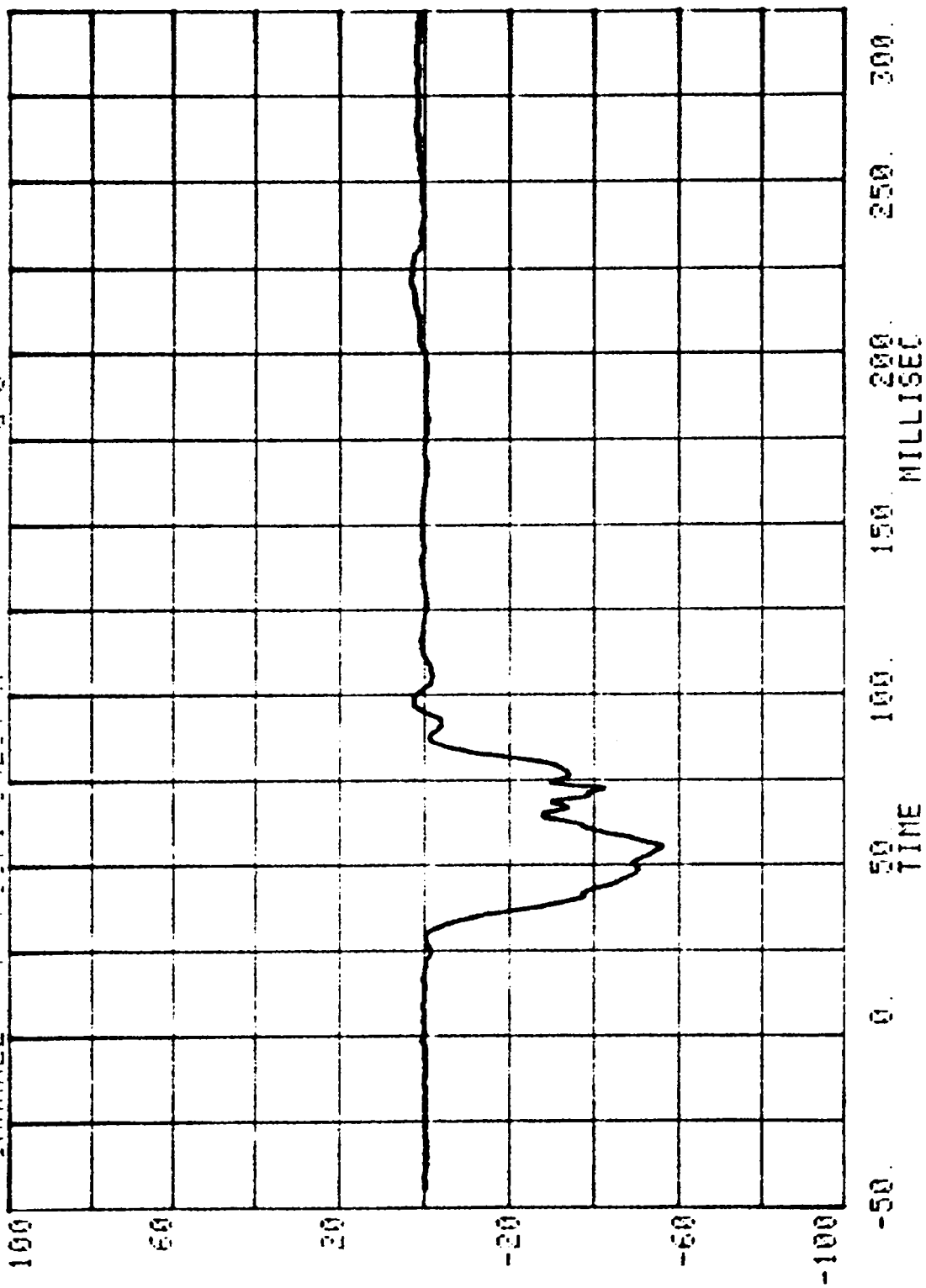
CHANNEL 3 POS#1 HEAD 2 RUN# 966 SERIES# 11 G'S



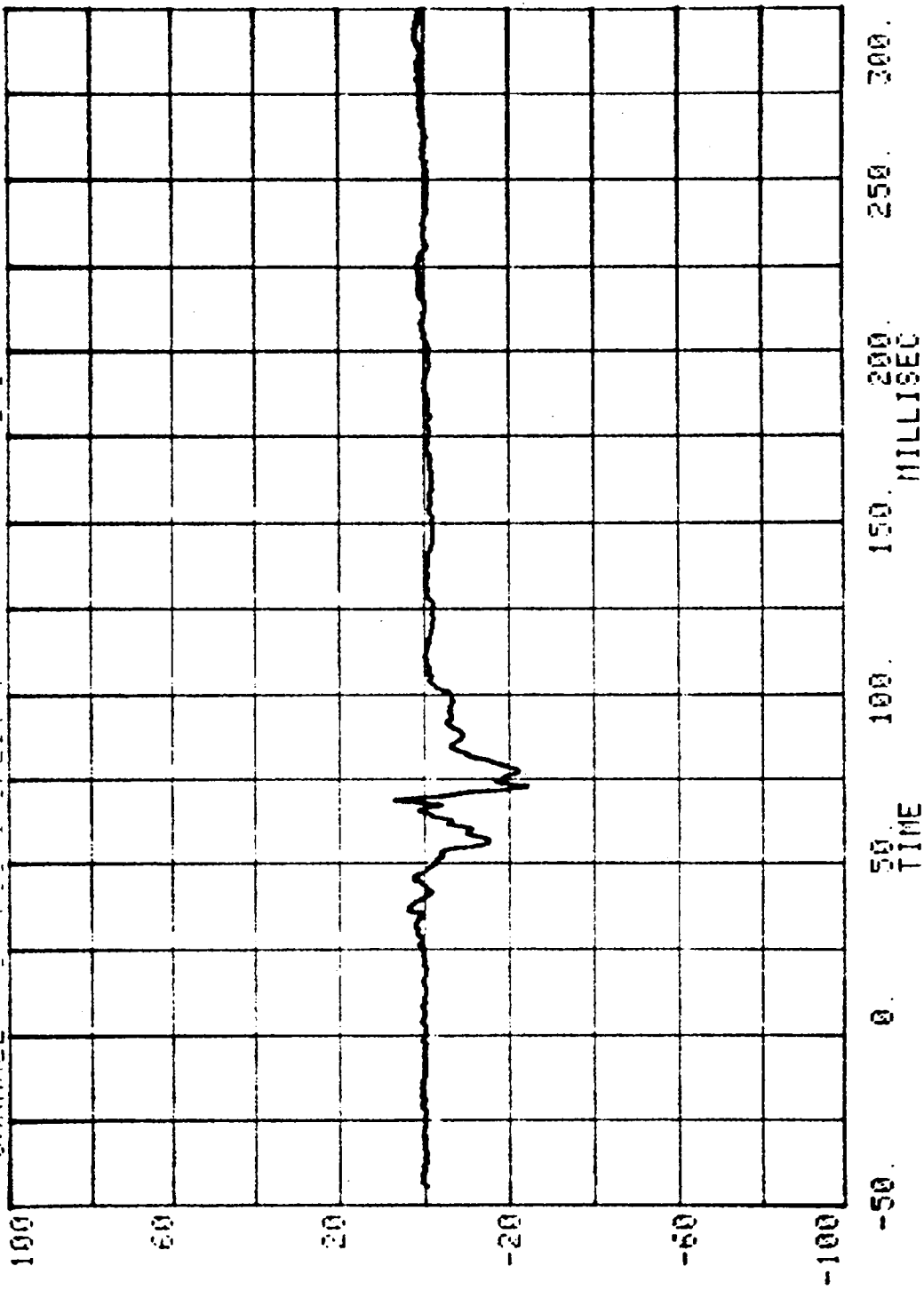
CHANNEL 1 POS #1 HEAD RESULTANT 5'S
RUN= 966 SERIES= 11



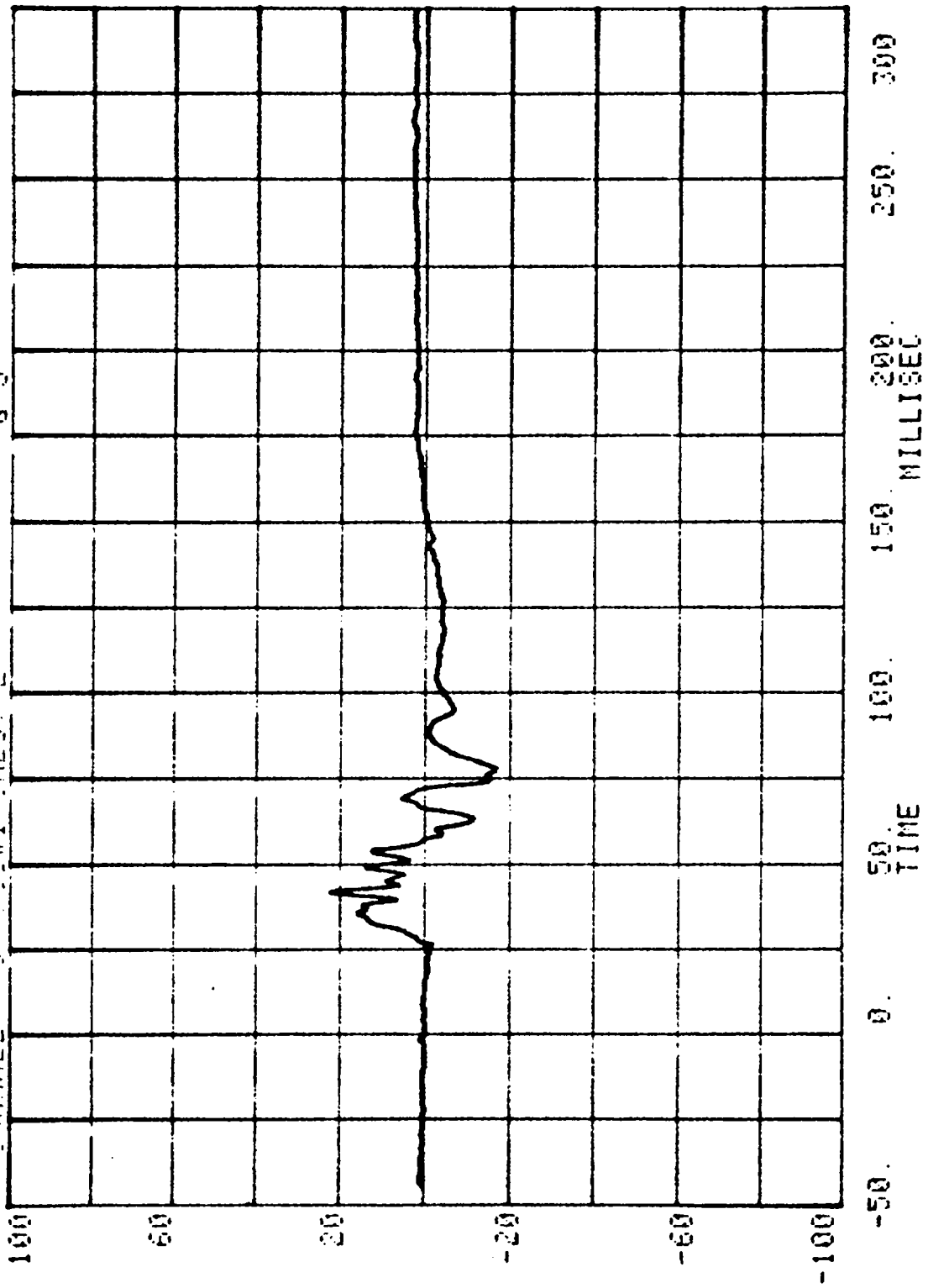
CHANNEL 4 POS#1 CHEST X
RUN= 969 SERIES= 11 G'S



CHANNEL 5 POS#1 CHEST Y
RUN# 956 SERIES# 11 6'S

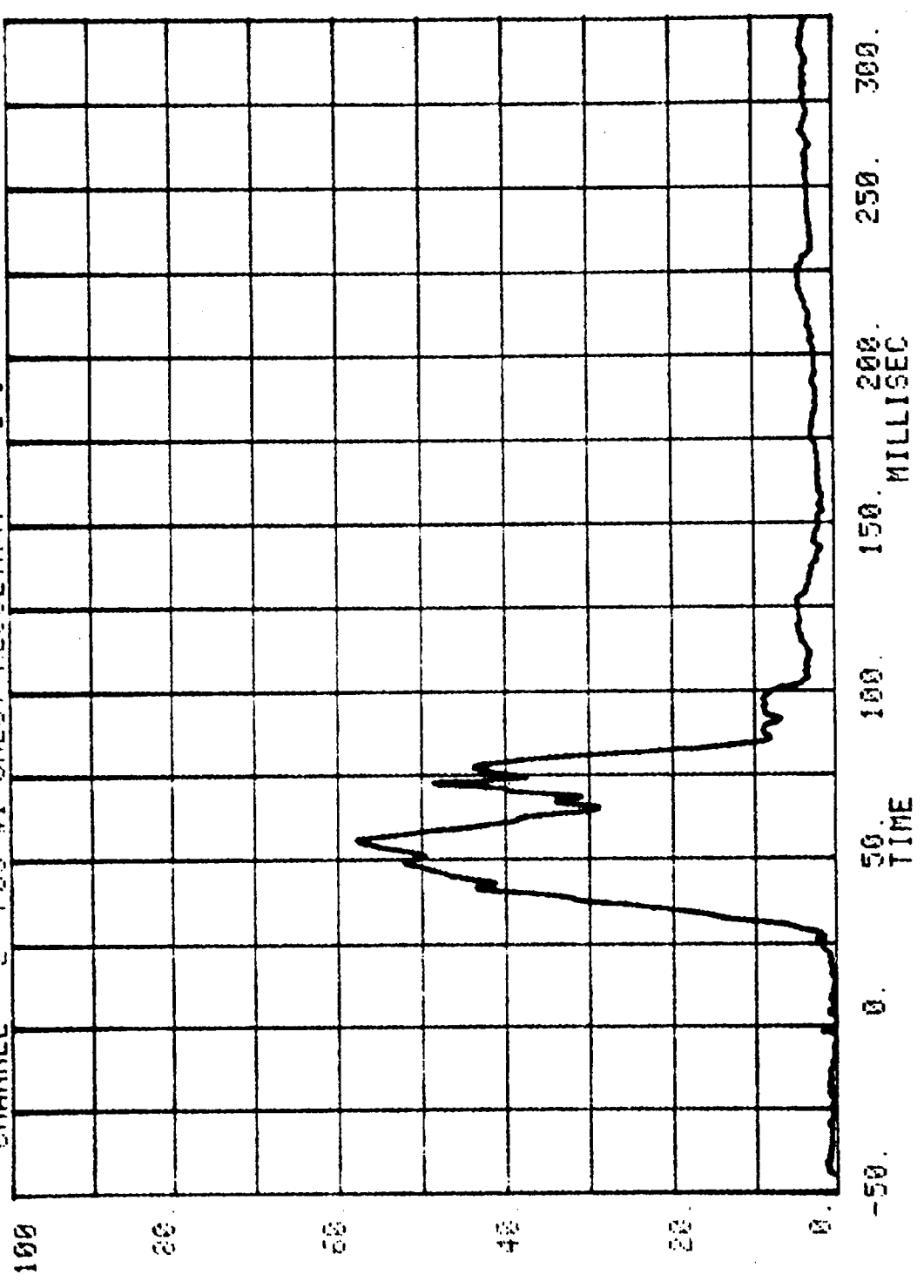


CHANNEL 5 RUN= 966 SERIES= 11 G'S
R02#1 CHEST Z

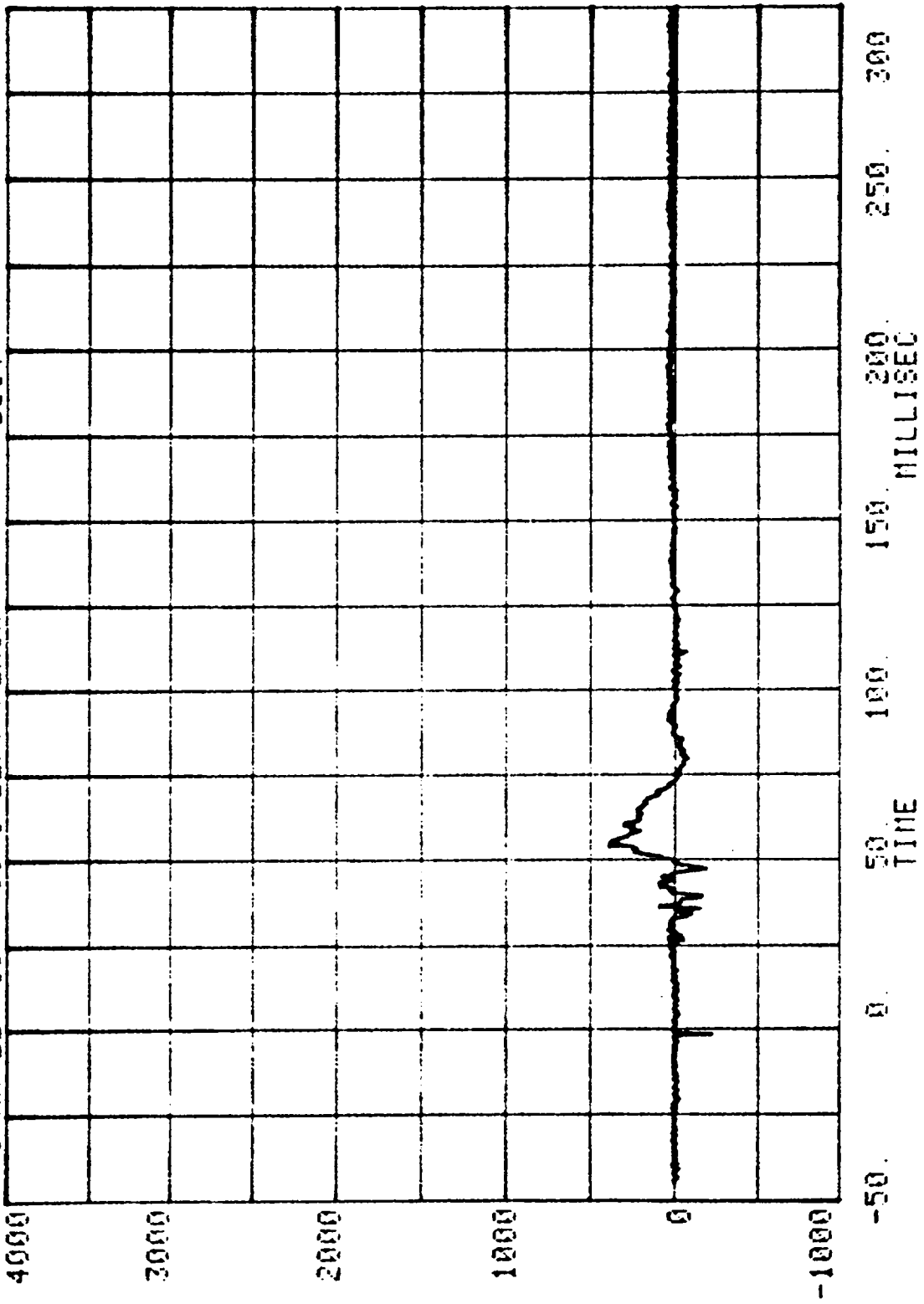


CHANNEL 2 POS #1 CHEST RESULTANT 11 G'S

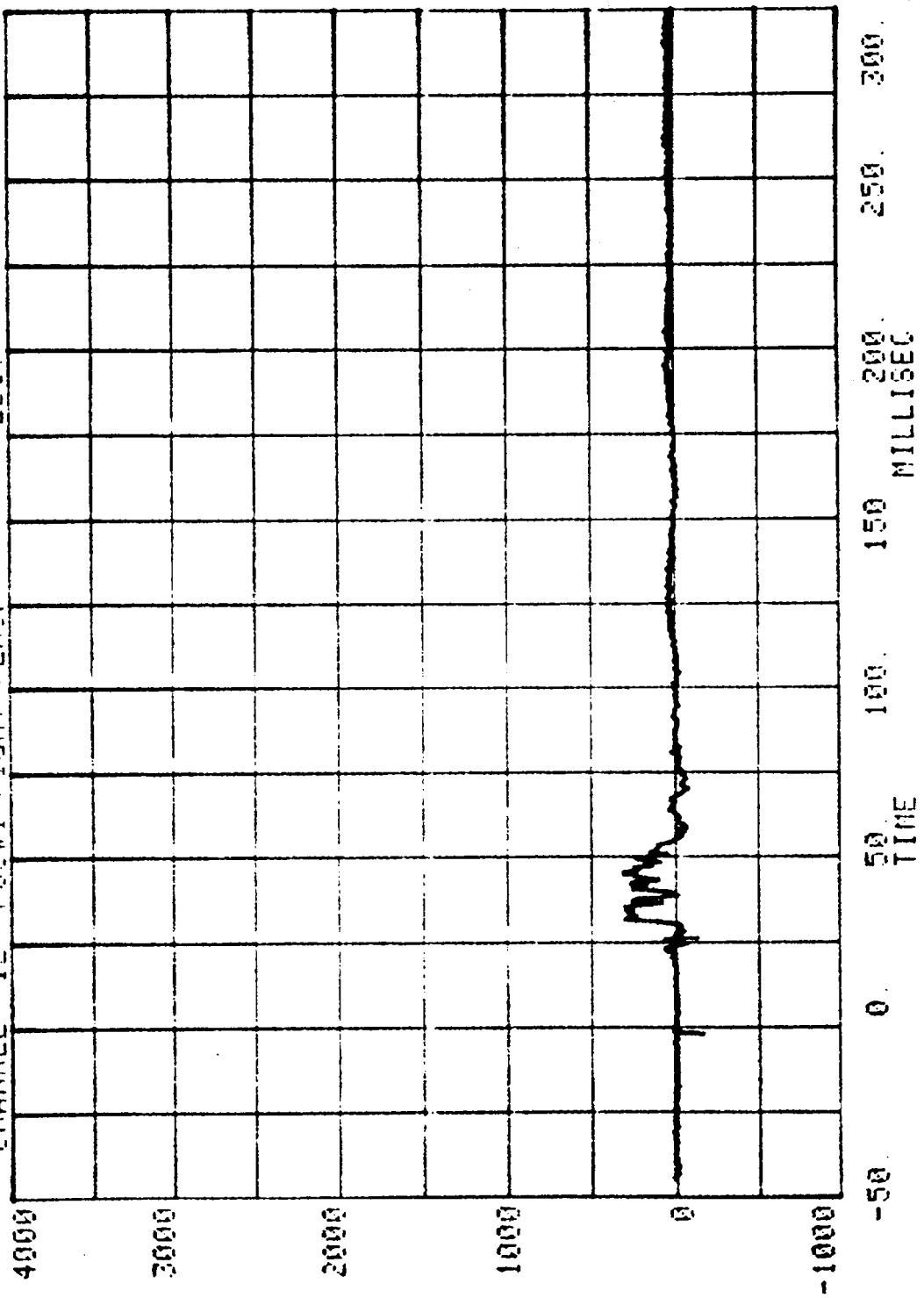
RUN= 966 SERIES= 11



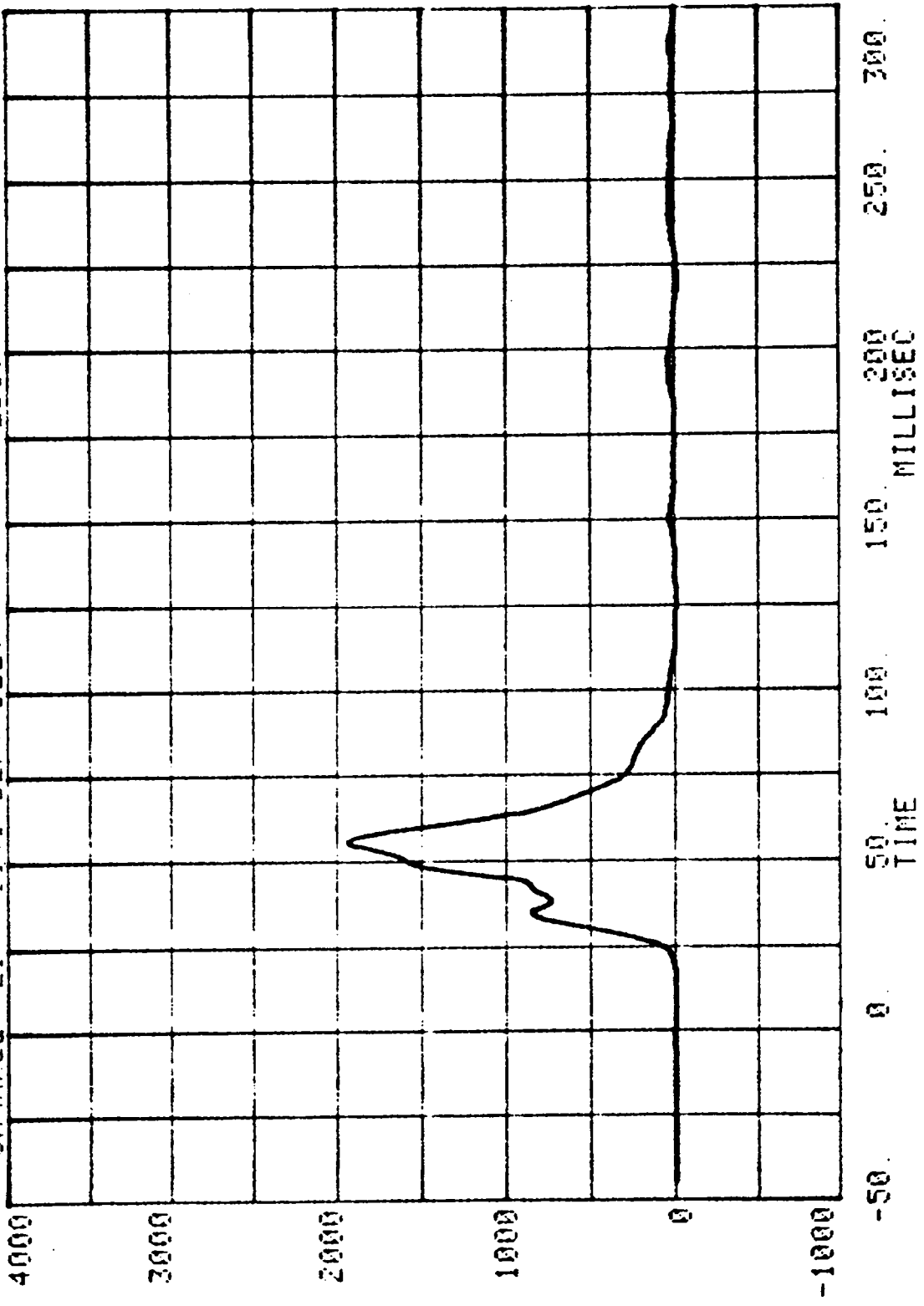
CHANNEL 11 POS#1 LEFT FEMUR RUN= 966 SERIES= 11 LBS.



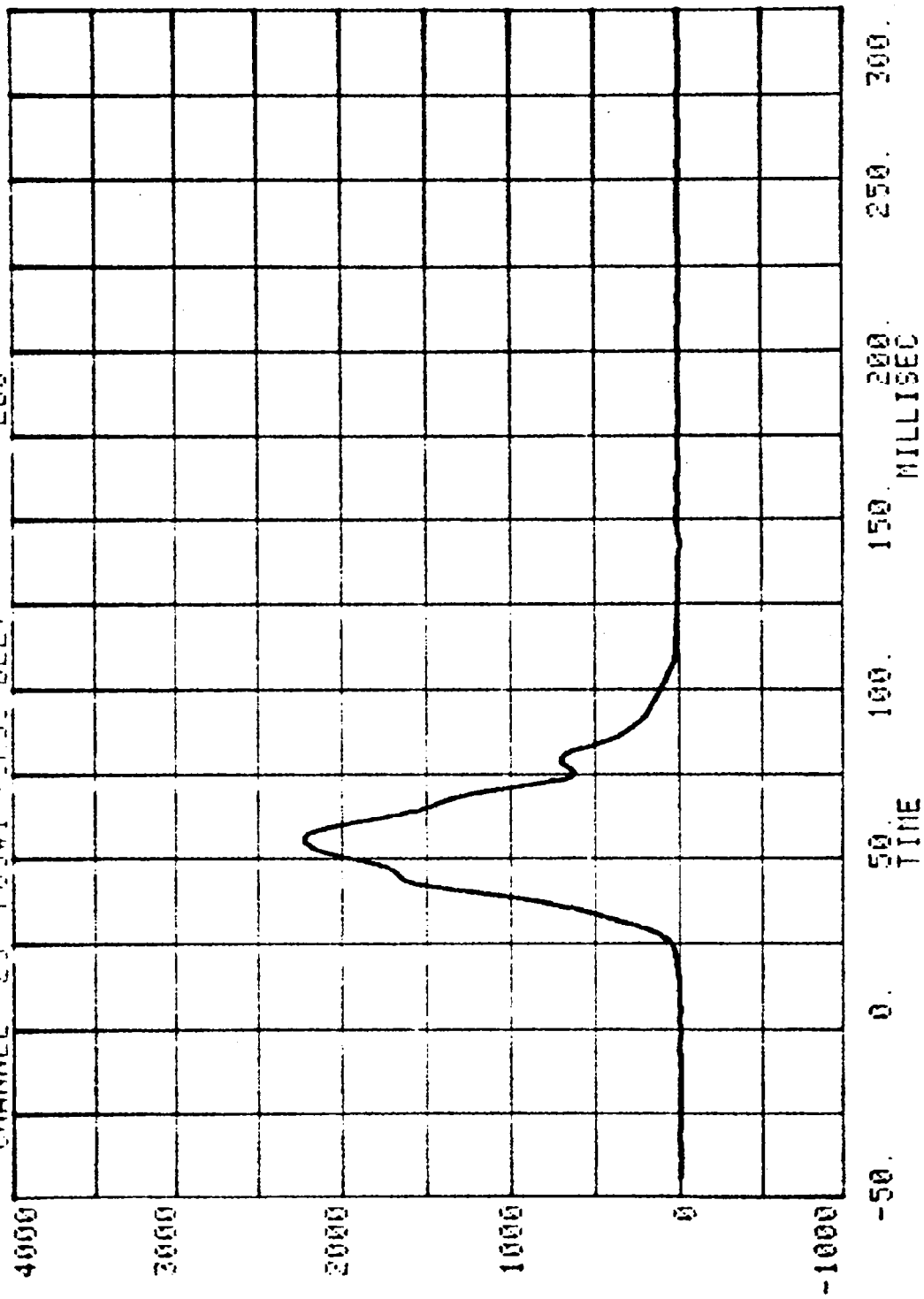
CHANNEL 12 POS#1 RIGHT FEMUR
RUN= 266 SERIES= 11 LBS



CHANNEL 21 POS#1 LEFT BELT
RUN= 266 SERIES= 11 LBS.

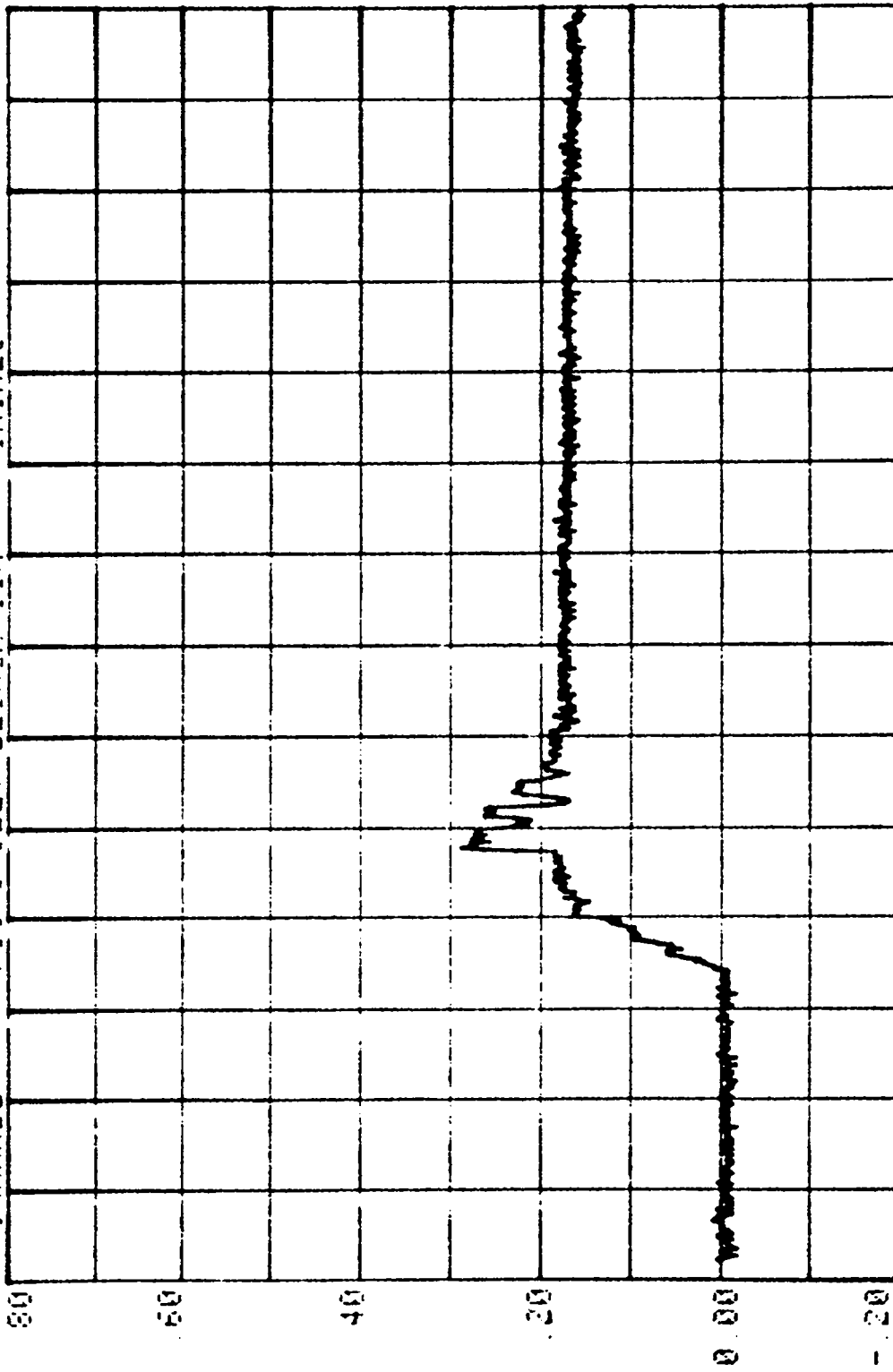


RUN= 956 SERIES= 11 LBS
CHANNEL 23 POS#1 TOPSO BELT

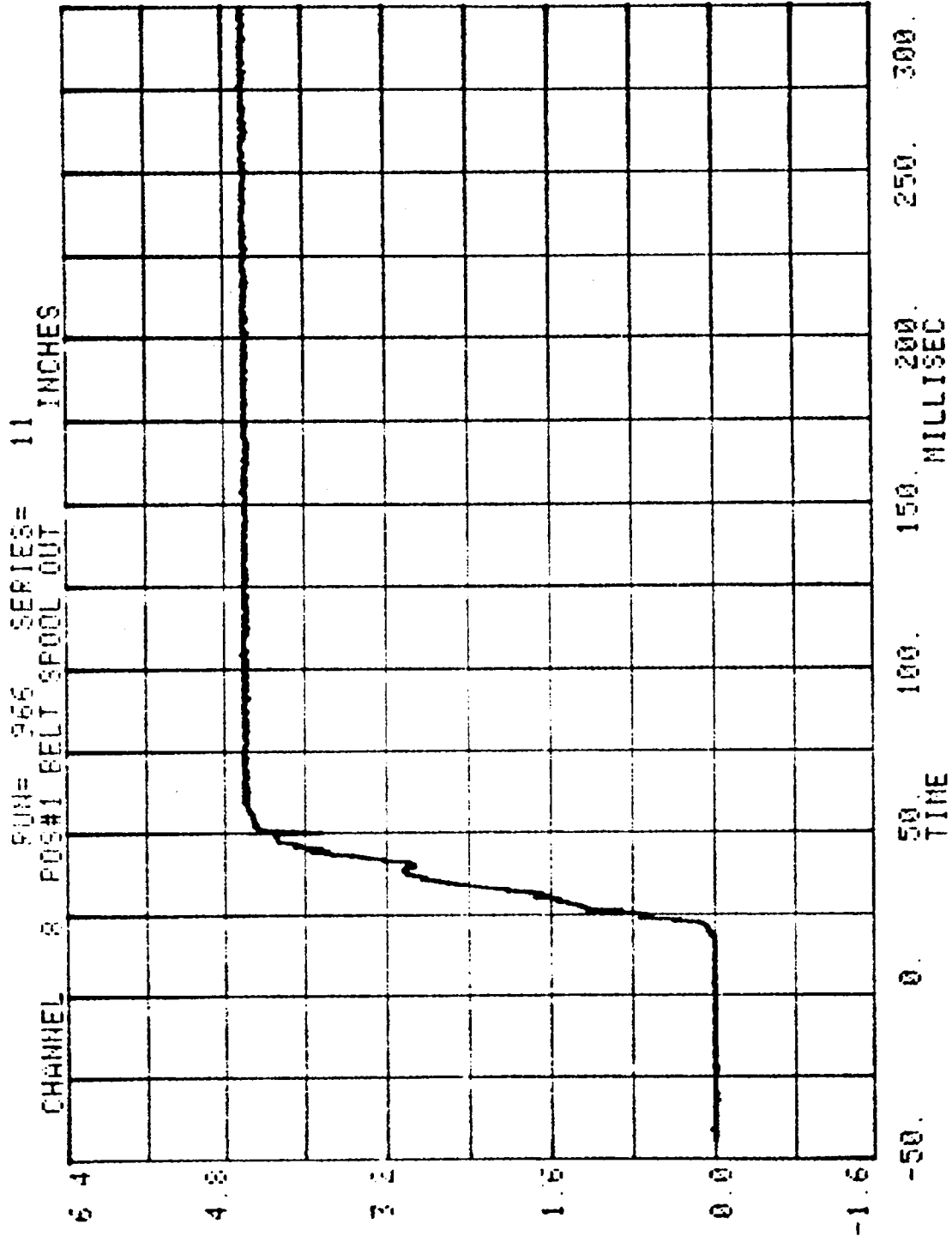


Measured over
2.5 inches

CHANNEL 7 POS#1 SELF ELONGATION SERIES= 11 INCHES



CHANNEL 8 POS#1 BELT SPOOL OUT 11 INCHES



HEAD INJURY CRITERION
HEAD SEVERITY INDEX
3CMS. MAXIMUM CURATION

NEW CAR ASSESSMENT PROGRAM - 1990

PUN= 966

POS #2 HEAD RESULTANT

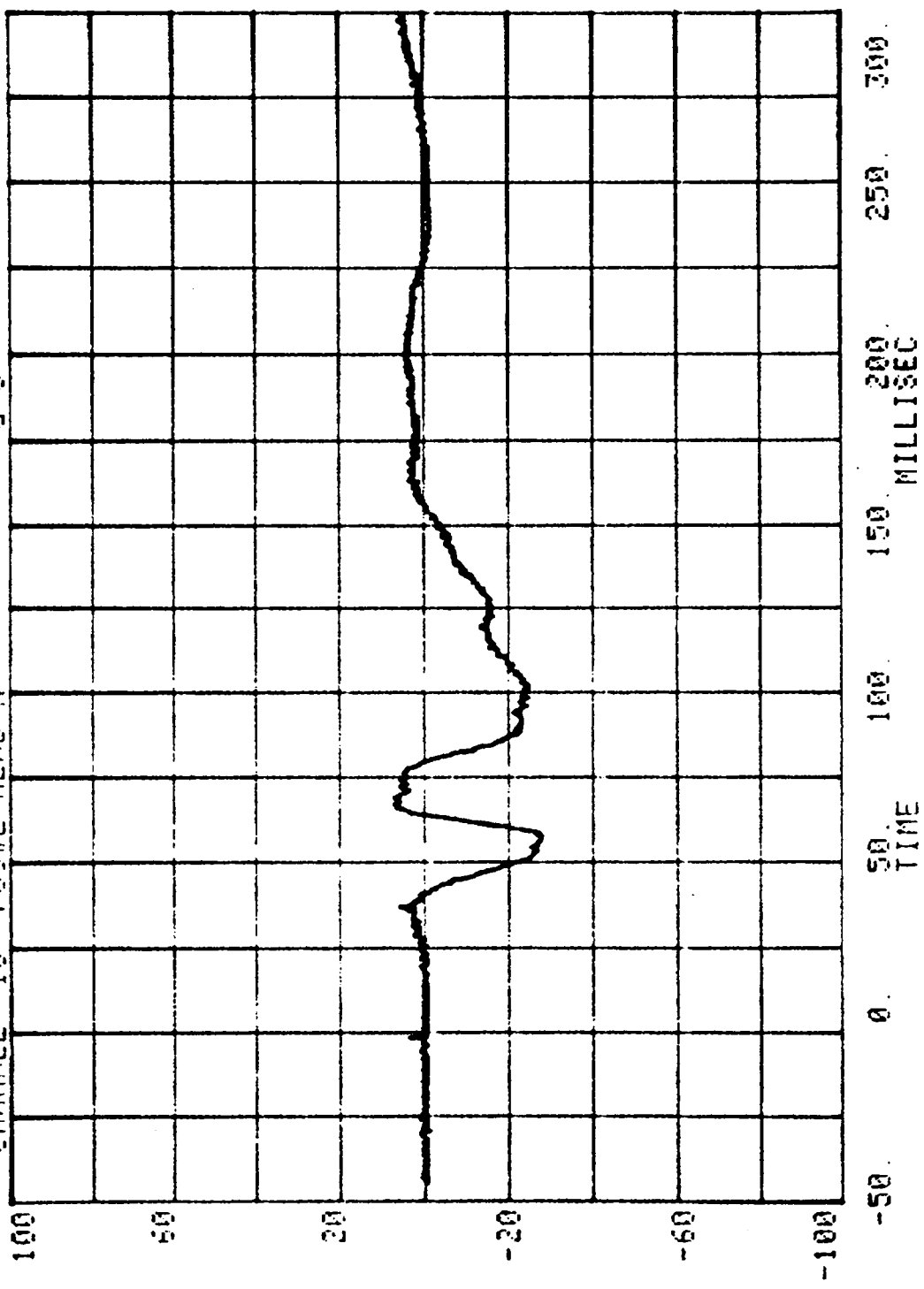
HIC= 743.5 FROM T1= .05540 TO T2= .09240

AVERAGE ACCELERATION BETWEEN T1 AND T2= 53.25'S

EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1217.0

CHANNEL 13 POS#2 HEAD W
RUN= 965 SERIES= 11 G'S



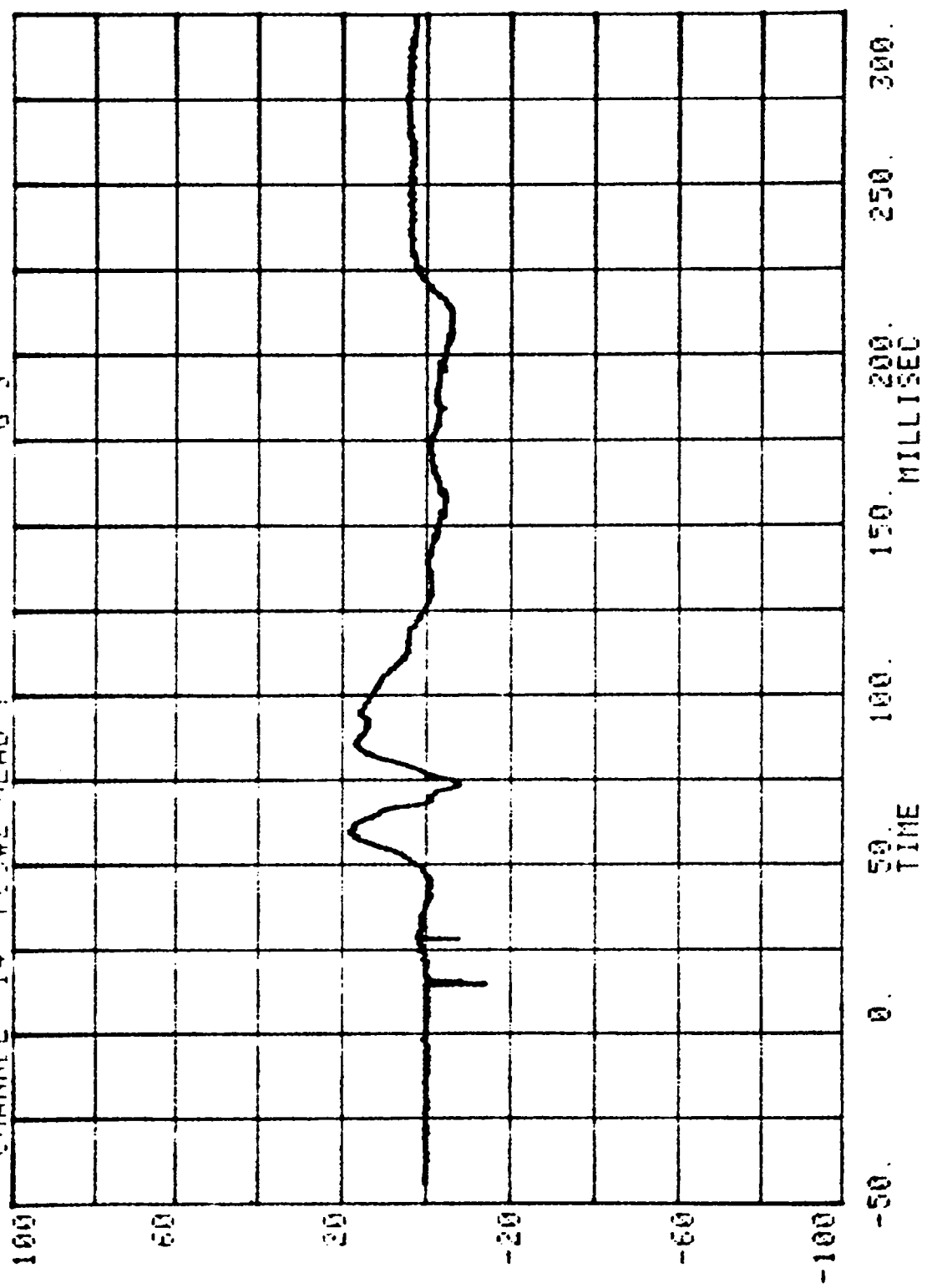
CHANNEL 14 POS#2 HEAD Y

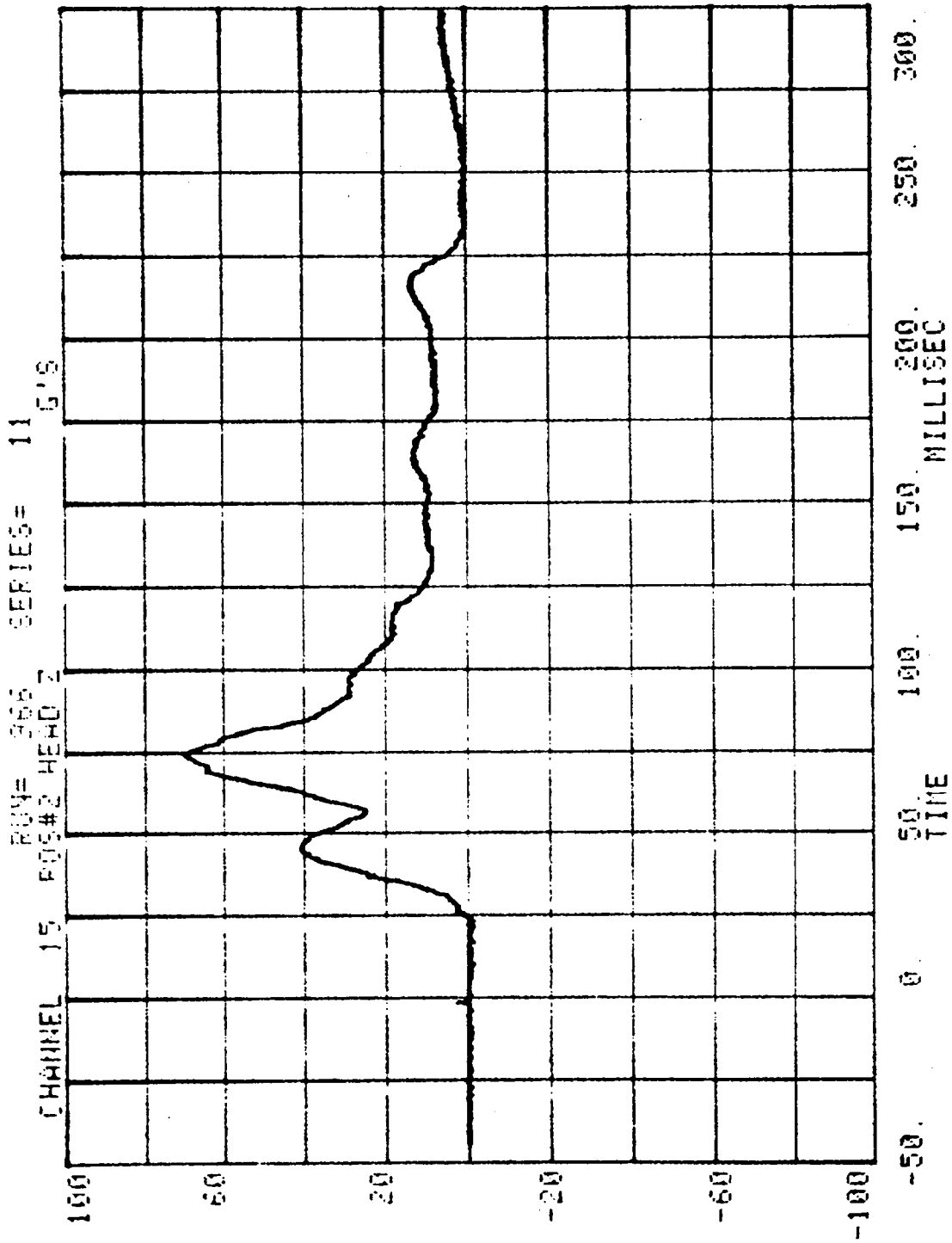
RUN= 966

SERIES=

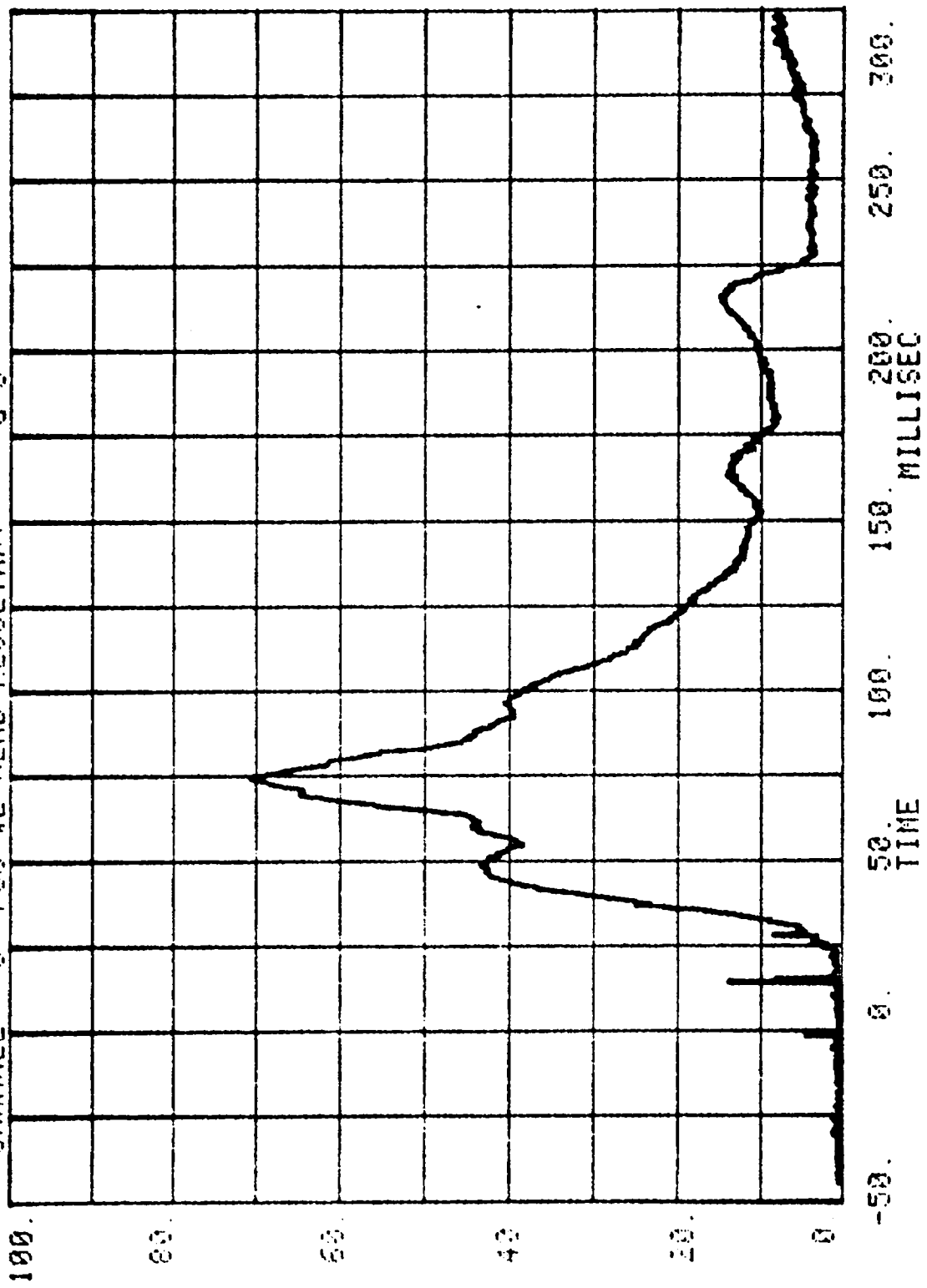
11

G'S

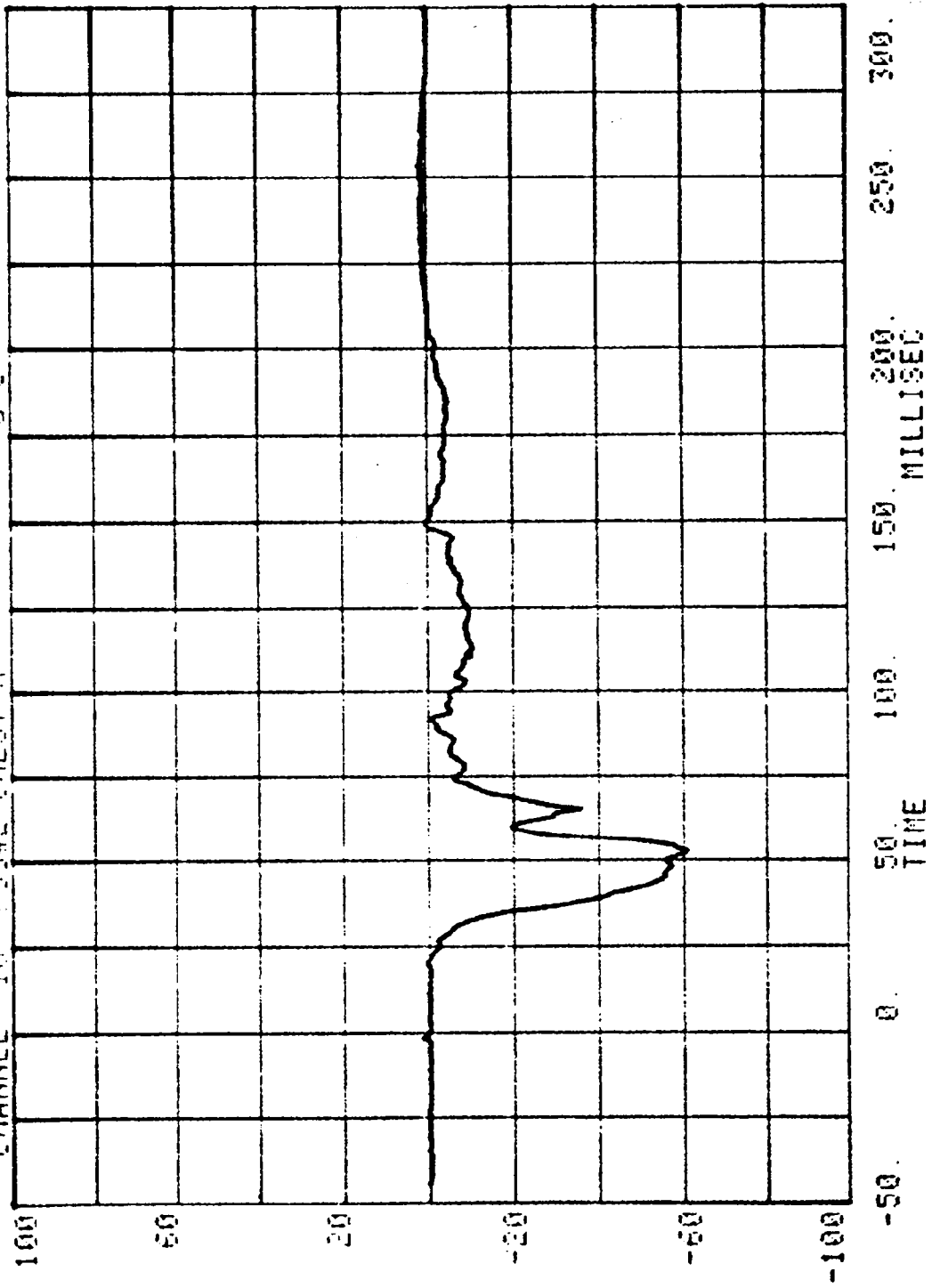




CHANNEL 3 POS #2 HEAD RESULTANT 11 G'S



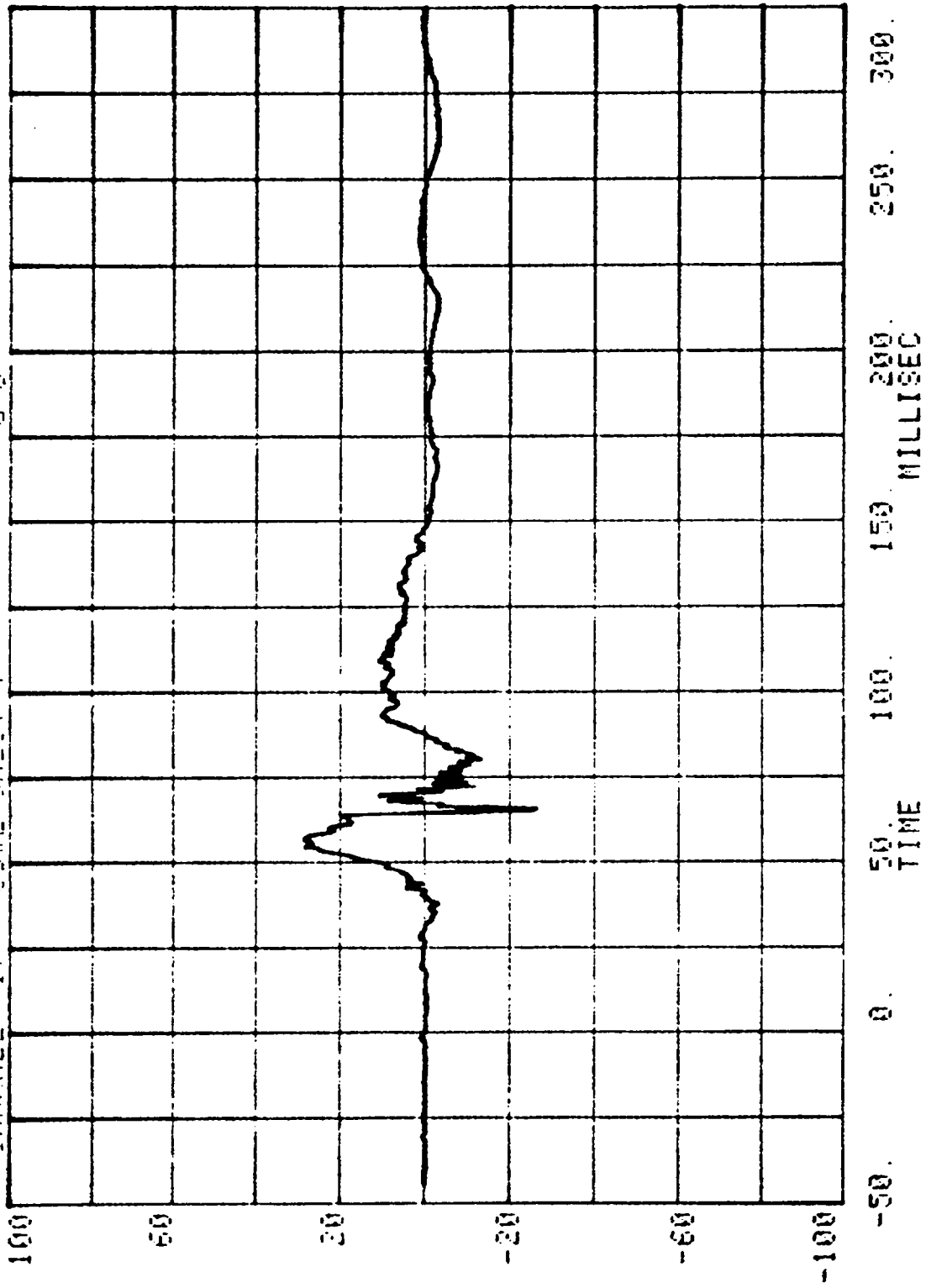
CHANNEL 16 POS#2 CHEST X
RUN= 966 SERIES= 11 G'S



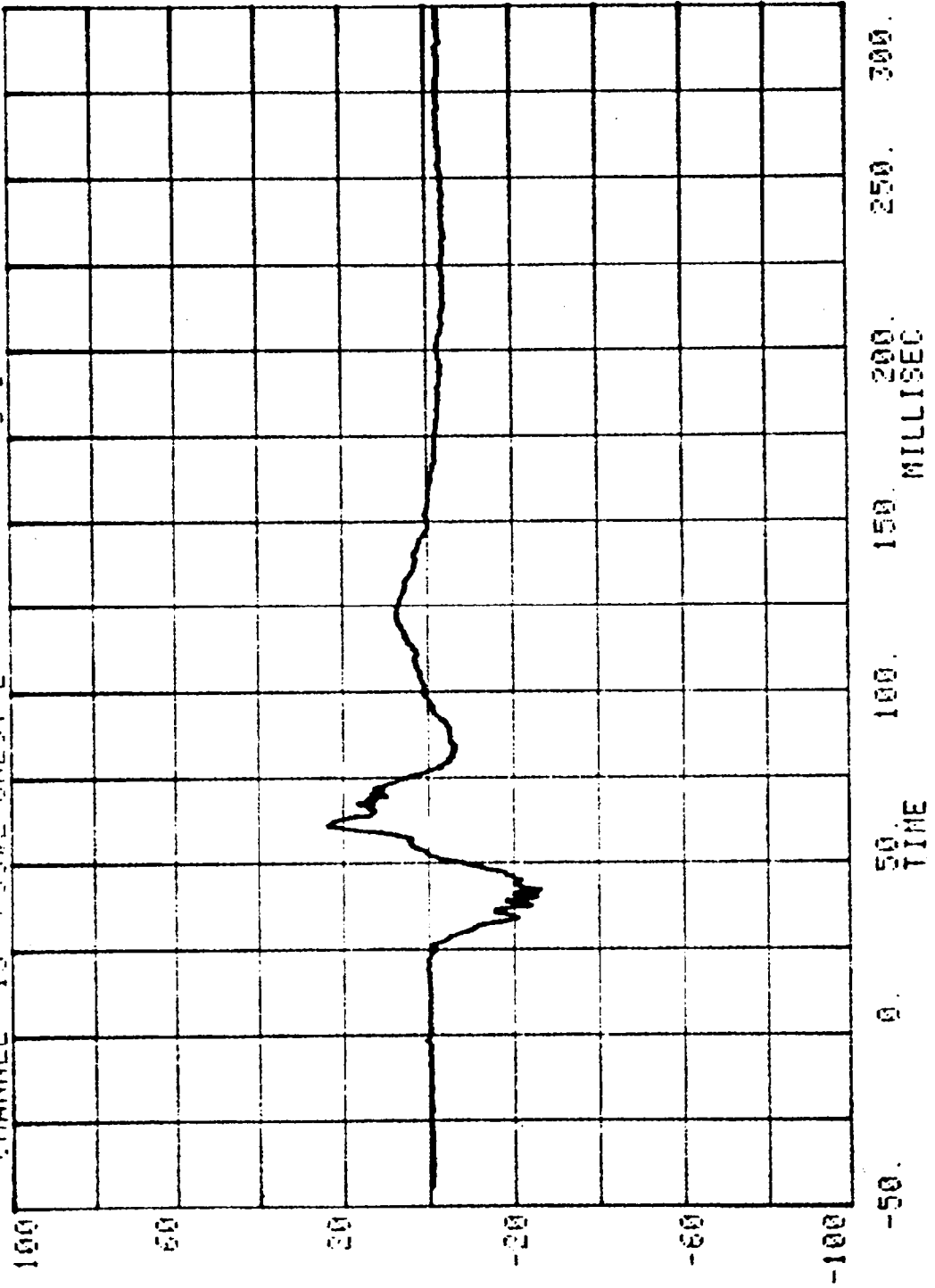
CHANNEL 17 POS#3 CHEST Y

SUN# 929 SERIES= 11

G'S



CHANNEL 18 POS#2 CHEST 2
RUN# 966 SERIES# 11 G'S



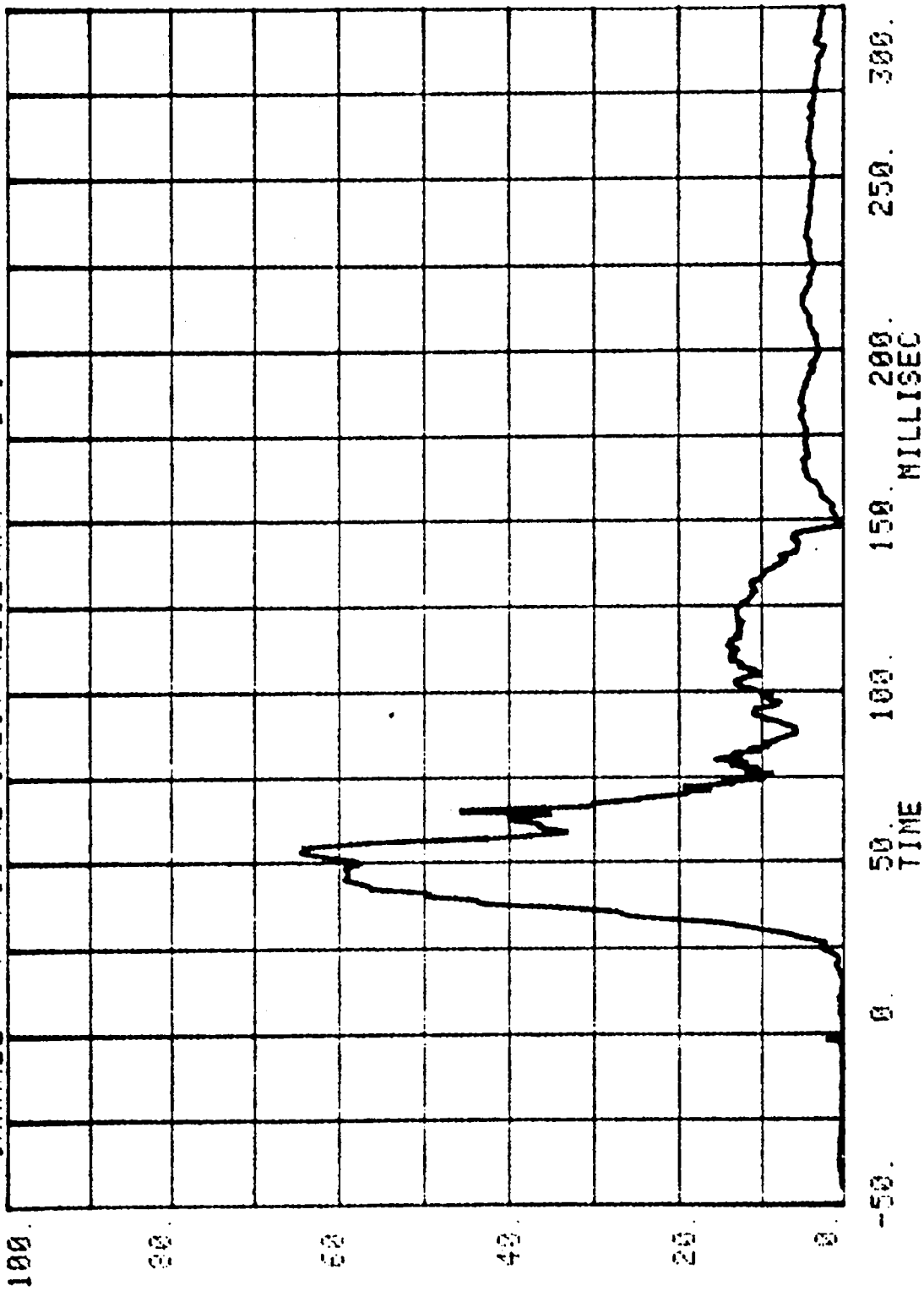
CHANNEL 4 POS #2 CHEST RESULTANT 11 G'S

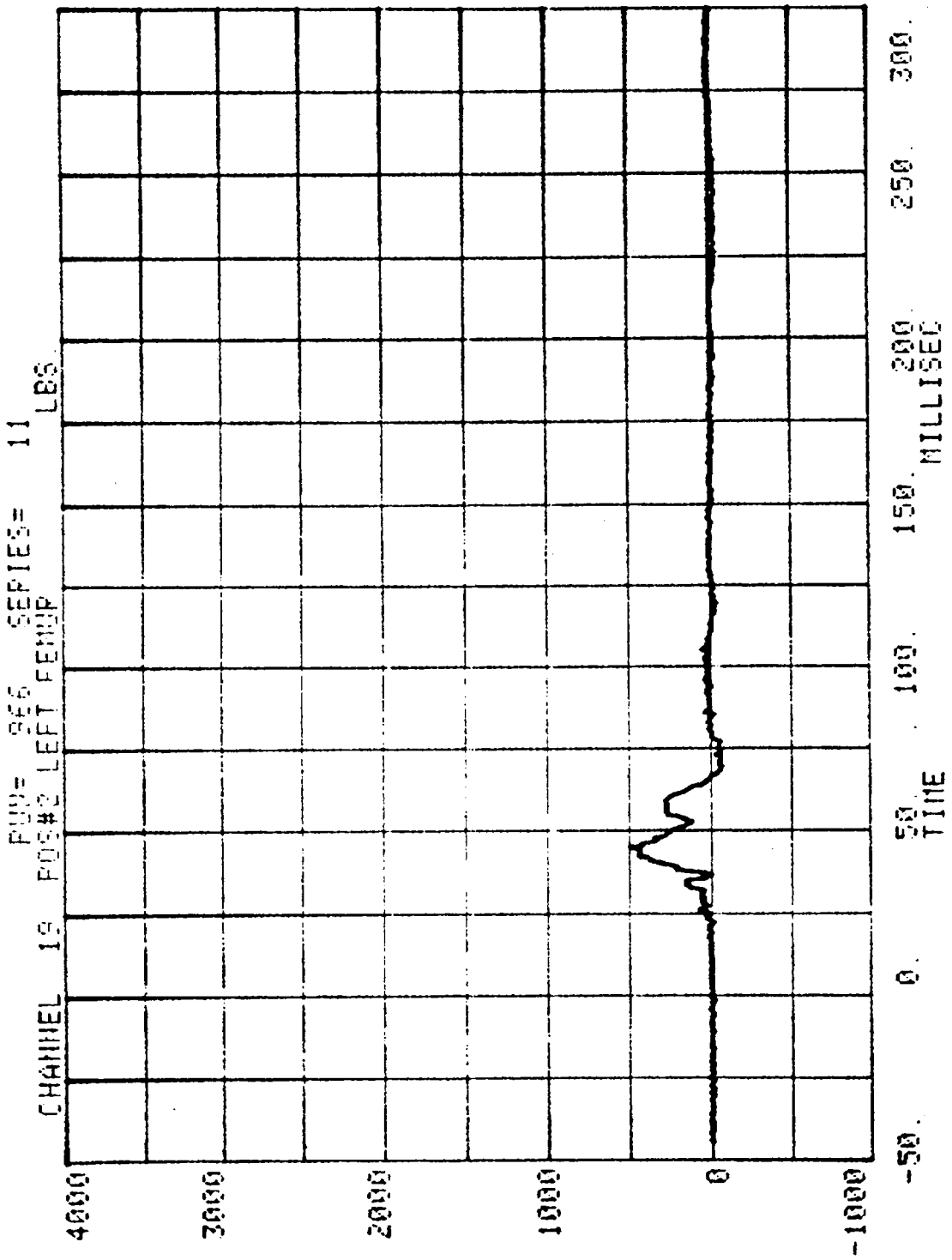
RUN= 966

SERIES=

11

G'S



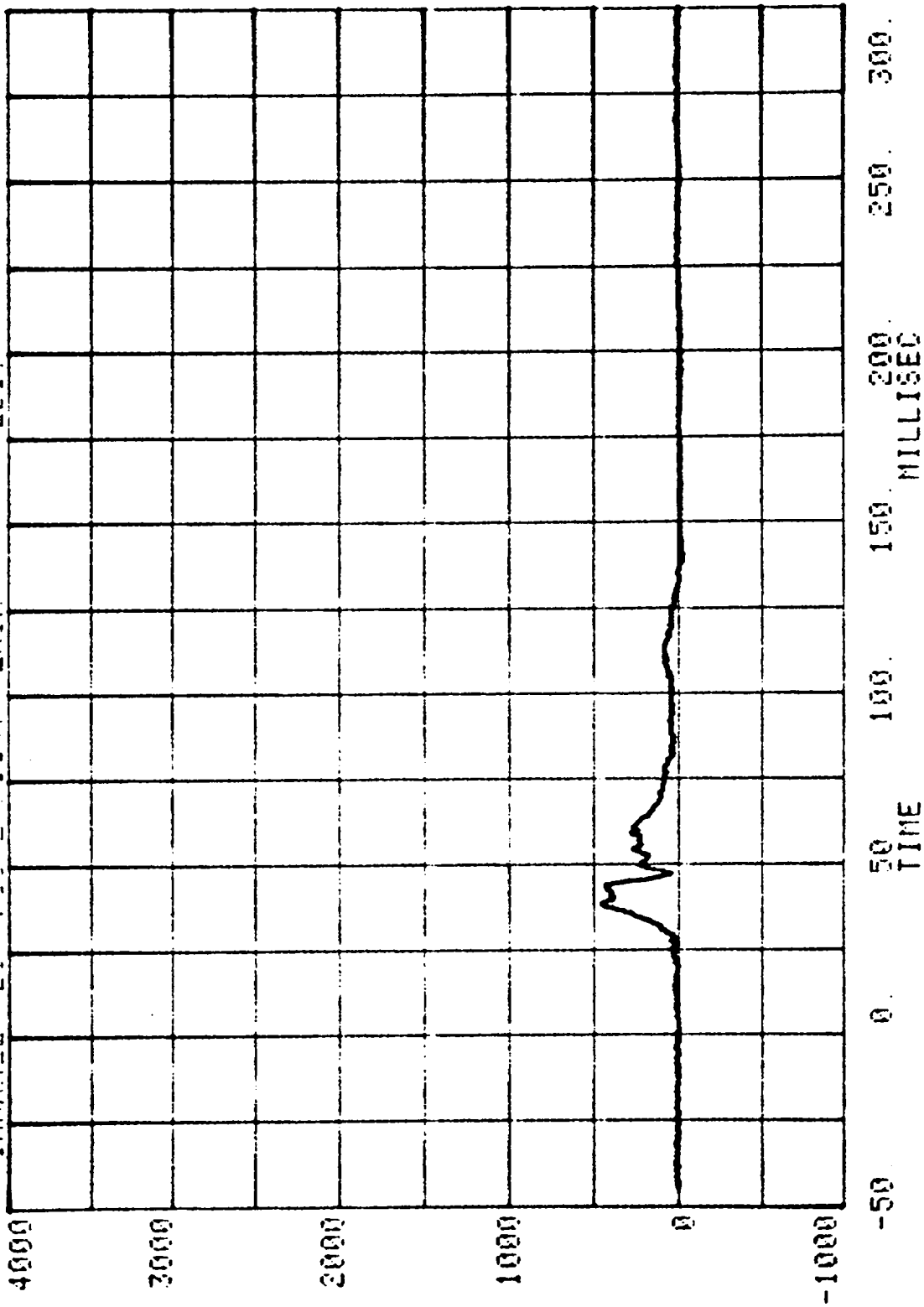


CHANNEL 20 POS#2 RIGHT FENOR

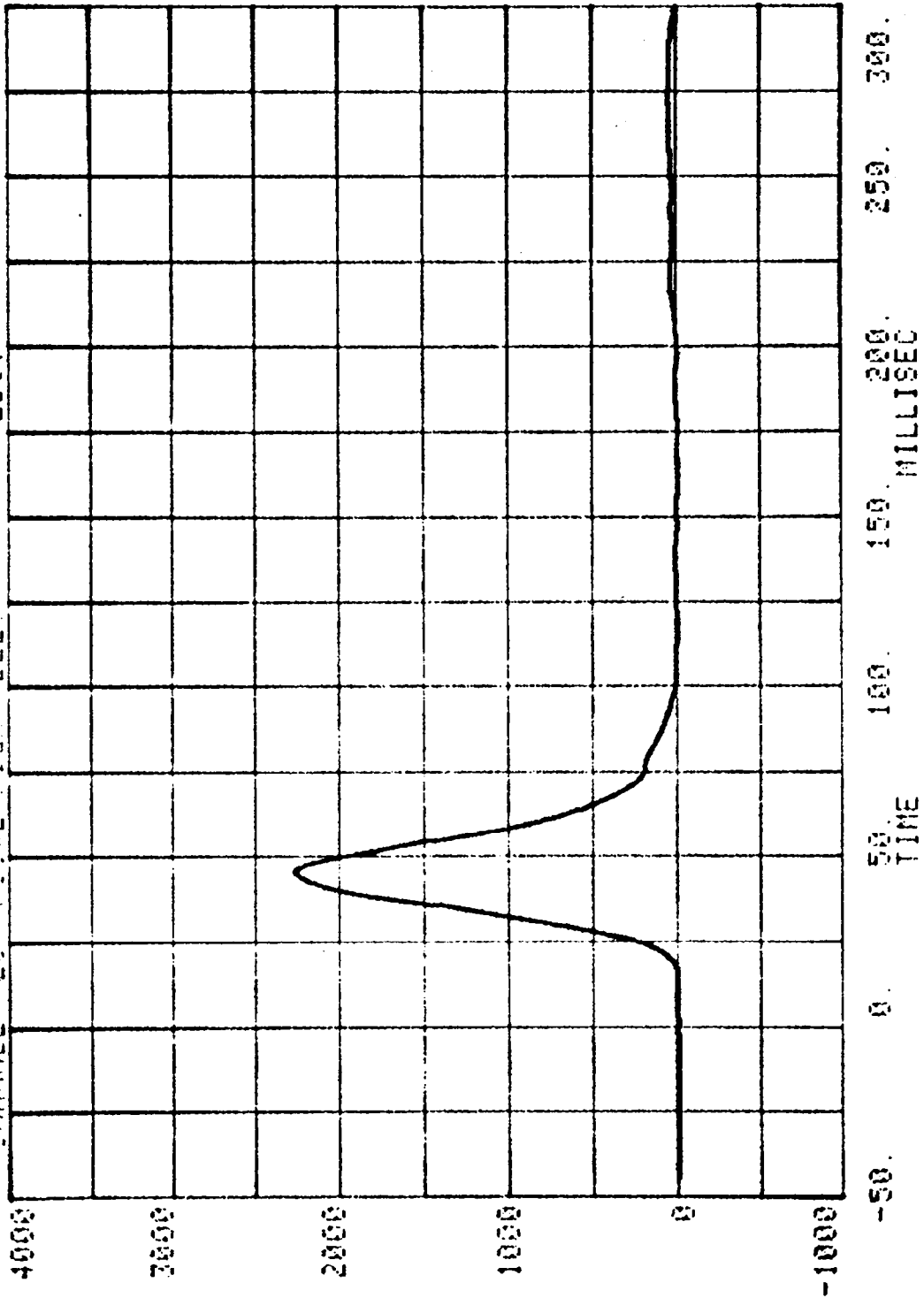
RUN= 968

SERIES= 11

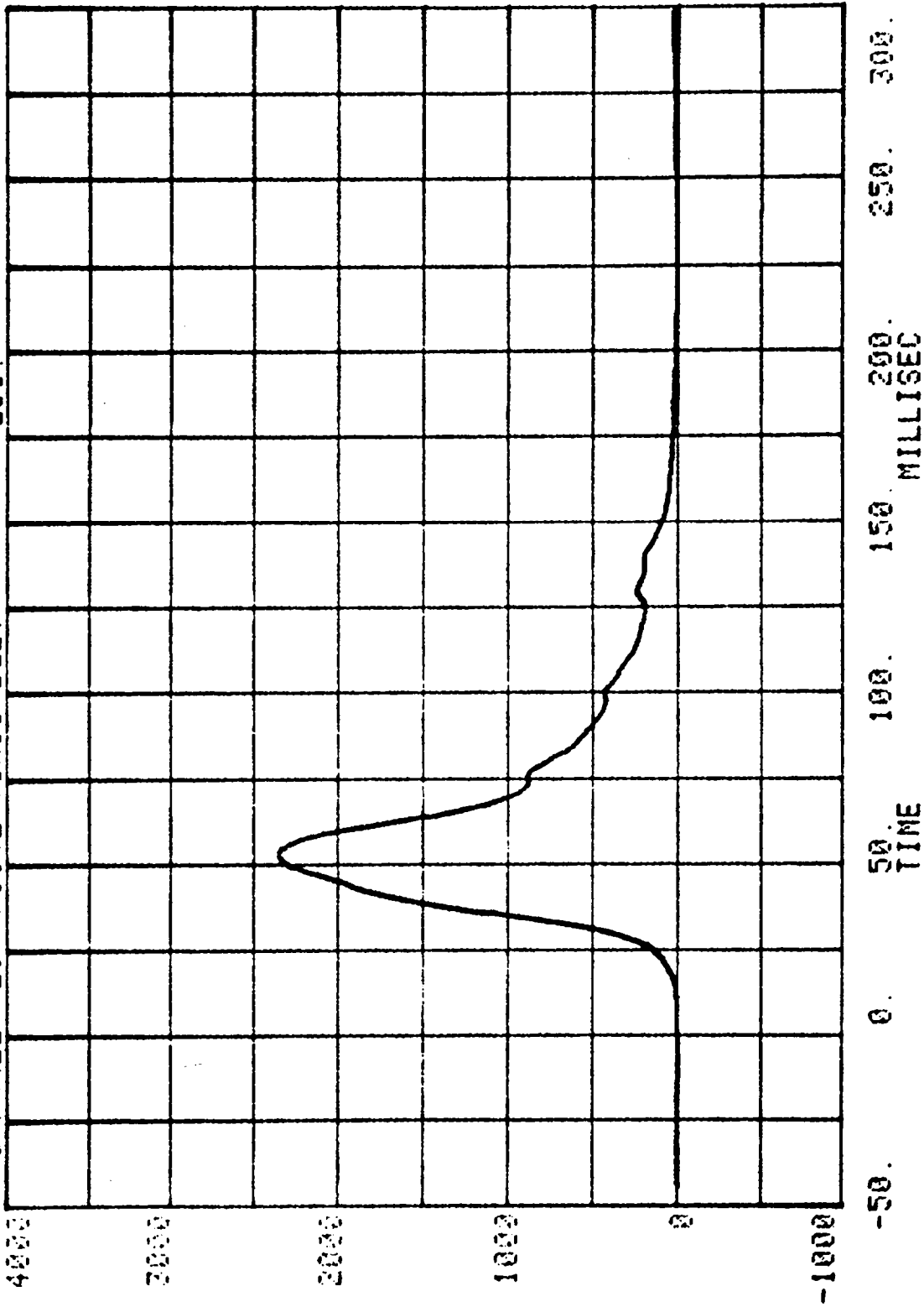
LBS.



CHANNEL 25 SUP= 225 SERIES= 11 LBS.
POS#2 RIGHT BELT



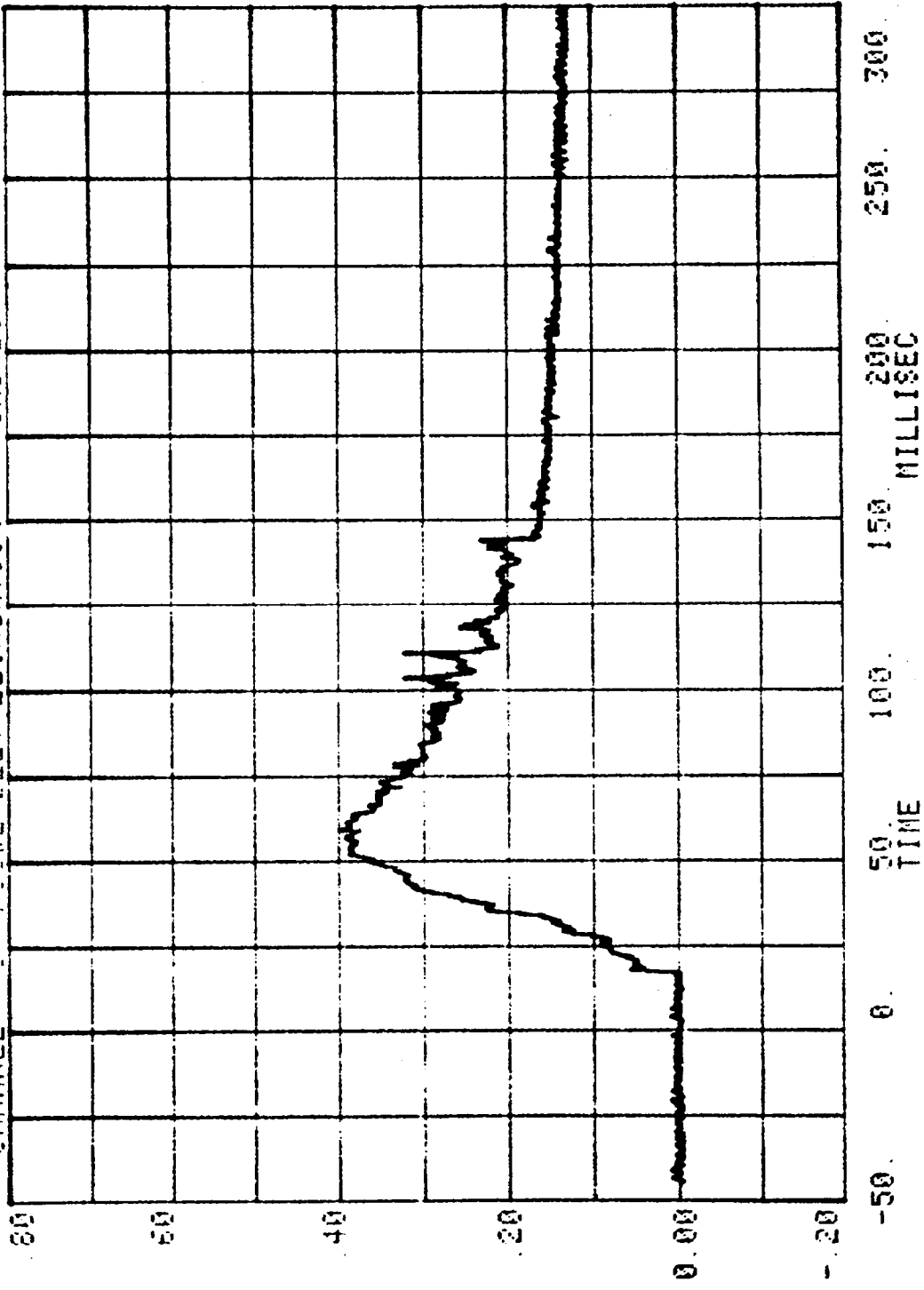
CHANNEL 26 POS#2 TOPSO BELT RUN= 966 SERIES= 11 LBS.



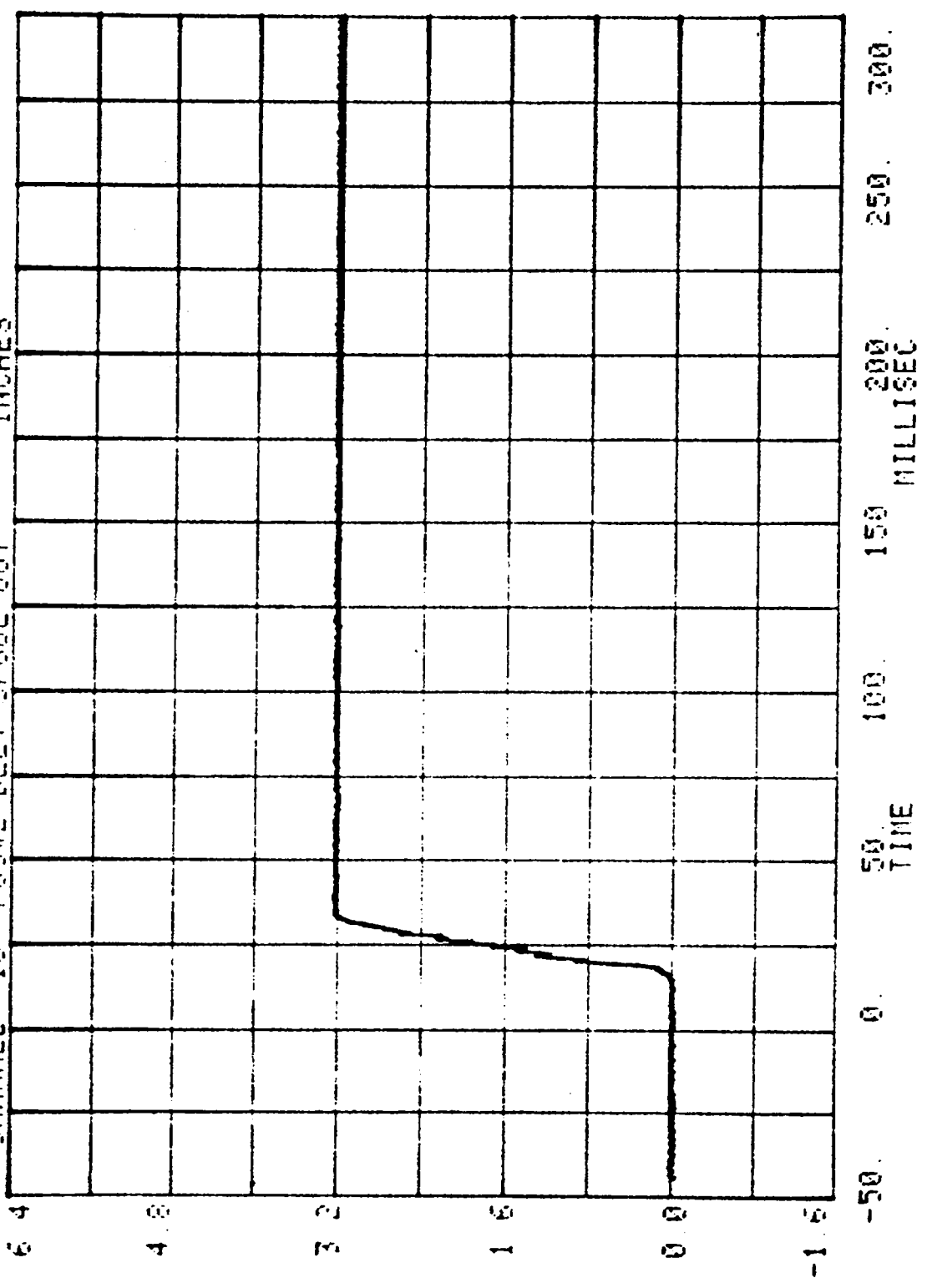
Measured over
2.5 inches

CHANNEL 9 POS#2 BELT ELONGATION 11 INCHES

RUN= 966 SERIES=



CHANNEL 10 POS#2 BELT SPOOL OUT 11 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.

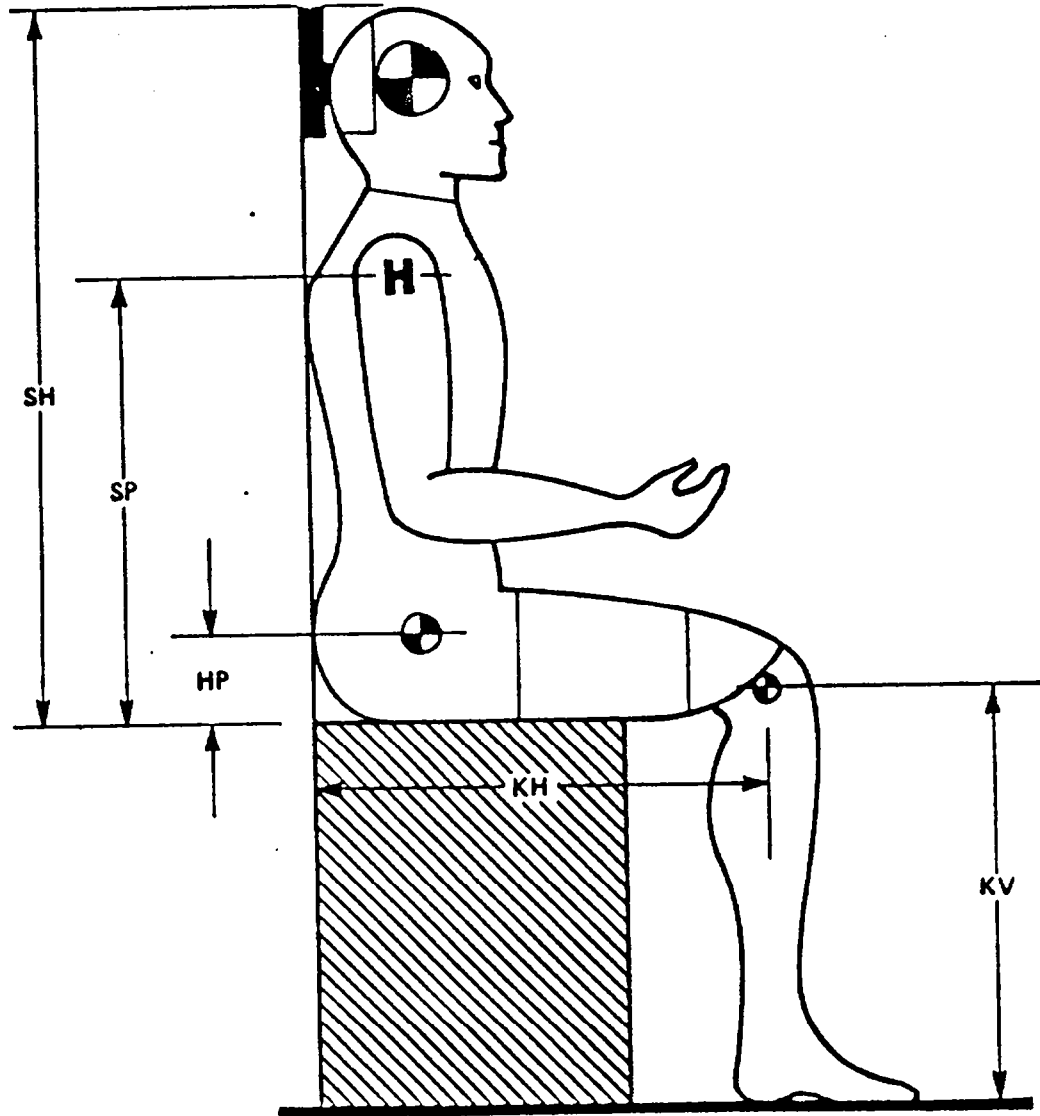
Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Data</u>
357	01-24-90
358	01-25-90

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.: 357

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXXX	1-24-90	
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"	21.9 "	"
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"	18.0 "	"
HW - Hip Width	14.0 to 15.4"	14.3 "	"

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		1-24-90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		3	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		29-33 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	211 G's	G's
b. peak lateral accel.	<= 10 G's	2.2 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' crash test program.

TECHNICIAN'S NAME: IVAN MINKEWICZ

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 357

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	24.0 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.7 G's	
c. Peak Resultant Head Acceleration		26 G's max.	22.78 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.23 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	25.92 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	9.18 ms	
g. Max. Head Rotation		63 to 73 deg.	71.73 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.	27.16 ms	
	Displ.	2.1 to 3.1"	2.51 "	
60 deg.	Time	40.3 to 51.7 ms.	42.78 ms	
	Displ.	4.3 to 5.3"	4.96 "	
Maximum	Time	53.2 to 66.8 ms.	56.67 ms	
	Displ.	5.0 to 6.0"	5.72 "	
60 deg.	Time	67.0 to 83.0 ms.	73.41 ms	
	Displ.	4.3 to 5.3"	4.82 "	
30 deg.	Time	85.4 to 104.6 ms.	90.65 ms	
	Displ.	2.1 to 3.1"	2.11 "	
0 deg.	Time	101.0 - 123.0 ms.	104.29 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: 357

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.	24 lbs	
b. Force @ 0.75"	36 to 50 lbs.	37 lbs	
c. Force @ 1.0"	50 to 63 lbs.	56 lbs	
d. Force @ 1.3"	73 to 88 lbs.	83.5 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	25.5 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	38 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	1.55 "	
(3) Peak Resistive Force	2250 lbs maximum	2009 lbs	
(4) Internal Hysteresis	50 to 70%	57 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	.92 "	
(3) Peak Resistive Force	1450 lbs maximum	1208 lbs	
(4) Internal Hysteresis	50 to 70%	50.5 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 357

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
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	2337 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	2146 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 357

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	1-90	7-90
RIGHT SIDE	GSE	549	1-90	7-90
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

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 358

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXXX	1-25-90	
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"	20.5 "	"
KV - Knee Pivot from floor	19.3 to 19.9"	19.6 "	"
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		1-25-90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		3	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		30-33 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	228.9 G's	G's
b. peak lateral accel.	<= 10 G's	6.1 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

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

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 358

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	24.2 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.5 G's	
c. Peak Resultant Head Acceleration		26 G's max.	23.67 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.36 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	27.65 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	6.82 ms	
g. Max. Head Rotation		63 to 73 deg.	70.84 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	.87 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	27.28 ms	
	Displ.	2.1 to 3.1"	2.35 "	
60 deg.	Time	40.3 to 51.7 ms.	42.66 ms	
	Displ.	4.3 to 5.3"	4.92 "	
Maximum	Time	53.2 to 66.8 ms.	56.67 ms	
	Displ.	5.0 to 6.0"	5.68 "	
60 deg.	Time	67.0 to 83.0 ms.	73.91 ms	
	Displ.	4.3 to 5.3"	4.72 "	
30 deg.	Time	85.4 to 104.6 ms.	90.53 ms	
	Displ.	2.1 to 3.1"	2.1 "	
0 deg.	Time	101.0 - 123.0 ms.	104.91 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: 358

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.	26 lbs	
b. Force @ 0.75"	36 to 50 lbs.	41.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	58.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	87 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	26 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	38 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	50.5 lbs	
d. Return Angle	12 deg. maximum	10.5 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	1.53 "	
(3) Peak Resistive Force	2250 lbs maximum	2031 lbs	
(4) Internal Hysteresis	50 to 70%	56.4 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	14.0 fps	
(2) Peak Deflection	1.1" maximum	1.01 "	
(3) Peak Resistive Force	1450 lbs maximum	1267 lbs	
(4) Internal Hysteresis	50 to 70%	58.8 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 358

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
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	2145 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	1875 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	2.0 ms	

REMARKS:

TECHNICIAN'S NAME: IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER 358

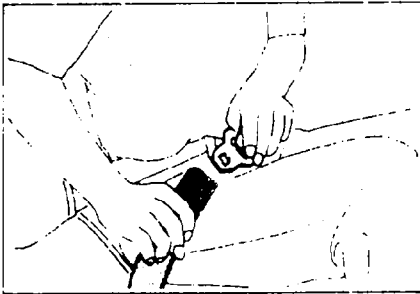
DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	EL86	10-89	4-90
HY LATERAL--	ENDEVCO	FR42	10-89	4-90
HZ VERTICAL--	ENDEVCO	GD35	10-89	4-90
2. CHEST ACCELEROMETER--				
CX LONGITUDINAL--	CEC	A150	1-90	7-90
CY LATERAL--	ENDEVCO	EL79	1-90	7-90
CZ VERTICAL--	CEC	A151	1-90	7-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	551	1-90	7-90
RIGHT SIDE	GSE	552	1-90	7-90
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

label "REPLACE BELT" will appear if the belt receives a severe impact or other force.

REAR SEAT LAP BELT (If so equipped)



- The rear seat is provided with two sets of lap belts (for the right and left side seat occupants).
- The right and left side lap belts are equipped with an individual retractor which is designed to take up extra webbing automatically.
- To use the rear seat belts, hold the latch plate and pull out the webbing until it reaches the buckle. Push the latch plate into the buckle until it clicks.

- After fastening, check that the belt is **SNUG** by pulling the belt firmly across the lap toward the lap belt retractor. This will allow the retractor to take up slack.
- To unfasten the belts, push in the button at the top of the buckle.

CAUTION

- *Position the lap belt as low as possible on your hips (not on your waist) then adjust it to a snug fit. Failure to do so could increase the chance of injury due to sliding under the lap belt during an accident.*

SEAT BELT INSPECTION

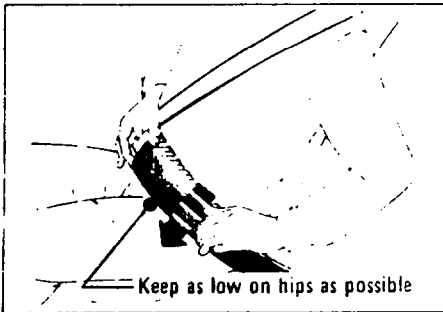
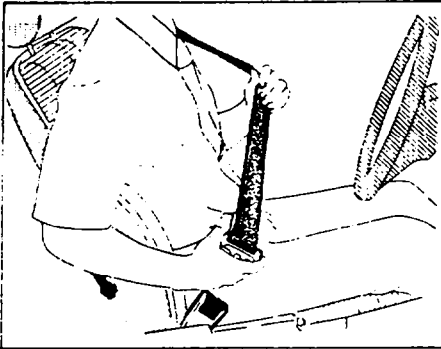
- Occasionally check that the belts, buckles, latch plates, retractors, reminder systems, guide loops, keepers, and anchors work properly. Also check for damage that could keep the restraint system from doing its job.
- Keep sharp edges and damaging objects away from the belts and other parts of the restraint system.
- Replace belts if cut, weakened, or frayed. Also, have belts replaced if they have been worn in a collision.
- If there is any doubt have all related parts including belts replaced.

- Keep belts clean and dry.
- Clean only with mild soap and lukewarm water.
- Do not bleach or dye belts since this may badly weaken them.

CHILD RESTRAINT

Children in vehicles should be restrained to help lessen the chance and/or severity of injury in accidents or sudden stops. Never let a child of any age stand or kneel on any seat. Use of infant or child restraint systems which conform to federal motor vehicle safety standards and which are installed according to their instructions is the surest way of minimizing the risk of injury to young passengers. Older children should be placed on a seat and restrained with the seat belts provided with your vehicle. Both lap and shoulder belts should be used. The use of infant or child restraint systems may be required by the laws of your state. You should check with the appropriate state authorities to ensure that you are in compliance with these laws.

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

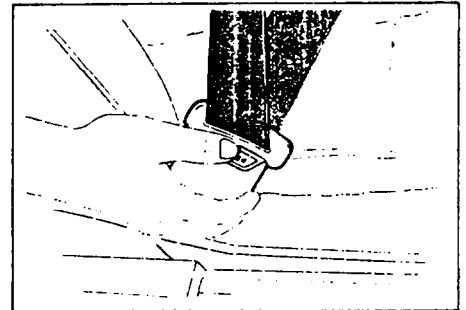


- Position the "lap" portion of the belt across the lap as **LOW ON THE HIPS** as possible. Then, adjust to a **SNUG FIT** by

holding the "shoulder" portion of the front seat belt and pulling it **UPWARD** through the latch plate until the lap portion is snug across the lap. This reduces the risk of sliding under the belt during an accident.

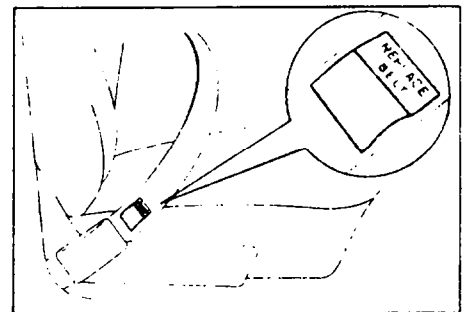
WARNING

- A snug fit with the lap belt positioned low on the hips is necessary to lessen the chance of injury and/or the degree of injury in an accident. This spreads the force of the lap belt over the hip bone instead of across the abdomen.
- Never use the same seat belt for more than one person at a time. A seat belt worn by more than one person will not provide adequate protection in the event of a collision.
- Never wear twisted seat belts.
- Be very careful not to damage seat belts or seat belt buckles by pinching them in the seat or the door.
- Too much slack could increase the possibility of injury because the belt would not be able to properly restrain you in an accident. **DO NOT** wear shoulder belt under the arm or out of position. Such use could increase the chance of injury and/or the degree of injury in an accident.



To unfasten the belts, push in the button at the top of the buckle.

When no longer in use, seat belts can be stowed by letting them rewind into their retractors.

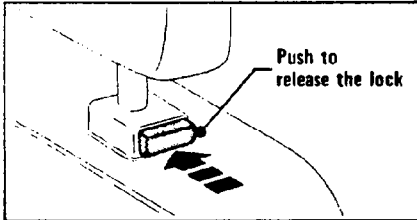
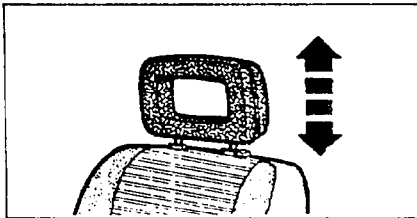


- Replace the seat belt if the warning label under the sleeve can be seen. The warning

- Failure to lock the rear seat securely to the floor and engage the seatback latches could increase the risk of personal injury in an accident.
- Failure to properly route the seatbelts could result in damage to belts, reducing their effectiveness in case of accident.
- Never let anyone ride in the cargo area of the vehicle unless it is equipped with the optional rear seat.
- All occupants should always sit in a seat with their seat belts properly fastened during vehicle operation.

▣ HEAD RESTRAINT

Head restraints are designed to help reduce the risk of neck injuries. Choose the position which places the top of the head restraint closest to the top of your ears.

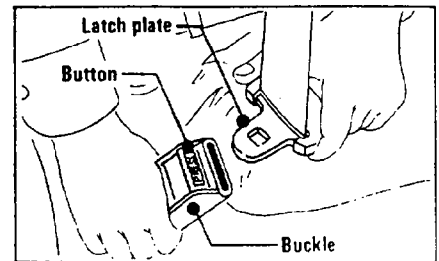


Push the lock knob to unlock the head restraint. Move the restraint up or down as required.

WARNING

- Do not attempt to adjust the driver's head restraint while the vehicle is in motion.
- Do not operate the vehicle with the head restraint removed.

▣ FRONT SEAT LAP/SHOULDER BELT



To lessen the chance of injury and/or the severity of injury in accidents or sudden stops, driver and passengers should be properly restrained at all times, using the seat belts provided. (See the following pages for the use of restraints by children and pregnant women.) This vehicle is equipped with seat belts for two occupants in the front bucket seats. If equipped with rear bench seat, lap seat belts are provided for two additional occupants.

- Adjust the front seat as needed and sit up straight and well back in the seat.
- Take hold of the seat belt latch plate and pull the lap/shoulder belt webbing across the body. At the same time, slide the latch plate along the belt until it reaches the