

REPORT NUMBER: CAL-90-N03

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

**TOYOTA MOTOR CORPORATION
1990 LEXUS ES250
4-DOOR SEDAN**

NHTSA NUMBER: ML5102

CALSPAN TEST NUMBER: 7776-3

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December 1, 1989



FINAL REPORT

PREPARED FOR:

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National Highway Traffic Safety Administration
Office of Market Incentives
400 Seventh Street, S.W.
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16. Abstract A frontal barrier impact test of a 1990 Toyota Lexus ES250 4-Door Sedan was performed as Calspan Advanced Technology Center crash test facility in Buffalo, New York on December 1, 1989. The impact speed was 35.1 mph and the ambient temperature at the barrier face at the time of impact was 25°F. The maximum post-test vehicle crush was 19.5 inches. The test vehicle was equipped with a manual 3-point continuous belt system at each of the front outboard positions. The driver position was also equipped with a supplement airbag. With regard to FMVSS 208-"Occupant Crash Protection," injury criteria, both the driver and passenger dummies appear to satisfy the head, 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 ML5102

A load cell barrier consisting of 36 load cells was impacted by a 1990 Toyota Lexus ES250 at a velocity of 35.1 mph. The test was performed at the Calspan Corporation Advanced Technology Center on December 1, 1989. 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. 1021) and the right-front passenger ATD (Serial No. 1022) were calibrated previous to this test. 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 A3 and A4 did not record accurately. These 2 load cells were not used in the calculation of group load cell sums.

The driver's head struck the air bag; the HIC was 991.9. The maximum chest deceleration over 3 milliseconds was 55.2 g's and femur loads were 1101.8 and 1689.4 pounds.

The right front passenger's HIC was 630.2 and maximum chest deceleration over 3 milliseconds was 47.1 g's. Femur loads were 1011.5 and 1074.8 pounds.

Table 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1990 Toyota Lexus ES250 4-Door Sedan

NHTSA No.: ML5102 VIN.: JT8VV22T6L0089392

Body Color: White Date Of Manufacture: 7-89

Engine: 6 Cylinders; - C.I.D.; 2.5 Liters; - CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse

Transmission: 4 Speed; - Manual; - Automatic; X Overdrive

Final Drive: X Front Wheel; - Rear Wheel; - Four Wheel

Date Received: 10-9-89 Odometer Reading: 30

X A/C; X P/S; X P/B; X P/wdo.; - Tilt Wheel
- P/seats; X Cruise Control

Type of Occupant Restraint:
Driver: 3-point continuous belt system with supplemental air bag
Passenger: 3-point continuous belt system

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 35 psi, Rear 29 psi

Recommended Tire Size: 195/60R15 88V or 195/60R15 86H

Recommended Cold Tire Pressure: Front 35 psi, Rear 29 psi

Tires on Vehicle: 195/60R15 86H ; Manufacturer: Bridgestone

Number of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 900 lbs. (A)

No. of Occupants x 150 lbs. = 750 lbs. (B)

Rated Cargo and Luggage
Weight (RCLW) A-B = 150 lbs.

GVWR 4210 lbs. GAWR: Front 2281 lbs. Rear 2017 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 = 1070 lbs. Right Rear = 580 lbs.
 Left Front = 1010 lbs. Left Rear = 620 lbs.
 TOTAL FRONT WEIGHT = 2080 lbs. (63 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1200 lbs. (37 % of Total Vehicle Weight)
 TOTAL DELIVERY WEIGHT = 3280 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (3280 lbs.)
 VCW = Vehicle Capacity Weight (900 lbs.)
 DSC = Designated Seating Capacity (5)
 RCLW = VCW - 150 (DSC) = 150 lbs.
 Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
 Target Test Weight = 3758 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 162 POUNDS CARGO:

Right Front = 1090 lbs. Right Rear = 760 lbs.
 Left Front = 1130 lbs. Left Rear = 790 lbs.
 TOTAL FRONT WEIGHT = 2220 lbs. (59 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1550 lbs. (41 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 3770 lbs.
 Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 26.3" LF 26.5" RR 26.2" LR 26.2"
 Test Attitude: RF 25.9" LF 26.0" RR 24.3" LR 24.5"
 Wheel Base: 102.5 in.; C.G. = 42.1 in. rearward of front wheel C/L

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°
 Date of Test: December 1, 1989 Time of Test: 12:10
 Ambient Temperature: 25 °F at impact area
 Temperature in Occupant Compartment: 72 °F
 Windshield Molding Temperature: 68 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 35.1 mph, secondary = 35.2 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 180.6 L C 183.8 L 179.5
 Post-test = R 163.4 L C 164.3 L 163.2
 Crush = R 17.2 L C 19.5 L 16.3

Distance from front of test vehicle to point of impact:

R 24.3" C 22.9" L 23.9"

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Air Bar</u>	<u>Dash Panel</u>
Chest	<u>No Contact</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>operable</u>	<u>operable</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: 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.: ML5102 Vehicle: 1990 Toyota Lexus ES250

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-62.7	-17.9	39.8	73.0
Position #2 - Passenger	-56.6	40.6	66.3	81.5

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-57.7	-36.4	-14.4	55.2
Position #2 - Passenger	-51.2	31.8	15.8	47.1

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	1101.8	1689.4
Position #2 - Passenger	1011.5	1074.8

	MAXIMUM FORCE - SEAT BELT LOADS (lbs.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	1576.7	-	606.2
Position #2 - Passenger	1919.1	978.1	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (SEC)	t ₂ (SEC)	Average Acceleration t ₁ TO t ₂
Position #1 - Driver	991.9	.05902	.09150	62.2
Position #2 - Passenger	630.2	.07605	.11205	49.8

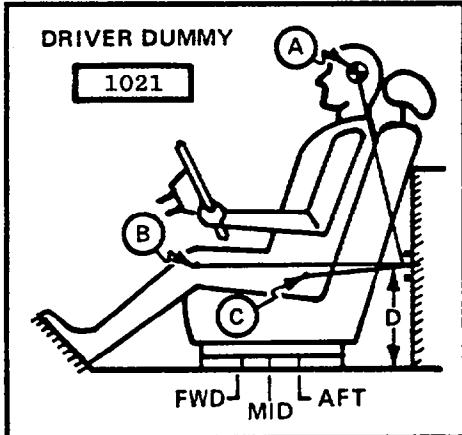
HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

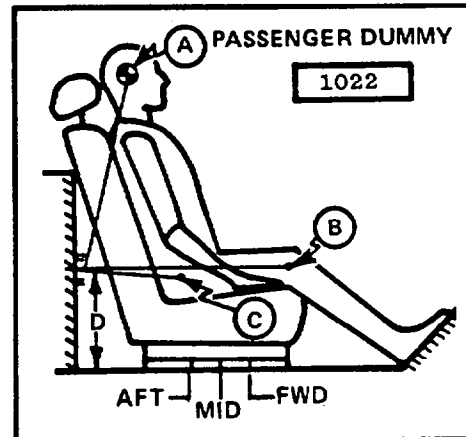
Test No.: ML5102 Vehicle: 1990 Toyota Lexus ES250

<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		



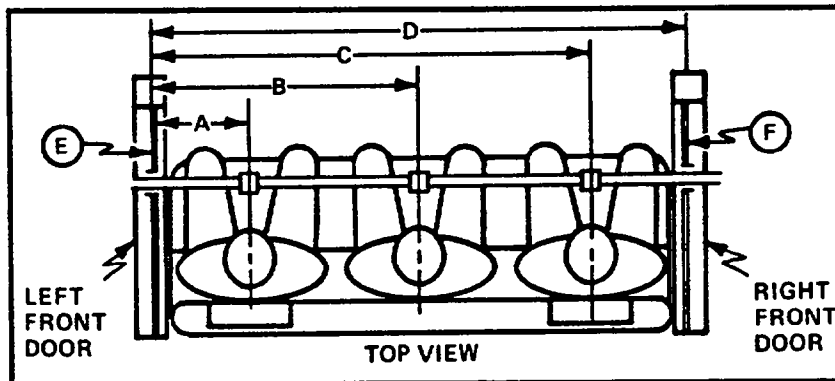
MEASUREMENT
LOCATION

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



A = 21.2 in. 1 Degrees
 B = 21.2 in. 108 Degrees
 C = 8.3 in. 133 Degrees
 D = 12.3 in.

A = 21.6 in. 0 Degrees
 B = 21.0 in. 104 Degrees
 C = 8.1 in. 130 Degrees
 D = 12.3 in.



1021

DUMMY ID

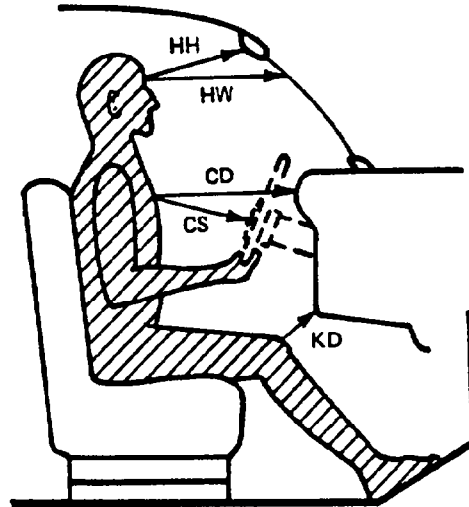
1022

A =	Left Door to Driver Centerline	<u>11.2</u> in.
B =	Left Door to Center Passenger Centerline	<u>-</u> in.
C =	Left Door to Right Passenger Centerline	<u>38.6</u> in.
D =	Left Door to Right Door	<u>50.2</u> in.
E,F =	Window Glass Height (Right and Left Must Be Equal)	<u>11.0</u> in.

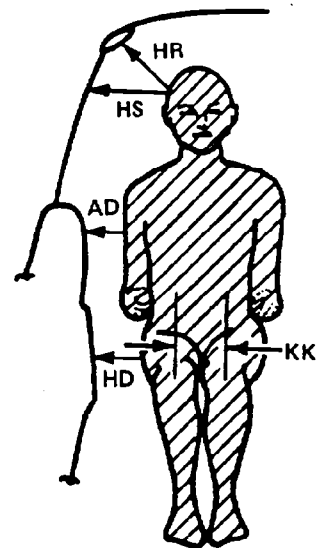
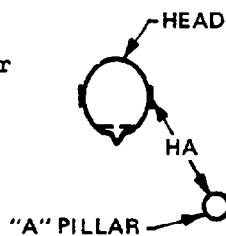
Figure 2

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	13.3	13.4
HW	19.1	19.1
CD	23.0	23.2
CS	14.2	-
KDL	6.2	7.1
KDR	6.2	6.5
SA	See note	See note
TA	23°	23°



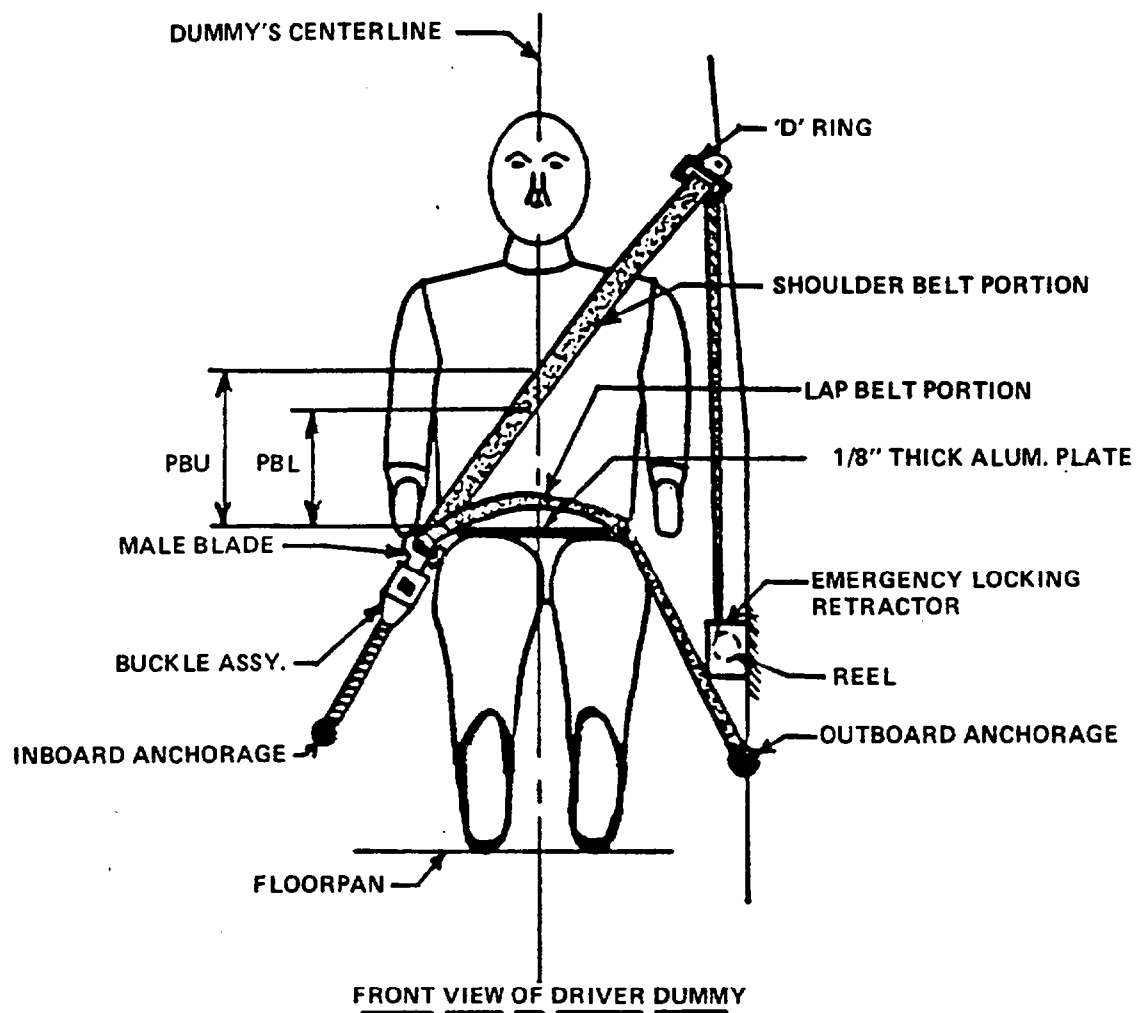
HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD(L/R) = Knee to Dash (Left/Right)
 SA = Seat Back Angle
 TA = Torso Angle
 HA = Head Target to "A" Pillar
 HR = Head to Side Roof
 HS = Head to Side Window
 AD = Arm to Door
 HD = Hip to Door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



	DRIVER	PASSENGER
HR	5.2	4.9
HS	7.9	8.4
AD	3.7	4.1
HD	7.4	7.1
KK	10.0	9.8
HA	17.7	17.1

Note: Seat back angle was positioned as specified by manufacturer.

Figure 3
SEAT BELT POSITIONING DATA

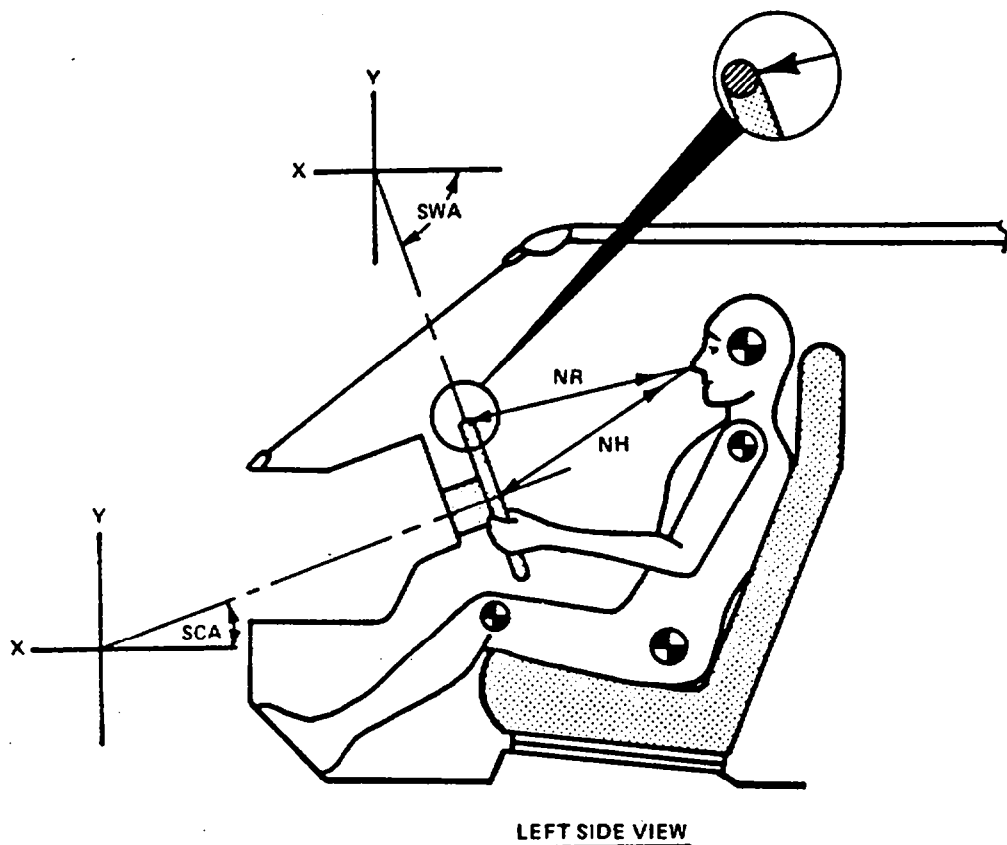


	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	13.3	13.0
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	10.2	10.0
<u>LAP BELT TENSION</u>	2.0 lbs	2.0 lbs
<u>SHOULDER BELT TENSION</u>	-	-

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>72.5"</u>	<u>72.5"</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>31.5"</u>	<u>31.5"</u>
Lap belt length as measured on Part 572 Dummy.	<u>31.0"</u>	<u>31.0"</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>2.5"</u>	<u>2.3"</u>
<u>BELT STRETCH DATA:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>.6 in/ft</u>	<u>1.0 in/ft</u>
Measured mechanically	<u>.5 in/ft</u>	<u>.5 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	17.5	Inches
<u>NH</u>	-- Distance from tip of dummy's nose to center of steering column hub	18.6	Inches
<u>SCA</u>	-- Angle of steering column relative to the horizontal X axis	22.0	Degrees
<u>SWA</u>	-- Angle of steering wheel relative to the horizontal X axis	-68.0	Degrees

Figure 5
CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

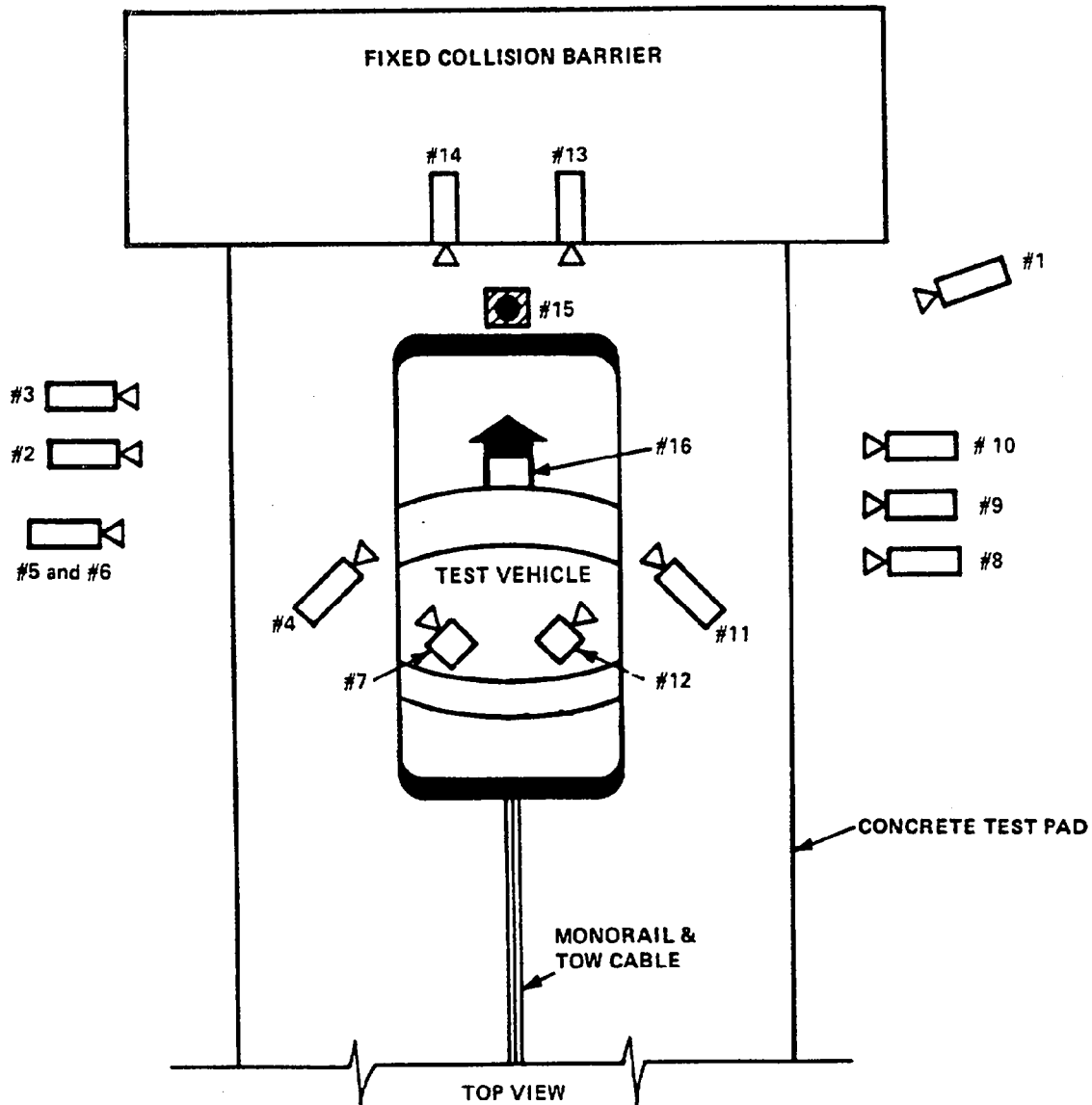


Table 4

HIGH-SPEED CAMERA LOCATIONS

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	229	42	42	-2	215	13	See Note
3	Left Side View	317	19	41	-4	303	25	See Note
4	Driver and Interior View	116	104	77	-22	102	13	880
5	Steering Column (Bottom)	299	72	47	-4	285	25	550
6	Steering Column (Top)	299	72	71	-11	285	25	570
7	Left Belt	-	-	-	-	-	8	780
8	Overall Right Side	236	66	42	-6	222	13	760
9	Right Side View	310	44	42	-2	296	25	790
10	Right Passenger View	292	64	54	-3	278	35	800
11	Passenger and Interior View	104	113	74	-22	80	25	610
12	Right Belt	-	-	-	-	-	8	720
13	Passenger Front View	24	-5	73	-39	-	13	630
14	Driver Front View	24	-5	73	-35	-	13	540
15	Windshield View	0	0	128	-45	-	13	530
16	Pit View of Engine	0	32	-120	90	-	13	940

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

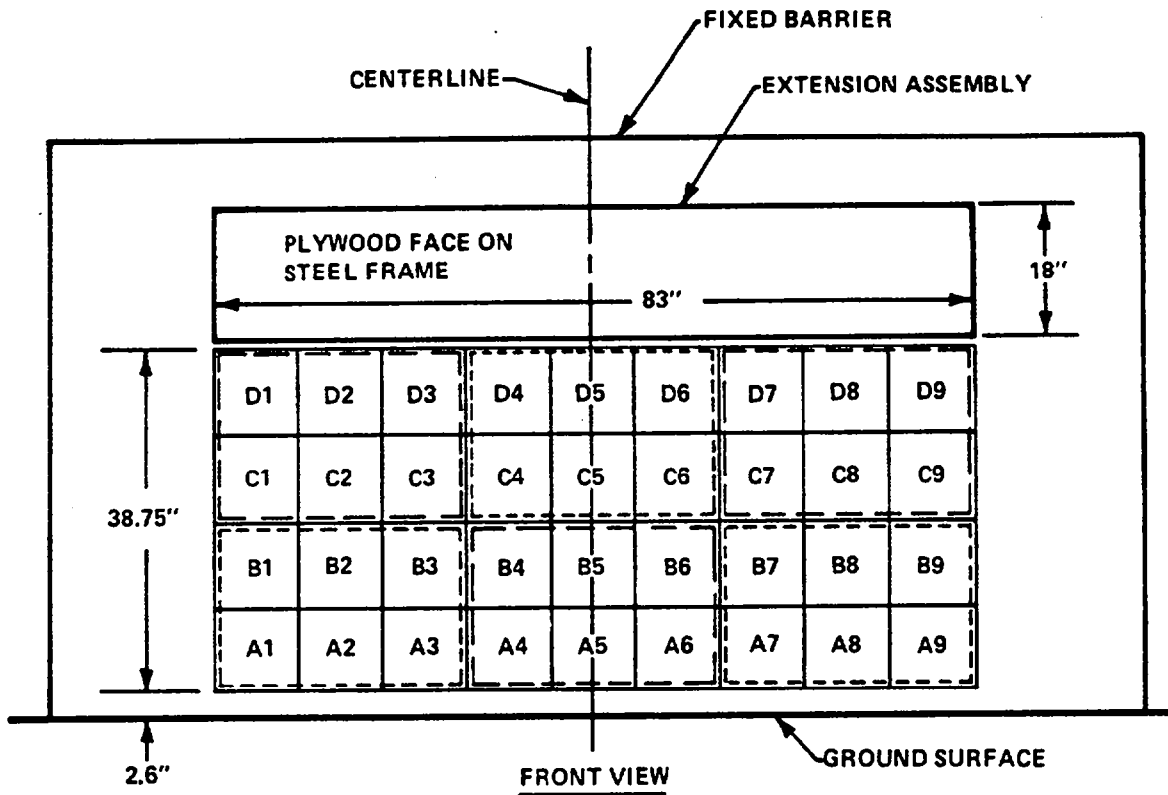
Note: Film speed is not available for this camera.

[illegible]

Figure 7

LOAD CELL LOCATIONS ON FIXED BARRIER

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



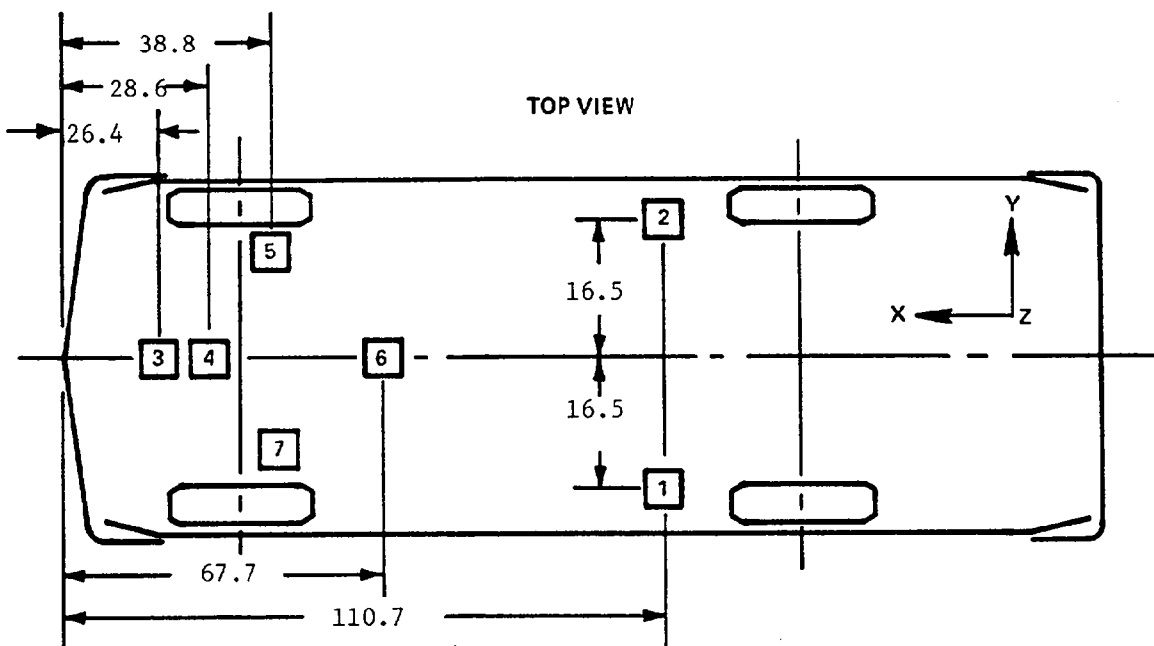
6 GROUPS OF 6 LOAD CELLS EACH

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

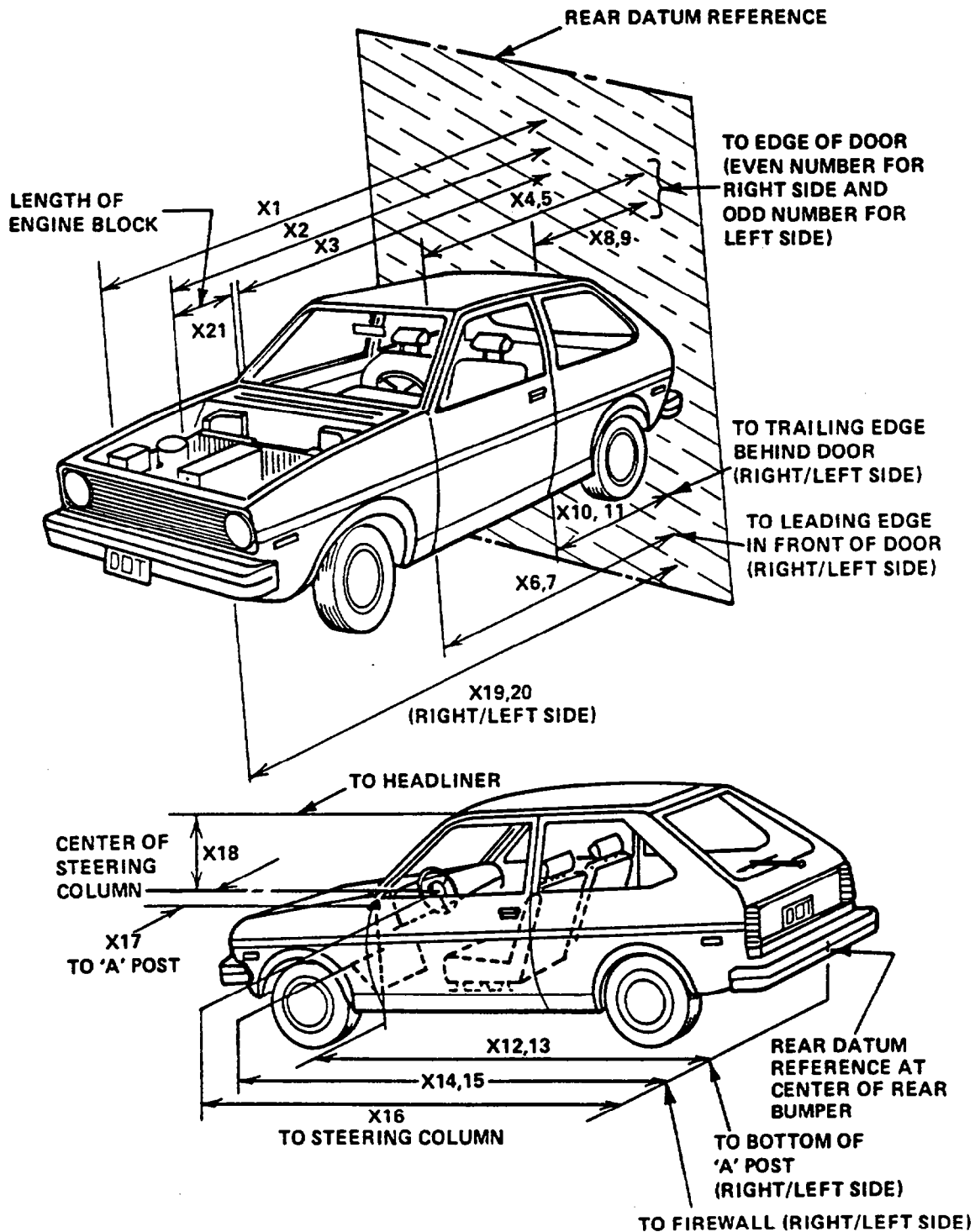


Table 5
VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	183.8	164.3	19.5
X2	Rear Surface of Vehicle to Front of Engine	161.8	152.6	9.2
X3	Rear Surface of Vehicle to Firewall	137.8	131.0	6.8
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	124.3	124.8	-0.5
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	124.3	123.5	0.8
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	122.2	122.4	-0.2
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	122.0	121.9	0.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	84.5	84.8	-0.3
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	84.7	84.2	0.5
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	83.6	83.8	-0.2
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	83.3	83.2	0.1
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	122.7	122.9	-0.2
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	122.8	122.9	-0.1
X14	Rear Surface of Vehicle to Firewall, Right Side	135.2	131.7	3.5
X15	Rear Surface of Vehicle to Firewall, Left Side	134.4	133.3	1.1
X16	Rear Surface of Vehicle to Steering Column	108.4	108.3	0.1
X17	Center of Steering Column to "A" Post	13.6	13.9	-0.3
X18	Center of Steering Column to Headliner	17.6	15.9	1.7
X19	Rear Surface of Vehicle to Right Side of Front Bumper	180.6	163.4	17.2
X20	Rear Surface of Vehicle to Left Side of Front Bumper	179.5	163.2	16.3
X21	Length of Engine Block	20.0	20.0	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	115.8	116.2	-0.4
CD	Rear Surface of Vehicle to Center of Dash Panel	116.0	114.3	1.7
LD	Rear Surface of Vehicle to Left Side of Dash Panel	116.4	115.8	0.6

Appendix A

PHOTOGRAPHS

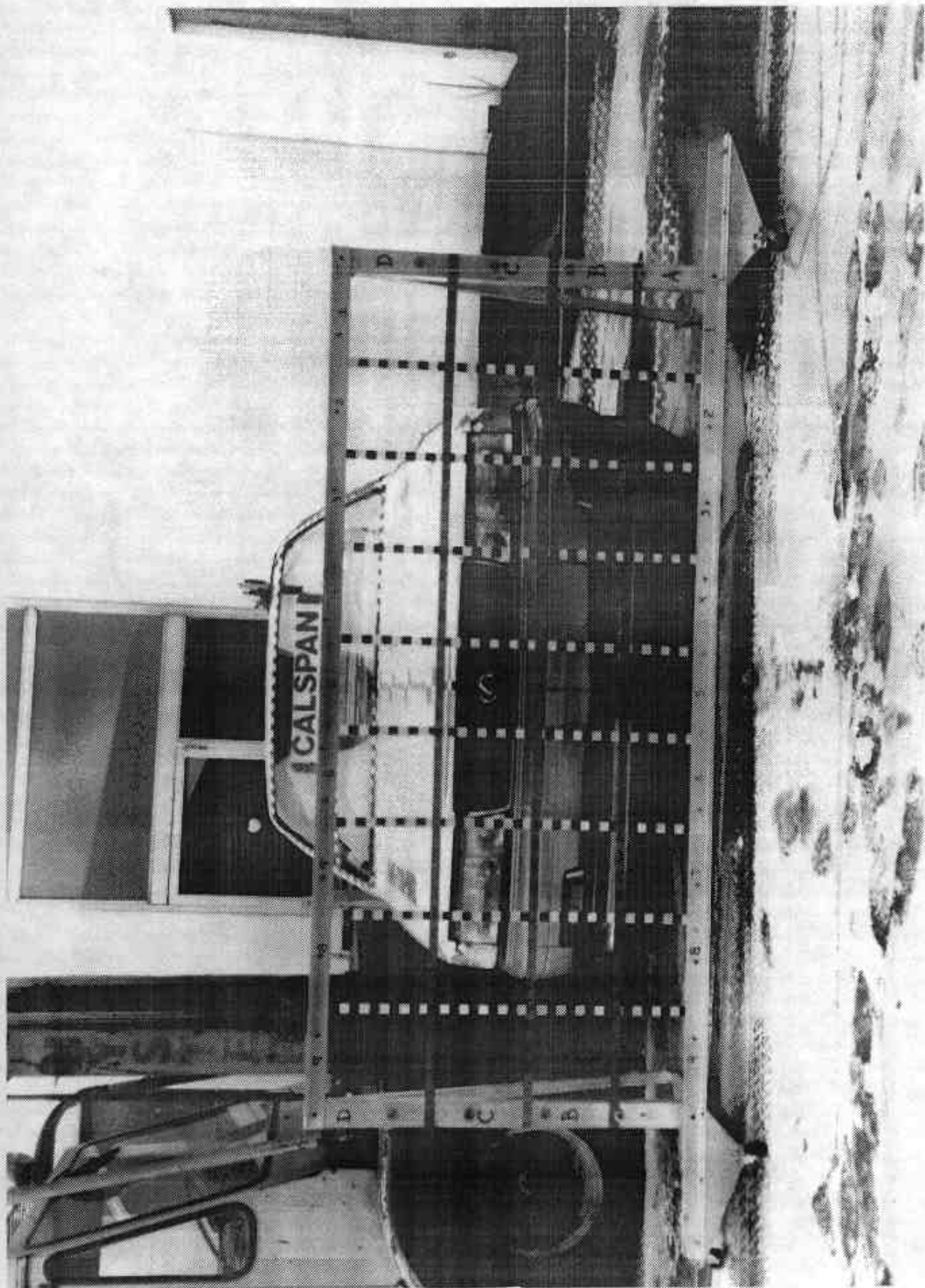


Figure A-1 PRE-TEST LOAD CELL LOCATIONS

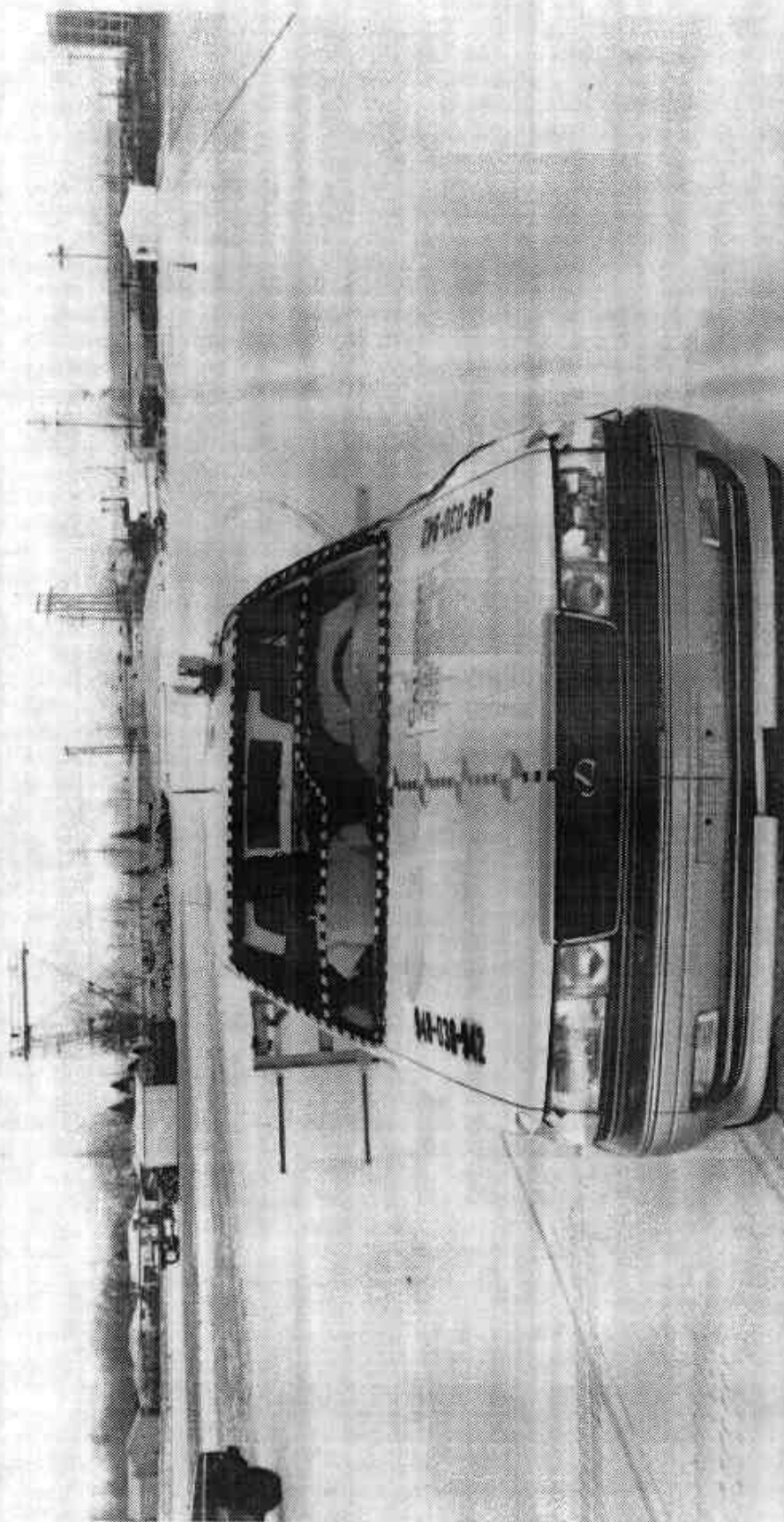


Figure A-2 PRE-TEST FRONT VIEW



Figure A-3 POST TEST FRONT VIEW

A-4

7776-3

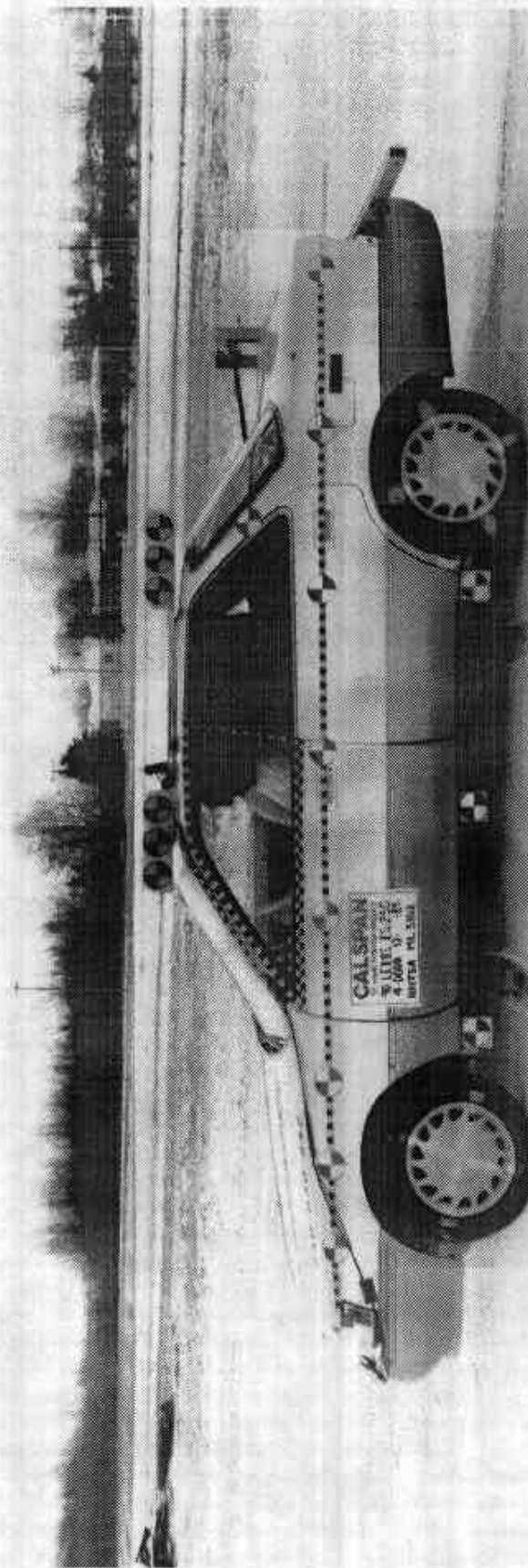


Figure A-4 PRE-TEST LEFT SIDE VIEW

A-5

7776-3

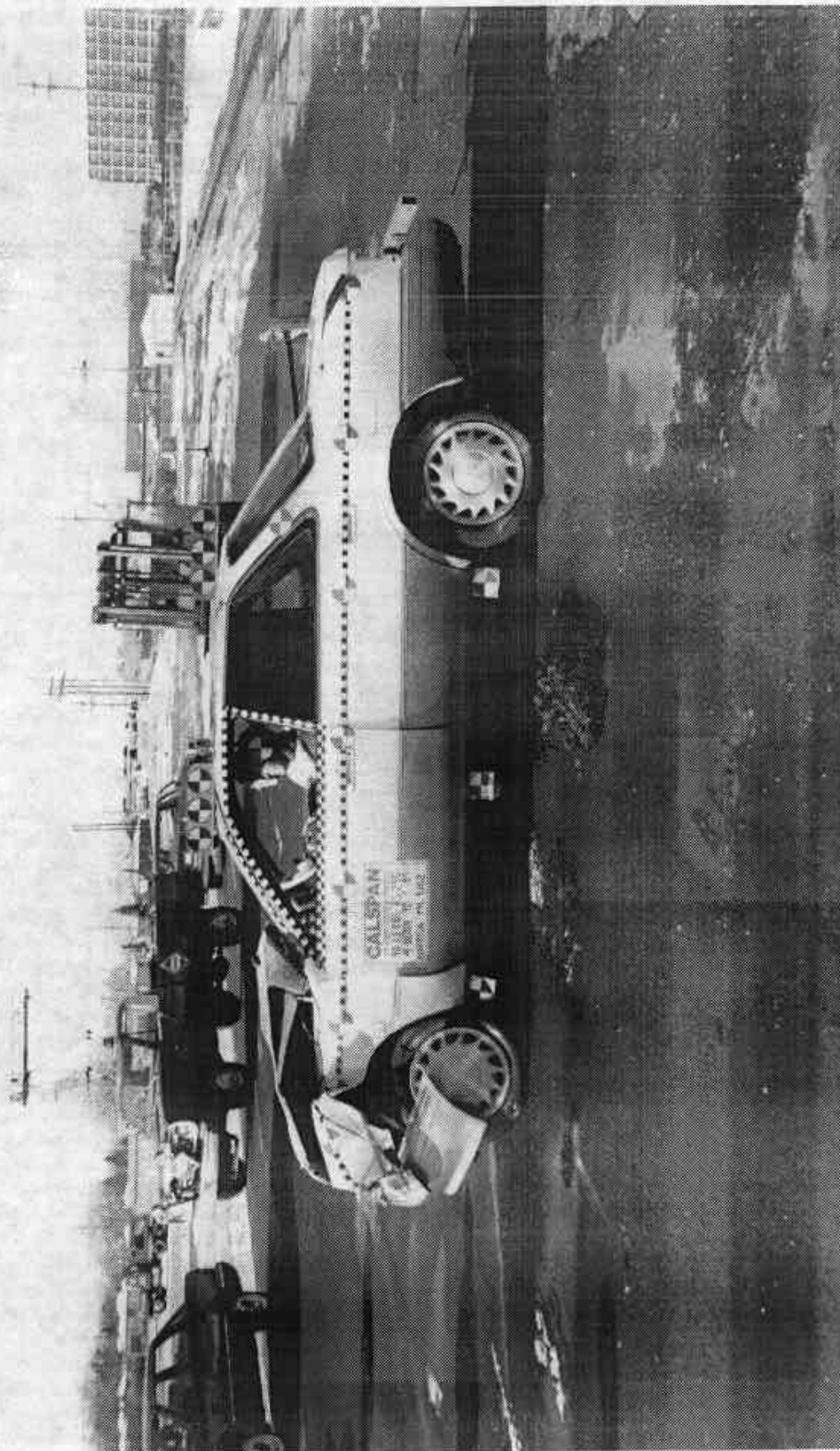


Figure A-5 POST TEST LEFT SIDE VIEW

A-6

7776-3

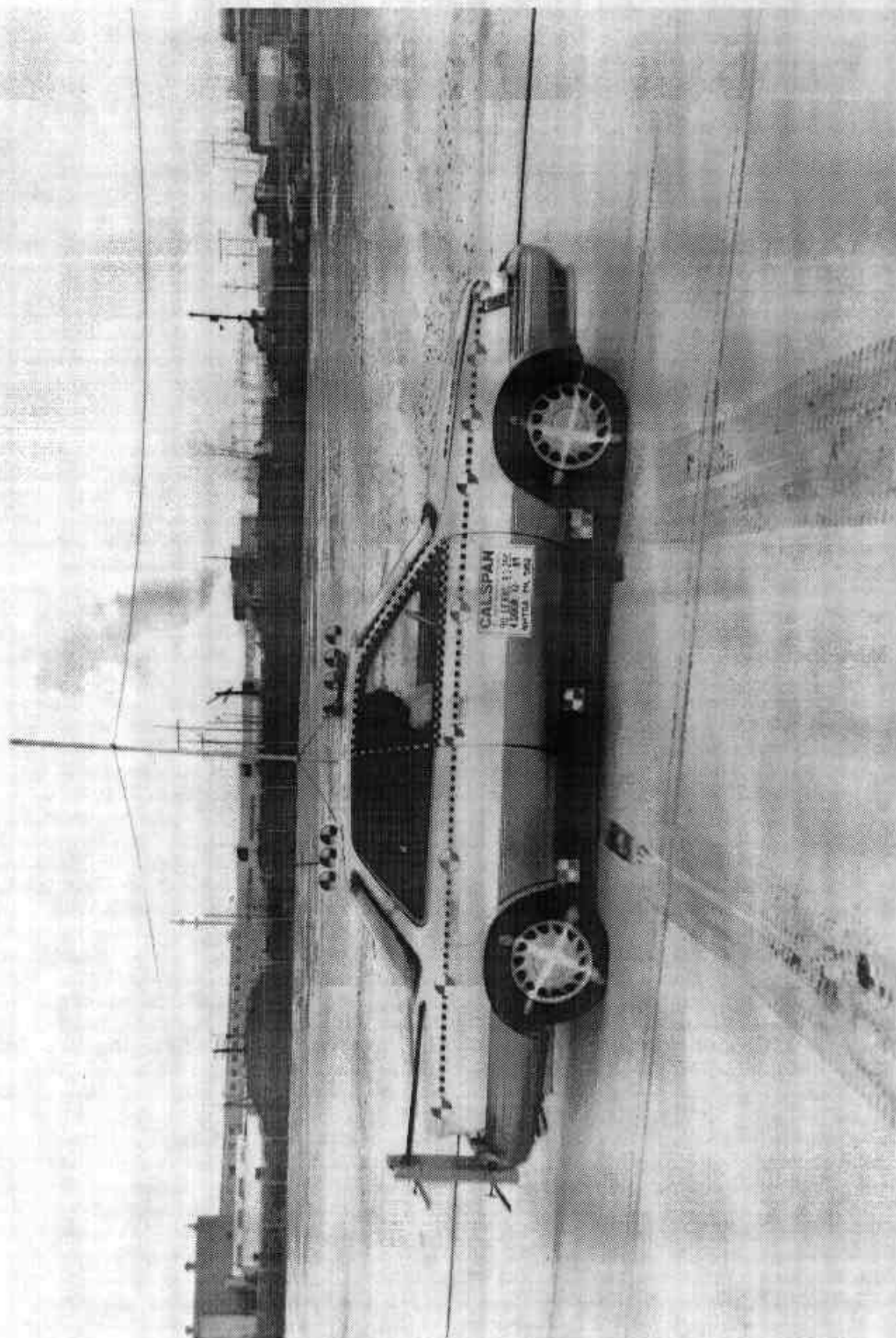


Figure A-6 PRE-TEST RIGHT SIDE VIEW

A-7

7776-3

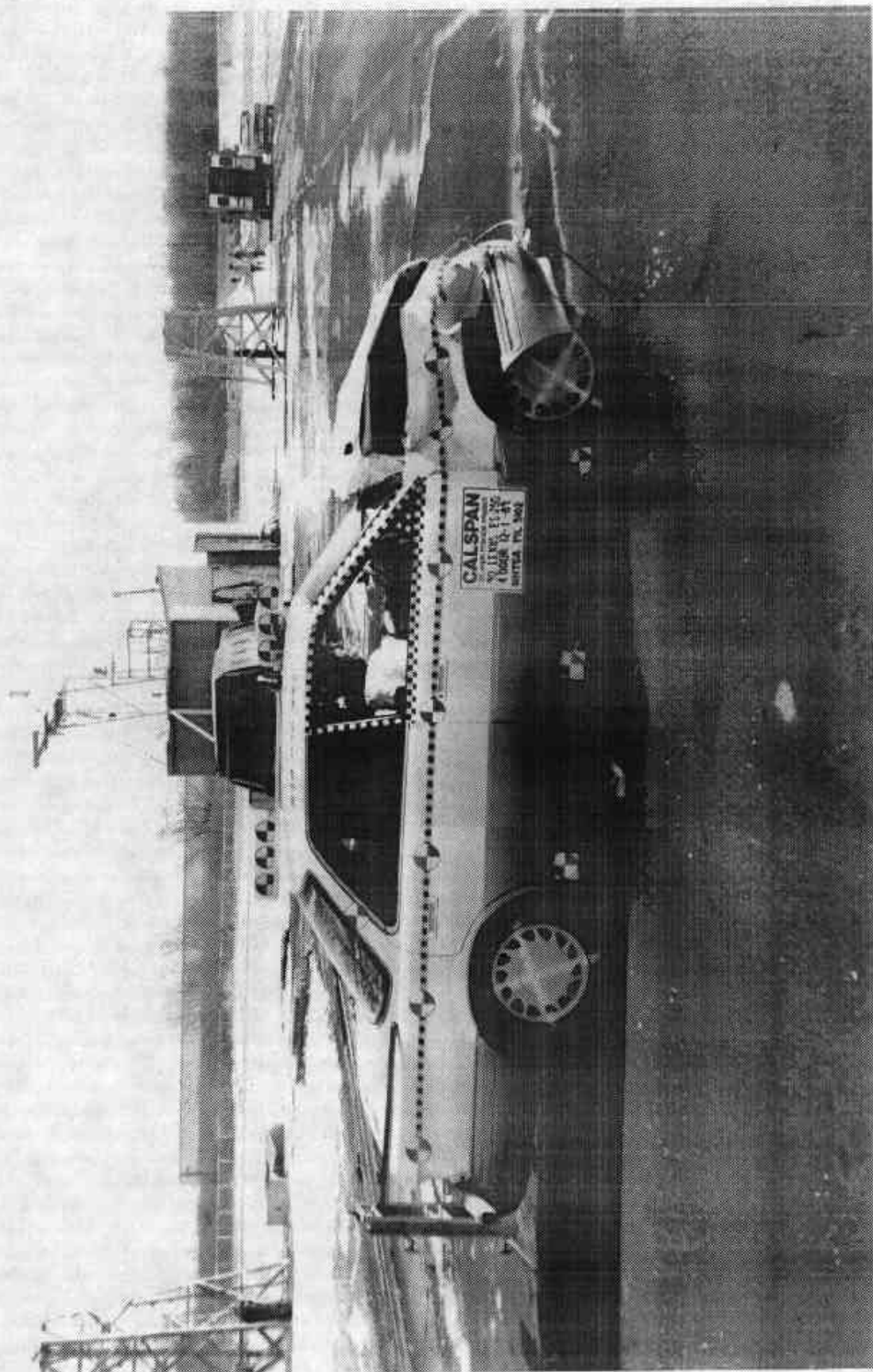


Figure A-7 POST-TEST RIGHT SIDE VIEW

A-8

7776-3

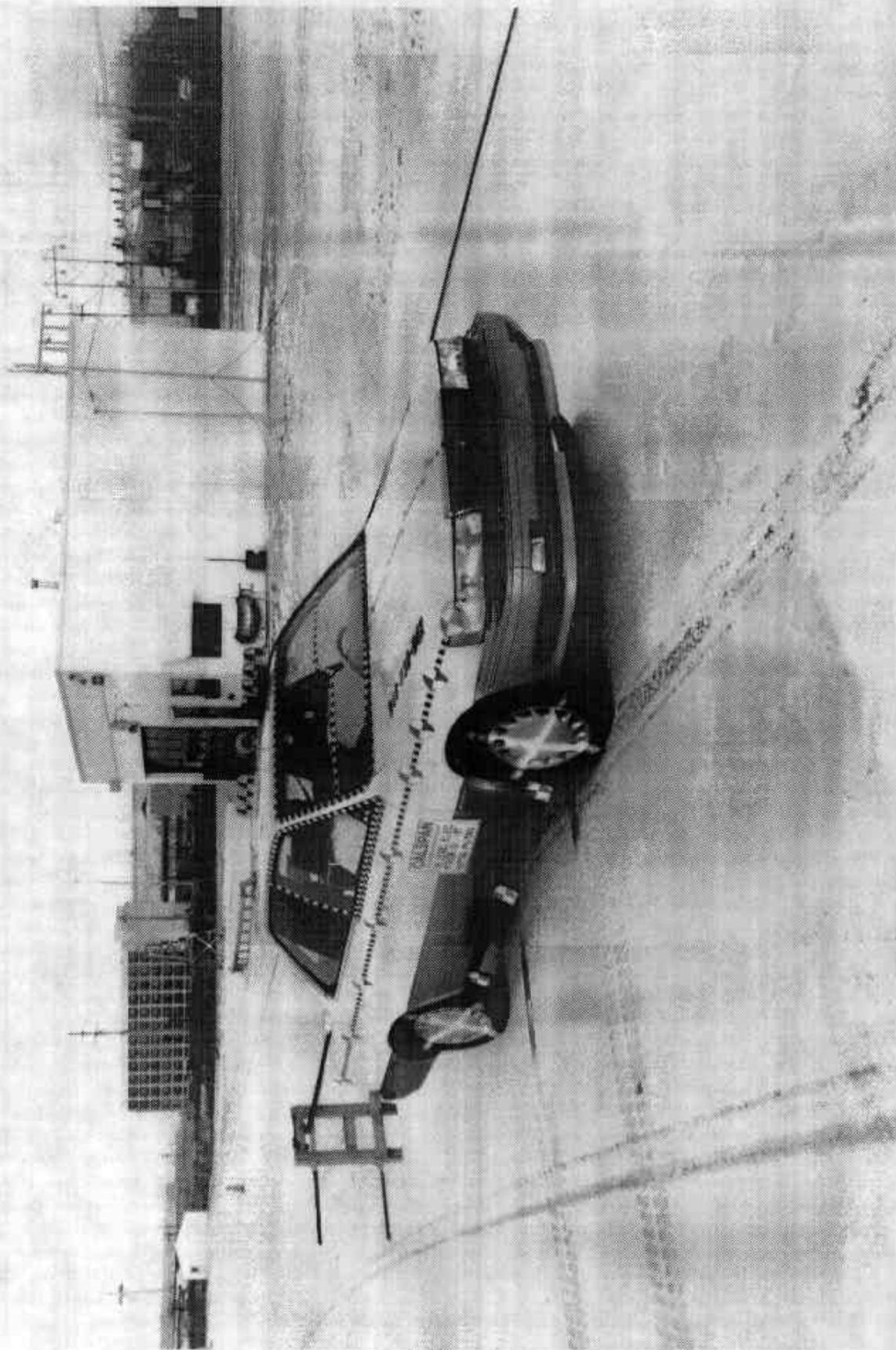


Figure A-8 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

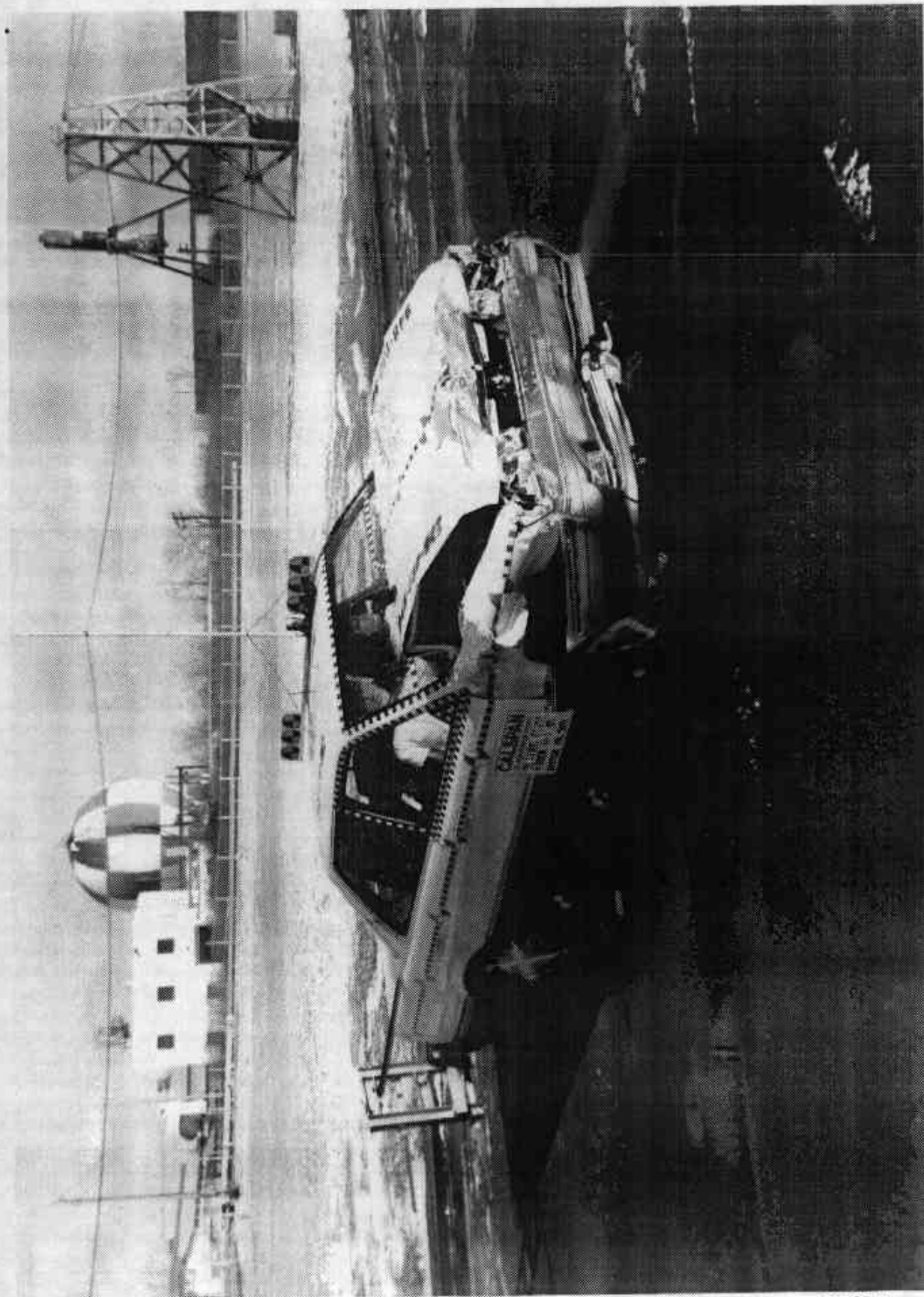


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-10

7776-3



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

A-11

7776-3

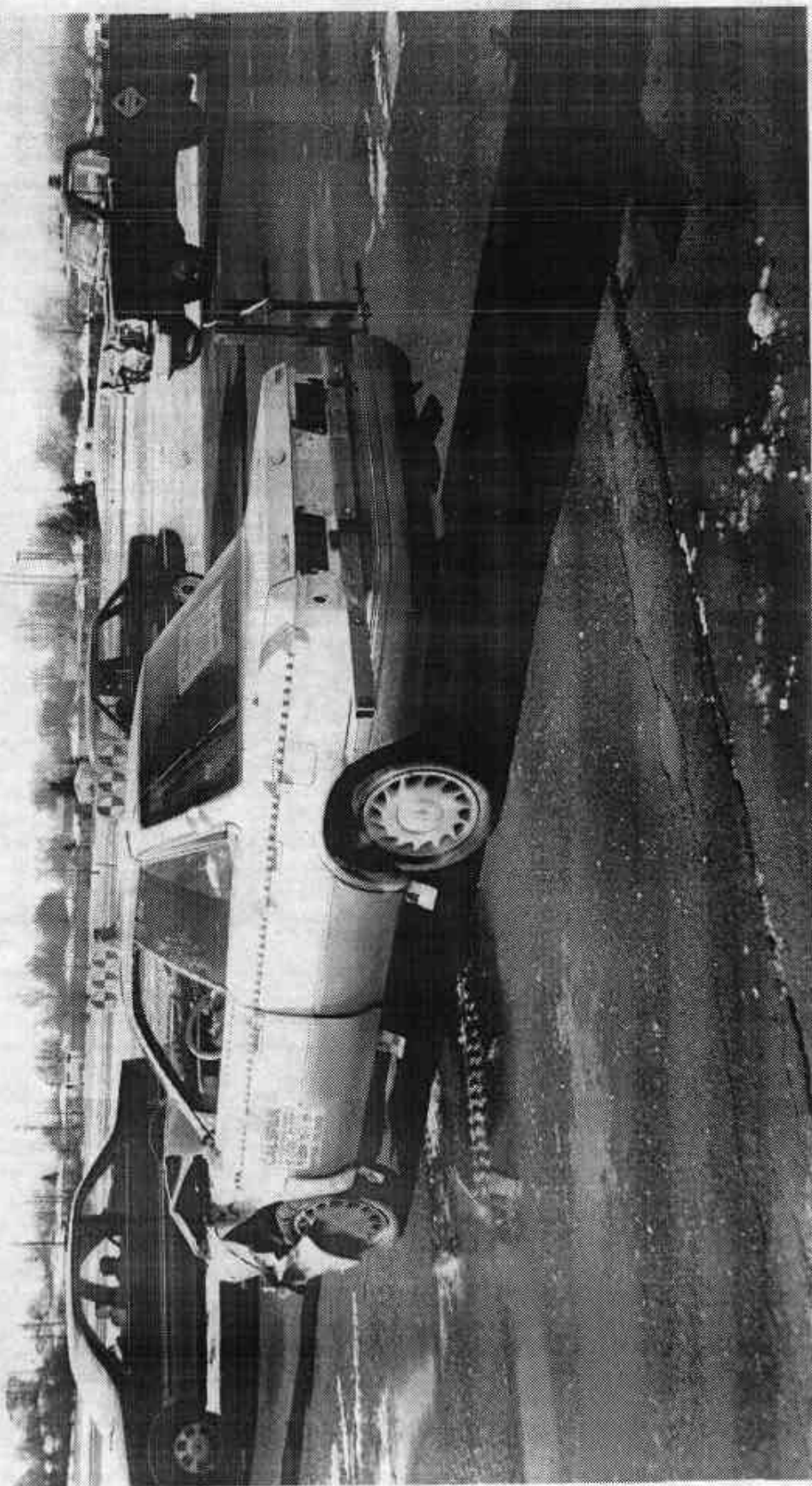


FIGURE A-11 POST-TEST LEFT REAR THREE-QUARTER VIEW

A-12

7776-3

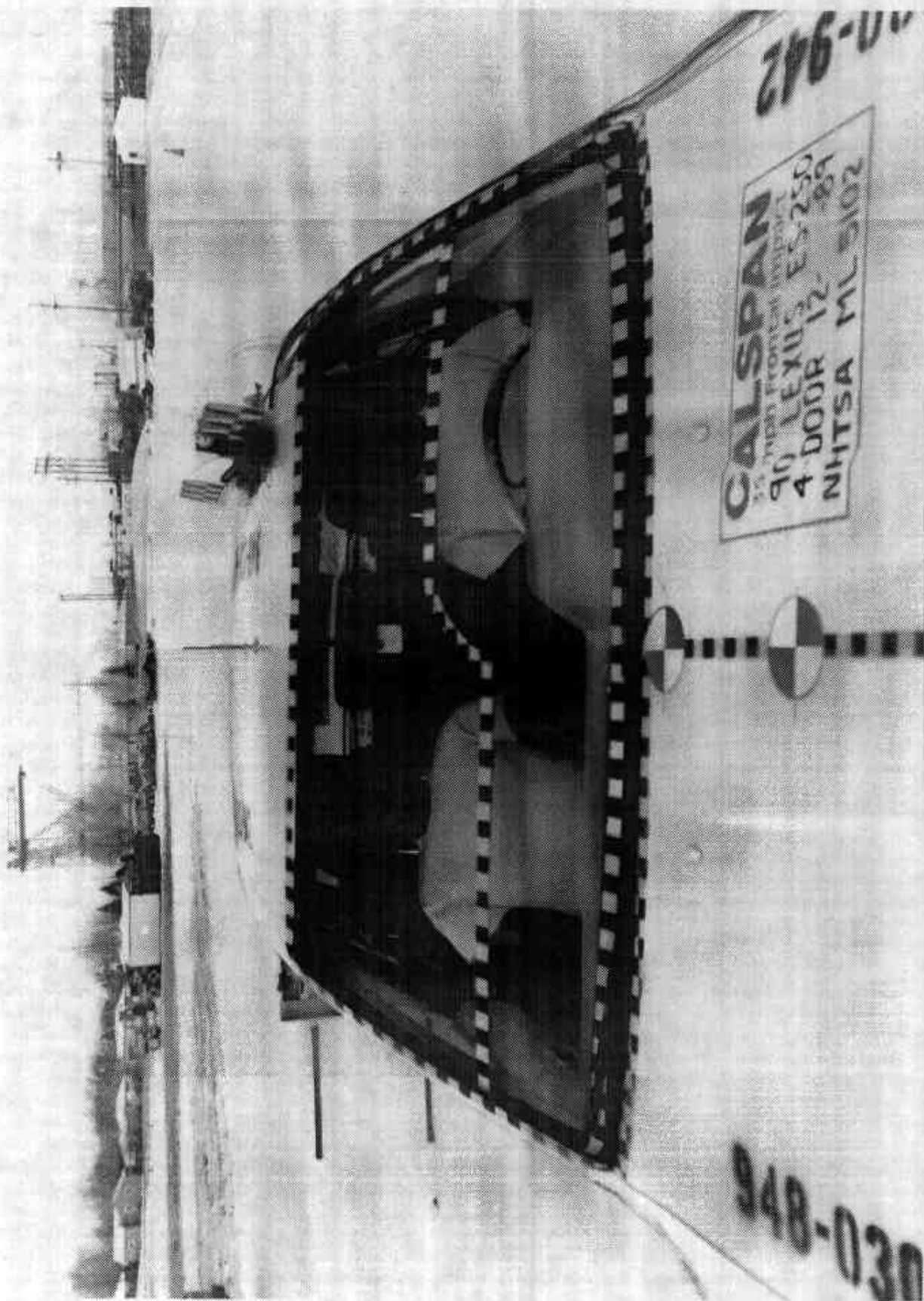


Figure A-12 PRE-TEST WINDSHIELD VIEW

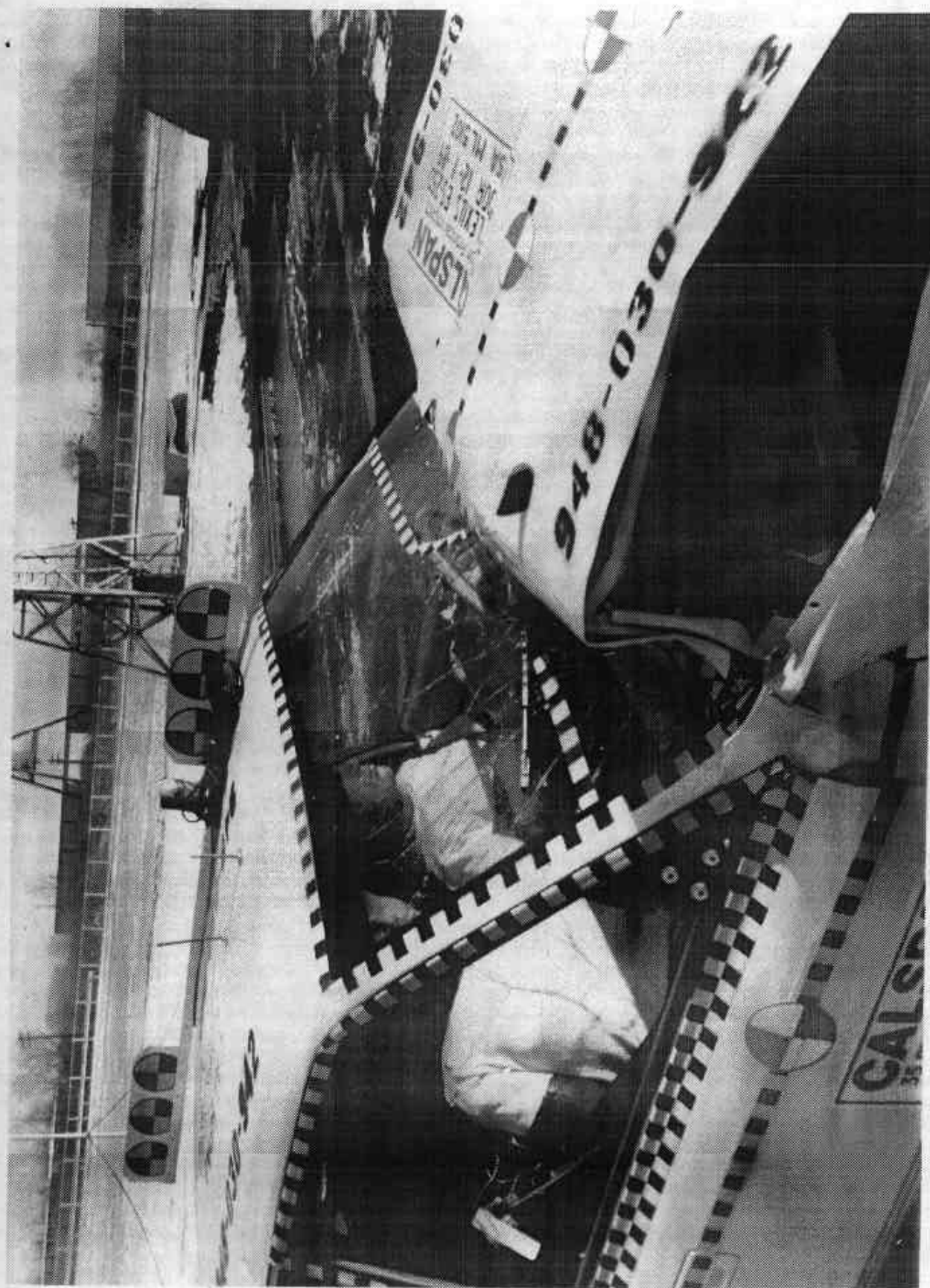


Figure A-13 POST-TEST WINDSHIELD VIEW

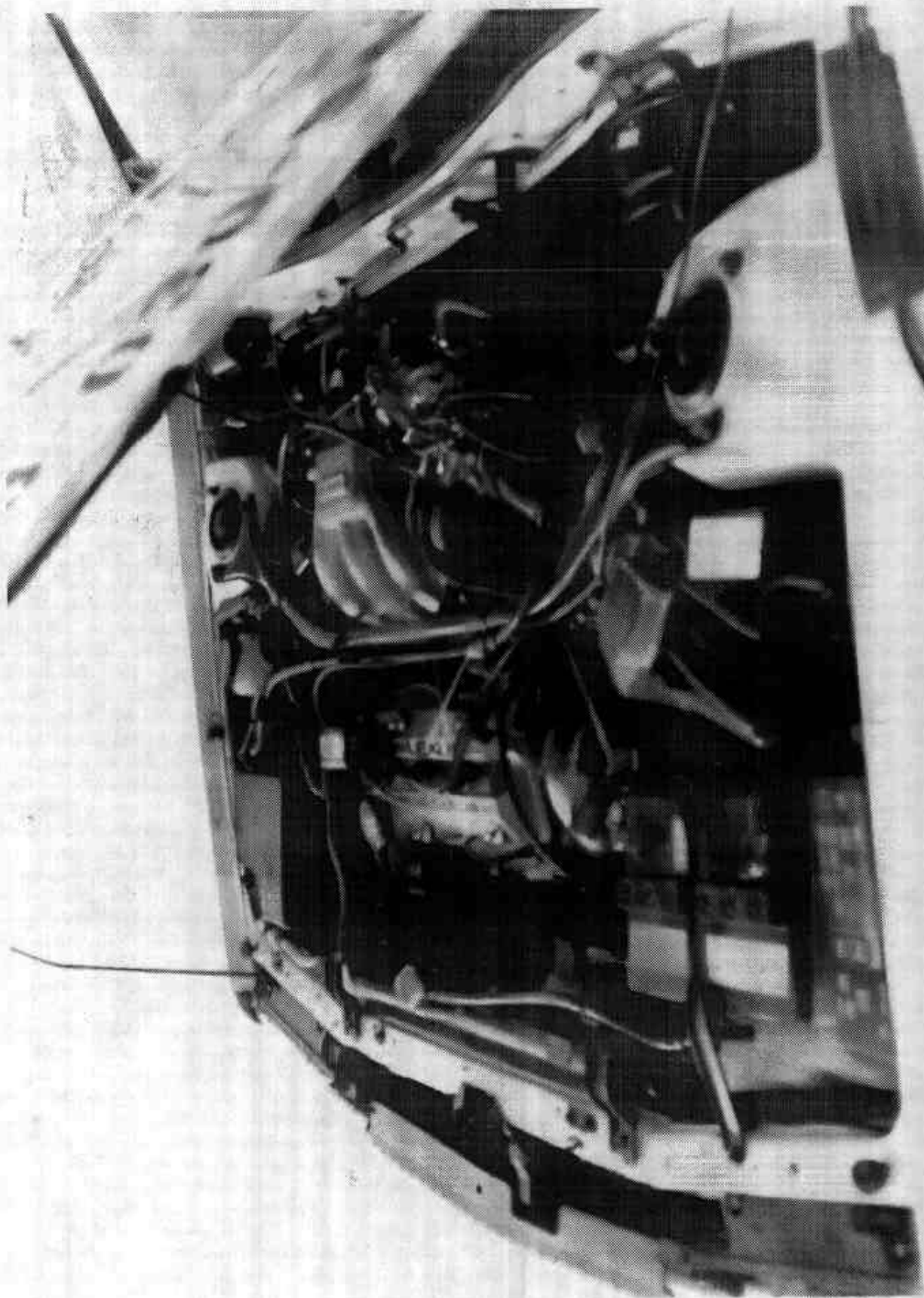


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

A-15

7776-3

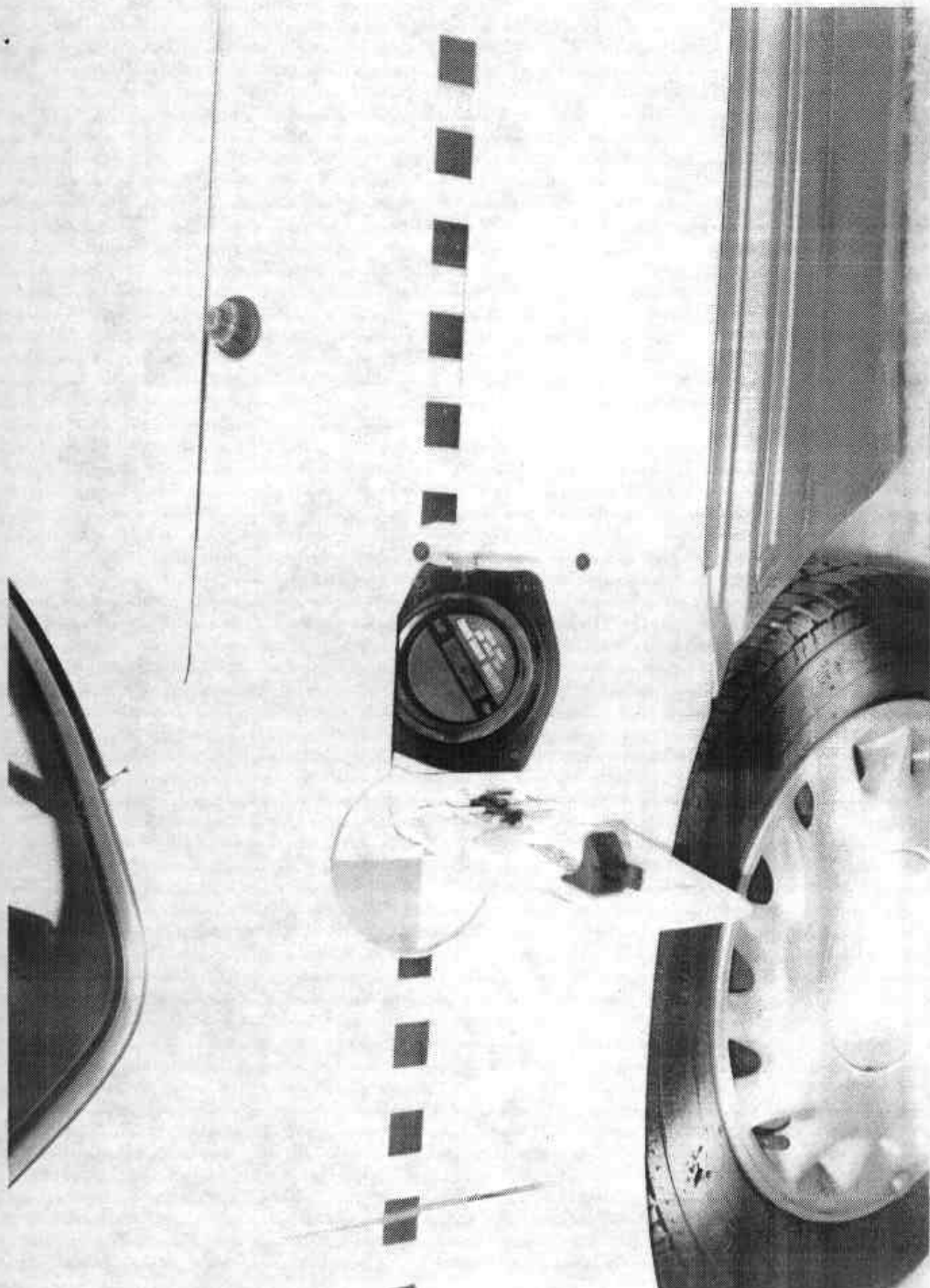


Figure A-15 PRE-TEST FUEL CAP VIEW

A-16

7776-3

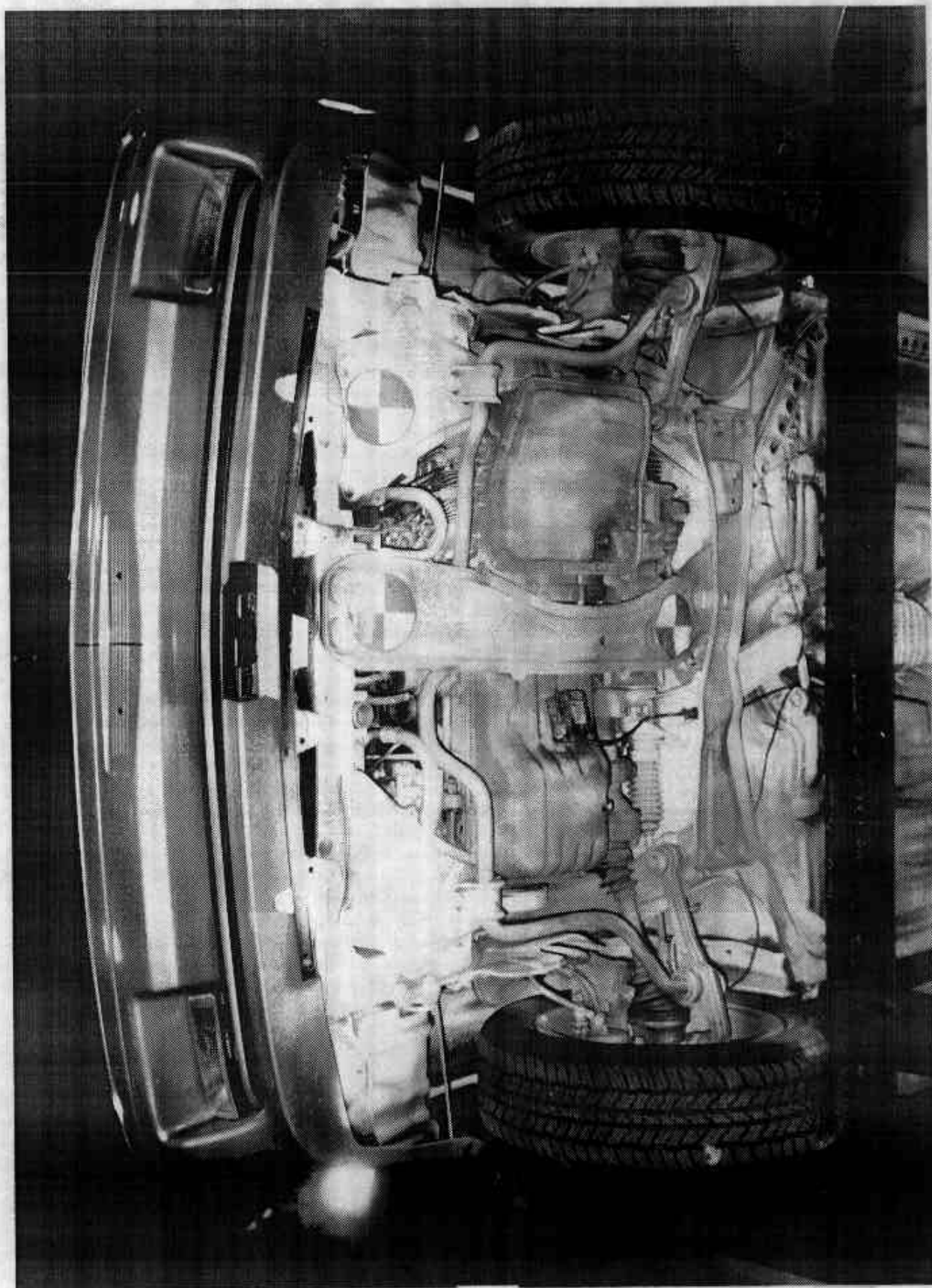


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

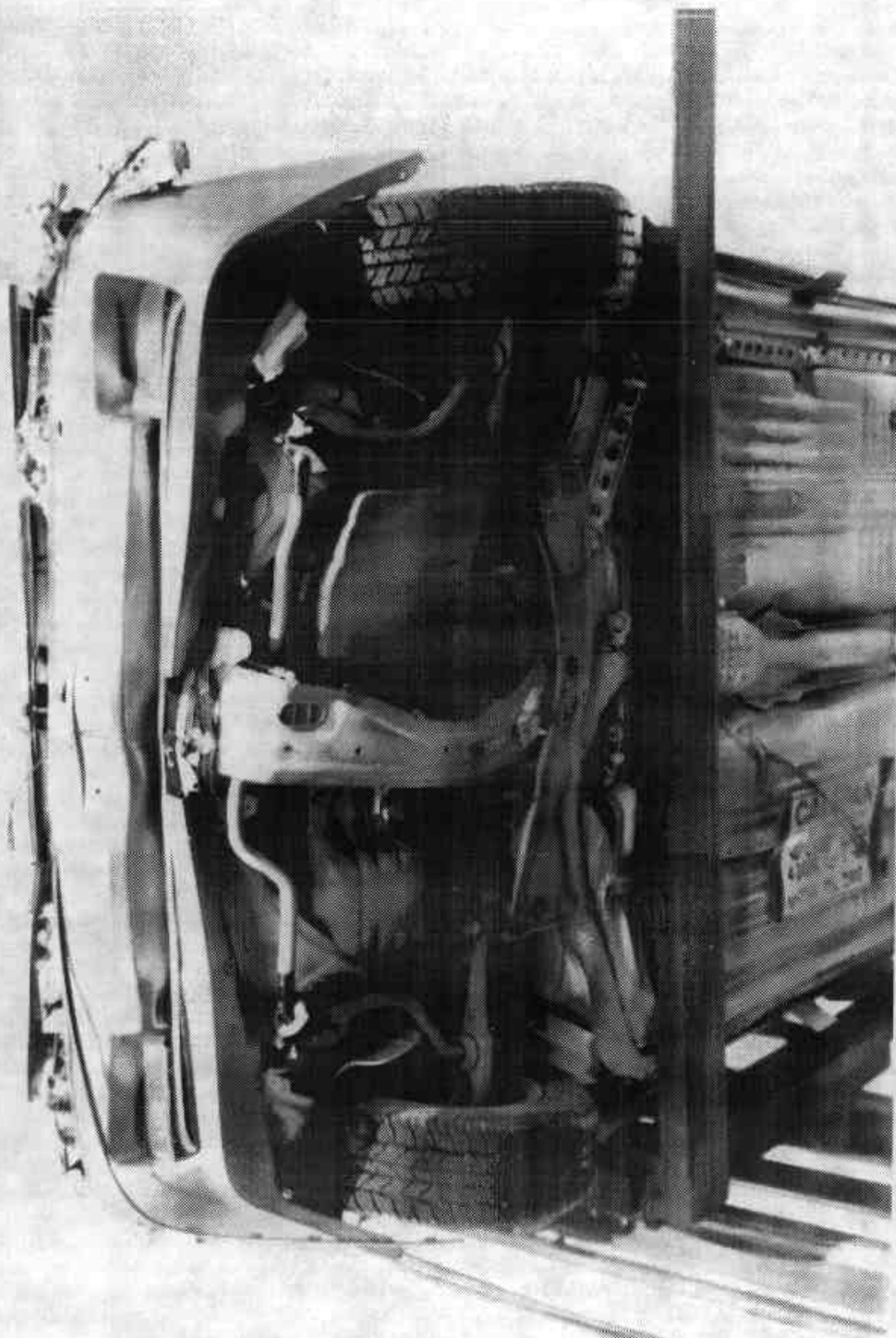


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

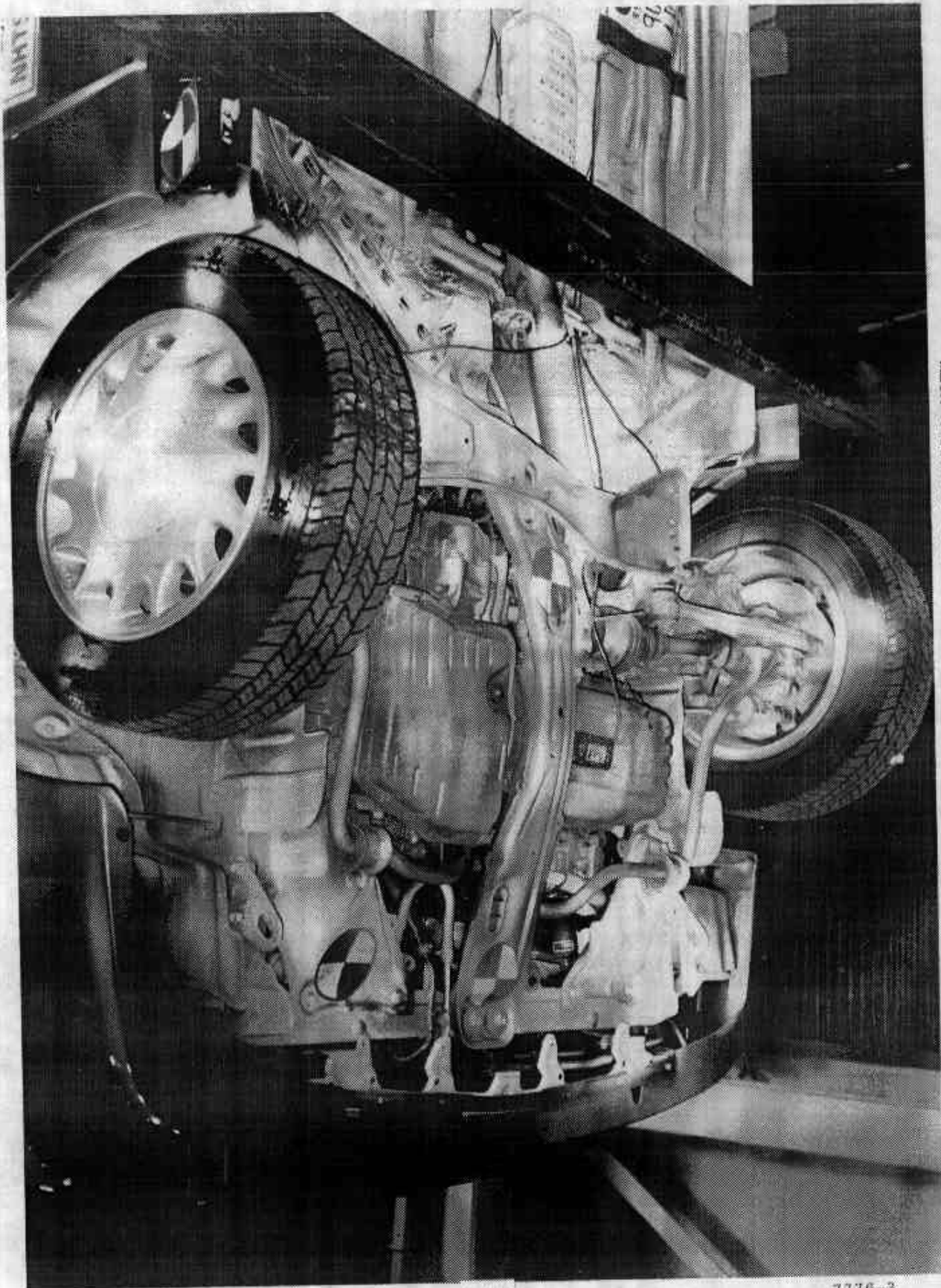


Figure A-18 PRE-TEST FRONT SIDE UNDERSODY VIEW

A-19

7776-3

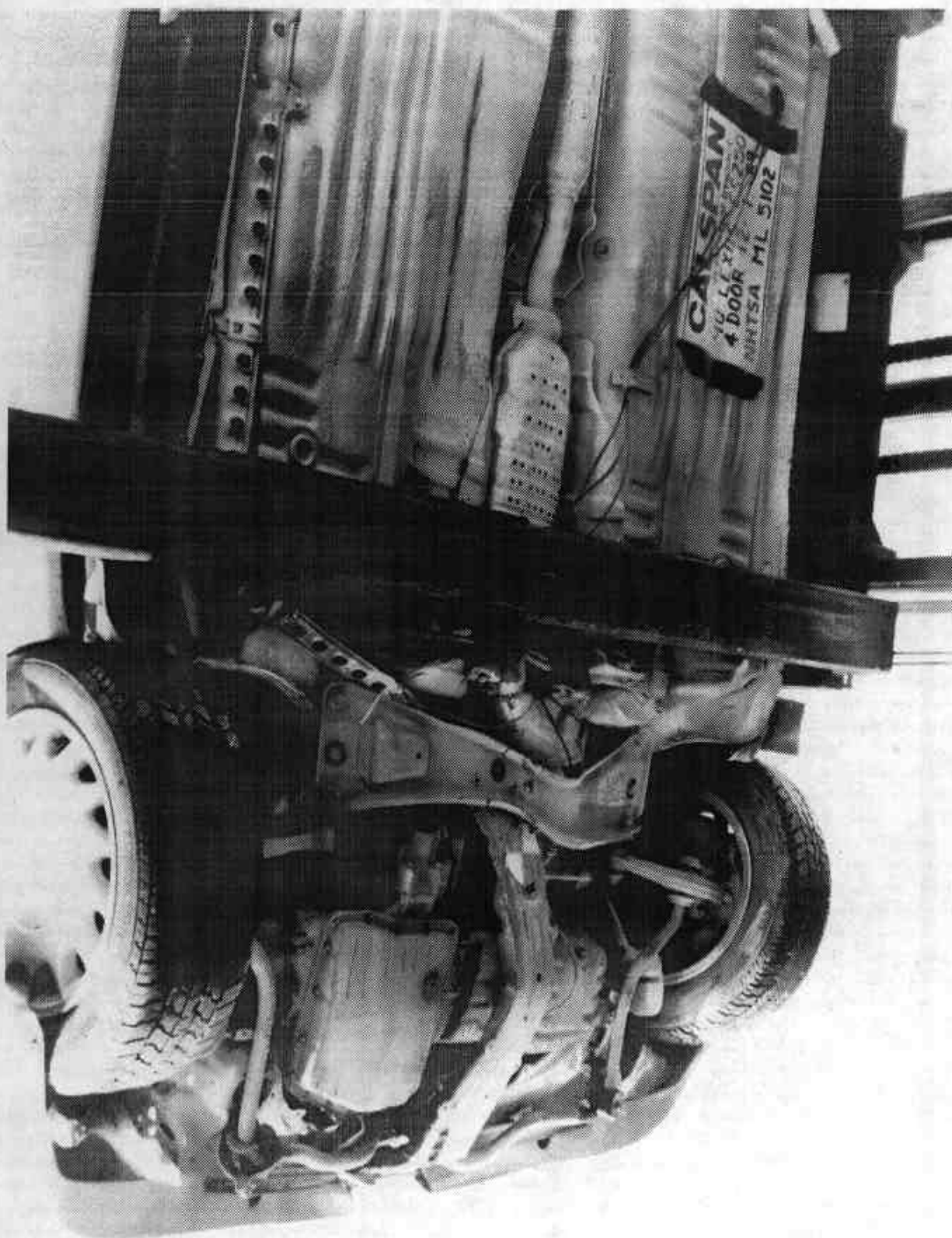


Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

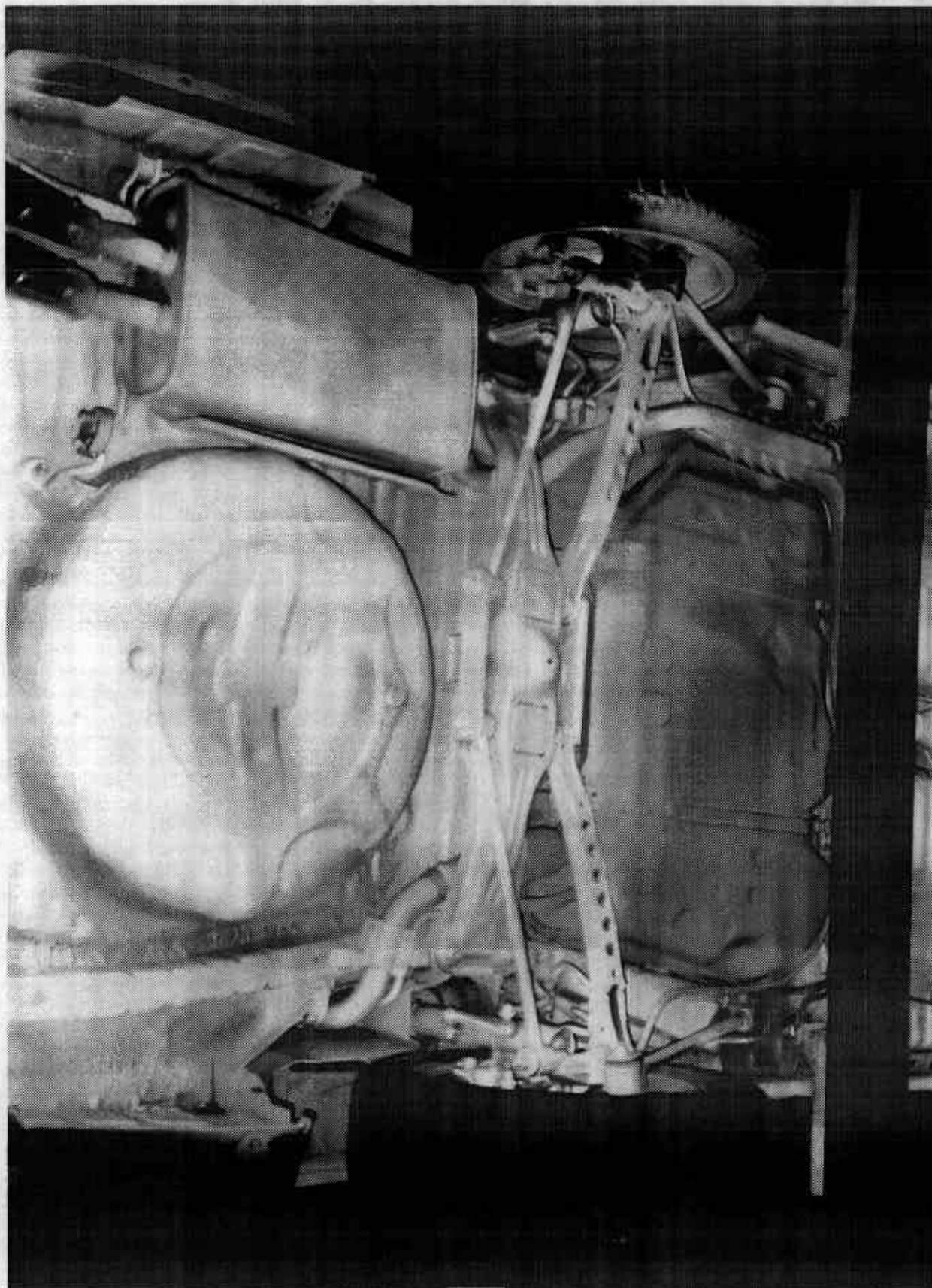


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

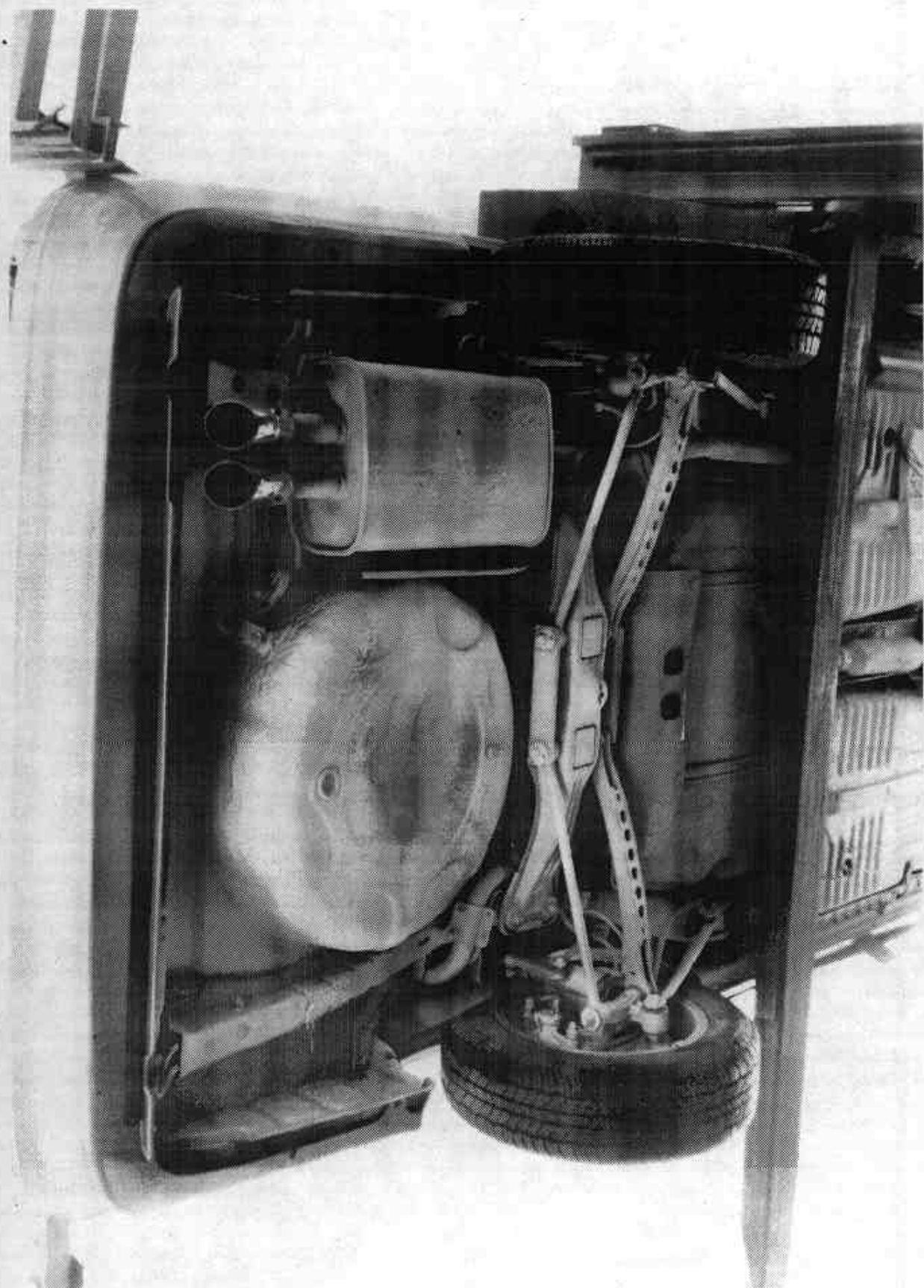


Figure A-21 POST-TEST REAR UNDERBODY VIEW

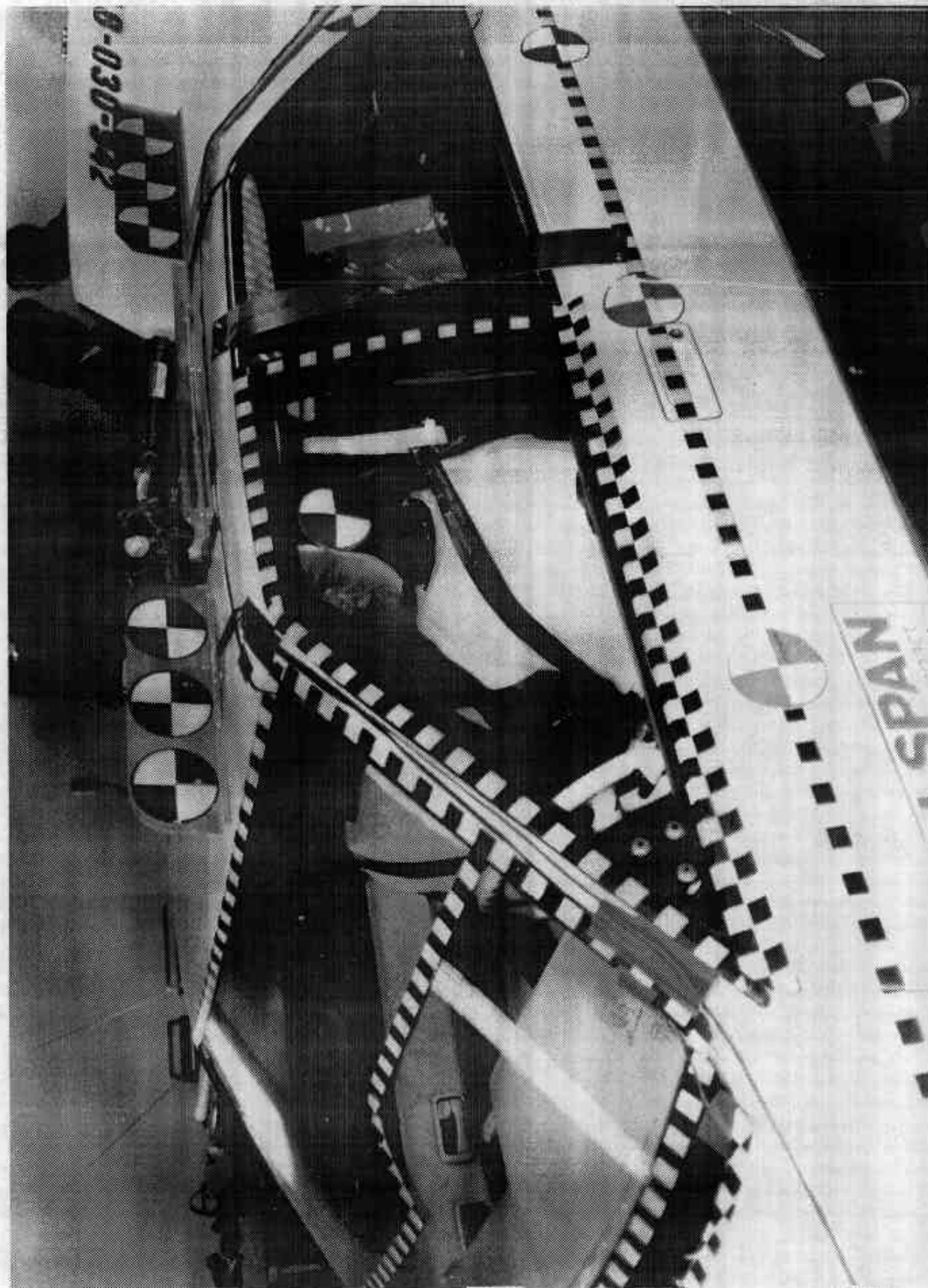


Figure A-22 PRE-TEST DRIVER POSITION VIEW

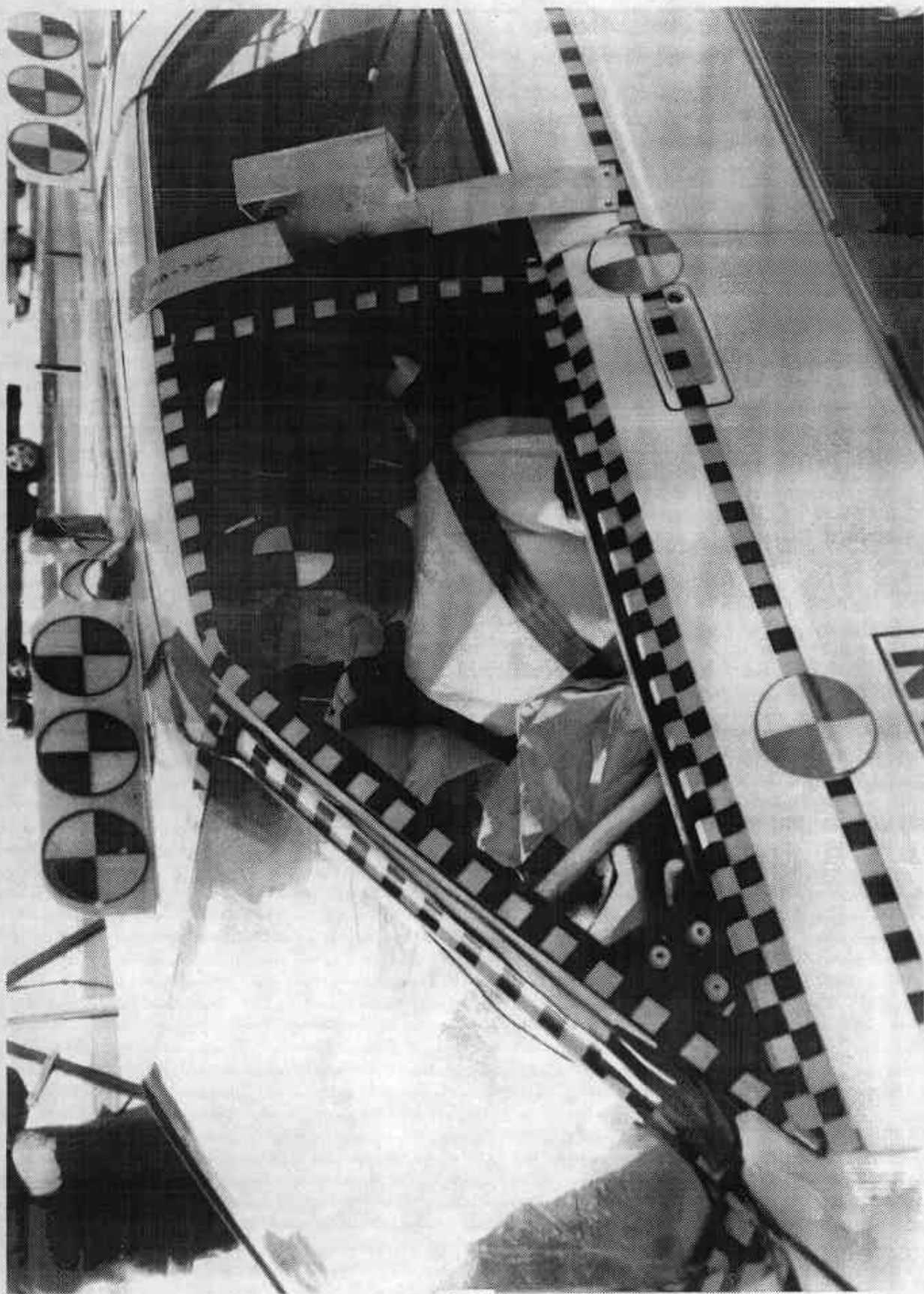


Figure A-23 POST-TEST DRIVER POSITION VIEW

A-24

7776-3

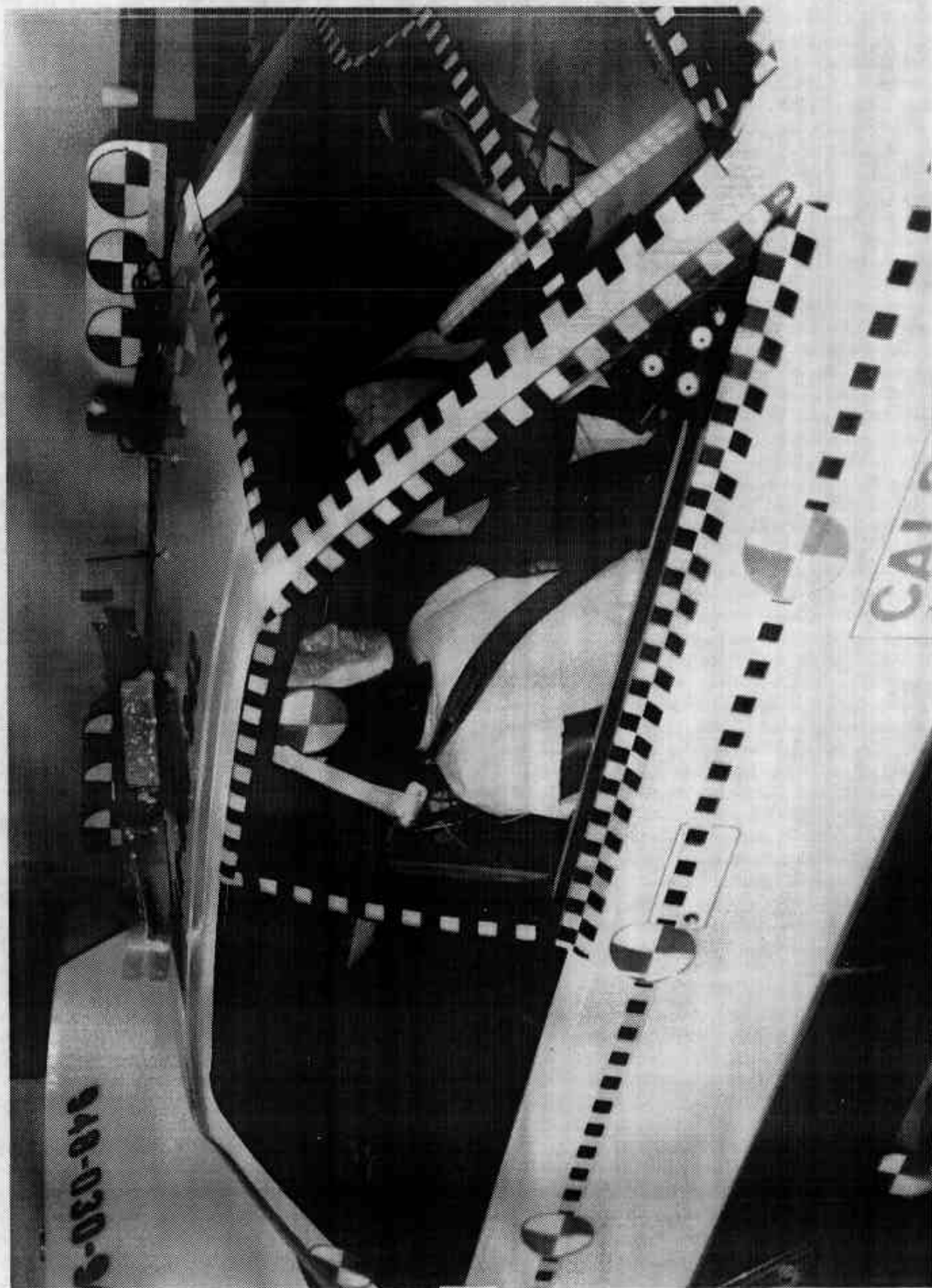


Figure A-24 PRE-TEST PASSENGER POSITION VIEW

A-25

7776-3

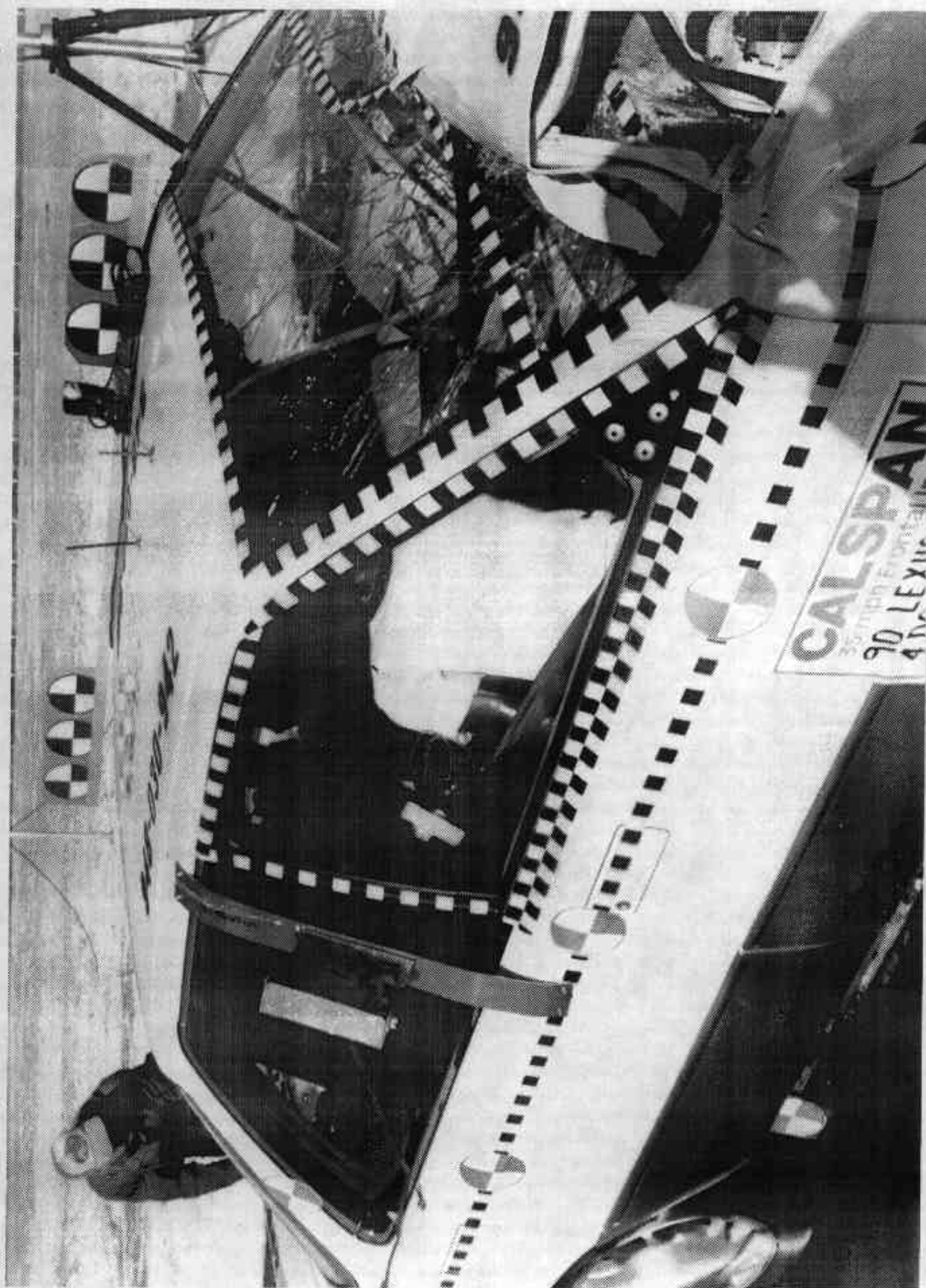


Figure A-25 POST-TEST PASSENGER POSITION VIEW

A-26

7776-3

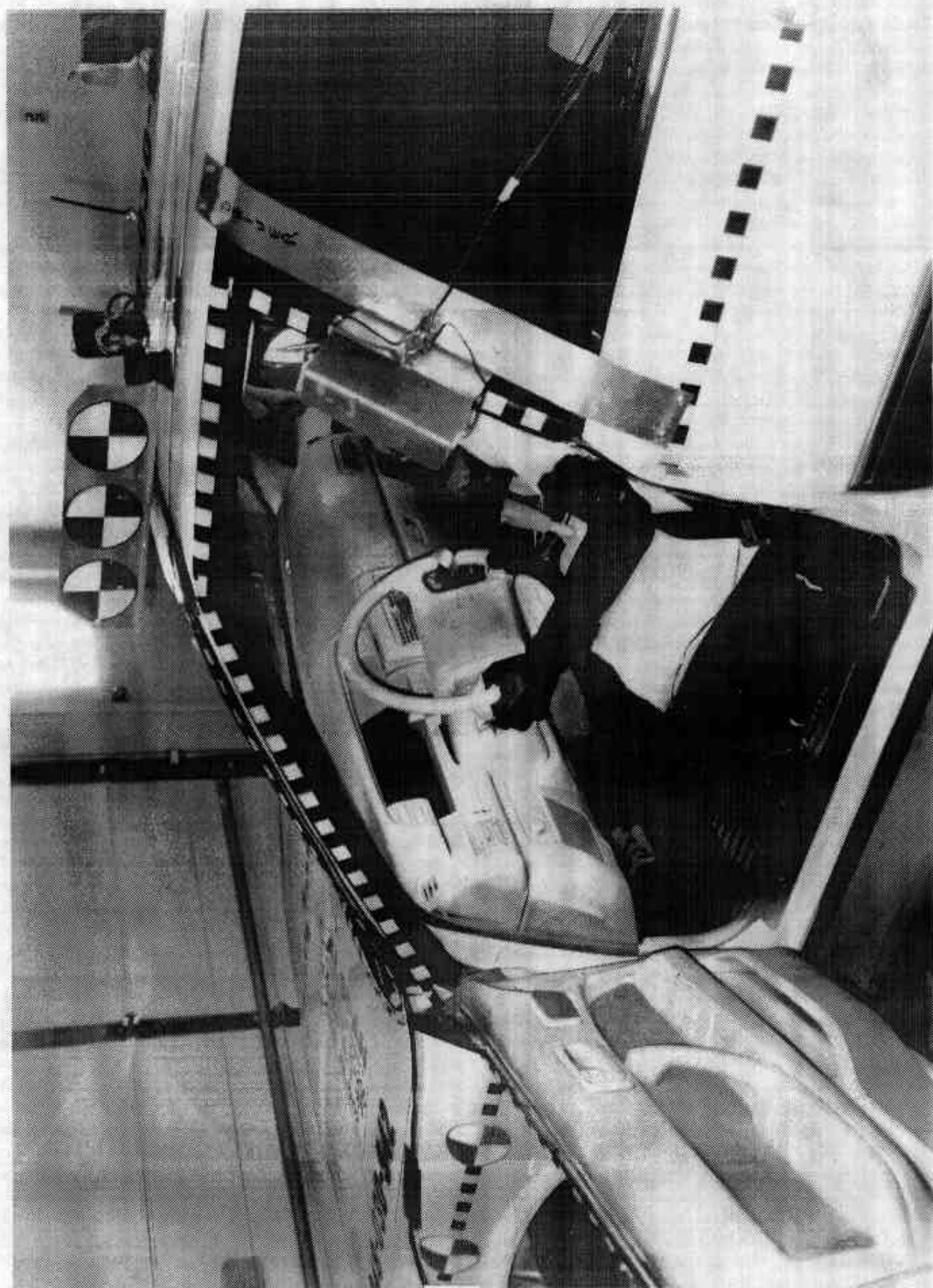


FIGURE A-26 PRE-TEST DRIVER AND INTERIOR VIEW

A-27

7776-3

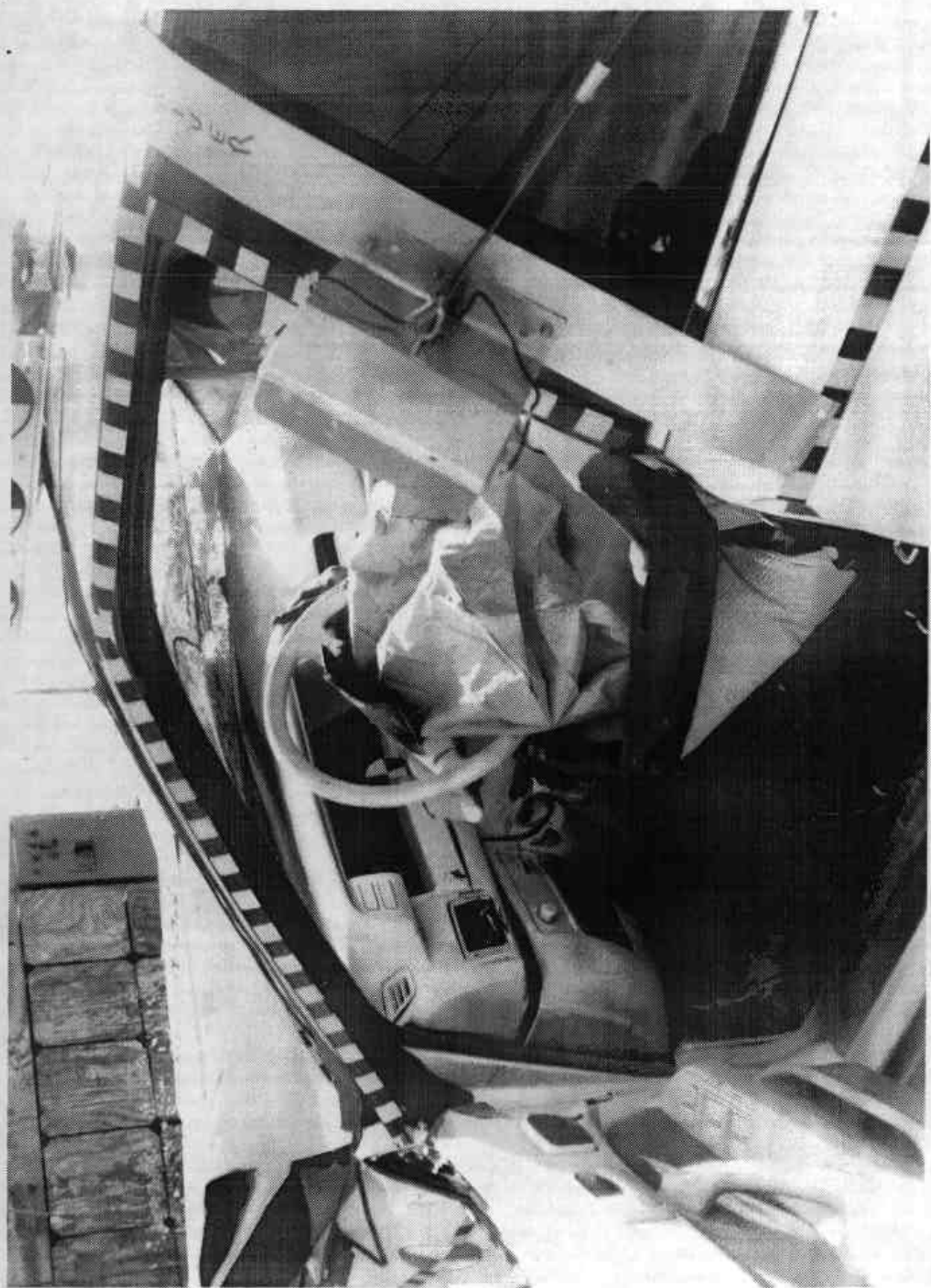


Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

A-28

7776-3



Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

A-29

7776-3

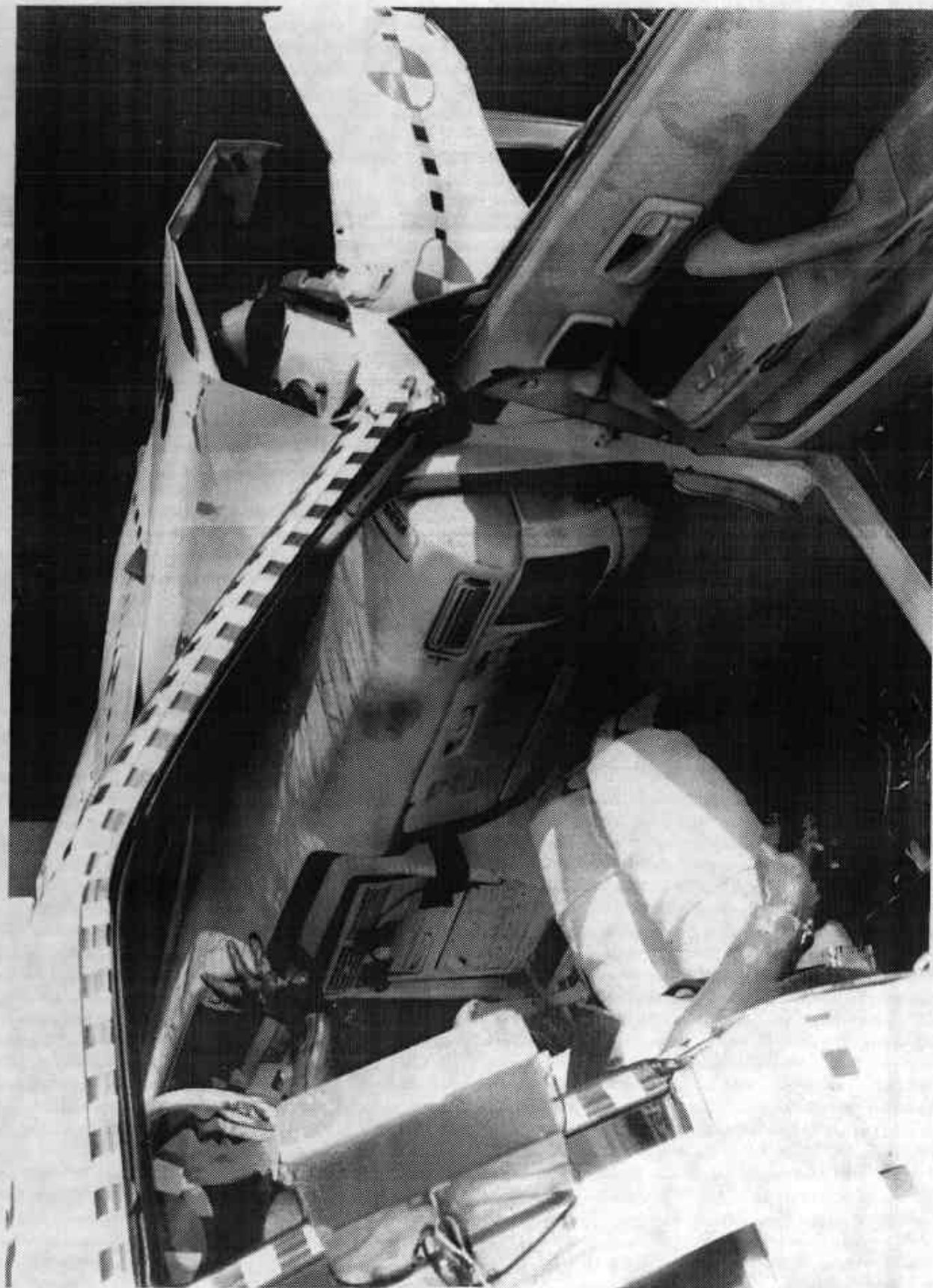


Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

A-30

7776-3

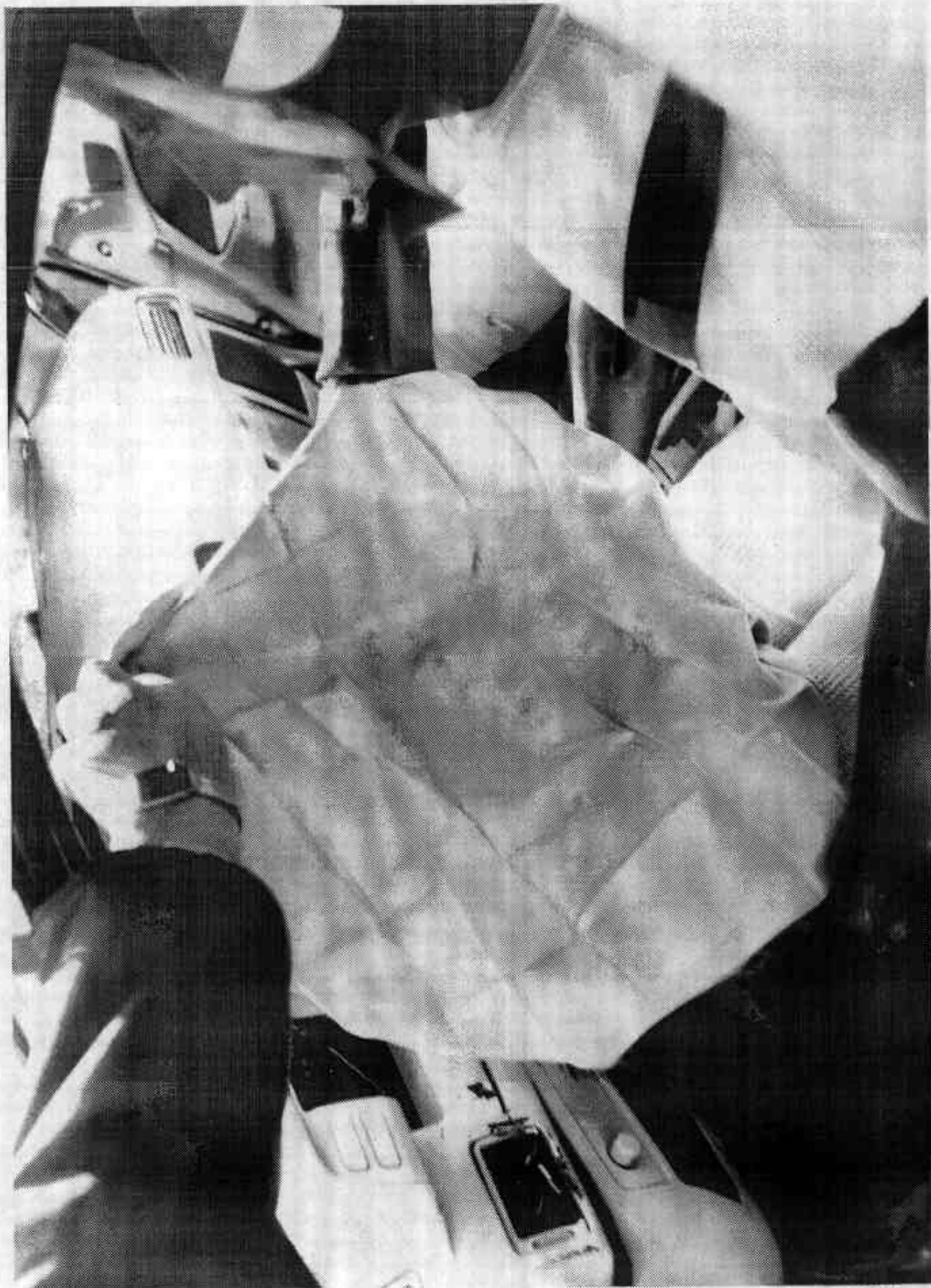


FIGURE A-30 POST-TEST AIR BAG VIEW

A-31

7776-3

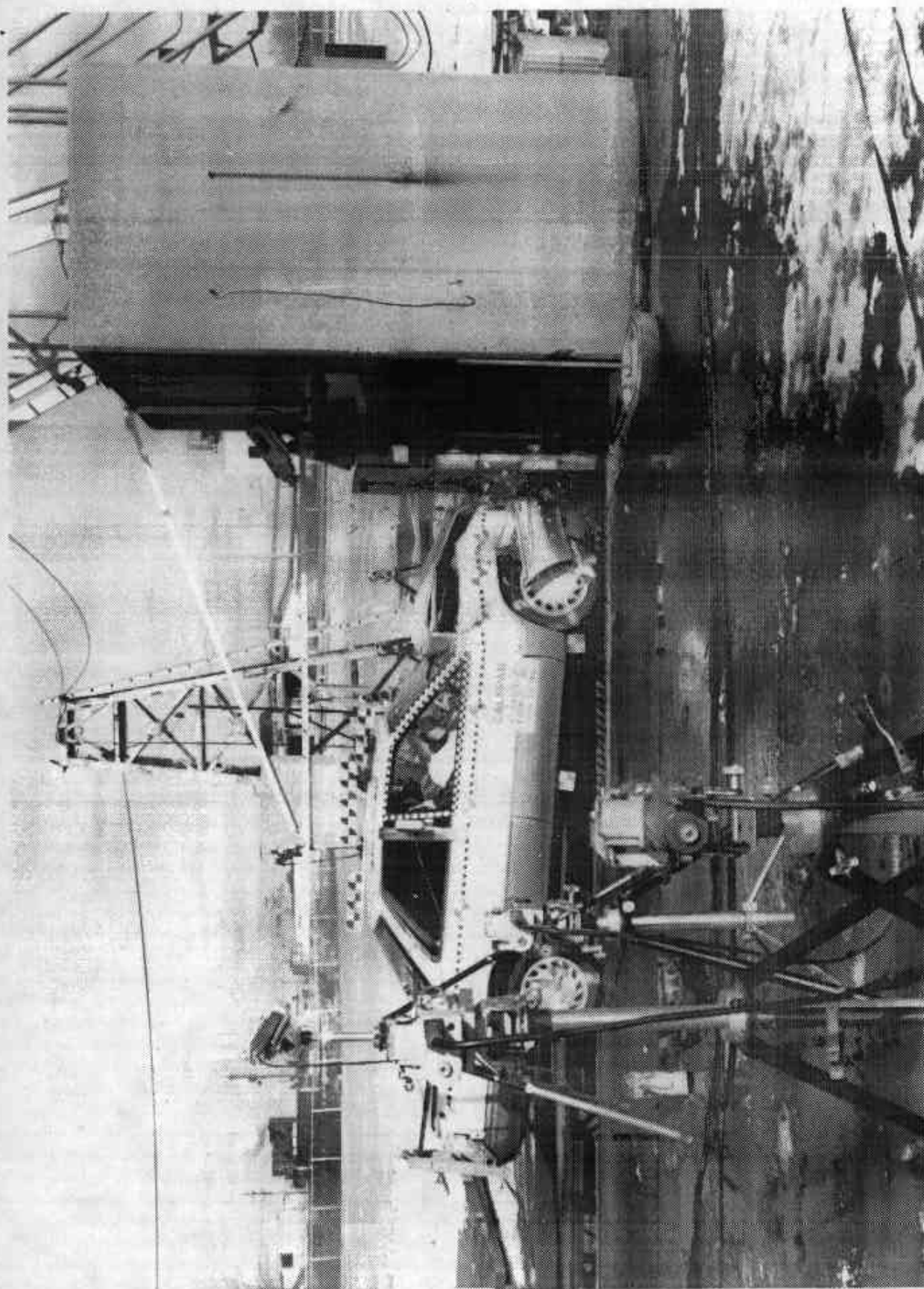


Figure A-31 IMPACT VIEW

A-32

7776-3

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. ML5102

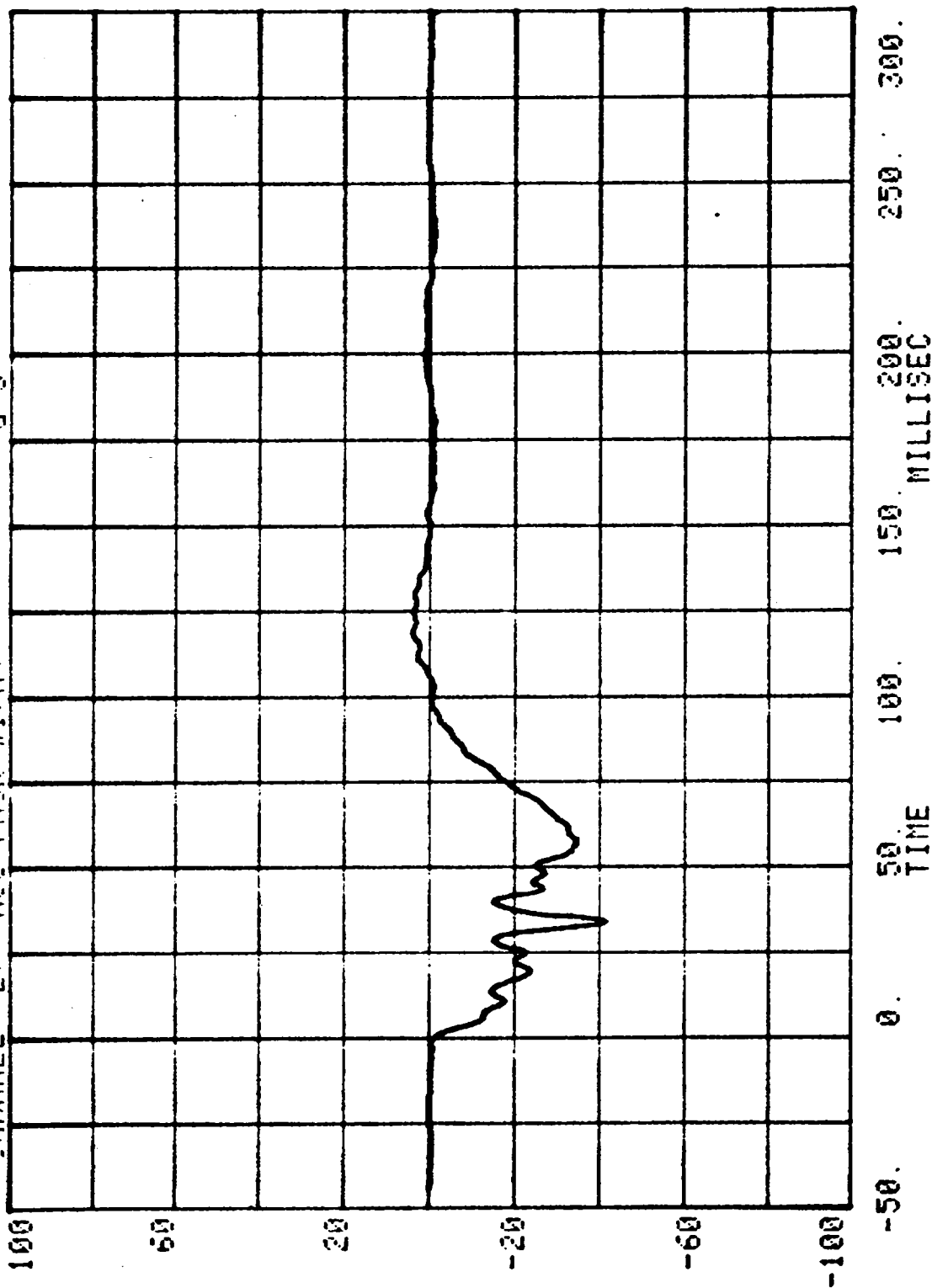
VEHICLE DATA

FILTER CHANNEL CLASS

60

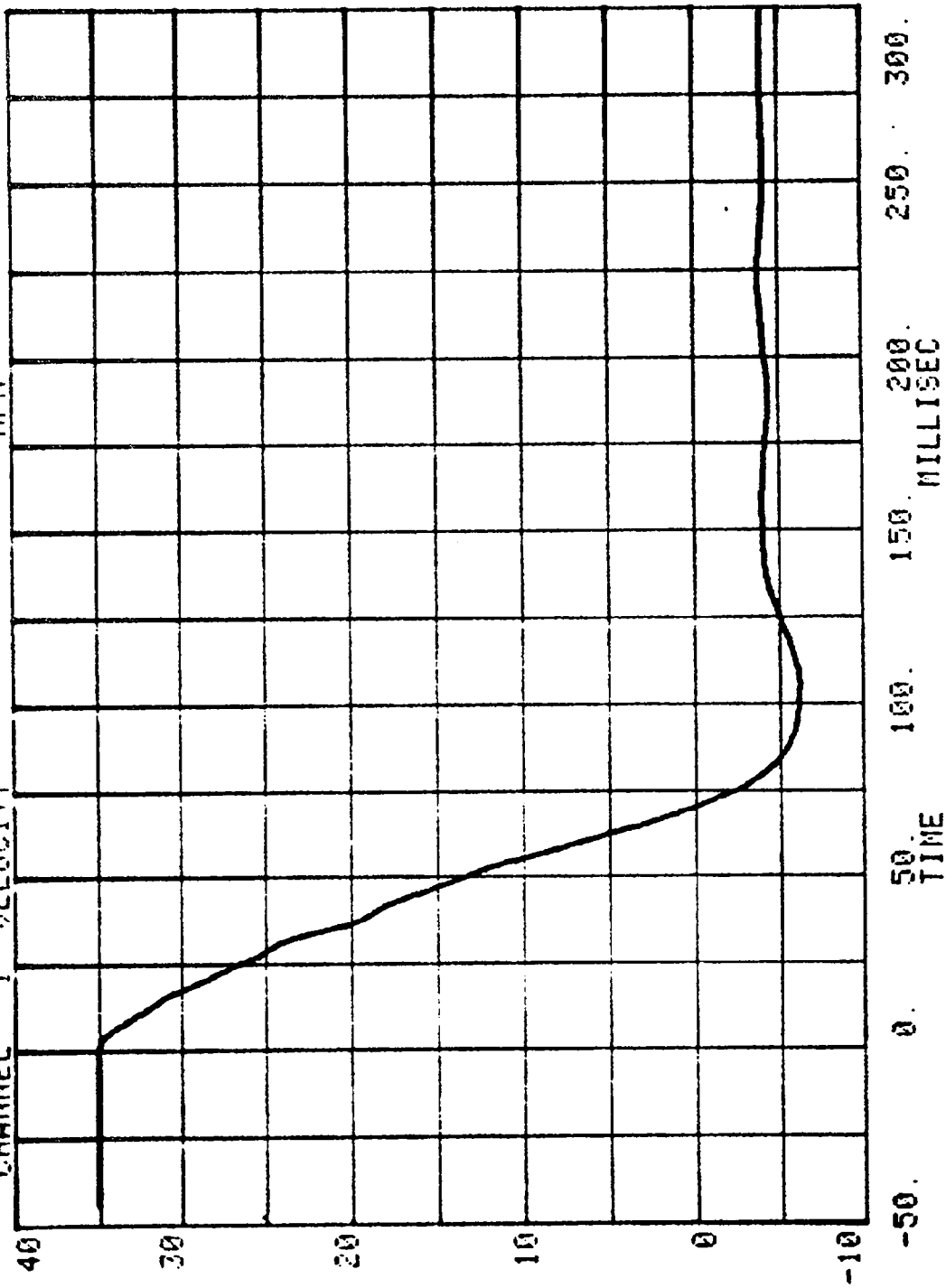
CHANNEL 27 ACC PACK #1 (X) G'S

RUN= 942 SERIES= 5102



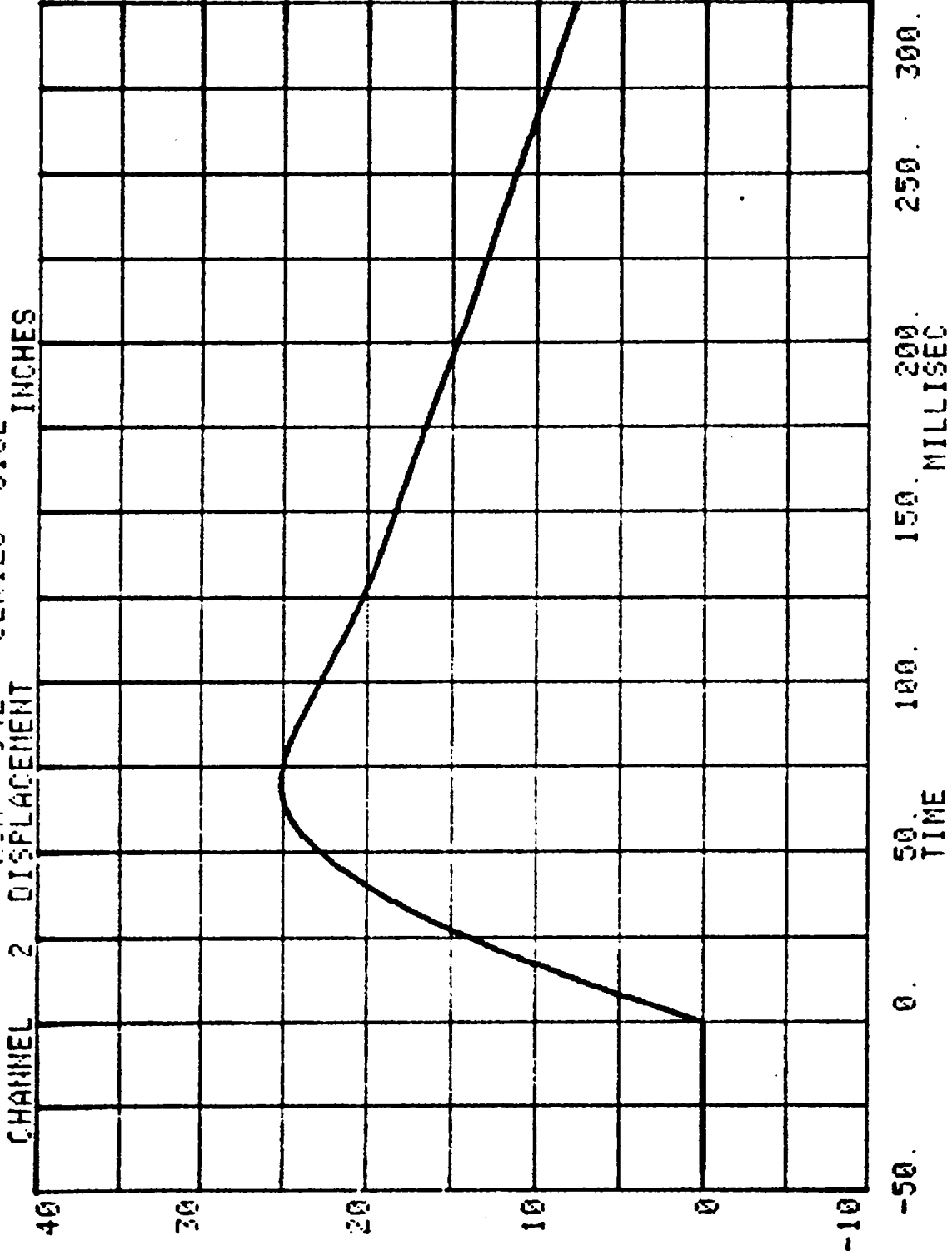
ACCEL #1(X)

RUN= 342 SERIES= 5102
CHANNEL 1 VELOCITY MPH

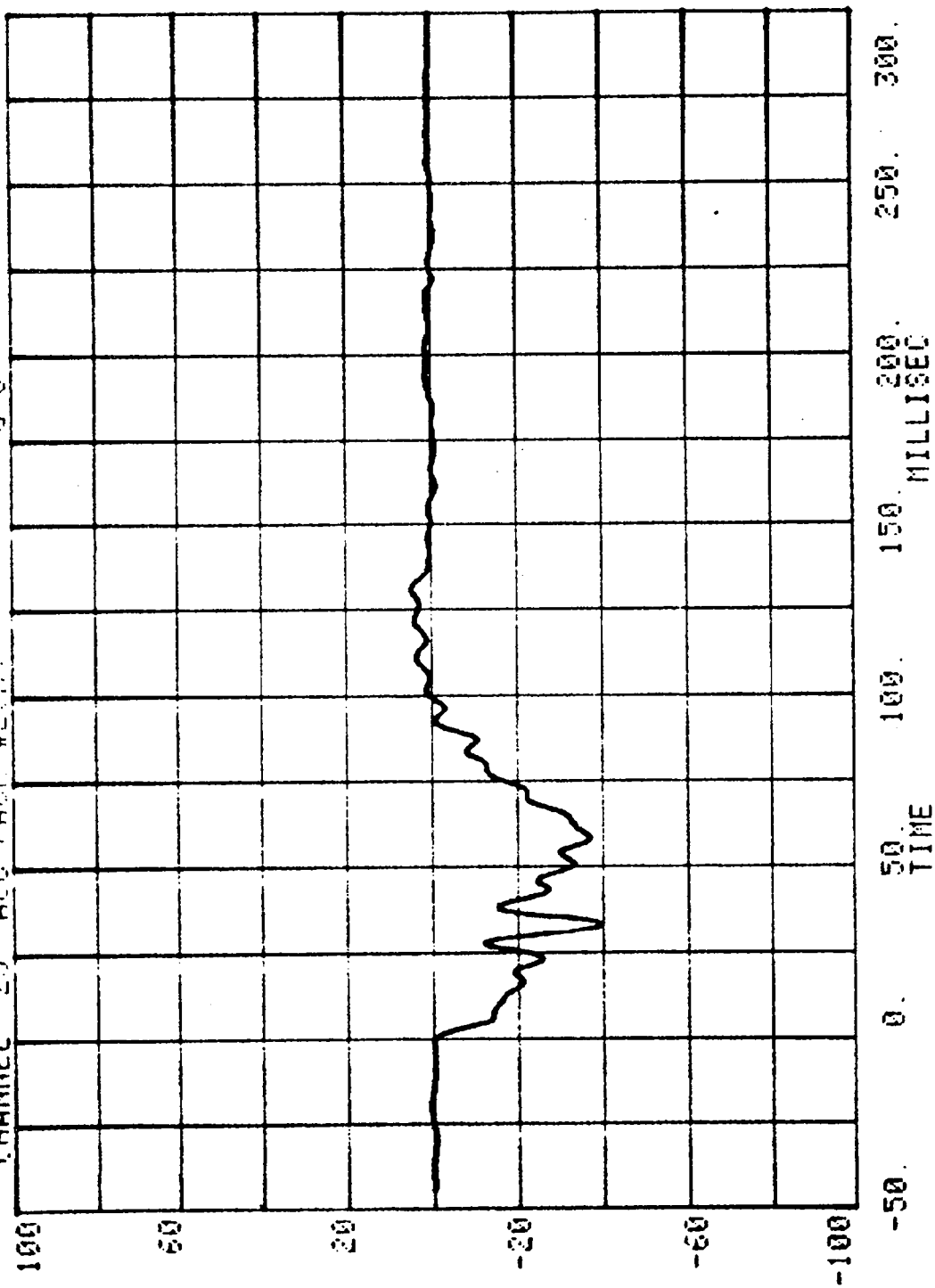


ACCEL #1 (x)

RUN= 942 SERIES= 5102 INCHES



CHANNEL 20 ACC PAK #20X0
RUN= 942 SERIES= 5102
G'S

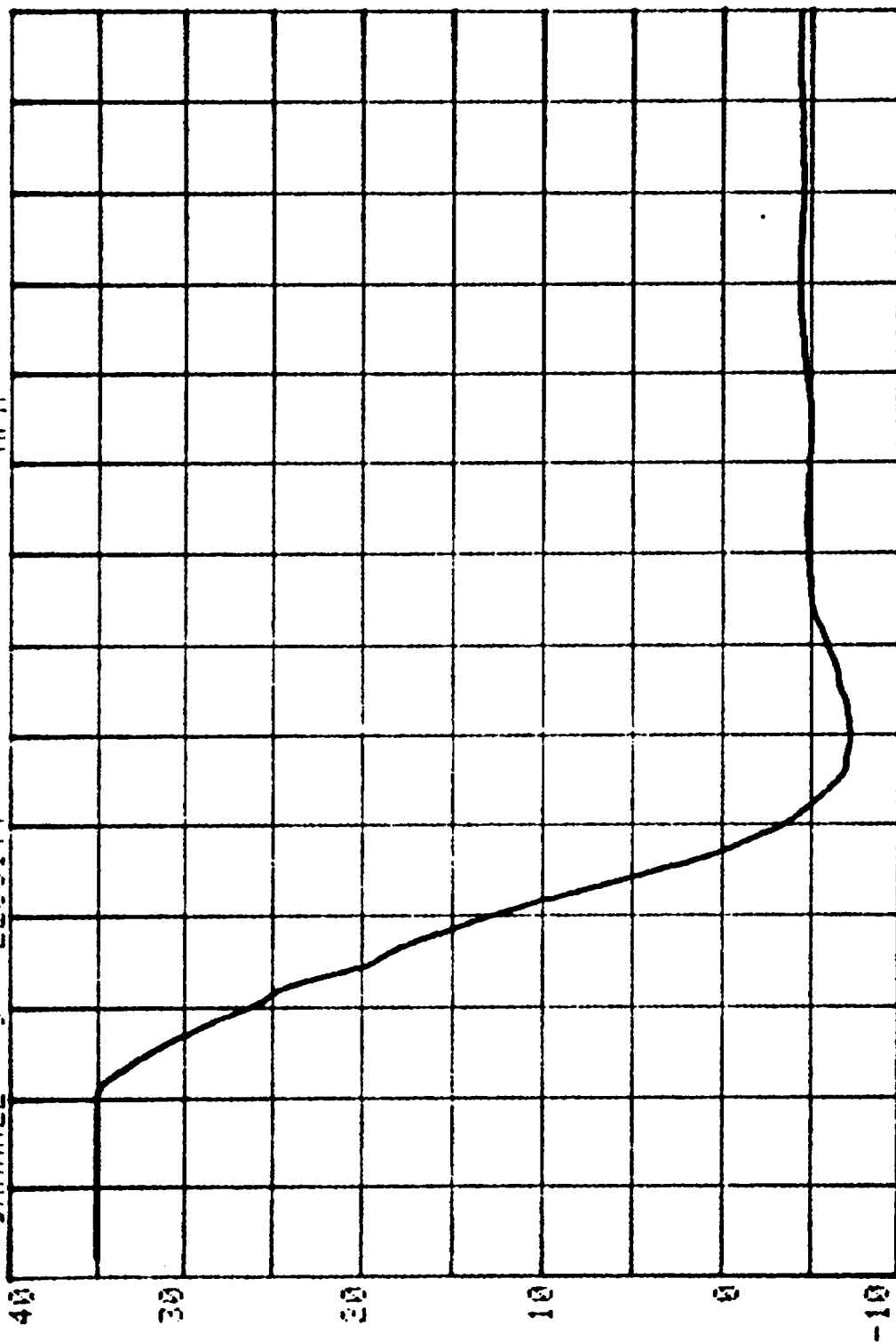


ACCEL #2 (x)

CHANNEL 3 VELOCITY MPH

SERIES= 5102

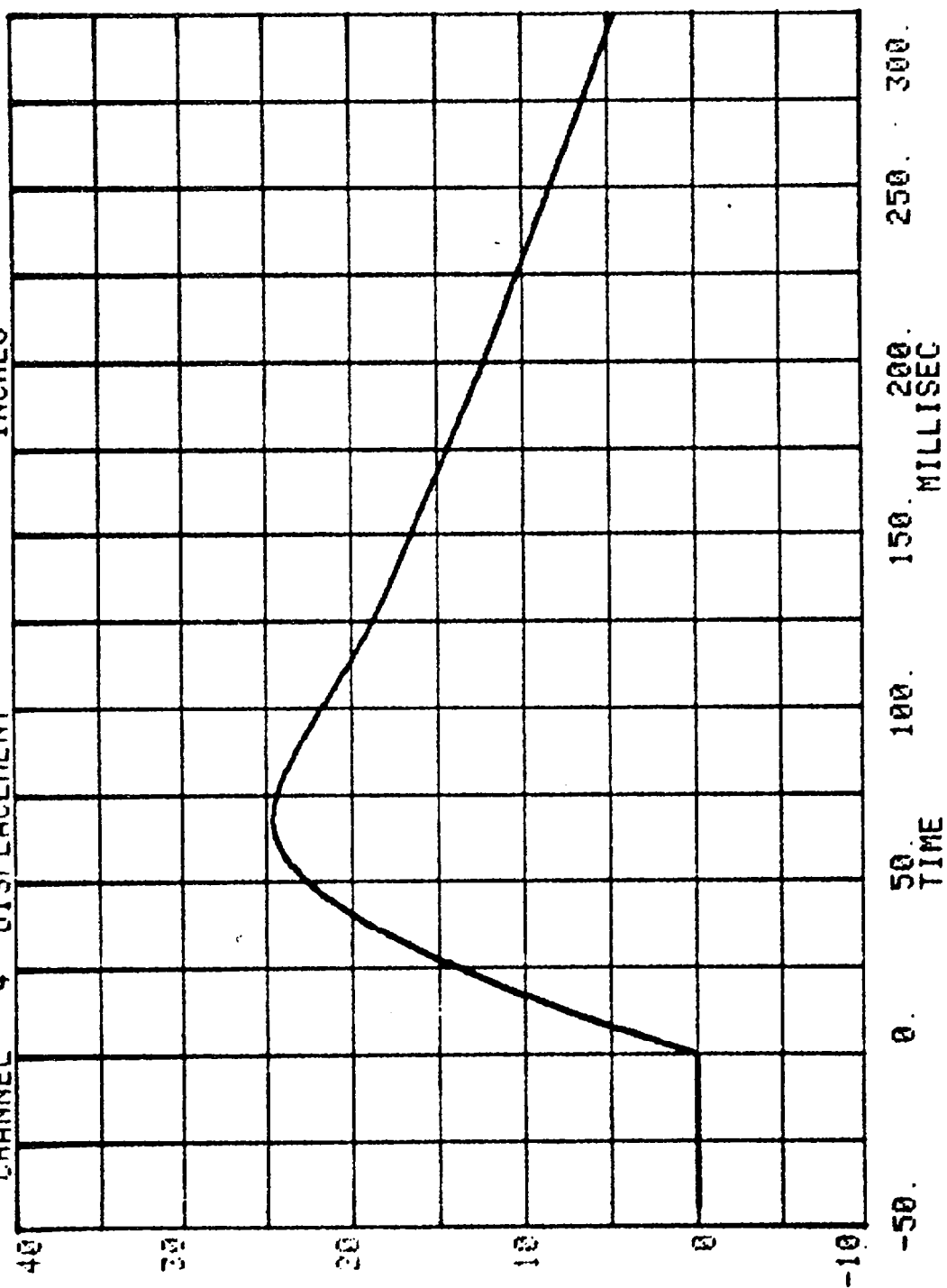
RUN= 242



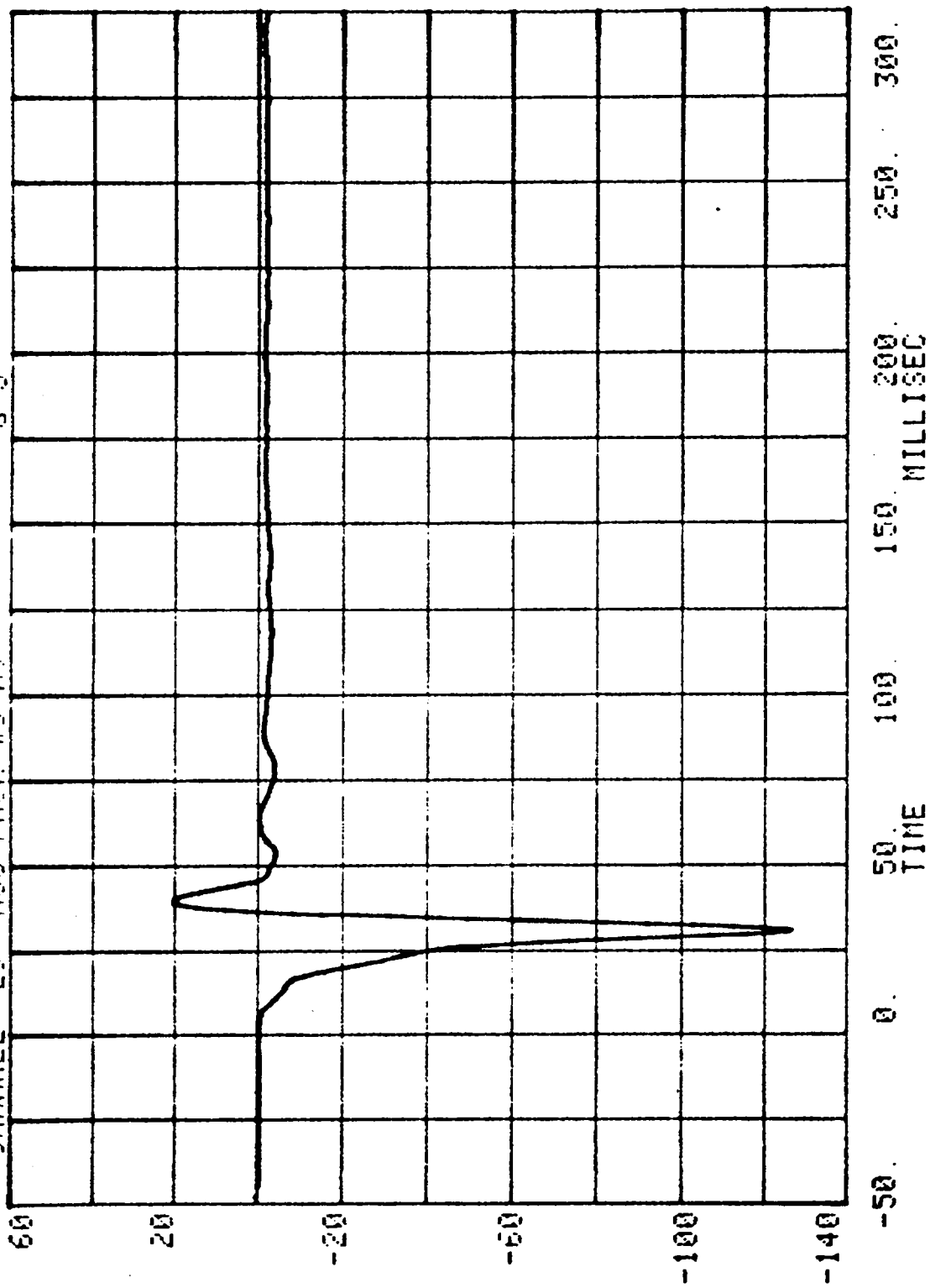
TIME

ACCEL #2 (x)

CHANNEL 4 DISPLACEMENT SERIES= 5102 INCHES

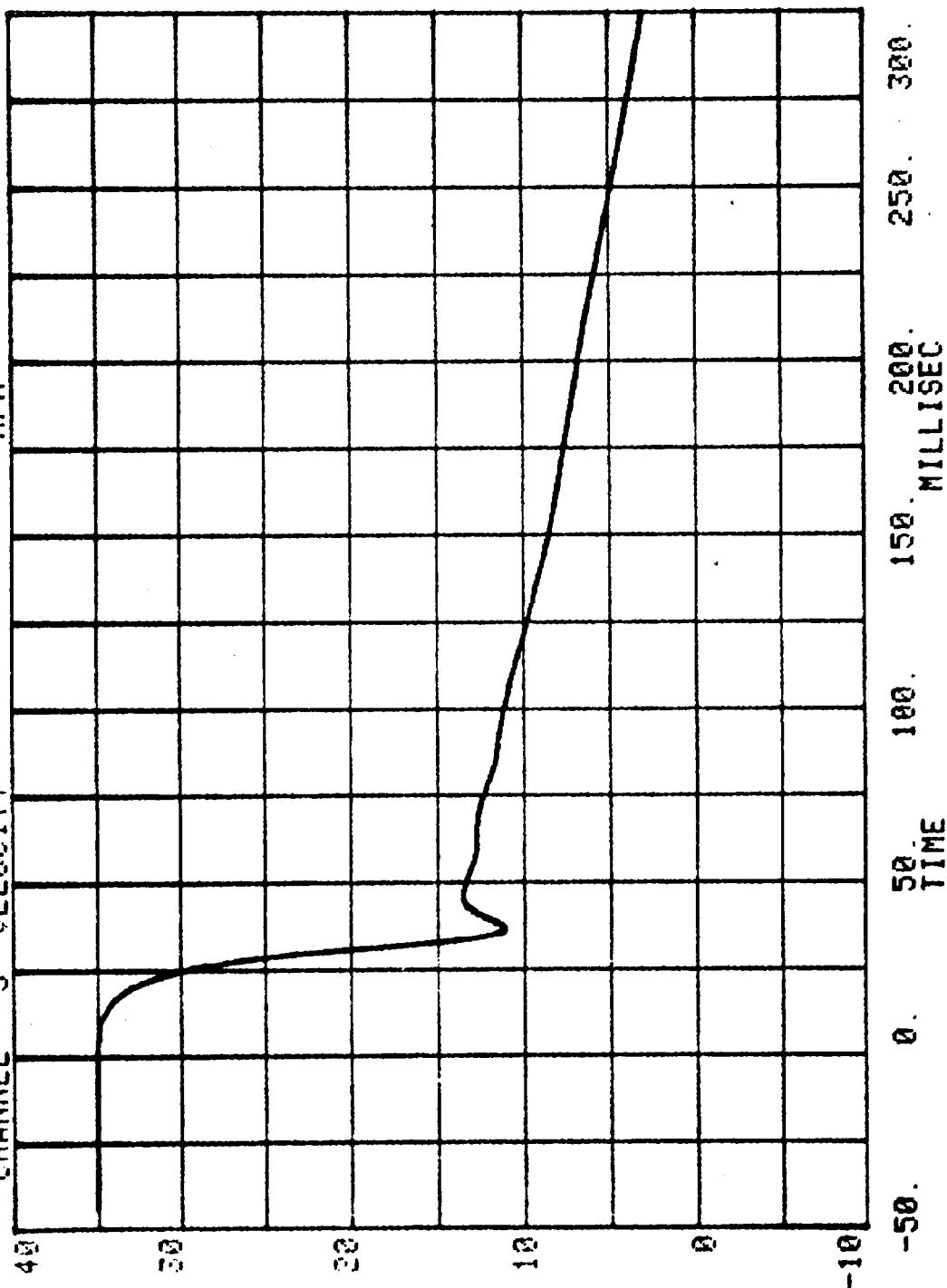


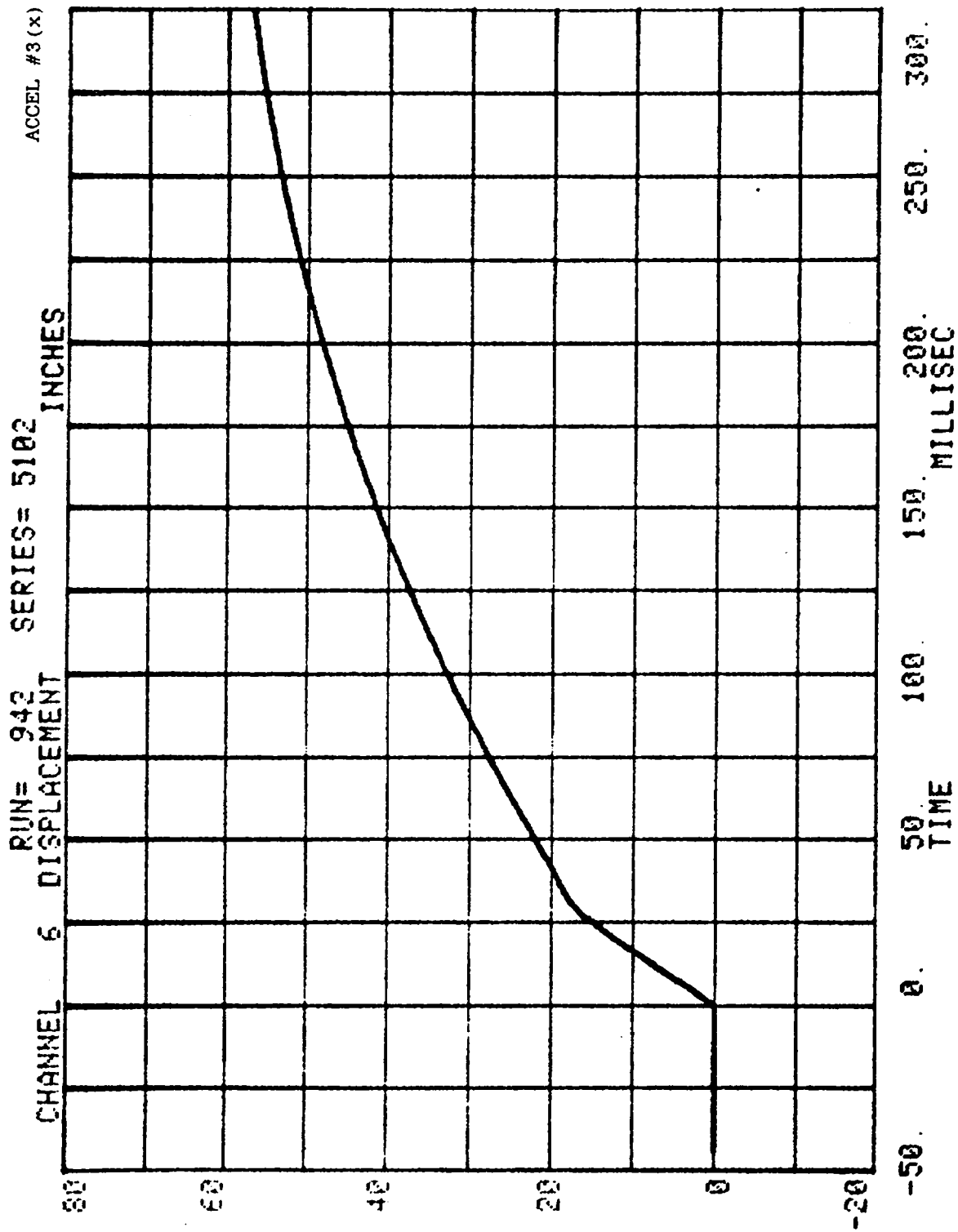
RUN= 942 SERIES= 5102
CHANNEL 29 ACC PACK #3000 G'S



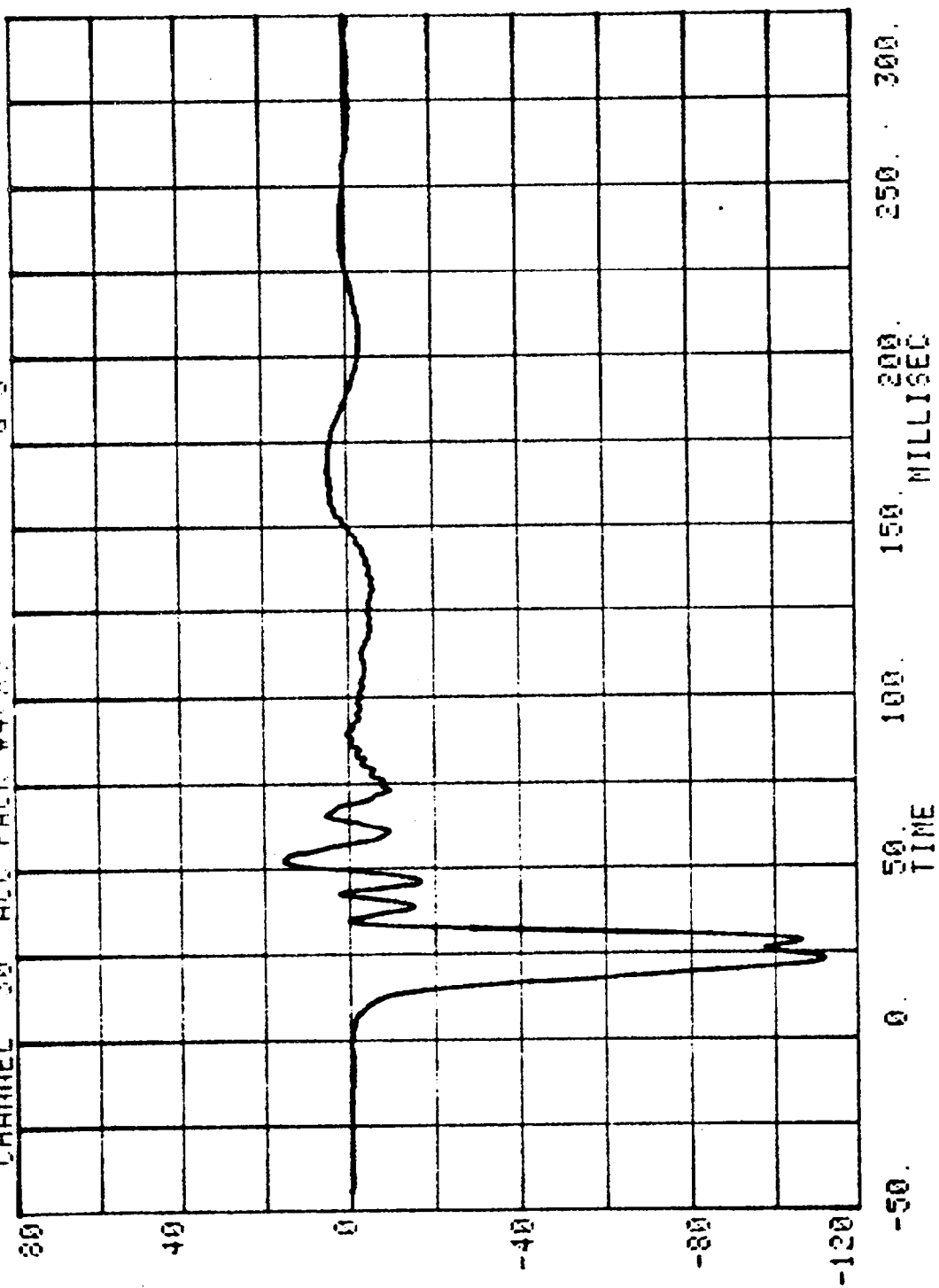
ACCEL #3(X)

CHANNEL 5 VELOCITY
RUN= 942 SERIES= 5102 MPH



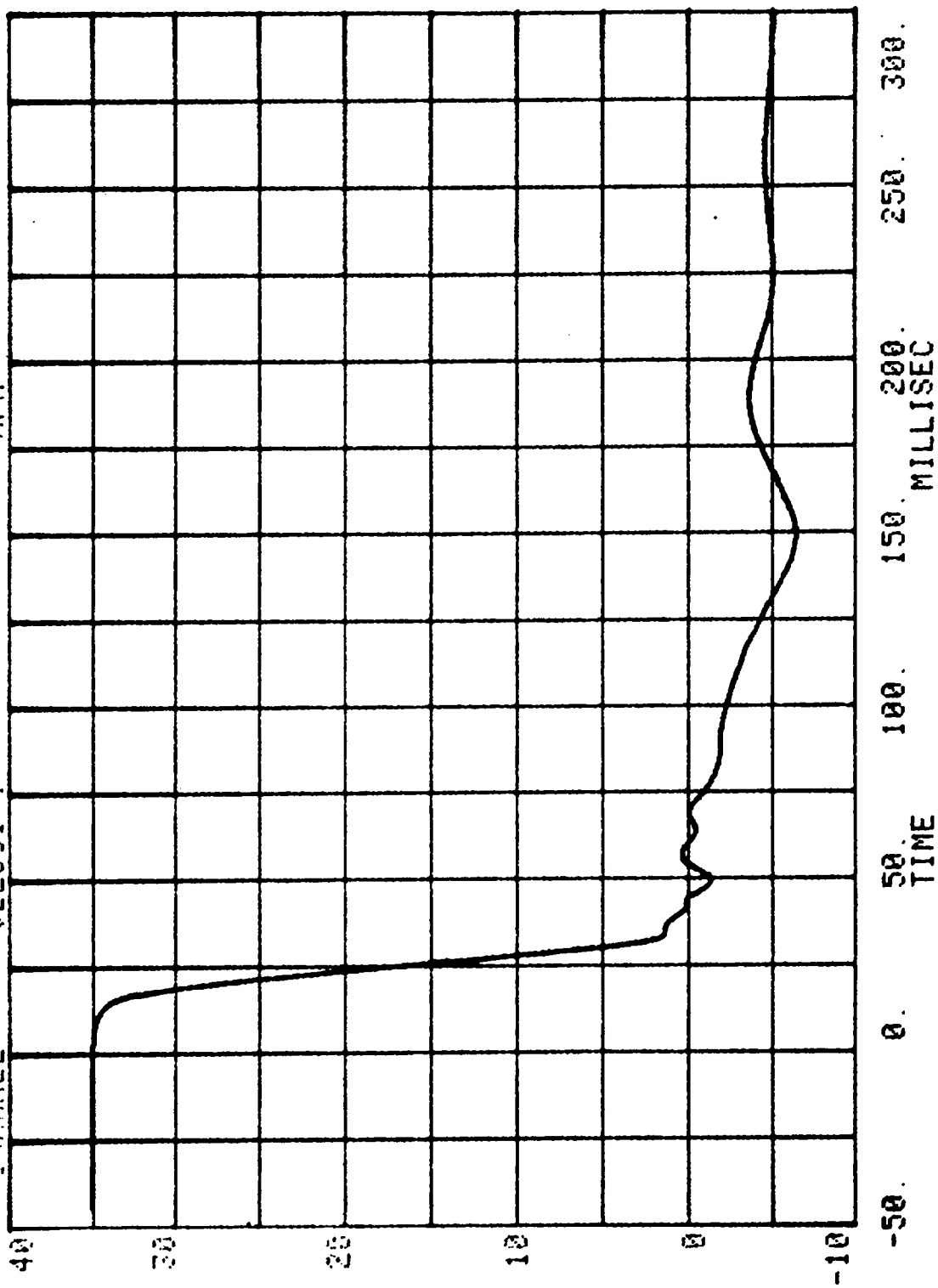


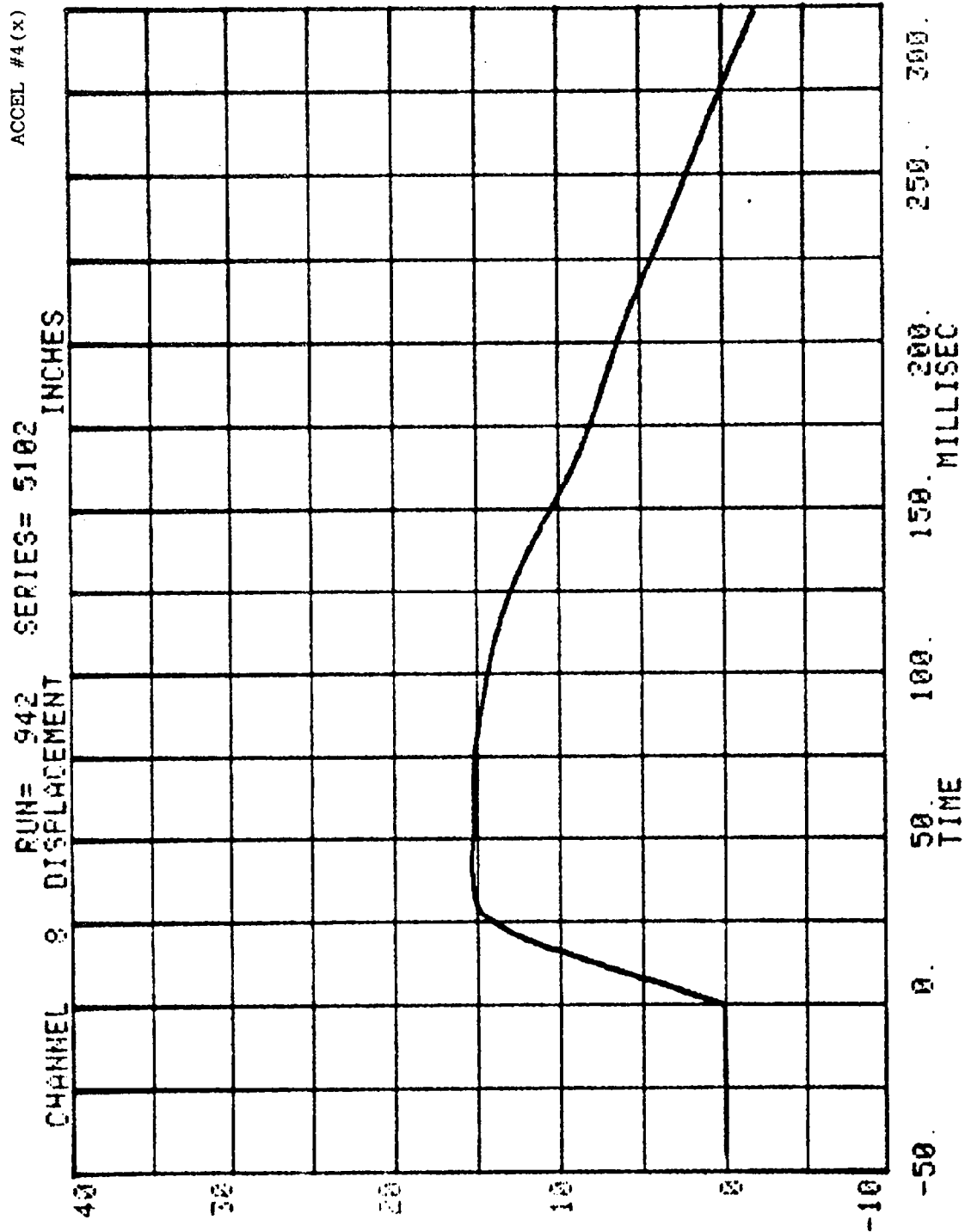
CHANNEL 30 ACC PACK #4(X) RUN= 942 SERIES= 5102 G'S



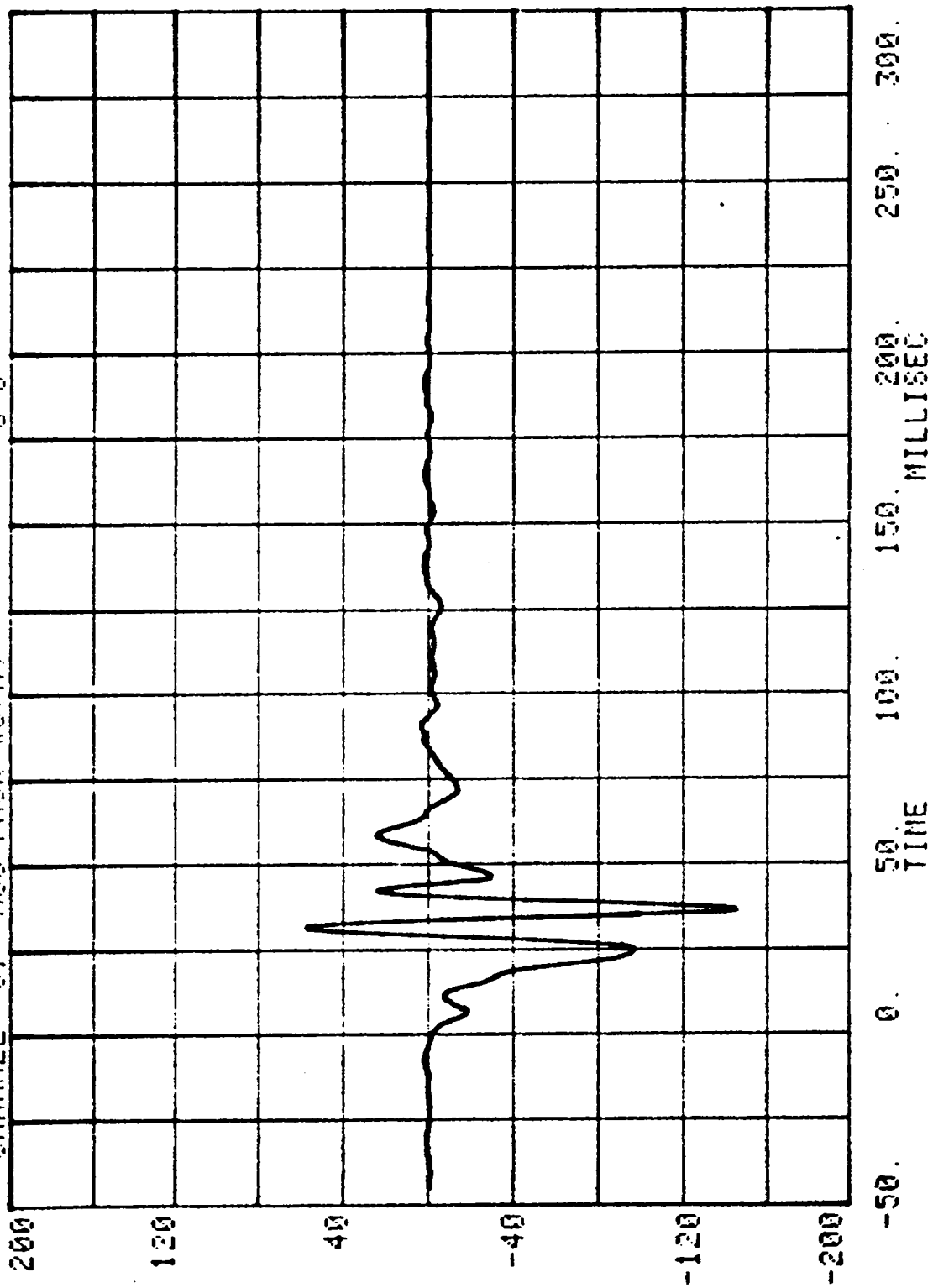
ACCEL #4 (x)

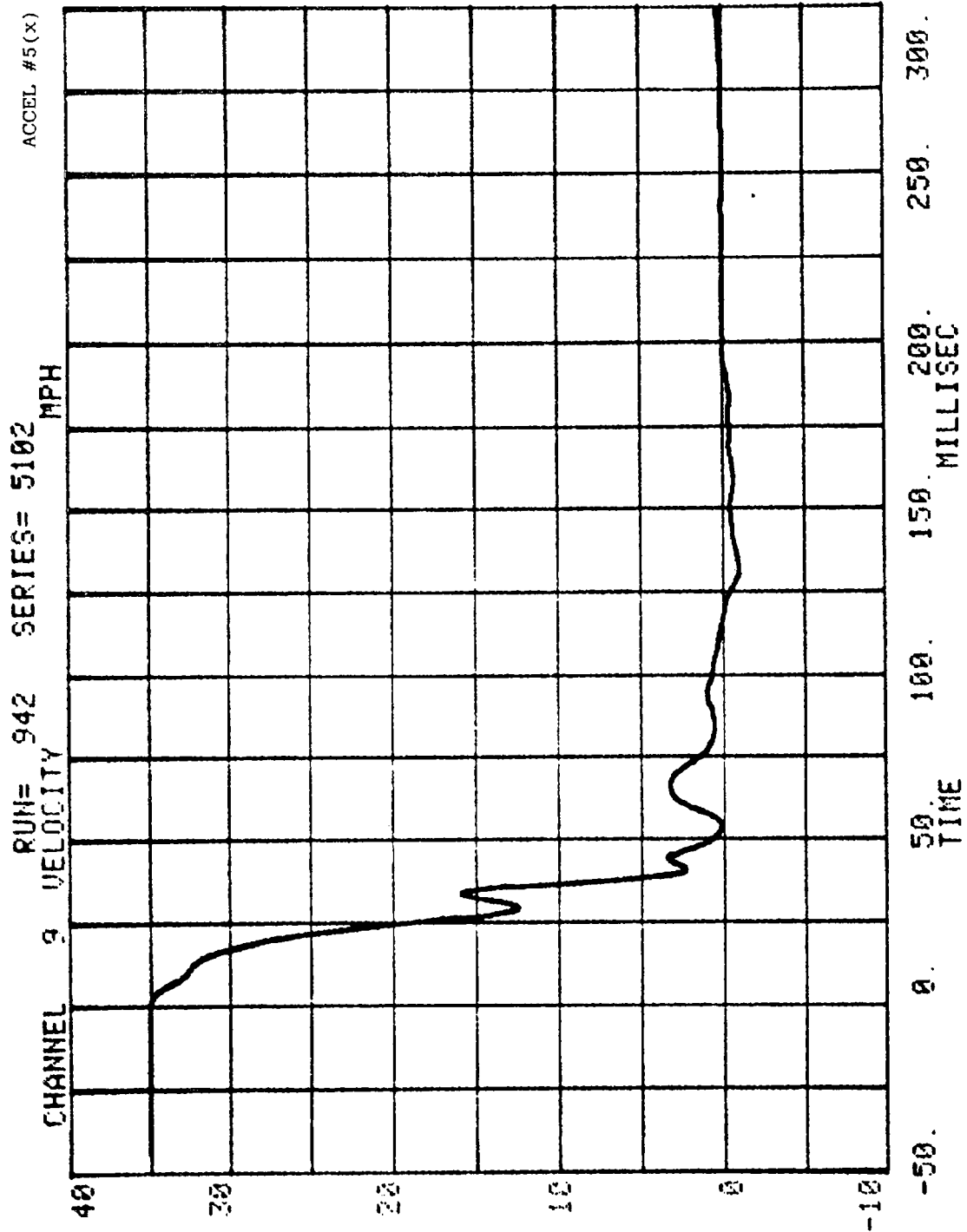
RUN= 342 SERIES= 5102
CHANNEL 7 VELOCITY MPH



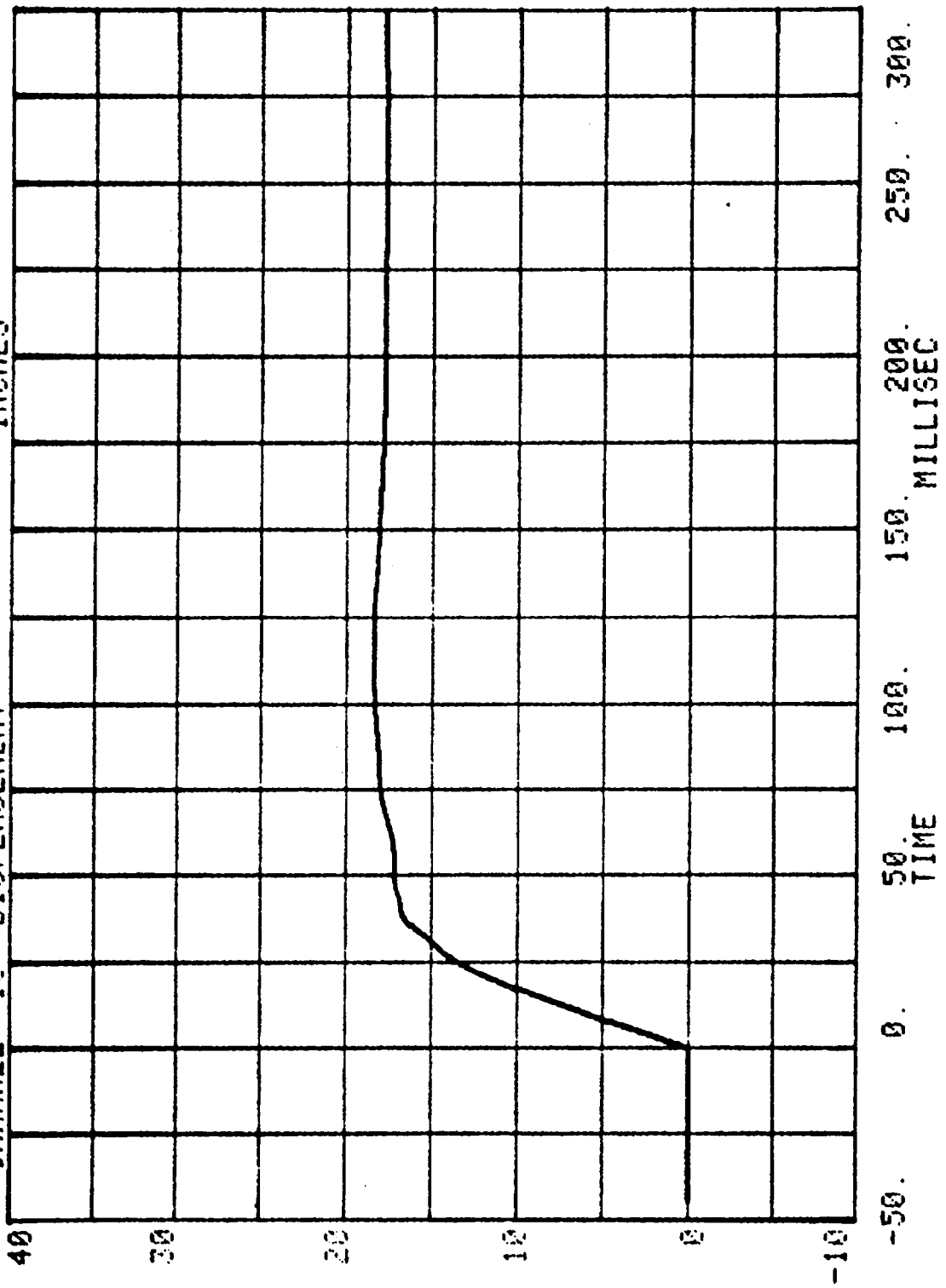


CHANNEL 31 ACC PACK #5(X) RUN= 242 SERIES= 5102 5'S

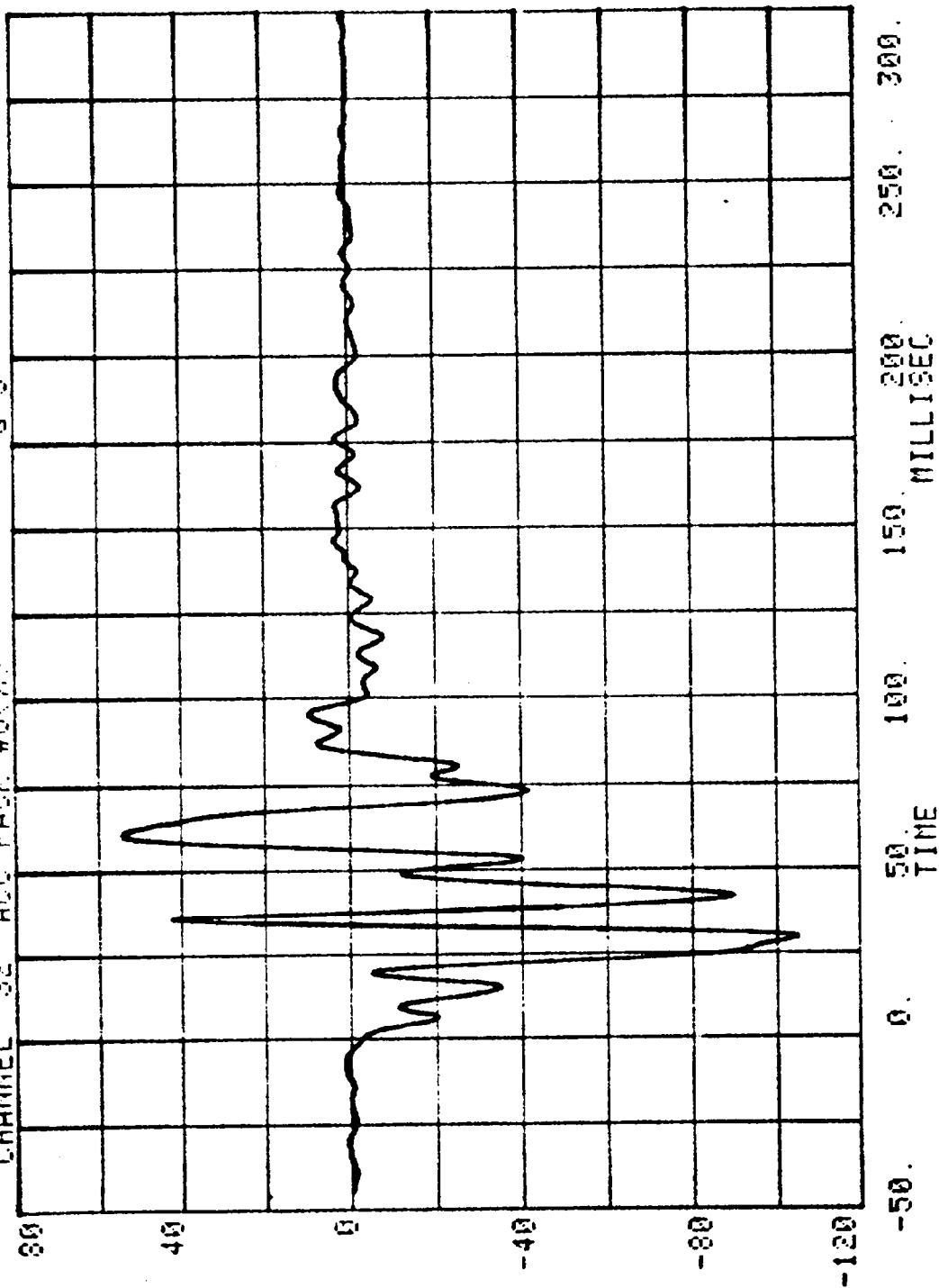




CHANNEL 10 DISPLACEMENT RUN= 942 SERIES= 5102 ACCEL #5 (x) INCHES



CHANNEL 32 ACC PACK #6020 RUN= 942 SERIES= 5102 513



ACCEL #6 (x)

RUN= 942 SERIES= 5102

MPH

CHANNEL 11 VELOCITY



250. 300.

200. MILLISEC

150.

100.

50. TIME

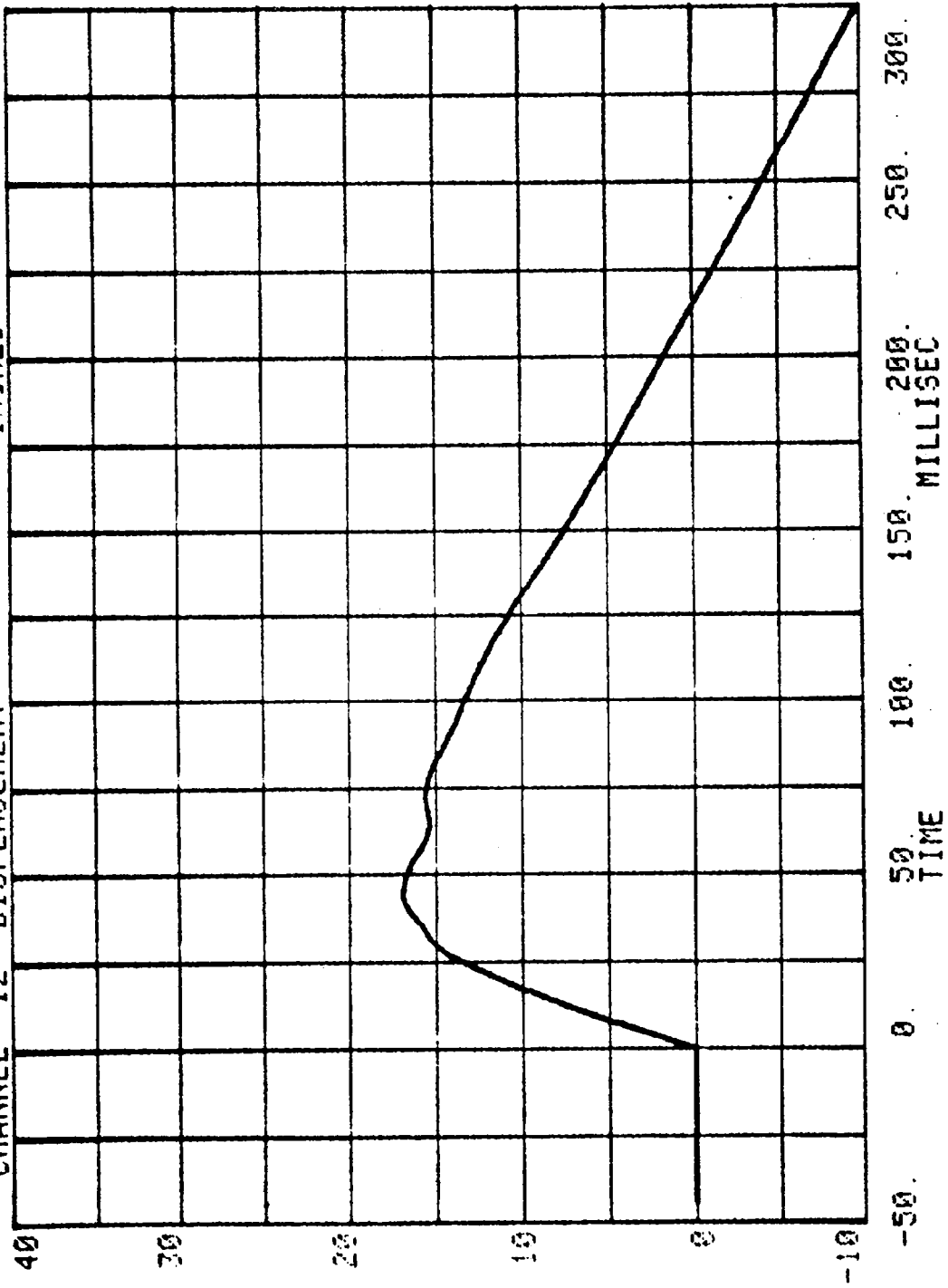
0.

-50.

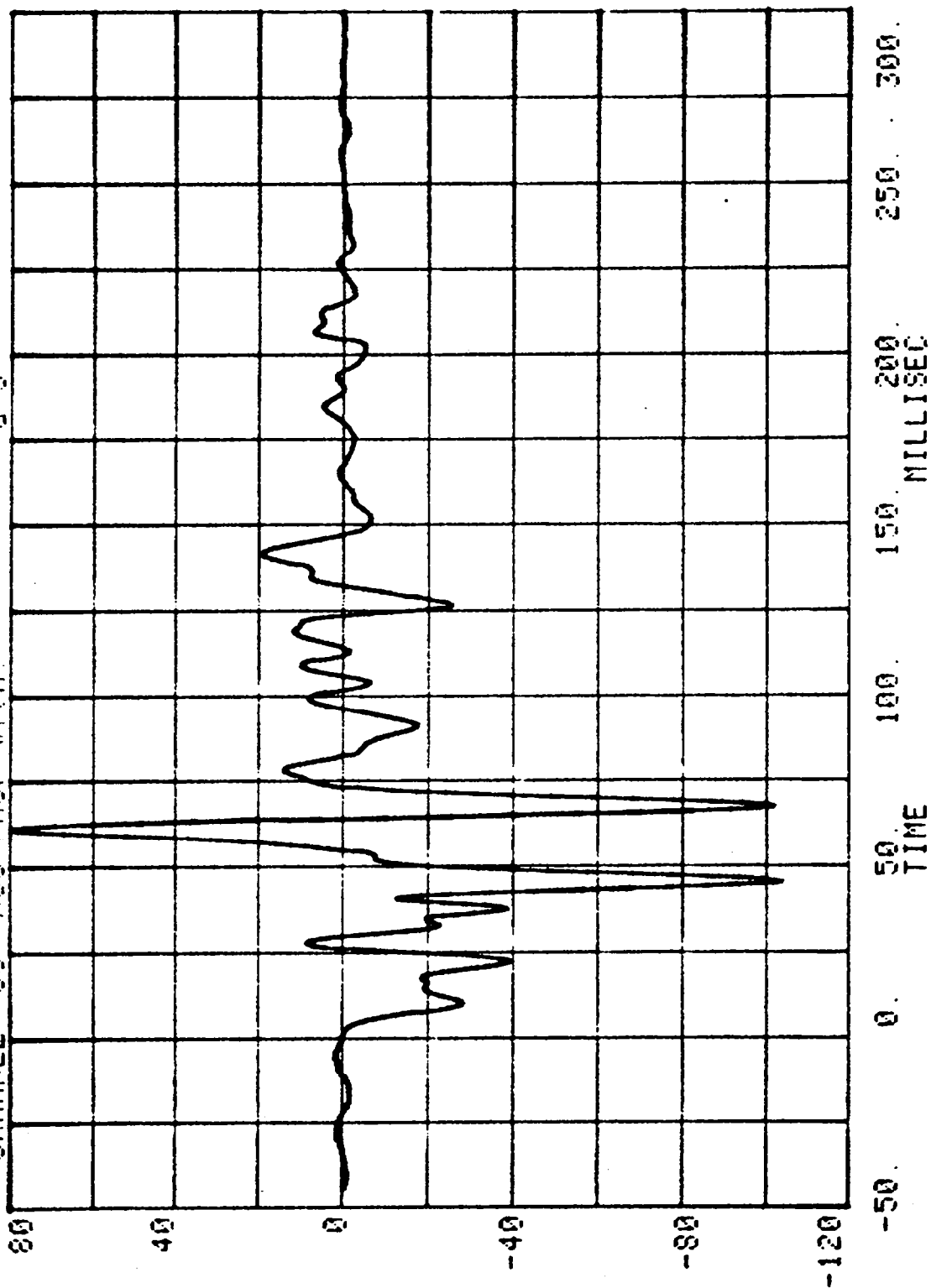
-10

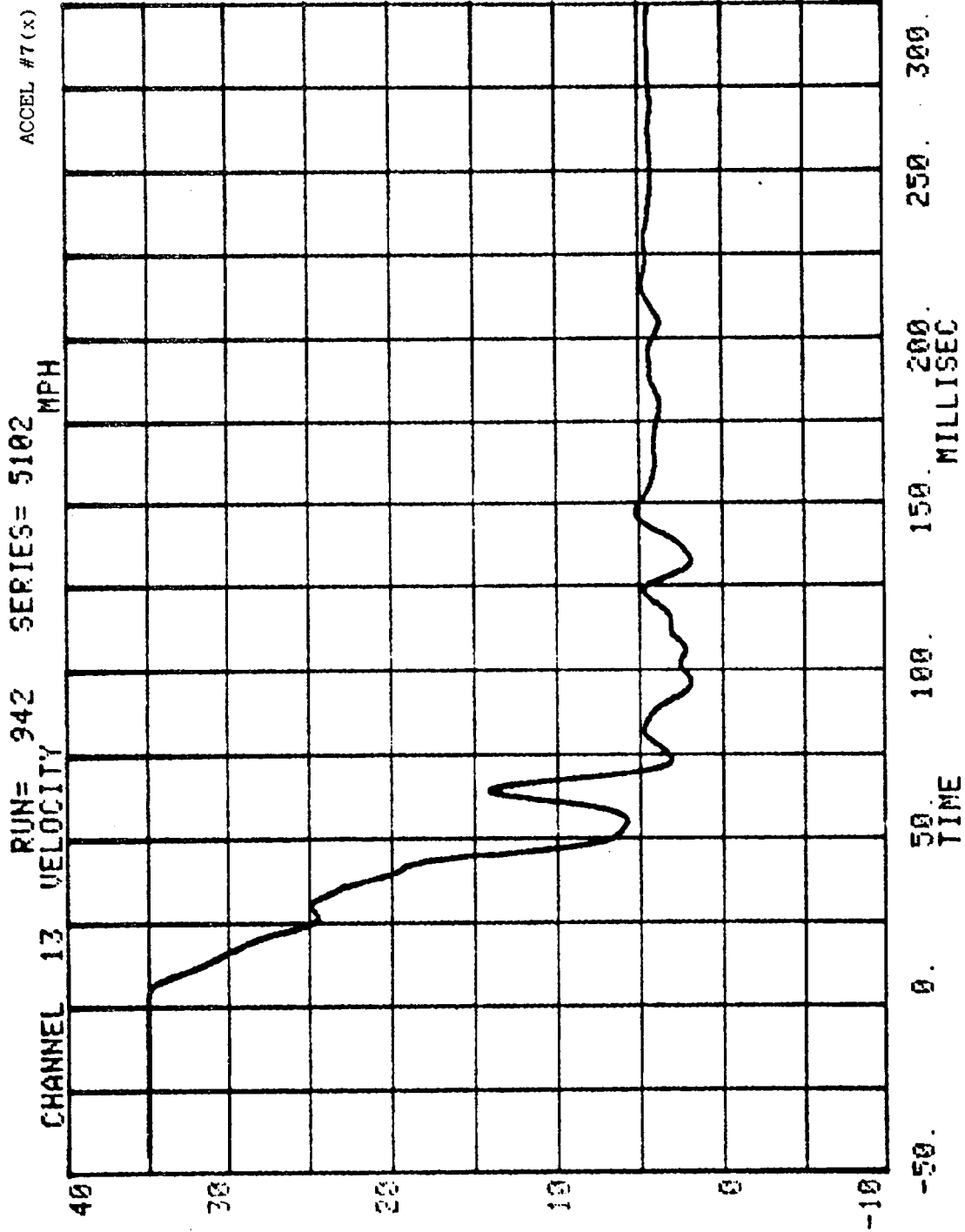
ACCEL #6 (x)

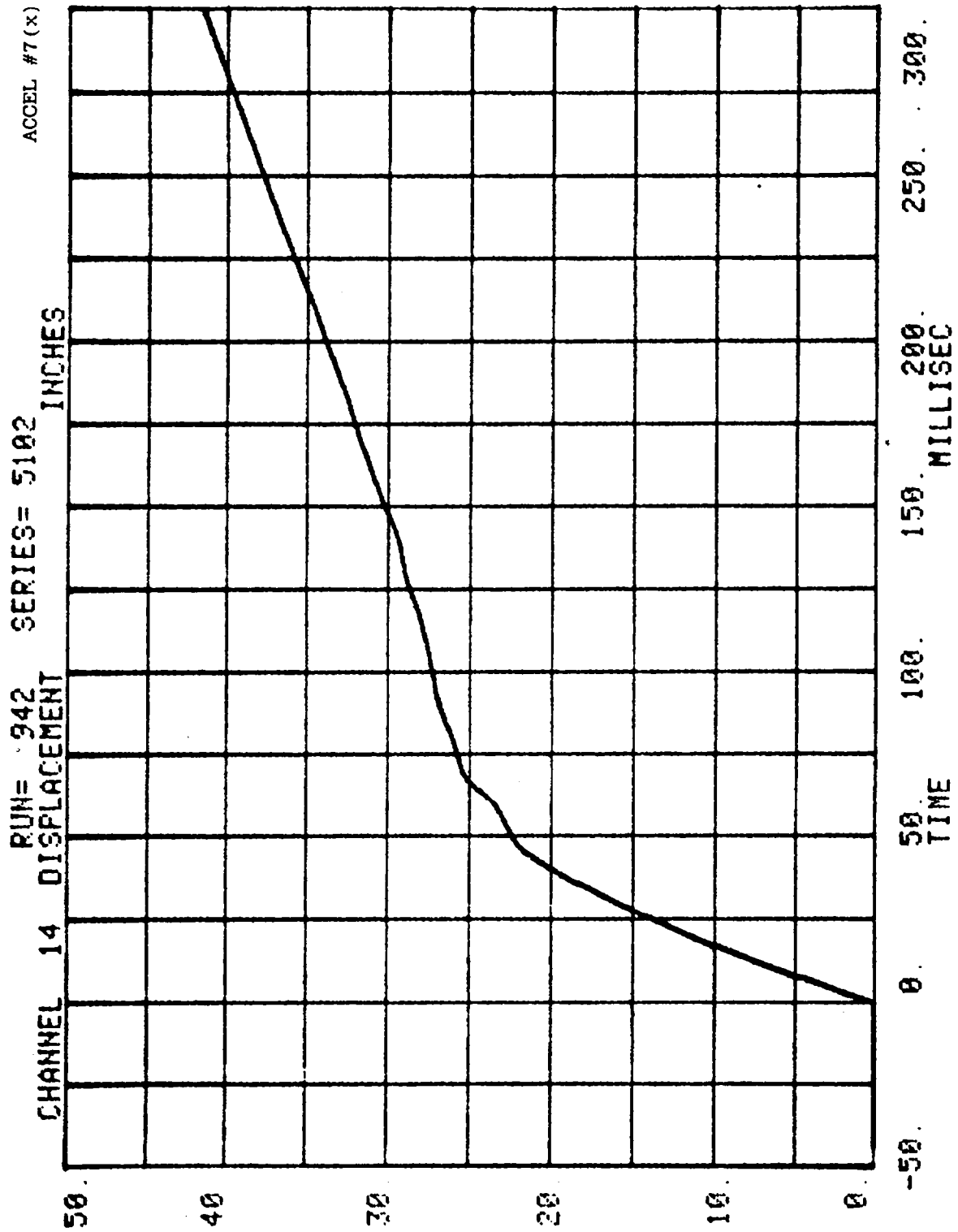
RUN= 942 SERIES= 5102 INCHES
CHANNEL 12 DISPLACEMENT



CHANNEL 33 ACC PACK #7 (H) RUN= 942 SERIES= 5102 G'S







TEST NO. ML5102

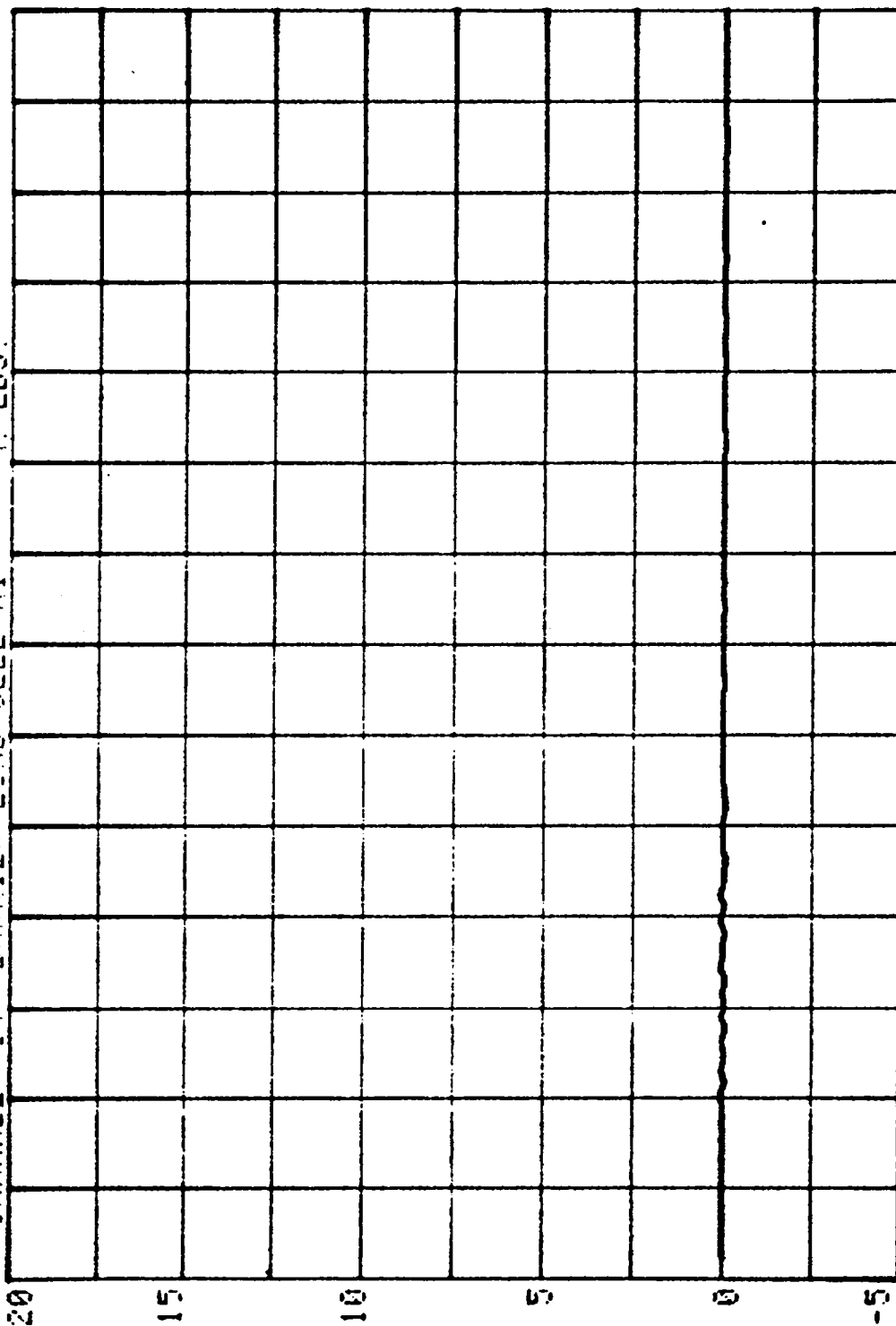
LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

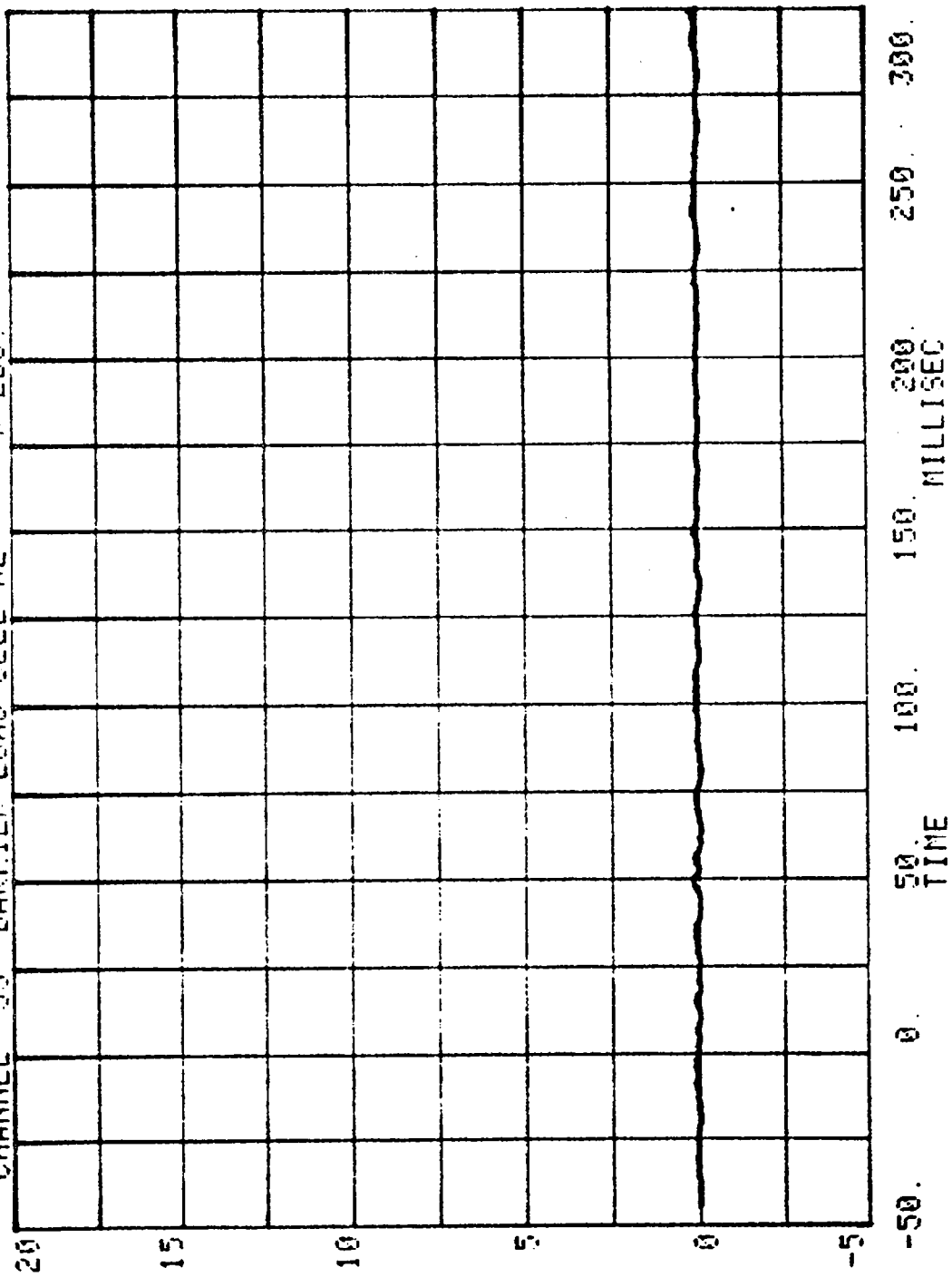
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CHANNEL 34 BARRIER LOAD CELL A1 K LBS.

RUN= 942 SERIES= 5102

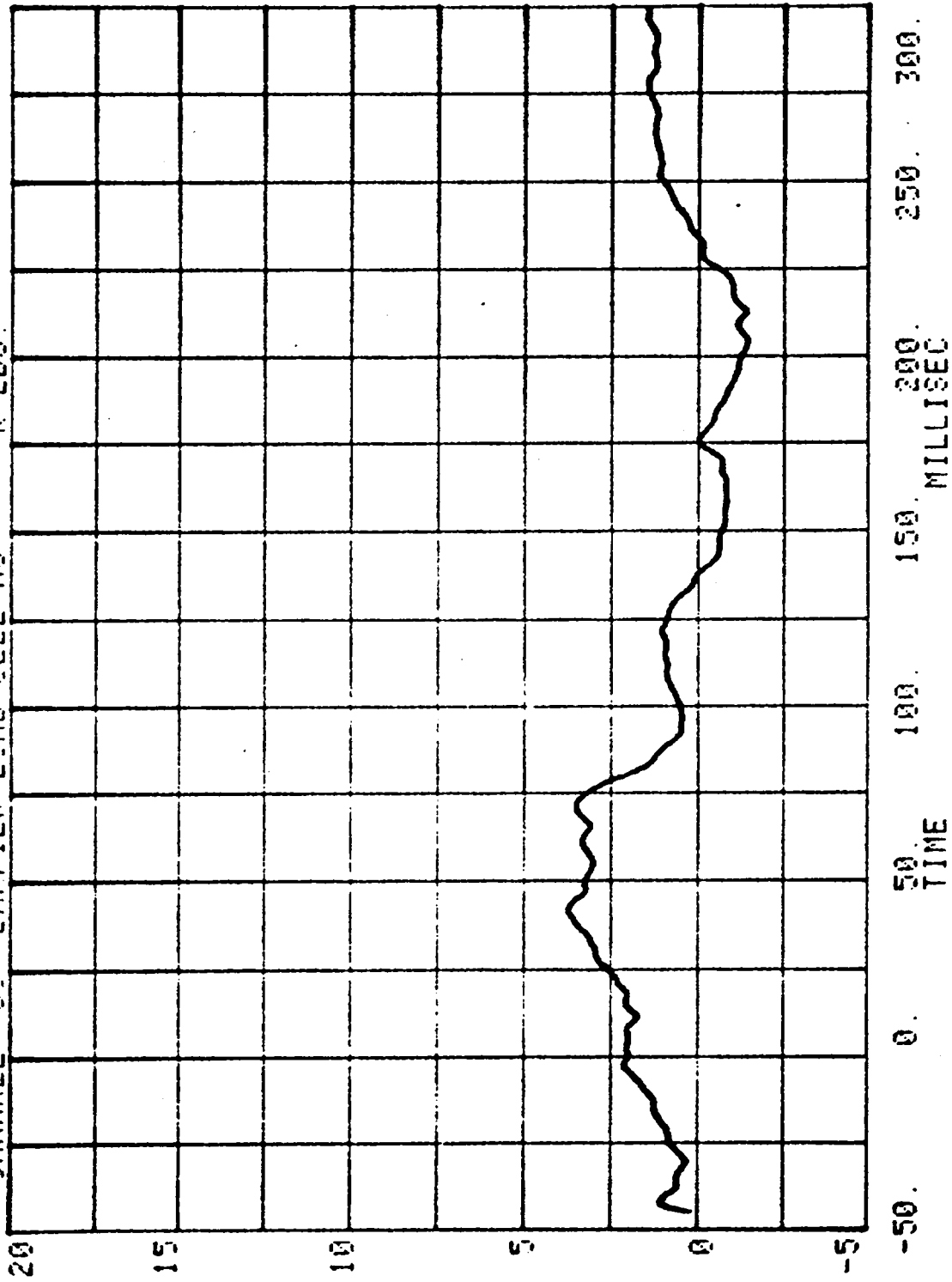


CHANNEL 35 BARRIER LOAD CELL A2
RUN= 942 SERIES= 5102 K LBS.



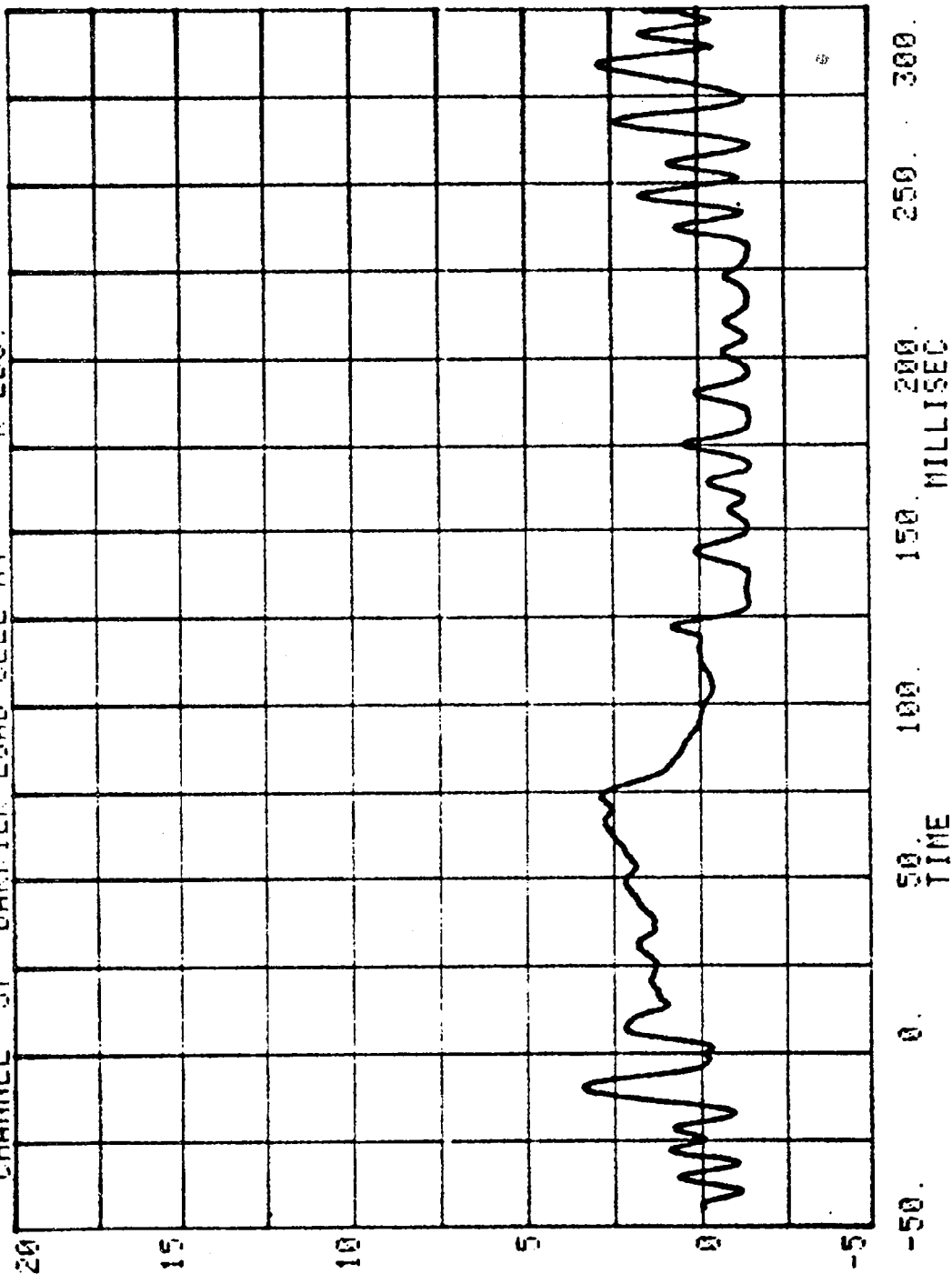
Data is not accurate

CHANNEL 36 BARRIER LOAD CELL A3
FUH= 942 SERIES= 5102 K LBS.

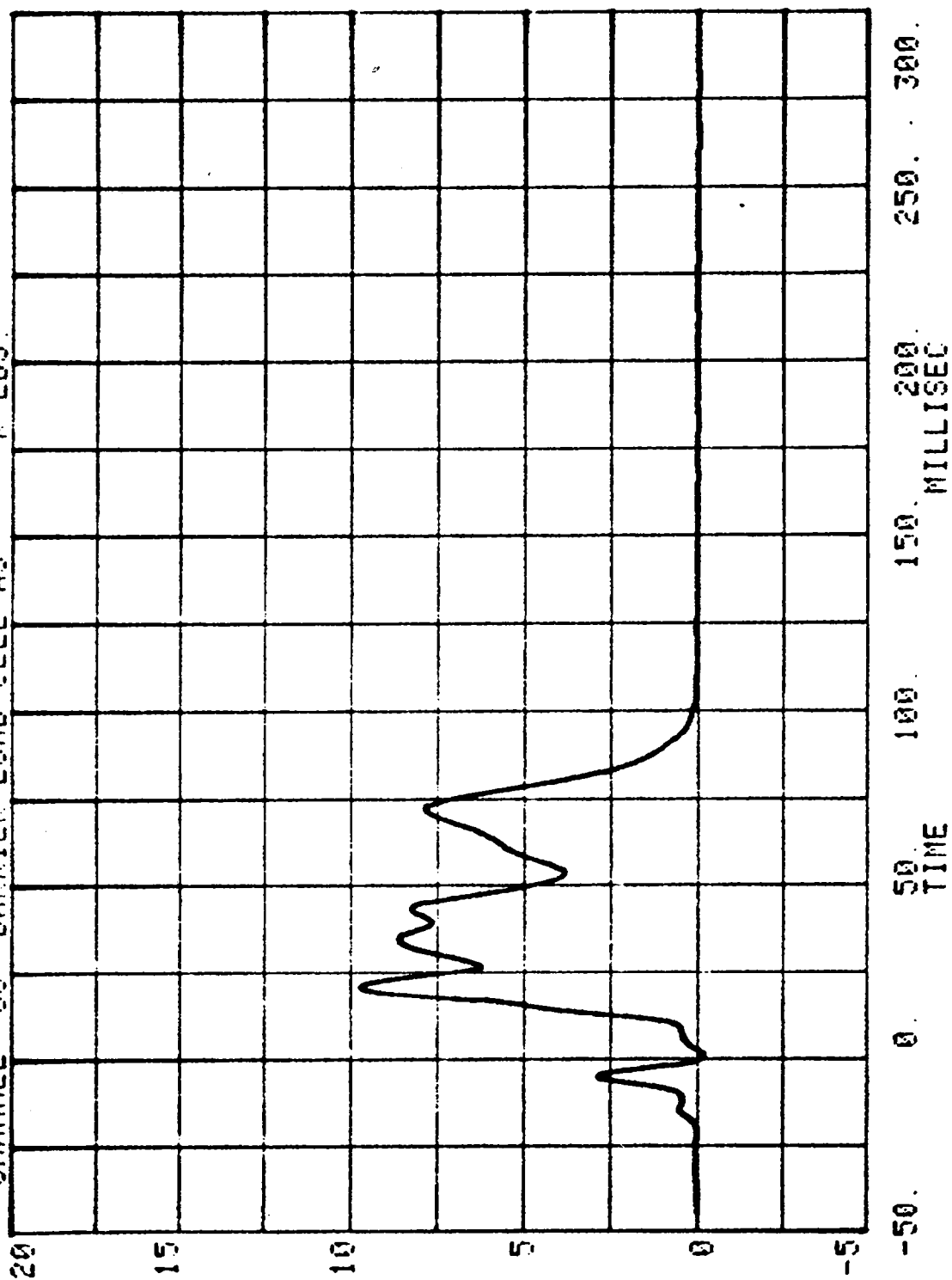


Data is not accurate

CHANNEL 37 BARRIER LOAD CELL A4 RUN= 342 SERIES= 5102 K LBS.

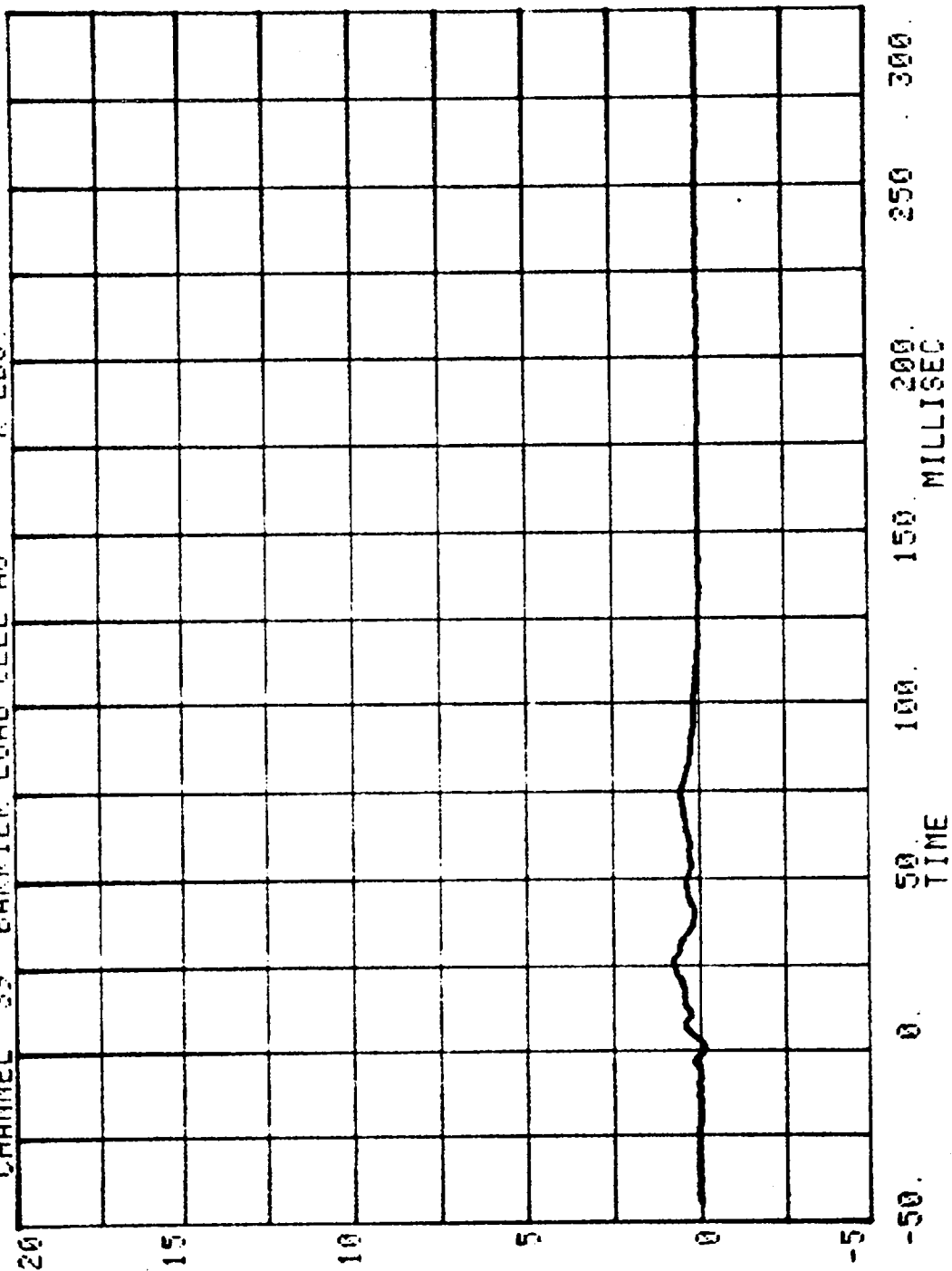


CHANNEL 38 BARRIER LOAD CELL H5 RUN= 942 SERIES= 5102 K LBS.

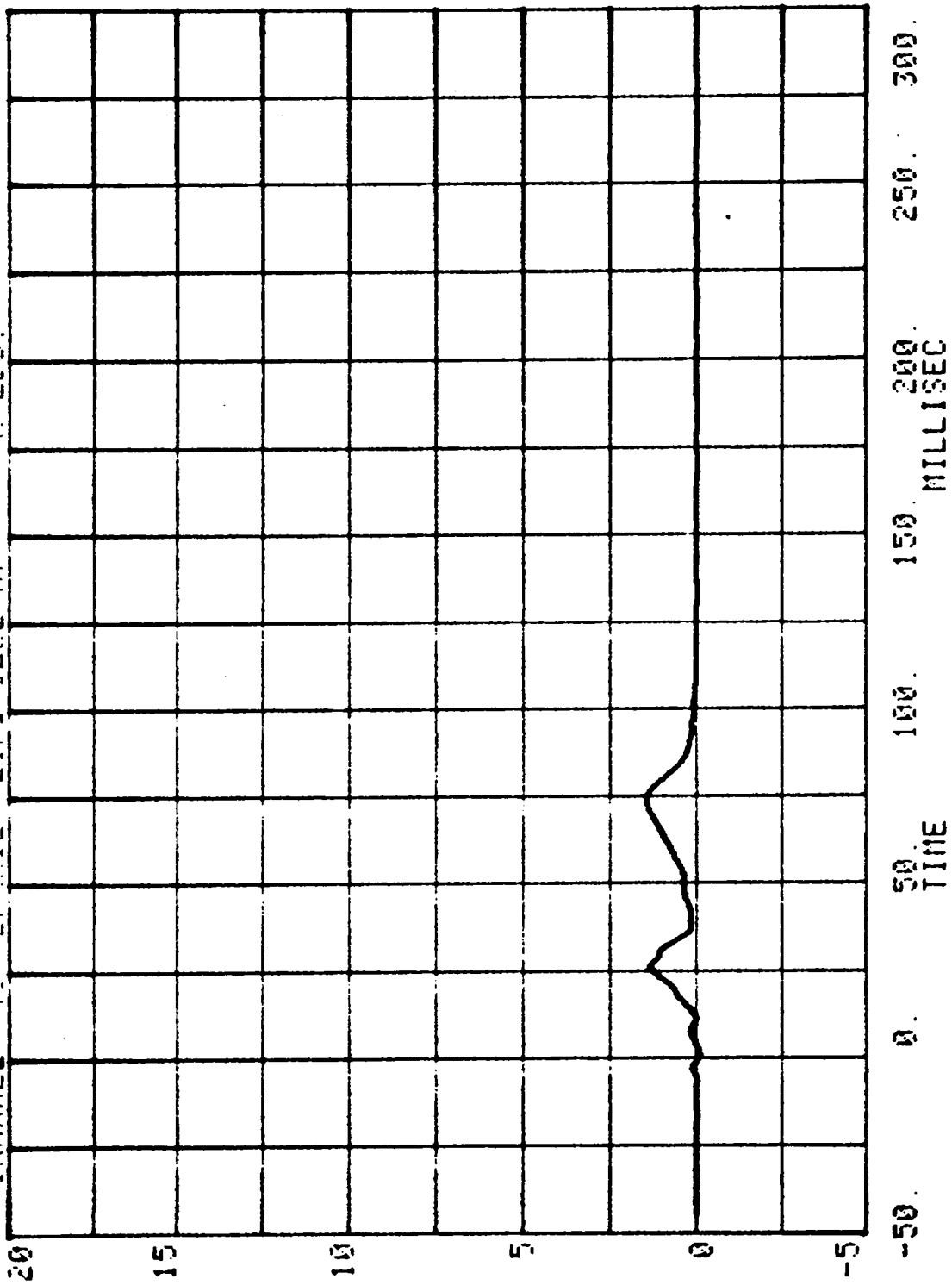


CHANNEL 39 BARRIER LOAD CELL A6 K LBS.

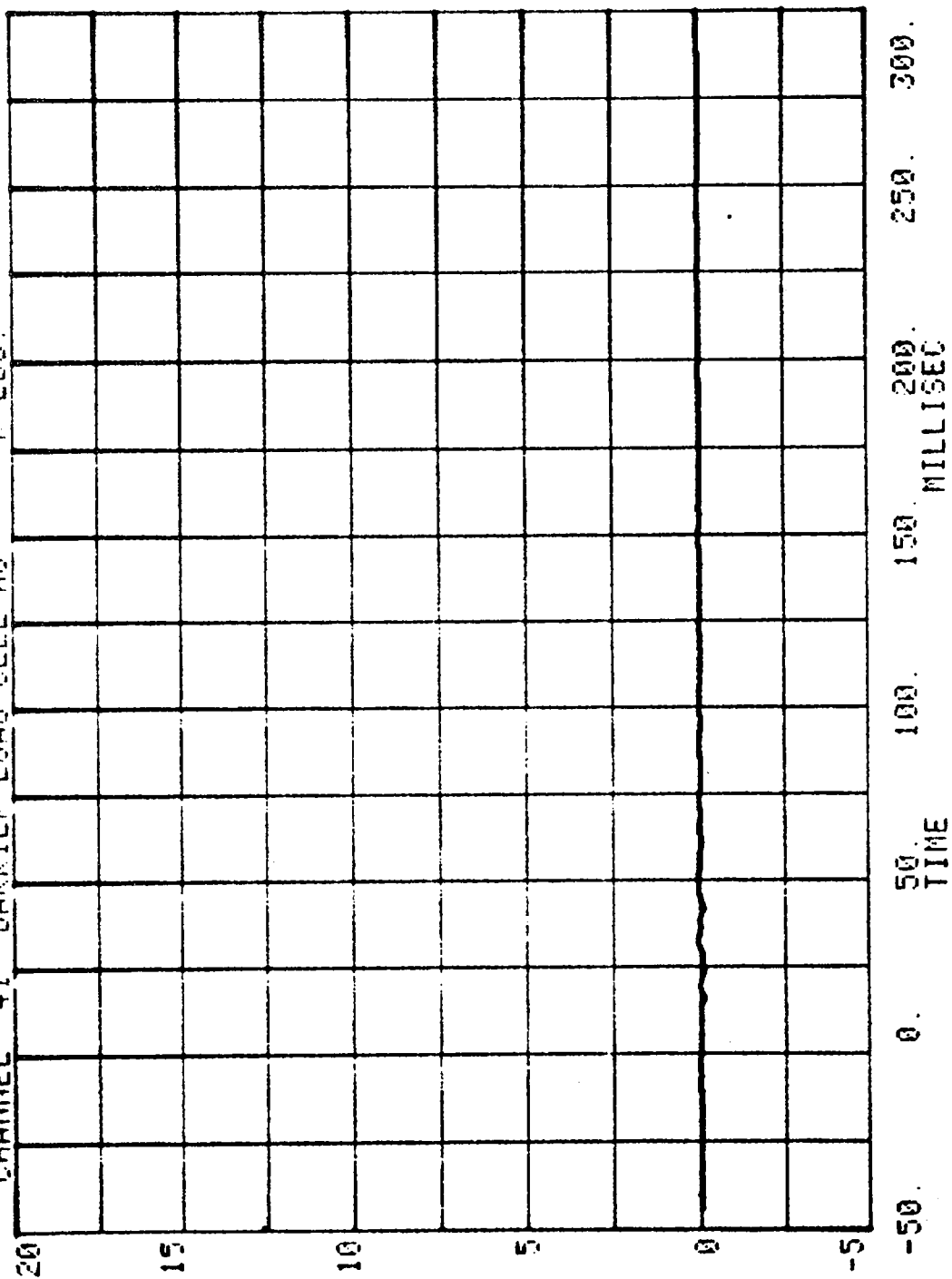
RUN= 942 SERIES= 5102



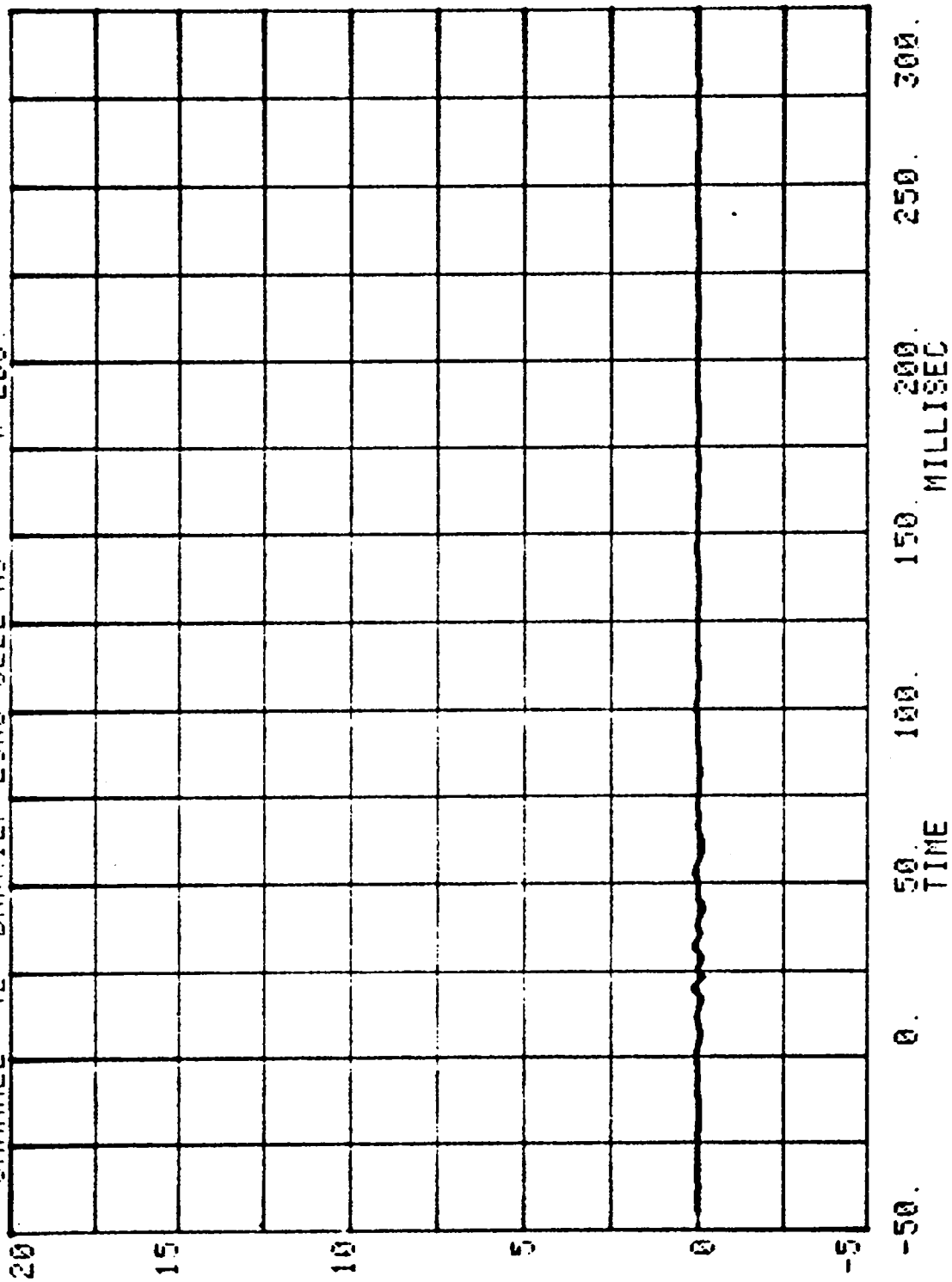
CHANNEL 40 BARRIER LOAD CELL A7 K LBS.
RUN= 942 SERIES= 5102



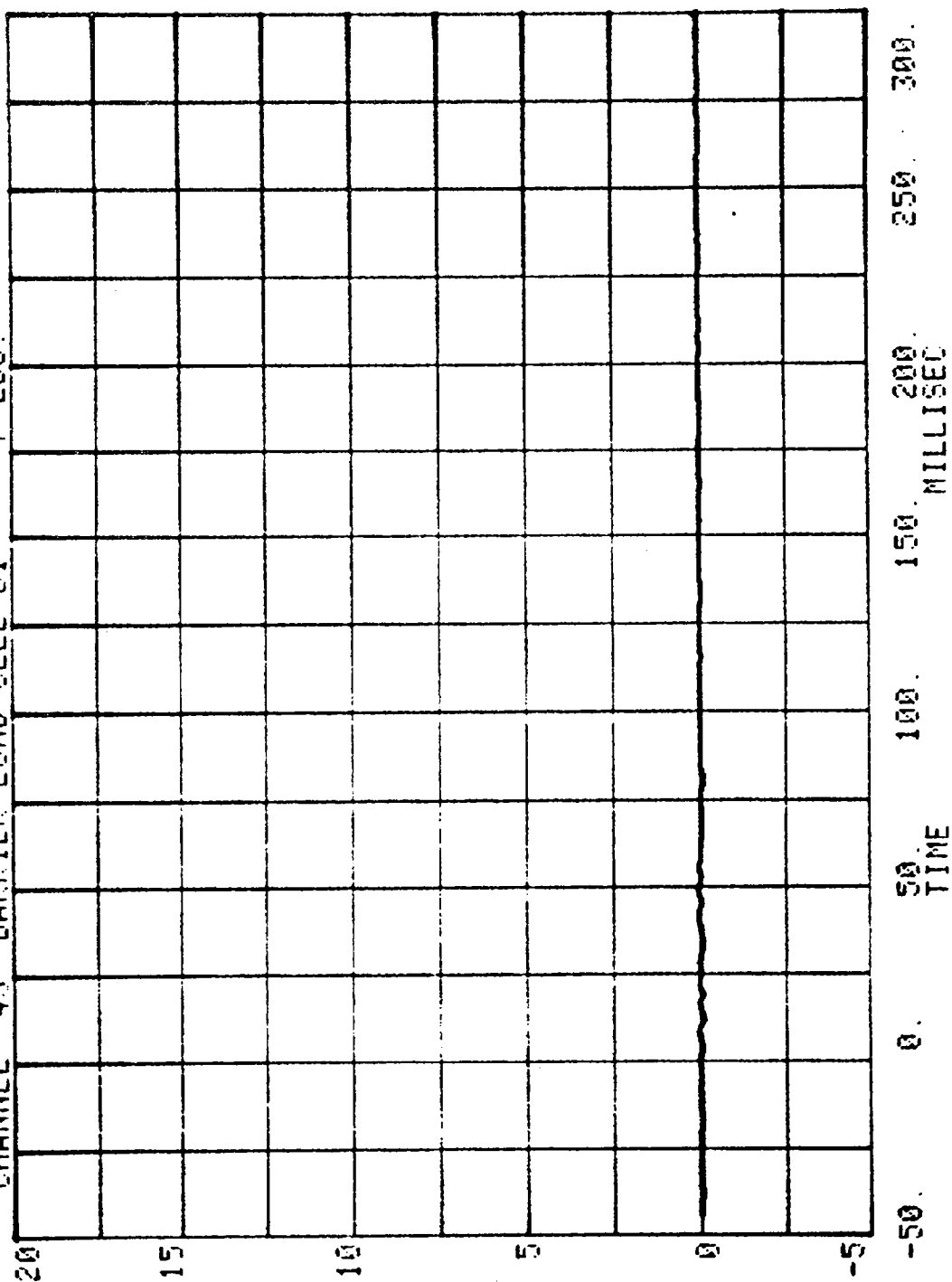
CHANNEL 41 BARRIER LOAD CELL A8
RUN= 942 SERIES= 5102 K LBS.



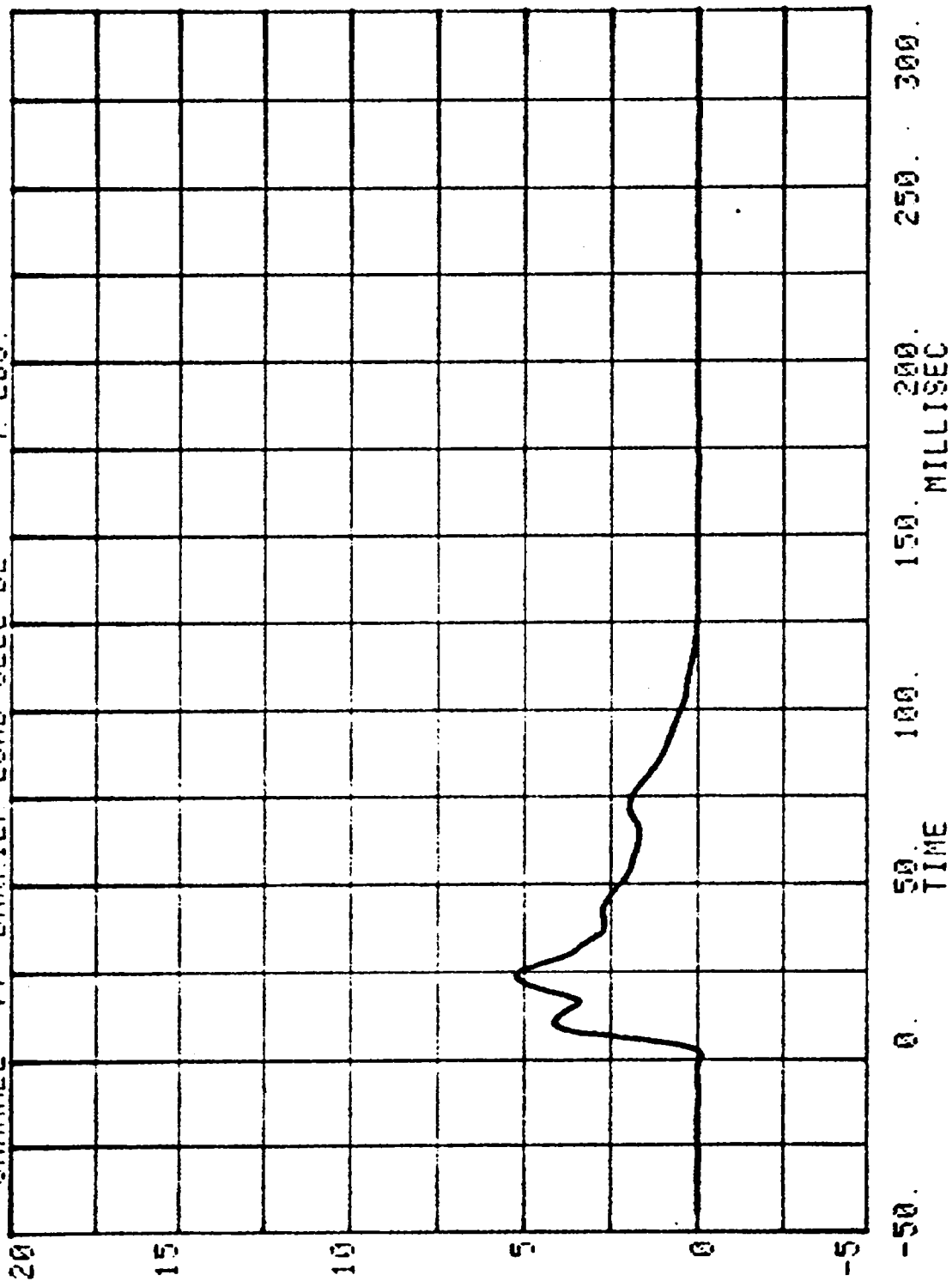
RUN= 942 SERIES= 5102
CHANNEL 42 BARRIER LOAD CELL A9 Y LBS



CHANNEL 43 BARRIER LOAD CELL B1
FUH= 242 SERIES= 5102 K LBS.

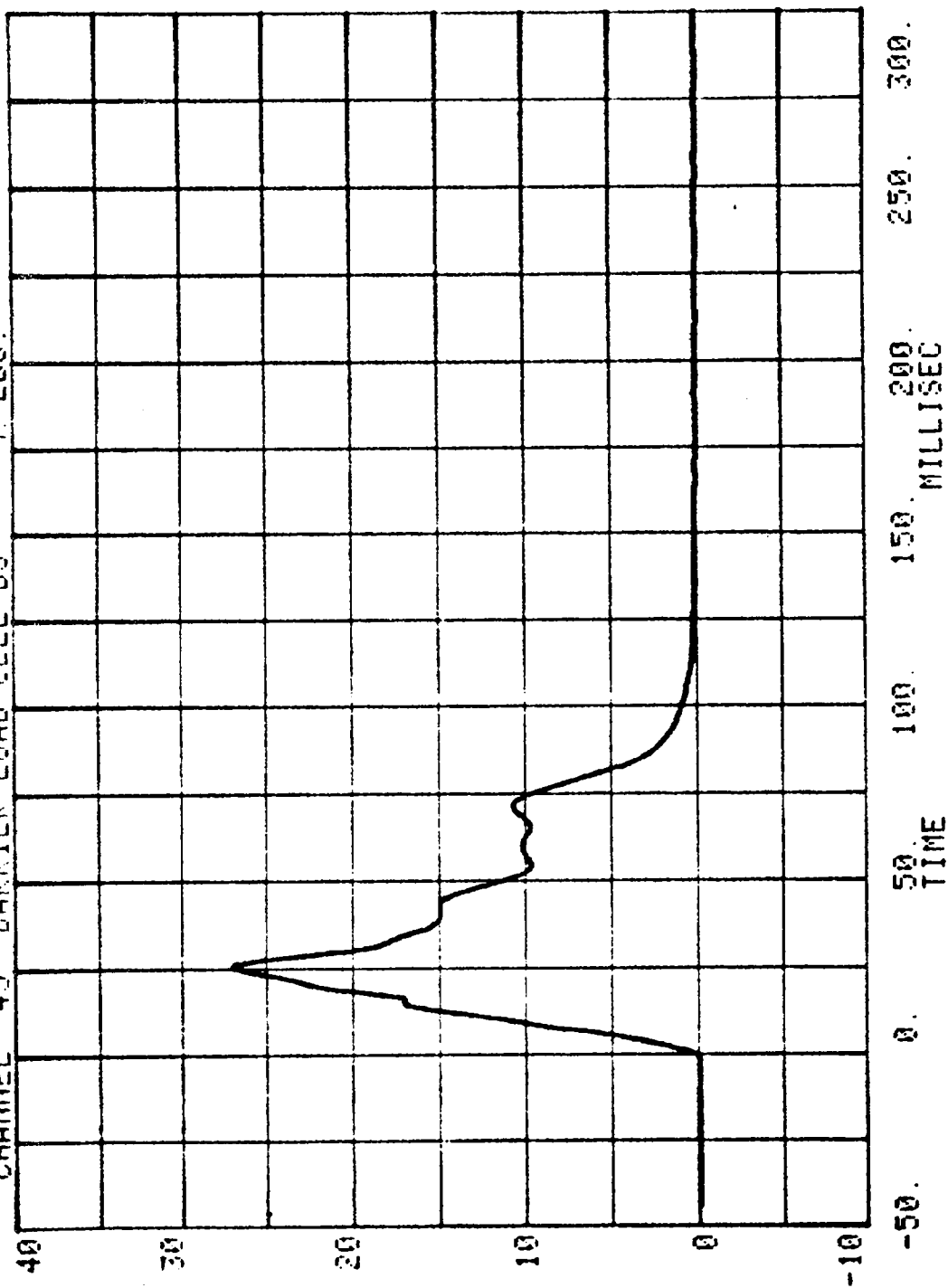


CHANNEL 44 BARRIER LOAD CELL B2
RUN= 942 SERIES= 5102 K LBS.



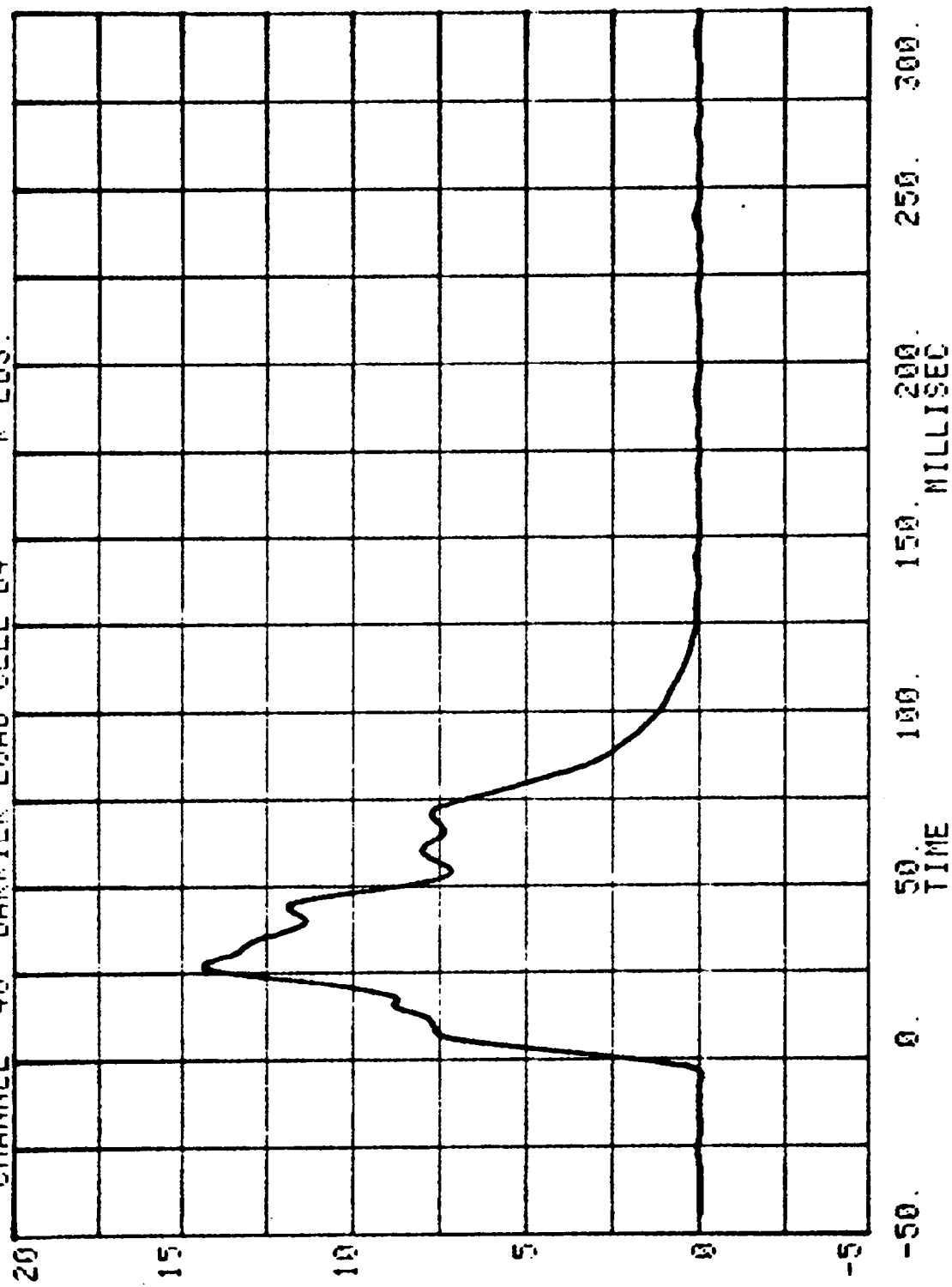
CHANNEL 45 BARRIER LOAD CELL B3 K LBS.

RUN= 942 SERIES= 5102



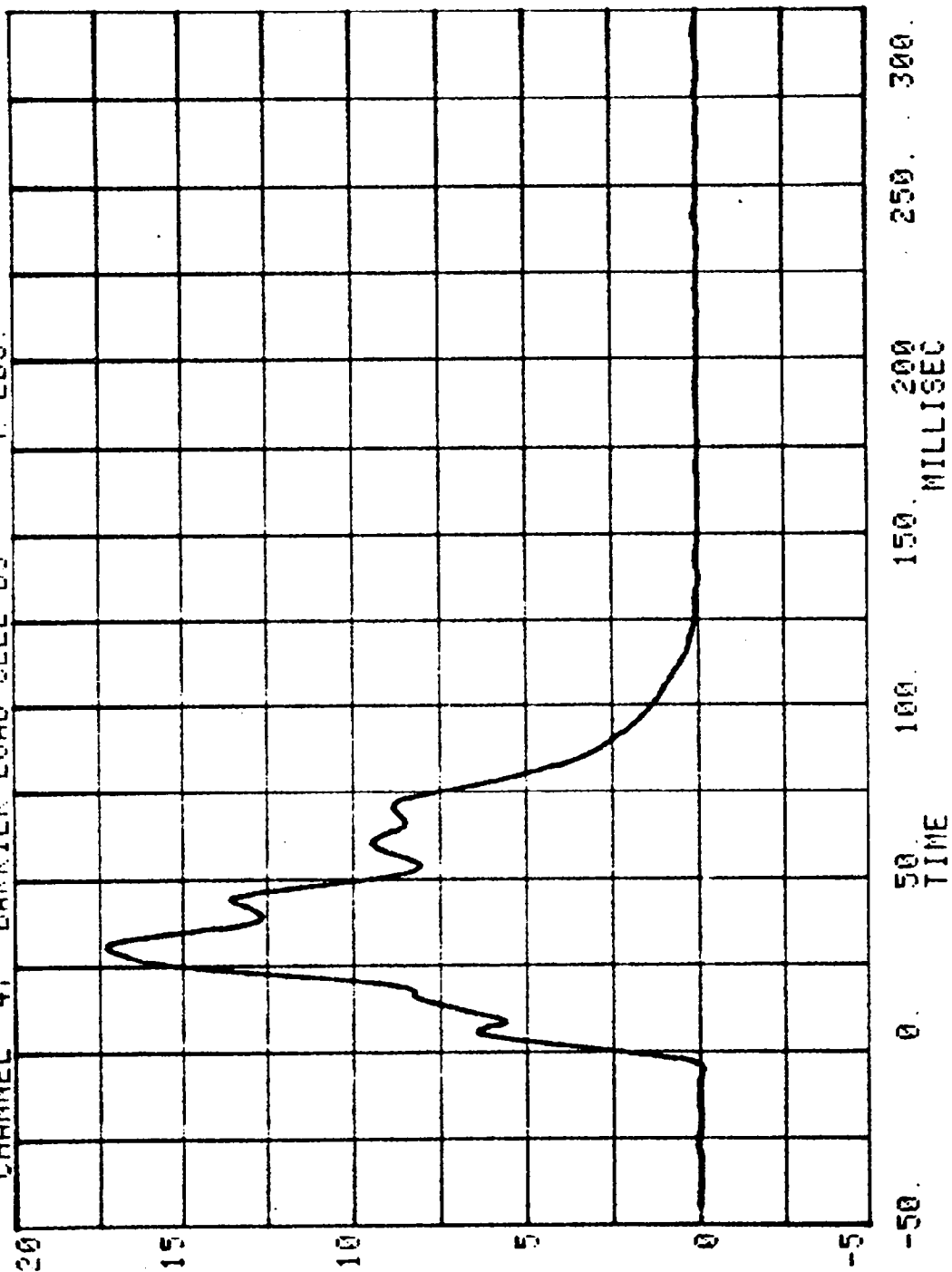
CHANNEL 46 BARRIER LOAD CELL B4 K LBS.

RUN= 942 SERIES= 5102

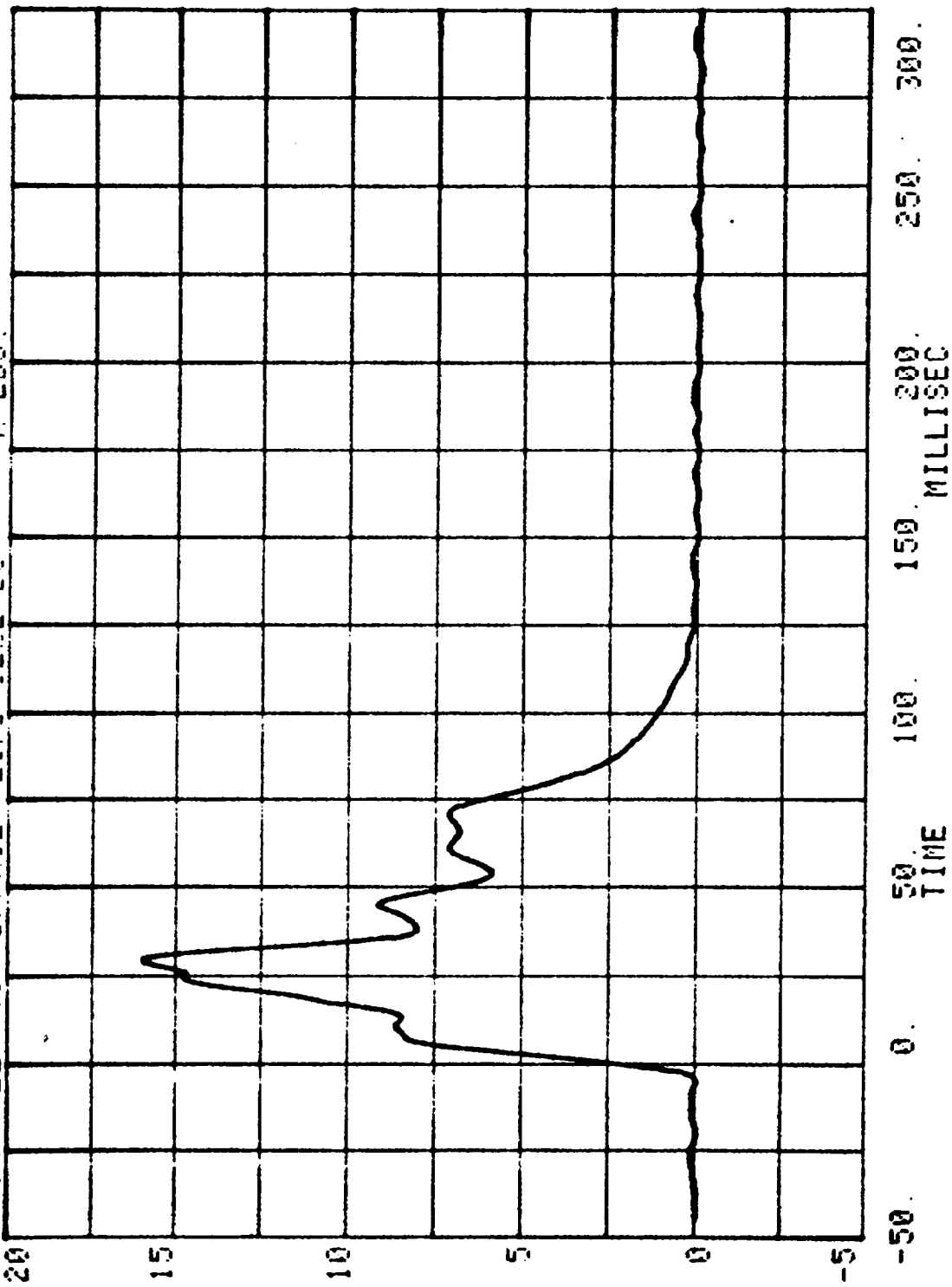


CHANNEL 47 BARRIER LOAD CELL B5 K LBS.

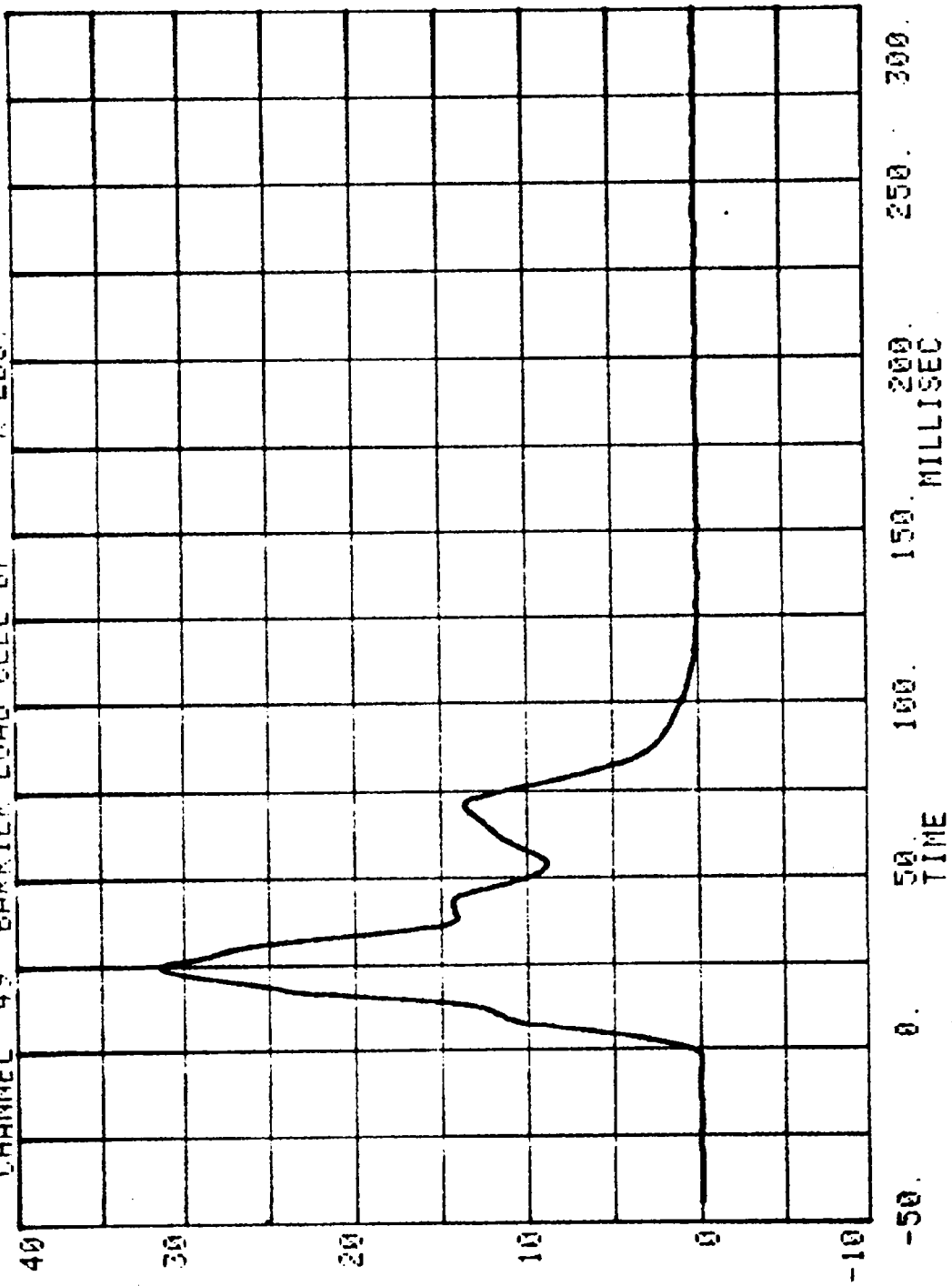
RUN= 942 SERIES= 5102



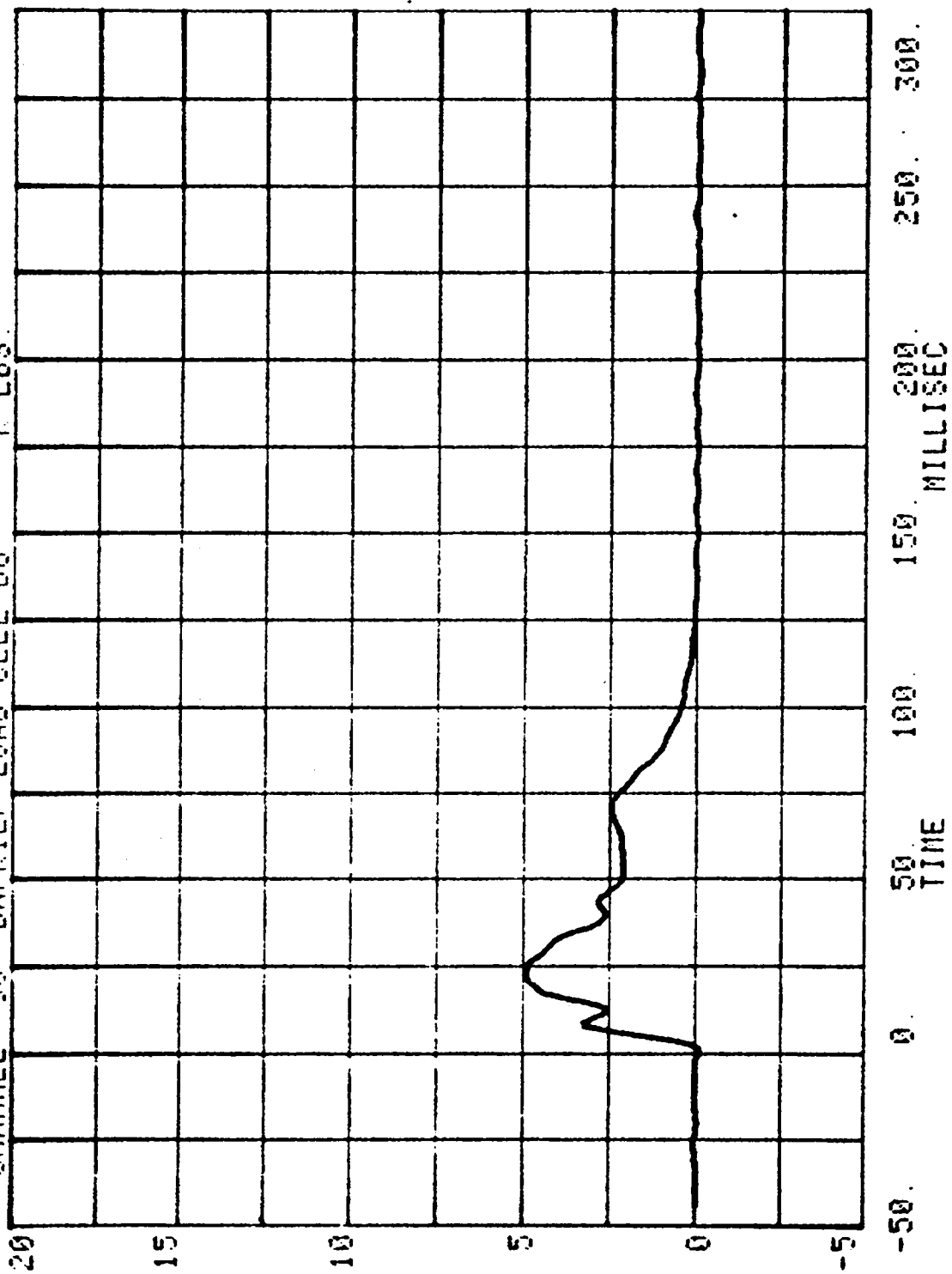
RUN= 942 SERIES= 5102
CHANNEL 49 BARRIER LOAD CELL B6 K LBS.



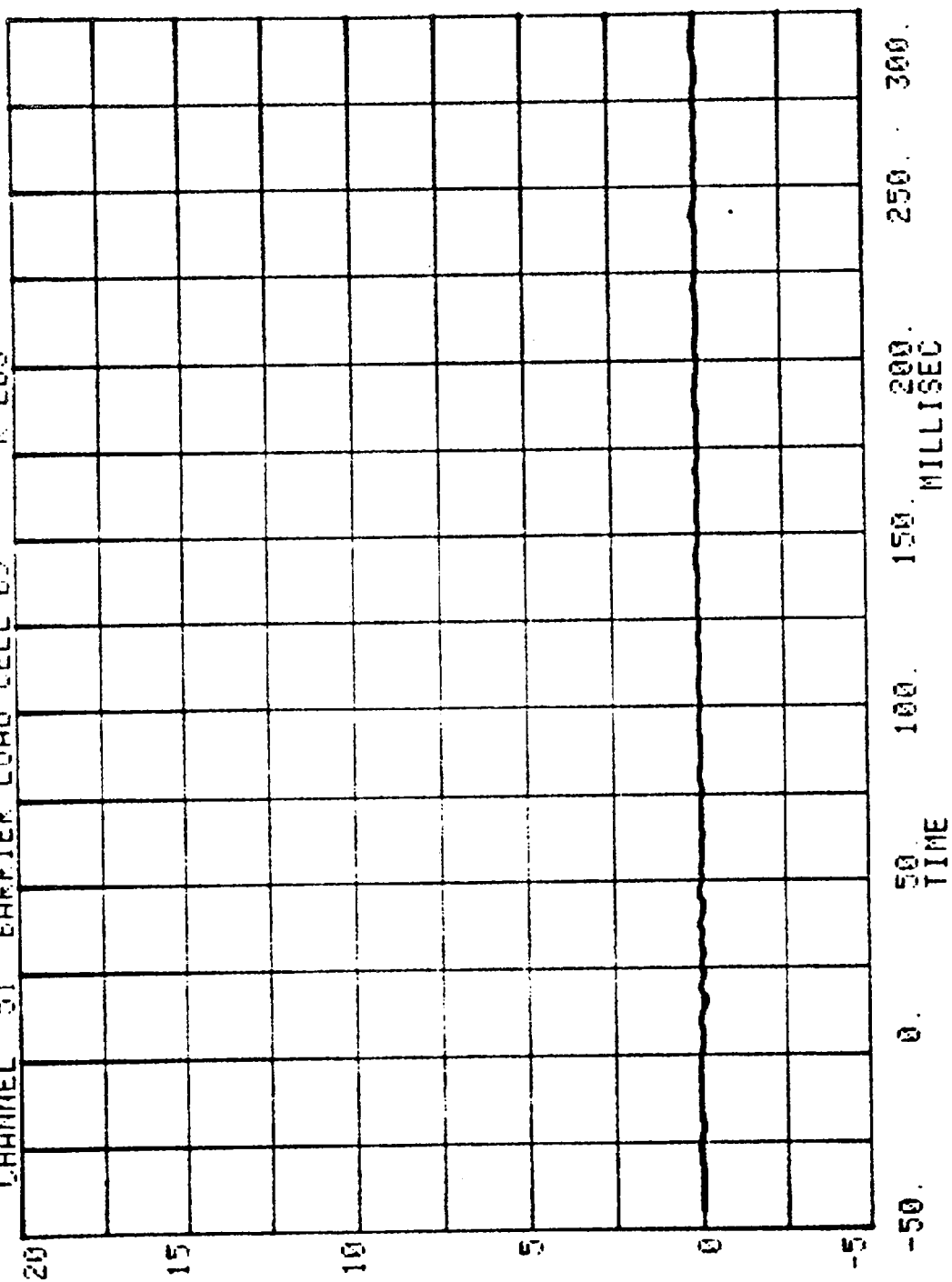
CHANNEL 49 BARRIER LOAD CELL B7
RUN= 942 SERIES= 5102
K LBS.



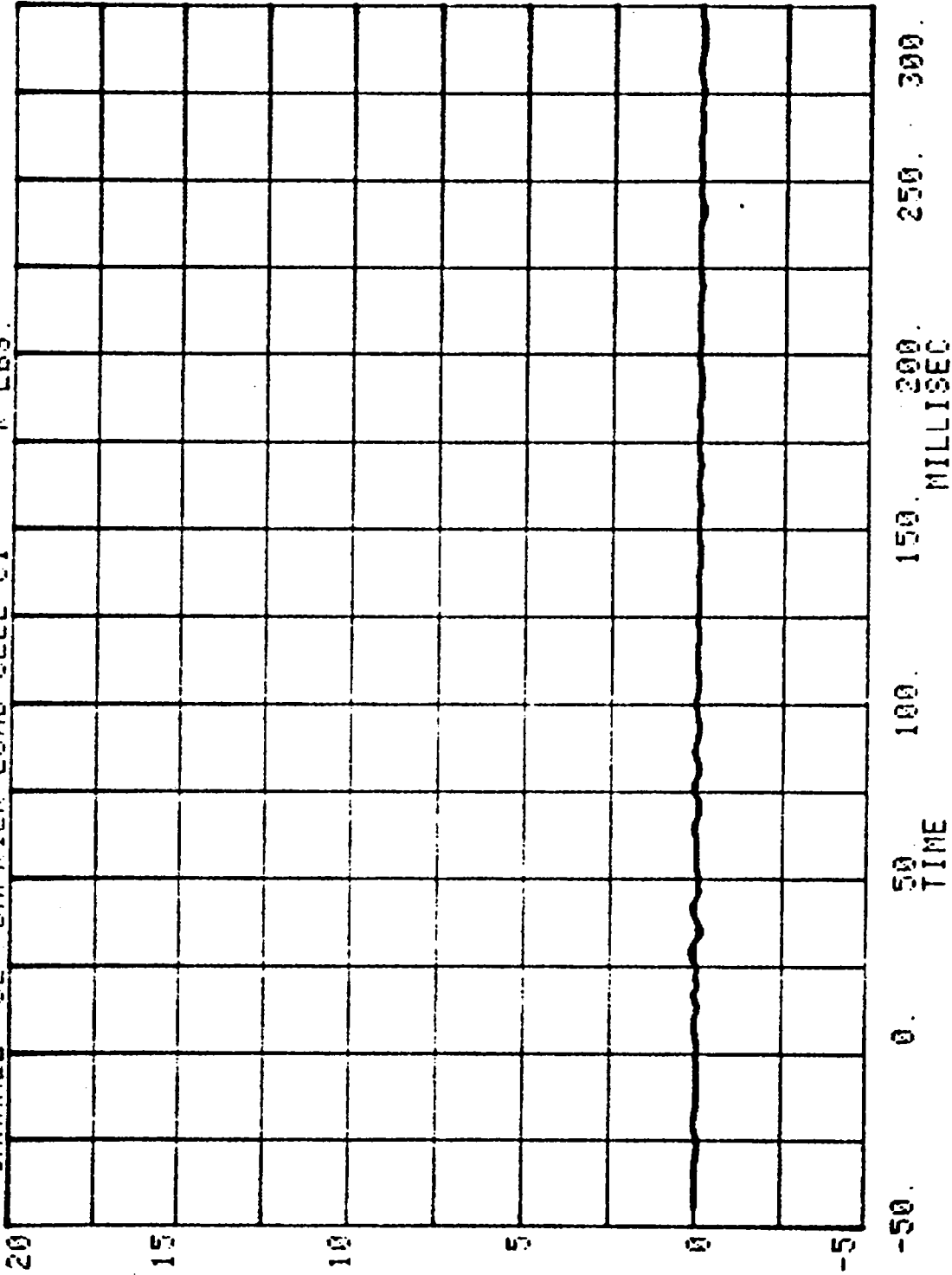
RUN= 942 SERIES= 5102
CHANNEL 50 BAPRIEP LOAD CELL B8 K LBS.



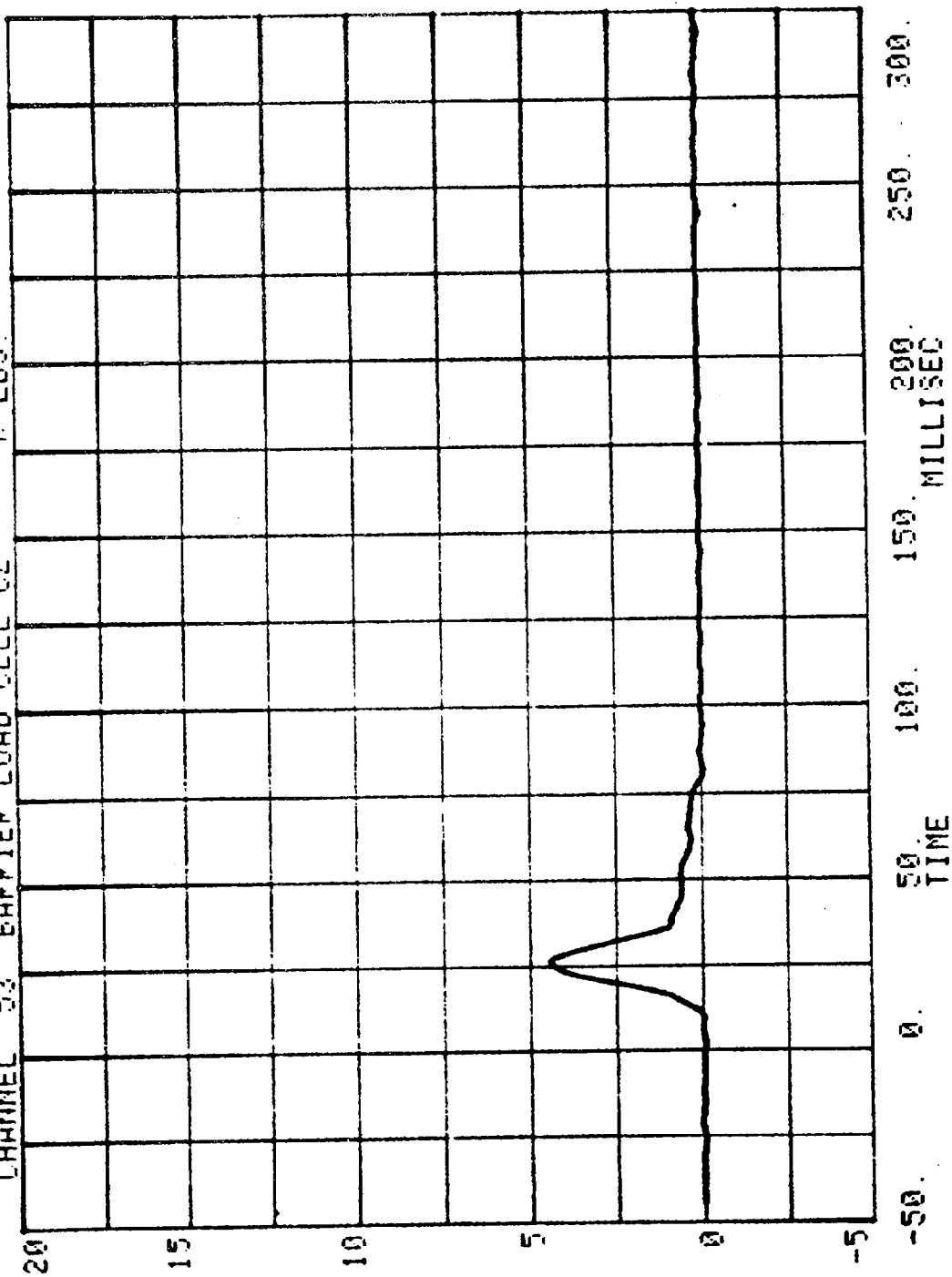
CHANNEL 51 BARRIER LOAD CELL B9 K LBS
RUN= 942 SERIES= 5102



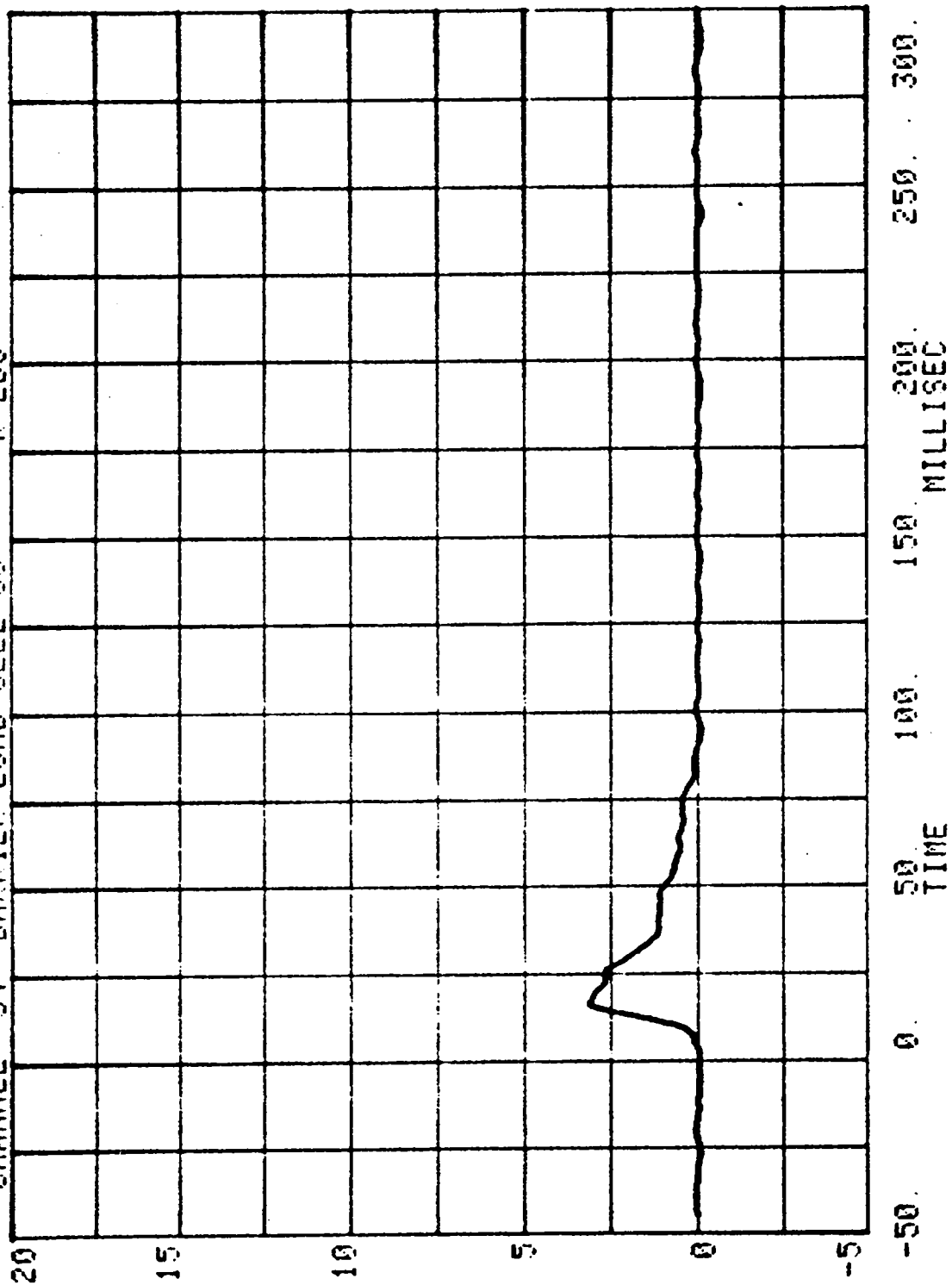
RUN= 942 SERIES= 5102
CHANNEL 52 BARRIER LOAD CELL C1 K LBS.



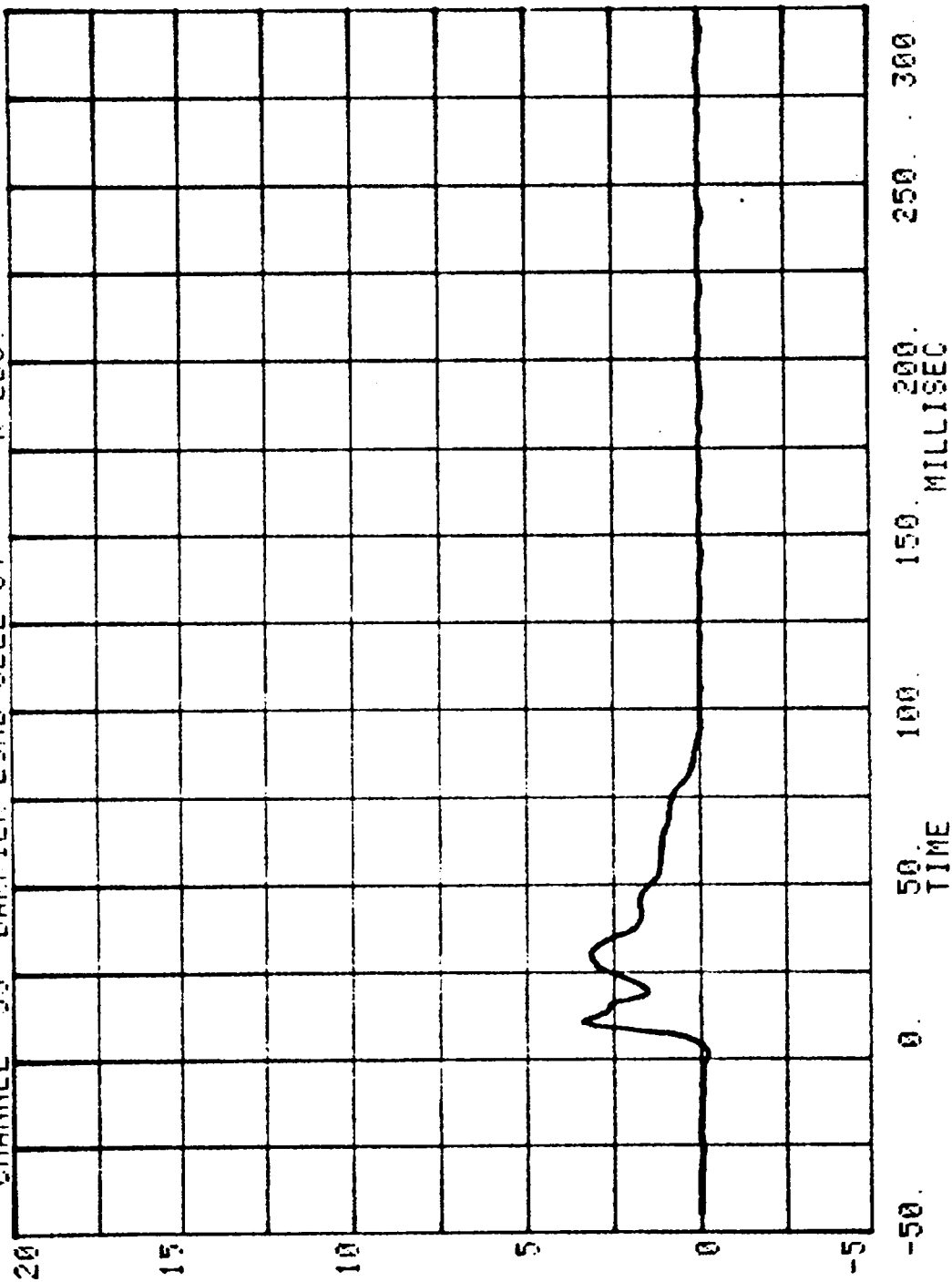
CHANNEL 53 BARRIER LOAD CELL C2
RUN= 942 SERIES= 5102
K LBS.



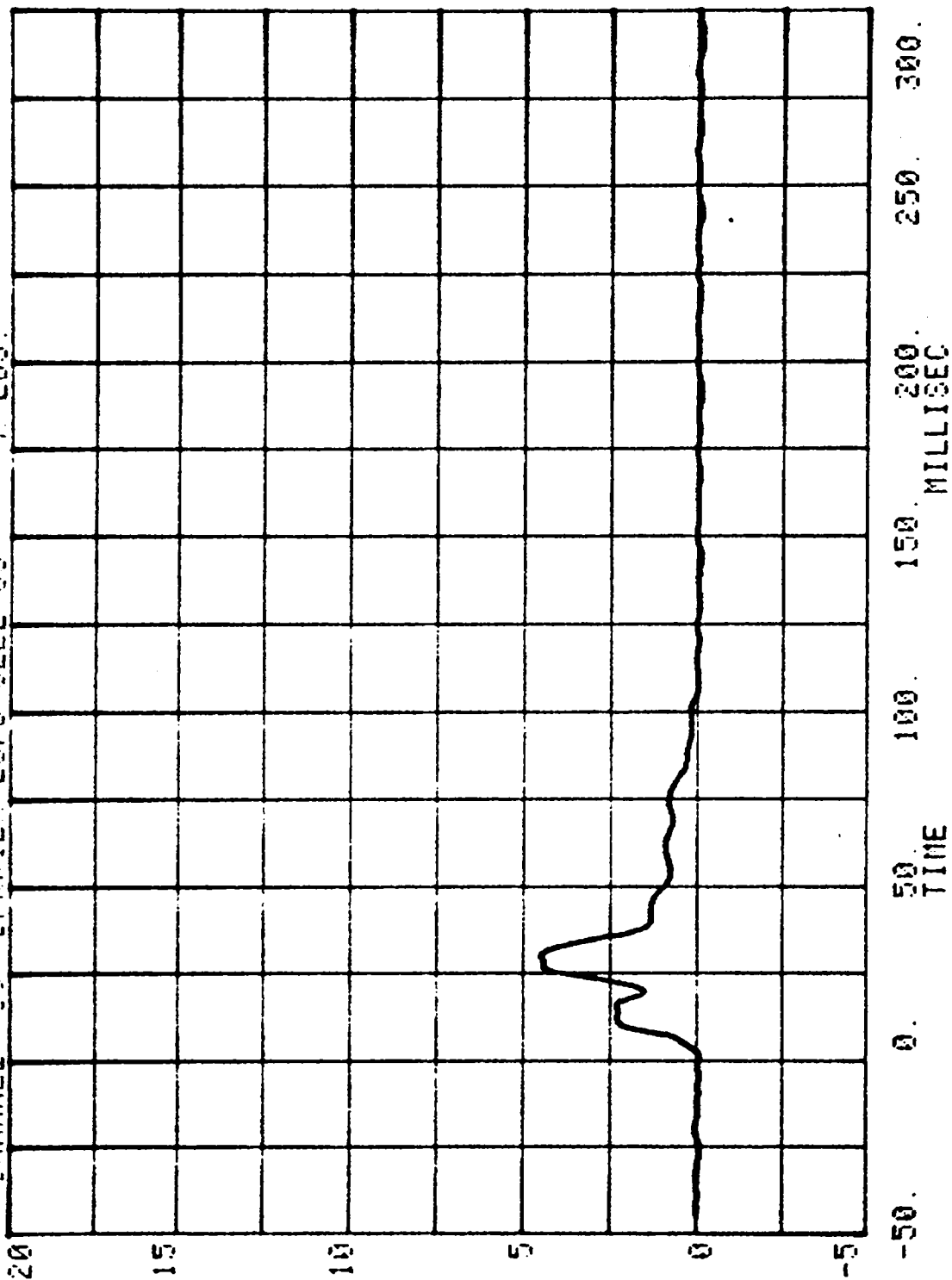
CHANNEL 54 BARRIER LOAD CELL C3 RUN= 342 SERIES= 5102 K LBS



CHANNEL 55 BARRIER LOAD CELL C4
RUH= 942 SERIES= 5102 K LBS.

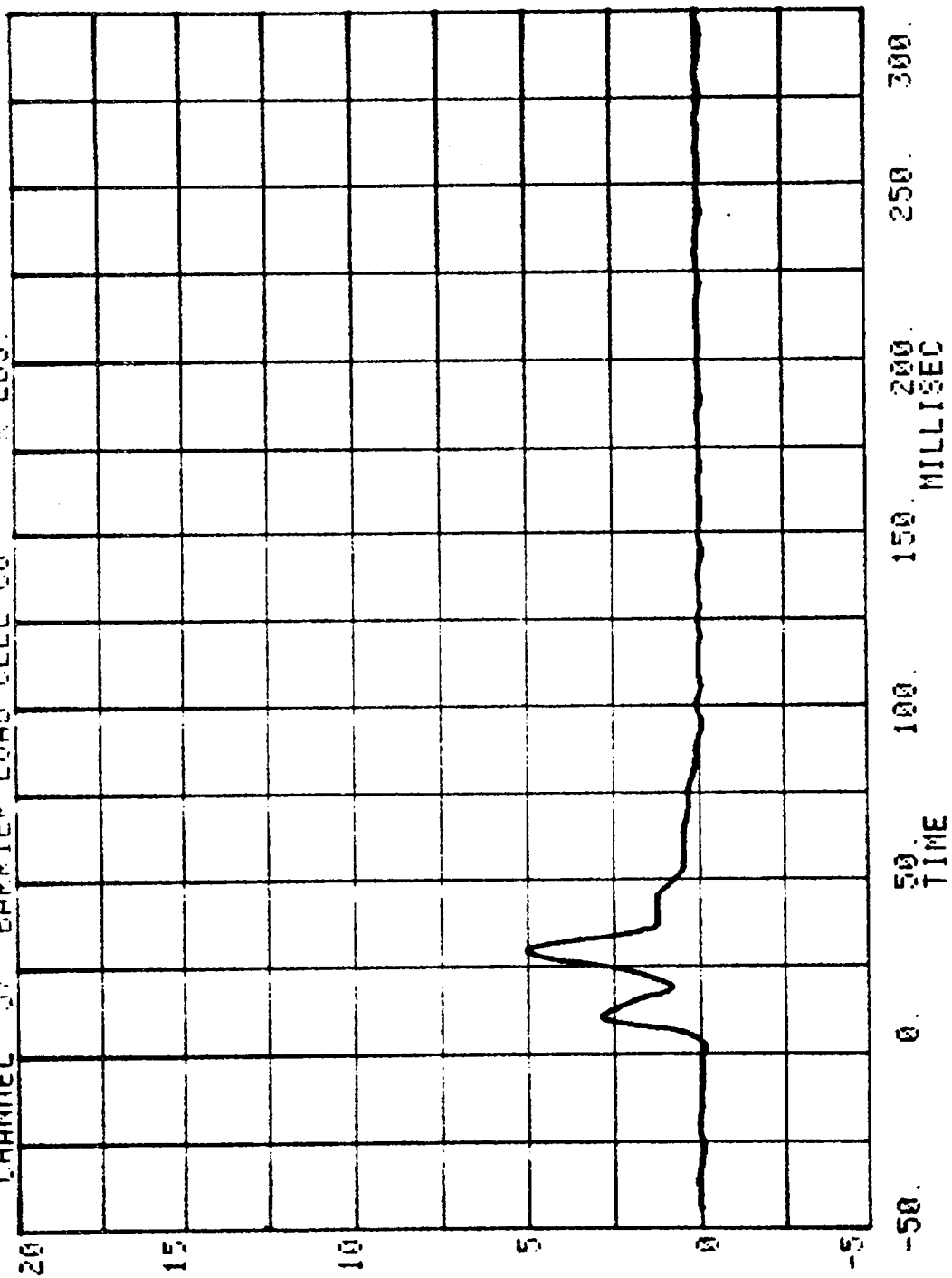


CHANNEL 55 BARRIER LOAD CELL 05 K LBS.
RUN= 942 SERIES= 5102

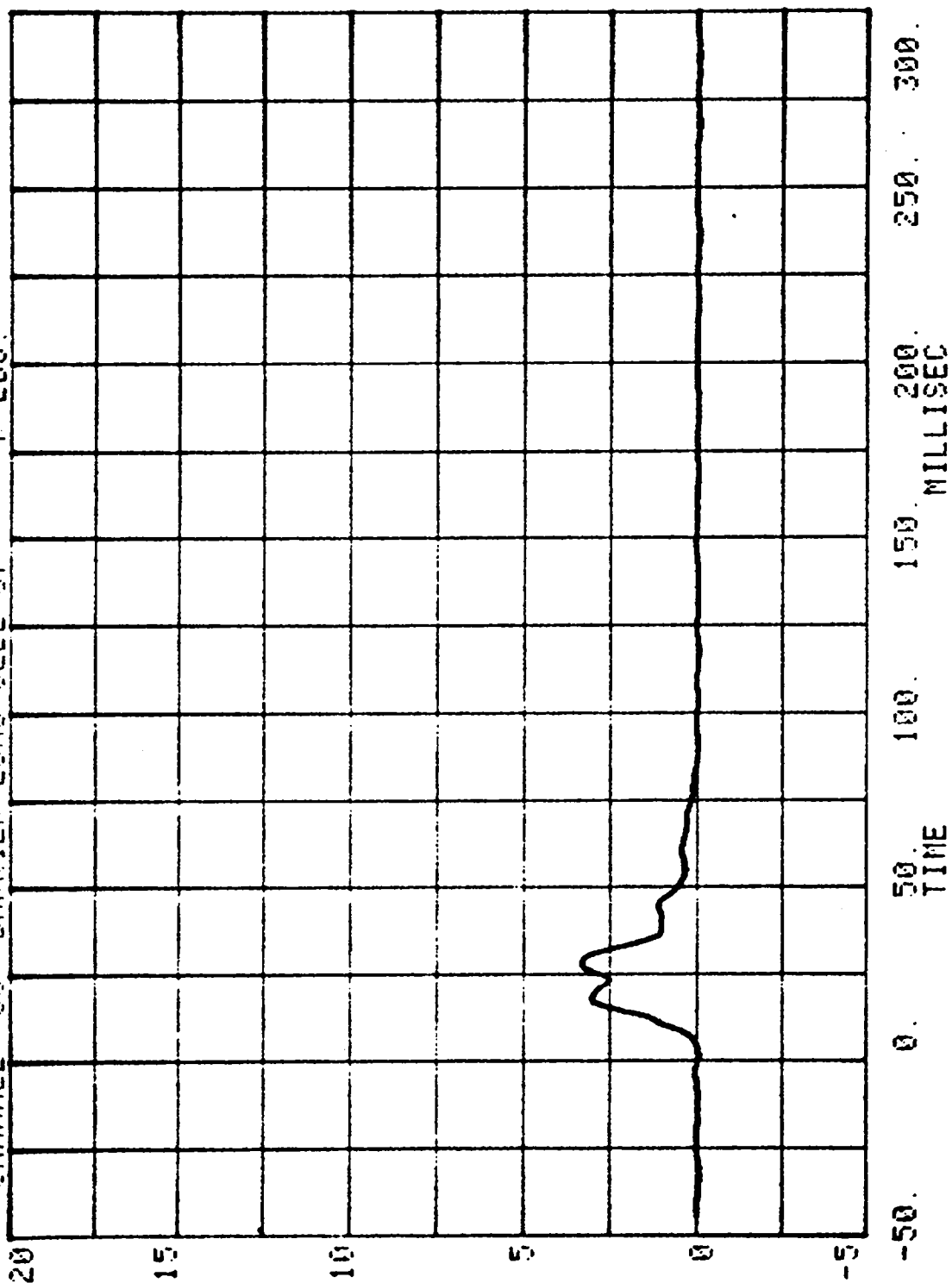


CHANNEL 57 BARRIER LOAD CELL CG K LBS.

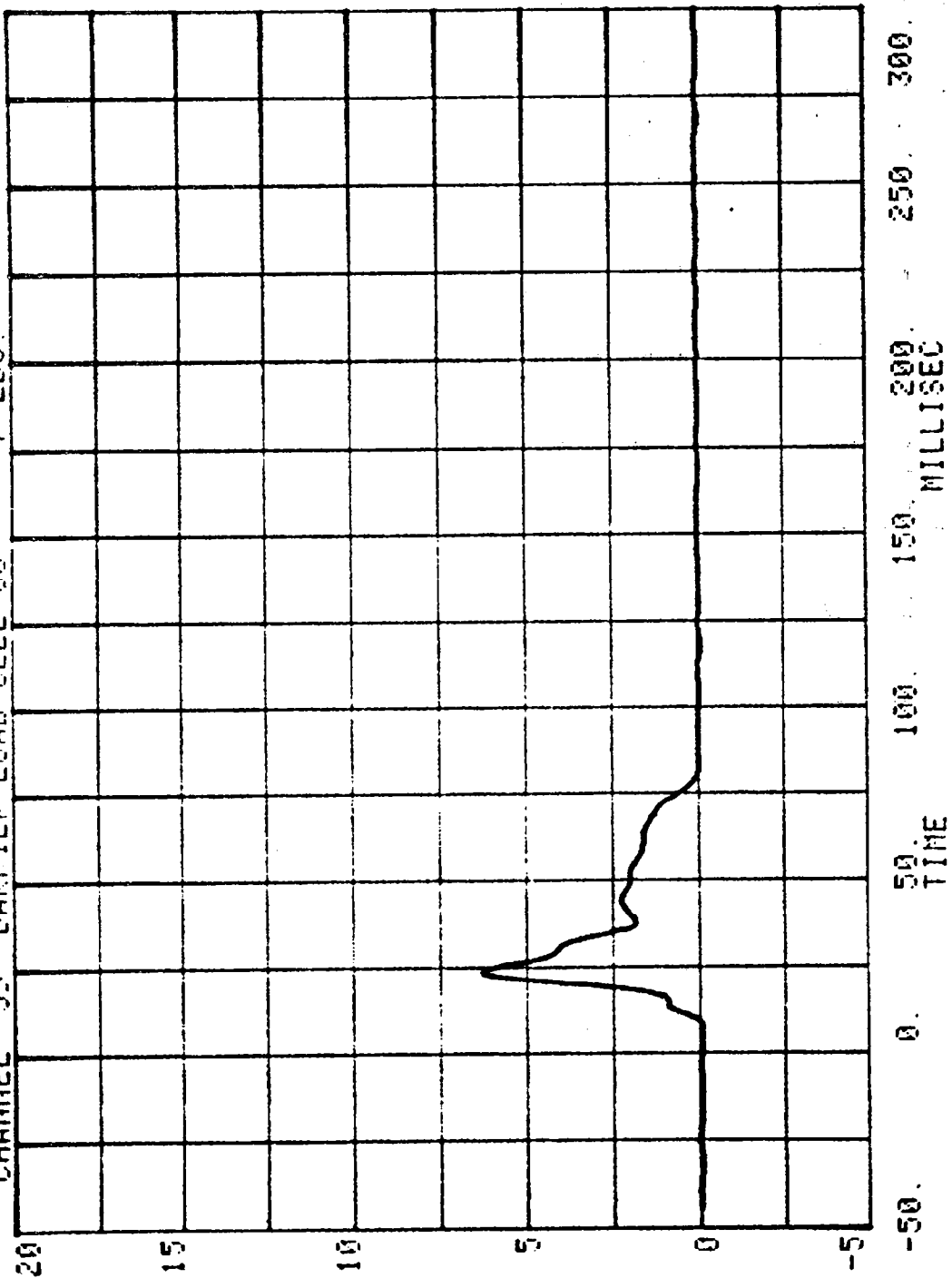
RUN= 942 SERIES= 5102



CHANNEL 53 BARRIER LOAD CELL 07 K LBS.
RUN= 942 SERIES= 5102

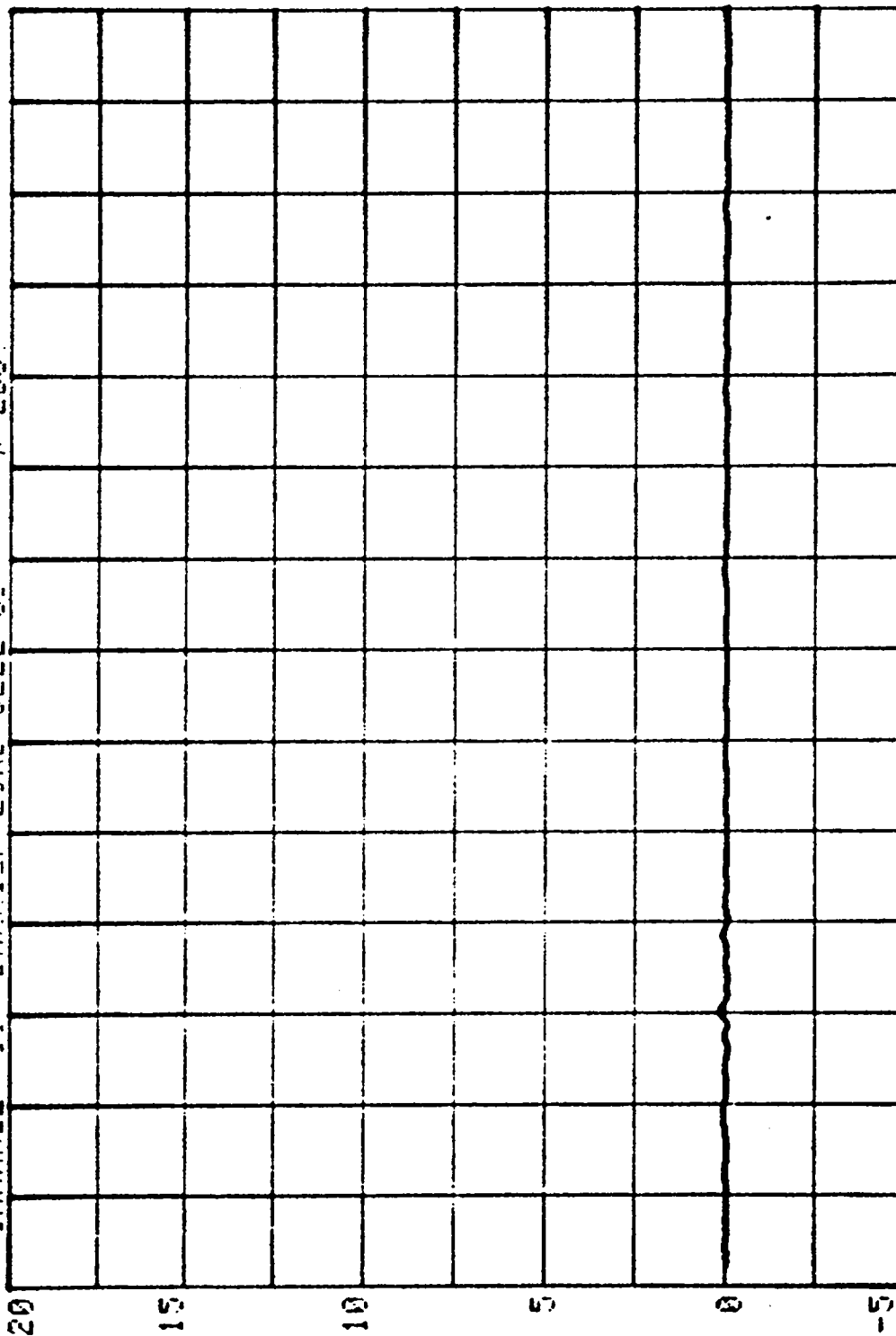


CHANNEL 59 BARRIER LOAD CELL C8
RUN= 942 SERIES= 5102 Y LBS.

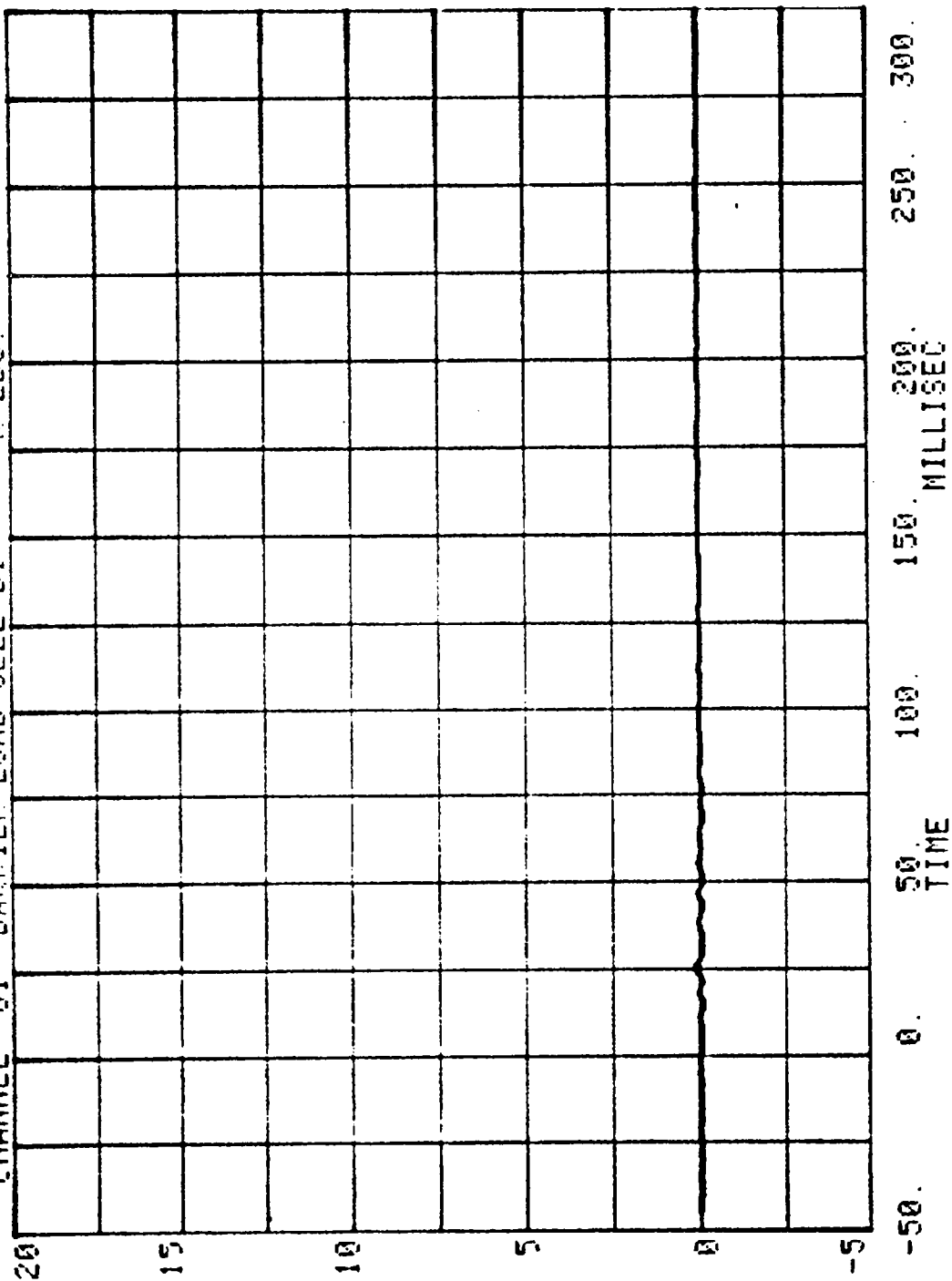


CHANNEL 60 BARRIER LOAD CELL C3 K LBS.

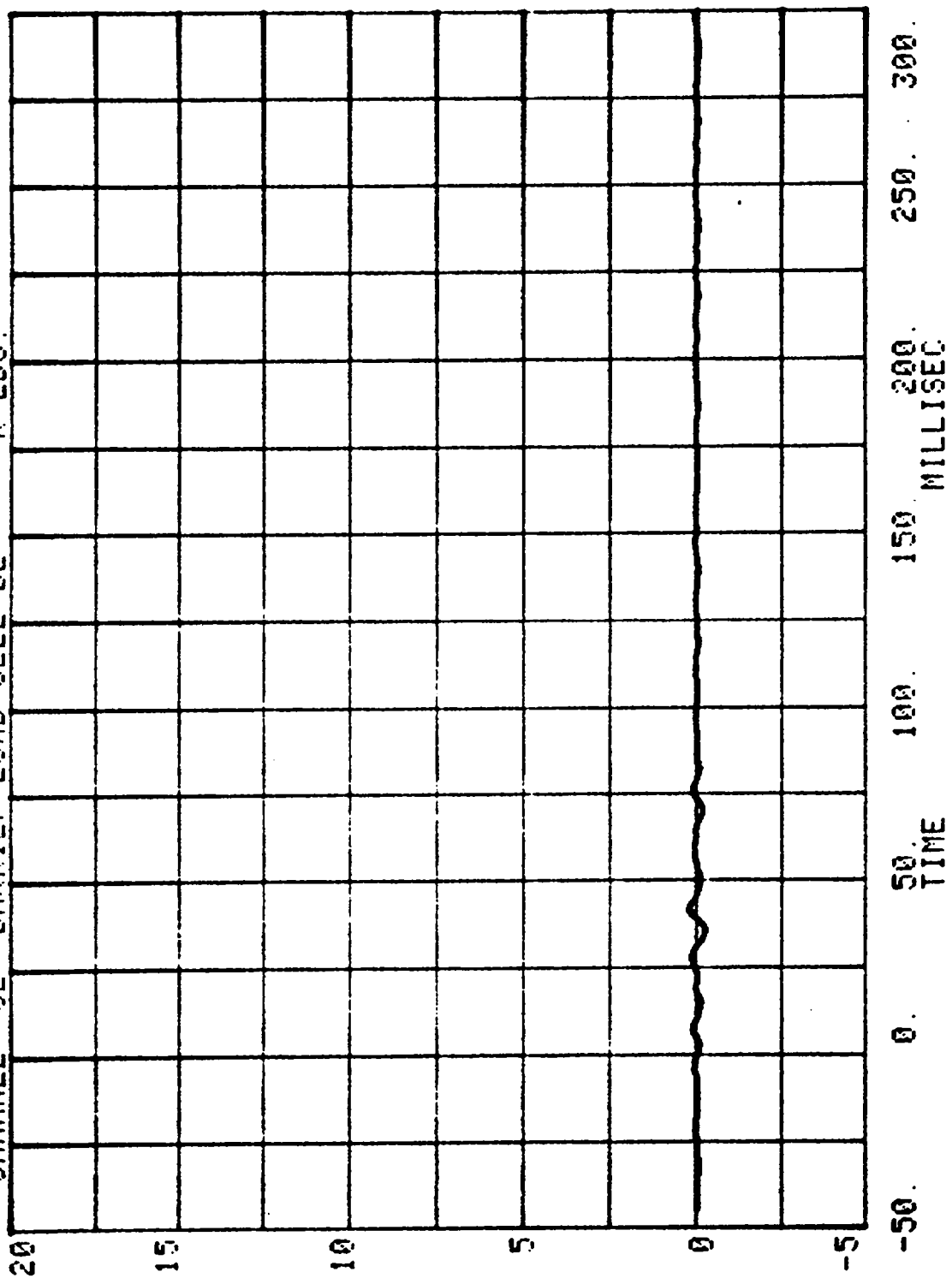
RUN= 942 SERIES= 5102



CHANNEL 61 BARRIER LOAD CELL 01 K LBS.

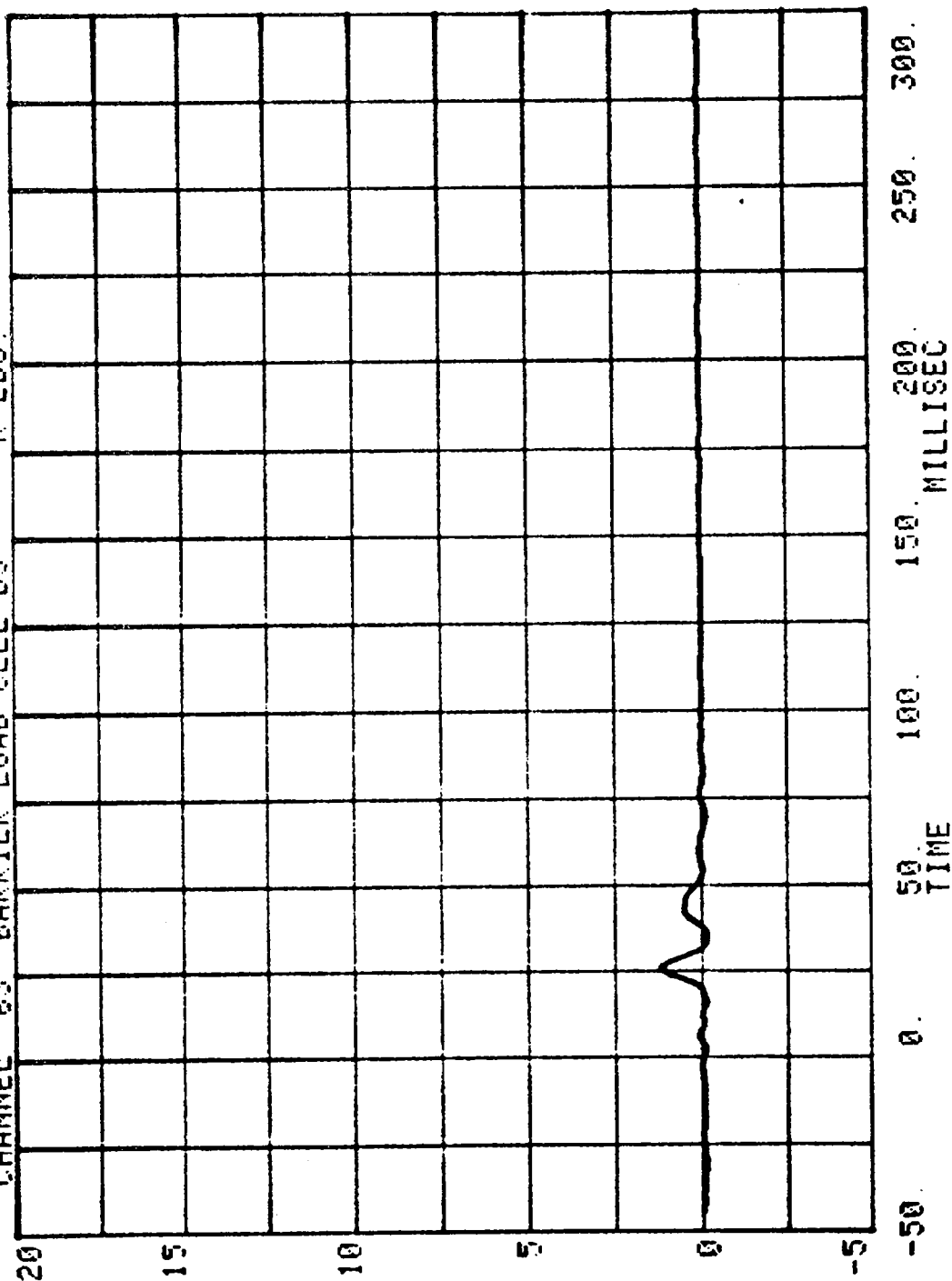


CHANNEL 62 RUN= 942 SERIES= 5102 K LBS.
BARRIER LOAD CELL 02

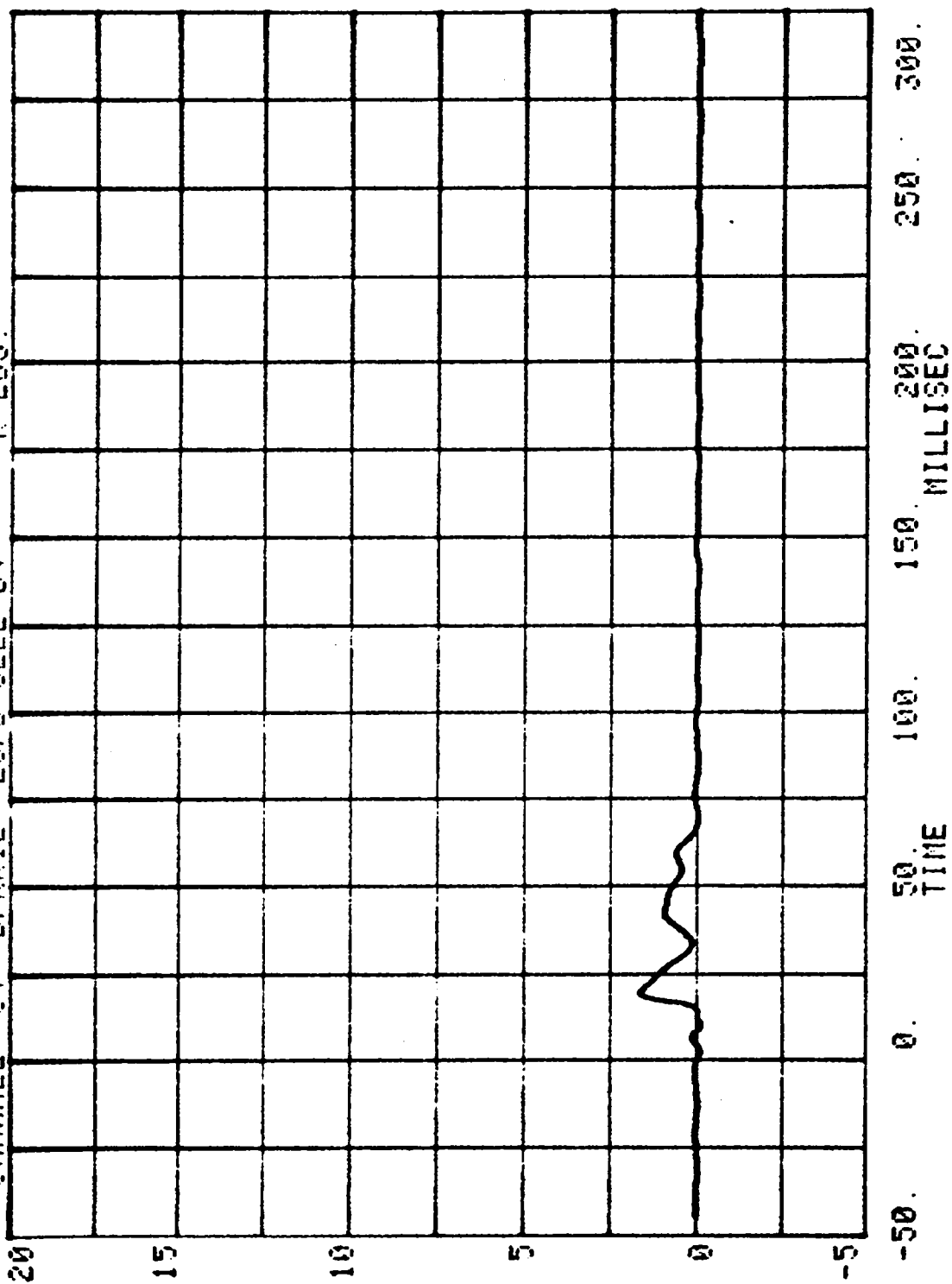


CHANNEL 63 BARRIER LOAD CELL D3 K LBS.

RUN= 942 SERIES= 5102

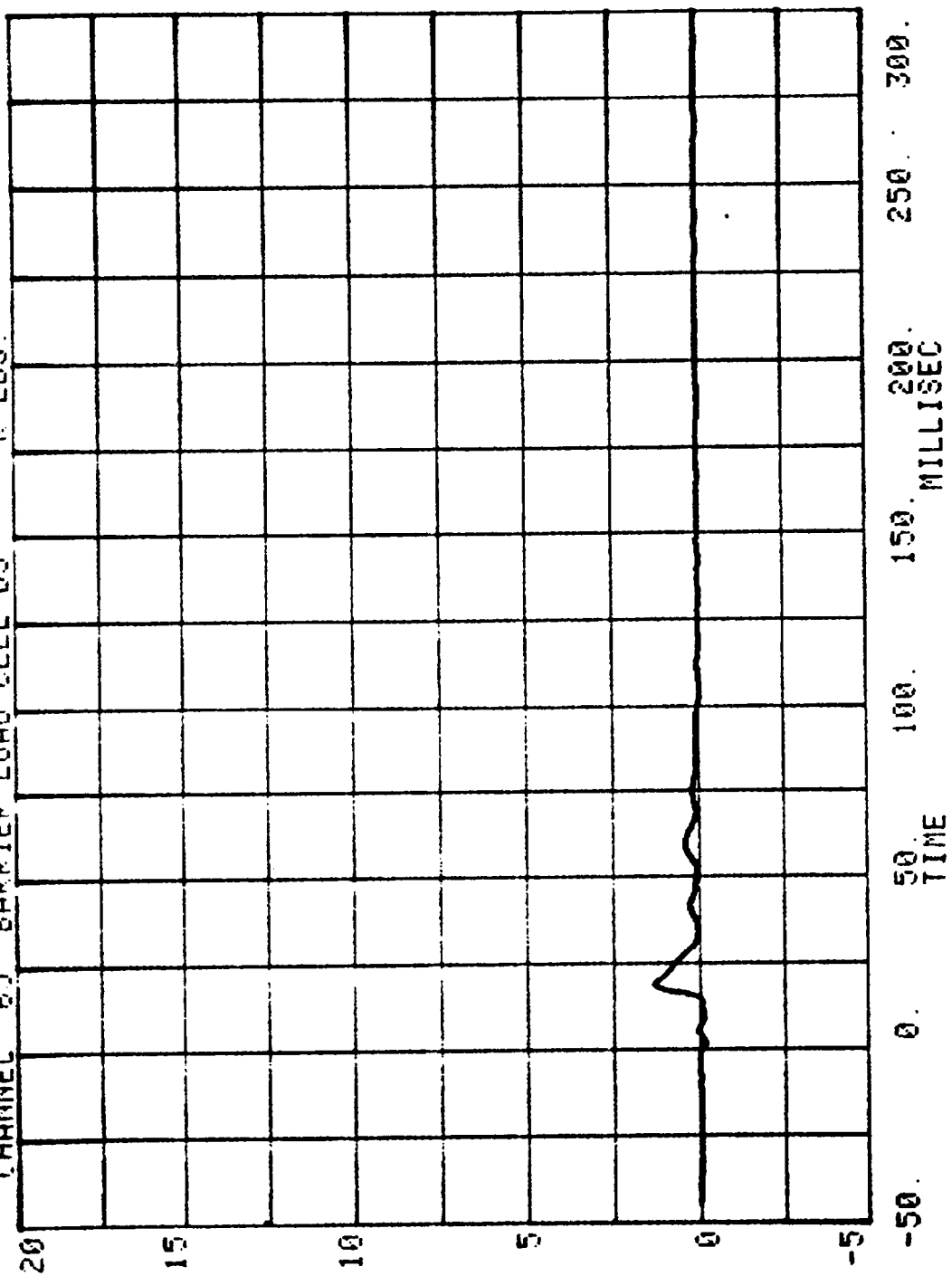


CHANNEL 64 BARRIER LOAD CELL 04 K LBS.
RUN= 942 SERIES= 5102

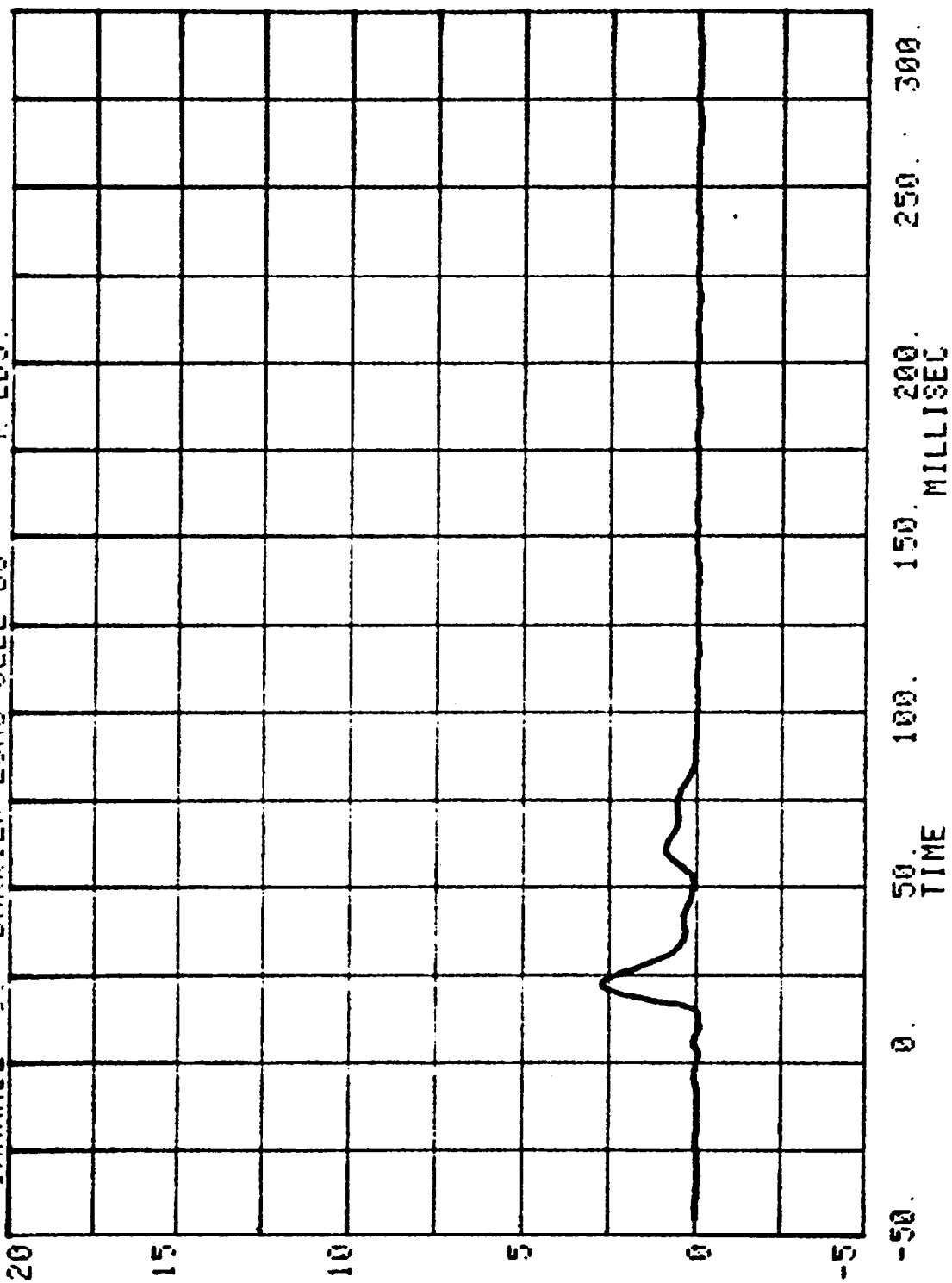


CHANNEL 65 BARRIER LOAD CELL D5 K LBS.

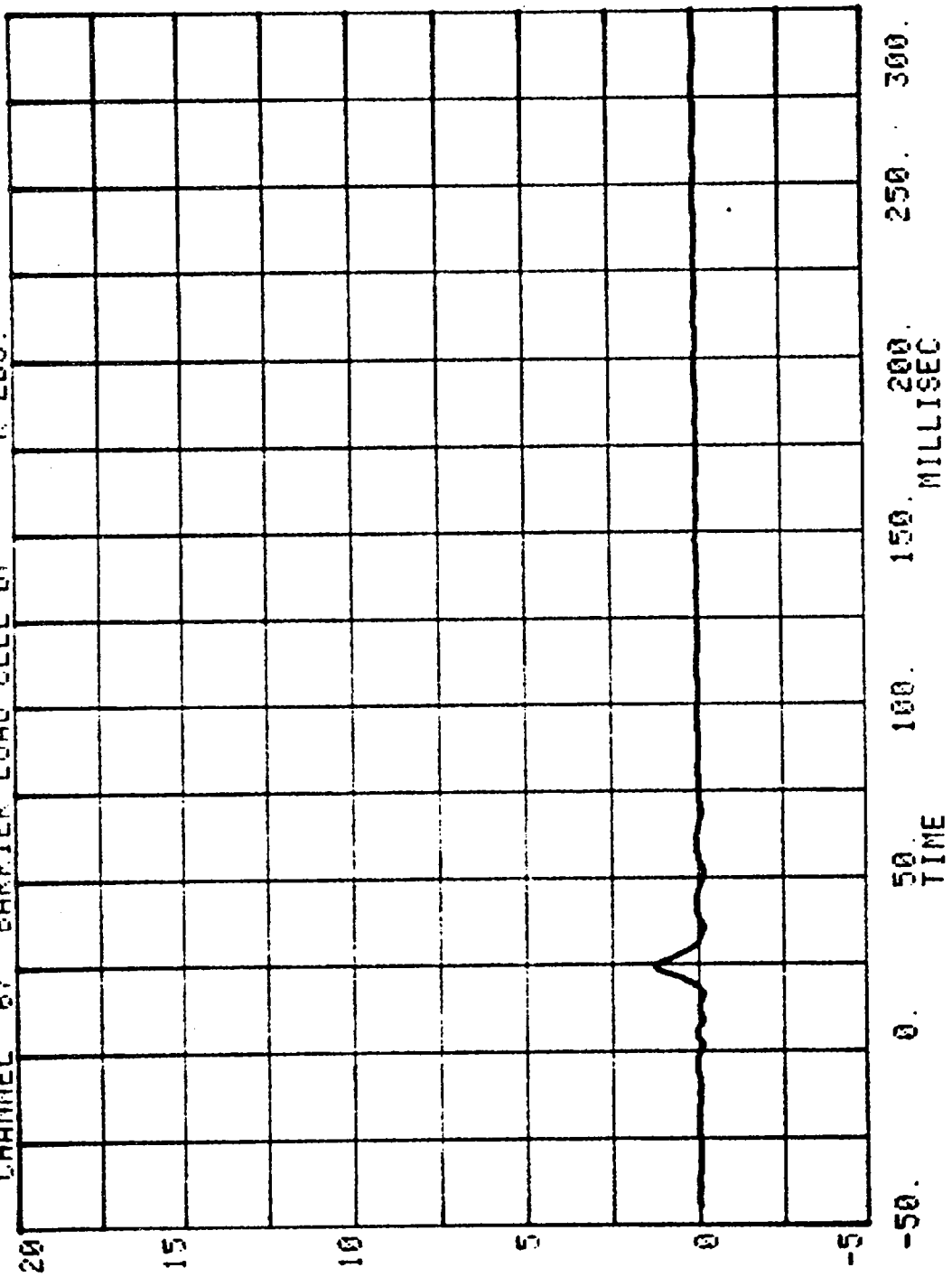
RUN= 942 SERIES= 5102



RUN= 942 SERIES= 5102
CHANNEL 66 BARRIER LOAD CELL 06 K LBS.

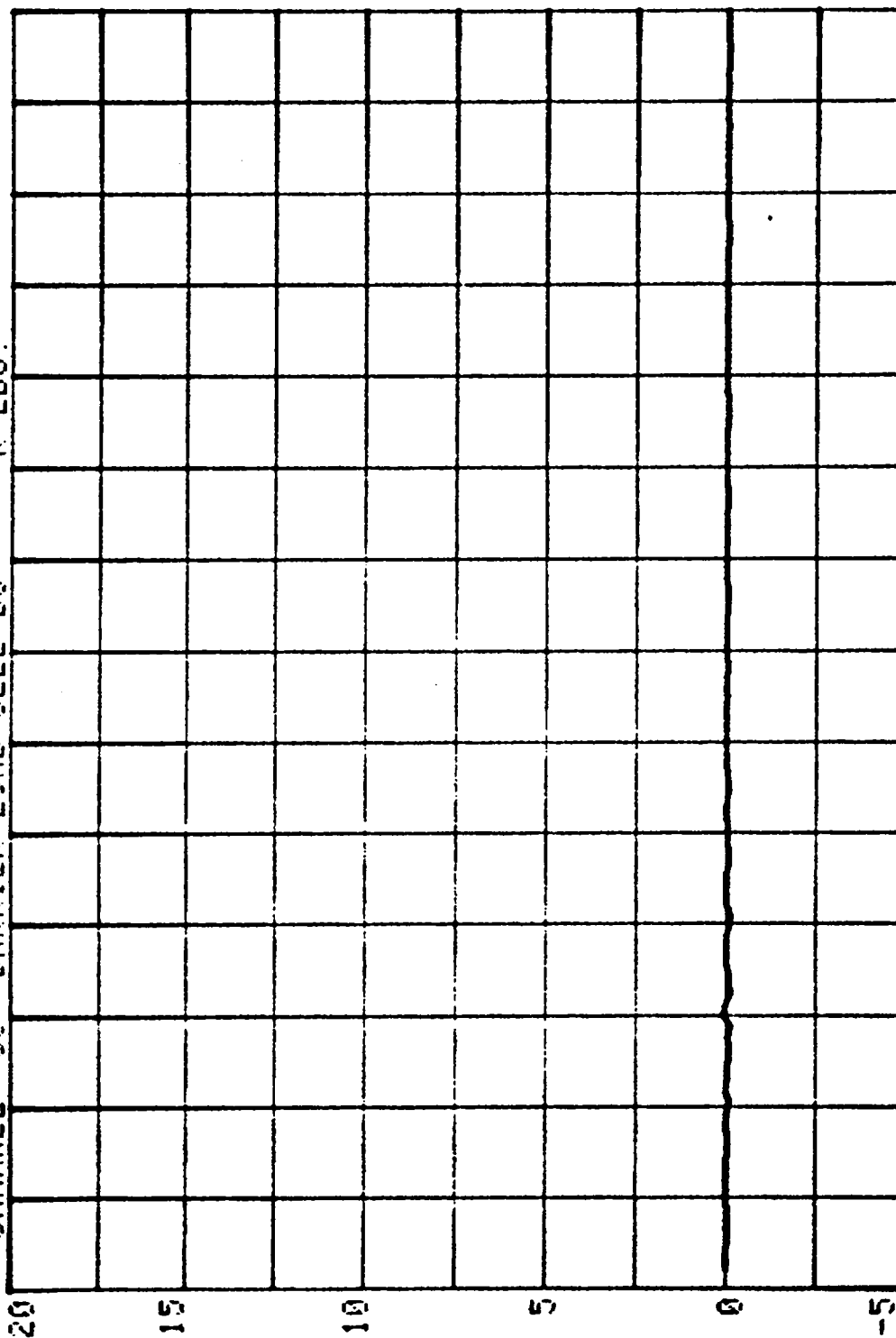


CHANNEL 67 BARRIER LOAD CELL 07 K LBS.
RUN= 942 SERIES= 5102

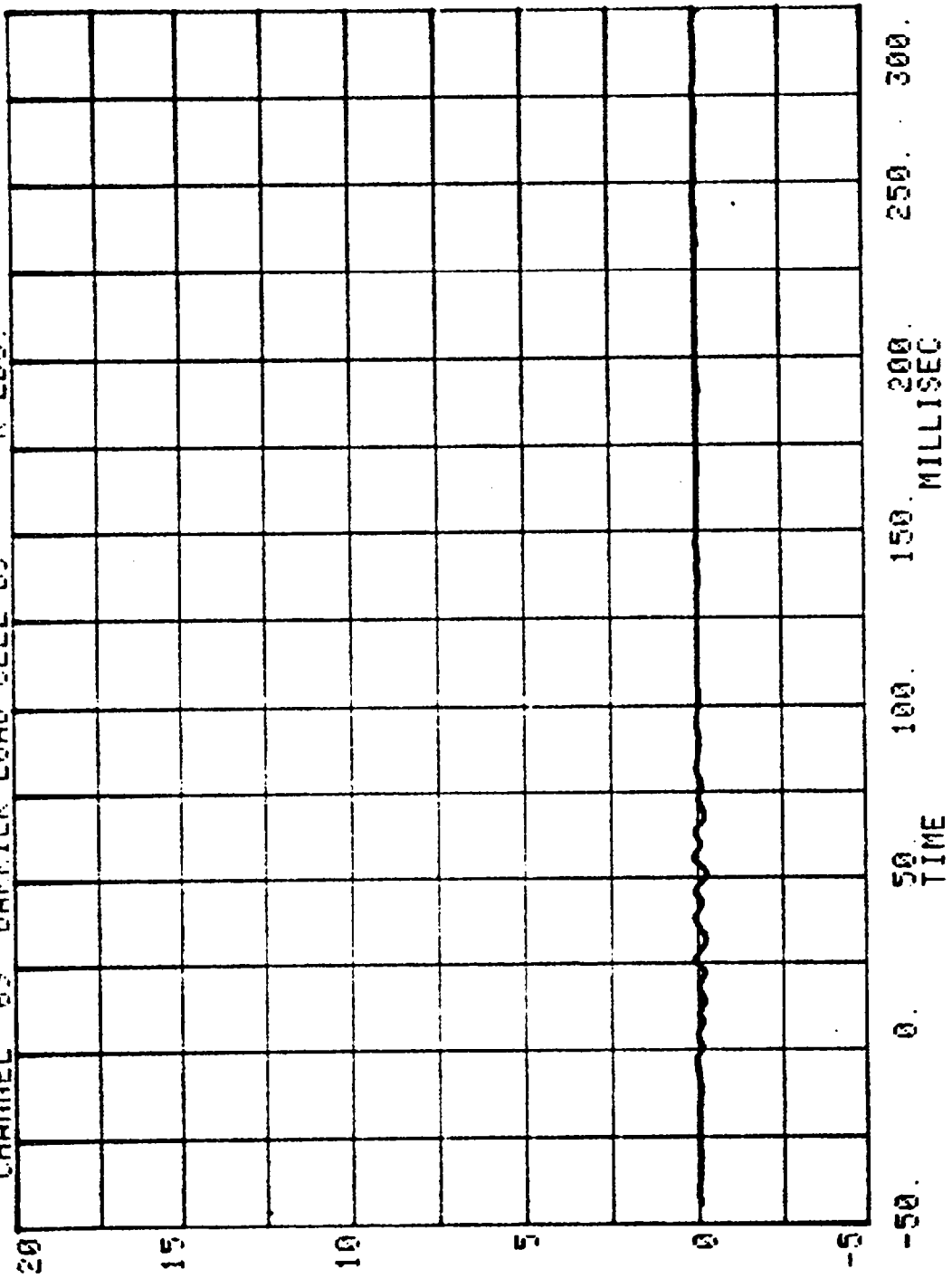


CHANNEL 68 BARRIER LOAD CELL 08 K LBS.

RUN= 942 SERIES= 5102



CHANNEL 69 BARRIER LOAD CELL 09 K LBS.



NEW CAR ASSESSMENT PROGRAM - 1990

RUN # 942

SERIES # 5102

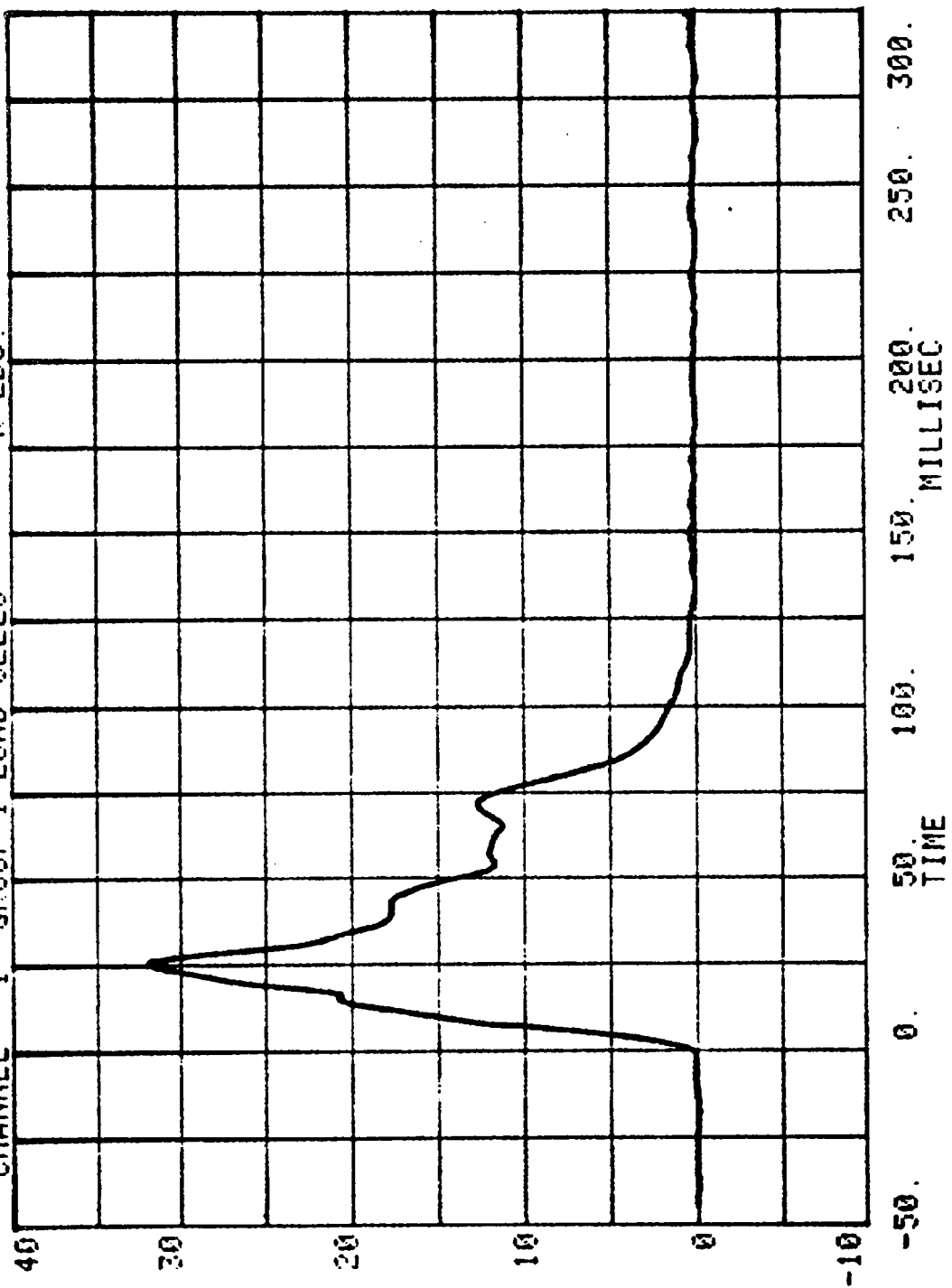
CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	- .119	31.995 K LBS.
2	GROUP 2 LOAD CELLS	- .113	54.798 K LBS.
3	GROUP 3 LOAD CELLS	- .178	37.590 K LBS.
4	GROUP 4 LOAD CELLS	- .356	8.524 K LBS.
5	GROUP 5 LOAD CELLS	- .597	14.886 K LBS.
6	GROUP 6 LOAD CELLS	- .332	10.252 K LBS.
7	TOTAL LOAD CELL SUM	- .451	153.648 K LBS.

Note: Group 1 Load Cell sum was computed without Load Cell A3.

Group 2 Load Cell sum was computed without Load Cell A4.

CHANNEL 1 GROUP 1 LOAD CELLS K LBS.

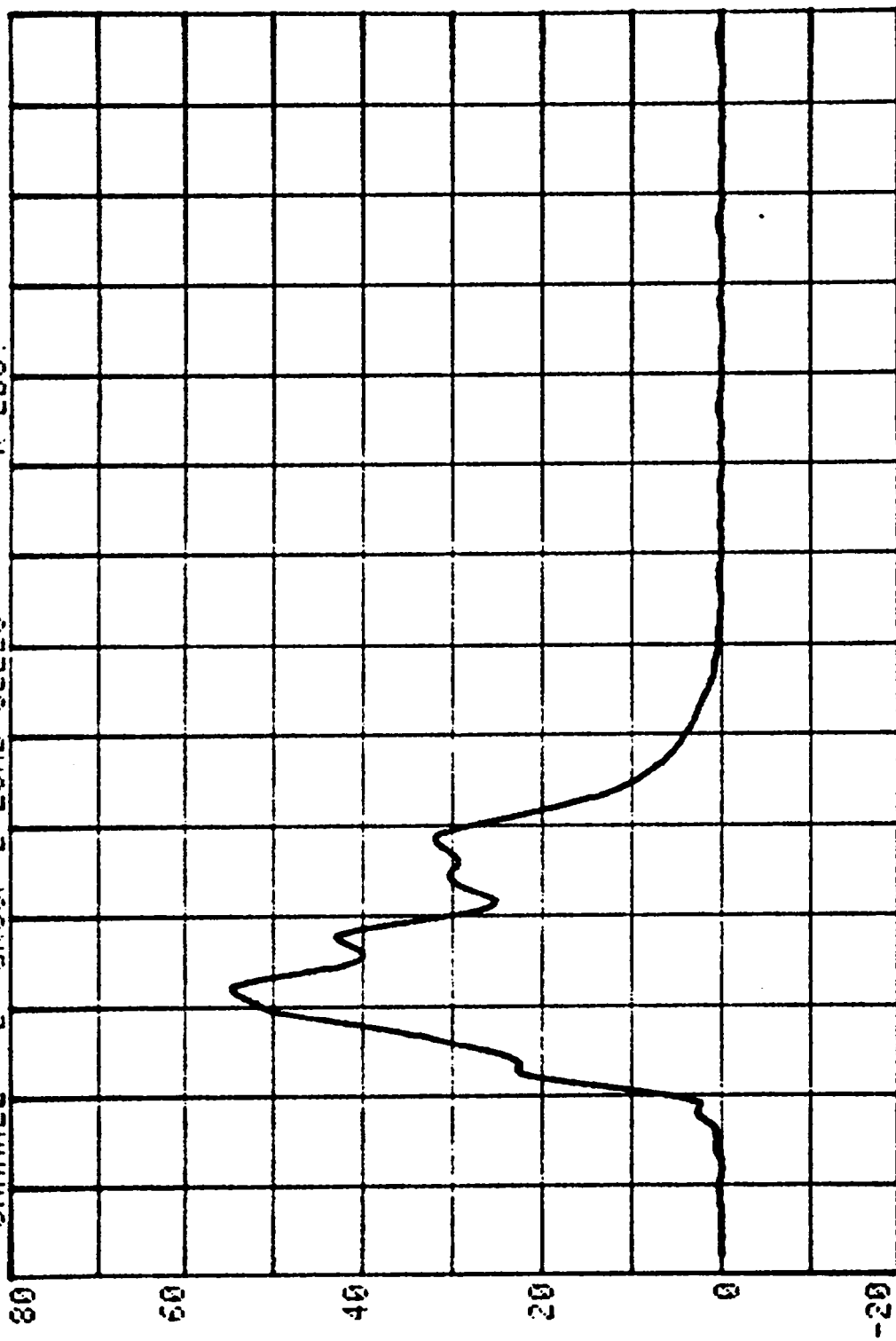
RUN= 942 SERIES= 5102



CHANNEL 2 GROUP 2 LOAD CELLS

RUN= 342 SERIES= 5102

K LBS.



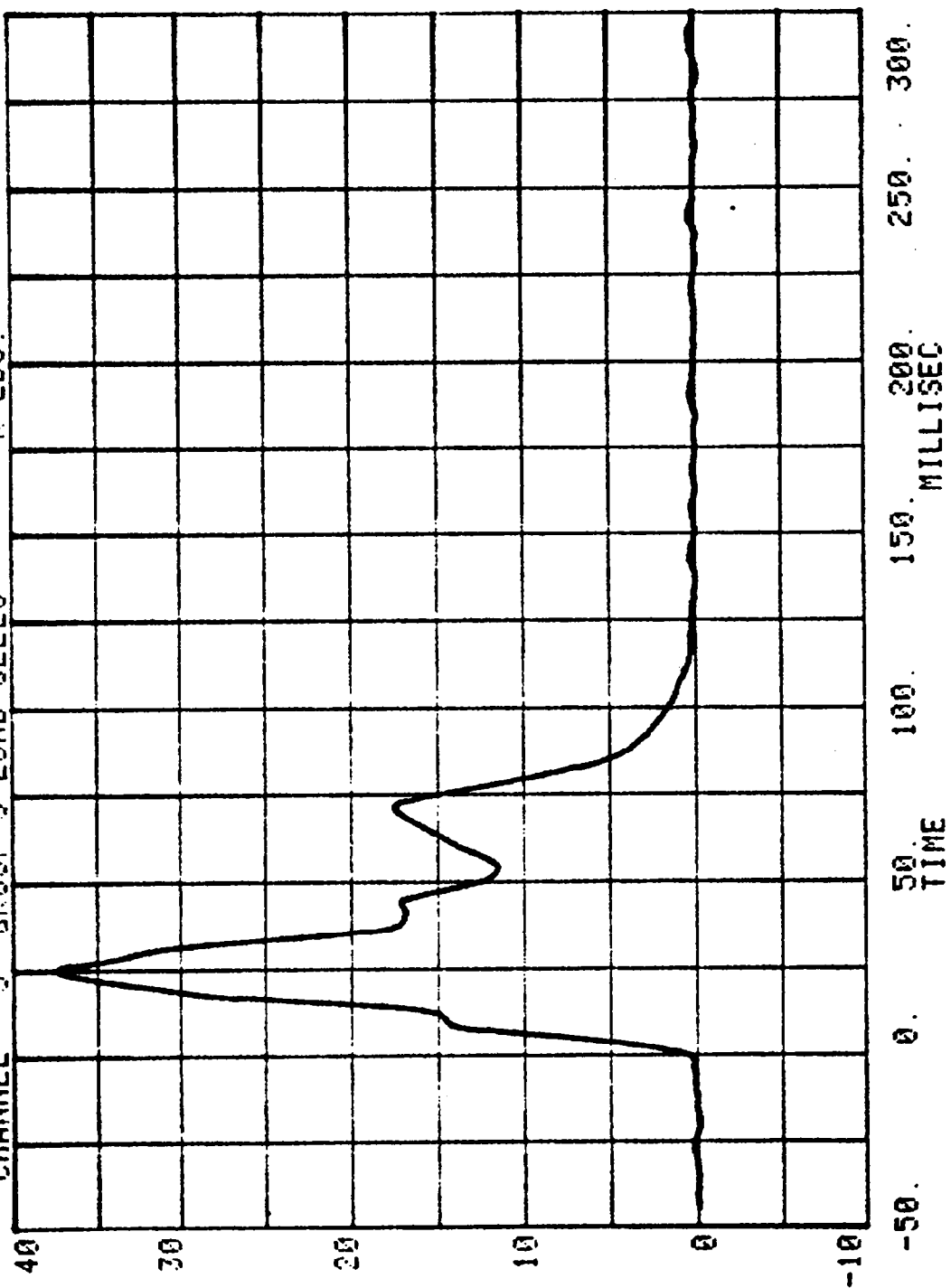
-50. 0. 50. 100. 150. 200. 250. 300.

MILLISEC

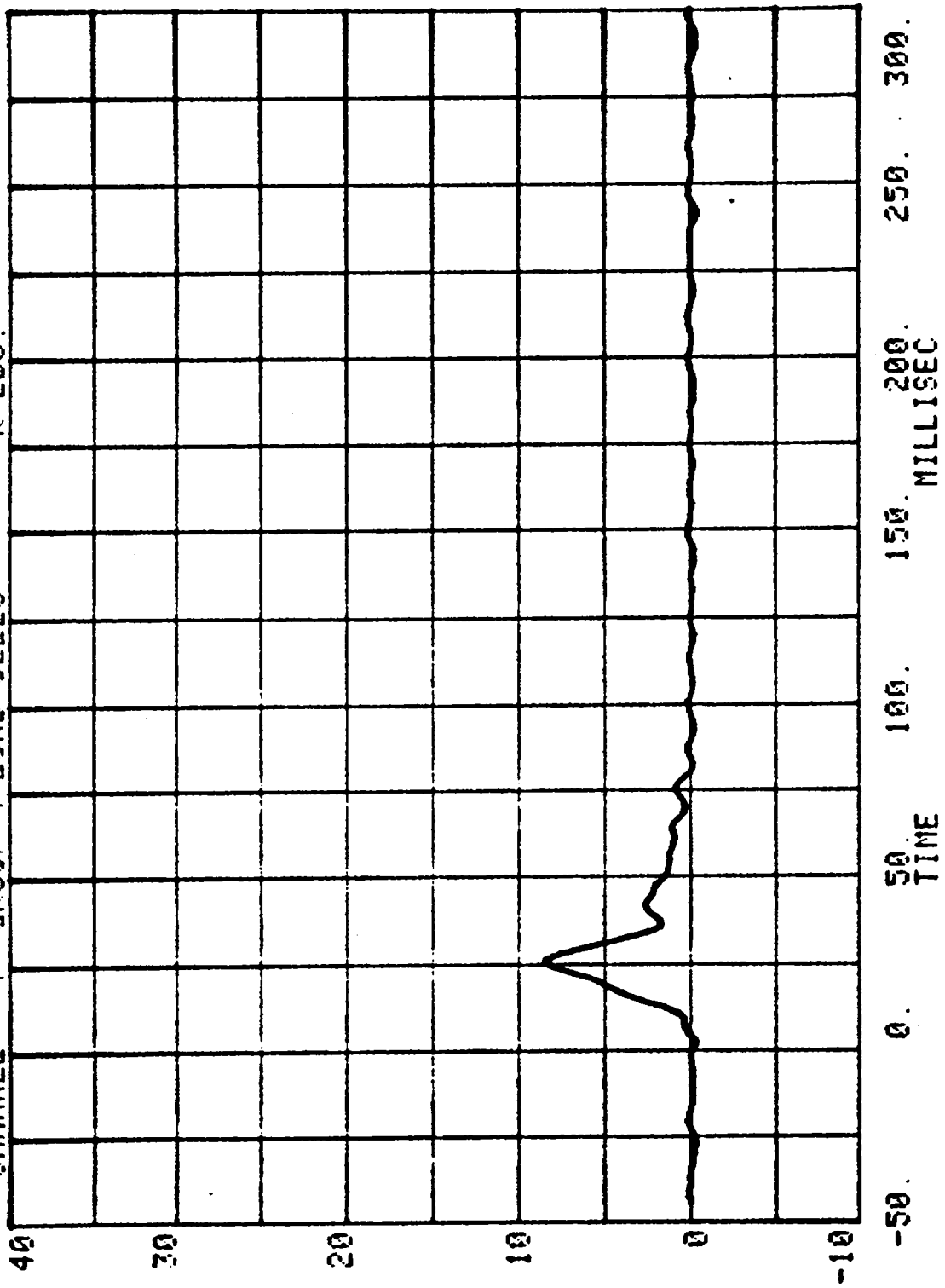
CHANNEL 3 GROUP 3 LOAD CELLS

RUN= 942 SERIES= 5102

K LBS.

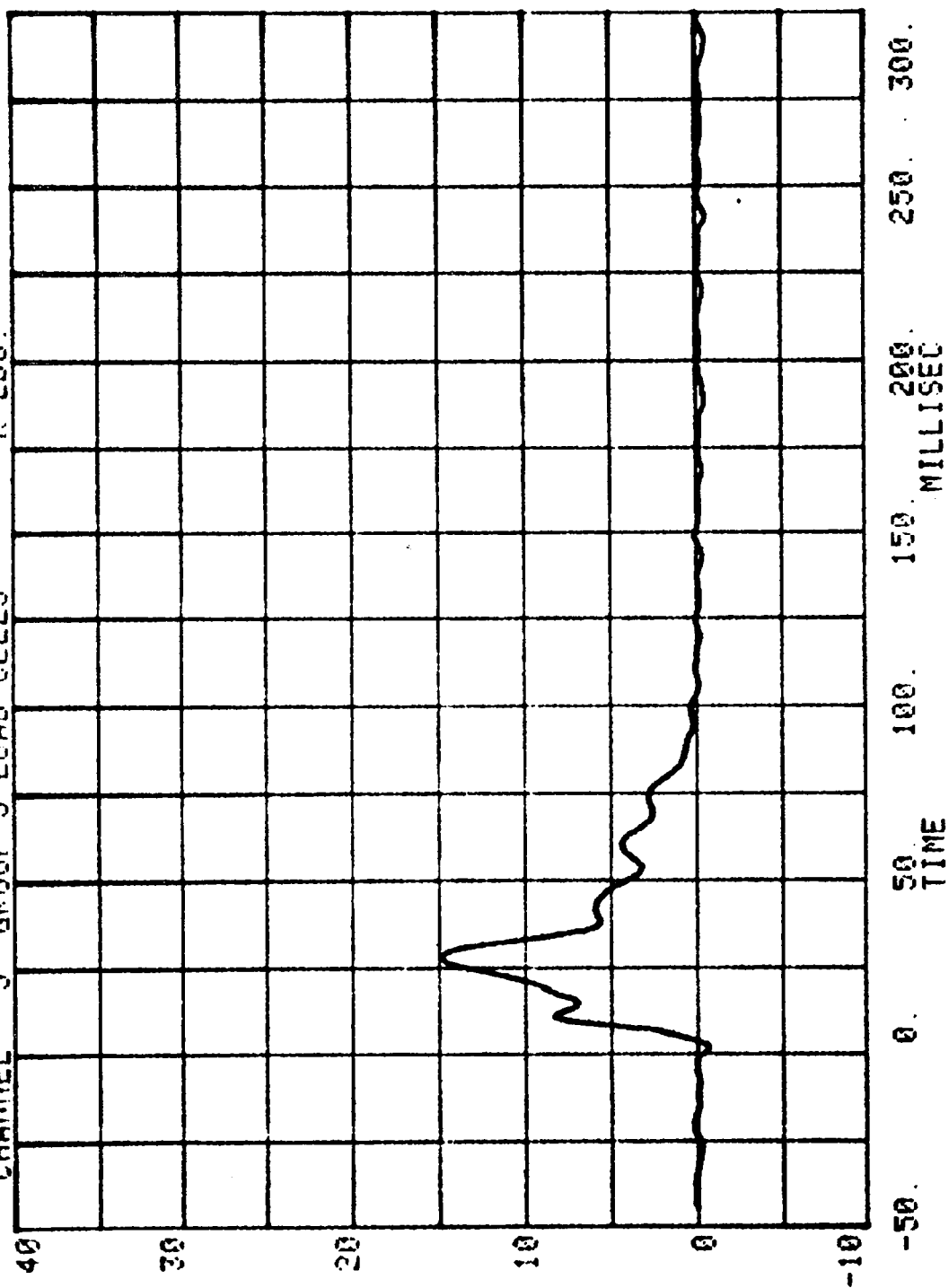


RUN= 942 SERIES= 5102
CHANNEL 4 GROUP 4 LOAD CELLS K LBS.

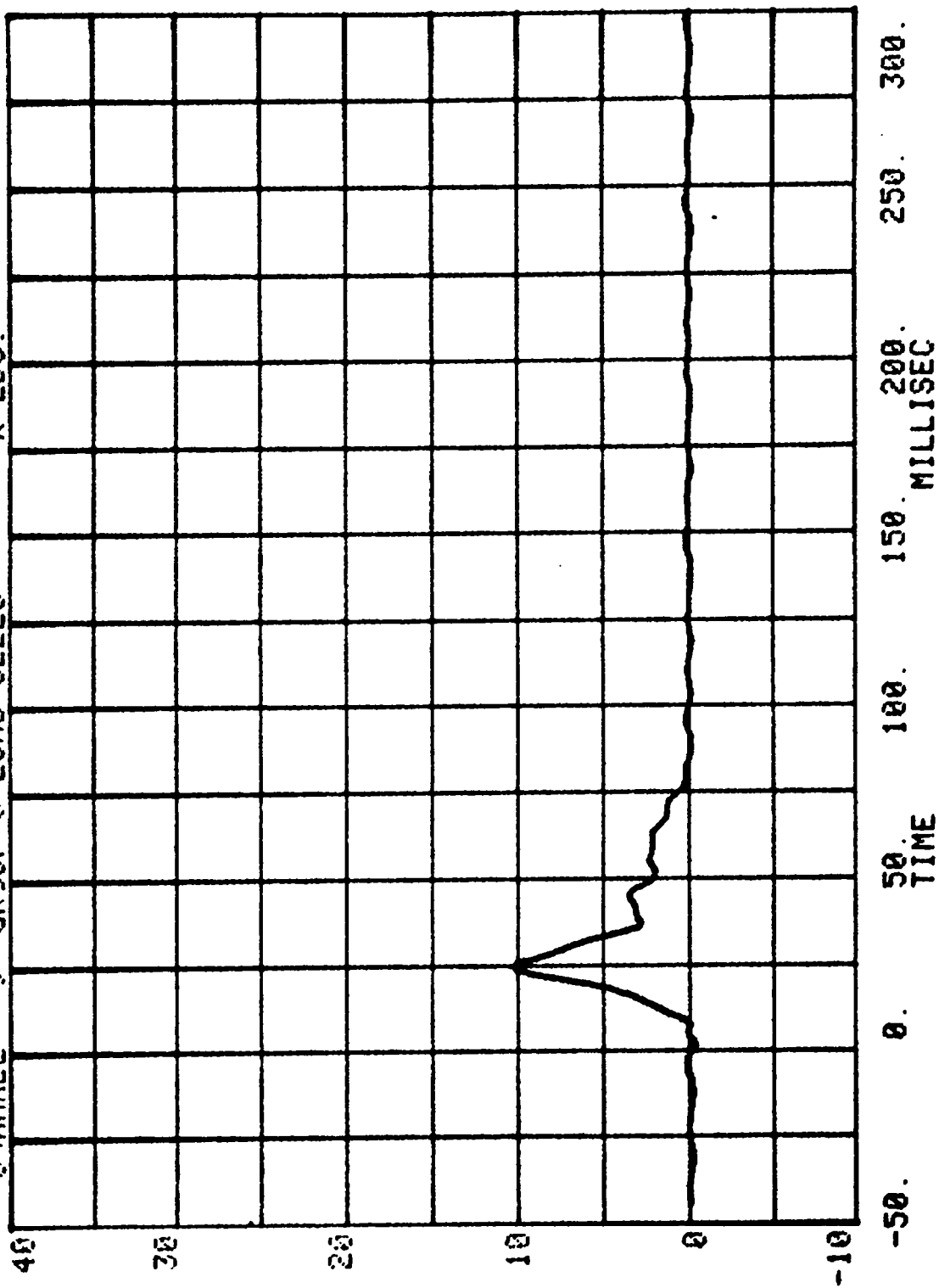


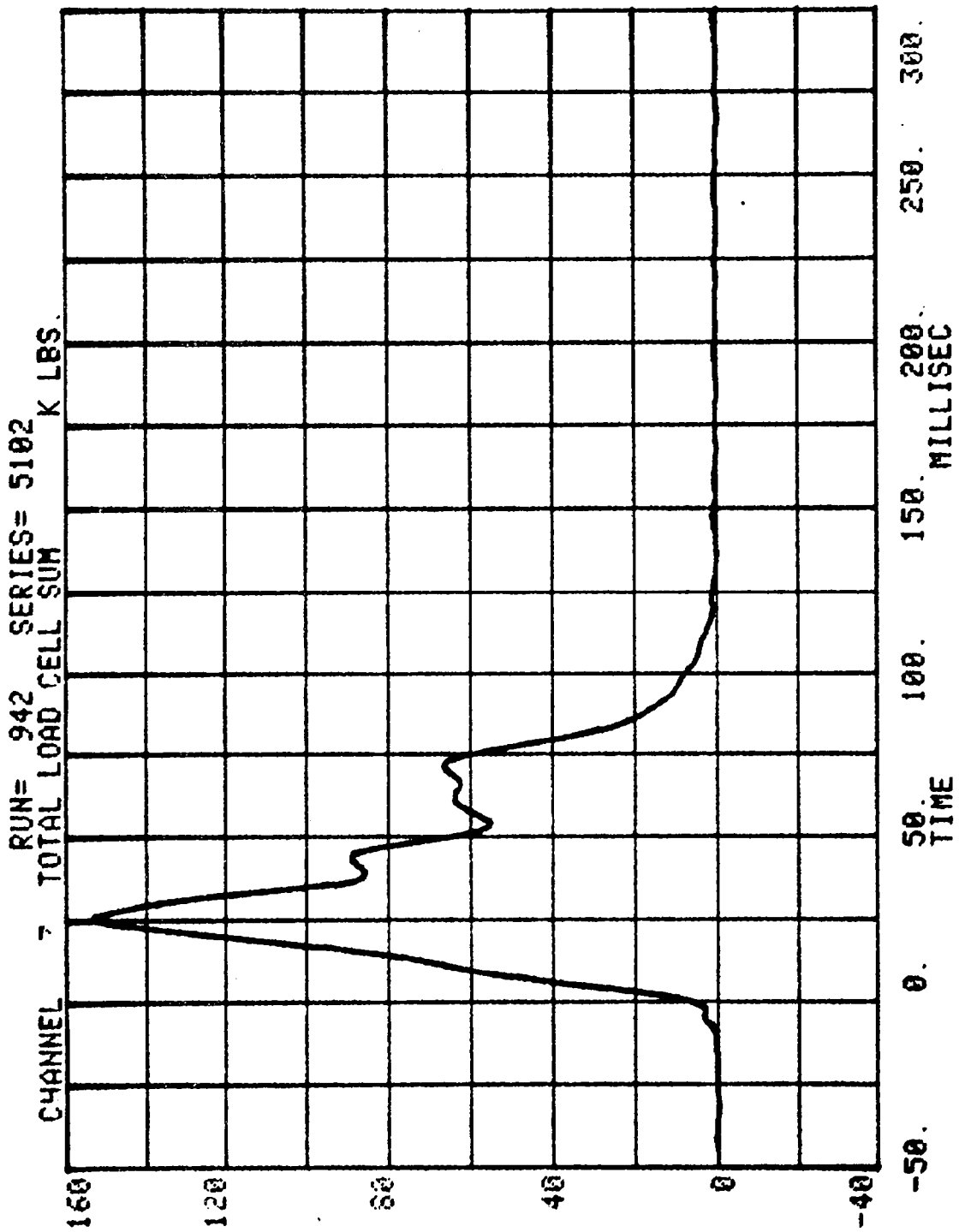
CHANNEL 5 GROUP 5 LOAD CELLS K LBS.

PUN= 942 SERIES= 5102



RUN= 942 SERIES= 5102
CHANNEL 5 GROUP 6 LOAD CELLS K LBS.





TEST NO. ML5102

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
35MS. MAXIMUM DURATION

NEW CAR ASSESSMENT PROGRAM - 1990

RUN= 942

POS#1 HEAD R

HIC= 991.9 FROM T1= .05902 TO T2= .09150
AVERAGE ACCELERATION BETWEEN T1 AND T2= 62.2G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1122.7

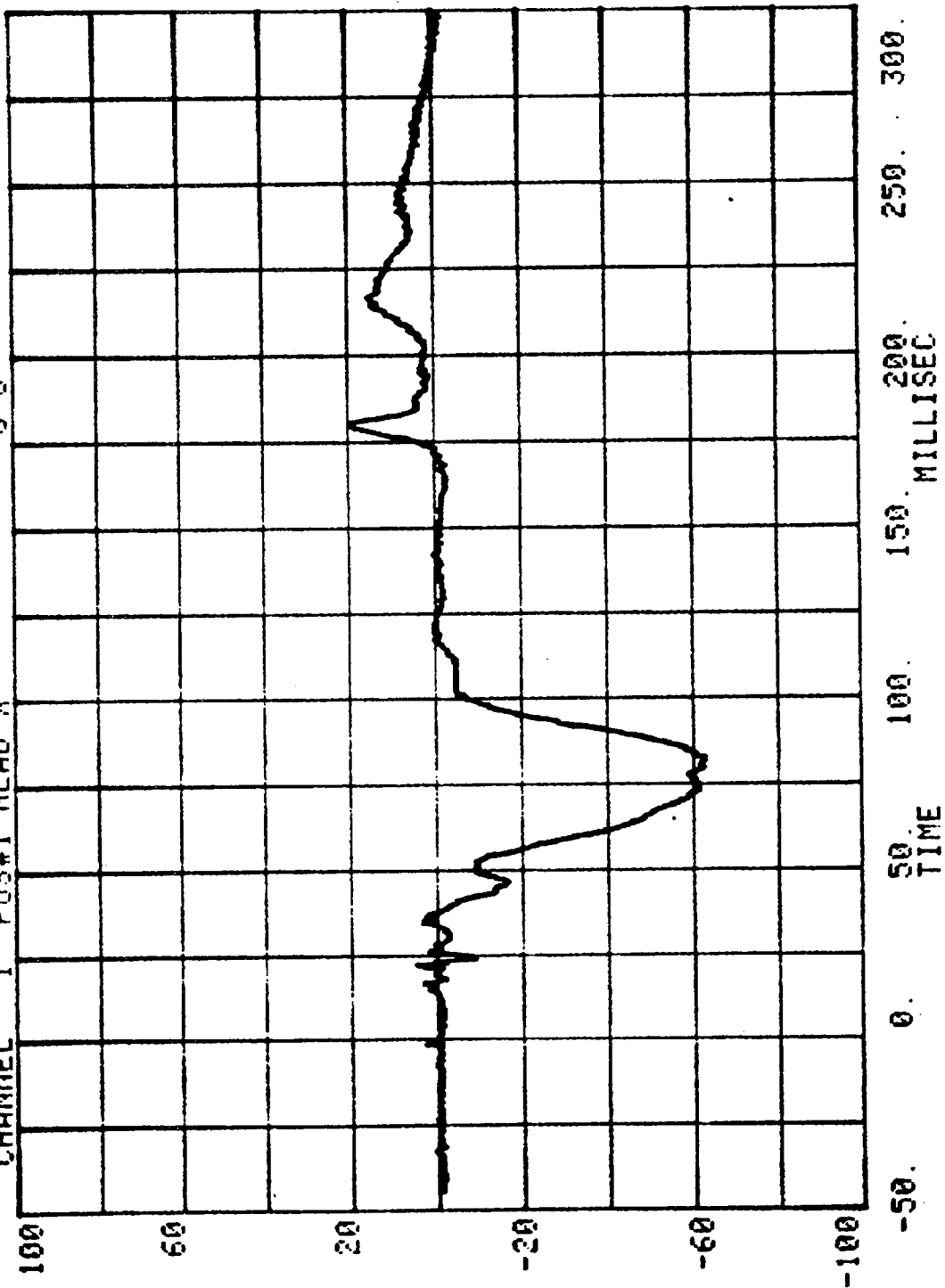
NEW CAR ASSESSMENT PROGRAM - 1990

RUN # 942

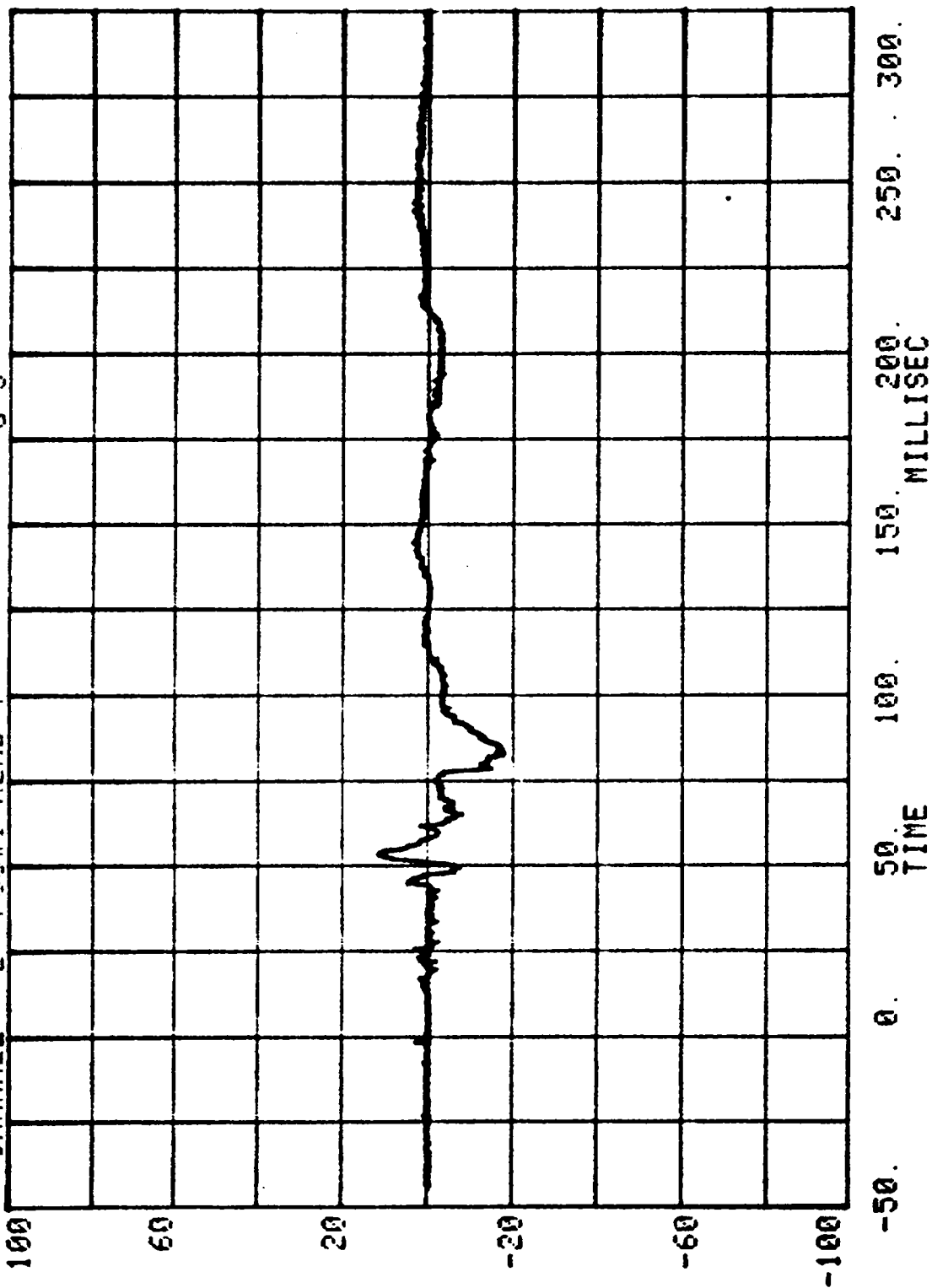
SERIES # 5102

CHANNEL	TITLE	7 MS. CLIPPED PEAK
2	POS#1 CHEST R	55.185 G'S
4	POS#2 CHEST R	47.140 G'S

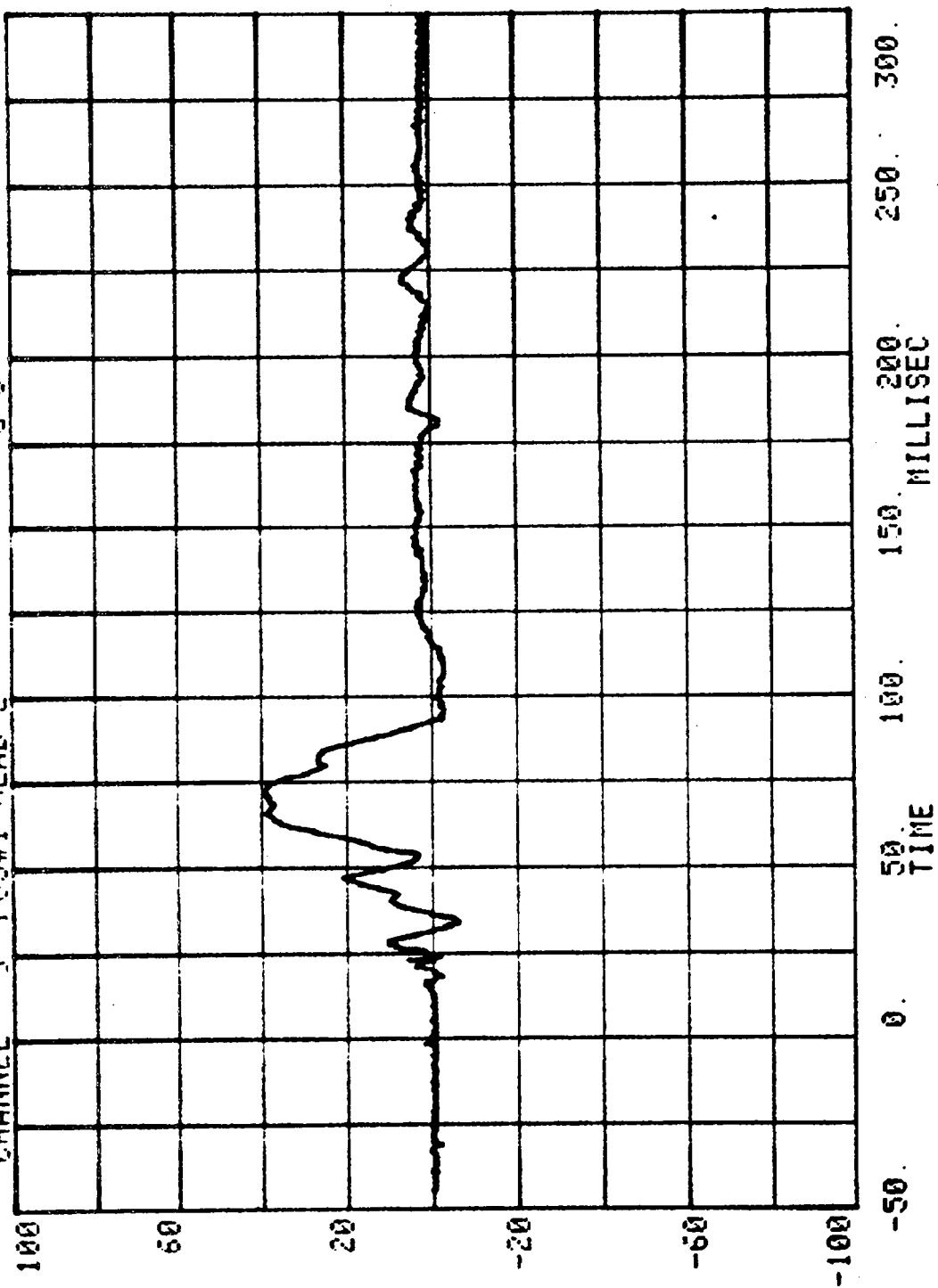
CHANNEL 1 POS#1 HEAD X
RUN= 942 SERIES= 5102 G'S



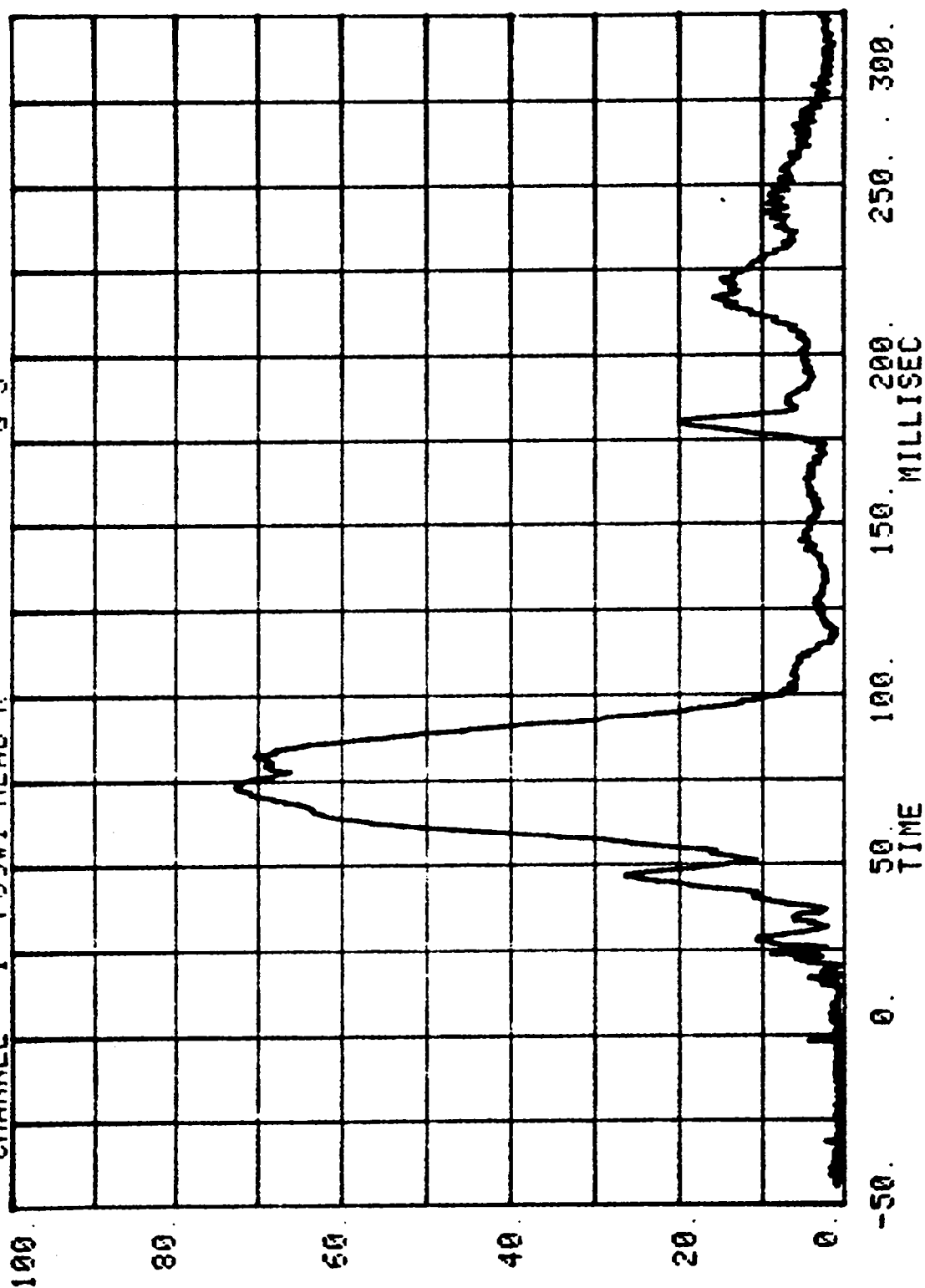
CHANNEL 2 RUN= 342 SERIES= 5102 G'S
POS#1 HEAD Y



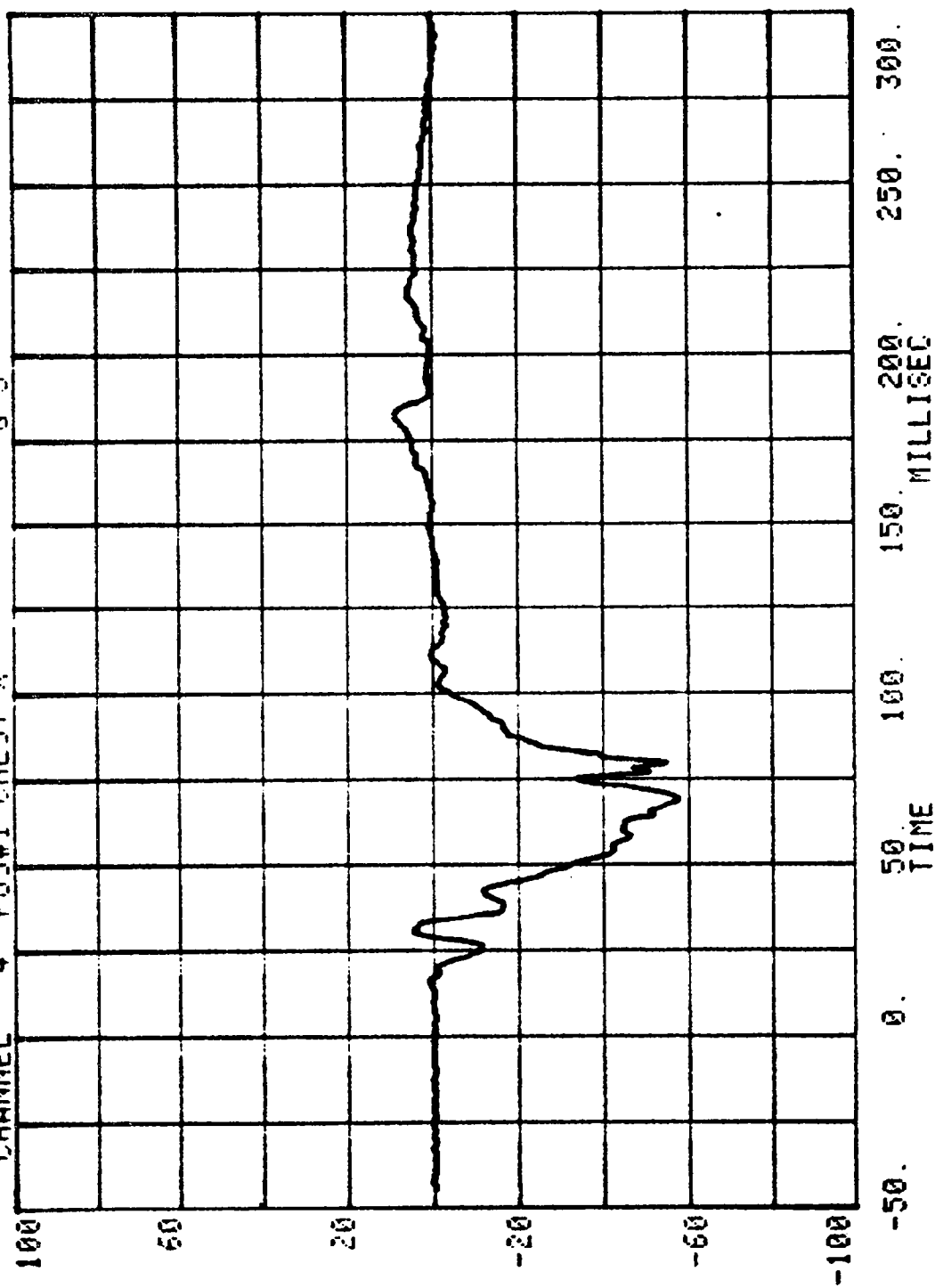
CHANNEL 3 POS#1 HEAD 2 RUN= 942 SERIES= 5102 G'S



CHANNEL 1 POS#1 HEAD R RUN= 942 SERIES= 5102 G'S



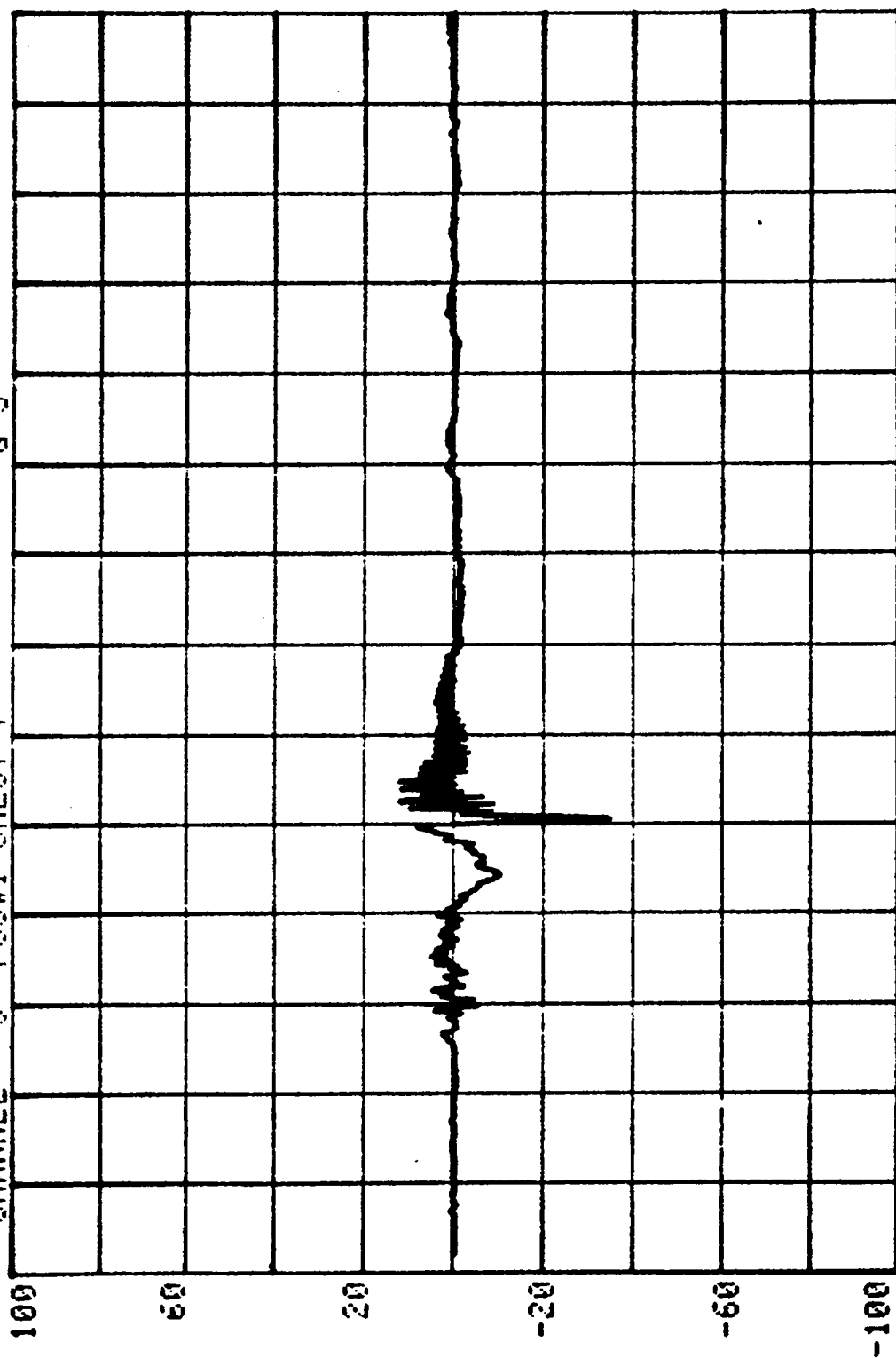
CHANNEL 4 POS#1 CHEST X
RUN= 942 SERIES= 5102 G'S



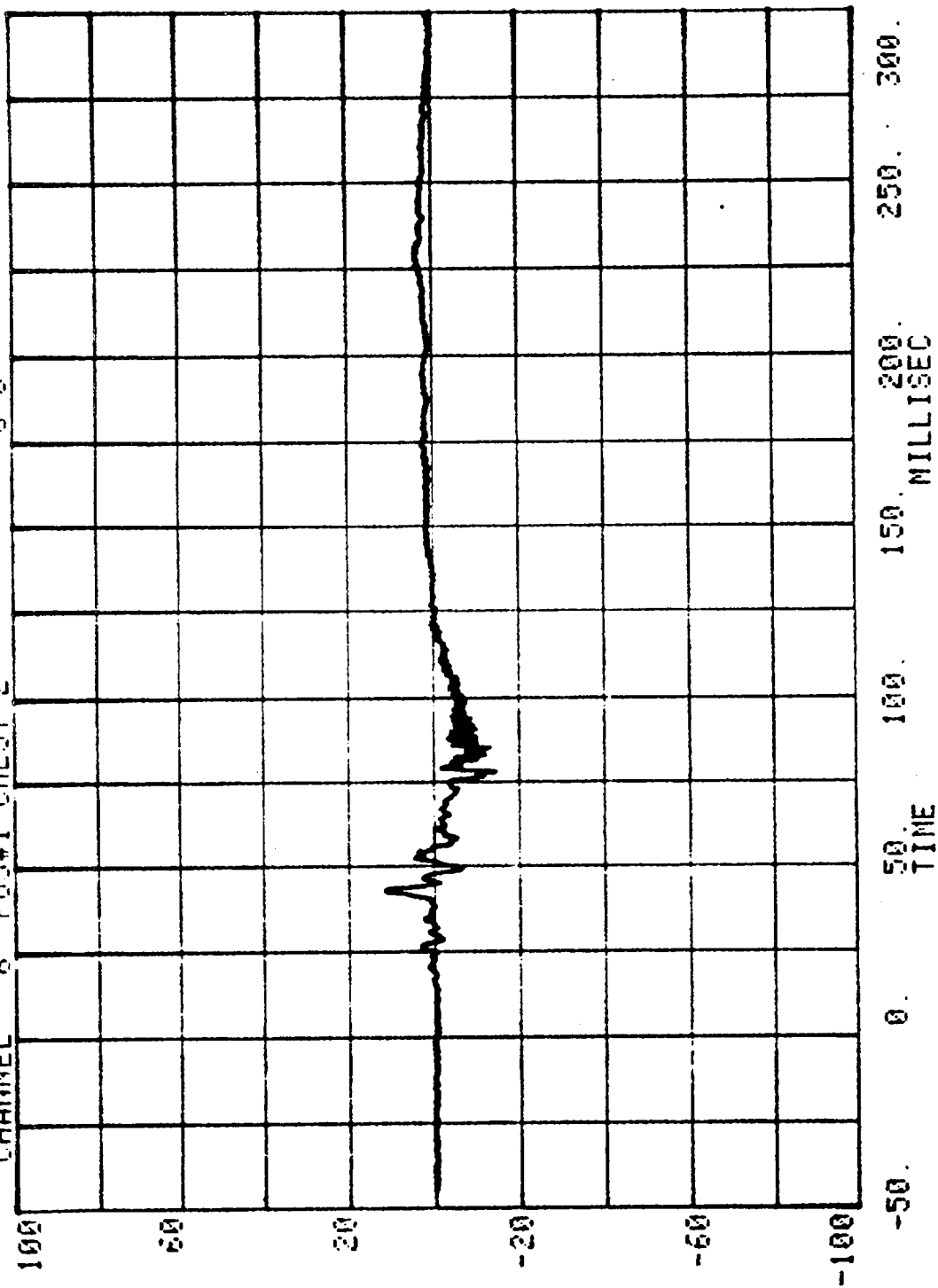
CHANNEL 5 POS#1 CHEST Y G'S

RUN= 942

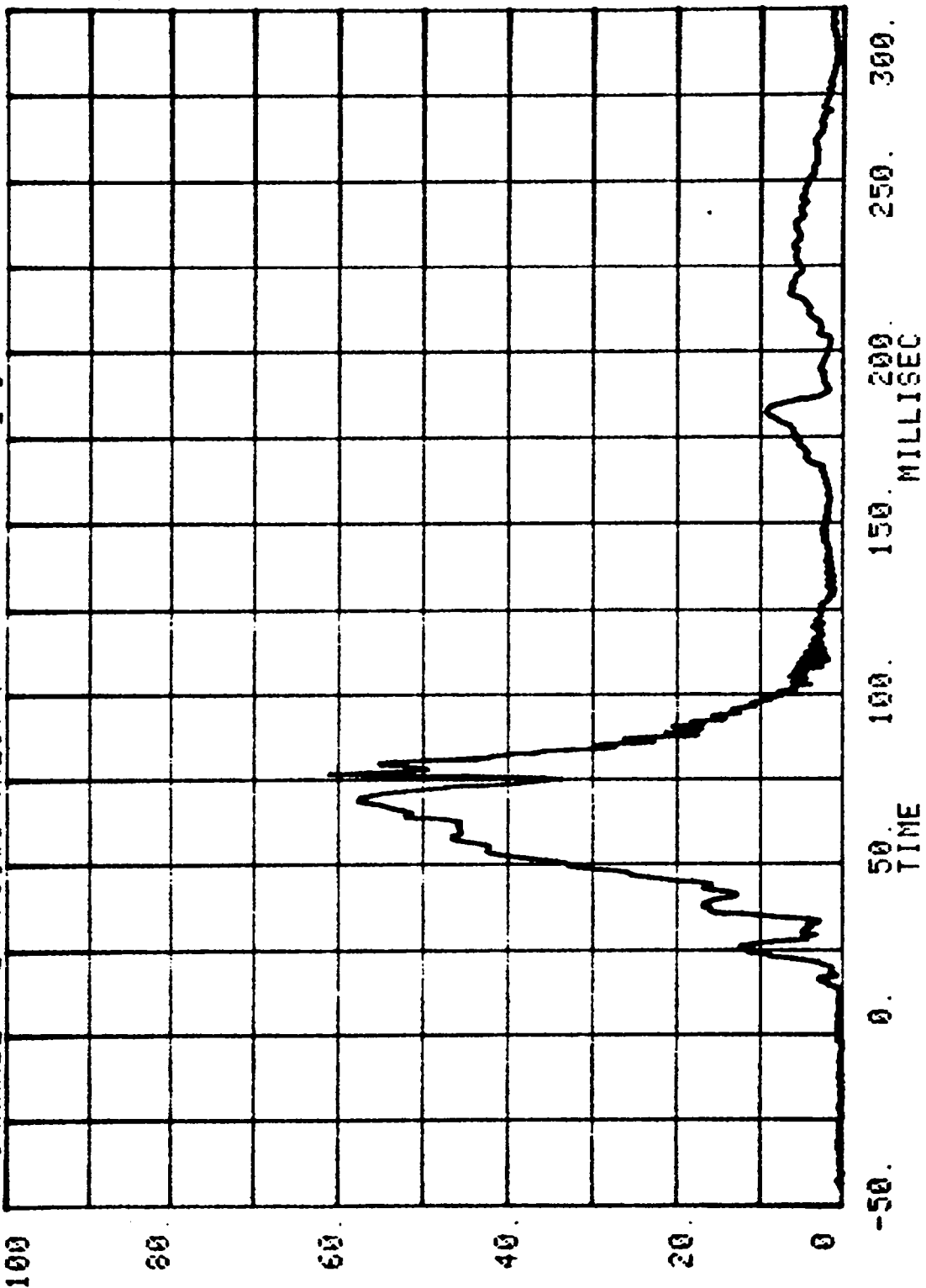
SERIES= 5102



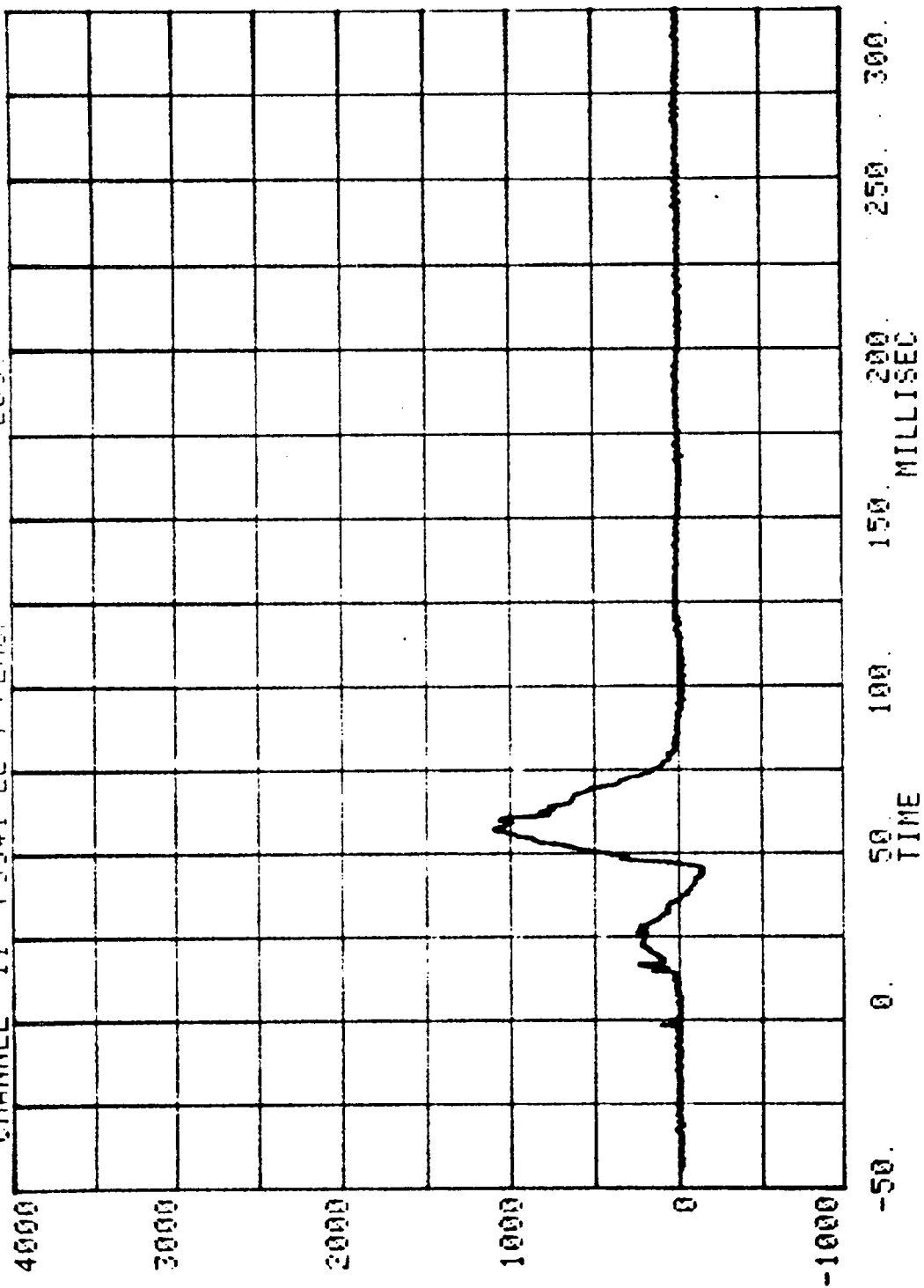
CHANNEL 6 RUN= 942 SERIES= 5102 5'S
POS#1 CHEST 2



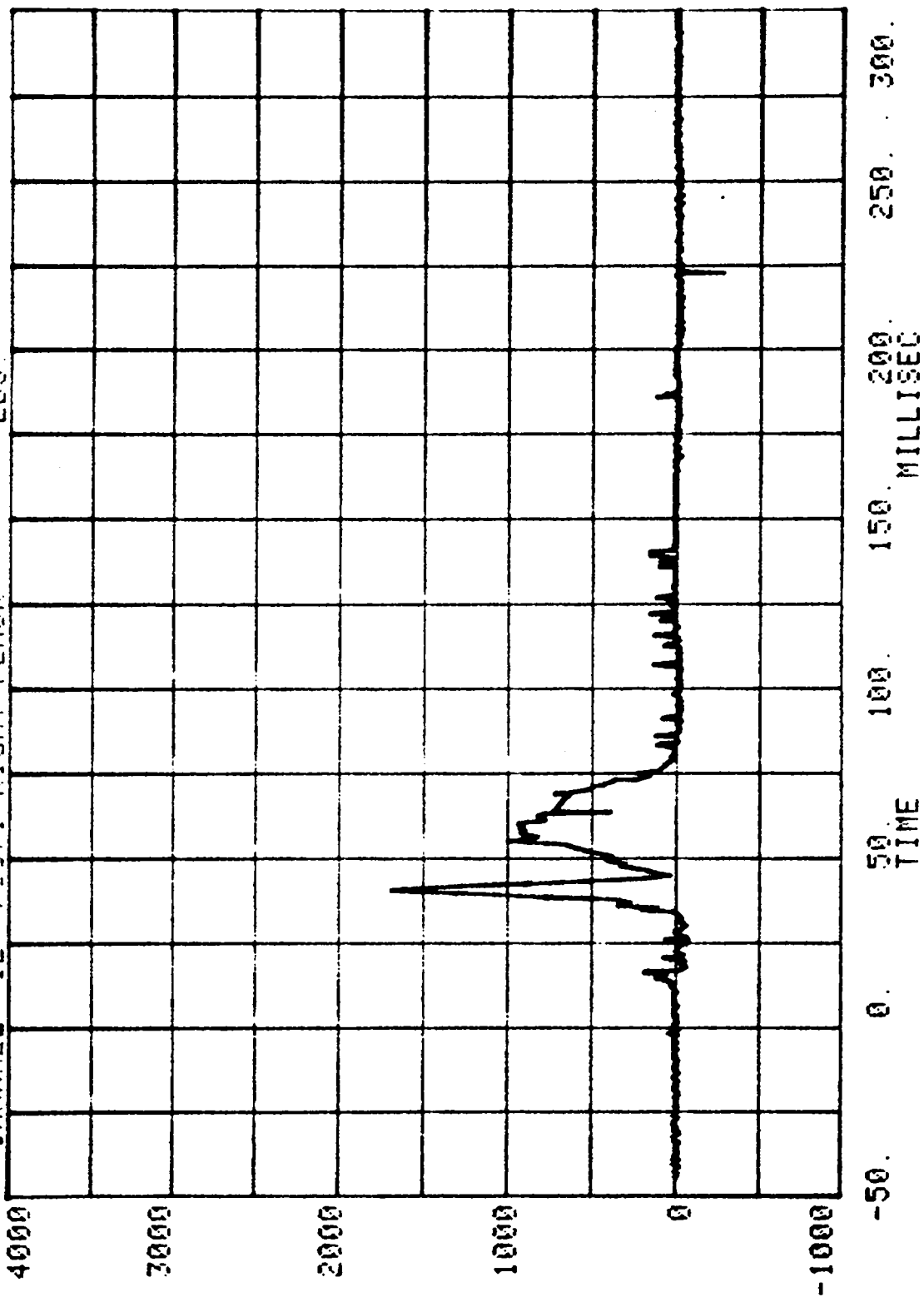
CHANNEL 2 POS#1 CHEST R
RUN= 942 SERIES= 5102
G'S



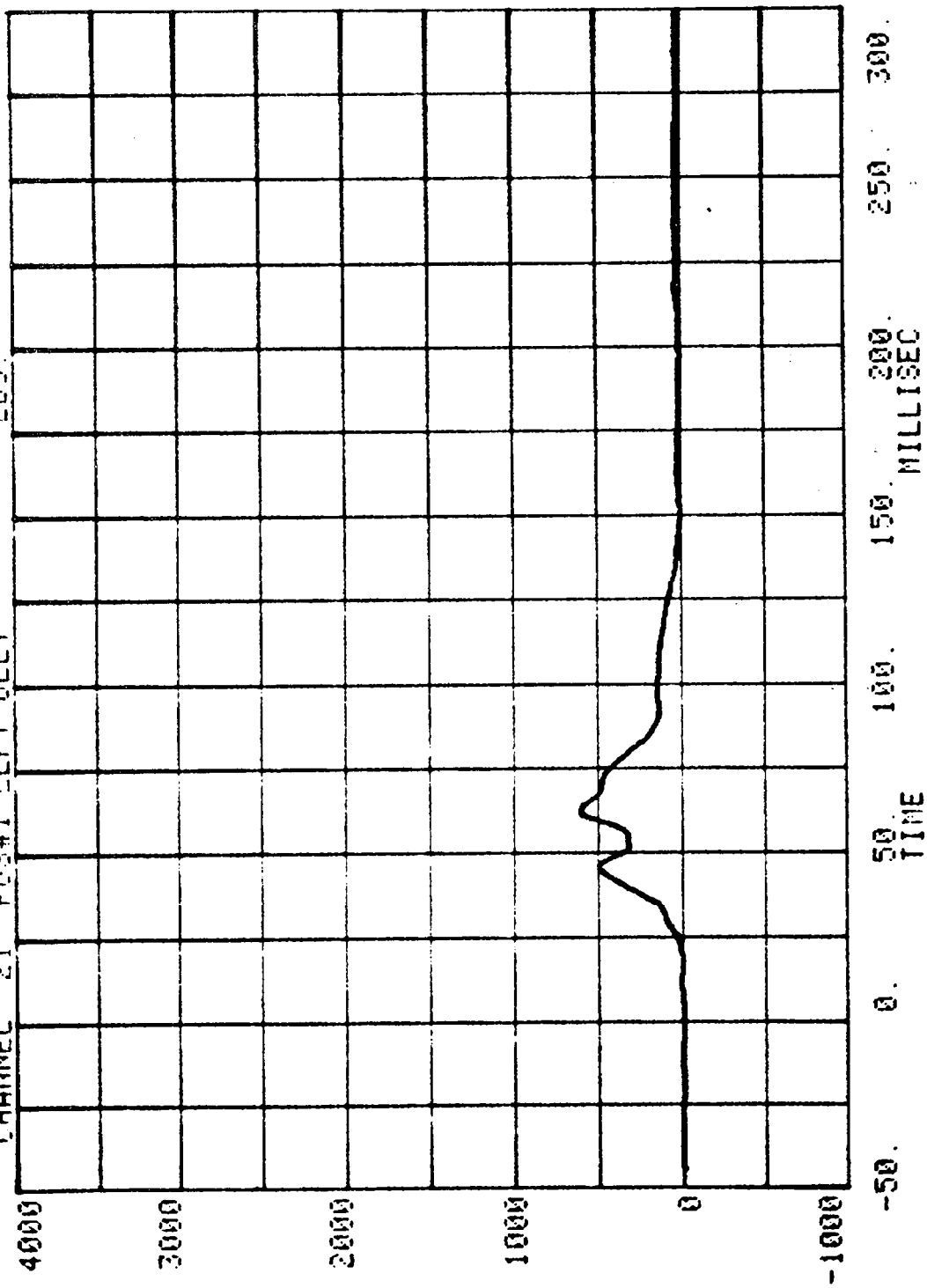
CHANNEL 11 RUN= 242 SERIES= 5102 L83
POS#1 LEFT FEMUR



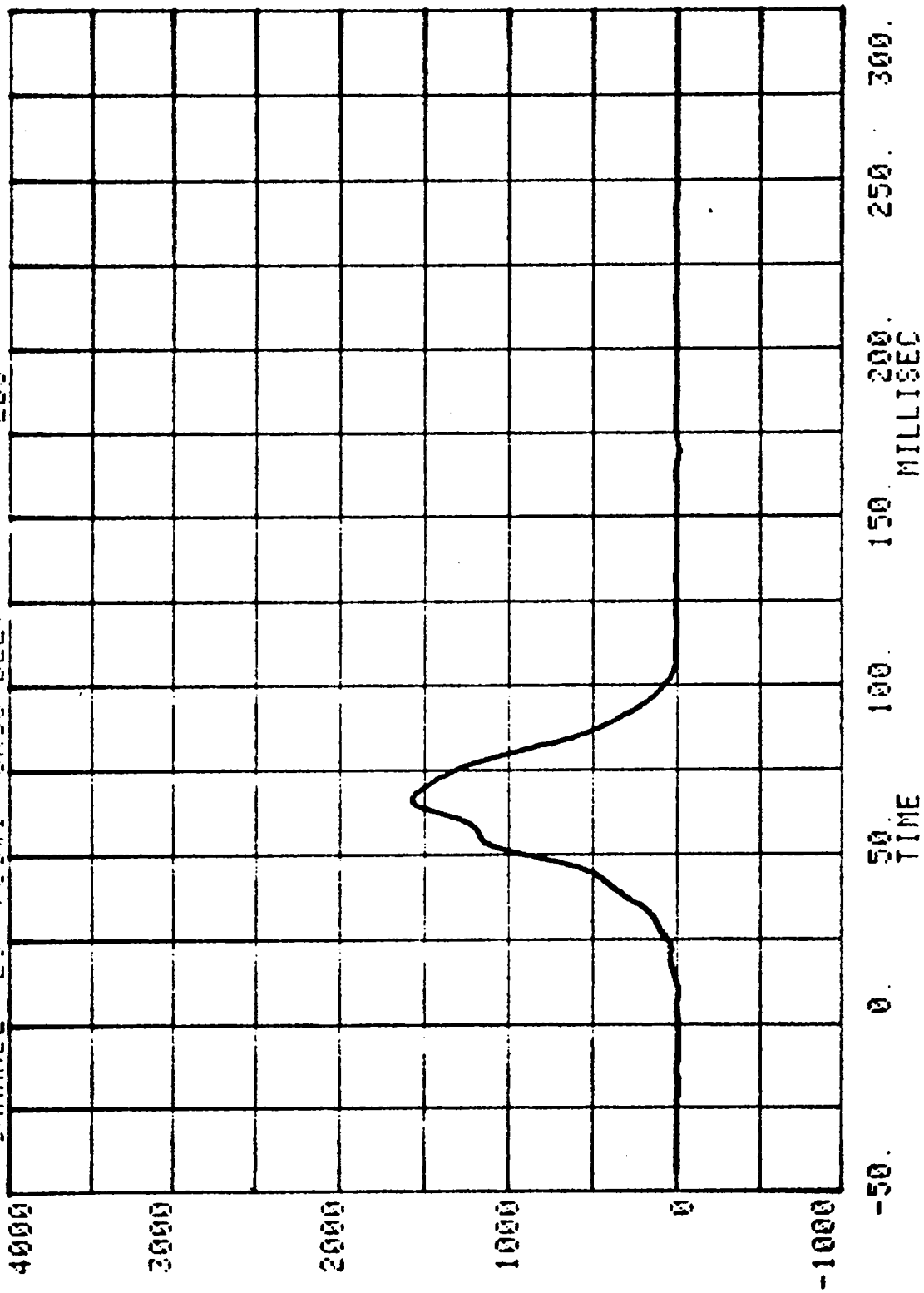
CHANNEL 12 POS#1 RIGHT FEMUR LBS
RUN= 942 SERIES= 5102



CHANNEL 21 RUN= 942 SERIES= 5102 LBS
POS#1 LEFT BELT

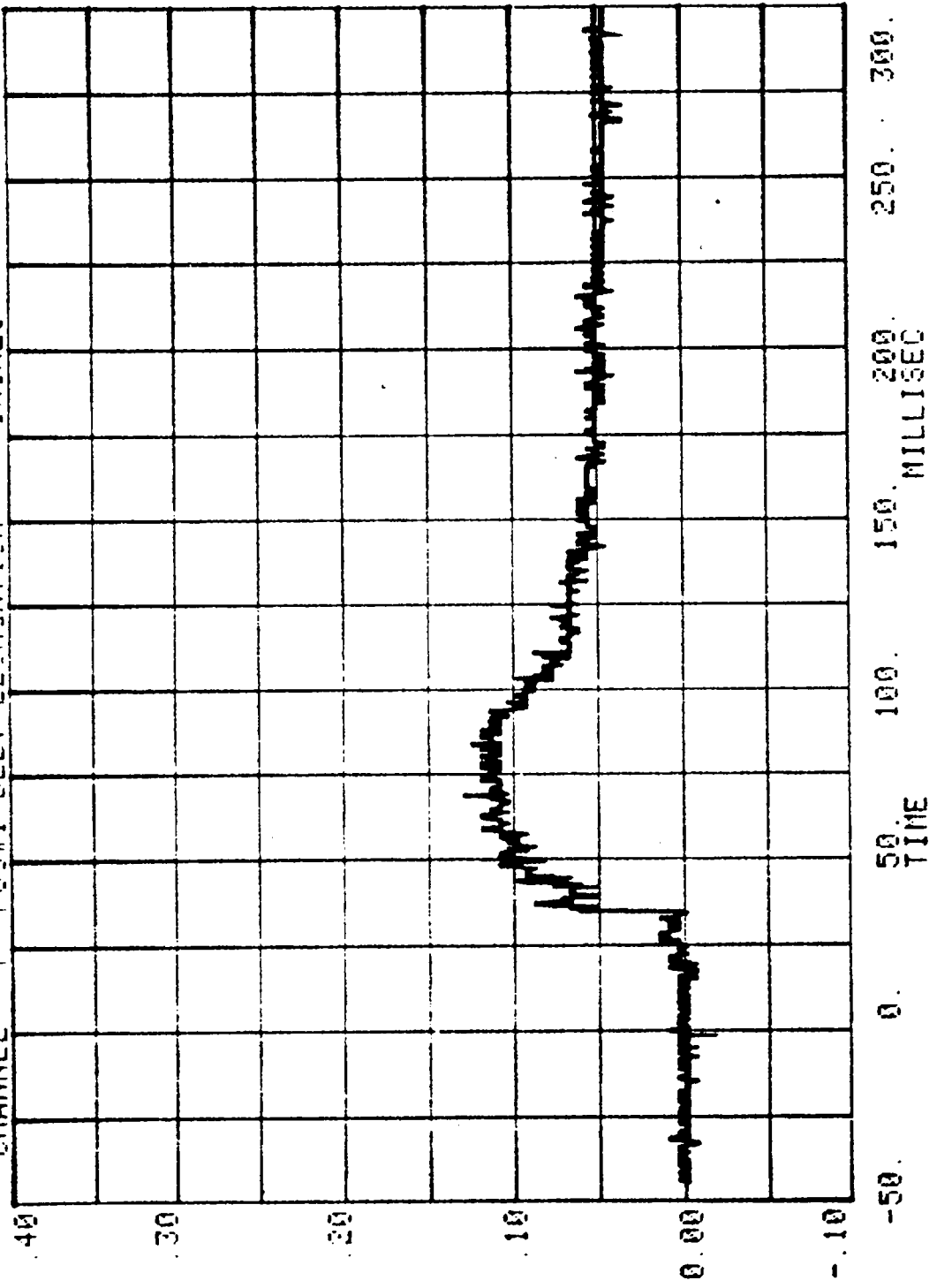


CHANNEL 23 POS#1 TORSO BELT
RUN= 942 SERIES= 5102 LBS



Measured over
2.5 inches

CHANNEL 7 RUH= 942 SERIES= 5102
POS#1 BELT ELONGATION INCHES



HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NEW CAR ASSESSMENT PROGRAM - 1990

RUN= 942

POS#2 HEAD R

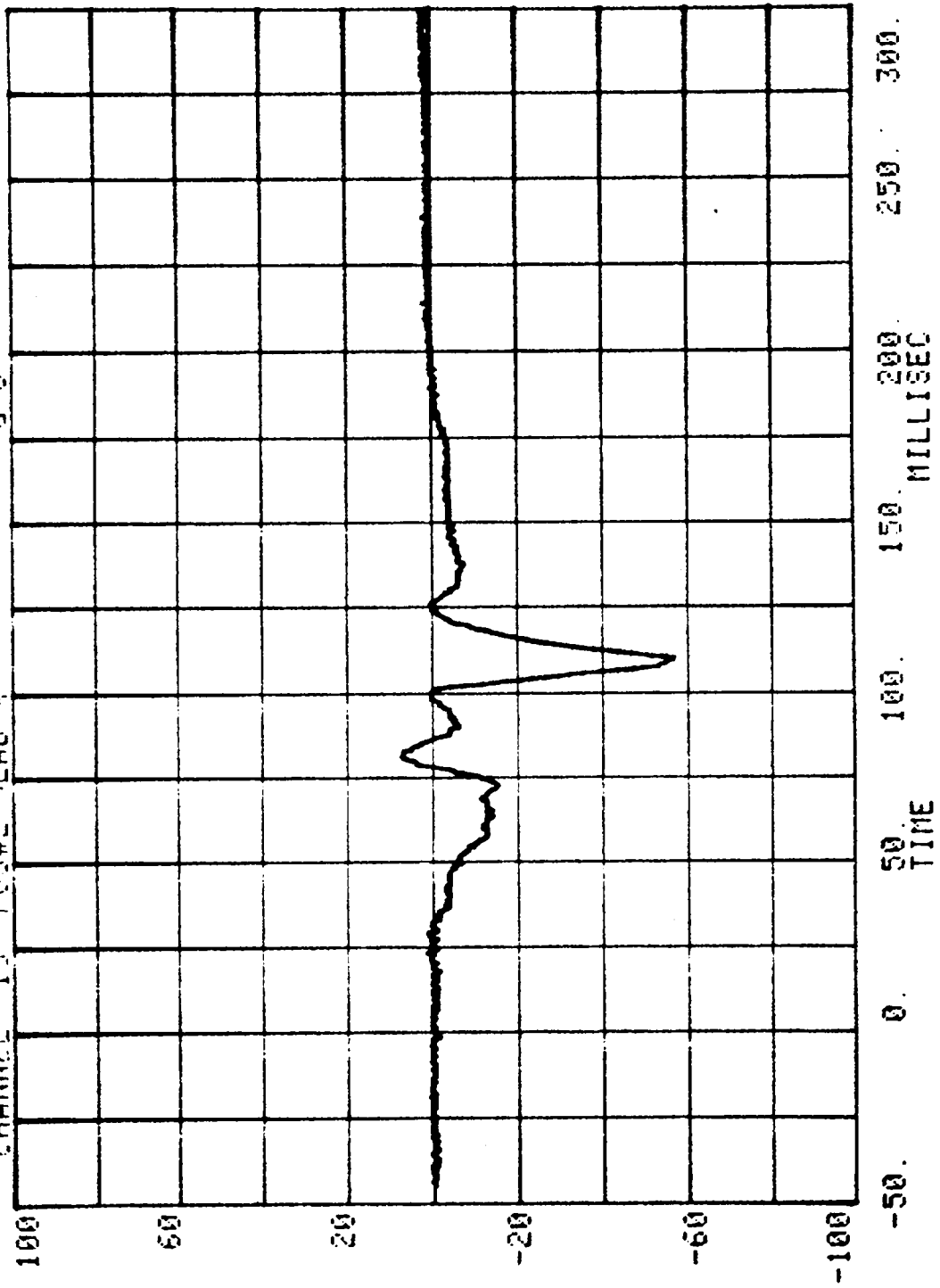
HIC= 630.2 FROM T1= .07605 TO T2= .11205

AVERAGE ACCELERATION BETWEEN T1 AND T2= 49.95'S

EVENT TIME= 300.0 MSEC

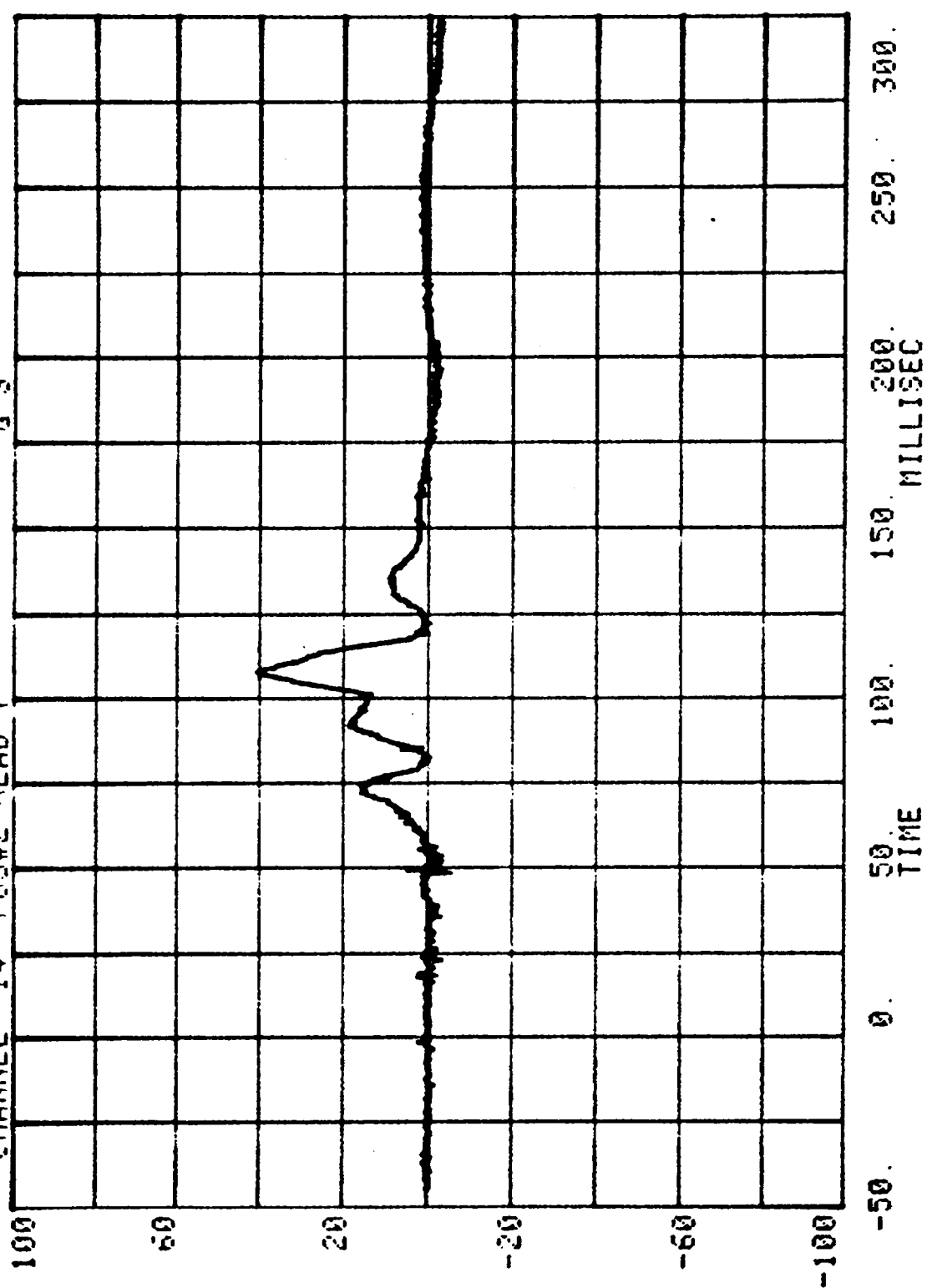
SEVERITY INDEX= 997.0

CHANNEL 13 RUN= 942 SERIES= 5102
POS#2 HERO X G'S

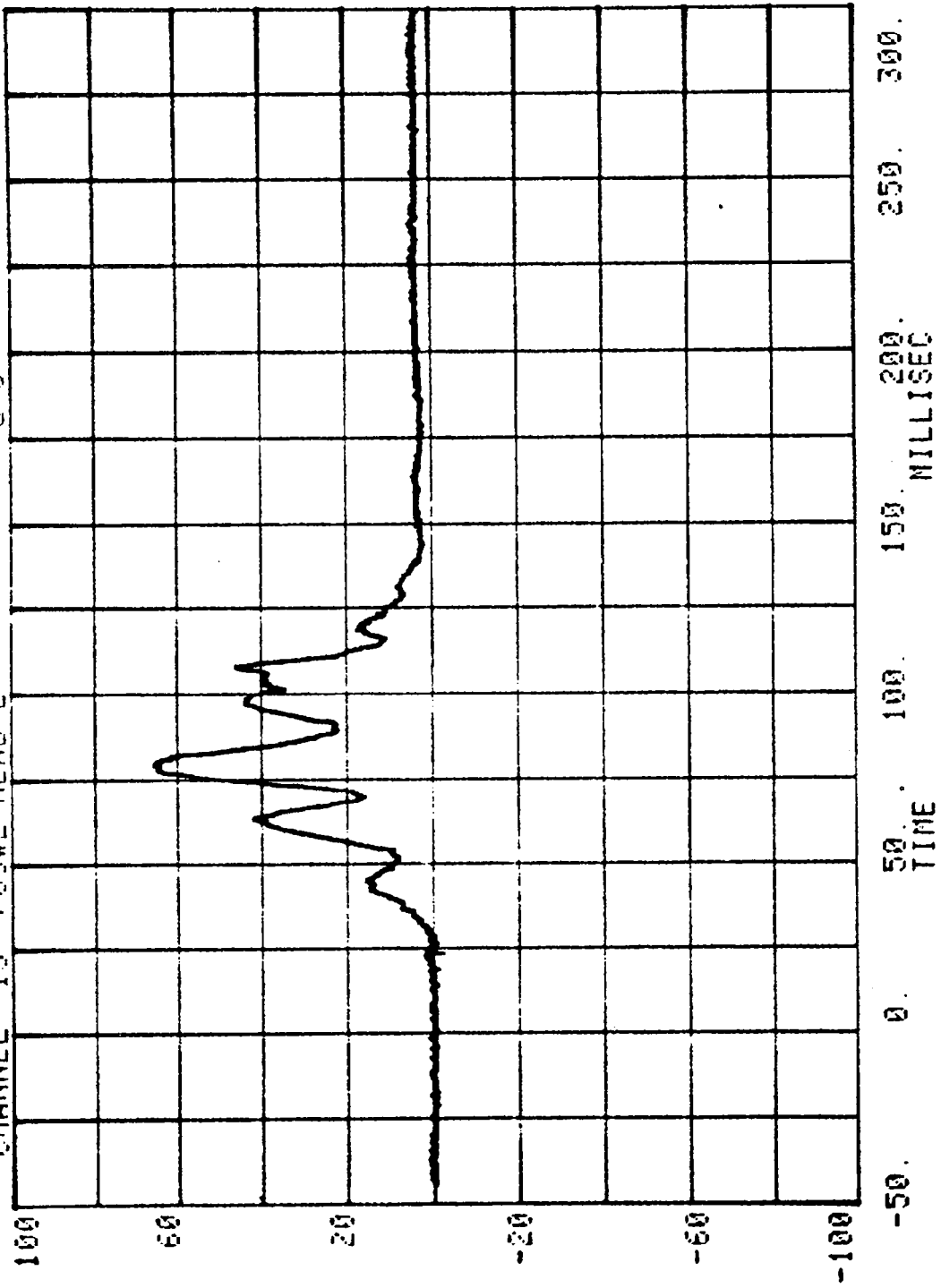


CHANNEL 14 POS#2 HEAD Y G'S

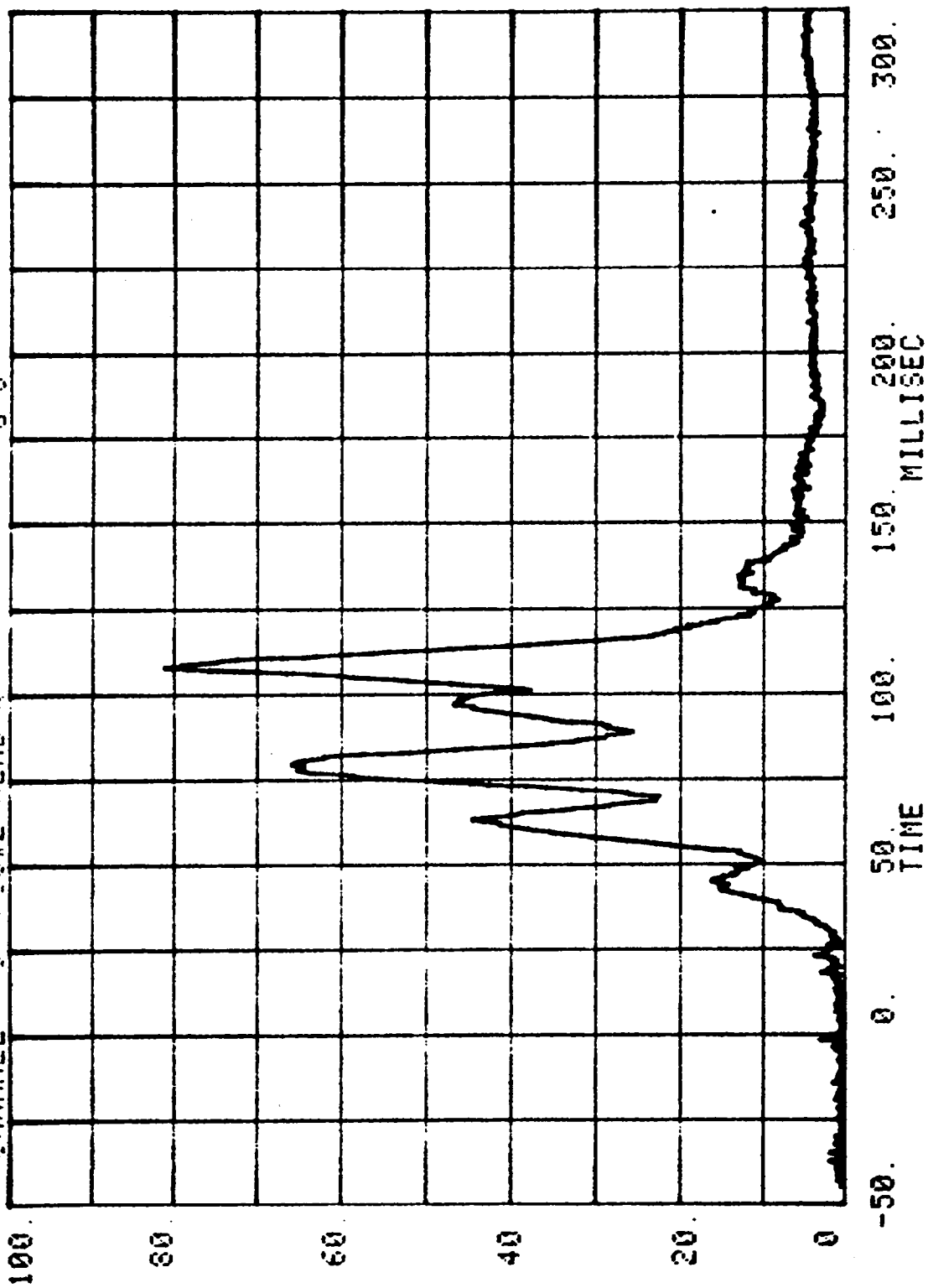
RUN= 942 SERIES= 5102



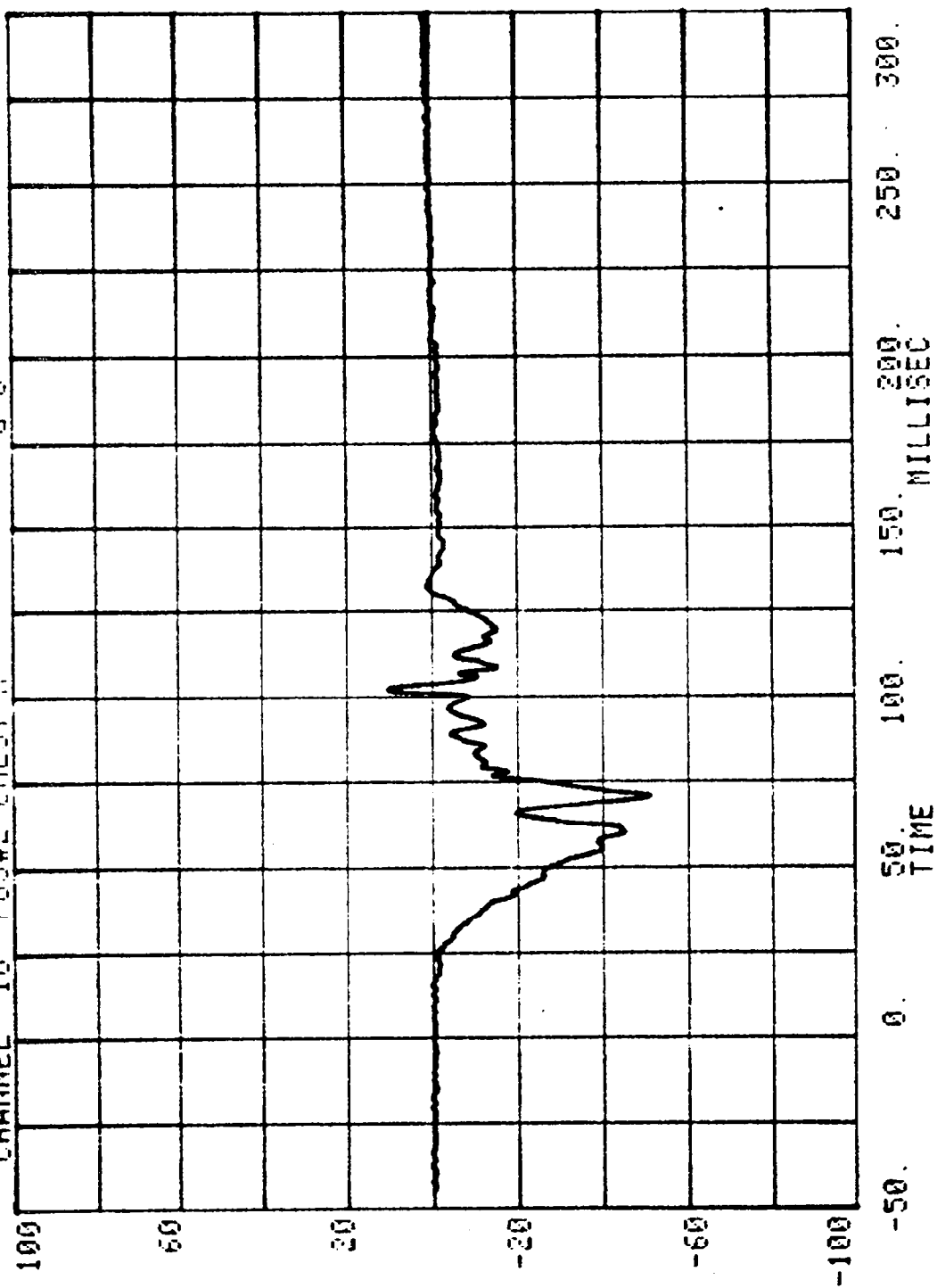
CHANNEL 15 RUN= 942 SERIES= 5102 G'S
POS#2 HEAD 2



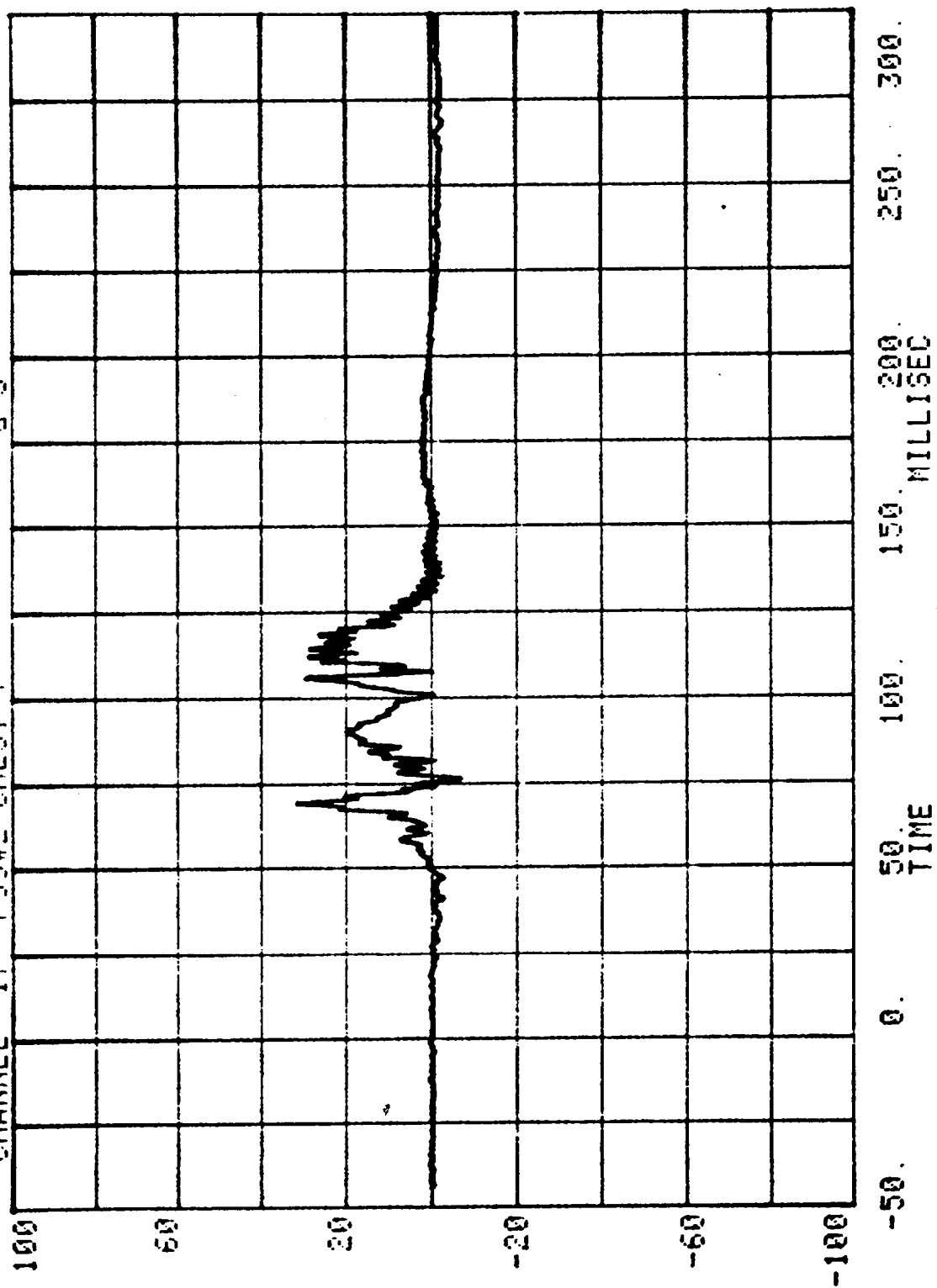
CHANNEL 3 POS#2 HEAD R RUN= 242 SERIES= 5102 G'S



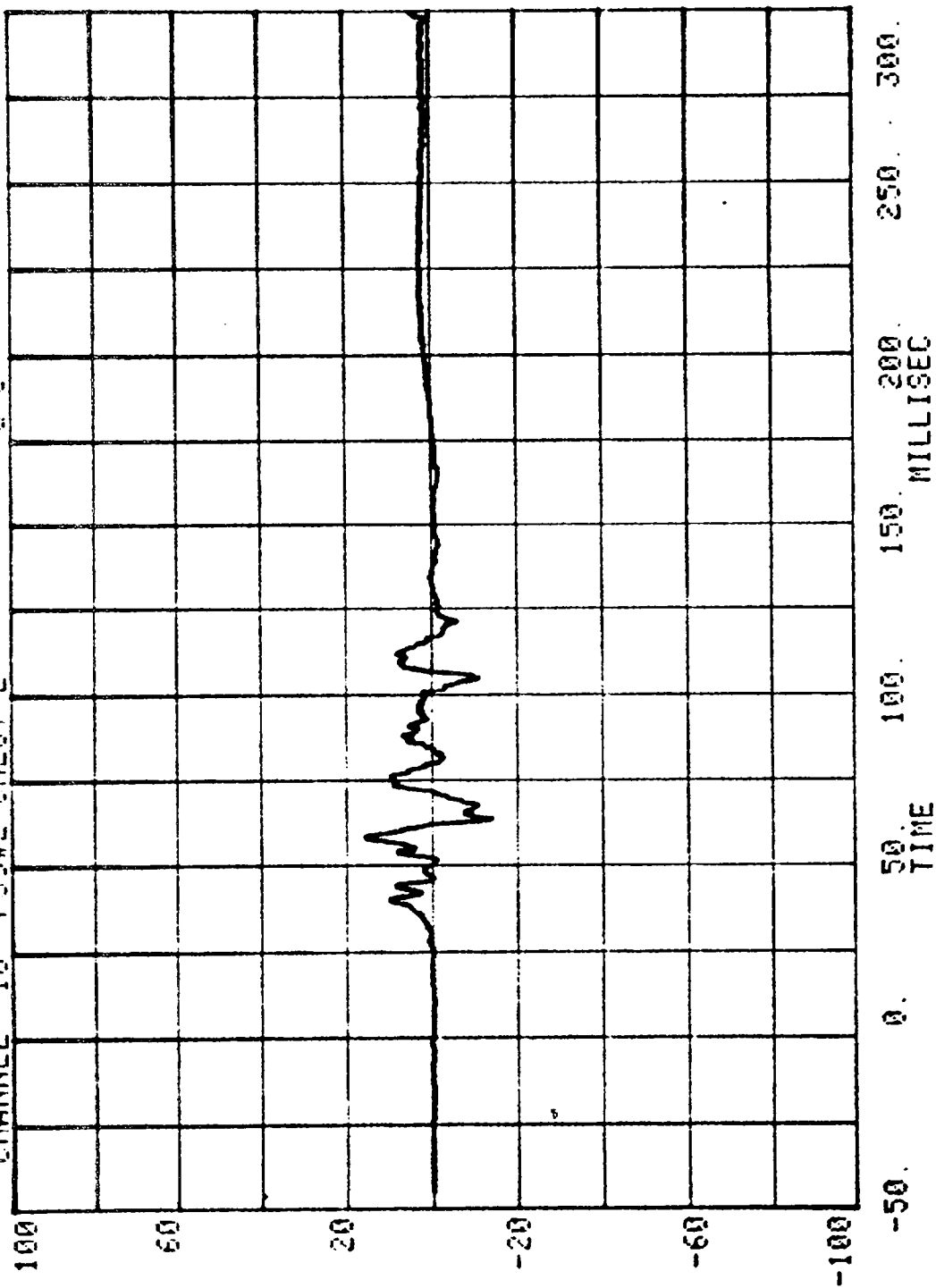
CHANNEL 16 RUN= 942 SERIES= 5102
POS#2 CHEST K G'S



CHANNEL 17 RUN= 942 SERIES= 5102
POS#2 CHEST Y G'S



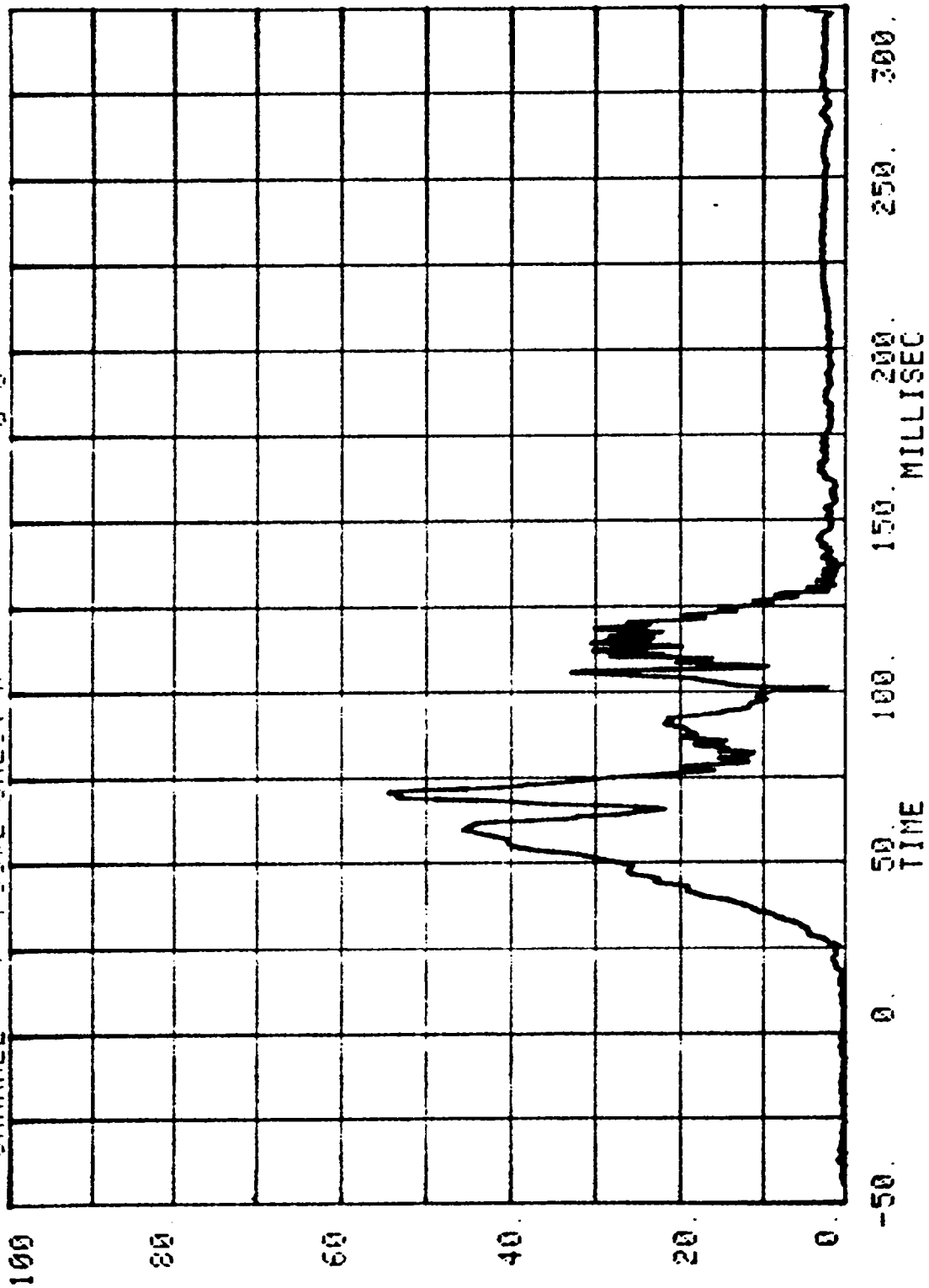
CHANNEL 18 POS#2 CHEST 2
RUN= 942 SERIES= 5102
G'S



CHANNEL 4 POS#2 CHEST R G'S

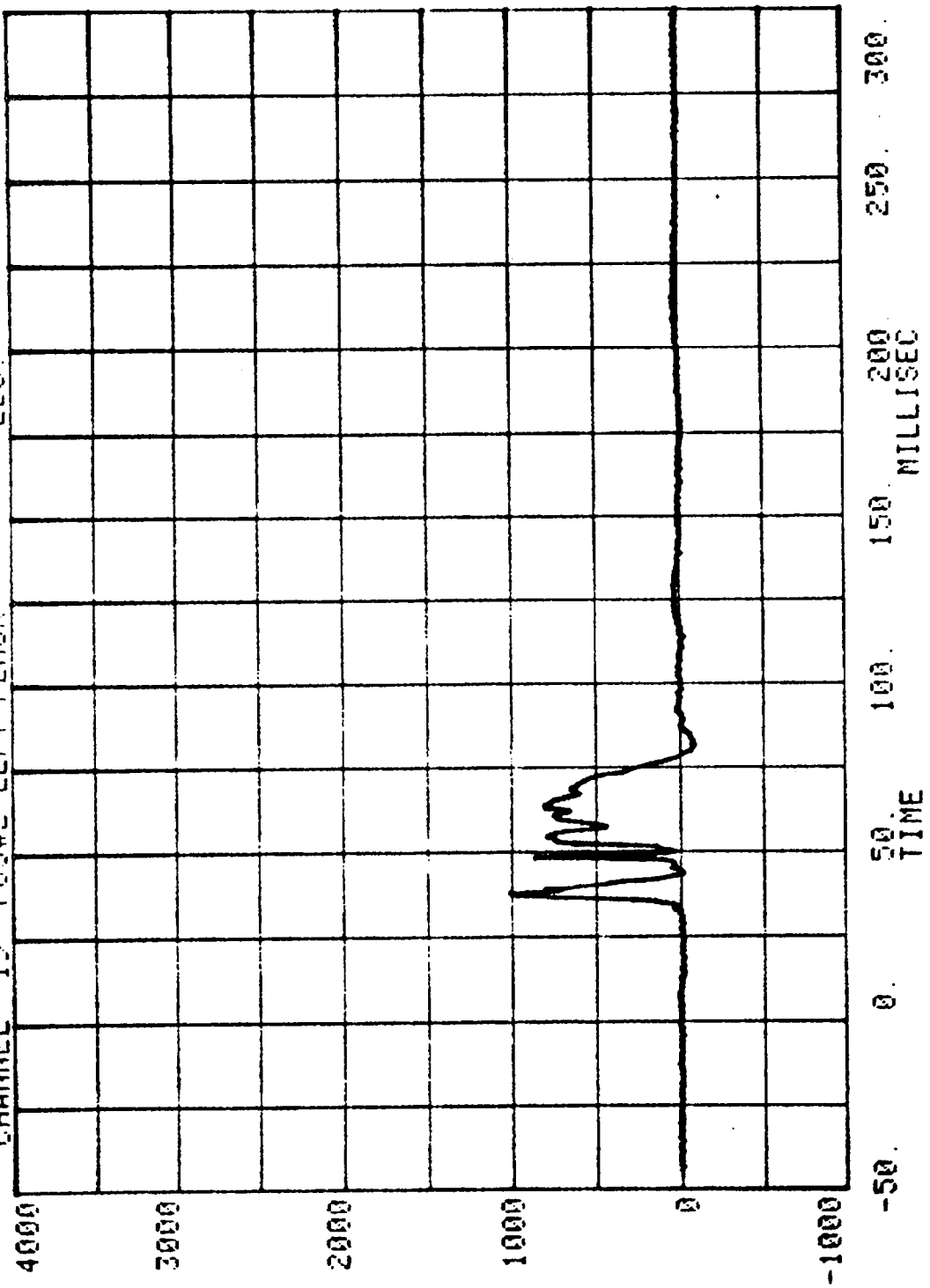
RUN= 942

SERIES= 5102



CHANNEL 19 POS#2 LEFT FEMUR LBS.

RUN= 942 SERIES= 5102

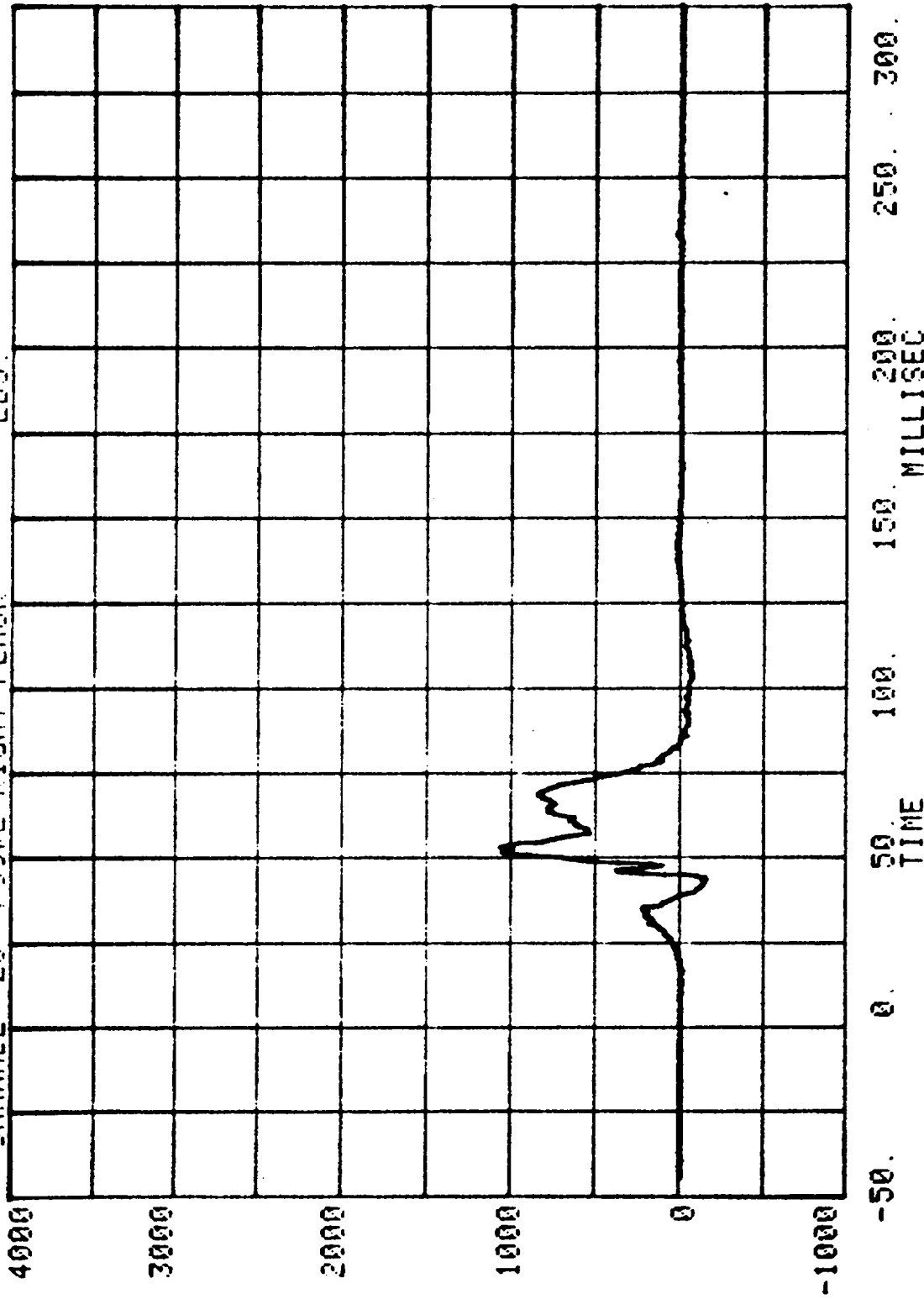


CHANNEL 20 POS#2 RIGHT FEMUR LBS.

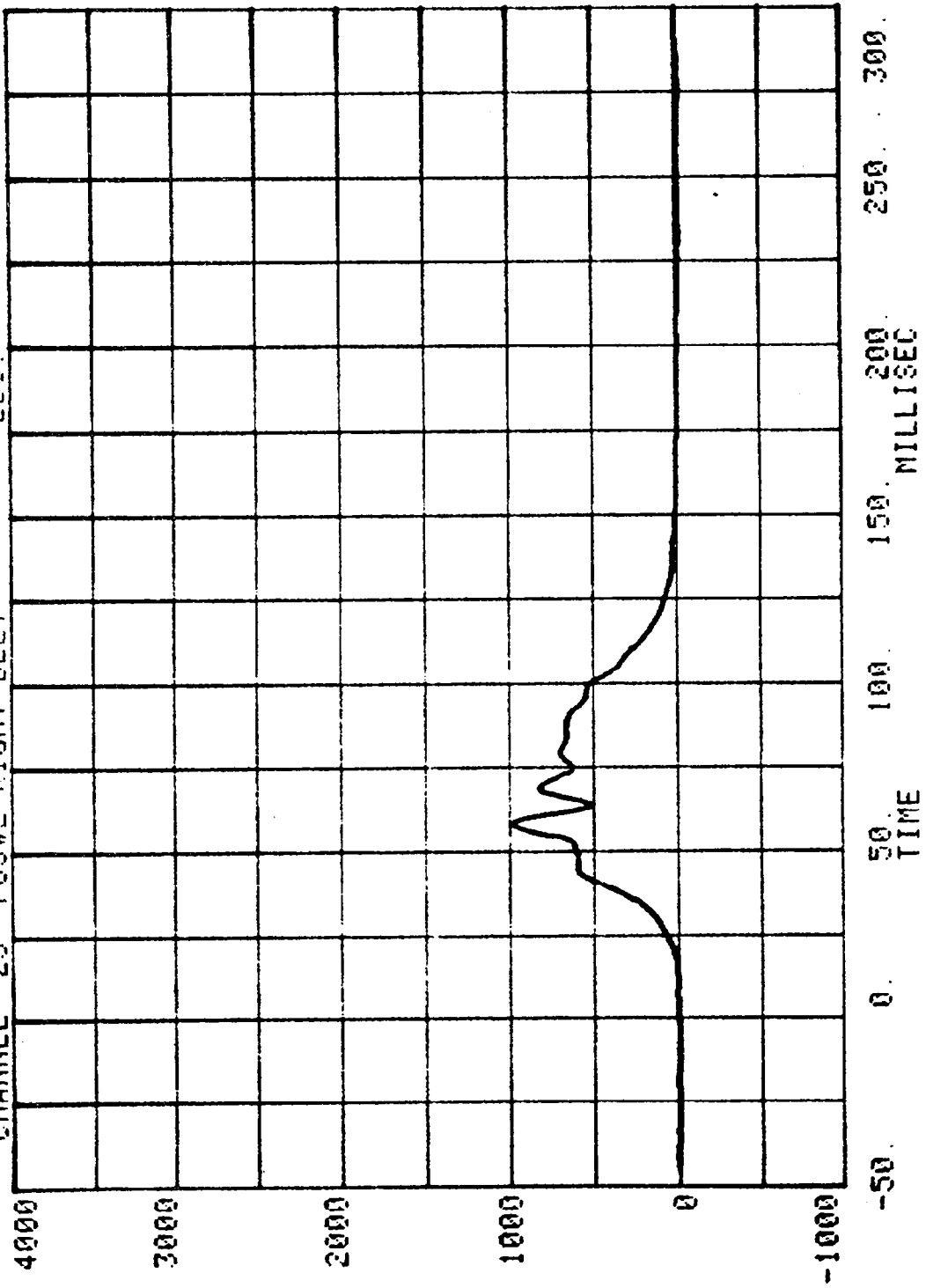
RUN= 942

SERIES= 5102

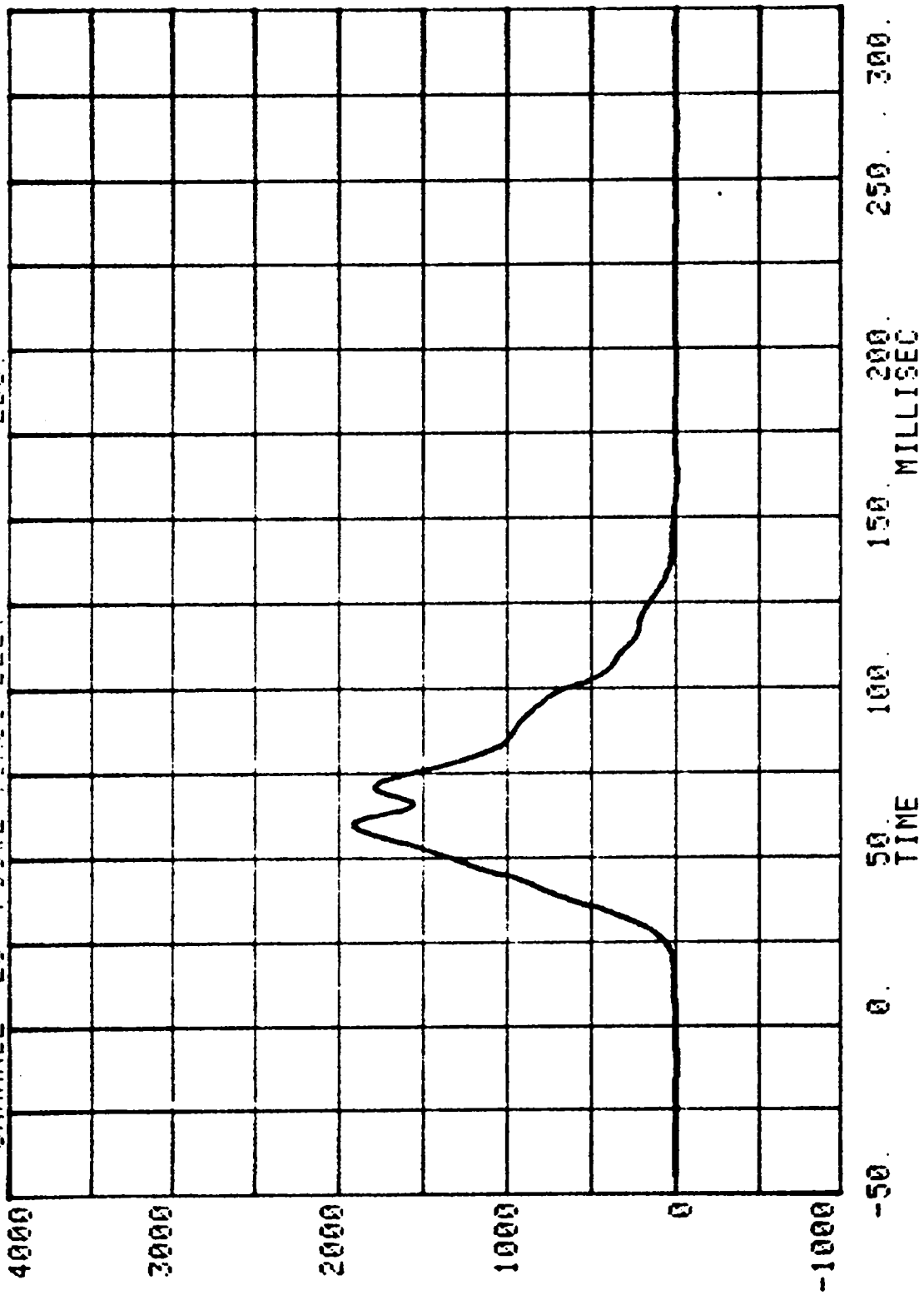
LBS.



CHANNEL 25 POS#2 RIGHT BELT
RUN= 942 SERIES= 5102 LBS.

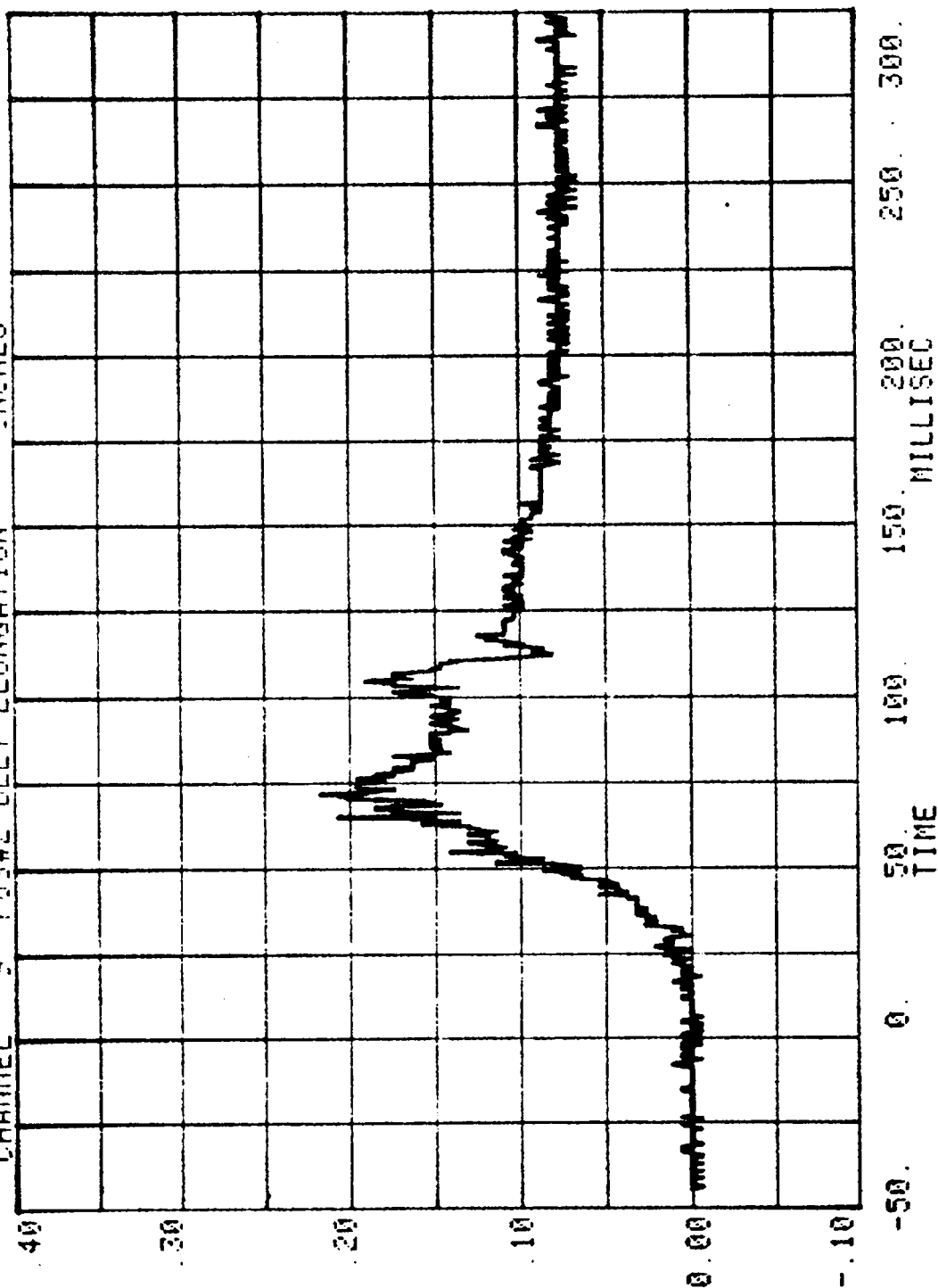


CHANNEL 26 PD9#2 TOR90 BELT
RUN= 942 SERIES= 5102 LBS.



Measured over
2.5 inches

CHANNEL 9 POS#2 BELT ELONGATION SERIES= 5102 INCHES



Appendix C

DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropomorphic test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Volume 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan Corporation, Advanced Technology Center. A summary of the test results, Part 572 specifications and instrument calibration information is included in this Appendix.

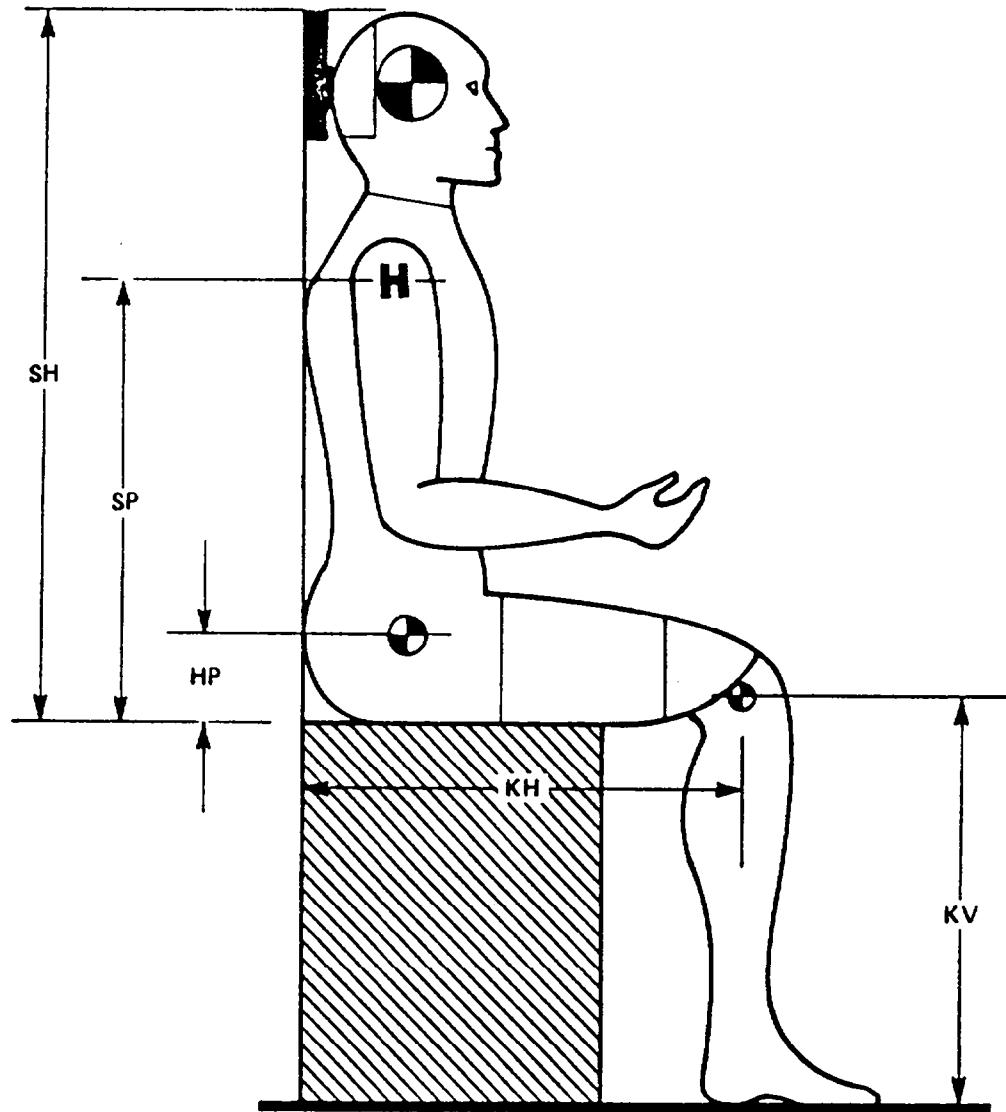
Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
1021	11-28-89
1022	11-22-89

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.: 1021

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXXX	11-28-89	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXXX	1	
SH - Seated Height	35.6 to 35.8"	35.7 "	"
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"	19.8 "	"
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	-----	11-28-89	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)	---	1	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-71 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		25-40 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	216.6 G's	G's
b. peak lateral accel.	<= 10 G's	1.3 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' crash test program.

TECHNICIAN'S NAME: IVAN MINKIEWICZ

11. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1021

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	23.4 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.	25.47 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.36 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	26.54 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	4.34 ms	
g. Max. Head Rotation		63 to 73 deg.	71.59 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.	27.41 ms	
	Displ.	2.1 to 3.1"	2.45 "	
60 deg.	Time	40.3 to 51.7 ms.	41.54 ms	
	Displ.	4.3 to 5.3"	4.77 "	
Maximum	Time	53.2 to 66.8 ms.	53.32 ms	
	Displ.	5.0 to 6.0"	5.57 "	
60 deg.	Time	67.0 to 83.0 ms.	74.53 ms	
	Displ.	4.3 to 5.3"	4.43 "	
30 deg.	Time	85.4 to 104.6 ms.	89.04 ms	
	Displ.	2.1 to 3.1"	2.12 "	
0 deg.	Time	101.0 - 123.0 ms.	103.17 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: 1021

		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.	26.5 lbs	
b. Force @ 0.75"	36 to 50 lbs.	41 lbs	
c. Force @ 1.0"	50 to 63 lbs.	57 lbs	
d. Force @ 1.3"	73 to 88 lbs.	83 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	26.5 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	39 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	50.5 lbs	
d. Return Angle	12 deg. maximum	10 deg	
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.9 fps	
(2) Peak Deflection	1.7" maximum	1.61 "	
(3) Peak Resistive Force	2250 lbs maximum	2087 lbs	
(4) Internal Hysteresis	50 to 70%	53.7 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	14.1 fps	
(2) Peak Deflection	1.1" maximum	1.09 "	
(3) Peak Resistive Force	1450 lbs maximum	1284 lbs	
(4) Internal Hysteresis	50 to 70%	51.7 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1021

		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	1954 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	2.0 ms	
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2493 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 1021

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CX42	6-89	12-89
HY LATERAL--	ENDEVCO	CS41	11-89	5-90
HZ VERTICAL--	ENDEVCO	CH31	5-89	11-89
2. CHEST ACCELEROMETER--				
CX LONGITUDINAL--	CEC	A73	11-89	5-90
CY LATERAL--	ENDEVCO	CE06	11-89	5-90
CZ VERTICAL--	CEC	A44	11-89	5-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	551	6-89	12-89
RIGHT SIDE	GSE	552	6-89	12-89
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A144	6-89	12-89
2. TEST PROBE ACCELEROMETER--	CEC	A154	6-89	12-89
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS- DUCER INC	20051	7-89	1-90
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	7-89	1-90
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	7-89	1-90

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 1022

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	11-22-89	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	1	
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 -----		11-22-89	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)----		1	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-71 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		26-50 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	239.9 G's	G's
b. peak lateral accel.	<= 10 G's	2.4 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 MINKIEWICZ

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

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.	22.0 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.2 G's	
c. Peak Resultant Head Acceleration		26 G's max.	24.65 G's	
d. Pendulum Decel. (t2-t1)		≤ 3 ms.	2.48 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	26.17 ms	
f. Pendulum Decel. (t4-t3)		≤ 10 ms.	5.46 ms	
g. Max. Head Rotation		63 to 73 deg.	69.17 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.12 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	28.03 ms	
	Displ.	2.1 to 3.1"	2.4 "	
60 deg.	Time	40.3 to 51.7 ms.	42.78 ms	
	Displ.	4.3 to 5.3"	4.55 "	
Maximum	Time	53.2 to 66.8 ms.	53.7 ms	
	Displ.	5.0 to 6.0"	5.2 "	
60 deg.	Time	67.0 to 83.0 ms.	74.16 ms	
	Displ.	4.3 to 5.3"	4.38 "	
30 deg.	Time	85.4 to 104.6 ms.	91.27 ms	
	Displ.	2.1 to 3.1"	2.11 "	
0 deg.	Time	101.0 - 123.0 ms.	106.52 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: IVAN MINKIEWICZ

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		
3. ABDOMINAL COMPRESSION			
TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	29 lbs	
b. Force @ 0.75"	36 to 50 lbs.	36.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	62 lbs	
d. Force @ 1.3"	73 to 88 lbs.	86 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	27 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	39 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	52 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	1.69 "	
(3) Peak Resistive Force	2250 lbs maximum	2015 lbs	
(4) Internal Hysteresis	50 to 70%	59.7 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	14.1 fps	
(2) Peak Deflection	1.1" maximum	1.07 "	
(3) Peak Resistive Force	1450 lbs maximum	1231 lbs	
(4) Internal Hysteresis	50 to 70%	52.9 %	

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	2085 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	2.0 ms	
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	1901 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 1022

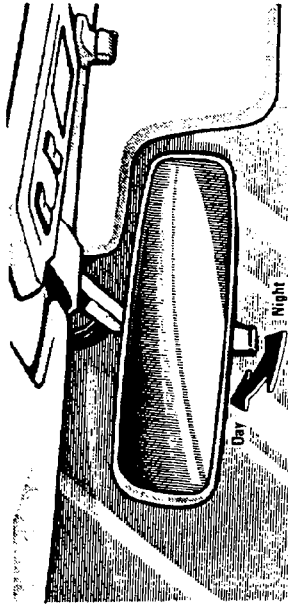
DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CP30	9-89	3-90
HY LATERAL--	ENDEVCO	CX05	9-89	3-90
HZ VERTICAL--	ENDEVCO	DB47	9-89	3-90
2. CHEST ACCELEROMETER--				
CX LONGITUDINAL--	CEC	A90	6-89	12-89
CY LATERAL--	ENDEVCO	FH01	9-89	3-90
CZ VERTICAL--	CEC	A128	11-89	5-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	548	6-89	12-89
RIGHT SIDE	GSE	549	6-89	12-89
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A144	6-89	12-89
2. TEST PROBE ACCELEROMETER--	CEC	A154	6-89	12-89
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS- DUCER INC	20051	7-89	1-90
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	7-89	1-90
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	7-89	1-90

Appendix D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

COMFORT ADJUSTMENT

INSIDE REAR VIEW MIRROR



Pull the lever backward to reduce glare from the rear vehicle headlights during night driving.

Before adjusting the mirror to the position with most clarity, push the day-night change lever forward (daylight driving position).

Remember that by reducing glare you also lose some rear view clarity.

SEAT BELTS

Seat belt precautions

Lexus recommends that the driver and passengers in the vehicle be properly restrained at all times with the seat belts provided.

Failure to do so could increase the chance of injury and/or the severity of injury in accidents.

Babies or small children. Use a child restraint system which fits your vehicle. See "Child restraint" for details.

Children. If a child is too large for a child restraint system, the child should sit in the rear seat and be restrained using the vehicle's seat belts. According to accident statistics, children are safer when properly restrained in the rear seat than in the front seat. Do not allow the child to stand up or kneel on the seat. If the shoulder belt falls across the child's neck or face, move the child to the center position and use the center lap belt.

Pregnant women. Lexus recommends the use of a seat belt. Ask your doctor for specific recommendations. The lap belt should be worn securely and as low as possible over the hips and not on the waist.

Injured persons. Lexus recommends the use of a seat belt. Depending on the injury, however, first check with your doctor.

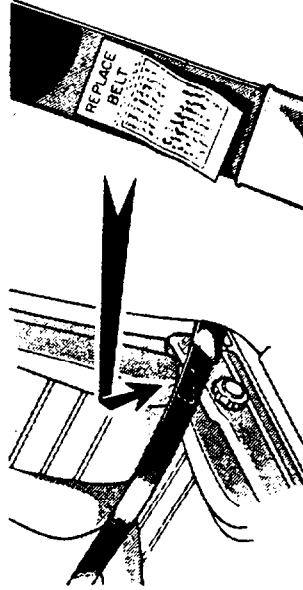
COMFORT ADJUSTMENT

CAUTION:

Persons should ride in their seats properly wearing their seat belts whenever the vehicle is moving. Otherwise, they are much more likely to suffer serious bodily injury in the event of sudden braking or a collision.

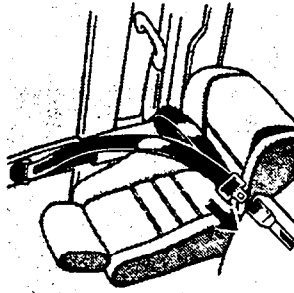
When using the seat belts, observe the following:

- Use the belt for only one person at a time. Do not use a single belt for two or more people – even children.
- Avoid reclining the seatbacks too much. The seat belts provide maximum protection when the seatbacks are in the upright position. (See "Adjusting seatback angle".)
- Be careful not to damage the belt webbing or hardware. Take care that they do not get caught or pinched in the seat or doors.
- Inspect the belt system periodically. Check for cuts, fraying, and loose parts. Damaged parts should be replaced. Do not disassemble or modify the system.
- Keep the belts clean and dry. If they need cleaning, use a mild soap solution or lukewarm water. Never use bleach, dye, or abrasive cleaners—they may severely weaken the belts.
- Replace the belt assembly if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.



- Replace the belt if the warning label under the sleeve can be seen. The warning label, "REPLACE BELT", will appear if the belt receives a severe impact or other force.

Front seat belts



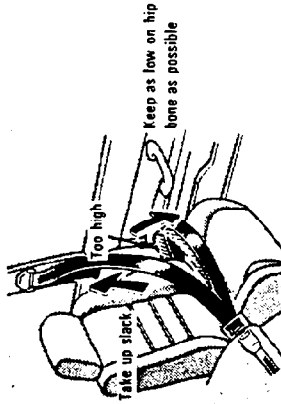
Adjust the seat as needed and sit up straight well back in the seat. To fasten your belt, pull it out of the retractor and insert the tab into the buckle.

COMFORT ADJUSTMENT

You will hear a click when the tab locks into the buckle. The seat belt length automatically adjusts to your size and the seat position.

The retractor will lock the belt during a sudden stop or on impact. At other times you can move around freely.

CAUTION:
After inserting the tab, make sure that the connection is secure and the belt is not twisted.



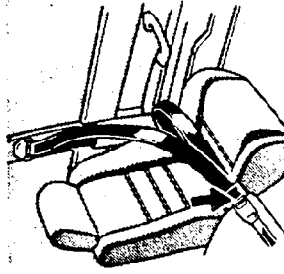
Adjust the position of the lap and shoulder belts.

Position the lap belt as low as possible on your hips – not on your waist, then adjust it to a snug fit by pulling the shoulder portion upward through the latch plate.

CAUTION:

- High-positioned lap belts and loose-fitting shoulder belts could both increase the chance of injury due to sliding under the lap belt during an accident.

- For your safety, do not place the shoulder belt under your arm.

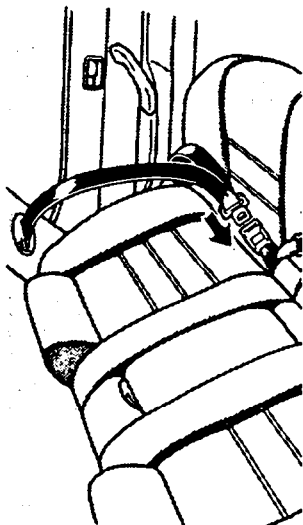


To release the belt, press the buckle release button and allow the belt to retract.

If the belt does not retract smoothly, pull it out and check for kinks or twists. Then make sure that it remains untwisted as it retracts.

COMFORT ADJUSTMENT

Rear outside seat belts



Sit up straight well back in the seat. To fasten your belt, pull it out of the retractor and insert the tab into the buckle.

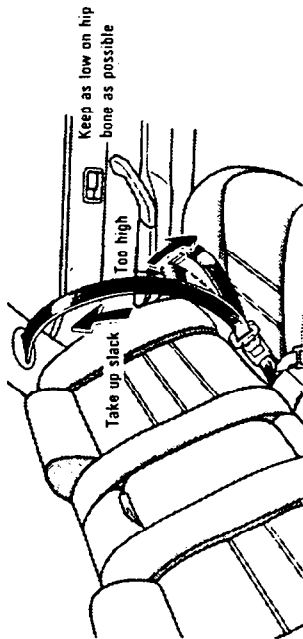
You will hear a click when the tab locks into the buckle.

The seat belt length automatically adjusts to your size.

The retractor will lock the belt during a sudden stop or on impact. At other times you can move around freely.

CAUTION:

After inserting the tab, make sure that the connection is secure and the belt is not twisted.



Adjust the position of the lap and shoulder belts.

Position the lap belt as low as possible on your hips -- not on your waist, then adjust it to a snug fit by pulling the shoulder portion upward through the latch plate.

CAUTION:

- **High-positioned lap belts and loose-fitting shoulder belts both could increase the chance of injury due to sliding under the lap belt during an accident.**

- **For your safety, do not place the shoulder belt under your arm.**

COMFORT ADJUSTMENT

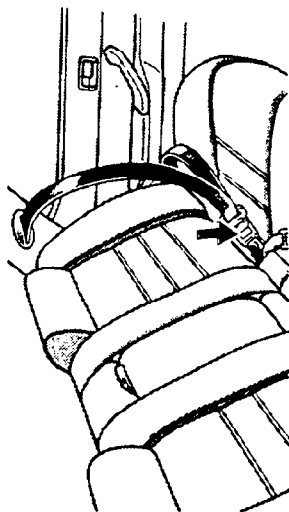
Sit up straight and well back in the seat. To fasten your belt, insert the tab into the buckle.

You will hear a click when the tab locks into the buckle.

If the belt is not long enough for you, hold the tab at a right angle to the belt and pull on the tab.

CAUTION:

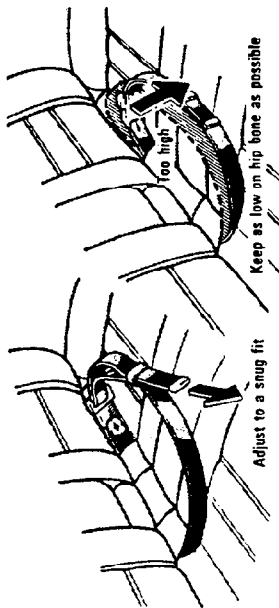
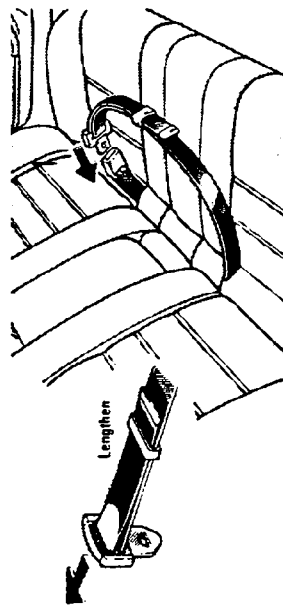
After inserting the tab, make sure that the connection is secure and the belt is not twisted.



To release the belt, press the buckle release button and allow the belt to retract.

If the belt does not smoothly retract, pull it out and check for kinks or twists. Then make sure that it remains untwisted as it retracts.

Rear center seat belt



Remove excess length of the belt and adjust the belt position.

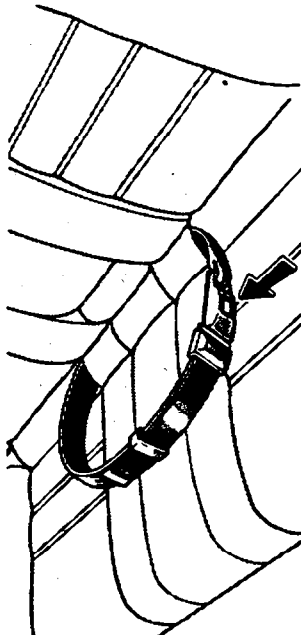
To shorten the belt, pull the free end of the belt.

Position the lap belt as low as possible on your hips – not on your waist, then adjust it to a snug fit.

COMFORT ADJUSTMENT

CAUTION:

High-positioned lap belts could increase the chance of injury due to sliding under the belt during an accident.



To release the belt, press the buckle release button.

Seat belt extender

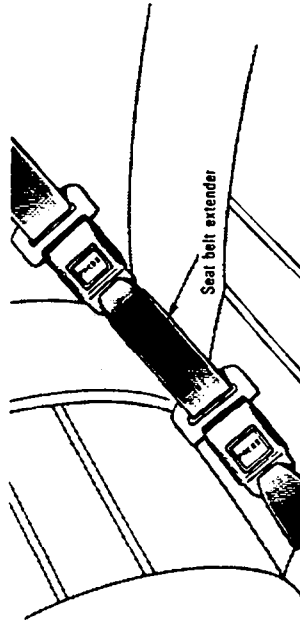
If your seat belt cannot be fastened securely because it is not long enough, a personalized seat belt extender is available from your Lexus dealer free of charge.

Please contact your local Lexus dealer so that the dealer can order the proper required length for the extender. Bring the heaviest coat you expect to wear for proper measurement and selection of length. Additional ordering information is available at your Lexus dealer.

CAUTION:

When using the seat belt extender, observe the following. Failure to follow these instructions could result in less effectiveness of the seat belt restraint system in case of vehicle accident, increasing the chance of personal injury.

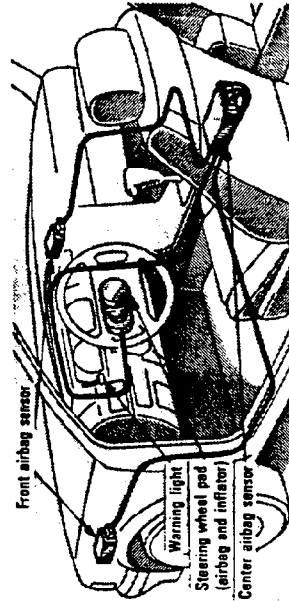
- Never use the seat belt extender if you can fasten the seat belt without it.
- Remember that the extender provided for you may not be safe when used on a different vehicle, or for another person and at different seating position than specified.



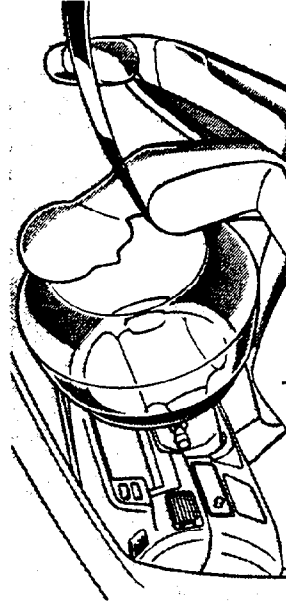
To connect the extender to the seat belt, insert the tab into the seat belt buckle so that the buckle release buttons of the extender and the seat belt are both facing outward as shown.

You will hear a click when the tab locks into the buckle

COMFORT ADJUSTMENT



In the event of severe frontal impact, when the front airbag sensor and center airbag sensor, or the center airbag sensor alone, detects the shock, the center airbag sensor triggers the inflator, and the inflator fills the bag to help restrain the driver's forward motion.



The SRS airbag system is not designed to protect the driver from an impact from the side or rear, or if the vehicle overturns.

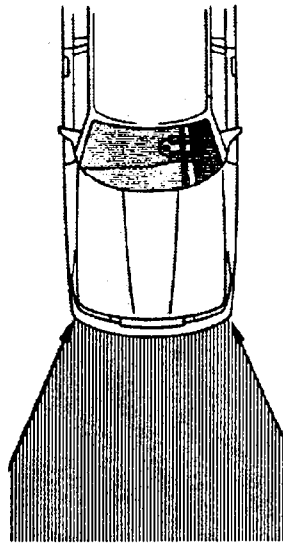
When releasing the seat belt, press on the buckle release button on the extender, not on the seat belt. This helps prevent damage to the vehicle interior and extender itself.

When not in use, remove the extender and store in the vehicle for future use.

CAUTION:

After inserting the tab, make sure that the connection is secure and the seat belt extender is not twisted.

SRS AIRBAG



The SRS (supplemental Restraint System) airbag is designed to be activated in response to a severe frontal impact within the shaded area as shown in the illustration, and to provide the driver with further protection in addition to the protection provided by the driver's seat belt.