

REPORT NO. CAL-88-N15

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

MAZDA MOTOR CO.

1988 MAZDA RX-7 SE
2-DOOR HATCHBACK

NHTSA NO. MJ5401

CALSPAN TEST NO. 7626-15

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FINAL REPORT

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION
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OFFICE OF MARKET INCENTIVES
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16. Abstract A frontal load cell barrier test of a 1988 Mazda RX-7 SE 2-d-or Hatchback was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on April 19, 1988. Impact speed was 34.7 mph and the ambient temperature at the barrier face at the time of impact was 36°F. The maximum post-test vehicle crush was 24.6 inches. The test vehicle was equipped with a manual 3-point continuous belt system at each of the front outboard seating positions. With regard to FMVSS 208 "Occupant Crash Protection," injury criteria, both the driver and the passenger satisfied the head, chest and femur requirements.					
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Section 1
PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 88 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-87-D-02012. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph 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 MJ5401

A load cell barrier consisting of 36 load cells was impacted by a 1988 Mazda RX-7 SE 2-Door Hatchback at a velocity of 34.7 mph. The test was performed at the Calspan Corporation Advanced Technology Center on April 19, 1988. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 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 Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 1019) and the passenger ATD (Serial No. 1020) had been used in two previous tests. These ATD's were both used in tests MJ5302 and MJ0103. 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. Accelerometer #5 experienced a cut wire approximately 70 milliseconds after T_0 .

The driver's head struck the steering wheel hub; the HIC was 921. The maximum chest deceleration over 3 milliseconds was 39 g's and femur loads were 1135 and 186 pounds.

The right front passenger's HIC was 614 and maximum chest deceleration over 3 milliseconds was 48 g's and femur loads were 650 and 268 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1988 Mazda RX-7 SE 2-Door HatchbackNHTSA NO.: MJ5401VIN.: JM1FC3315J0611277BODY COLOR: WhiteDATE OF MANUFACTURE: Not available

Engine: ^{see note} cylinders; 80 C.I.D.; - Liters; - CC
☒ Gas; - Diesel; - Turbocharged
☒ Longitudinal; - Transverse

Transmission: 5 Speed - Manual; - Automatic; ☒ Overdrive
 Final Drive: - Front Wheel; ☒ Rear Wheel; - Four Wheel

Date Received: 3/31/88 Odometer Reading: 110
☒ A/C; ☒ P/S; ☒ P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint: 3-Point Continuous Belt SystemDATA RECORDED FROM VEHICLE'S TIRE PLACARD:Tire Pressure (at capacity): Front 32 psi, Rear 32 psiRecommended Tire Size: 185/70HR14 184/70R14 87HRecommended Cold Tire Pressure: Front 32 psi, Rear 32 psiTires on Vehicle: 185/70 HR14; Manufacturer: BridgestoneNumber of Occupants: 2 Front; - Rear; - 3rd Seat; 2 TOTALType of Front Seats: ☒ Bucket; - Bench; - Split BenchType of Front Seat Back: - Fixed; ☒ Adj. With ☒ Lever - Rot. KnobVehicle Capacity Weight (VCW) = 680 lbs. (A)No. of Occupants x 150 lbs. = 300 lbs. (B)

Rated Cargo and Luggage
 Weight (RCLW) A-B = 380 lbs.

GVWR 3635 lbs. GAWR: Front 1750 lbs. Rear 1980 lbs.

NOTE: Engine is a 2-rotor rotary type engine.

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

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

Right Front = <u>670</u> lbs.	Right Rear = <u>640</u> lbs.
Left Front = <u>680</u> lbs.	Left Rear = <u>640</u> lbs.
TOTAL FRONT WEIGHT = <u>1350</u> lbs. (<u>51</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>1280</u> lbs. (<u>49</u> % of Total Vehicle Weight)	
TOTAL DELIVERY WEIGHT = <u>2630</u> lbs.	

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2630 lbs.)
VCW = Vehicle Capacity Weight (680 lbs.)
DSC = Designated Seating Capacity (2)
RCLW = VCW - 150 (DSC) = 380 lbs.
Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
Target Test Weight = 3338 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 120 POUNDS CARGO:

Right Front = <u>760</u> lbs.	Right Rear = <u>900</u> lbs.
Left Front = <u>740</u> lbs.	Left Rear = <u>920</u> lbs.
TOTAL FRONT WEIGHT = <u>1500</u> lbs. (<u>45</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>1820</u> lbs. (<u>55</u> % of Total Vehicle Weight)	
TOTAL TEST WEIGHT = <u>3320</u> lbs.	
Weight of ballast secured in vehicle trunk area = <u>200</u> lbs.	

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude:	RF	<u>26.9</u>	LF	<u>26.9</u>	RR	<u>27.2</u>	LR	<u>27.2</u>
Test Attitude:	RF	<u>27.0</u>	LF	<u>27.0</u>	RR	<u>25.1</u>	LR	<u>25.1</u>
Wheel Base: <u>95.5</u> in.; C.G. = <u>52.1</u> in. rearward of front wheel C/L								
Remarks:	<u>None</u>							

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

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0 °
 Date of Test: April 19, 1988 Time of Test: 11:45
 Ambient Temperature: 36 °F at impact area
 Temperature in Occupant Compartment: 68 °F.
 Windshield Molding Temperature: 72 °F.
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 34.7 mph, secondary = 34.7 mph
 Distance From Front Bumper to Barrier Face When Entering Speed Trap: 52
 inches; Exiting Speed Trap: 12 inches

VEHICLE REBOUND AND CRUSH (inches):

Vehicle Length:	Pre-test	= R	<u>165.2</u>	C _L	<u>168.9</u>	L	<u>164.9</u>
	Post-test	= R	<u>142.9</u>	C _L	<u>144.3</u>	L	<u>142.9</u>
	Crush	= R	<u>22.3</u>	C _L	<u>24.6</u>	L	<u>22.0</u>

Distance from front of test vehicle to point of impact:

R 13.9 C/L 13.4 L 12.7

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Steering Hub</u>	<u>No contact</u>
Chest	<u>No contact</u>	<u>No contact</u>
Abdomen	<u>No contact</u>	<u>No contact</u>
Left Knee	<u>Dash</u>	<u>Dash</u>
Right Knee	<u>Dash</u>	<u>Dash</u>

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

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

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

Glazing Damage

Backlight/Windshield Windshield 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

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-103	-65	98	154	-36	-25	12	39
DUMMY (2)	-38	19	65	70	-49	-15	16	48
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1135	186
DUMMY (2)	650	268
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE - SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)	1392	-	853
DUMMY (2)	1926	1211	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	36 millisecond max.		AVE. ACC. (g) t ₁ TO t ₂
		t ₁ (SEC)	t ₂ (SEC)	
DUMMY (1)	920.8	.09090	.10020	99.6
DUMMY (2)	613.9	.08257	.11857	49.3
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

TEST NO.: MJ5401

VEHICLE: 1988 Mazda RX7

SEAT TYPE:

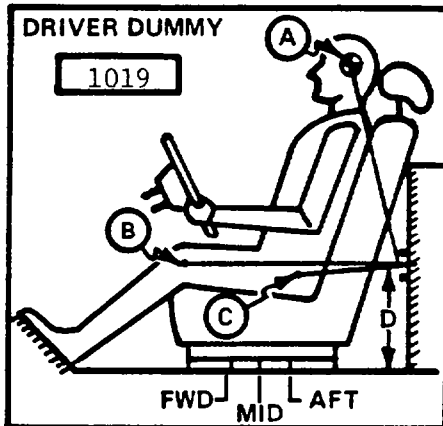
 Bench
 X Bucket
 Split Bench

ADJUSTER TYPE:

 X Manual
 Power

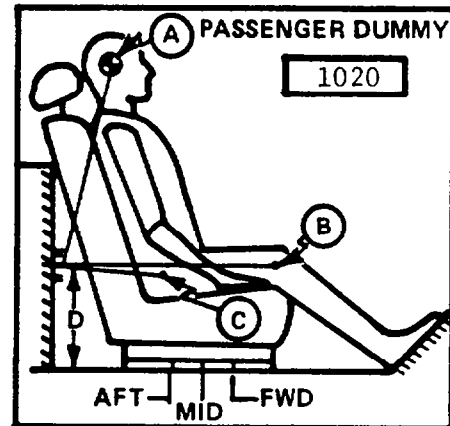
BUCKET SEAT BACK TYPE:

 Fixed
 X Adjustable Reclining



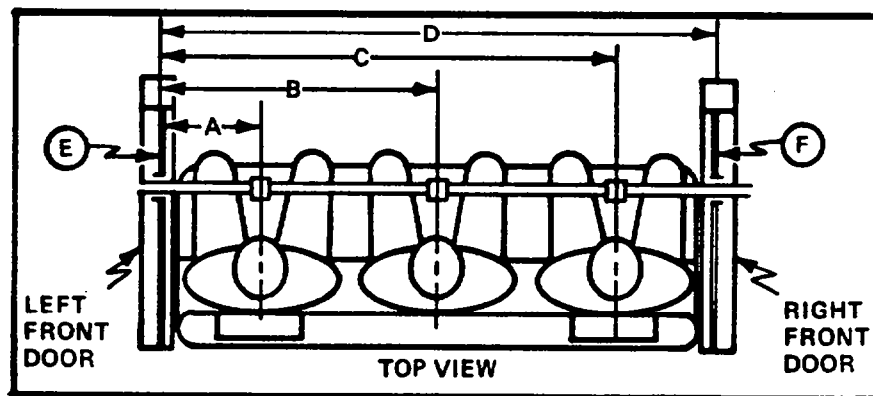
**MEASUREMENT
LOCATION**

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



A = 19.8 in. 21 Degrees
 B = 31.4 in. 97 Degrees
 C = 17.0 in. 117 Degrees
 D = 14.4 in.

A = 20.5 in. 23 Degrees
 B = 31.7 in. 97 Degrees
 C = 16.8 in. 119 Degrees
 D = 14.4 in.



DUMMY ID

1019

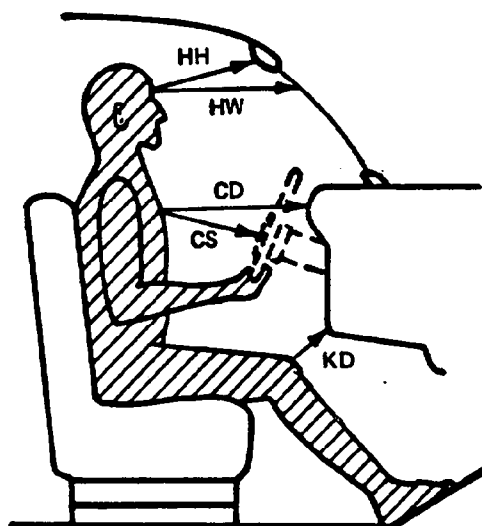
1020

A	=	Left Door to Driver Centerline	<u>10.9</u> in.
B	=	Left Door to Center Passenger Centerline	<u>-</u> in.
C	=	Left Door to Right Passenger Centerline	<u>37.7</u> in.
D	=	Left Door to Right Door	<u>48.4</u> in.
E, F	=	Window Glass Height (Right and Left Must Be Equal)	<u>10.0</u> in.

Figure 2

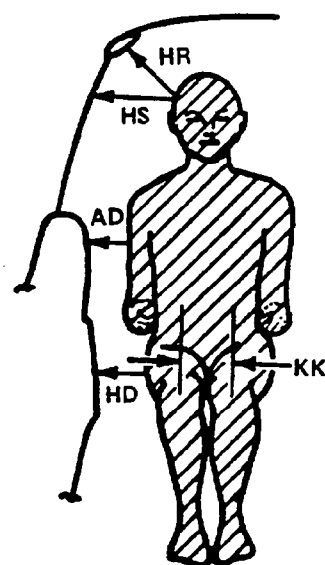
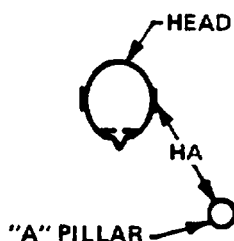
OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	14.7	14.8
HW	20.3	20.7
CD	21.7	23.9
CS	15.7	-
KDL	7.7	6.9
KDR	7.6	7.3
SA	29	29
TA	24	25



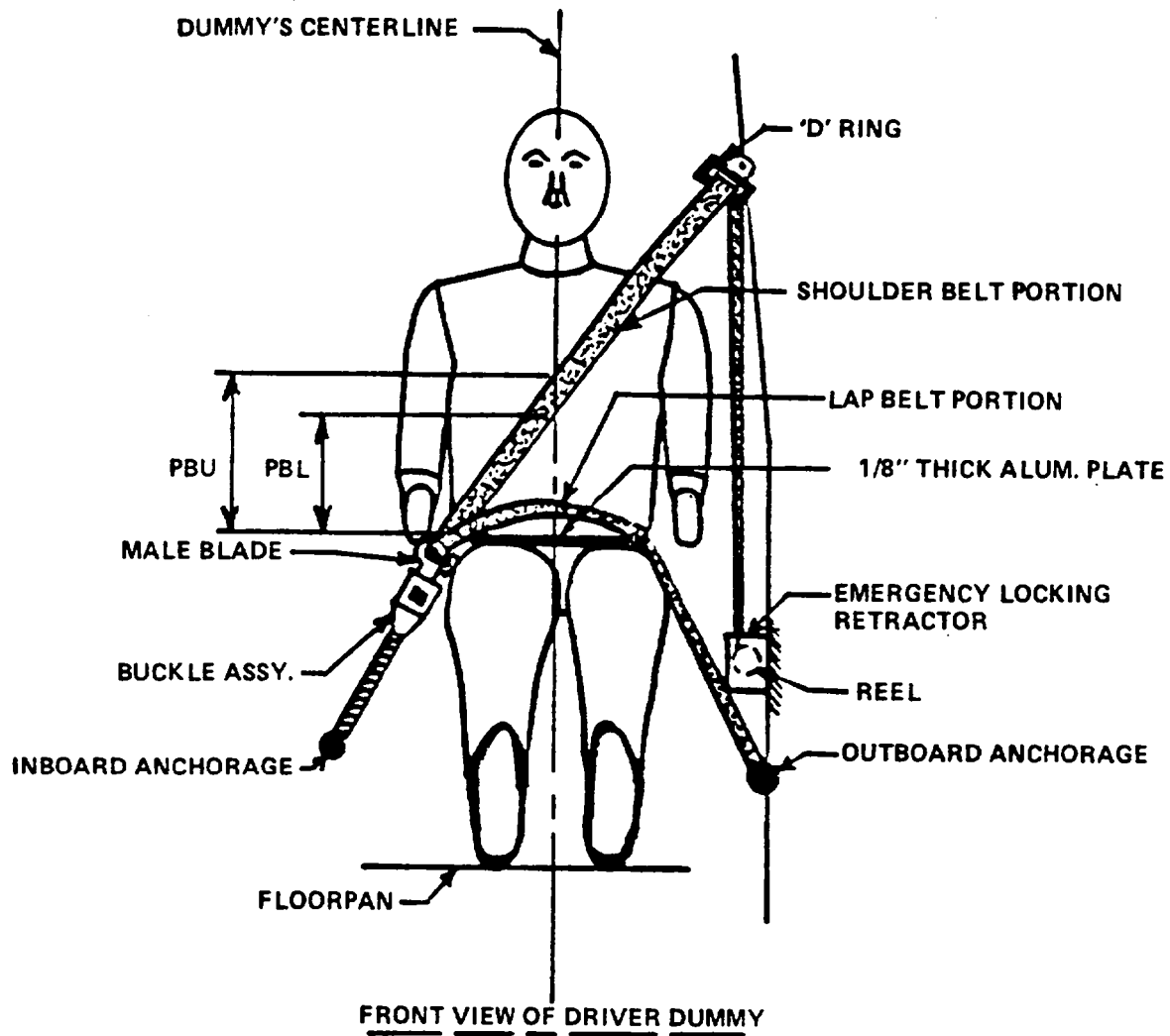
HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD(L/R)= Knee to Dash (Left/Right)
 SA = Seat Back Angle
 TA = Torso Angle

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



	DRIVER	PASSENGER
HR	4.3	4.3
HS	7.8	7.7
AD	3.6	4.2
HD	6.5	6.9
KK	9.3	7.2
HA	19.0	19.1

Figure 3
SEAT BELT POSITIONING DATA



	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	14.3	14.0
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	11.0	11.0
<u>LAP BELT TENSION</u>	--	--
<u>SHOULDER BELT TENSION</u>	2 lbs	2 lbs

Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATABELT LENGTH DATA:

	<u>Driver</u>	<u>Passenger</u>
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	<u>70.5"</u>	<u>71.0"</u>
Should belt length as measured on Part 572 Dummy.	<u>36.0"</u>	<u>36.0"</u>
Lap belt length as measured on Part 572 Dummy.	<u>27.5"</u>	<u>28.0"</u>

BELT SPOOL-OFF DATA:

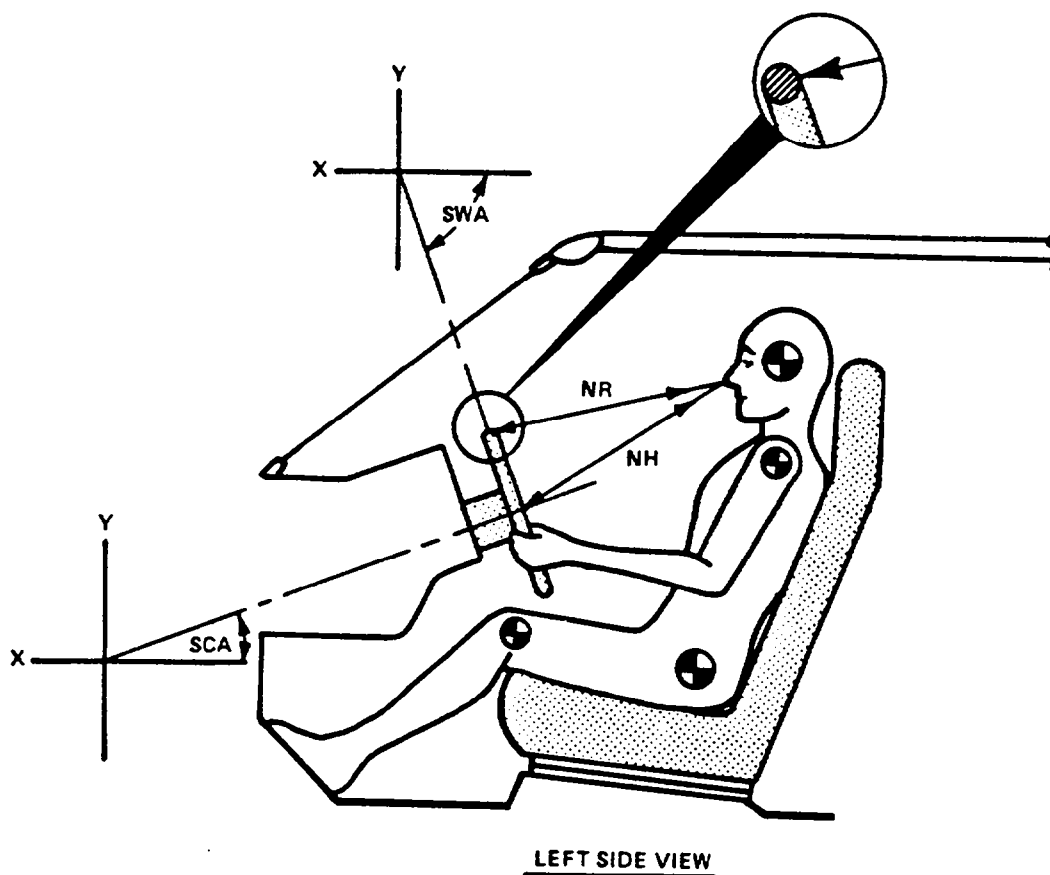
As determined by film analysis.	<u>2.0"</u>	<u>3.0"</u>
As determined mechanically.	<u>3.0"</u>	<u>3.1"</u>

BELT STRETCH DATA:

Measured electronically between shoulder belt load cell and the "D" ring.	<u>.816 in/ft</u>	<u>1.248 in/ft</u>
Measured Mechanically	<u>0.0"</u>	<u>0.0"</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	19.4	Inches
<u>NH</u> -- Distance from tip of dummy's nose to center of steering column hub	20.6	Inches
<u>SCA</u> -- Angle of steering column relative to the horizontal X axis	18	Degrees
<u>SWA</u> -- Angle of steering wheel relative to the horizontal X axis	-72	Degrees

Figure 5

CAMERA POSITION FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

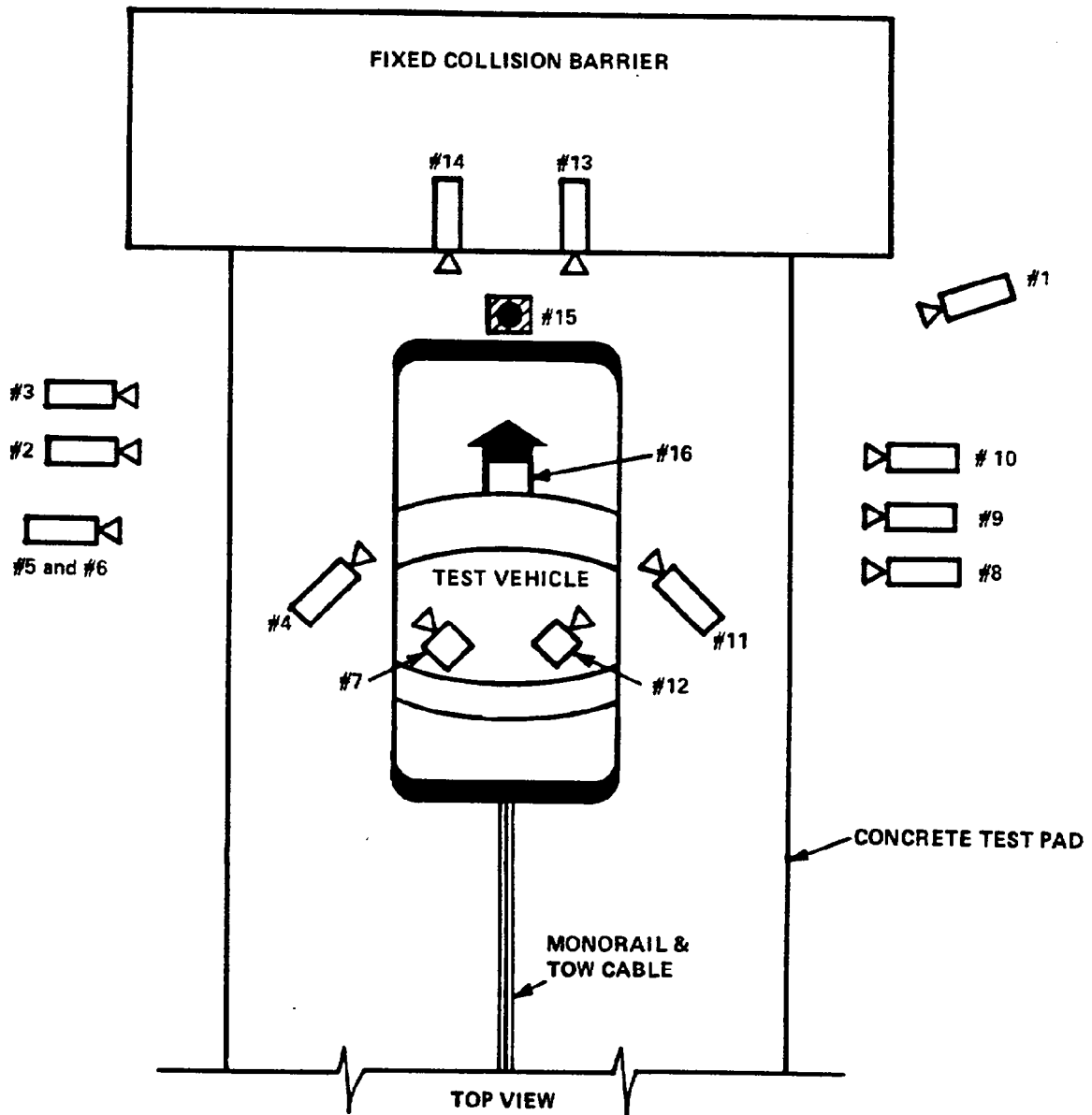


Table 4
HIGH-SPEED CAMERA LOCATIONS

Test No. MJ5401 1988 Mazda RX-7 Vehicle

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	280	57	41	5	-	13	540
3	Left Side View	224	38	41	5	-	25	540
4	Driver and Interior View	81	82	71	19	64.6	13	780
5	Steering Column (Bottom)	292	82	49	4	275.6	25	550
6	Steering Column (Top)	292	94	73	10	-	25	550
7	Left Belt	-	-	-	-	-	8	750
8	Overall Right Side	232	64	43	1	-	13	800
9	Right Side View	248	42	44	3	231.6	25	850
10	Right Passenger View	275	65	54	5	258.6	35	680
11	Passenger and Interior View	72	95	71	21	-	25	600
12	Right Belt	-	-	-	-	-	8	820
13	Passenger Front View	24	-5	73	42	-	13	550
14	Driver Front View	24	-5	73	38	-	13	540
15	Windshield View	0	0	126	-55	-	13	550
16	Pit View of Engine	0	32	-120	90	-	13	880

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

Figure 6

VEHICLE TARGET LOCATIONS

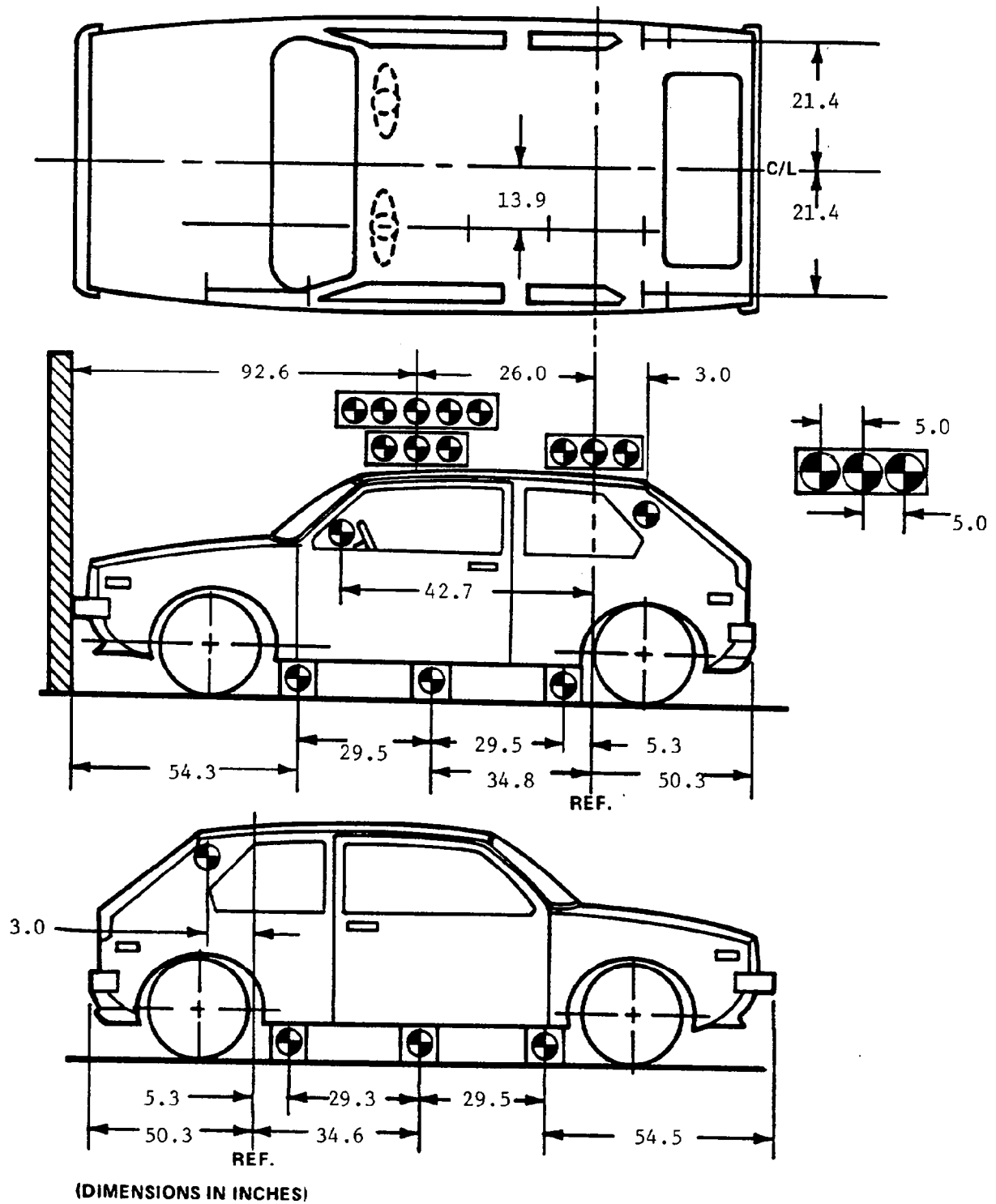


Figure 7

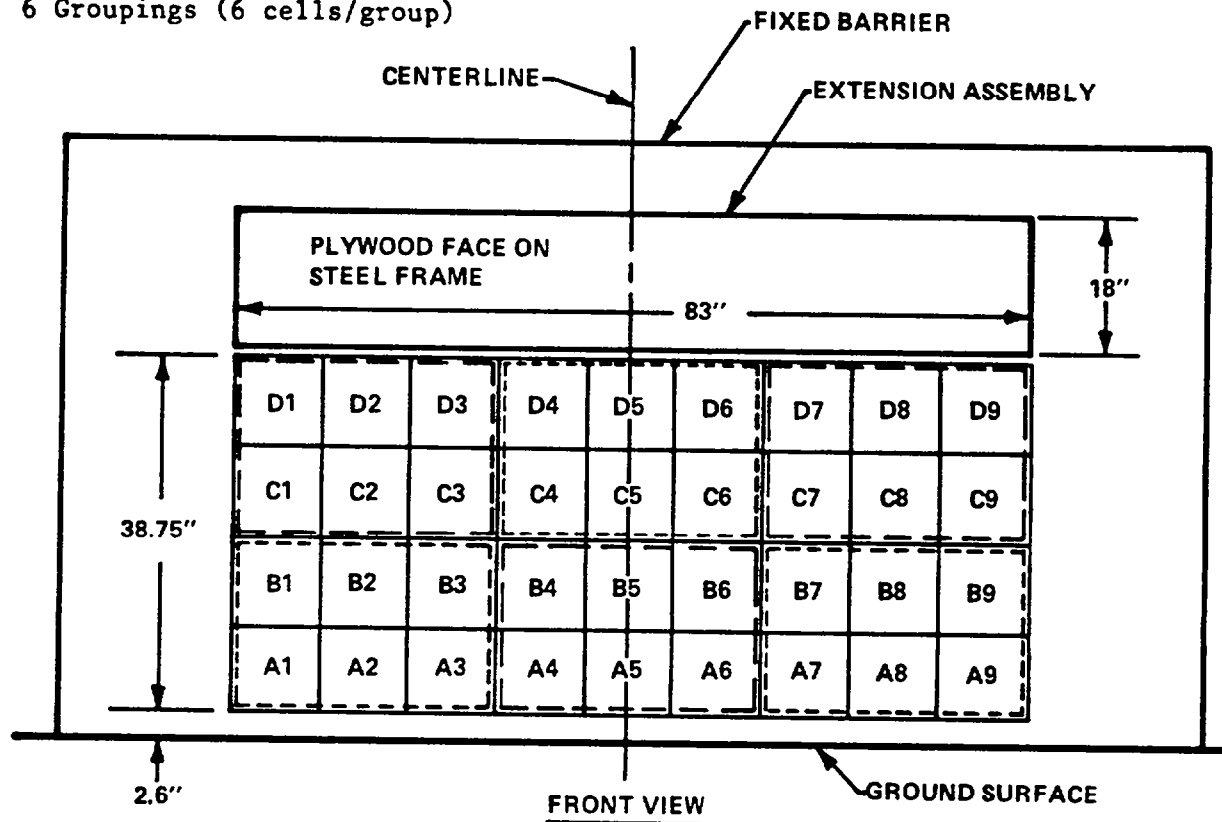
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells

4 Rows

9 Columns

6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

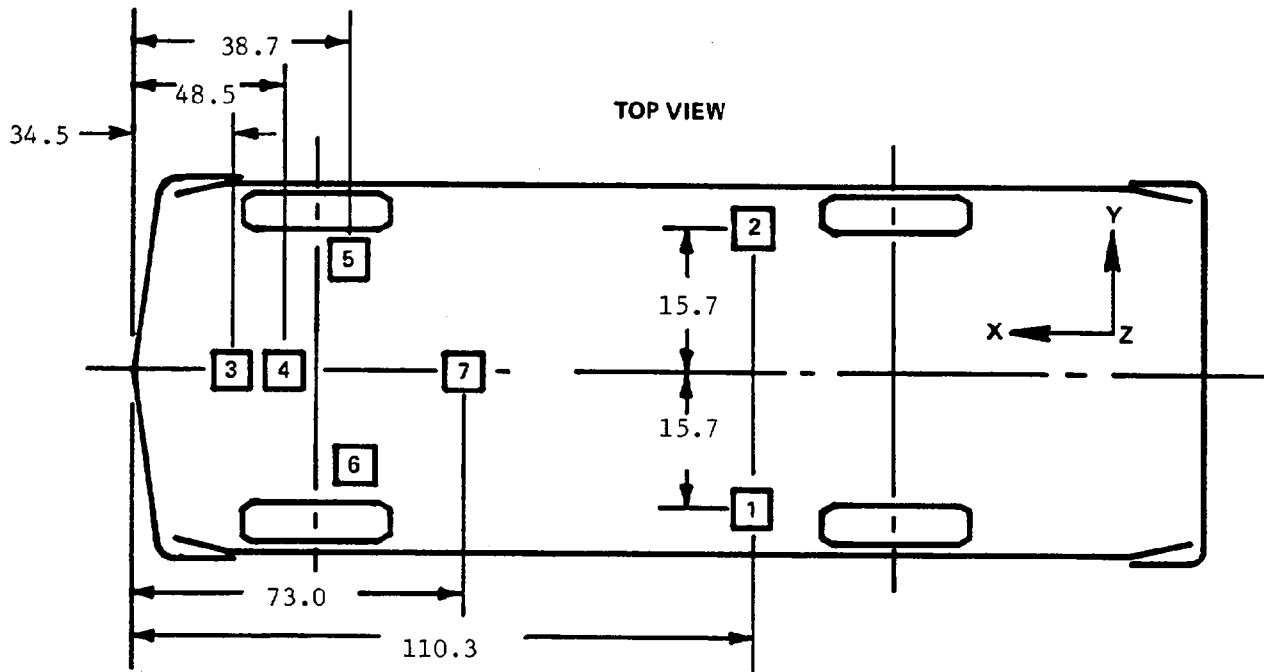
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

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

Figure 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	Left Disc Brake Caliper	X		
7	Instrument Panel	X		

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

Figure 9

TEST VEHICLE MEASUREMENTS

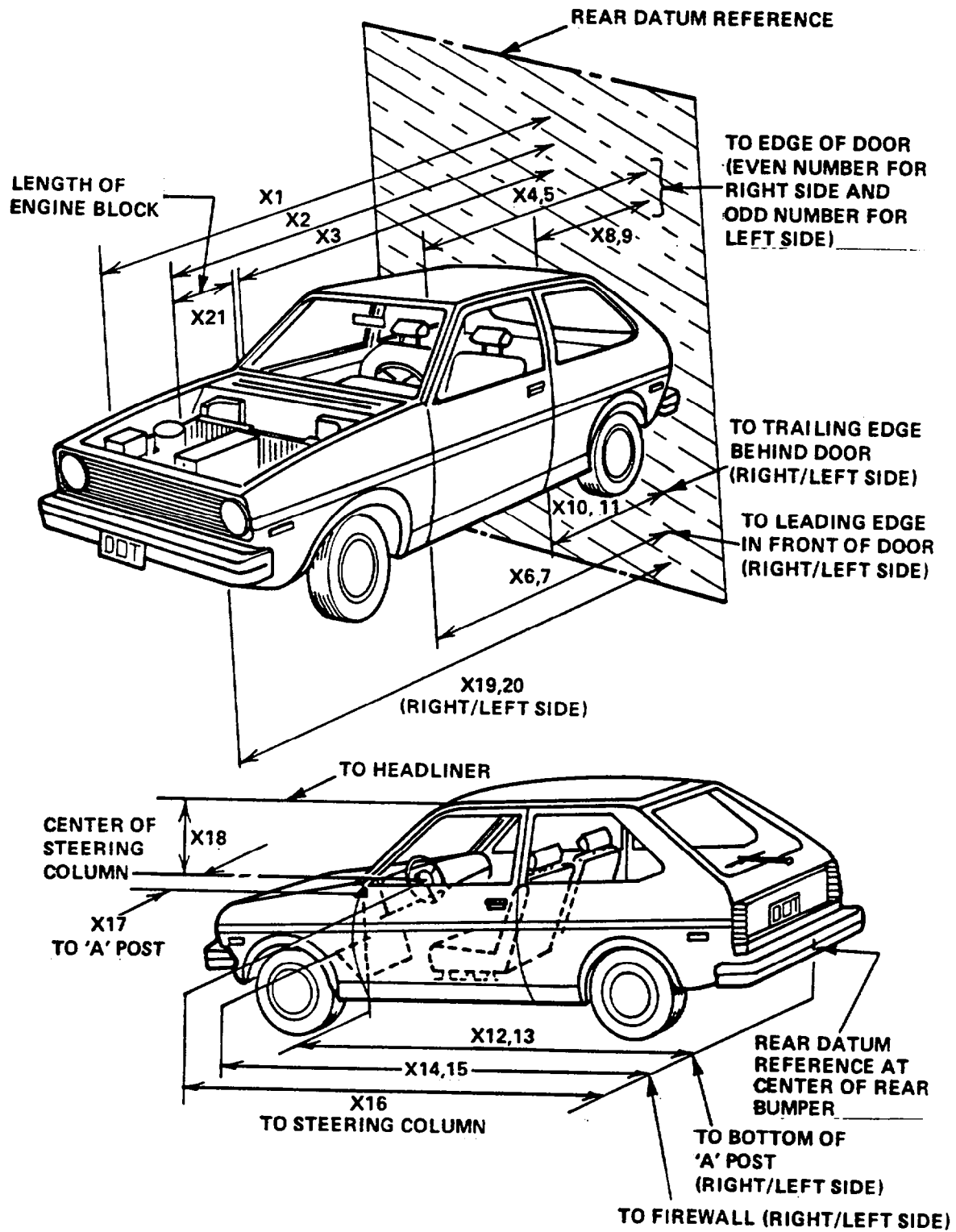


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	168.9	144.3	24.6
X2	Rear Surface of Vehicle to Front of Engine	135.6	129.9	5.7
X3	Rear Surface of Vehicle to Firewall	116.8	115.0	1.8
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	105.5	105.1	0.4
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	105.5	105.0	0.5
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	105.2	104.2	1.0
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	105.4	104.1	1.3
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	52.7	52.5	0.2
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	52.9	52.0	0.9
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	58.8	58.1	0.7
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	59.0	58.0	1.0
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	105.2	104.2	1.0
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	105.4	104.3	1.1
X14	Rear Surface of Vehicle to Firewall, Right Side	112.6	108.1	4.5
X15	Rear Surface of Vehicle to Firewall, Left Side	115.5	110.7	4.8
X16	Rear Surface of Vehicle to Steering Column	88.4	87.6	0.8
X17	Center of Steering Column to "A" Post	15.1	15.5	-0.4
X18	Center of Steering Column to Headliner	16.2	17.9	-1.7
X19	Rear Surface of Vehicle to Right Side of Front Bumper	165.2	142.9	22.3
X20	Rear Surface of Vehicle to Left Side of Front Bumper	164.9	142.9	22.0
X21	Length of Engine Block	12.0	12.0	0.0

Appendix A
PHOTOGRAPHS

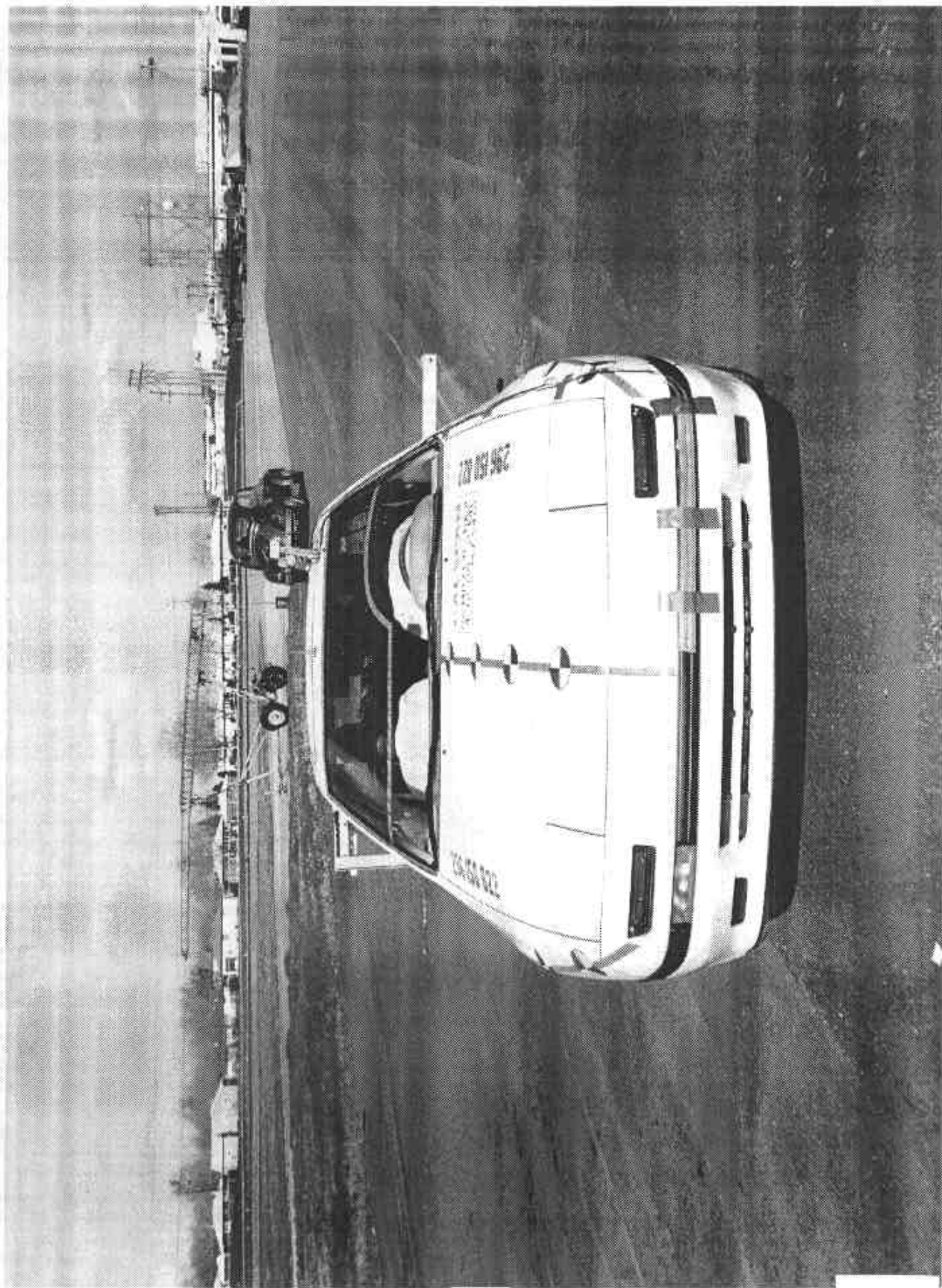


Figure A-1 PRE-TEST FRONT VIEW

A-2

7626-15

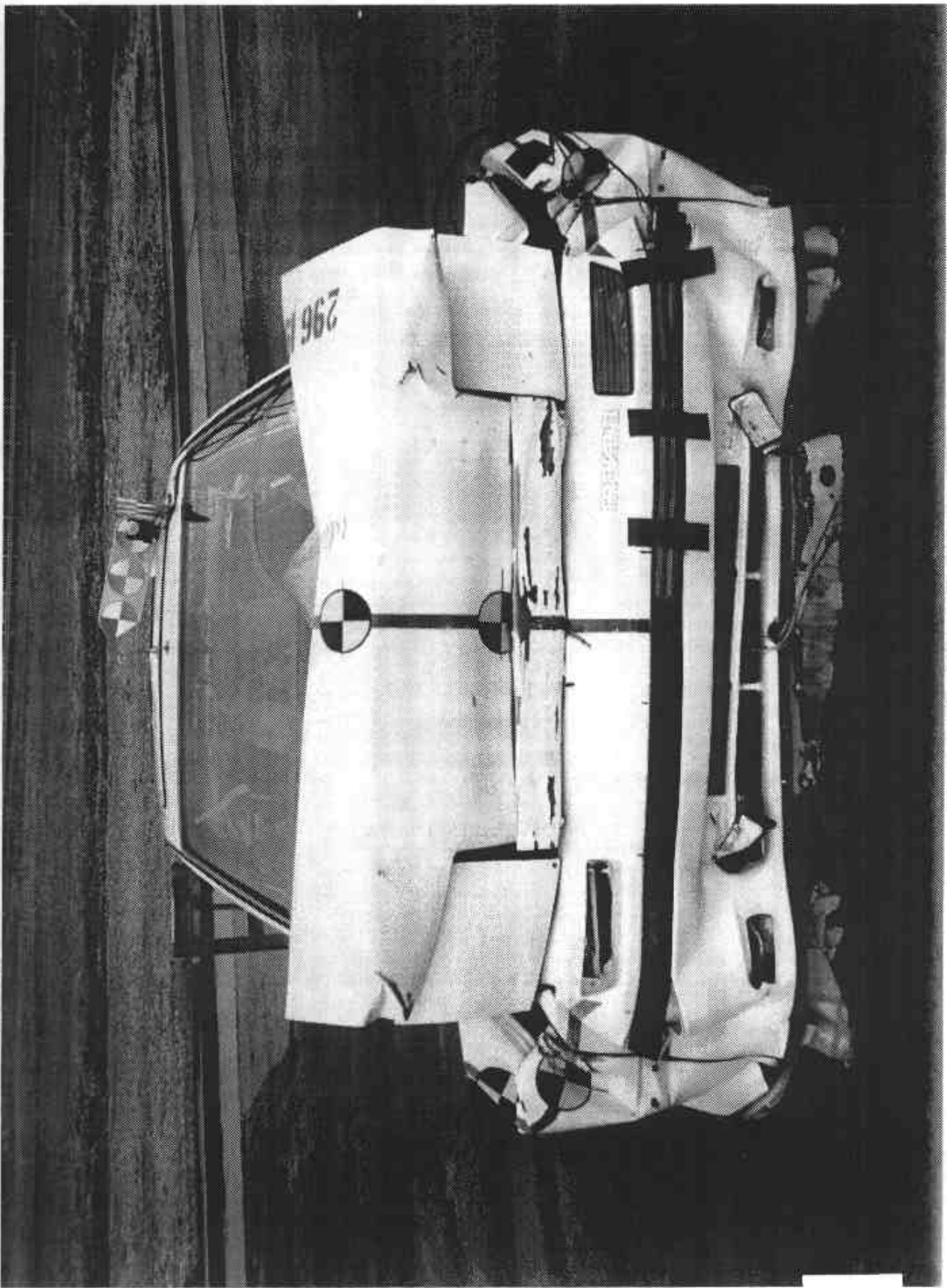


Figure A-2 POST-TEST FRONT VIEW

A-3

7426-15

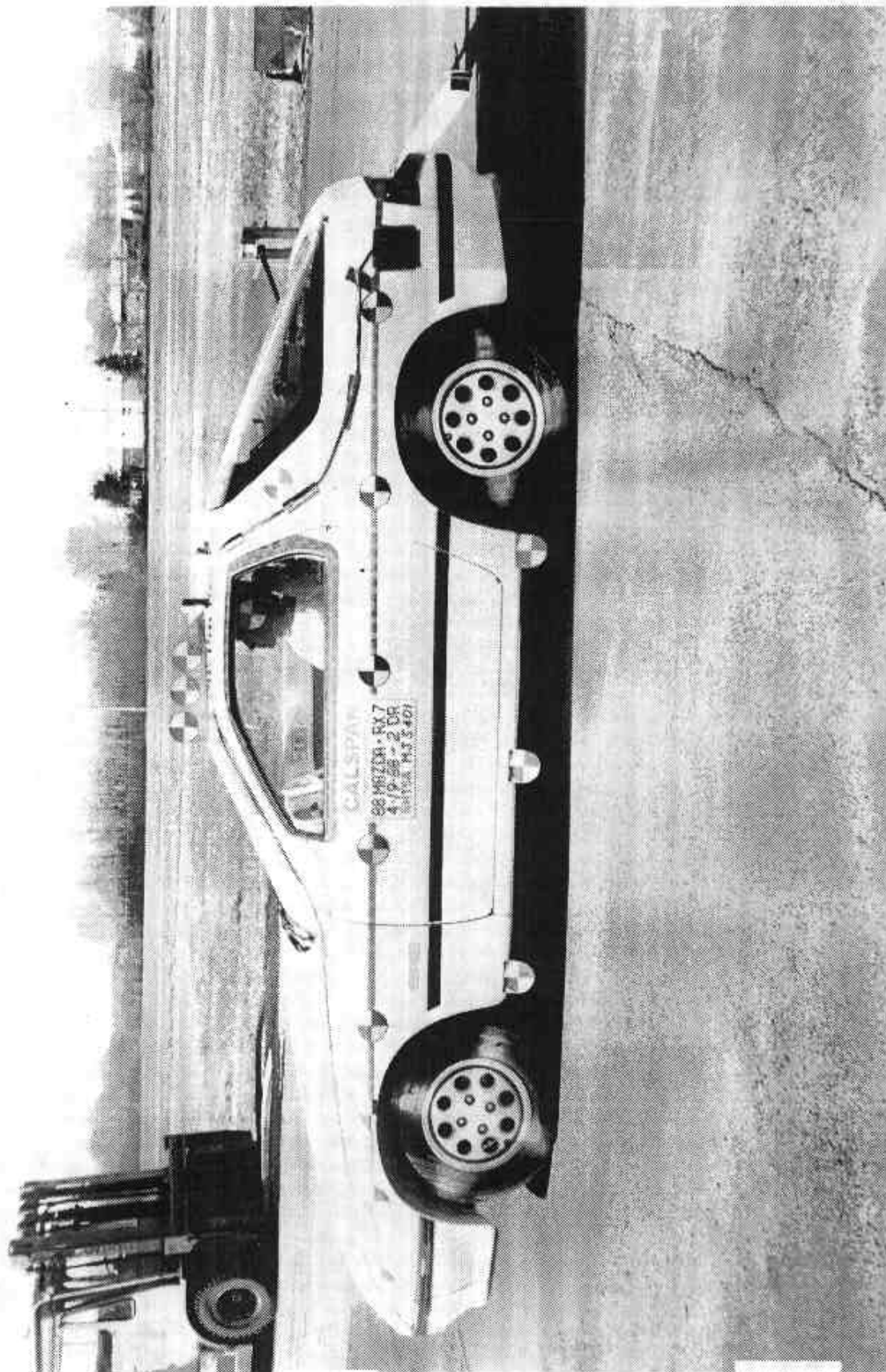


Figure A-3 PRE-TEST LEFT SIDE VIEW

A-4

7626-15

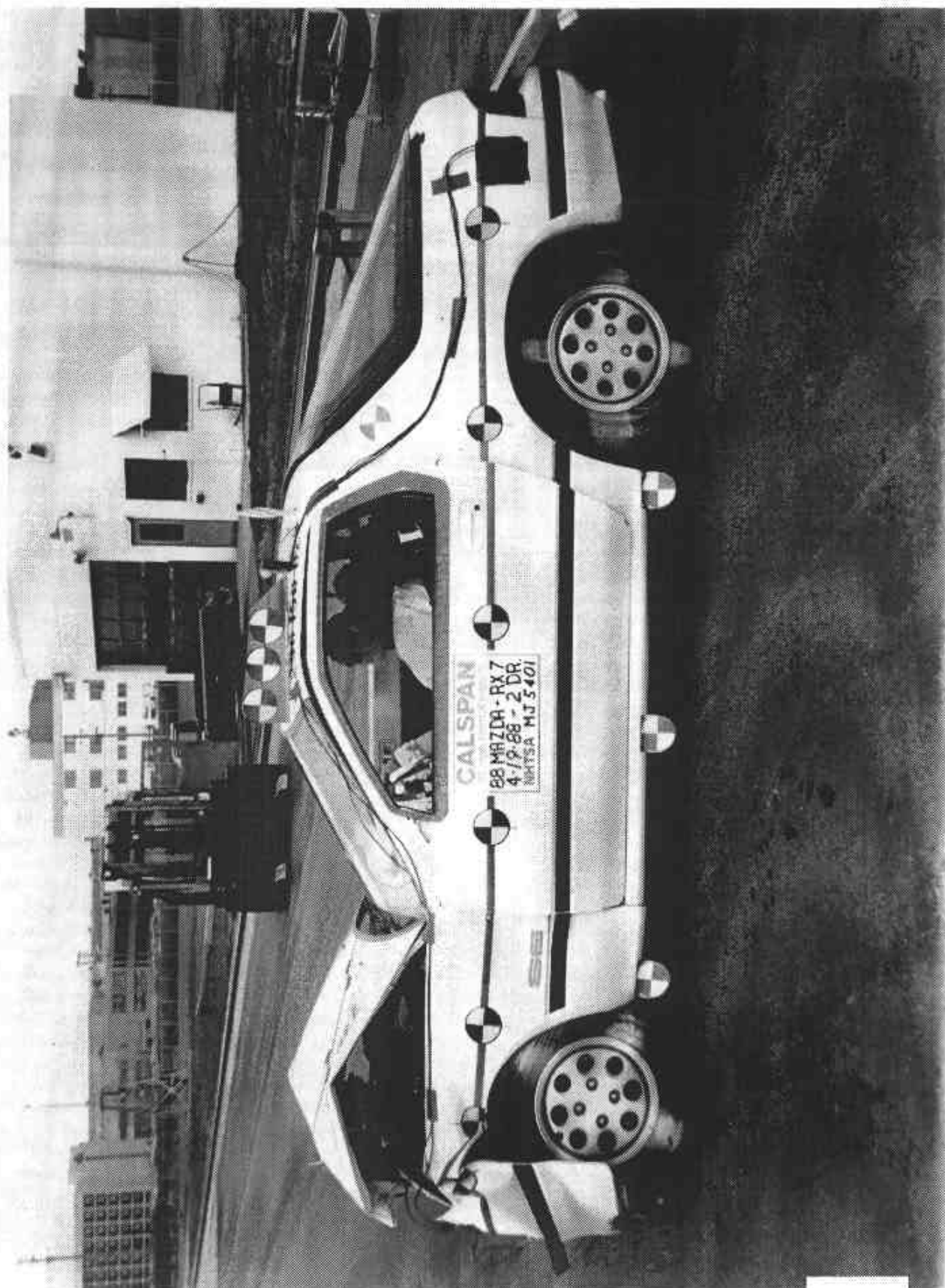


Figure A-4 POST-TEST LEFT SIDE VIEW

A-5

7626-15

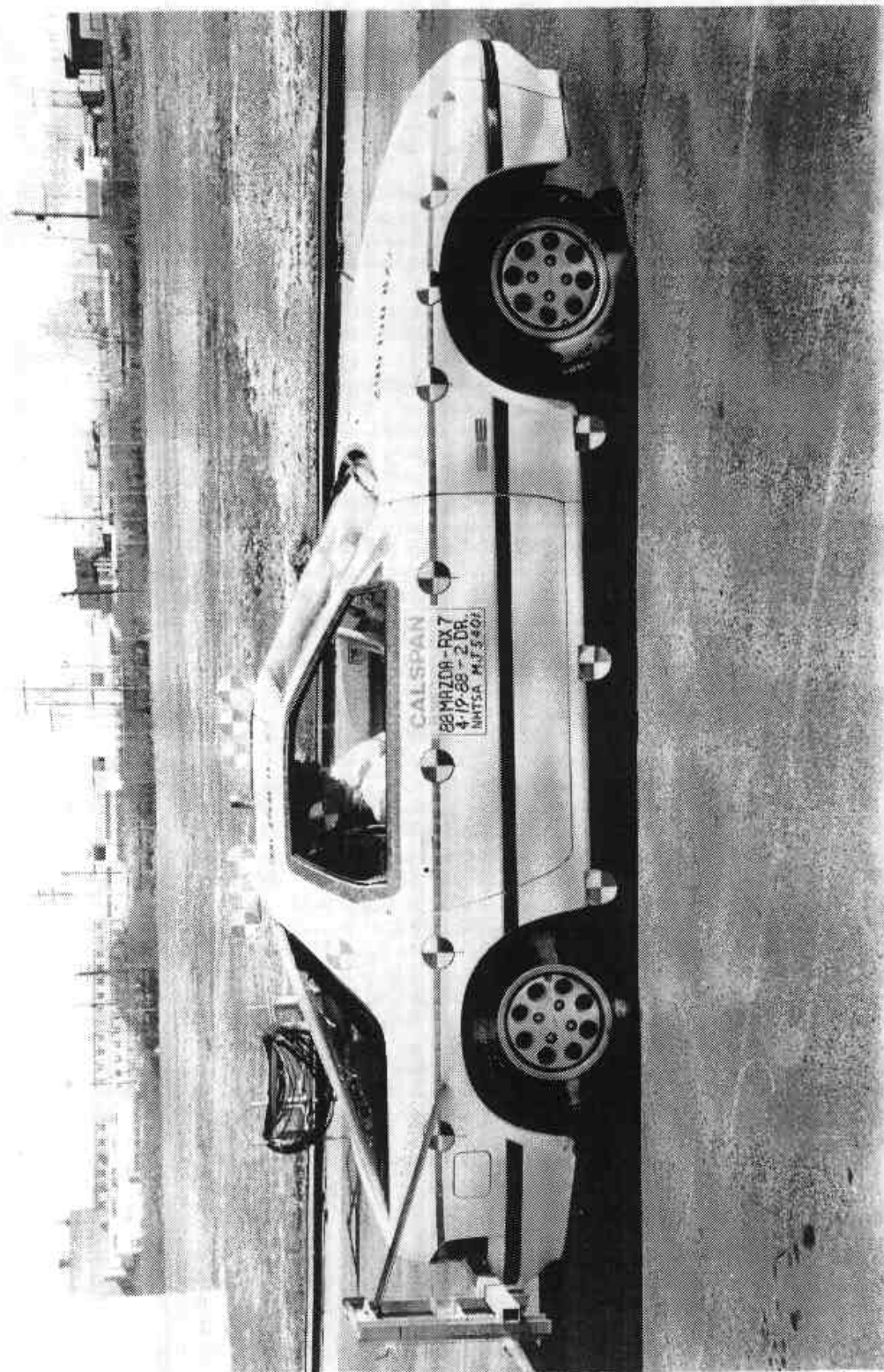


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-6

7626-15

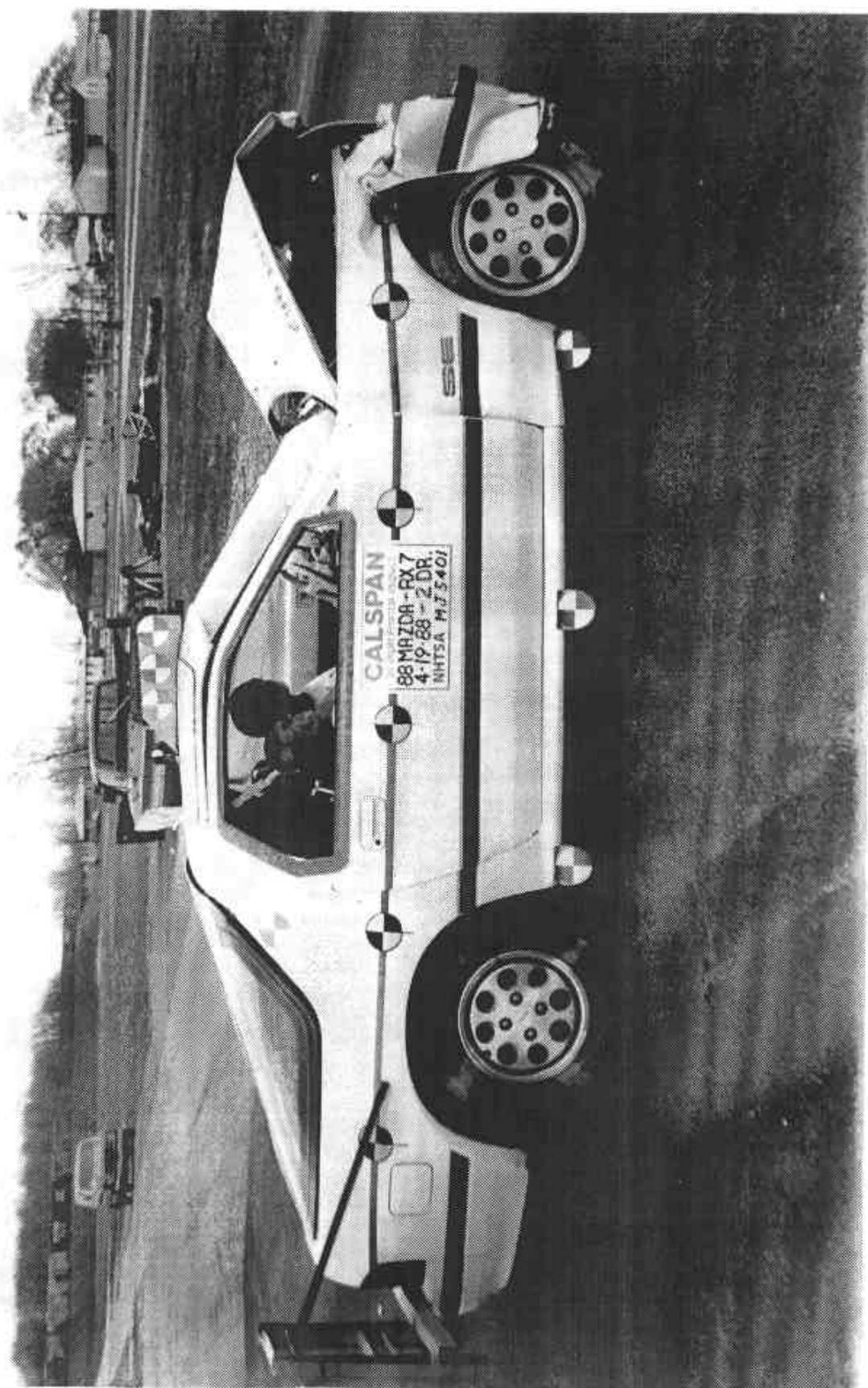


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-7

7626-15



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

A-8

7626-15

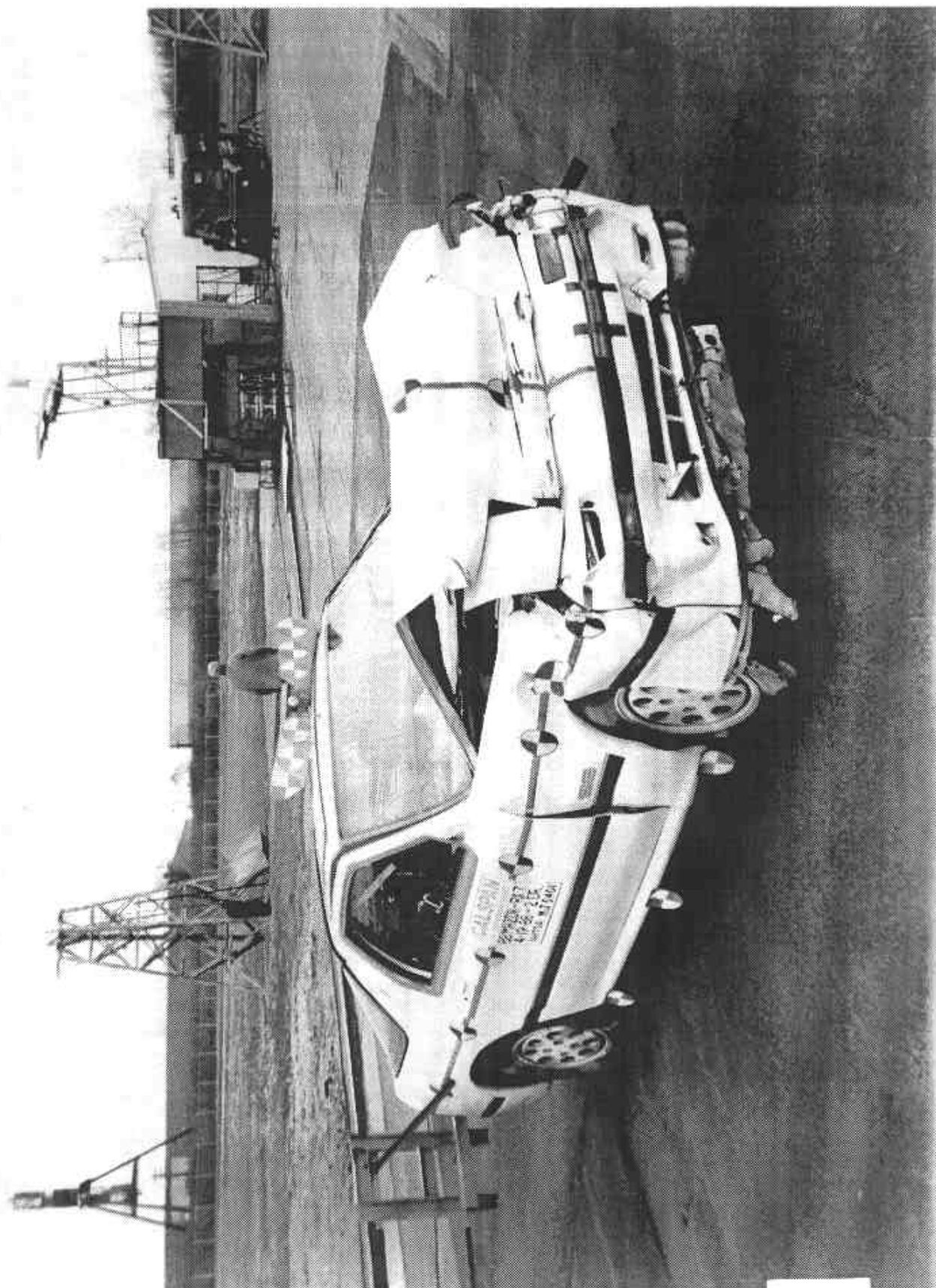


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-9

7626-15



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

A-10

7626-15



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

A-11

7626-15



Figure A-11 PRE-TEST WINDSHIELD VIEW

A-12

7626-15



Figure A-12 POST-TEST WINDSHIELD VIEW

A-13

7626-13

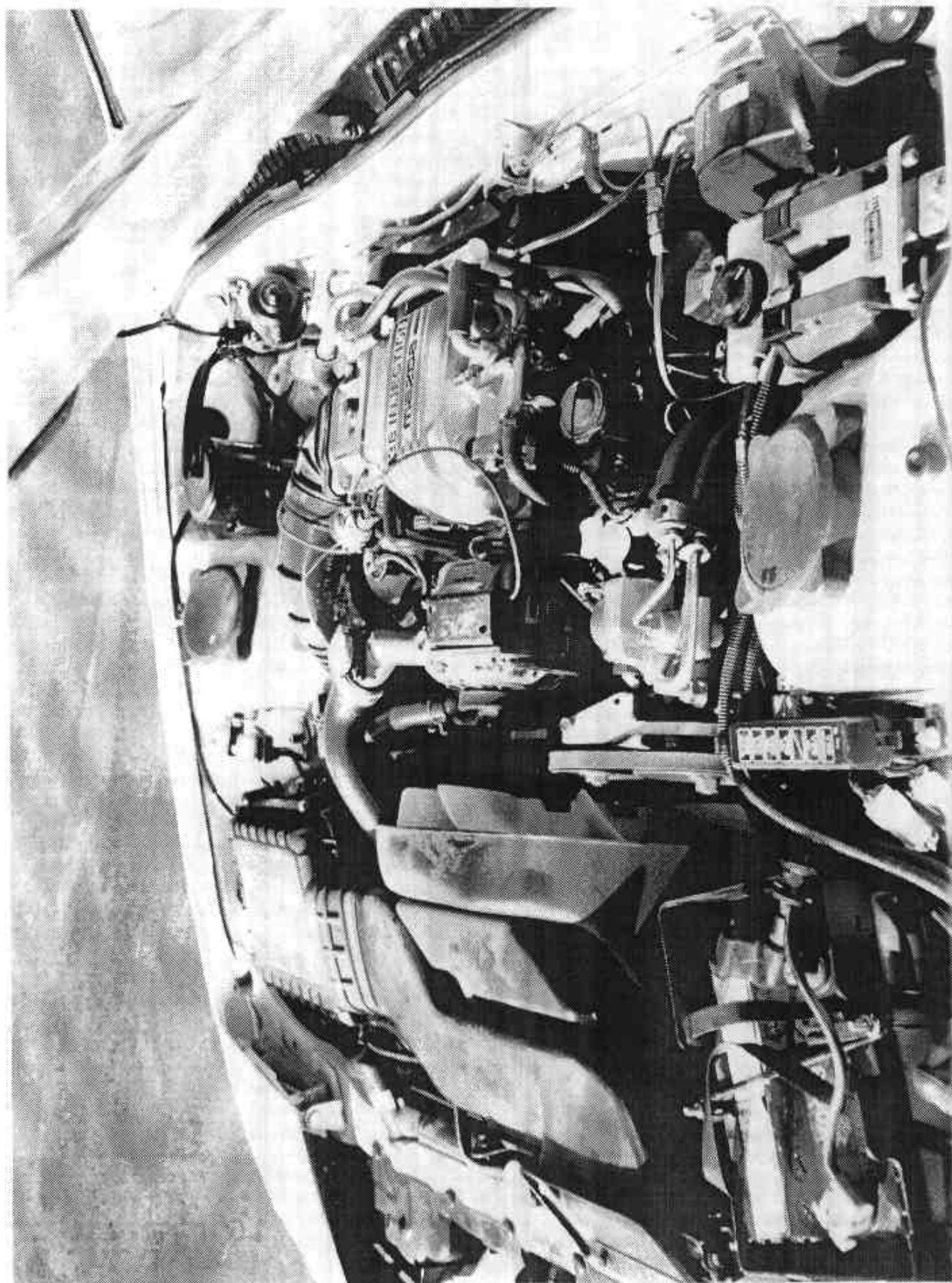


Figure A-13 PRE-TEST ENGINE COMPARTMENT VIEW

A-14

7626-15

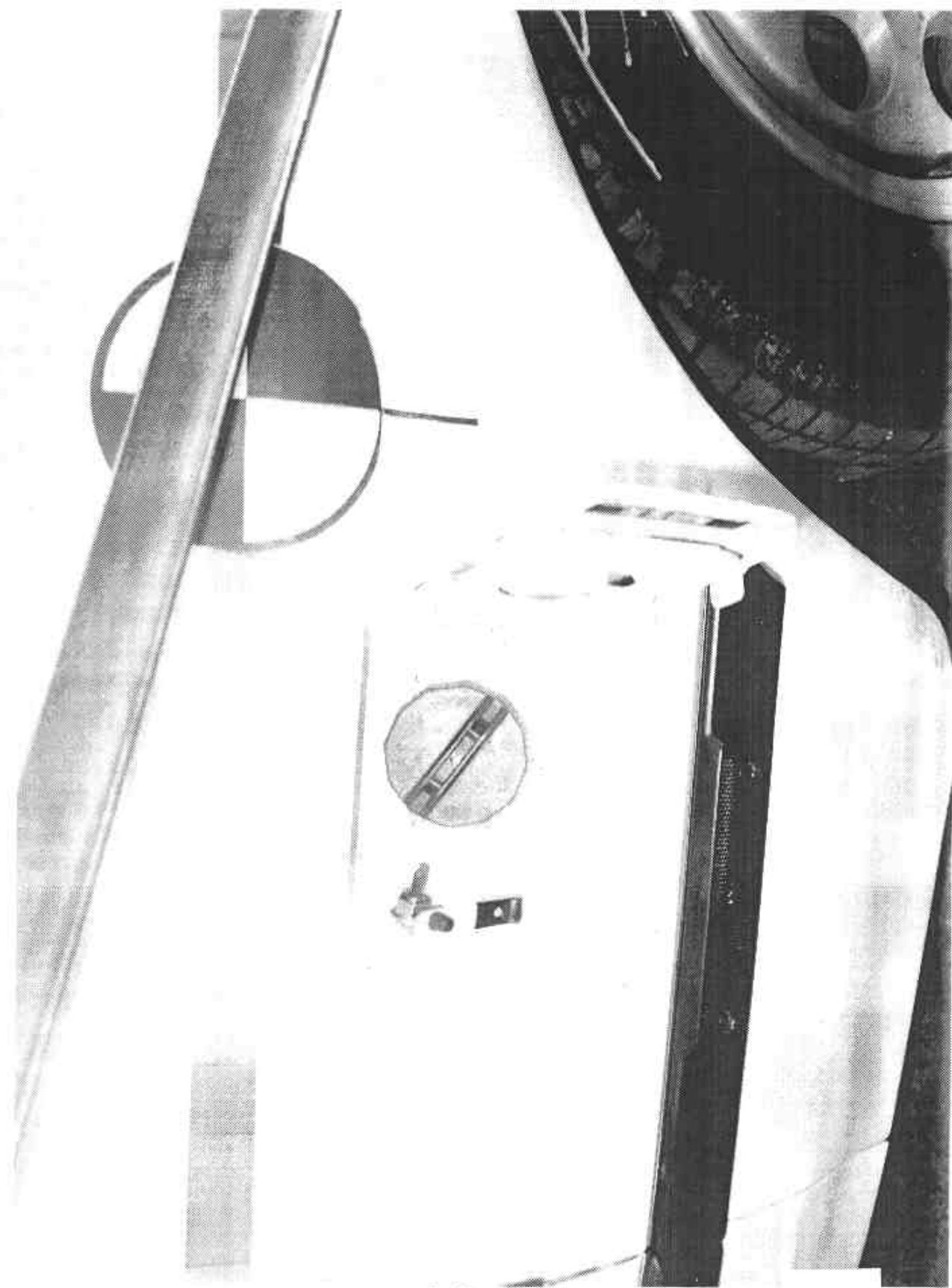
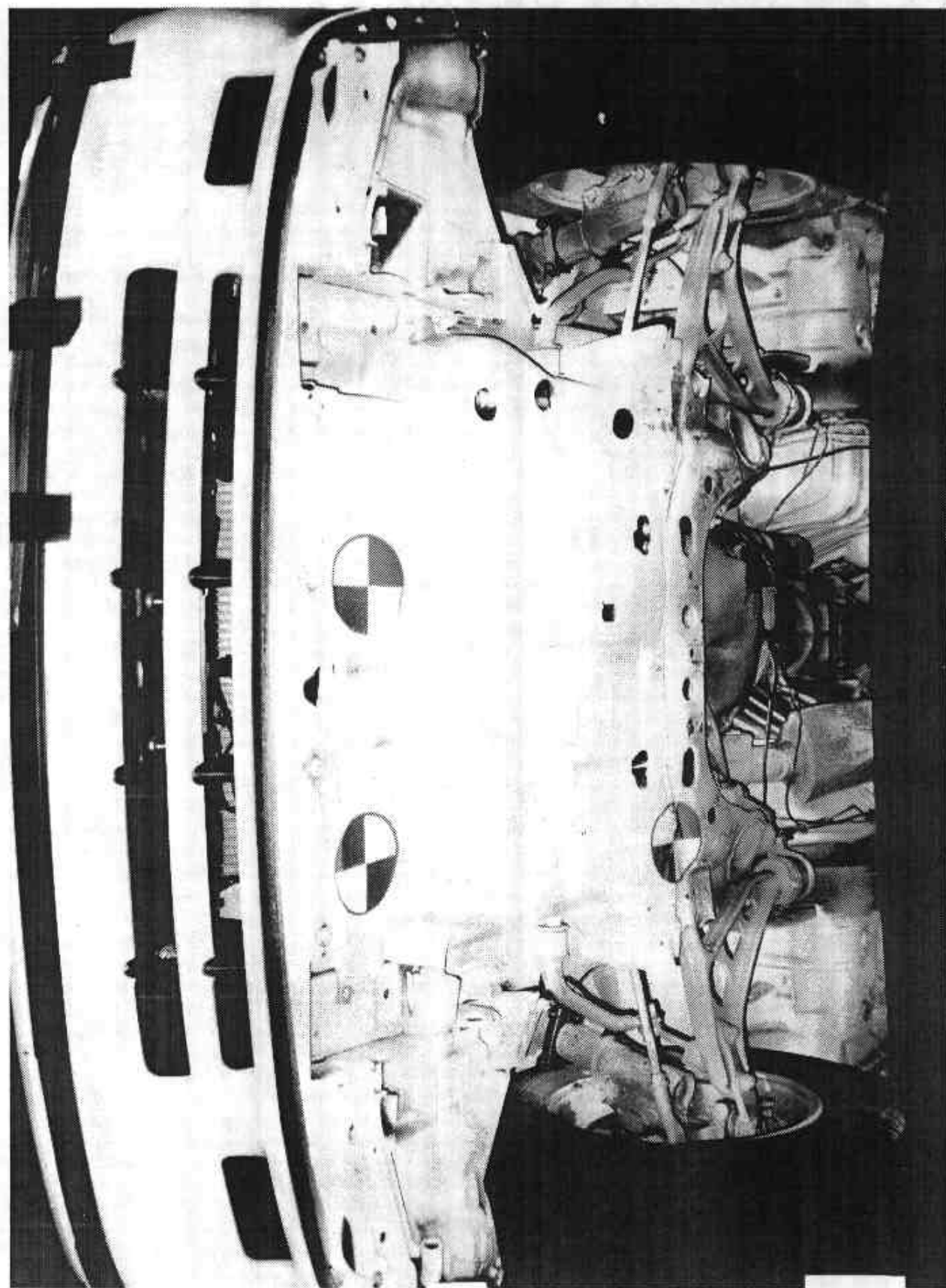


Figure A-14 PRE-TEST FUEL CAP VIEW

A-15

7626-15



A-16

7626-15

Figure A-15. PRE-TEST FRONT UNDERBODY VIEW

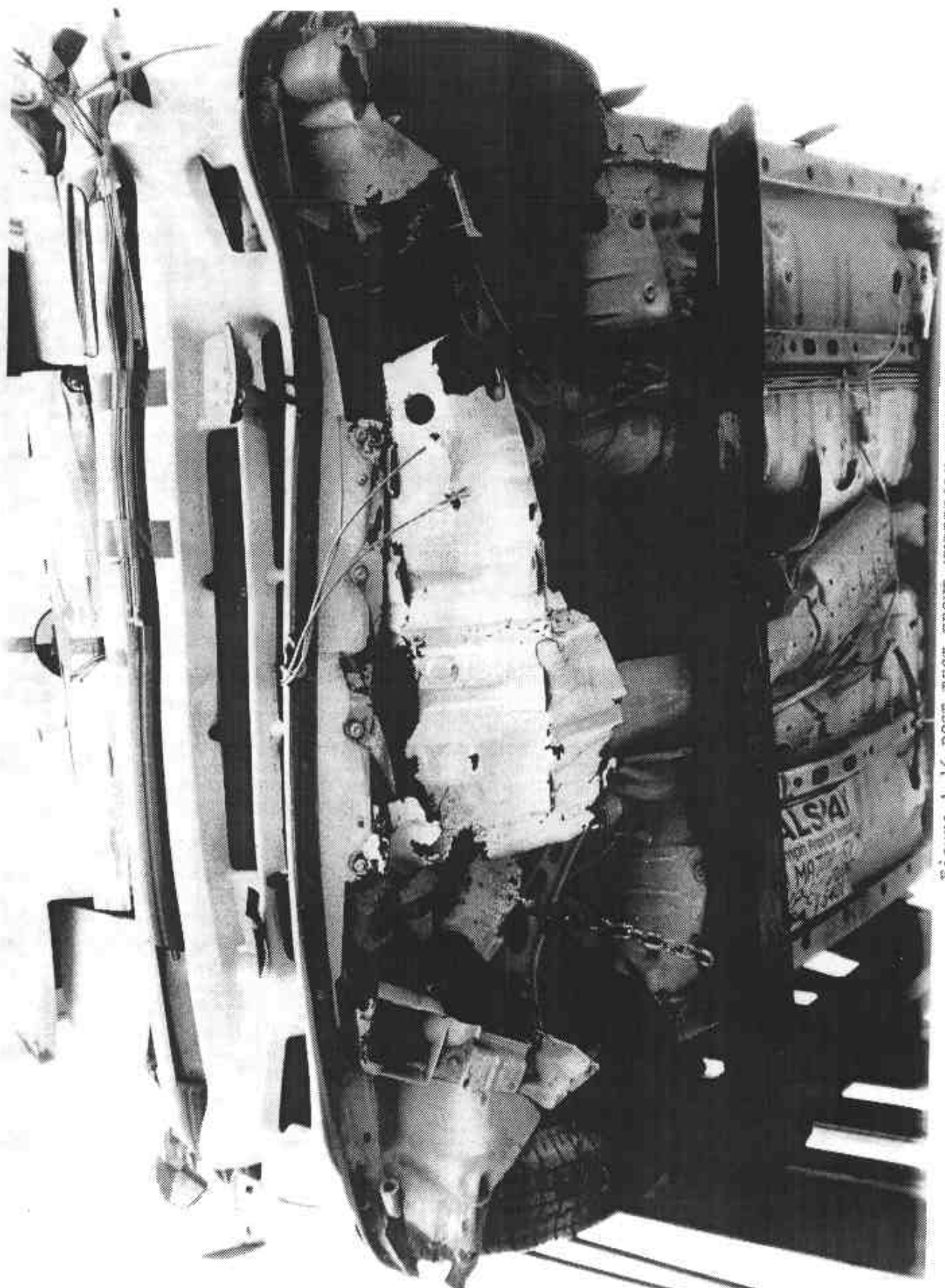


Figure A-16 POST-TEST FRONT UNDERBODY VIEW

A-17

7626-15

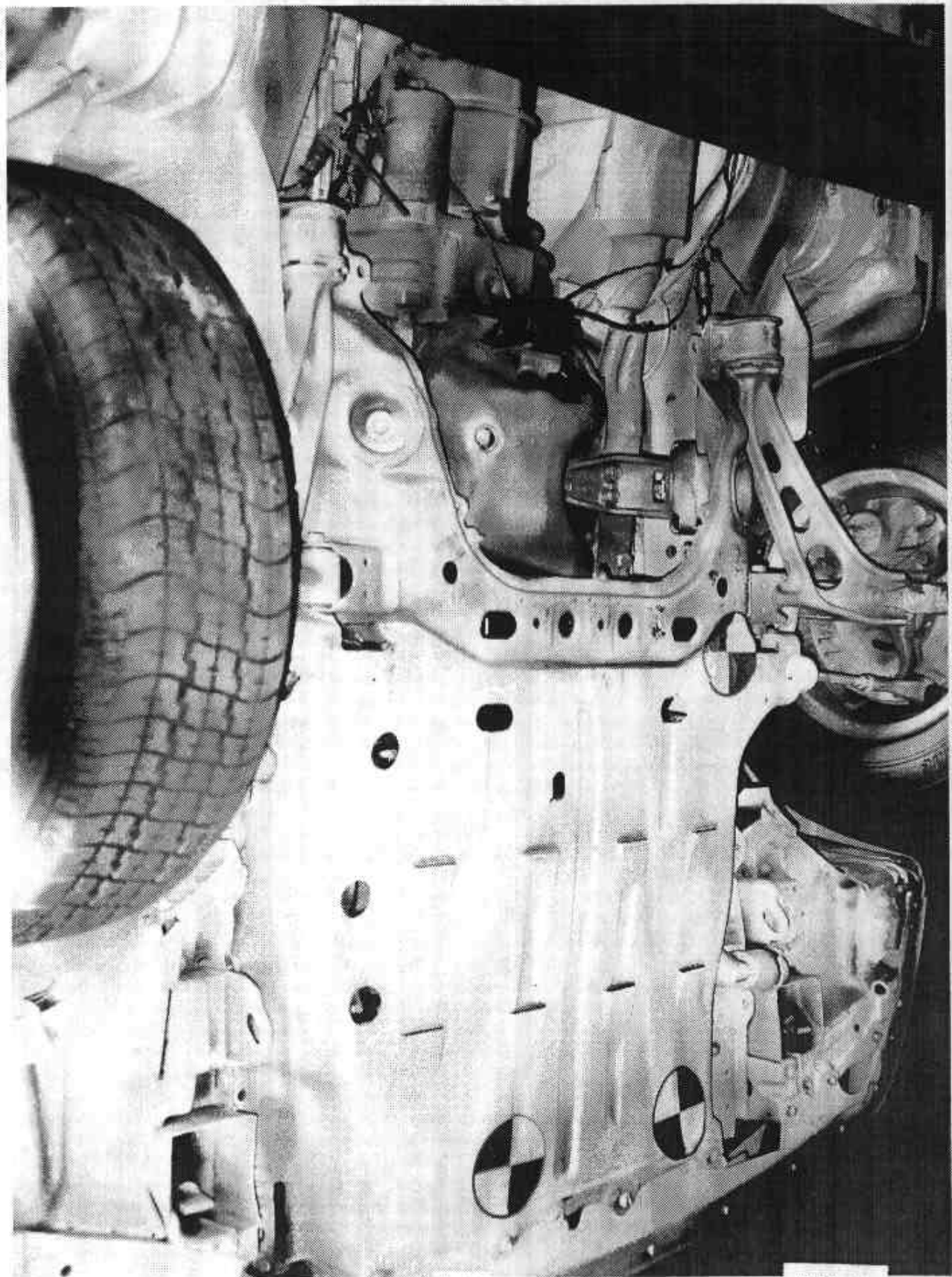


Figure A-17 PRE-TEST FRONT-SIDE UNDERBODY VIEW

A-18

7626-15

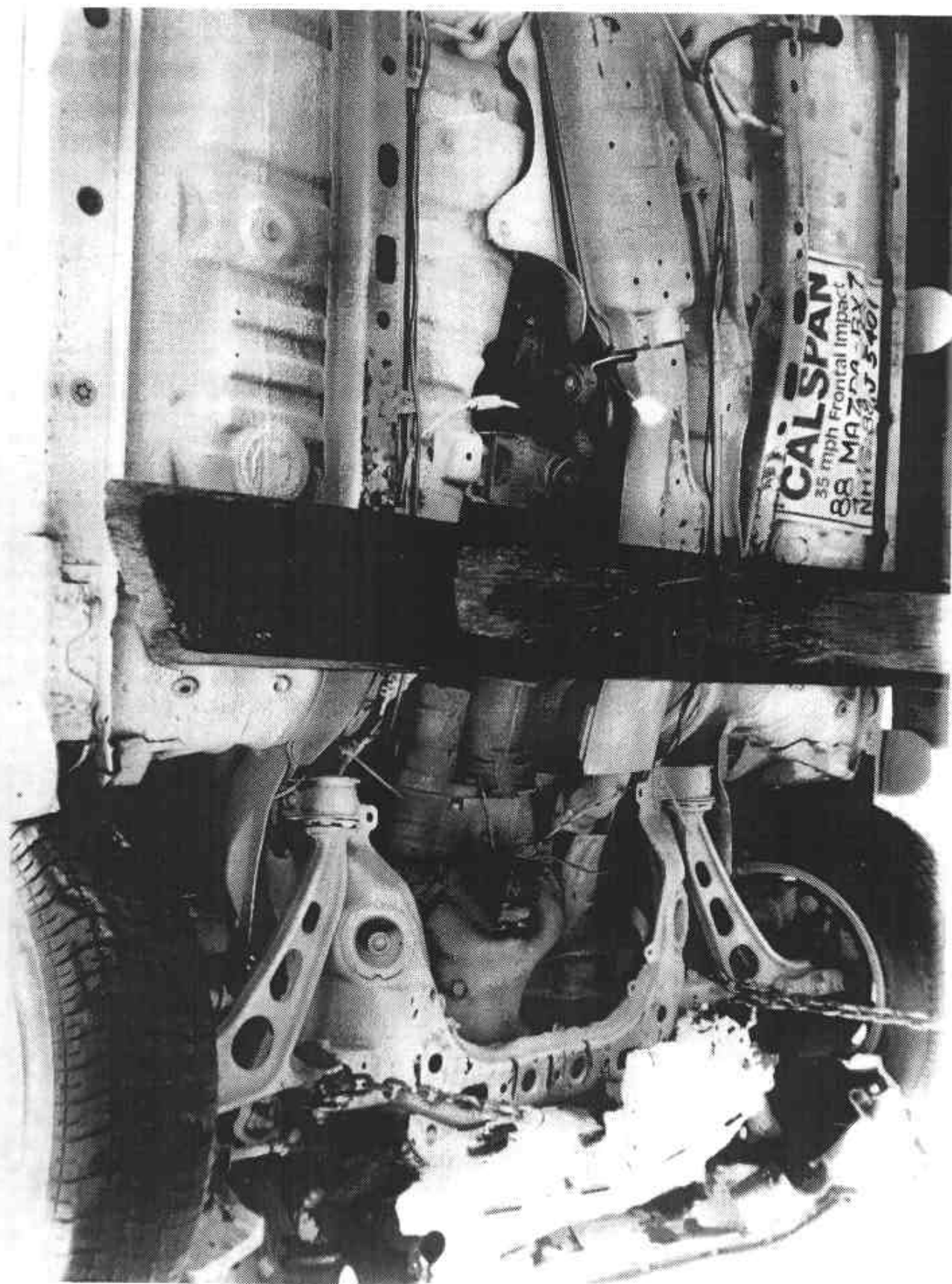


Figure A-18 POST-TEST FRONT-SIDE UNDERBODY VIEW

A-19

7620-15

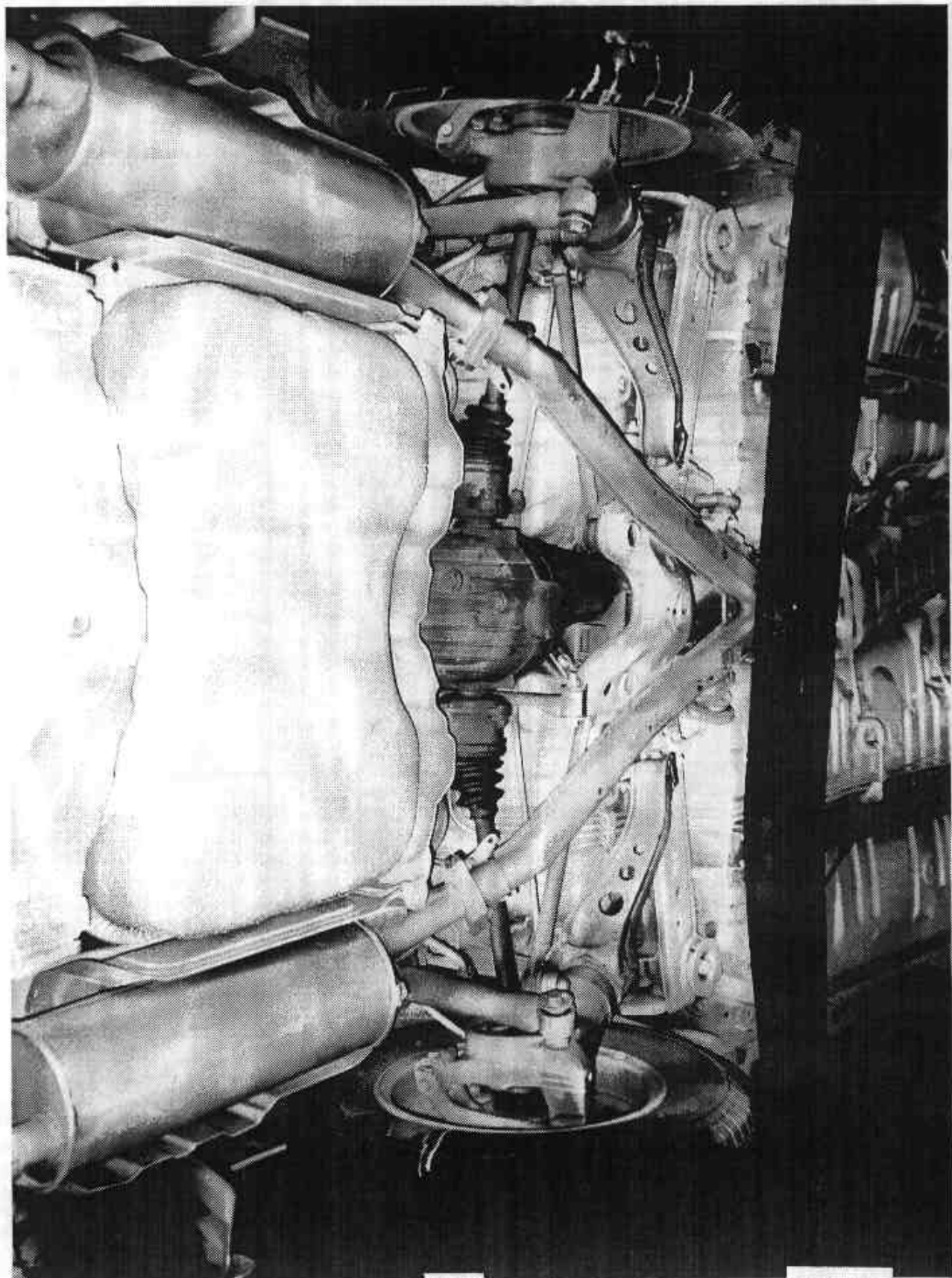


Figure A-19 PRE-TEST REAR UNDERBODY VIEW

A-20

7626-15

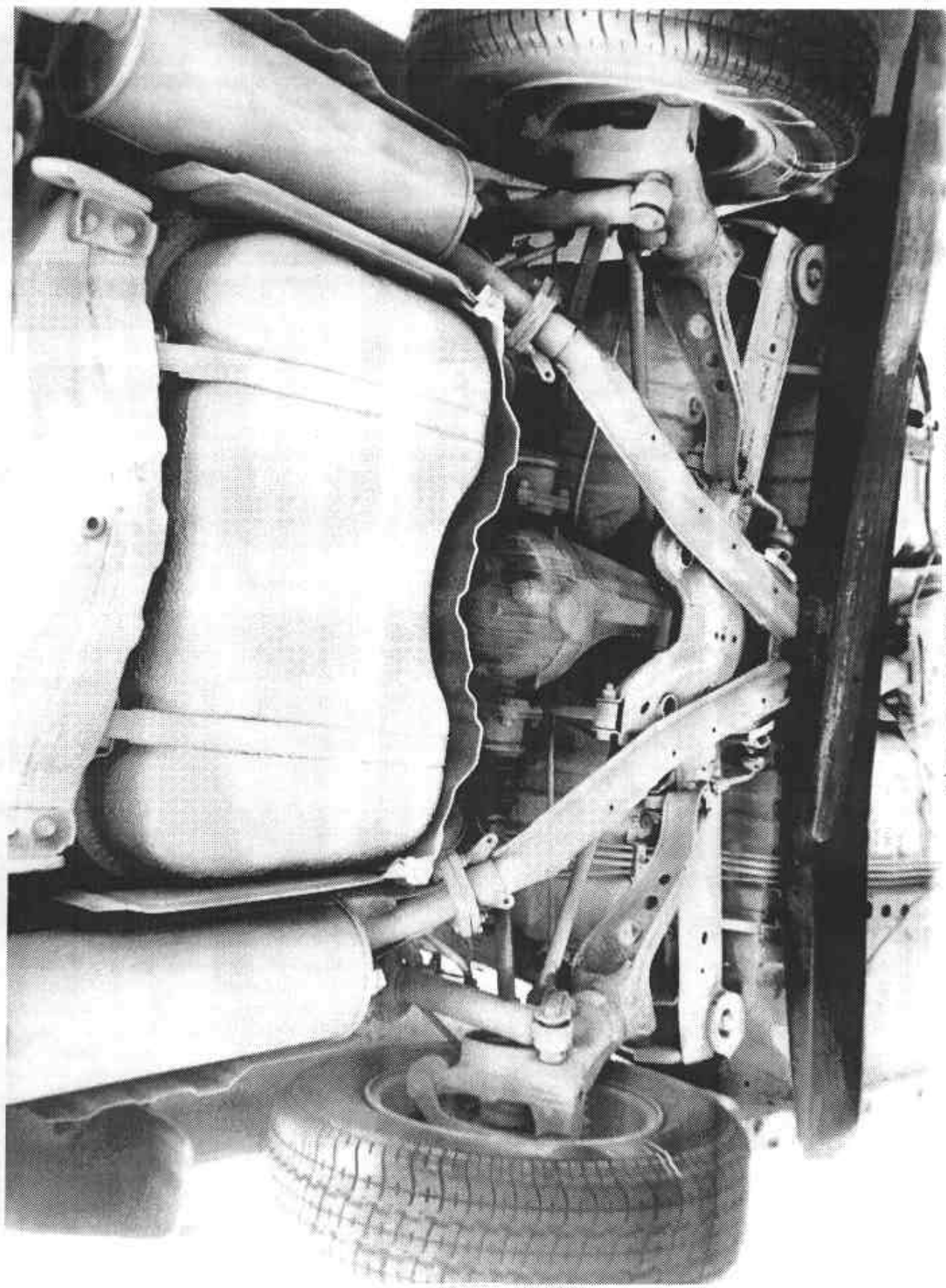


Figure A-20 POST-TEST REAR UNDERBODY VIEW

A-21

7626-15

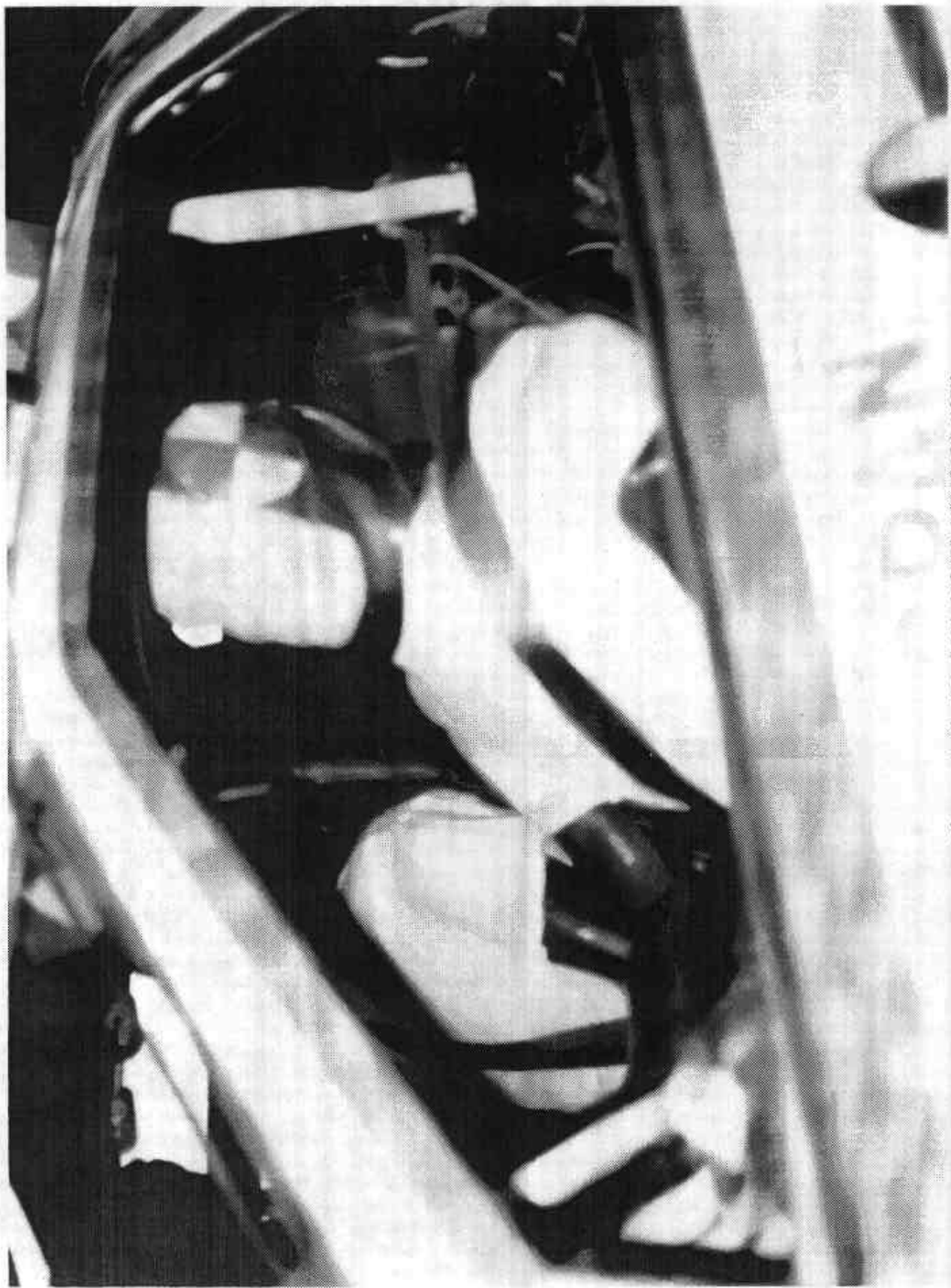


Figure A-21 PRE-TEST DRIVER POSITION VIEW

A-22

7626-15

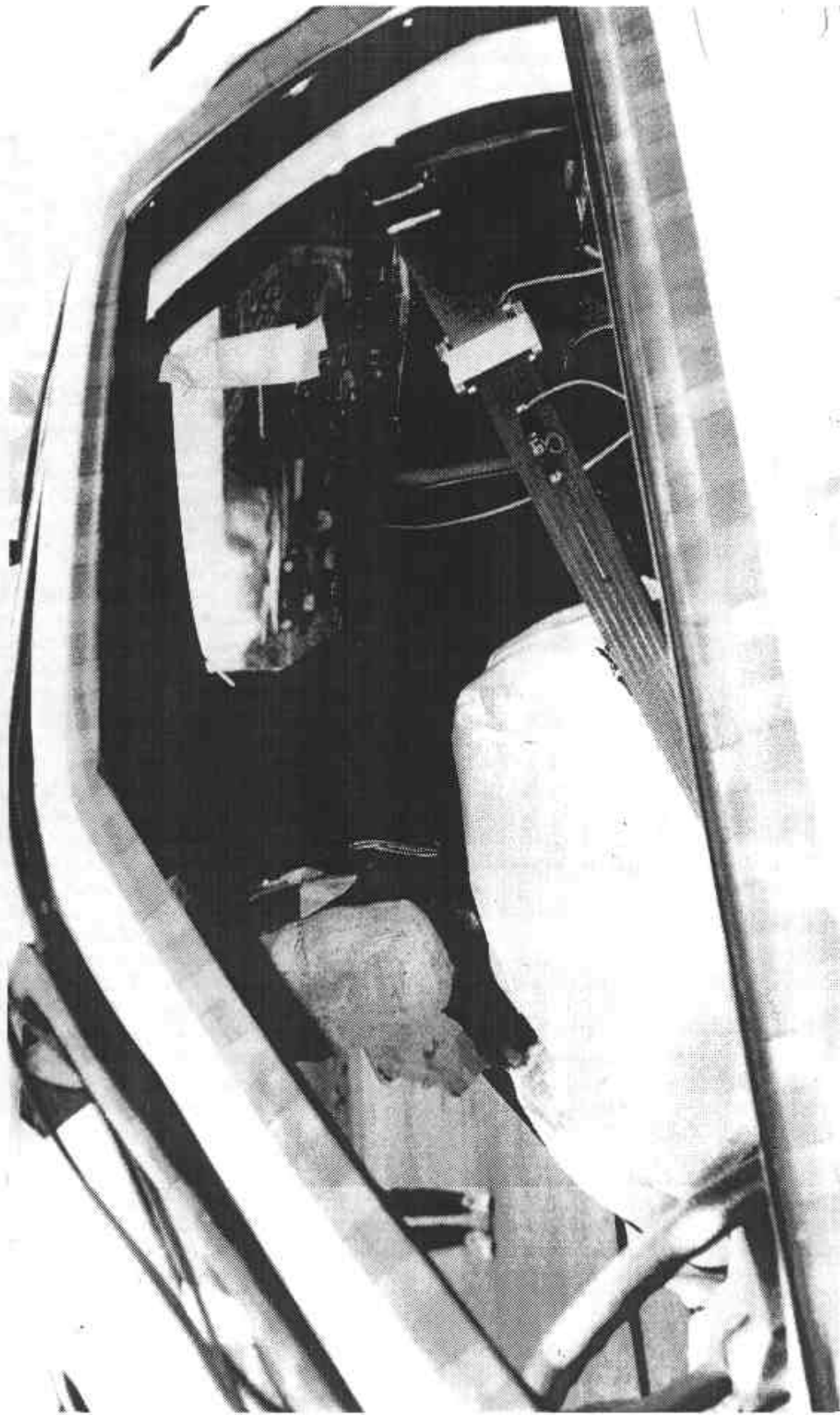


Figure A-22 POST-TEST DRIVER POSITION VIEW

A-23

7626-15



Figure A-23 PRE-TEST PASSENGER POSITION VIEW

A-24

7626-15



Figure A-24 POST-TEST PASSENGER POSITION VIEW

A-25

7626-15



Figure A-25 PRE-TEST DRIVER AND INTERIOR VIEW

A-26

7626-15



Figure A-26 POST-TEST DRIVER AND INTERIOR VIEW

A-27

7626-15



Figure A-27 PRE-TEST PASSENGER AND INTERIOR VIEW

A-28

7626-15



Figure A-28 POST-TEST PASSENGER AND INTERIOR VIEW

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

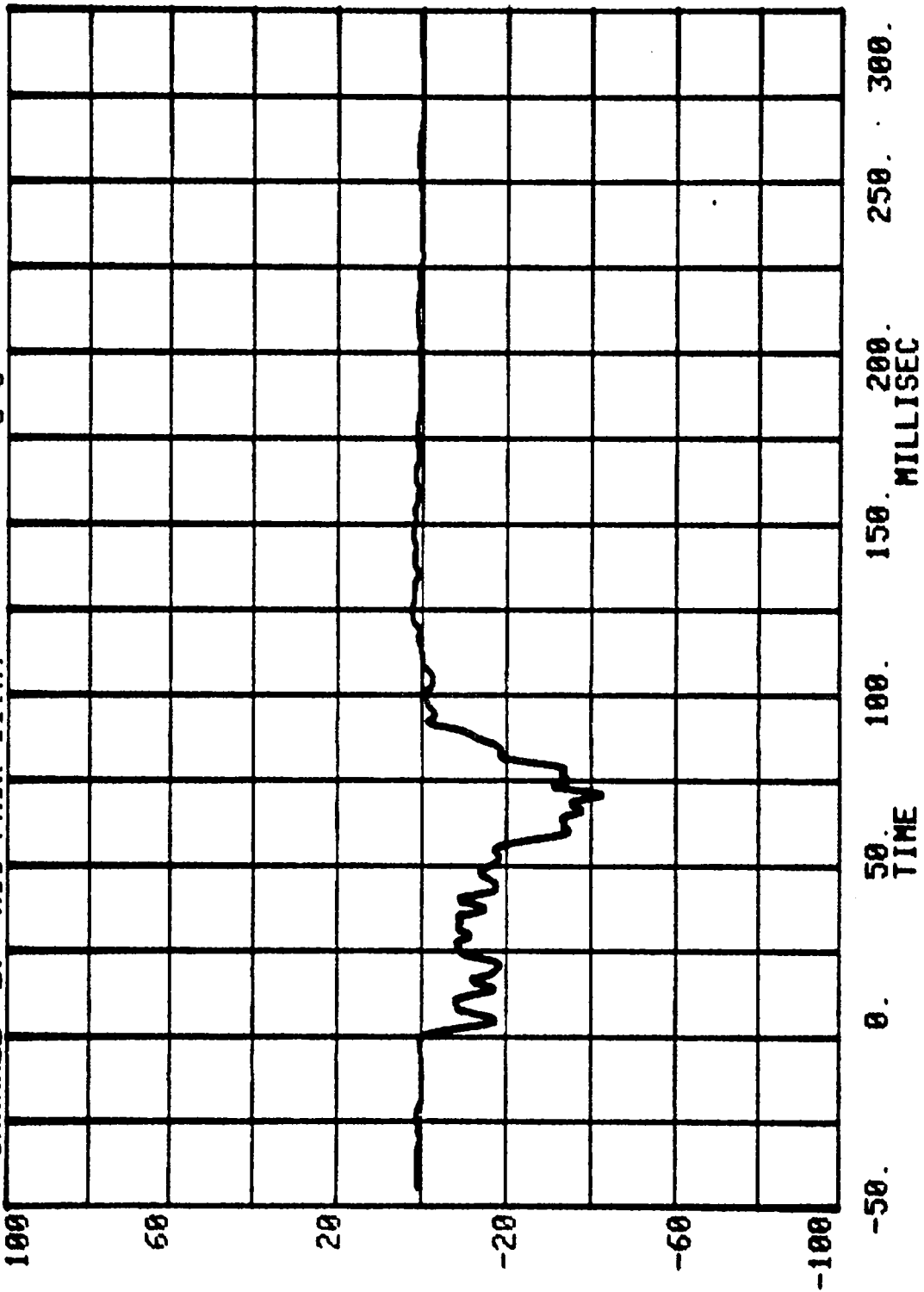
TEST NO. MJ5401

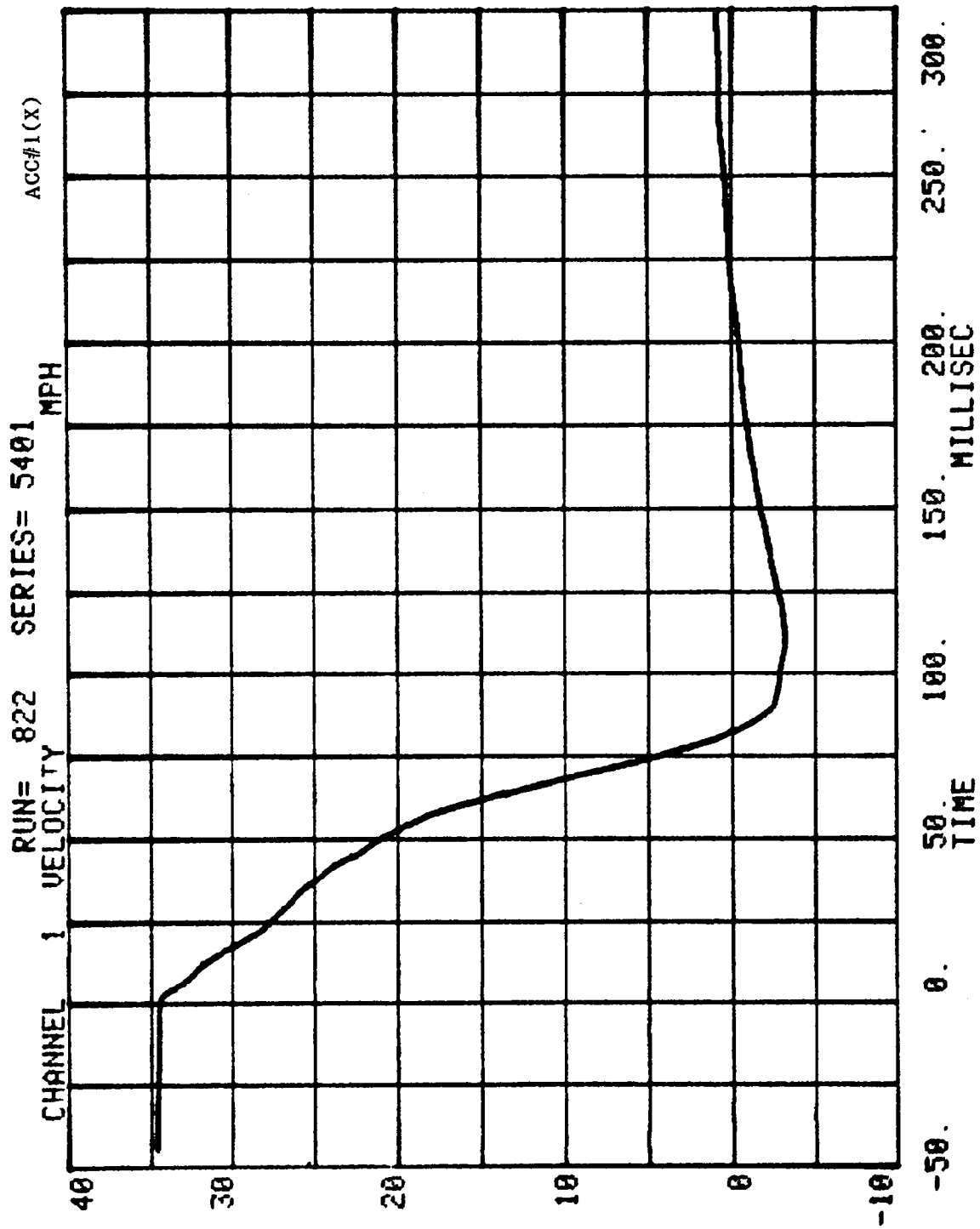
VEHICLE DATA

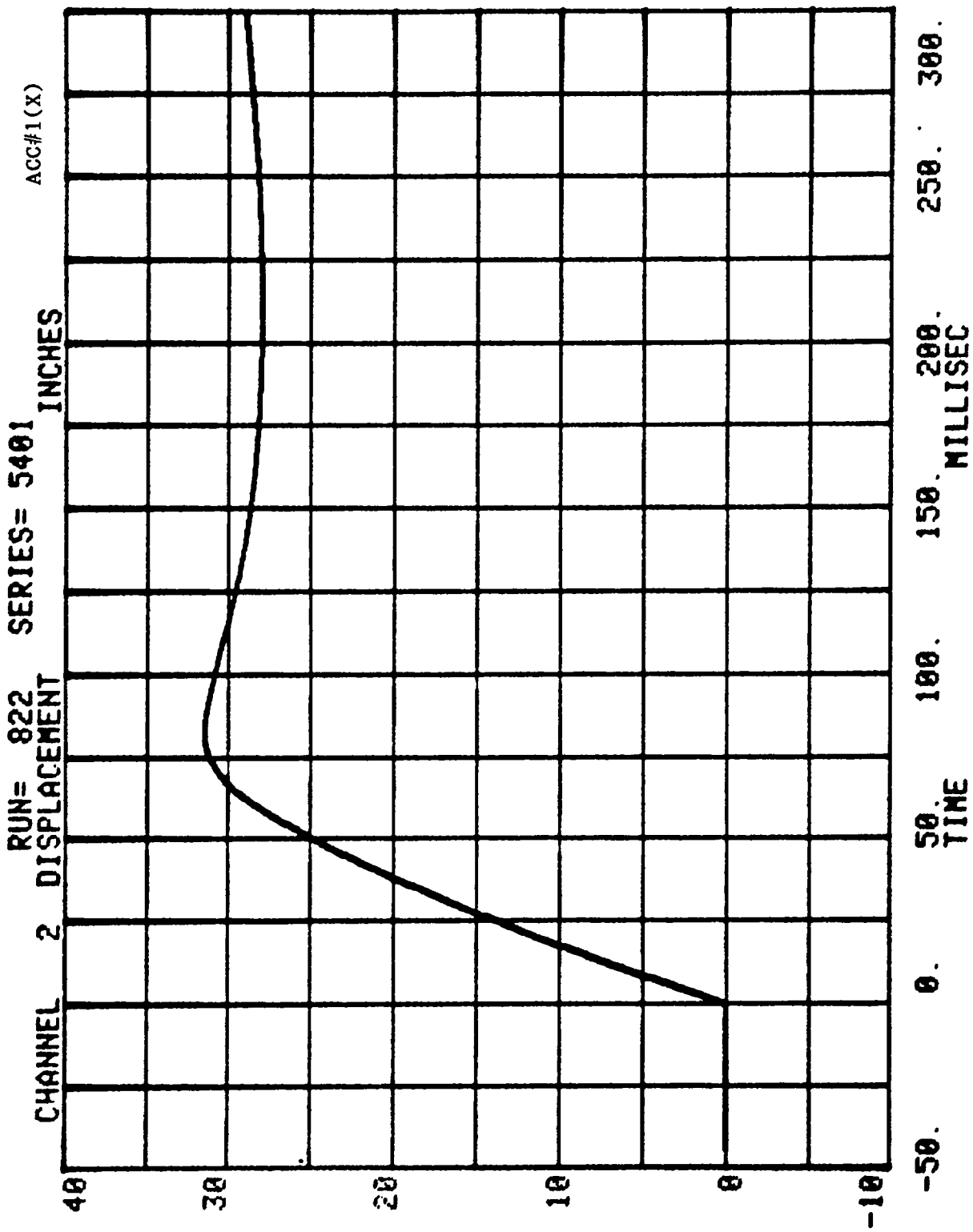
FILTER CHANNEL CLASS

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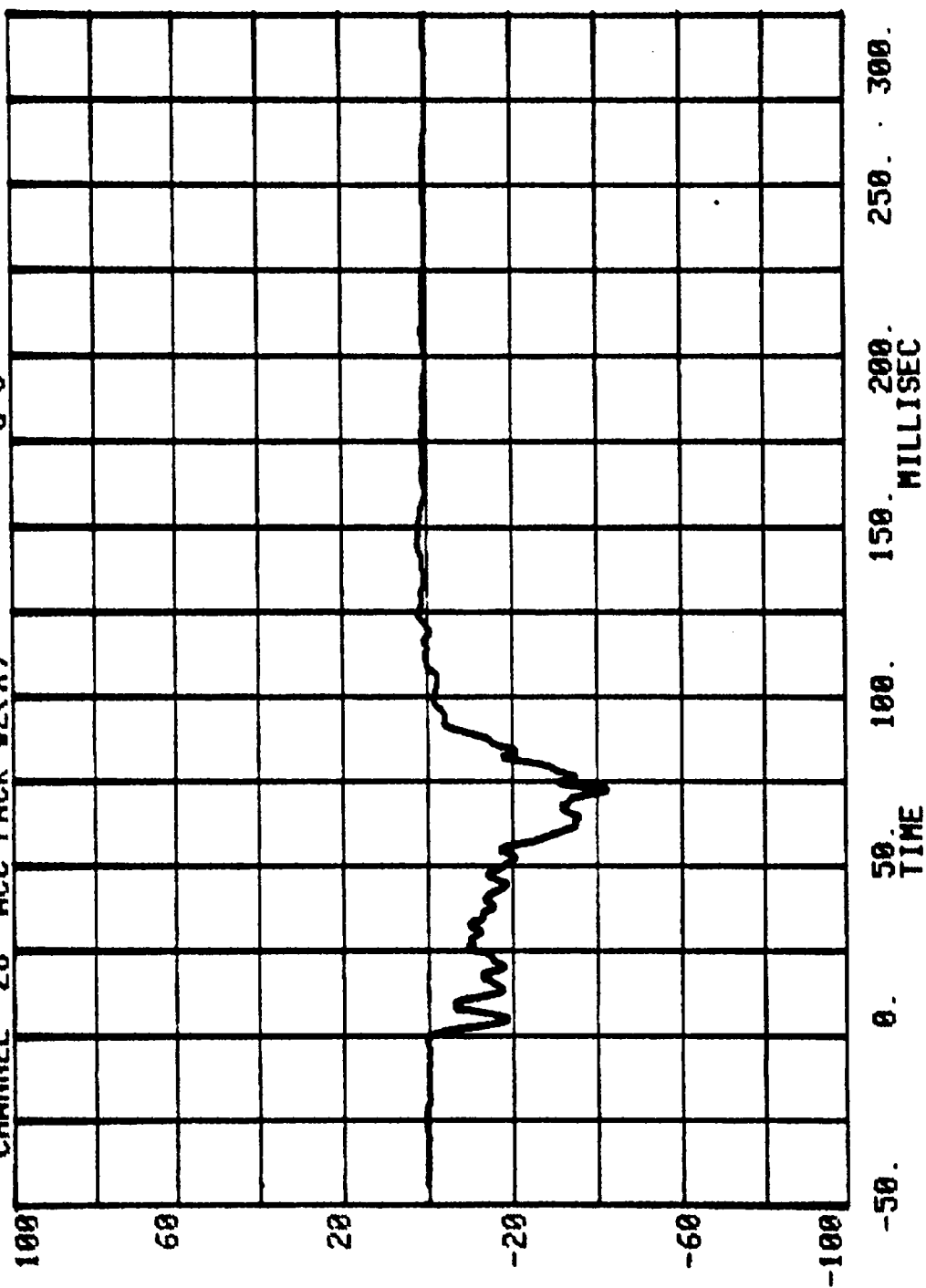
RUN= 822 SERIES= 5401 G'S
CHANNEL 27 ACC PACK #1(X)

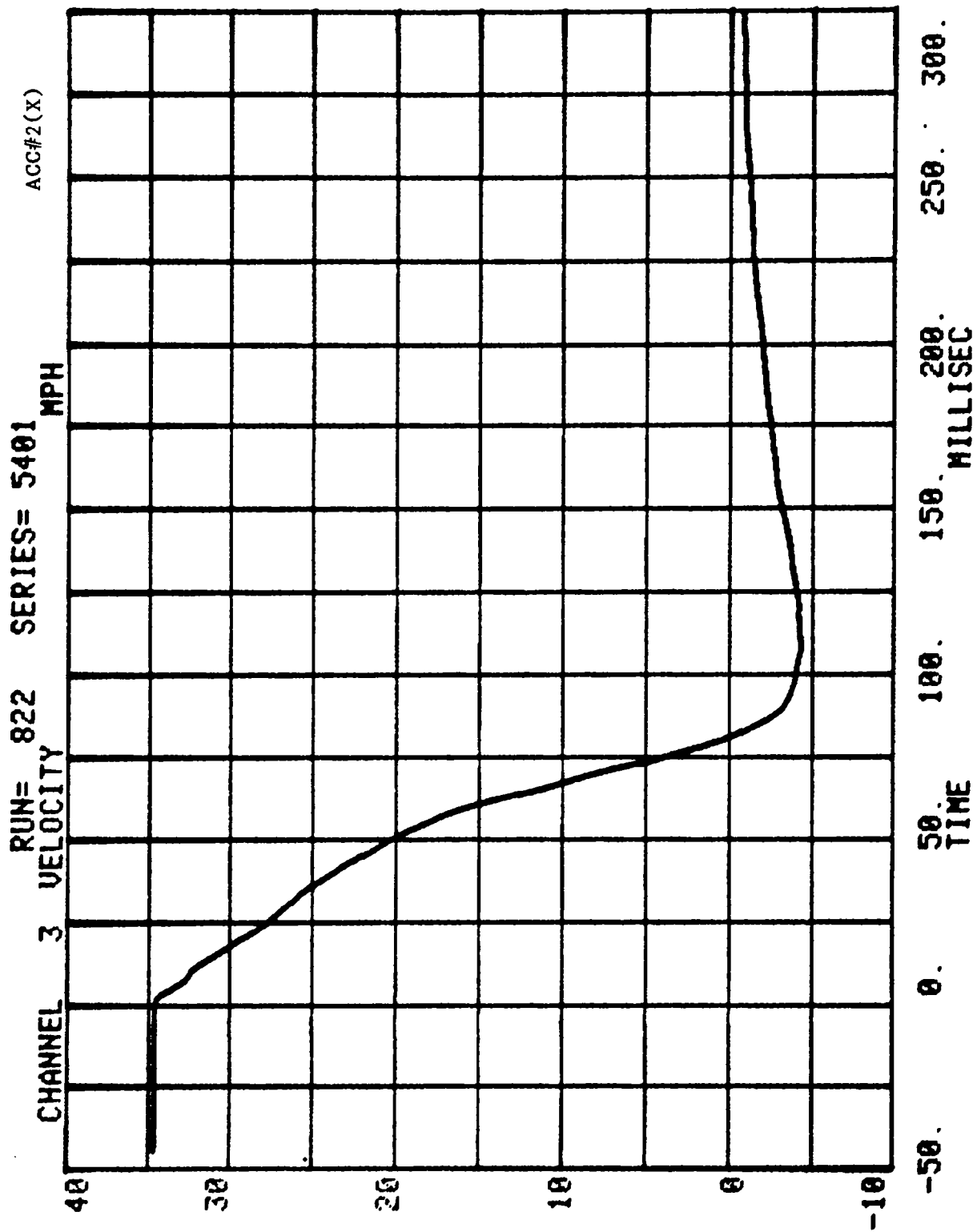


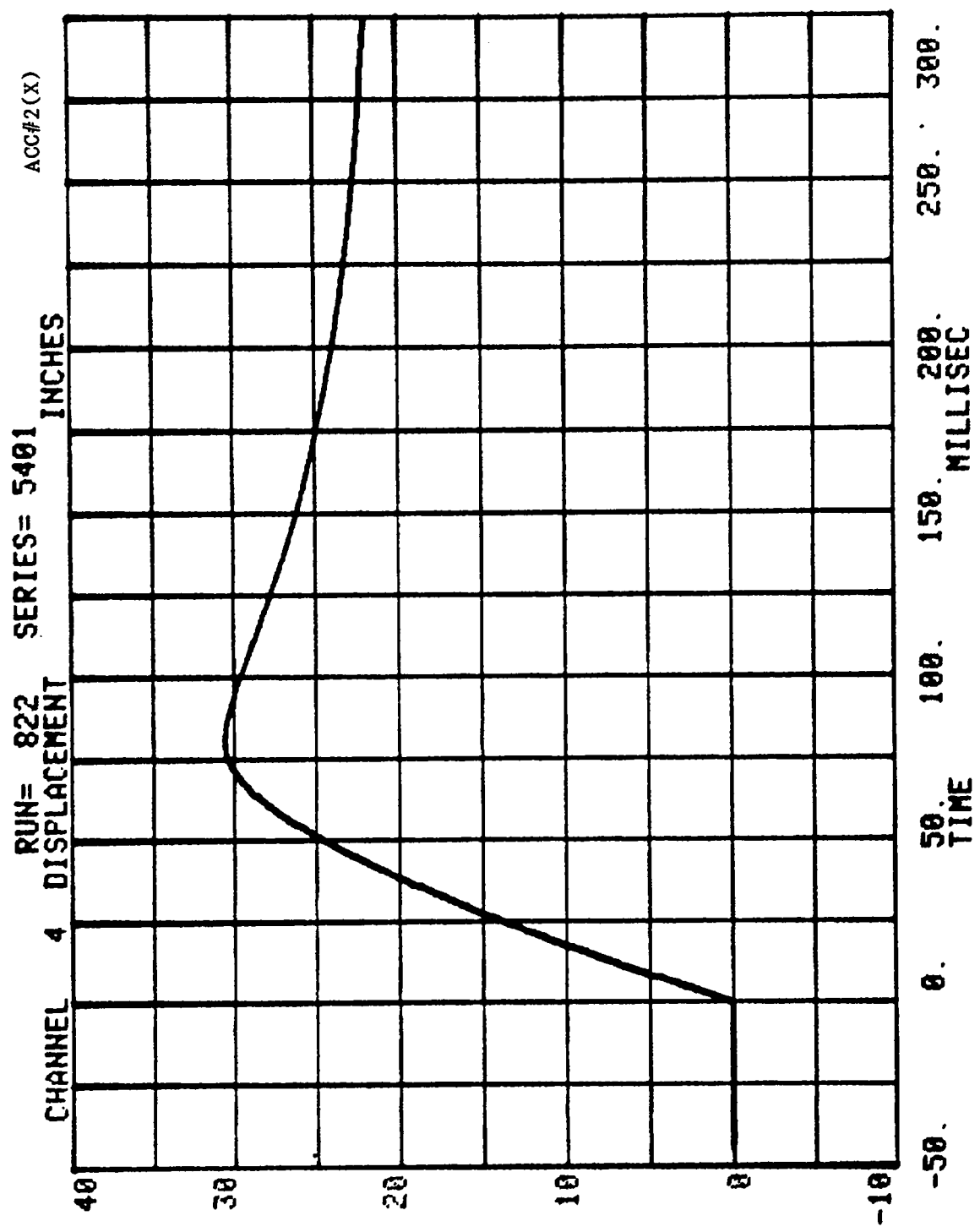




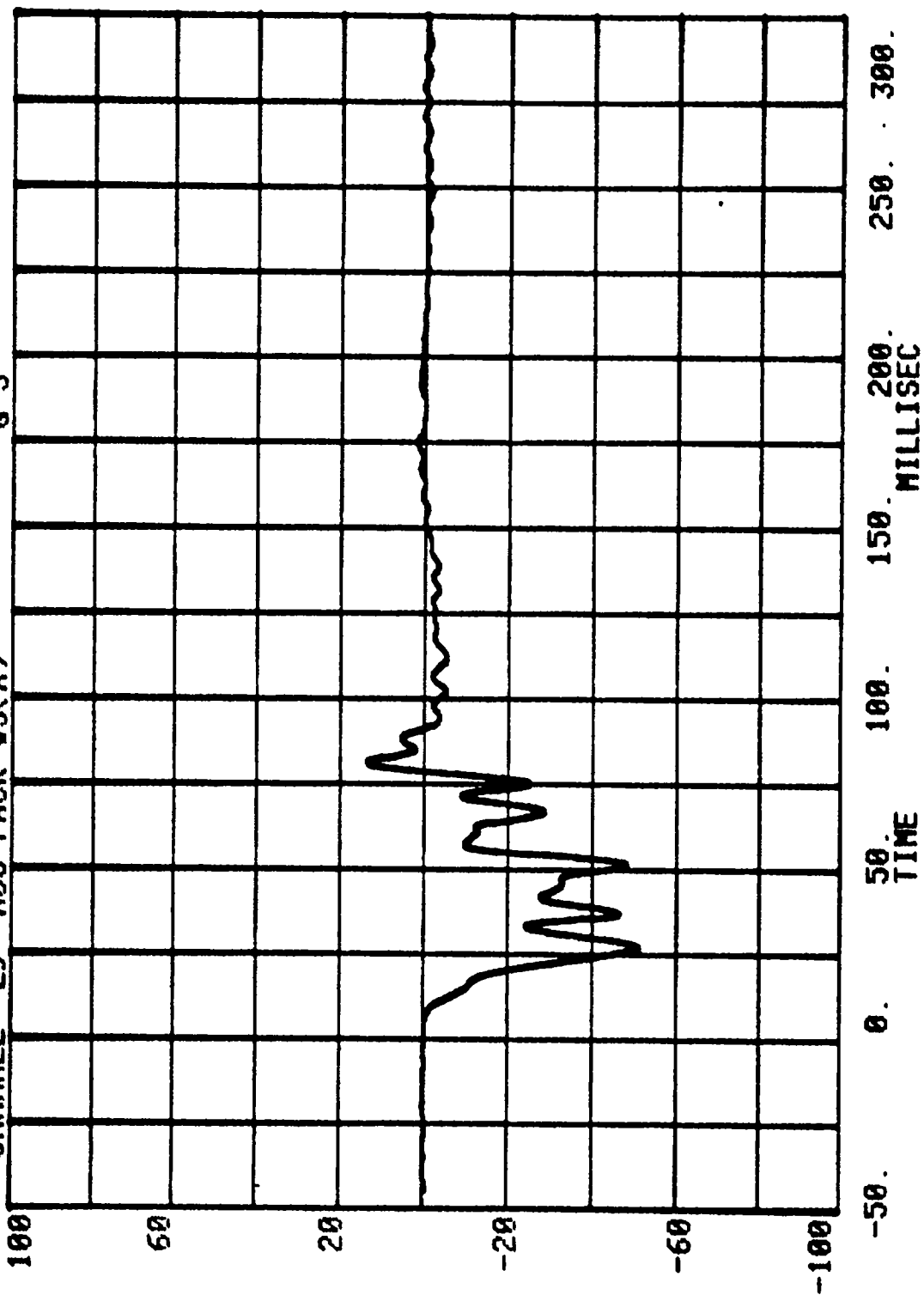
RUN= 822 SERIES= 5401 G'S
CHANNEL 28 ACC PACK #2(X)



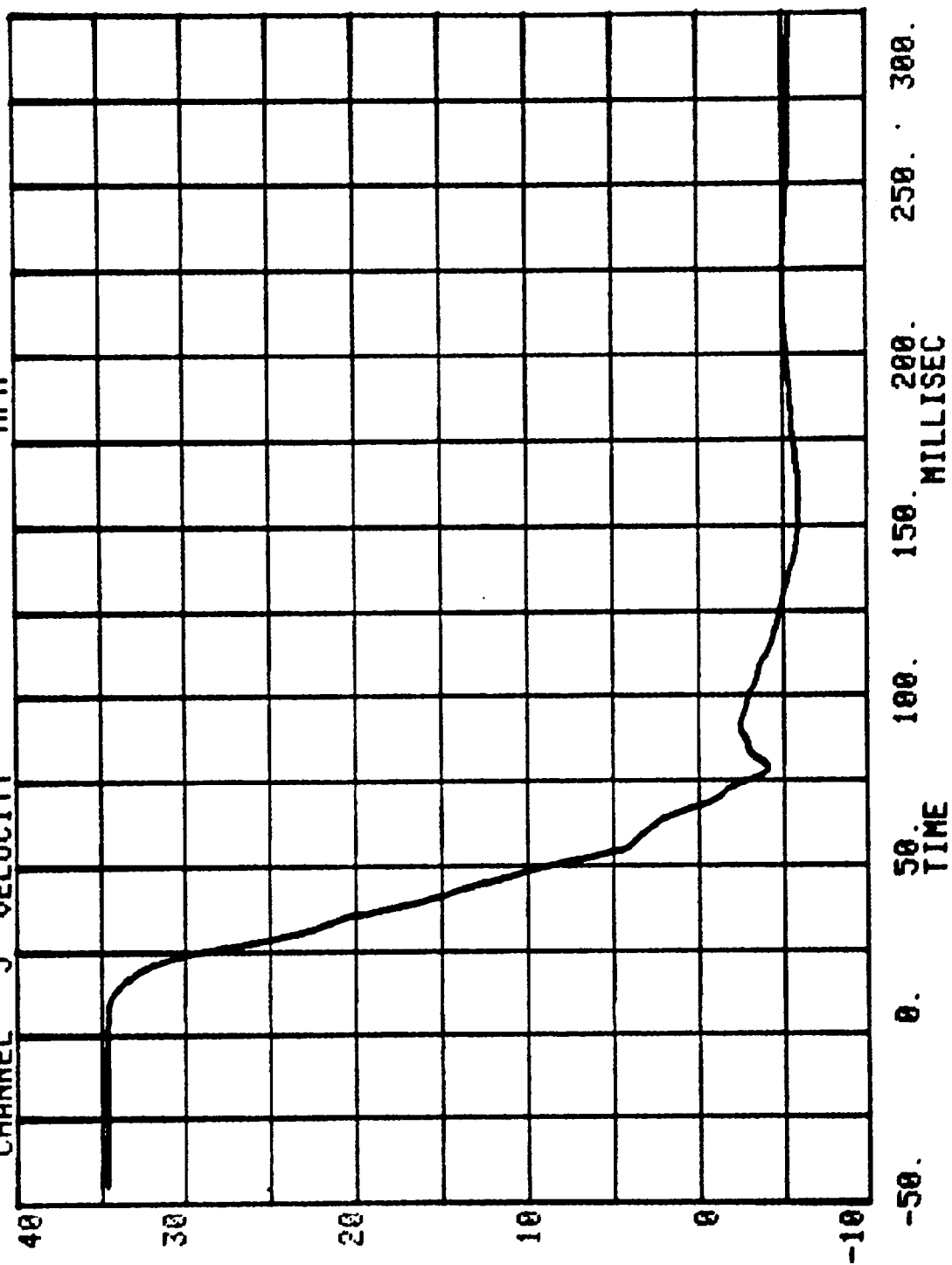


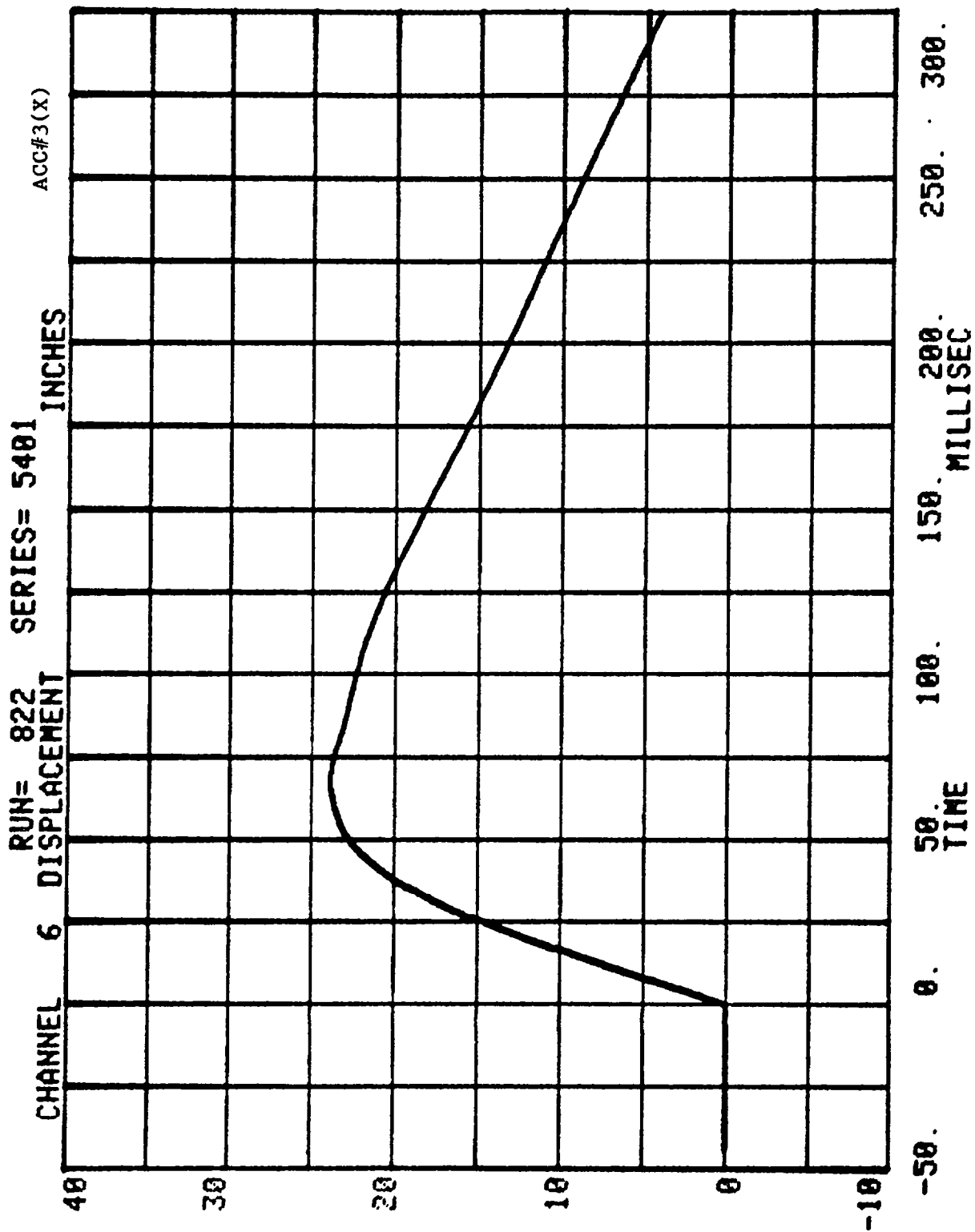


RUN= 822 SERIES= 5401
CHANNEL 29 ACC PACK #3(X) G'S

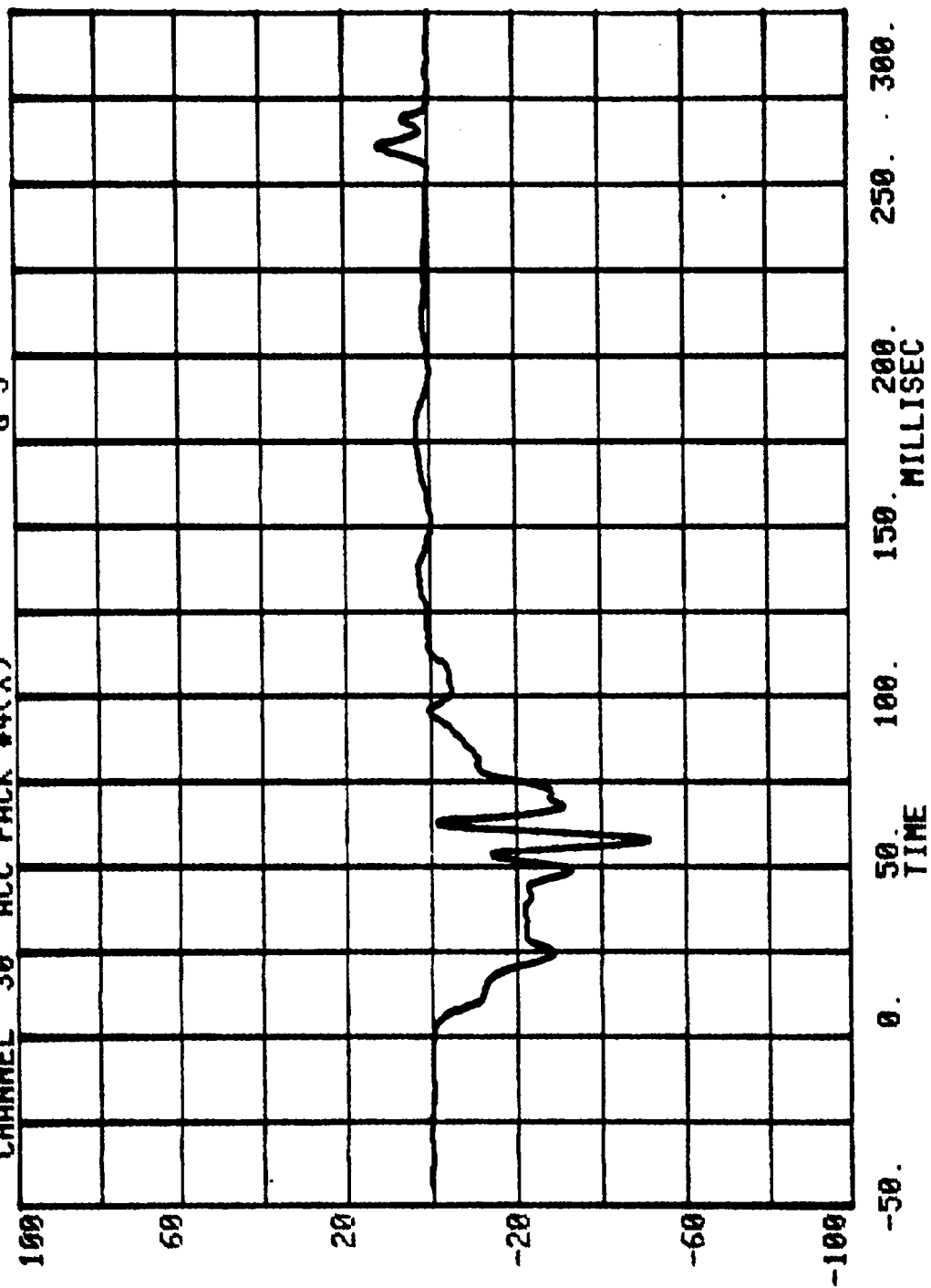


CHANNEL 5 VELOCITY
RUN= 822 SERIES= 5401
ACG#3(X)

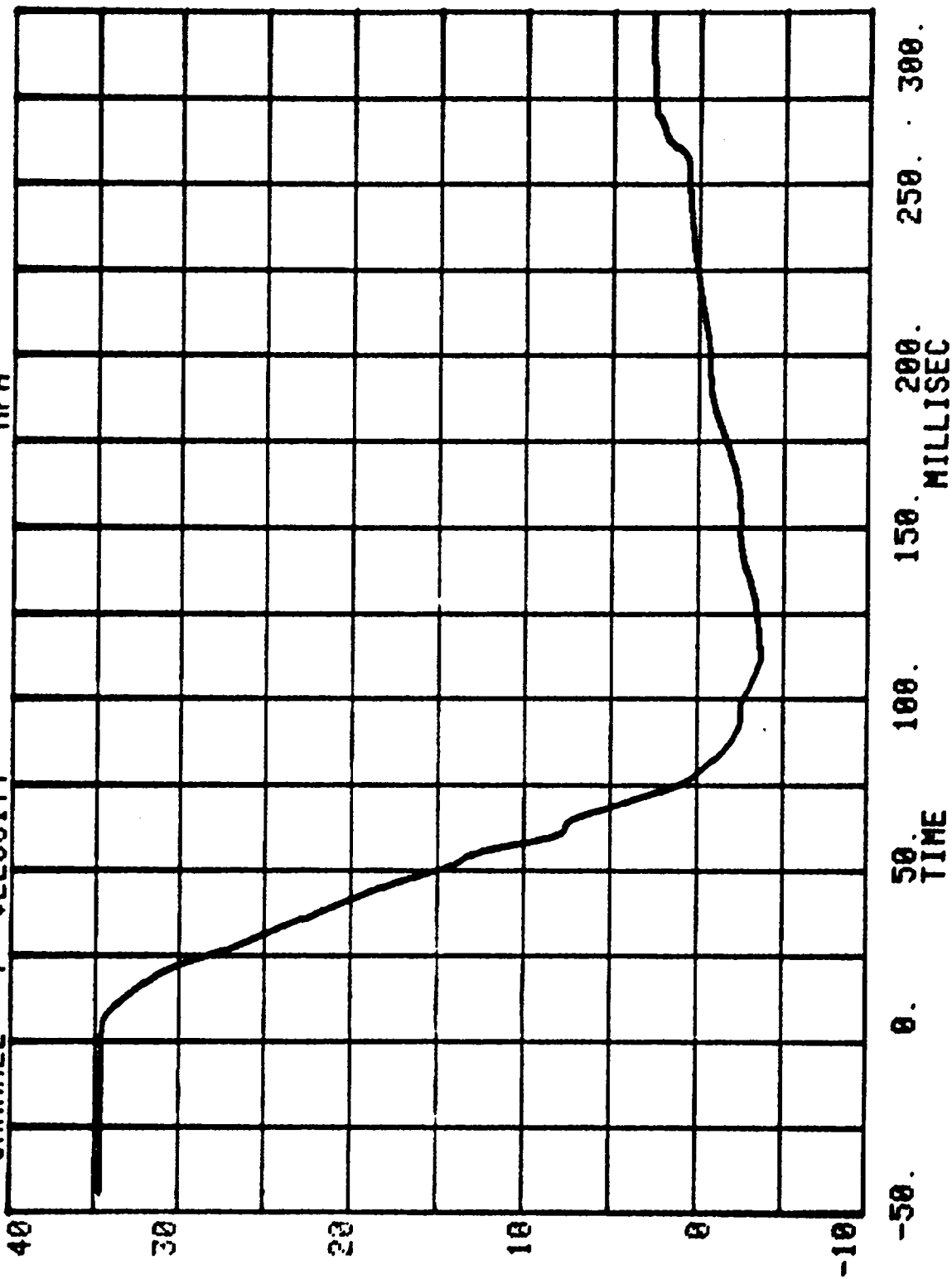


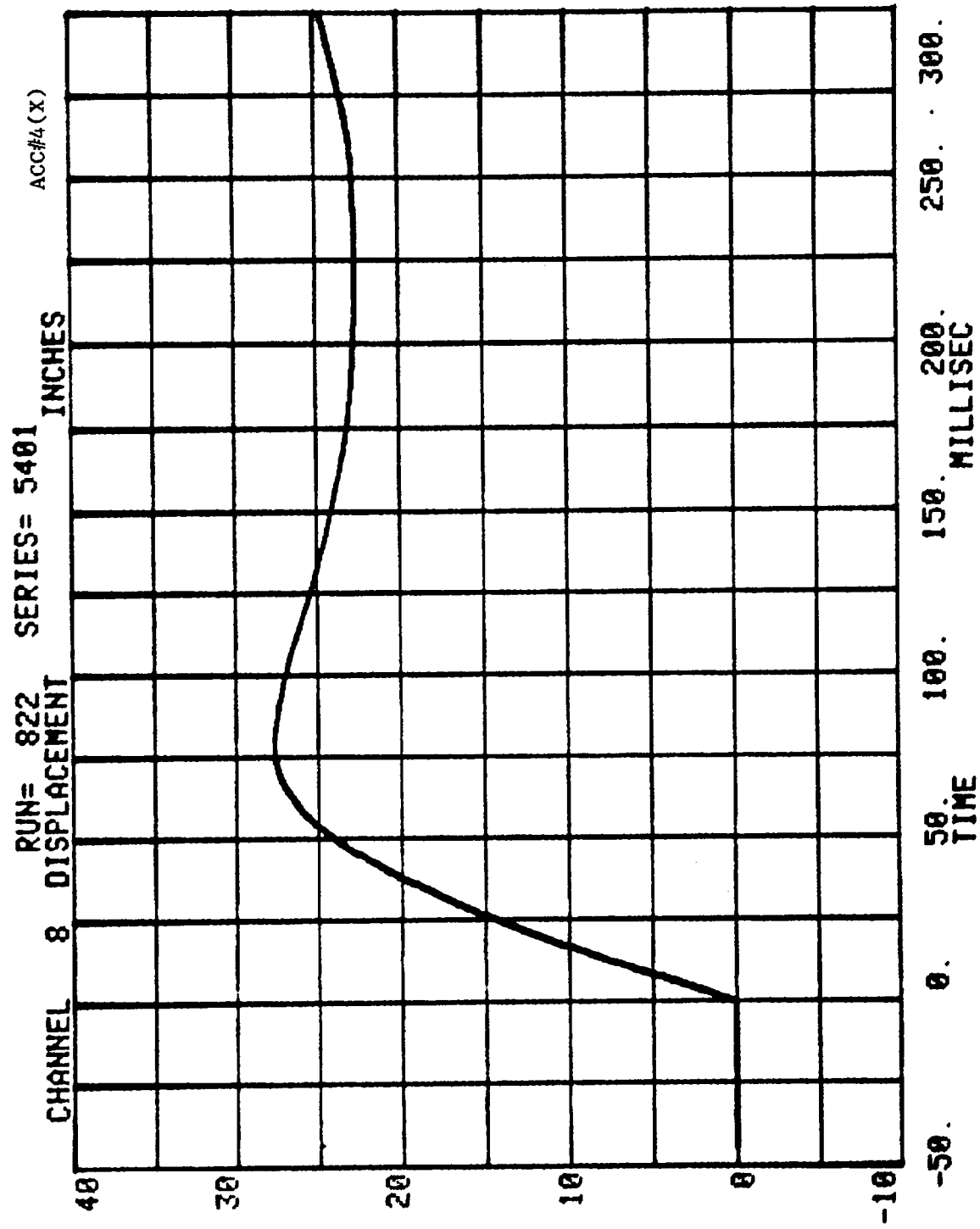


RUN= 822 SERIES= 5401 G'S
CHANNEL 30 ACC PACK #4(X)

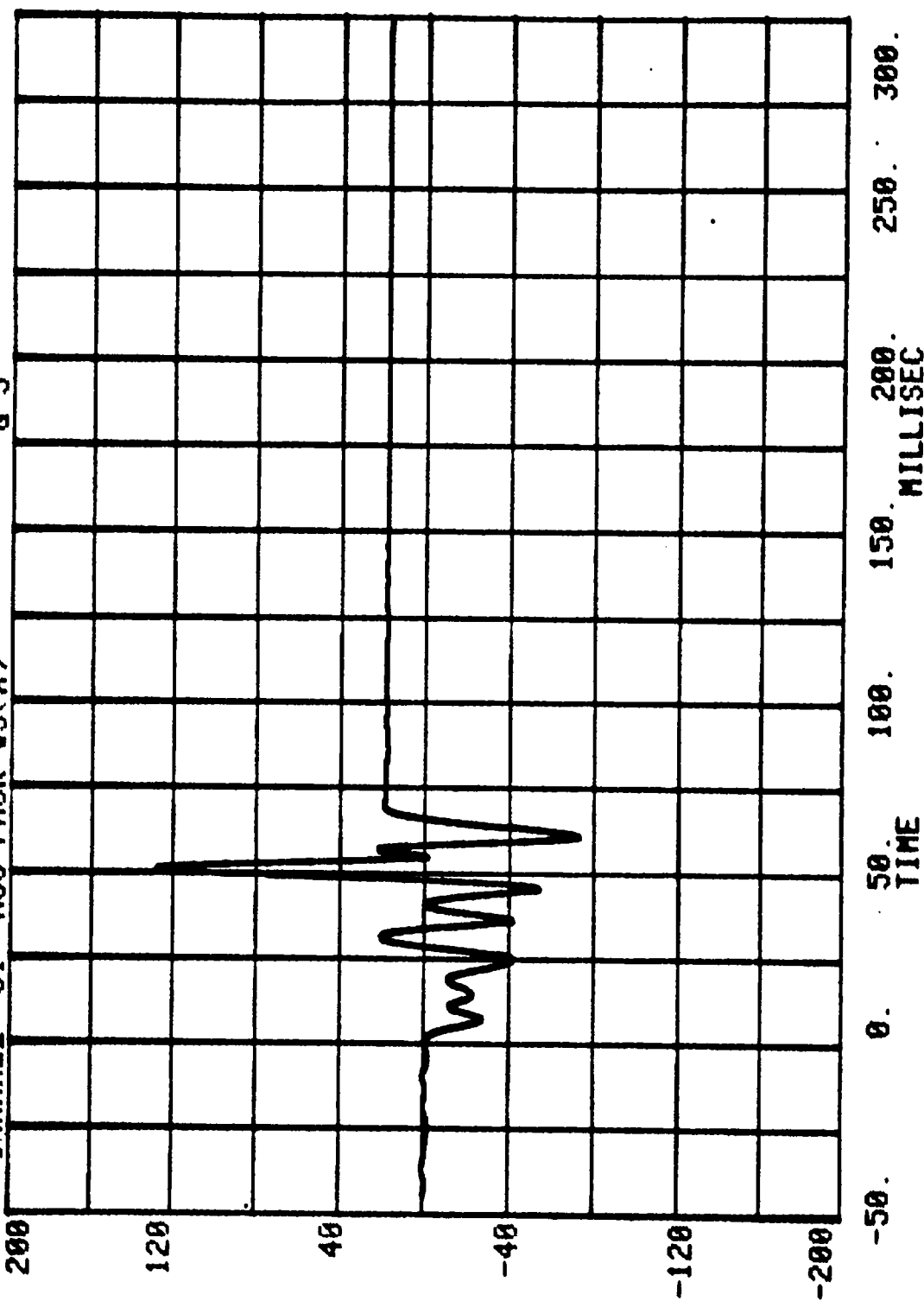


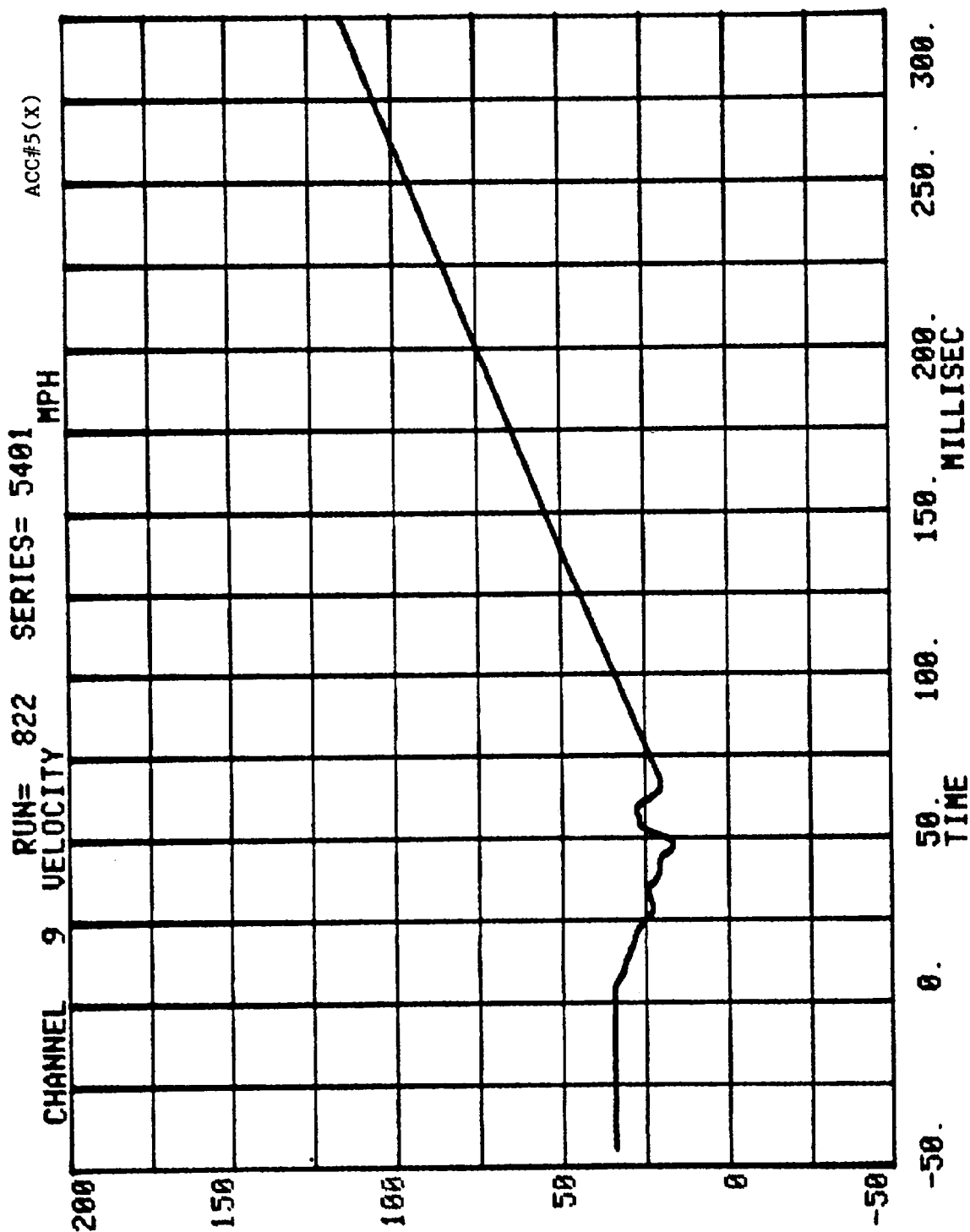
CHANNEL 7 VELOCITY
RUN= 822 SERIES= 5401 MPH
ACC#4 (X)



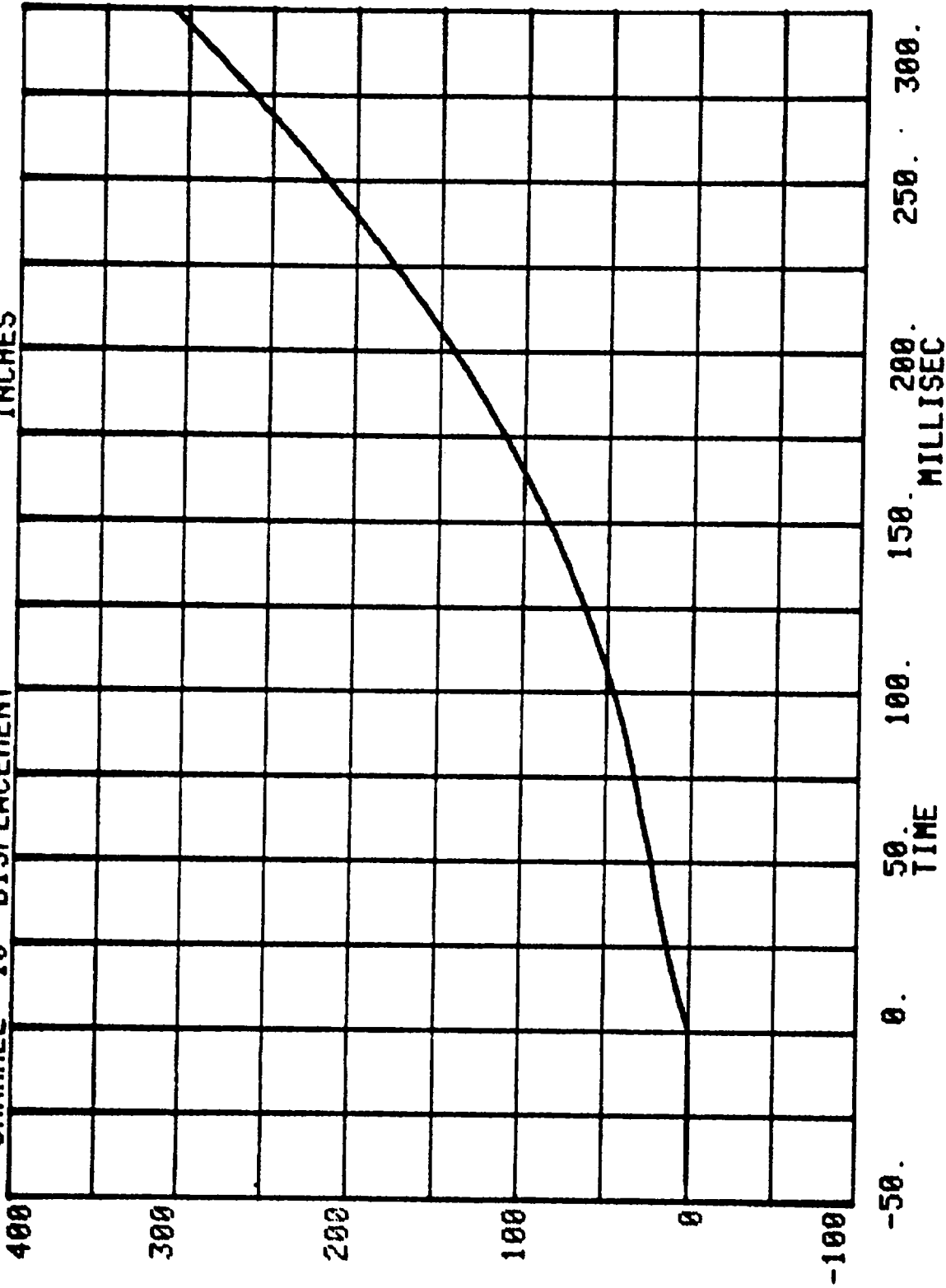


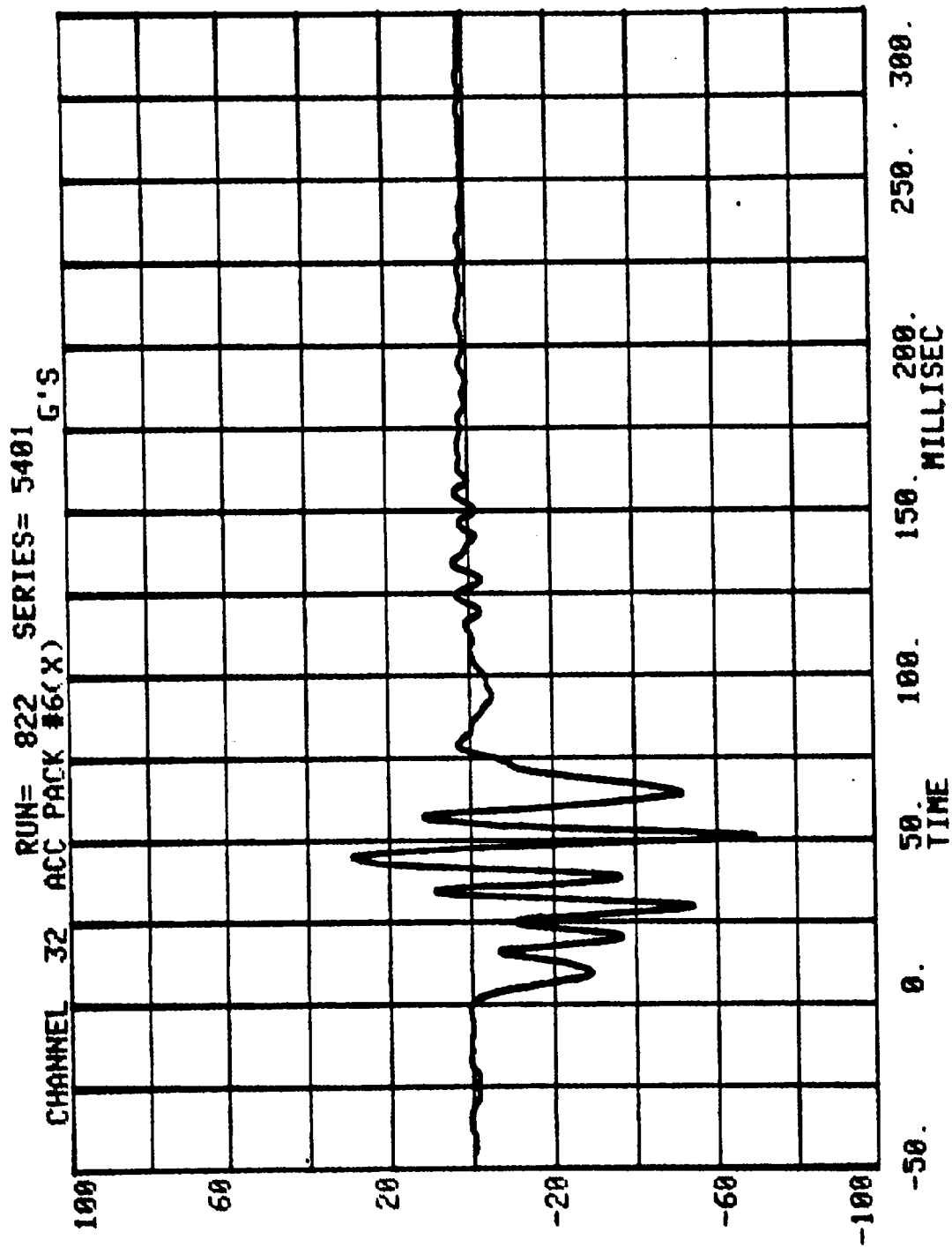
CHANNEL 31 ACC PACK #5(X) RUN= 822 SERIES= 5401 G'S

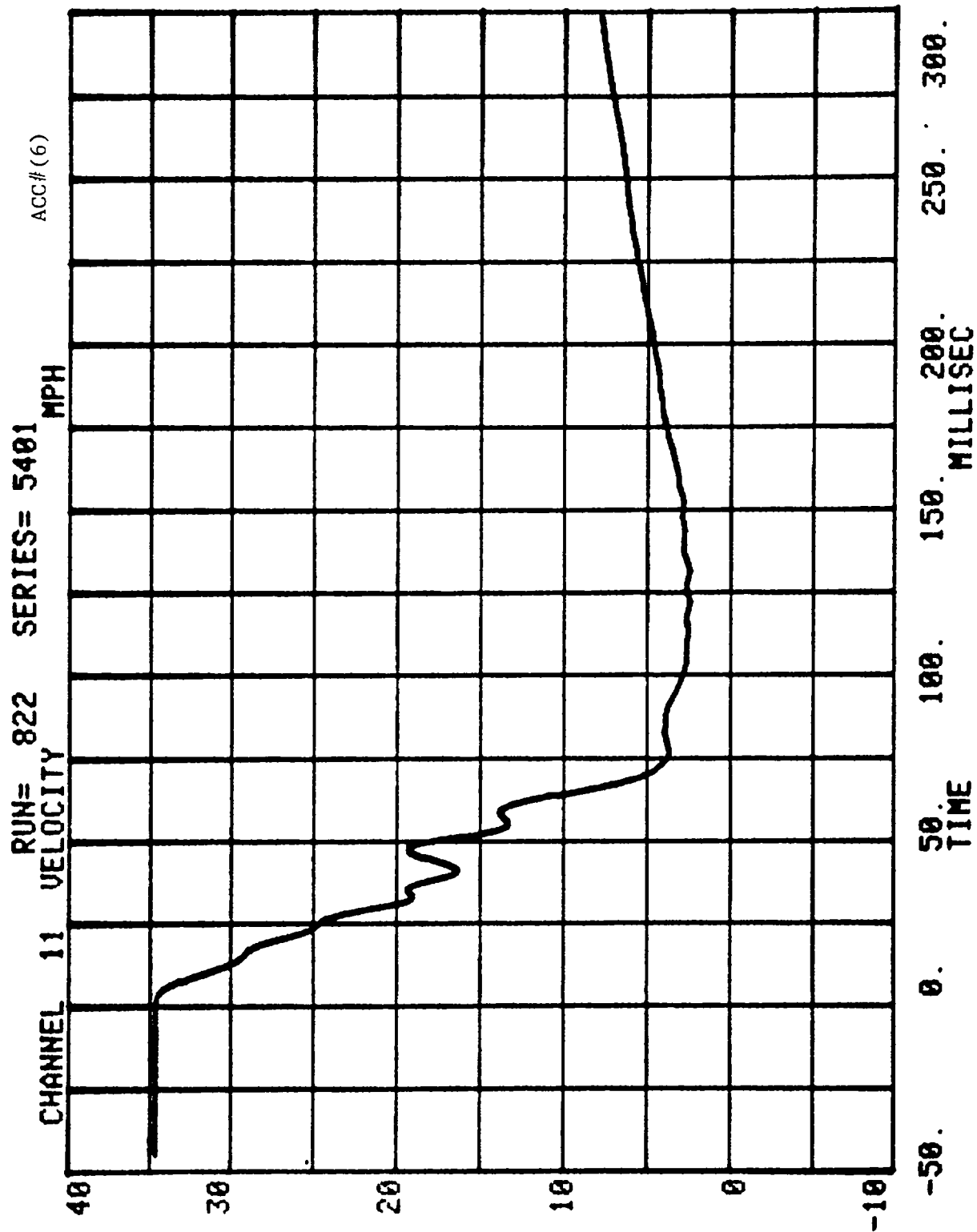


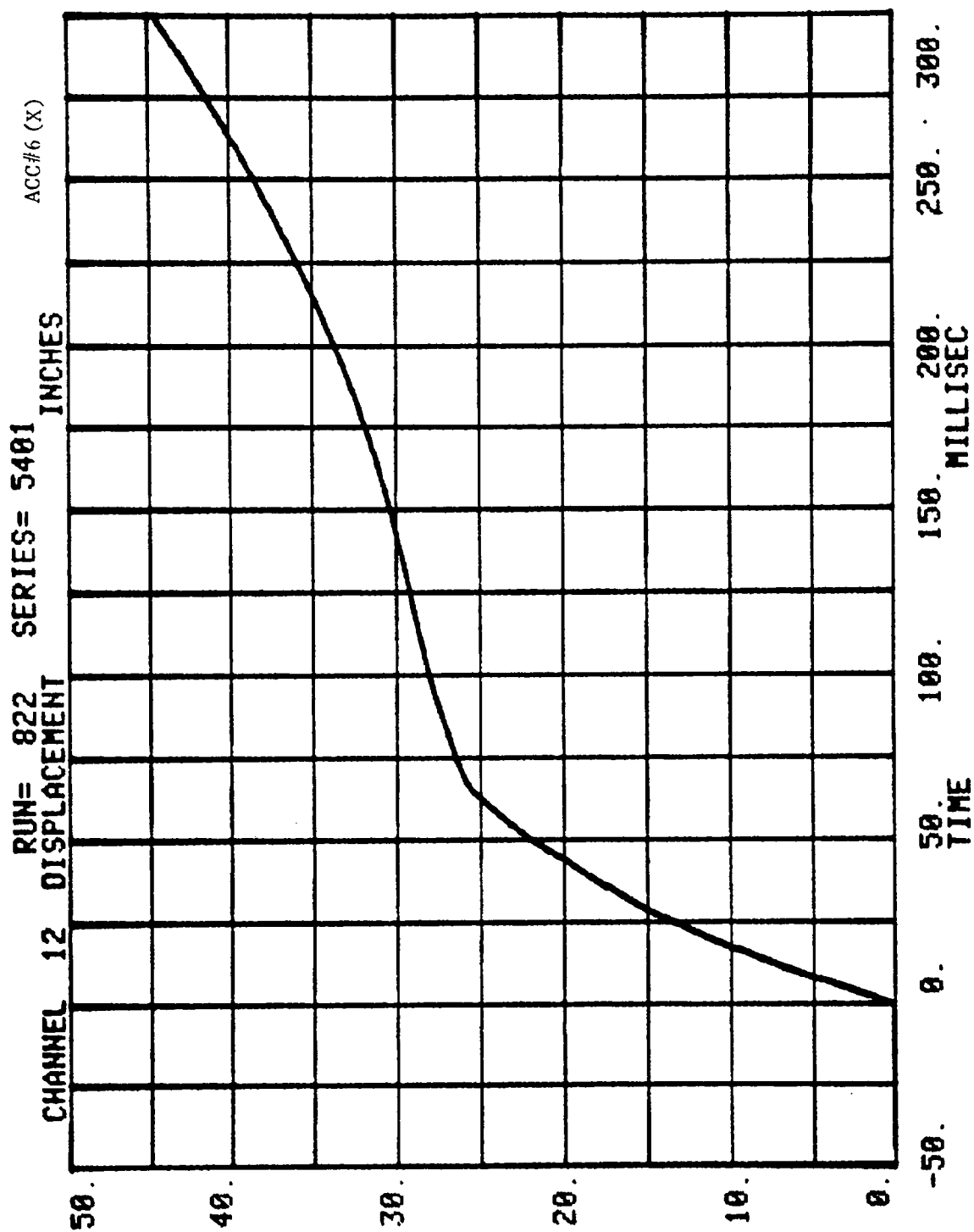


RUN= 822 SERIES= 5401
 CHANNEL 10 DISPLACEMENT INCHES ACC#5(X)

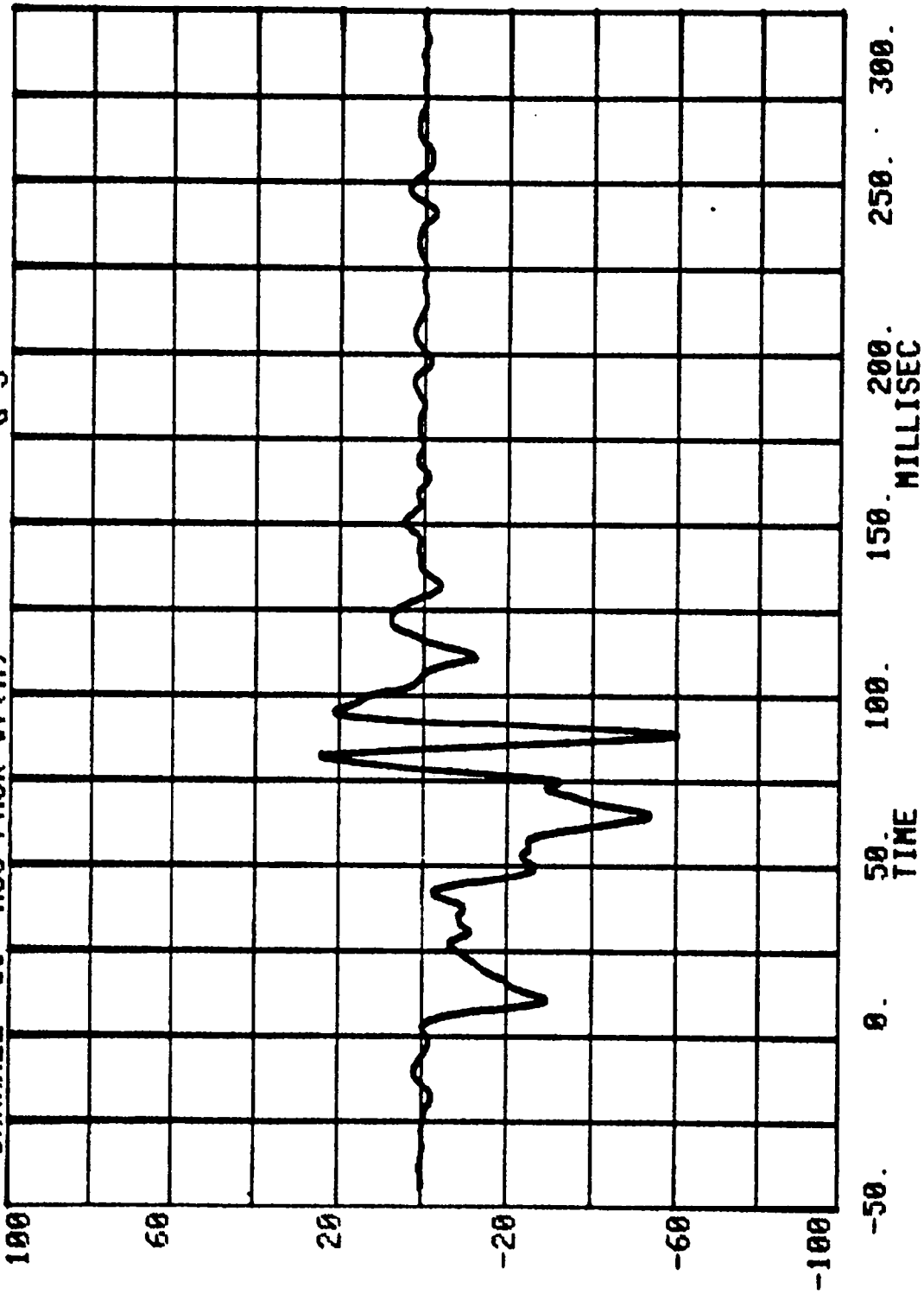


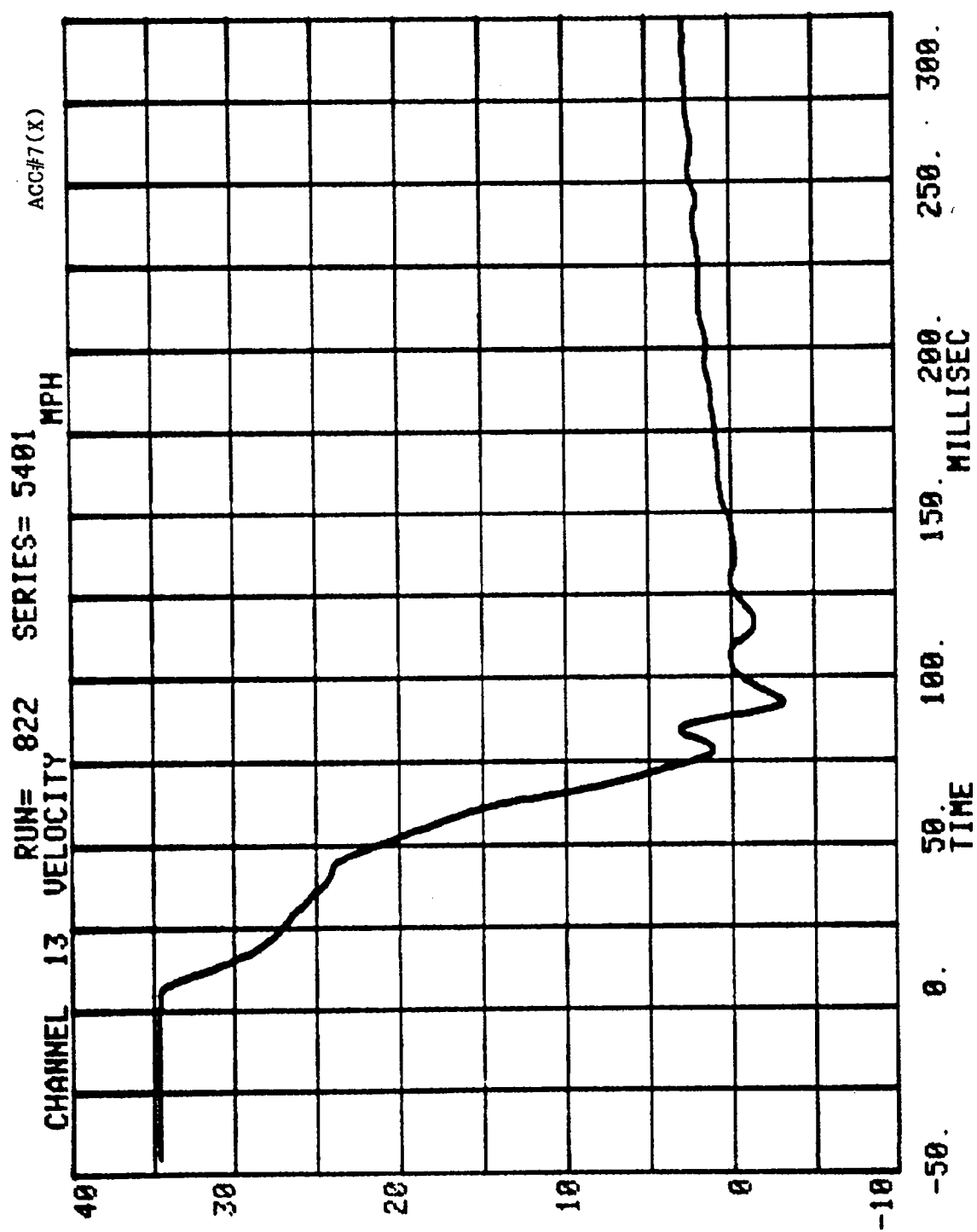




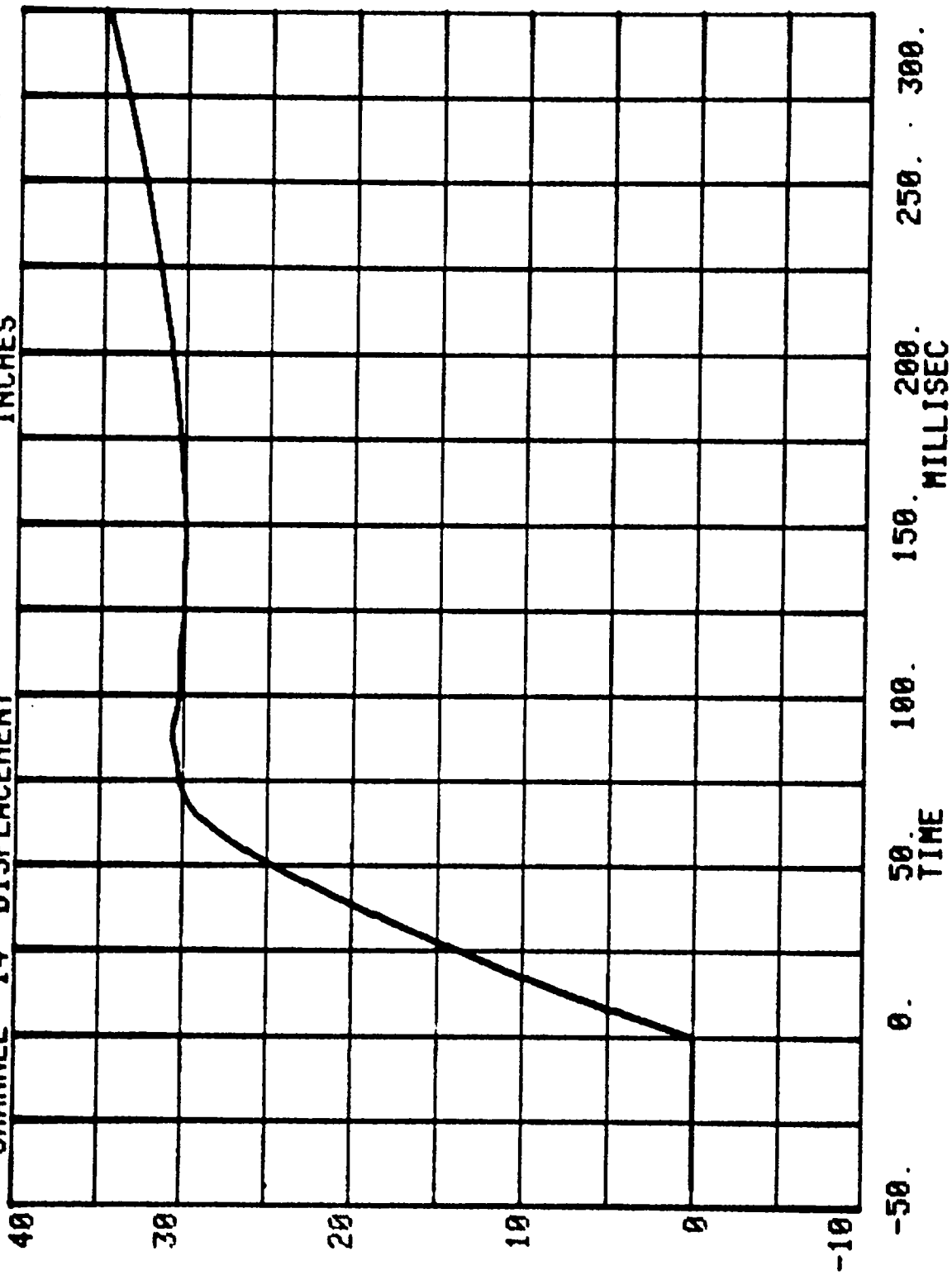


RUN= 822 SERIES= 5401
CHANNEL 33 ACC PACK #7(X) G'S





CHANNEL 14 DISPLACEMENT RUN= 822 SERIES= 5401 ACC#7(X)



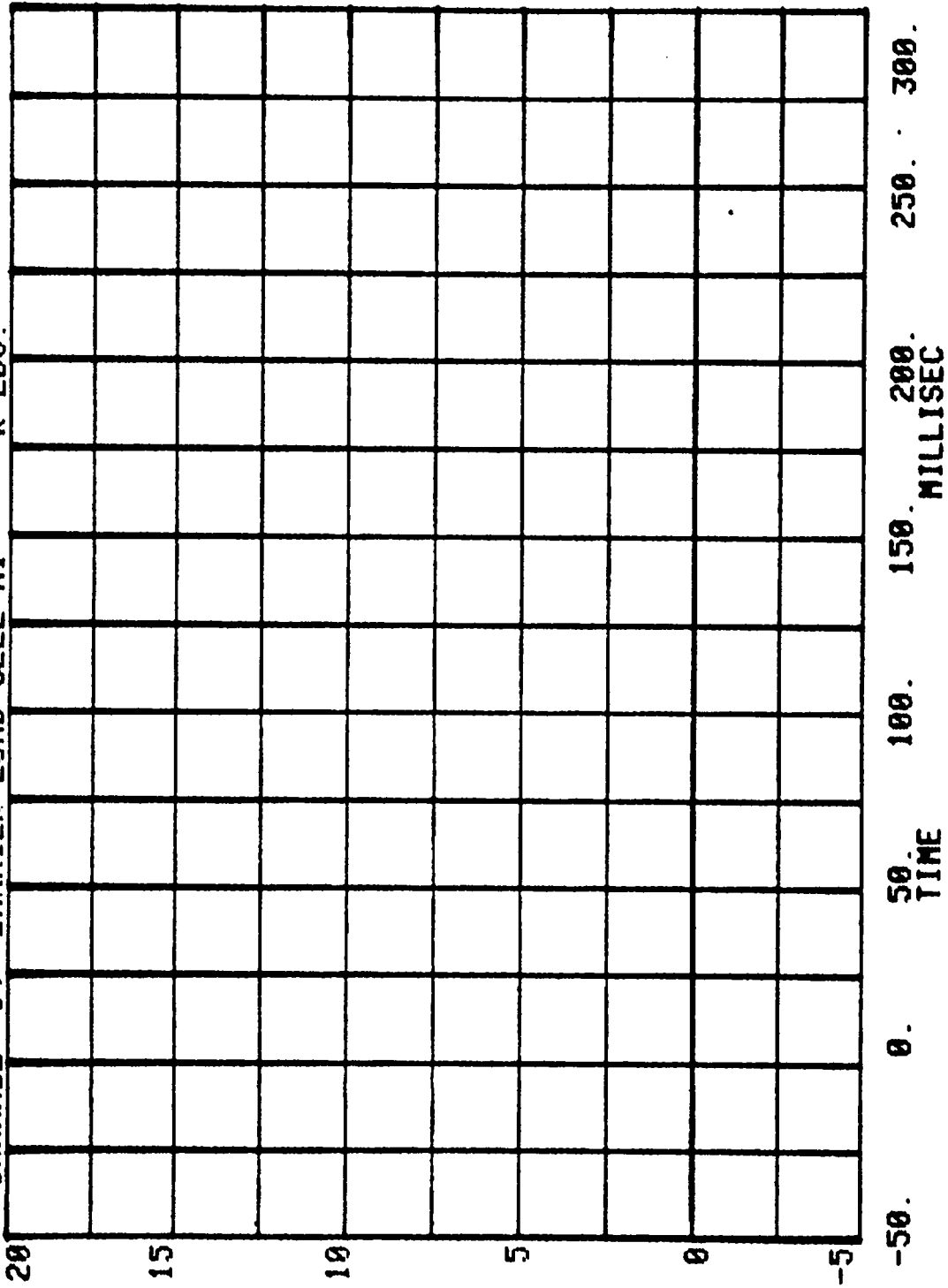
TEST NO. MJ5401

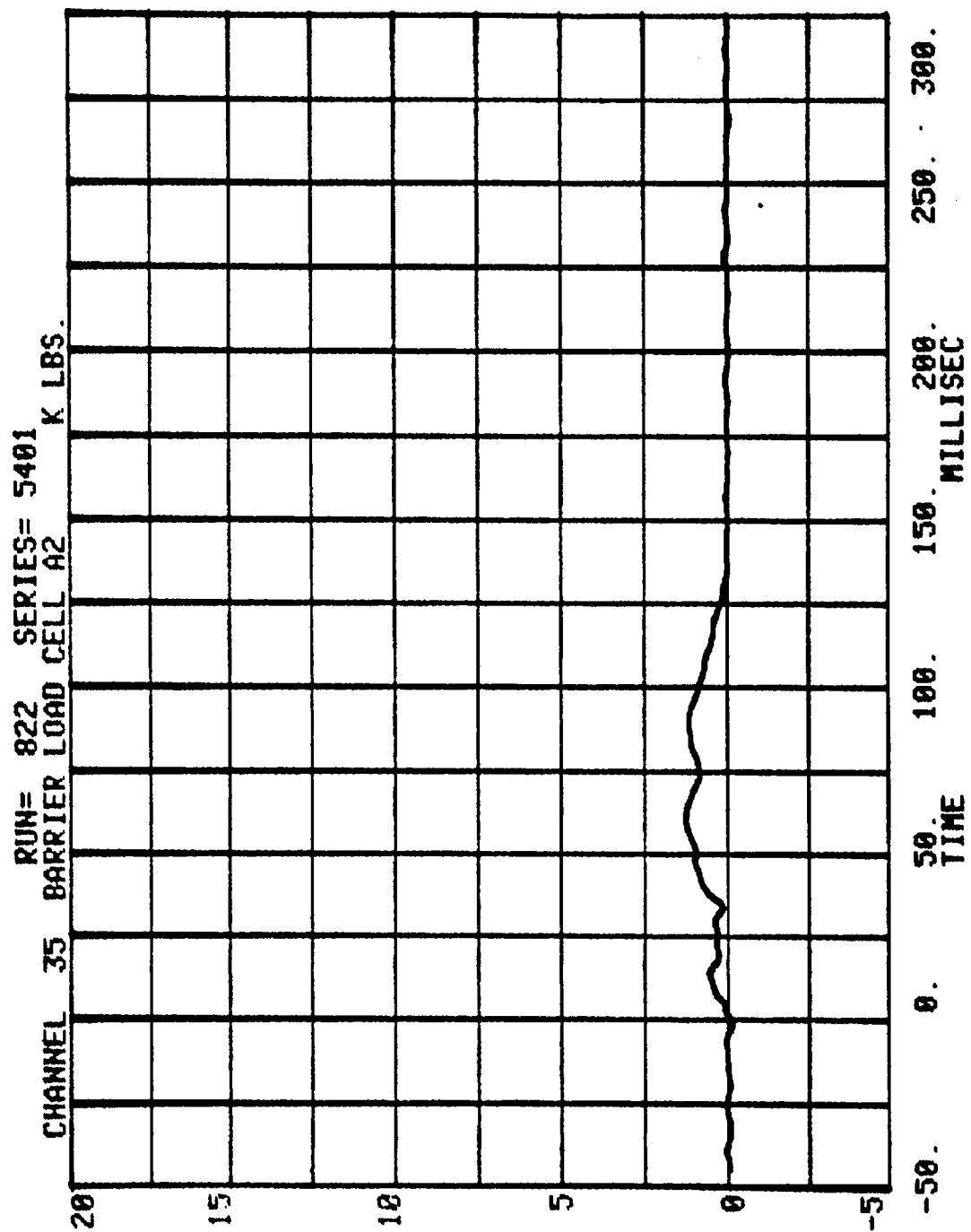
LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

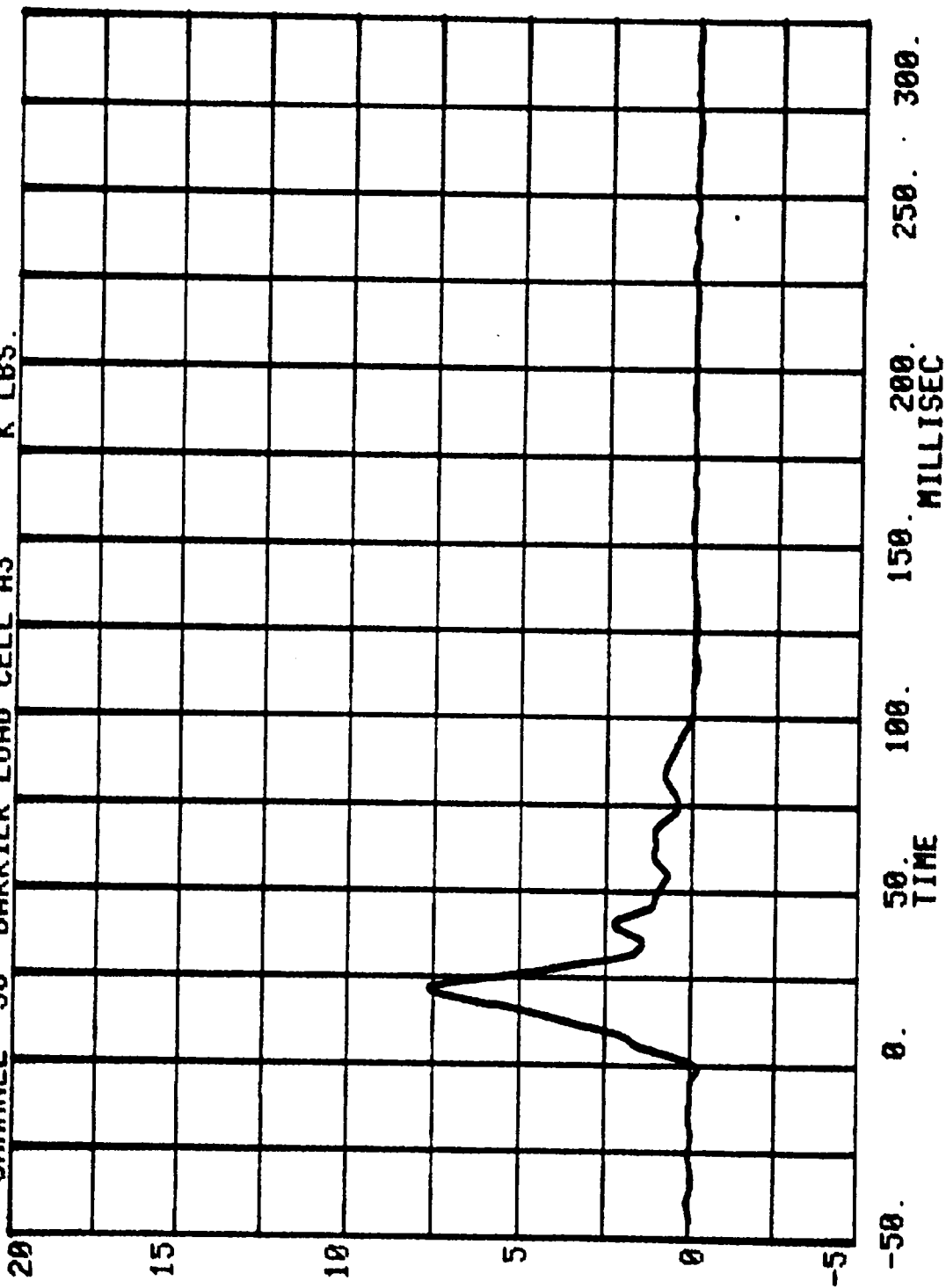
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CHANNEL 34 BARRIER LOAD CELL A1 RUN= 822 SERIES= 5401 K LBS.



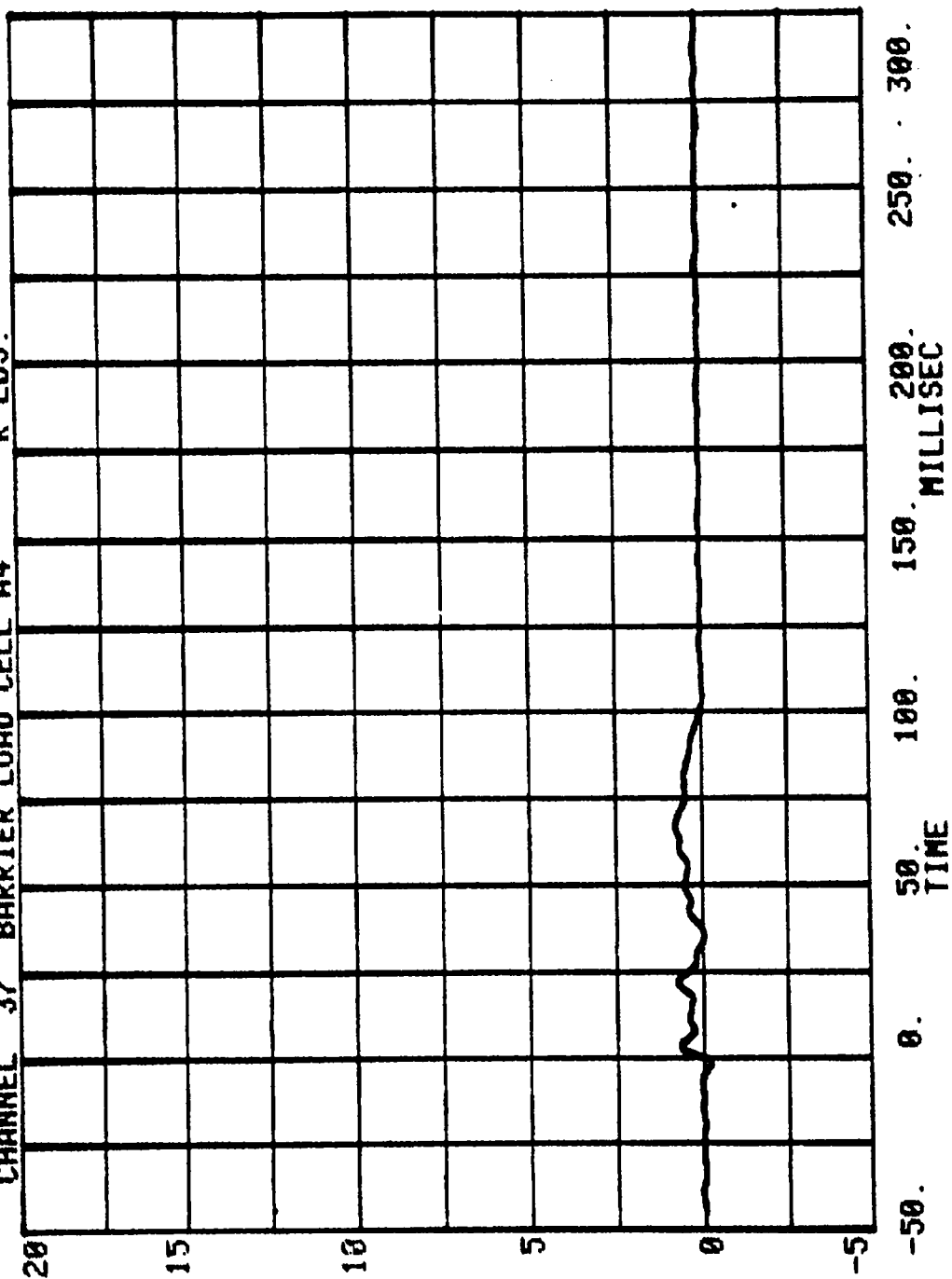


RUN= 822 SERIES= 5401
CHANNEL 36 BARRIER LOAD CELL A3 K LBS.

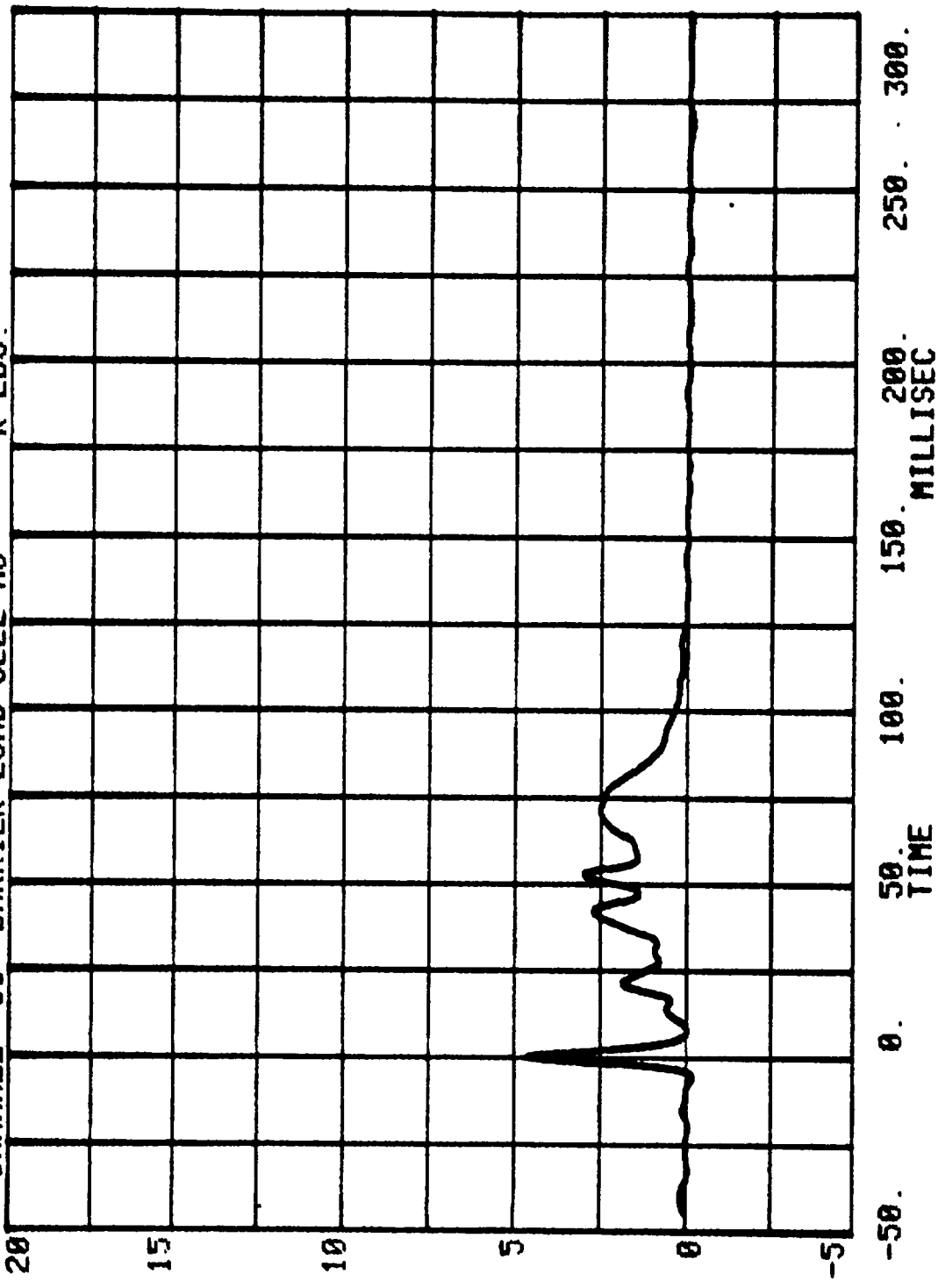


CHANNEL 37 BARRIER LOAD CELL A4 K LBS.

RUN= 822 SERIES= 5401

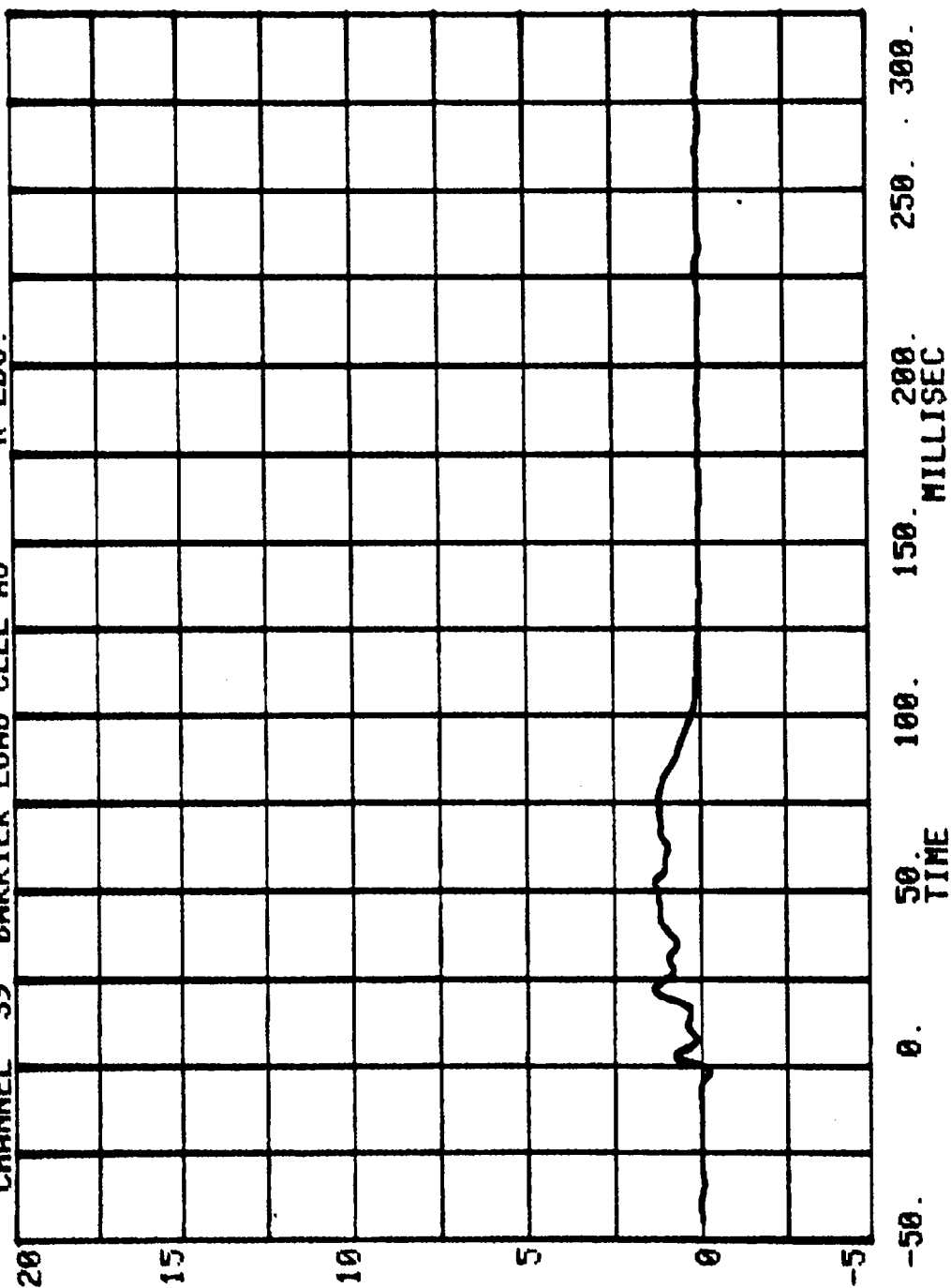


RUN= 822 SERIES= 5401
CHANNEL 38 BARRIER LOAD CELL A5 K LBS.

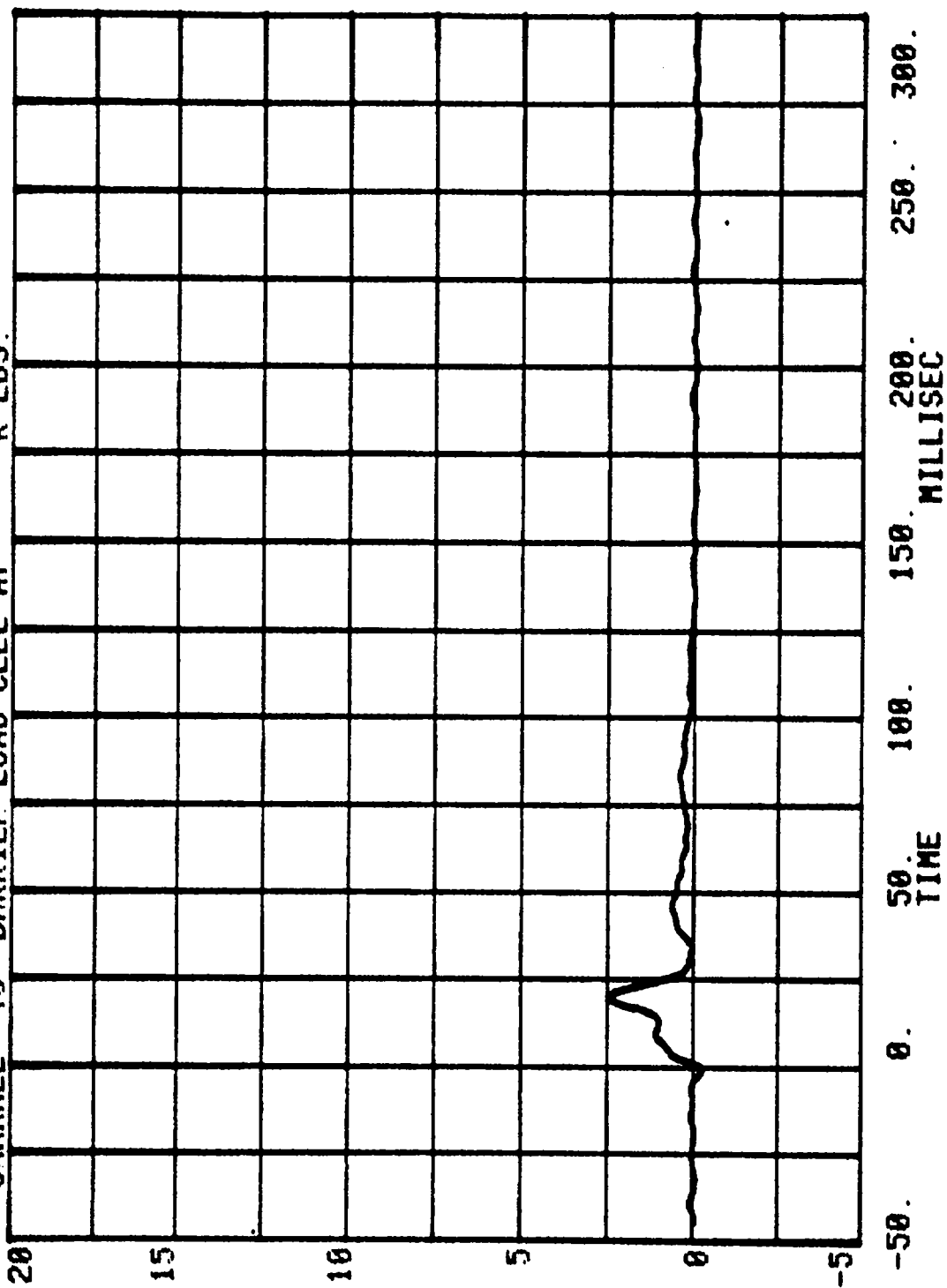


CHANNEL 39 BARRIER LOAD CELL A6 K LBS.

RUN= 822 SERIES= 5401

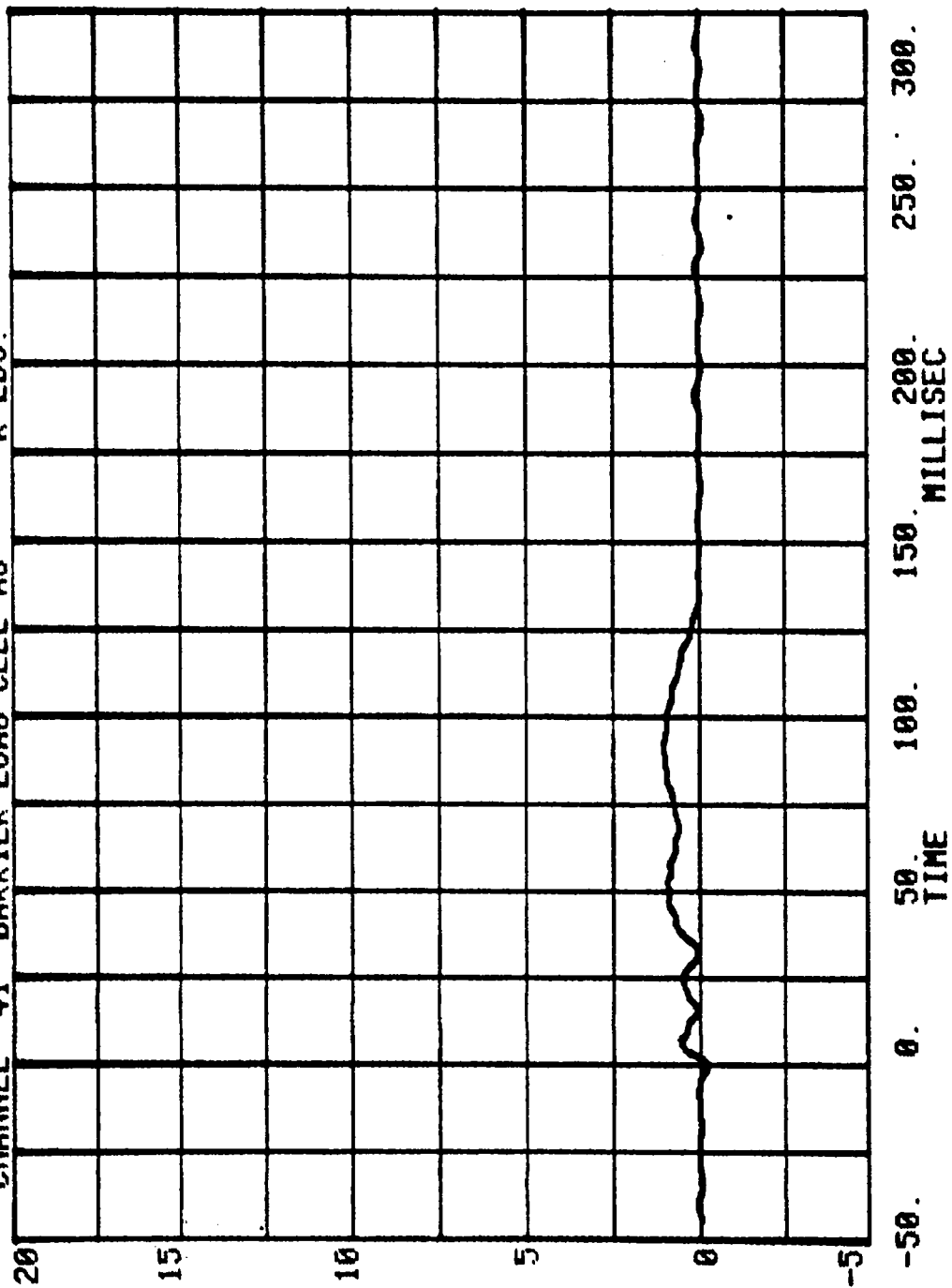


RUN= 822 SERIES= 5401
CHANNEL 40 BARRIER LOAD CELL A7 K LBS.

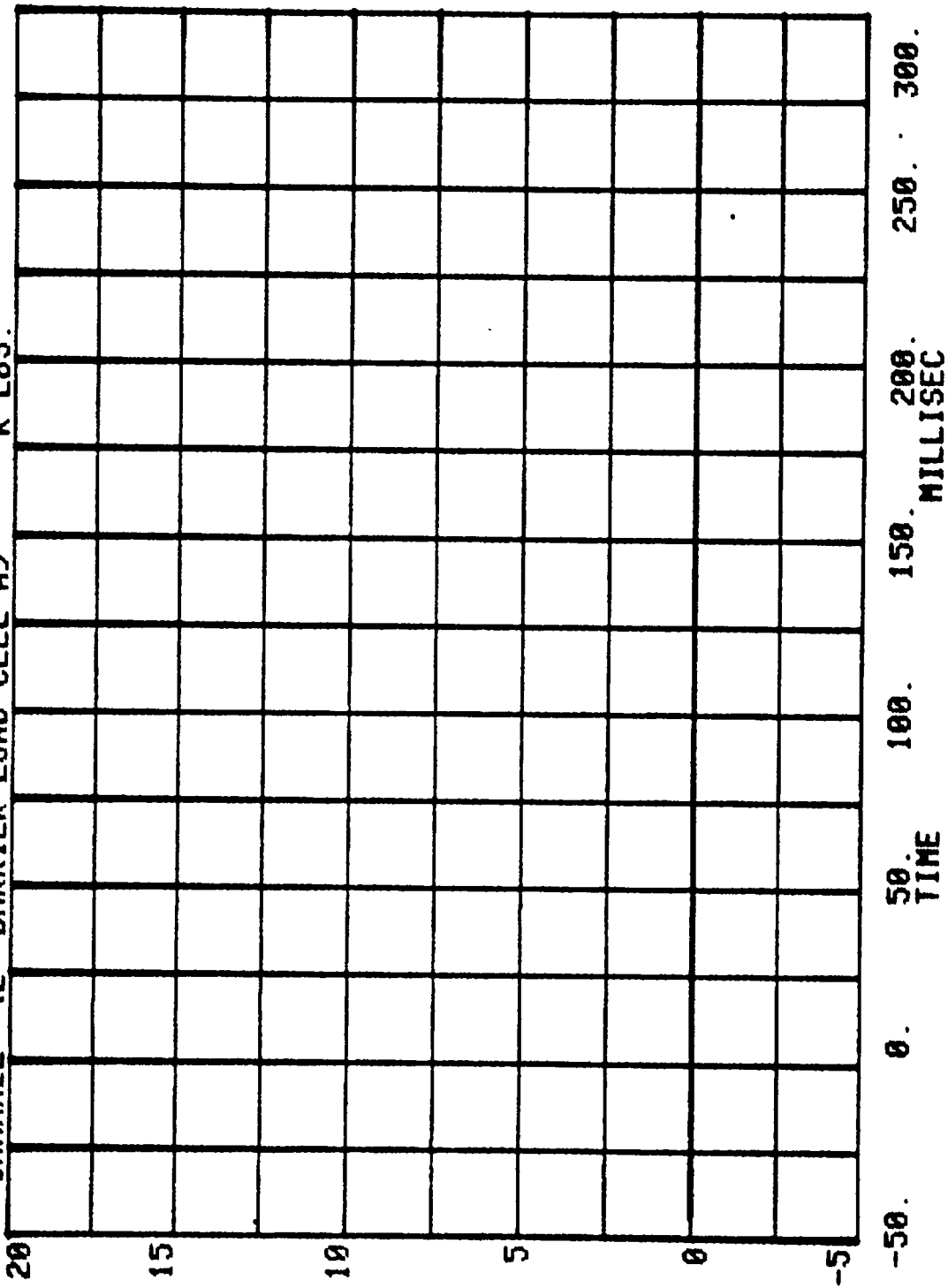


CHANNEL 41 BARRIER LOAD CELL A8 K LBS.

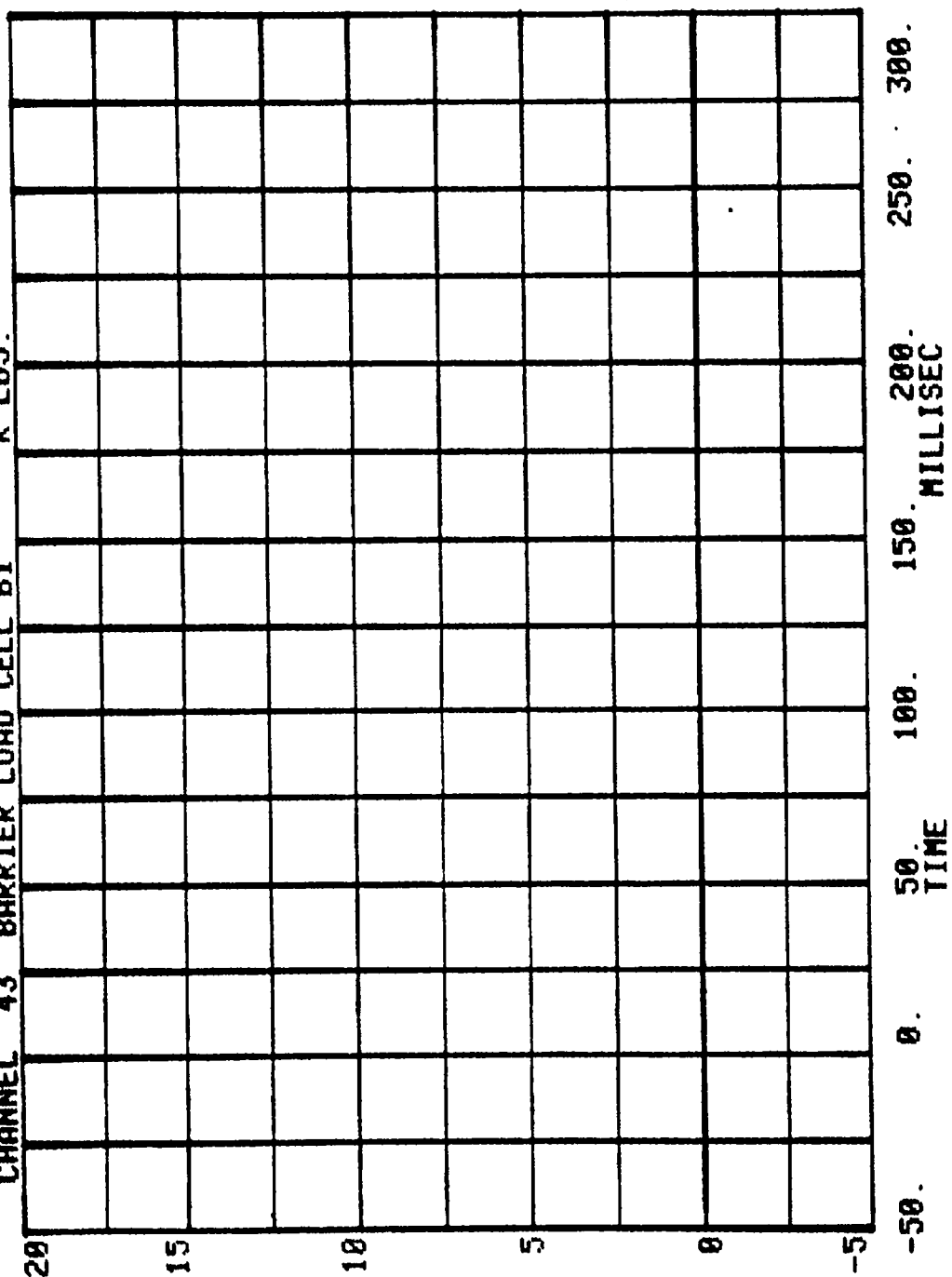
RUN= 822 SERIES= 5401



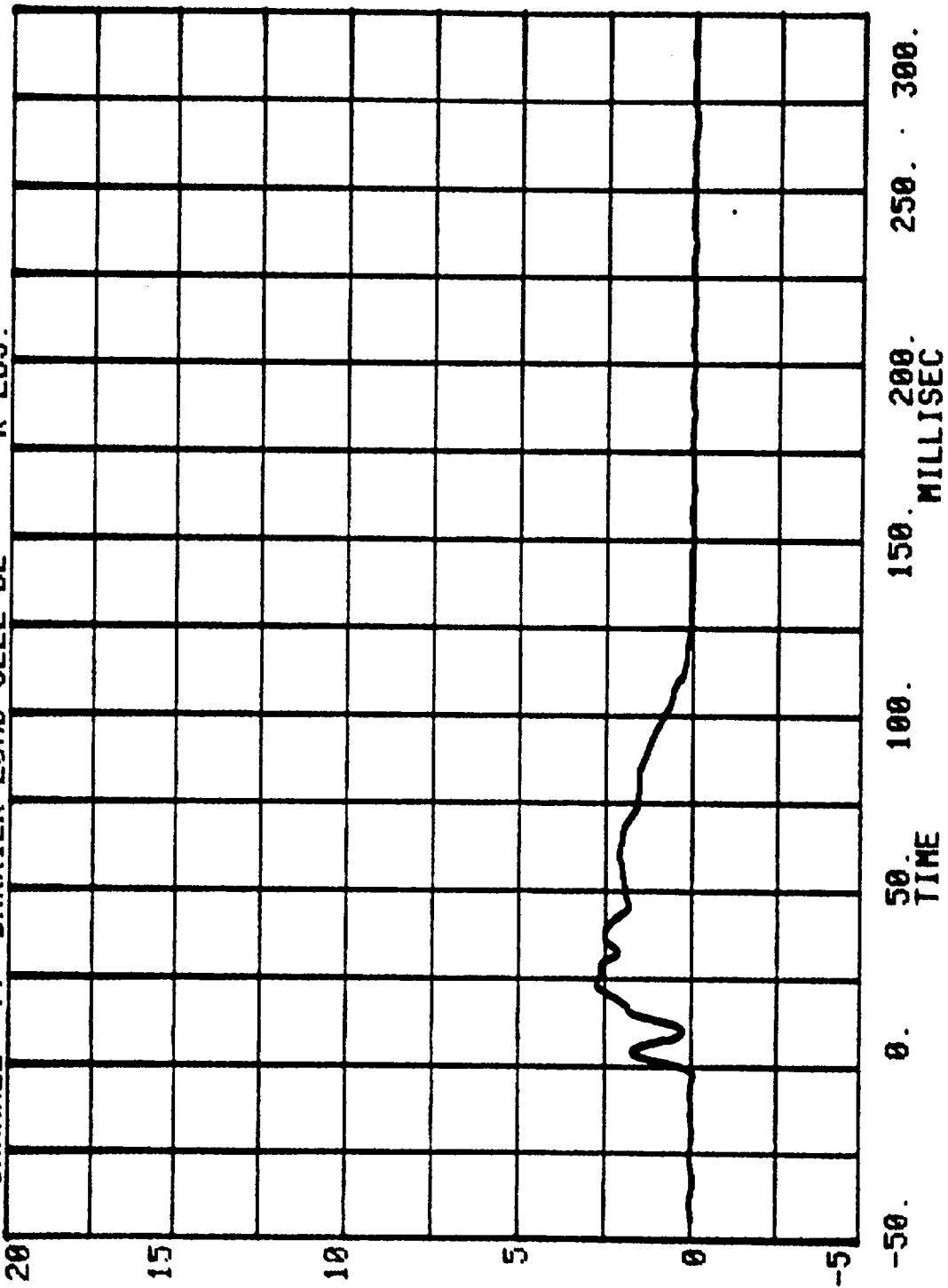
CHANNEL 42 BARRIER LOAD CELL A9 RUN= 822 SERIES= 5401 K LBS.



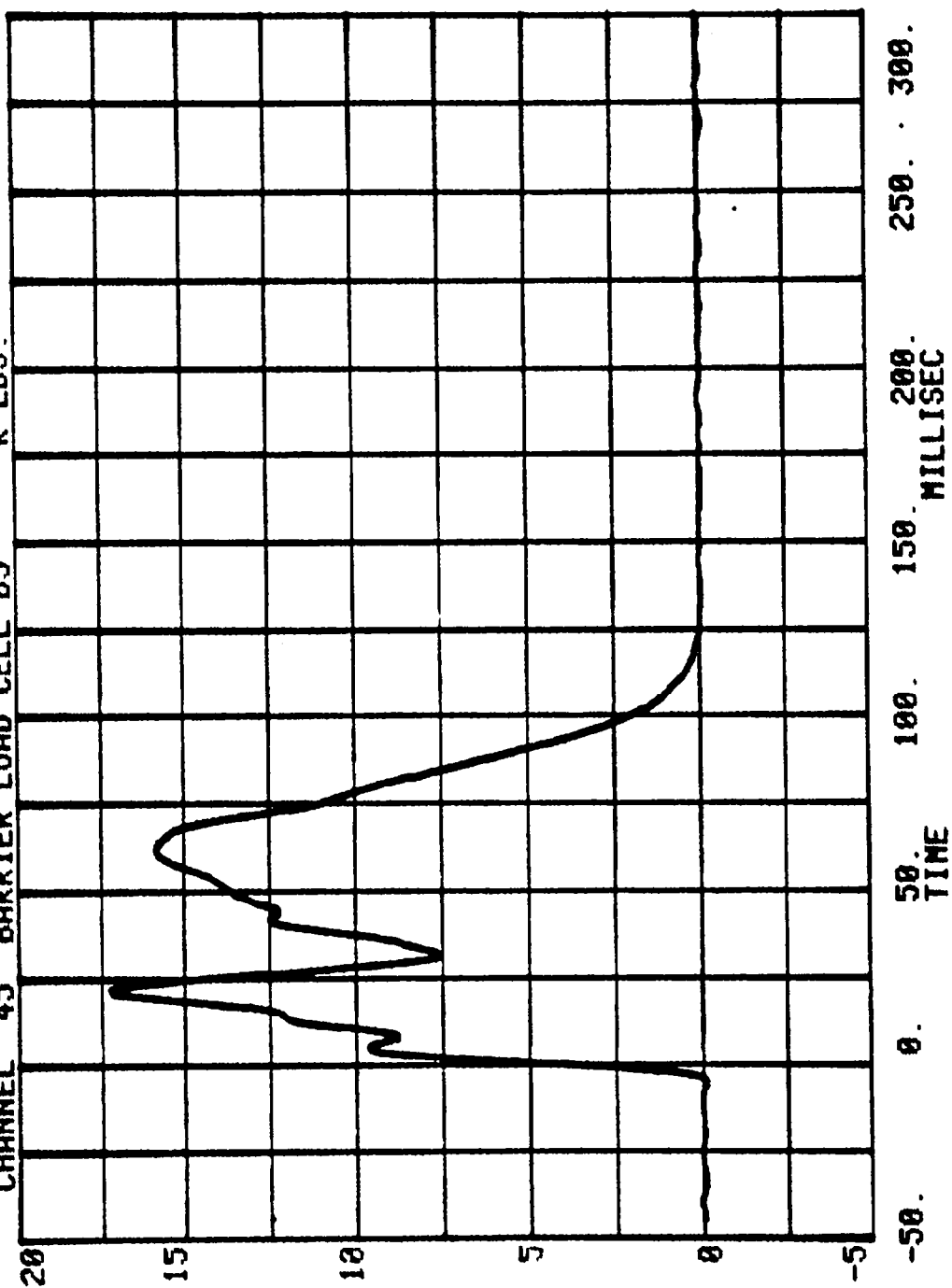
CHANNEL 43 RUN= 822 SERIES= 5401
BARRIER LOAD CELL B1 K LBS.



CHANNEL 44 RUN= 822 SERIES= 5401
BARRIER LOAD CELL B2 K LBS.

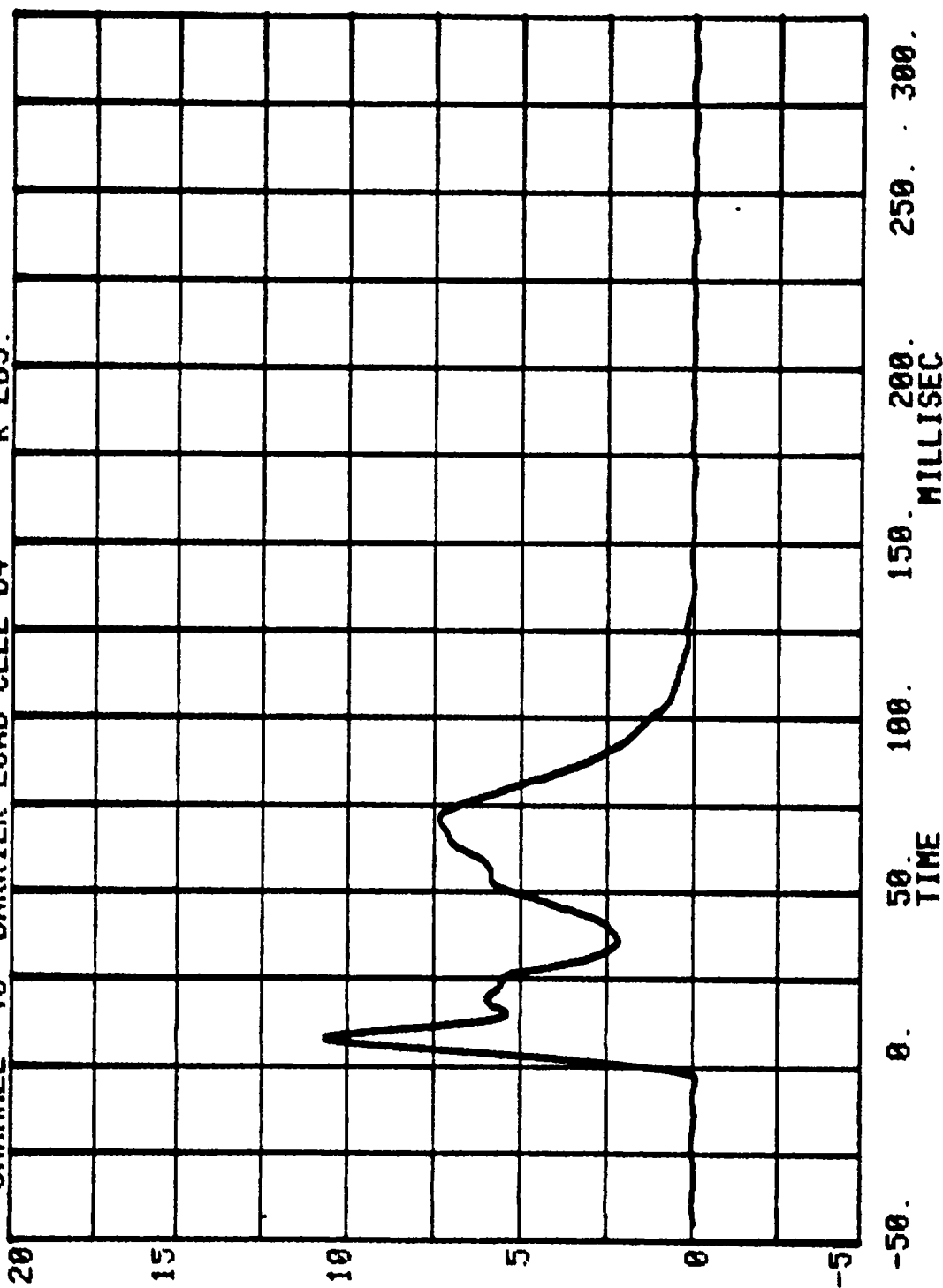


RUN= 822 SERIES= 5401
CHANNEL 45 BARRIER LOAD CELL B3 K LBS.



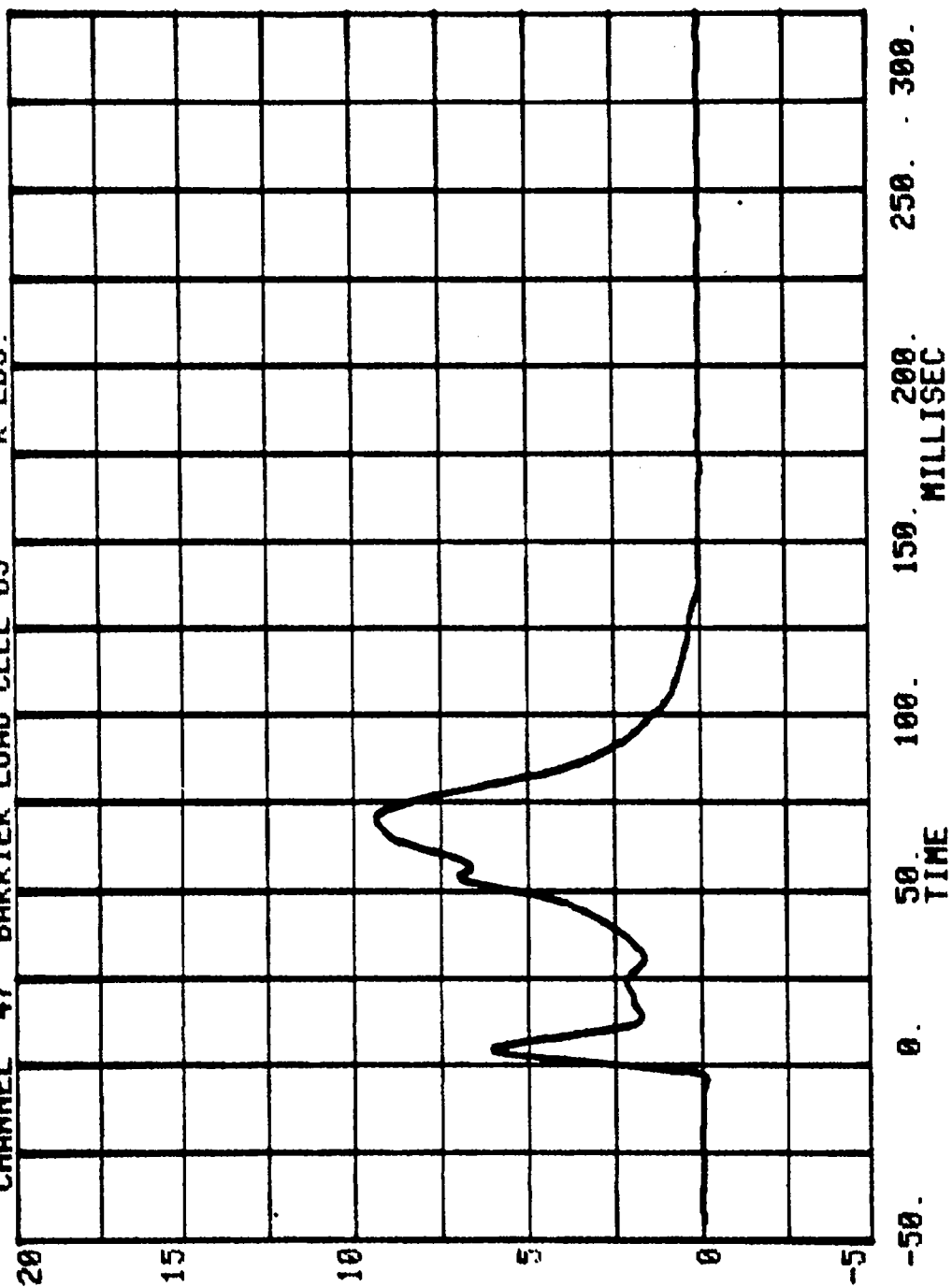
CHANNEL 46 BARRIER LOAD CELL B4 K LBS.

RUN= 822 SERIES= 5401

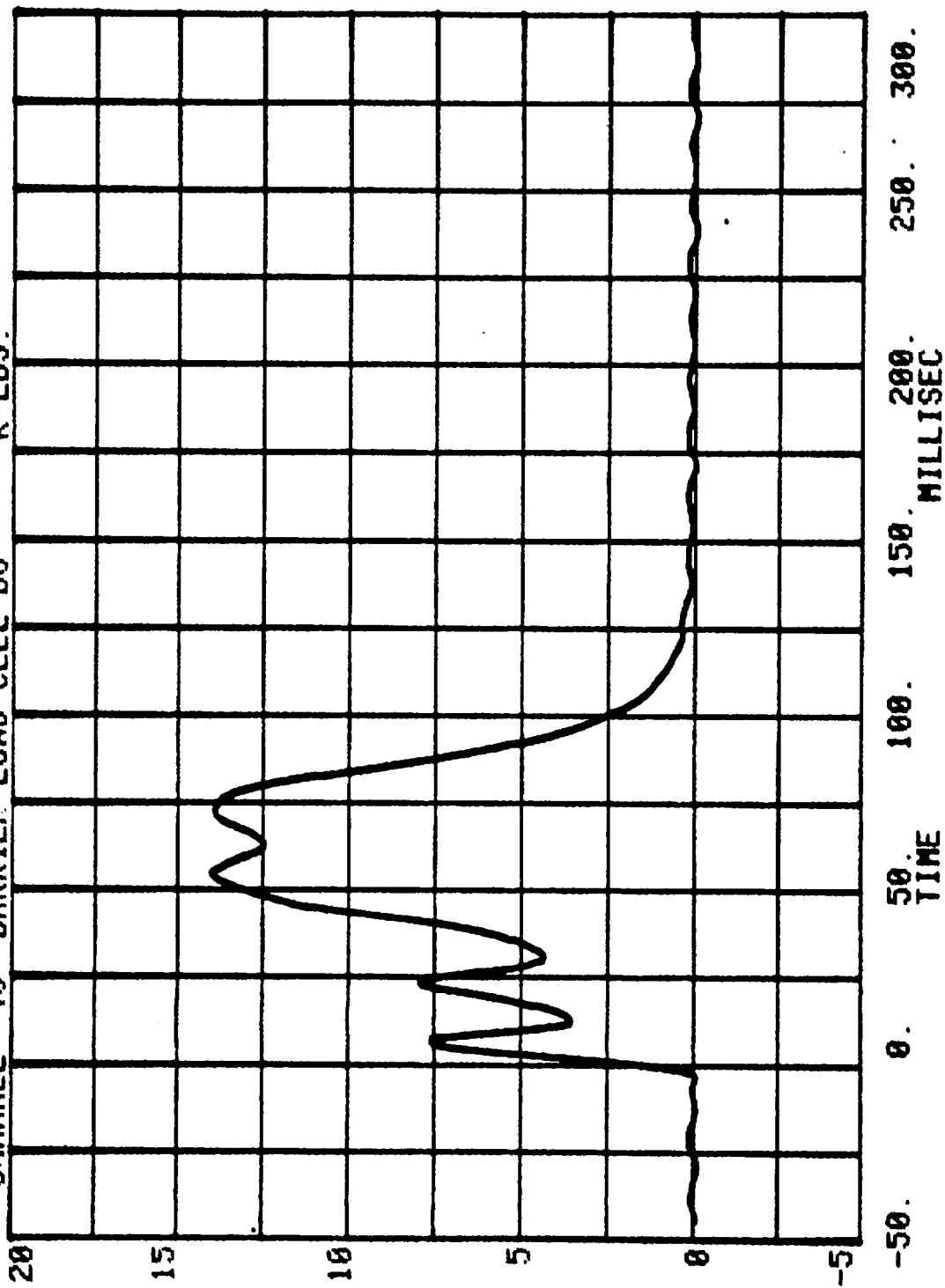


CHANNEL 47 BARRIER LOAD CELL B5 K LBS.

RUN= 822 SERIES= 5401

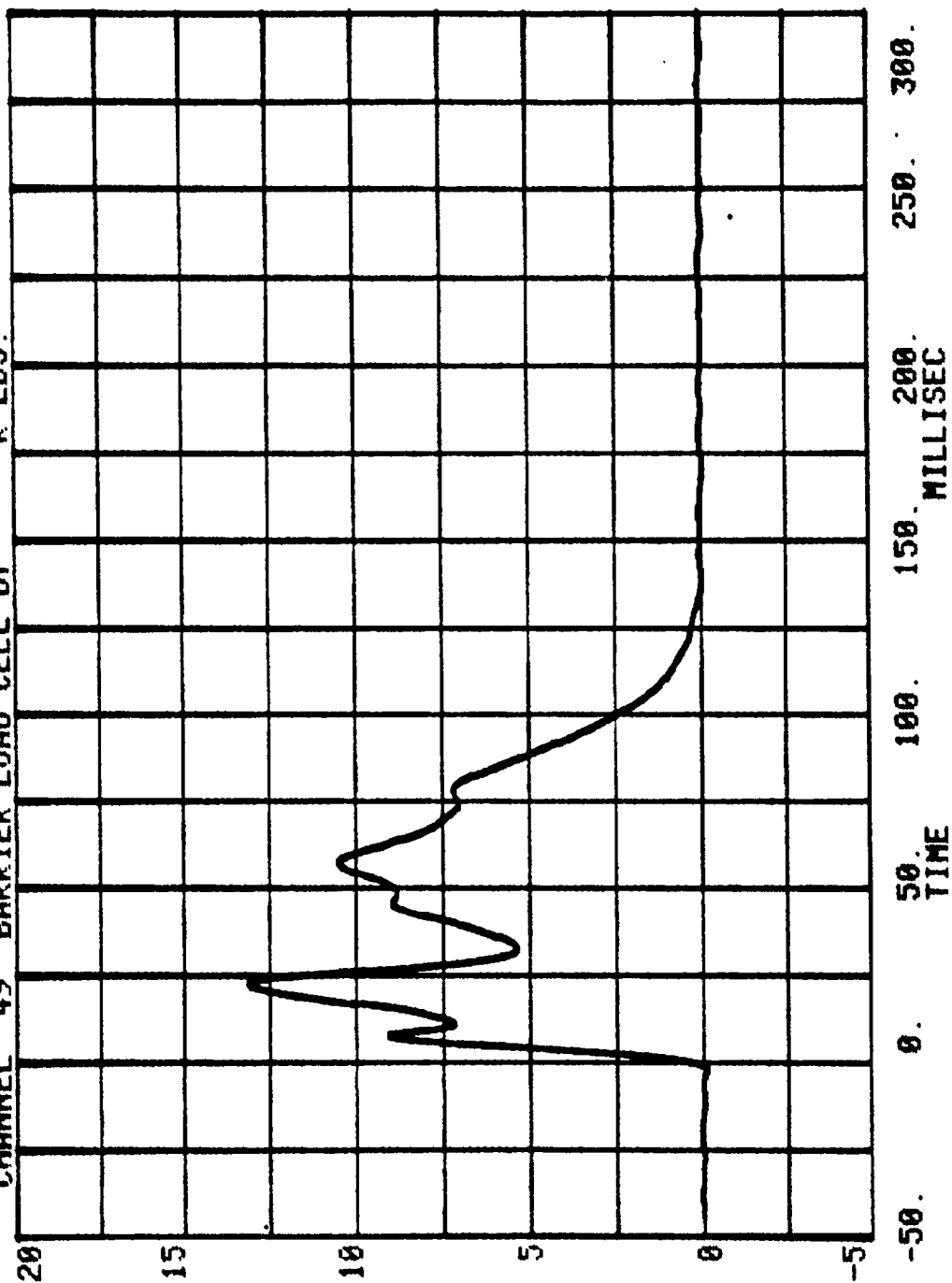


RUN= 822 SERIES= 5401
CHANNEL 48 BARRIER LOAD CELL B6 K LBS.

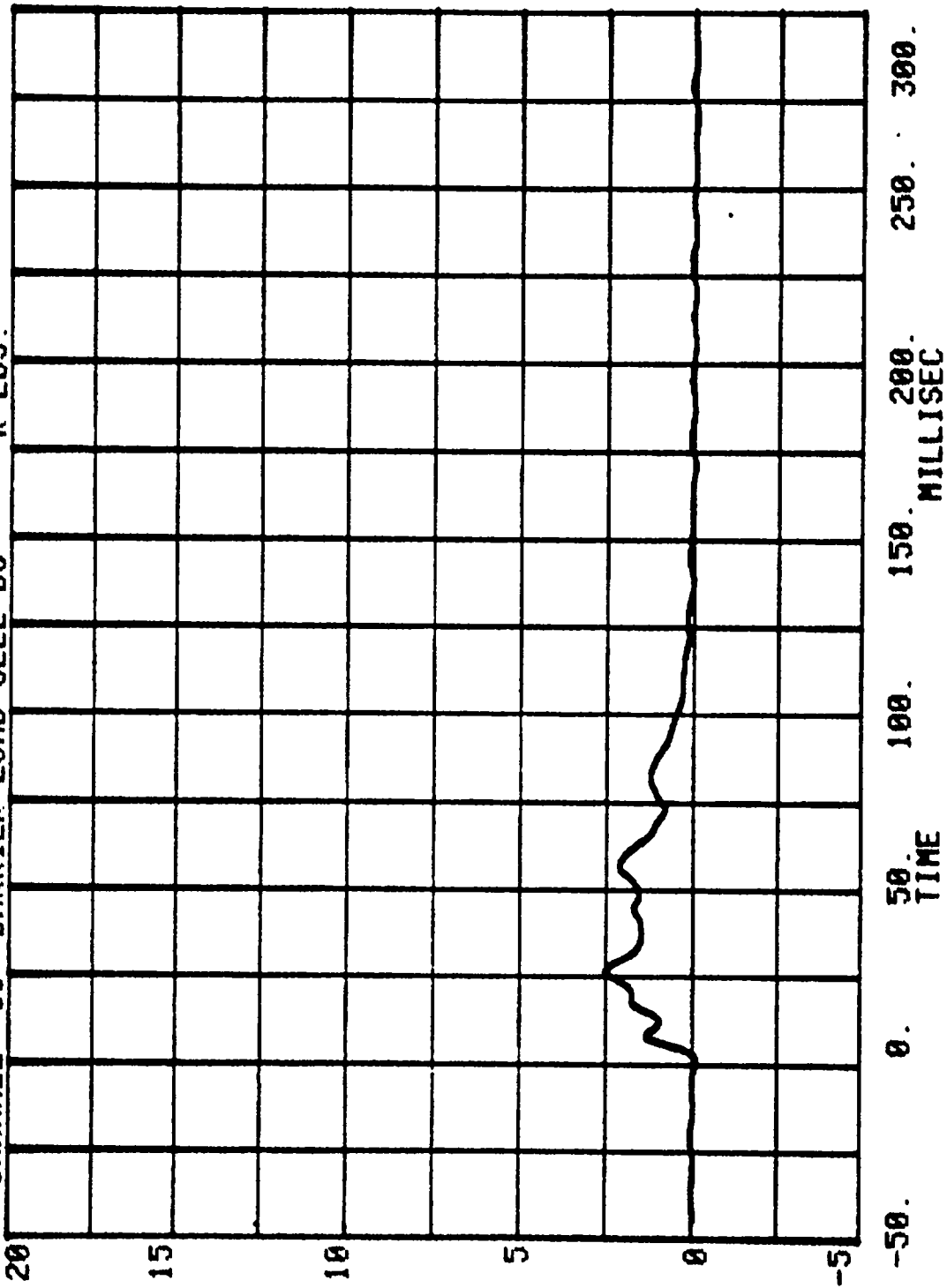


CHANNEL 49 BARRIER LOAD CELL B7 K LBS.

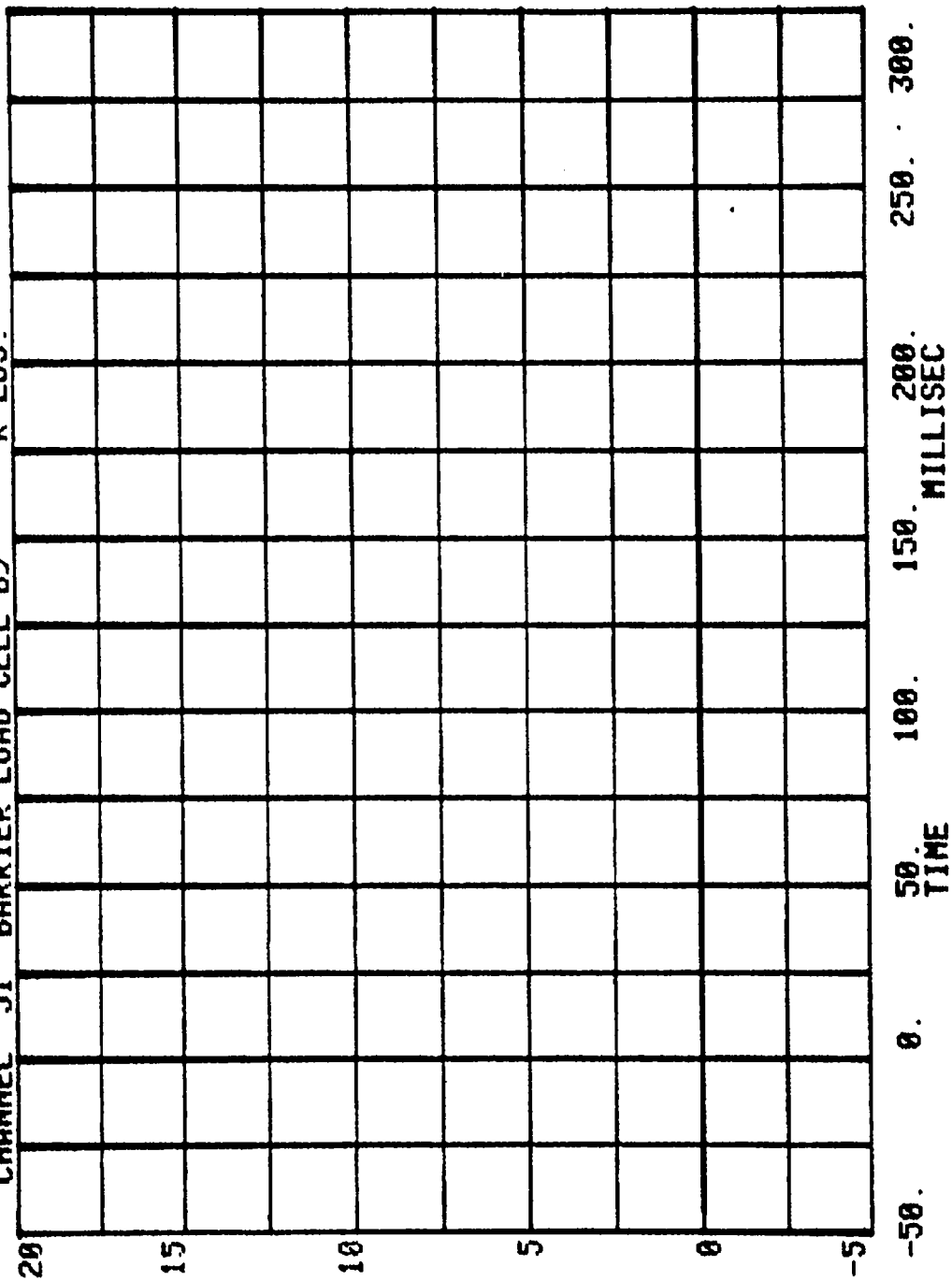
RUN= 822 SERIES= 5401



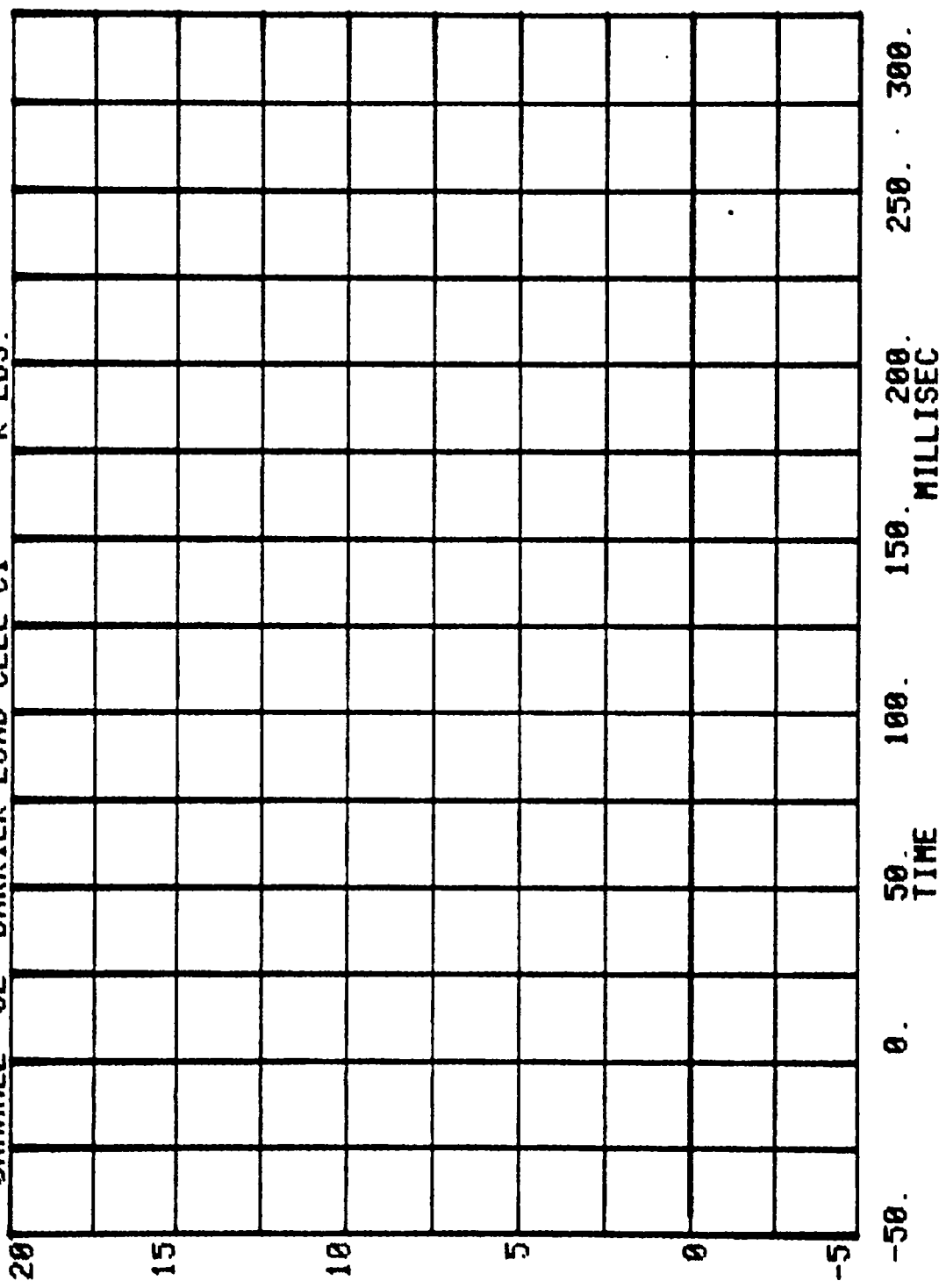
CHANNEL 50 BARRIER LOAD CELL B8 RUN= 822 SERIES= 5401 K LBS.



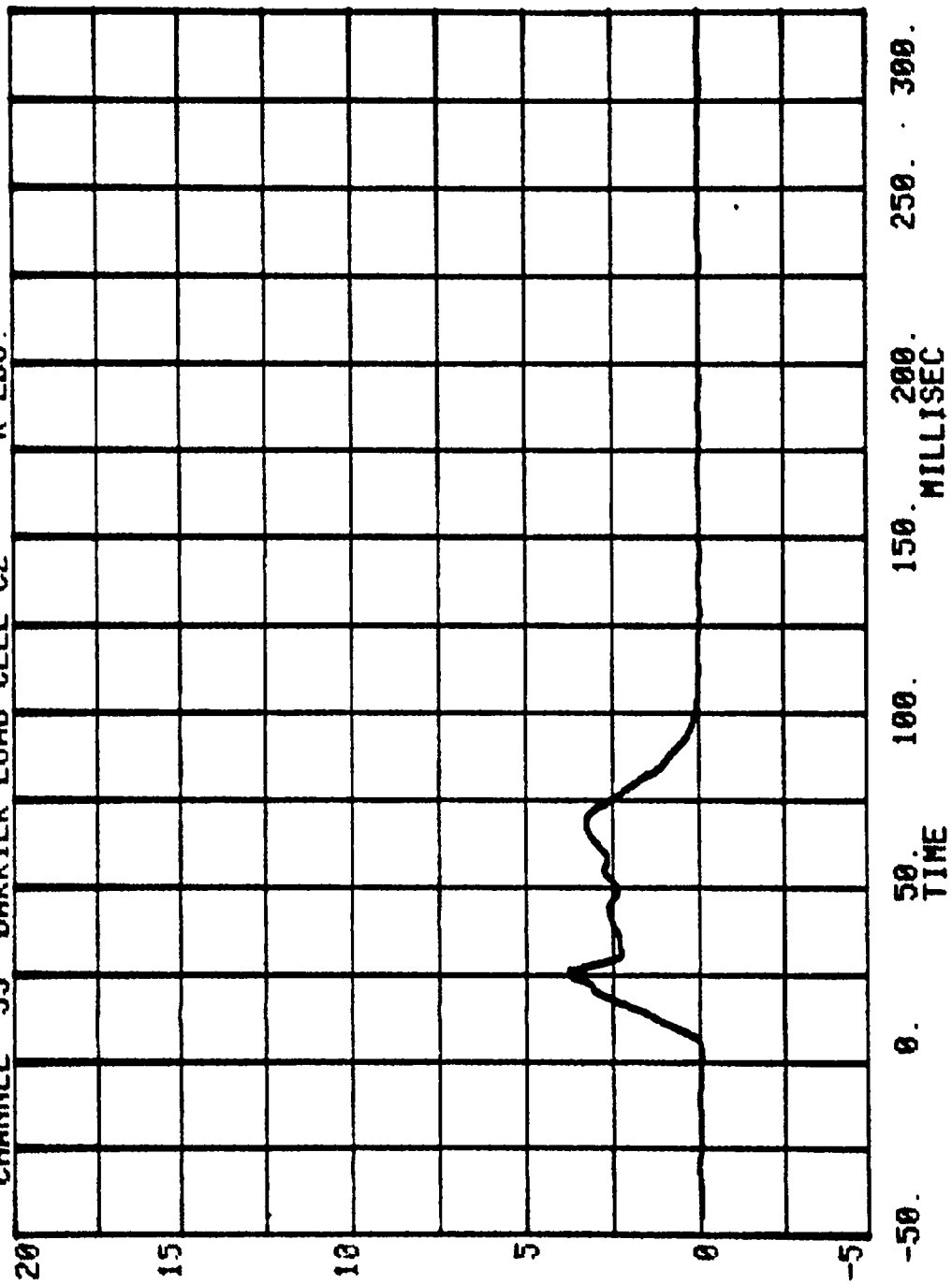
RUN= 822 SERIES= 5401
CHANNEL 51 BARRIER LOAD CELL B9 K LBS.



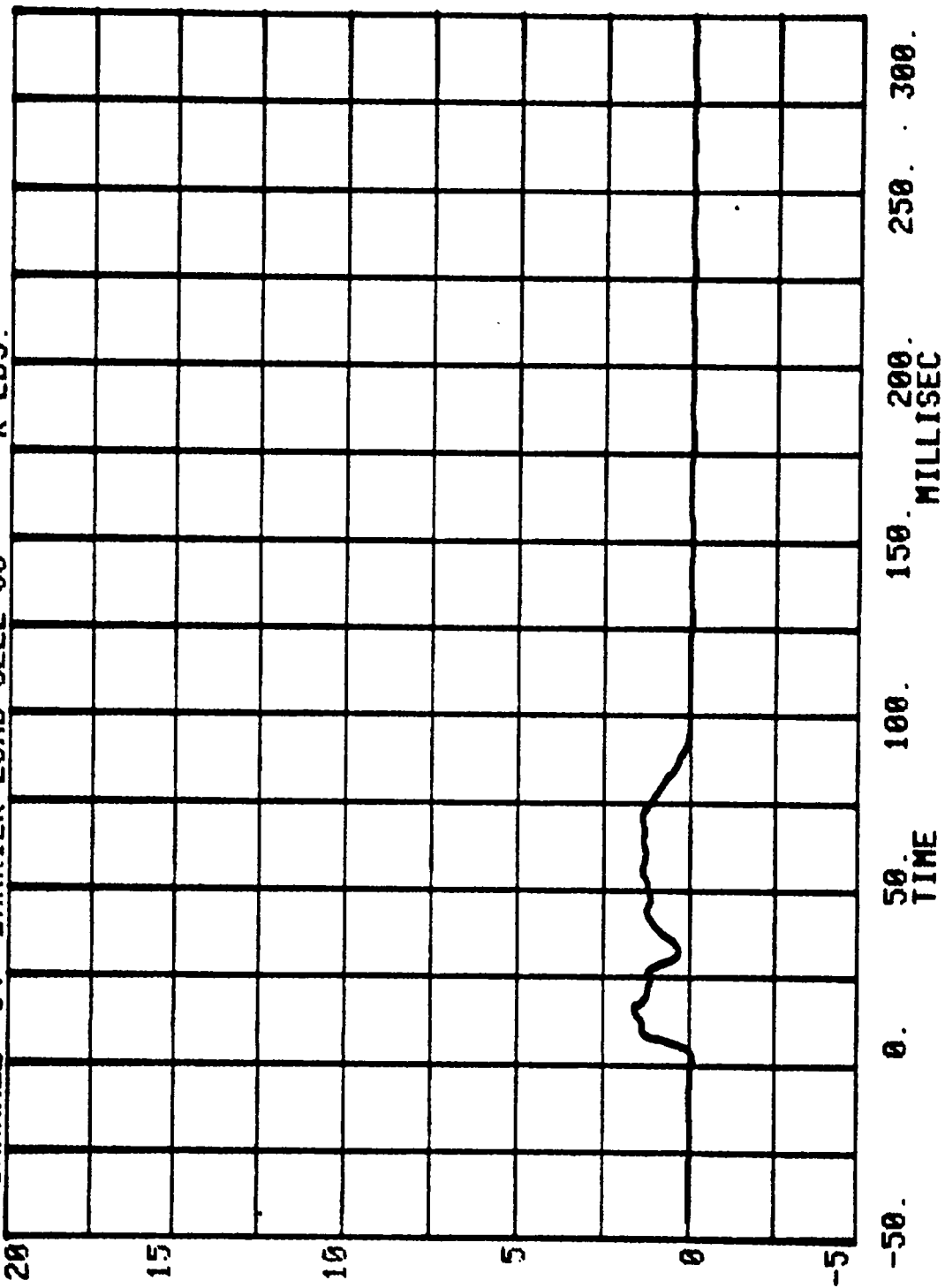
CHANNEL 52 BARRIER LOAD CELL C1 RUN= 822 SERIES= 5401 K LBS.



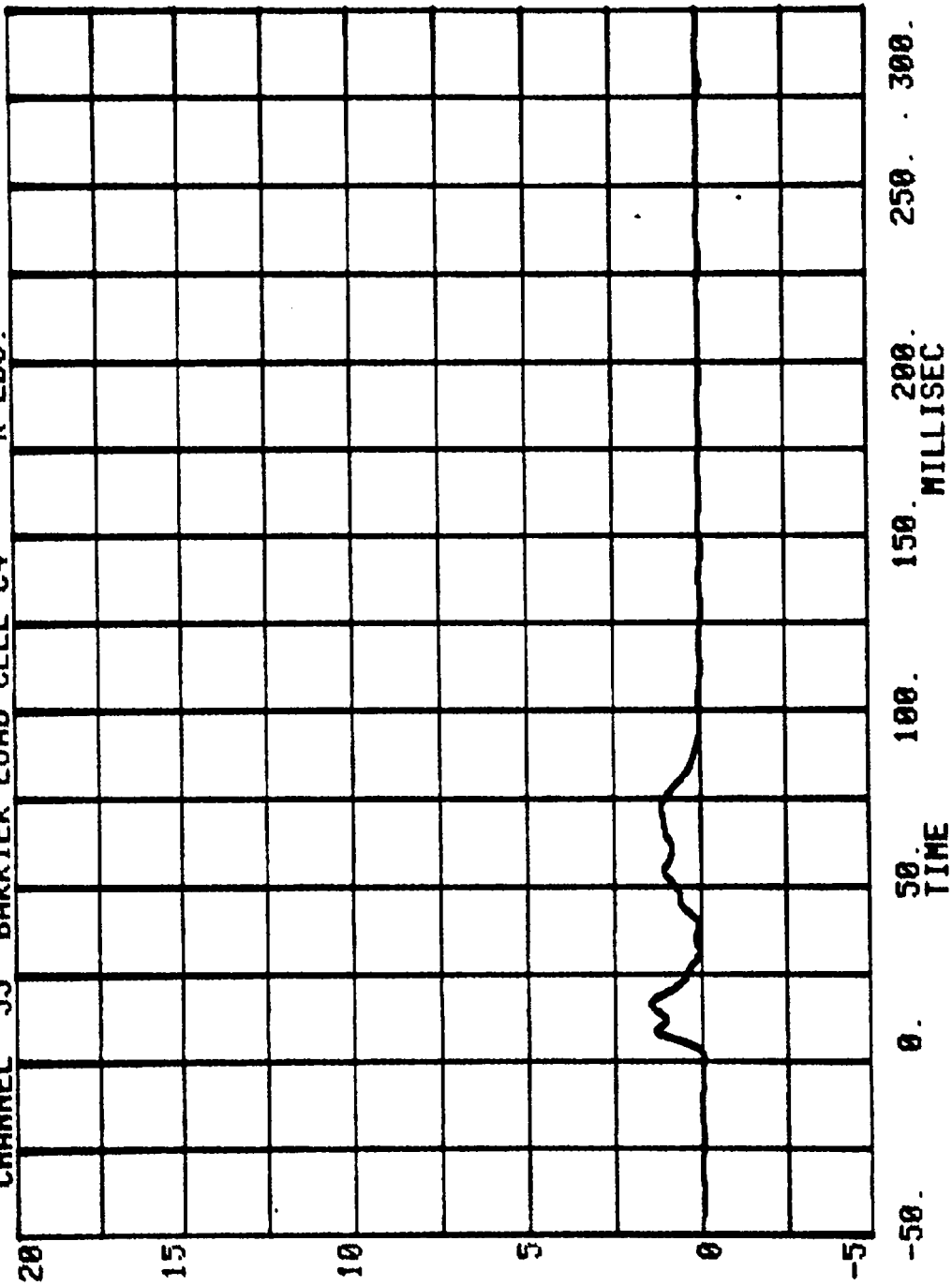
RUN= 822 SERIES= 5401
CHANNEL 53 BARRIER LOAD CELL C2 K LBS.



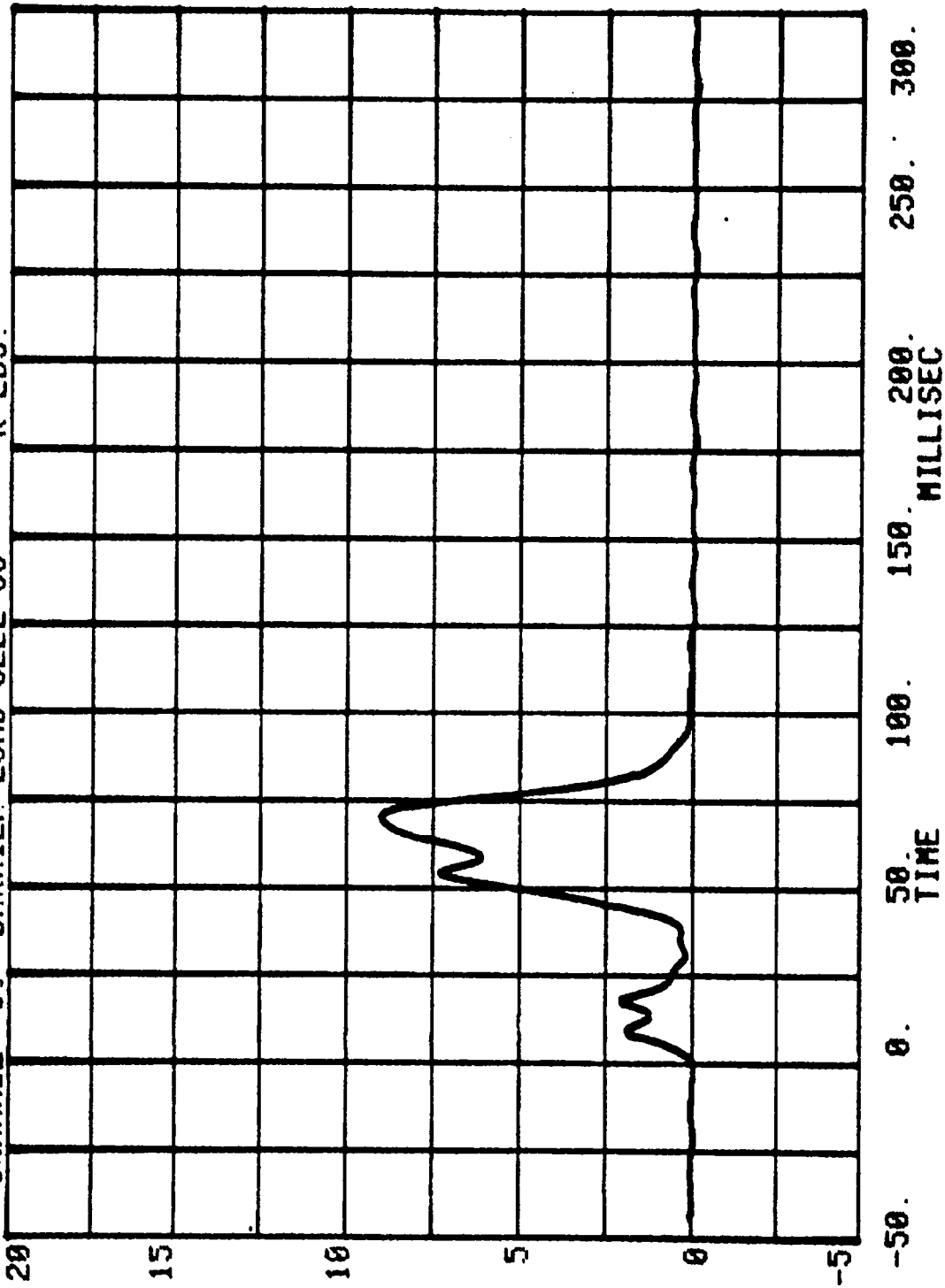
RUN= 822 SERIES= 5401
CHANNEL 54 BARRIER LOAD CELL C3 K LBS.



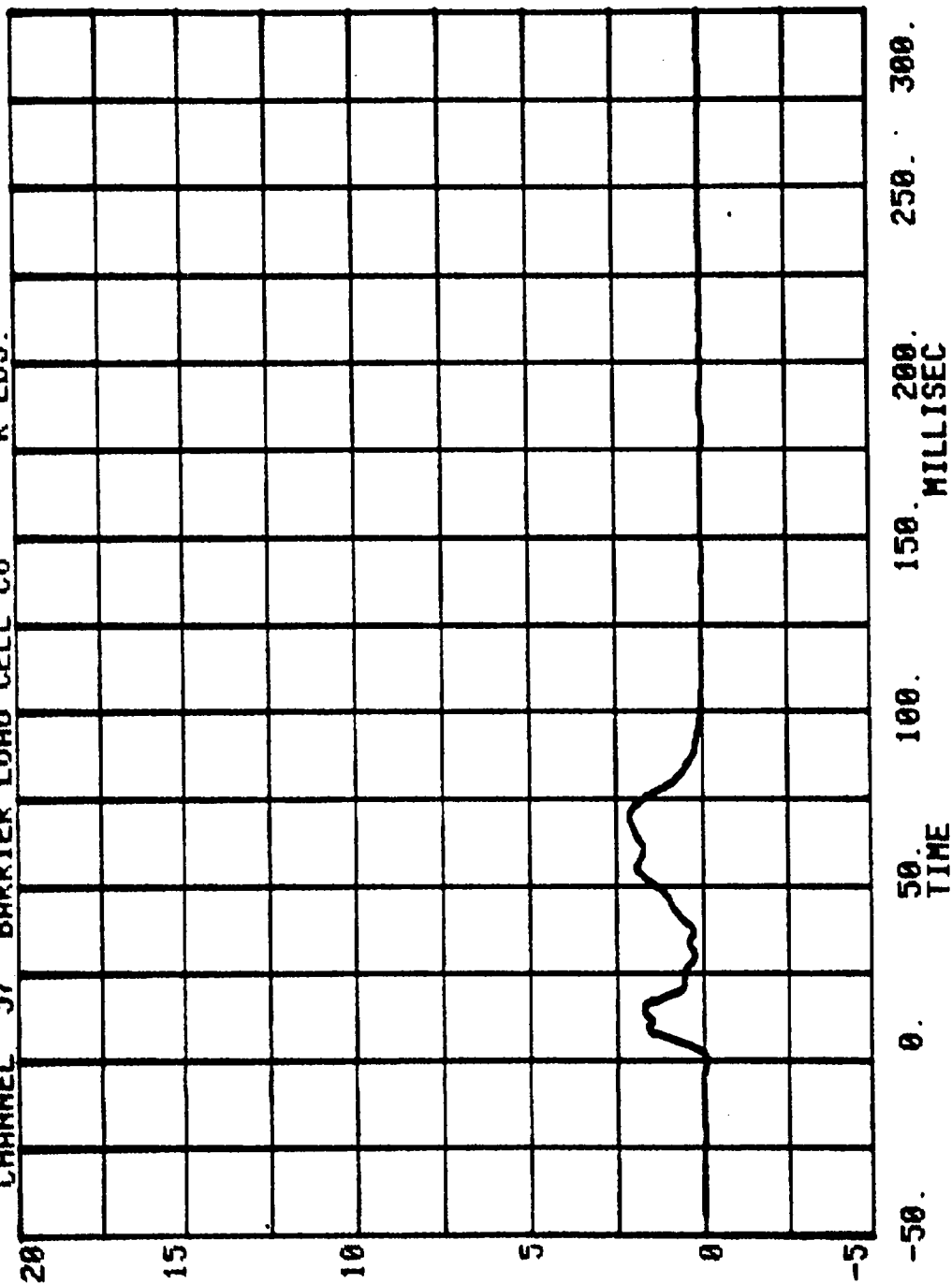
RUN= 822 SERIES= 5401 K LBS.
CHANNEL 55 BARRIER LOAD CELL C4



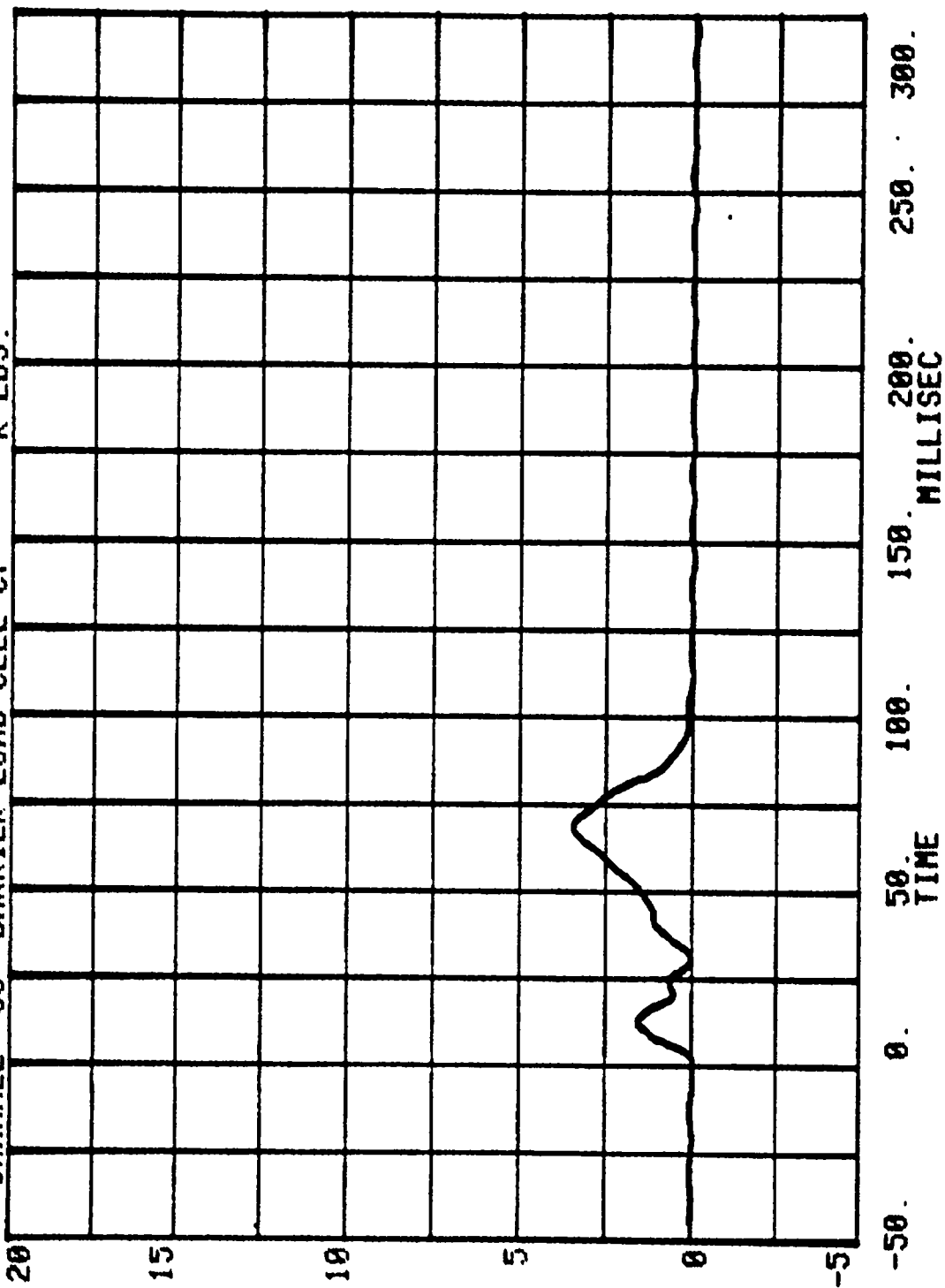
RUN= 822 SERIES= 5401
CHANNEL 56 BARRIER LOAD CELL C5 K LBS.



RUN= 822 SERIES= 5401
CHANNEL 57 BARRIER LOAD CELL C6 K LBS.

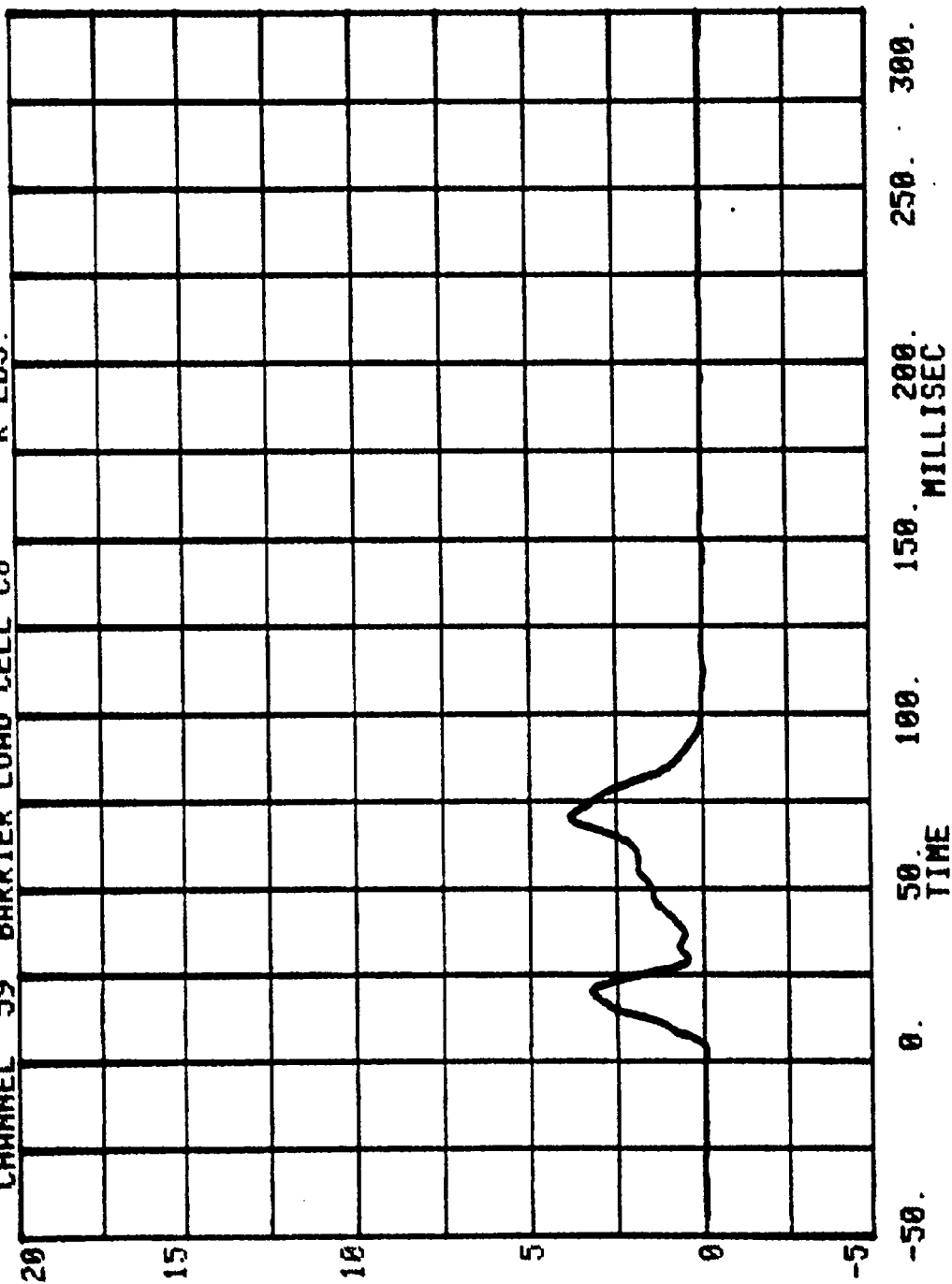


CHANNEL 58 BARRIER LOAD CELL C7 K LBS.
RUN= 822 SERIES= 5401

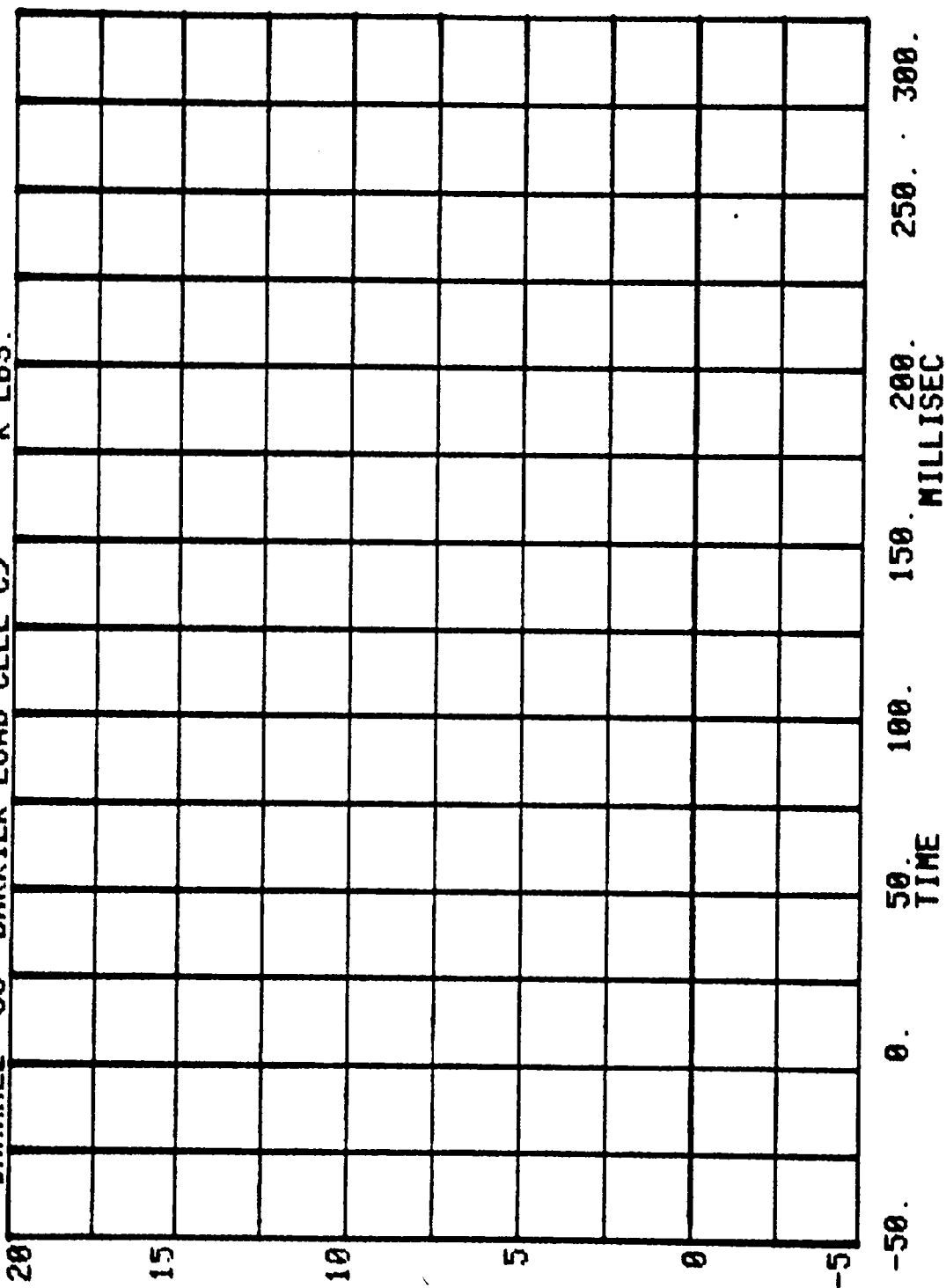


CHANNEL 59 BARRIER LOAD CELL C8 K LBS.

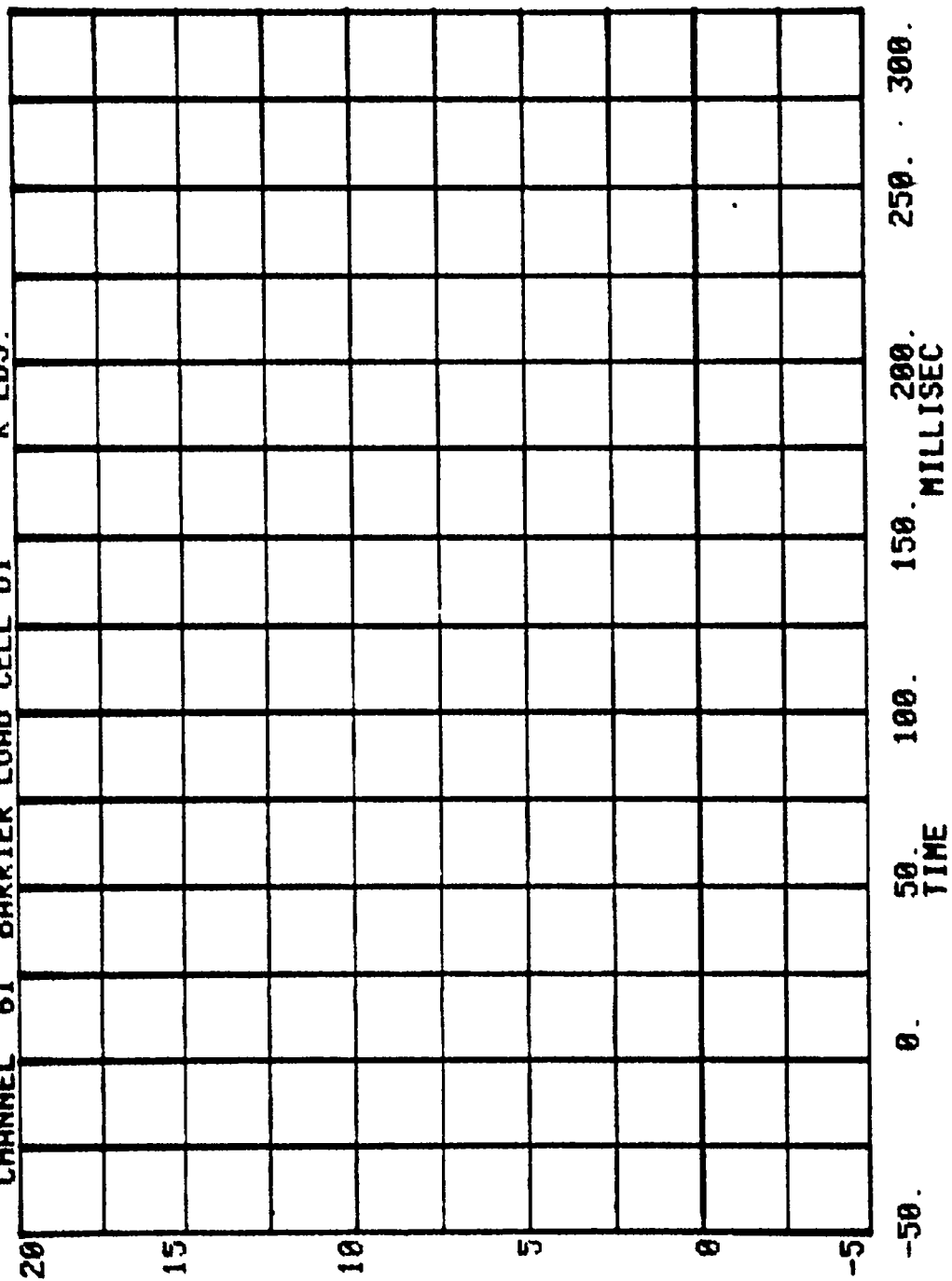
RUN= 822 SERIES= 5401



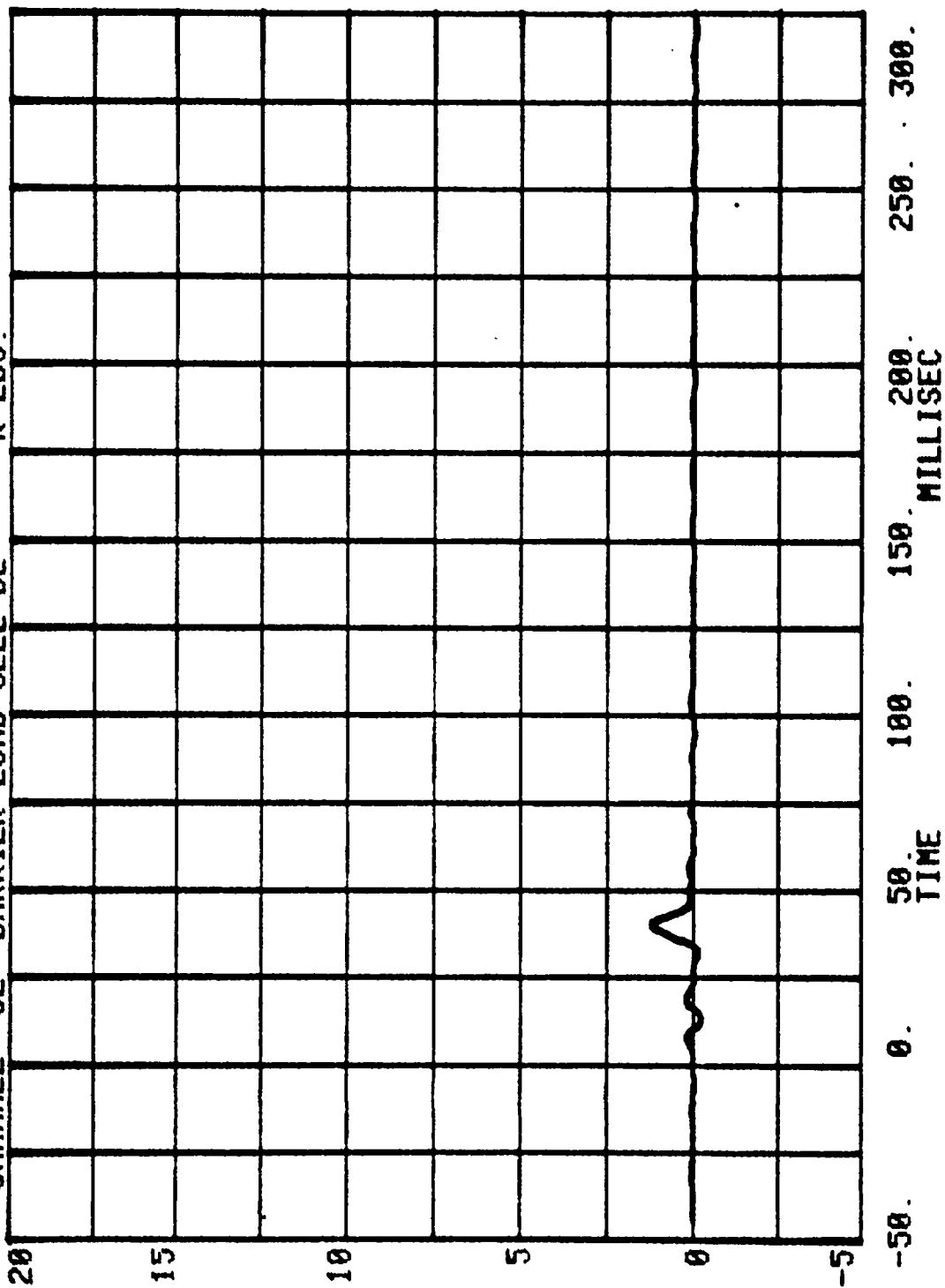
RUN= 822 SERIES= 5401
CHANNEL 60 BARRIER LOAD CELL C9 K LBS.



CHANNEL 61 BARRIER LOAD CELL D1 RUN= 822 SERIES= 5401 K LBS.

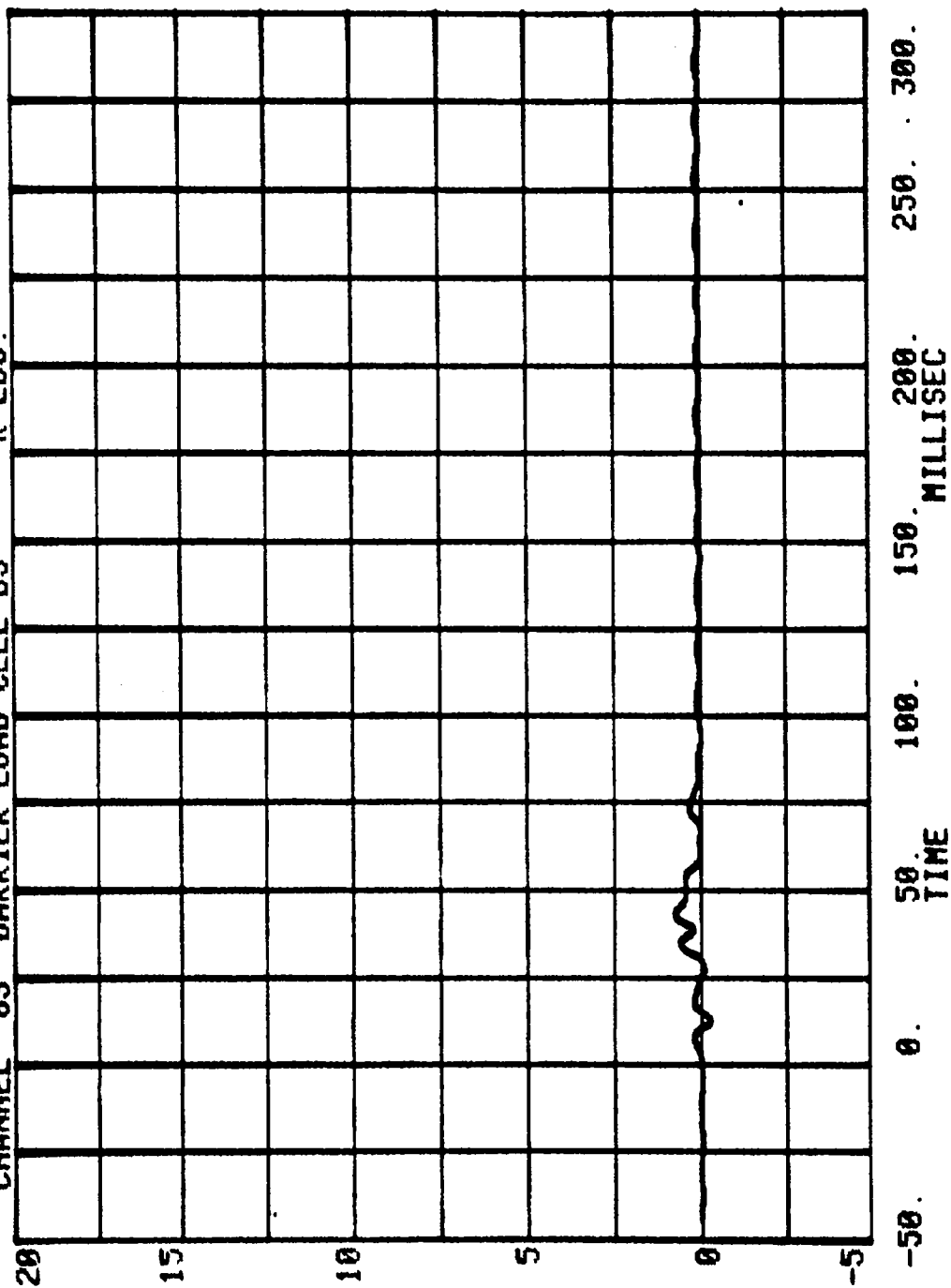


8
RUN= 822 SERIES= 5401
CHANNEL 62 BARRIER LOAD CELL D2 K LBS.

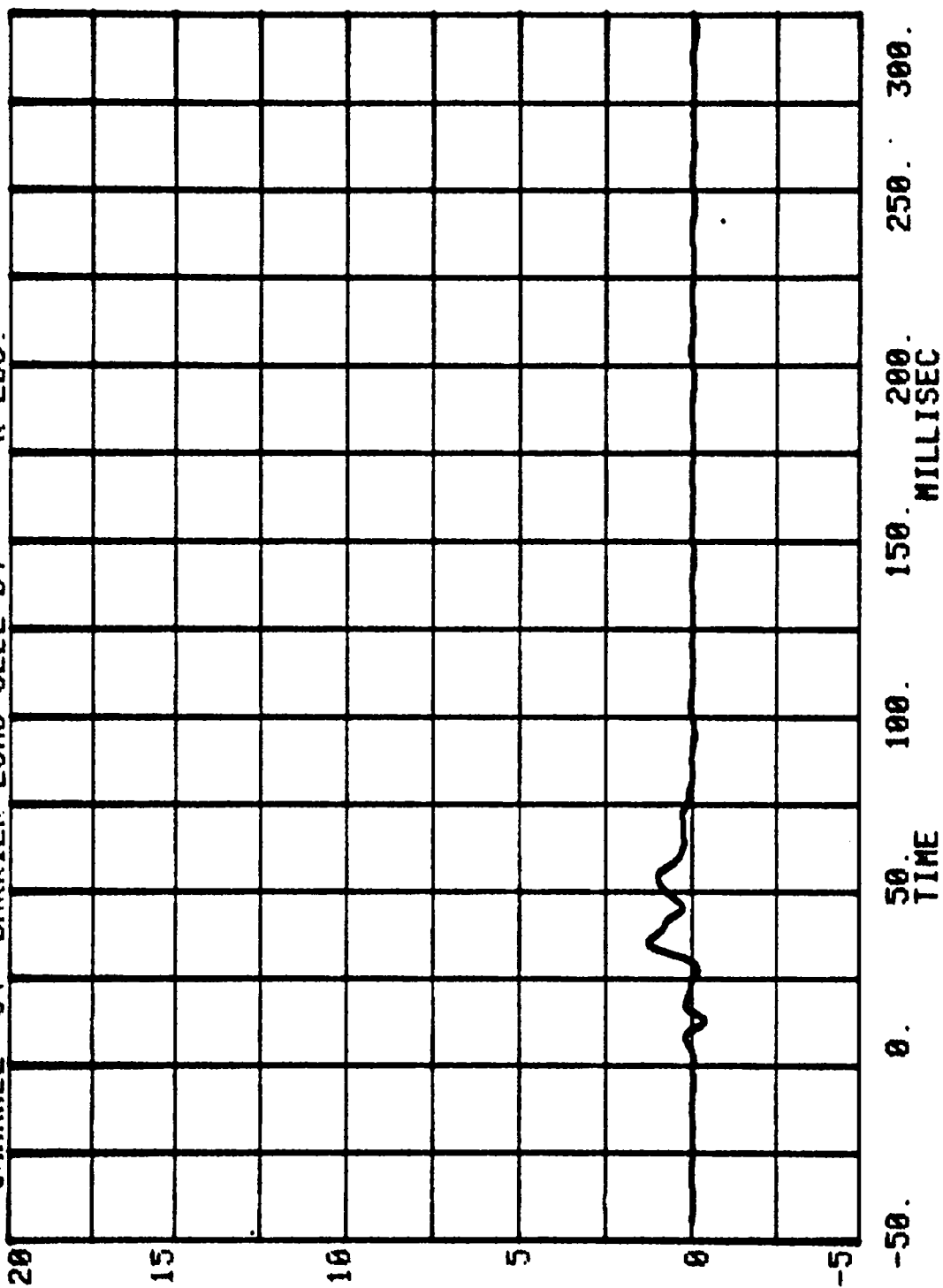


CHANNEL 63 BARRIER LOAD CELL D3 K LBS.

RUN= 822 SERIES= 5401

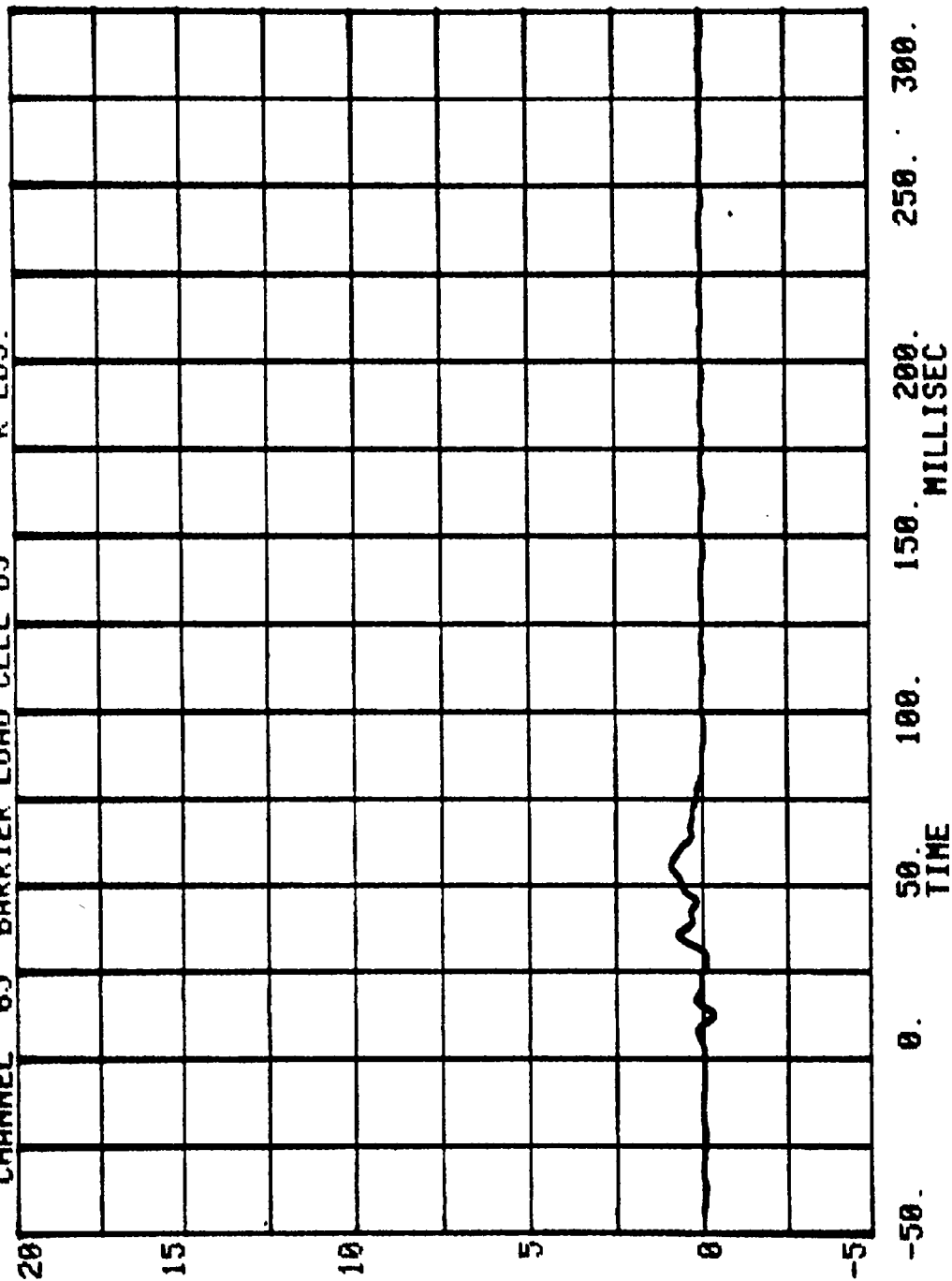


CHANNEL 64 RUN= 822 SERIES= 5401 K LBS.
BARRIER LOAD CELL D4

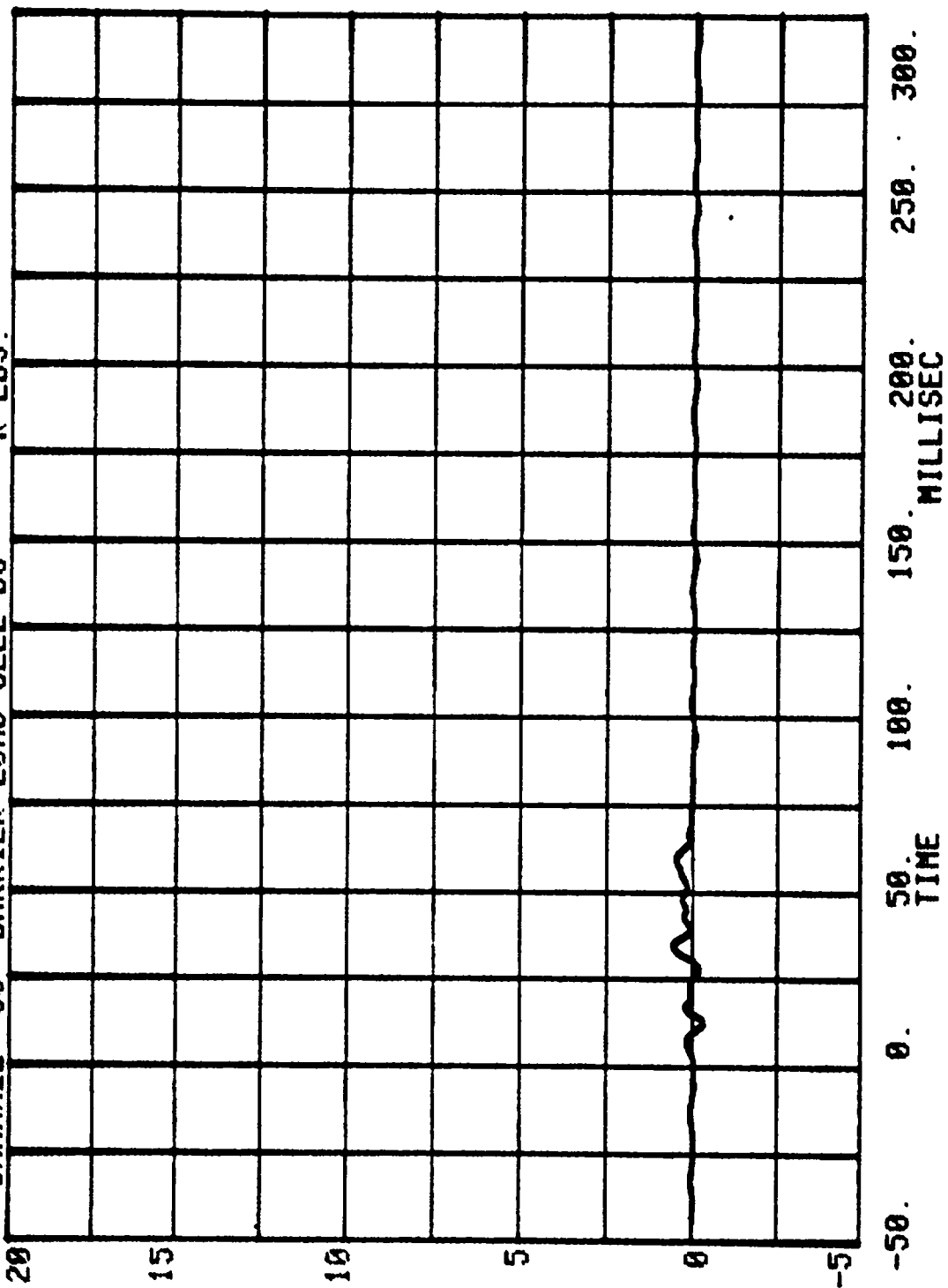


CHANNEL 65 BARRIER LOAD CELL 05 K LBS.

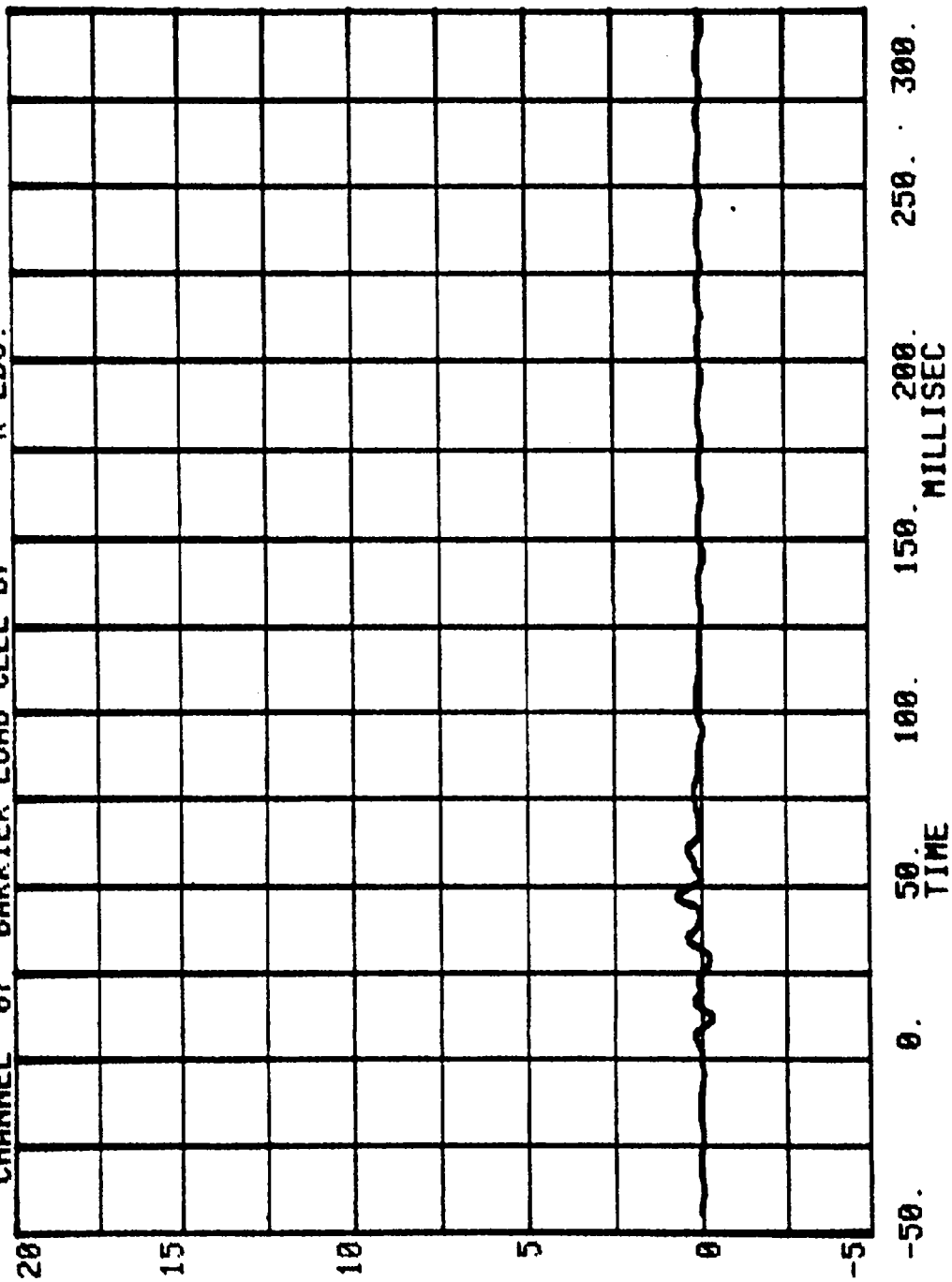
RUN= 822 SERIES= 5401



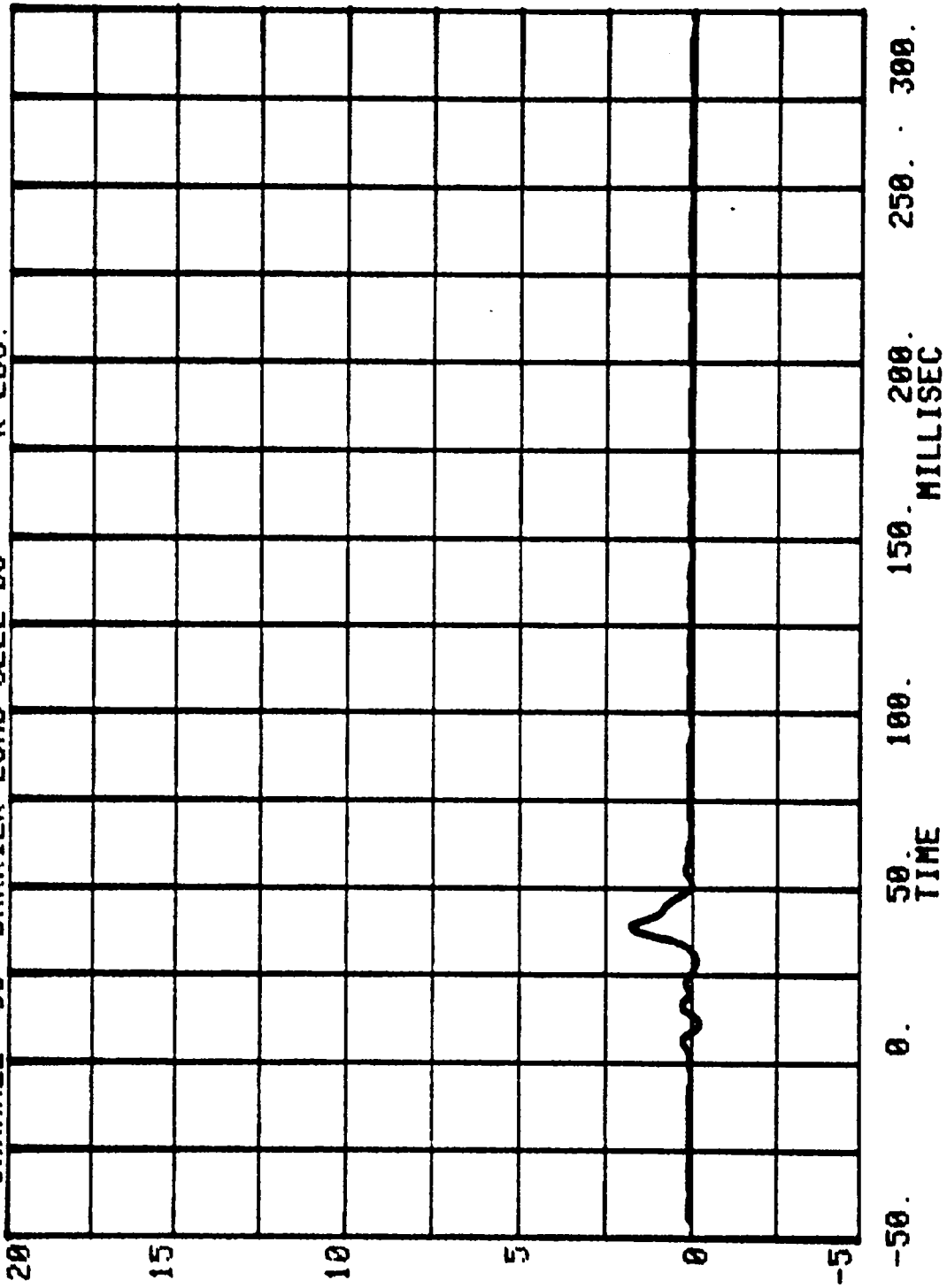
RUN= 822 SERIES= 5401
CHANNEL 66 BARRIER LOAD CELL D6 K LBS.



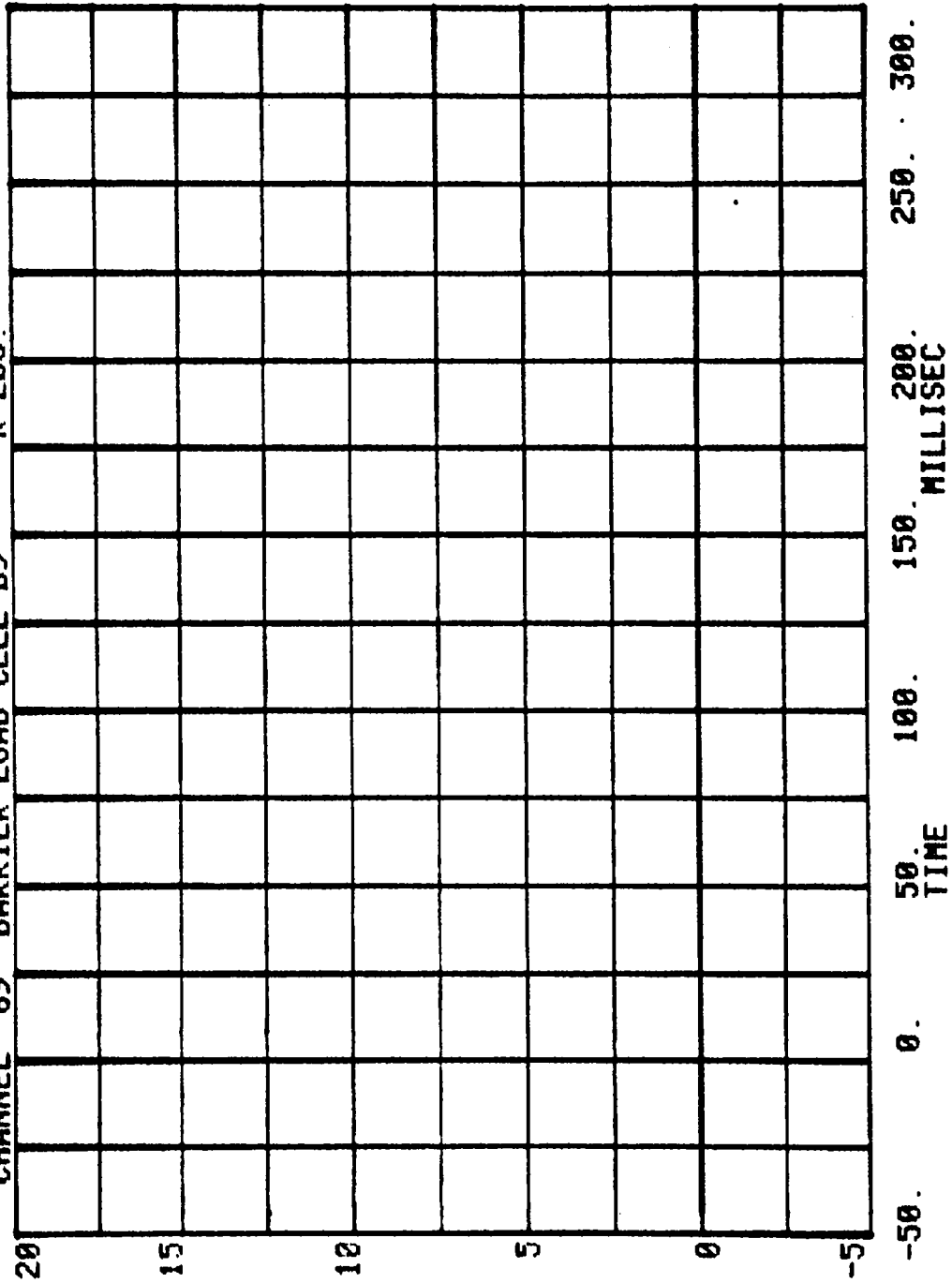
RUN= 822 SERIES= 5401
CHANNEL 67 BARRIER LOAD CELL D7 K LBS.



RUN= 822 SERIES= 5401
CHANNEL 68 BARRIER LOAD CELL 08 K LBS.



RUN= 822 SERIES= 5401
CHANNEL 69 BARRIER LOAD CELL D9 K LBS.



NEW CAR ASSESSMENT BARRIER TEST - 1988

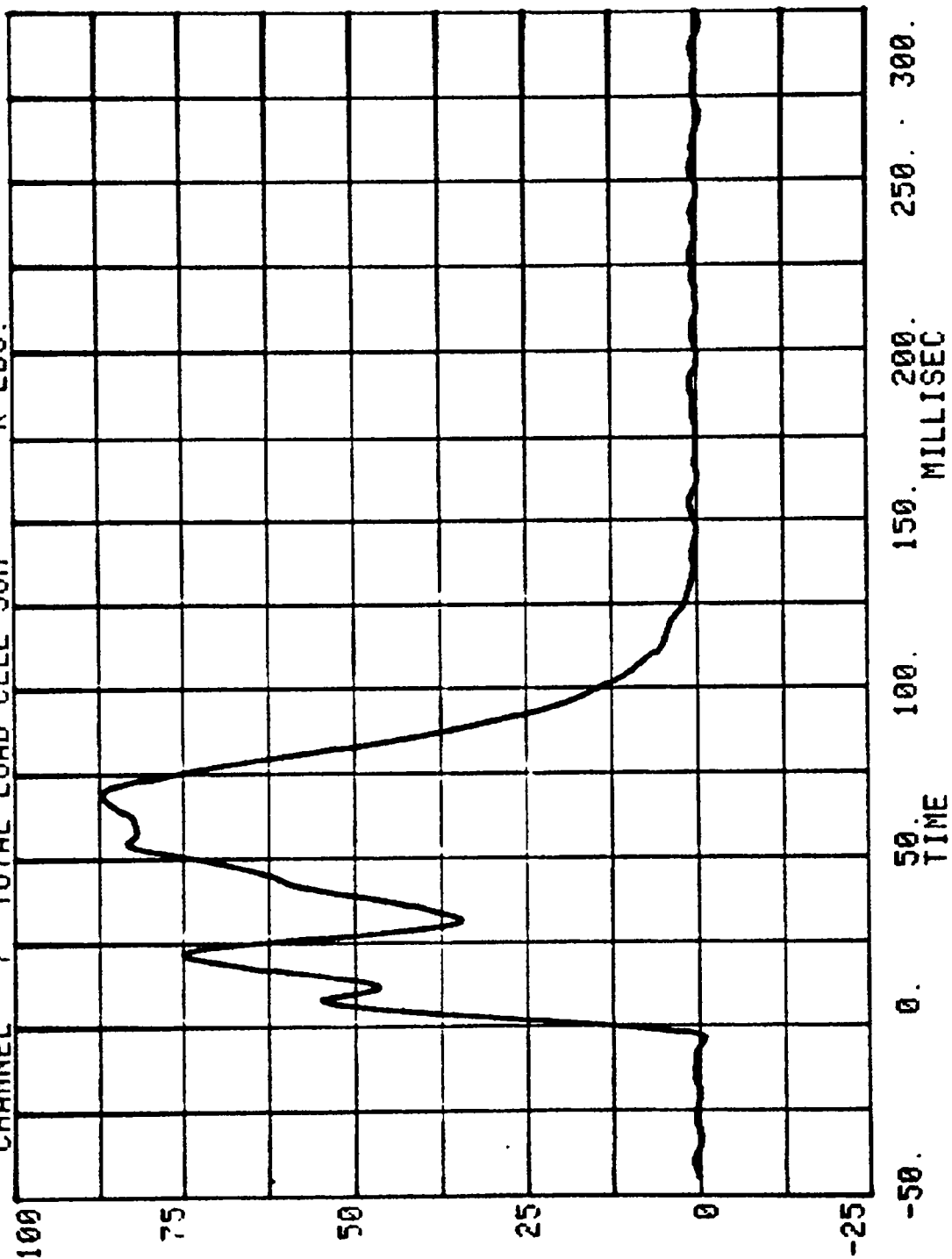
RUN # 822 SERIES # 5401

CHAN	TITLE	MINIMUM	MAXIMUM
------	-------	---------	---------

7	TOTAL LOAD CELL SUM	- .703	87.323 K LBS.
---	---------------------	--------	---------------

CHANNEL 7 TOTAL LOAD CELL SUM K LBS.

RUN= 822 SERIES= 5401



TEST NO. MJ5401

DUMMY DATA

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

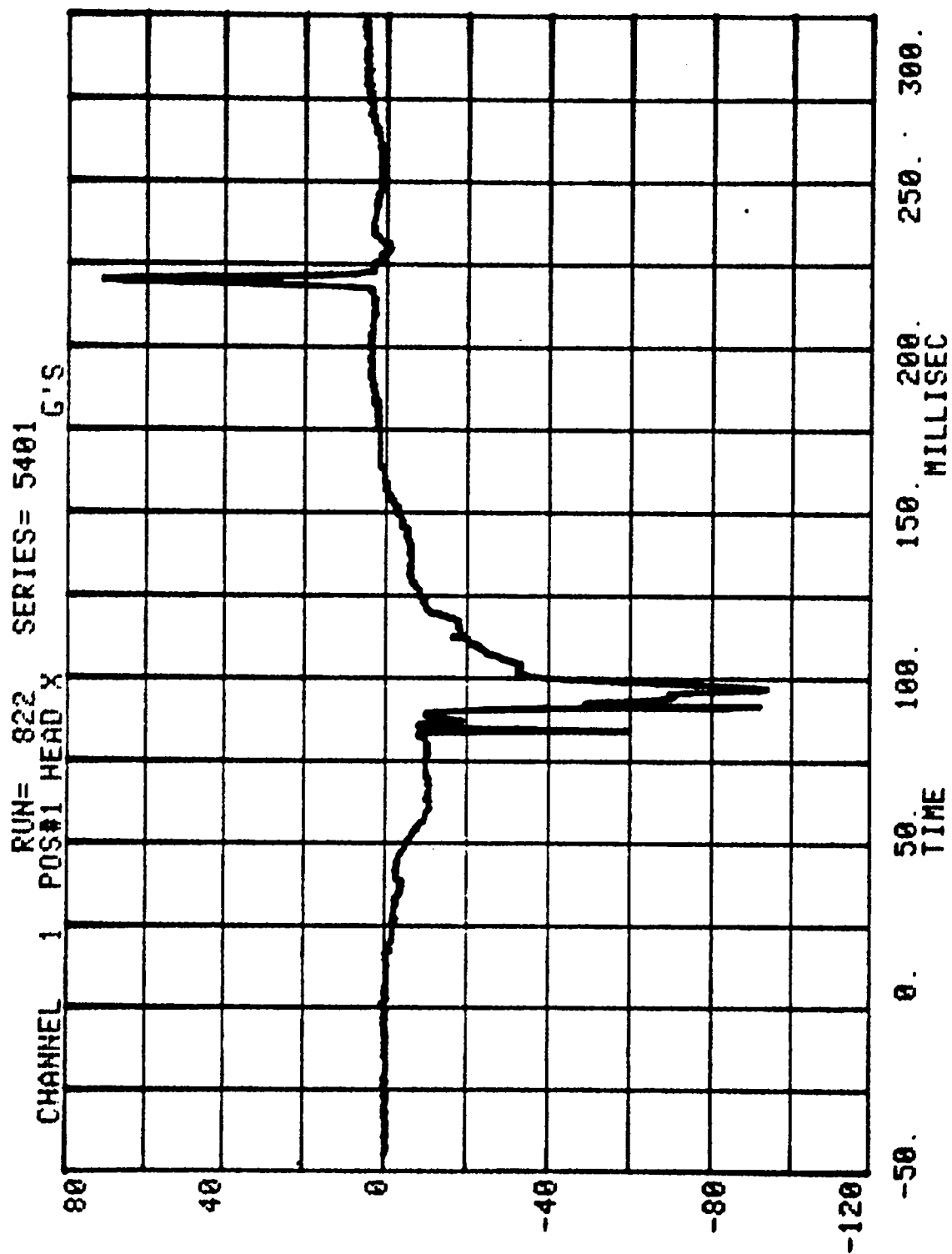
HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NEW CAR ASSESSMENT BARRIER TEST - 1988

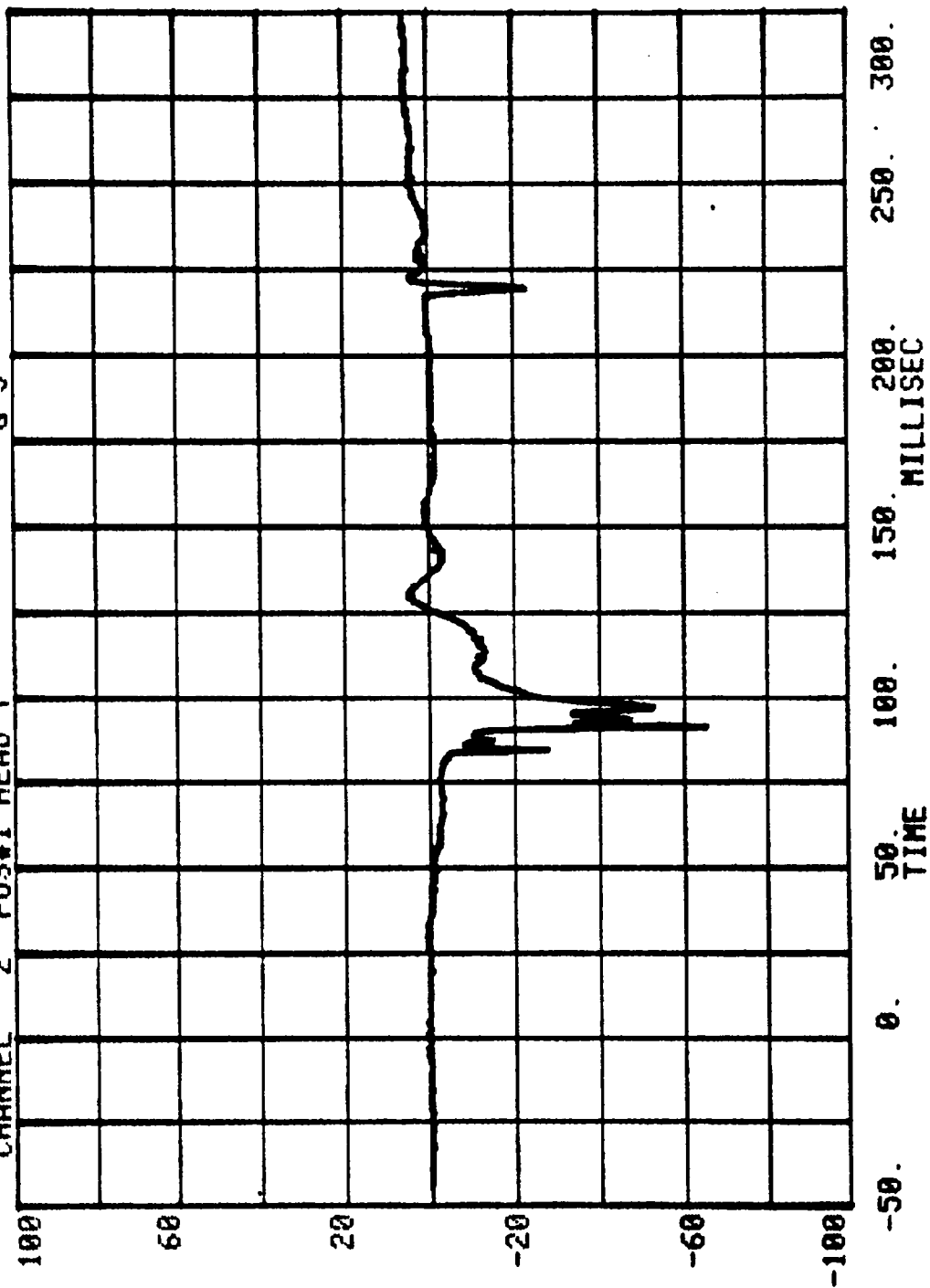
RUN= 822

POS#1 HEAD R

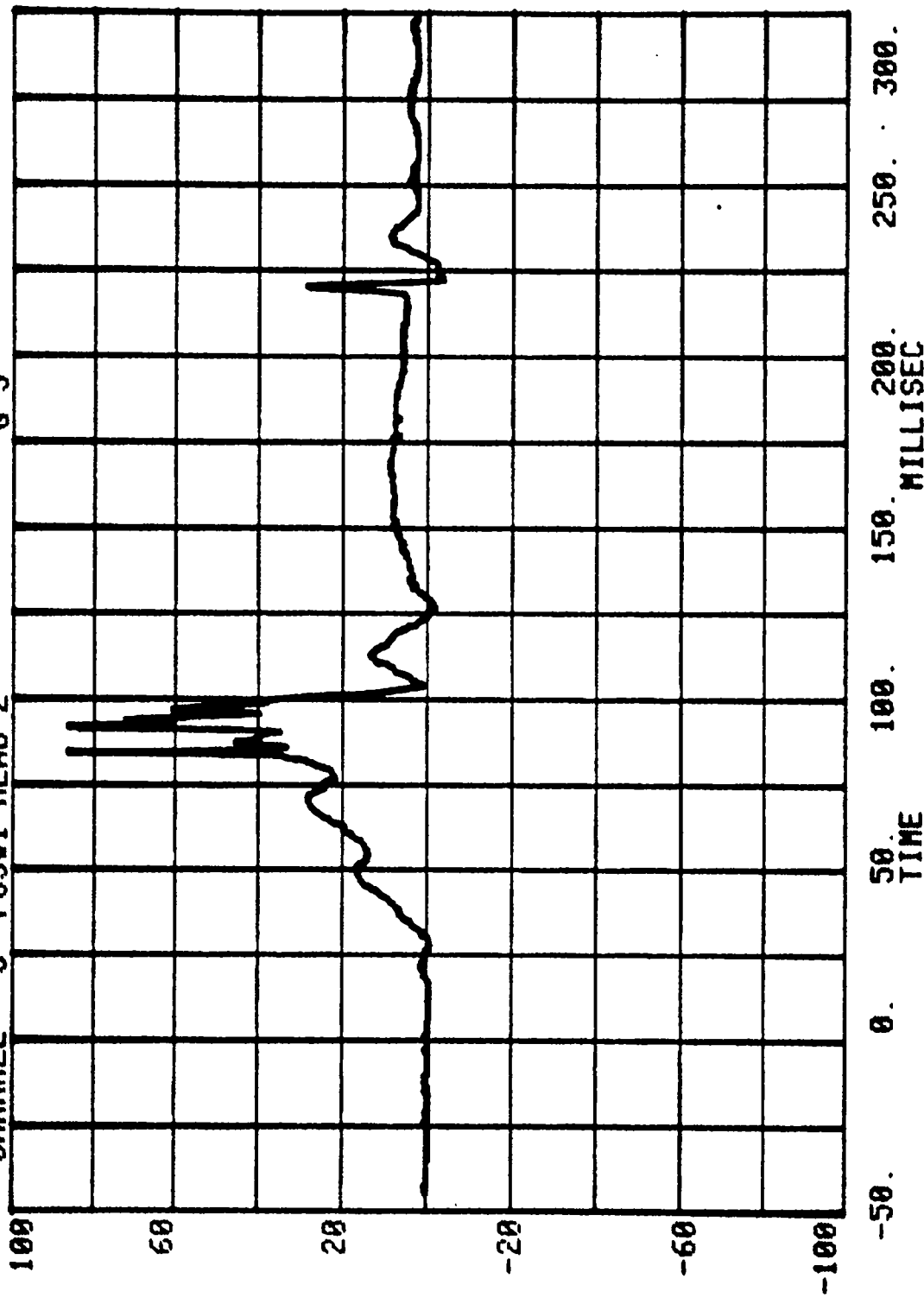
HIC= 920.8 FROM T1= .09090 TO T2= .10020
AVERAGE ACCELERATION BETWEEN T1 AND T2= 39.6G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1448.2



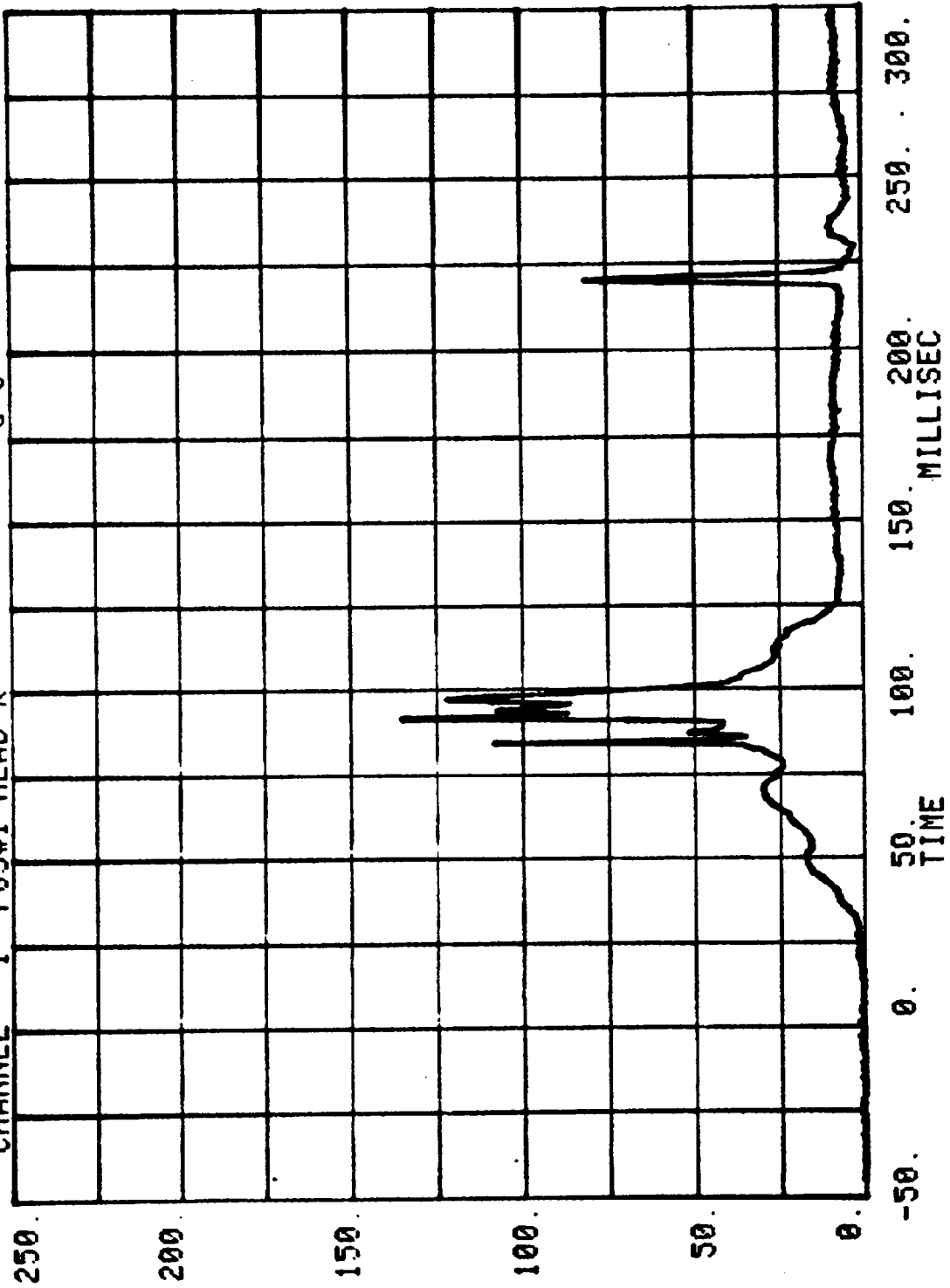
RUN= 822 SERIES= 5401
CHANNEL 2 POS#1 HEAD Y G'S



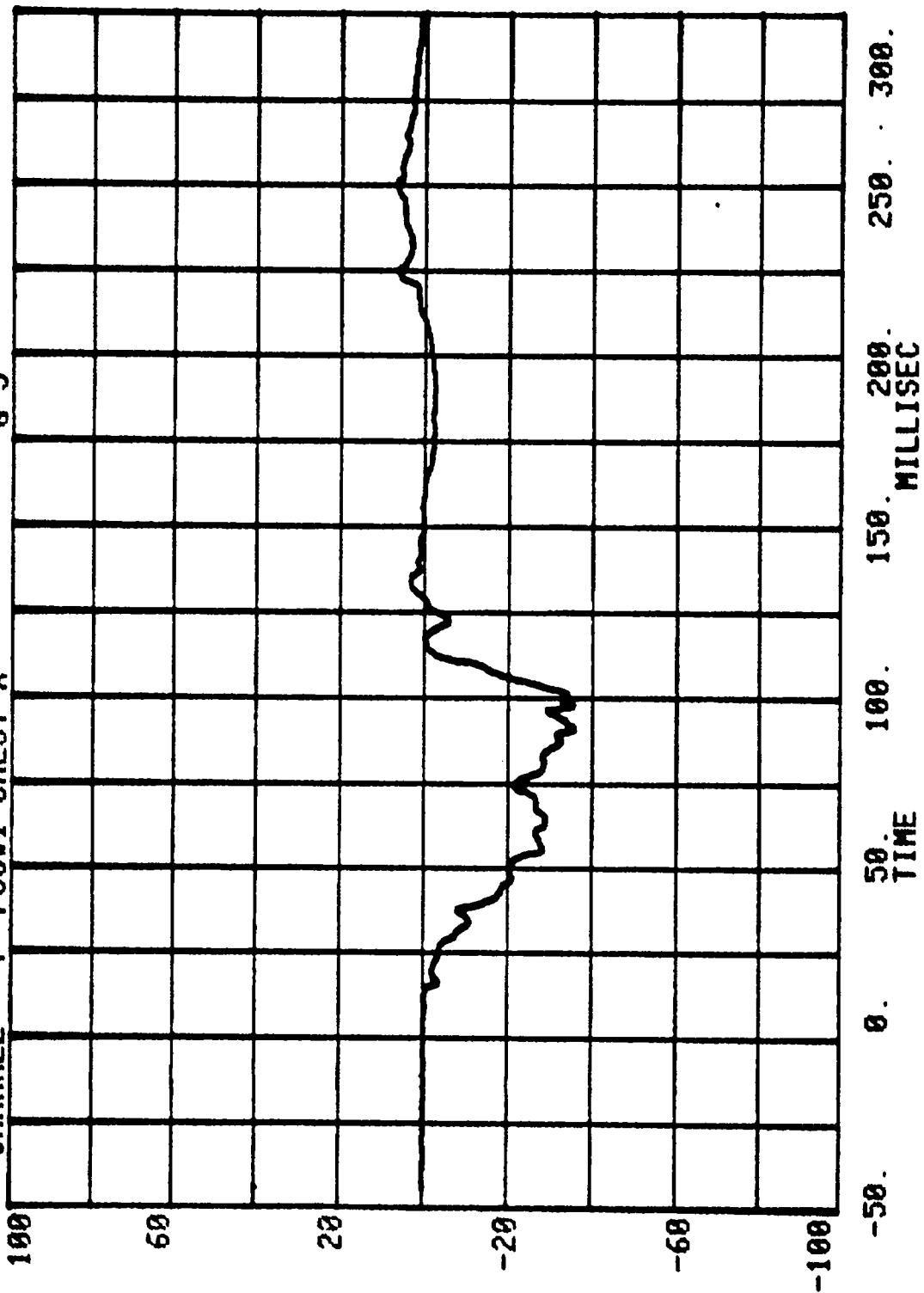
CHANNEL 3 POS#1 HEAD Z RUN= 822 SERIES= 5401 G'S



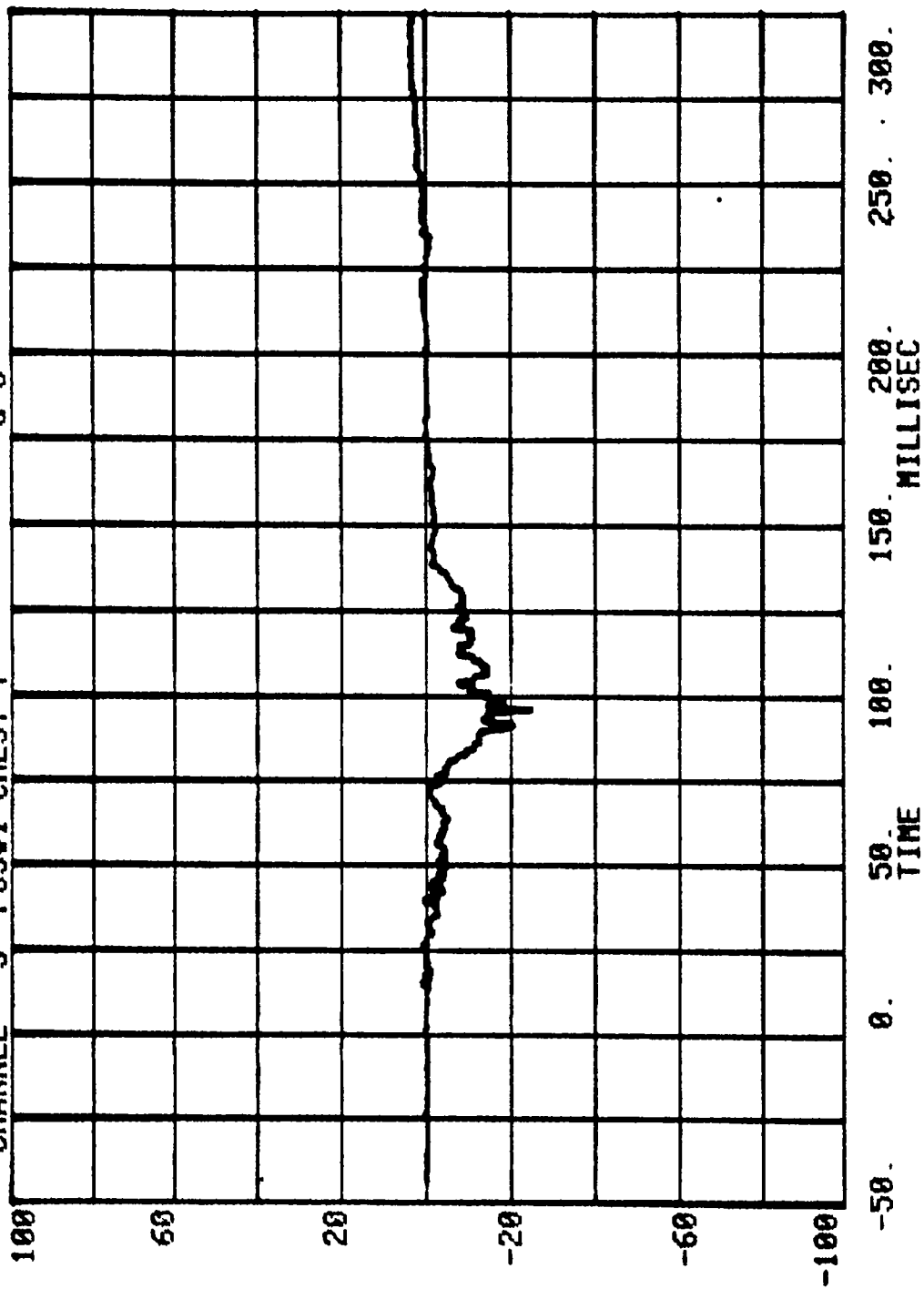
CHANNEL 1 POS#1 HEAD R RUN= 822 SERIES= 5401 G'S



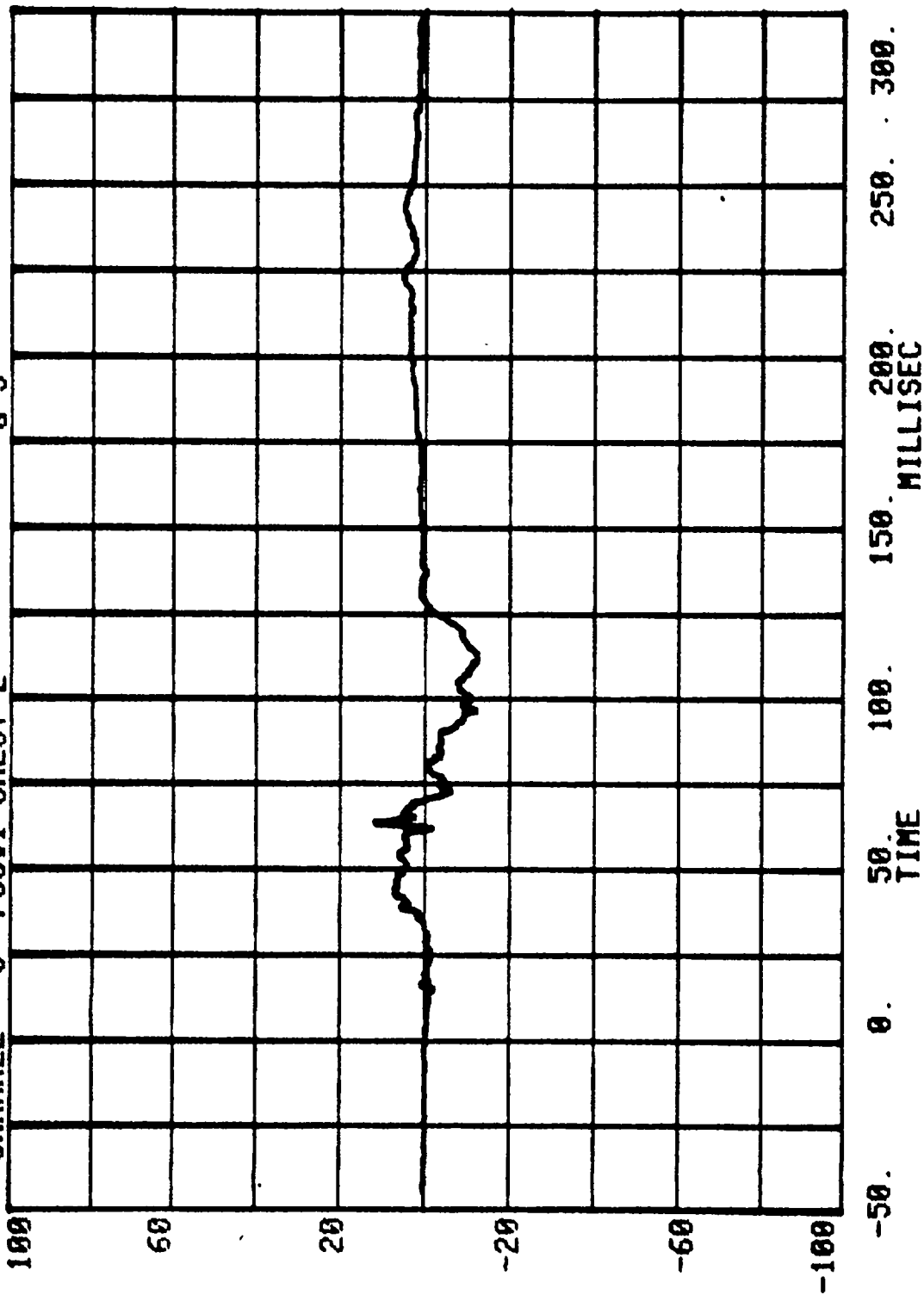
CHANNEL 4 POS#1 CHEST X RUN= 822 SERIES= 5401 G'S



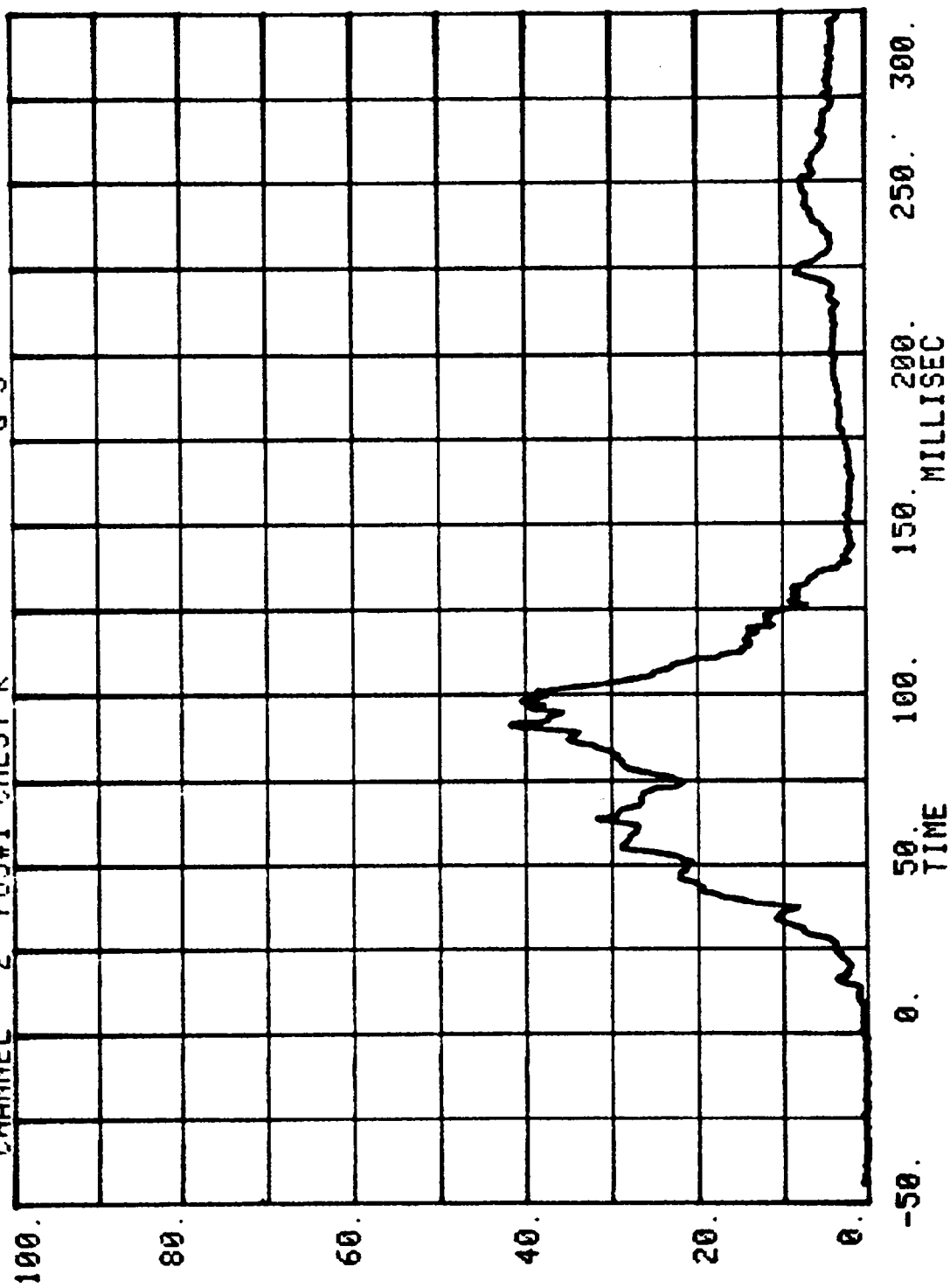
RUN= 822 SERIES= 5401 G'S
CHANNEL 5 POS#1 CHEST Y



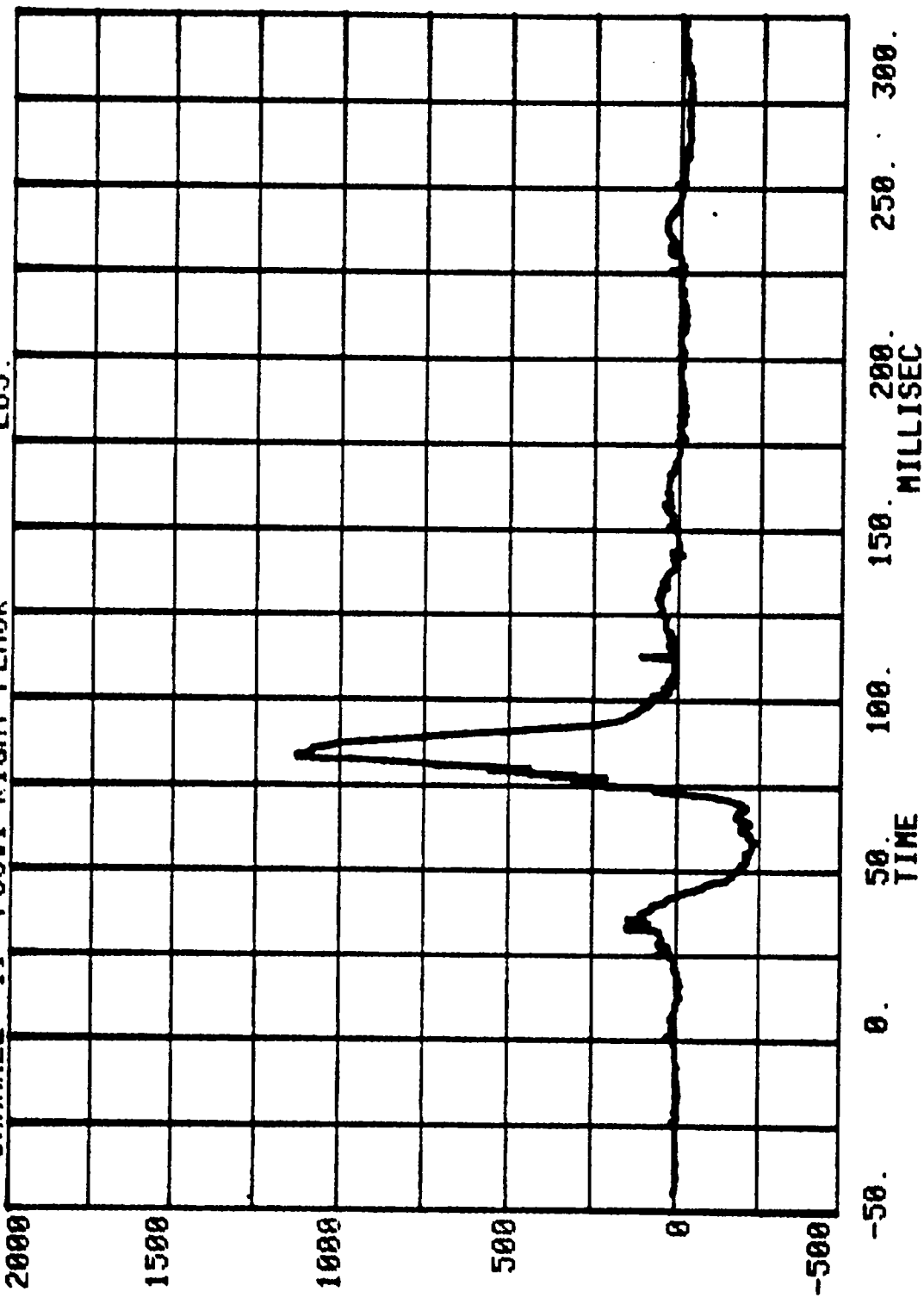
CHANNEL 6 POS#1 CHEST Z RUN= 822 SERIES= 5401 G'S



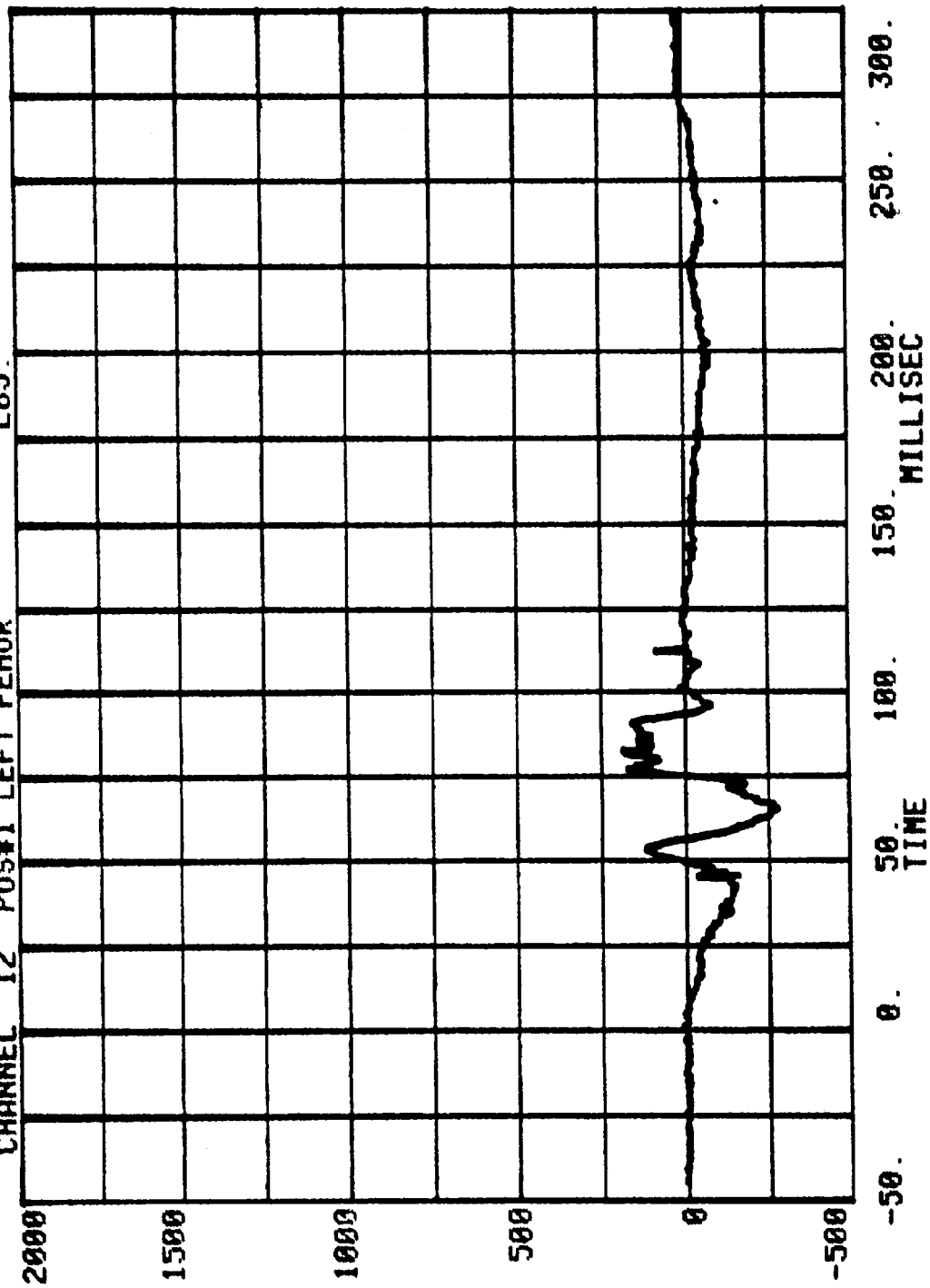
CHANNEL 2 POS#1 CHEST R RUN= 822 SERIES= 5401 G'S



CHANNEL 11 POS#1 RIGHT FEMUR RUN= 822 SERIES= 5401 LBS.



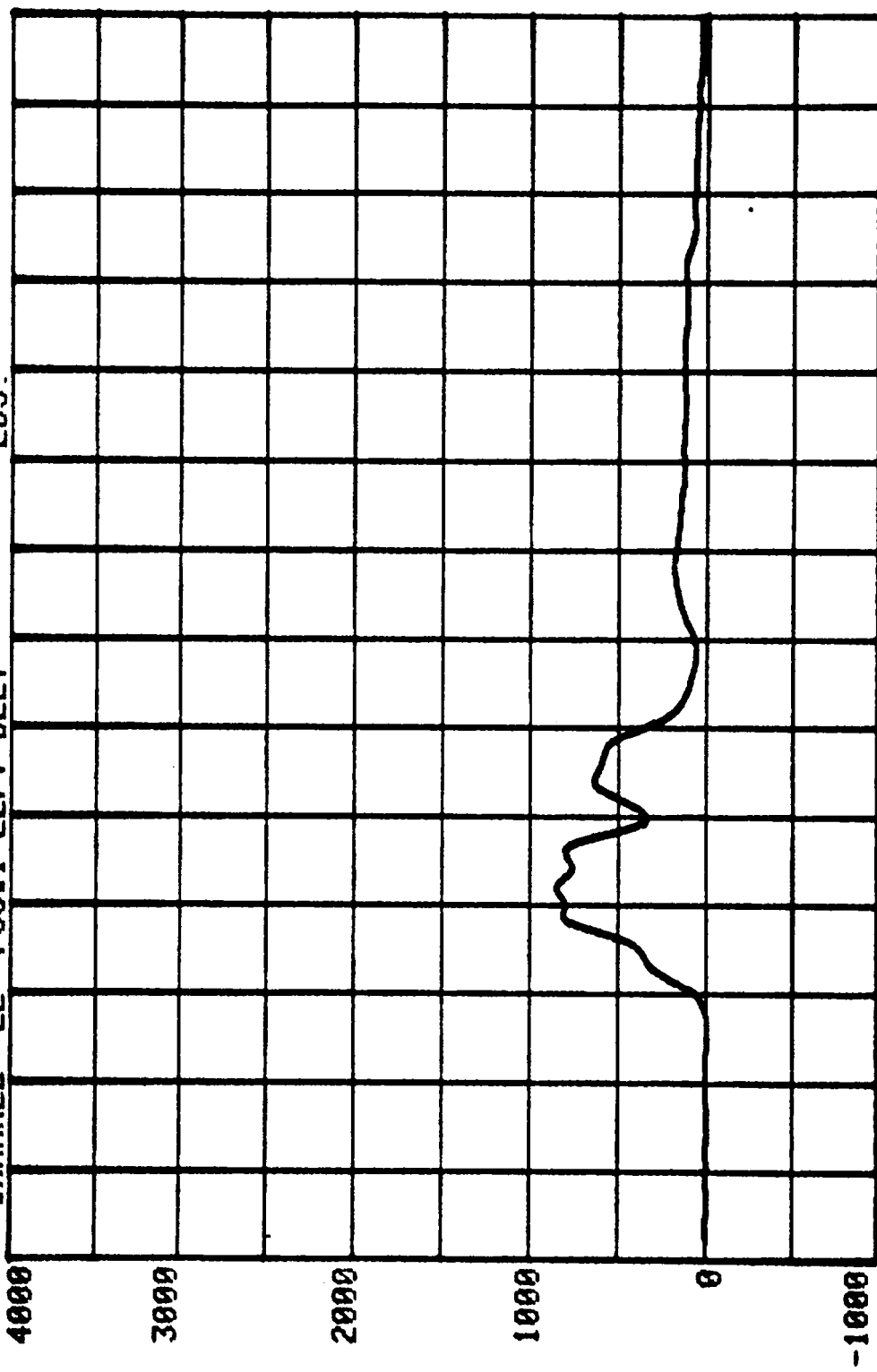
RUN= 822 SERIES= 5401 LBS.
CHANNEL 12 POS#1 LEFT FEMUR



CHANNEL 22 POS#1 LEFT BELT

RUN= 822 SERIES= 5401

LBS.



250. 300.

200.

150.

100.

50.

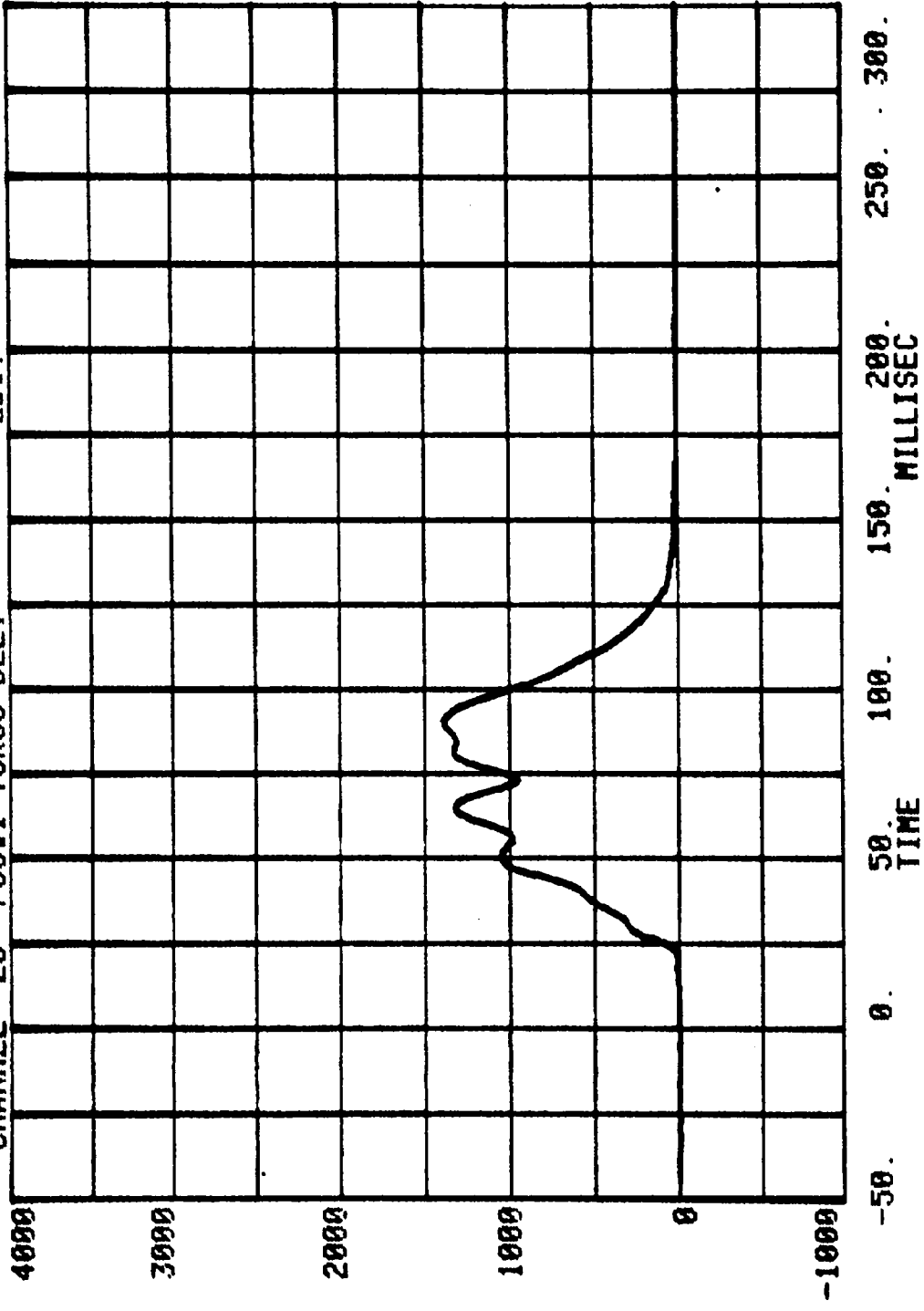
0.

-50.

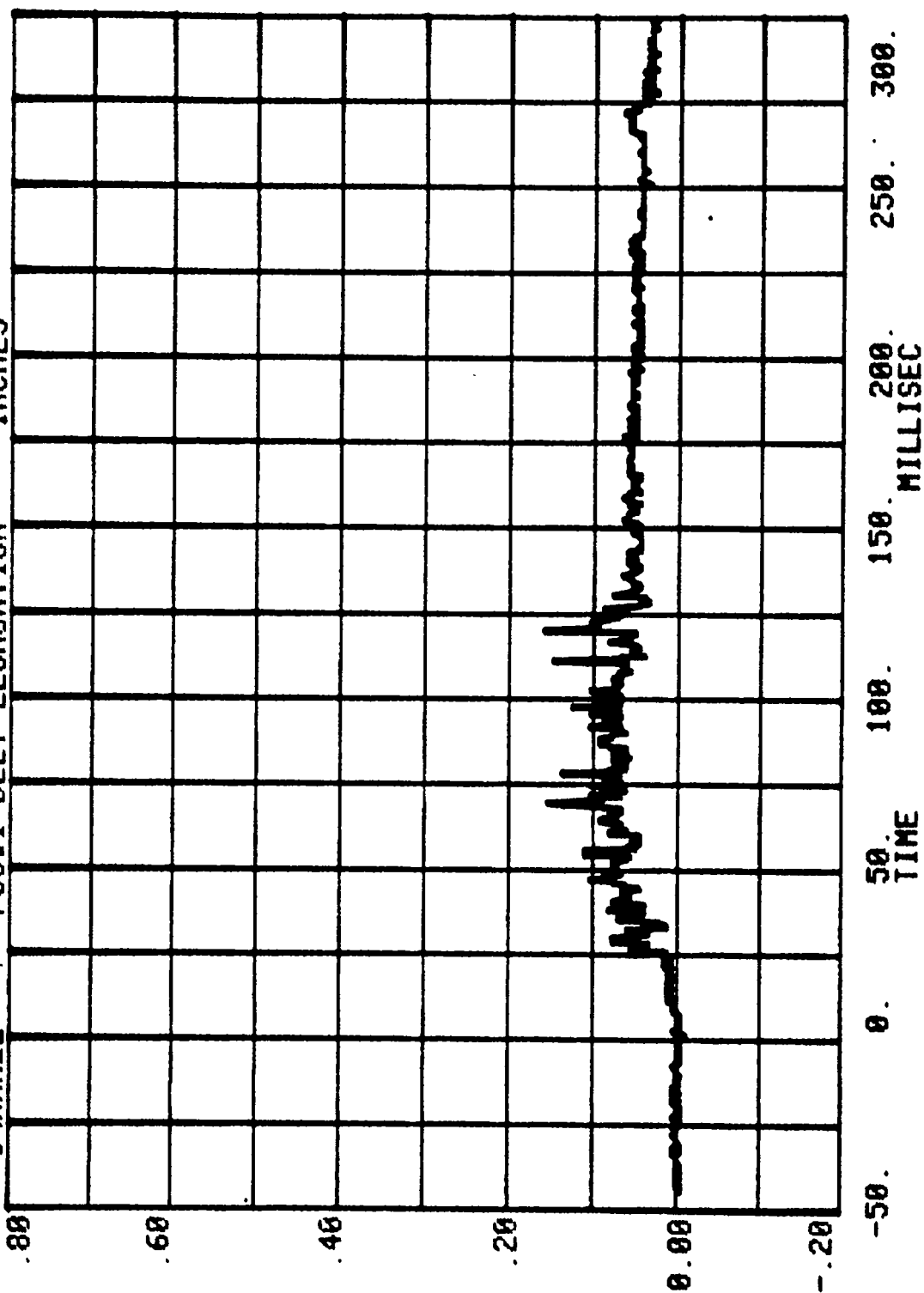
MILLISEC

TIME

CHANNEL 23 POS#1 TORSO BELT
RUN= 822 SERIES= 5401 LBS.



CHANNEL 7 RUN= 822 SERIES= 5401 Measured over 2.5 inches
POS#1 BELT ELONGATION INCHES



HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NEW CAR ASSESSMENT BARRIER TEST - 1988

RUN= 822

POS#2 HEAD R

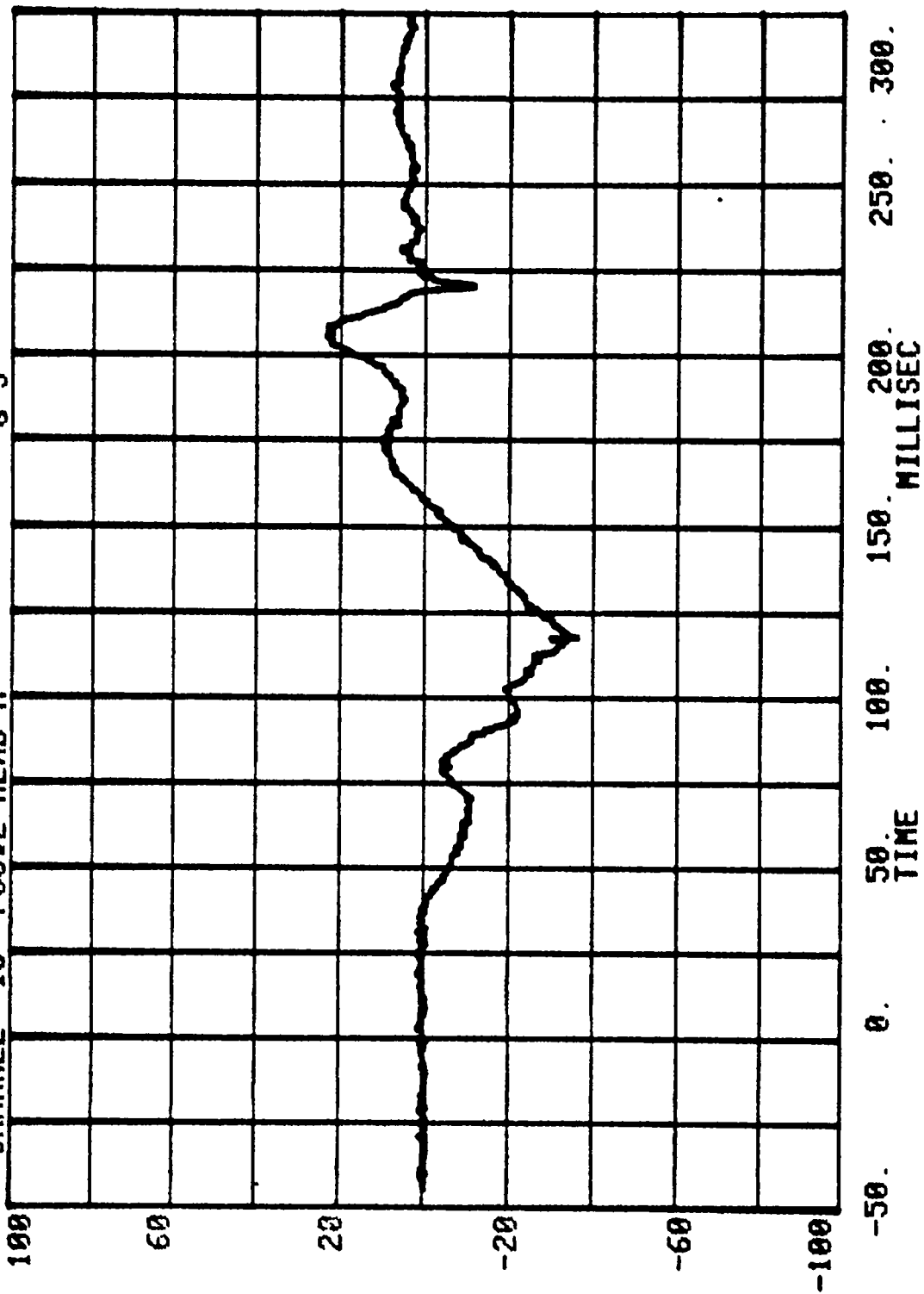
HIC= 613.9 FROM T1= .08257 TO T2= .11857

AVERAGE ACCELERATION BETWEEN T1 AND T2= 49.3G'S

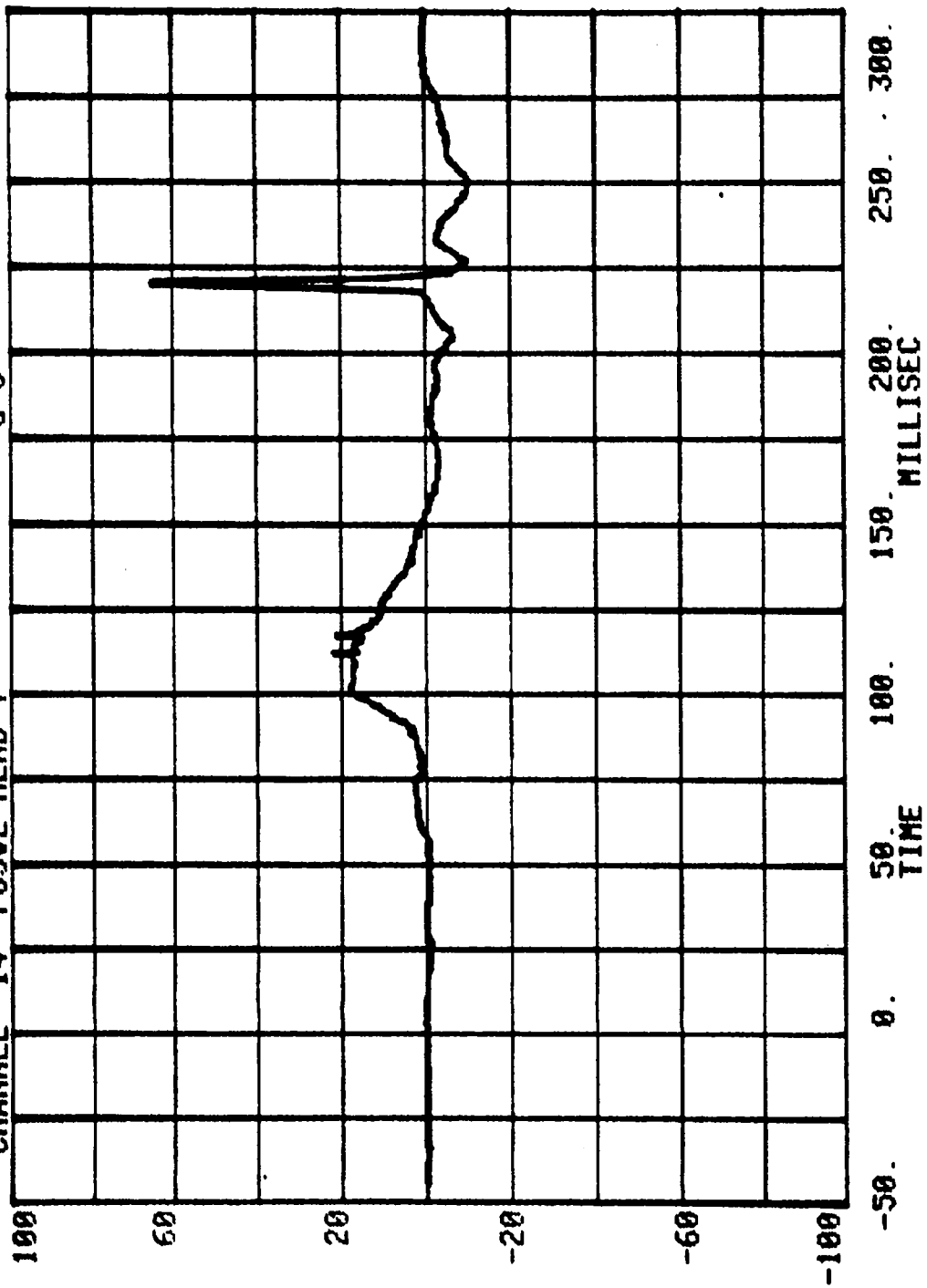
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1161.0

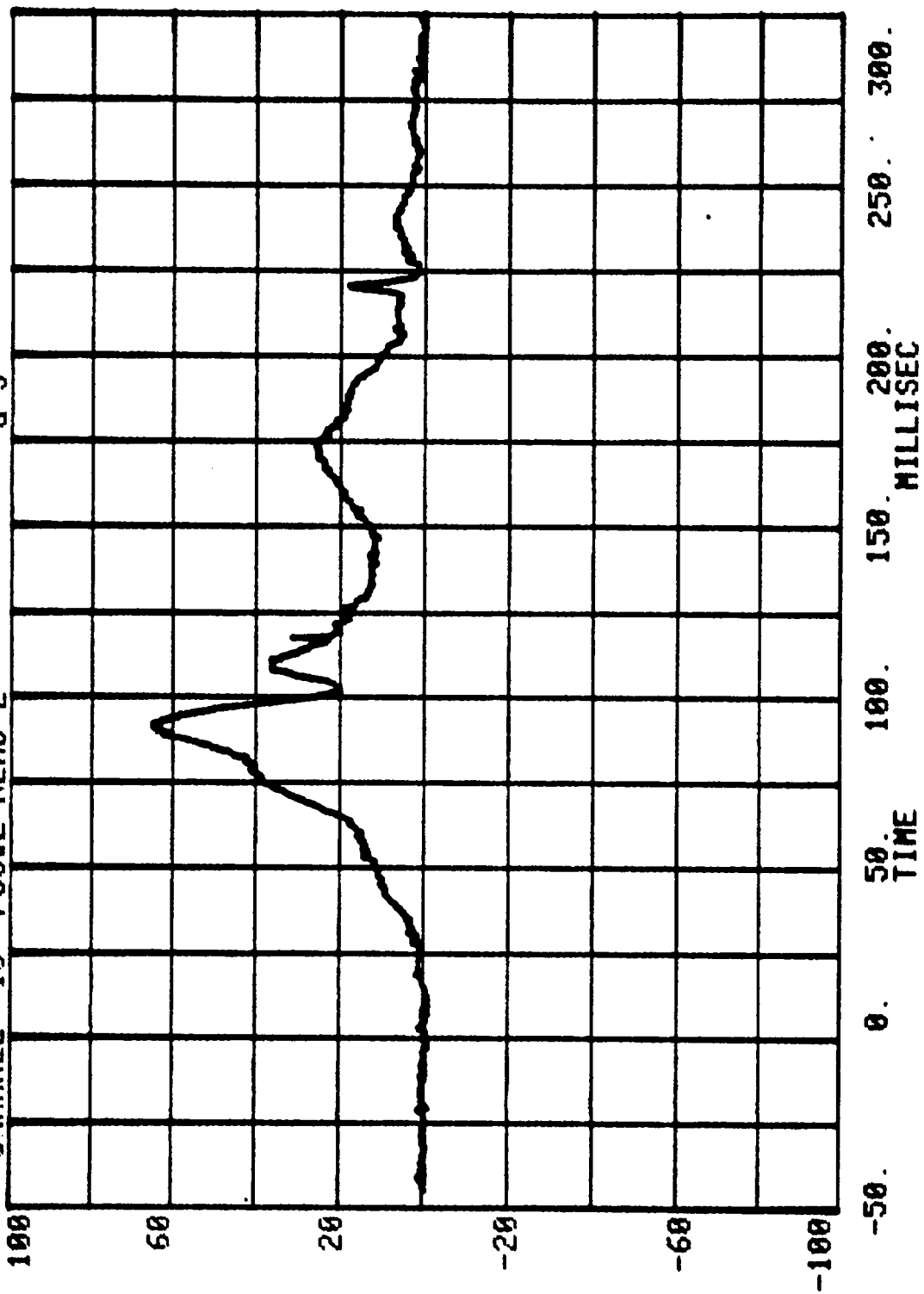
CHANNEL 13 POS#2 HEAD X
RUN= 822 SERIES= 5401 G'S



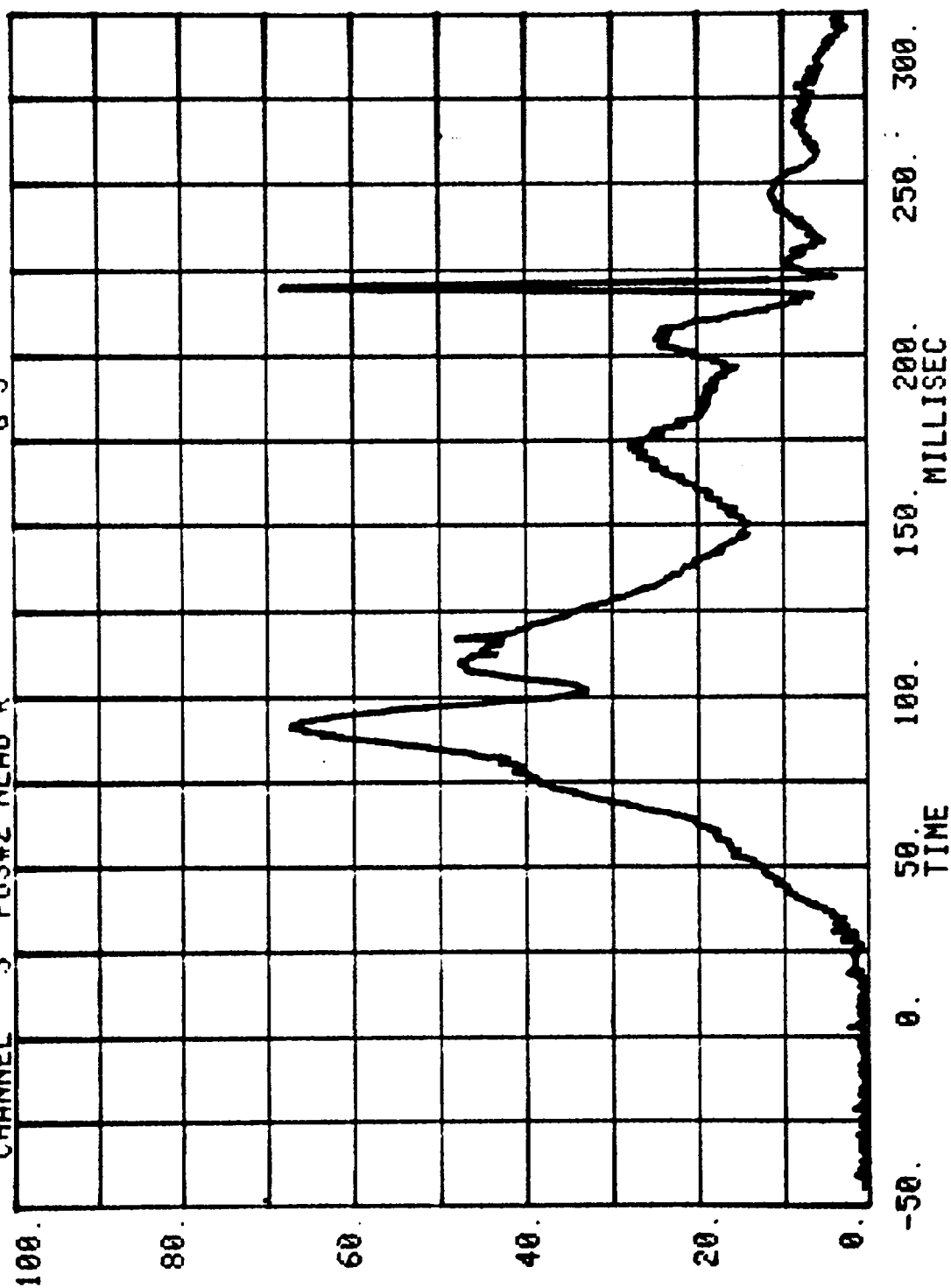
CHANNEL 14 POS#2 HEAD Y RUN= 822 SERIES= 5401 G'S



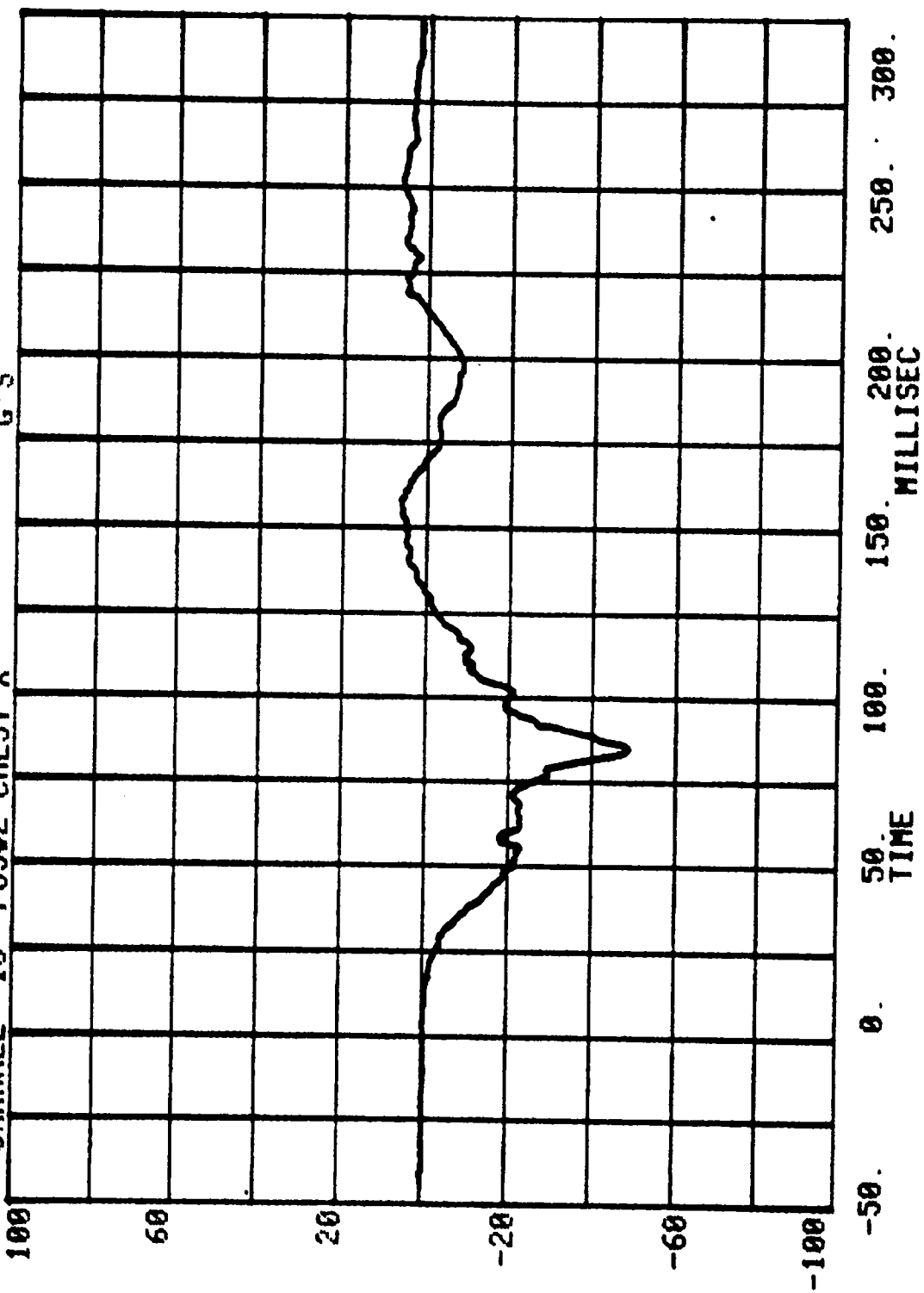
CHANNEL 15 POS#2 HEAD Z RUN= 822 SERIES= 5401 G'S



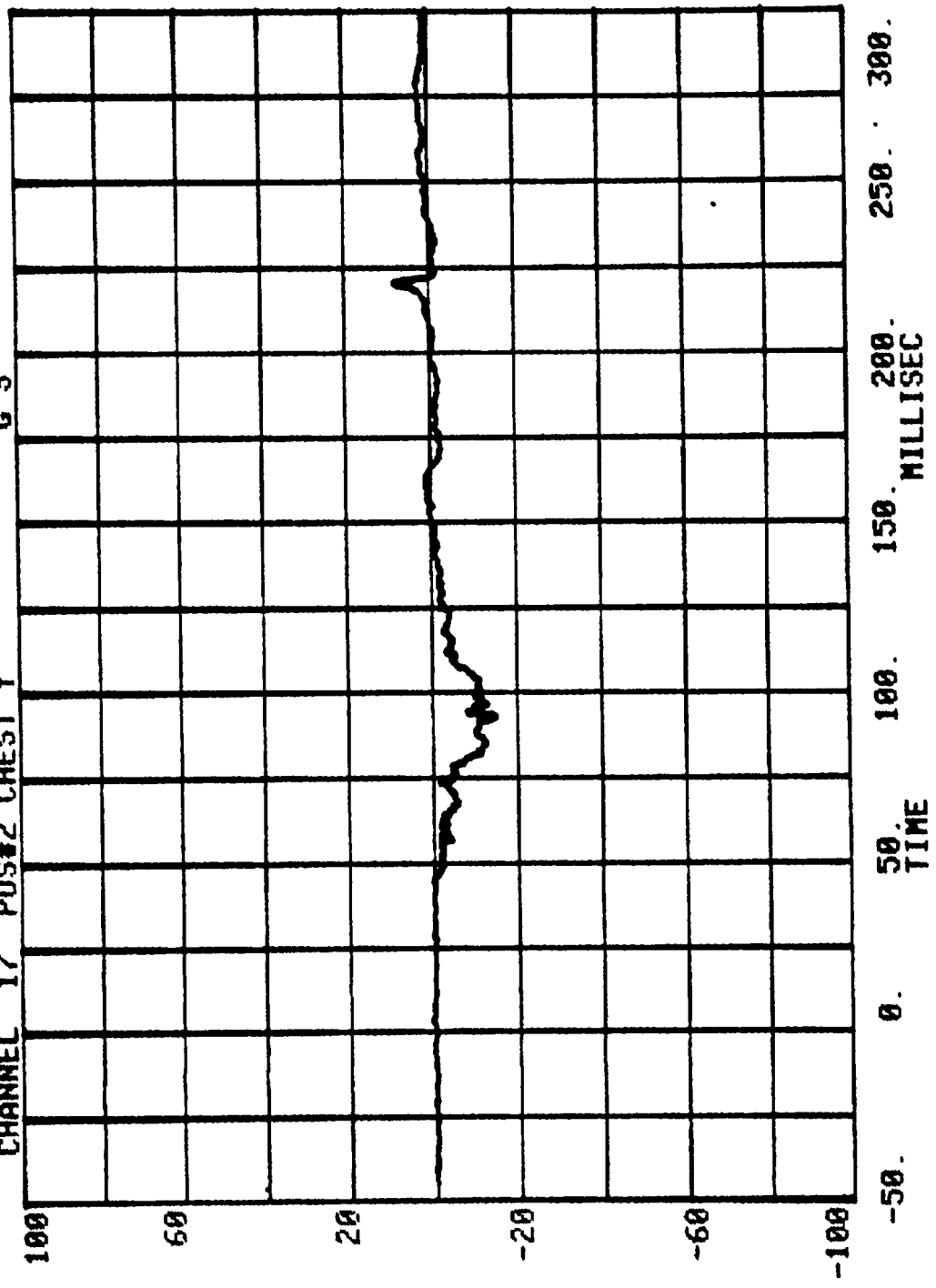
CHANNEL 3 POS#2 HEAD R RUN= 822 SERIES= 5401 G'S



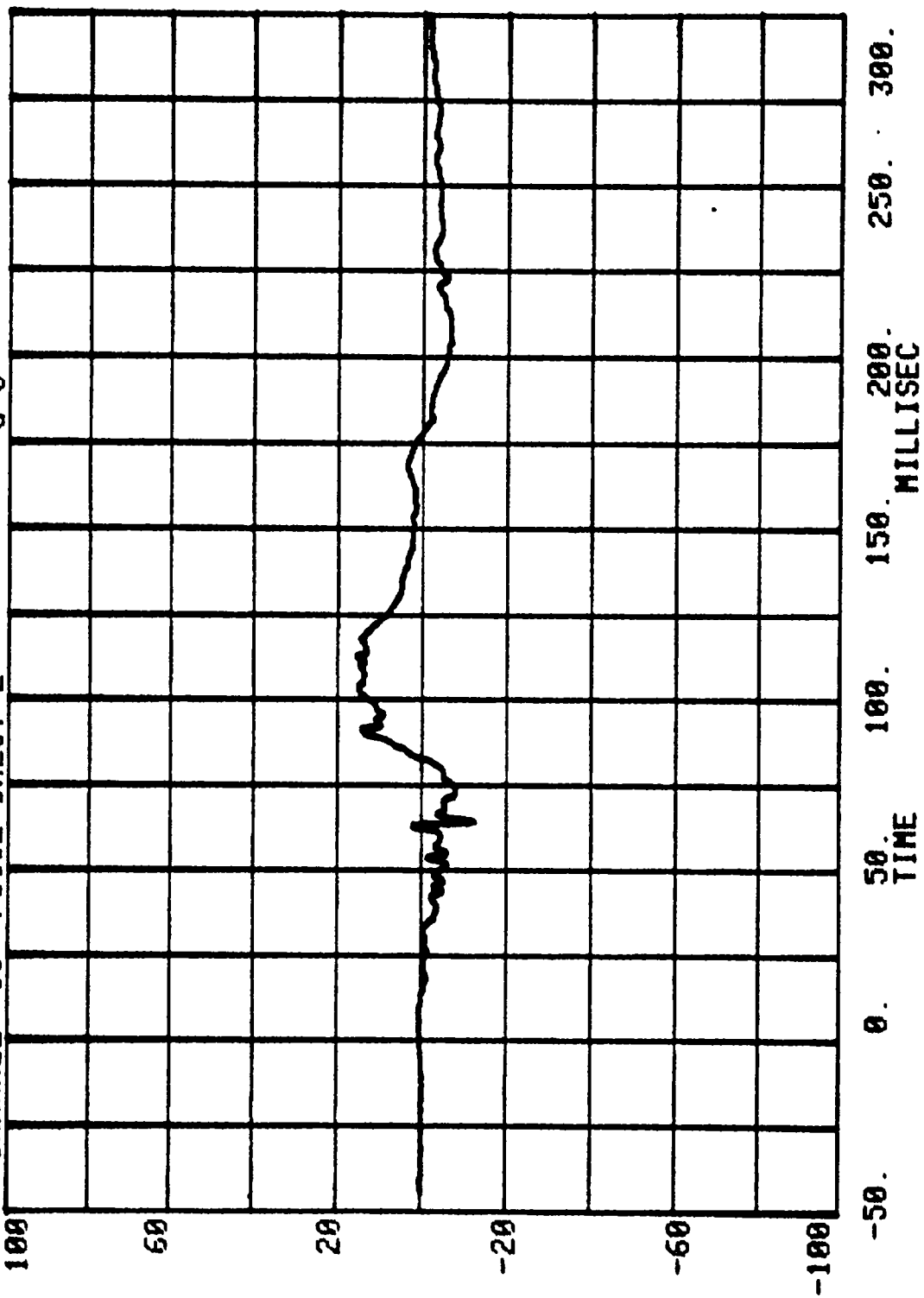
CHANNEL 16 POS#2 CHEST X
RUN= 822 SERIES= 5401 G'S



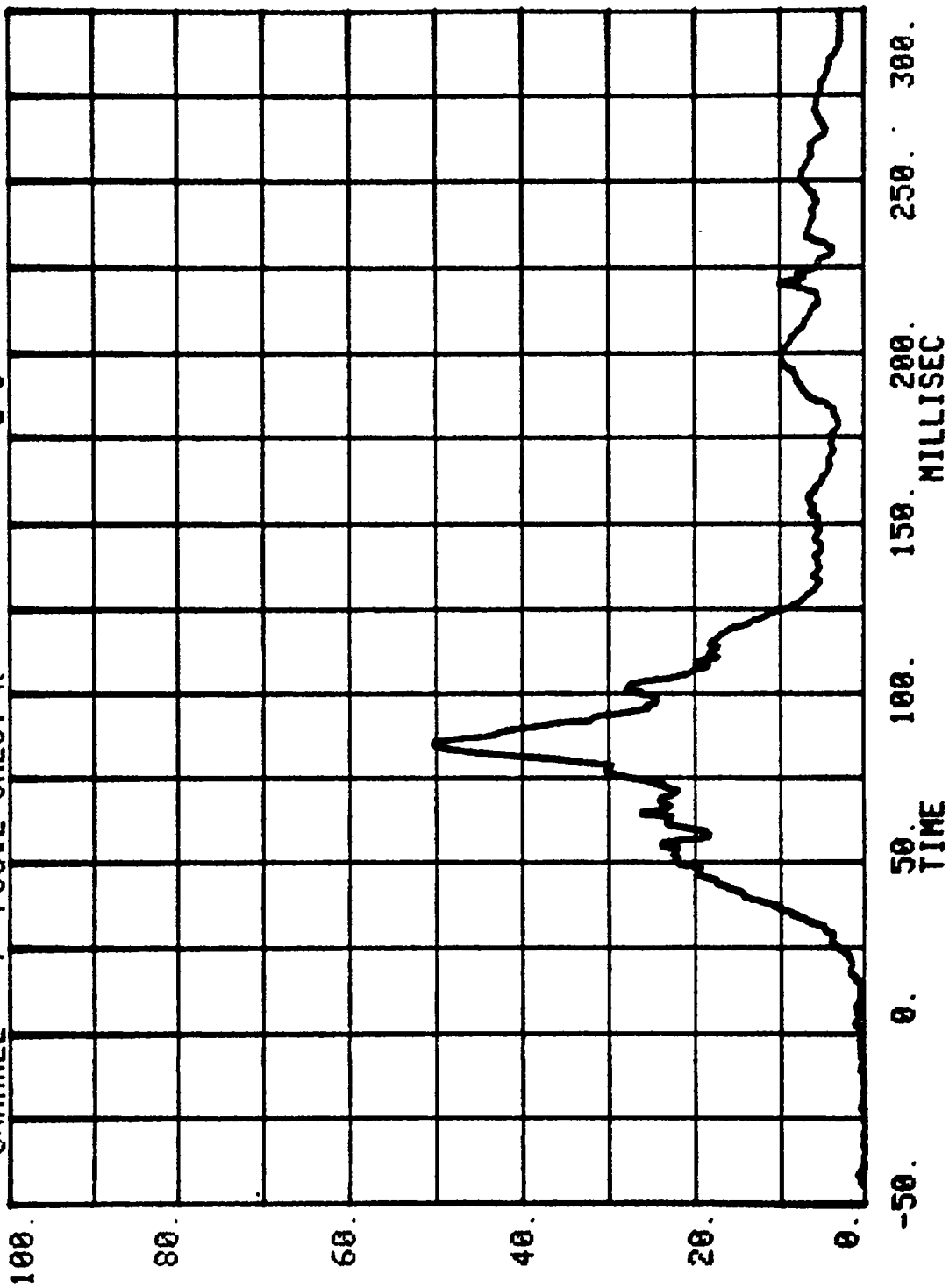
CHANNEL 17 POS#2 CHEST Y RUN= 822 SERIES= 5401 G'S



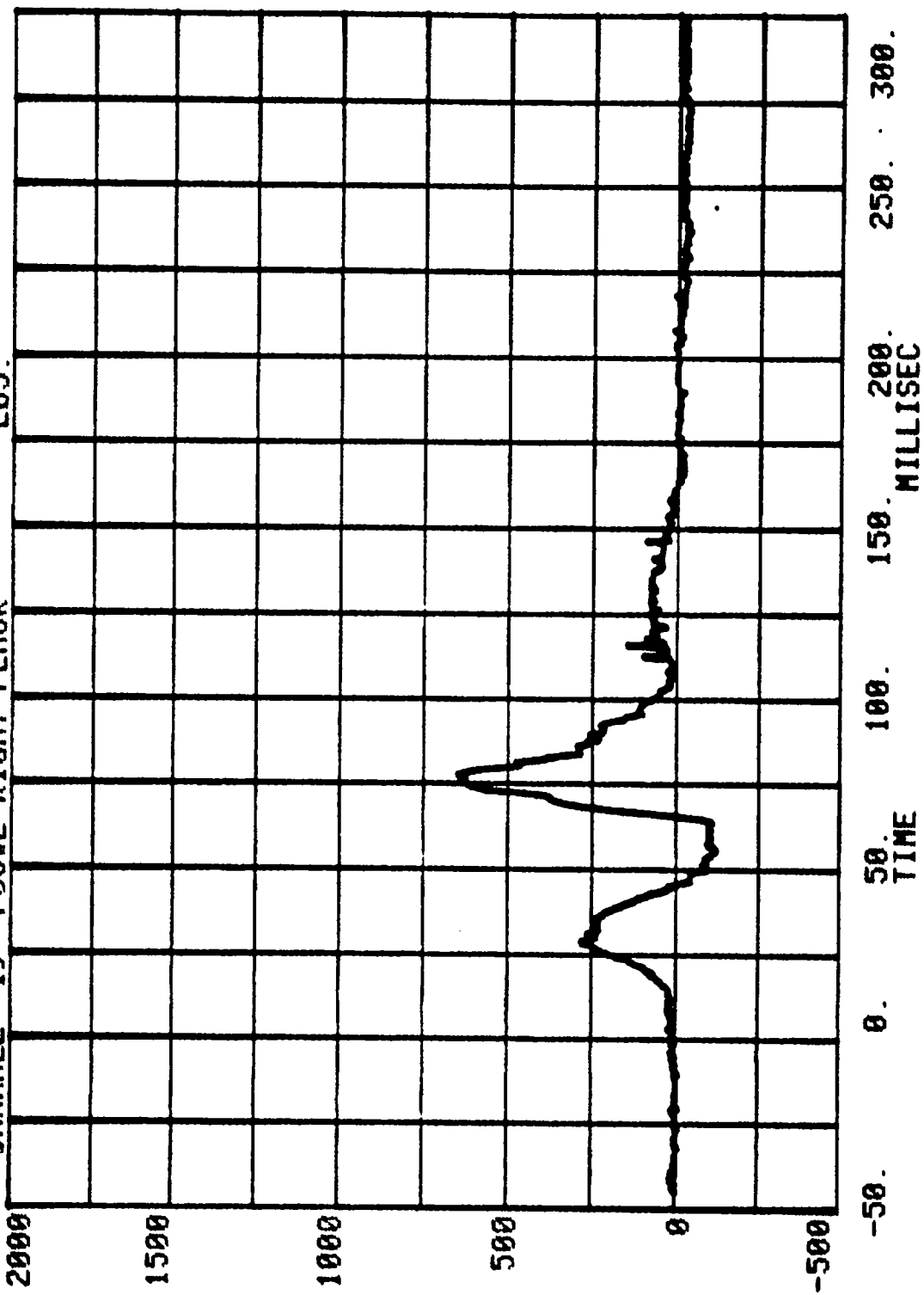
CHANNEL 18 RUN= 822 SERIES= 5401
POS#2 CHEST Z G'S



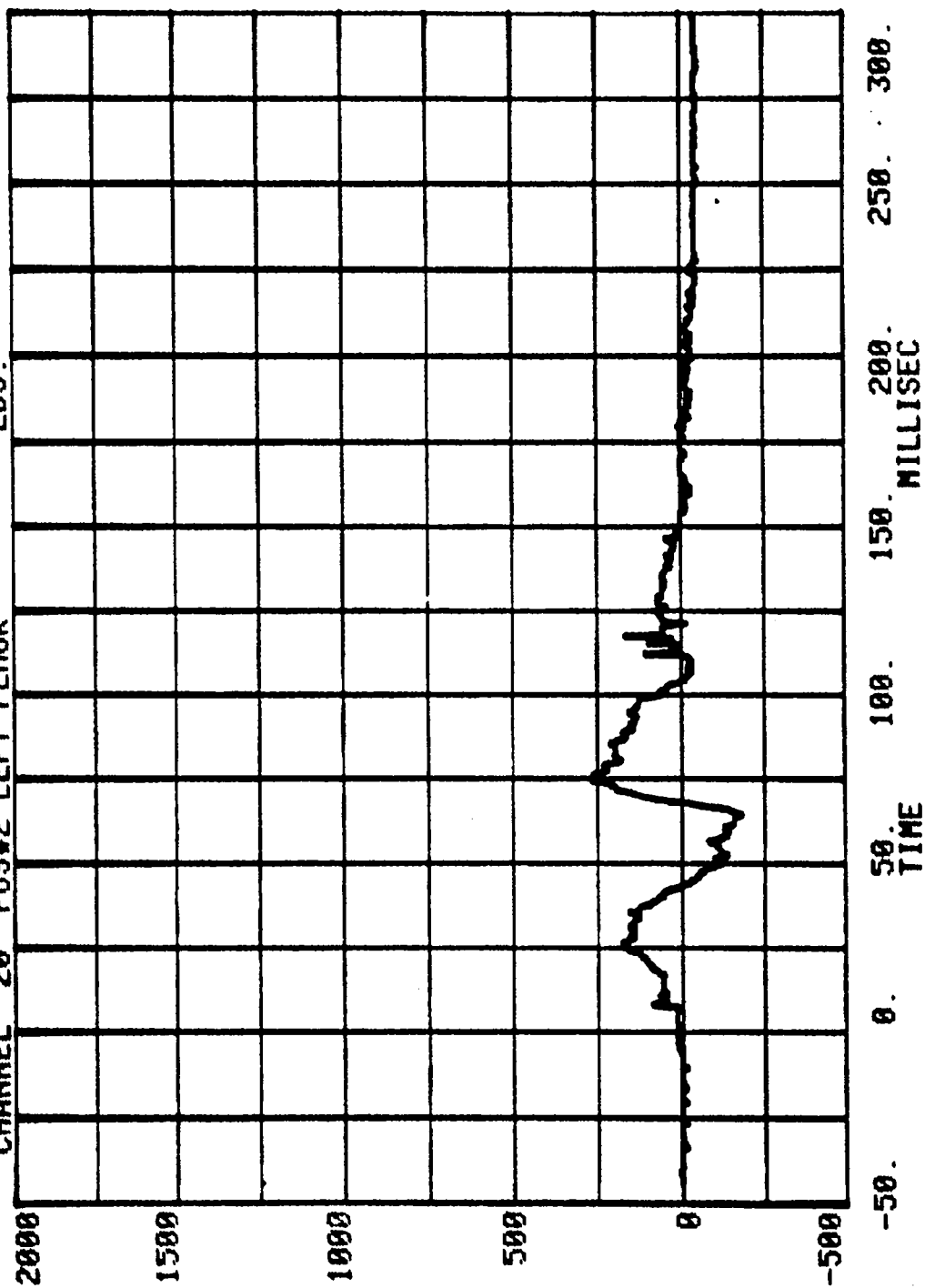
CHANNEL 4 POS#2 CHEST R RUN= 822 SERIES= 5401 G'S



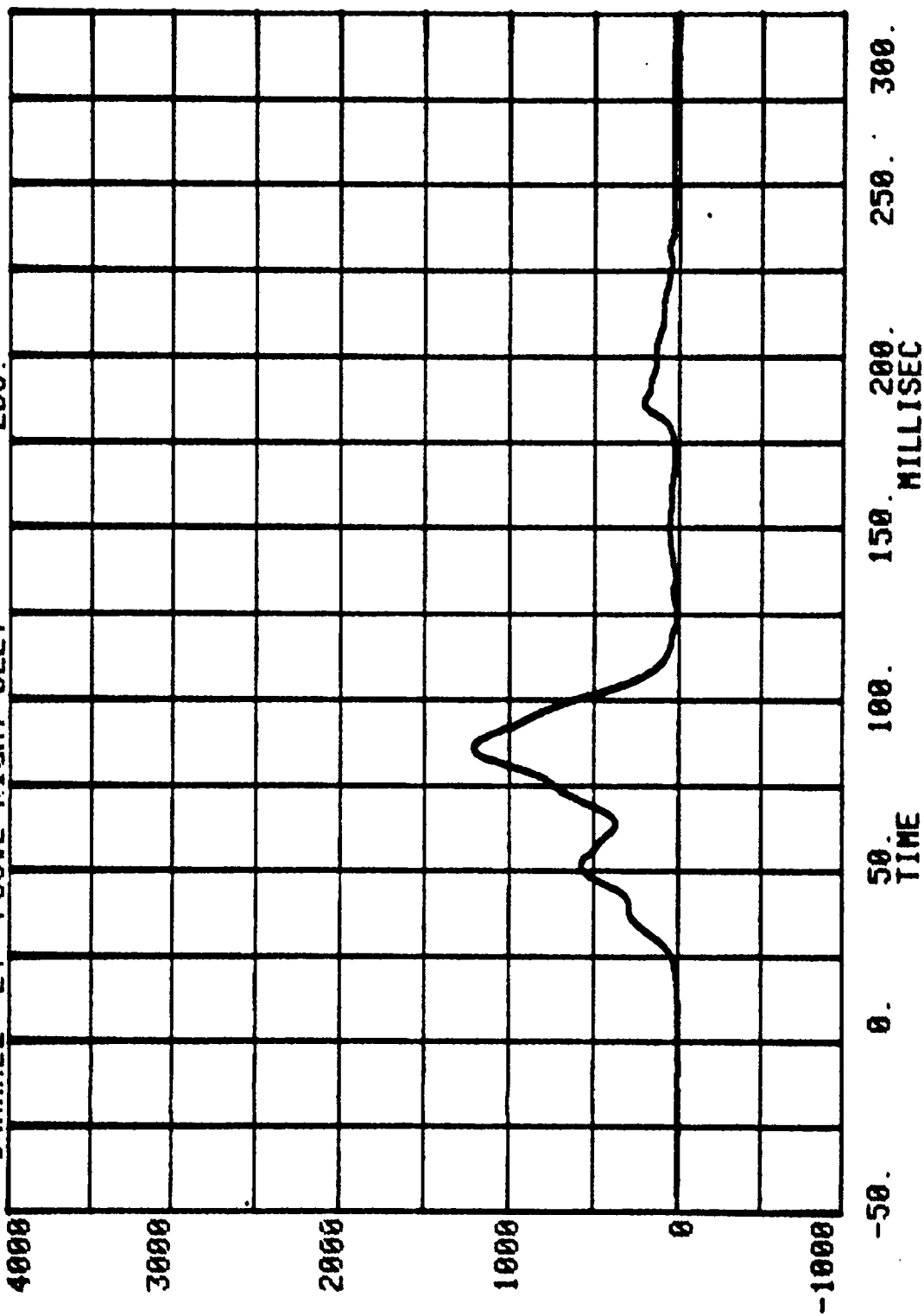
RUN= 822 SERIES= 5401
CHANNEL 19 POS#2 RIGHT FEMUR LBS.



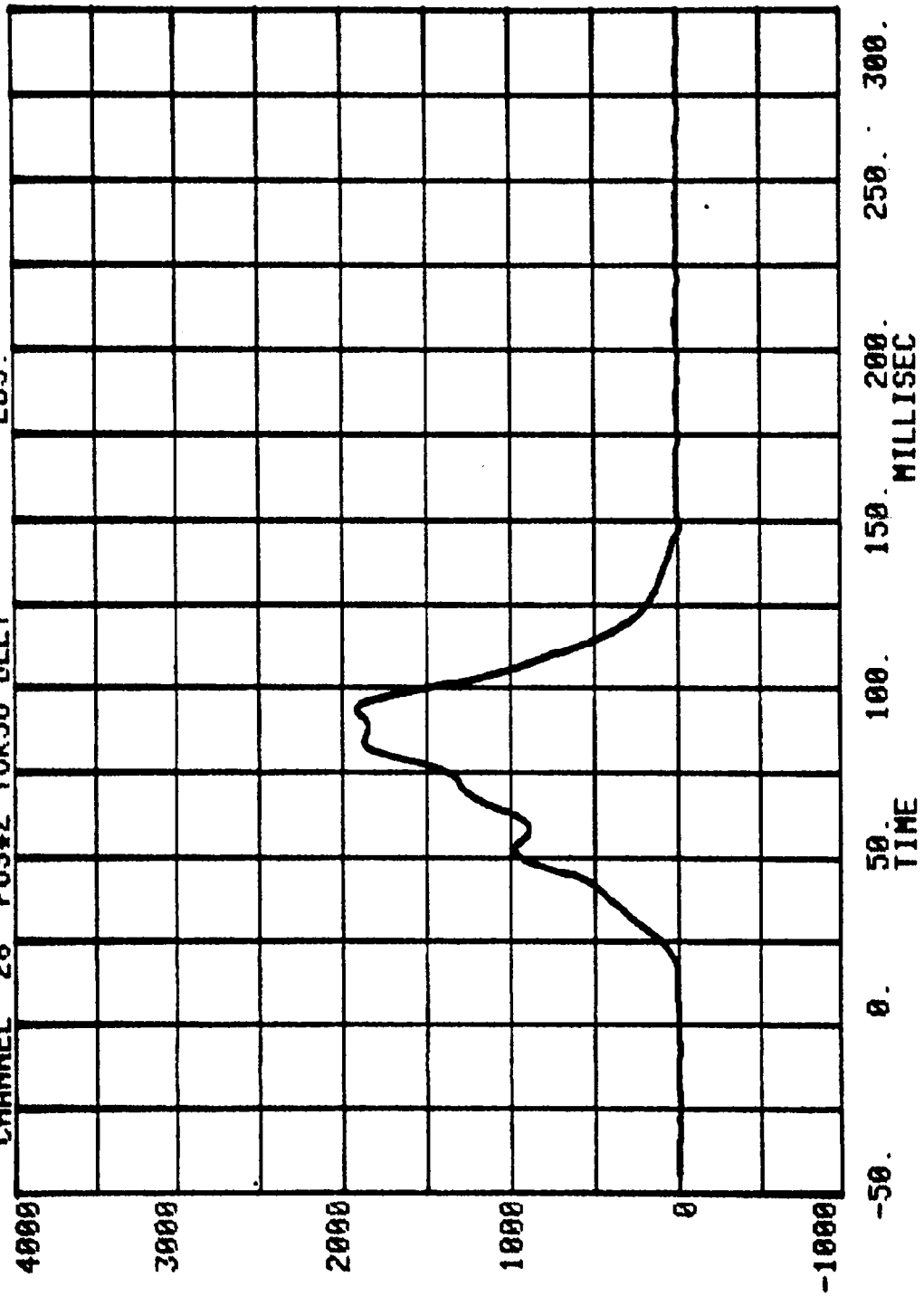
CHANNEL 20 POS#2 LEFT FEMUR
RUN= 822 SERIES= 5401 LBS.



CHANNEL 24 POS#2 RIGHT BELT
RUN= 822 SERIES= 5401 LBS.



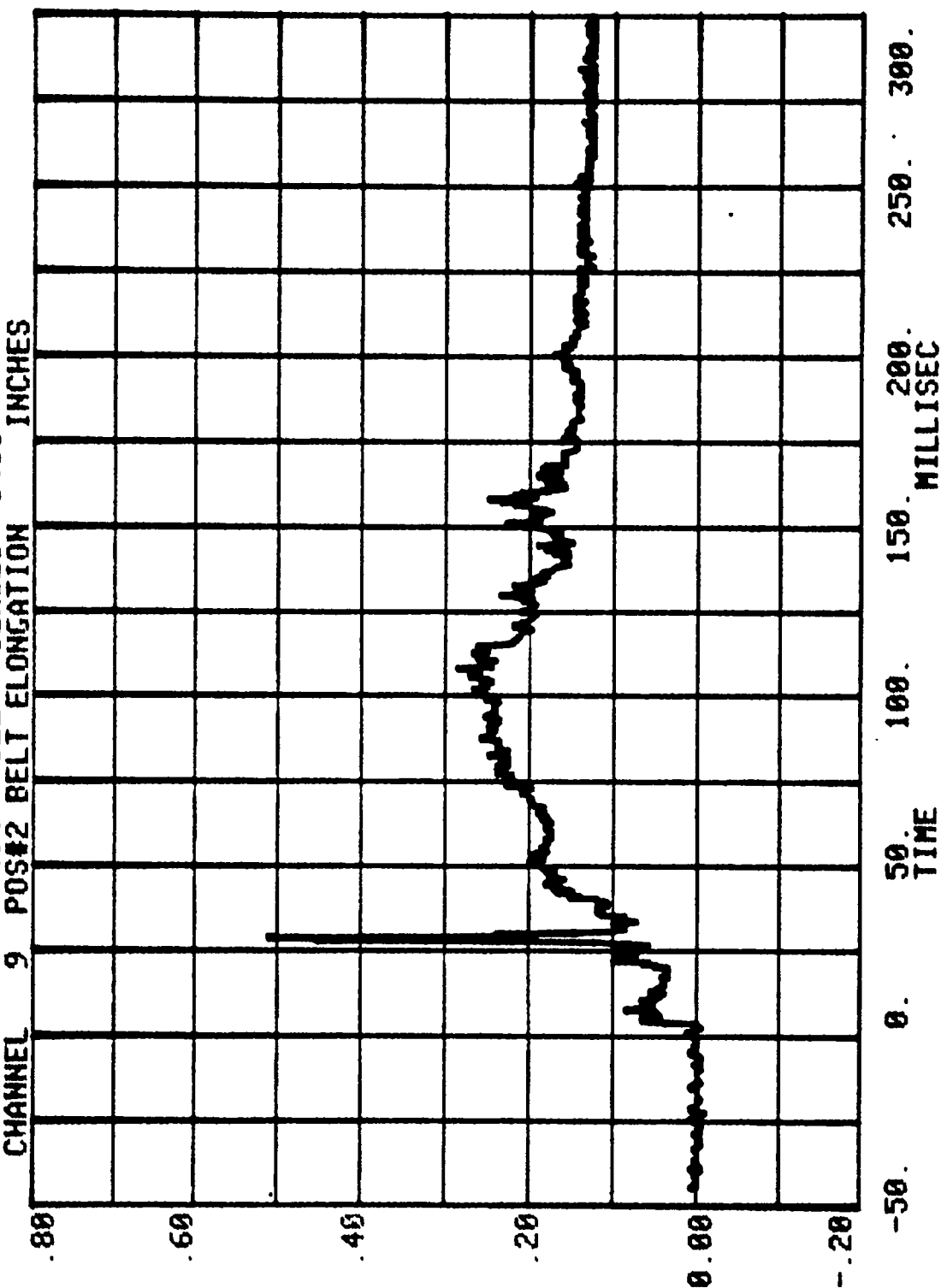
CHANNEL 26 POS#2 TORSO BELT
RUN= 822 SERIES= 5401 LBS.



Measured over 2.5 inches

CHANNEL 9 POS#2 BELT ELONGATION

RUN= 822 SERIES= 5401



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.

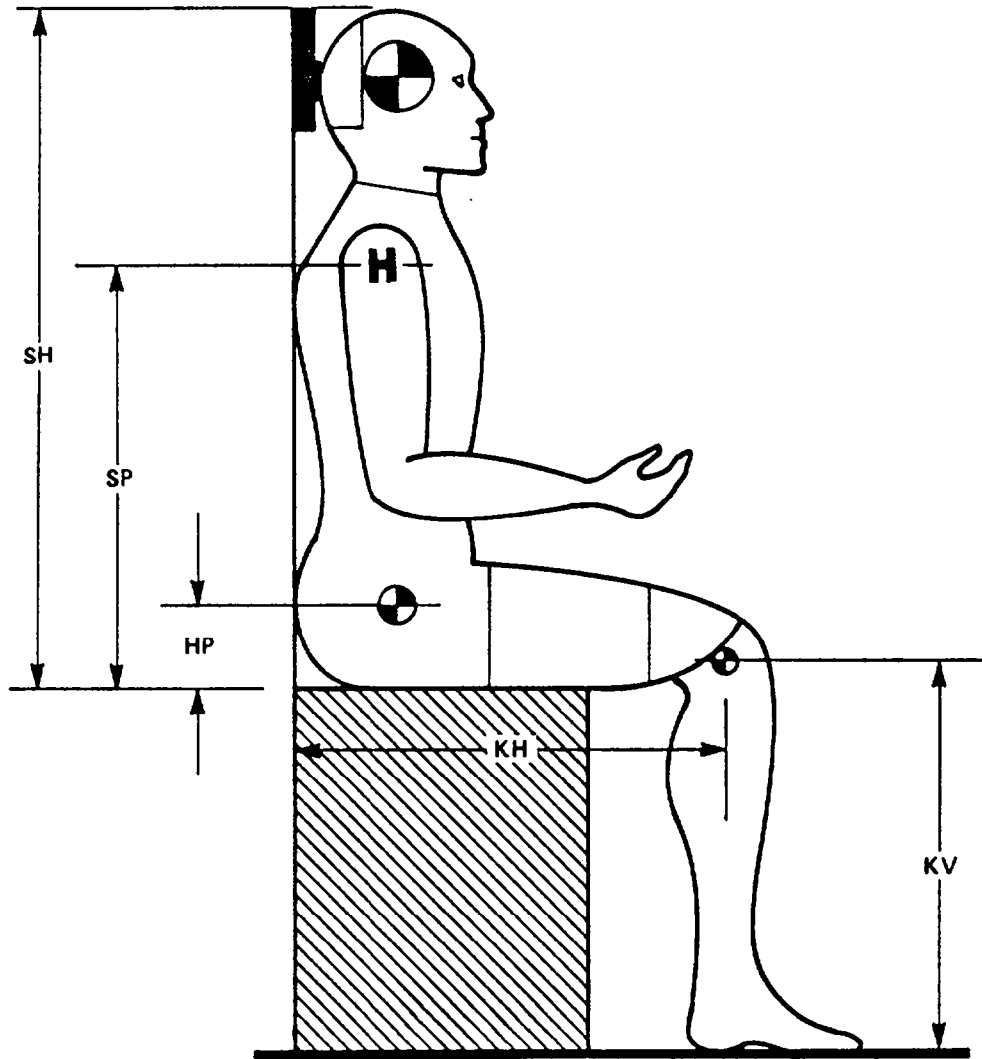
Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
1019	3-17-88
1020	2- 9-88

Electronic Test Equipment

The complement of signal conditioning recording and display equipment in conjunction with dummy certification testing can be found in New Car Assessment and Standards Inducant Testing Final Report, Report No. 6525-V-1.

Figure 10 DUMMY CONFIGURATION DIMENSIONS



PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 1019

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXXX	3-17-88	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXXX	3	
SH - Seated Height	35.6 to 35.8"	35.7 "	
SP - Shoulder Pivot Height	21.8 to 22.4"	22.2 "	
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"	19.6 "	
SW - Shoulder Width	17.8 to 18.4"	18.1 "	
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		3-17-88	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		3	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		70-71 deg	
VERIFICATION LAB HUMIDITY (10 TO 70 %)		25-30 %	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	260 G's	
b. peak lateral accel.	<= 10 G's	8.5 G's	
c. Time above 100 G's	0.9 to 1.5 ms.	1.1 ms	

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

TECHNICIAN'S NAME:

DW Hess

1. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	22.2 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23 G's	
c. Peak Resultant Head Acceleration		26 G's max.	23 G's	
d. Pendulum Decel. (t2-t1)		≤ 3 ms.	2 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	25.5 ms	
f. Pendulum Decel. (t4-t3)		≤ 10 ms.	3.7 ms	
g. Max. Head Rotation		63 to 73 deg.	72 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.	27.1 ms	
	Displ.	2.1 to 3.1"	2.9 "	
60 deg.	Time	40.3 to 51.7 ms.	41 ms	
	Displ.	4.3 to 5.3"	4.8 "	
Maximum (72 deg)	Time	53.2 to 66.8 ms.	56.5 ms	
	Displ.	5.0 to 6.0"	5.7 "	
60 deg.	Time	67.0 to 83.0 ms.	73.7 ms	
	Displ.	4.3 to 5.3"	4.7 "	
30 deg.	Time	85.4 to 104.6 ms.	90.6 ms	
	Displ.	2.1 to 3.1"	2.4 "	
0 deg.	Time	101.0 - 123.0 ms.	104.3 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: Dh11teed

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

		PRE-TEST (if required)	POST-TEST (if required)
TEST PARAMETER	SPECIFICATION		
3. ABDOMINAL COMPRESSION			
TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	27 lbs	
b. Force @ 0.75"	36 to 50 lbs.	42 lbs	
c. Force @ 1.0"	50 to 63 lbs.	58.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	83.5 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	27 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	40 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	52 lbs	
d. Return Angle	12 deg. maximum	8 deg	
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	22.1 fps	
(2) Peak Deflection	1.7" maximum	1.6 "	
(3) Peak Resistive Force	2250 lbs maximum	2106 lbs	
(4) Internal Hysteresis	50 to 70%	66.8 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	.88 "	
(3) Peak Resistive Force	1450 lbs maximum	1235 lbs	
(4) Internal Hysteresis	50 to 70%	69.4 %	

TECHNICIAN'S NAME:

D. W. Hess

 . PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

		PRE-TEST (if required)	POST-TEST (if required)
TEST PARAMETER	SPECIFICATION		
B. KNEE IMPACT TEST			

A. Right Side			

(1) Probe Speed	6.76 to 7.04 fps	6.8 fps	
(2) Maximum Force	1850 to 2500 lbs	2400 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.7 ms	
B. Left Knee			

(1) Probe Speed	6.76 to 7.04 fps	7.01 fps	
(2) Maximum Force	1850 to 2500 lbs	2350 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	

REMARKS:

TECHNICIAN'S NAME:

DLW Hess

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER 1019

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

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	2-9-88	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	2	
SH - Seated Height	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height	21.8 to 22.4"	22.0"	
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"	19.4"	
SW - Shoulder Width	17.8 to 18.4"	18.1"	
HW - Hip Width	14.0 to 15.4"	14.6"	

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		2-9-88	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		2	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		70 deg	
VERIFICATION LAB HUMIDITY (10 TO 70 %)		20-26 %	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	230 G's	
b. peak lateral accel.	<= 10 G's	8 G's	
c. Time above 100 G's	0.9 to 1.5 ms.	1.1 ms	

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

TECHNICIAN'S NAME:

D. W. H. 22

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1020

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	21.8 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	24 G's	
c. Peak Resultant Head Acceleration		26 G's max.	25 G's	
d. Pendulum Decel. (t2-t1)		≤ 3 ms.	1.9 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	29 ms	
f. Pendulum Decel. (t4-t3)		≤ 10 ms.	7 ms	
g. Max. Head Rotation		63 to 73 deg.	70 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	28.1 ms	
	Displ.	2.1 to 3.1"	2.6 "	
60 deg.	Time	40.3 to 51.7 ms.	43.5 ms	
	Displ.	4.3 to 5.3"	5.0 "	
Maximum (70 deg)	Time	53.2 to 66.8 ms.	59 ms	
	Displ.	5.0 to 6.0"	5.6 "	
60 deg.	Time	67.0 to 83.0 ms.	74 ms	
	Displ.	4.3 to 5.3"	4.8 "	
30 deg.	Time	85.4 to 104.6 ms.	92 ms	
	Displ.	2.1 to 3.1"	2.2 "	
0 deg.	Time	101.0 - 123.0 ms.	106 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: D. H. H. H.

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1020

		PRE-TEST (if required)	POST-TEST (if required)
TEST PARAMETER	SPECIFICATION		
3. ABDOMINAL COMPRESSION			
TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	25 lbs	
b. Force @ 0.75"	36 to 50 lbs.	37 lbs	
c. Force @ 1.0"	50 to 63 lbs.	51 lbs	
d. Force @ 1.3"	73 to 88 lbs.	78 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	26.5 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	42 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	54 lbs	
d. Return Angle	12 deg. maximum	9 deg	
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.9 fps	
(2) Peak Deflection	1.7" maximum	1.56 "	
(3) Peak Resistive Force	2250 lbs maximum	2132 lbs	
(4) Internal Hysteresis	50 to 70%	51.4 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	14.1 fps	
(2) Peak Deflection	1.1" maximum	.96 "	
(3) Peak Resistive Force	1450 lbs maximum	1300 lbs	
(4) Internal Hysteresis	50 to 70%	65.3 %	

TECHNICIAN'S NAME: D.L. Hoot

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1020

		PRE-TEST (if required)	POST-TEST (if required)
TEST PARAMETER	SPECIFICATION		
6. KNEE IMPACT TEST			
A. Right Side			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2150 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.7 ms	
B. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	6.9 fps	
(2) Maximum Force	1850 to 2500 lbs	2150 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	

REMARKS:

TECHNICIAN'S NAME: D. W. H. 2.2

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER 1020

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CS75	4-88	10-88
HY LATERAL--	ENDEVCO	CY89	4-88	10-88
HZ VERTICAL--	ENDEVCO	CE76	4-88	10-88
2. CHEST ACCELEROMETER--				
CX LONGITUDINAL--	CEC	A150	1-88	7-88
CY LATERAL--	ENDEVCO	CL65	1-88	7-88
CZ VERTICAL--	CEC	A151	1-88	7-88
3. FEMUR LOAD CELLS				
RIGHT SIDE	GSE	548	10-87	4-88
LEFT SIDE	GSE	549	10-87	4-88
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A144	12-87	6-88
2. TEST PROBE ACCELEROMETER--	CEC	A142	12-87	6-88
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS- DUCER INC	20051	11-87	5-88
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	11-87	5-88
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	11-87	5-88

APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

77U2-0230E

SEAT BELT RESTRAINT SYSTEM

Seat belts with retractors

To help decrease the possibility or severity of injury in accidents or sudden stops, we recommend that you and your passengers in the vehicle be properly restrained at all times, using the seat belts provided. The front seat lap-shoulder belts have retractors with inertia locks.

The retractors keep the belts out of the way while passengers enter or exit the vehicle. Inertia locks allow the belts to remain slack on the passengers for comfort until a deceleration force occurs (such as a sudden stop or collision). At that time the belts will automatically lock in position, and the passengers will not be thrown forward.

WARNING!

- Seat and shoulder belt assemblies may be damaged when subjected to stress by occupants in a collision and must be replaced.
- Passengers should not be allowed to ride in the cargo area of any vehicle. Persons who are not riding in a seat with a fastened seat belt are much more likely to suffer serious bodily injury in the event of a collision.

77U2-0240E

FRONT SEAT BELTS

To Fasten Seat Belt:

1. Grasp the buckle end and tongue plate.
2. Slowly pull out the lap-shoulder belt.
3. Insert the tongue plate into the open end of the buckle. An audible click will indicate the belt is securely locked.

Position the lap belt across your lap as **LOW ON THE HIPS** as possible to reduce the risk of sliding under it during an accident. Adjust it to a **SNUG FIT** by pulling the belt through the tongue plate. The belt retractor is designed to take up excess webbing automatically and maintain tension on the belt.

NOTE

If the belt locks when being pulled out, rewind the belt completely in the retractor and then pull out to the desired length.

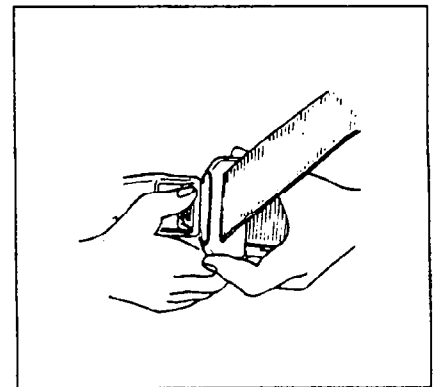
WARNING!

Never wear the shoulder belt under the arm. Never swing it around your neck and over the inside shoulder. Never use a single belt for more than one person. Be sure the lap portion of the belt is fitted snugly around the hips, not on the waist. Use the shoulder belt on the outside shoulder only. Failure to follow these precautions could increase the

chance and/or severity of injury in an accident.

To Unfasten Seat Belt

To unfasten the belt, depress the buckle release button.

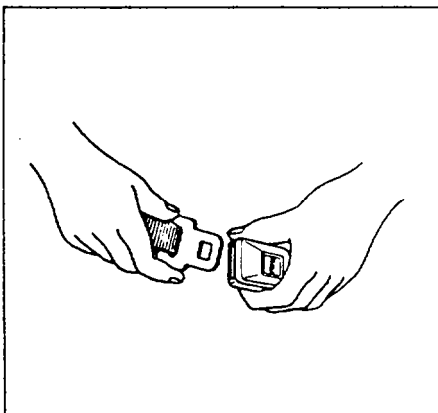


**To Fasten Rear Seat Belts:
(If equipped with the rear seat)**

1. Grasp the buckle end.
2. Grasp the tongue plate and pull it until the desired length is obtained.
3. Insert the tongue plate into the open end of the buckle until an audible click is heard, which indicates the belt is locked. Make sure the belt is not twisted.
4. Adjust the belt by pulling the belt down toward the retractor.

WARNING!

Be sure the lap belt is fitted snugly around the hips, not on the waist. Failure to do so may increase the chance of injury in the event of a collision.



NOTE

If the belt locks when being pulled out, rewind the belt completely in the retractor and then pull out to the desired length.

To Unfasten Seat Belts

Depress the buckle release button.

RESTRAINT OF INFANTS OR SMALL CHILDREN

Any number of companies manufacture safety seats for infants and small children. An acceptable child restraint system should always satisfy local motor vehicle safety standards.

Moreover, it should be chosen to fit both the size of the child and of the vehicle seat.

It is recommended that the child restraint be installed in the rear seat (for 4 seater models).

Be sure to follow any instructions provided by the manufacturer when installing the child restraint system.

CAUTION

- Do not select a child restraint system which requires an anchor, because your vehicle is not so equipped.
- Since a safety belt or child restraint can become very hot if it is left in a closed vehicle, be sure and check the seat cover and buckles before placing a child there.
- When the child restraint system is not in use, fasten it with a safety belt or luggage straps (if equipped, see page 2—23 for detailed information.) so that it will not be thrown forward in the case of a sudden stop or accident.