

REPORT NO. CAL-87-N18

1048

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

HYUNDAI MOTOR COMPANY

1987 HYUNDAI EXCEL

4 DOOR SEDAN

NHTSA NO. MH5302

CALSPAN TEST NO. 7556-18

CALSPAN CORPORATION
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FINAL REPORT

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16. Abstract A Frontal Load Cell Barrier Test of a 1987 Hyundai Excel 4-Door Sedan was performed at the Calspan Corporation, Advanced Technology Center Crash Test Facility in Buffalo, New York on June 10, 1987. Impact speed was 35.4 mph and the ambient temperature at the Barrier face at the time of impact was 62°F. The maximum post-test vehicle crush was 22.5 inches. The 1987 Hyundai Excel 4-door Sedan was equipped with a 2-point passive shoulder belt. With regard to the FMVSS No. 208 "Occupant Crash Protection" injury criteria the driver dummy appears to exceed the femur load criteria.					
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Section 1
PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 87 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.

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 MH5302

A load cell barrier consisting of 36 load cells was impacted by a 1987 Hyundai Excel 4-Door Sedan at a velocity of 35.4 mph. The test was performed at the Calspan Corporation Advanced Technology Center on June 10, 1987. 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.

The 1987 Hyundai Excel 4-Door Sedan was equipped with a 2-point passive shoulder belt.

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were not used on the driver's and passenger's shoulder belts. The Driver ATD (Serial No. 1019) and the Right Front Passenger ATD (Serial No. 1022) had been used in a previous test (MH5300) and the Injury Criteria Values were not exceeded in that test. Certification details along with instrumentation calibration data, are found in Appendix C.

The 59 channels of data were recorded on six 14-channel FM tape recorders. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

The driver's head struck the steering wheel rim and dashpanel. The Driver's HIC was 757. The maximum chest deceleration over 3 milliseconds was 54 g's and femur loads were 2408 and 1794 pounds.

The right front passenger's HIC was 345. The maximum chest deceleration over 3 milliseconds was 46 g's and femur loads were 1006 and 1187 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1987 Hyundai Excel 4-Door Sedan

NHTSA NO.: MH5302 VIN.: KMHLE22J9HU169561

BODY COLOR: Grey DATE OF MANUFACTURE: February 1987

Engine: 4 cylinders; - C.I.D.; 1.5 Liters; - CC
4 Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse

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

Date Received: 5/12/87 Odometer Reading: 11
- A/C; X P/S; X P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint: 2-point passive shoulder restraint

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 30 psi, Rear 30 psi

Recommended Tire Size: P155/80R13 P175/70R13

Recommended Cold Tire Pressure: Front 30 psi, Rear 30 psi

Tires on Vehicle: P155/80R13; Manufacturer: Goodyear

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 X Lever - Rot. Knot

Vehicle Capacity Weight (VCW) = 816 lbs. (A)

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

Rated Cargo and Luggage Weight (RCLW) A-B = 66 lbs.

GVWR 3185 lbs. GAWR: Front 1653 lbs. Rear 1587 lbs.

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

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

Right Front = <u>660</u> lbs.	Right Rear = <u>430</u> lbs.
Left Front = <u>680</u> lbs.	Left Rear = <u>430</u> lbs.
TOTAL FRONT WEIGHT = <u>1340</u> lbs. (<u>60.9</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>860</u> lbs. (<u>39.1</u> % of Total Vehicle Weight)	
TOTAL DELIVERY WEIGHT = <u>2200</u> lbs.	

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2200 lbs.)
 VCW = Vehicle Capacity Weight (816 lbs.)
 DSC = Designated Seating Capacity (6)
 RCLW = VCW - 150 (DSC) = 66 lbs.
 Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
 Target Test Weight = 2594 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 132 POUNDS CARGO:

Right Front = <u>730</u> lbs.	Right Rear = <u>590</u> lbs.
Left Front = <u>730</u> lbs.	Left Rear = <u>610</u> lbs.
TOTAL FRONT WEIGHT = <u>1460</u> lbs. (<u>54.9</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>1200</u> lbs. (<u>45.1</u> % of Total Vehicle Weight)	
TOTAL TEST WEIGHT = <u>2660</u> lbs.	
Weight of ballast secured in vehicle trunk area = <u>0</u> lbs.	

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude:	RF <u>25.4"</u>	LF <u>25.3"</u>	RR <u>24.2"</u>	LR <u>24.2"</u>
Test Attitude:	RF <u>25.1</u>	LF <u>25.2</u>	RR <u>22.5</u>	LR <u>22.5</u>
Wheel Base: <u>93.7</u> in.; C.G. = <u>42.3</u> in. rearward of front wheel C/L				
Remarks: <u>9.8 gallons of solvent in fuel tank. Vehicle was received</u> <u>without owner's manual, consumer information or warrenty information.</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: 6/10/87 Time of Test: 11.40
 Ambient Temperature: 62 °F at impact area
 Temperature in Occupant Compartment: 73 °F.
 Windshield Molding Temperature: 70 °F.
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 35.4 mph, secondary = 35.4 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>165.5</u>	C _L	<u>167.3</u>	L	<u>165.7</u>
	Post-test	= R	<u>143.2</u>	C _L	<u>144.8</u>	L	<u>144.1</u>
	Crush	= R	<u>22.3</u>	C _L	<u>22.5</u>	L	<u>21.6</u>

Distance from front of test vehicle to point of impact:

R 10.3" C/L 8.2" L 10.3"

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Top of Steering Wheel & Dash</u>	<u>No Contact</u>
Chest	<u>Hub of Steering Wheel</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	In Operation	In Operation	Operable	Operable

	<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>None</u>	<u>None</u>

Glazing Damage

Backlight/Windshield	<u>Windshield Shattered</u>
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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)	-172	-89	101	201	-54	-48	14	54
DUMMY (2)	-17	25	42	50	-48	22	-18	46
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1794	2408
DUMMY (2)	1006	1187
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)	Not installed	No Lap Belt	No Lap Belt
DUMMY (2)	Not installed	No Lap Belt	No Lap Belt
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	36 MILLISEC MAX.		AVE. ACC. (g) t ₁ TO t ₂
		t ₁ (SEC)	t ₂ (SEC)	
DUMMY (1)	756.9	.0681	.09285	62.3
DUMMY (2)	345.1	.07507	.11107	39.1
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

***HIC WAS CALCULATED FROM 0 TO 175 MILLISECONDS

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

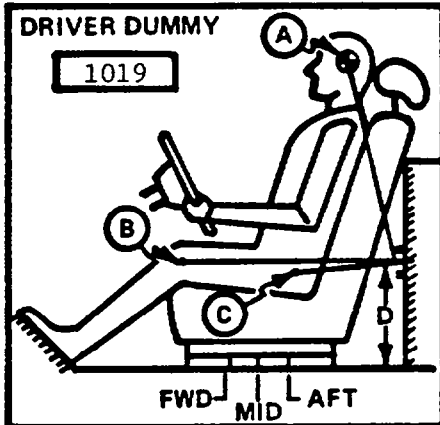
TEST NO.: MH5302

VEHICLE: 1987 Hyundai Excel 4-Dr. Sedan

SEAT TYPE:
 Bench
 X Bucket
 Split Bench

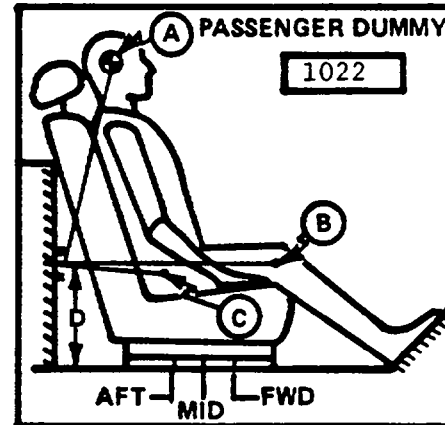
ADJUSTER TYPE:
 X Manual
 Power

BUCKET SEAT BACK TYPE:
 Fixed
 X Adjustable Reclining



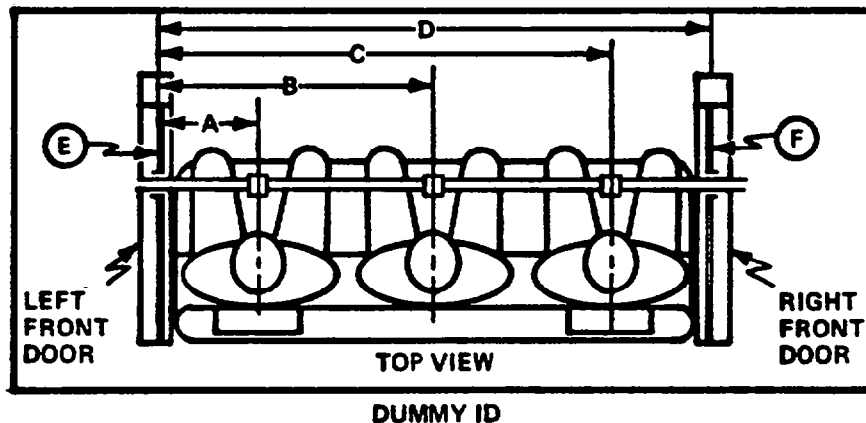
**MEASUREMENT
LOCATION**

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



A = 22.0 in. 1 Degrees
 B = 20.3 in. 95 Degrees
 C = 6.7 in. 131 Degrees
 D = 11.2 in.

A = 21.6 in. 0 Degrees
 B = 21.0 in. 97 Degrees
 C = 7.1 in. 138 Degrees
 D = 11.2 in.



1019

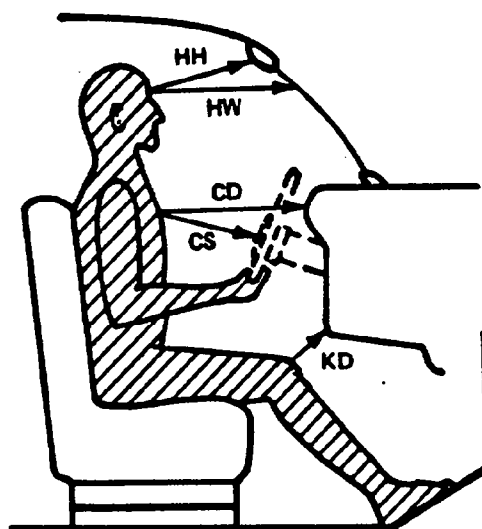
1022

A	=	Left Door to Driver Centerline	<u>11.0</u> in.
B	=	Left Door to Center Passenger Centerline	<u>-</u> in.
C	=	Left Door to Right Passenger Centerline	<u>35.7</u> in.
D	=	Left Door to Right Door	<u>47.3</u> in.
E, F	=	Window Glass Height (Right and Left Must Be Equal)	<u>11.0</u> in.

Figure 2

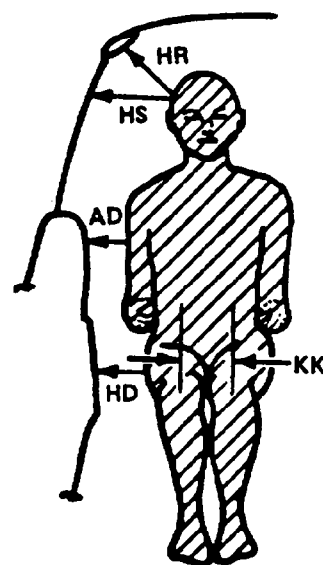
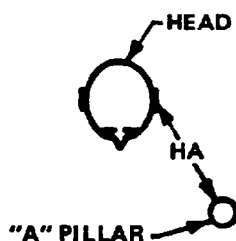
OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	15.0	14.3
HW	19.8	18.9
CD	21.8	24.6
CS	14.9	-
KDL	6.0	6.3
KDR	6.6	6.1
SA	9th notch	9th notch
TA	25°	25°



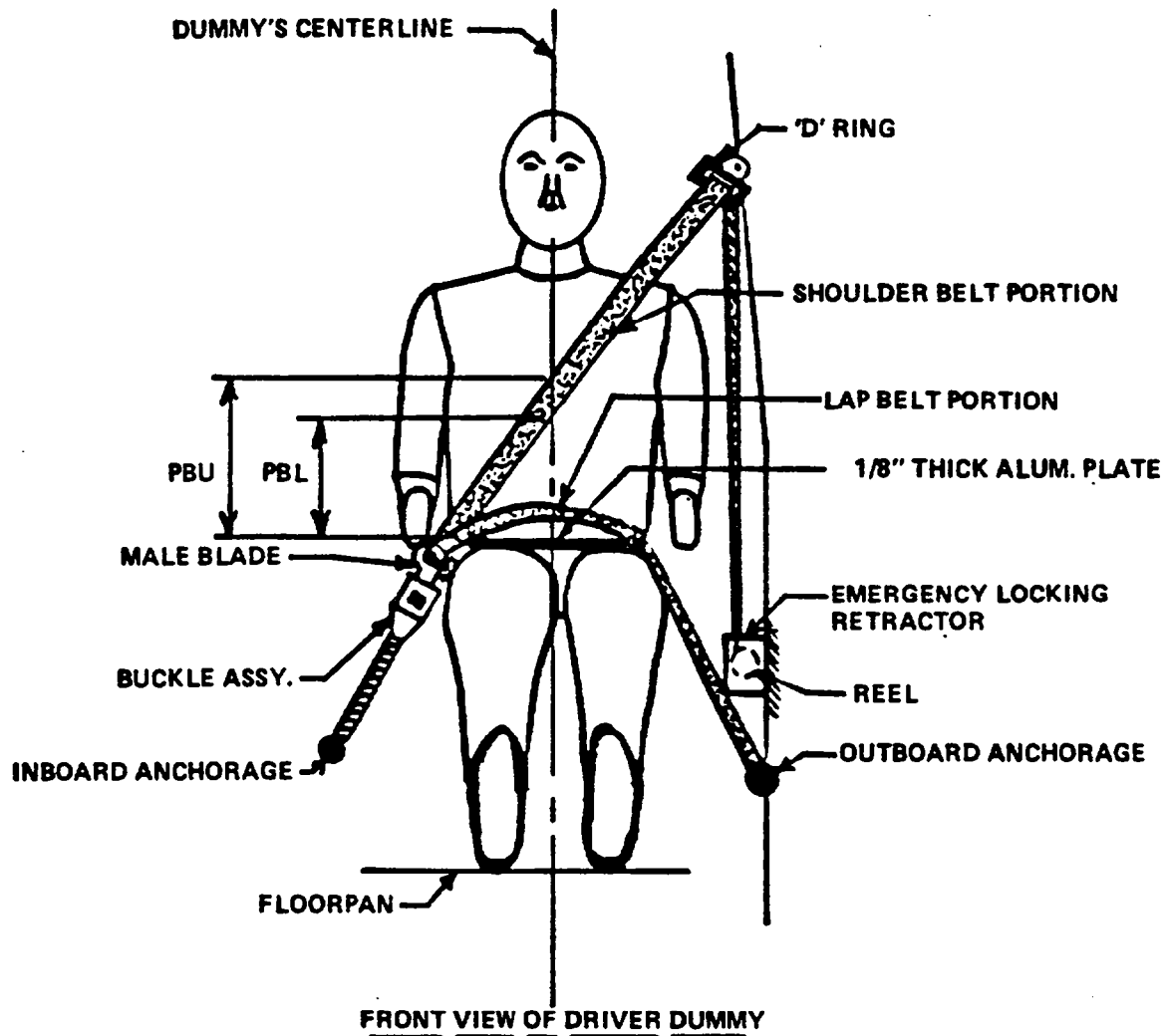
HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD(L/R) = Knee to Dash (Left/Right)
 SA = Seat Back Angle
 TA = Torso Angle

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



	DRIVER	PASSENGER
HR	4.6	4.4
HS	6.9	7.1
AD	2.8	3.4
HD	5.4	6.0
KK	10.6	7.6
HA	21.4	20.3

Figure 3
SEAT BELT POSITIONING DATA



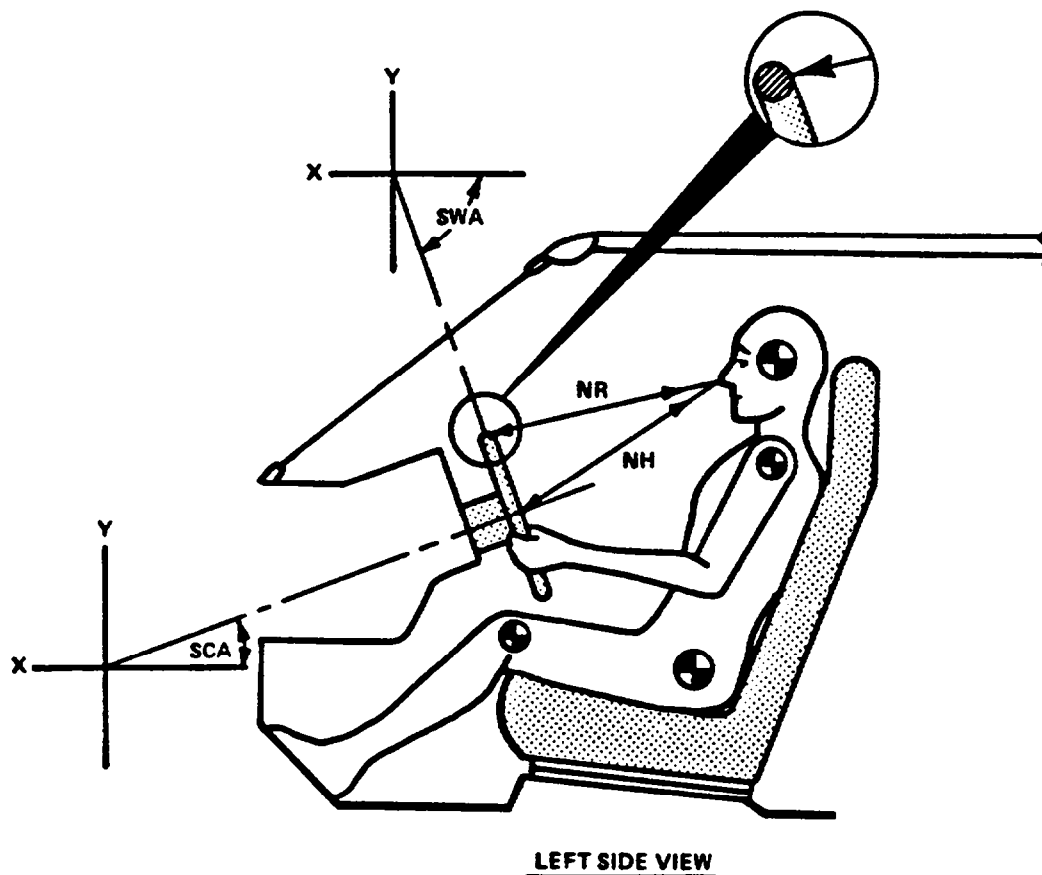
	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	11.3	11.3
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	8.6	8.6
<u>LAP BELT TENSION</u>	No Lap Belt	No Lap Belt
<u>SHOULDER BELT TENSION</u>	0.5	0.5

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.	-	-
Should belt length as measured on Part 572 Dummy.	<u>32.2</u>	<u>32.4</u>
Lap belt length as measured on Part 572 Dummy.	No Lap Belt	No Lap Belt
<u>BELT SPOOL-OFF DATA:</u>		
As determined by film analysis.	<u>1.0</u>	<u>1.0</u>
As determined mechanically.	<u>0.8"</u>	<u>0.75"</u>
As determined electronically.	<u>Not Measured</u>	<u>Not Measured</u>
<u>BELT STRETCH DATA:</u>		
Measured Mechanically	<u>0.6/ft.</u>	<u>0.6/ft.</u>

Figure 4
DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



LEFT SIDE VIEW

MEASUREMENTS		
<u>NR</u> -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	18.9	Inches
<u>NH</u> -- Distance from tip of dummy's nose to center of steering column hub	20.5	Inches
<u>SCA</u> -- Angle of steering column relative to the horizontal X axis	25	Degrees
<u>SWA</u> -- Angle of steering wheel relative to the horizontal X axis	-65	Degrees

NOTE: Camera Information Shown on Table 4

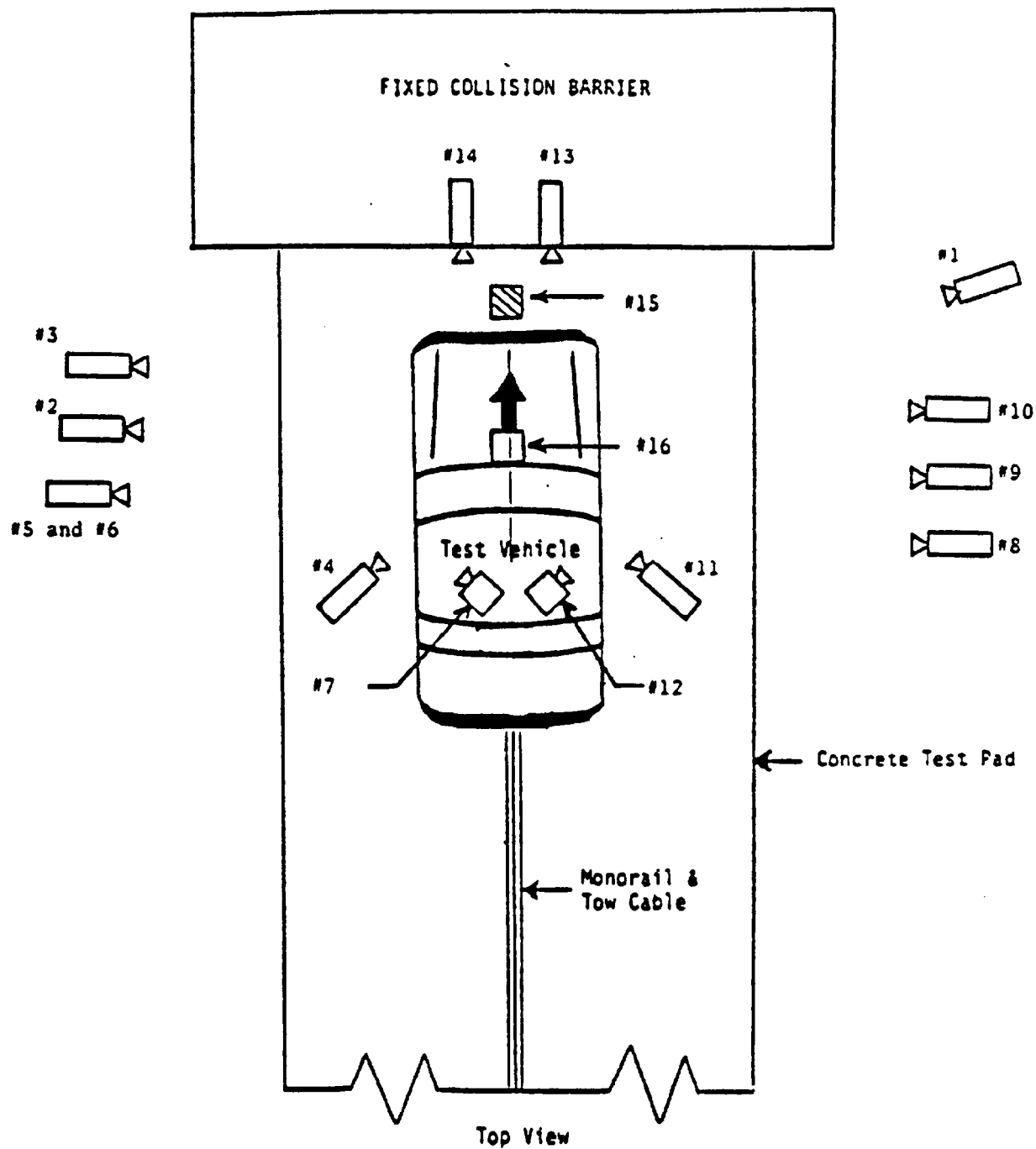


Figure 5 CAMERA POSITION FOR FRONTAL IMPACTS

Table 4
HIGH-SPEED CAMERA LOCATIONS

Test No. MH5302

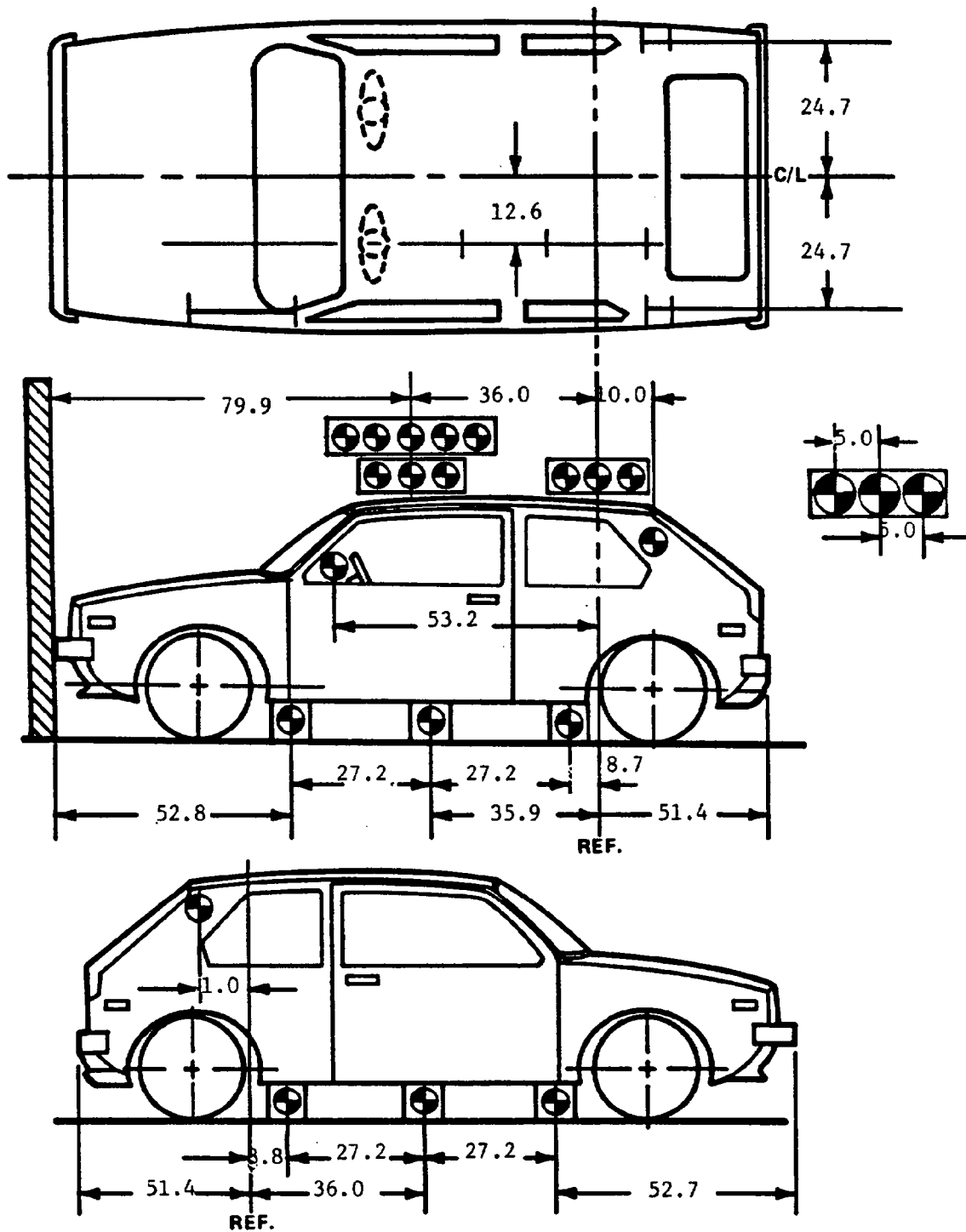
Vehicle 1987 Hyundai Excel 4-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (in)**			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	262	45	42	-2	-	13	525
3	Left Side View	251	40	43	-5	-	25	525
4	Driver and Interior View	105	114	70	18	-	13	650
5	Steering Column (Bottom)	240	78	52	-6	223	25	540
6	Steering Column (Top)	240	78	77	-13	223	25	550
7	Left Belt	-	-	-	-	-	8	700
8	Overall Right Side	246	47	43	-1	-	13	no timing
9	Right Side View	255	70	44	-4	-	25	775
10	Right Passenger View	276	86	42	-3	259	35	775
11	Passenger & Interior View	87	101	66	-16	-	25	590
12	Right Belt	-	-	-	-	-	8	800
13	Passenger Front View	24	0	72	-37	-	13	550
14	Driver Front Window	24	0	72	-37	-	13	575
15	Windshield View	0	0	126	-55	-	13	525
16	Pit View of Engine	0	32	-120	90	-	13	775
17								

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

Figure 6

VEHICLE TARGET LOCATIONS



(DIMENSIONS IN INCHES)

Figure 7

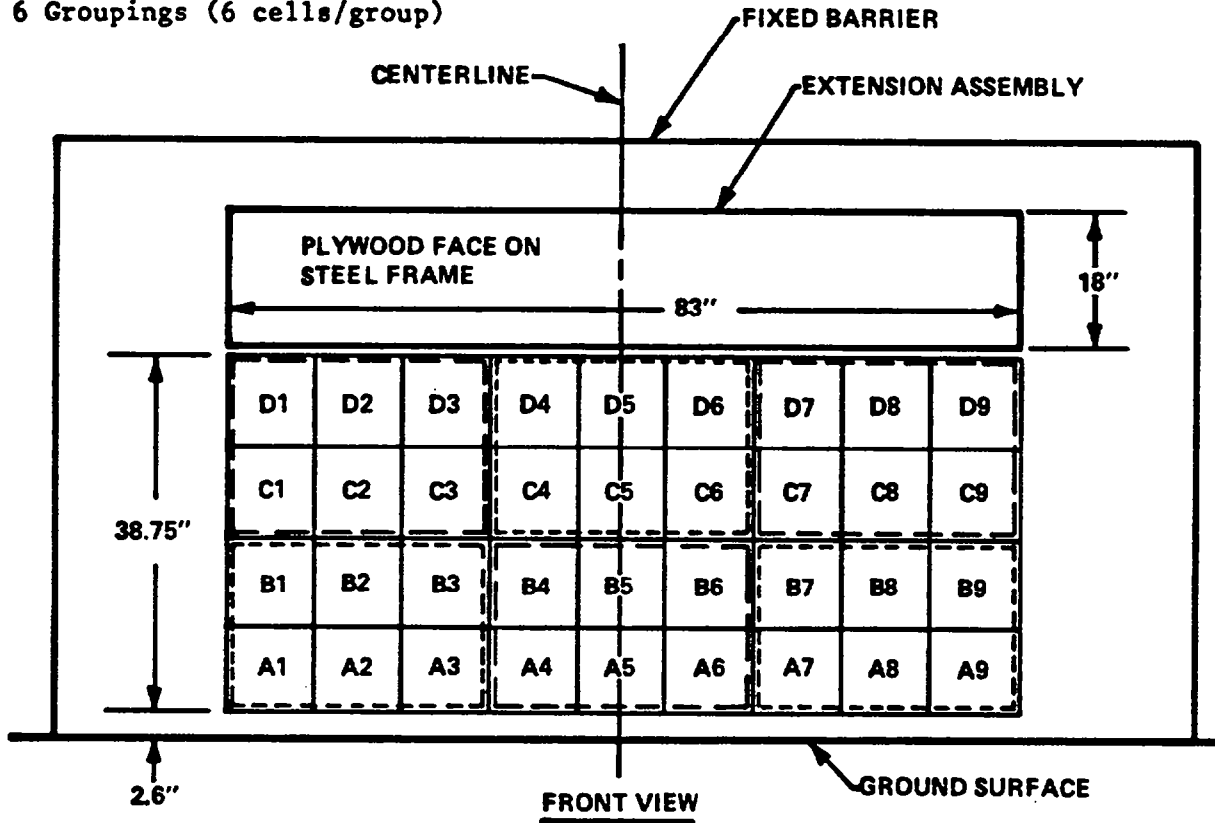
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells

4 Rows

9 Columns

6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

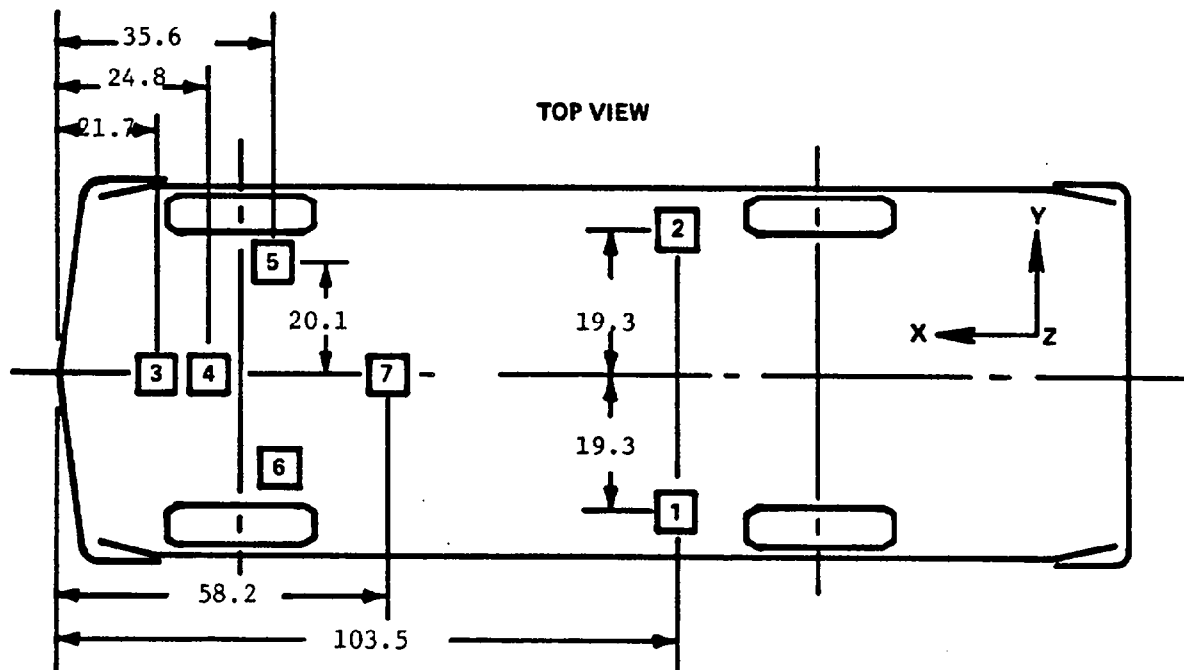
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

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

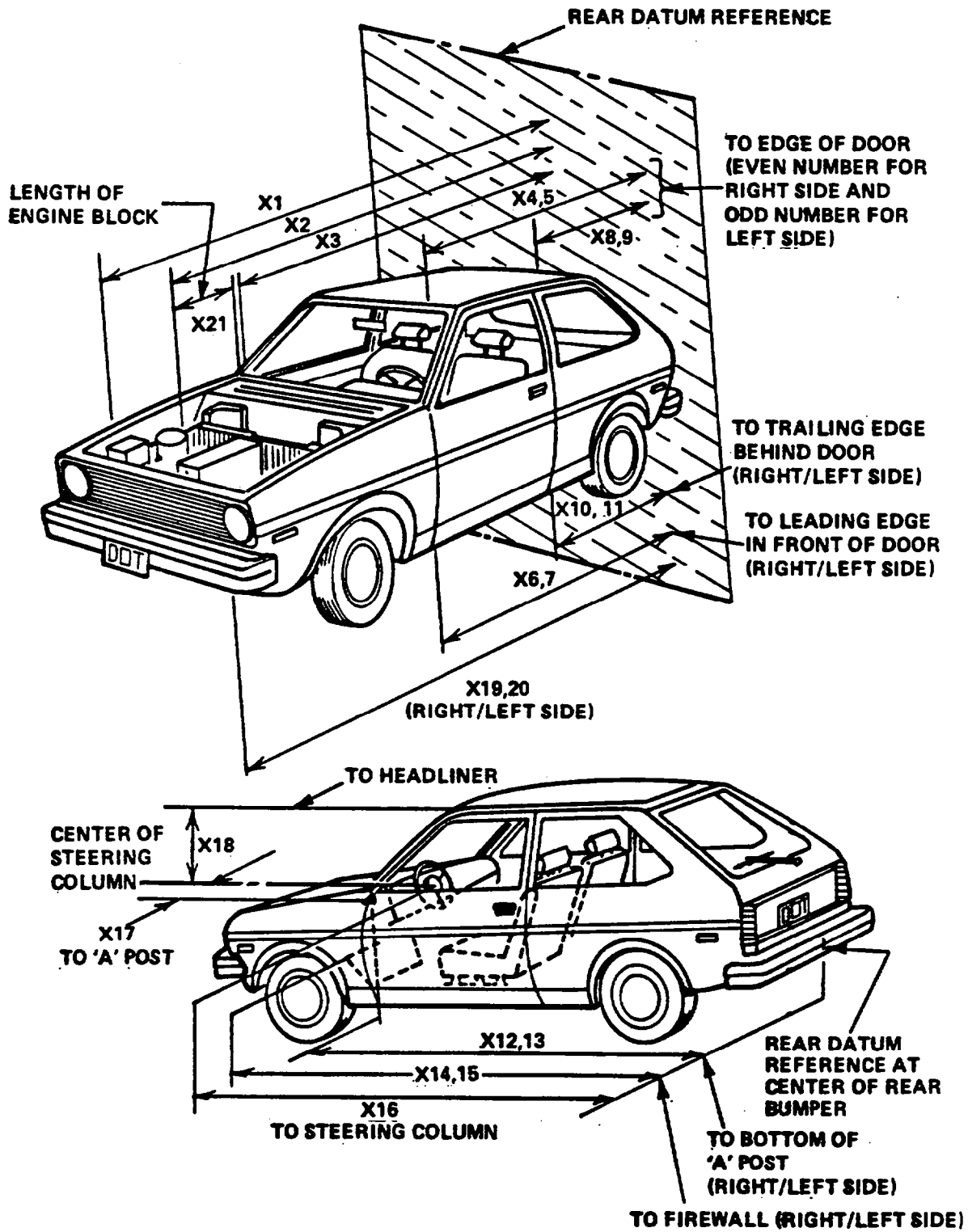


Table 5
VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	167.3	144.8	22.5
X2	Rear Surface of Vehicle to Front of Engine	143.7	133.5	10.2
X3	Rear Surface of Vehicle to Firewall	125.8	122.2	3.6
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	115.5	114.6	0.9
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	115.1	114.0	1.1
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	114.5	114.6	-0.1
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	114.0	113.6	0.4
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	77.0	77.0	0.0
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	76.8	76.2	0.6
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	78.4	78.0	0.4
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	78.0	77.1	0.9
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	114.5	114.4	0.1
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	114.2	113.5	0.7
X14	Rear Surface of Vehicle to Firewall, Right Side	124.1	114.7	9.4
X15	Rear Surface of Vehicle to Firewall, Left Side	126.1	117.6	8.5
X16	Rear Surface of Vehicle to Steering Column	98.4	95.4	3.0
X17	Center of Steering Column to "A" Post	14.5	13.5	1.0
X18	Center of Steering Column to Headliner	17.0	18.2	-1.2
X19	Rear Surface of Vehicle to Right Side of Front Bumper	165.5	143.2	22.3
X20	Rear Surface of Vehicle to Left Side of Front Bumper	165.7	144.1	21.6
X21	Length of Engine Block	14.5	14.5	0.0

Appendix A
PHOTOGRAPHS

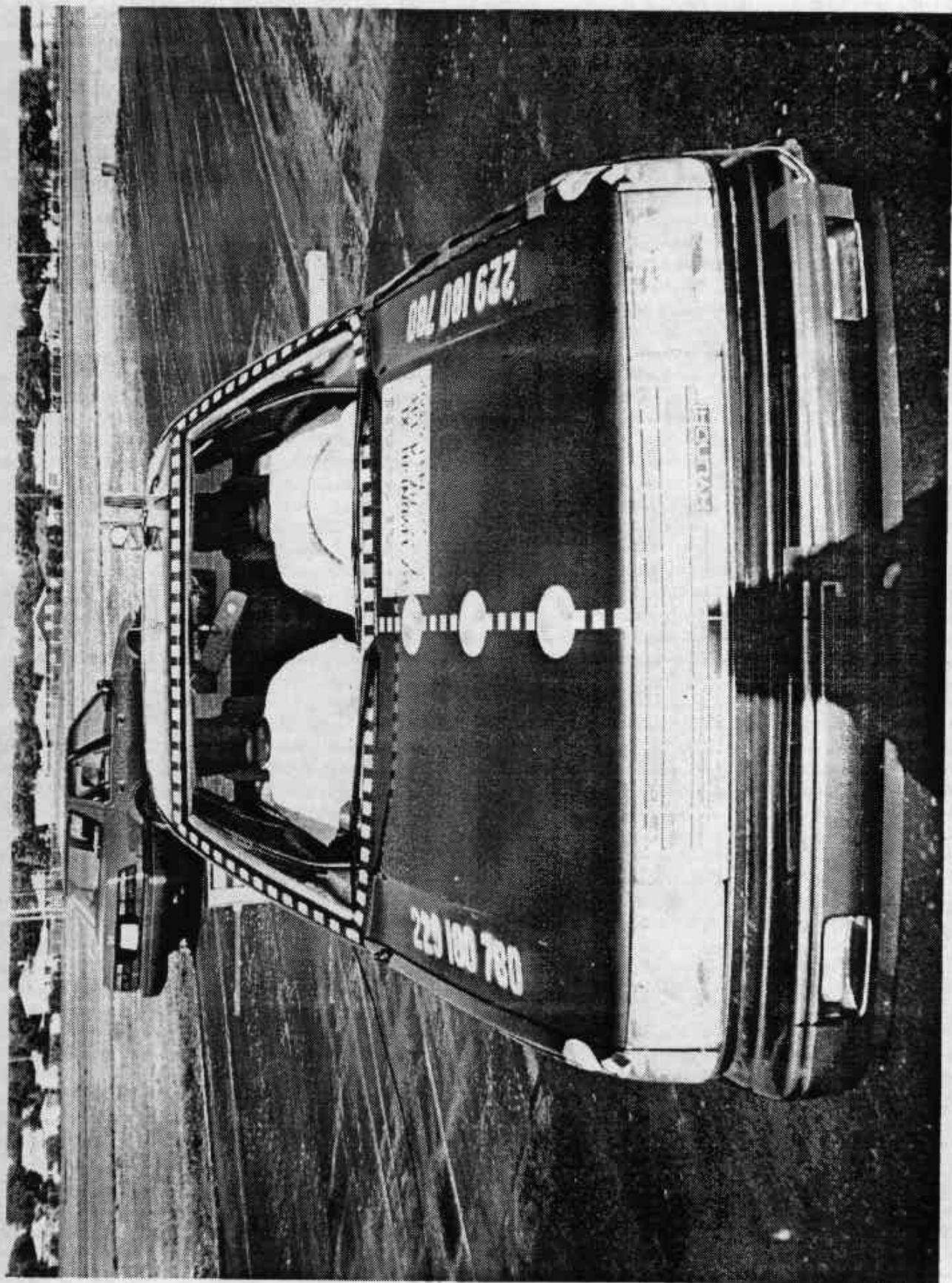


Figure A-1 PRE-TEST FRONT VIEW

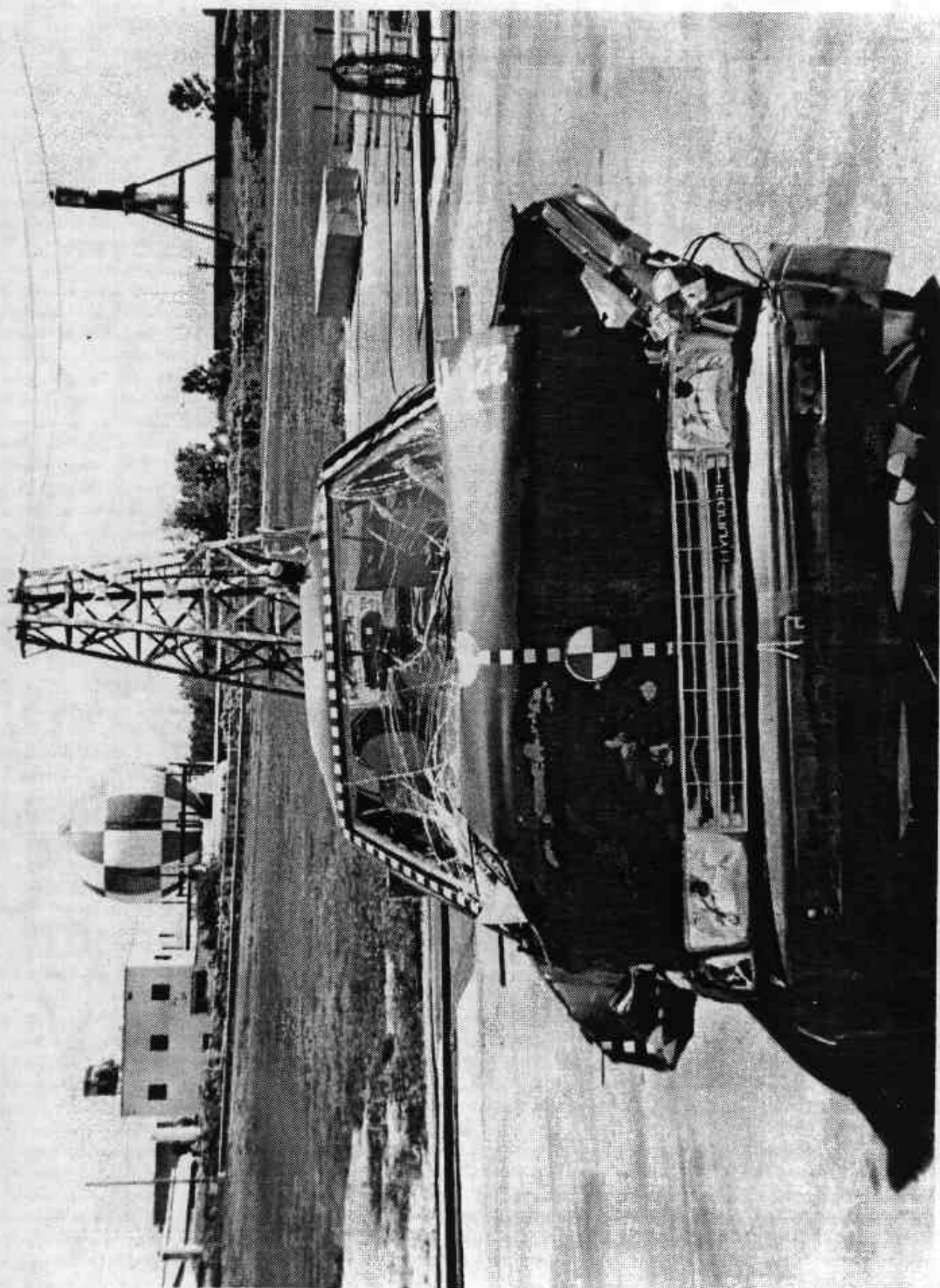


Figure A-2 POST-TEST FRONT VIEW

A-3

7556-18

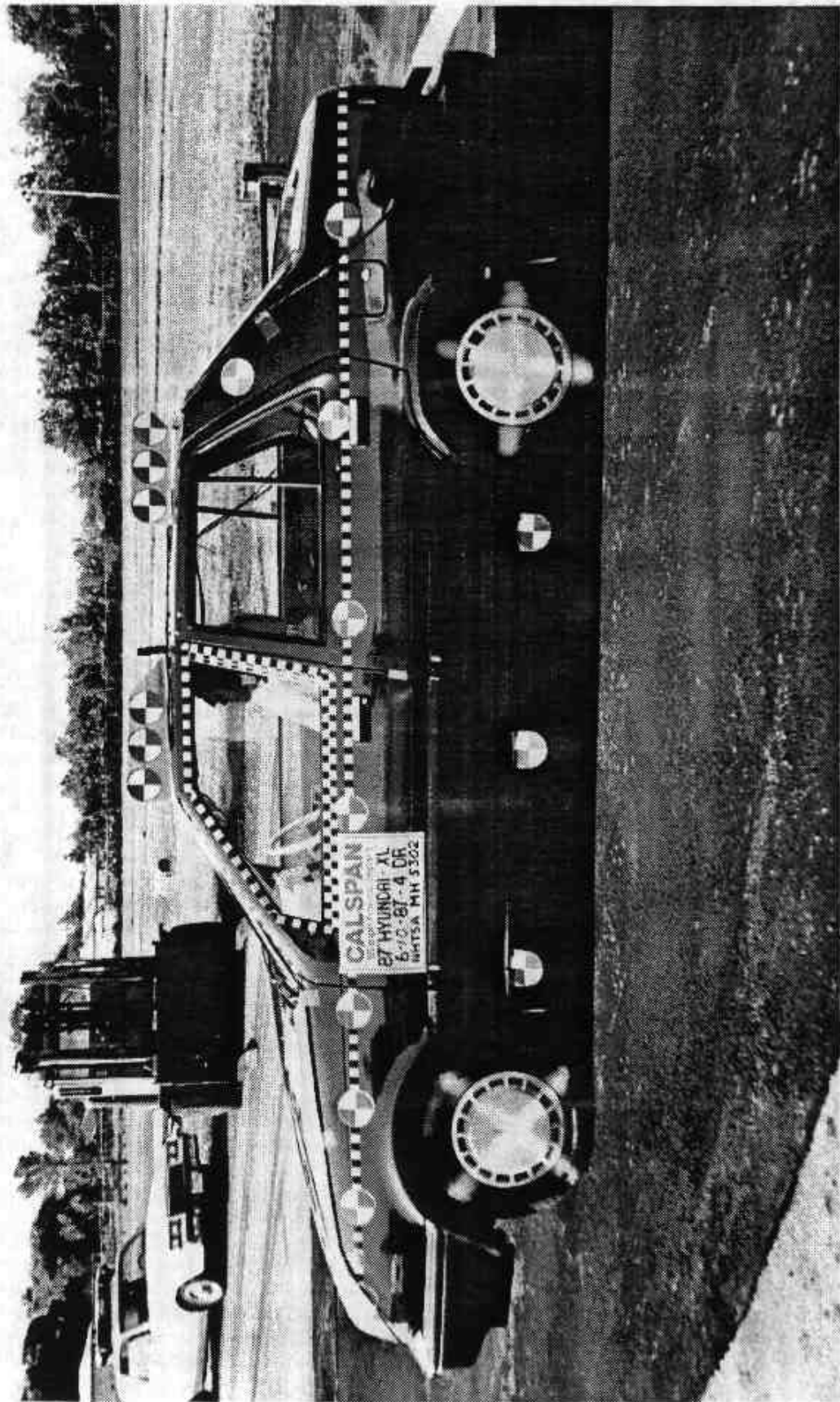


Figure A-3 PRE-TEST LEFT SIDE VIEW

A-4

7556-18

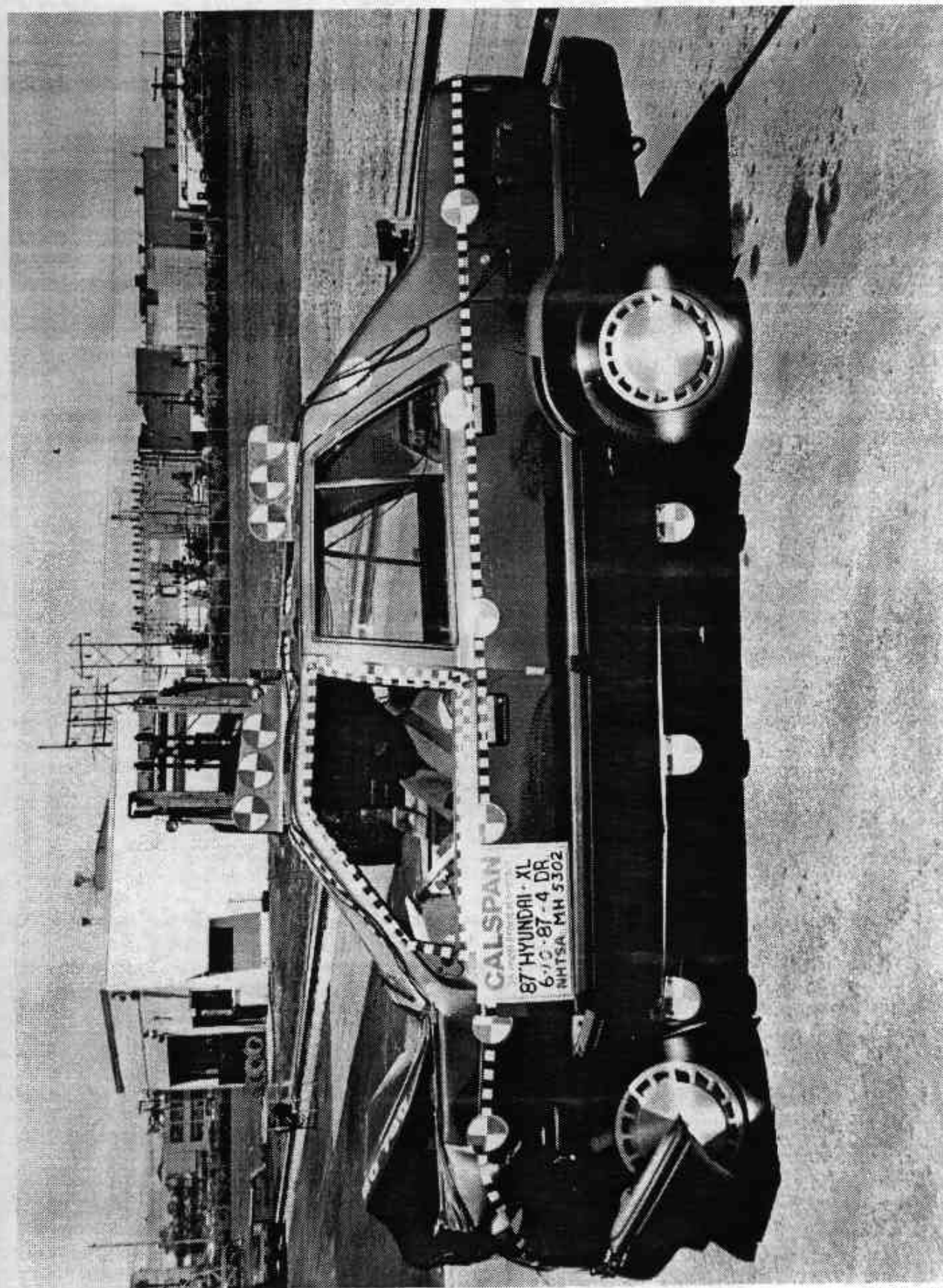


Figure A-4 POST-TEST LEFT SIDE VIEW

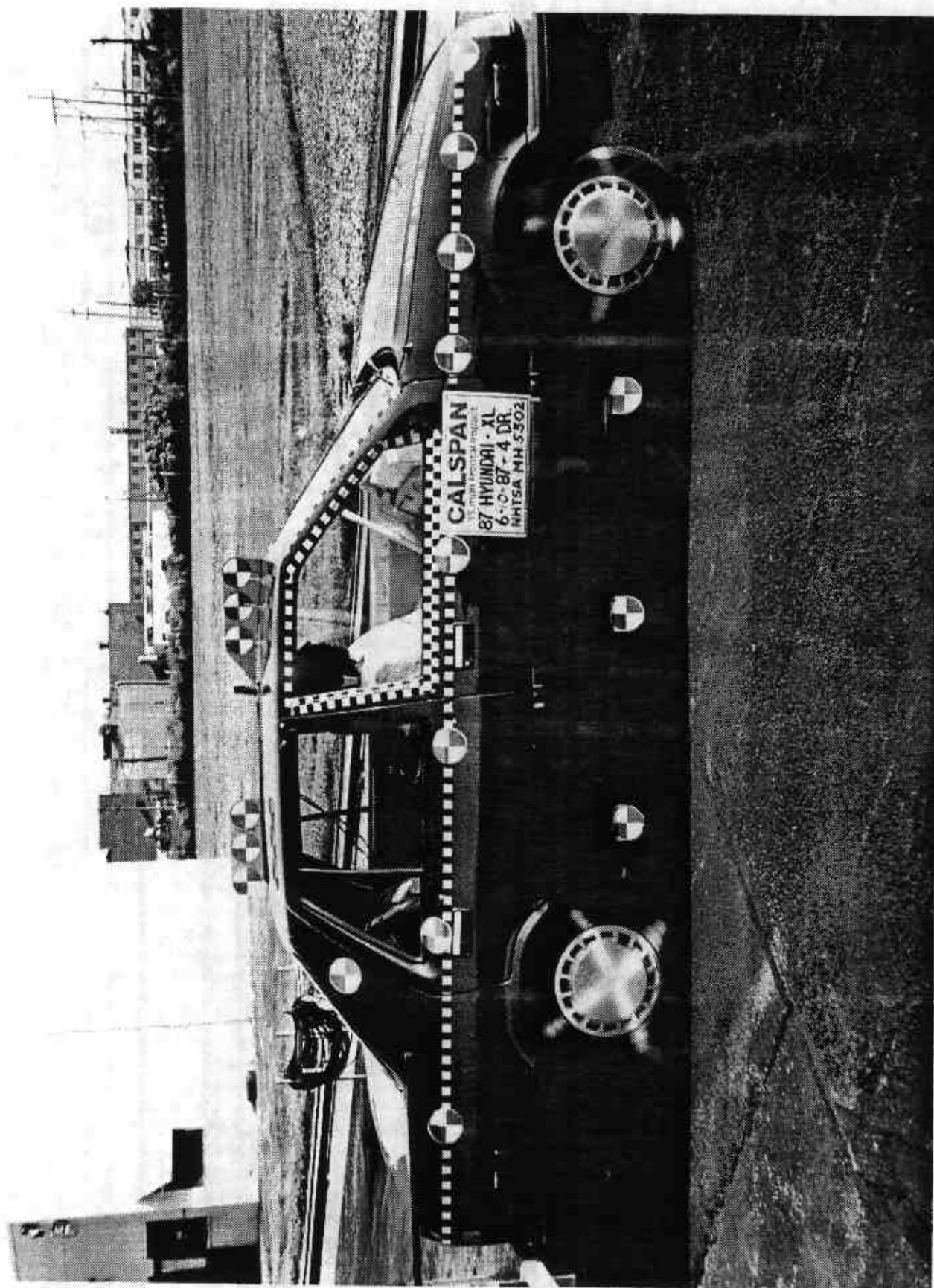


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-6

7556-18

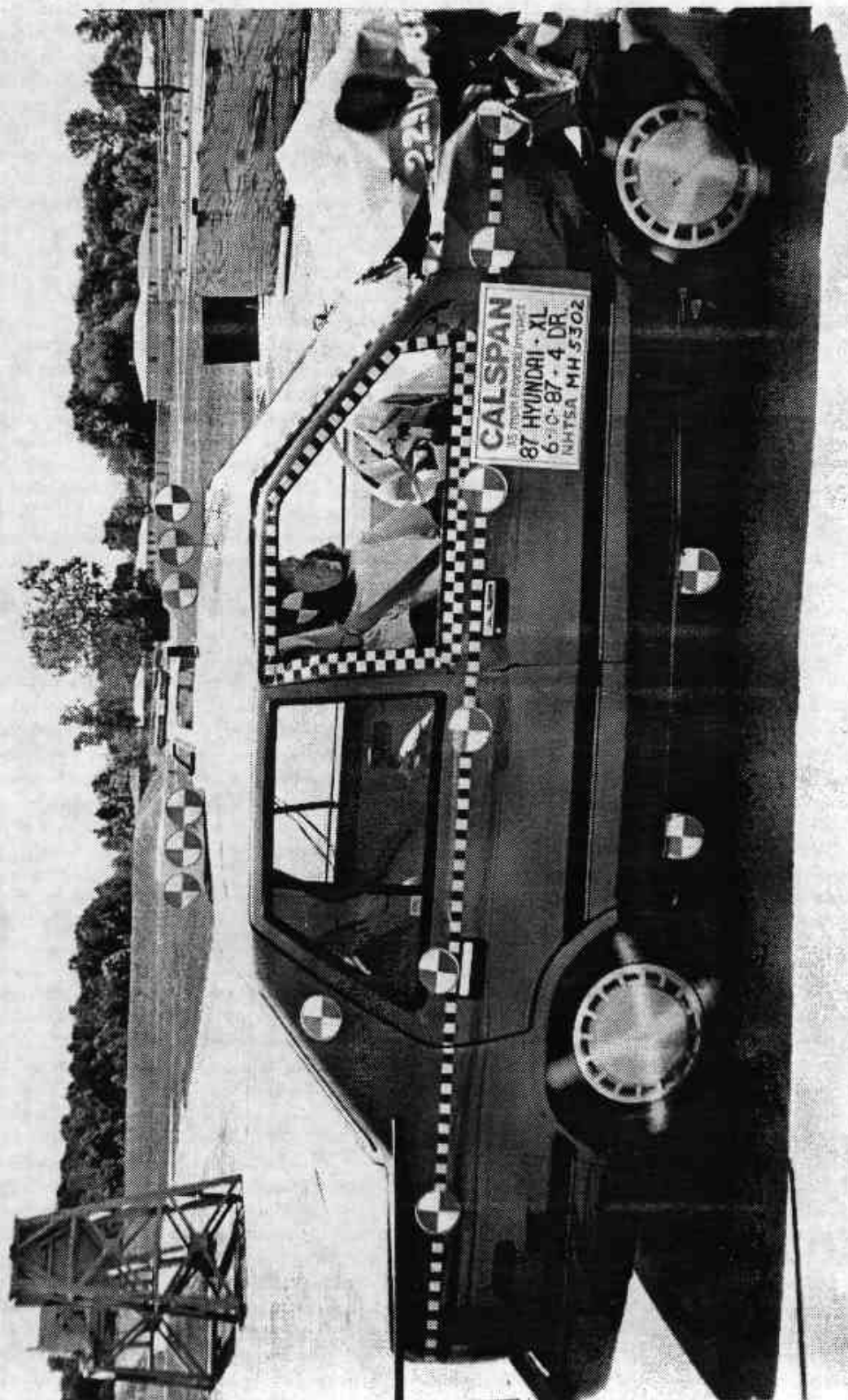


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-7

7556-18

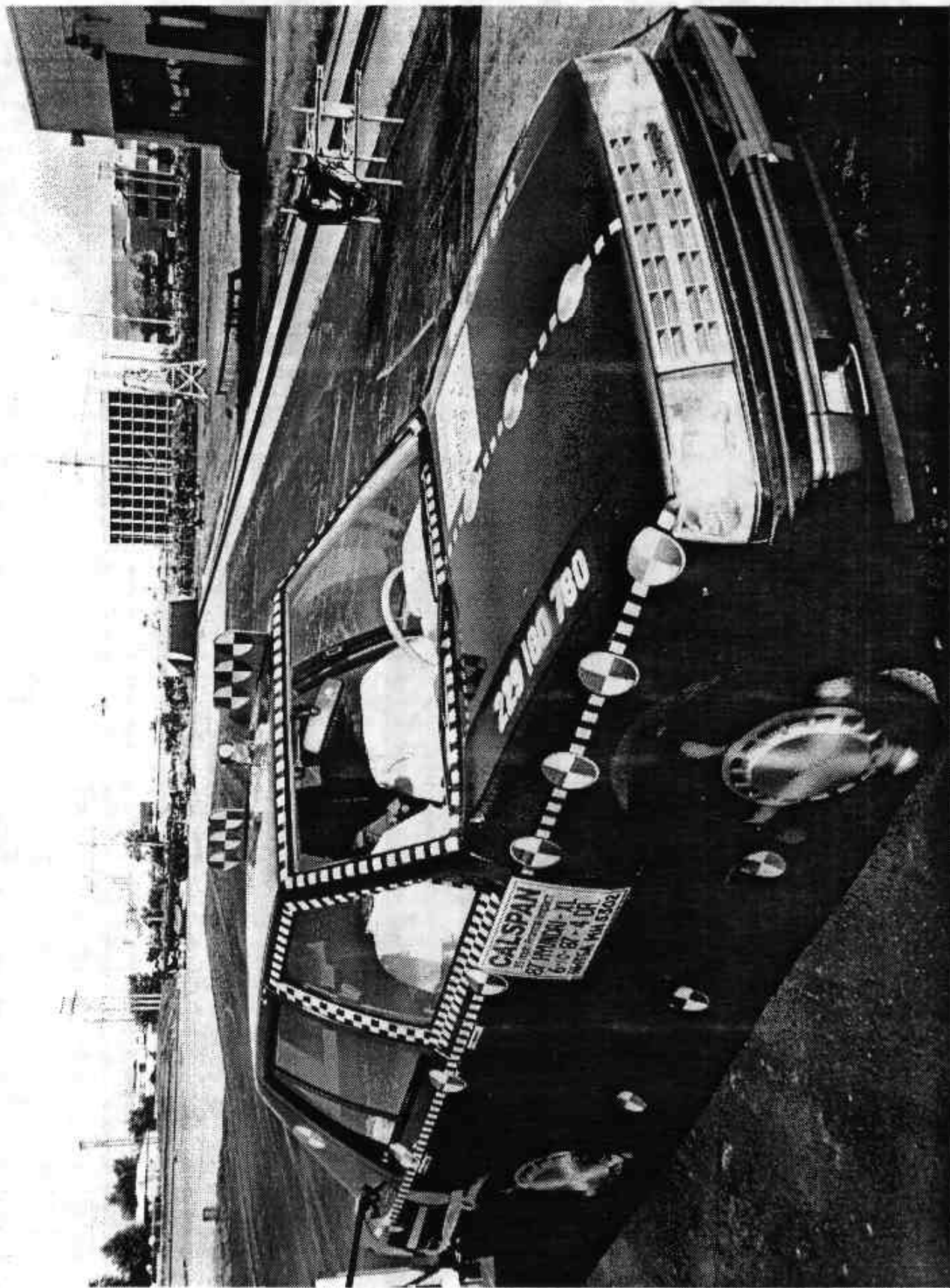


Figure A-7 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-8

7556-18

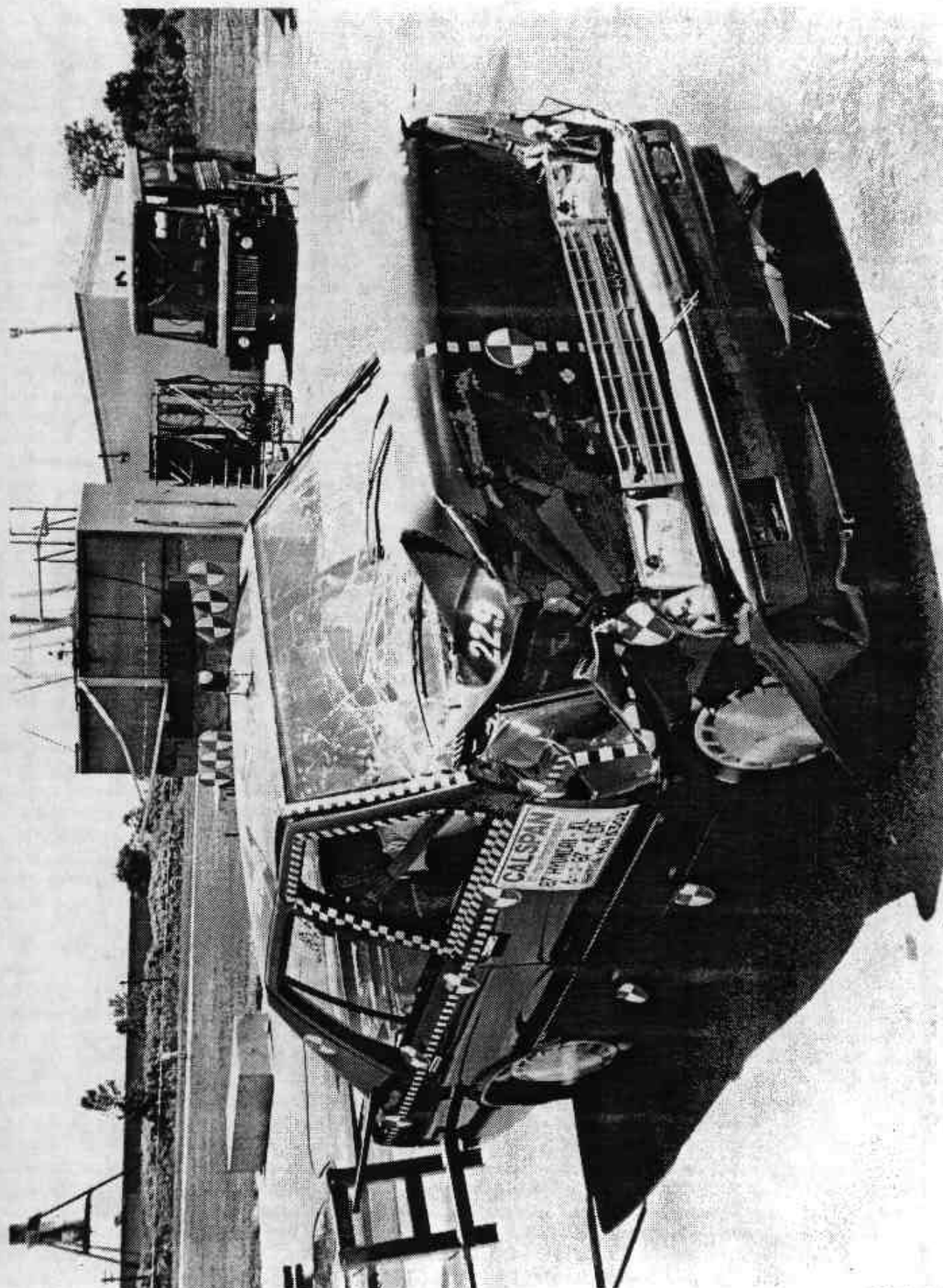


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

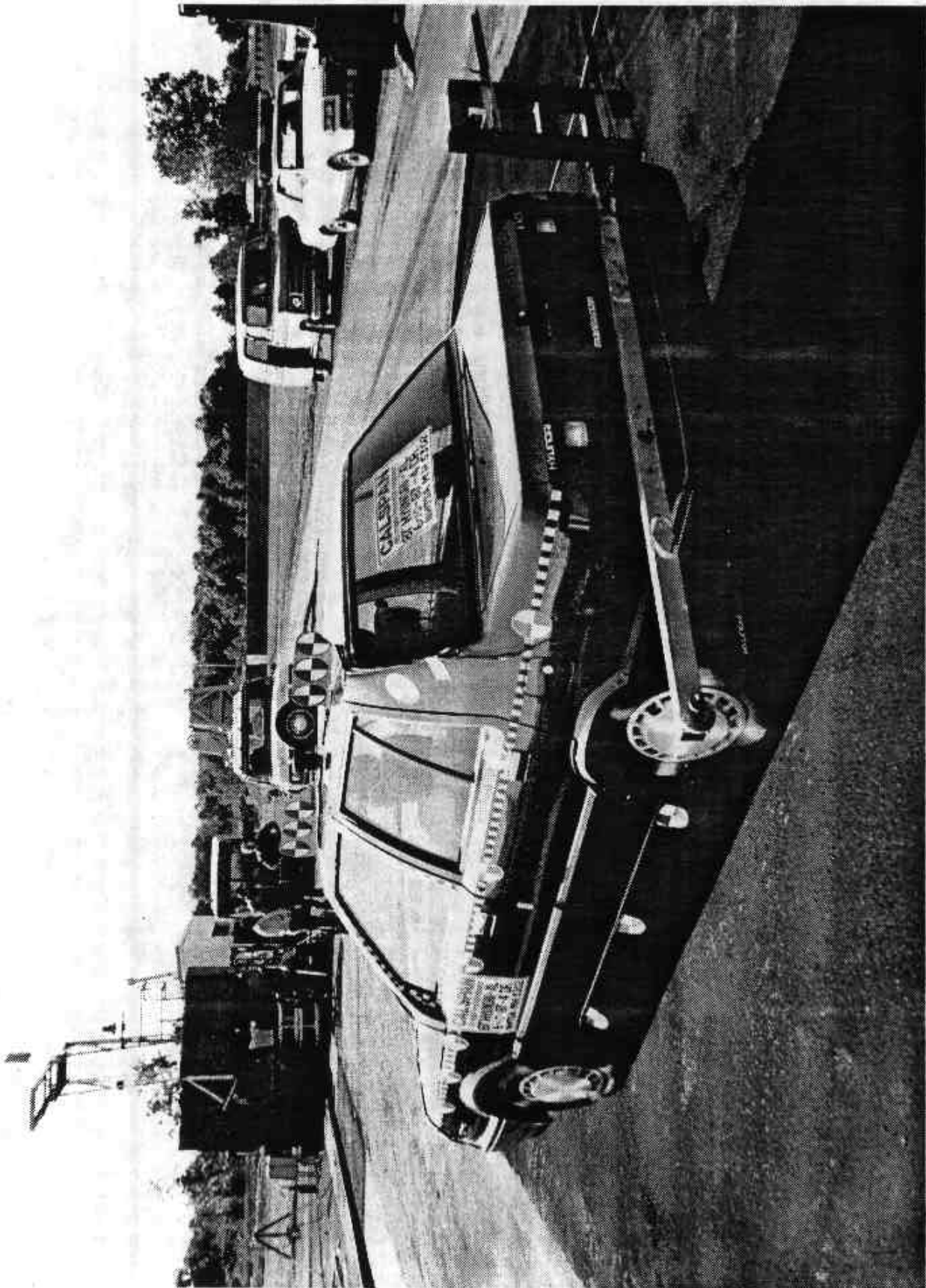


Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-10

7556-18

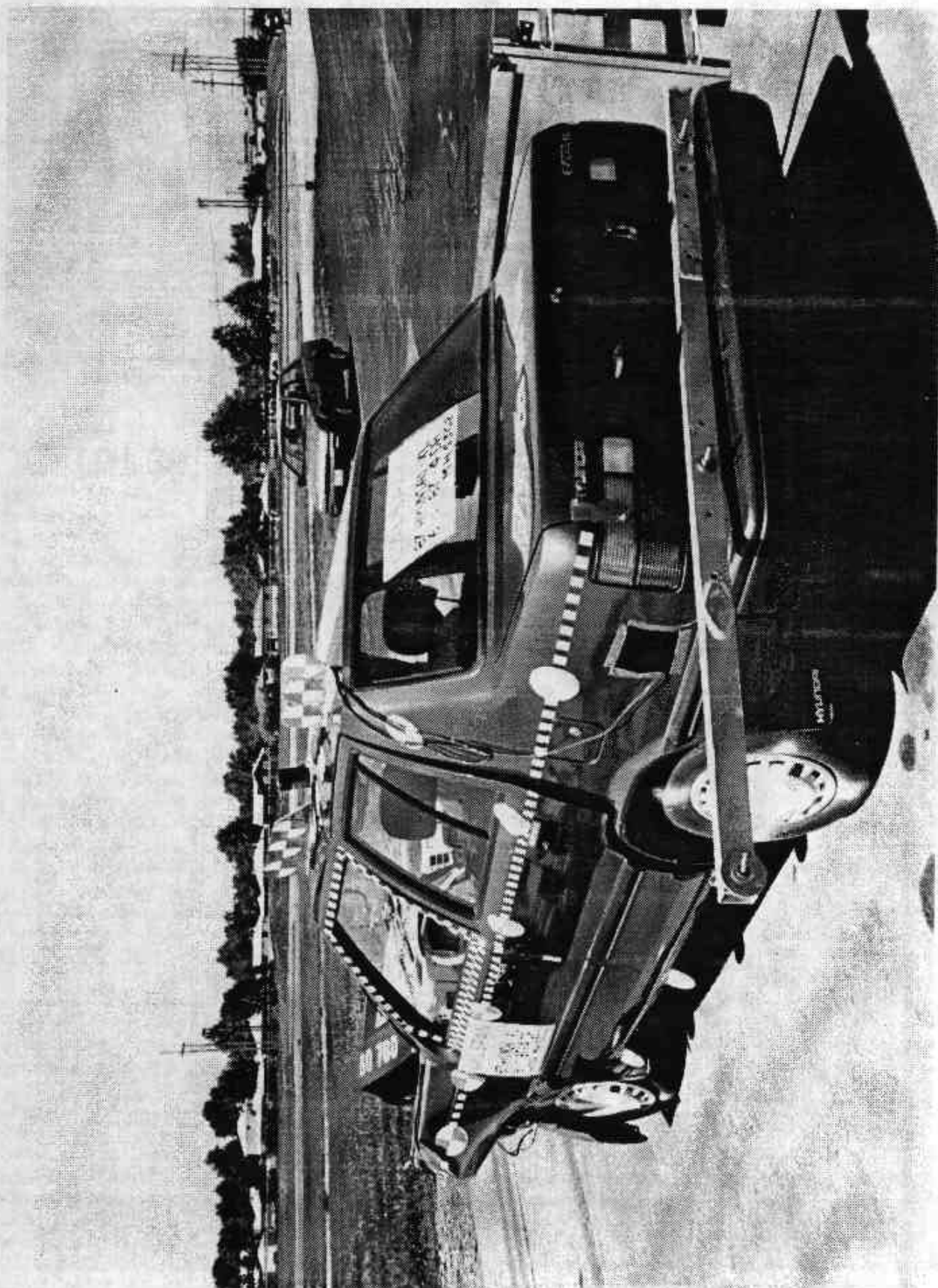


Figure A-10 POST-TEST LEFT REAR THREE-QUARTER VIEW

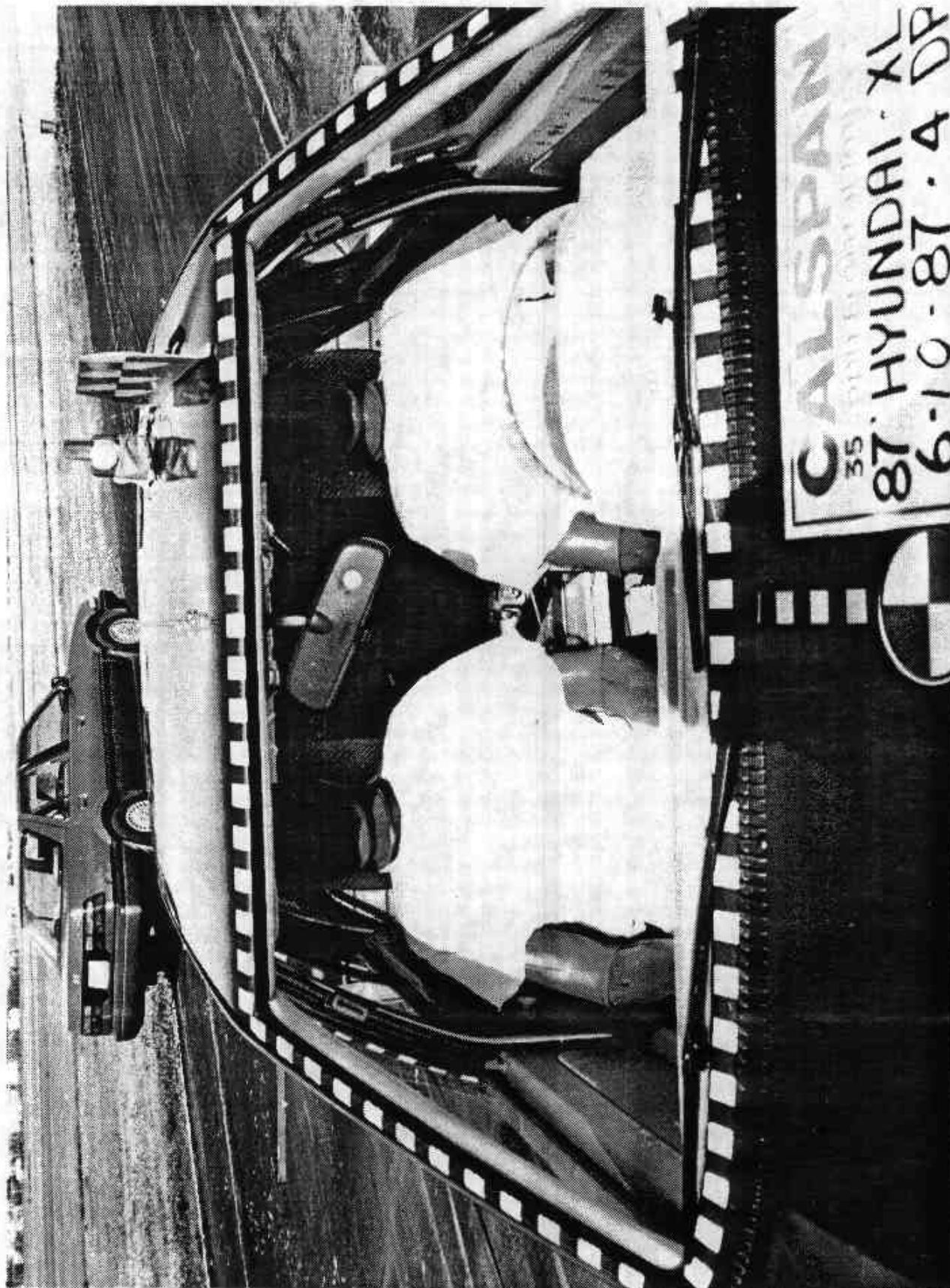


Figure A-11 PRE-TEST WINDSHIELD VIEW

A-12

7556-18

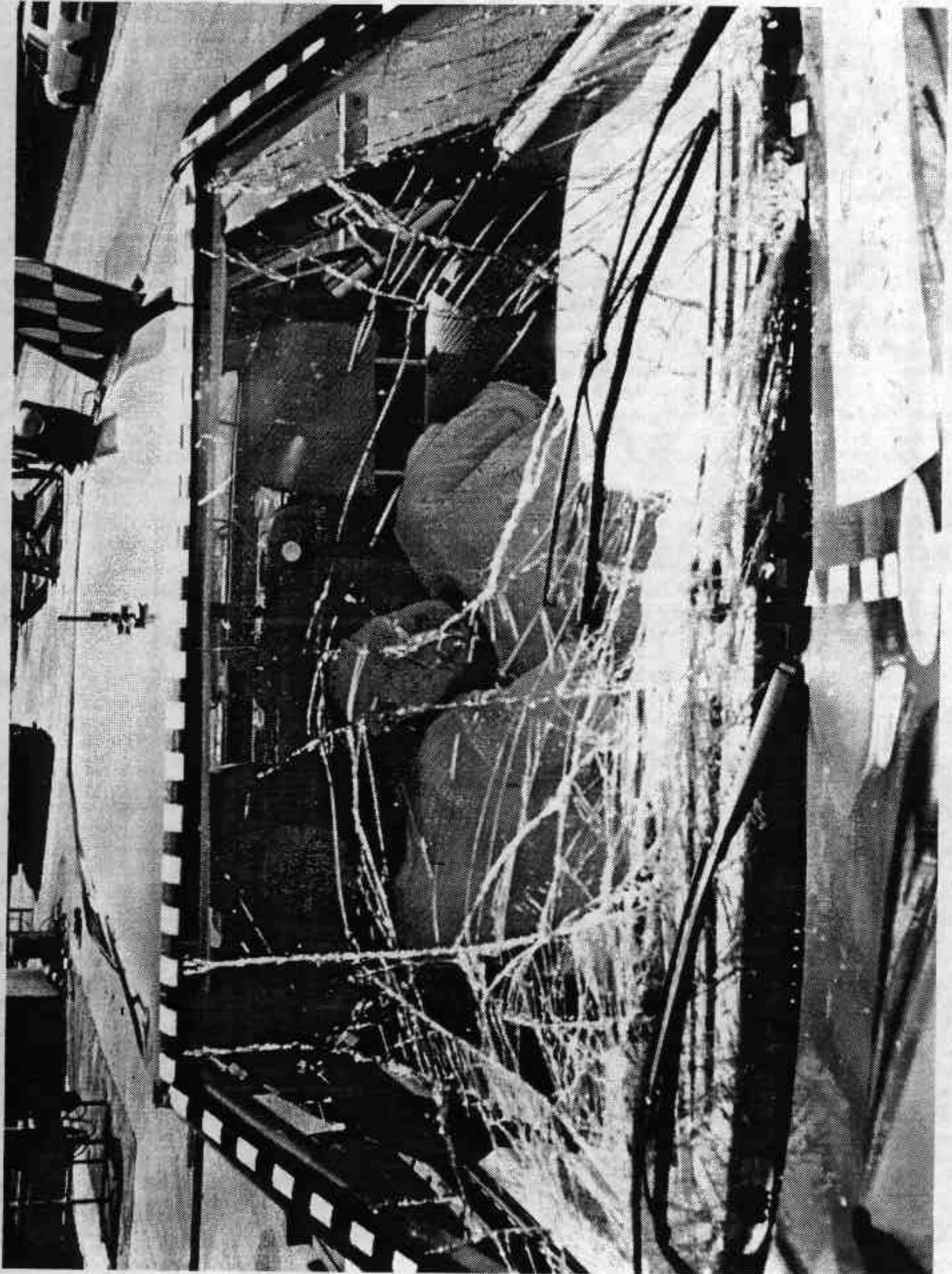


Figure A-12 POST-TEST WINDSHIELD VIEW

A-13

7556-18

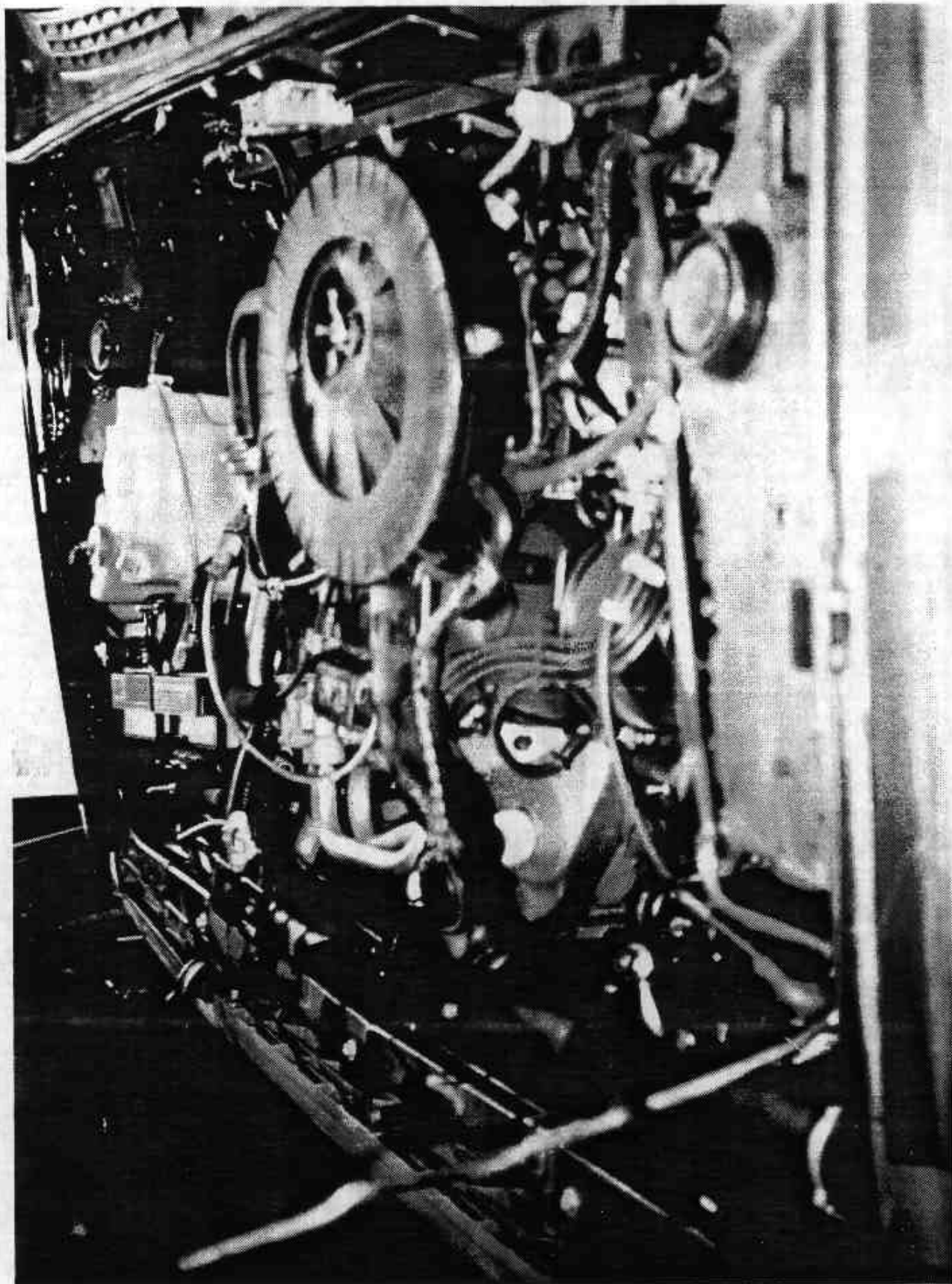


Figure A-13 PRE-TEST ENGINE COMPARTMENT VIEW

A-14

7556-18

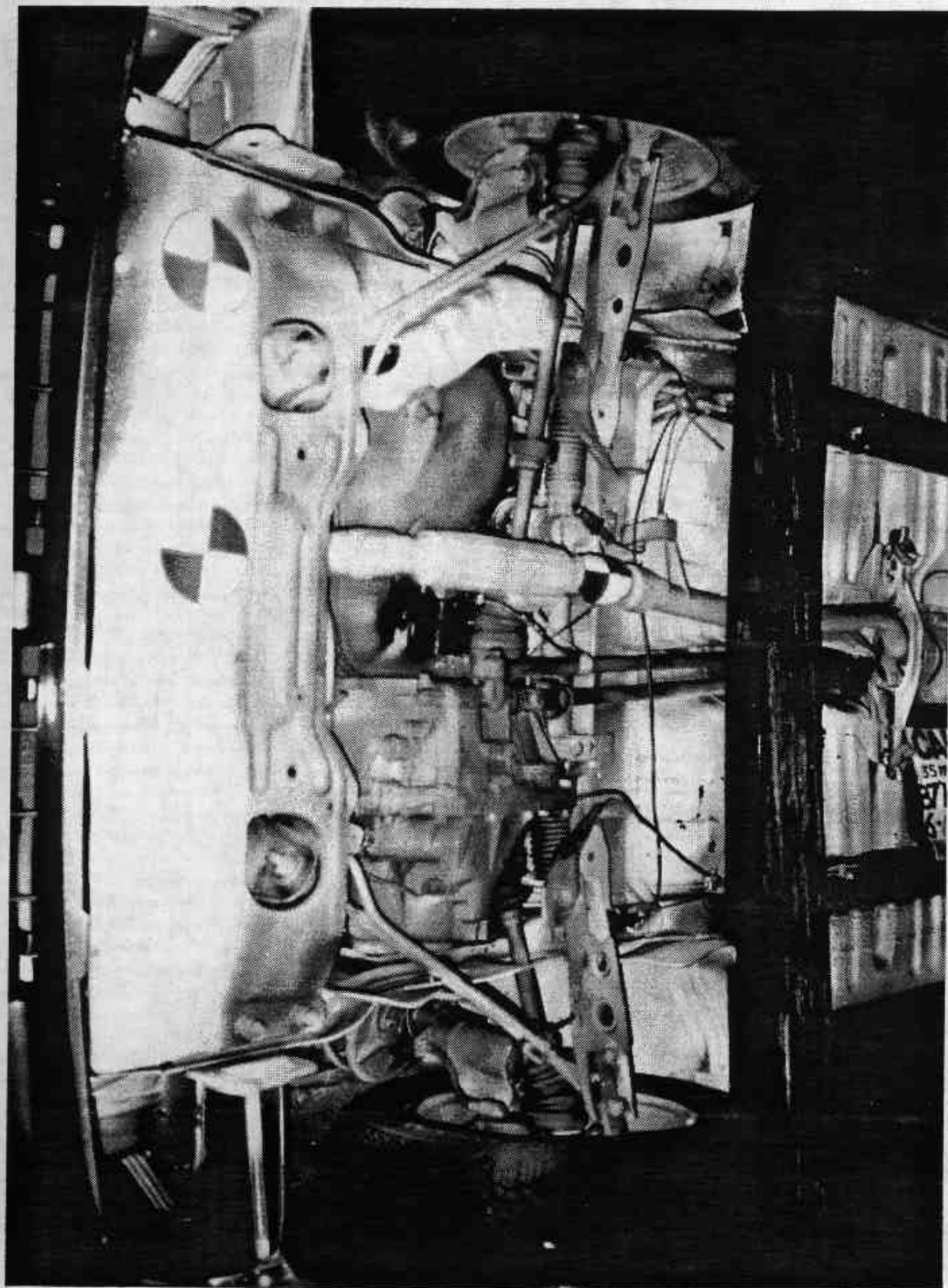


Figure A-14 PRE-TEST FRONT UNDERBODY VIEW

A-15

7556-18

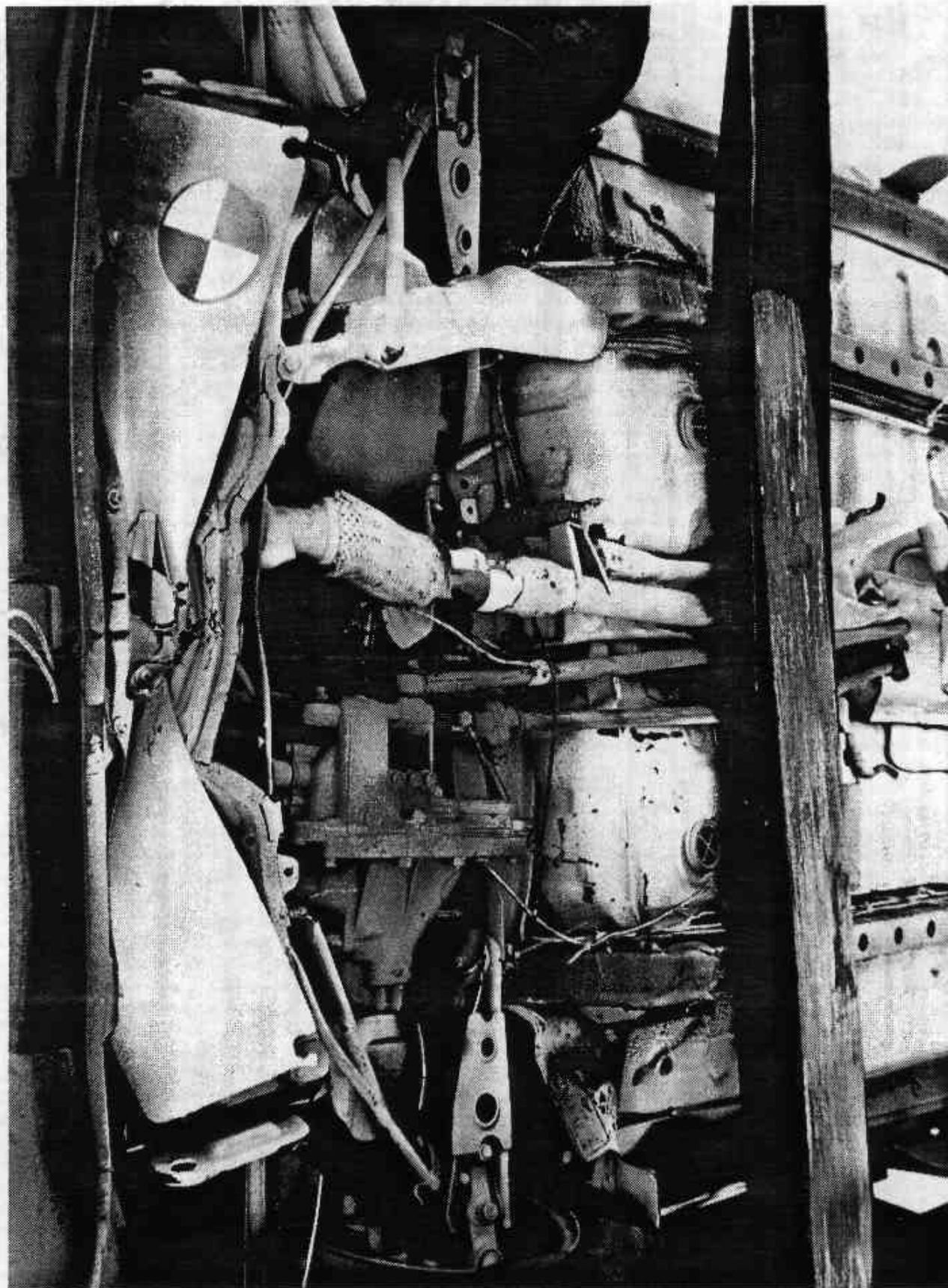


Figure A-15 POST-TEST FRONT UNDERBODY VIEW

A-16

7556-18

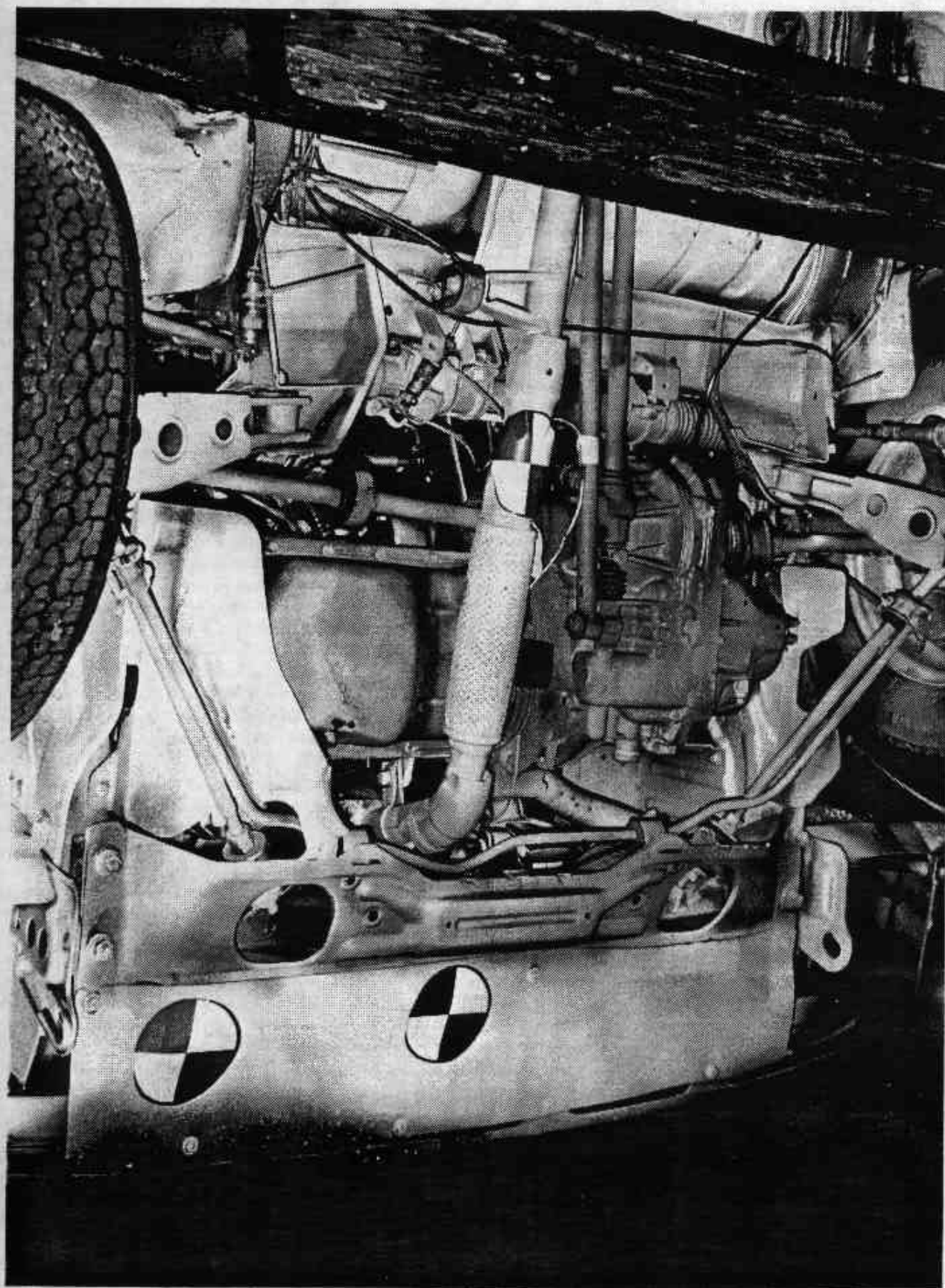


Figure A-16 PRE-TEST FRONT-SIDE UNDERBODY VIEW

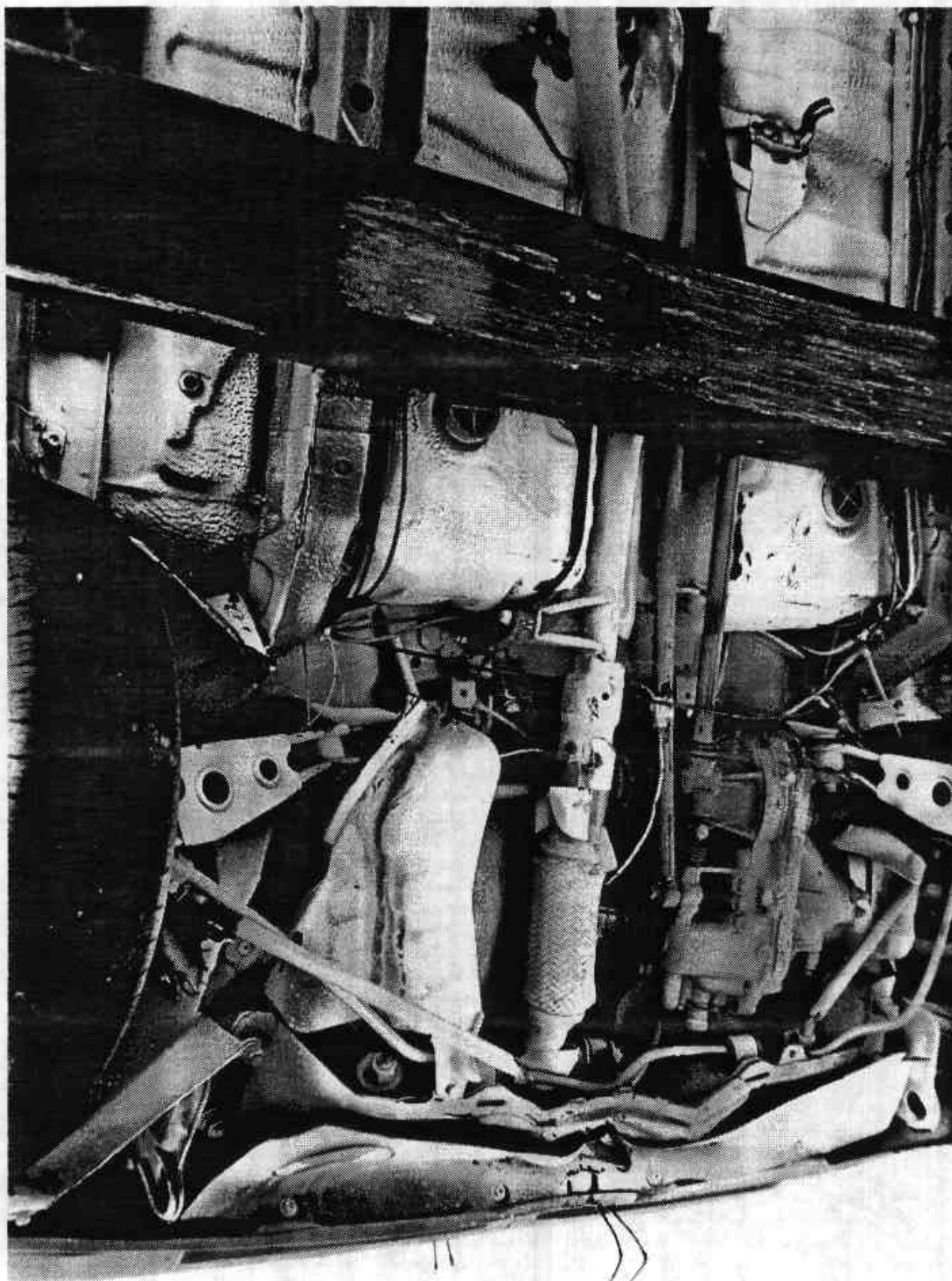


Figure A-17 POST-TEST FRONT-SIDE UNDERBODY VIEW

A-18

7556-18

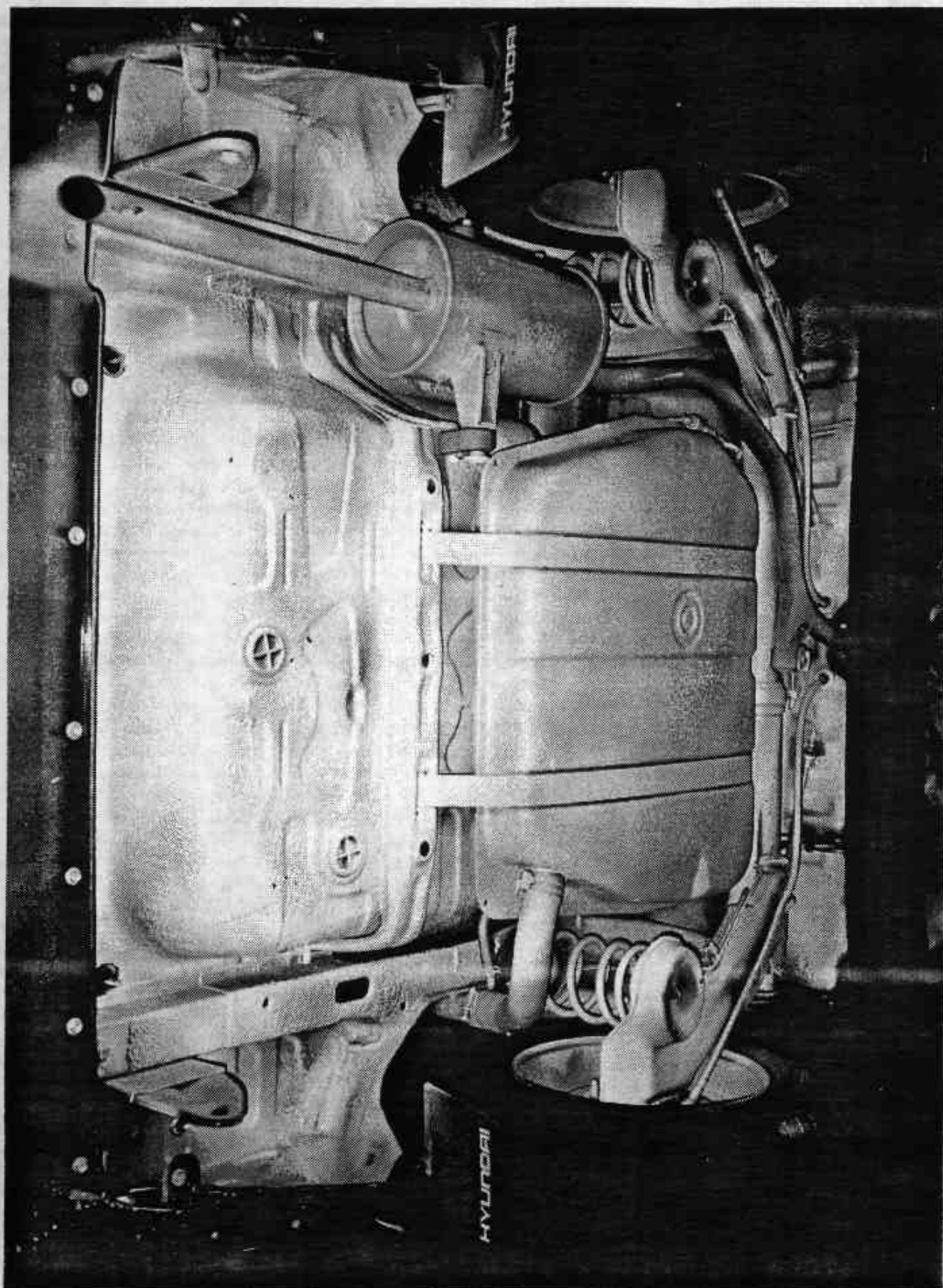


Figure A-18 PRE-TEST REAR UNDERBODY VIEW

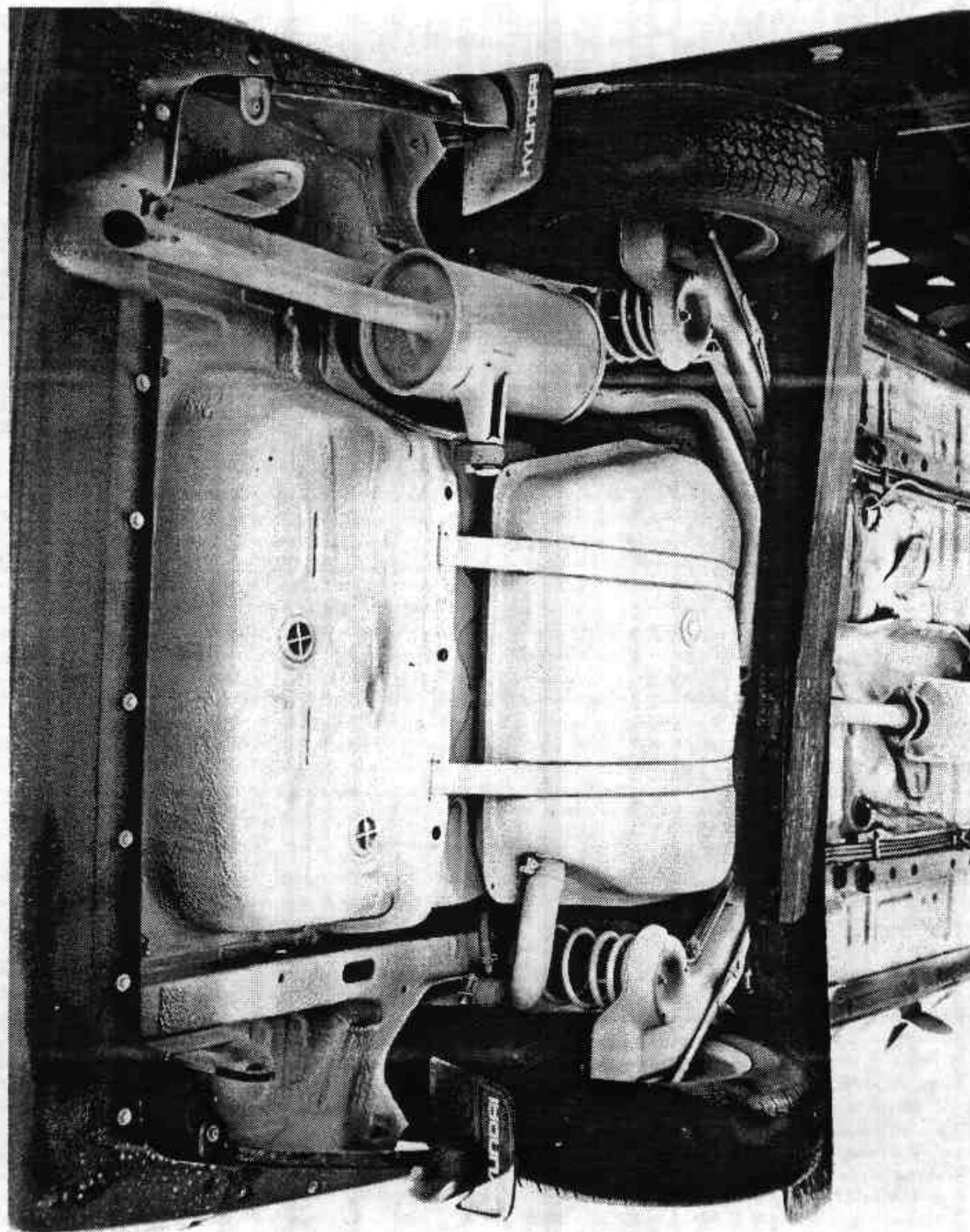


Figure A-19 POST-TEST REAR UNDERBODY VIEW

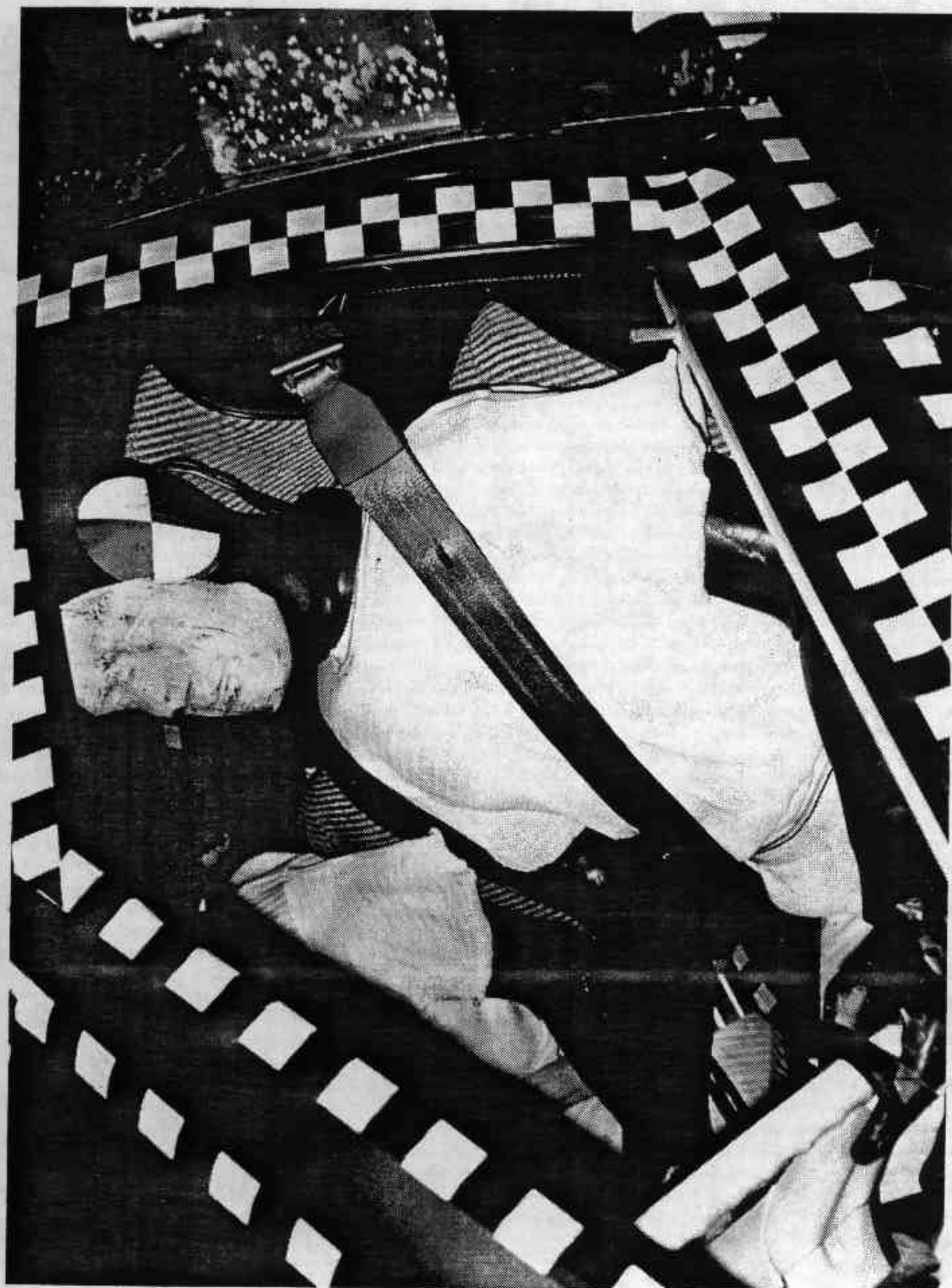


Figure A-20 PRE-TEST DRIVER POSITION VIEW

A-21

7556-18



Figure A-21 POST-TEST DRIVER POSITION VIEW

A-22

7556-18

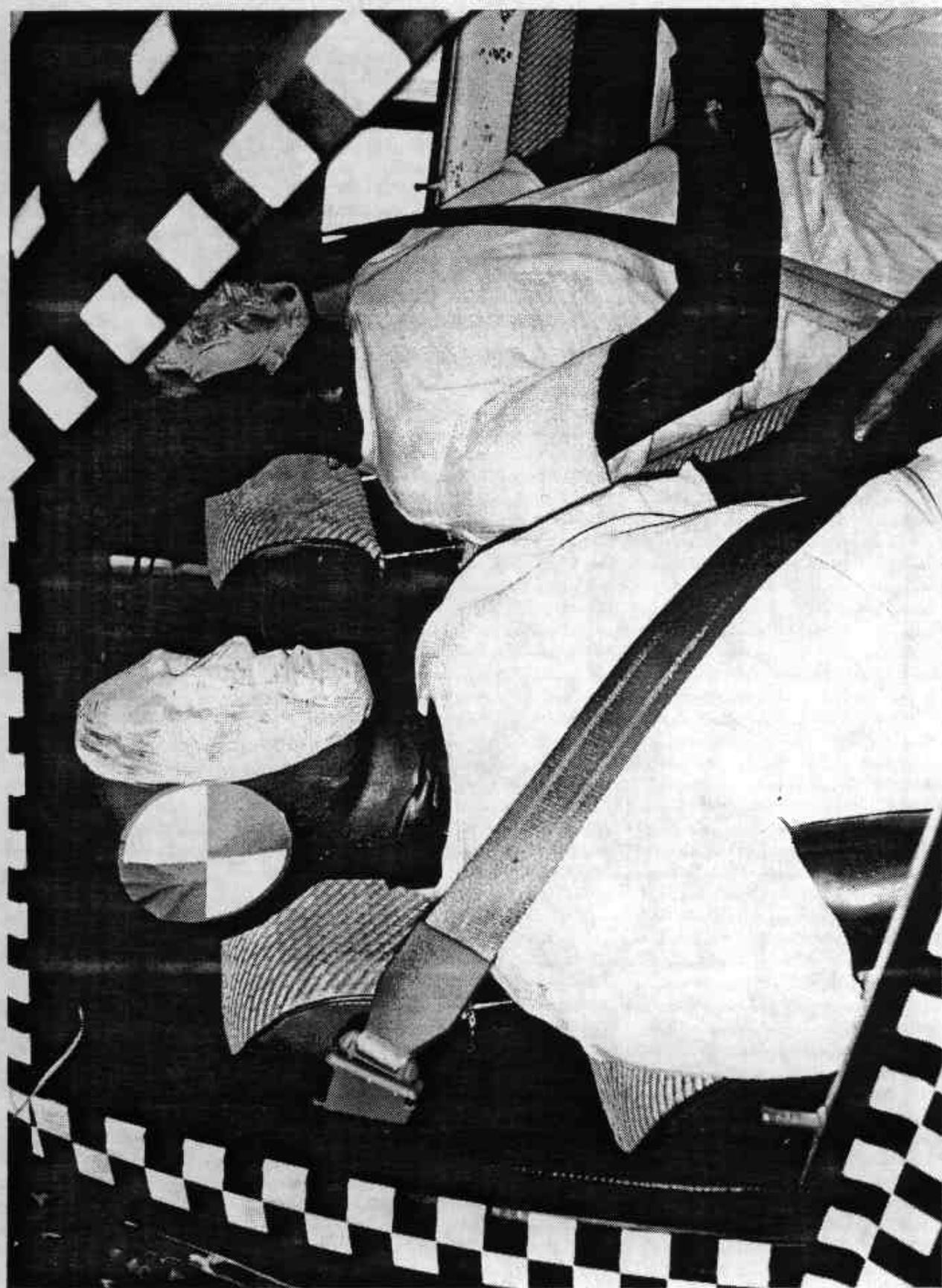


Figure A-22 PRE-TEST PASSENGER POSITION VIEW

A-23

7556-18

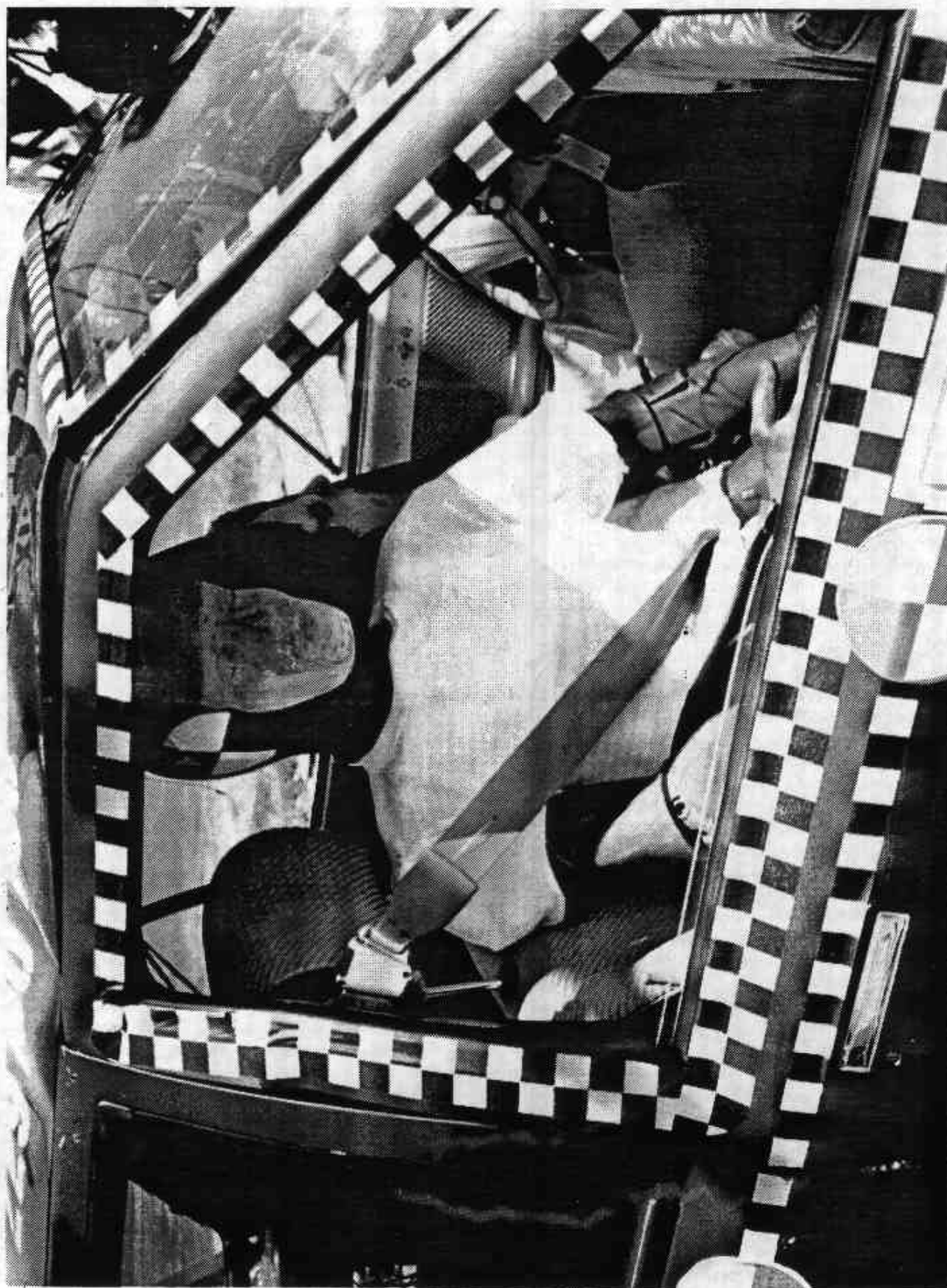


Figure A-23 POST-TEST PASSENGER POSITION VIEW

A-24

7556-18

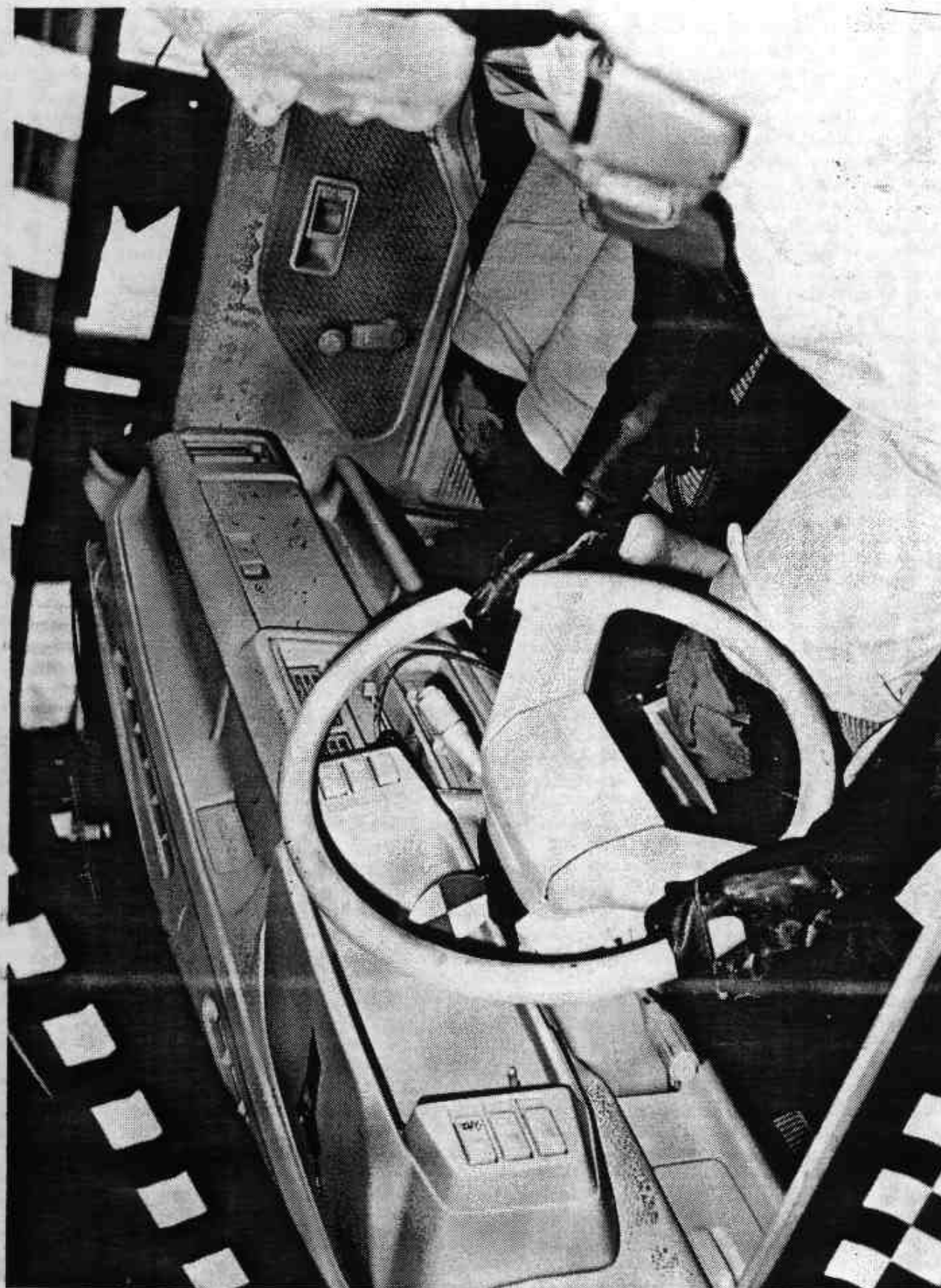


Figure A-24 PRE-TEST DRIVER AND INTERIOR VIEW



Figure A-25 POST-TEST DRIVER AND INTERIOR VIEW

A-26

7556-18

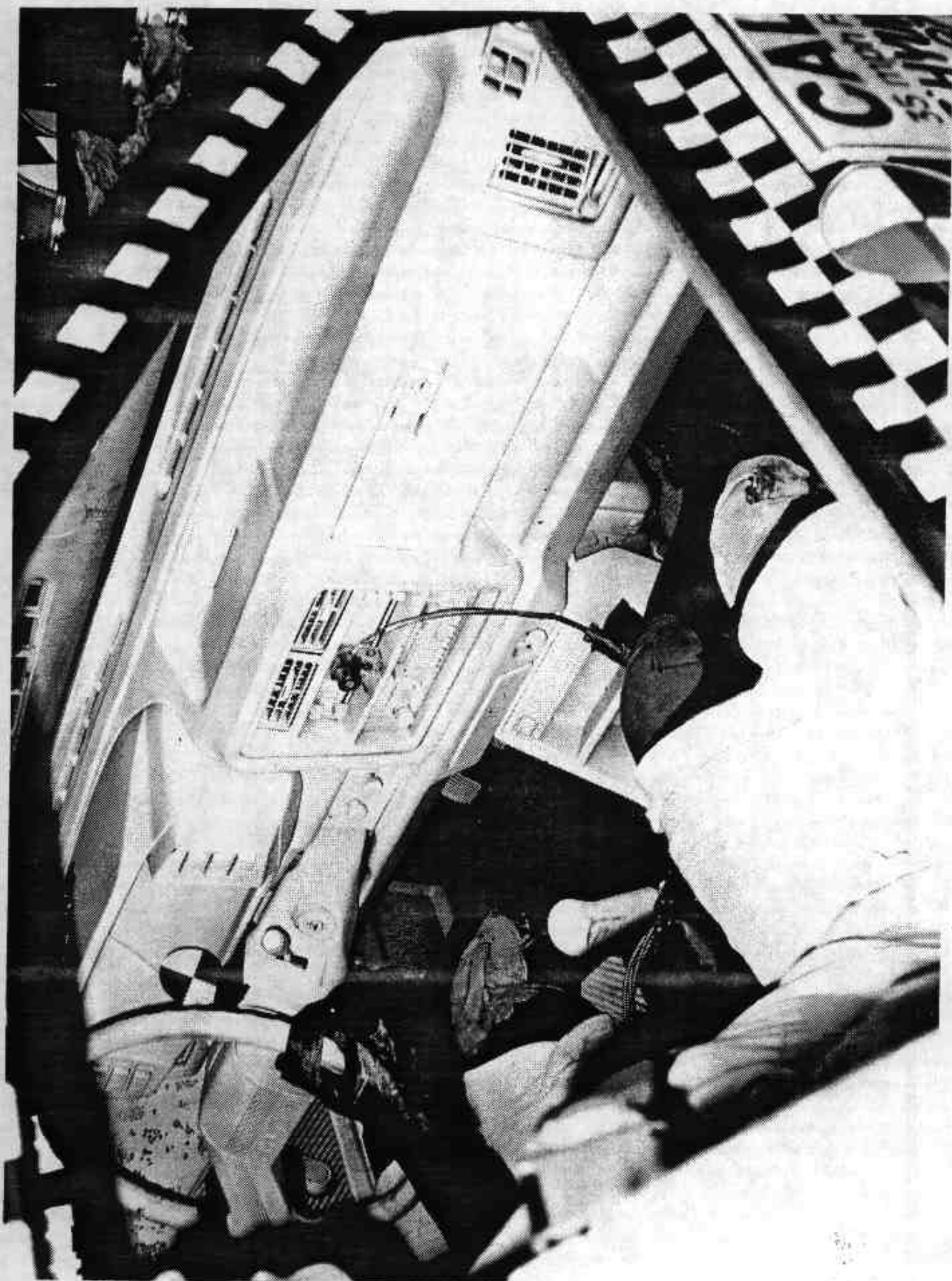


Figure A-26 PRE-TEST PASSENGER AND INTERIOR VIEW

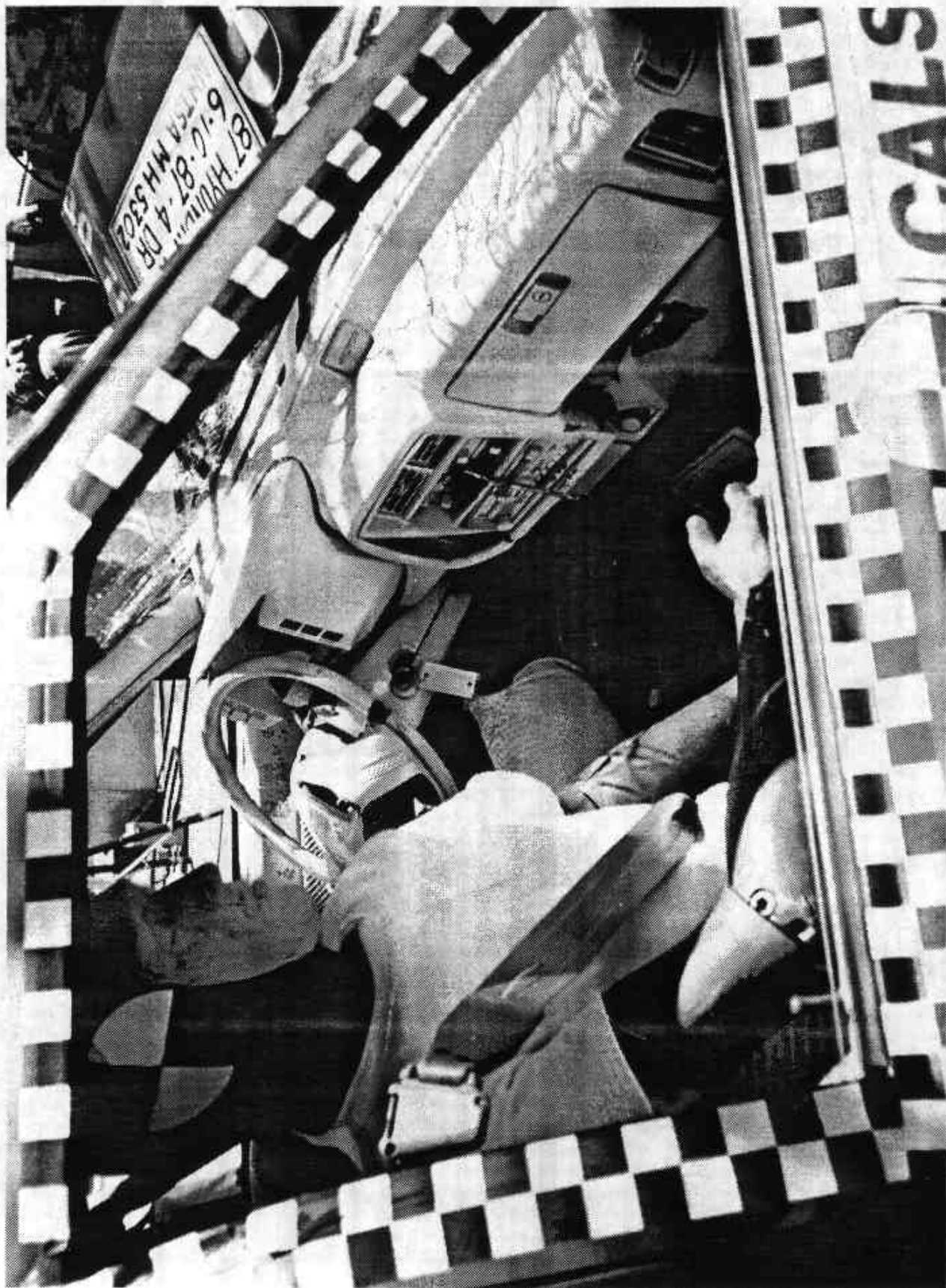


Figure A-27 POST-TEST PASSENGER AND INTERIOR VIEW

Appendix B

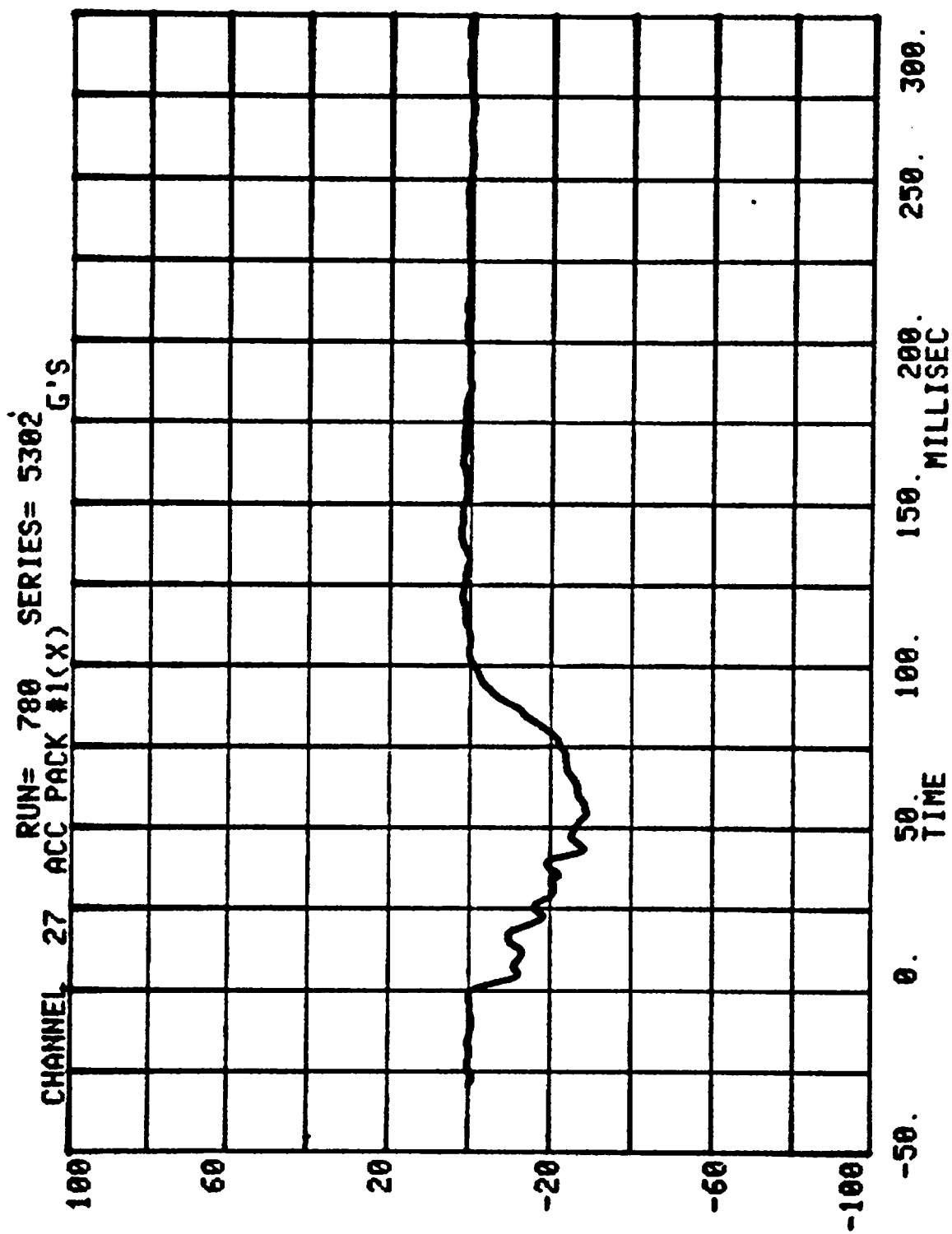
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MH5302

VEHICLE DATA

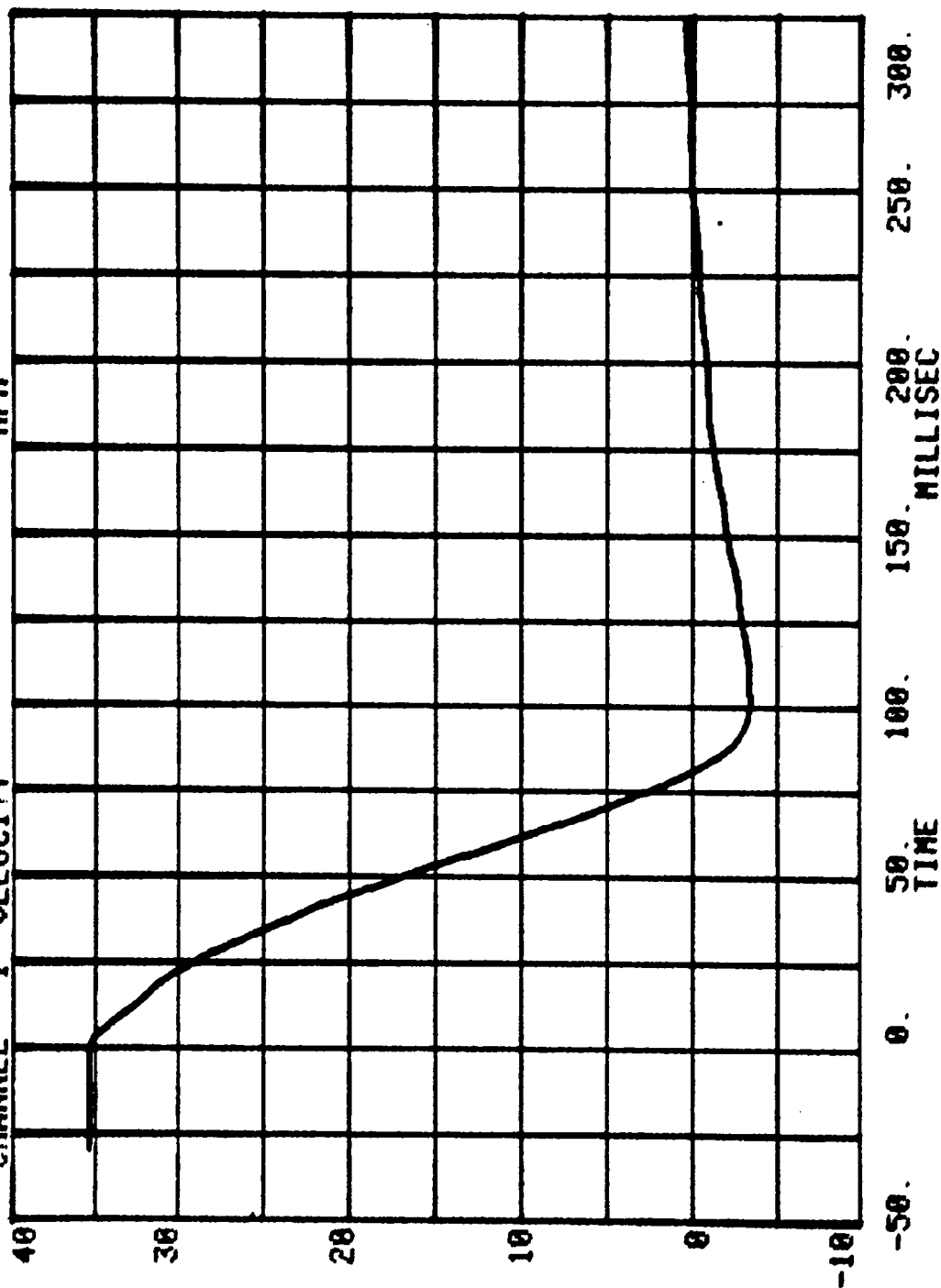
FILTER CHANNEL CLASS

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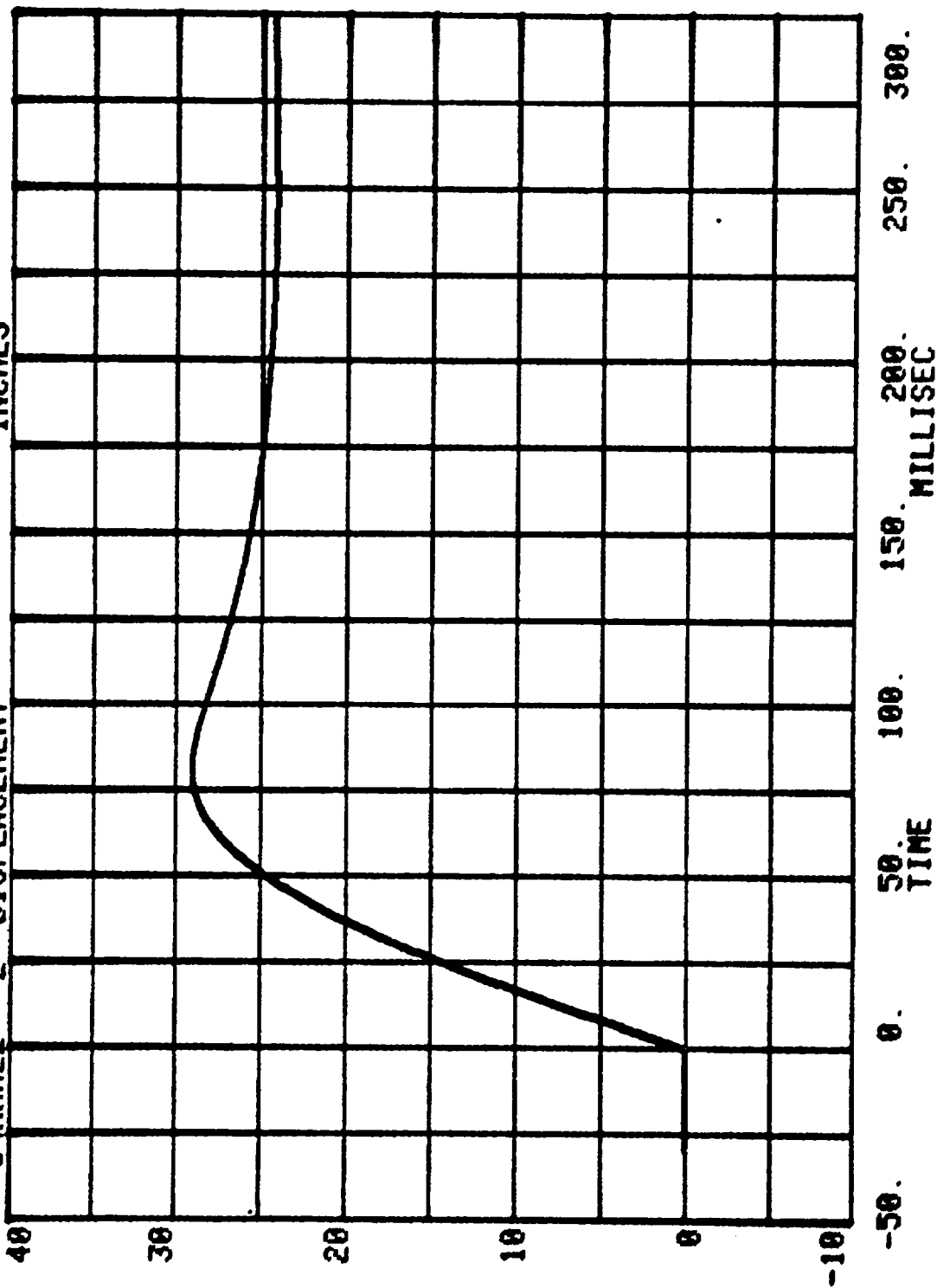


Acc #1(x)

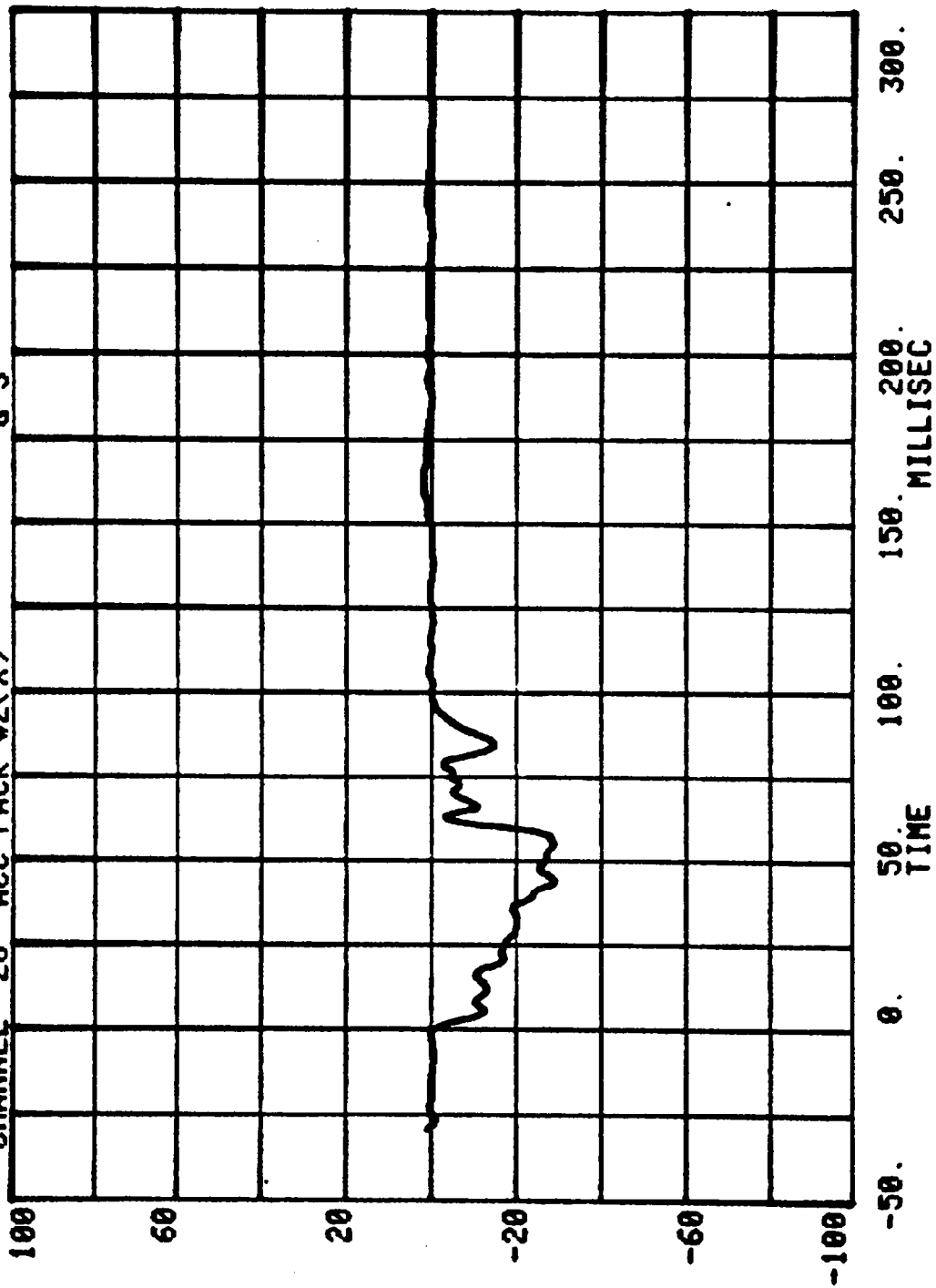
CHANNEL 1 VELOCITY
RUN= 780 SERIES= 5302 MPH



CHANNEL 2 DISPLACEMENT RUN= 780 SERIES= 5302 INCHES

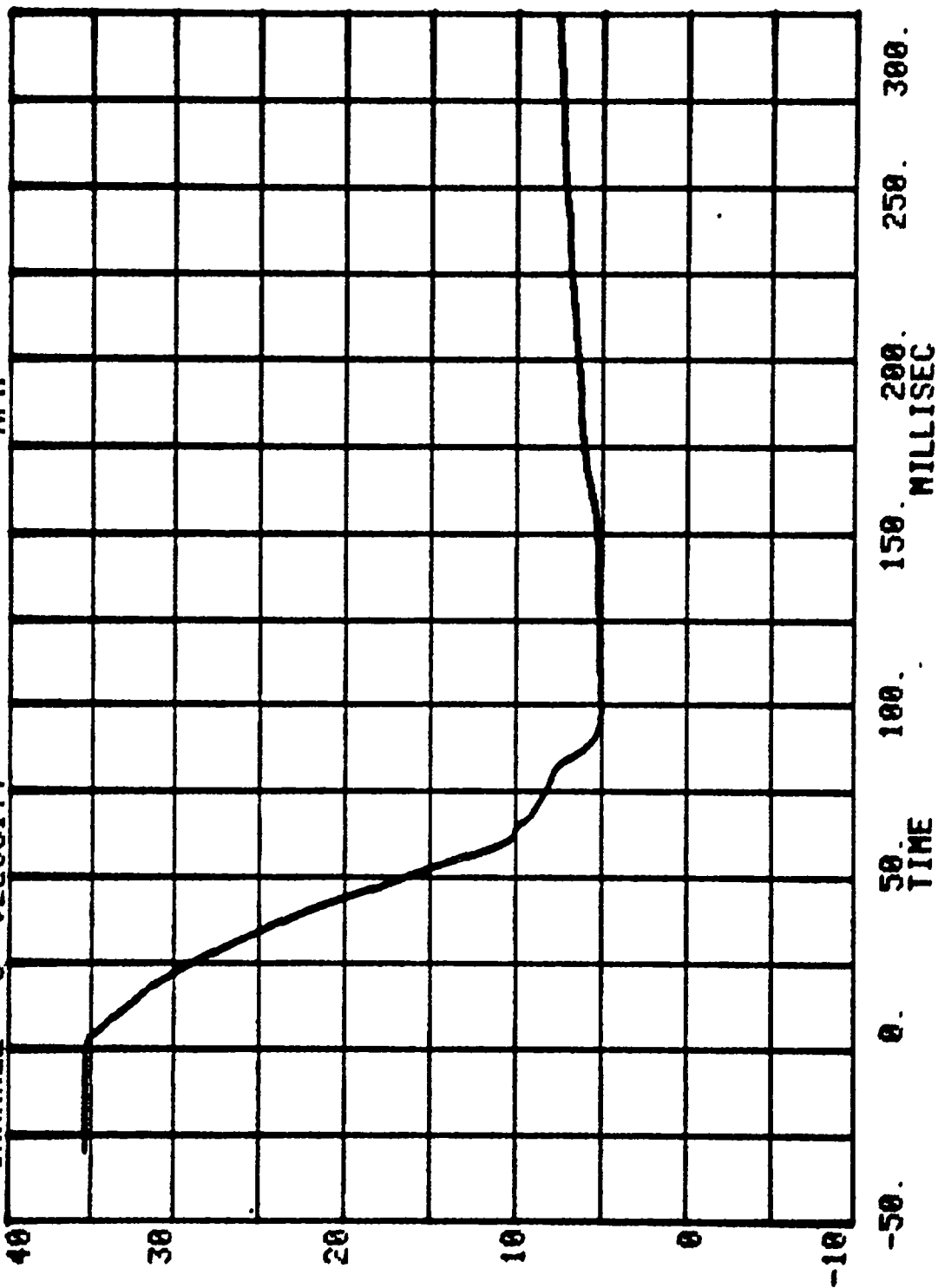


RUN= 780 SERIES= 5302
CHANNEL 28 ACC PACK #2(X) G'S



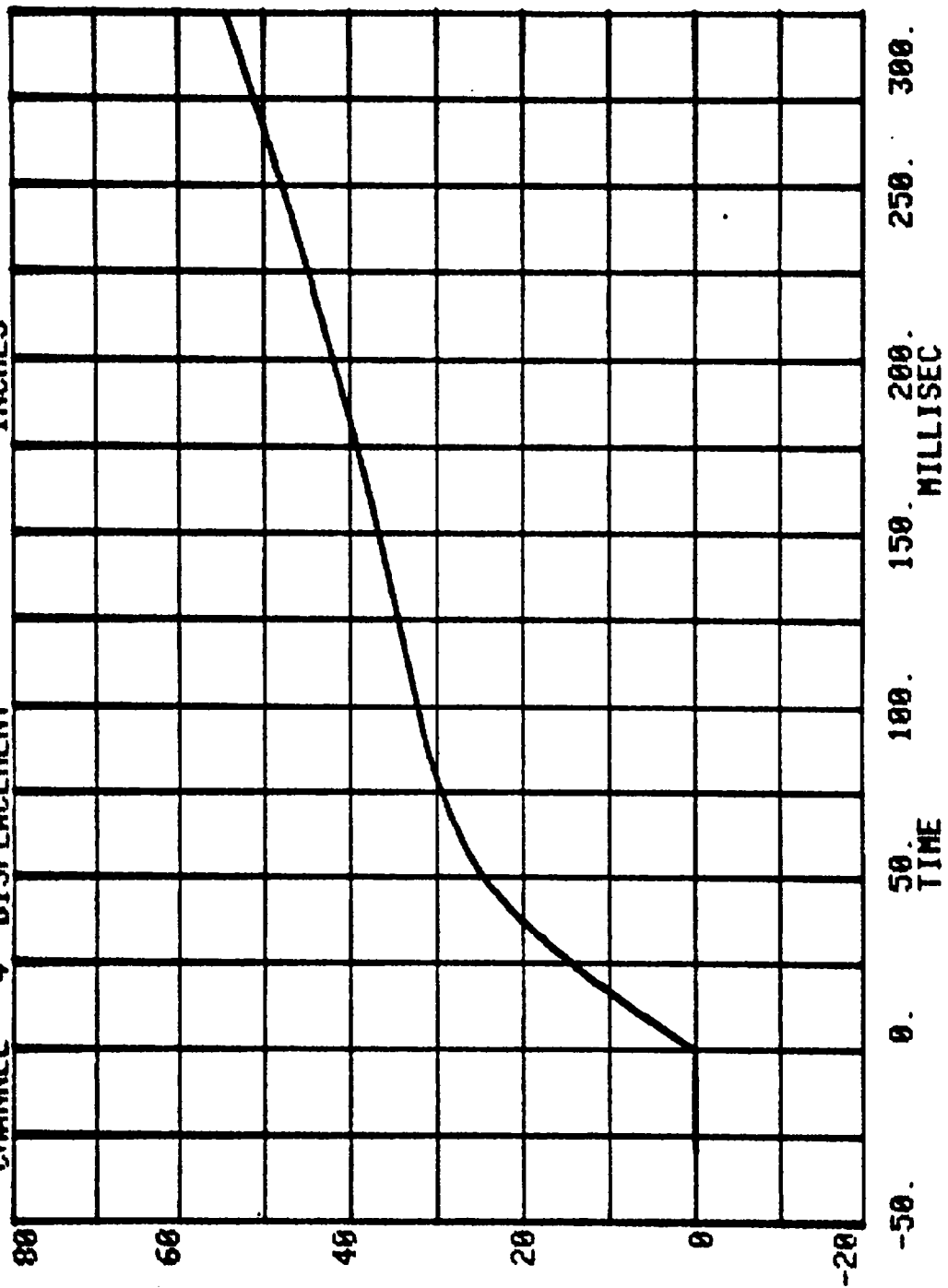
Acc#1 (x)

CHANNEL 3 VELOCITY RUN= 780 SERIES= 5302 MPH

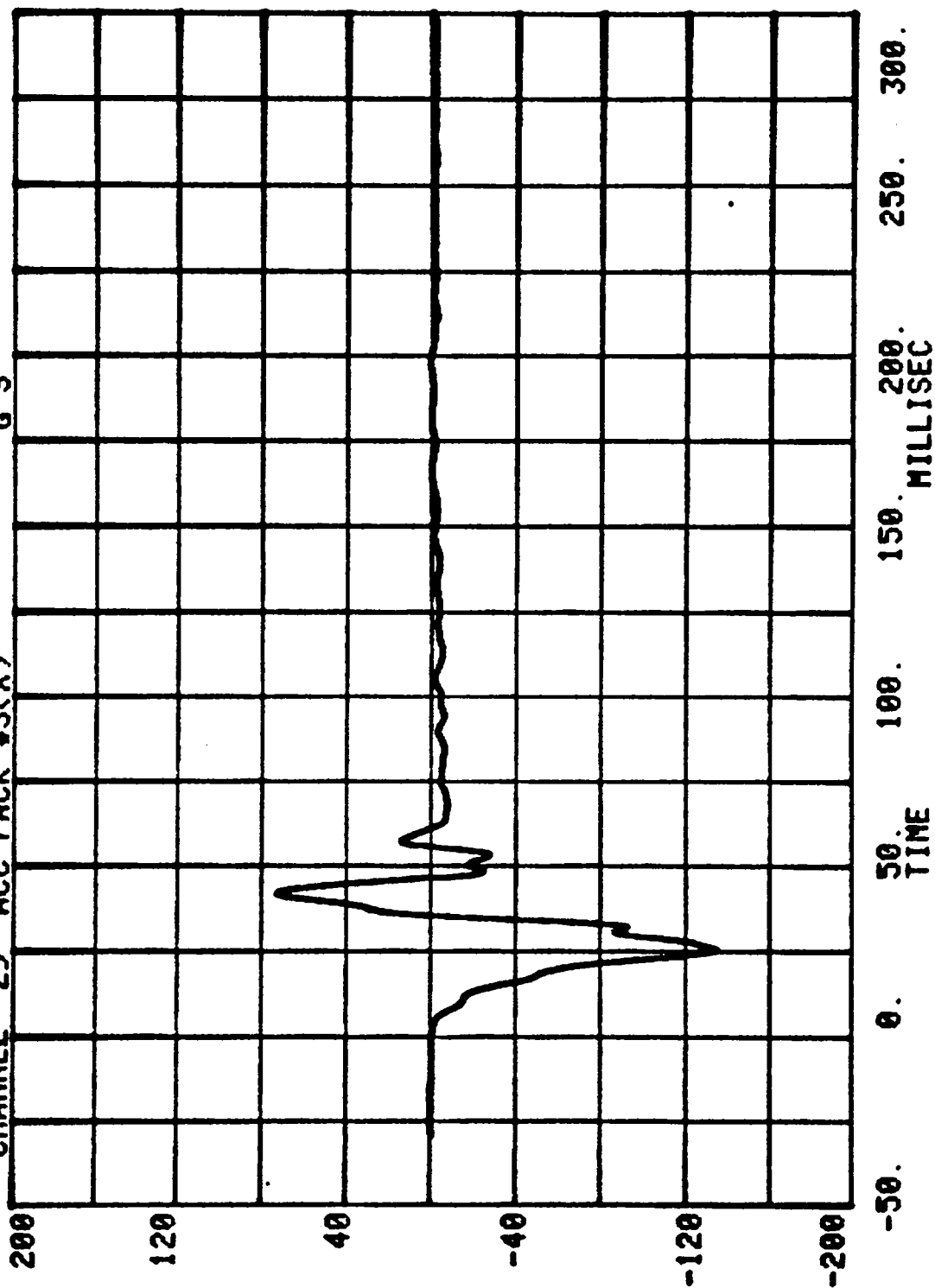


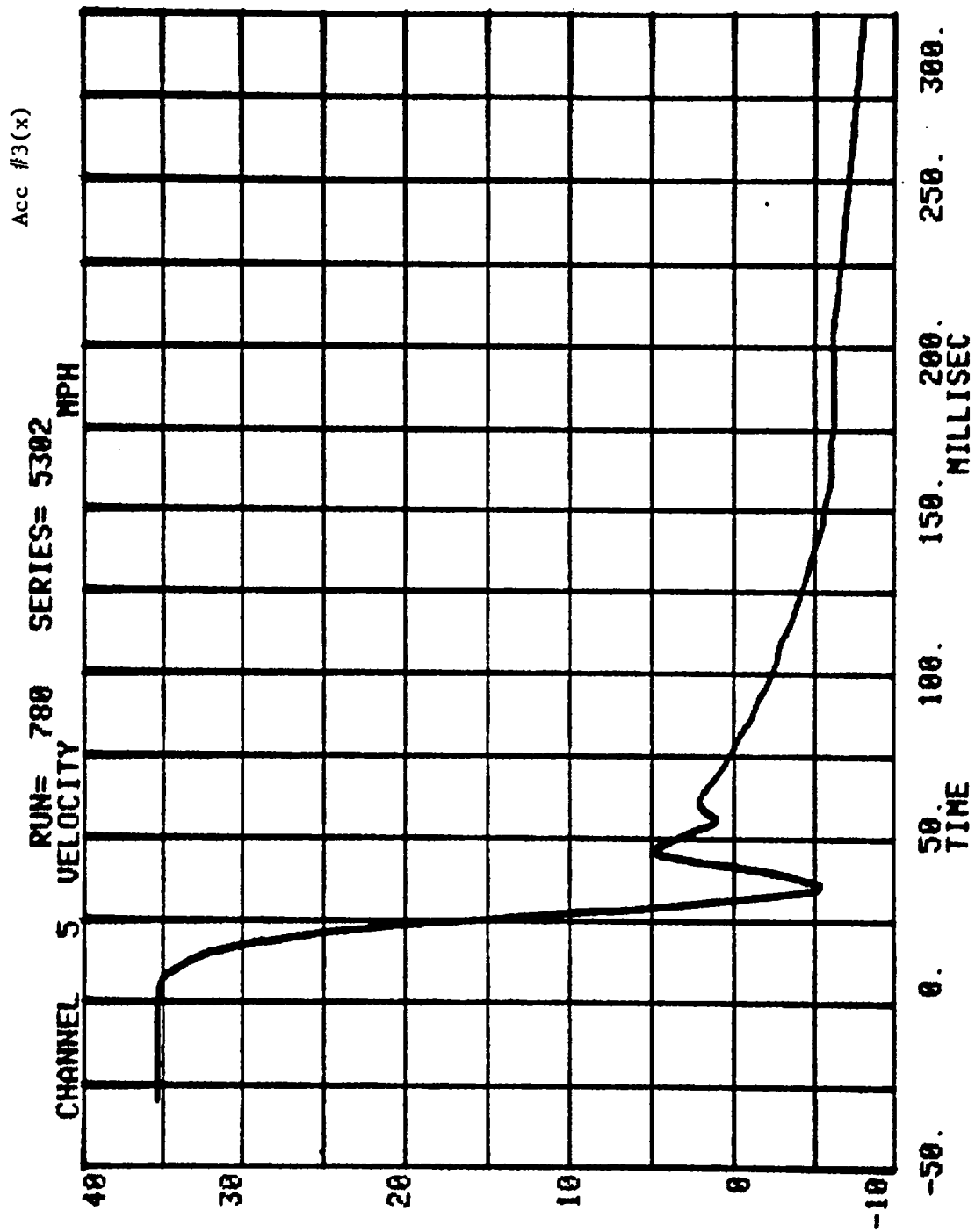
Acc #2(x)

CHANNEL 4 DISPLACEMENT RUN= 780 SERIES= 5302 INCHES



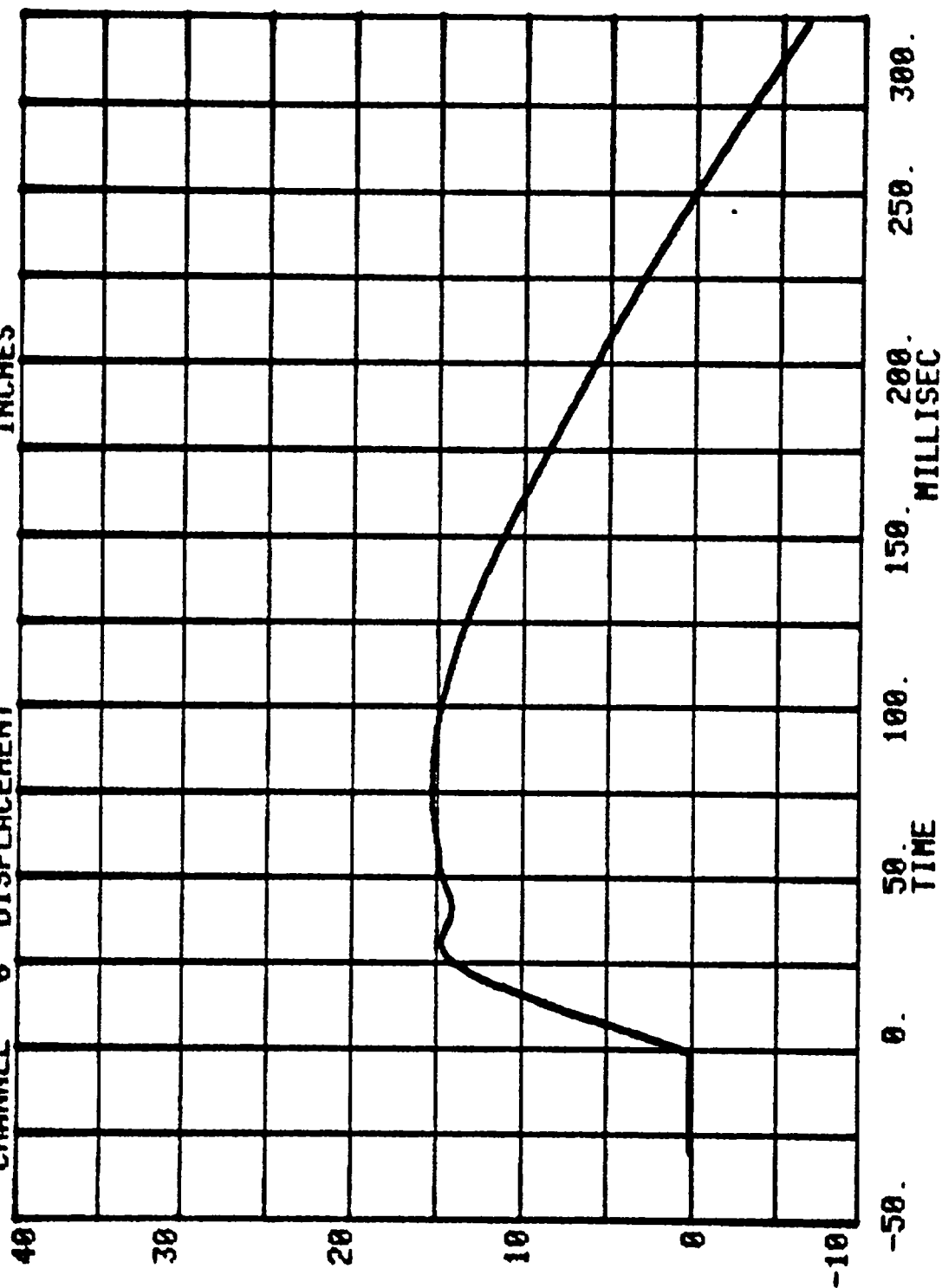
CHANNEL 29 ACC PACK #3(X) RUN= 780 SERIES= 5302 G'S



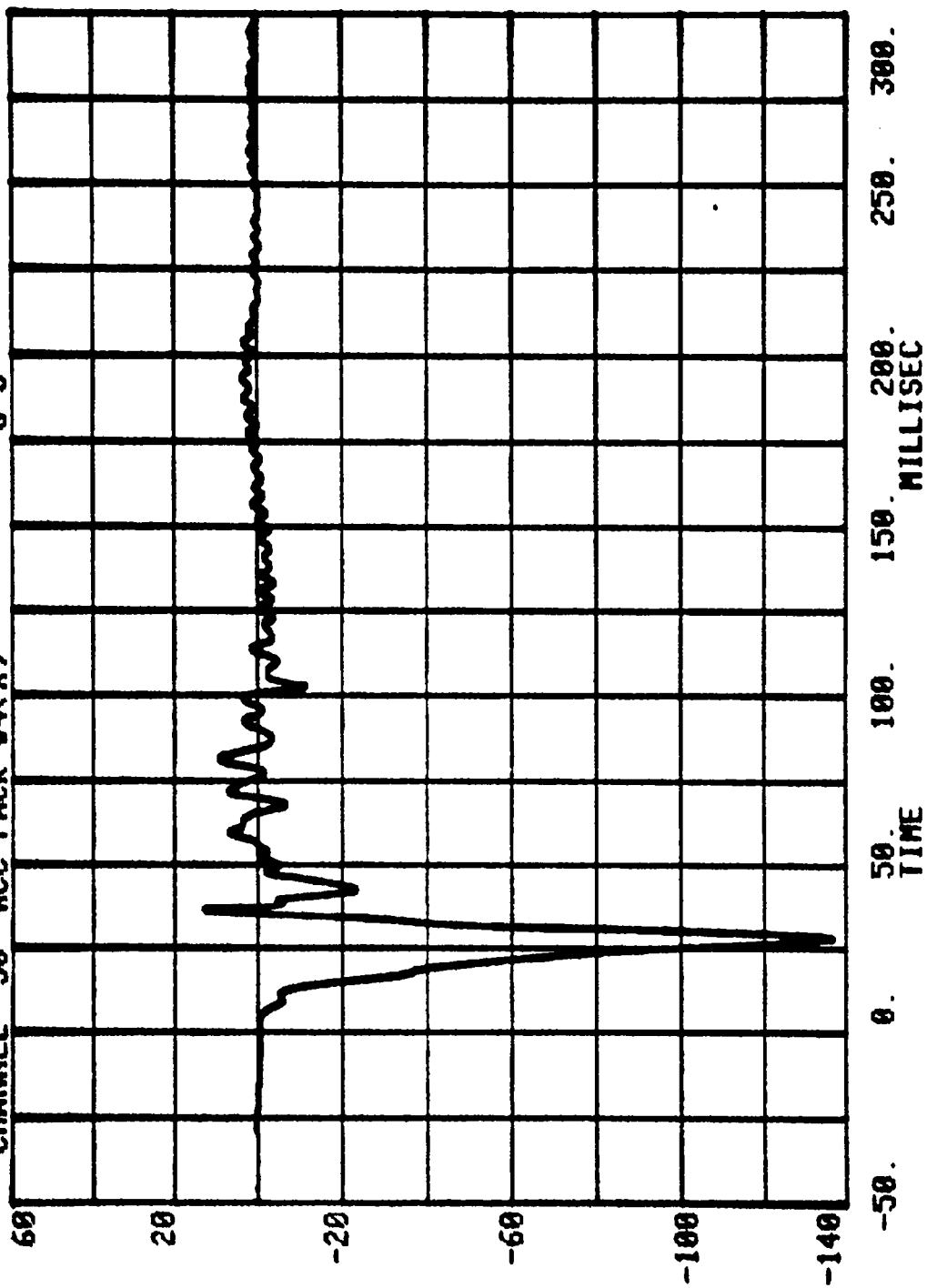


Acc #3(x)

CHANNEL 6 DISPLACEMENT RUN= 780 SERIES= 5302 INCHES

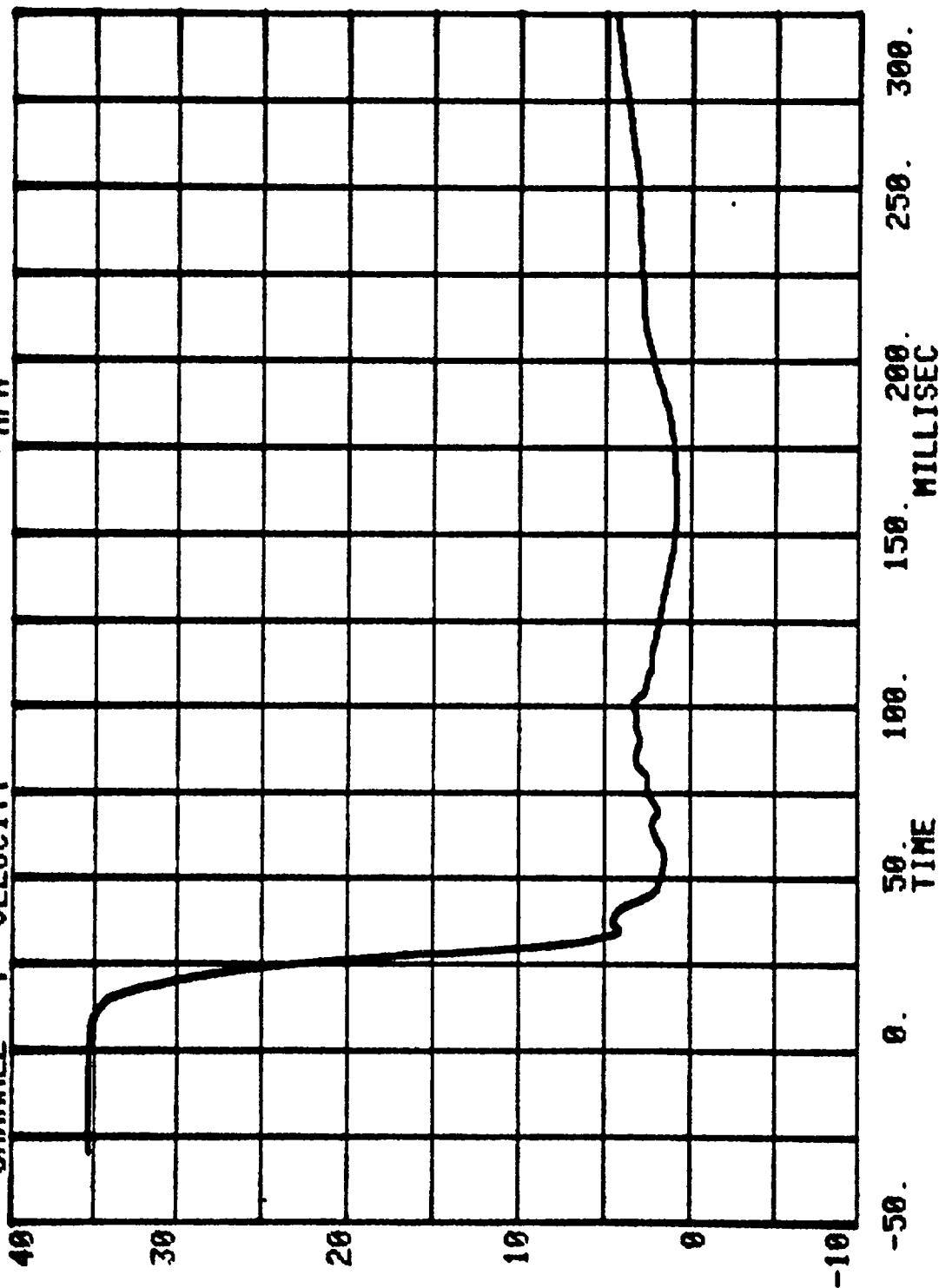


RUN= 788 SERIES= 5302
CHANNEL 30 ACC PACK #4(X) G'S



Acc #4(x)

CHANNEL 7 VELOCITY
RUN= 780 SERIES= 5382 MPH



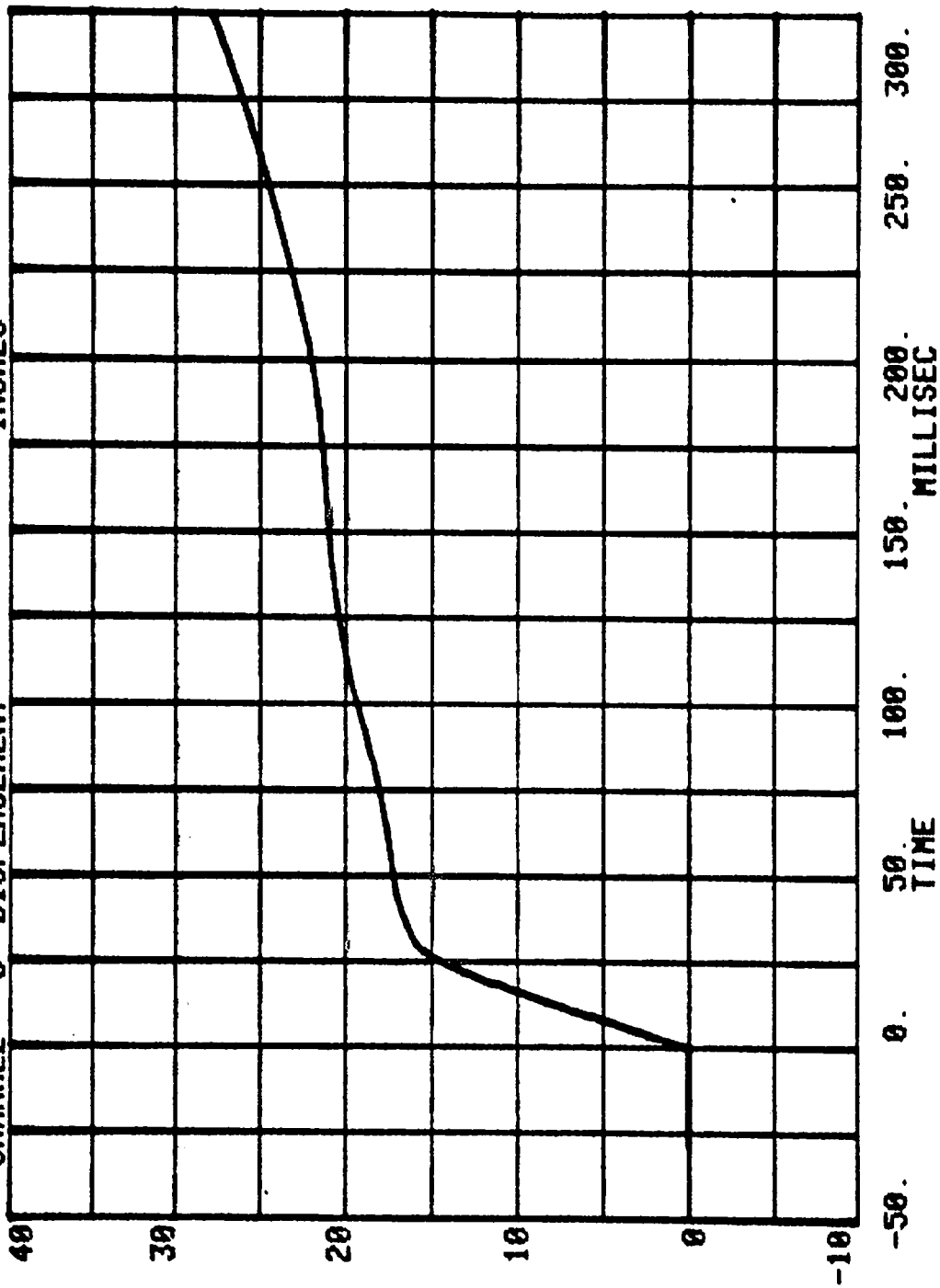
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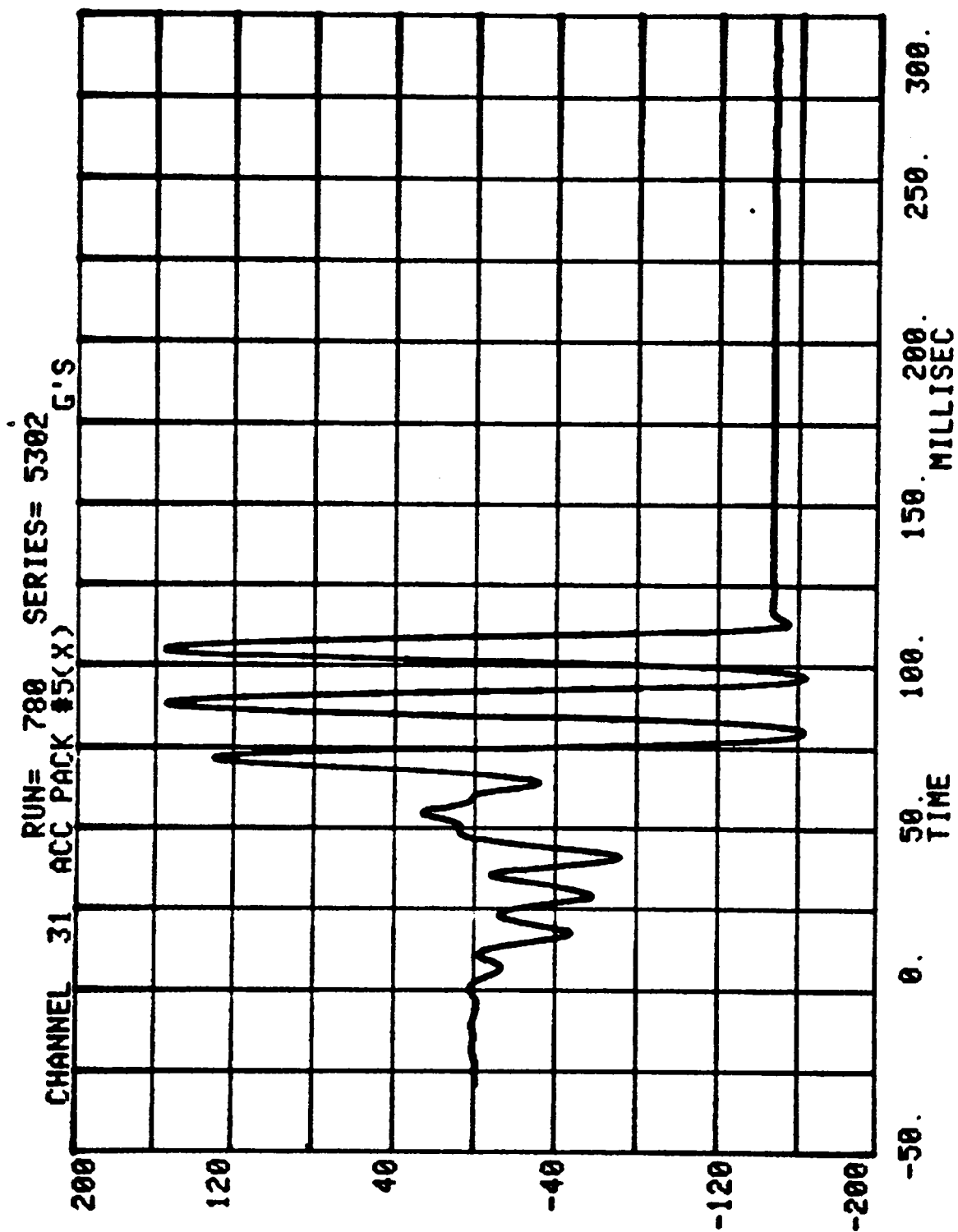
CHANNEL 8 DISPLACEMENT

RUN= 780

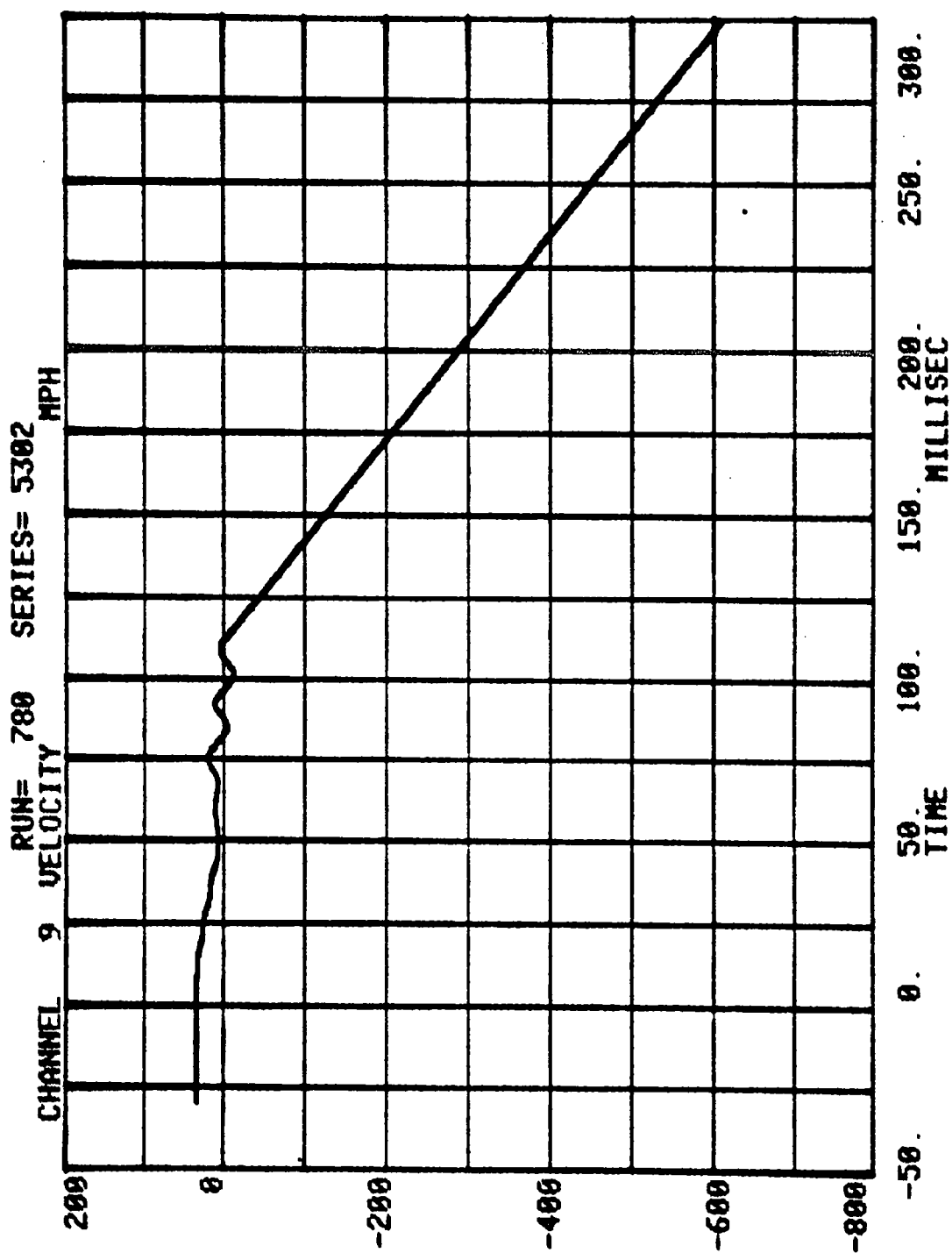
SERIES= 5302

INCHES





Acc #5(x)

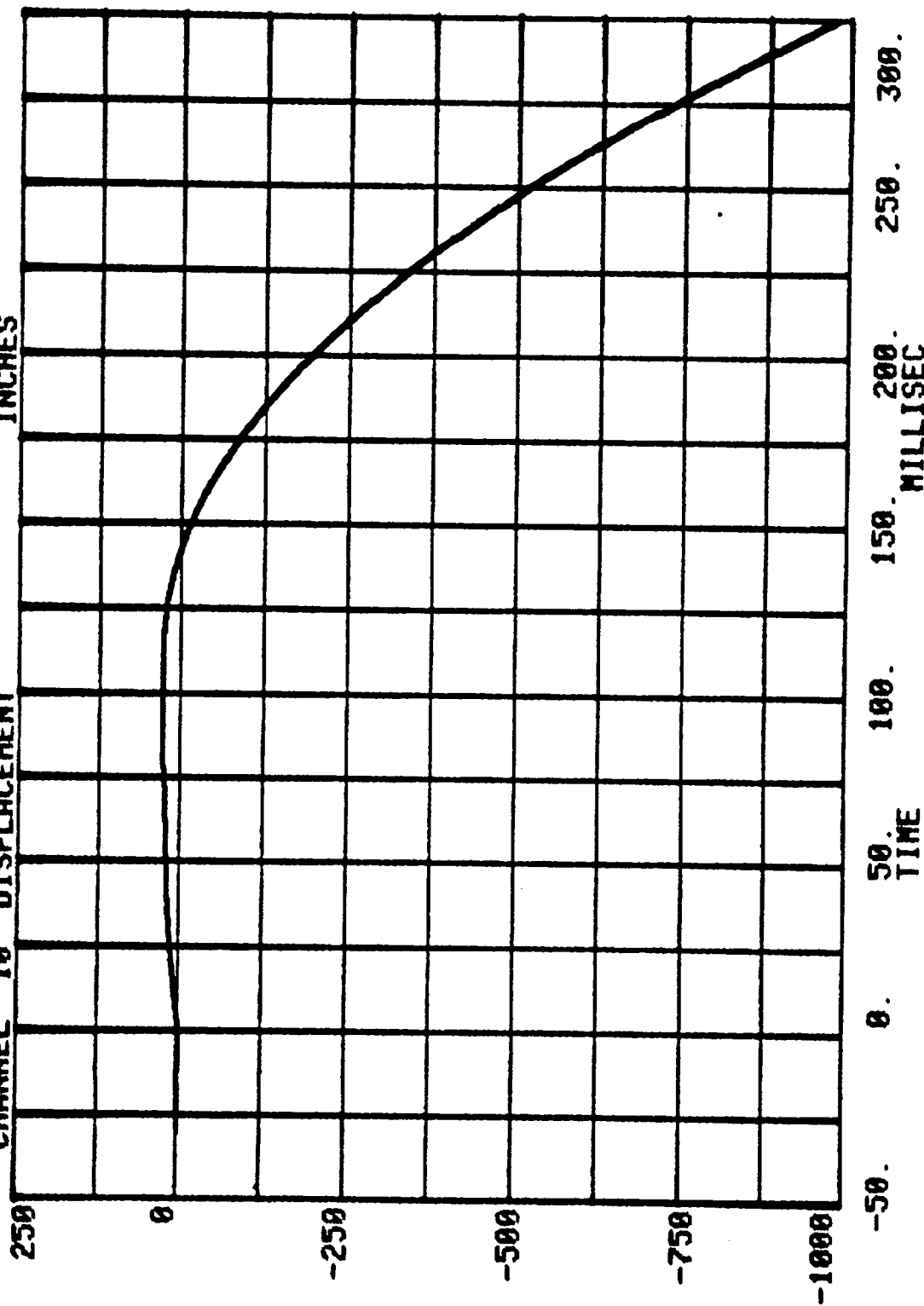


Acc #5(x)

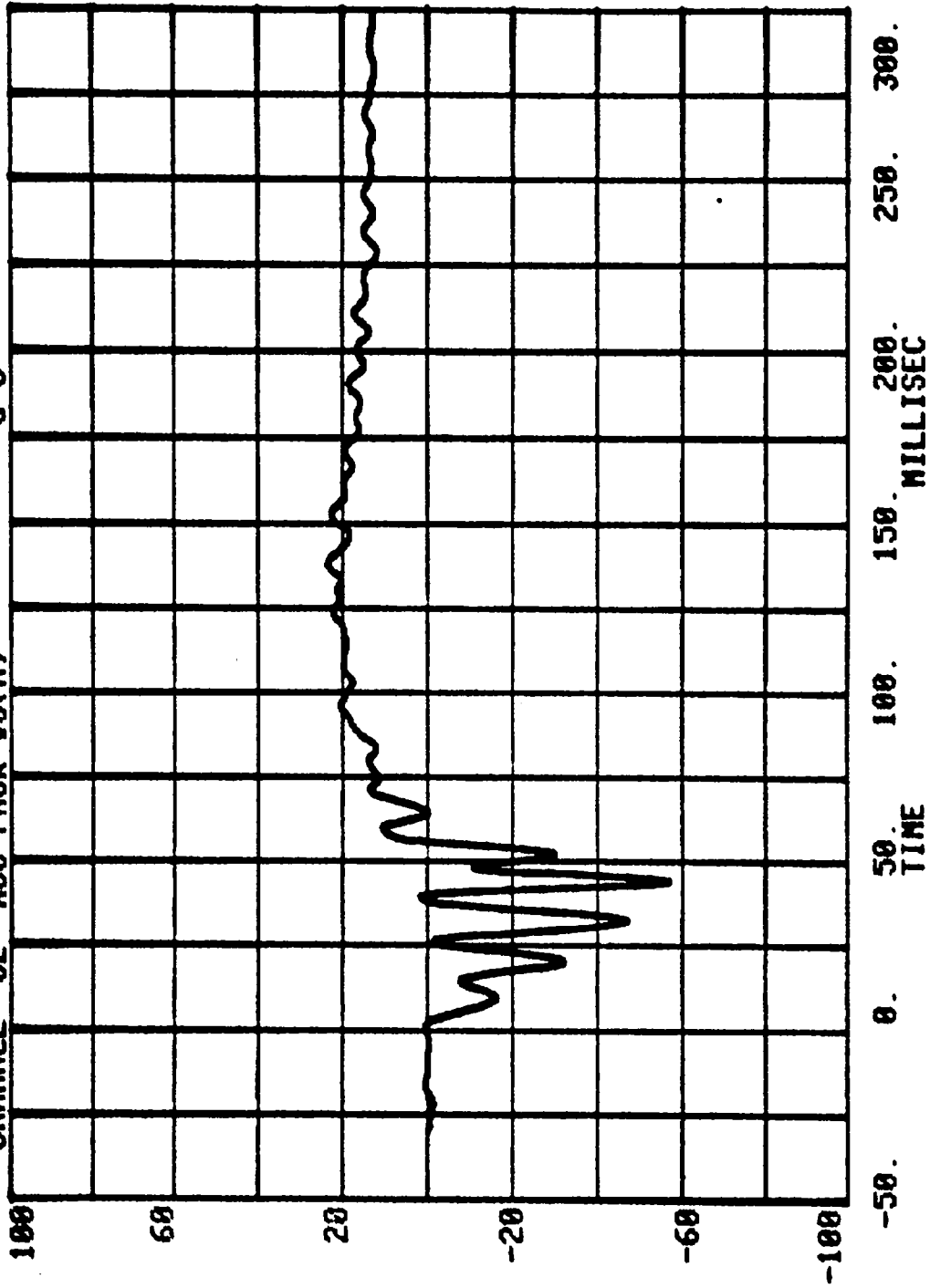
CHANNEL 10 DISPLACEMENT INCHES

RUN= 788

SERIES= 5302

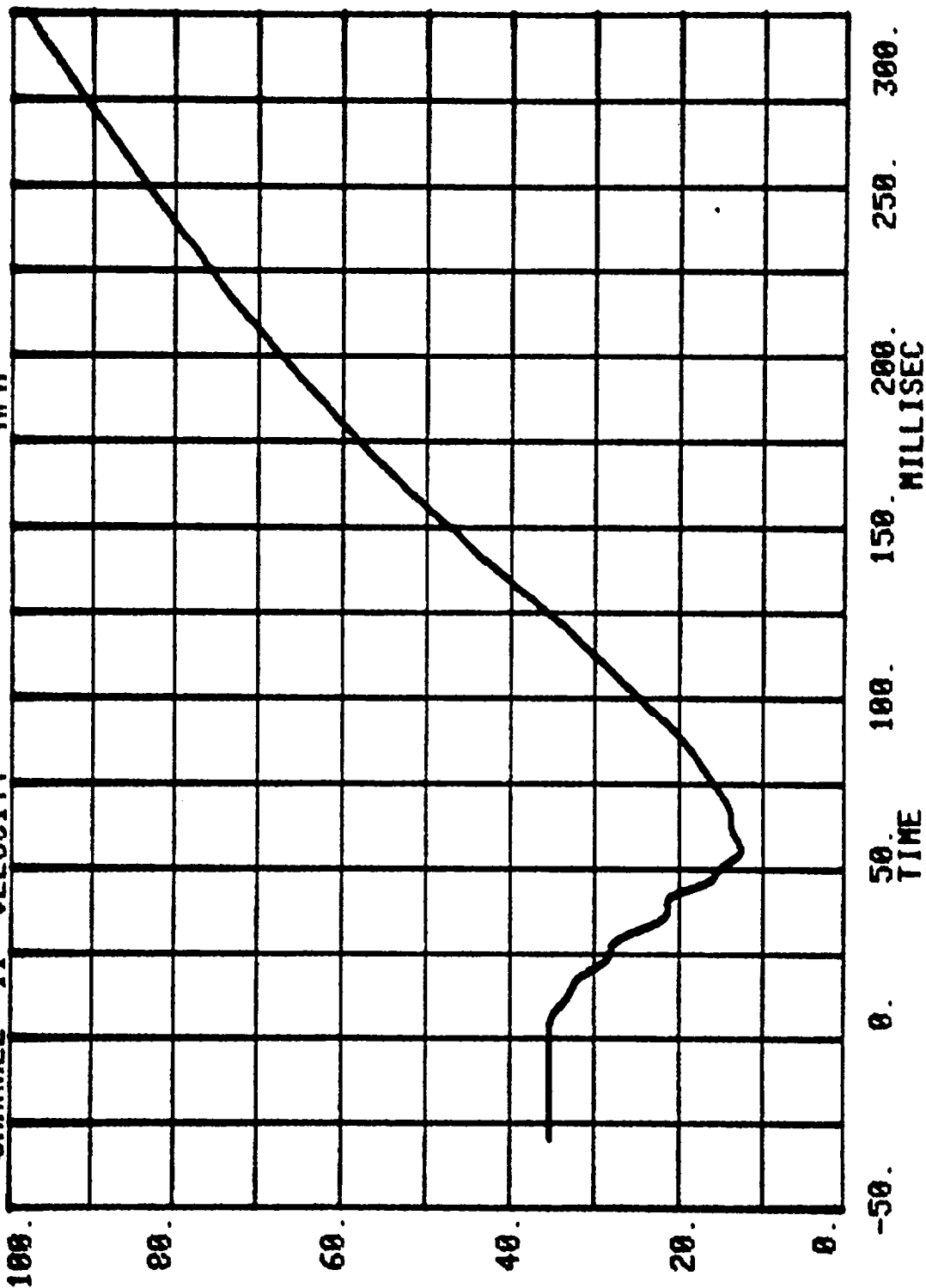


CHANNEL 32 ACC PACK #6(X) RUN= 780 SERIES= 5302 G'S



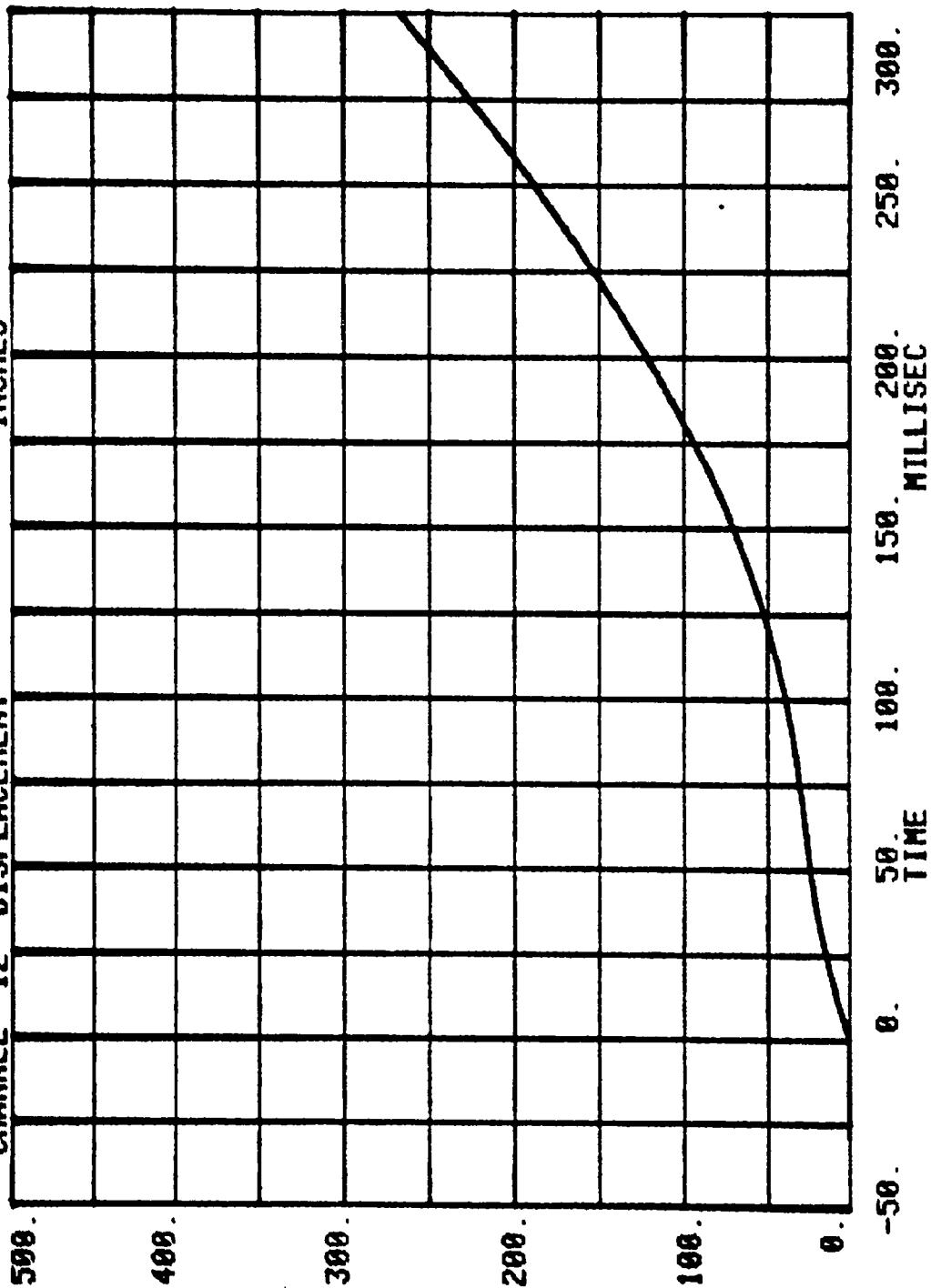
Acc #6(x)

CHANNEL 11 VELOCITY
RUN= 780 SERIES= 5302 MPH

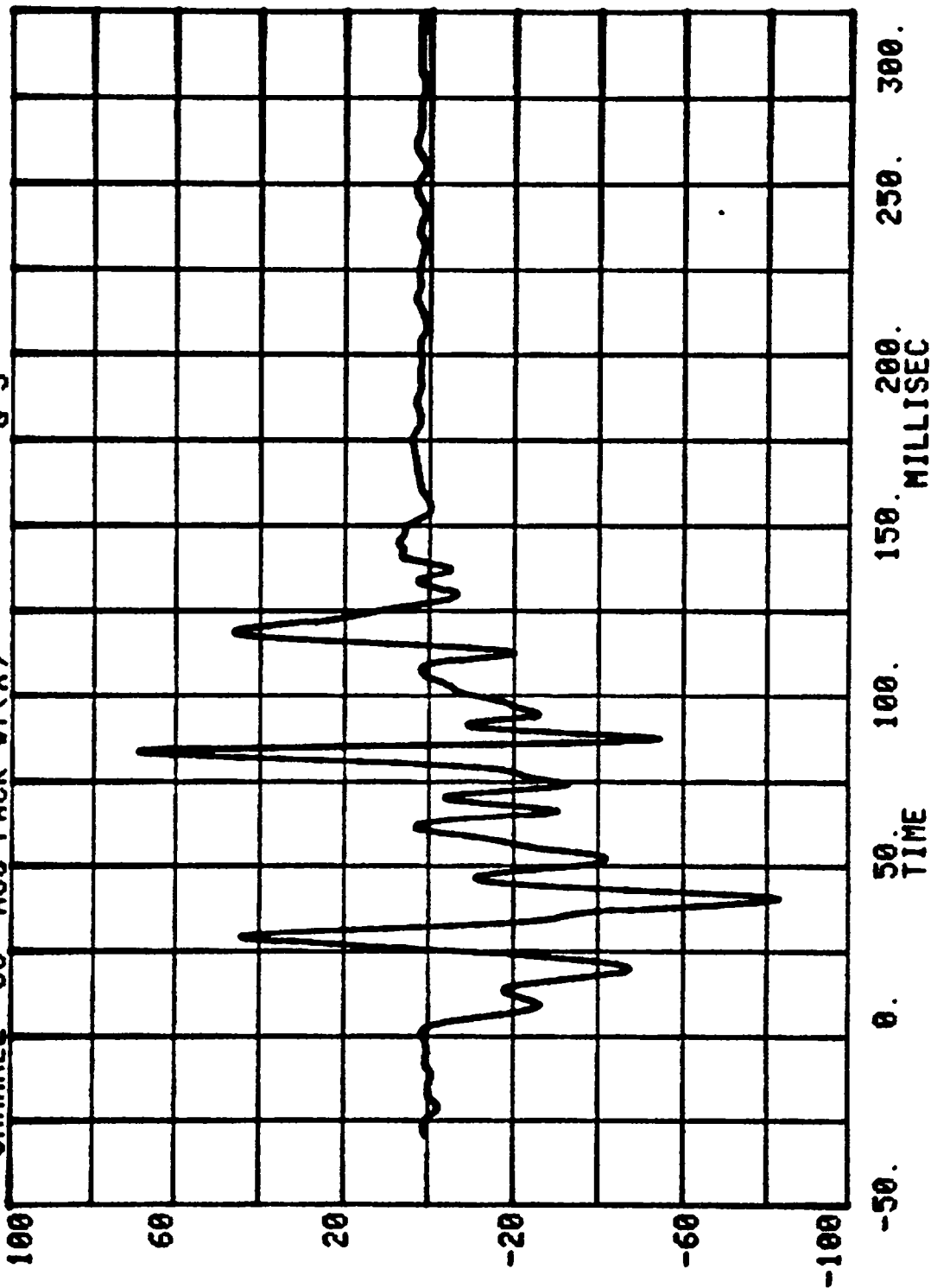


Acc #6(x)

CHANNEL 12 DISPLACEMENT RUN= 780 SERIES= 5302 INCHES

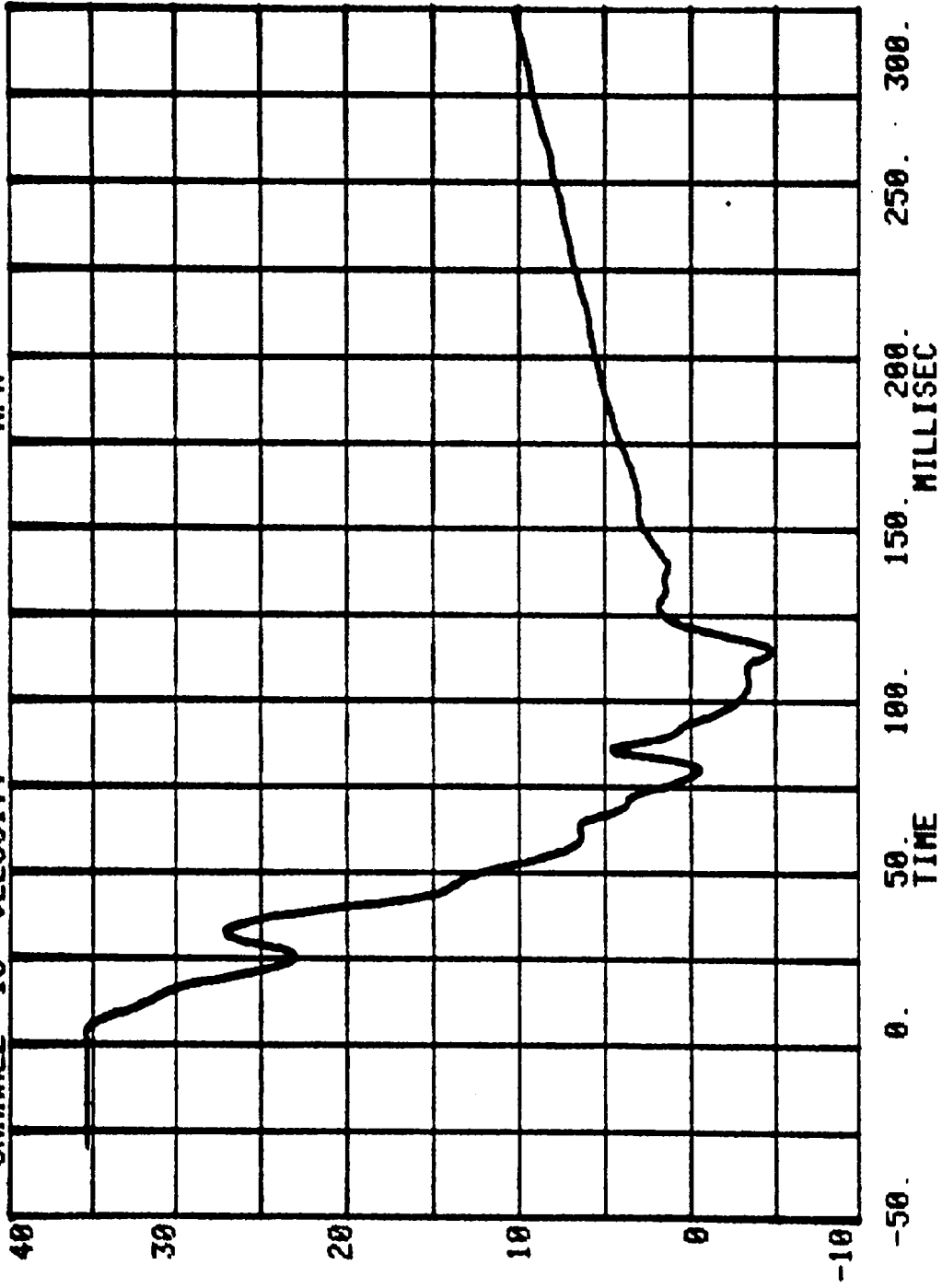


CHANNEL 33 ACC PACK #7(X) RUN= 780 SERIES= 5302 G'S



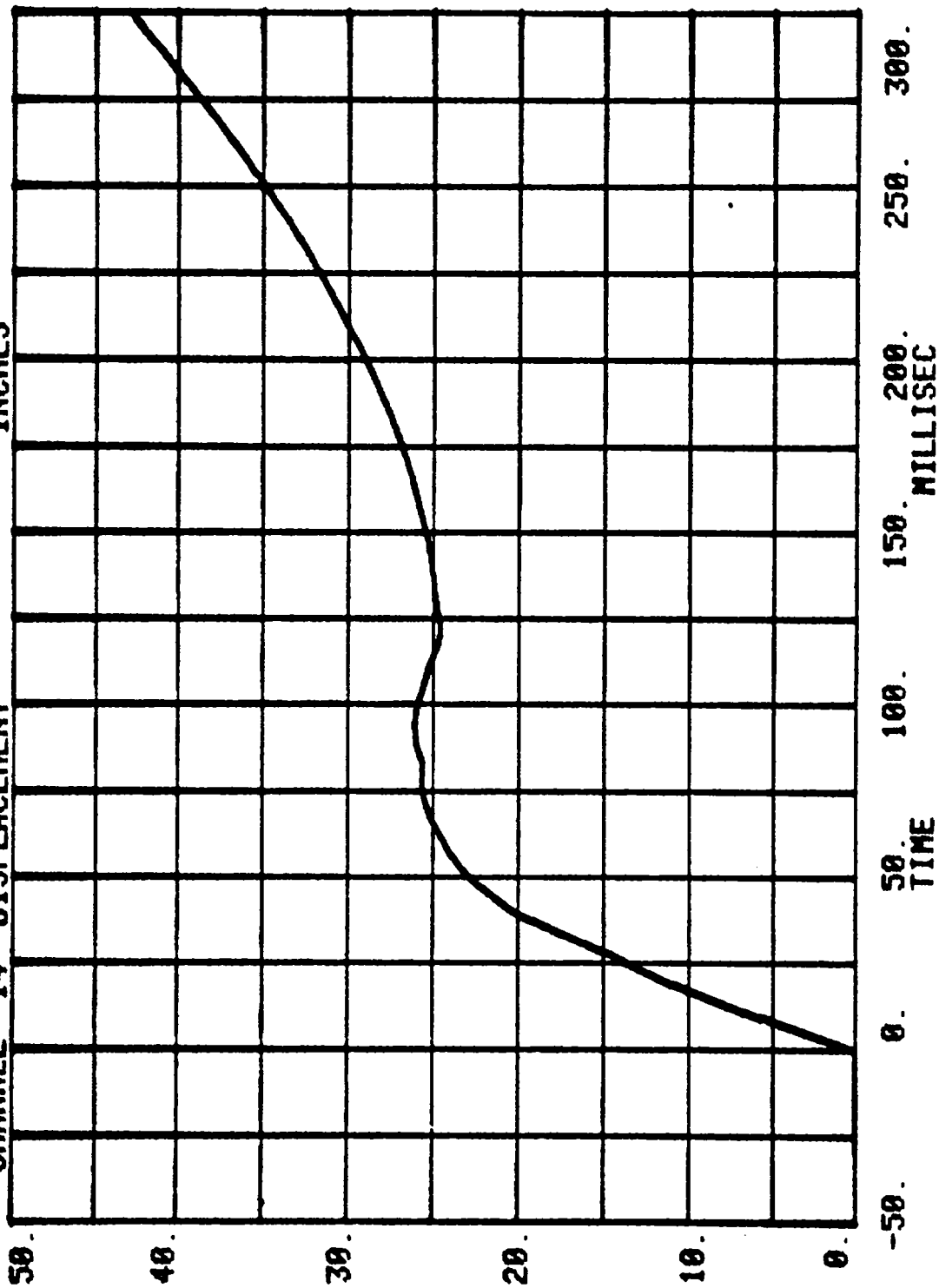
Acc #7(x)

CHANNEL 13 VELOCITY RUN= 780 SERIES= 5302 MPH



Acc #7(x)

CHANNEL 14 DISPLACEMENT RUN= 780 SERIES= 5302 INCHES

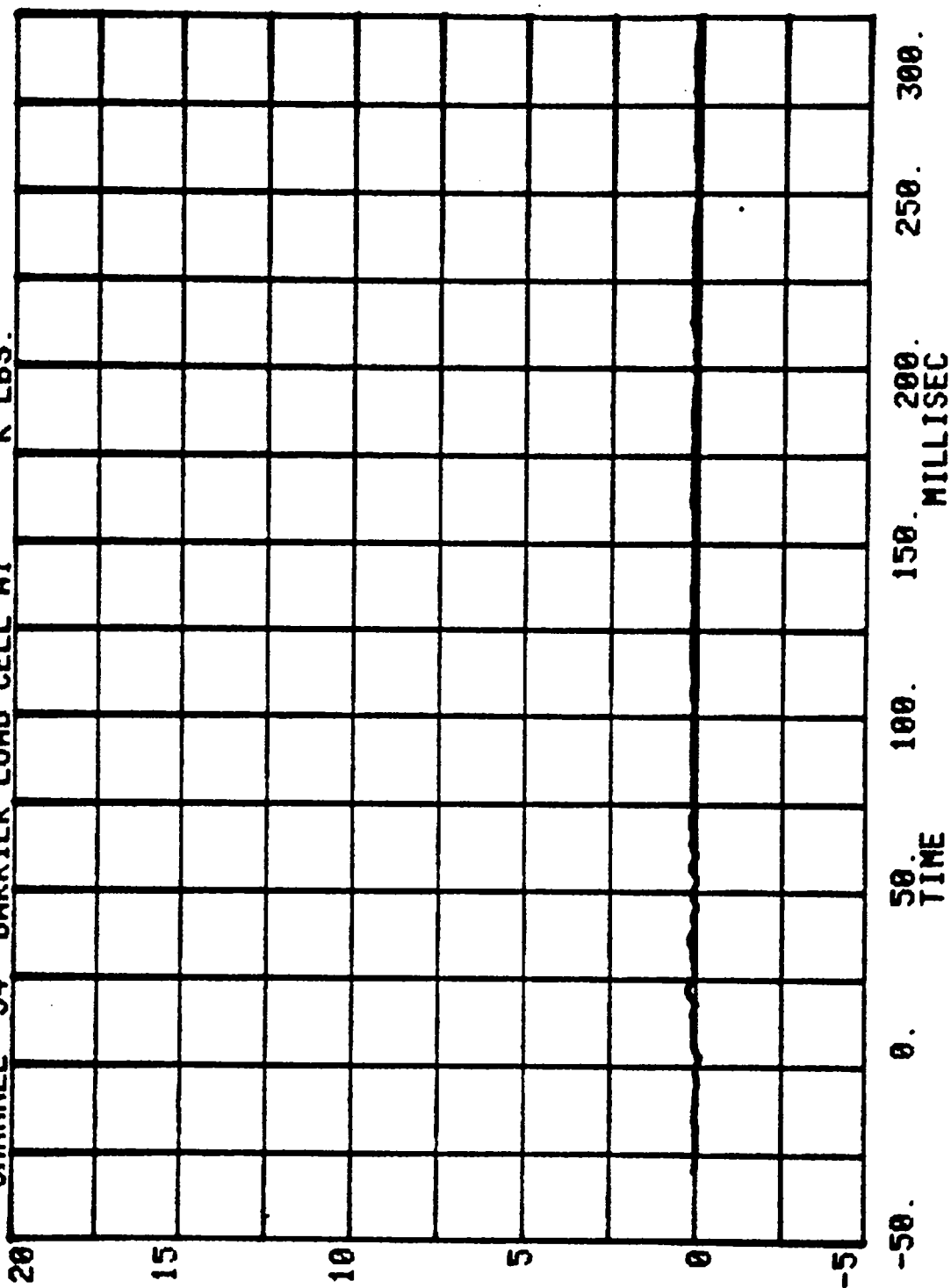


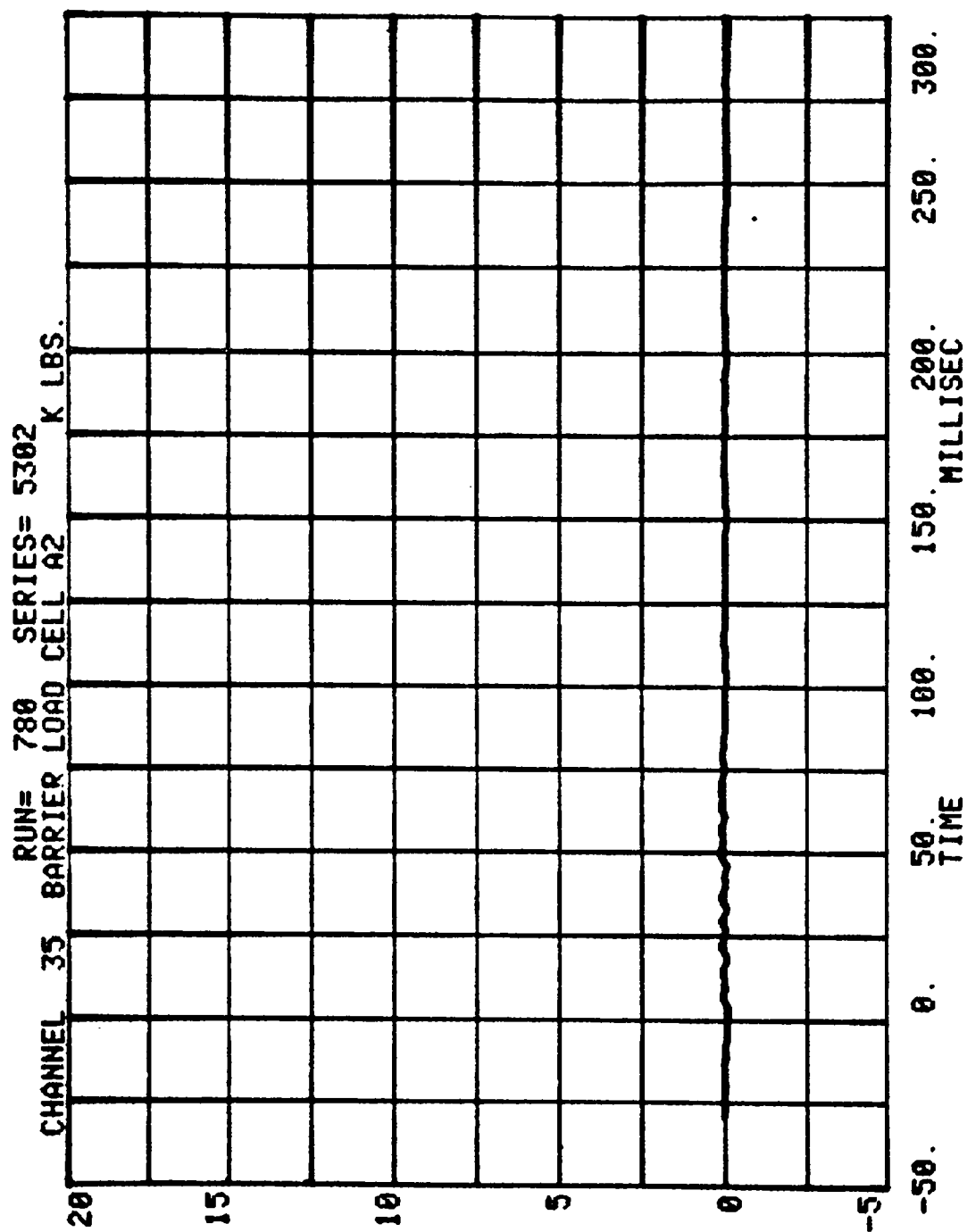
TEST NO. MH5302

LOAD CELL BARRIER DATA
FILTER CHANNEL CLASS

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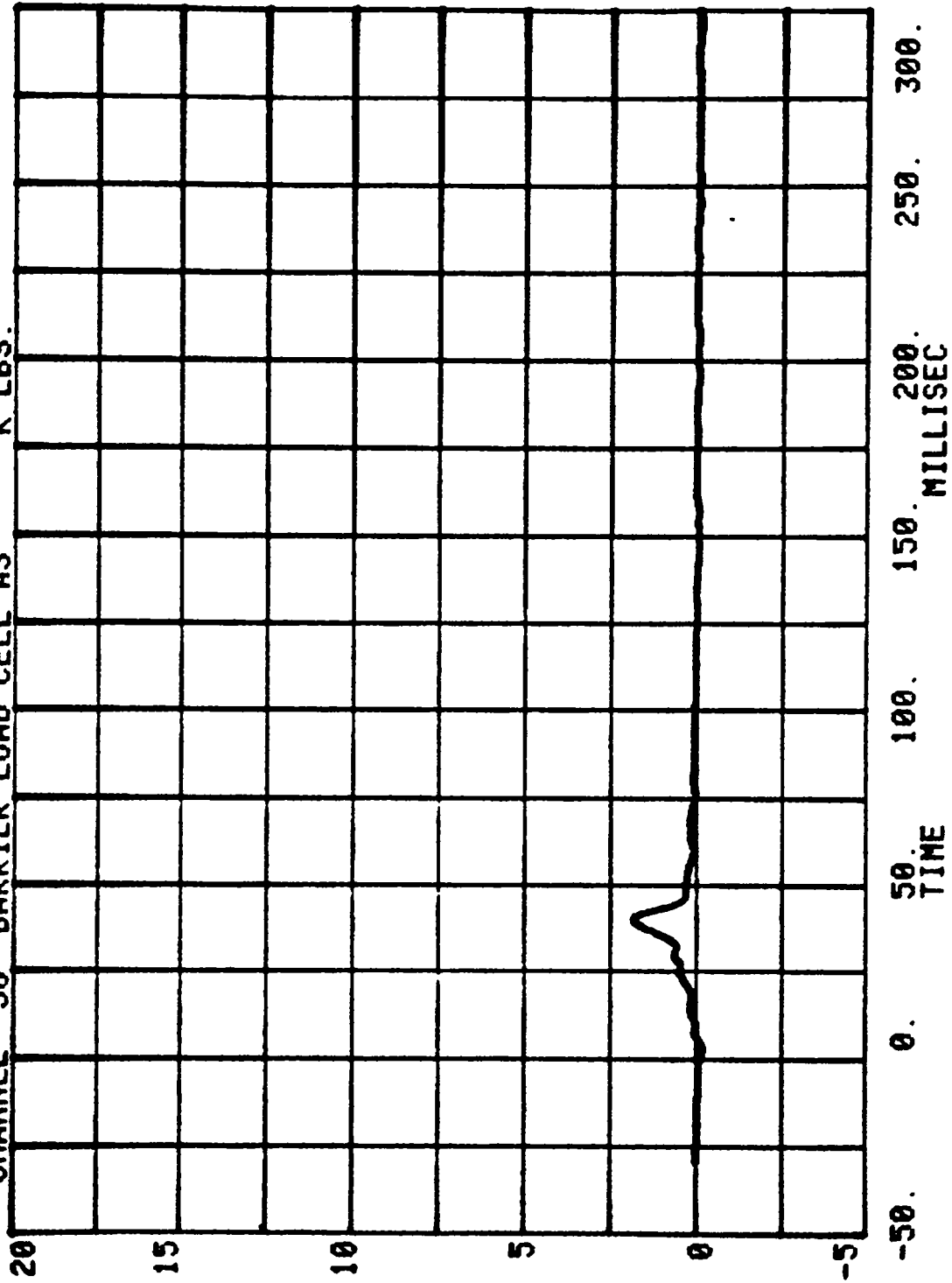
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CHANNEL 34 BARRIER LOAD CELL A1 K LBS.



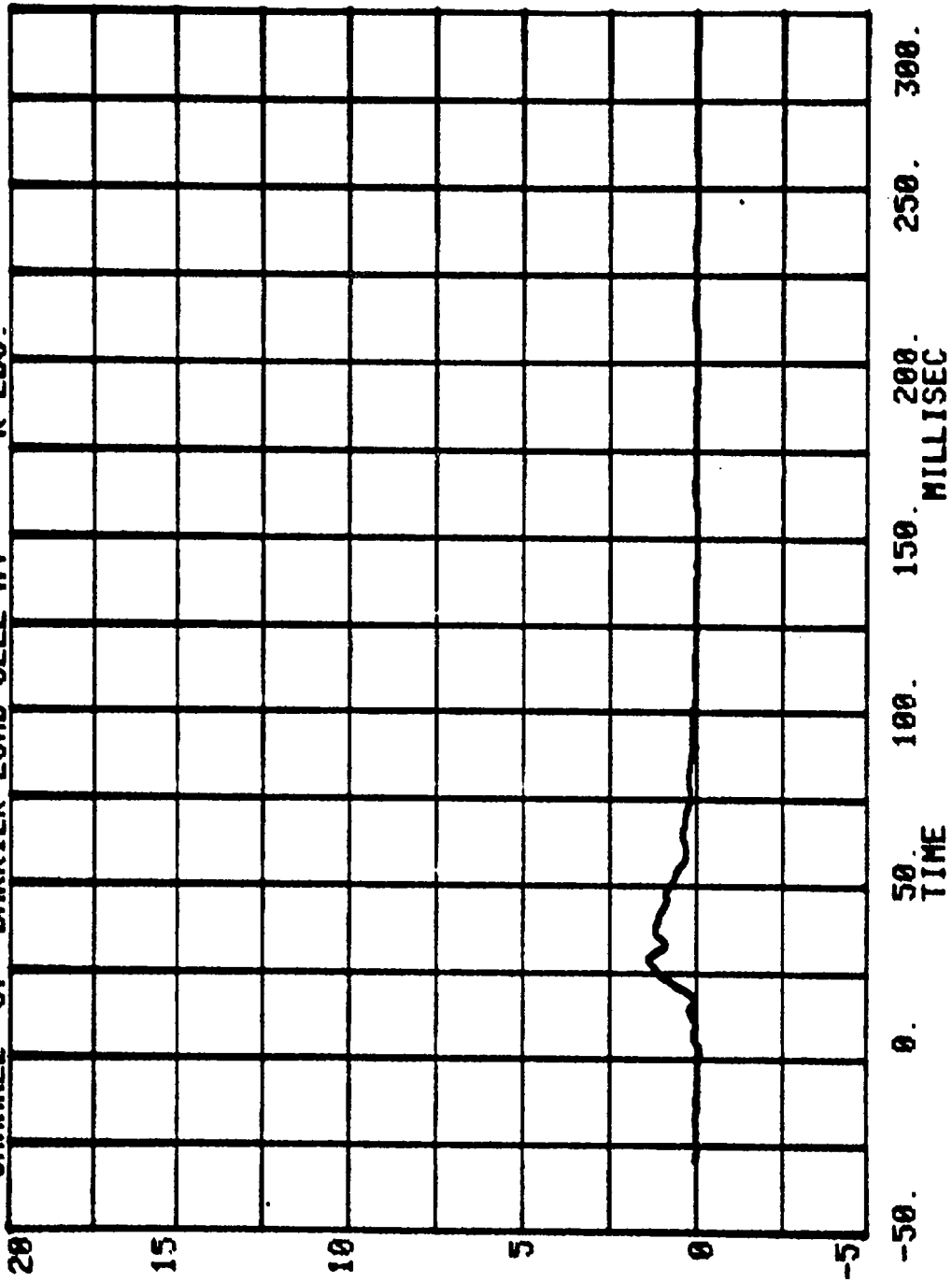


CHANNEL 36 BARRIER LOAD CELL A3 K LBS.

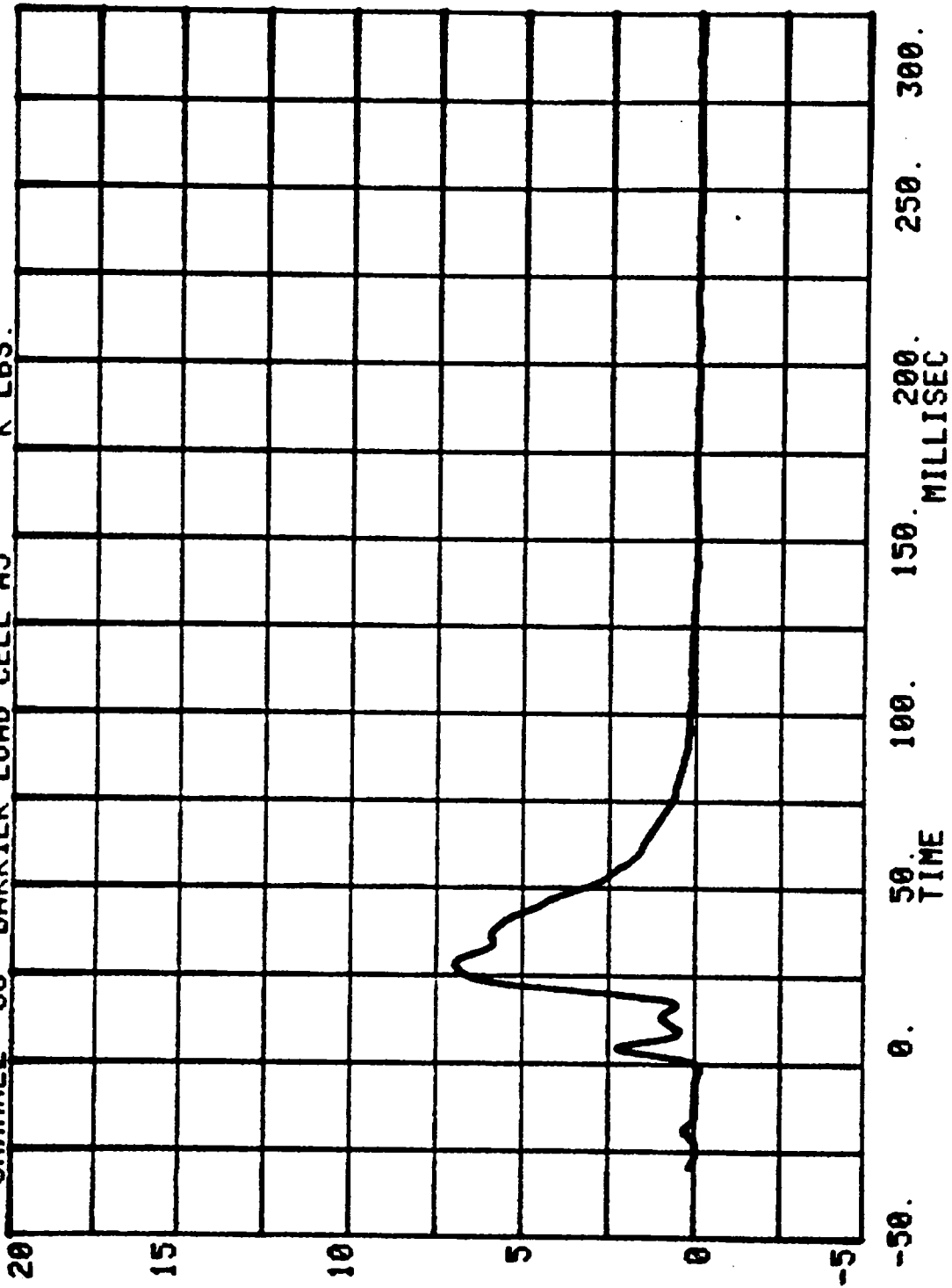
RUN= 780 SERIES= 5302

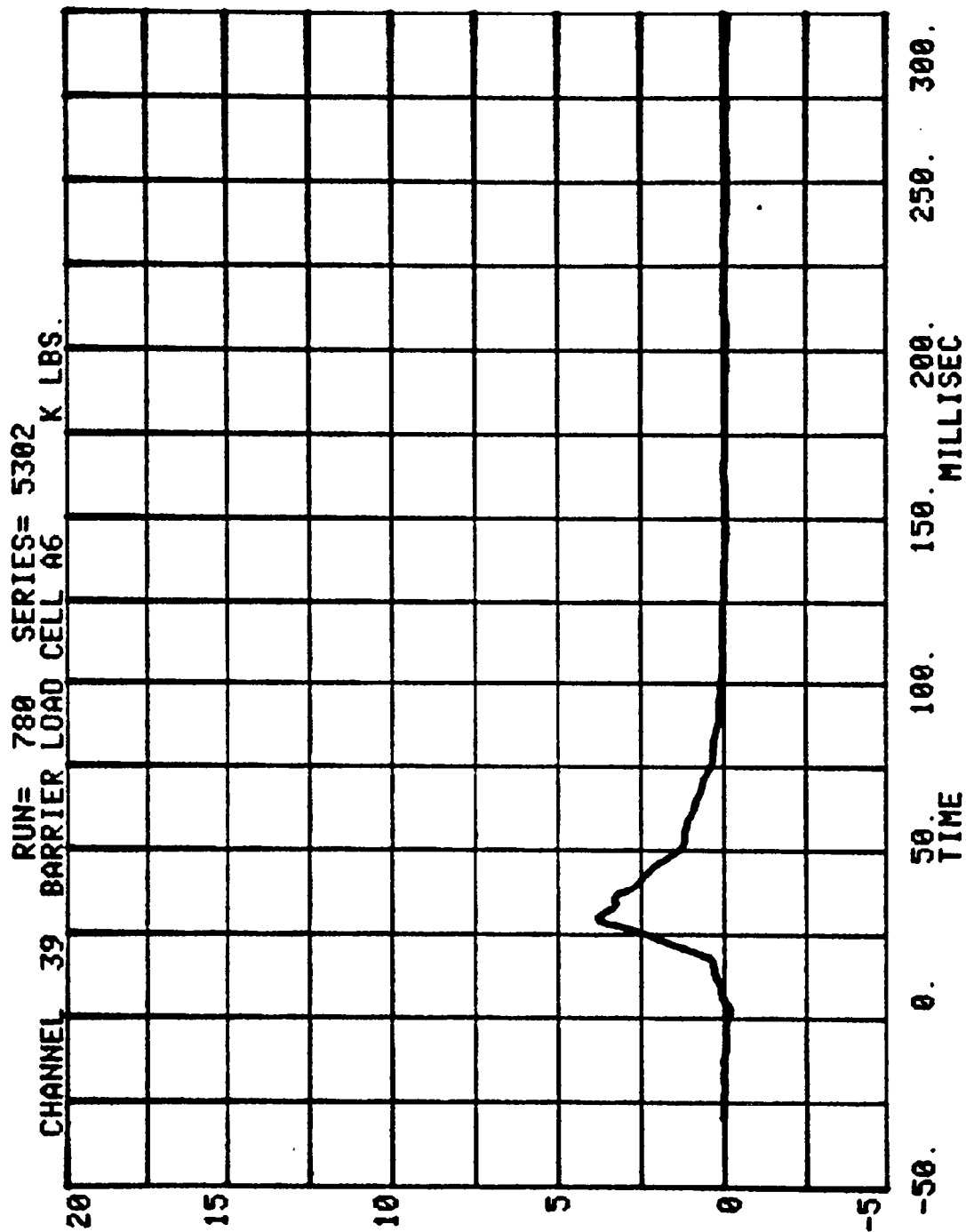


CHANNEL 37 RUN= 780 SERIES= 5302
BARRIER LOAD CELL #4 K LBS.



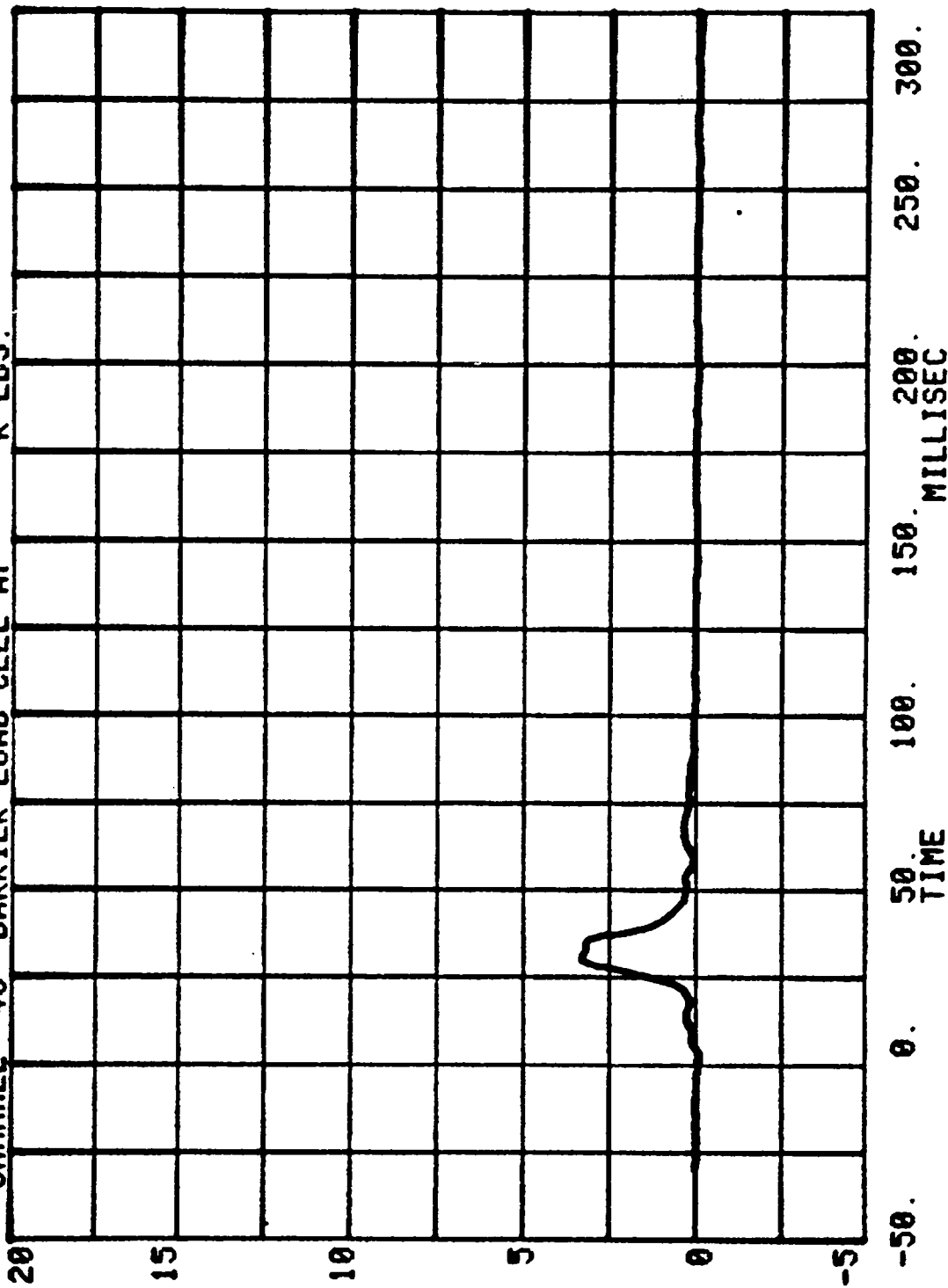
CHANNEL 38 BARRIER LOAD CELL A5
RUN= 780 SERIES= 5302 K LBS.



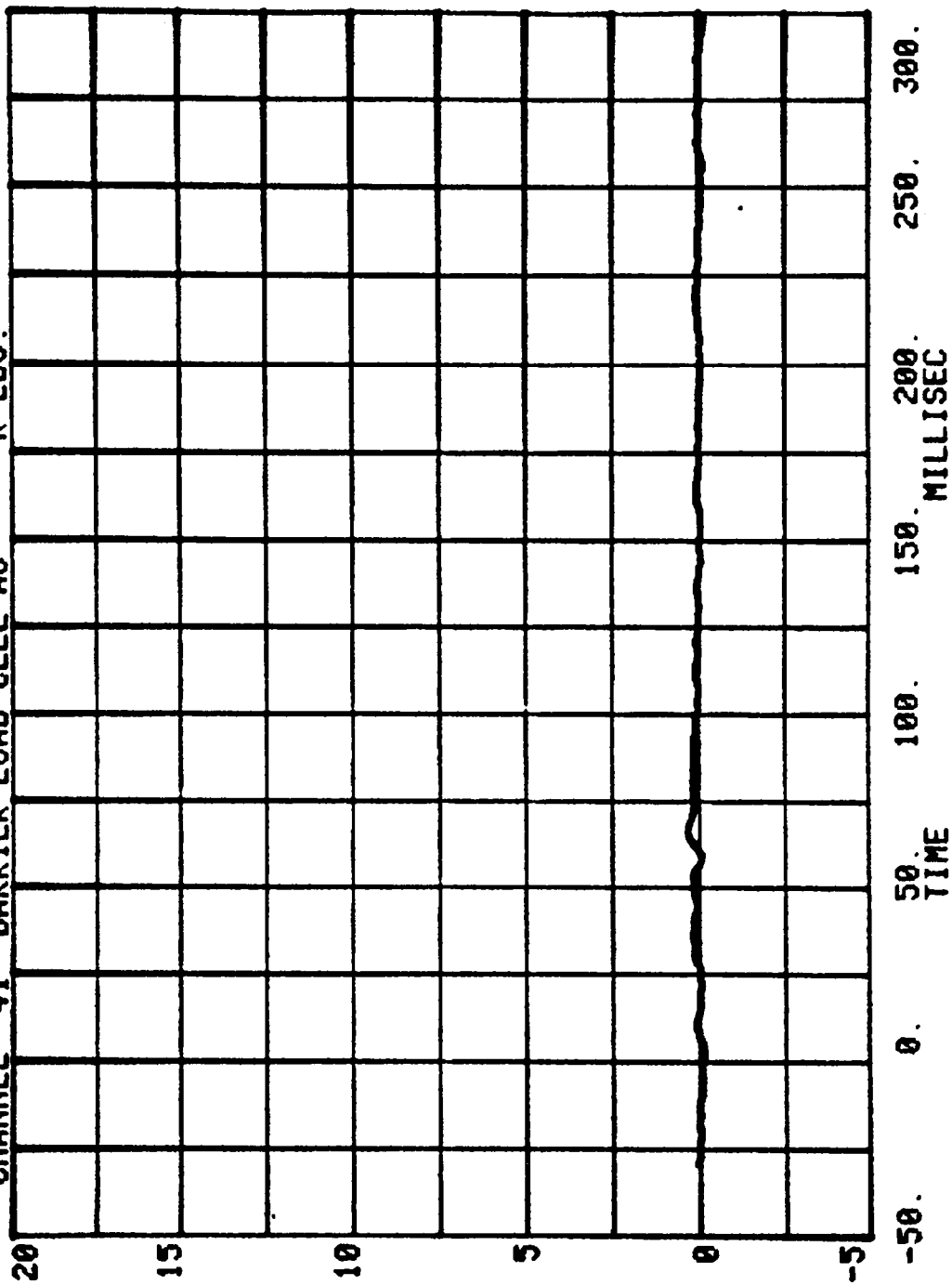


CHANNEL 40 BARRIER LOAD CELL A7 K LBS.

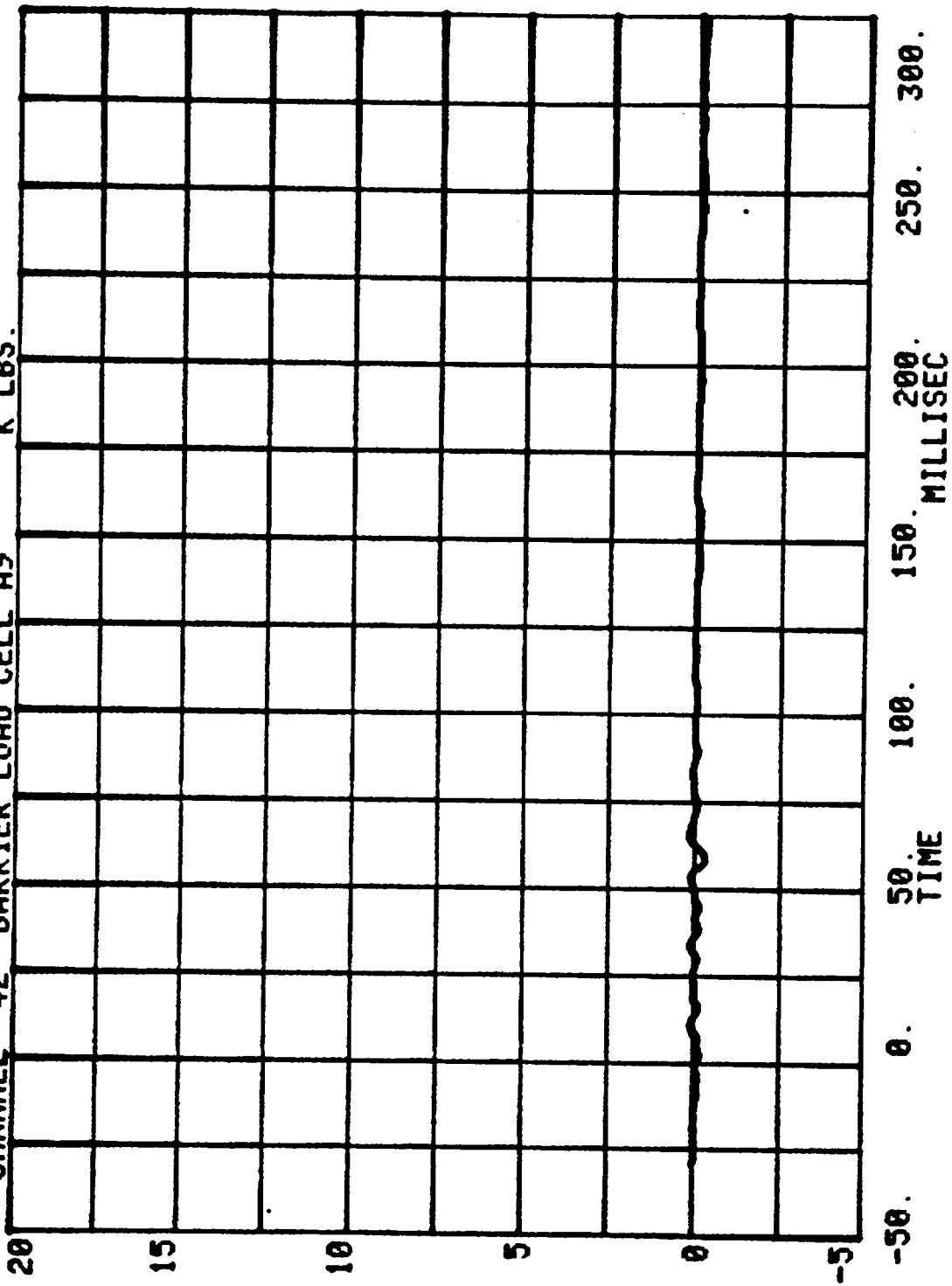
RUN= 780 SERIES= 5302



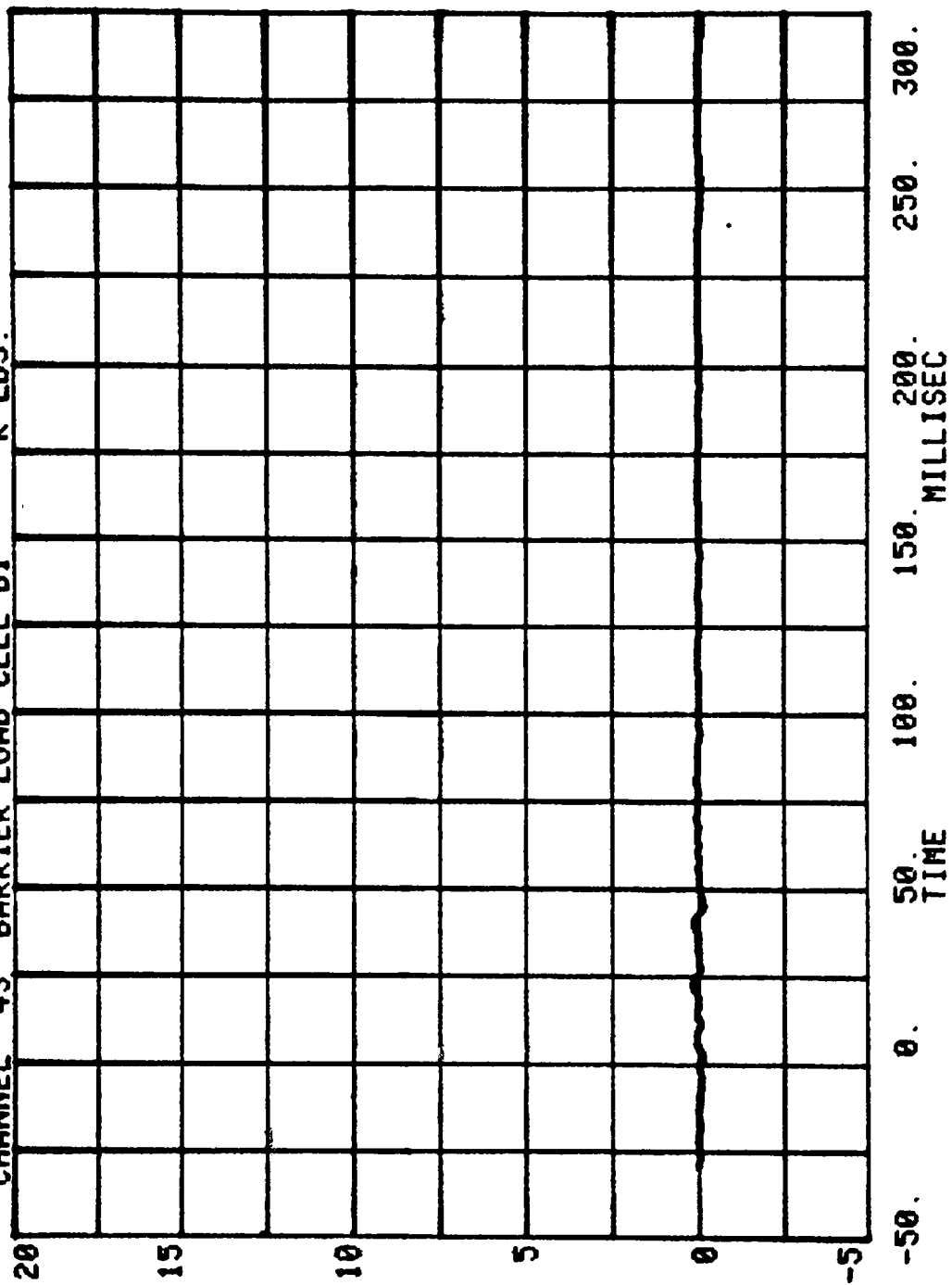
CHANNEL 41 BARRIER LOAD CELL A8 RUN= 780 SERIES= 5302 K LBS.



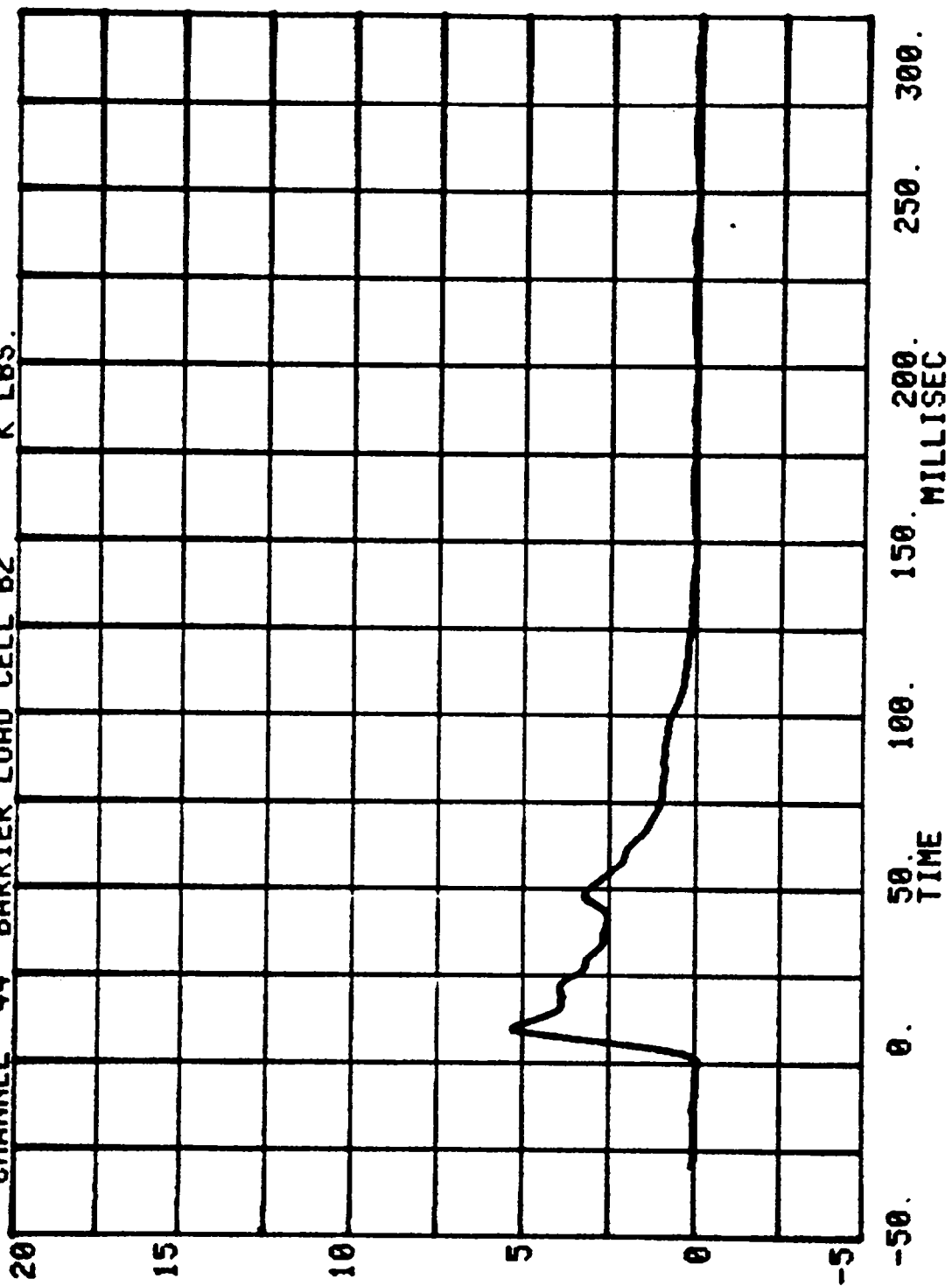
CHANNEL 42 RUN= 780 SERIES= 5302
BARRIER LOAD CELL A9 K LBS.

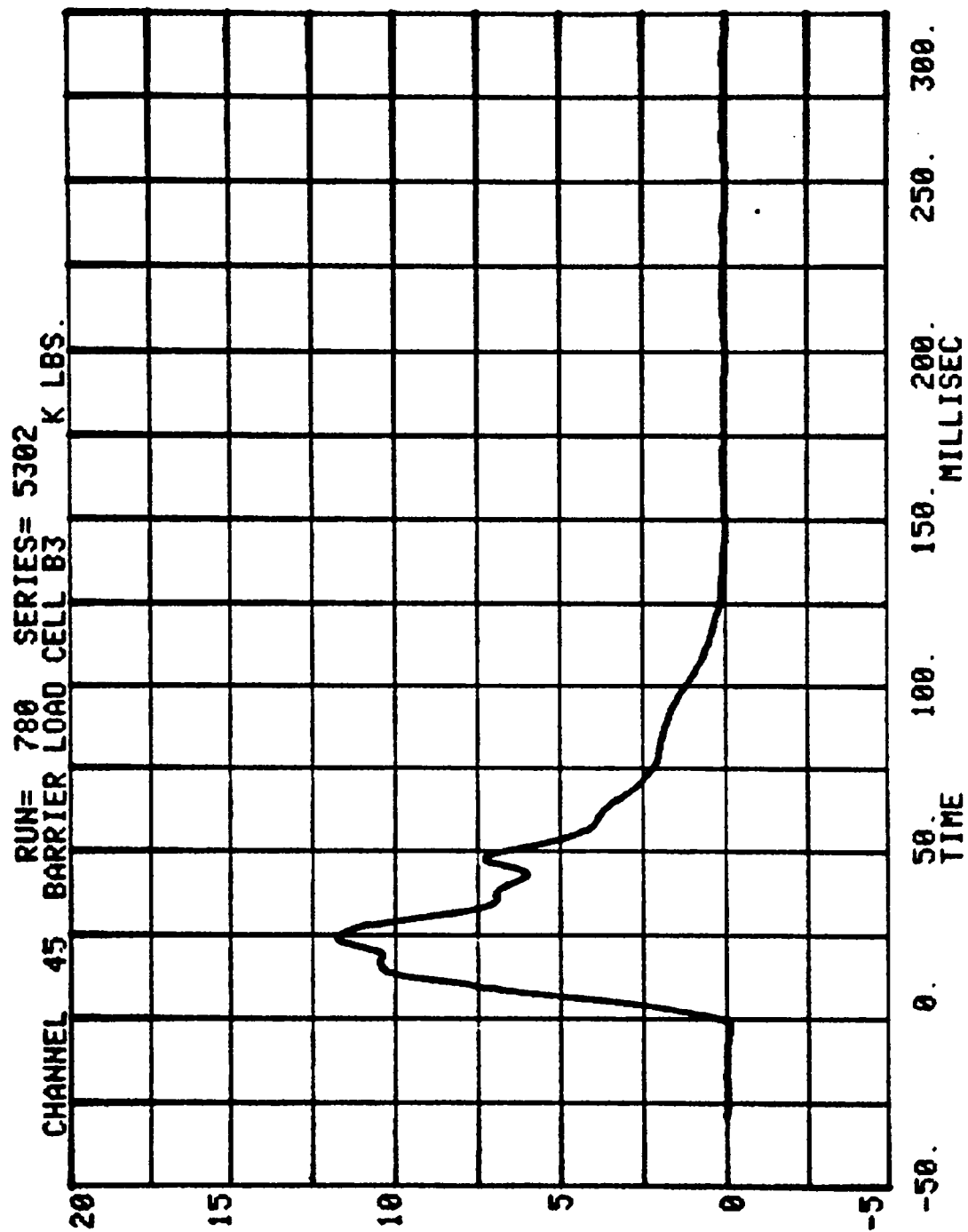


CHANNEL 43 RUN= 780 SERIES= 5302
BARRIER LOAD CELL B1 K LBS.

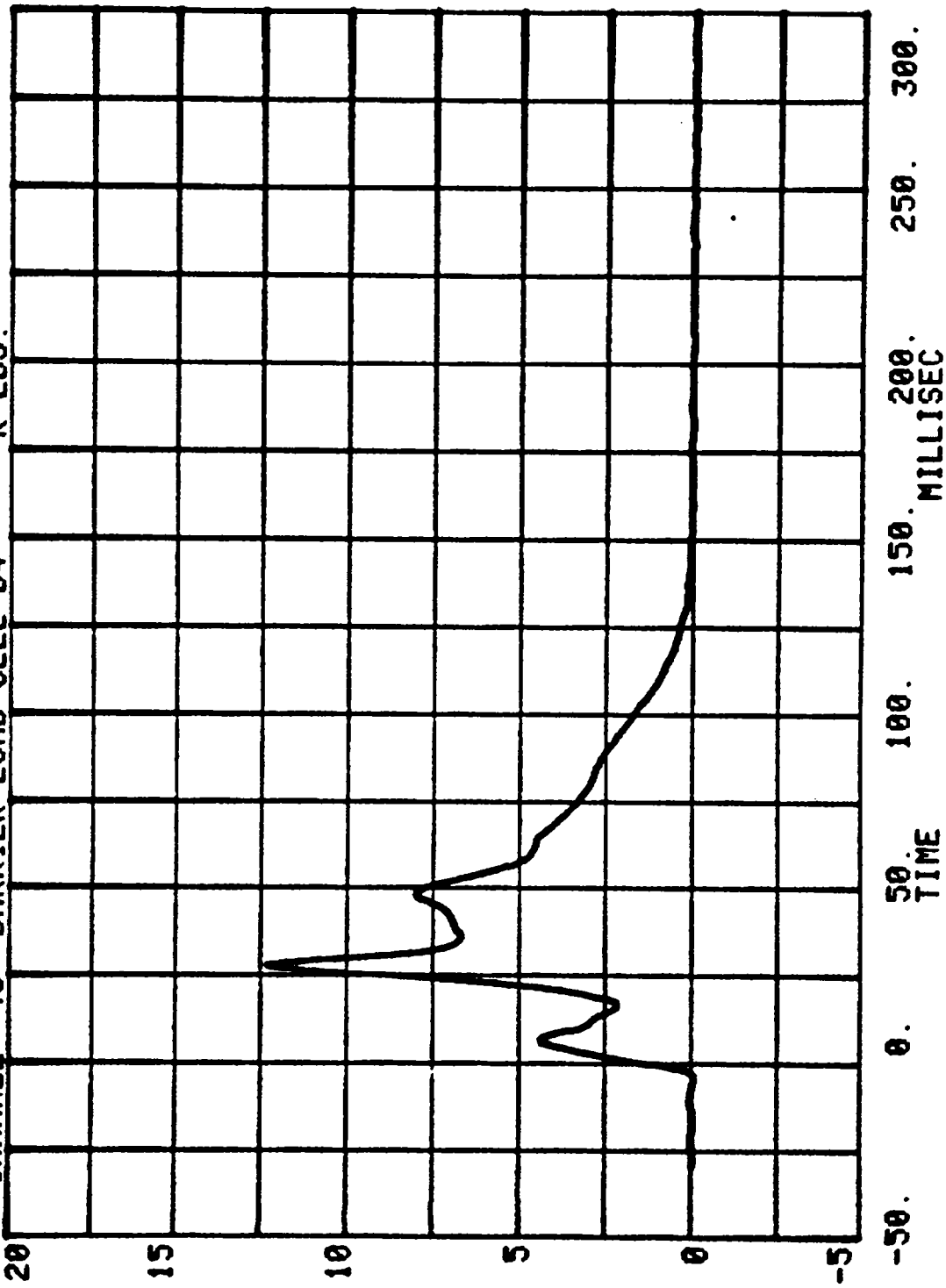


CHANNEL 44 RUN= 780 SERIES= 5302
BARRIER LOAD CELL B2 K LBS.



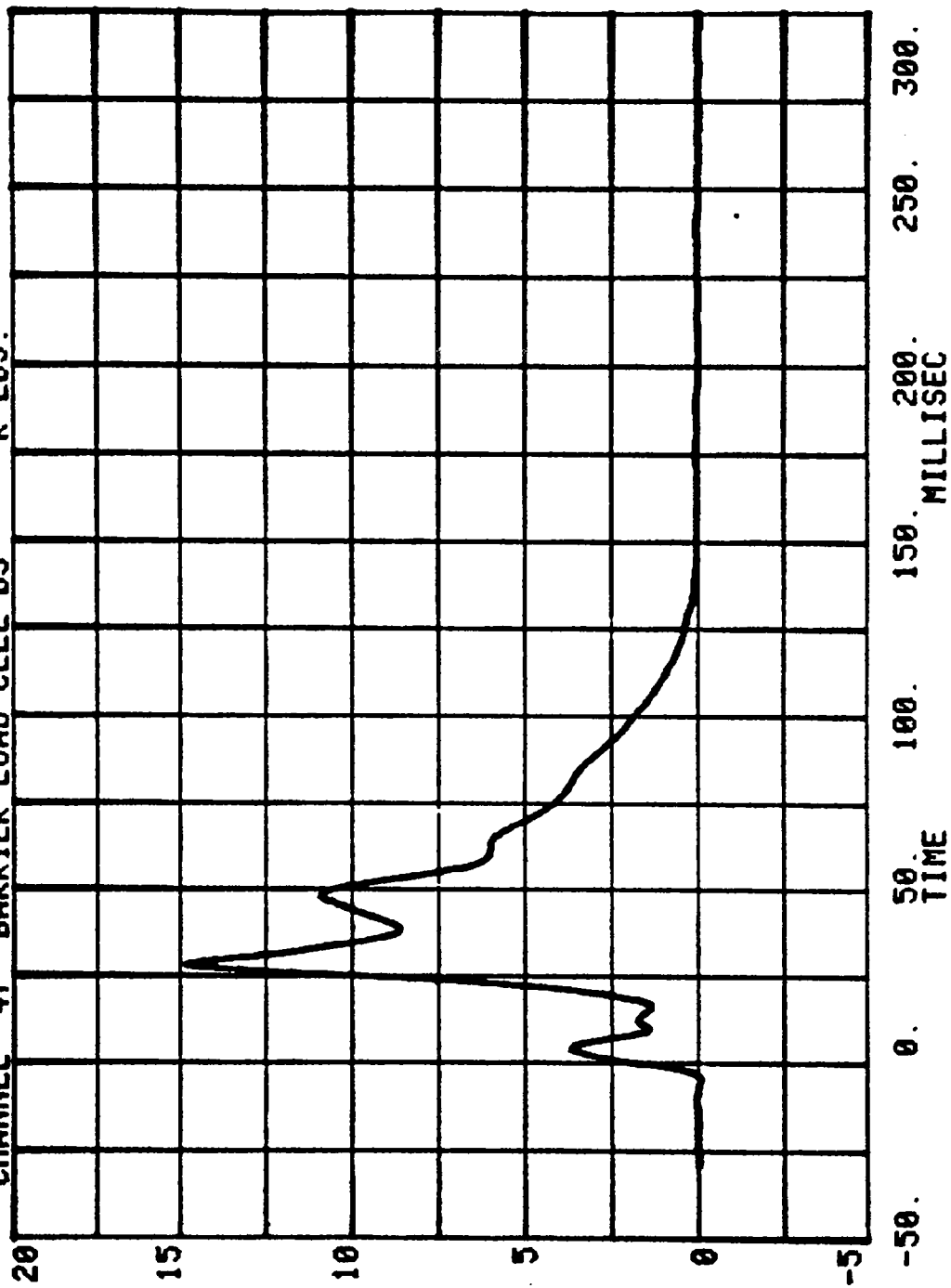


RUN= 780 SERIES= 5302
CHANNEL 46 BARRIER LOAD CELL B4 K LBS.

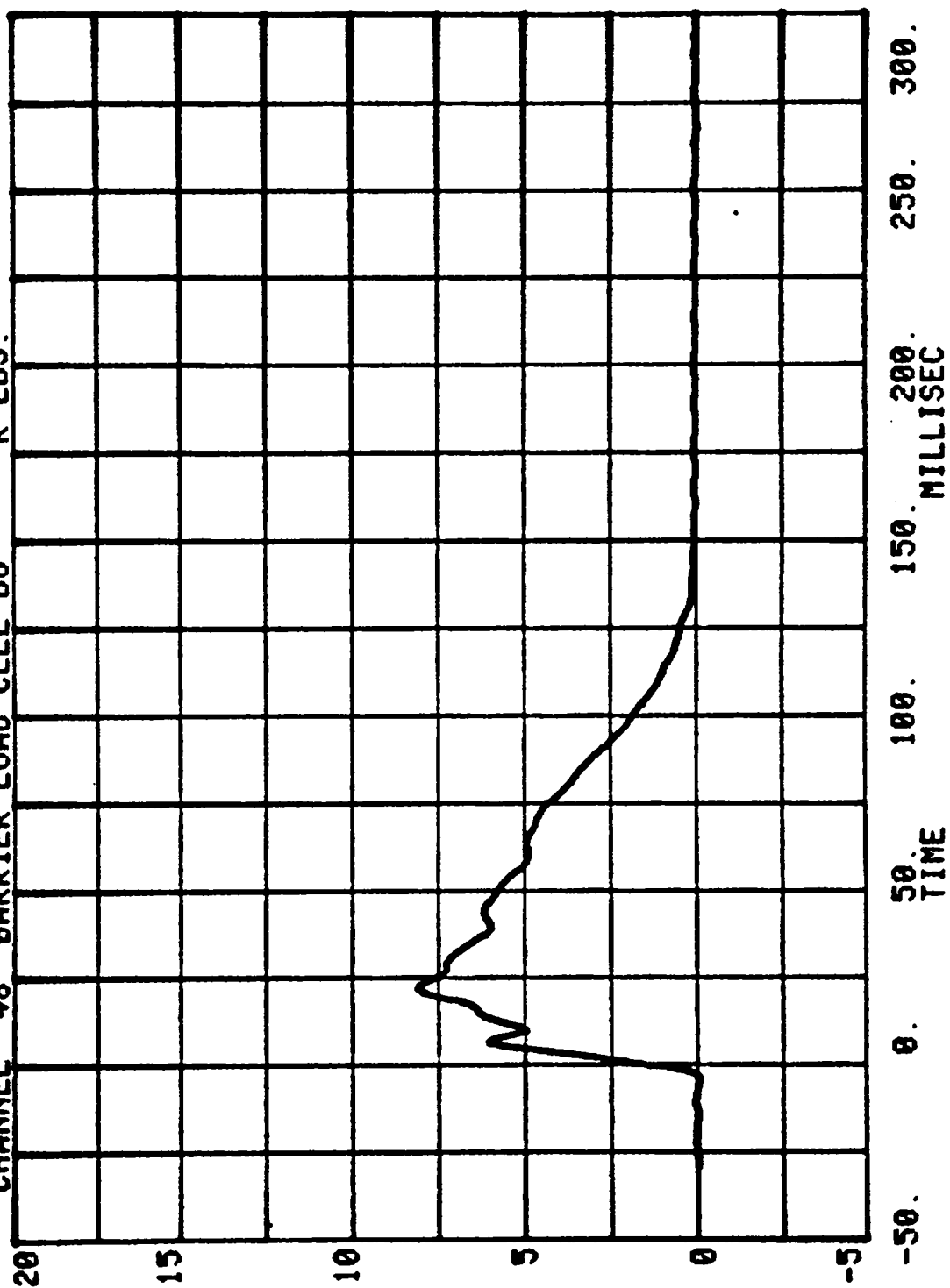


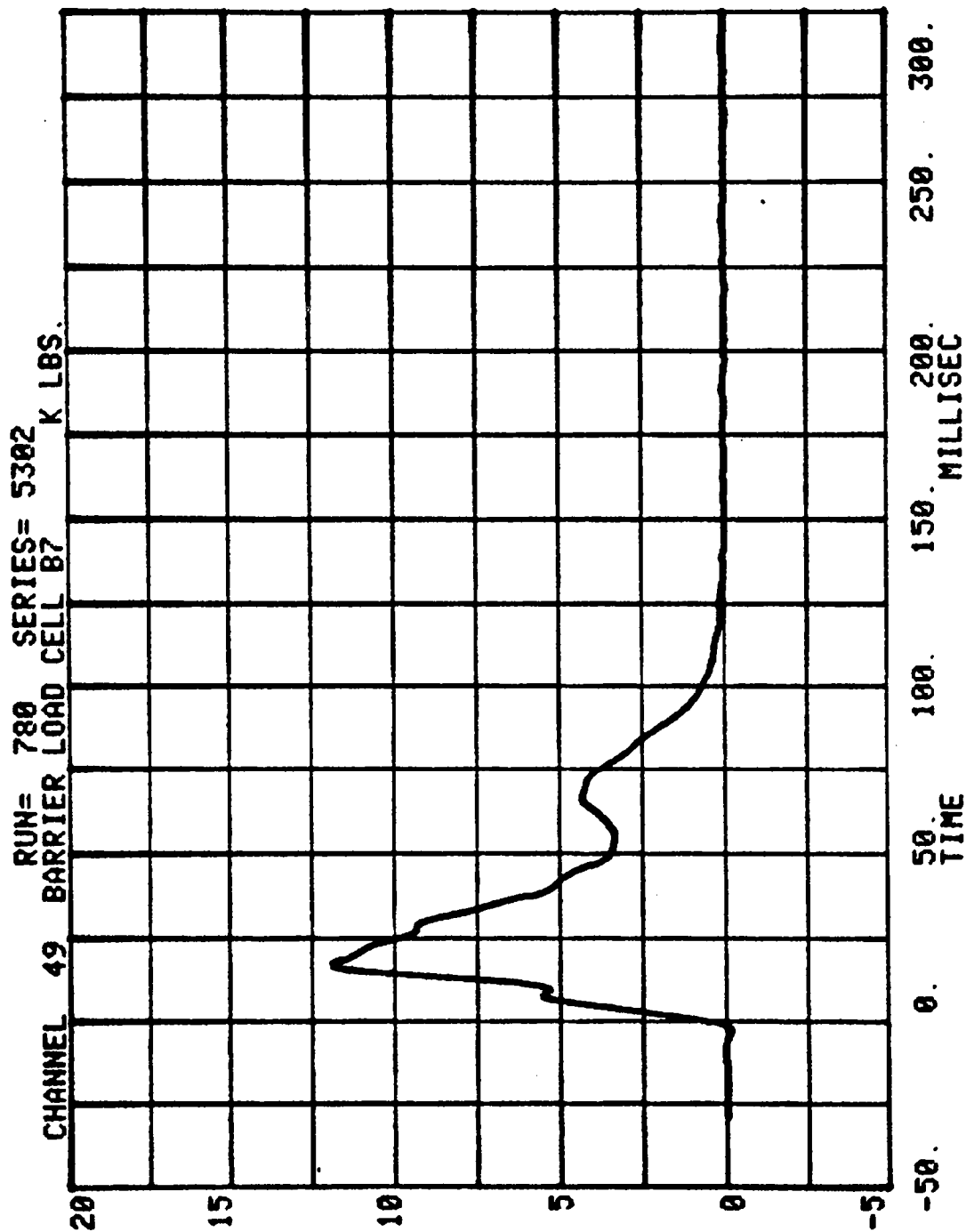
CHANNEL 47 BARRIER LOAD CELL B5 K LBS.

RUN= 780 SERIES= 5302

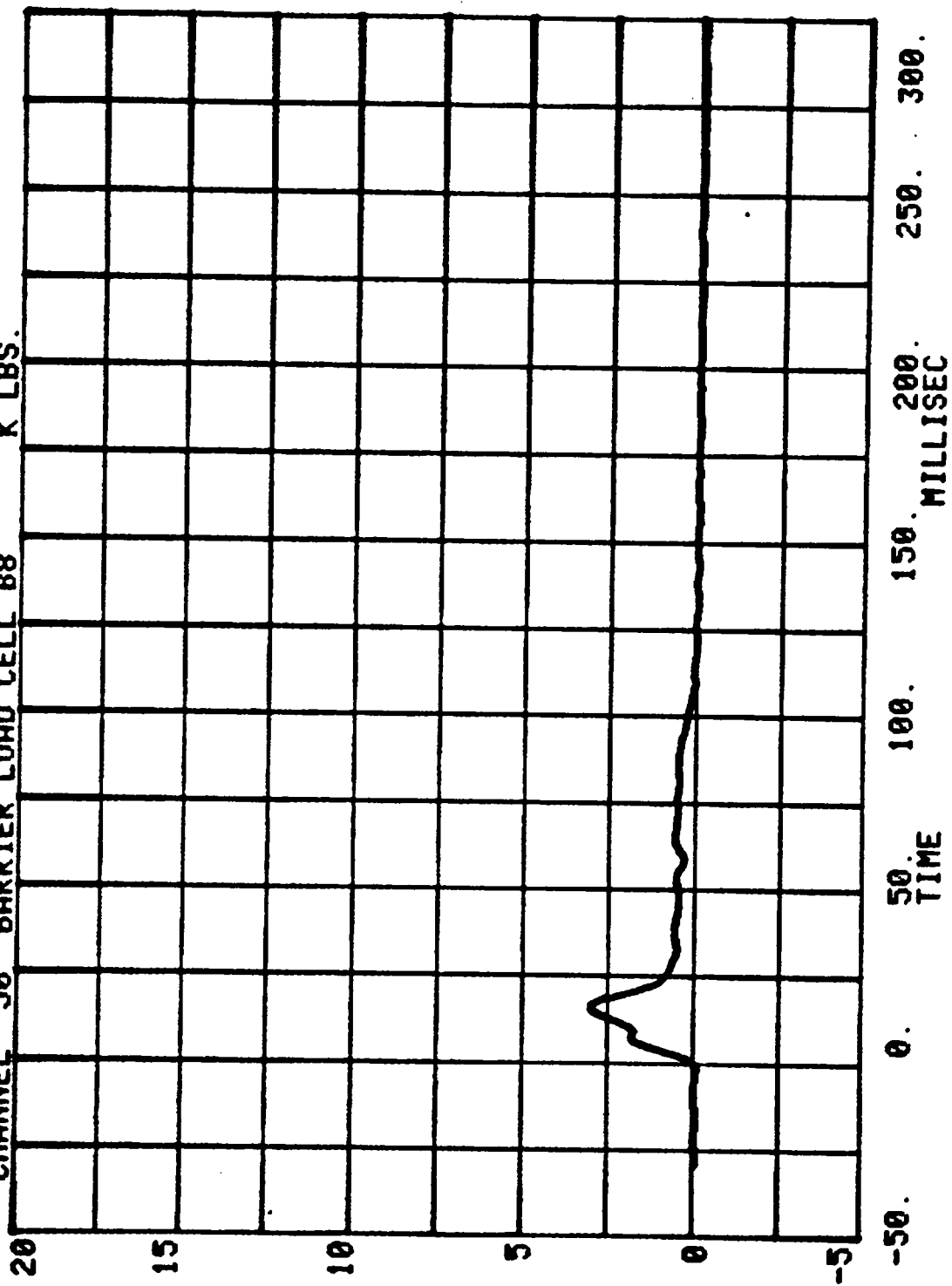


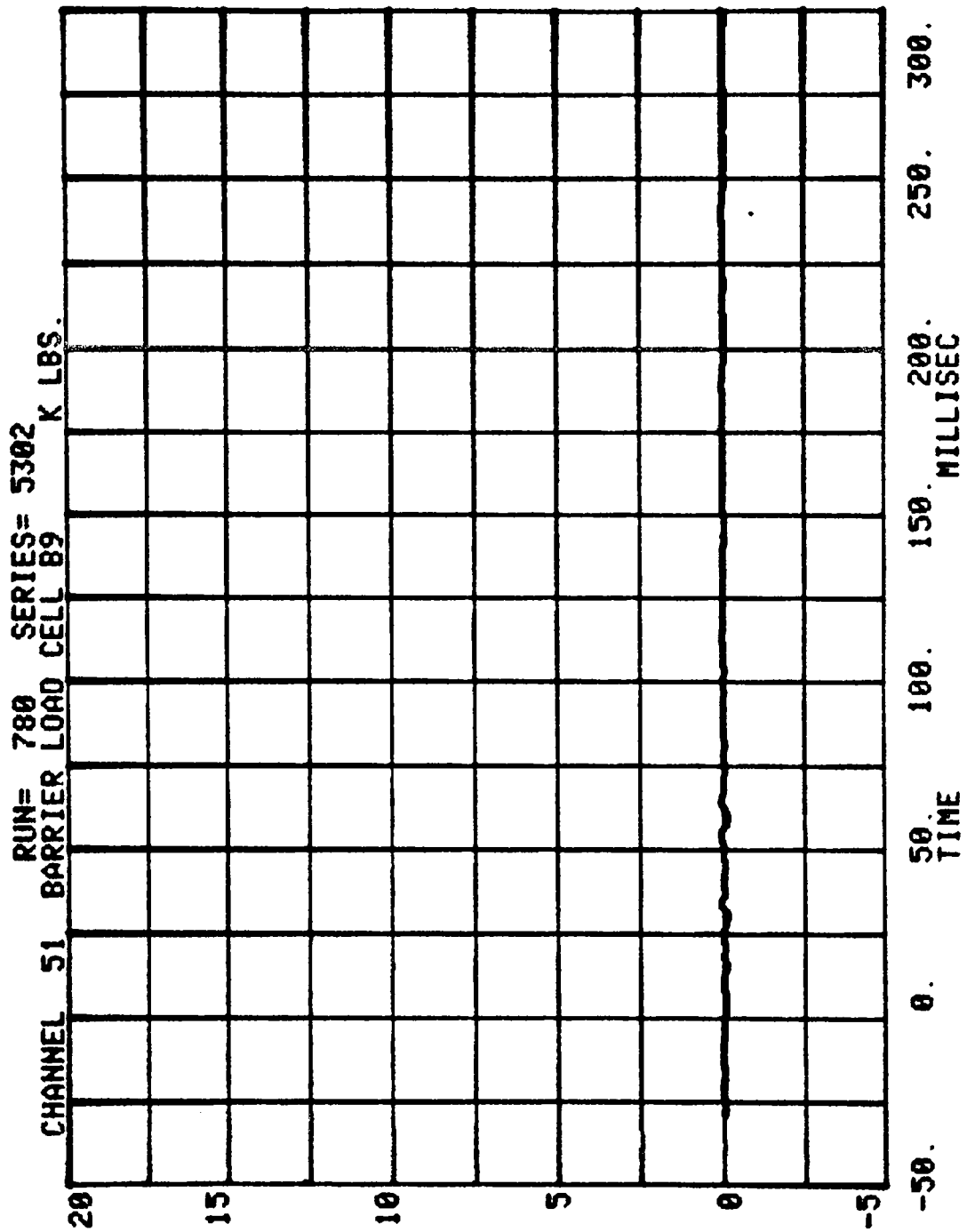
RUN= 780 SERIES= 5302
CHANNEL 48 BARRIER LOAD CELL B6 K LBS.



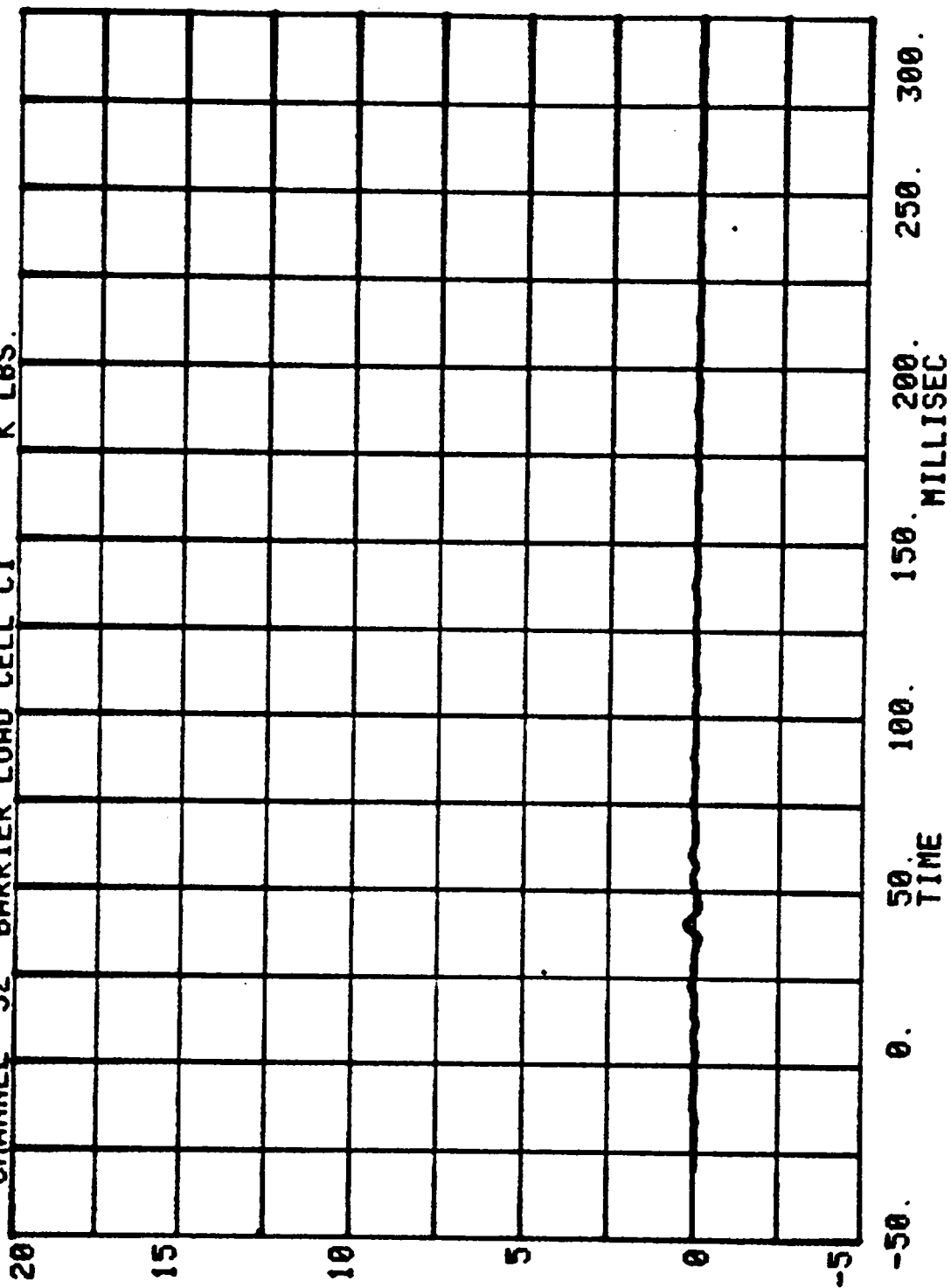


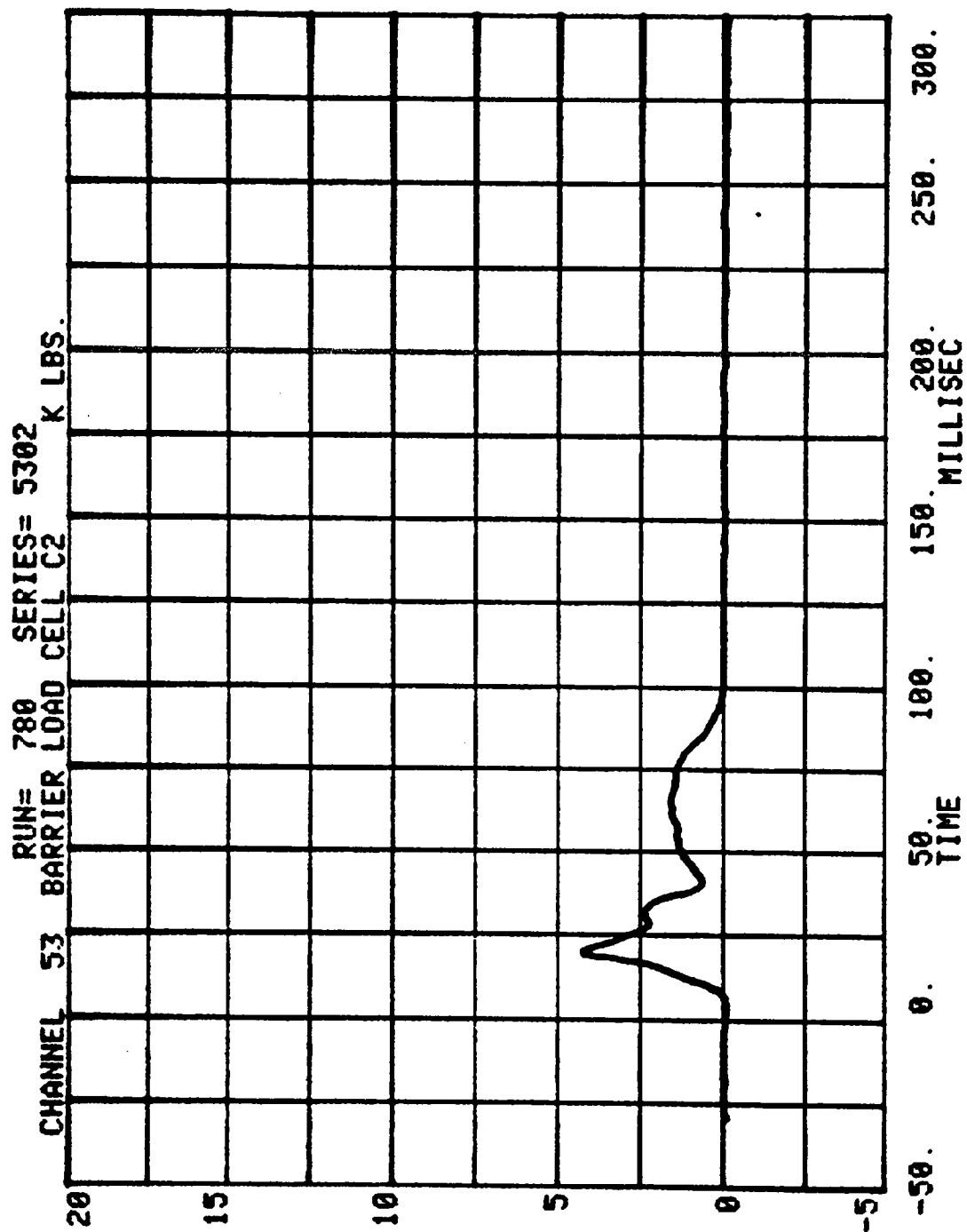
RUN= 780 SERIES= 5302
CHANNEL 50 BARRIER LOAD CELL 88 K LBS.



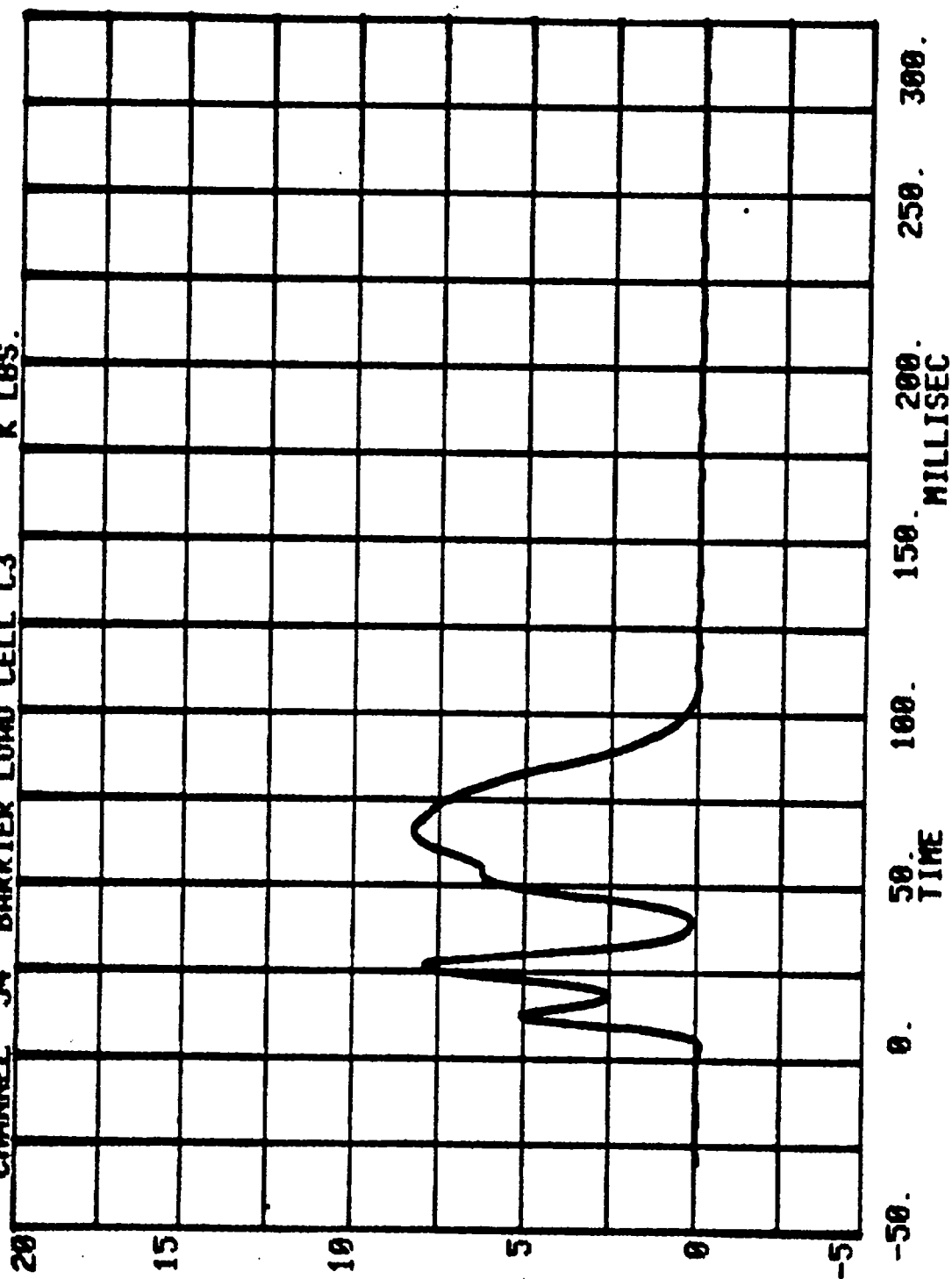


CHANNEL 52 BARRIER LOAD CELL C1 RUN= 780 SERIES= 5302 K LBS.





RUN= 780 SERIES= 5302
CHANNEL 54 BARRIER LOAD CELL C3 K LBS.

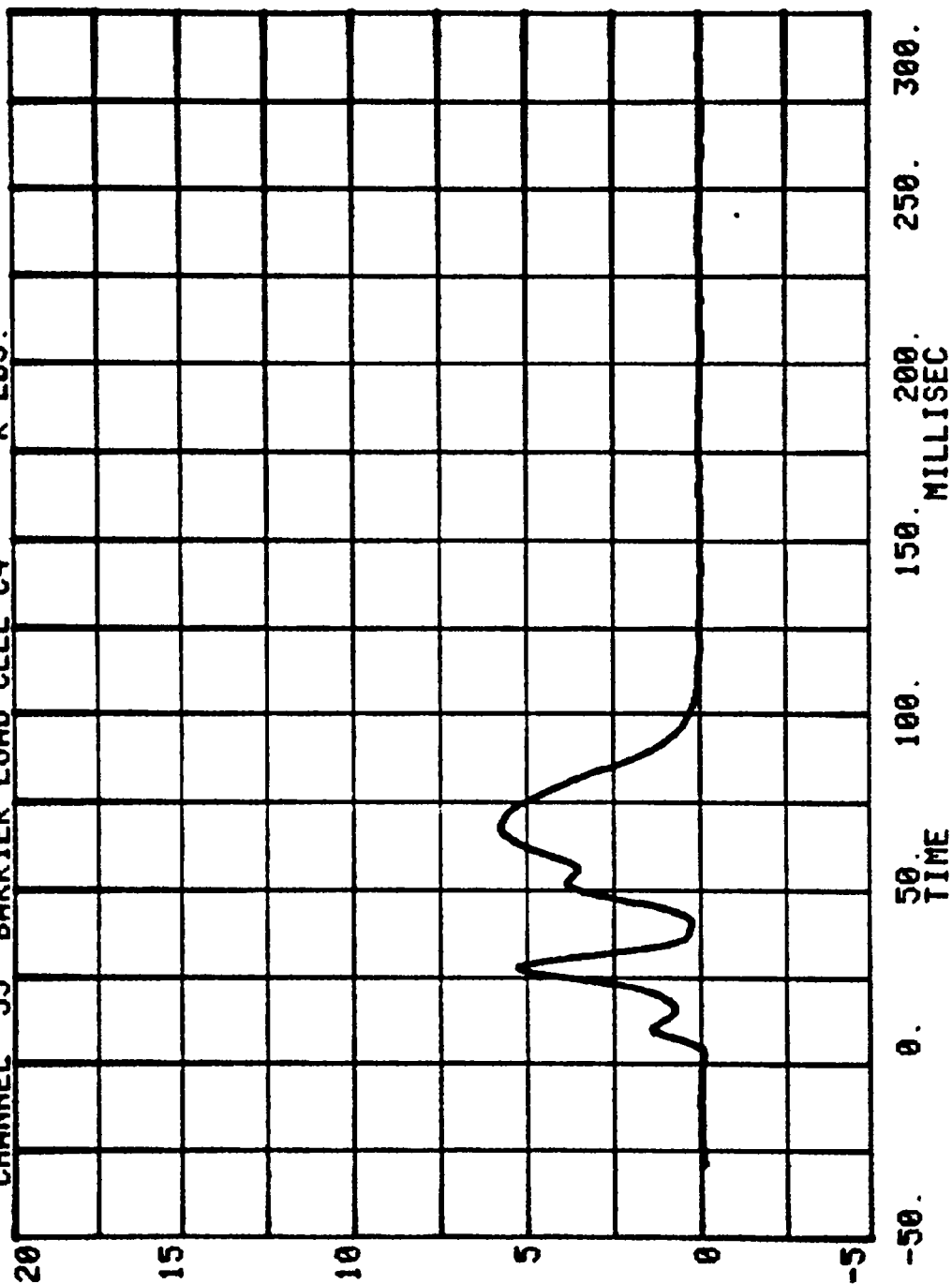


CHANNEL 55 BARRIER LOAD CELL C4

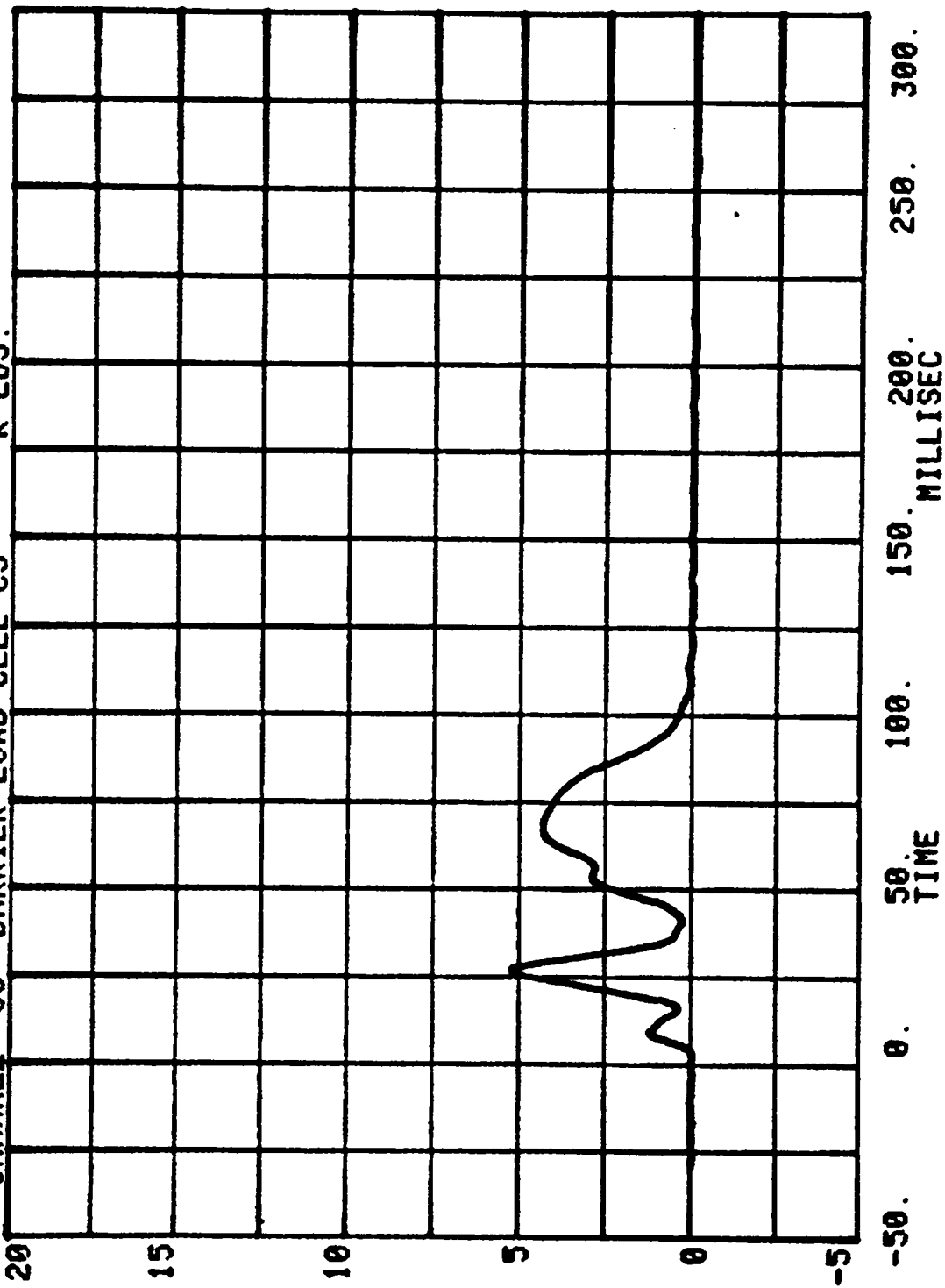
RUN= 780

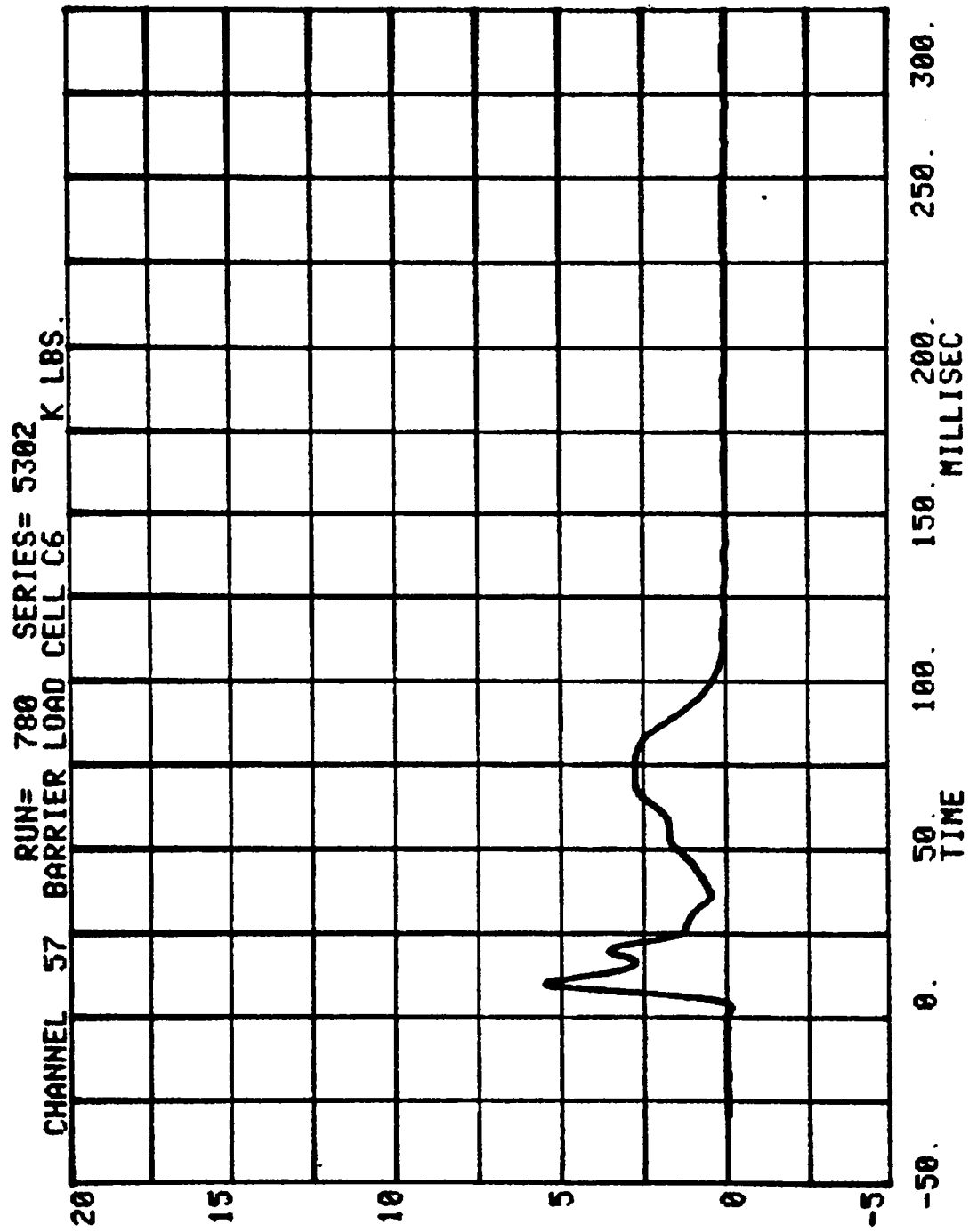
SERIES= 5302

K LBS.

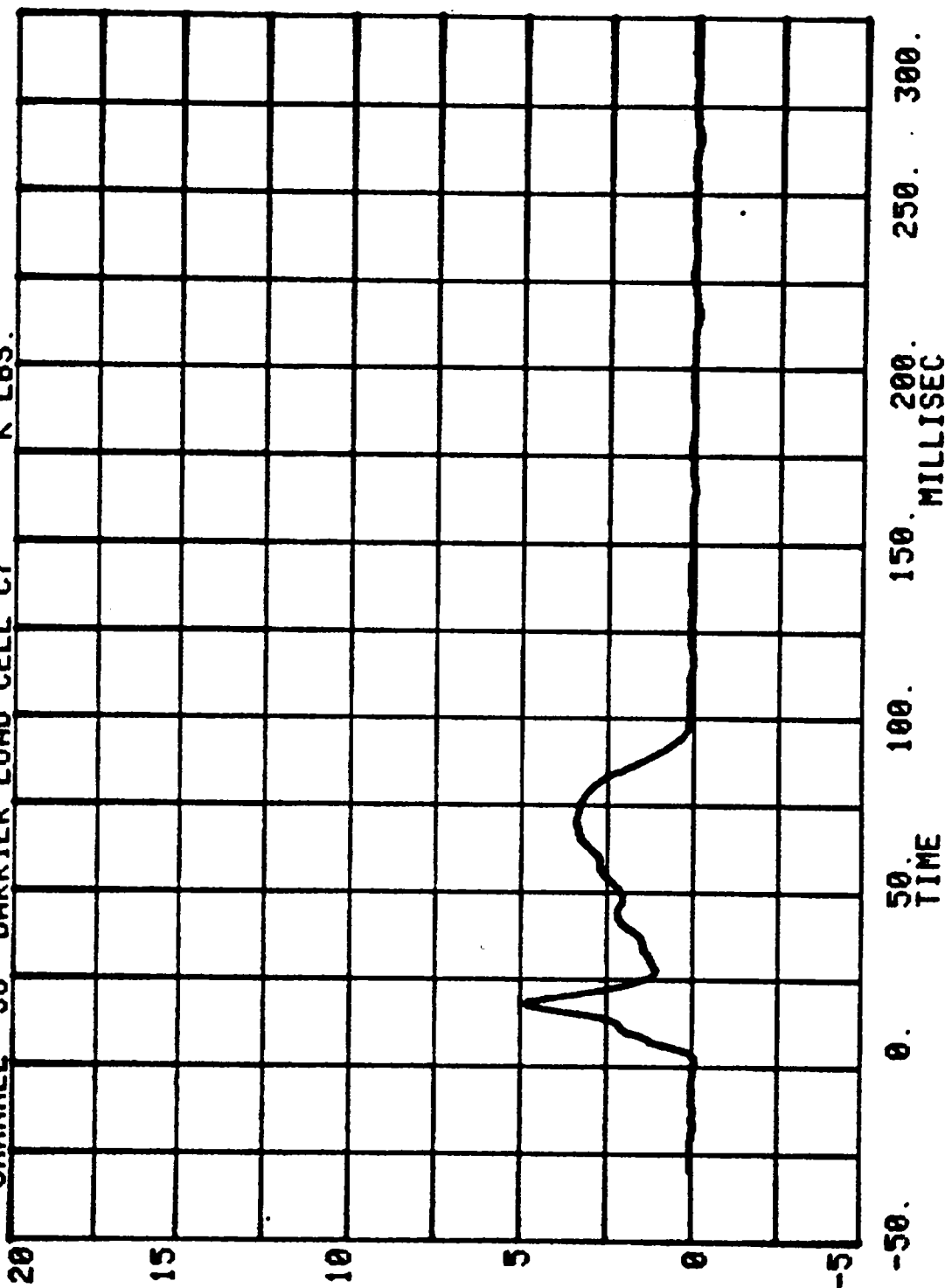


CHANNEL 56 RUN= 780 SERIES= 5302
BARRIER LOAD CELL C5 K LBS.

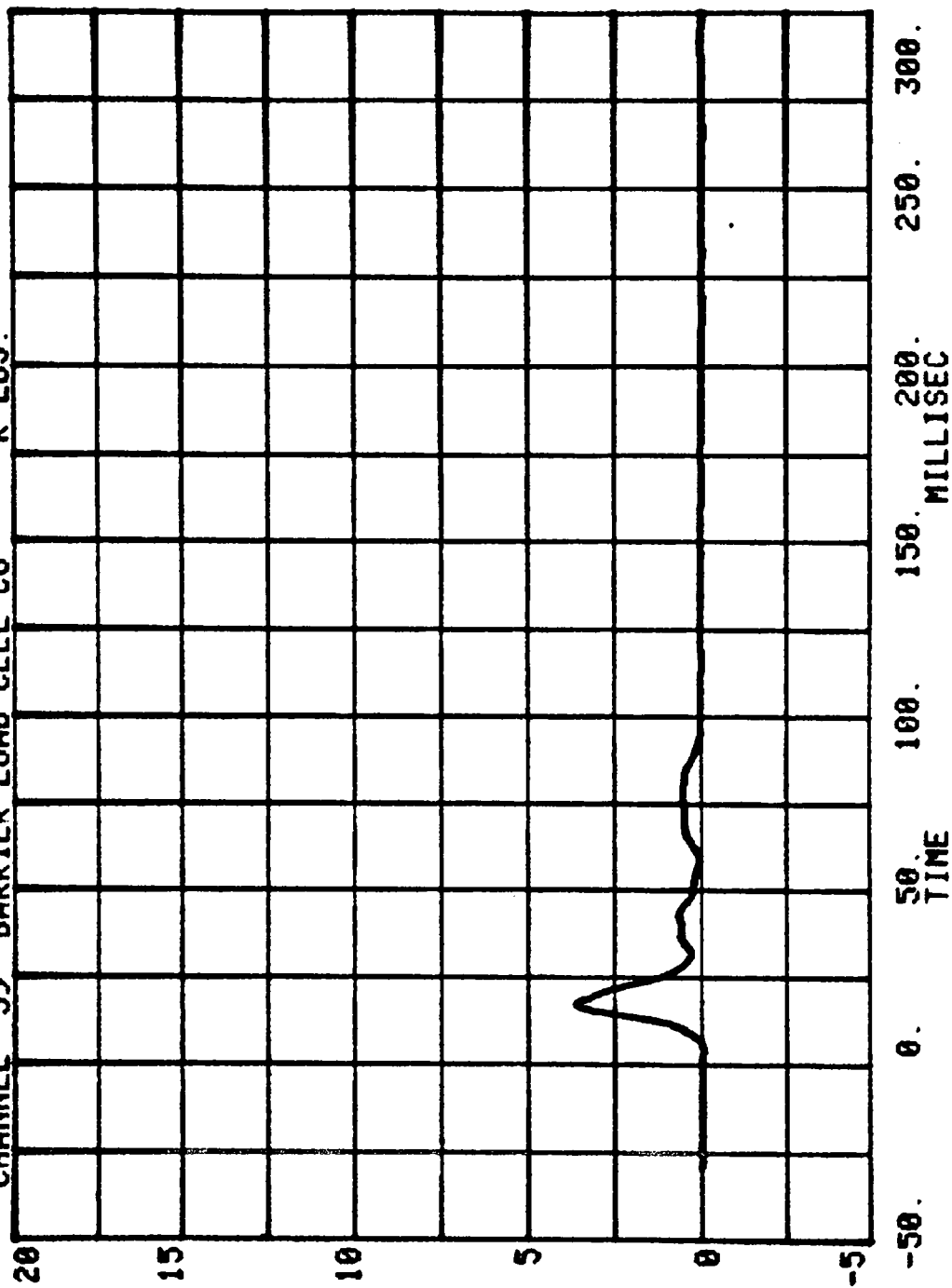




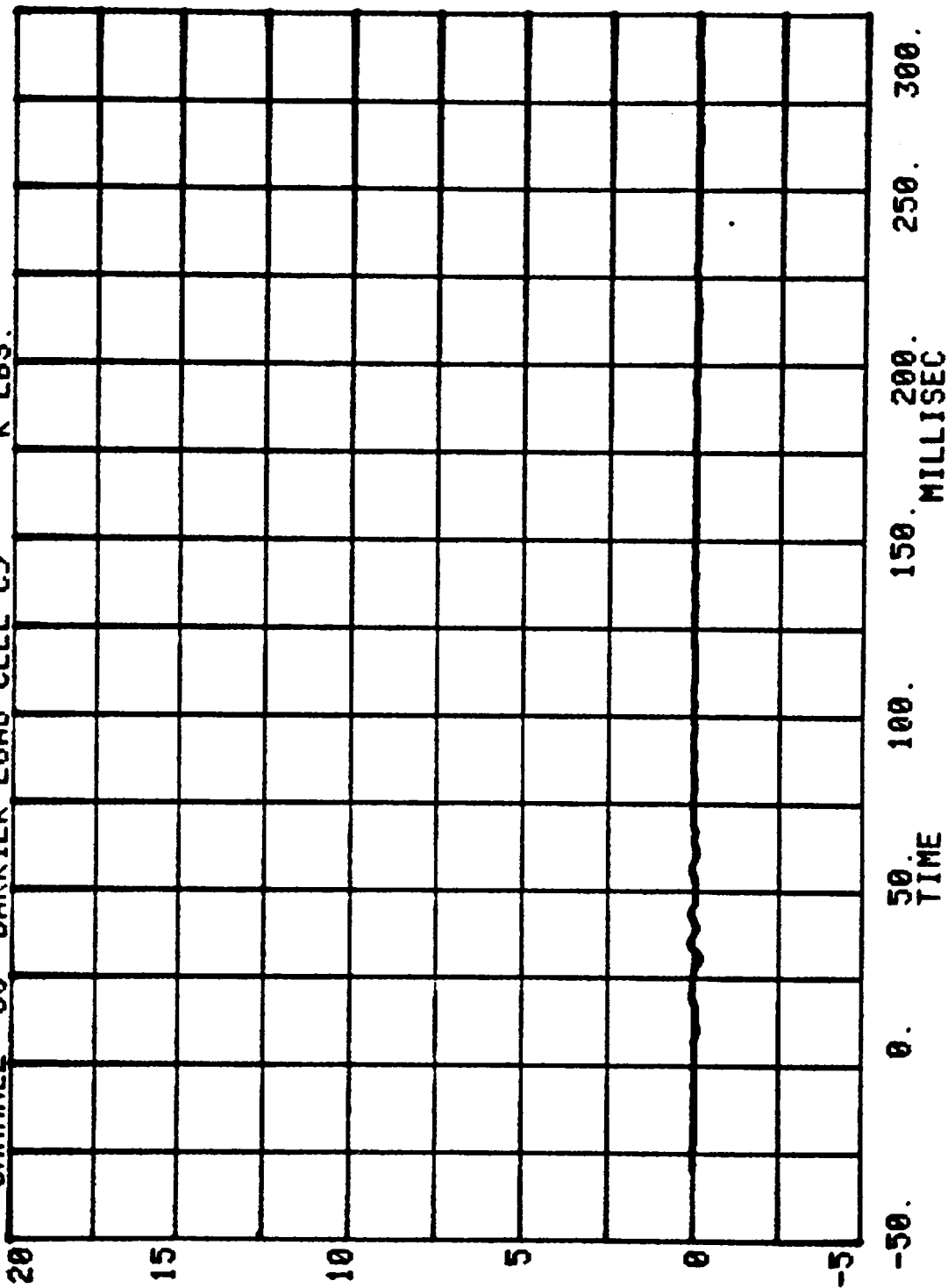
CHANNEL 58 BARRIER LOAD CELL C7 RUN= 780 SERIES= 5302 K LBS.



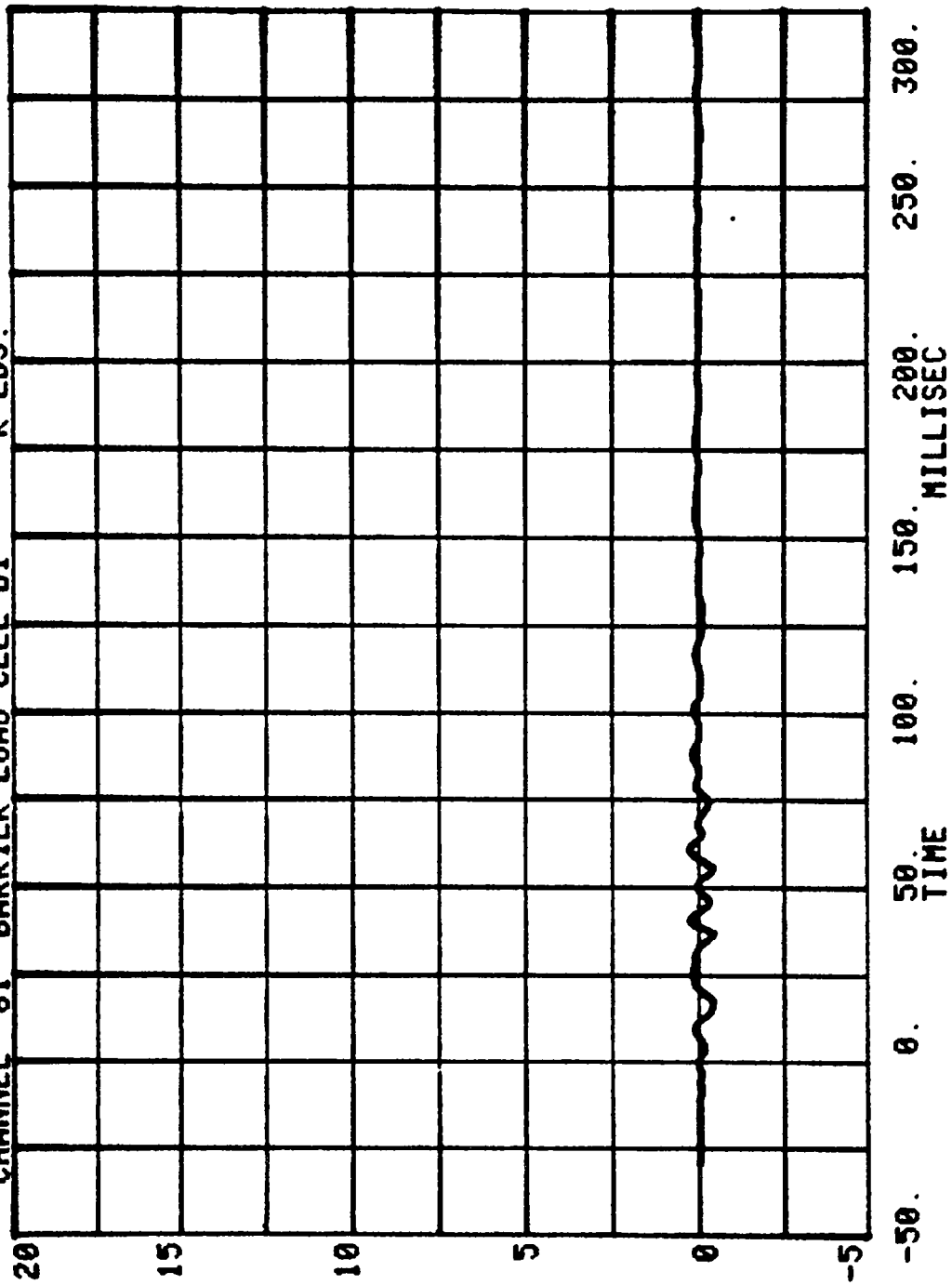
CHANNEL 59 RUN= 780 SERIES= 5302 K LBS.
BARRIER LOAD CELL C8



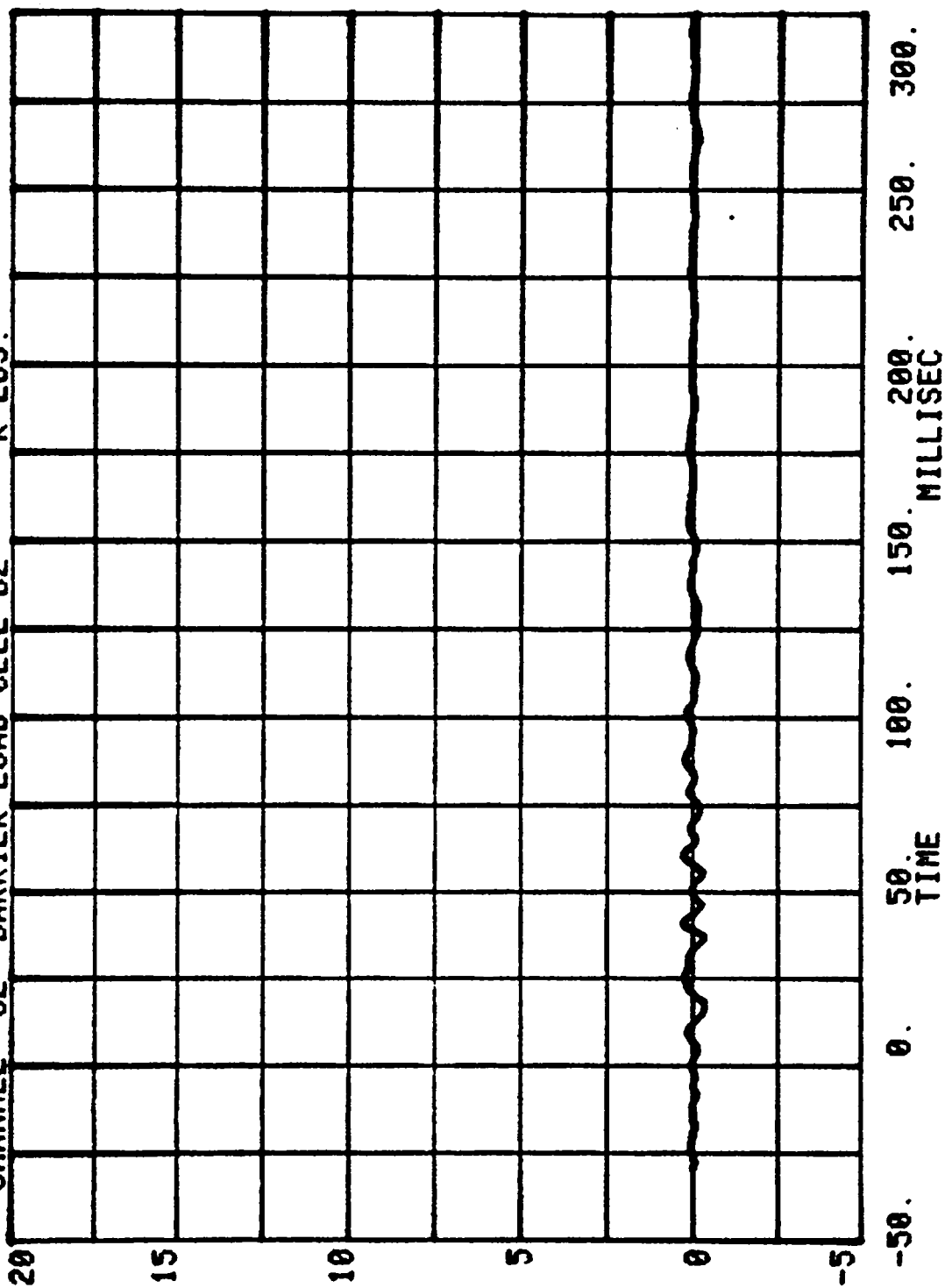
CHANNEL 60 BARRIER LOAD CELL C9 RUN= 780 SERIES= 5302 K LBS.



CHANNEL 61 BARRIER LOAD CELL 01 RUN= 780 SERIES= 5302 K LBS.

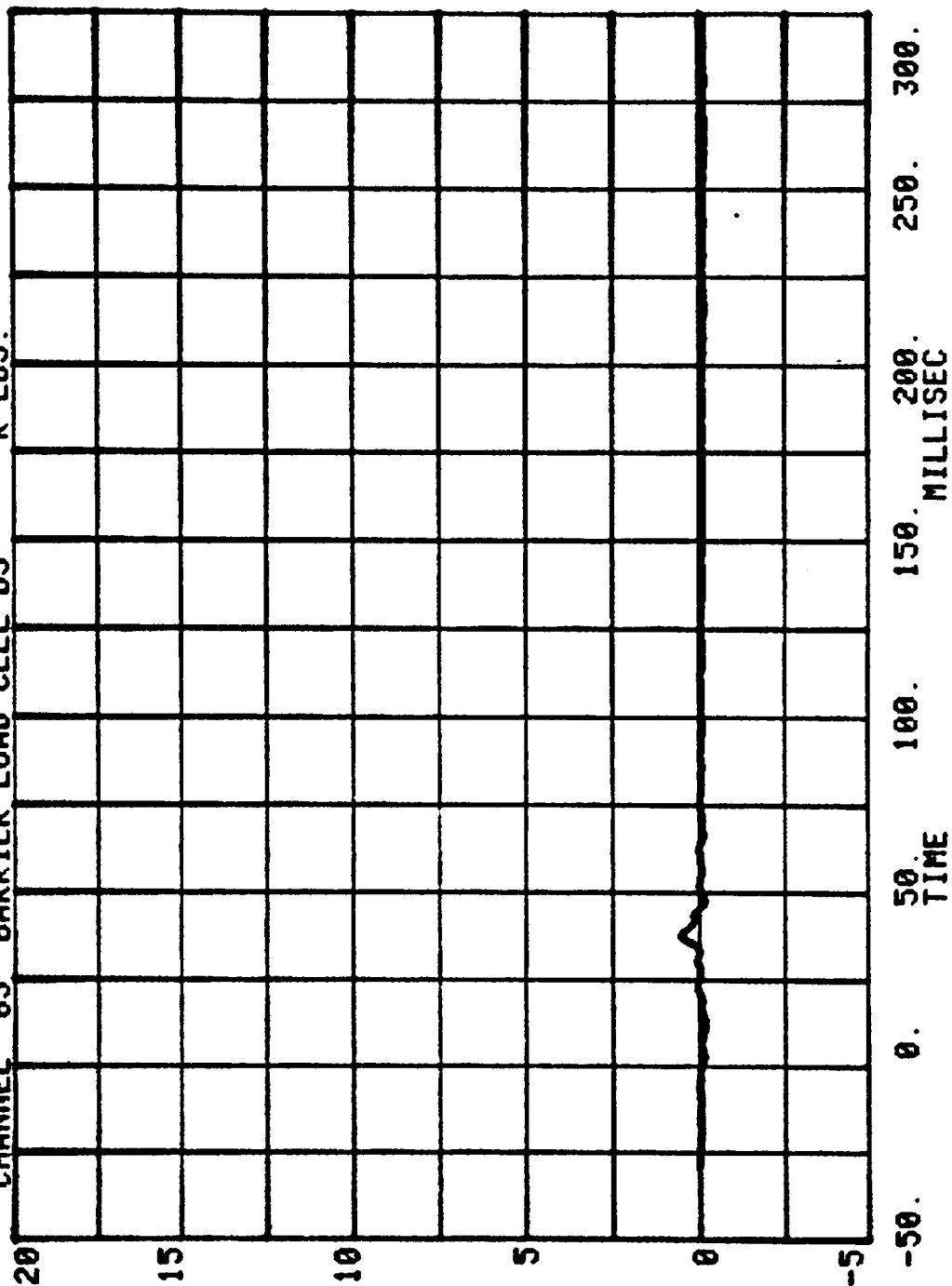


RUN= 780 SERIES= 5302
CHANNEL 62 BARRIER LOAD CELL D2 K LBS.



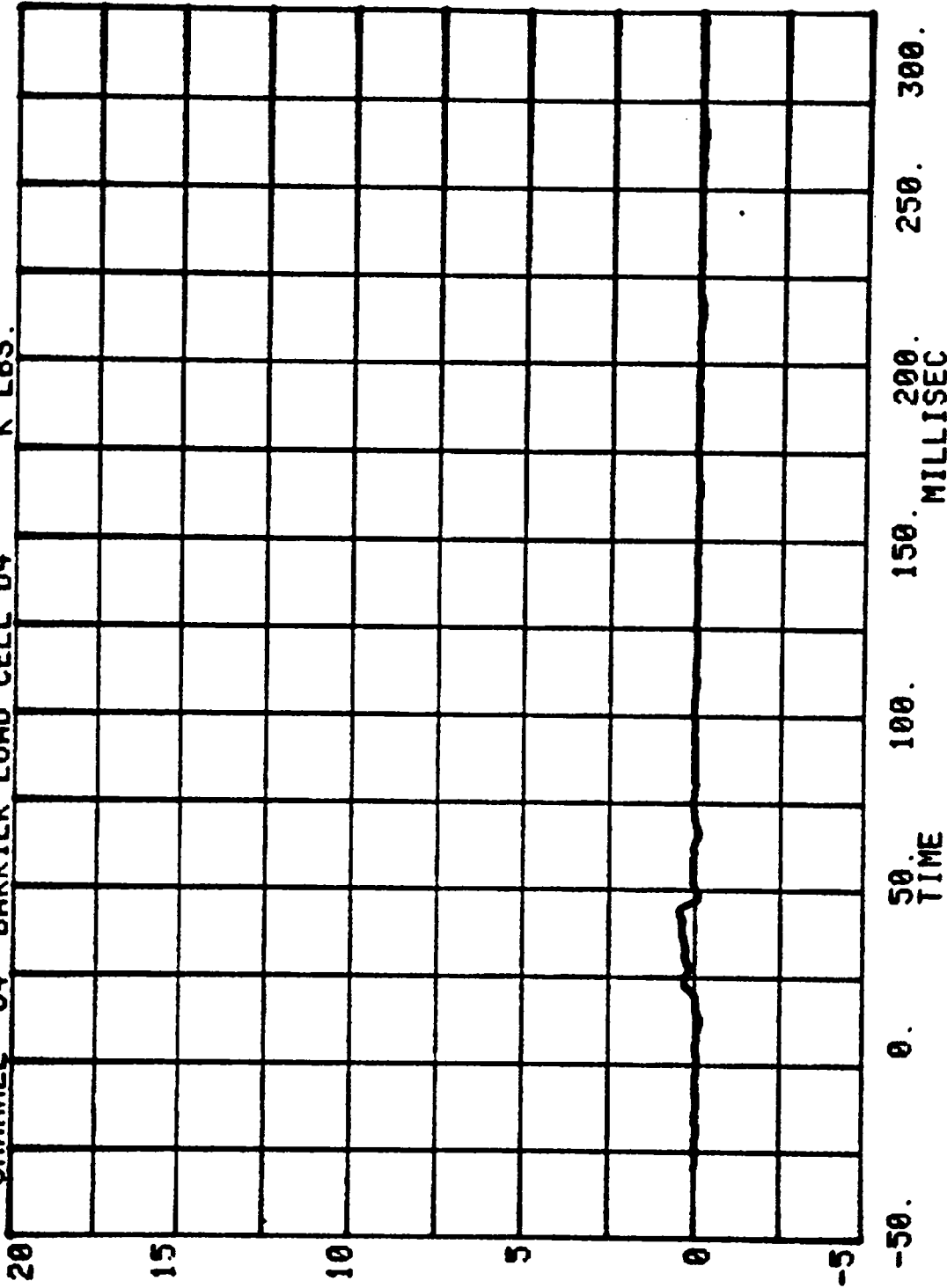
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.

RUN= 780 SERIES= 5302

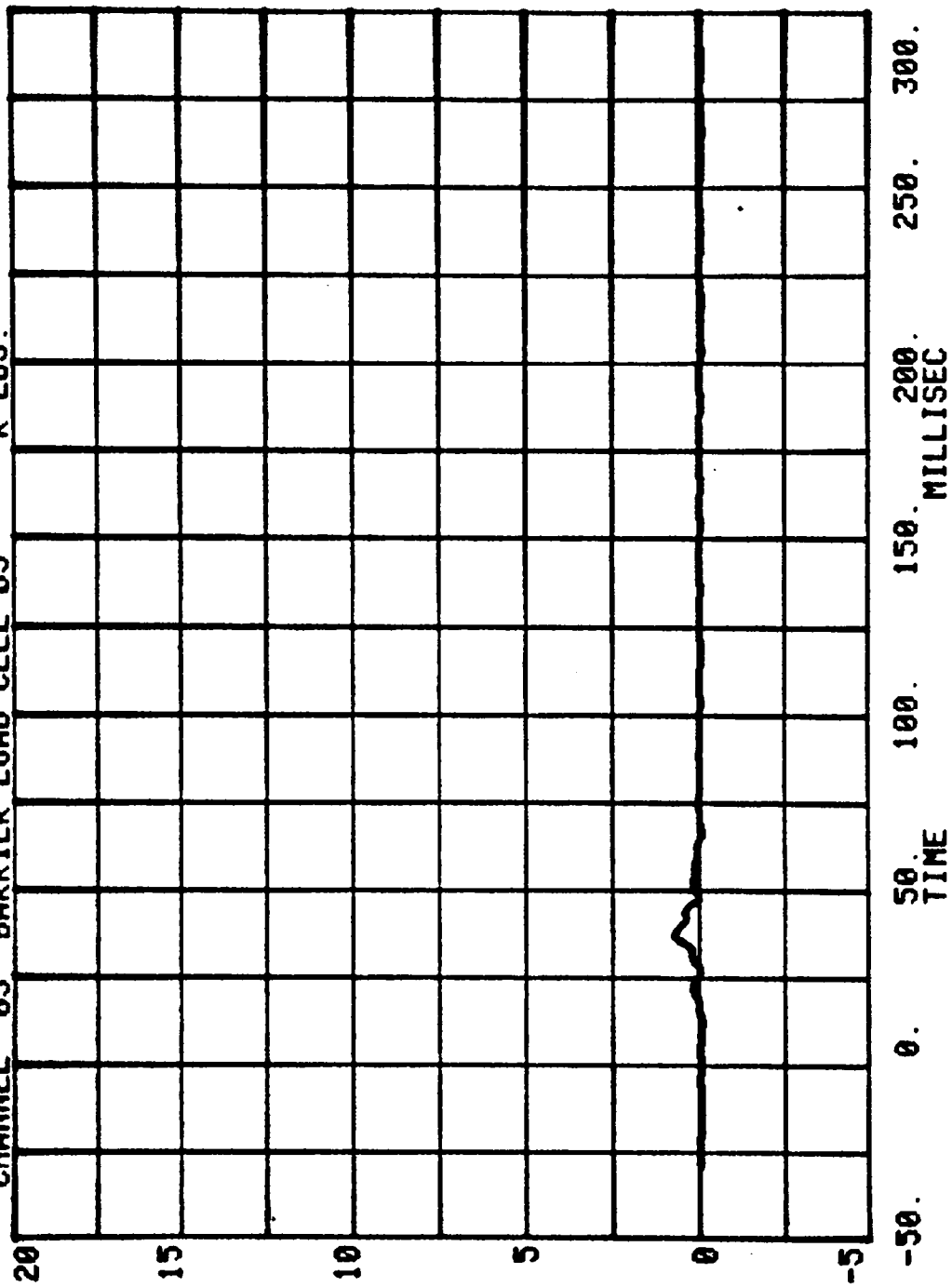


CHANNEL 64 BARRIER LOAD CELL D4 K LBS.

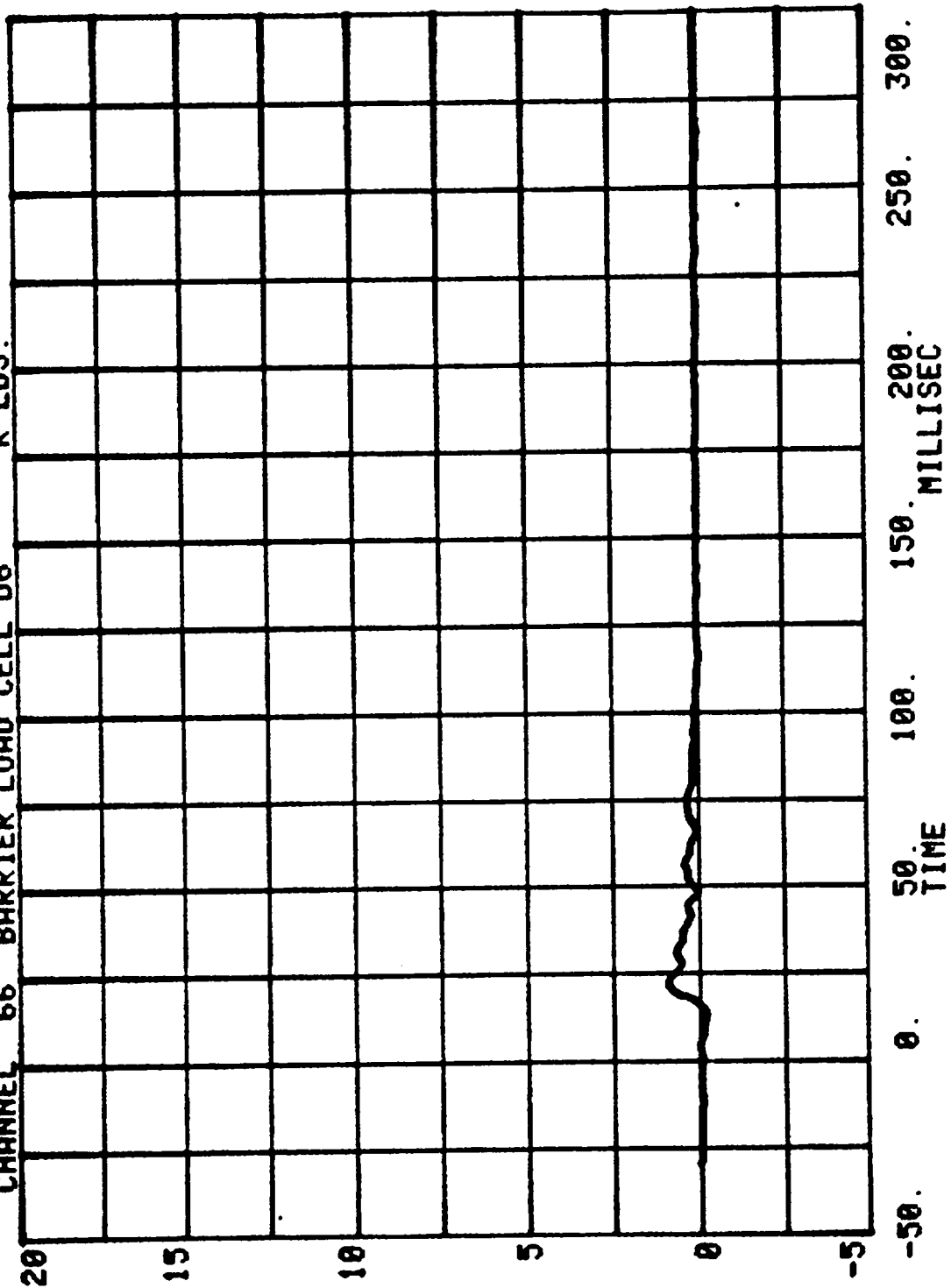
RUN= 780 SERIES= 5302



RUN= 780 SERIES= 5302
CHANNEL 65 BARRIER LOAD CELL D5 K LBS.

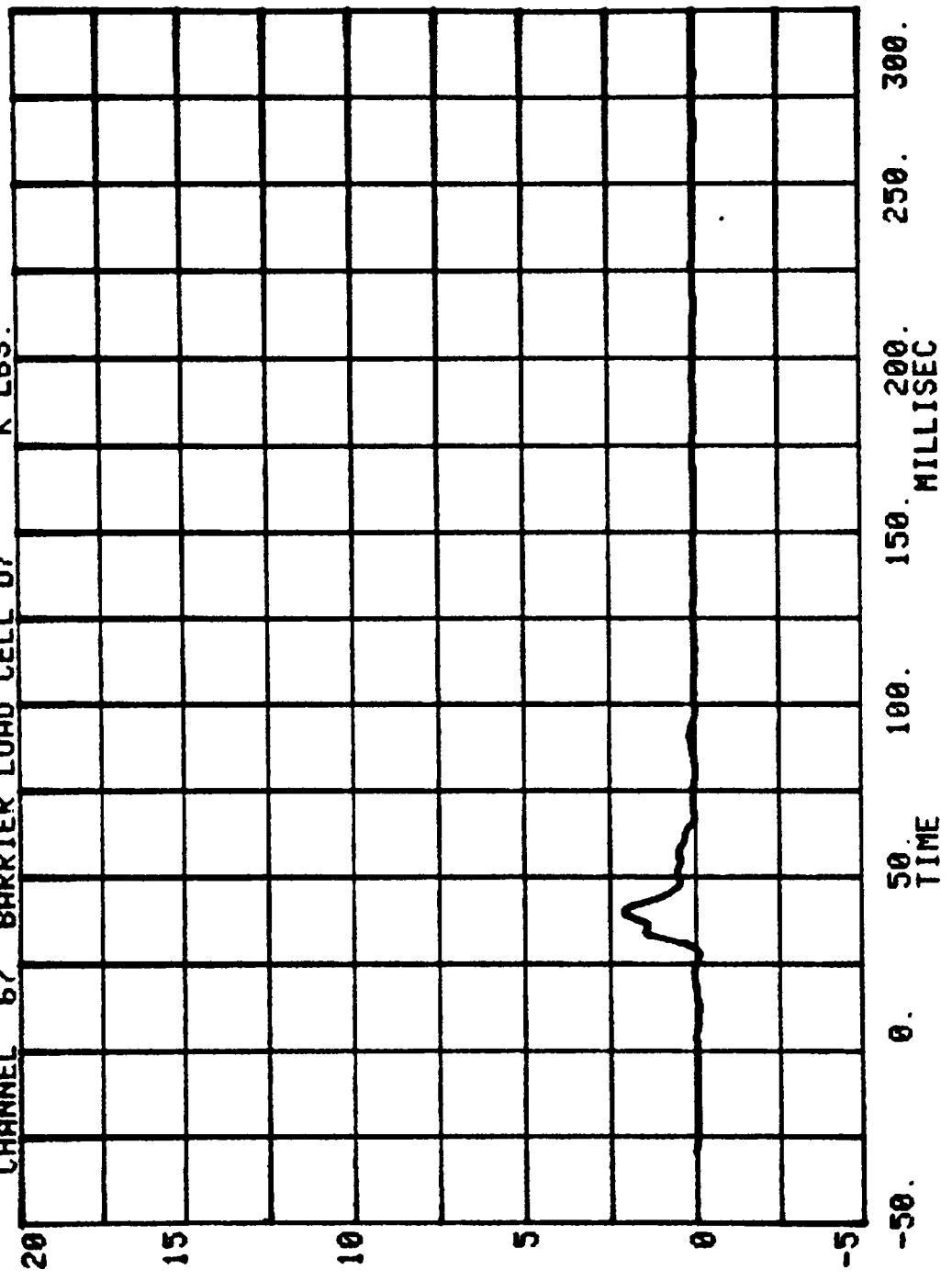


RUN= 780 SERIES= 5302
CHANNEL 66 BARRIER LOAD CELL D6 K LBS.

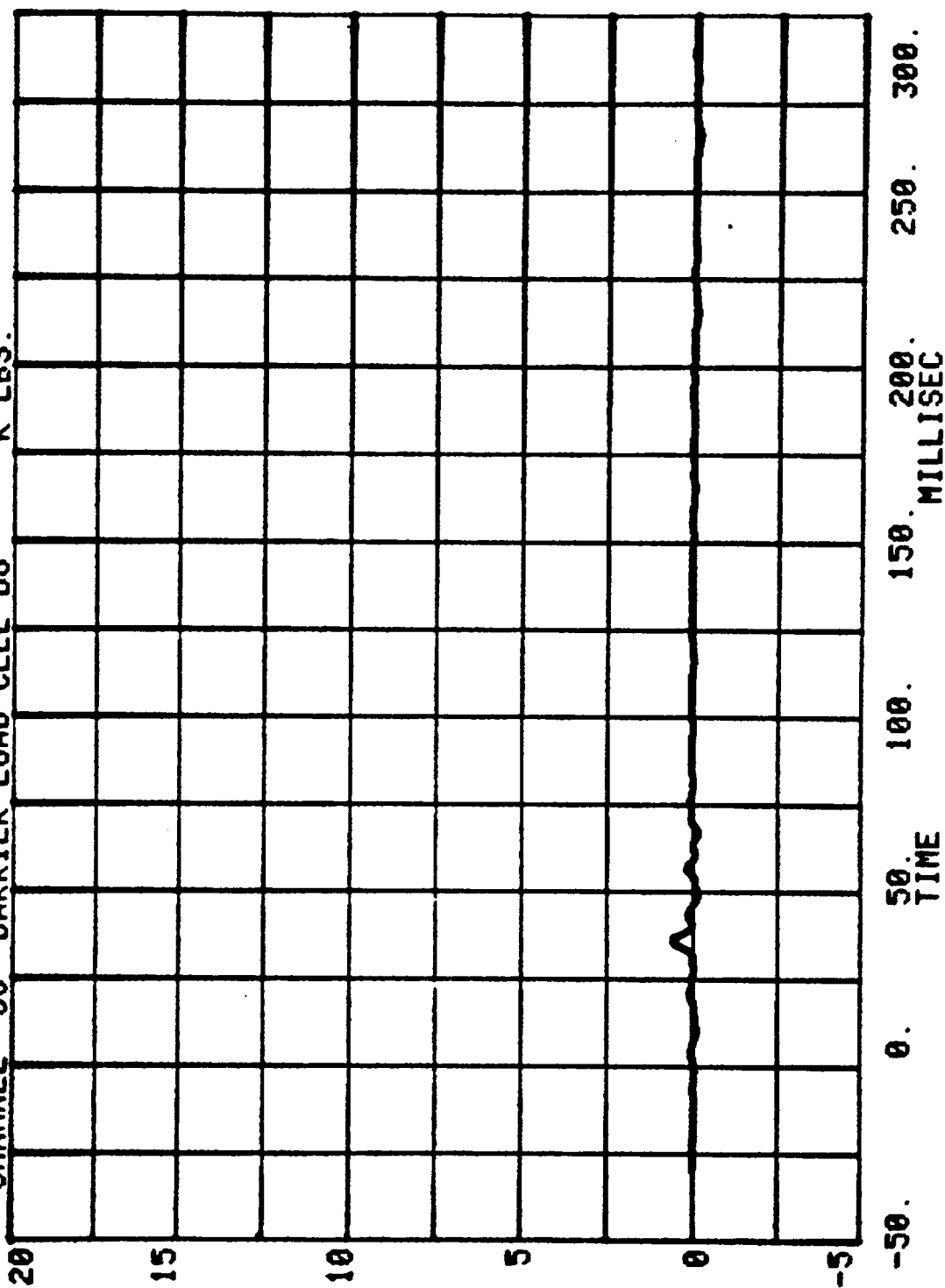


CHANNEL 67 BARRIER LOAD CELL D7 K LBS.

RUN= 780 SERIES= 5302

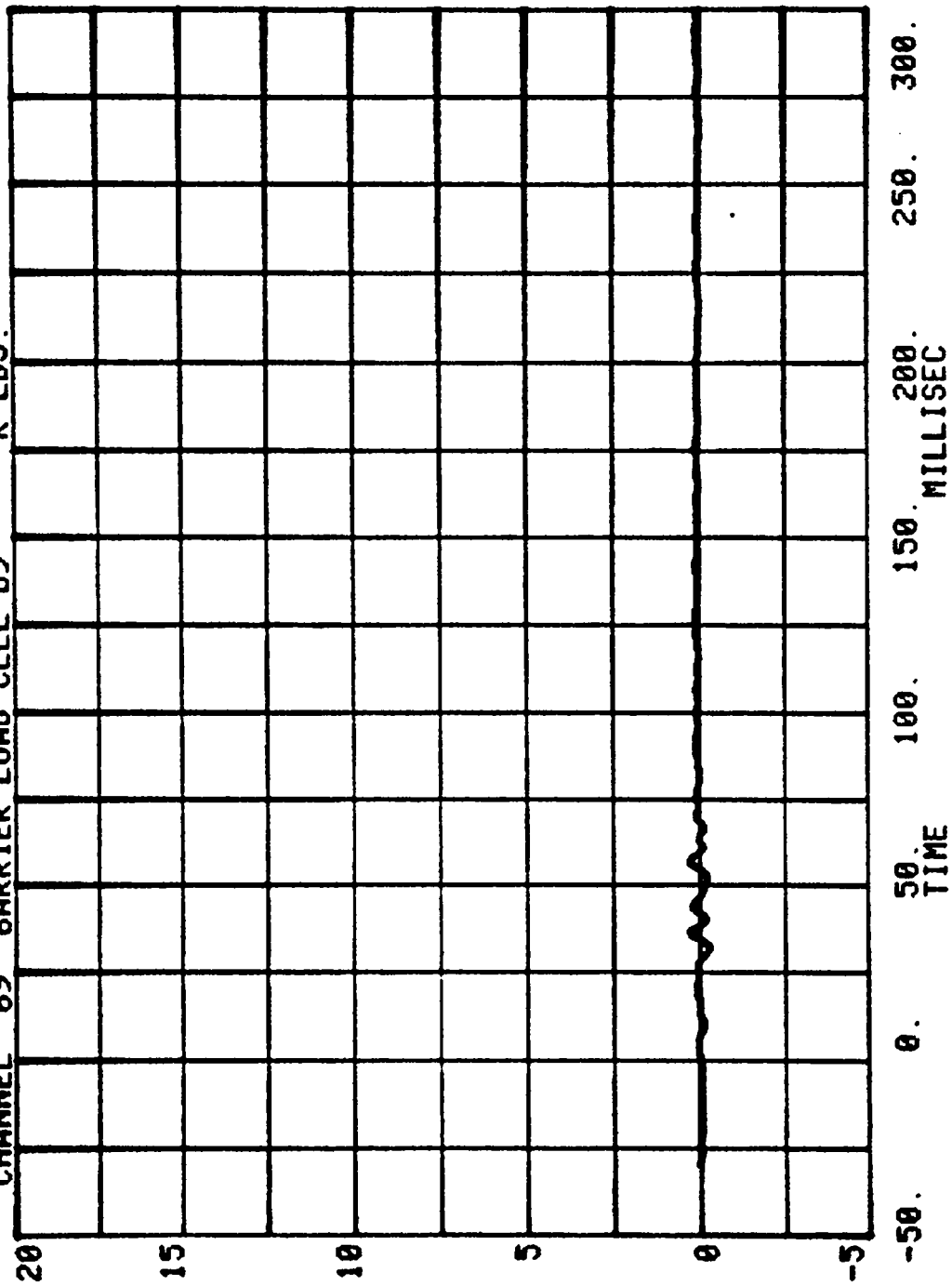


CHANNEL 68 BARRIER LOAD CELL D8 RUN= 780 SERIES= 5302 K LBS.



CHANNEL 69 BARRIER LOAD CELL D9 K LBS.

RUN= 780 SERIES= 5302

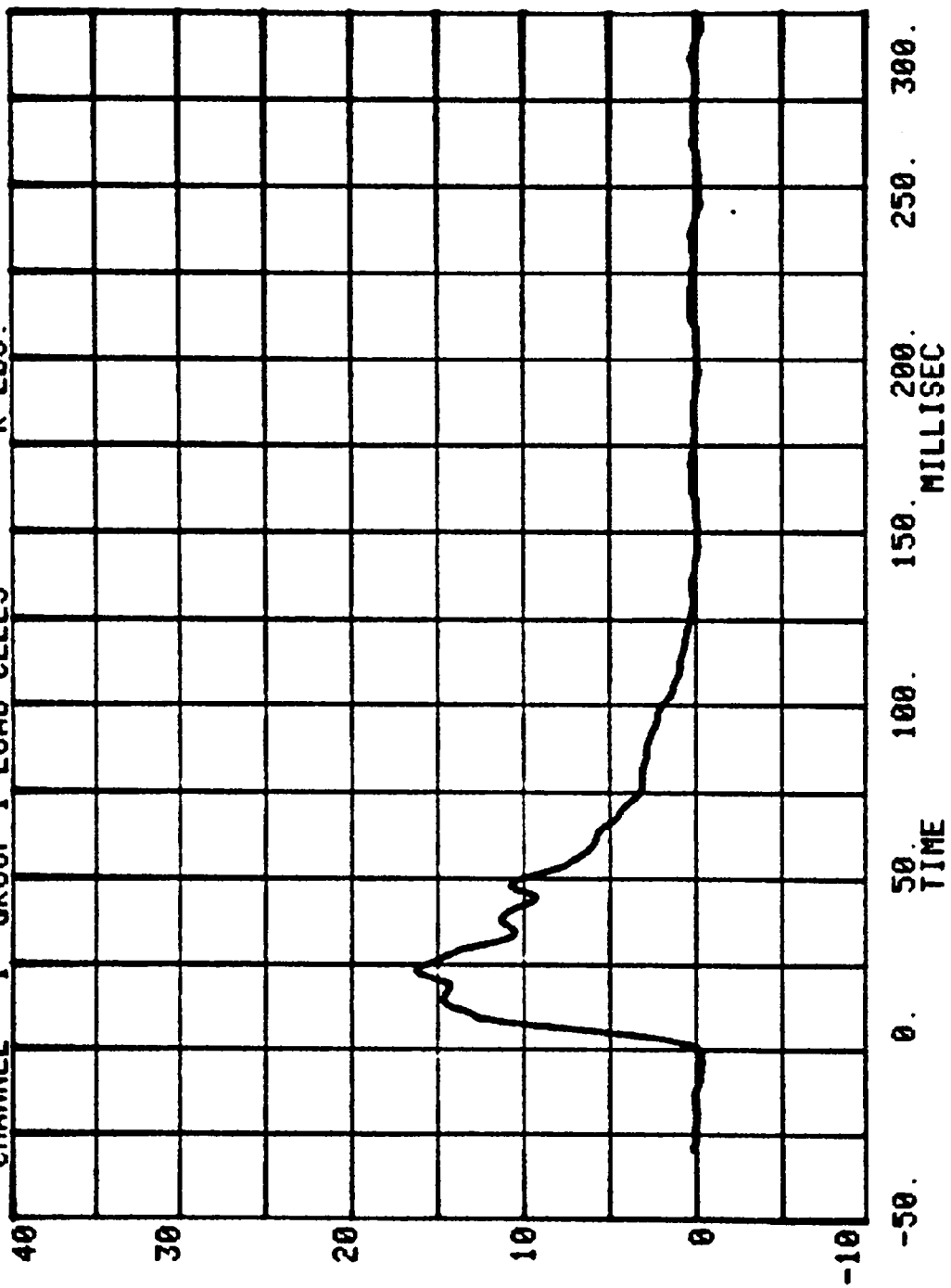


NEW CAR ASSESSMENT BARRIER TESTS - 1987

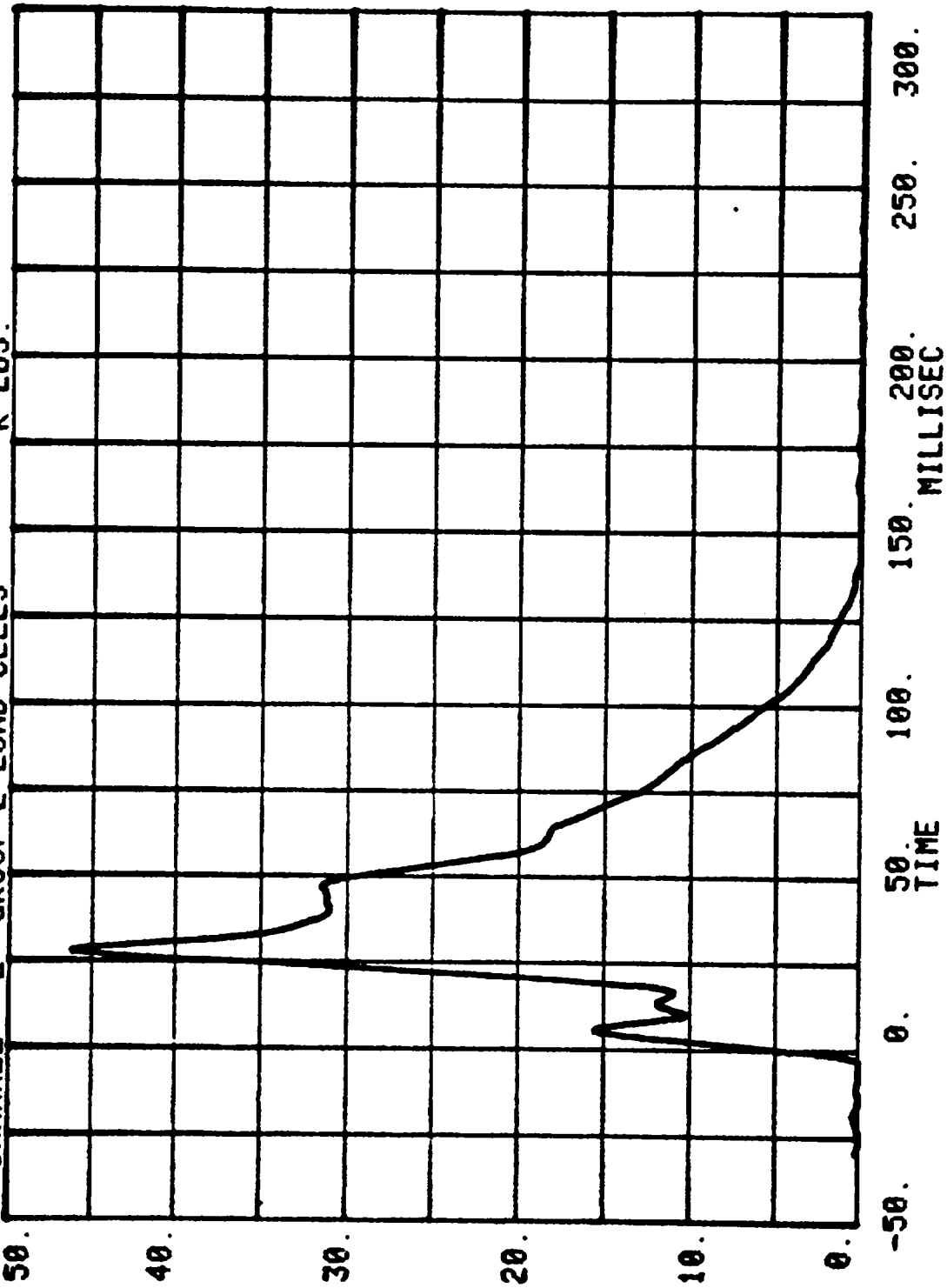
RUN # 780 SERIES # 5302

CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	- .319	16.292 K LBS.
2	GROUP 2 LOAD CELLS	- .284	46.264 K LBS.
3	GROUP 3 LOAD CELLS	- .411	14.855 K LBS.
4	GROUP 4 LOAD CELLS	- .634	10.866 K LBS.
5	GROUP 5 LOAD CELLS	- .343	13.007 K LBS.
6	GROUP 6 LOAD CELLS	- .412	9.440 K LBS.
7	TOTAL LOAD CELL SUM	-1.426	96.866 K LBS.

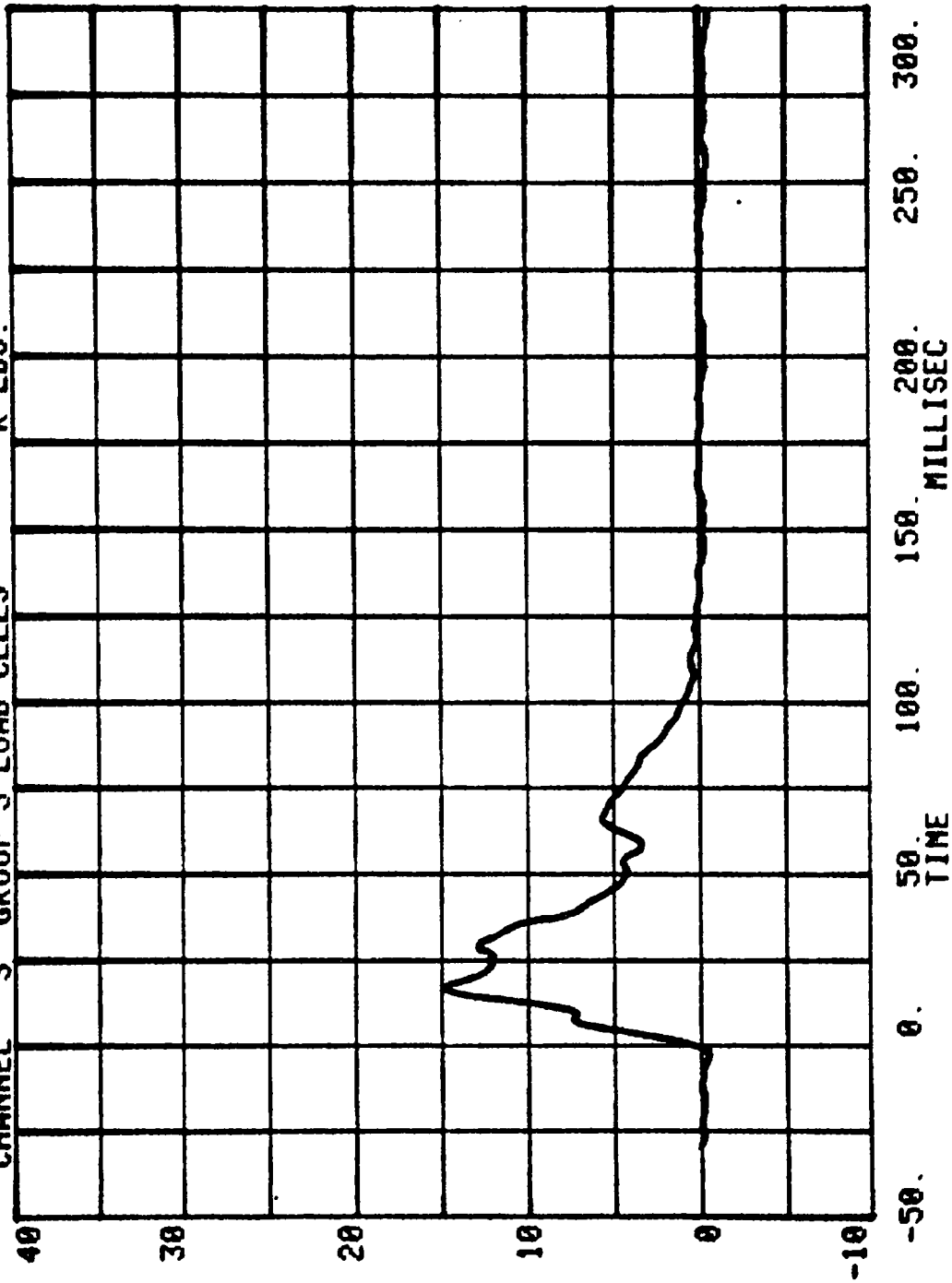
RUN= 780 SERIES= 5302
CHANNEL 1 GROUP 1 LOAD CELLS K LBS.



CHANNEL 2 GROUP 2 LOAD CELLS
RUN= 780 SERIES= 5302 K LBS.

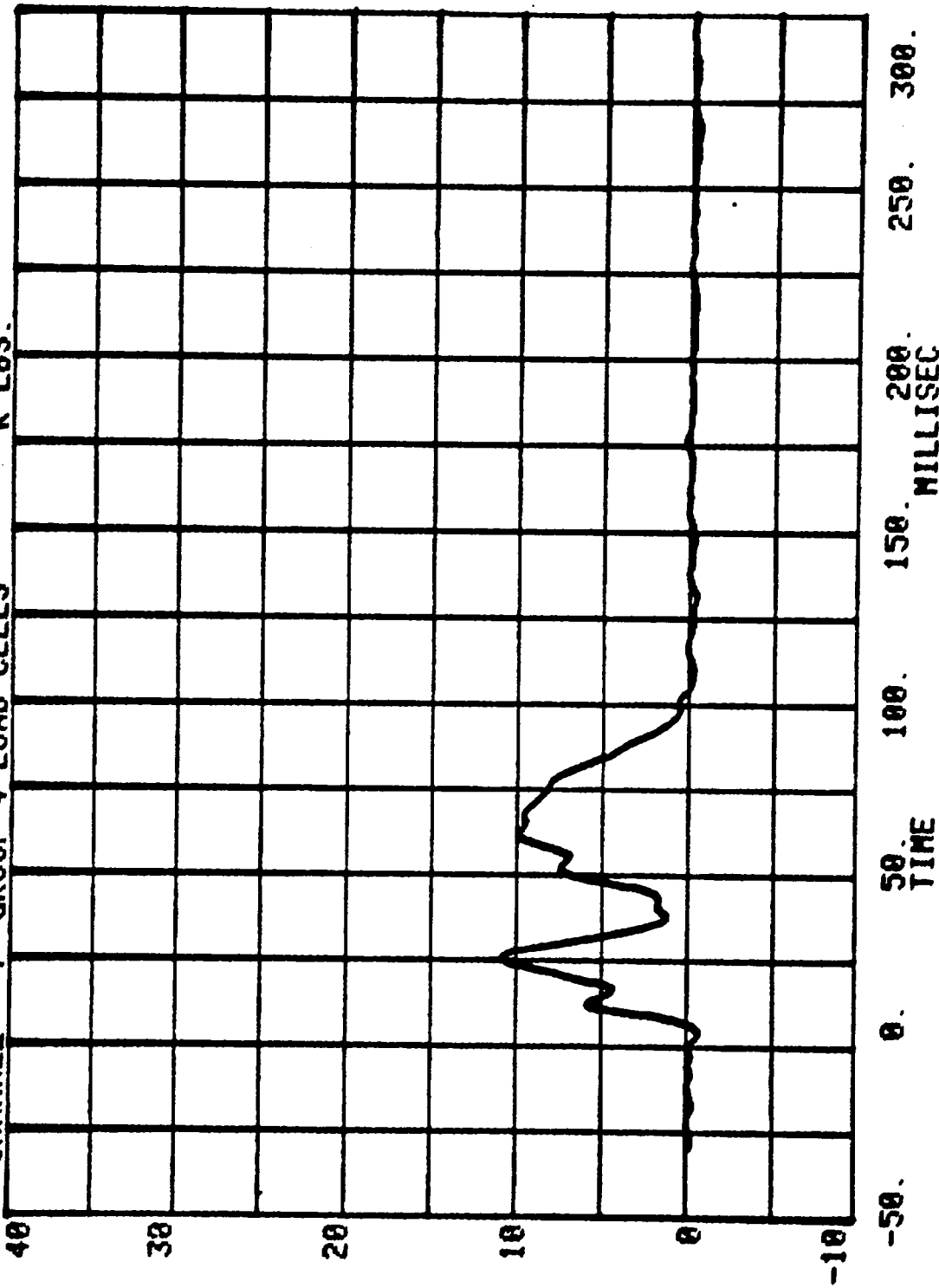


CHANNEL 3 GROUP 3 LOAD CELLS
RUN= 788 SERIES= 5302 K LBS.

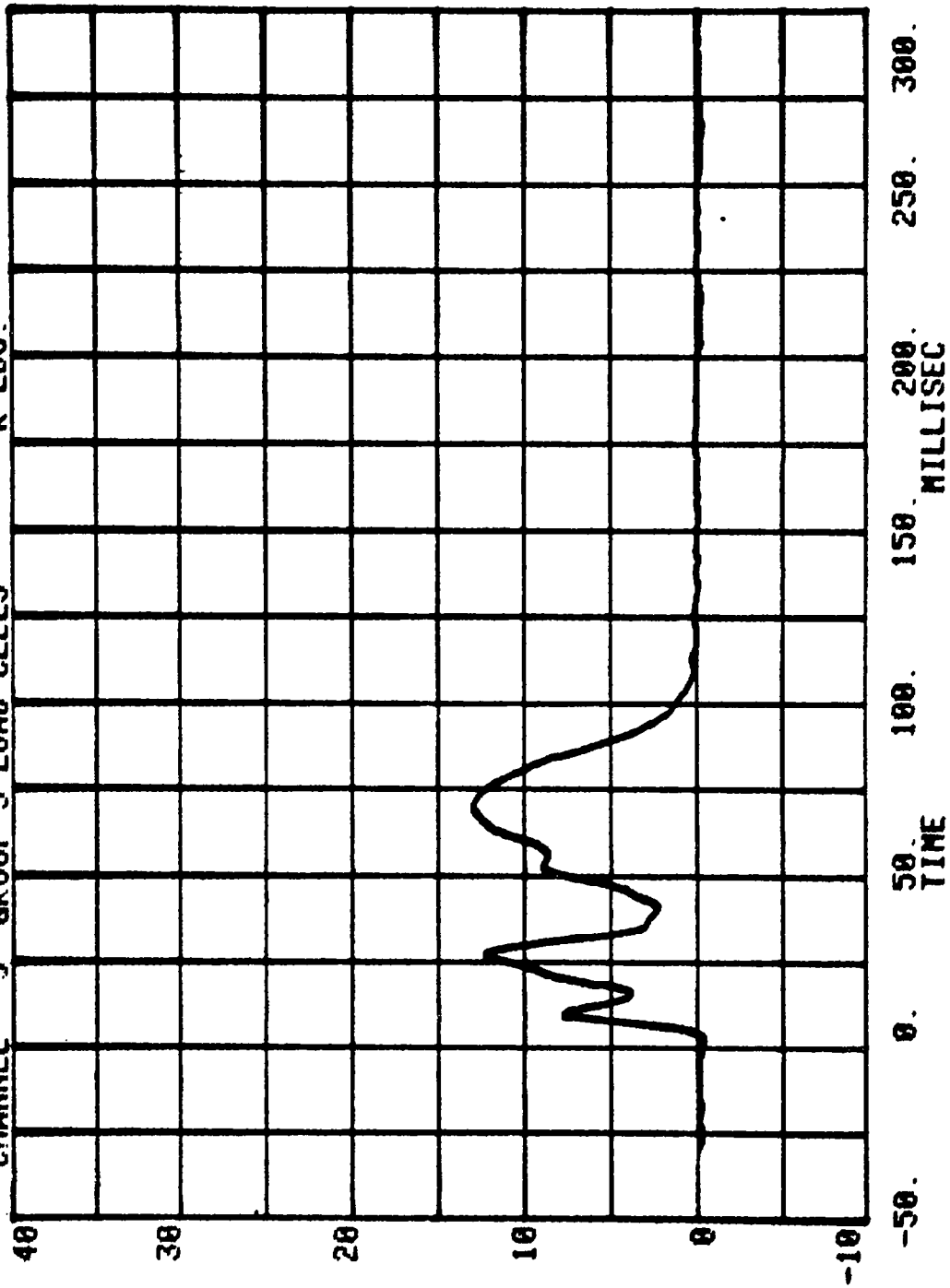


CHANNEL 4 GROUP 4 LOAD CELLS K LBS.

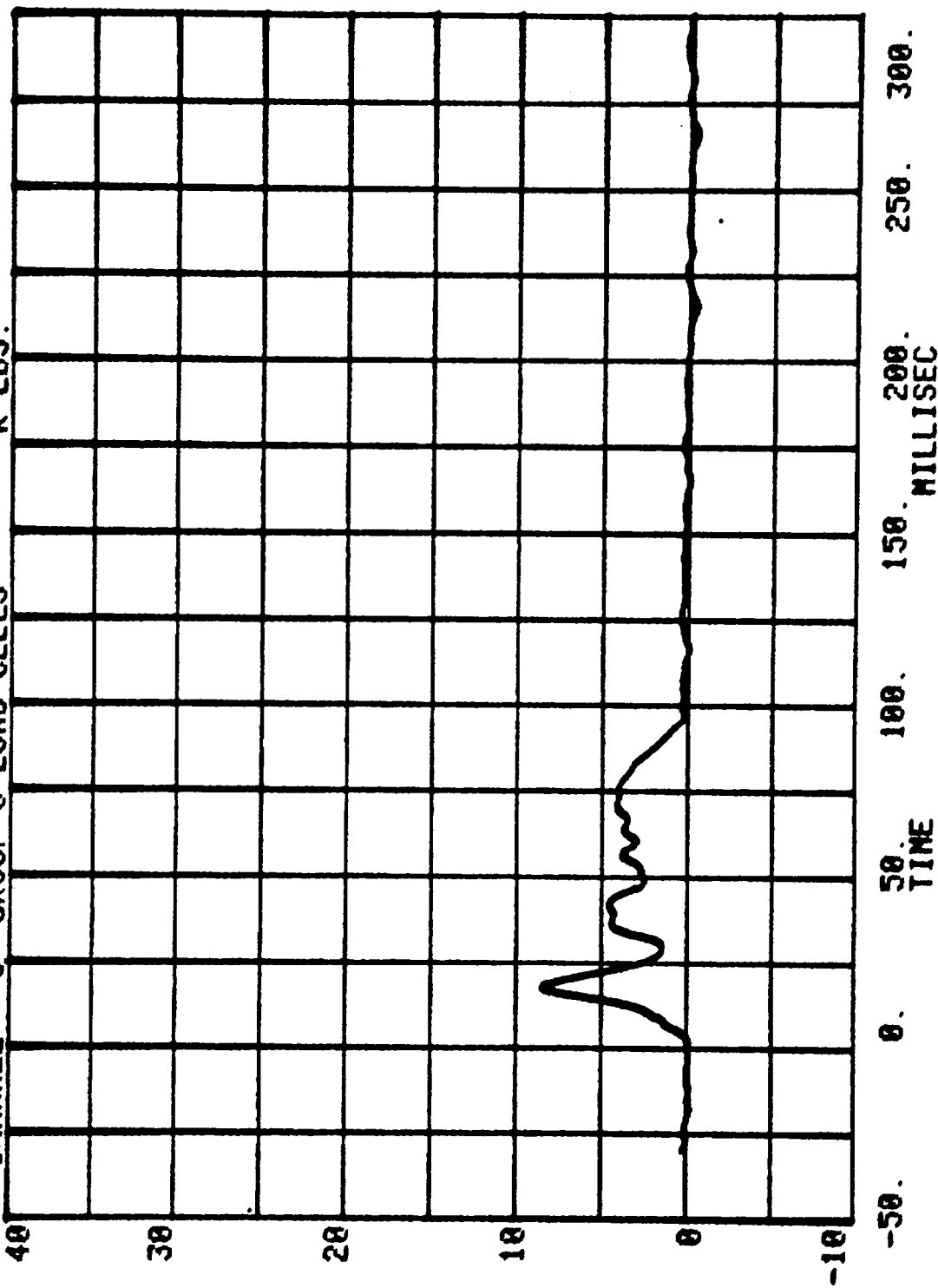
RUN= 780 SERIES= 5302

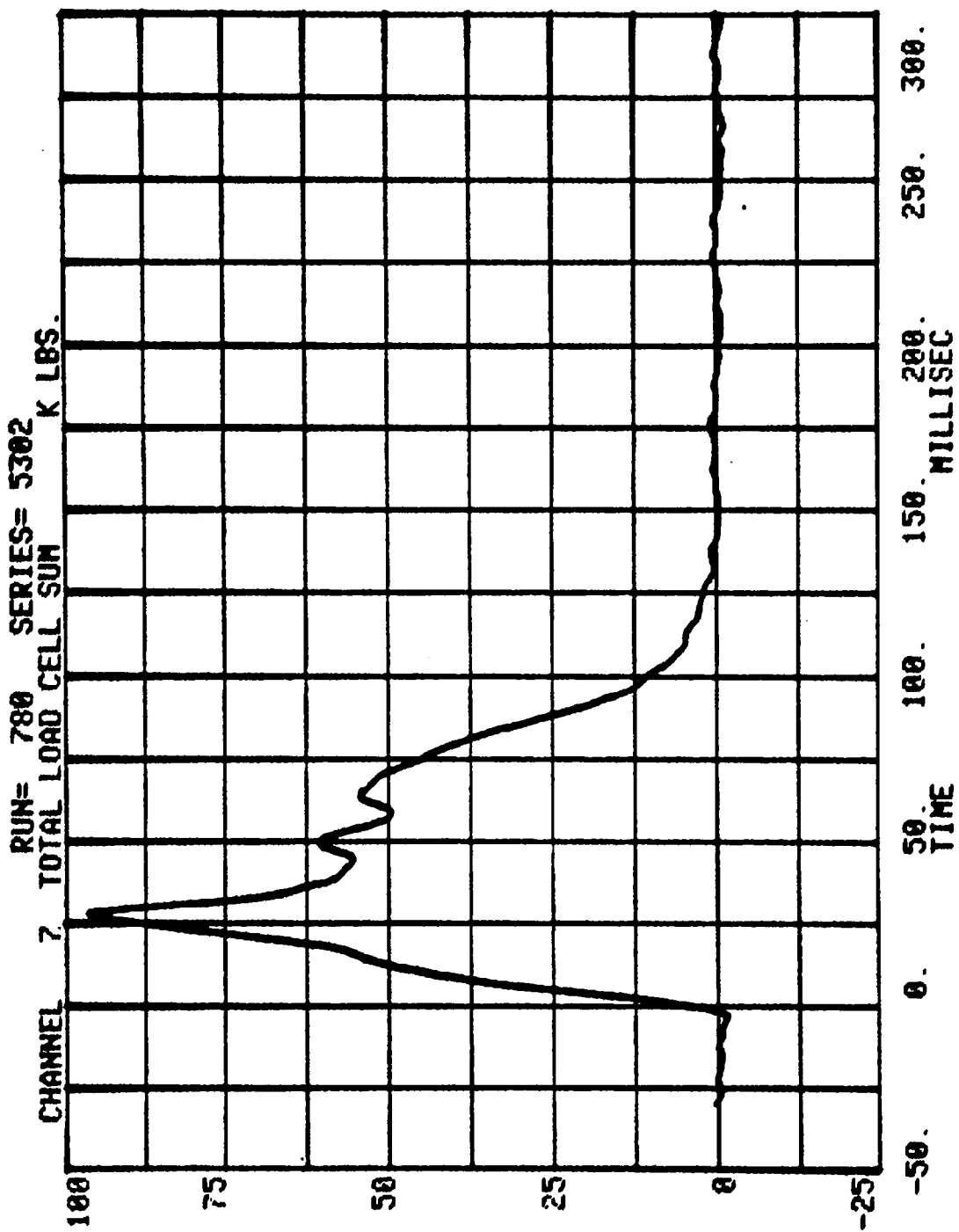


RUN= 780 SERIES= 5302
CHANNEL 5 GROUP 5 LOAD CELLS K LBS.



CHANNEL 6 GROUP 6 LOAD CELLS
RUN= 780 SERIES= 5302
K LBS.





TEST NO. MH5302

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NEW CAR ASSESSMENT BARRIER TESTS - 1987

RUN= 780

POS#1 HEAD R

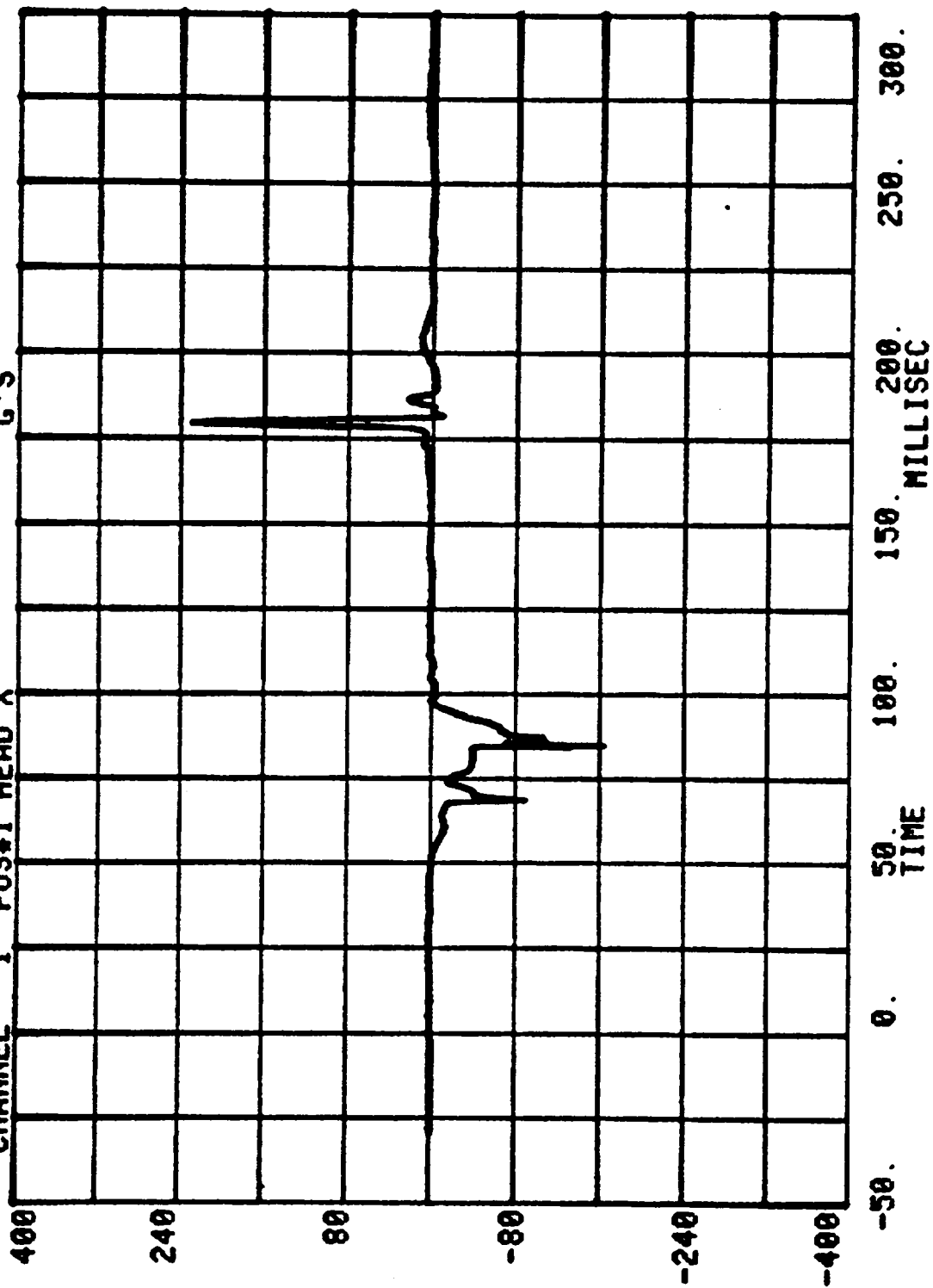
HIC= 756.9 FROM T1= .06810 TO T2= .09285

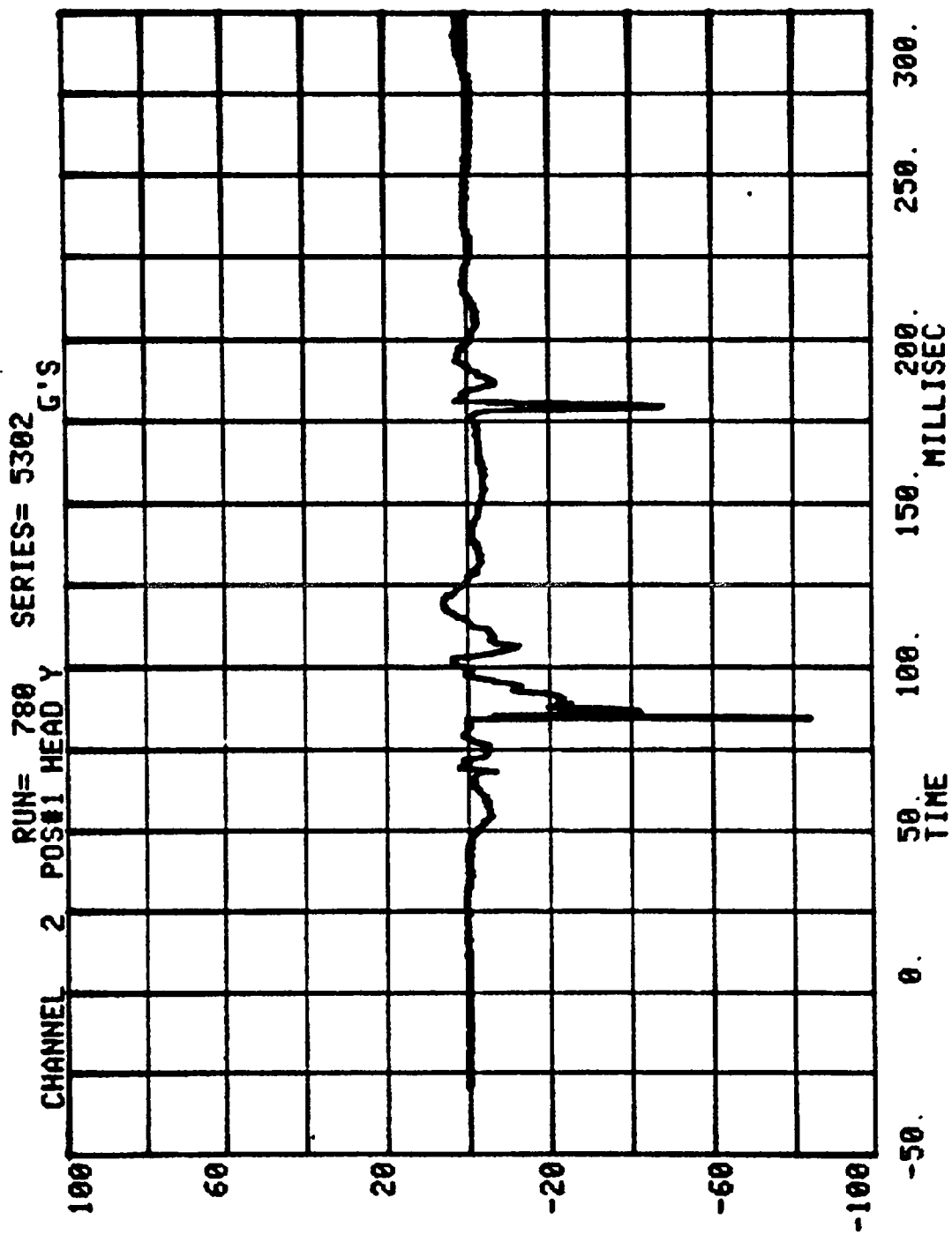
AVERAGE ACCELERATION BETWEEN T1 AND T2= 62.3G'S

EVENT TIME= 300.0 MSEC

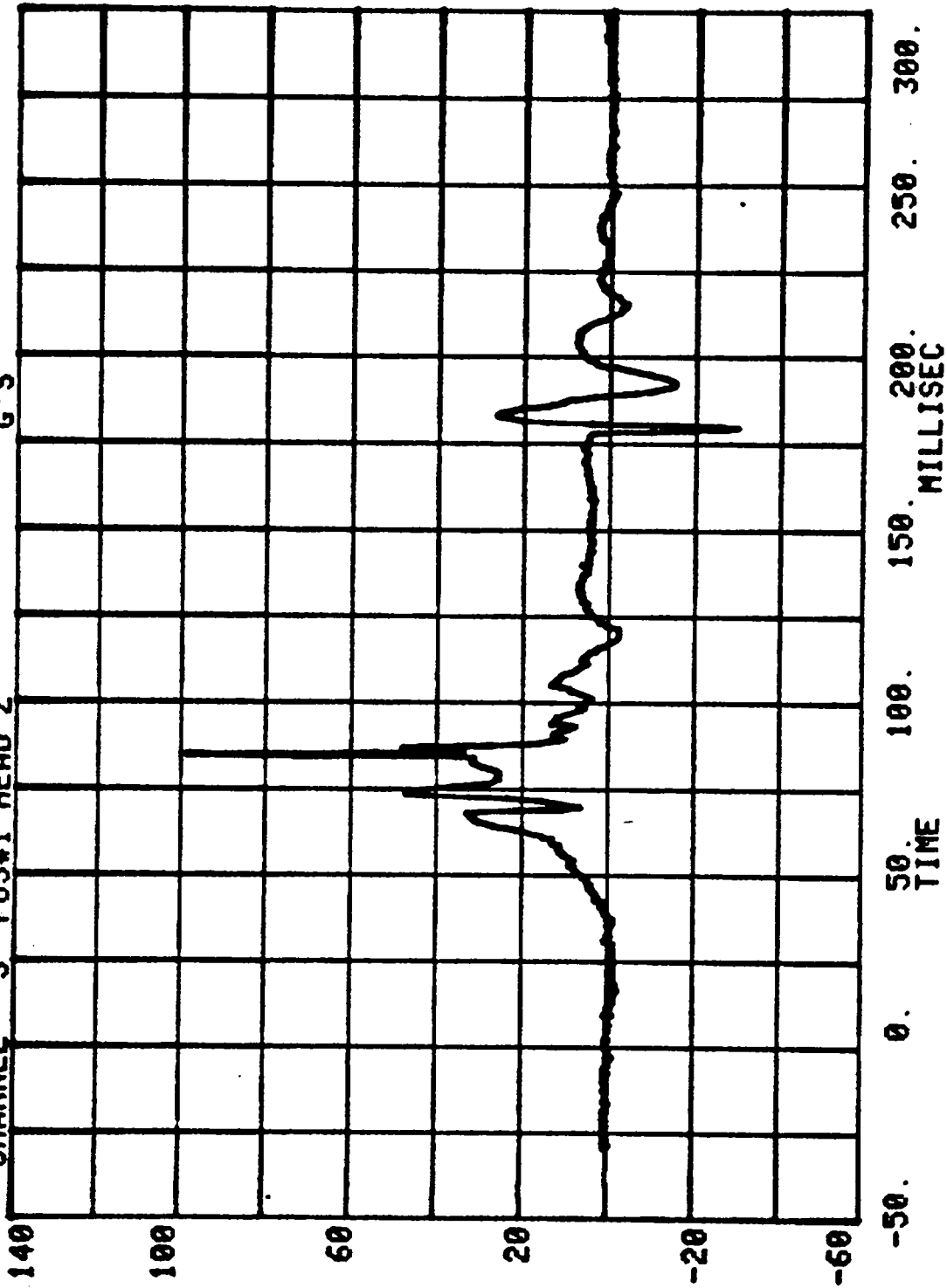
SEVERITY INDEX=1251.4

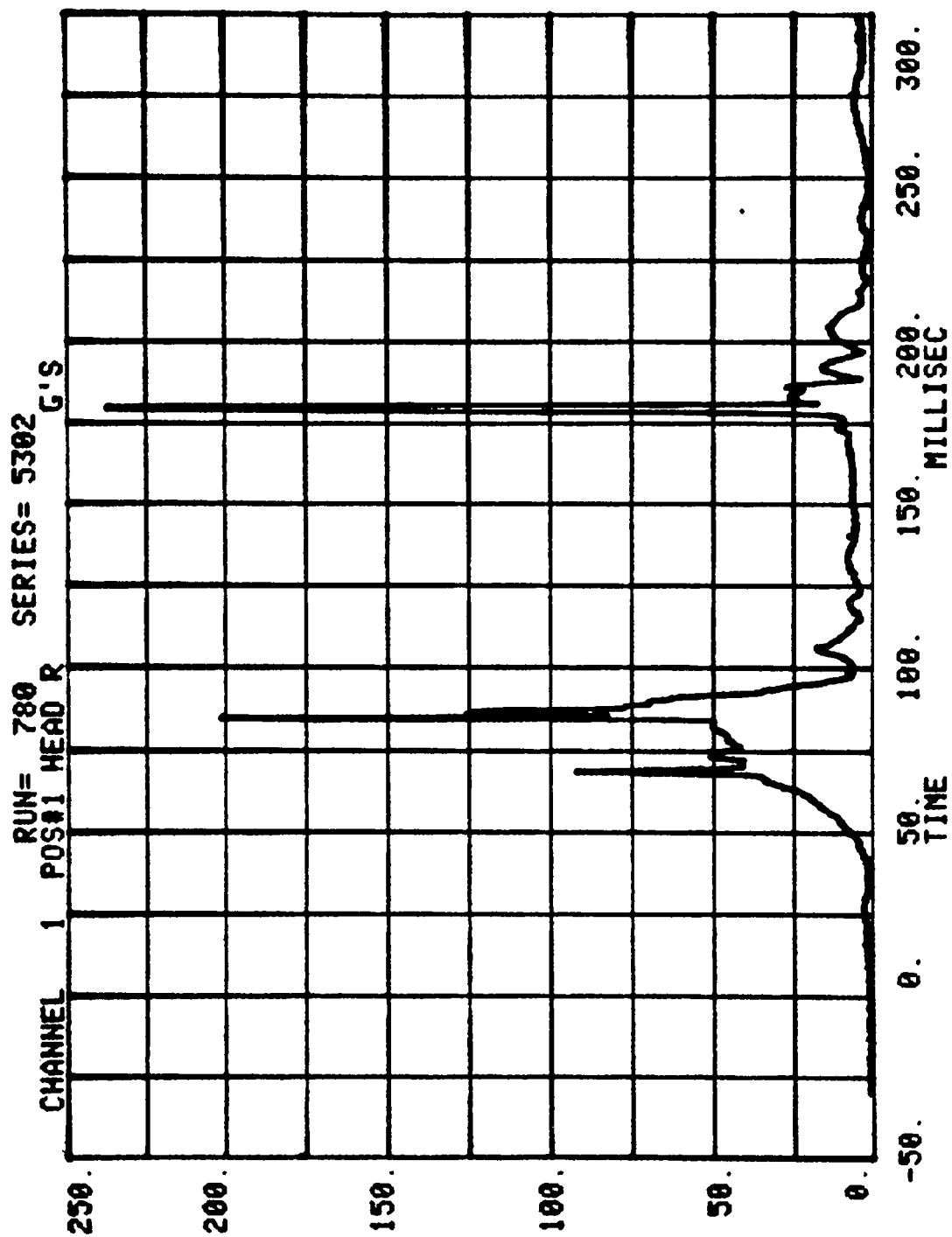
CHANNEL 1 POS#1 HEAD X RUN= 780 SERIES= 5302 G'S



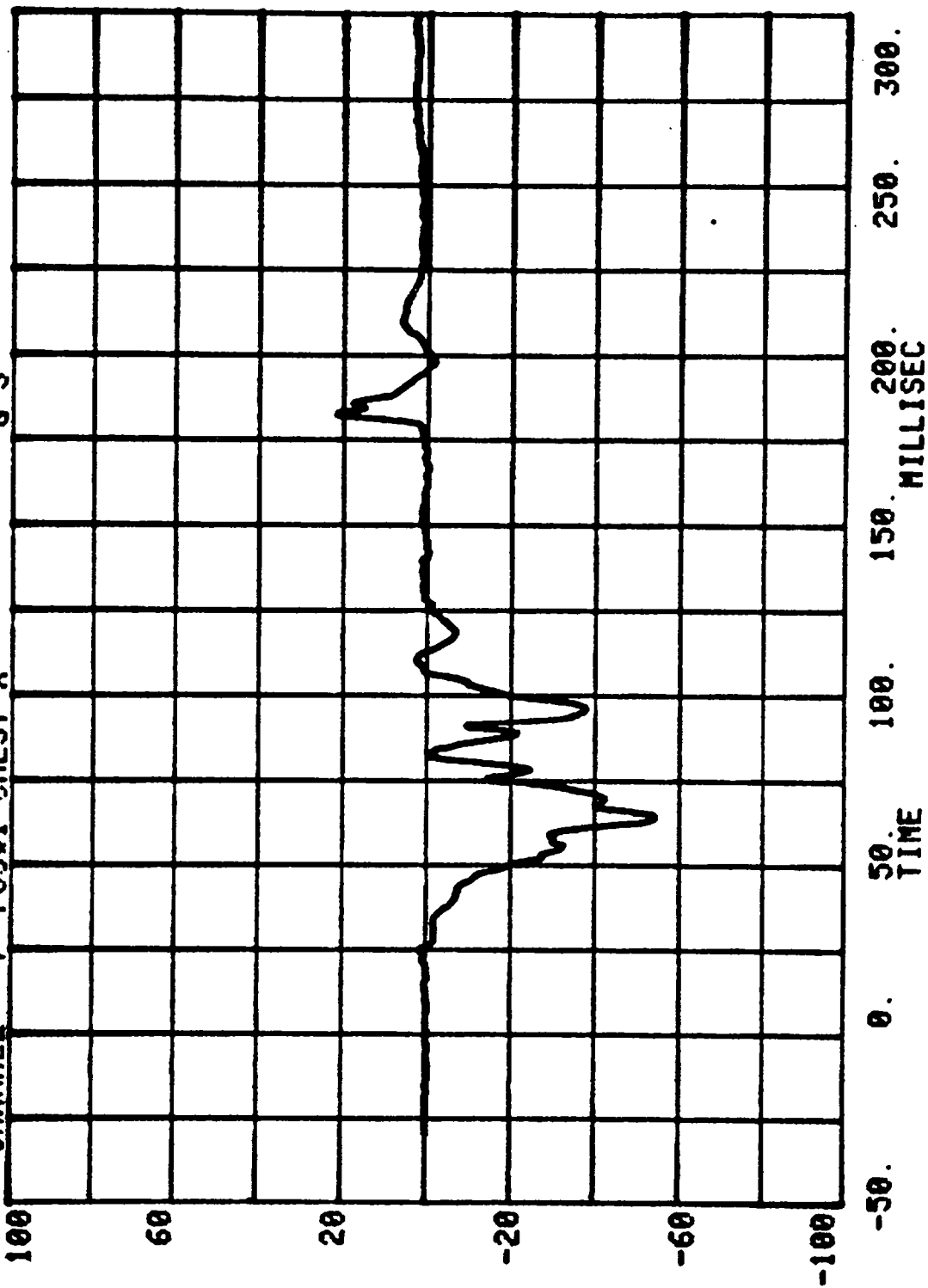


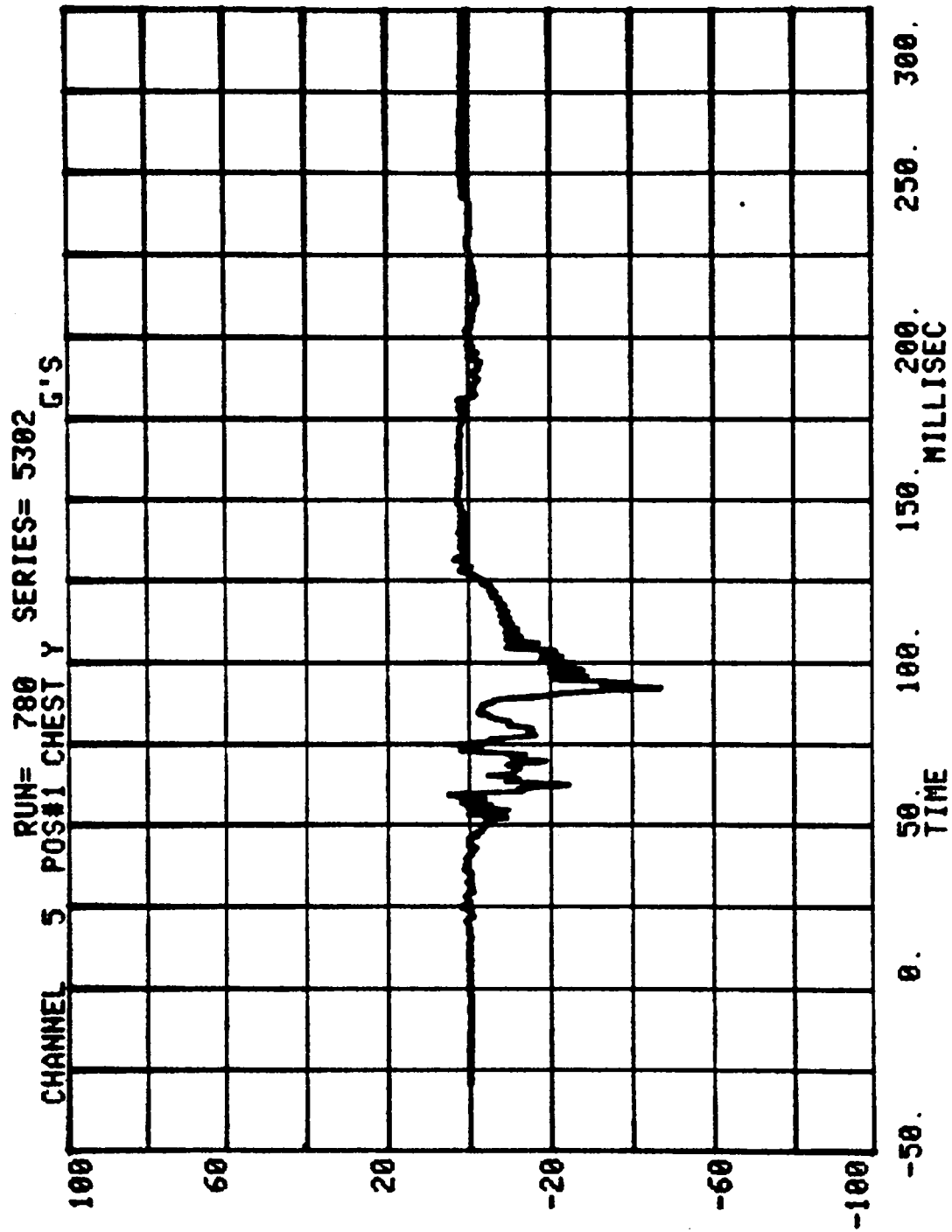
CHANNEL 3 POS#1 HEAD 2 RUN= 780 SERIES= 5302 G'S



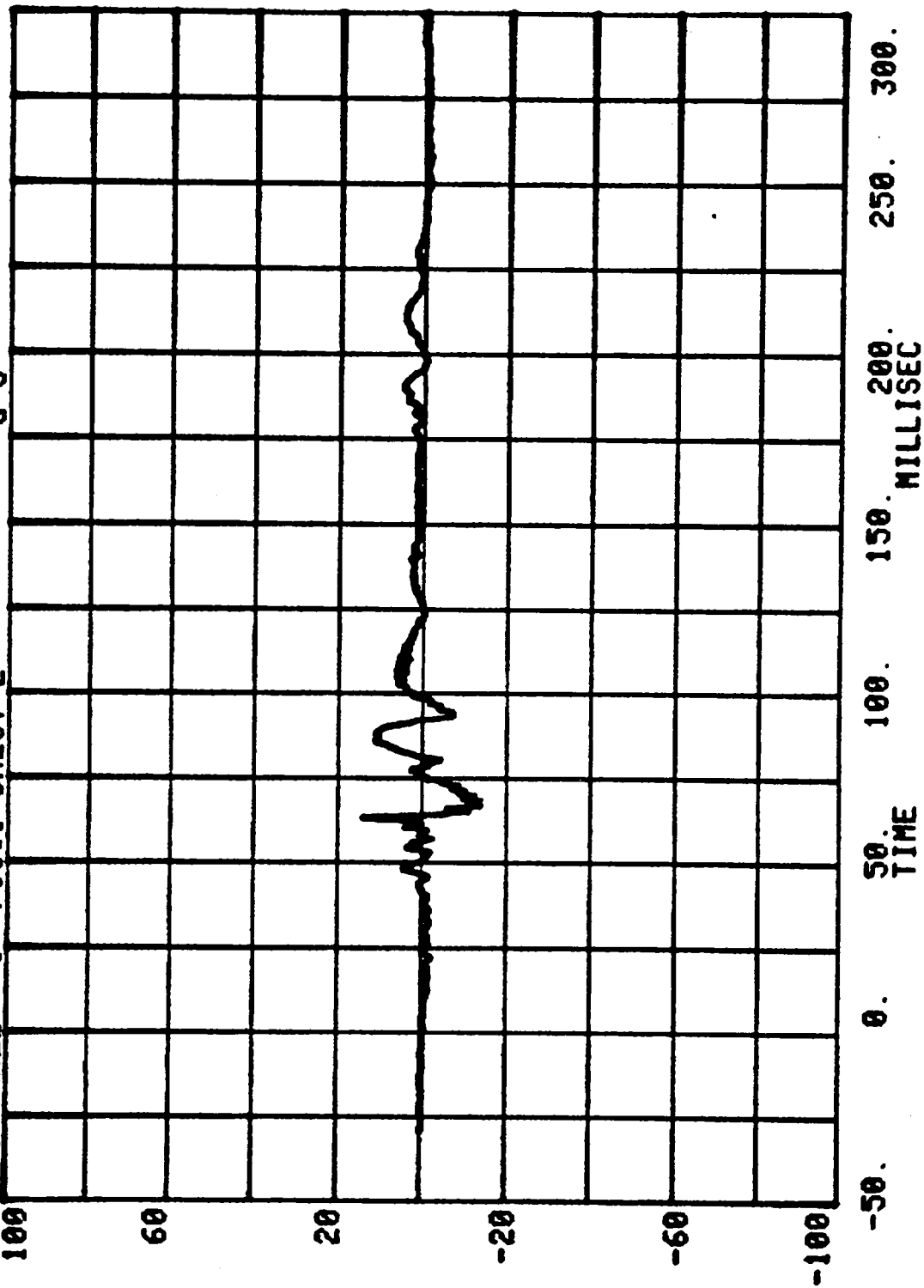


CHANNEL 4 POS#1 CHEST X RUN= 780 SERIES= 5302 G'S





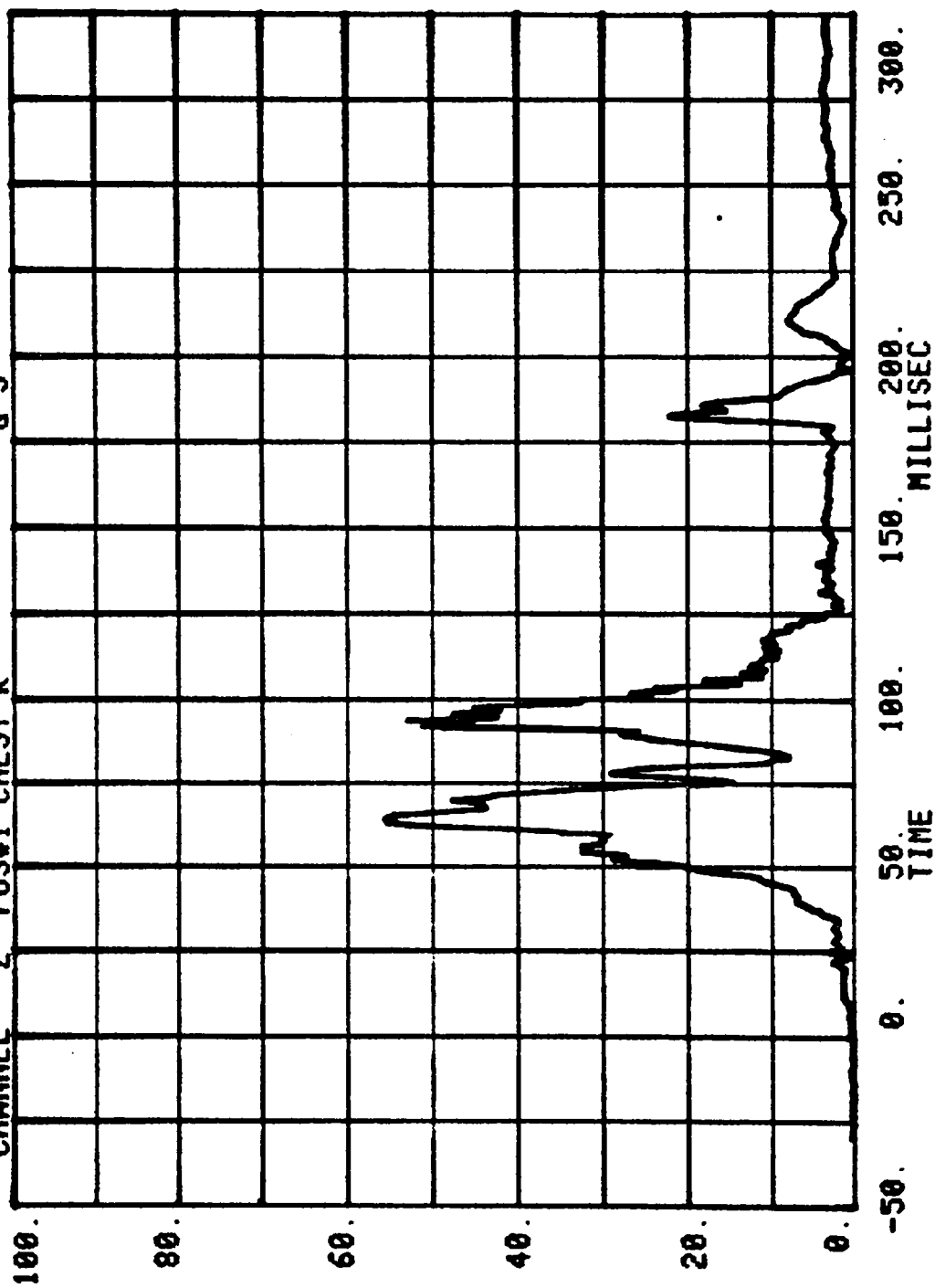
CHANNEL 6 POS#1 CHEST Z RUN= 780 SERIES= 5302 G'S



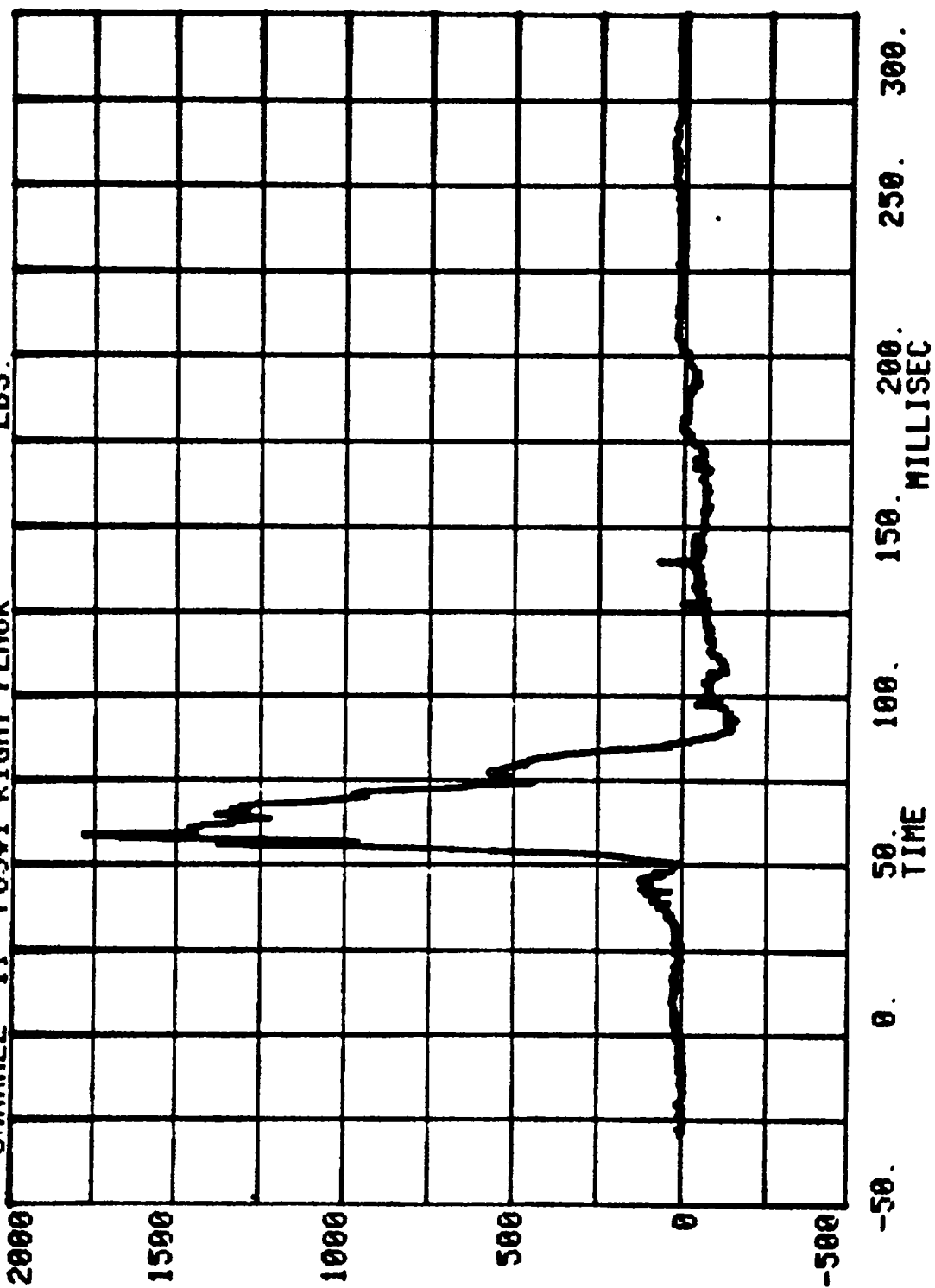
CHANNEL 2 POS#1 CHEST R G'S

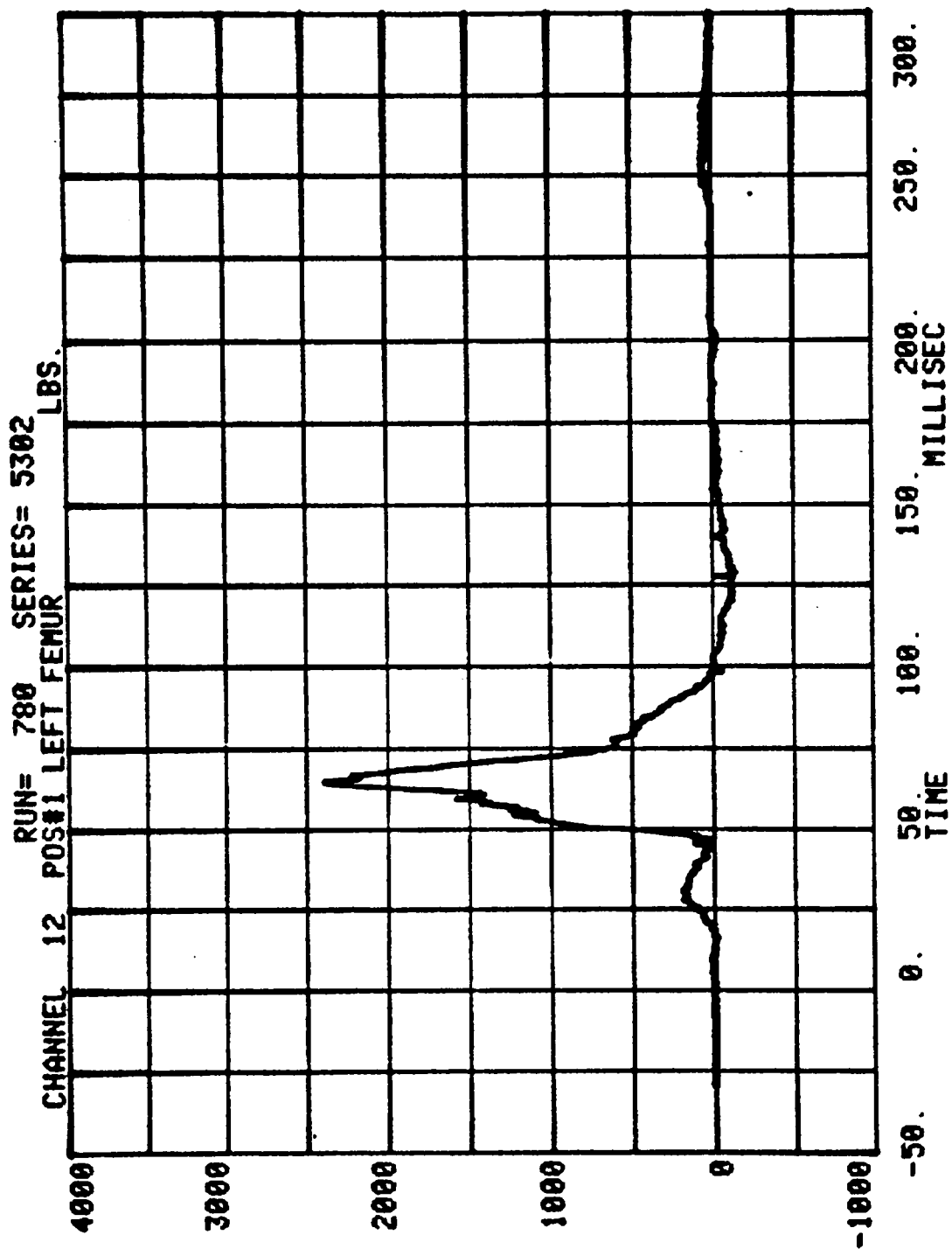
RUN= 780

SERIES= 5302



CHANNEL 11 POS#1 RIGHT FEMUR
RUN= 780 SERIES= 5302 LBS.





HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NEW CAR ASSESSMENT BARRIER TESTS - 1987

RUN= 780

POS#2 HEAD R

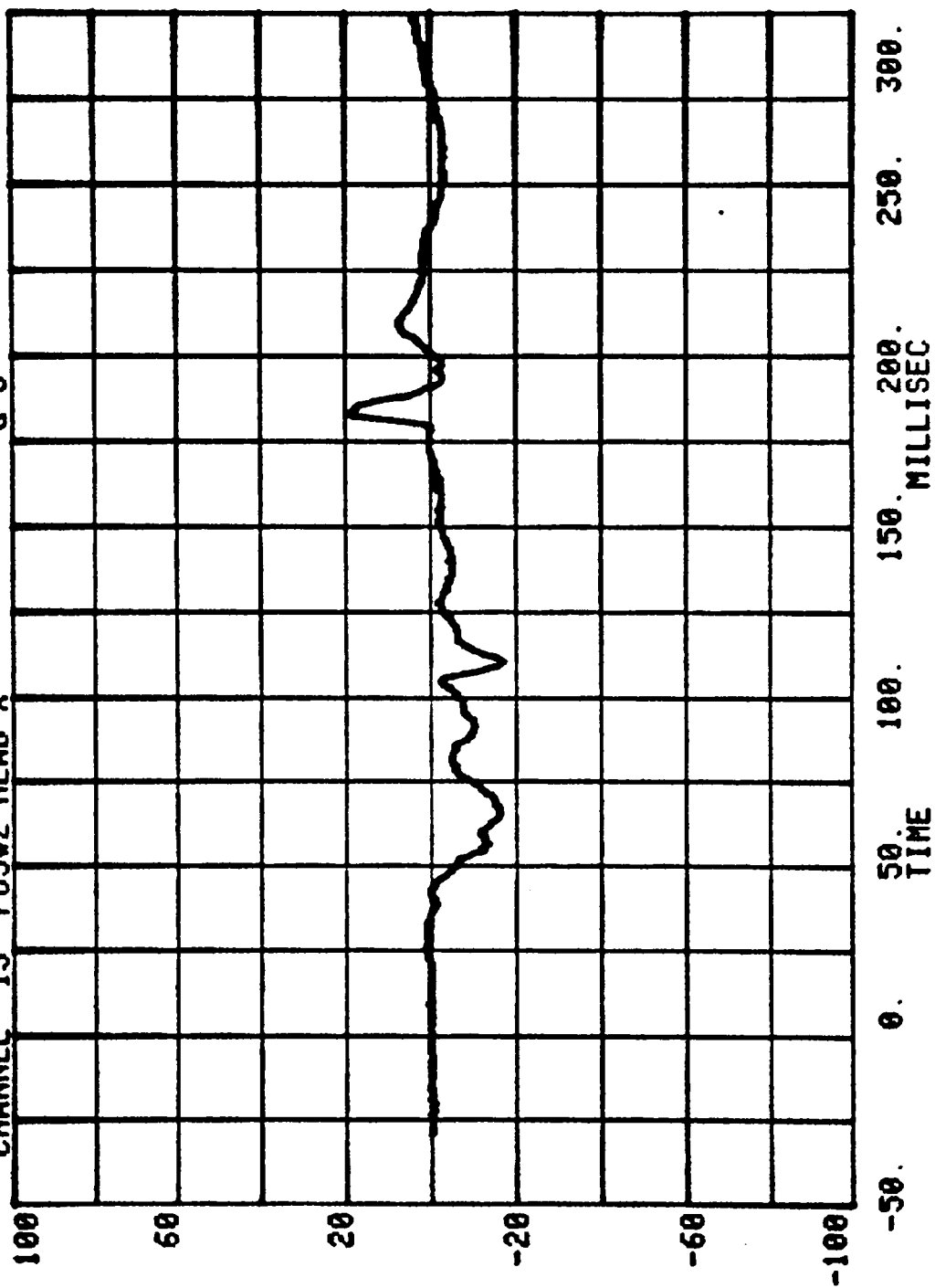
HIC= 345.1 FROM T1= .07507 TO T2= .11107

AVERAGE ACCELERATION BETWEEN T1 AND T2= 39.1G'S

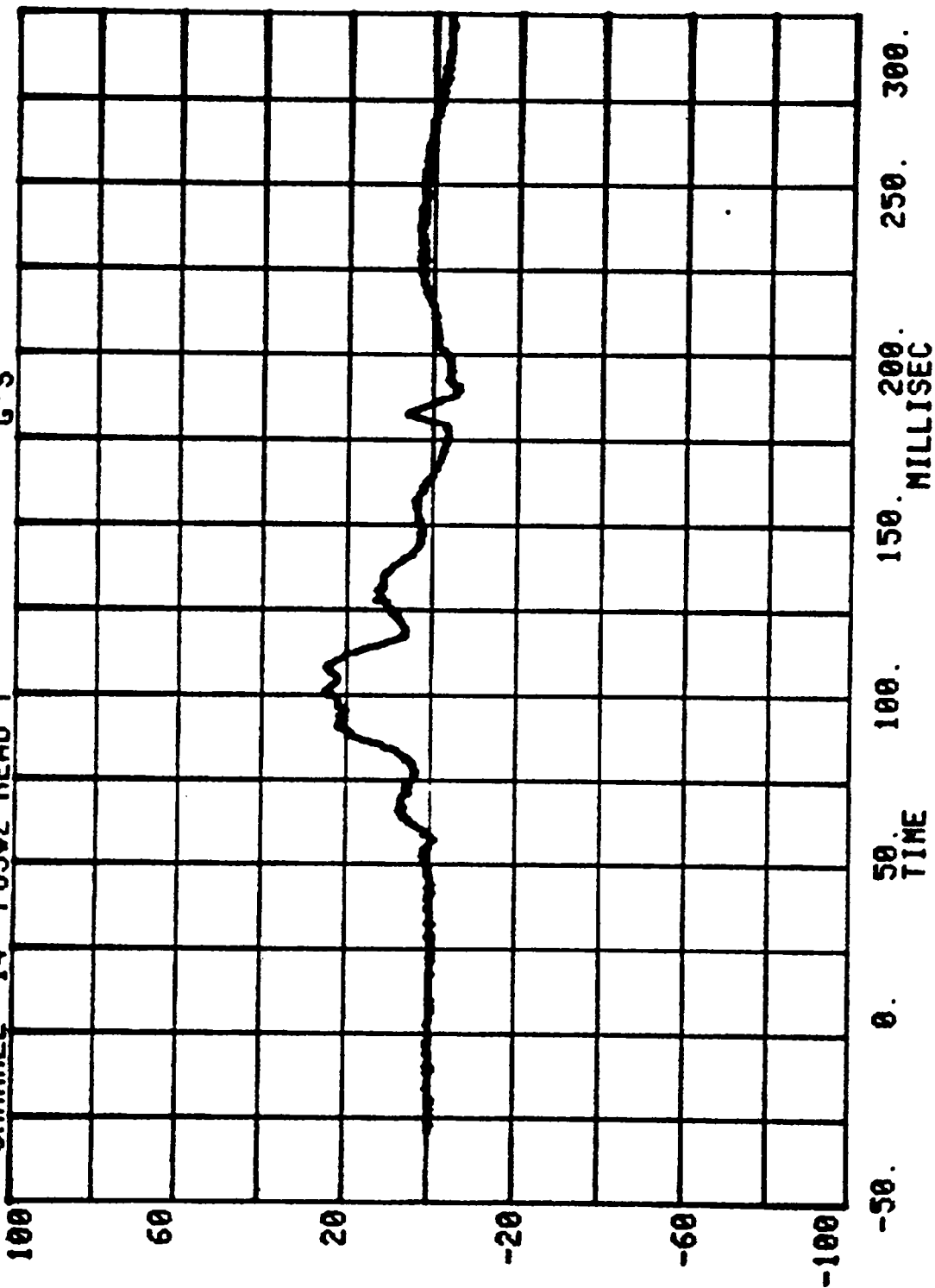
EVENT TIME= 300.0 MSEC

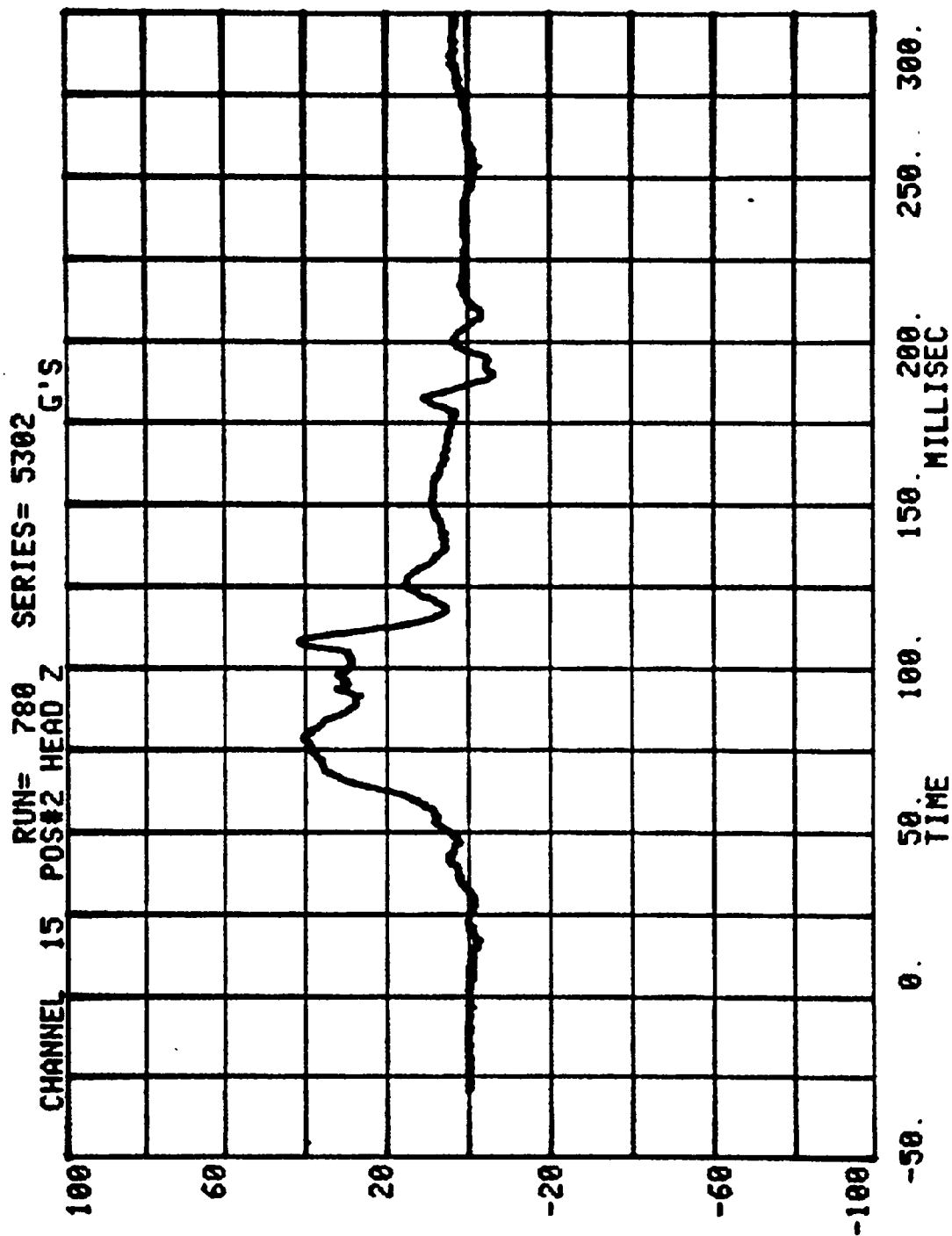
SEVERITY INDEX= 531.8

CHANNEL 13 POS#2 HEAD X
RUN= 780 SERIES= 5302 G'S

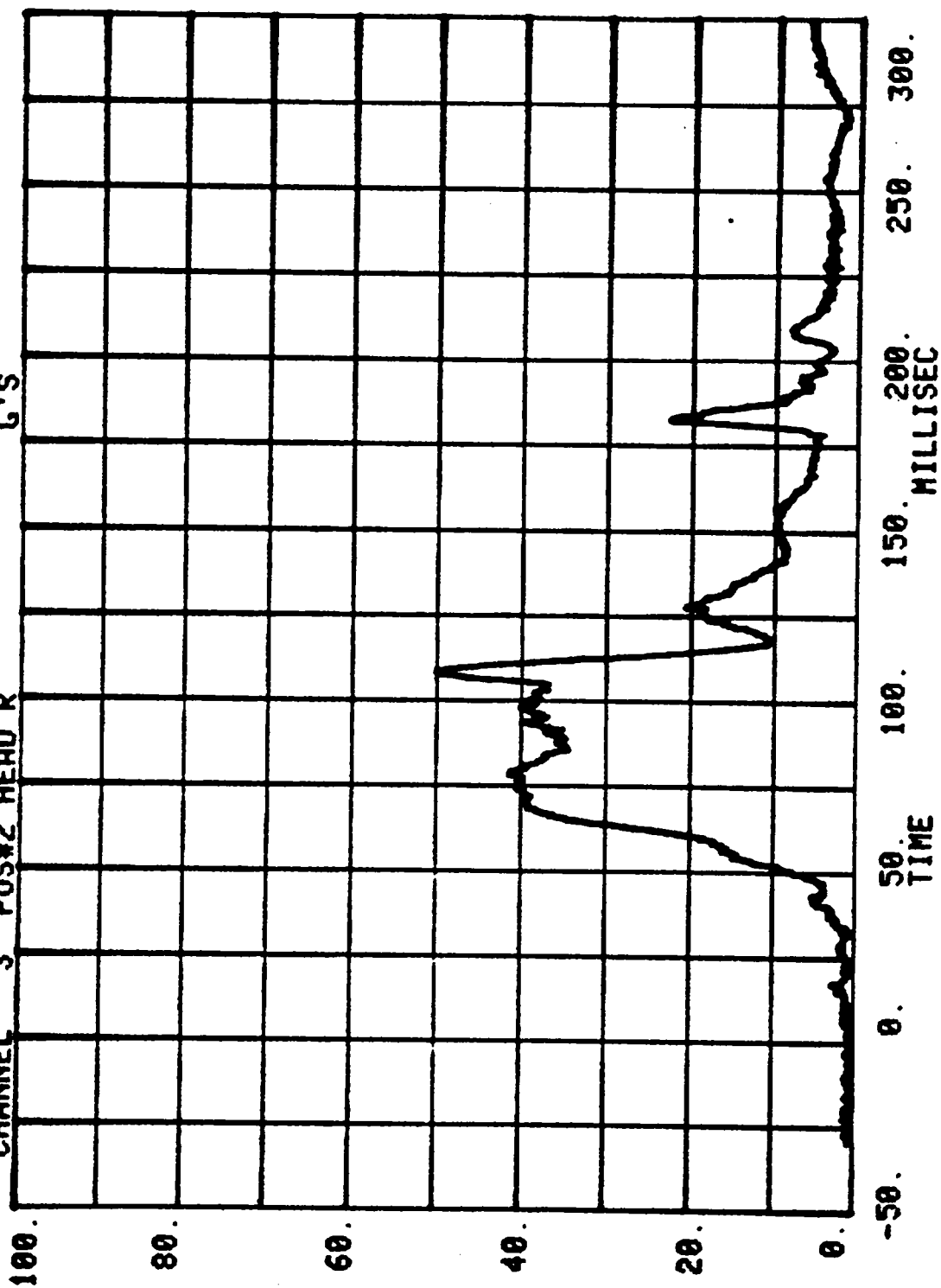


CHANNEL 14 POS#2 HEAD Y RUN= 780 SERIES= 5302 G'S

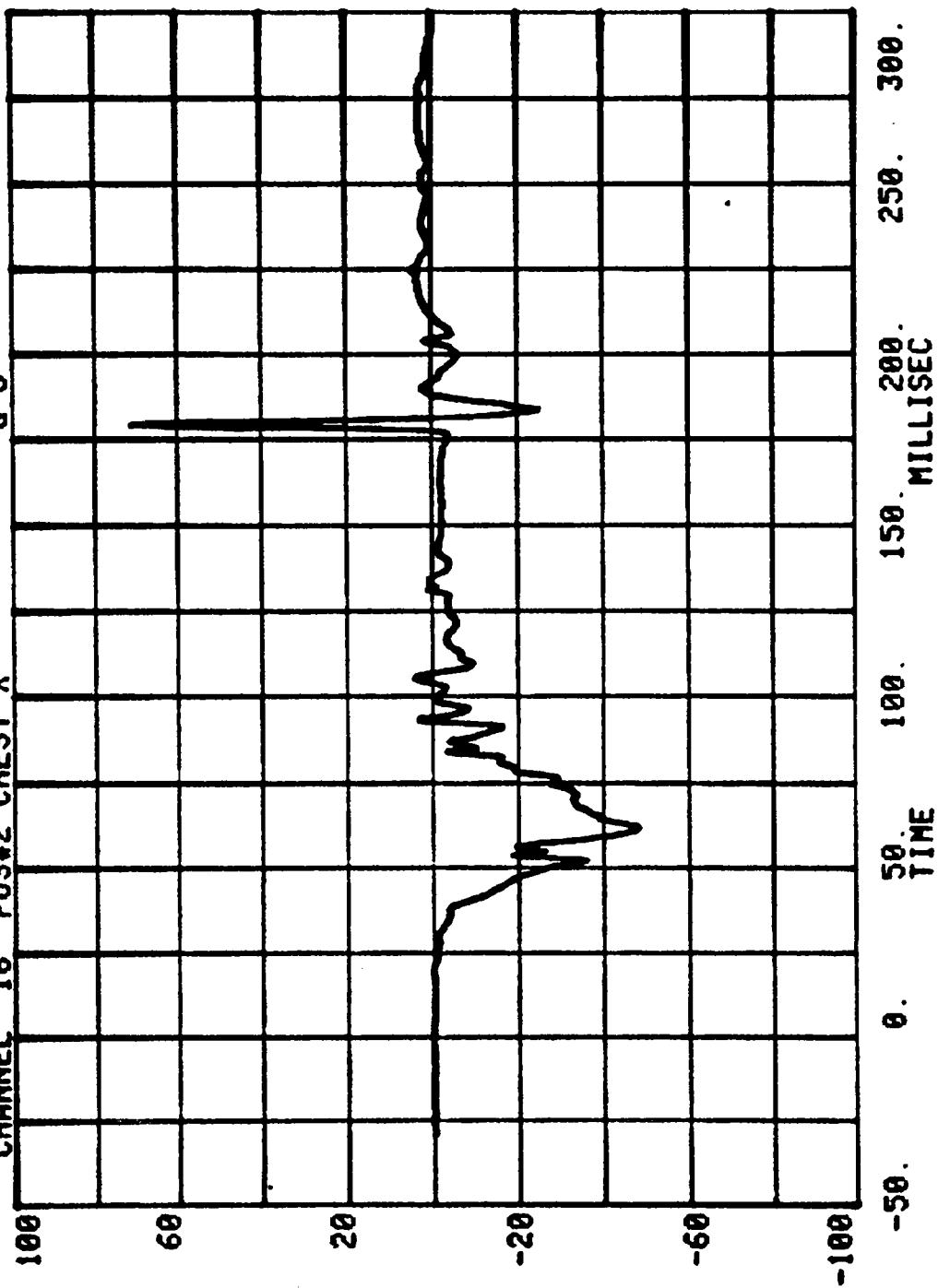




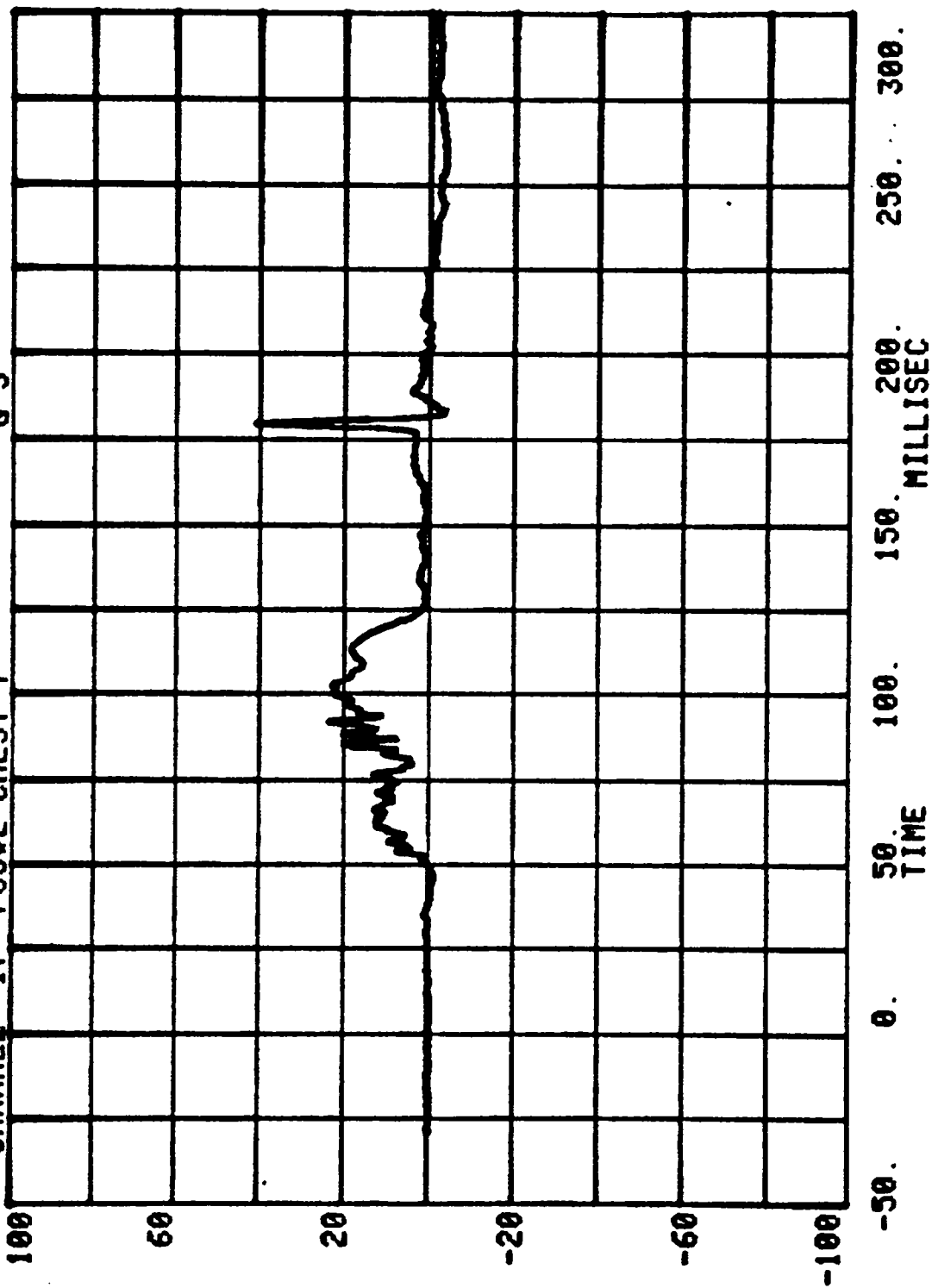
CHANNEL 3 RUN= 780 SERIES= 5302
POS#2 HEAD R G'S



CHANNEL 16 POS#2 CHEST X
RUN= 780 SERIES= 5302 G'S



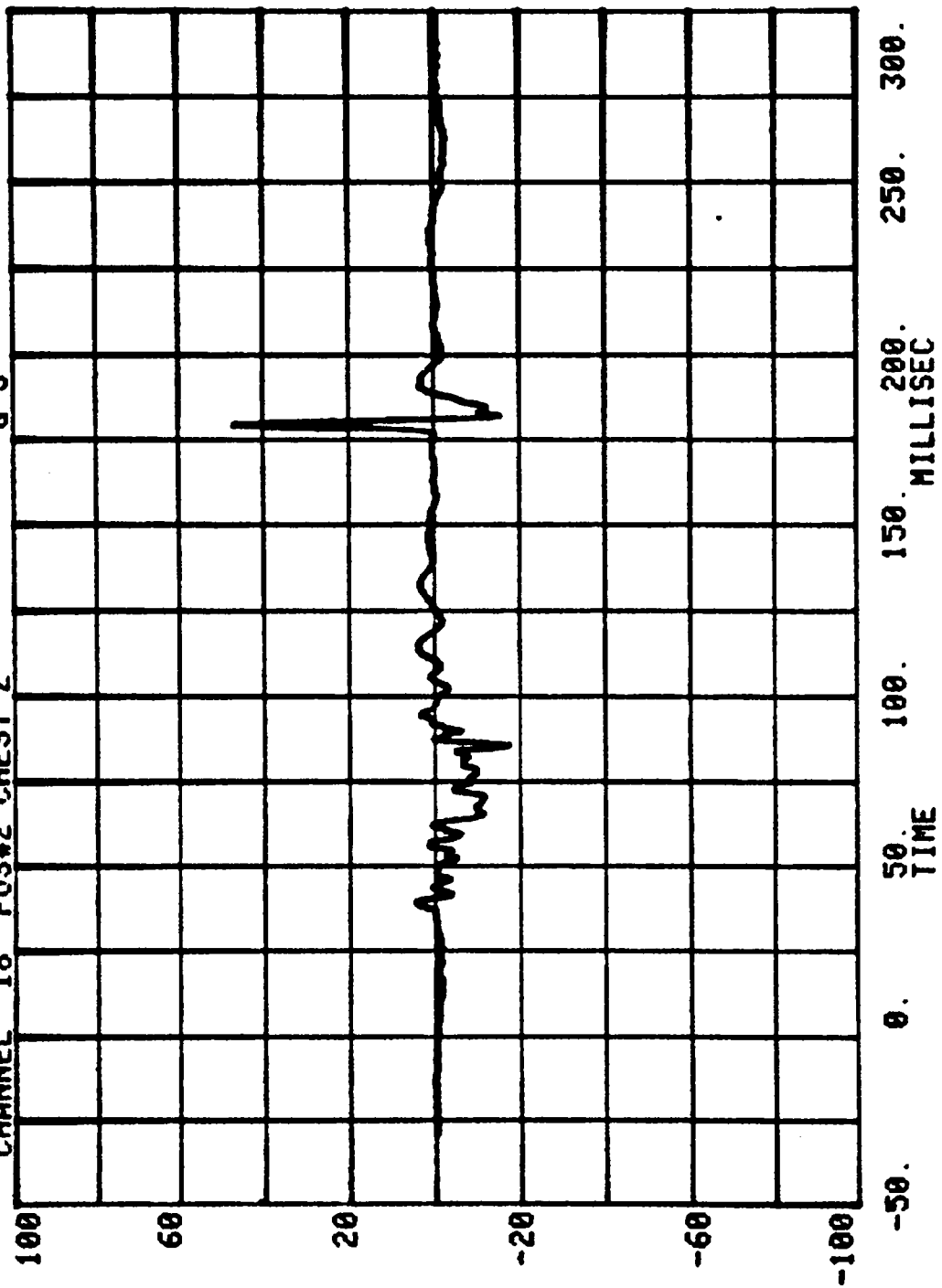
CHANNEL 17 POS#2 CHEST Y
RUN= 780 SERIES= 5302 G'S



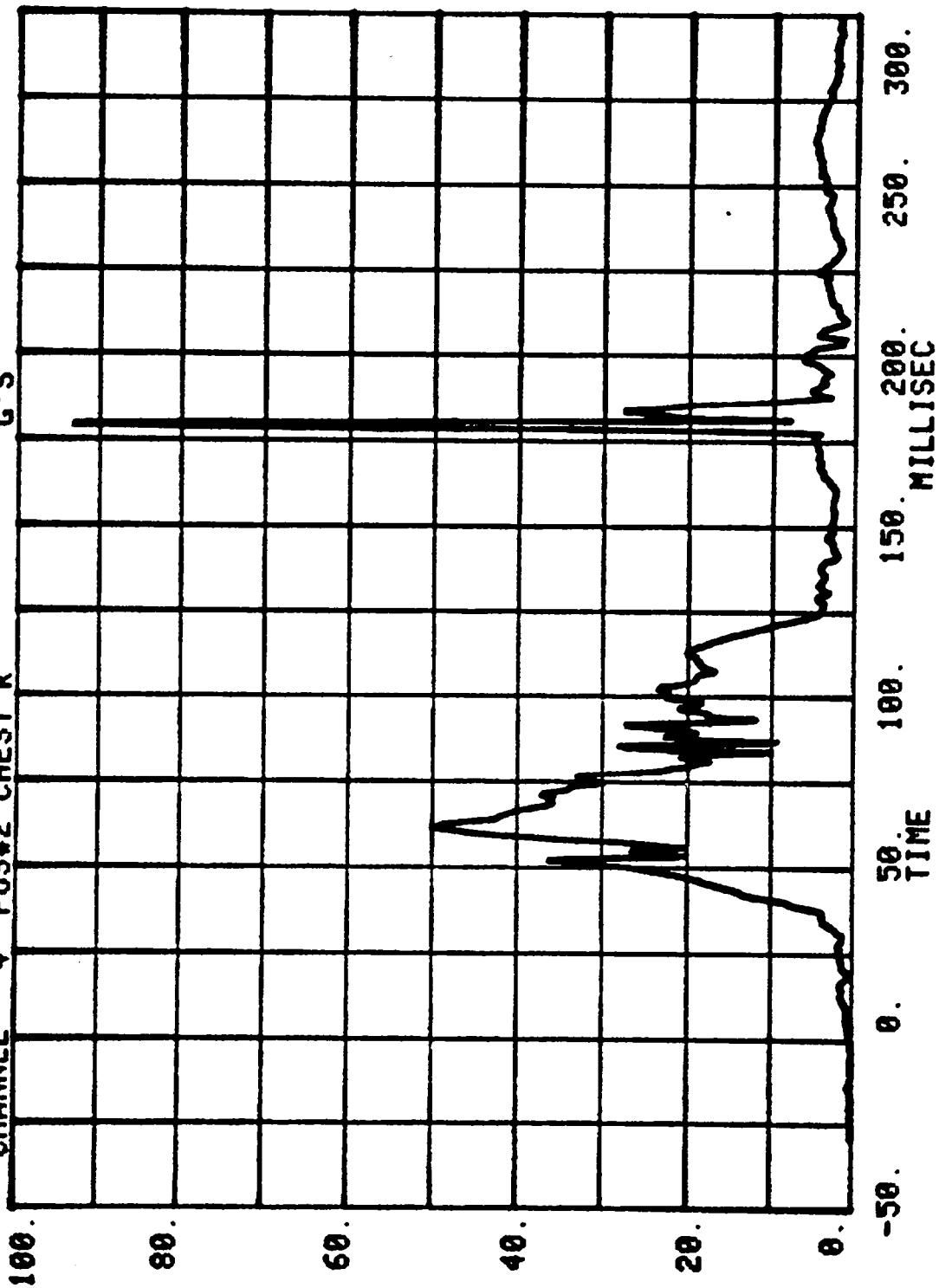
CHANNEL 18 POS#2 CHEST Z G'S

RUN= 780

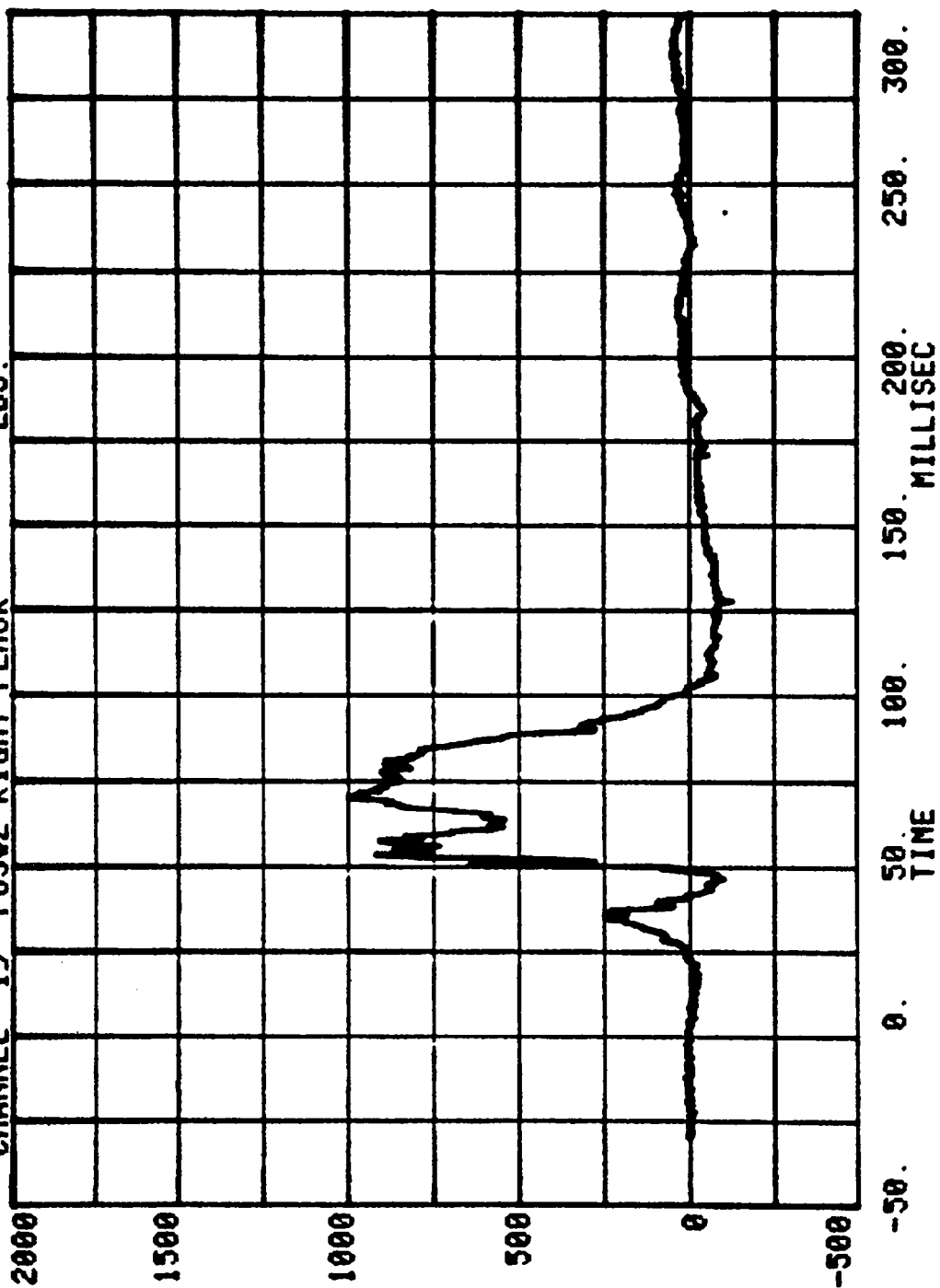
SERIES= 5302

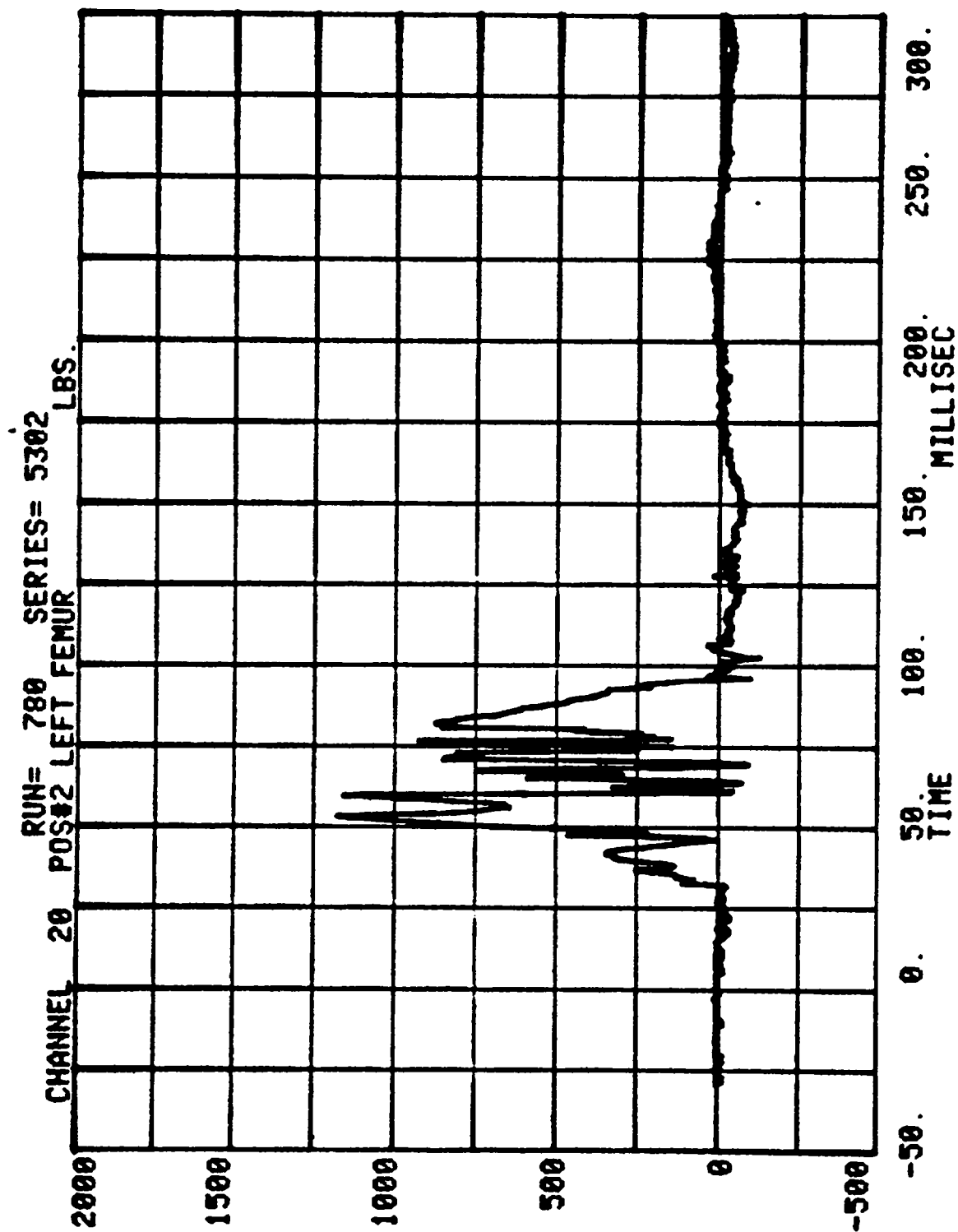


CHANNEL 4 POS#2 CHEST R
RUN= 780 SERIES= 5302 G'S



CHANNEL 19 POS#2 RIGHT FEMUR
RUN= 780 SERIES= 5302 LBS.





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 the Appendix.

Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
1019	5/18/87
1022	5/18/87

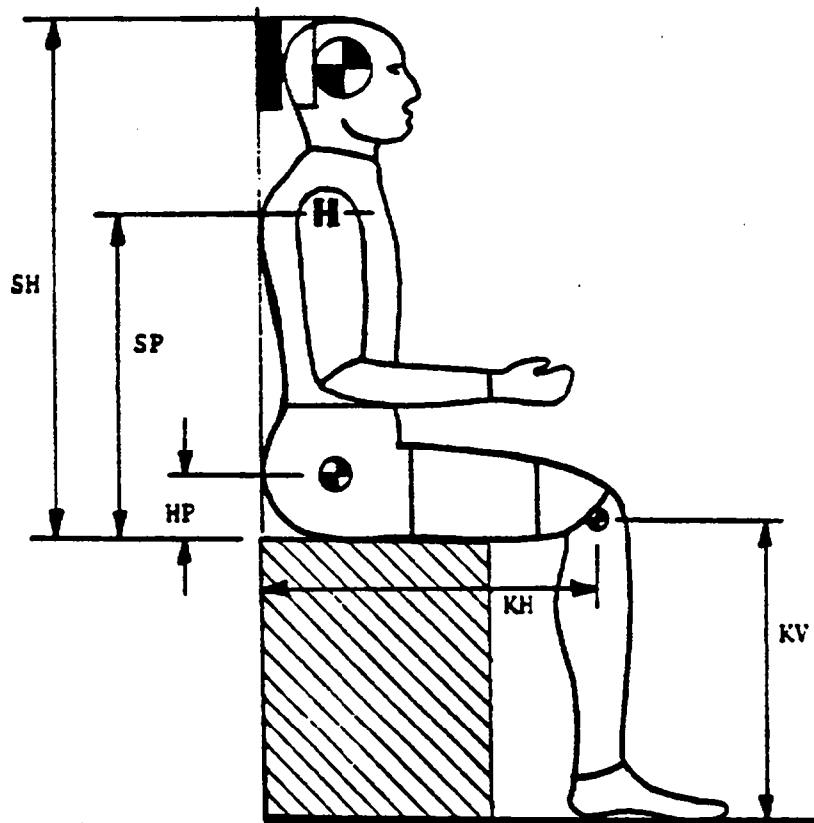
Electronic Test Equipment

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.

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1019

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		5/18/87	
VERIFICATION NUMBER FOR DUMMY*		3	
SH - Seated Height- - - - -	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height- - -	21.8 to 22.4"	22.1"	
HP - Hip Pivot Height - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.5"	
KV - Knee Pivot from floor- - -	19.3 to 19.9"	19.5"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	18.1"	
HW - Hip Width- - - - -	14.0 to 15.4"	15.1"	

TECHNICIAN'S NAME: D. W. Hess

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

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA:

NHTSA DUMMY I.D. NO.: 1019

TECHNICIAN'S NAME: D. W. Hess

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		5/18/87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		3	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		69-76 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		35-43 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	258 g	
b. Peak Lateral Accel.-	≤ - 10G	3 g	
c. Time above 100G- - -	0.9 to 1.5ms	1.08 ms	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	23.24 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - -	26G max.	24 g	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2 ms	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	27.5 ms	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	3 ms	
g. Max. Head Rotation -	63 to 73°	70°	
h. Chordal Displacement-- Head Rotation Angle-			
0°	Time- - -2 to 2 ms	0.0 ms	
	Displ.- -.5 to .5"	0.0"	
30°	Time- - 25.6 to 34.4ms	29 ms	
	Displ.- 2.1 to 3.1"	2.8"	
60°	Time- - 40.3 to 51.7ms	45 ms	
	Displ.- 4.3 to 5.3"	5.2"	
Maximum (70 °)	Time- - 53.2 to 66.8ms	58.5 ms	
	Displ.- 5.0 to 6.0"	5.8"	

*beginning with "1" at the start of each fiscal year's crash test program

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

11. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1019

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER		SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. <u>NECK BENDING TEST</u>....				
<u>Continued:</u>				
h. Chordal Displacement:				
Head Rotation Angle				
60°	Time	67.0 to 83.0 ms	74.5 ms	
	Displ.	4.3 to 5.3 in.	5.0"	
30°	Time	85.4 to 104.6 ms	93 ms	
	Displ.	2.1 to 3.1 in.	2.3"	
0°	Time	101.0 to 123.0 ms	108 ms	
	Displ.	-.5 to 0.5 in.	0.0"	
3. <u>ABDOMINAL COMPRESSION TEST:</u>				
(Preload = 10 pounds)				
a. Force @ .5" - - - - -		23 to 36 lbs.	25 lbs.	
b. Force @ .75" - - - - -		36 to 50 lbs.	37 lbs.	
c. Force @ 1.0" - - - - -		50 to 63 lbs.	55 lbs.	
d. Force @ 1.5" - - - - -		73 to 88 lbs.	88 lbs.	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20° - - - - -		22 to 34 lbs.	33 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	44 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	56 lbs.	
d. Return Angle - - - - -		12° maximum	7°	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed- - -		21.78-22.22 fps	22.06 fps	
(2) Peak Deflection- -		1.7" maximum	1.48"	
(3) Peak Resistive Force- - - - -		2250 lbs. maximum	2132 lbs.	
(4) Internal Hysteresis - - -		50 to 70%	54.3%	
b. Low Speed				
(1) Probe Speed- - -		13.86-14.14 fps	13.96 fps	
(2) Peak Deflection- -		1.1" maximum	.95"	
(3) Peak Resistive Force- - - - -		1450 lbs. maximum	1222 lbs.	
(4) Internal Hyster. -		50 to 70%	58.7%	

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1019

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER	SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
6. KNEE IMPACT TESTS:			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.90 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2200 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.76"	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.03 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2350 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.84"	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1019

CALIB. SEQ. NOS. FOR DUMMY: 3

A. DUMMY INSTRUMENTS:

1. Head Accelerometers --

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

2. Chest Accelerometers -- (Vehicle Crash Test Usage)

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

3. Chest Potentiometer - - -

4. Femur Load Cells --

a. Right Side - - - - -

b. Left Side - - - - -

B. CALIB. LAB. INSTRUMENTS:

1. Pendulum Accelerometer - - -

2. Test Probe Accelerometer - - -

3. Lumbar Flexion Test Push Force Gauge - - - - -

4. Abdominal Compression Test Force Gauge - - - - -

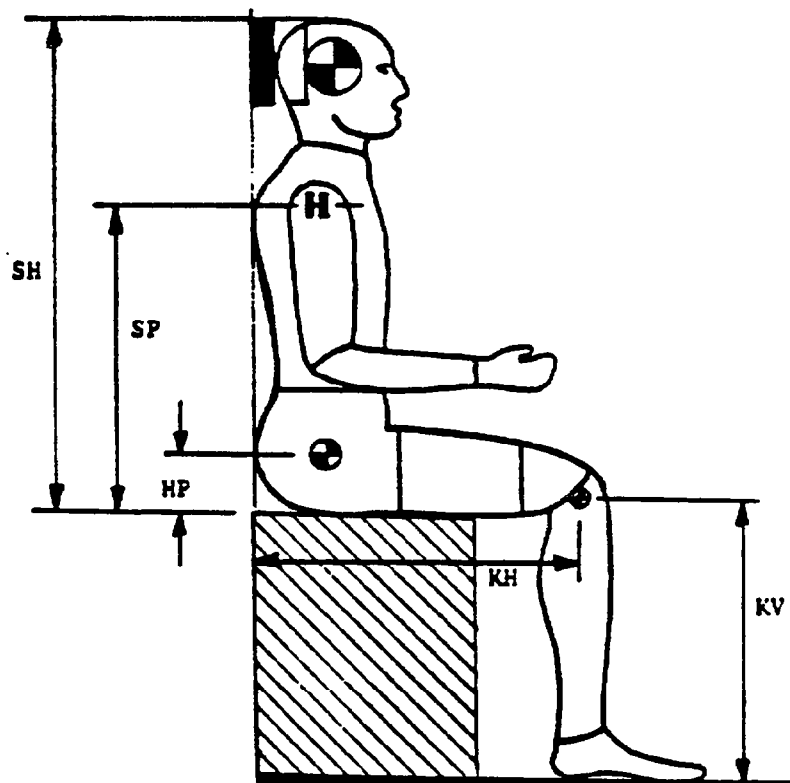
5. Abdominal Compression Test Displacement Gauge - - - - -

<u>MANUFACTURER</u>	<u>SERIAL NUMBER</u>	<u>DATE LAST CALIBRATED</u>	<u>DATE OF NEXT CALIBRATION</u>
NA	-----	-----	-----
Endevco	CL60	2-87	8-87
"	CG34	2-87	8-87
"	CN24	2-87	8-87
NA	-----	-----	-----
CEC	A129	2-87	8-87
Endevco	CN64	2-87	8-87
CEC	A56	2-87	8-87
NA	-----	-----	-----
GSE	311	2-87	8-87
GSE	312	2-87	8-87
CED	18259	2-87	8-87
CED	17815	2-87	8-87
Transducer Inc.	20051	2-87	8-87
BLH	72952	2-87	8-87
CIC	567-11	2-87	8-87

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1022

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		5-18-87	
VERIFICATION NUMBER FOR DUMMY*		3	
SH - Seated Height- - - - -	35.6 to 35.8"	35.7"	
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"	19.6"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	18.1"	
HW - Hip Width- - - - -	14.0 to 15.4"	14.8"	

TECHNICIAN'S NAME: D.W. Hess

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

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA:

NHTSA DUMMY I.D. NO.: 1022

TECHNICIAN'S NAME: D.W. Hess

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		5-18-87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		3	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		70-77 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		37-45 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	245 g	
b. Peak Lateral Accel.-	≤ - 10G	10 g	
c. Time above 100G- - -	0.9 to 1.5ms	1.04 ms	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	22.79 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	23 g	
c. Peak Resultant Head Acceleration - - - -	26G max.	23 g	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2 ms	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	26.8 ms	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	4.5 ms	
g. Max. Head Rotation - -	63 to 73°	70°	
h. Chordal Displacement-- Head Rotation Angle-			
0°	Time- - -2 to 2 ms	0 ms	
	Displ.- -.5 to .5"	0.0"	
30°	Time- - 25.6 to 34.4ms	29 ms	
	Displ.- 2.1 to 3.1"	2.6"	
60°	Time- - 40.3 to 51.7ms	44 ms	
	Displ.- 4.3 to 5.3"	4.9"	
Maximum (70 °)	Time- - 53.2 to 66.8ms	60 ms	
	Displ.- 5.0 to 6.0"	5.7"	

*beginning with "1" at the start of each fiscal year's crash test program

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1022

TECHNICIAN'S NAME: D.W. Hess

TEST PARAMETER		SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. NECK BENDING TEST.... <u>Continued:</u>				
h. Chordal Displacement:				
Head Rotation Angle--				
60°	Time	67.0 to 83.0 ms	76 ms	
	Displ.	4.3 to 5.3 in.	4.7"	
30°	Time	85.4 to 104.6 ms	93 ms	
	Displ.	2.1 to 3.1 in.	2.1"	
0°	Time	101.0 to 123.0 ms	107 ms	
	Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5" - - - -		23 to 36 lbs.	29.5 lbs.	
b. Force @ .75" - - - -		36 to 50 lbs.	40.5 lbs.	
c. Force @ 1.0" - - - -		50 to 63 lbs.	55 lbs.	
d. Force @ 1.5" - - - -		73 to 88 lbs.	76 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - -		22 to 34 lbs.	33 lbs.	
b. Force @ 30° - - - -		34 to 46 lbs.	45 lbs.	
c. Force @ 40° - - - -		46 to 58 lbs.	53 lbs.	
d. Return Angle - - - -		12° maximum	6°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - - -		21.78-22.22 fps	21.80 fps	
(2) Peak Deflection- - -		1.7" maximum	1.62"	
(3) Peak Resistive Force- - - - -		2250 lbs. maximum	2000 lbs.	
(4) Internal Hysteresis - - -		50 to 70%	60.9%	
b. Low Speed				
(1) Probe Speed- - - -		13.86-14.14 fps	13.87 fps	
(2) Peak Deflection- - -		1.1" maximum	1.08"	
(3) Peak Resistive Force- - - - -		1450 lbs. maximum	1196 lbs.	
(4) Internal Hyster. - - -		50 to 70%	60.7%	

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA (Continued)

MHTSA DUMMY I.D. NO.: 1022

TECHNICIAN'S NAME: D.W. Hess

TEST PARAMETER	SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
6. KNEE IMPACT TESTS:			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.98 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2350 lbs.	
(3) Time Above 1000g--	1.7 ms minimum	1.76 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.01 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2280 lbs.	
(3) Time Above 1000g--	1.7 ms minimum	1.84 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1022 CALIB. SEQ. NOS. FOR DUMMY: 3

A. DUMMY INSTRUMENTS:

1. Head Accelerometers --

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

2. Chest Accelerometers -- (Vehicle Crash Test Usage)

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

3. Chest Potentiometer - - -

4. Femur Load Cells --

a. Right Side - - - - -

b. Left Side - - - - -

B. CALIB. LAB. INSTRUMENTS:

1. Pendulum Accelerometer - - -

2. Test Probe Accelerometer - - -

3. Lumbar Flexion Test Push
Force Gauge - - - - -

4. Abdominal Compression Test
Force Gauge - - - - -

5. Abdominal Compression Test
Displacement Gauge - - - - -

MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
NA	-----	-----	-----
Endevco	DB47	2-87	8-87
"	CX05	2-87	8-87
"	CJ54	2-87	8-87
NA	-----	-----	-----
CEC	A115	2-87	8-87
Endevco	CS09	2-87	8-87
CEC	A29	2-87	8-87
NA	-----	-----	-----
GSE	75	2-87	8-87
GSE	74	2-87	8-87
CED	18259	2-87	8-87
CED	17815	2-87	8-87
Transducer Inc.	20051	2-87	8-87
BLH	72952	2-87	8-87
CIC	567-11	2-87	8-87