

DOT 1015

REPORT NO. CAL-87-N09

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST
MAZDA MOTOR CORPORATION
1987 MAZDA 626
4 DOOR SEDAN

NHTSA NO. MH5400
CALSPAN TEST NO. 7556-9

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FINAL REPORT

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16. Abstract A frontal load cell barrier test of a 1987 Mazda 626 4-door Sedan was performed at the Calspan Corporation, Advanced Technology Center crash test facility in Buffalo, New York on April 22, 1987. Impact speed was 35.0 mph and the ambient temperature at the barrier face at the time of impact was 42°F. The maximum post-test vehicle crush was 25.2 inches. The 1987 Mazda 626 4-Door Sedan was equipped with a passive shoulder belt and manual lap belt. The shoulder belt and lap belt were both used on each occupant in the test. With regard to FMVSS No. 208 "Occupant Crash Protection", injury criteria, the driver and passenger dummies appeared to satisfy the head, chest and femur requirements.					
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND TEST PROCEDURE	1-1
2	SUMMARY OF FRONTAL BARRIER IMPACT TEST	2-1
3	OCCUPANT AND VEHICLE INFORMATION	3-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE, LOAD CELL BARRIER DATA AND DUMMY RESPONSE DATA	B-1
APPENDIX C	DUMMY CONFIGURATION TESTS	C-1
APPENDIX D	VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM MANUAL	D-1

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	Part 572 Dummy In-Vehicle Position	3-3
2	Occupant Clearance Dimensions	3-4
3	Seat Belt Positioning Data	3-5
4	Driver Dummy to Steering Column/Wheel Dimensions	3-7
5	Camera Positions for Frontal Impacts	3-8
6	Vehicle Target Locations	3-10
7	Load Cell Locations on Fixed Barrier	3-11
8	Vehicle Accelerometer Locations	3-12
9	Test Vehicle Measurements	3-13

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	General Test and Vehicle Data	2-3
2	Dummy Injury Criteria Values	3-2
3	Seat Belt Performance Assessment Test Data	3-6
4	High Speed Camera Locations	3-9
5	Vehicle Measurements	3-14

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 MH 5400

A load cell barrier consisting of 36 load cells was impacted by a 1987 Mazda 626 4-Door Sedan at a velocity of 35.0 mph. The test was performed at the Calspan Corporation Advanced Technology Center on April 22, 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.

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. These ATDs had been certified prior to the test, and 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.

The driver's head struck the steering wheel hub and rim. The driver's HIC was 846. The maximum chest deceleration over 3 milliseconds was 52 g's and femur loads were 1300 and 820 pounds.

The right front passenger's HIC was 801. The maximum chest deceleration over 3 milliseconds was 46 g's and femur loads were 1255 and 1487 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1987 Mazda 626 4-Door
 NHTSA NO.: MH5400 VIN.: JM1GC22AOH1101892
 BODY COLOR: White DATE OF MANUFACTURE: 12-86
 Engine: 4 cylinders; 121.9 C.I.D.; 2.0 Liters; - CC
x Gas; - Diesel; - Turbocharged
- Longitudinal; x Transverse
 Transmission: 5 Speed x Manual; - Automatic; x Overdrive
 Final Drive: x Front Wheel; - Rear Wheel; - Four Wheel
 Date Received: 2-24-87 Odometer Reading: 23
- A/C; x P/S; x P/B; x P/wdo.; - Tilt Wheel
- P/seats; x Cruise Control
 Type of Occupant Restraint: Passive Belt System
 DATA RECORDED FROM VEHICLE'S TIRE PLACARD:
 Tire Pressure (at capacity): Front 28 psi, Rear 26 psi
 Recommended Tire Size: 165/SR14 185/70 SR14 - P195/60R15
 Recommended Cold Tire Pressure: Front 28 psi, Rear 26 psi
 Tires on Vehicle: 180/70SR14; Manufacturer: BF Goodrich
 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) = 850 lbs. (A)
 No. of Occupants x 150 lbs. = 750 lbs. (B)
 Rated Cargo and Luggage Weight (RCLW) A-B = 100 lbs.
 GVWR 3535 lbs. GAWR: Front 1960 lbs. Rear 1610 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>780</u>	lbs.	Right Rear =	<u>510</u>	lbs.
Left Front =	<u>810</u>	lbs.	Left Rear =	<u>490</u>	lbs.
TOTAL FRONT WEIGHT =	<u>1590</u>	lbs.	(<u>61.4</u> % of Total Vehicle Weight)		
TOTAL REAR WEIGHT =	<u>1000</u>	lbs.	(<u>38.6</u> % of Total Vehicle Weight)		
TOTAL DELIVERY WEIGHT =	<u>2590</u>	lbs.			

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2590 lbs.)
 VCW = Vehicle Capacity Weight (850 lbs.)
 DSC = Designated Seating Capacity (5)
 RCLW = VCW - 150 (DSC) = 100 lbs.
 Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
 Target Test Weight = 3018 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 122 POUNDS CARGO:

Right Front =	<u>840</u>	lbs.	Right Rear =	<u>660</u>	lbs.
Left Front =	<u>870</u>	lbs.	Left Rear =	<u>670</u>	lbs.
TOTAL FRONT WEIGHT =	<u>1710</u>	lbs.	(<u>56.2</u> % of Total Vehicle Weight)		
TOTAL REAR WEIGHT =	<u>1330</u>	lbs.	(<u>43.8</u> % of Total Vehicle Weight)		
TOTAL TEST WEIGHT =	<u>3040</u>	lbs.			
Weight of ballast secured in vehicle trunk area = <u>0</u> lbs.					

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude:	RF	<u>26.6</u>	LF	<u>26.5</u>	RR	<u>25.8</u>	LR	<u>25.8</u>
Test Attitude:	RF	<u>26.3</u>	LF	<u>26.4</u>	RR	<u>24.1</u>	LR	<u>24.2</u>
Wheel Base: <u>99.5</u> in.; C.G. = <u>43.6</u> in. rearward of front wheel C/L								
Remarks:	<u>14.7 gallons of solvent in fuel tank</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: 4/22/87 Time of Test: 1145
Ambient Temperature: 42 °F at impact area
Temperature in Occupant Compartment: 71 °F.
Windshield Molding Temperature: 70 °F.
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: primary = 35.0 mph, secondary = 35.0 mph
Distance From Front Bumper to Barrier Face When Entering Speed Trap: 52
inches; Exiting Speed Trap: 12.0 inches

VEHICLE REBOUND AND CRUSH (inches):

Vehicle Length:	Pre-test	= R	<u>176.0</u>	C _L	<u>178.0</u>	L	<u>176.0</u>
	Post-test	= R	<u>150.8</u>	C _L	<u>153.6</u>	L	<u>154.3</u>
	Crush	= R	<u>25.2</u>	C _L	<u>24.4</u>	L	<u>21.7</u>

Distance from front of test vehicle to point of impact:

R 21.5 C/L 20.1 L 19.7

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Steering wheel hub & rim</u>	<u>None</u>
Chest	<u>None</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>Dash Panel</u>	<u>Glove Compartment door</u>
Right Knee	<u>Dash Panel</u>	<u>Glove Compartment door</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	Operable _____	Operable _____	Operable _____	Operable _____

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

Glazing Damage

Backlight/Windshield _____ Windshield 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)	-110	30	66	115	-53	9	15	52
DUMMY (2)	-30	-14	70	71	-51	-21	-15	46
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1300	820
DUMMY (2)	1255	1487
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)	2125	-	430
DUMMY (2)	2200	384	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	36 MILLISEC MAX.		AVE. ACC. (g)
		t ₁ (SEC)	t ₂ (SEC)	t ₁ TO t ₂
DUMMY (1)	846	.07050	.10072	60.1
DUMMY (2)	801	.07455	.11055	54.8
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.: MH5400

VEHICLE: 1987 Mazda 626 4-Door Sedan

SEAT TYPE:

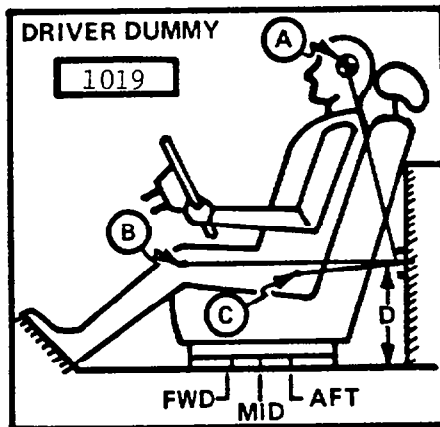
 Bench
 x Bucket
 Split Bench

ADJUSTER TYPE:

 x Manual
 Power

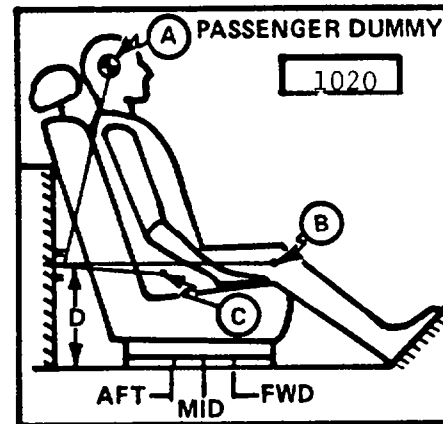
BUCKET SEAT BACK TYPE:

 Fixed
 x Adjustable Reclining



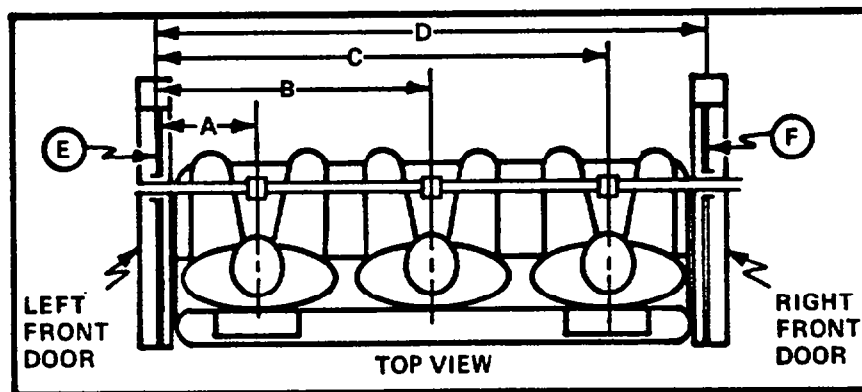
MEASUREMENT LOCATION

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



A = 24.0 in. 3 Degrees
 B = 23.2 in. 92 Degrees
 C = 8.6 in. 115 Degrees
 D = 12.4 in.

A = 24.1 in. 2 Degrees
 B = 24.4 in. 90 Degrees
 C = 9.1 in. 112 Degrees
 D = 12.4 in.



DUMMY ID

1019

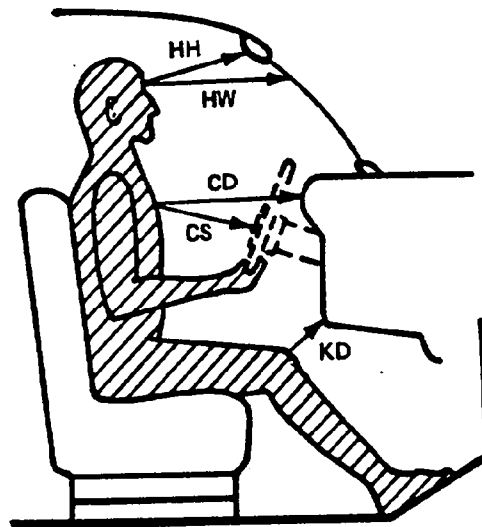
1020

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>39.0</u> in.
D	=	Left Door to Right Door	<u>50.0</u> in.
E, F	=	Window Glass Height (Right and Left Must Be Equal)	<u>12.7</u> in.

Figure 2

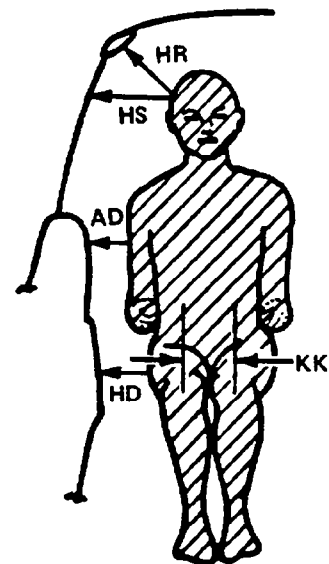
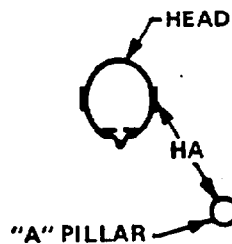
OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	13.6	12.7
HW	17.9	17.6
CD	19.3	21.1
CS	12.5	-
KDL	5.2	4.6
KDR	5.6	4.3
SA	7th notch 2nd fine	4th notch
TA	25°	25°



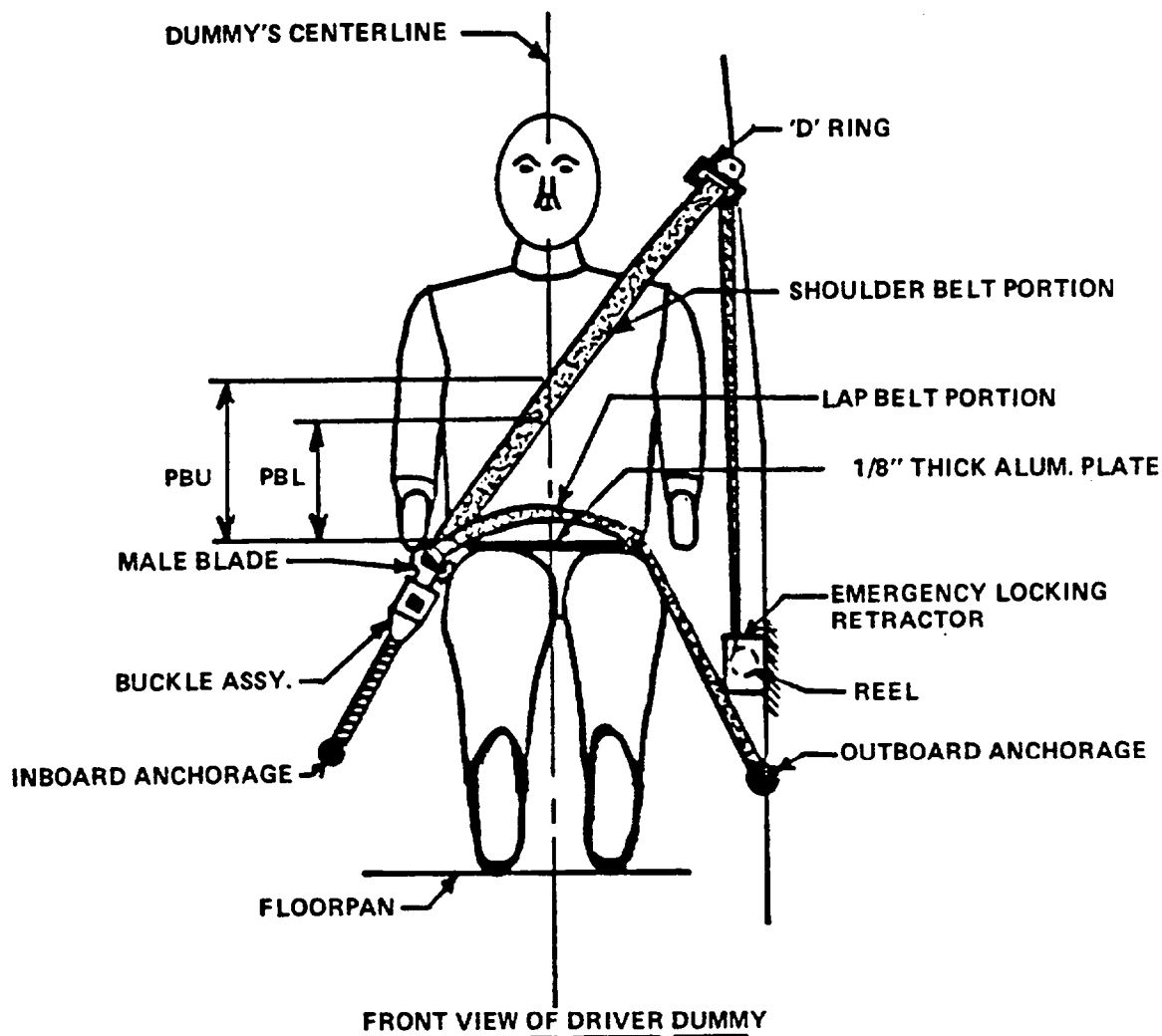
HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD(L/R) = Knee to Dash (Left/Right)
 SA = Seat Back Angle
 TA = Torso Angle

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	5.2	5.3
HS	8.1	8.0
AD	3.6	4.1
HD	4.9	4.9
KK	10.5	8.0
HA	17.8	17.6

Figure 3
SEAT BELT POSITIONING DATA



	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	15.5	15.5
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	12.5	12.5
<u>LAP BELT TENSION</u>	-	-
<u>SHOULDER BELT TENSION</u>	Passive Rest.	Passive Rest.

Table 3

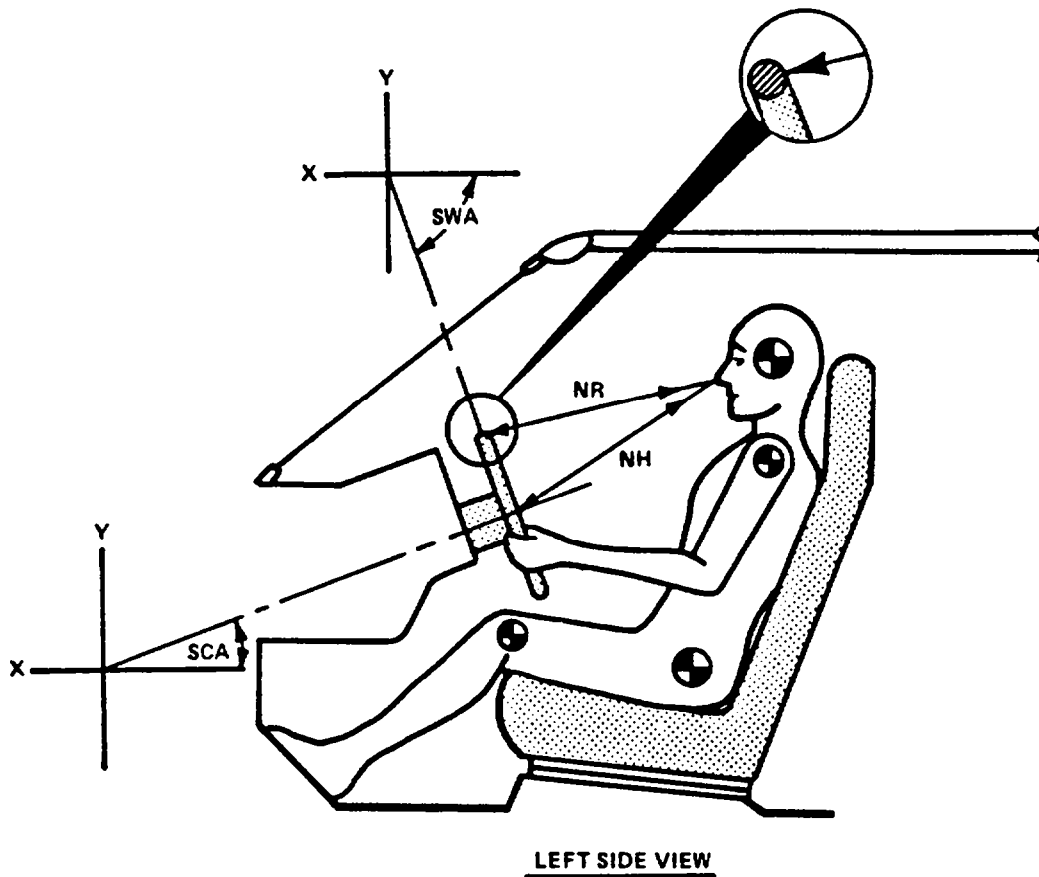
SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

<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.	Passive Belt System	Passive Belt System
Should belt length as measured on Part 572 Dummy.	41.0	40.3
Lap belt length as measured on Part 572 Dummy.	36.0	36.4
<u>BELT SPOOL-OFF DATA:</u>		
As determined by film analysis.	See Note 1	See Note 1
As determined mechanically.	—	—
As determined electronically.	2.0	1.5
<u>BELT STRETCH DATA:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	.7 in. per foot	1.0 in. per foot
Measured Mechanically	0.0	0.0

NOTE 1: Unable to read film to measure belt spool off.

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



		MEASUREMENTS	
<u>NR</u>	-- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	17.6	Inches
<u>NH</u>	-- Distance from tip of dummy's nose to center of steering column hub	18.4	Inches
<u>SCA</u>	-- Angle of steering column relative to the horizontal X axis	23	Degrees
<u>SWA</u>	-- Angle of steering wheel relative to the horizontal X axis	-67	Degrees

NOTE: Camera Information Shown on Table 4

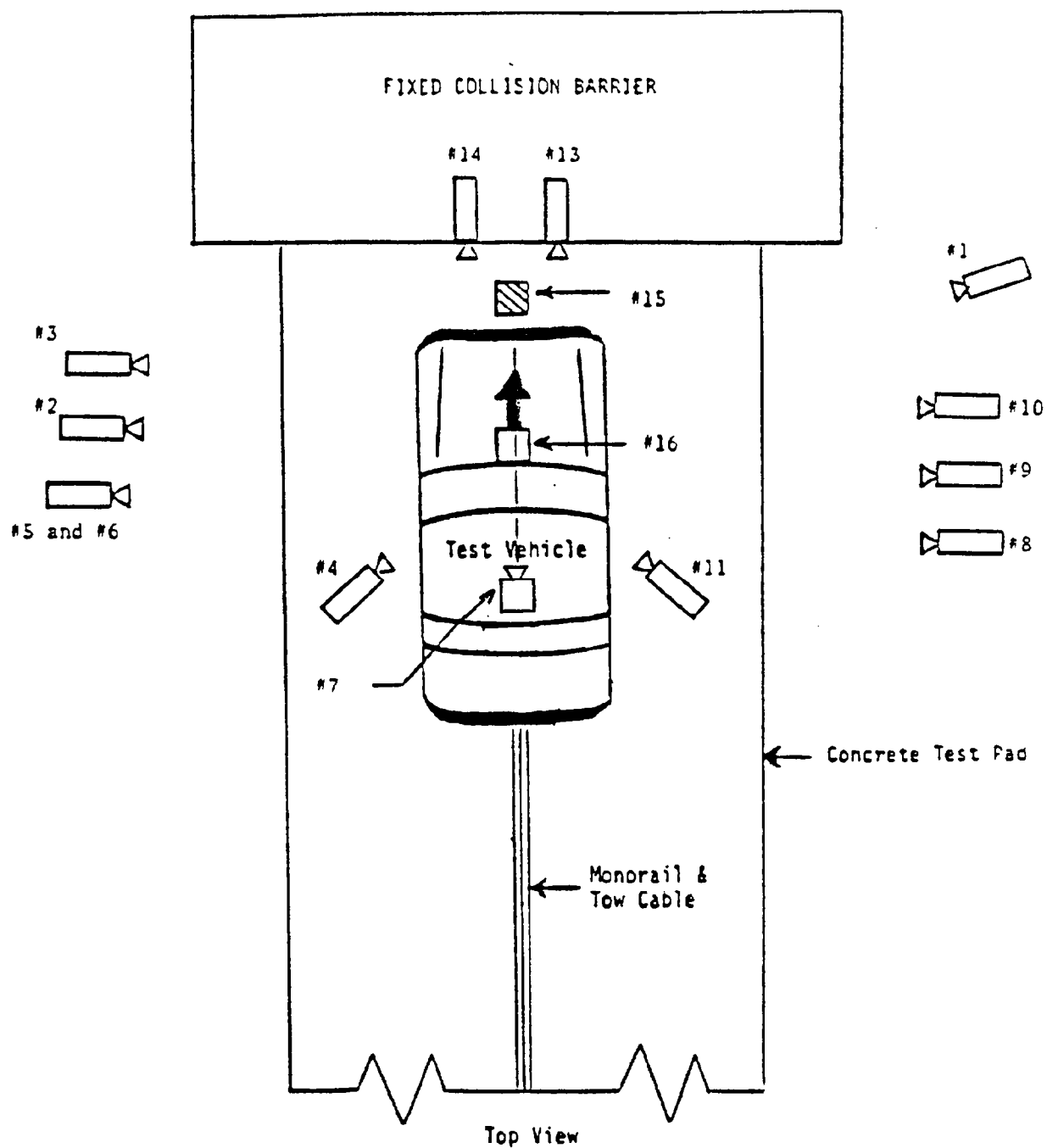


Figure 5 CAMERA POSITION FOR FRONTAL IMPACTS

Table 4
HIGH-SPEED CAMERA LOCATIONS

Test No. MH 5400

Vehicle 1987 Mazda 626 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	-16	-	13	650
5	Steering Column (Bottom)	240	78	52	-6	-	25	550
6	Steering Column (Top)	240	78	77	-13	-	25	525
7	Right and Left Belt	-	-	-	-	-	8	700
8	Overall Right Side	246	47	43	-1	-	13	800
9	Right Side View	260	70	44	-4	-	25	750
10	Right Passenger View	276	86	42	-3	-	35	725
11	Passenger & Interior View	87	101	66	-15	-	25	600
12	Right Belt	NOT USED	IN THIS	TEST				
13	Passenger Front View	24	0	72	-40	-	13	Note 1
14	Driver Front View	24	0	72	-40	-	13	590
15	Windshield View	0	0	126	-55	-	13	540
16	Pit View of Engine	0	32	-120	90	-	13	775

Note 1: No Timing

* X = film plane to monorail centerline

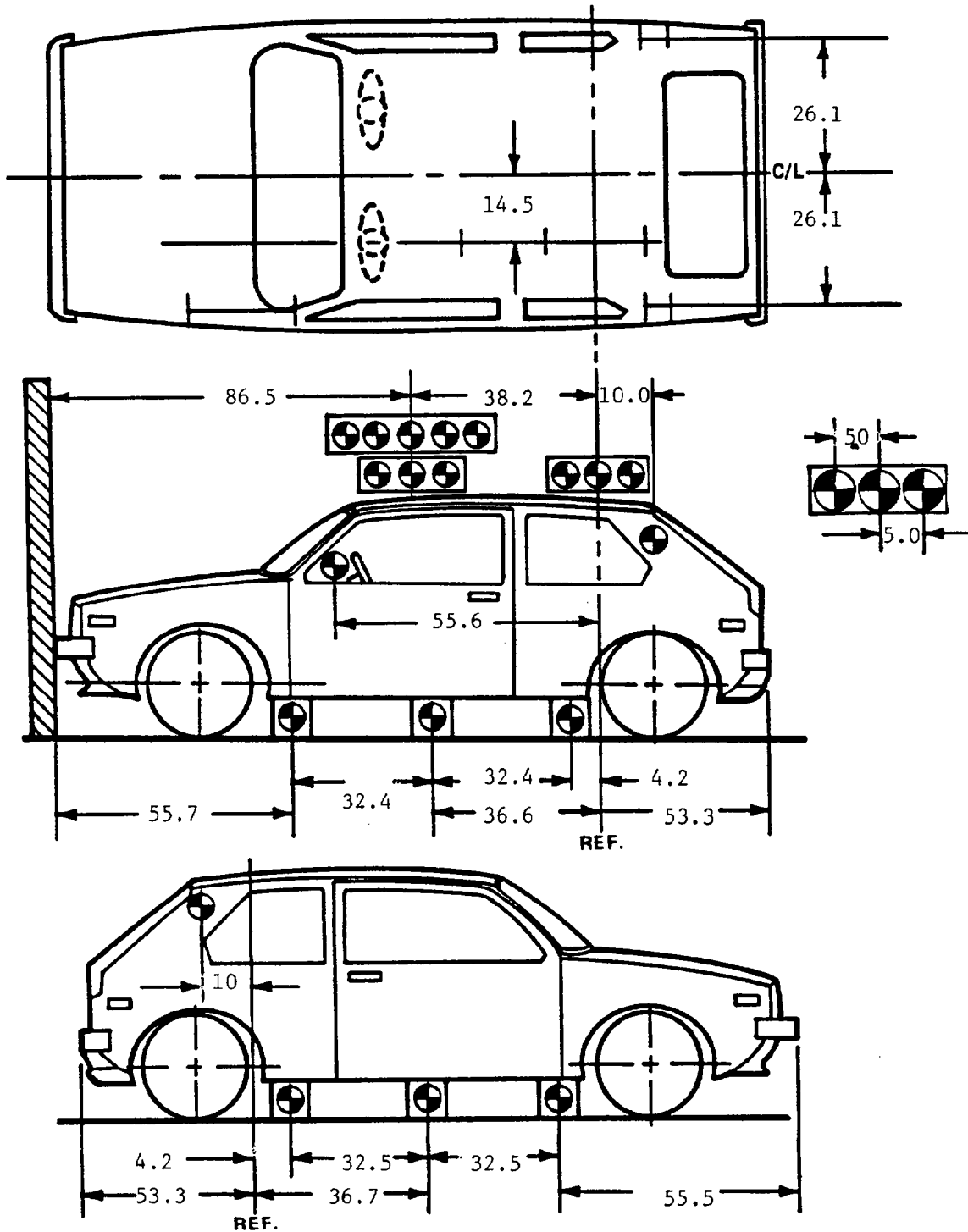
Y = film plane to impact location

Z = film plan to ground

** = referenced to horizontal plane

Figure 6

VEHICLE TARGET LOCATIONS



(DIMENSIONS IN INCHES)

Figure 7

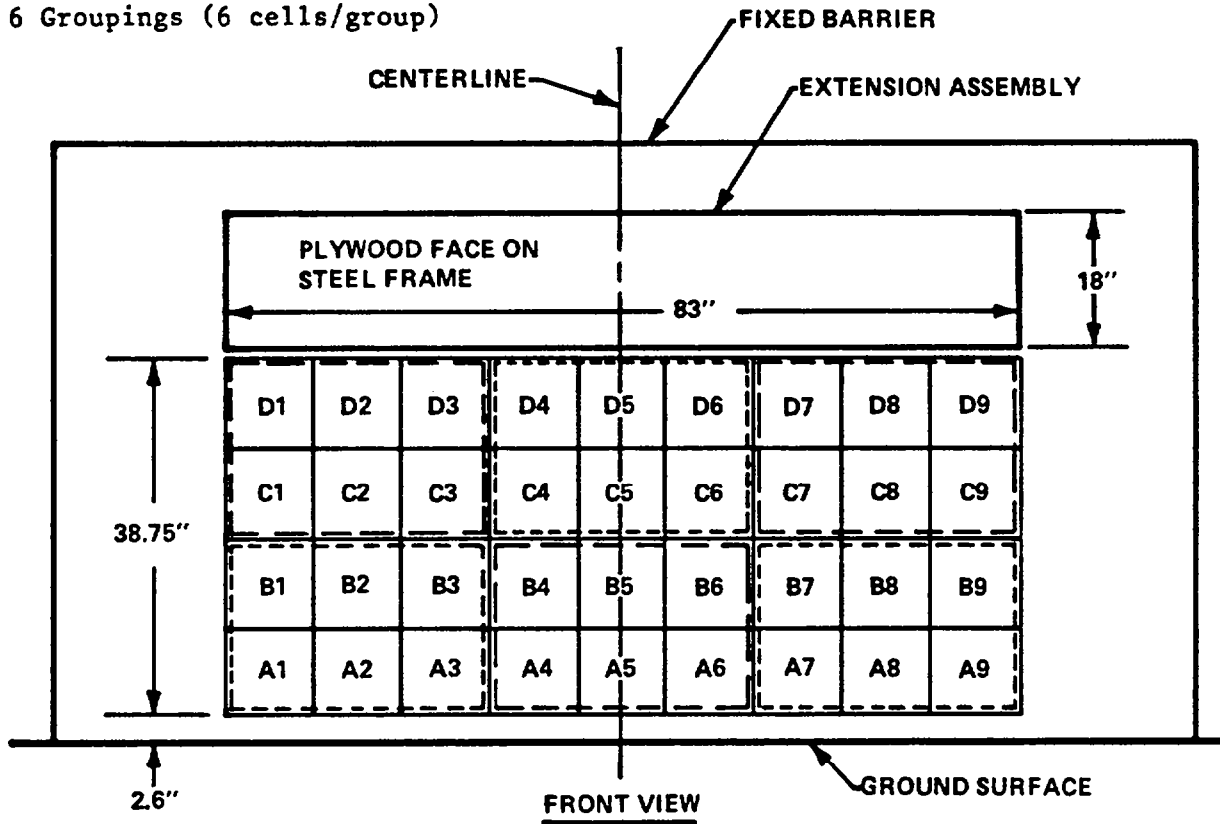
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells

4 Rows

9 Columns

6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

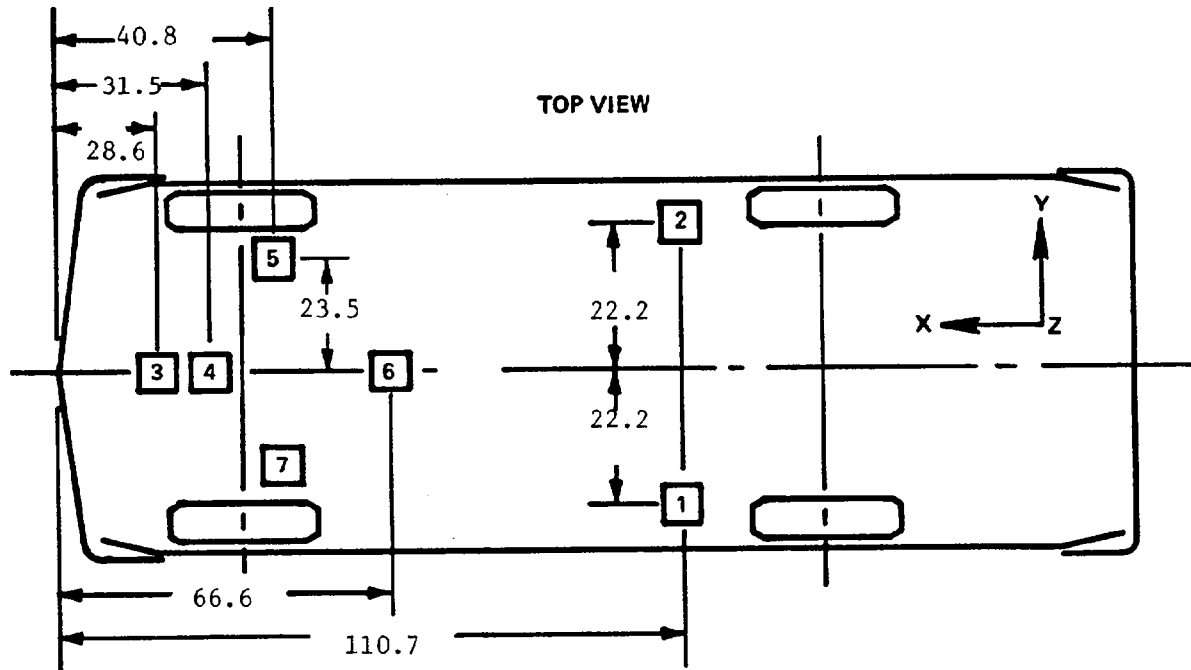
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

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

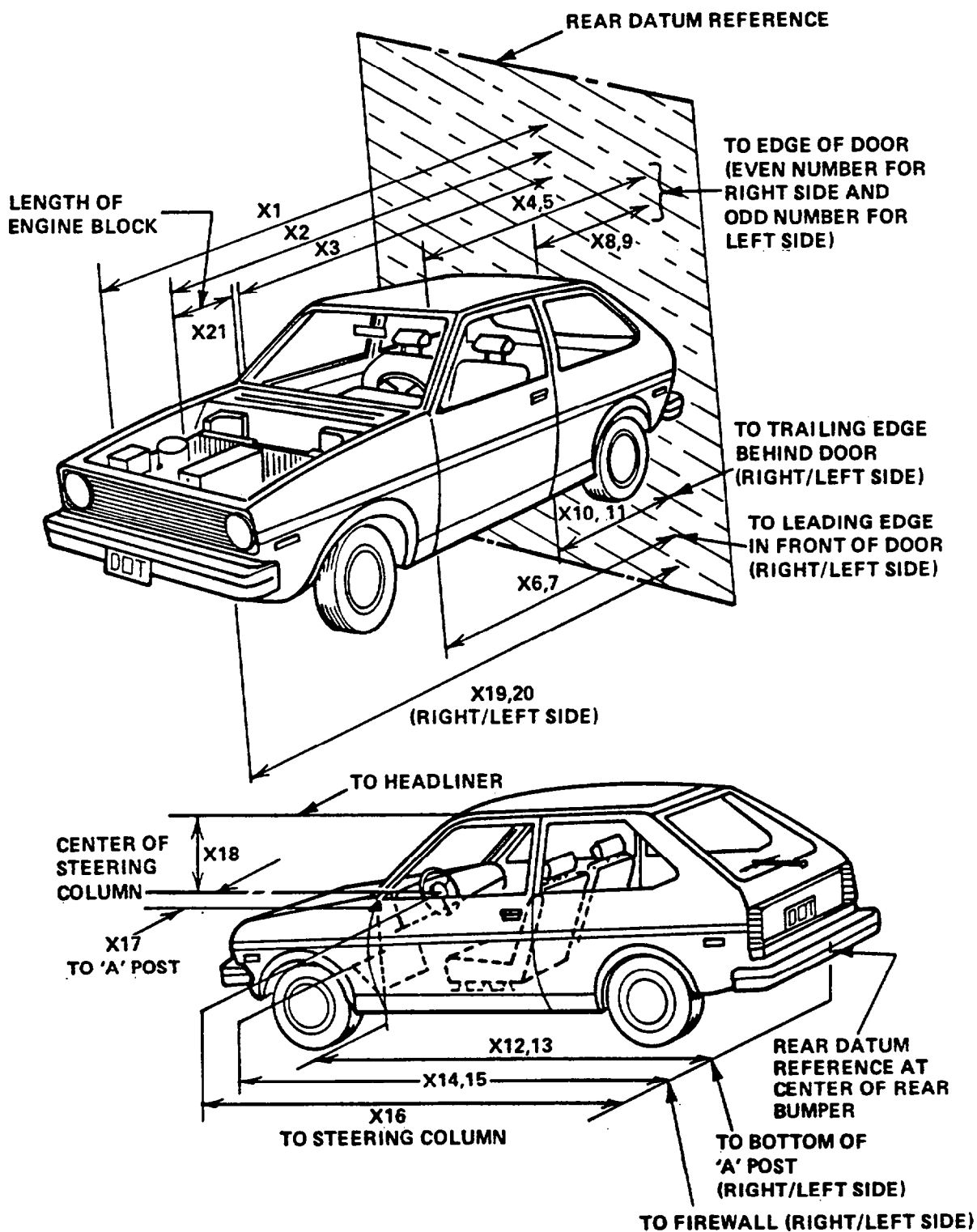


Table 5
VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	178.0	153.6	24.4
X2	Rear Surface of Vehicle to Front of Engine	151.0	142.5	8.5
X3	Rear Surface of Vehicle to Firewall	129.6	124.5	5.1
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	116.9	116.4	0.5
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	117.0	116.5	0.5
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	118.5	118.4	0.1
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	118.9	118.4	0.5
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	79.4	79.3	0.1
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	79.6	79.5	0.1
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	80.0	80.0	0.0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	80.4	80.0	0.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	118.5	118.2	0.3
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	119.0	118.9	0.1
X14	Rear Surface of Vehicle to Firewall, Right Side	127.8	122.4	5.4
X15	Rear Surface of Vehicle to Firewall, Left Side	128.8	123.5	5.3
X16	Rear Surface of Vehicle to Steering Column	102.1	101.8	0.3
X17	Center of Steering Column to "A" Post	15.9	15.5	0.4
X18	Center of Steering Column to Headliner	16.2	16.5	-0.3
X19	Rear Surface of Vehicle to Right Side of Front Bumper	176.0	150.8	25.2
X20	Rear Surface of Vehicle to Left Side of Front Bumper	176.0	154.3	21.7
X21	Length of Engine Block	16.5	16.5	0.0

Appendix A

PHOTOGRAPHS

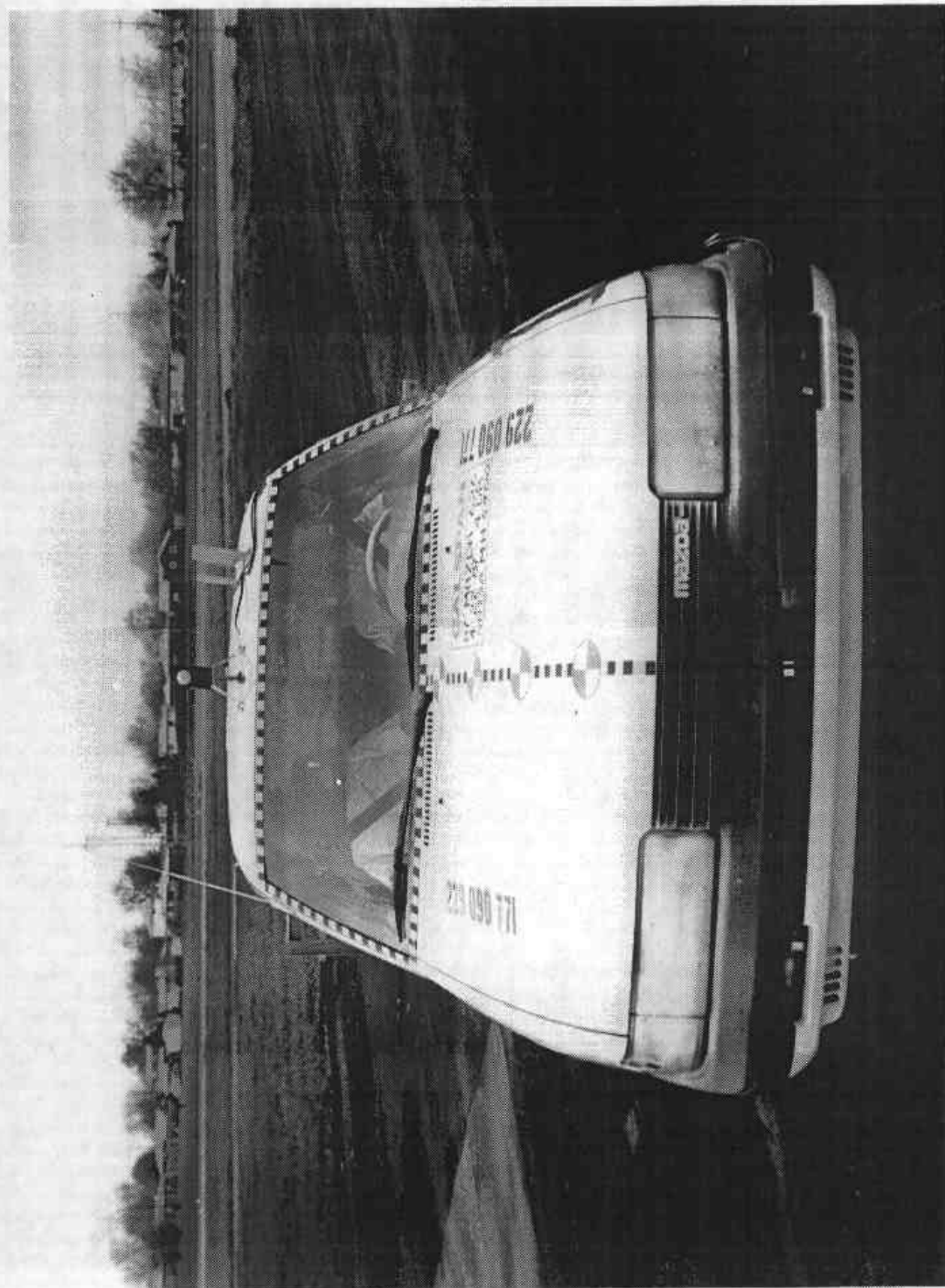


Figure A-1 PRE-TEST FRONT VIEW

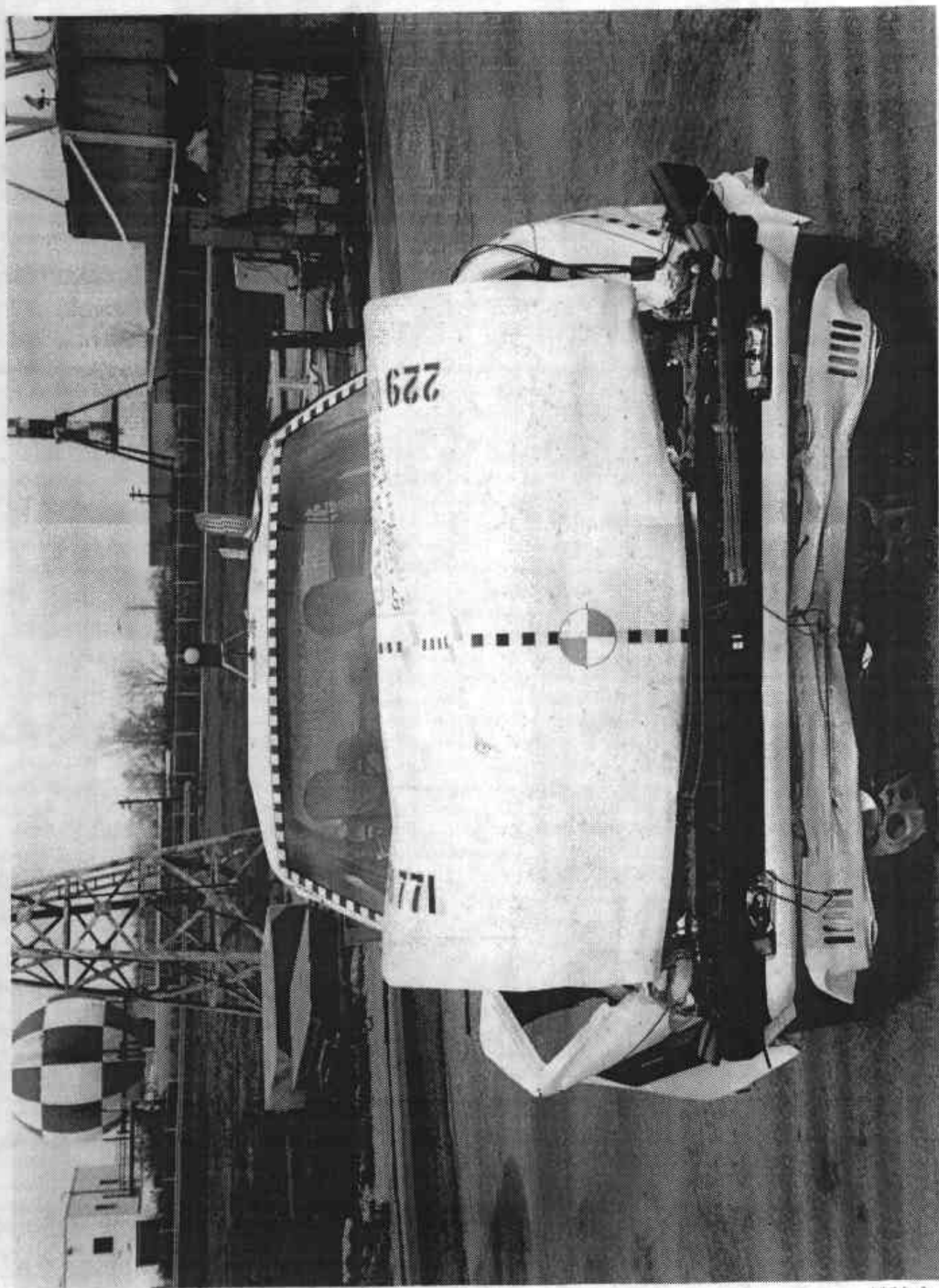


Figure A-2 POST-TEST FRONT VIEW

A-3

7556-9

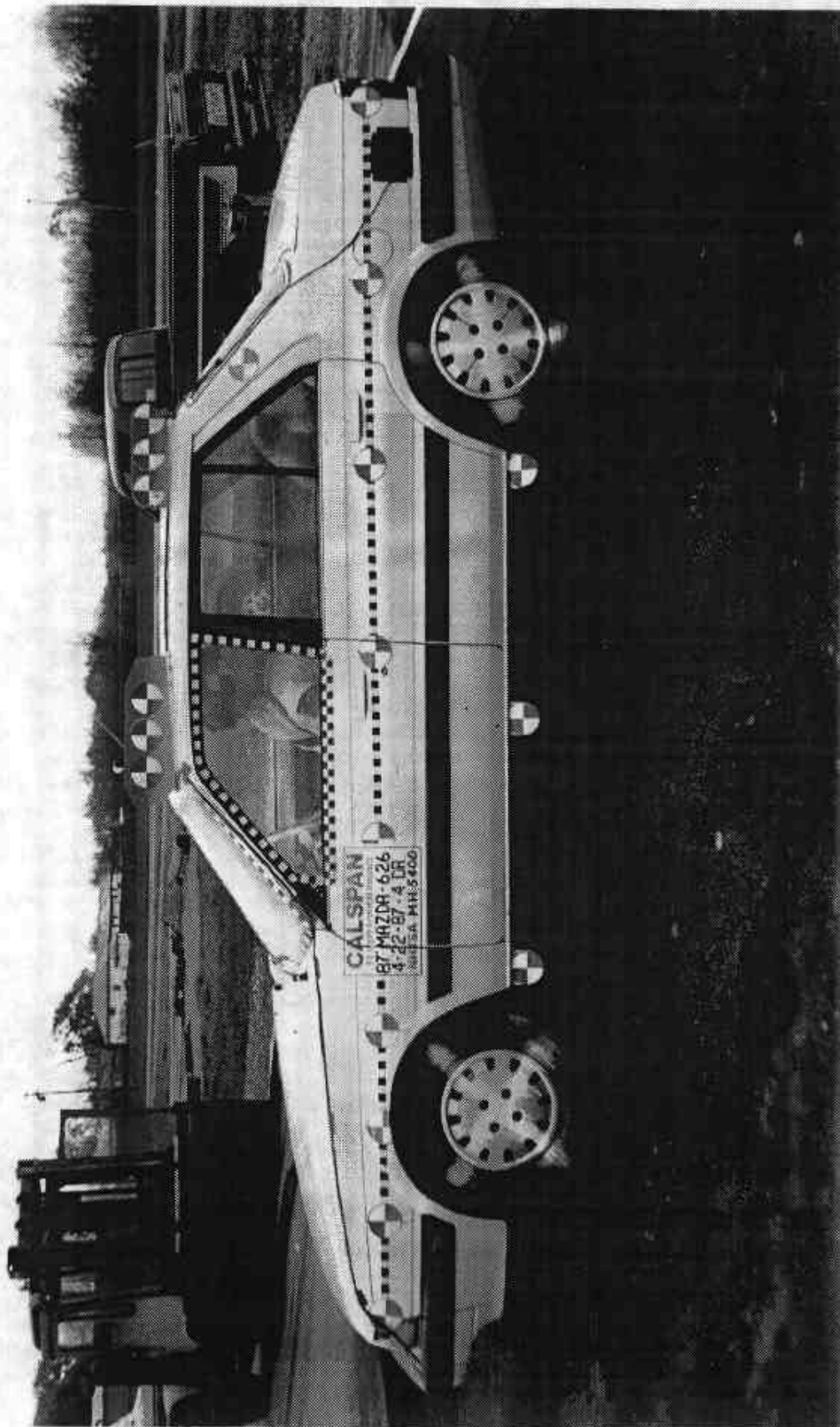


Figure A-3 PRE-TEST LEFT SIDE VIEW

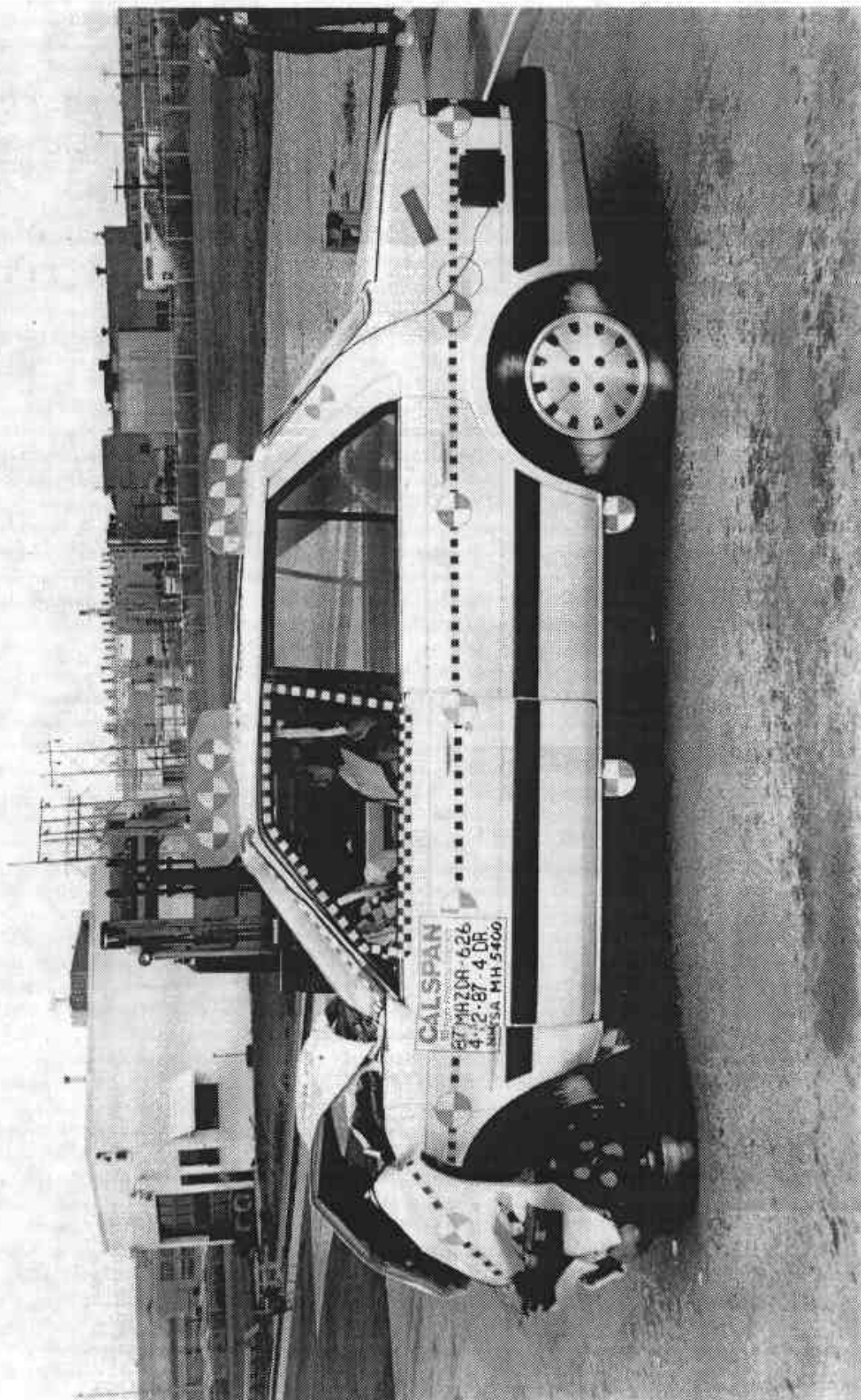


Figure A-4 POST-TEST LEFT SIDE VIEW

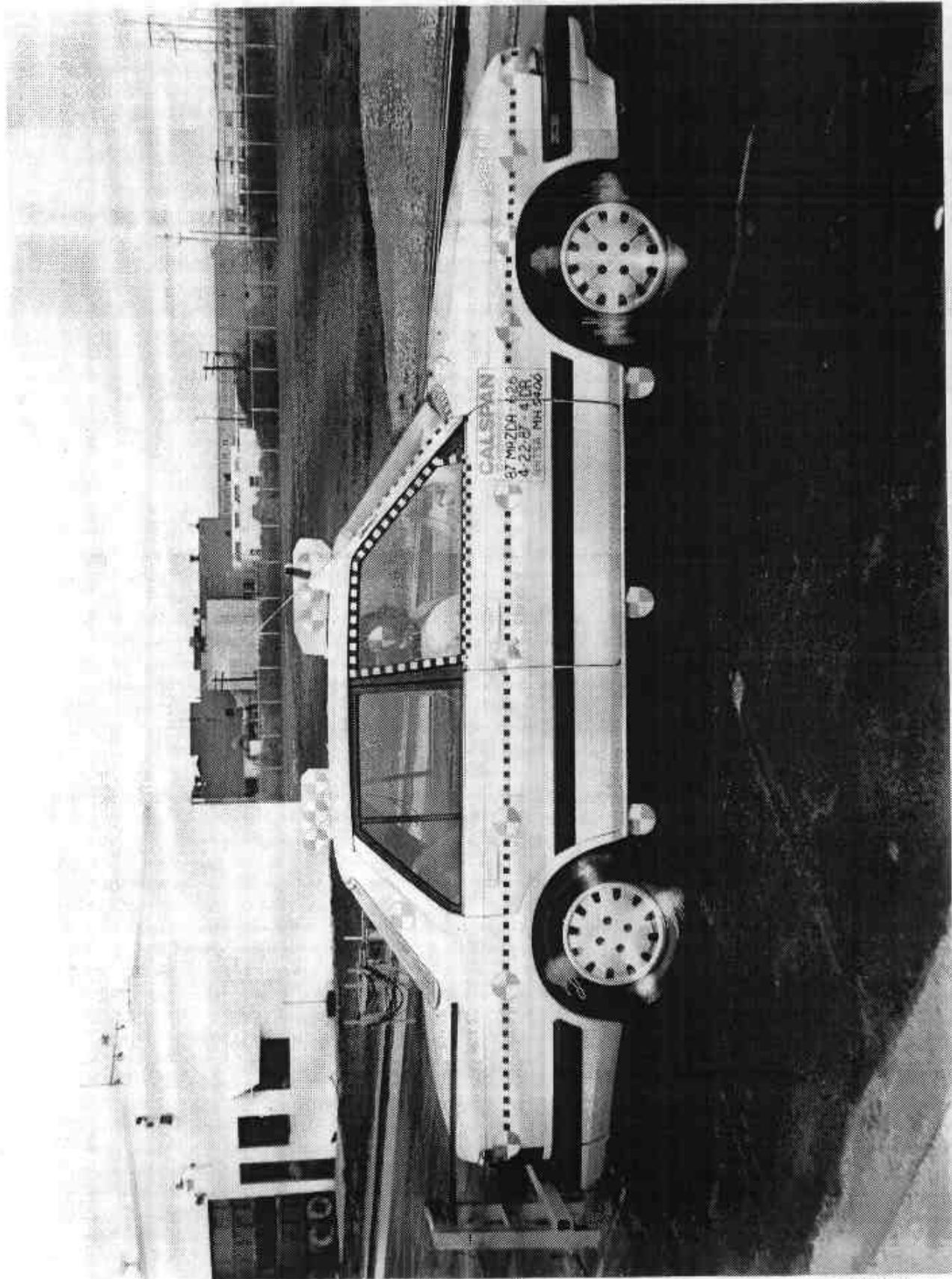
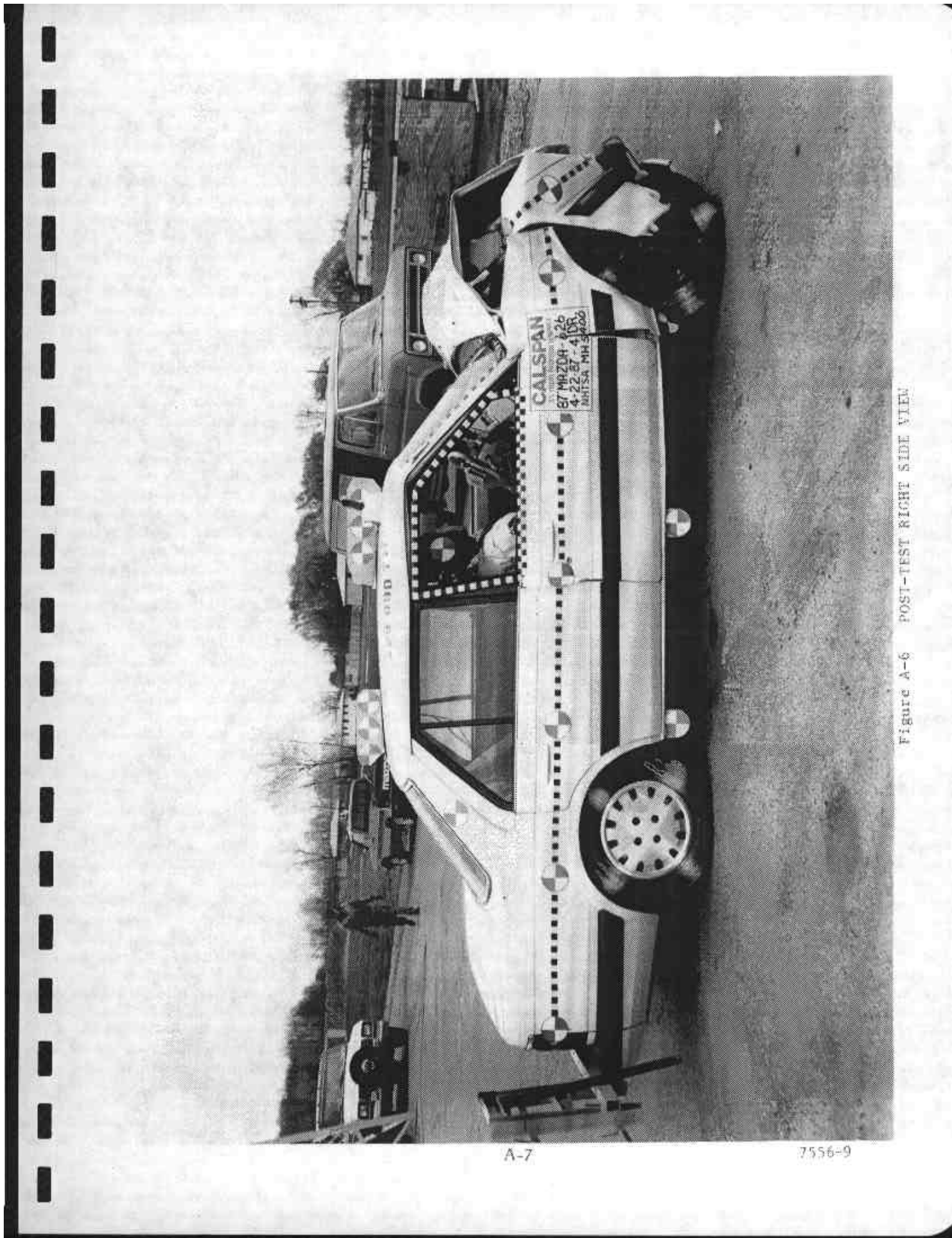


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-6

7556-9



A-7

7556-9

Figure A-6 POST-TEST RIGHT SIDE VIEW

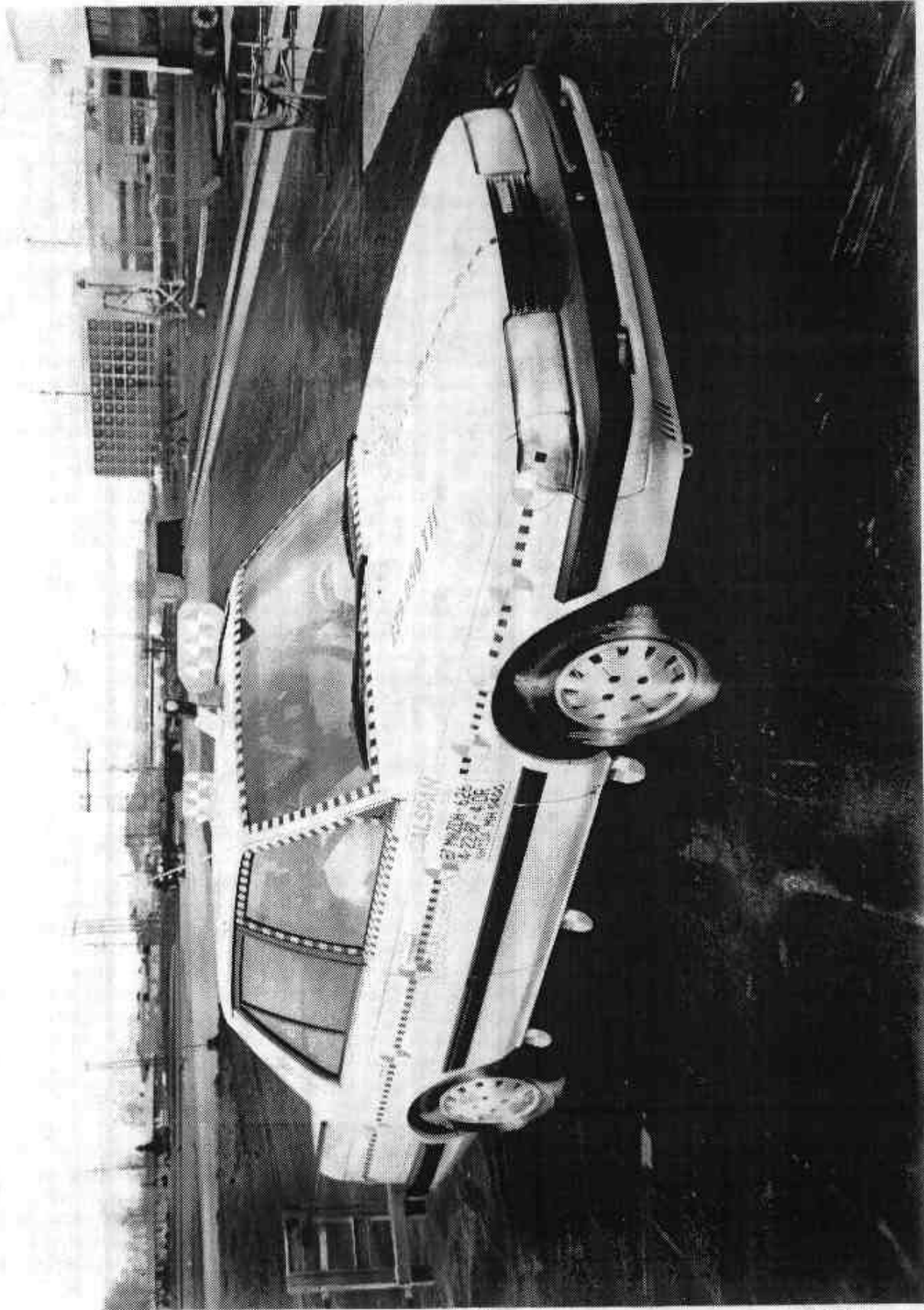


Figure A-7 PRE-TEST FRONT THREE-QUARTER VIEW

A-8

7556-9

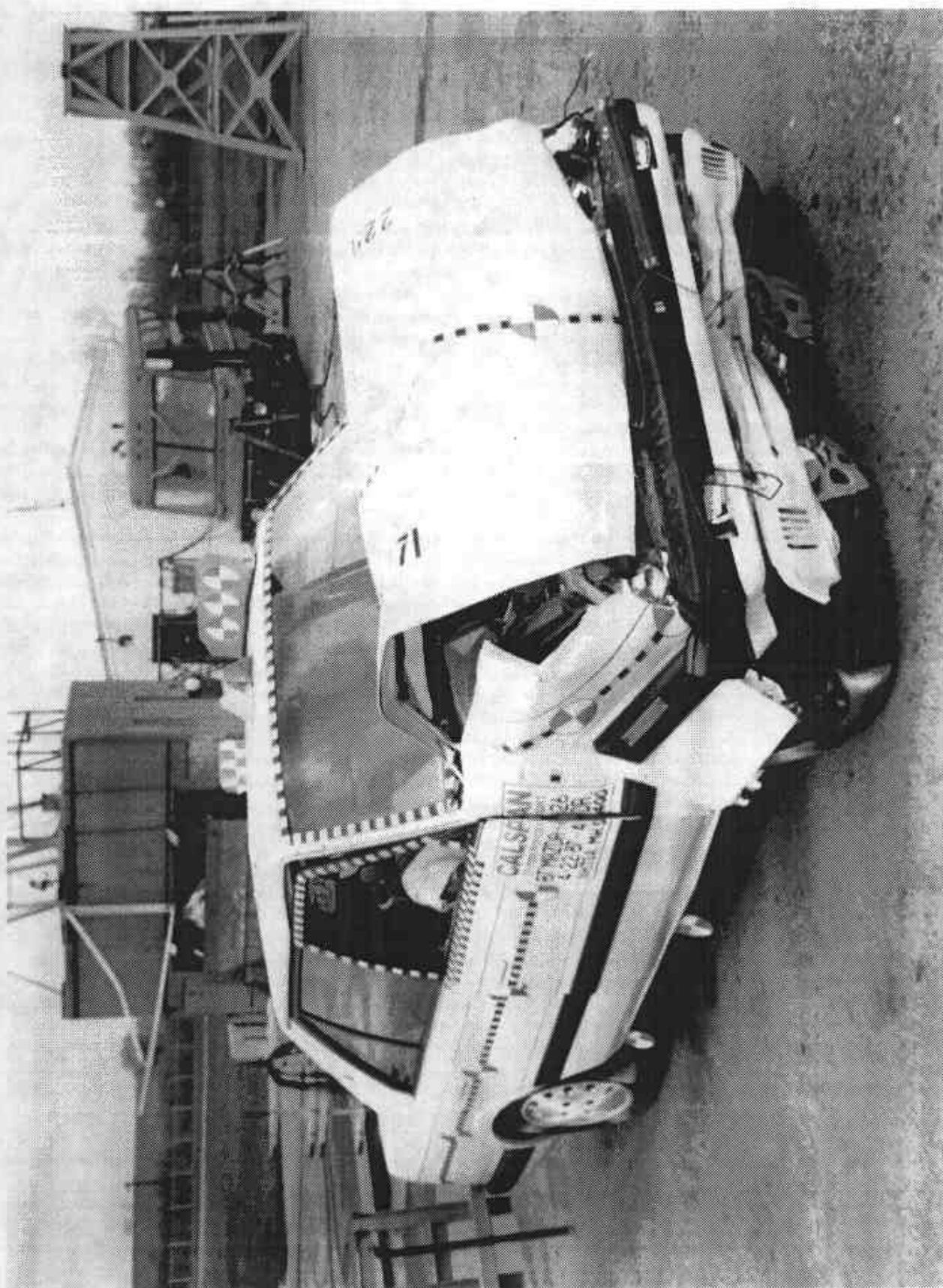


Figure A-8 POST-TEST FRONT THREE-QUARTER VIEW

A-9

7556-9

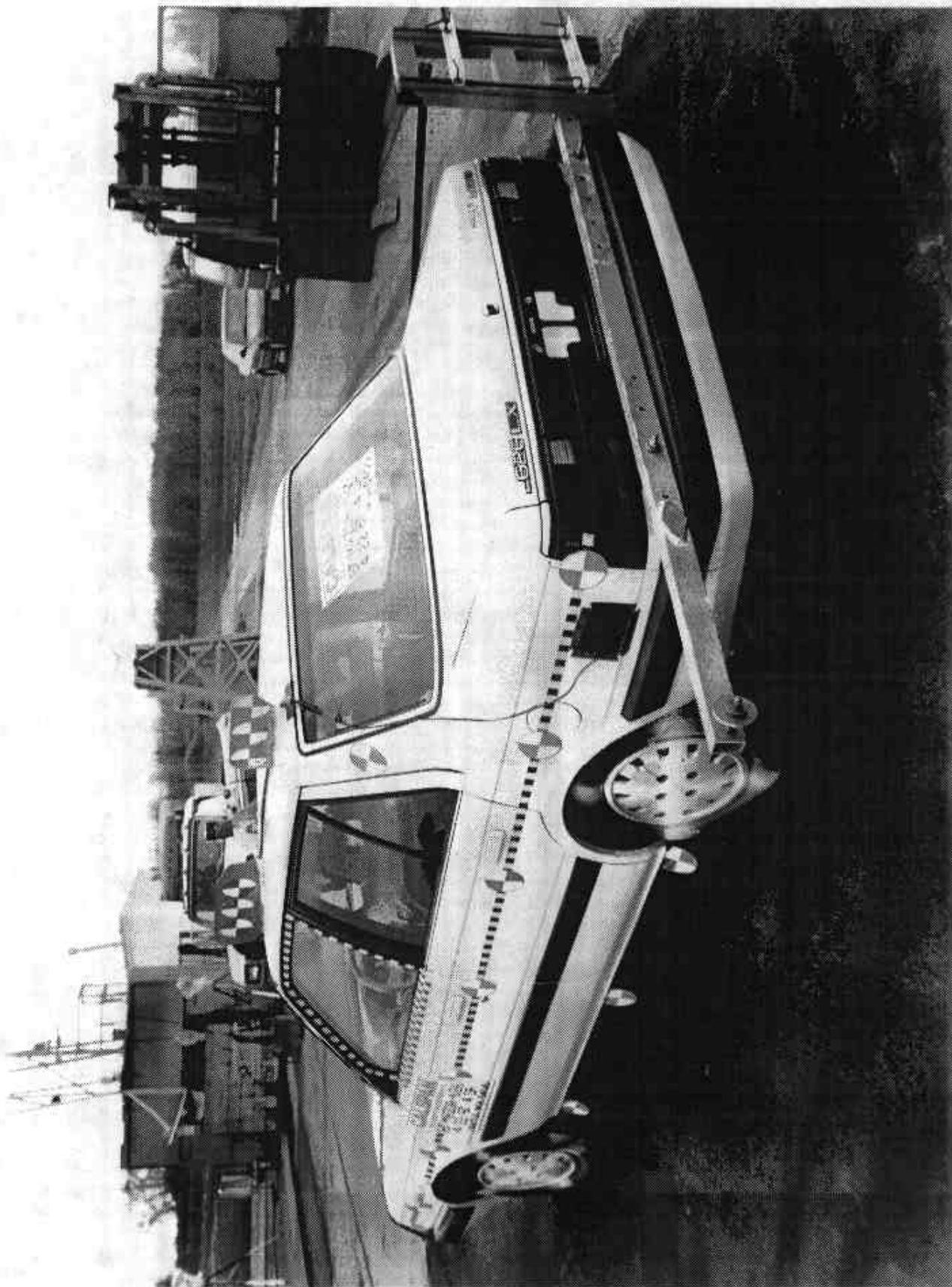


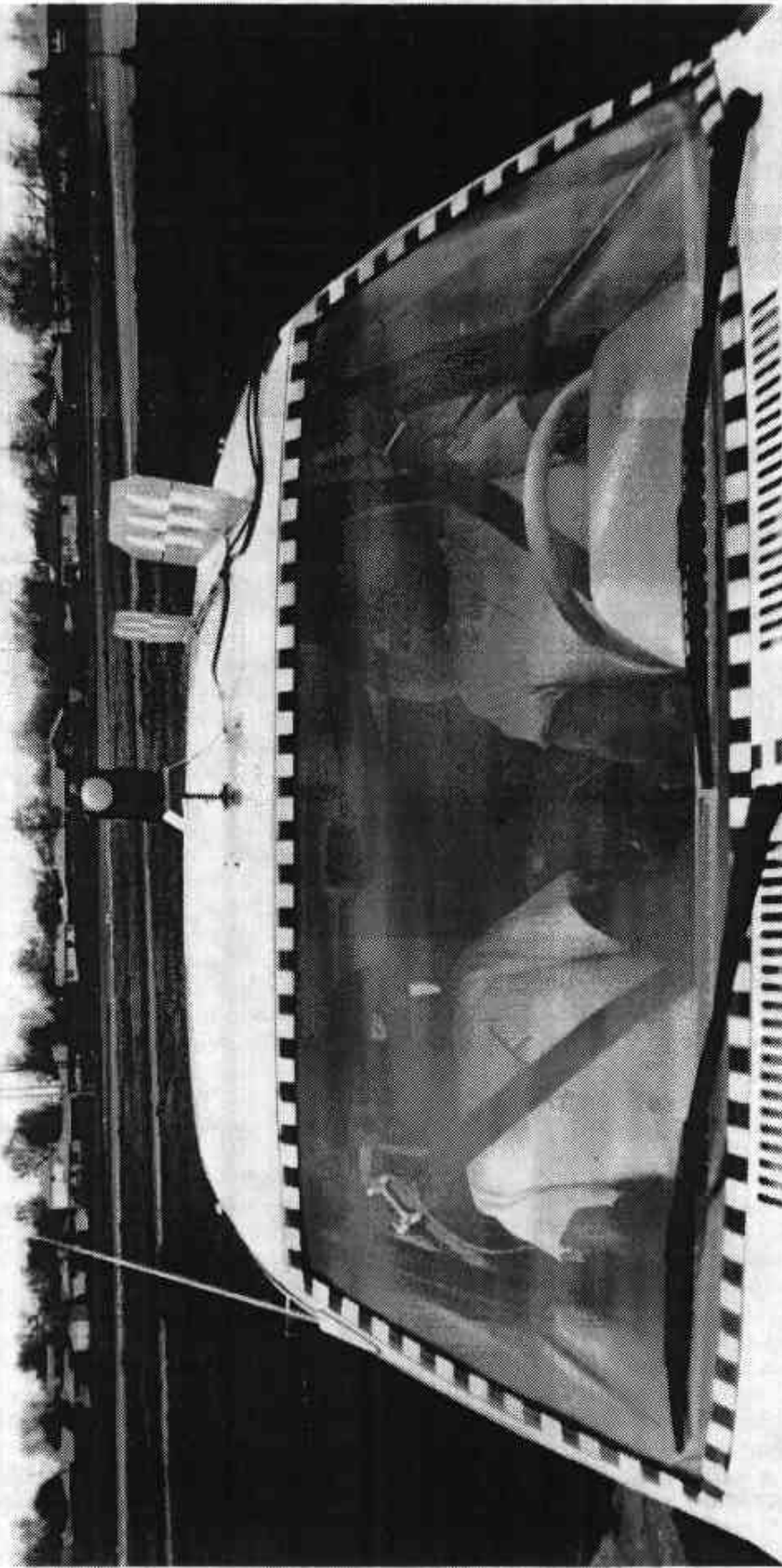
FIGURE A-9 PRE-TEST REAR THREE-QUARTER VIEW

A-10

7556-9



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



CALSPAN
87 MAZDA 626
4 22-87 A 08

229

FIGURE A-11 PRE-TEST WINDSHIELD VIEW

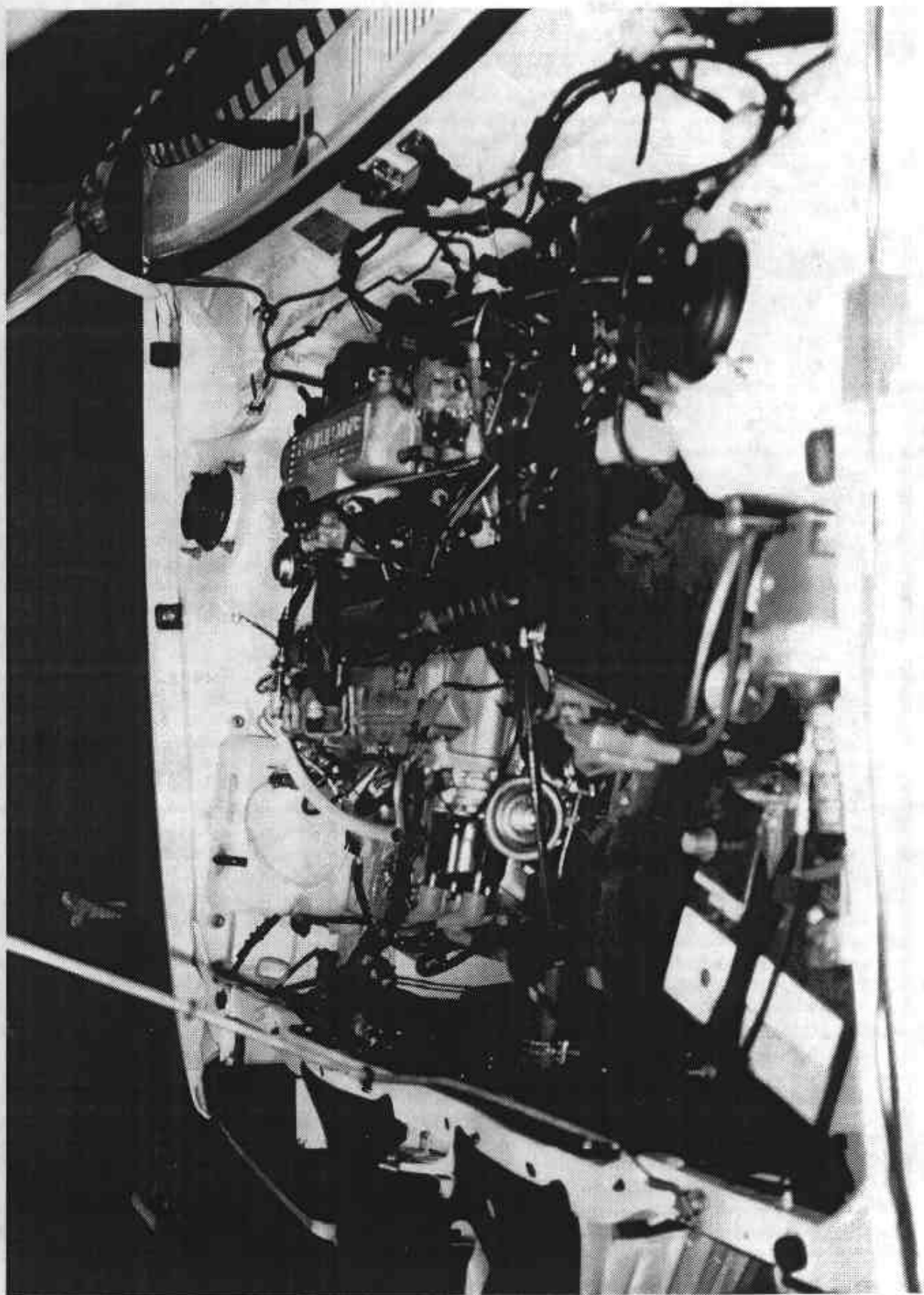


Figure A-12 PRE-ENGINE COMPARTMENT VIEW

A-13

7556-9

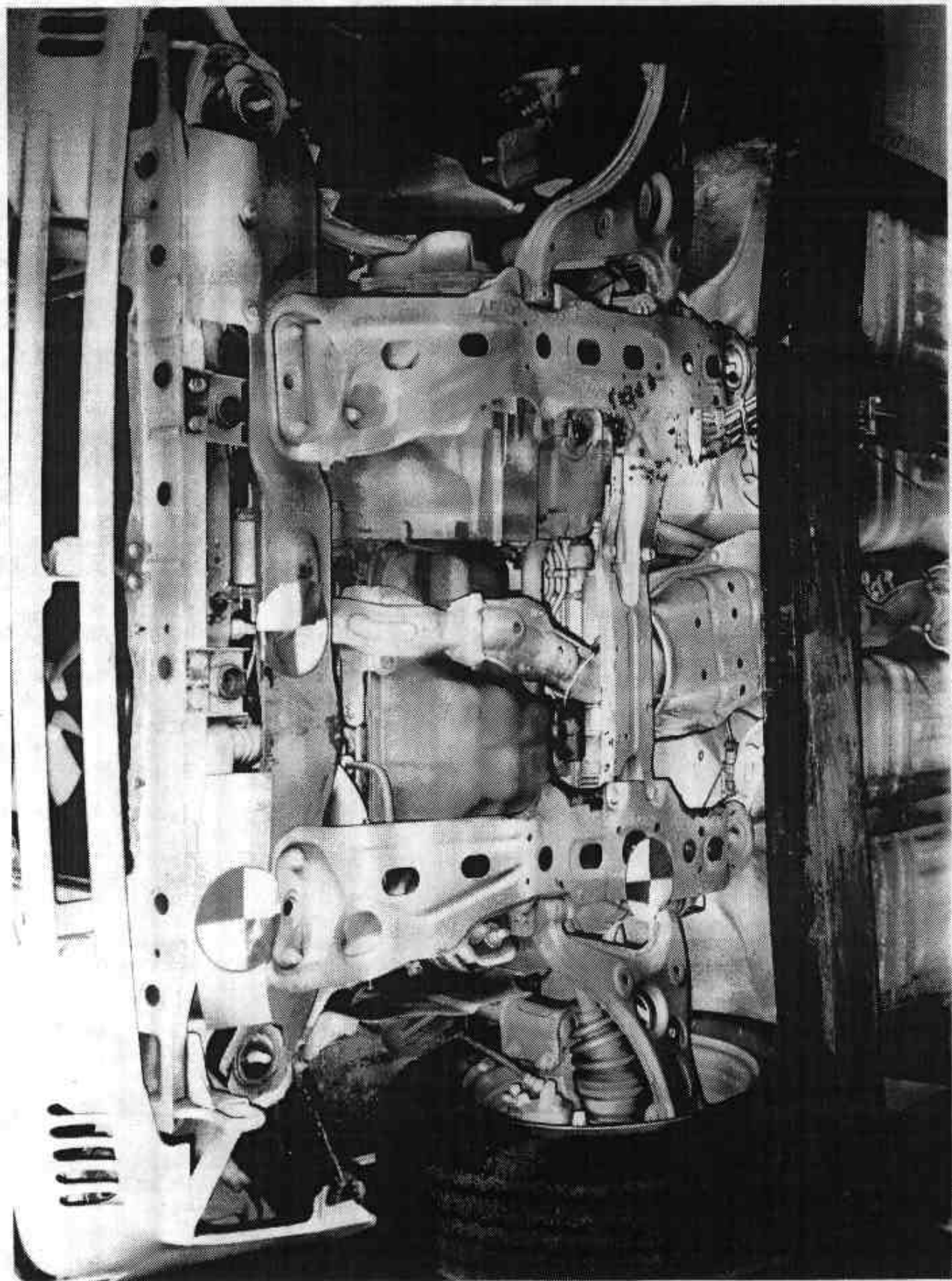


Figure A-13 PRE-TEST FRONT UNDERBODY VIEW

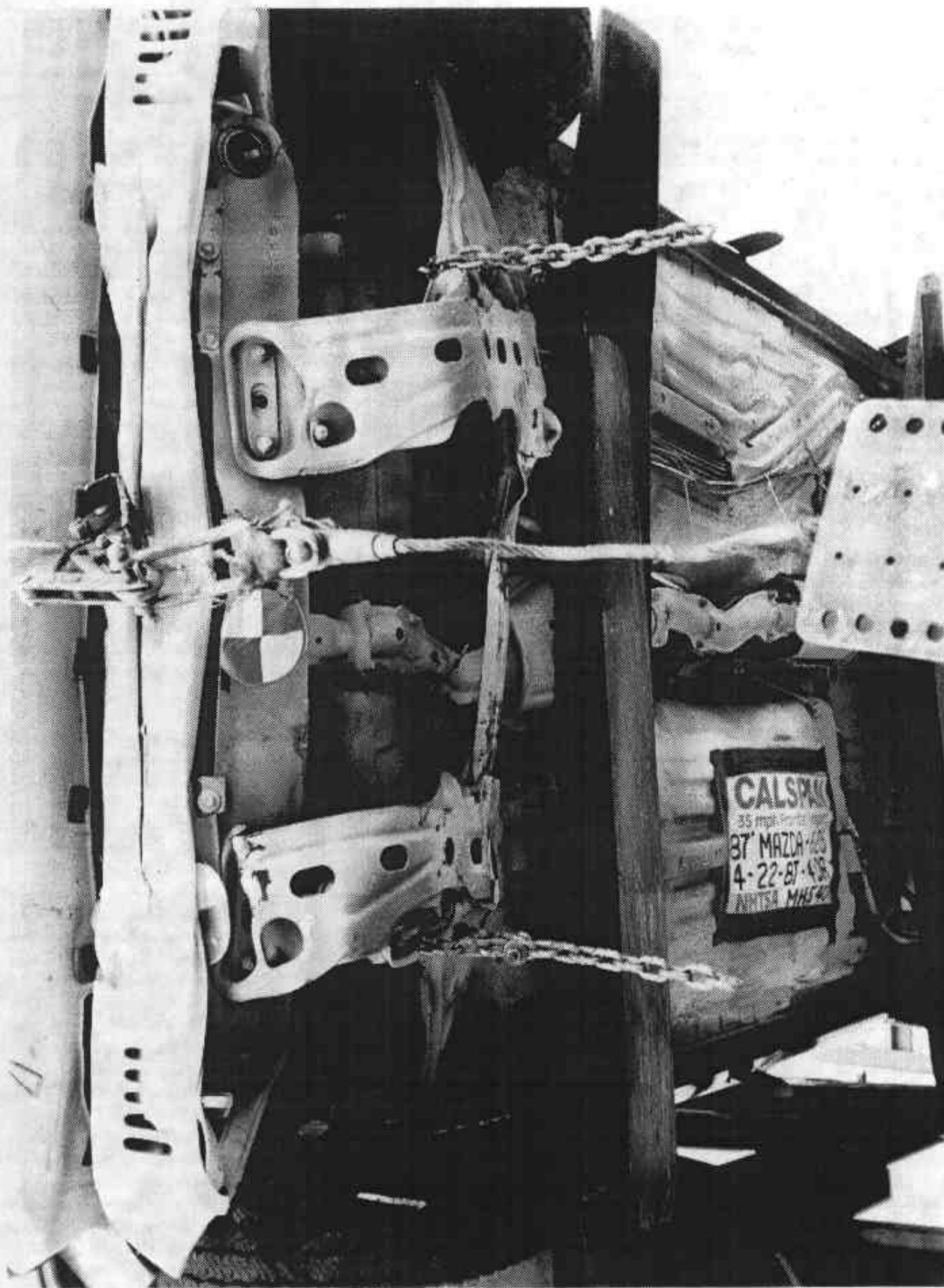


Figure A-14 POST-TEST FRONT UNDERBODY VIEW

A-15

7556-9

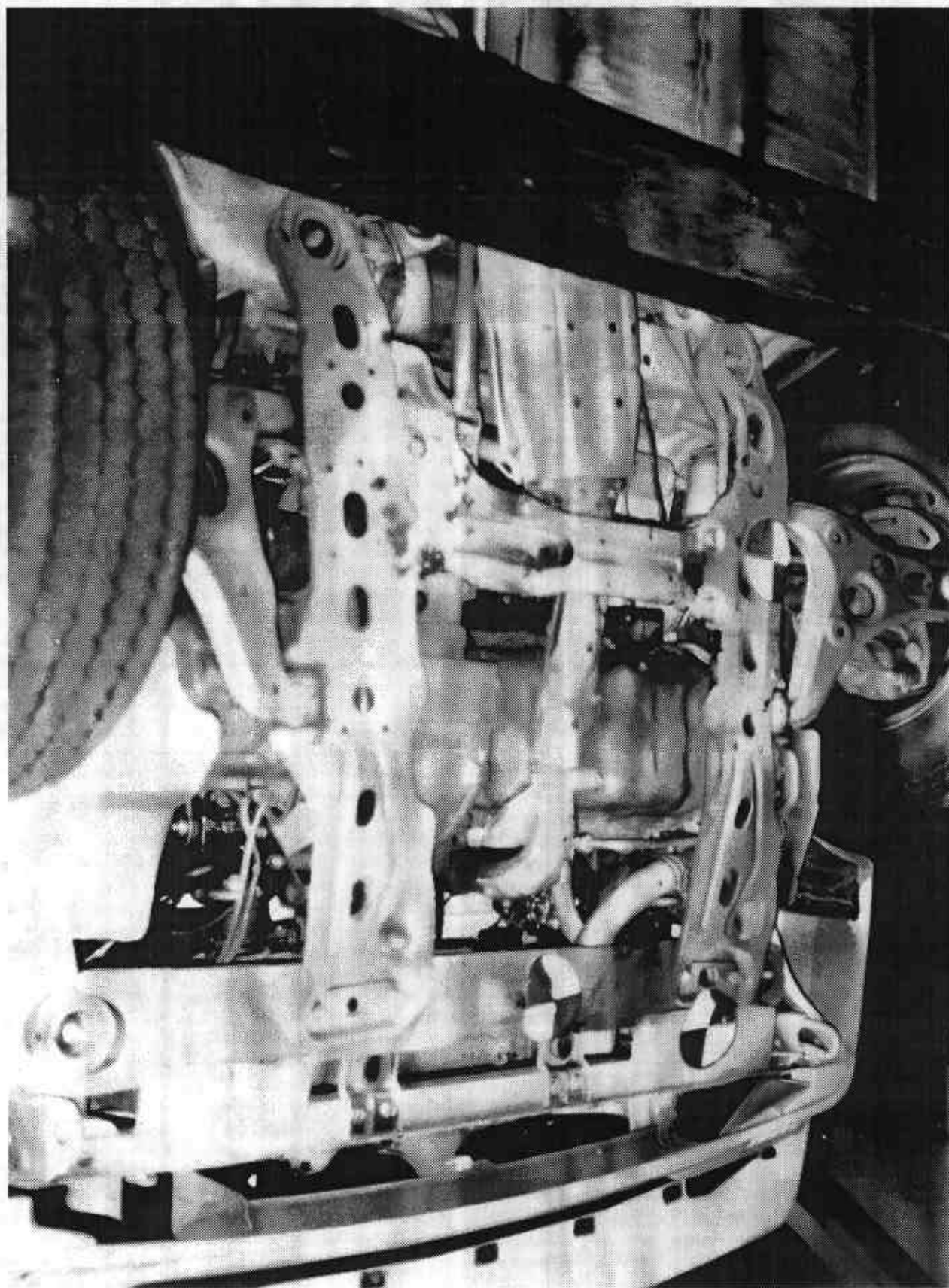


Figure A-15 PRE-TEST FRONT SIDE UNDERBODY VIEW

A-16

7556-9

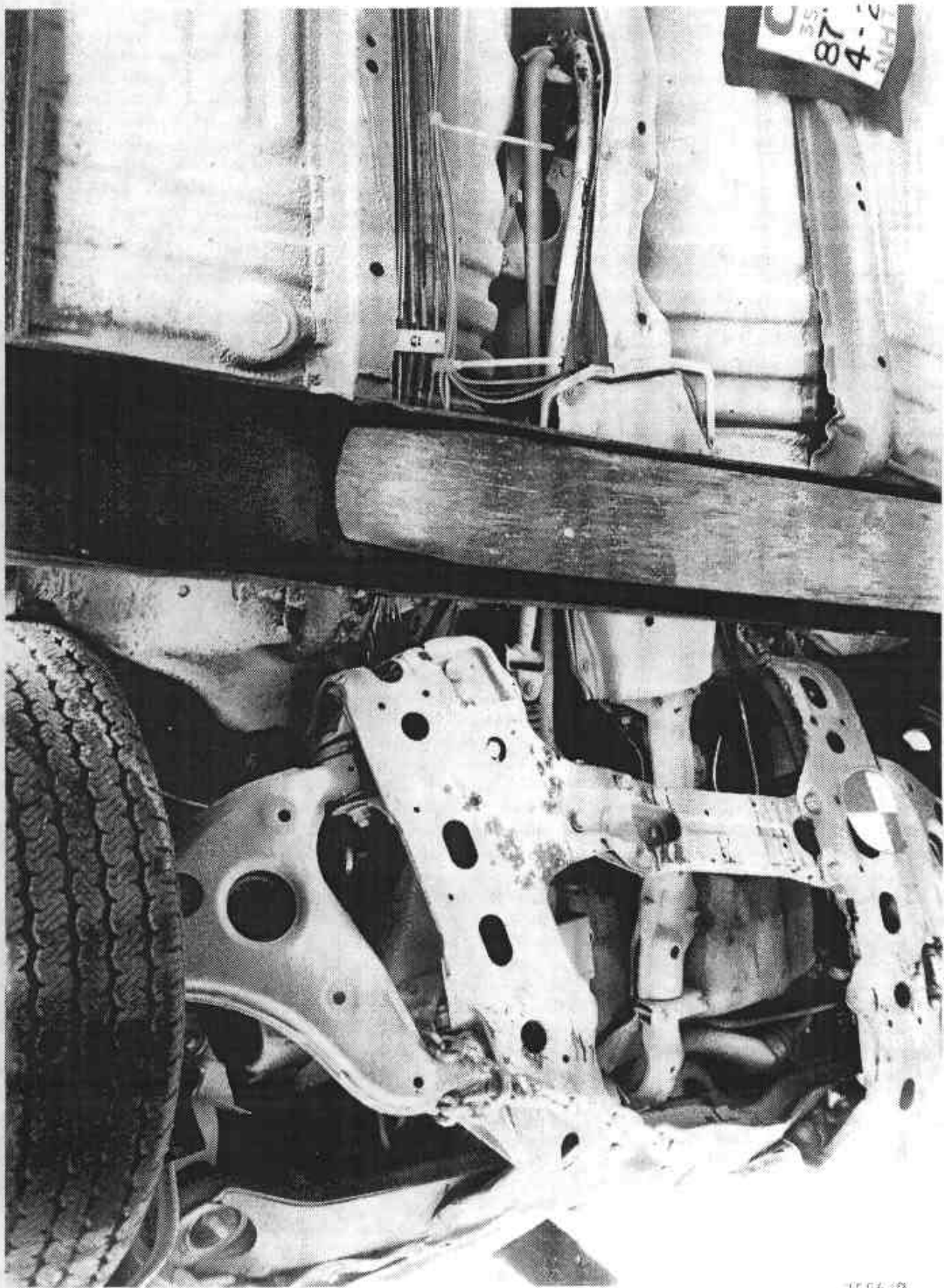


Figure A-16 POST-TEST FRONT SIDE UNDERBODY VIEW

A-17

755649

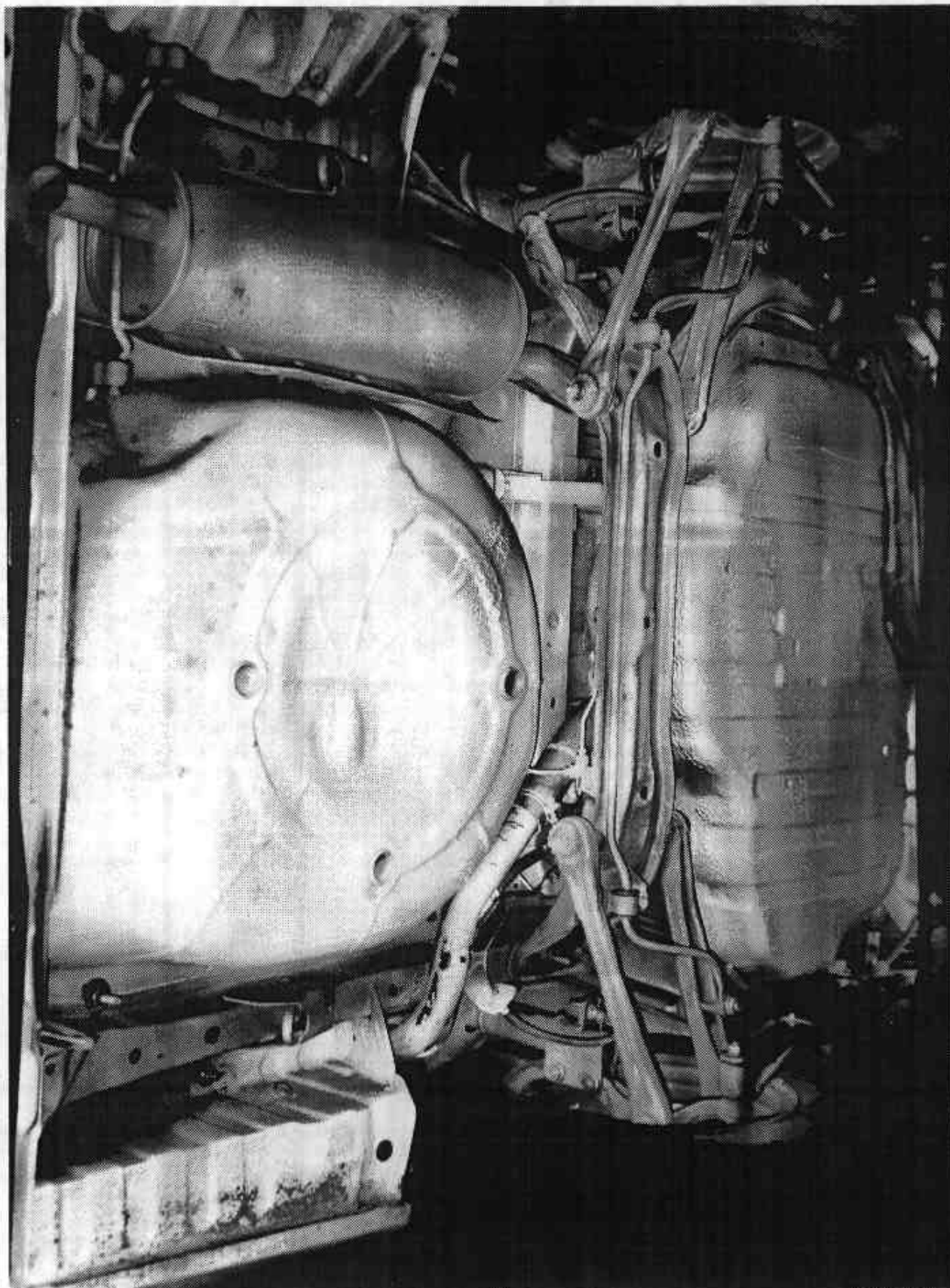


Figure A-17 PRE-TEST REAR UNDERBODY VIEW

A-18

7556-9

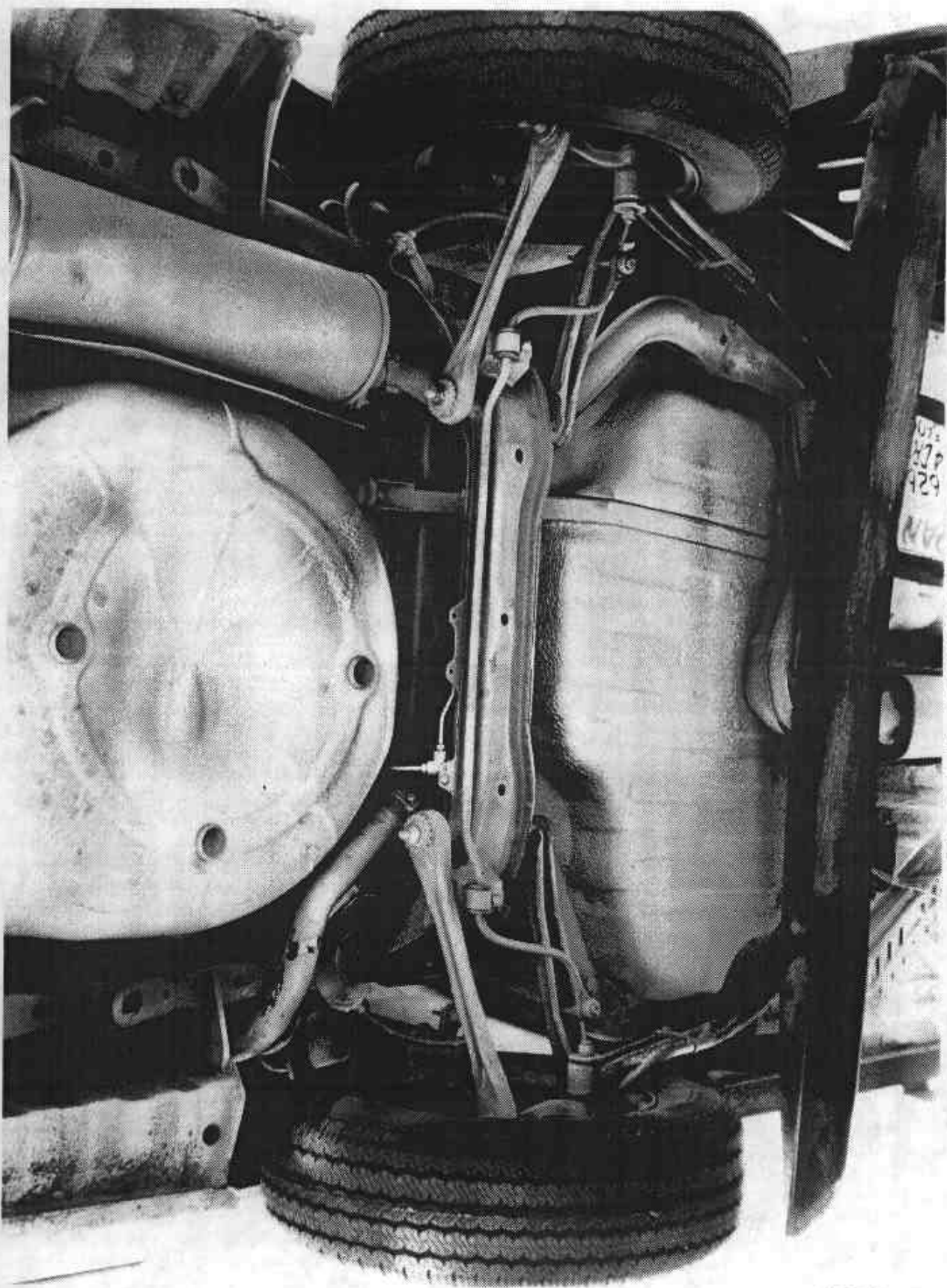


Figure A-18 POST-TEST REAR UNDERBODY VIEW

A-19

2556-19

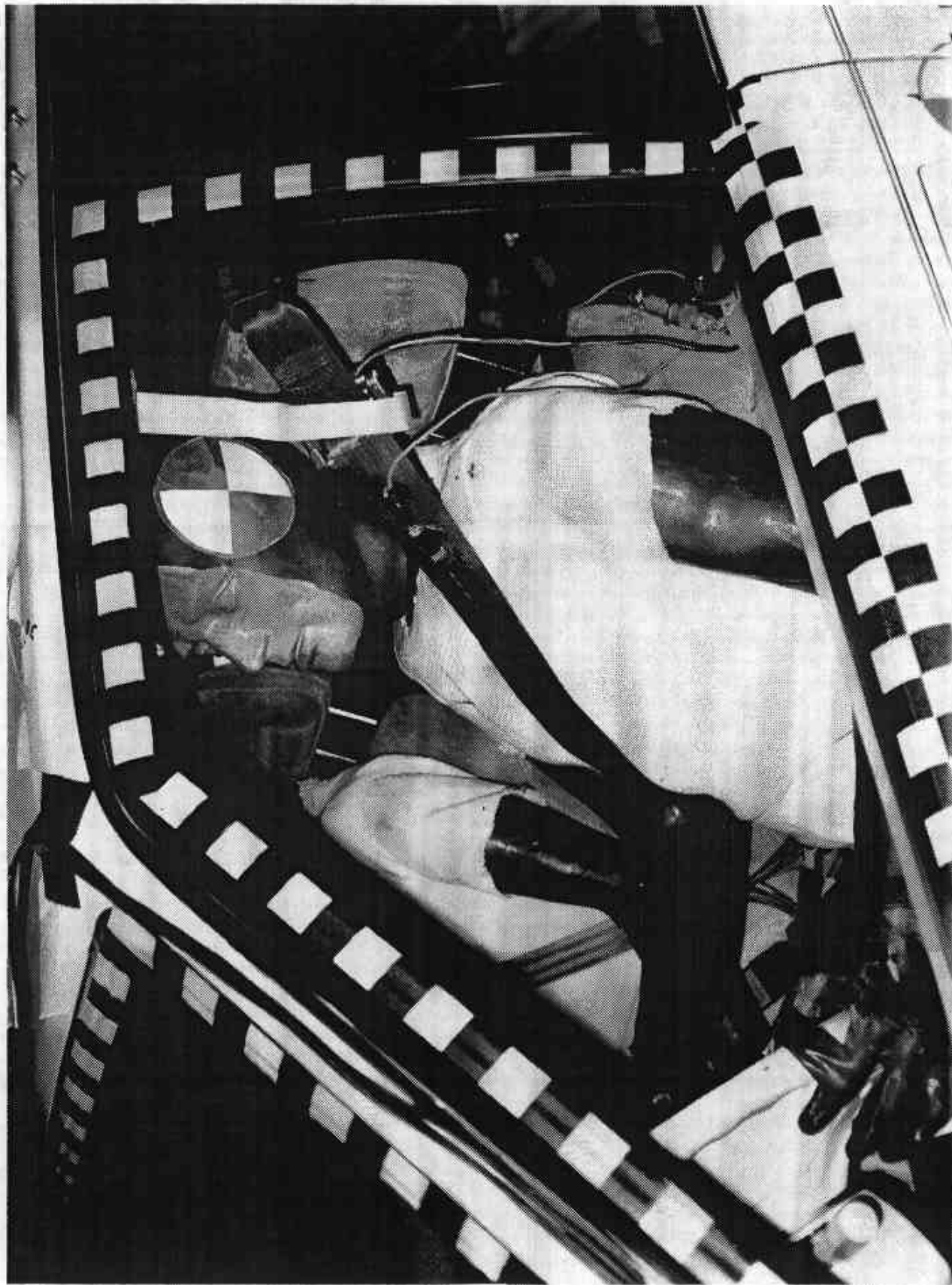


Figure A-19 PRE-TEST DRIVER POSITION VIEW

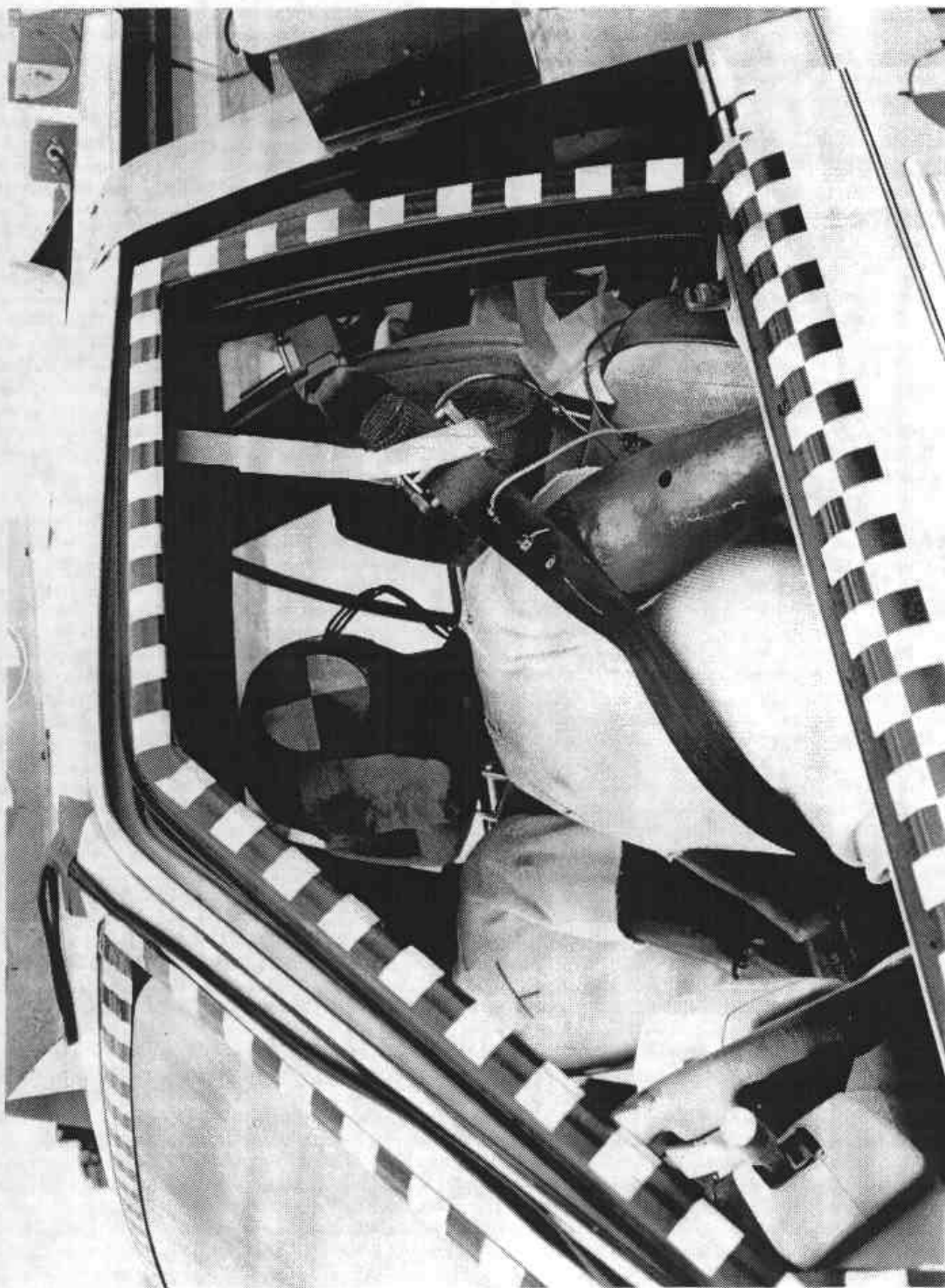


Figure A-20 POST-TEST DRIVER POSITION VIEW

A-21

7556-9

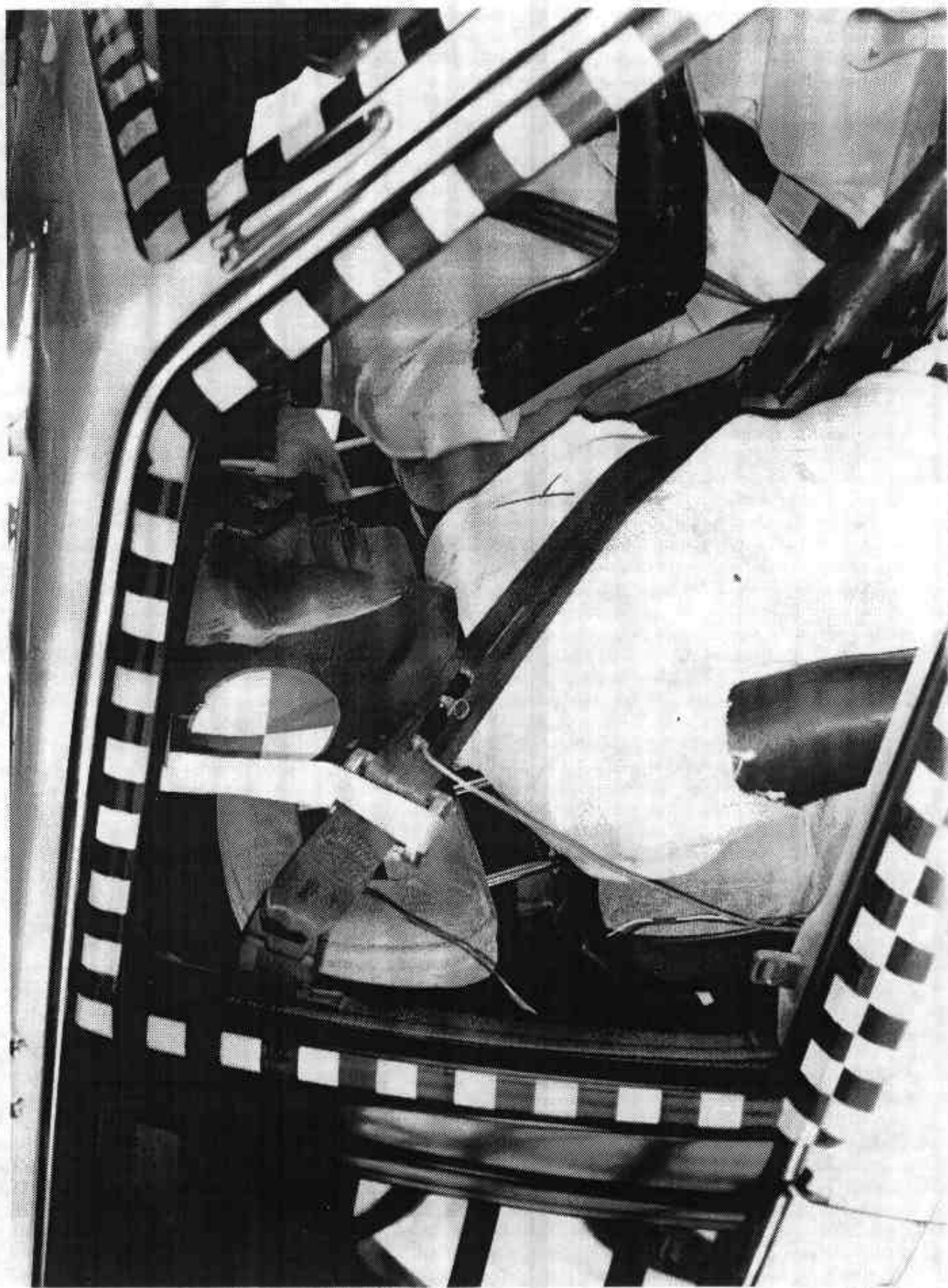


Figure A-21 PRE-TEST PASSENGER POSITION VIEW

A-22

7556-9

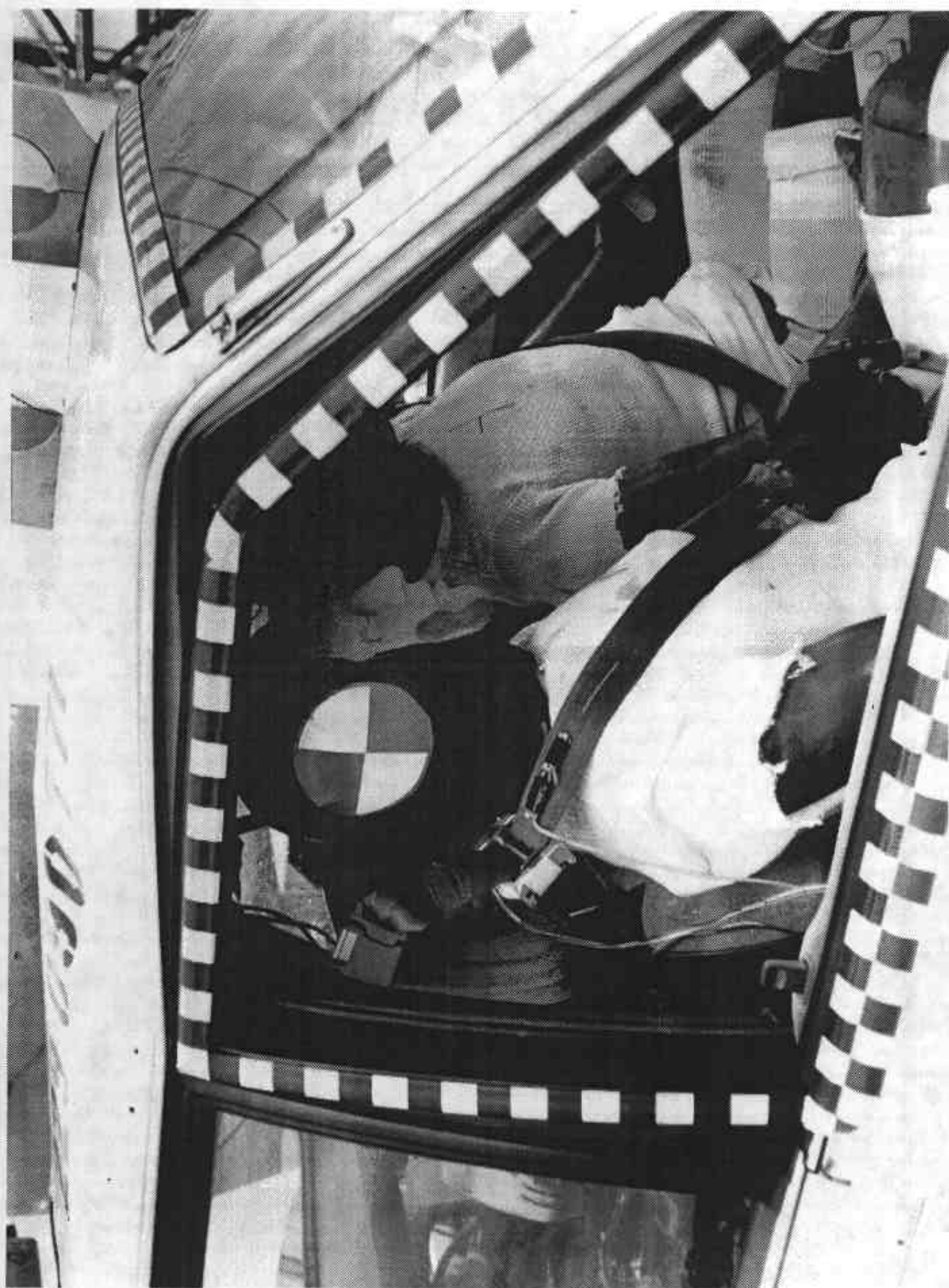


FIGURE A-22 POST-TEST PASSENGER POSITION VIEW



Figure A-23 PRE-TEST DRIVER AND INTERIOR VIEW



Figure A-24 POST-TEST DRIVER AND INTERIOR VIEW

A-25

7556-9



Figure A-25 PRE-TEST PASSENGER AND INTERIOR VIEW



Figure A-26 POST-TEST PASSENGER AND INTERIOR VIEW

Appendix B

VEHICLE, DEFORMABLE MOVING BARRIER AND DUMMY RESPONSE DATA

TEST NO. MH5400

VEHICLE DATA

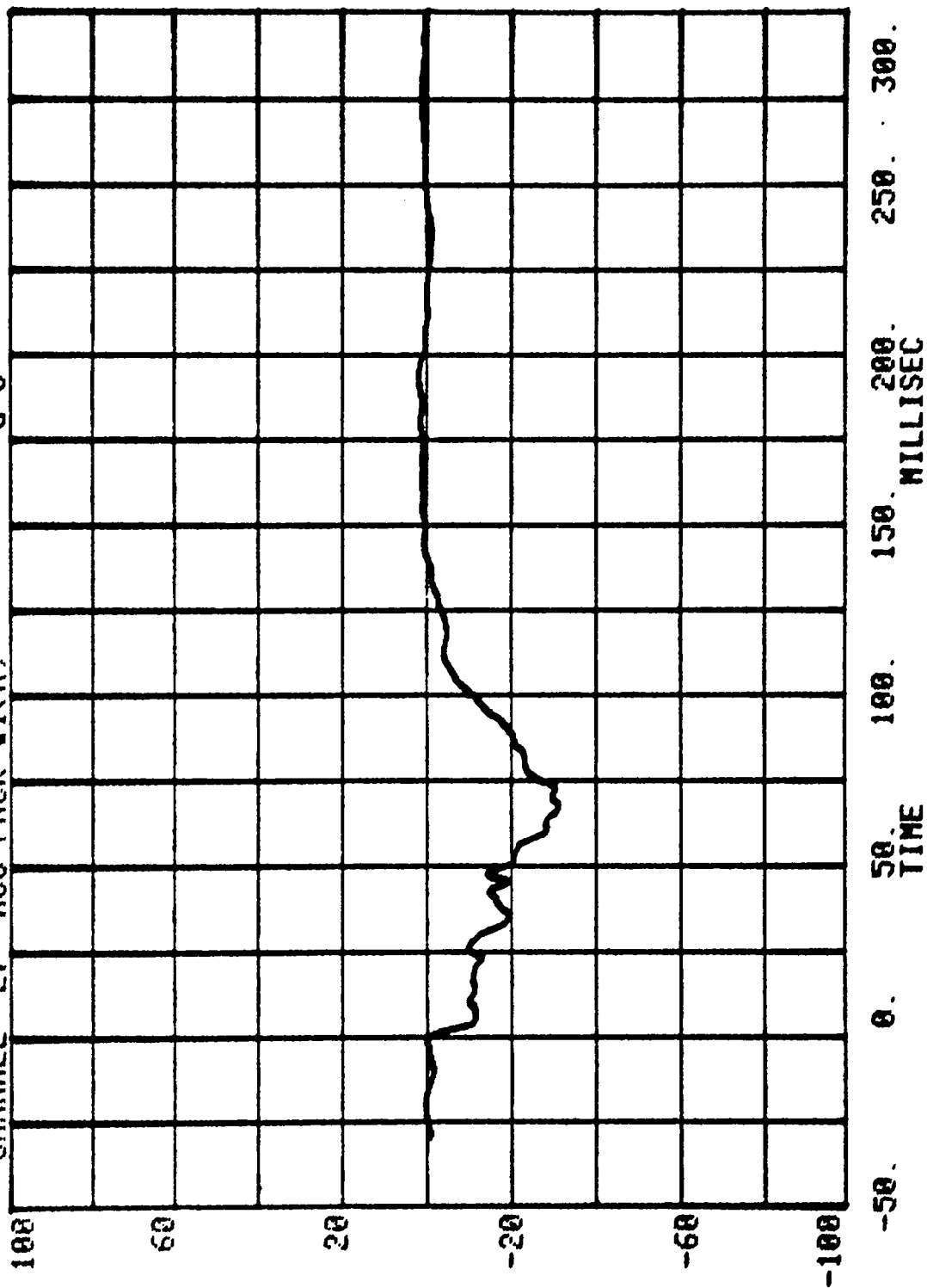
FILTER CHANNEL CLASS

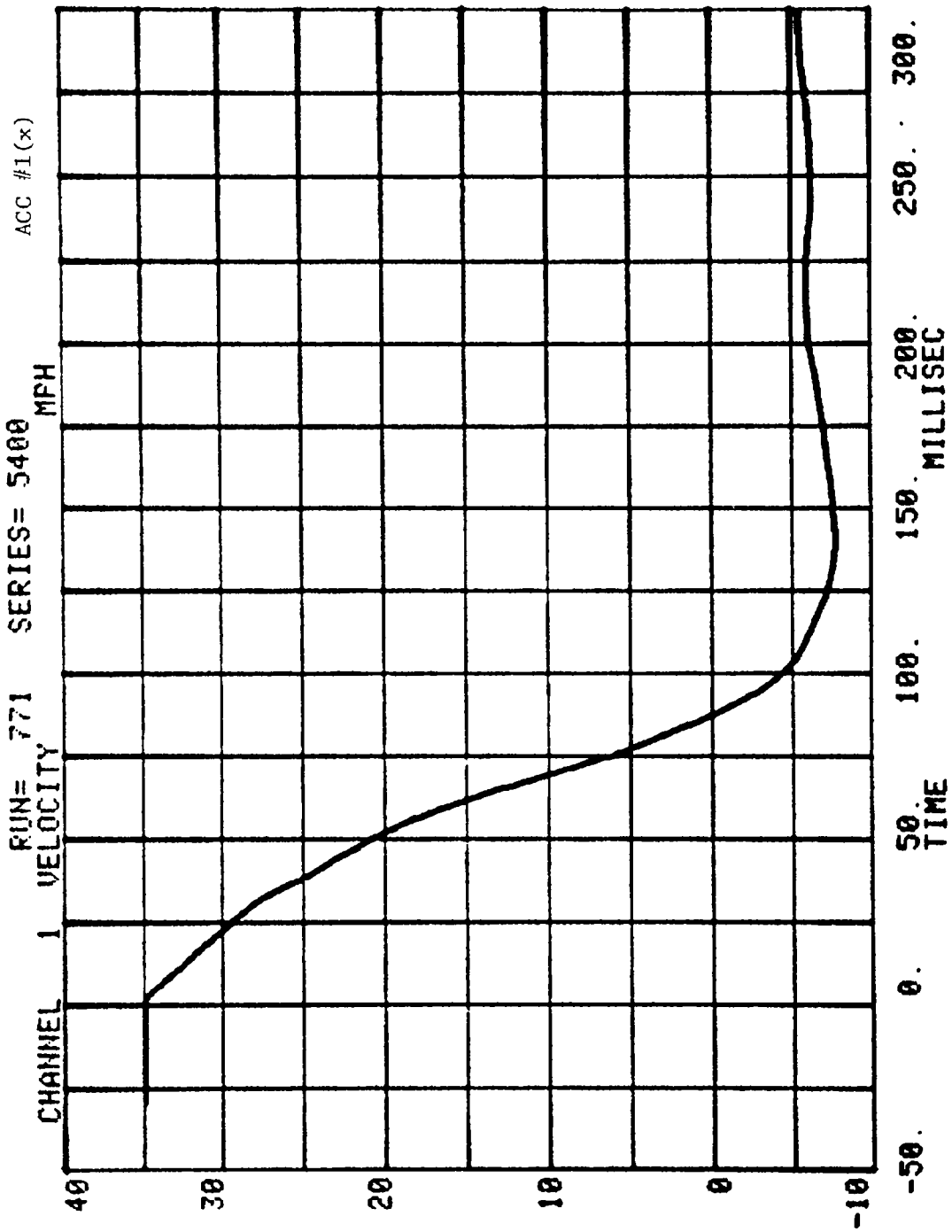
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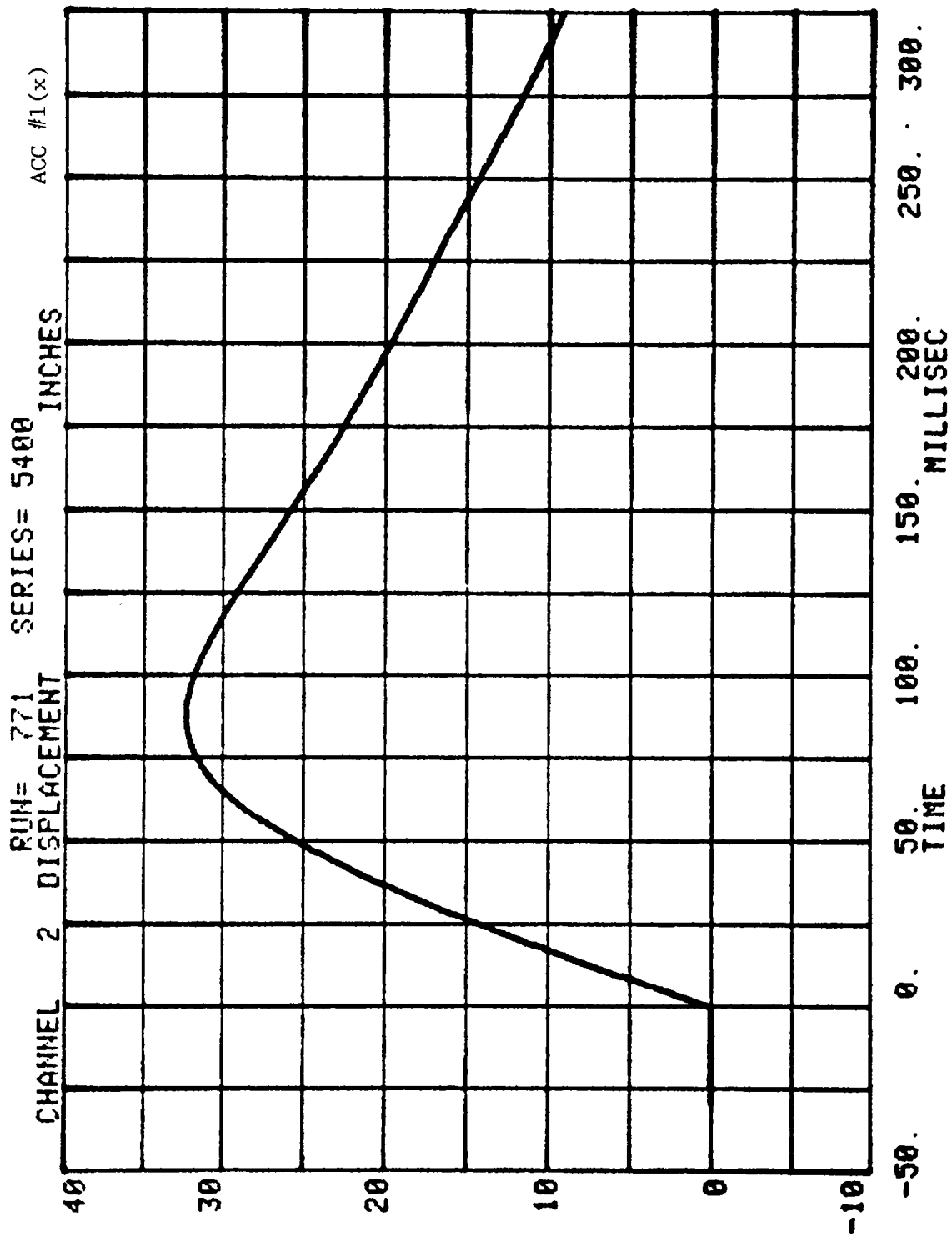
B-2

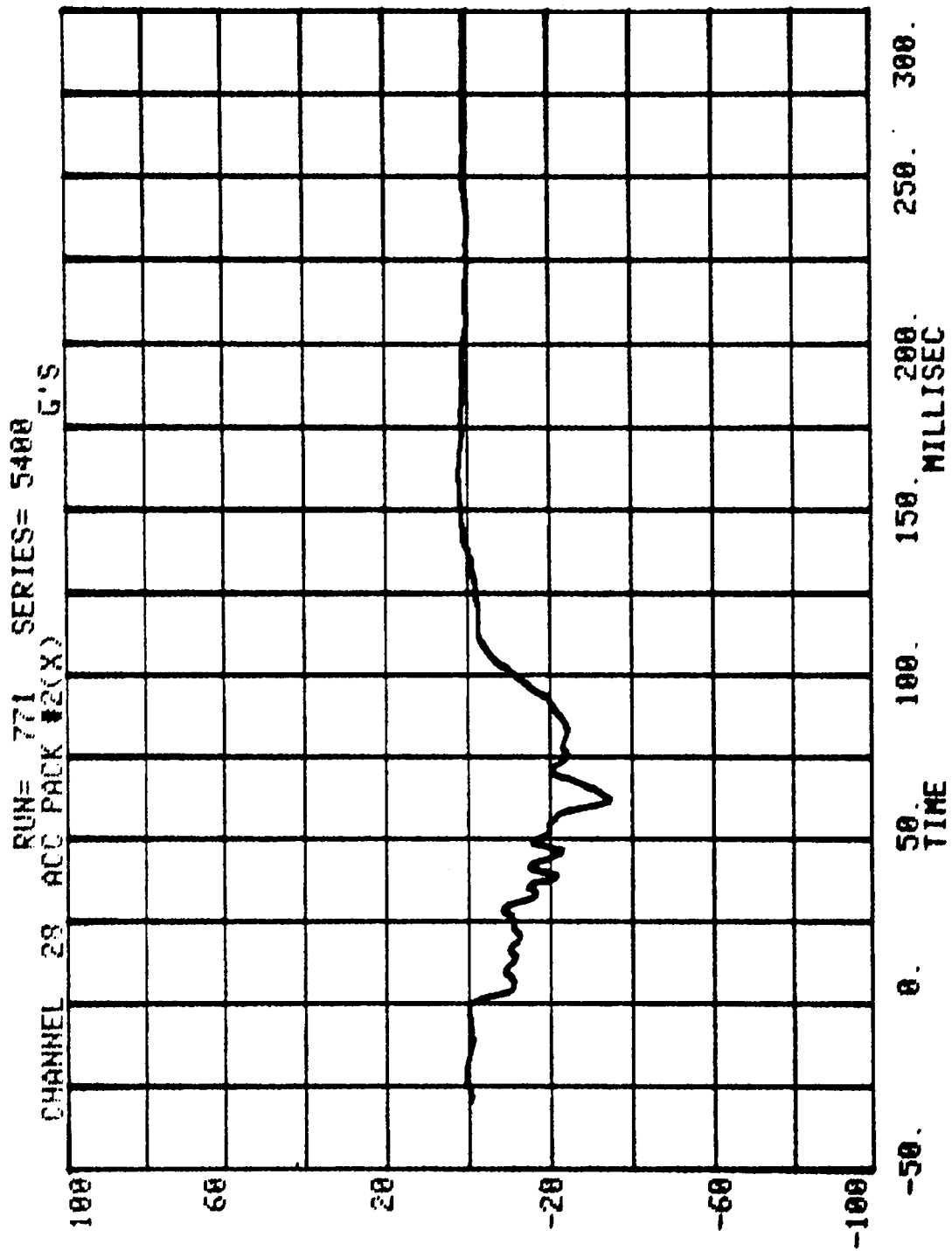
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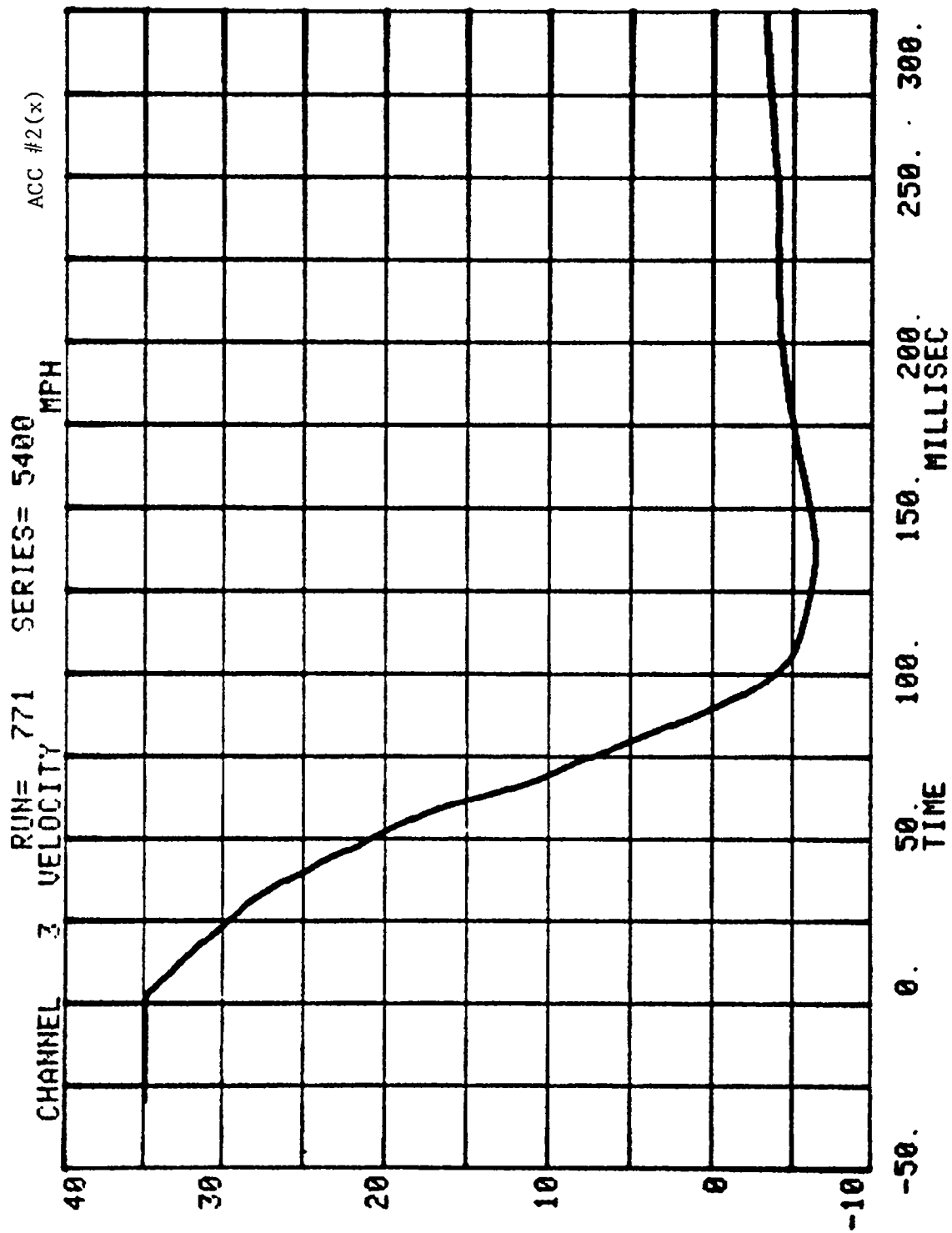
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CHANNEL 27 ACC PACK #1(X)

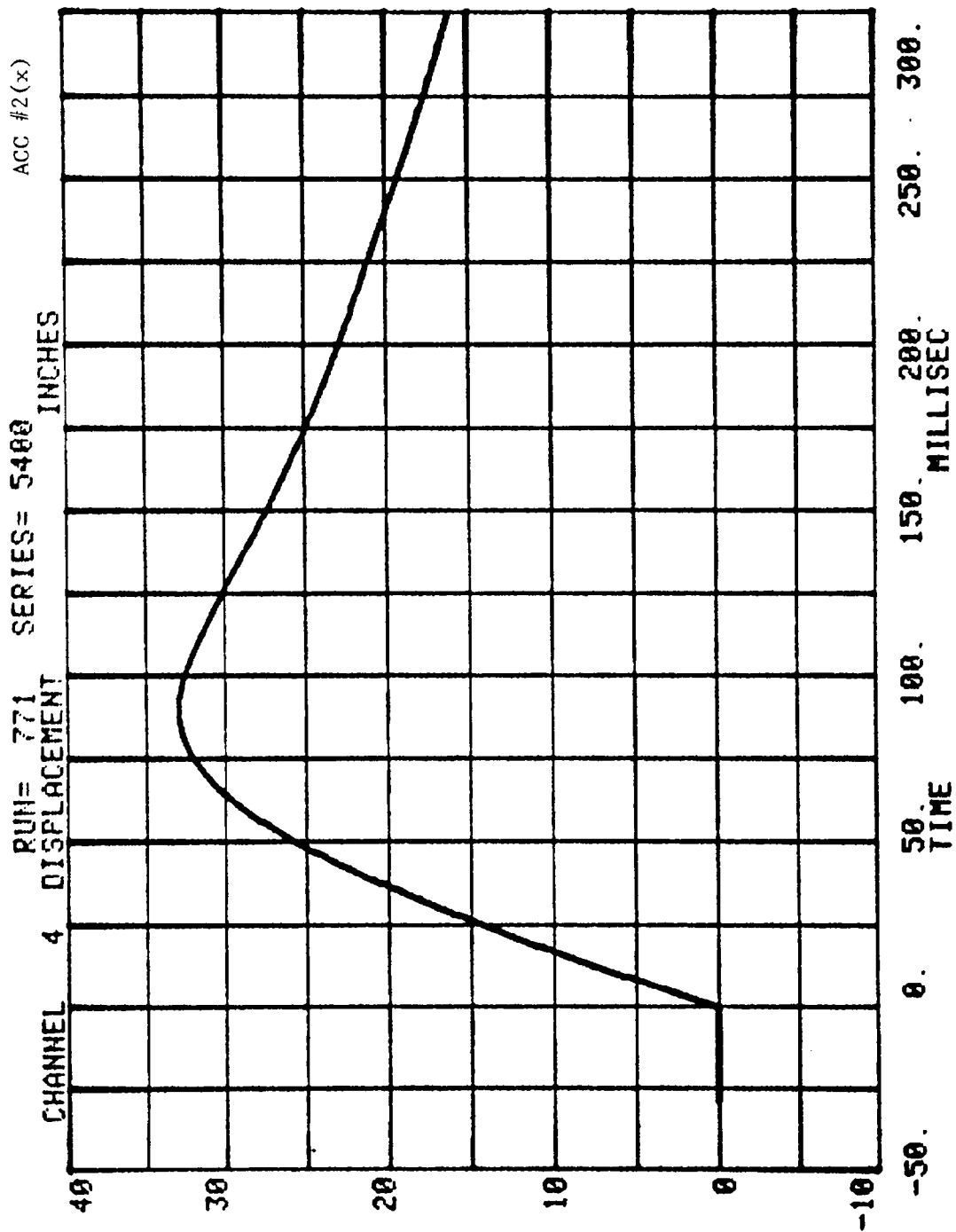




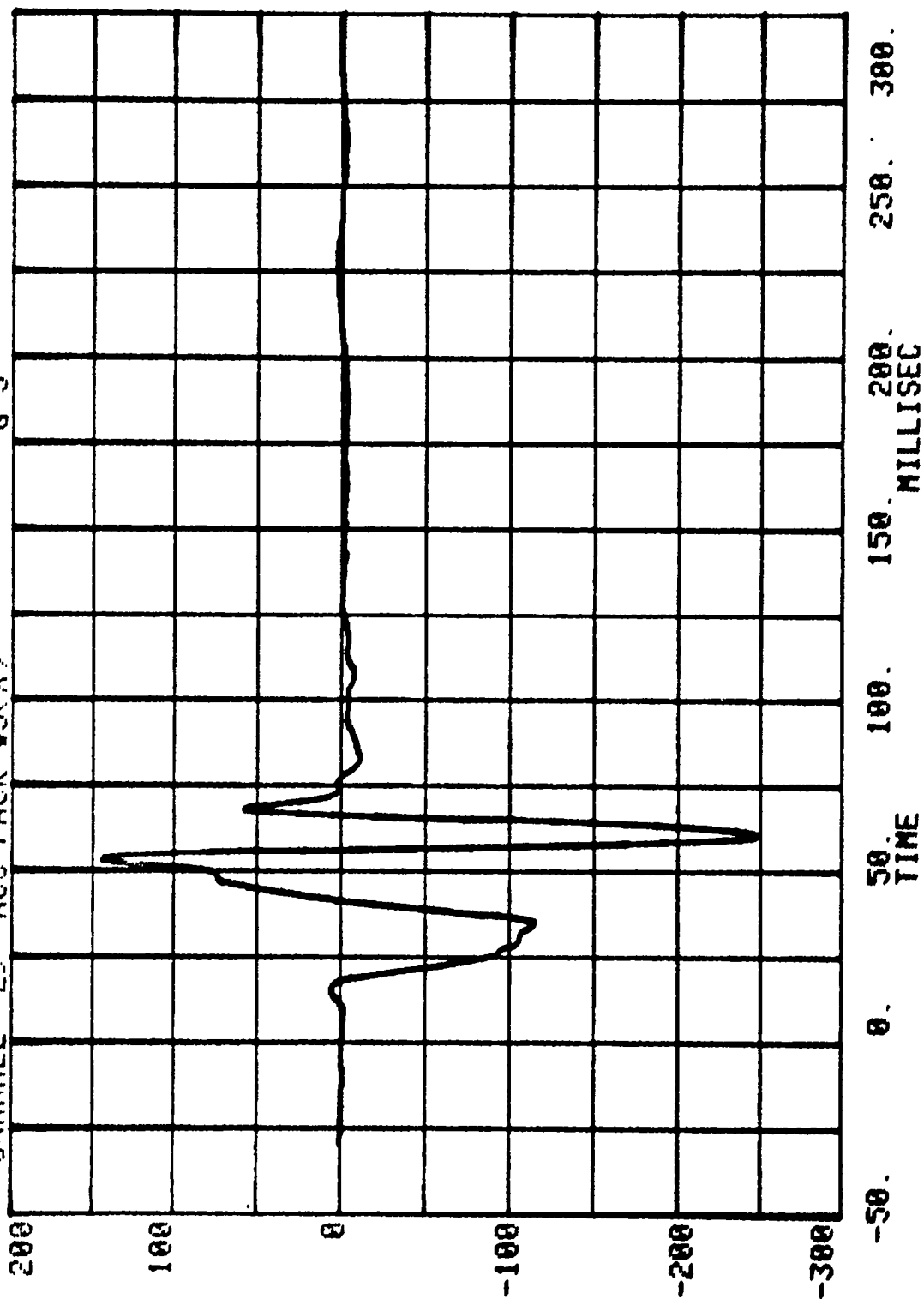


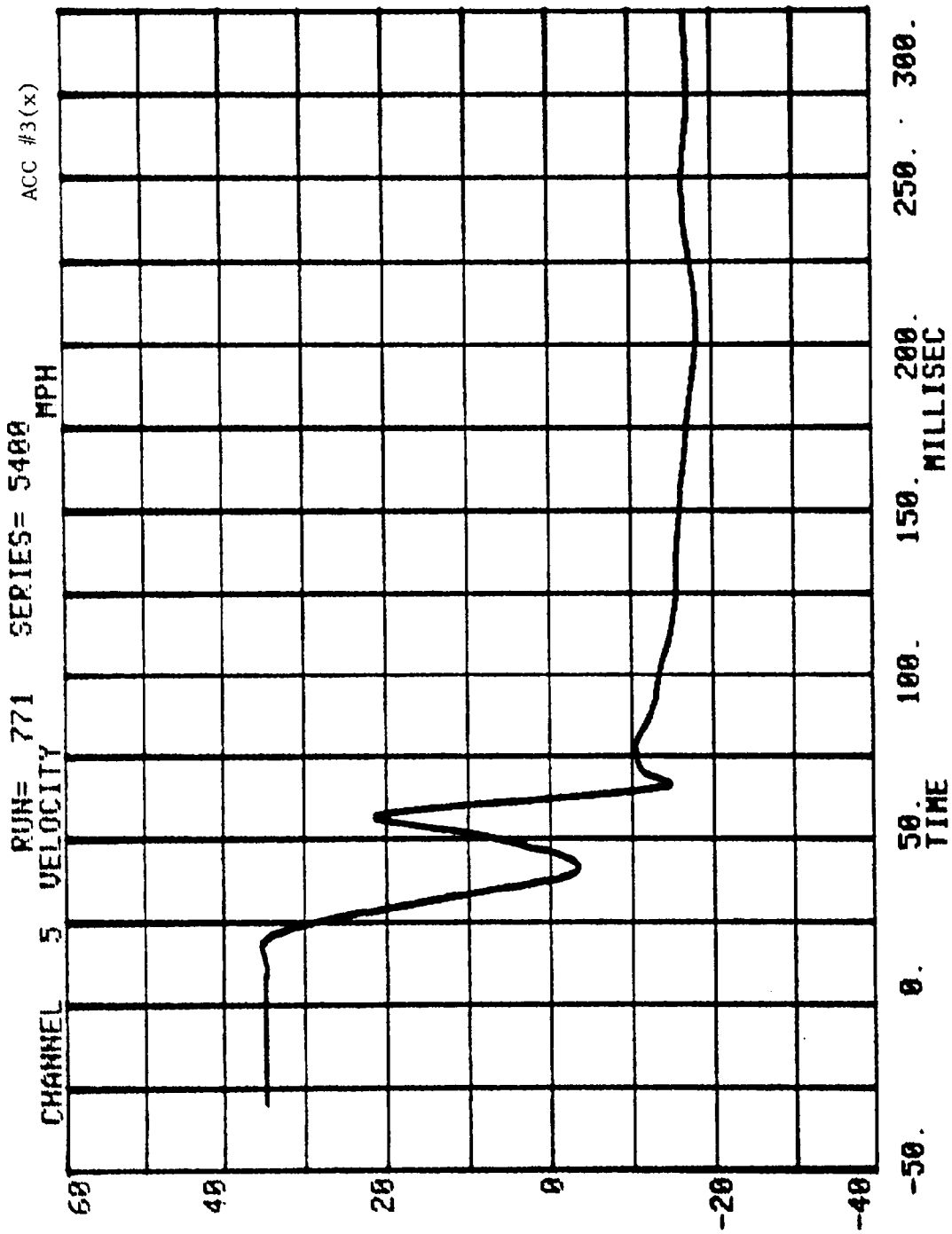




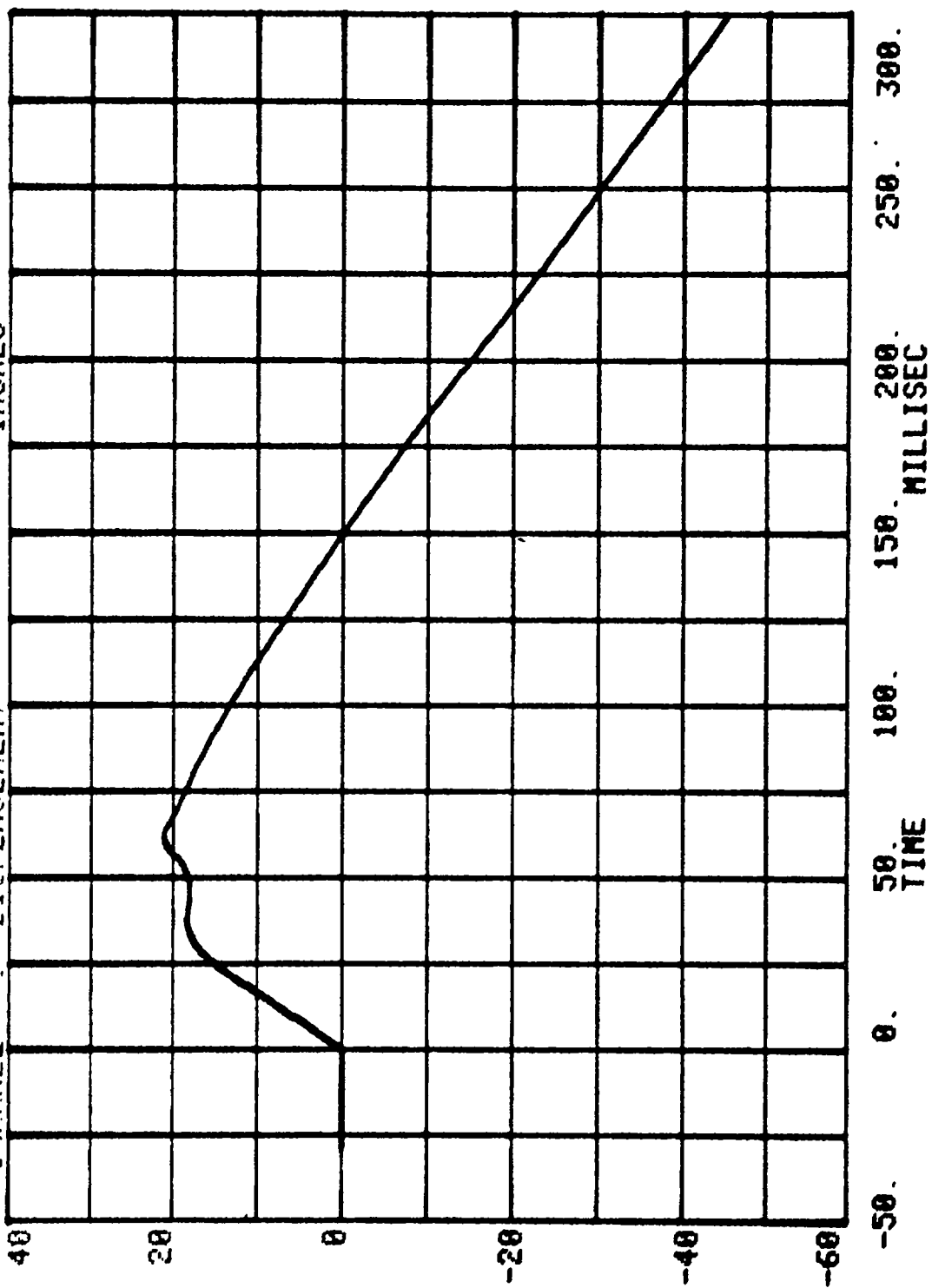


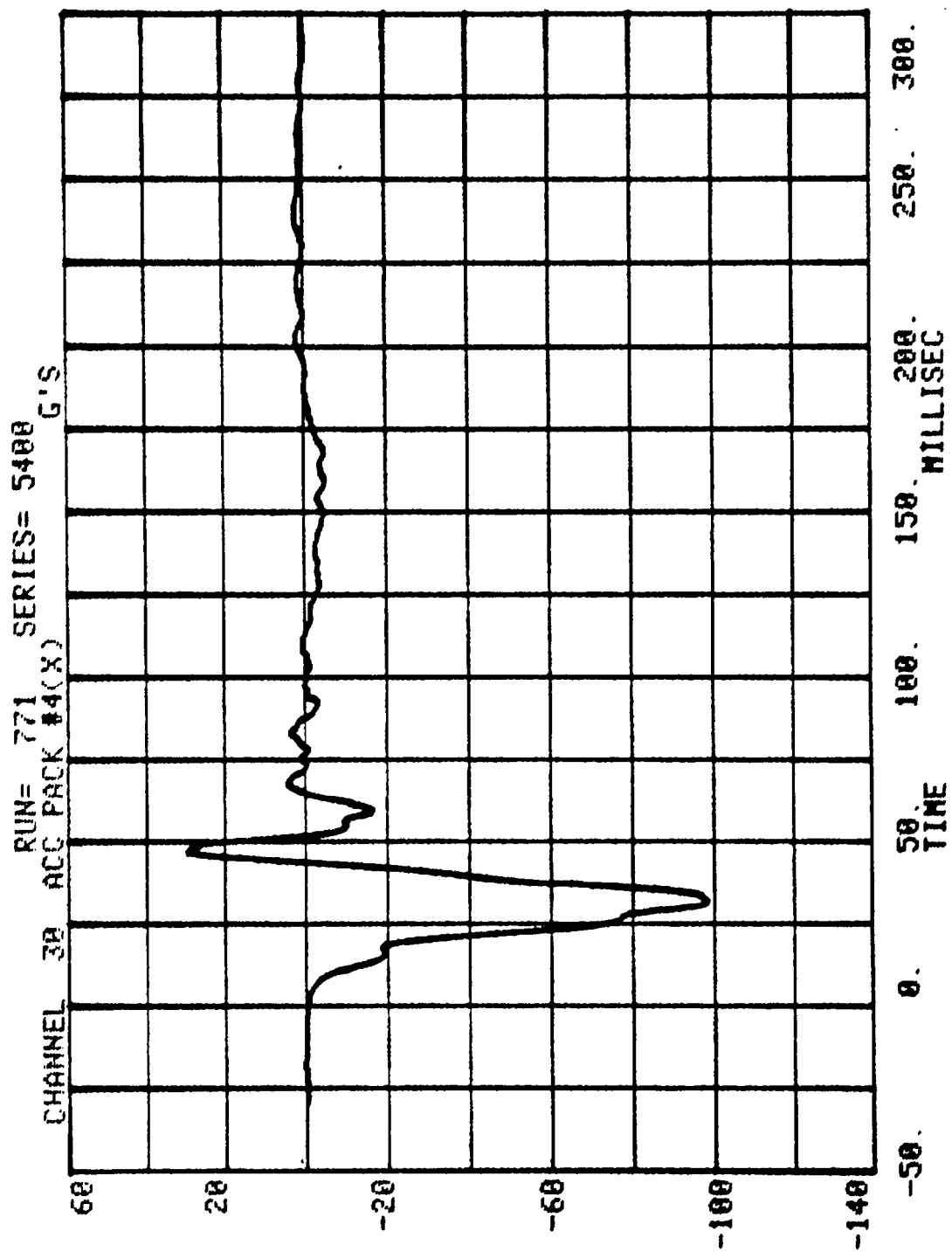
RUN= 771 SERIES= 5400
CHANNEL 29 ACC PACK #3(X) G'S

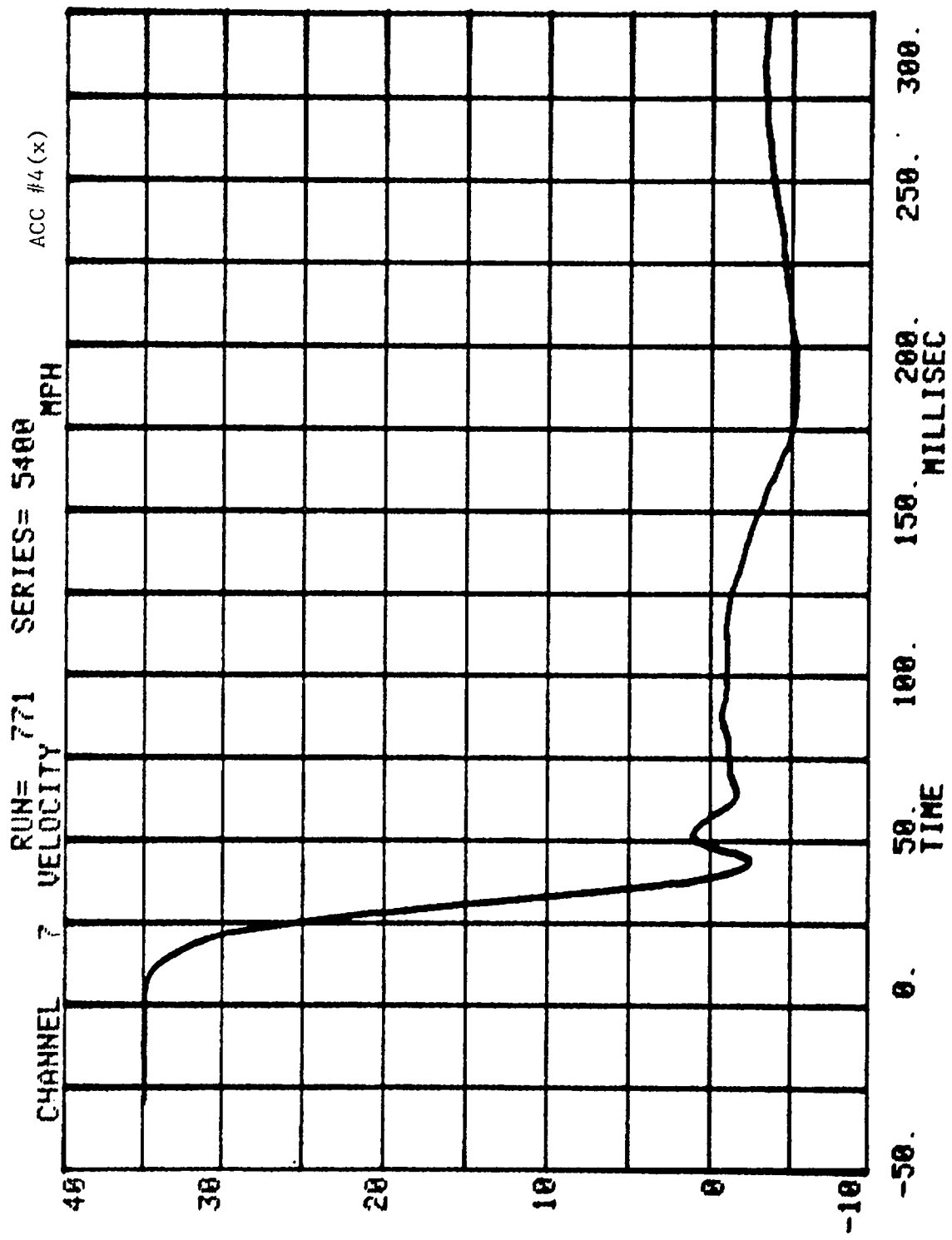


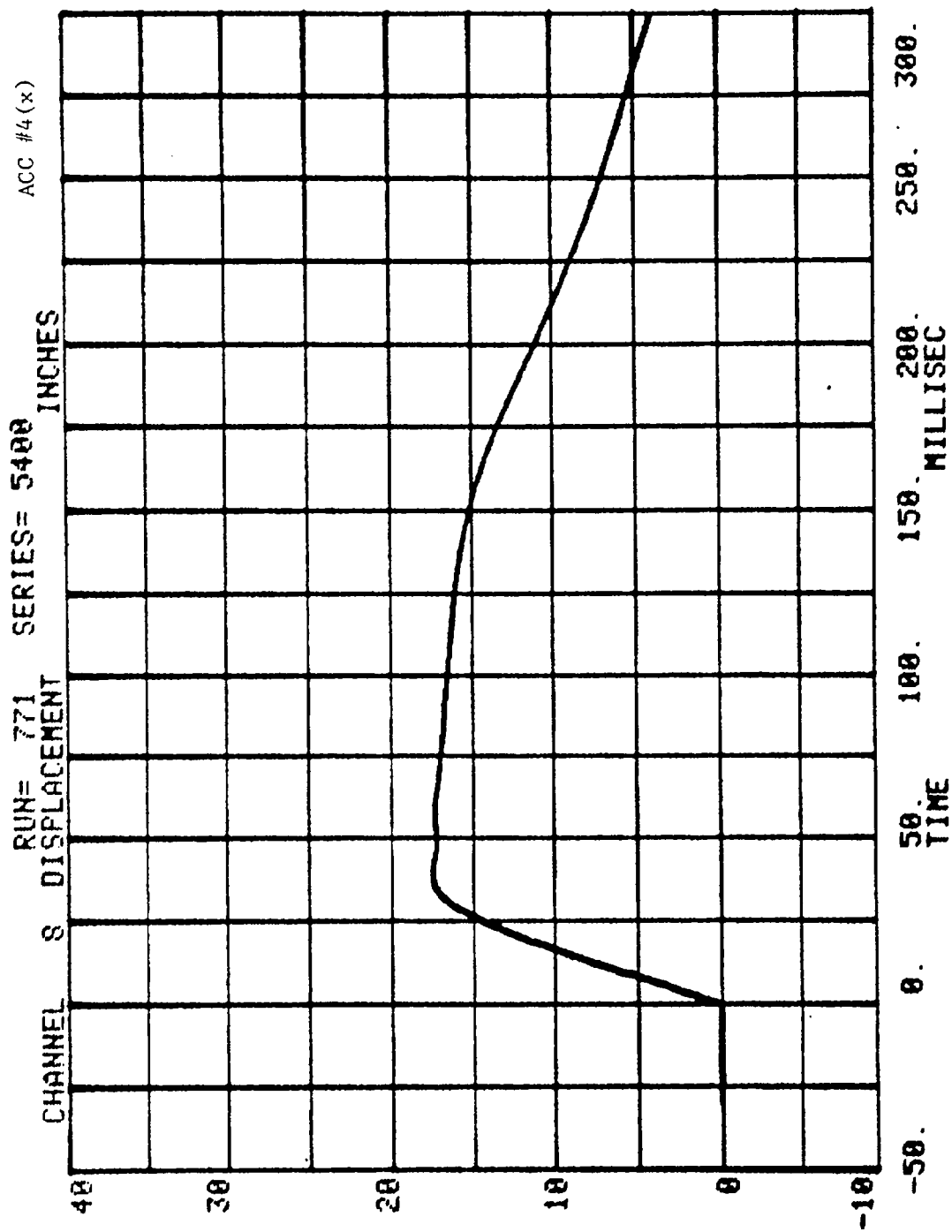


CHANNEL 6 DISPLACEMENT RUN= 771 SERIES= 5400 INCHES ACC #3(x)

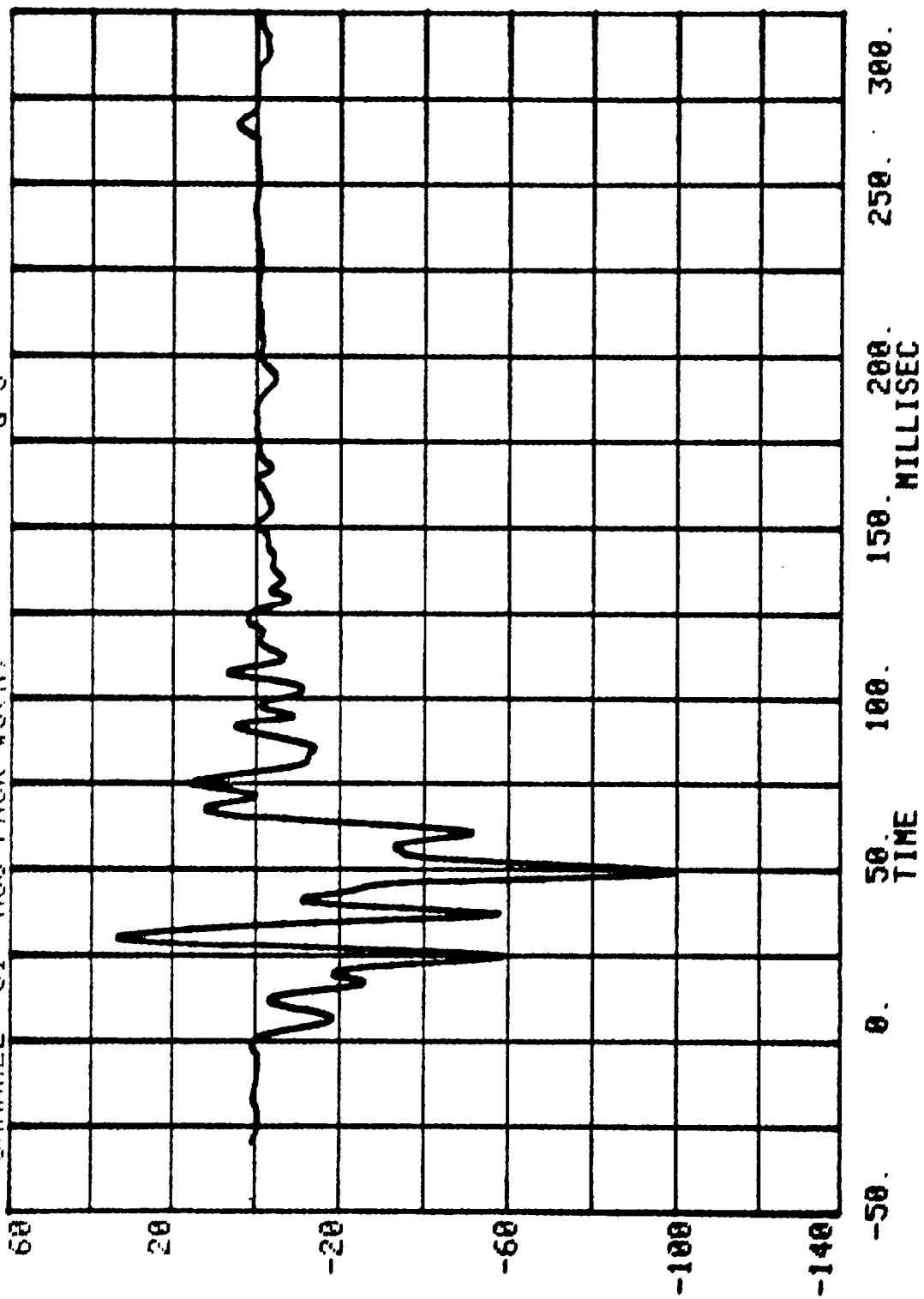


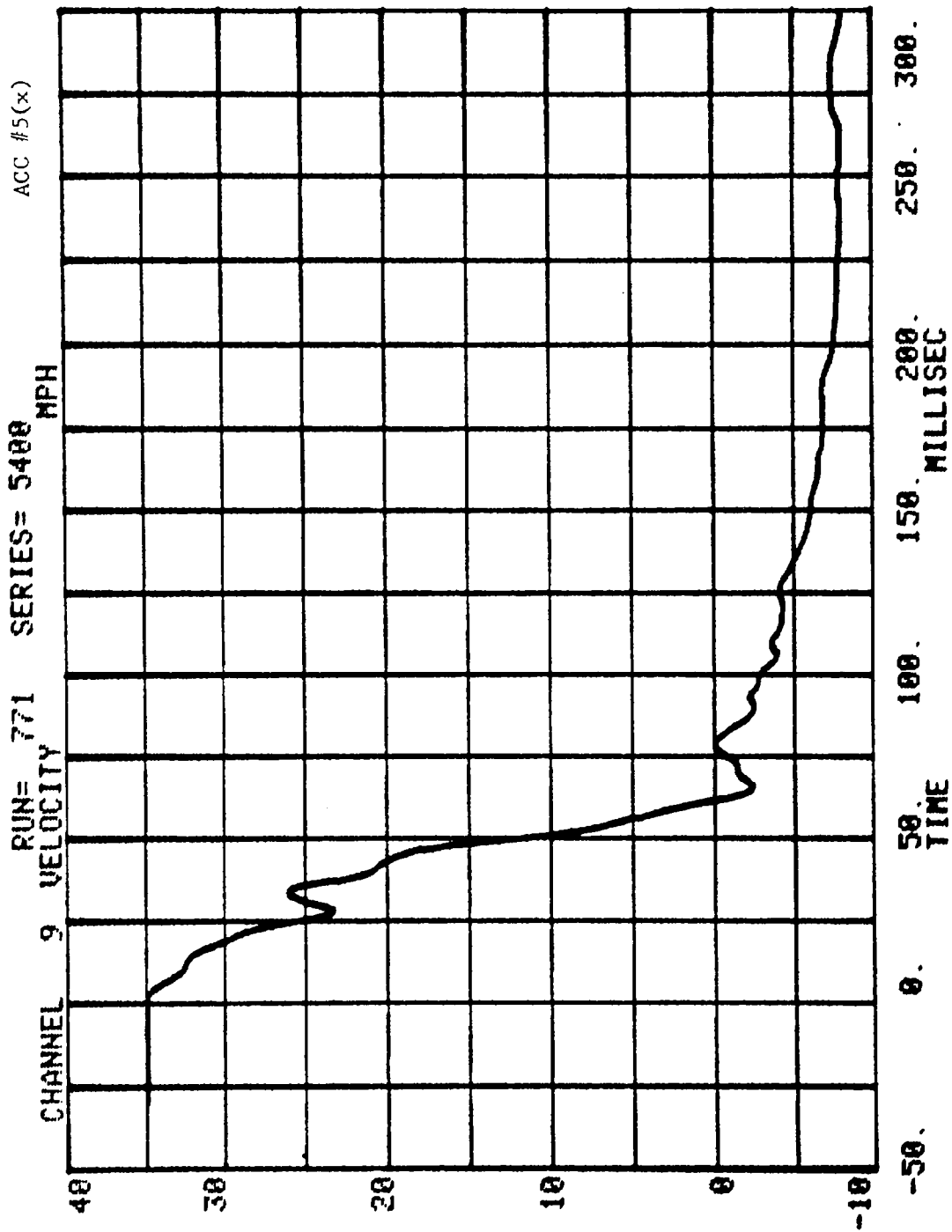


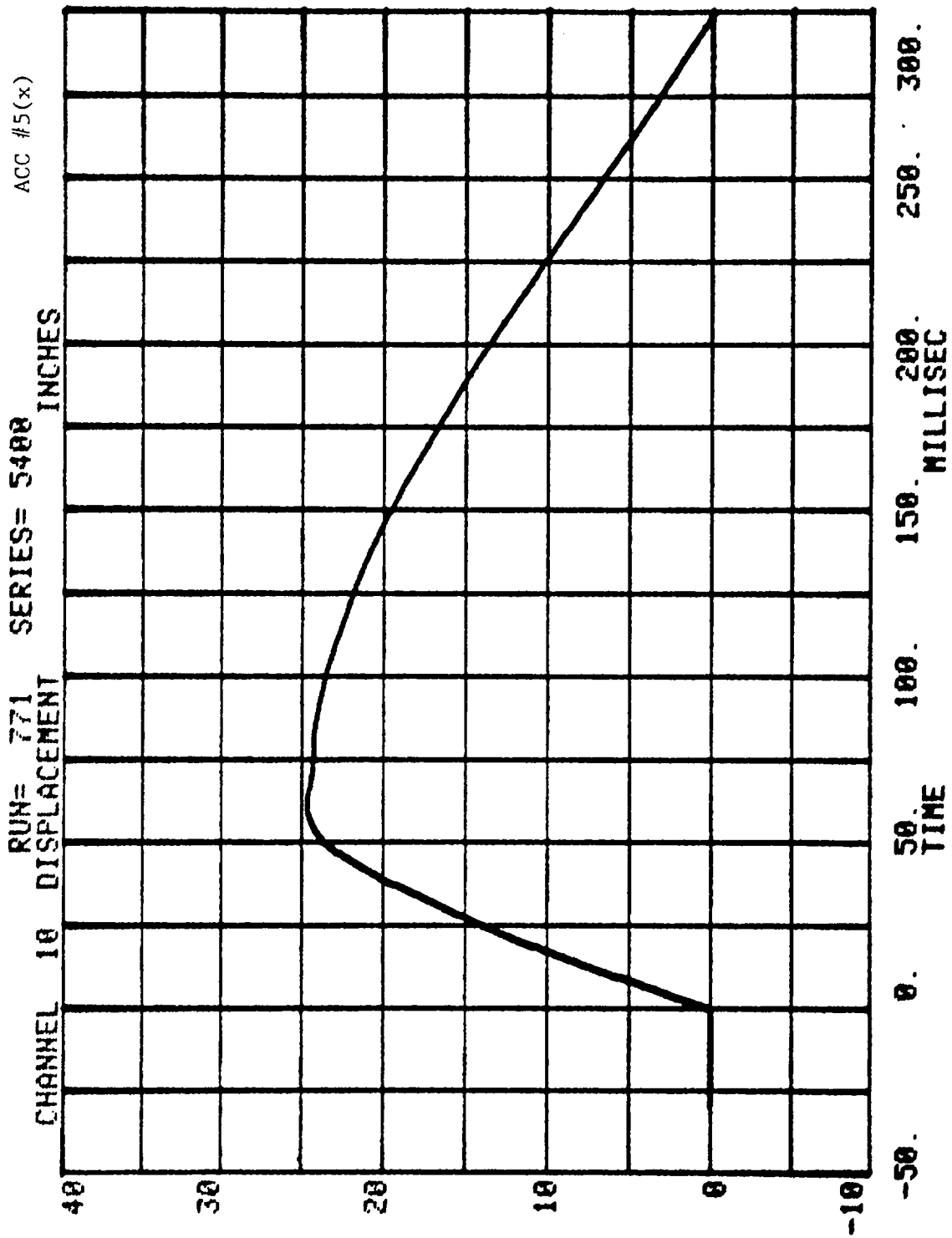




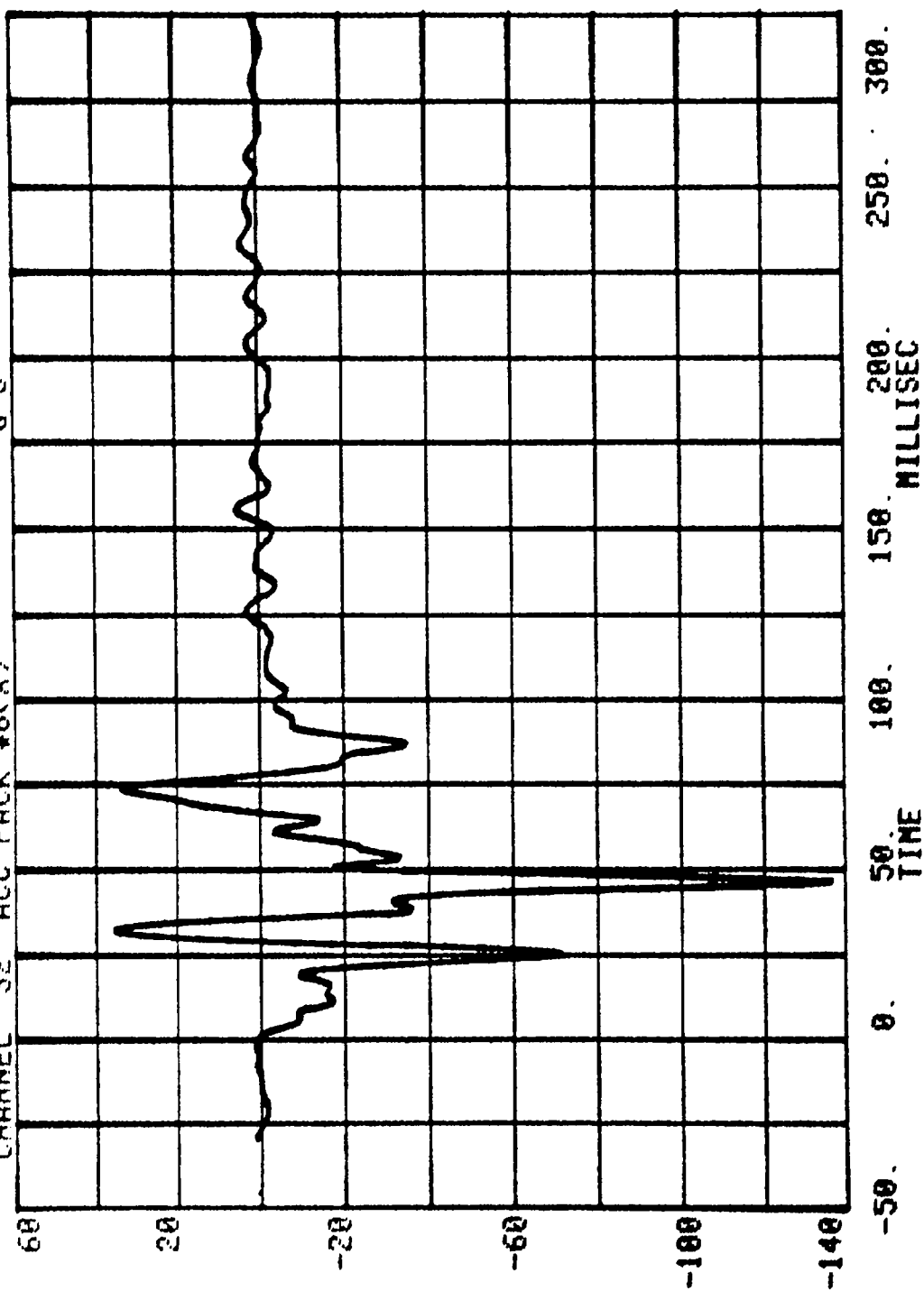
RUN= 771 SERIES= 5408
CHANNEL 31 ACC PACK #5(X) G'S

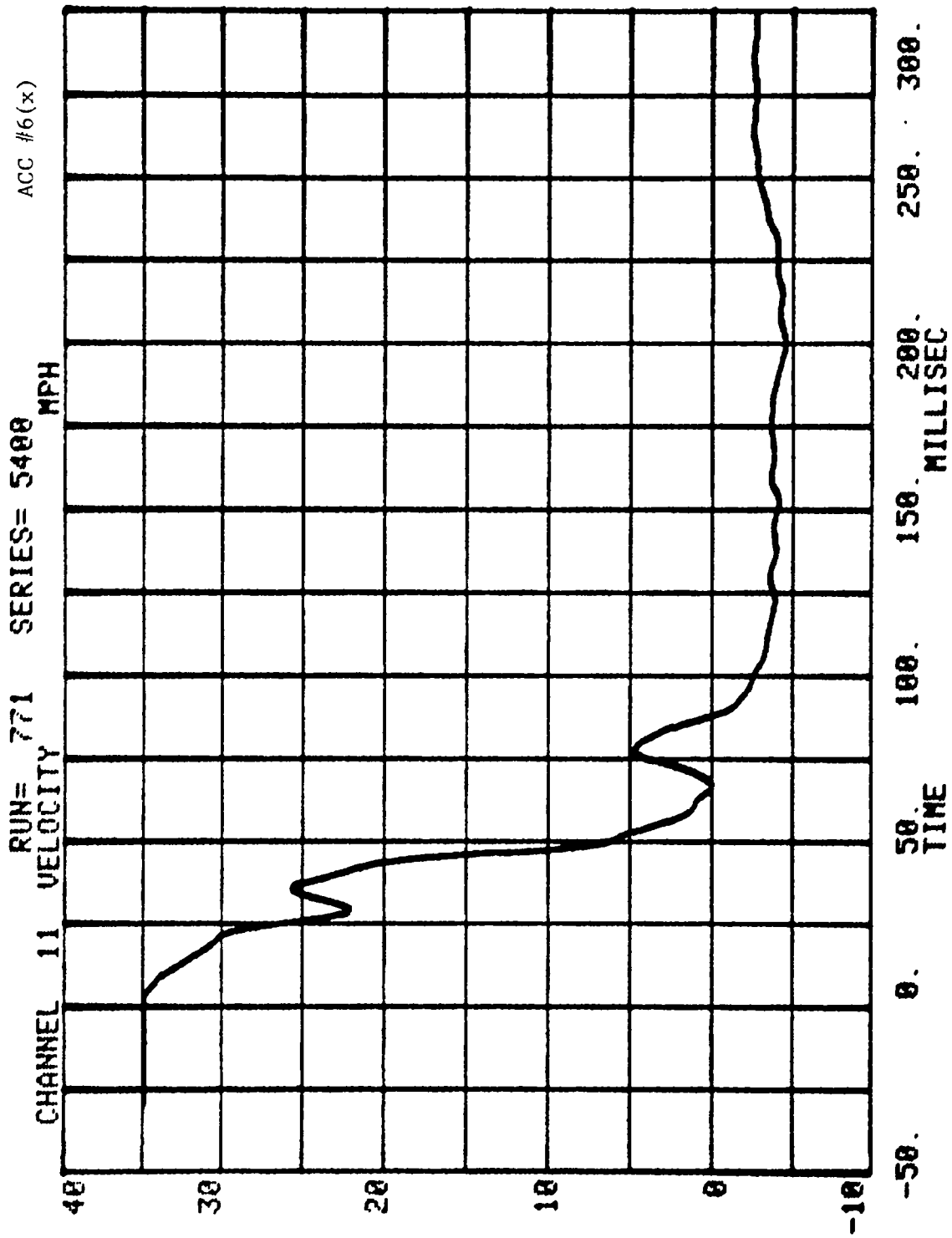


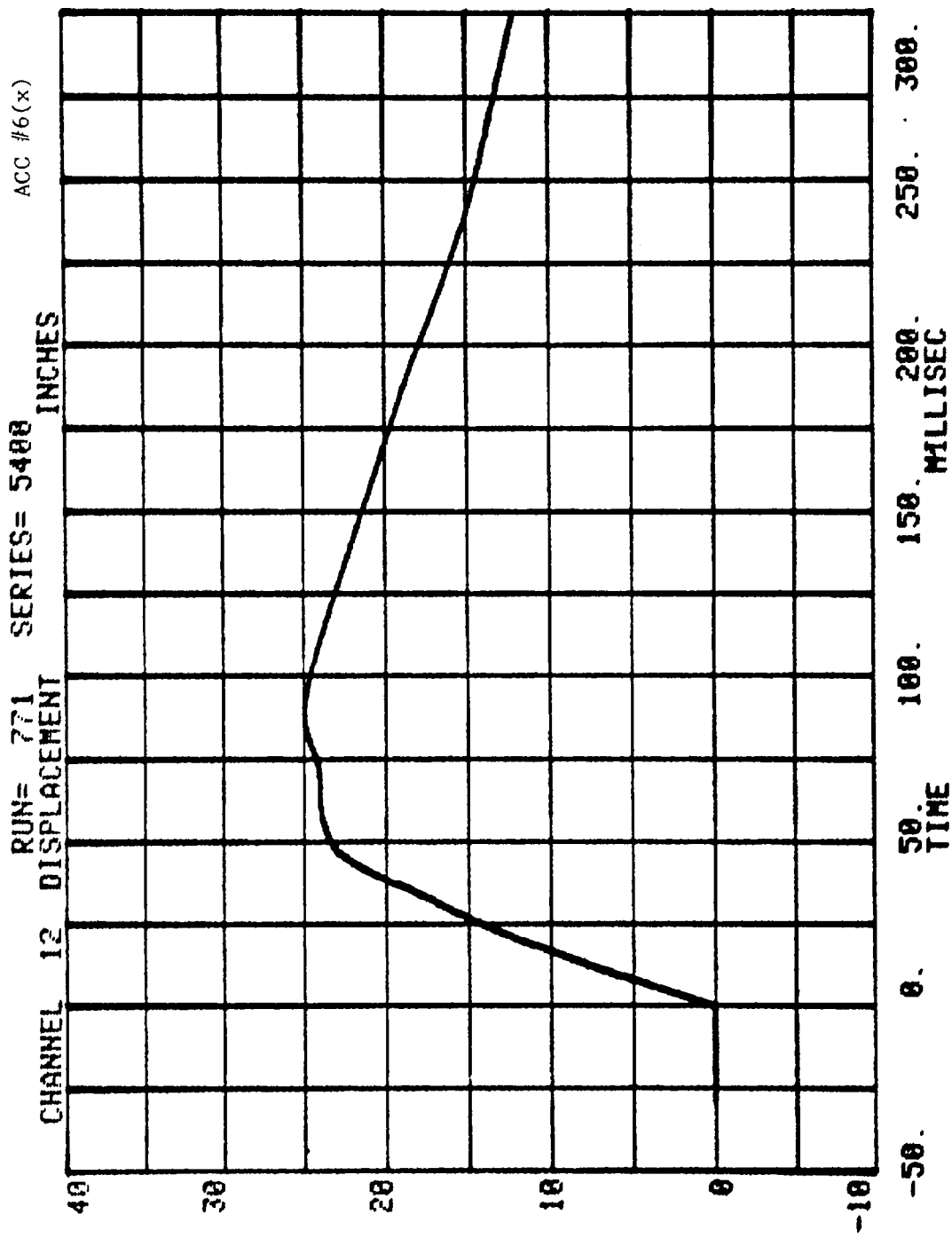




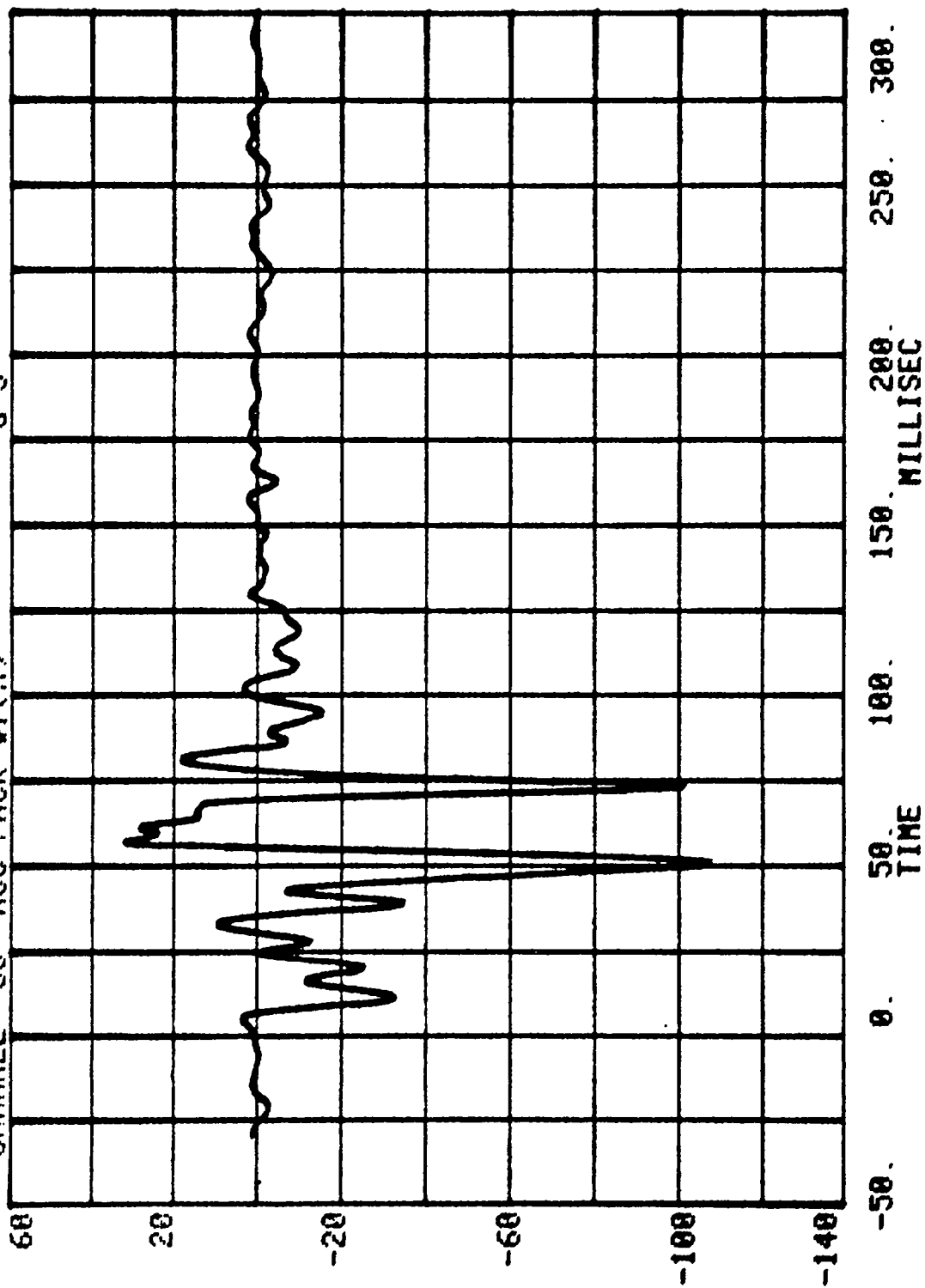
CHANNEL 32 ACC PACK #6(X) RUN= 771 SERIES= 5400 G'S

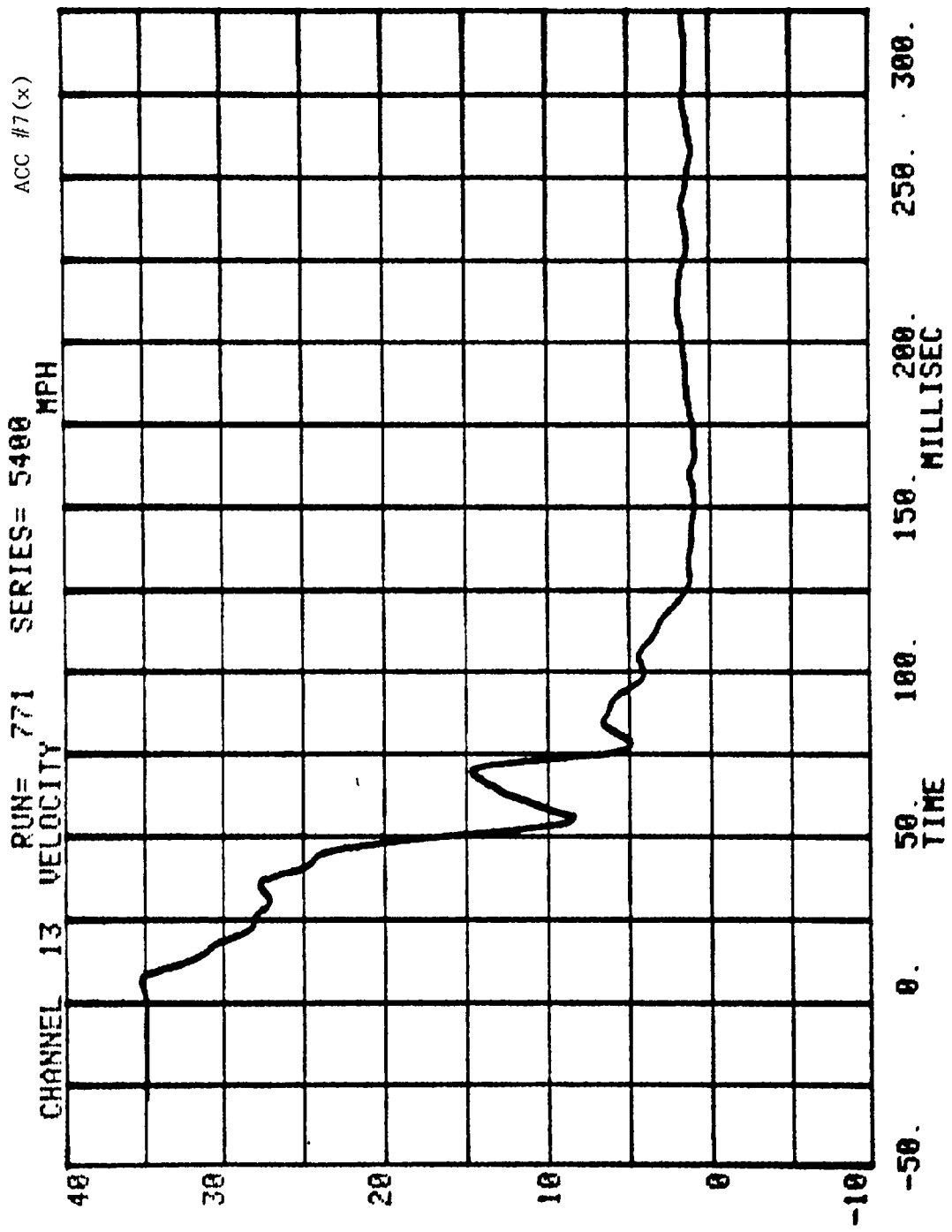


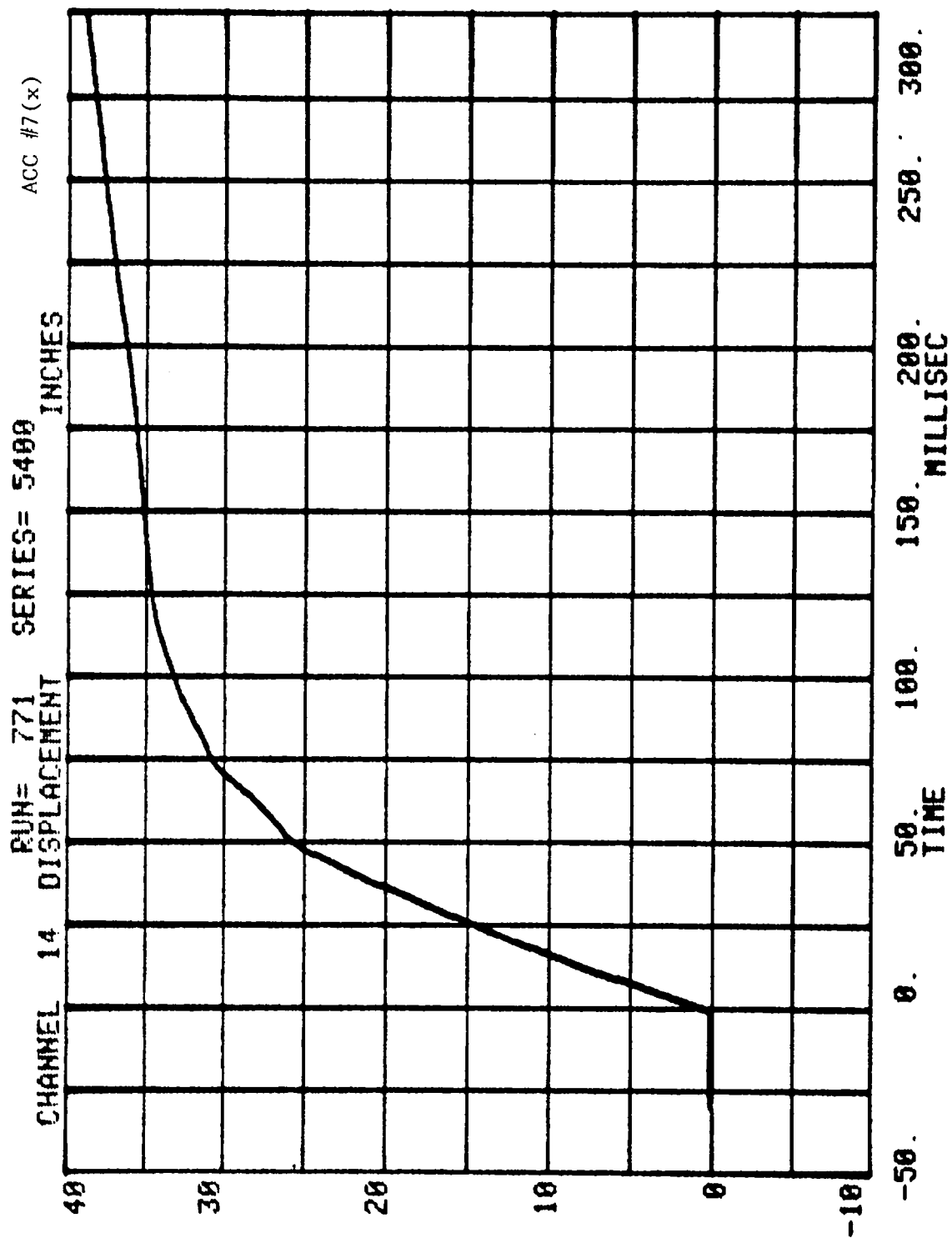




RUN= 771 SERIES= 5408
CHANNEL 33 ACC PACK #7(X) G'S







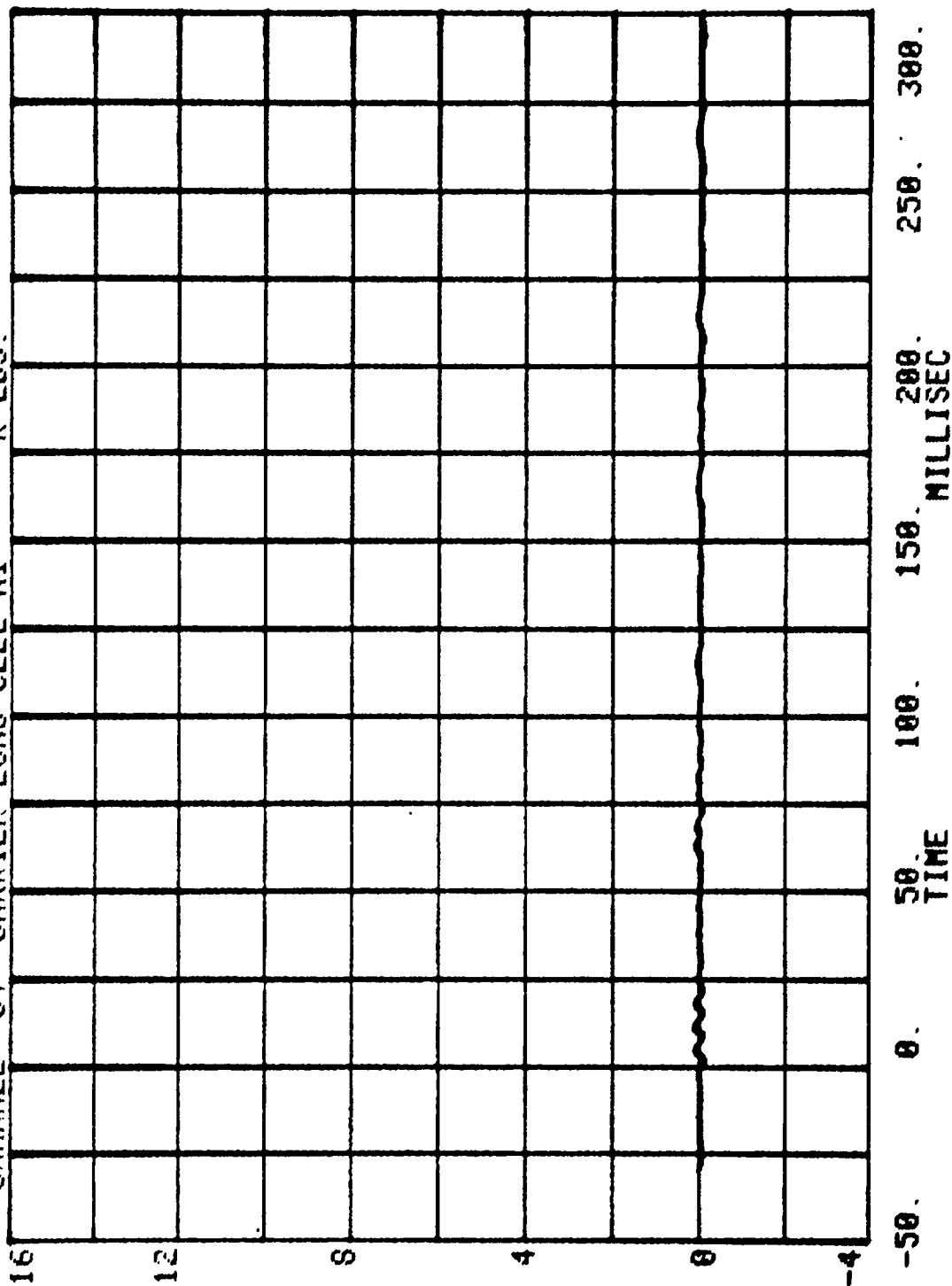
TEST NO. MH5400

LOAD CELL BARRIER DATA

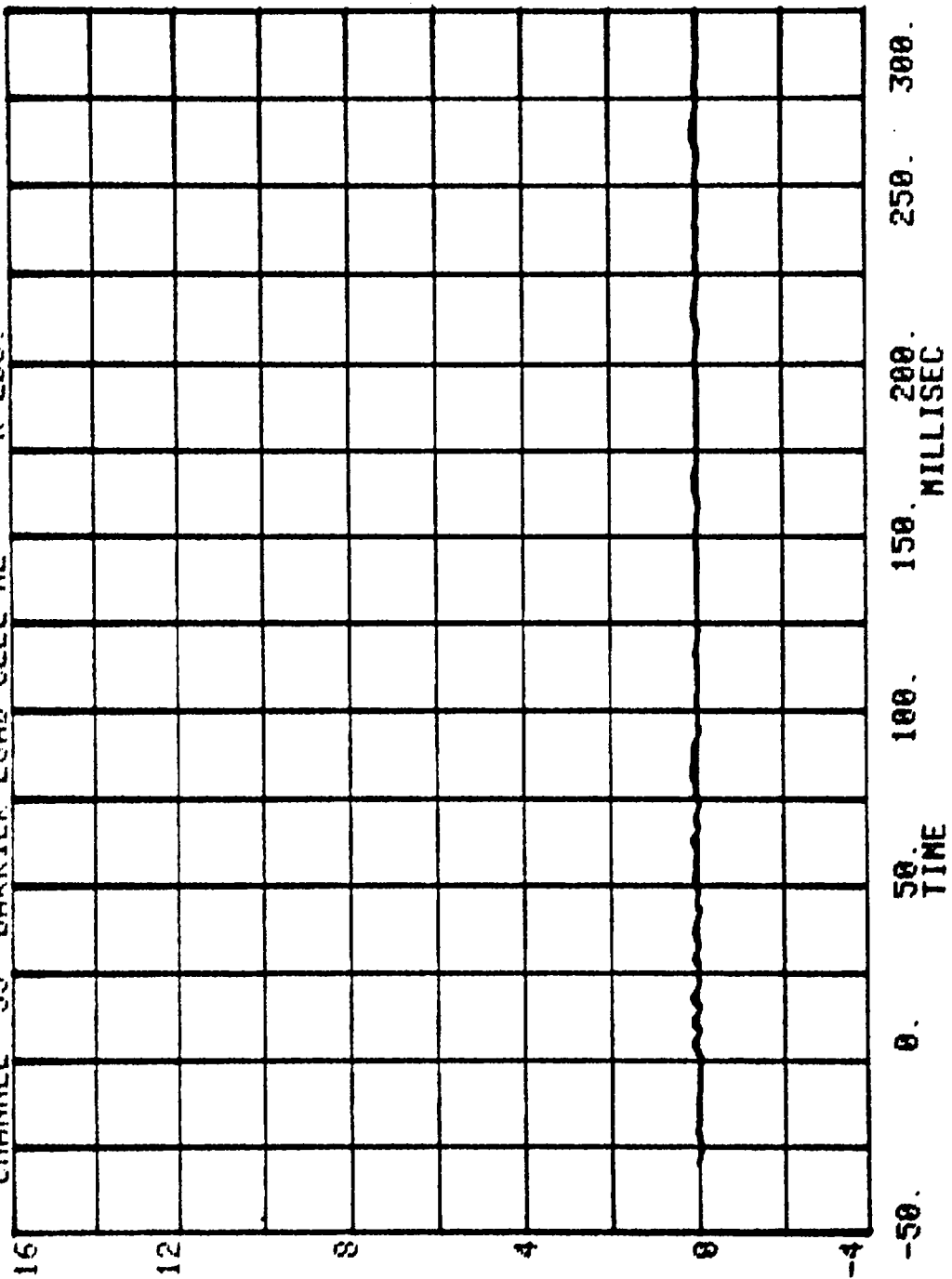
FILTER CHANNEL CLASS

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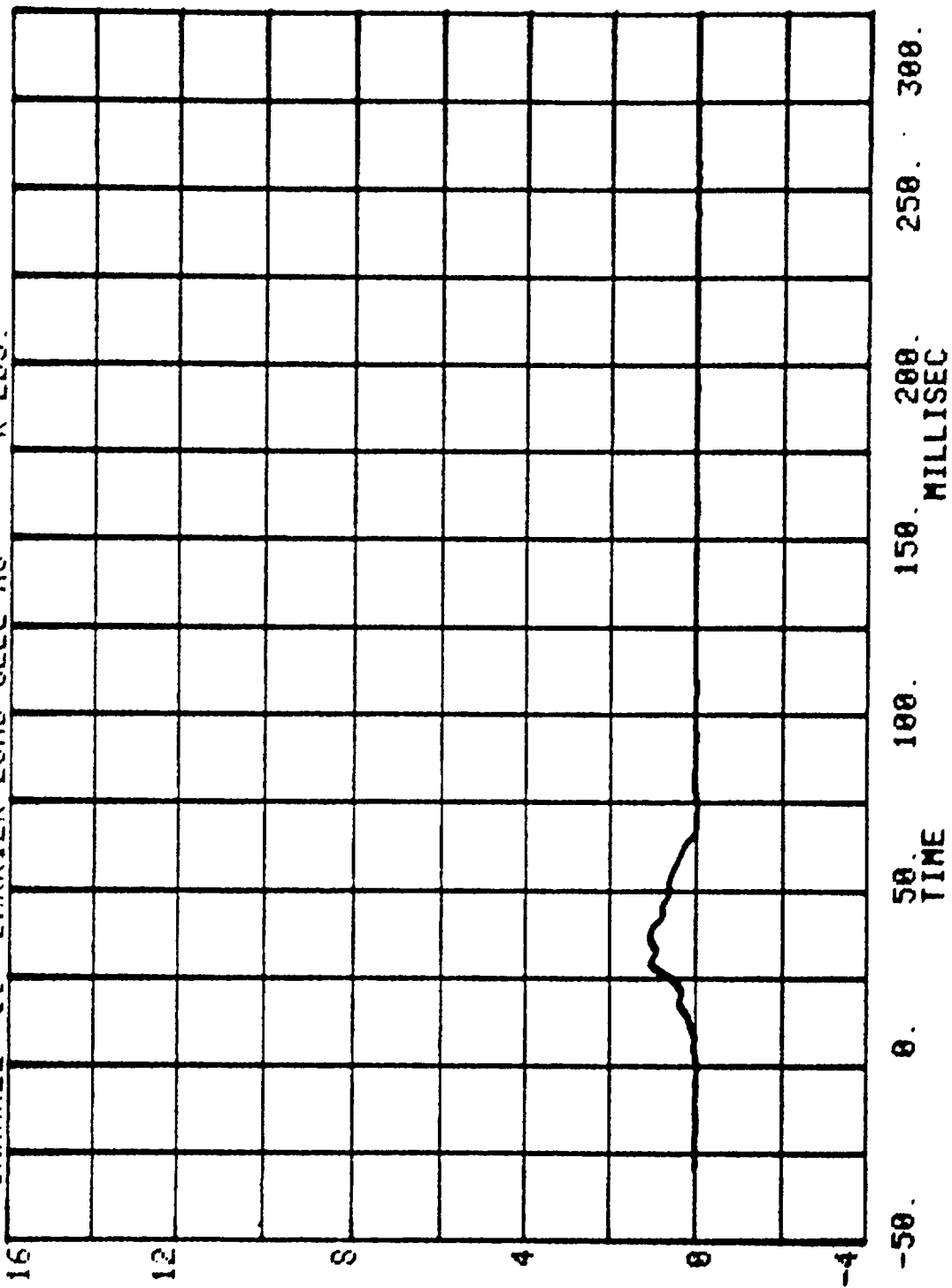
CHANNEL 34 BARRIER LOAD CELL A1 RUN= 771 SERIES= 5400 K LBS.



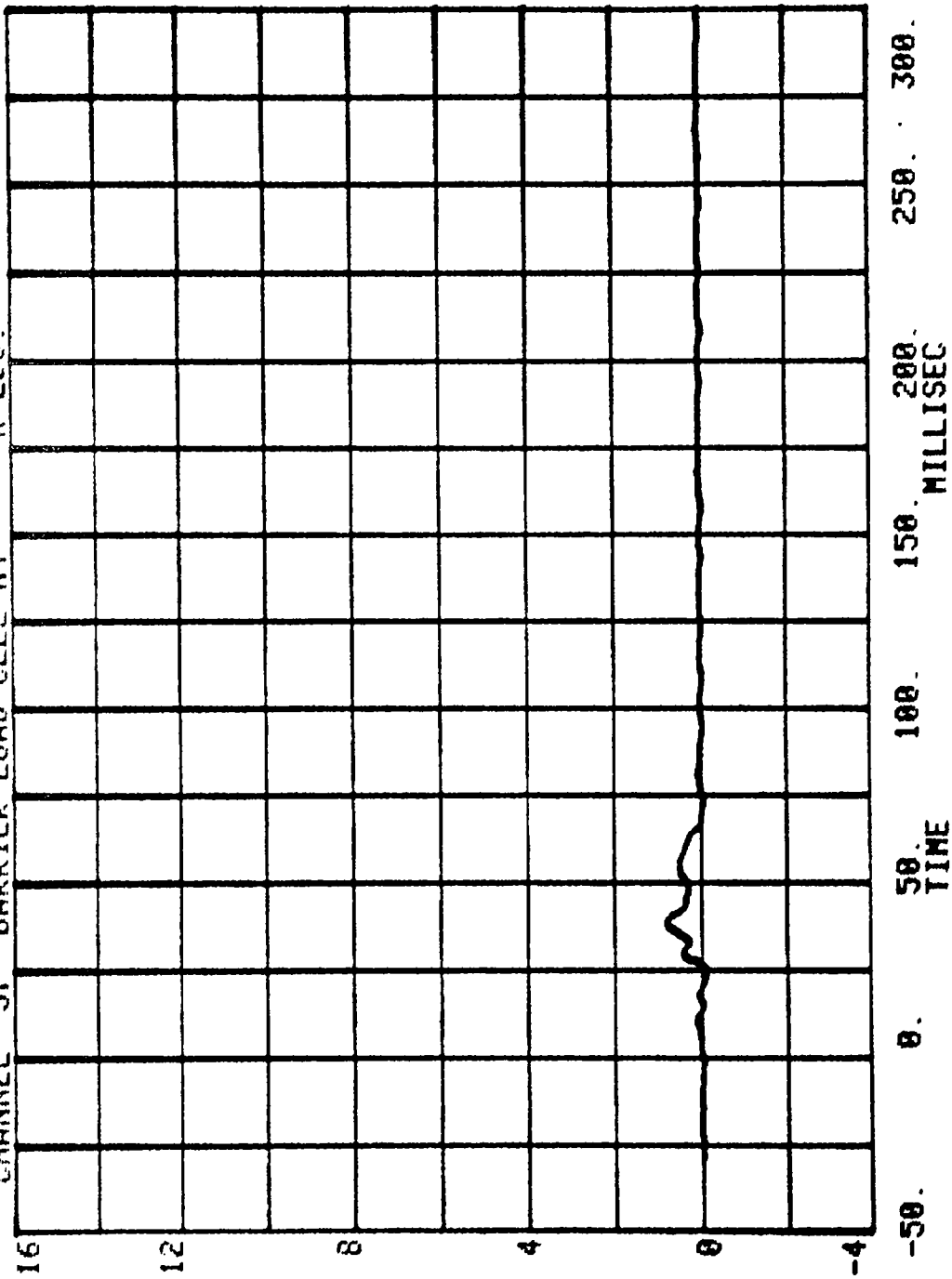
RUN= 771 SERIES= 5400
CHANNEL 35 BARRIER LOAD CELL A2 K LBS.



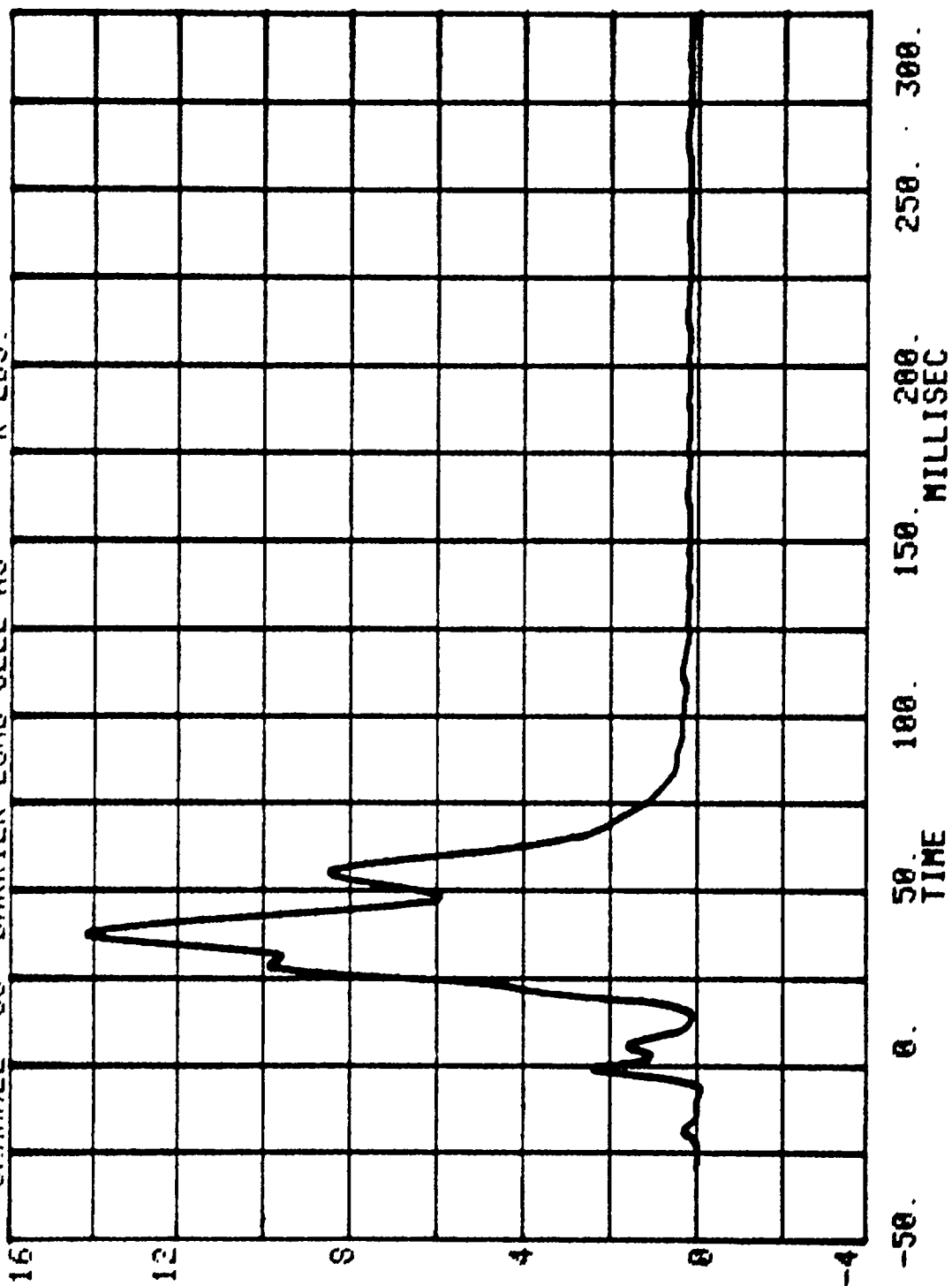
RUN= 771 SERIES= 5400
CHANNEL 36 BARRIER LOAD CELL A3 K LBS.



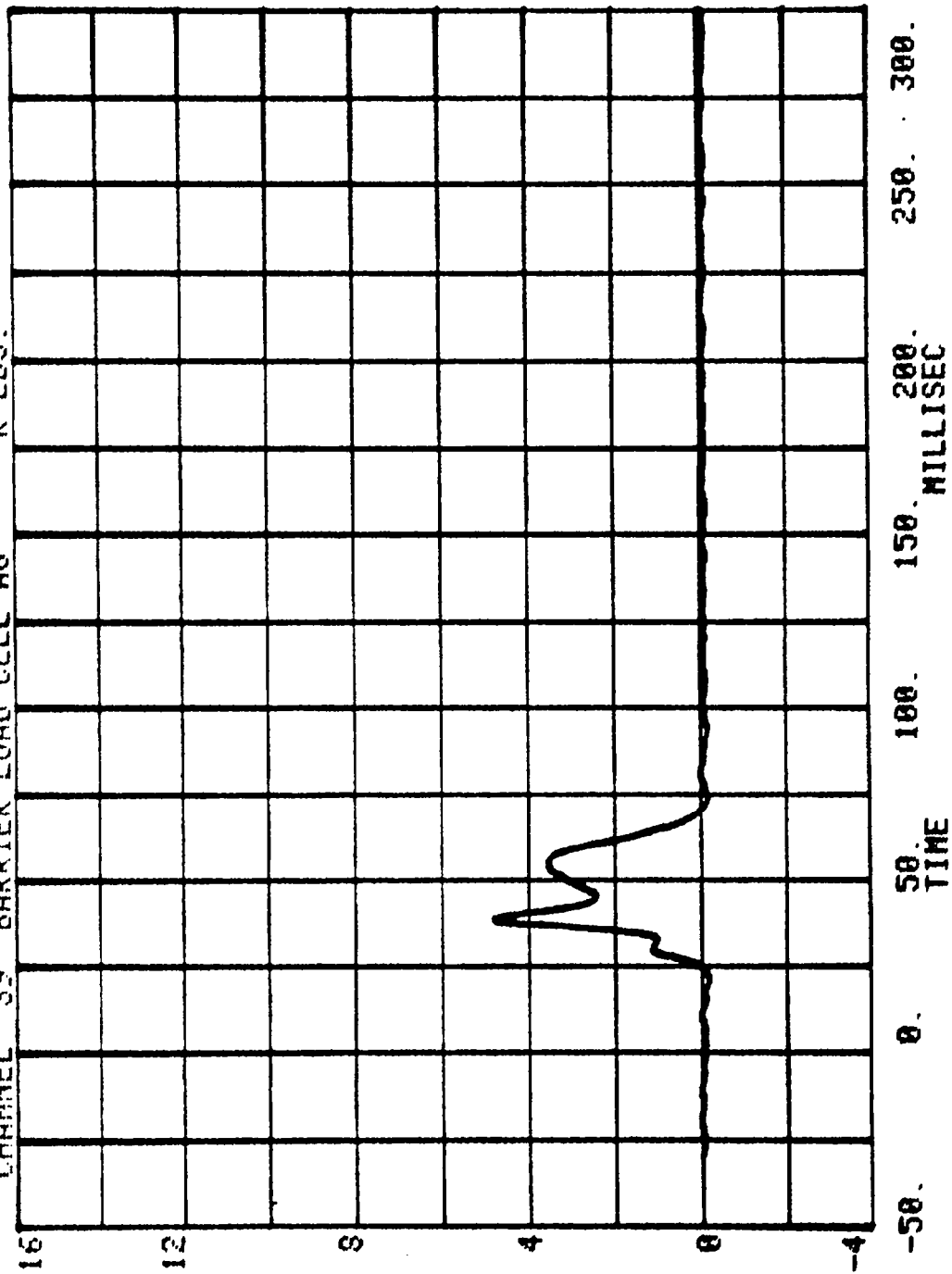
CHANNEL 37 BARRIER LOAD CELL A4 RUN= 771 SERIES= 5480 K LBS.



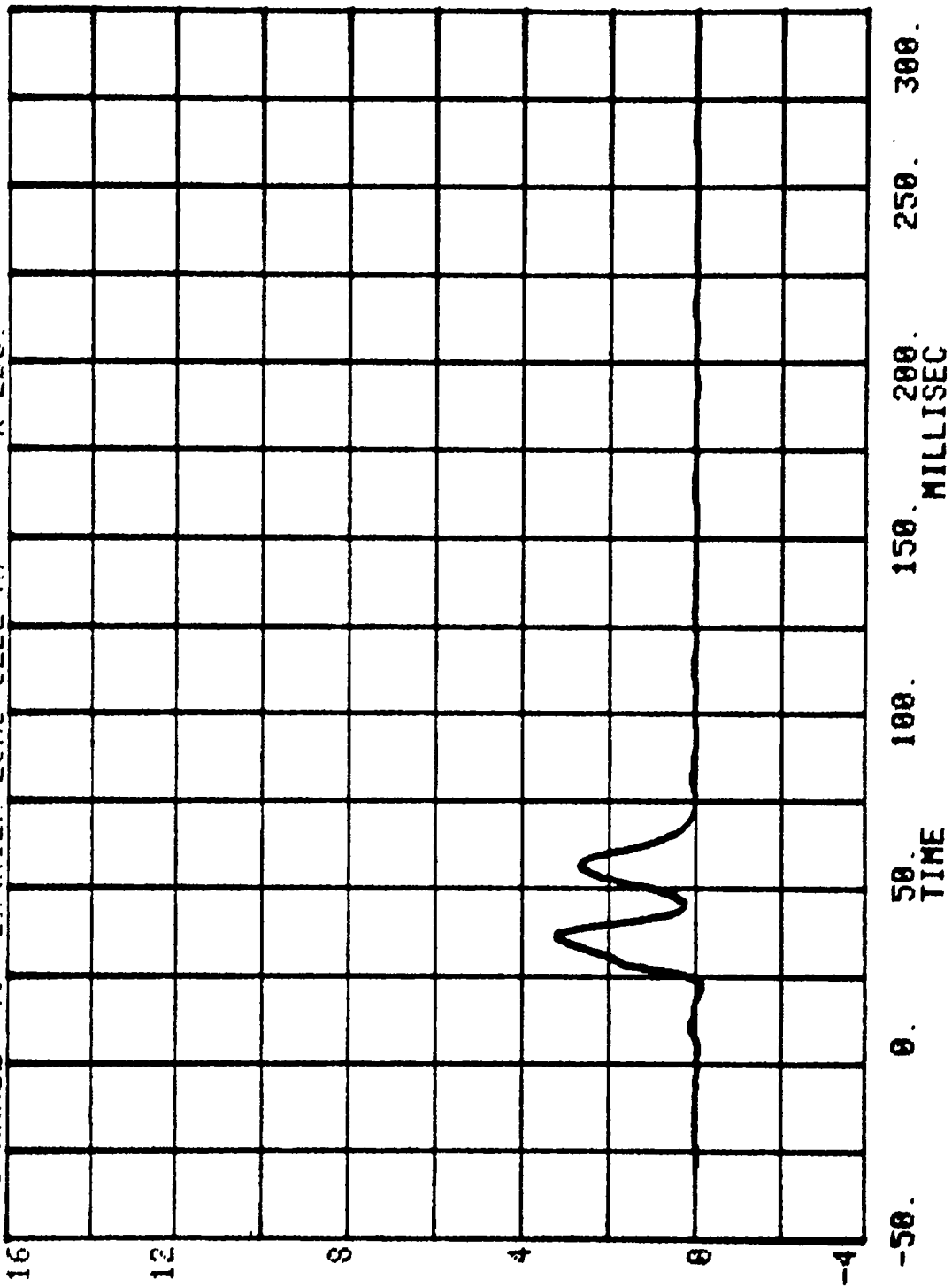
RUN= 771 SERIES= 5400
CHANNEL 38 BARRIER LOAD CELL A5 K LBS.



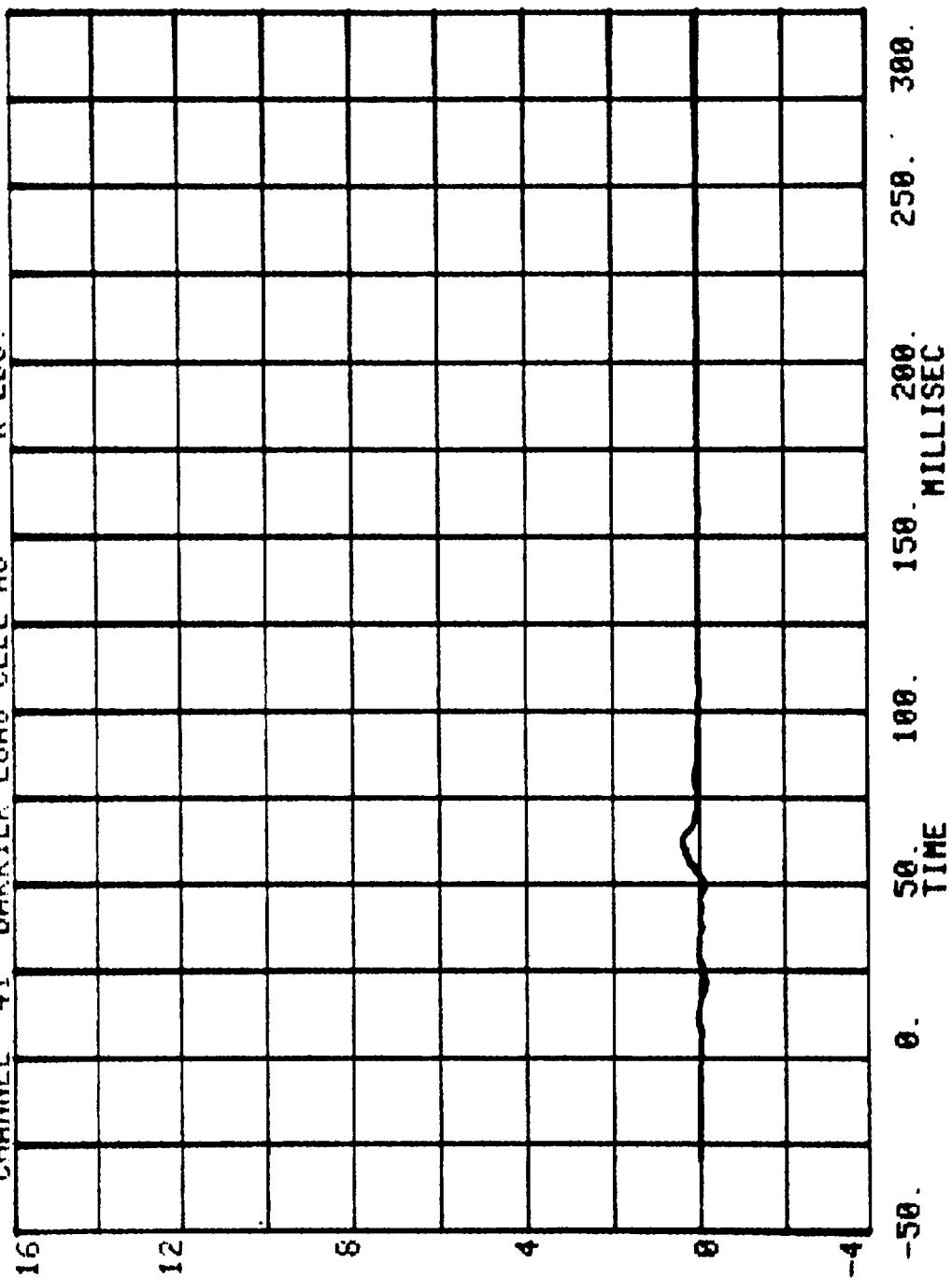
CHANNEL 39 BARRIER LOAD CELL A6
RUN= 771 SERIES= 5488 K LBS.



CHANNEL 40 BARRIER LOAD CELL A7 RUN= 771 SERIES= 5400 K LBS.

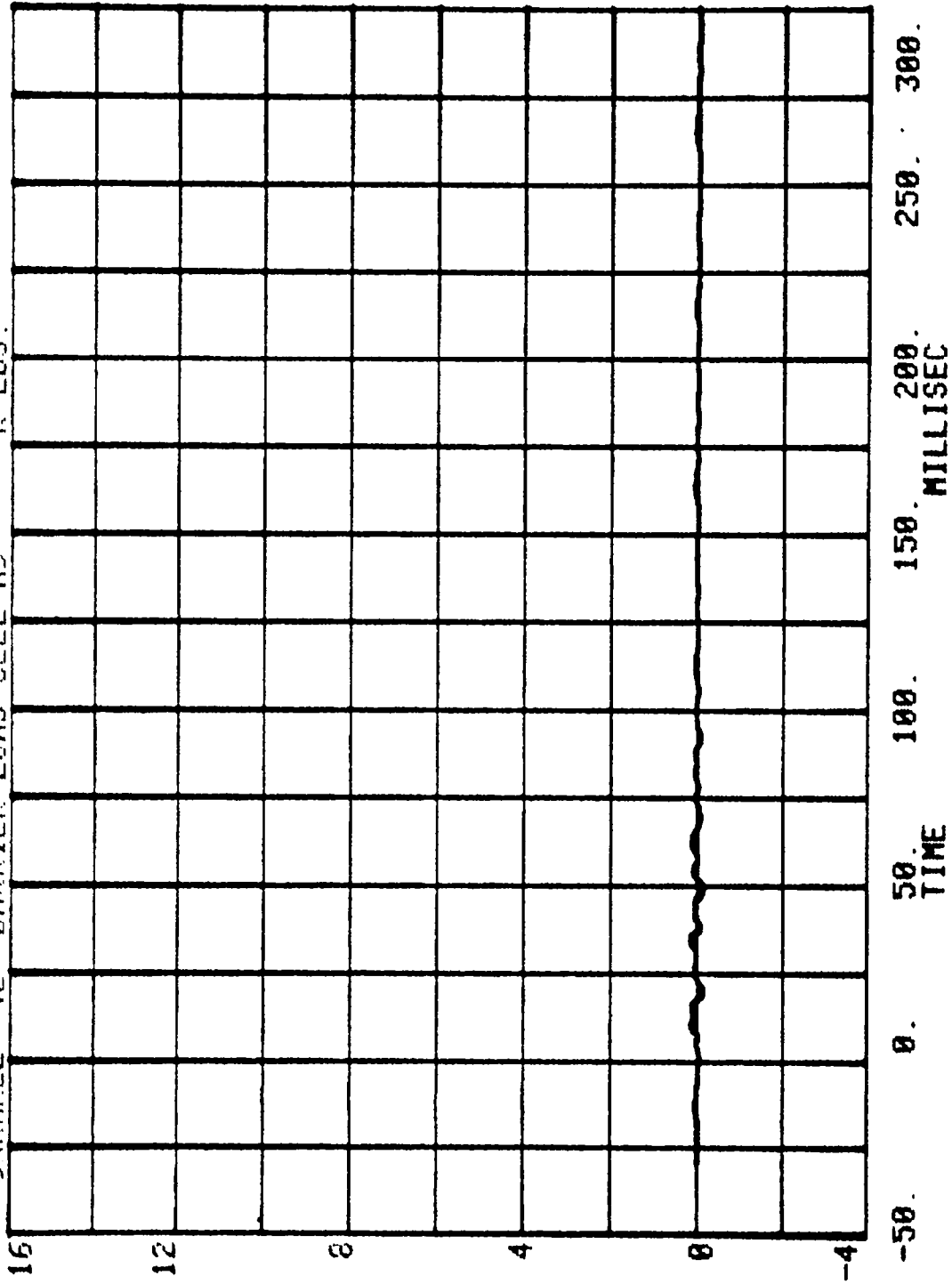


CHANNEL 41 BARRIER LOAD CELL A8 RUN= 771 SERIES= 5400 K LBS.

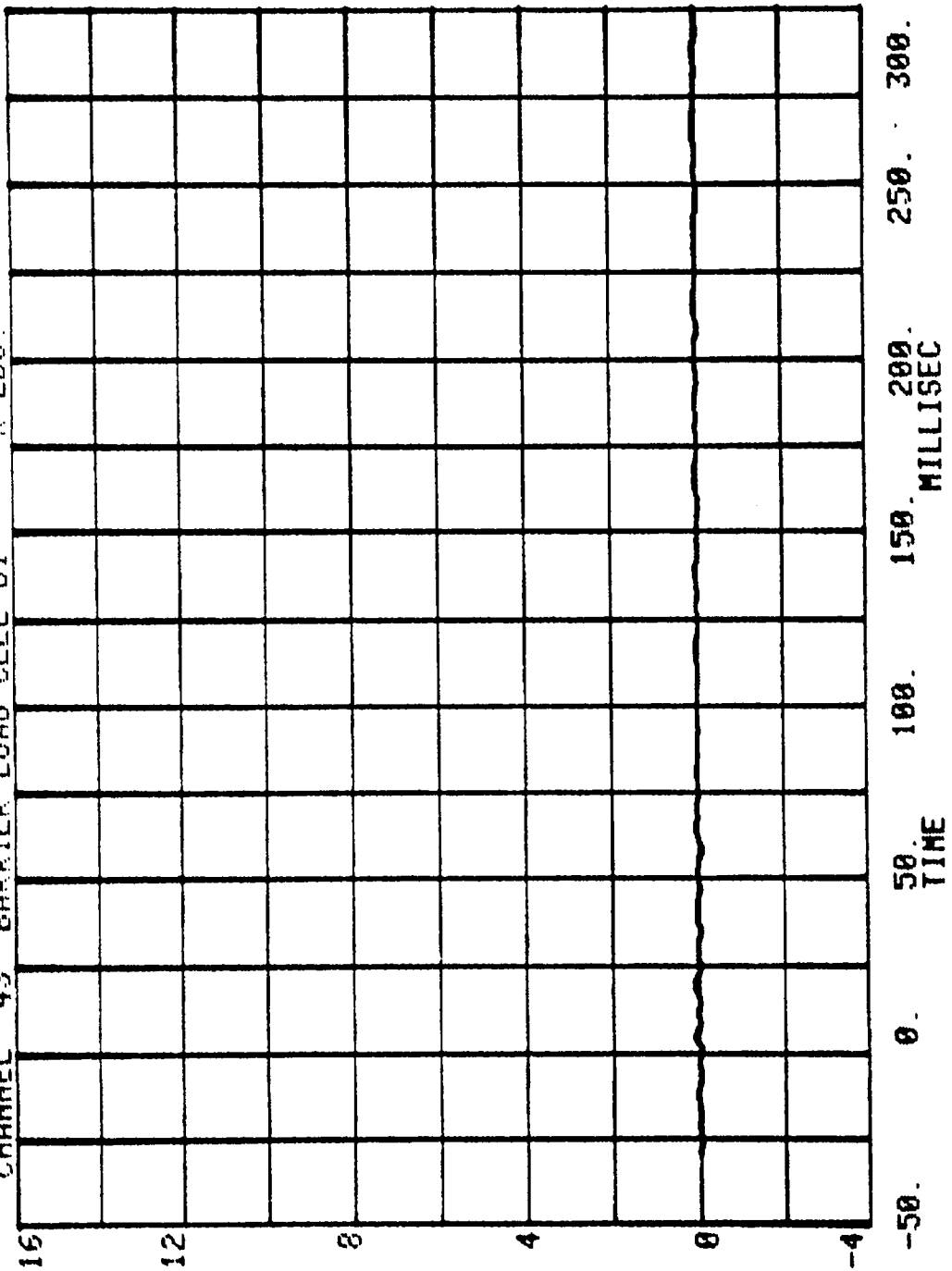


CHANNEL 42 BARRIER LOAD CELL A9 K LBS.

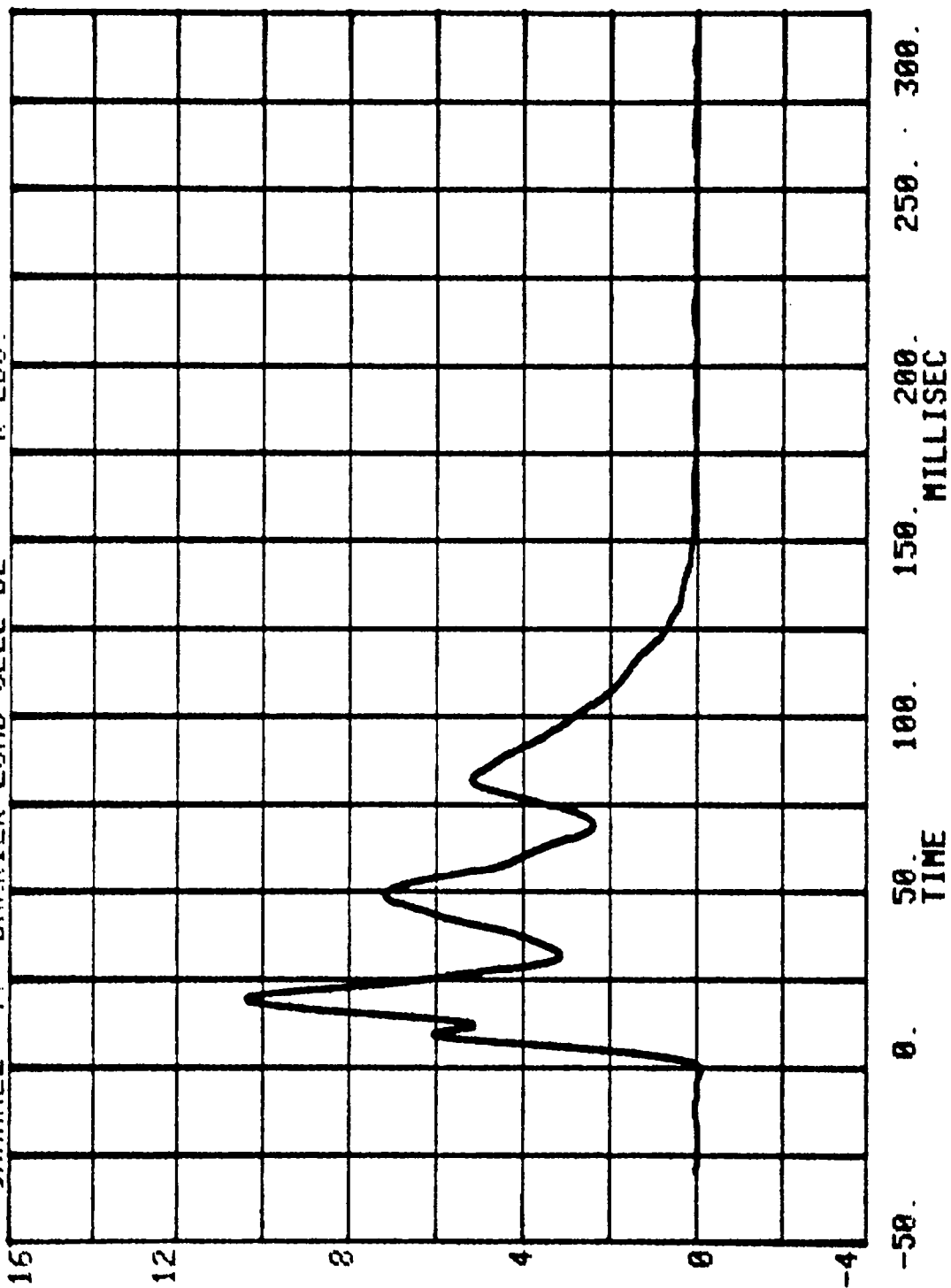
RUN= 771 SERIES= 5488



CHANNEL 43 BARRIER LOAD CELL B1 RUN= 771 SERIES= 5400 K LBS.

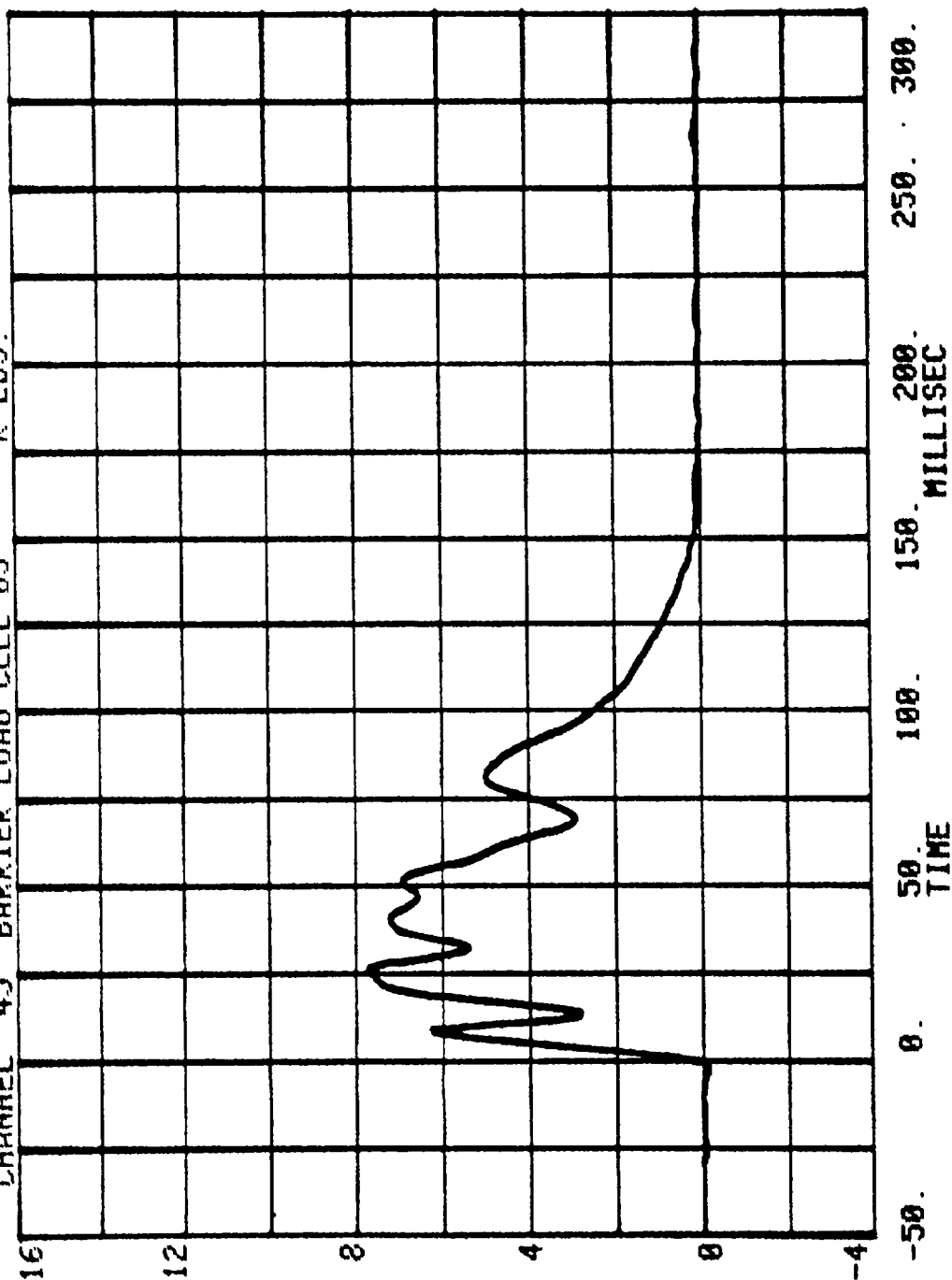


CHANNEL 44 BARRIER LOAD CELL B2
RUN= 771 SERIES= 5498 K LBS.

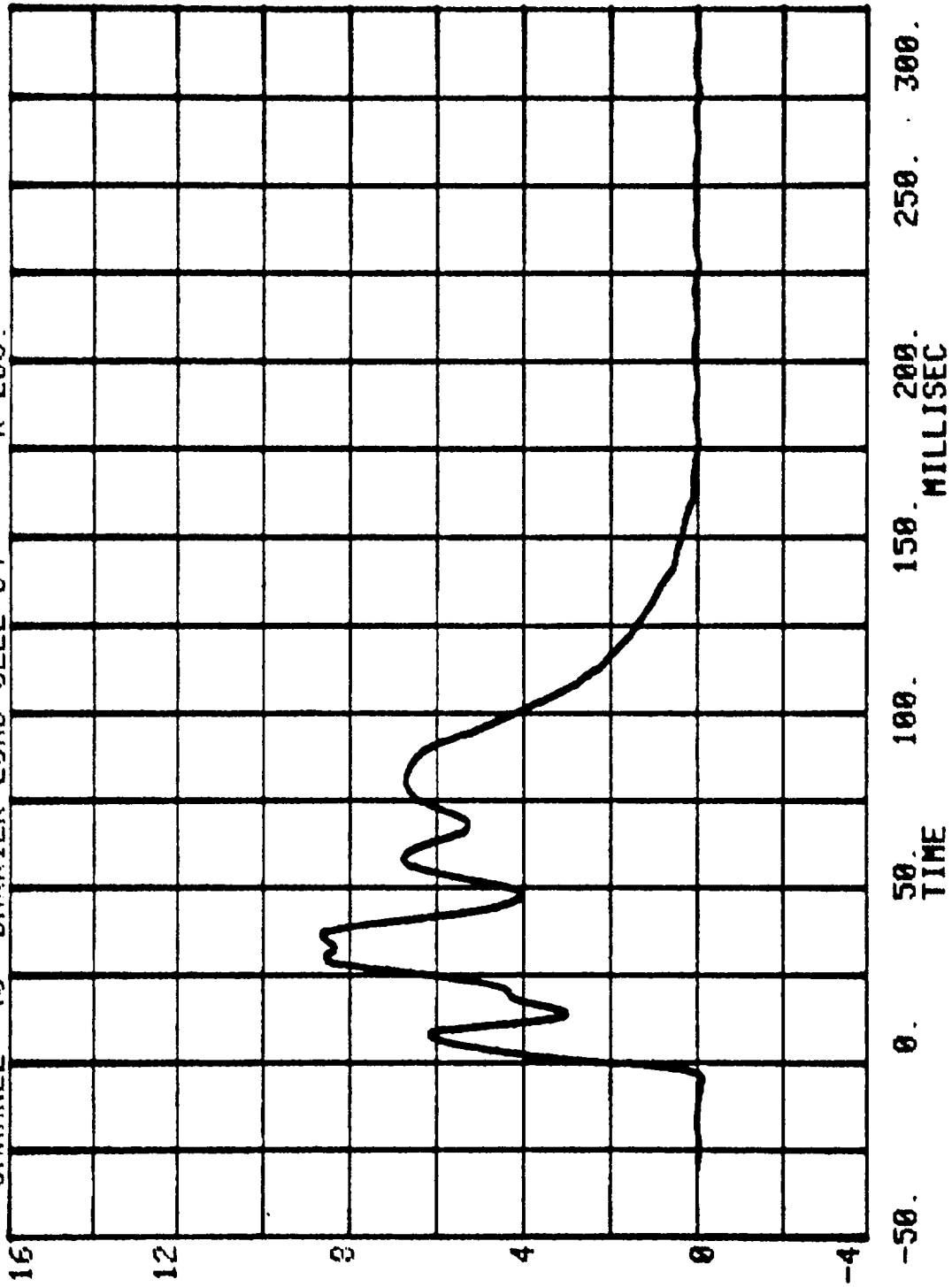


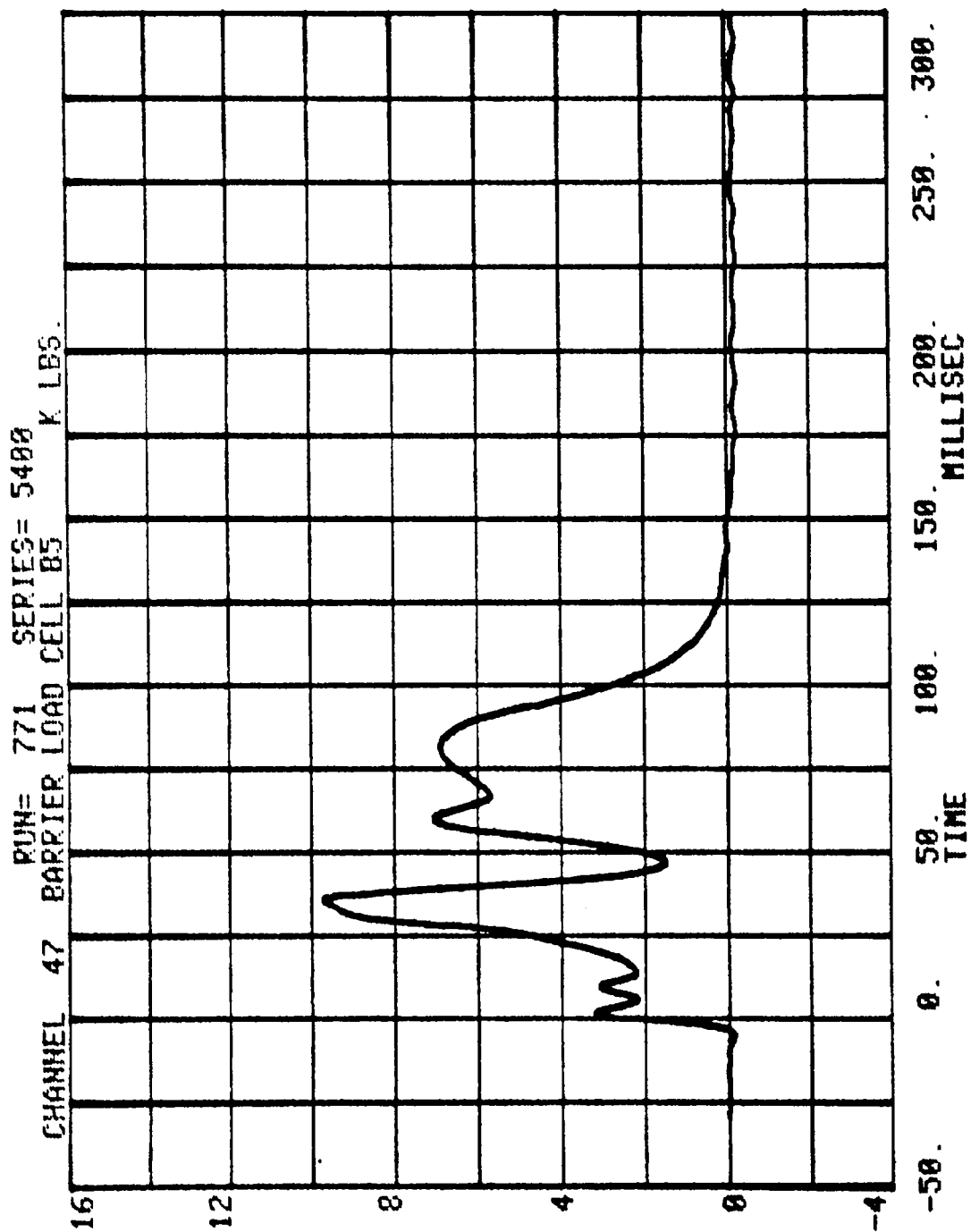
CHANNEL 45 BARRIER LOAD CELL B3 K LBS.

RUN= 771 SERIES= 5400

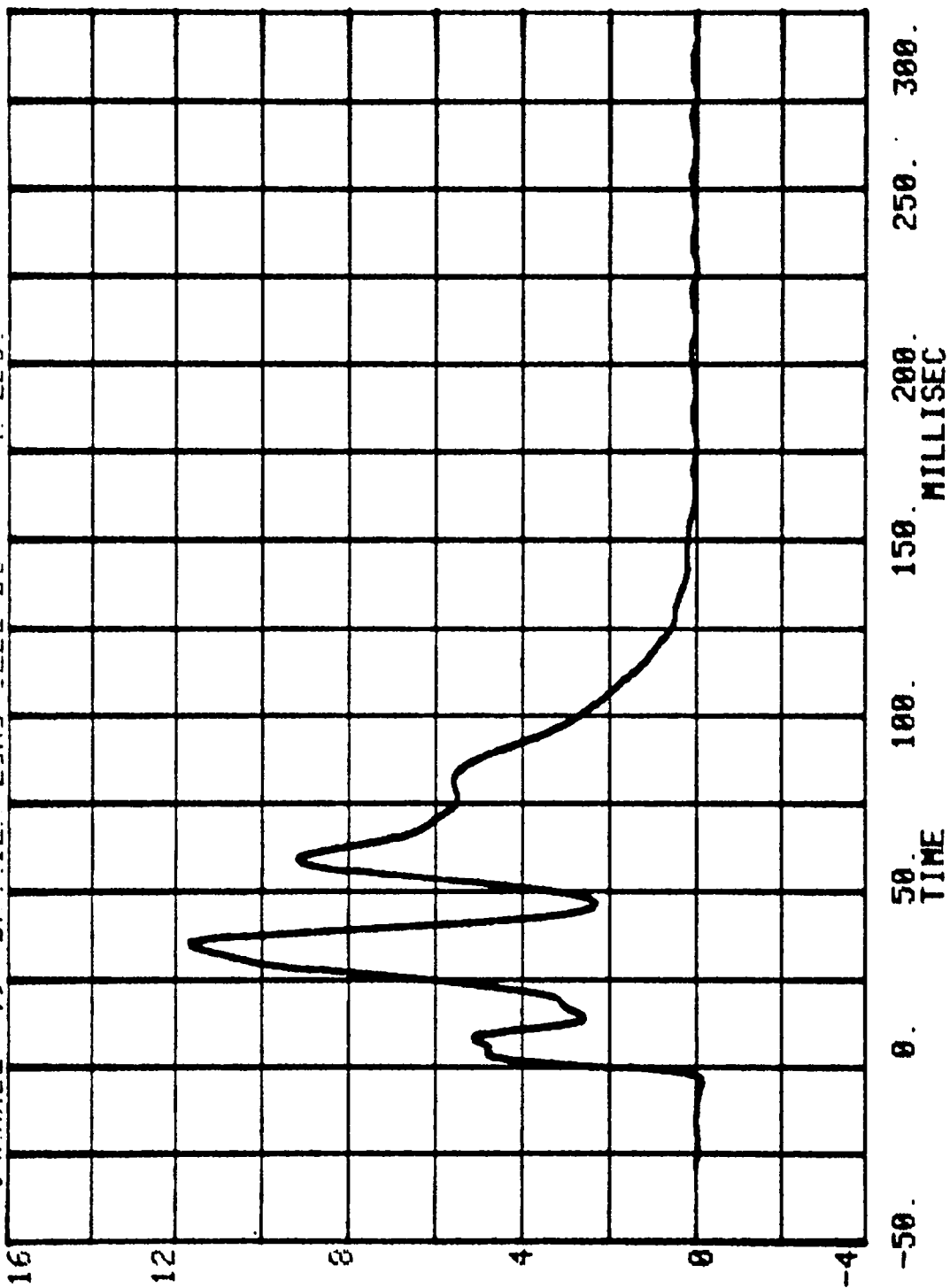


RUN= 771 SERIES= 5400
CHANNEL 46 BARRIER LOAD CELL B4 K LBS.

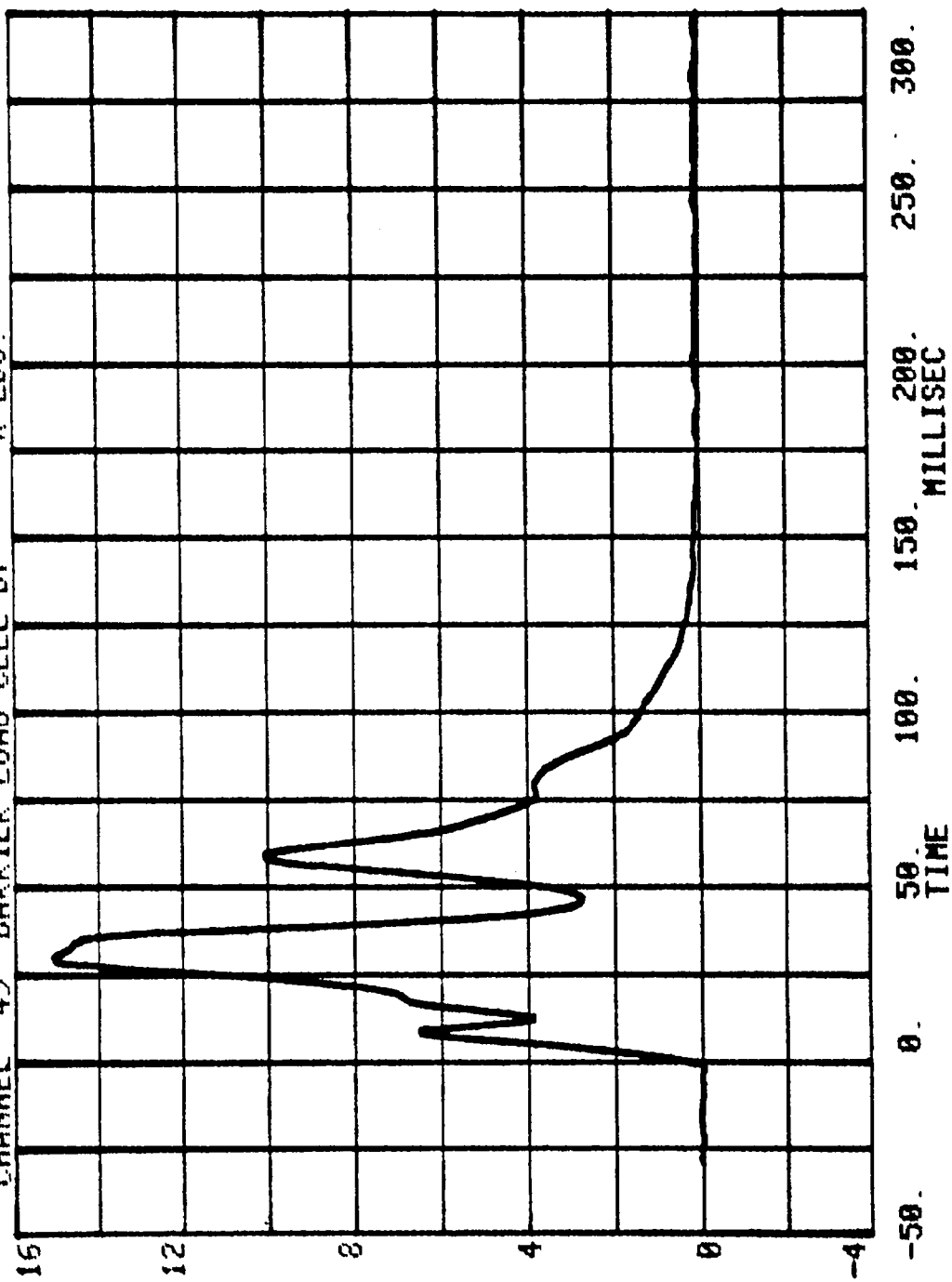




CHANNEL 48 BARRIER LOAD CELL B6 RUN= 771 SERIES= 5400 K LBS.

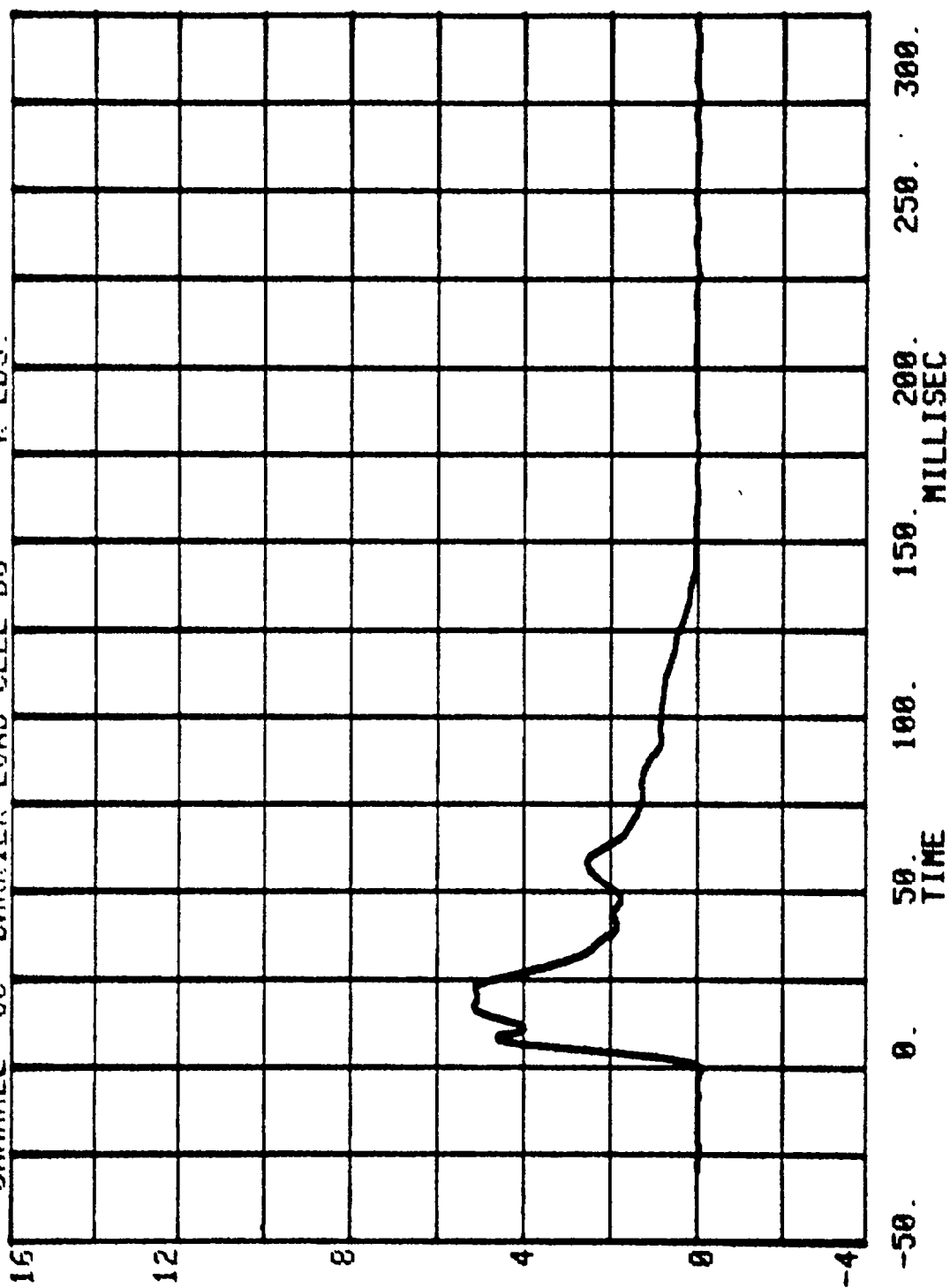


RUN= 771 SERIES= 5400
CHANNEL 49 BARRIER LOAD CELL B7 K LBS.

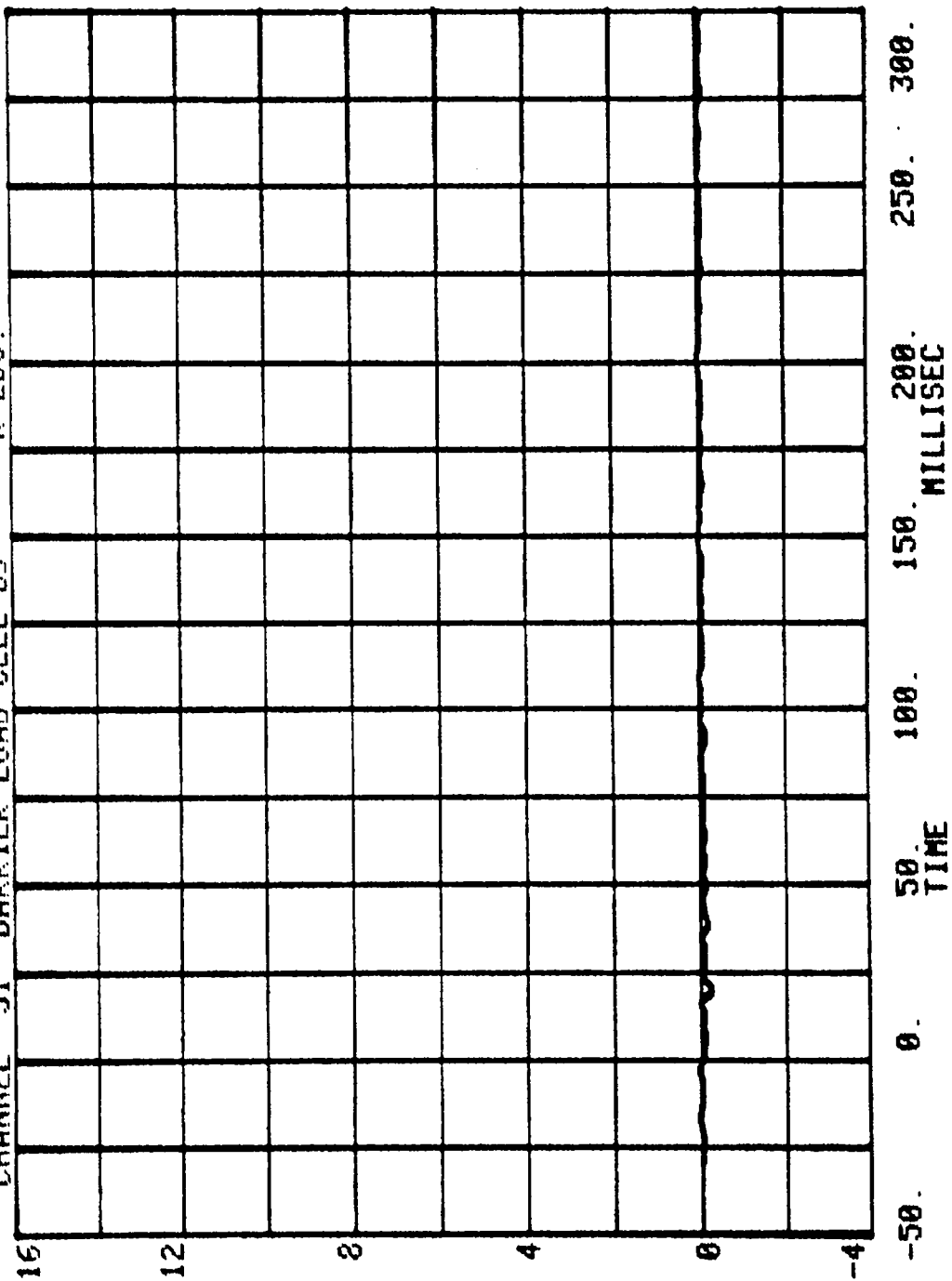


CHANNEL 50 BARRIER LOAD CELL B3 K LBS.

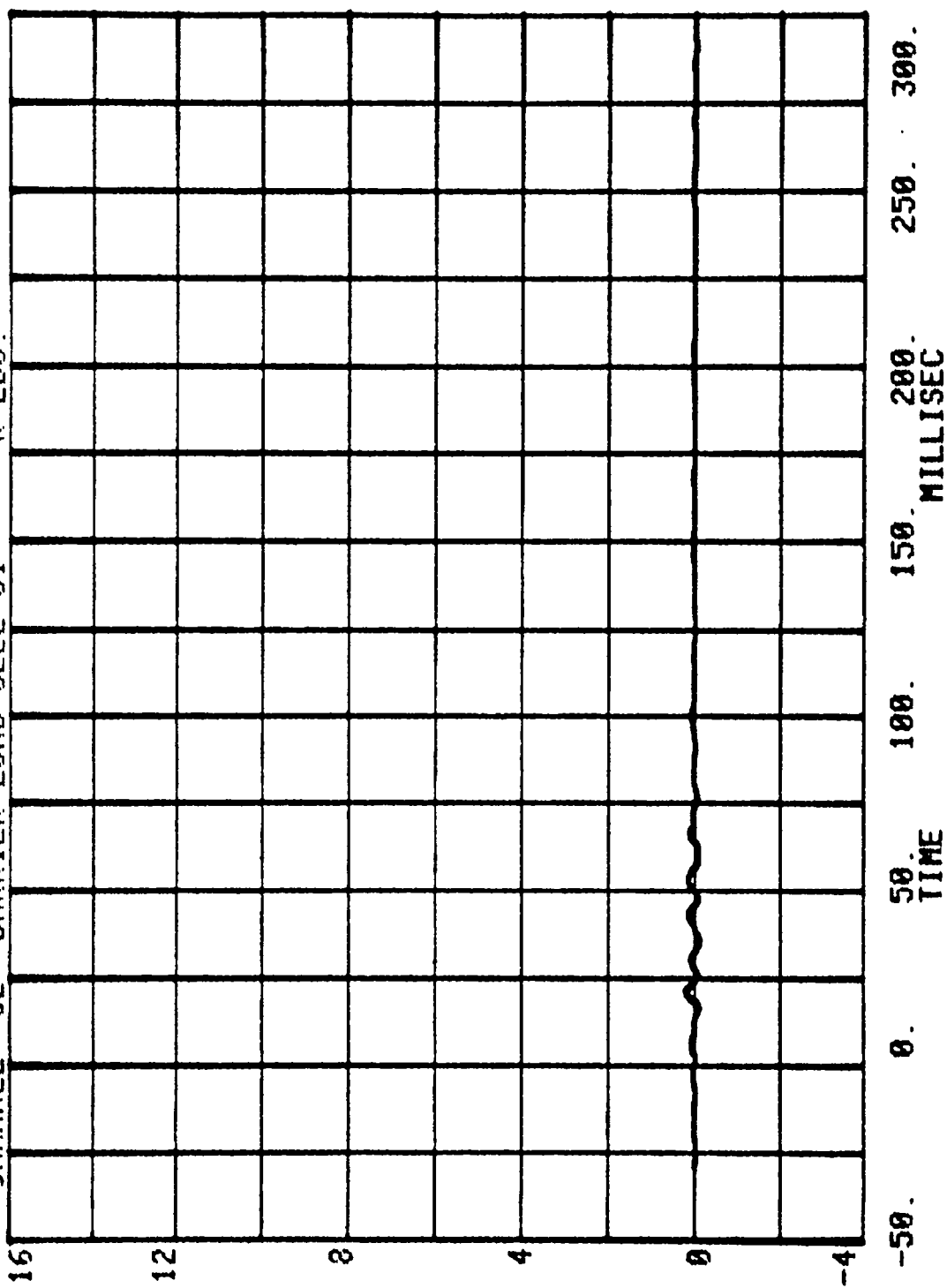
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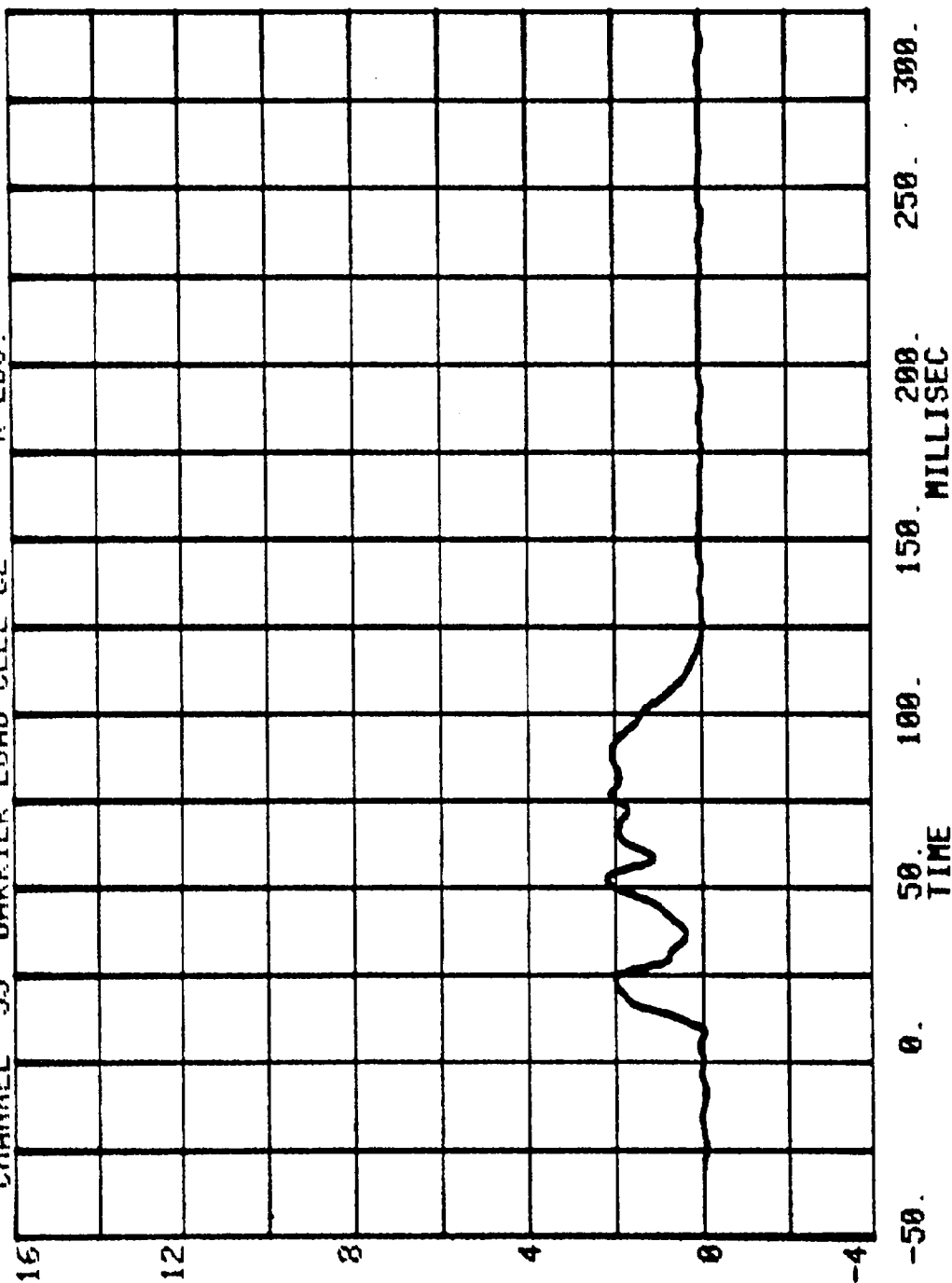
RUN= 771 SERIES= 5400
CHANNEL 51 BARRIER LOAD CELL B9 K LBS.



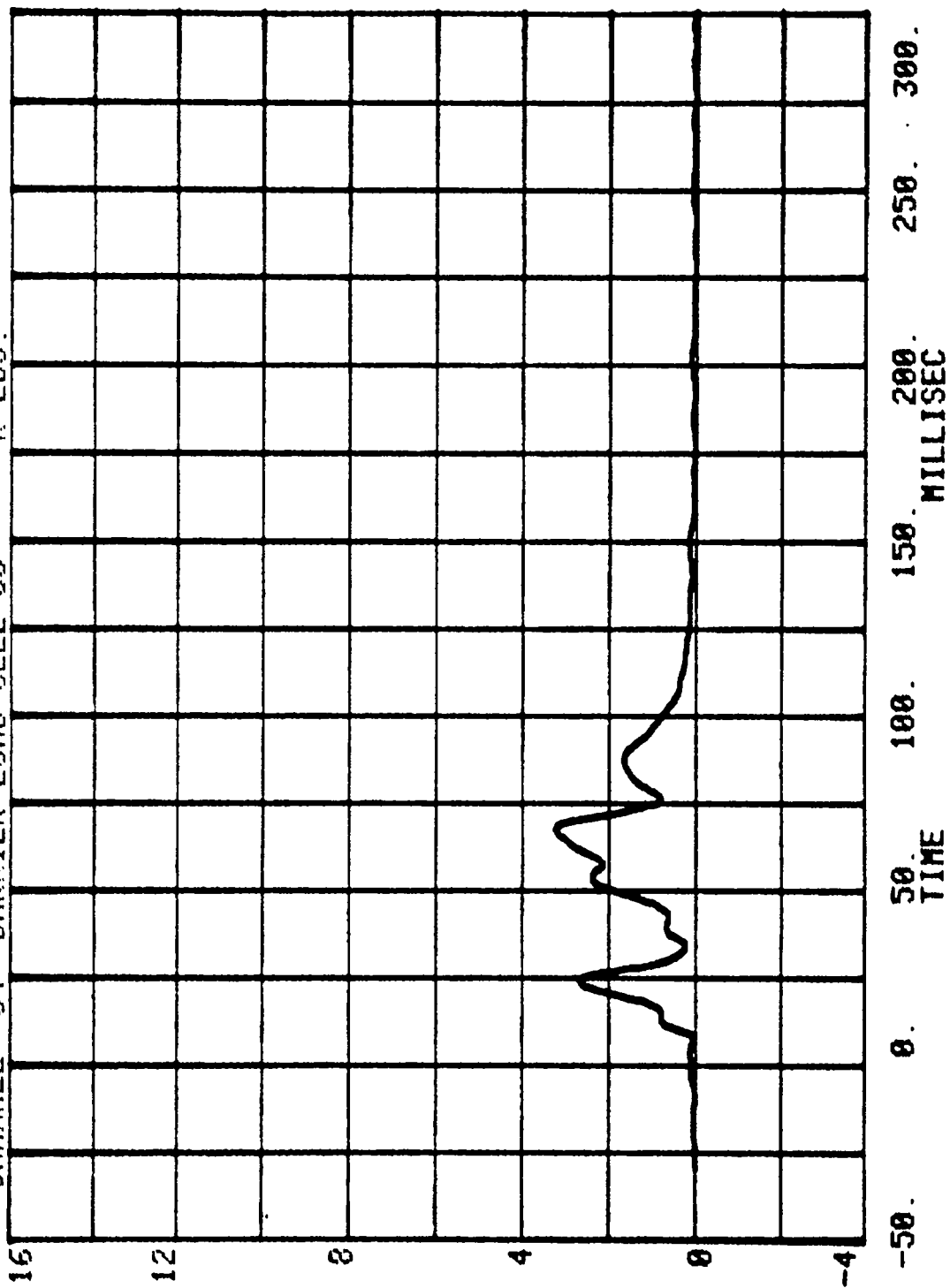
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CHANNEL 52 BARRIER LOAD CELL C1 K LBS.



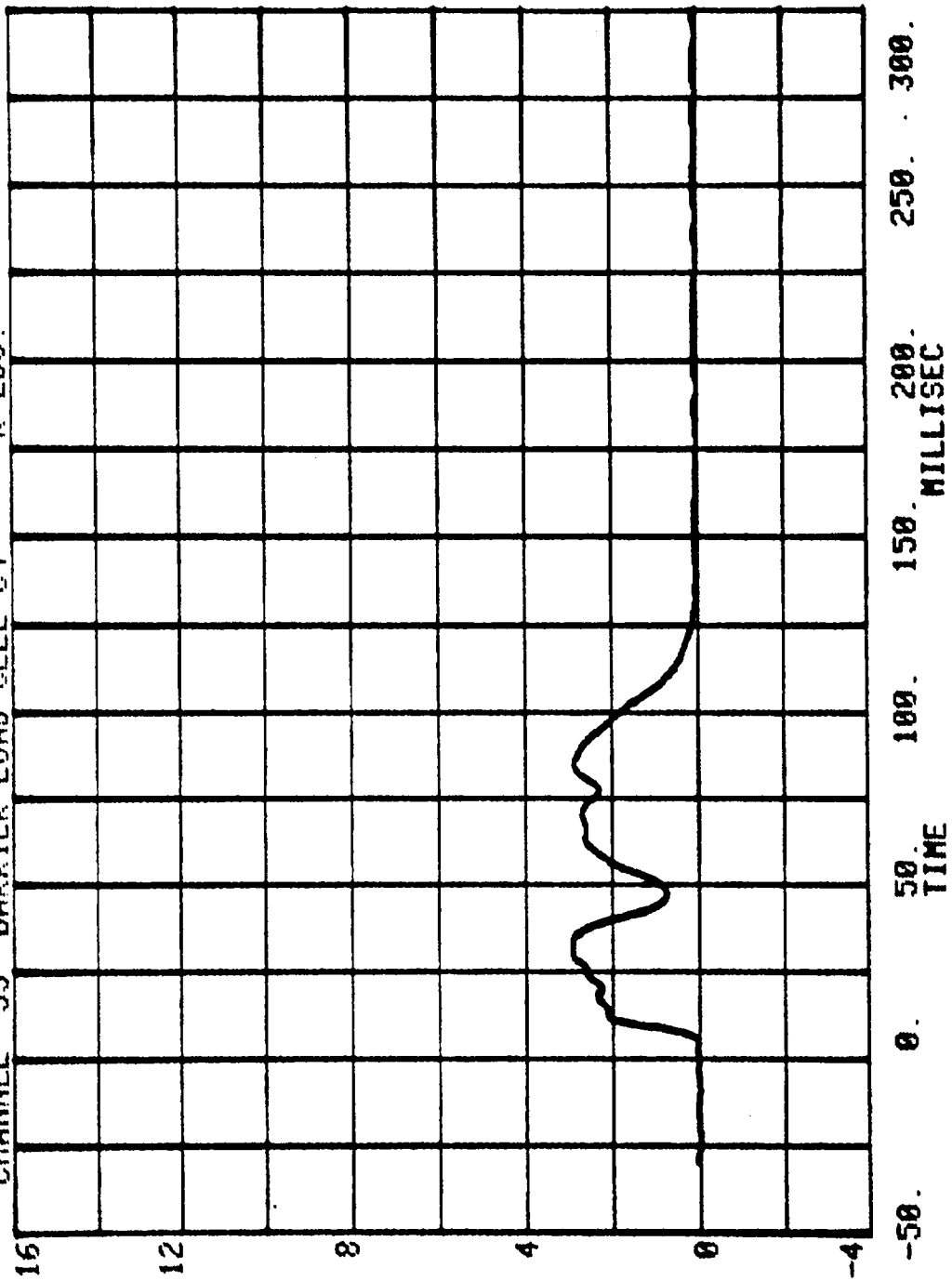
RUN= 771 SERIES= 5400
CHANNEL 53 BARRIER LOAD CELL C2 K LBS.



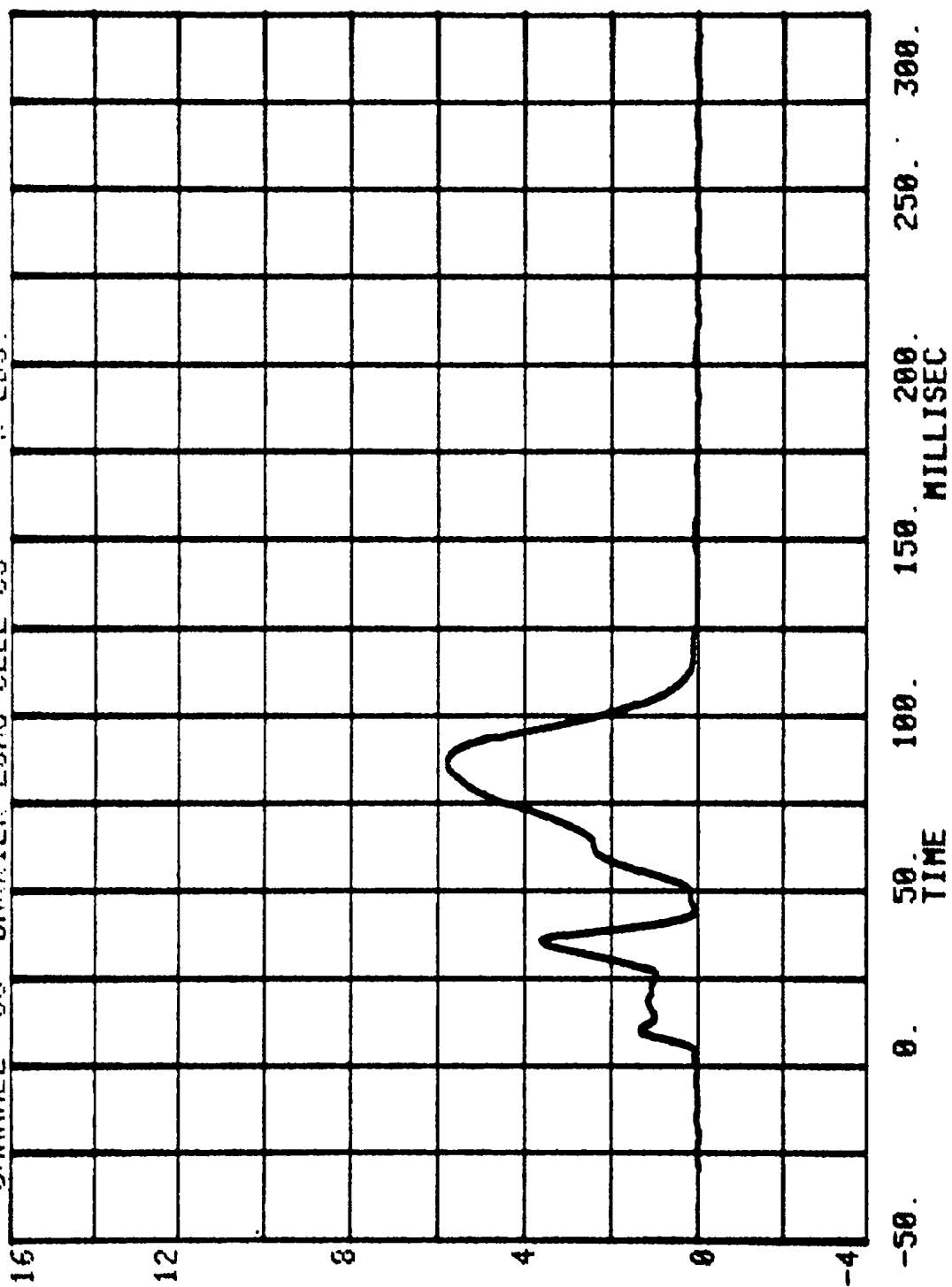
RUN= 771 SERIES= 5400
CHANNEL 54 BARRIER LOAD CELL C3 K LBS.



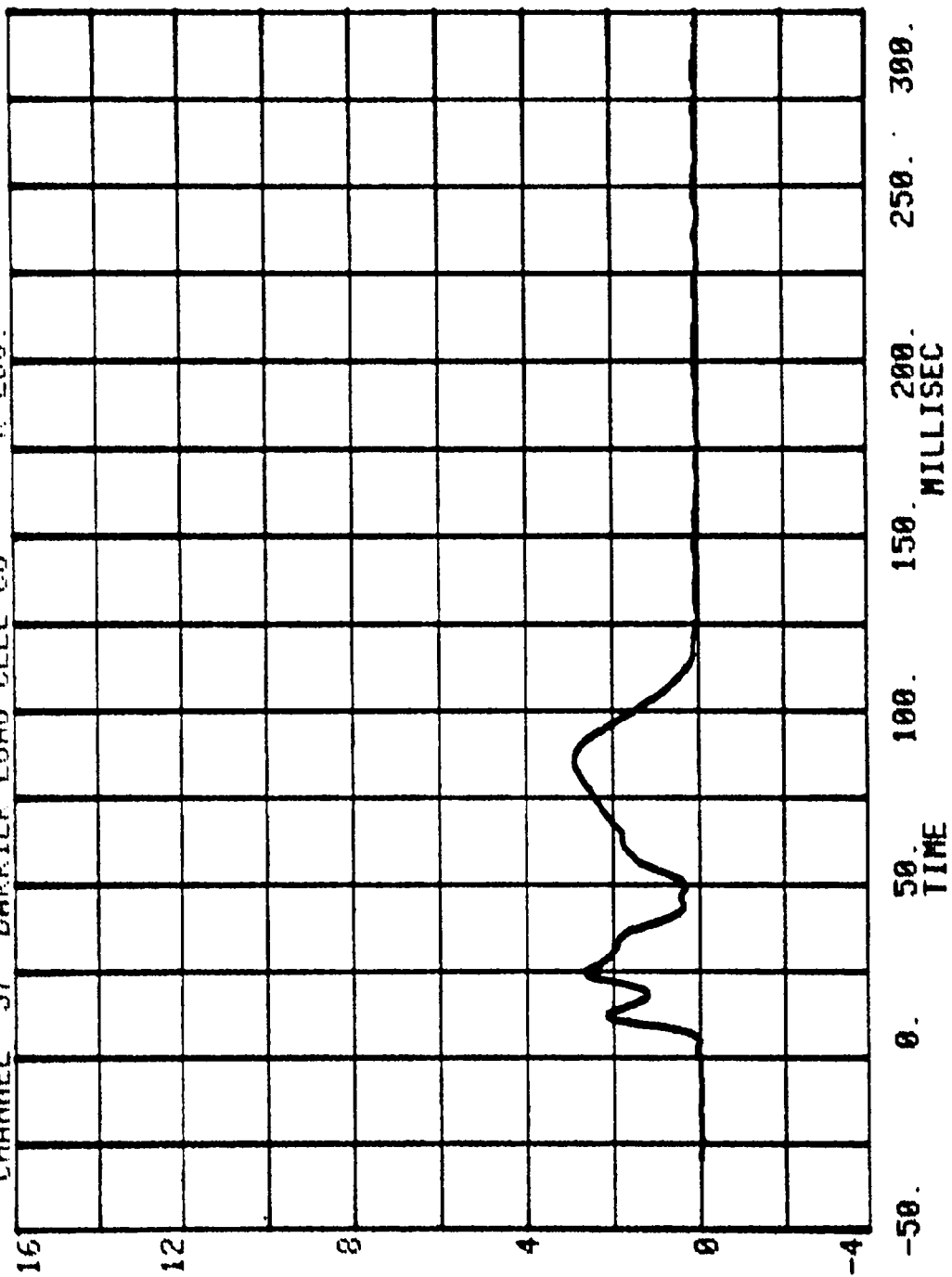
RUN= 771 SERIES= 5400
CHANNEL 55 BARRIER LOAD CELL C4 K LBS.



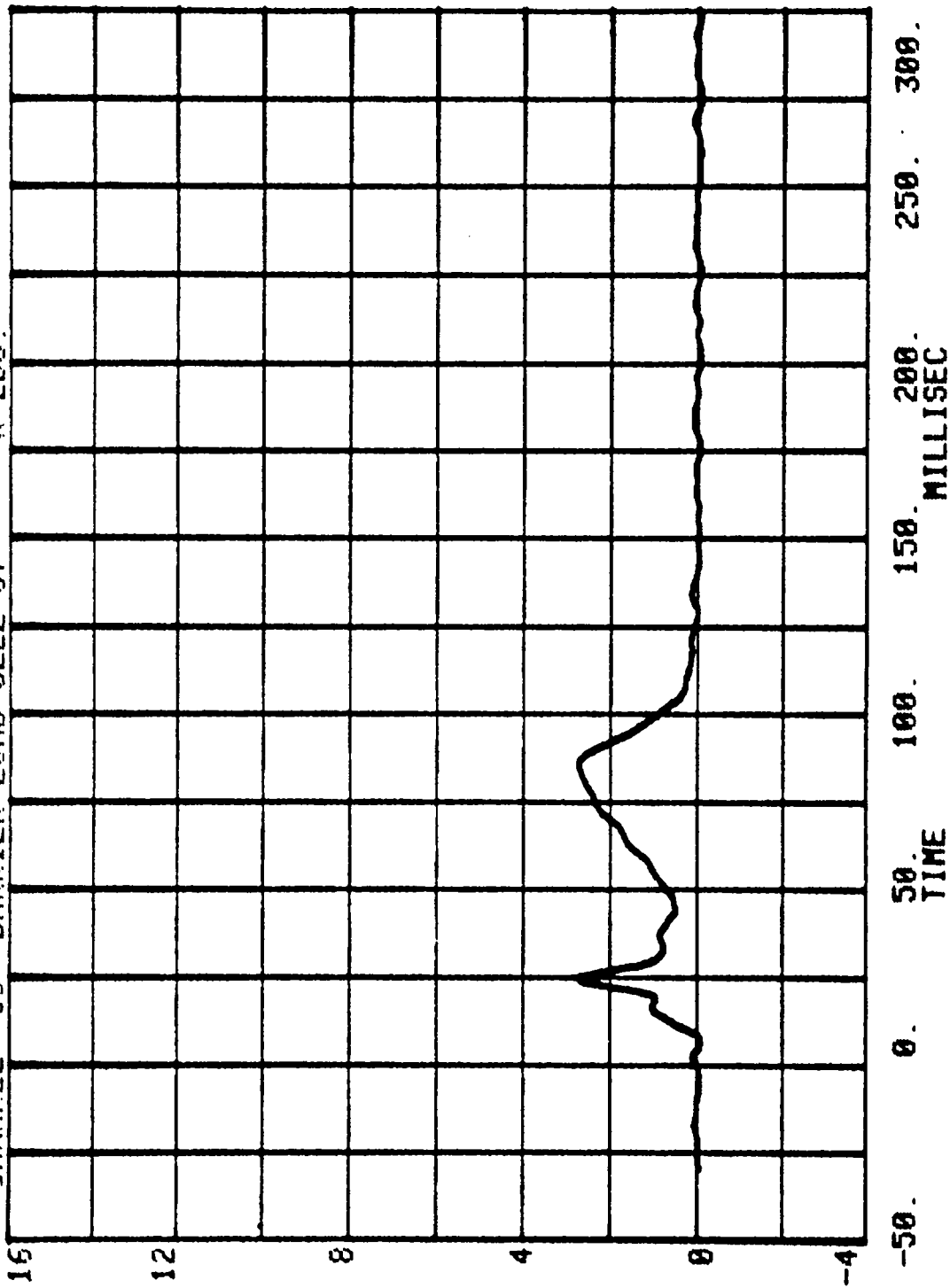
RUN= 771 SERIES= 5488
CHANNEL 56 BARRIER LOAD CELL C5 K LBS.



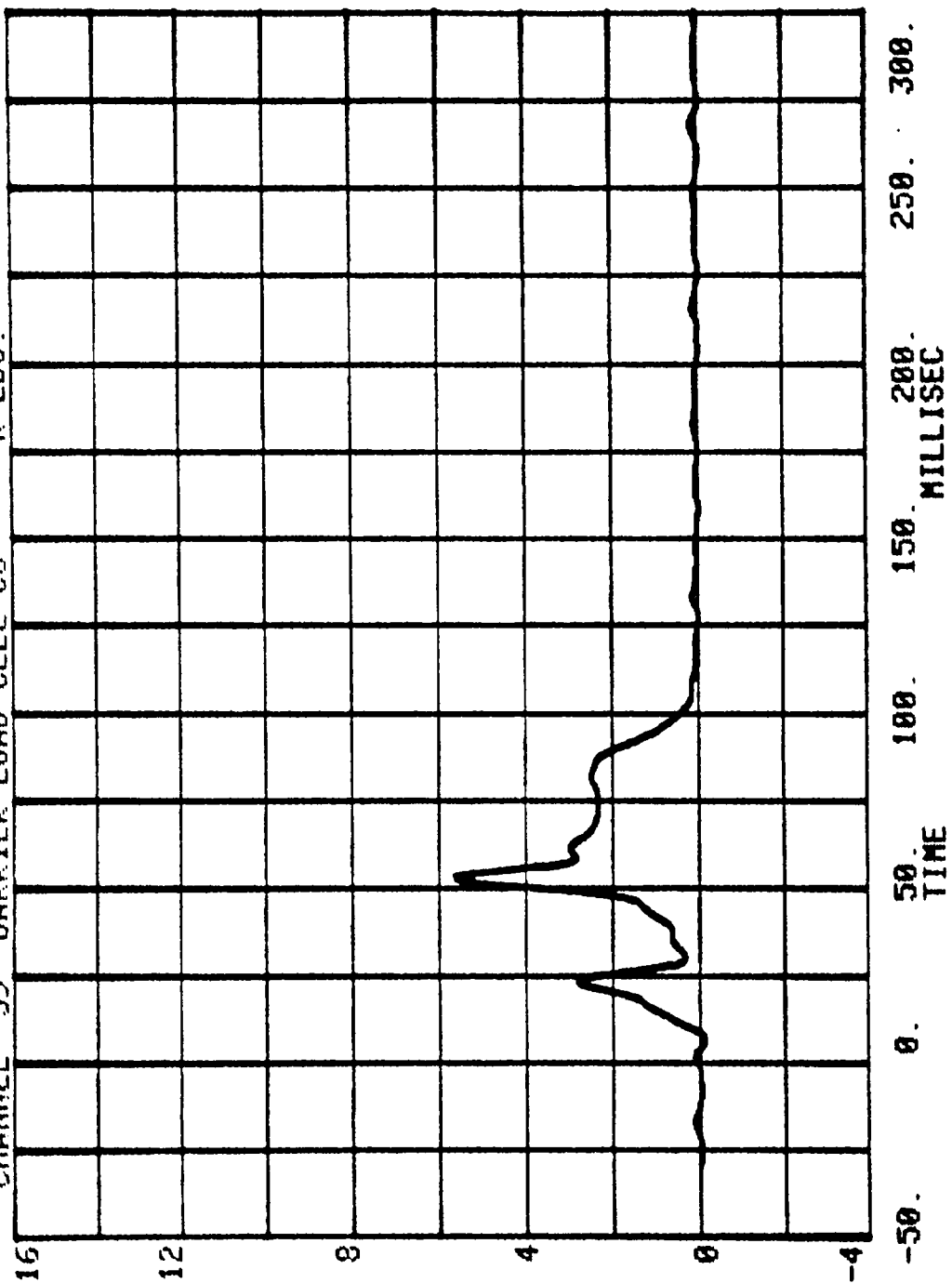
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CHANNEL 57 BARRIER LOAD CELL C6



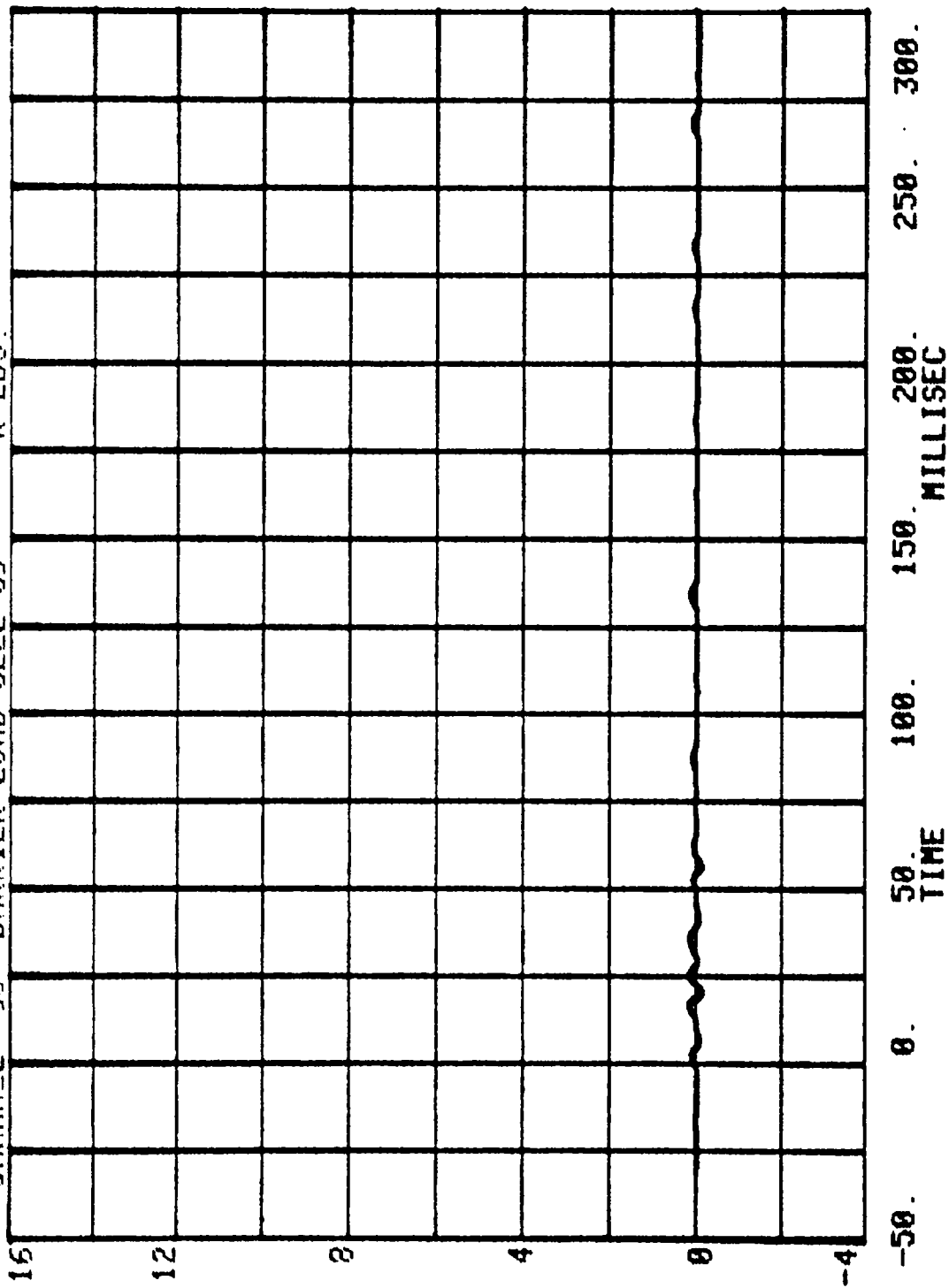
CHANNEL 58 BARRIER LOAD CELL C7
RUN= 771 SERIES= 5400 K LBS.



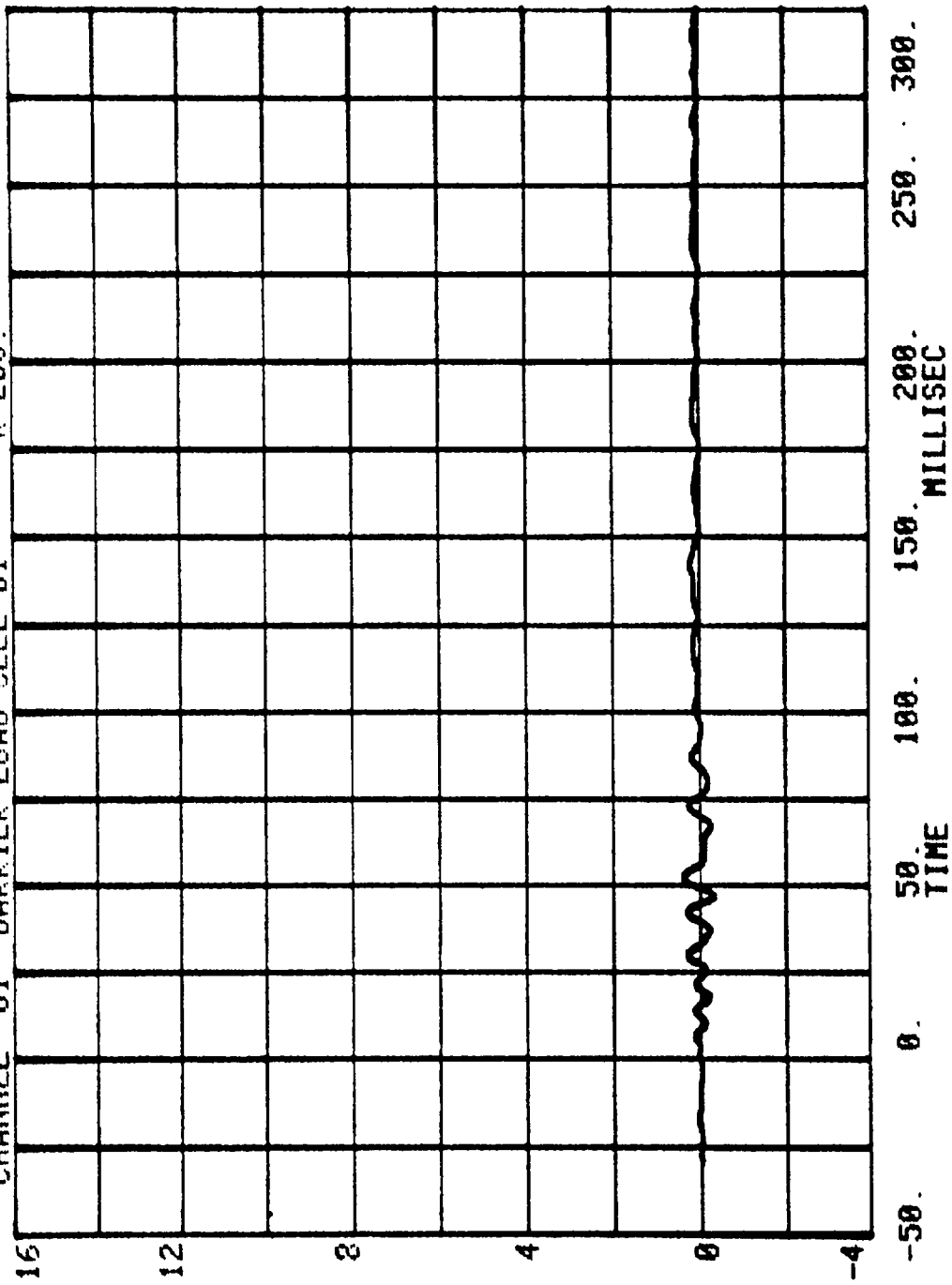
CHANNEL 59 RUH= 771 SERIES= 5400 K LBS.



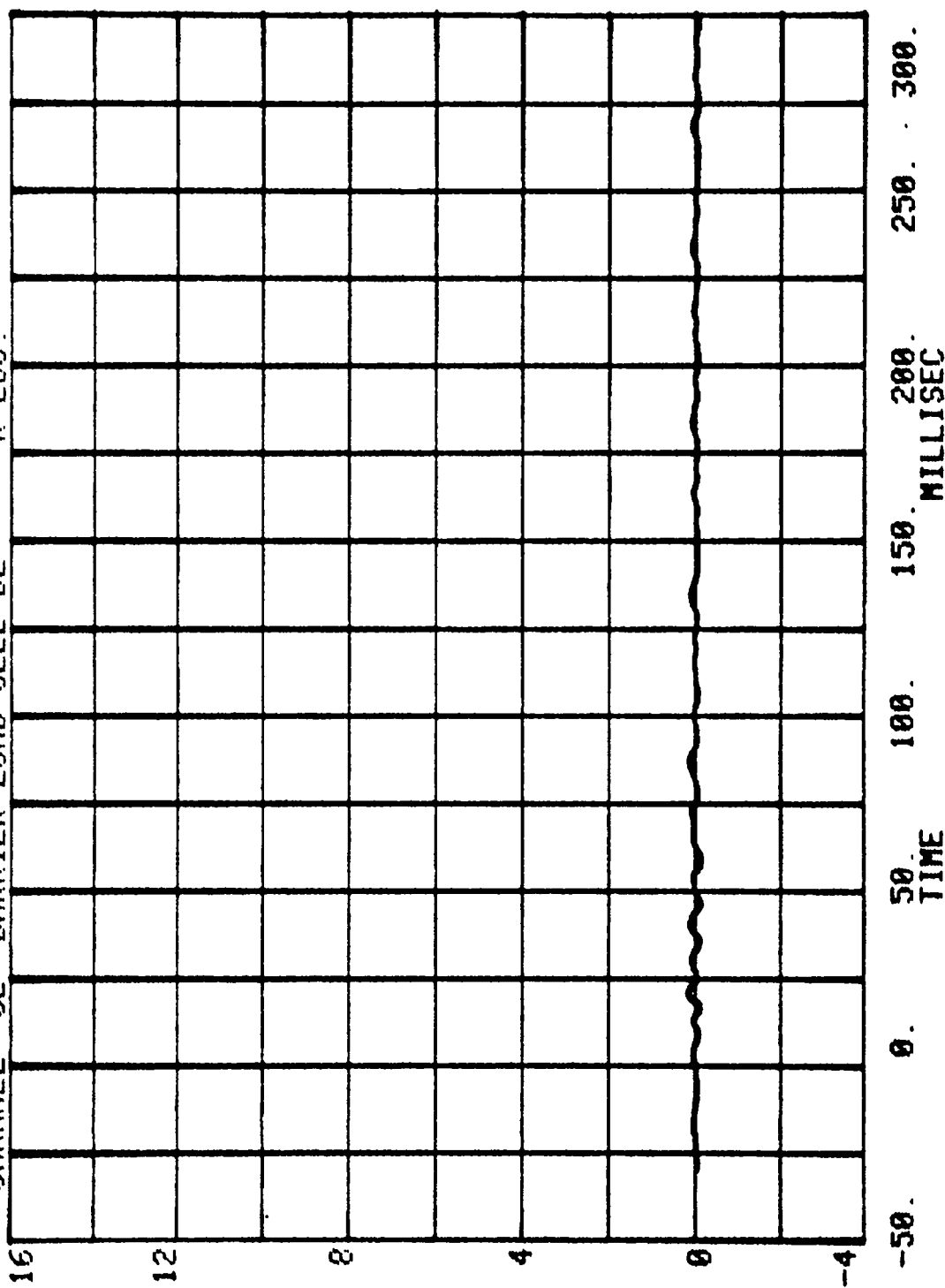
CHANNEL 68 BARRIER LOAD CELL C9 RUH= 771 SERIES= 5400 K LBS.



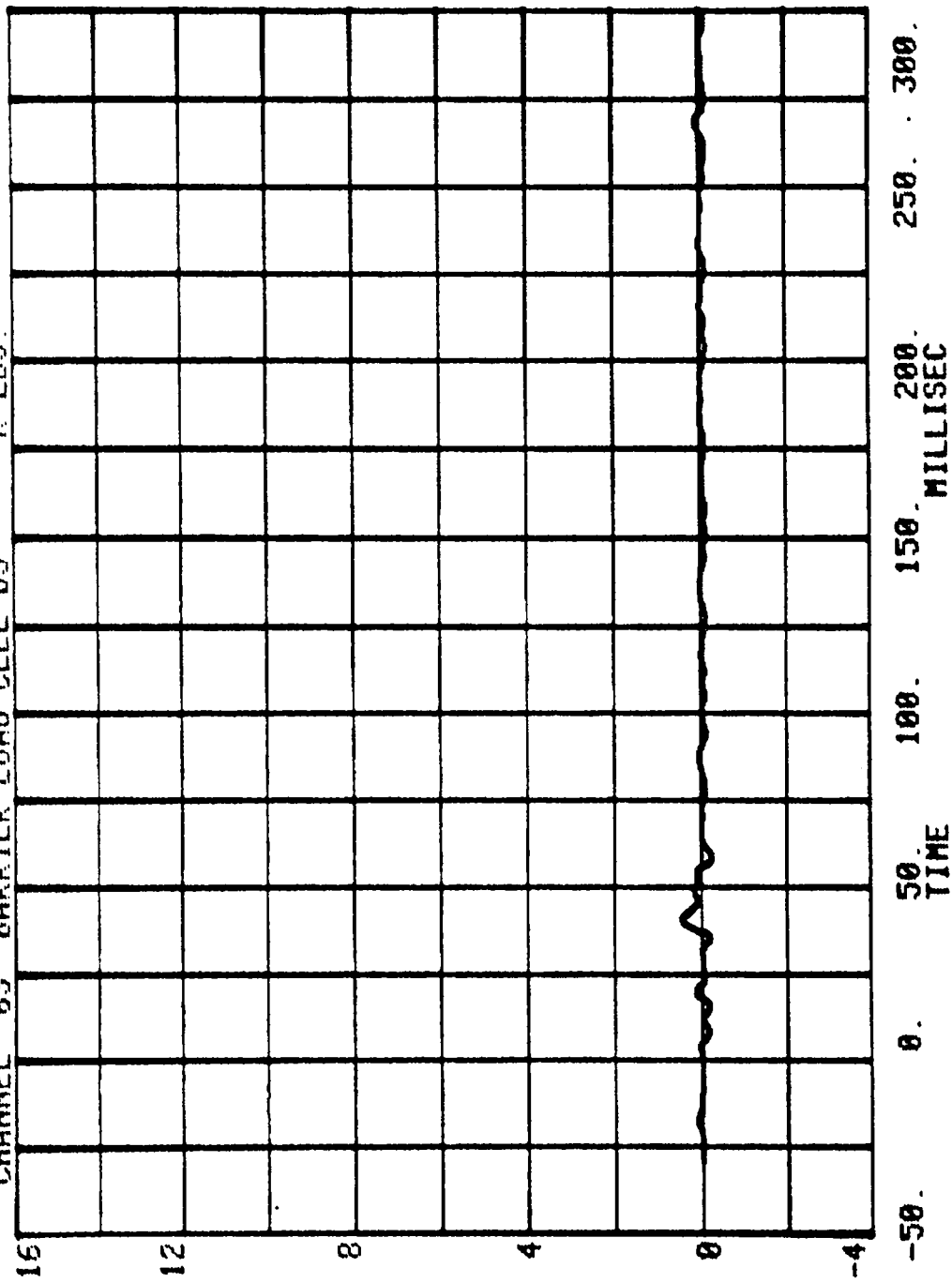
CHANNEL 61 BARRIER LOAD CELL 01 PUH= 771 SERIES= 5488 K LBS.



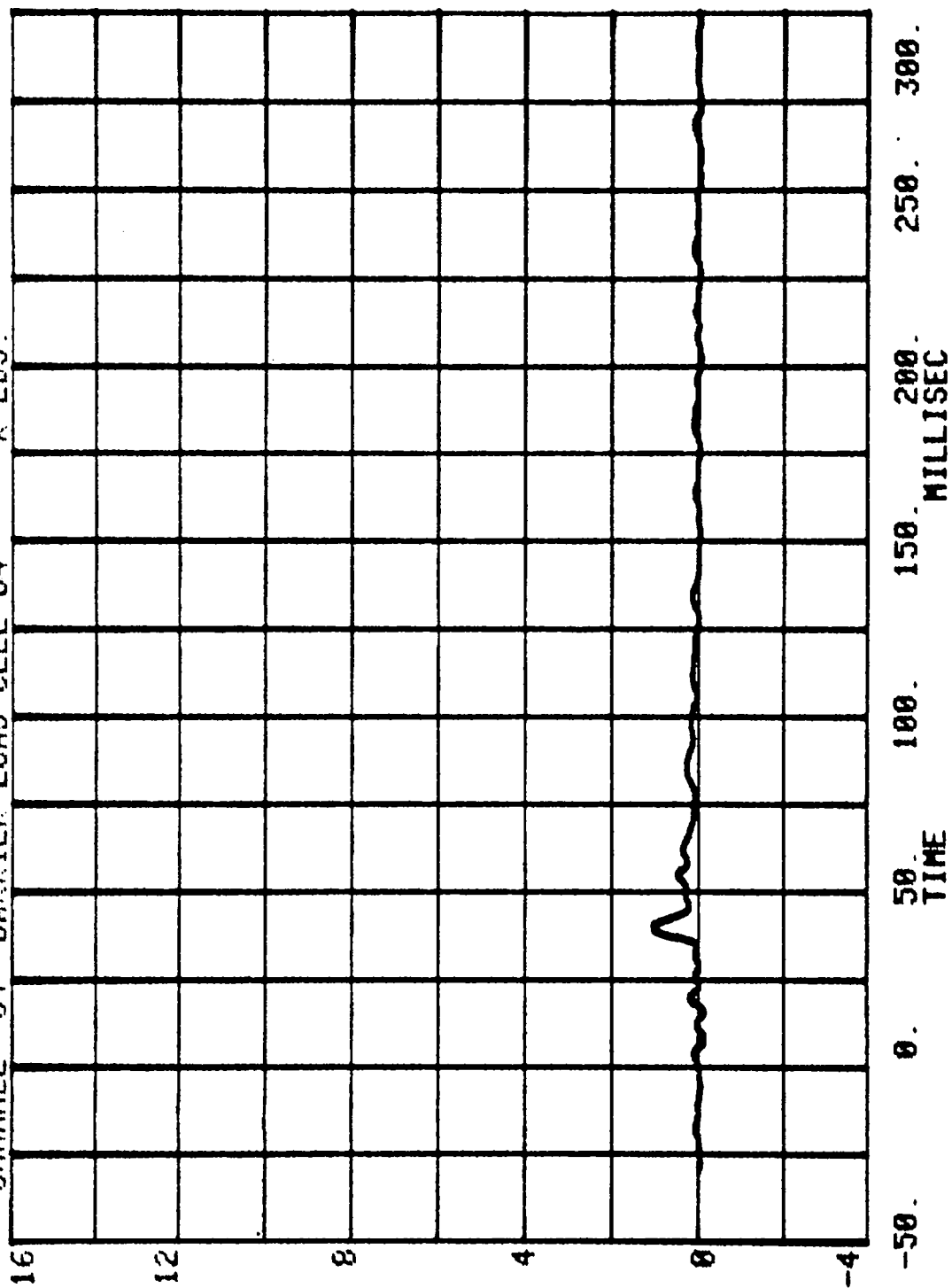
CHANNEL 62 RUN= 771 SERIES= 5488 K LBS.
BARRIER LOAD CELL D2



RUN= 771 SERIES= 5400
CHANNEL 63 BARRIER LOAD CELL 03 K LBS.

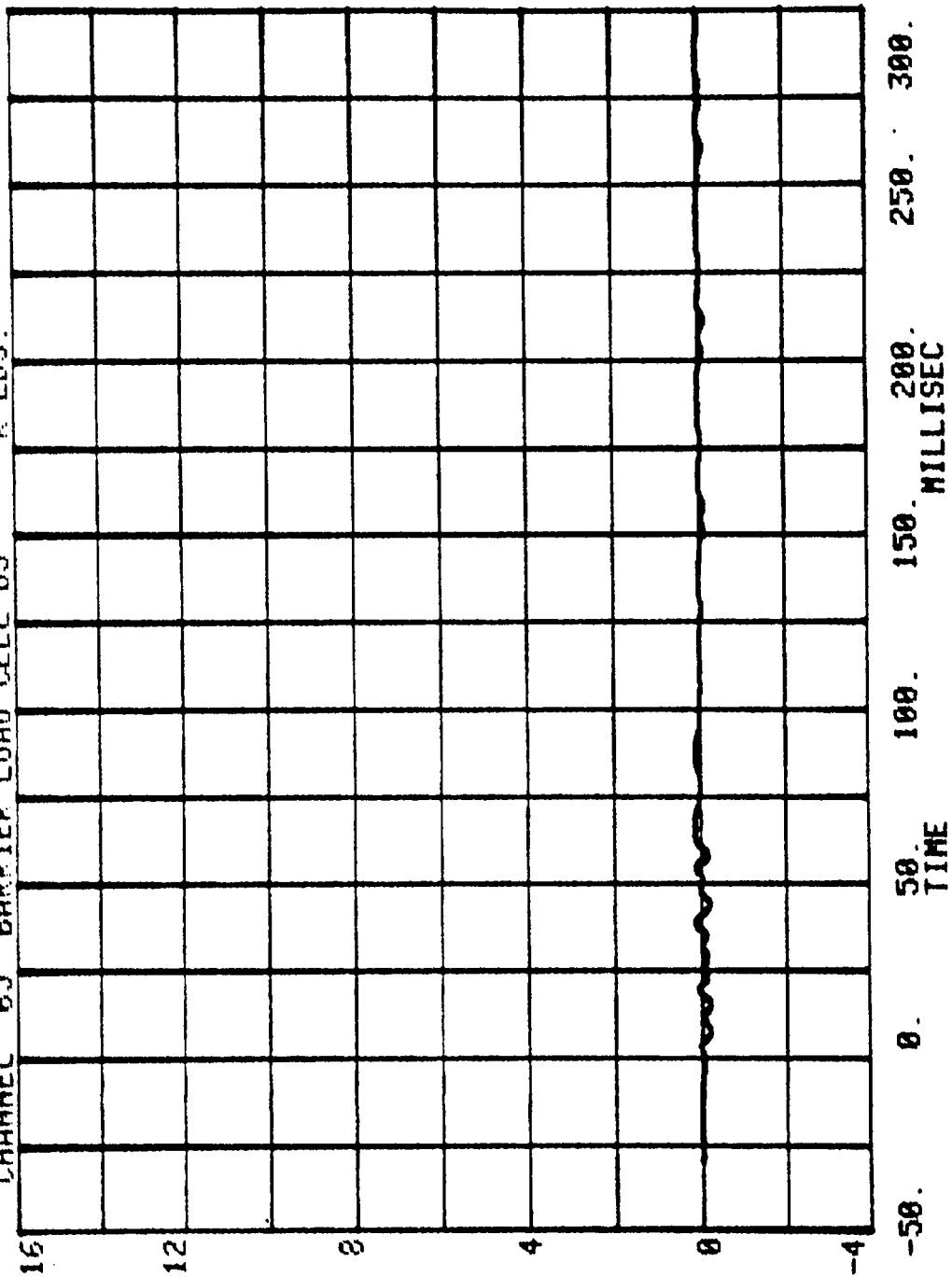


RUN= 771 SERIES= 5400
CHANNEL 64 BARRIER LOAD CELL 04 K LBS.



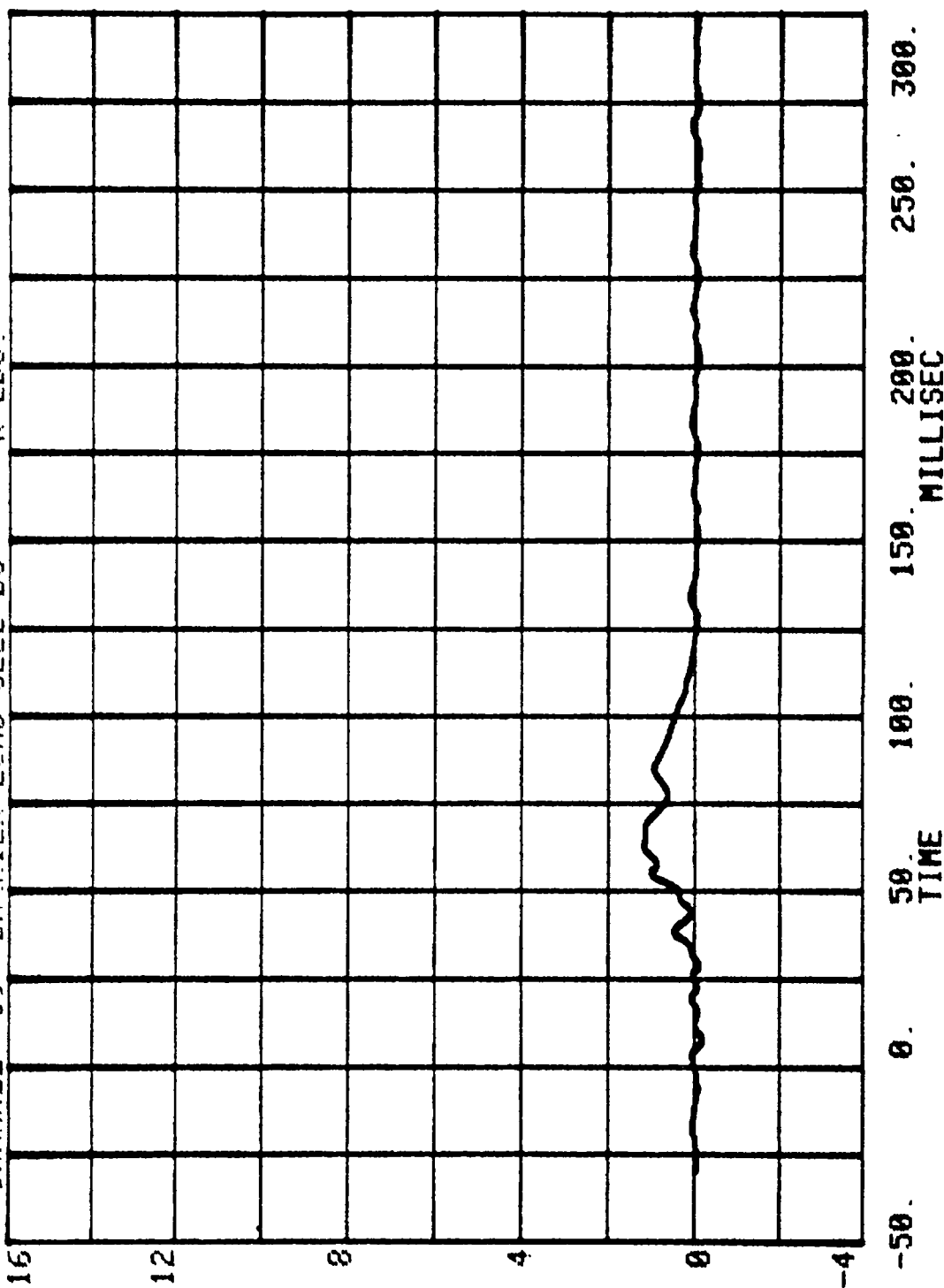
CHANNEL 65 BARRIER LOAD CELL D5 K LBS.

RUN= 771 SERIES= 5400



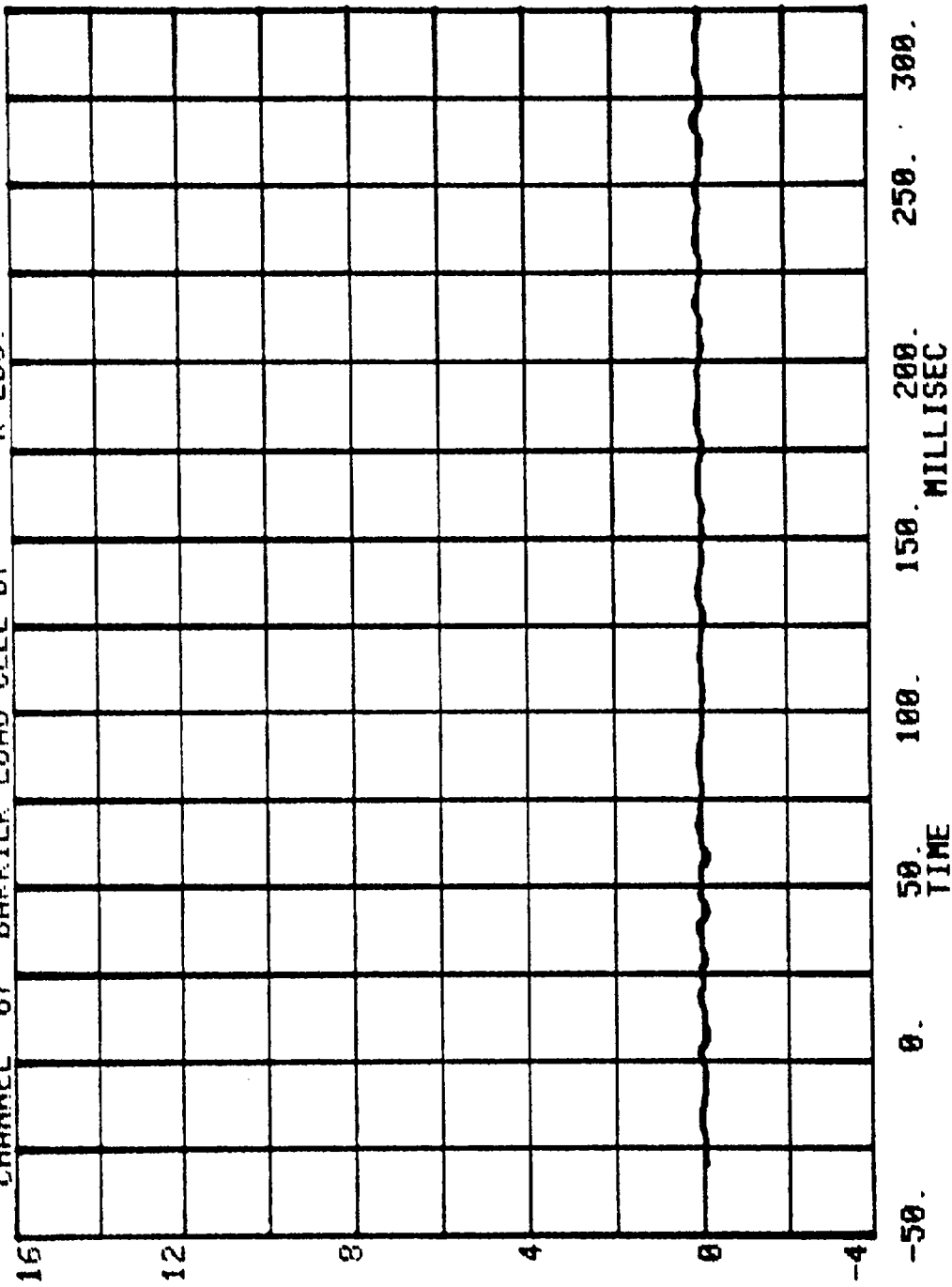
CHANNEL 66 BARRIER LOAD CELL D6 K LBS.

RUN= 771 SERIES= 5400

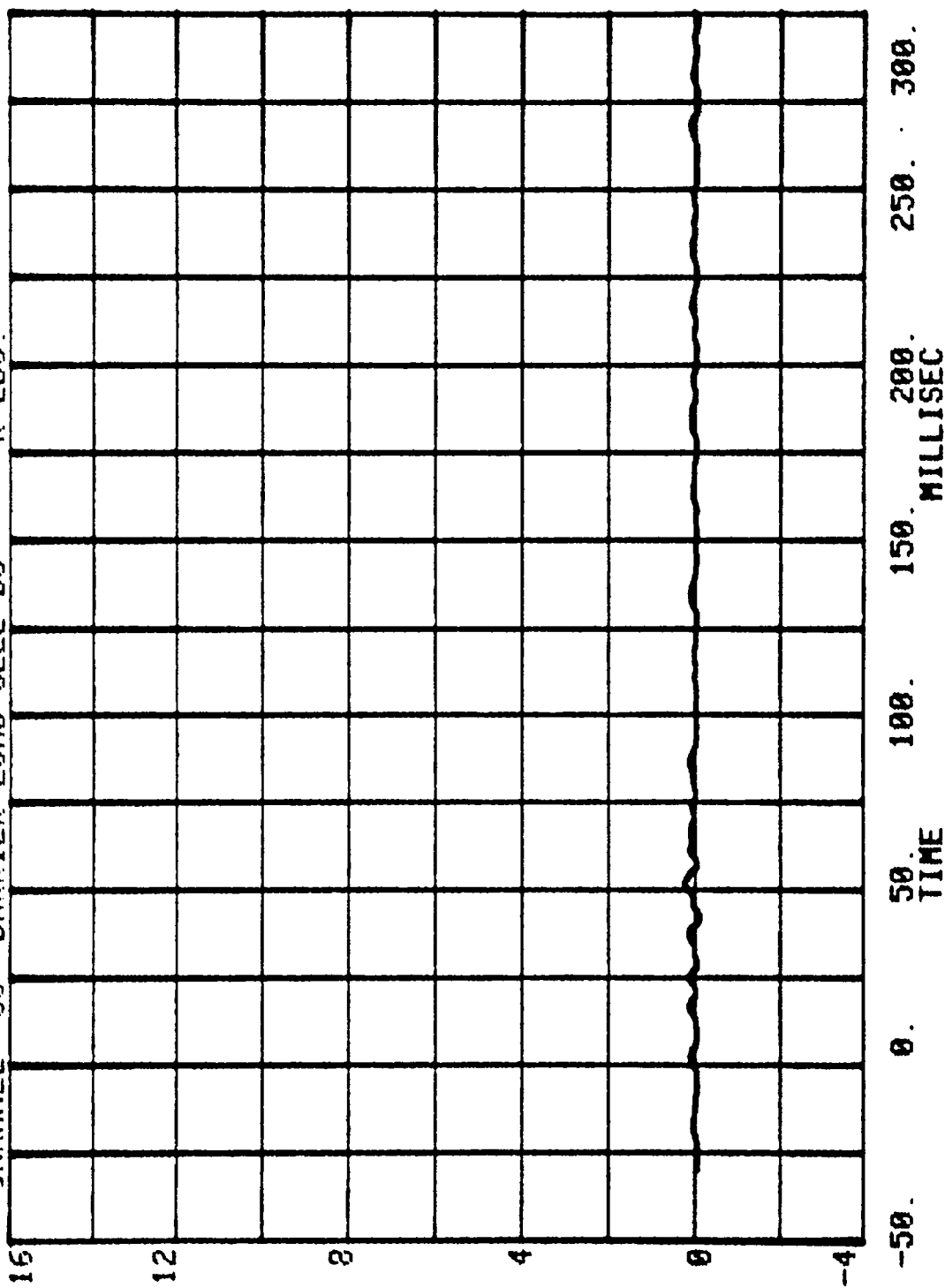


CHANNEL 67 BARRIER LOAD CELL 07 K LBS.

RUN= 771 SERIES= 5400

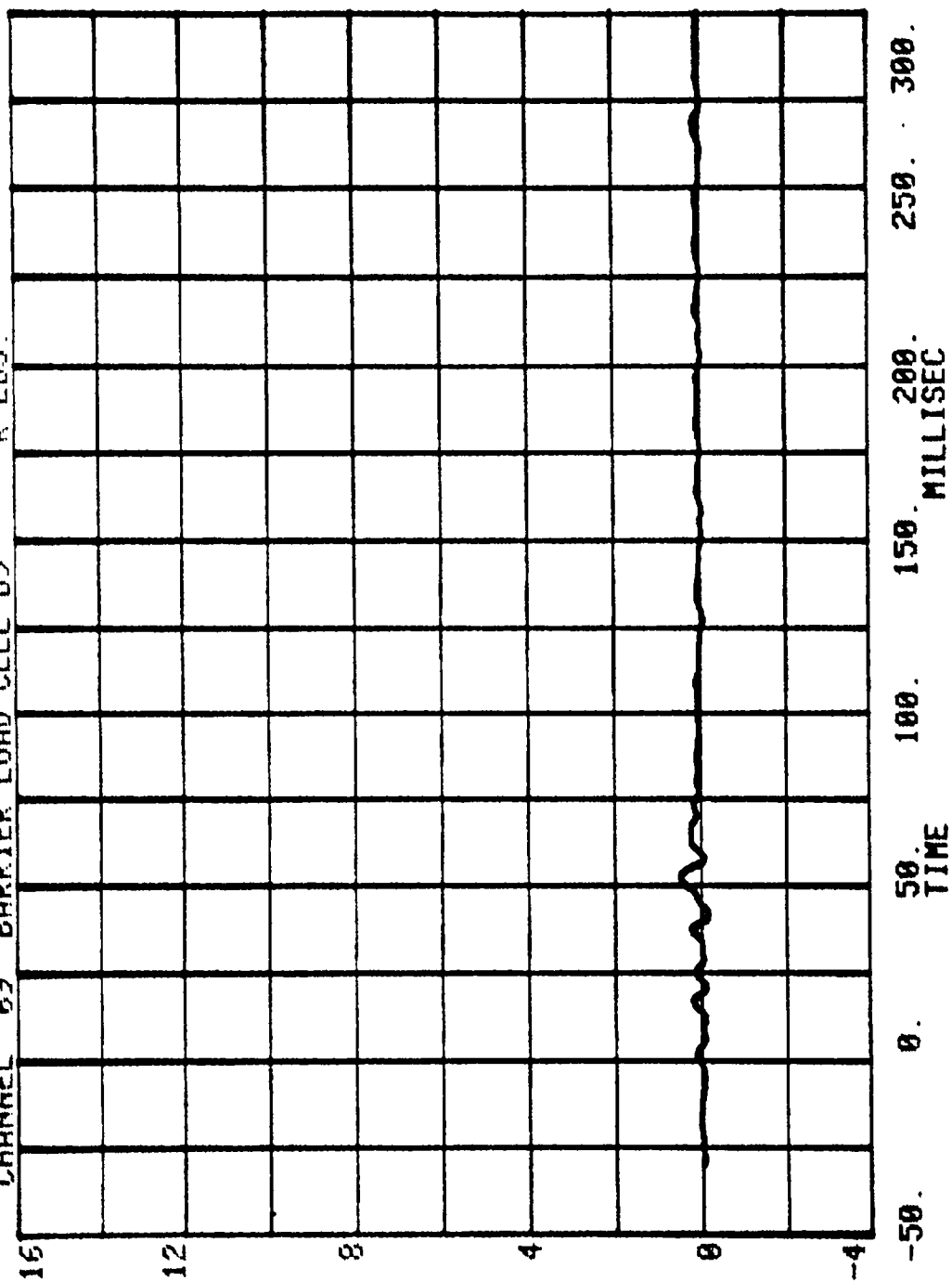


CHANNEL 68 BARRIER LOAD CELL D8 RUN= 771 SERIES= 5400 K LBS.



CHANNEL 69 BARRIER LOAD CELL D9 K LBS.

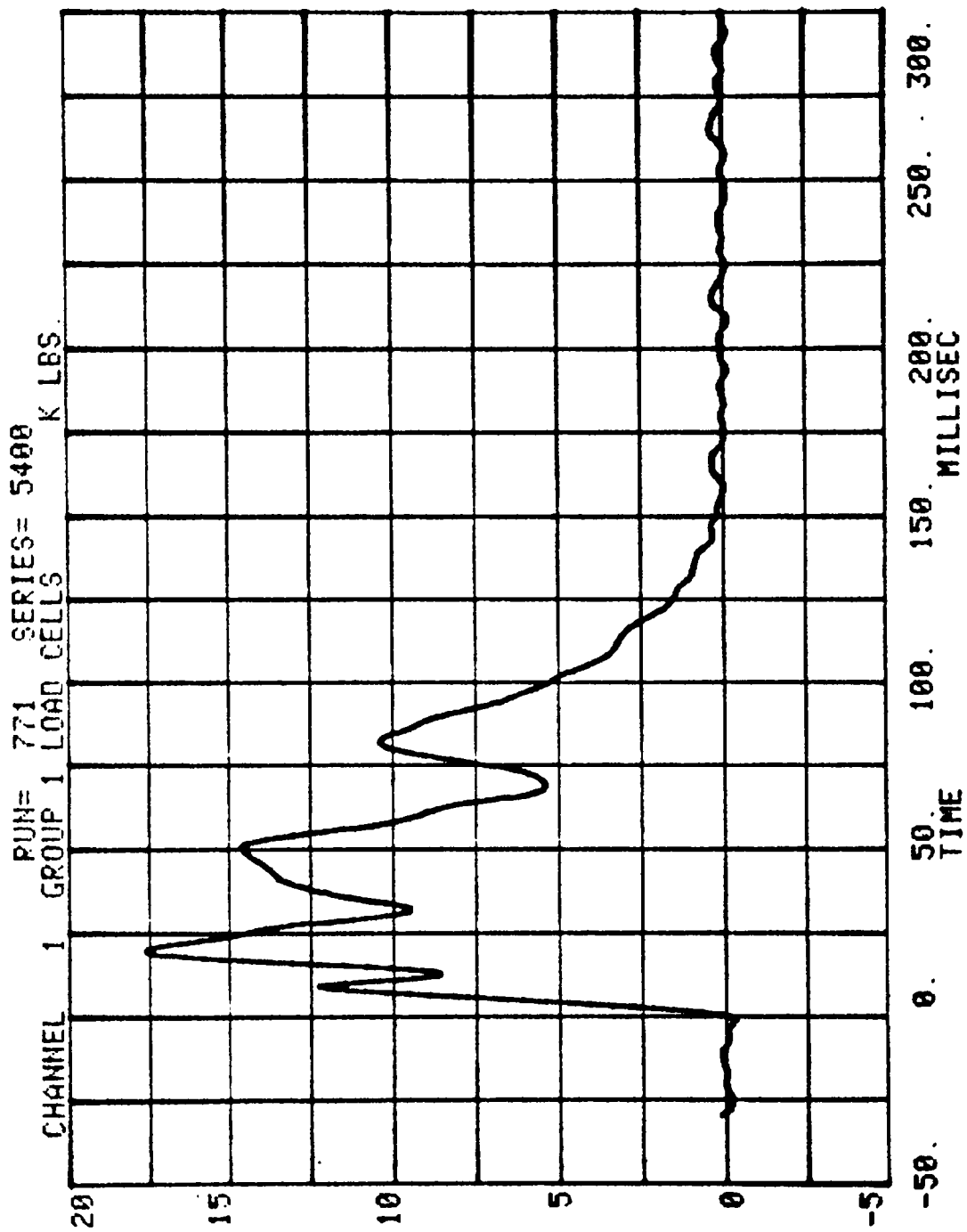
RUH= 771 SERIES= 5400



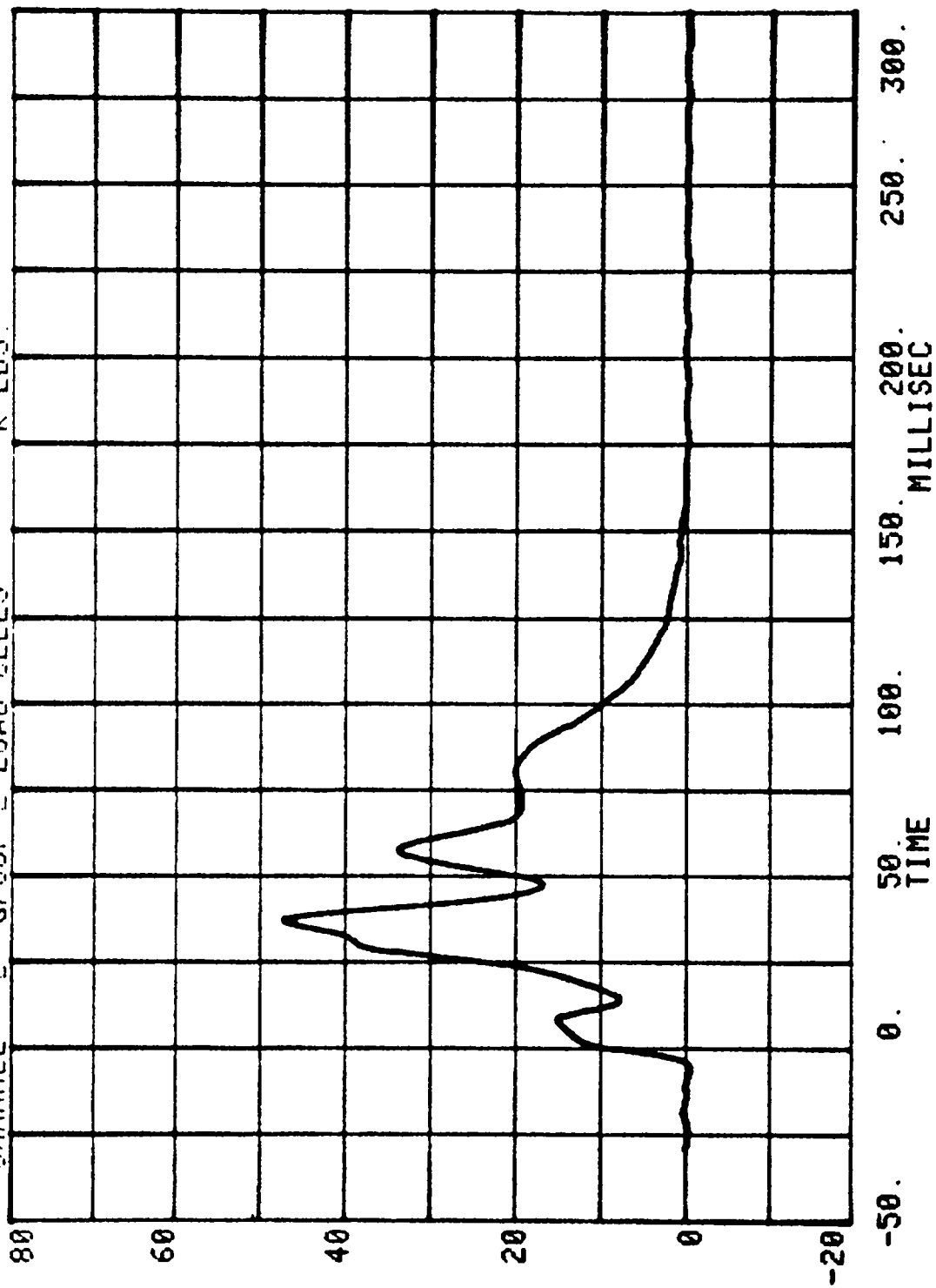
NEW CAR ASSESSMENT BARRIER TESTS - 1987

RUN # 771 SERIES # 5400

CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	- .284	17.642 K LBS.
2	GROUP 2 LOAD CELLS	- .411	47.320 K LBS.
3	GROUP 3 LOAD CELLS	- .191	20.108 K LBS.
4	GROUP 4 LOAD CELLS	- .224	5.213 K LBS.
5	GROUP 5 LOAD CELLS	- .166	12.926 K LBS.
6	GROUP 6 LOAD CELLS	- .508	7.325 K LBS.
7	TOTAL LOAD CELL SUM	-1.061	88.525 K LBS.



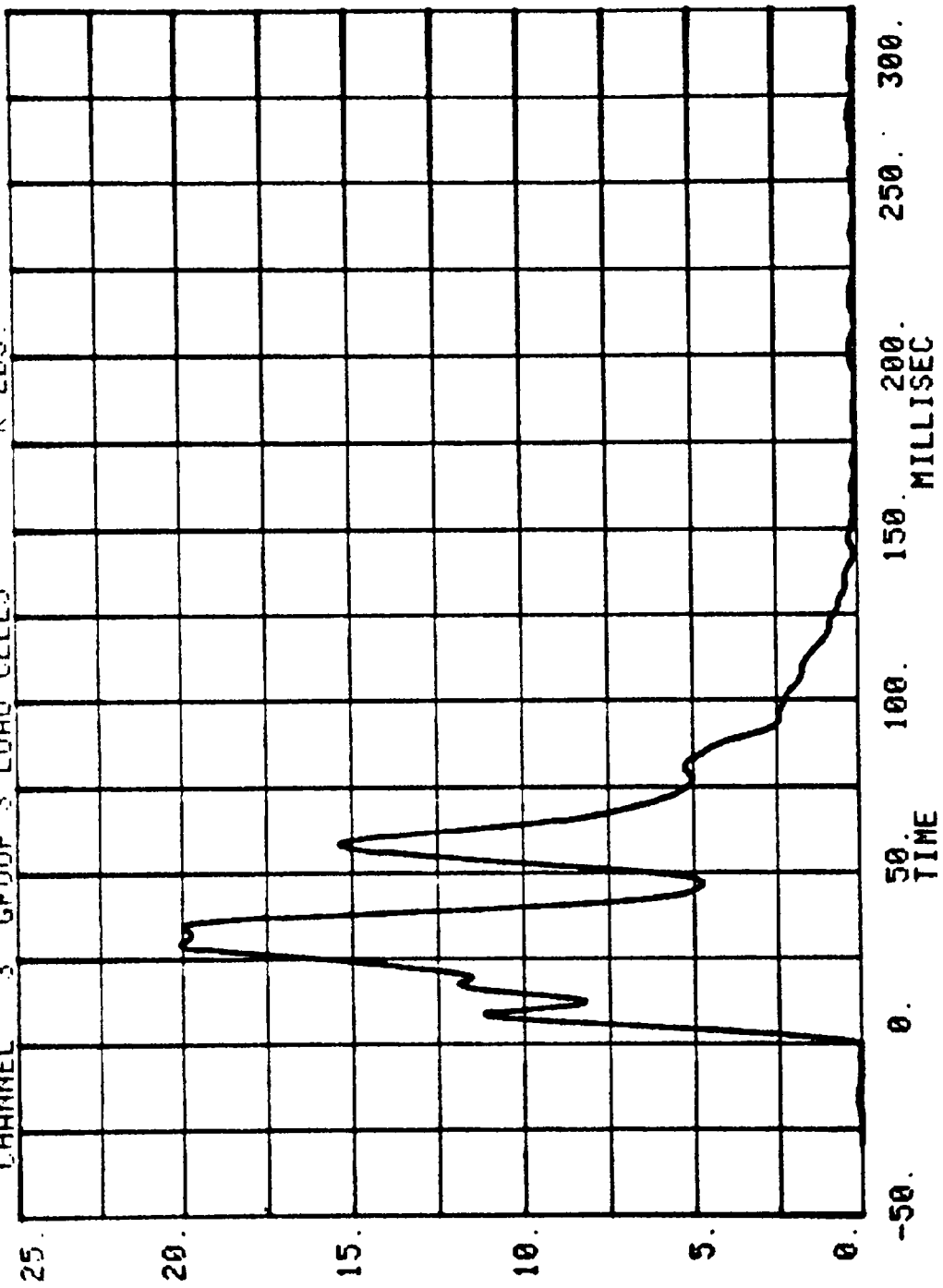
RUN= 771 SERIES= 5400 K LBS.
CHANNEL 2 GROUP 2 LOAD CELLS



CHANNEL 3 GROUP 3 LOAD CELLS

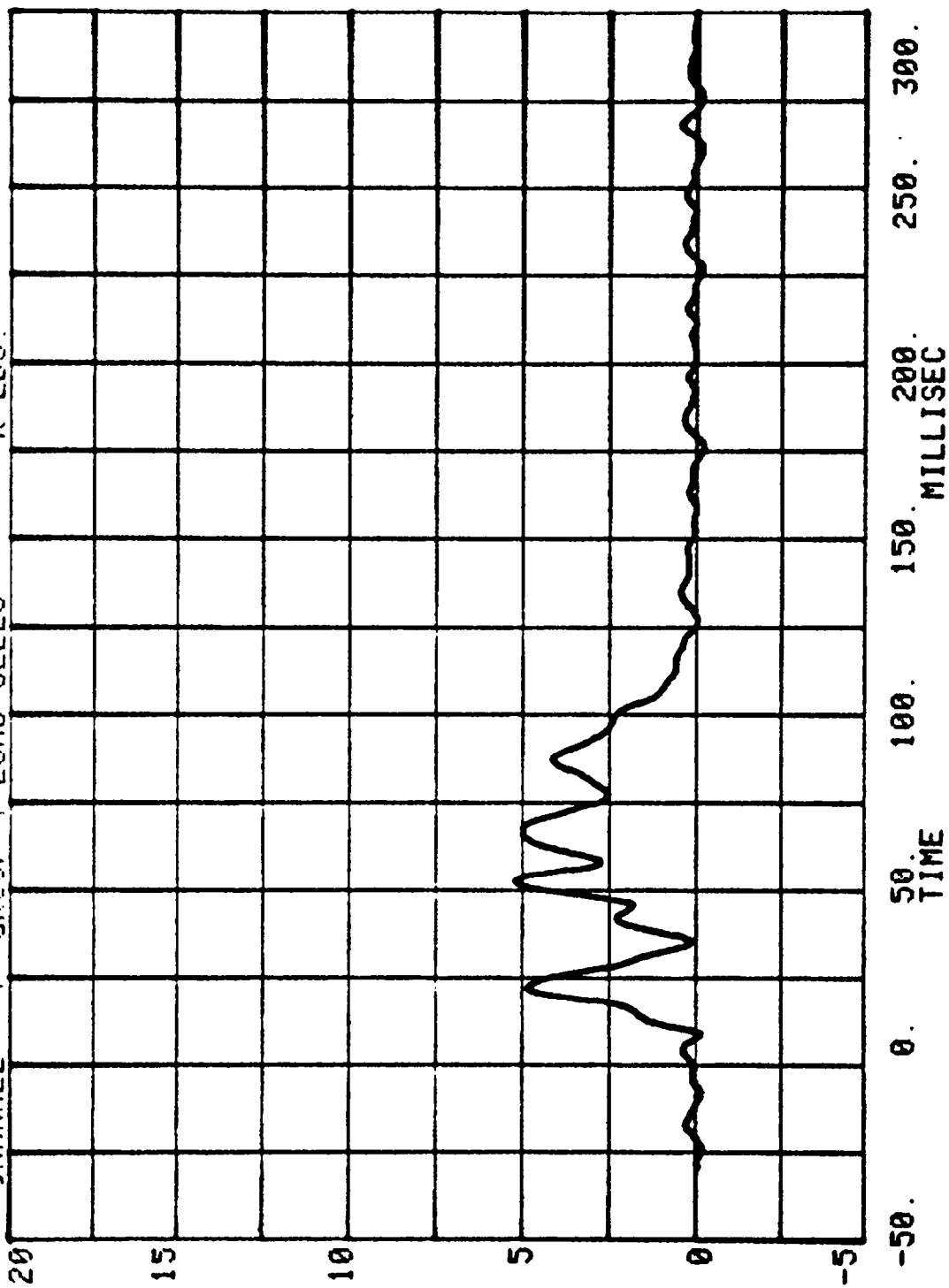
RUN= 771 SERIES= 5400

K LBS.

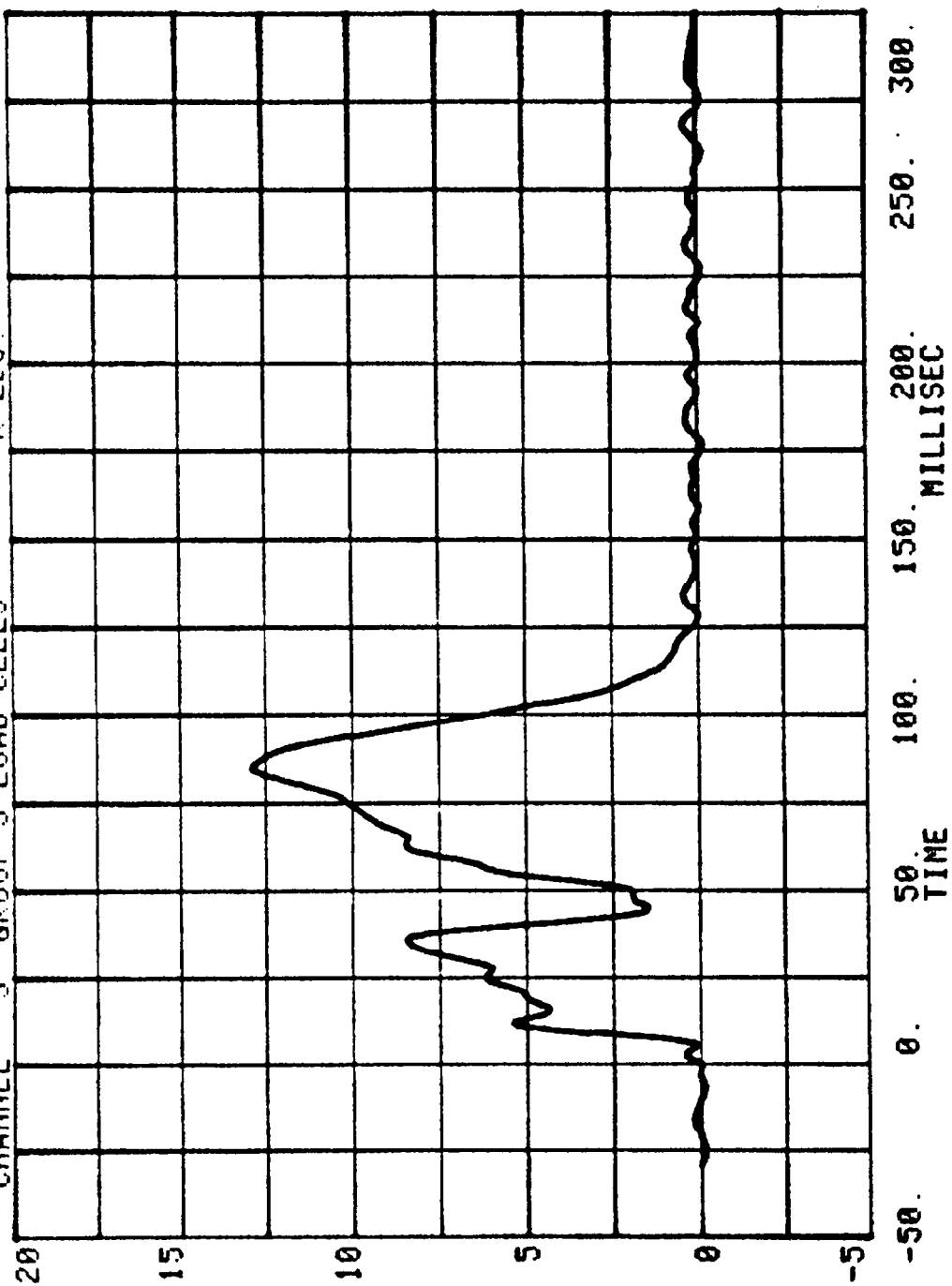


CHANNEL 4 GROUP 4 LOAD CELLS K LBS.

RUN= 771 SERIES= 5400

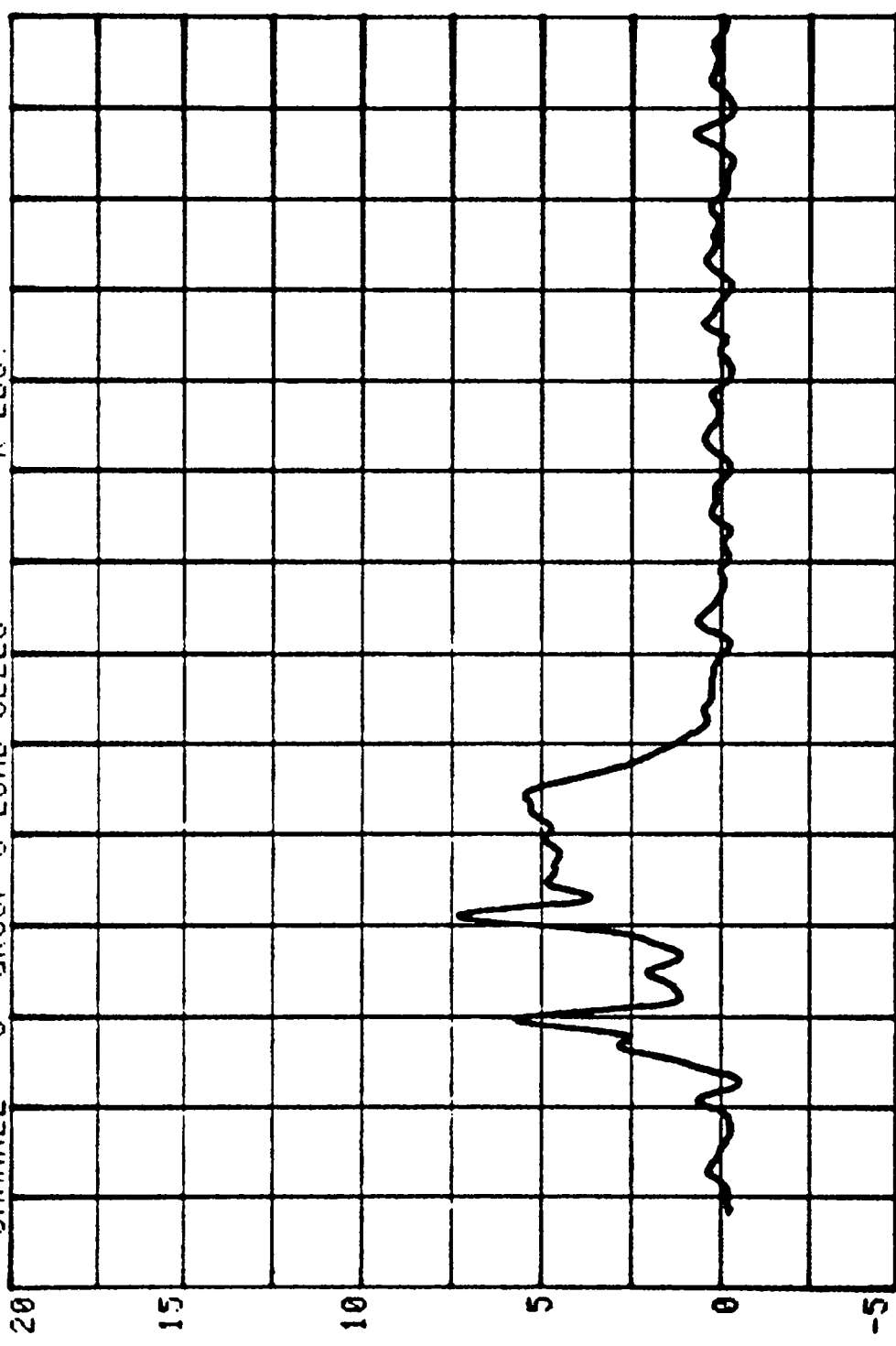


RUN= 771 SERIES= 5400 K LBS.
CHANNEL 5 GROUP 5 LOAD CELLS



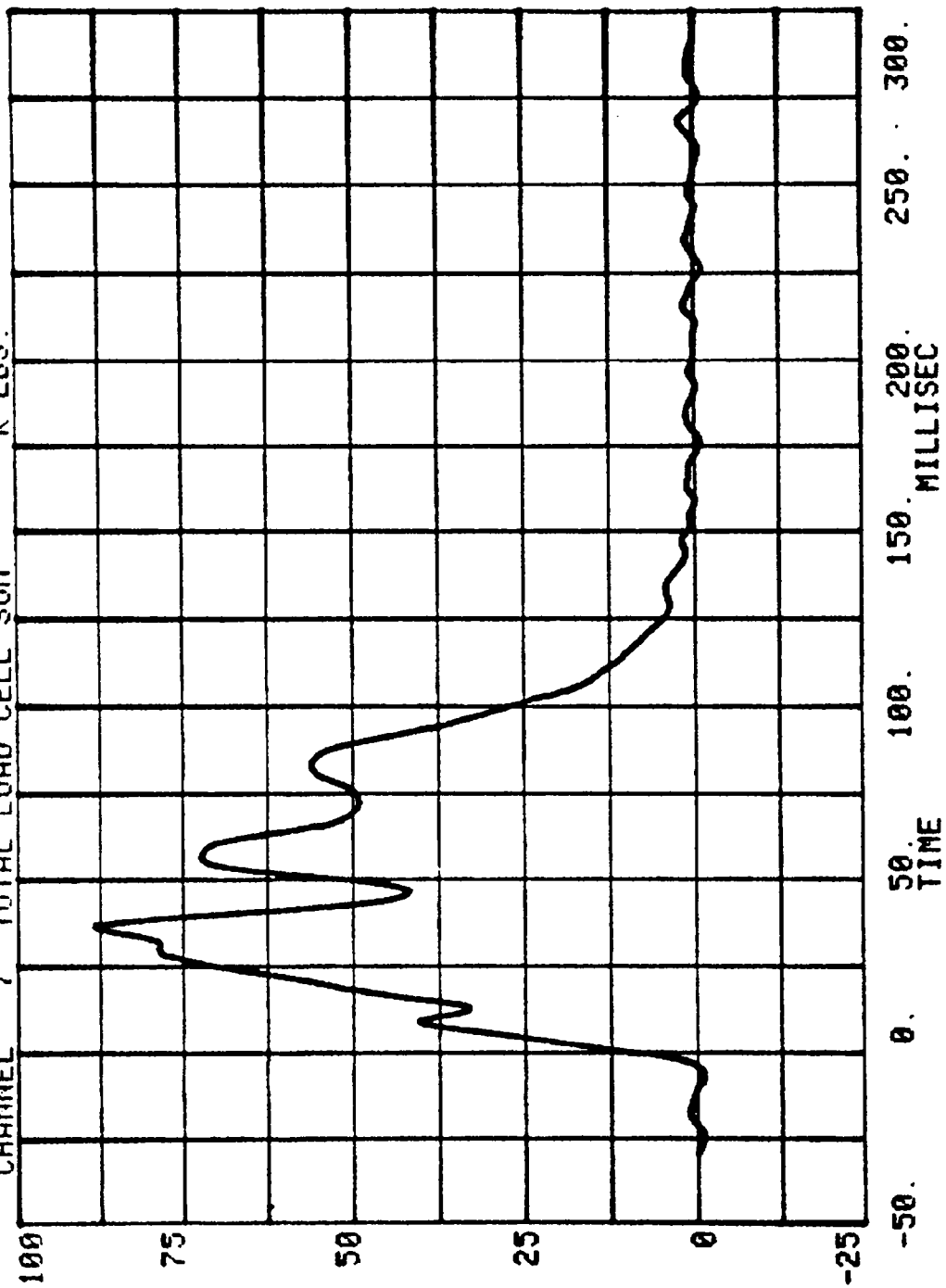
CHANNEL 6 GROUP 6 LOAD CELLS K LBS.

RUN= 771 SERIES= 5400



CHANNEL 7 TOTAL LOAD CELL SUM K LBS.

RUN= 771 SERIES= 5400



TEST NO. MH5400

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

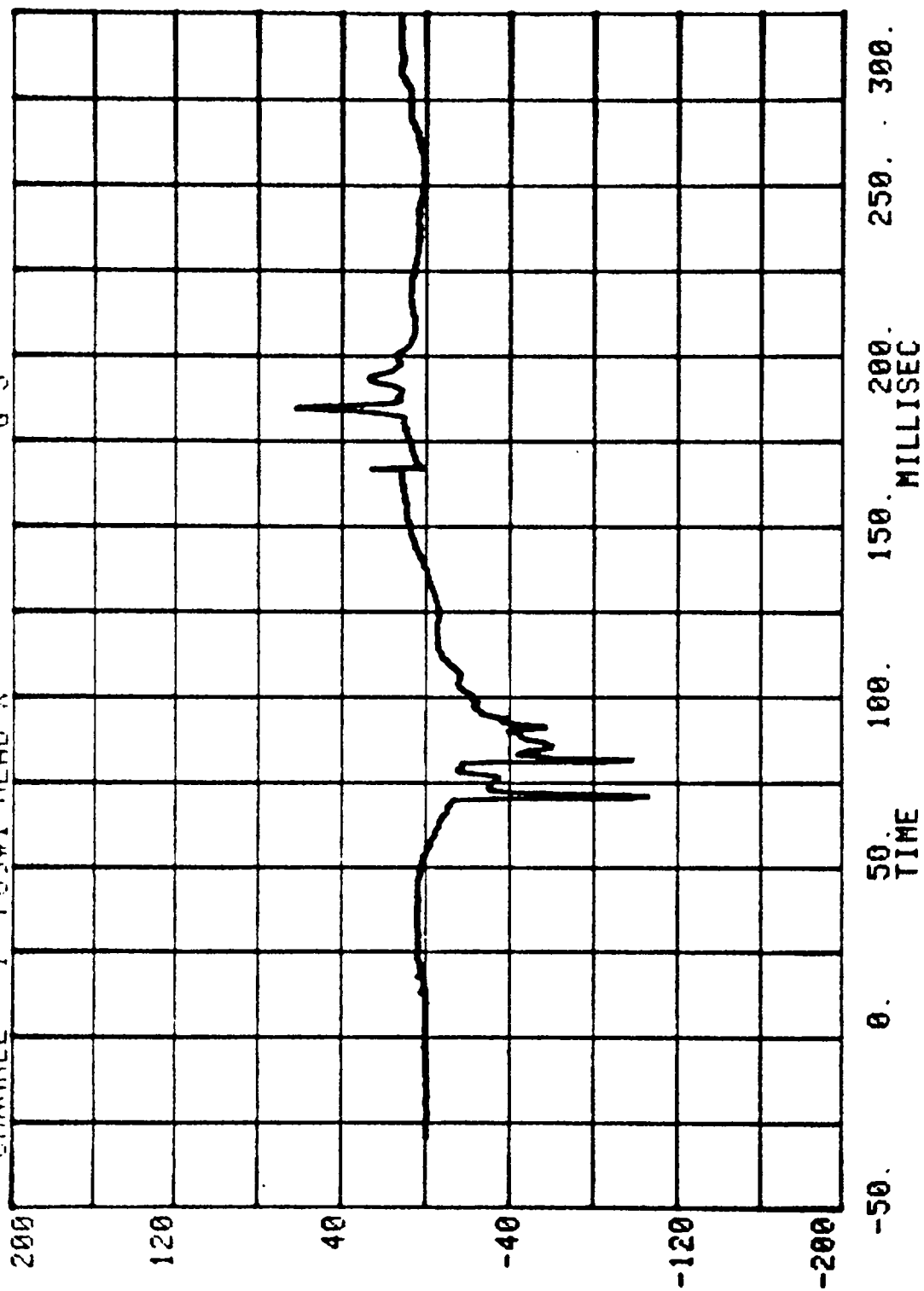
NEW CAR ASSESSMENT BARRIER TESTS - 1987

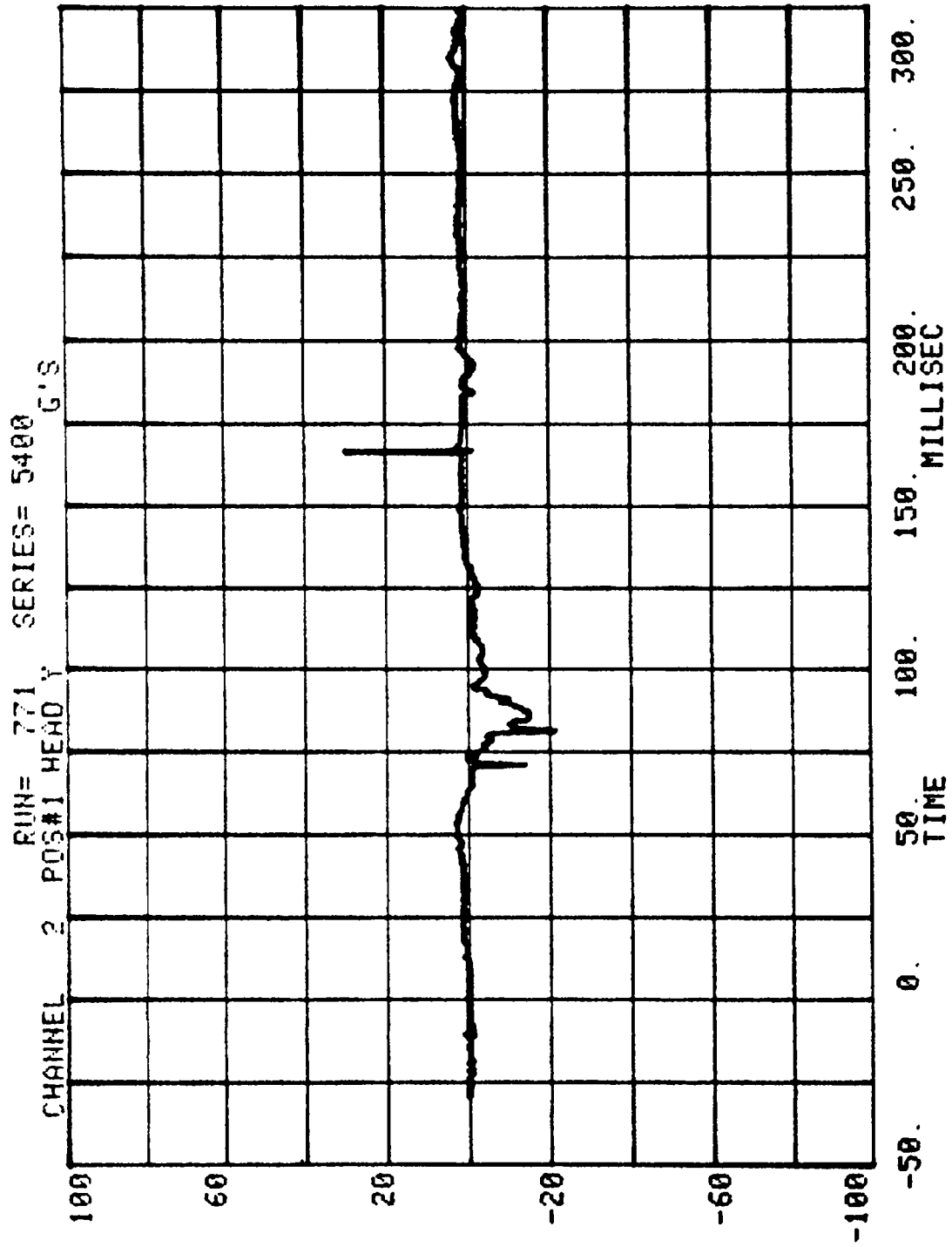
RUN= 771

POS#1 HEAD R

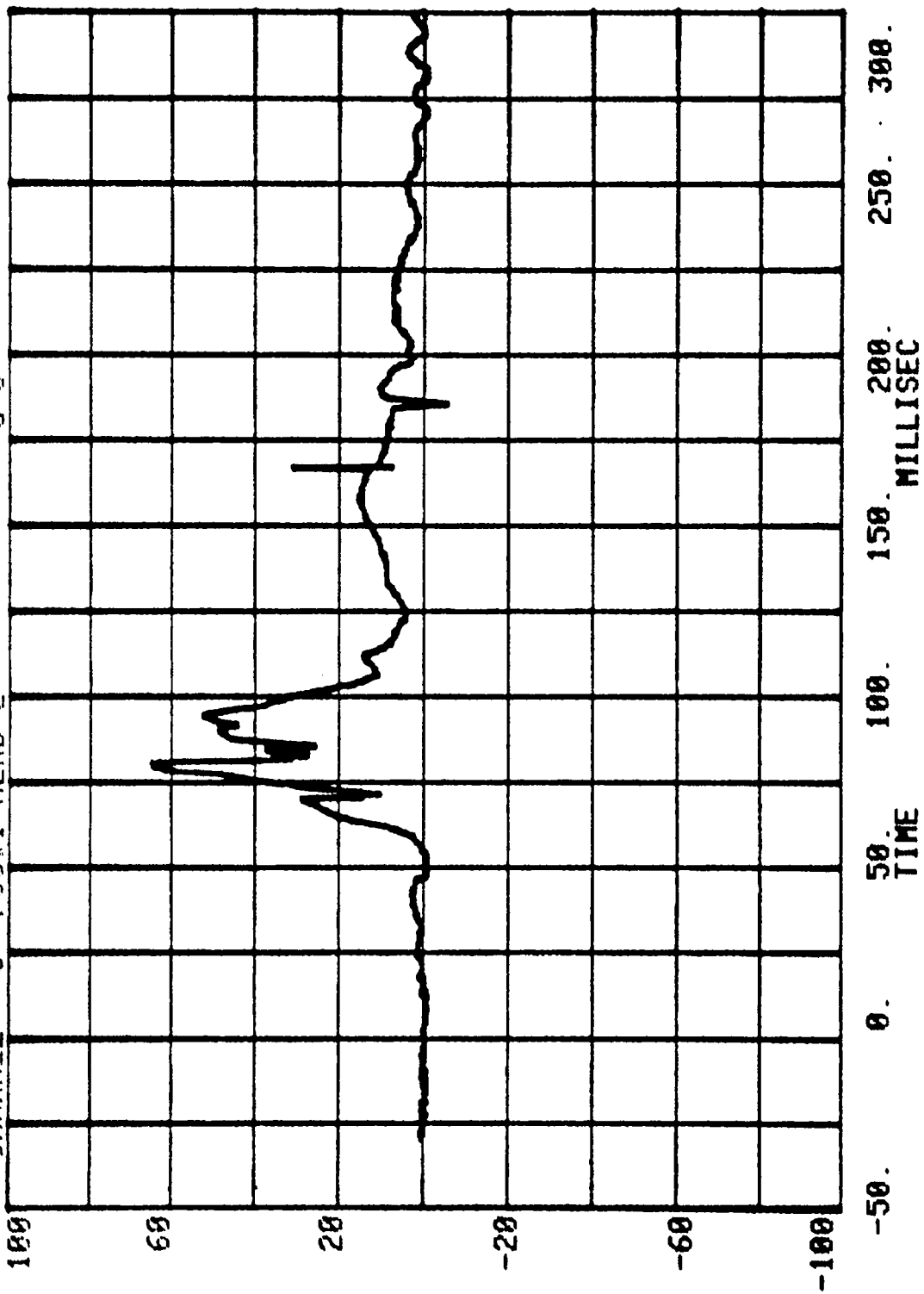
HIC= 845.5 FROM T1= .07050 TO T2= .10072
AVERAGE ACCELERATION BETWEEN T1 AND T2= 60.1G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1129.7

CHANNEL 1 POS#1 HEAD X RUN= 771 SERIES= 5400 G'S

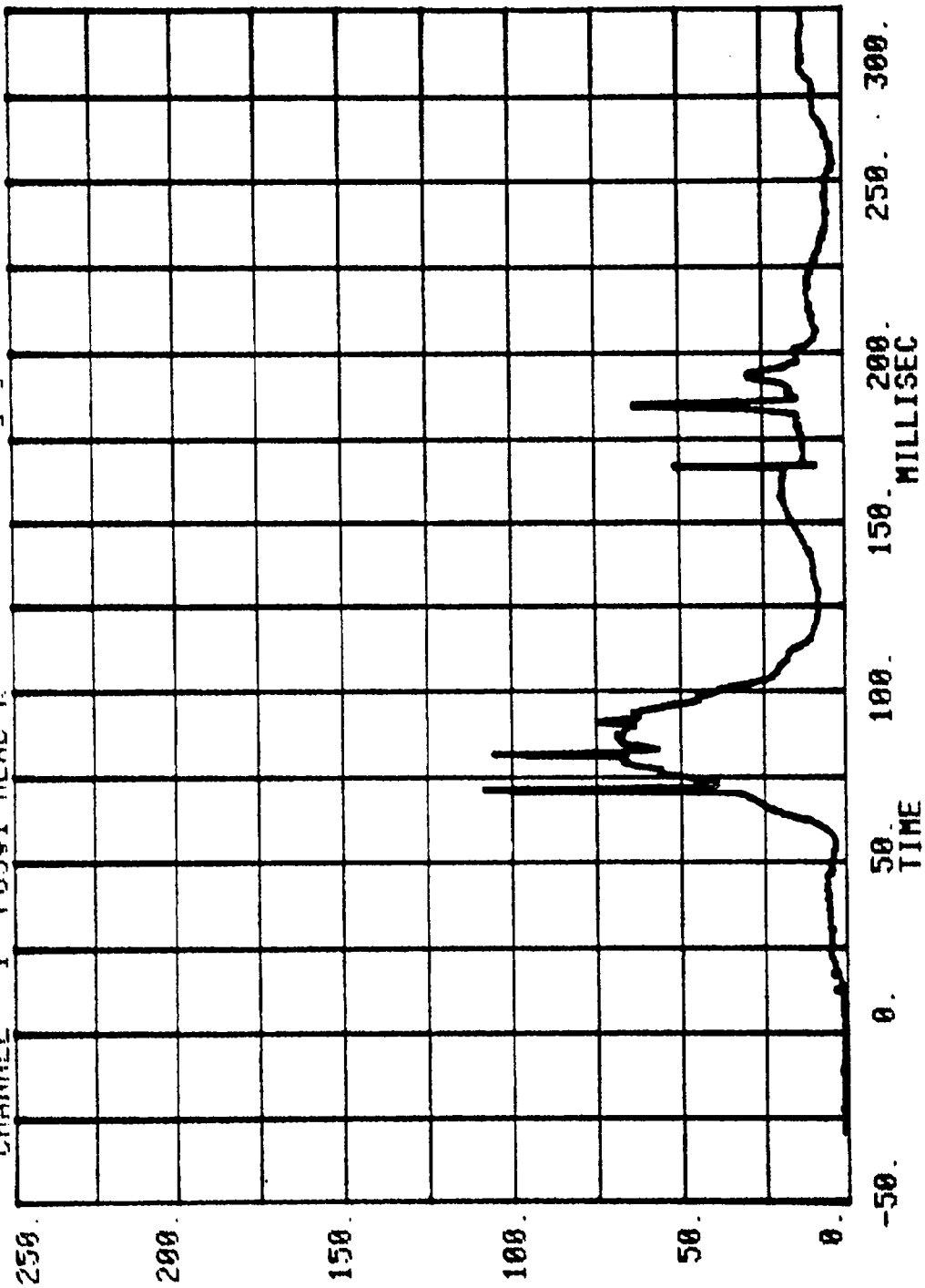




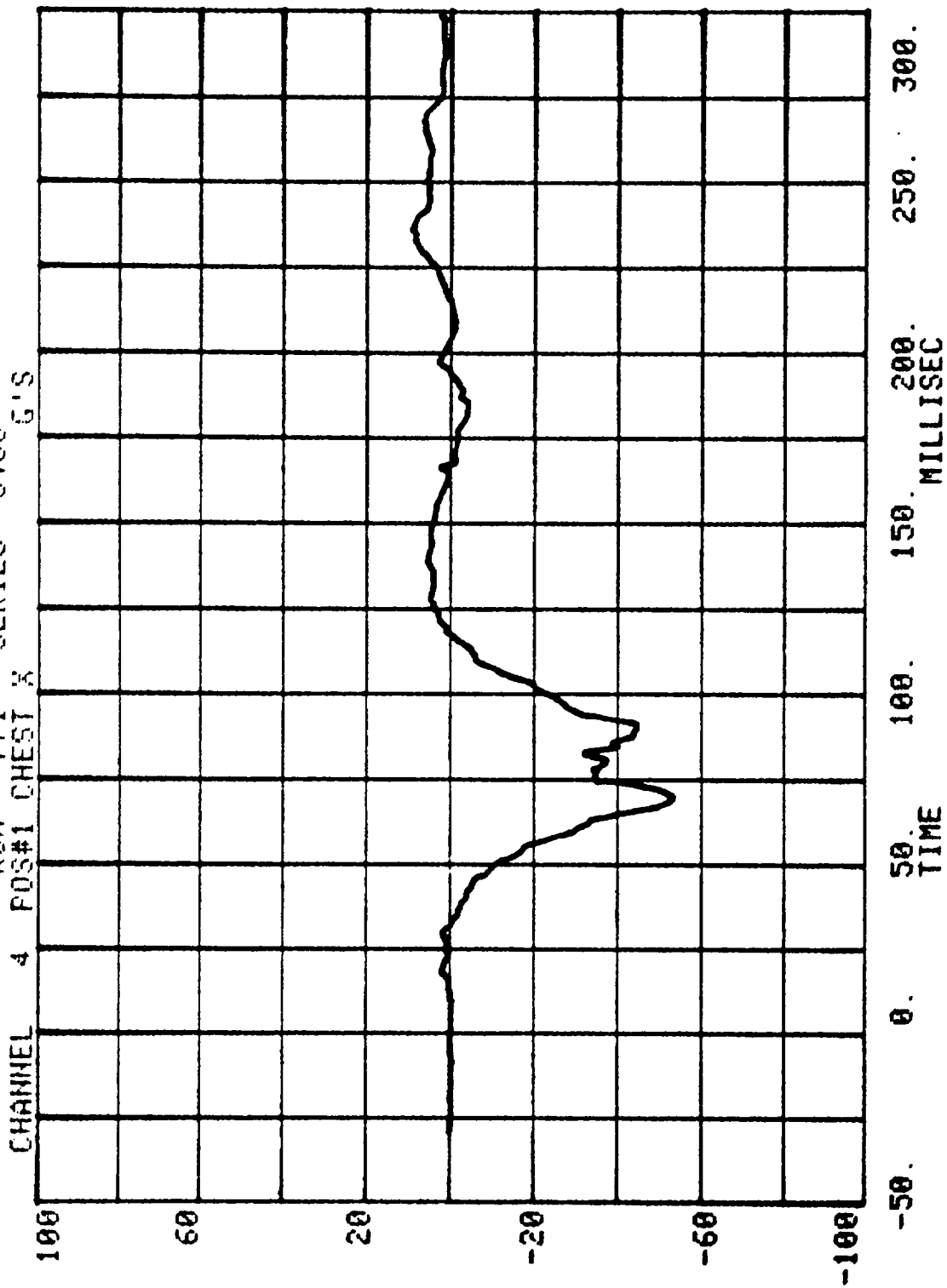
CHANNEL 3 POS#1 HEAD 2 RUN= 771 SERIES= 5488 G'S



CHANNEL 1 POS#1 HEAD R RUN= 771 SERIES= 5400 G'S



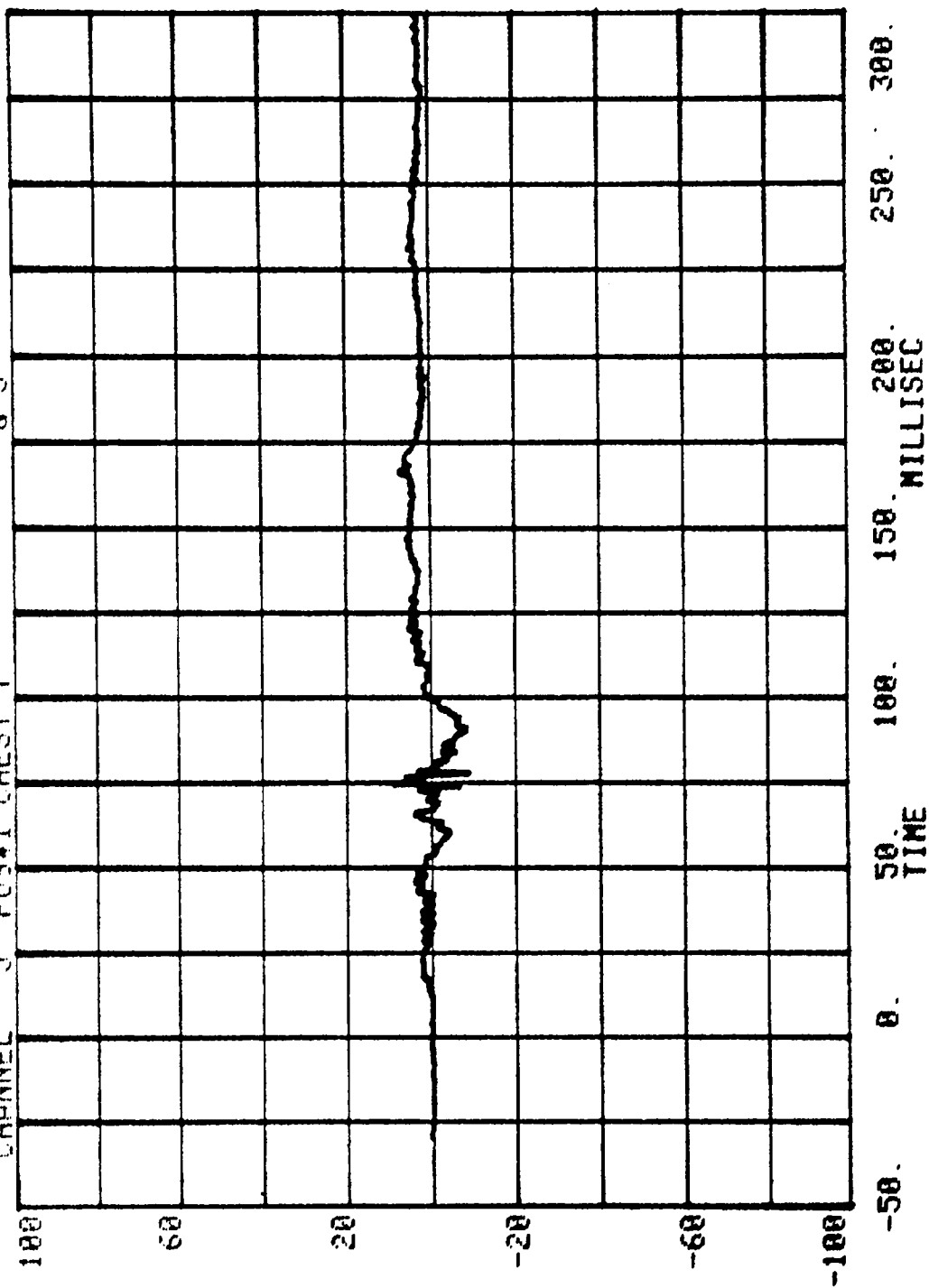
CHANNEL 4 RUN= 771 SERIES= 5488 G'S



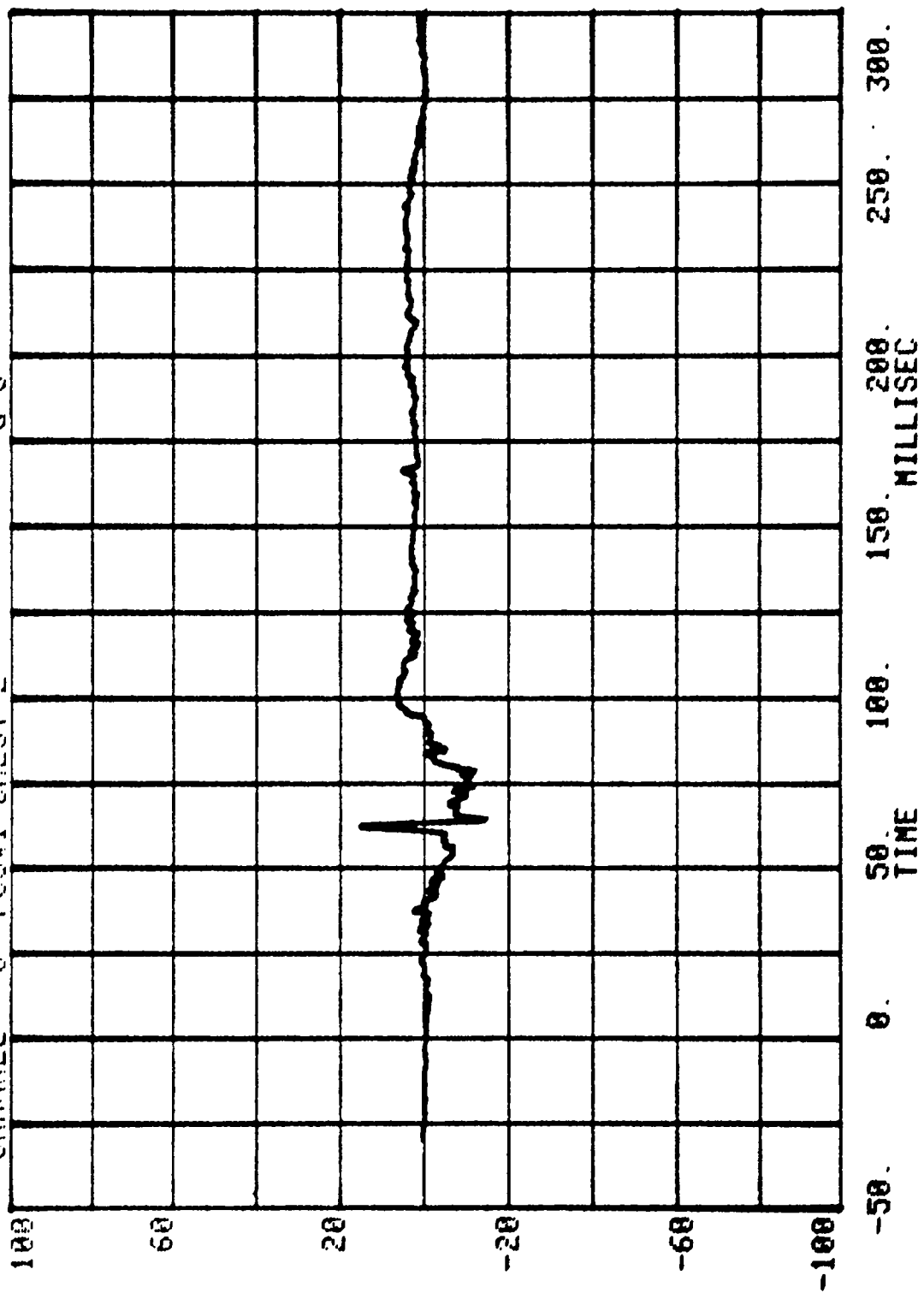
CHANNEL 5 POS#1 CHEST Y G'S

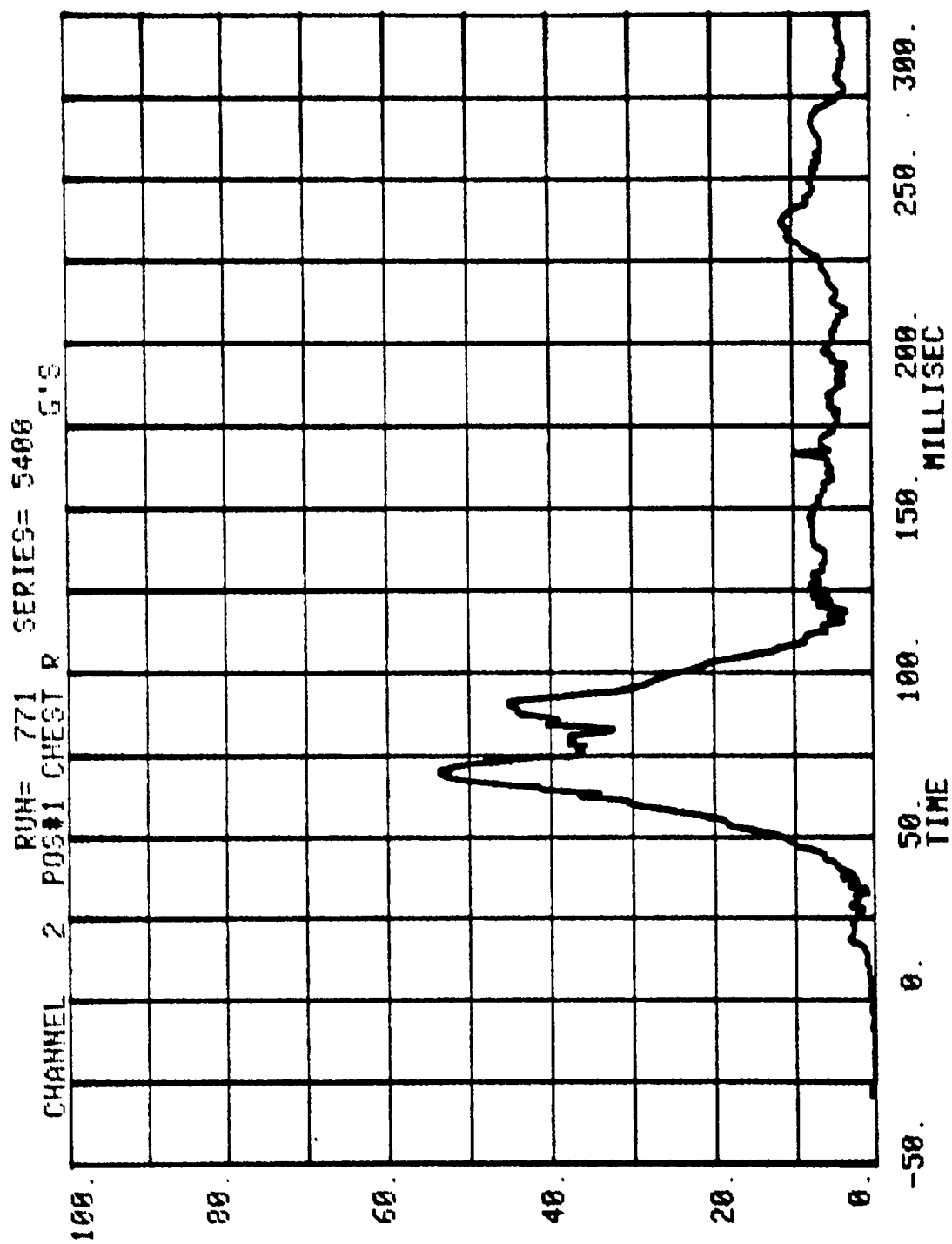
RUN= 771

SERIES= 5400

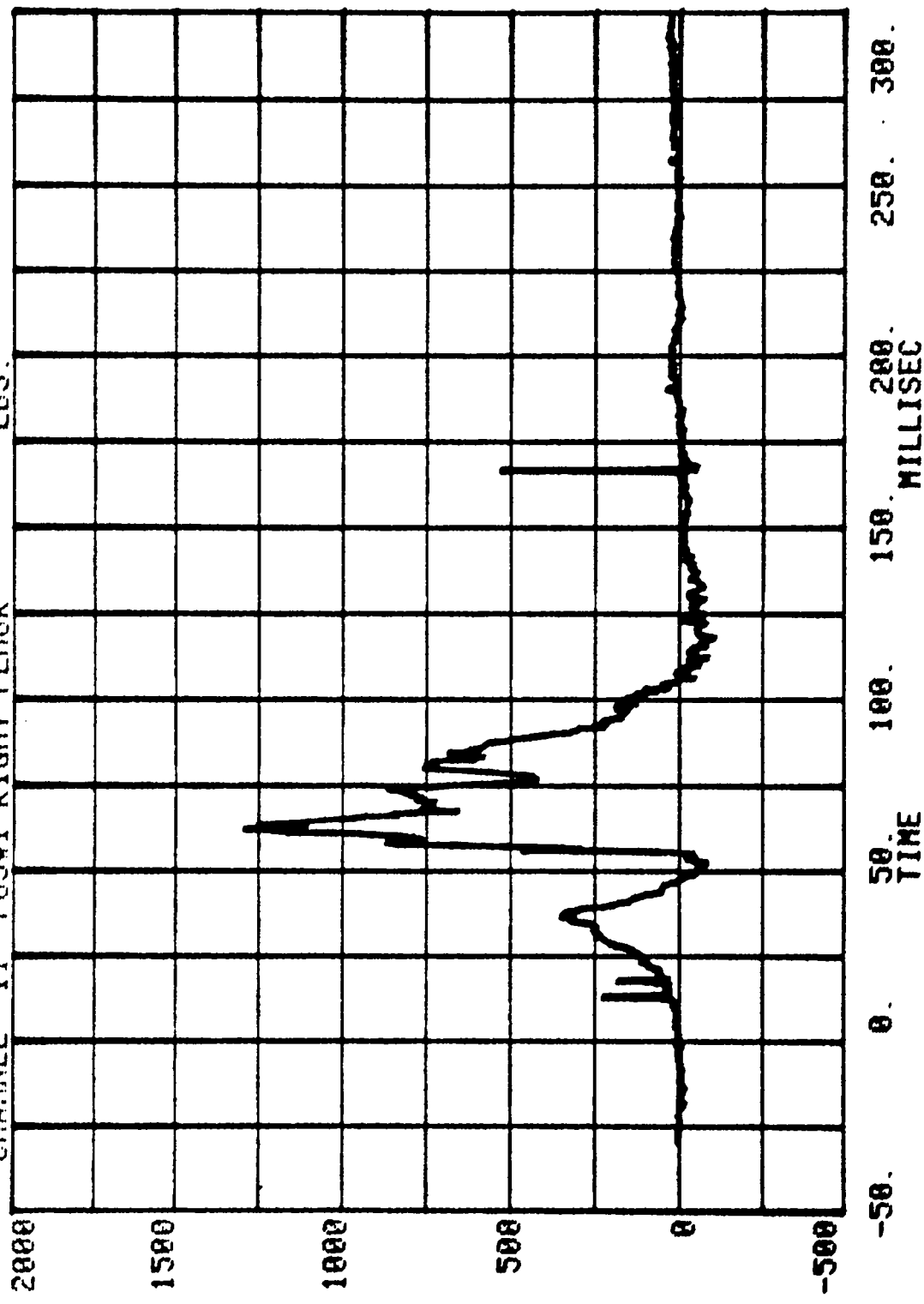


CHANNEL 6 POS#1 CHEST 2 RUN= 771 SERIES= 5488 G'S

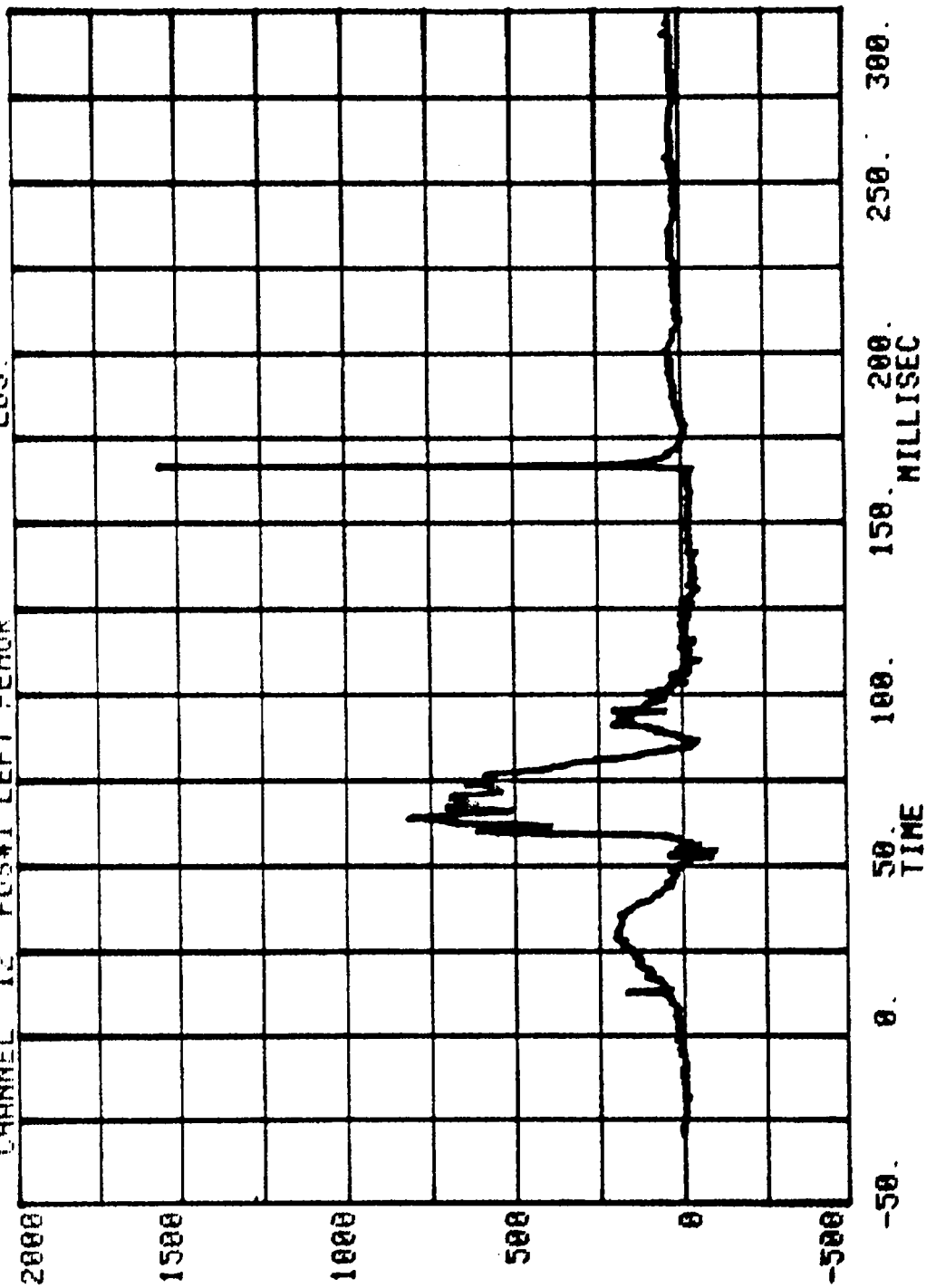




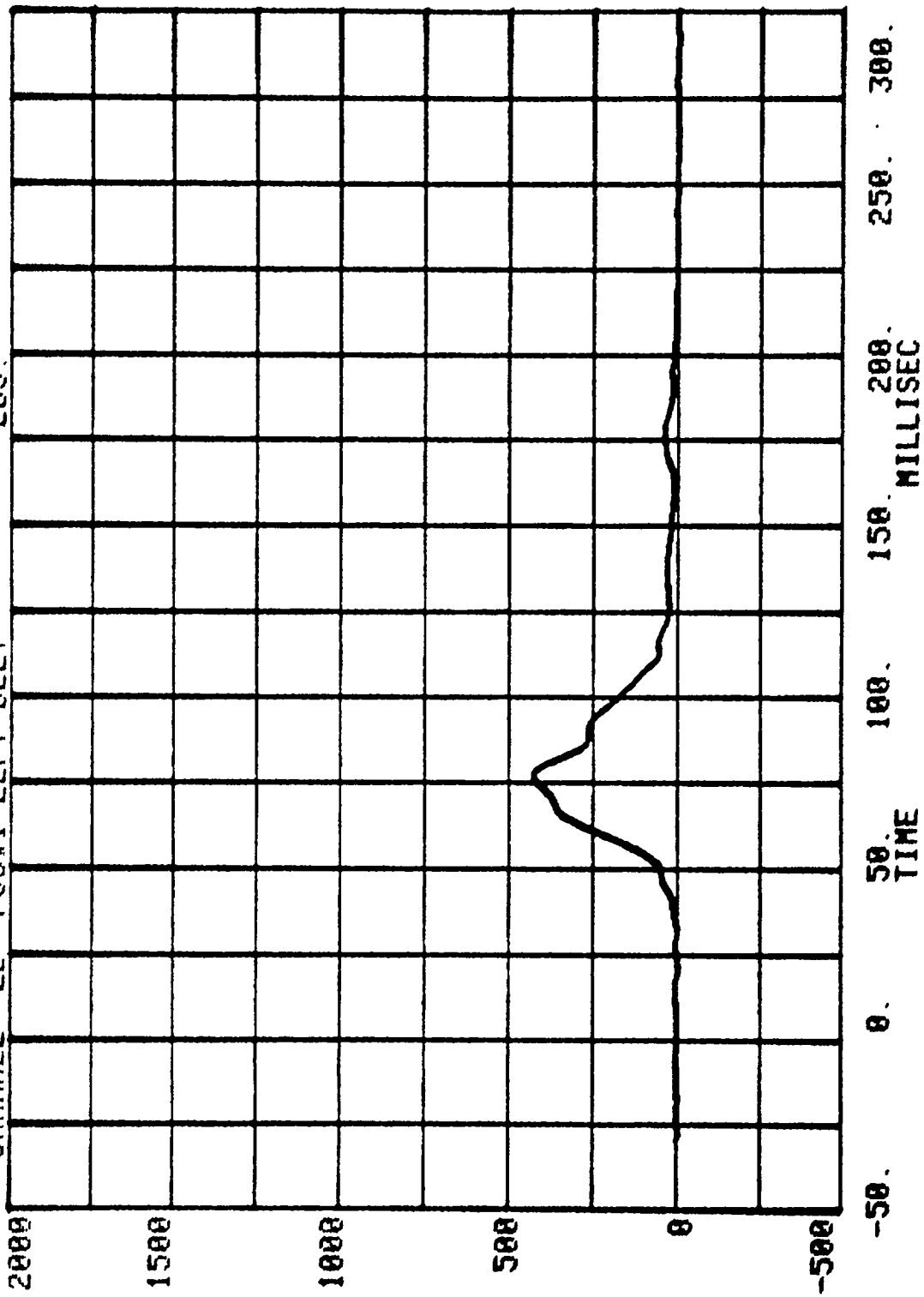
CHANNEL 11 POS#1 RIGHT FEMUR
RUN= 771 SERIES= 5400 LBS.



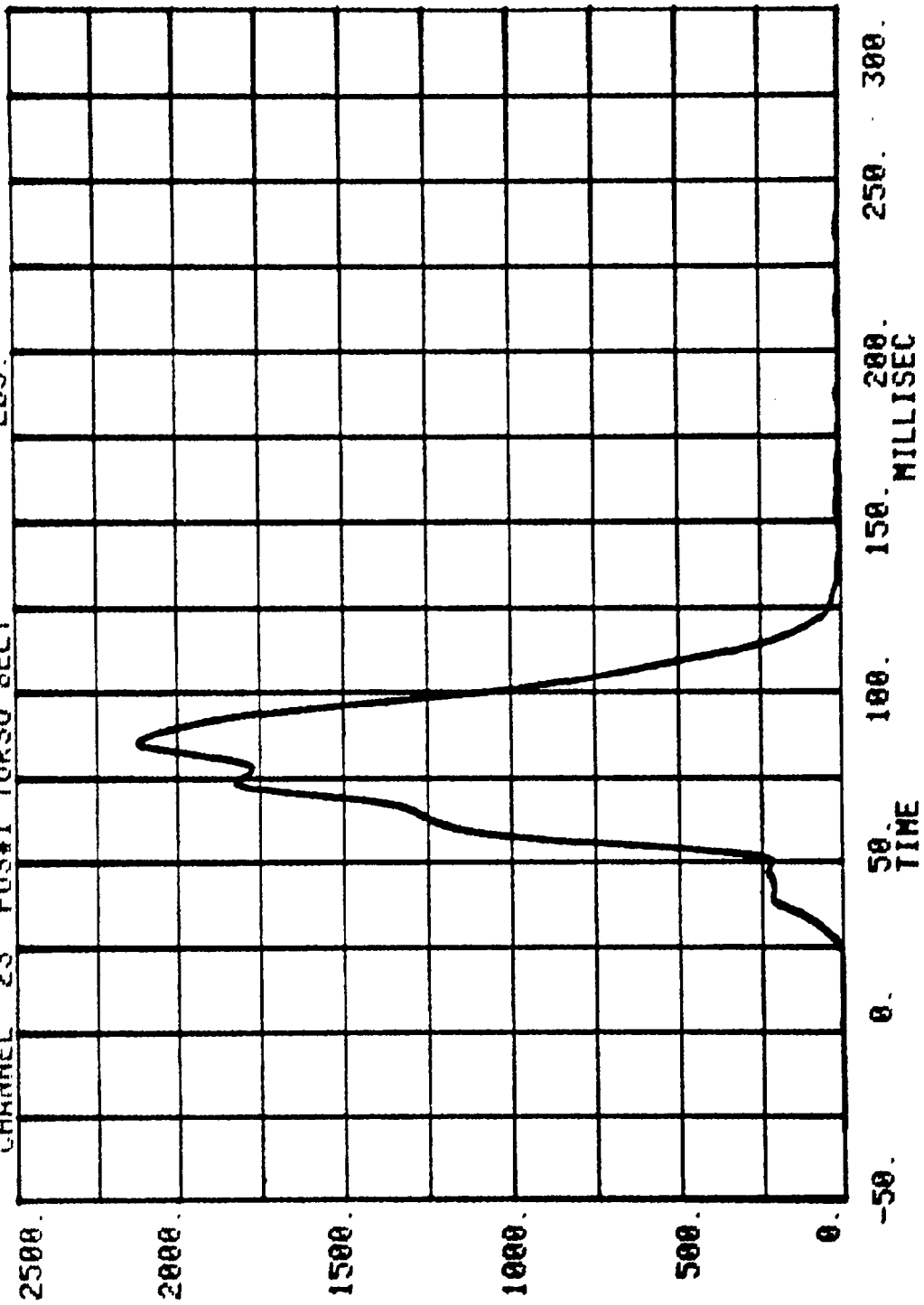
CHANNEL 12 POS#1 LEFT FEMUR
RUN= 771 SERIES= 5400 LBS.



CHANNEL 22 POS#1 LEFT BELT
RUN= 771 SERIES= 5400 LBS.



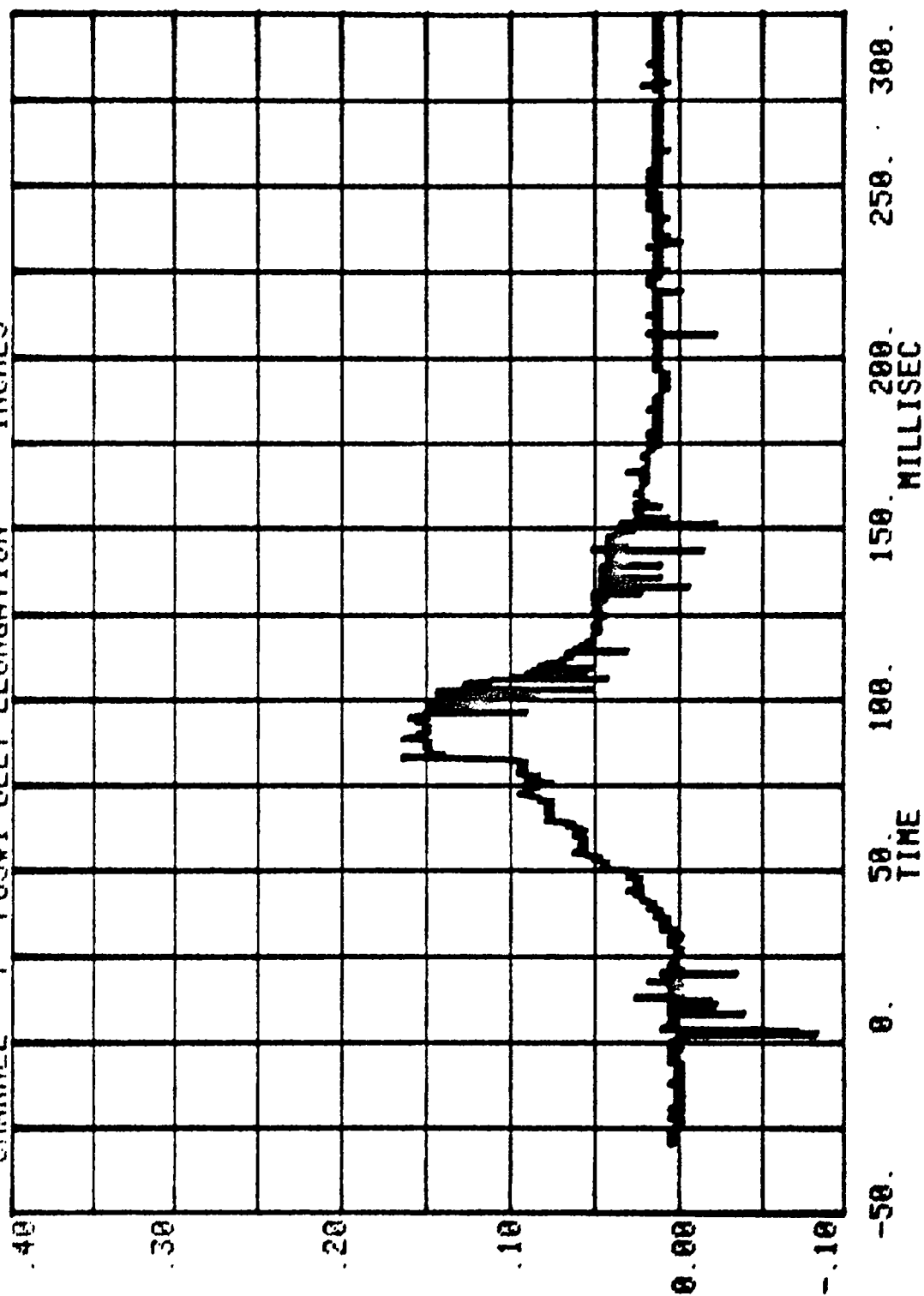
CHANNEL 23 RUN= 771 SERIES= 5400 LBS.
POS#1 TORSO BELT



MEASURED OVER 2.5 INCHES

CHANNEL 7 POS#1 BELT ELONGATION INCHES

RUN= 771 SERIES= 5400



HEAD INJURY CRITERION
HEAD SEVERITY INDEX

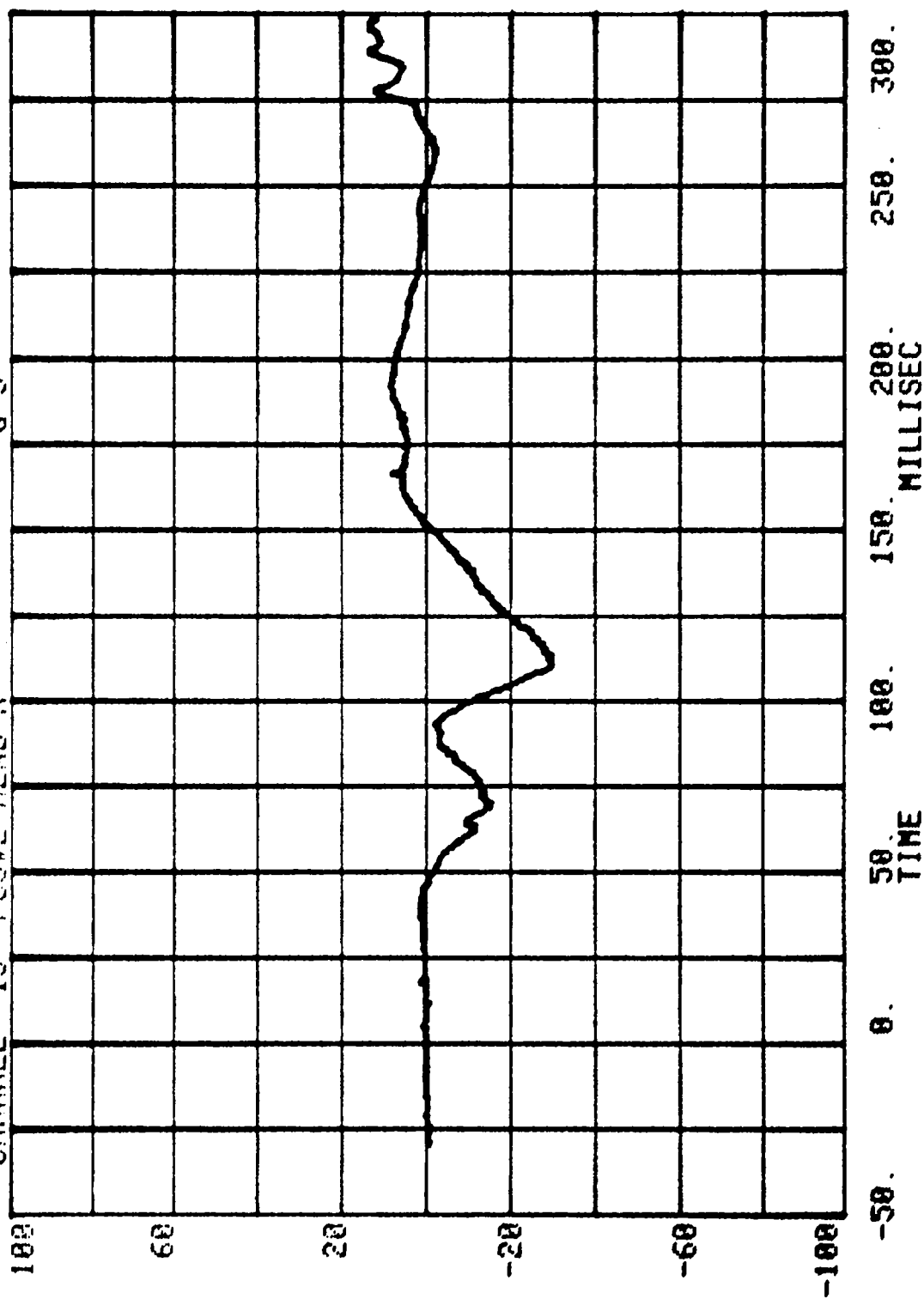
NEW CAR ASSESSMENT BARRIER TESTS - 1987

RUN= 771

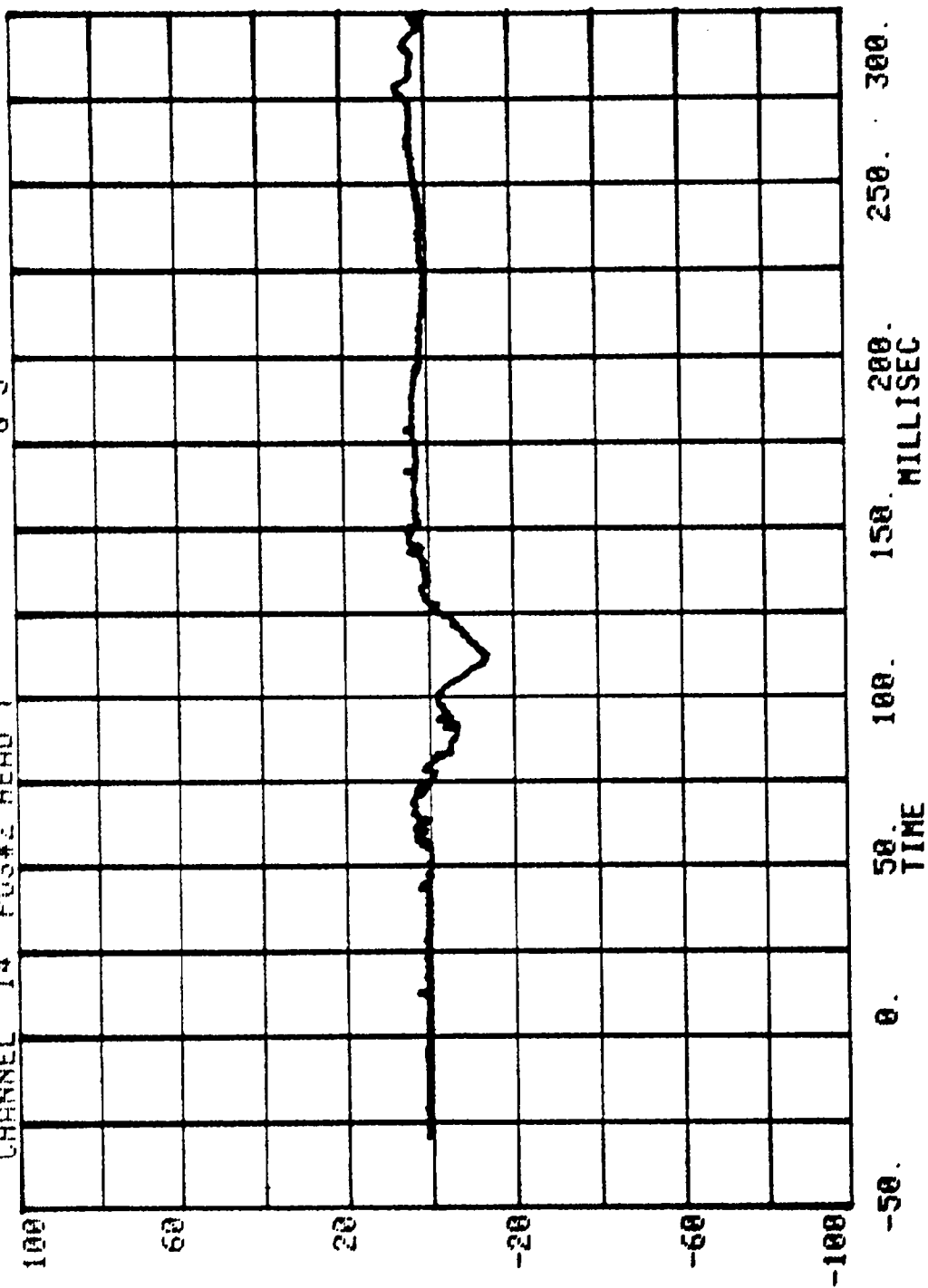
POS#2 HEAD R

HIC= 801.1 FROM T1= .07455 TO T2= .11055
AVERAGE ACCELERATION BETWEEN T1 AND T2= 54.8G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1086.0

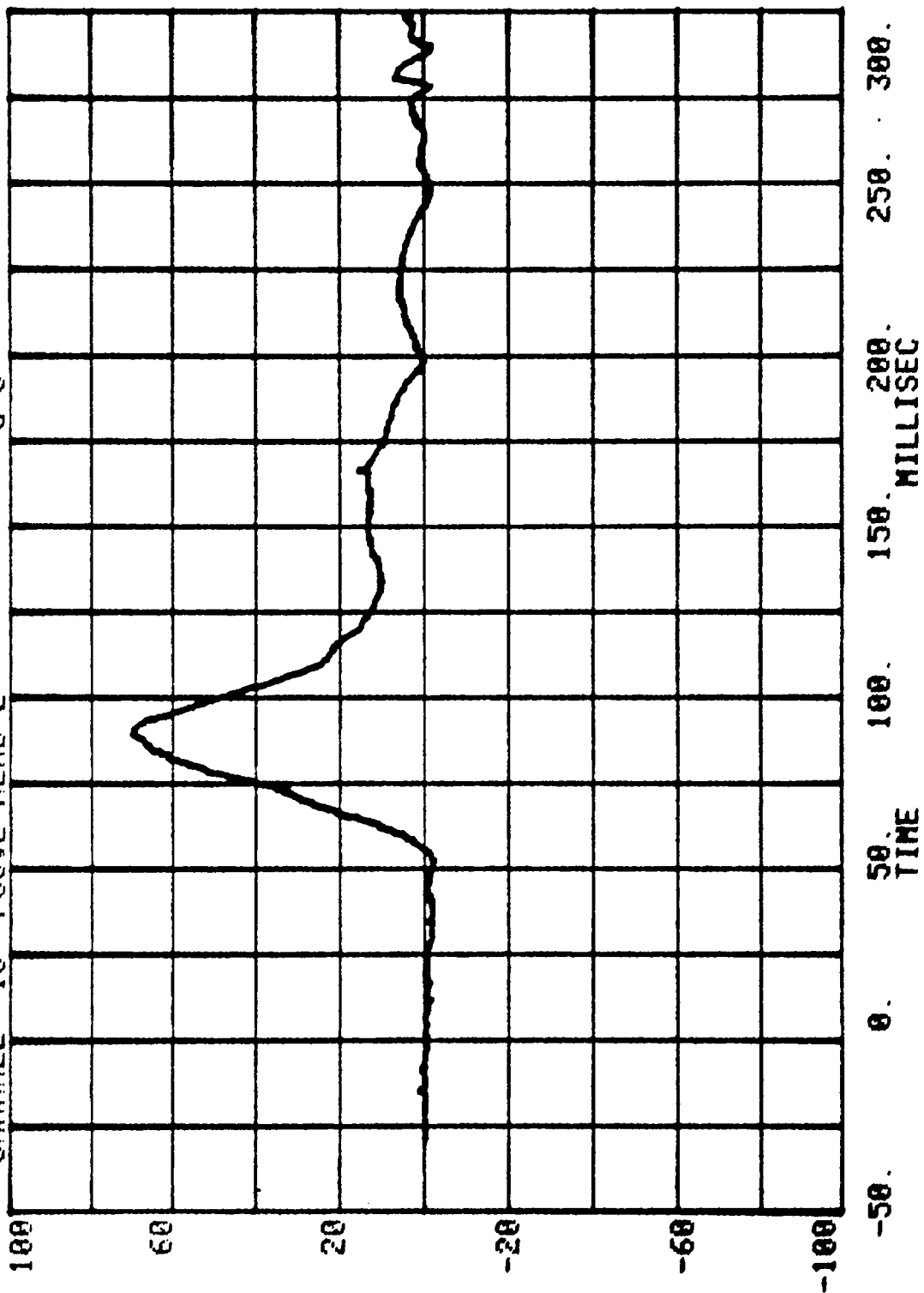
CHANNEL 13 POS#2 HEAD X RUN= 771 SERIES= 5400 G'S



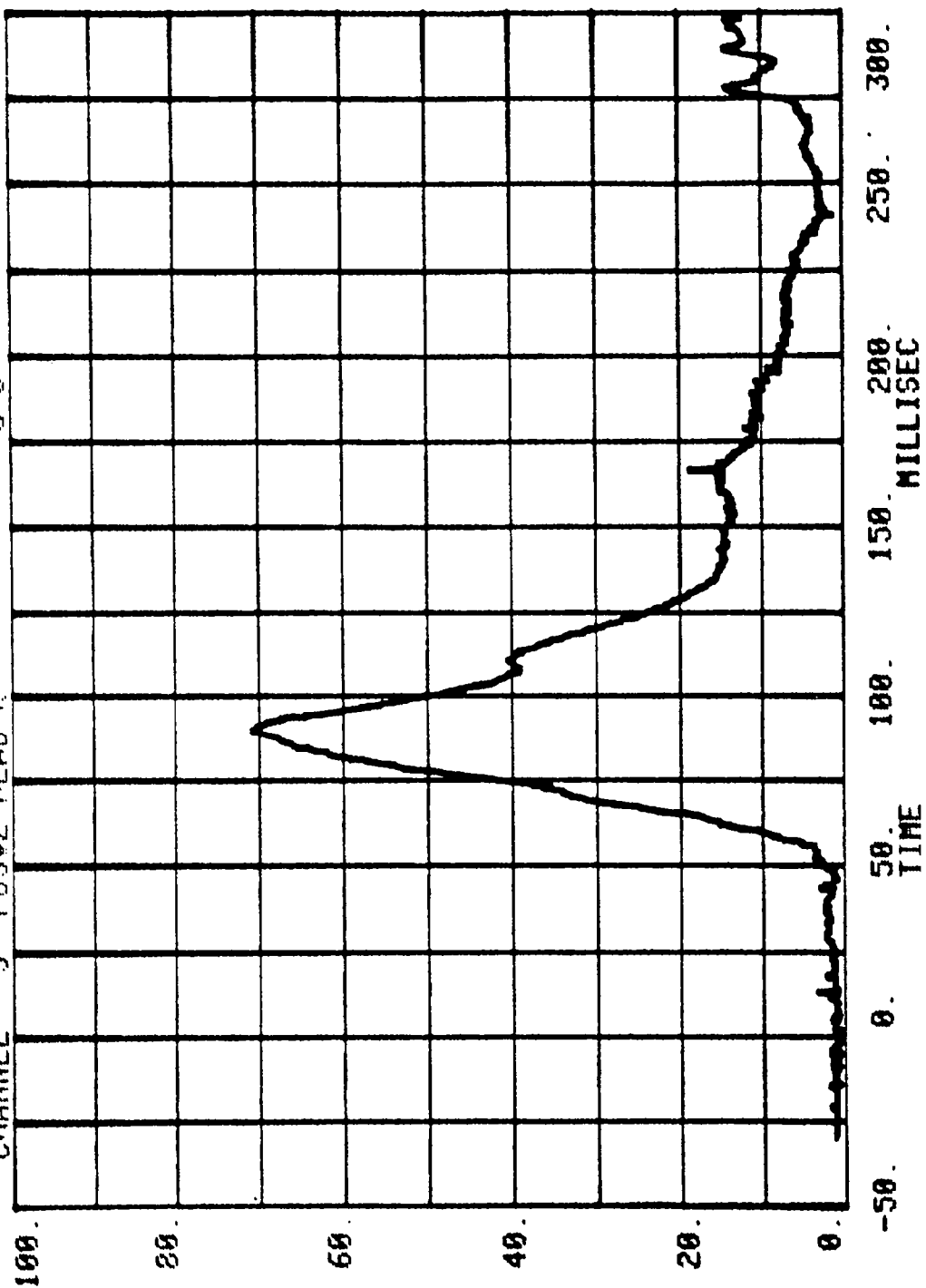
CHANNEL 14 POS#2 HEAD Y RUN= 771 SERIES= 5400 G'S



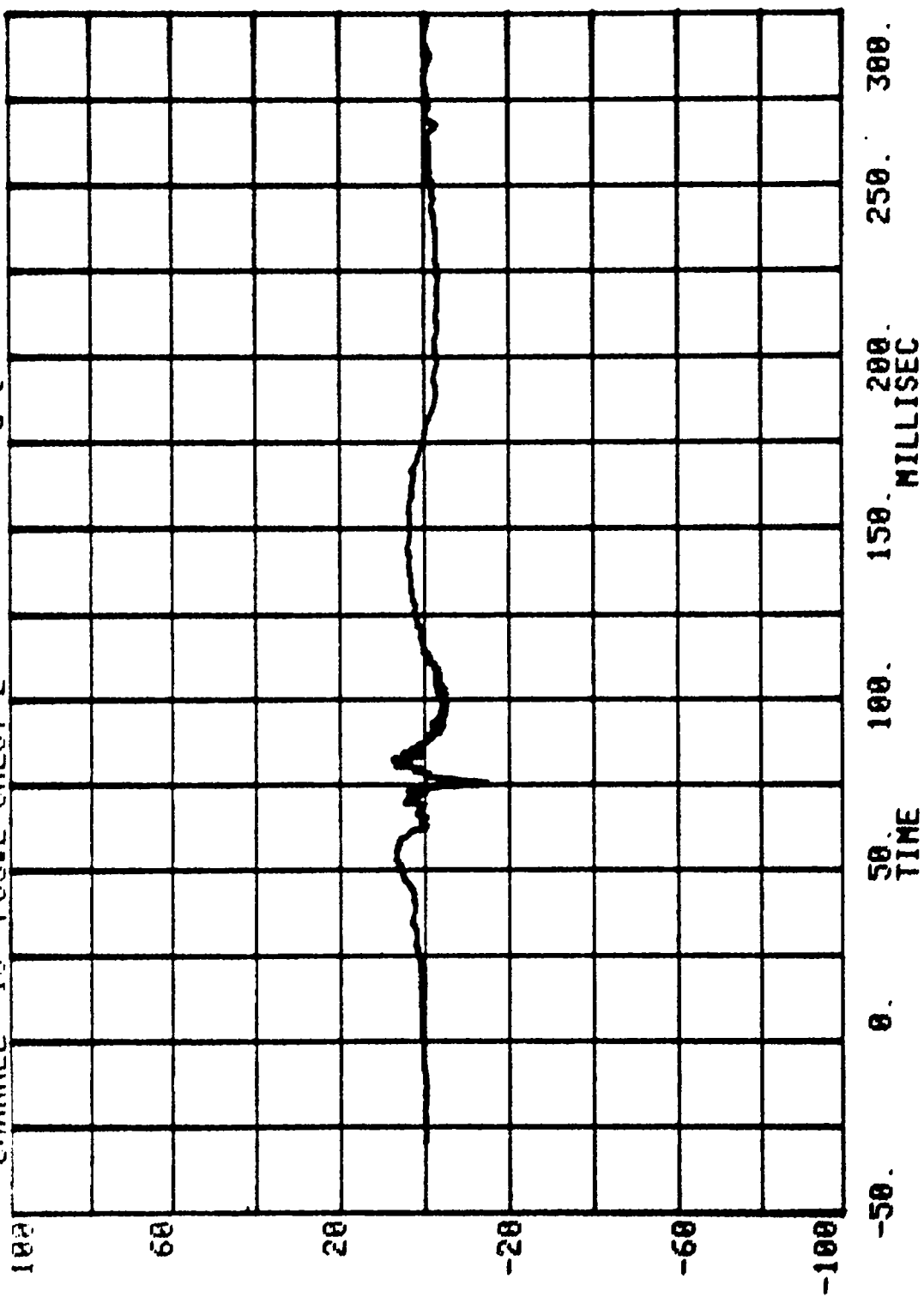
CHANNEL 15 POS#2 HEAD Z RUN= 771 SERIES= 5400 G'S



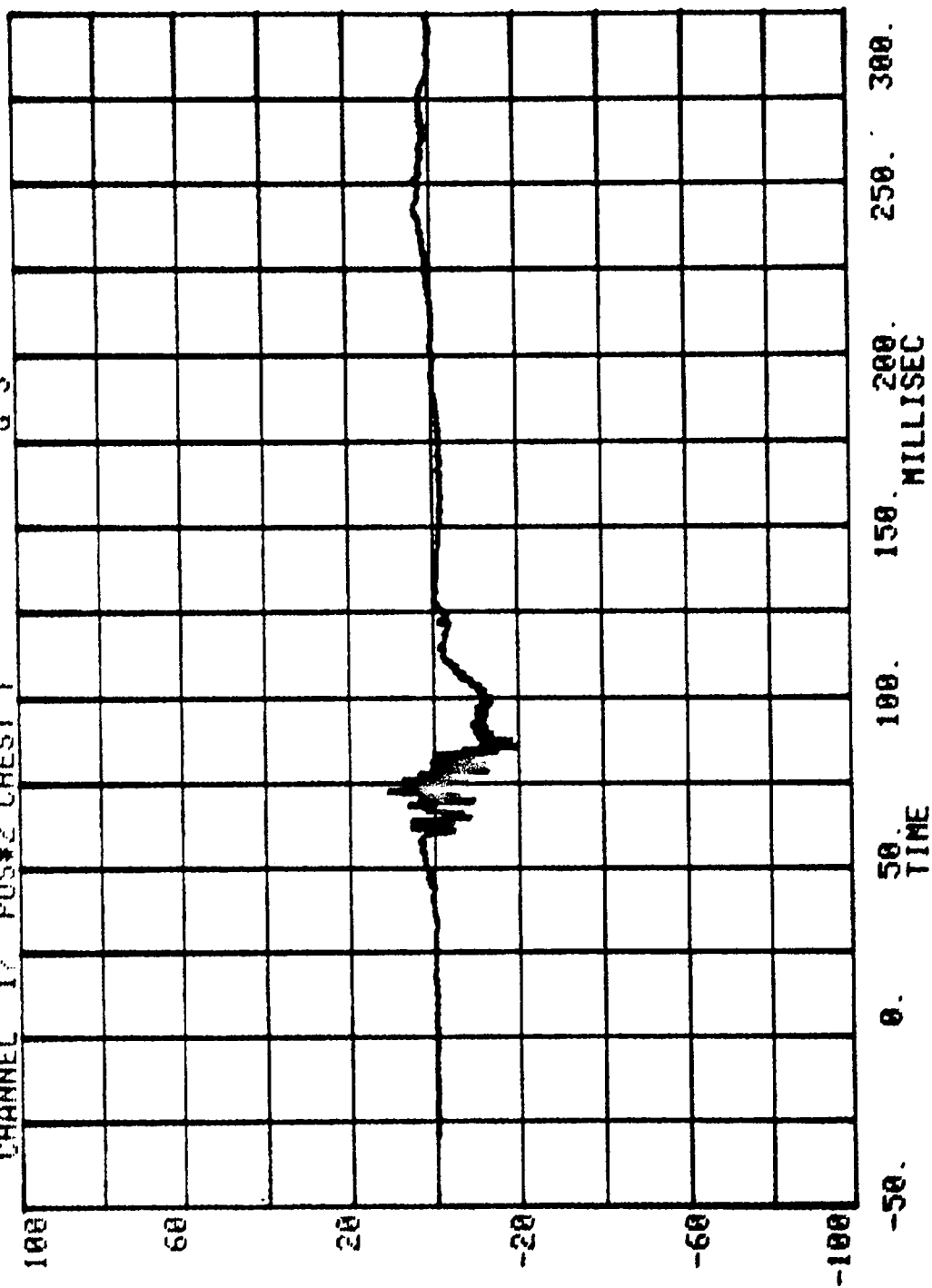
CHANNEL 3 POS#2 HEAD R
PUN= 771 SERIES= 5400 G'S



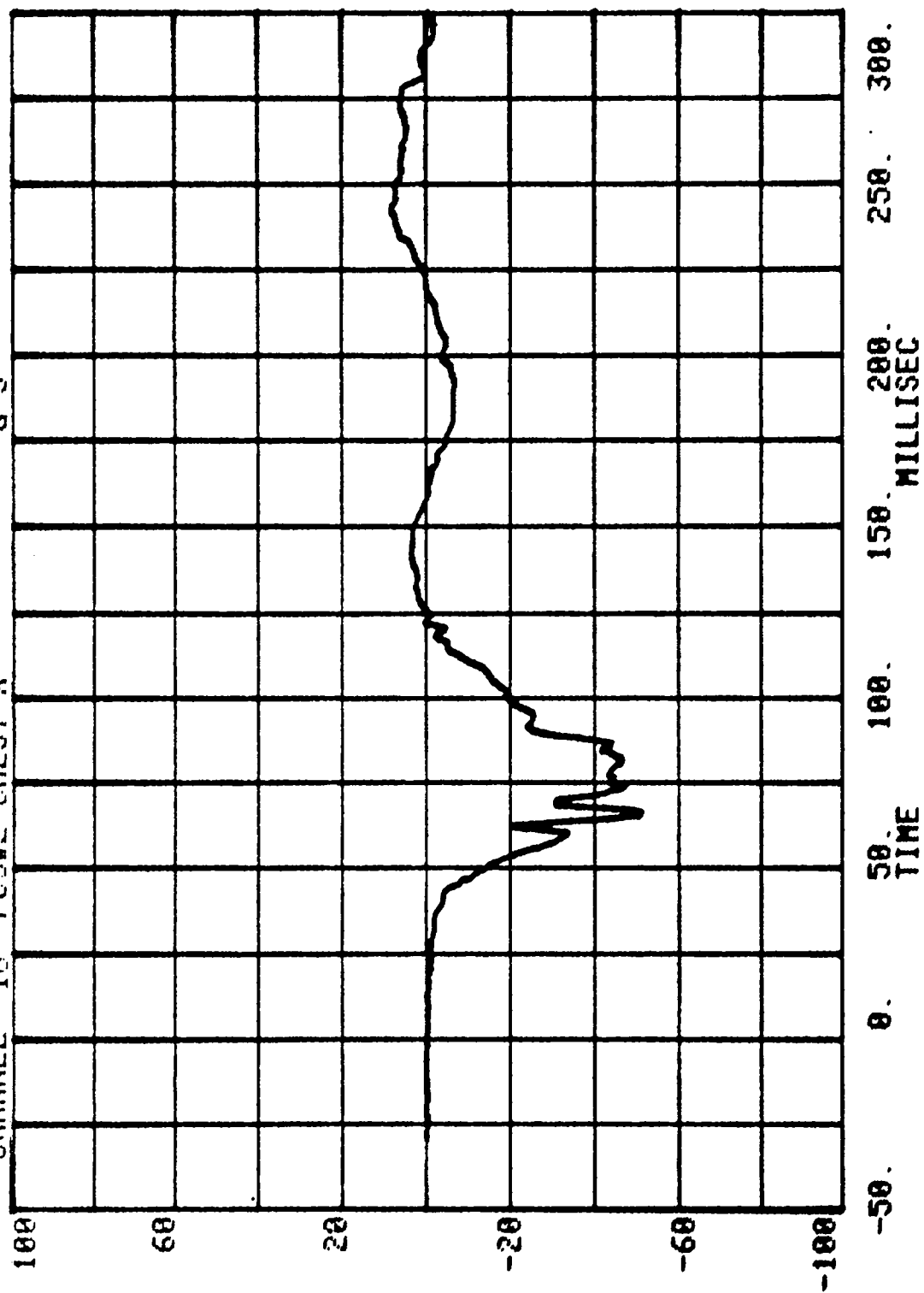
CHANNEL 15 POS#2 CHEST Z RUN= 771 SERIES= 5480 G'S



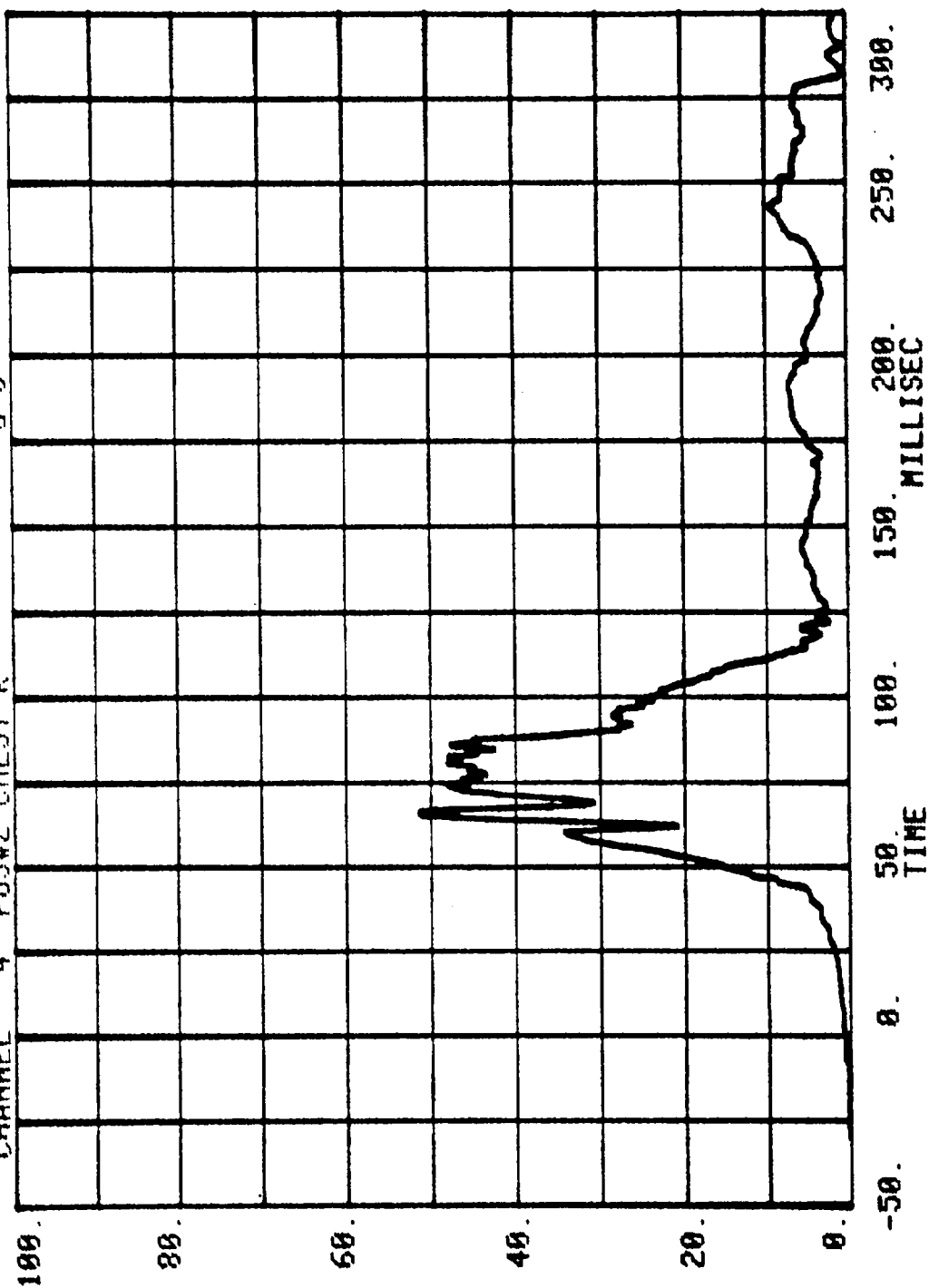
CHANNEL 17 POS#2 CHEST Y
RUN= 771 SERIES= 5400 G'S



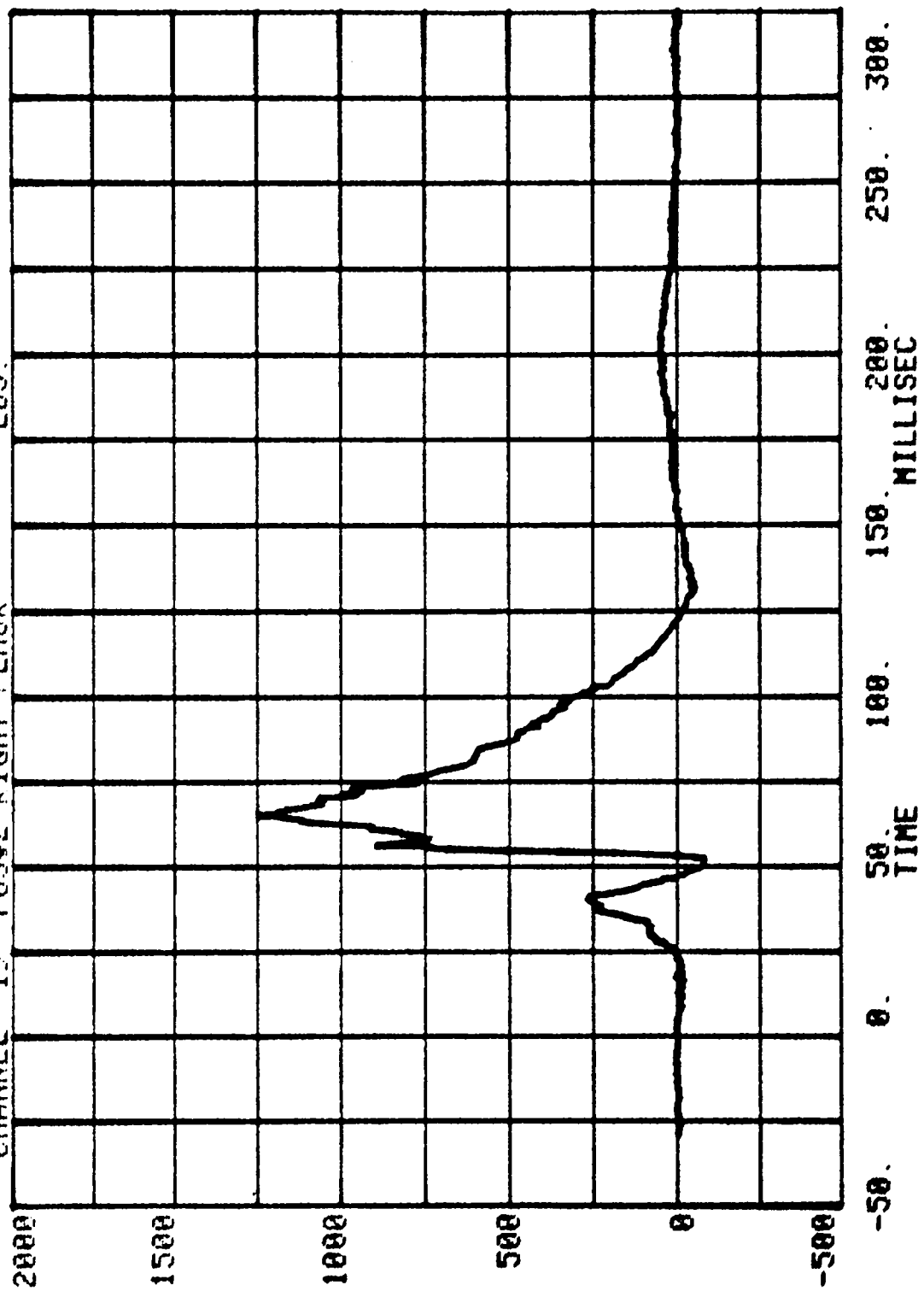
CHANNEL 18 POS#2 CHEST X
RUN= 771 SERIES= 5400 G'S



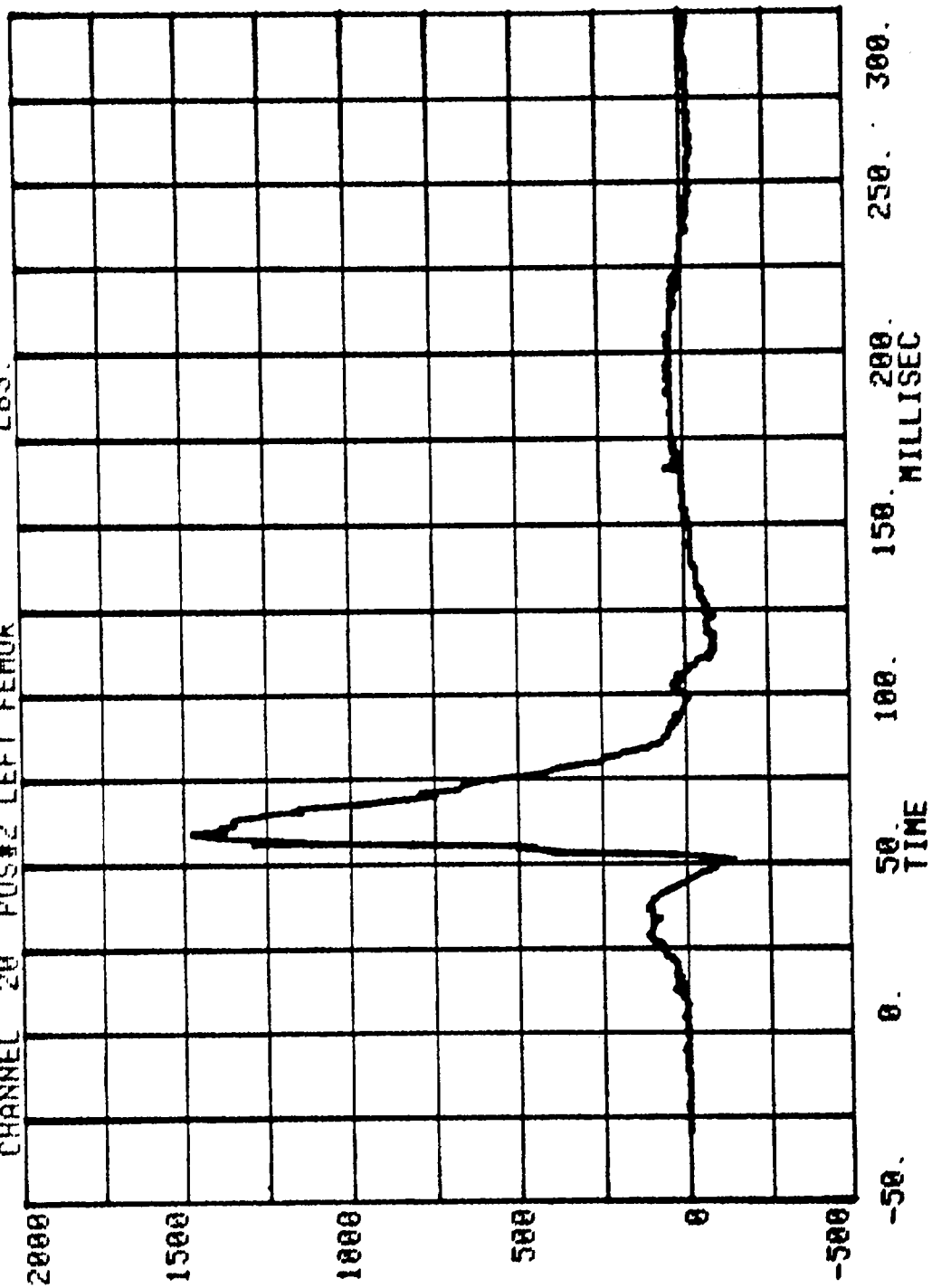
CHANNEL 4 POS#2 CHEST R RUN= 771 SERIES= 5400 G'S



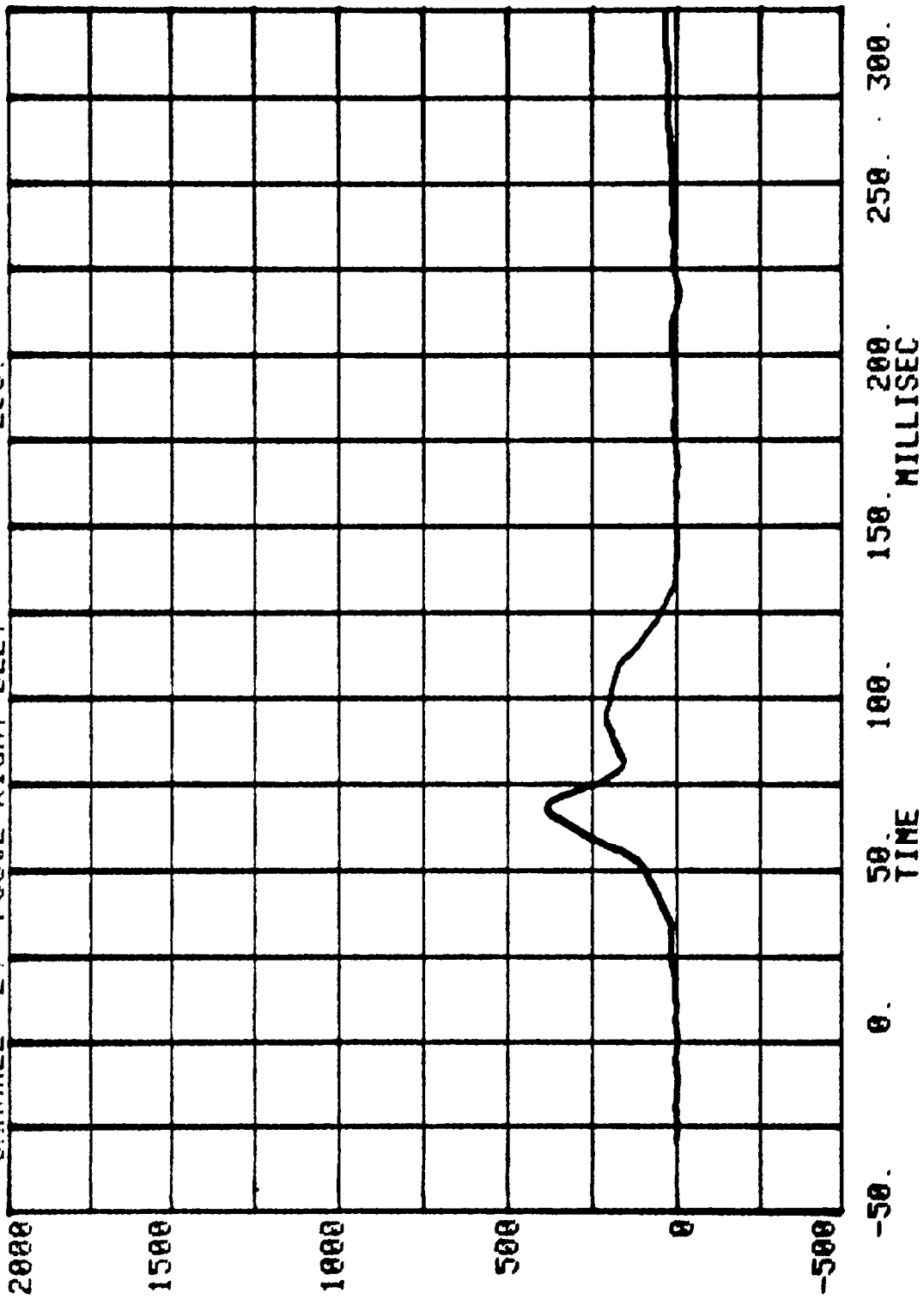
CHANNEL 13 RUN= 771 SERIES= 5400 LBS.
POST#2 RIGHT FEMUR



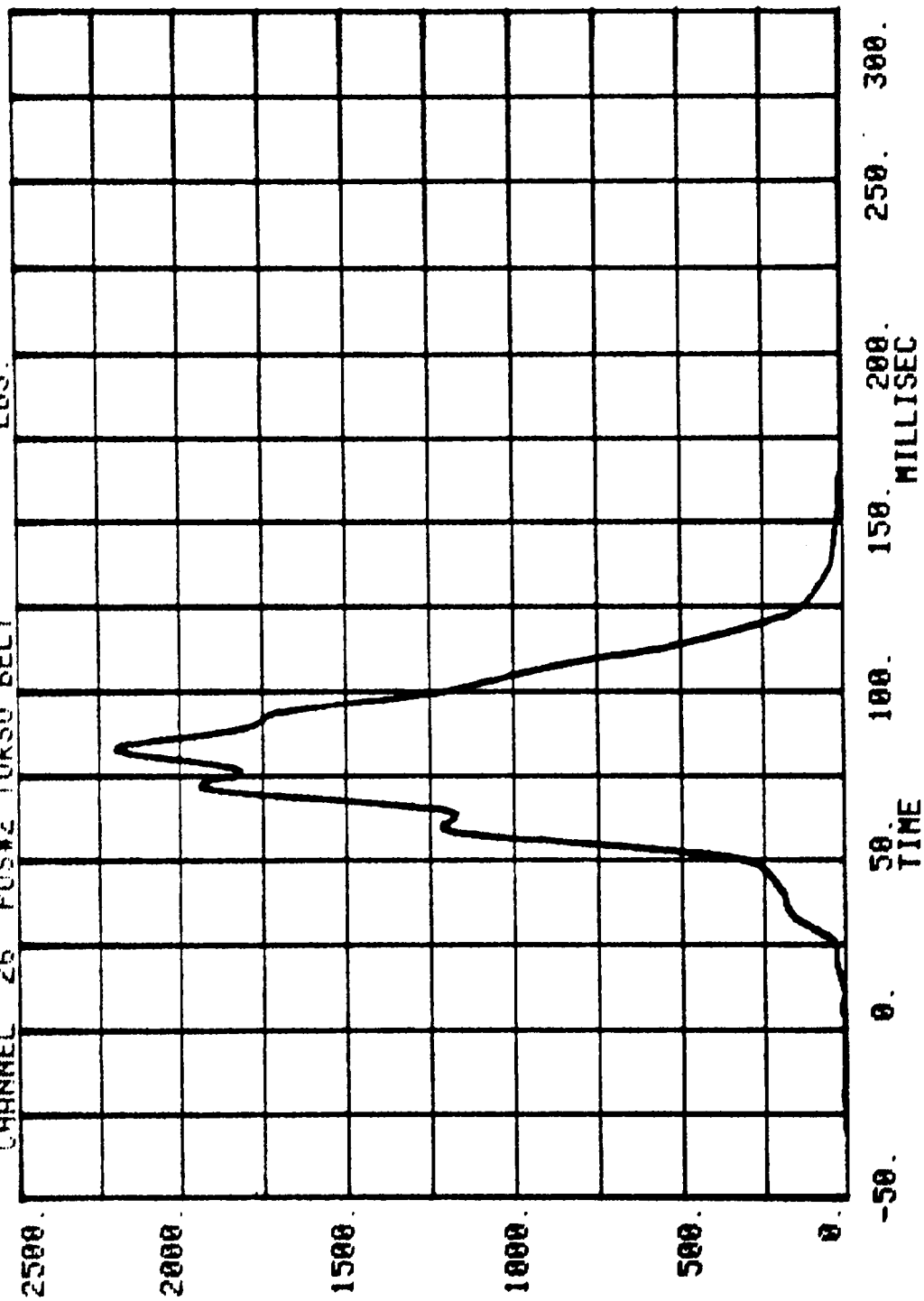
CHANNEL 20 POS#2 LEFT FEMUR
RUN= 771 SERIES= 5400 LBS.



CHANNEL 24 POS#2 RIGHT BELT
RUN= 771 SERIES= 5400 LBS.



CHANNEL 26 POS#2 TORSO BELT
RUN= 771 SERIES= 5488 LBS.



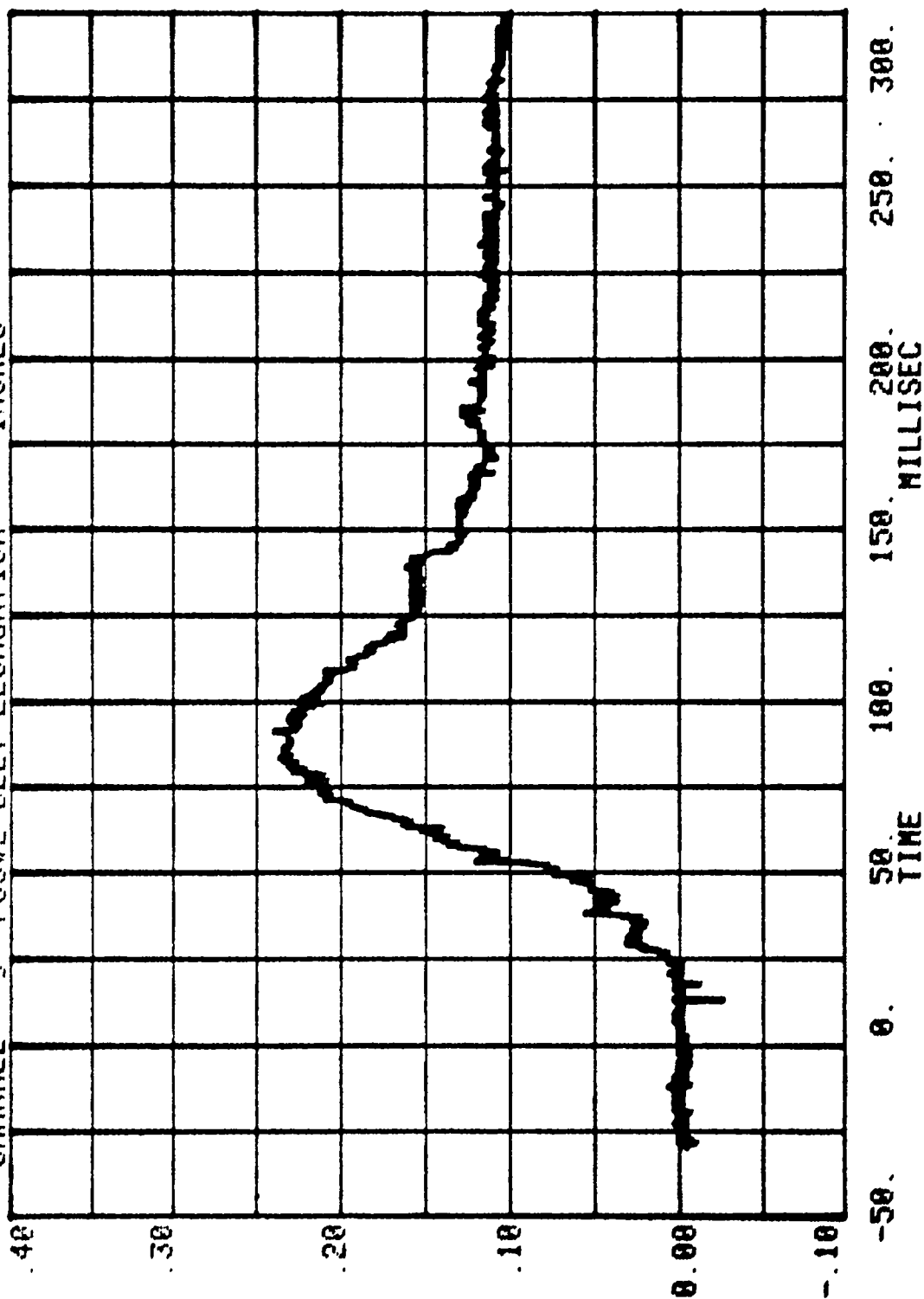
MEASURED OVER 2.5 INCHES

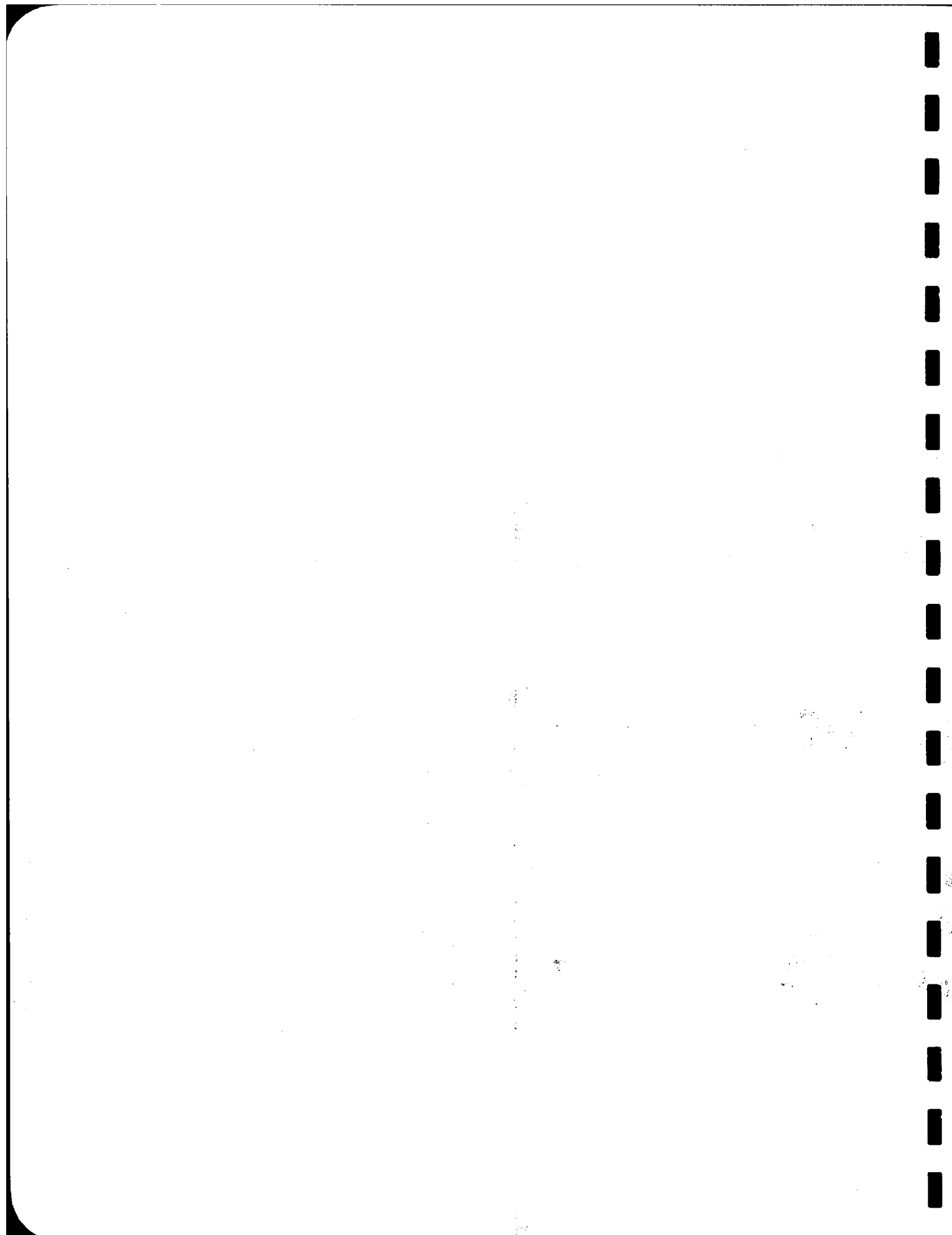
RUN= 771 SERIES= 5400

INCHES

CHANNEL 9 POS#2 BELT ELONGATION

TIME





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	3/18/87
1020	4/7/87

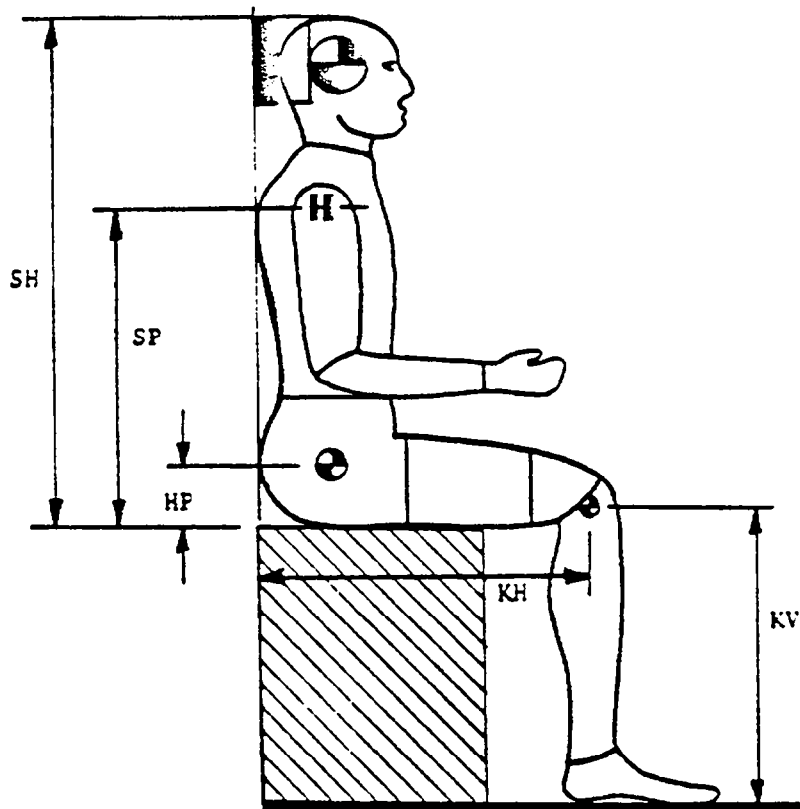
Electronic Test Equipment

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		3/18/87	
VERIFICATION NUMBER FOR DUMMY*		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"	19.6"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	18.1"	
HW - Hip Width- - - - -	14.0 to 15.4"	14.7"	

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-----		3/18/87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		2	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		70-73 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		24-42 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	260 g	
b. Peak Lateral Accel.-	≤ - 10G	4 g	
c. Time above 100G- - -	0.9 to 1.5ms	1.09 ms	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	22.9 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	2.2 ms	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	25.5 ms	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	2 ms	
g. Max. Head Rotation -	63 to 73°	72°	
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	27 ms	
	Displ.- 2.1 to 3.1"	2.9"	
60°	Time- 40.3 to 51.7ms	41.5 ms	
	Displ.- 4.3 to 5.3"	4.9"	
Maximum	Time- 53.2 to 66.8ms	57 ms	
(72°)	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.: 1019

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER		SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. <u>NECK BENDING TEST</u>....				
Continued:				
h. Chordal Displacement:				
Head Rotation Angle--				
60°	Time	67.0 to 83.0 ms	74.5 ms	
	Displ.	4.3 to 5.3 in.	4.6"	
30°	Time	85.4 to 104.6 ms	91 ms	
	Displ.	2.1 to 3.1 in.	2.1"	
0°	Time	101.0 to 123.0 ms	106 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.	28.5 lbs.	
b. Force @ .75" - - - -		36 to 50 lbs.	41.5 lbs.	
c. Force @ 1.0" - - - -		50 to 63 lbs.	58.5 lbs.	
d. Force @ 1.5" - - - -		73 to 88 lbs.	83.5 lbs.	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20° - - - -		22 to 34 lbs.	26 lbs.	
b. Force @ 30° - - - -		34 to 46 lbs.	36.5 lbs.	
c. Force @ 40° - - - -		46 to 58 lbs.	47.5 lbs.	
d. Return Angle - - - -		12° maximum	8°	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed- - -	21.78-22.22 fps	21.89 fps		
(2) Peak Deflection- -	1.7" maximum	1.59"		
(3) Peak Resistive Force- - - - -	2250 lbs. maximum	2028 lbs.		
(4) Internal Hysteresis - - -	50 to 70%	55.3%		
b. Low Speed				
(1) Probe Speed- - -	13.86-14.14 fps	13.94 fps		
(2) Peak Deflection- -	1.1" maximum	1.01"		
(3) Peak Resistive Force- - - - -	1450 lbs. maximum	1170 lbs.		
(4) Internal Hyster. -	50 to 70%	51.6%		

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. <u>KNEE IMPACT TESTS:</u>			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.04 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2200 lbs.	
(3) Time Above 1000g--	1.7 ms minimum	1.7 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.92 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1950 lbs.	
(3) Time Above 1000g--	1.7 ms minimum	1.92 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1019

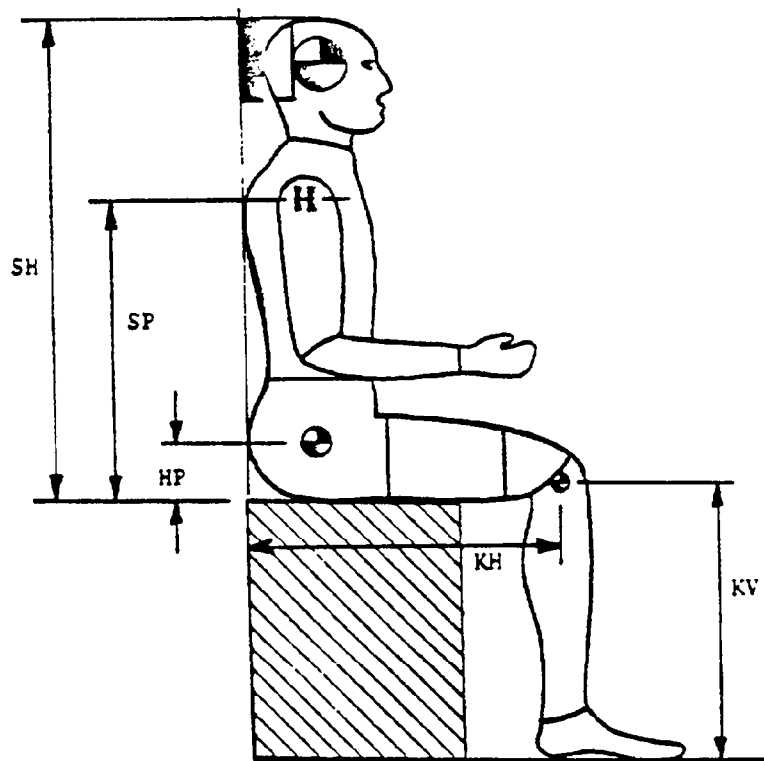
CALIB. SEQ. NOS. FOR DUMMY: 2

A. <u>DUMMY INSTRUMENTS:</u>	<u>MANUFACTURER</u>	<u>SERIAL NUMBER</u>	<u>DATE LAST CALIBRATED</u>	<u>DATE OF NEXT CALIBRATION</u>
1. Head Accelerometers --				
a. Triaxial unit - - - - -	NA	-----	-----	-----
b. Uniaxial units				
(1) Longitudinal (A_x) -	Endevco	CL60	2-87	8-87
(2) Lateral (A_y) - - -	"	CG34	2-87	8-87
(3) Vertical (A_z) - - -	"	CN24	2-87	8-87
2. Chest Accelerometers --				
(Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	-----	-----	-----
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A129	2-87	8-87
(2) Lateral (A_y) - - -	Endevco	CN64	2-87	8-87
(3) Vertical (A_z) - - -	CEC	A56	2-87	8-87
3. Chest Potentiometer - - -	NA	-----	-----	-----
4. Femur Load Cells --				
a. Right Side - - - - -	GSE	311	2-87	8-87
b. Left Side - - - - -	GSE	312	2-87	8-87
B. <u>CALIB. LAB. INSTRUMENTS:</u>				
1. Pendulum Accelerometer - - -	CED	18259	2-87	8-87
2. Test Probe Accelerometer - - -	CED	17815	2-87	8-87
3. Lumbar Flexion Test Push Force Gauge - - - - -	Transducer Inc.	20051	2-87	8-87
4. Abdominal Compression Test Force Gauge - - - - -	BLH	72952	2-87	8-87
5. Abdominal Compression Test Displacement Gauge - - - - -	CIC	567-11	2-87	8-87

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1020

1. CONFIGURATION VERIFICATION DATA:



	P. 572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		4/7/87	
VERIFICATION NUMBER FOR DUMMY*		2	
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"	19.5"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	18.1"	
HW - Hip Width- - - - -	14.0 to 15.4"	14.5"	

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.: 1020

TECHNICIAN'S NAME: D. W. Hess

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		4/7/87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		2	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		70-73 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		25-44 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	230 g	
b. Peak Lateral Accel.-	≤ - 10G	7 g	
c. Time above 100G- - -	0.9 to 1.5ms	1.12 ms	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	21.97 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	23 g	
c. Peak Resultant Head Acceleration - - - -	26G max.	25.5 g	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2.5 ms	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	27.2 ms	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	3.5 ms	
g. Max. Head Rotation -	63 to 73°	71°	
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	27.5 ms	
	Displ.- 2.1 to 3.1"	2.9"	
60°	Time- - 40.3 to 51.7ms	43 ms	
	Displ.- 4.3 to 5.3"	5.2"	
Maximum	Time- - 53.2 to 66.8ms	59 ms	
(71 °)	Displ.- 5.0 to 6.0"	6.0"	

*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.: 1020

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.	4.9"	
30°	Time	85.4 to 104.6 ms	93 ms	
	Displ.	2.1 to 3.1 in.	2.4"	
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.	23.5 lbs.	
b. Force @ .75" - - - -		36 to 50 lbs.	36.5 lbs.	
c. Force @ 1.0" - - - -		50 to 63 lbs.	52 lbs.	
d. Force @ 1.5" - - - -		73 to 88 lbs.	76 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - -		22 to 34 lbs.	32 lbs.	
b. Force @ 30° - - - -		34 to 46 lbs.	43 lbs.	
c. Force @ 40° - - - -		46 to 58 lbs.	54 lbs.	
d. Return Angle - - - -		12° maximum	9°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - -		21.78-22.22 fps	21.9 fps	
(2) Peak Deflection- -		1.7" maximum	1.31"	
(3) Peak Resistive Force- - - - -		2250 lbs. maximum	2132 lbs.	
(4) Internal Hysteresis - - -		50 to 70%	52.5%	
b. Low Speed				
(1) Probe Speed- - -		13.86-14.14 fps	14.04 fps	
(2) Peak Deflection- -		2.1" maximum	.94"	
(3) Peak Resistive Force- - - - -		1450 lbs. maximum	1222 lbs.	
(4) Internal Hyster. -		50 to 70%	55.7%	

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1020

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	7.04 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2200 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.76 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.87 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1850 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.84 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1020 CALIB. SEQ. NOS. FOR DUMMY: 2

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	CS70	2-87	8-87
"	CH35	2-87	8-87
"	CU88	2-87	8-87
NA	-----	-----	-----
CEC	A84	2-87	8-87
Endevco	CY71	2-87	8-87
CEC	A86	2-87	8-87
NA	-----	-----	-----
GSE	551	2-87	8-87
GSE	552	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

Appendix D

**VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT
SYSTEM INSTRUCTIONS**

SEAT BELT RESTRAINT SYSTEM

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. Either of the following two types of seat belt restraint systems is provided at the front seats; one is Type A (without Automatic Shoulder Belt) which is composed of a manually operated lap-shoulder belt, and the other is Type B (with Automatic Shoulder Belt) which is composed of an automatic shoulder belt and a manually operated lap belt. The front seat lap and shoulder belts have retractors with inertia locks. (Passenger sides of 4 door and 5 door models are also equipped with a locking mechanism.)

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 automatically lock in position, and the passengers will not be thrown forward.

WARNING

- Lap 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 sitting in a seat with a fastened seat belt are much more likely to suffer serious bodily injury in the event of a collision.

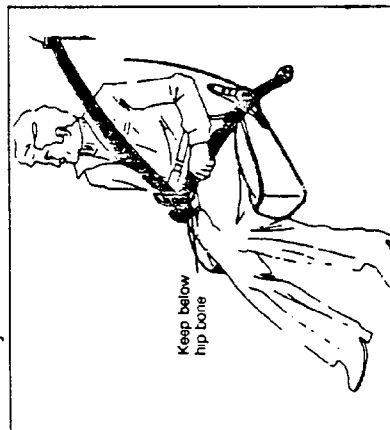
FRONT SEAT BELTS

Type A (without Automatic Shoulder Belt)

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

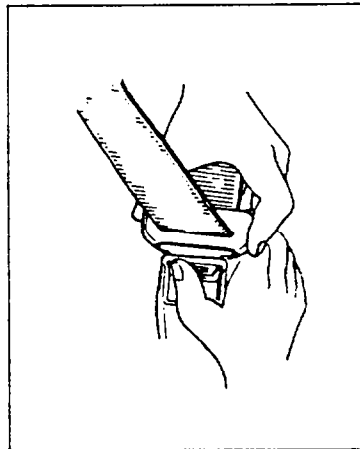
If the belt does not fully retract, pull it out and check for kinks or twists. Then make sure that it remains untwisted as it retracts.

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 Belts

Depress the button on the buckle.



Type B (with Automatic Shoulder Belt)

The automatic shoulder belt system is one in which the shoulder belt automatically fastens and unfastens for persons sitting in the front seats. This shoulder belt is equipped with a retractor, which will lock in case of a sudden stop or impact. The lap belt is operated manually.

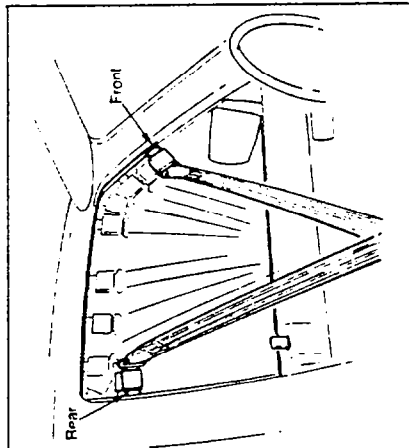
To provide sufficient restraint, always fasten the lap belt.

Shoulder Belt

To fasten your shoulder belt, get in the vehicle, close the door, and turn the ignition key to the "ON" position.

The shoulder belt buckle moves from front to rear automatically.

When you stop your vehicle and open the door while your shoulder belt is fastened, the shoulder belt buckle moves from rear to front, and the shoulder belt unfastens automatically.



Emergency Release Button

In an emergency such as an accident, press the emergency release button on the shoulder belt buckle. The shoulder belt will be released.

When buckling the shoulder belt after it has been released, insert the tongue of the shoulder belt into the buckle until an audible click is heard.

WARNING

- For your safety, never let the shoulder belt pass under your outer arm.
- Under normal circumstances, do not press the emergency release button to re-

CAUTION

When the shoulder belt is moving, do not impede its movement by pulling on it with your hand, etc.

- Release the shoulder belt, or you will not obtain shoulder belt restraint at the time of an accident.
- Keep your hands, head, other parts of your body and other objects away from the buckle and its path while it is moving. They may get caught, resulting in injury.
- Do not place a child restraint system on the front seat because the automatic shoulder belt could hurt the child as it is moving. Place the child restraint system on the rear seat and secure it with the rear seat belt.

