

2014011
REPORT NO. CAL-86-N-04

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

MAZDA MOTOR CORPORATION

1986 MAZDA 323 LX

~~2~~-DOOR HATCHBACK

NHTSA NO. MG5401
CALSPAN TEST NO. 7457-3

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FINAL REPORT

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16. Abstract A frontal load cell barrier test of a 1986 Mazda 323 LX 2-Door Hatchback was performed at the Calspan Corporation, Advanced Technology Center crash test facility in Buffalo, New York, on January 30, 1986. Impact speed was 35.2 mph, and the ambient temperature at the barrier face at the time of impact was 30°F. The maximum post-test vehicle crush was 21.4 inches. The test vehicle appeared to comply with the indicant requirements of the following Federal Motor Vehicle Safety Standard. 1. FMVSS No. 212, "Windshield Mounting" (95.1%) 2. FMVSS No. 219 (Partial), "Windshield Zone Intrusion" 3. FMVSS No. 301-75, "Fuel System Integrity" <u>Type of Restraint System.</u> 3-point continuous webbing manual system at each front outboard seating position.					
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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	SUMMARY OF RESULTS FOR FMVSS NOS. 212, 219, & 301-75	3-1
4	OCCUPANT AND VEHICLE INFORMATION	4-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE, DUMMY RESPONSE DATA AND LOAD CELL BARRIER DATA	B-1
APPENDIX C	DUMMY CONFIGURATION & PERF. VERIFICATION DATA	C-1
APPENDIX D	VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS	D-1

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	FMVSS No. 212, "Windshield Mounting" Data	3-2
2	FMVSS No. 219, (Partial), "Windshield Zone Intrusion" Data	3-3
3	FMVSS No. 301-75, "Fuel System Integrity" Data	3-4
4	Part 572 Dummy In-Vehicle Position	4-3
5	Occupant Clearance Dimensions	4-4
6	Seat Belt Positioning Data	4-5
7	Driver Dummy to Steering Column/Wheel Dimensions	4-7
8	Camera Position for Frontal Impacts	4-8
9	Vehicle Target Locations	4-10
10	Load Cell Locations on Fixed Barrier	4-11
11	Vehicle Accelerometer Locations	4-12
12	Test Vehicle Measurements	4-13
13	Test Vehicle Damage Details	4-17

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	General Test and Vehicle Data	2-3
2	Dummy Injury Criteria Values	4-2
3	Seat Belt Performance Assessment Test Data	4-6
4	High Speed Camera Locations	4-9
5	Vehicle Measurements	4-14
6	Accident Investigation Division Data	4-15

SECTION 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 86 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-84-D-01149. The purpose of this test was to obtain vehicle crash-worthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph FMVSS 212/219/301-75 requirements.

The 35 mph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test Procedure. Standards Enforcement Indicant Test Program data for FMVSS No. 212, "Windshield Mounting," FMVSS No. 219 (Partial), "Windshield Zone Intrusion," FMVSS No. 301-75, "Fuel System Integrity," as well as occupant performance data are provided herein.

SECTION 2
SUMMARY OF TEST NUMBER MG5401

A load cell barrier consisting of 36 load cells was impacted by a 1986 Mazda 323 LX 2-Door Hatchback at a velocity of 35.2 mph. The test was performed at the Calspan Corporation Advanced Technology Center on January 30, 1986. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

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 accelerometer and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial 1020) and the passenger ATD (Serial 1021) had been certified prior to the test, and certification details along with instrumentation calibration data are found in Appendix C.

The frontal barrier impact event was documented by one real-time camera and 16 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

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 rim and hub and his HIC was 802. The maximum chest deceleration over 3 milliseconds was 66 g's and femur loads were 440 and 425 pounds.

The right-front passenger HIC was 894 and maximum chest deceleration over 3 milliseconds was 47 g's. Femur loads were 325 and 200 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style 1986 Mazda 323 LX 2-Door Hatchback

NHTSA No. MG5401 VIN. JM1BF232XG0110581

Body Color Silver Date of Manufacture 9/85

Engine: 4 cylinders; 98 C.I.D.; - Liters; - CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse

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

Date Received 12/9/85 Odometer Reading; 72
- A/C; - P/S; X P/B; - P/wdo.; X Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint 3-Point Continuous Belt

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 29 psi, Rear 26 psi

Recommended Tire Size: 155SR13

Recommended Cold Tire Pressure: Front 29 psi, Rear 26 psi

Tires on Vehicle: 175/TO-SR13; Manufacture: Bridgestone

Number of Occupants: 2 Front; 2 Rear; - 3rd Seat; 4 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 680 lbs. (A)

No. of Occupants x 150 lbs. = 600 lbs. (B)

Rated Cargo and Luggage Weight (RCLW) A-B = 80 lbs.

GVWR 3085 lbs. GAWR: Front 1700 lbs. Rear 1460 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 = 640 lbs. Right Rear = 380 lbs.
Left Front = 650 lbs. Left Rear = 410 lbs.
TOTAL FRONT WEIGHT = 1290 lbs. (62.0 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 790 lbs. (38.0 % of Total Vehicle Weight)
TOTAL DELIVERY WEIGHT = 2080 lbs.

CALCULATION FOR TARGET TEST WEIGHT

UDW = Unloaded Delivered Weight (2080 lbs.)
VCW = Vehicle Capacity Weight (680 lbs.)
DSC = Designated Seating Capacity (4)
RCLW = VCW - 150 (DSC) = 80 lbs.
Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
Target Test Weight = 2488 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 102 POUNDS CARGO

Right Front = 690 lbs. Right Rear = 560 lbs.
Left Front = 700 lbs. Left Rear = 560 lbs.
TOTAL FRONT WEIGHT = 1390 lbs. (55.4 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1120 lbs. (44.6 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 2510 lbs.
Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 25.5" LF 25.5" RR 25.7" LR 25.5"
Test Attitude: RF 25.5" LF 25.5" RR 24.0" LR 23.6"
Wheel Base: 94.5 in.; C.G. = 42.2 in. rearward of front wheel C/L

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)POST-IMPACT DATA

Type of Test Frontal Barrier Impact Angle 0° °

Date of Test 1/30/86 Time of Test 1220

Ambient Temperature 30 °F. at impact area

Temperature in Occupant Compartment 69 °F.

Windshield Molding Temperature 66 °F.

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 35.2 mph, secondary 35.3 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 159.0 E 161.3 L 159.0

Post-test = R 138.7 E 139.9 L 139.0

Crush = R 20.3 E 21.4 L 20.0

Distance from front of test vehicle to point of impact:

R 22.7 C/L 21.7 L 22.4

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Upper Steering Wheel</u> <u>Rim and Hub</u>	<u>Dash Panel</u>
Chest	<u>None</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>Lower Dash Panel</u>	<u>Glove Compartment Door</u>
Right Knee	<u>Lower Dash Panel</u>	<u>Glove Compartment Door.</u>

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

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

SECTION 3

SUMMARY OF RESULTS OF FMVSS NOS. 212, 219 AND 301-75

- o "Windshield Mounting," FMVSS No. 212 Data
- o "Windshield Zone Intrusion," FMVSS No. 219 (Partial) Data
- o "Fuel System Integrity," FMVSS No. 301-75

Figure 1

FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

Details of windshield mounting such as retention method, trim type, etc.:

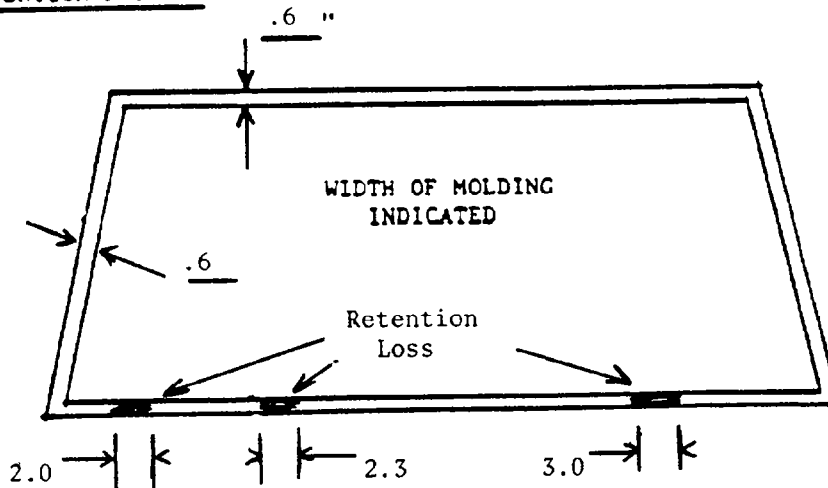
Windshield is bonded in place and has a .61 inch chrome trim along the top and sides.

FMVSS 212 REQUIREMENTS: The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	75.1	70.8	94.3
LEFT SIDE	75.1	72.1	96.0
TOTAL	150.2	142.9	95.1

AREA OF RETENTION FAILURE:



FAILURE DETAILS:

See Darkened areas along windshield bottom (Figure A-13).

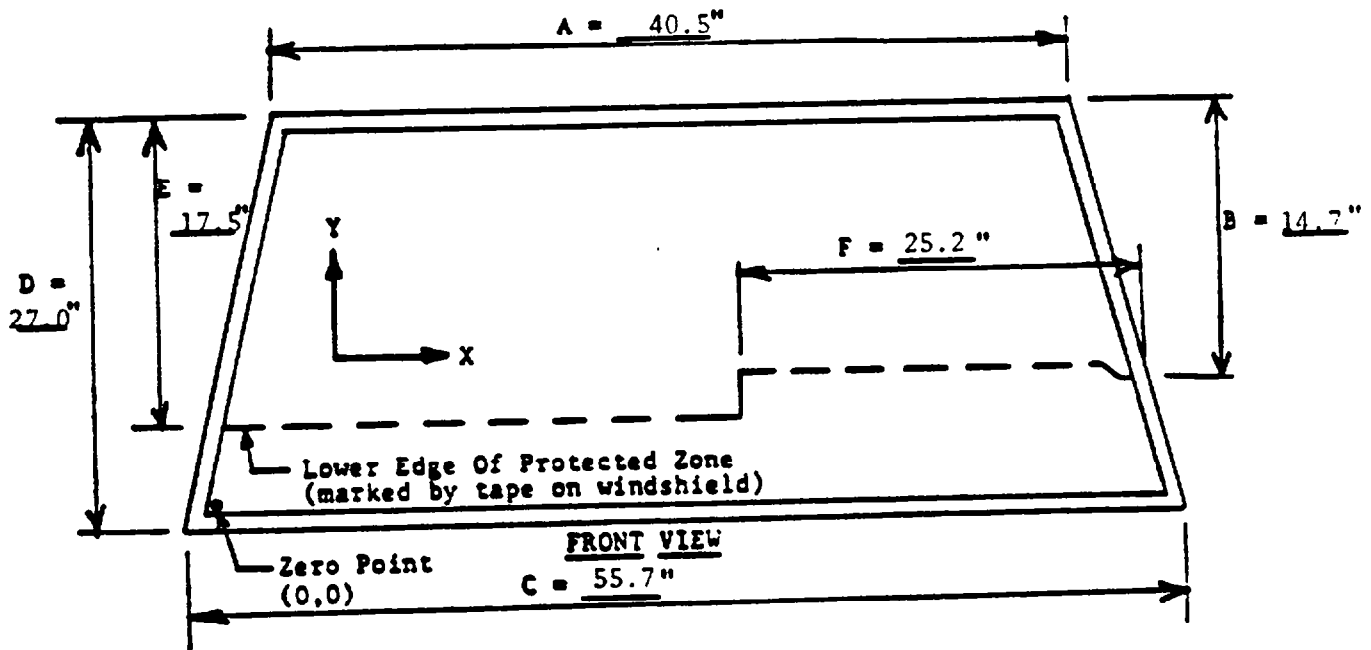
Figure 2

FMVSS NO. 219, (PARTIAL) "WINDSHIELD ZONE INTRUSION", DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

FMVSS 219 TEST DATA:



DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":
(Show location of penetration on above sketch)

NONE

COORDINATES	
	X Y
1.	
2.	
3.	
4.	

Figure 3

FMVSS NO. 301-75, "FUEL SYSTEM INTEGRITY", DATA SHEETS

TEST VEHICLE NHTSA NO.: MG5401; TEST DATE: 1/30/86
VEHICLE MAKE/MODEL/BODY STYLE: 1986 Mazda 323 LX 2-Door Hatchback
USABLE CAPACITY OF VEHICLE'S FUEL TANK: 11.9 Gallons (figure furnished by
vehicle manufacturer)

TEST REQUIREMENTS:

Test vehicle's engine operated to "run dry" condition, and then a small amount of Stoddard solvent which has been dyed RED shall be added to the vehicle's fuel tank. Operate the fuel pump enough to completely fill the fuel system ahead of the fuel tank, and add 92 to 94% of the stated USABLE CAPACITY to the fuel tank.

AMOUNT OF STODDARD SOLVENT ADDED TO VEHICLE'S FUEL TANK:

11.0 Gallons Which is 93 % of the Stated USABLE CAPACITY.

SOLVENT SPILLAGE MEASUREMENT AFTER 35 MPH FRONTAL BARRIER IMPACT TEST:

	<u>Actual</u>	<u>Maximum Allowable</u>
From impact until vehicle motion ceases - - - -	<u>0</u>	1 oz.
For 5 min. period after vehicle motion ceases -	<u>0</u>	5 oz.
For next 25 minutes at barrier face - - - - -	<u>0</u>	1 oz./1 minute

SOLVENT SPILLAGE DETAILS:

NONE

STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 minutes)

Time reqd. for machine to rotate 90° = 2 minutes, 58 seconds
FMVSS 301-75 Position Hold Time = 5 minutes, 0 seconds
TOTAL - - - - - = 7 minutes, 58 seconds
Next Whole Minute Interval - - - - - = 8 minutes

Figure 3

FMVSS NO. 301-75 TEST DATA....Continued:

VEHICLE STATIC ROLLOVER DATA:

	First 5 Minutes FROM ONSET OF ROTATION	6th. Minute	7th. Minute	8th. Minute
Maximum Allowable Solvent Spillage - -	5 oz.	1 oz.	1 oz.	1 oz.
0 to 90° (filler cap down) - - - - -	0	0	0	0
90 to 180° - - - - -	0	0	0	0
180 to 270° - - - - -	0	0	0	0
270 to 360° - - - - -	0	0	0	0

Solvent Spillage Location(s):

NONE

OMI FINAL DATA

SECTION 4

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

III. AID DATA

1. Test Vehicle Measurements
2. Accident Investigation Damage Data Summary

Table 2
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R *
DUMMY (1)	-184	-98	105	233	20	-55	-54	66
DUMMY (2)	-75	71	79	121	-29	45	14	47
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	440	425
DUMMY (2)	325	200
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)	2020	-	1850
DUMMY (2)	1475	1685	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂
DUMMY (1)	802	.07125	.09450	65
DUMMY (2)	894	.09652	.10665	95
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION
** AS DEFINED IN FMVSS NO. 208

Figure 4

PART 572 DUMMY IN-VEHICLE POSITION

Test No. MG5401

Vehicle 1986 Mazda 323 LX 2-Door Hatchback

SEAT TYPE:

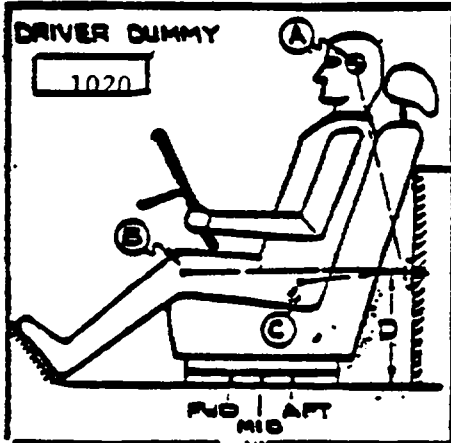
 Bench
 X Bucket
 Split Bench

ADJUSTER TYPE:

 X Manual
 Power

BUCKET SEAT BACK TYPE:

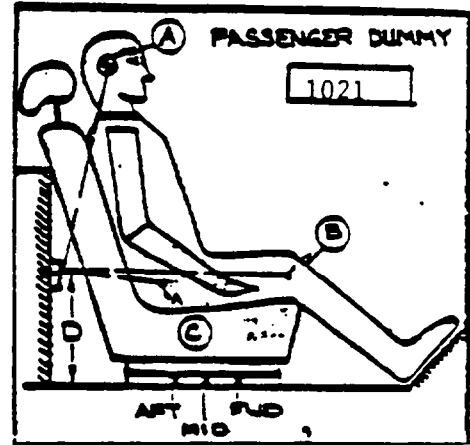
 Fixed
 X Adjustable Reclining



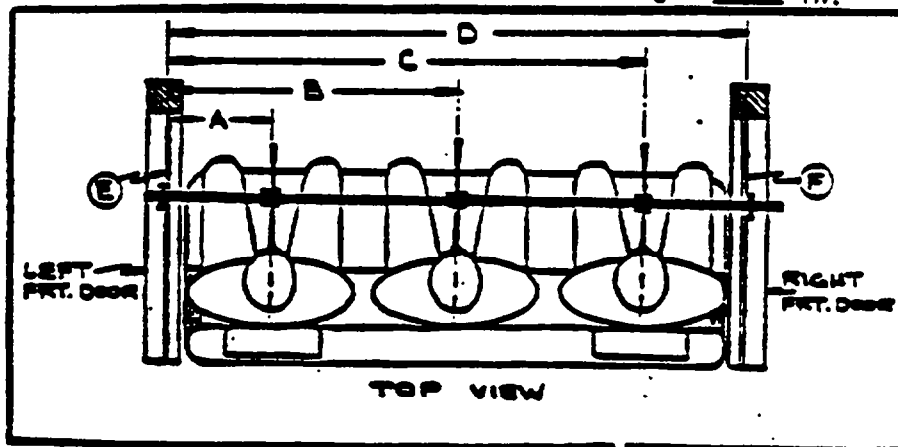
A = 24 in. 27 Degrees
B = 32 in. 95 Degrees
C = 17 in. 110 Degrees
D = 145 in.

MEASUREMENT LOCATION

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



A = 23.8 in. 28 Degrees
B = 32.5 in. 96 Degrees
C = 18 in. 109 Degrees
D = 145 in.



DUMMY ID

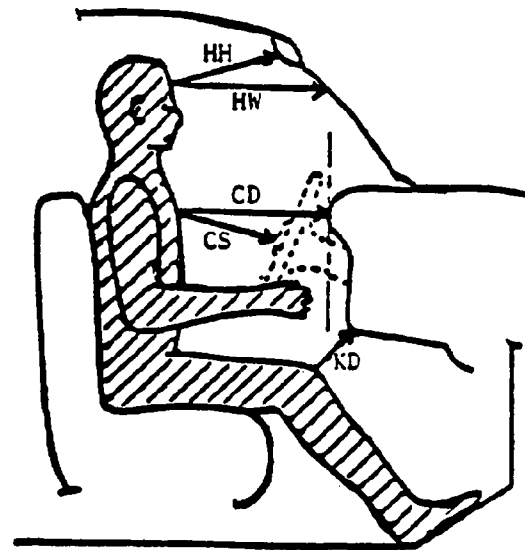
1020

1021

A	=	Left Door to Driver Centerline	<u>11.4</u> in.
B	=	Left Door to Center Passenger Centerline	<u>--</u> in.
C	=	Left Door to Right Passenger Centerline	<u>35.5</u> in.
D	=	Left Door to Right Door	<u>47.1</u> in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	<u>12.7</u> in.

	DRIVER	PASSENGER
HH	13.7	13.5
HW	19.5	19.5
CD	21.2	21.7
CS	14.5	--
KDL	5.1	6
KDR	5.2	6
SA	4th Notch	4th Notch
TA	25°	25°

HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD = Knee to Dash
 SA = Seat Back Angle
 TA = Torso Angle



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	5.5	5.6
HS	8.1	8.2
AD	4.7	4.6
HD	6.0	6.2
KK	11.5	7.5

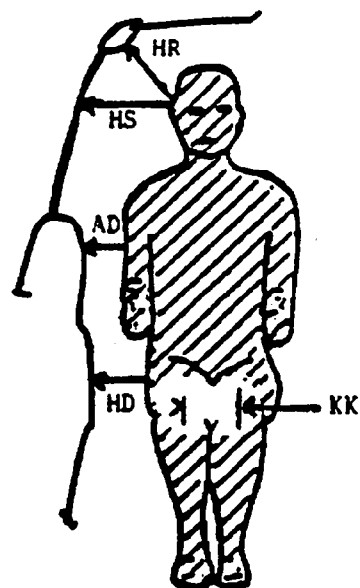
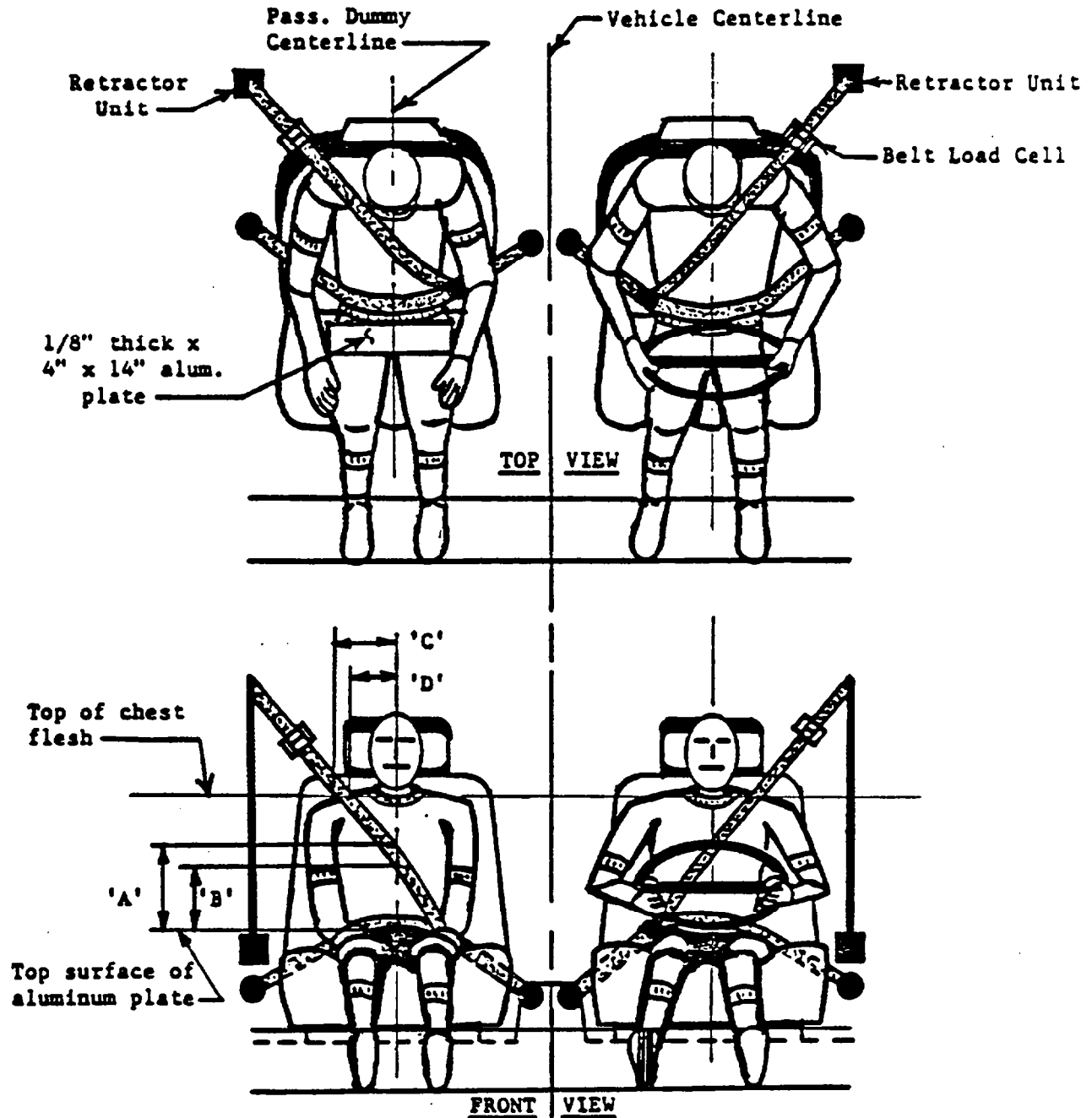


Figure 5 OCCUPANT CLEARANCE DIMENSIONS

Figure 6

SEAT BELT POSITIONING DATA

	DRIVER DUMMY (in.)	PASS. DUMMY (in.)
1. Dimension 'A'--alum. plate to belt upper edge on dummy centerline	12.5	12.2
2. Dimension 'B'--alum. plate to belt lower edge on dummy centerline	9.7	9.5
3. Dimension 'C'--dummy centerline to outer edge at chest flesh top	6.6	6.7
4. Dimension 'D'--dummy centerline to inner edge at chest flesh top	4.2	4.5
5. Lap belt tension (lbs.)		
6. Shoulder belt tension (lbs.)	2.7	2.8

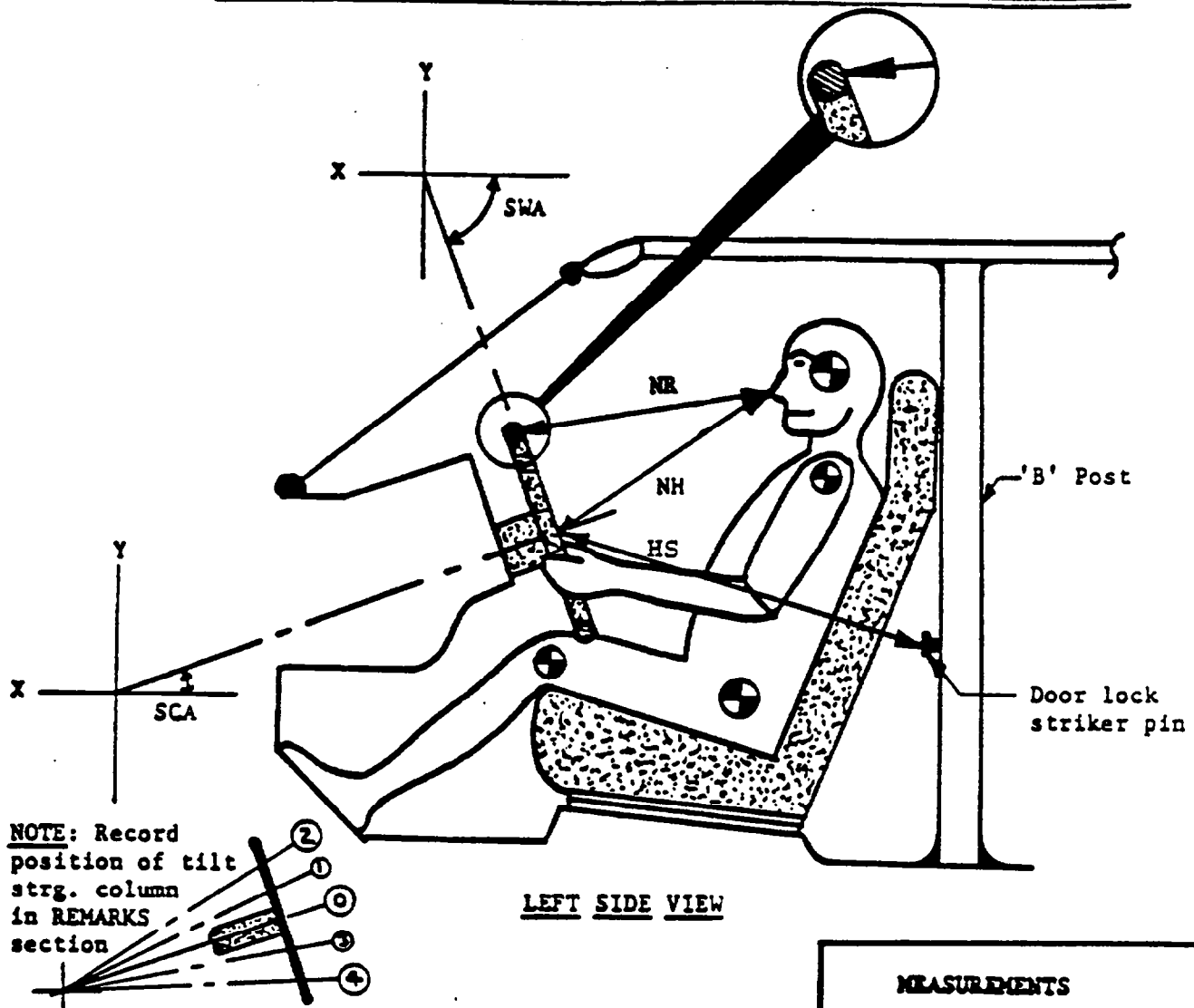
Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

<u>Belt Length Data:</u>	<u>Driver</u>	<u>Passenger</u>
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	<u>6.2</u>	<u>6.2</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>38.5</u>	<u>38.2</u>
Lap belt length as measured on Part 572 Dummy.	<u>30.5</u>	<u>30.2</u>
<u>Belt Spool-Off Data:</u>		
As determined by film analysis.	<u>1.5 inches</u>	<u>1.3</u>
As determined mechanically.	<u>1.7 inches</u>	<u>1.8 inches</u>
As determined electronically.	<u>Note 1</u>	<u>Note 1</u>
<u>Belt Stretch Data:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>.48 in per ft</u>	<u>.53 in per ft</u>
Measured between two inch reference marks on belt.	<u>0</u>	<u>0</u>

NOTE 1. Because of the closeness of the panel belt exit to the "D" ring, a transducer was not installed.

Figure 7

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS

MEASUREMENTS		
NR --Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	18	Inches
NH --Distance from tip of dummy's nose to center of steering column hub	19.3	Inches
HS --Distance from center of steering column hub to the forward surface of the door lock striker pin.	Y - 16" X - 30.7"	Inches
SCA --Angle of steering column relative to the horizontal X axis	22	Degrees
SWA --Angle of steering wheel relative to the horizontal X axis.	68	Degrees

REMARKS CONCERNING ADJUSTABLE OR TILT STEERING COLUMN IF VEHICLE IS SO EQUIPPED:
Steering column adjusted to mid-position.

NOTE: Camera Information Shown on Table 4

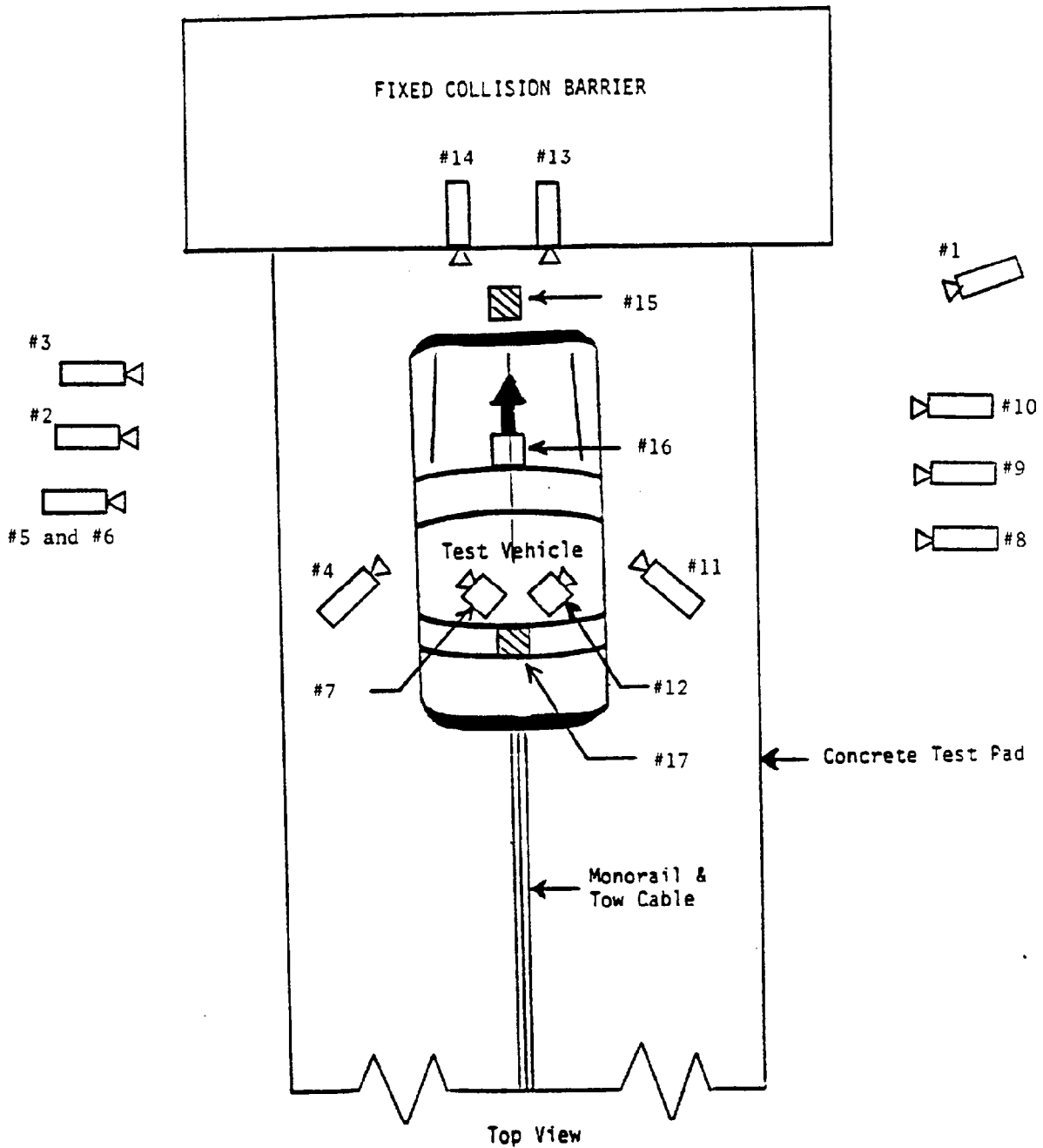


Figure 8 CAMERA POSITION FOR FRONTAL IMPACTS

Table 4
HIGH-SPEED CAMERA LOCATIONS

Vehicle 1986 Mazda 323 LX 3-Door Hatchback

Test No. MG5401

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	205	63	50	-5	--	13	540
3	Left Side View	211	40	51	-6	--	25	530
4	Driver and Interior View	96	156	67	-18	--	13	550
5	Steering Column (Bottom)	222	81	46	-6	206	25	550
6	Steering Column (Top)	222	81	60	-12	206	25	540
7	Left Belt	--	--	--	--	--	8	720
8	Overall Right Side	282	106	46	-4	--	13	800
9	Right Side View	280	82	48	-5	--	25	810
10	Right Passenger View	282	70	52	-3	266	35	810
11	Passenger and Interior View	96	156	63	-16	--	25	No Timing
12	Right Belt	--	--	--	--	--	8	700
13	Passenger Front View	21	0	72	-28	98	13	540
14	Driver Front View	21	0	72	-27	98	13	620
15	Windshield View	0	0	126	-47	--	13	530
16	Pit View of Engine	0	38	-120	90	--	13	800
17	Pit View of Fuel Tank	0	132	-120	90	--	13	790

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

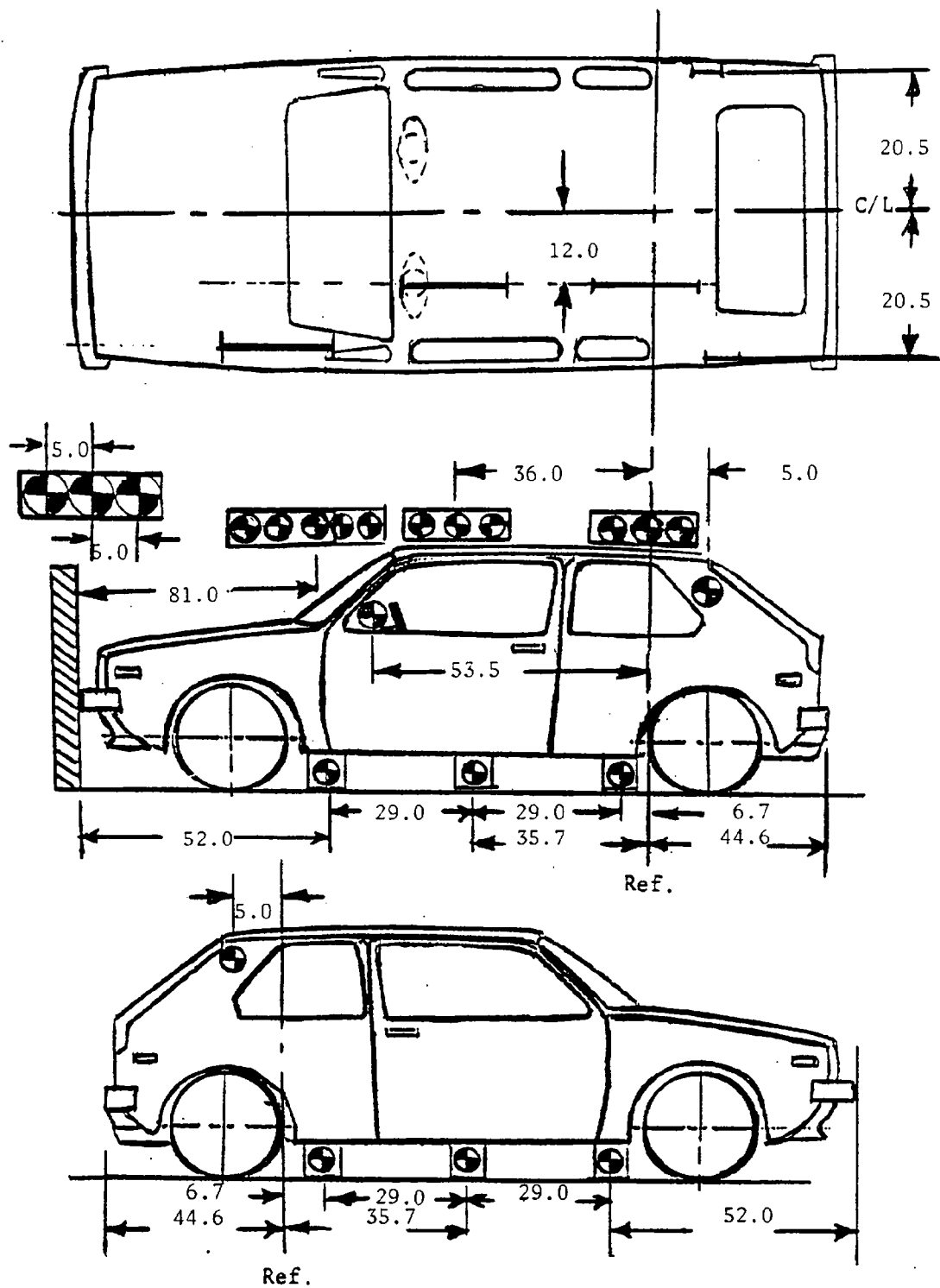


Figure 9 VEHICLE TARGET LOCATIONS
4-10

Figure 10

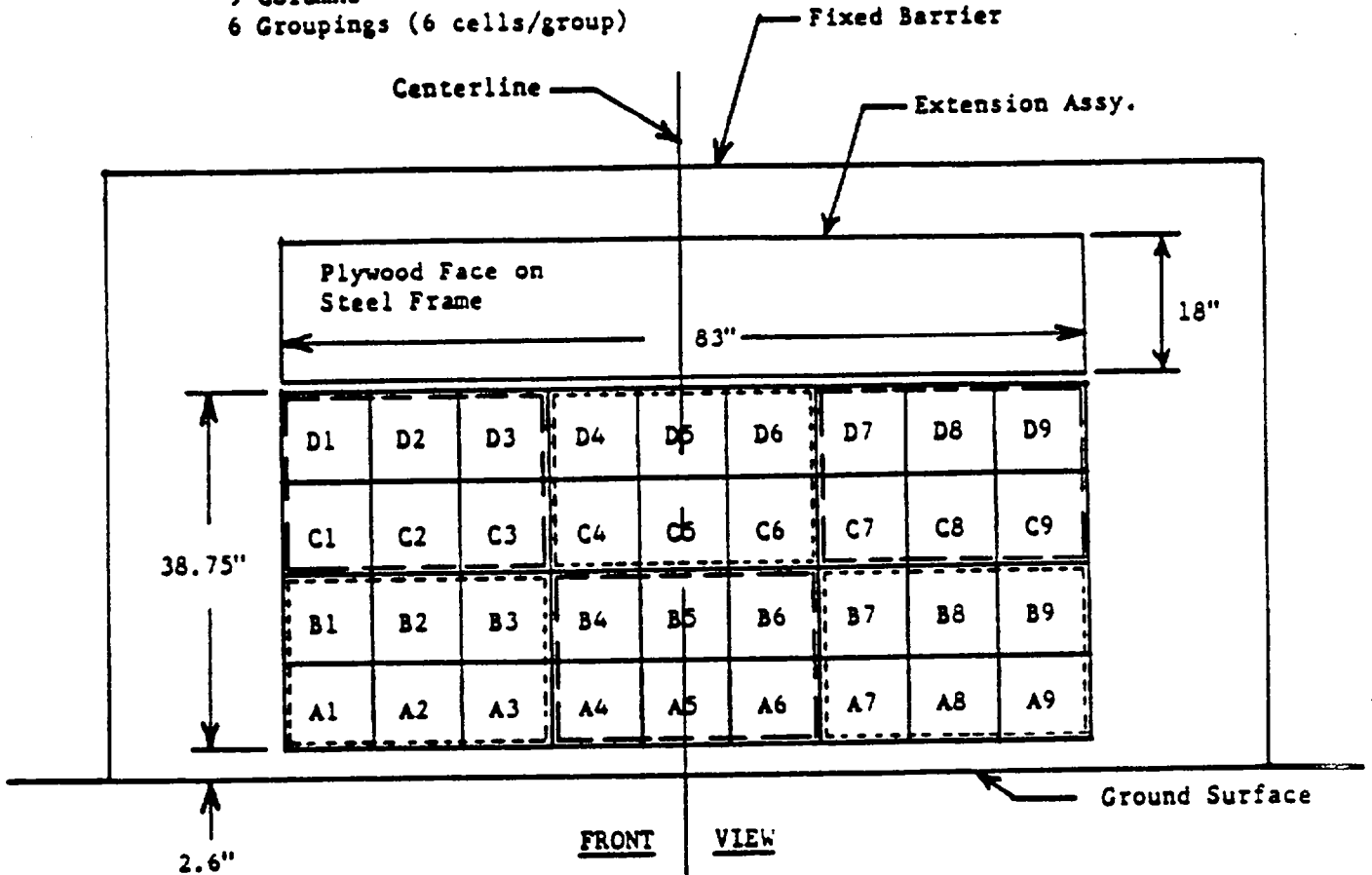
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells

4 Rows

9 Columns

6 Groupings (6 cells/group)

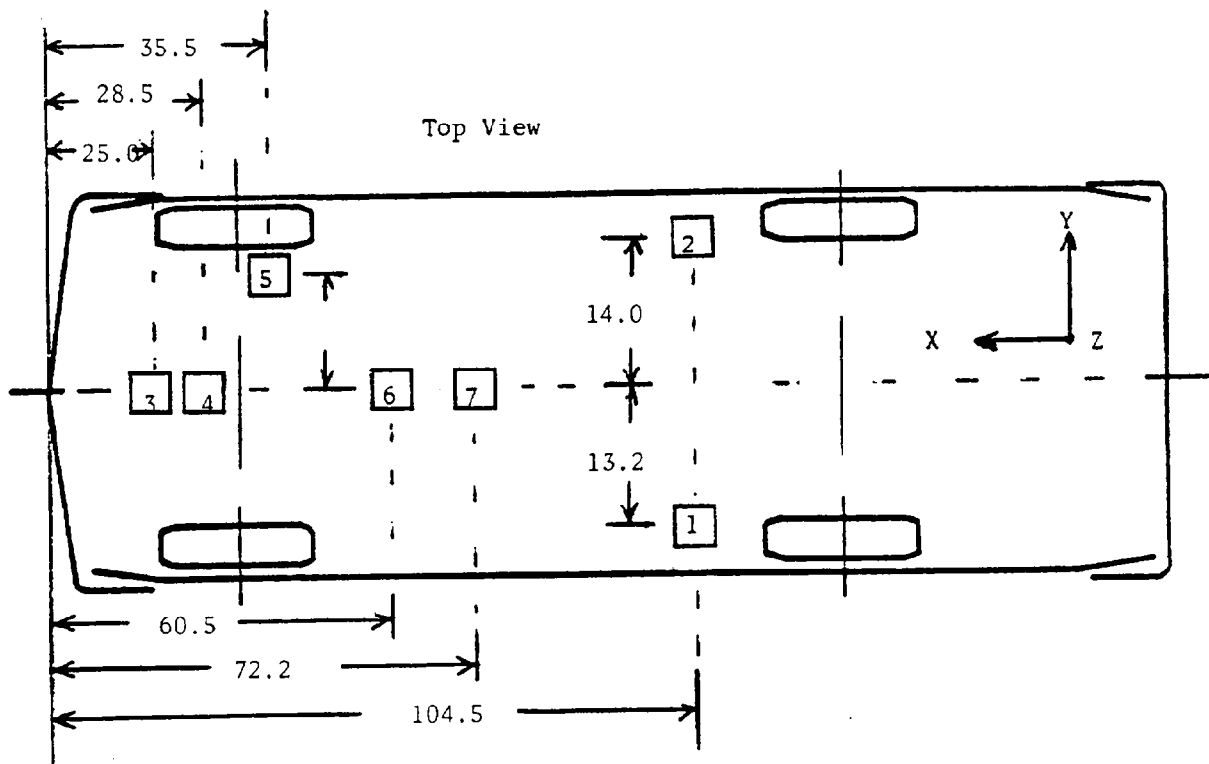


6 GROUPINGS OF 6 LOAD CELLS EACH

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)



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Left Rear Seat Crossmember	X		
2	Right Rear Seat Crossmember	X		
3	Top of Engine	X		
4	Bottom of Engine	X		
5	Right Disc Brake Caliper	X		
6	Instrument Panel	X		
7	Center of Gravity (C/G)	X		

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

Figure 11 VEHICLE ACCELEROMETER LOCATIONS

Figure 12

TEST VEHICLE MEASUREMENTS

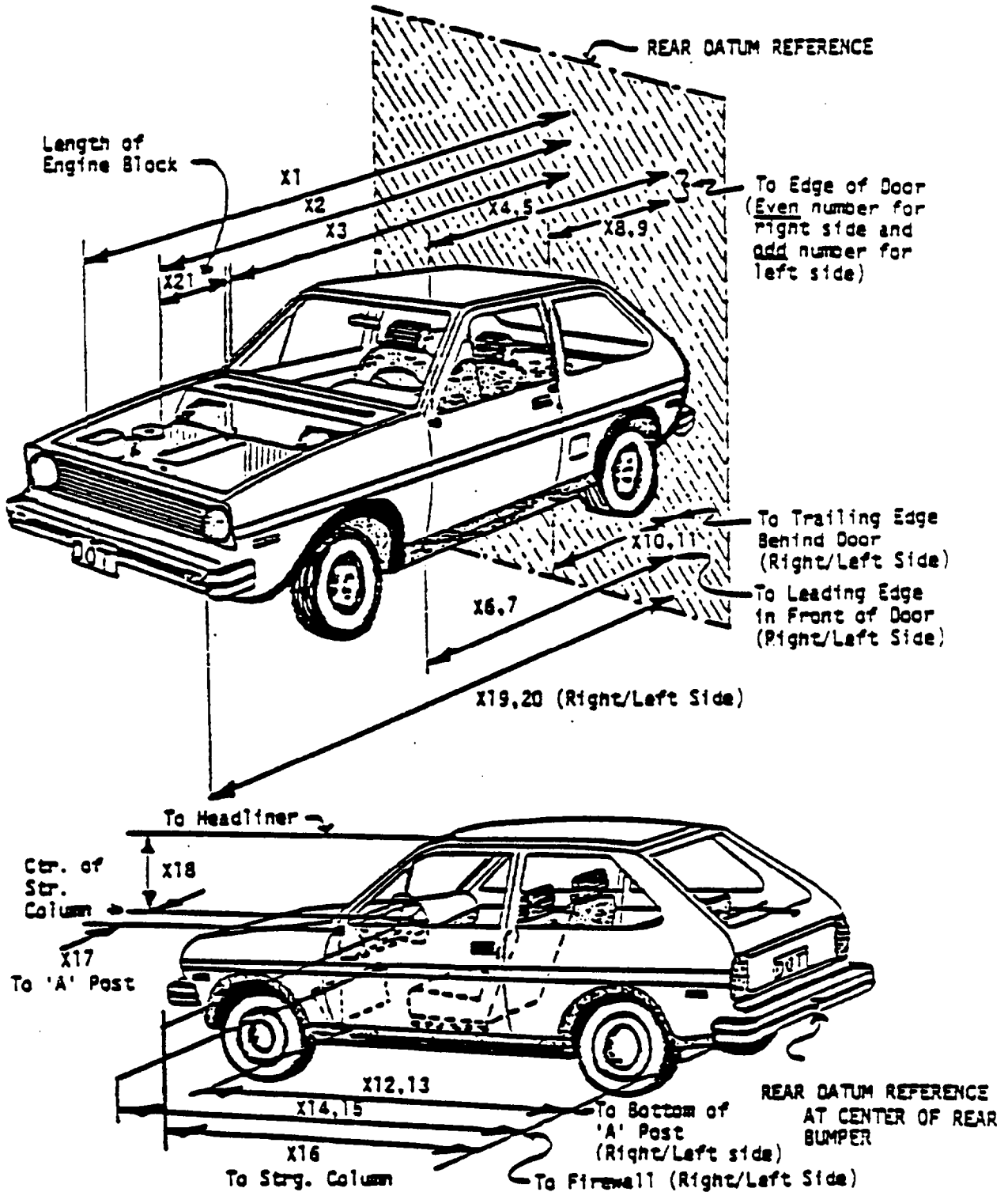


Table 5

VEHICLE MEASUREMENTS

		All Dimensions in Inches		
No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	161.3	139.9	21.4
X2	Rear Surface of Vehicle to Front of Engine	138.3	126.9	11.4
X3	Rear Surface of Vehicle to Firewall	119.6	116.2	3.4
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	109.0	109.0	0
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	109.0	108.8	.2
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	108.6	108.6	0
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	108.5	108.4	.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	60.7	60.7	0
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	60.6	60.5	.1
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	61.1	61.1	0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	61.1	61.0	.1
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	108.0	108.0	0
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	108.0	108.0	0
X14	Rear Surface of Vehicle to Firewall, Right Side	118.3	113.5	4.8
X15	Rear Surface of Vehicle to Firewall, Left Side	117.8	112.8	5.0
X16	Rear Surface of Vehicle to Steering Column	92.4	91.4	1.0
X17	Center of Steering Column to "A" Post	15.6	16.6	-1.0
X18	Center of Steering Column to Headliner	17.3	15.8	1.5
X19	Rear Surface of Vehicle to Right Side of Front Bumper	159.0	138.7	20.3
X20	Rear Surface of Vehicle to Left Side of Front Bumper	159.0	139.0	20
X21	Length of Engine Block	19.0	19.0	0

Table 6

**ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT**

VEHICLE MAKE/MODEL/BODY STYLE: 1986 Mazda 323 LX 2-Door Hatchback

VEH. MNTSA NO.: MG5401; VIN: JM1BF232XG0110581

MODEL YEAR: 1986; BUILD DATE: 9/85; TEST DATE: 1/30/86

VEH. SIZE CATEGORY: Compact; TEST WEIGHT: 2510

VEH. WHEELBASE: 94.5; FRONT OVERHANG: 34.5; OVERALL WIDTH: 64.8

ACCELEROMETER DATA:

LOCATION: 42.2 Inches Rearward of front wheel C/L

CALIBRATION PROCEDURE: Shaker Table/Least Squares

LINEARITY: ±0.75%; INTEGRATION ALGORITHM: Hybrid Simpson -Newton 3/8

VEH. IMPACT SPEED: 35.2 mph; TIME OF SEPARATION: 153.37 milliseconds

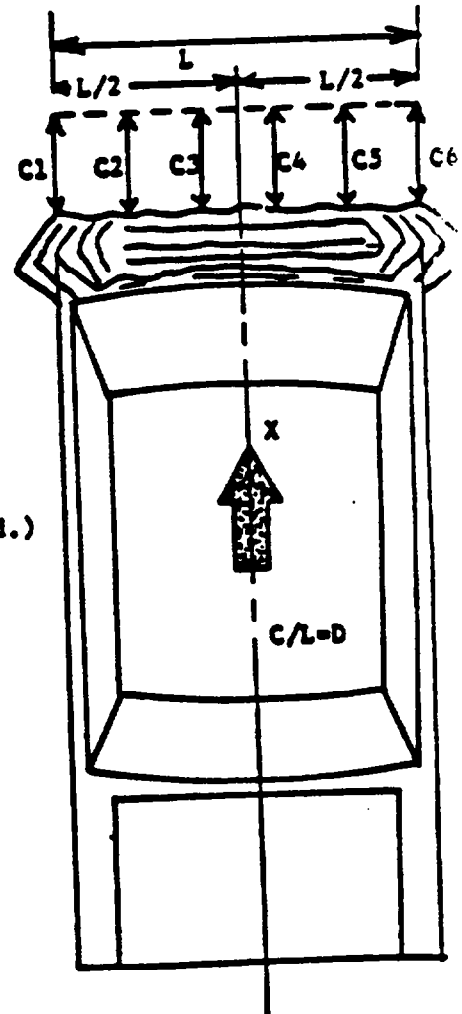
VELOCITY CHANGE: 39.42 mph

☒ COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:
F (Frontal) 12 FDEW3

CRUSH DEPTH DIMENSIONS:	C1=	<u>20.0</u>	<u>inches</u>
	C2=	<u>20.8</u>	<u>inches</u>
	C3=	<u>21.2</u>	<u>inches</u>
	C4=	<u>21.2</u>	<u>inches</u>
	C5=	<u>21.2</u>	<u>inches</u>
	C6=	<u>21.0</u>	<u>inches</u>

MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitud.)

LENGTH OF DAMAGED
REGION: L = 57.0 inches



National Accident Sampling System — Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

NCI

1986 MAZDA 323 LX 2 DR HATCHBACK JM1BF232X60110581

Complete When Applicable

End Damage	Side Damage
Undeformed end width <u>57"</u> Corner shift: A1 _____ A2 _____ End shift at frame (CDC) (check one) <4 inches _____ ≥4 inches _____	Bowing: B1 _____ X1 _____ B2 _____ X2 _____ Bowing constant $\frac{X1 + X2}{2} = \underline{\hspace{2cm}}$

Note: Measure C1 to C6 from Driver to Passenger side in Front or Rear impacts—
 Rear to Front in Side impacts.

12 FDEW3

Specific Impact Number	Plane* of C-Measurements	Direct Damage		Field L**	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	±D
		Width** (CDC)	Max*** Crush								
1	Bumper	57"	31.3	57"	23.3	21.6	21.3	21.3	22.0	24.3	Ø
	Free/space		-1		-3.3	-8	-1	-1	-8	-3.3	
1	Actual crush	57"	21.2	57"	20.0	20.8	21.2	21.2	21.2	21.0	Ø

*Identify the plane at which the C-measurements are taken (e.g., at bumper, above bumper, at sill, above sill, at beltline, etc.) or label adjustments (e.g., free space).

Free space value is defined as the distance between the baseline and the original body contour taken at the individual C locations. This may include the following: bumper lead, bumper taper, side protrusion, side taper, etc. Record the value for each C-measurement and maximum crush.

**Measure and document on the vehicle diagram the beginning or end of the direct damage width and field L (e.g., side damage with respect to undamaged axle.)

***Measure and document on the vehicle diagram the location of the maximum crush.

Note: Use as many lines/columns as necessary to describe each damage profile.

DAMAGE DESCRIPTION

Tire—Wheel Damage

- a. Rotation physically restricted b. Tire deflated

RF 1

LF 1

RR 2

LR 2

RF 2

LF 2

RR 3

LR 2

(1) Yes, (2) No, (8) NA, (9) Unk.

TYPE OF TRANSMISSION

☒ Manual ☐ Automatic

Average Track: _____

Maximum Width: _____

curb Weight: 2510

Overall Length: 161.3

Wheel Base: 94.5

Engine Size: cyl. _____
displ. _____

WHEEL STEER ANGLES

(For locked front wheels or displaced rear axles only)

RF 0 4 °

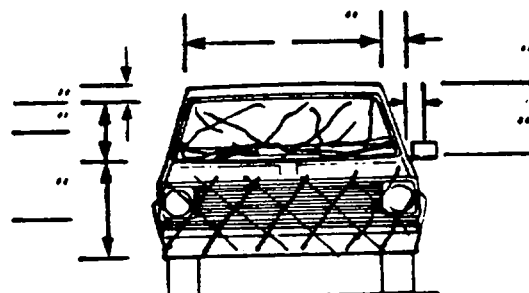
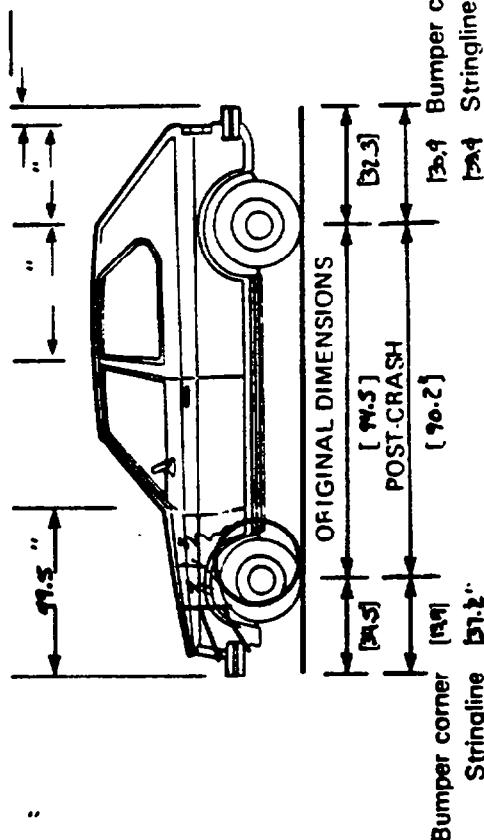
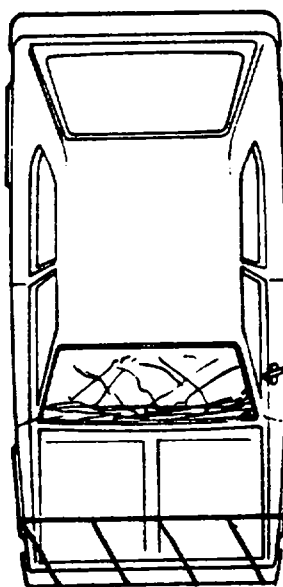
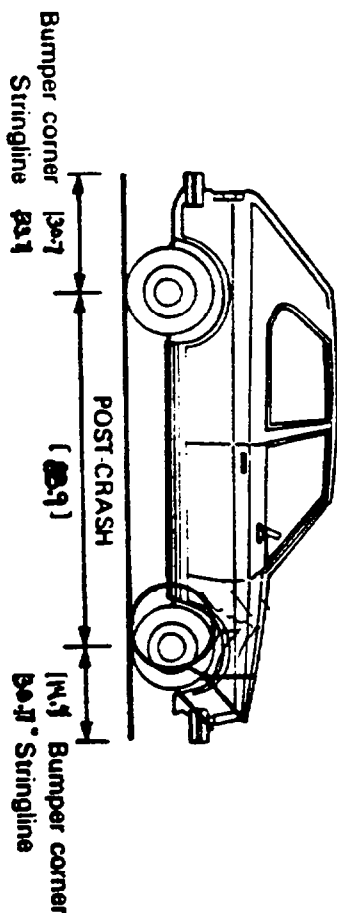
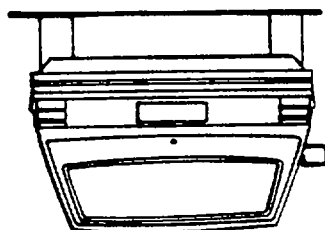
LF 0 6 °

RR ± N/A °

LR ± N/A °

Within ± 5 degrees

1986 MAZDA 323 Lx
JM1BF232XG0110581



Note: Sketch new perimeter and cross hatch direct damage and single hatch induced damage on all views. Annotate observations which might be useful in reconstructing the accident (e.g., grass in tire bead, direction of striations, scuff on sidewall, etc.) If pulling trailer sketch type of trailer and damage received on the back of this page. Annotate any damage caused by extrication such as component removal by torching, prying or hydraulic shears. If the vehicle contacted a pedestrian, complete page 6R.

APPENDIX A
PHOTOGRAPHS

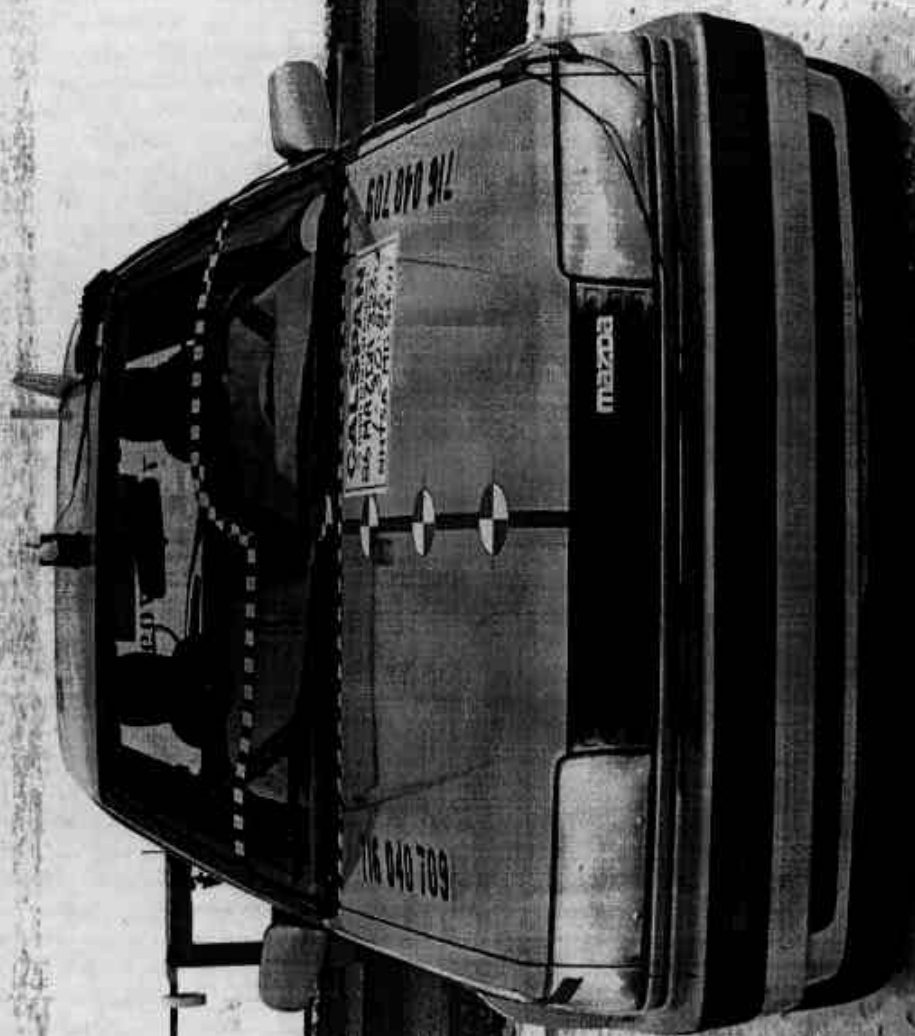


Figure A-1 PRE-TEST FRONT VIEW

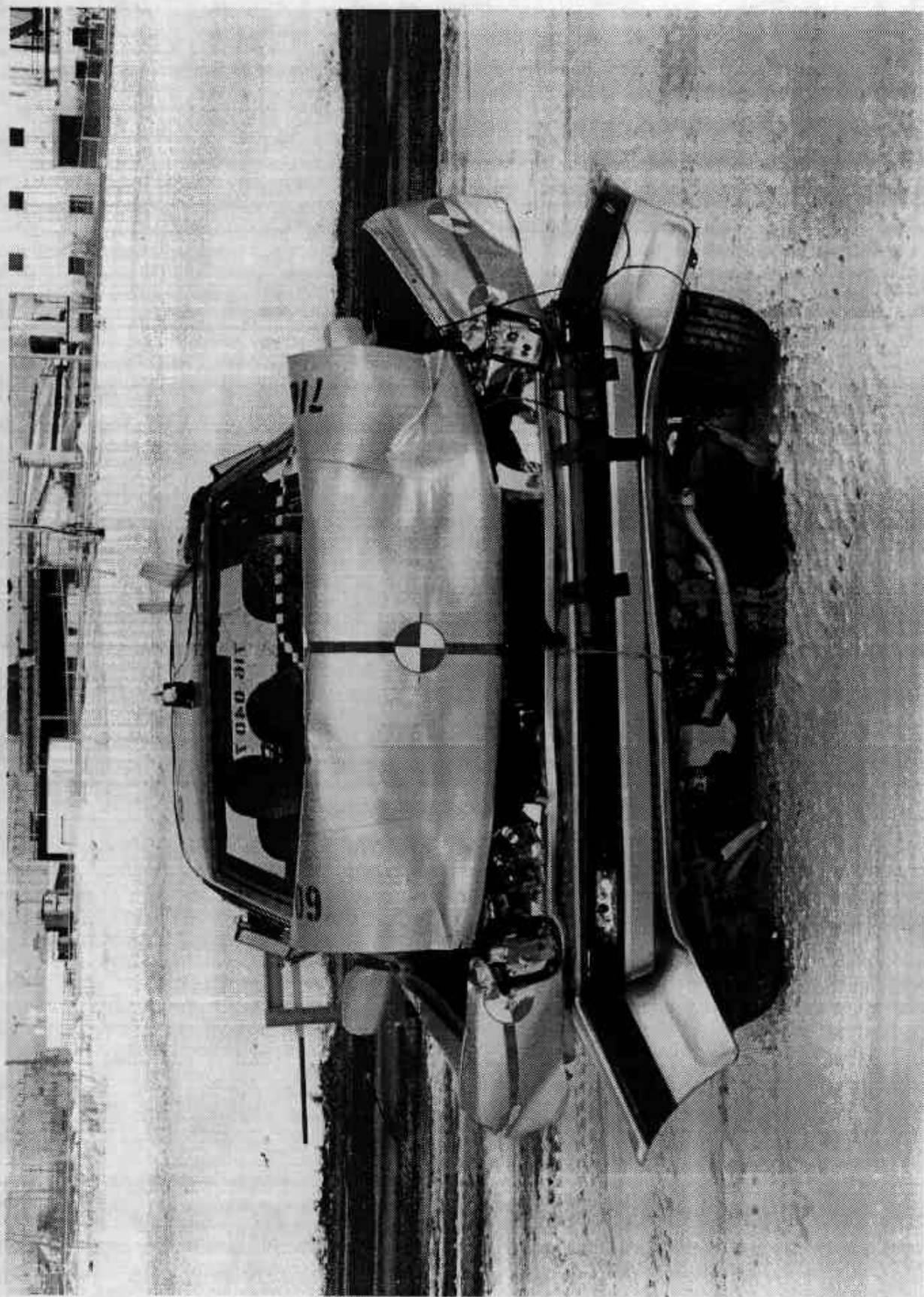


Figure A-2 POST-TEST FRONT VIEW

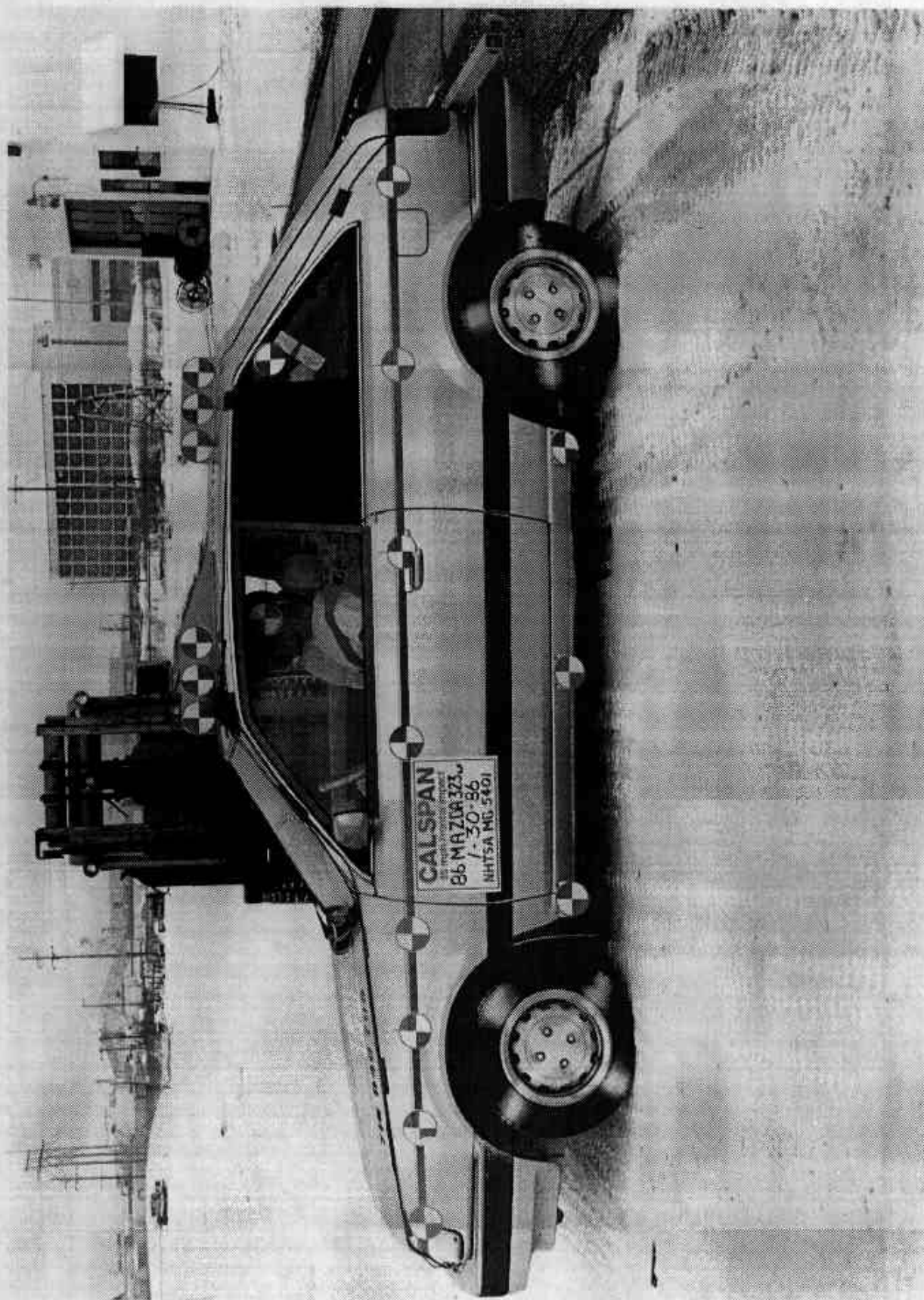


Figure A-3 PRE-TEST LEFT SIDE VIEW

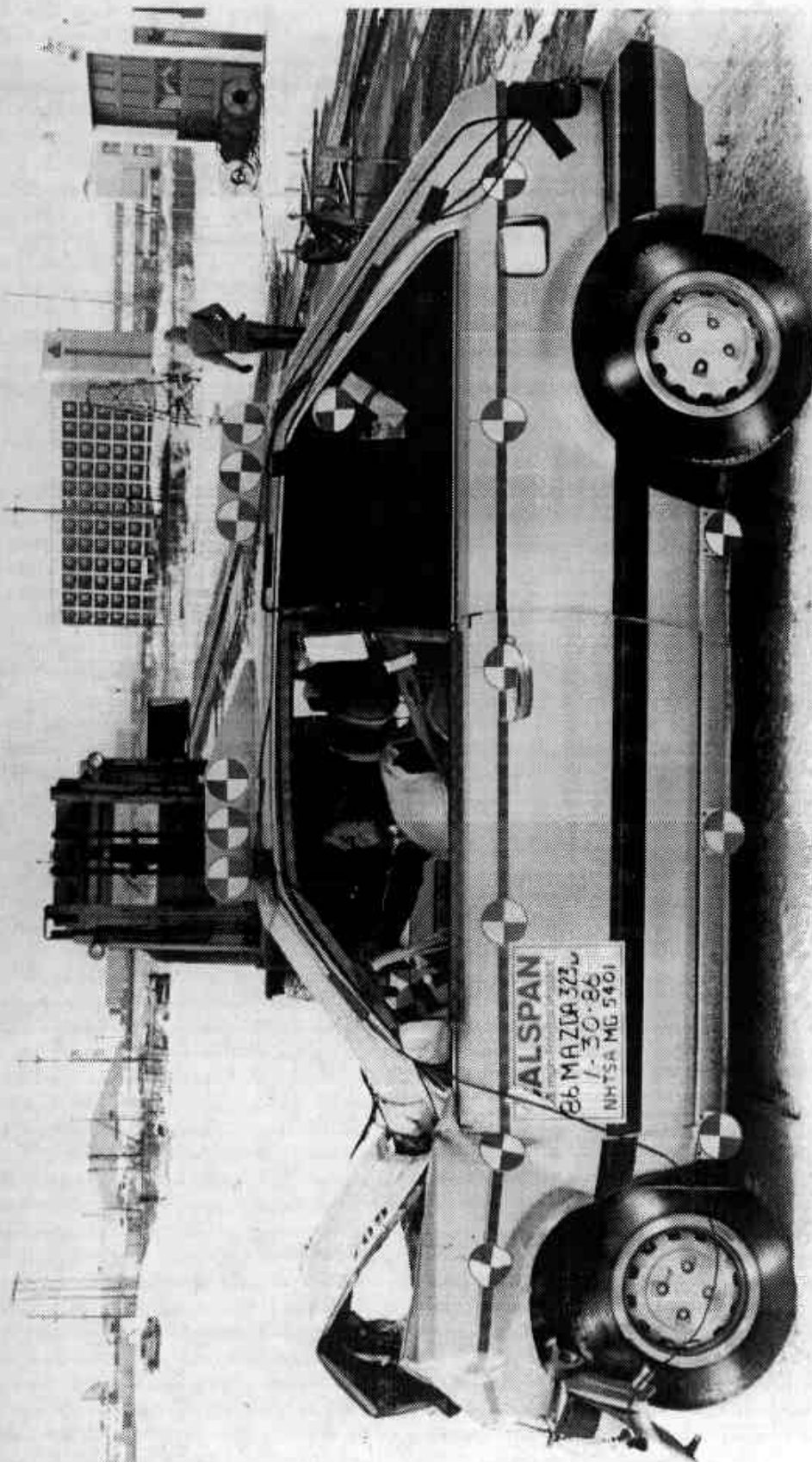
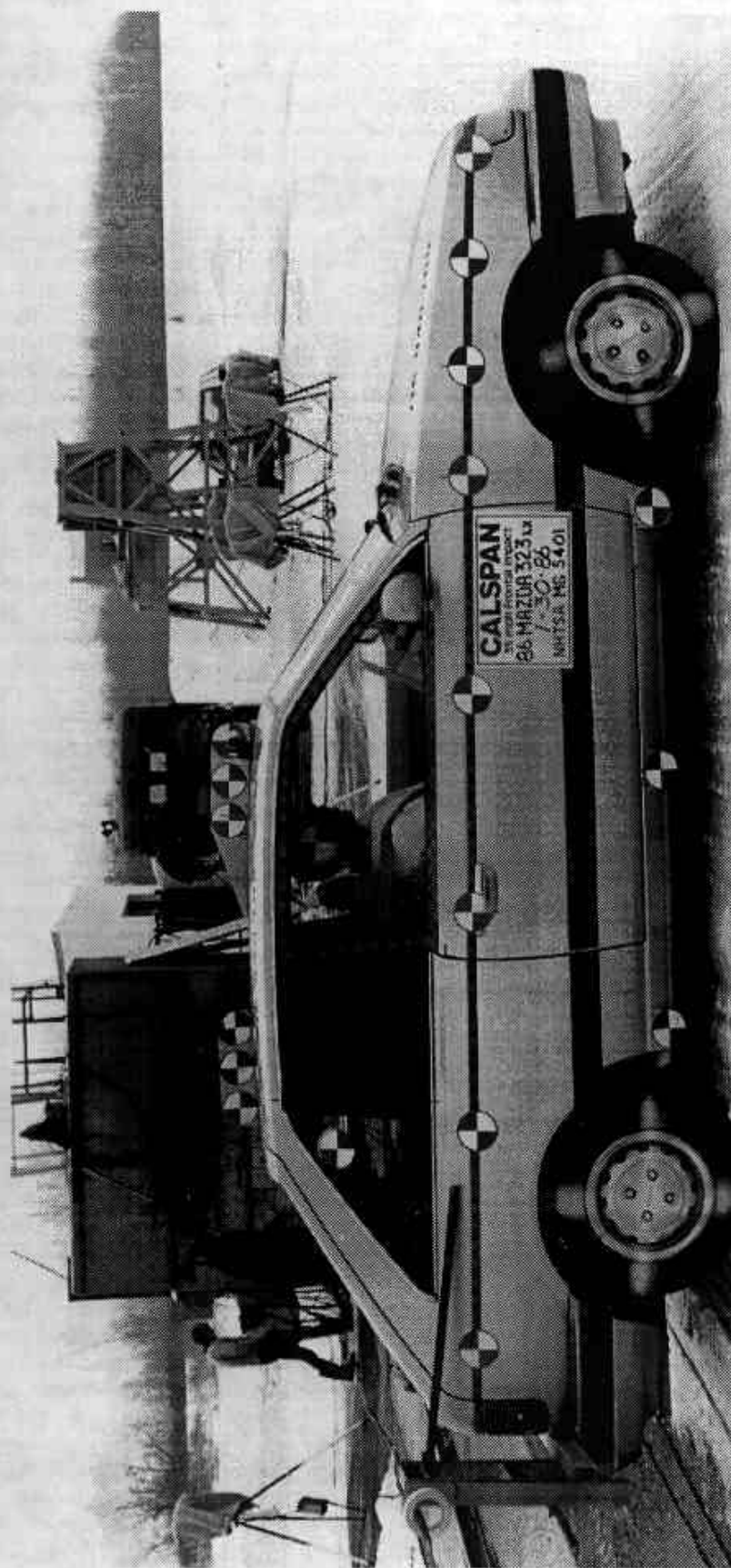


Figure A-4 POST-TEST LEFT SIDE VIEW



A-6

Figure A-5 PRE-TEST RIGHT SIDE VIEW

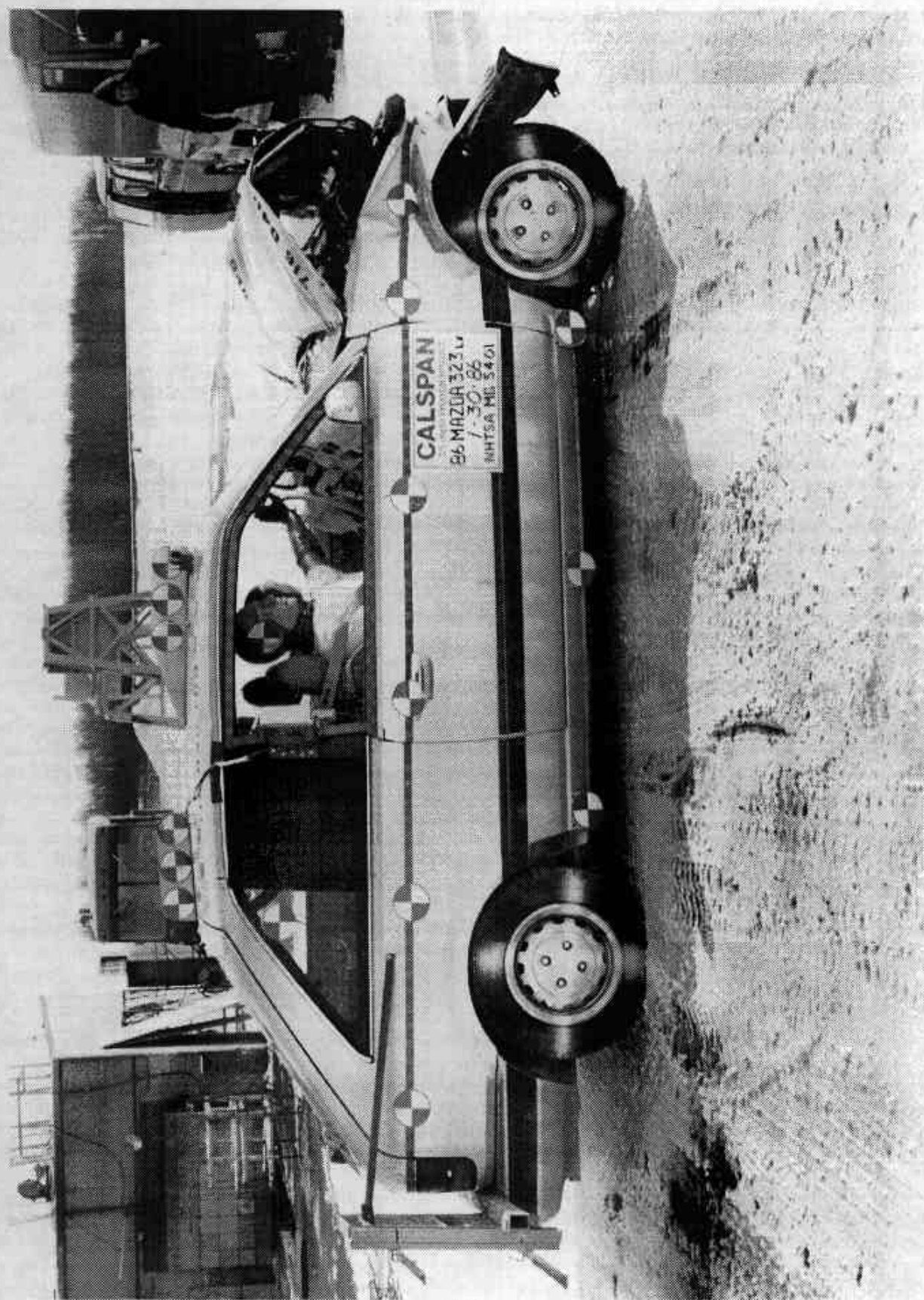
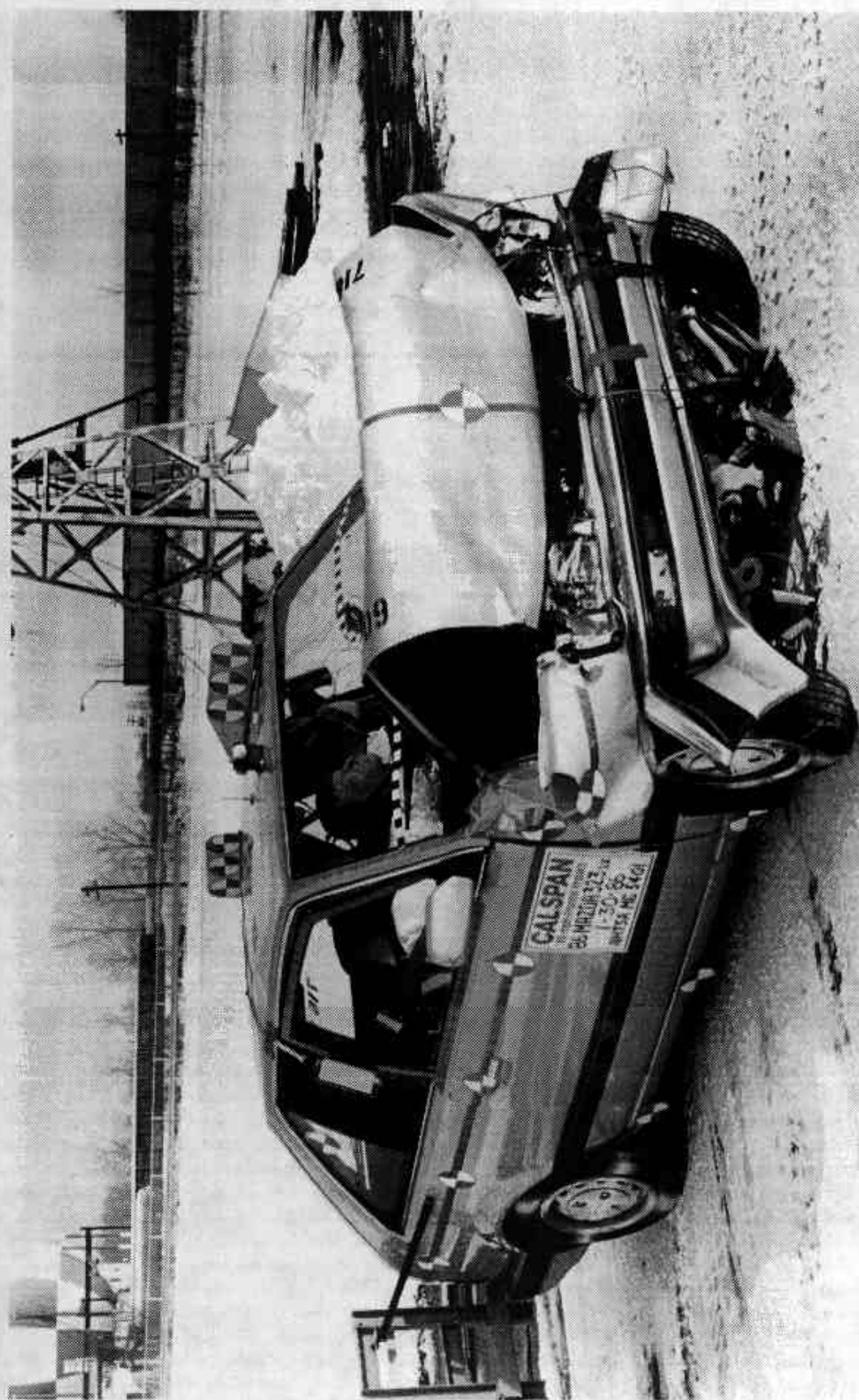


Figure A-6 POST-TEST RIGHT SIDE VIEW



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



A-9

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

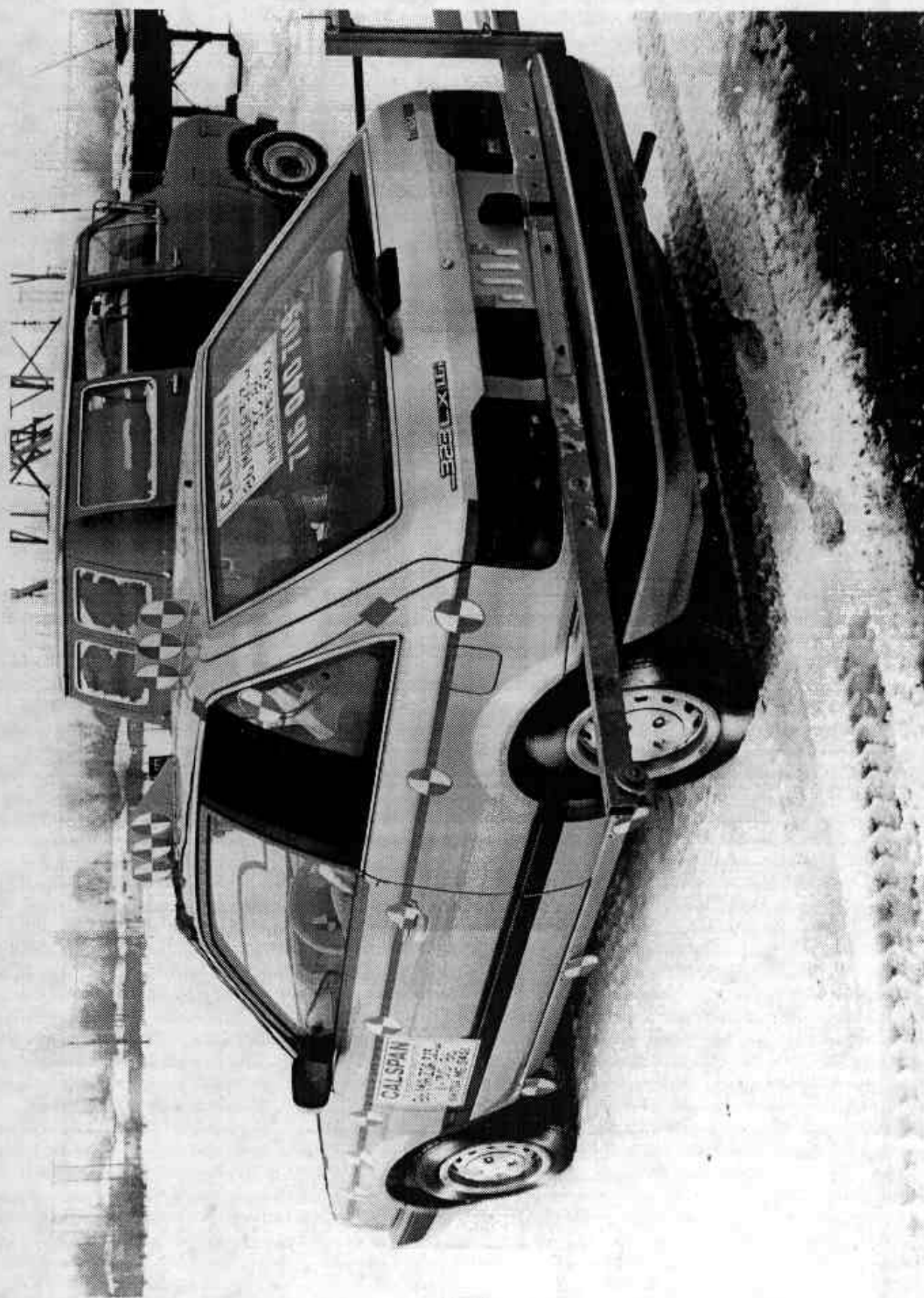


Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

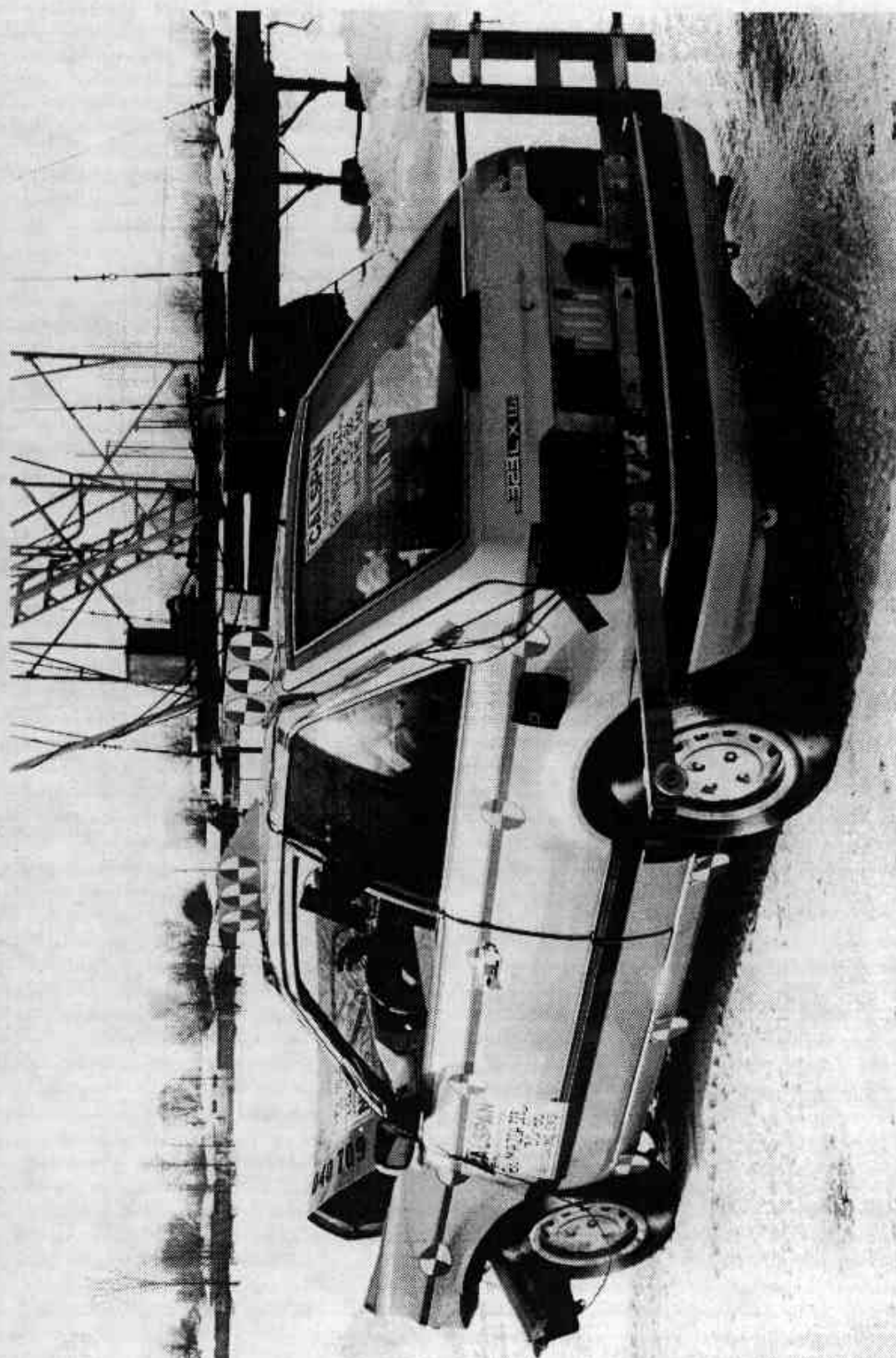


Figure A-10 POST-TEST LEFT REAR THREE-QUARTER VIEW

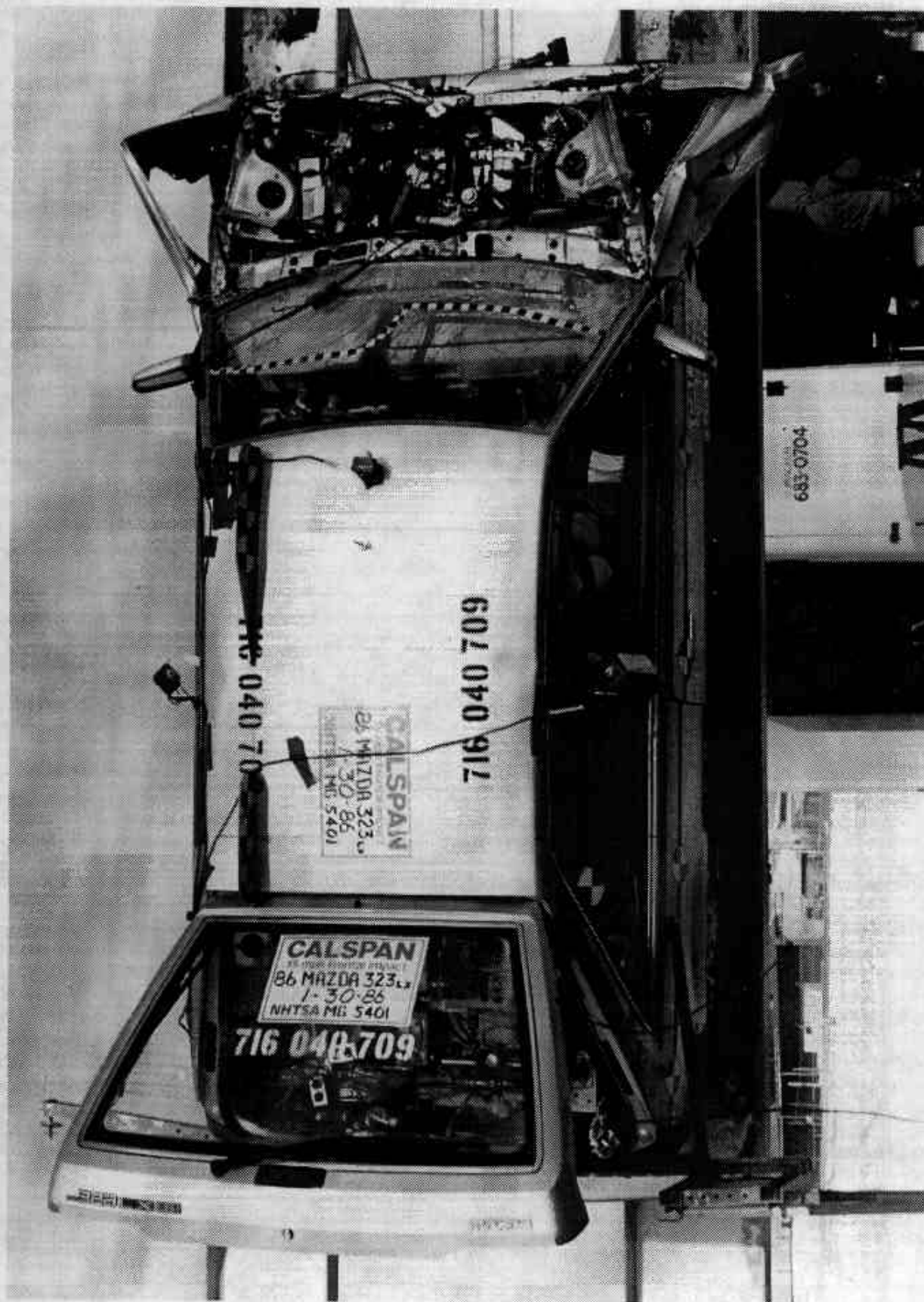
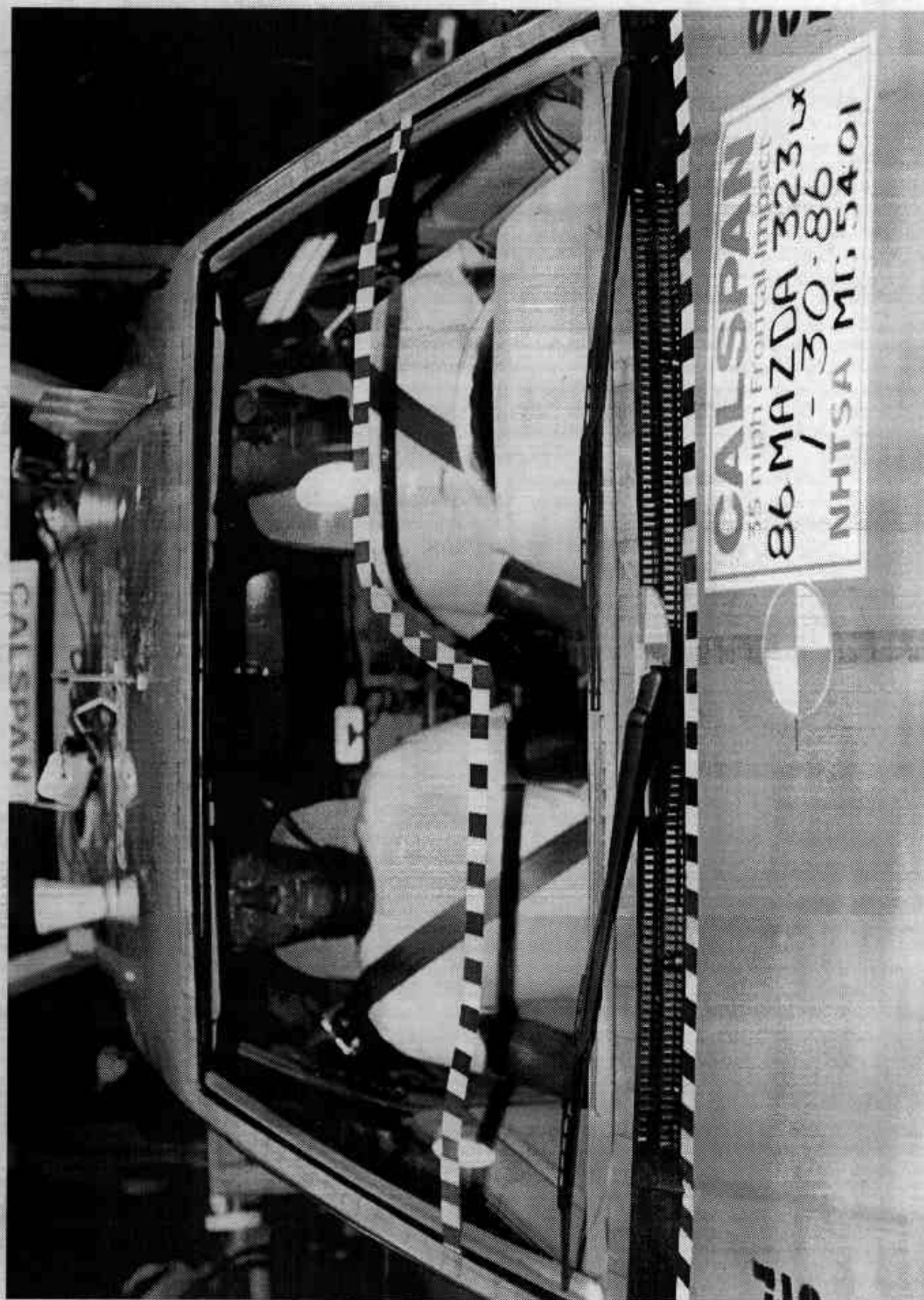


Figure A-11 POST-TEST TOP VIEW



A-13

Figure A-12 PRE-TEST WINDSHIELD VIEW

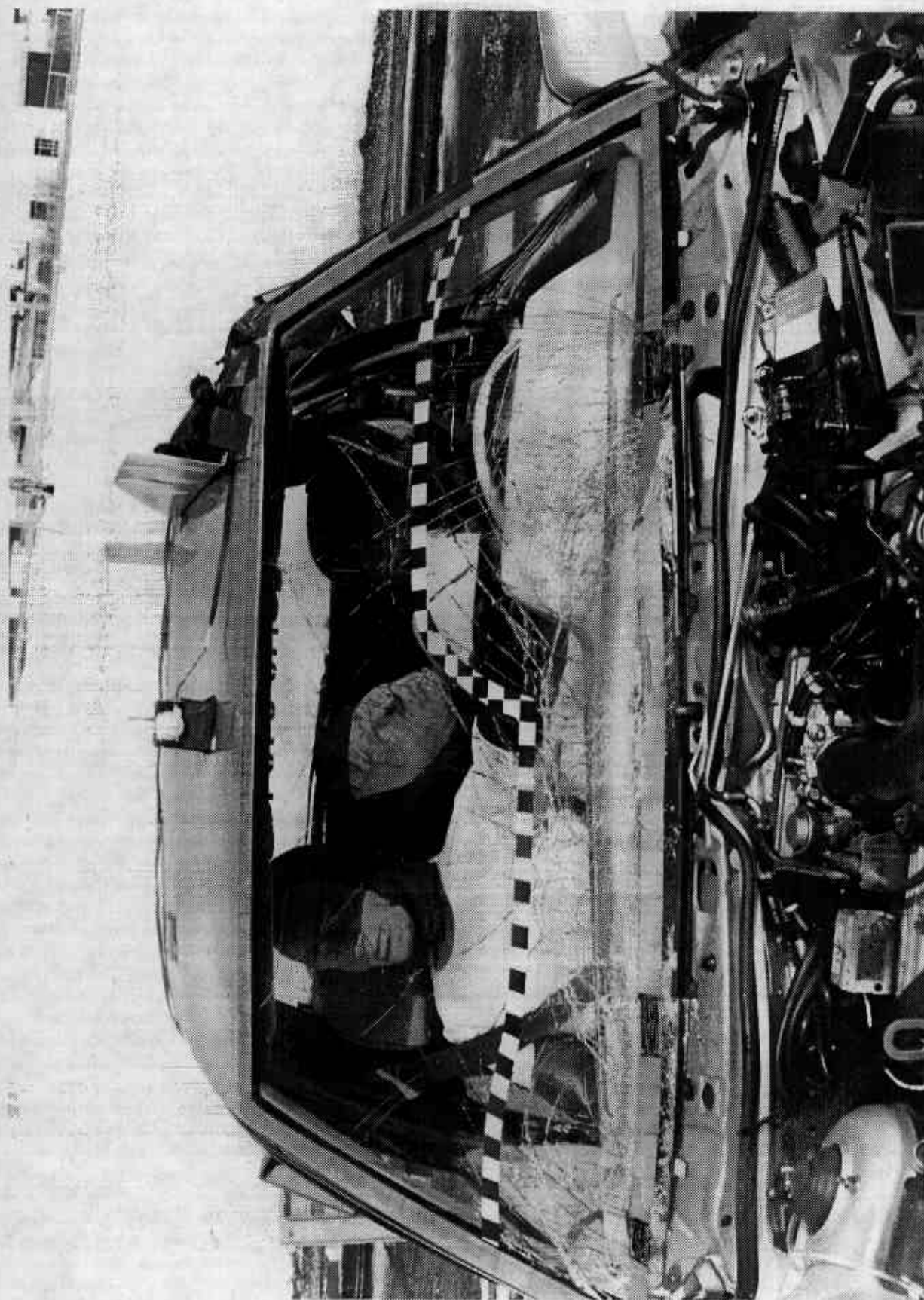


Figure A-13 POST-TEST WINDSHIELD VIEW

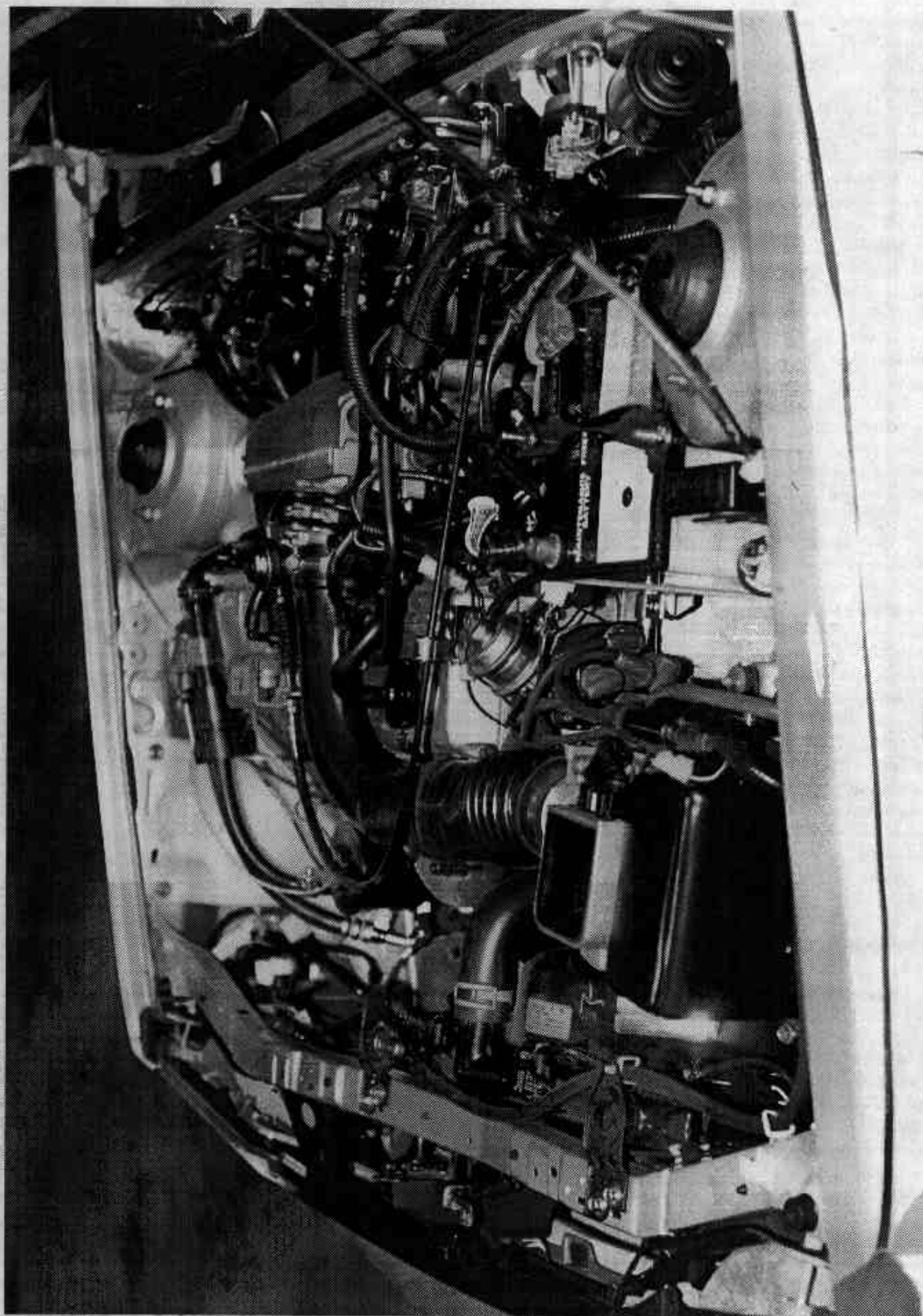


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

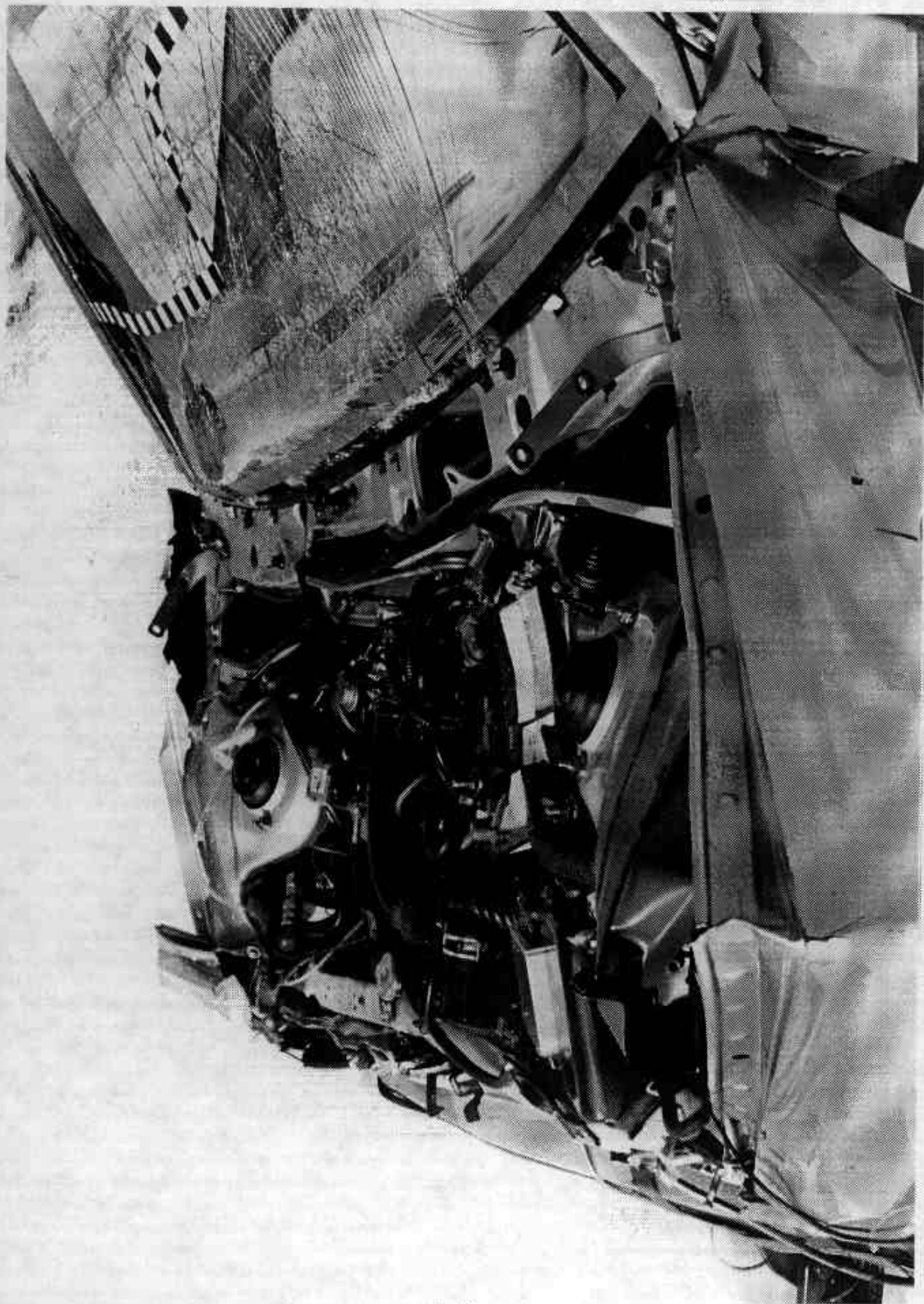


Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

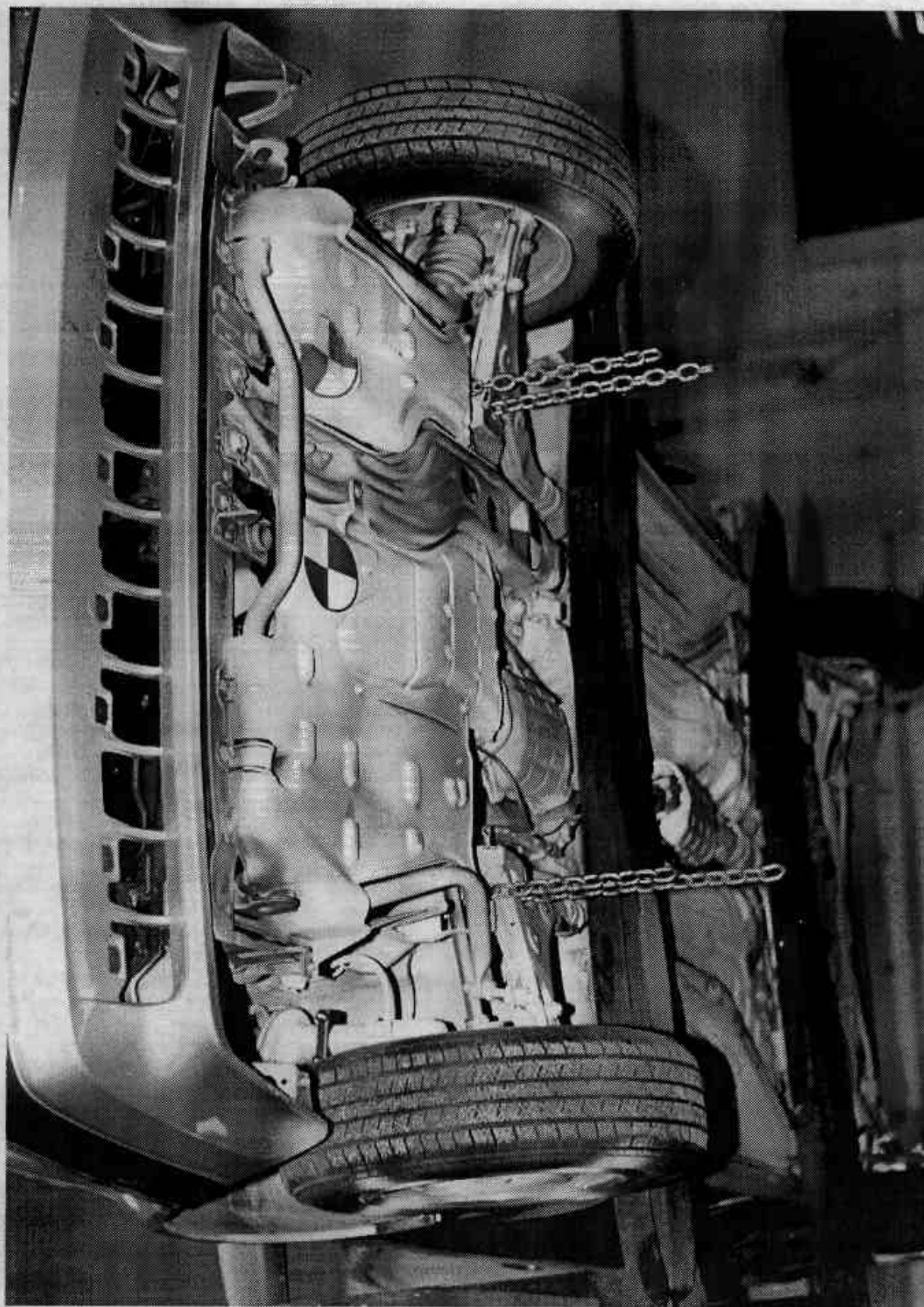


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

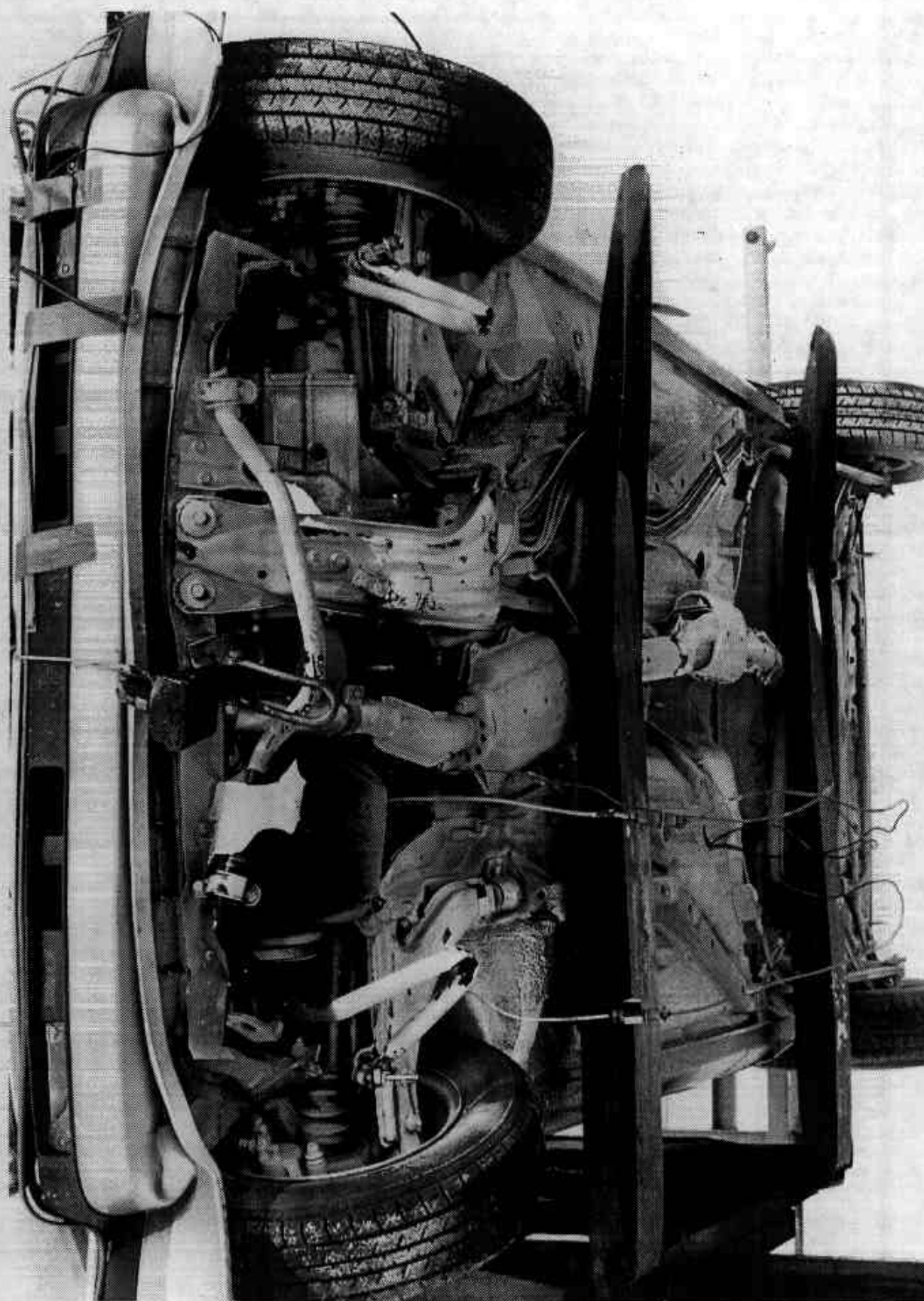


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

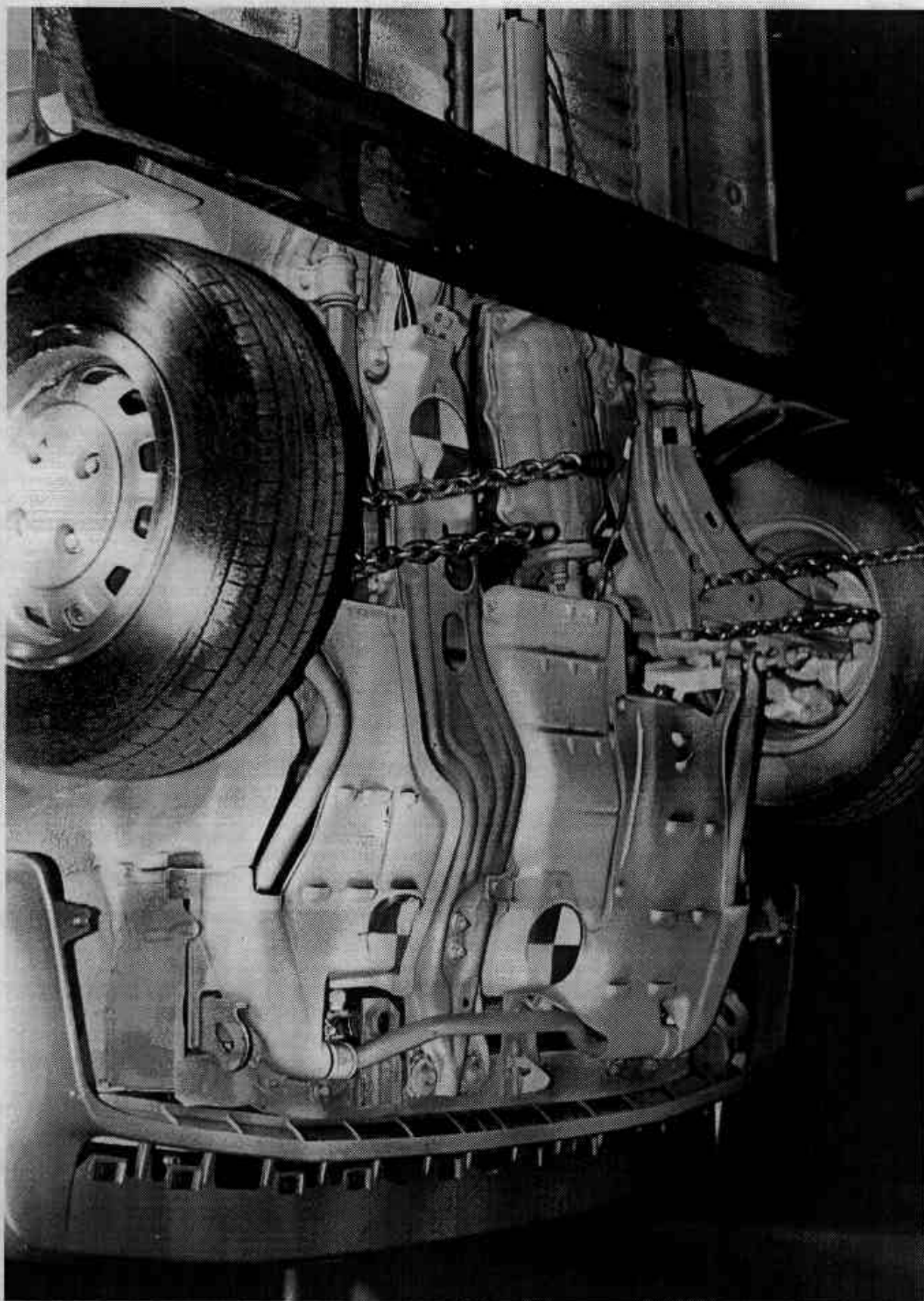


Figure A-18 PRE-TEST FRONT-SIDE UNDERBODY VIEW



Figure A-19 POST-TEST FRONT-SIDE UNDERBODY VIEW

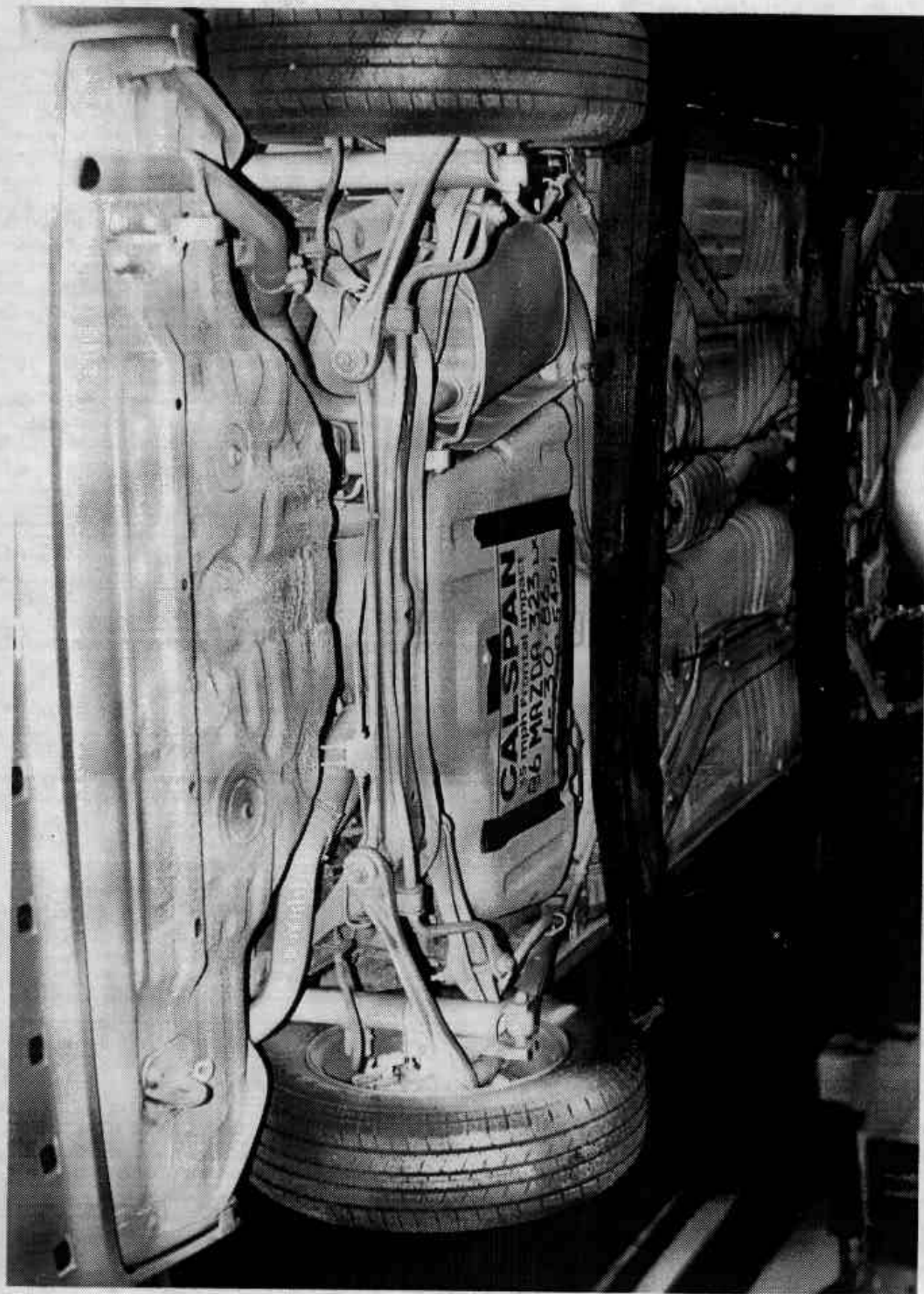


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

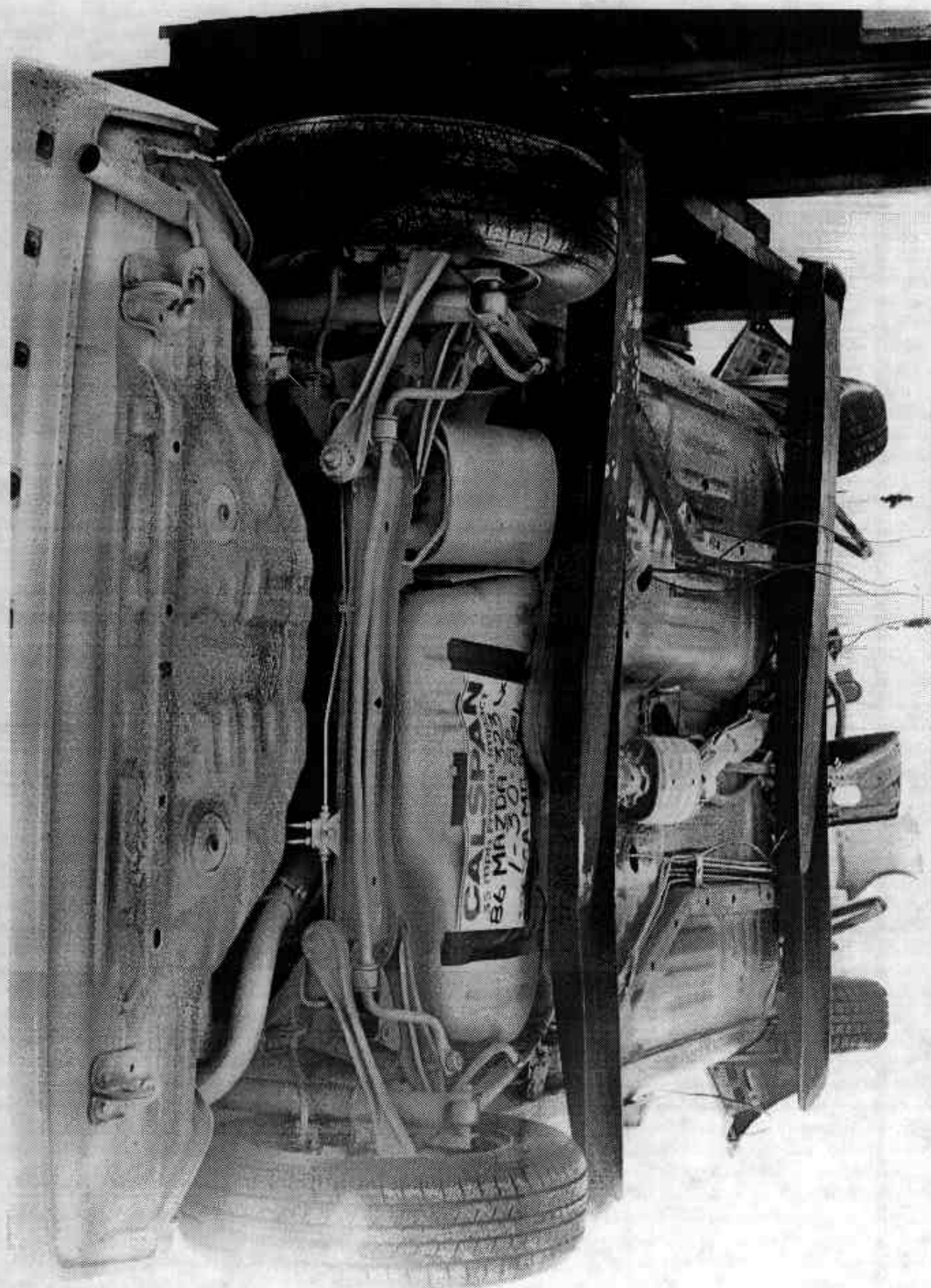


Figure A-21 POST-TEST REAR UNDERBODY VIEW



Figure A-22 PRE-TEST DRIVER POSITION VIEW

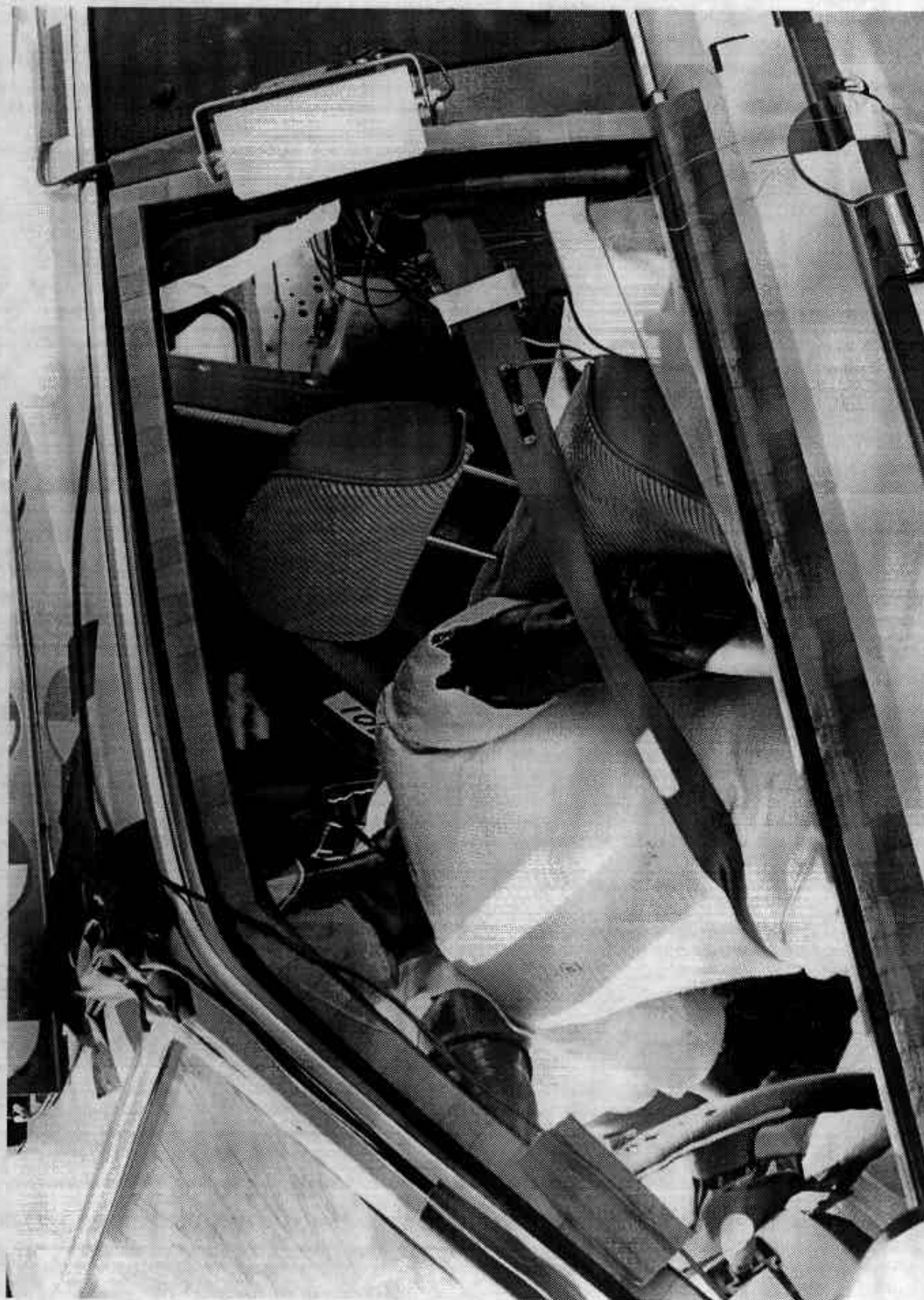


Figure A-23 POST-TEST DRIVER POSITION VIEW



Figure A-24 PRE-TEST PASSENGER POSITION VIEW



Figure A-25 POST-TEST PASSENGER POSITION VIEW



Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW



Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW



Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW



Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

APPENDIX B

VEHICLE, DUMMY RESPONSE DATA AND LOAD CELL BARRIER DATA

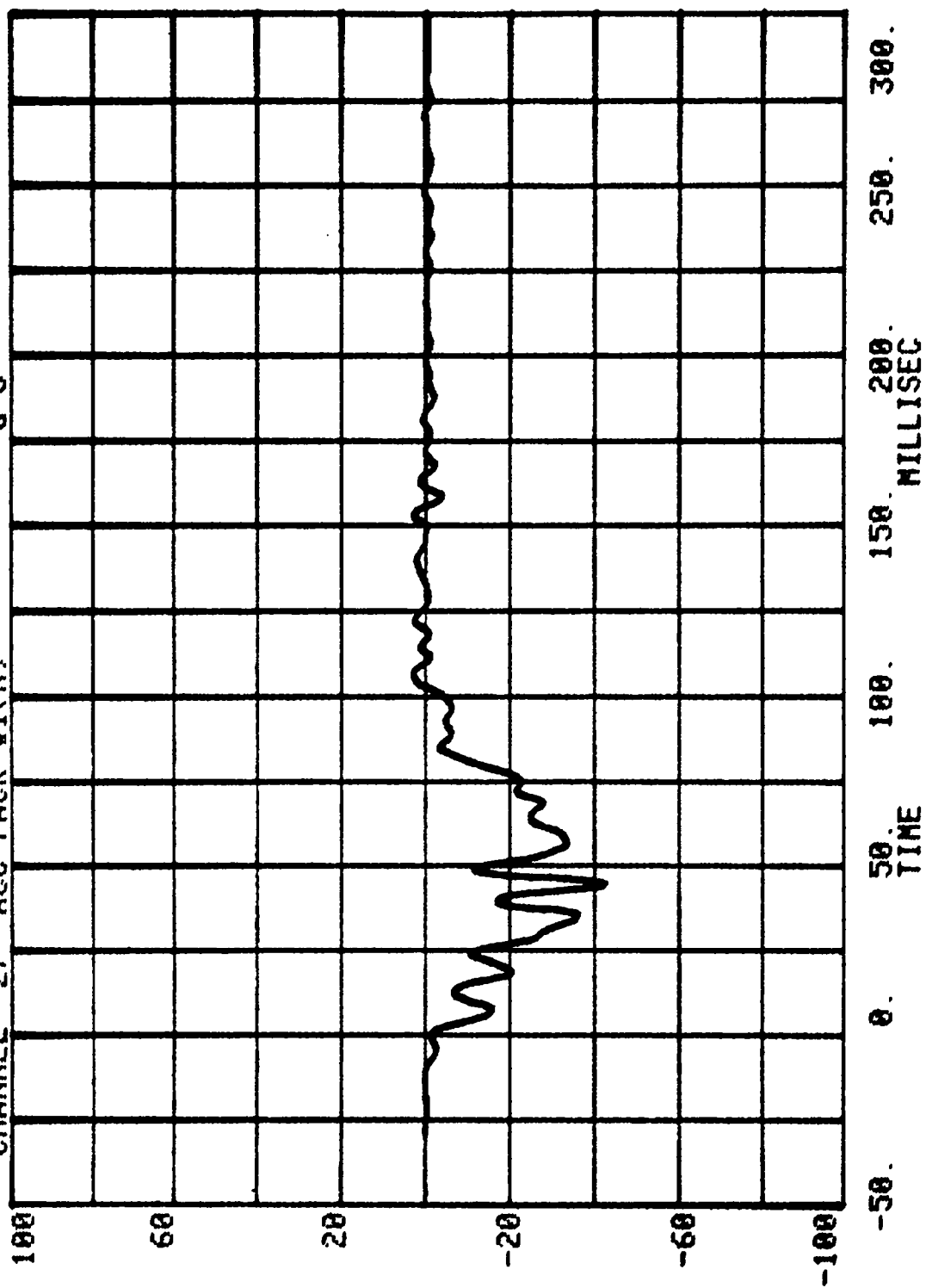
TEST NO. MG5401

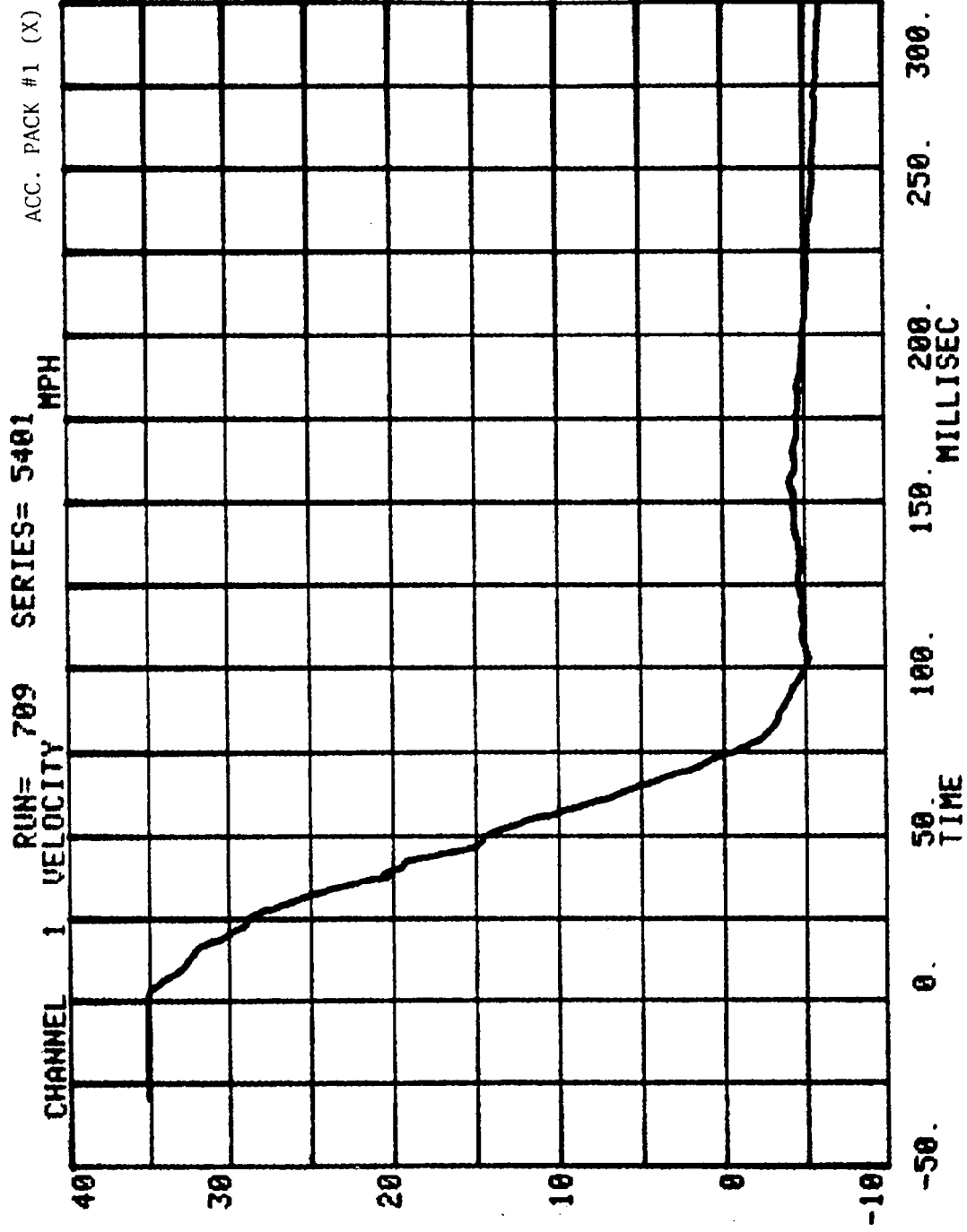
VEHICLE DATA

FILTER CHANNEL CLASS

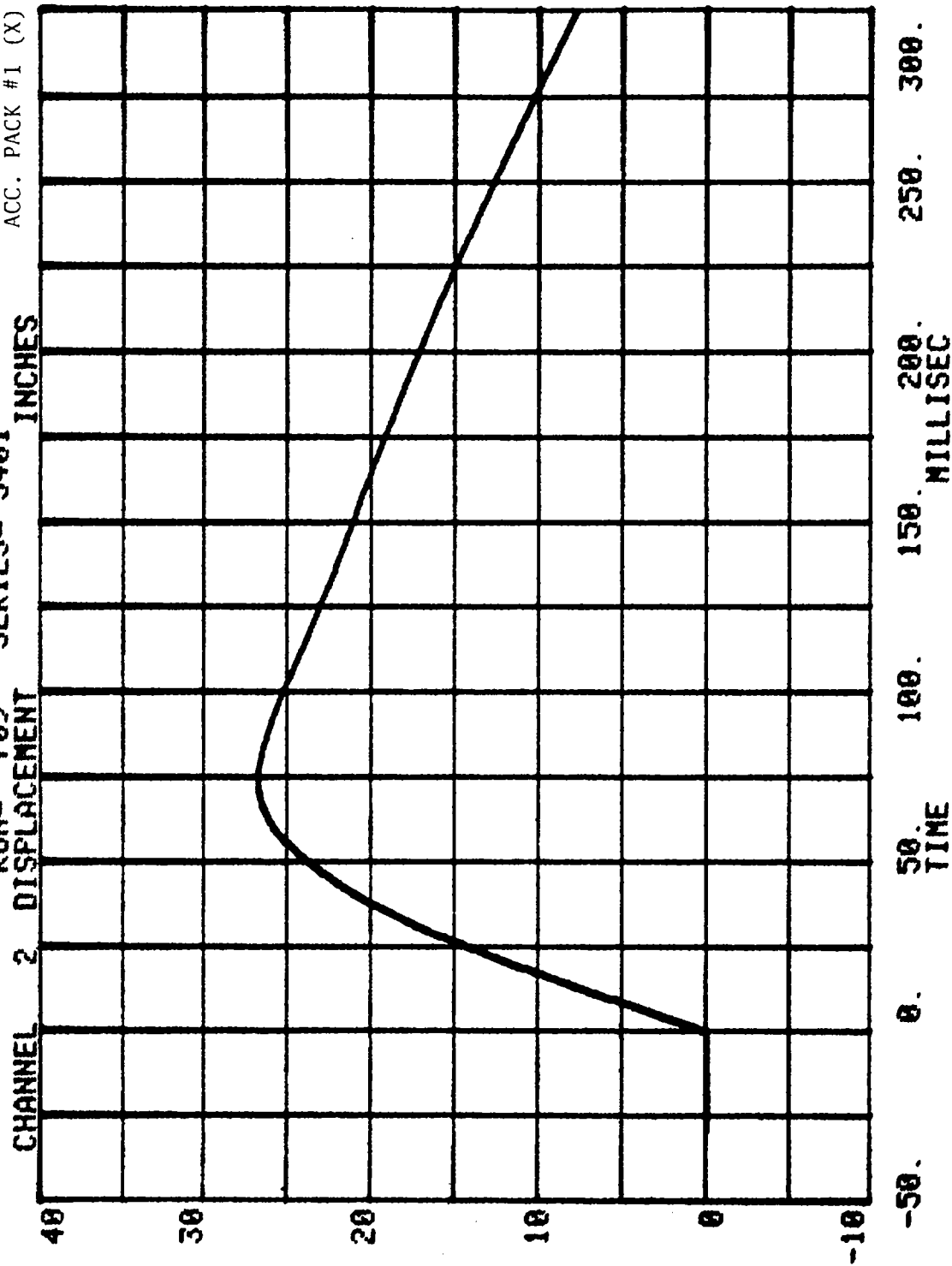
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RUN= 709 SERIES= 5401
CHANNEL 27 ACC PACK #1(X) G'S

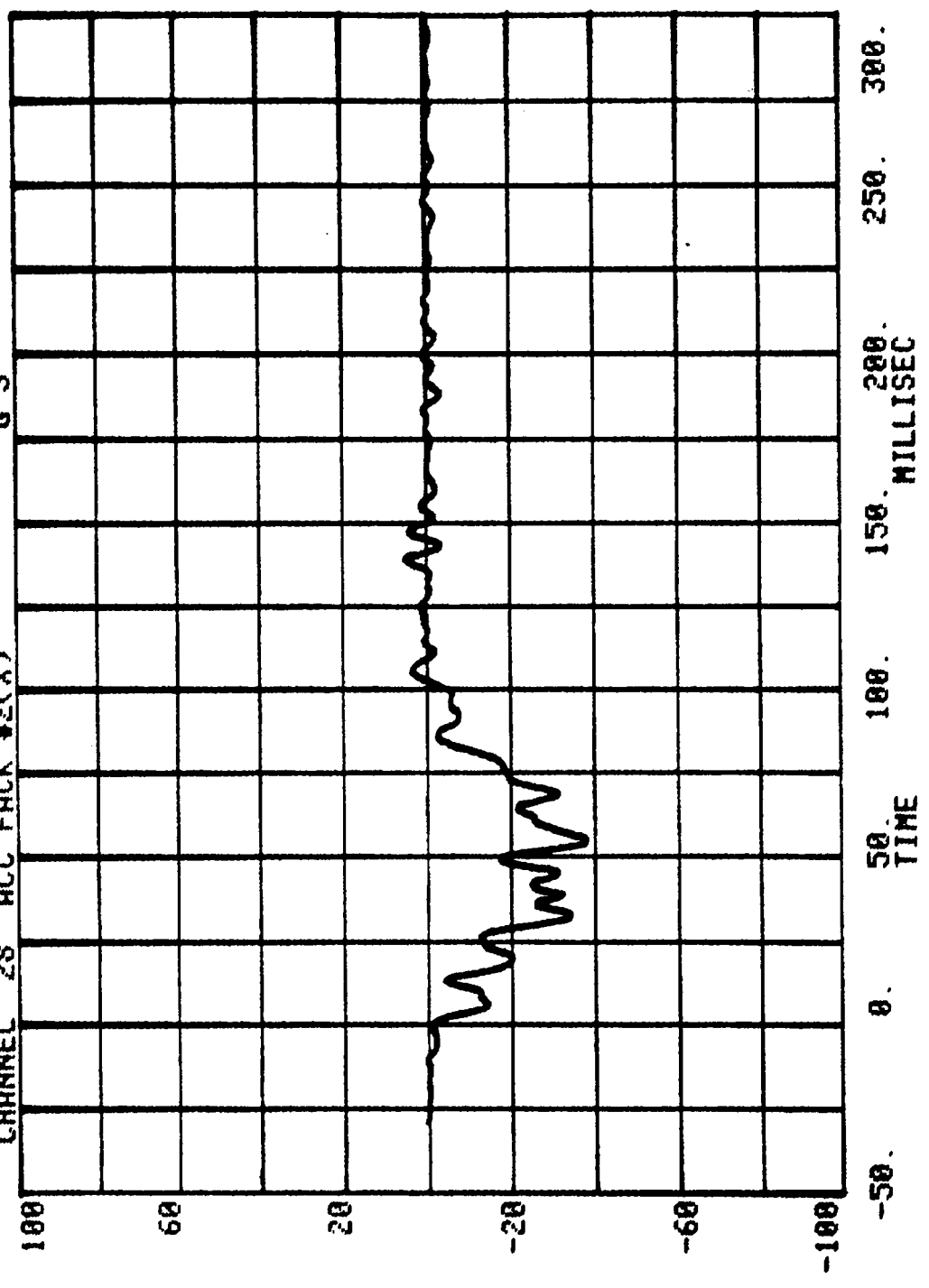


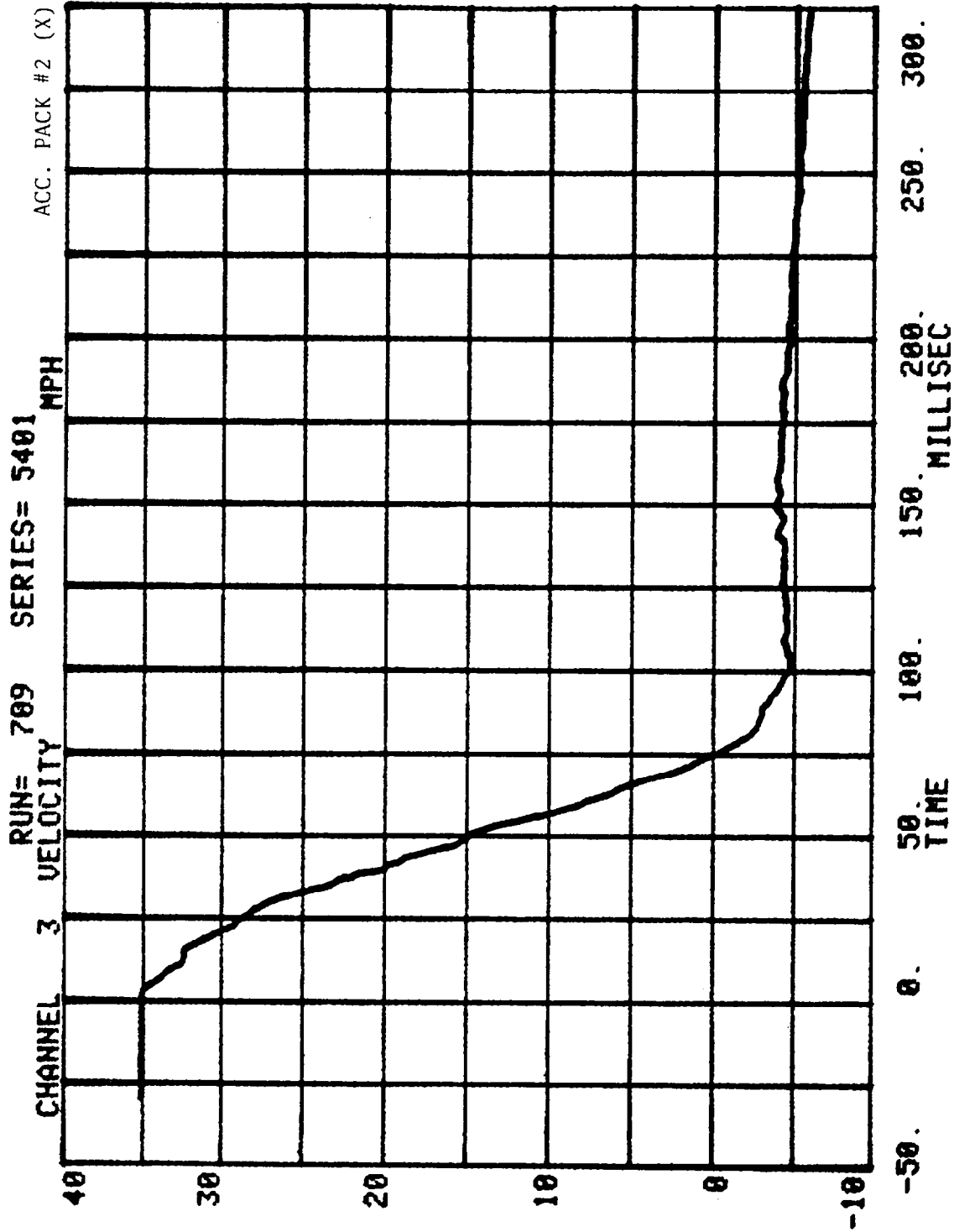


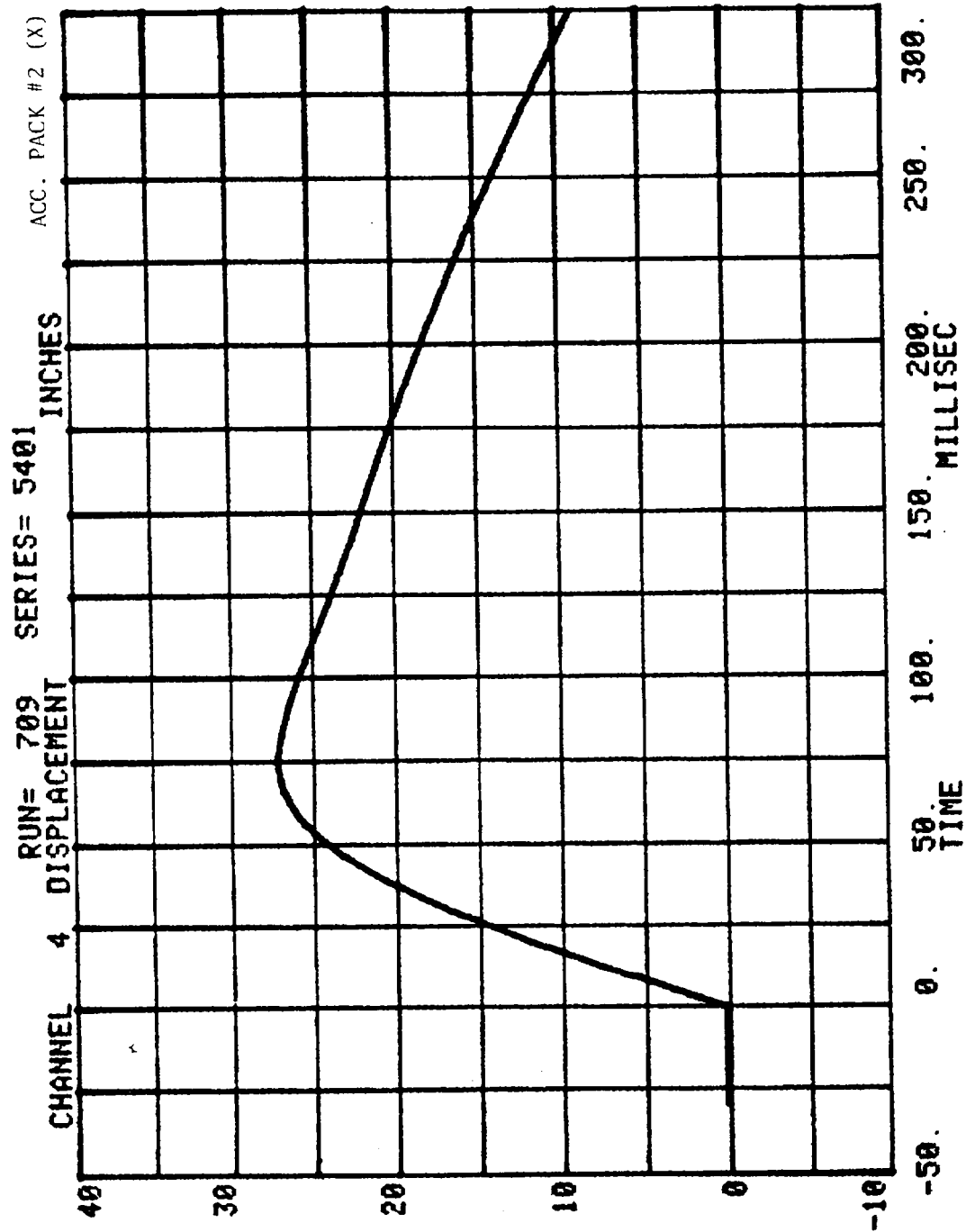
CHANNEL 2 DISPLACEMENT RUN= 709 SERIES= 5401 ACC. PACK #1 (X)



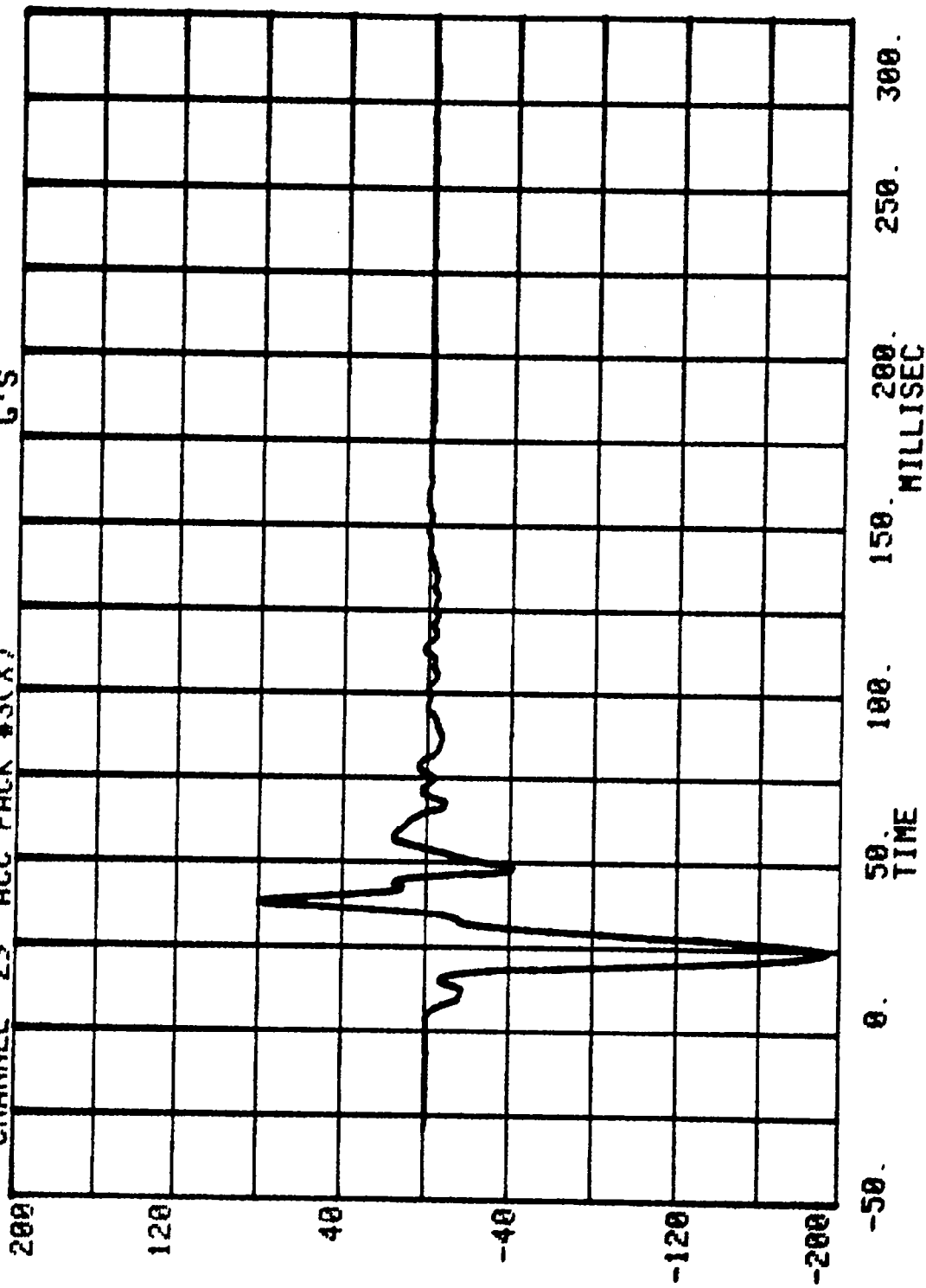
RUN= 709 SERIES= 5401
CHANNEL 28 ACC PACK #2(X) G'S

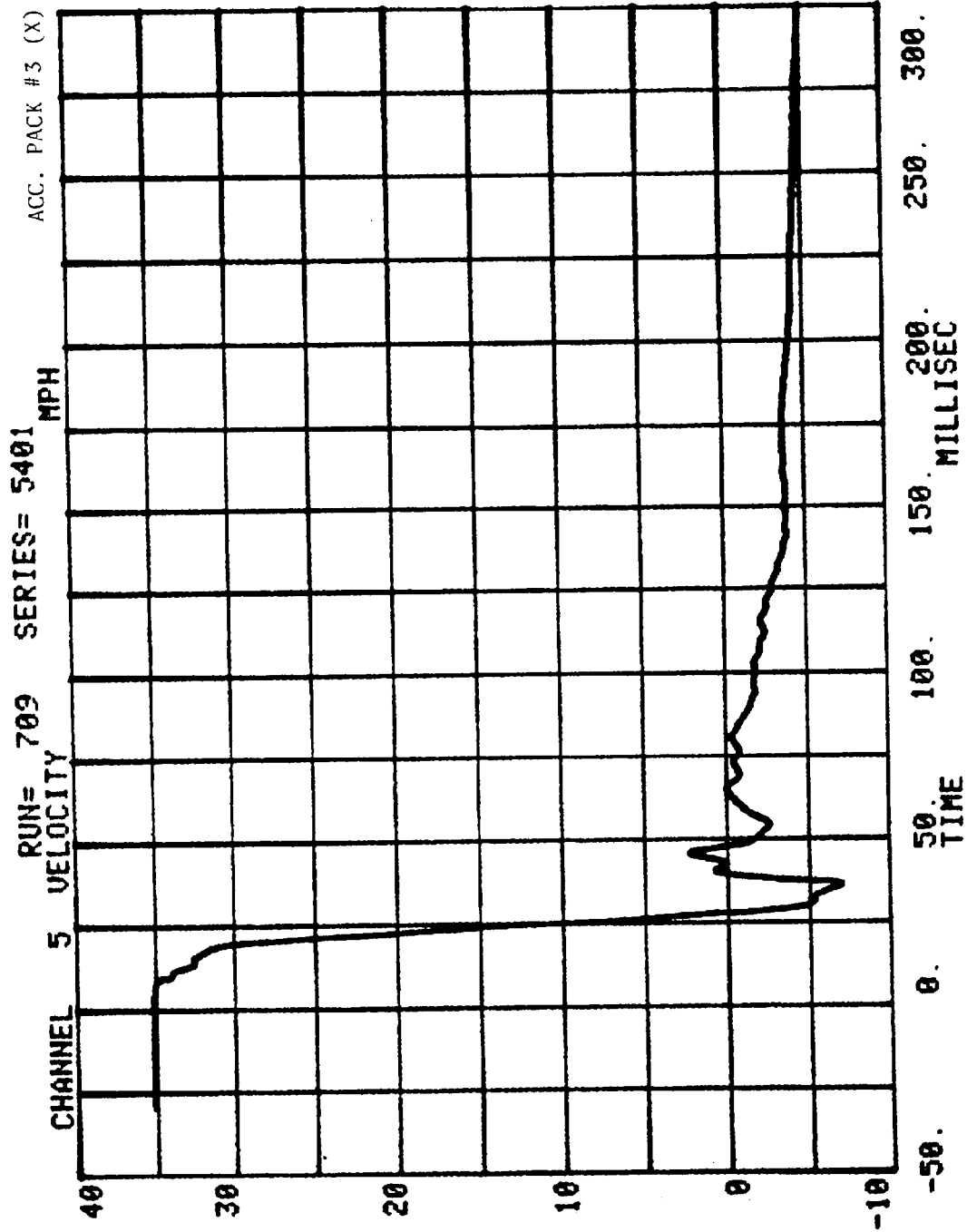


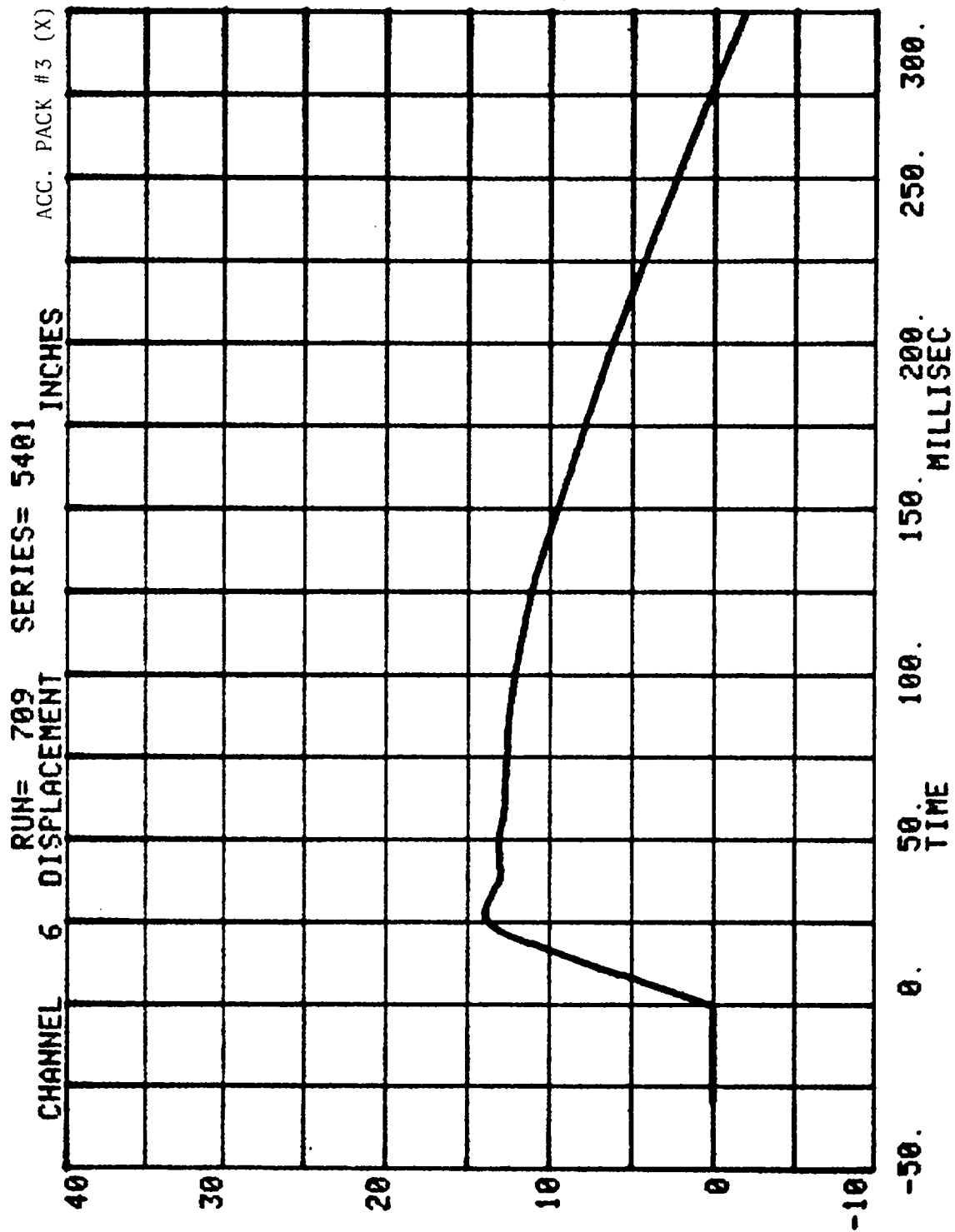




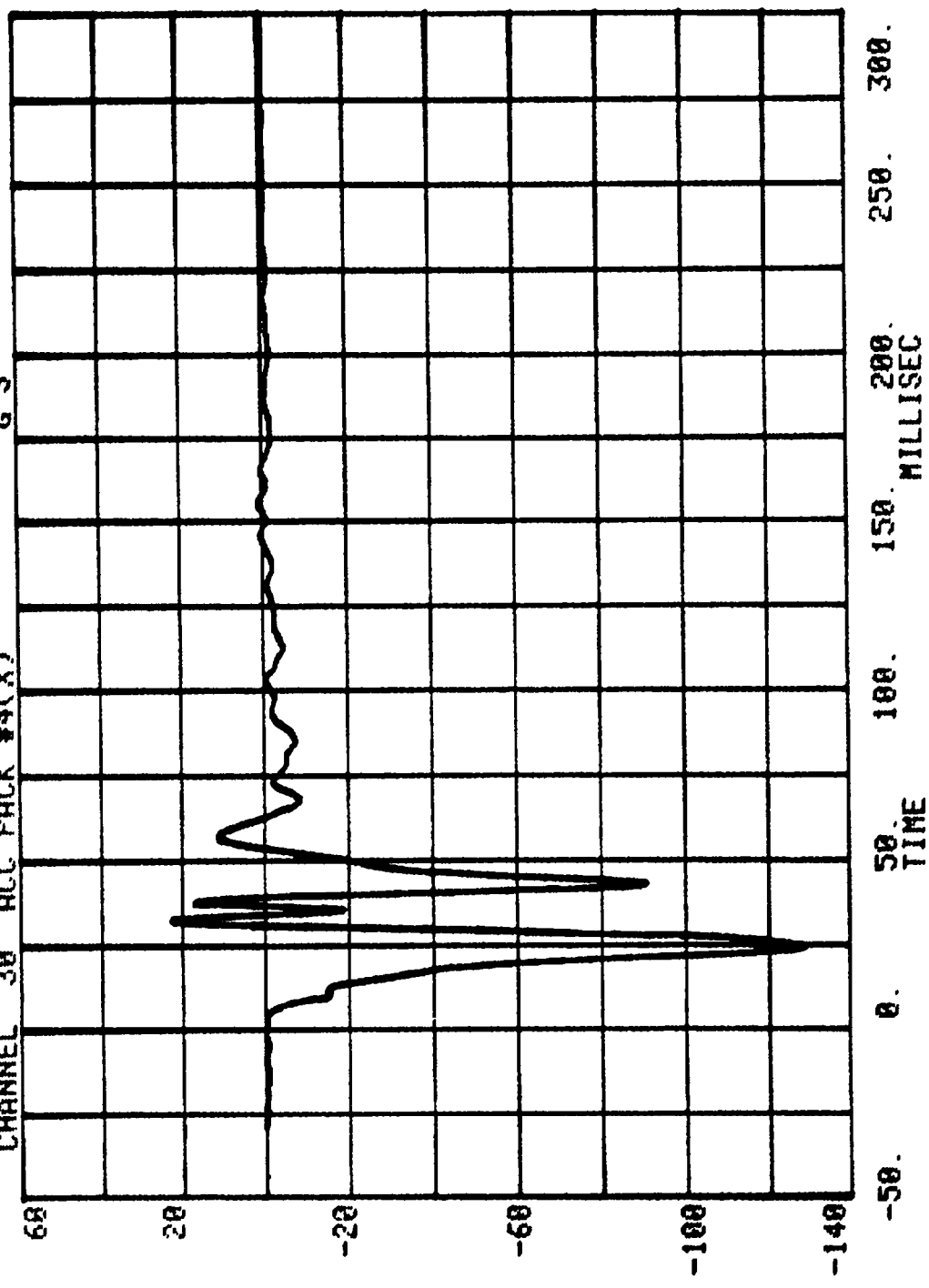
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CHANNEL 29 ACC PACK #3(X)

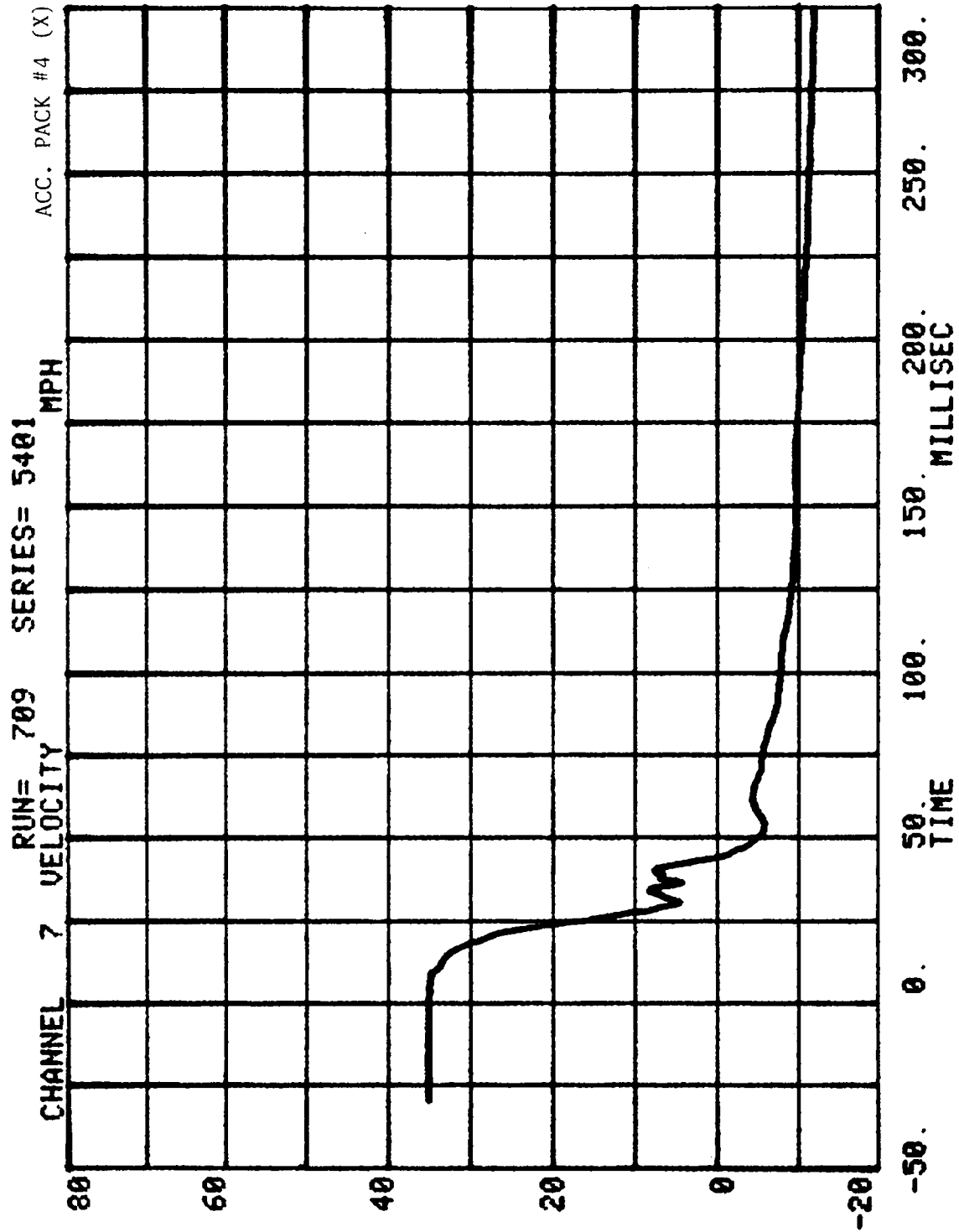


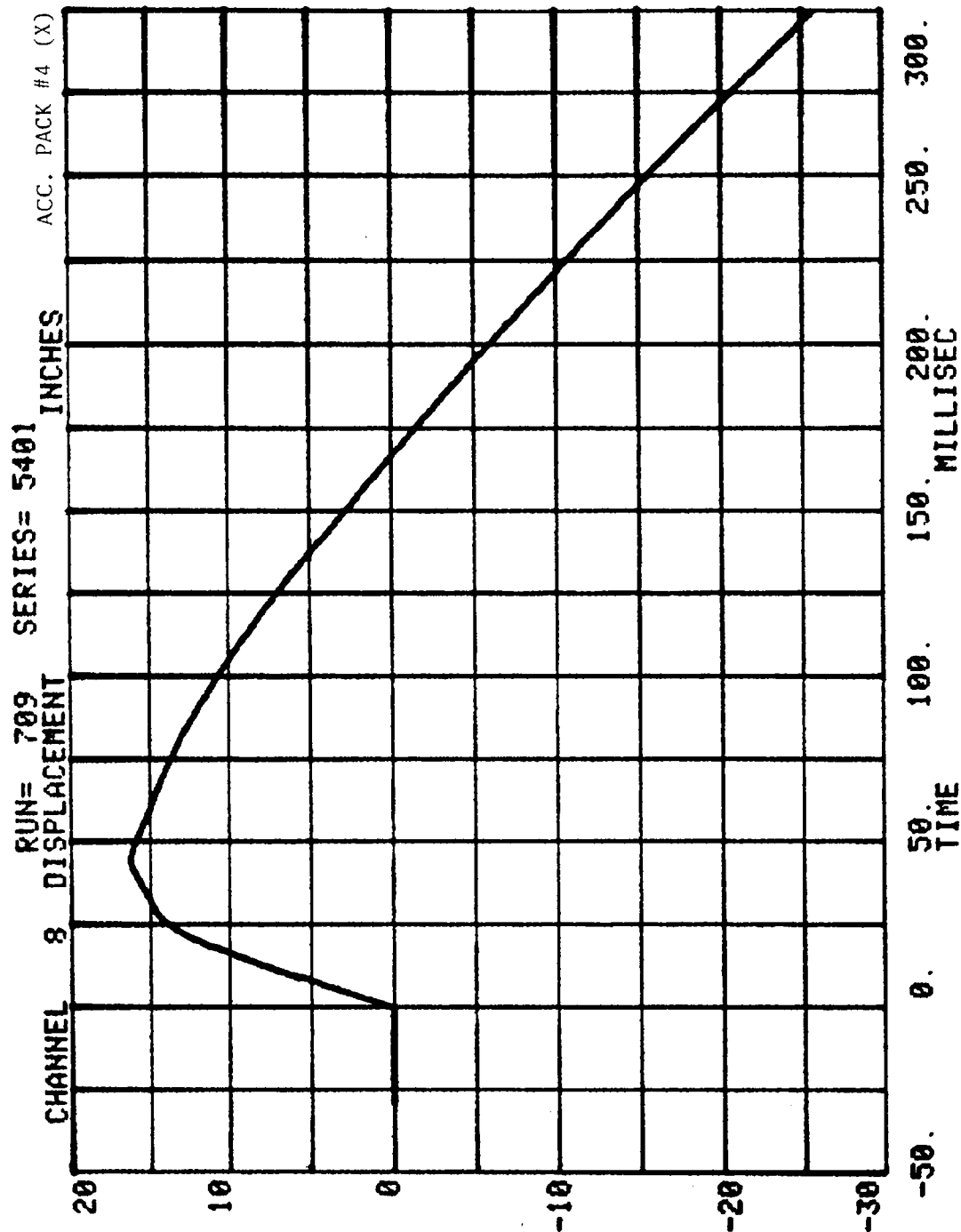




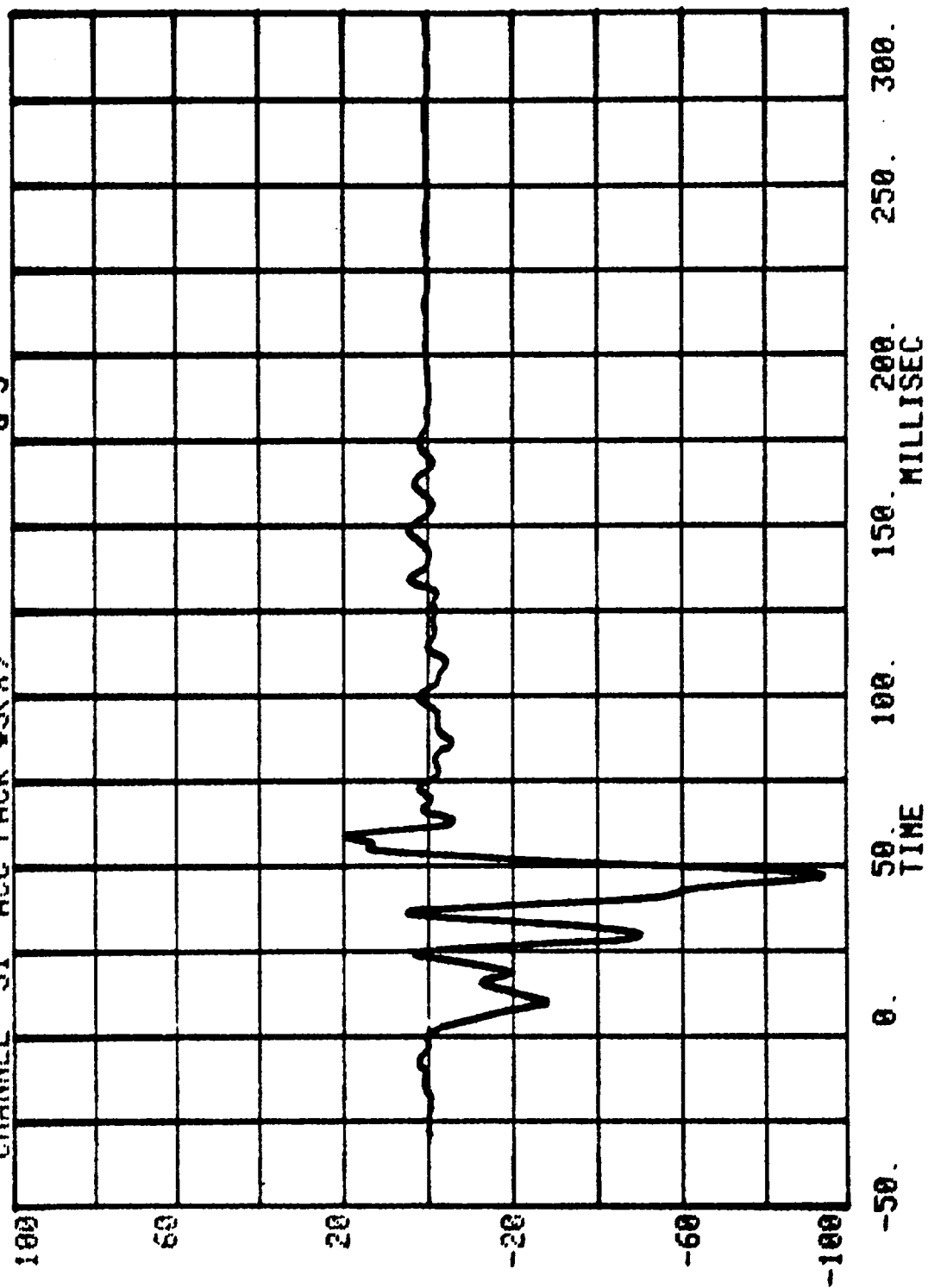
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CHANNEL 30 ACC PACK #4(X)

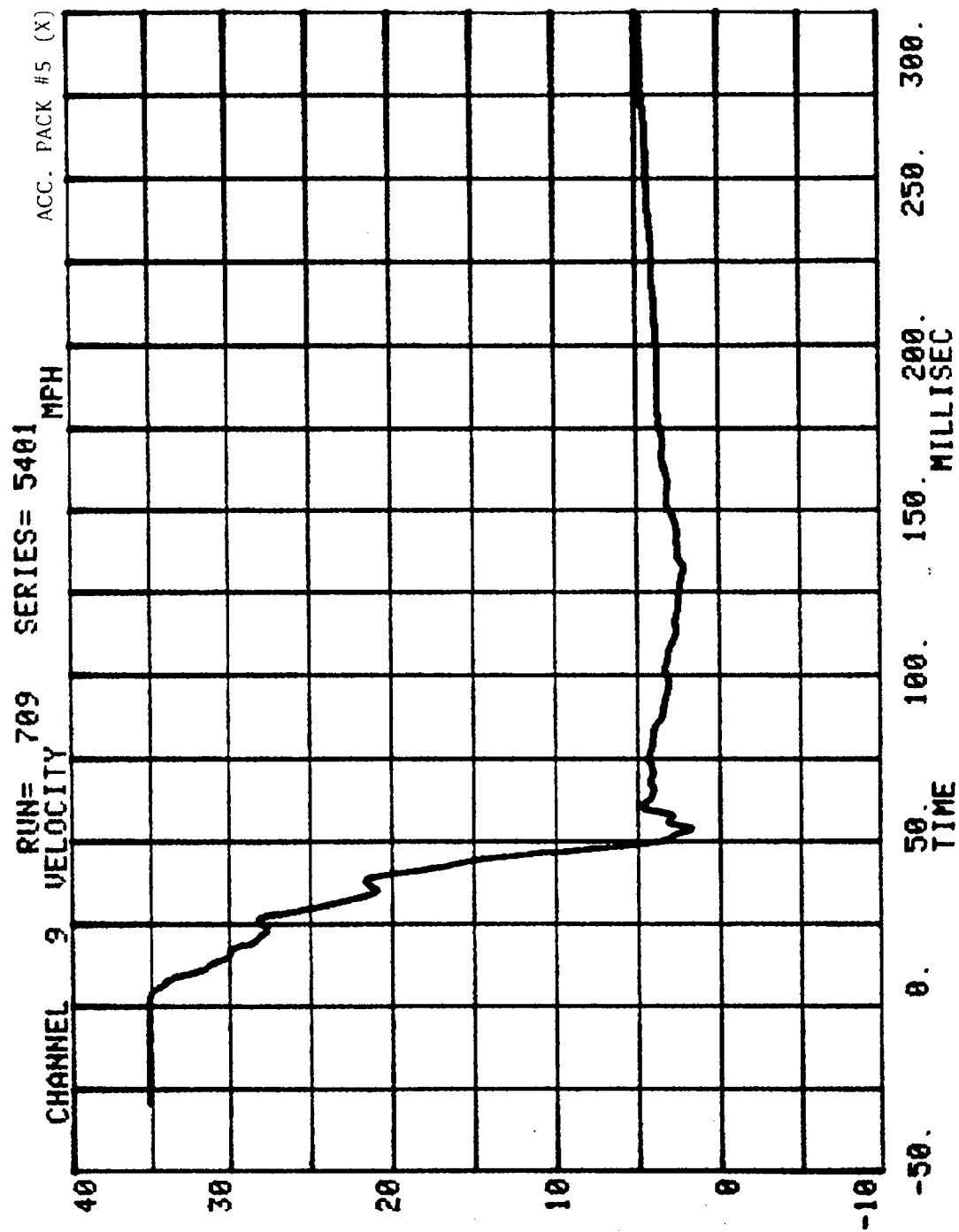


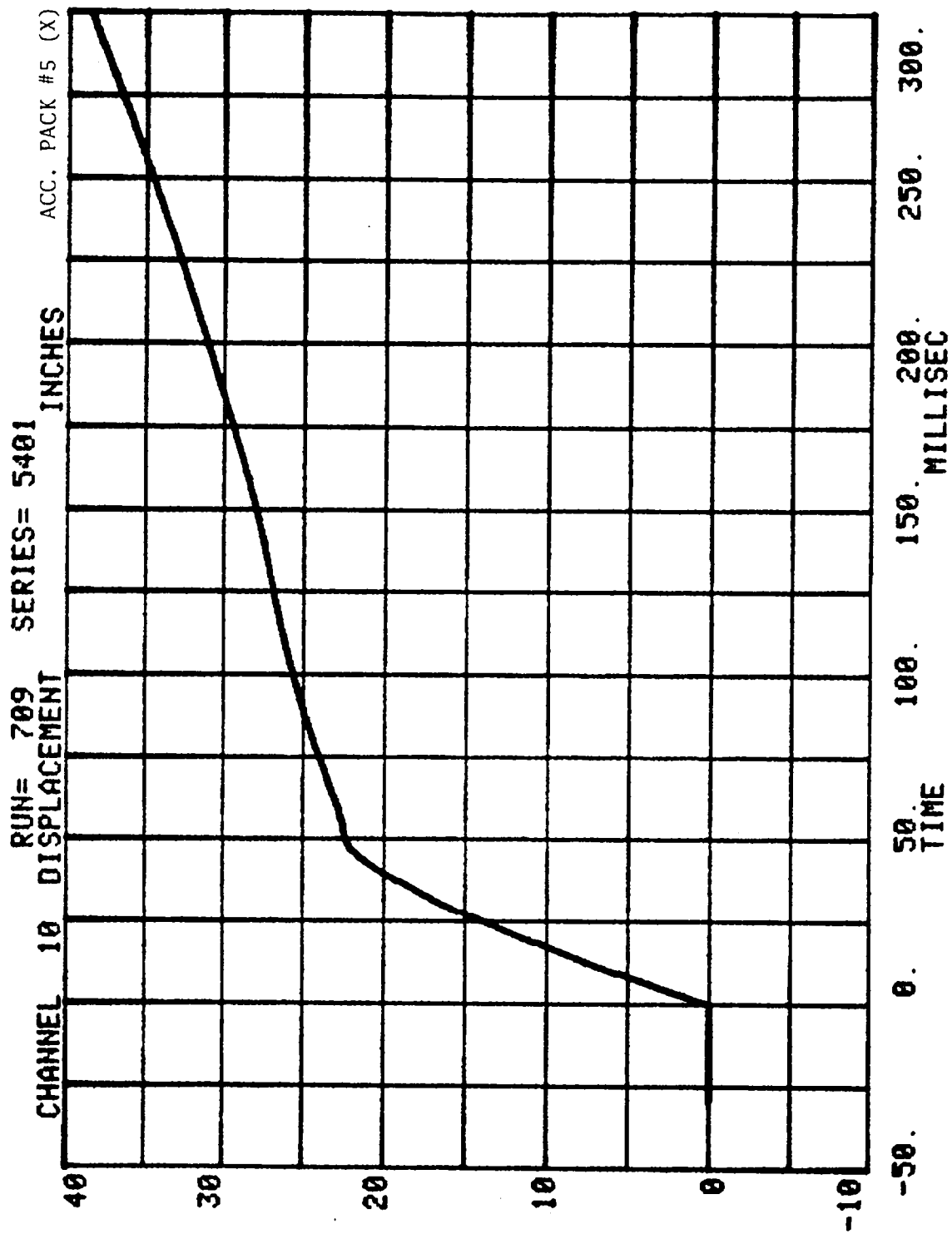




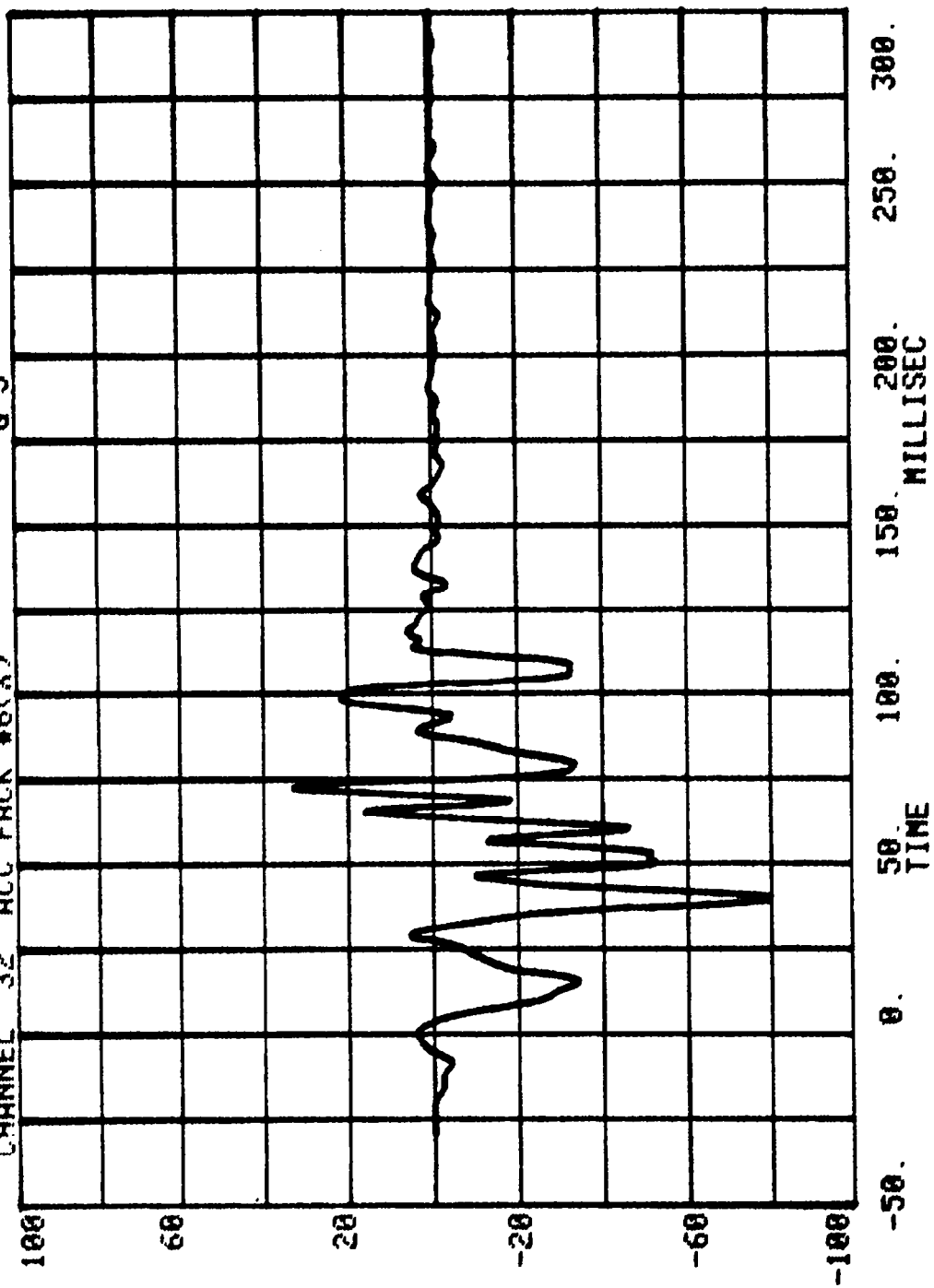
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CHANNEL 31 ACC PACK #5(X)

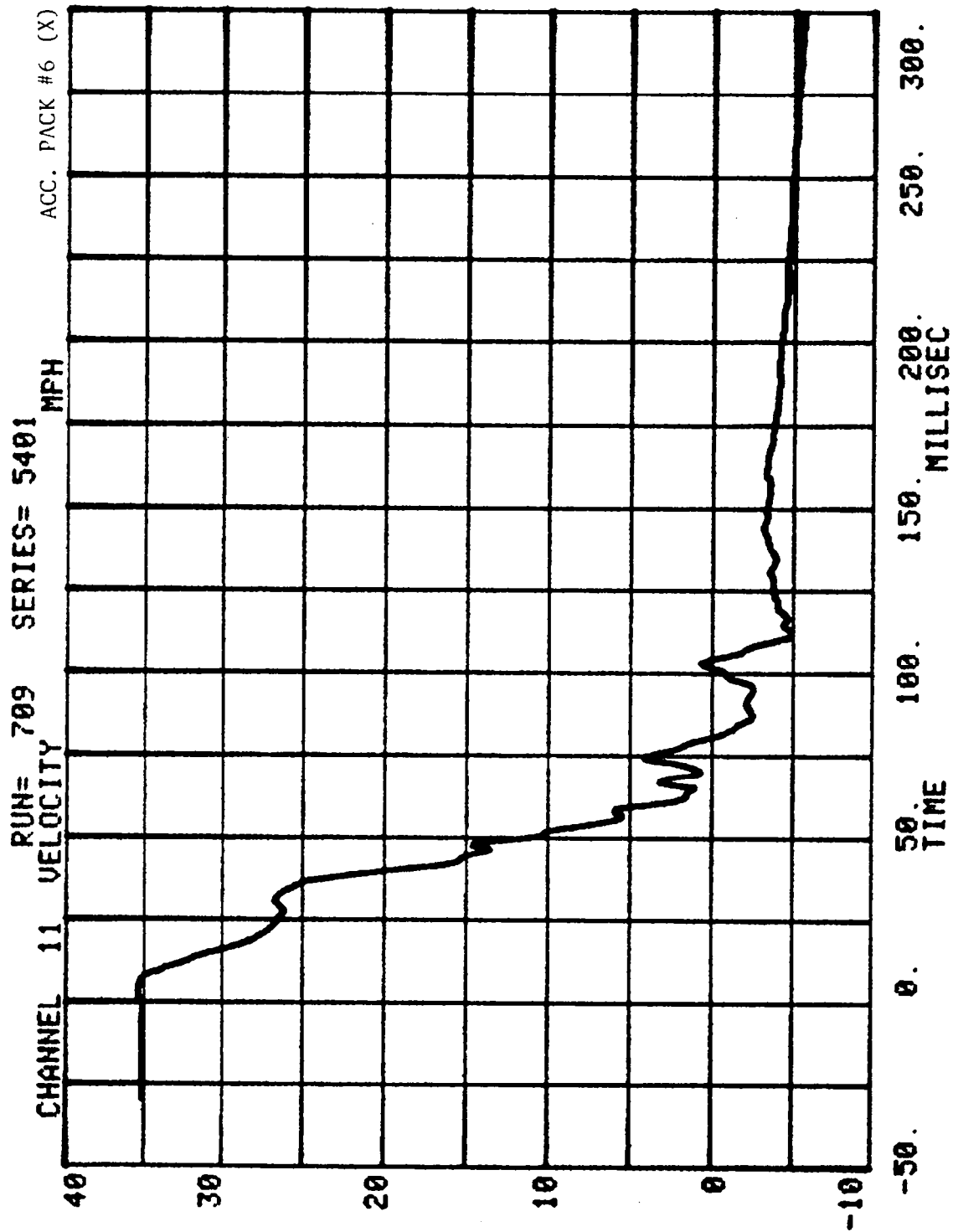


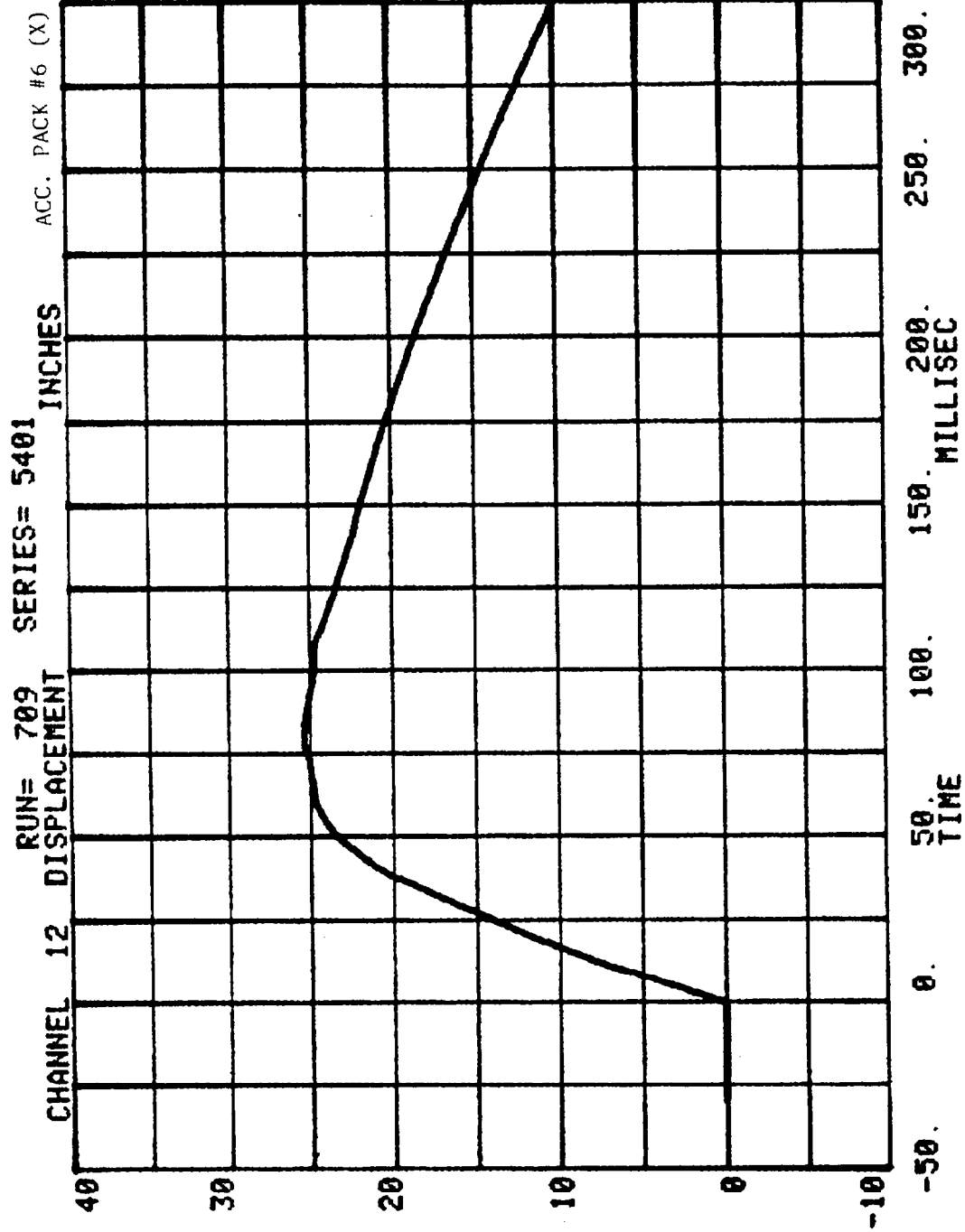




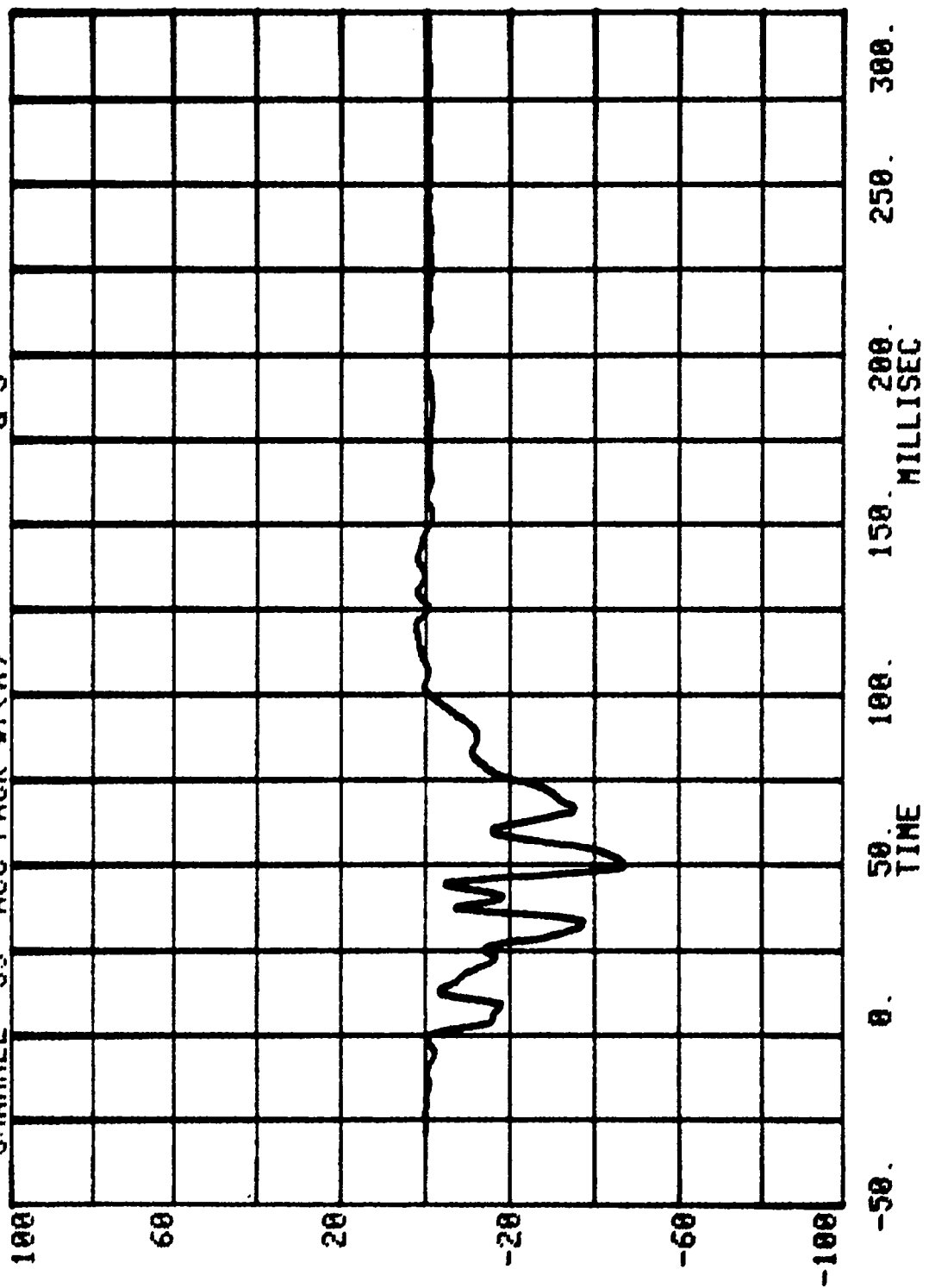
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CHANNEL 32 ACC PACK #6(X) G'S

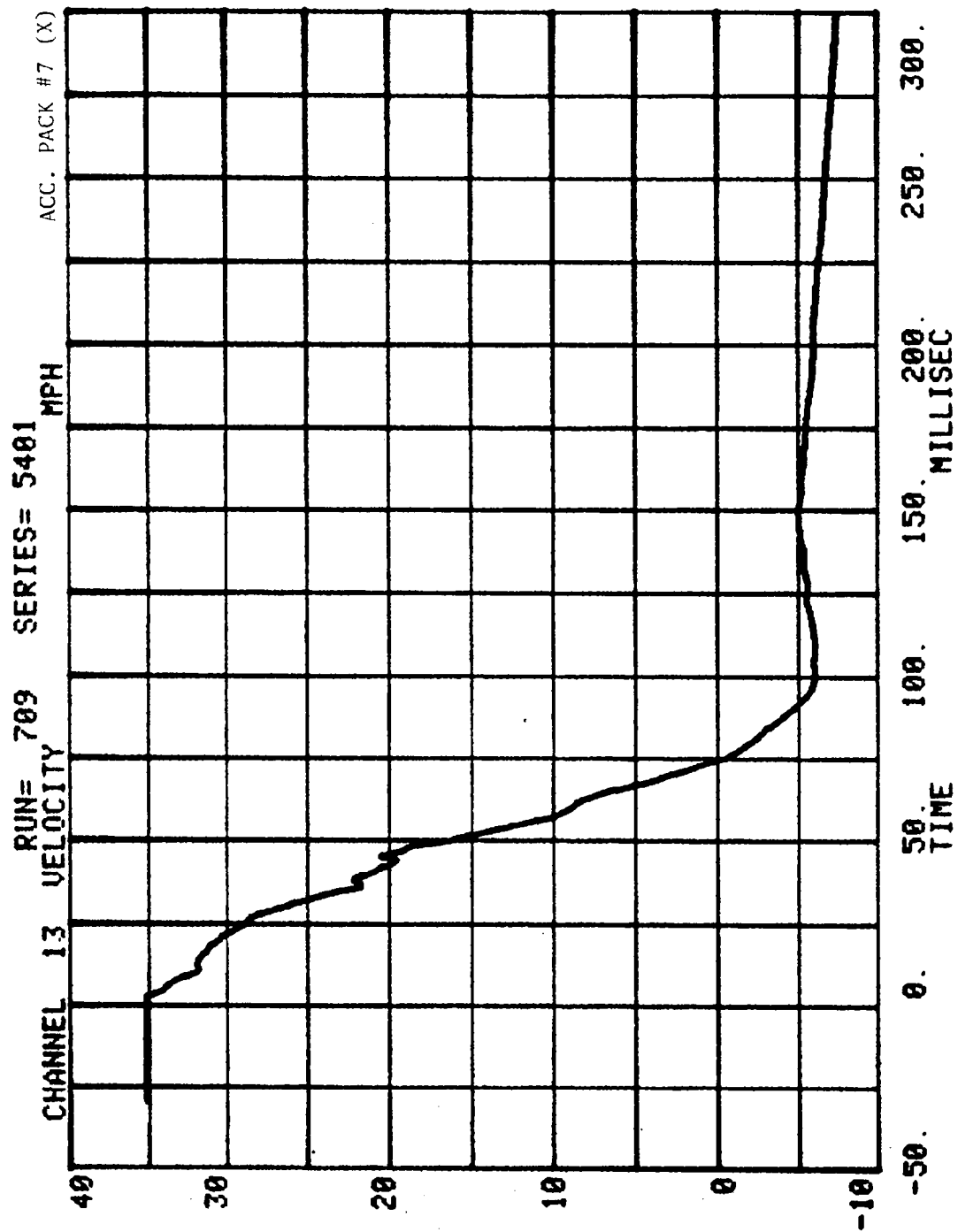


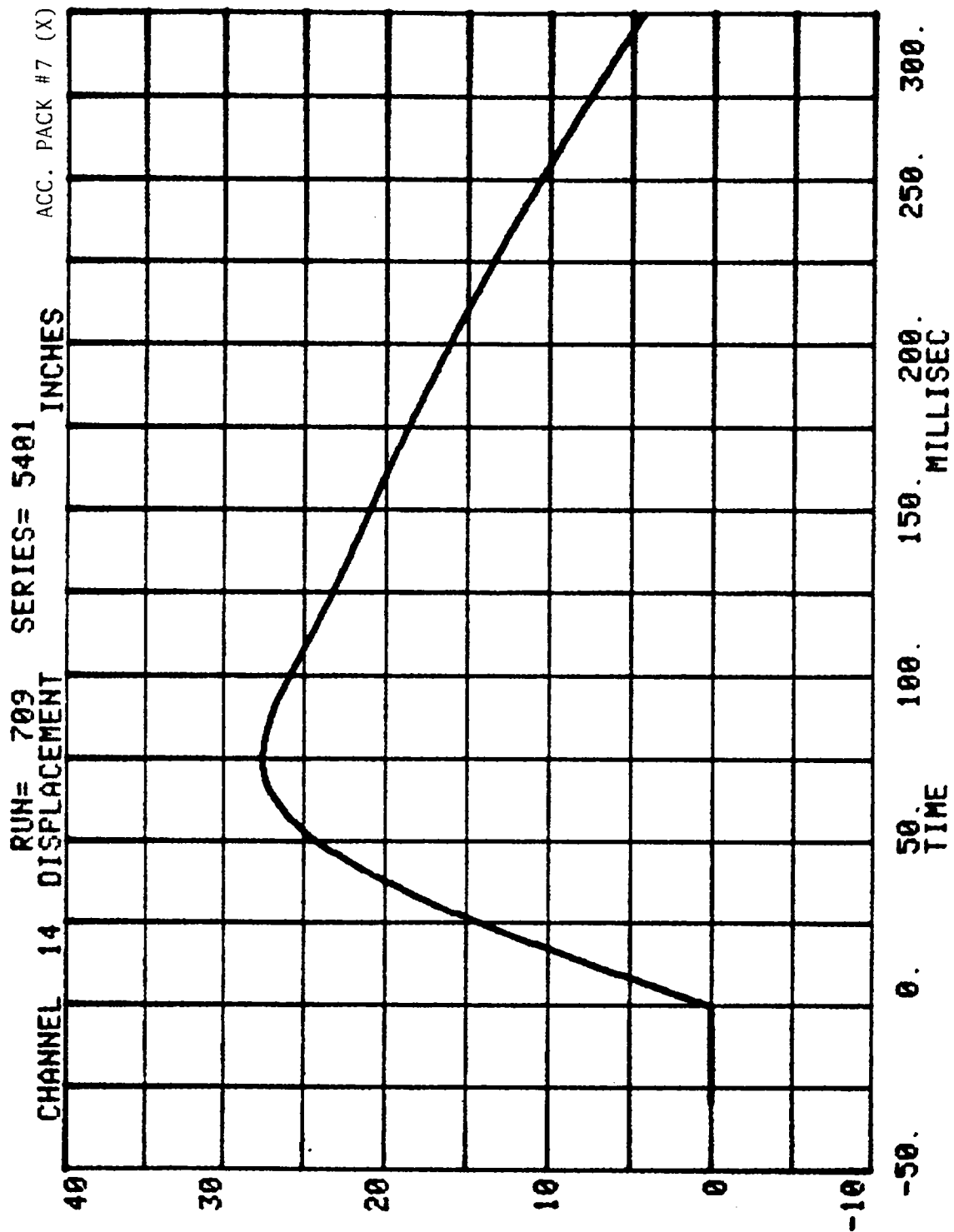




RUN= 709 SERIES= 5401
CHANNEL 33 ACC PACK #7(X) G'S







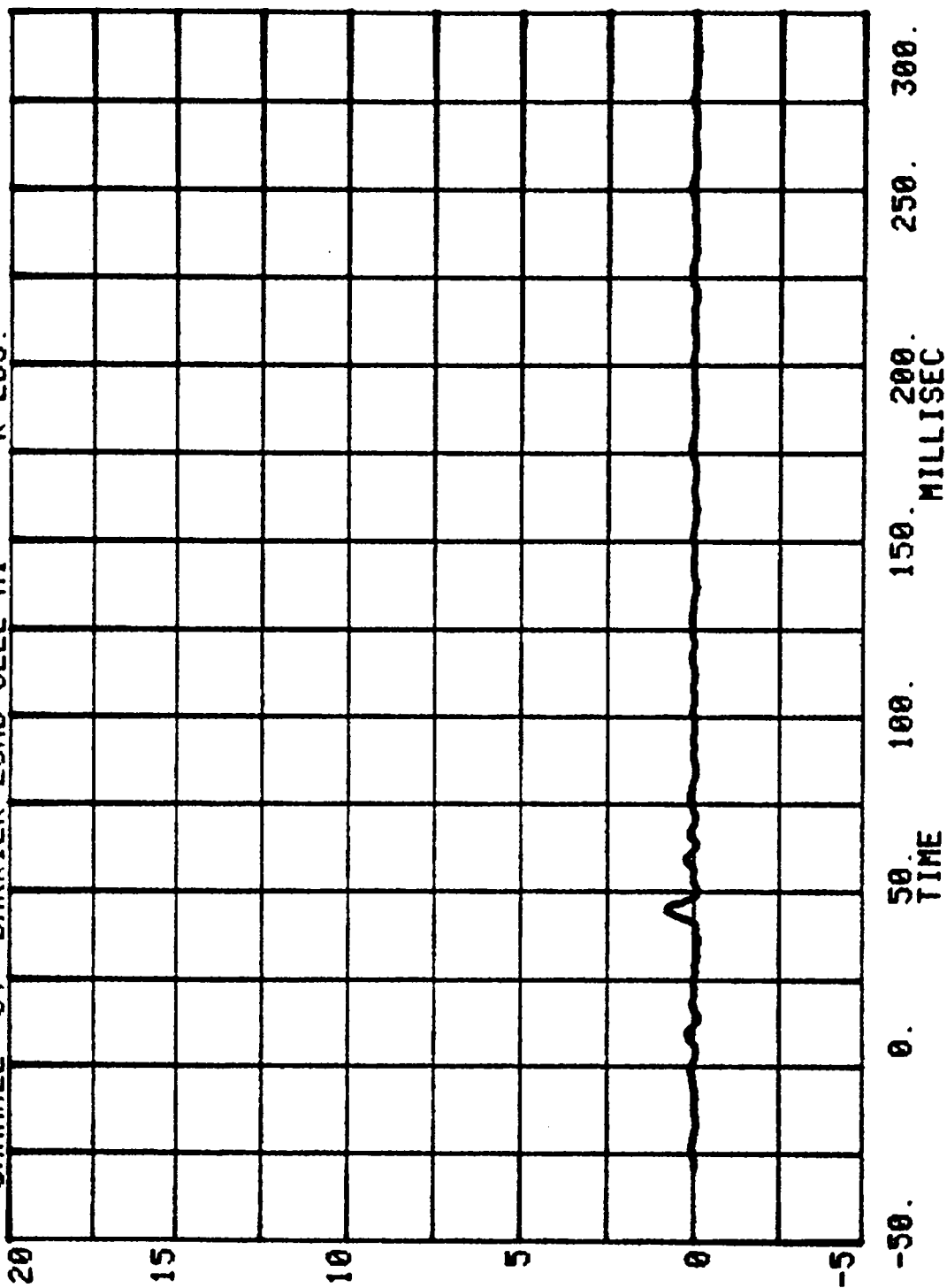
TEST NO. MG5401

LOAD CELL BARRIER DATA
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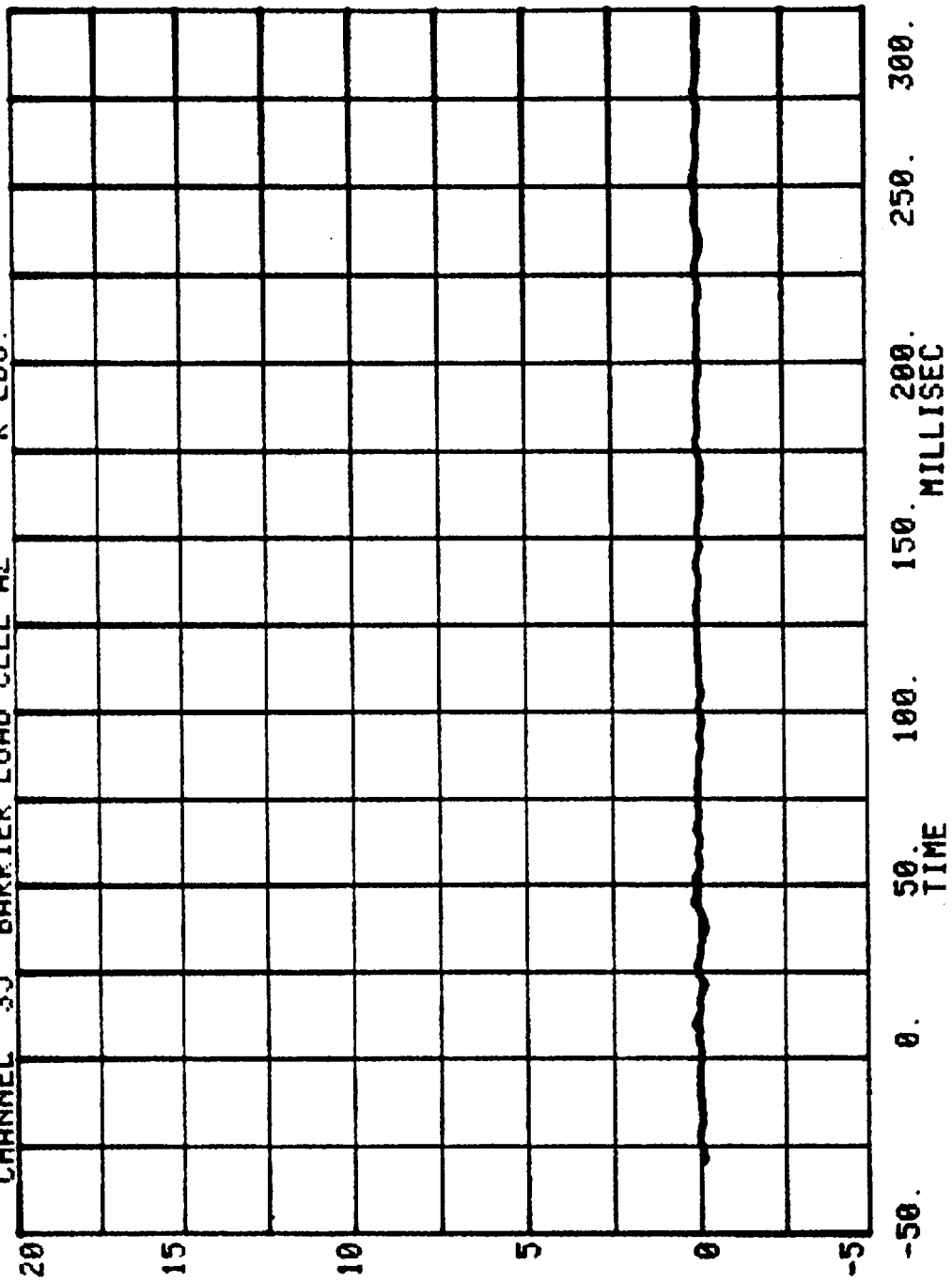
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B-24

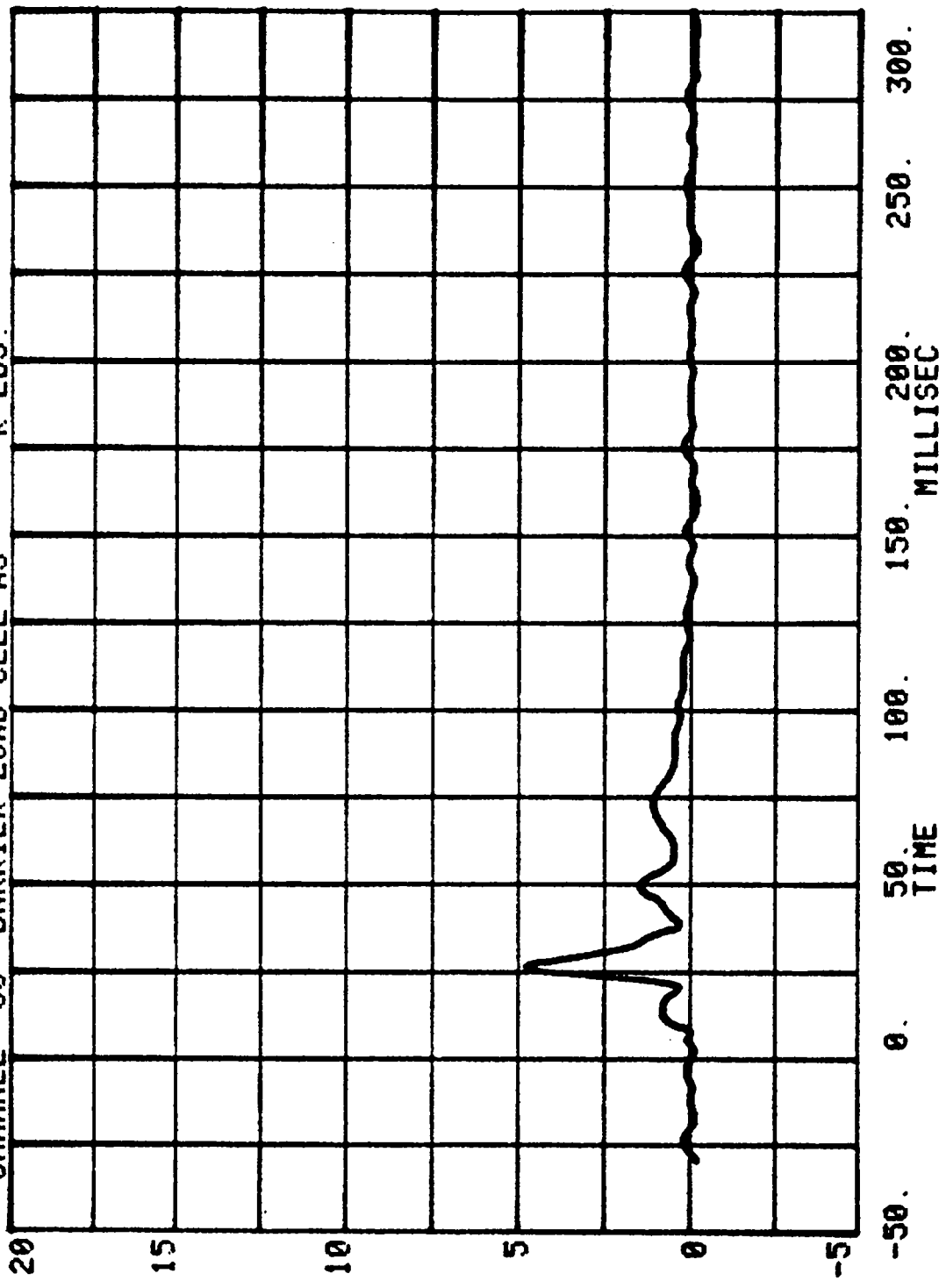
RUN= 709 SERIES= 5401
CHANNEL 34 BARRIER LOAD CELL A1 K LBS.



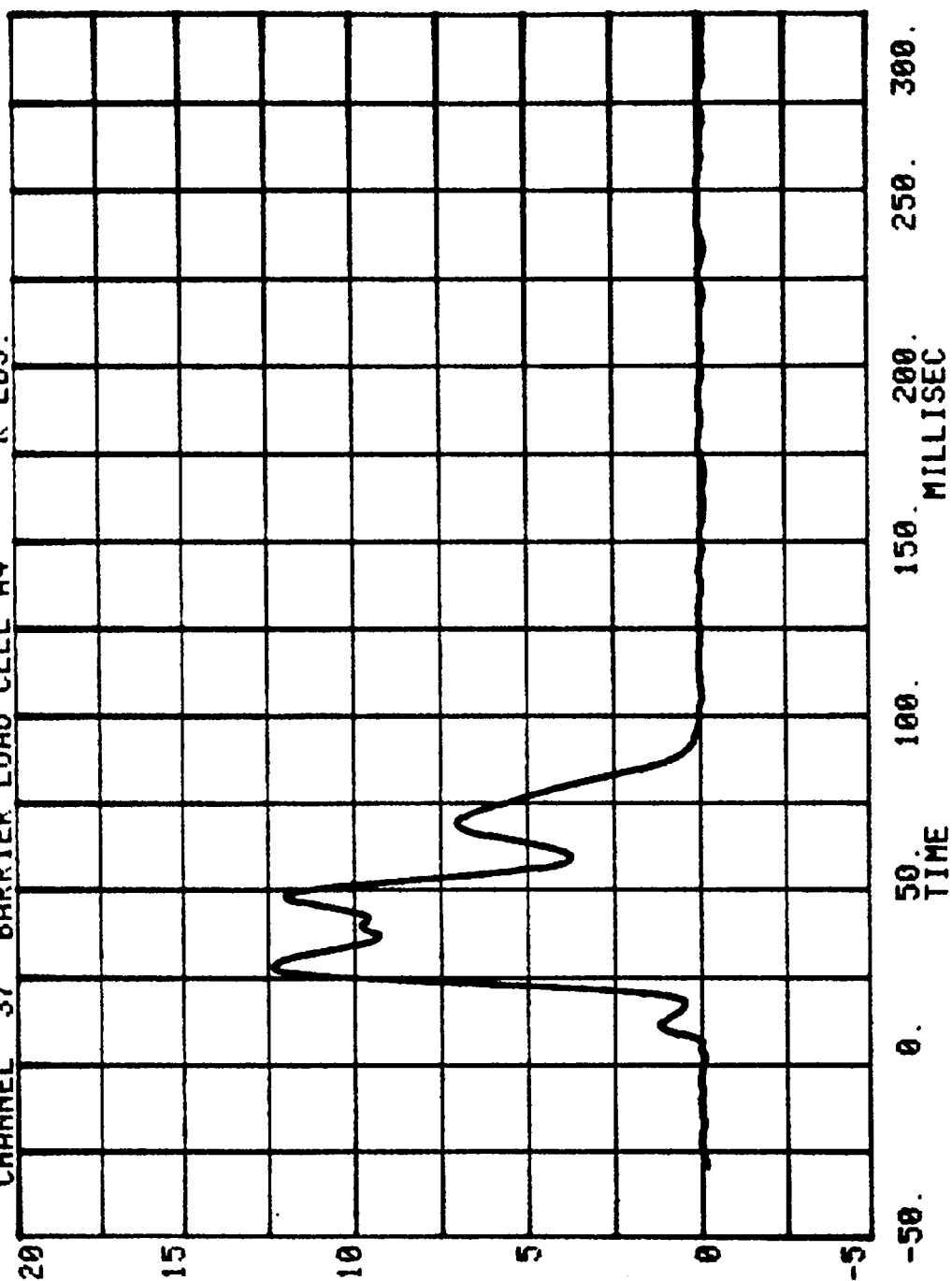
CHANNEL 35 BARRIER LOAD CELL A2 RUN= 709 SERIES= 5401 K LBS.



RUN= 709 SERIES= 5401
CHANNEL 36 BARRIER LOAD CELL A3 K LBS.

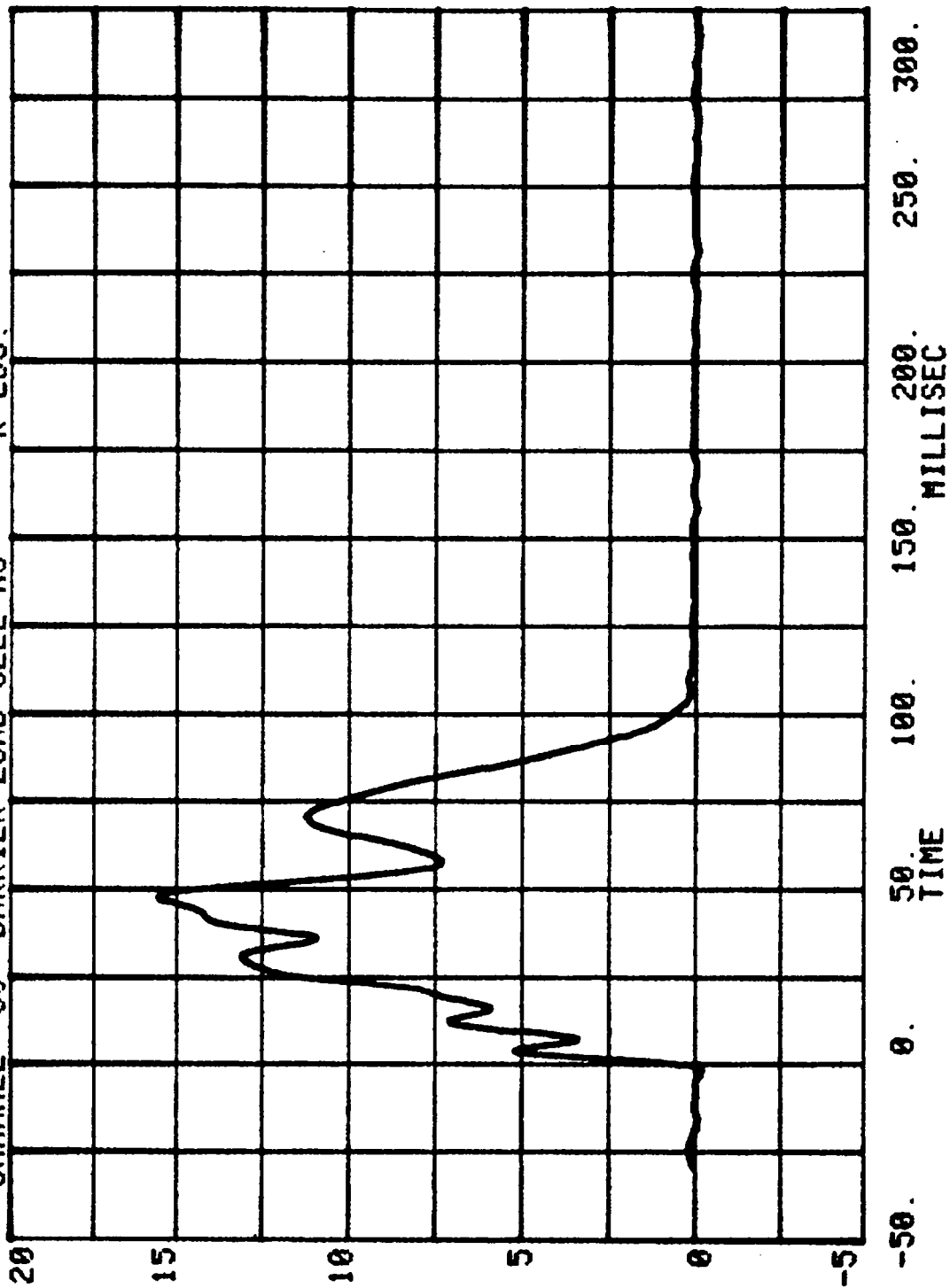


CHANNEL 37 BARRIER LOAD CELL A4
RUN= 709 SERIES= 5401 K LBS.



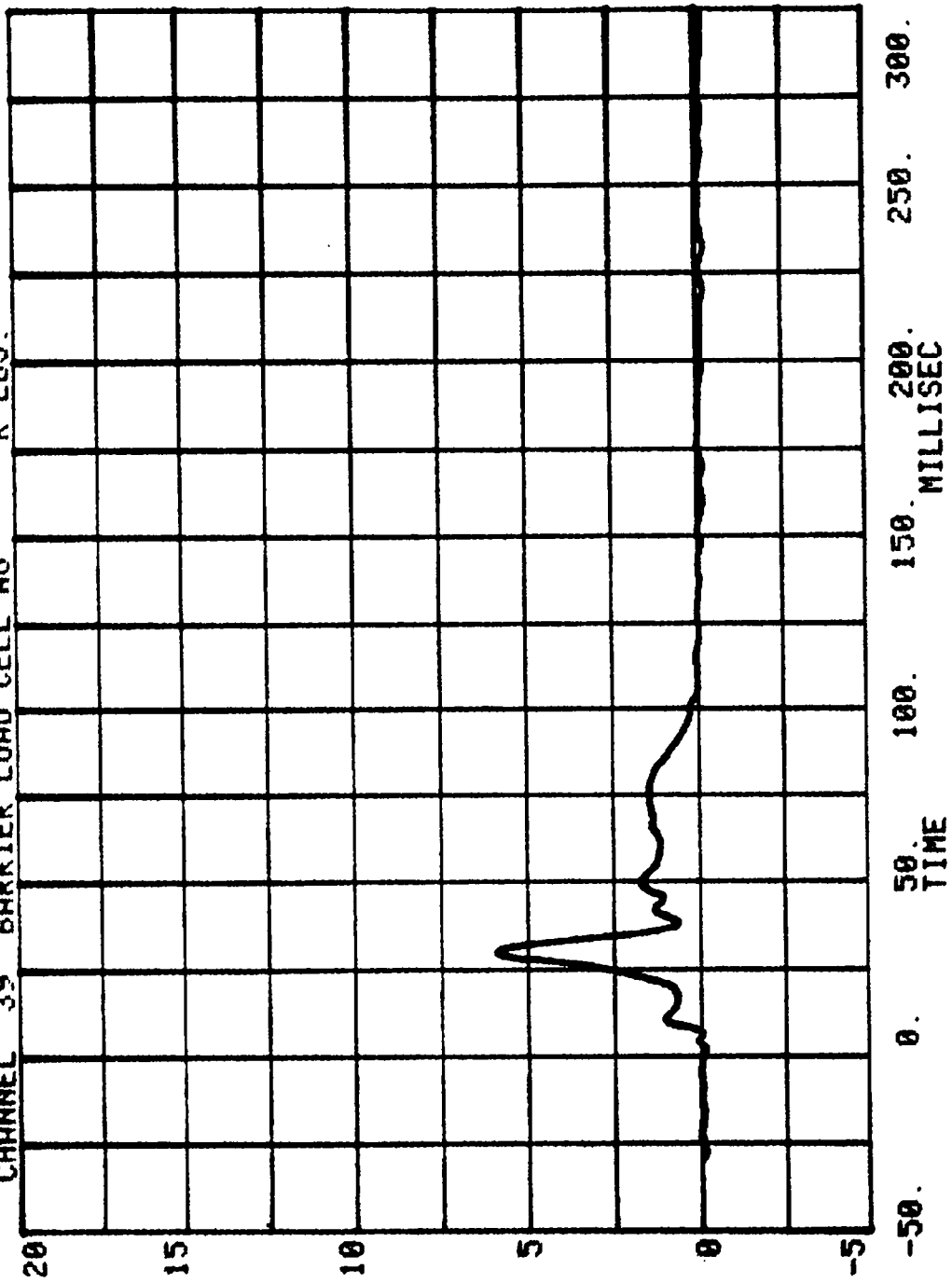
CHANNEL 38 BARRIER LOAD CELL A5 K LBS.

RUN= 709 SERIES= 5401

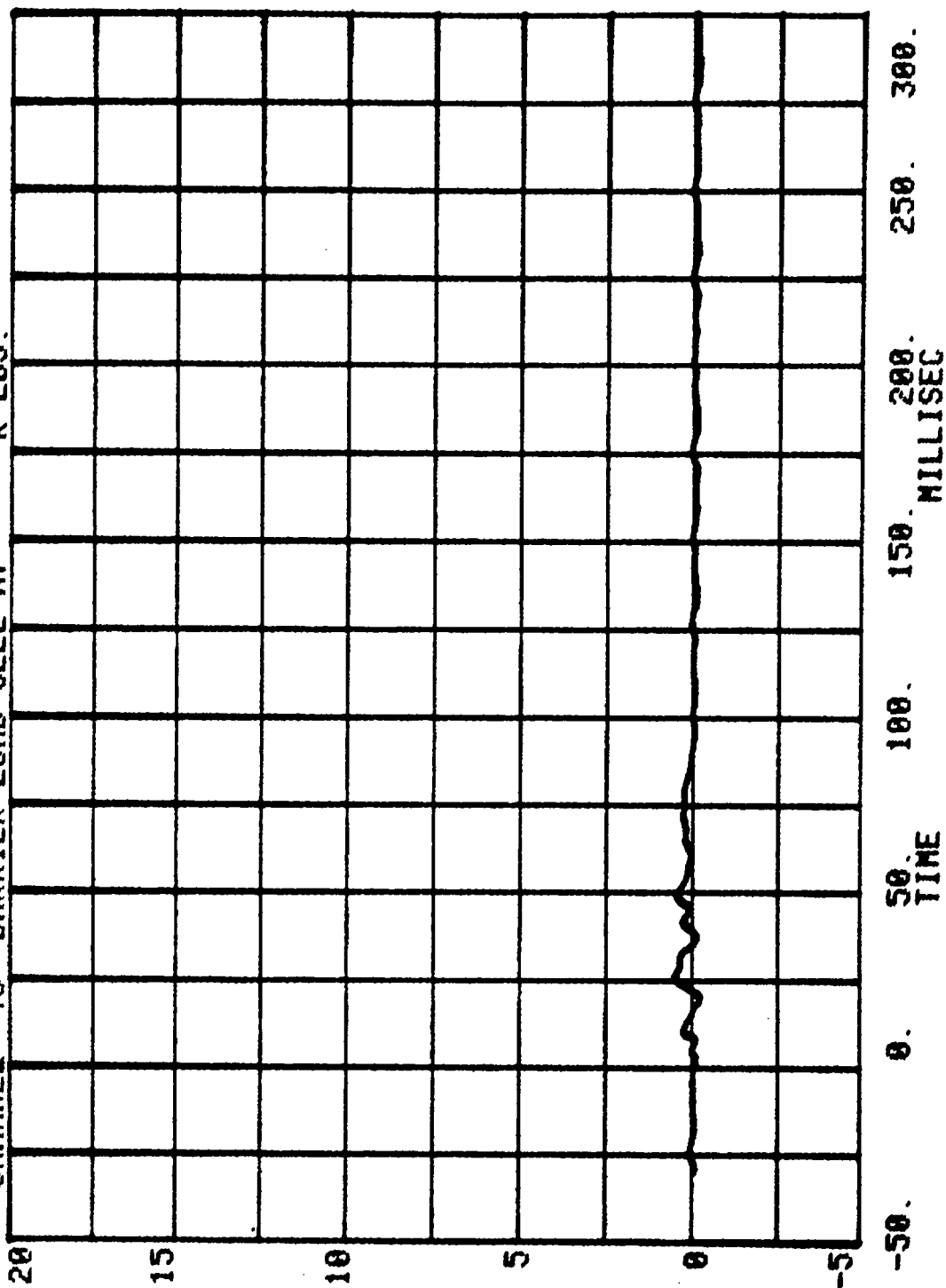


CHANNEL 39 BARRIER LOAD CELL A6 K LBS.

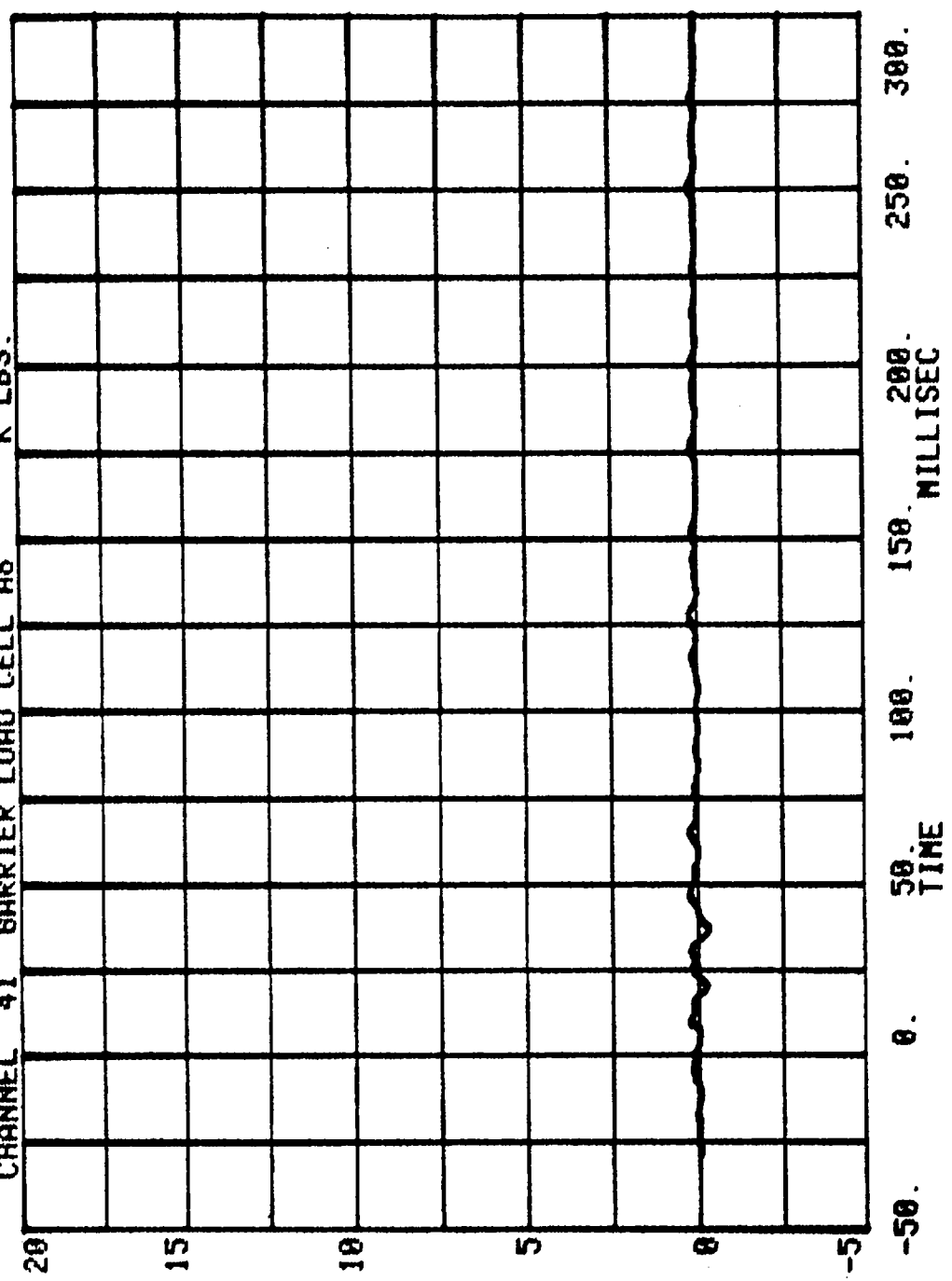
RUN= 709 SERIES= 5401



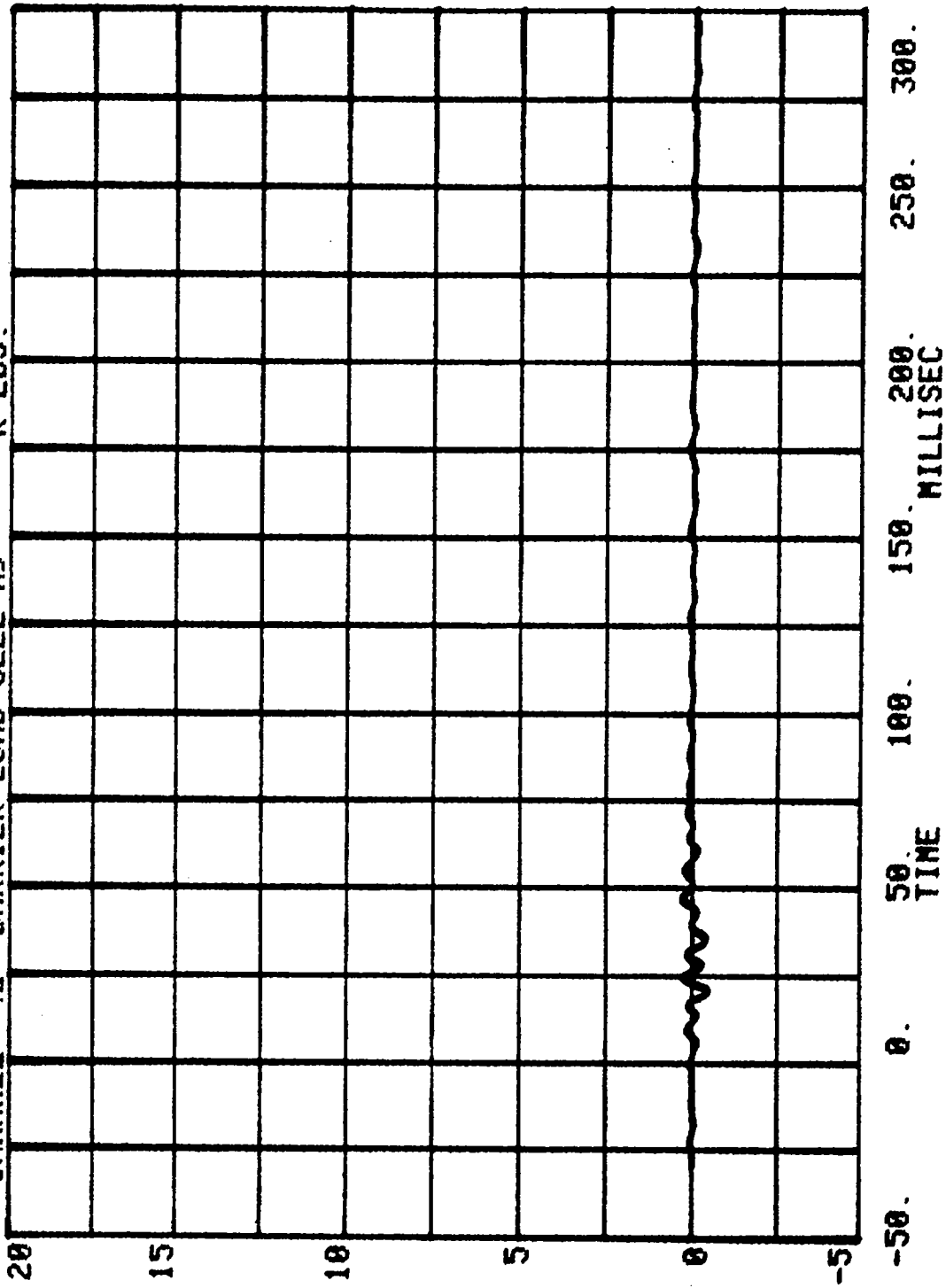
RUN= 709 SERIES= 5401
CHANNEL 40 BARRIER LOAD CELL A7 K LBS.



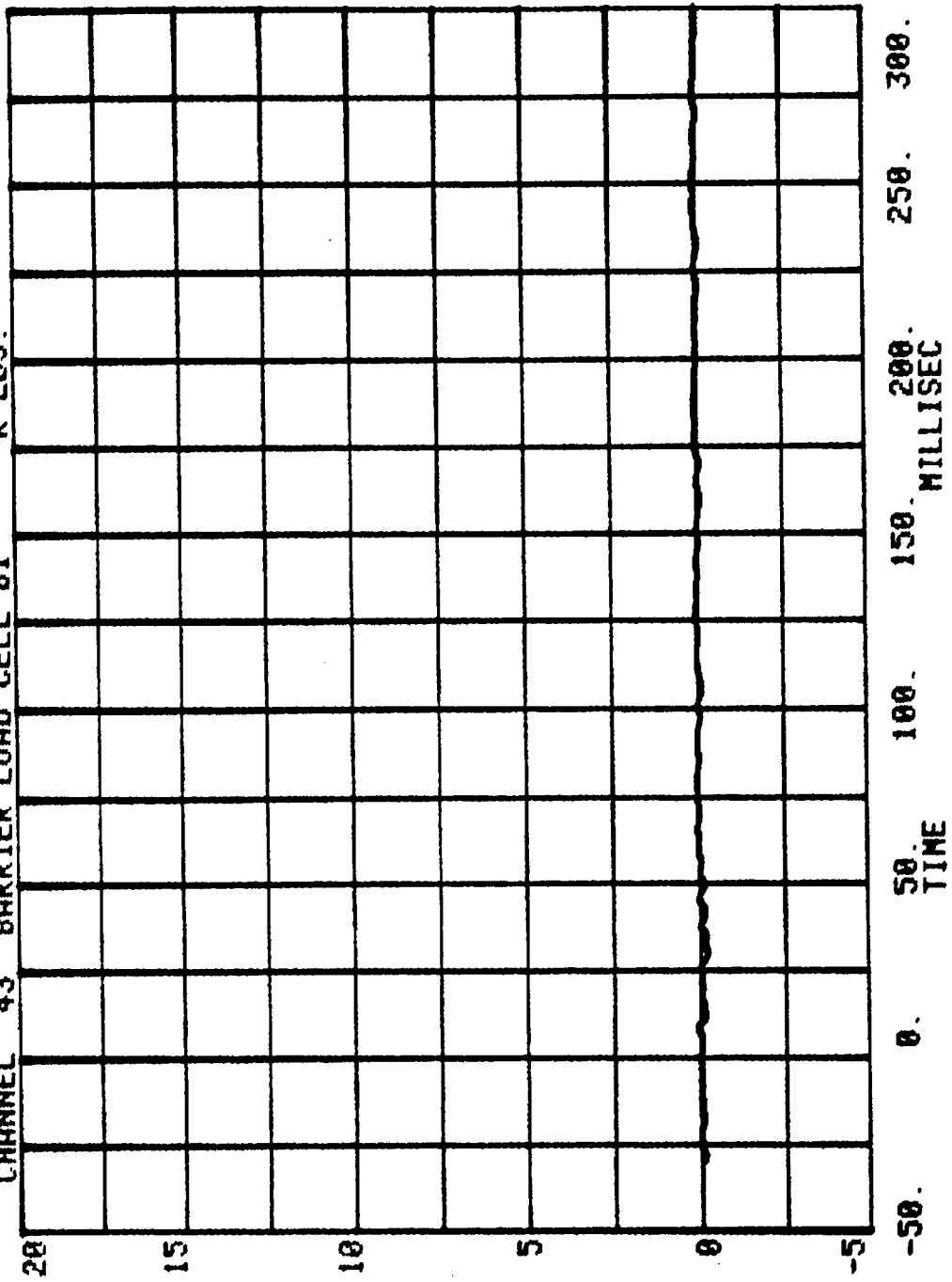
CHANNEL 41 BARRIER LOAD CELL A8 RUN= 789 SERIES= 5401 K LBS.



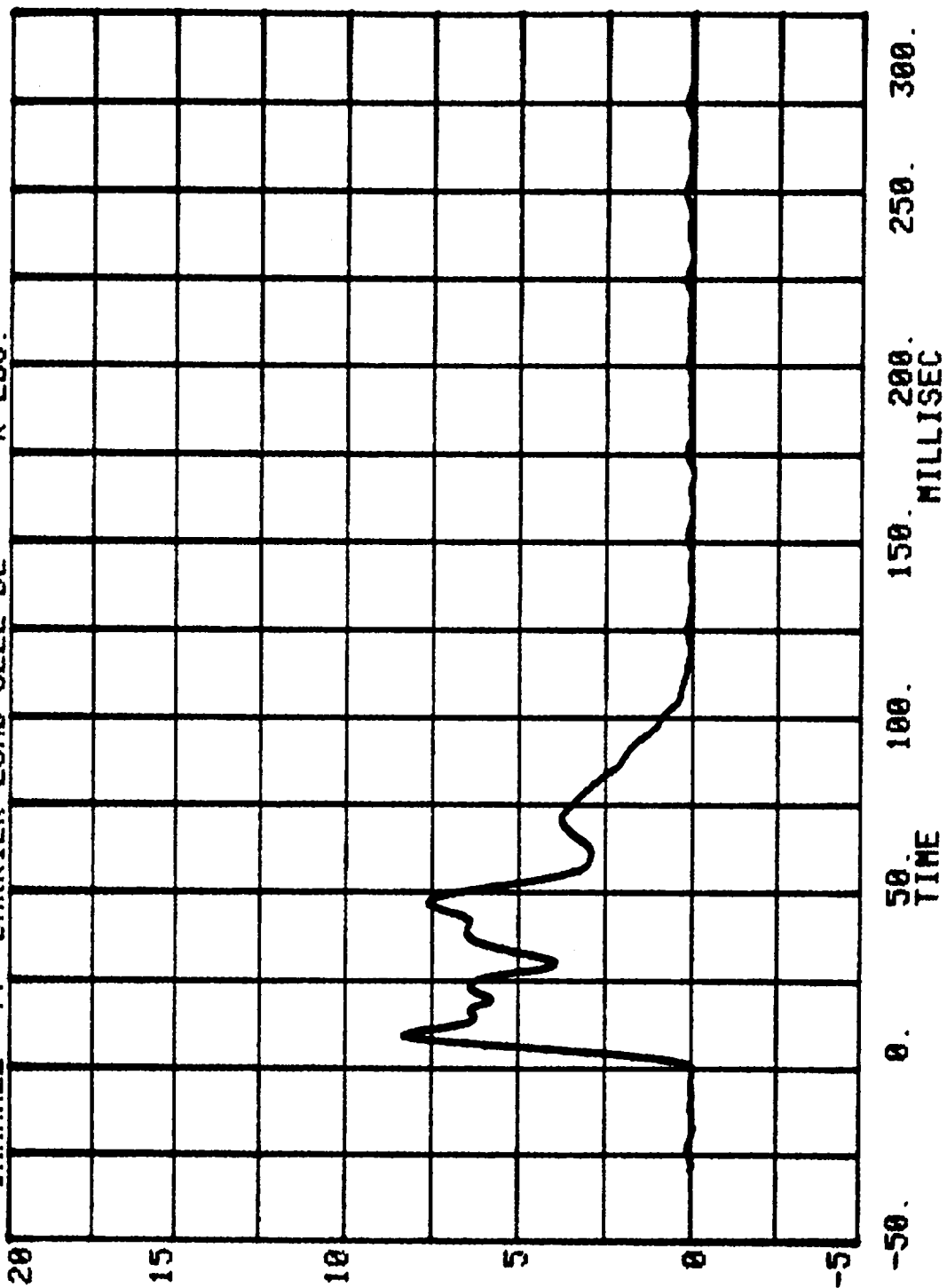
RUN= 709 SERIES= 5401
CHANNEL 42 BARRIER LOAD CELL A9 K LBS.



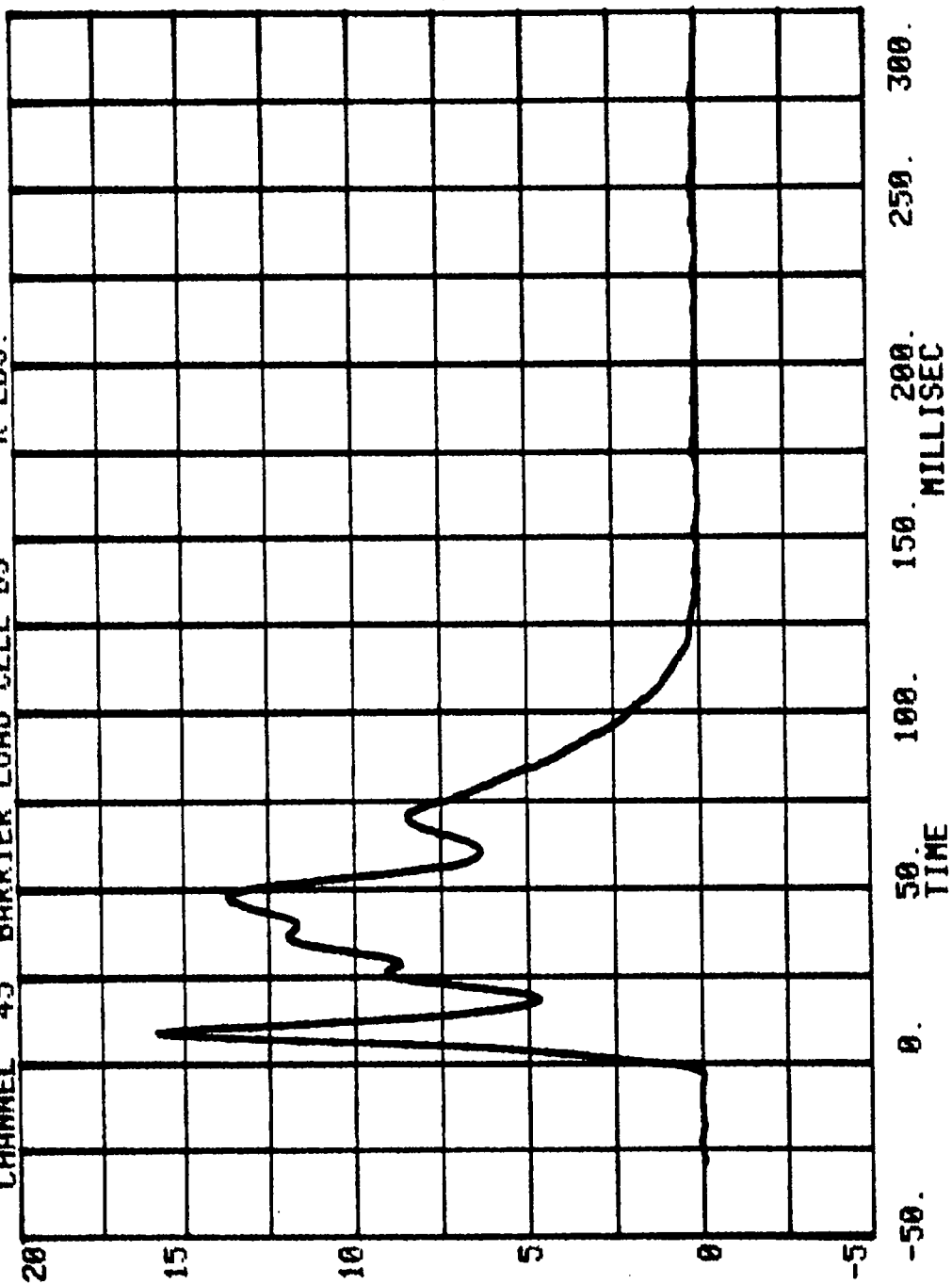
RUN= 789 SERIES= 5401
CHANNEL 43 BARRIER LOAD CELL B1 K LBS.



RUN= 789 SERIES= 5401
CHANNEL 44 BARRIER LOAD CELL B2 K LBS.

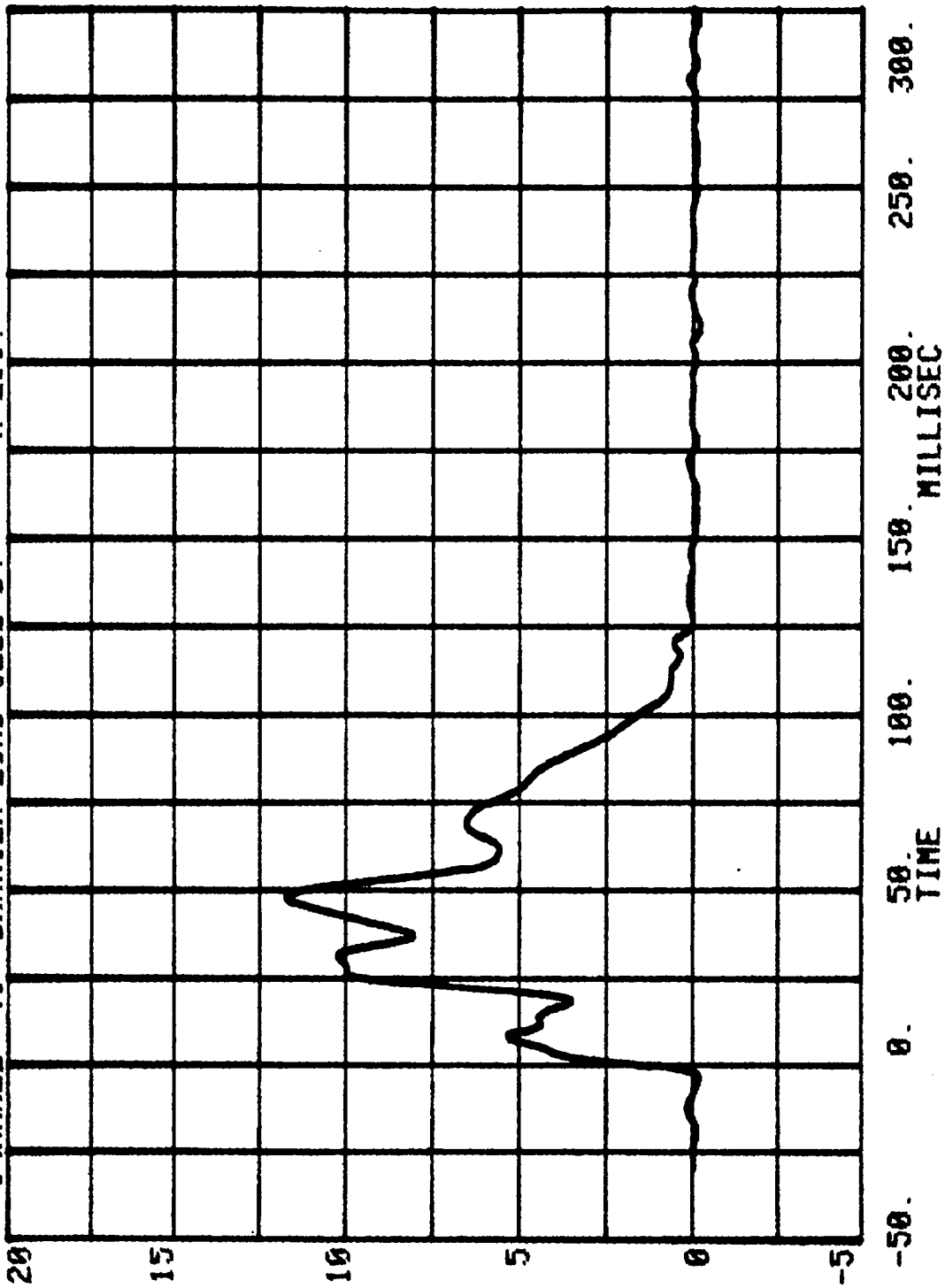


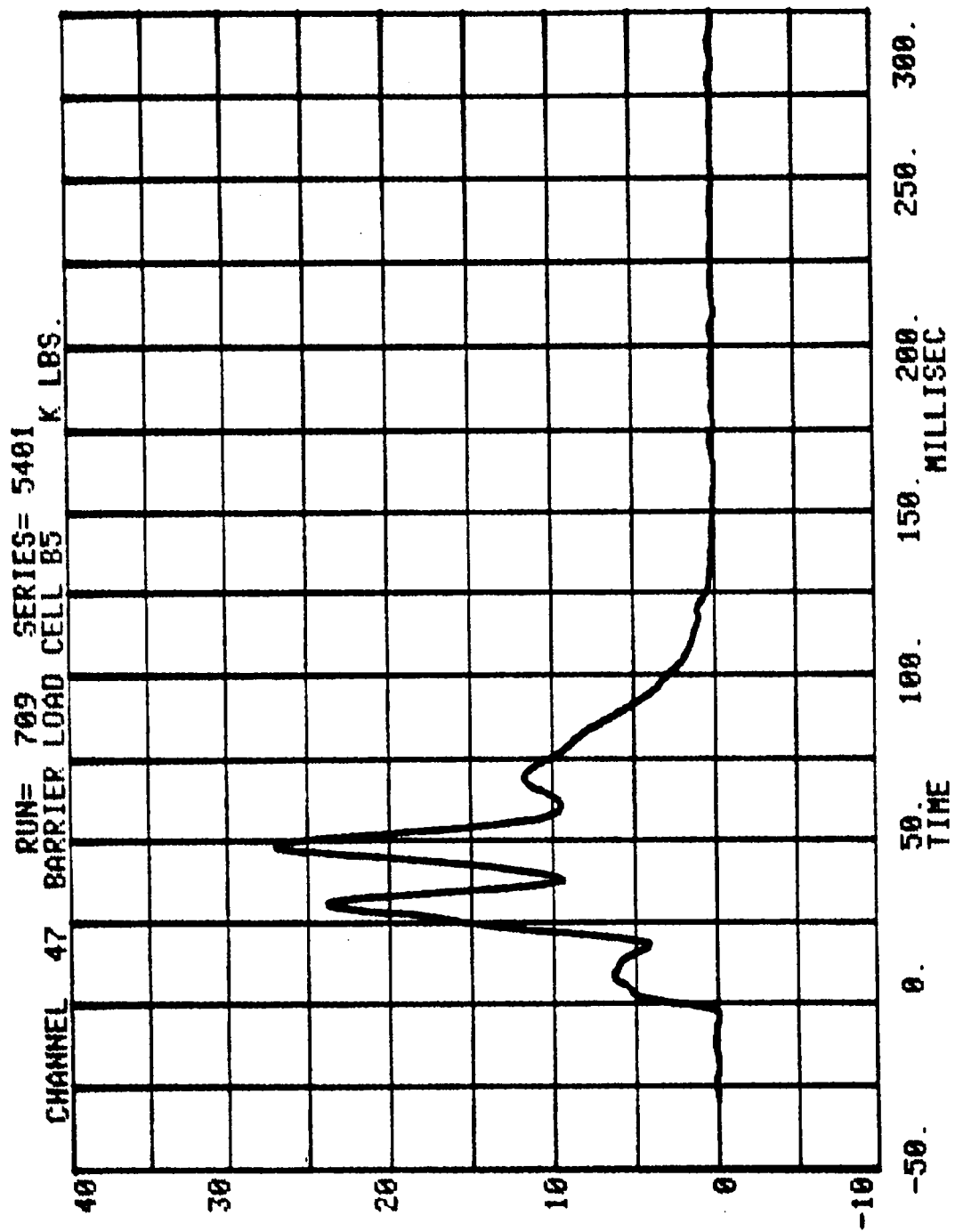
CHANNEL 45 BARRIER LOAD CELL B3 RUN= 709 SERIES= 5401 K LBS.



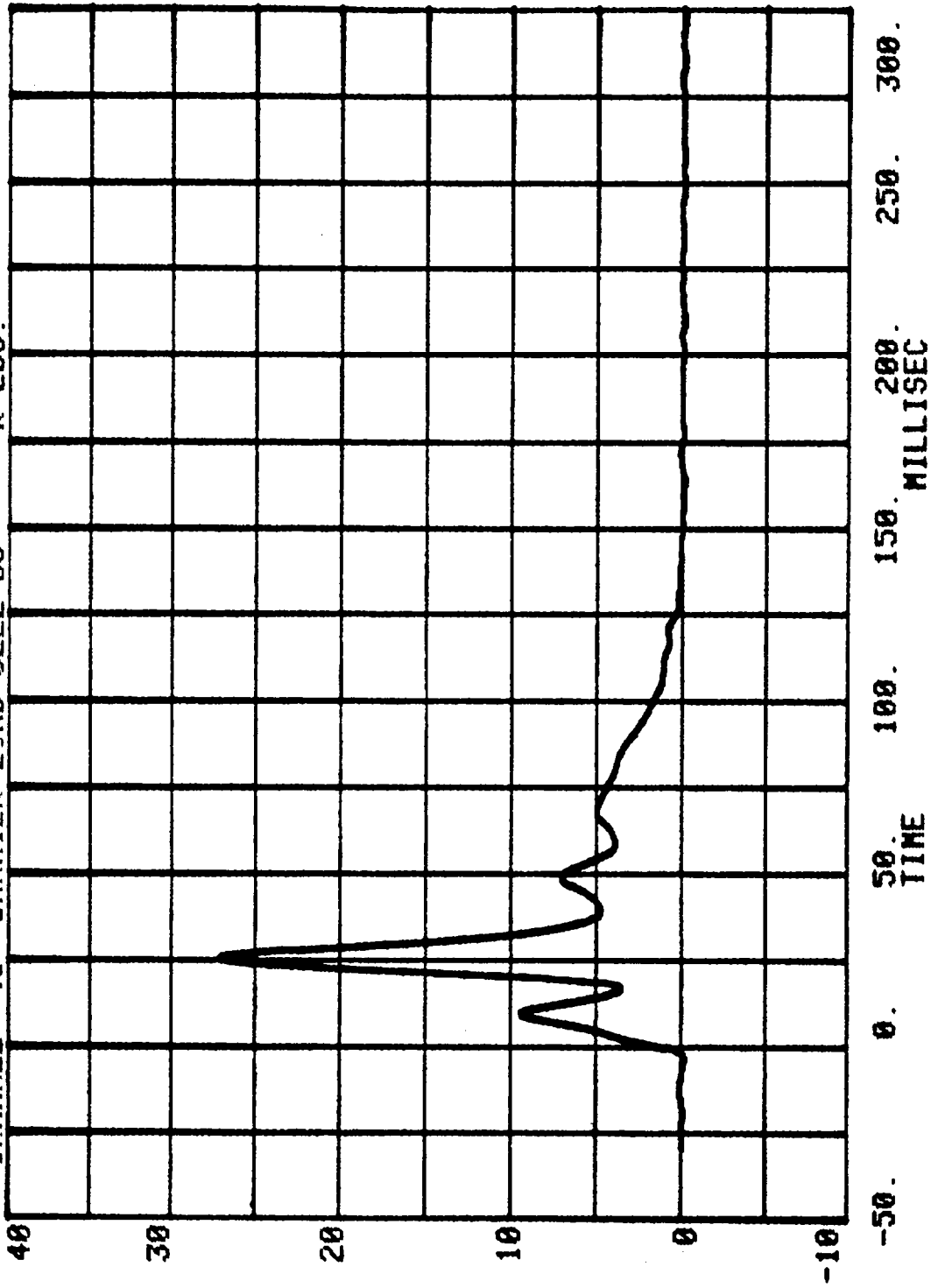
CHANNEL 46 BARRIER LOAD CELL B4 K LBS.

RUN= 709 SERIES= 5401

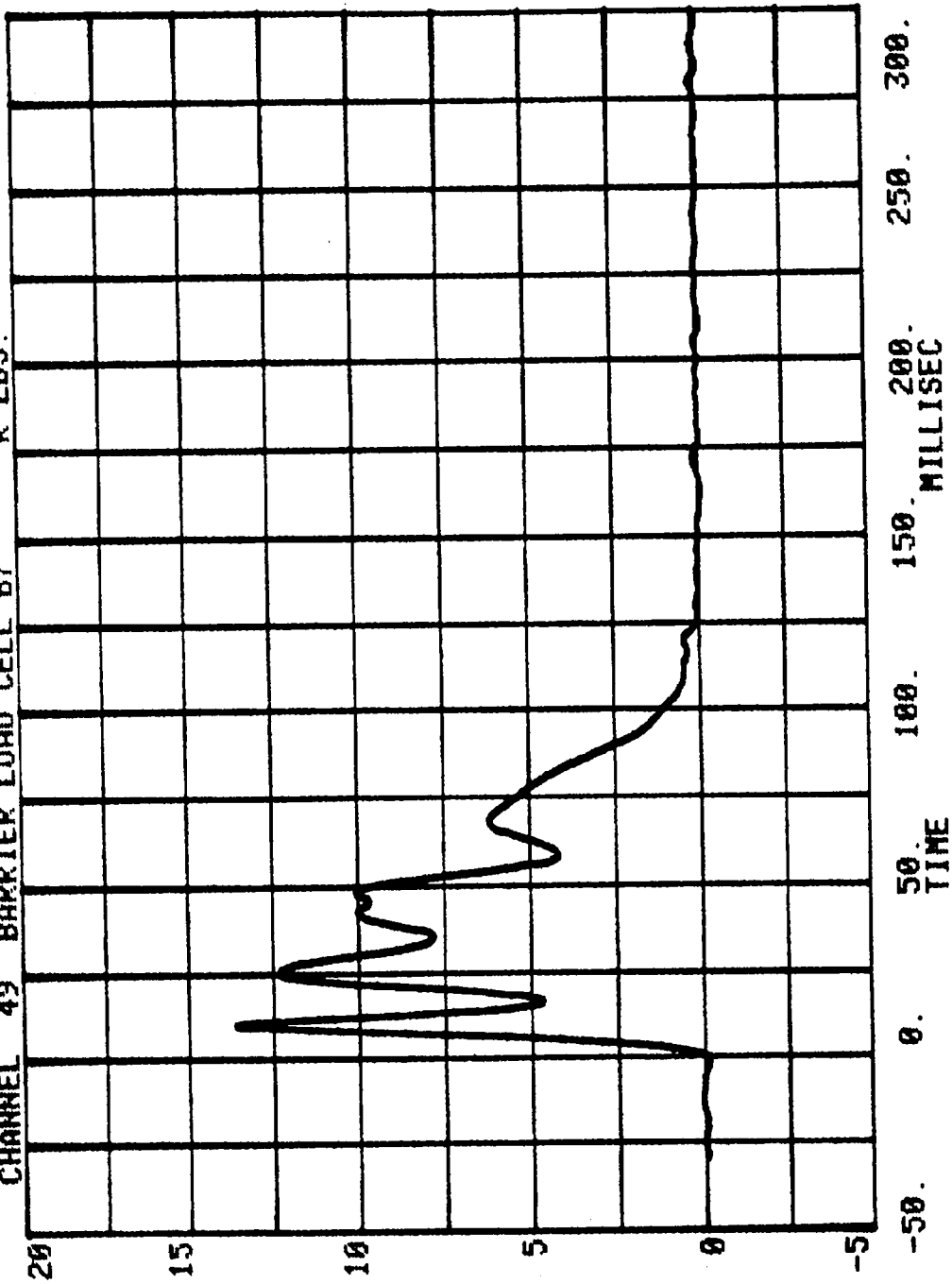




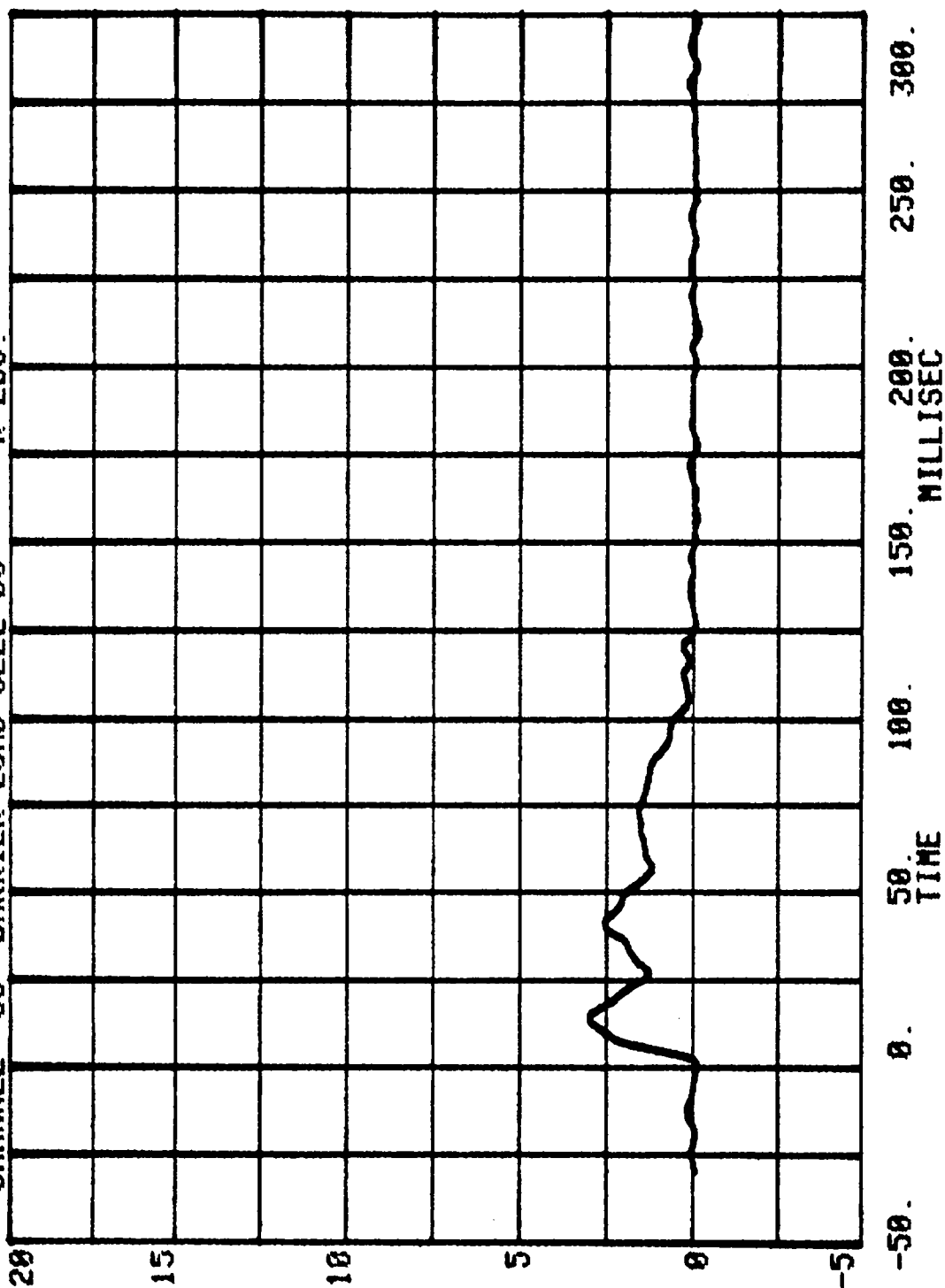
CHANNEL 48 BARRIER LOAD CELL B6 RUI= 709 SERIES= 5401 K LBS.



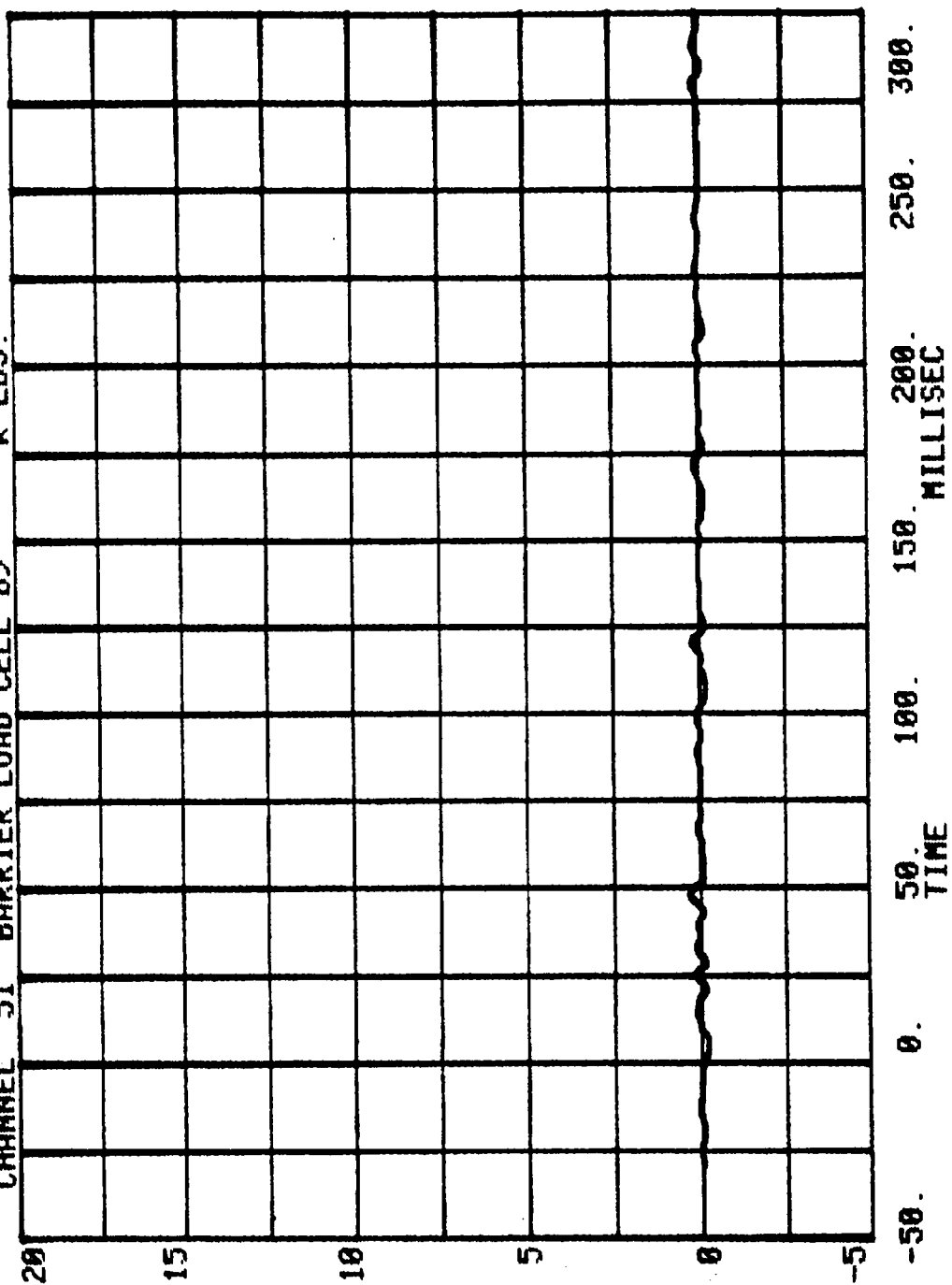
CHANNEL 49 BARRIER LOAD CELL B7 RUN= 709 SERIES= 5401 K LBS.



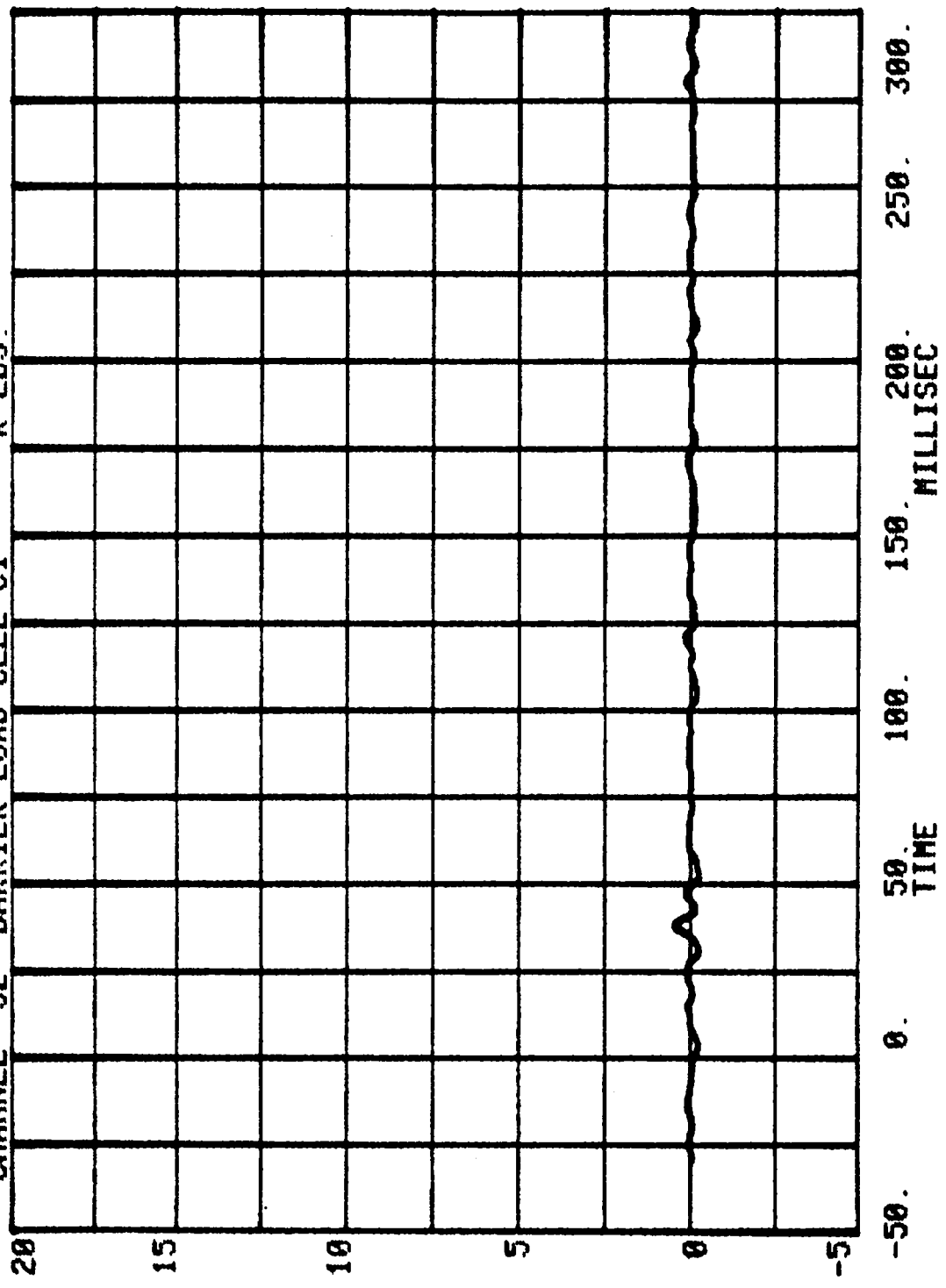
RUN= 709 SERIES= 5401
CHANNEL 50 BARRIER LOAD CELL B8 K LBS.



CHANNEL 51 BARRIER LOAD CELL B9
RUN= 709 SERIES= 5401 K LBS.

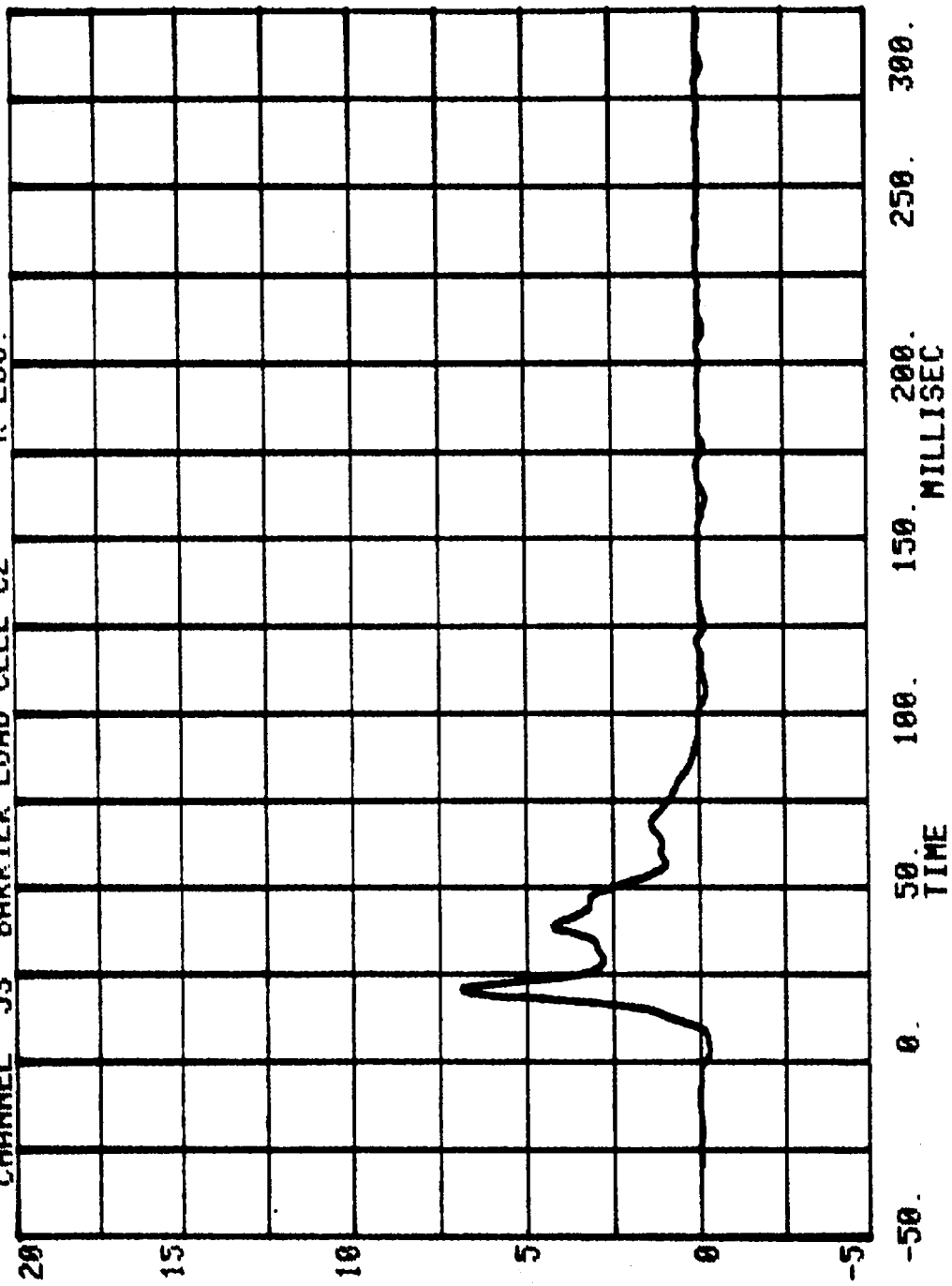


RUN= 709 SERIES= 5401
CHANNEL 52 BARRIER LOAD CELL C1 K LBS.

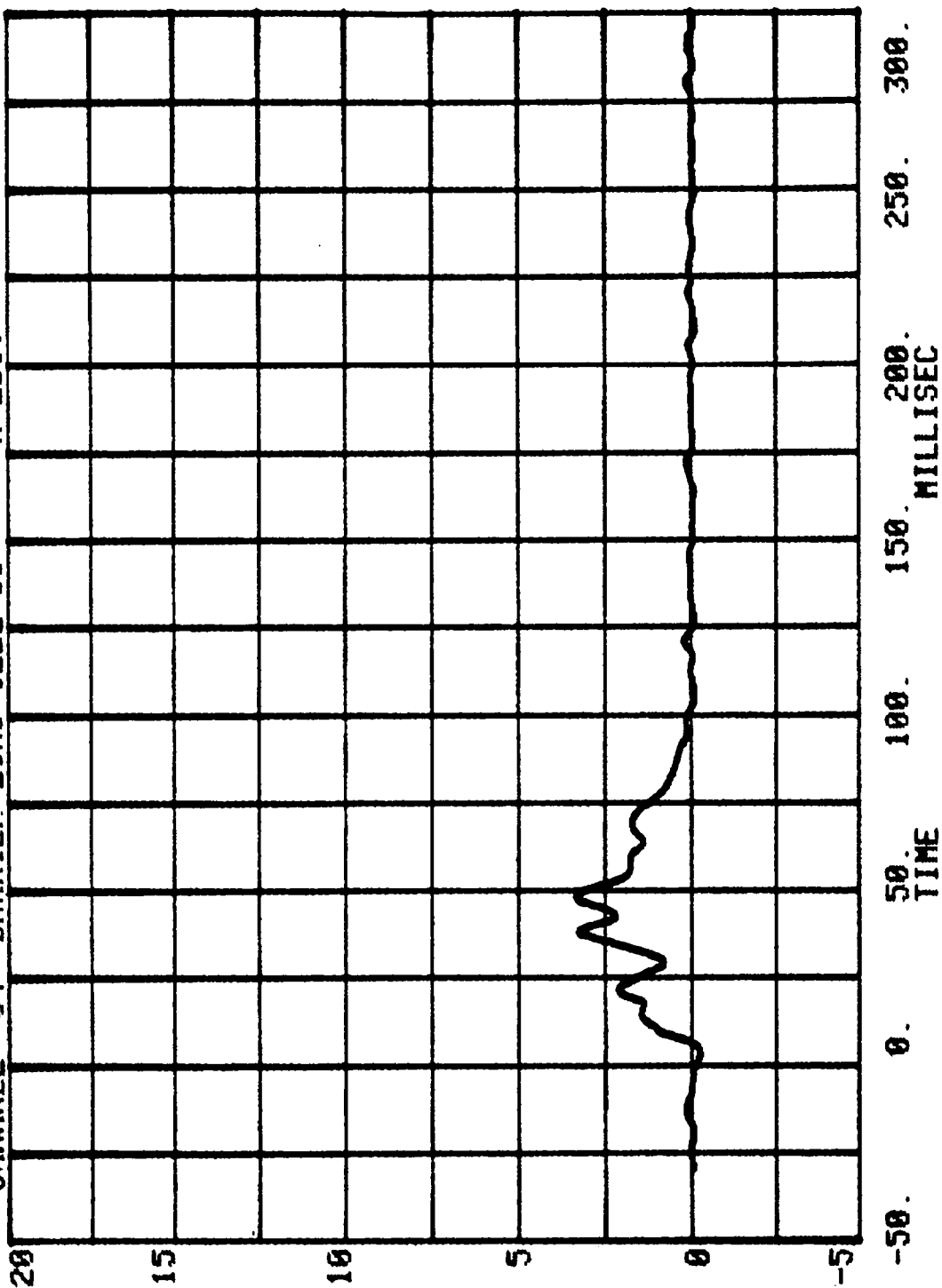


CHANNEL 53 BARRIER LOAD CELL C2 K LBS.

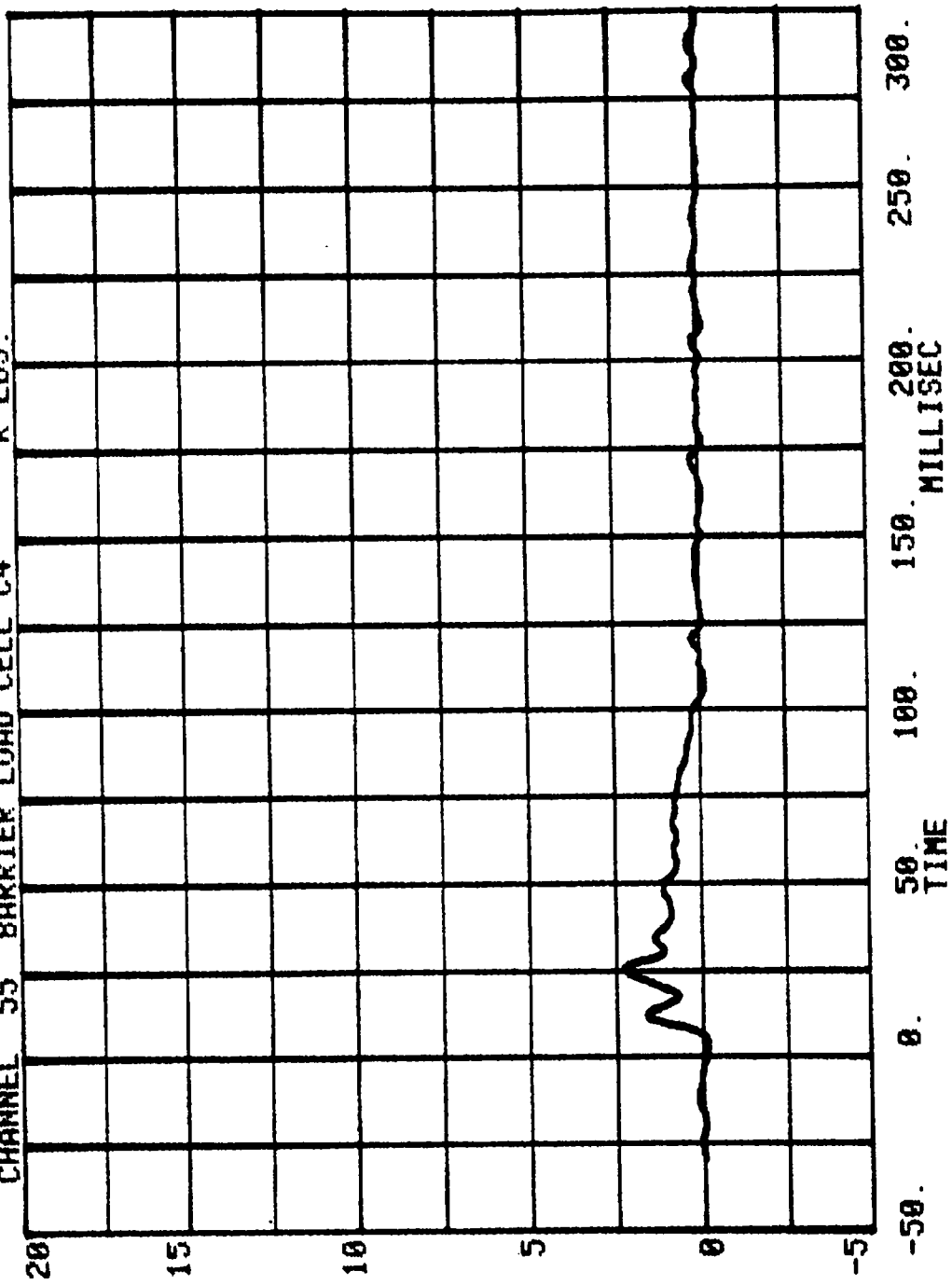
RUN= 709 SERIES= 5401



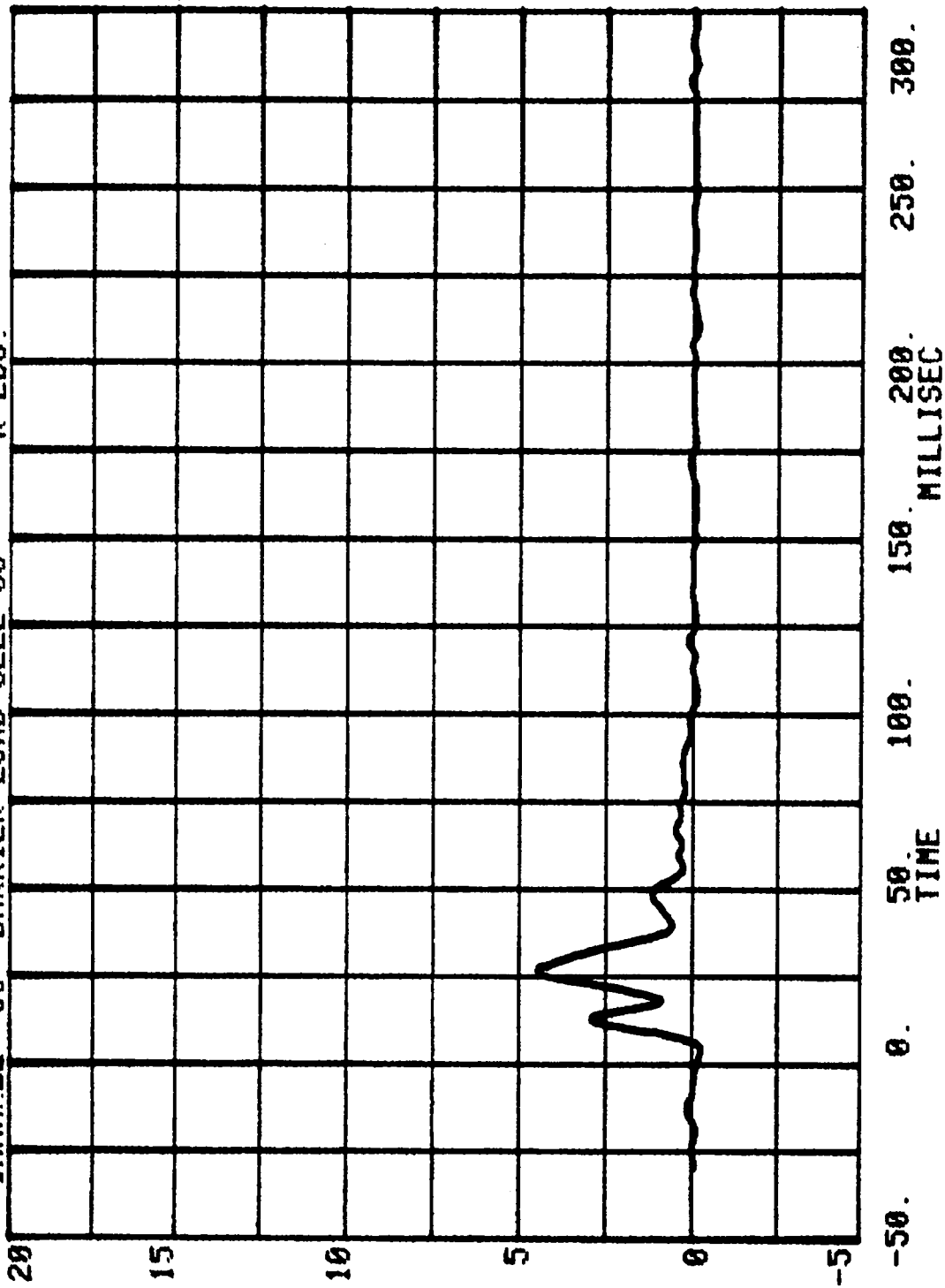
CHANNEL 54 BARRIER LOAD CELL C3 RUN= 709 SERIES= 5401 K LBS.



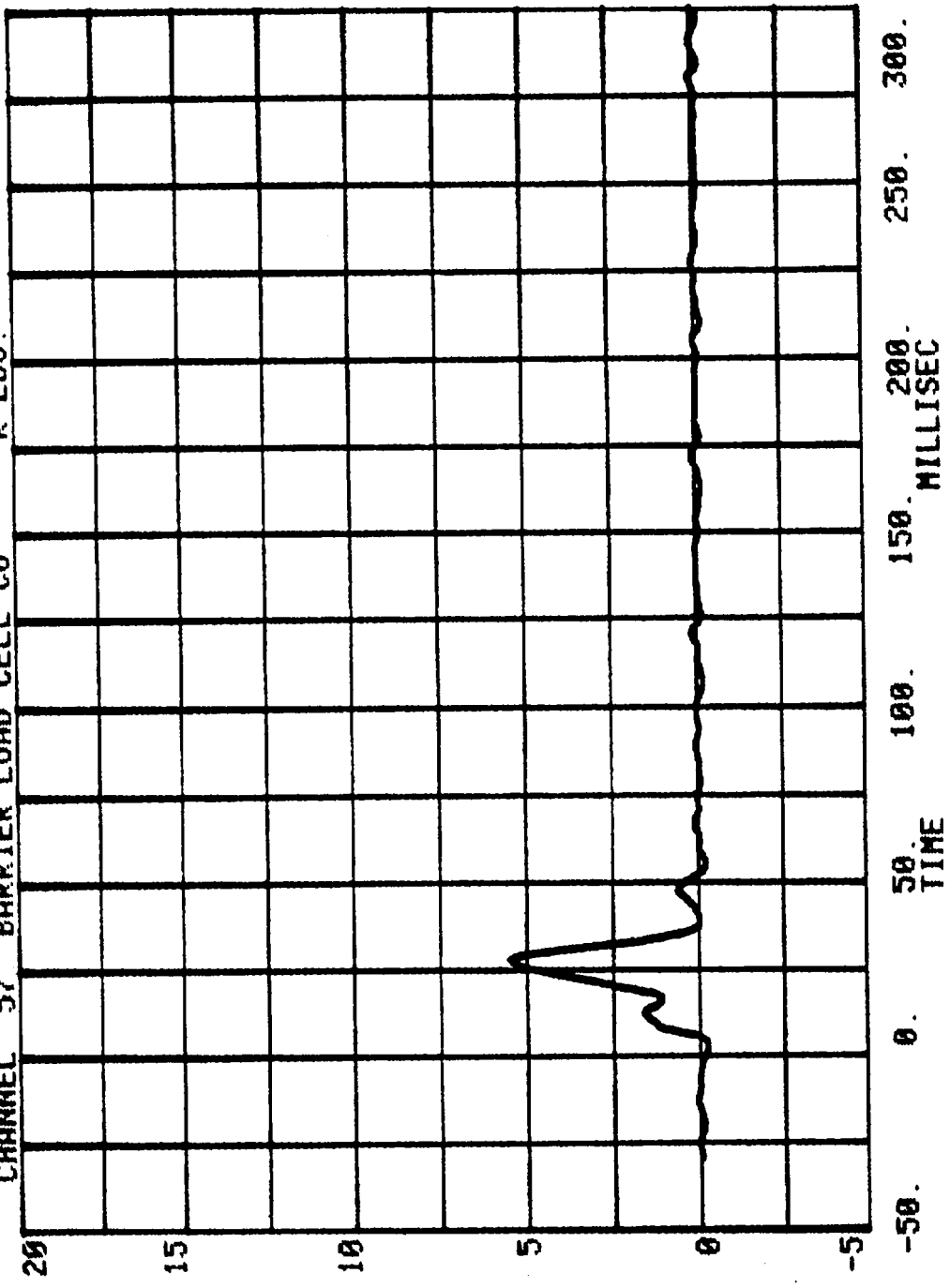
RUN= 709 SERIES= 5401
CHANNEL 55 BARRIER LOAD CELL C4 K LBS.



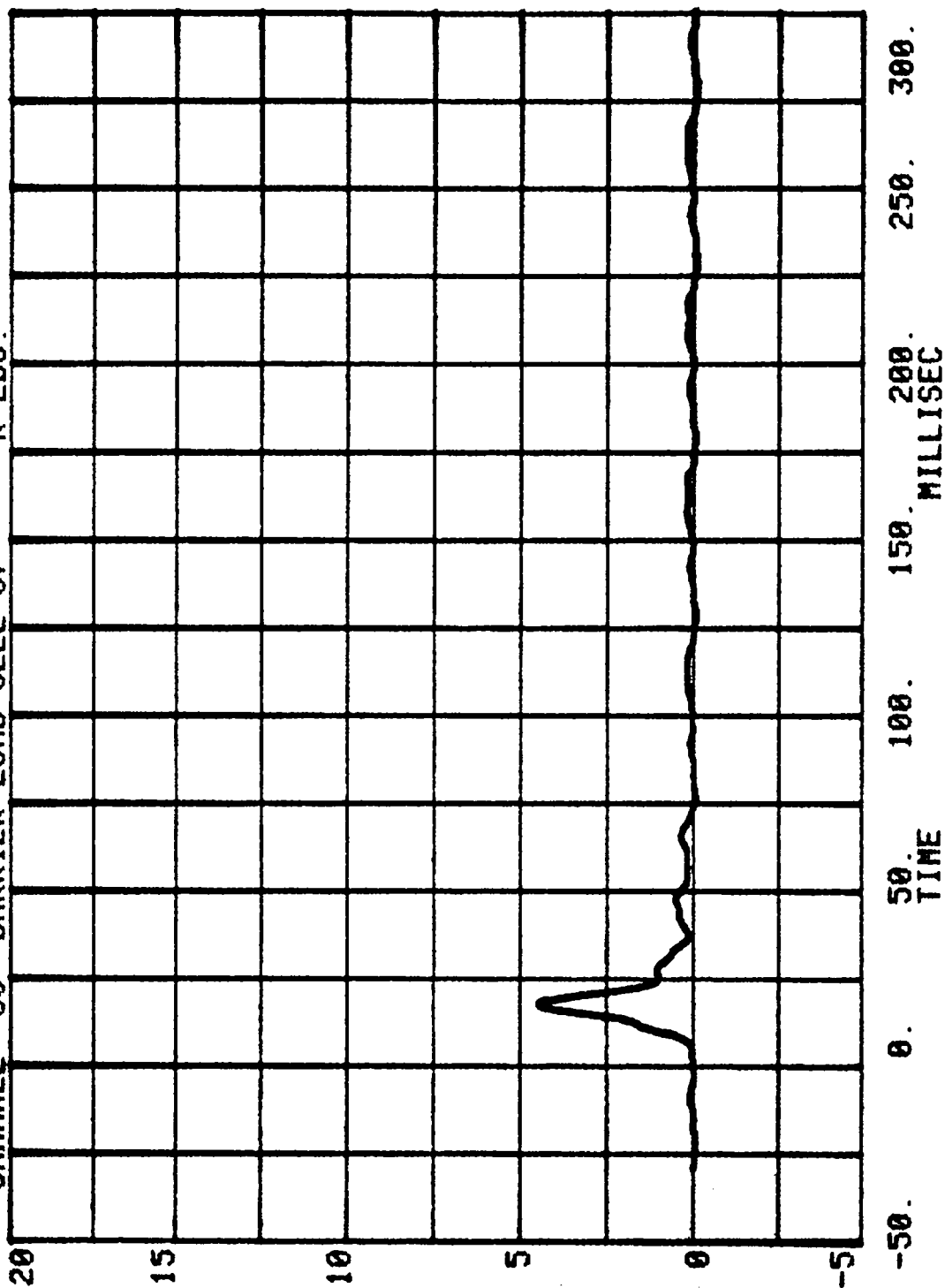
CHANNEL 56 RUN= 709 SERIES= 5401 K LBS.



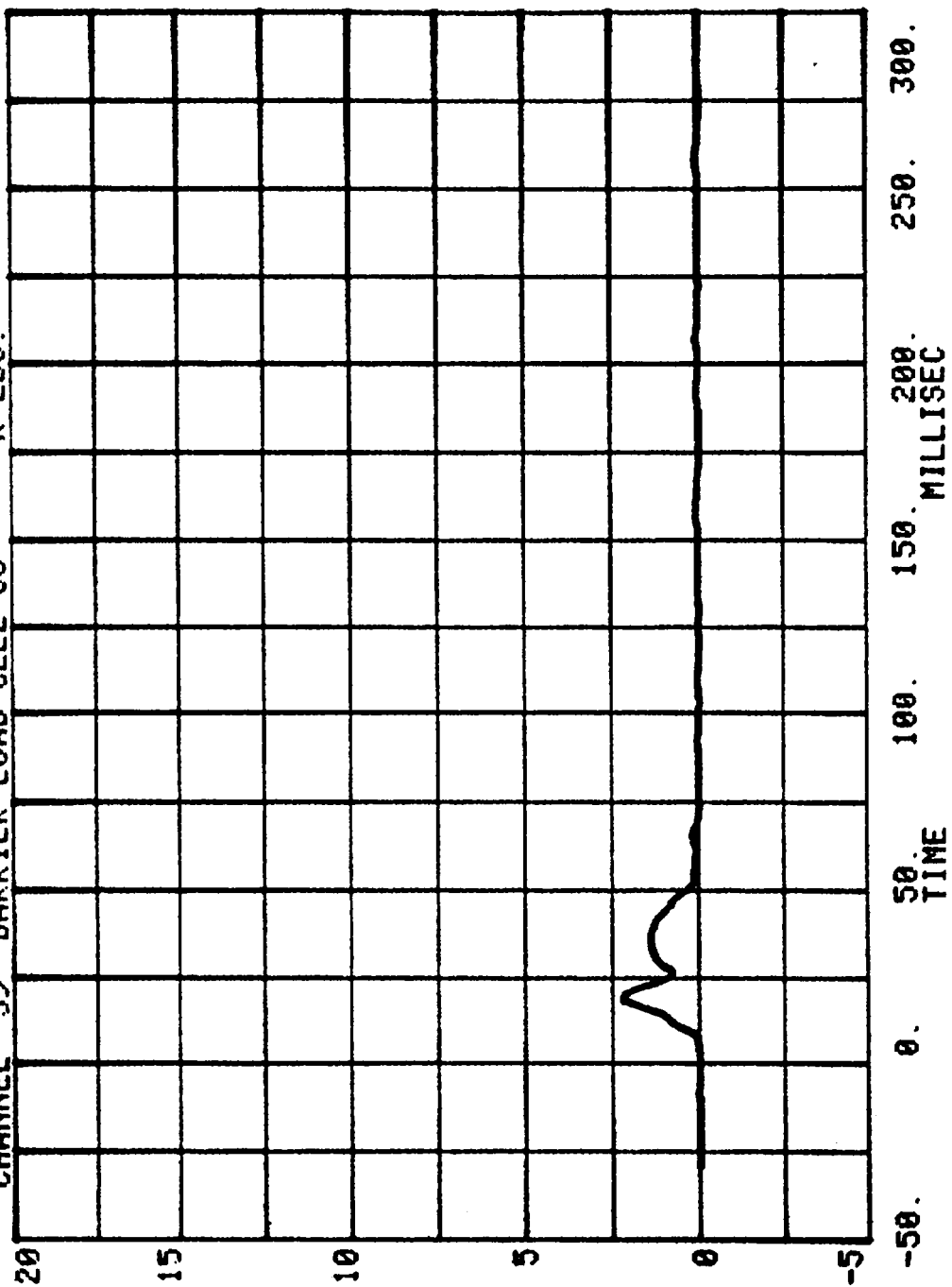
RUN= 789 SERIES= 5401
CHANNEL 57 BARRIER LOAD CELL C6 K LBS.



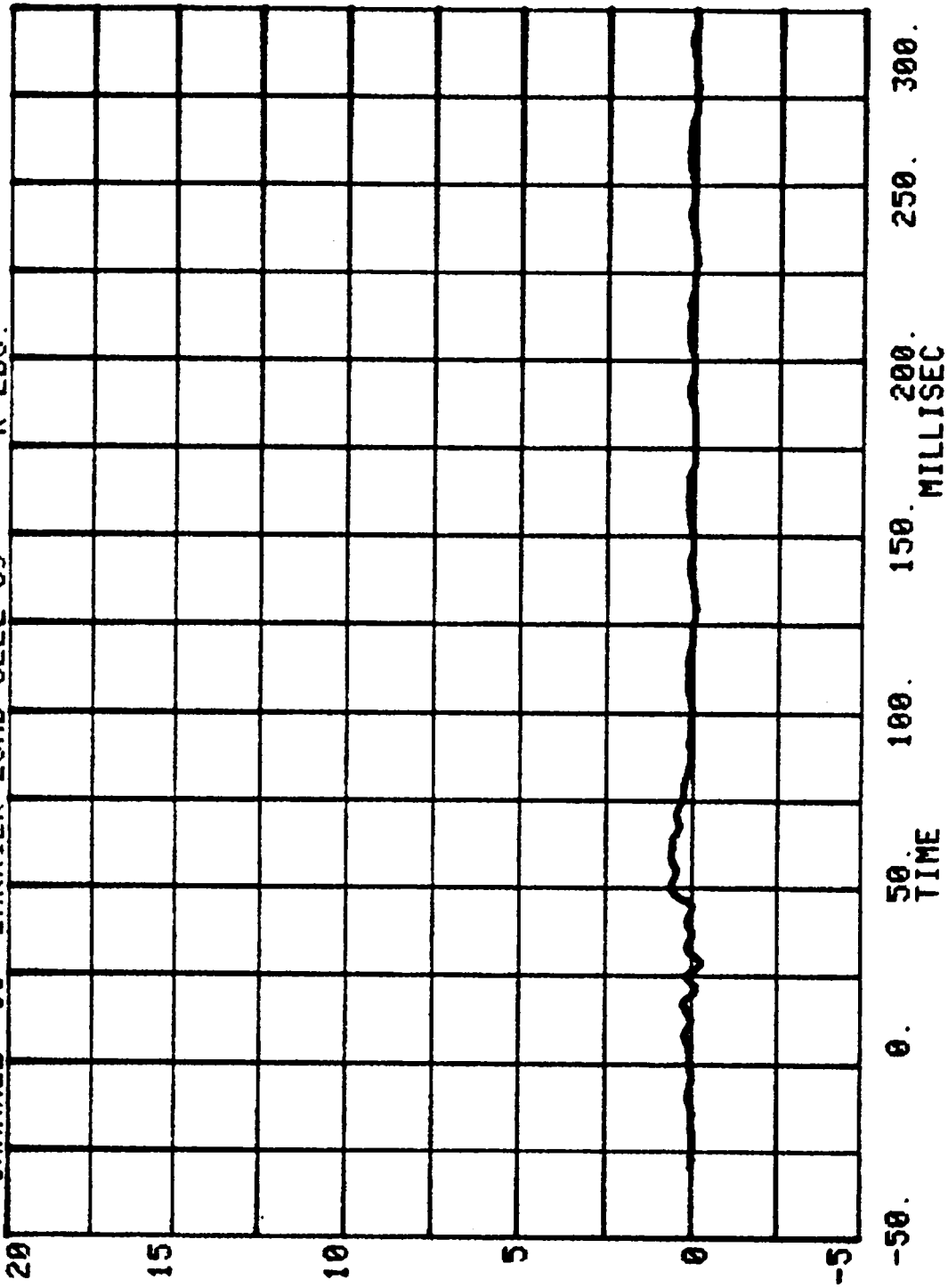
CHANNEL 58 BARRIER LOAD CELL C7 K LBS.
RUN= 709 SERIES= 5401



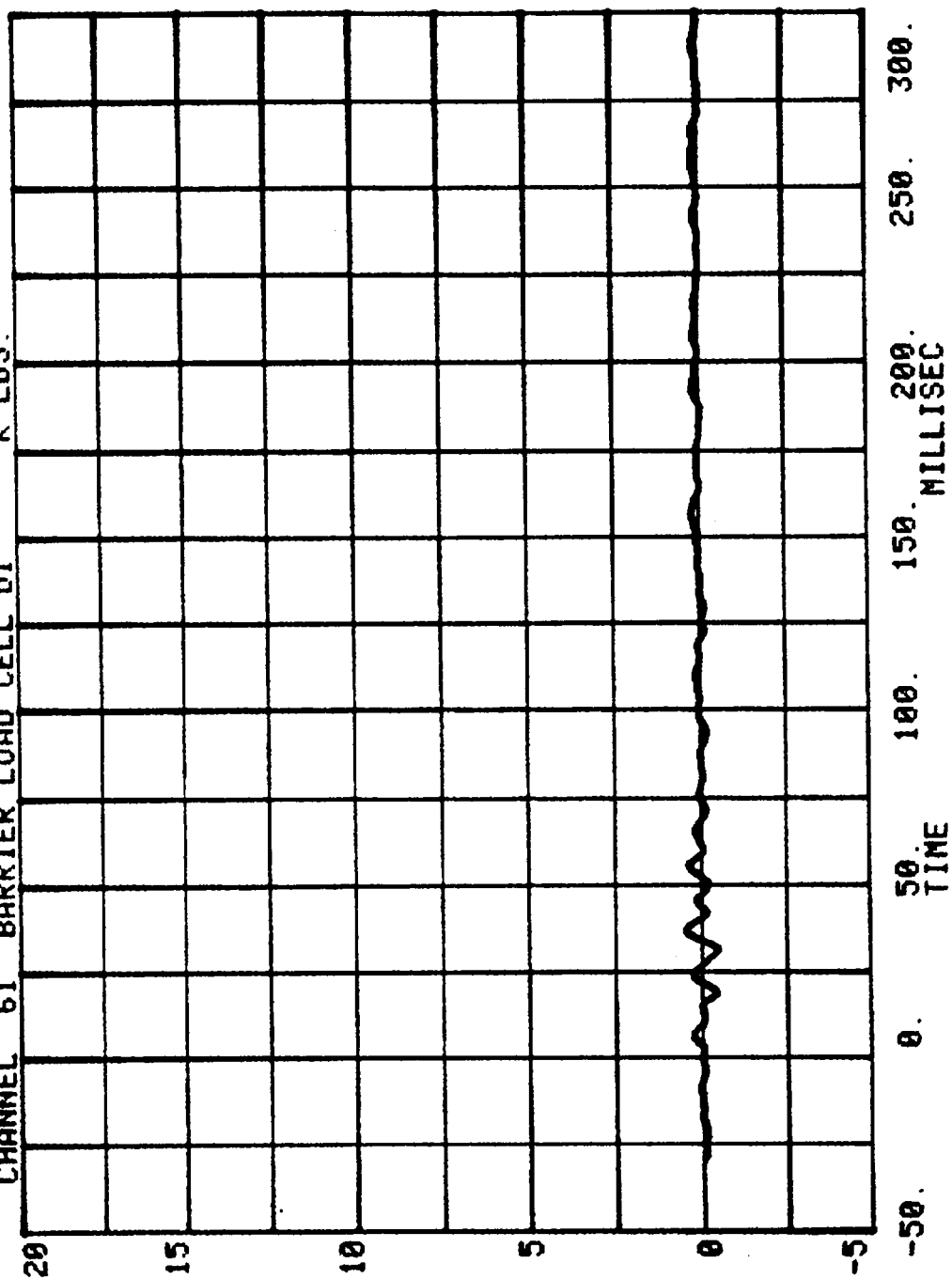
CHANNEL 59 BARRIER LOAD CELL C8 RUN= 709 SERIES= 5401 K LBS.



RUN= 709 SERIES= 5401
CHANNEL 60 BARRIER LOAD CELL C9 K LBS.

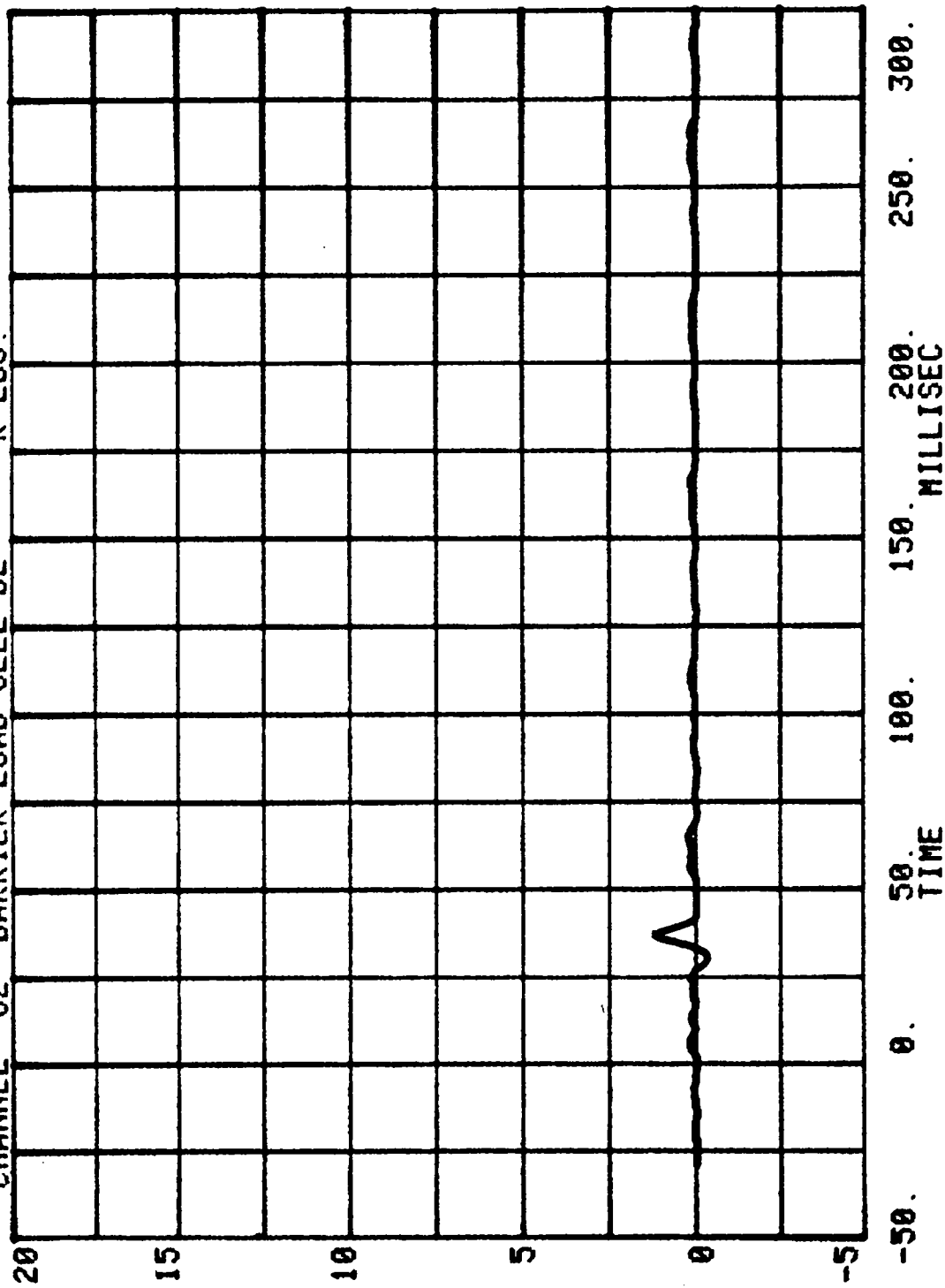


CHANNEL 61 BARRIER LOAD CELL D1 RUN= 709 SERIES= 5401 K LBS.



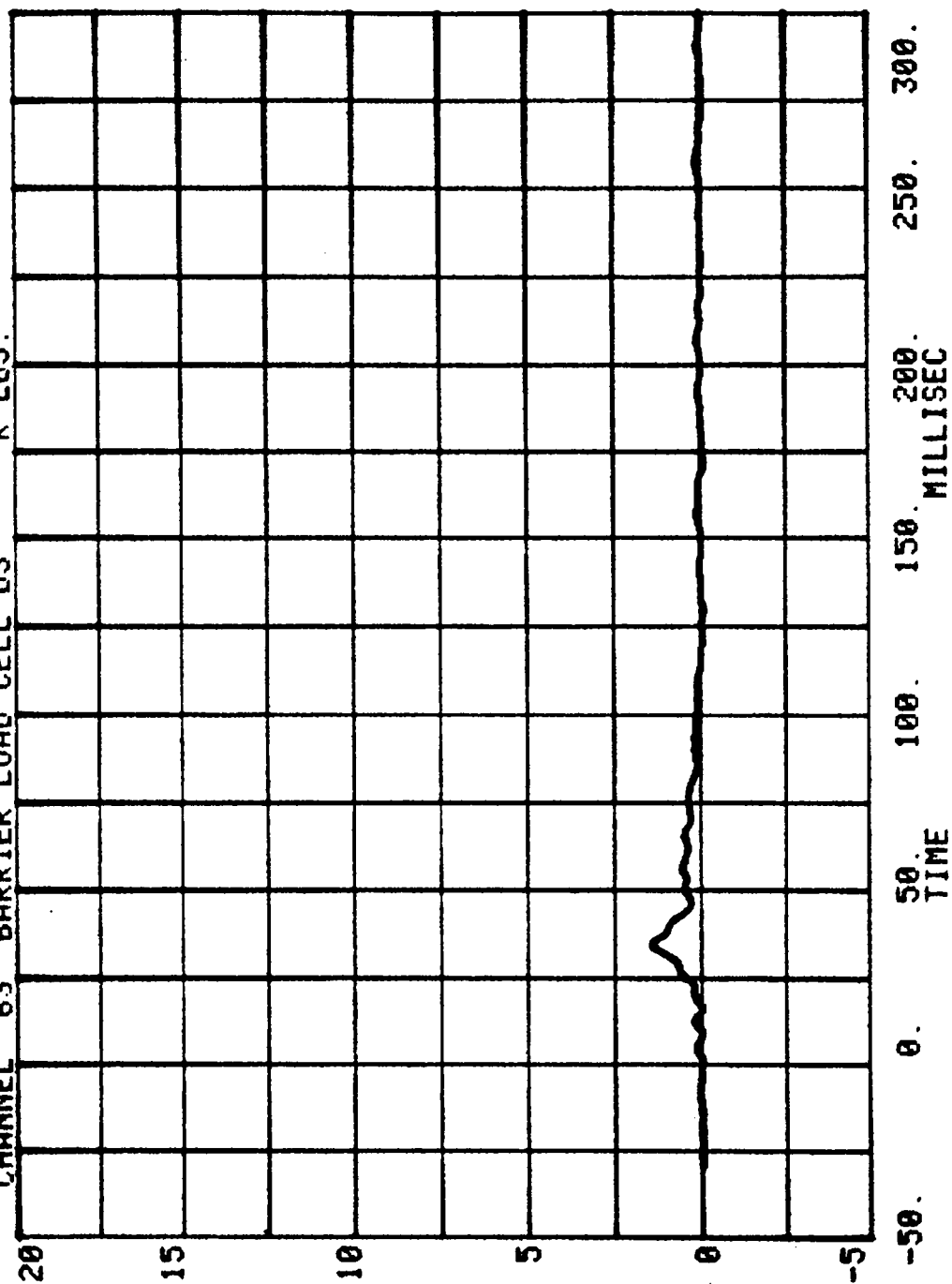
CHANNEL 62 BARRIER LOAD CELL 02 K LBS.

RUN= 709 SERIES= 5401



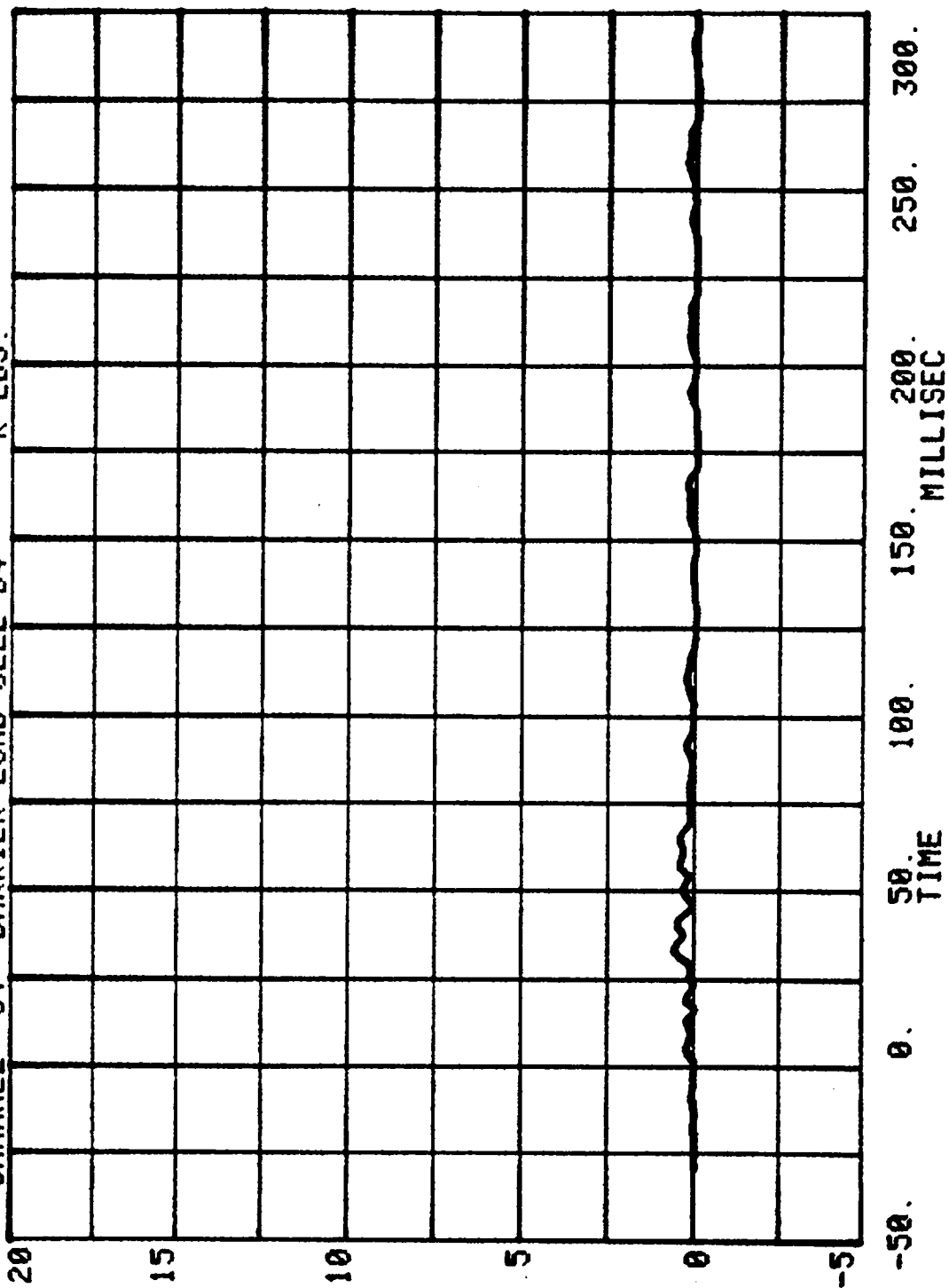
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.

RUN= 709 SERIES= 5401

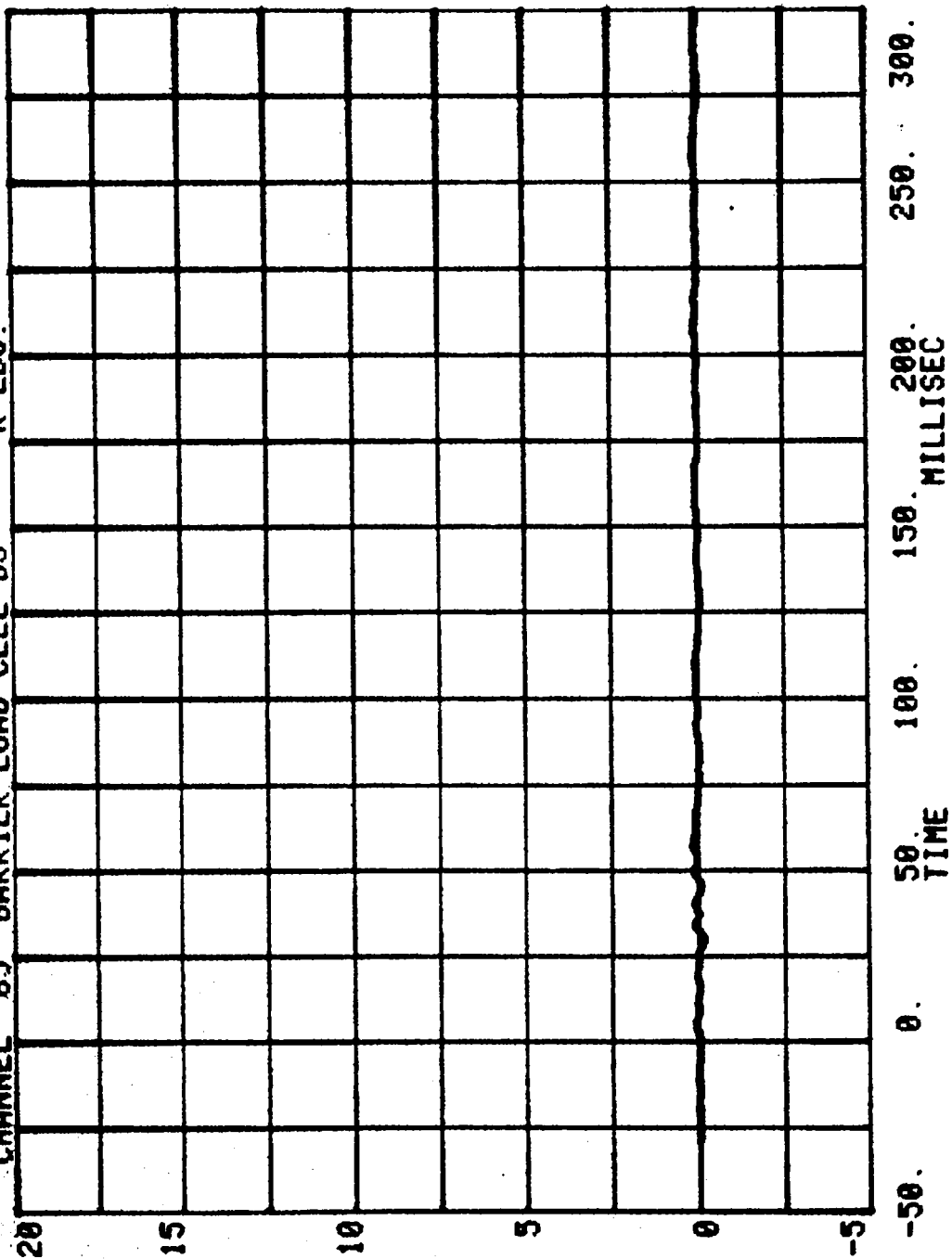


CHANNEL 64 BARRIER LOAD CELL D4 K LBS.

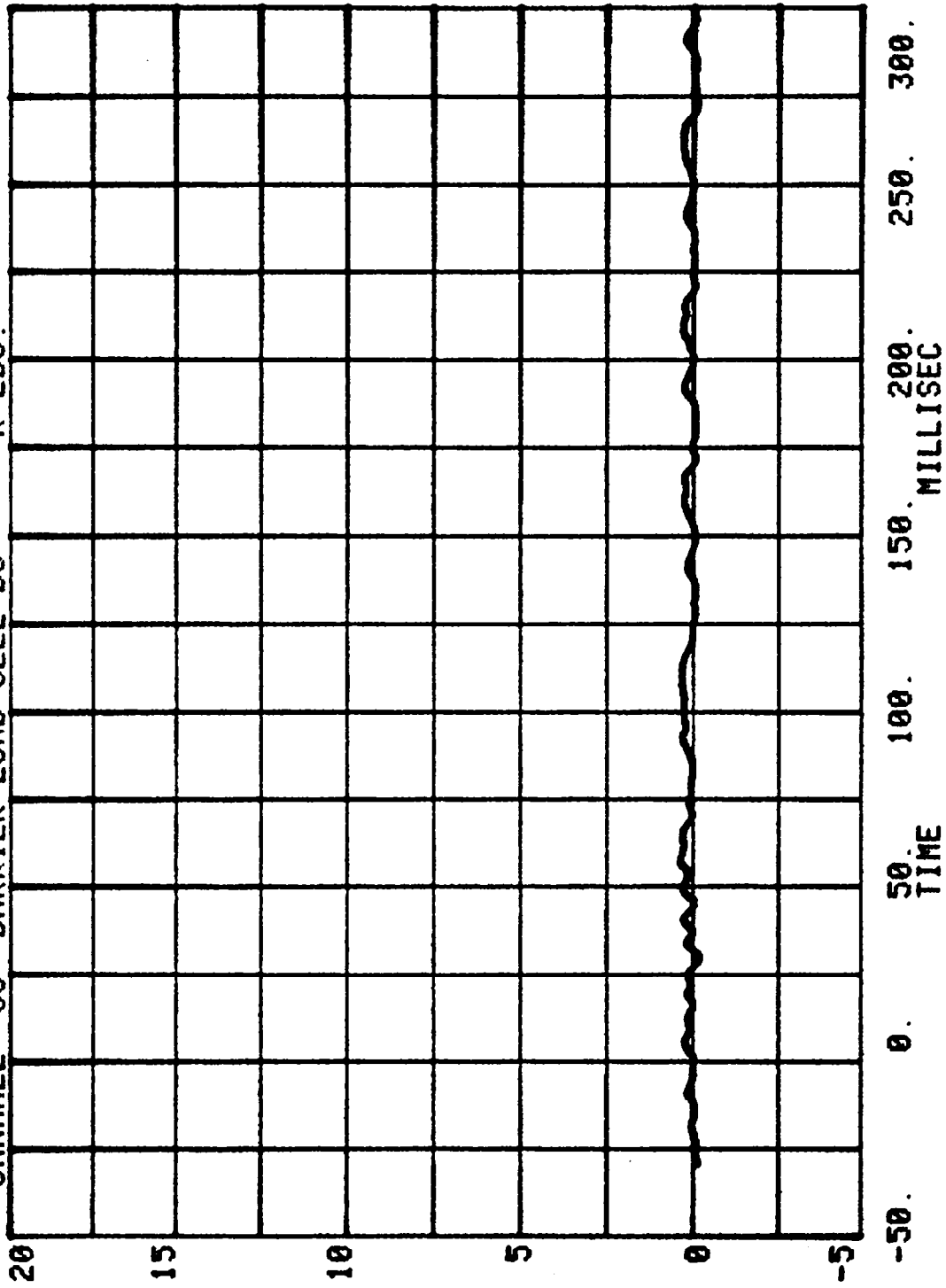
RUN= 709 SERIES= 5401



RUN= 709 SERIES= 5401
CHANNEL 65 BARRIER LOAD CELL D5 K LBS.

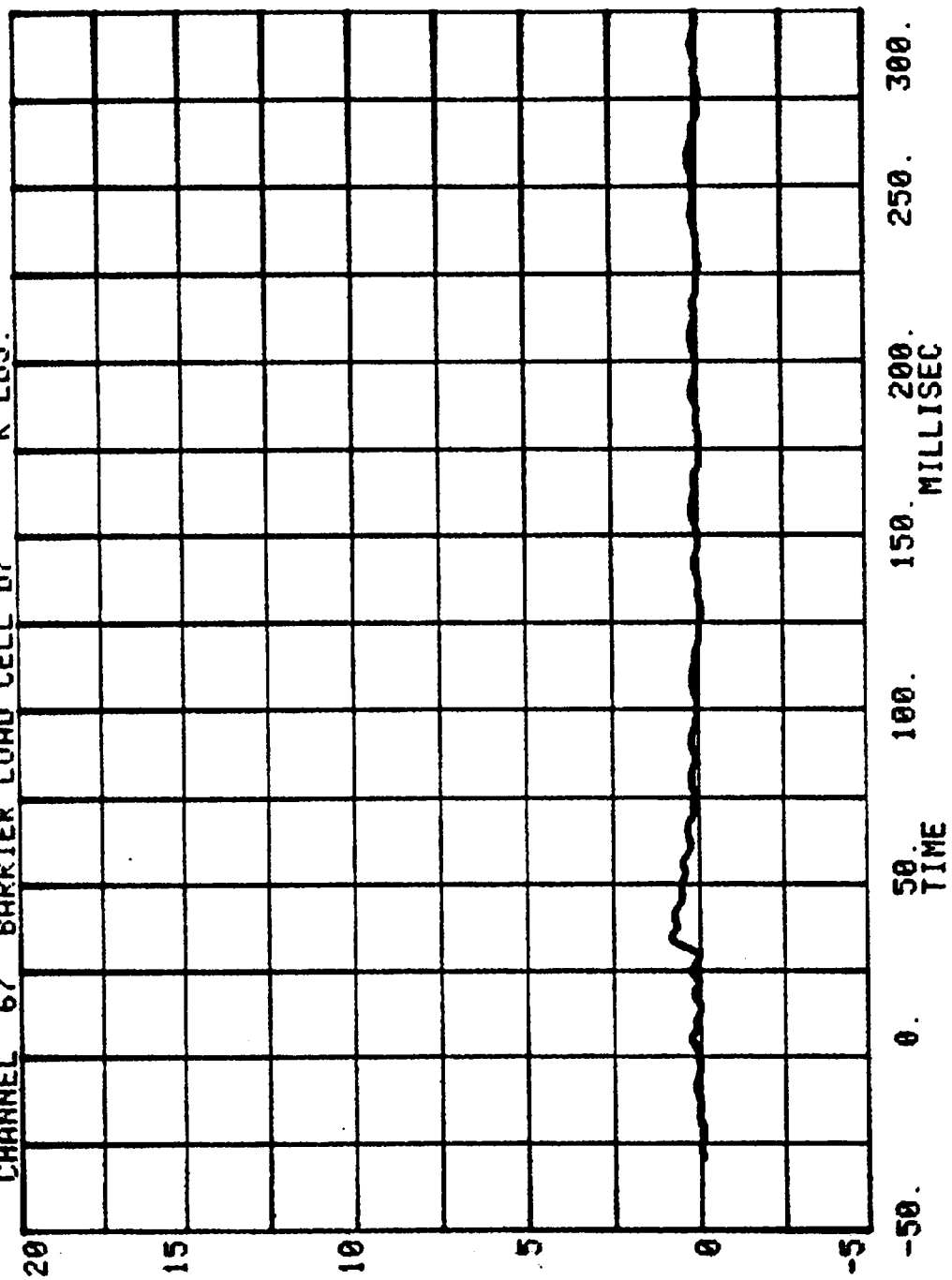


RUN= 709 SERIES= 5401
CHANNEL 66 BARRIER LOAD CELL D6 K LBS.

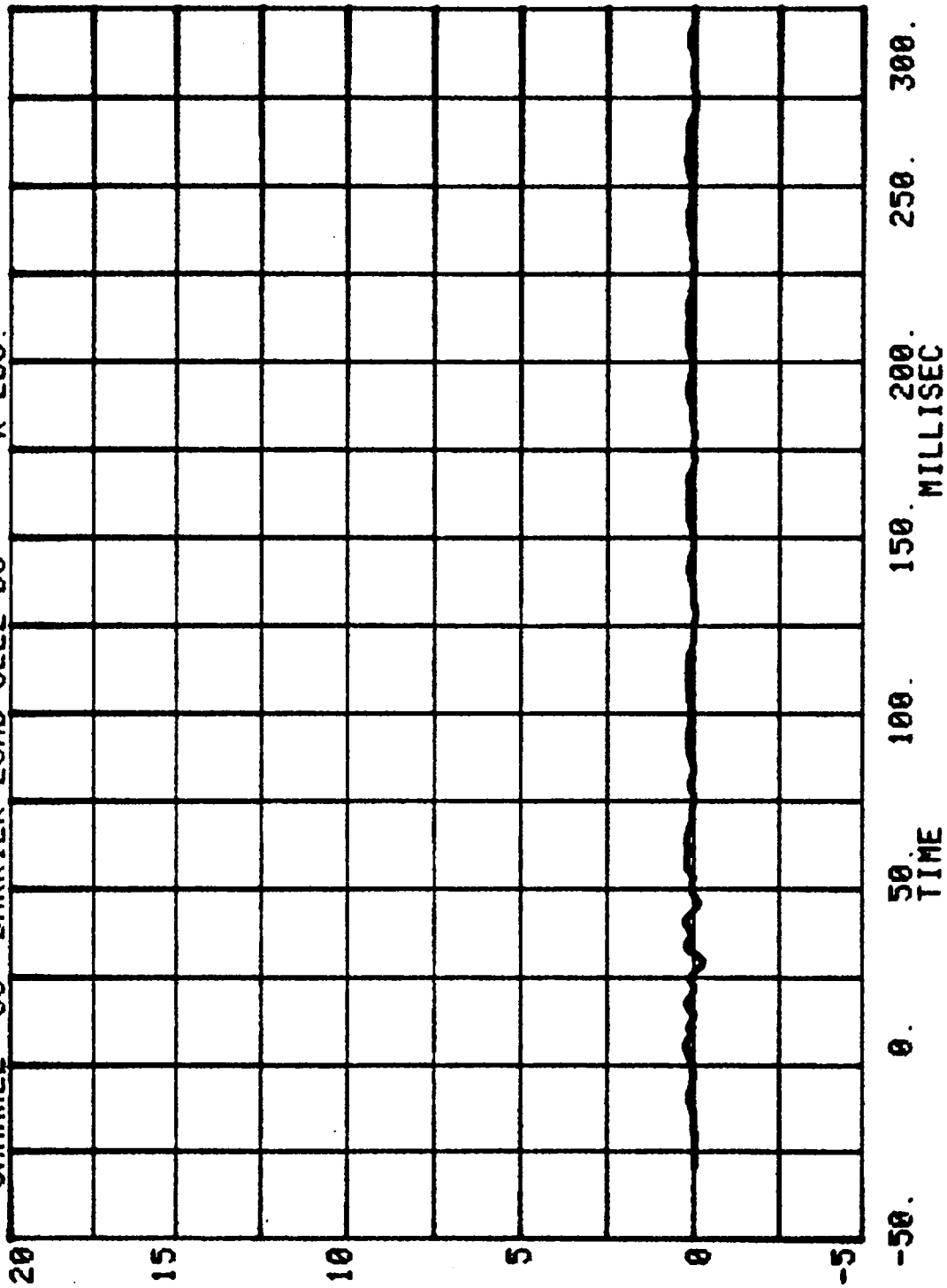


CHANNEL 67 BARRIER LOAD CELL D7 K LBS.

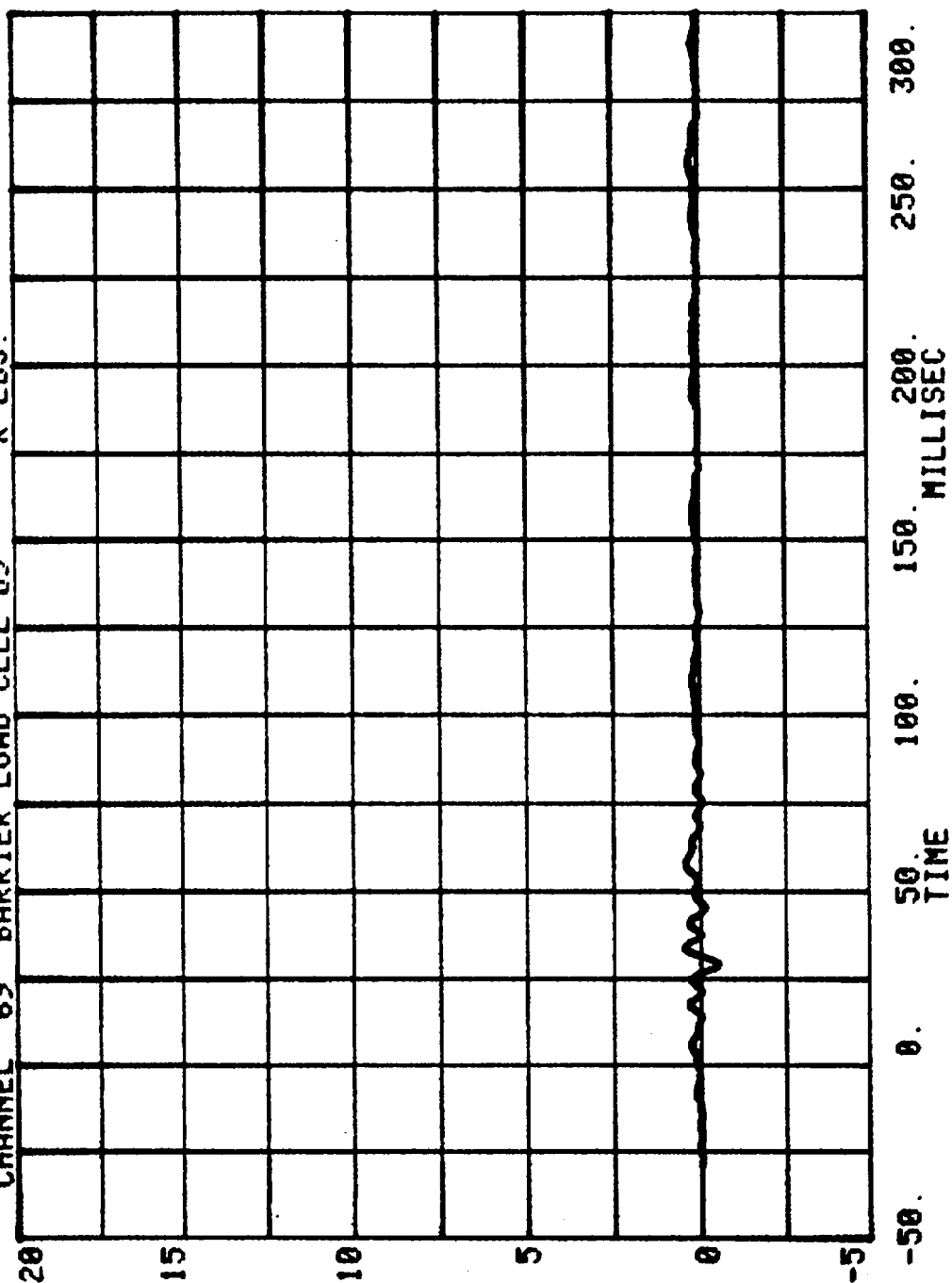
RUN= 709 SERIES= 5401



RUN= 799 SERIES= 5401
CHANNEL 68 BARRIER LOAD CELL D8 K LBS.



CHANNEL 63 BARRIER LOAD CELL 09 K LBS.
RUN= 709 SERIES= 5401



NEW CAR ASSESSMENT BARRIER TESTS - 1986

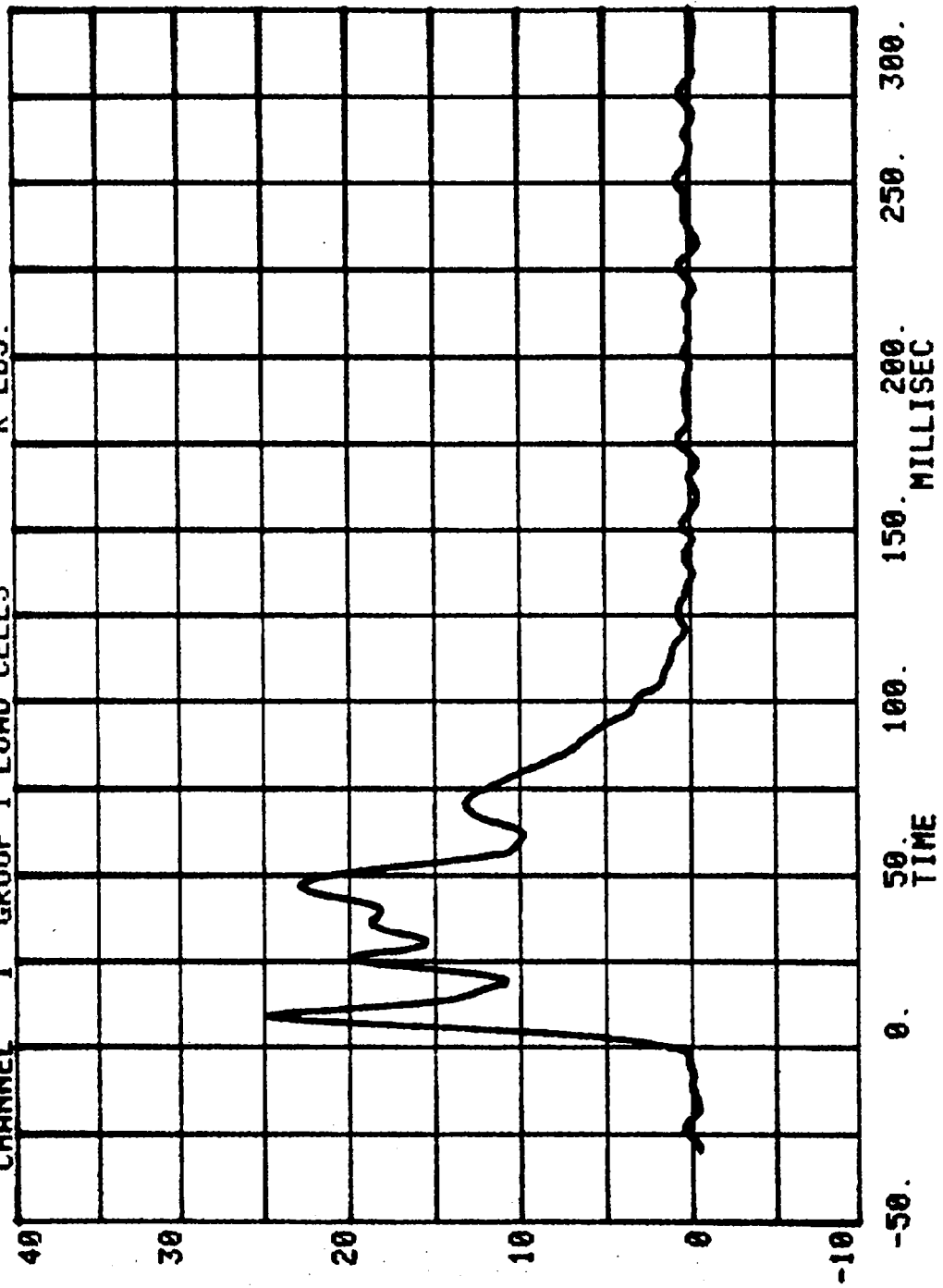
RUN # 709 SERIES # 5401

CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	-.472	24.799 K LBS.
2	GROUP 2 LOAD CELLS	-.584	82.745 K LBS.
3	GROUP 3 LOAD CELLS	-.493	16.803 K LBS.
4	GROUP 4 LOAD CELLS	-.673	10.376 K LBS.
5	GROUP 5 LOAD CELLS	-.538	12.121 K LBS.
6	GROUP 6 LOAD CELLS	-.374	7.371 K LBS.
7	TOTAL LOAD CELL SUM	-1.709	134.298 K LBS.

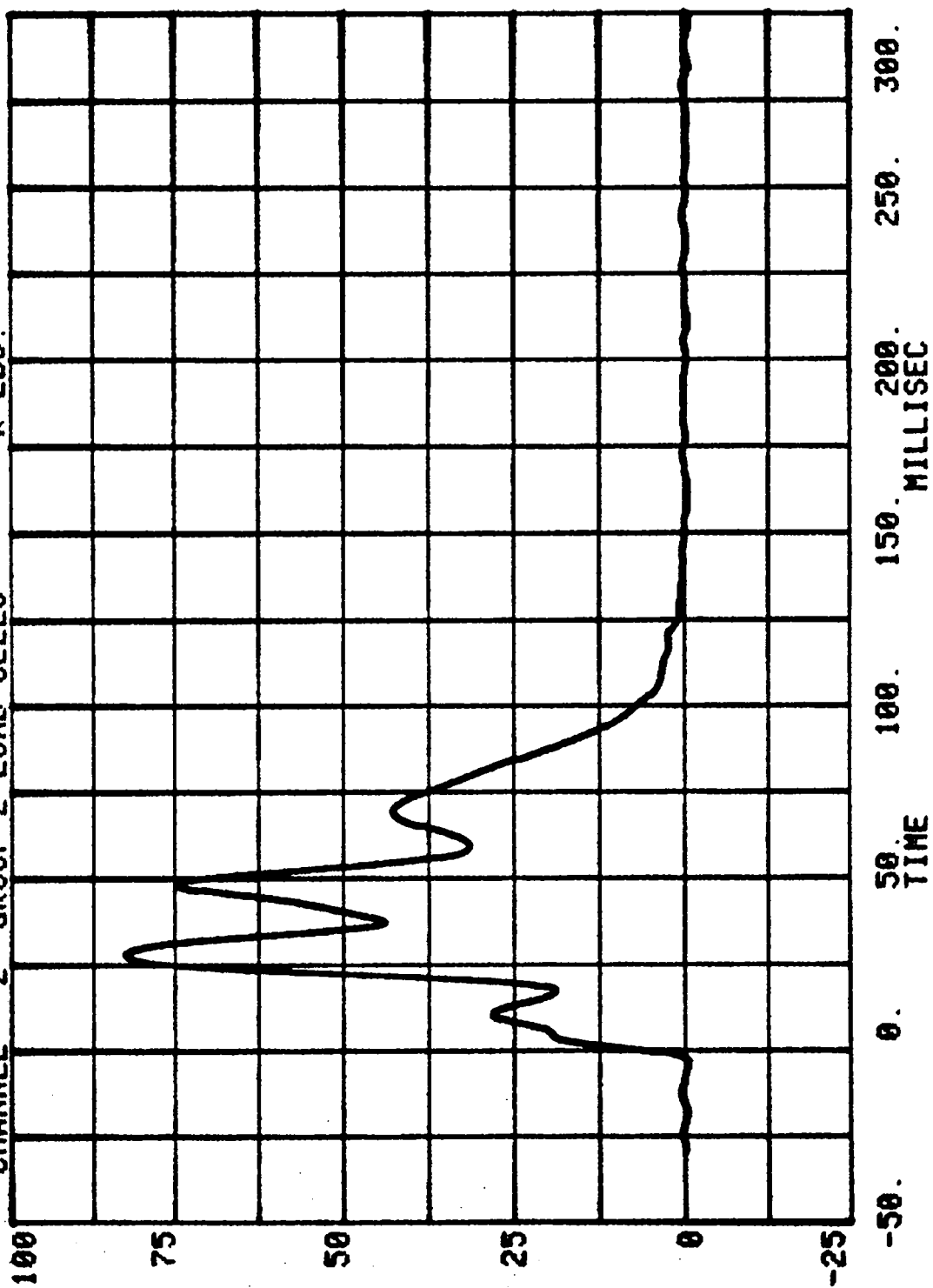
CHANNEL 1 GROUP 1 LOAD CELLS

RUN= 709 SERIES= 5401

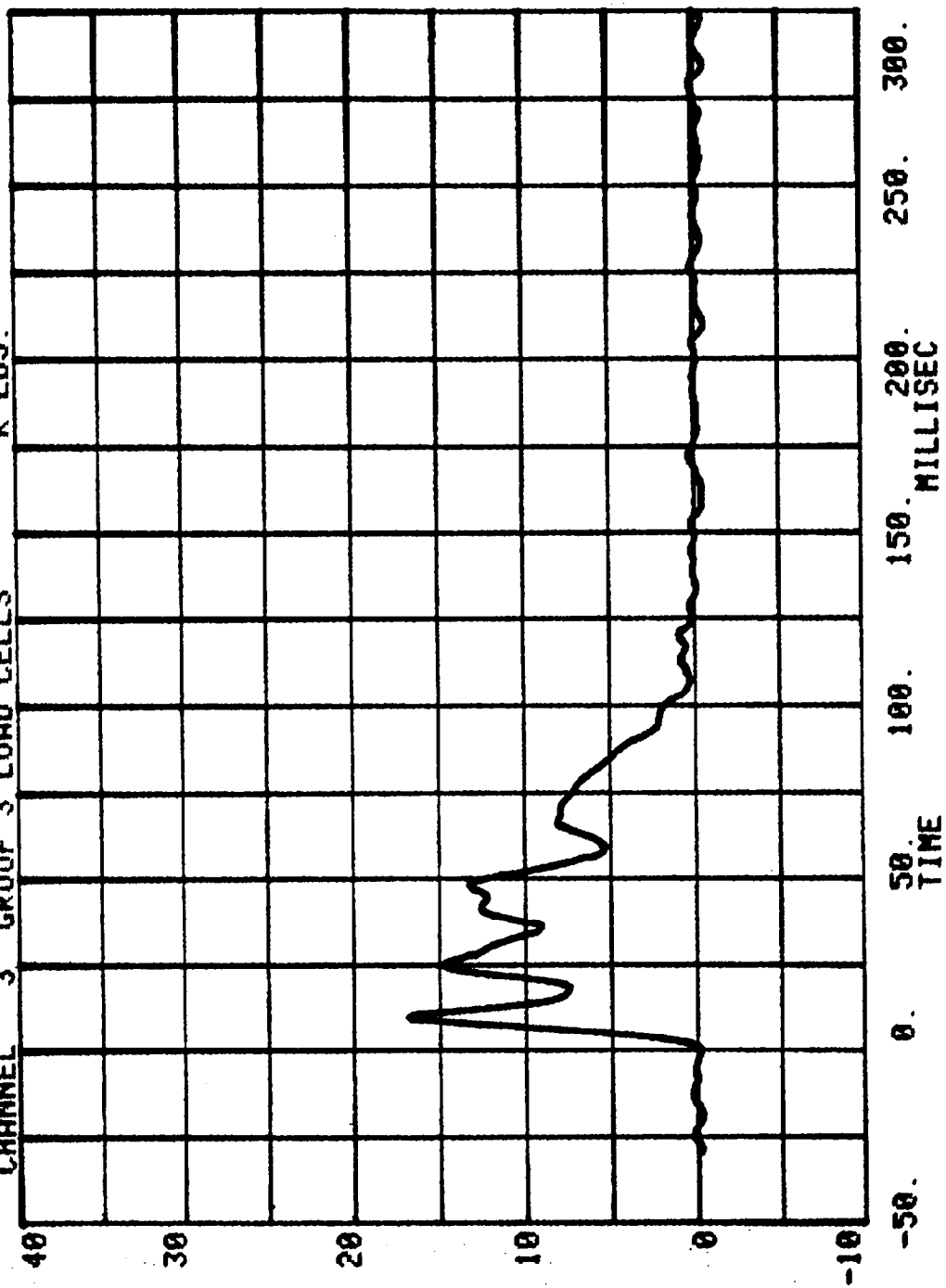
K LBS.



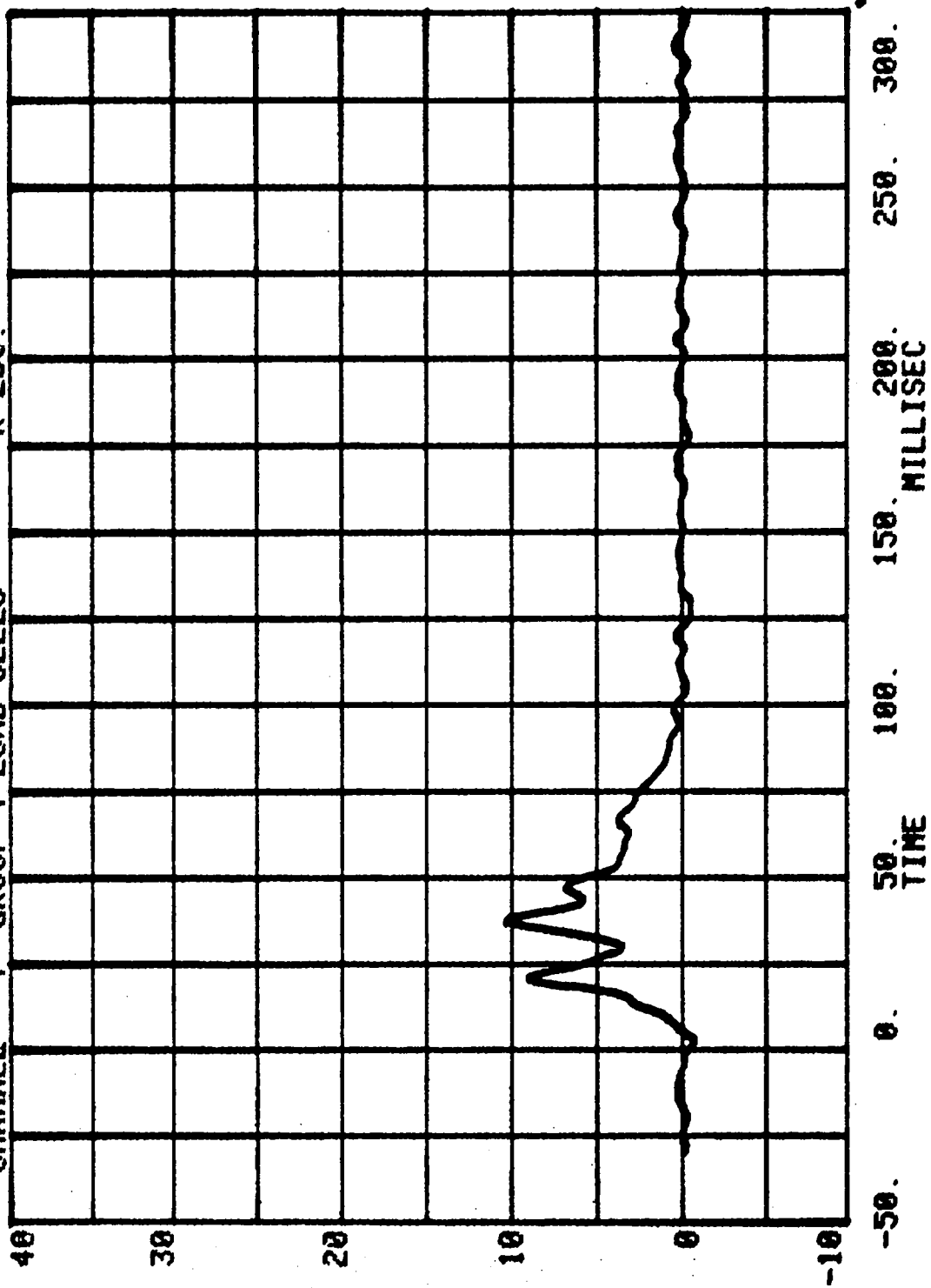
CHANNEL 2 GROUP 2 LOAD CELLS
RUN= 709 SERIES= 5401 K LBS.



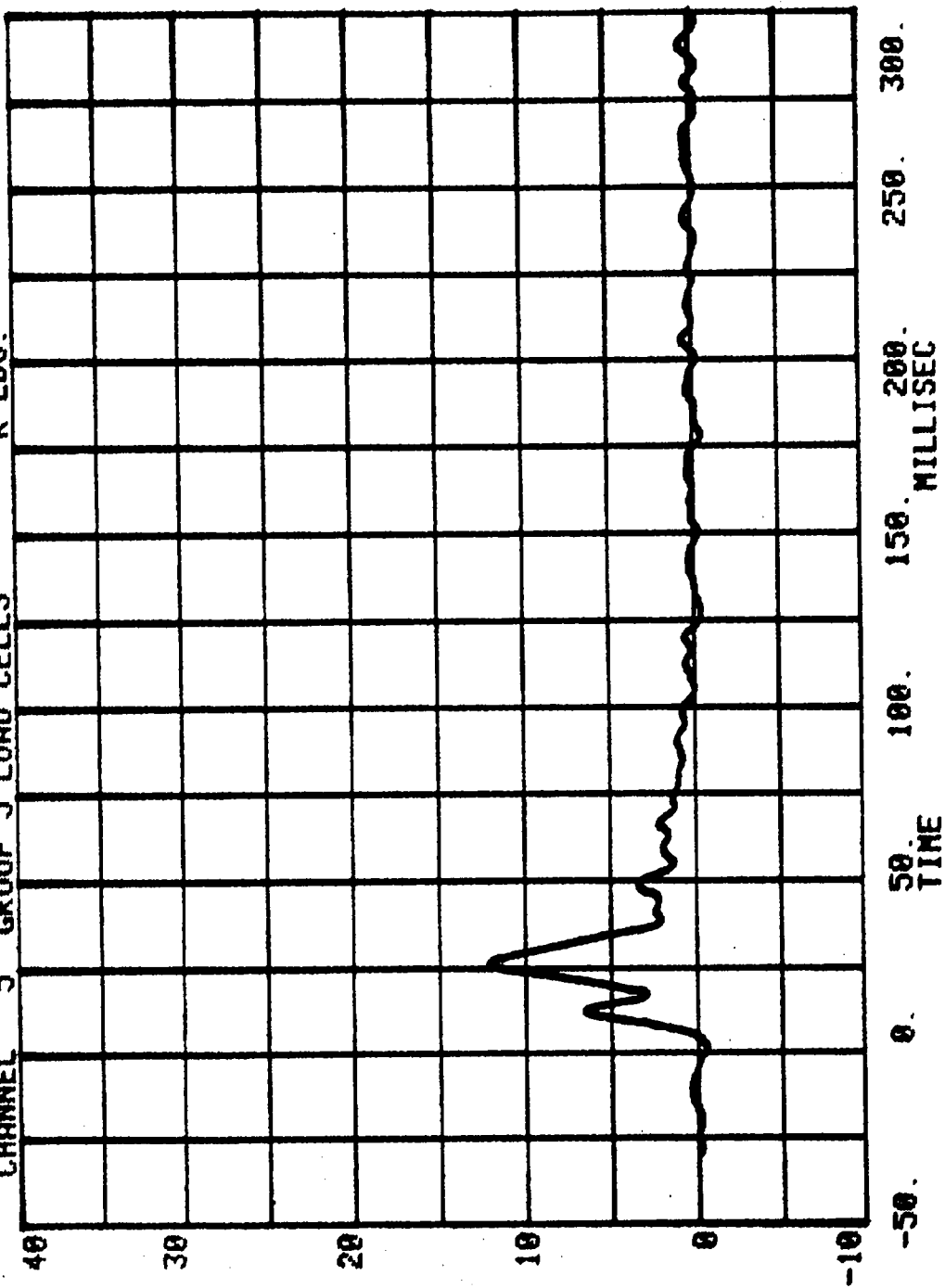
CHANNEL 3 GROUP 3 LOAD CELLS
RUN= 709 SERIES= 5401 K LBS.



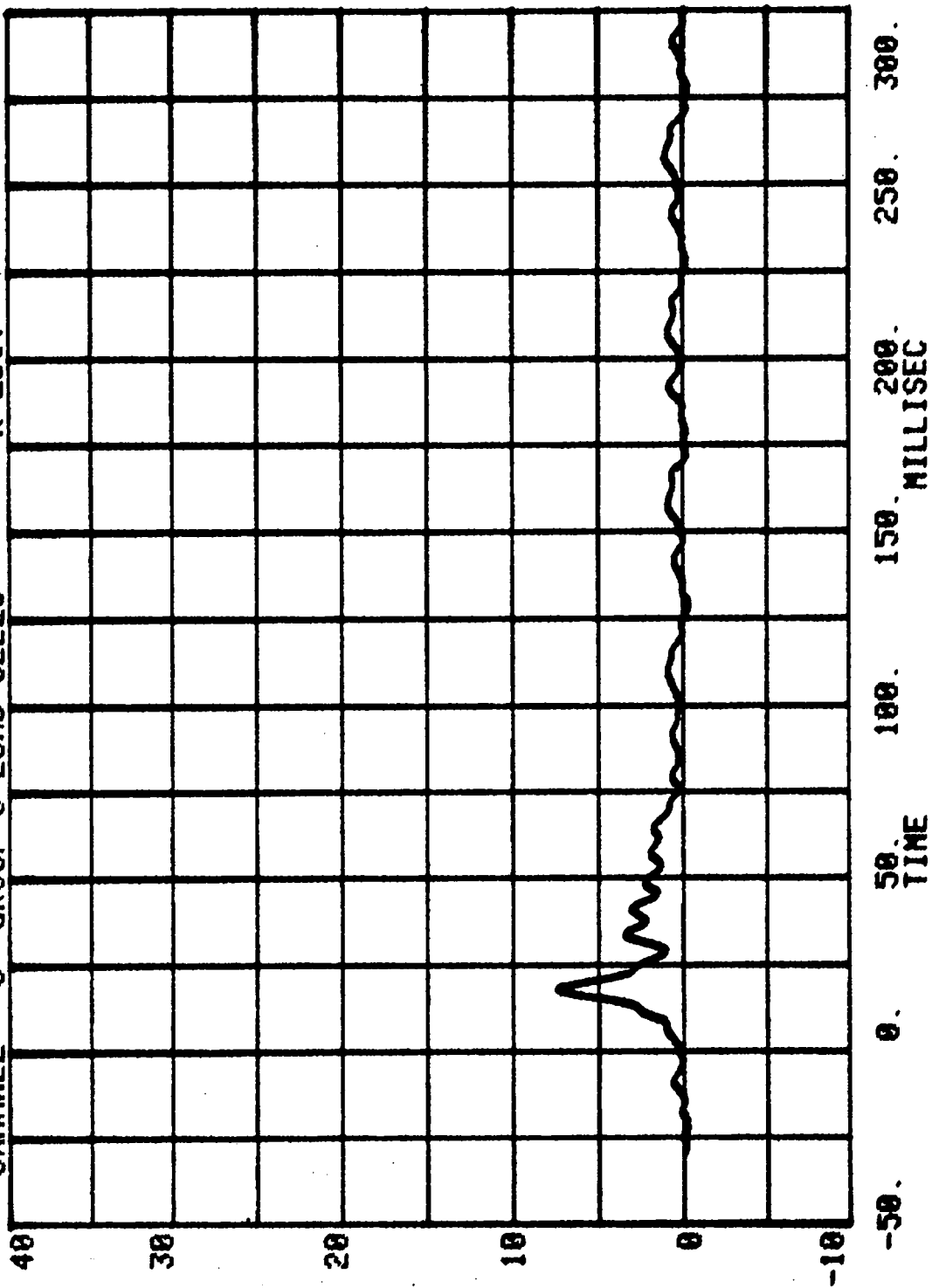
RUN= 789 SERIES= 5401
CHANNEL 4 GROUP 4 LOAD CELLS K LBS.

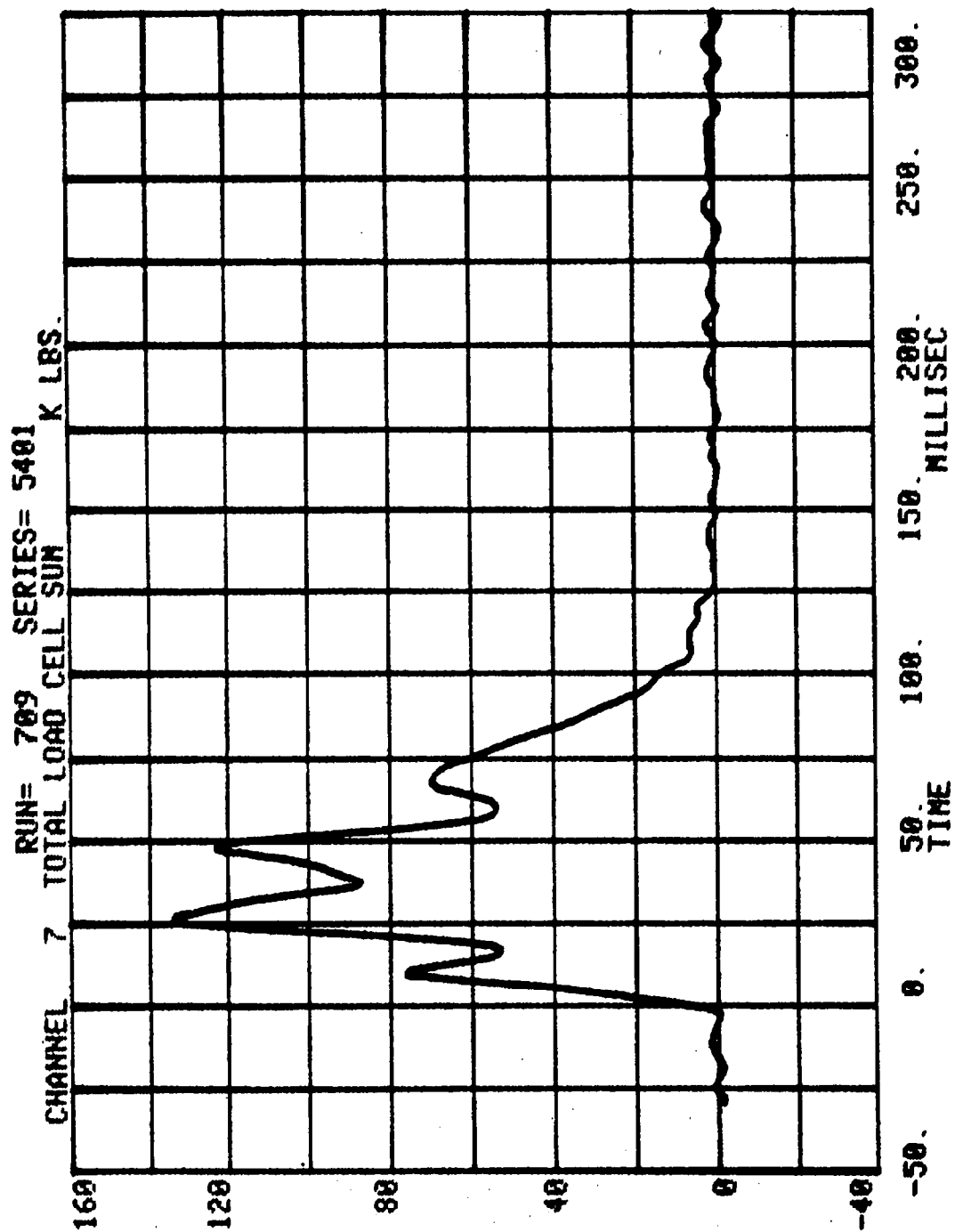


CHANNEL 5 GROUP 5 LOAD CELLS
RUN= 709 SERIES= 5401 K LBS.



RUN= 709 SERIES= 5401
CHANNEL 6 GROUP 6 LOAD CELLS K LBS.





TEST NO. MG5401

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 - 1986

RUN= 709

POS#1 HEAD R

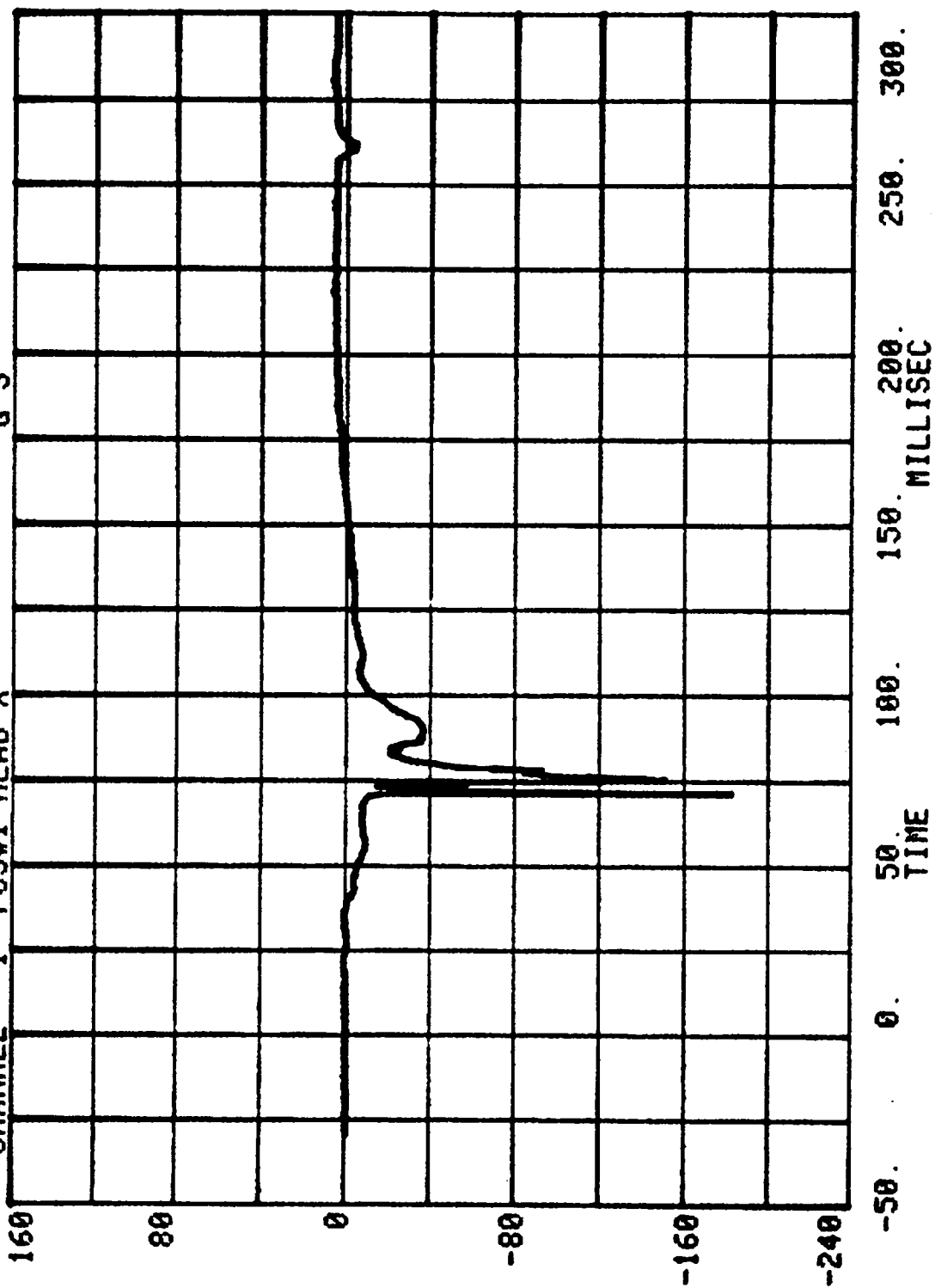
HIC= 801.8 FROM T1= .07125 TO T2= .09450

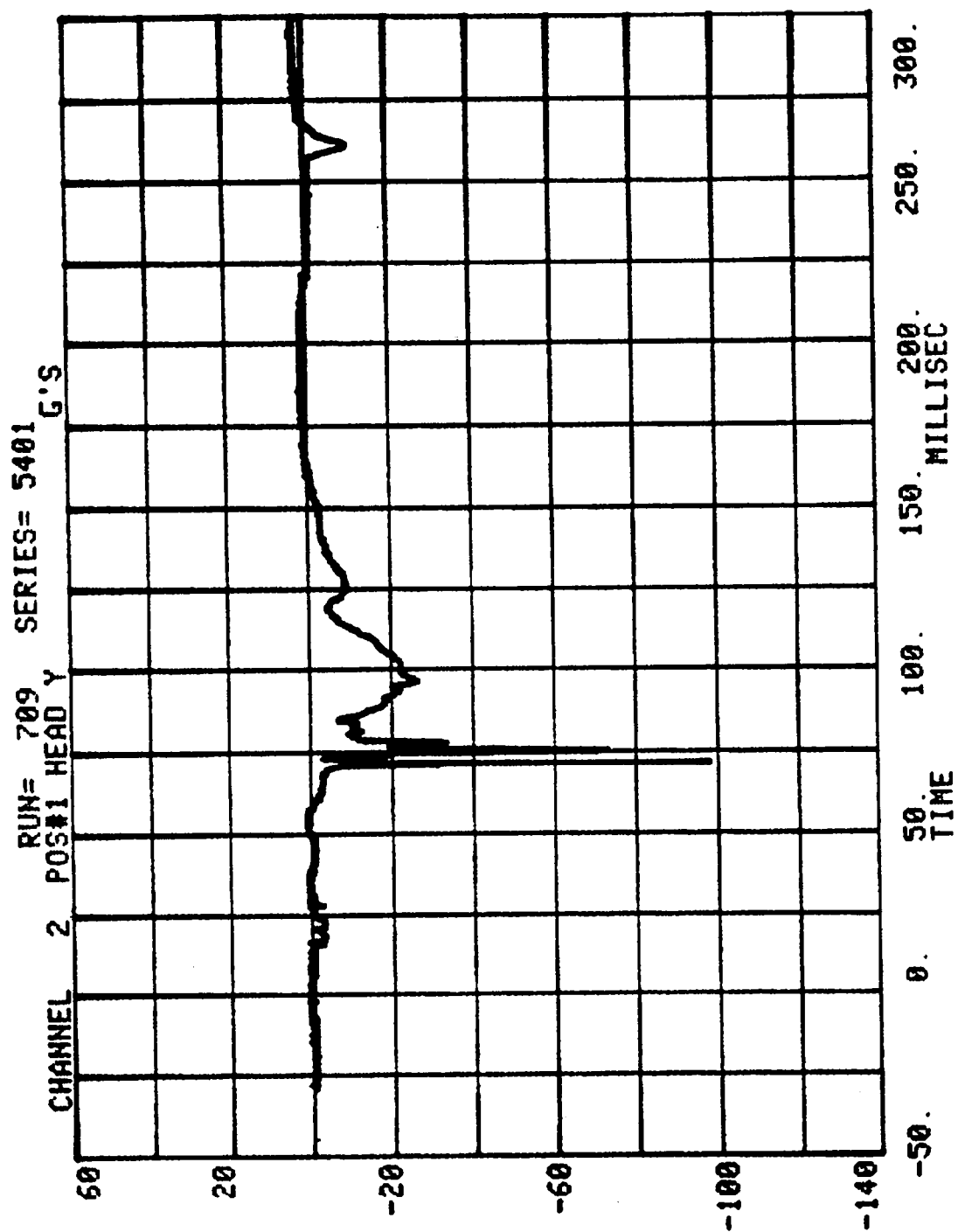
AVERAGE ACCELERATION BETWEEN T1 AND T2= 65.3G'S

EVENT TIME= 300.0 MSEC

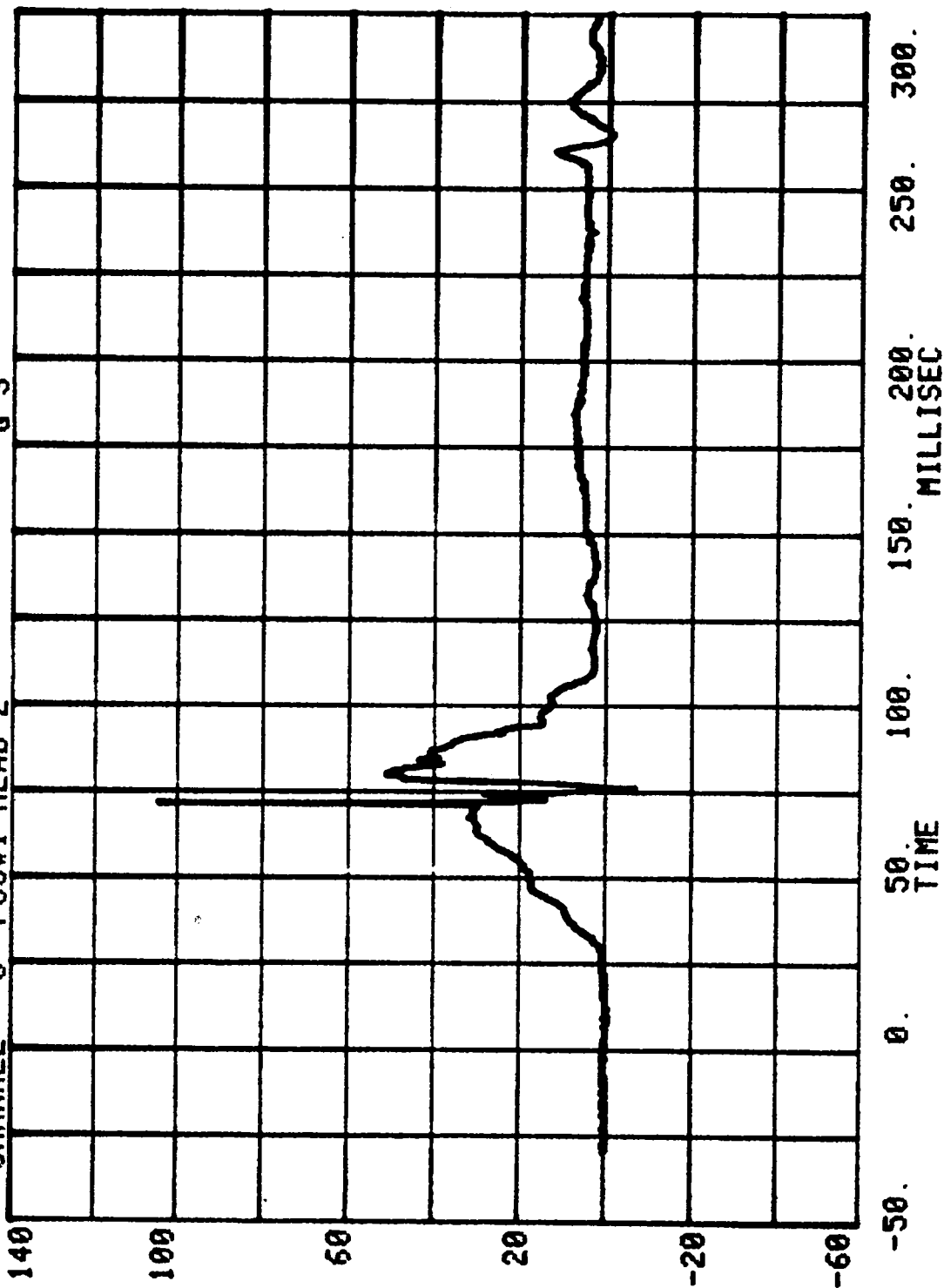
SEVERITY INDEX=1469.0

CHANNEL 1 POS#1 HEAD X RUN= 709 SERIES= 5401 G'S

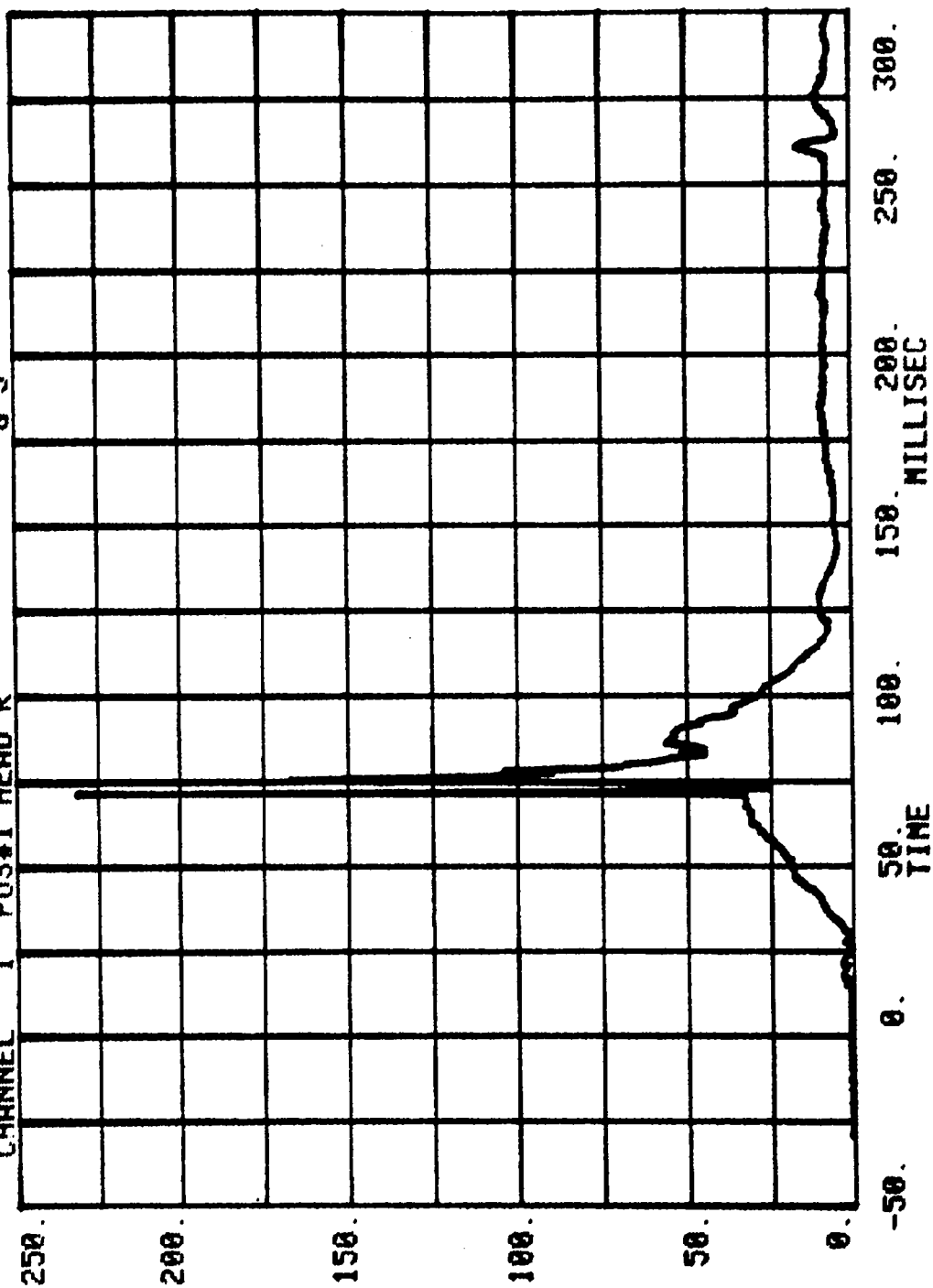




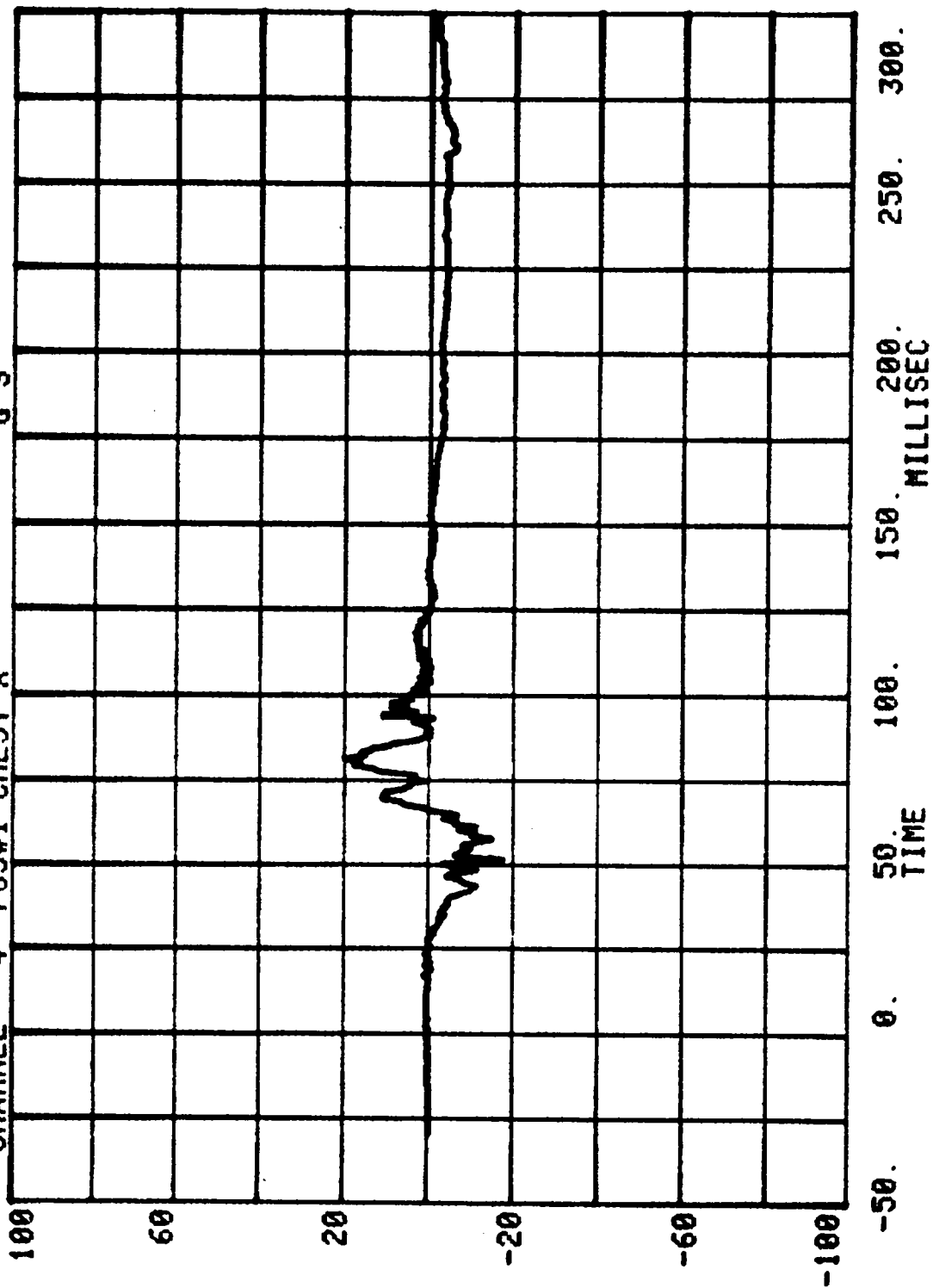
CHANNEL 3 POS#1 HEAD Z RUN= 709 SERIES= 5401 G'S



CHANNEL 1 POS#1 HEAD R RUN= 709 SERIES= 5401 G'S



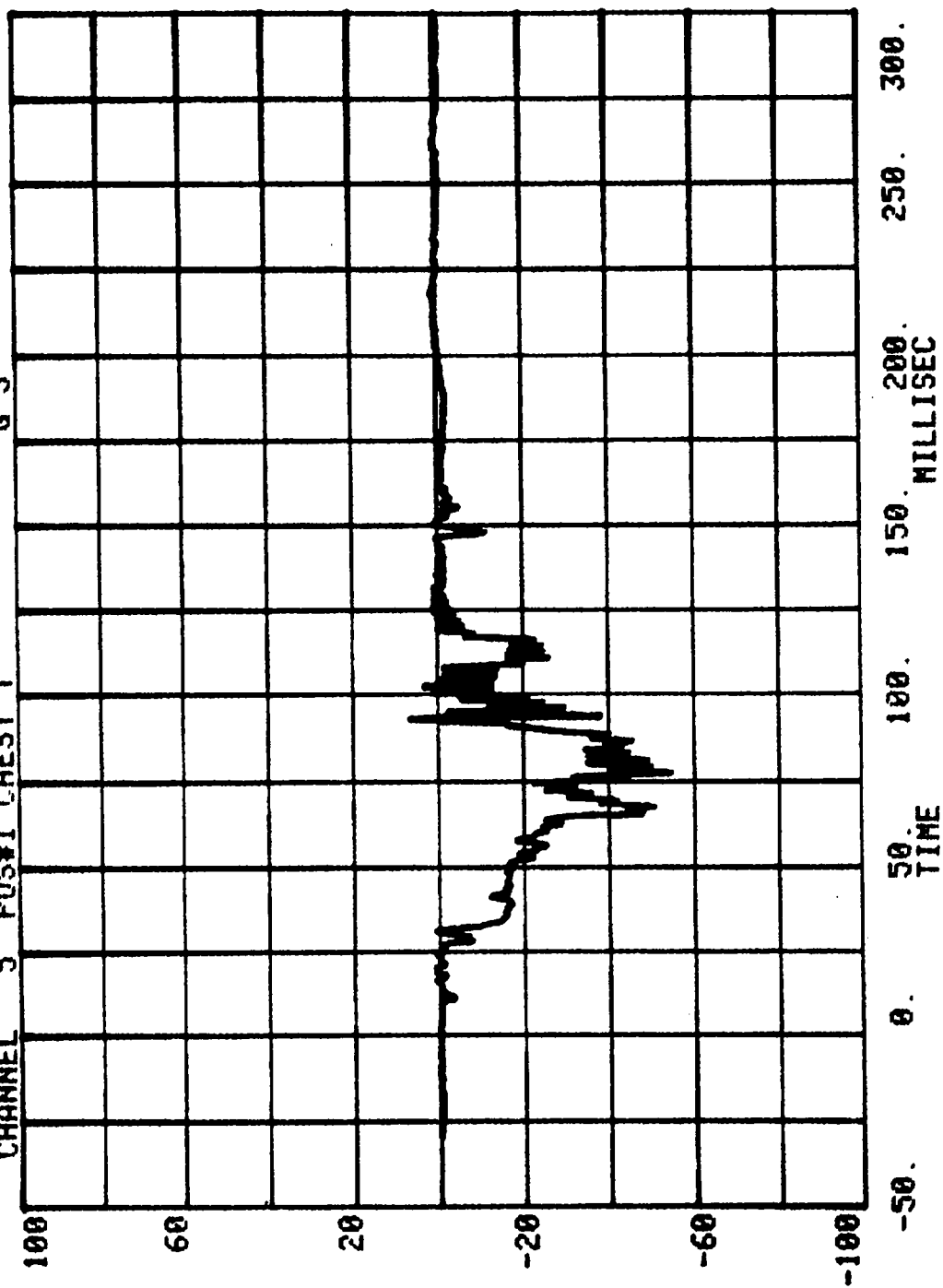
CHANNEL 4 POS#1 CHEST X RUN= 709 SERIES= 5401 G'S



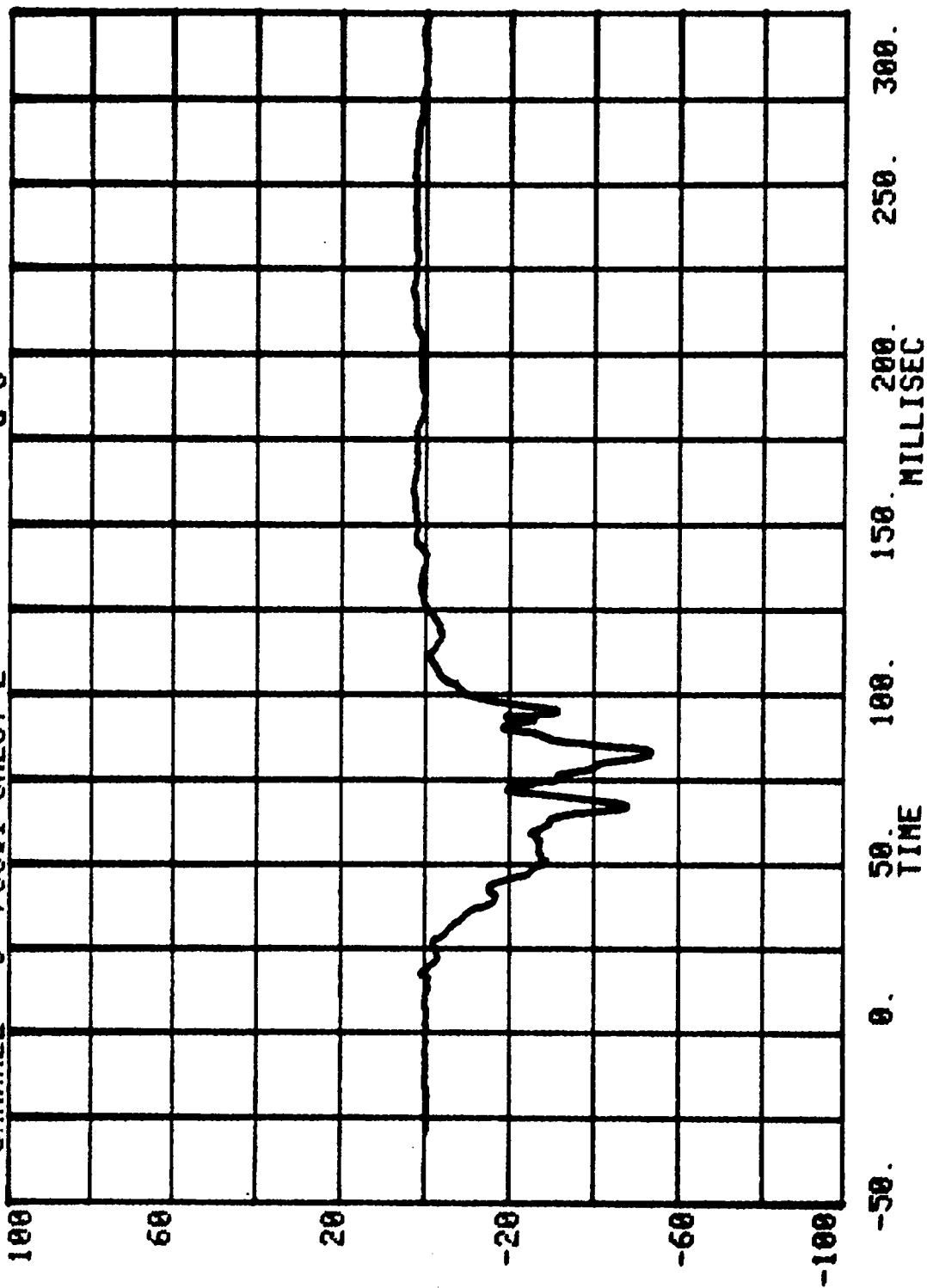
CHANNEL 5 POS#1 CHEST Y G'S

RUN= 709

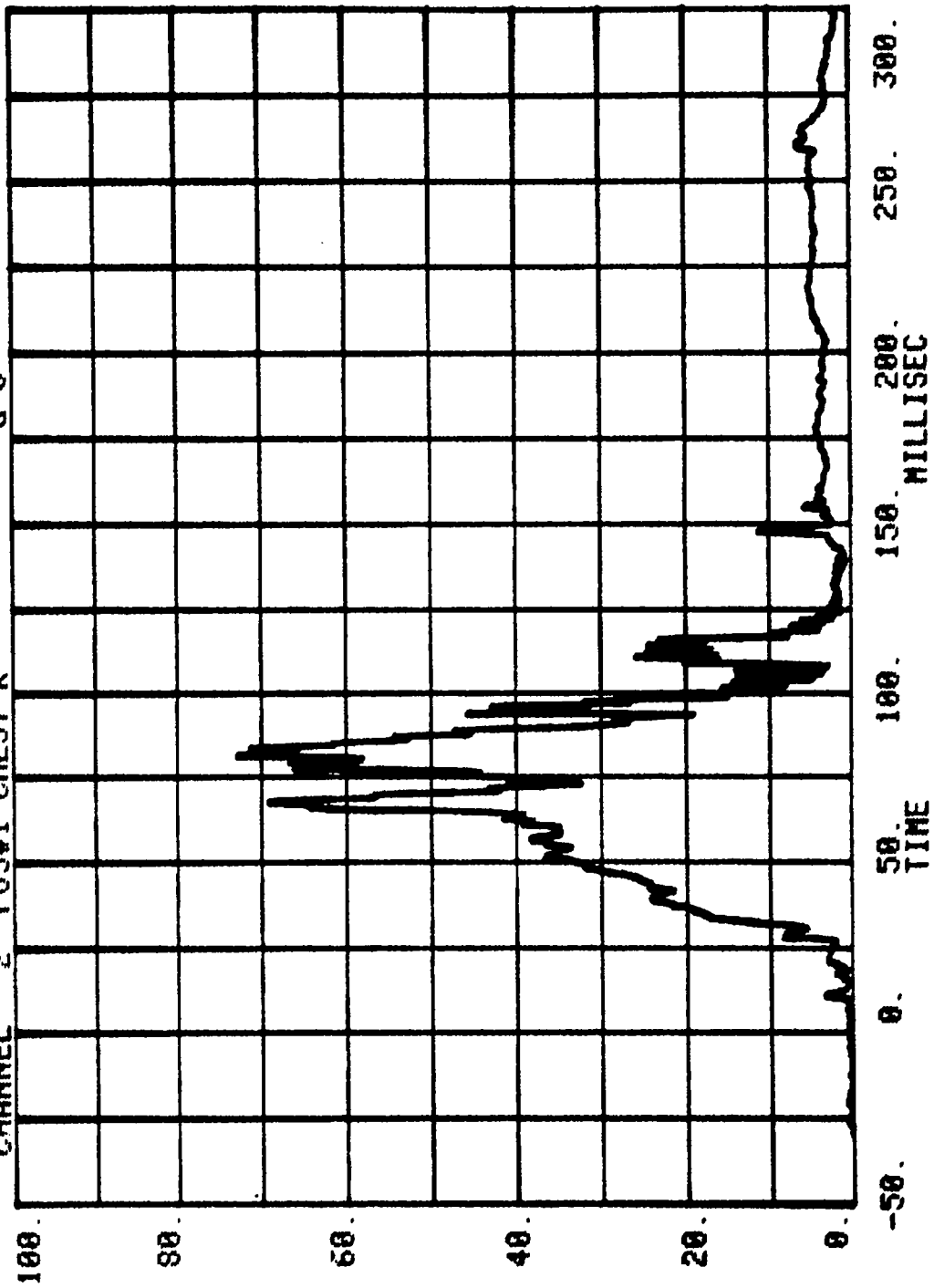
SERIES= 5401



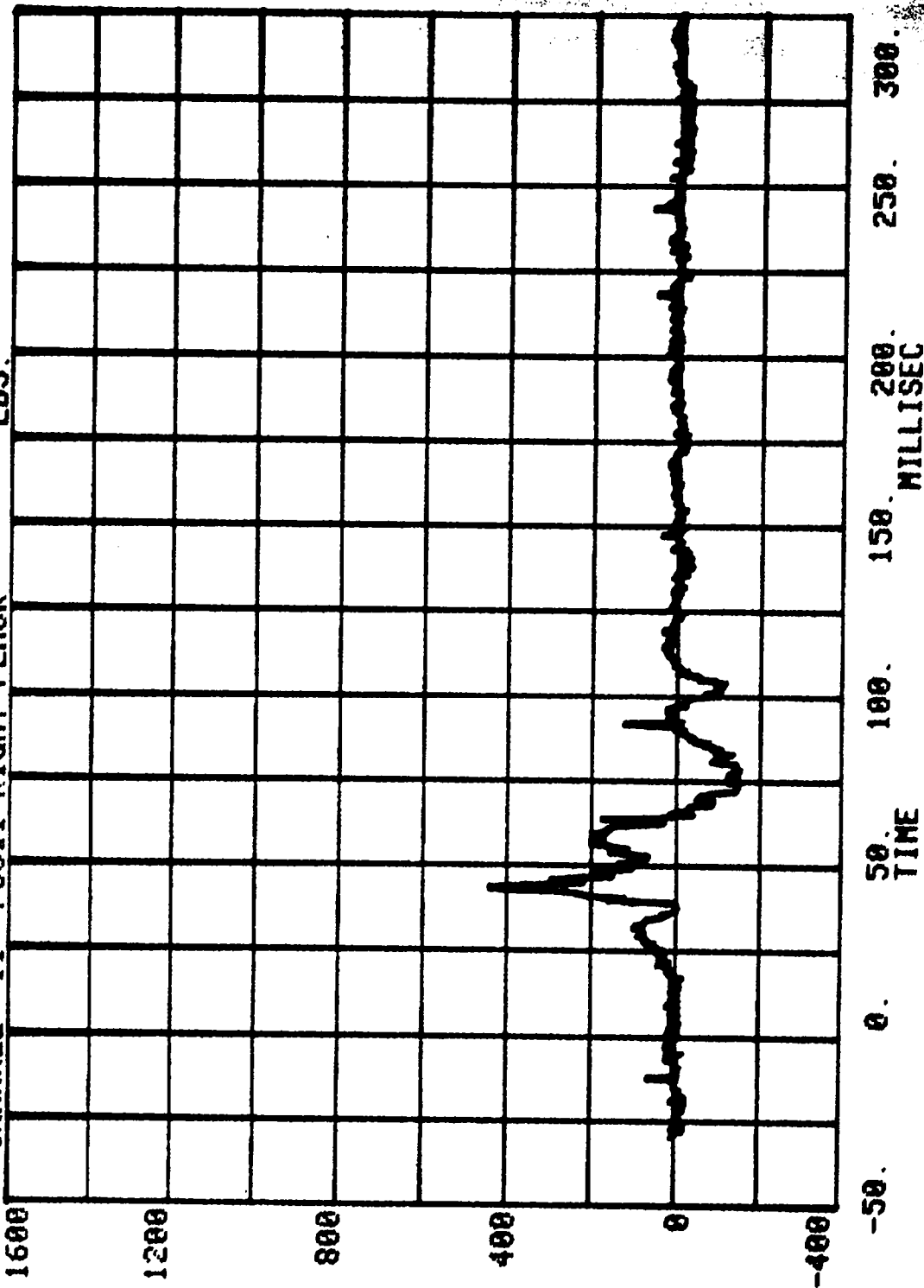
RUN= 709 SERIES= 5401
CHANNEL 6 POS#1 CHEST Z G'S



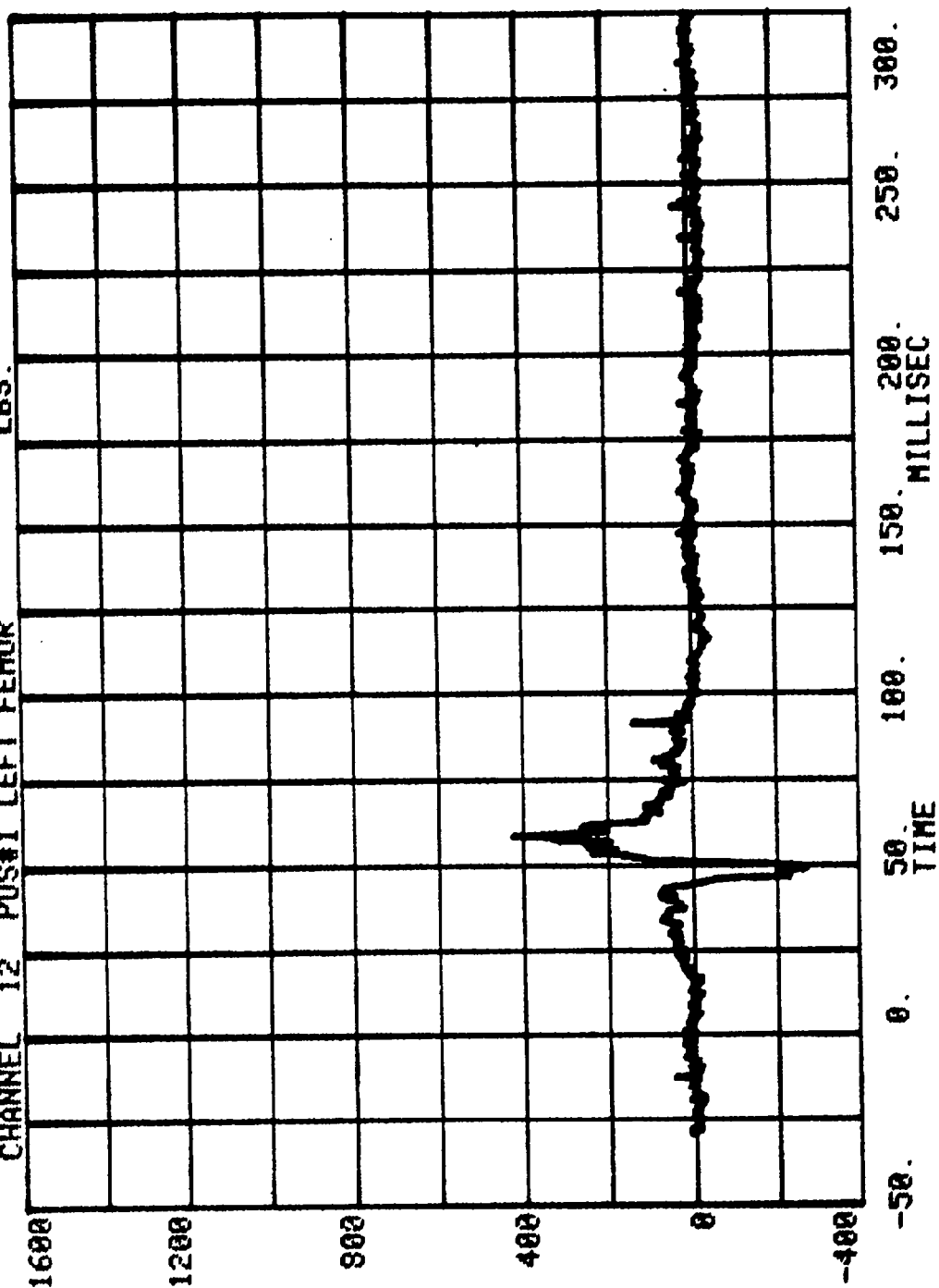
CHANNEL 2 POS#1 CHEST R RUN= 702 SERIES= 5401 G'S



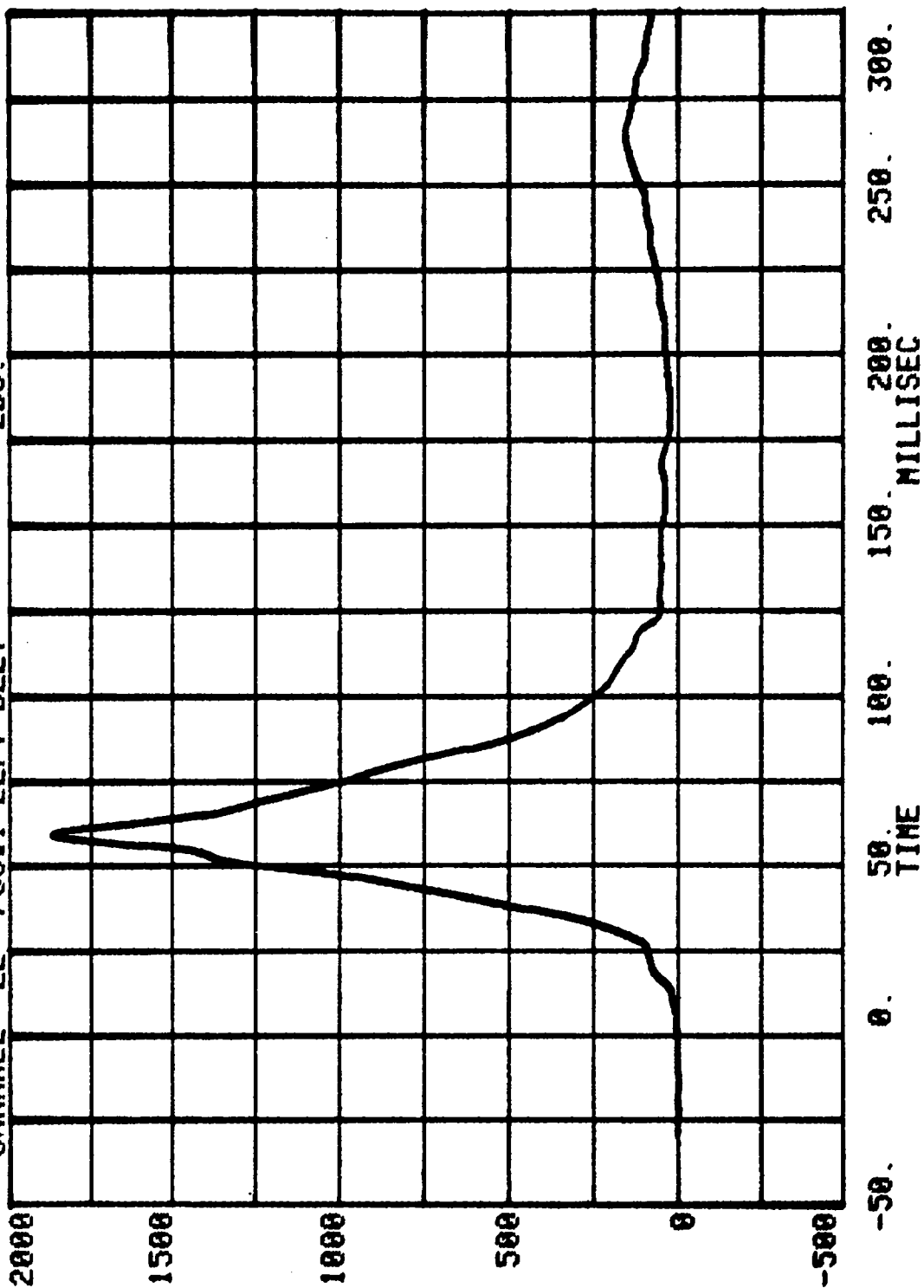
CHANNEL 11 POS#1 RIGHT FEMUR
RUN= 709 SERIES= 5401 LBS.



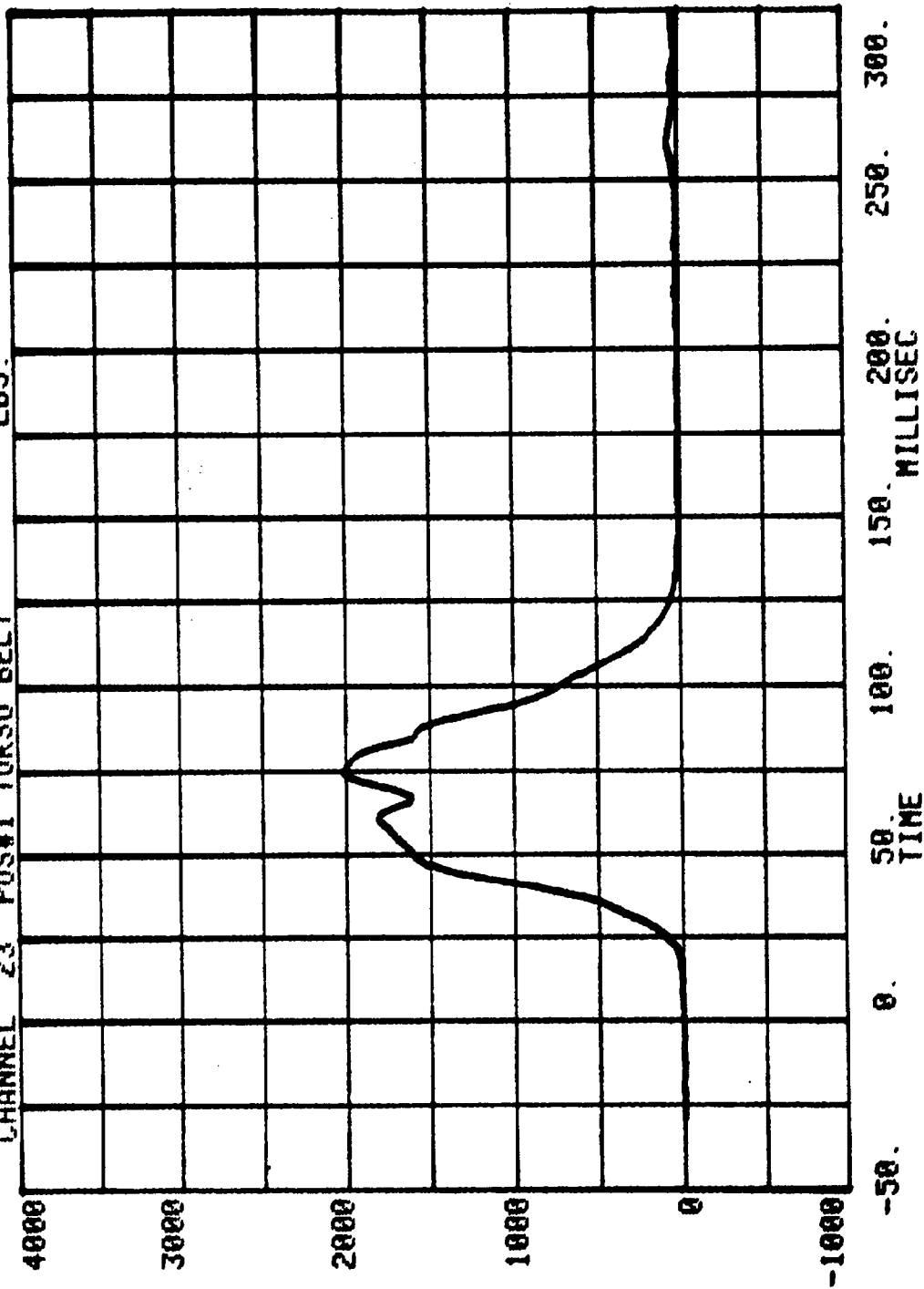
CHANNEL 12 POS#1 LEFT FEMUR
RUN= 709 SERIES= 5401 LBS.



RUN= 709 SERIES= 5401 LBS.
CHANNEL 22 POS#1 LEFT BELT

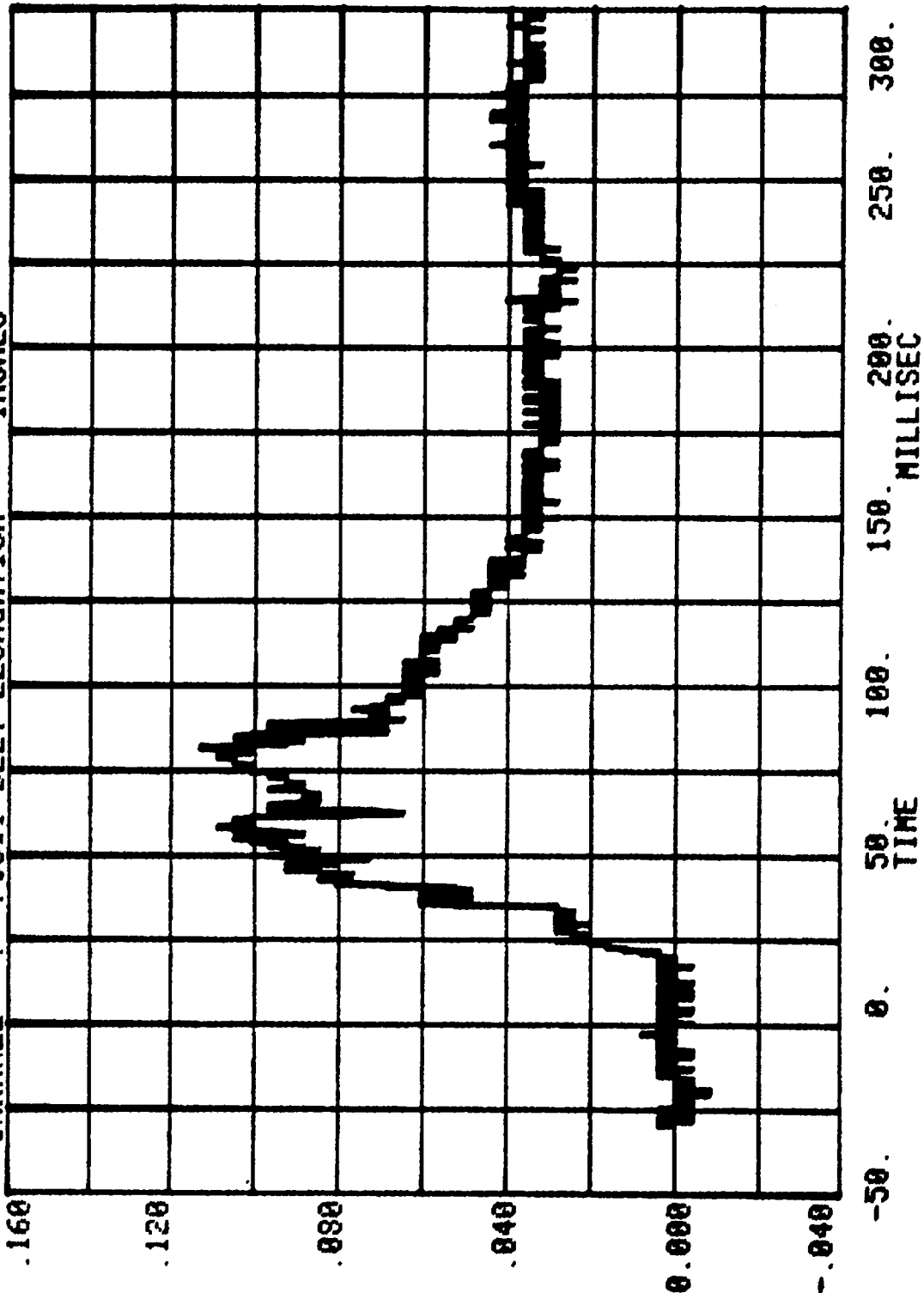


CHANNEL 23 POS#1 TORSO BELT
RUN= 709 SERIES= 5401 LBS.



MEASURED OVER 2.5 INCHES

RUN= 789 SERIES= 5401
CHANNEL 7 POS#1 BELT ELONGATION INCHES



HEAD INJURY CRITERION
HEAD SEVERITY INDEX

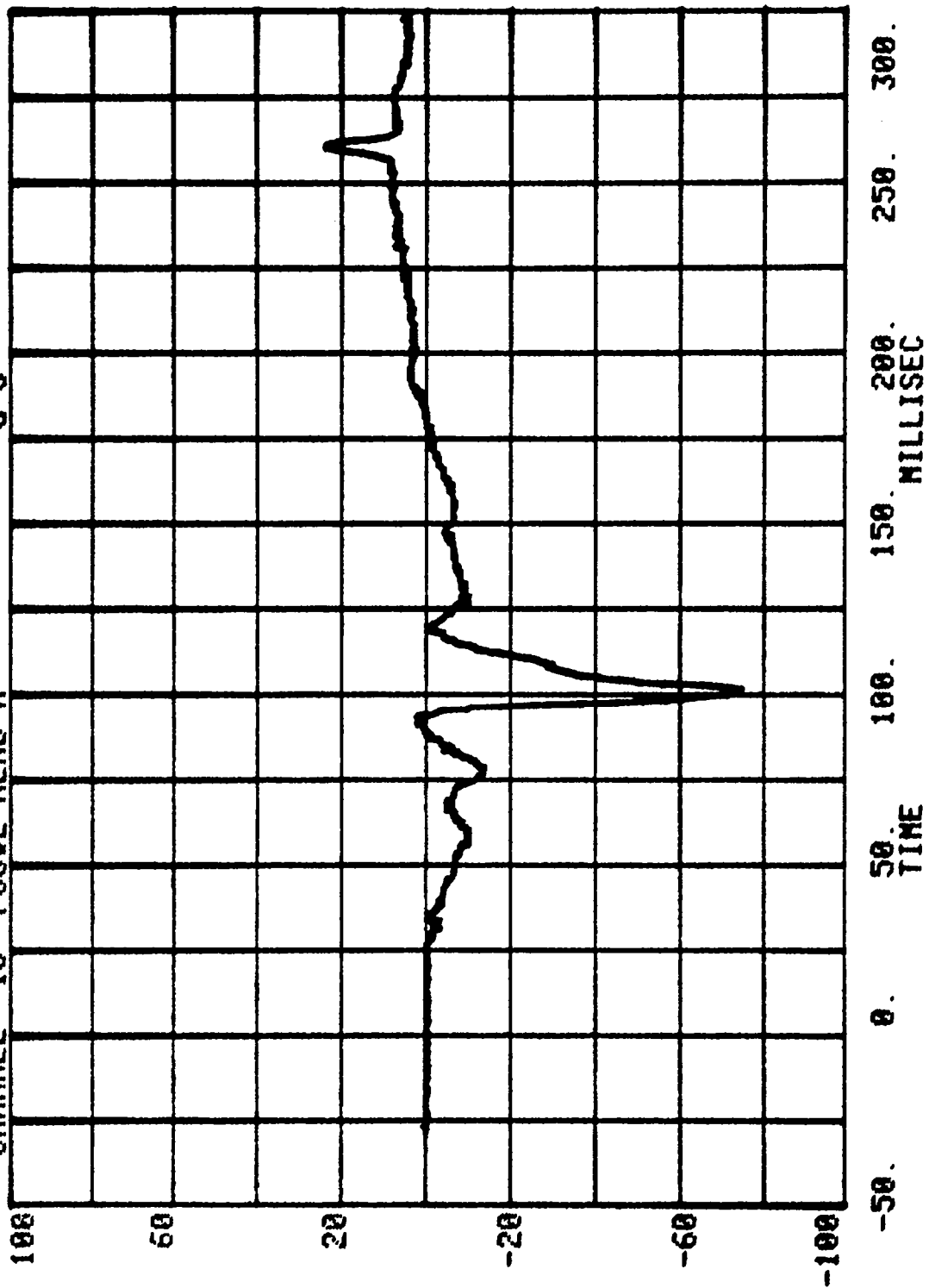
NEW CAR ASSESSMENT BARRIER TESTS - 1986

RUN= 709

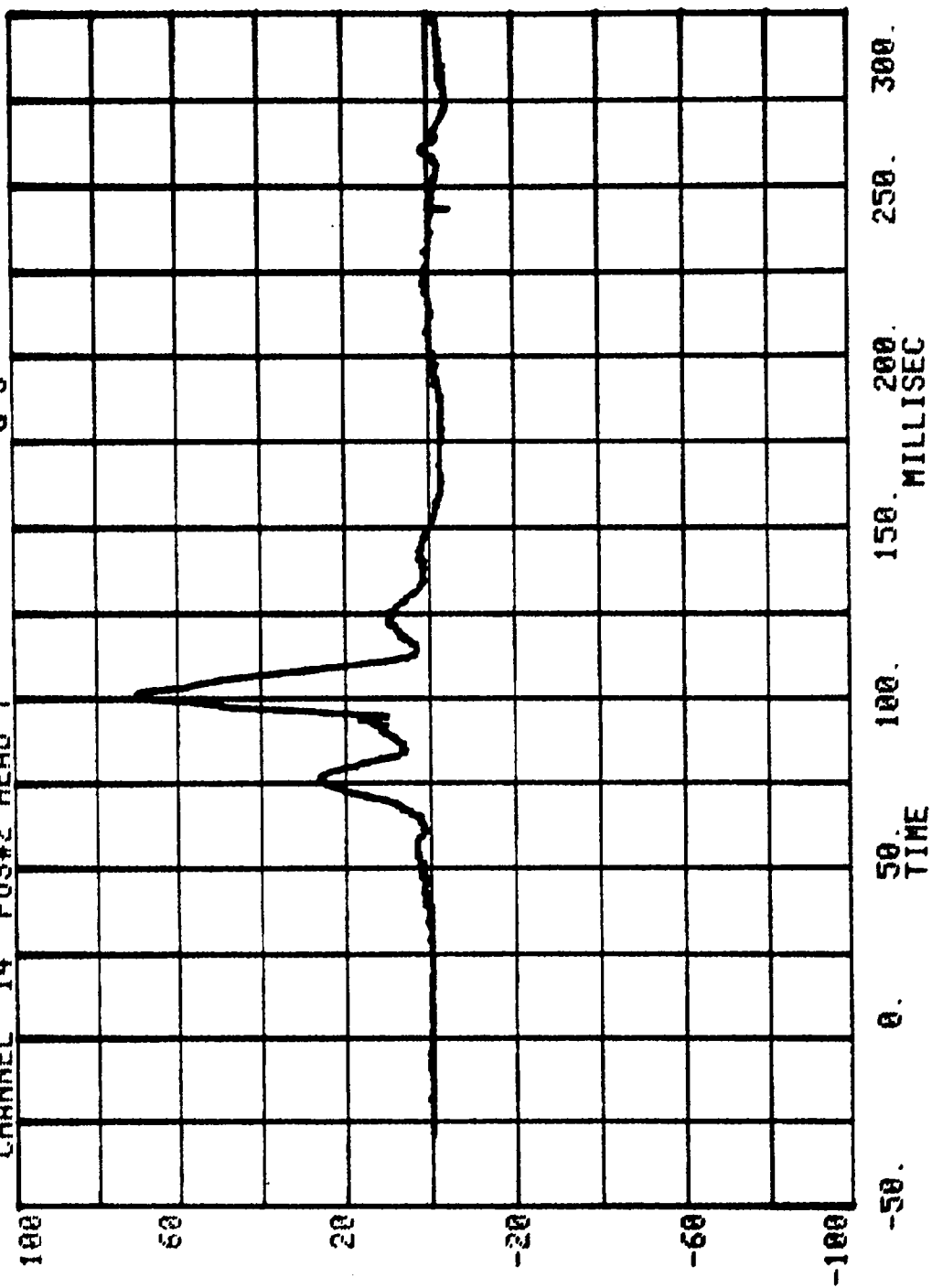
POS#2 HEAD R

HIC= 893.7 FROM T1= .09652 TO T2= .10665
AVERAGE ACCELERATION BETWEEN T1 AND T2= 95.1G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1537.1

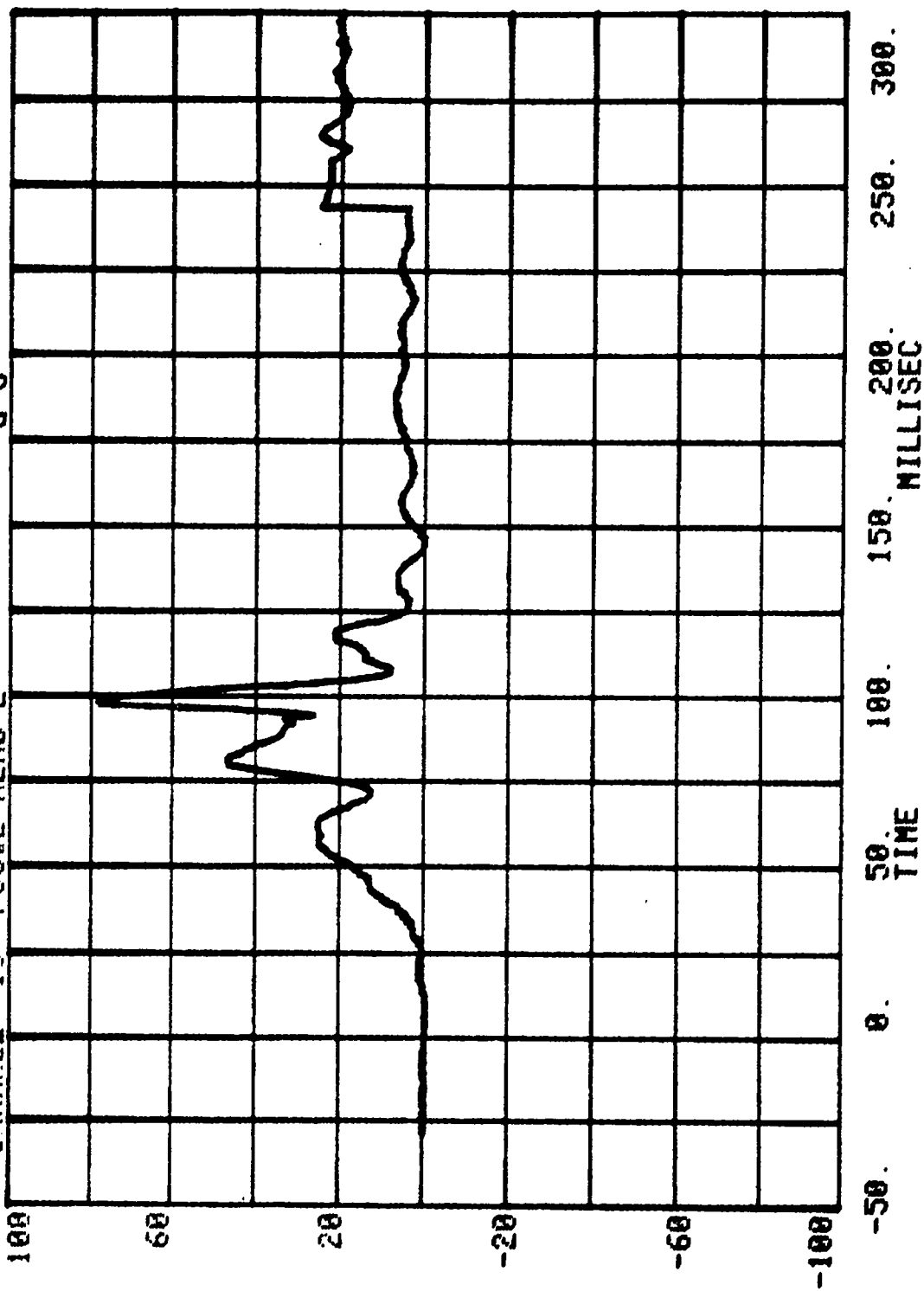
CHANNEL 13 POS#2 HEAD X
RUN= 709 SERIES= 5401 G'S

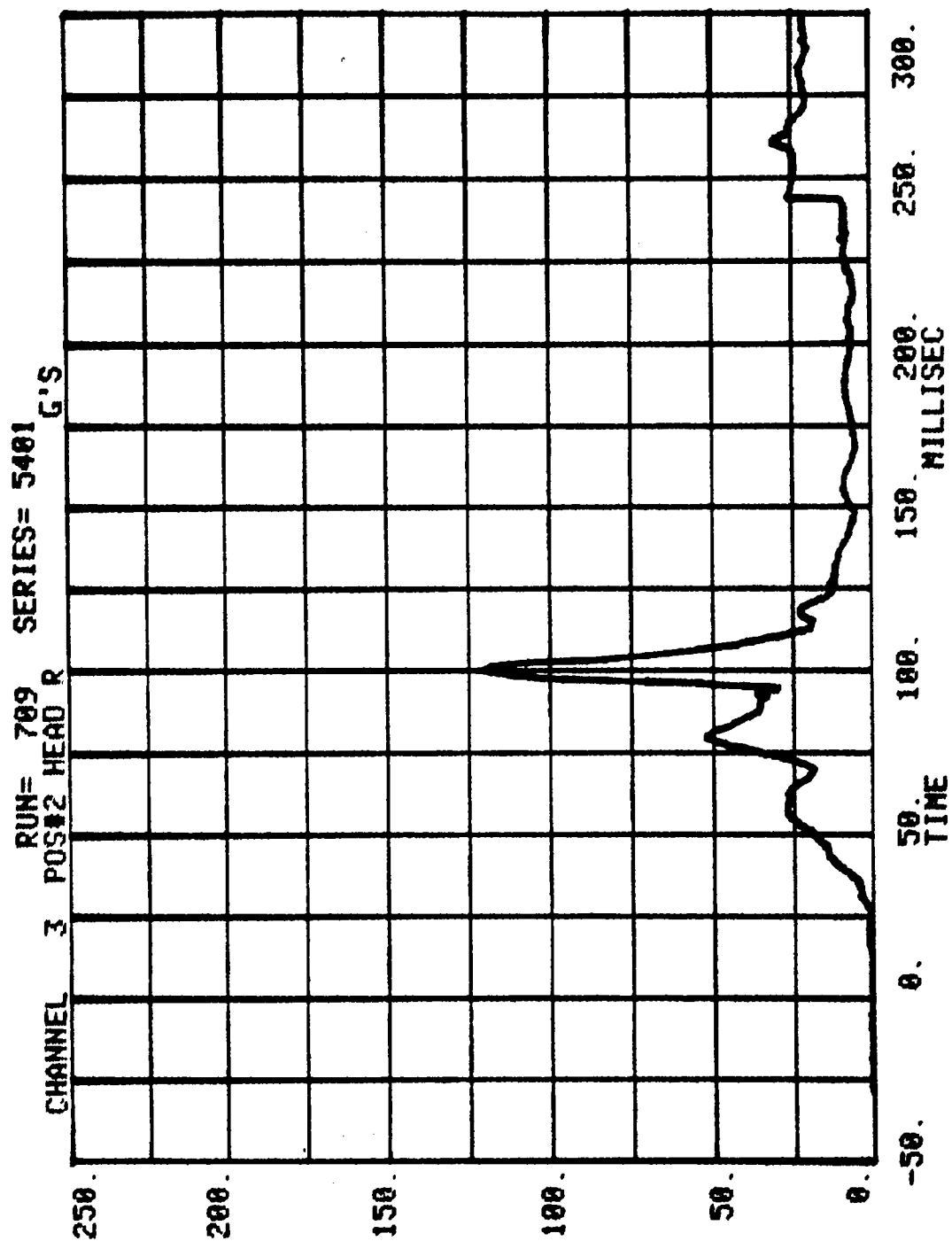


CHANNEL 14 POS#2 HEAD Y RUN= 709 SERIES= 5401 G'S

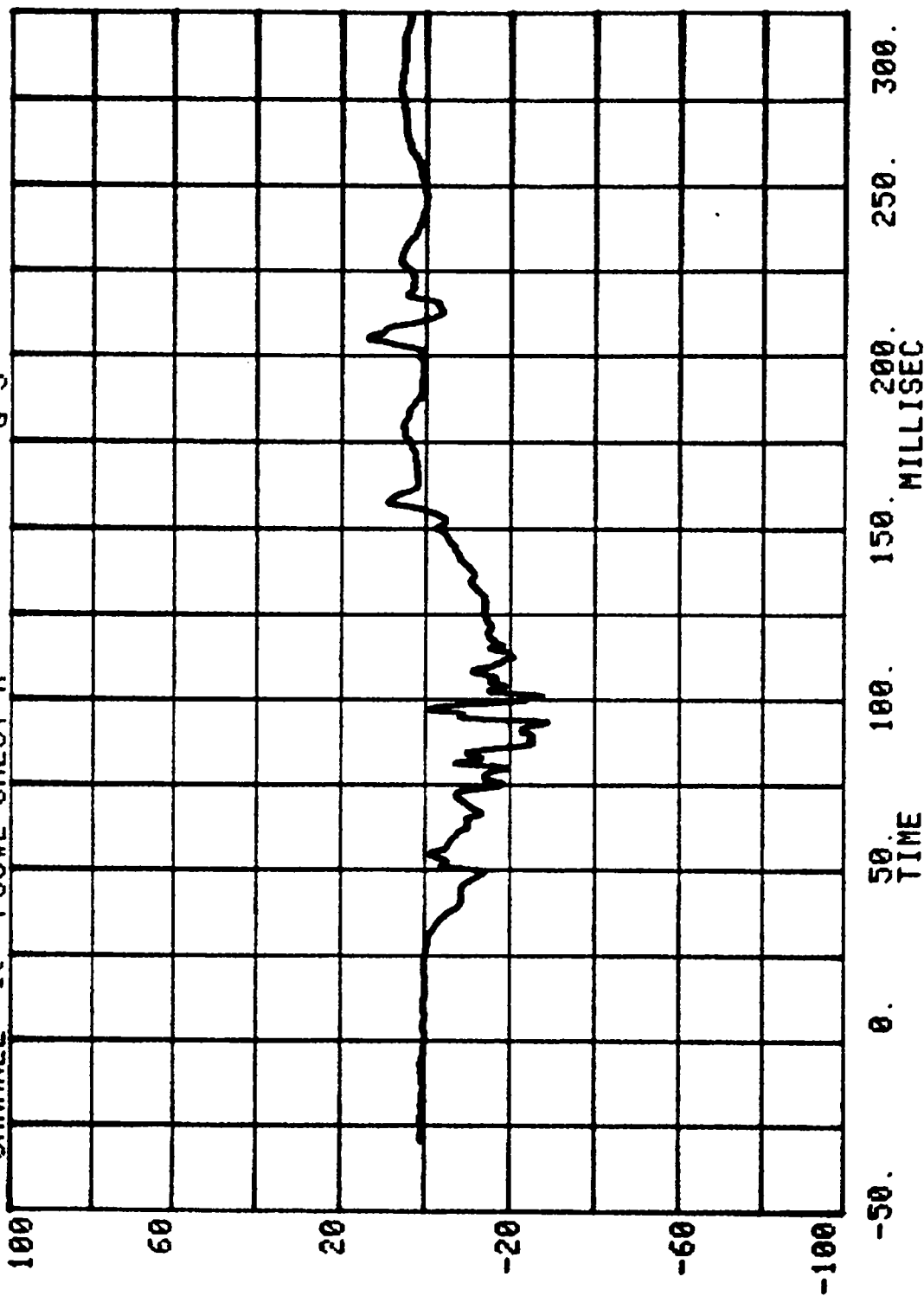


CHANNEL 15 POS#2 HEAD 2 RUN= 709 SERIES= 5401 G'S





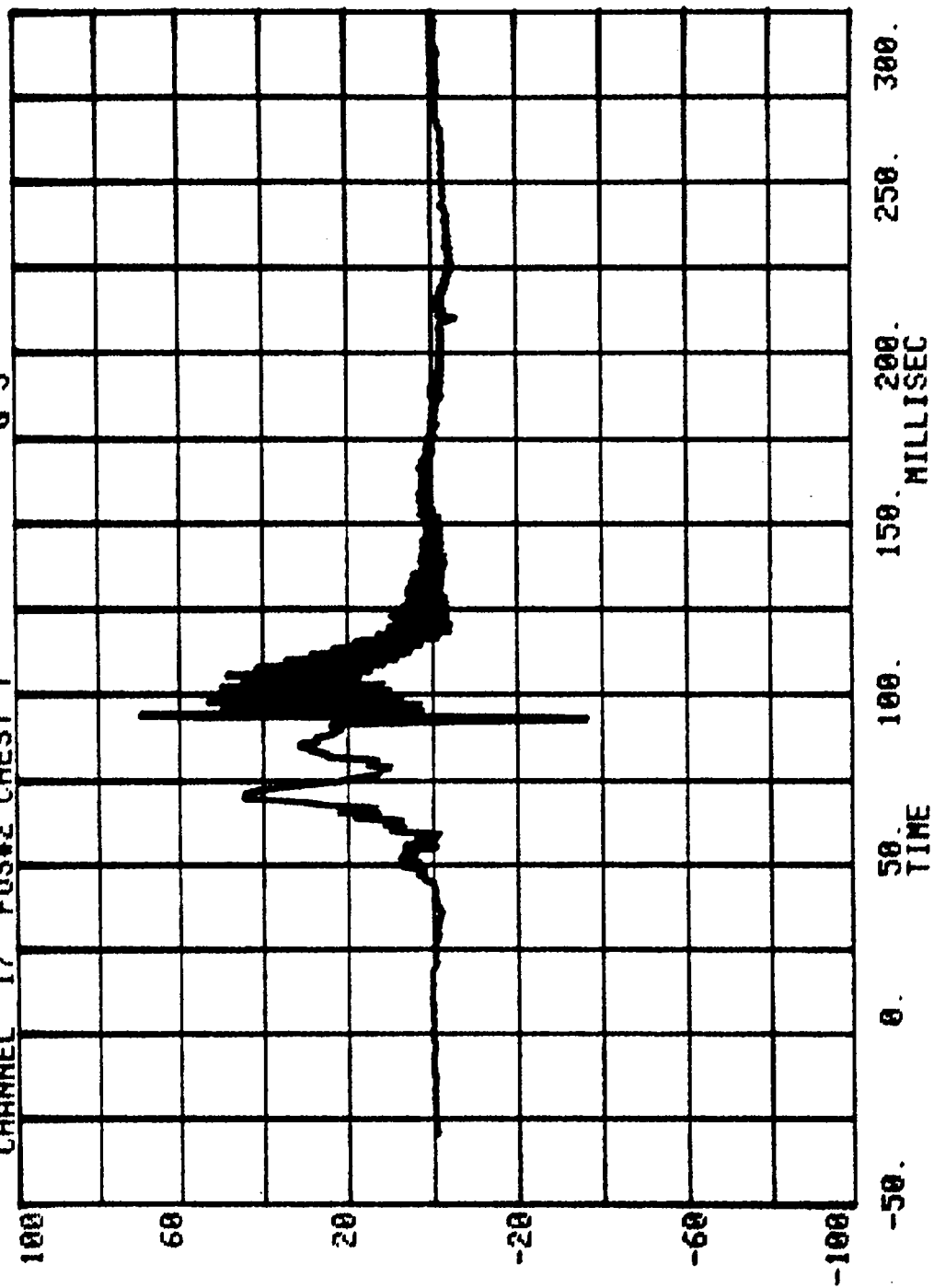
CHANNEL 16 POS#2 CHEST X RUN= 709 SERIES= 5401 G'S



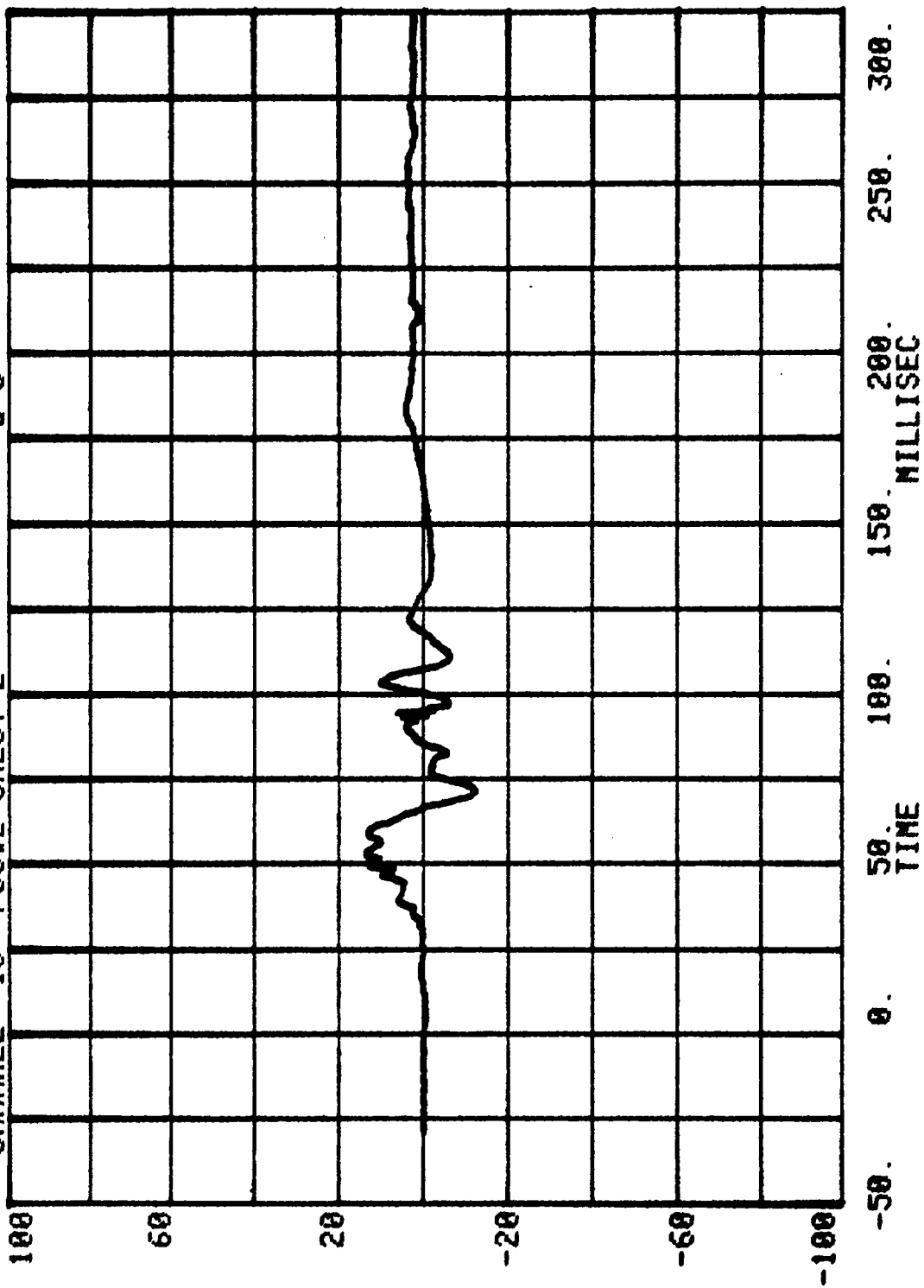
CHANNEL 17 POS#2 CHEST Y G'S

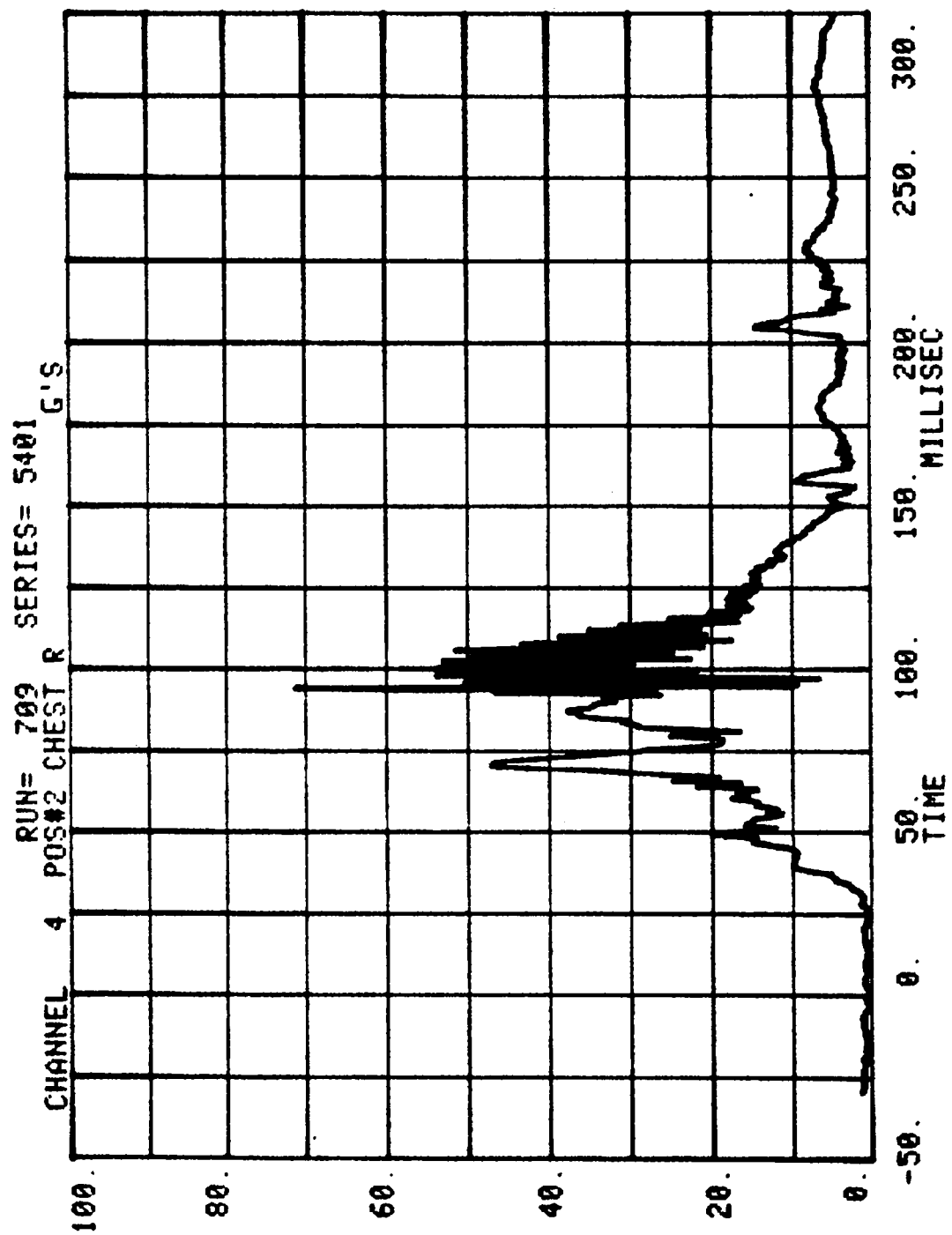
RUN= 709

SERIES= 5401



CHANNEL 18 POS#2 CHEST Z RUN= 709 SERIES= 5401 G'S

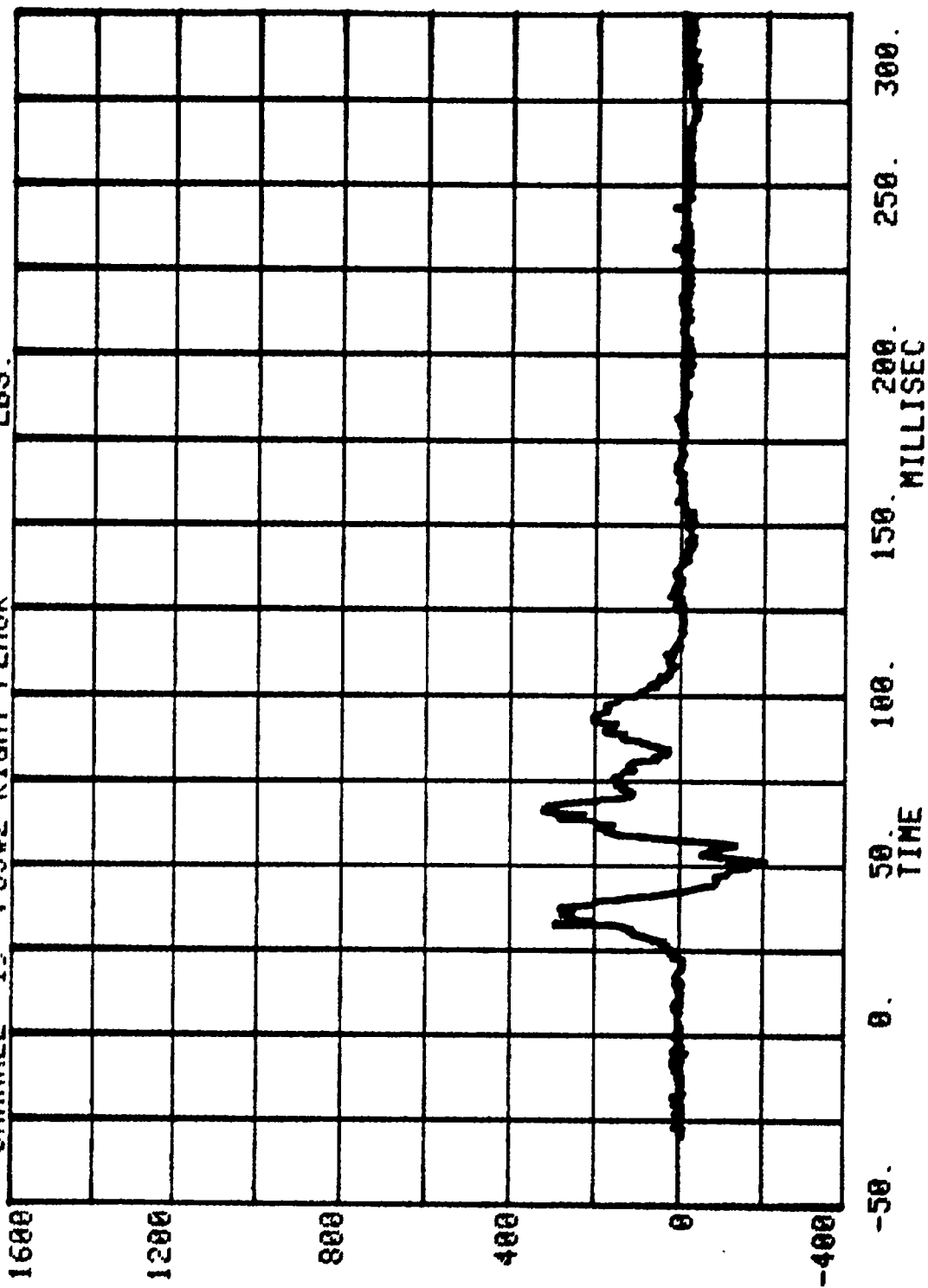




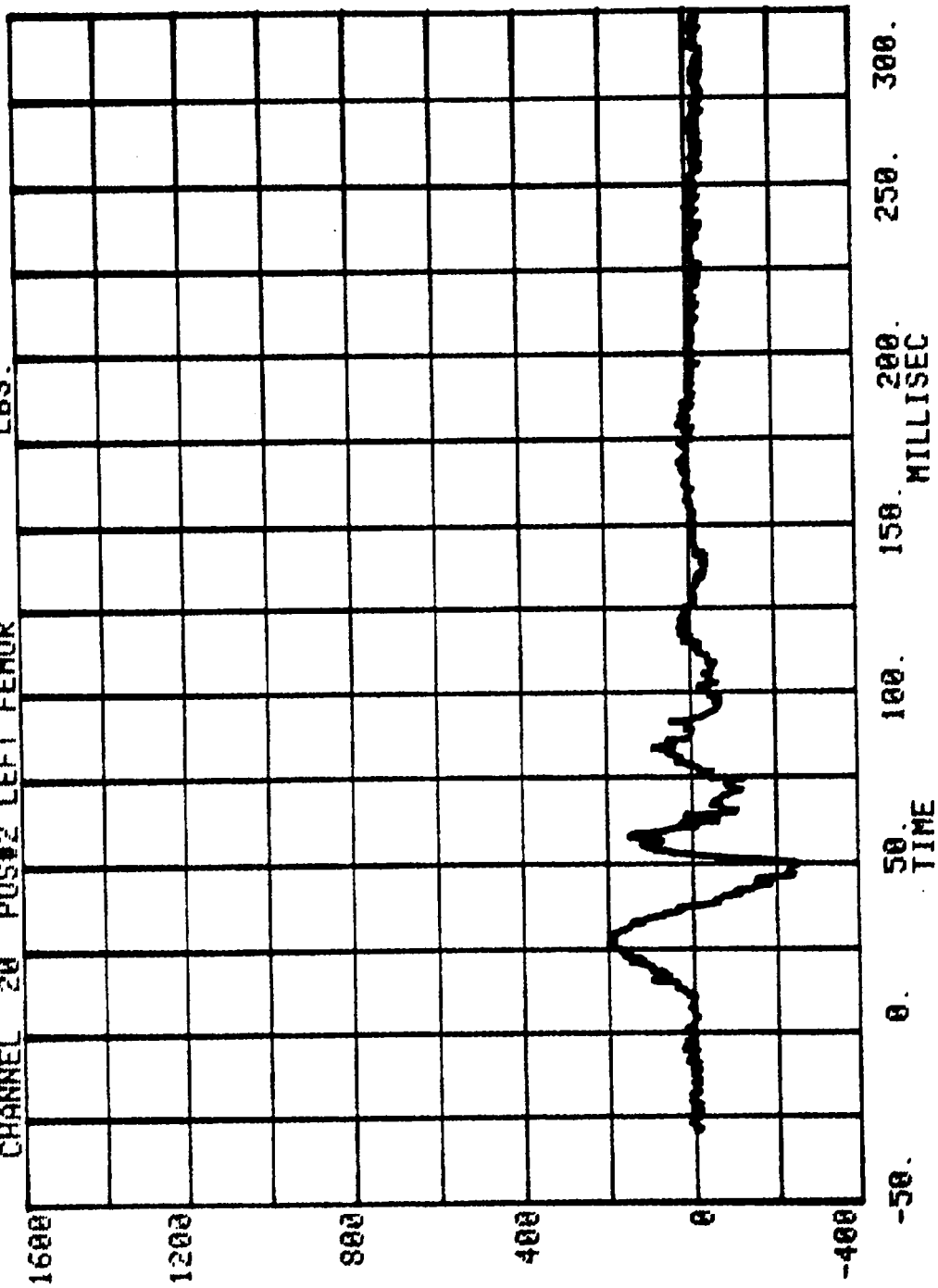
CHANNEL 19 POS#2 RIGHT FEMUR

RUN= 709 SERIES= 5401

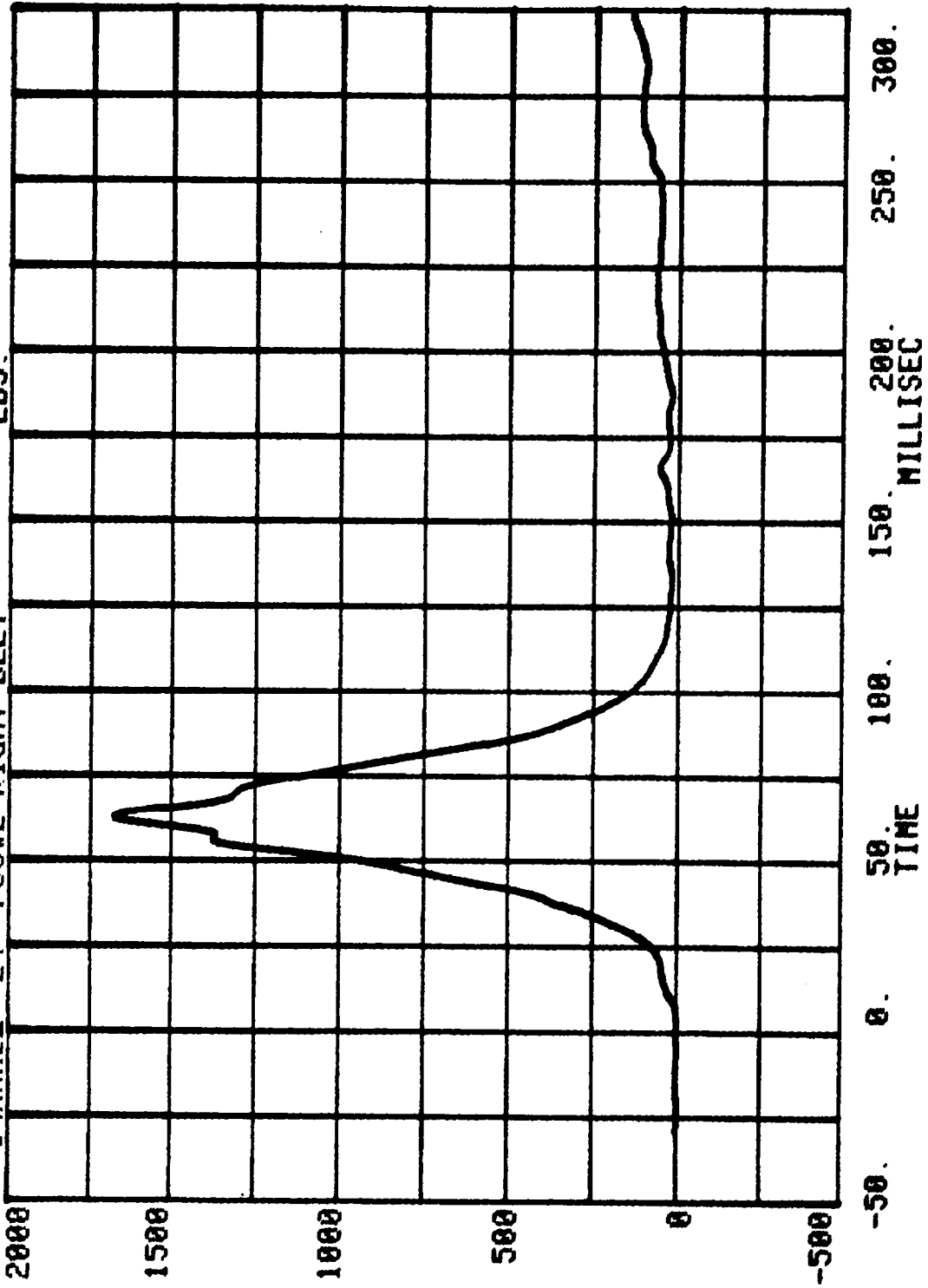
LBS.



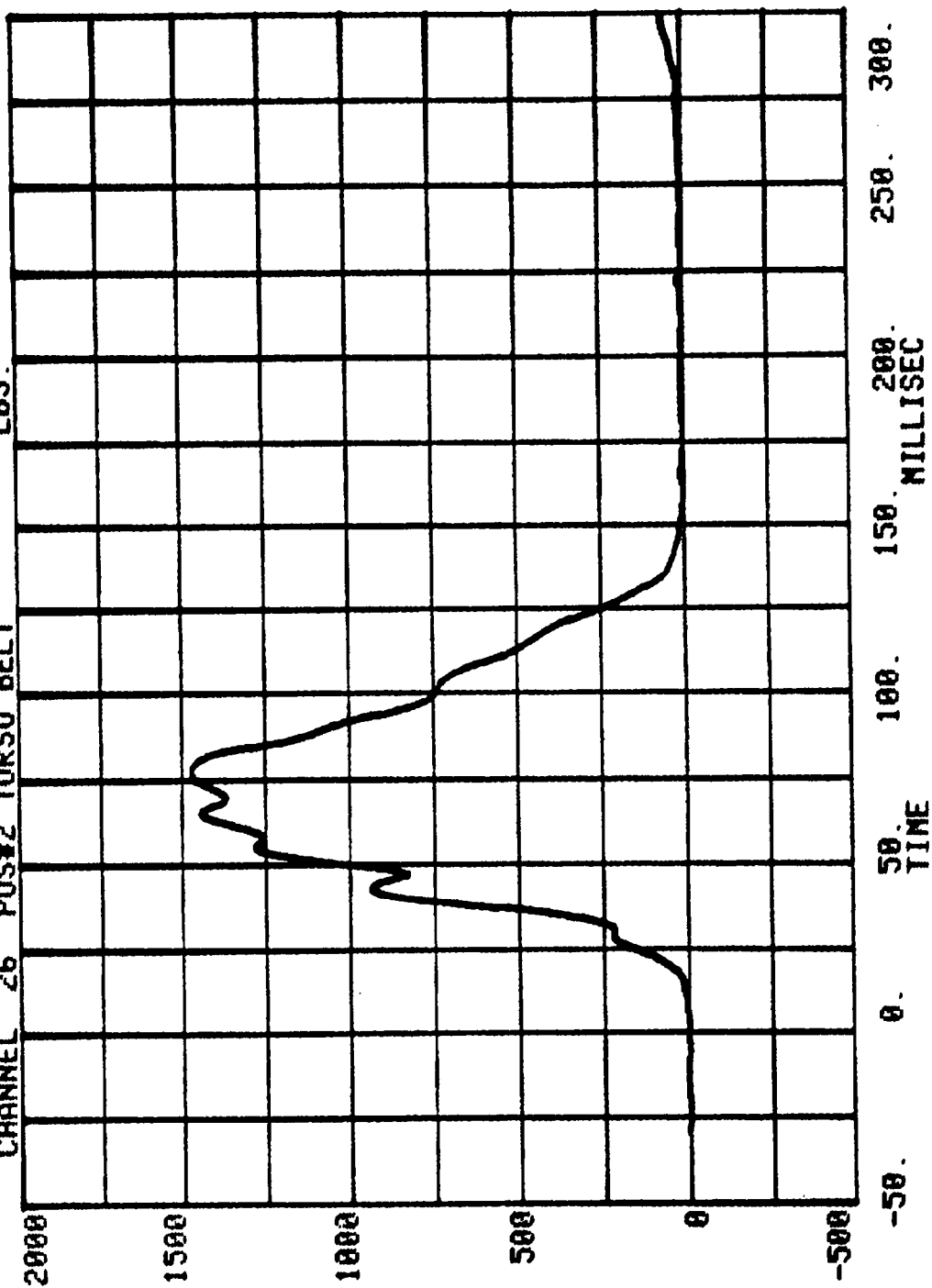
RUN= 709 SERIES= 5401 LBS.
CHANNEL 20 POS#2 LEFT FEMUR



RUN= 709 SERIES= 5401
CHANNEL 24 POS#2 RIGHT BELT LBS.



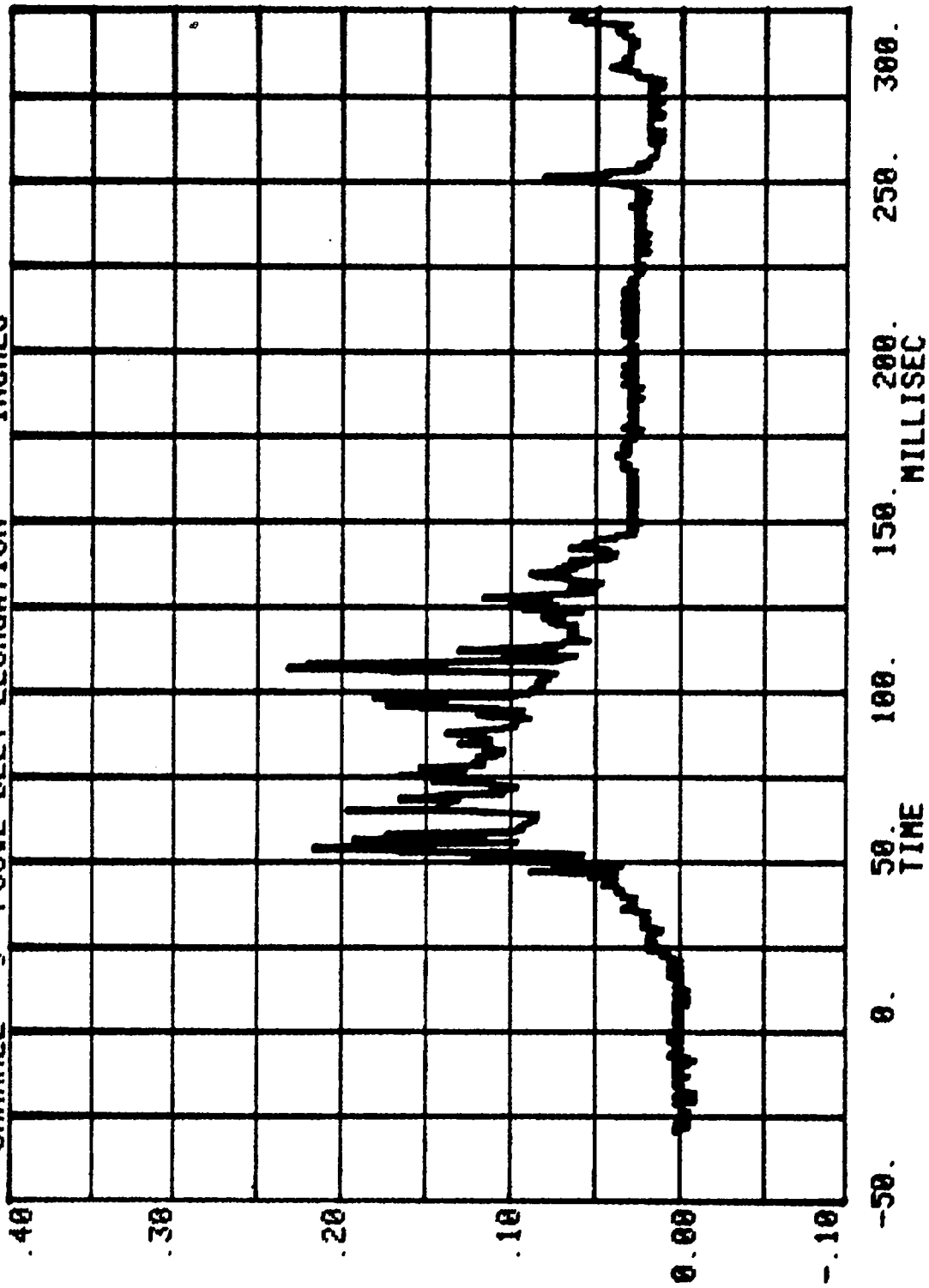
CHANNEL 26 POS#2 TORSO BELT
RUN= 709 SERIES= 5401 LBS.



Measured over 2.5 inches

CHANNEL 9 POS#2 BELT ELONGATION INCHES

RUN= 709 SERIES= 5401



APPENDIX C
DUMMY CERTIFICATION TESTS

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

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

Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
1020	1/3/86
1021	1/3/86

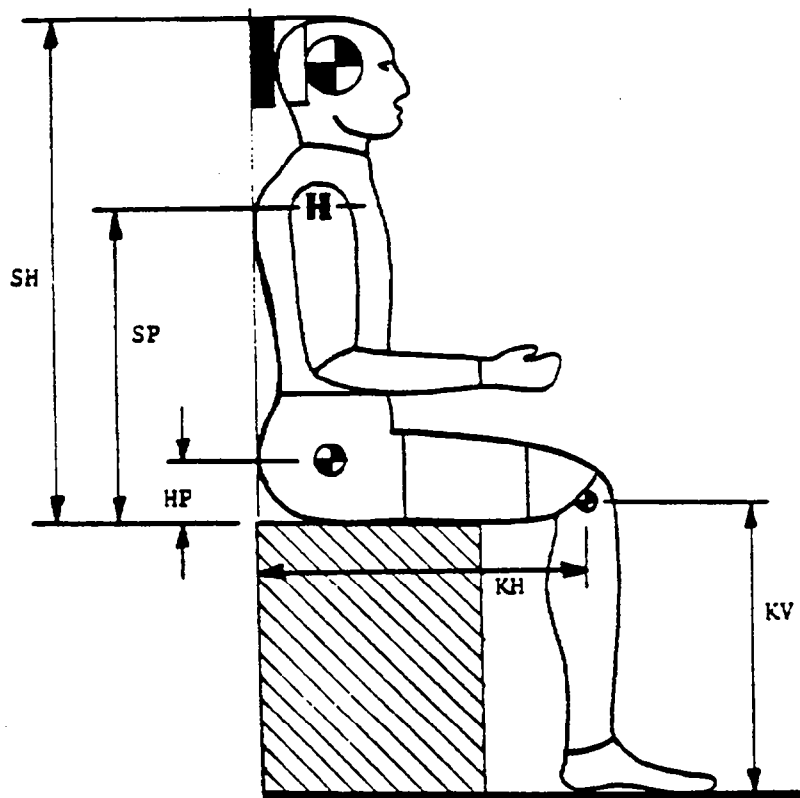
Electronic Test Equipment

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.: 1020

I. CONFIGURATION VERIFICATION DATA:



	P. 572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		1/3/86	
VERIFICATION NUMBER FOR DUMMY*		1	
SH - Seated Height- - - - -	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height- - -	21.8 to 22.4"	22.2"	
HP - Hip Pivot Height - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.7"	
KV - Knee Pivot from floor- - -	19.3 to 19.9"	19.6"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	18.0"	
HW - Hip Width- - - - -	14.0 to 15.4"	14.6"	

TECHNICIAN'S NAME: G. Gestwick

* 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: G. Gestwick

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		1/3/86	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		68° - 70° °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		25% - 36% %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	245 g.	
b. Peak Lateral Accel.- -	≤ - 10G	8 g.	
c. Time above 100G- - -	0.9 to 1.5ms	1.2 ms.	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	23.8 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	23.5 g.	
c. Peak Resultant Head Acceleration - - - -	26G max.	26 g.	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2.2 ms.	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	25.9 ms.	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	2.5 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	27.5 ms.	
	Displ.- 2.1 to 3.1"	3.1"	
60°	Time- - 40.3 to 51.7ms	41.5 ms.	
	Displ.- 4.3 to 5.3"	5.3"	
Maximum (70°)	Time- - 53.2 to 66.8ms	57.5 ms.	
	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: G. Gestwick

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	73.5 ms.	
	Displ.	4.3 to 5.3 in.	5.3"	
30°	Time	85.4 to 104.6 ms	87 ms.	
	Displ.	2.1 to 3.1 in.	2.6"	
0°	Time	101.0 to 123.0 ms	105 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.	29.5 lbs.	
b. Force @ .75"- - - -		36 to 50 lbs.	42.0 lbs.	
c. Force @ 1.0"- - - -		50 to 63 lbs.	61.5 lbs.	
d. Force @ 1.3"- - - -		73 to 88 lbs.	85.5 lbs.	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20°- - - -		22 to 34 lbs.	28.5 lbs.	
b. Force @ 30°- - - -		34 to 46 lbs.	42.5 lbs.	
c. Force @ 40°- - - -		46 to 58 lbs.	53.5 lbs.	
d. Return Angle - - - -		12° maximum	7°	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed- - -	21.78-22.22 fps		22.03 fps	
(2) Peak Deflection- -	1.7" maximum		1.64"	
(3) Peak Resistive Force- - - - -	2250 lbs. maximum		2020 lbs.	
(4) Internal Hysteresis - - - -	50 to 70%		51.9%	
b. Low Speed				
(1) Probe Speed- - -	13.86-14.14 fps		13.89 fps	
(2) Peak Deflection- -	1.1" maximum		.96"	
(3) Peak Resistive Force- - - - -	1450 lbs. maximum		1140 lbs.	
(4) Internal Hyster. - -	50 to 70%		59.5%	

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1020

TECHNICIAN'S NAME: G. Gestwick

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	6.88 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2100 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.95 ms.	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.00 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1975 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	2.15 ms.	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

HTSA DUMMY ID NO. 1020 CALIB. SEQ. NOS. FOR DUMMY: 1

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:

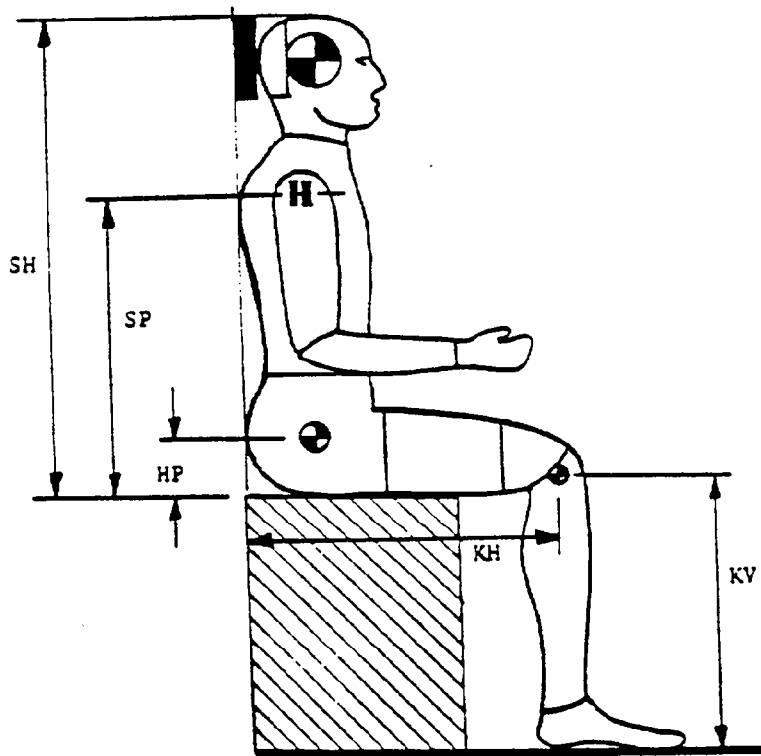
- 1. Pendulum Accelerometer - - -
- 2. Test Probe Accelerometer - - -
- 3. Lumbar Flexion Test Push
Force Gauge - - - - -
- 4. Abdominal Compression Test
Force Gauge - - - - -
- 5. Abdominal Compression Test
Displacement Gauge - - - - -

<u>MANUFACTURER</u>	<u>SERIAL NUMBER</u>	<u>DATE LAST CALIBRATED</u>	<u>DATE OF NEXT CALIBRATION</u>
NA	--	--	--
Endevco	CS70	10-85	4-86
Endevco	CH35	10-85	4-86
Endevco	CU88	10-85	4-86
NA	--	--	--
CEC	A84	10-85	4-86
Endevco	CY71	10-85	4-86
CEC	A86	10-85	4-86
NA	--	--	--
GSE	551	11-85	5-86
GSE	552	11-85	5-86
CEC	18259	9-85	3-86
CEC	17815	9-85	3-86
Transducer Inc.	20051	11-85	5-86
BLH	72952	11-85	5-86
CIC	567-11	11-85	5-86

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1021

1. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		1/3/86	
VERIFICATION NUMBER FOR DUMMY*		1	
SH - Seated Height- - - - -	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height- - -	21.8 to 22.4"	22.2"	
HP - Hip Pivot Height - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.5"	
KV - Knee Pivot from floor- - -	19.3 to 19.9"	19.8"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	18.0"	
HW - Hip Width- - - - -	14.0 to 15.4"	15.0"	

TECHNICIAN'S NAME: Gary Gestwick

* 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.: 1021

TECHNICIAN'S NAME: G. Gestwick

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		1/3/86	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		68° - 70° °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		25% - 36% %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	220 g.	
b. Peak Lateral Accel.-	≤ - 10G	3 g.	
c. Time above 100G- - -	0.9 to 1.5ms	1.2 ms.	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	23.7 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	24 g.	
c. Peak Resultant Head Acceleration - - -	26G max.	26 g.	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	1.9 ms.	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	25.6 ms.	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	2.5 ms.	
g. Max. Head Rotation - -	63 to 73°	68°	
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	27 ms.	
	Displ.- 2.1 to 3.1"	3.1"	
60°	Time- - 40.3 to 51.7ms	42 ms.	
	Displ.- 4.3 to 5.3"	5.2"	
Maximum	Time- - 53.2 to 66.8ms	57.5 ms.	
(68 °)	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:

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1021

TECHNICIAN'S NAME: G. Gestwick

TEST PARAMETER		SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. NECK BENDING TEST....				
<u>Continued:</u>				
b. Chordal Displacement:				
Head Rotation Angle--				
60°	Time	67.0 to 83.0 ms	71 ms.	
	Displ.	4.3 to 5.3 in.	5.0"	
30°	Time	85.4 to 104.6 ms	88 ms.	
	Displ.	2.1 to 3.1 in.	2.8"	
0°	Time	101.0 to 123.0 ms	103 ms.	
	Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5" - - - - -		23 to 36 lbs.	24.5 lbs.	
b. Force @ .75" - - - - -		36 to 50 lbs.	38.0 lbs.	
c. Force @ 1.0" - - - - -		50 to 63 lbs.	54.0 lbs.	
d. Force @ 1.3" - - - - -		73 to 88 lbs.	78.0 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	32.0 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	43.5 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	54.5 lbs.	
d. Return Angle - - - - -		12° maximum	8°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - - - -		21.78-22.22 fps	21.88 fps	
(2) Peak Deflection- - - - -		1.7" maximum	1.46"	
(3) Peak Resistive Force- - - - -		2250 lbs. maximum	2020 lbs.	
(4) Internal Hysteresis - - - - -		50 to 70%	57.0%	
b. Low Speed				
(1) Probe Speed- - - - -		13.86-14.14 fps	13.90 fps	
(2) Peak Deflection- - - - -		1.1" maximum	.95"	
(3) Peak Resistive Force- - - - -		1450 lbs. maximum	1170 lbs.	
(4) Internal Hyster. - - - - -		50 to 70%	55.0%	

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1021

TECHNICIAN'S NAME: G. Gestwick

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	7.00 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2200 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	2.1 ms.	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.93 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2175 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	2.1 ms.	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1021

CALIB. SEQ. NOS. FOR DUMMY: 1

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	CH83	10-85	4-86
Endevco	CU62	10-85	4-86
Endevco	CM86	10-85	4-86
NA	--	--	--
CEC	A91	10-85	4-86
Endevco	CE76	10-85	4-86
CEC	A72	10-85	4-86
GSE	306	11-85	5-86
GSE	310	12-85	6-86
CEC	18259	9-85	3-86
CEC	17815	9-85	3-86
Transducer Inc.	20051	11-85	5-86
CLH	72952	11-85	5-86
CIC	567-11	11-85	5-86

APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

63UJ-0270E

SEAT BELT RESTRAINT SYSTEM (if equipped)

Seat belts with retractors

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

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

NOTE

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

CAUTION

Replace seat belt assemblies that have undergone stress by occupants in a collision.

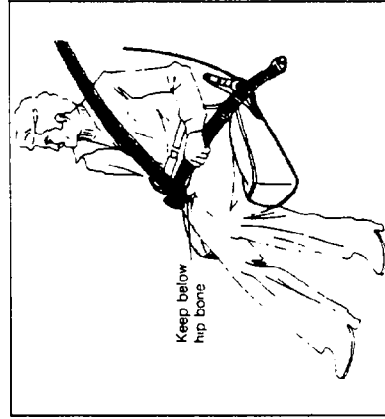
63UJ-0280E

FRONT SEAT BELTS

To Fasten Seat Belt:

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

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

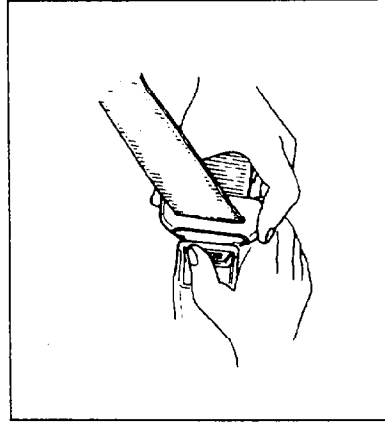


WARNING

Do not wear the shoulder belt under the arm, across the neck or over the inside shoulder. Any of these practices can reduce effectiveness of the restraint system.

To Unfasten Seat Belt

To unfasten the belt, depress the buckle release button.



2-11

Figure 14 VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS