

DOT# 193

REPORT NO. CAL-85-N04

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

CHRYSLER CORPORATION
1985 PLYMOUTH CARAVELLE
4-DOOR SEDAN

NHTSA NO. CF0303
CALSPAN TEST NO. 7333-5

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FINAL REPORT

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16. Abstract A frontal load cell barrier test of a 1985 Plymouth Caravelle 4-door sedan was performed at the Calspan Corporation, Advanced Technology Center crash test facility in Buffalo, New York, on January 30, 1985. Impact speed was 35.1 mph, and the ambient temperature at the barrier force at the time of impact was 35°F. The maximum post-test vehicle crush was 28.1 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" 2. FMVSS No. 219 (Partial), "Windshield Zone Intrusion" 3. FMVSS No. 301-75, "Fuel System Integrity" Type of Restraint System 3-point continuous webbing manual system at each front outboard seating position.					
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SECTION 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 85 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 CF0303

A load cell barrier consisting of 36 load cells was impacted by a 1985 Plymouth Caravelle 4-door sedan at a velocity of 35.1 mph. The test was performed at the Calspan Corporation Advanced Technology Center on January 30, 1985. 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 16 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions, according to dummy placement instructions specified in Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 1019) had been used in two previous tests (CF0301 and CF0302) and the Injury Criteria Values were not exceeded in these tests. The right-front passenger ATD (Serial 1020) was certified prior to the test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 65 channels of data were recorded in 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; the HIC was 684.8. The maximum chest deceleration over 3 milliseconds was 50.8 g's and femur loads were 1150 and 800 pounds.

The right-front passenger HIC was 759.8 and maximum chest deceleration over 3 milliseconds was 34.7 g's. Femur loads were 700 and 990 pounds.

Table 1

GENERAL TEST AND VEHICLE DATAVehicle Year/Make/Model/Body Style 1985 Plymouth Caravelle 4-Door SedanNHTSA No. CF0303 VIN. 1P3BJ46DOFC103742Body Color Red Date of Manufacture 8-84Engine: 4 cylinders; 135 C.I.D.; 2.2 Liters; -- CC
X Gas; -- Diesel; -- Turbocharged
-- Longitudinal; X TransverseTransmission 3 Speed -- Manual X Automatic -- Overdrive
Final Drive; X Front Wheel; -- Rear Wheel; -- Four WheelDate Received 11/26/84 Odometer Reading; 20 miles
-- A/C; X P/S; X P/B; -- P/wdo.; -- Tilt Wheel
-- P/seats; -- Cruise ControlType of Occupant Restraint Continuous Belt 3-pointDATA RECORDED FROM VEHICLE'S TIRE PLACARD:Tire Pressure (at capacity): Front 32 psi, Rear 32 psiRecommended Tire Size: P185/75R14Recommended Cold Tire Pressure: Front 26 psi, Rear 26 psiTires on Vehicle: P185/70R14; Manufacture: MichelinNumber of Occupants: 3 Front; 3 Rear; -- 3rd Seat; .6 TOTALType of Front Seats: -- Bucket; -- Bench; X Split BenchType of Front Seat Back: X Fixed; -- Adj. With -- Lever -- Rot. KnobVehicle Capacity Weight (VCW) = 1015 lbs. (A)No. of Occupants x 150 lbs. = 900 lbs. (B)Rated Cargo and Luggage
Weight (RCLW) A-B = 115 lbs.GVWR 3629 lbs. GAWR: Front 1981 lbs. Rear 1698 lbs.

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

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

Right Front = 810 lbs. Right Rear = 500 lbs.
Left Front = 870 lbs. Left Rear = 510 lbs.
TOTAL FRONT WEIGHT = 1680 lbs. (62.5 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1010 lbs. (37.5 % of Total Vehicle Weight)
TOTAL DELIVERY WEIGHT = 2690 lbs.

CALCULATION FOR TARGET TEST WEIGHT

UDW = Unloaded Delivered Weight (2690 lbs.)
VCW = Vehicle Capacity Weight (1015 lbs.)
DSC = Designated Seating Capacity (6)
RCLW = VW - 150 (DSC) = 115 lbs.
Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
Target Test Weight = 3133 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 115 POUNDS CARGO

Right Front = 920 lbs. Right Rear = 660 lbs.
Left Front = 930 lbs. Left Rear = 660 lbs.
TOTAL FRONT WEIGHT = 1850 lbs. (58.4 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1320 lbs. (41.6 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3170 lbs.
Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 27.0 LF 26.5 RR 25.5 LR 26.0
Test Attitude: RF 25.7 LF 25.7 RR 23.9 LR 24.0
Wheel Base: 103.2 in.; C.G. = 43.0 in. rearward of front wheel C/L
Remarks: None

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

POST-IMPACT DATA

Type of Test Frontal Barrier Impact Angle 0° °
 Date of Test 1/30/85 Time of Test 1330 hrs.
 Ambient Temperature 35 °F. at impact area
 Temperature in Occupant Compartment 72 °F.
 Windshield Molding Temperature 67 °F.
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 35.1 mph, secondary 35.08 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 181.5 C 186.7 L 181.4
 Post-test = R 157.1 C 158.6 L 155.7
 Crush = R 24.4 C 28.1 L 25.7

Distance from front of test vehicle to point of impact:

R 24.0 C/L 23.5 L 24.5

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Steering Wheel 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>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	<u>Not</u> Operable	<u>Not</u> Operable	<u>Not</u> Operable	<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>1.2"</u> rearward	<u>1.1"</u> forward		
<u>Glazing Damage</u>				
Backlight/Windshield	<u>Windshield shattered</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. There is a 1.0 inch chrome strip along the top and a 1.1 inch chrome strip on each side.

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	80.25	73.25	91.9%
LEFT SIDE	80.25	71.25	88.8%
TOTAL	160.5	145.0	90.3%

AREA OF RETENTION FAILURE:

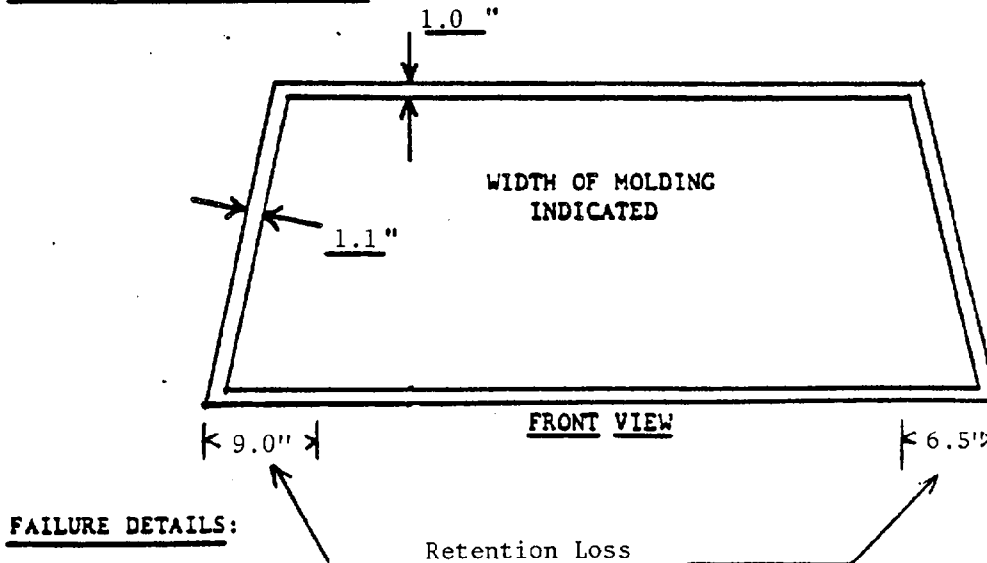


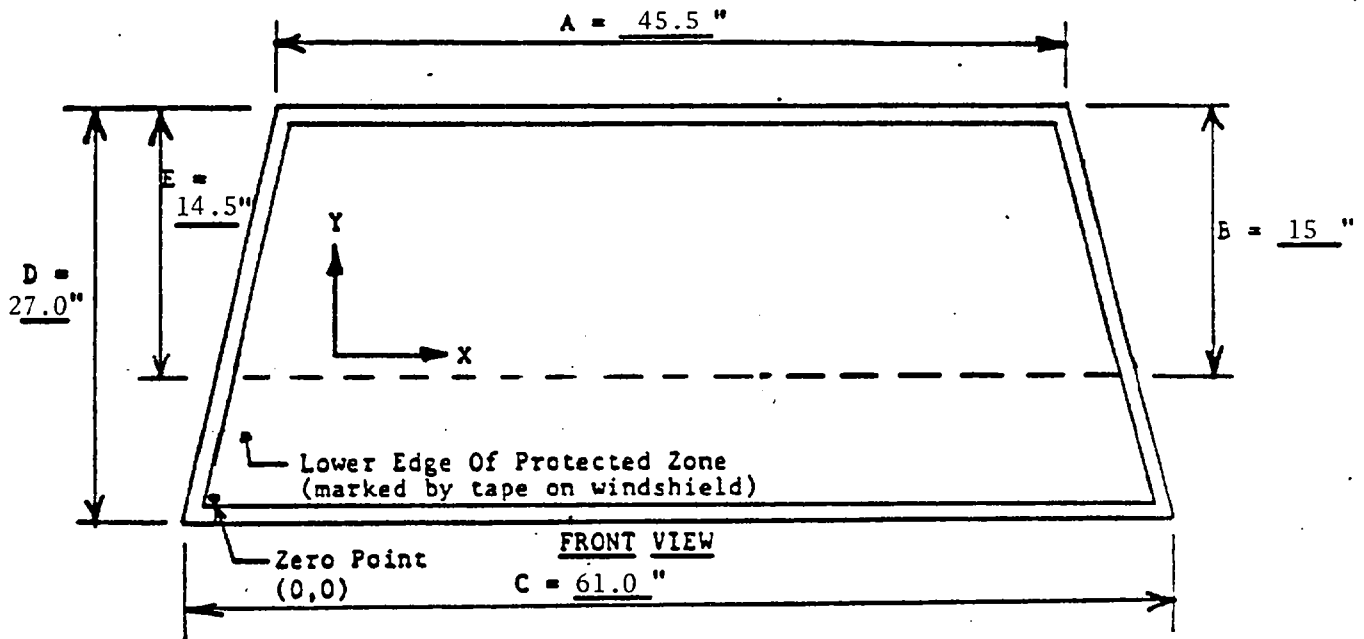
Figure 2

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.: CF0303; TEST DATE: 1/30/85
 VEHICLE MAKE/MODEL/BODY STYLE: 1985 Plymouth Caravelle 4-door sedan
 USABLE CAPACITY OF VEHICLE'S FUEL TANK: 14 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:

13.0 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:

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

Time reqd. for machine to rotate 90° = 2 minutes, 57 seconds
 FMVSS 301-75 Position Hold Time = 5 minutes, 0 seconds
 TOTAL- - - - - = 7 minutes, 57 seconds
 Next Whole Minute Interval - - - - - = 8 minutes

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):

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)	-129	-30	36	131	-55	14	14	50.8
DUMMY (2)	-52	31	76	94	-37	19	-12	34.7
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1150	800
DUMMY (2)	700	990
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)	1415	--	950
DUMMY (2)	1950	1350	--
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂
DUMMY (1)	684.8	.06990	.10792	50.4
DUMMY (2)	759.8	.07717	.12517	47.8
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. CF0303

Vehicle 1985 Plymouth Caravelle 4-Door Sedan

SEAT TYPE:

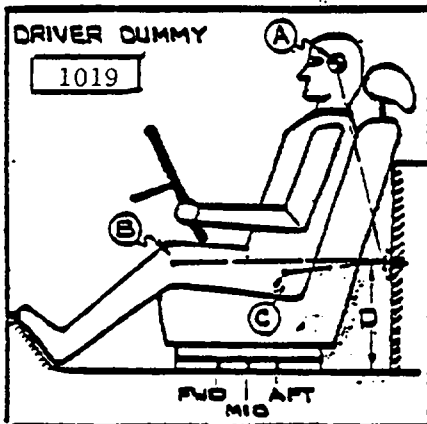
 Bench
 Bucket
 X Split Bench

ADJUSTER TYPE:

 X Manual
 Power

BUCKET SEAT BACK TYPE:

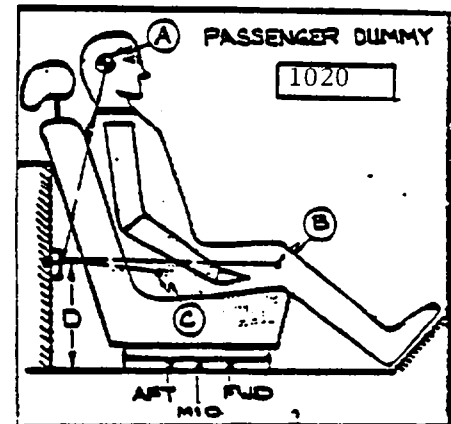
 X Fixed
 Adjustable Reclining



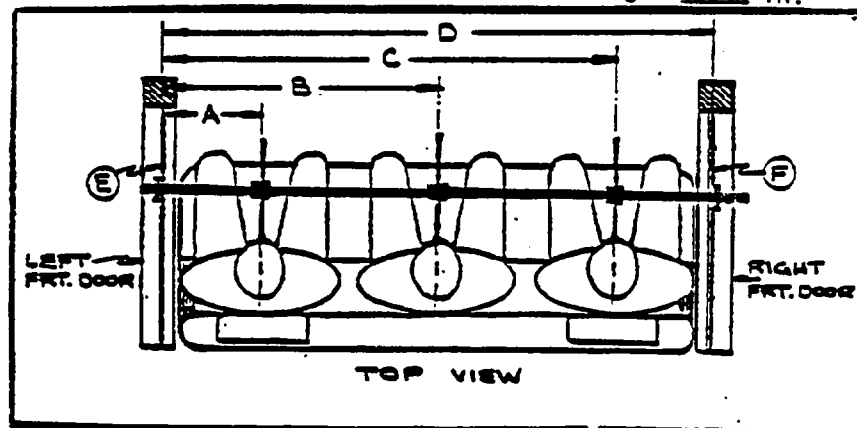
A = 23.2 in. 4 Degrees
 B = 24.5 in. 93 Degrees
 C = 9.7 in. 115 Degrees
 D = 13 in.

MEASUREMENT LOCATION

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



A = 23.4 in. 5 Degrees
 B = 24.5 in. 94 Degrees
 C = 9.2 in. 115 Degrees
 D = 13 in.



DUMMY ID

1019

1020

A	=	Left Door to Driver Centerline	39.3 in.
B	=	Left Door to Center Passenger Centerline	-- in.
C	=	Left Door to Right Passenger Centerline	11.6 in.
D	=	Left Door to Right Door	50.7 in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	12 in.

	DRIVER	PASSENGER
HH	14.2"	14.0"
HW	19.5	19.0"
CD	21.5"	21.0"
CS	14.5"	--
KDL	7.0"	5.5"
KDR	5.7"	5.7"
SA	Fixed	Fixed
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

	DRIVER	PASSENGER
HR	5.5"	5.4"
HS	8.5"	8.6"
AD	3.7"	4.2"
HD	6.0"	6.0"

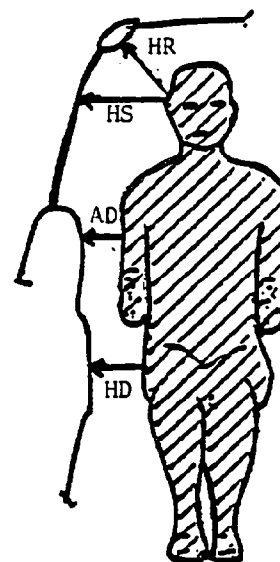
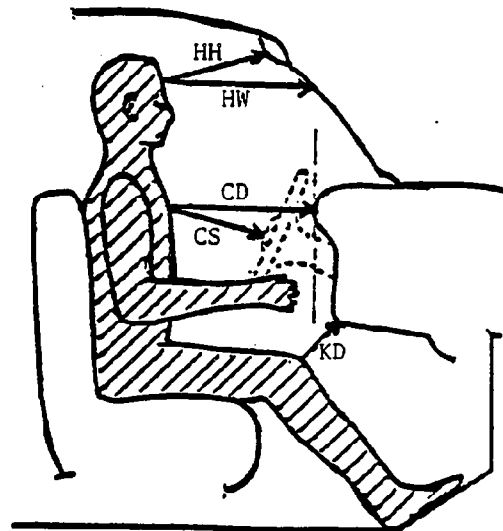
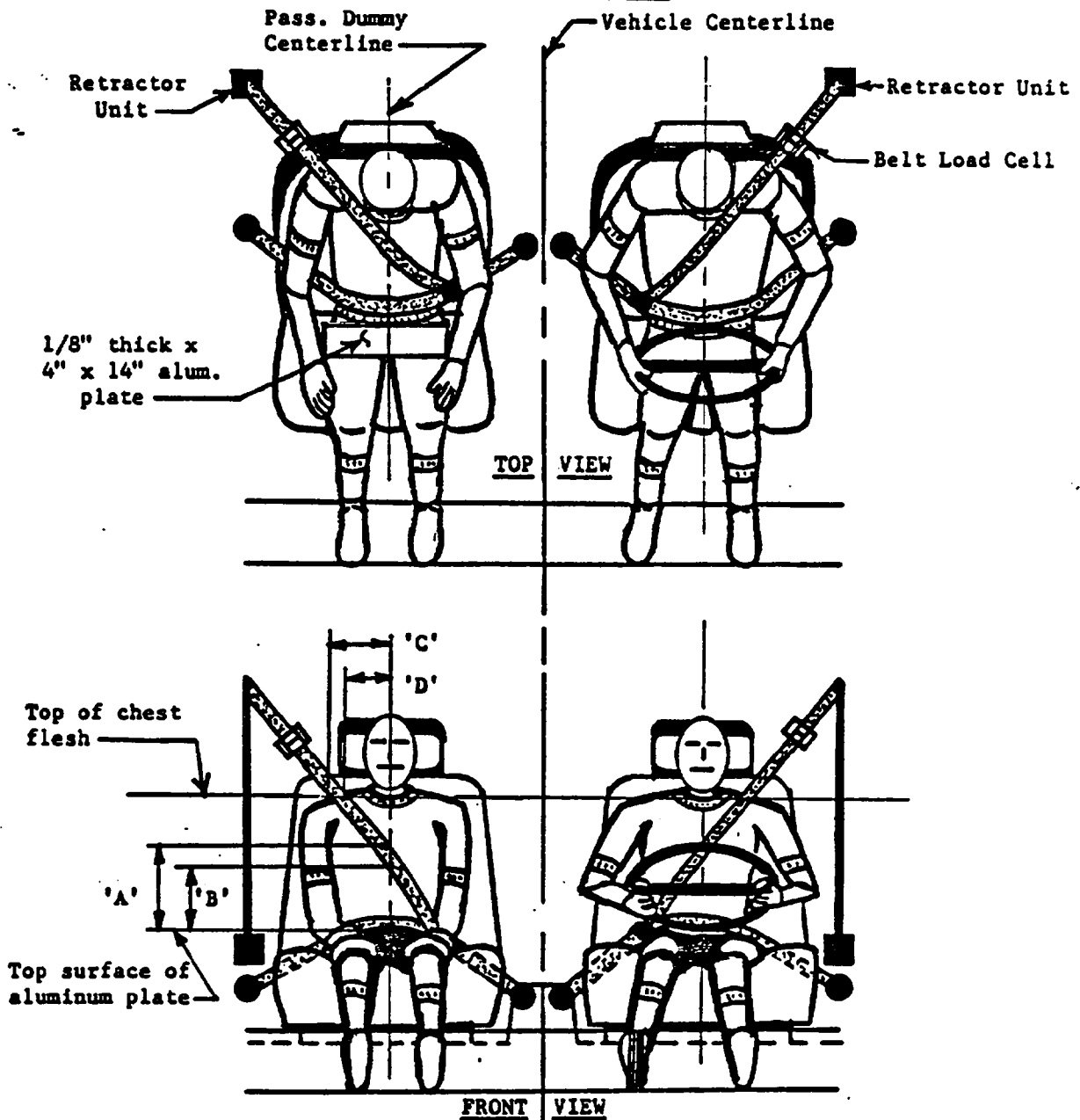


Figure 5
 OCCUPANT CLEARANCE DIMENSIONS

Figure 6

SEAT BELT POSITIONING DATA



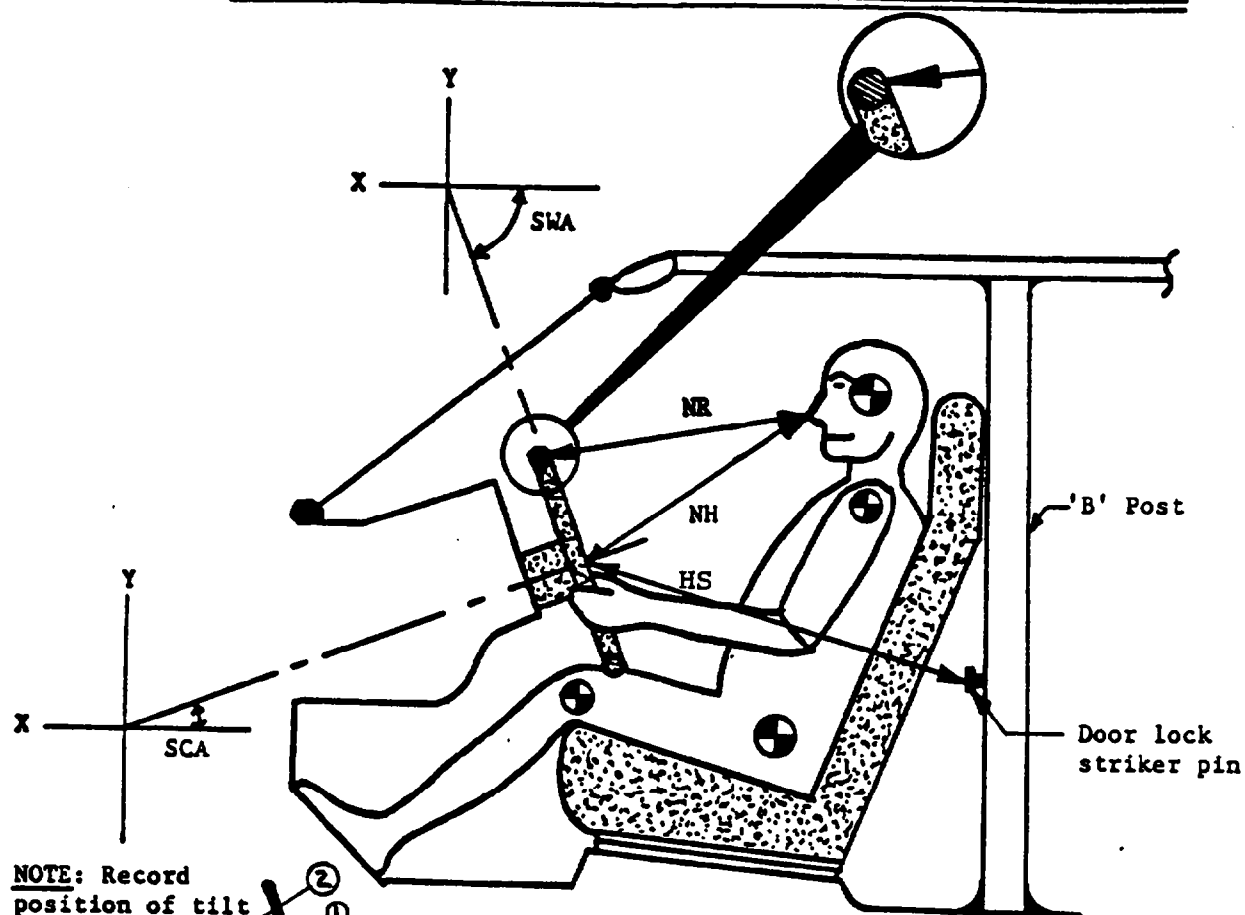
	DRIVER DUMMY (in.)	PASS. DUMMY (in.)
1. Dimension 'A'--alum. plate to belt upper edge on dummy centerline	14.3	14.2
2. Dimension 'B'--alum. plate to belt lower edge on dummy centerline	11.0	11.0
3. Dimension 'C'--dummy centerline to outer edge at chest flesh top	5.5	5.7
4. Dimension 'D'--dummy centerline to inner edge at chest flesh top	3.3	3.5
5. Lap belt tension (lbs.)	--	--
6. Shoulder belt tension (lbs.)	3.0 lbs.	3.0 lbs.

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>61.5"</u>	<u>61.5"</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>32"</u>	<u>32"</u>
Lap belt length as measured on Part 572 Dummy.	<u>29.5"</u>	<u>29.5"</u>
<u>Belt Spool-Off Data:</u>		
As determined by film analysis.	<u>3.2"</u>	<u>4.3"</u>
As determined mechanically.	<u>3.2"</u>	<u>4.5"</u>
<u>Belt Stretch Data:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>.45" per ft.</u>	<u>.6" per ft.</u>

Figure 7

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONSLEFT SIDE VIEW

NOTE: Record position of tilt strg. column in REMARKS section

MEASUREMENTS		
<u>NR</u> --Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	18.7	Inches
<u>NH</u> --Distance from tip of dummy's nose to center of steering column hub	20.0	Inches
<u>HS</u> --Distance from center of steering column hub to the forward surface of the door lock striker pin.	24.7X 16.0Y	Inches
<u>SCA</u> --Angle of steering column relative to the horizontal X axis	27.0	Degrees
<u>SWA</u> --Angle of steering wheel relative to the horizontal X axis.	62.0	Degrees

REMARKS CONCERNING ADJUSTABLE OR TILT STEERING COLUMN IF VEHICLE IS SO EQUIPPED:

Not adjustable.

NOTE: Camera Information Shown on Table 4

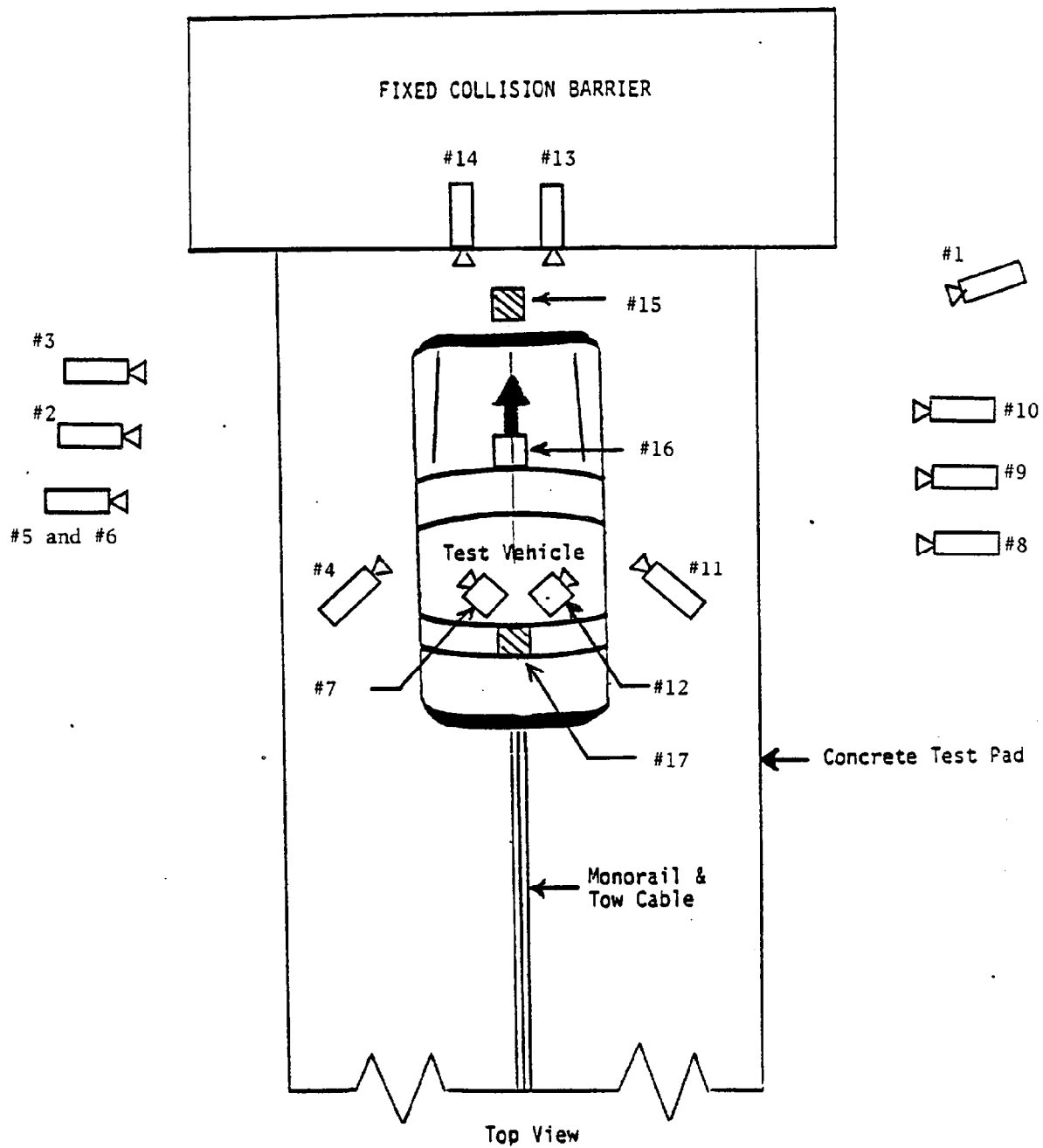


Figure 8 CAMERA POSITION FOR FRONTAL IMPACTS

Table 4
HIGH-SPEED CAMERA LOCATIONS

Test No. CF0303

Vehicle 1985 Plymouth Caravelle 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	236	63	50	-5	--	13	520
3	Left Side View	248	40	41	-6	--	25	540
4	Driver and Interior View	96	108	67	-15	80	25	540
5	Steering Column (Bottom)	270	78	46	-4	254	25	540
6	Steering Column (Top)	270	78	60	-11	254	25	540
7	Left Belt	--	--	--	--	--	8	810
8	Overall Right Side	282	80	46	-4	--	13	810
9	Right Side View	280	69	51	-5	--	25	860
10	Right Passenger View	282	58	58	-3	266	35	780
11	Passenger and Interior View	96	108	63	-16	92	25	590
12	Right Belt	--	--	--	--	--	8	850
13	Passenger Front View	21	0	72	-33	105	13	840
14	Driver Front View	21	0	72	-33	105	13	620
15	Windshield View	0	0	126	-47	--	13	540
16	Pit View of Engine	0	38	-120	90	--	13	770
17	Pit View of Fuel Tank	0	132	-120	90	--	13	800

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

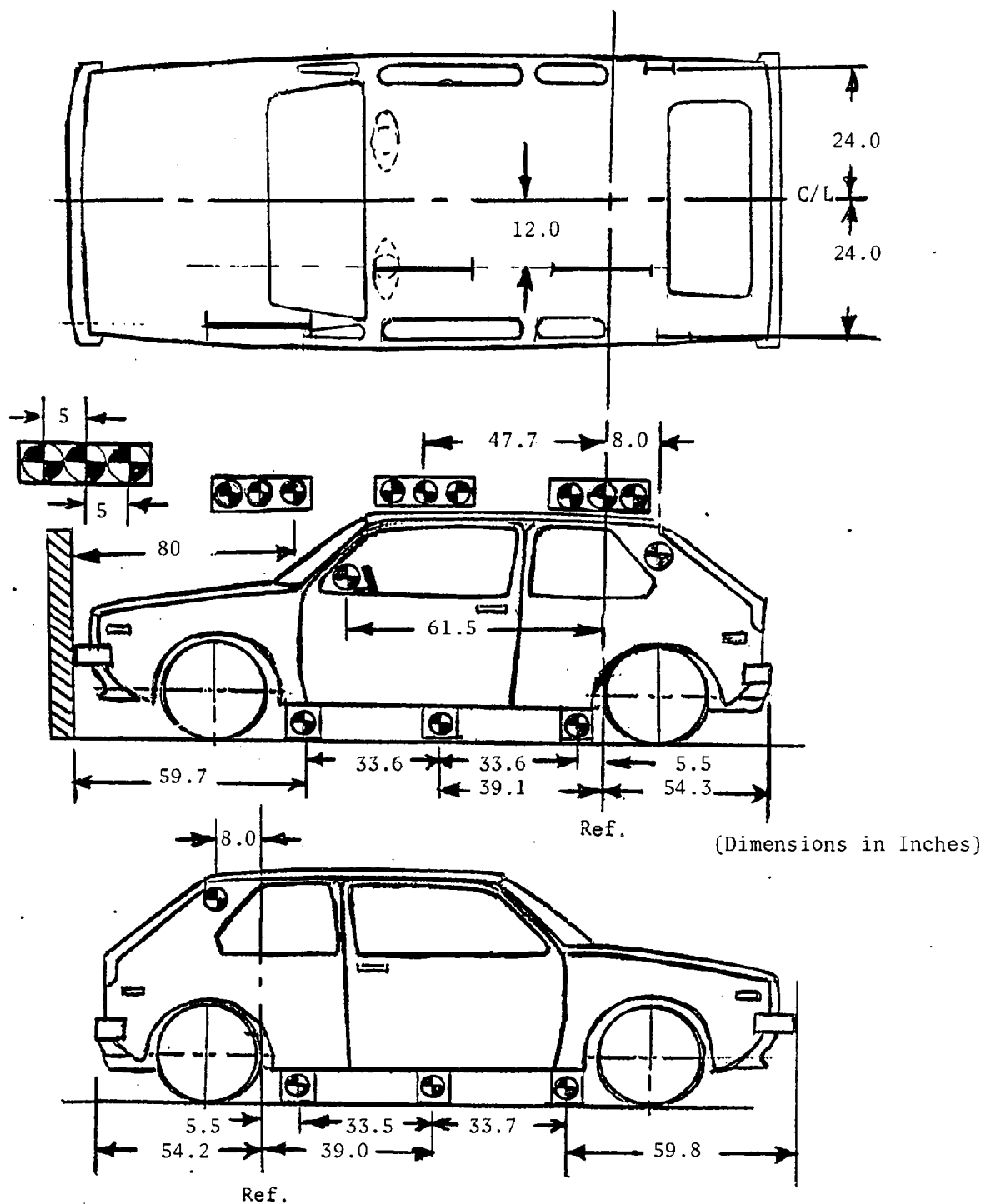


Figure 9 VEHICLE TARGET LOCATIONS

Figure 10

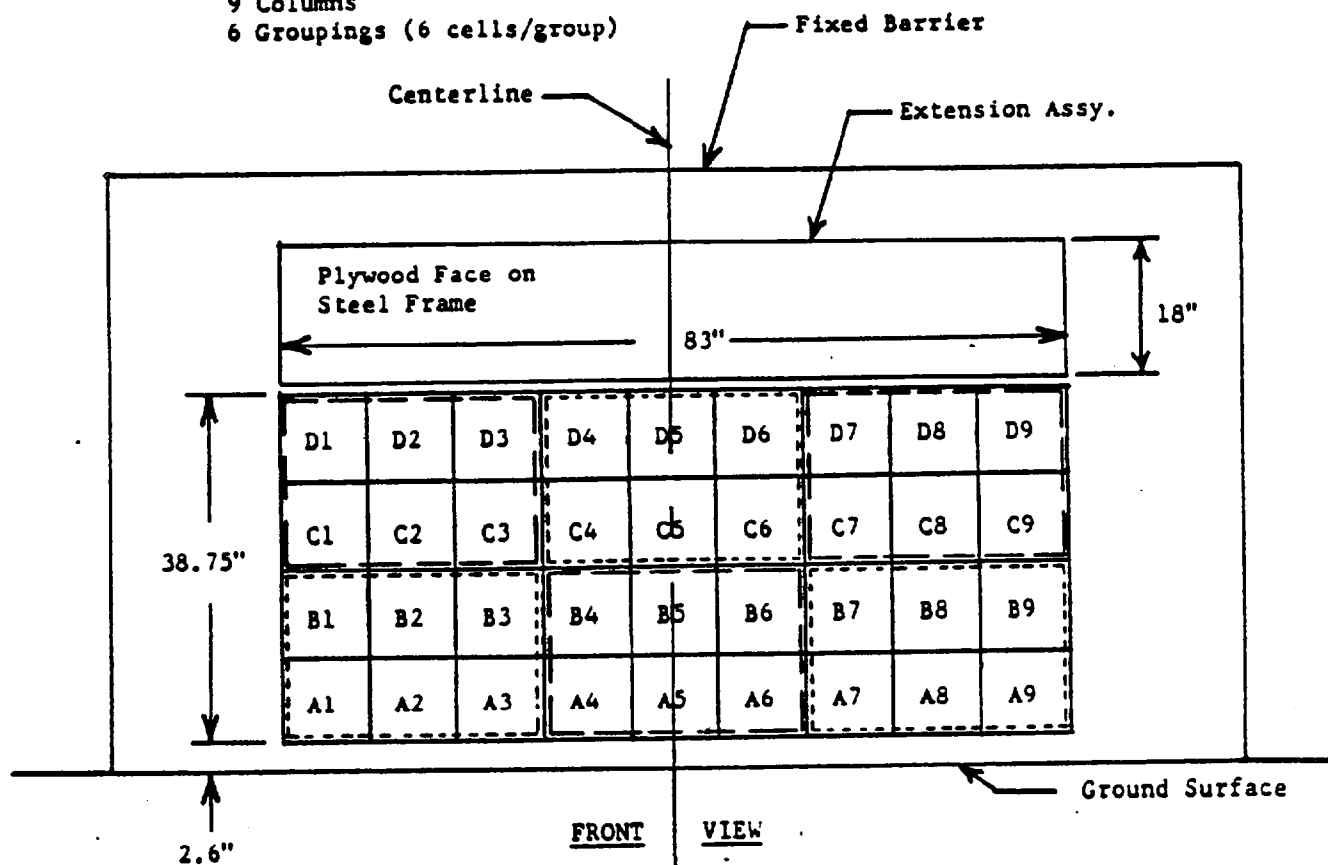
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells

4 Rows

9 Columns

6 Groupings (6 cells/group)

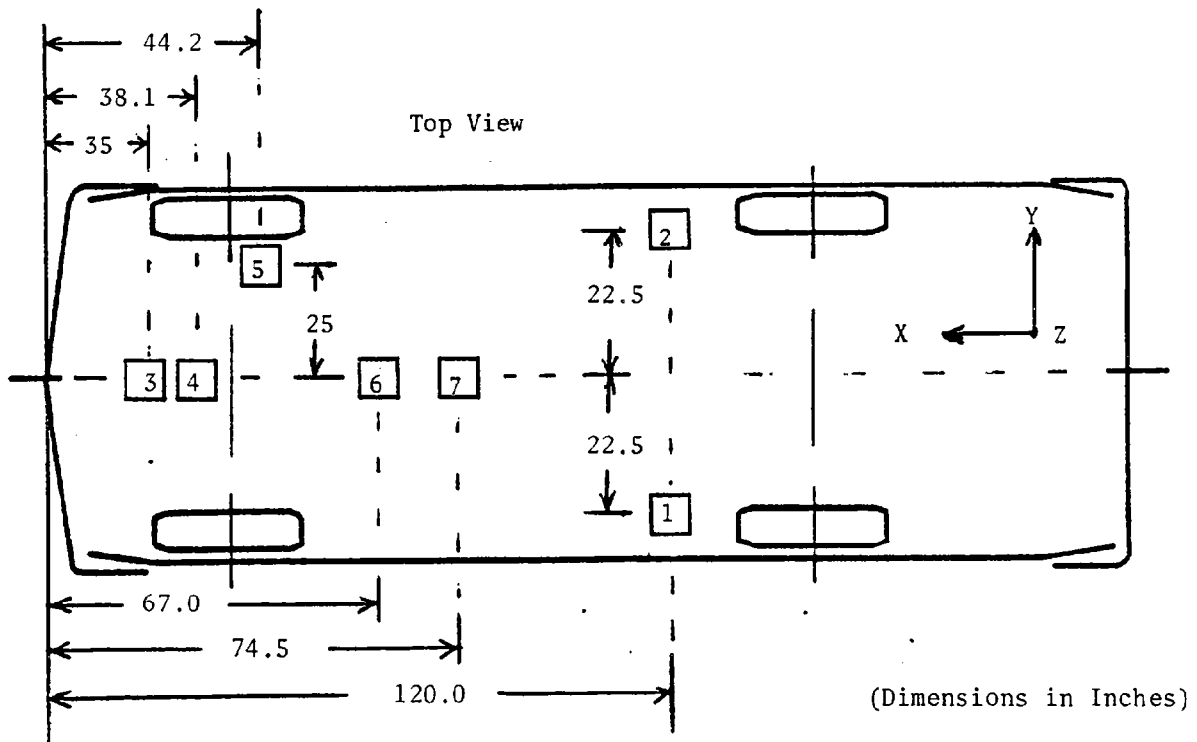


6 GROUPINGS OF 6 LOAD CELLS EACH

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

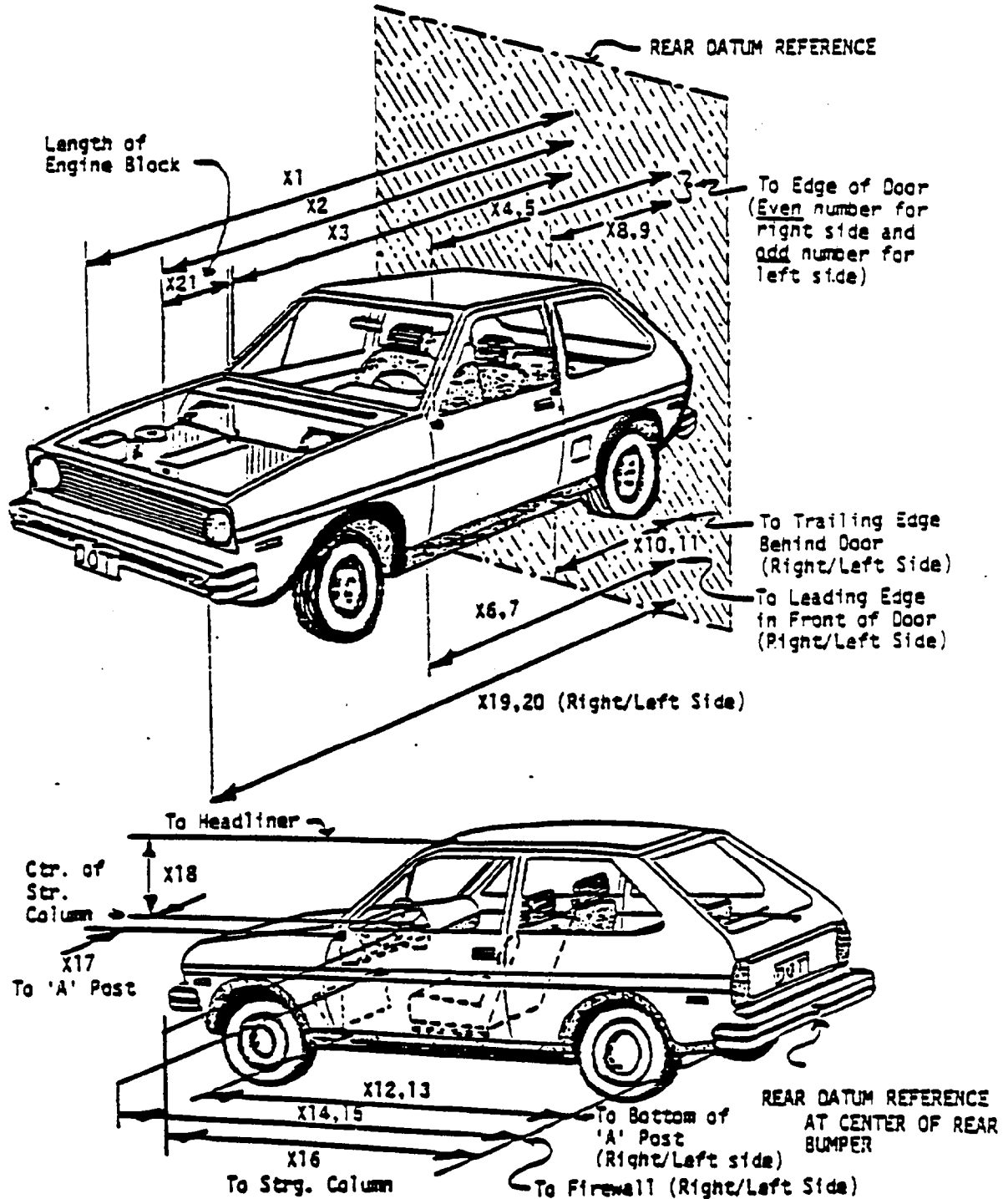


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	186.7	158.6	28.1
X2	Rear Surface of Vehicle to Front of Engine	157.2	150.1	7.1
X3	Rear Surface of Vehicle to Firewall	139.0	133.3	5.7
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	122.8	122.5	0.3
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	122.8	122.5	0.3
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	123.7	123.1	0.6
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	123.6	122.6	1.0
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	85.0	84.7	0.3
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	84.9	84.6	0.3
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	84.7	84.1	.6
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	84.6	83.2	1.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	123.0	122.5	0.5
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	123.0	122.4	0.6
X14	Rear Surface of Vehicle to Firewall, Right Side	135.4	128.4	7.0
X15	Rear Surface of Vehicle to Firewall, Left Side	135.3	132.2	3.1
X16	Rear Surface of Vehicle to Steering Column	109.6	105.5	4.1
X17	Center of Steering Column to "A" Post	13.4	16.7	-3.3
X18	Center of Steering Column to Headliner	17.0	19.5	-2.5
X19	Rear Surface of Vehicle to Right Side of Front Bumper	181.5	157.1	24.4
X20	Rear Surface of Vehicle to Left Side of Front Bumper	181.4	155.7	25.7
X21	Length of Engine Block	14.5	14.5	0

Table 6

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

VEHICLE MAKE/MODEL/BODY STYLE: 1985 Plymouth Caravelle 4-door sedan
 VEH. NHTSA NO.: CF0303; VIN: 1P3BJ46DOFC103742
 MODEL YEAR: 1985; BUILD DATE: 8-84; TEST DATE: 1/30/85
 VEH. SIZE CATEGORY: Mid-size; TEST WEIGHT: 3170 pounds
 VEH. WHEELBASE: 103.2"; FRONT OVERHANG: 41.4"; OVERALL WIDTH: 68.0"

ACCELEROMETER DATA:

LOCATION: 43.0 inches aft of front wheel C/L
 CALIBRATION PROCEDURE: Shaker table/least squares
 LINEARITY: $\pm 0.75\%$; INTEGRATION ALGORITHM: Hybrid Simpson-Newton 3/8
 VEH. IMPACT SPEED: 35.1 mph; TIME OF SEPARATION: 178.57 milliseconds
 VELOCITY CHANGE: 40.8 mph

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

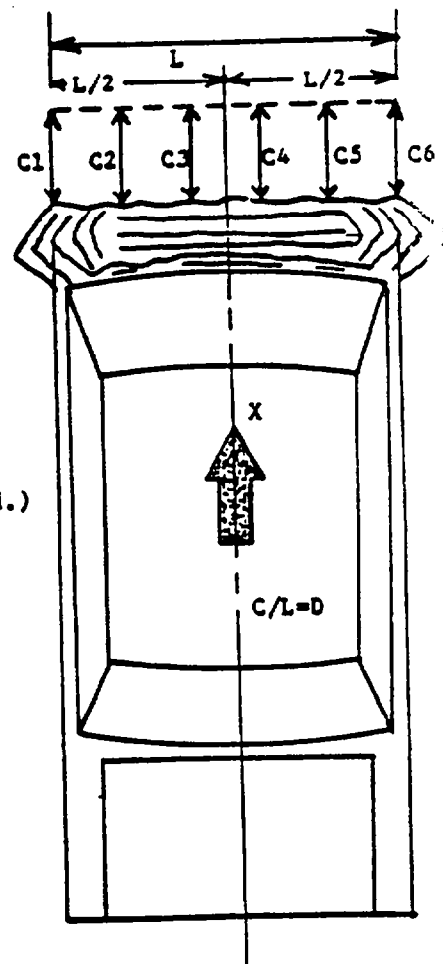
**CRUSH DEPTH
DIMENSIONS:**

C1= 25.6 inches
 C2= 27.5 inches
 C3= 28.2 inches
 C4= 26.7 inches
 C5= 26.0 inches
 C6= 25.5 inches

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

**LENGTH OF DAMAGED
REGION:**

L = 62.0 inches



National Accident Sampling System — Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

1985 PLYMOUTH CARAVELLE

35 mph

Complete When Applicable	
End Damage	Side Damage
Undeformed end width <u>62"</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	62"	<u>29.6</u>	62"	31.4	31.0	29.6	28.1	29.5	31.3	
	Free/space		1.4		5.8	3.5	1.4	1.4	3.5	5.8	
	ACTUAL CRUSH		28.2	62"	25.6	27.5	28.2	26.7	26.0	25.5	

*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.

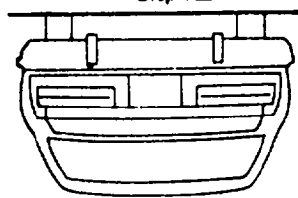
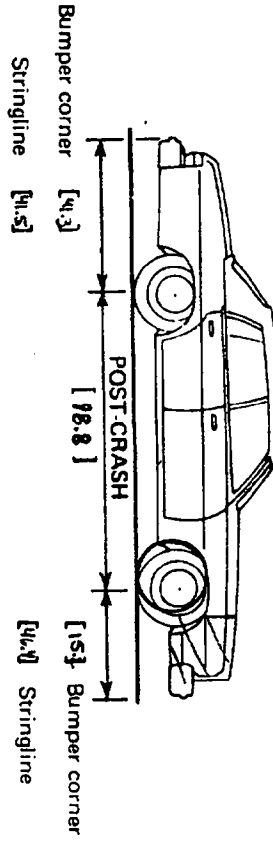
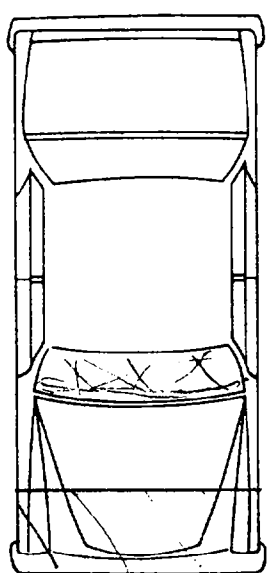
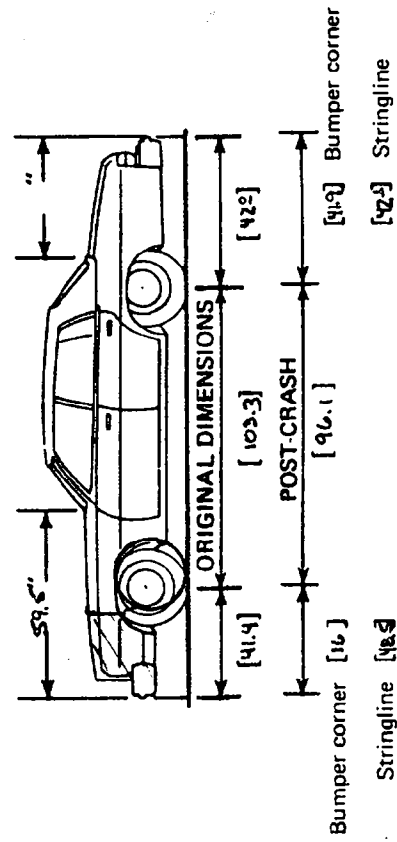
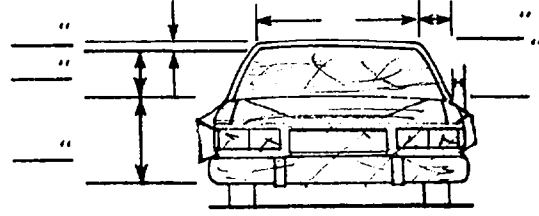
DAMAGE DESCRIPTION	TYPE OF TRANSMISSION	WHEEL STEER ANGLES
Tire—Wheel Damage a. Rotation physically restricted RF <u>1</u> LF <u>1</u> RR <u>2</u> LR <u>2</u>	___ Manual ☒ Automatic Average Track: _____ Maximum Width: _____ Curb Weight: _____ Overall Length: <u>186.7</u> Wheel Base: <u>103.3</u> Engine Size: cyl. _____ displ. _____	(For locked front wheels or displaced rear axles only) RF ± <u>00</u> ° LF ± <u>02</u> ° RR ± <u>N/A</u> ° LR ± <u>N/A</u> ° Within ± 5 degrees
(1) Yes, (2) No, (8) NA, (9) Unk.		
Vehicle No.: <u>1985 PLYMOUTH CARAVELLE</u>		
		
		
		
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 page 3. Annotate any damage caused by extrication such as component removal by torching, prying or hydraulic shears. If the vehicle contacted a pedestrian, complete the back of this page.		

Figure 13 TEST VEHICLE DAMAGE DETAILS

APPENDIX A
PHOTOGRAPHS

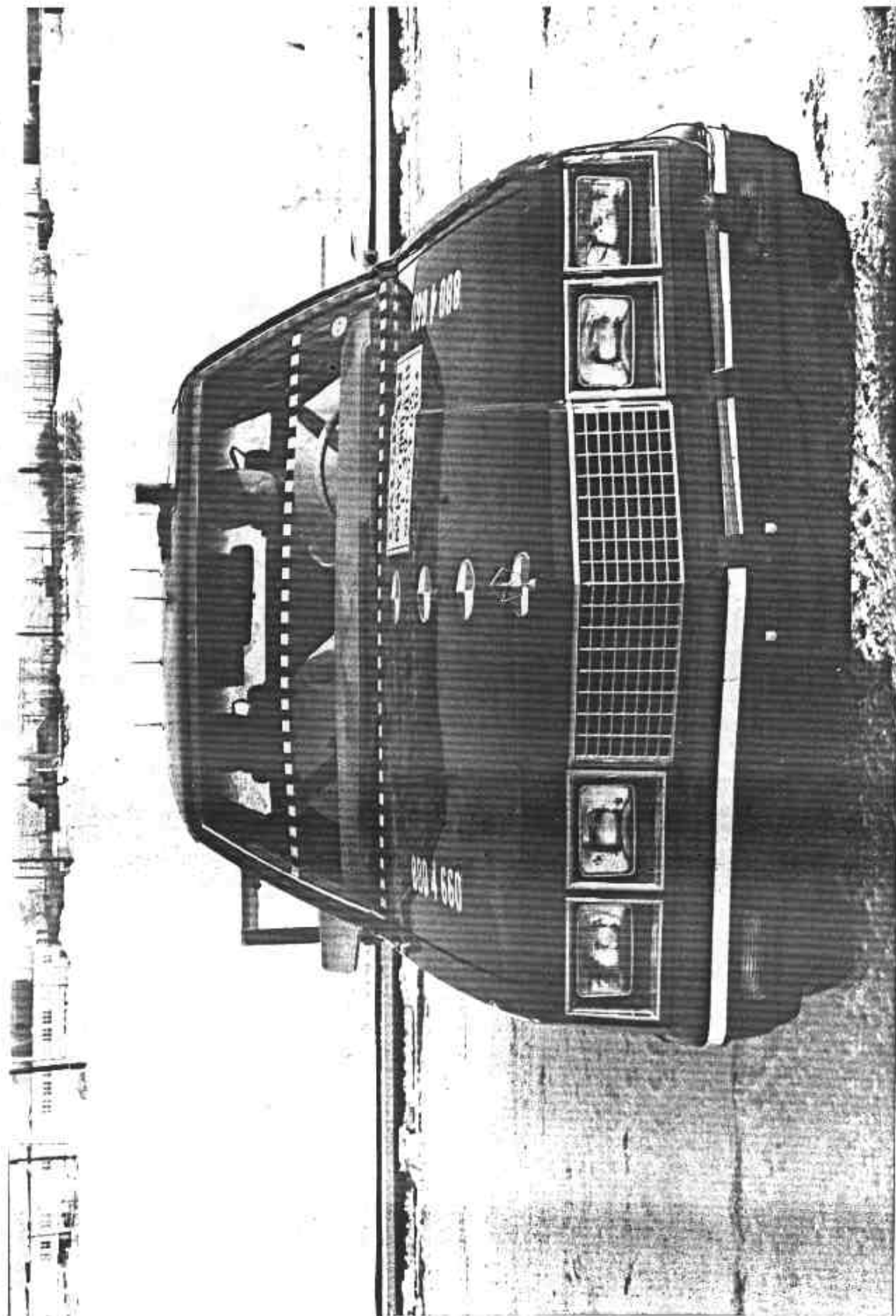


Figure A-1 PRE-TEST FRONT VIEW

A-2

7333-5

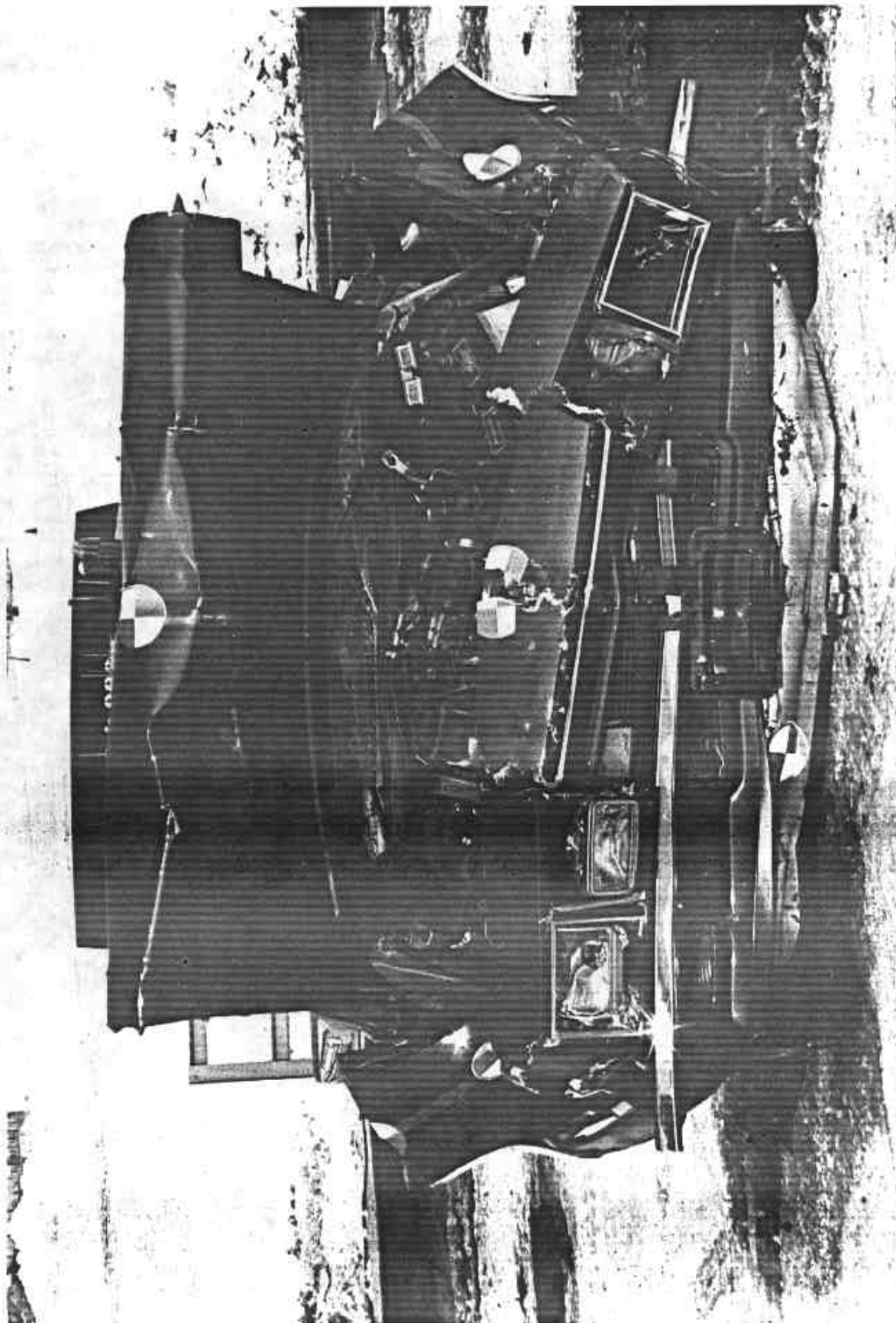


Figure A-2 POST-TEST FRONT VIEW

A-3

7333-5



Figure A-3 PRE-TEST LEFT SIDE VIEW

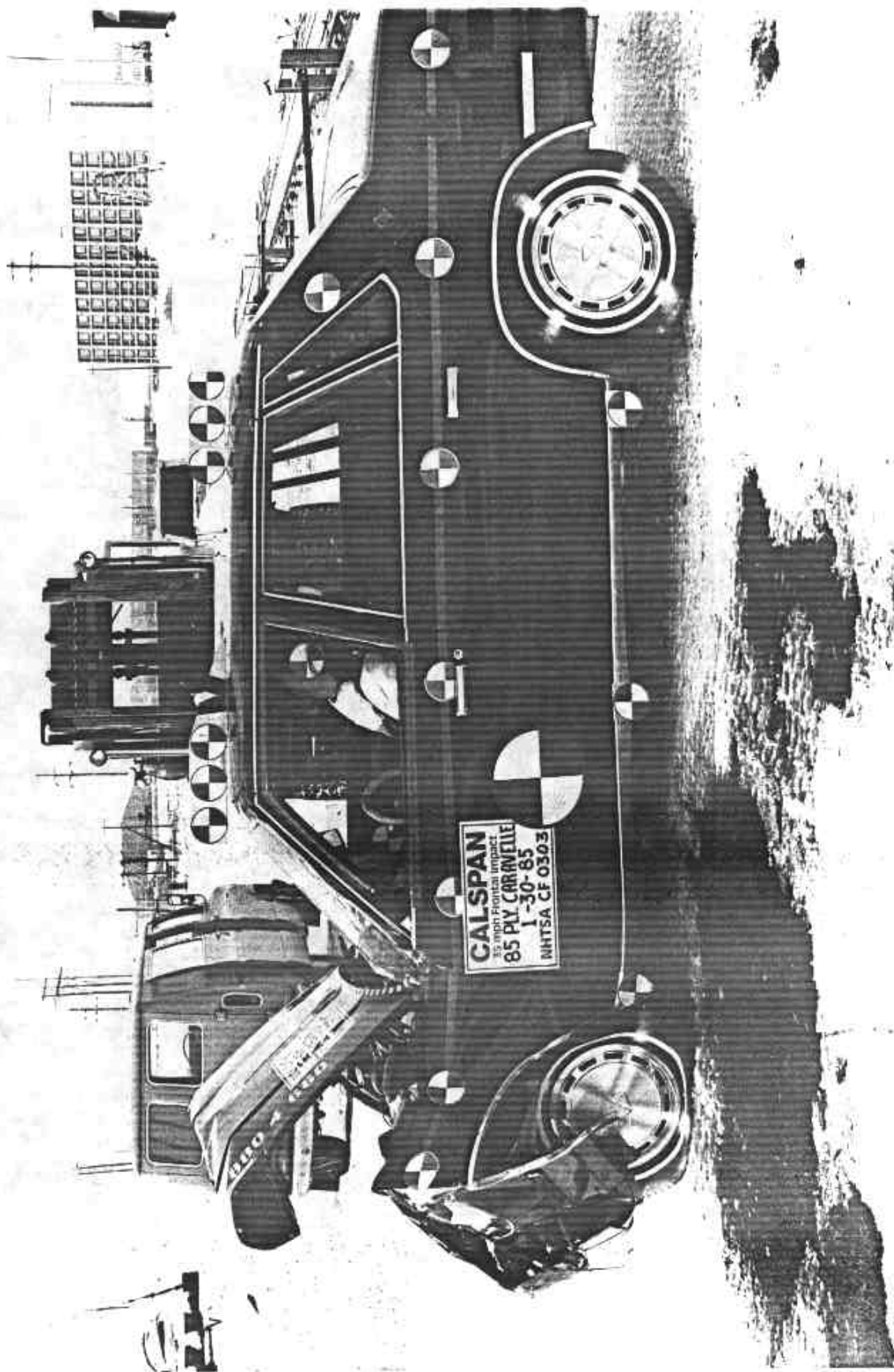


Figure A-4 POST-TEST LEFT SIDE VIEW

A-5

7333-5

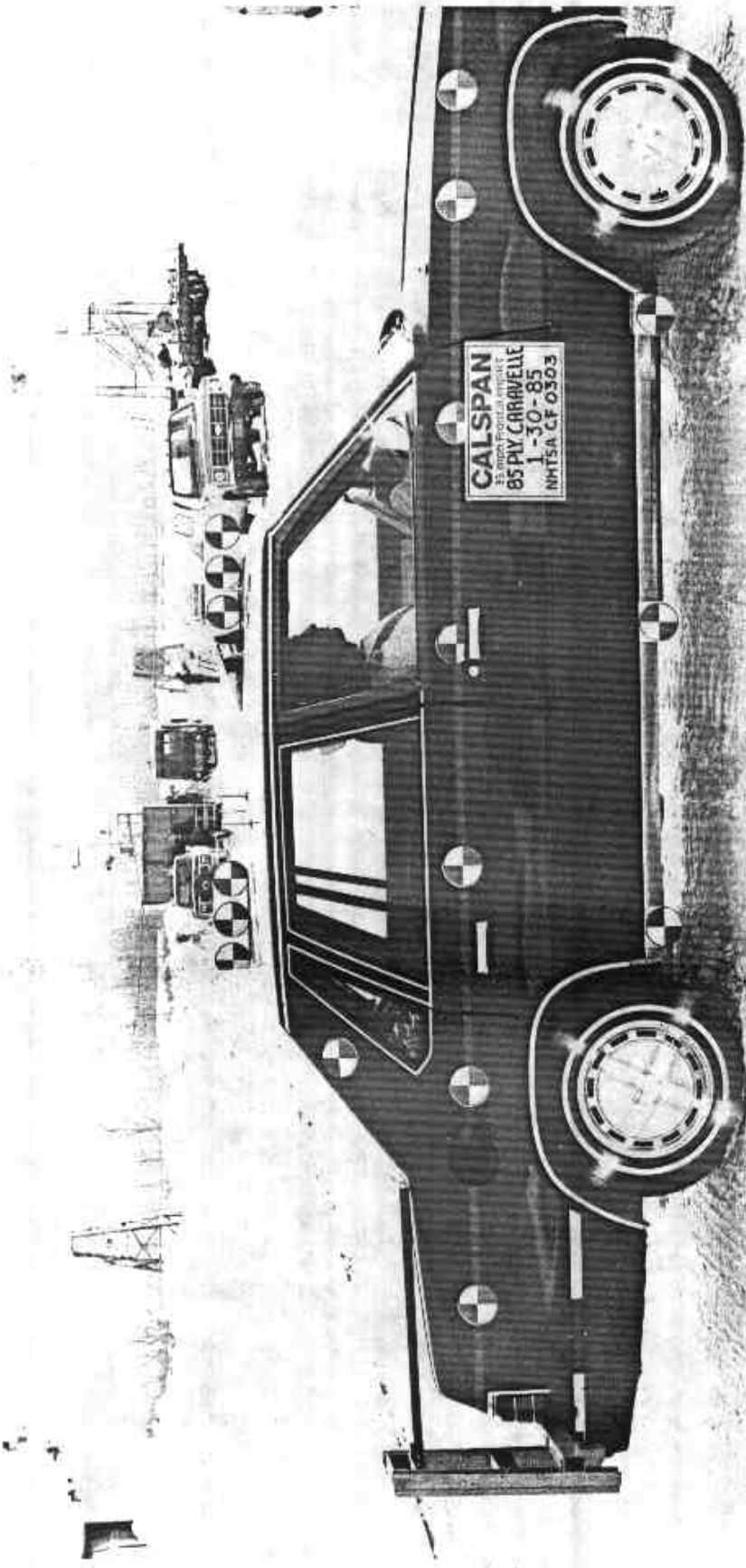


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-6

7333-5

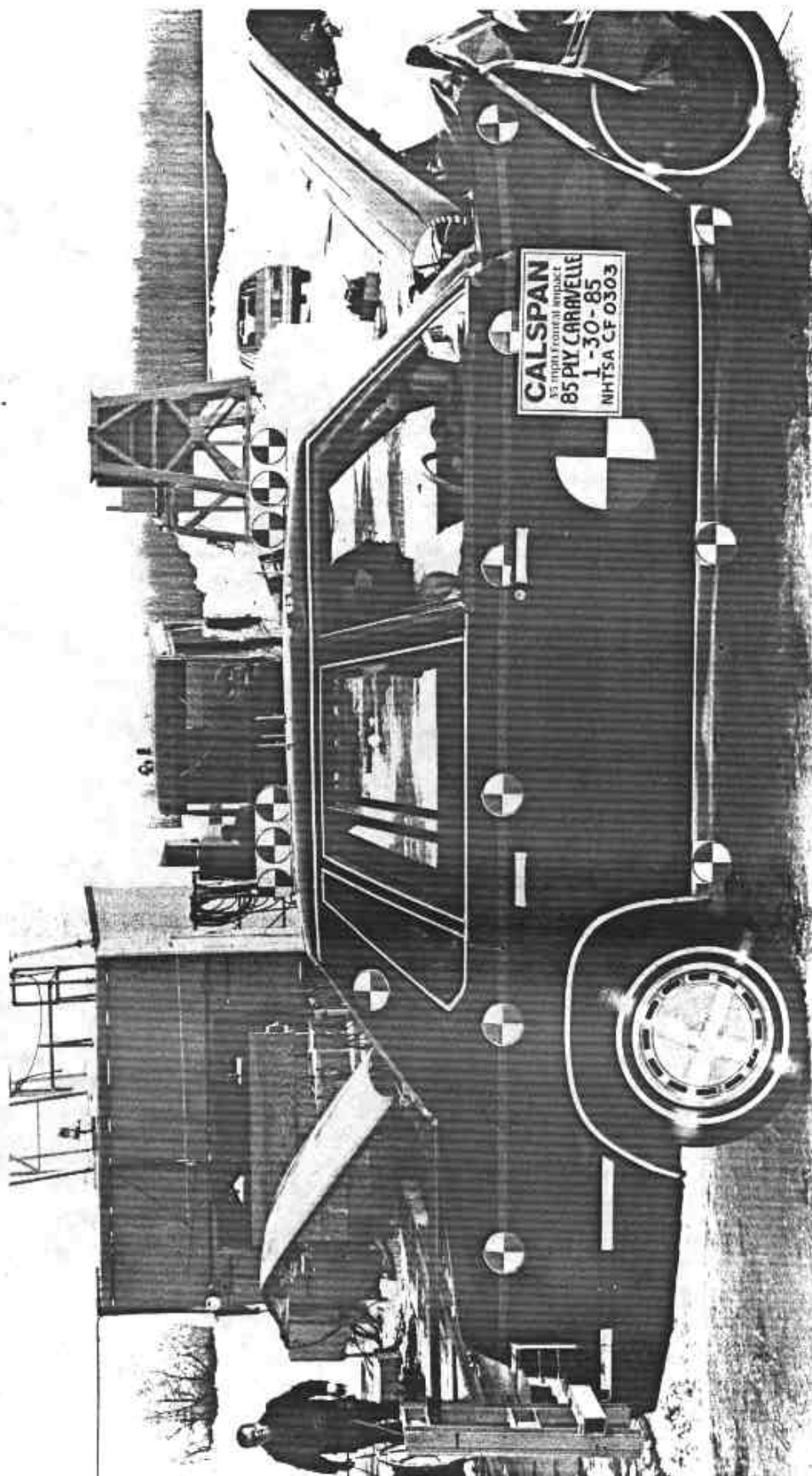


Figure A-6 POST-TEST RIGHT SIDE VIEW



A-8

7333-5

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

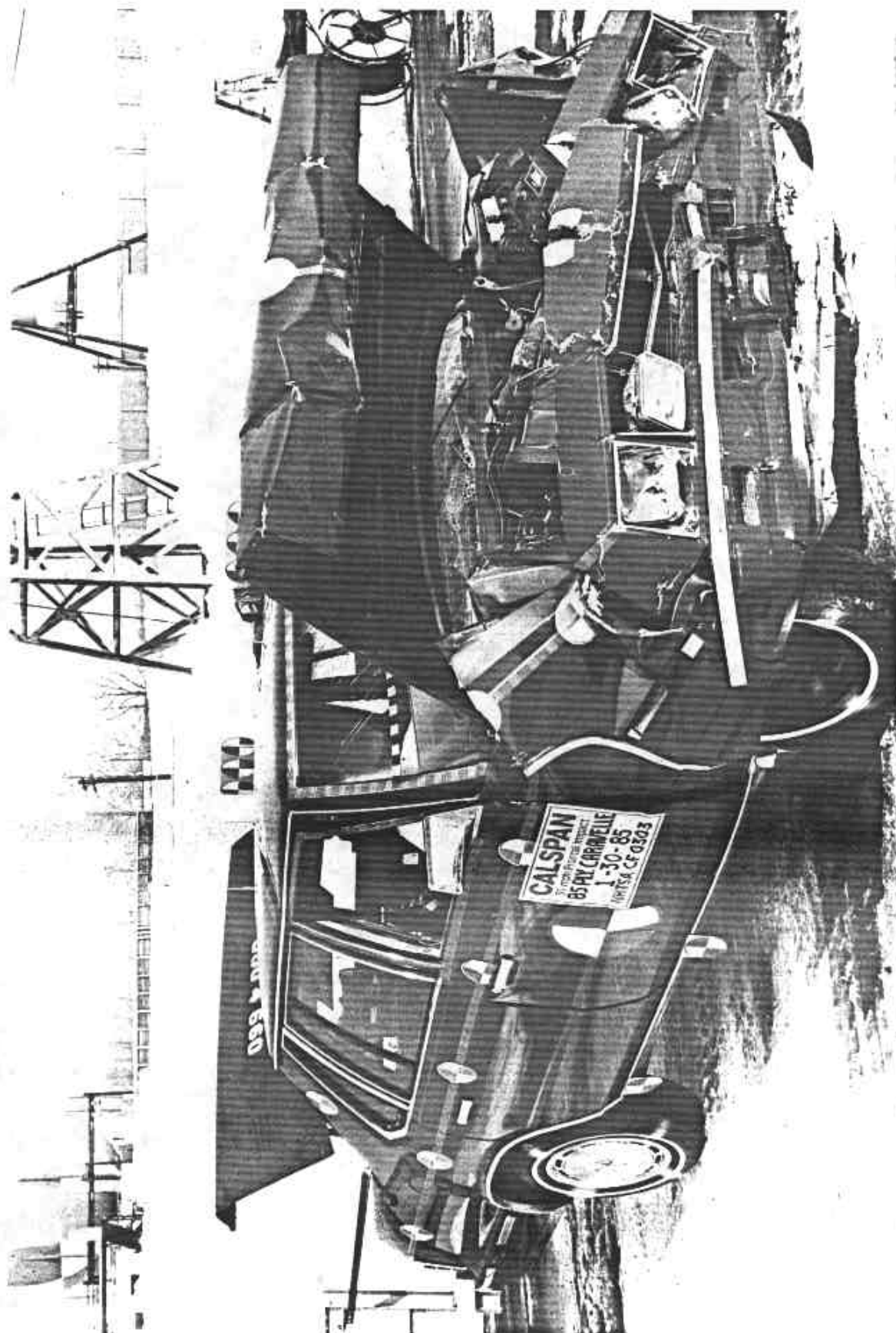


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-9

7333-5

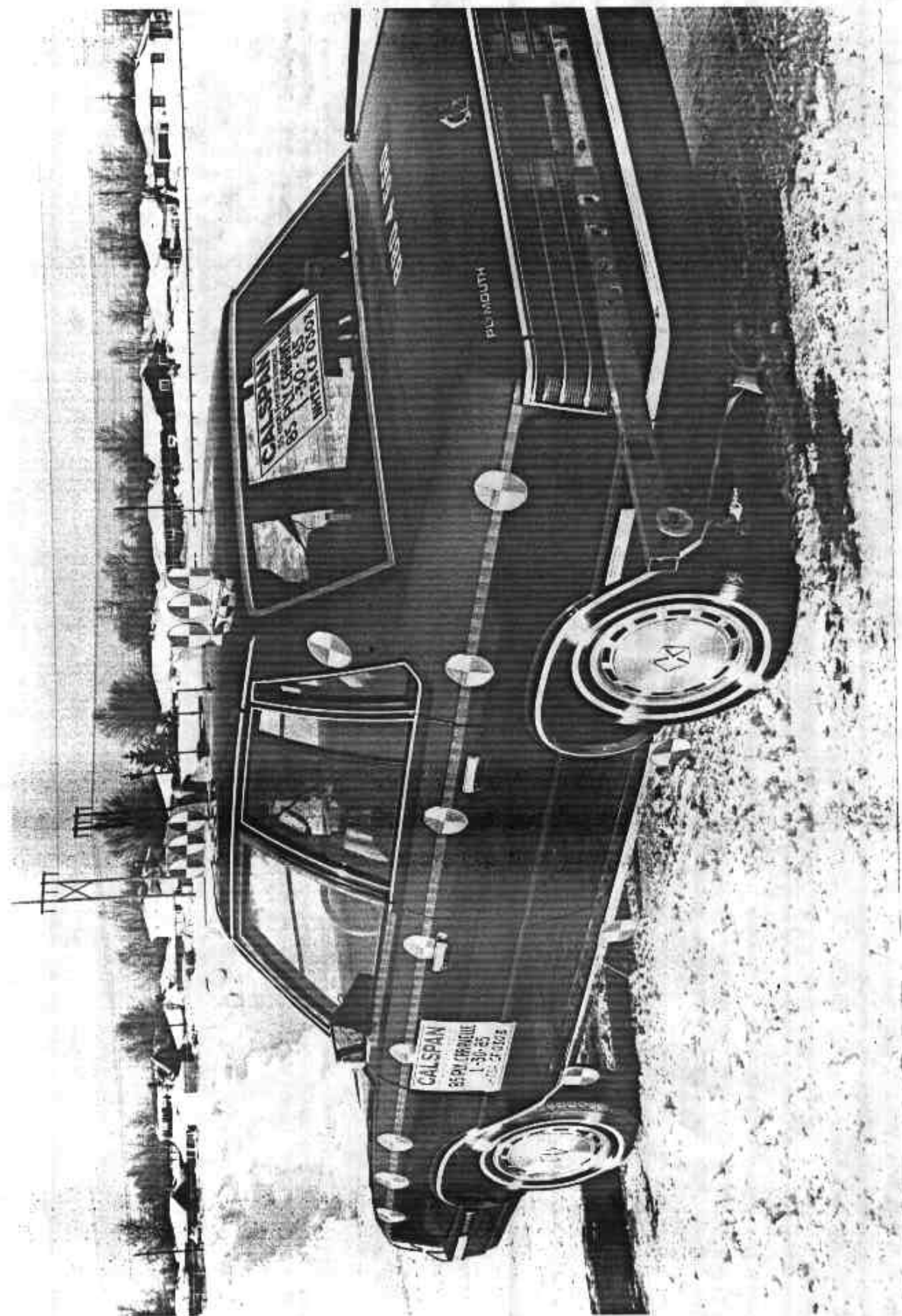


Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-10

7333-5

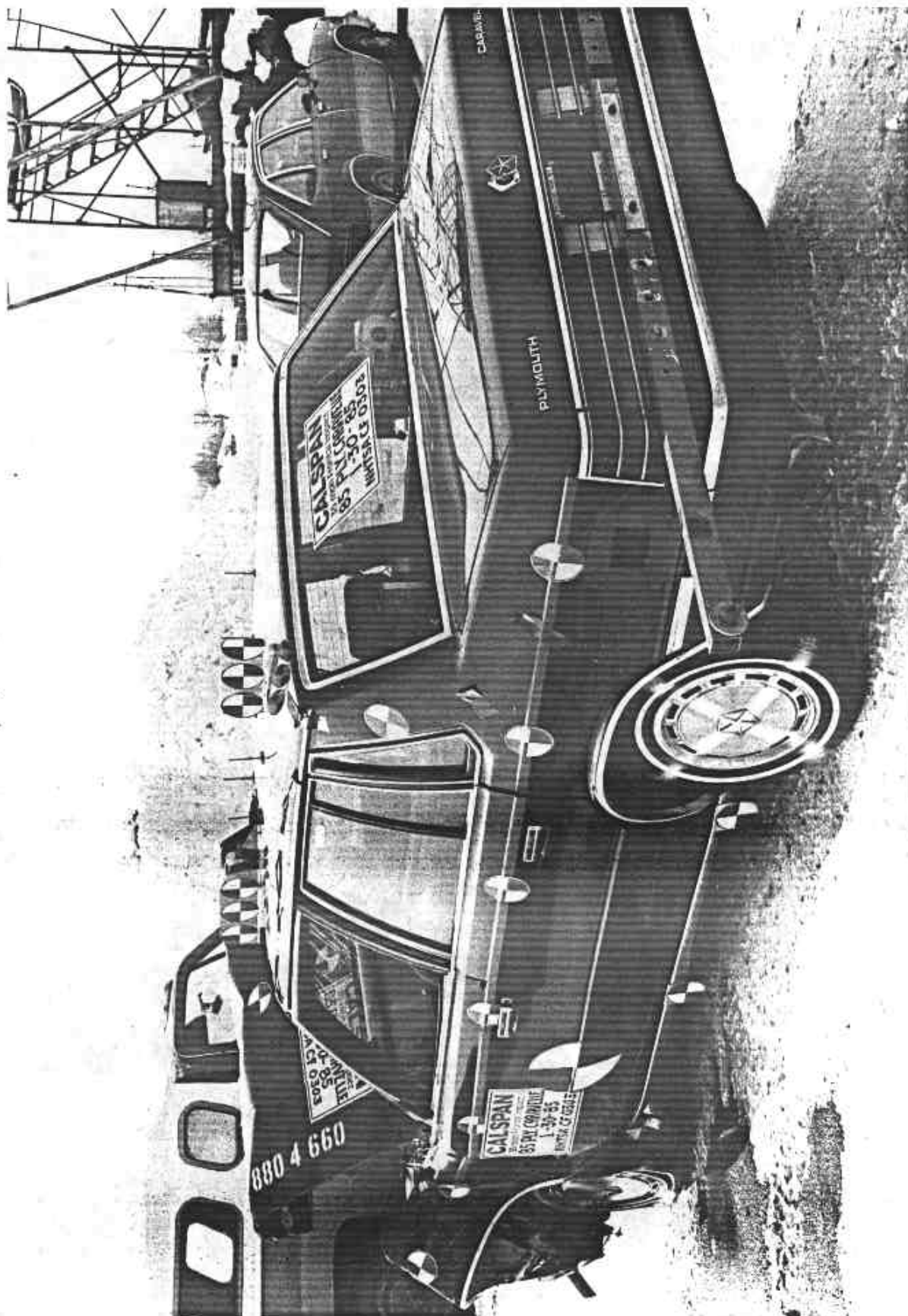


Figure A-10 POST-TEST LEFT REAR THREE-QUARTER VIEW

A-11

7333-5

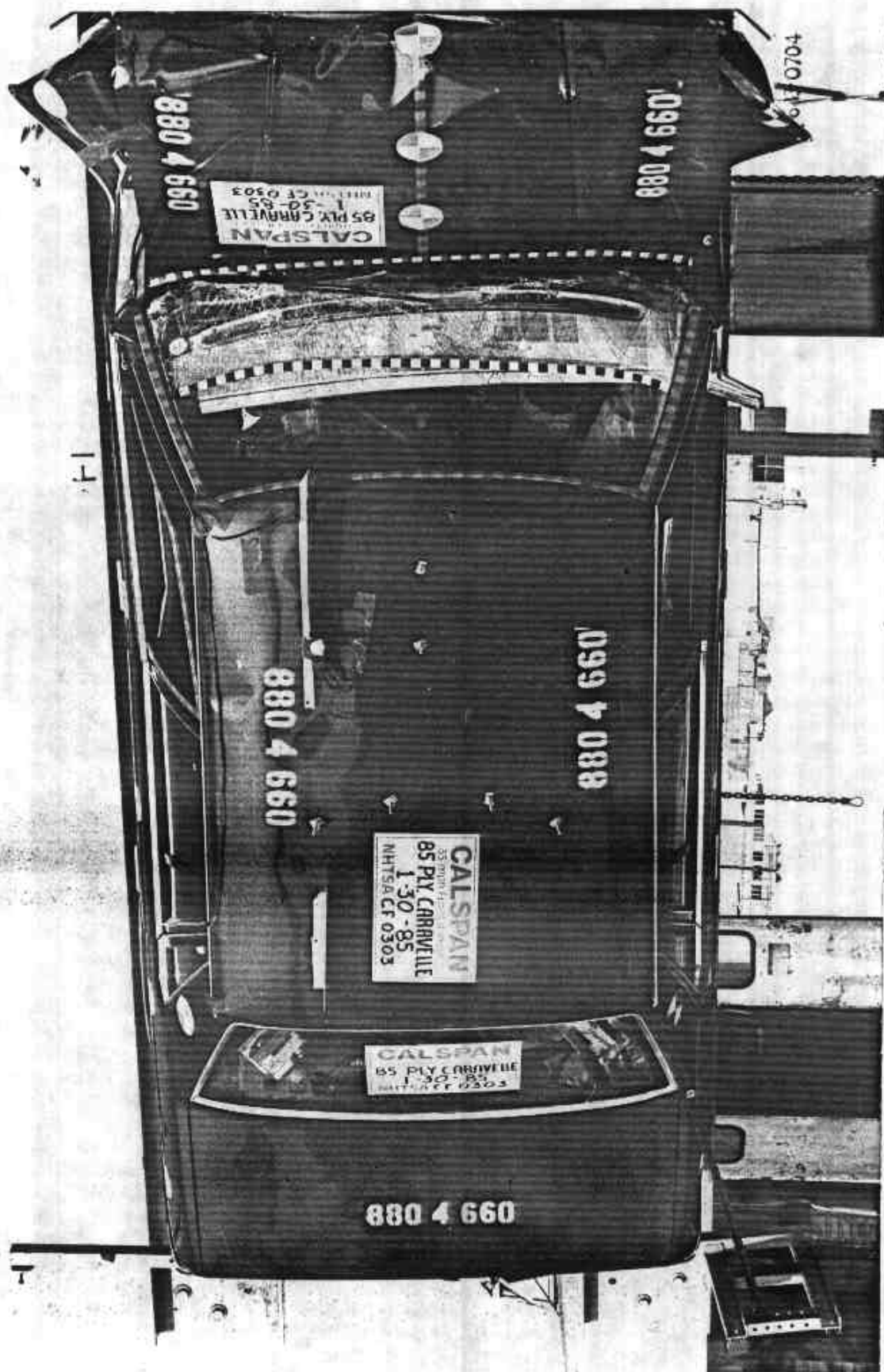


Figure A-11 POST-TEST TOP VIEW



Figure A-12 PRE-TEST WINDSHIELD VIEW

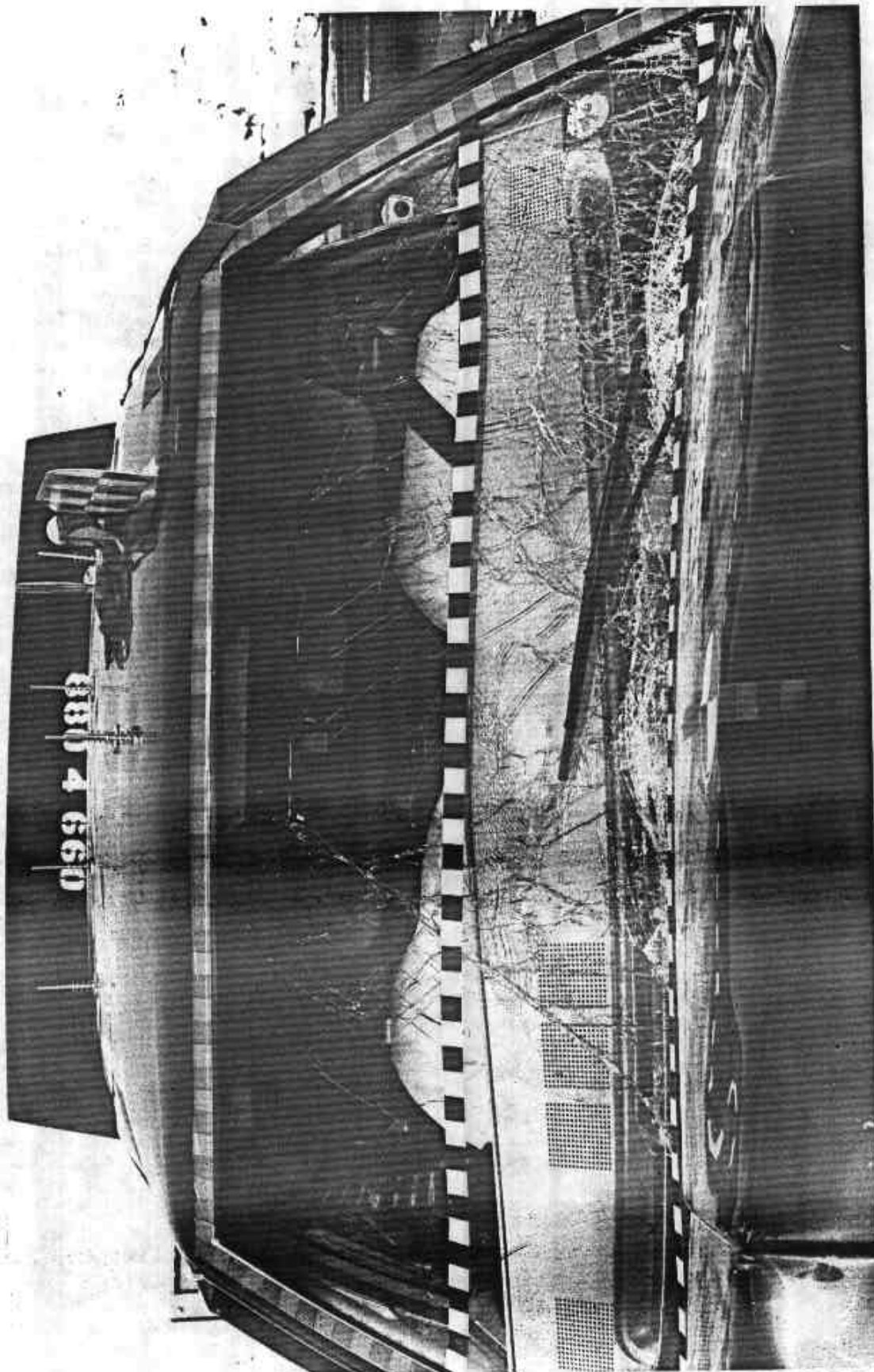


Figure A-13 POST-TEST WINDSHIELD VIEW

A-14

7333-5

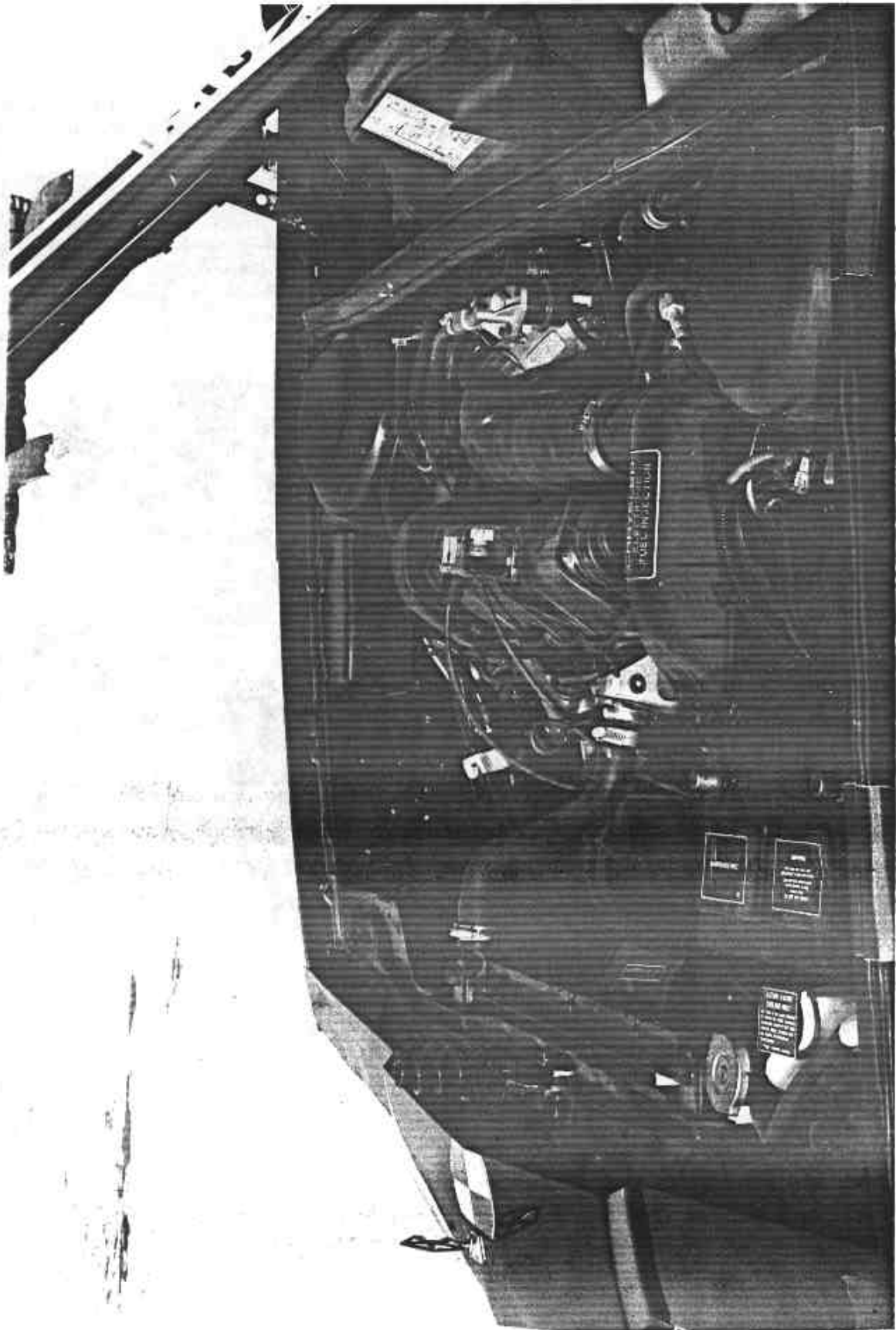


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

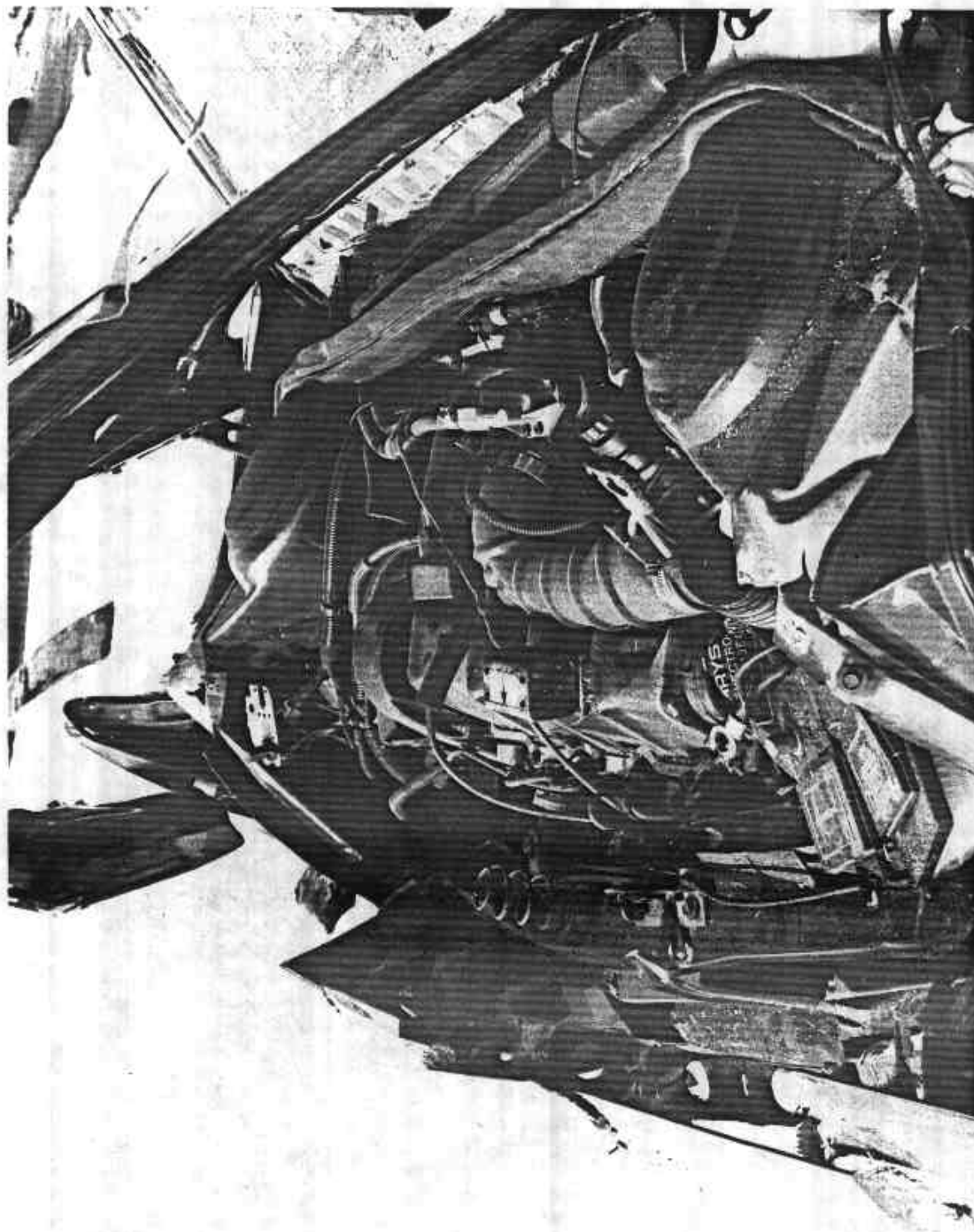


Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

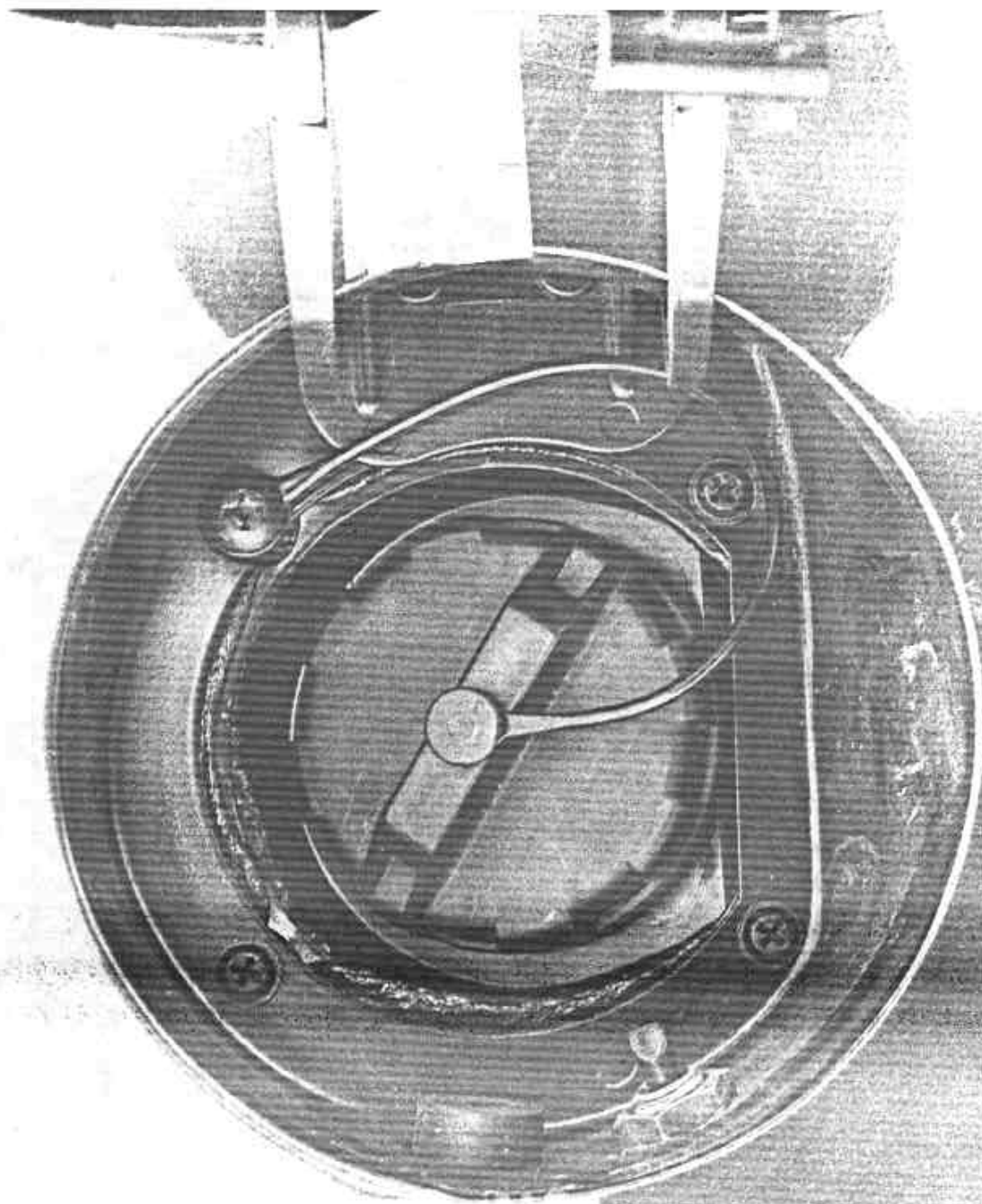


Figure A-16 PRE-TEST FUEL FILLER CAP VIEW

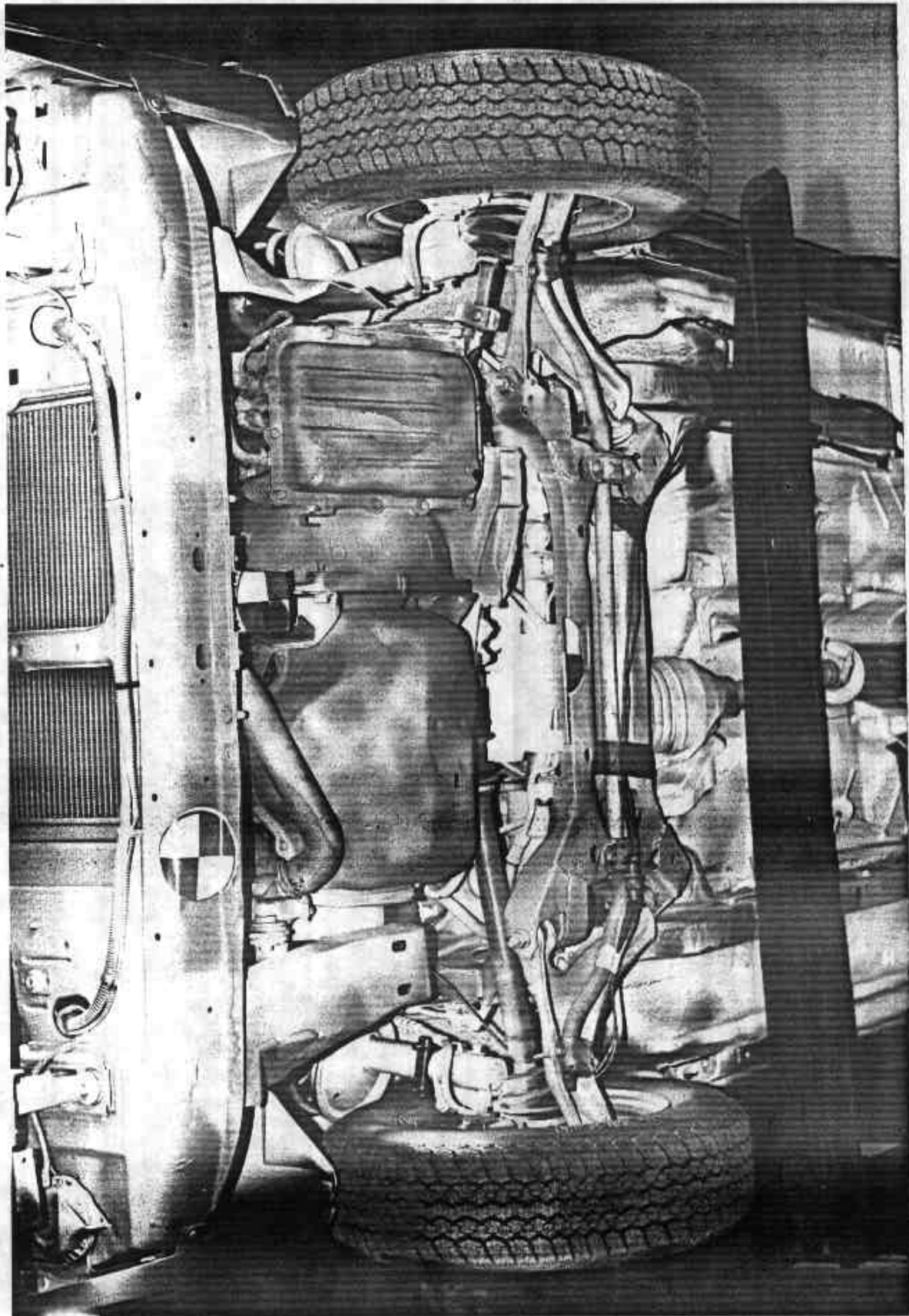


Figure A-17 PRE-TEST FRONT UNDERBODY VIEW

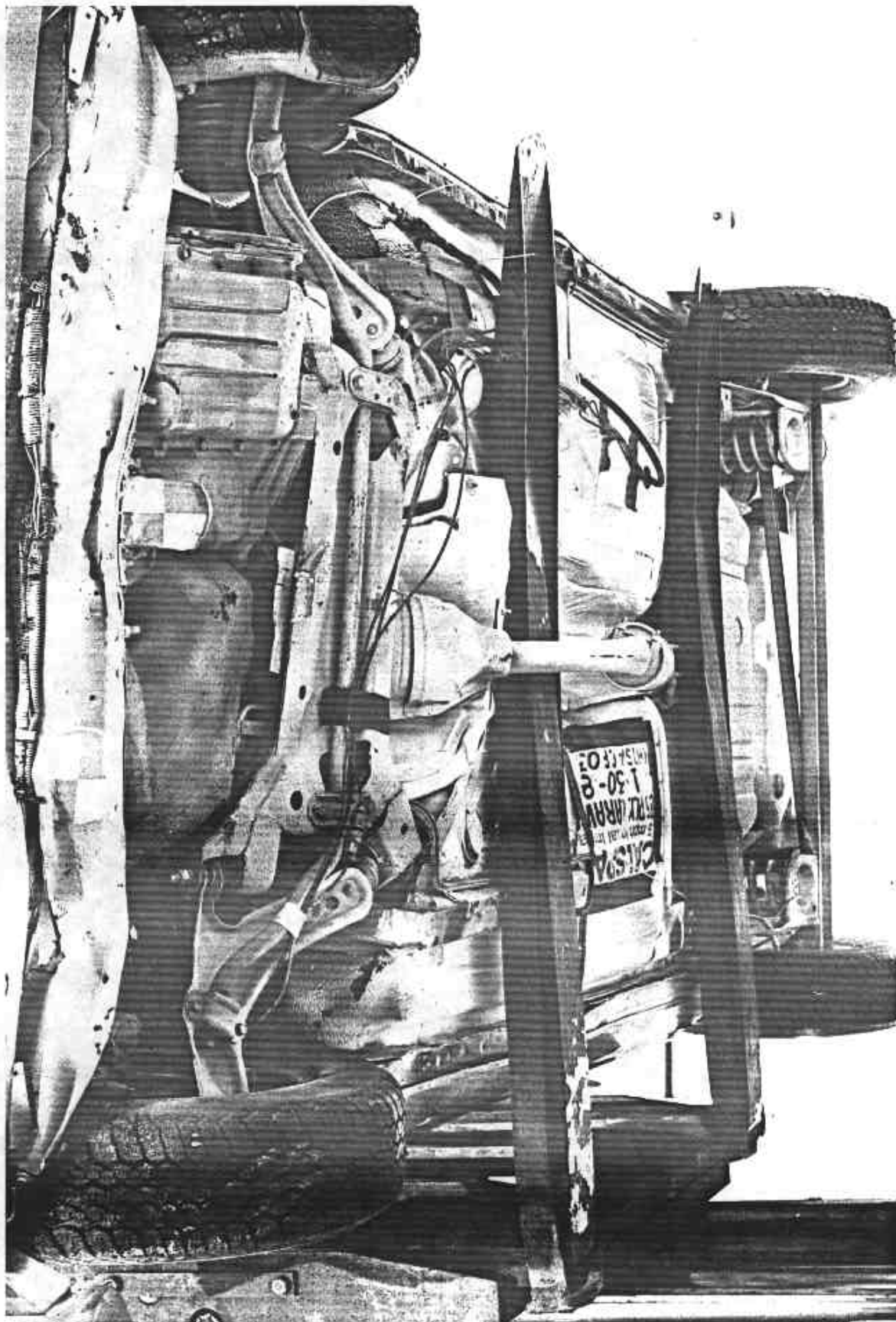


Figure A-18 POST-TEST FRONT UNDERBODY VIEW

A-19

7333-5

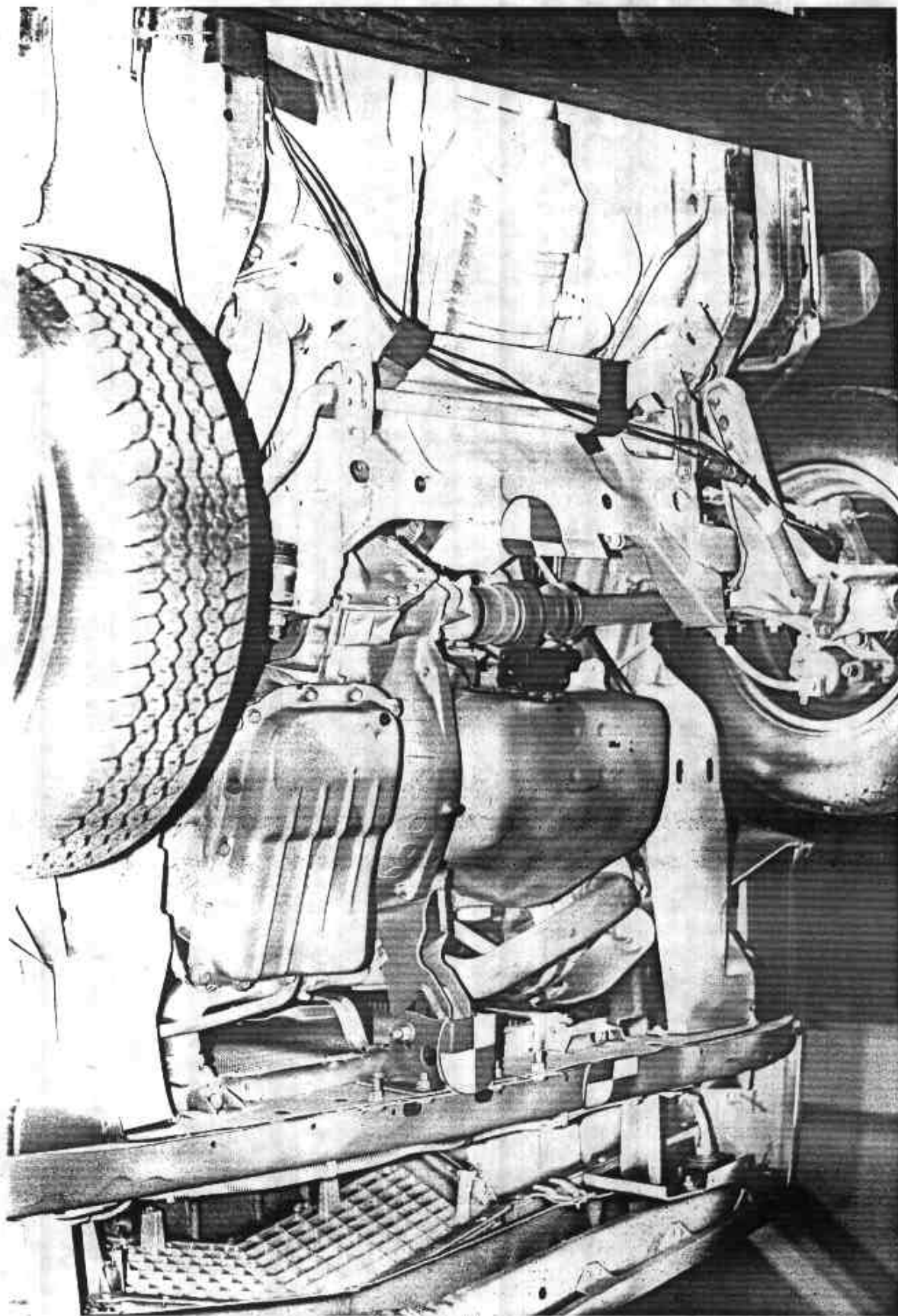


Figure A-19 PRE-TEST FRONT-SIDE UNDERBODY VIEW

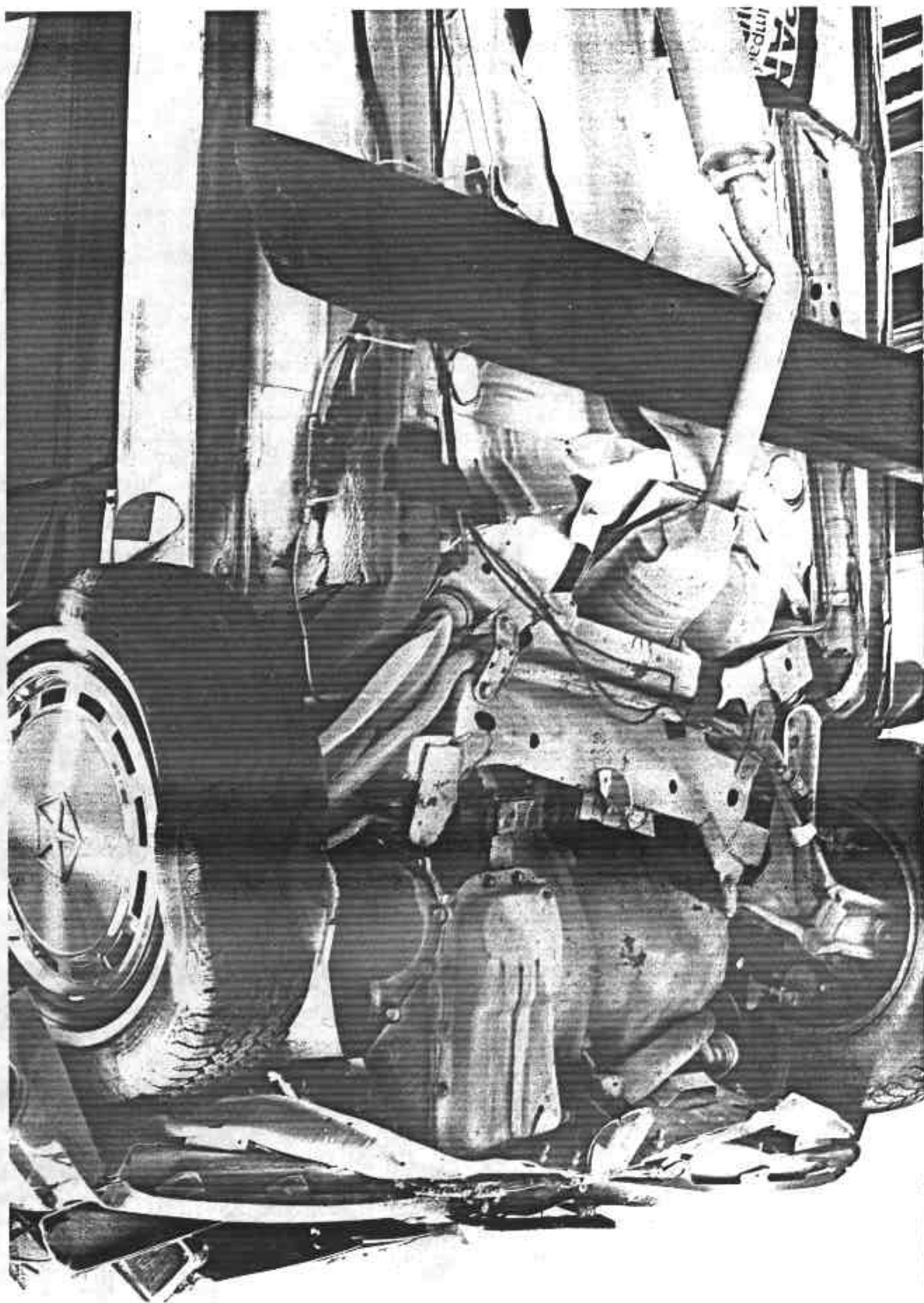


Figure A-20 POST-TEST FRONT-SIDE UNDERBODY VIEW

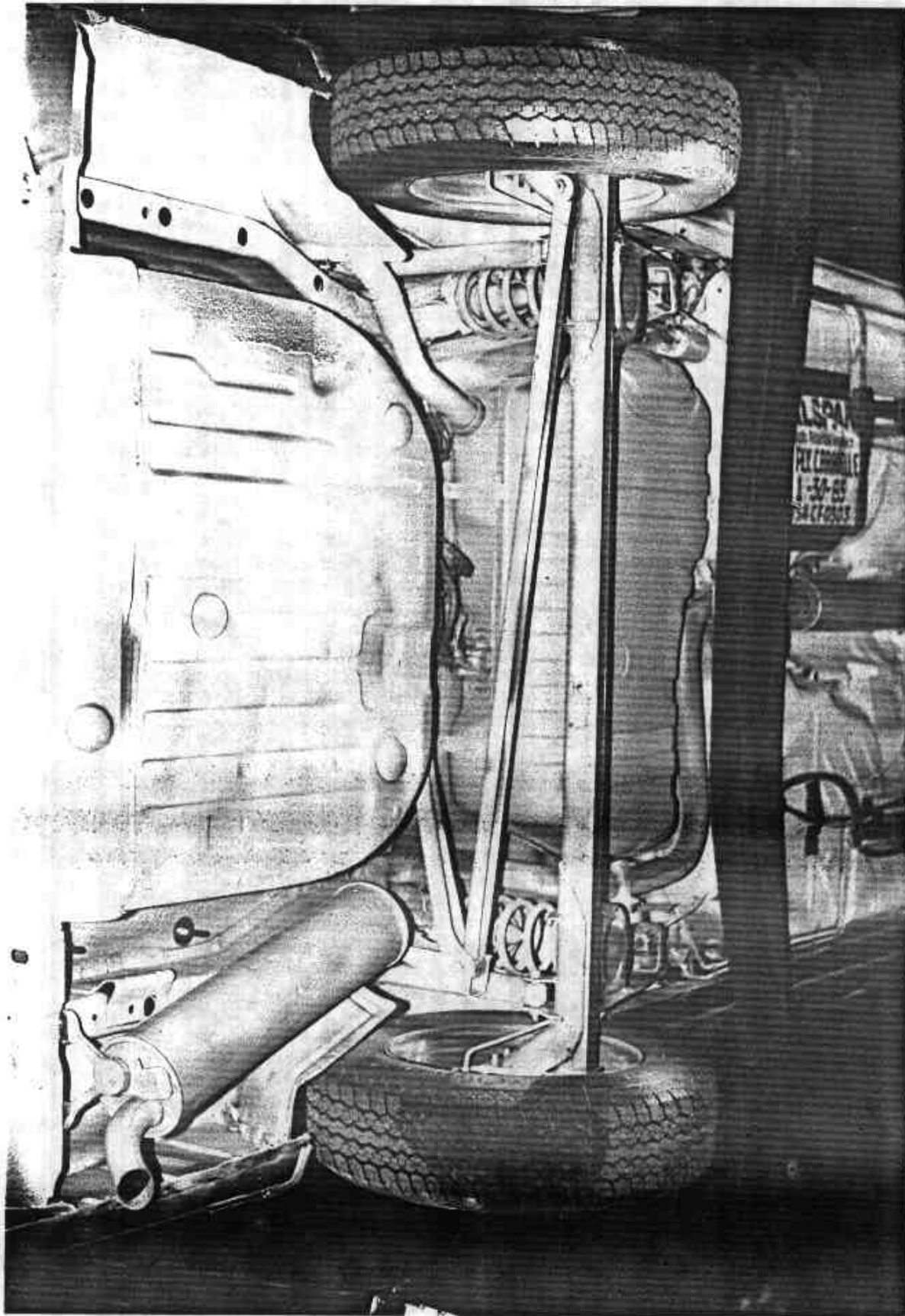


Figure A-21 PRE-TEST REAR UNDERBODY VIEW

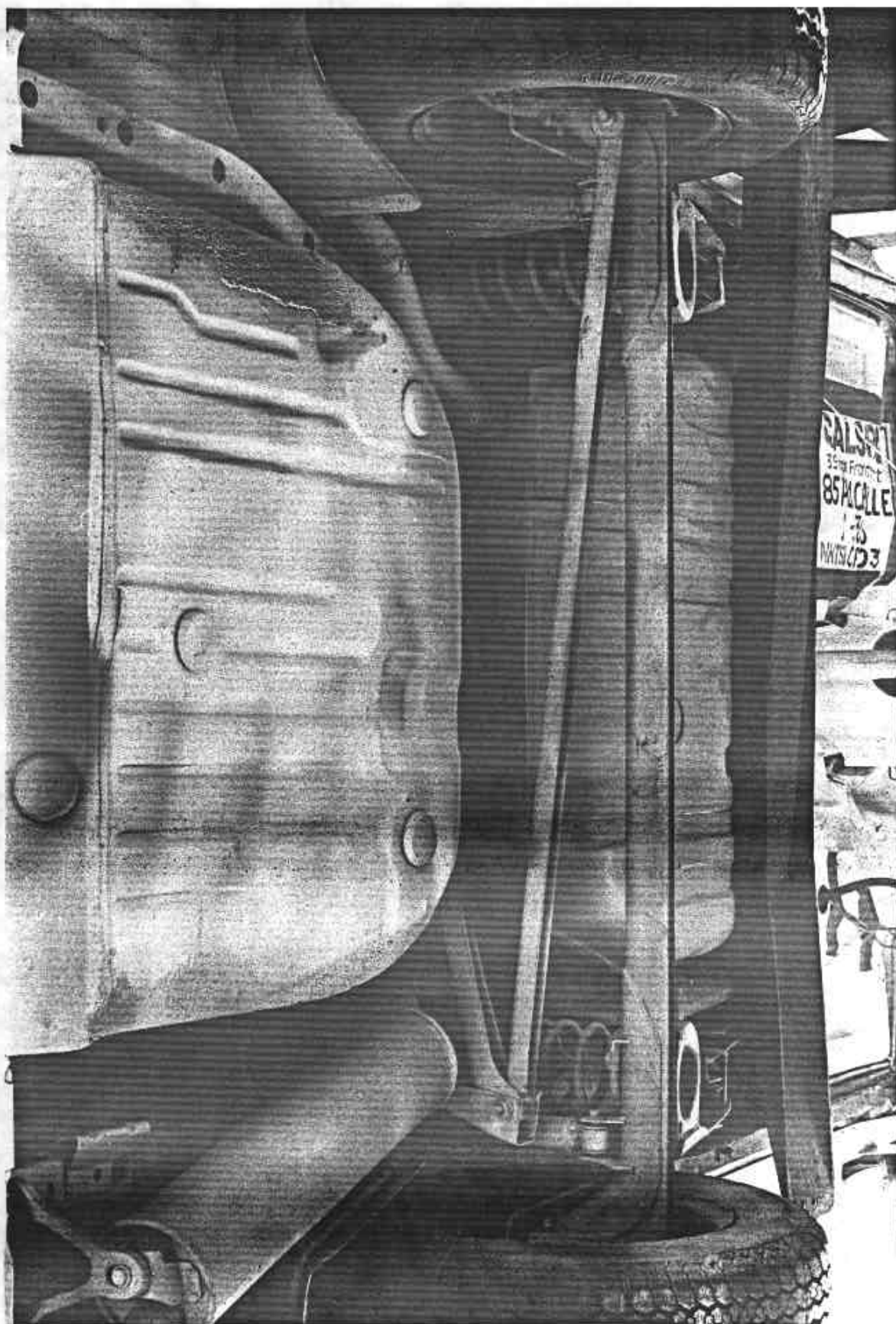


Figure A-22 POST-TEST REAR UNDERBODY VIEW



Figure A-23 PRE-TEST DRIVER POSITION VIEW



Figure A-24 POST-TEST DRIVER POSITION VIEW



Figure A-25 PRE-TEST PASSENGER POSITION VIEW

A-26

7333-5



Figure A-26 POST-TEST PASSENGER POSITION VIEW



Figure A-27 PRE-TEST DRIVER AND INTERIOR VIEW



Figure A-28 POST-TEST DRIVER AND INTERIOR VIEW



Figure A-29 PRE-TEST PASSENGER AND INTERIOR VIEW

A-30

7333-5



Figure A-30 POST-TEST PASSENGER AND INTERIOR VIEW

APPENDIX B

VEHICLE, DUMMY AND LOAD CELL BARRIER DATA

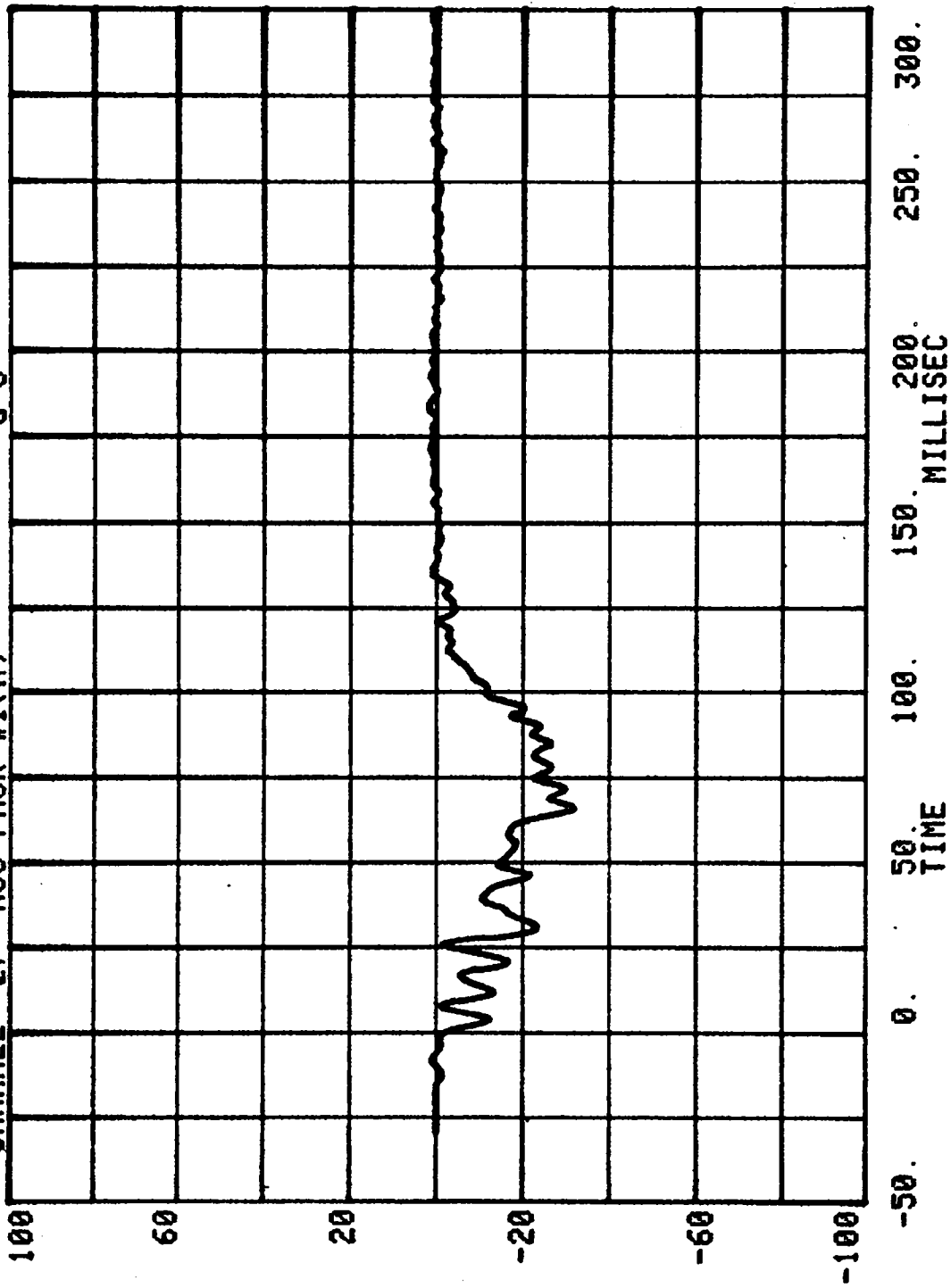
TEST NO. CF0303

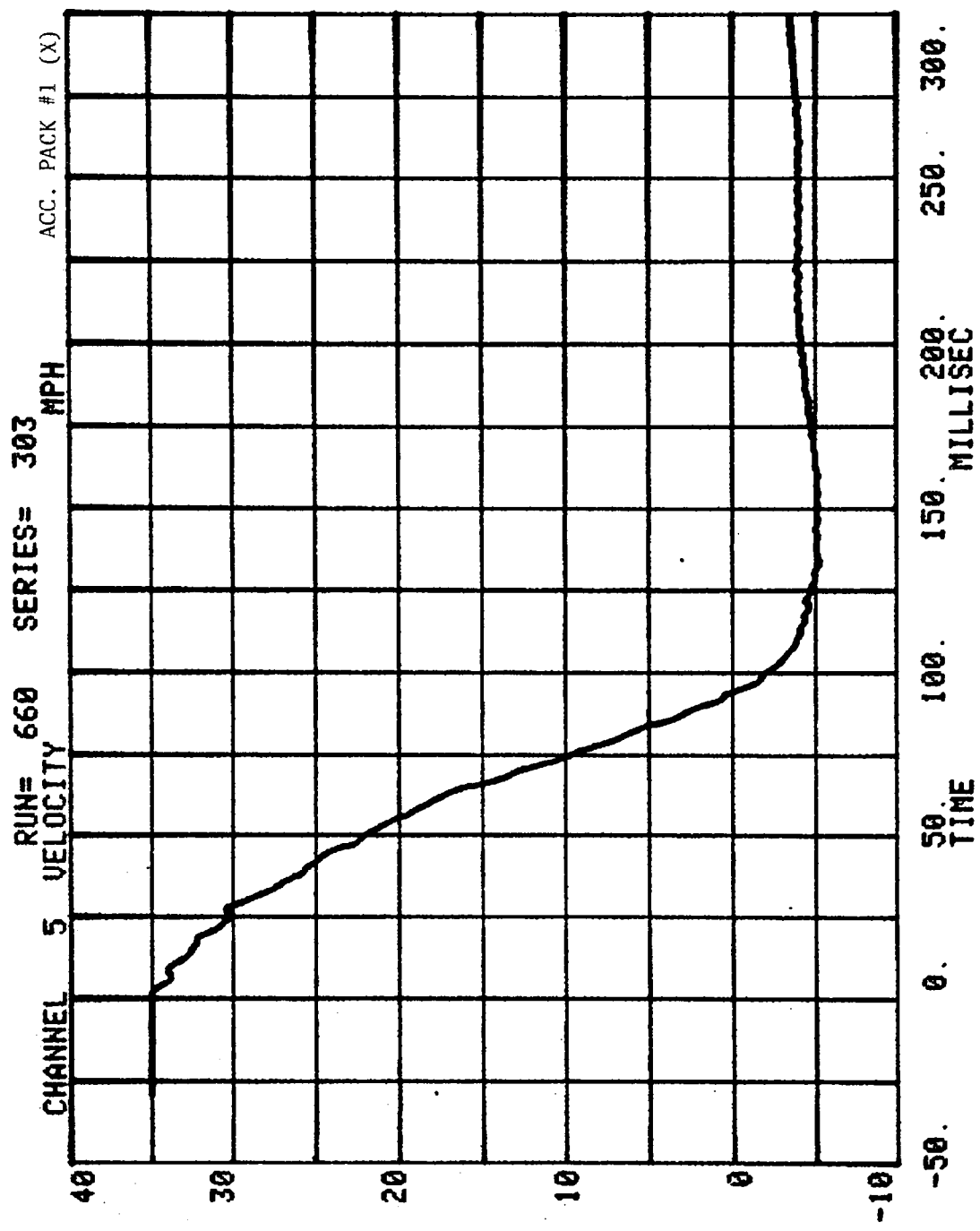
VEHICLE DATA

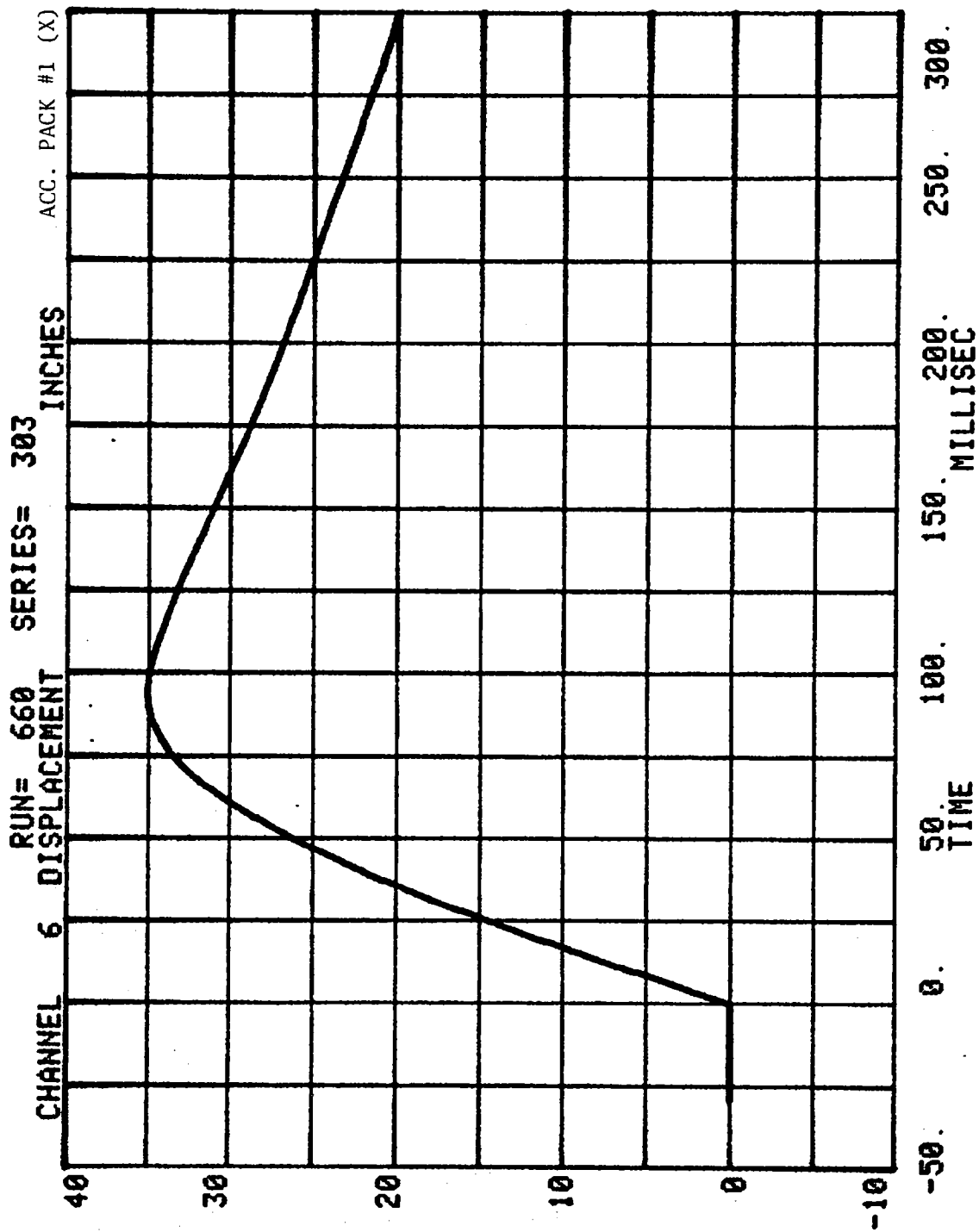
FILTER CHANNEL CLASS

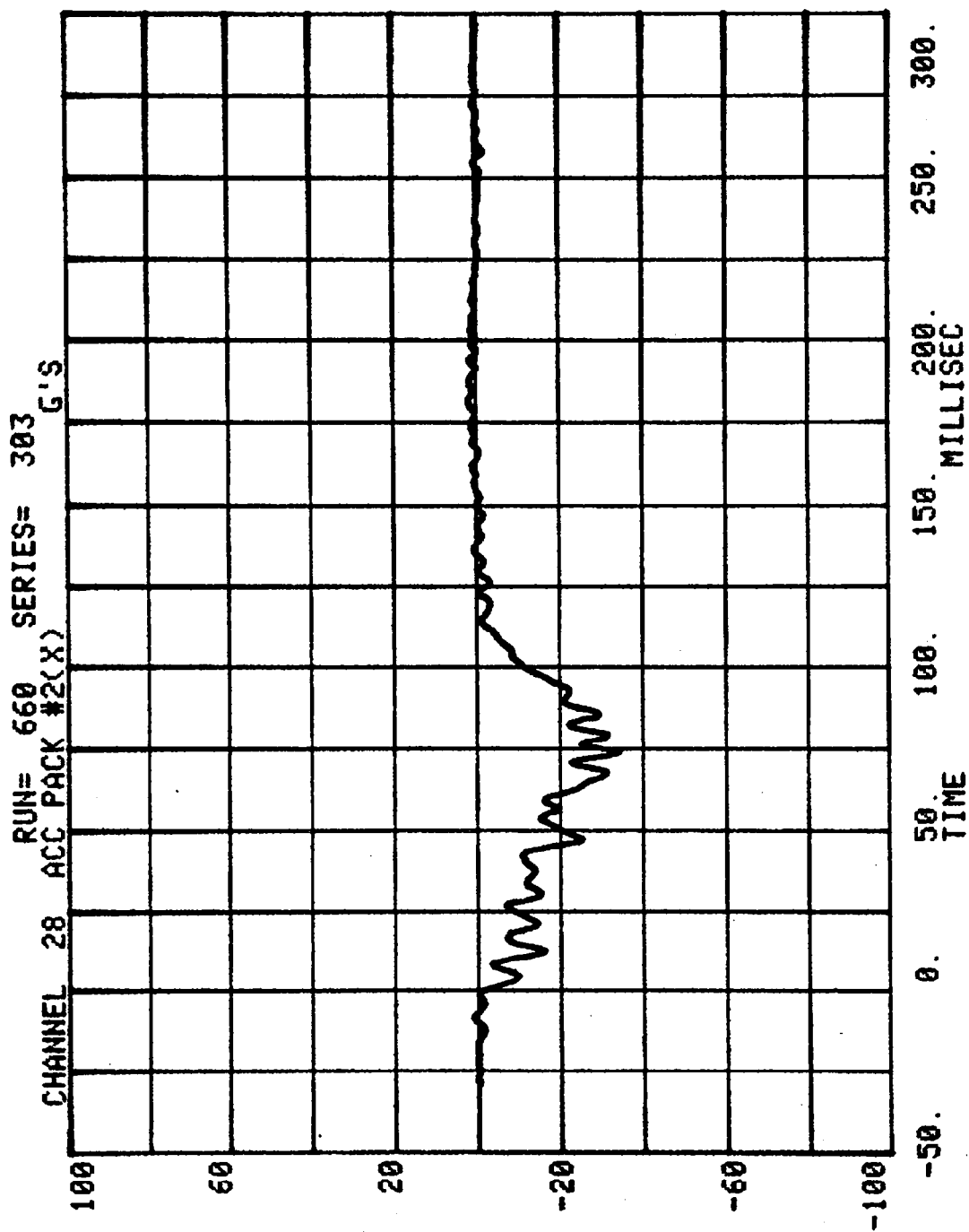
60

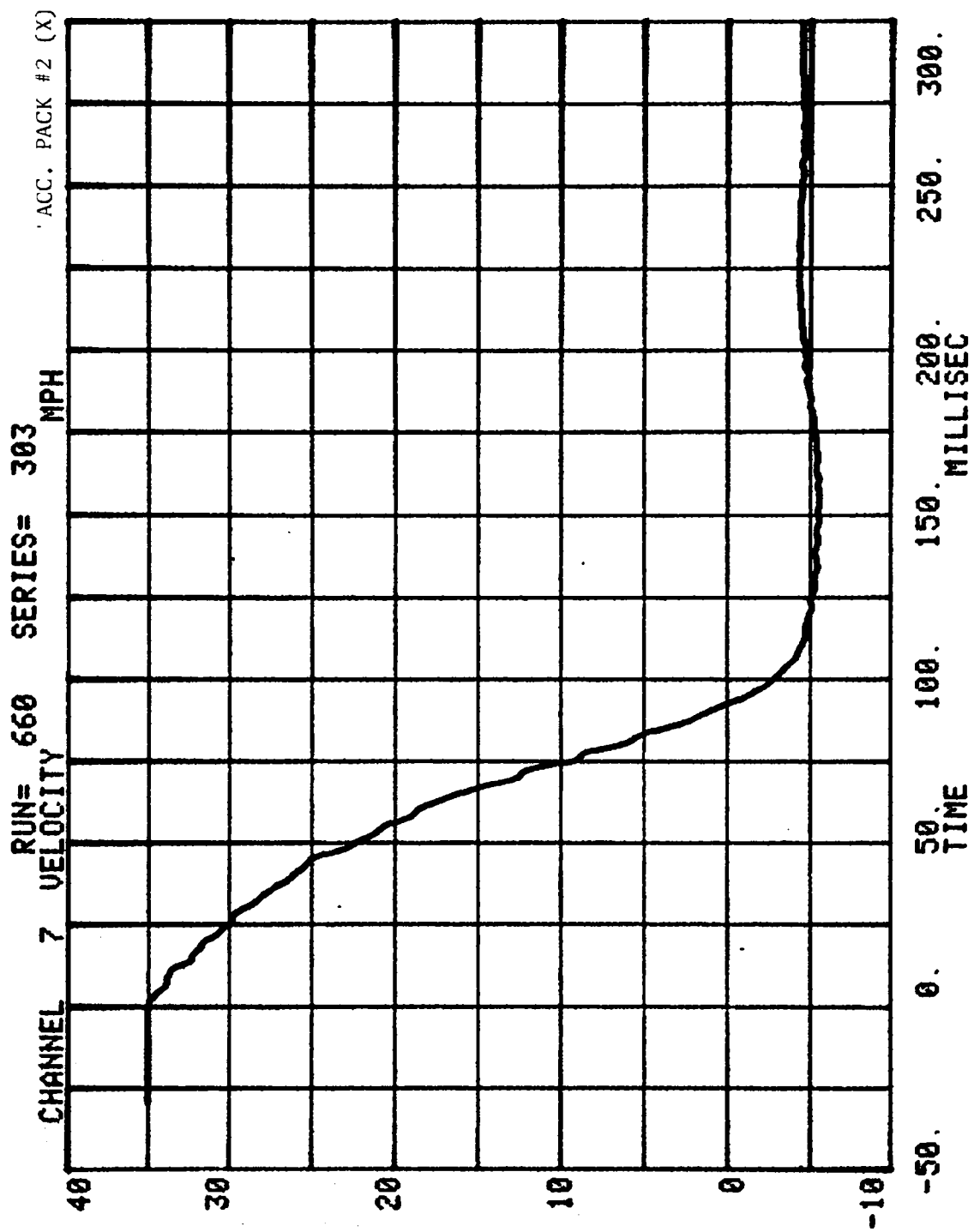
CHANNEL 27 ACC PACK #1(X) RUN= 660 SERIES= 303 G'S

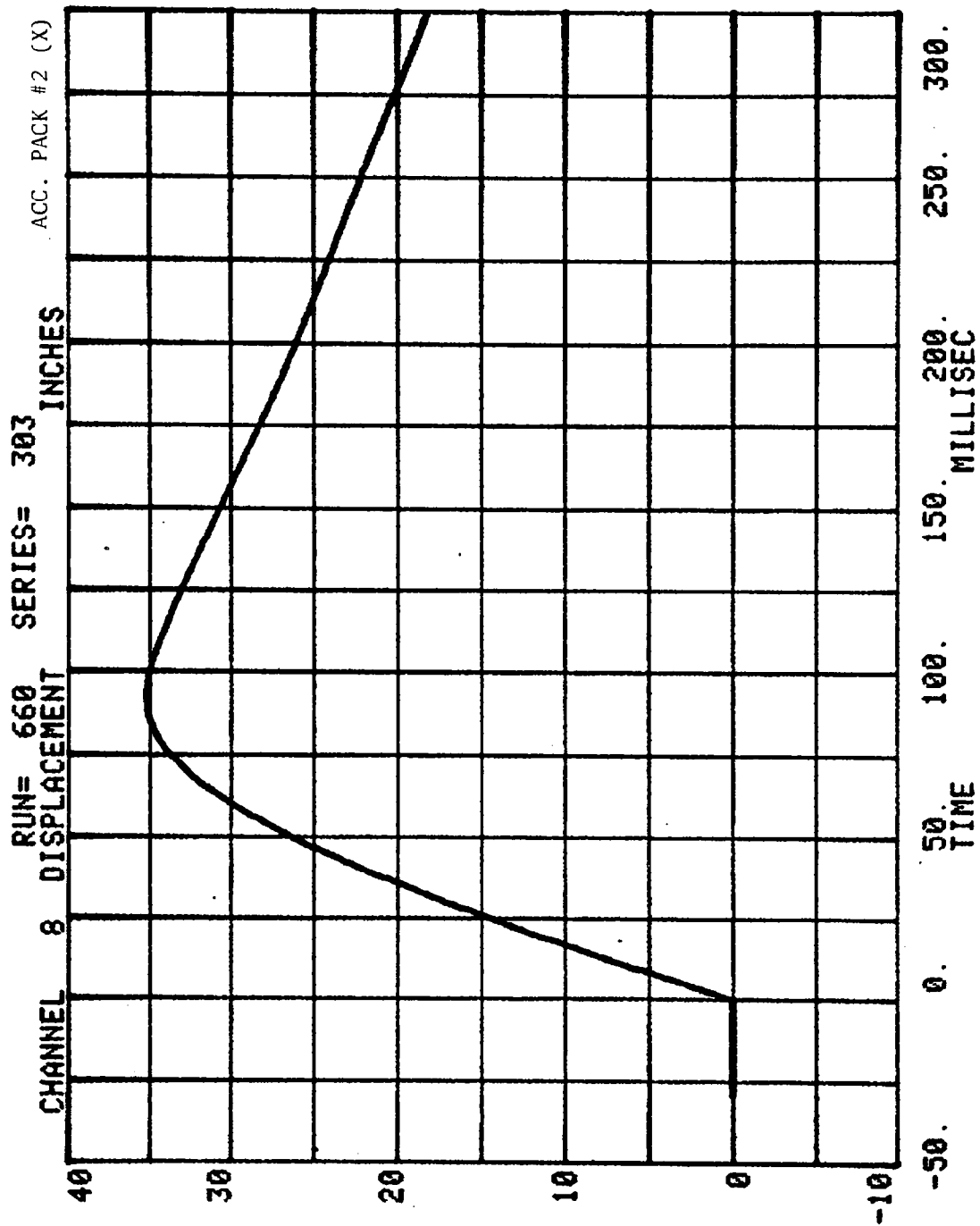




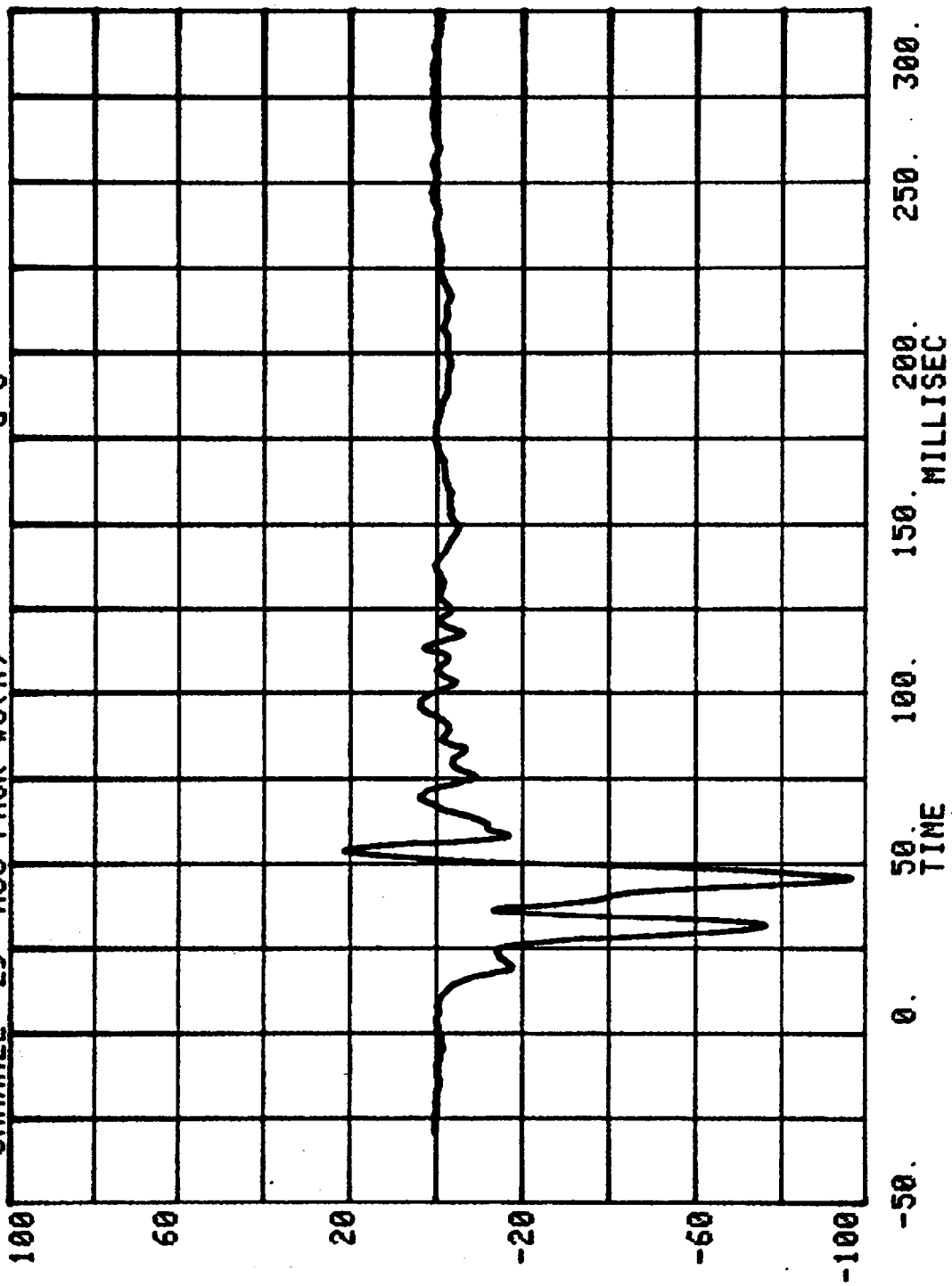




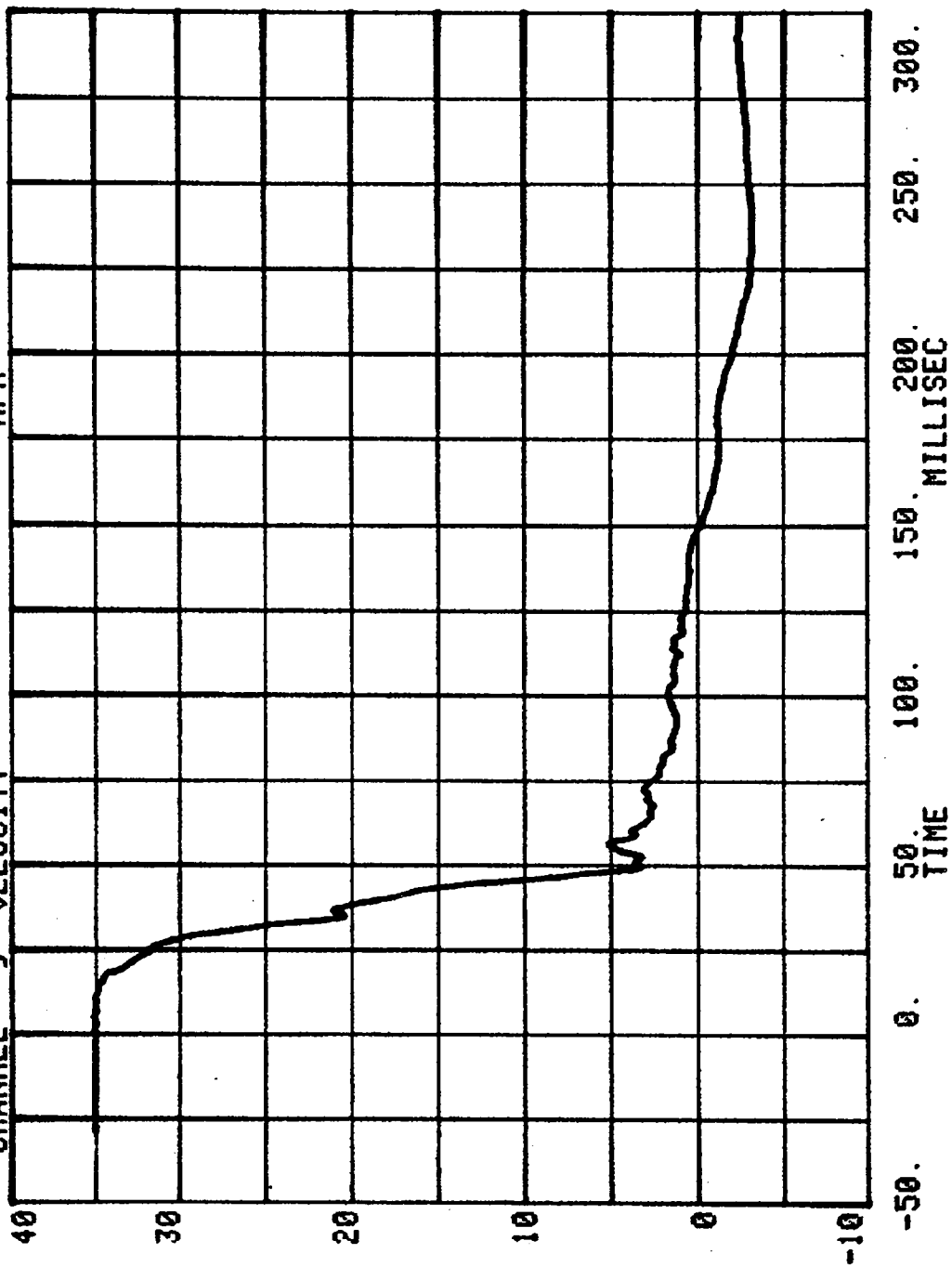


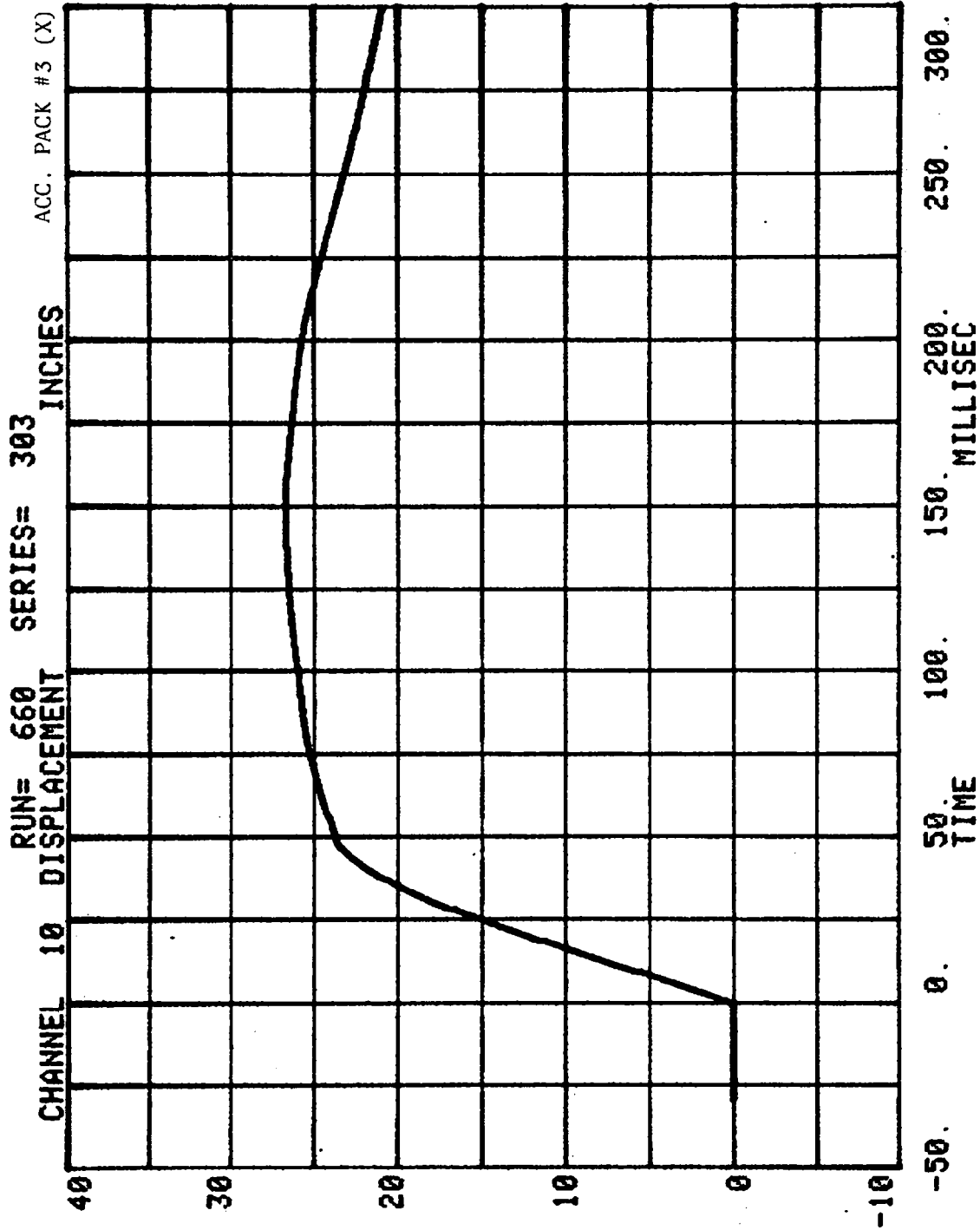


RUN= 660 SERIES= 303
CHANNEL 29 ACC PACK #3(X) G'S

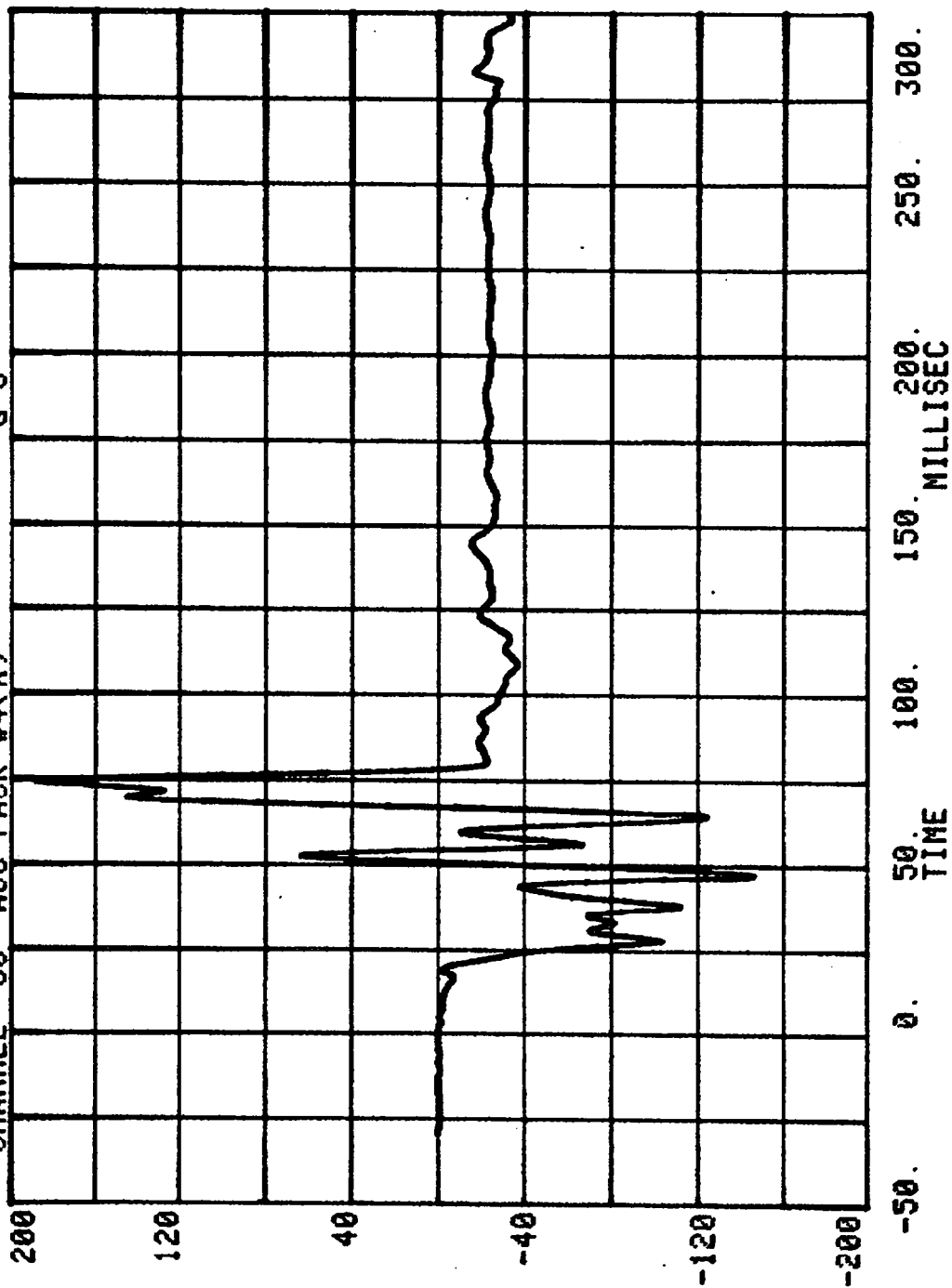


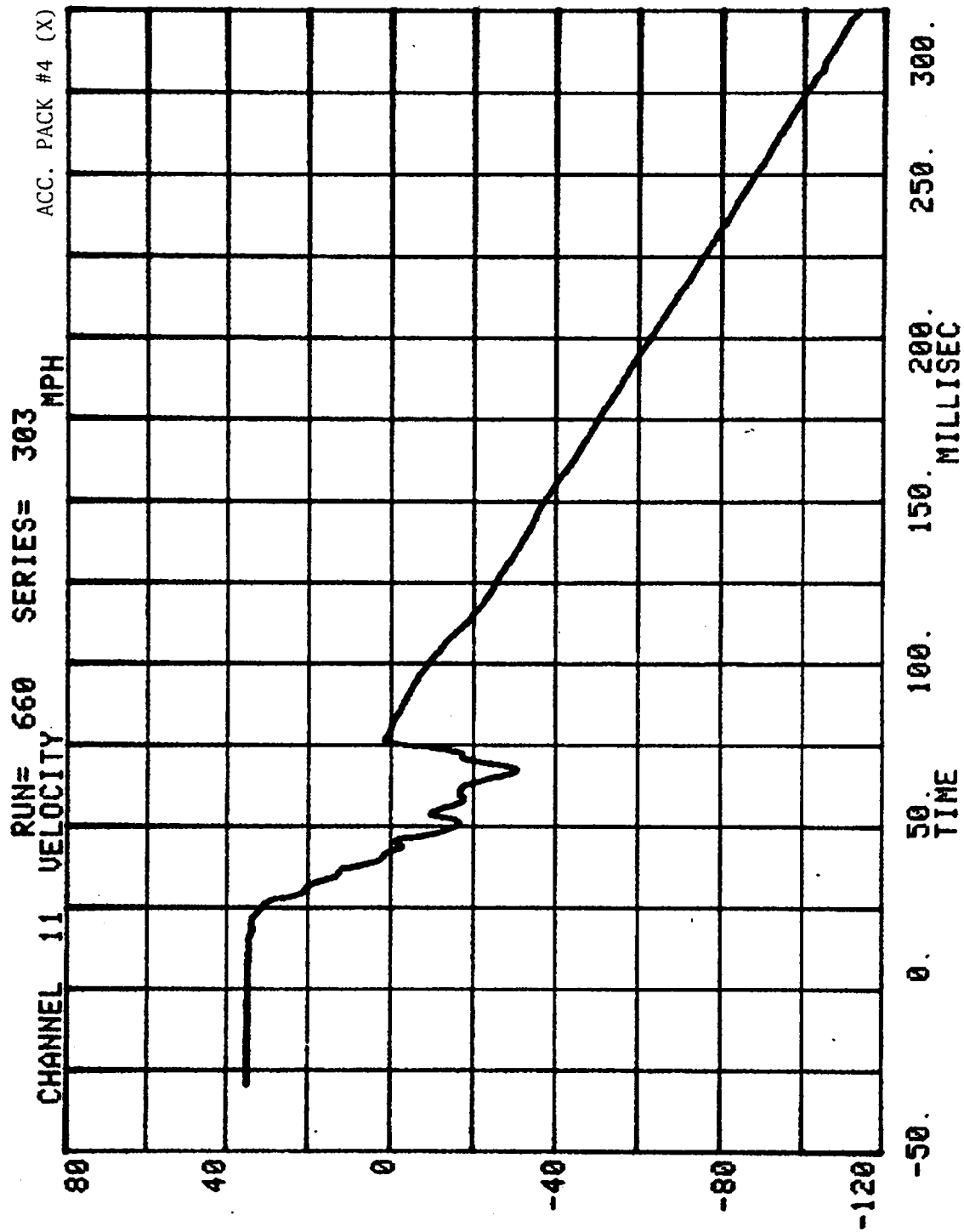
CHANNEL 9 VELOCITY RUN= 660 SERIES= 303 MPH
ACC. PACK #3 (X)

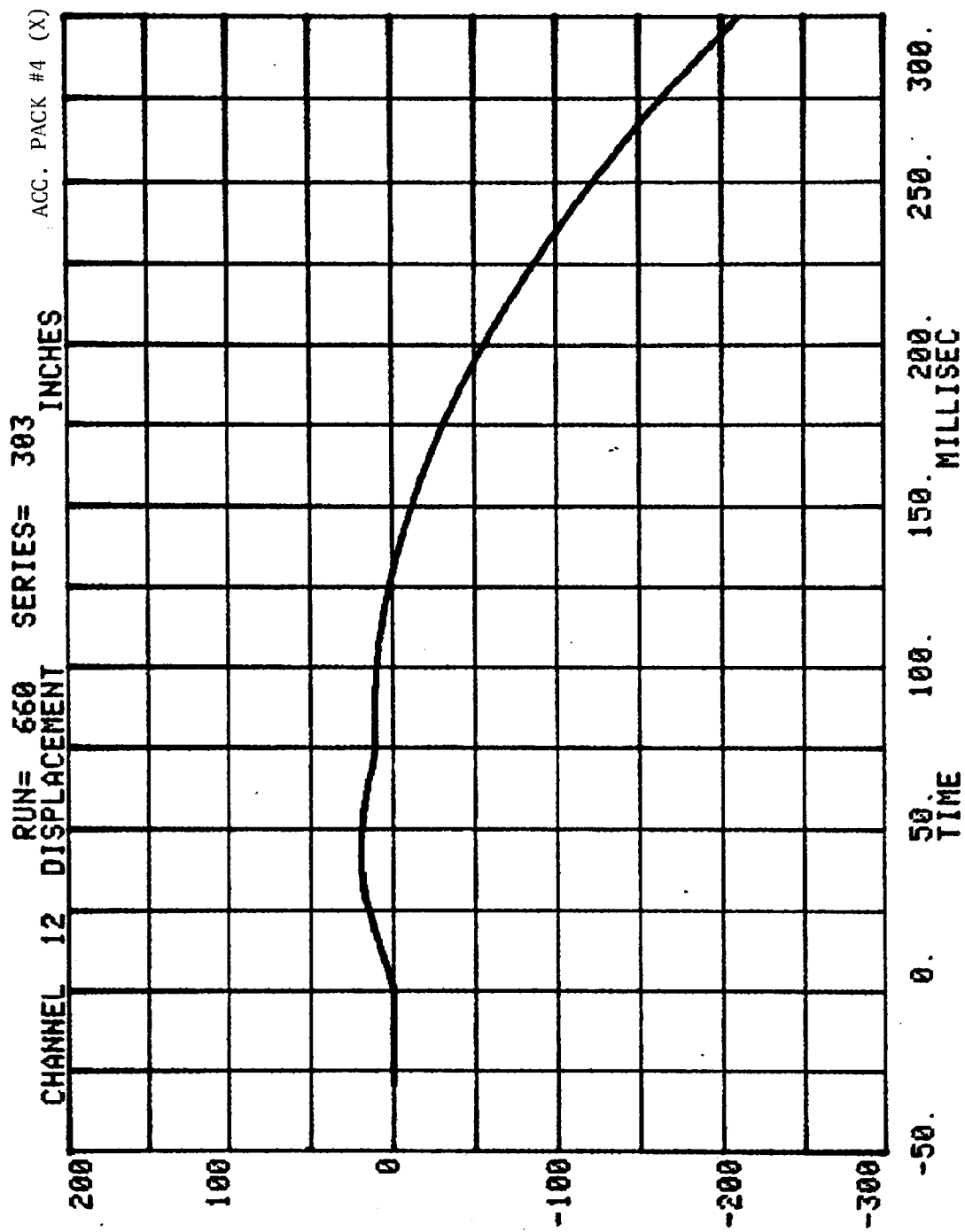


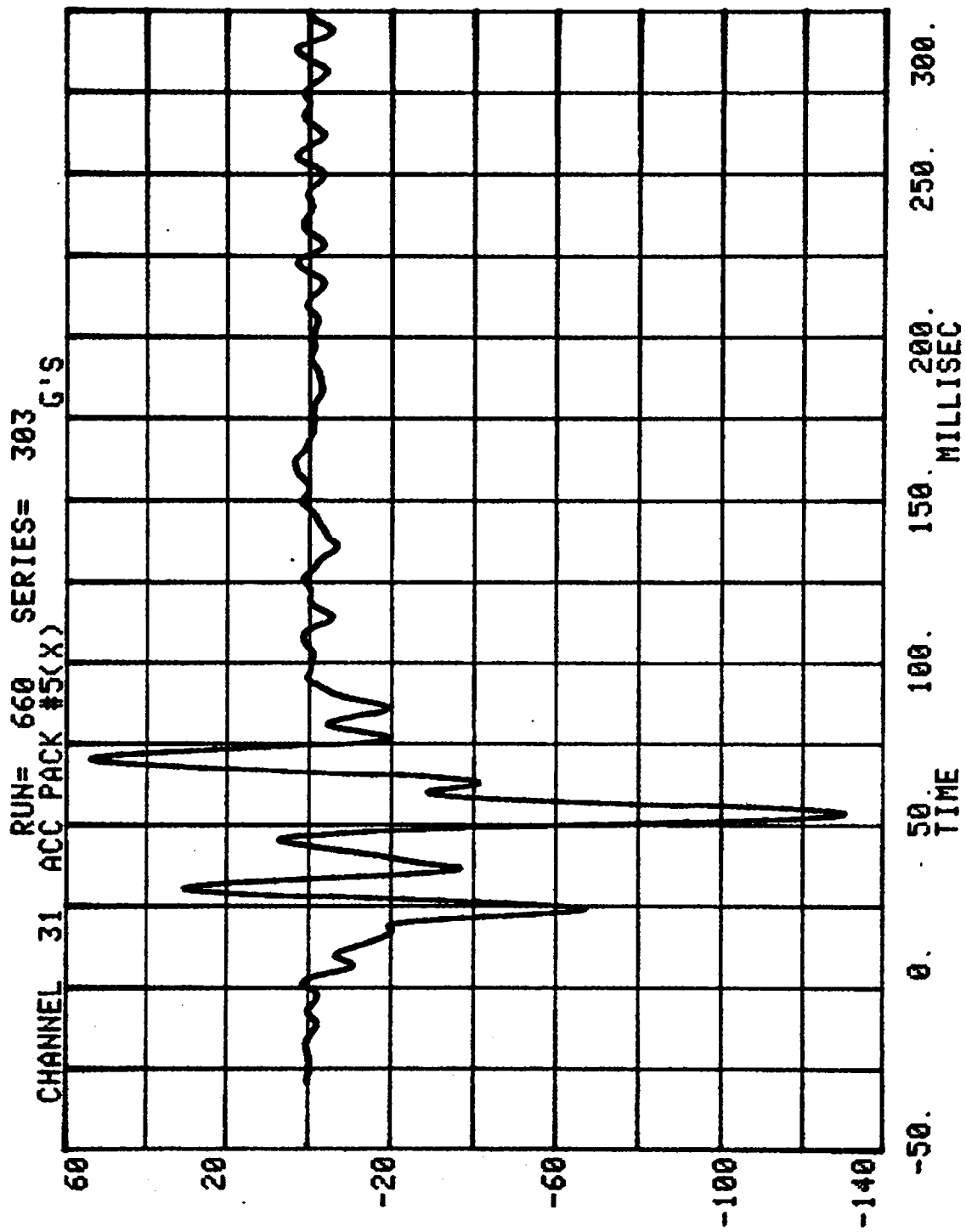


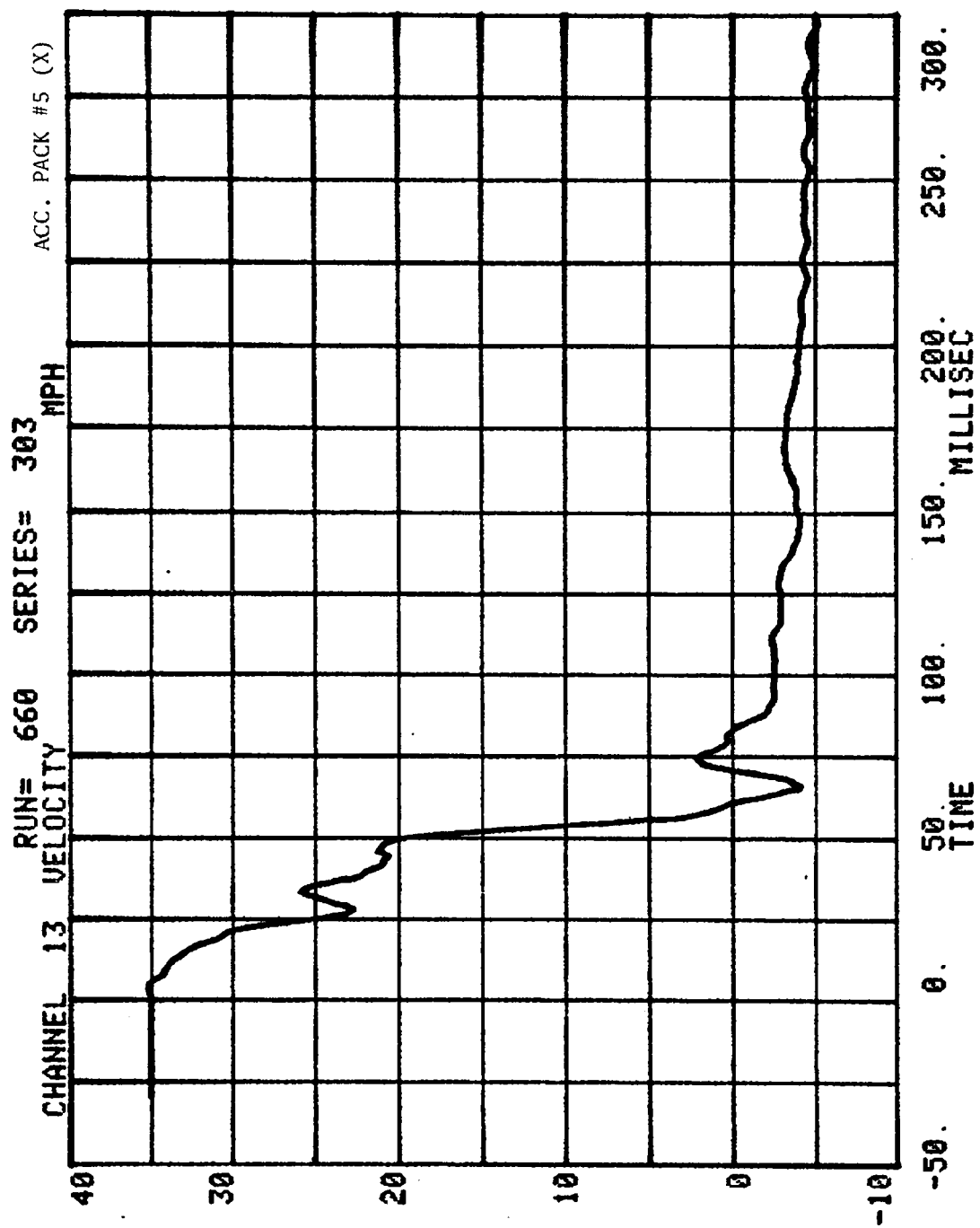
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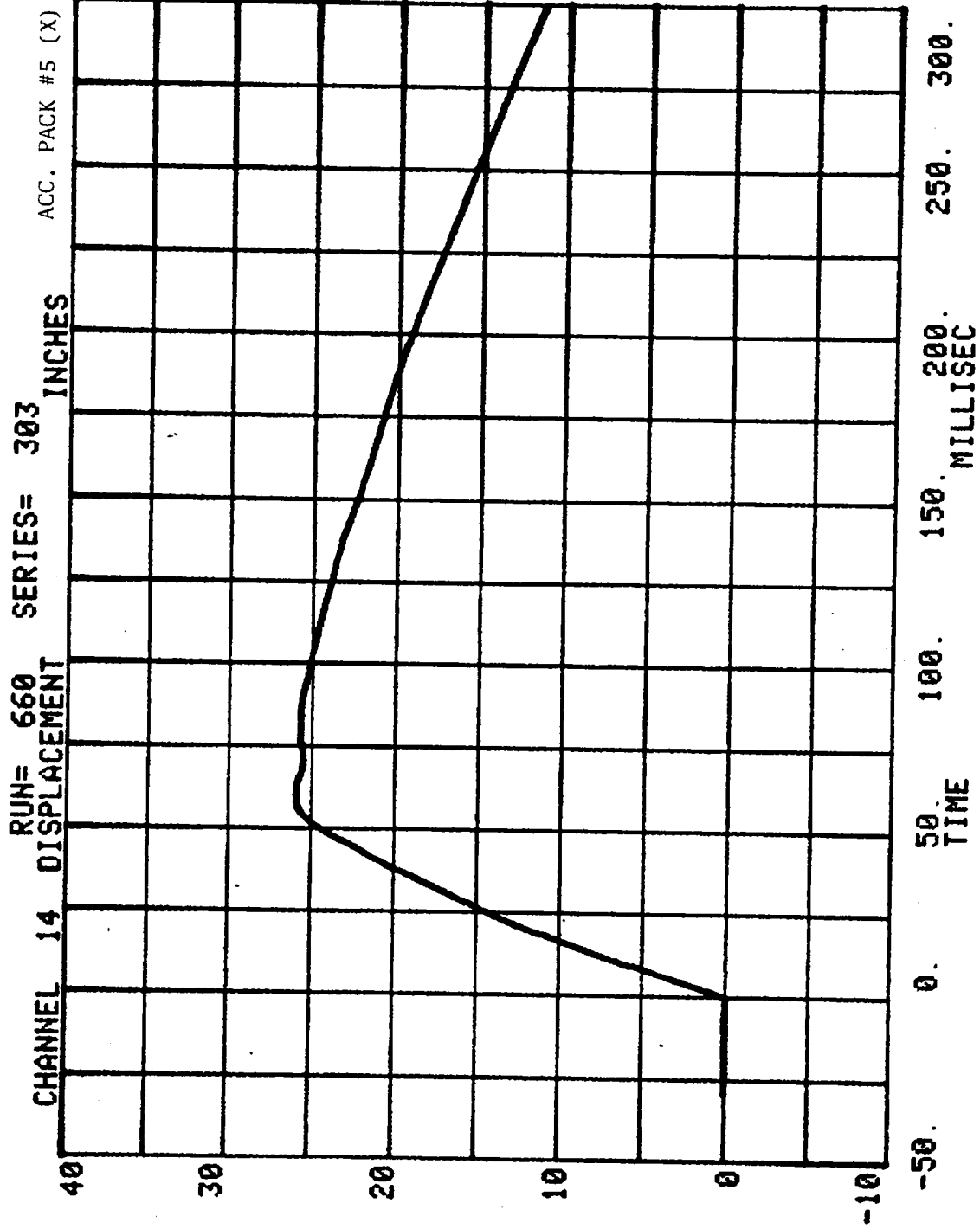




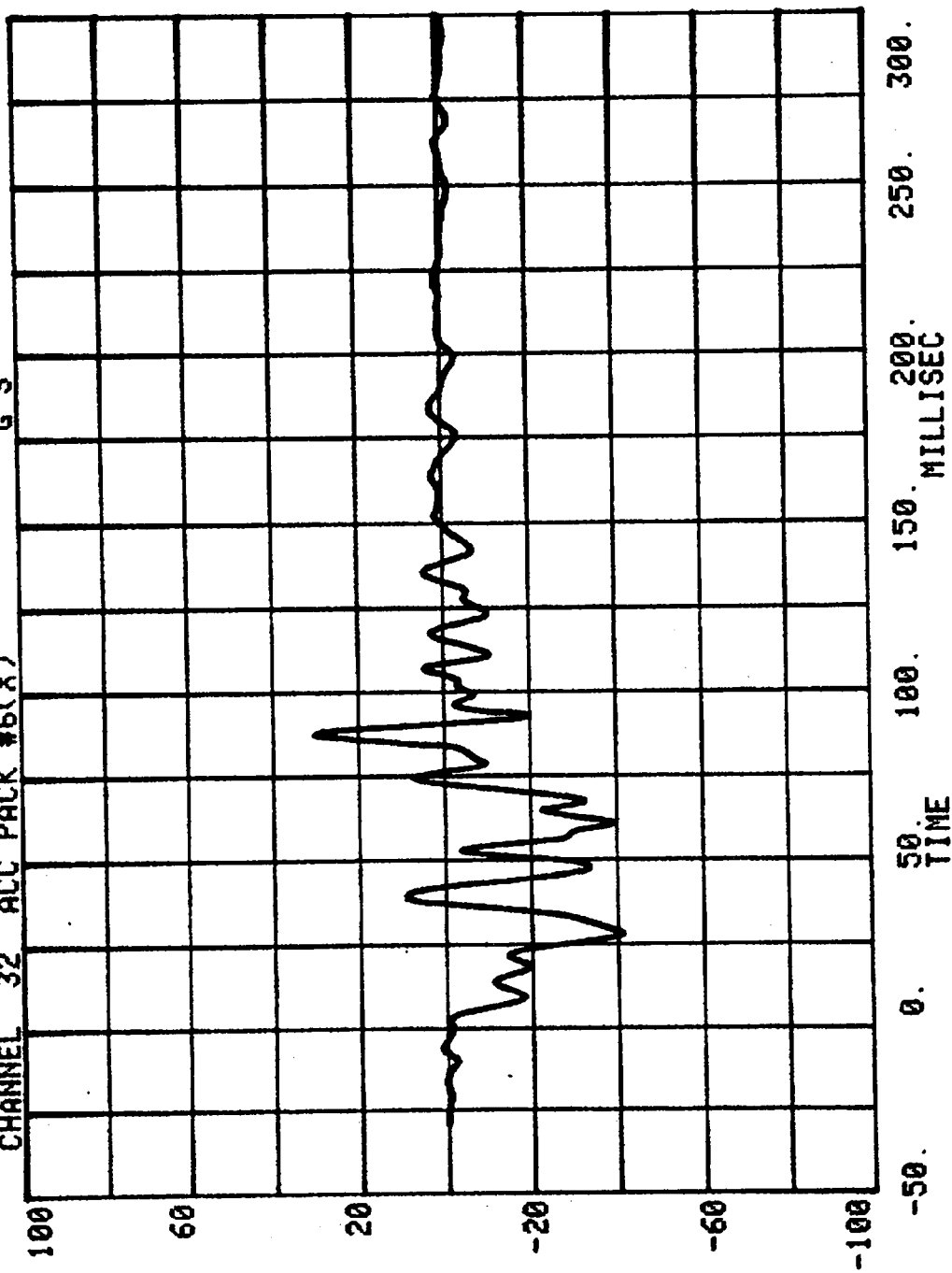


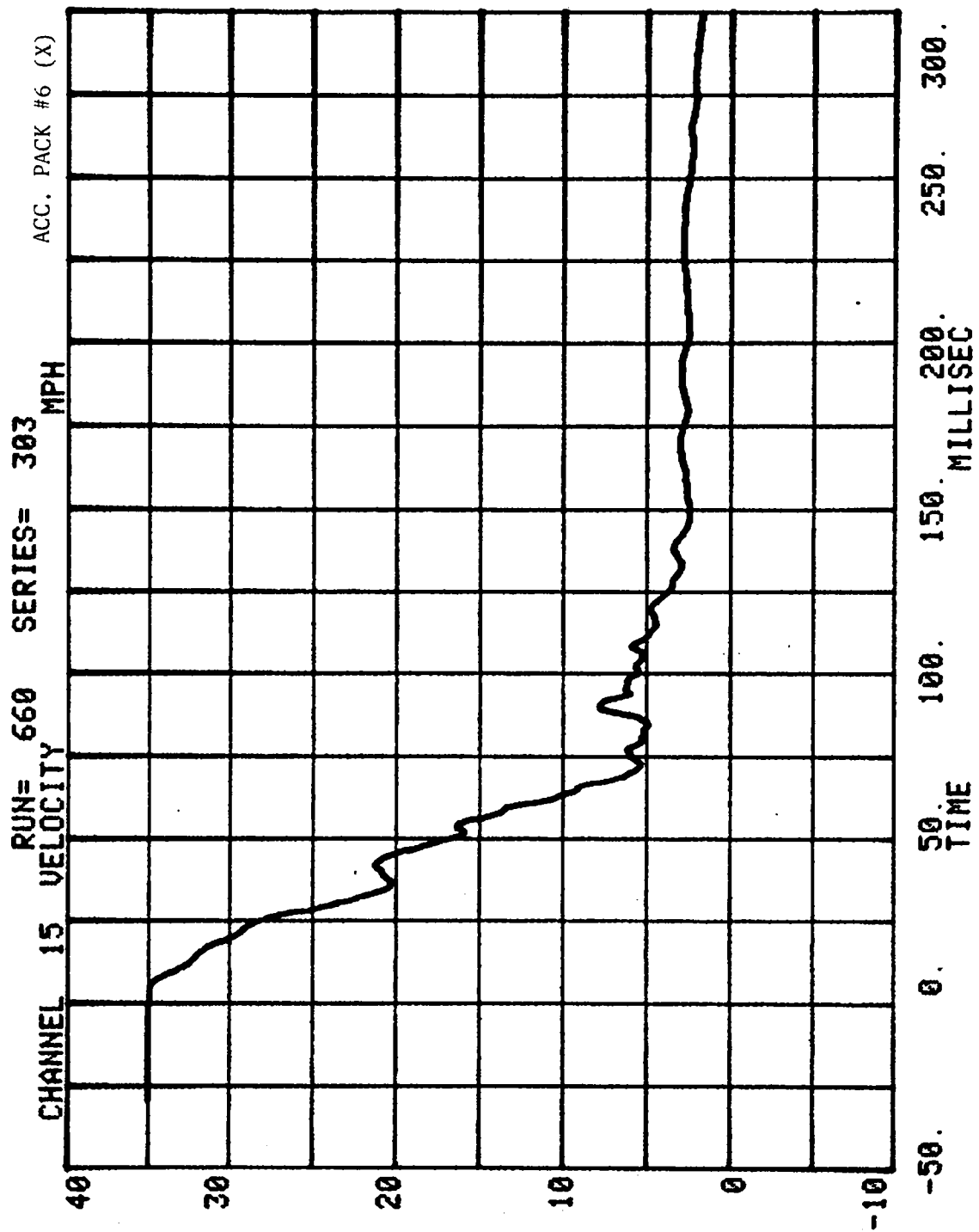


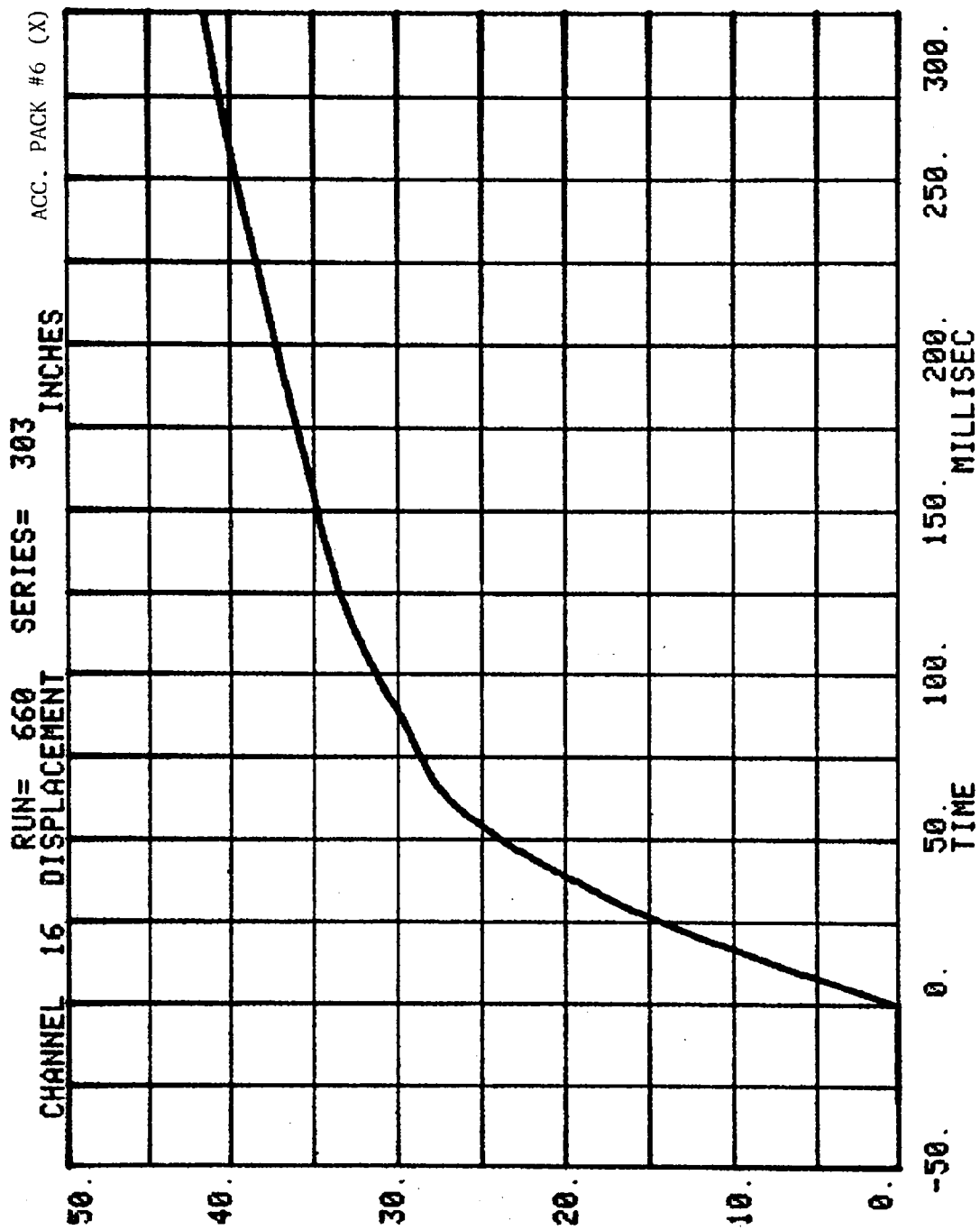




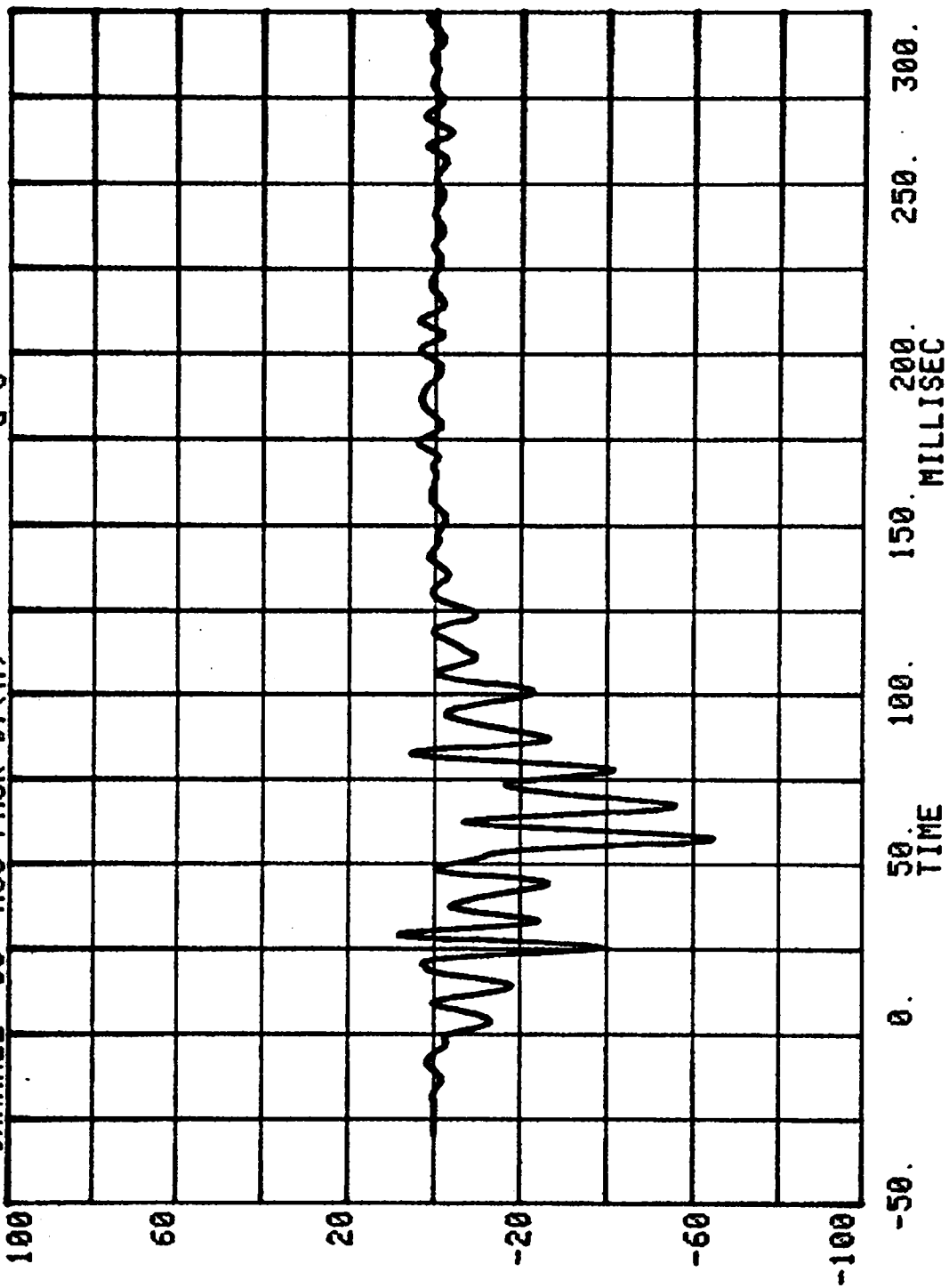
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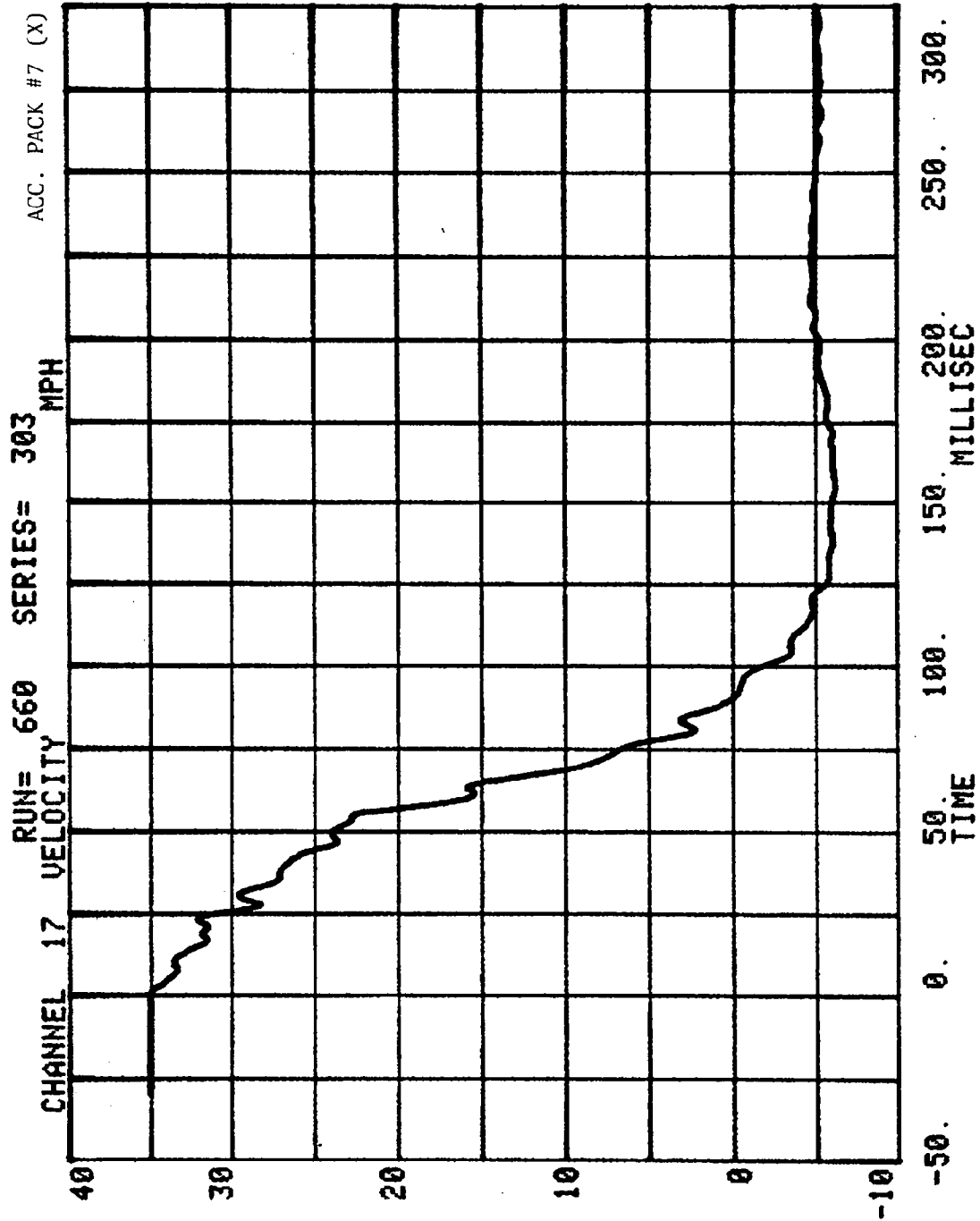


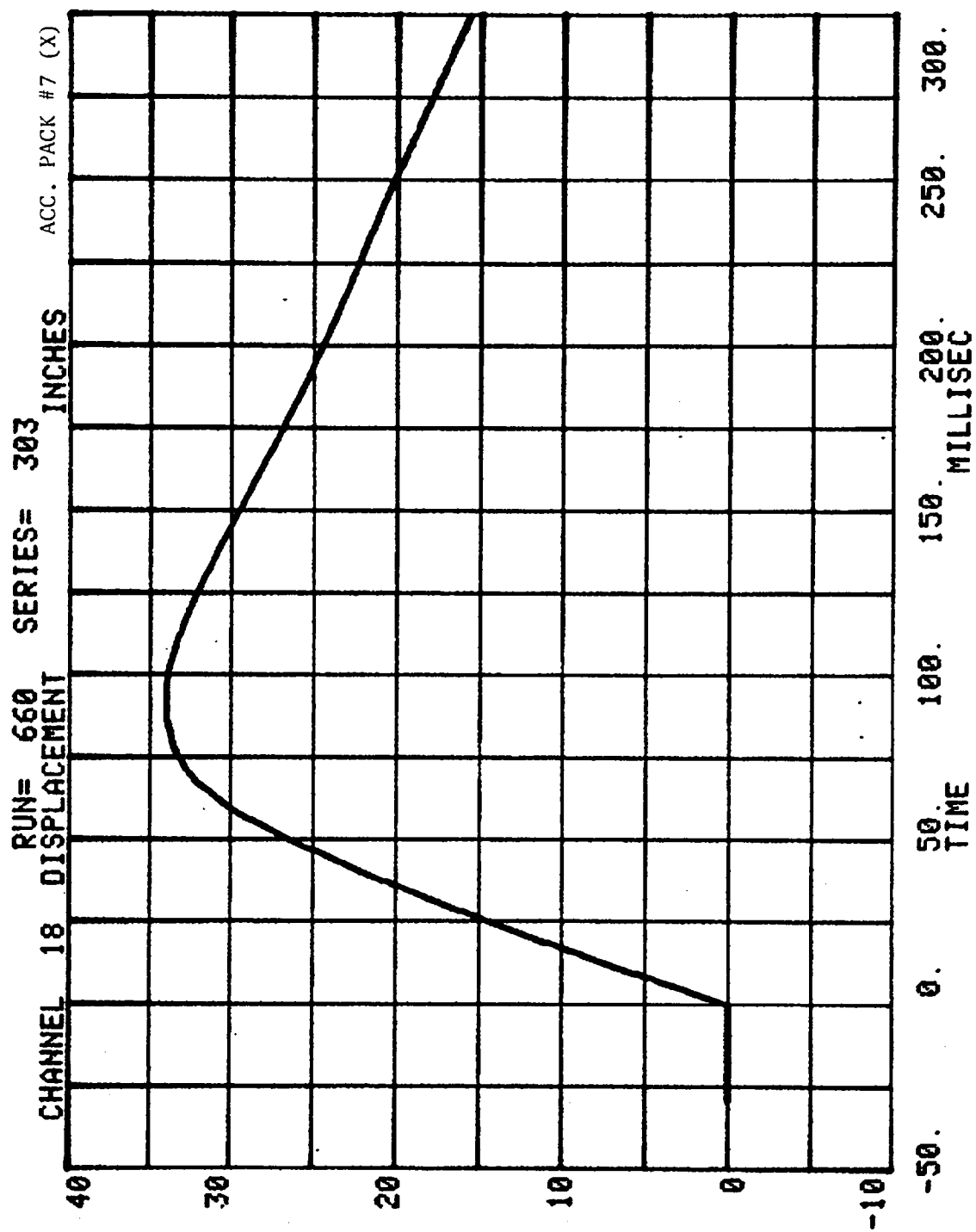




CHANNEL 33 ACC PACK #7(X) RUN= 660 SERIES= 303 G'S





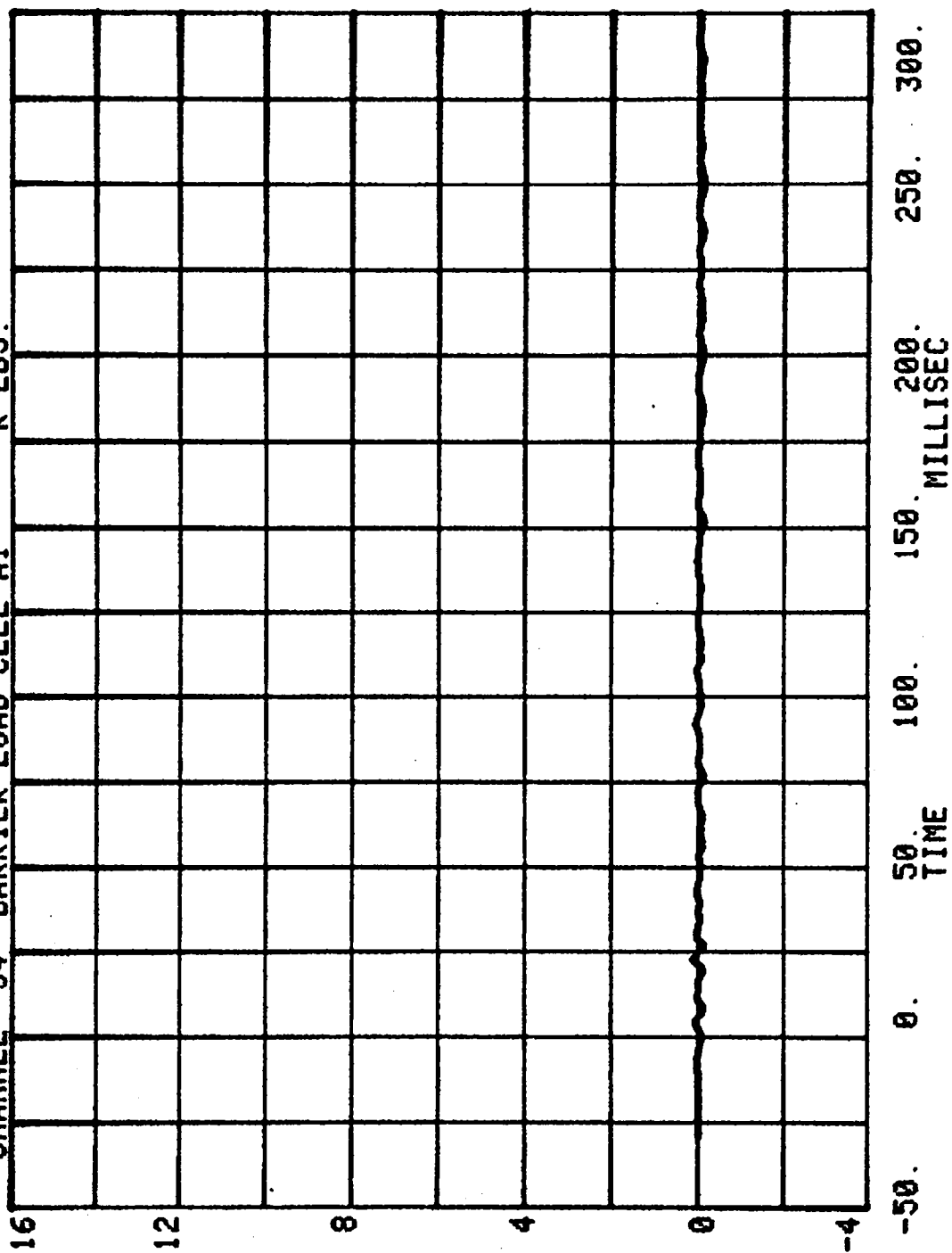


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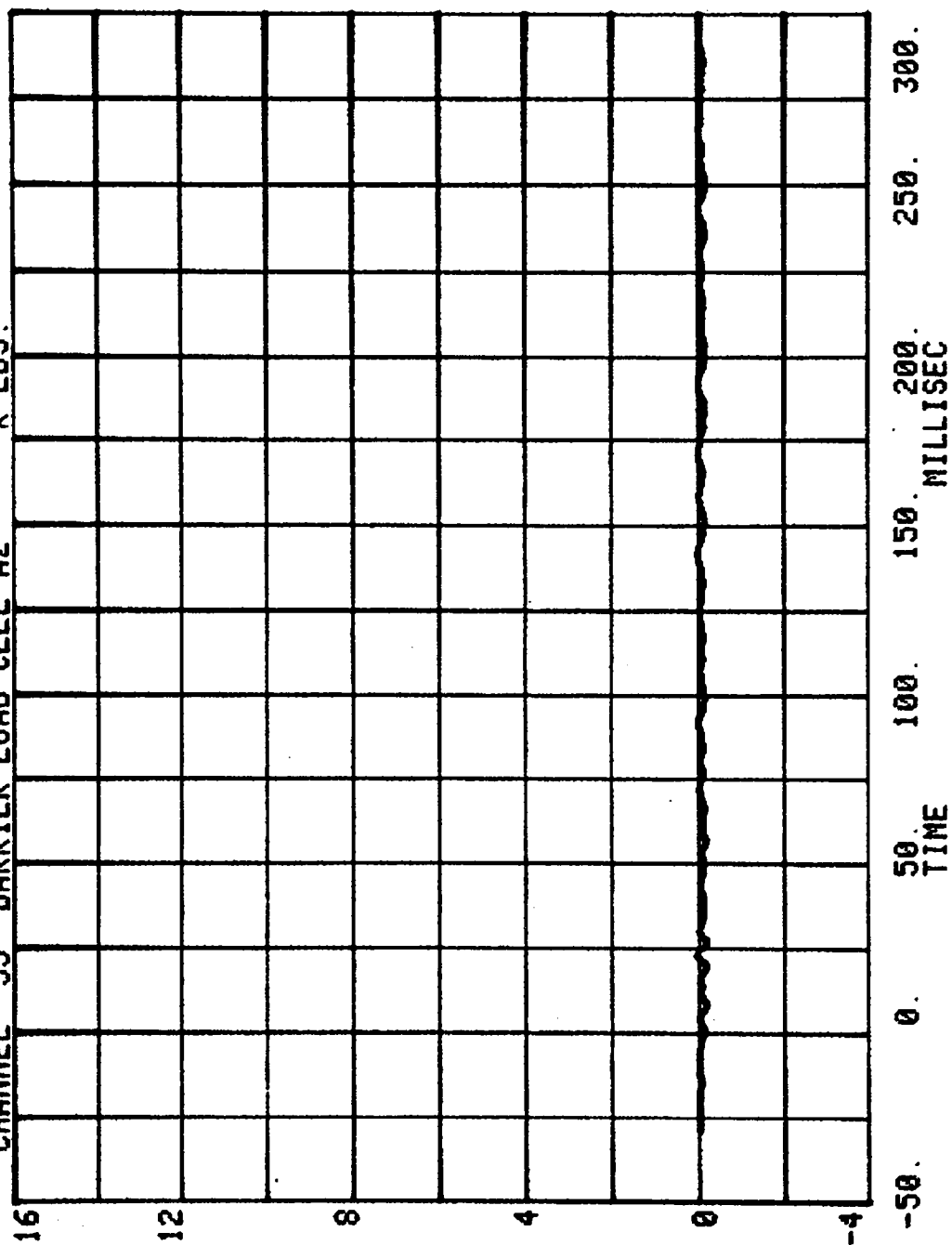
LOAD CELL BARRIER DATA
FILTER CHANNEL CLASS

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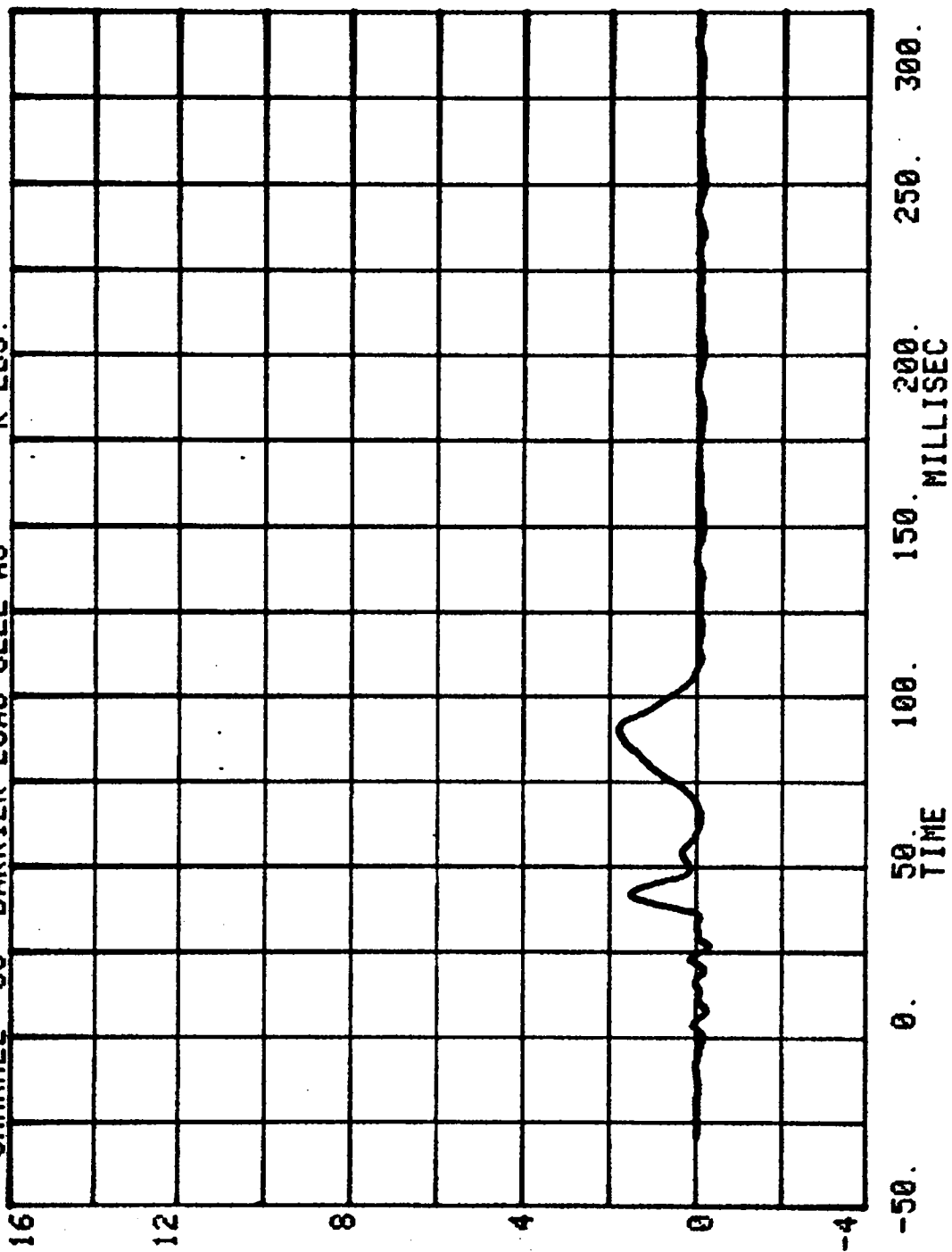
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CHANNEL 34 BARRIER LOAD CELL A1 K LBS.



CHANNEL 35 BARRIER LOAD CELL A2 RUN= 660 SERIES= 303 K LBS.

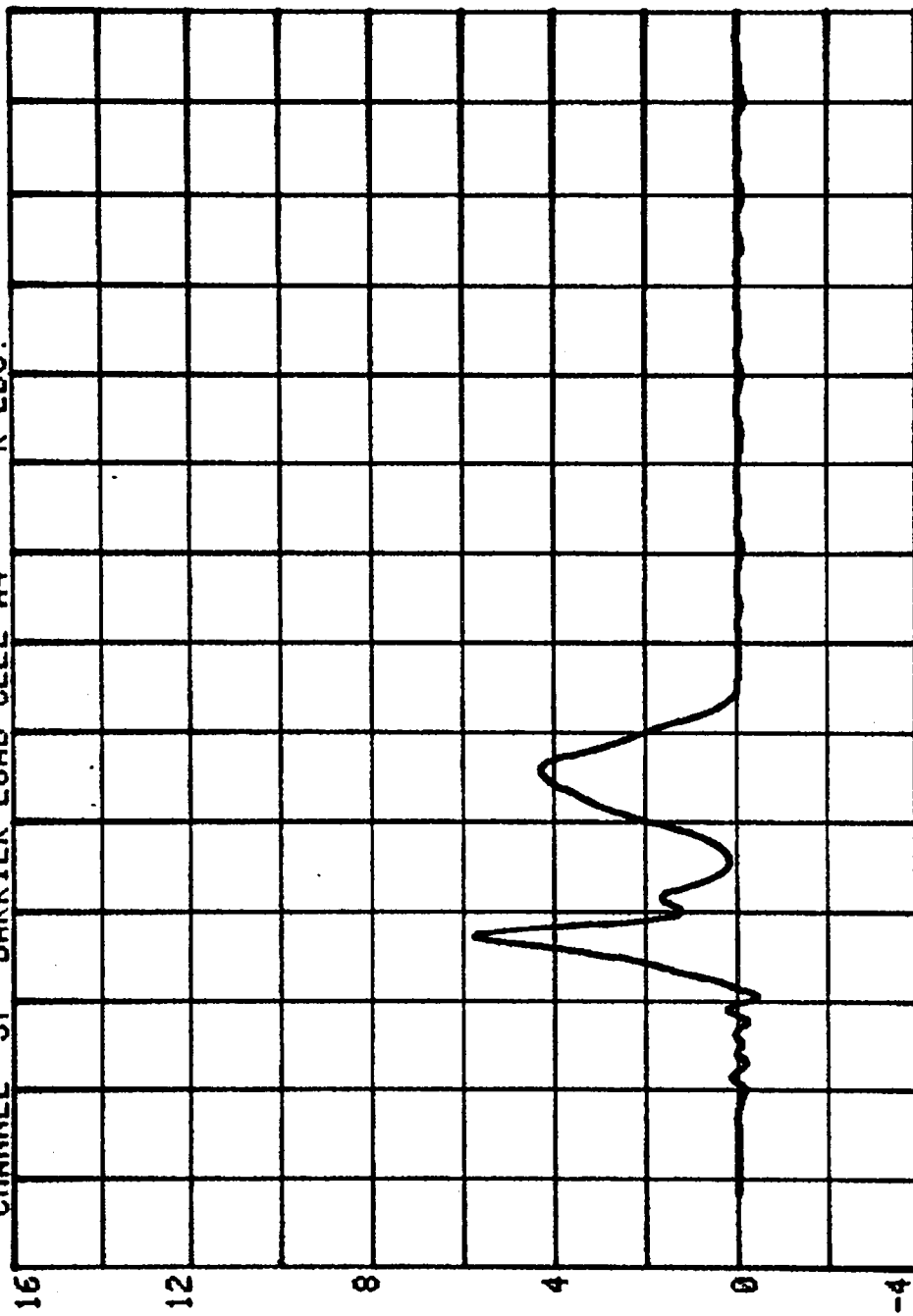


RUN= 660 SERIES= 303
CHANNEL 36 BARRIER LOAD CELL A3 K LBS.



CHANNEL 37 BARRIER LOAD CELL A4 K LBS.

RUN= 660 SERIES= 303

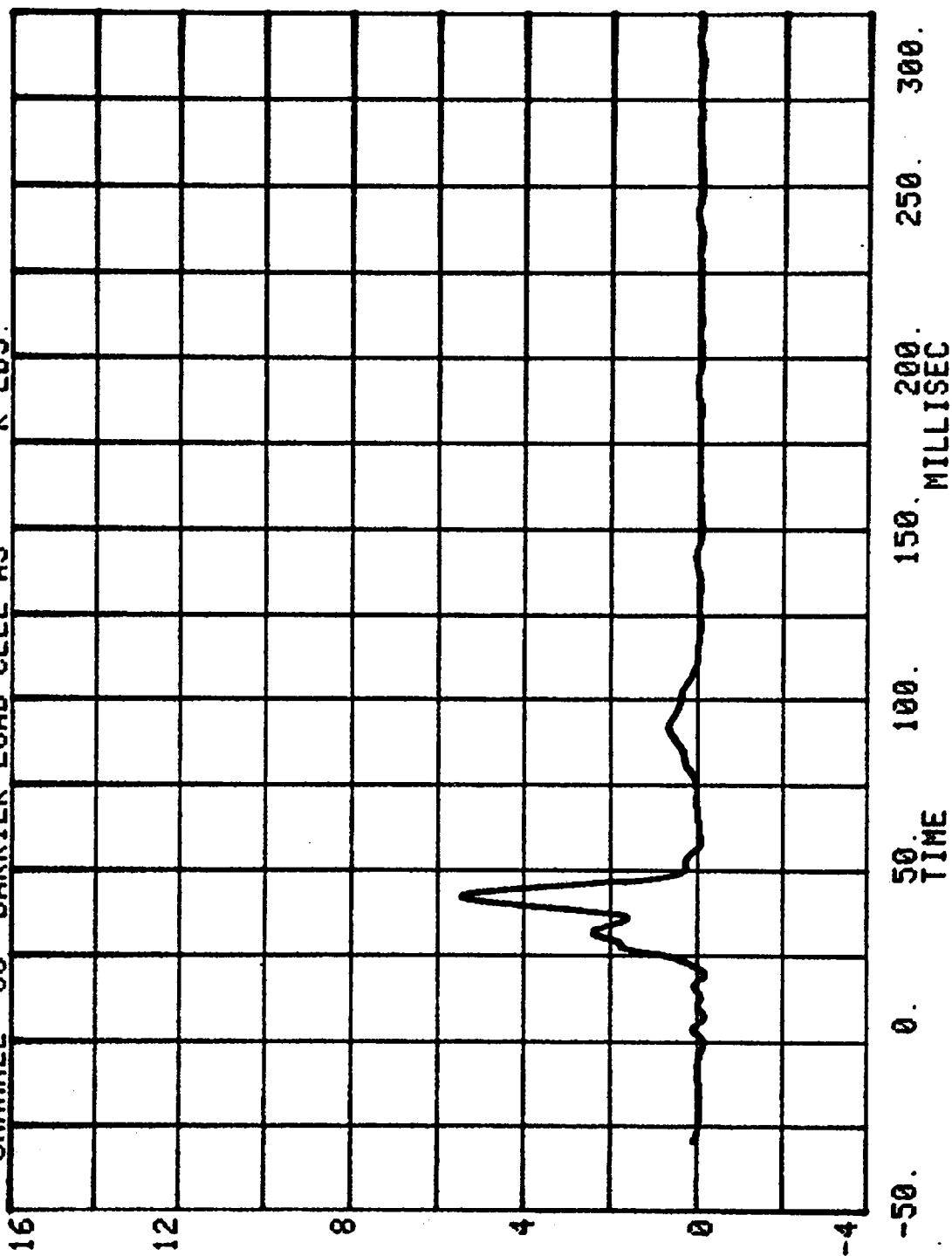


TIME
-50. 0. 50. 100. 150. 200. 250. 300.

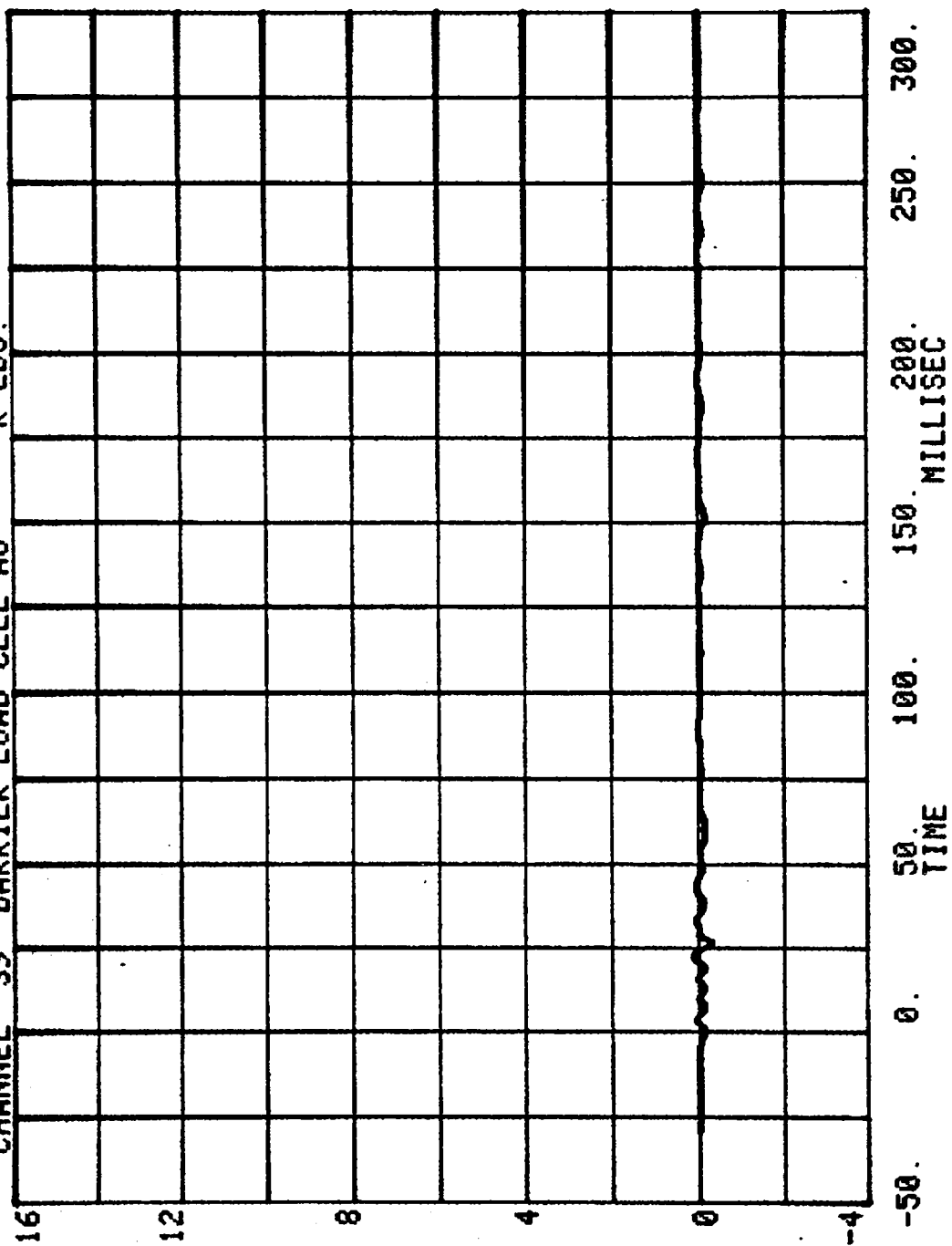
CHANNEL 38 BARRIER LOAD CELL A5

RUN= 660 SERIES= 303

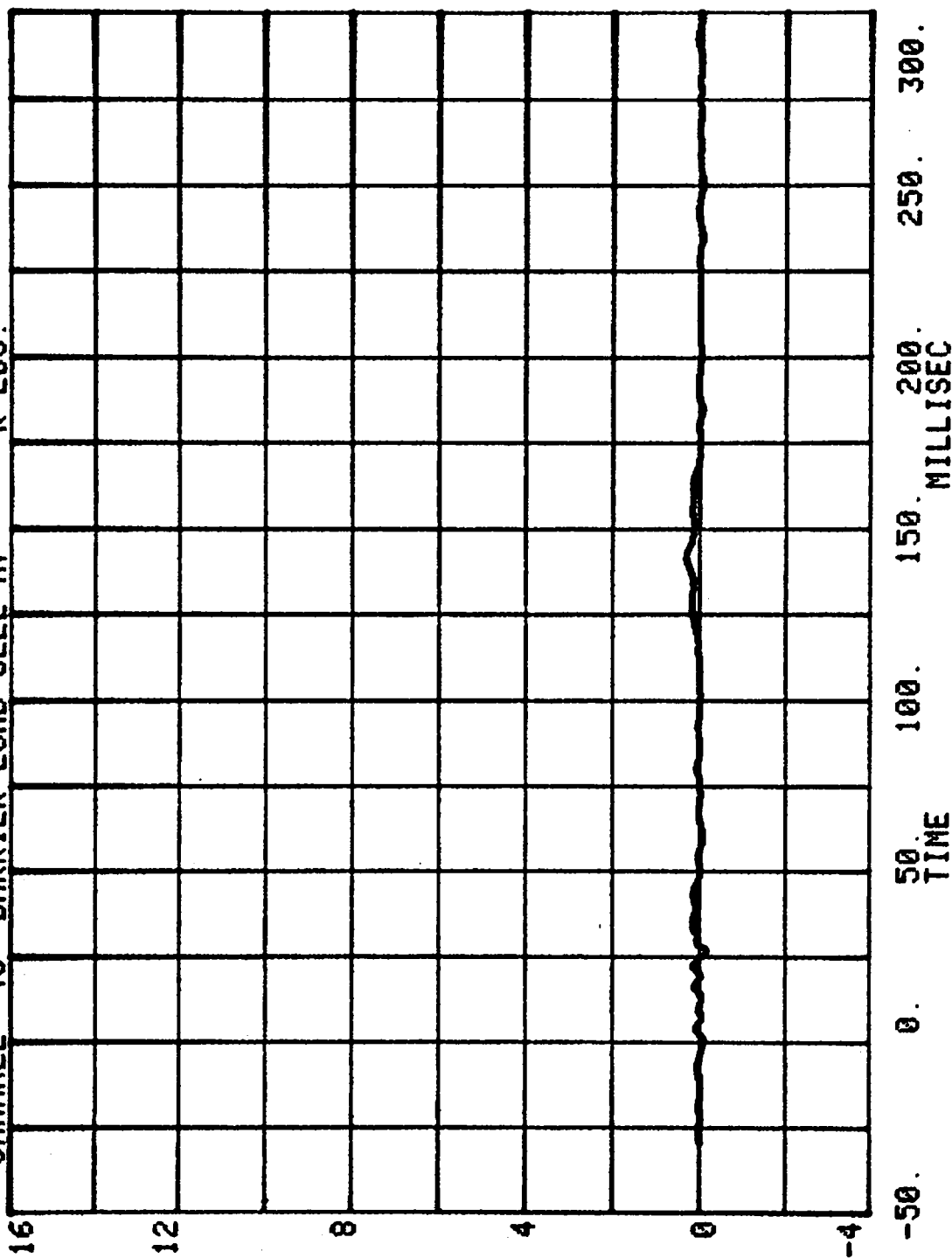
K LBS.



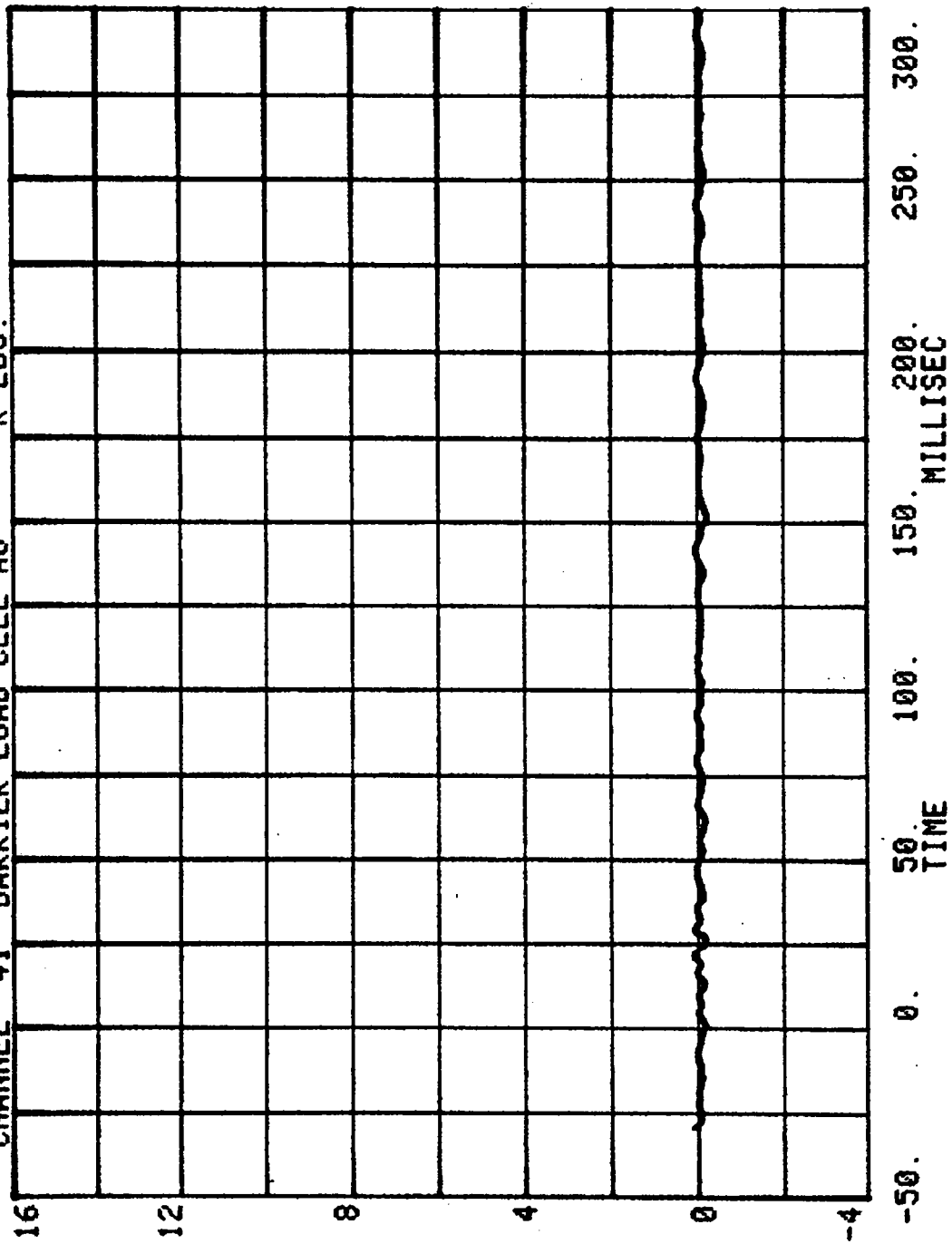
CHANNEL 39 BARRIER LOAD CELL A6 RUN= 660 SERIES= 303 K LBS.



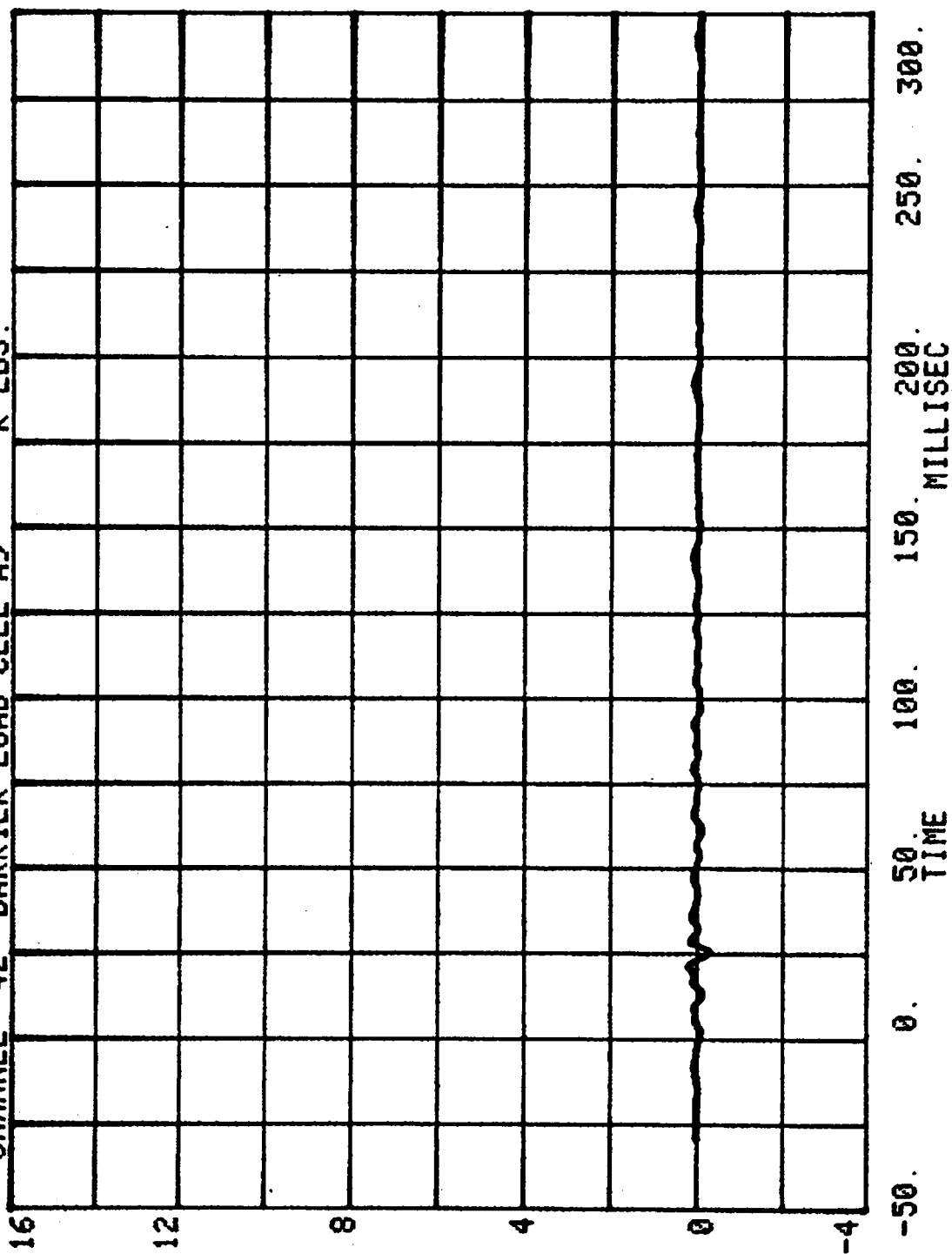
CHANNEL 40 BARRIER LOAD CELL A7 RUN= 660 SERIES= 303 K LBS.



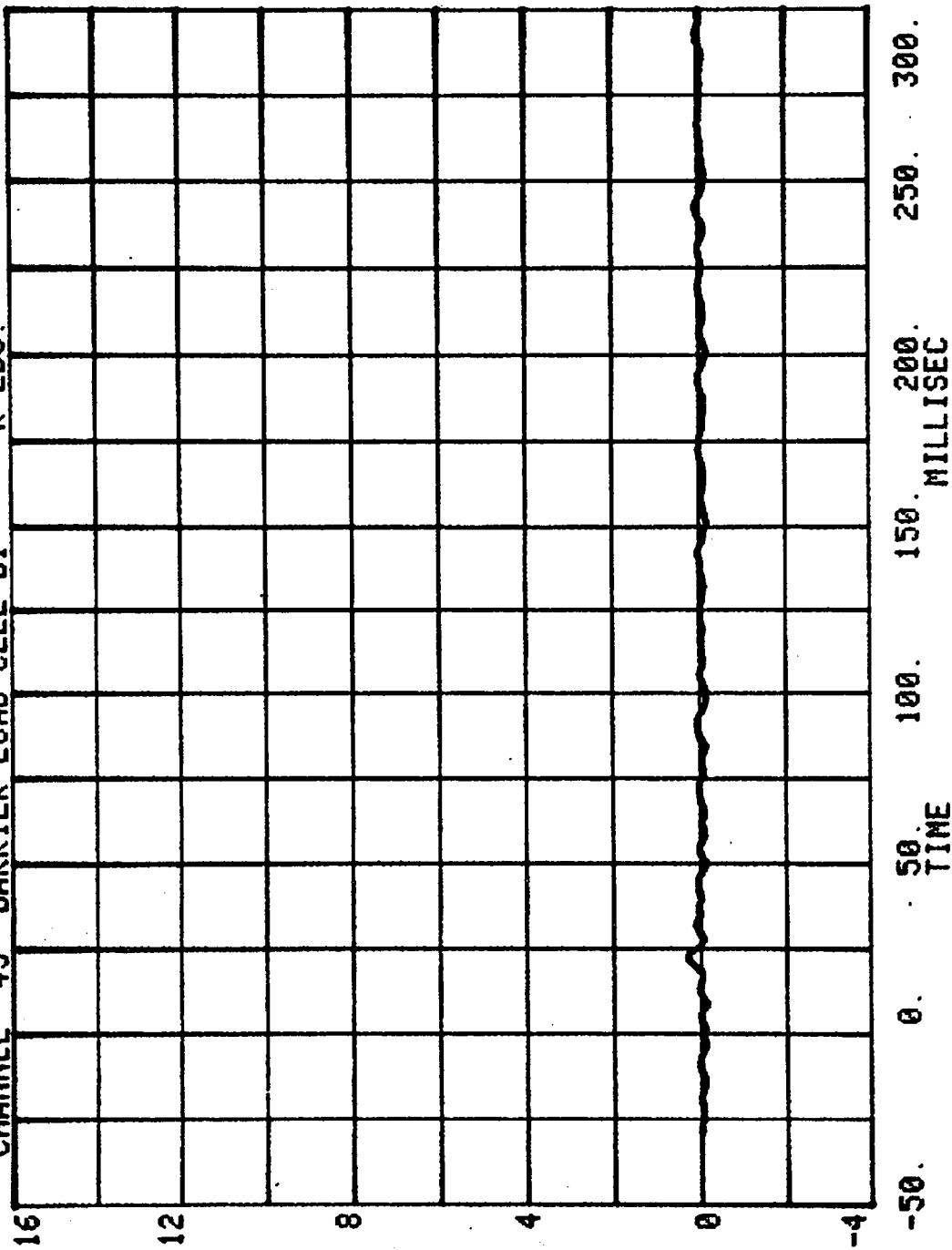
CHANNEL 41 BARRIER LOAD CELL A8 RUN= 660 SERIES= 303 K LBS.



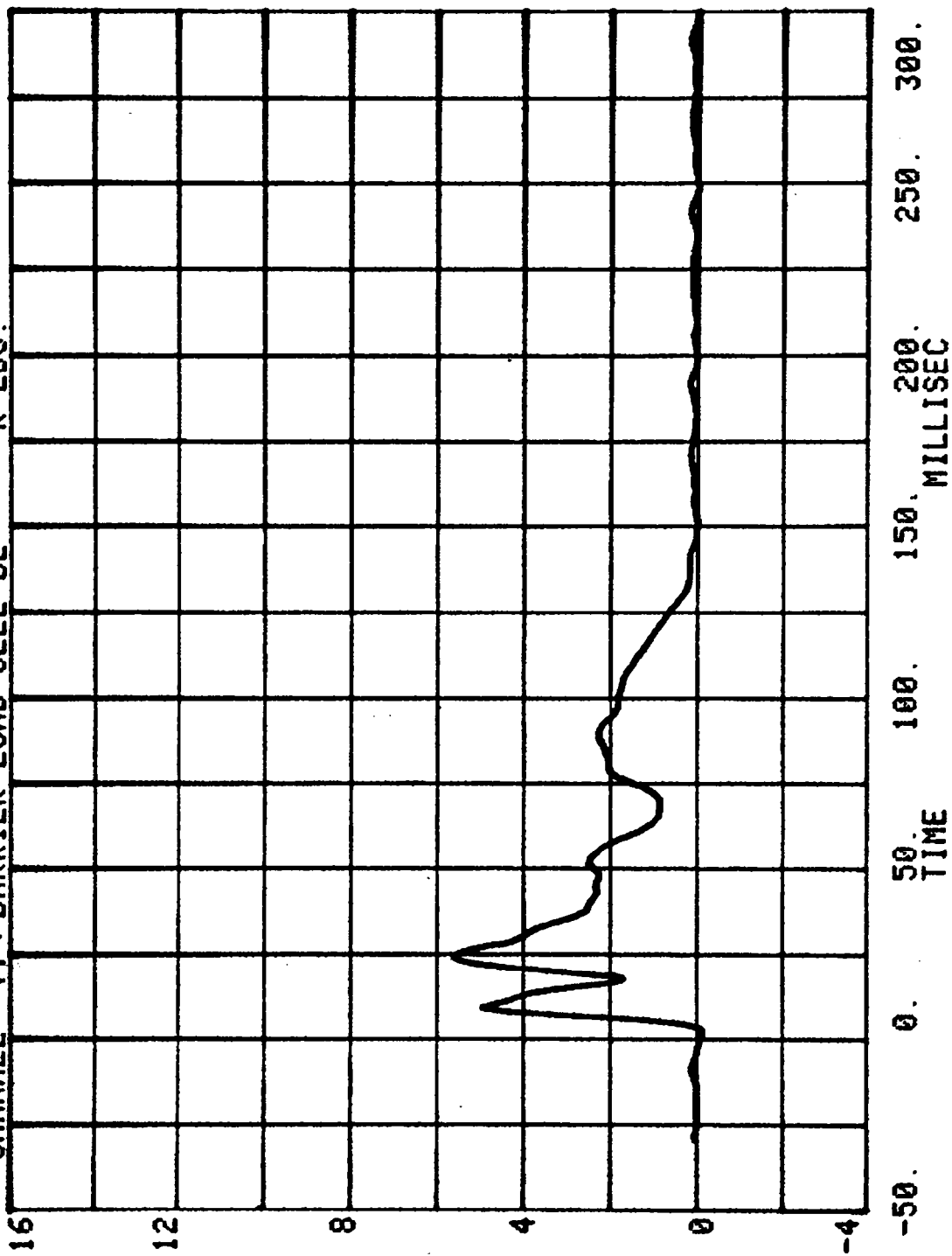
CHANNEL 42 BARRIER LOAD CELL A9 RUN= 660 SERIES= 303 K LBS.



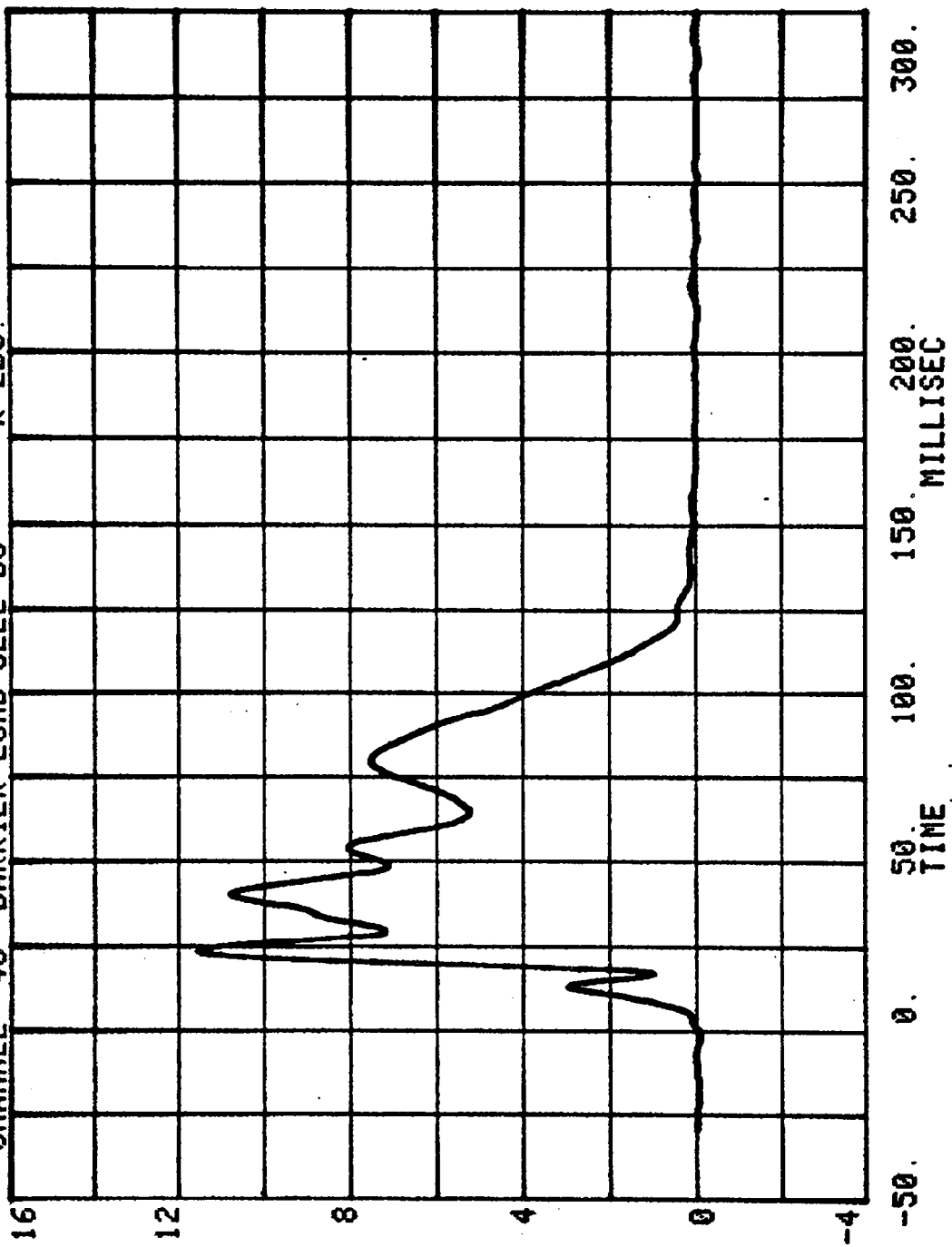
CHANNEL 43 BARRIER LOAD CELL B1 RUN= 660 SERIES= 303 K LBS.



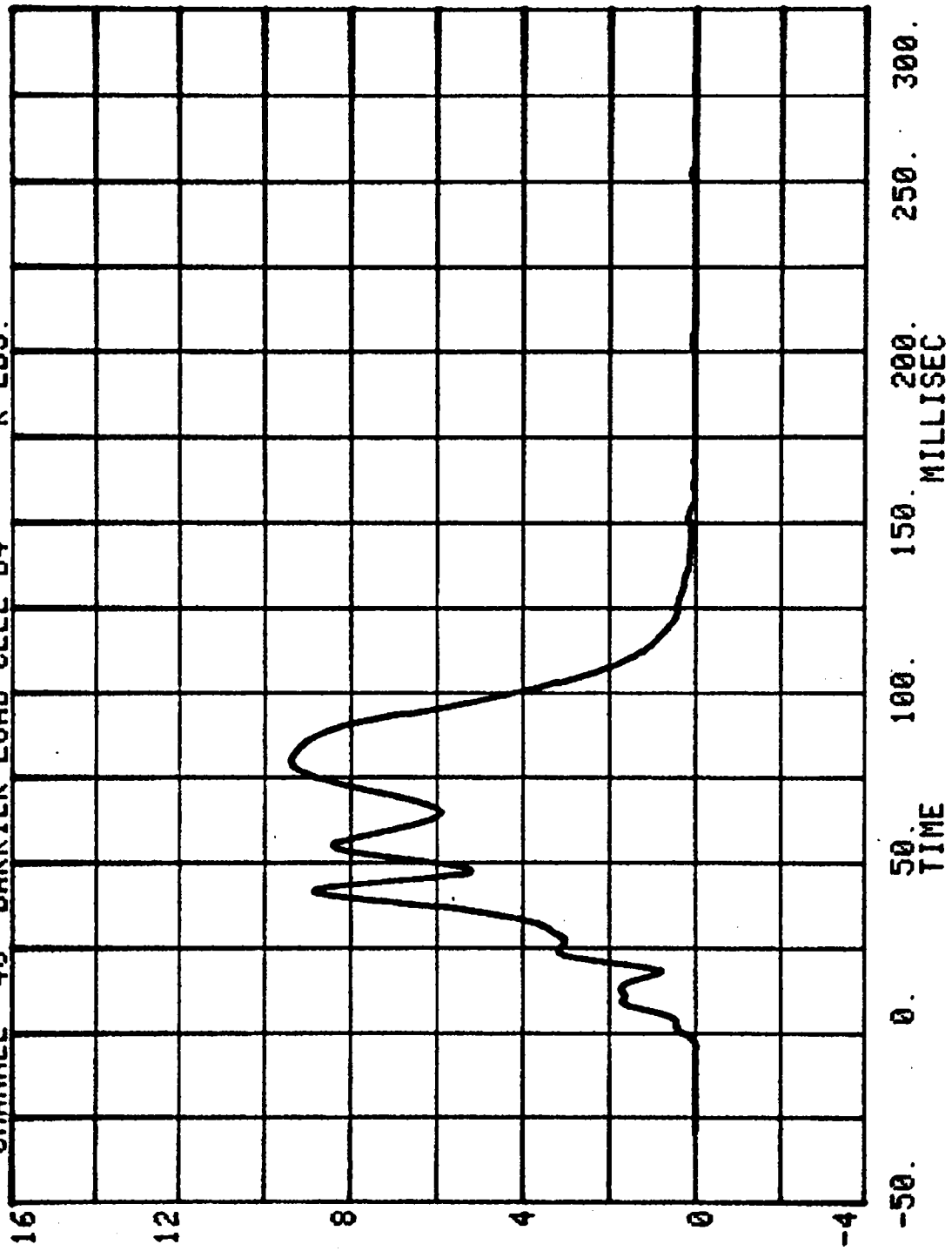
CHANNEL 44 BARRIER LOAD CELL 62 K LBS.
RUN= 660 SERIES= 303



RUN= 660 SERIES= 303
CHANNEL 45 BARRIER LOAD CELL B3 K LBS.

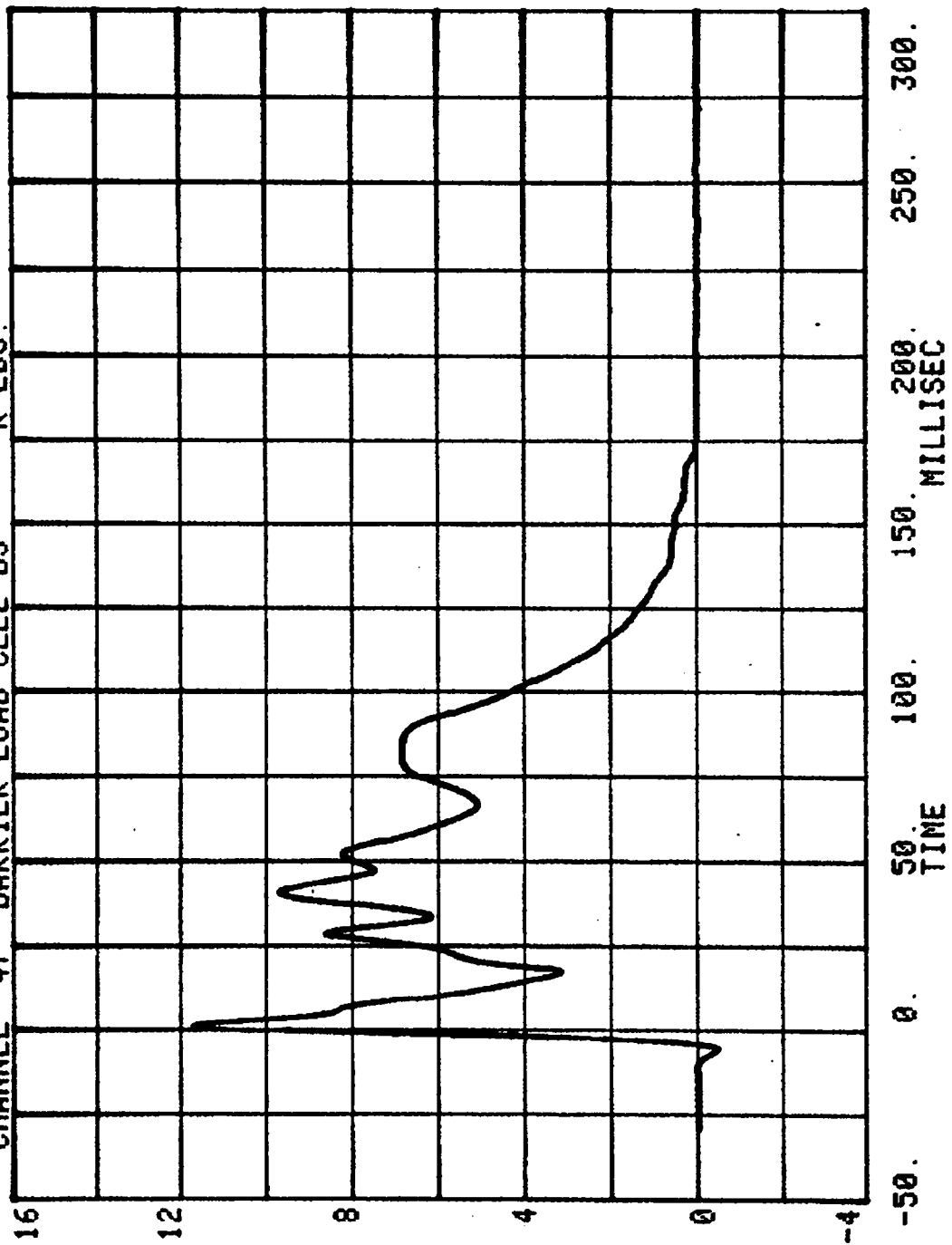


RUN= 660 SERIES= 303
CHANNEL 46 BARRIER LOAD CELL B4 K LBS.

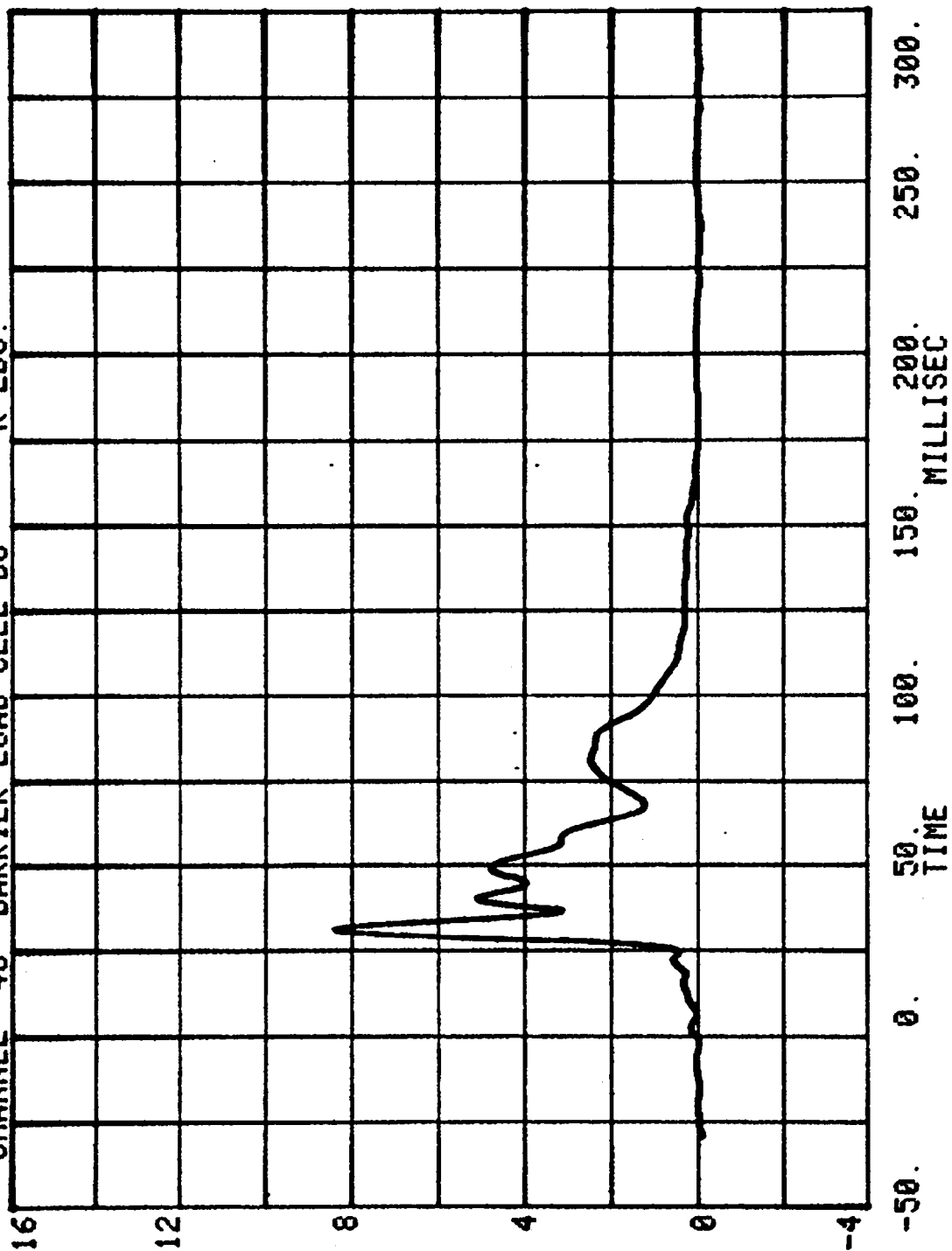


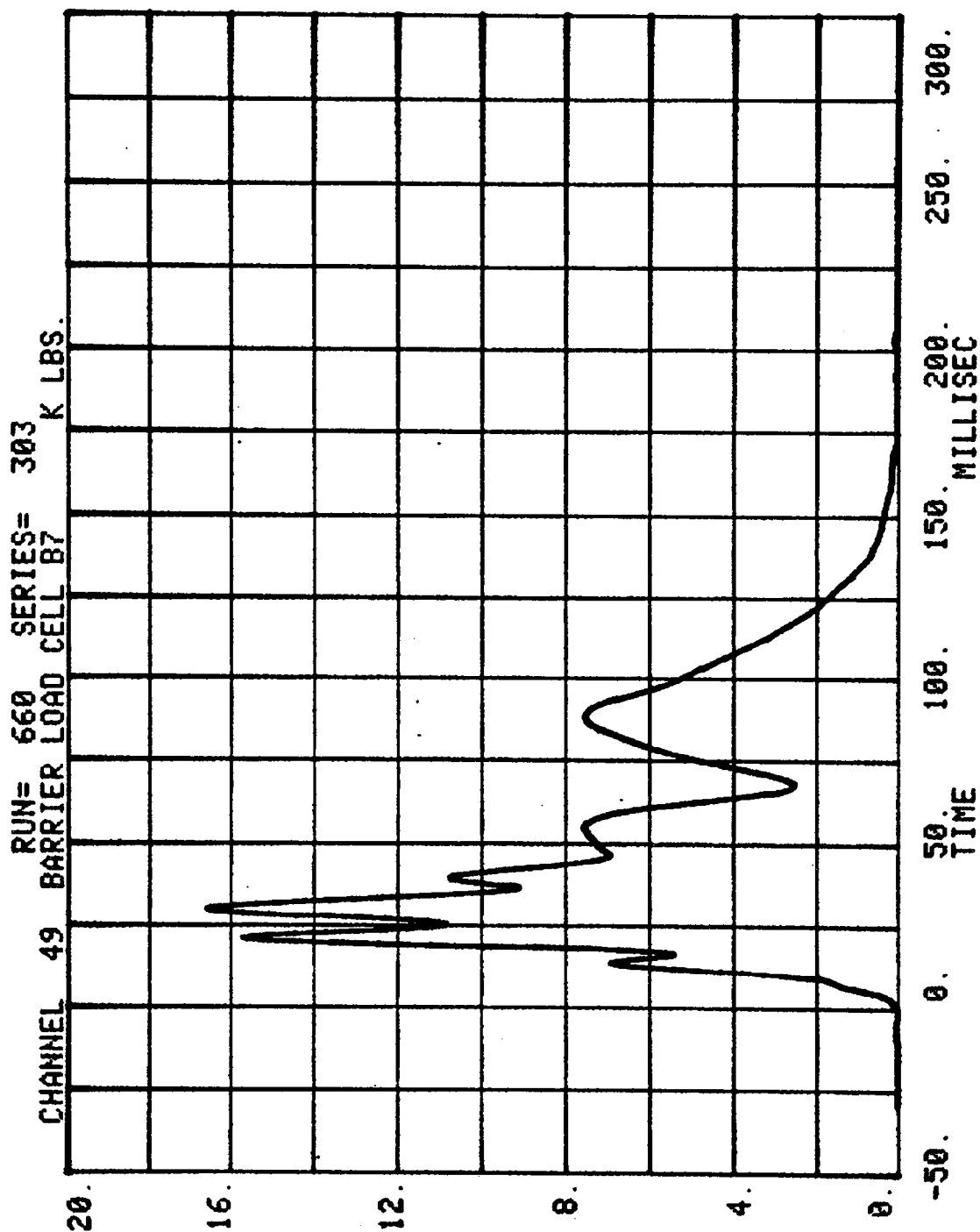
CHANNEL 47 BARRIER LOAD CELL B5 K LBS.

RUN= 668 SERIES= 303

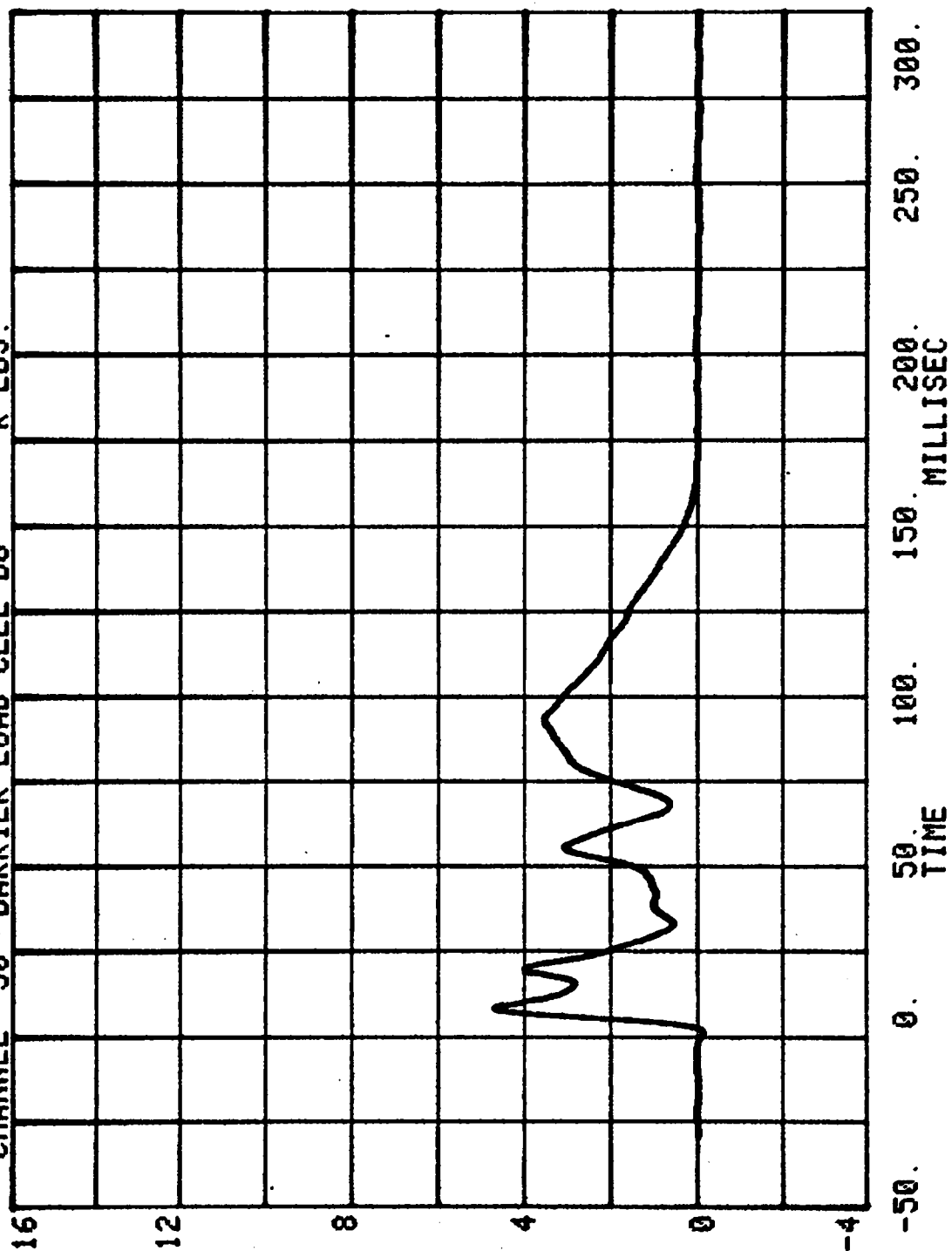


CHANNEL 48 BARRIER LOAD CELL B6 RUN= 660 SERIES= 303 K LBS.

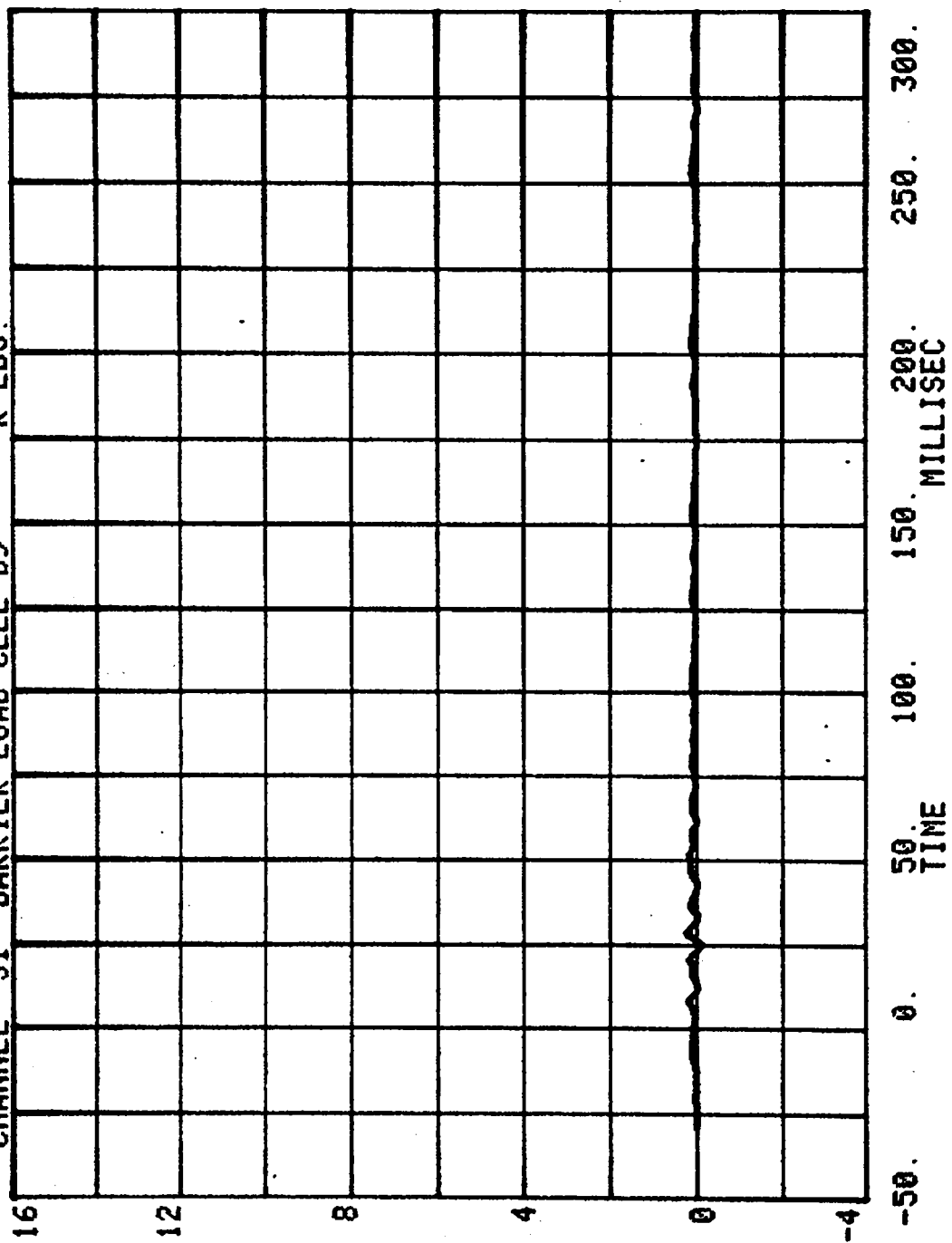




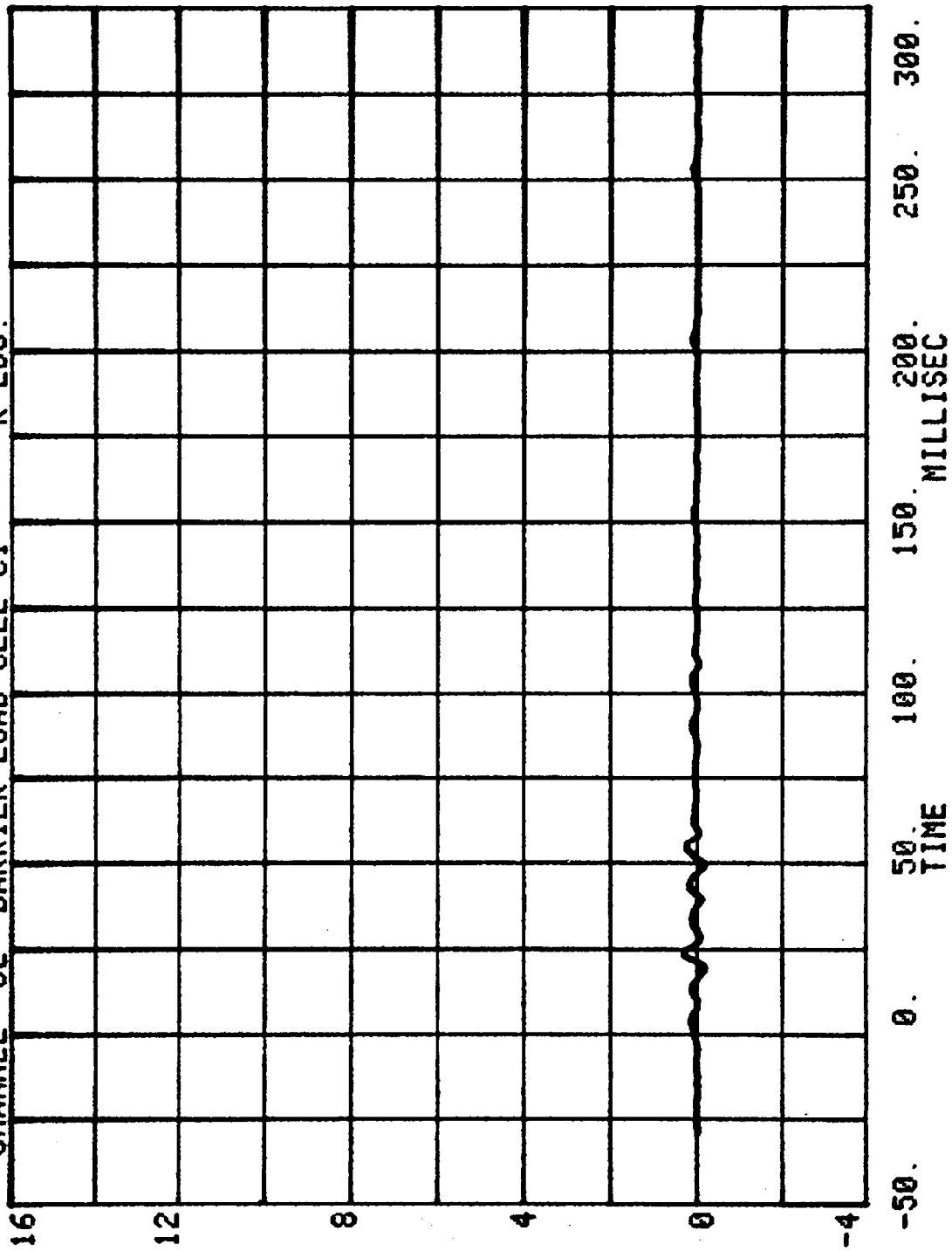
RUN= 660 SERIES= 303
CHANNEL 50 BARRIER LOAD CELL B8 K LBS.

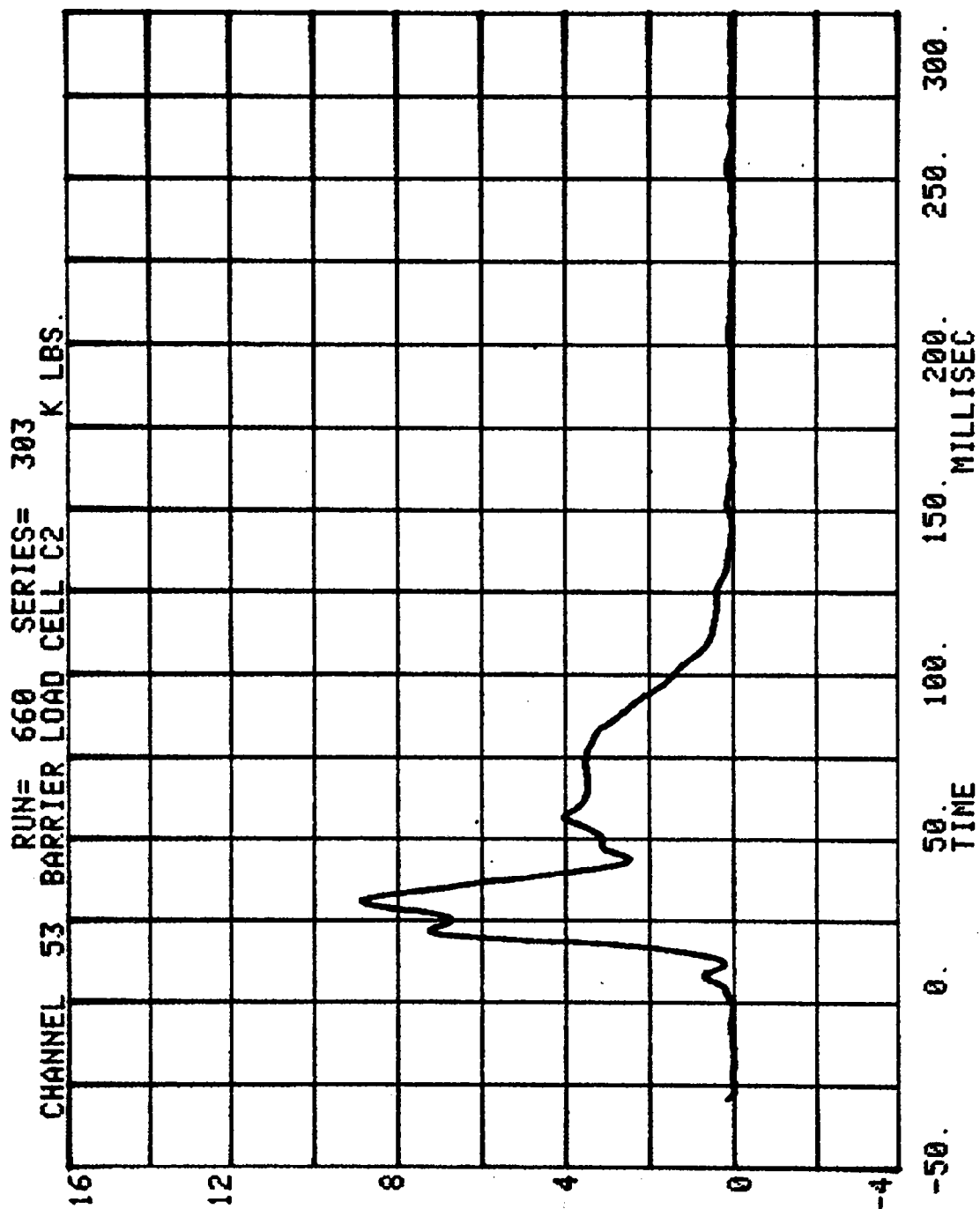


CHANNEL 51 BARRIER LOAD CELL B9 RUN= 660 SERIES= 303 K LBS.

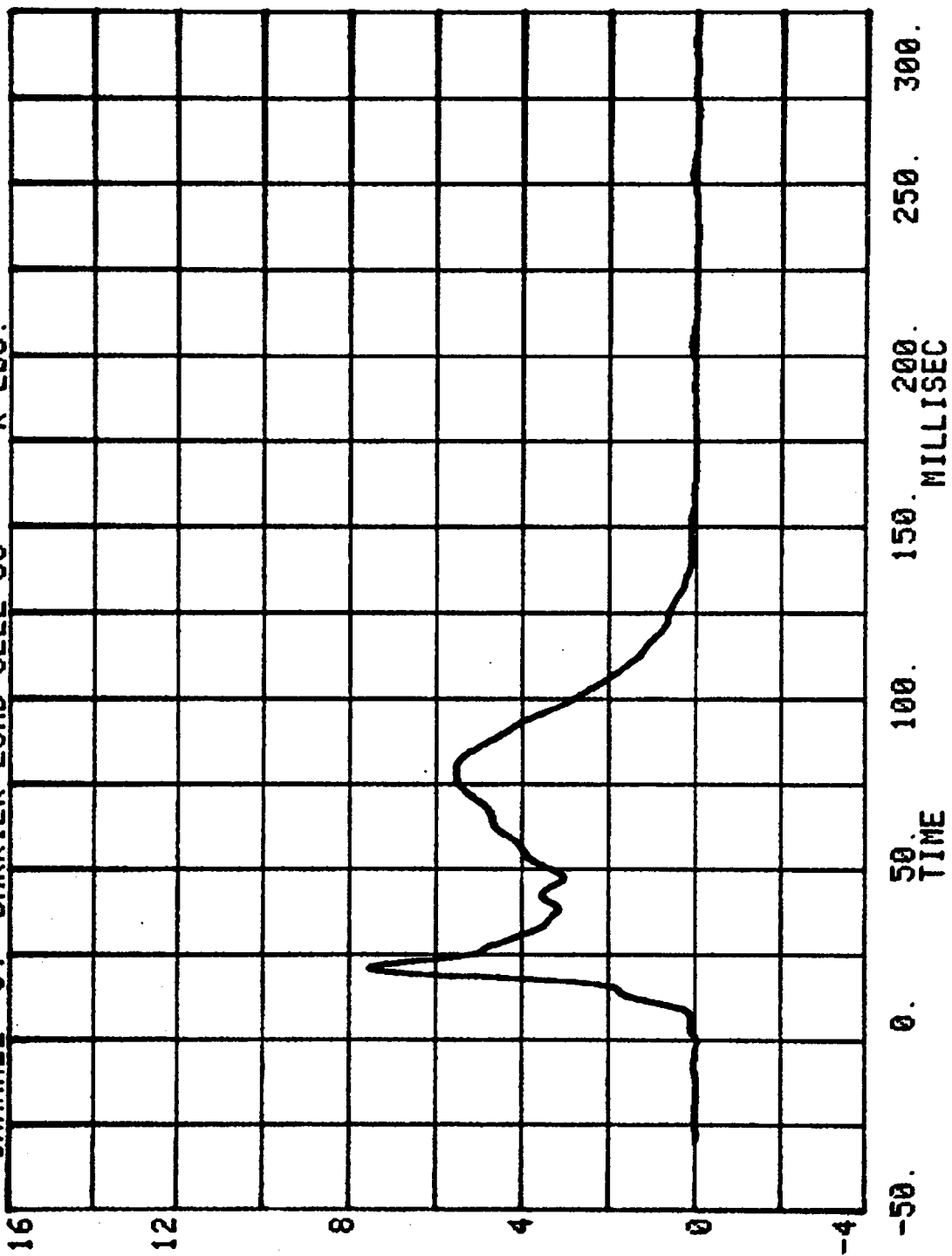


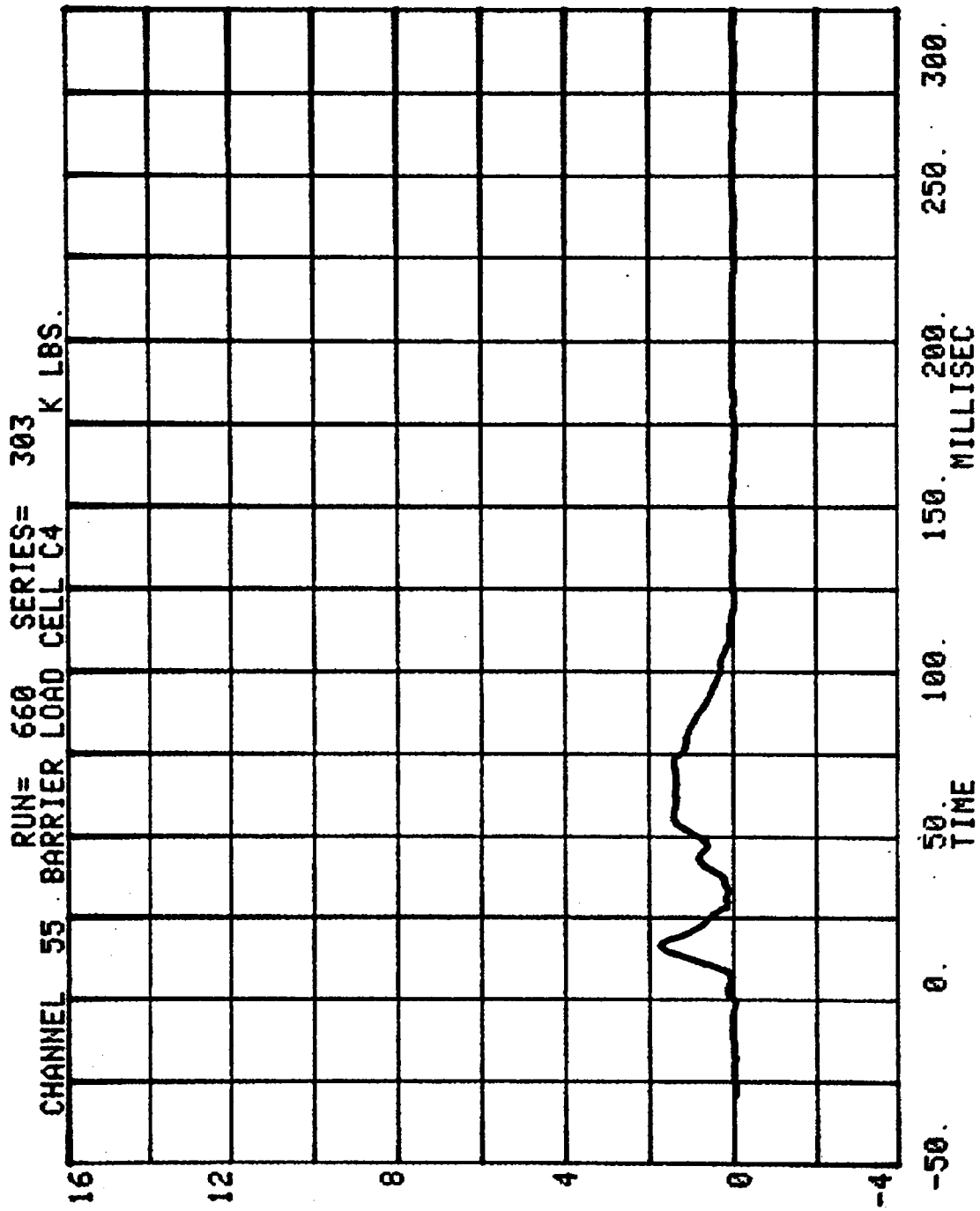
RUN= 660 SERIES= 303
CHANNEL 52 BARRIER LOAD CELL C1 K LBS.





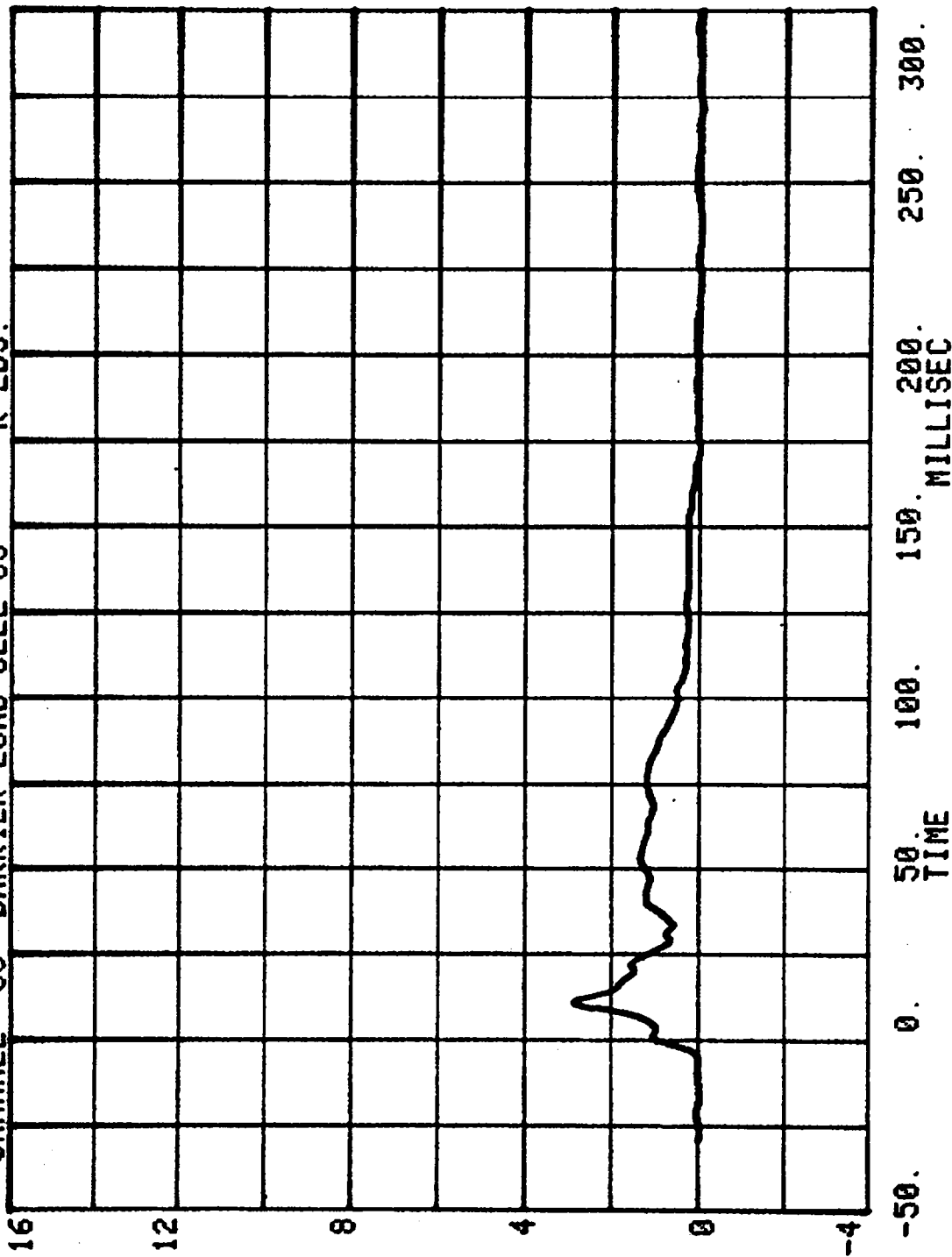
RUN= 660 SERIES= 303
CHANNEL 54 BARRIER LOAD CELL C3 K LBS.



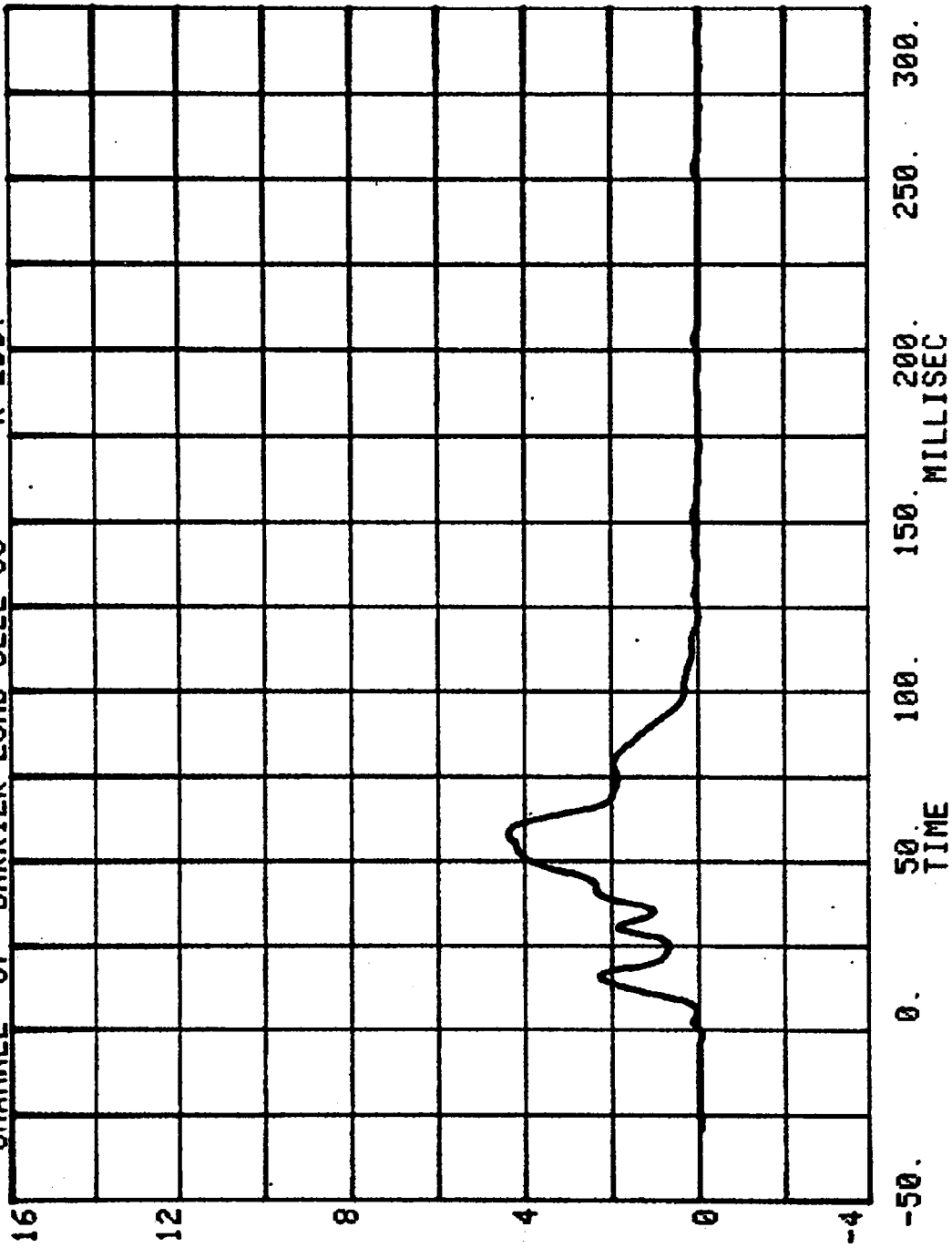


CHANNEL 56 BARRIER LOAD CELL C5 K LBS.

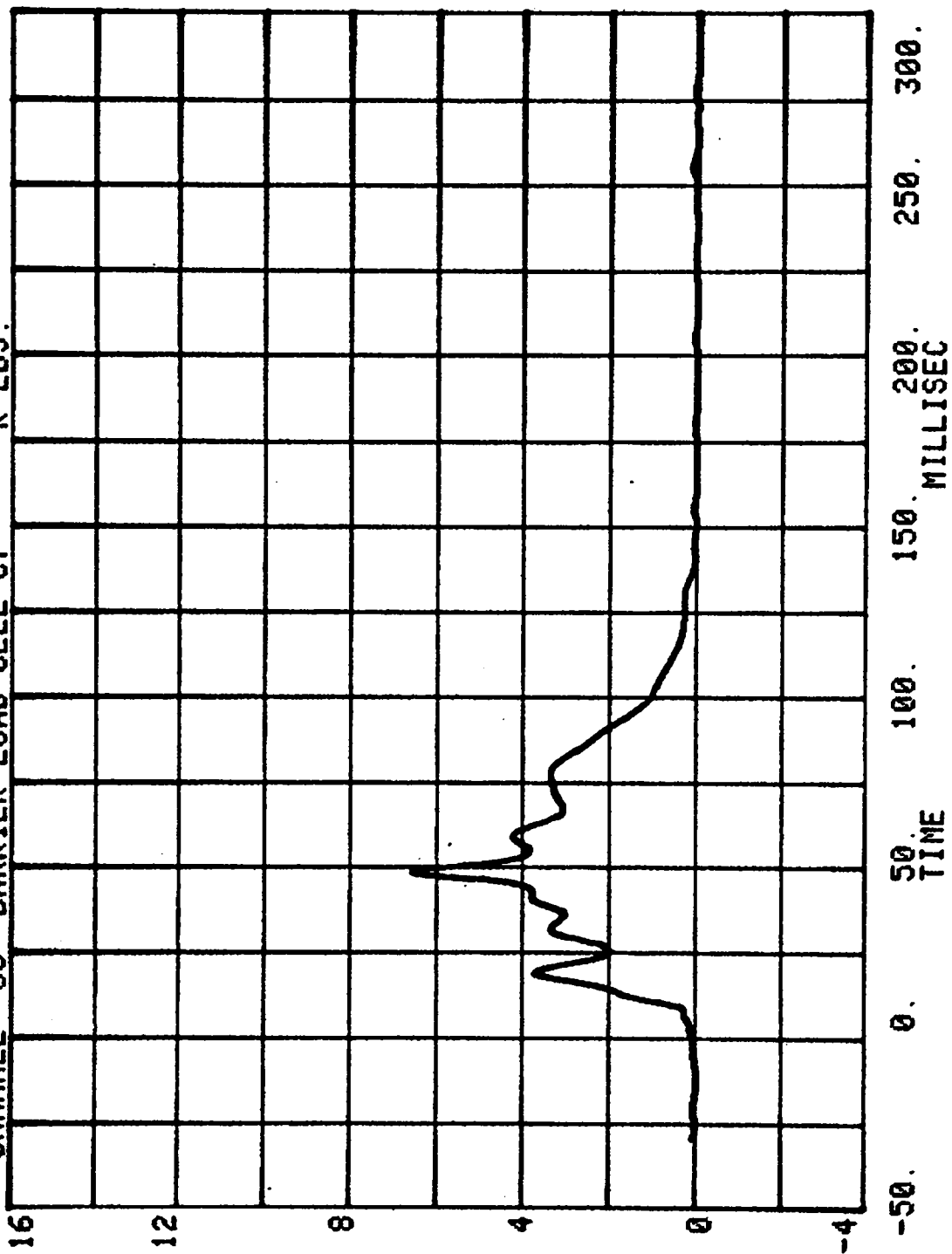
RUN= 660 SERIES= 303



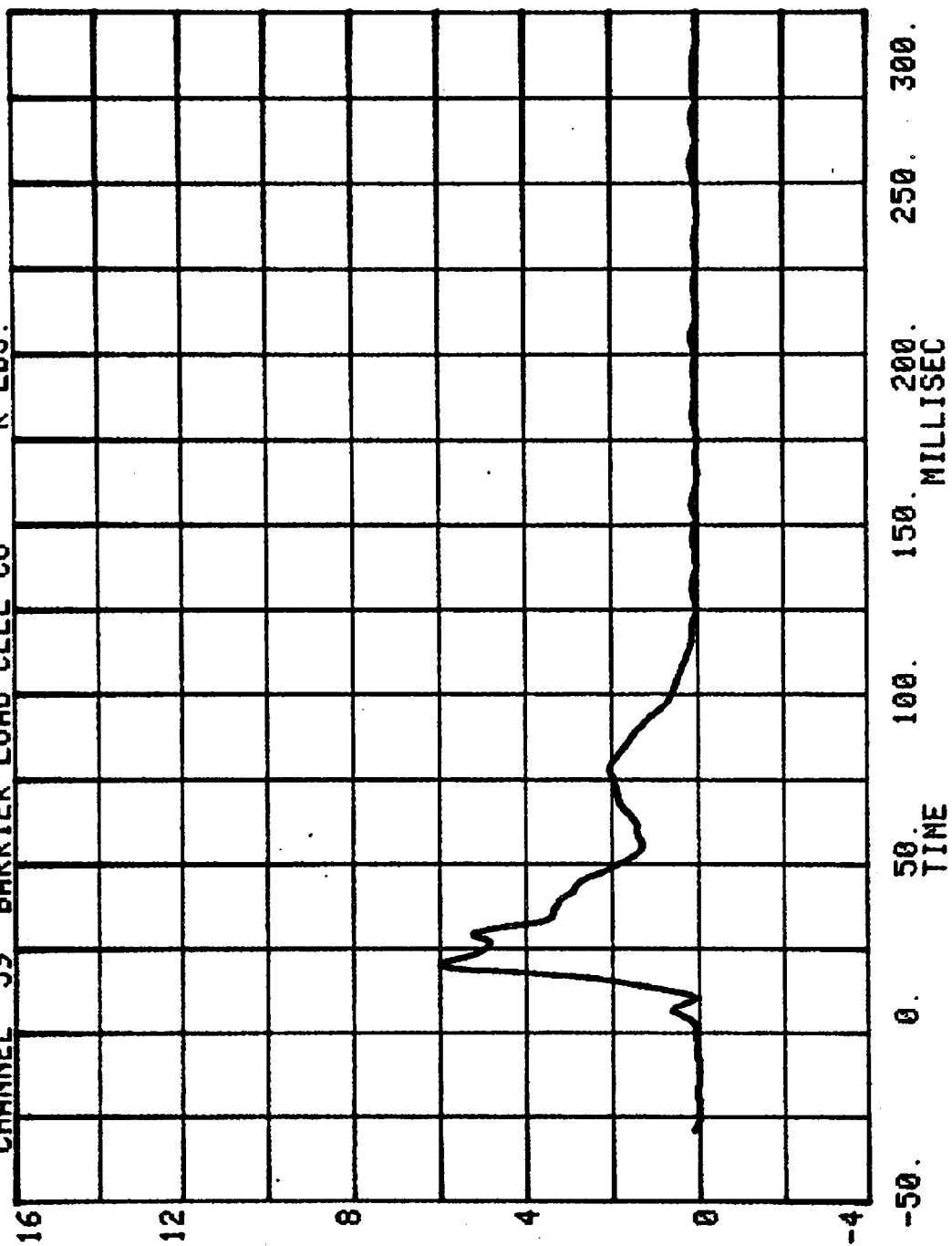
CHANNEL 57 BARRIER LOAD CELL C6 RUN= 660 SERIES= 303 K LBS.



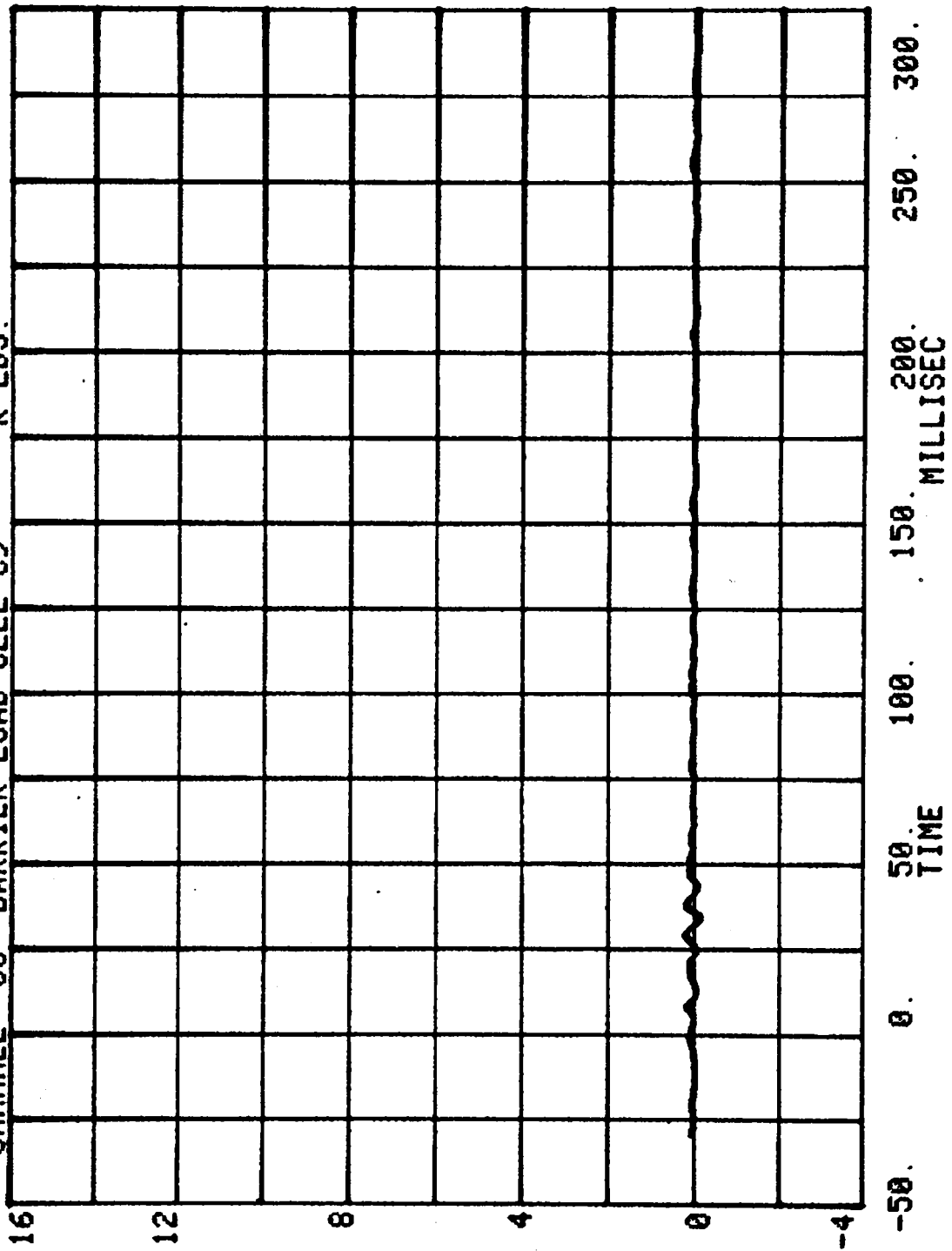
RUN= 660 SERIES= 303
CHANNEL 58 BARRIER LOAD CELL C7 K LBS.



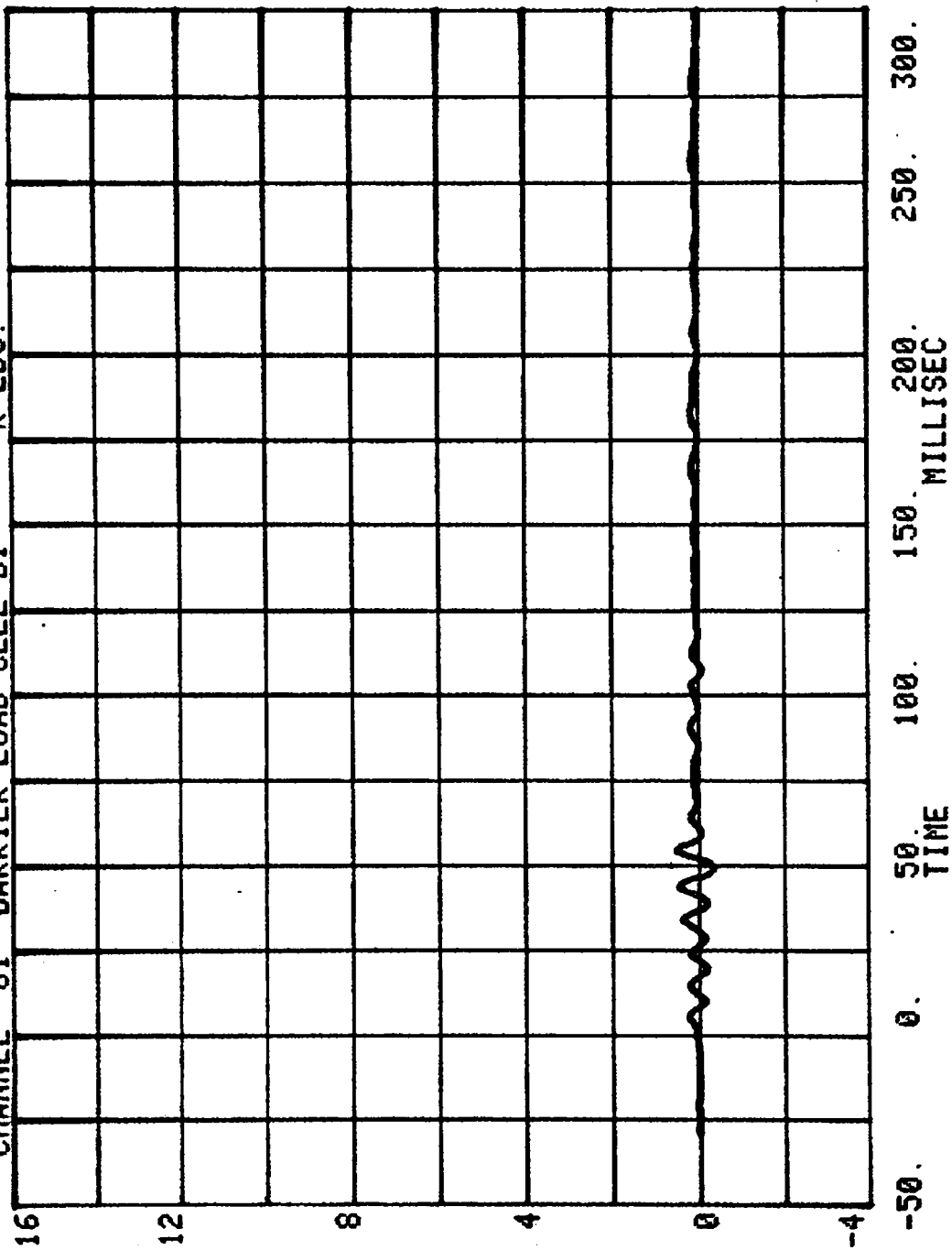
CHANNEL 59 RUN= 660 SERIES= 303
BARRIER LOAD CELL C8 K LBS.



CHANNEL 60 BARRIER LOAD CELL C9 RUN= 660 SERIES= 303 K LBS.

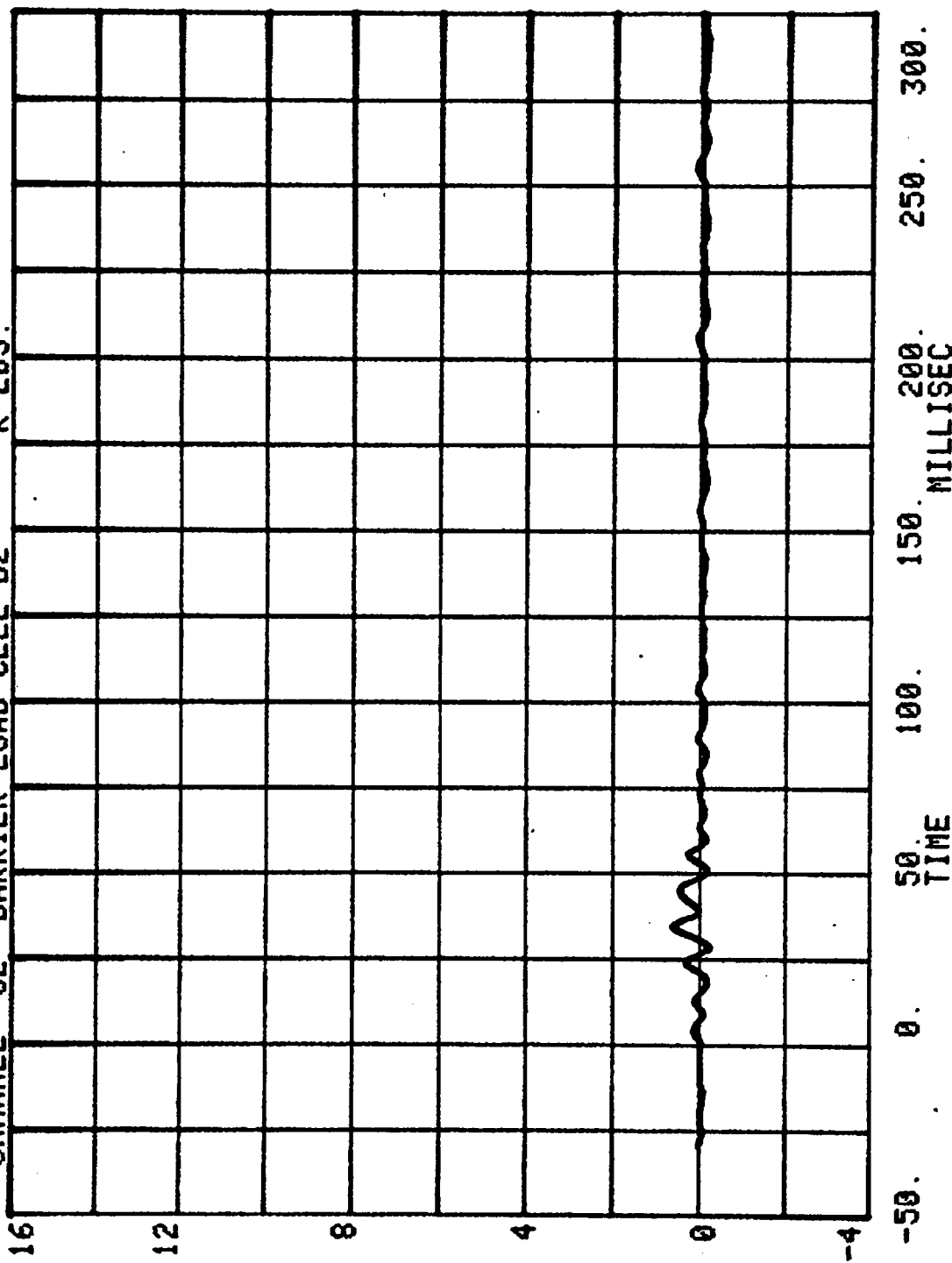


CHANNEL 61 BARRIER LOAD CELL 01 RUN= 660 SERIES= 303 K LBS.



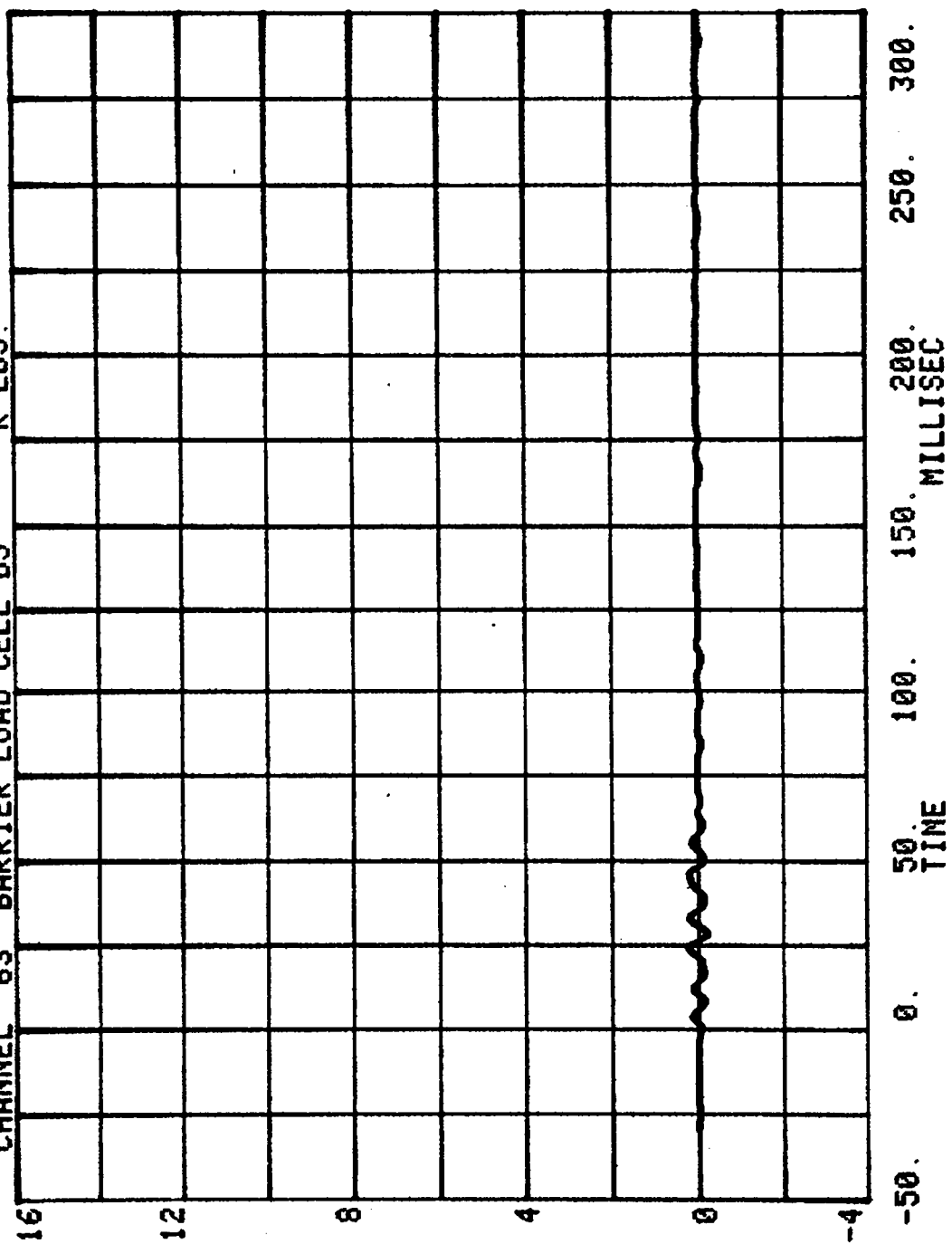
CHANNEL 62 BARRIER LOAD CELL D2 K LBS.

RUN= 660 SERIES= 303



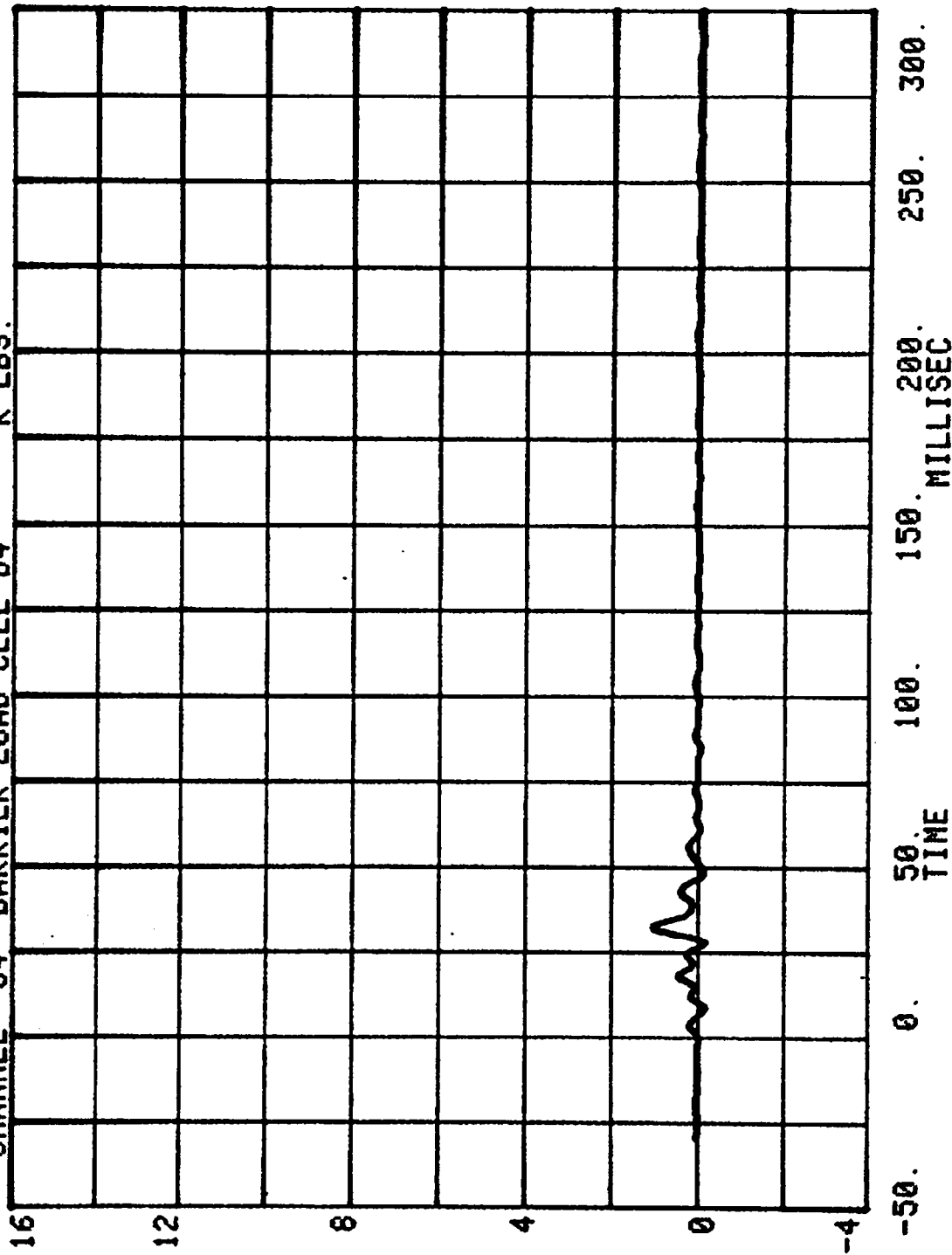
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.

RUN= 660 SERIES= 303

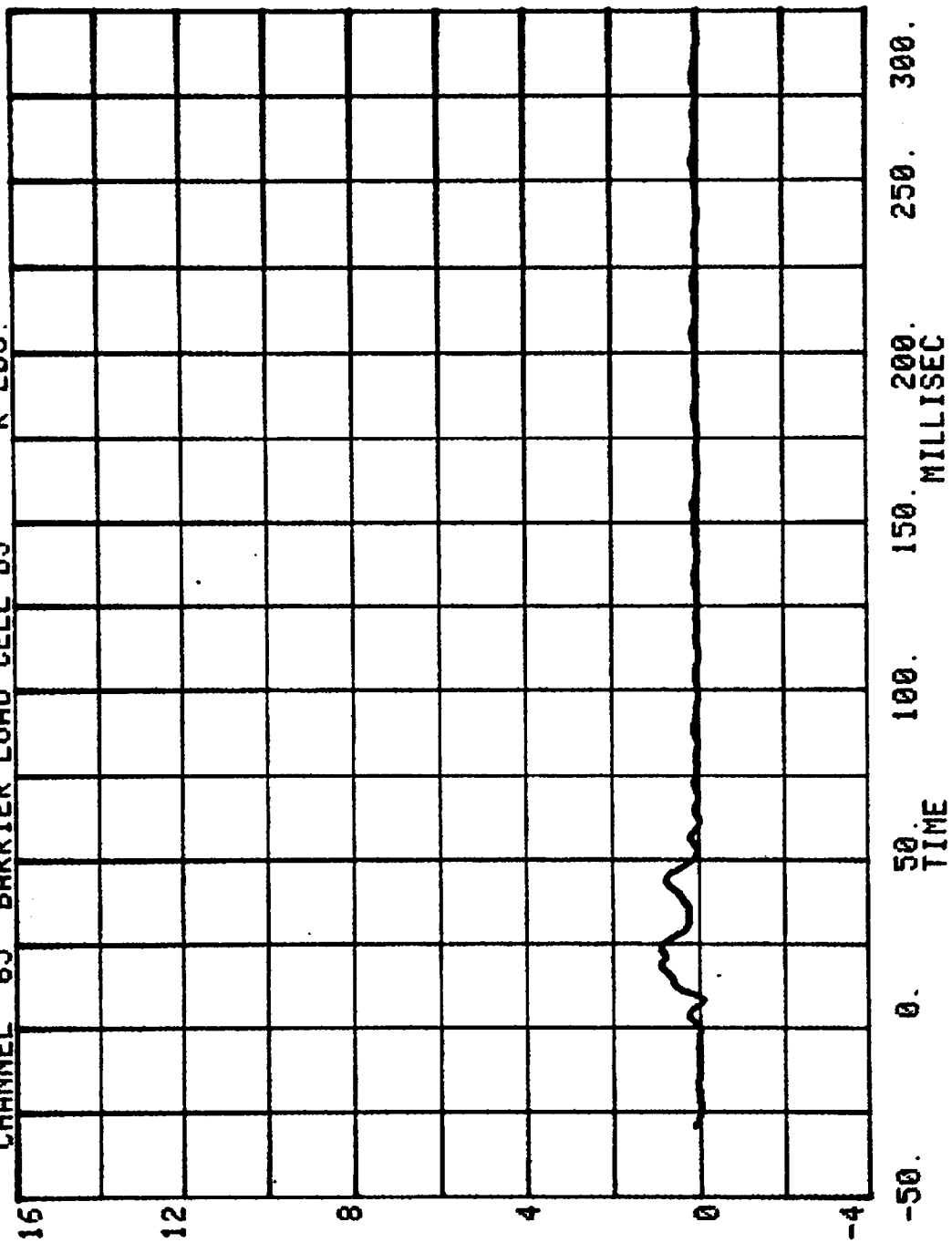


CHANNEL 64 BARRIER LOAD CELL 04 K LBS.

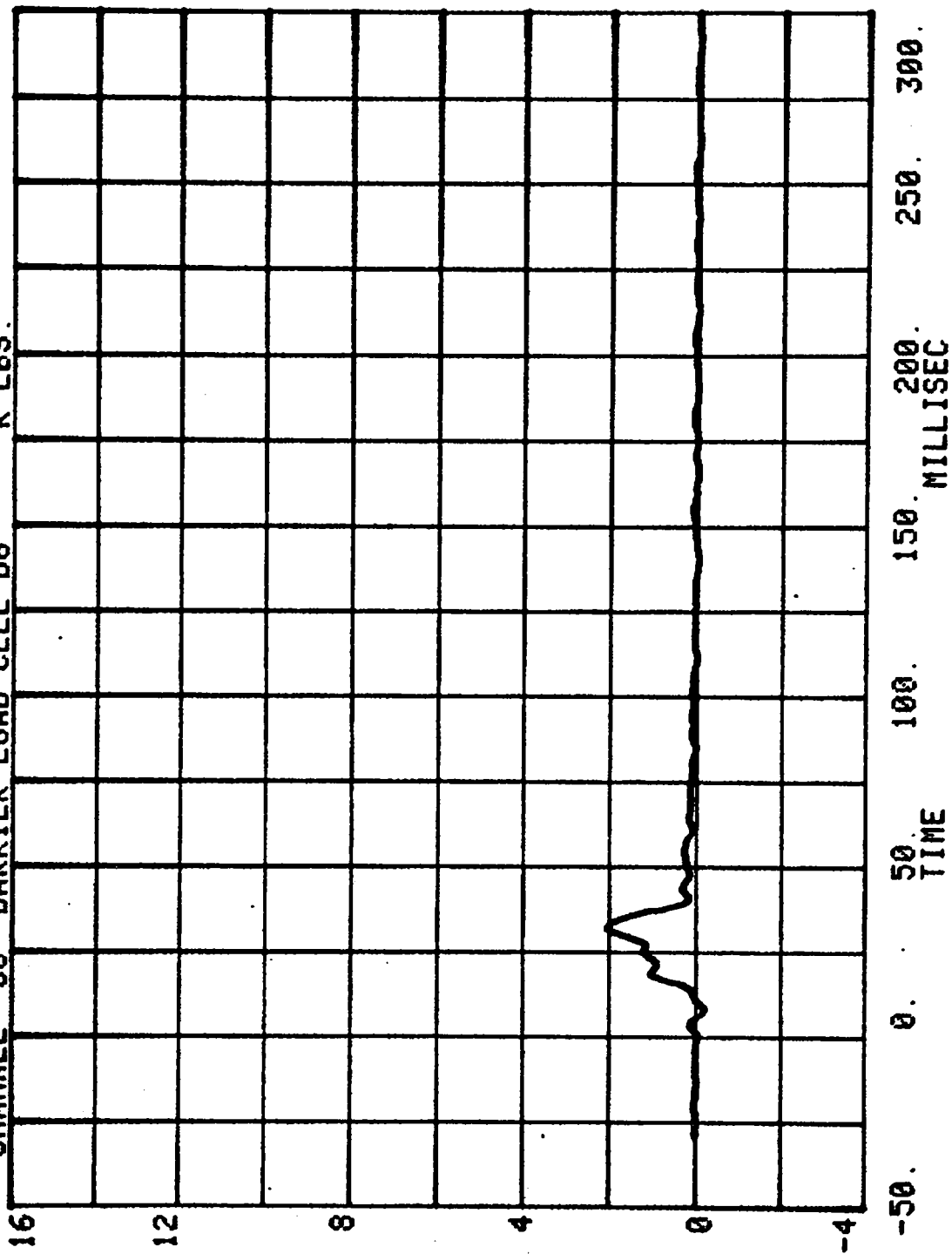
RUN= 660 SERIES= 303



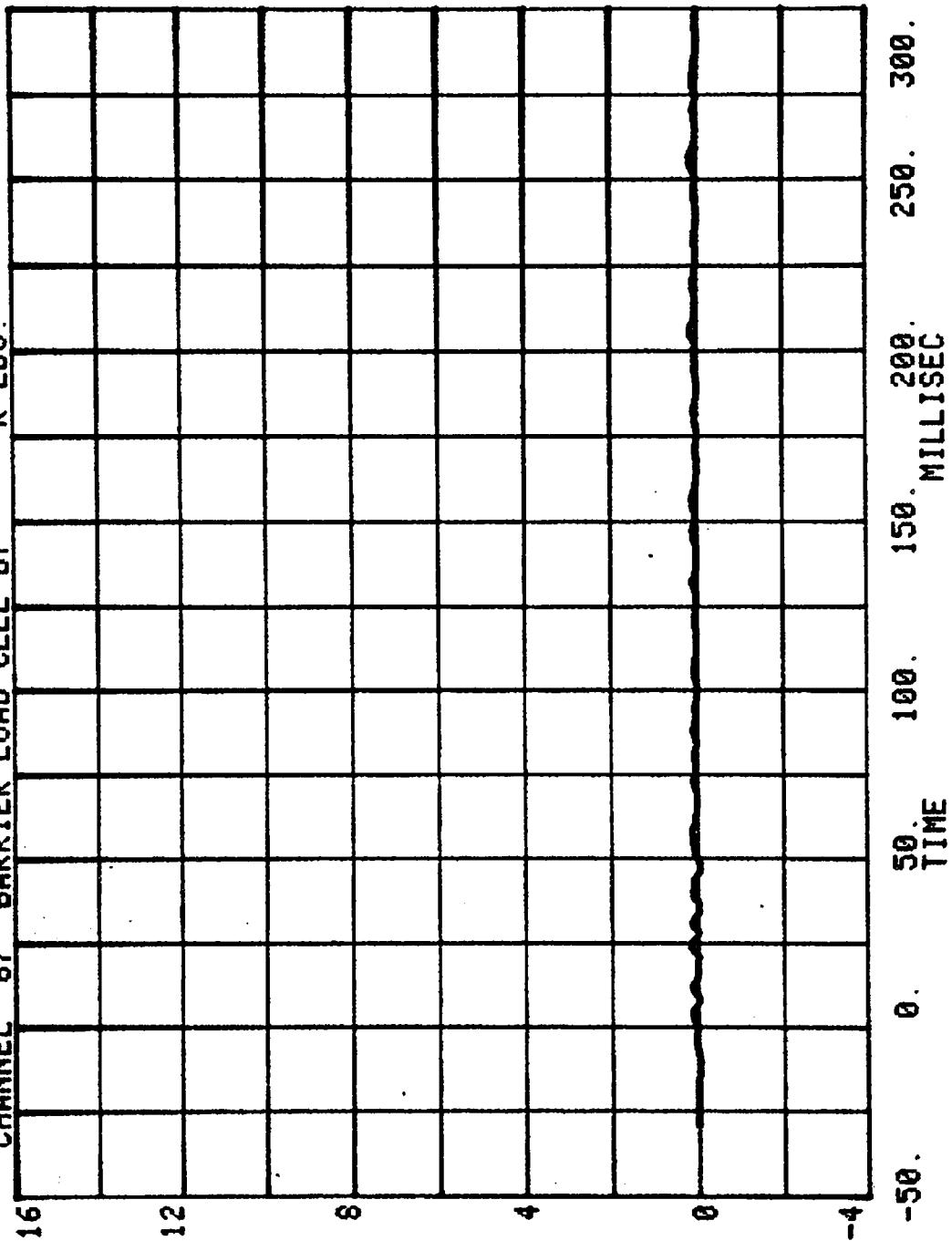
RUN= 660 SERIES= 303
CHANNEL 65 BARRIER LOAD CELL D5 K LBS.



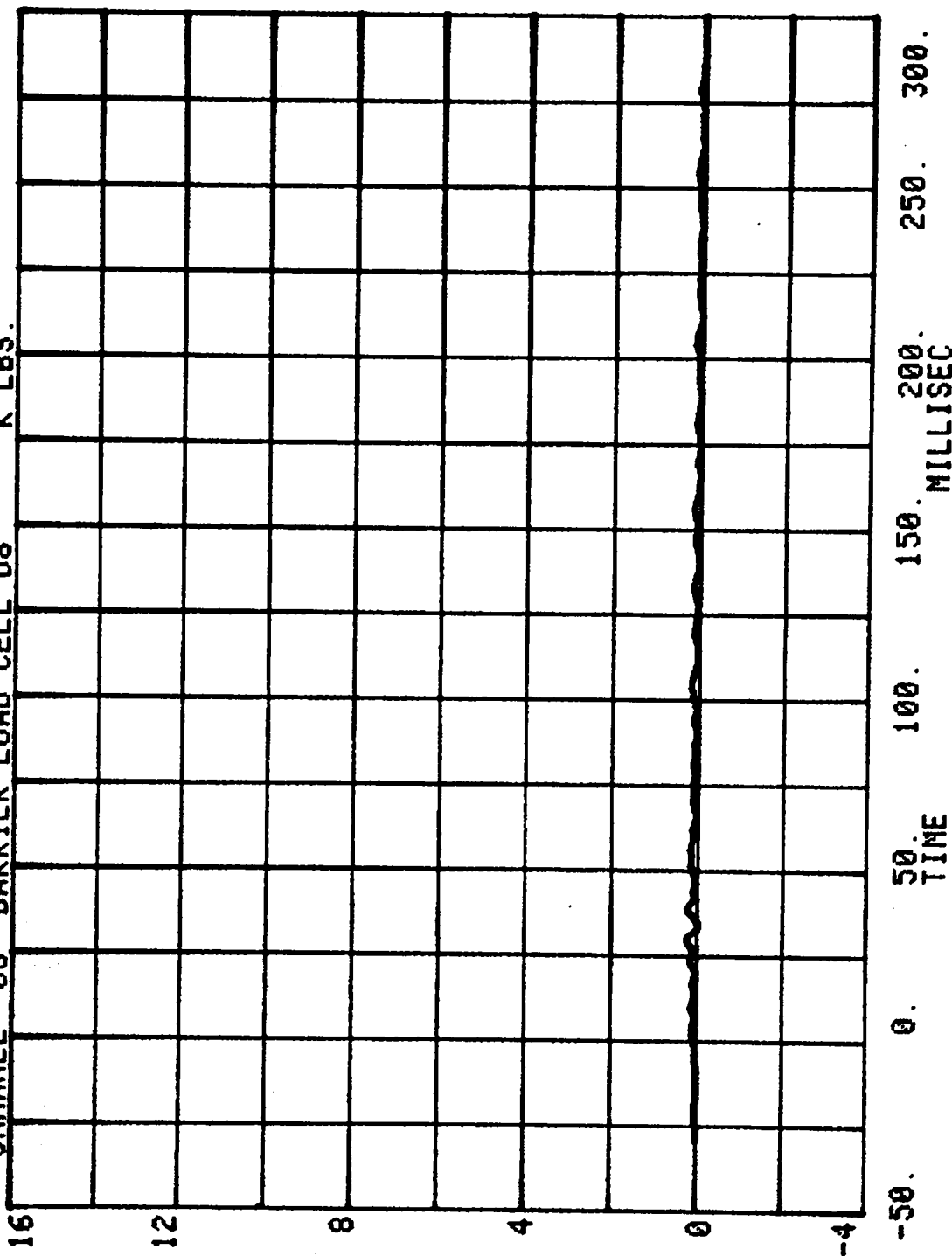
CHANNEL 66 BARRIER LOAD CELL D6
RUN= 660 SERIES= 303 K LBS.



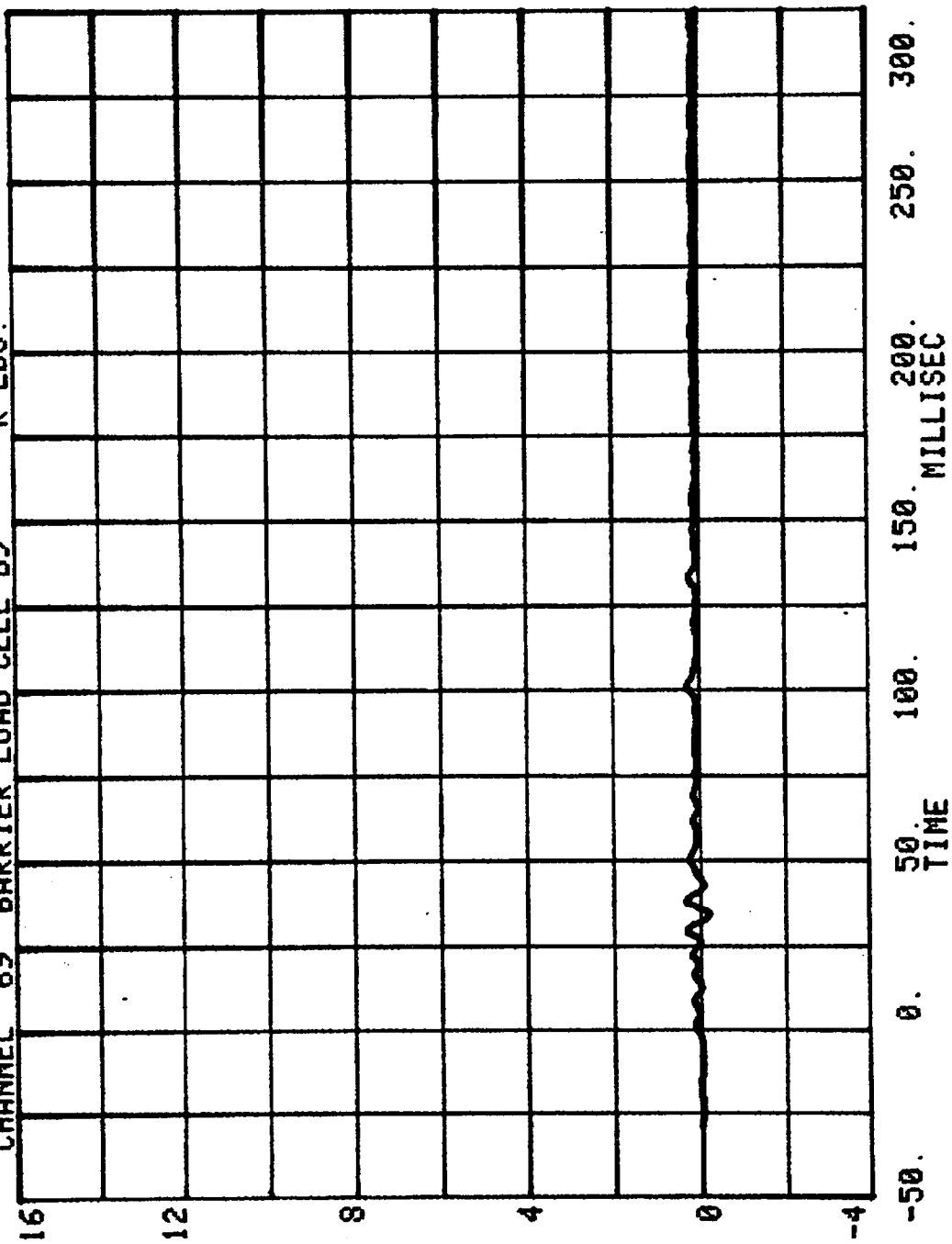
RUN= 660 SERIES= 303
CHANNEL 67 BARRIER LOAD CELL D7 K LBS.



CHANNEL 68 BARRIER LOAD CELL D8 RUN= 660 SERIES= 303 K LBS.



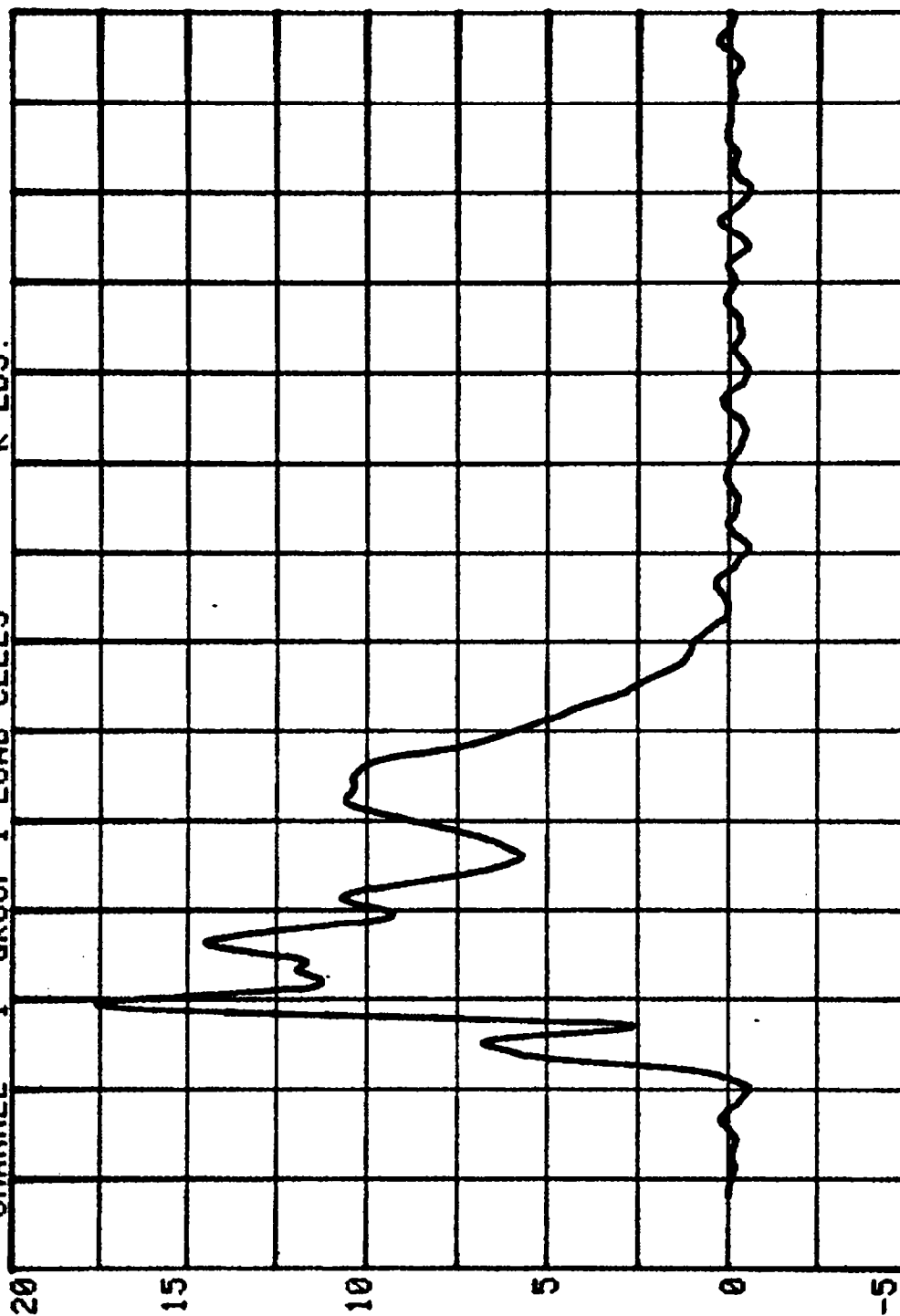
RUN= 660 SERIES= 303
CHANNEL 69 BARRIER LOAD CELL D9 K LBS.



CHANNEL 1 GROUP 1 LOAD CELLS

RUN= 660 SERIES= 303

K LBS.

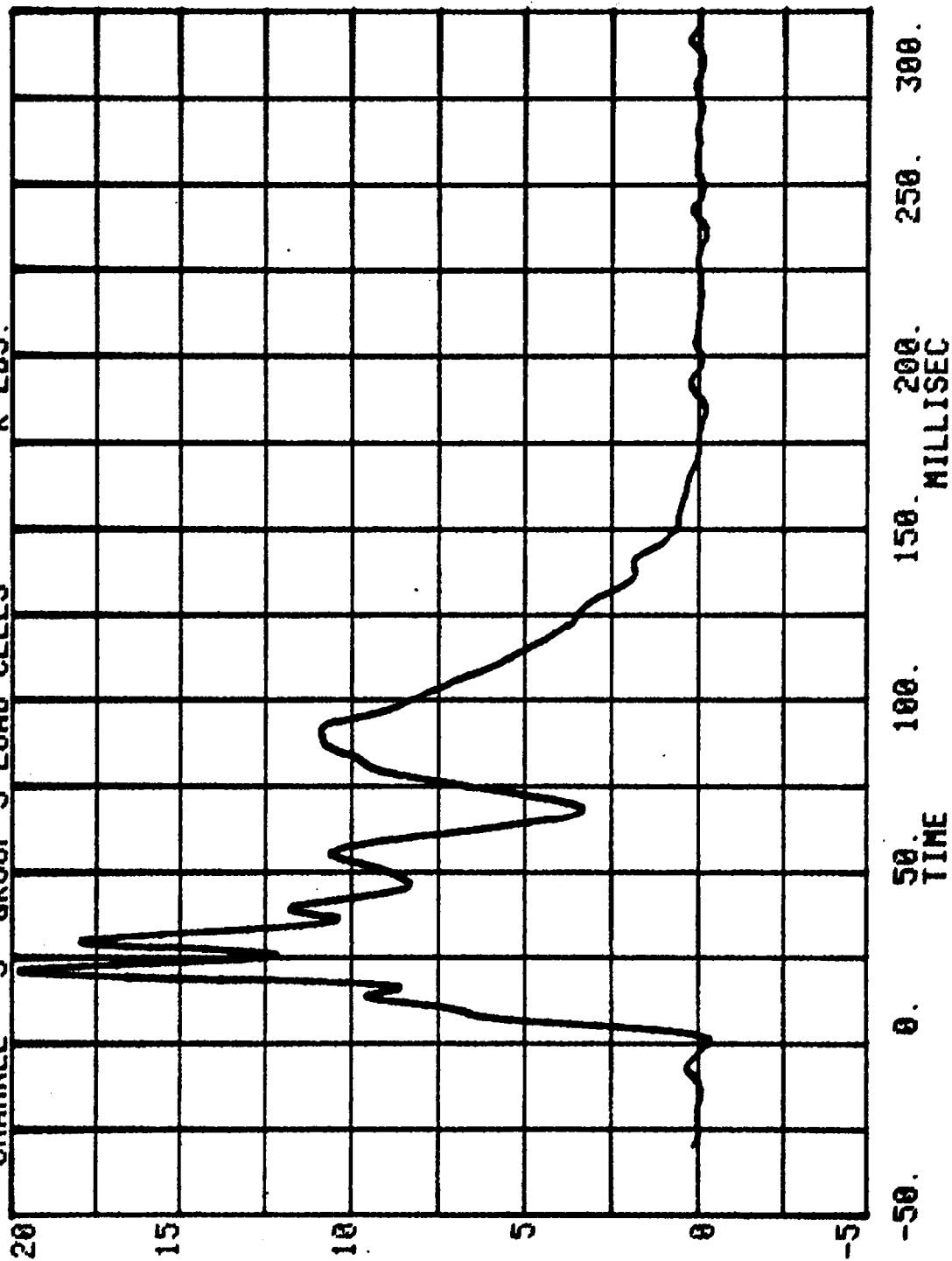


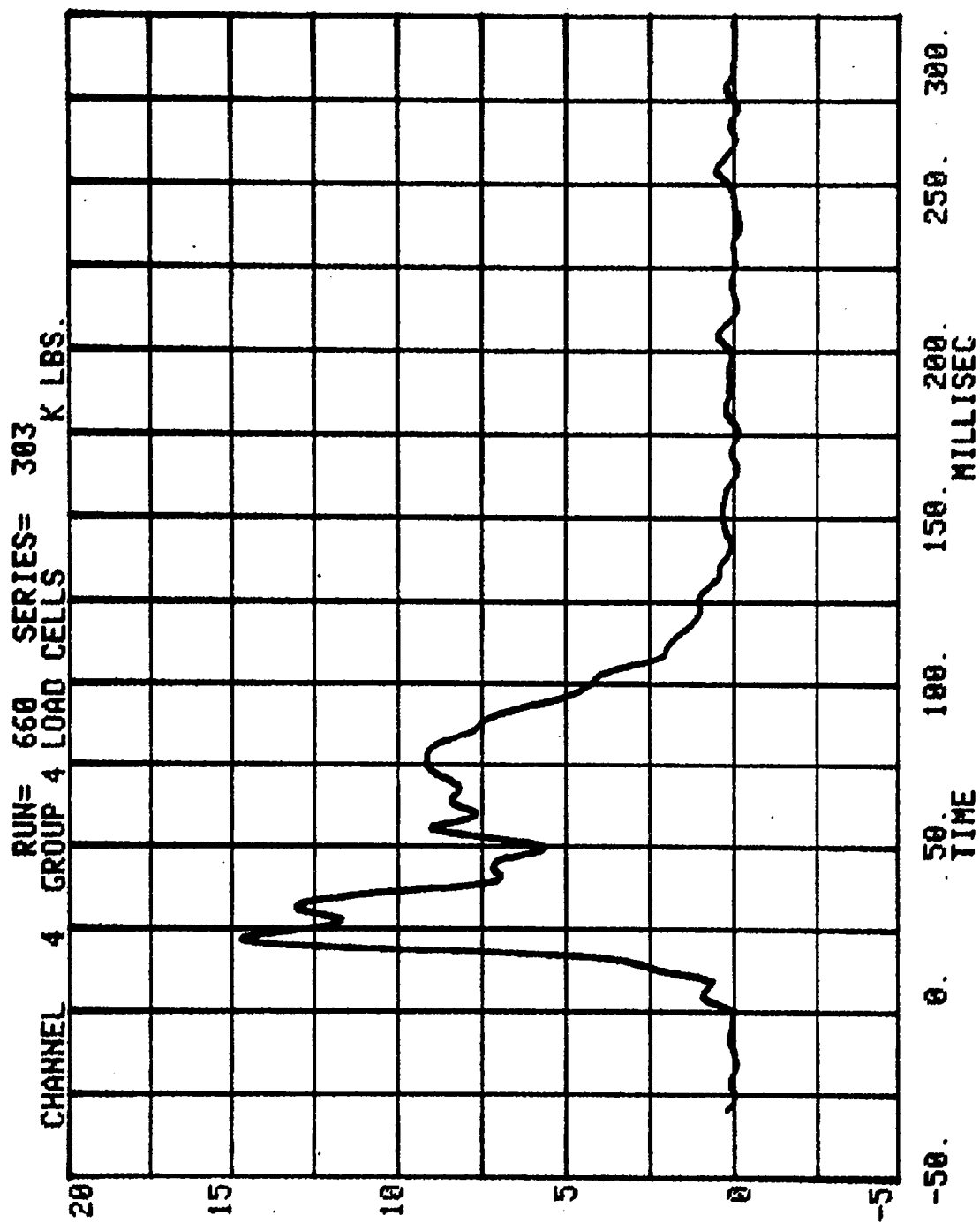
TIME

CHANNEL 3 GROUP 3 LOAD CELLS

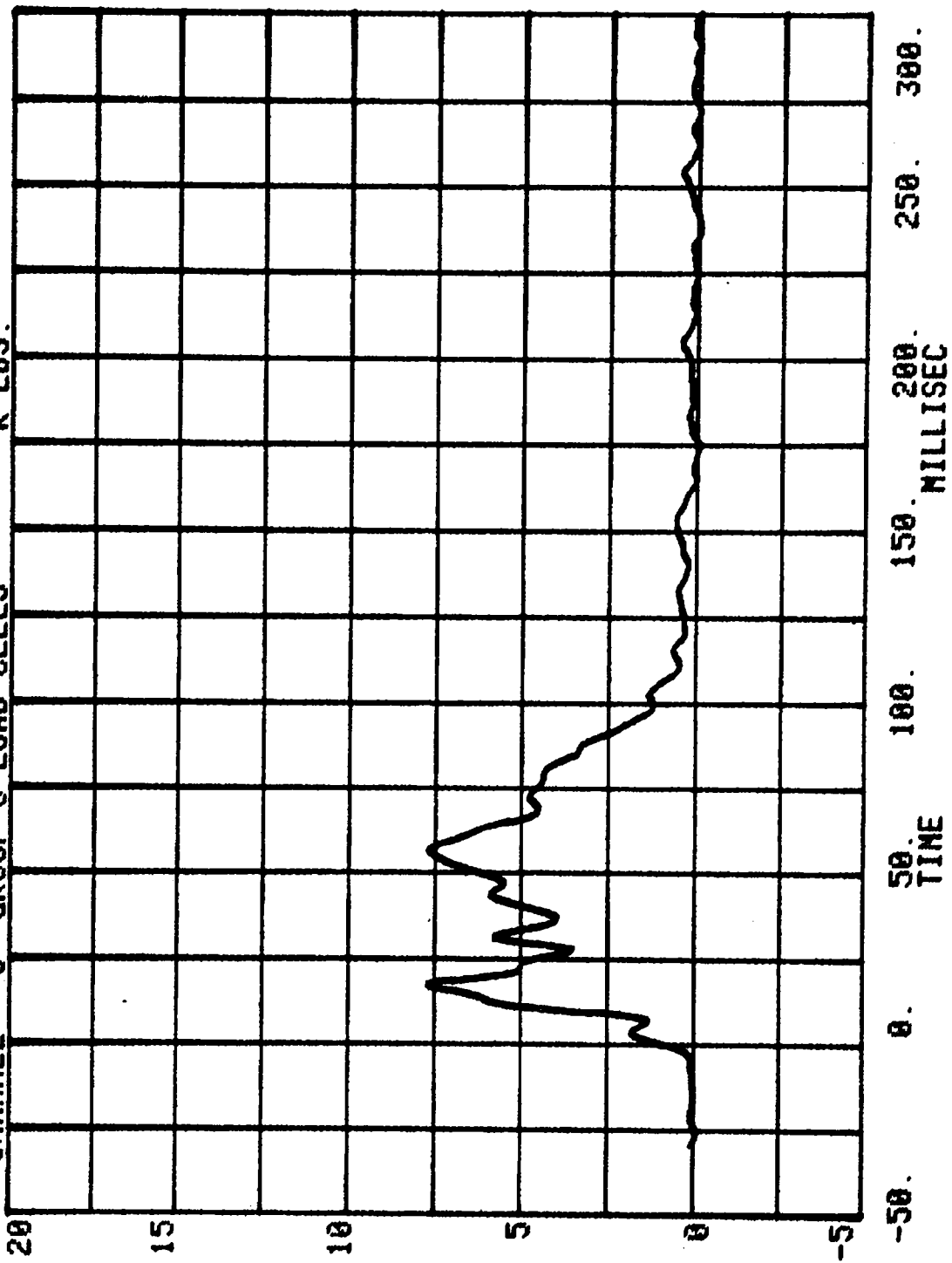
RUN= 660 SERIES= 303

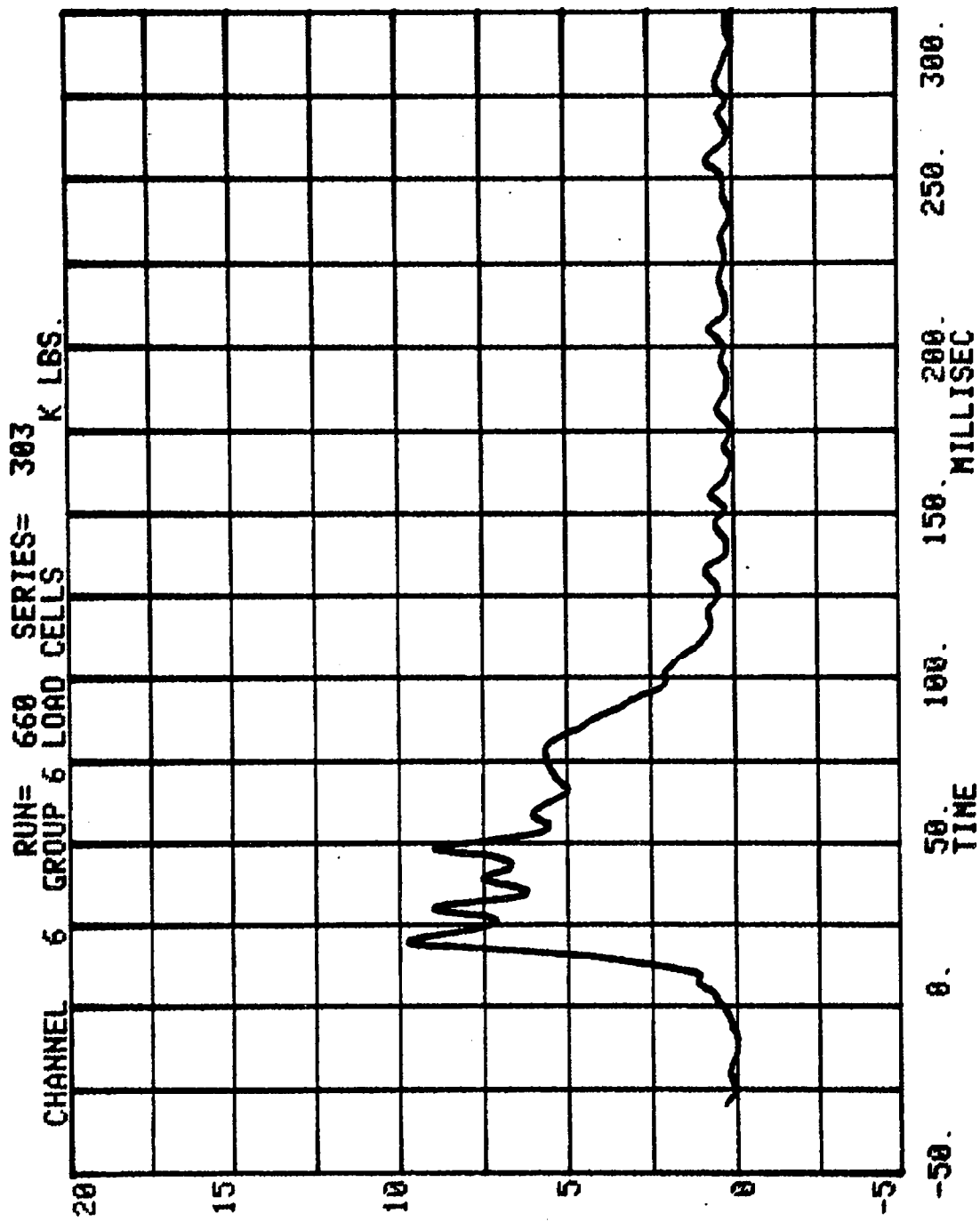
K LBS.

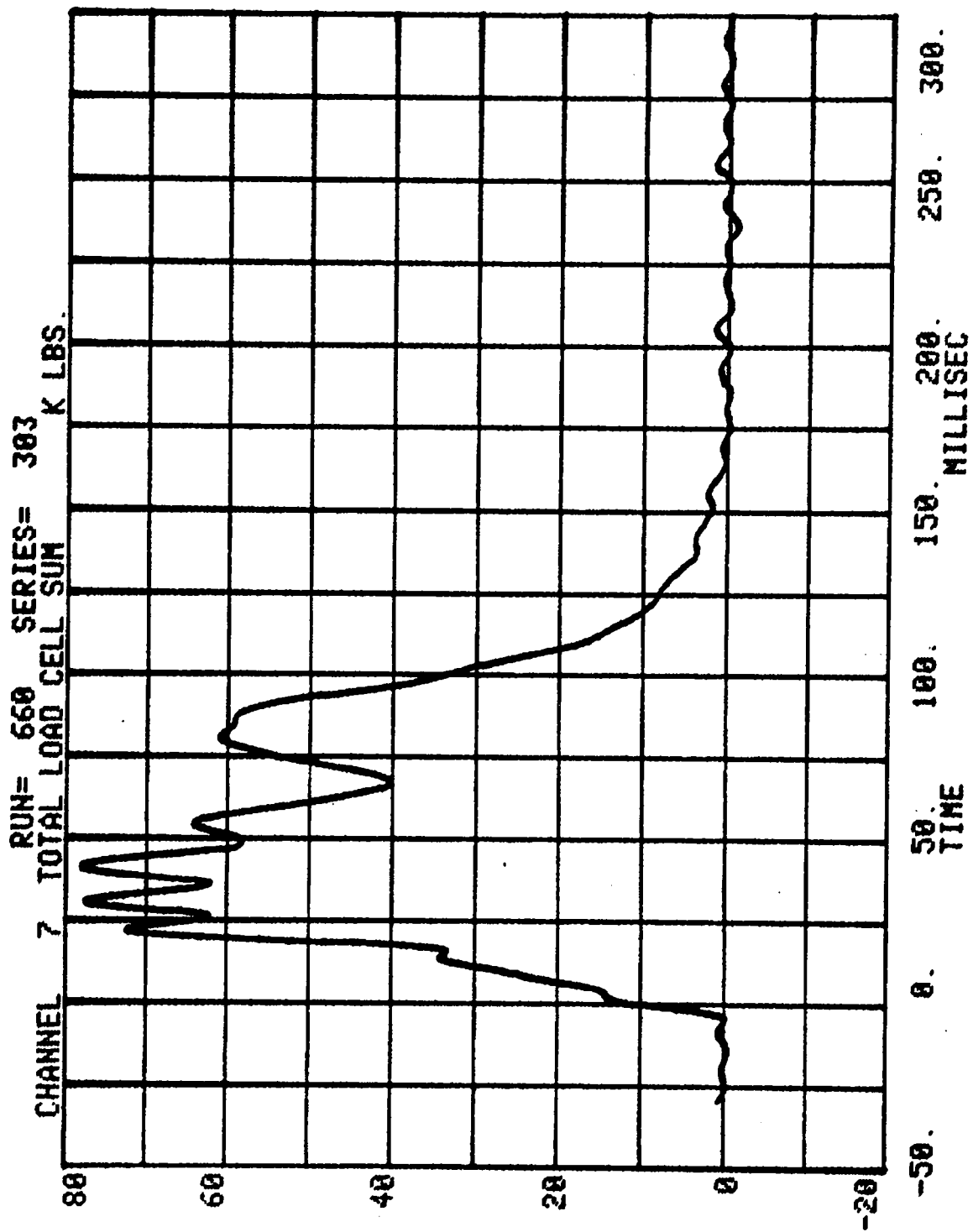




RUN= 660 SERIES= 303
CHANNEL 5 GROUP 5 LOAD CELLS K LBS.







TEST NO. CF0303

DUMMY DATA

FILTER CHANNEL CLASS

HEAD ACCELERATIONS	1000
CHEST ACCELERATIONS	180
FEMUR FORCES	600
BELT LOADS	60

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

CAR TO LOAD CELL BARRIER

RUN= 660

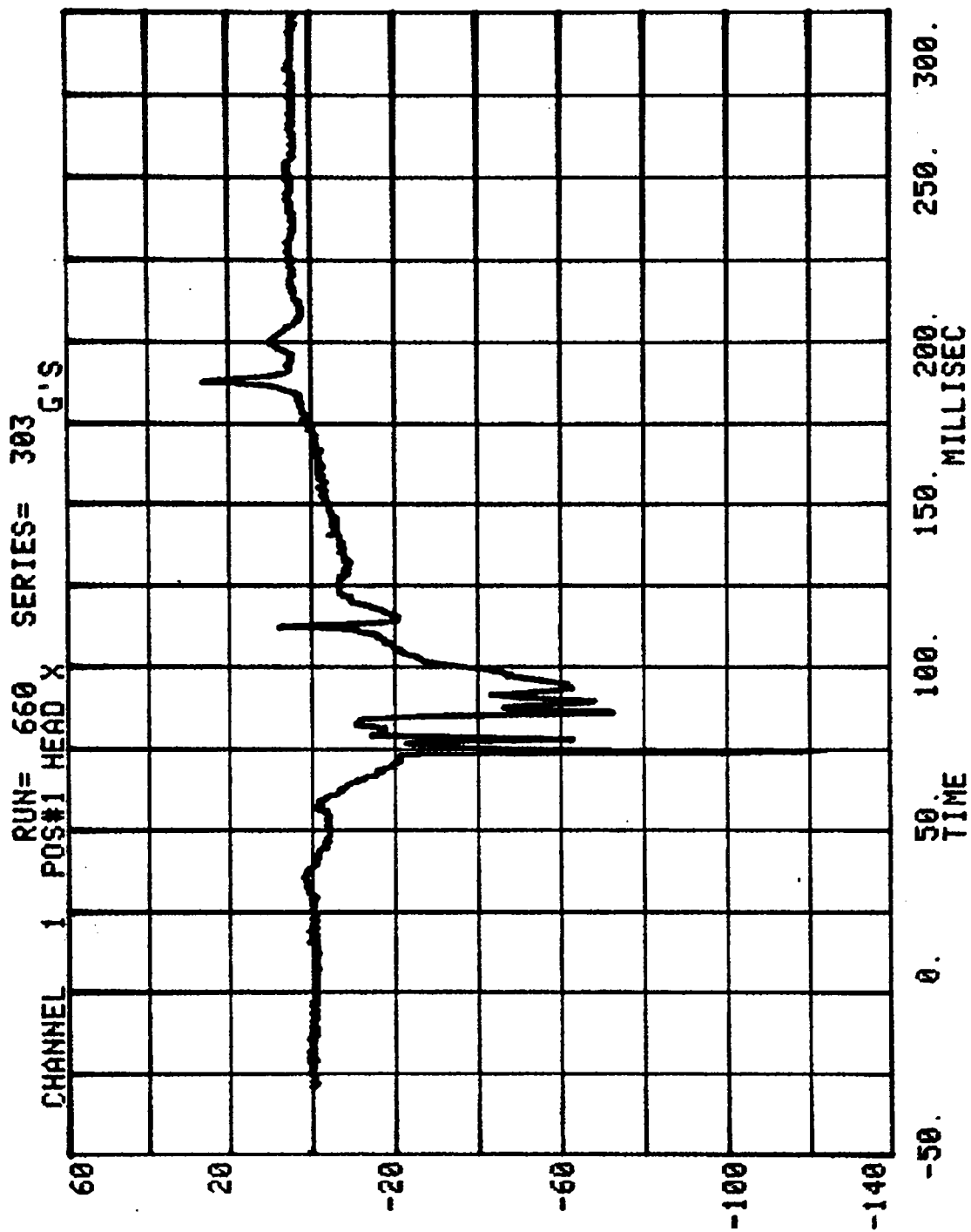
POS#1 HEAD RESULTANT

HIC= 684.8 FROM T1= .06990 TO T2= .10792

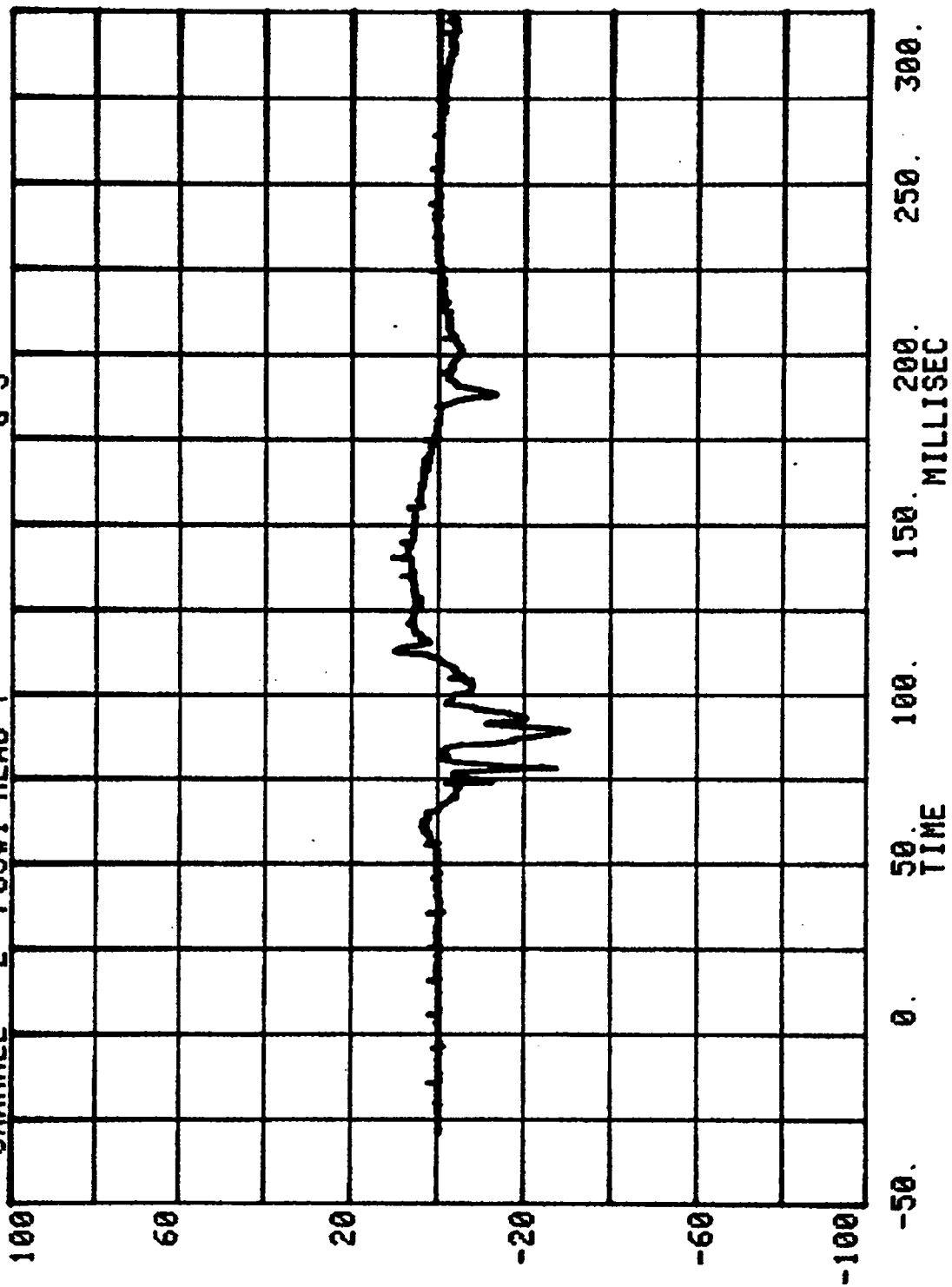
AVERAGE ACCELERATION BETWEEN T1 AND T2= 50.4G'S

EVENT TIME= 300.0 MSEC

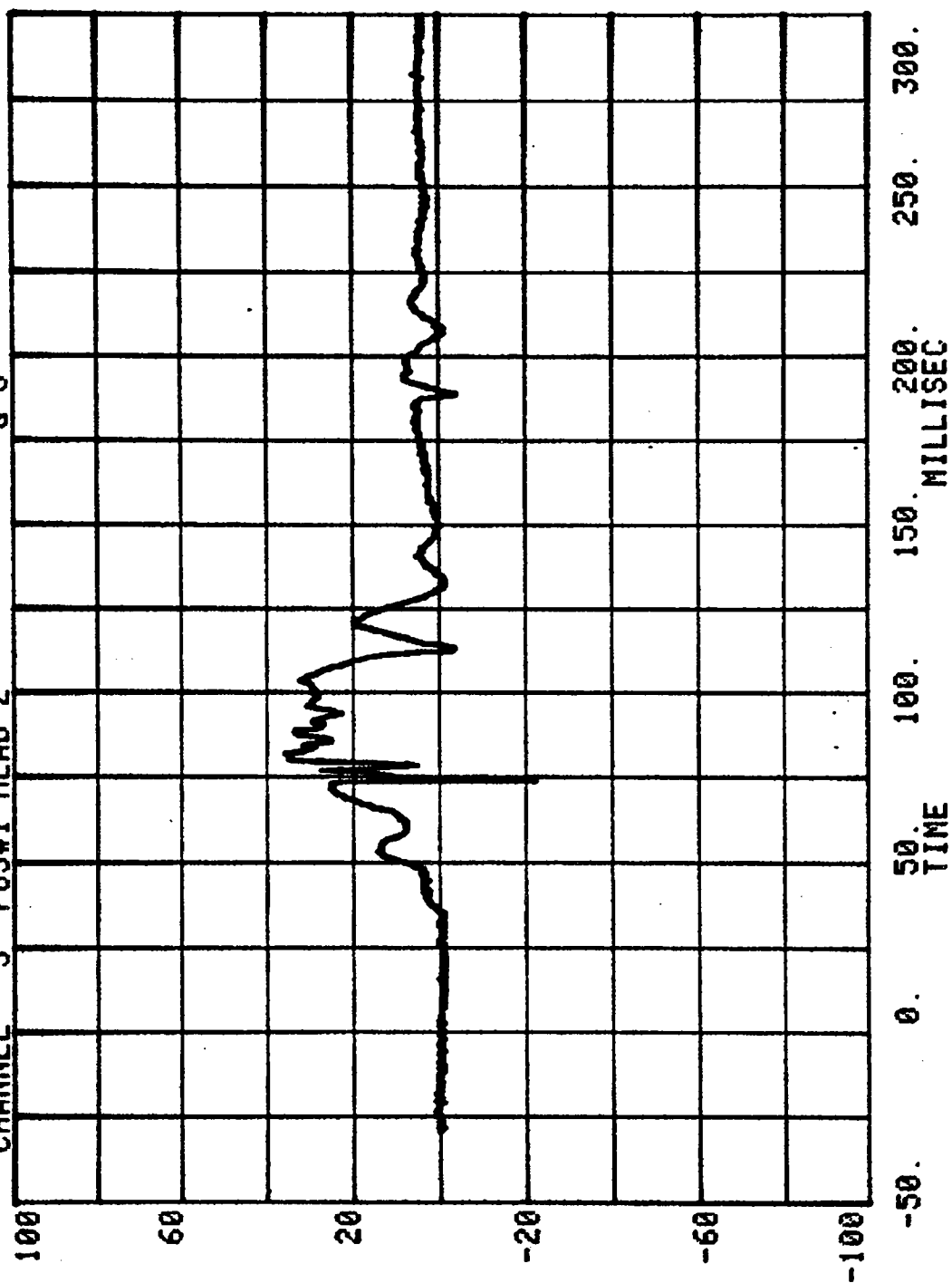
SEVERITY INDEX= 973.0

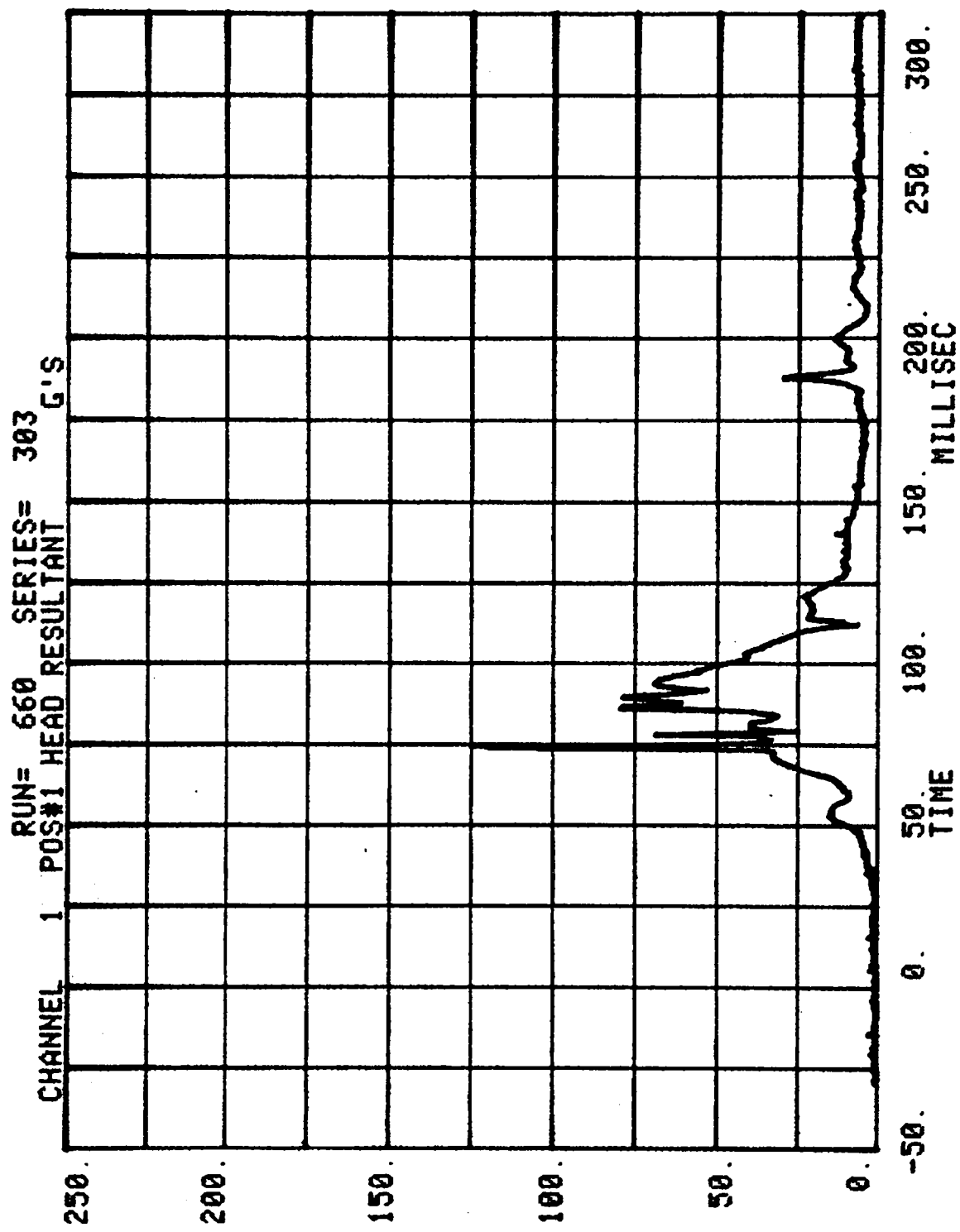


CHANNEL 2 POS#1 HEAD Y RUN= 660 SERIES= 303 G'S

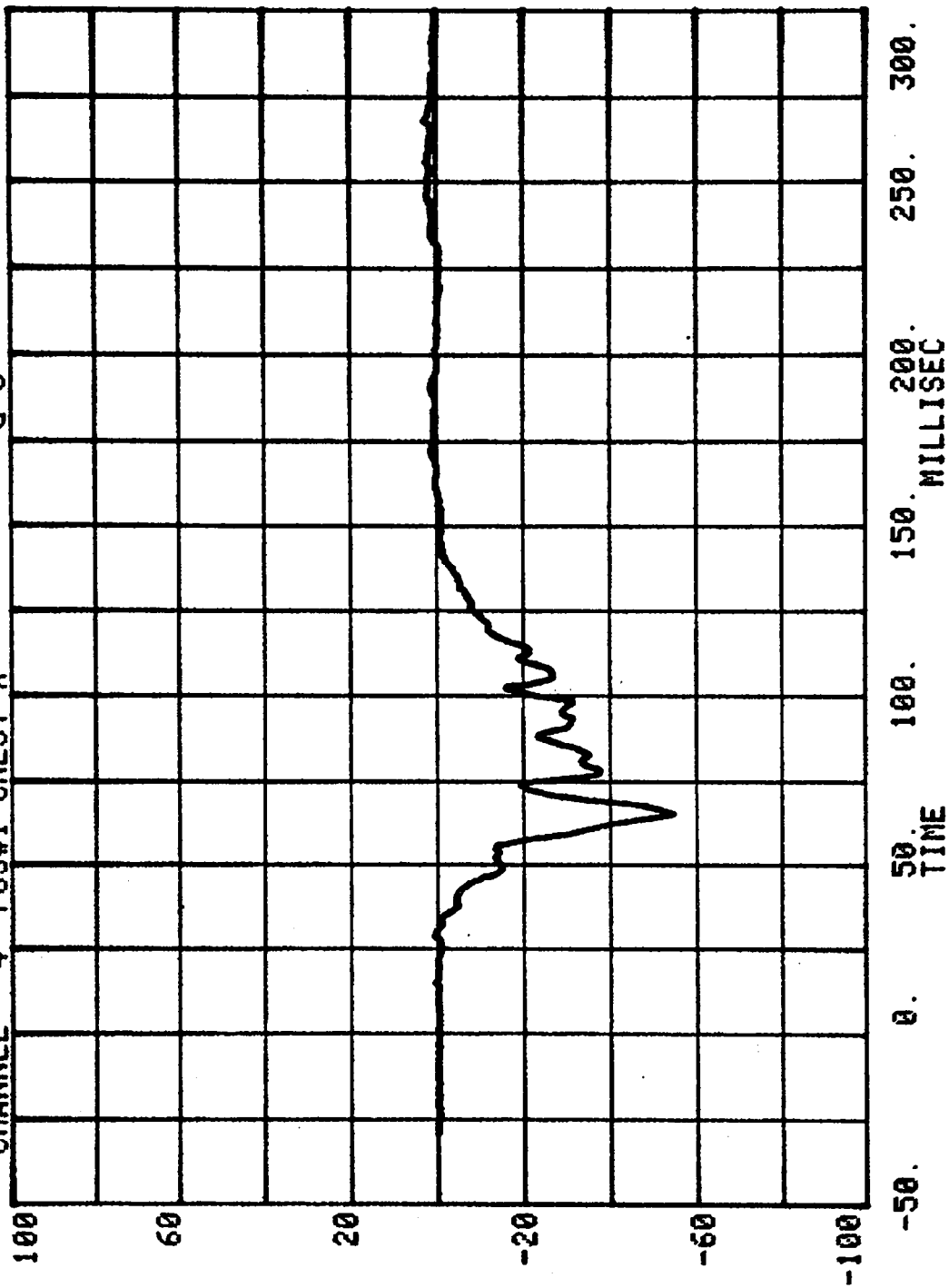


CHANNEL 3 RUN= 660 SERIES= 303
POS#1 HEAD 2 G'S

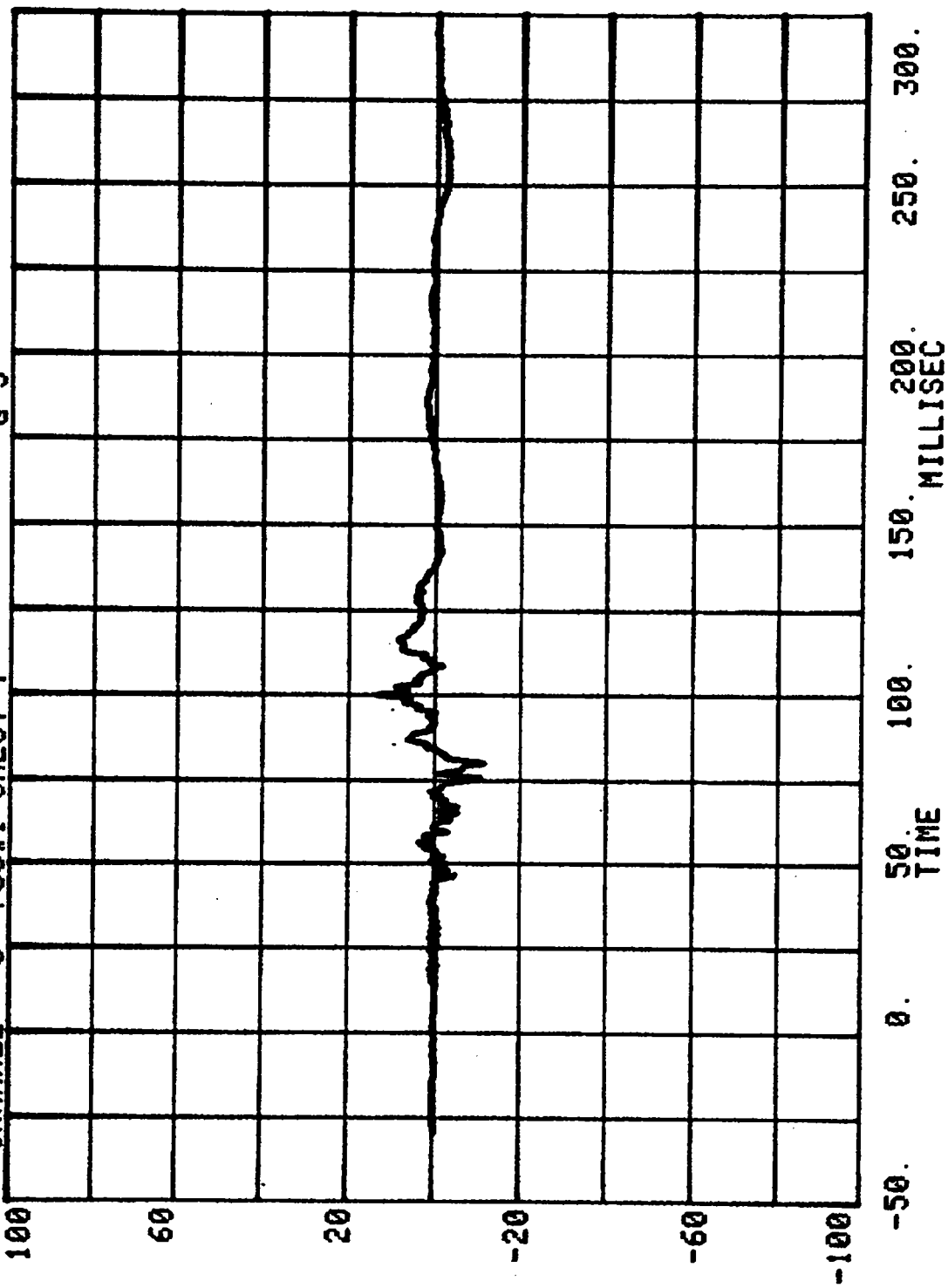




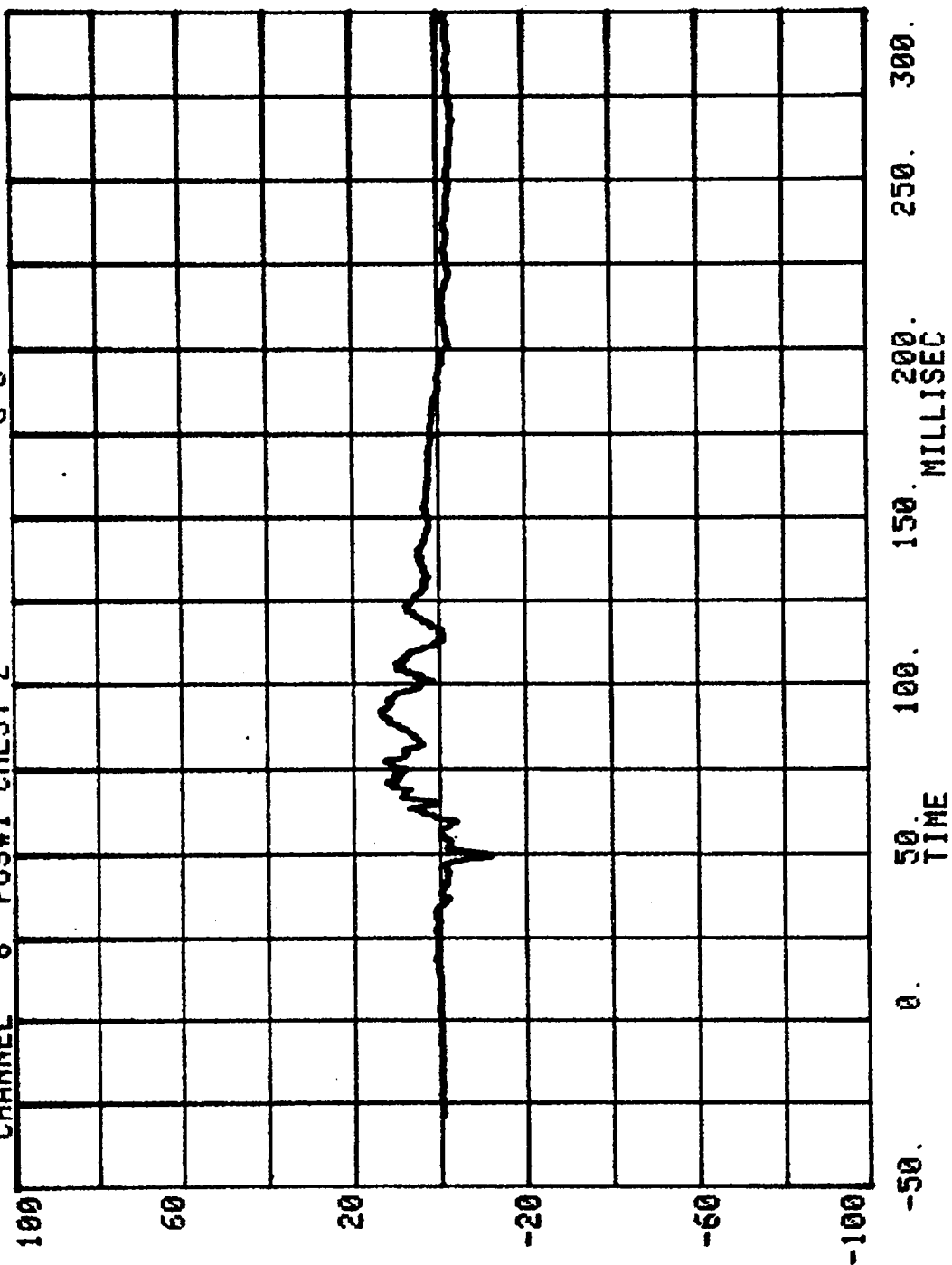
CHANNEL 4 POS#1 CHEST X RUN= 660 SERIES= 303 G'S



CHANNEL 5 POS#1 CHEST Y RUN= 660 SERIES= 303 G'S

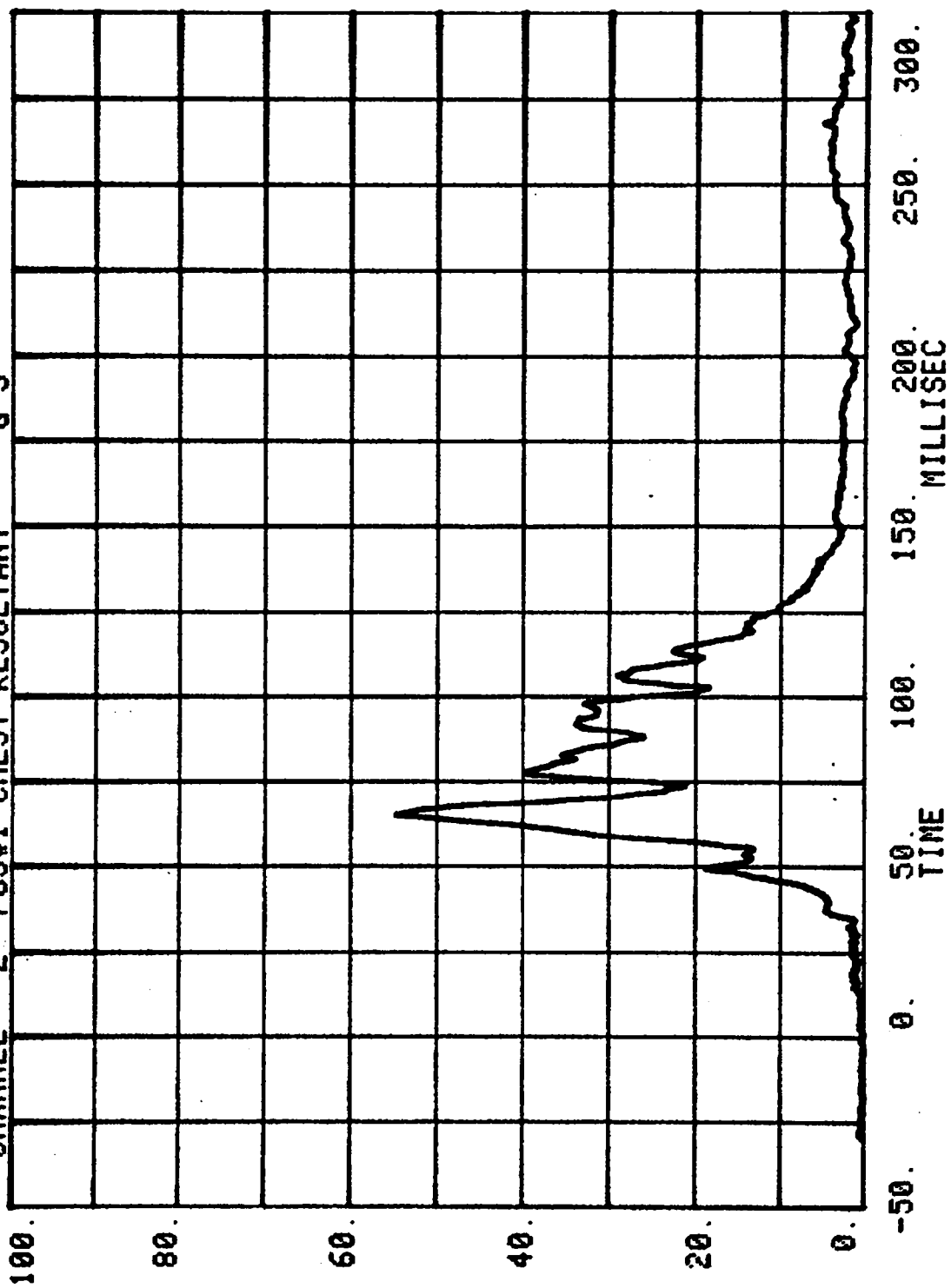


RUN= 660 SERIES= 303
CHANNEL 6 POS#1 CHEST Z G'S

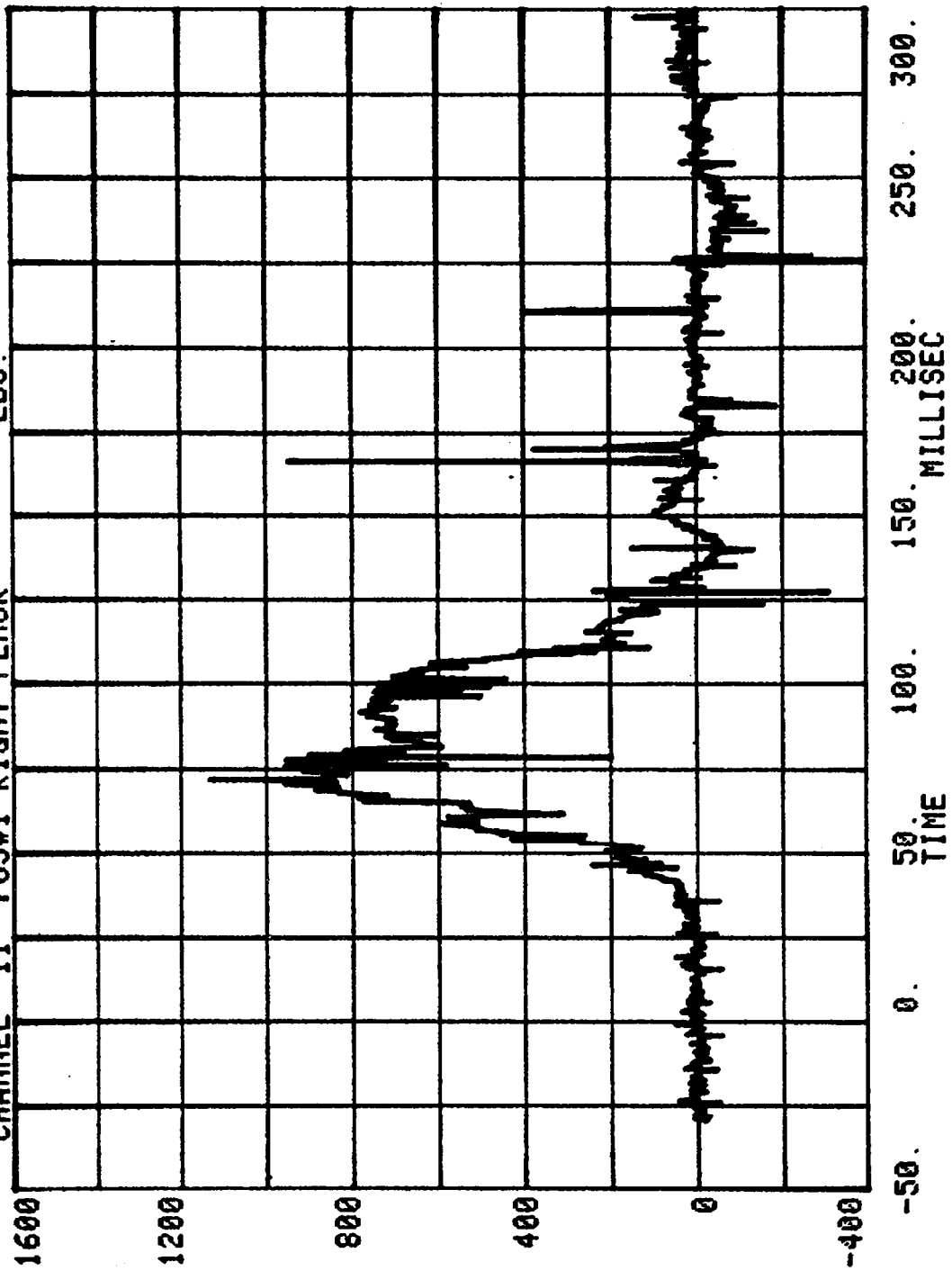


CHANNEL 2 POS#1 CHEST RESULTANT G'S

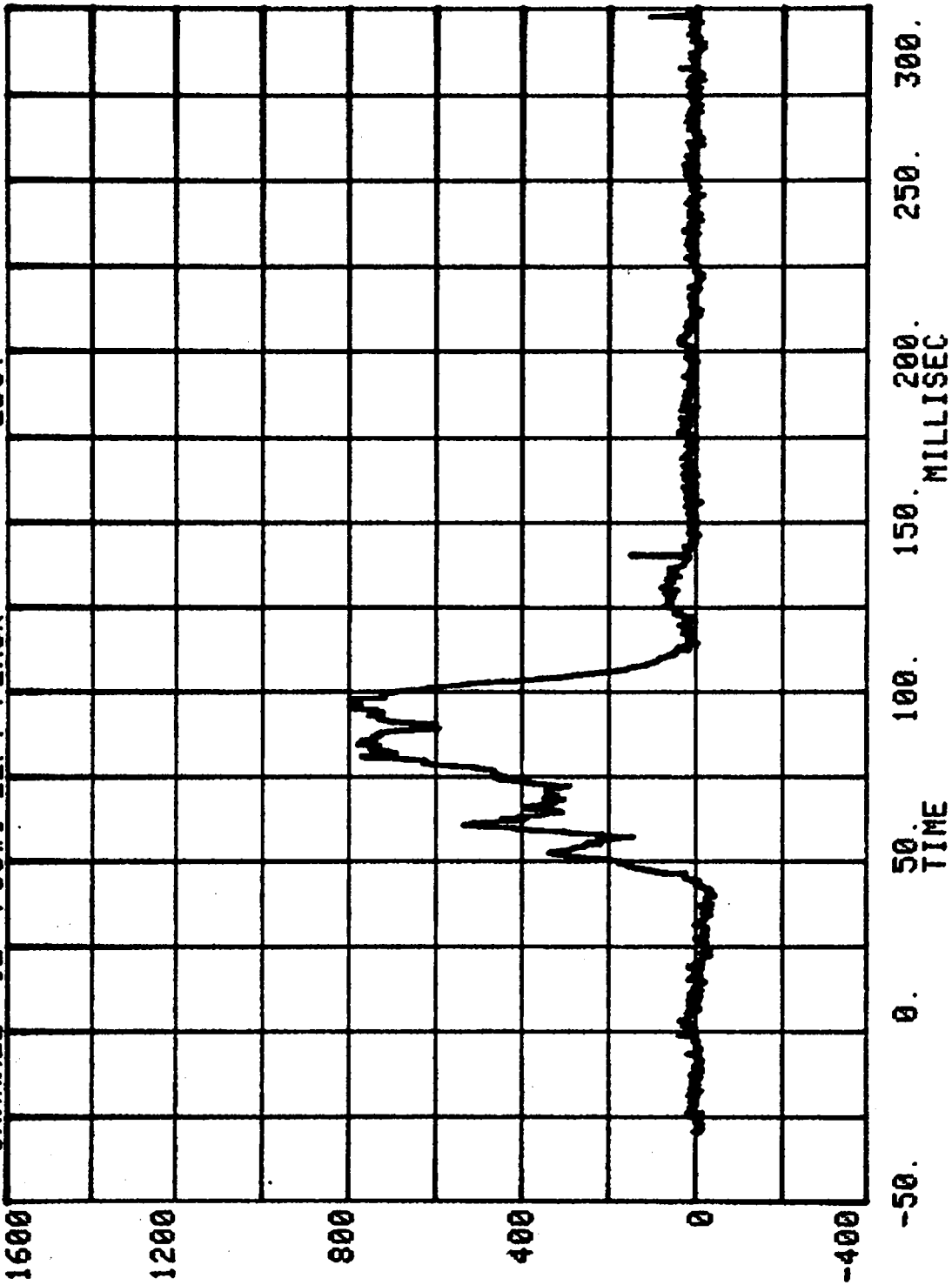
RUN= 660 SERIES= 303



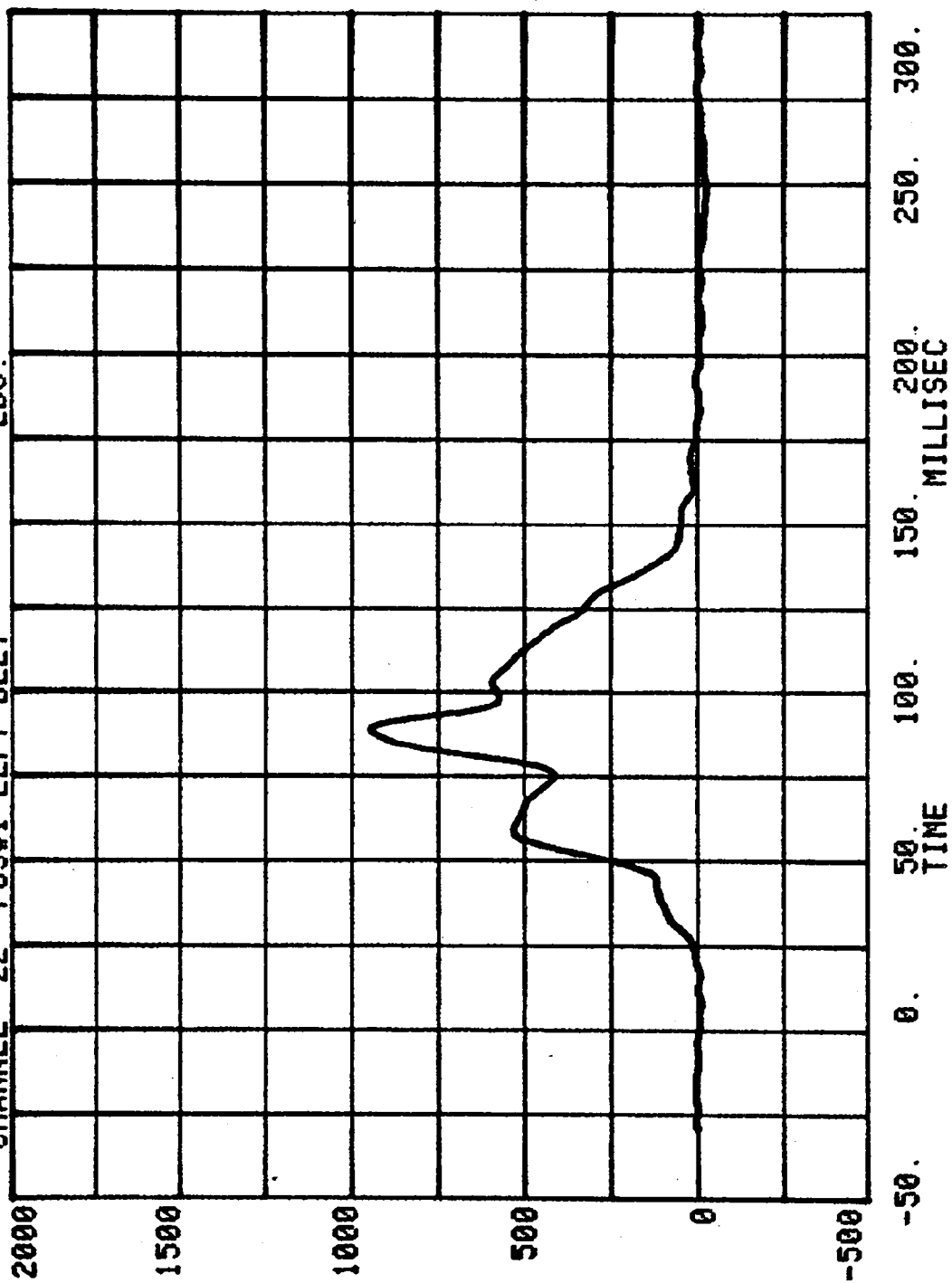
CHANNEL 11 POS#1 RIGHT FEMUR
RUN= 660 SERIES= 303 LBS.



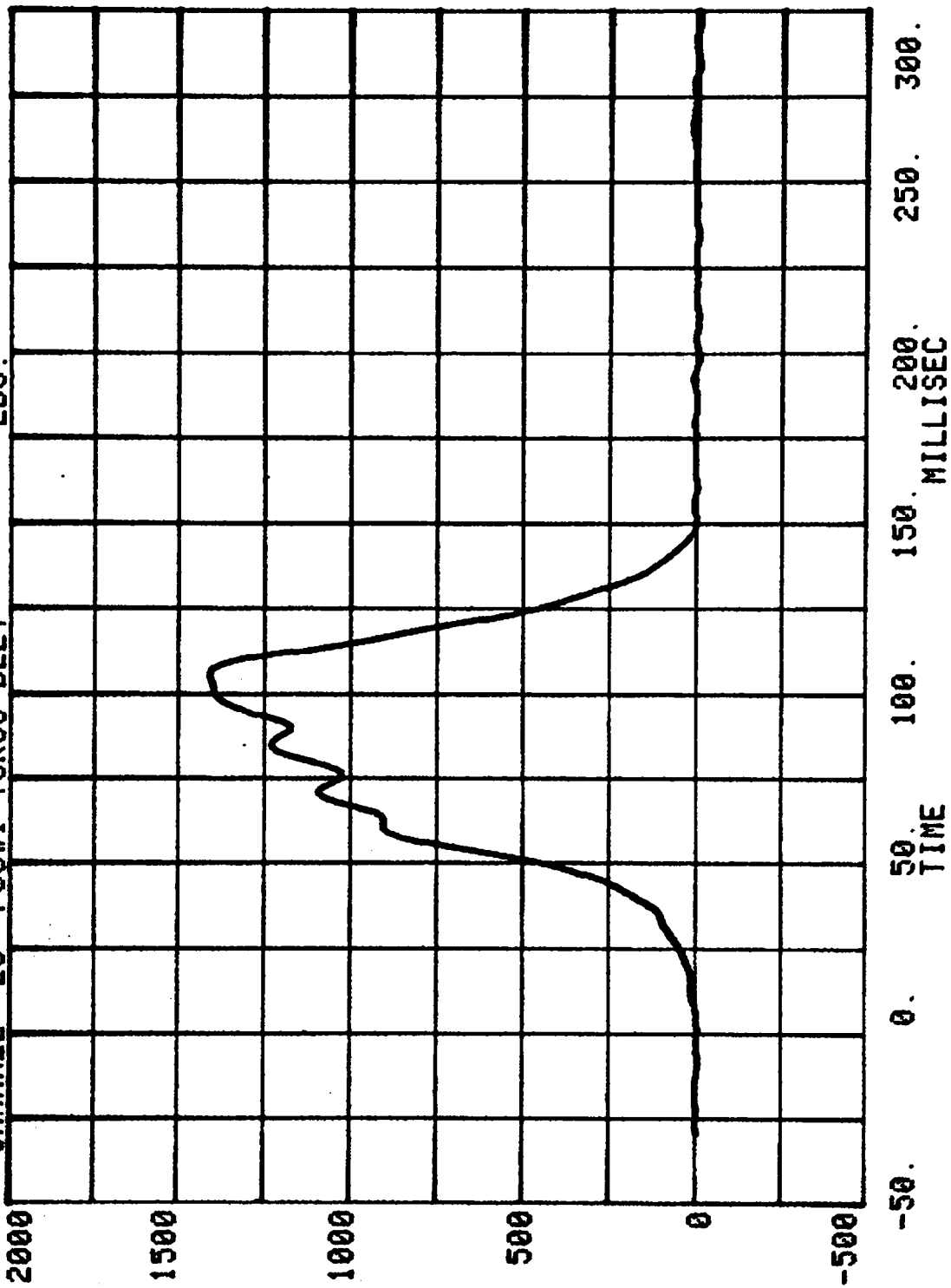
RUN= 660 SERIES= 303
CHANNEL 12 POS#1 LEFT FEMUR LBS.



RUN= 660 SERIES= 303 LBS.
CHANNEL 22 POS#1 LEFT BELT

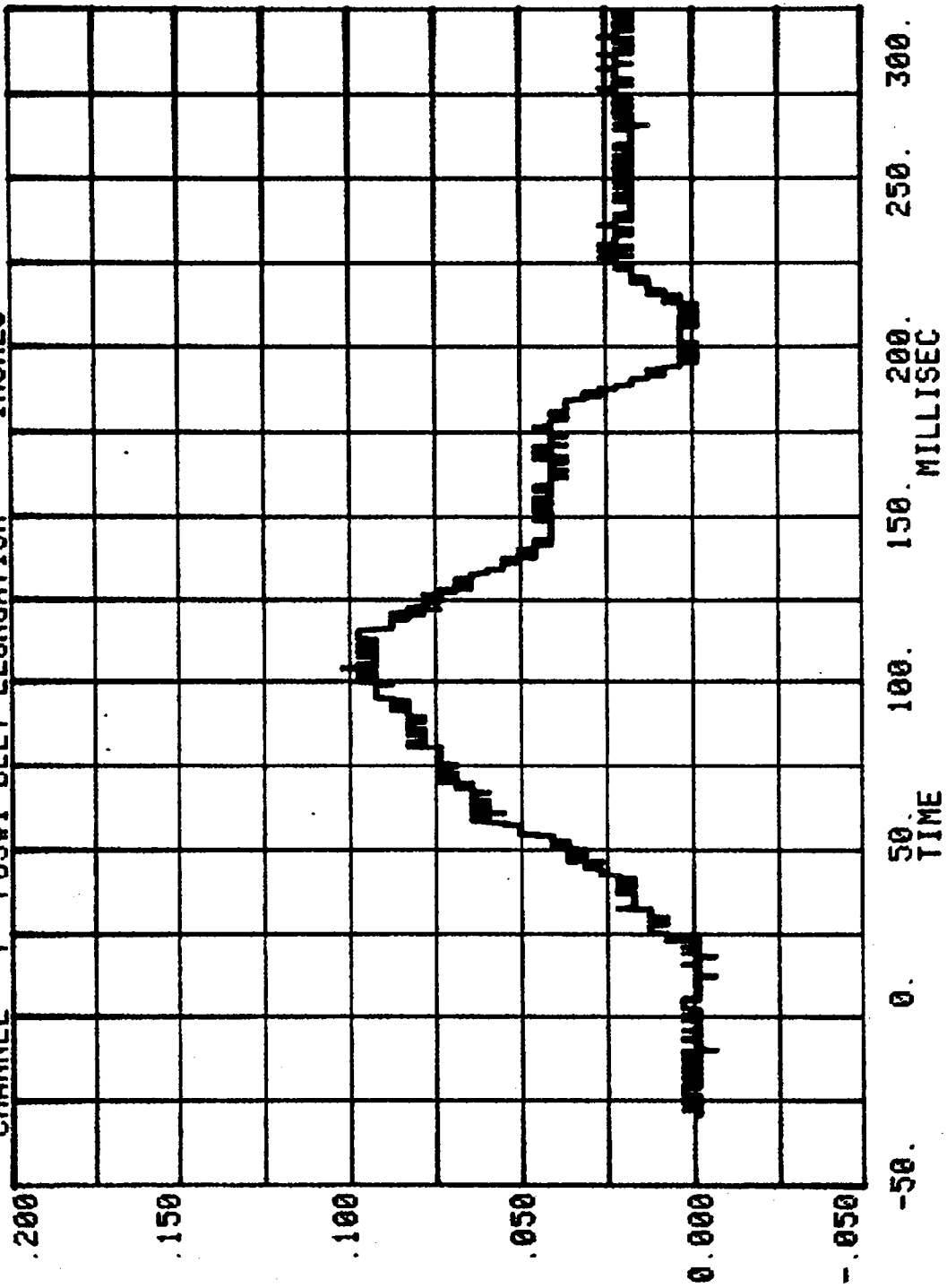


RUN= 660 SERIES= 303
CHANNEL 23 POS#1 TORSO BELT LBS.



CHANNEL 7 POS#1 BELT ELONGATION INCHES MEASURED OVER 2.5 INCHES

RUN= 660 SERIES= 303



HEAD INJURY CRITERION
HEAD SEVERITY INDEX

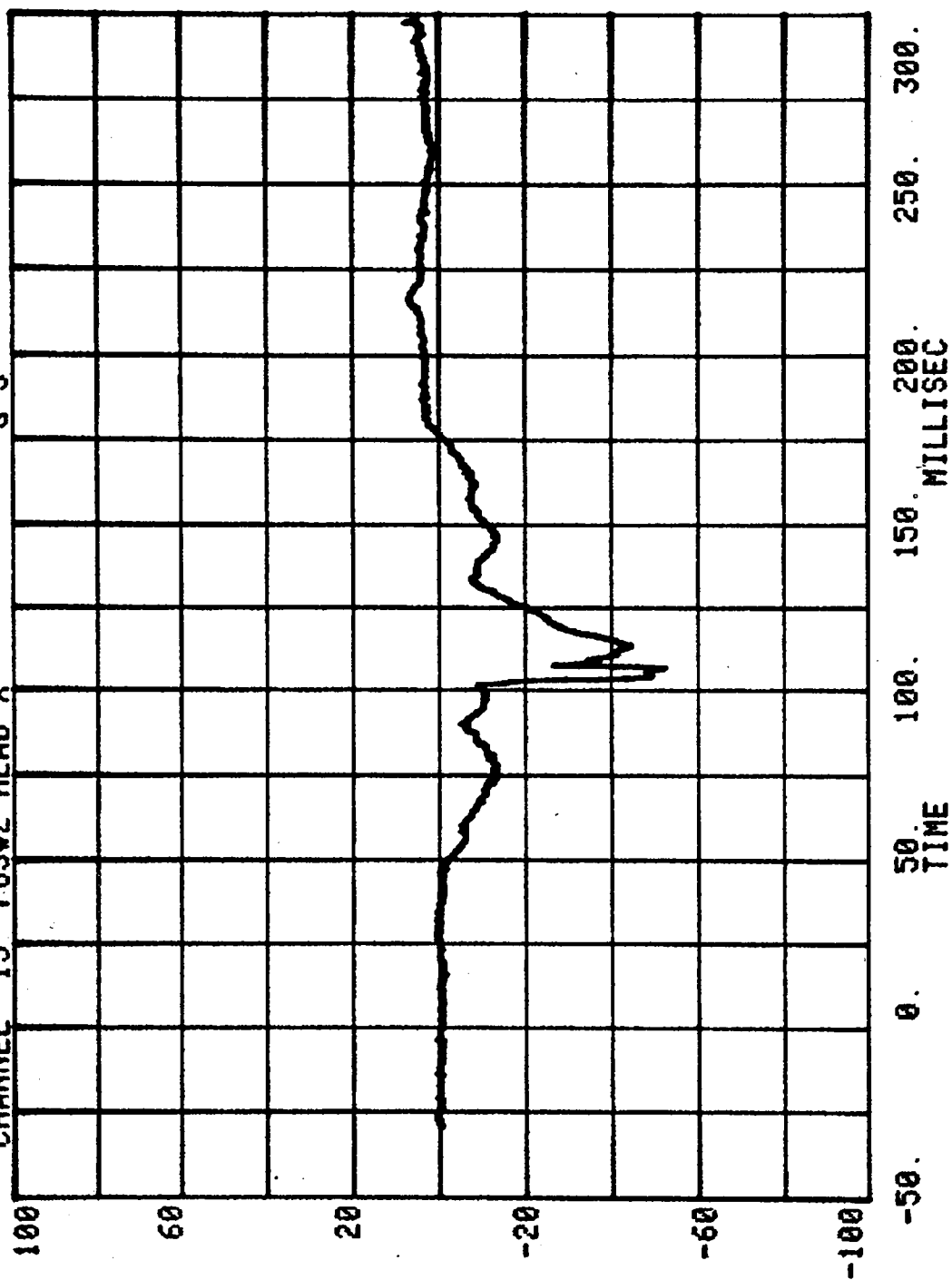
CAR TO LOAD CELL BARRIER

RUN= 660

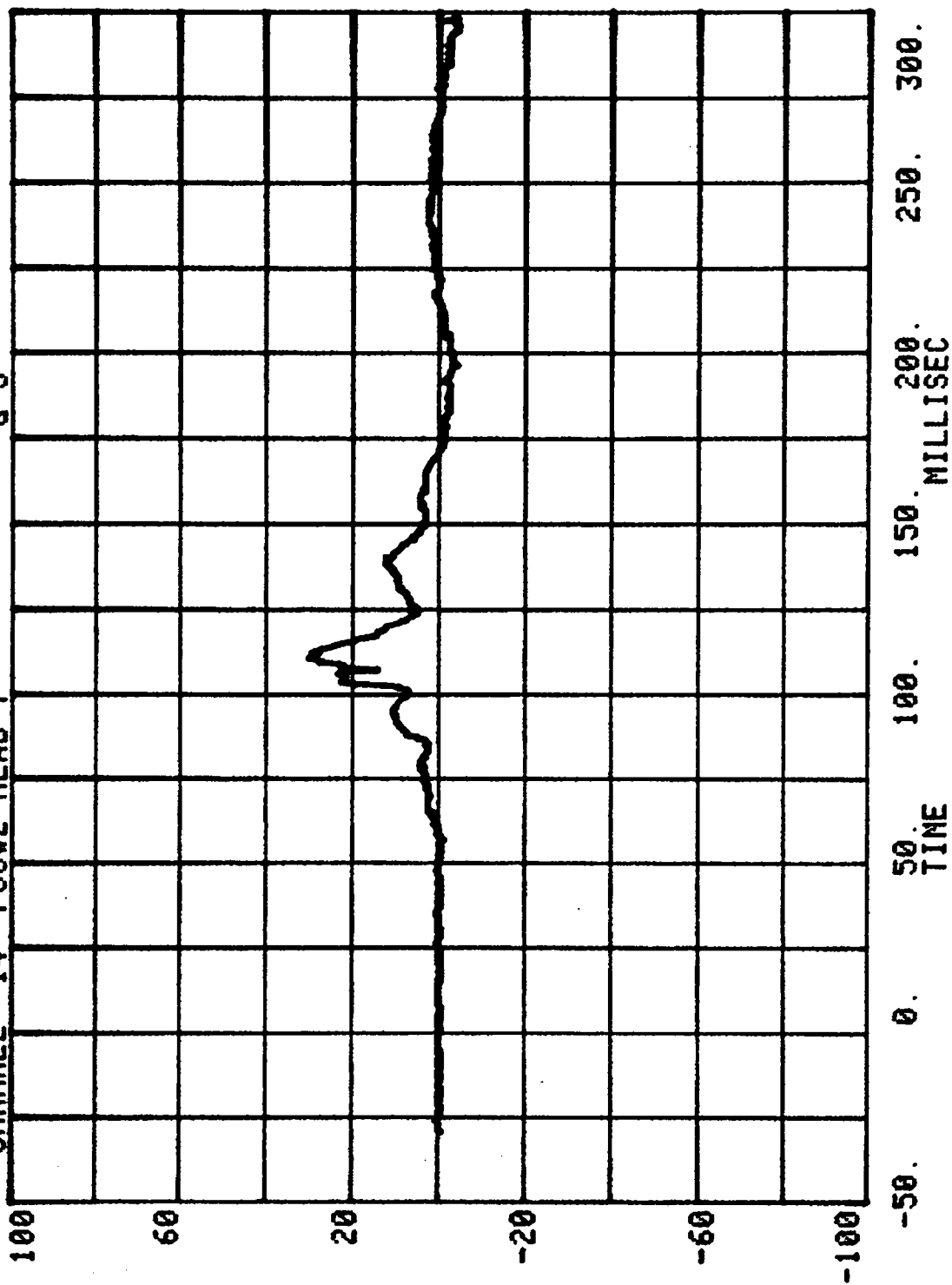
POS#2 HEAD RESULTANT

HIC= 759.8 FROM T1= .07717 TO T2= .12517
AVERAGE ACCELERATION BETWEEN T1 AND T2= 47.8G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1027.3

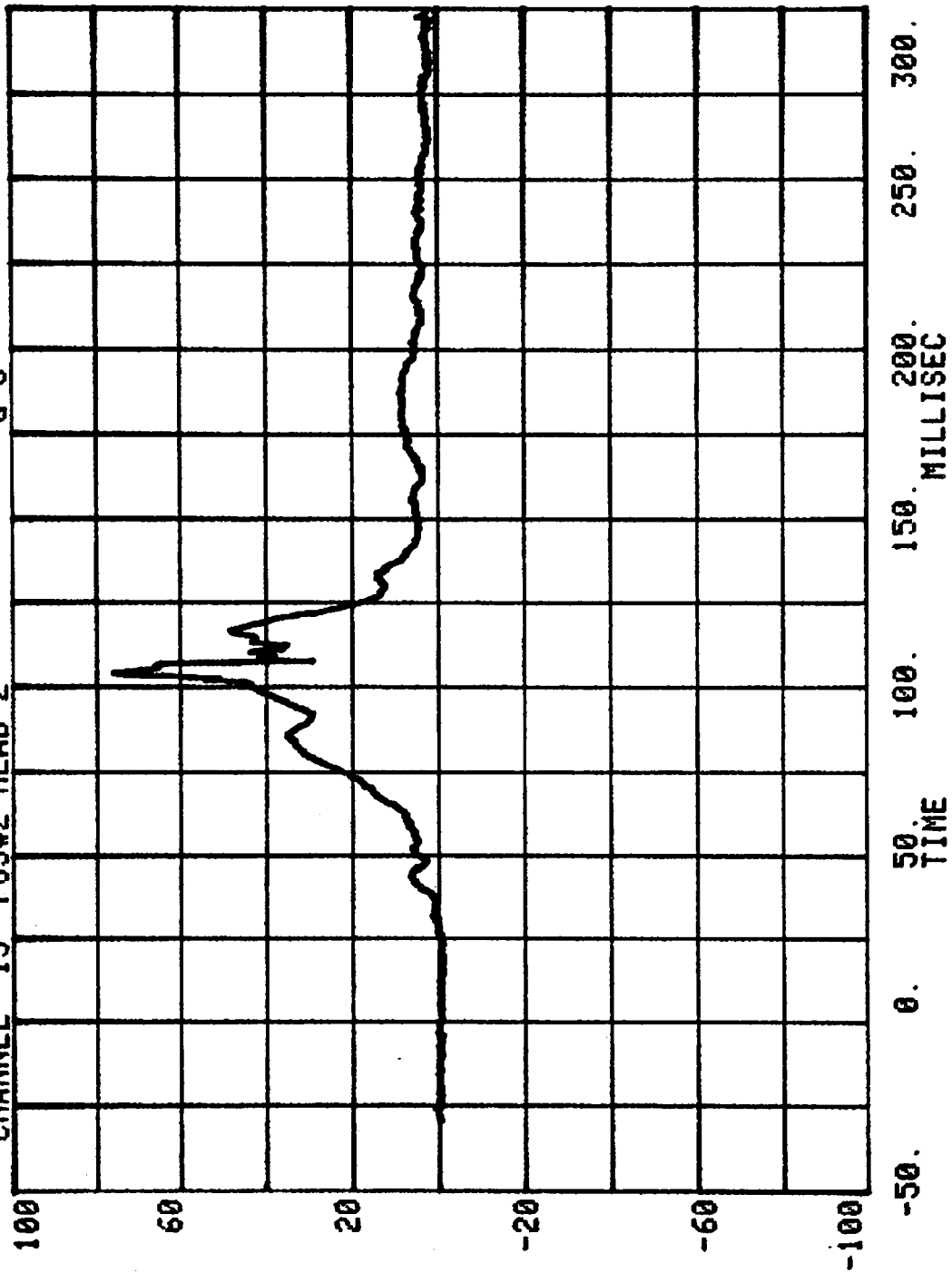
CHANNEL 13 RUN= 660 SERIES= 303 G'S
POS#2 HEAD X



CHANNEL 14 POS#2 HEAD Y
RUN= 660 SERIES= 303
G'S

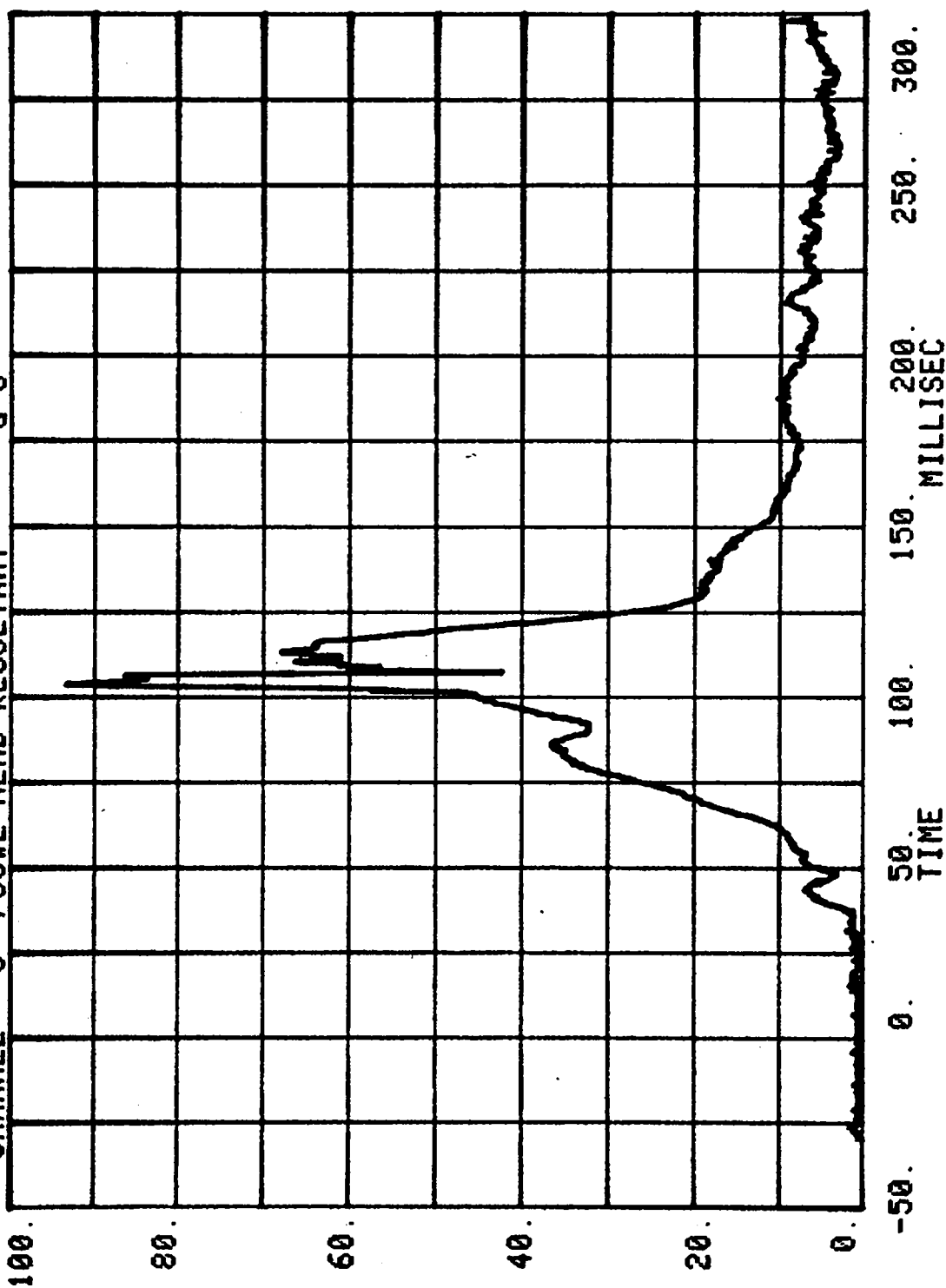


CHANNEL 15 POS#2 HEAD Z
RUN= 660 SERIES= 303 G'S

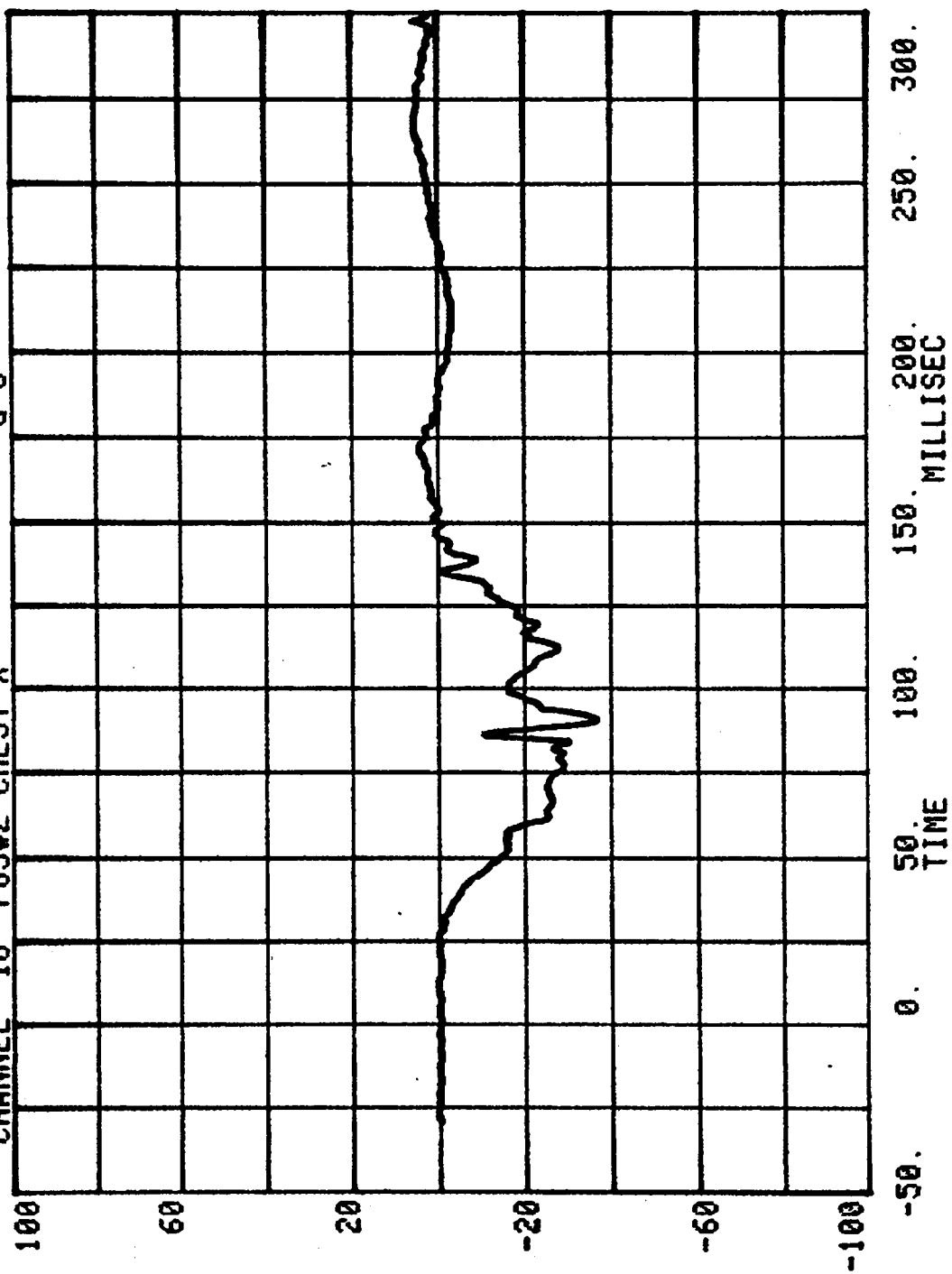


CHANNEL 3 POS#2 HEAD RESULTANT G'S

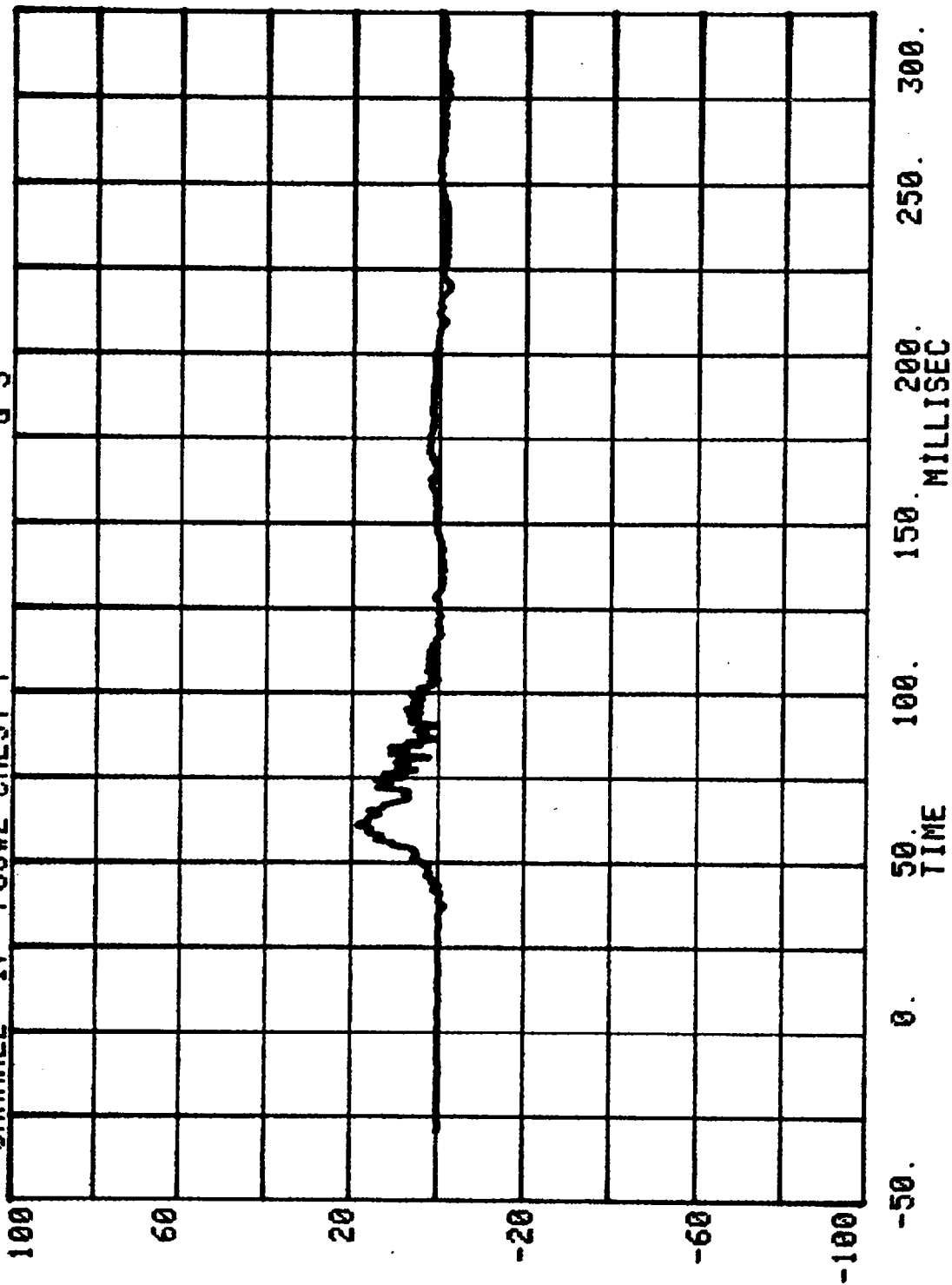
RUN= 660 SERIES= 303



CHANNEL 16 POS#2 CHEST X
RUN= 660 SERIES= 303 G'S

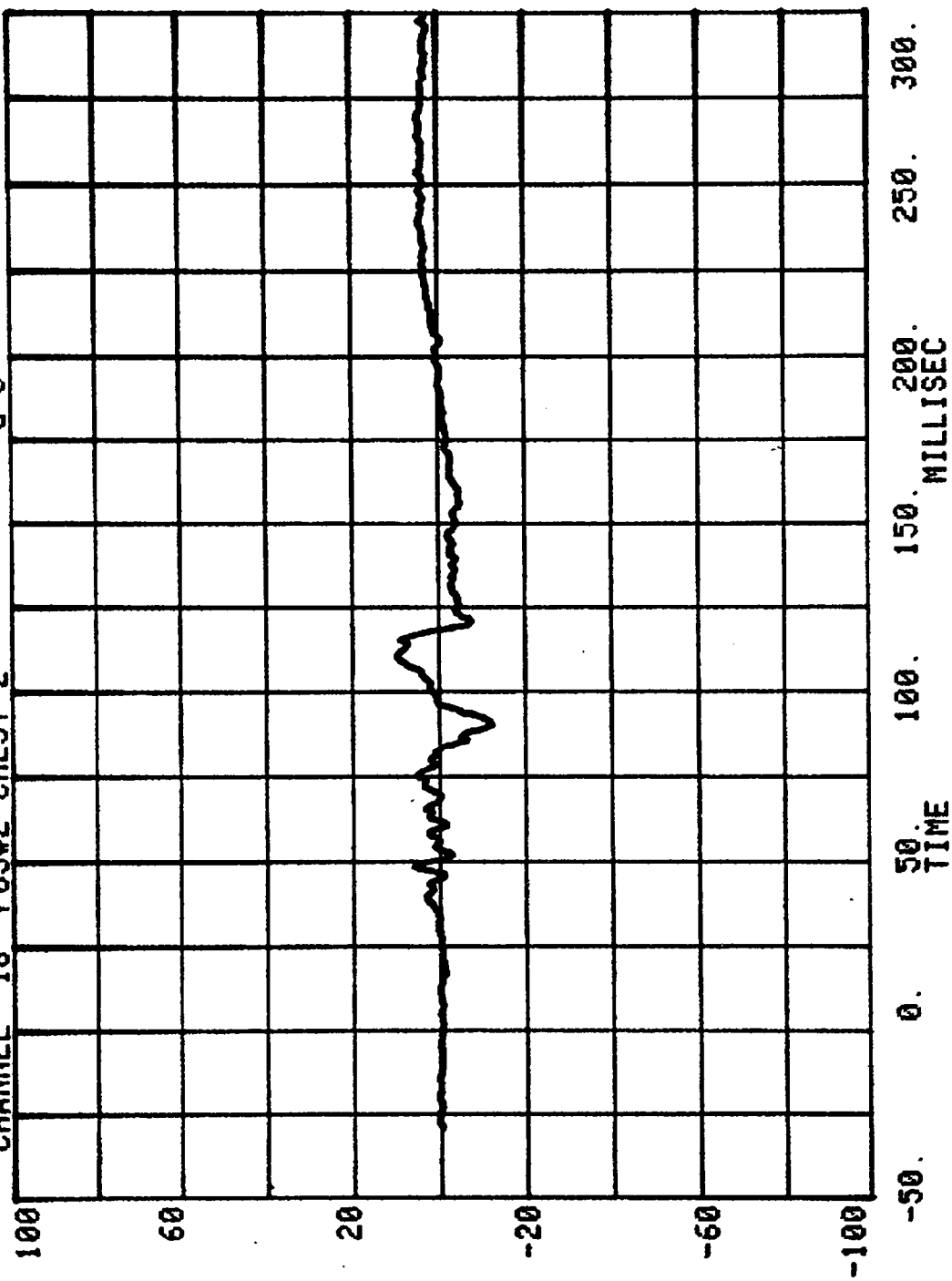


CHANNEL 17 RUN= 660 SERIES= 303
POS#2 CHEST Y G'S

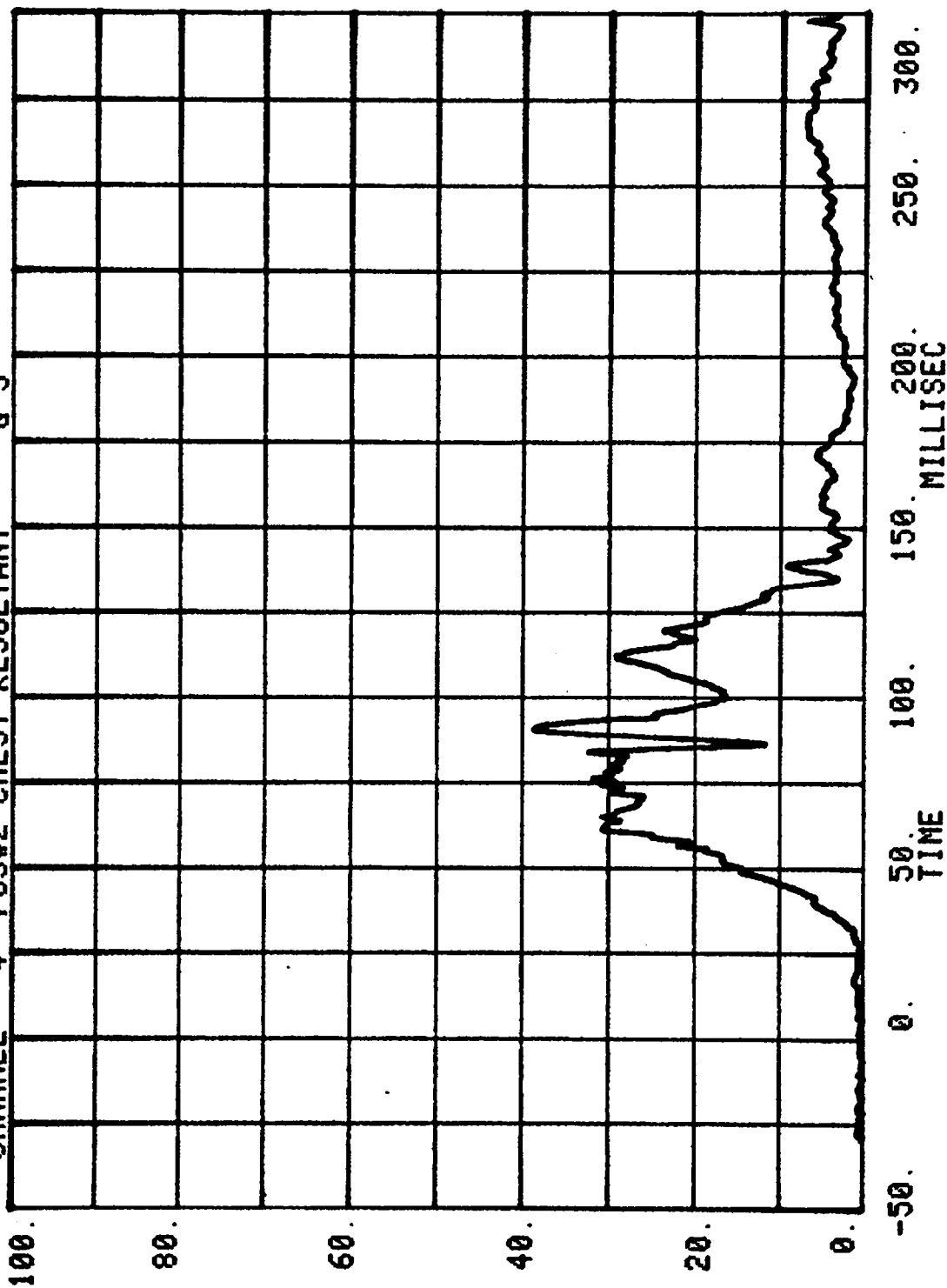


CHANNEL 18 POS#2 CHEST Z G'S

RUN= 660 SERIES= 303

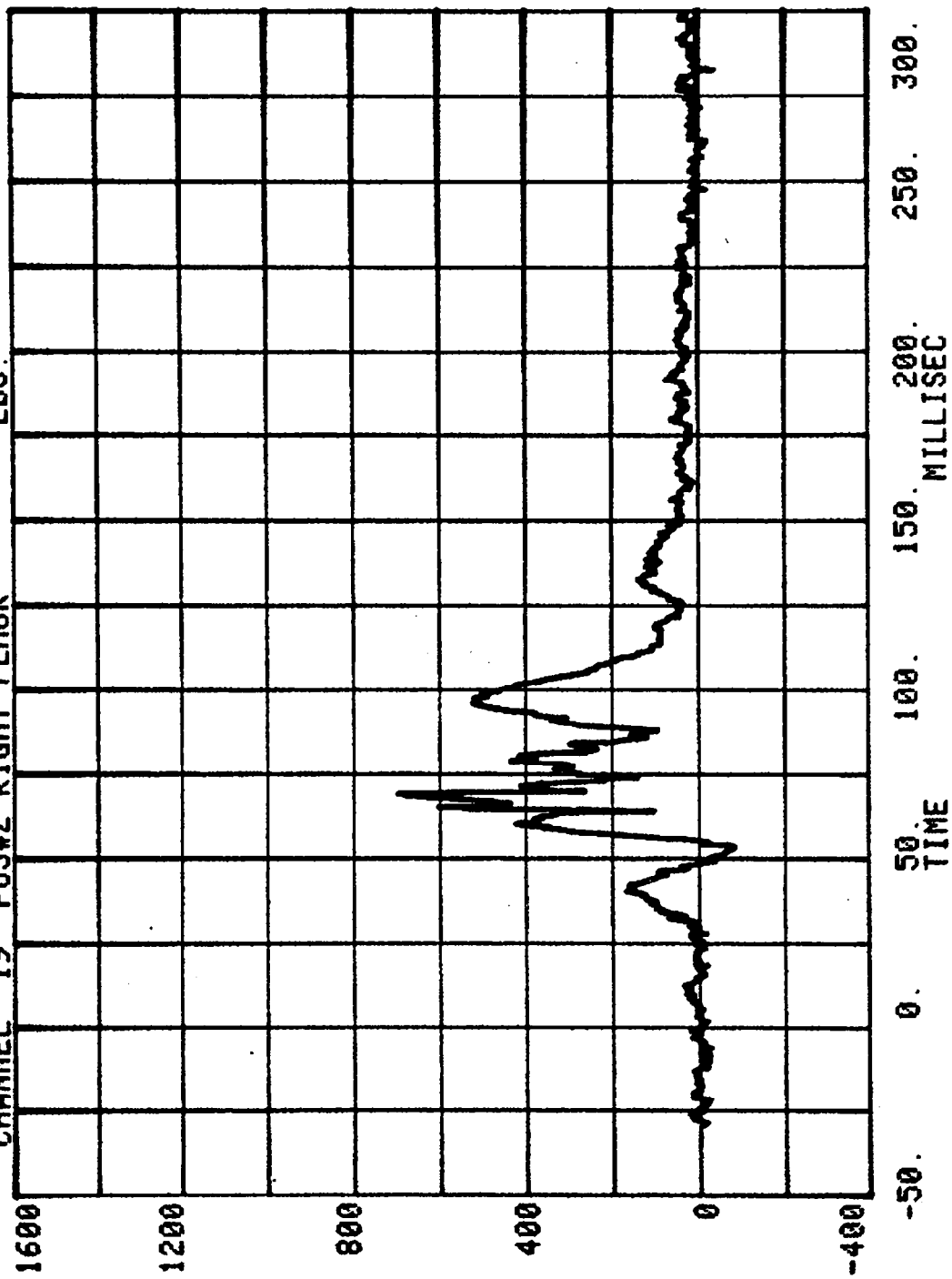


CHANNEL 4 RUN= 660 SERIES= 303
POS#2 CHEST RESULTANT G'S



CHANNEL 19 POS#2 RIGHT FEMUR LBS.

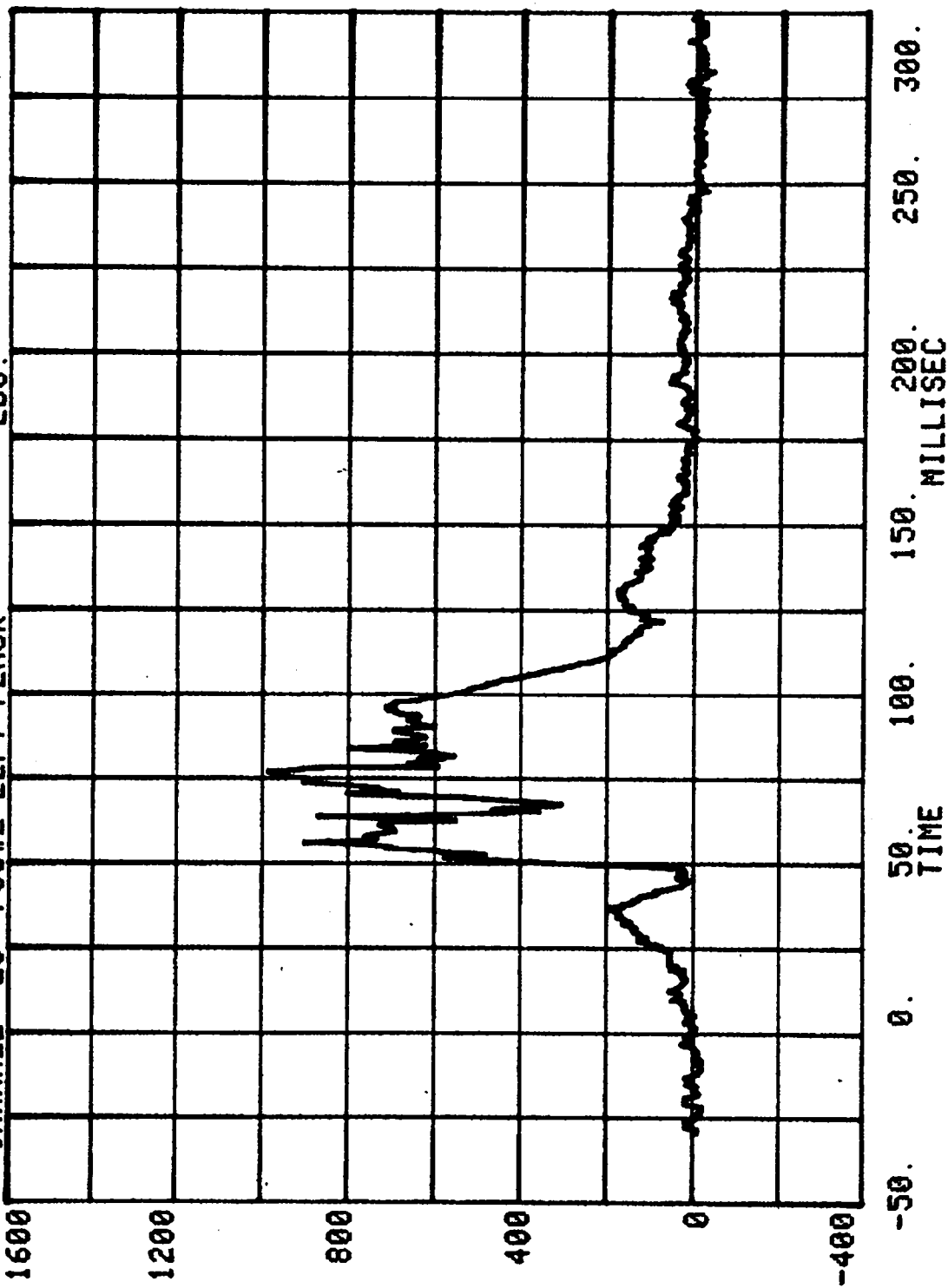
RUN= 660 SERIES= 303



CHANNEL 20 POS#2 LEFT FEMUR

RUN= 660 SERIES= 303

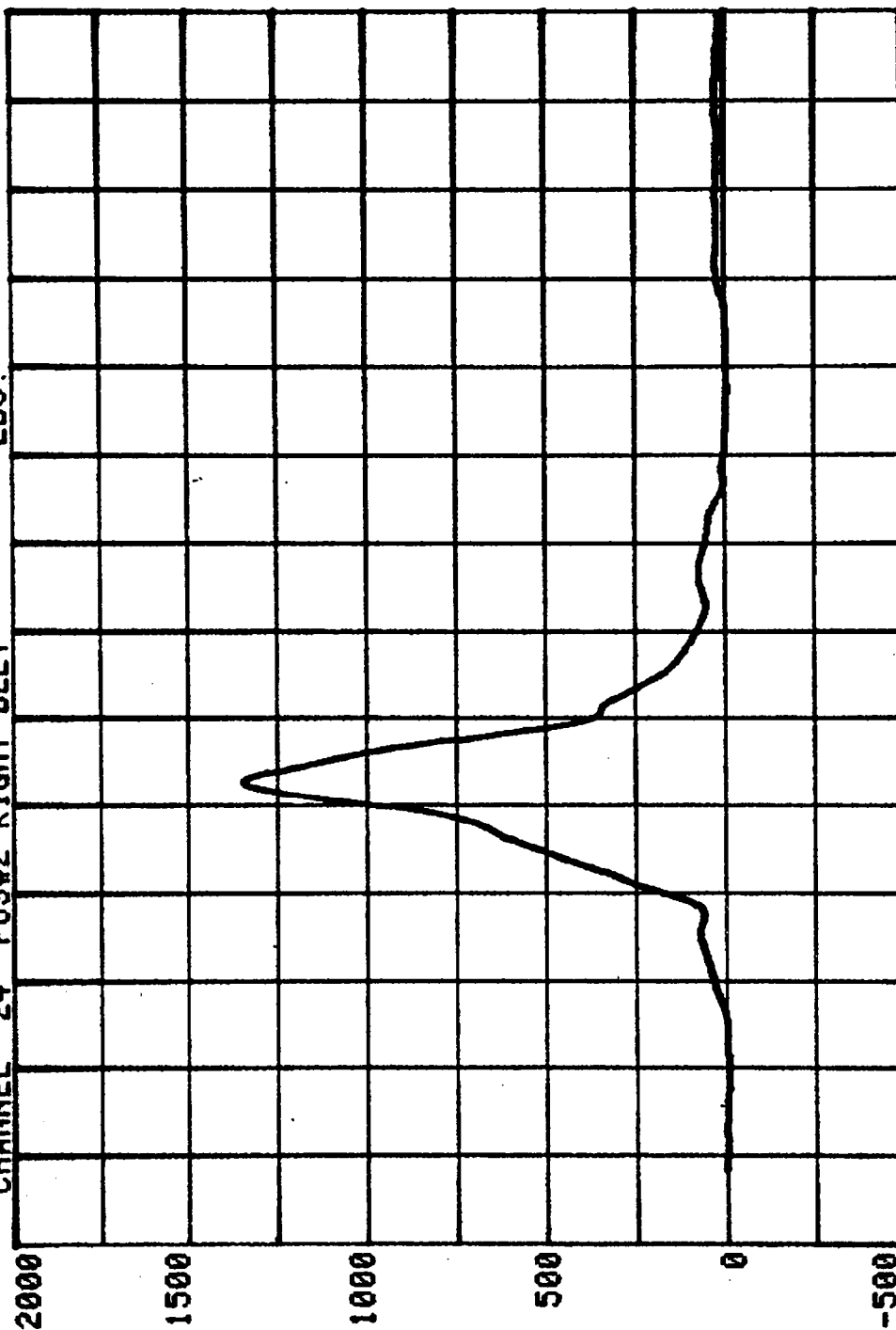
LBS.



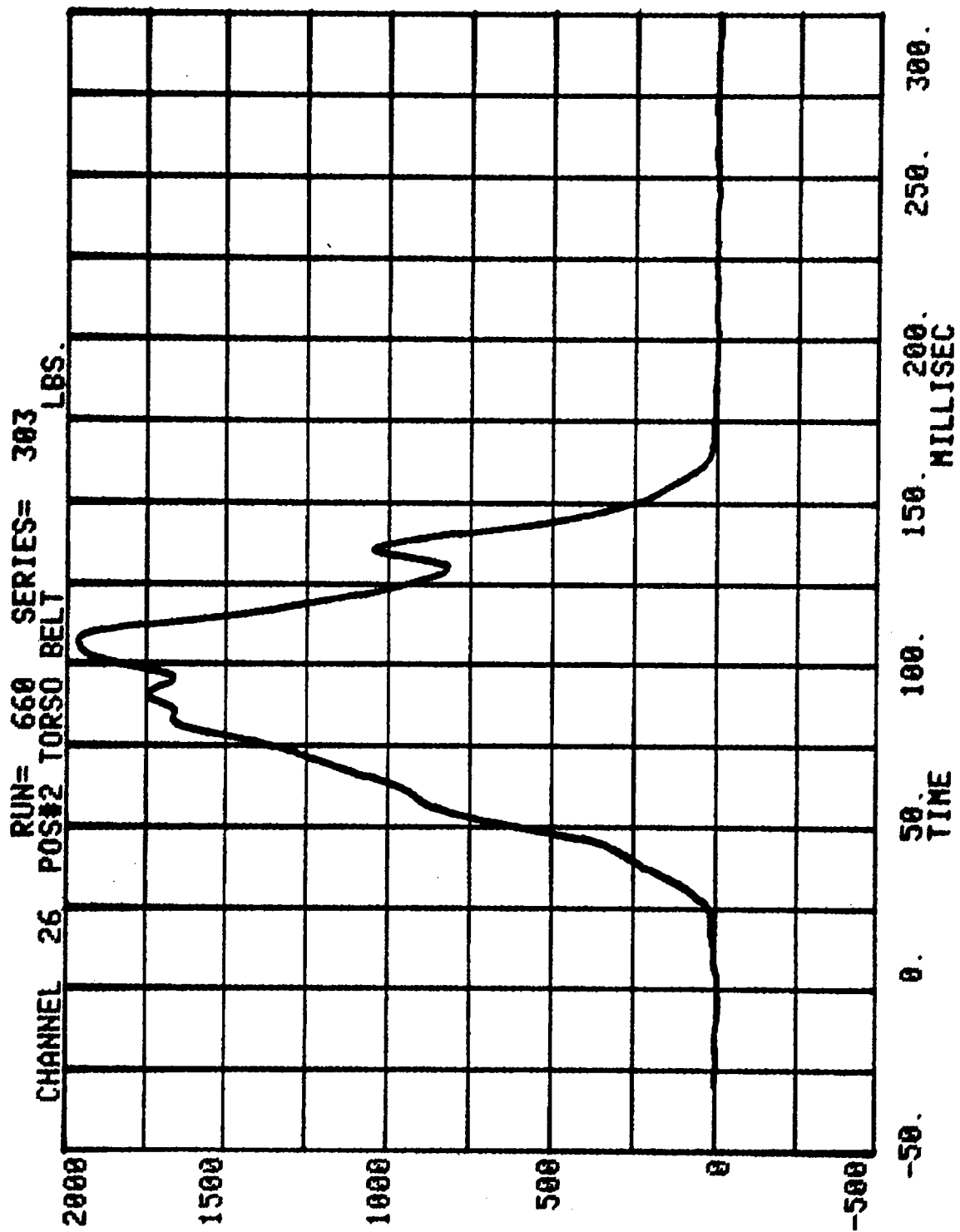
CHANNEL 24 POS#2 RIGHT BELT

RUN= 660 SERIES= 303

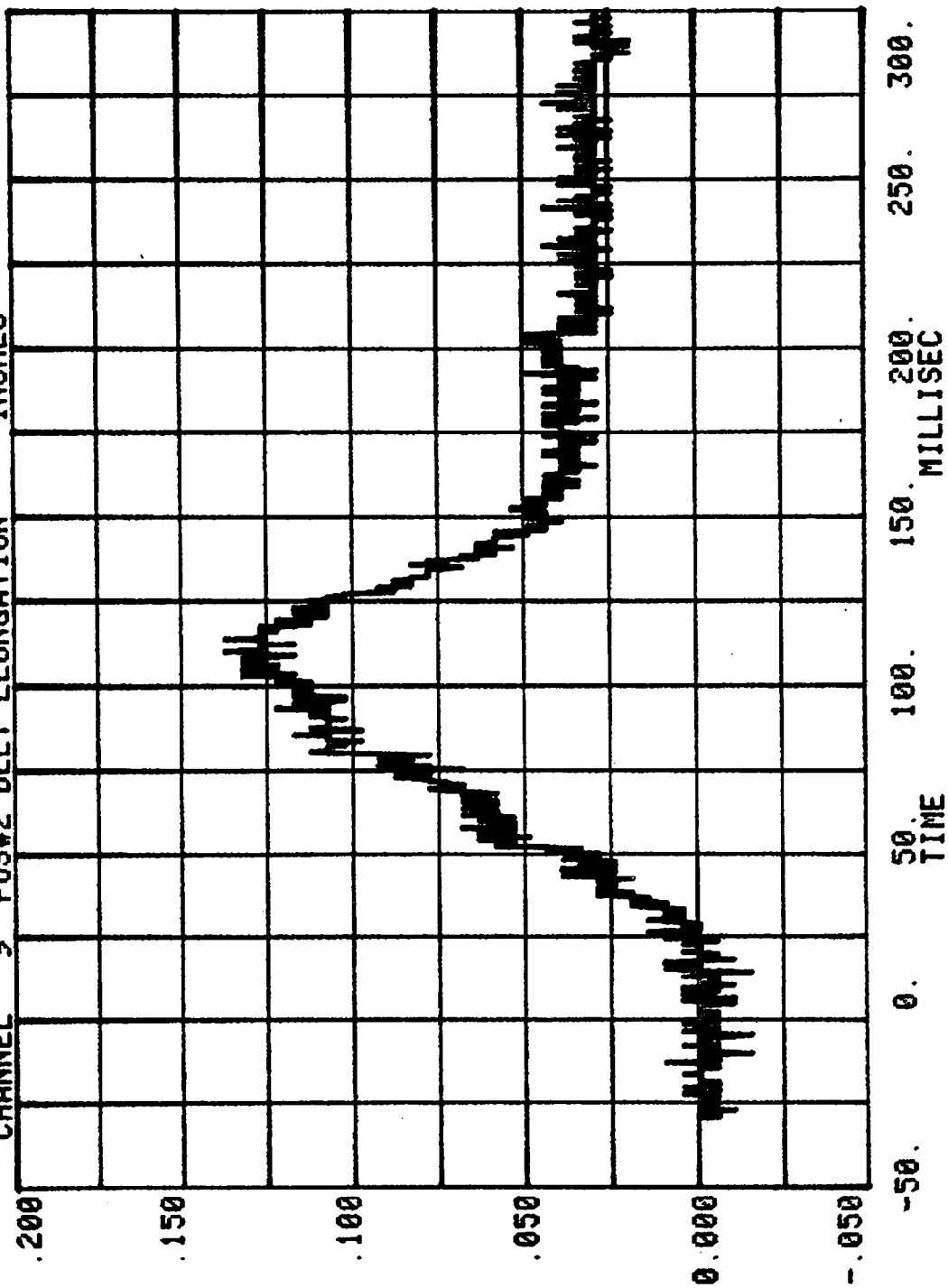
LBS.



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



CHANNEL 9 POS#2 BELT ELONGATION SERIES= 303 MEASURED OVER 2.5 INCHES



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>
1019	1/8/85
1020	1/8/85

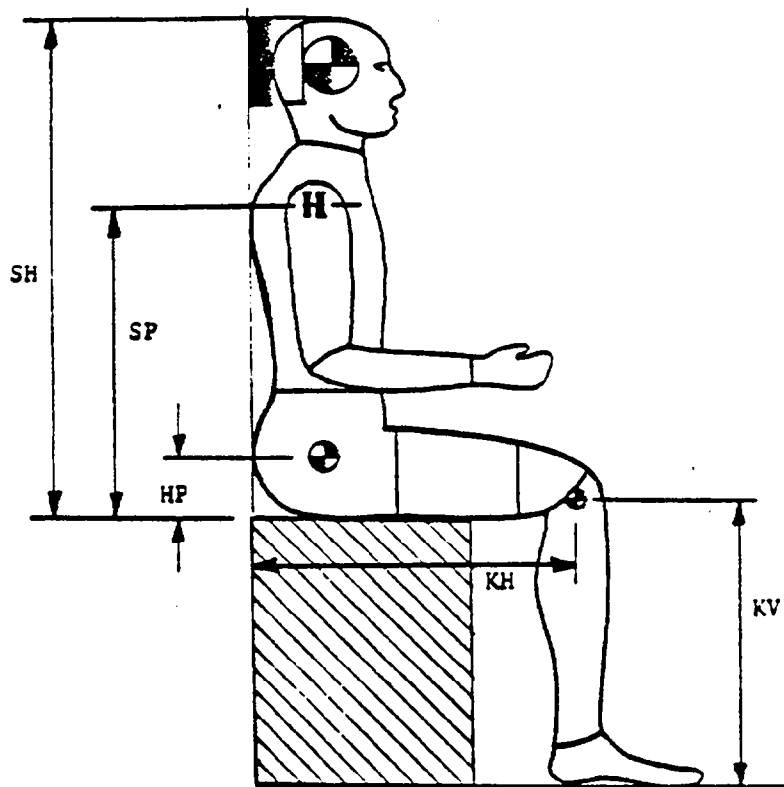
Electronic Test Equipment

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		1/3/85	
VERIFICATION NUMBER FOR DUMMY*		1	
SH - Seated Height- - - - -	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height- - -	21.8 to 22.4"	22.0"	
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"	14.8"	

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.: 1019

TECHNICIAN'S NAME: G. Gestwick

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		1/3/85-1/8/85	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		70 - 74 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		21 - 30 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	255 g.	
b. Peak Lateral Accel.-	≤ - 10G	3 g.	
c. Time above 100G- - -	0.9 to 1.5ms	1.1 ms.	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	23.0 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	23 g.	
c. Peak Resultant Head Acceleration - - - -	26G max.	21 g.	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2.6 ms.	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	26.3 ms.	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	8.0 ms.	
g. Max. Head Rotation -	63 to 73°	70°	
h. Chordal Displacement-- Head Rotation Angle-			
0°	Time- - -2 to 2 ms	0 ms.	
	Displ.- -.5 to .5"	0.0 "	
30°	Time- - 25.6 to 34.4ms	29 ms.	
	Displ.- 2.1 to 3.1"	3.1"	
60°	Time- - 40.3 to 51.7ms	45 ms.	
	Displ.- 4.3 to 5.3"	5.0"	
Maximum	Time- - 53.2 to 66.8ms	61 ms.	
(70 °)	Displ.- 5.0 to 6.0"	5.6"	

*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: 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	76.5 ms.	
	Displ.	4.3 to 5.3 in.	4.9 ms.	
30°	Time	85.4 to 104.6 ms	94.5 ms.	
	Displ.	2.1 to 3.1 in.	2.9 in.	
0°	Time	101.0 to 123.0 ms	109.5 ms.	
	Displ.	-.5 to 0.5 in.	0.0 in.	
3. <u>ABDOMINAL COMPRESSION TEST:</u>				
(Preload = 10 pounds)				
a. Force @ .5"- - - - -		23 to 36 lbs.	24.0 lbs.	
b. Force @ .75"- - - - -		36 to 50 lbs.	40.0 lbs.	
c. Force @ 1.0"- - - - -		50 to 63 lbs.	55.5 lbs.	
d. Force @ 1.3"- - - - -		73 to 88 lbs.	79.0 lbs.	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20°- - - - -		22 to 34 lbs.	25.0 lbs.	
b. Force @ 30°- - - - -		34 to 46 lbs.	34.5 lbs.	
c. Force @ 40°- - - - -		46 to 58 lbs.	52.5 lbs.	
d. Return Angle - - - - -		12° maximum	3°	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed- - -		21.78-22.22 fps	21.85 fps	
(2) Peak Deflection-		1.7" maximum	1.6 in.	
(3) Peak Resistive Force- - - - -		2250 lbs. maximum	2080 lbs.	
(4) Internal Hysteresis - - -		50 to 70%	51.2%	
b. Low Speed				
(1) Probe Speed- - -		13.86-14.14 fps	13.92 fps	
(2) Peak Deflection-		1.1" maximum	.9 in.	
(3) Peak Resistive Force- - - - -		1450 lbs. maximum	1220 lbs.	
(4) Internal Hyster.-		50 to 70%	52.2%	

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1019

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	6.95 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2375 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.7 ms.	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.99 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2375 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.75 ms.	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

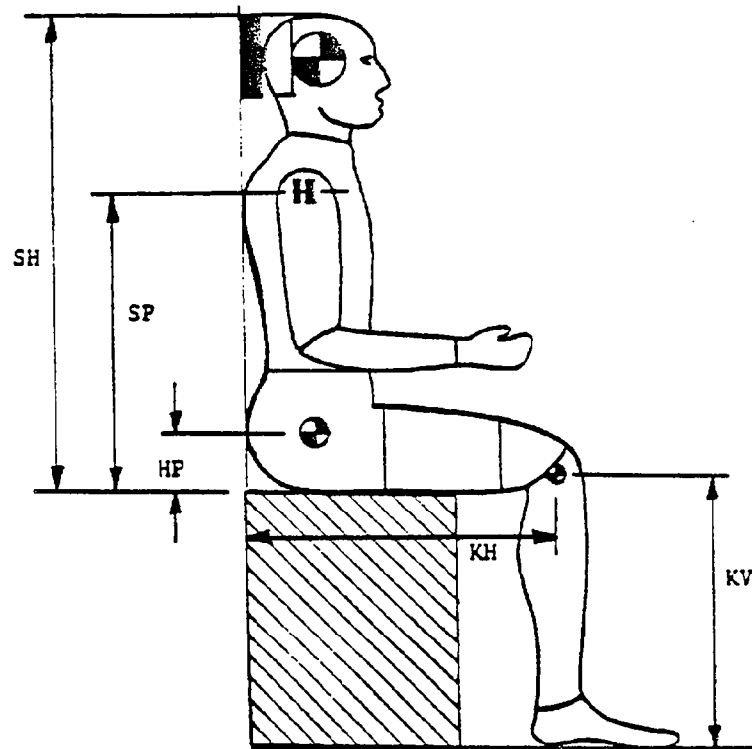
HTSA DUMMY ID NO. 1019 CALIB. SEQ. NOS. FOR DUMMY: 1

<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 - - - - -				
b. Uniaxial units	Endevco	CS70	10-84	4-85
(1) Longitudinal (A_x) -	--	CH35	10-84	4-85
(2) Lateral (A_y) - - -	--	CU88	10-84	4-85
(3) Vertical (A_z) - - -				
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -				
b. Uniaxial units	CEC	25189	10-84	4-85
(1) Longitudinal (A_x) -	Endevco	CY71	10-84	4-85
(2) Lateral (A_y) - - -	CEC	25188	10-84	4-85
(3) Vertical (A_z) - - -	Ohmite	7915	1-85	7-85
3. Chest Potentiometer - - -				
4. Femur Load Cells --				
a. Right Side - - - - -	GSE	74	10-84	4-85
b. Left Side - - - - -	GSE	75	10-84	4-85
5. <u>CALIB. LAB. INSTRUMENTS:</u>				
1. Pendulum Accelerometer - - -	CEC	19965	1-85	7-85
2. Test Probe Accelerometer - - -	CEC	25184	1-85	7-85
3. Lumbar Flexion Test Push Force Gauge - - - - -	Transducer Inc.	20051	1-85	7-85
4. Abdominal Compression Test Force Gauge - - - - -	BLH	72952	1-85	7-85
5. Abdominal Compression Test Displacement Gauge - - - - -	CIC	567-11	1-85	7-85

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		1/3/85	
VERIFICATION NUMBER FOR DUMMY*		1	
SH - Seated Height- - - - -	35.6 to 35.8"	35.6"	
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"	20.6"	
KV - Knee Pivot from floor- - -	19.3 to 19.9"	19.6"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	17.9"	
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-----		1/3/85-1/8/85	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		70 - 74 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		21 - 50 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	250 g.	
b. Peak Lateral Accel.-	≤ - 10G	5 g.	
c. Time above 100G- - -	0.9 to 1.5ms	1.1 ms.	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	23.2 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	24 g.	
c. Peak Resultant Head Acceleration - - - -	26G max.	24.5 g.	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2 ms.	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	28 ms.	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	4 ms.	
g. Max. Head Rotation -	63 to 73°	71°	
h. Chordal Displacement-- Head Rotation Angle-			
0°	Time- - -2 to 2 ms	0 ms.	
	Displ.- -.5 to .5"	0.0 in.	
30°	Time- - 25.6 to 34.4ms	28 ms.	
	Displ.- 2.1 to 3.1"	2.7 in.	
60°	Time- - 40.3 to 51.7ms	43 ms.	
	Displ.- 4.3 to 5.3"	5.0 in.	
Maximum	Time- - 53.2 to 66.8ms	59 ms.	
(71 °)	Displ.- 5.0 to 6.0"	5.8 in.	

*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. NECK BENDING TEST....				
<u>Continued:</u>				
h. Chordal Displacement:				
Head Rotation Angle--				
60°	Time	67.0 to 83.0 ms	74.5 ms.	
	Displ.	4.3 to 5.3 in.	4.8 in.	
30°	Time	85.4 to 104.6 ms	92 ms.	
	Displ.	2.1 to 3.1 in.	2.4 in.	
0°	Time	101.0 to 123.0 ms	106.5 ms.	
	Displ.	-.5 to 0.5 in.	0.0 in.	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5" - - - - -		23 to 36 lbs.	25.0 lbs.	
b. Force @ .75" - - - - -		36 to 50 lbs.	40.0 lbs.	
c. Force @ 1.0" - - - - -		50 to 63 lbs.	59.5 lbs.	
d. Force @ 1.3" - - - - -		73 to 88 lbs.	87.0 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	33.5 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	46.0 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	57.0 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	1.5 in.		
(3) Peak Resistive Force- - - - -	2250 lbs. maximum	1920 lbs.		
(4) Internal Hysteresis - - -	50 to 70%	51.0%		
b. Low Speed				
(1) Probe Speed- - -	13.86-14.14 fps	13.91 fps		
(2) Peak Deflection-	1.1" maximum	.96 in.		
(3) Peak Resistive Force- - - - -	1450 lbs. maximum	1220 lbs.		
(4) Internal Hyster. -	50 to 70%	55.9%		

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. <u>KNEE IMPACT TESTS:</u>			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.02 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2450 lbs.	
(3) Time Above 1000g--	1.7 ms minimum	1.88 ms.	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.78 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1900 lbs.	
(3) Time Above 1000g--	1.7 ms minimum	1.88 ms.	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA 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>
Endevco	CJ22	10-84	4-85
Endevco	CS41		
Endevco	CH21		
CEC	22960		
Endevco	CE06		
CEC	22703		
Ohmite	7915	1-85	7-85
GSE	76	10-84	4-85
GSE	77	10-84	4-85
CEC	19965	1-85	7-85
CEC	25184		
Transducer Inc.	20051		
BLH	72952		
CIC	567-11		

APPENDIX D

VEHICLE ' OWNERS MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Seats, Safety Belts, Mirrors

Safety Belts

Always use the safety belts. The chance of a serious injury is greatly reduced when the belts are properly used.

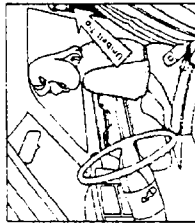
Safety belts provide protection against being thrown from the vehicle as well as reducing the risk of an injury caused by striking the interior of the vehicle.

Front Seats

The "UNIBELT", or single continuous-belt restraint system, is installed for the driver and front seat passenger. The unbelt system incorporates an inertia sensitive belt webbing retractor which is designed to lock (i.e., prevent belt travel) *only during very sudden stops or impacts*. This feature allows the shoulder belt to move freely with the wearer under normal conditions. *The retractor will not lock by jerking or pulling the webbing rapidly by hand.*

UNIBELT OPERATING INSTRUCTIONS

1. Enter the vehicle and close the door. Sit well back and erect and adjust the seat. Note the metal tip of the unbelt in its stowed position.



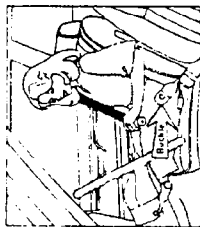
2. Grasp the metal tip and slide it up the webbing as far as necessary to go around your lap as you pull out the webbing. A couple of tries and this will become an automatic one handed operation.



3. As you pull the webbing across your lap and over your shoulder, move the metal tip toward the buckle. This system will not lock up if you stop or hesitate, so relax and continue to "buckle up".

Insert the tip into the buckle until a "click" is heard.

Do not wear the shoulder belt under your arm or otherwise out of position. Such use could increase the chance and/or severity of injury in an accident.



4. Position the lap belt with the upper edge of the belt drawn across the thighs and snug against the hips. Slack will automatically be removed due to tension created by the retractor. If a snug fit in the lap belt portion is desired, pull up on the shoulder belt as shown. A snug belt reduces the risk of sliding under the belt in a collision.



5. If the shoulder belt feels too tight, move your shoulder forward slightly, or withdraw an inch or so of webbing by giving a slight tug on the belt. The belt will retain the small amount of slack necessary for comfort when you return to your normal seating position. If the belt is still too tight, pull out 6 to 8 inches of webbing, let it return to your chest and repeat the above motion.

CAUTION: The amount of slack in the shoulder belt should be kept to a minimum. Too much slack could reduce the amount of protection because the belt may not be able to properly restrain you in an accident. The shoulder belt will allow unrestricted movement of the upper body under normal conditions. Extreme movements will probably require resetting the slack in the shoulder belt. The belt will lock in the event of an accident.



6. To release the belt, push the button on the buckle. The belt will automatically retract to its stowed position when the door is opened. If needed, slide the tip down the webbing to allow the belt to fully retract.

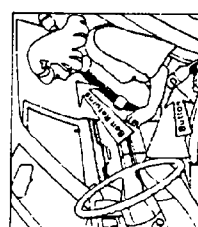


Figure 14 OWNER'S MANUAL SEAT BELT INSTRUCTIONS