

DOT 574

REPORT NOS. 212-CAL-83-008
219-CAL-83-008
301-CAL-83-008

NHTSA NEW VEHICLE ASSESSMENT AND
STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS 212, 219, 301-75

GENERAL MOTORS CORPORATION
1983 PONTIAC FIREBIRD
2-DOOR SEDAN

NHTSA NO. CD0114
CALSPAN REPORT NO. 7103-V-9

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JUNE 1983



FINAL REPORT

Prepared for:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
400 SEVENTH STREET, S.W.
WASHINGTON, DC 20590

This Final Test Report was prepared for the U. S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-82-C-01140. This document is disseminated under the sponsorship of the U. S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 212-CAL-83-008 219-CAL-83-008 301-CAL-83-008		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle NHTSA New Vehicle Assessment and Standards Enforcement Indicant Testing, FMVSS 212, 219, 301-75, General Motors Corp., 1983 Pontiac Firebird 2-door Sedan				5. Report Date June 1983	
				6. Performing Organization Code	
7. Author(s)				8. Performing Organization Report No. 7103-V-9	
9. Performing Organization Name and Address Calspan Advanced Technology Center P.O. Box 400 Buffalo, New York 14225				10. Work Unit No. 454 Series	
				11. Contract or Grant No. DTNH22-82-C-01140	
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh Street, S.W., Nassif Building Washington, DC 20590				13. Type of Report and Period Covered Final Report May-June 1983	
				14. Sponsoring Agency Code	
15. Supplementary Notes					
16. Abstract A frontal load cell barrier test of a 1983 Pontiac Firebird 2-door sedan was performed at Calspan Corporation, Advanced Technology Center, Transportation Research/Physical Sciences Department facility for the New Vehicle Assessment and Standards Enforcement Testing of FMVSS 212, "Windshield Mounting;" FMVSS 219, "Windshield Zone Intrusion;" and FMVSS 301-75, "Fuel System Integrity" for the Office of Vehicle Safety Compliance, the Office of Market Incentives and for Research and Development. Impact speed was 35.21 mph. Ambient temperature on the test data was 65°F. The post-test vehicle crush was 28.4 inches and intrusion of the firewall into compartment was 5.4 inches. The test vehicle appeared to comply with the following vehicle performance standards: FMVSS 212 - Windshield Retention FMVSS 219 - Windshield Intrusion FMVSS 301-75 - Fuel System Integrity With regard to occupant restraint performance (FMVSS 208-Injury Criteria) the driver and passenger position Part 572 test devices satisfied the criteria.					
17. Key Words Load Cell Barrier Frontal Impact FMVSS Compliance Testing FMVSS 212, 219, 301-75			18. Distribution Statement Copies of this report are available from: Technical Reference Division National Highway Traffic Safety Admin. 400 Seventh St., S.W., Nassif Bldg., Rm. 5108 Washington, DC 20590		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages	
				22. Price	

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SECTION 1
PURPOSE AND TEST PROCEDURE

This frontal barrier test is part of the Composite FY-83 Vehicle Barrier Impact Testing, sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract DTNH22-82-C-01140. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint performance data for impact speeds in excess of the current FMVSS requirements.

The test was performed in accordance with the Office of Market Incentives Procedure No. IP-212-02 dated April 4, 1980. Indicant test data for FMVSS 212, "Windshield Mounting;" FMVSS 219, "Windshield Zone Intrusion;" FMVSS 301-75, "Fuel System Integrity;" as well as occupant performance data for a nominal 35 mph impact is provided herein.

SECTION 2
SUMMARY OF TEST NUMBER CD0114

A load cell barrier consisting of 36 load cells (Figure 6) was impacted by a 1983 Pontiac Firebird at a velocity of 35.21 mph. The test was performed at the Calspan Corporation Advanced Technology Center on May 11, 1983. Pre- and post-test photographs of the vehicle and occupants can be found in Appendix A. Table 1 presents pertinent crash test information.

Two Part 572, 50th percentile male anthropomorphic test devices (ATD's) were placed in the driver and right-front passenger seating positions, according to dummy placement procedures specified in Laboratory Procedure for Vehicle Assessment IP-212-02.

Both ATDs were fully instrumented with femur load cells and triaxial accelerometers in the head and chest areas. These ATDs had been certified prior to the test, and certification details, along with instrumentation calibration data, are found in Appendix C. The driver dummy had been used twice previously in Tests CD5901 and CD0307. The injury criteria were not exceeded for those two exposures.

The crash event was recorded by one real-time camera and 12 high-speed cameras. Camera locations and other pertinent camera information are found in Section 4 of this report.

The 67 channels of data were recorded on six 14-channel FM tape recorders. The only data loss experienced was accelerometer 2X (Vehicle C.G.). The signal wire was cut by the seat rail 80 milliseconds into the event. Appendix B contains the vehicle and dummy response data traces. The Injury Criteria Values are presented in summary form in Table 10.

GENERAL COMMENTS

The 1983 Pontiac Firebird 2-door sedan was equipped with a 2.5 liter, 4-cylinder engine, 3-speed automatic transmission, power steering and power brakes. The total test weight with two 50th percentile male dummies, instrumentation and two on-board cameras was 3,330 pounds.

The 1983 Pontiac Firebird which was involved in a frontal load cell barrier crash at a velocity of 35.21 mph appeared to comply with FMVSS Nos. 212, "Windshield Mounting;" 219, "Windshield Intrusion;" and 301-75, "Fuel System Integrity. There was 100 percent windshield retention, no intrusion into the protected or unprotected zone of the windshield and no fuel leakage after impact or any phase of the rollover test.

The vehicle sustained 28.4 inches of static crush and approximately 38 inches of dynamic crush. Maximum load cell barrier forces measured by the 36 load cells was 67,250 pounds at 67.5 milliseconds.

The driver's head struck the upper steering wheel rim and hub, and the femurs contacted the dash panel. The driver did comply with all FMVSS 208, "Injury Criteria," with a HIC of 408, maximum chest decelerations over 3 milliseconds of 33.6 g's and femur loads of 480 and 900 pounds.

The relative forward motion of the right-front passenger in relation to the front seat caused the lap belt to rope around the lower abdomen (Figure A-29 and A-30). The right-front passenger complied with all FMVSS 208, "Injury Criteria," with a HIC number of 375.8, maximum chest decelerations over 3 milliseconds of 32.3 g's, and femur loads of 125 and 100 pounds.

Belt related data is presented in Table 11 of this report.

Table 1

CRASH TEST SUMMARY

TEST NO. <u>CD0114</u>	PROJECT: <u>FY-83 New Car Assessment Program</u> <u>FMVSS Nos. 208/212/219/301-75</u>
DATE: <u>5/11/83</u>	TIME: <u>1412 hrs.</u> TEMP: <u>65°F</u>

VEHICLE	<u>1983 Pontiac Firebird 2-Door Sedan</u>
TEST WEIGHT (lbs)	<u>3330</u>
IMPACT ANGLE (deg)*	<u>0</u>
IMPACT VELOCITY (mph)**	<u>35.21</u>
MAX. CRUSH (in)	<u>28.4</u>
MAX. INTRUSION (in)	<u>5.4</u>

DUMMIES

TYPE	<u>Hybrid II Part 572</u>	<u>Hybrid II Part 572</u>
LOCATION	<u>LF (Serial No. 162)</u>	<u>RF (Serial No. 818)</u>
RESTRAINT	<u>production 3-point</u> <u>belt system</u>	<u>production 3-point</u> <u>belt system</u>
NUMBER OF DATA CHANNELS	<u>67</u>	
NUMBER OF HIGH SPEED CAMERAS	<u>12 + 1 real time</u>	

*With respect to tow track Centerline

**Speed trap measurement ($\pm$.05% accuracy)

Table 2
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION

Make/Model Pontiac Firebird Body Style 2-door sedan
Model Year 1983 NHTSA No. CD0114 Color lt. blue
Engine Data: 4 cylinders, 2.5 liter
Transmission Data: 3 speed, () manual (X) automatic
Date Rec'd 3/83 Air Cond. no Pw. Str. yes Pw. Brks. yes
Dealer's Name & Address Allen Brown Motors, Buffalo, NY
Odometer Reading 21

DATA FROM CERTIFICATION LABEL ON LEFT DOOR REAR FACE OR "B" POST

Vehicle Manufactured by: General Motors Corporation
Date of Manufacture 11/82 VIN 1G2AS8729DN203924
GVRW 3620 lbs., GAWR: front 1759 lbs., rear 1861 lbs.

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVE BOX, ETC.

Vehicle Load (up to capacity): front 35 psi
rear 35 psi
Recommended Tire Size P195/75R14 Load Range X B C D
Recommended Cold Tire Pressure: front 35 psi, rear 35 psi
Tires on Vehicle P195/75R14
Is Spare Tire a "Space Saver?" X yes no
Is Spare Tire Standard Equipment? X yes no
Vehicle Capacity: Types of Seats: bench, X bucket, split bench
Number of Occupants (Designated Seating Capacity): 2 front
2 rear
4 TOTAL
Cargo Load: 100 lbs.
TOTAL = 700 lbs.

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = 780 lbs. Right Rear = 660 lbs.
Left Front = 780 lbs. Left Rear = 680 lbs.
TOTAL FRONT WEIGHT = 1560 lbs. (53.8 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1340 lbs. (46.2 % of Total Vehicle Weight)
TOTAL DELIVERY WEIGHT = 2900 lbs.

CALCULATION FOR TARGET TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
UDW = Unloaded Delivered Weight (2900 lbs.)
VCW = Vehicle Capacity Weight (700 lbs.)
DSC = Designated Seating Capacity (4)
RCLW = VCW - 150 (DSC) = 100 lbs.
Target Test Weight = UDW + RCLW + (2 dummies X 164 lbs./dummy)
Target Test Weight = 3318 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 102 POUNDS CARGO

Right Front = 840 lbs. Right Rear = 790 lbs.
Left Front = 870 lbs. Left Rear = 830 lbs.
TOTAL FRONT WEIGHT = 1710 lbs. (51.4 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1620 lbs. (48.6 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3330 lbs.
Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 29.5 LF 28.7 RR 29.3 LR 28.6
Test Attitude: RF 28.4 LF 27.5 RR 27.3 LR 27.4
Remarks: Wheelbase = 101 inches. CG = 49.1 rearward of front wheel C.

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA

Type of Test frontal barrier Impact Angle 0 °
Date of Test 5/11/83 Time of Test 1412 hrs.
Ambient Temperature 65 °F at impact area
Temperature in Occupant Compartment 65 °F
Windshield Molding Temperature 65 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: primary = 35.14 mph, secondary 35.29 mph

VEHICLE REBOUND AND CRUSH (inches)

Vehicle Length: Pre-test = R 184.1 C 189.3 L 184.1
Post-test = R 157.4 C 160.9 L 158.5
Crush = R 26.7 C 28.4 L 25.6
Distance from front of test vehicle to point of impact:
R 15.5 C/L 16.0 L 16.5

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>steering wheel rim/hub</u>	<u></u>
Chest	<u></u>	<u></u>
Abdomen	<u></u>	<u></u>
Left Knee	<u>instrument panel</u>	<u>lower instrument panel</u>
Right Knee	<u>instrument panel</u>	<u>lower instrument panel</u>

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

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

<u>Seat Movement</u>	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	intact	intact	-	-
Seat Shift (in.)	none	.5" forward	-	-
			-	-
			-	-

Glazing Damage

Backlight/Windshield Windshield shattered

Other notable impact effects: All other glazing intact



SECTION 3

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

- - Summary of FMVSS 212, 219, and 301 Data
 - Post-Impact Data for FMVSS Nos. 212, 219, and 301-75
 - Windshield Retention, FMVSS No. 212 Data
 - Protected Zone for FMVSS No. 219
 - Windshield Zone Intrusion, FMVSS No. 219 Data
 - Fuel System Integrity, FMVSS No. 301-75 Data

Table 3
SUMMARY OF FMVSS 212, 219 AND 301 DATA

PRE-IMPACT DATA

Make/Model: 1983 Pontiac Firebird
Body Style: 2-door sedan Model Year: 1983
NHTSA No.: CD0114 Color: lt. blue

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: General Motors Corporation
Date of Manufacture: 11/82 VIN: 1G2AS8729DN203924
GVWR: 3620 lbs., GAWR: Front 1759 lbs., Rear 1861 lbs.

POST-IMPACT DATA

Type of Test: frontal load cell barrier impact
Date of Test: 5/11/83 Time: 1412 hrs. Temp.: 65 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 35.14 mph, Secondary = 35.29 mph
Test Weight 3330 lbs., Static Crush 28.4 in., Rebound 16 in.

FUEL SYSTEM DATA

Test Fluid Type: Red Stoddard Solvent #2, Spec. Grav.: 0.764
Kinematic Viscosity 0.96 Centistokes
EPA Capacity* 16.1 gal.
Test Volume 14.9 gal. (93% of EPA Capacity)
Fuel System Capacity (data from Owner's Manual) 16.0 gal.
Electric Fuel Pump? yes X no, Fuel Injection? yes X no
Does electric fuel pump operate with ignition switch "on" and the engine
not operating? yes X no

Test vehicle fuel tank filled to 93% of "usable" capacity with
Stoddard Solvent and with electric fuel pump operating (if it will
operate without engine operation) until start of static roll.

*with entire fuel system filled from fuel tank through carburetor bowl.

SUMMARY OF FMVSS 212, 219, AND 301 DATA (cont'd)

Details of fuel system: The filler tube is located on the left side of the
vehicle. It has a screw ratchet type of filler cap and a hinged door. The
fuel tank is aft of the rear wheels and is secured with two tank straps.

POST-IMPACT DATA - FMVSS NOS. 212, 219, AND 301-75

TYPE OF TEST X Frontal (0°) Impact
 _____ Oblique (_____°) Impact on _____ Left (Driver's) Side
 _____ Right Side
 _____ Lateral or Side Impact on _____ Left (Driver's) Side
 _____ Right Side
 _____ Rear Impact

exiting the vehicle velocity measurement device = 18 inches

Crush Details:

Crush Details:

C/L = 16 in. Average = 16 in.

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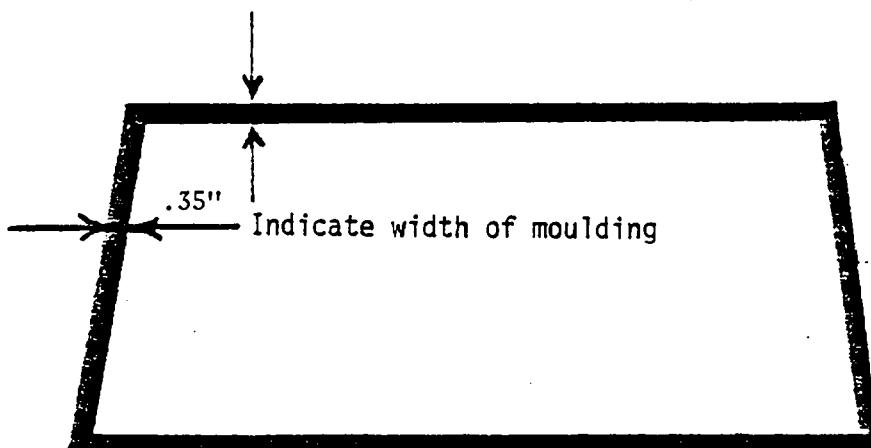
Details of windshield mounting (method of retention, type of trim, etc.):

The windshield is bonded in place and has a .35 inch plastic molding covering the top and sides.

	Windshield Periphery		
	Pre-Test	Post-Test	Retention %
Right Side	84.6"	84.6"	100
Left Side	84.6"	84.6"	100
TOTAL	169.2"	169.2"	100

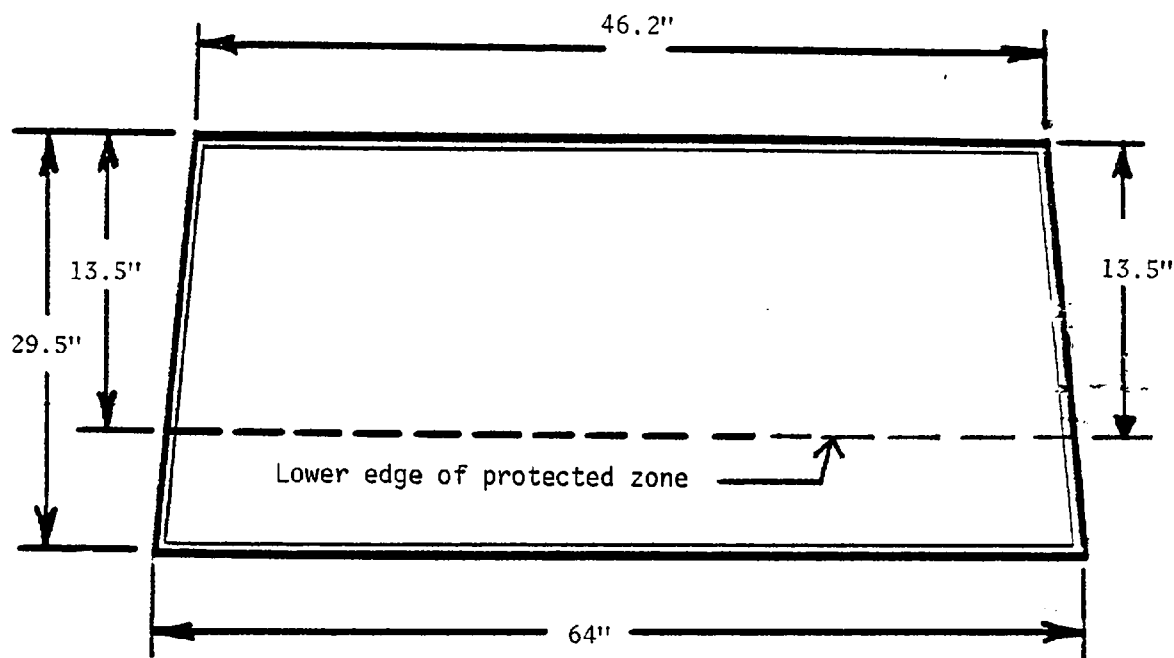
The standard requires that Post-Test be a minimum of 75 percent of the Pre-Test total periphery measurement for vehicle not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

AREA OF RETENTION FAILURE



FRONT VIEW

Figure 1 WINDSHIELD RETENTION, FMVSS NO. 212 DATA



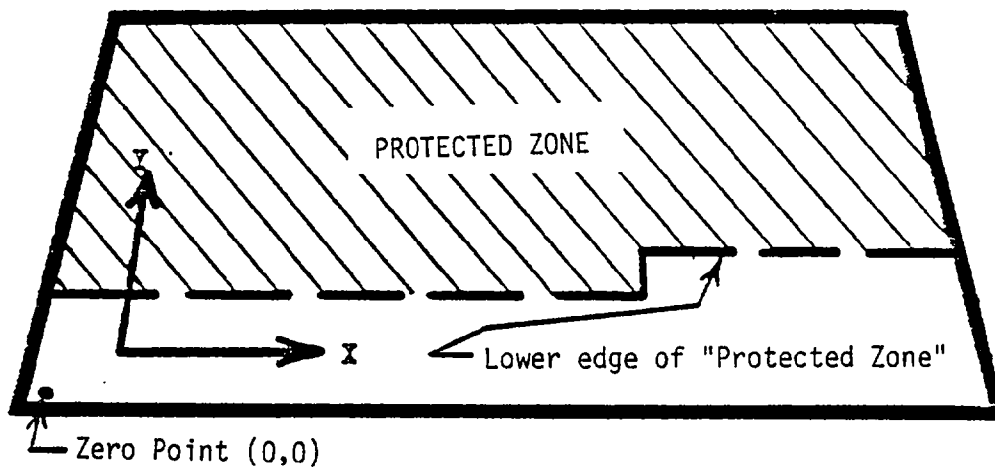
FRONT VIEW OF WINDSHIELD

Provide all dimensions necessary to reproduce the protected zone.

Method of adhering styrofoam to the windshield:

Silicone rubber sealant adhesive was applied to the windshield
surface and to the back side of the styrofoam. The styrofoam
was then clamped in place until dry.

Figure 2 PROTECTED ZONE FOR FMVSS 219



FRONT VIEW

With the zero coordinate for the X-Y grid located at the lower right corner (passenger side) of the windshield, record the following positions:

- (1) The area that the "Protected Zone" template was penetrated more than .25 inches by a vehicle component other than one which is normally in contact with the windshield.

NONE

Coordinates	
X	Y

- (2) The area beneath the "Protected Zone" that the inner surface of the windshield was penetrated by a vehicle component.

NONE

Coordinates	
X	Y

- (3) Record any windshield retention clips or brackets used to insure that the windshield would not disengage from the body.

Figure 3 WINDSHIELD ZONE INTRUSION, FMVSS 219 DATA

Table 5

"FUEL SYSTEM INTEGRITY" POST-IMPACT TEST DATA

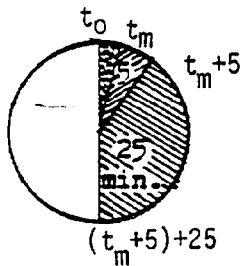
FMVSS No. 301-75

TEST VEHICLE NHTSA NO. CD0114 Test Date 5/11/83
 Vehicle Manufacture/Make/Model General Motors 1983 Pontiac Firebird 2-door Sedan

Test vehicle fuel tank filled to 90-91% of capacity with Stoddard Solvent and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE

- ☒ Frontal (35 mph)
☐ Oblique (30 mph) with _____° barrier face first contacting
 _____ driver _____ passenger side
☐ Rear Moving Barrier (35 mph)
☐ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT

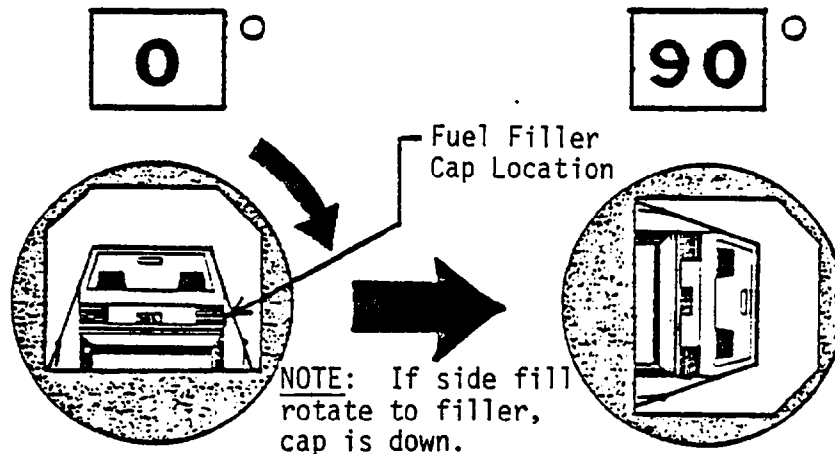
	Actual	Max. Allow.
From impact until vehicle motion ceases	0	1 oz
For 5 min. period after vehicle motion ceases	0	5 oz
For next 25 min.	0	1 oz/1 min

SOLVENT SPILLAGE DETAILS

None

Table 6
FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 43 seconds
 (Spec. Range = 1 to 3 min.)
 FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
 TOTAL = 7 minutes 43 seconds
 Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

First 5 min. <u>from</u> onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	-------------------

Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
---	---	---	---

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

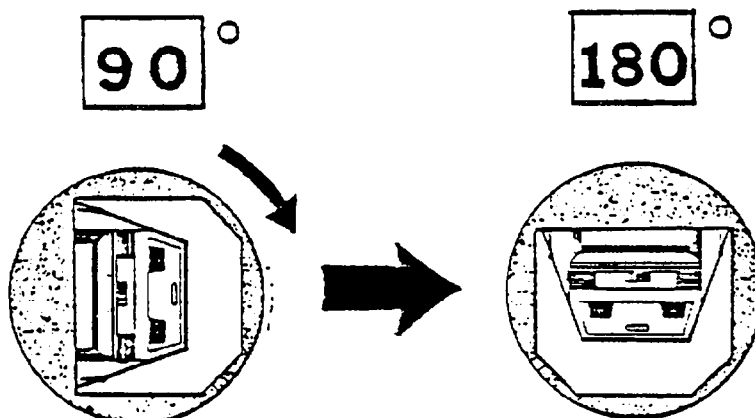
None

VEHICLE NHTSA ID NO. CD0114

Table 6 (cont'd)

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 53 seconds
(Spec. Range = 1 to 3 min.)
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
TOTAL = 7 minutes 53 seconds
Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

First 5 min. <u>from</u> onset of rotation	6th min.	7th min.	8th min. if reqd.
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Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
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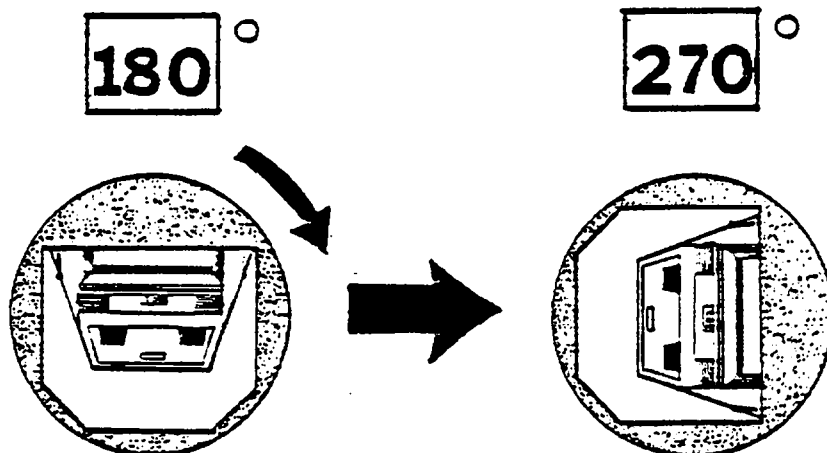
ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
---	---	---	---

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

None

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEETTEST PHASEDETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 51 seconds
(Spec. Range = 1 to 3 min.)

FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds

TOTAL = 7 minutes 51 seconds

Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

First 5 min. <u>from</u> onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	-------------------

Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
---	---	---	---

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

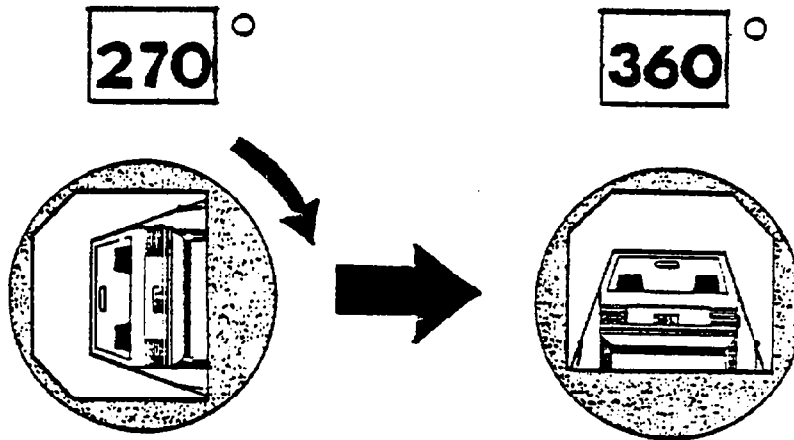
None

VEHICLE NHTSA ID NO. CD0114

Table 6 (cont'd)

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 56 seconds
(Spec. Range = 1 to 3 min.)

FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds

TOTAL = 7 minutes 56 seconds

Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

First 5 min. <u>from</u> onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	-------------------

Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
---	---	---	---

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

None

SECTION 4

OCCUPANT AND VEHICLE INFORMATION (OMI AND AID DATA)

- Vehicle Measurements
- Vehicle Accelerometer Locations
- Load Cell Barrier-Load Cells Locations
- AID Data Summary
- Camera Positions and Locations
- Owner's Manual Seat Belt Instructions
- Dummy In-Vehicle Positioning
- Dummy Injury Criteria Values
- Belt Related Data

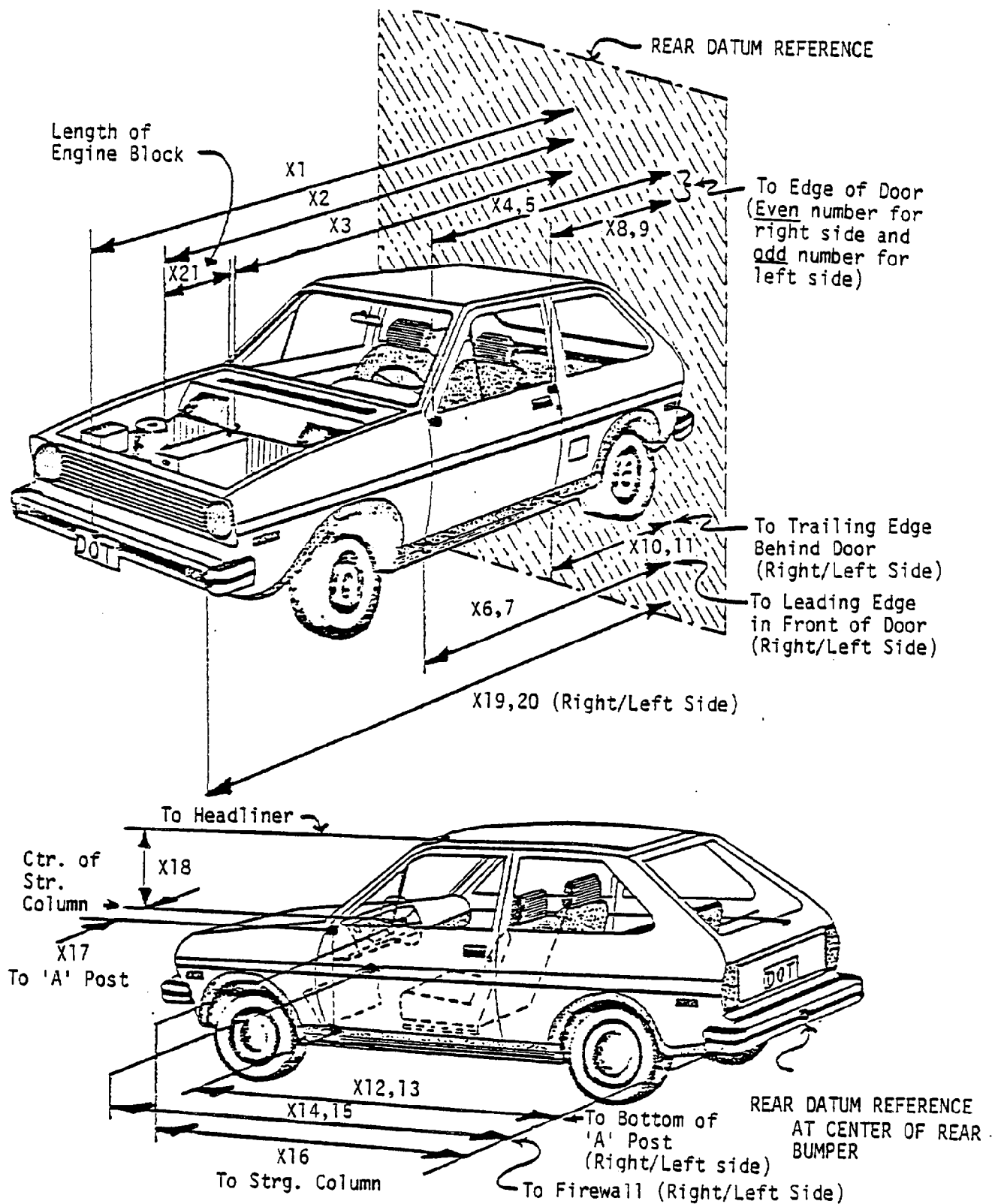


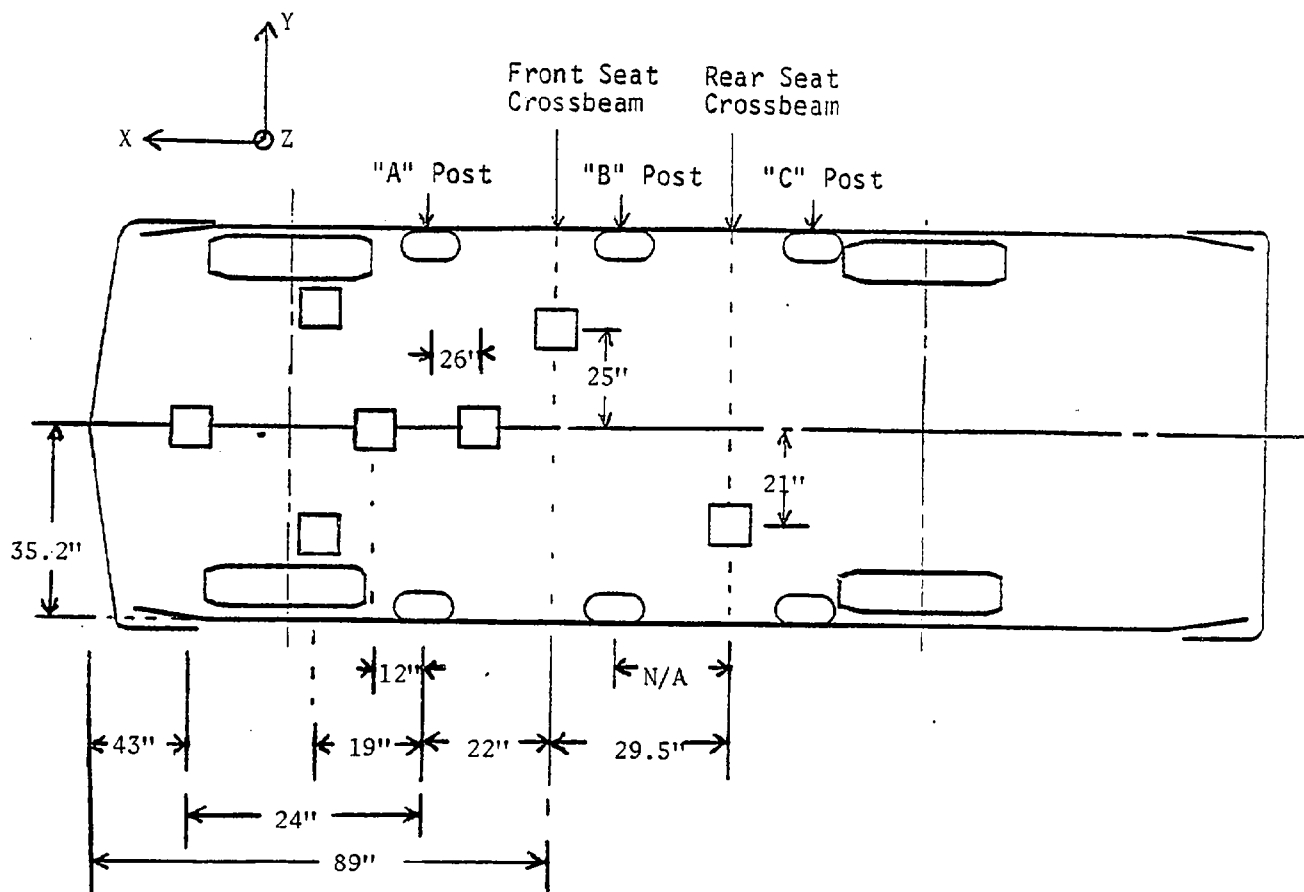
Figure 4 PRE- AND POST-TEST MEASUREMENT POINTS

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Table 7

VEHICLE MEASUREMENTS

		All Dimensions in Inches		
No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	189.3	160.9	28.4
X2	Rear Surface of Vehicle to Front of Engine	148.6	143.9	4.7
X3	Rear Surface of Vehicle to Firewall	127.3	122.7	4.6
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	116.3	115.9	0.4
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	116.0	115.6	0.4
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	117.0	116.8	0.2
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	116.8	116.4	0.4
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	66.0	65.3	0.7
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	65.7	65.4	0.3
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	66.3	65.9	0.4
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	66.4	66.0	0.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	116.3	115.6	0.7
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	116.5	116.0	0.5
X14	Rear Surface of Vehicle to Firewall, Right Side	125.2	120.6	4.6
X15	Rear Surface of Vehicle to Firewall, Left Side	129.2	124.1	5.4
X16	Rear Surface of Vehicle to Steering Column	100.9	97.9	3.0
X17	Center of Steering Column to "A" Post	15.6	18.1	-2.5
X18	Center of Steering Column to Headliner	17.0	17.7	-0.7
X19	Rear Surface of Vehicle to Right Side of Front Bumper	184.1	157.4	26.7
X20	Rear Surface of Vehicle to Left Side of Front Bumper	184.1	158.5	25.6
X21	Length of Engine Block	20.5	20.5	0.0



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Front Seat Crossmember	X		
2	Vehicle C.G.	X		
3	Rear Seat Crossmember	X		
4	Top of Engine	X		
5	Bottom of Engine	X		
6	Right Front Brake Caliper	X		
7	Left Front Brake Caliper	X		

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

FIGURE 5 VEHICLE ACCELEROMETER LOCATIONS

36 LOAD CELLS
4 ROWS
9 COLUMNS

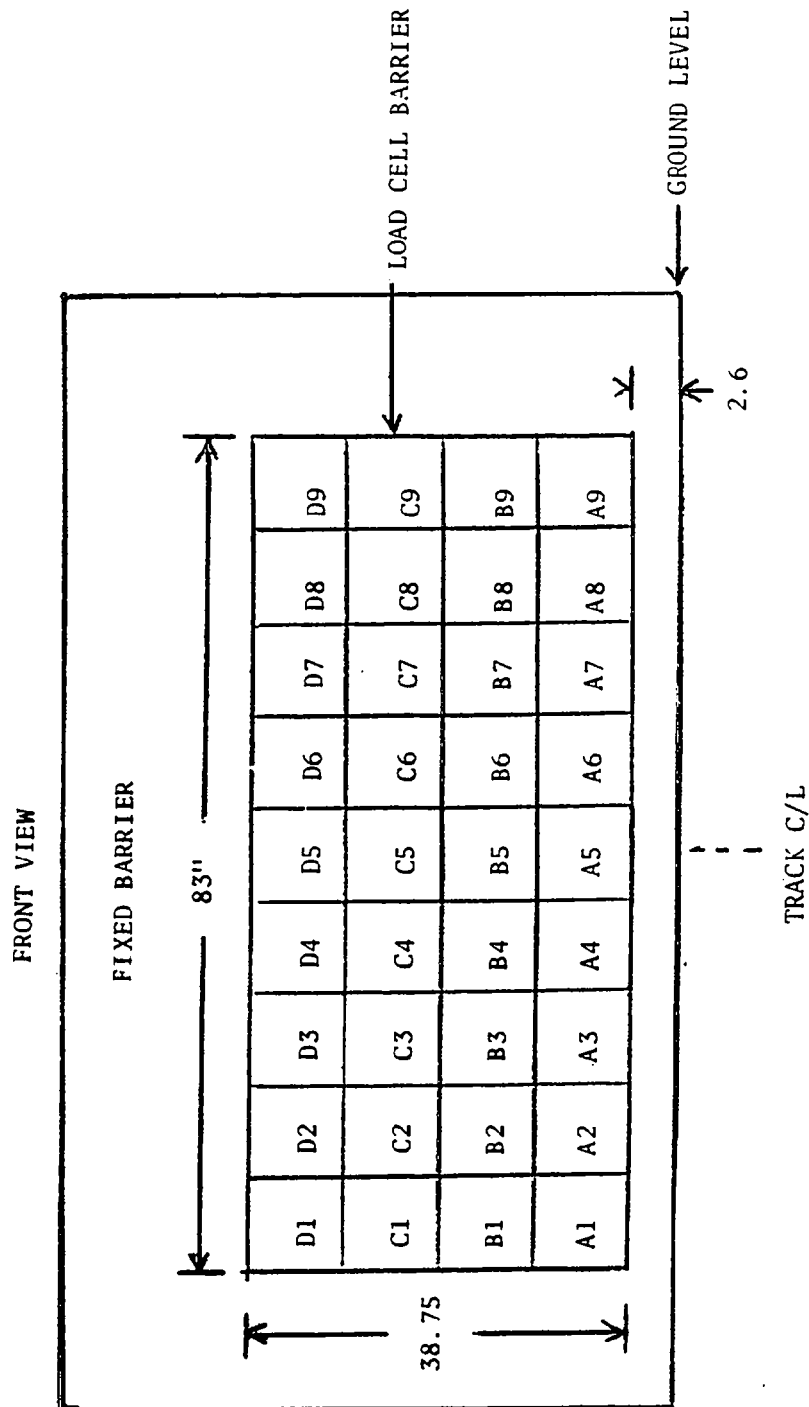


Figure 6 FIXED LOAD CELL BARRIER-LOAD CELL LOCATIONS

Table 8
ACCIDENT INVESTIGATION DIVISION
Data Summary

Test No. CD0114
Date 5/11/83

Vehicle No. 1

Impact Description	<u>frontal load cell barrier</u>
Make	<u>Pontiac</u>
Model	<u>Firebird 2-door sedan</u>
Year	<u>1983</u>
Size Category	<u>midsize</u>
Test Weight	<u>3330 lbs.</u>
Wheelbase	<u>101 inches</u>
Front Overhang	<u>17.9 inches</u>
Overall Width	<u>72.4 inches</u>
Accelerometer Location	<u>C/G - 49.1 inches rearward of front wheel C</u>
Calibration Procedure	<u>shaker table/least squares</u>
Accelerometer Linearity	<u>±.075%</u>
Integration Algorithm	<u>Hybrid Simpson-Newton 3/8</u>
Impact Speed	<u>35.21 mph</u>
Time of Separation	<u>285.15 msec</u>
Velocity Change	<u>37.78 mph</u>
CDC	<u>12 FDEW3</u>
Damage Length	L: <u>60.5</u>
Crush Dimensions	C1: <u>26.0</u>
	C2: <u>28.2</u>
	C3: <u>29.7</u>
	C4: <u>30.0</u>
	C5: <u>29.15</u>
	C6: <u>27.3</u>
Midpoint of Damage	D: <u>0</u>

National Accident Sampling System — Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

1983 Pontiac Firebird 4 cyl 35 mph Barrier Test

Complete When Applicable

End Damage	Side Damage
Undeformed end width <u>60.5</u>	Bowing: B1 _____ X1 _____
Corner shift: A1 _____	B2 _____ X2 _____
A2 _____	Bowing constant
End shift at frame (CDC) (check one)	$\frac{X1 + X2}{2} = \underline{\hspace{2cm}}$
< 4 inches _____	12 FDEW3
≥ 4 inches _____	

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

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								
SAE Bumper	Bumper	60.5	31.0	60.5	37.0	31.3	30.7	31.0	32.2	33.3	0
Free / Space			- 1.0		- 6.0	- 3.1	- 1.0	- 1.0	- 3.1	- 6.0	
ACTUAL CRUSH			30.0	60.5	36.0	28.2	29.7	30.0	29.15	27.3	0

*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.

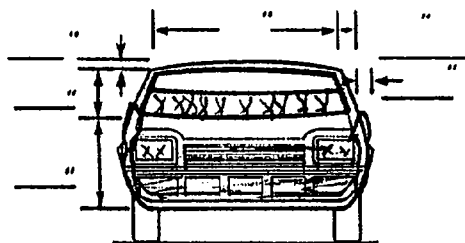
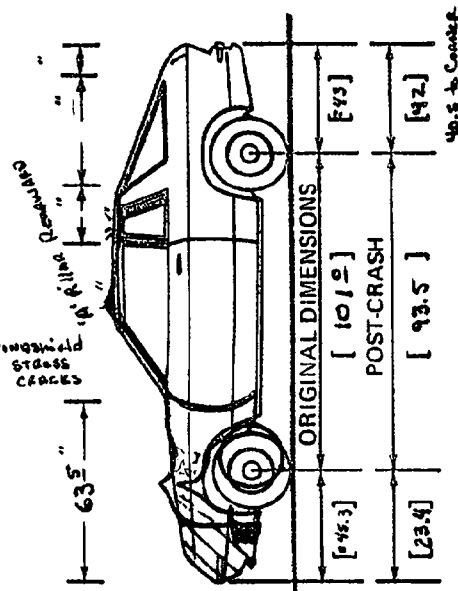
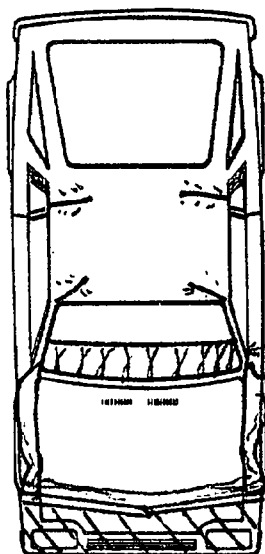
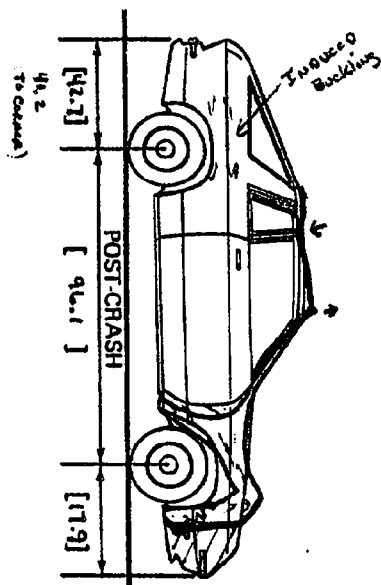
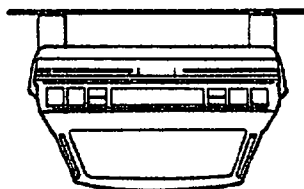
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

NATIONAL ACCIDENT SAMPLING SYSTEM—CONTINUOUS SAMPLING SUBSYSTEM: VEHICLE

Page 3D

DAMAGE DESCRIPTION		TYPE OF TRANSMISSION	WHEEL STEER ANGLES
Tire—Wheel Damage		Manual <u>3spd</u> <u>Console</u> Automatic	(For locked front wheels or displaced rear axles only)
a. Rotation physically restricted	b. Tire deflated	Average Track: <u>61</u> <u>.15</u>	RF θ <u>$\approx 16^\circ$</u>
RF <u>1</u>	RF <u>2</u>	Maximum Width: <u>73</u> <u>.4</u>	LF θ <u>$\approx 16^\circ$</u>
LF <u>1</u>	LF <u>2</u>	TEST Curb Weight: <u>3330</u> <u>.0</u>	RR θ <u>$\approx 2^\circ$</u>
RR <u>2</u>	RR <u>2</u>	Overall Length: <u>189</u> <u>.3</u>	LR θ <u>$\approx 1^\circ$</u>
LR <u>2</u>	LR <u>2</u>	Measure 0	Within ± 5 degrees
(1) Yes, (2) No, (8) NA, (9) Unk.			

Line OAL = 189.3
Post CRASH = 160.9
28.4"

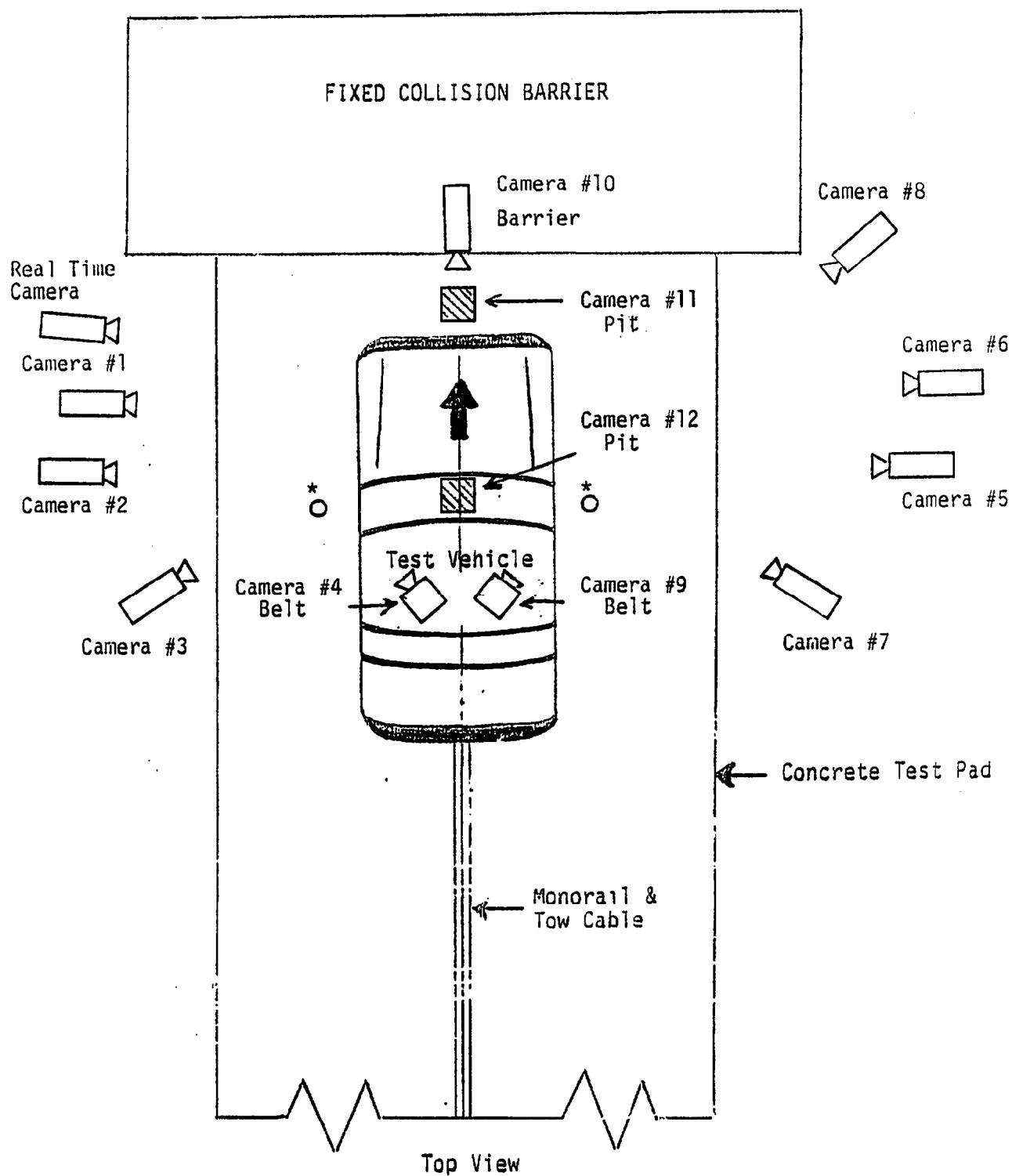


Note: Sketch new perimeter and cross hatch direct damage and single hatch induced damage on all views. Annotate observations which might be useful in reconstructing the accident (e.g., grass in tire bead, direction of striations, scuff on sidewall, etc.)

If pulling trailer sketch type of trailer and damage received on reverse side.

Annotate any damage caused by extrication such as component removal by torching, prying or hydraulic shears.

NOTE: Camera Information Shown on Table 9.



* Stadia Pole 72 inches from Barrier Face

Figure 8 CAMERA POSITION FOR FRONTAL IMPACTS

Table 9
HIGH-SPEED CAMERA LOCATIONS

Test No. CD0114 Vehicle 1983 Pontiac Firebird 2-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Vehicle Left Side	224	70	44	-4	-	13	900
2	Driver	360	96	50	-6	334	50	900
3	Driver	193	132	69	-22	167	25	900
4	Left Belt Retractor	-	-	-	-	-	8	1225
5	Vehicle Right Side	236	76	58	-8	-	13	900
6	Passenger	371	107	42	-2	345	50	900
7	Passenger	163	147	73	-25	138	25	875
8	Windshield	198	-12	55	-11	-	25	900
9	Right Belt Retractor	-	-	-	-	-	3	1250
10	Barrier	0	0	120	65	-	8	900
11	Pit (Engine)	0	36	-120	90	-	25	875
12	Pit (Fuel Tank)	0	136	-120	90	-	13	850

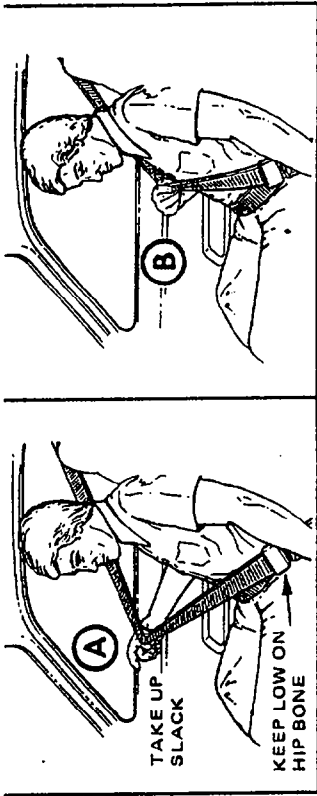
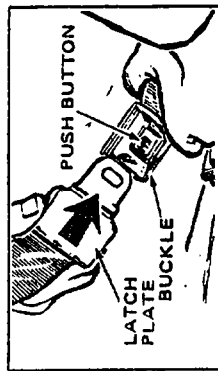
*X = film plane to monorail centerline
Y = film plane to impact location
Z = film plane to ground
** = referenced to horizontal plane

CAUTION To help lessen the change and/or the severity of injury in accidents or sudden maneuvers, use the passenger restraint system properly, carefully following the instructions in this section on their proper use, maintenance, and application with any child restraint system.

General Motors urges that vehicle occupants be properly restrained at all times, using the seat belts provided. This includes women who are pregnant, and children of all ages. (See the following pages for the use of restraints by children and pregnant women.) General Motors provides a seat belt at each position designed for occupant seating. For the number of front and rear seat occupants this vehicle is designed to seat, see the tire placard on the driver's door.

Front Seat Lap-Shoulder Belt

- Adjust the front seat as needed and sit up straight and well back in the seat.
- Pull the lap-shoulder belt across your body far enough to push the latch plate into the buckle, until it clicks.
- Position the "lap" portion of the belt across your lap as **LOW ON THE HIPS** as possible. This is necessary to spread the force of the lap belt over the strong hip bone instead of across the abdomen. Then, adjust to a **SNUG FIT** by pulling the belt firmly across your lap toward the lap belt retractor, so it can take up slack. This reduces the risk of sliding under the belt during an accident. The belt retractor is designed to take up slack.
- Never use the same belt for more than one person at a time; do not wear belts twisted; and do not let belt parts become damaged by pinching them in the seat or door.



- The front seat lap-shoulder belts are designed to lock only during a sudden stop or impact. At other times they are designed to move freely with the person.
- For those who find the shoulder belt too snug, belt pressure against the chest can be reduced by using the tension reliever built into the shoulder belt retractor. To use this feature: (A) Start by pulling the shoulder belt outward far enough so that when you let go, it returns to the chest (Step "A" in the illustration). (B) Then, adjust the belt tension by pulling down slightly on the shoulder portion of the belt and letting go (Step "B" in the illustration). The least amount of belt possible should be pulled from the retractor (about 25 millimeters or one inch) to minimize belt pressure.
- To release the tension reliever and get rid of slack, pull the shoulder belt out and let it retract; or, lean far forward and then back.
- If shoulder belt slack is used to minimize belt pressure, the amount of slack should be kept to a minimum. Too much belt slack could reduce the amount of protection because the belt may not be able to properly restrain you in an accident.
- Do not wear the shoulder belt under your arm nearest the door or otherwise out of position.
- To unfasten the belt, push in the button in the center of the buckle.
- The retractor is designed to rewind the belt automatically when the belt is pulled out about 150 millimeters (six inches) and let go. Pulling on the belt is necessary to cause it to retract. Be sure that the belt is fully retracted and the latch plate is out of the way before closing the car door. This will help prevent damage to interior trim and the seat belt assembly.

Figure 9 OWNER'S MANUAL, FRONT SEAT BELT INSTRUCTIONS

Figure 10
PART 572 DUMMY IN-VEHICLE POSITION

Test No. CD0114

Vehicle Pontiac Firebird 1983

SEAT TYPE:

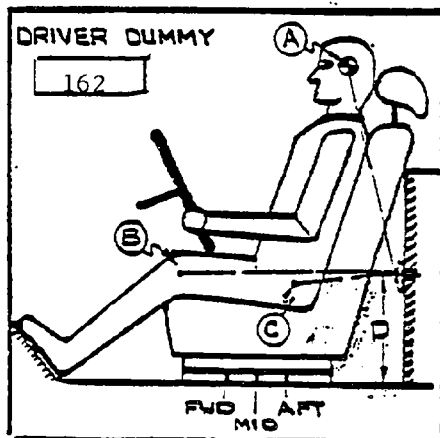
 Bench
 X Bucket
 Split Bench

ADJUSTER TYPE:

 X Manual
 Power

BUCKET SEAT BACK TYPE:

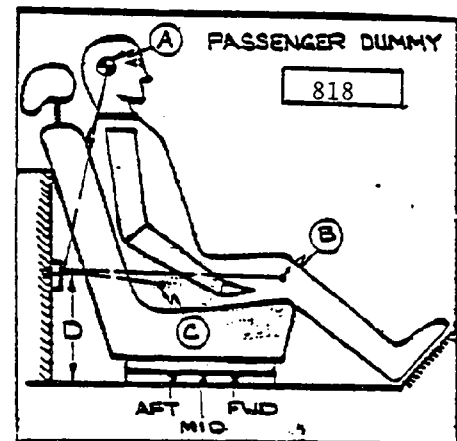
 X Fixed
 Adjustable Reclining



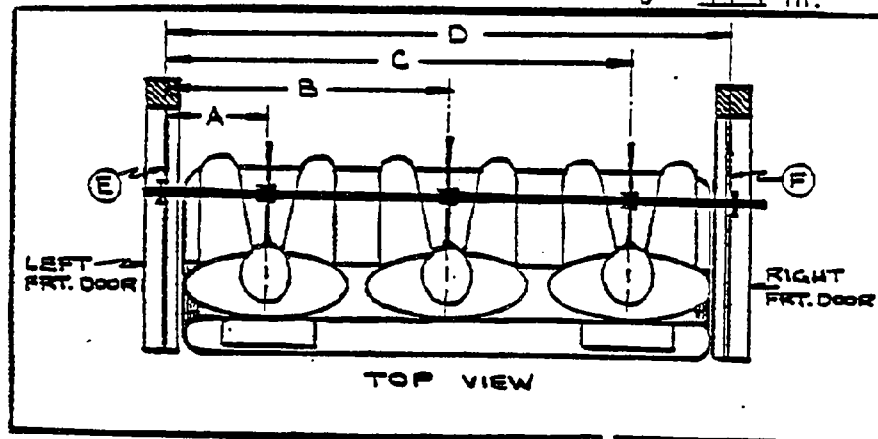
A = 26.5 in. 39 Degrees
B = 37.5 in. 95 Degrees
C = 22.5 in. 104 Degrees
D = 13.5 in.

MEASUREMENT LOCATION

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



A = 26.4 in. 40 Degrees
B = 37.7 in. 90 Degrees
C = 22.5 in. 105 Degrees
D = 13.5 in.



DUMMY ID

162

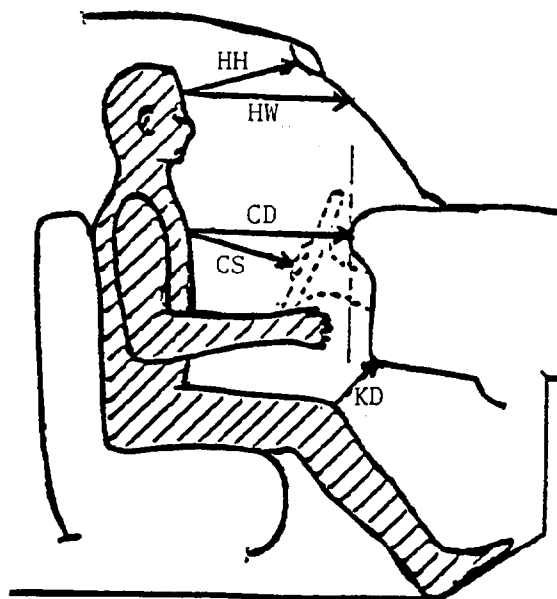
818

A =	Left Door to Driver Centerline	<u>14.2</u> in.
B =	Left Door to Center Passenger Centerline	<u>-</u> in.
C =	Left Door to Right Passenger Centerline	<u>42.5</u> in.
D =	Left Door to Right Door	<u>56.5</u> in.
E, F =	Window Glass Height (Right and Left Must be Equal)	<u>9.0</u> in.

	DRIVER	PASSENGER
HH	10"	10"
HW	14.7"	14.5"
CD	19"	19.2"
CS	12.7"	-
KDL	5.2"	5.7"
KDR	6"	5.7"
SA	24°	23°
TA	25°	24°

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	5.0"	5.0"
HS	9.7"	9.5"
AD	5.4"	5.5"
HD	7.2"	7.2"

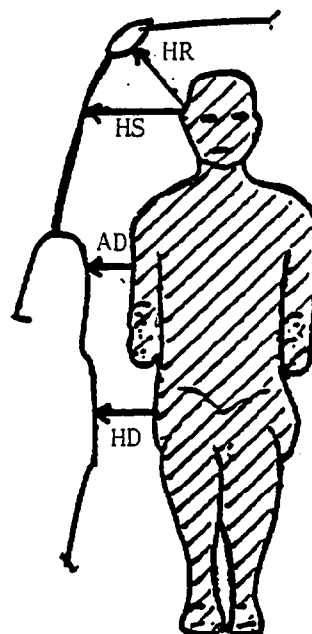


Figure 11 OCCUPANT CLEARANCE DIMENSIONS

Table 10
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R *
DUMMY (1)	-72	-14	+36	76	-33	-10	-9	33.6
DUMMY (2)	-40	+32	+38	46	-33	-9	-13	32.3
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	480	900
DUMMY (2)	125	100
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)	1370	--	450
DUMMY (2)	1410	700	--
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	HEAD
DUMMY (1)	408.0	.06015	.10845	37.2	572.6
DUMMY (2)	375.8	.06607	.13387	31.4	508.7
DUMMY (3)					
DUMMY (4)					

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

Table 11
BELT RELATED DATA

	<u>Driver</u>	<u>Passenger</u>
Belt Spool-off		
film	1.6 in.	2.3 in.
electronic	1.6 in.	2.1 in.
Belt Strain ⁽¹⁾	.34 in.	.4 in.
Belt Length Data		
total length ⁽²⁾	105 in.	105 in.
retractor to "D" ring ⁽³⁾	Retractor is located on the roof.	
torso belt ⁽³⁾	46 in.	45.5 in.
lap belt ⁽³⁾	26.5 in.	26.5 in.
remainder on spool (lap retractor)	17.0 in.	17.5 in.
(shoulder retractor)	15.5 in.	15.5 in.

(1) as measured between retractor and "D" ring

(2) retractor spool to bolt hole anchor point for unbelted

(3) as measured on Part 572 dummy

APPENDIX A
PHOTOGRAPHS

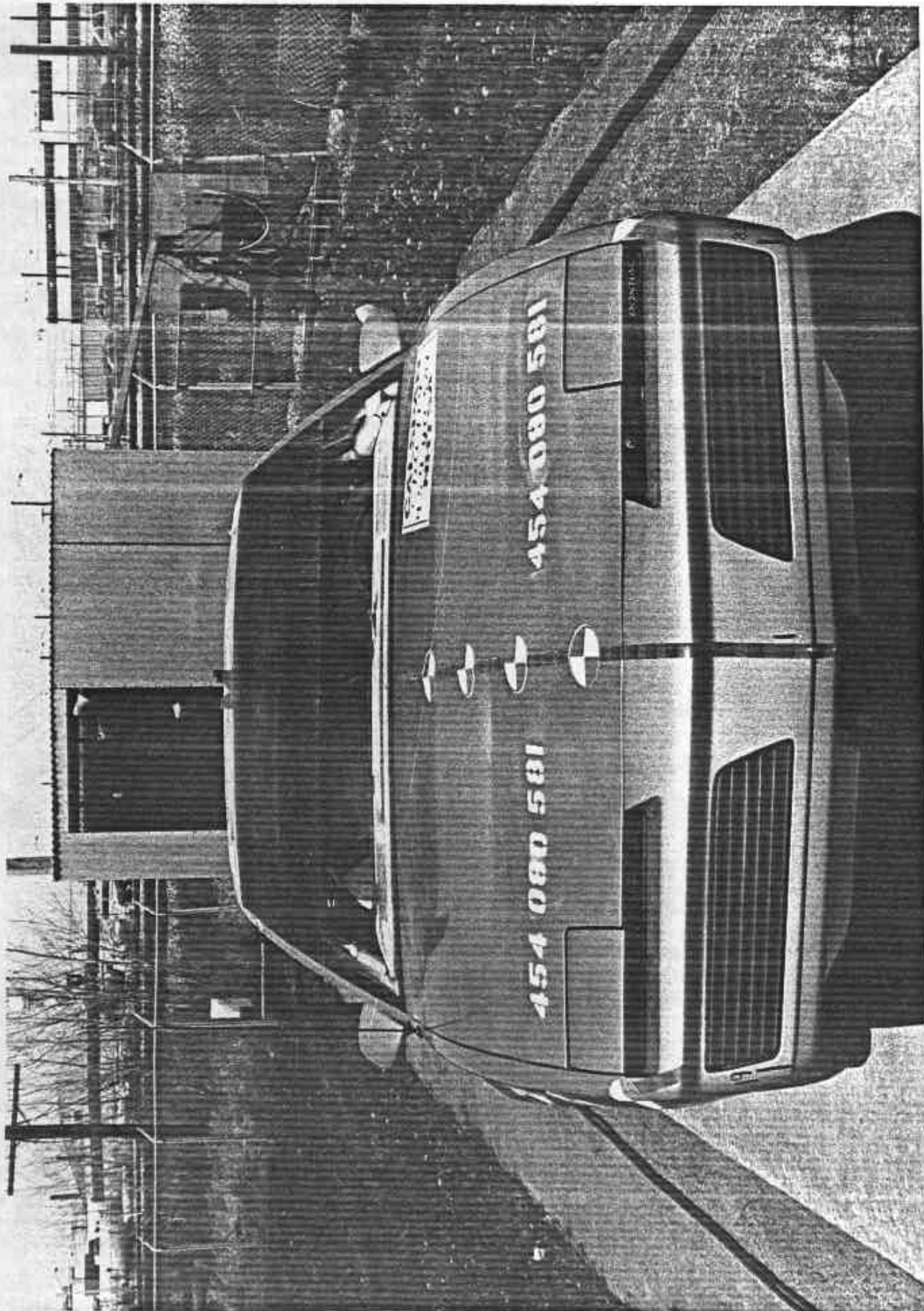


Figure A-1 PRE-TEST FRONT VIEW

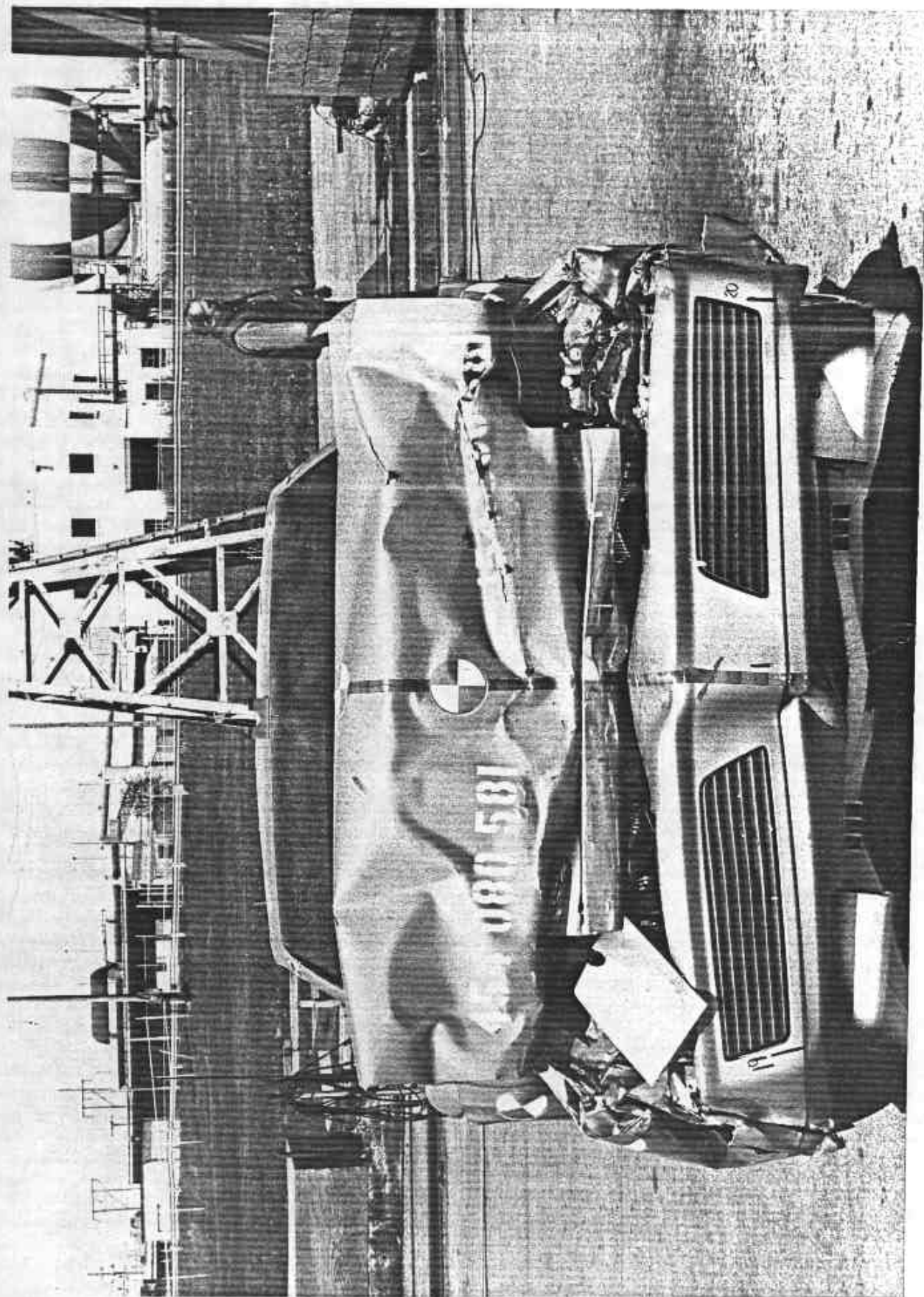
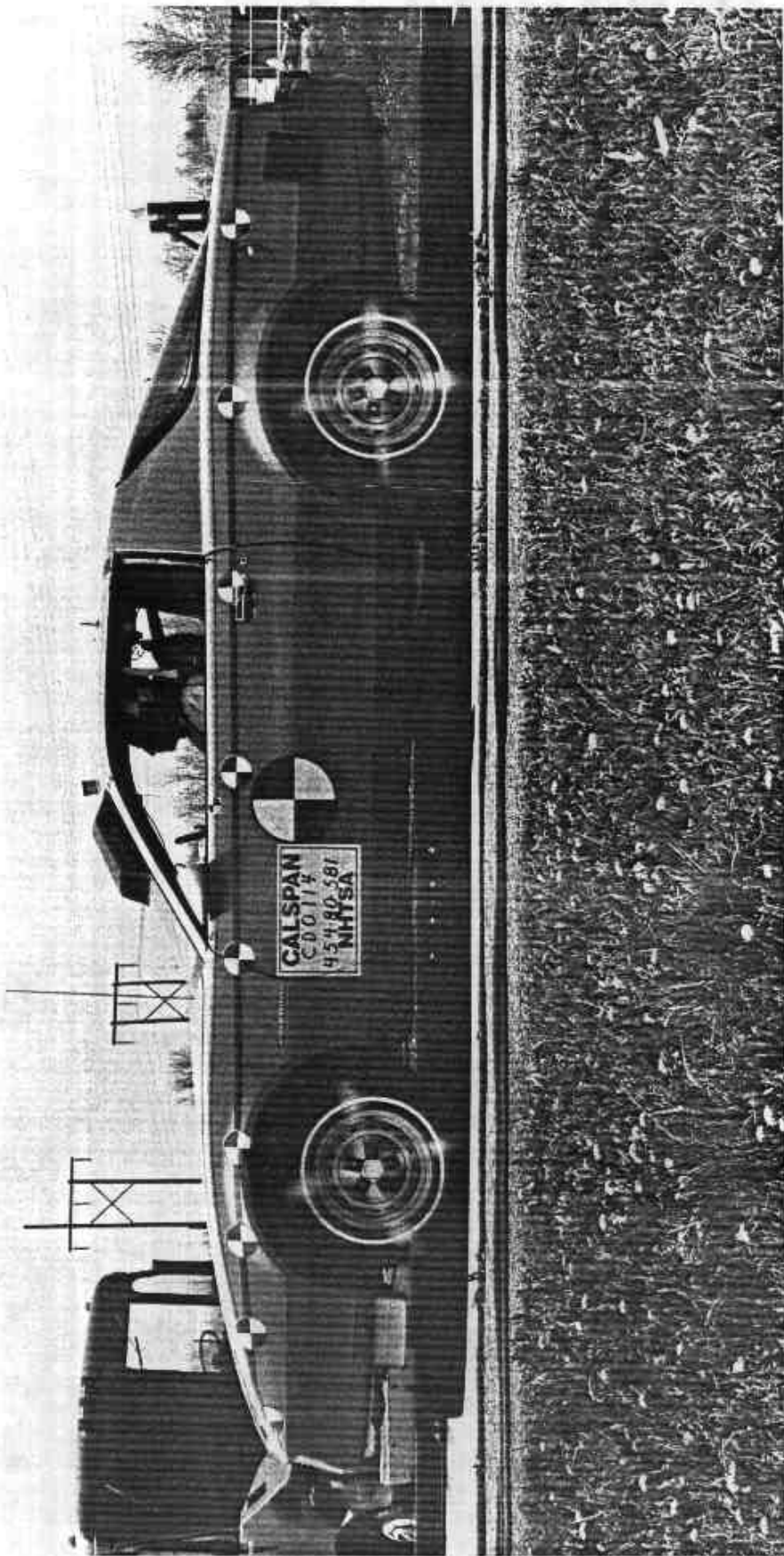


Figure A-2 POST-TEST FRONT VIEW



A-4

7103-V-9

Figure A-3 PRE-TEST LEFT SIDE VIEW

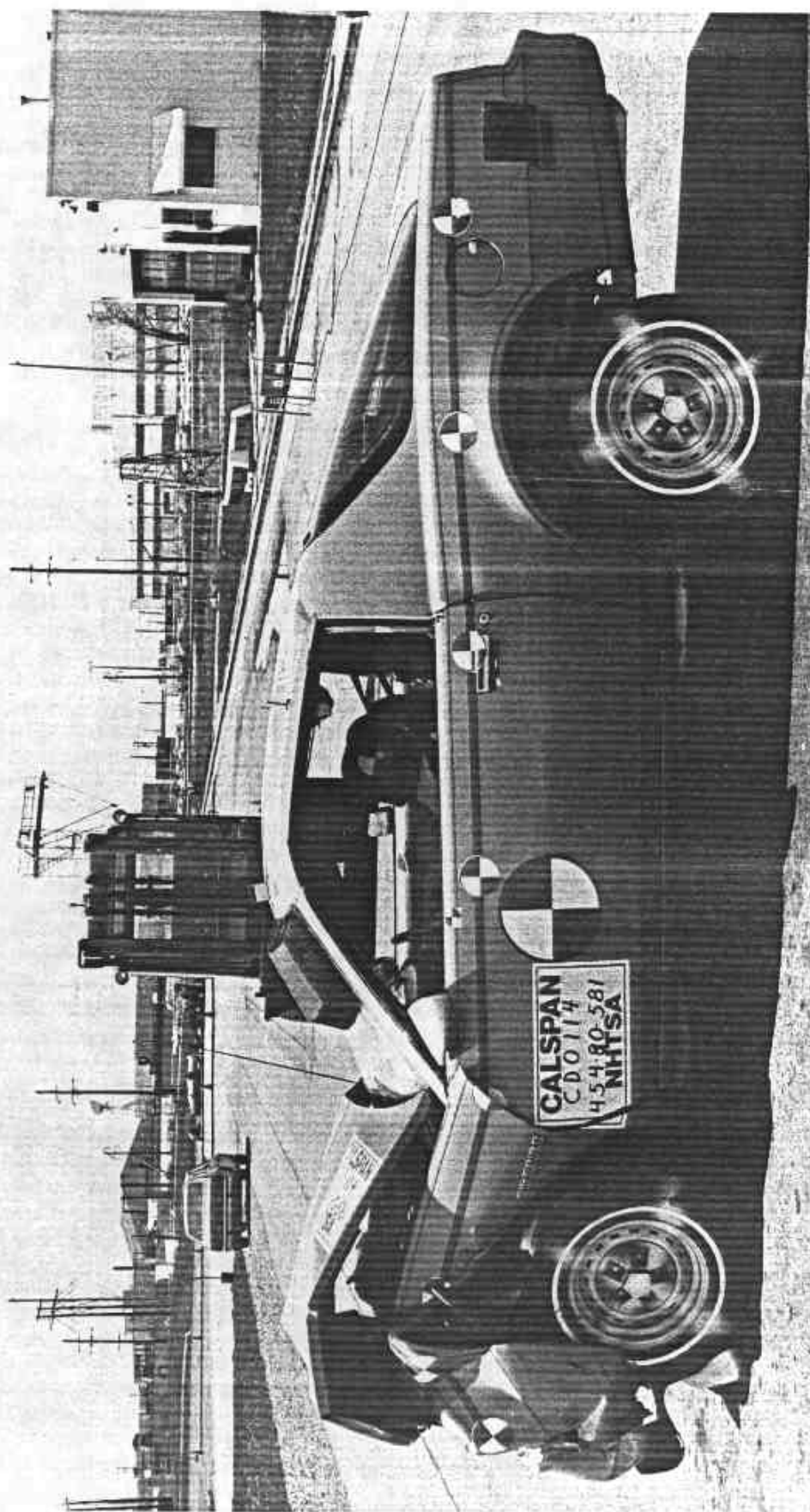


Figure A-4 POST-TEST LEFT SIDE VIEW

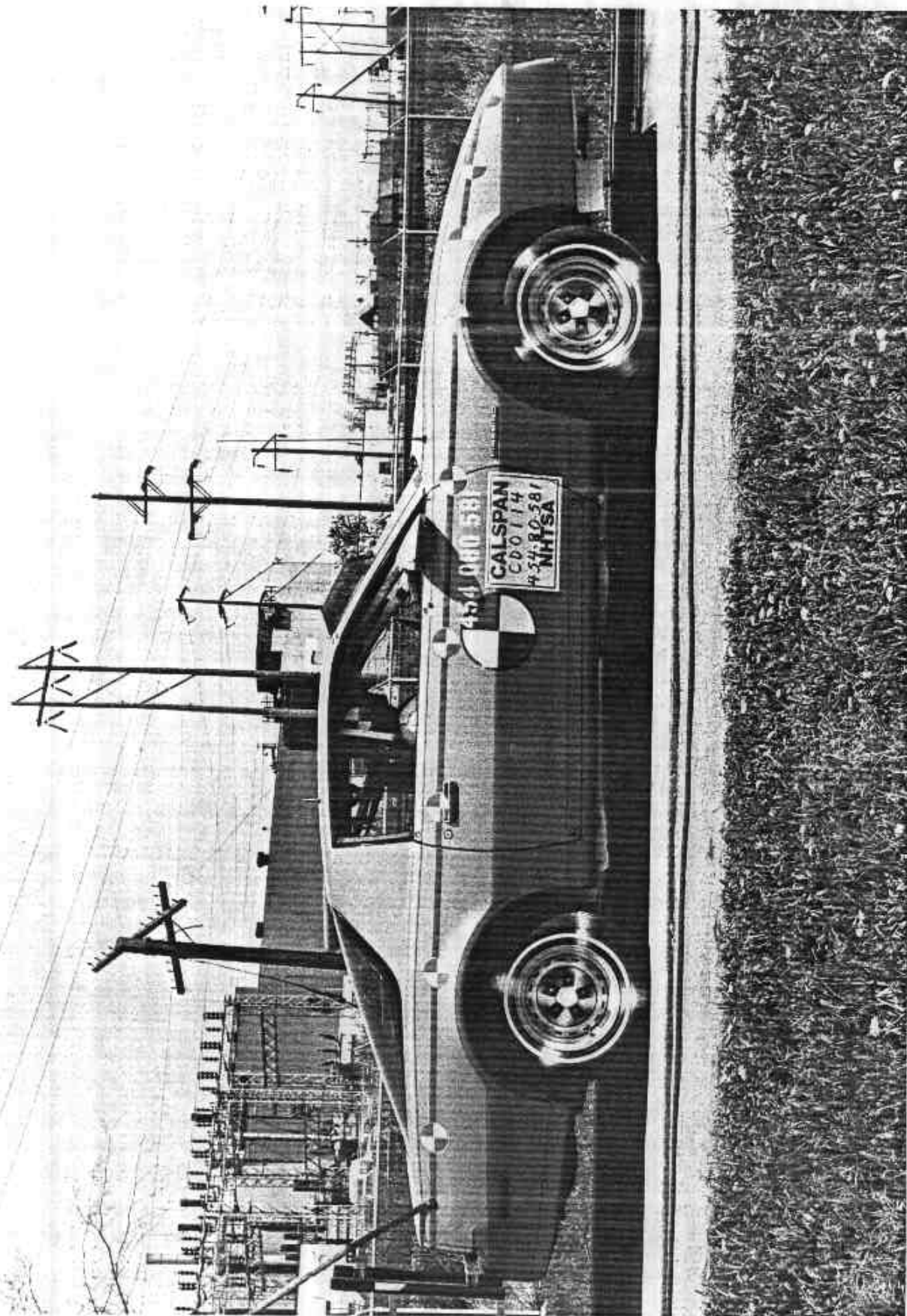


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-6

7103-V-9

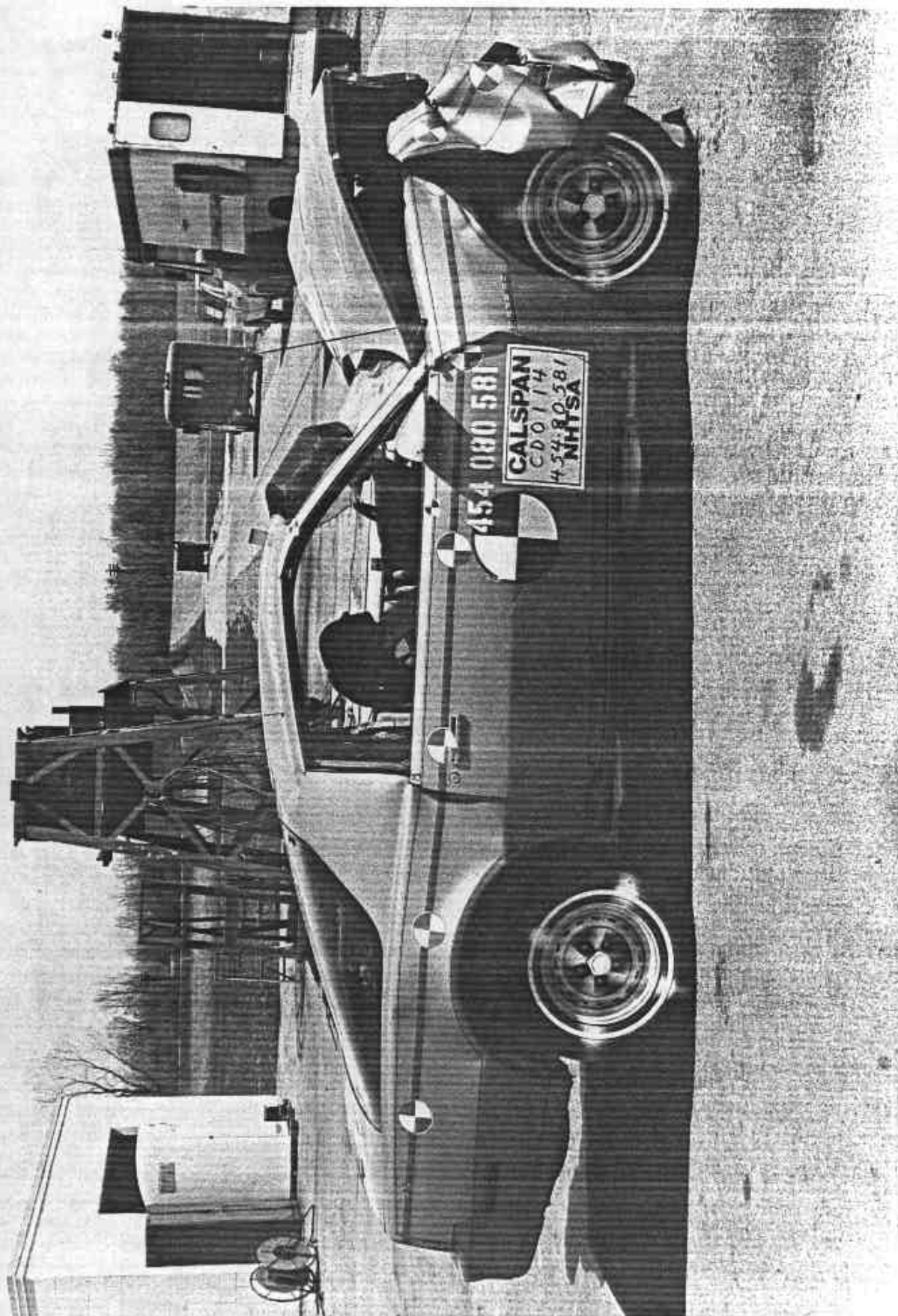


Figure A-6 POST-TEST RIGHT SIDE VIEW



Figure A-7 PRE-TEST FRONT THREE QUARTER VIEW



Figure A-8 POST-TEST FRONT THREE QUARTER VIEW

A-9

7103-V-9

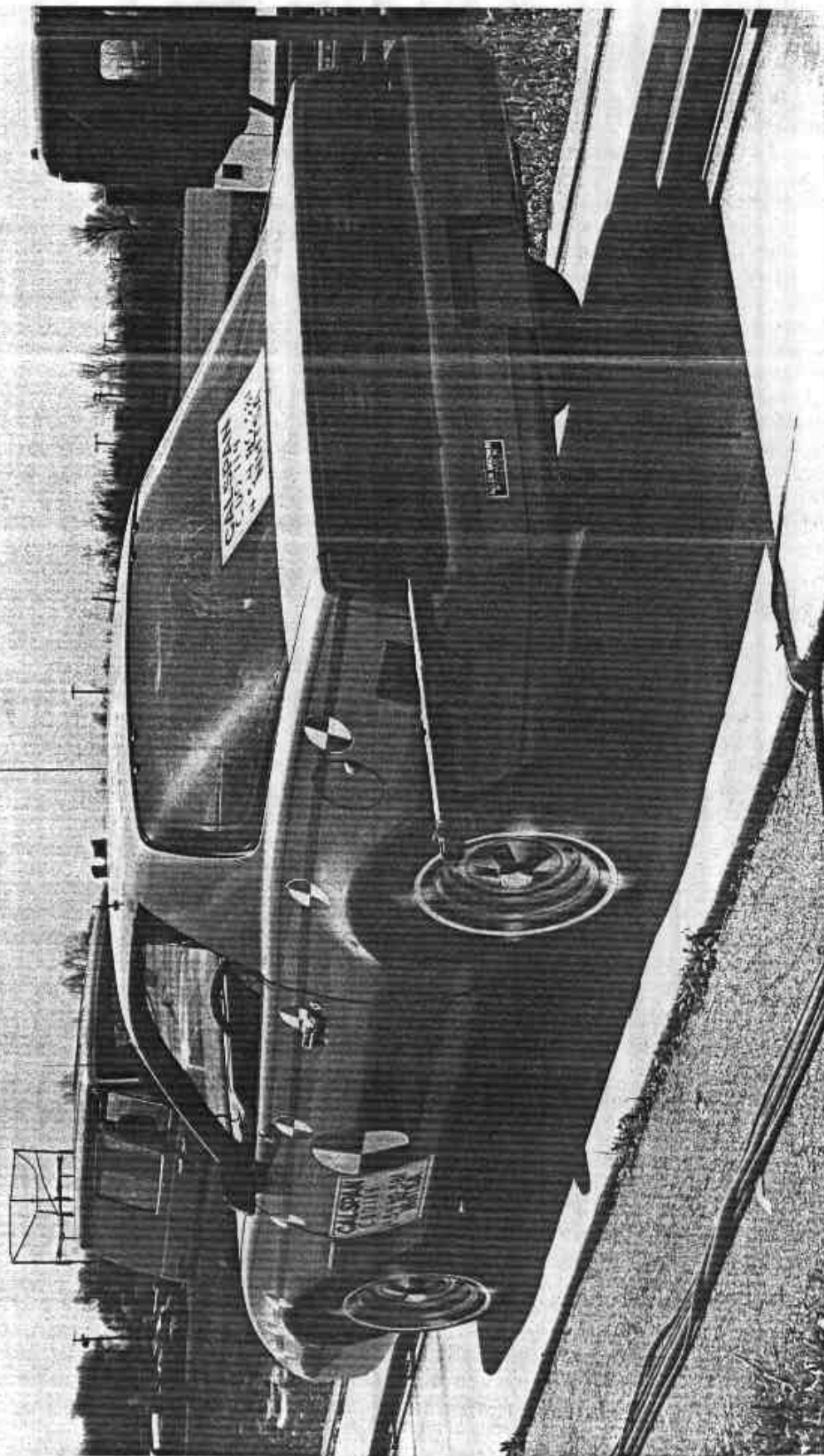


Figure A-9 PRE-TEST REAR THREE QUARTER VIEW

A-10

7103-V-9

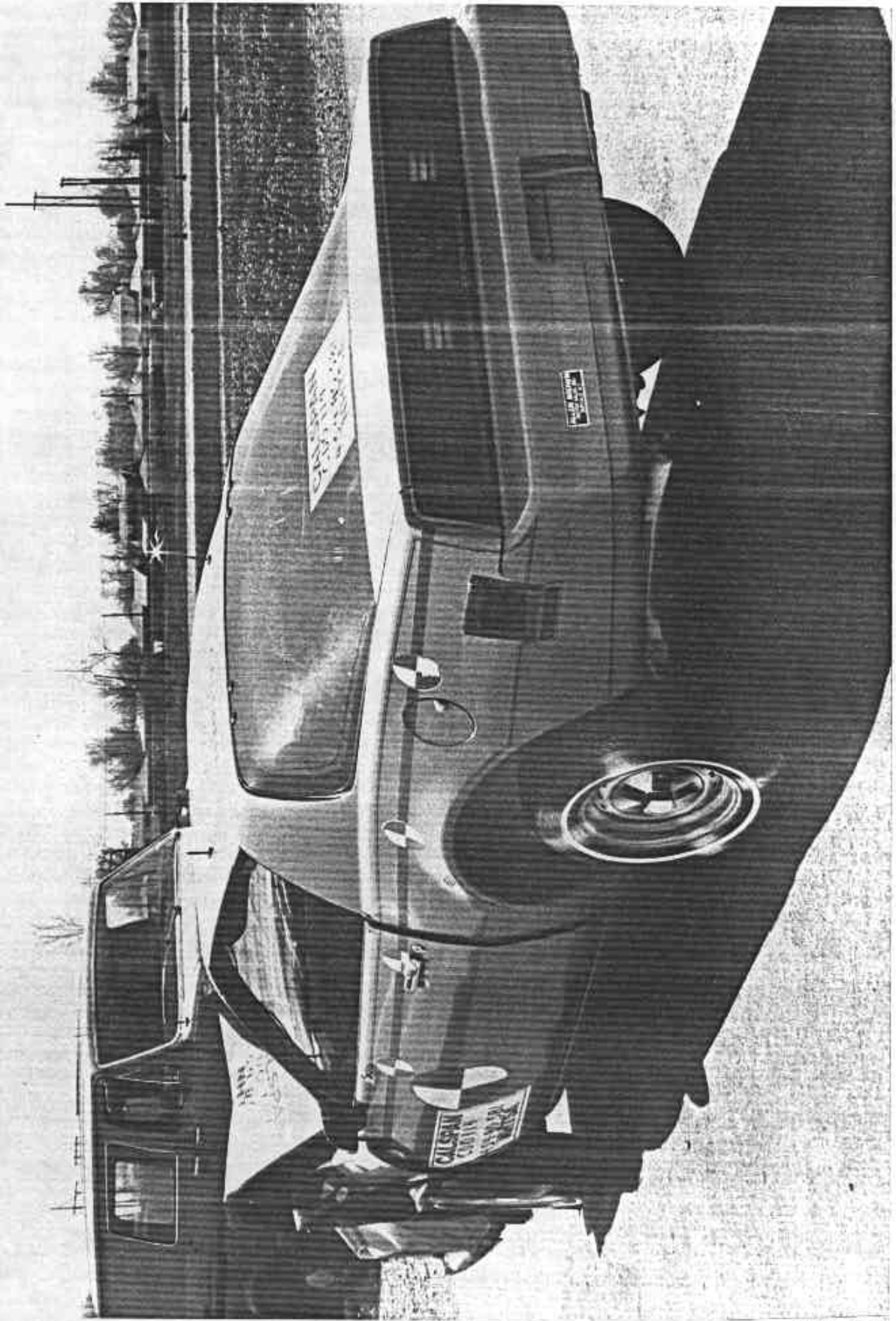


Figure A-10 POST-TEST REAR THREE QUARTER VIEW

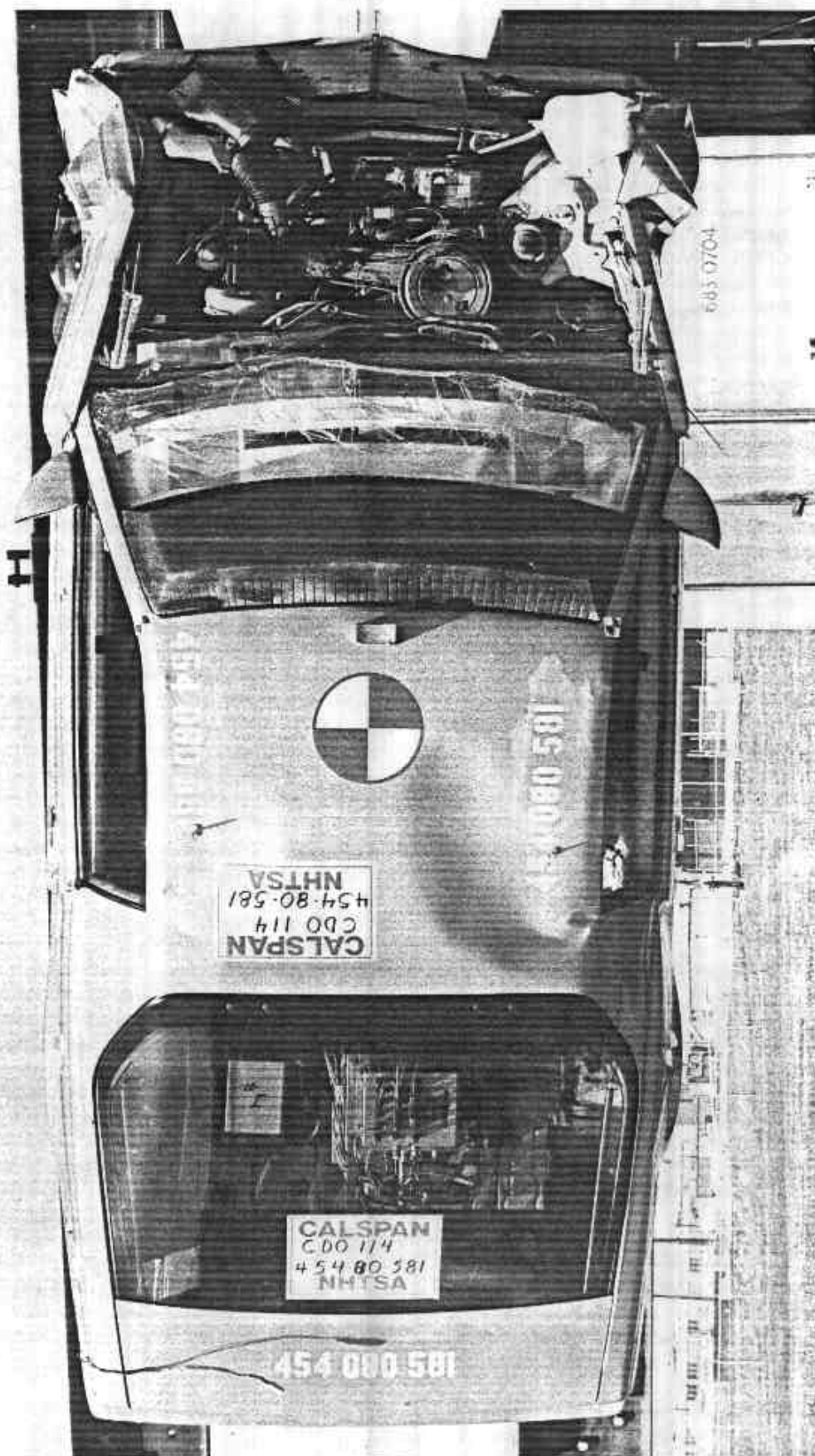


Figure A-11 POST-TEST TOP VIEW

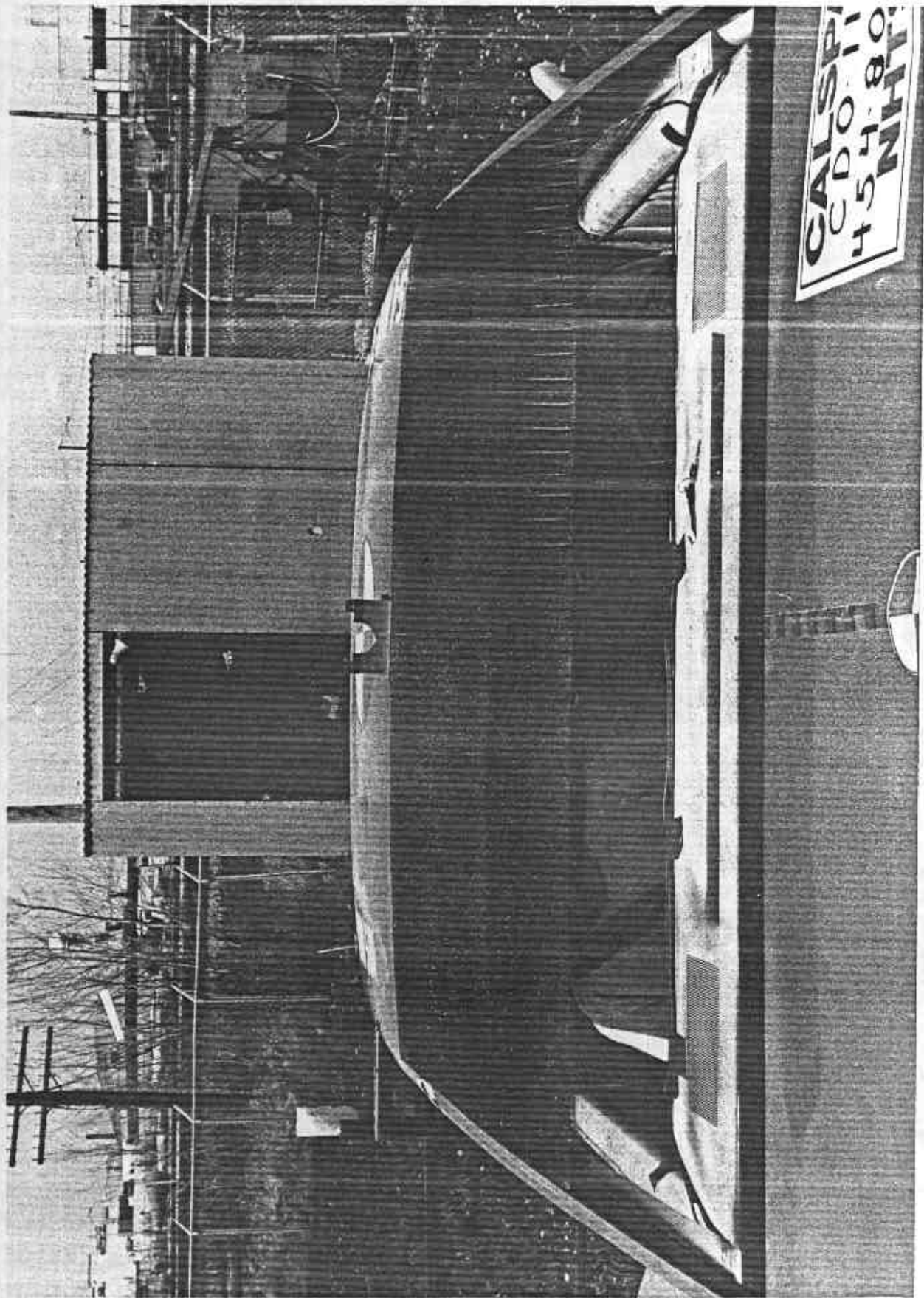


Figure A-12 PRE-TEST WINDSHIELD AND STYROFOAM FORM VIEW

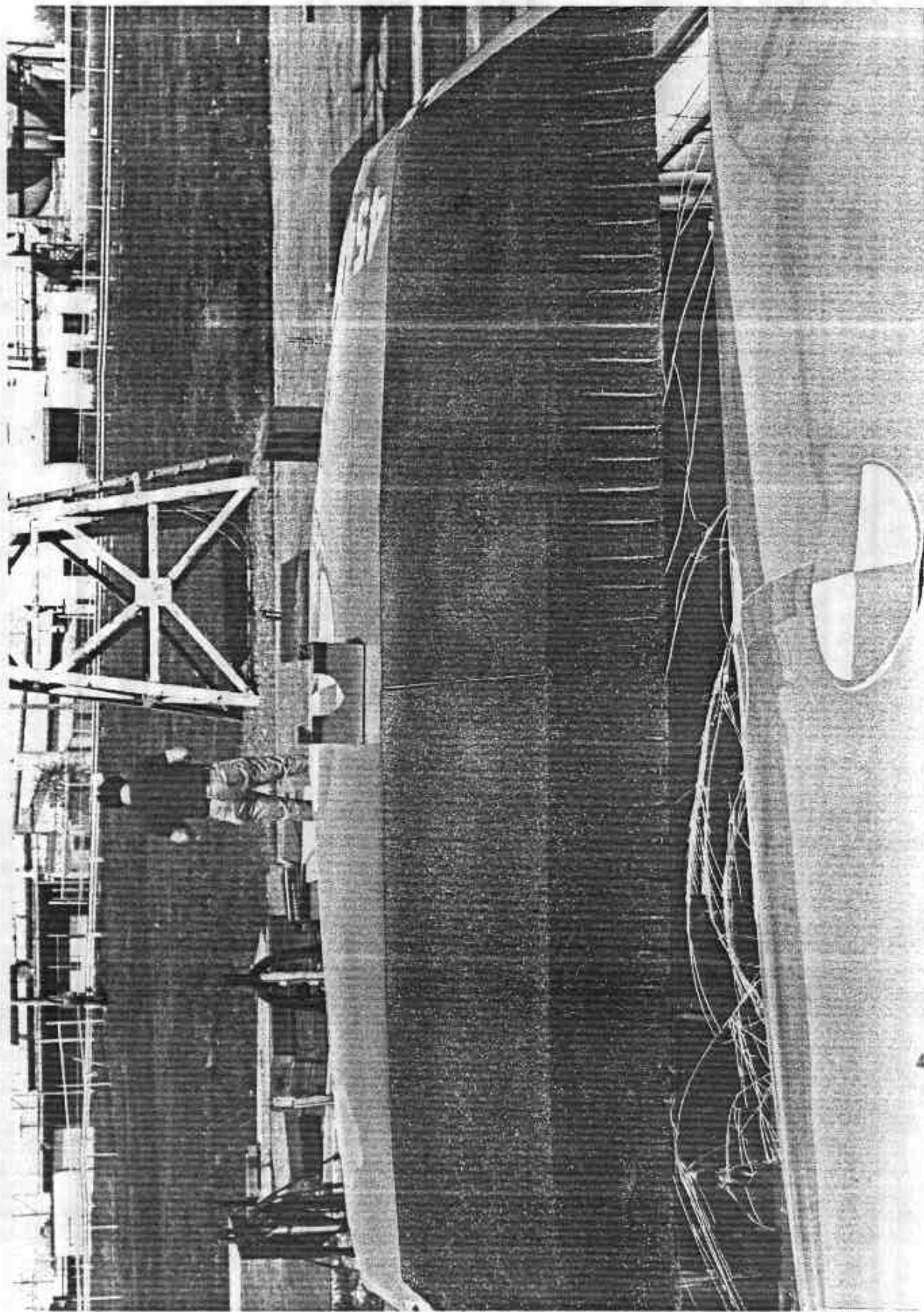


Figure A-13 POST-TEST WINDSHIELD AND STYROFOAM FORM VIEW

A-14

7103-V-9

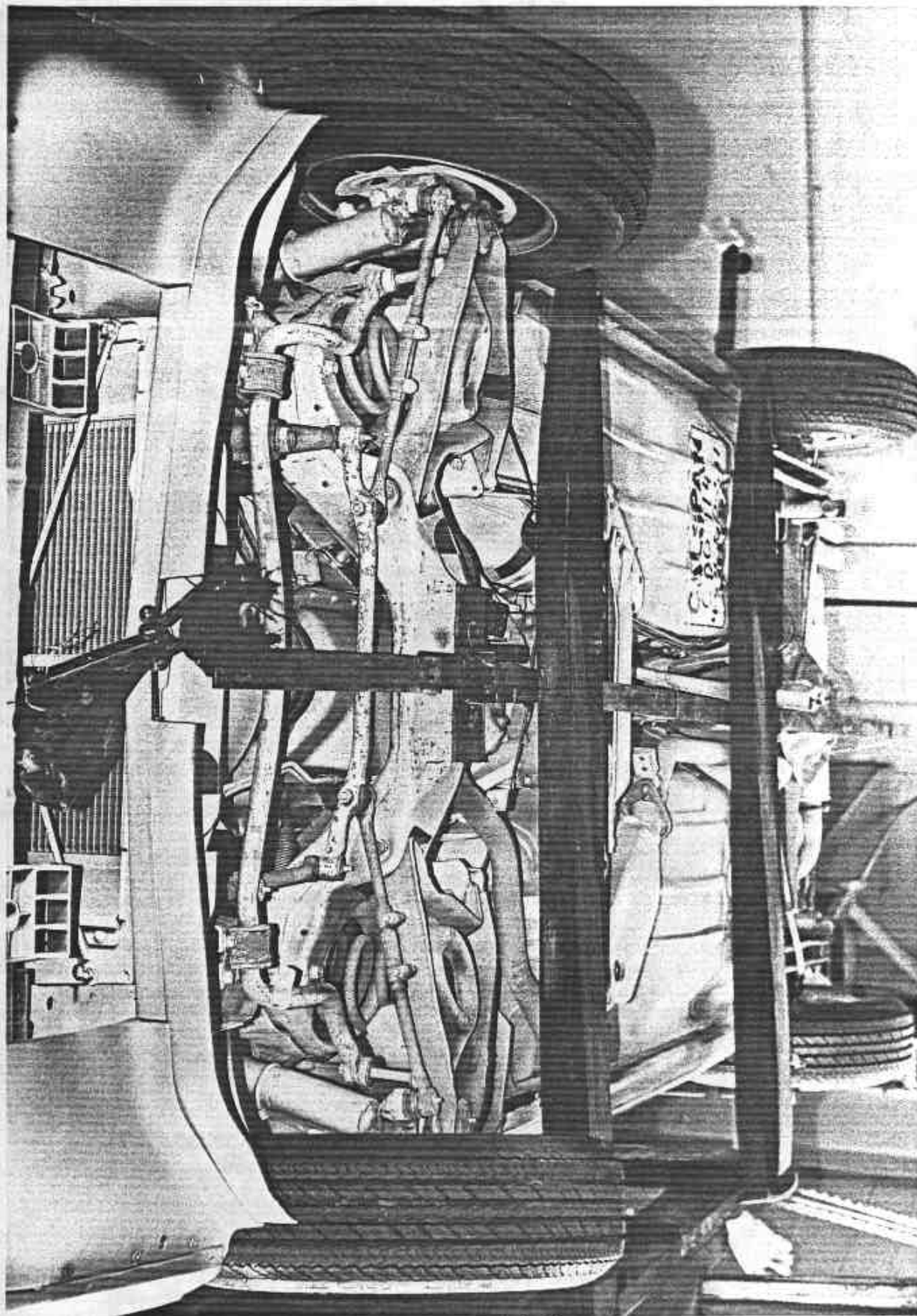


Figure A-14 PRE-TEST FRONT UNDERBODY VIEW

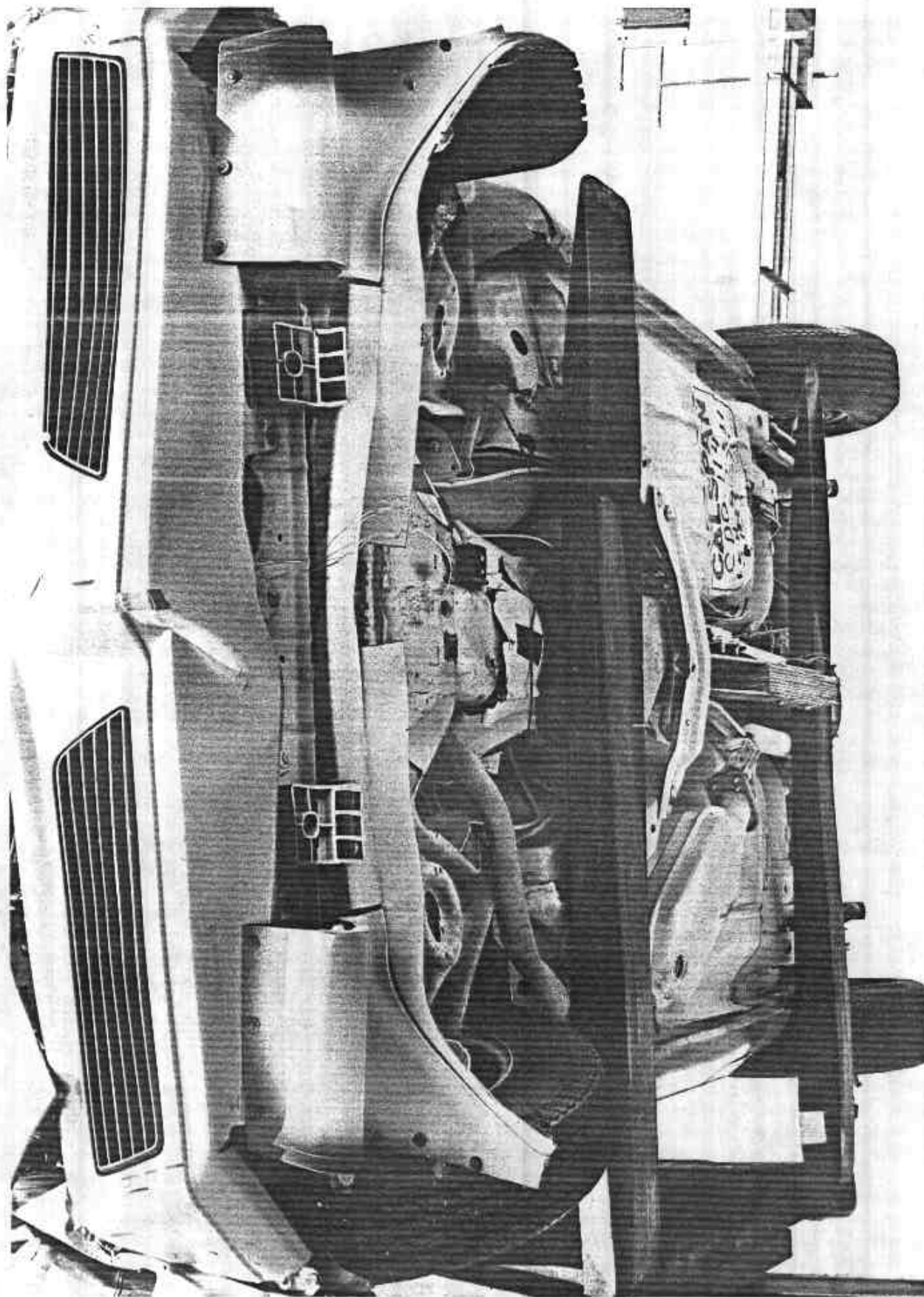


Figure A-15 POST-TEST FRONT UNDERBODY VIEW

A-16

7103-V-9

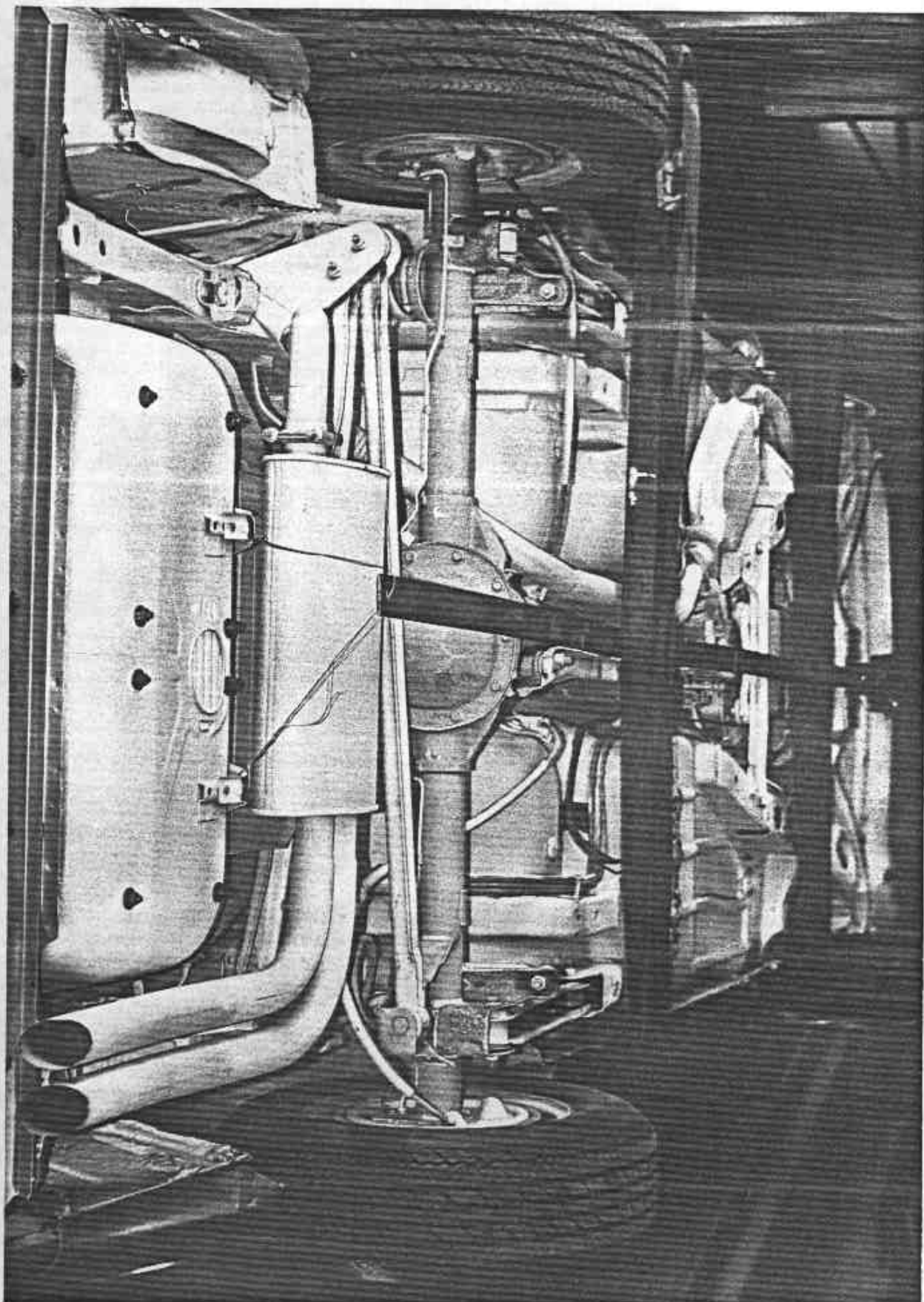


Figure A-16 PRE-TEST REAR UNDERBODY VIEW

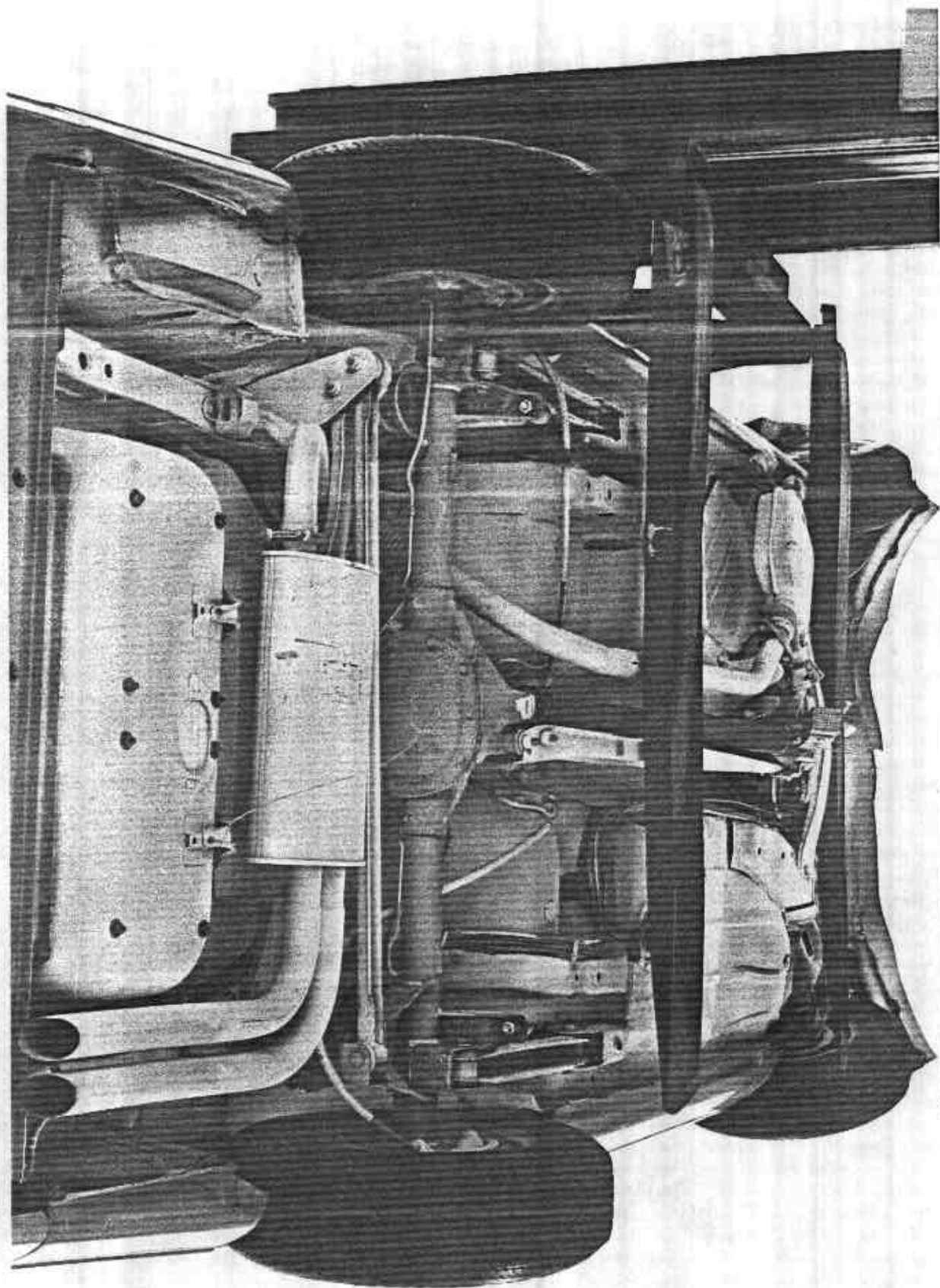


Figure A-17 POST-TEST REAR UNDERBODY VIEW

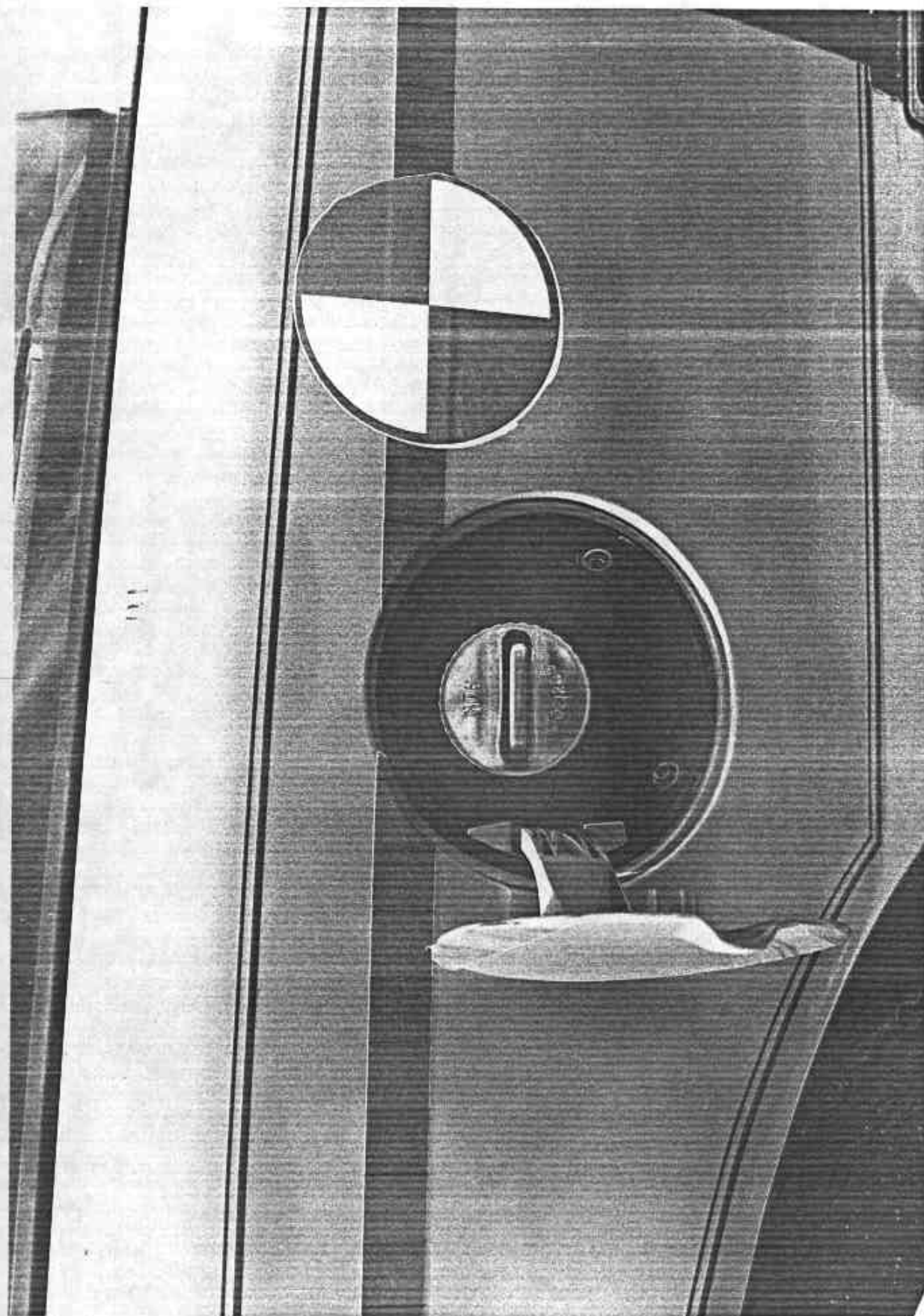


Figure A-18 FUEL FILLER CAP PRE-TEST

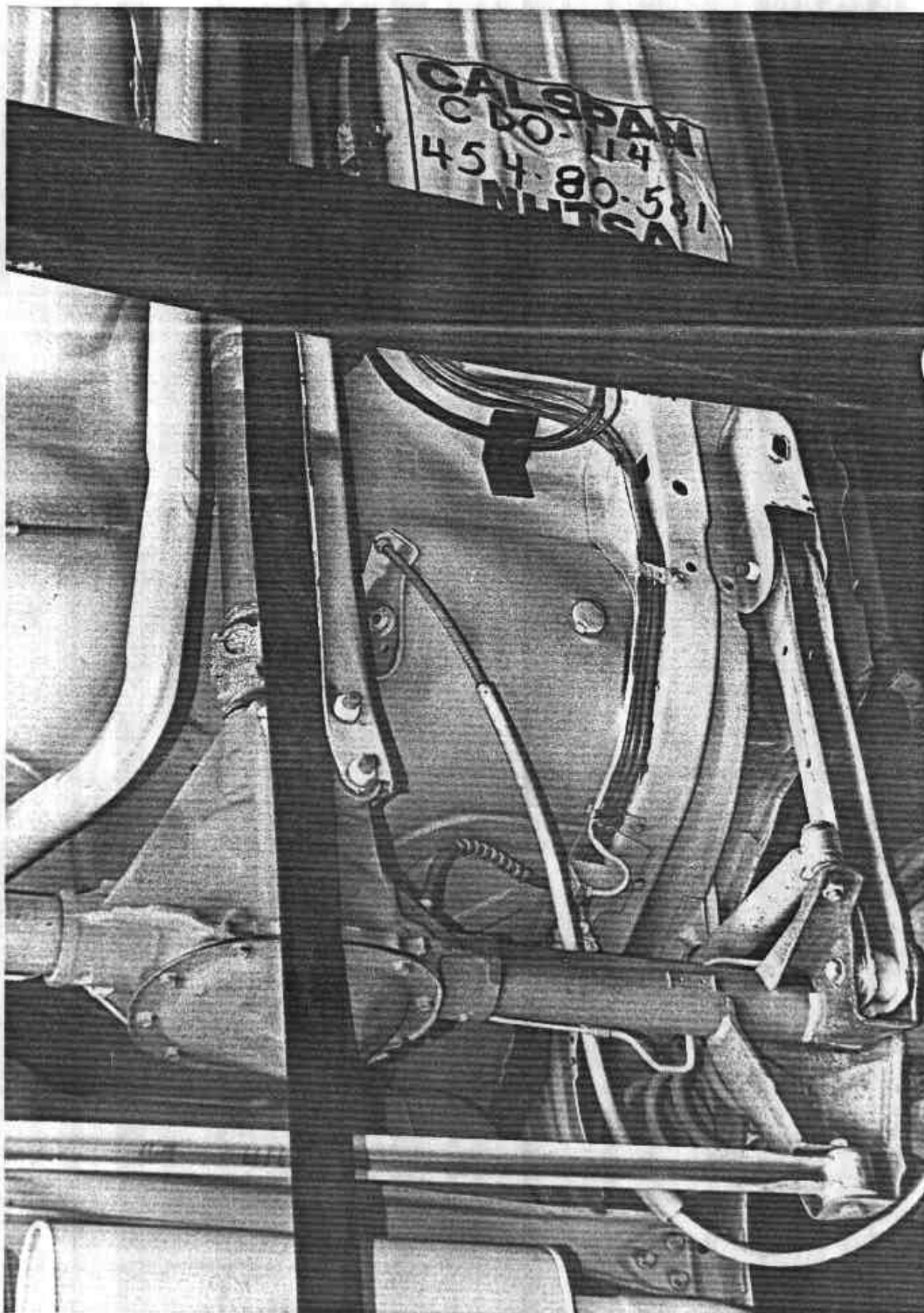


Figure A-19 PRE-TEST DRIVE SHAFT AND FUEL LINE VIEW

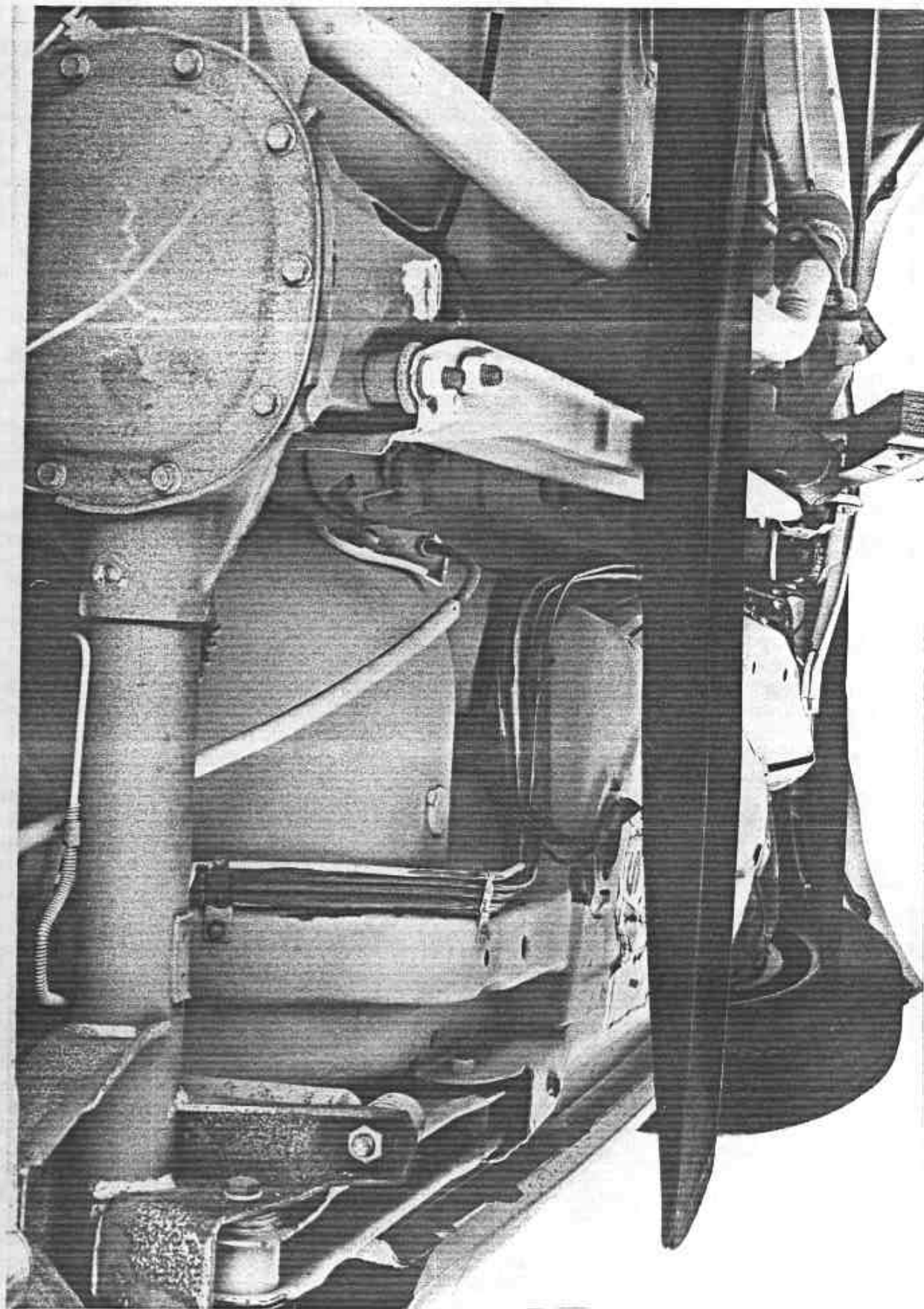


Figure A-20 POST-TEST DRIVE SHAFT AND FUEL LINE VIEW

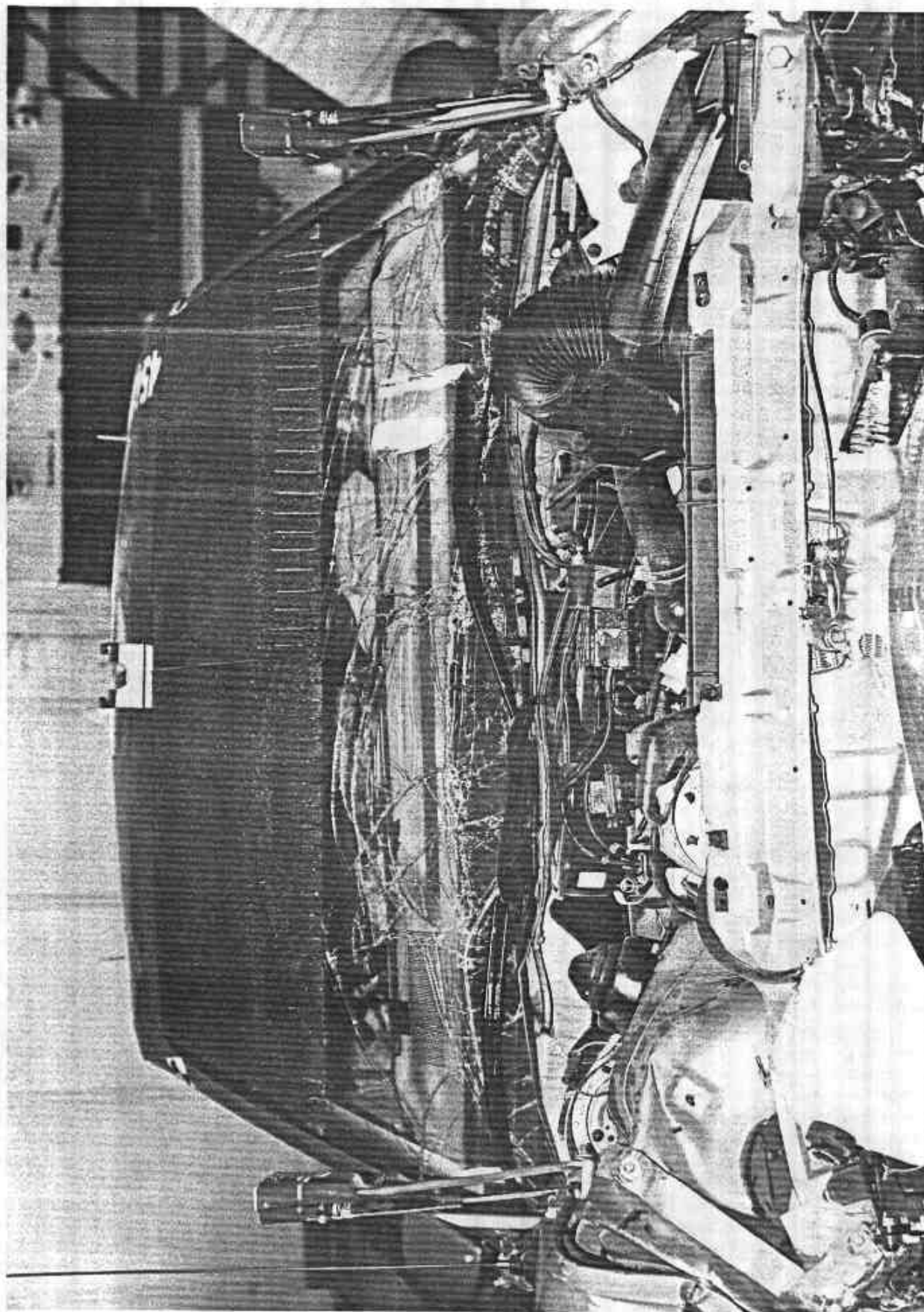


Figure A-21 POST-TEST ENGINE COMPARTMENT VIEW

A-22

7103-V-9

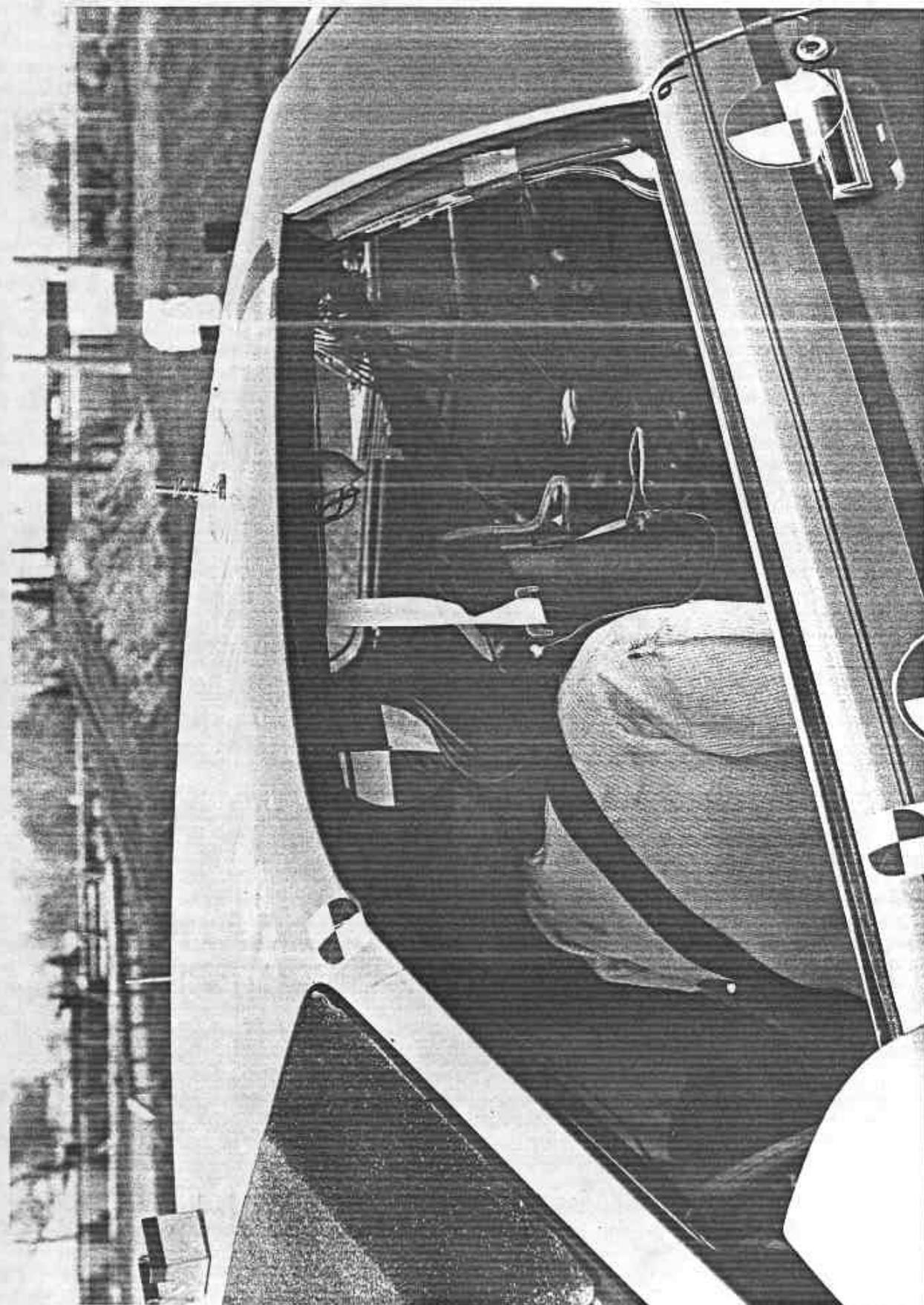


Figure A-22 PRE-TEST DRIVER POSITION VIEW



Figure A-23 POST-TEST DRIVER POSITION VIEW

A-24

7103-V-9

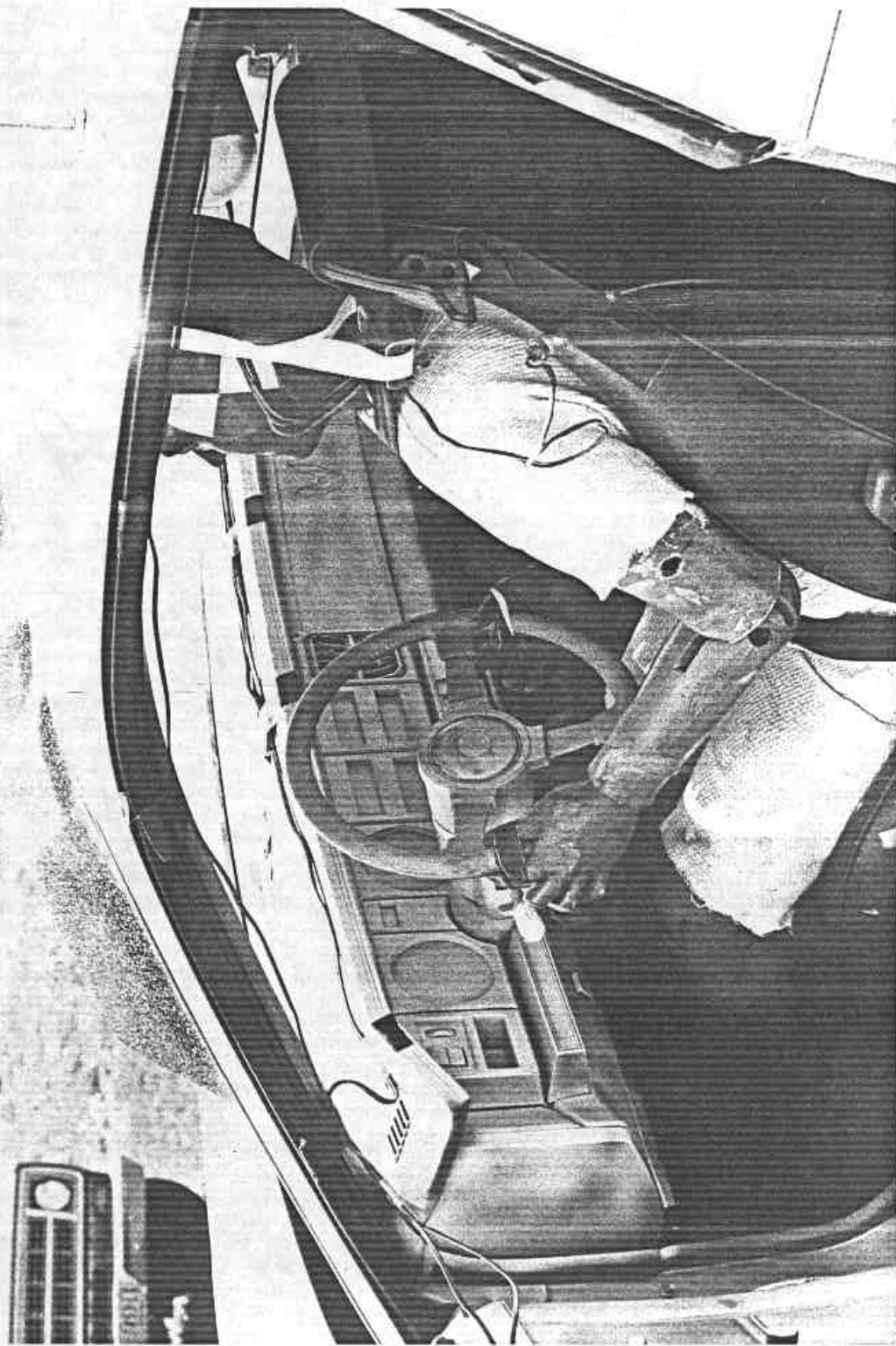


Figure A-24 PRE-TEST DRIVER AND INTERIOR VIEW

A-25

7103-V-9



Figure A-25 POST-TEST DRIVER AND INTERIOR VIEW



Figure A-26 PRE-TEST RIGHT FRONT PASSENGER VIEW



Figure A-27 POST-TEST RIGHT FRONT PASSENGER VIEW

A-28

7103-V-9



Figure A-28 PRE-TEST RIGHT FRONT PASSENGER AND INTERIOR VIEW

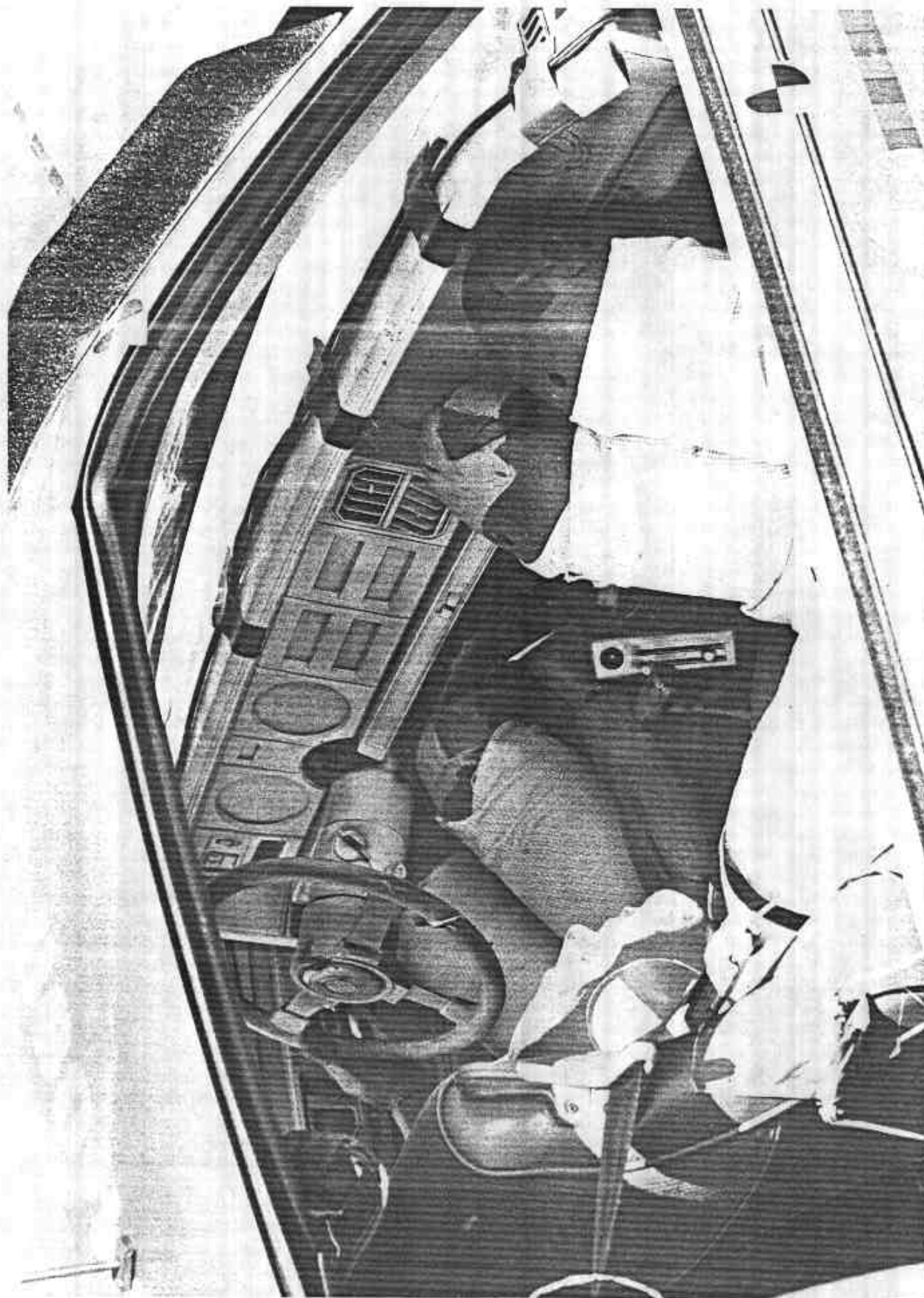


Figure A-29 POST-TEST RIGHT FRONT PASSENGER AND INTERIOR VIEW

A-30

7103-V-9



Figure A-30 POST-TEST BELT DEPLOYMENT ON RIGHT FRONT PASSENGER

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA

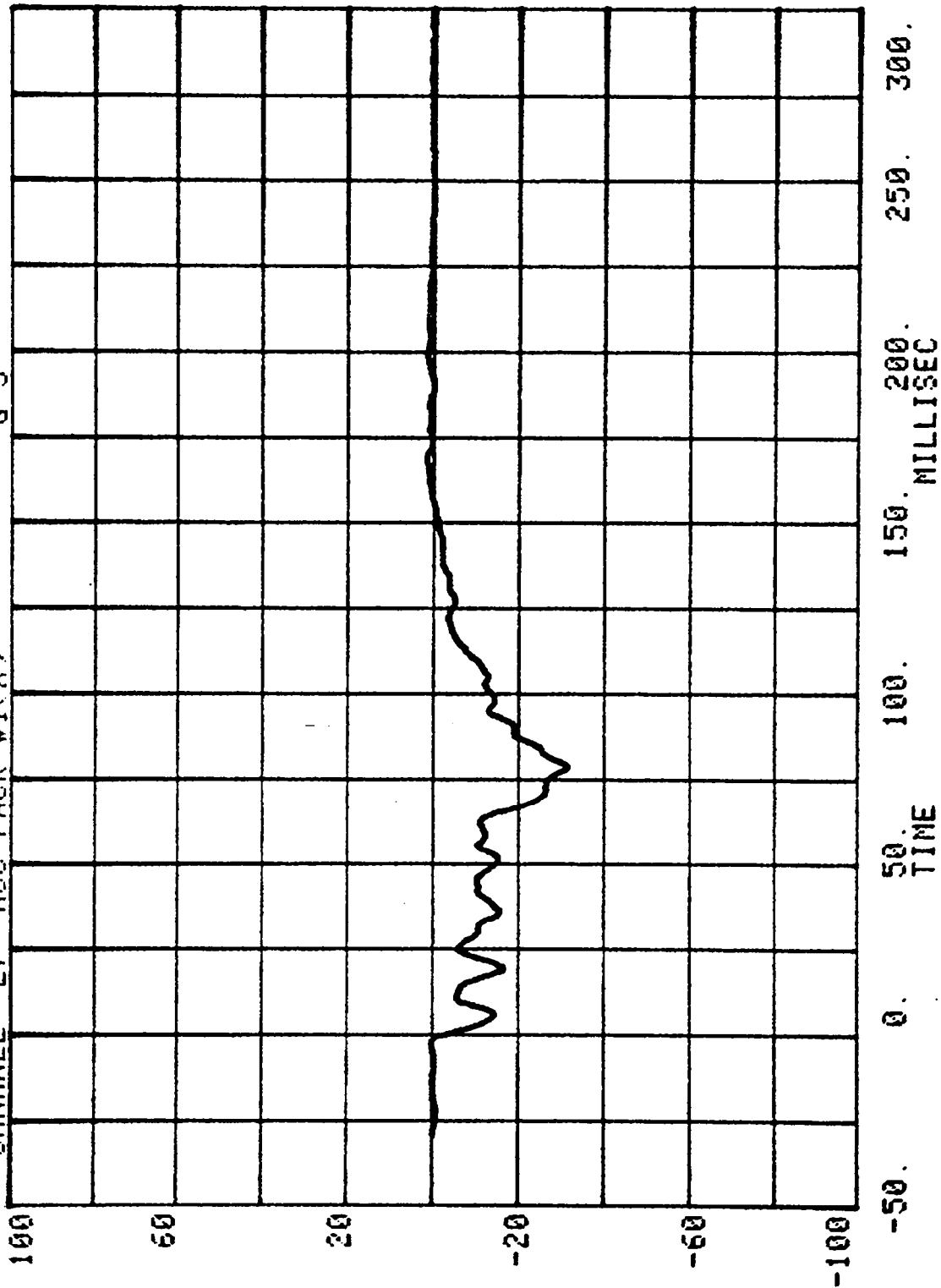
TEST NO. CD0114

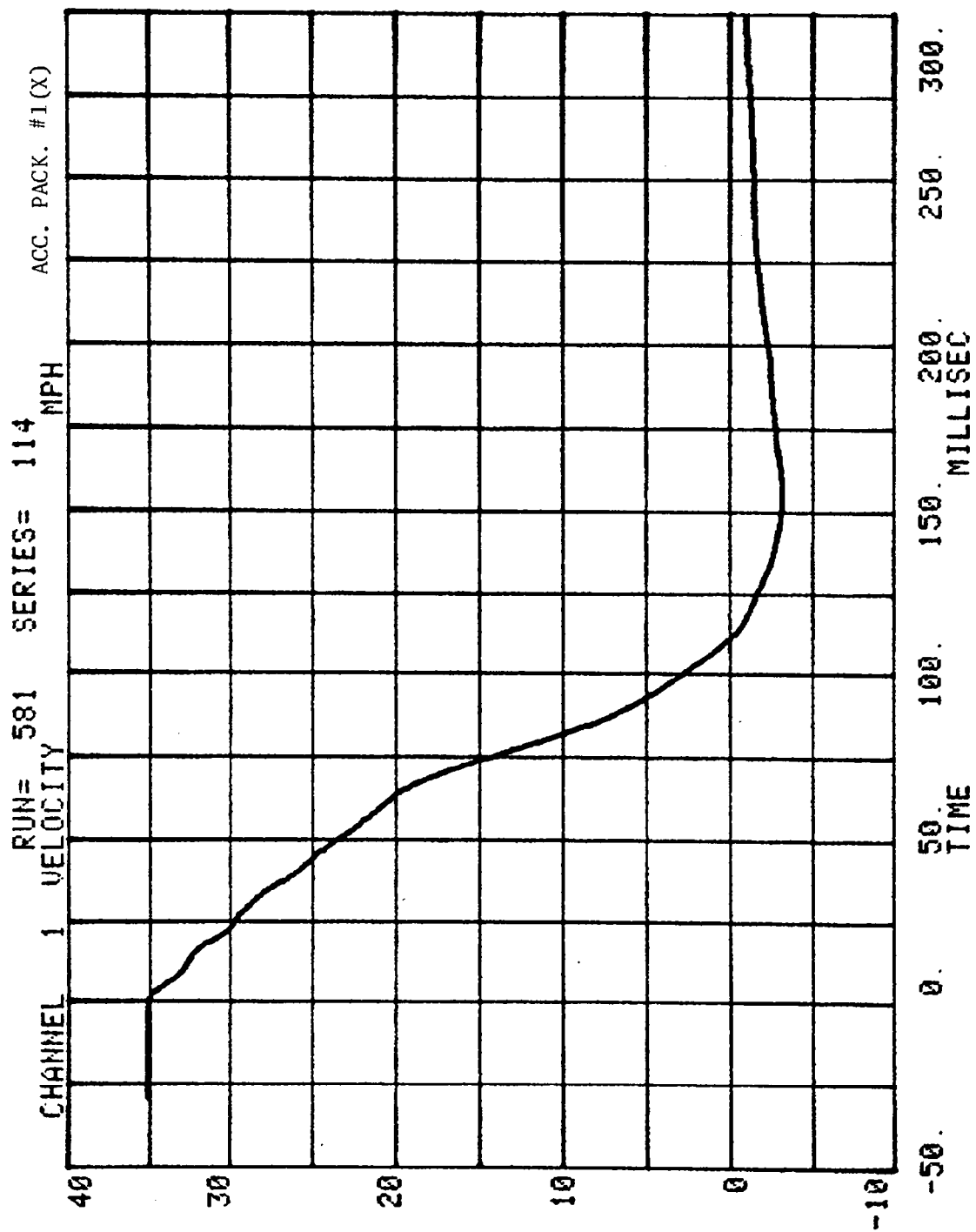
VEHICLE DATA

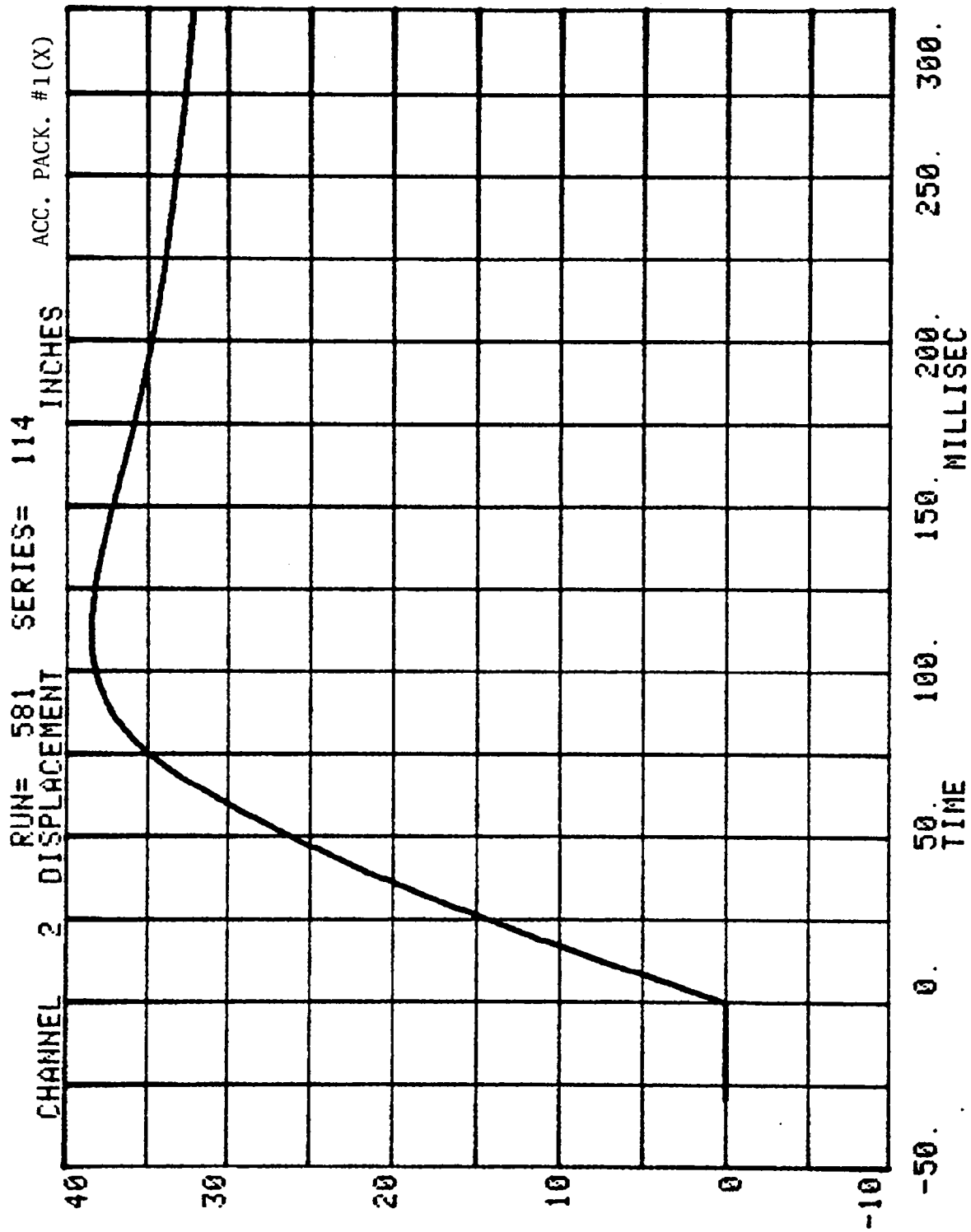
FILTER CHANNEL CLASS

60

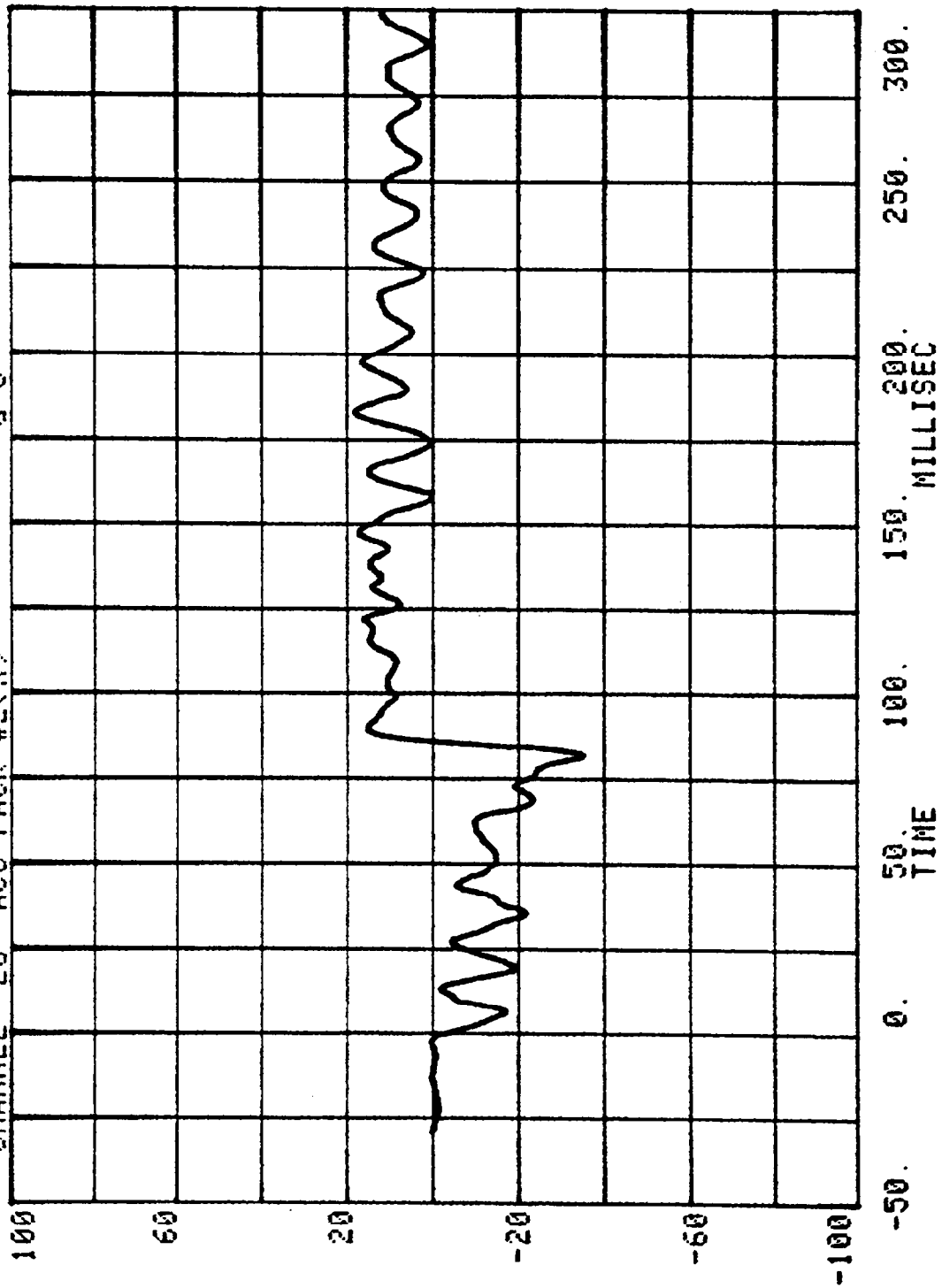
CHANNEL 27 ACC PACK #1(X) RUN= 581 SERIES= 114 G'S



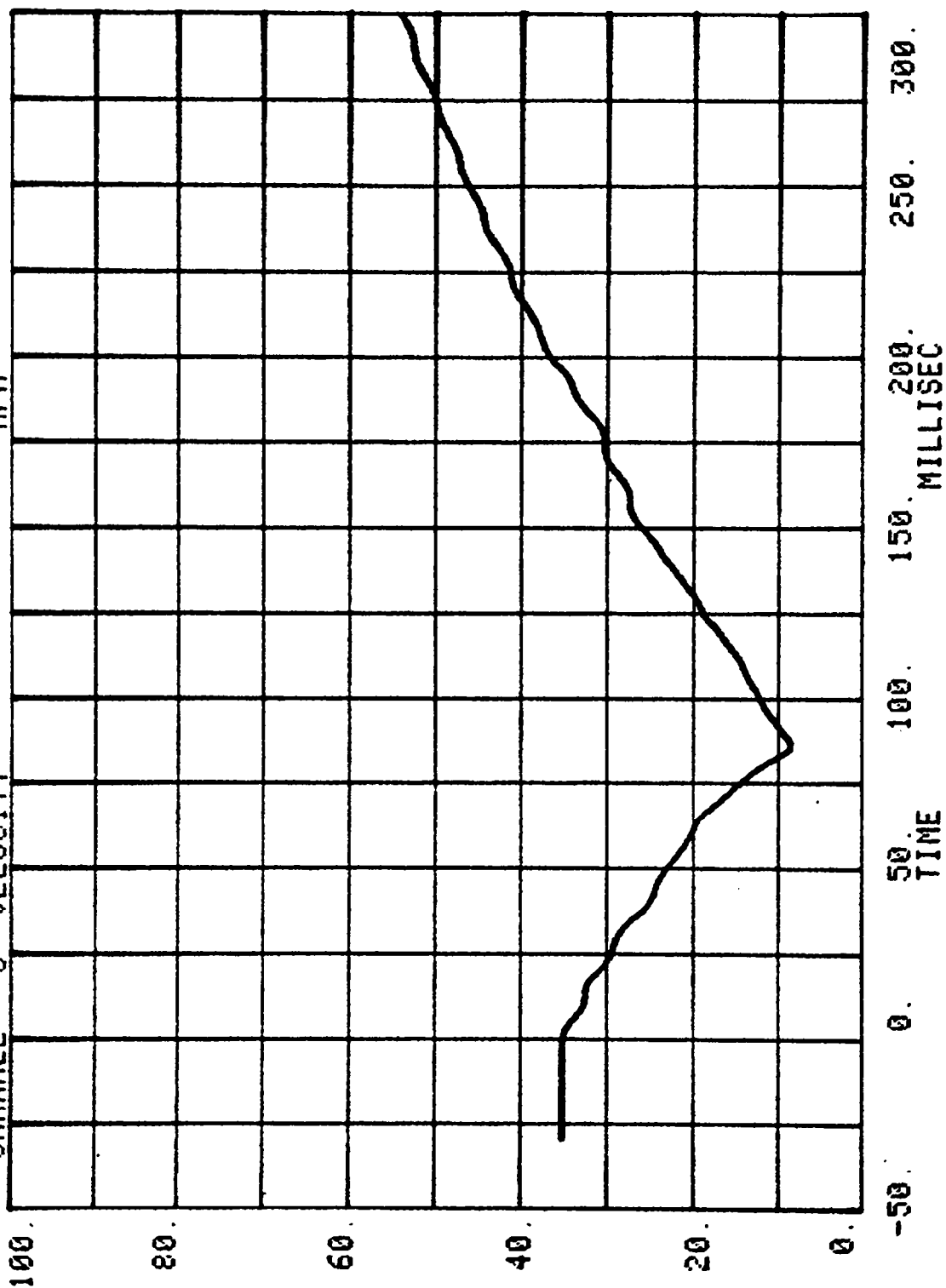


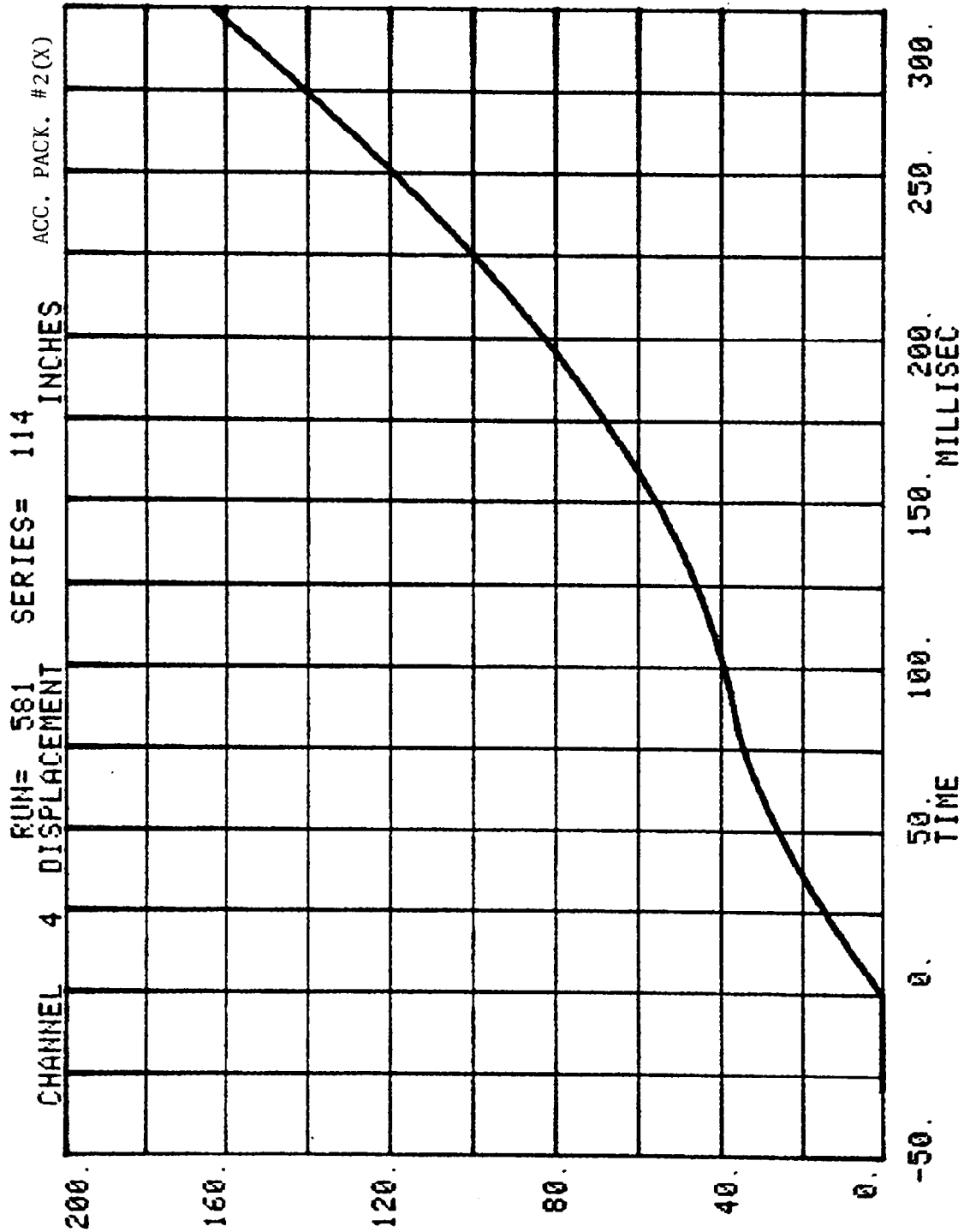


CHANNEL 28 ACC PACK #2(X) RUN= 581 SERIES= 114 G'S

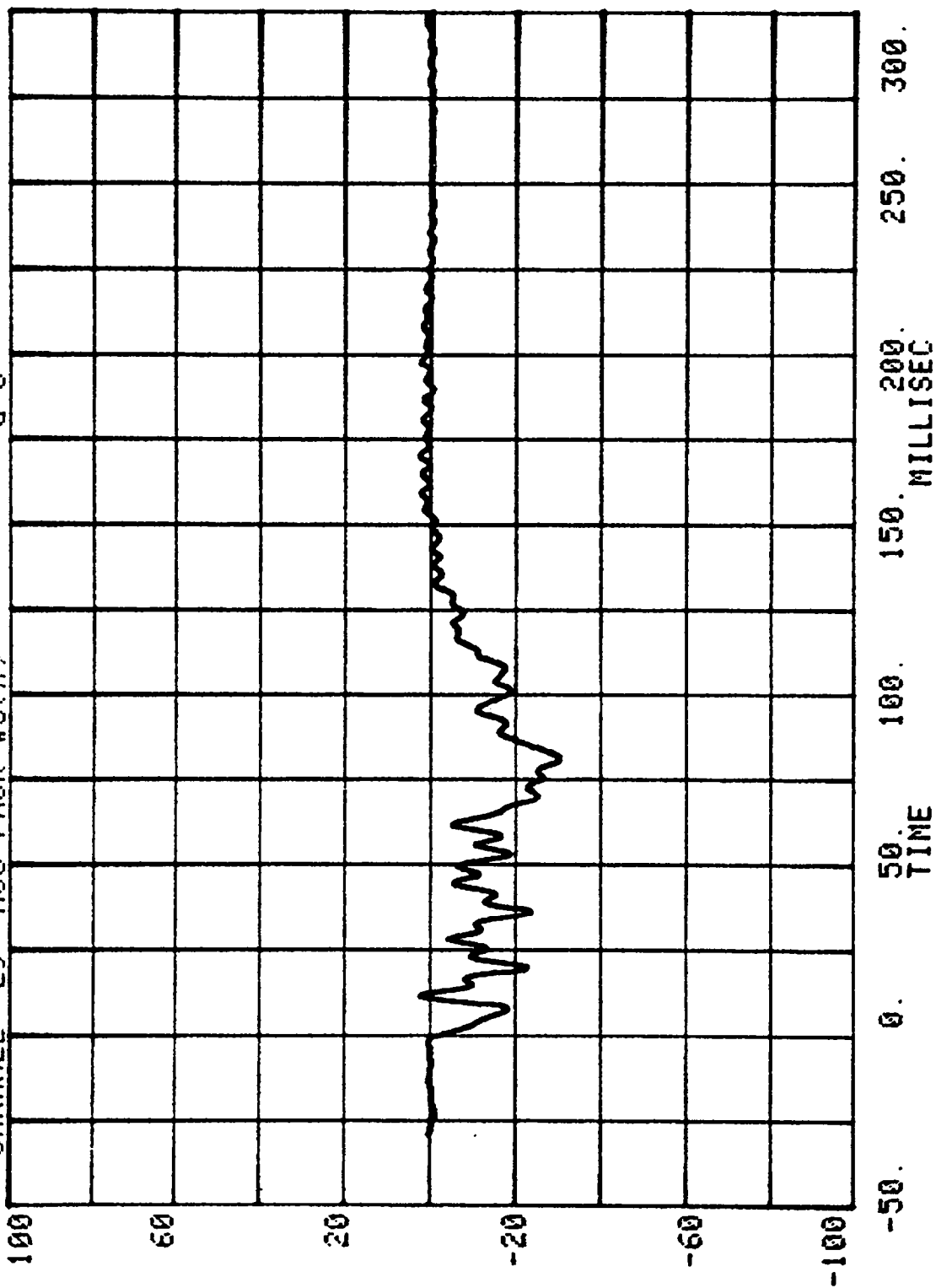


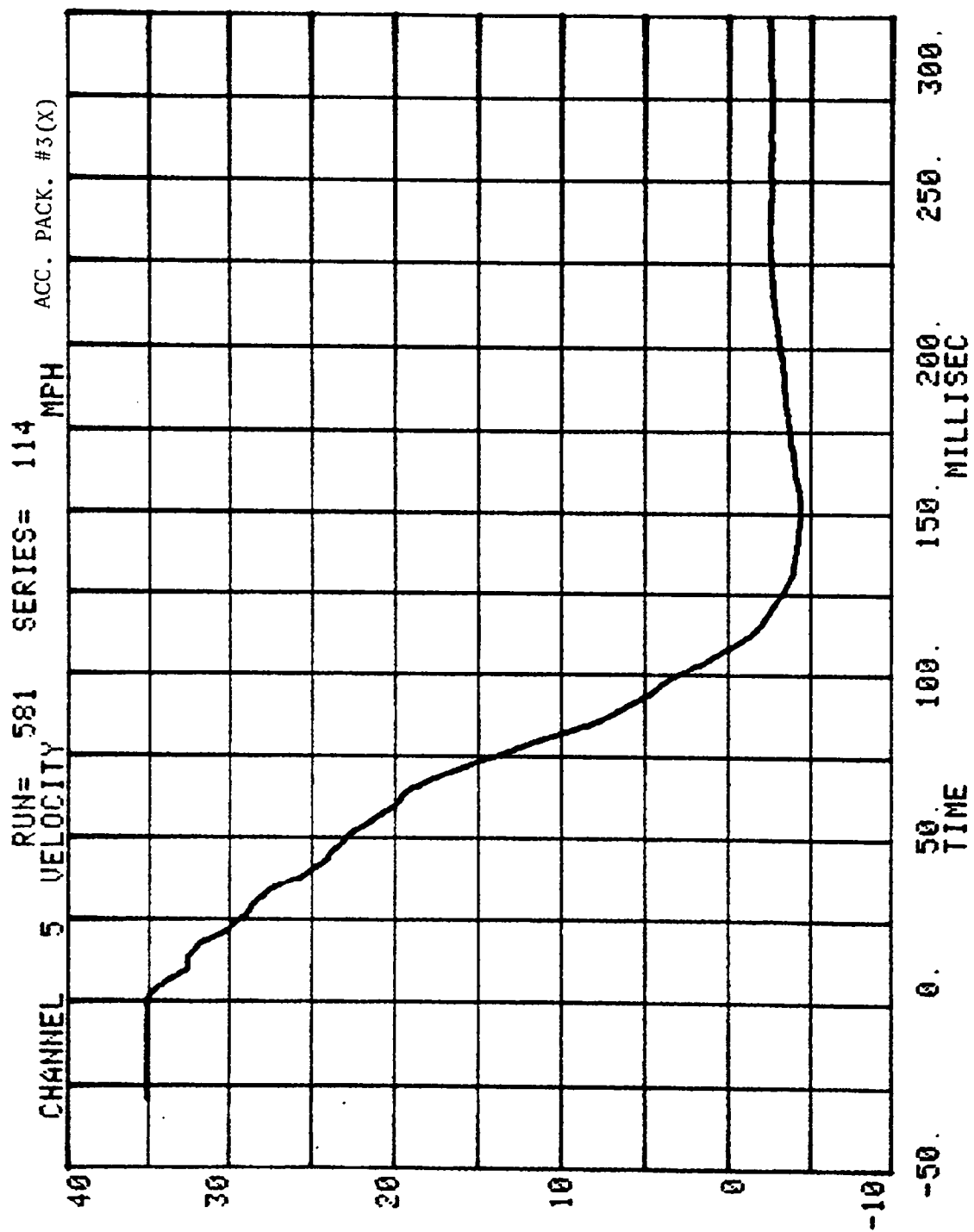
CHANNEL 3 VELOCITY
RUN= 581 SERIES= 114
ACC. PACK. #2(X)

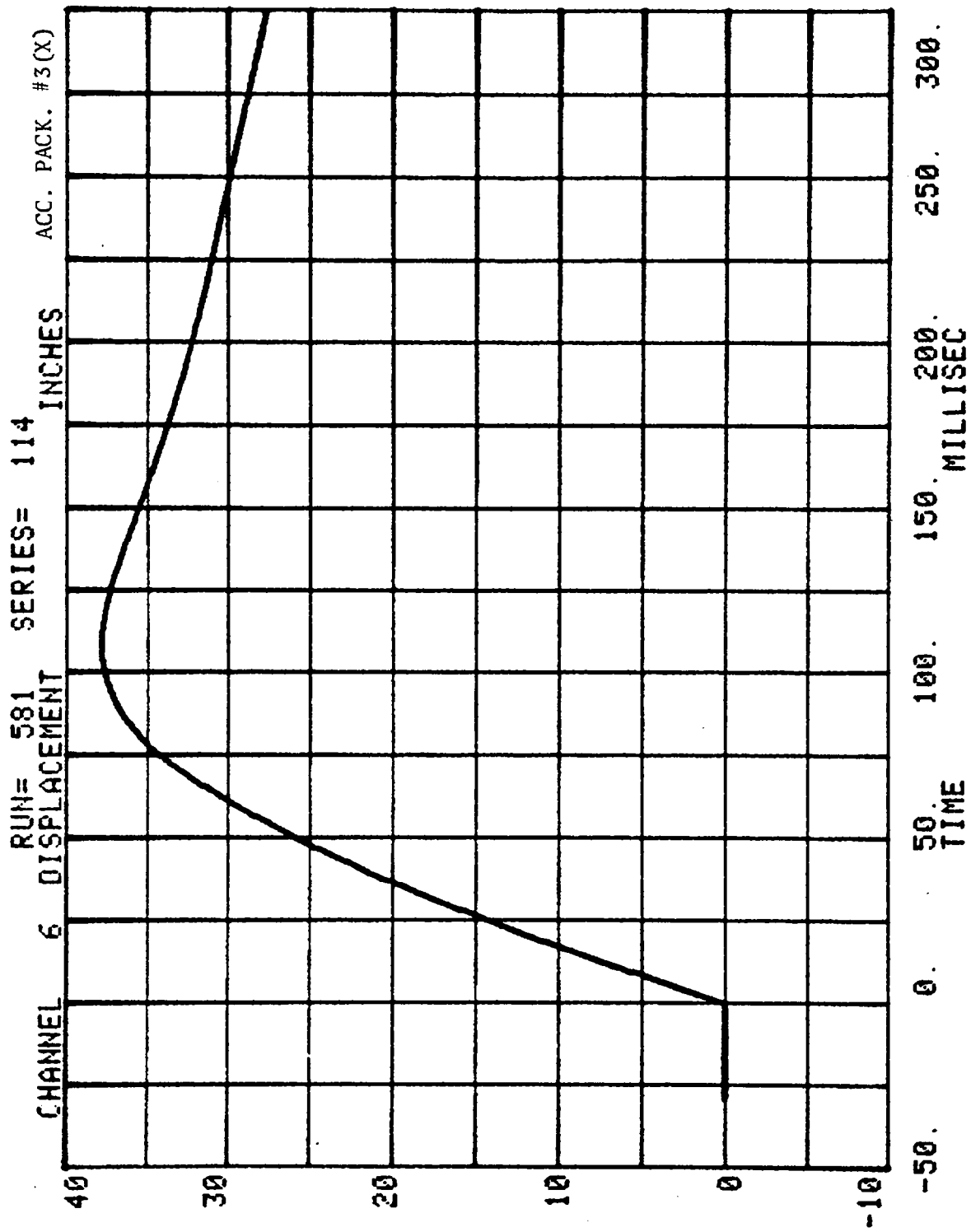




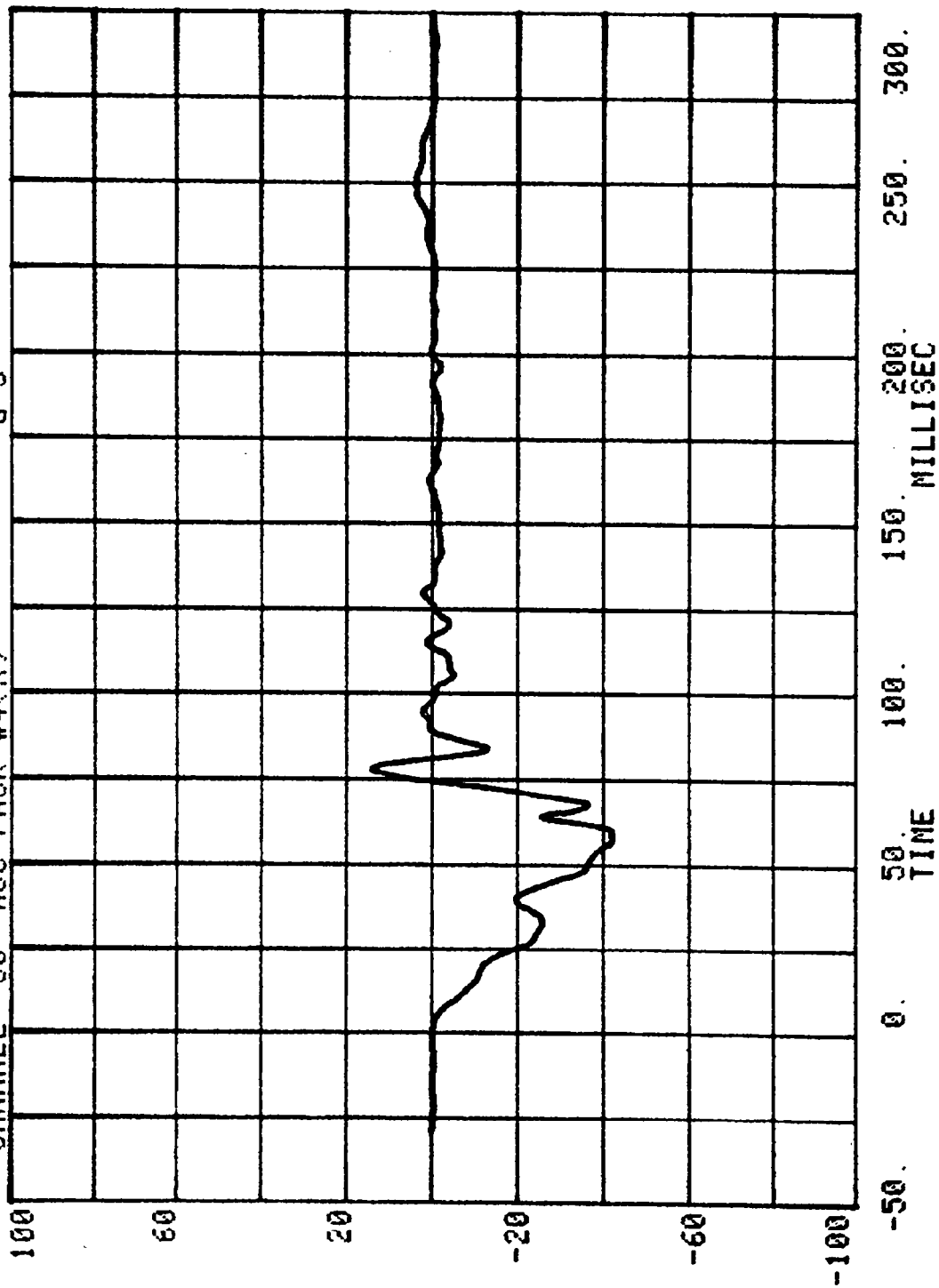
RUN= 581 SERIES= 114
CHANNEL 29 ACC PACK #3(X) G'S



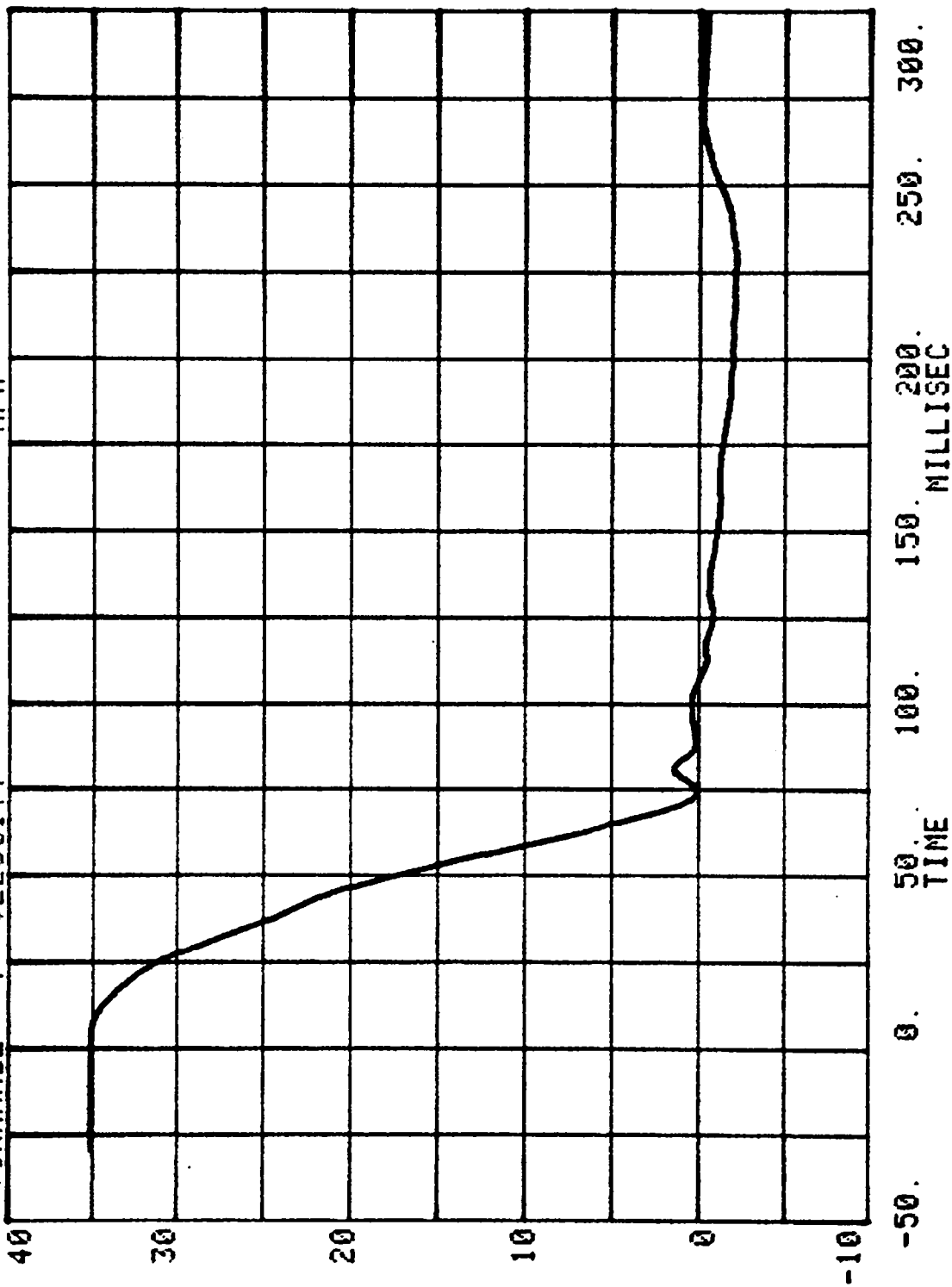




RUN= 581 SERIES= 114 G'S
CHANNEL 30 ACC PACK #4(X)



CHANNEL 7 VELOCITY RUN= 581 SERIES= 114 MPH ACC. PACK. #4(X)

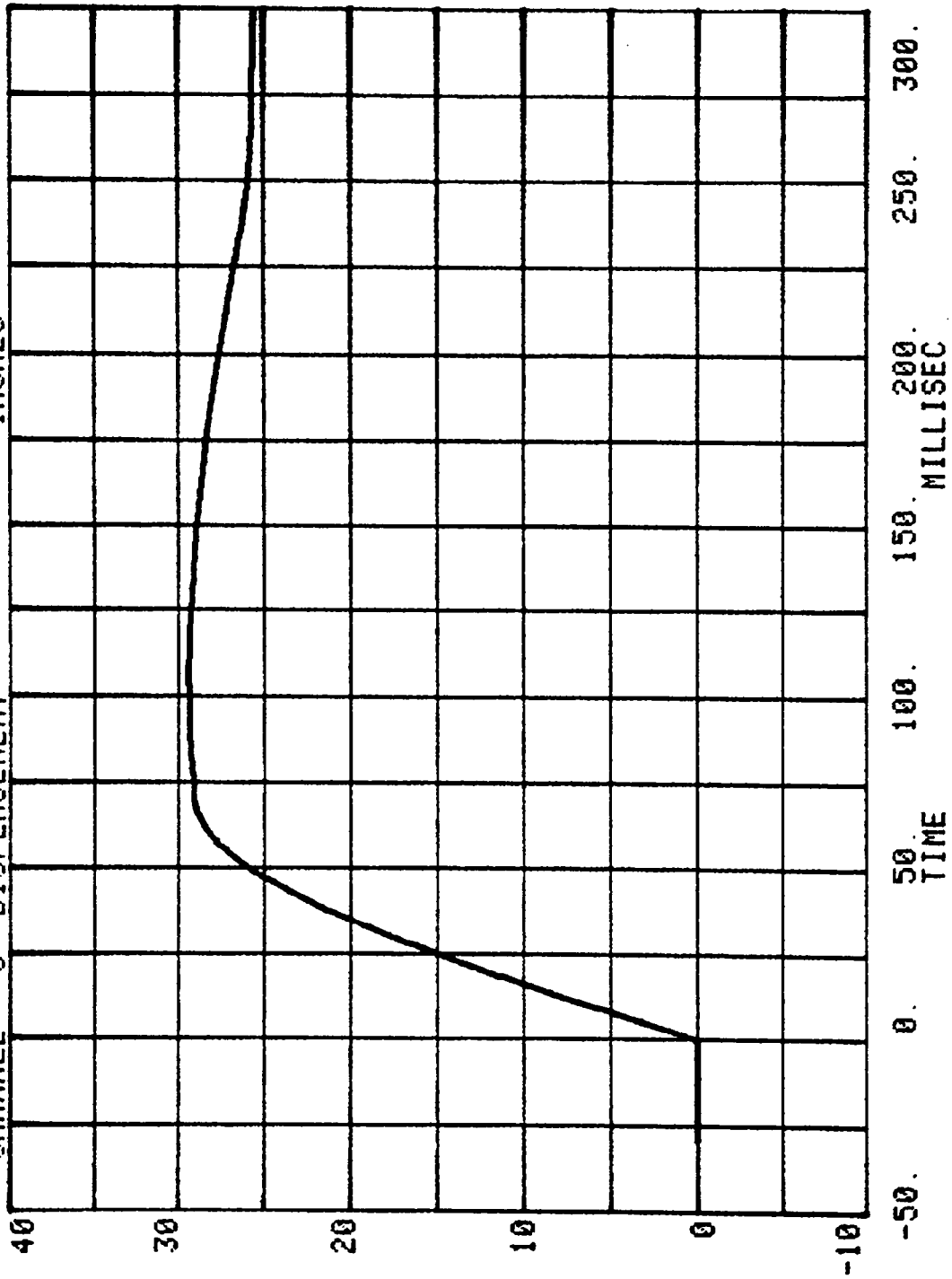


ACC. PACK. #4(X)

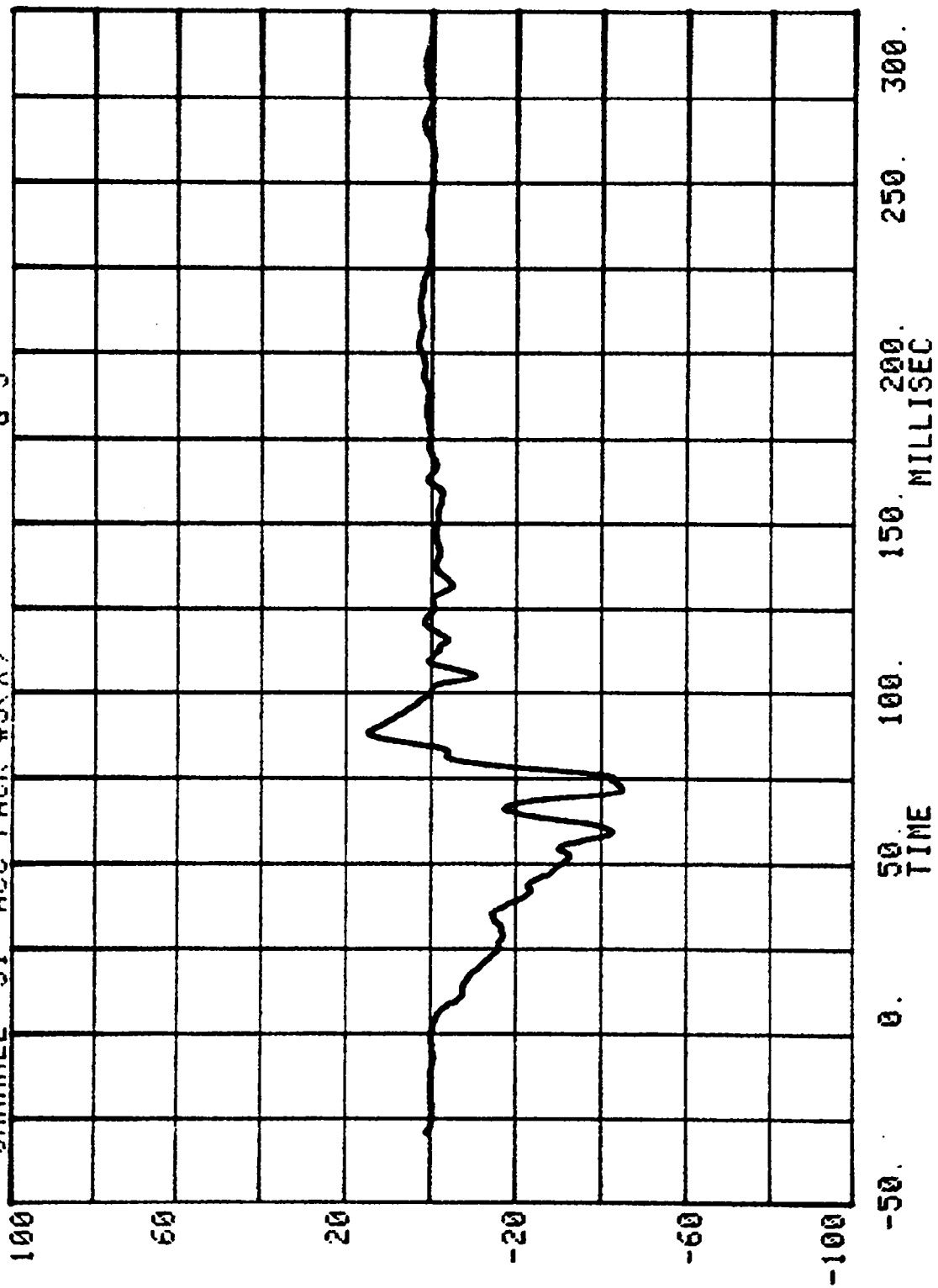
SERIES= 114 INCHES

RUN= 581

CHANNEL 8 DISPLACEMENT



CHANNEL 31 ACC PACK #5(X) RUN= 581 SERIES= 114 G'S

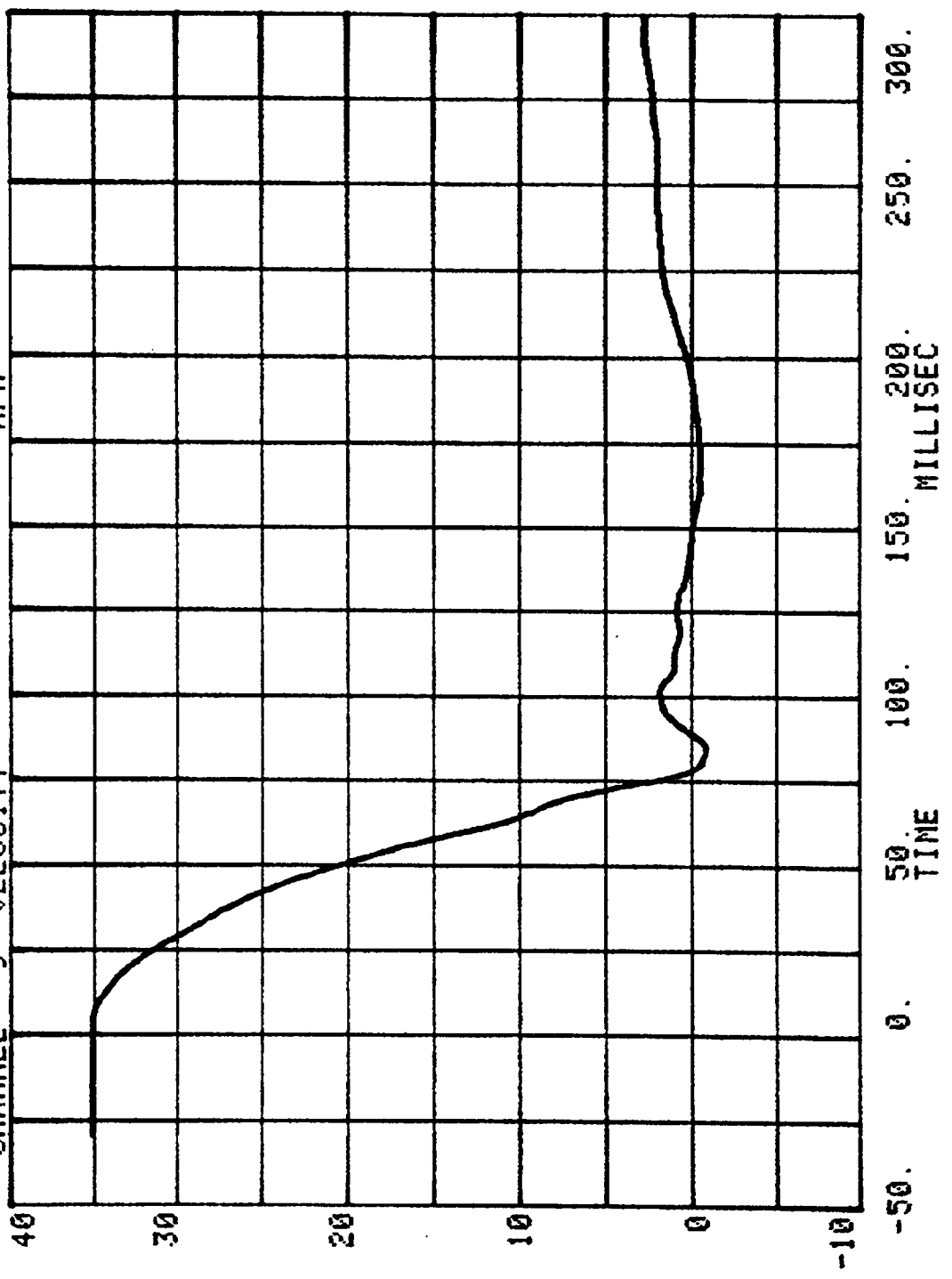


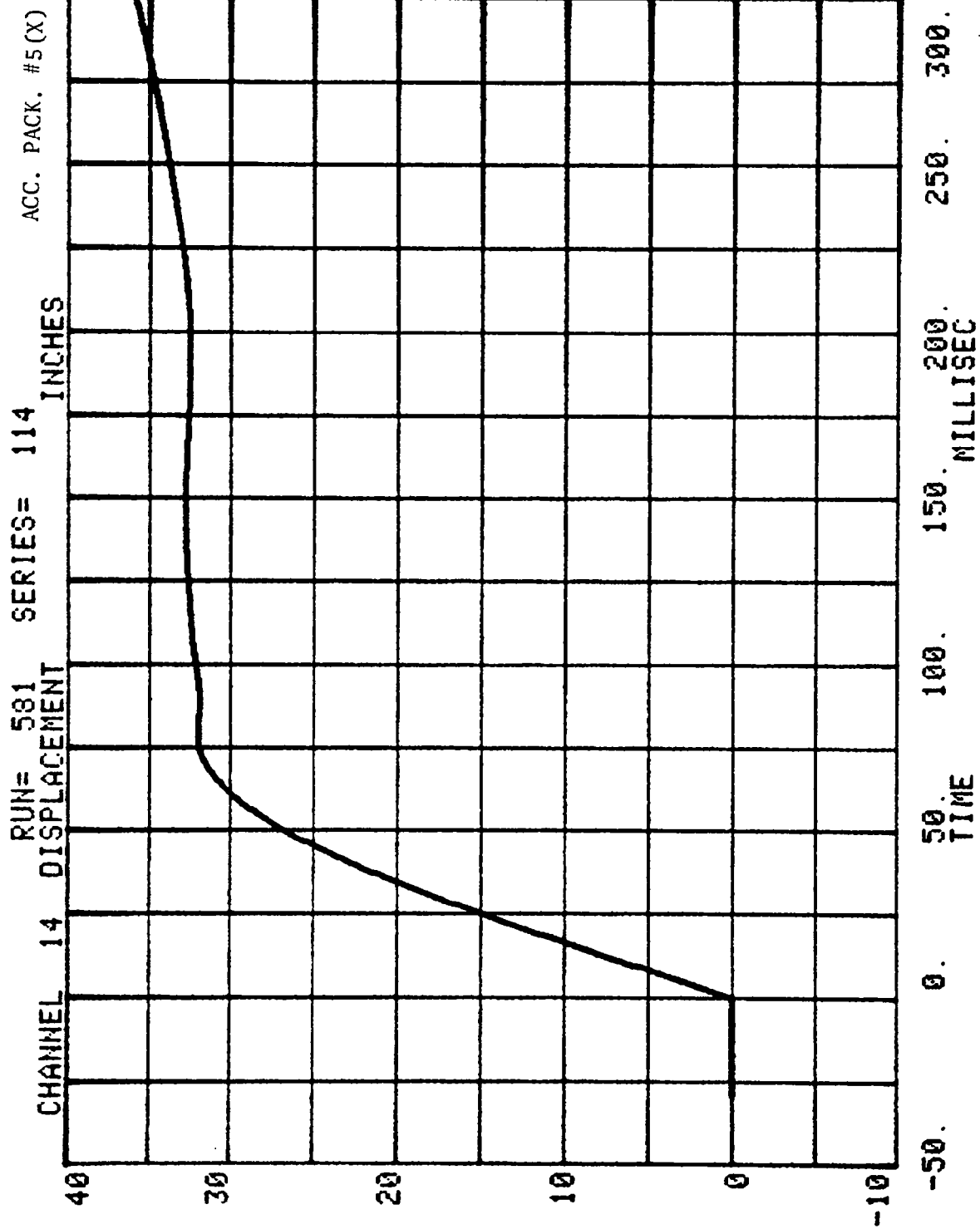
ACC. PACK. #5(X)

SERIES= 114 MPH

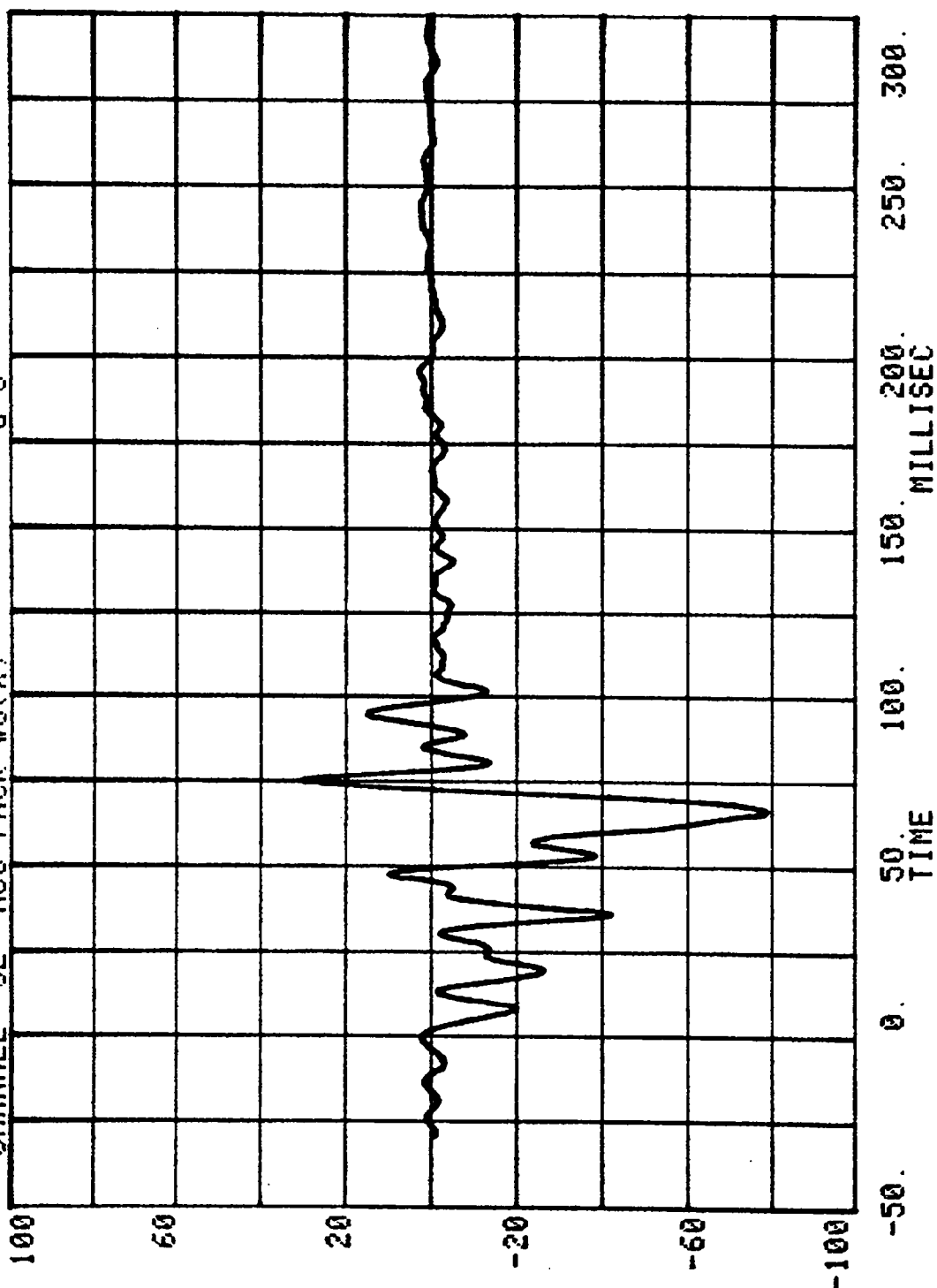
RUN= 581

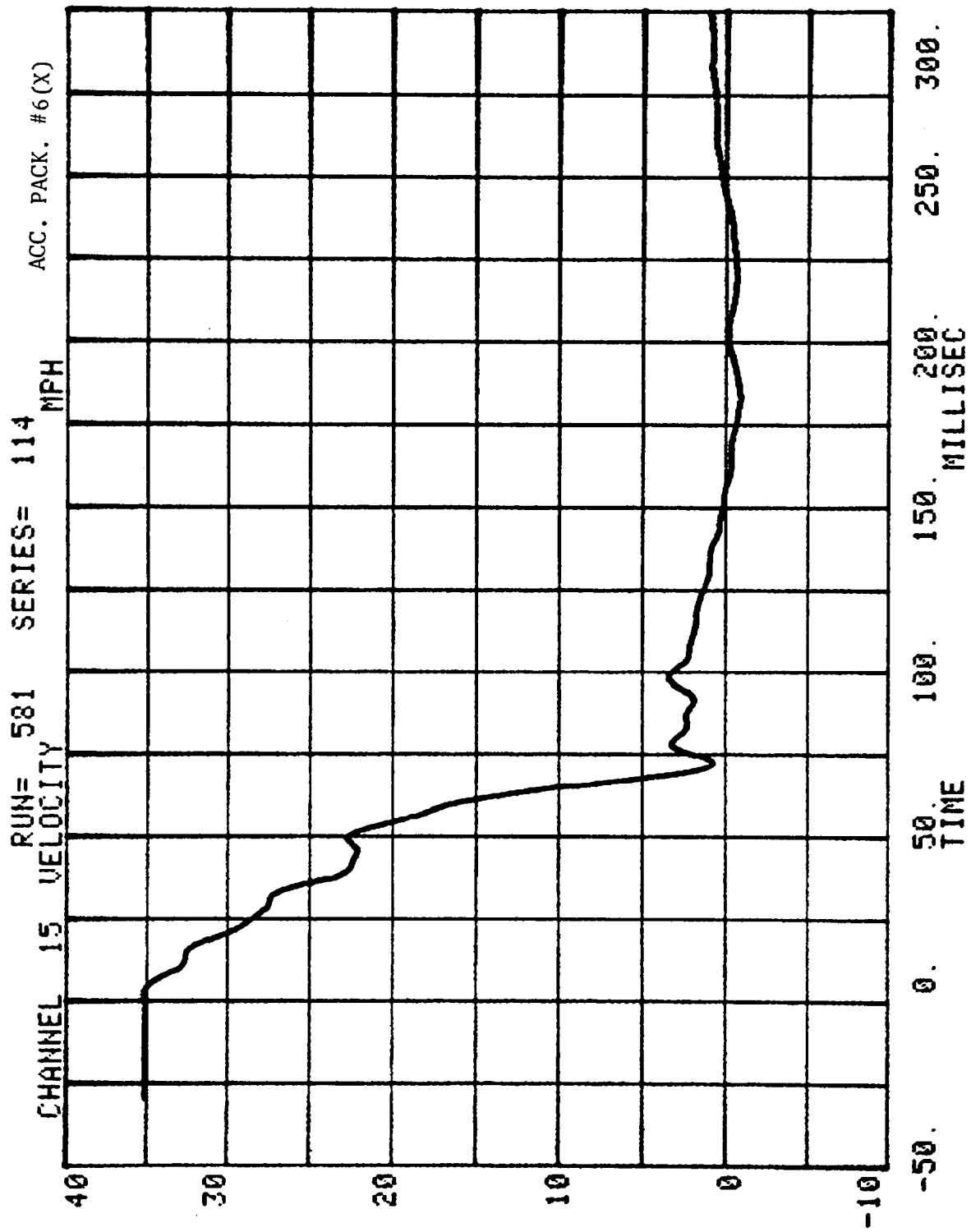
CHANNEL 3 VELOCITY

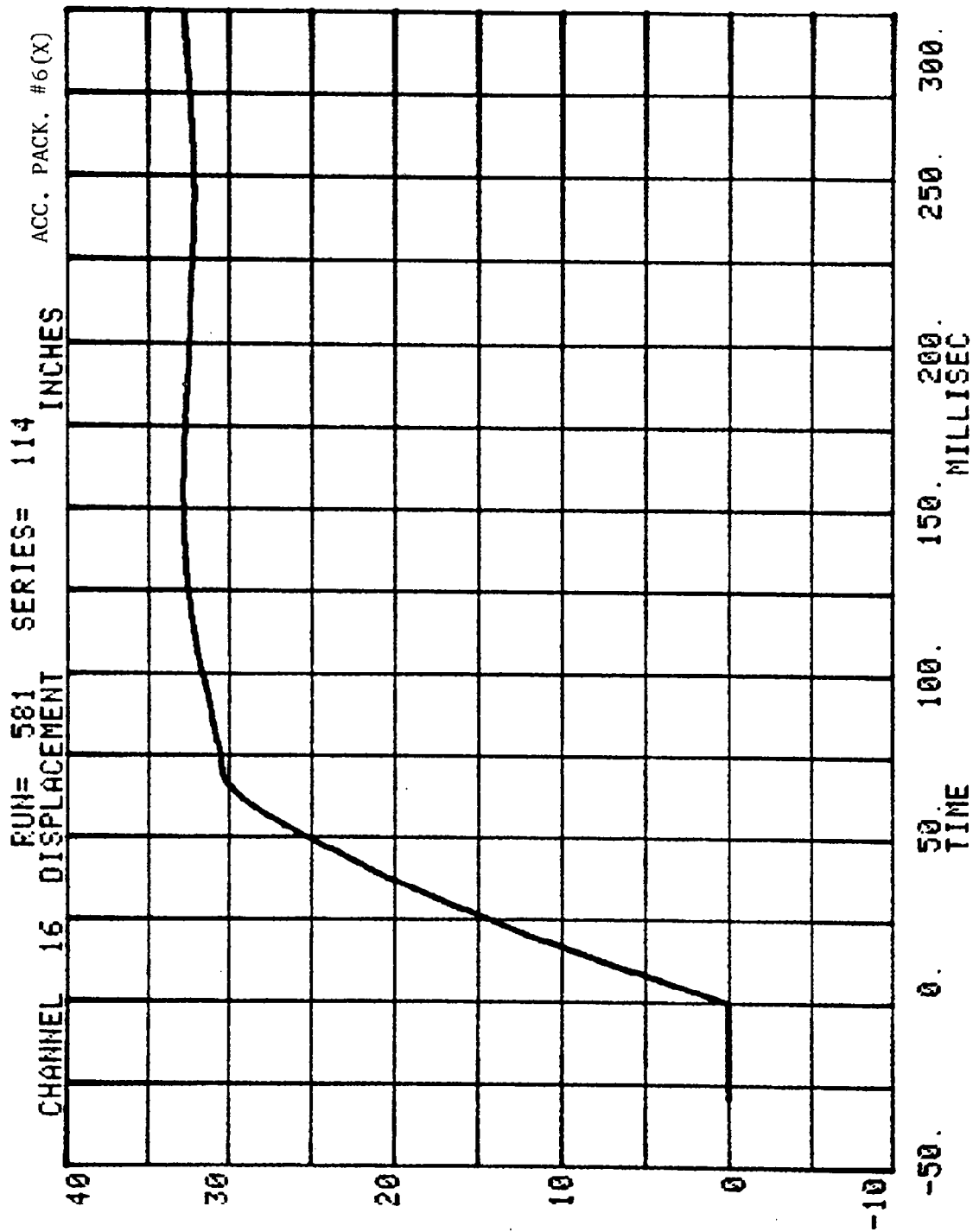




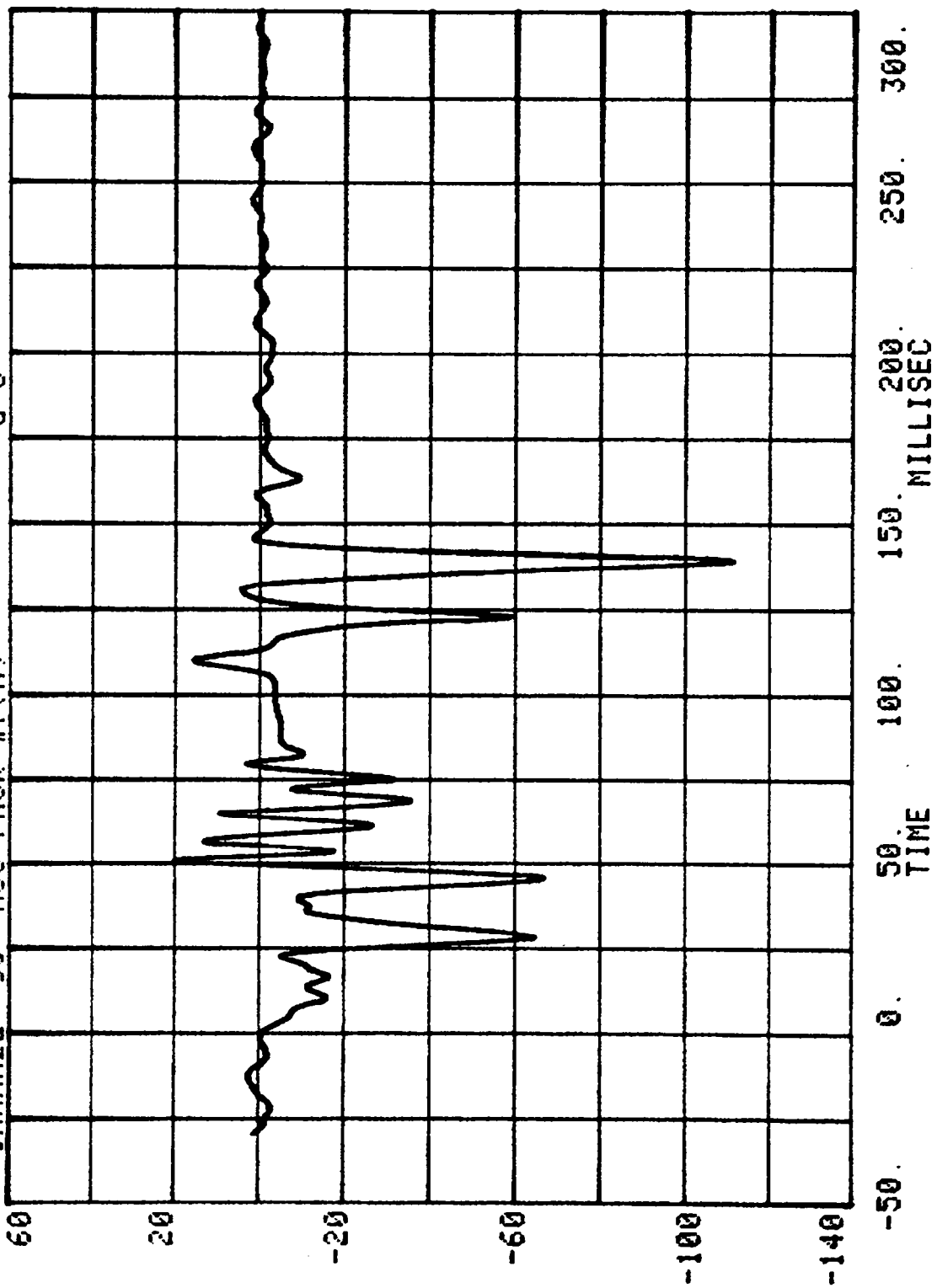
RUN= 581 SERIES= 114 G'S
CHANNEL 32 ACC PACK #6(X)

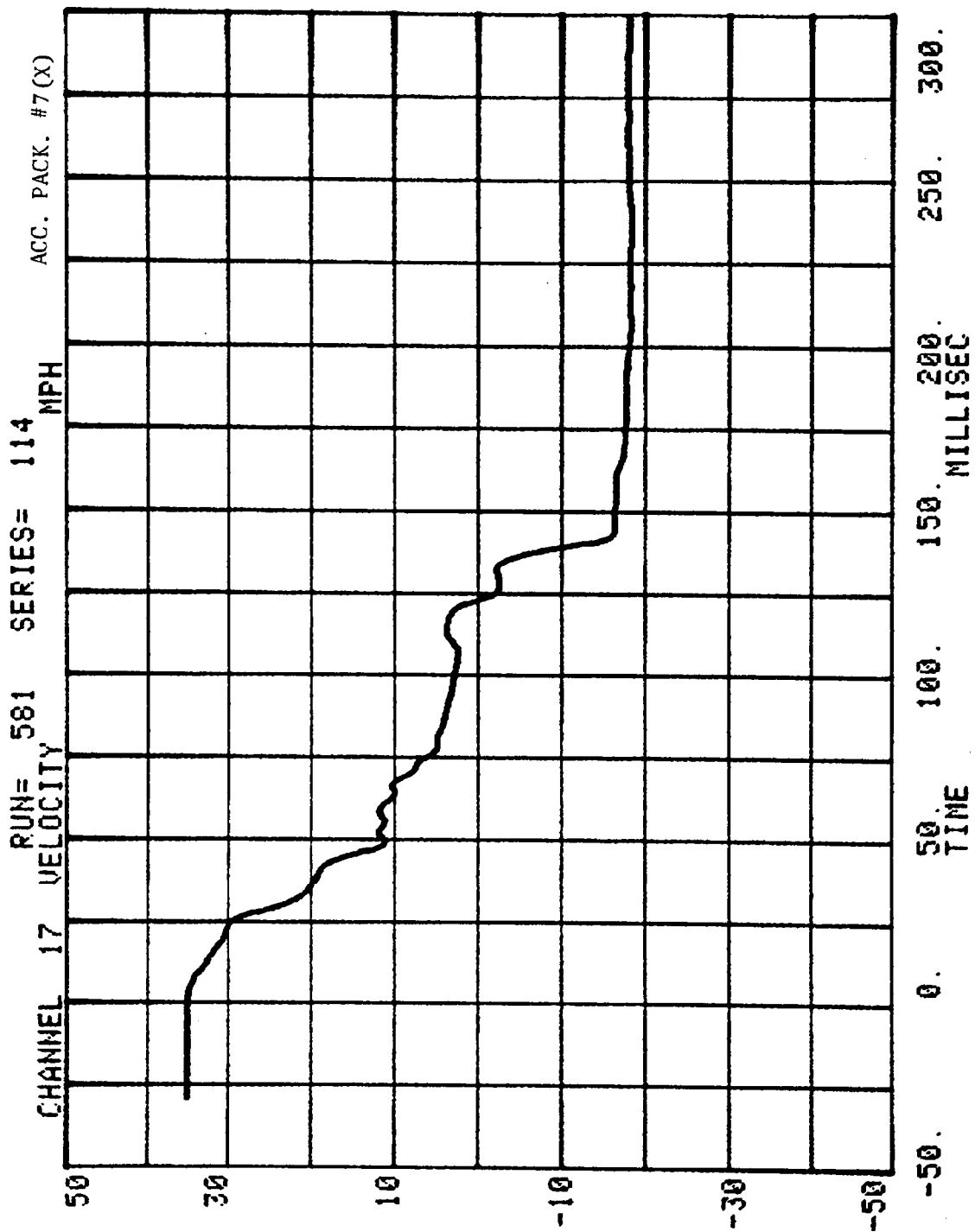




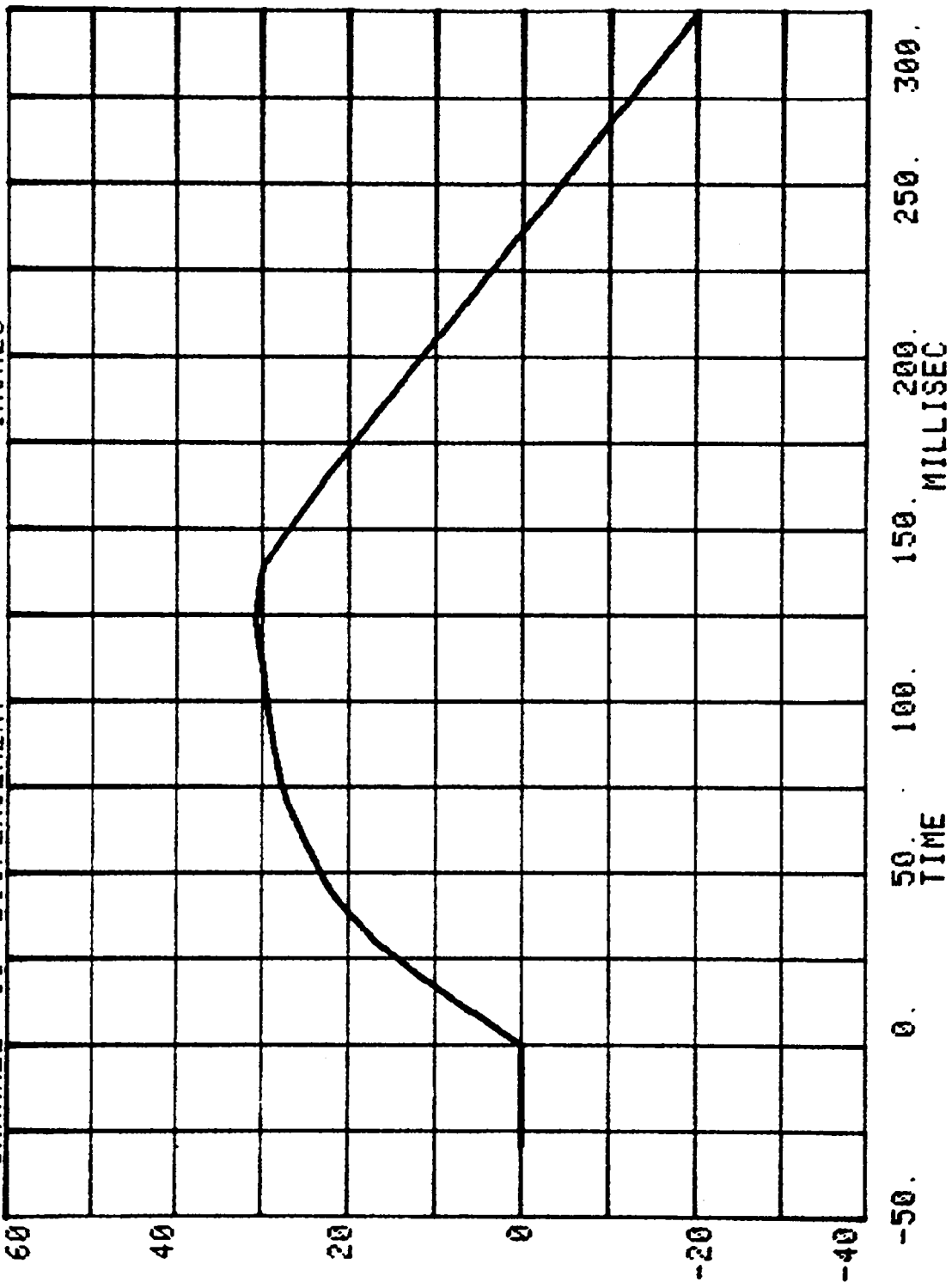


CHANNEL 33 ACC PACK #7(X) RUN= 581 SERIES= 114 G'S





CHANNEL 18 DISPLACEMENT RUN= 581 SERIES= 114 INCHES ACC. PACK. #7 (X)

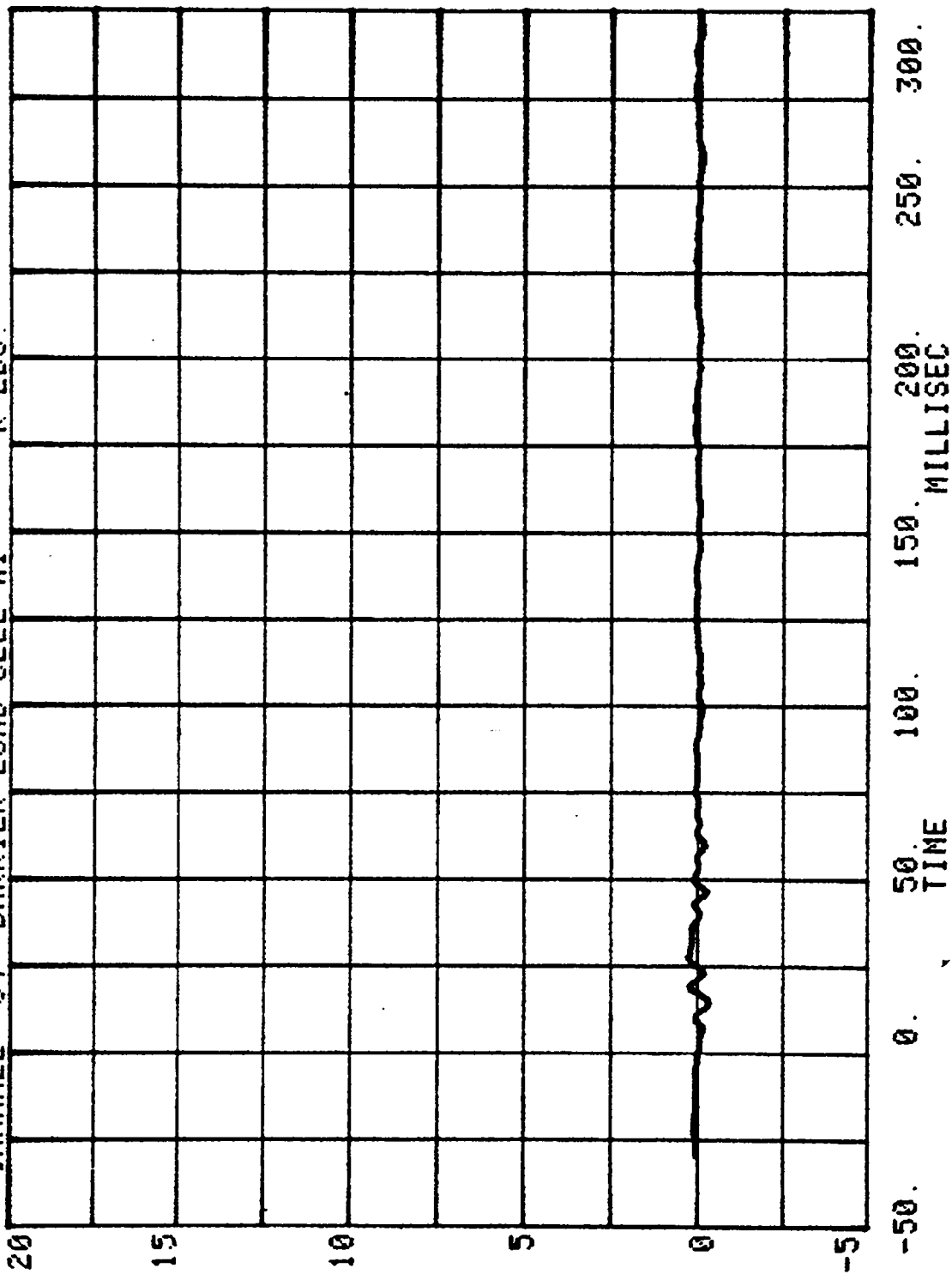


TEST NO. CD0114

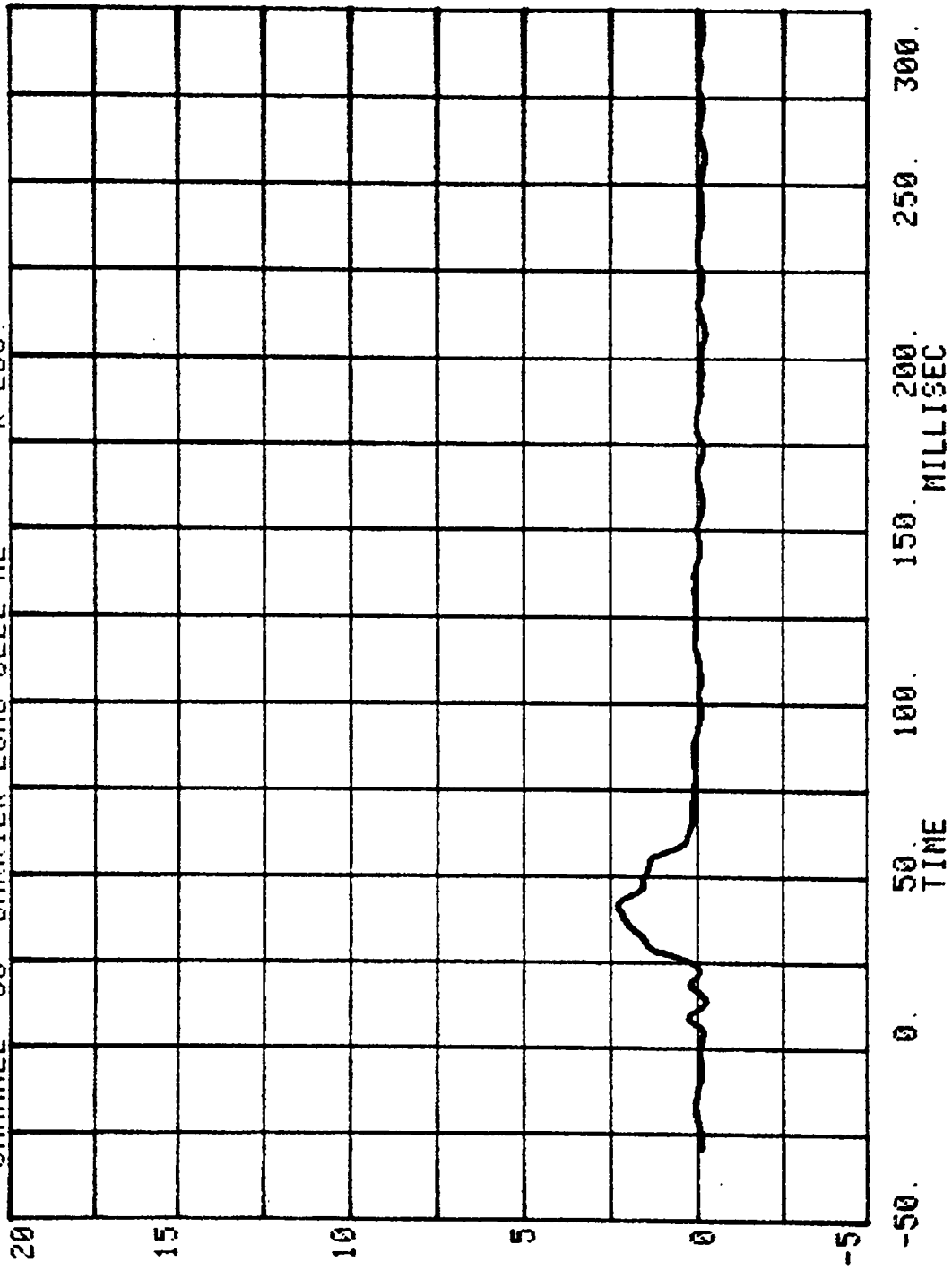
LOAD CELL BARRIER DATA
FILTER CHANNEL CLASS

60

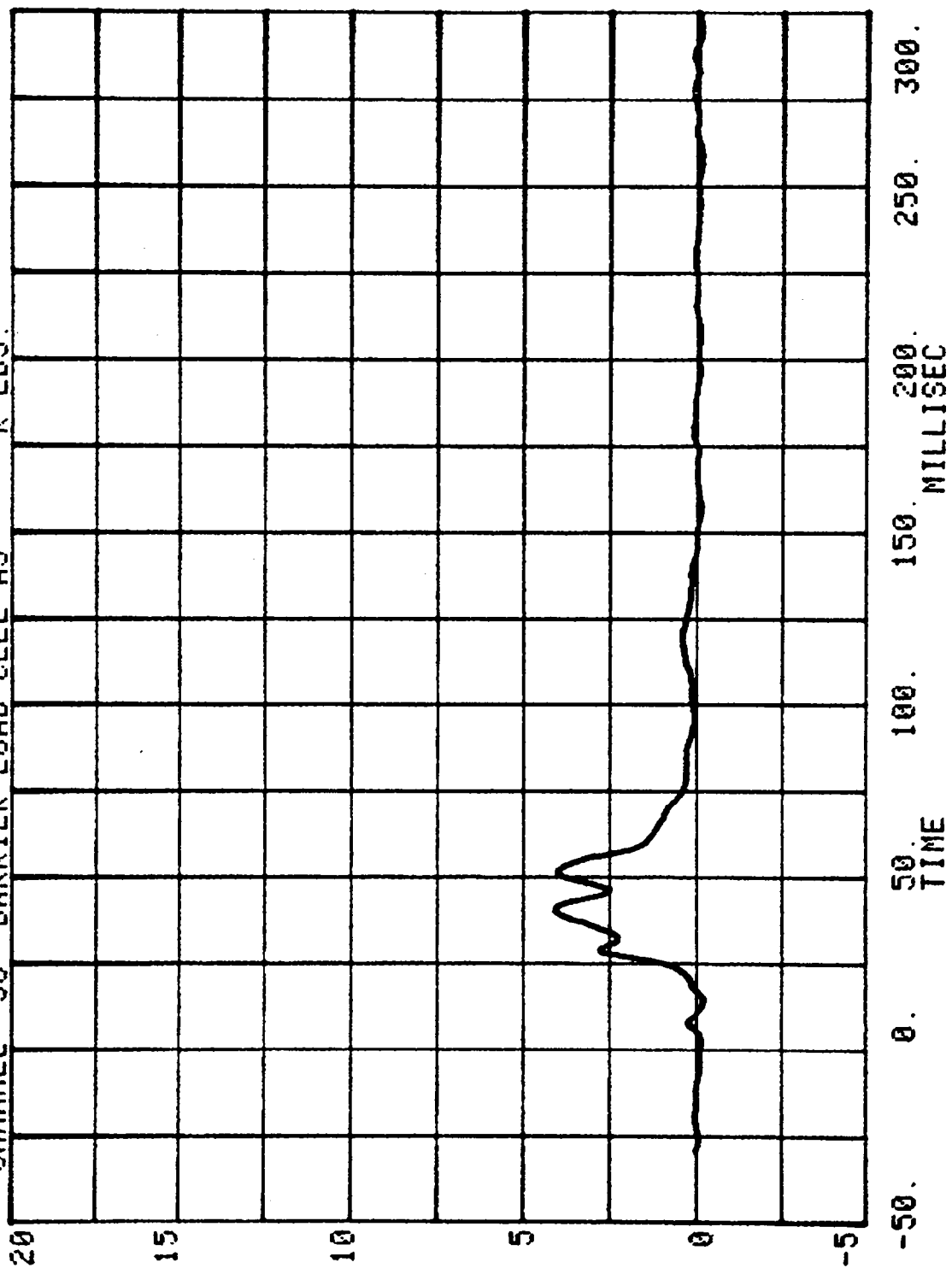
RUN= 581 SERIES= 114
CHANNEL 34 BARRIER LOAD CELL A1 K LBS.



CHANNEL 35 BARRIER LOAD CELL A2 RUN= 581 SERIES= 114 K LBS.

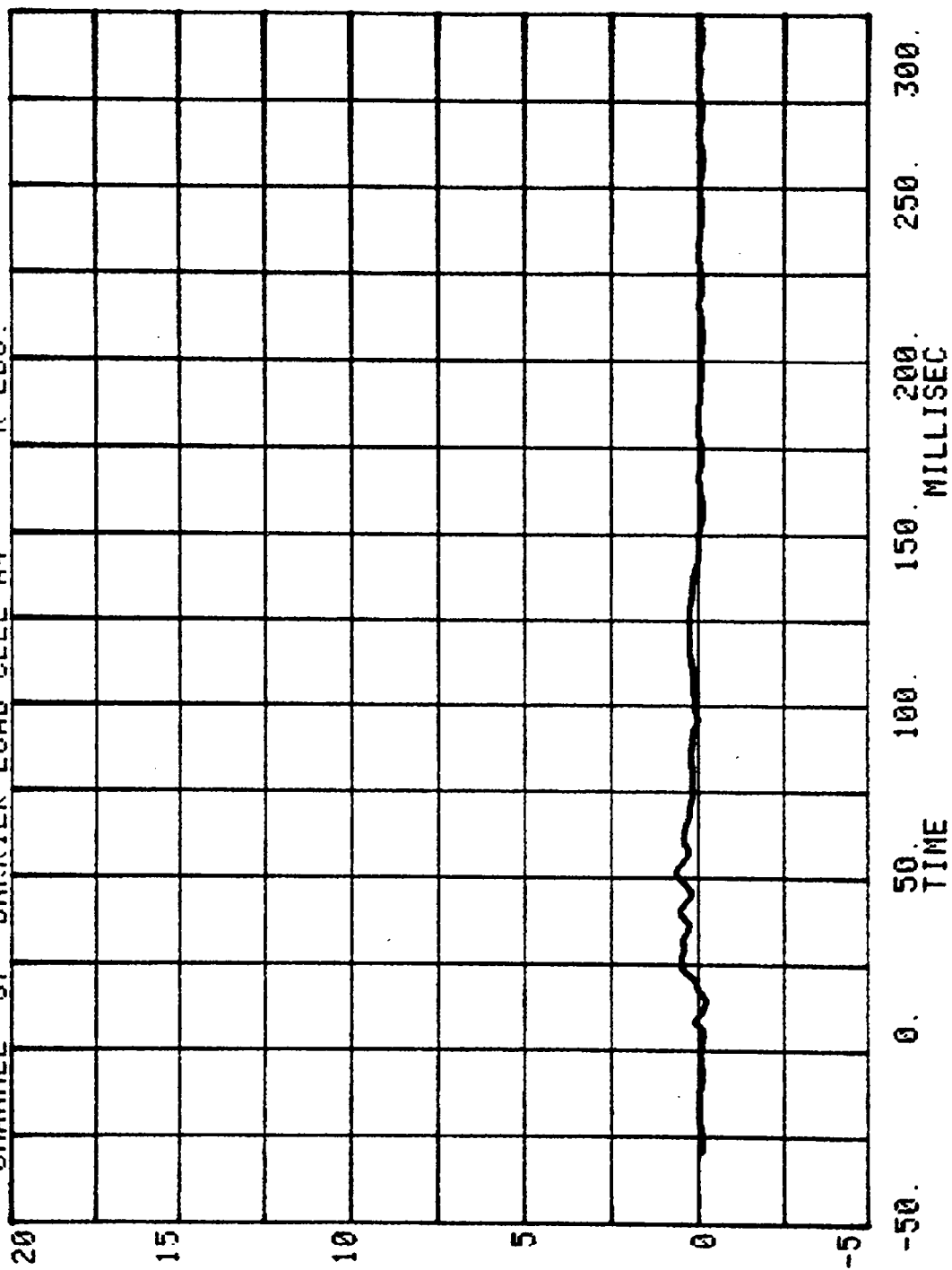


CHANNEL 36 BARRIER LOAD CELL A3 RUN= 521 SERIES= 114 K LBS.

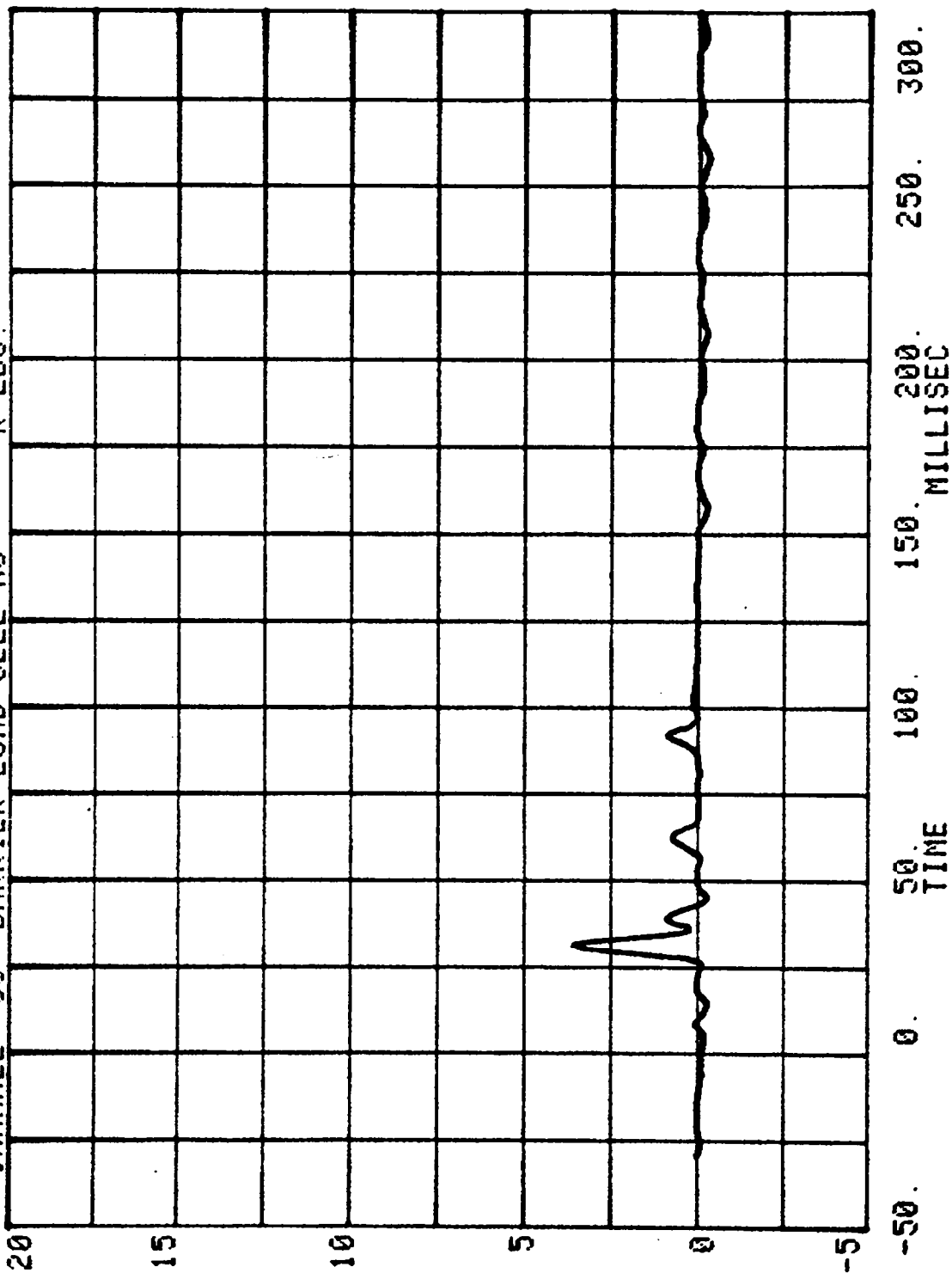


CHANNEL 37 BARRIER LOAD CELL #4 K LBS.

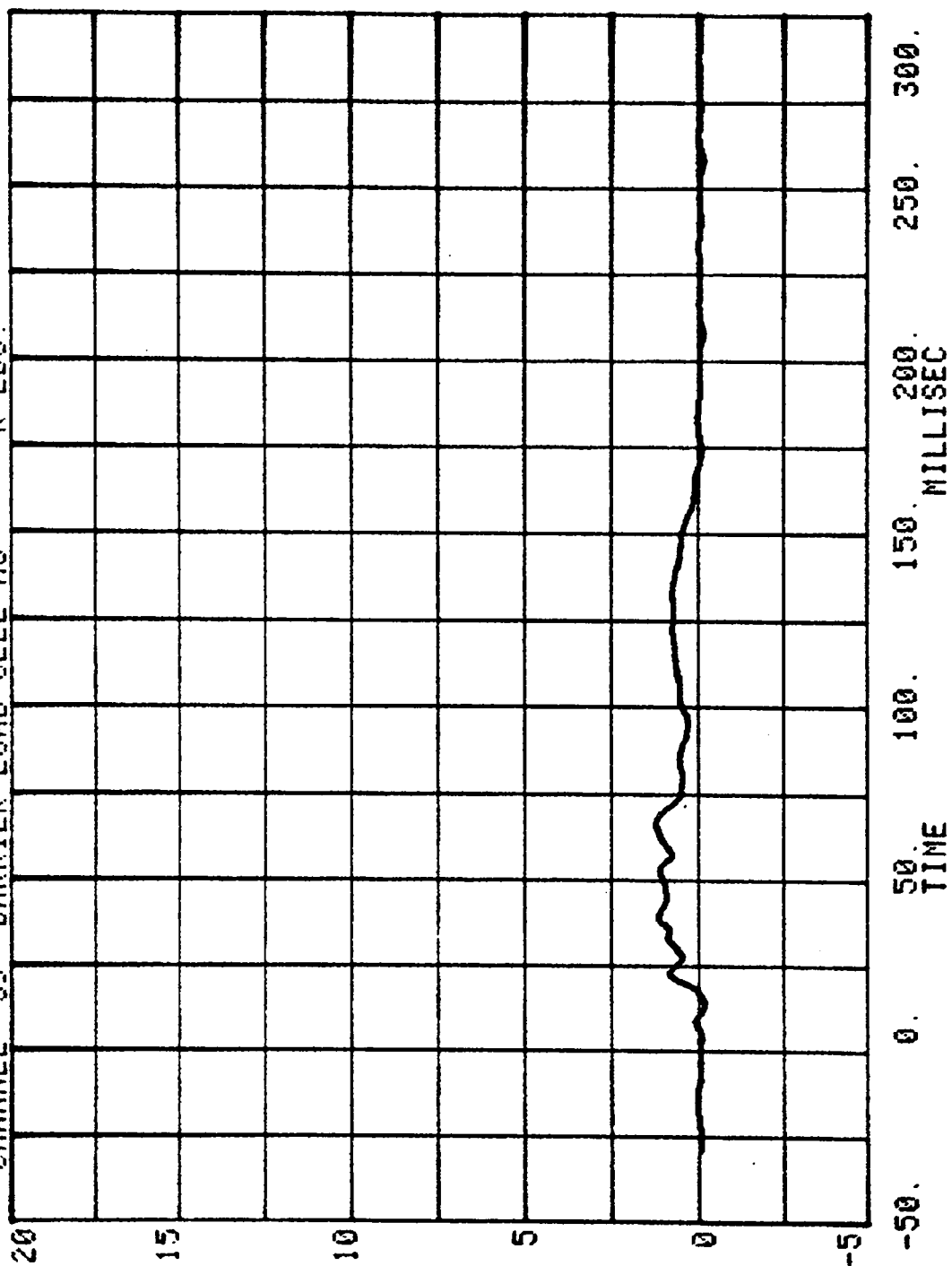
RUN= 581 SERIES= 114



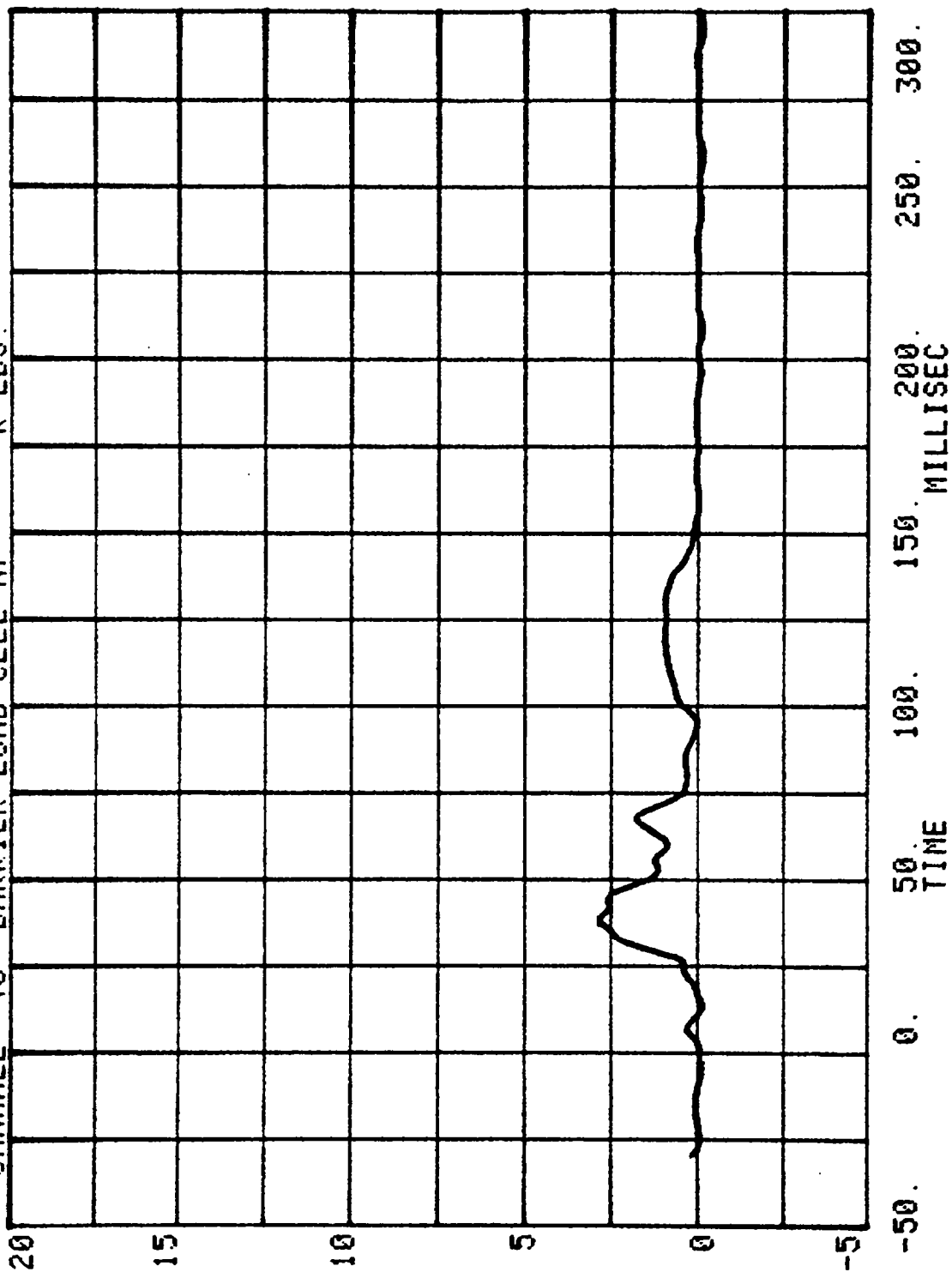
CHANNEL 38 BARRIER LOAD CELL A5 RUN= 581 SERIES= 114 K LBS.



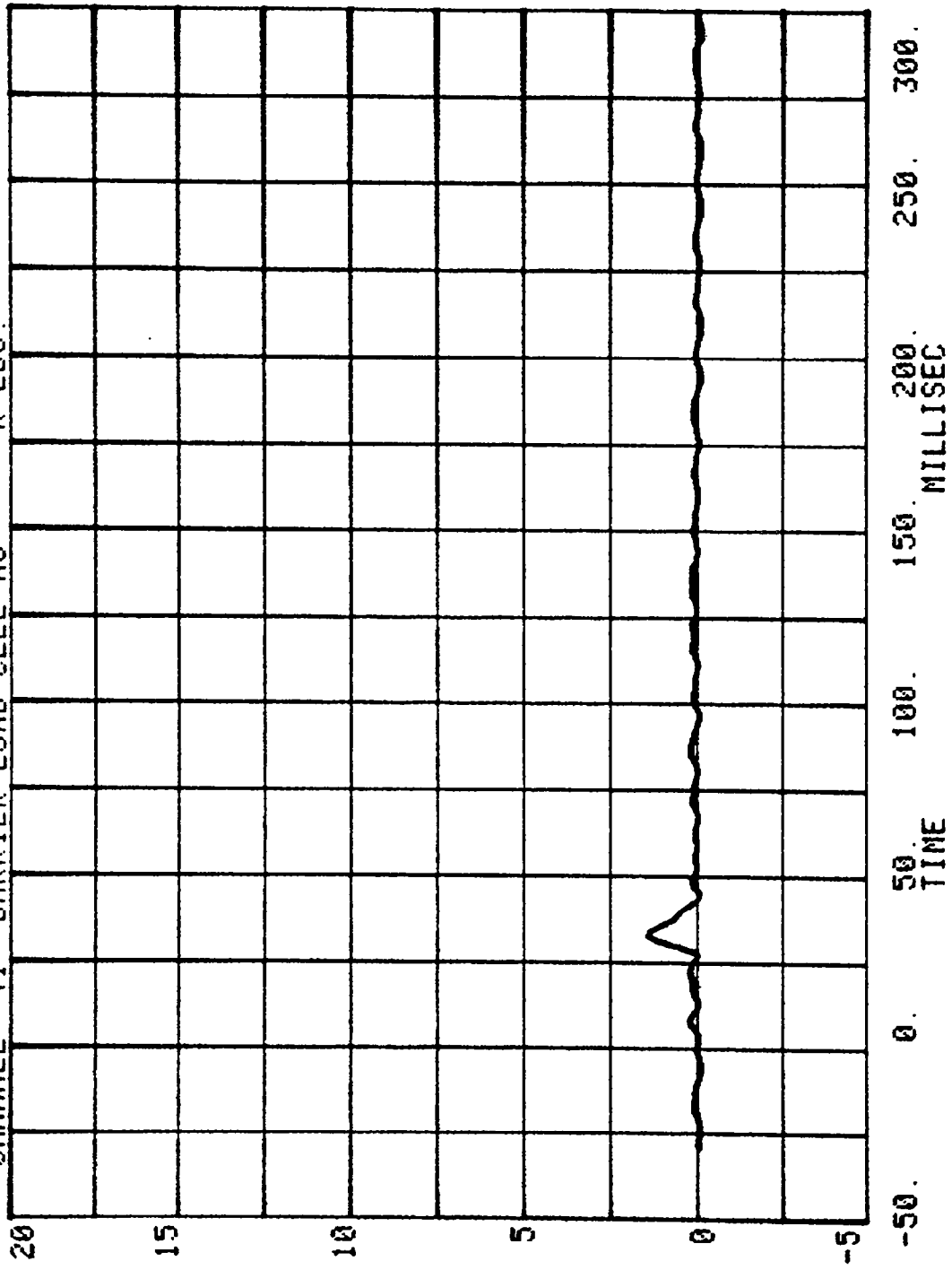
CHANNEL 39 BARRIER LOAD CELL A6 RUN= 581 SERIES= 114 K LBS.



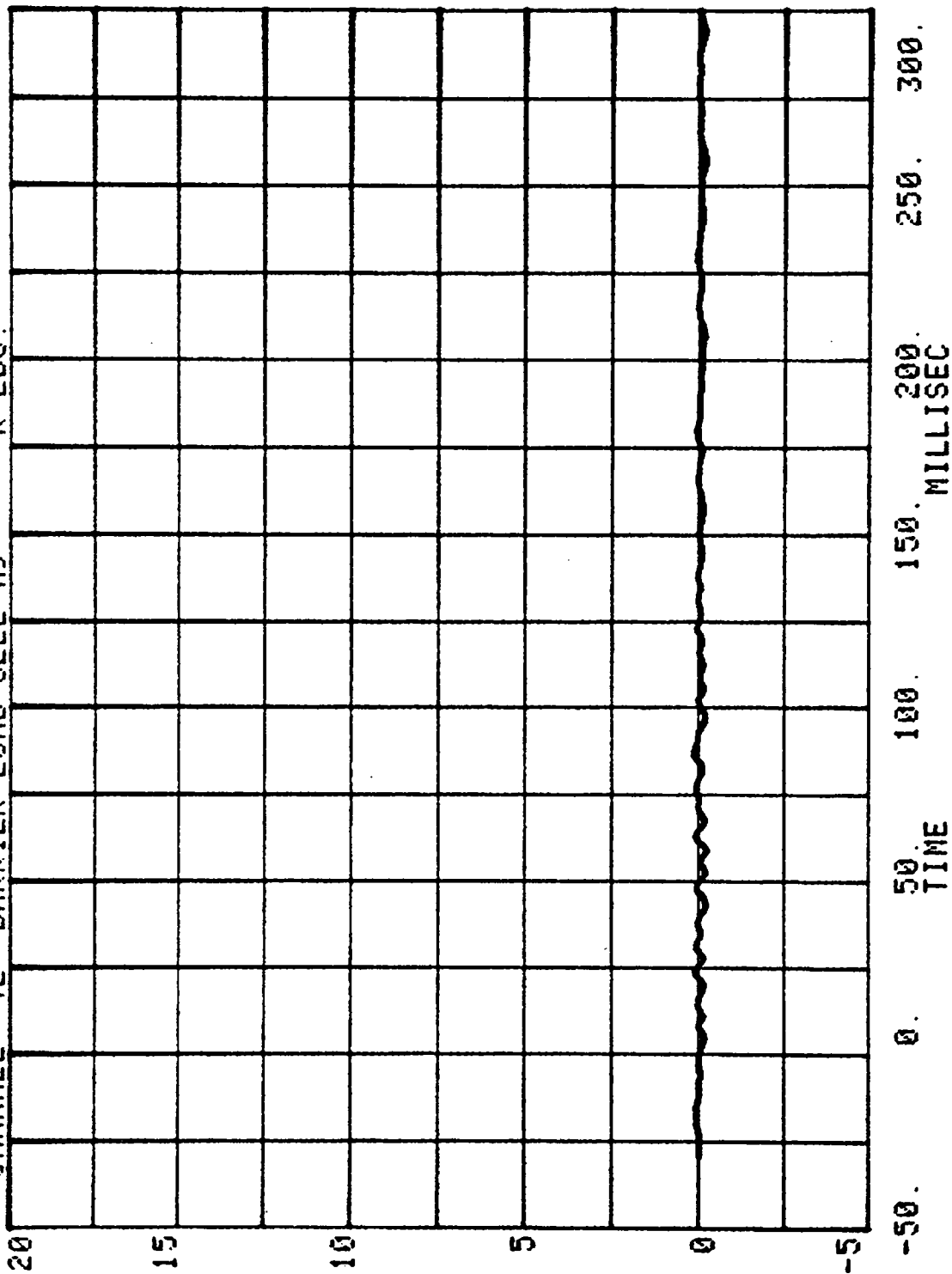
RUN= 581 SERIES= 114
CHANNEL 40 BARRIER LOAD CELL A7 K LBS.



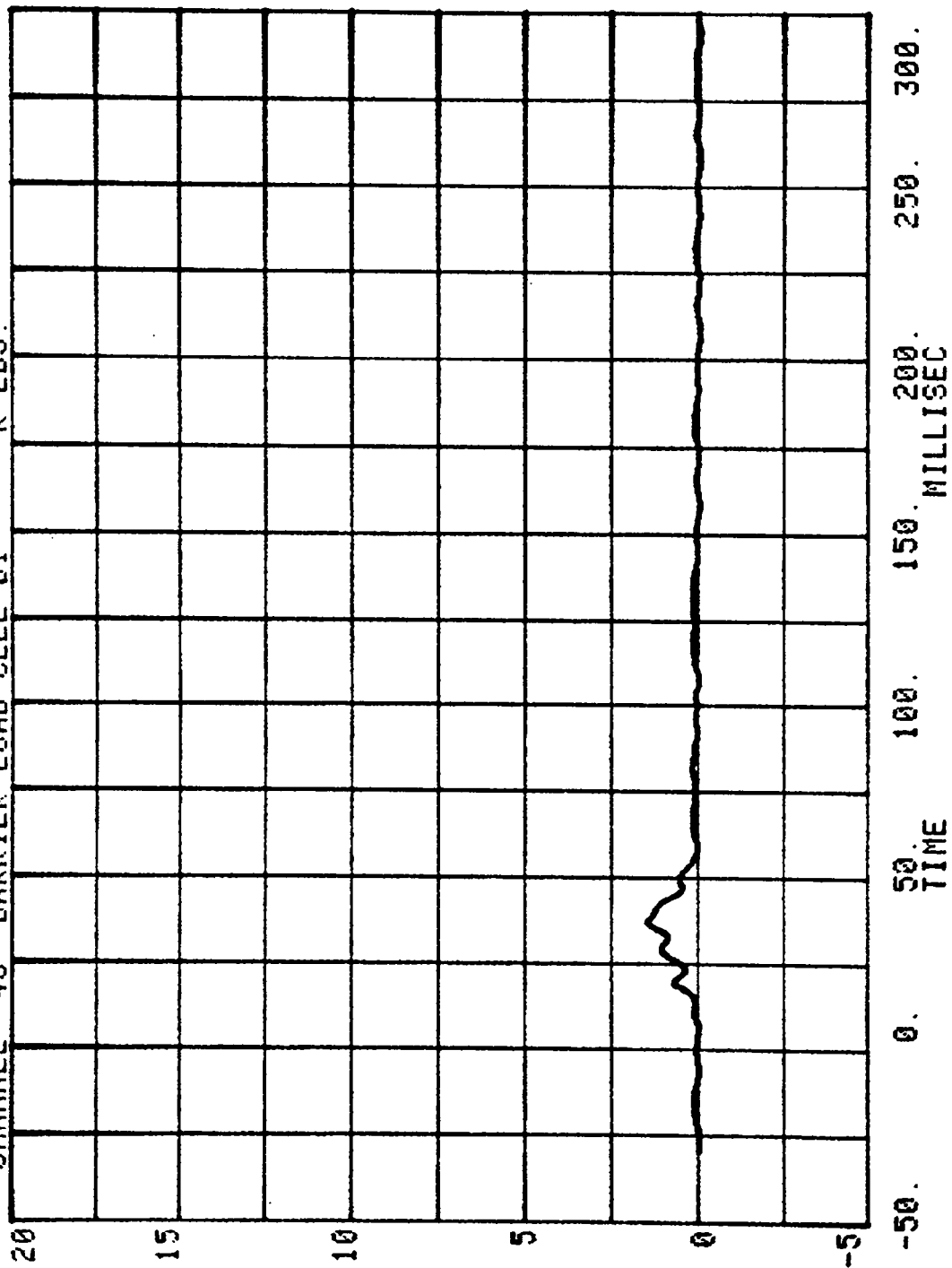
CHANNEL 41 RUN= 581 SERIES= 114 K LBS.
BARRIER LOAD CELL A8



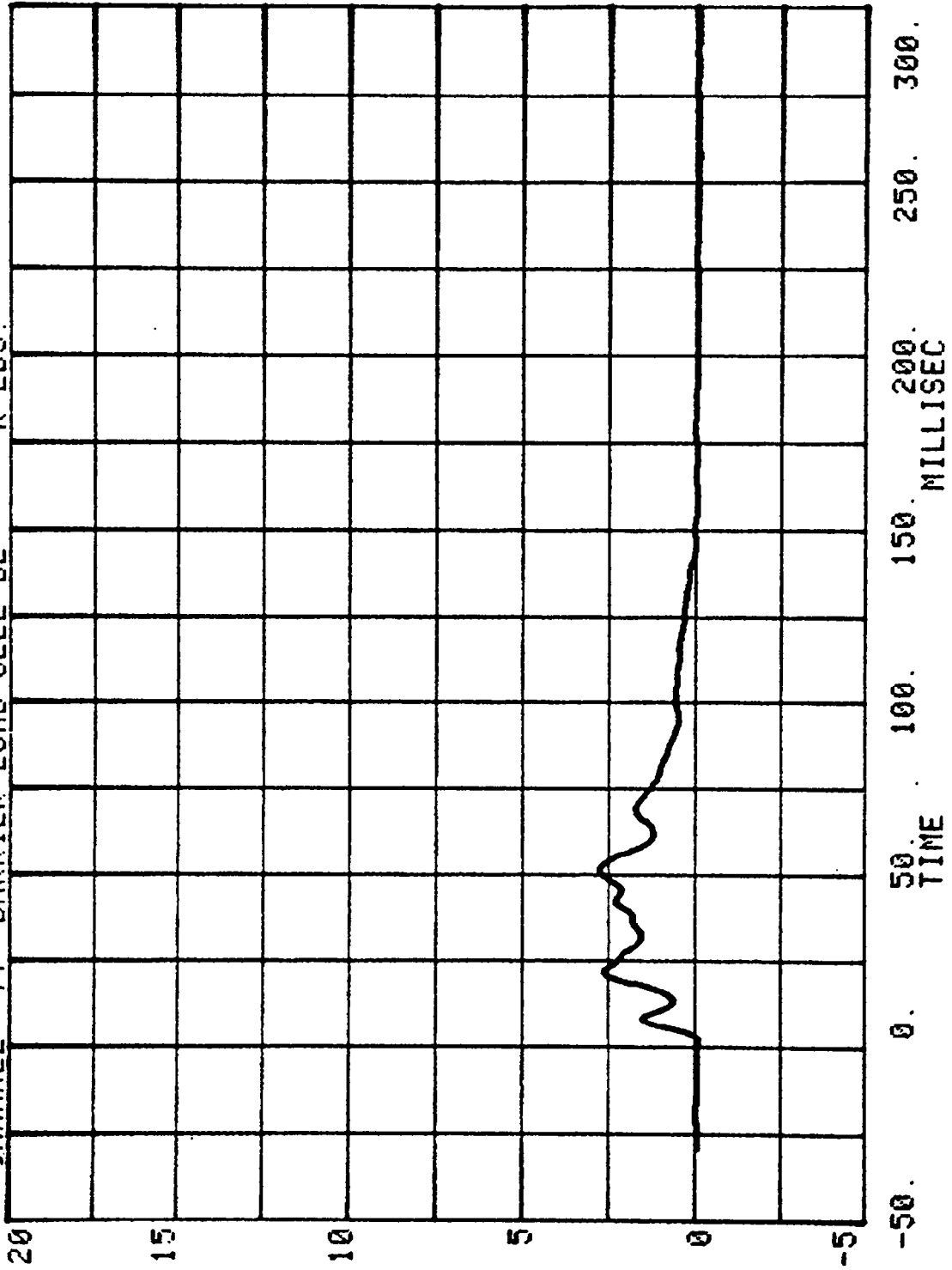
CHANNEL 42 BARRIER LOAD CELL A9 RUN= 581 SERIES= 114 K LBS.



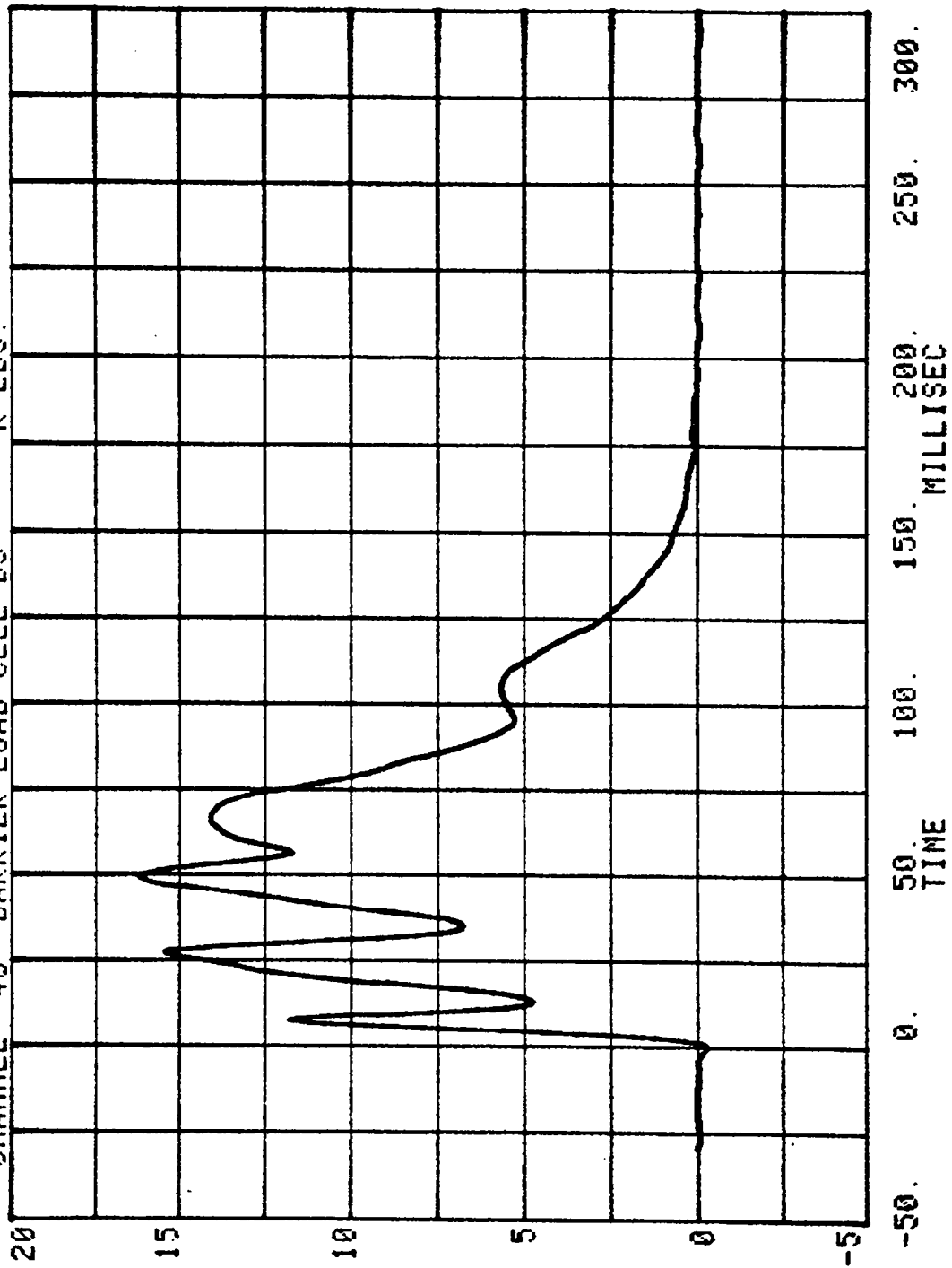
CHANNEL 43 RUN= 581 SERIES= 114
BARRIER LOAD CELL B1 K LBS.



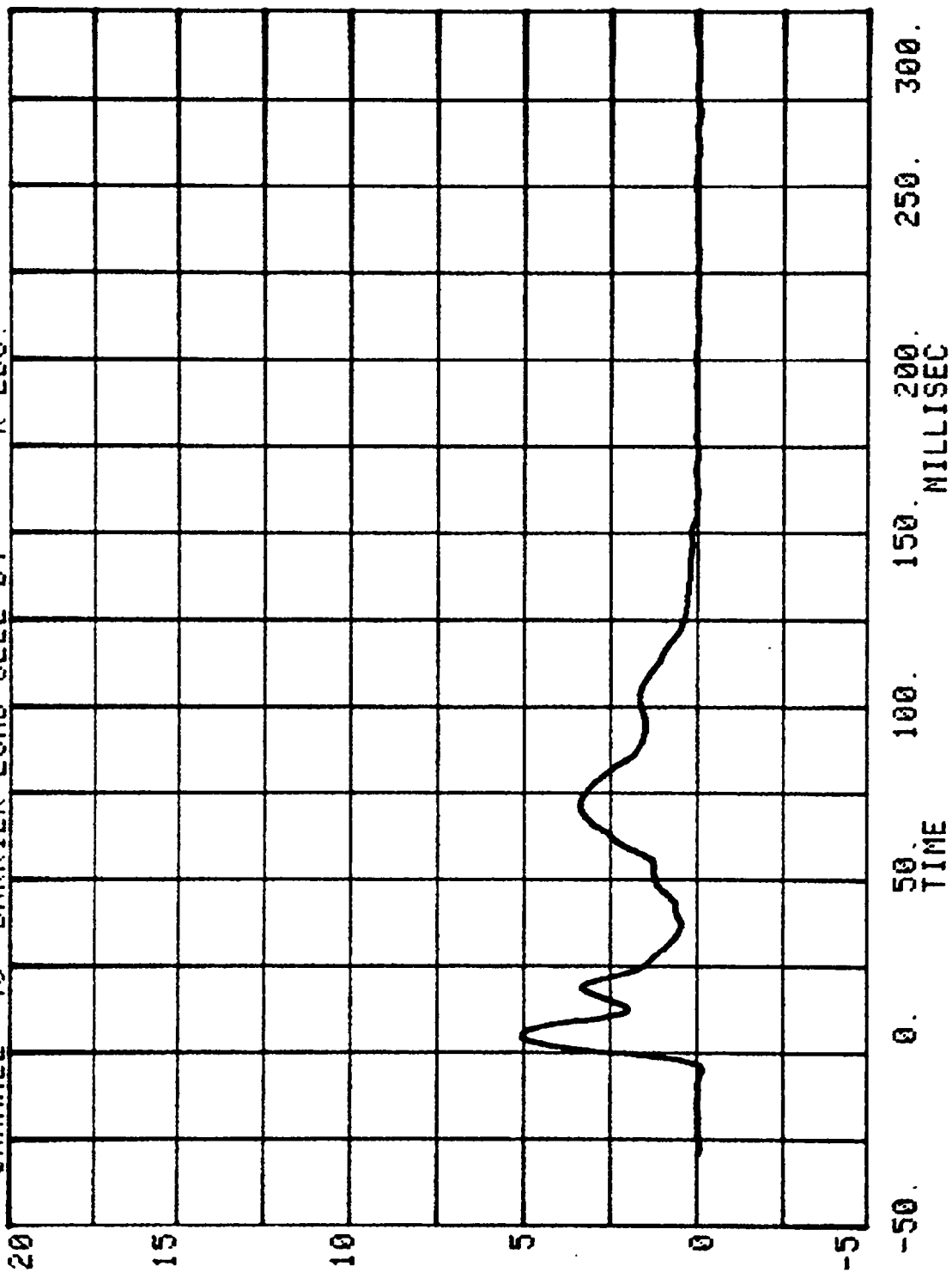
CHANNEL 44 BARRIER LOAD CELL B2
RUN= 581 SERIES= 114 K LBS.



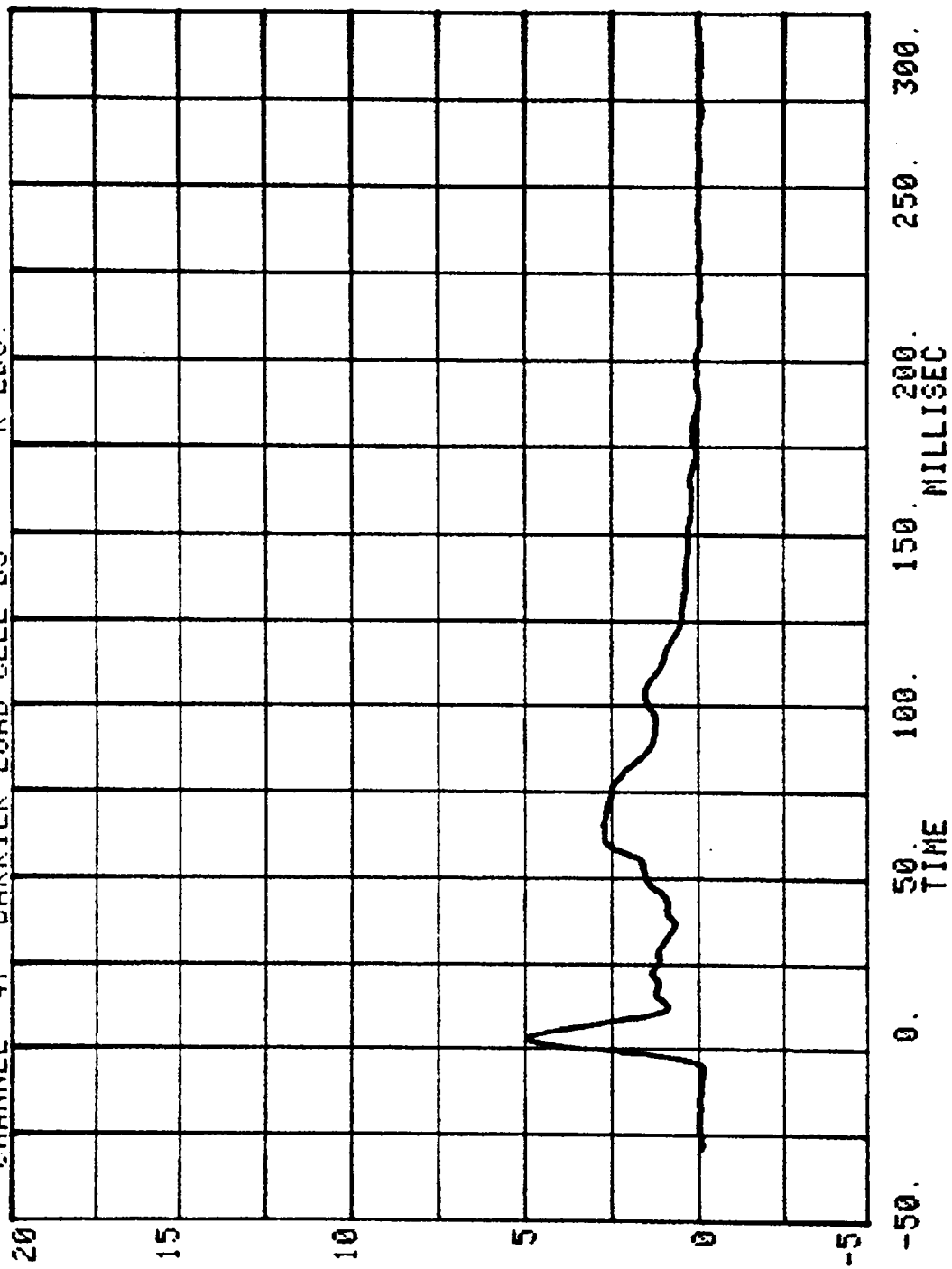
CHANNEL 45 RUN= 581 SERIES= 114 K LBS.
BARRIER LOAD CELL B3



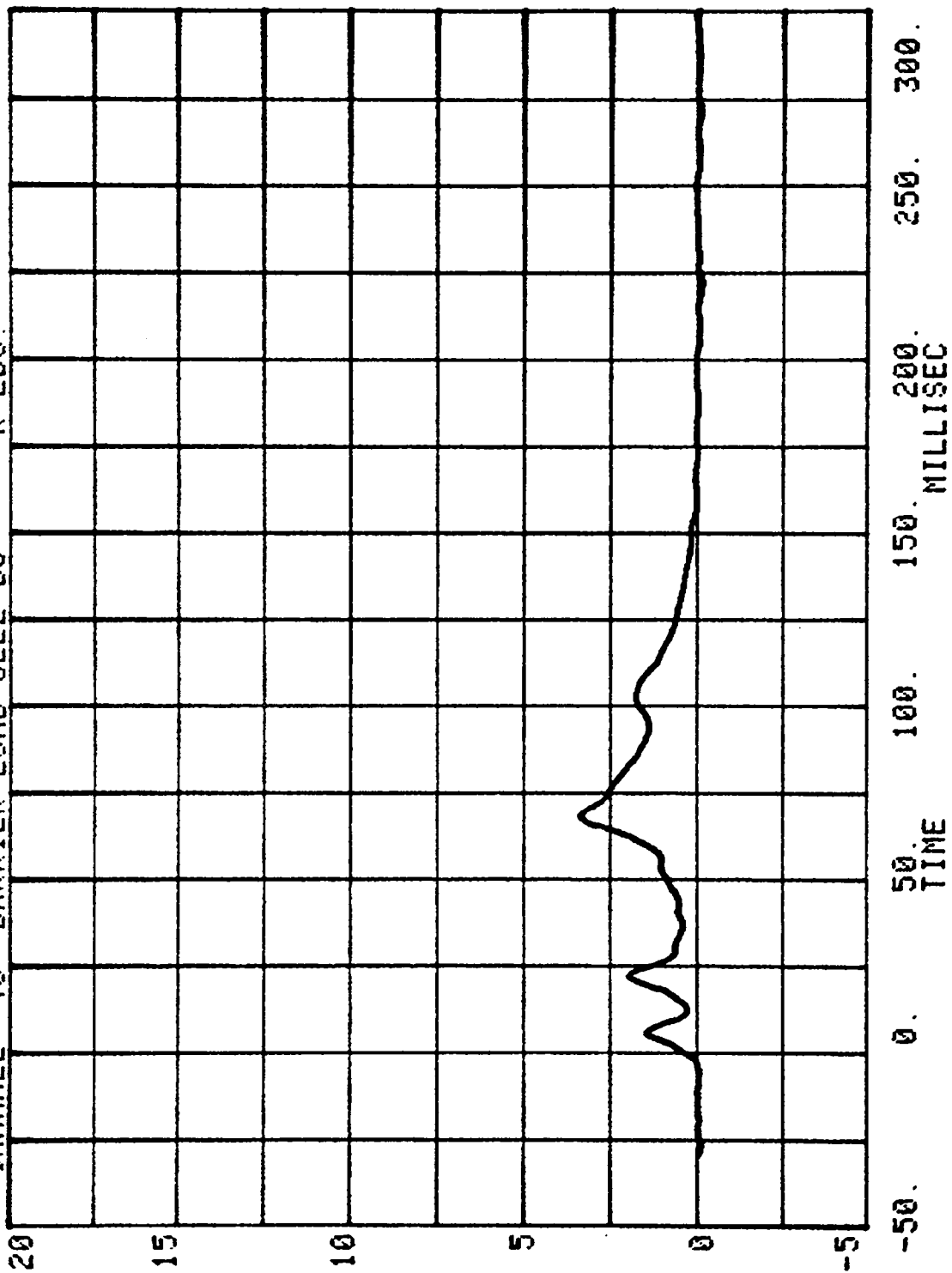
CHANNEL 46 RUN= 581 SERIES= 114 K LBS.
BARRIER LOAD CELL B4



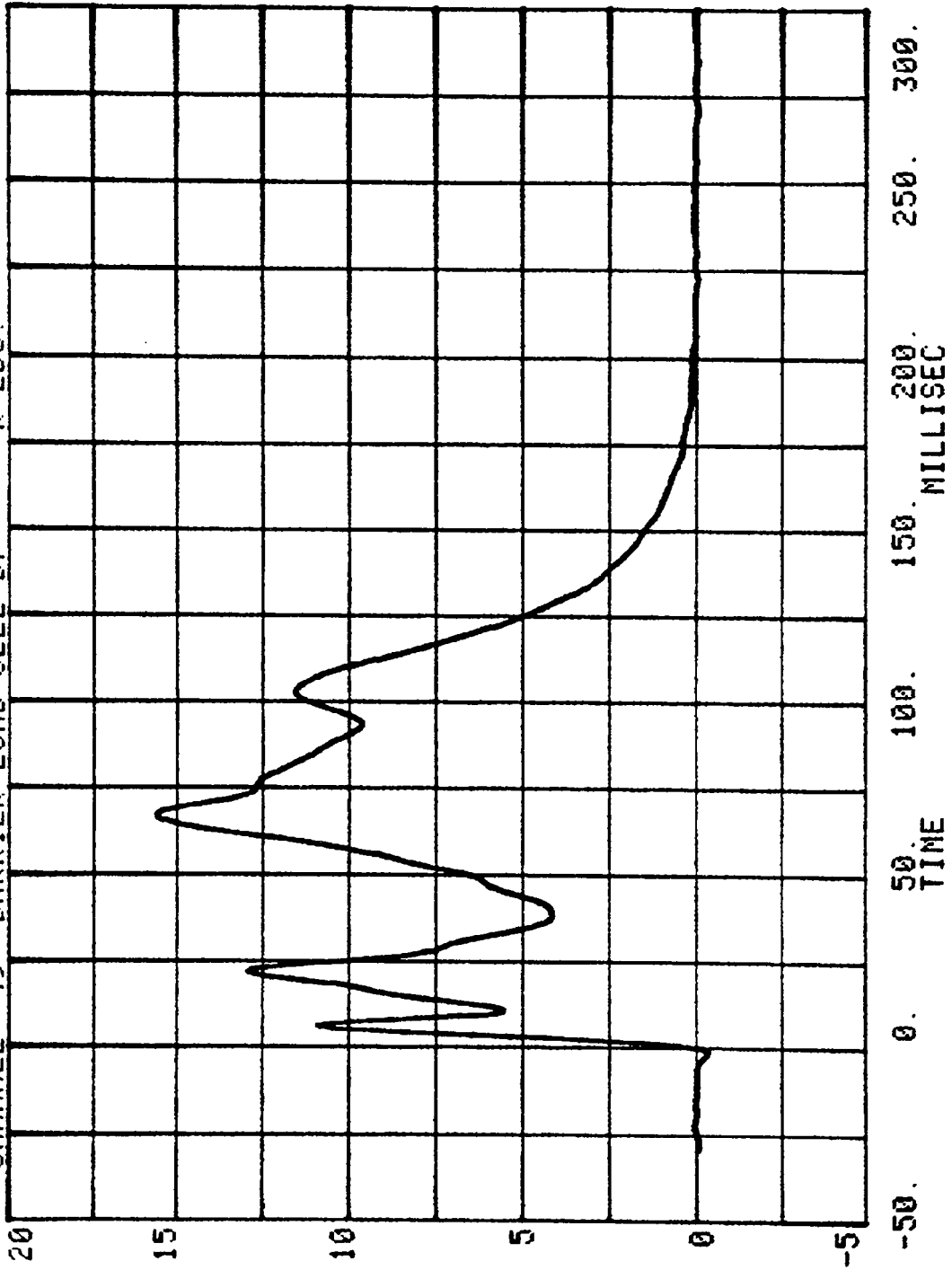
CHANNEL 47 BARRIER LOAD CELL B5
RUN= 581 SERIES= 114 K LBS.



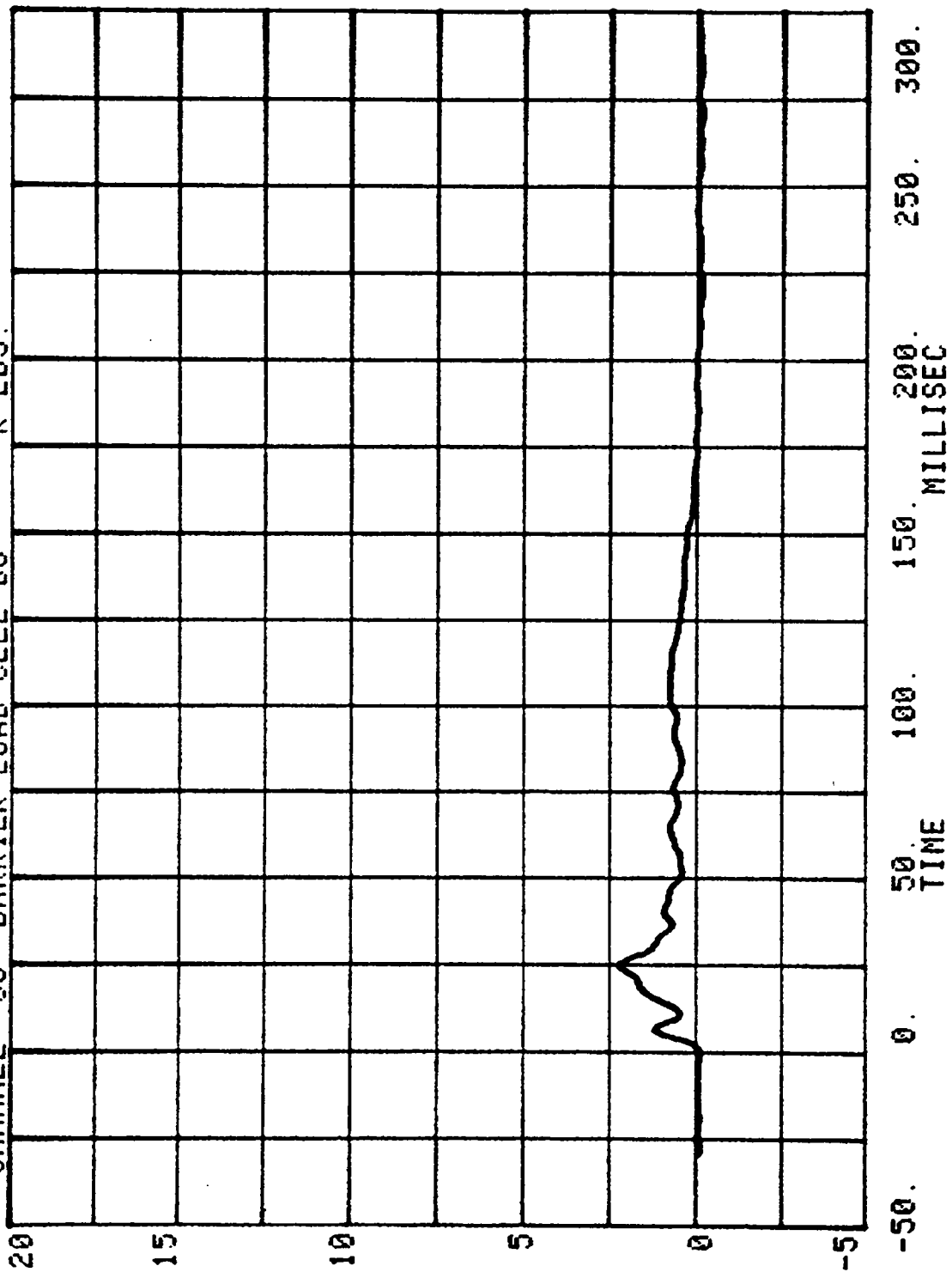
RUN= 581 SERIES= 114
CHANNEL 48 BARRIER LOAD CELL B6 K LBS.



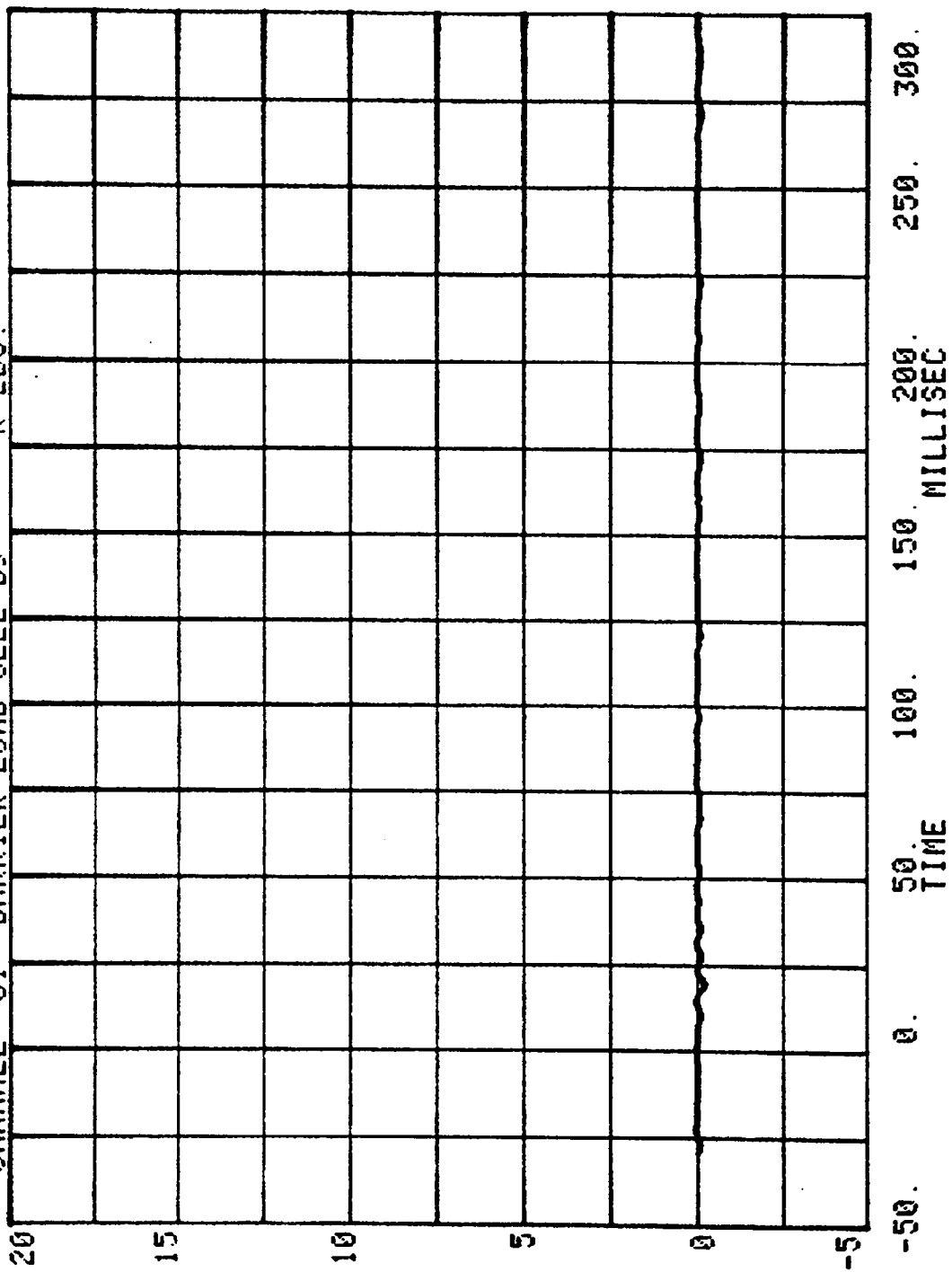
CHANNEL 49 RUN= 581 SERIES= 114 K LBS.
BARRIER LOAD CELL B7



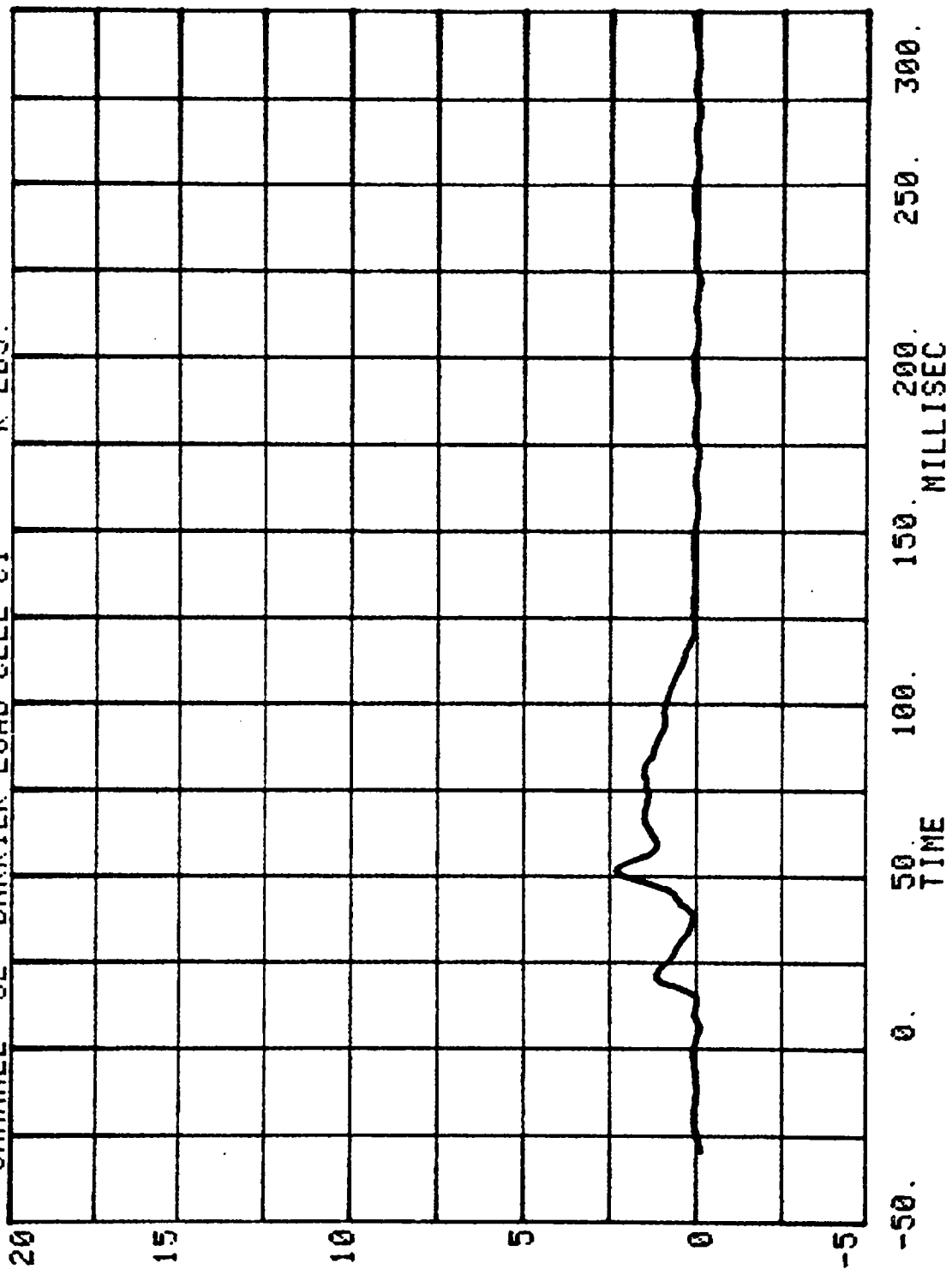
CHANNEL 50 BARRIER LOAD CELL B8 RUN= 581 SERIES= 114 K LBS.



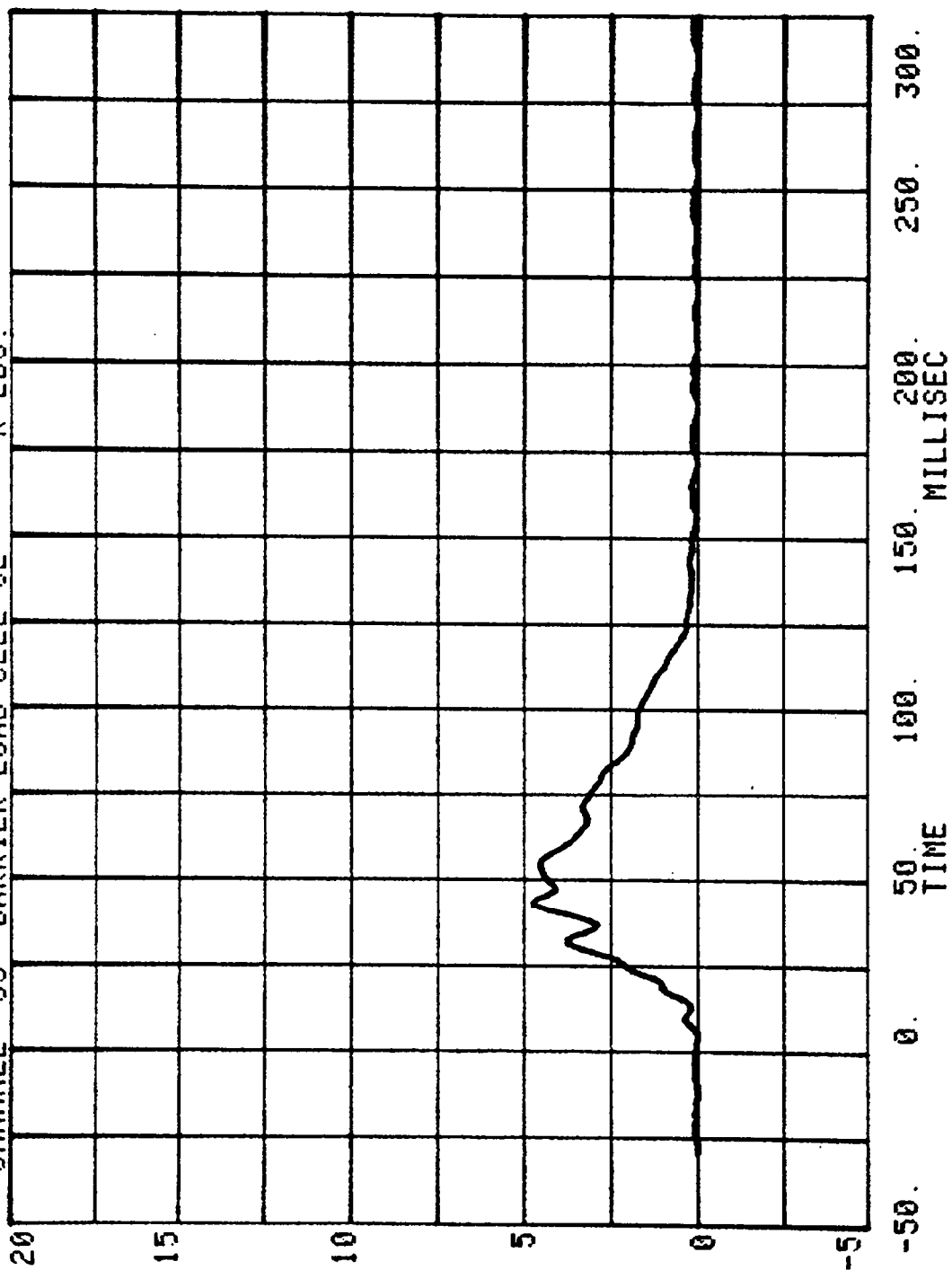
CHANNEL 51 BARRIER LOAD CELL B9 RUN= 581 SERIES= 114 K LBS.



CHANNEL 52 BARRIER LOAD CELL C1 RUN= 581 SERIES= 114 K LBS.

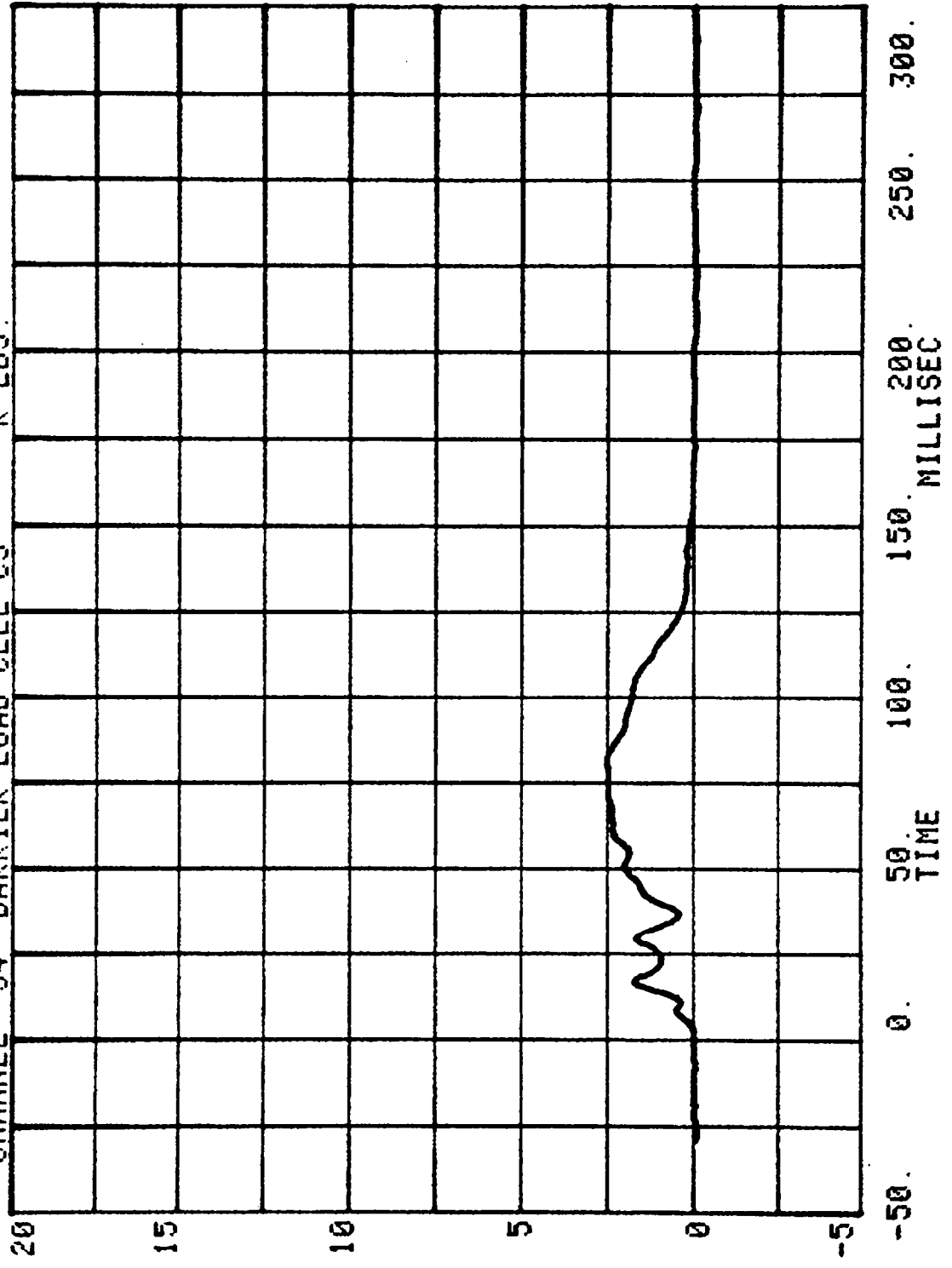


CHANNEL 53 RUN= 581 SERIES= 114
BARRIER LOAD CELL C2 K LBS.

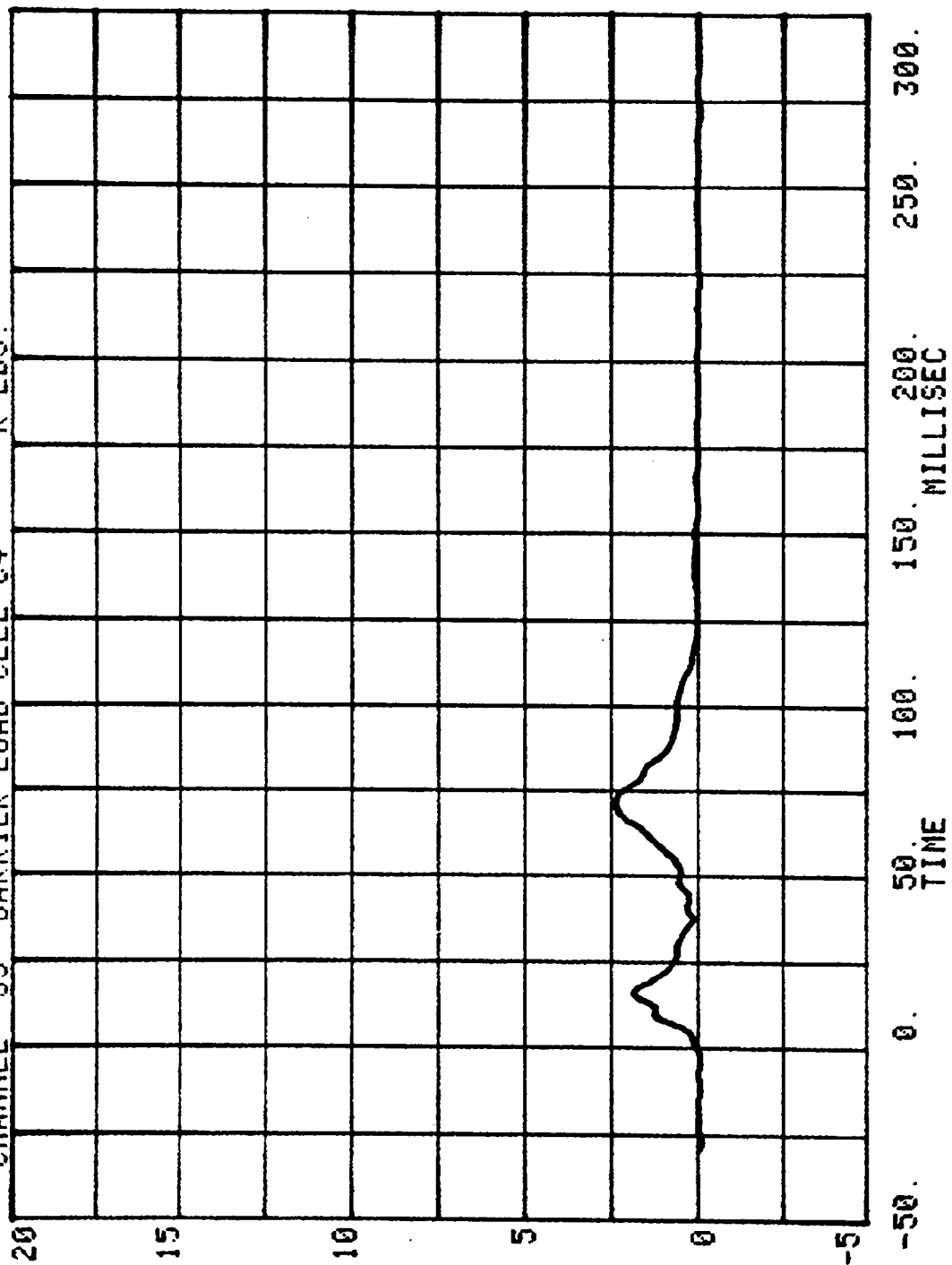


CHANNEL 54 BARRIER LOAD CELL C3 K LBS.

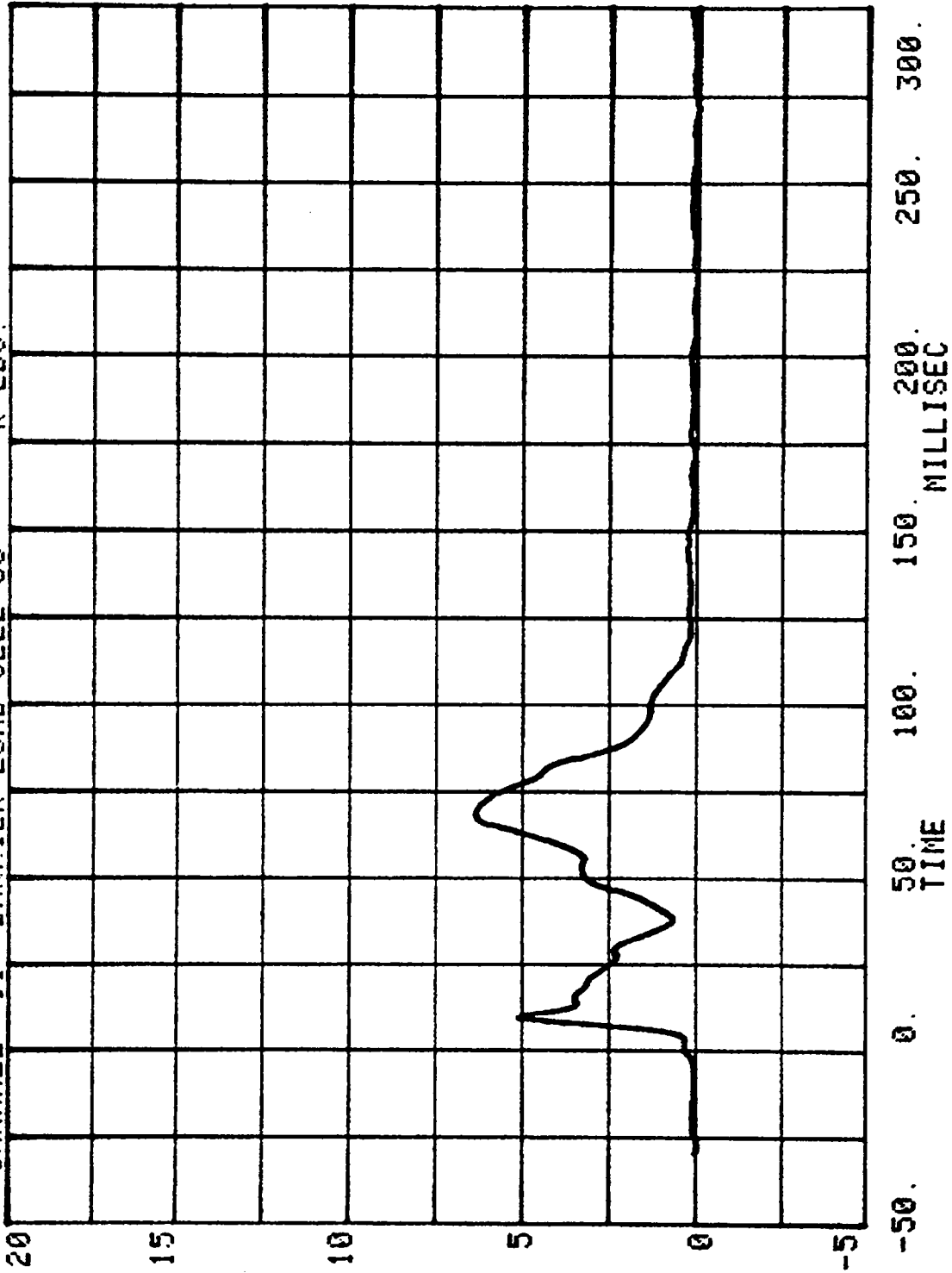
RUN= 581 SERIES= 114



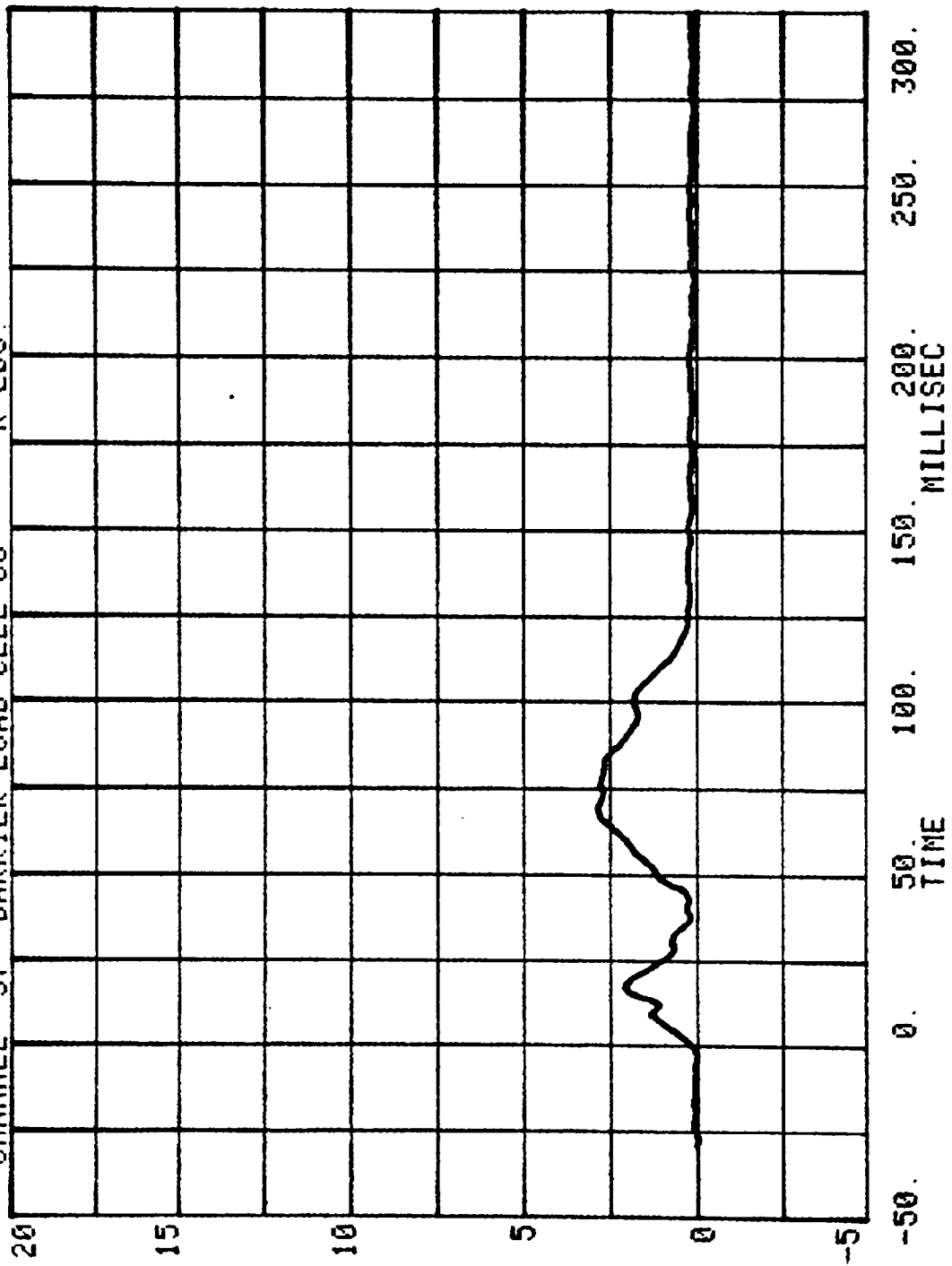
CHANNEL 55 BARRIER LOAD CELL C4 RUN= 581 SERIES= 114 K LBS.



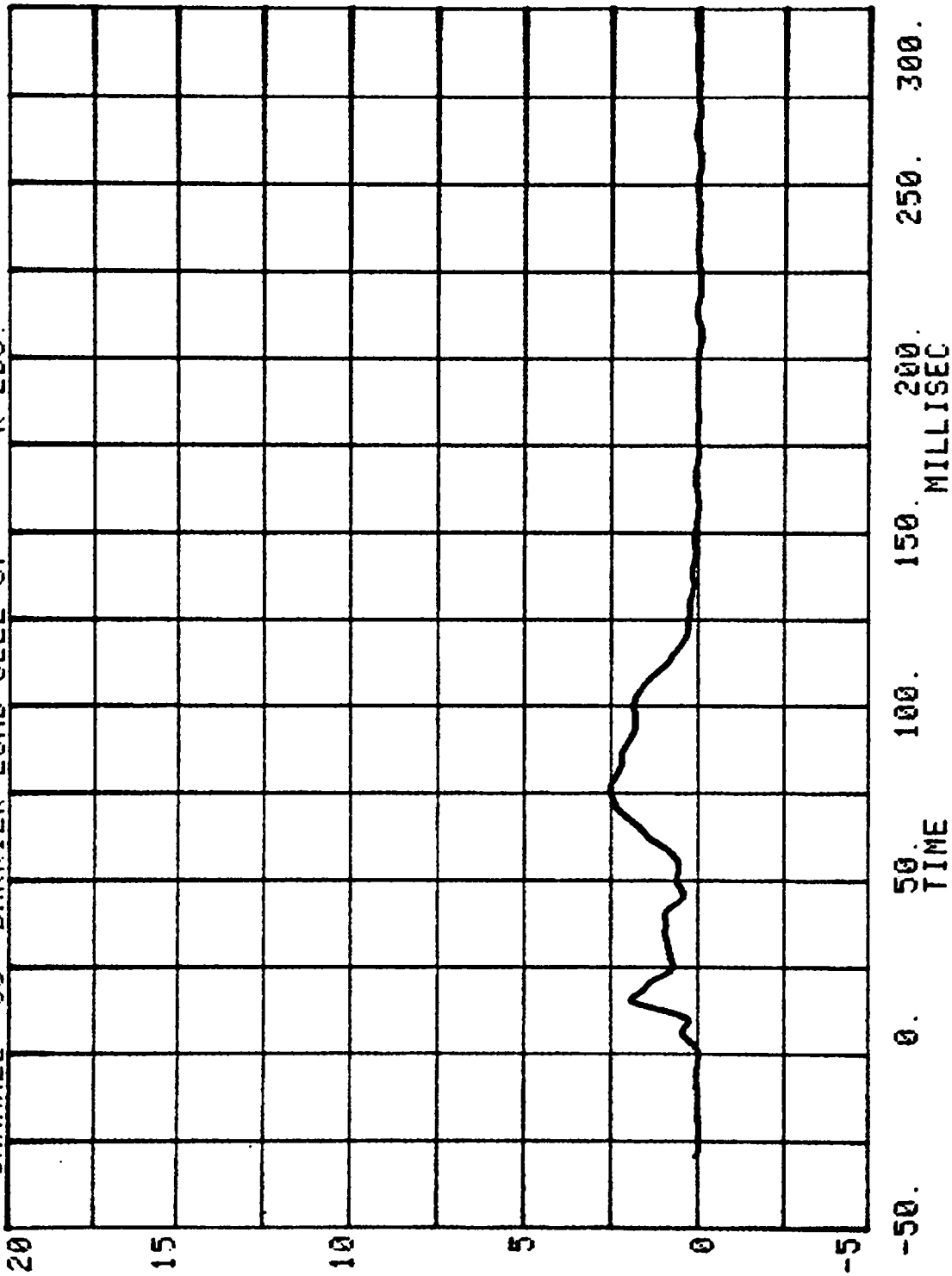
RUN= 581 SERIES= 114
CHANNEL 56 BARRIER LOAD CELL C5 K LBS.



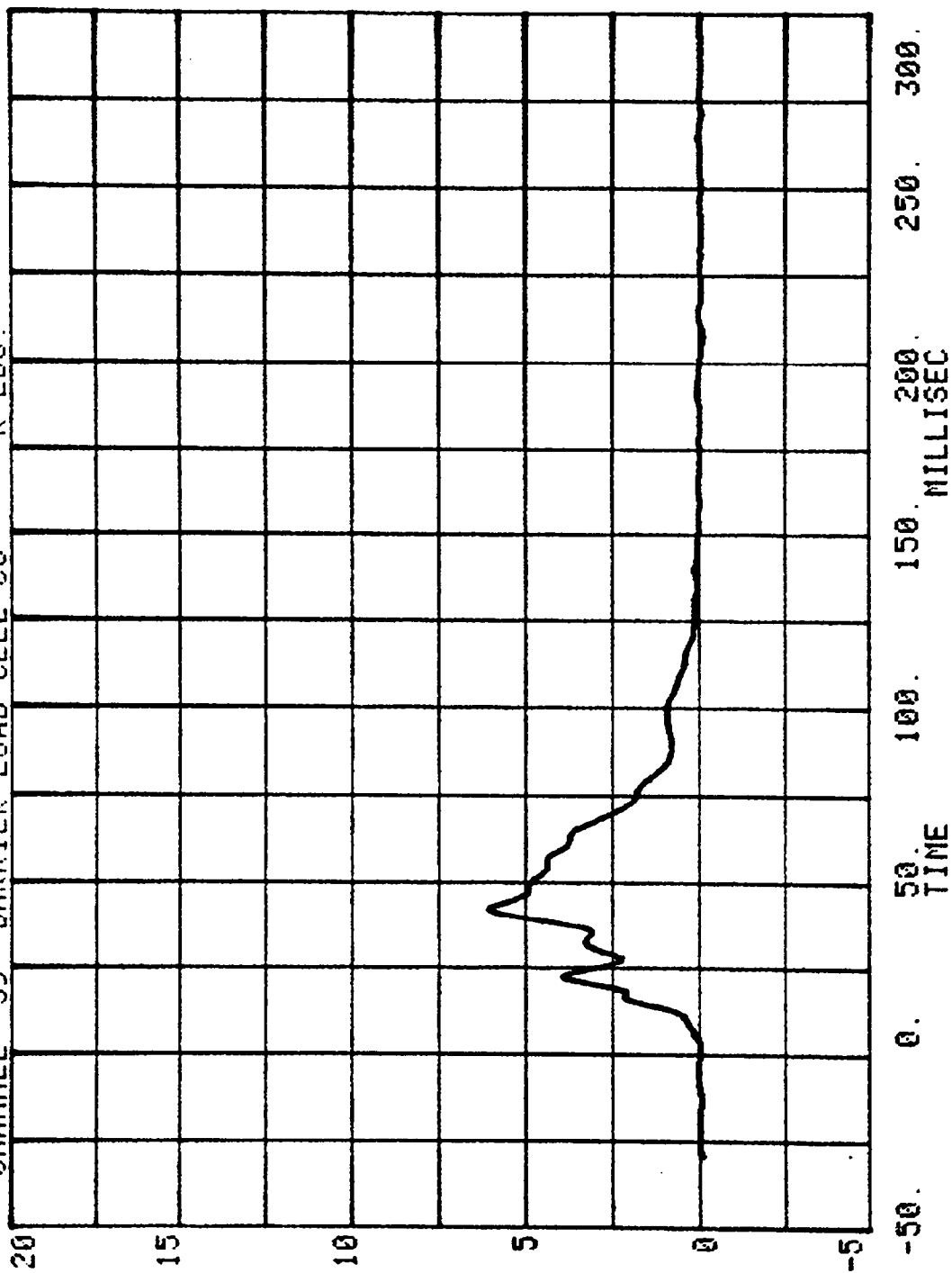
RUN= 581 SERIES= 114
CHANNEL 57 BARRIER LOAD CELL C6 K LBS.



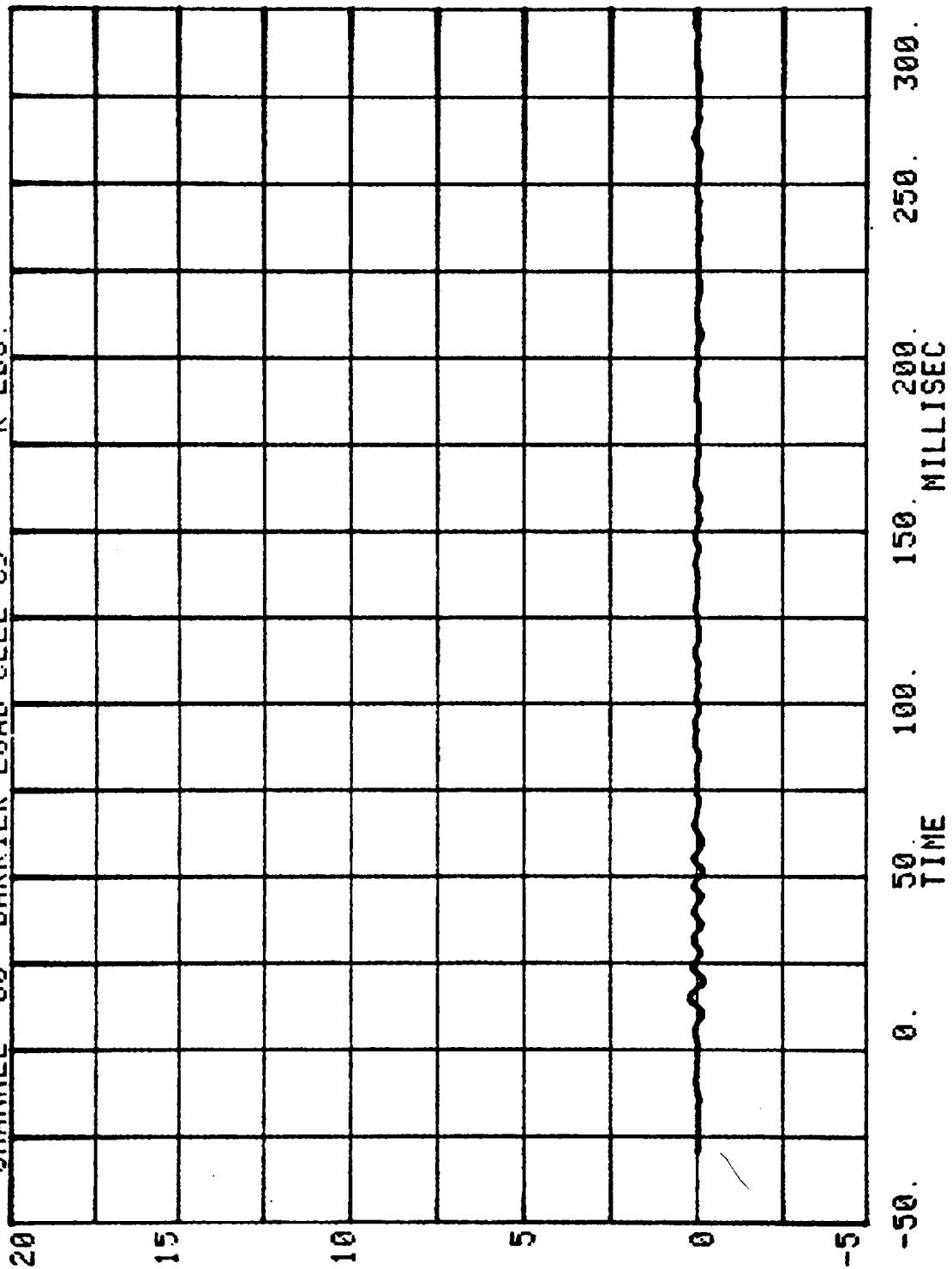
CHANNEL 58 BARRIER LOAD CELL C7 RUN= 581 SERIES= 114 K LBS.



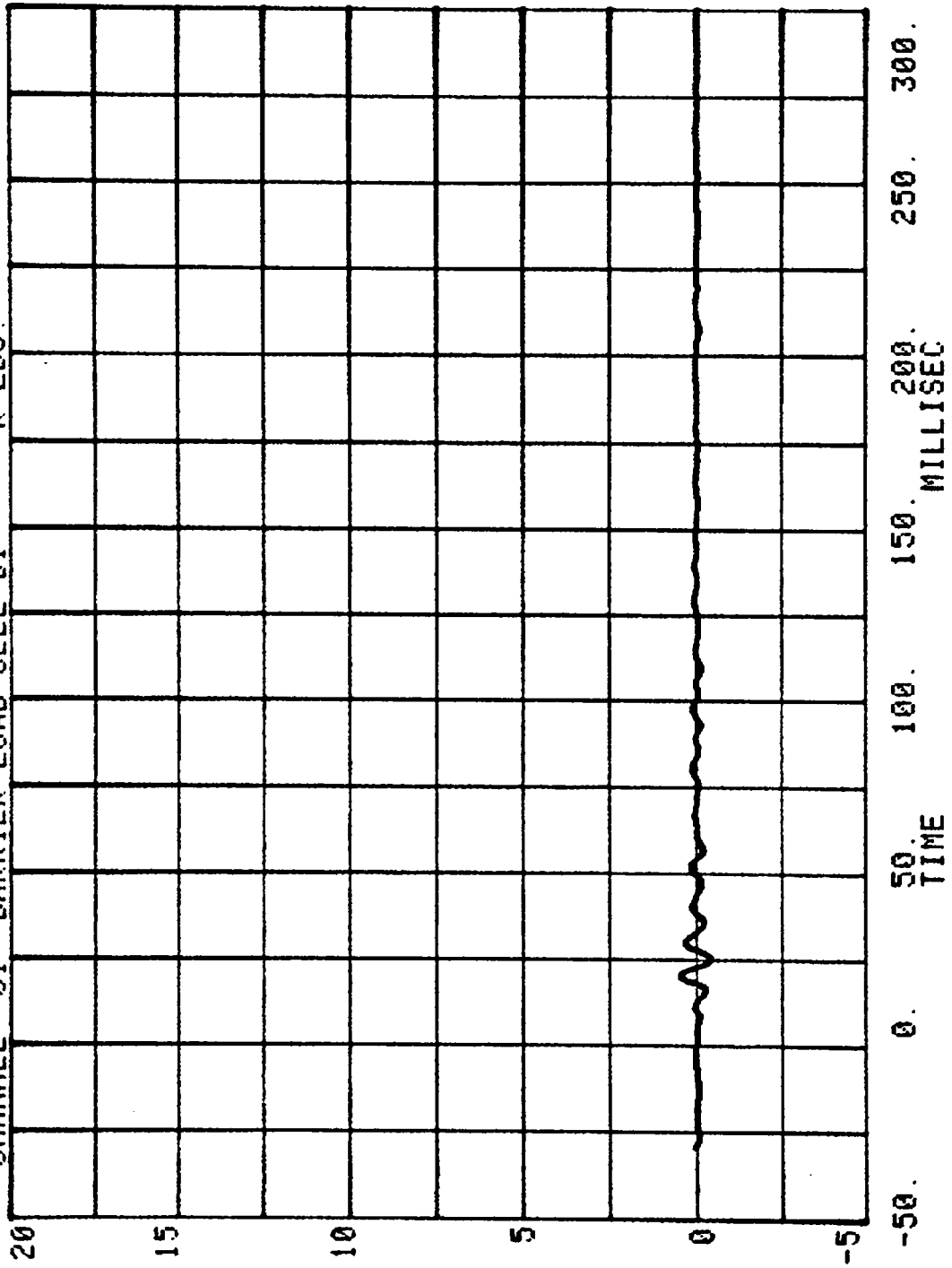
CHANNEL 59 RUN= 581 SERIES= 114
BARRIER LOAD CELL C8 K LBS.



RUN= 581 SERIES= 114
CHANNEL 60 BARRIER LOAD CELL C9 K LBS.



RUN= 581 SERIES= 114
CHANNEL 61 BARRIER LOAD CELL 01 K LBS.

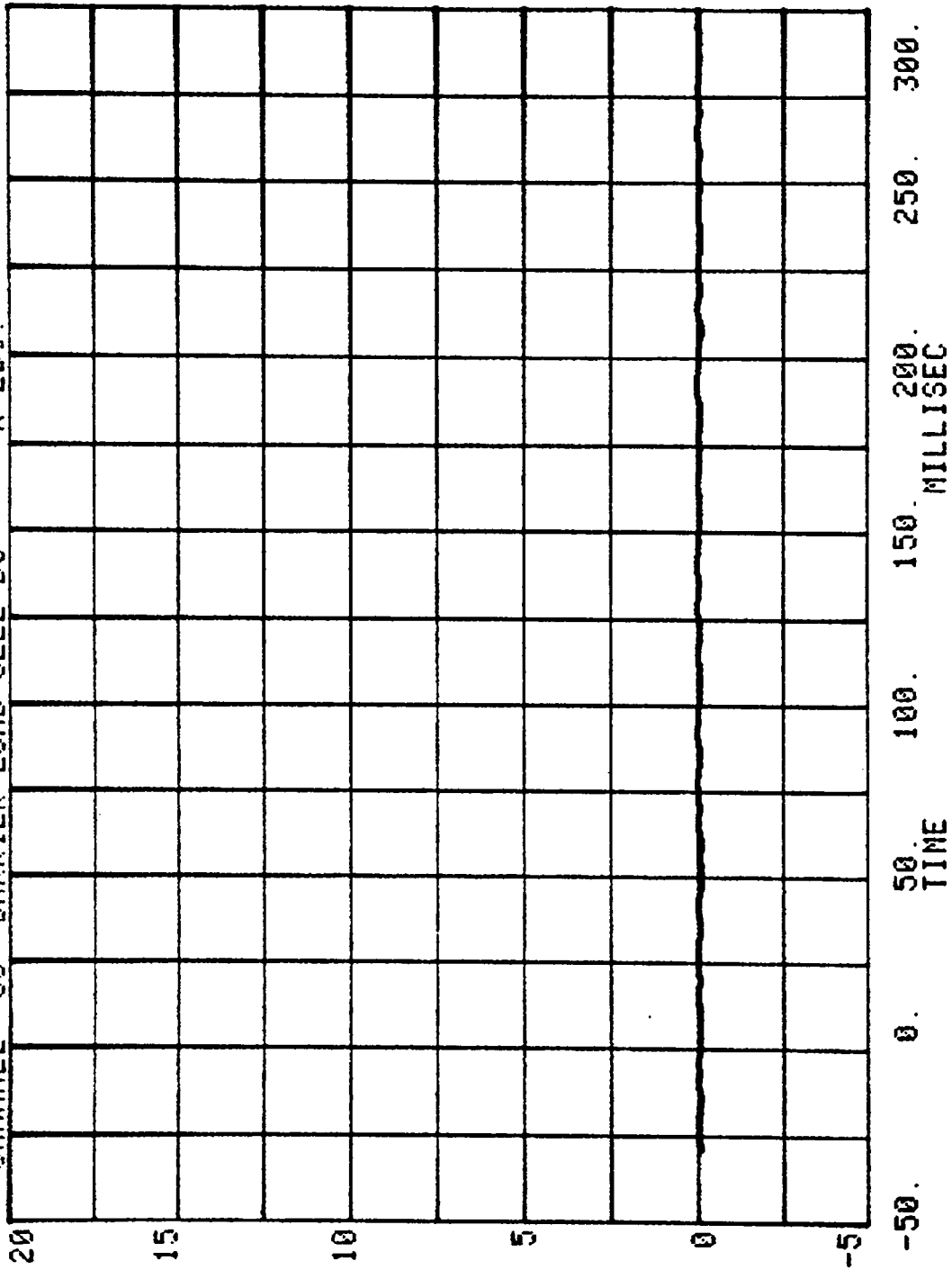


CHANNEL 62 BARRIER LOAD CELL D2 K LBS.

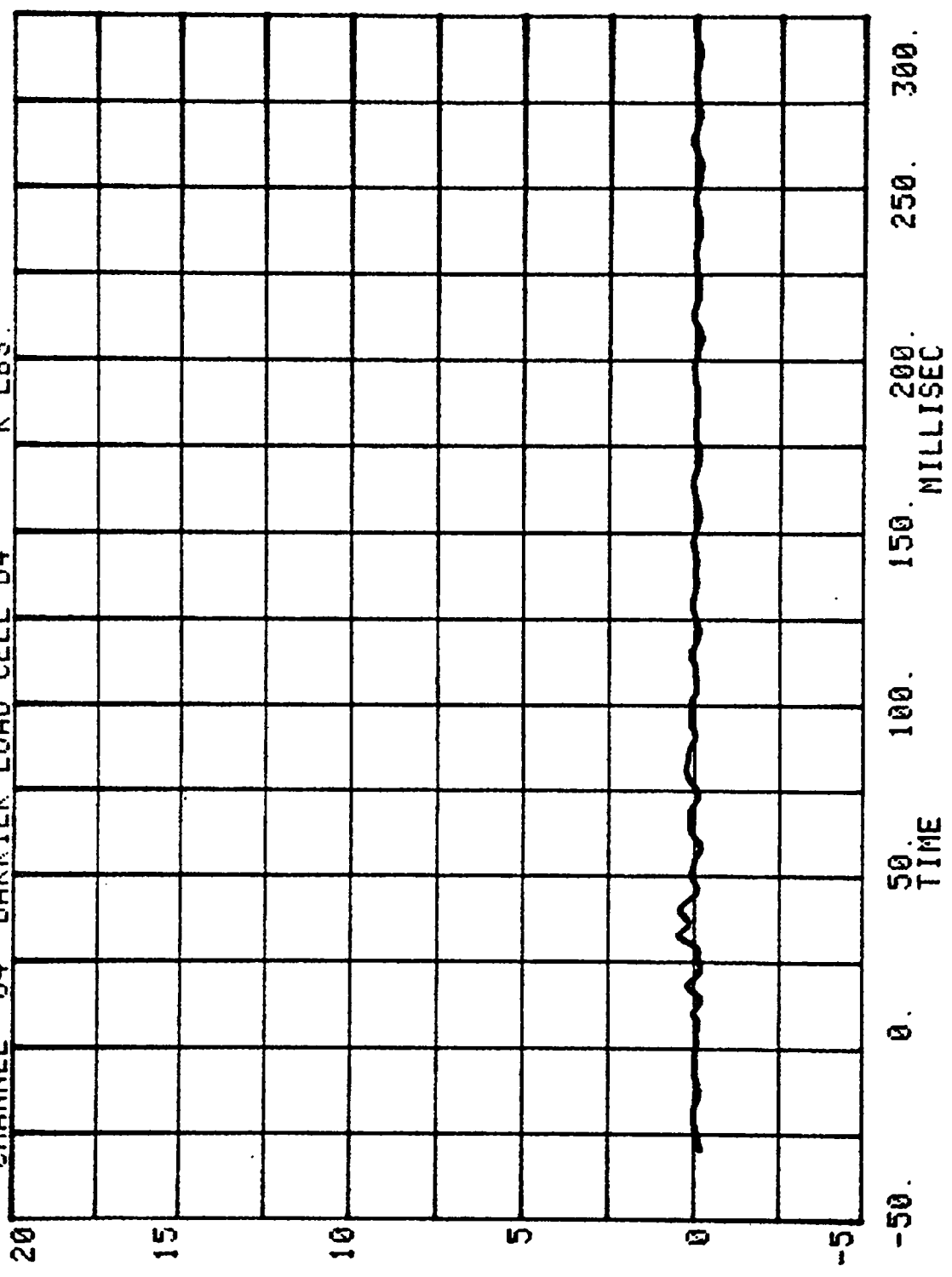
RUN= 581 SERIES= 114



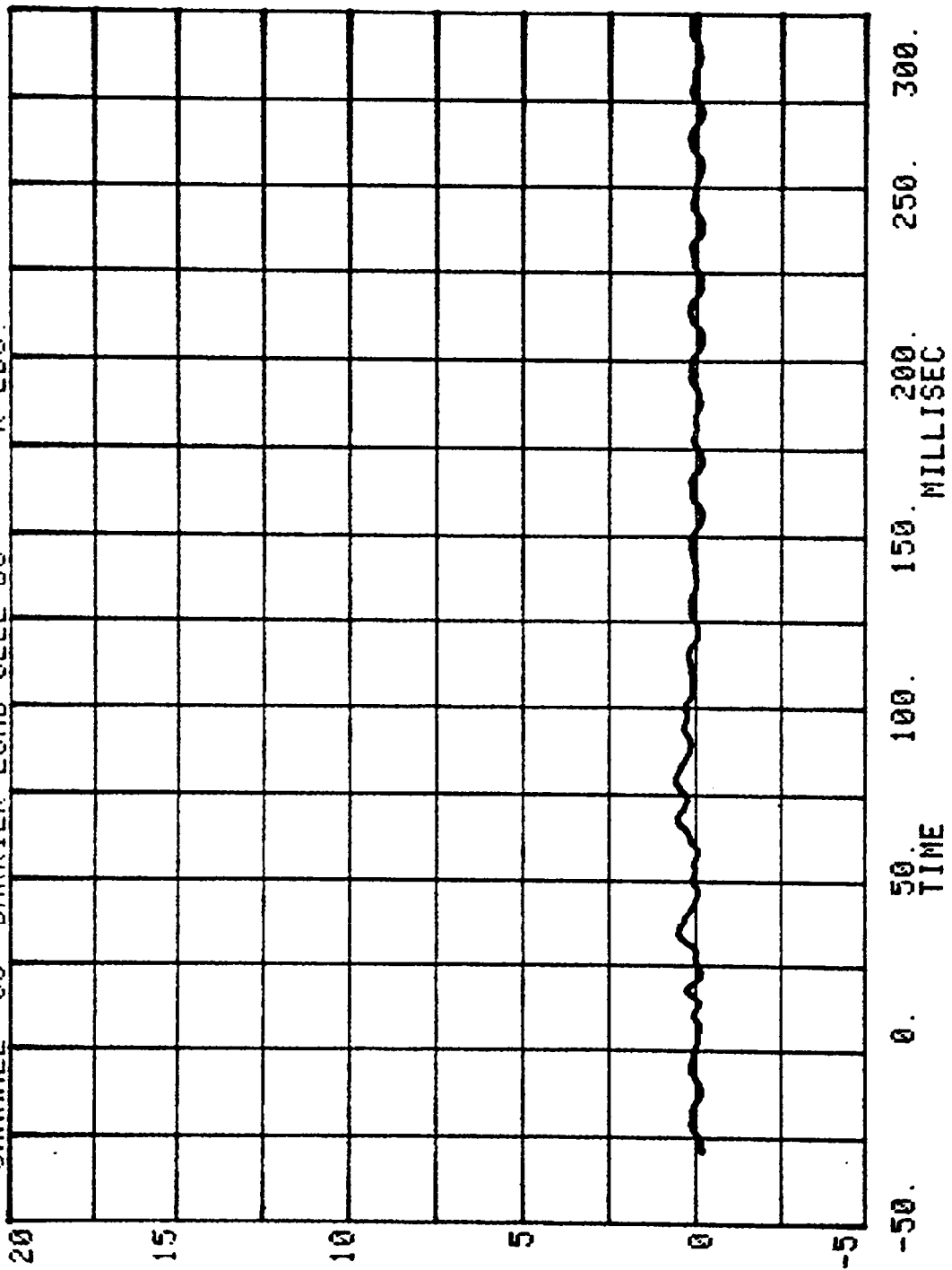
CHANNEL 63 BARRIER LOAD CELL D3 RUN= 581 SERIES= 114 K LBS.



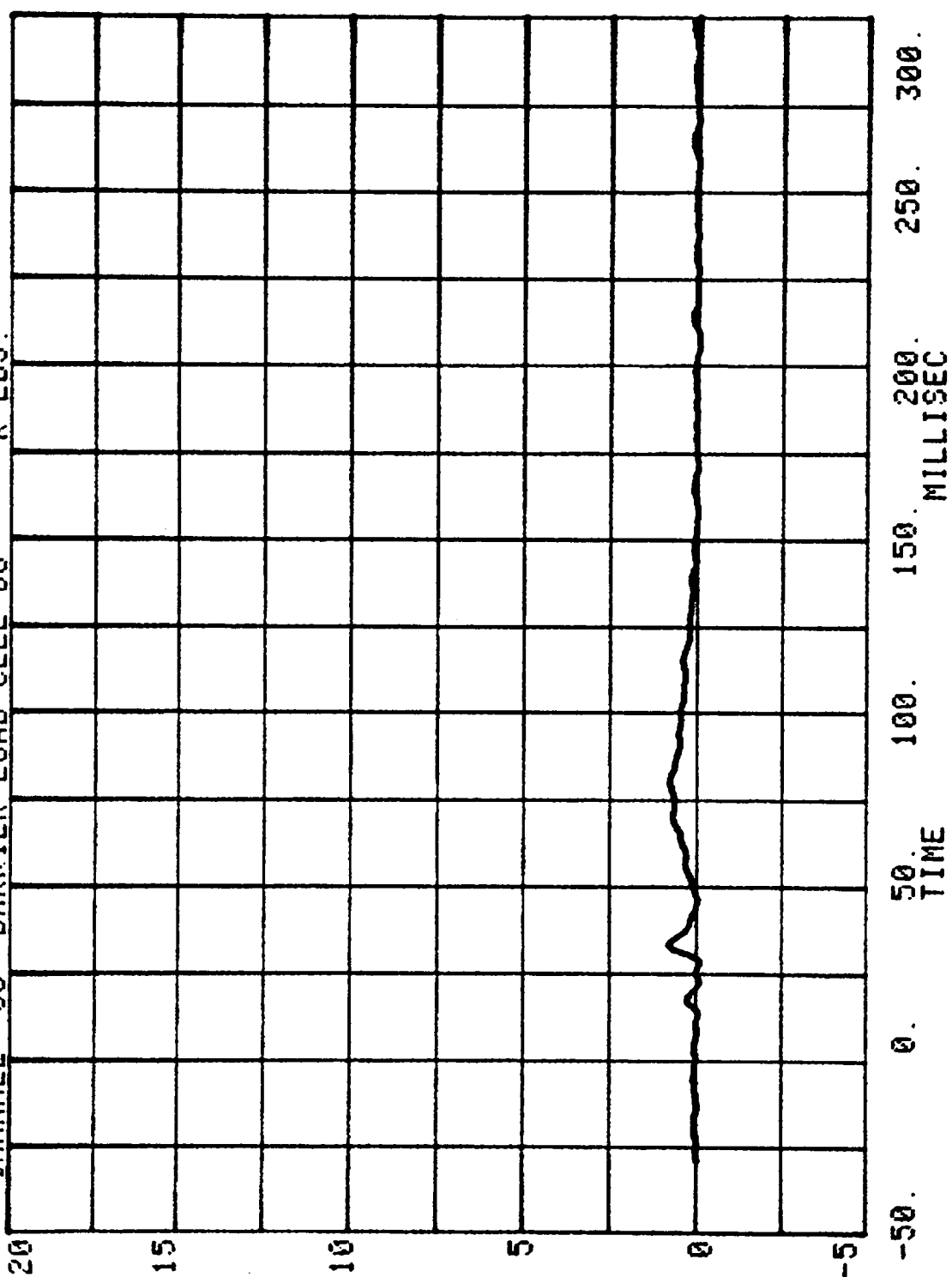
RUN= 581 SERIES= 114
CHANNEL 64 BARRIER LOAD CELL D4 K LBS.



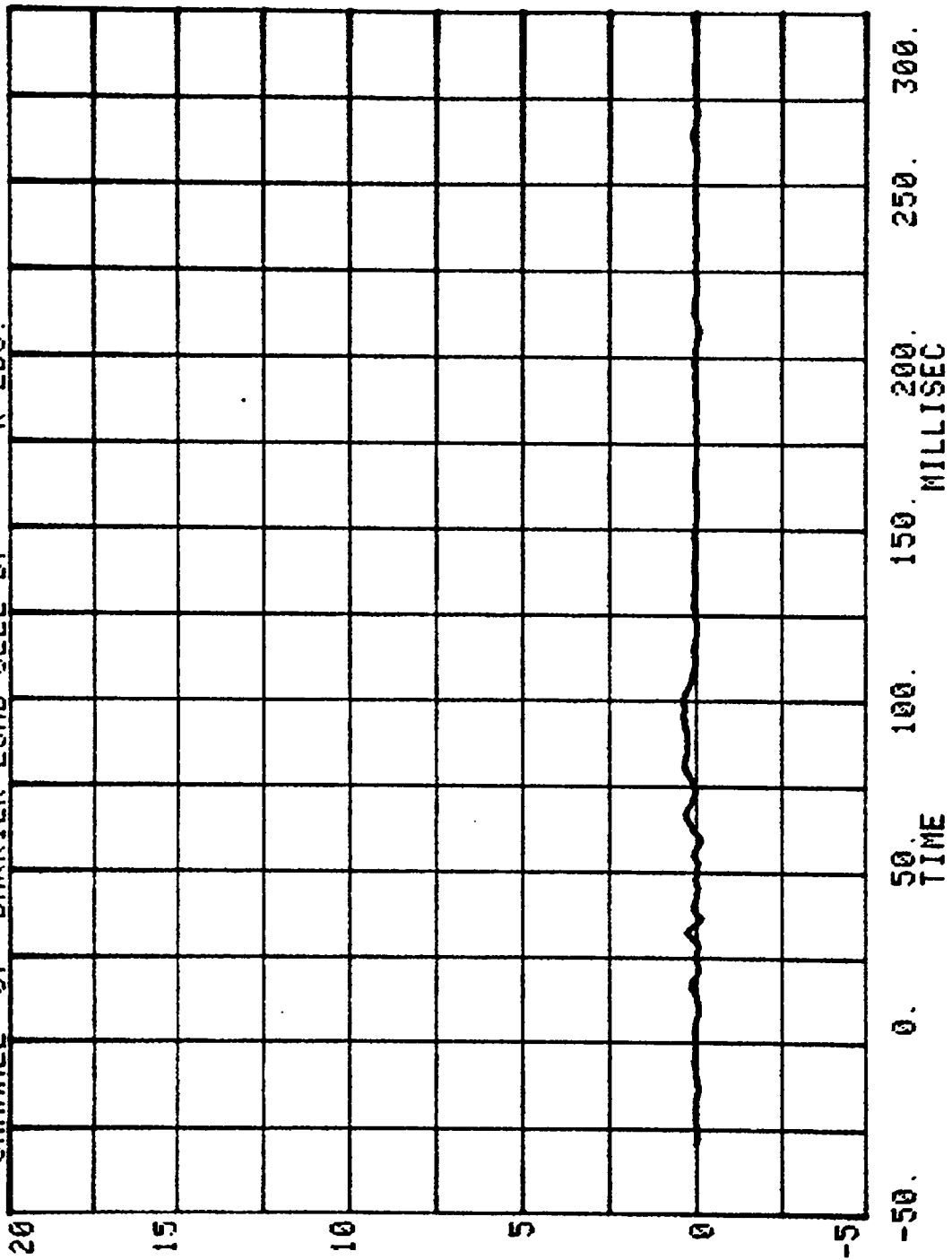
CHANNEL 65 RUN= 581 SERIES= 114
BARRIER LOAD CELL D5 K LBS.



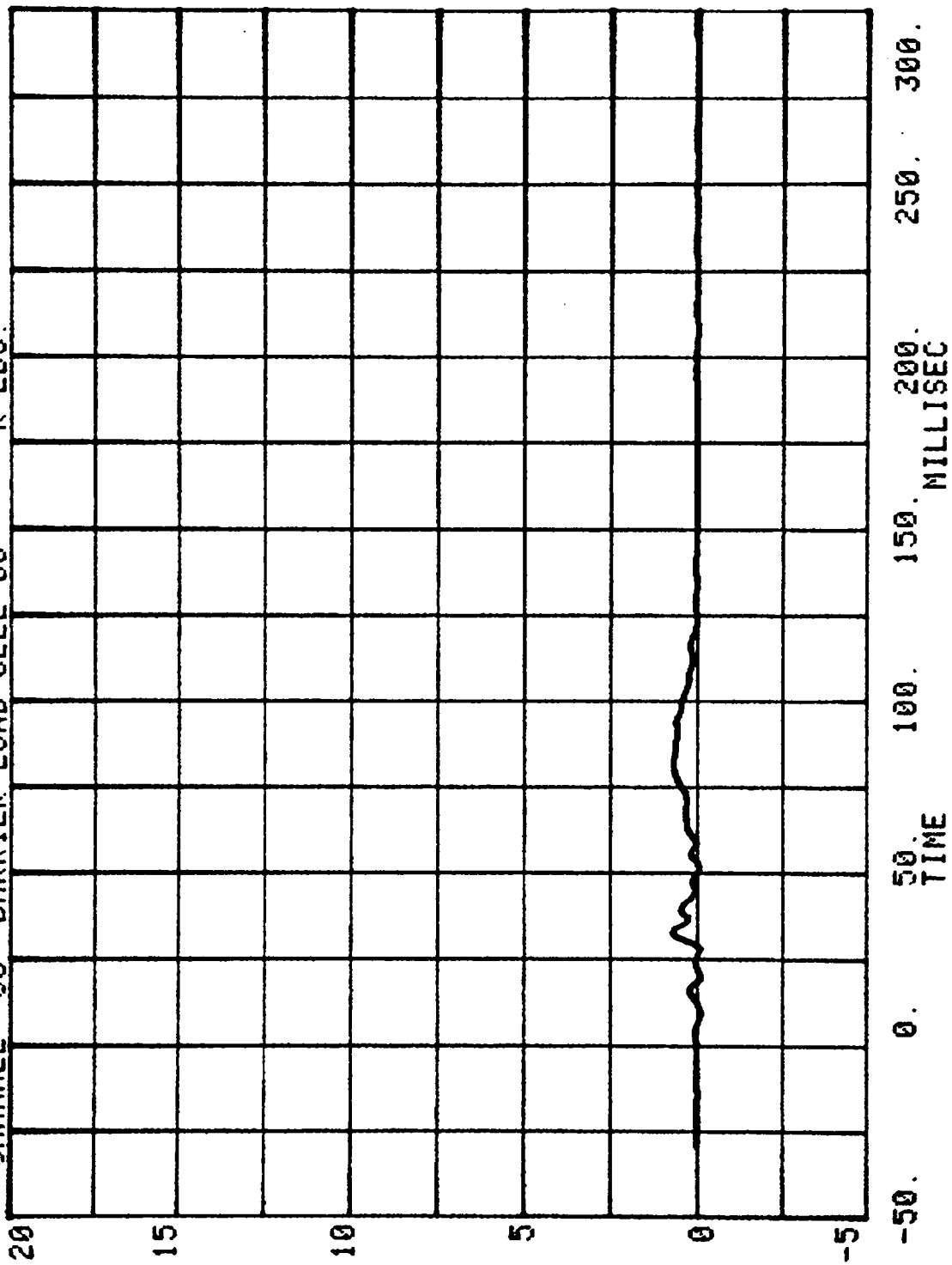
CHANNEL 66 RUN= 581 SERIES= 114 K LBS.
BARRIER LOAD CELL 06



CHANNEL 67 RUN= 581 SERIES= 114 K LBS.
BARRIER LOAD CELL D7

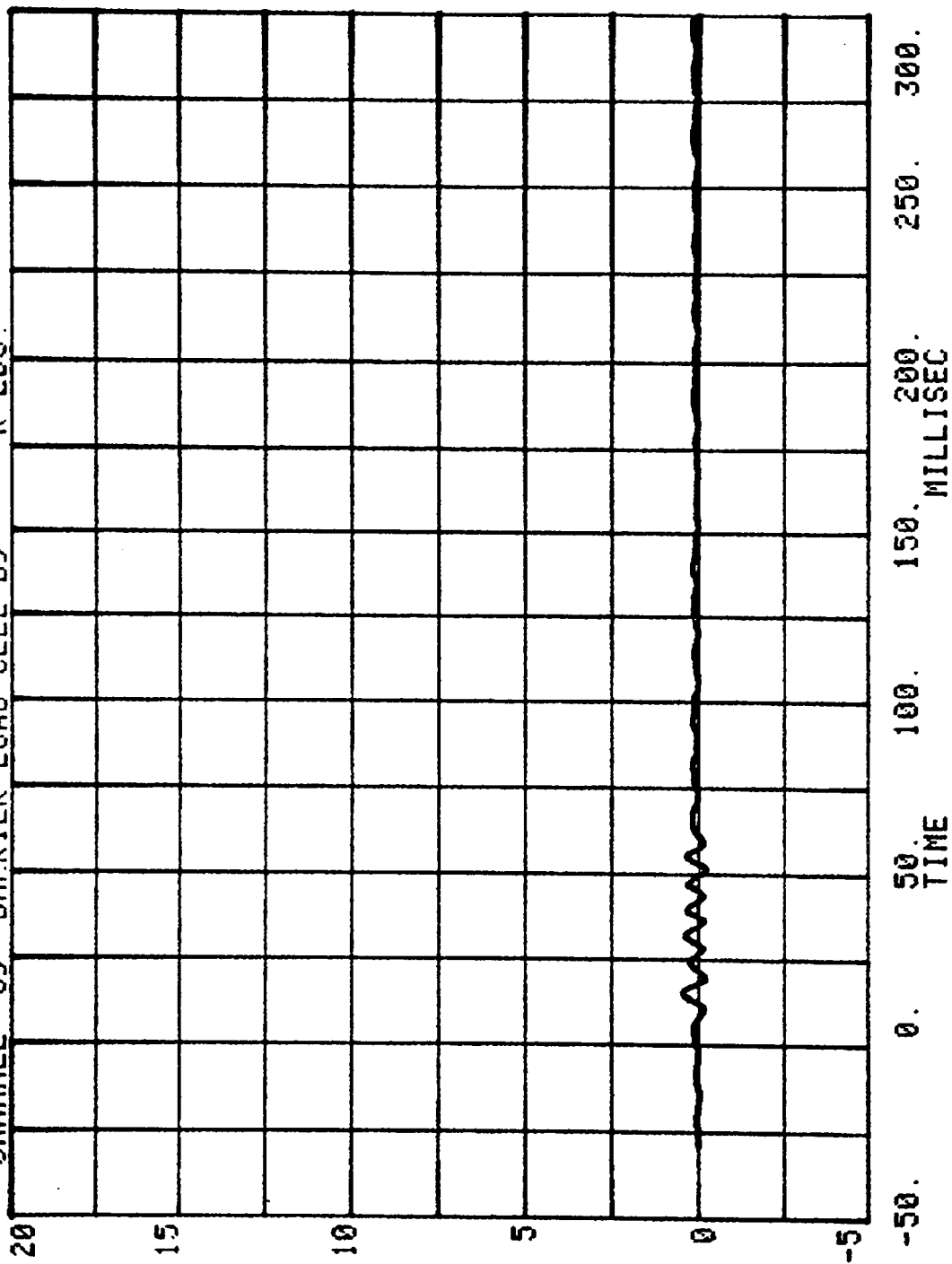


RUN= 581 SERIES= 114
CHANNEL 68 BARRIER LOAD CELL 08 K LBS.



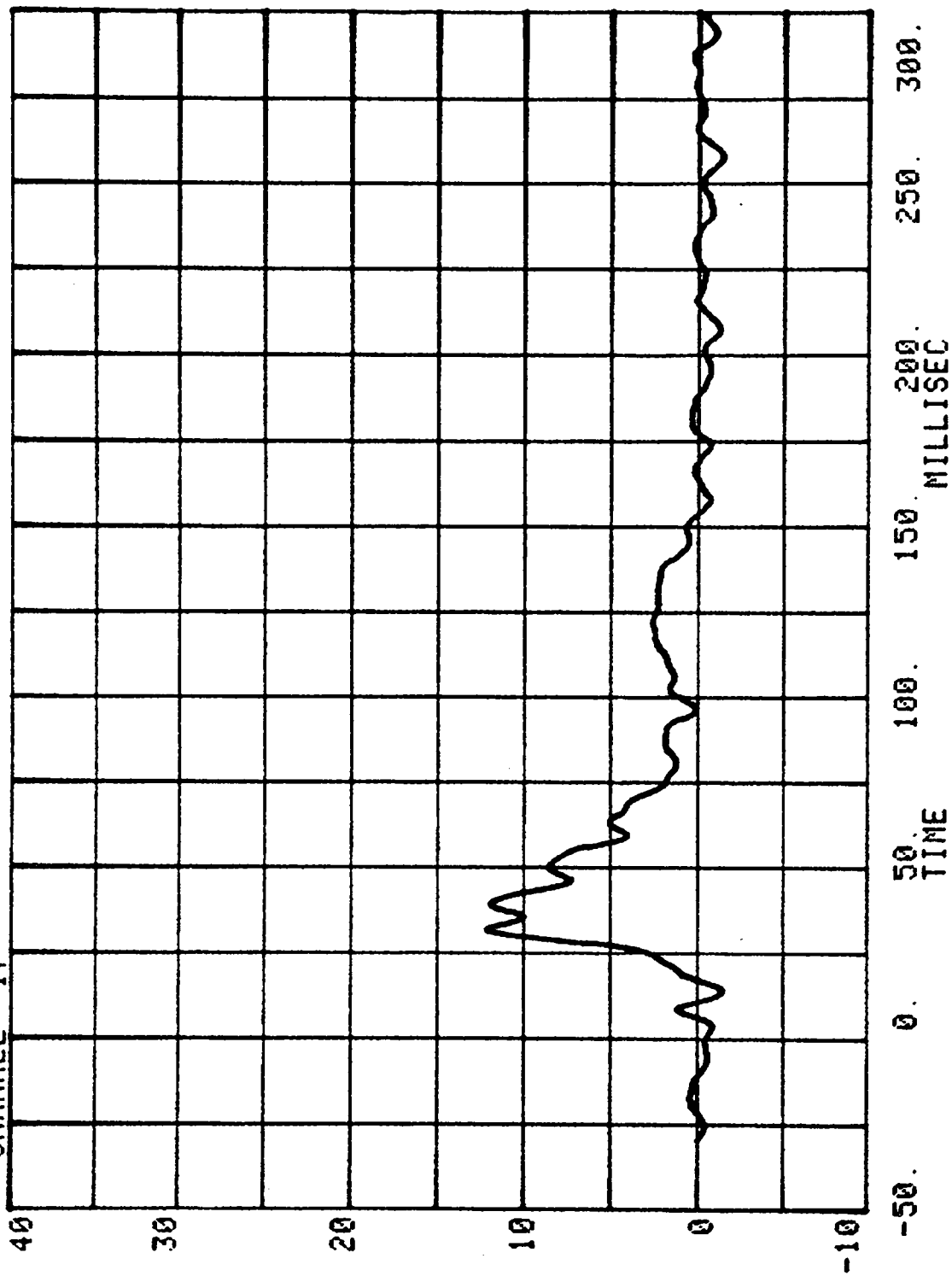
CHANNEL 69 BARRIER LOAD CELL D9 K LBS.

RUN= 581 SERIES= 114

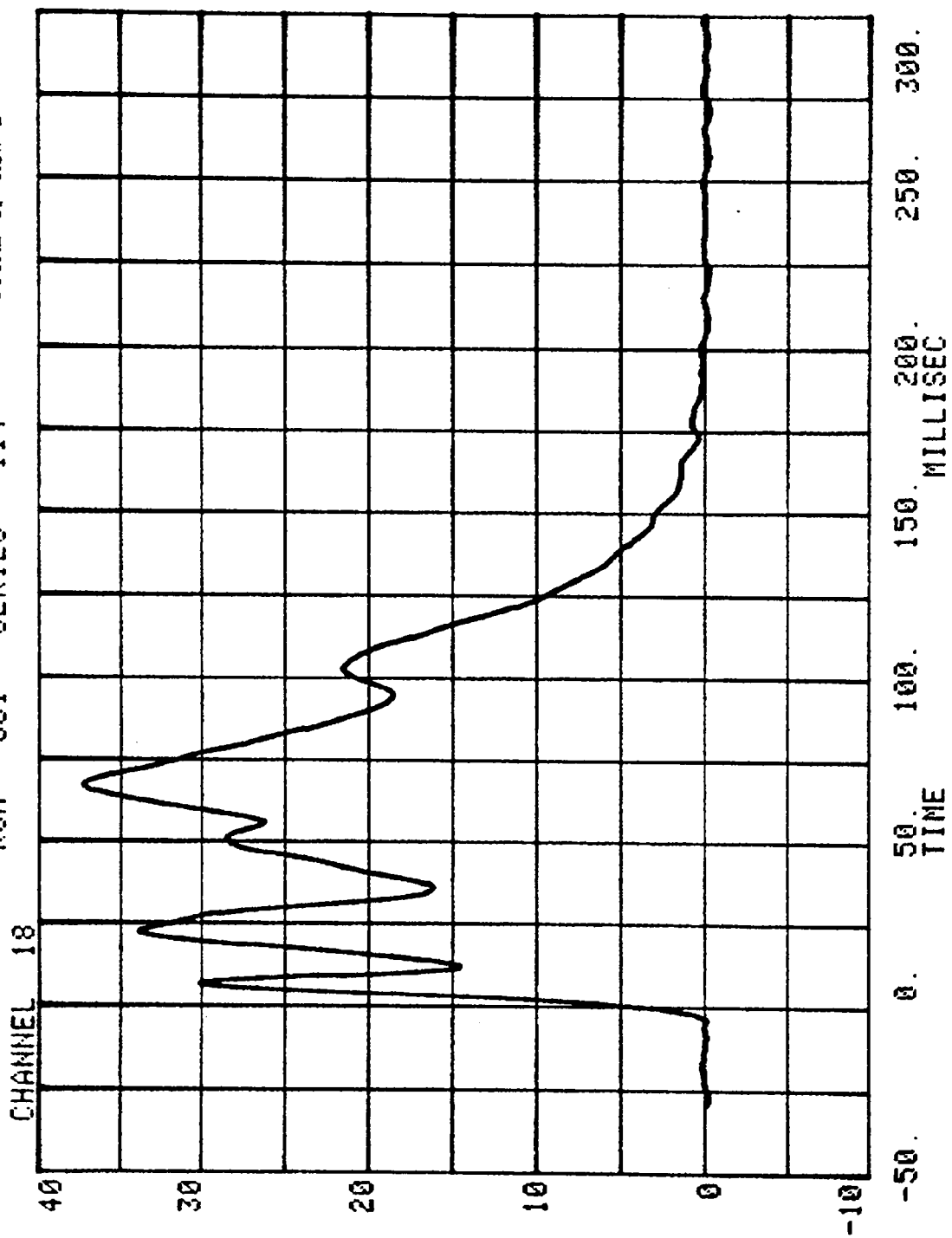


RUN= 581 SERIES= 114 TOTAL OF ROW A

CHANNEL 17

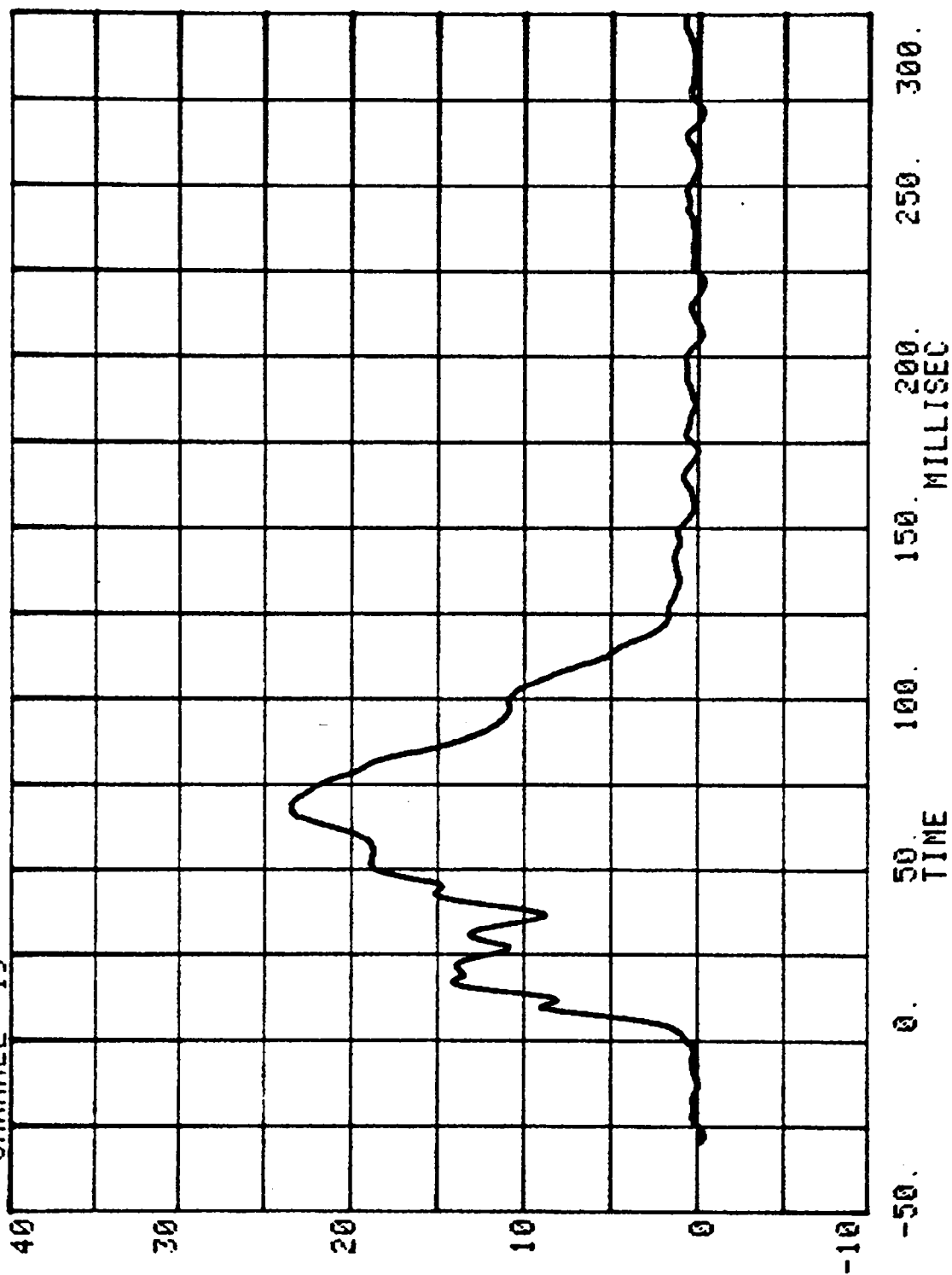


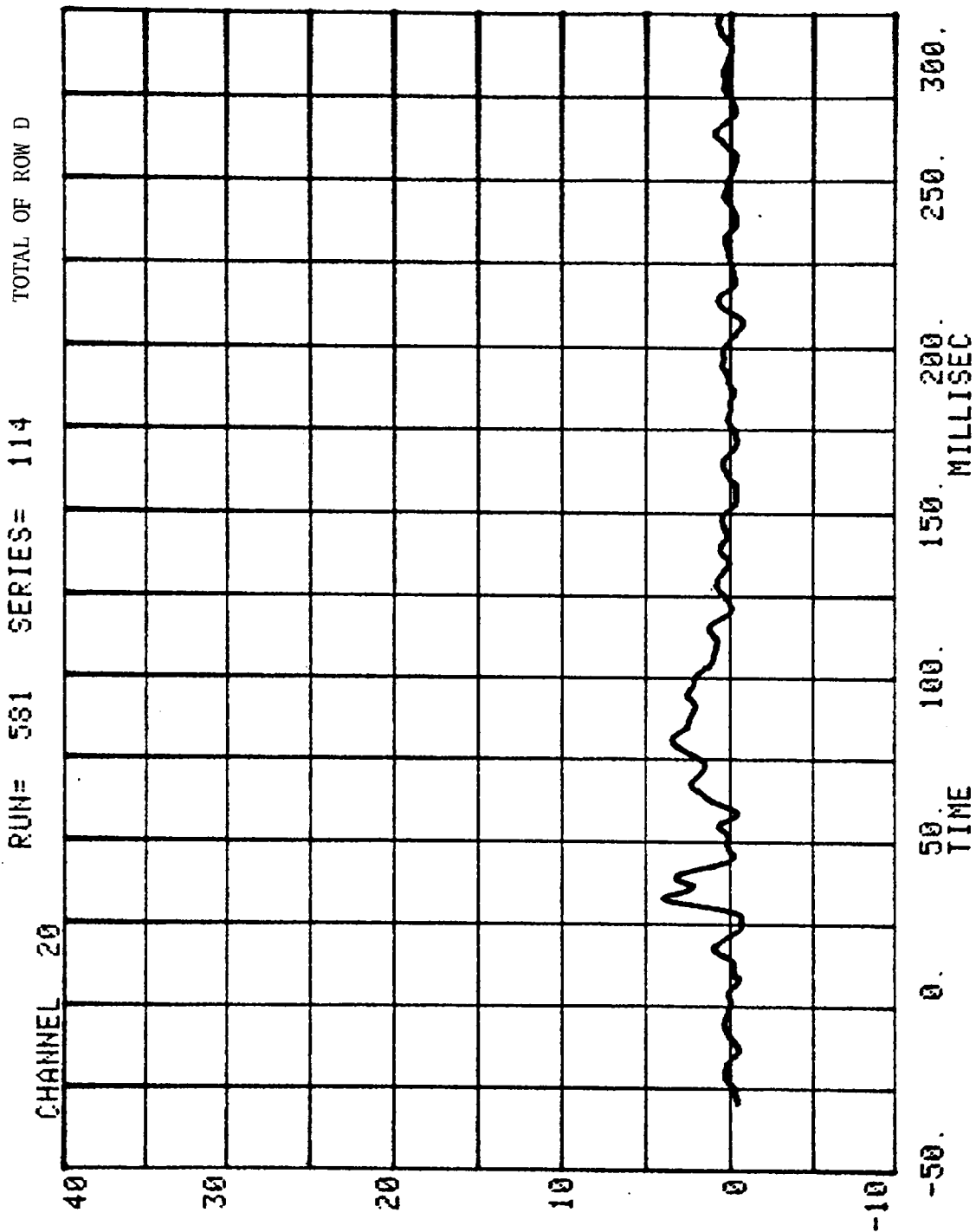
RUN= 581 SERIES= 114 TOTAL OF ROW B



RUN= 581 SERIES= 114 TOTAL OF ROW C

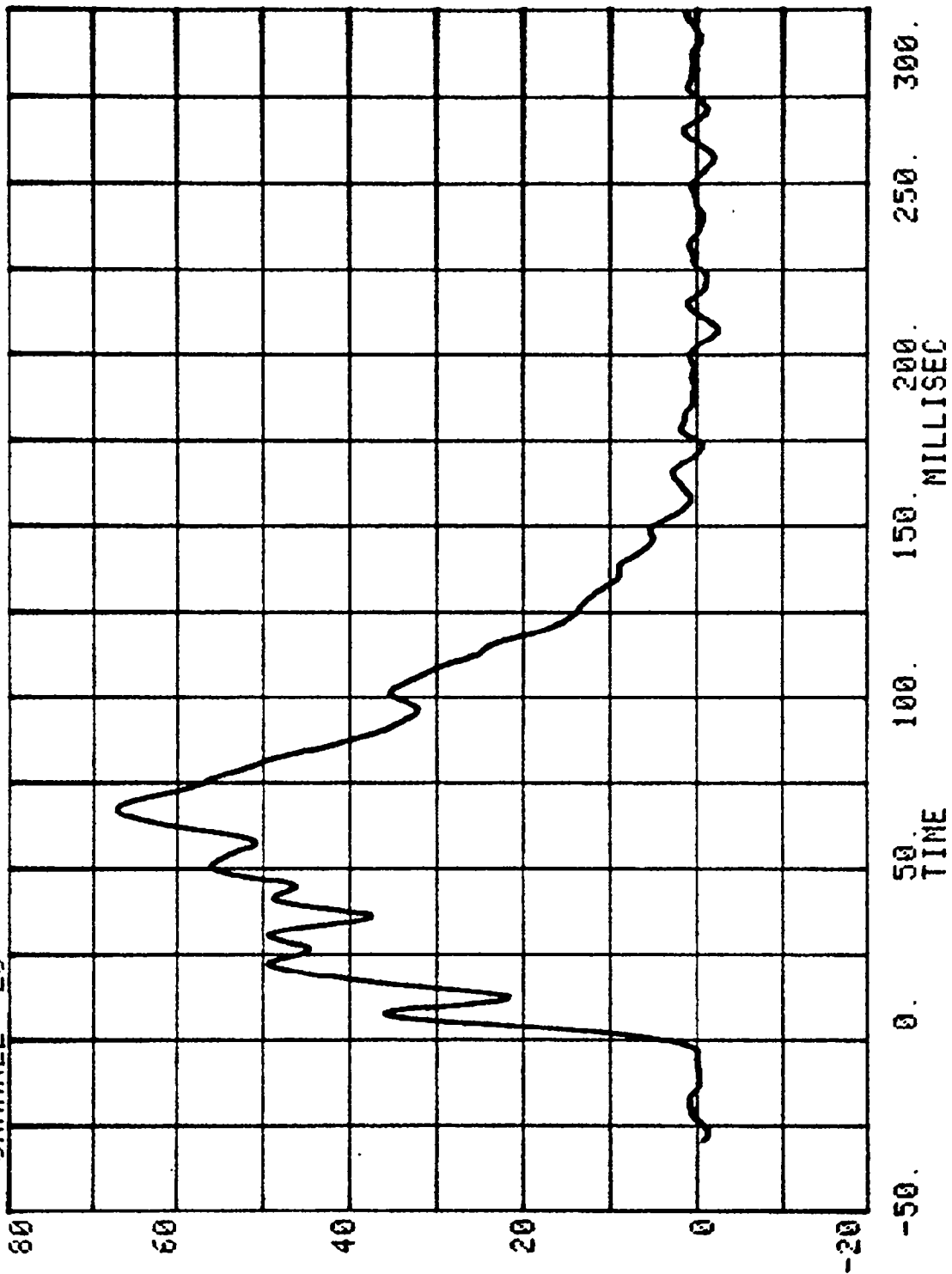
CHANNEL 19





RUN= 581 SERIES= 114 TOTAL OF ROWS A+B+C+D

CHANNEL 23



TEST NO. CD0114

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= 581

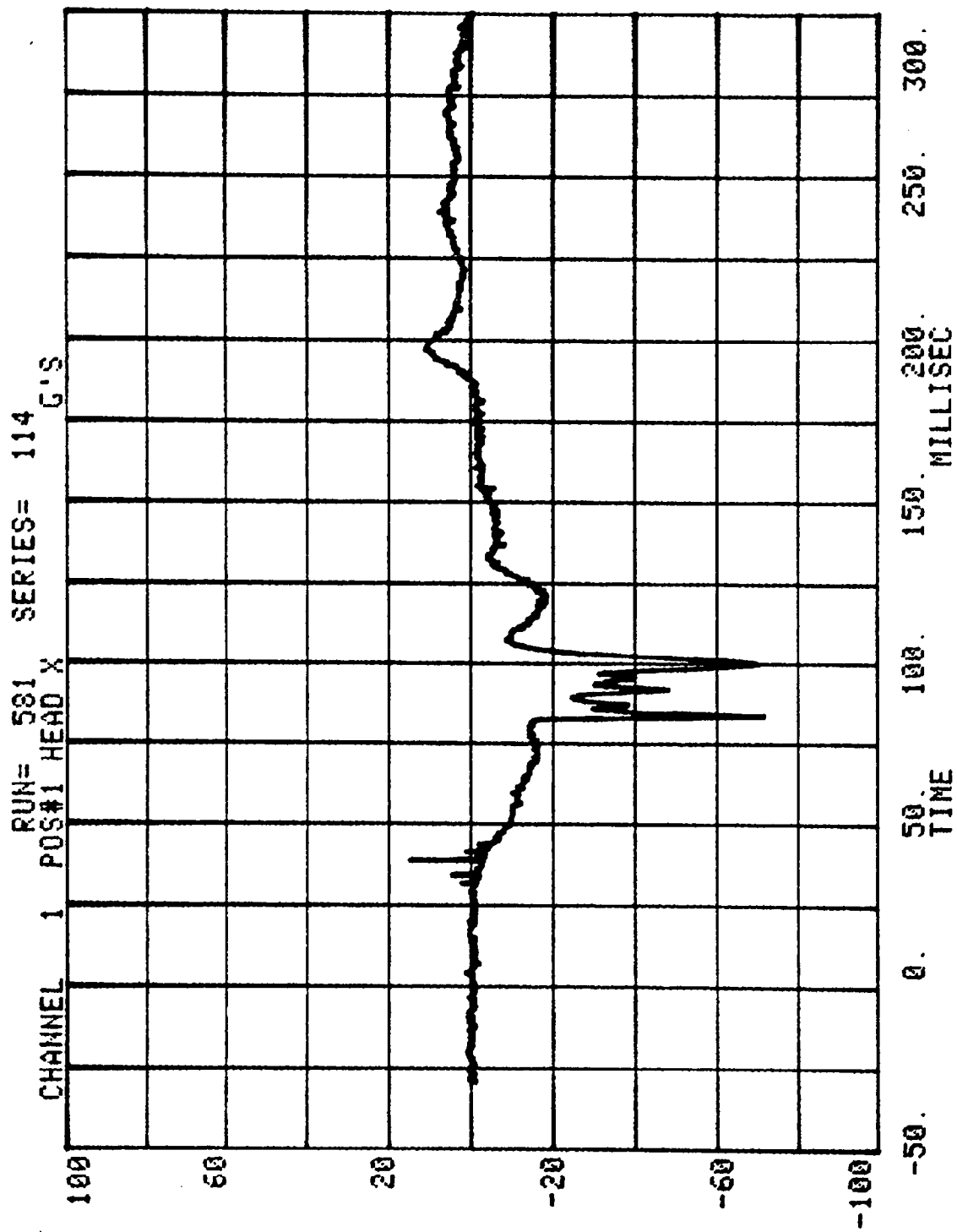
POS#1 HEAD RESULTANT

HIC= 408.0 FROM T1= .06015 TO T2= .10845

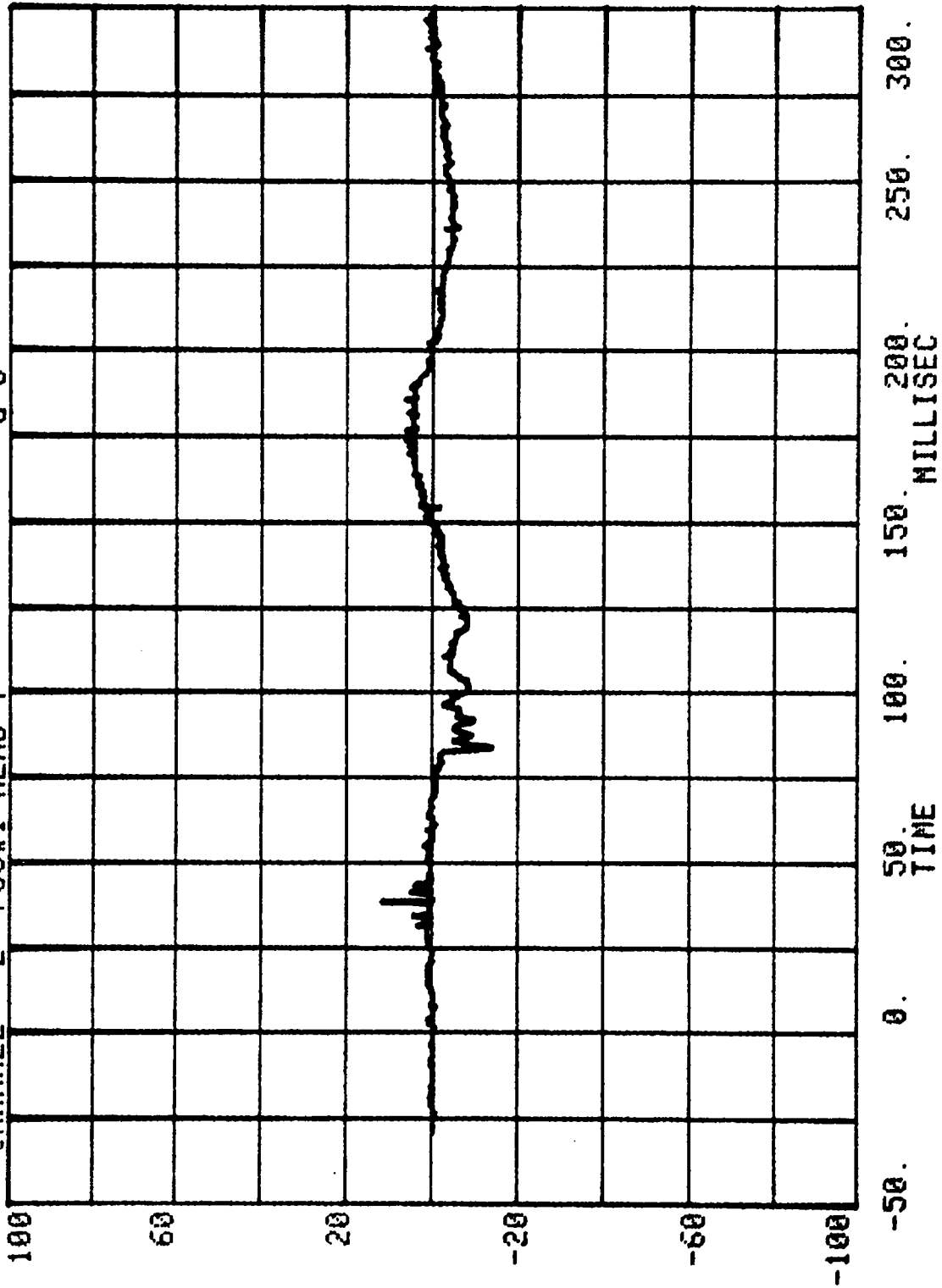
AVERAGE ACCELERATION BETWEEN T1 AND T2= 37.2G'S

EVENT TIME= 300.0 MSEC

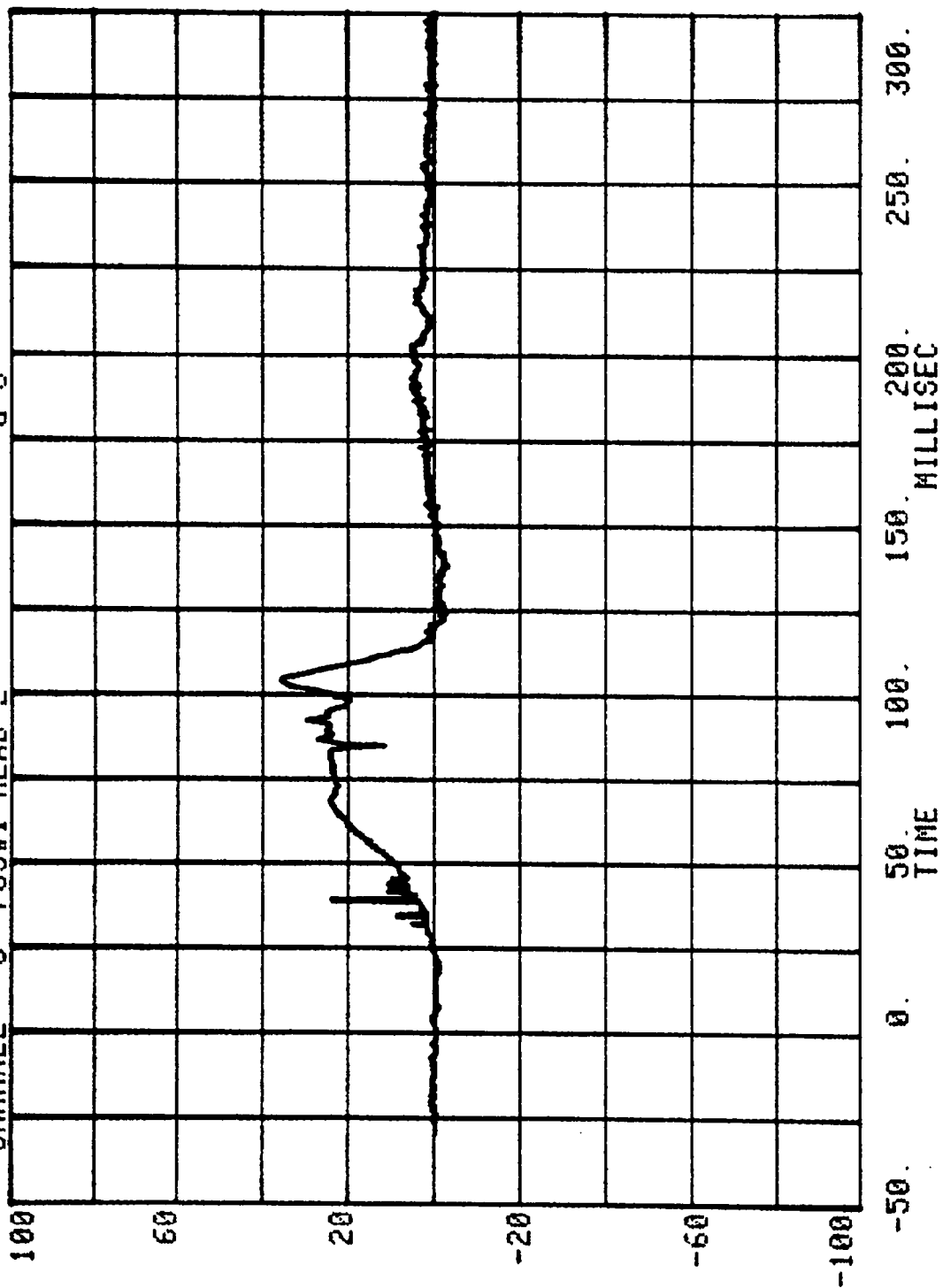
SEVERITY INDEX= 572.6

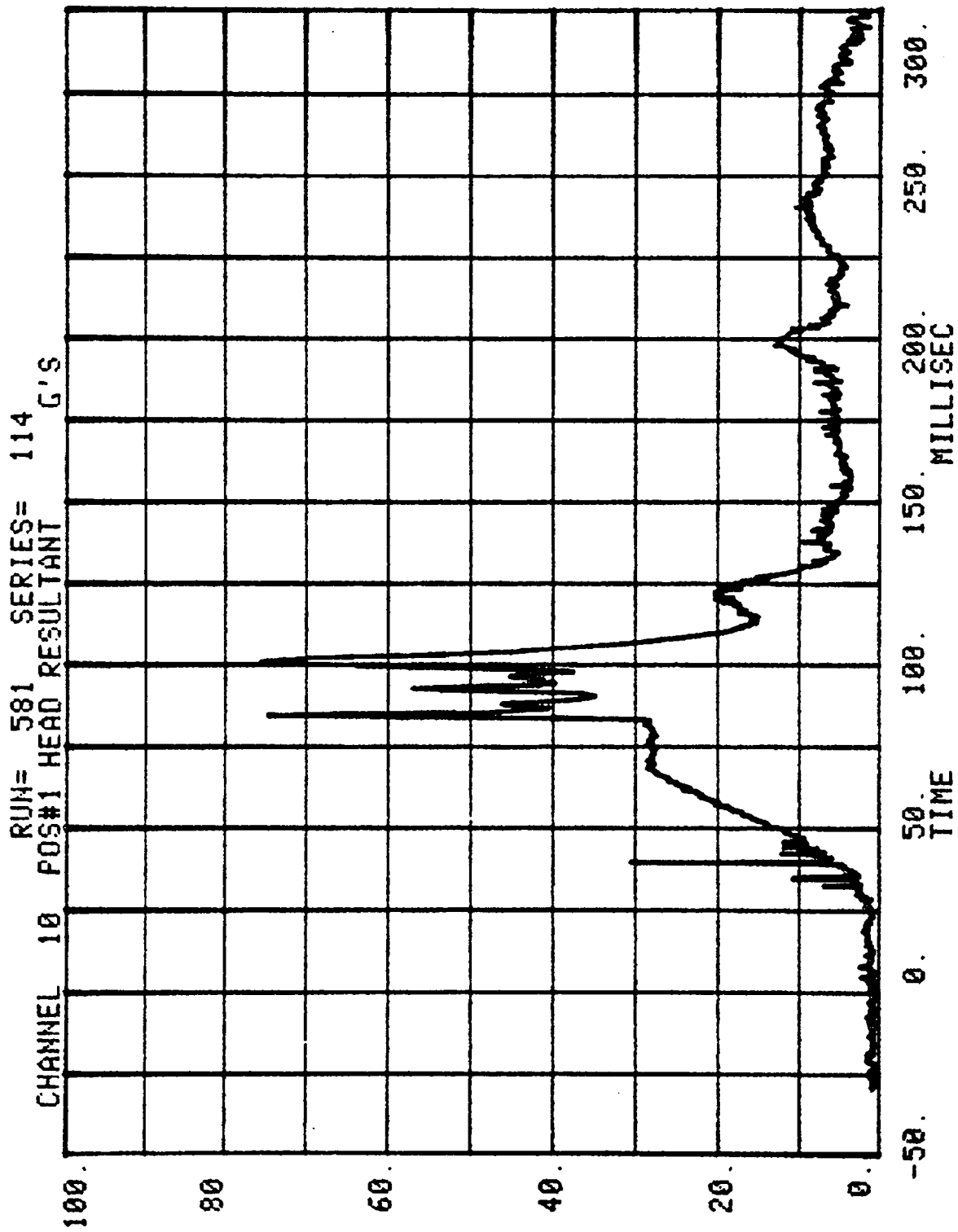


RUN= 581 SERIES= 114
CHANNEL 2 POS#1 HEAD Y G'S

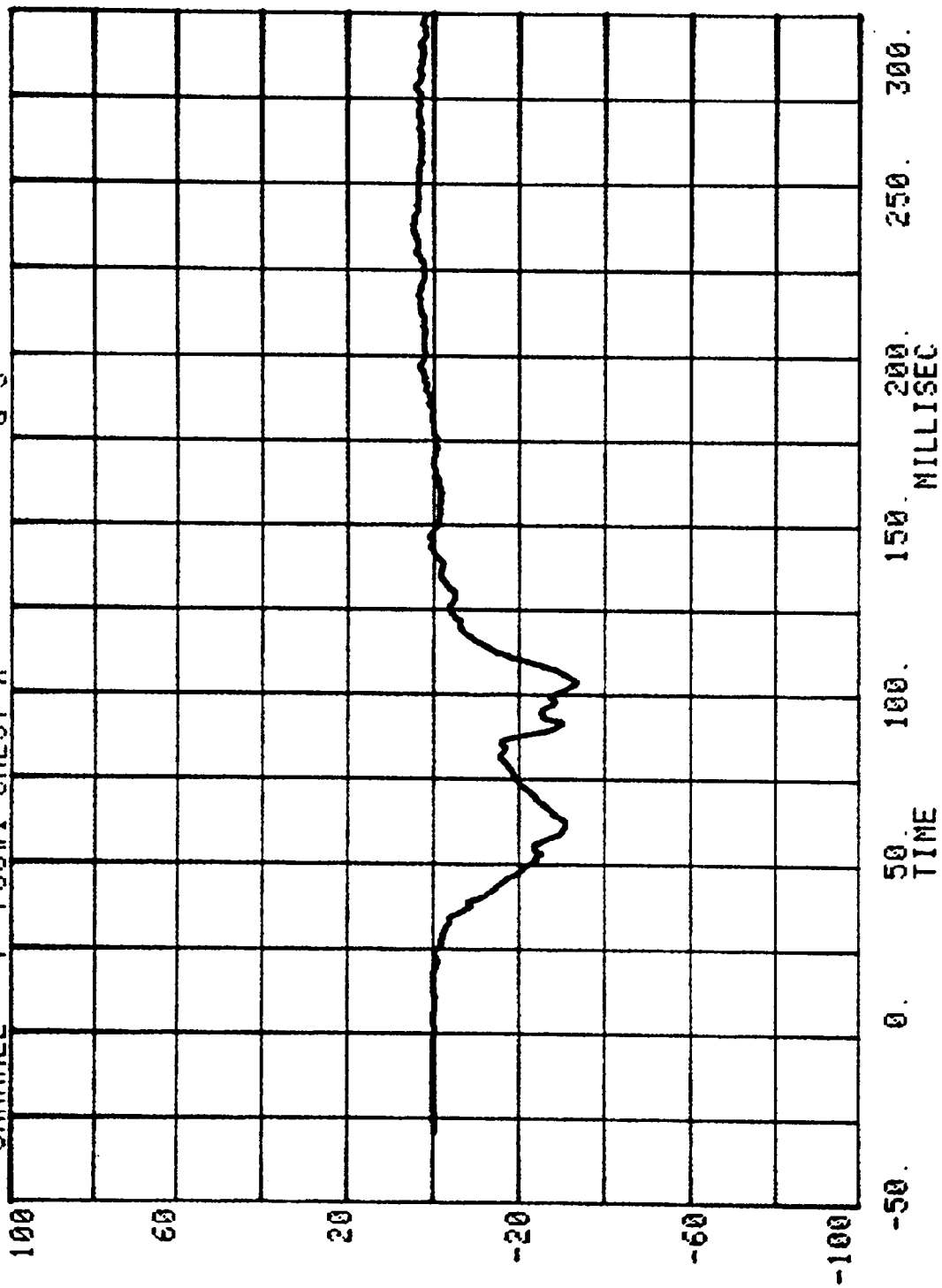


CHANNEL 3 POS#1 HEAD Z RUN= 581 SERIES= 114 G'S

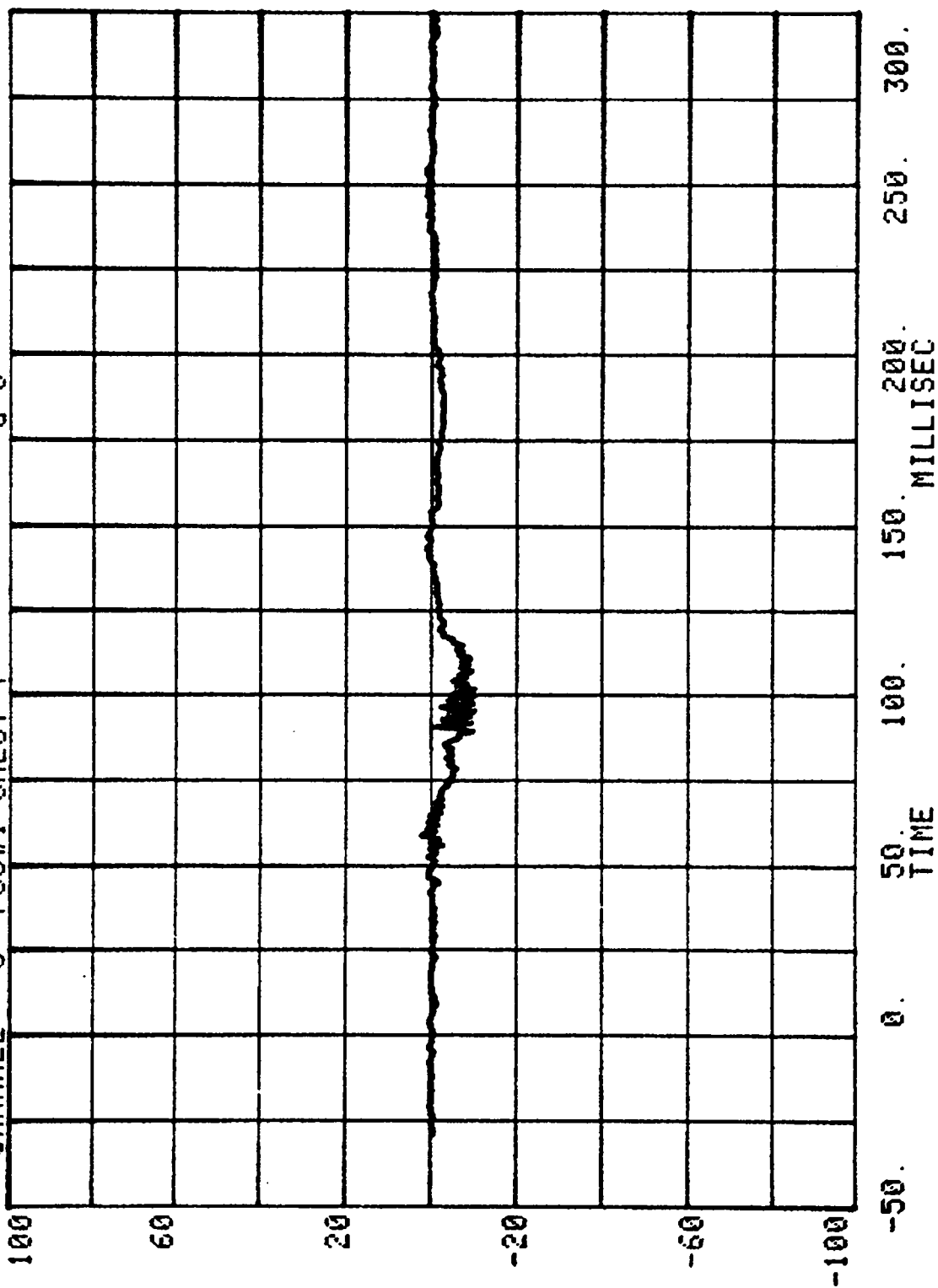




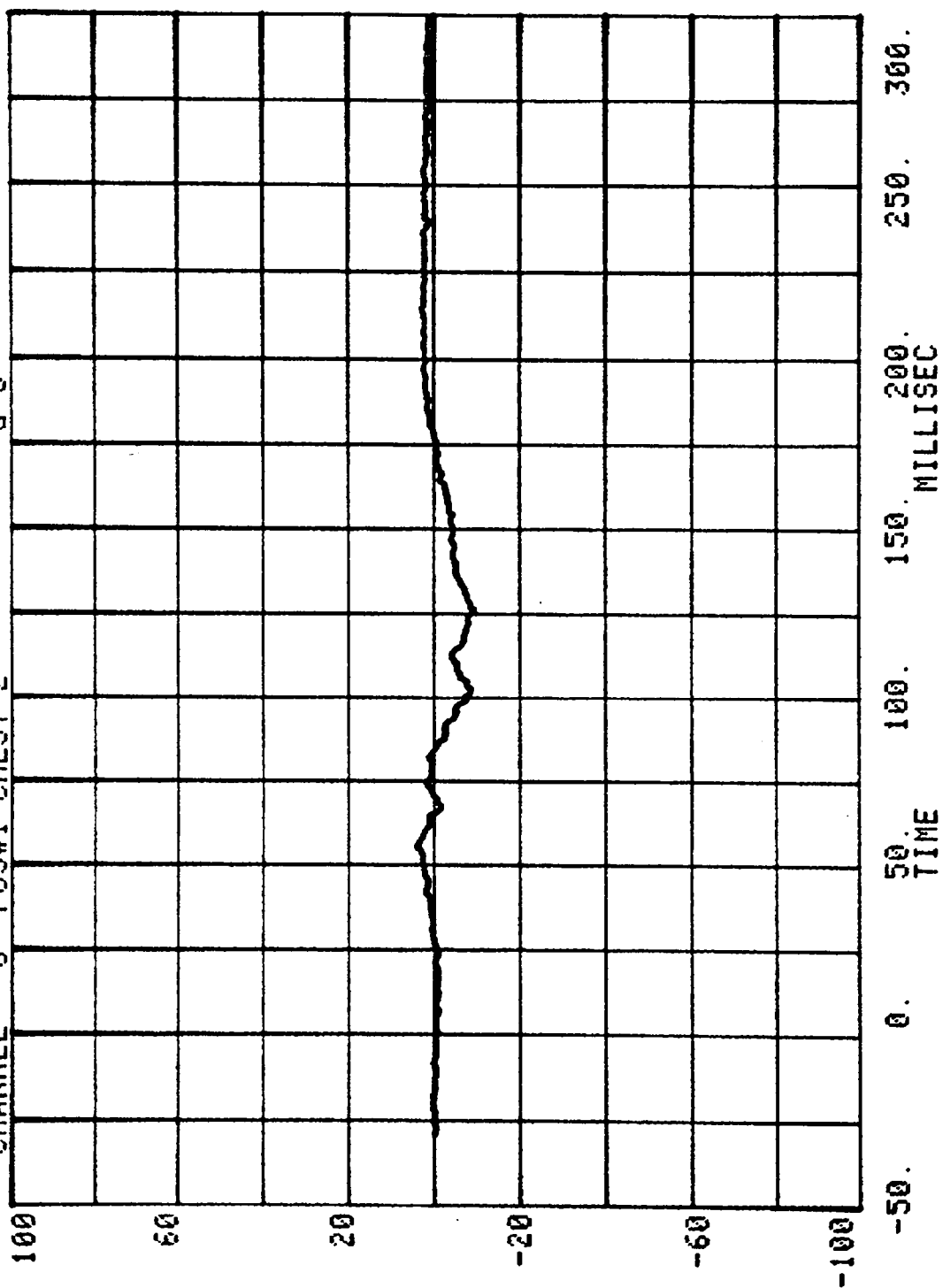
RUN= 581 SERIES= 114
CHANNEL 4 POS#1 CHEST X G'S



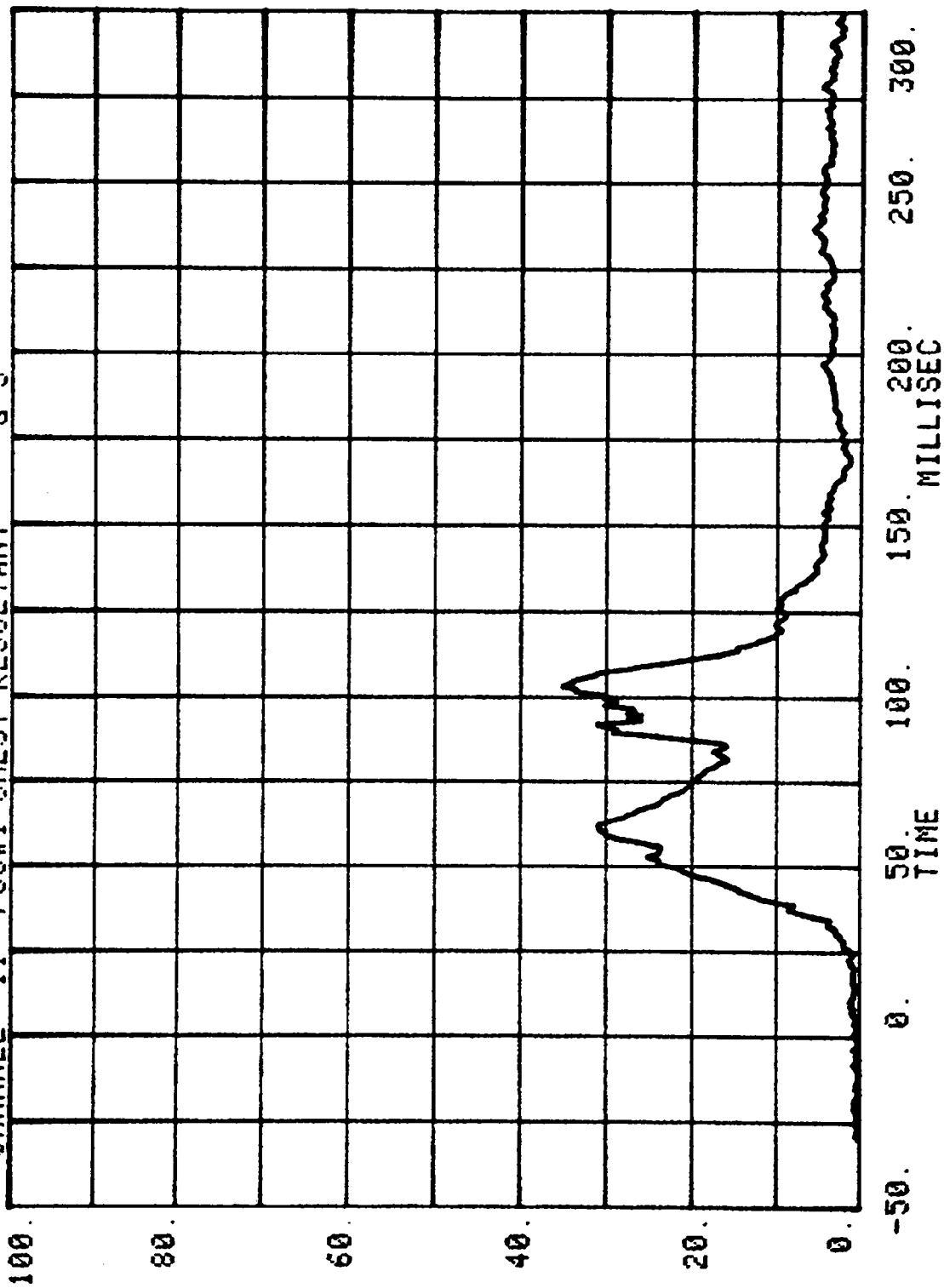
RUN= 581 SERIES= 114
CHANNEL 5 POS#1 CHEST Y G'S



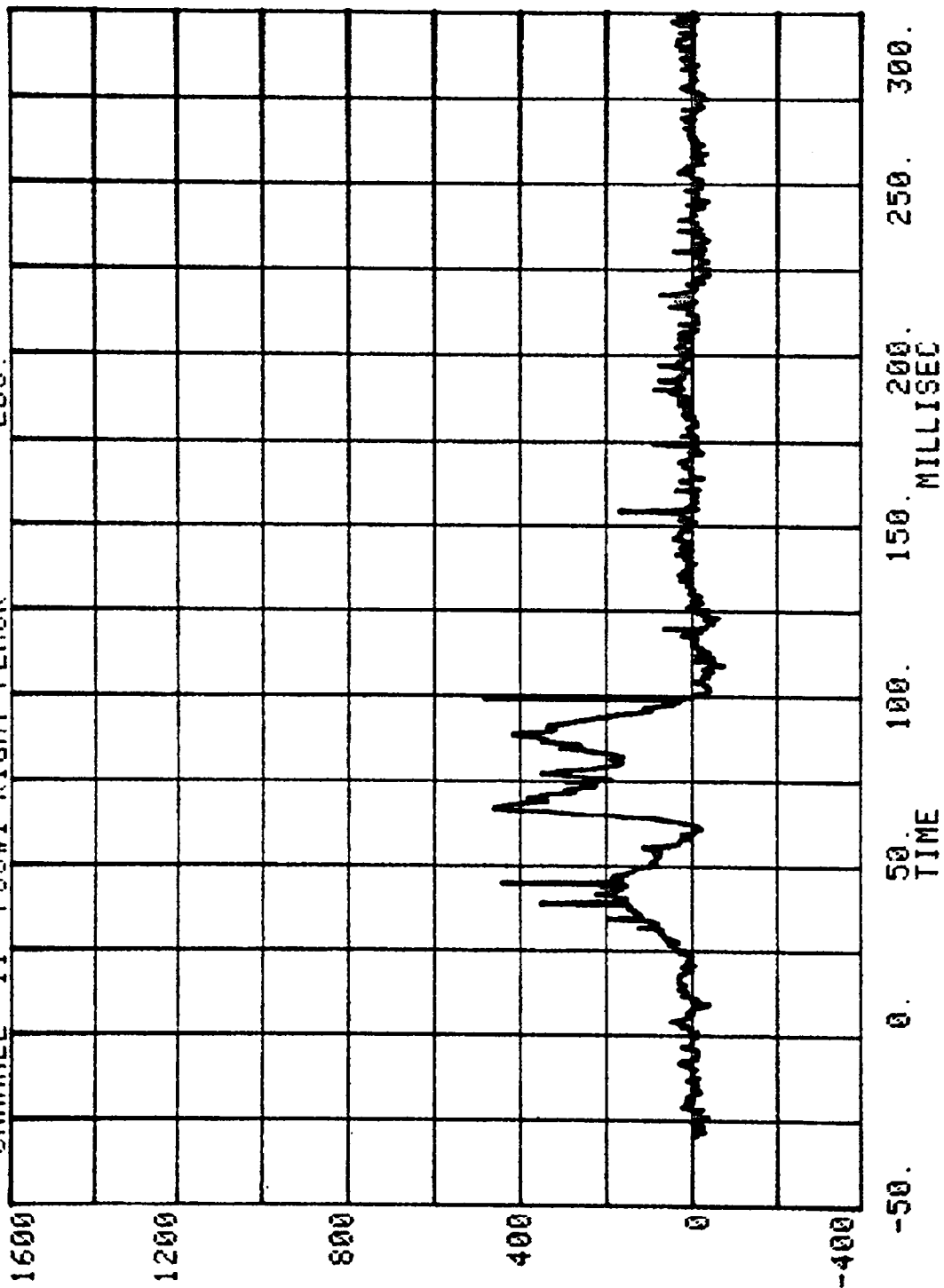
RUN= 581 SERIES= 114
CHANNEL 6 PDS#1 CHEST 2 G'S



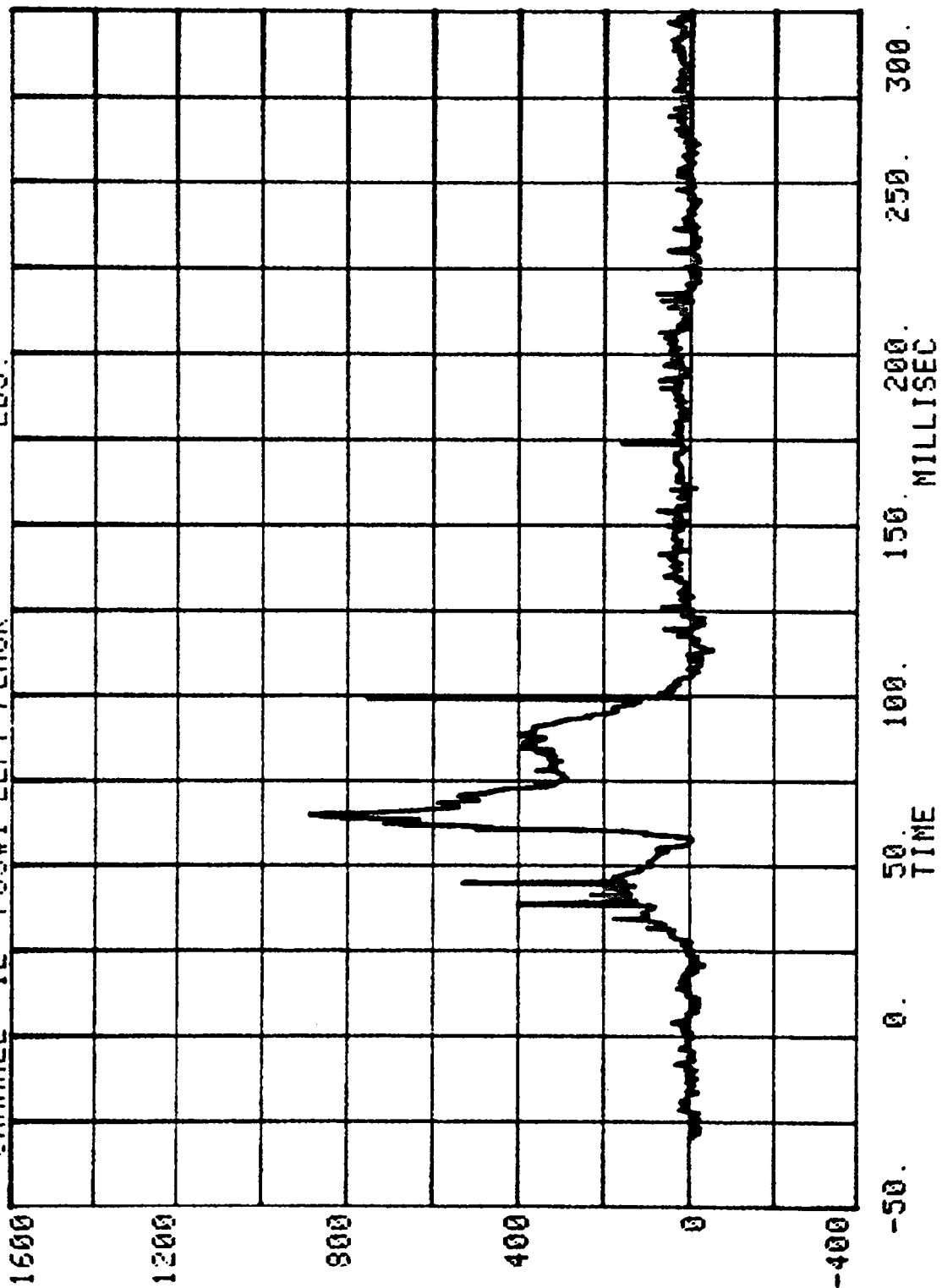
RUN= 581 SERIES= 114
CHANNEL 11 POS#1 CHEST RESULTANT G'S



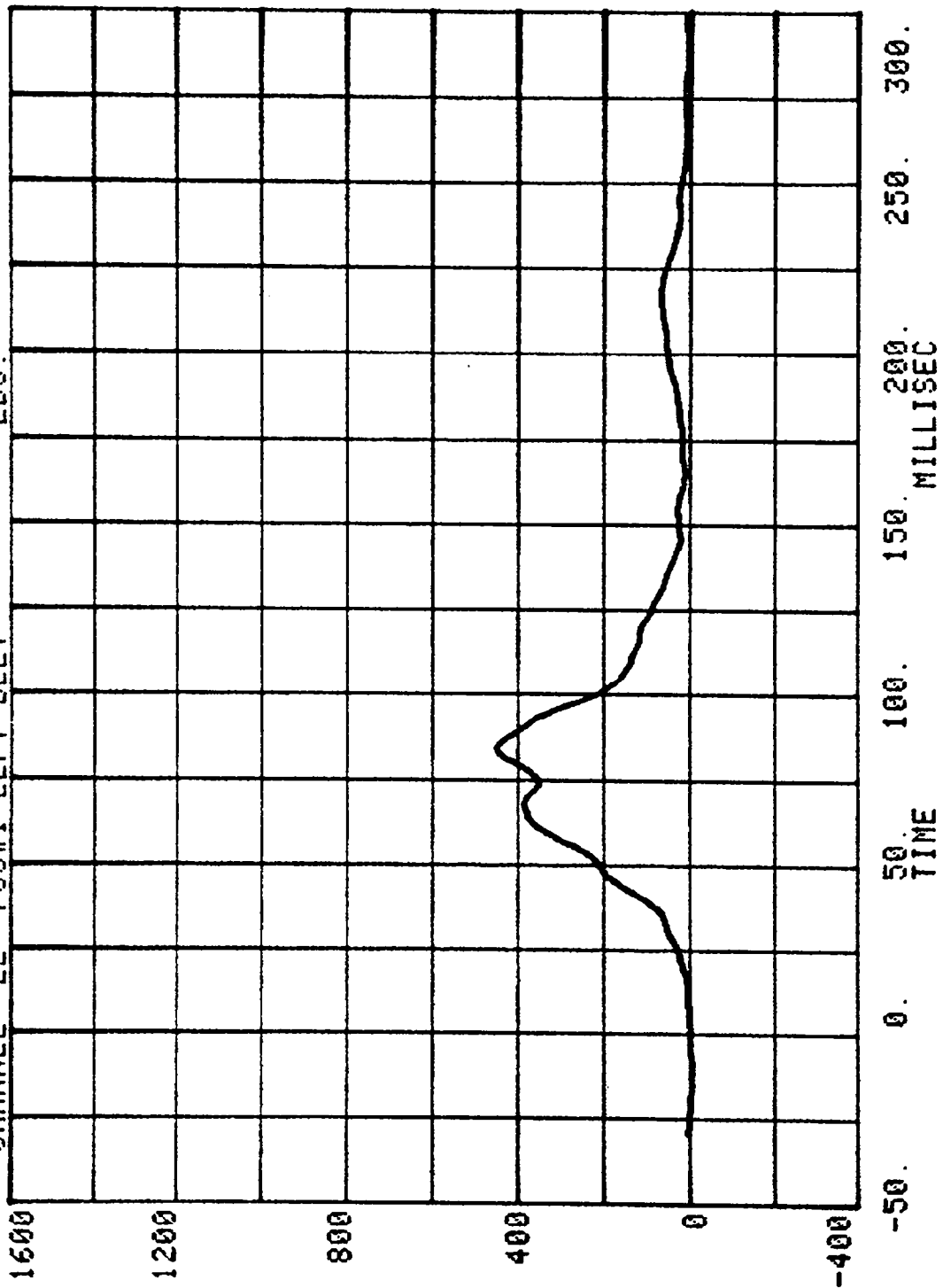
CHANNEL 11 POS#1 RIGHT FEMUR RUN= 581 SERIES= 114 LBS.



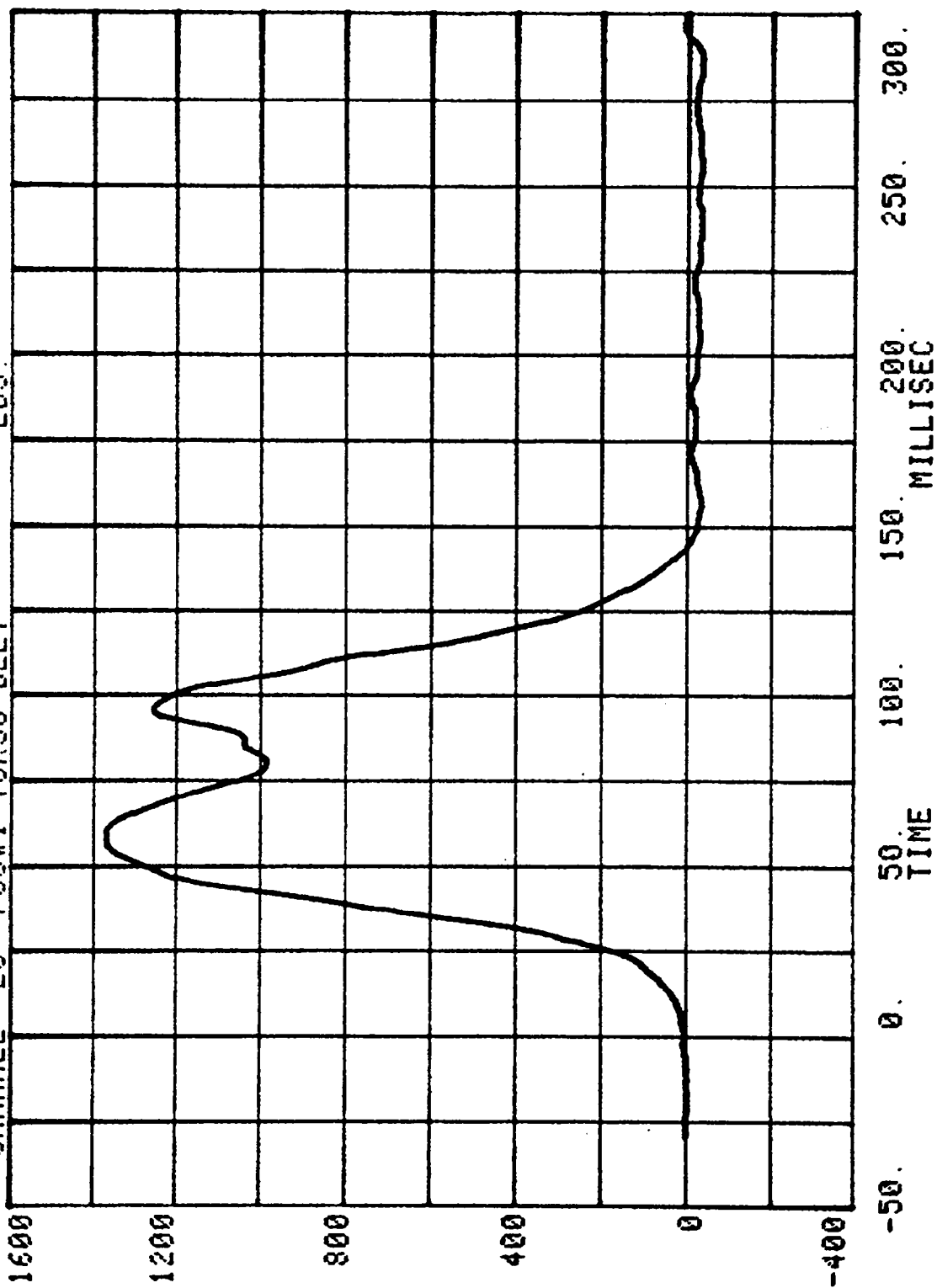
CHANNEL 12 POS#1 LEFT FEMUR
RUN= 581 SERIES= 114 LBS.

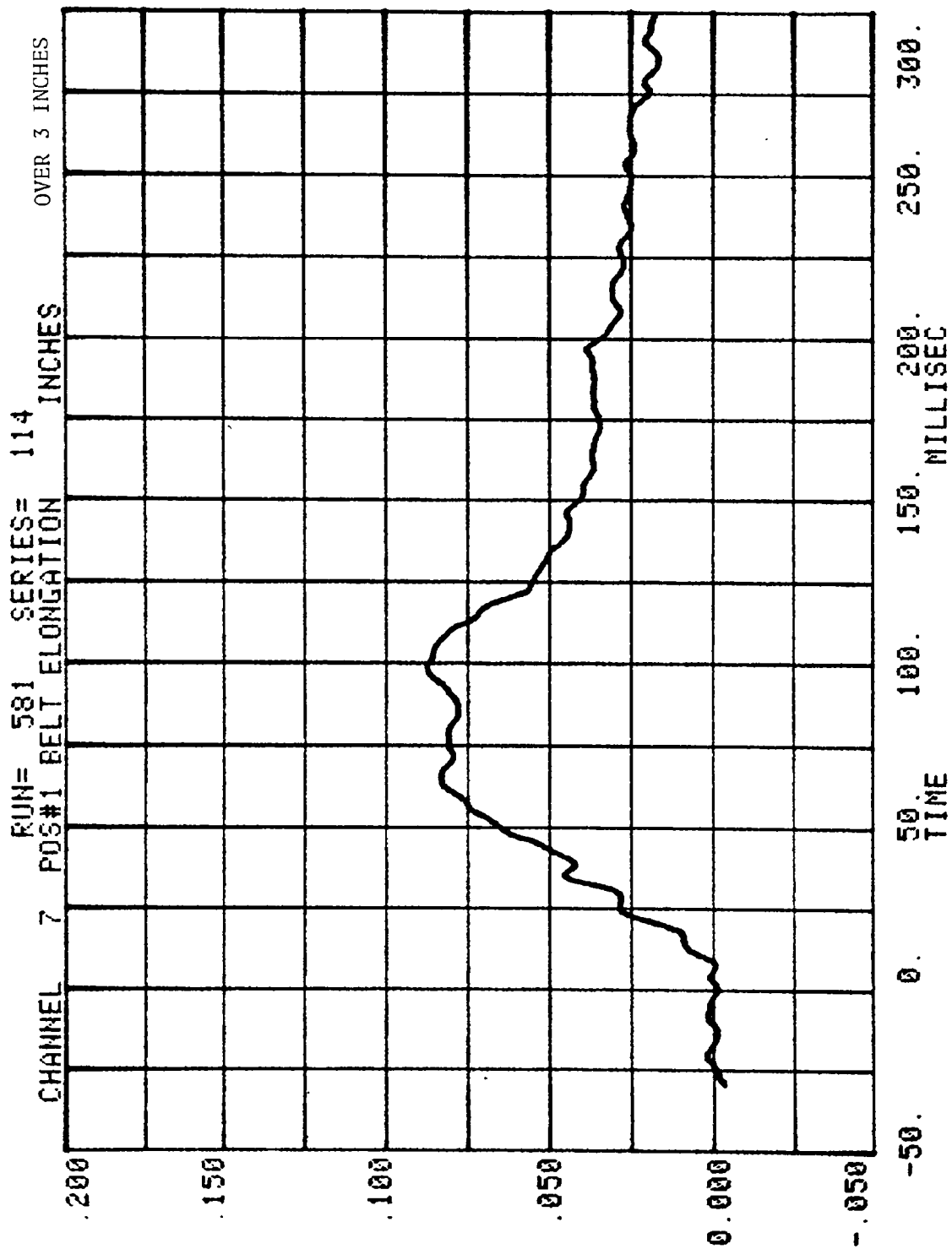


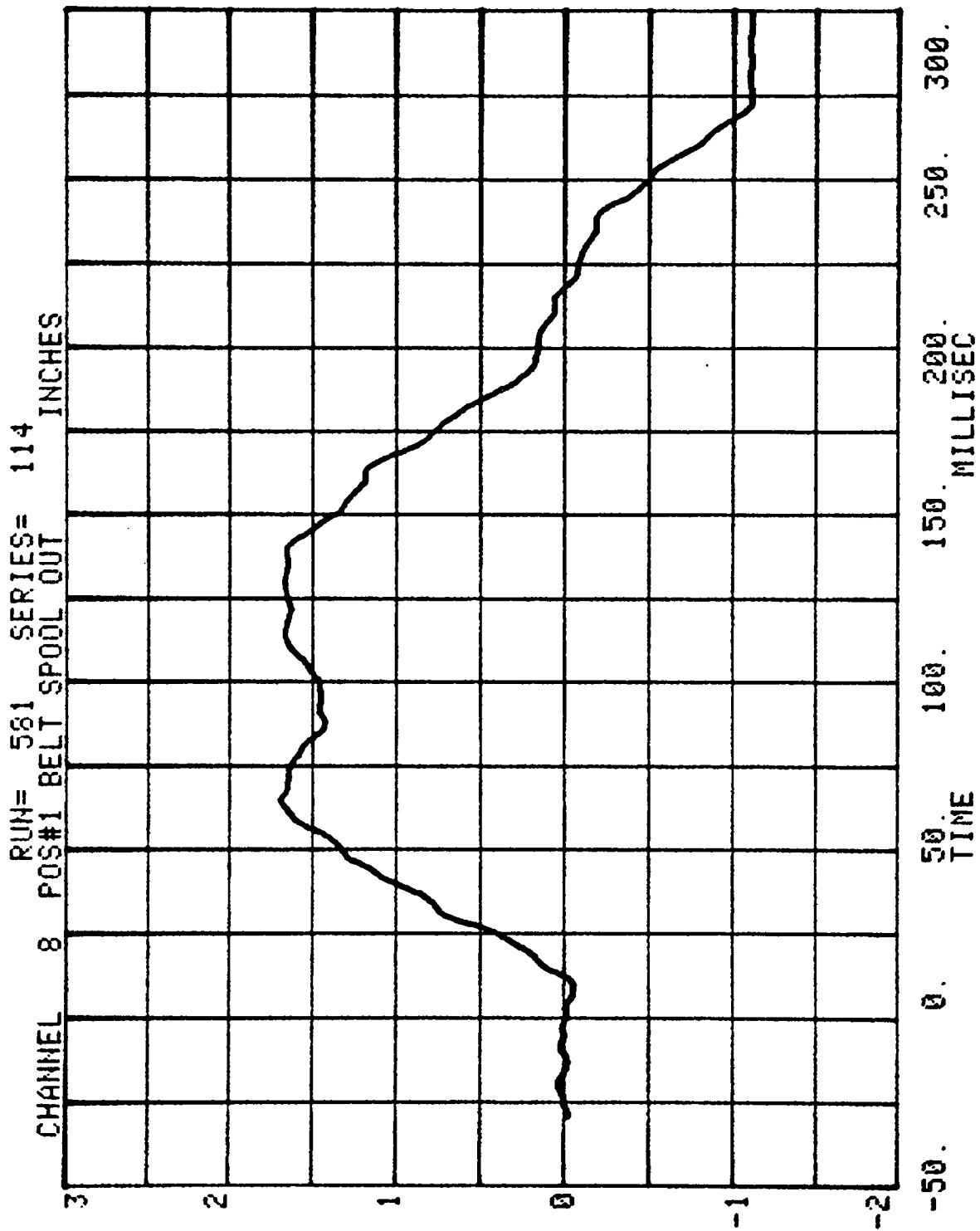
CHANNEL 22 POS#1 LEFT BELT
RUN= 581 SERIES= 114 LBS.



RUN= 581 SERIES= 114 LBS.
CHANNEL 23 POS#1 TORSO BELT







HEAD INJURY CRITERION
HEAD SEVERITY INDEX

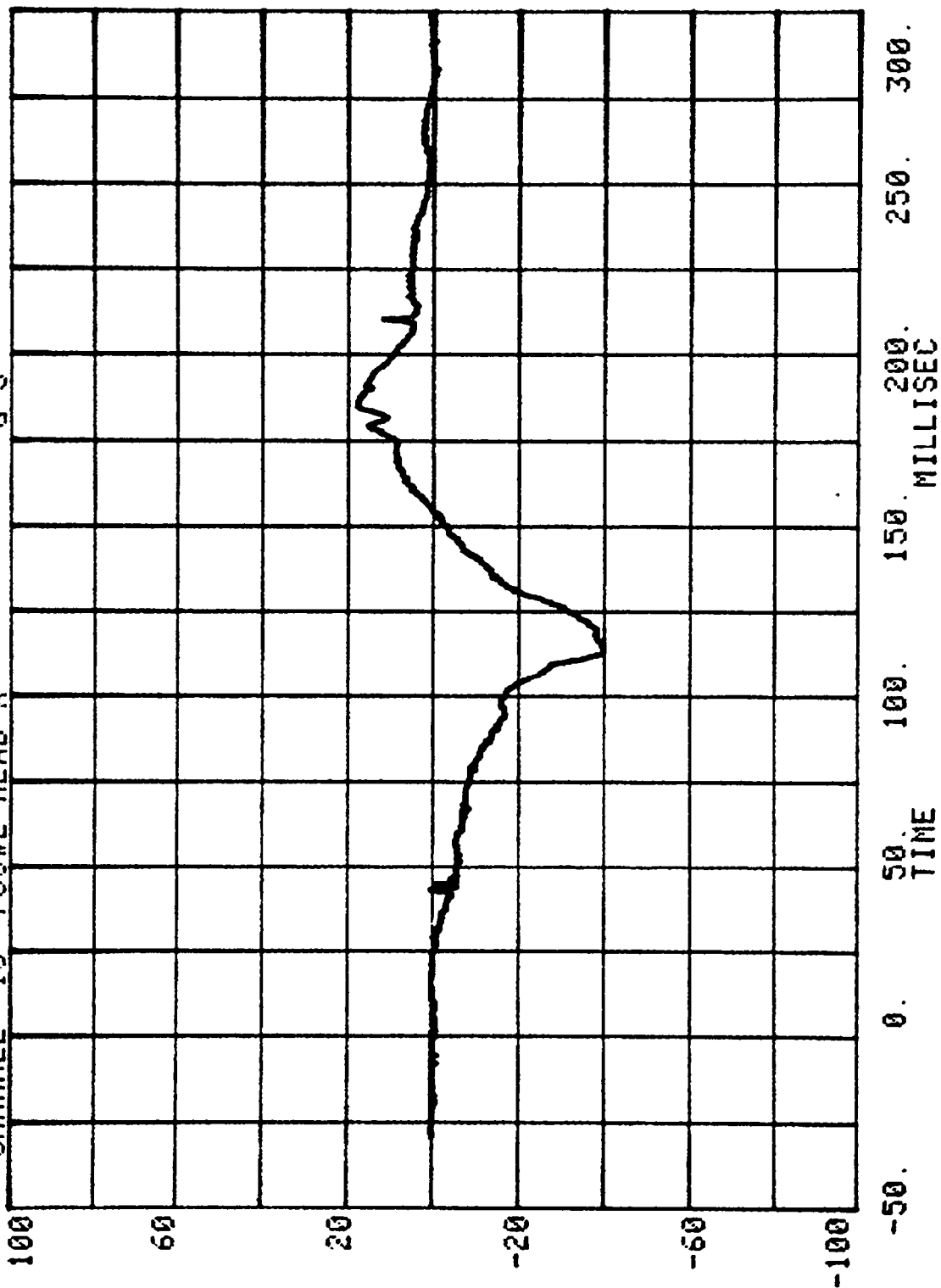
CAR TO LOAD CELL BARRIER

RUN= 581

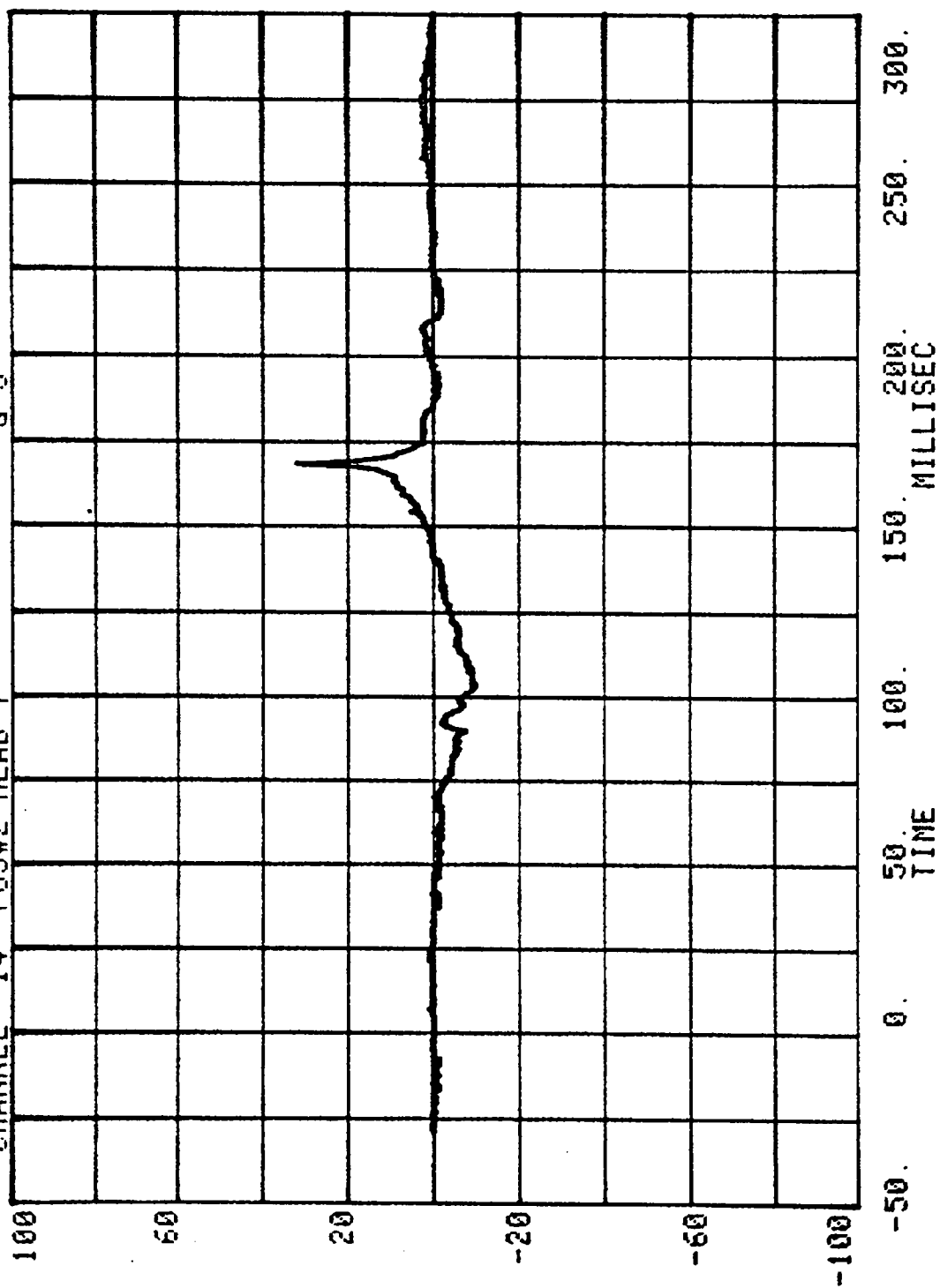
POS#2 HEAD RESULTANT

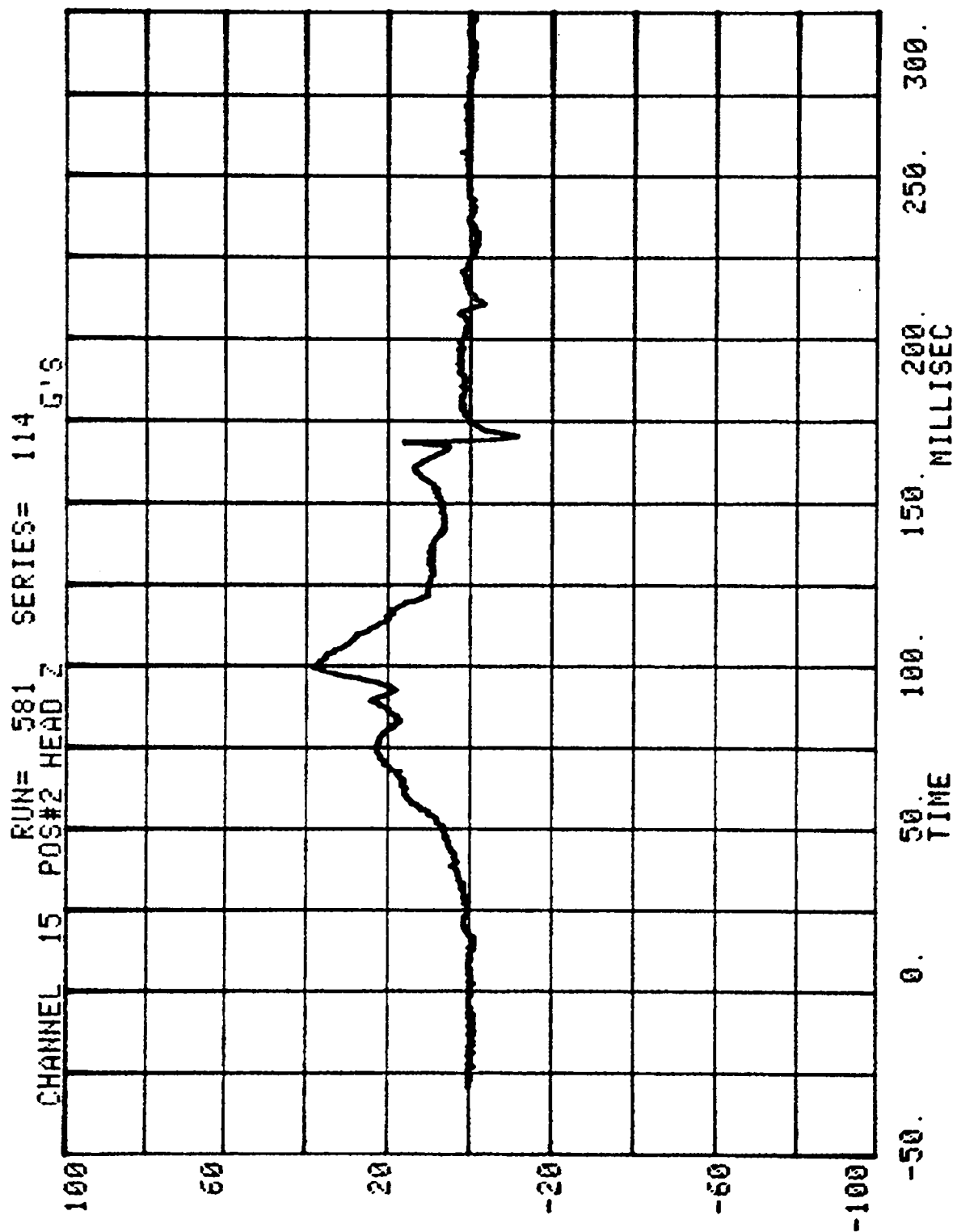
HIC= 375.8 FROM T1= .06507 TO T2= .13387
AVERAGE ACCELERATION BETWEEN T1 AND T2= 31.4G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX= 508.7

RUN= 581 SERIES= 114 G'S
CHANNEL 13 POS#2 HEAD X

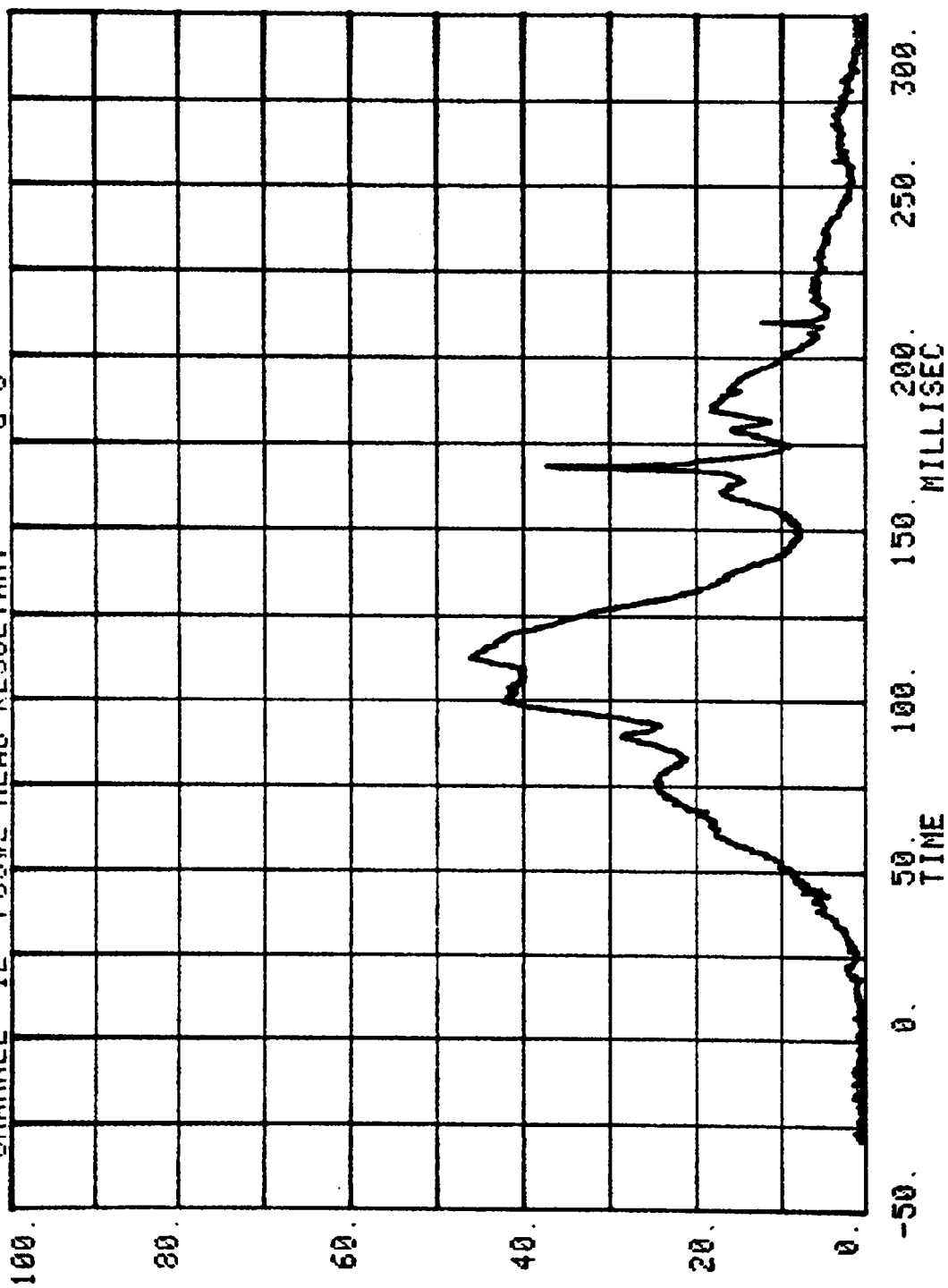


CHANNEL 14 POS#2 HEAD Y RUN= 581 SERIES= 114 G'S

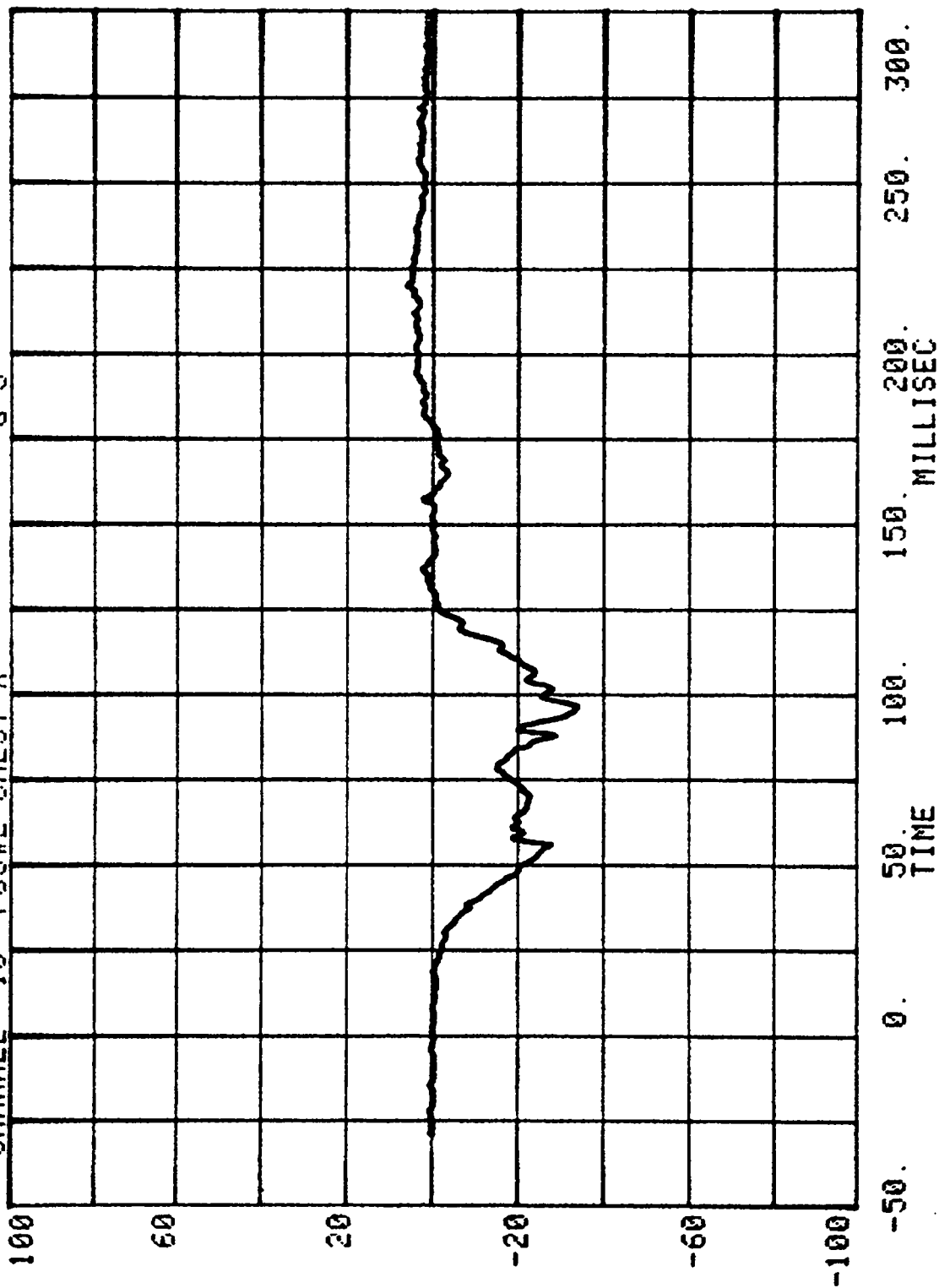




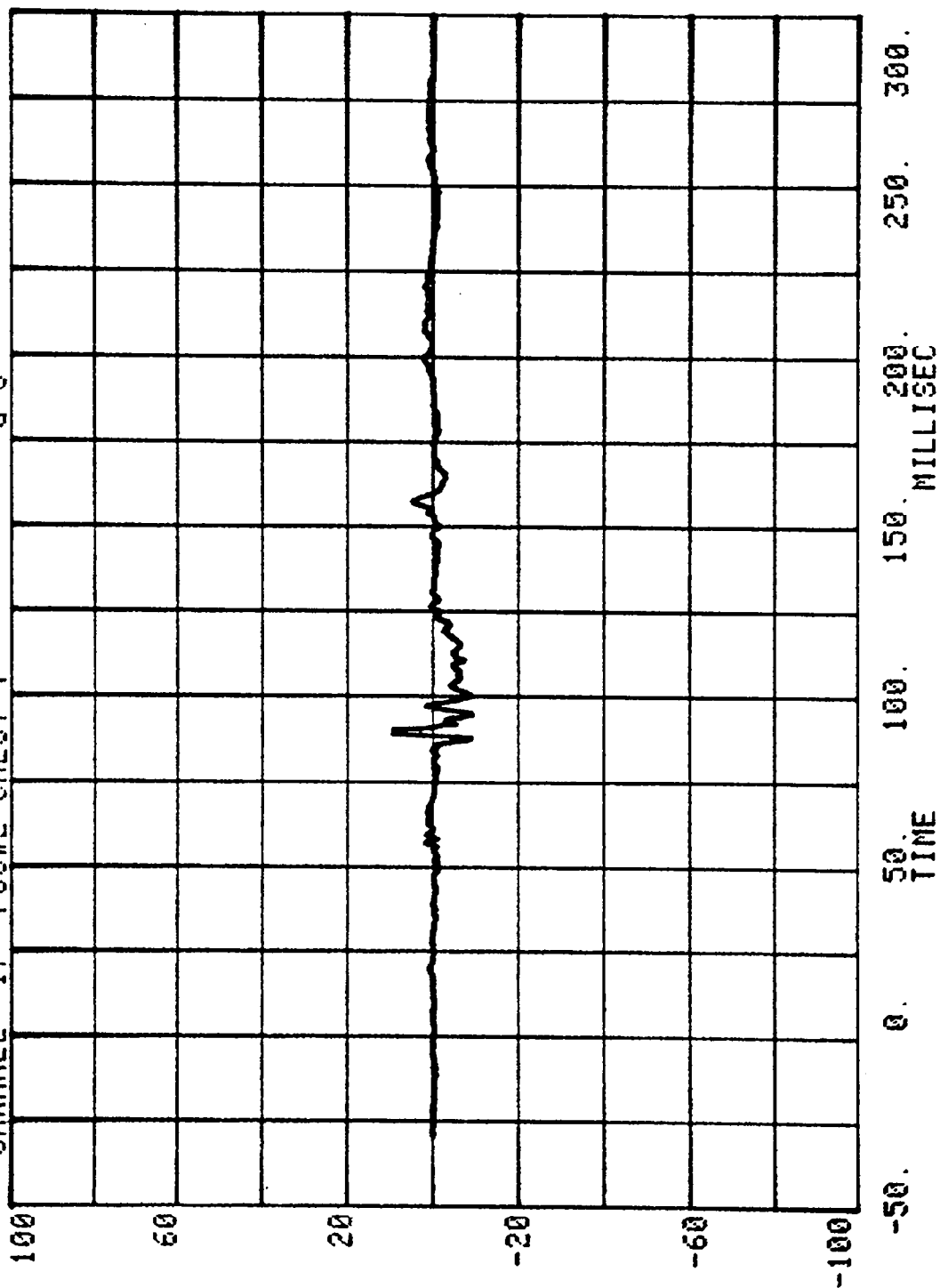
CHANNEL 12 POS#2 HEAD RESULTANT RUN= 581 SERIES= 114 G'S



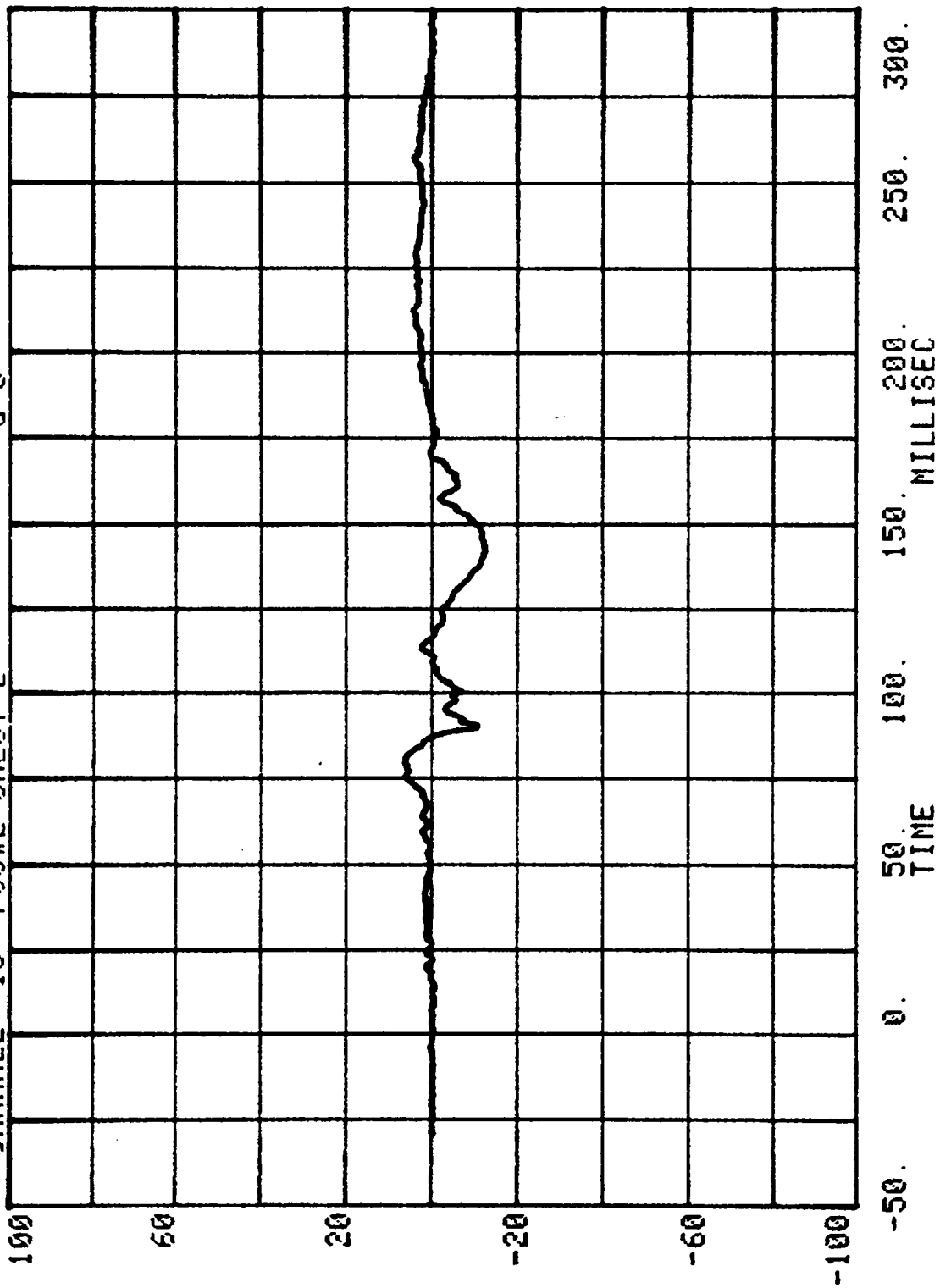
CHANNEL 16 POS#2 CHEST X
RUN= 581 SERIES= 114 G'S



CHANNEL 17 POS#2 CHEST Y RUN= 581 SERIES= 114 G'S

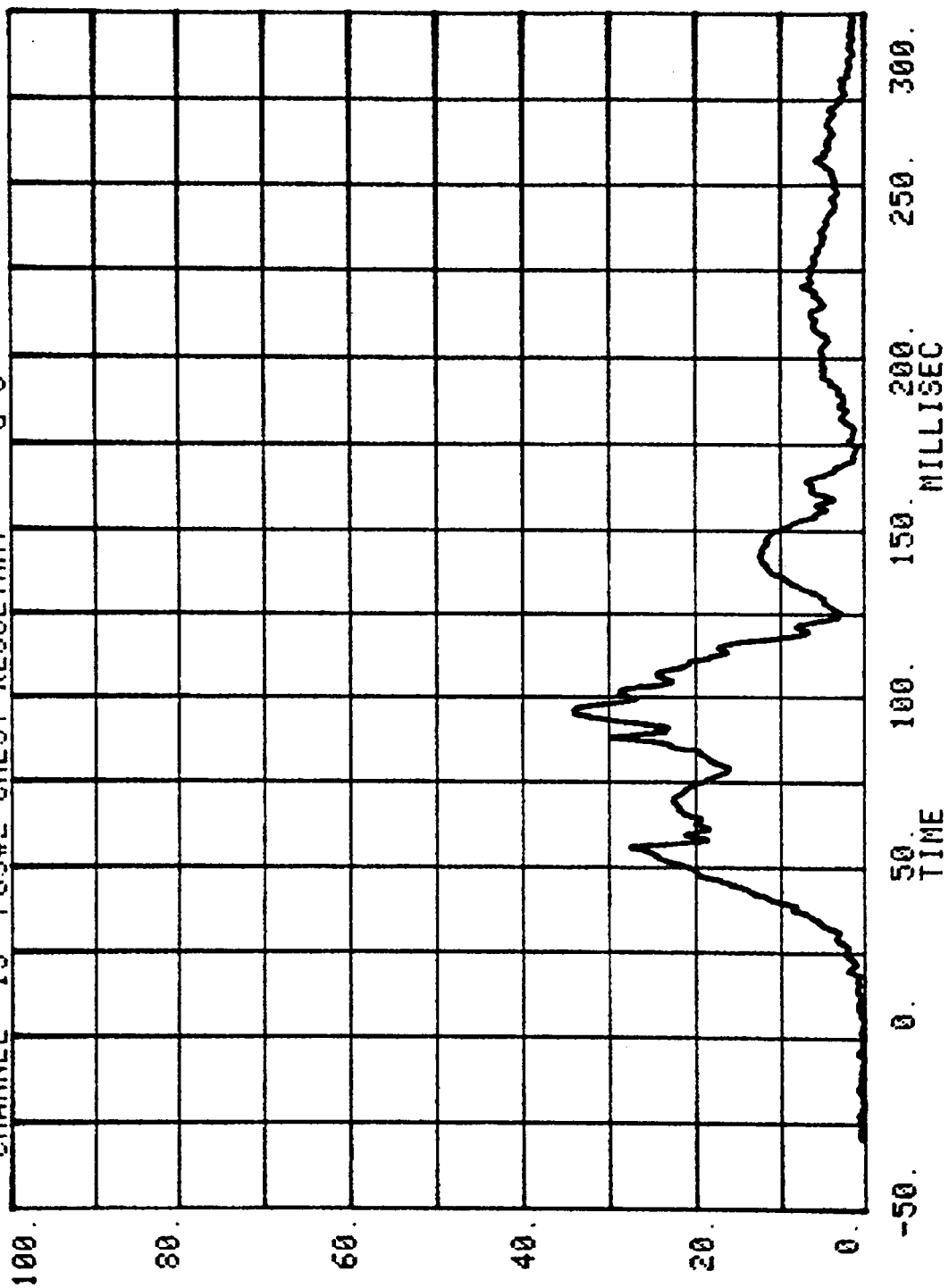


CHANNEL 18 RUN= 581 SERIES= 114
POS#2 CHEST 2 G'S



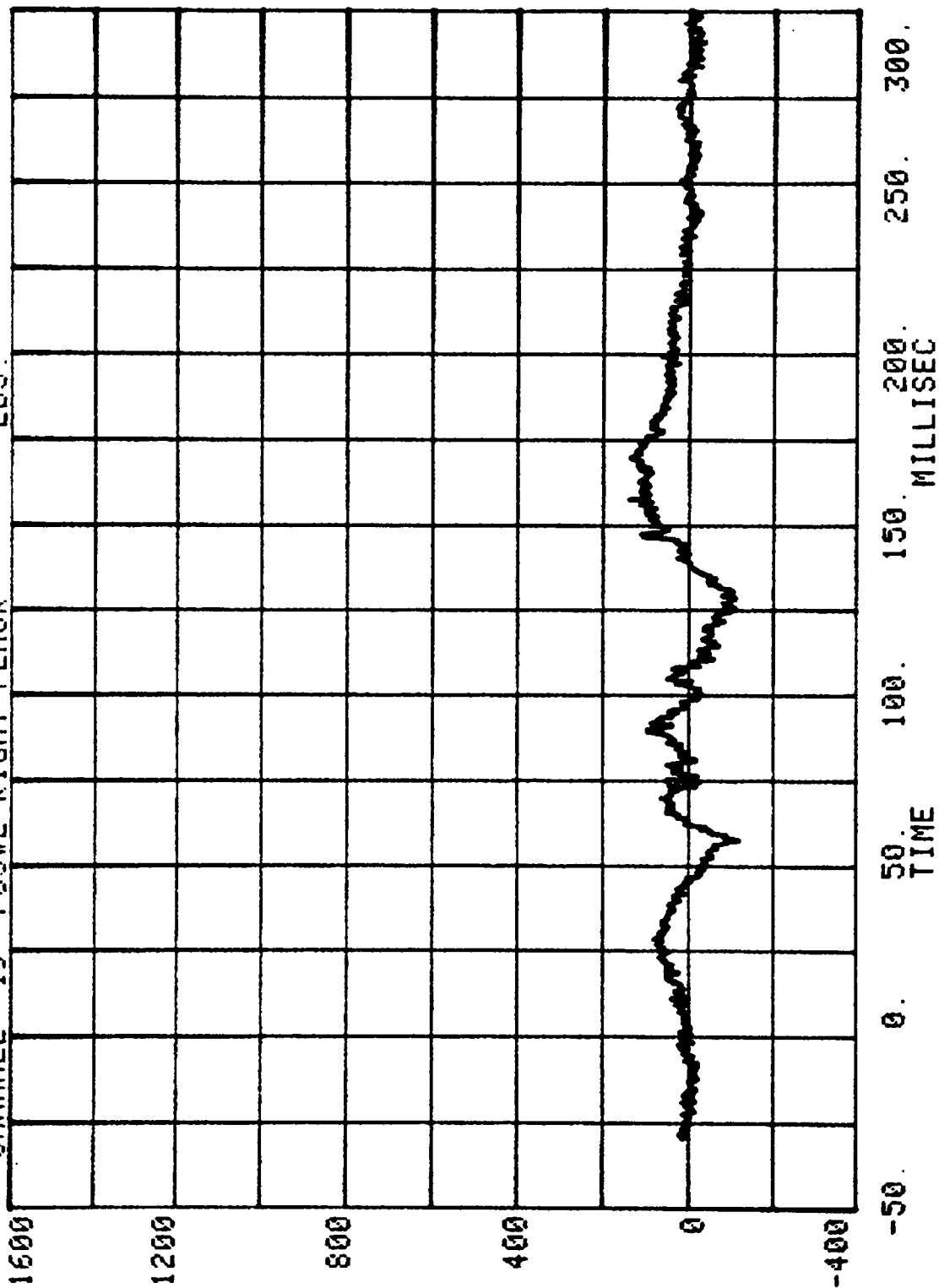
CHANNEL 13 POS#2 CHEST RESULTANT G'S

RUN= 581 SERIES= 114

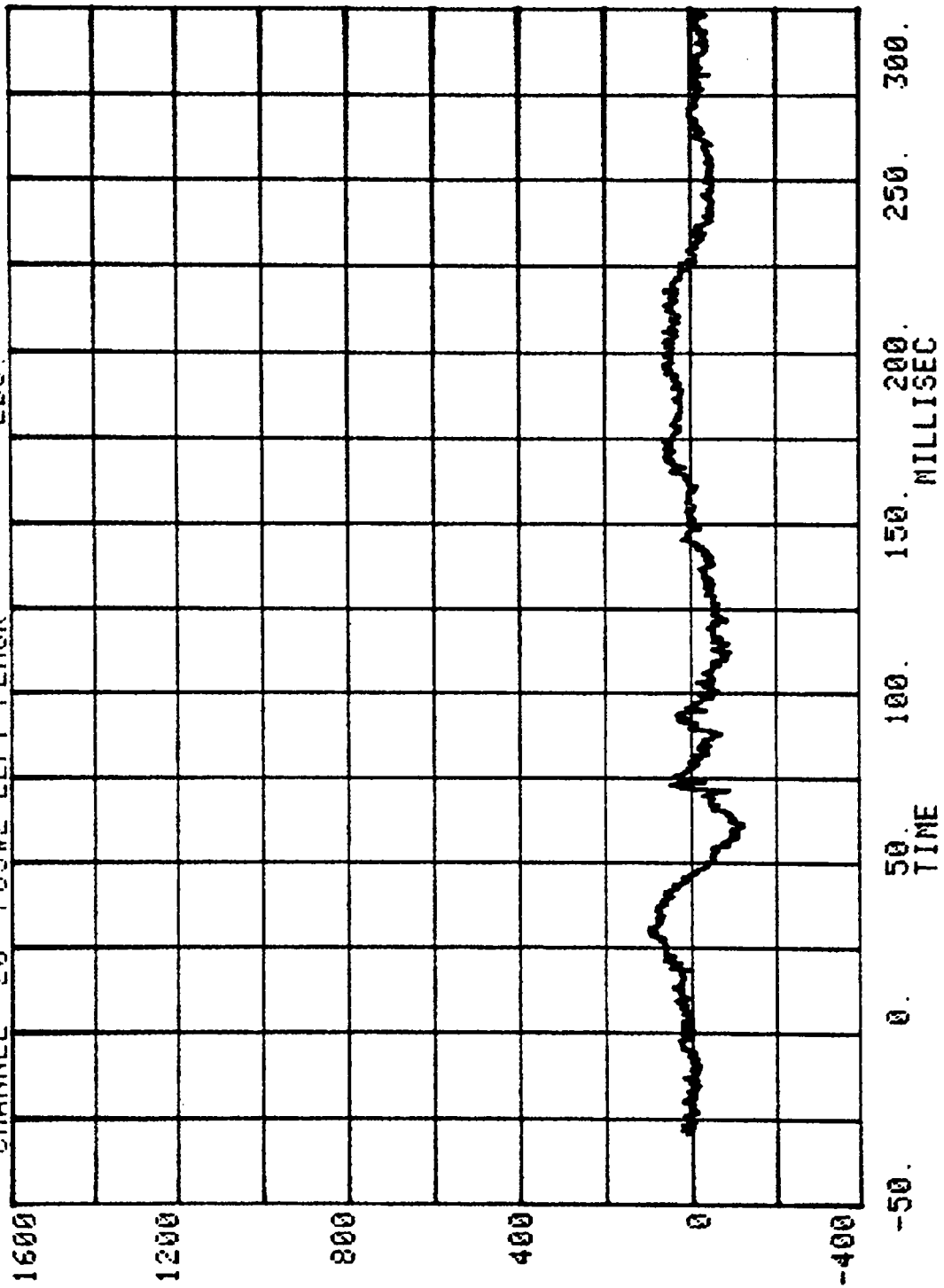


CHANNEL 19 POS#2 RIGHT FEMUR LBS.

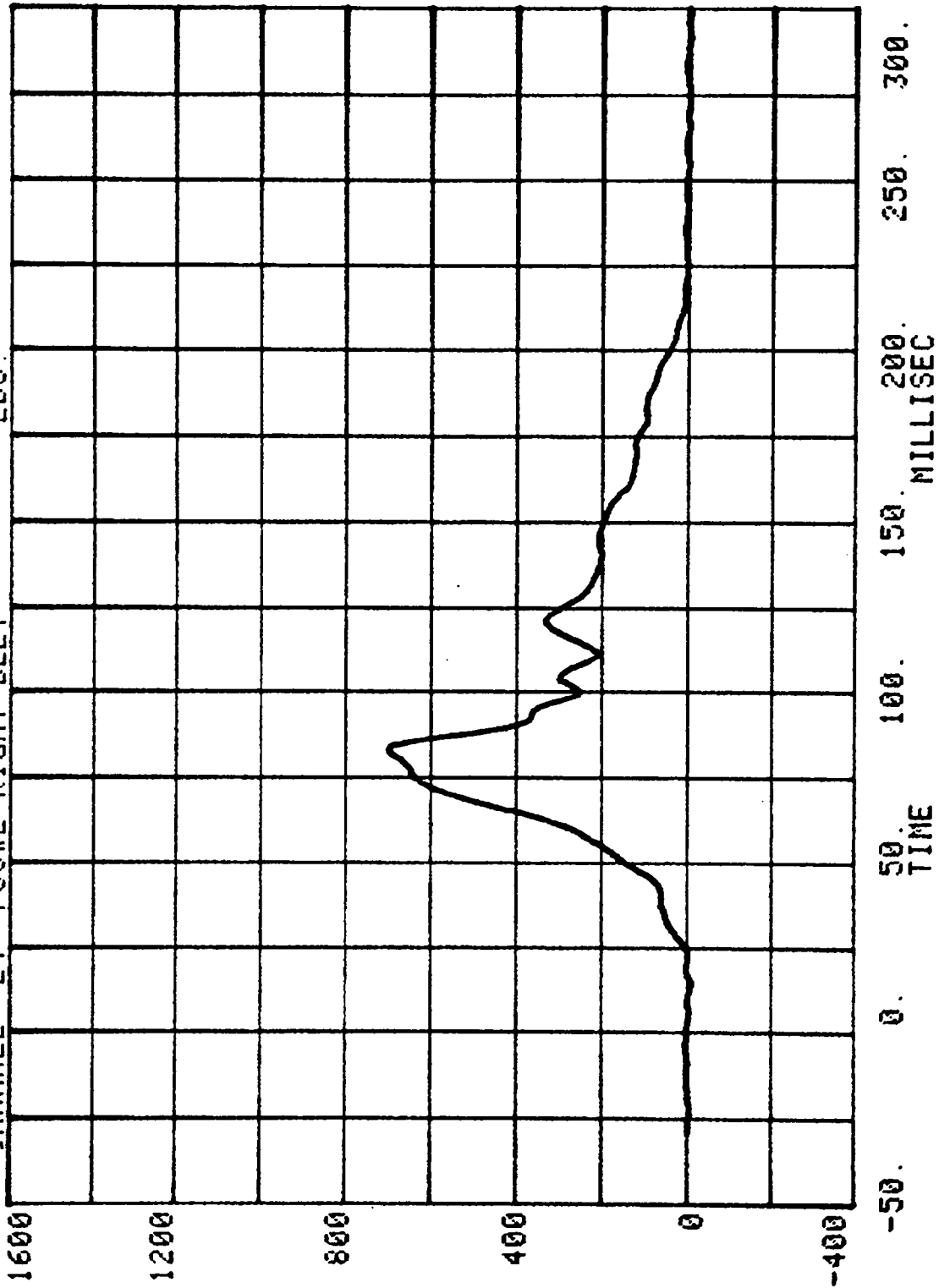
RUN= 581 SERIES= 114

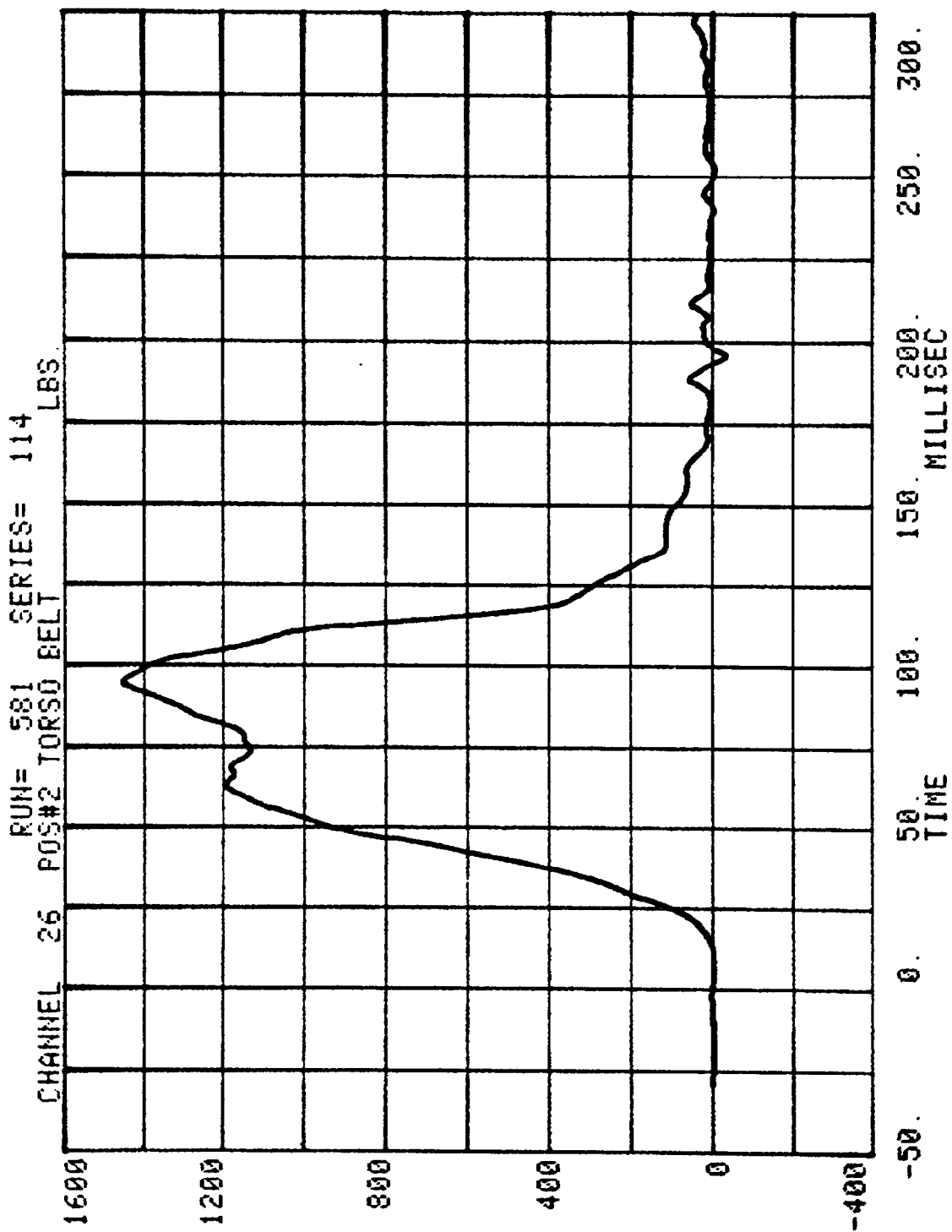


CHANNEL 20 POS#2 LEFT FEMUR RUN= 581 SERIES= 114 LBS.

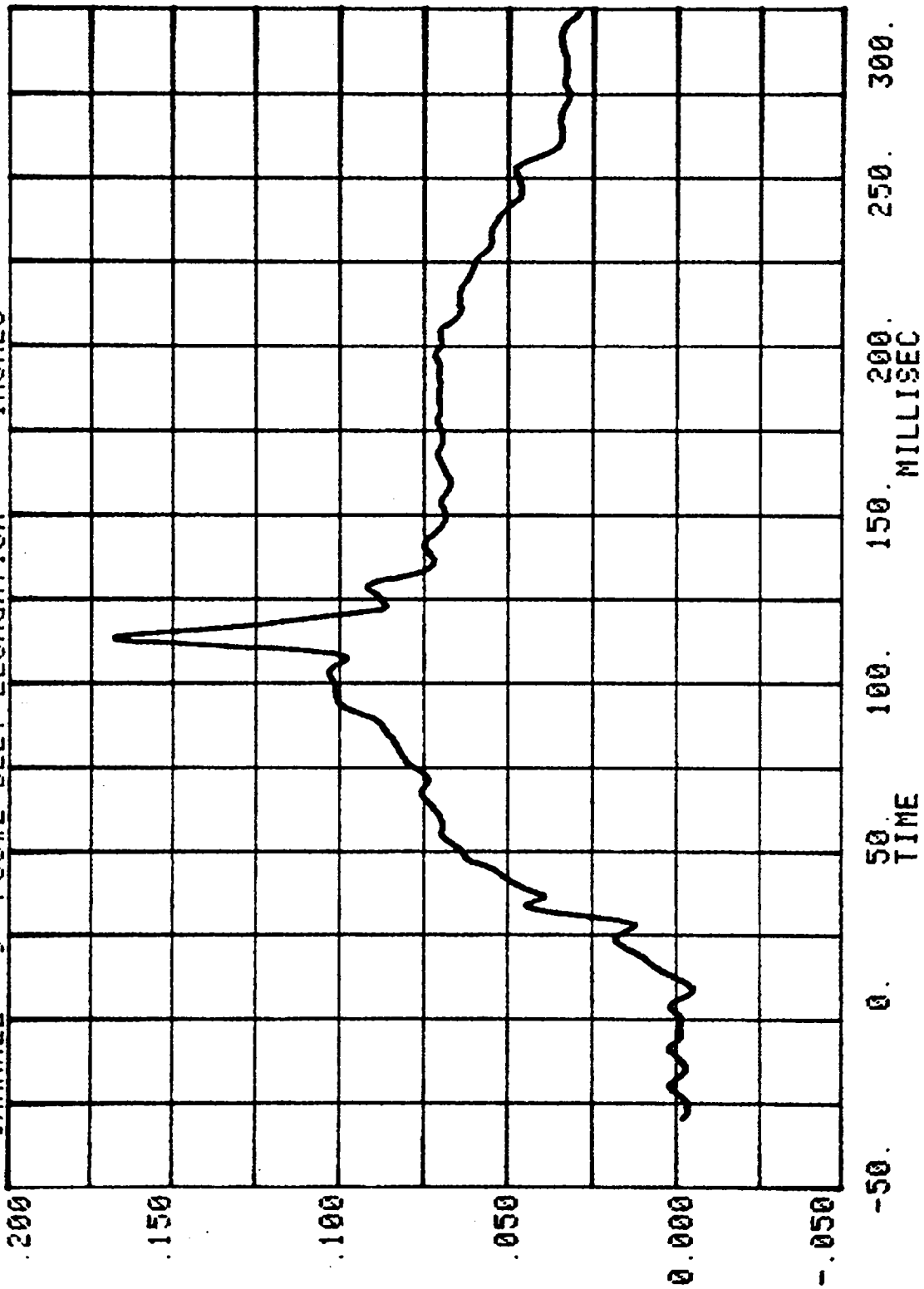


RUN= 581 SERIES= 114 LBS.
CHANNEL 24 POS#2 RIGHT BELT





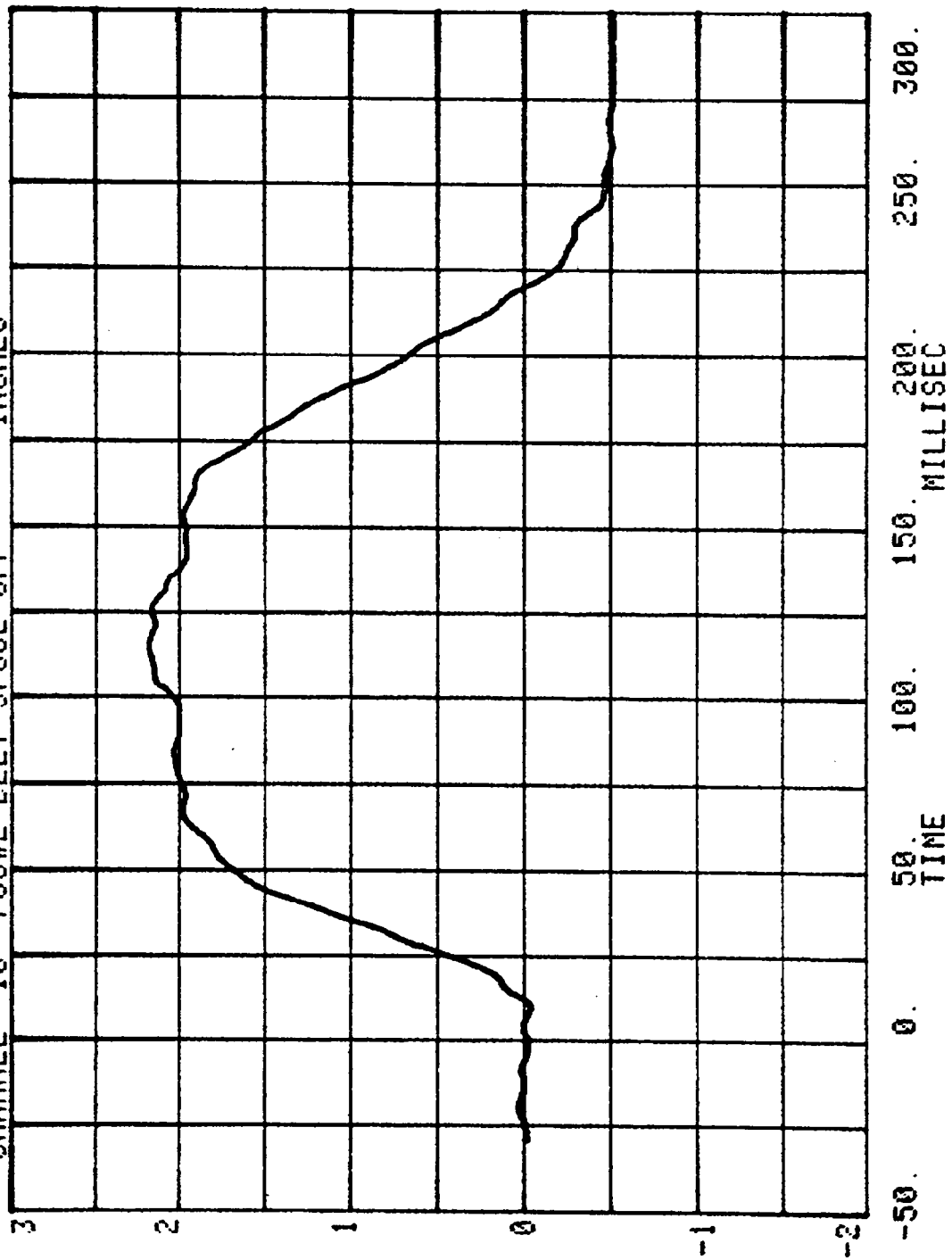
CHANNEL 3 POS#2 BELT ELONGATION RUN= 581 SERIES= 114 INCHES OVER 3 INCHES



CHANNEL 10 POS#2 BELT SPOOL OFF

RUN= 531 SERIES= 114

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>
162	3/18/83
818	4/13/83

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 Indicant Testing Final Report, Report No. 6525-V-1.

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO.: 162

LABORATORY TECHNICIAN: Gary Gostwick

APPROVED BY: _____

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	3/14/83 - 3/18/83	
Calibration Sequential Number for Dummy - - - -	8	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	70°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	25% - 32%	

TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u> -			
a. Peak Resultant Accel. -	210 to 260G	230 g	
b. Peak Lateral Accel. - -	≤10G	2 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.09 ms	
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.9 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	22 g	
d. Pendulum Decel. ($t_2 - t_1$)	≤3 ms	2.5 ms	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	27.2 ms	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	4.4 ms	
g. Pendulum Direction Reversal Time - - - -		108 ms	
h. Max. Head Rotation - -	63 to 73°	70°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in	0.0 in
30°	Time	25.6 to 34.4 ms	28.5 ms
	Displ.	2.1 to 3.1 in.	2.8 in
60°	Time	40.3 to 51.7 ms	44 ms
	Displ.	4.3 to 5.3 in.	4.6 in
Maximum ()	Time	53.2 to 66.8 ms	57 ms
	Displ.	5.0 to 6.0 in.	5.3 in

Continued

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST				
<u>Continued</u>				
i. Chordal Displacement:				
Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	71 ms	
	Displ.	4.3 to 5.3 in.	4.6 in	
30°	Time	85.4 to 104.6 ms	89.5 ms	
	Displ.	2.1 to 3.1 in.	2.4 in	
0°	Time	101.0 to 123.0 ms	104.5 ms	
	Displ.	-.5 to 0.5 in.	+.2 in	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	54 lbs	
b. Force @ 1.3" - - - - -		73 to 88 lbs.	76 lbs	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	30 lbs	
b. Force @ 30° - - - - -		34 to 46 lbs.	42.5 lbs	
c. Force @ 40° - - - - -		46 to 58 lbs.	54 lbs	
d. Return Angle - - -		12° maximum	5°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	22.2 fps	
(2) Peak Deflection -		1.7" maximum	1.7 in	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1840 lbs	
(4) Internal Hysteresis - - - - -		50 to 70%	52.4%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	14.1 fps	
(2) Peak Deflection -		1.1" maximum	1.1 in	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1195 lbs	
(4) Internal Hysteresis- - -		50 to 70%	50.6%	

P.572 DUMMY CALIBRATION TEST DATA Continued:

NHTSA DUMMY ID NO. 162

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
6. KNEE IMPACT TESTS:			
a. Right Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.82 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2000 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.77 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.98 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2050 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.6 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 162

CALIB. SEQ. NOS. FOR DUMMY: 8 &

A. DUMMY INSTRUMENTS:

1. Head Accelerometers--

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

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

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

3. Chest Potentiometer - - -

4. Femur Load Cells--

a. Right Side - - - - -

b. Left Side

B. CALIB. LAB. INSTRUMENTS:

1. Pendulum Accelerometer - -

2. Test Probe Accelerometer -

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

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

5. Abdominal Compression Test
Displacement Gauge - - - -

MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	DB47	1/83	7/83
ENDEVCO	CX05	1/83	7/83
ENDEVCO	CJ54	1/83	7/83
GSE	312	1/83	7/83
GSE	311	1/83	7/83
CEC	22707	1/83	7/83
CEC	22958	1/83	7/83
TRANSDUCER INC	20051	3/83	10/83
BLH	72952	3/83	10/83
CIC	567-11	3/83	10/83

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 818

LABORATORY TECHNICIAN: Gary R. Gestwick

APPROVED BY: _____

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	4/6/83-4/13/83	
Calibration Sequential Number for Dummy - - -	3	
Temperature in Lab. (Spec. = 66 to 78°F)- - -	68°-72°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	28%-32%	

TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel. -	210 to 260G	230 g	
b. Peak Lateral Accel. - -	≤10G	8 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.1 ms	
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	24.5 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	25 g	
d. Pendulum Decel. ($t_2 - t_1$)	≤3 ms	2.5 ms	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	27.2 ms	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	5.3 ms	
g. Pendulum Direction Reversal Time - - - -		113 ms	
h. Max. Head Rotation - -	63 to 73°	72°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in	0.0 in
30°	Time	25.6 to 34.4 ms	27.5 ms
	Displ.	2.1 to 3.1 in.	2.6 in
60°	Time	40.3 to 51.7 ms	42 ms
	Displ.	4.3 to 5.6 in.	4.8 in
Maximum	Time	53.2 to 66.8 ms	59 ms
(°)	Displ.	5.0 to 6.0 in.	5.7 in

Continued

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. <u>NECK BENDING TEST</u> <u>Continued</u>				
i. Chordal Displacement: Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	77 ms	
	Displ.	4.3 to 5.3 in.	4.7 in	
30°	Time	85.4 to 104.6 ms	94 ms	
	Displ.	2.1 to 3.1 in.	2.4 in	
0°	Time	101.0 to 123.0 ms	105 ms	
	Displ.	-.5 to 0.5 in.	0.0 in	
3. <u>ABDOMINAL COMPRESSION TEST:</u> (Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	55 lbs	
b. Force @ 1.3" - - - - -		73 to 88 lbs.	77 lbs	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20° - - - - -		22 to 34 lbs.	33.5 lbs	
b. Force @ 30° - - - - -		34 to 46 lbs.	45.0 lbs	
c. Force @ 40° - - - - -		46 to 58 lbs.	53.0 lbs	
d. Return Angle - - - - -		12° maximum	5°	
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	1.5 in	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	2035 lbs	
(4) Internal Hysteresis - - - - -		50 to 70%	54.1%	
b. Low Speed				
(1) Probe Speed - - - - -		13.86-14.14 fps	14.07 fps	
(2) Peak Deflection - - - - -		1.1" maximum	0.98 in	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1340 lbs	
(4) Internal Hysteresis - - - - -		50 to 70%	51.0%	

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
6. <u>KNEE IMPACT TESTS:</u>			
a. Right Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.03 fps	
(2) Maximum Force - -	1850 to 2500 lbs	1900 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.08 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.91 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1850 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.4 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 818

CALIB. SEQ. NOS. FOR DUMMY: 3 &

A. DUMMY INSTRUMENTS:

1. Head Accelerometers--

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

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

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

3. Chest Potentiometer - - -

4. Femur Load Cells--

a. Right Side - - - - -

b. Left Side

B. CALIB. LAB. INSTRUMENTS:

1. Pendulum Accelerometer - -

2. Test Probe Accelerometer -

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

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

5. Abdominal Compression Test
Displacement Gauge - - -

MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	DB47	1/83	7/83
ENDEVCO	CX05	1/83	7/83
ENDEVCO	CJ54	1/83	7/83
GSE	312	1/83	7/83
GSE	311	1/83	7/83
CEC	22707	1/83	7/83
CEC	22958	1/83	7/83
TRANSDUCER INC	20051	3/83	10/83
BLH	72952	3/83	10/83
CIC	567-11	3/83	10/83