

DOT 681

REPORT NOS. 212-CAL-83-017

301-CAL-83-017

NHTSA NEW VEHICLE ASSESSMENT AND  
STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS 212 AND 301-75

FORD MOTOR COMPANY

1984 FORD TEMPO

4-DOOR SEDAN

NHTSA NO. CE0201

CALSPAN TEST NO. 7103-V-18

CALSPAN CORPORATION

ADVANCED TECHNOLOGY CENTER

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FINAL REPORT

Prepared for:

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<p>A frontal load cell barrier test of a 1984 Ford Tempo 4-door sedan was performed at Calspan Corporation, Advanced Technology Center, Transportation Research/Physical Sciences Department facility, for the New Car Assessment and Standards Enforcement Testing of FMVSS 212, "Windshield Mounting" and FMVSS 301-75, "Fuel System Integrity" for the Office of Vehicle Safety Compliance, the Office of Market Incentives (OMI) and for Research and Development.</p> <p>Impact speed was 35.0 mph. Ambient temperature on the test date was 38°F. The post-test vehicle crush was 22.5 inches and intrusion of the firewall into compartment was 9.8 inches.</p> <p>The test vehicle appeared to comply with the following vehicle performance standards:</p> <p>FMVSS 212 - Windshield Retention FMVSS 301-75 - Fuel System Integrity</p> <p>The driver and right-front passenger did not appear to satisfy FMVSS 208 Injury Criteria for the following:</p> <p><u>Driver</u> - Head HIC 2954.5      <u>Right-Front Passenger</u> - Head HIC 1104.3 Chest 62.9 g's</p>					
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SECTION 1  
PURPOSE AND TEST PROCEDURE

This frontal barrier test is part of the Composite FY83 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 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 Automotive Ratings Laboratory Procedure No. IP-212-02 dated April 4, 1980. Indicant test data for FMVSS 212, "Windshield Mounting," and FMVSS 301-75, "Fuel System Integrity," as well as occupant performance data for a nominally 35 mph impact are provided herein.

## SECTION 2

### SUMMARY OF TEST NUMBER CE0201

A load cell barrier consisting of 36 load cells (Figure 4) was impacted by a 1984 Ford Tempo 4-door sedan at a velocity of 35.0 mph. The test was performed at the Calspan Corporation Advanced Technology Center on January 5, 1984. Pre- and post-test photographs of the vehicle and occupants can be found in Appendix A. Table 1 presents crash test information.

Two Part 572, 50th percentile male anthropomorphic test (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 ATD's were fully instrumented with femur load cells and triaxial accelerometers in the head and chest areas. Load cells were also placed on the lap and shoulder belts to measure dummy torso and lap loading. The driver ATD (Serial No. 1021) had been used in a previous test (CE0301) and the right-front passenger ATD (Serial 320) had been used in two previous tests (CE0301) and CE0107). The FMVSS Injury Criteria Values were not exceeded in those tests. Certification details, along with instrumentation calibrations data, are found in Appendix C.

The crash event was recorded by 15 high-speed cameras and one real-time camera. 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. There were no data losses experienced during the test. Appendix B contains the vehicle and dummy response data traces. The Injury Criteria Values are presented in summary form in Table 10.

Table 1

CRASH TEST SUMMARY

TEST NO. CE0201 PROJECT: FY83 New Car Assessment Program  
FMVSS No. 208/212/301-75  
DATE: 1/5/84 TIME: 1245 hrs. TEMP: 38°F.

VEHICLE 1984 Ford Tempo 4-door sedan  
TEST WEIGHT (lbs) 3080  
IMPACT ANGLE (deg)\* 0  
IMPACT VELOCITY (mph)\*\* 35.0  
MAX. CRUSH (in) static 22.5  
MAX. INTRUSION (in) 9.8

DUMMIES

TYPE	<u>Hybrid II Part 572</u>	<u>Hybrid II Part 572</u>
LOCATION	<u>LF (1) Serial 749</u>	<u>RF (2) Serial 320</u>
RESTRAINT	<u>Production 3-point belt system</u>	<u>Production 3-point belt system</u>
NUMBER OF DATA CHANNELS	<u>67</u>	
NUMBER OF HIGH SPEED CAMERAS	<u>15 + 1 real time</u>	

\*With respect to tow track Centerline

\*\*Speed trap measurement (± .05% accuracy)

### GENERAL COMMENTS

The 1984 Ford Tempo 4-door sedan was equipped with 2.3 liter, 4-cylinder transverse engine, three-speed automatic transmission, power steering, power brakes and air conditioner. The total test weight with two 50th percentile male dummies, instrumentation and two on-board cameras was 3080 pounds.

The 1984 Ford Tempo 4-door sedan which was involved in a frontal load cell barrier impact at a velocity of 35 mph appeared to comply with FMVSS Nos. 212, "Windshield Mounting" and 301-75, "Fuel System Integrity." There was 100 percent windshield retention and no fuel leakage after impact or any phase of the rollover test.

The vehicle sustained 22.5 inches of static crush and approximately 26.5 inches of dynamic crush. Maximum firewall intrusion into the occupant compartment was 9.8 inches. The maximum load cell barrier force measured by the 36 load cells was 136,000 pounds at 27 milliseconds.

The driver's head and chest struck the steering wheel and the femurs contacted the dash panel. The driver occupant exceeded the FMVSS 208, "Injury Criteria" for the head and chest with a HIC of 2954.5 and chest deceleration over 3 milliseconds of 62.9 g's. The right and left femur loads were acceptable (480 and 750 pounds).

The right-front passenger head struck the dash panel and thus did not appear to meet the FMVSS 208, "Head Injury Criteria" (HIC 1104.3). The remaining criteria were satisfactory as indicated by maximum chest deceleration over 3 milliseconds of 45 g's and femur loads of 370 and 675 pounds.

The belt related data for each occupant are presented in Table 11 of this report.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION

Make/Model Ford Tempo Body Style 4-door sedan  
 Model Year 1984 NHTSA No. CE0201 Color Silver  
 Engine Data: 4 cylinders, 2.3 liters  
 Transmission Data: 3 speed, ( ) manual (x) automatic  
 Date Rec'd 12/83 Air Cond. yes Pw. Str. yes Pw. Brks. yes  
 Dealer's Name & Address Terry Taylor Ford, Daytona Beach, Florida 32014  
 Odometer Reading 1013

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

Vehicle Manufactured by: Ford Motor Company  
 Date of Manufacture 5/83 VIN 1FABP22R3EK106987  
 GVRW 3660 lbs., GAWR: front 1984 lbs., rear 1787 lbs.

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

Vehicle Load (up to capacity): front 30 psi  
 rear 30 psi  
 Recommended Tire Size P175/80R13 Load Range    B    C    D Std.  
 Recommended Cold Tire Pressure: front 30 psi, rear 30 psi  
 Tires on Vehicle P175/80R13  
 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  
3 rear  
5 TOTAL

RCLW Cargo Load: 100 lbs.  
 VCW TOTAL = 850 lbs.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = 810 lbs.      Right Rear = 500 lbs.  
 Left Front = 820 lbs.      Left Rear = 510 lbs.  
 TOTAL FRONT WEIGHT = 1630 lbs. (61.7 % of Total Vehicle Weight)  
 TOTAL REAR WEIGHT = 1010 lbs. (38.3 % of Total Vehicle Weight)  
 TOTAL DELIVERY WEIGHT = 2640 lbs.

CALCULATION FOR TARGET TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight  
 UDW = Unloaded Delivered Weight (2640 lbs.)  
 VCW = Vehicle Capacity Weight (850 lbs.)  
 DSC = Designated Seating Capacity (5)  
 RCLW = VCW - 150 (DSC) = 100 lbs.  
 Target Test Weight = UDW + RCLW + (2 dummies X 164 lbs./dummy)  
 Target Test Weight = 3068 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND POUNDS CARGO

Right Front = 840 lbs.      Right Rear = 670 lbs.  
 Left Front = 900 lbs.      Left Rear = 670 lbs.  
 TOTAL FRONT WEIGHT = 1740 lbs. (56.5 % of Total Vehicle Weight)  
 TOTAL REAR WEIGHT = 1340 lbs. (43.5 % of Total Vehicle Weight)  
 TOTAL TEST WEIGHT = 3080 lbs.  
 Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude:	RF	<u>25.9</u>	LF	<u>25.7</u>	RR	<u>25.2</u>	LR	<u>25.2</u>
Test Attitude:	RF	<u>25.8</u>	LF	<u>25.8</u>	RR	<u>23.7</u>	LR	<u>23.8</u>

Remarks: Wheelbase = 100 inches  
Vehicle C/G as tested was 43.5 inches rearward of front wheel C/L

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA

Type of Test Frontal Impact Impact Angle 0 °  
 Date of Test 1/5/84 Time of Test 1245 hrs.  
 Ambient Temperature 38 °F at impact area  
 Temperature in Occupant Compartment 71 °F  
 Windshield Molding Temperature 61 °F  
 Required Impact Velocity Range: 34.5 to 35.5 mph  
 Impact Velocity: primary = 35.0 mph, secondary 34.99 mph

VEHICLE REBOUND AND CRUSH (inches)

Vehicle Length: Pre-test = R 175.5 C 177.3 L 174.5  
 Post-test = R 155.0 C 154.8 L 154.8  
 Crush = R 19.5 C 22.5 L 19.7  
 Distance from front of test vehicle to point of impact:  
 R 23.5 C/L 24.0 L 24.3

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Steering wheel rim &amp; hub</u>	<u>Dash panel</u>
Chest	<u>Steering wheel rim</u>	<u>-</u>
Abdomen	<u>-</u>	<u>-</u>
Left Knee	<u>Dash panel</u>	<u>Glove box door</u>
Right Knee	<u>Dash panel</u>	<u>Glove box door</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>not operable</u>	<u>operable</u>	<u>operable</u>

Table 2 (cont'd)

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

<u>Seat Movement</u>	<u>Front</u>		<u>Rear</u>
	<u>Left</u>	<u>Right</u>	
Seat Back Failure	<u>Intact</u>	<u>Intact</u>	
Seat Shift (in.)	<u>None</u>	<u>1.1 inches forward</u>	

Glazing Damage

Backlight/Windshield Windshield cracked

Other notable impact effects: Back window shattered and blew out (Figure A-14). At impact, the exhaust pipe dented the fuel tank (Figure A-22).

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### SECTION 3

#### SUMMARY OF RESULTS OF FMVSS NOS. 212 AND 301-75

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

Table 3  
SUMMARY OF FMVSS 212 AND 301 DATA

PRE-IMPACT DATA

Make/Model: Ford Tempo  
Body Style: 4-door sedan Model Year: 1984  
NHTSA No.: CE0201 Color: Silver

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Ford Motor Company  
Date of Manufacture: 5/83 VIN: 1FABP22R3EK106987  
GVWR: 3660 lbs., GAWR: Front 1984 lbs., Rear 1787 lbs.

POST-IMPACT DATA

Type of Test: Load cell barrier - frontal impact  
Date of Test: 1/5/84 Time: 1245 hrs. Temp.: 38 °F  
Required Impact Velocity Range: 34.5 to 35.5 mph  
Impact Velocity: Primary = 35.0 mph, Secondary = 34.99 mph  
Test Weight 3080 lbs., Static Crush Max. 22.5 in., Rebound 24.0 in.

FUEL SYSTEM DATA

Test Fluid Type: Red Stoddard Solvent #2, Spec. Grav.: 0.764  
Kinematic Viscosity 0.96 Centistokes  
EPA Capacity\* 14 gal.  
Test Volume 12.9 gal. (93% of EPA Capacity)  
Fuel System Capacity (data from Owner's Manual) 14 gal.  
Electric Fuel Pump? yes  no, Fuel Injection? yes  no  
Does electric fuel pump operate with ignition switch "on" and the engine  
not operating? - yes - 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

Table 3

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

Details of fuel system: Fuel tank is located forward of rear wheels and held in place by two tank straps. The fuel filler tube is on the right side of vehicle and sealed by a screw-ratchet type cap which is concealed by a hinged door. The fuel tank was dented by the exhaust pipe at impact (Figure A-22).

Table 4

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

DATA SHEET

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

DATE OF TEST  1/5/84  TIME  1245 hrs.  TEMP  38  °F

VEHICLE NHTSA NO.  CE0201  VIN  1EABP22R3EK106987

REQUIRED VEHICLE VELOCITY RANGE  34.5  to  35.5  mph

IMPACT VELOCITY (traps within 5 feet of impact event)

Trap No. 1 =  35.0  mph Trap No. 2 =  34.99  mph

Distance from the vehicle's front bumper to the barrier face entering the vehicle velocity measurement device =  58

exiting the vehicle velocity measurement device =  18

VEHICLE STATIC CRUSH (for frontal and rear impacts only)

Driver's Side =  19.7  in Passenger's Side =  19.5  in

C/L =  22.5  in. Average =  20.6  in.

Crush Details:

VEHICLE STATIC CRUSH (for side impacts only)

Amount of Crush =  --  inches on  --  side

Crush Details:

VEHICLE REBOUND (from rigid barrier only)

Driver's Side =  24.3  in Passenger's Side =  23.5  in

C/L =  24.0  in. Average =  23.9  in.

REMARKS

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

Windshield is bonded in place and has a one inch chrome molding along the top and sides.

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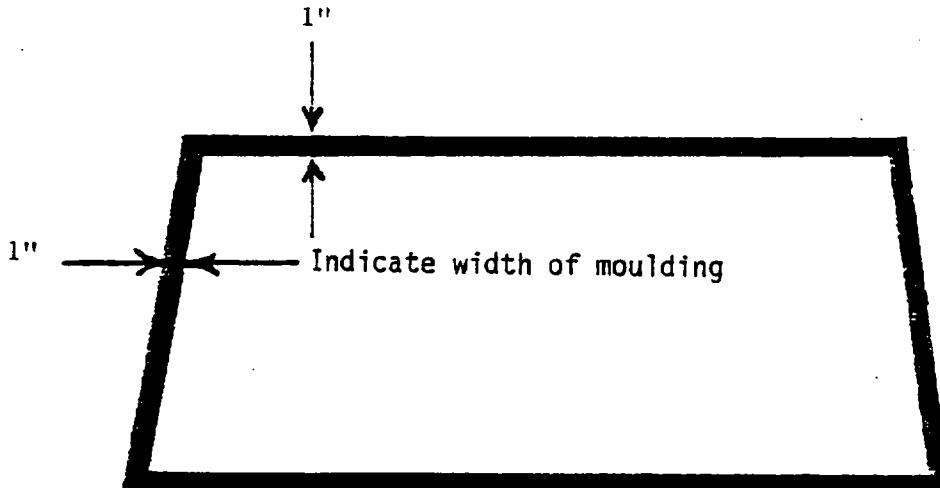
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	Windshield Periphery		Retention %
	Pre-Test (in.)	Post-Test (in.)	
Right Side	77	77	100
Left Side	77	77	100
TOTAL	154	154	100

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

Table 5

"FUEL SYSTEM INTEGRITY" POST-IMPACT TEST DATA

FMVSS No. 301-75

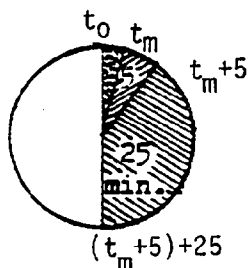
TEST VEHICLE NHTSA NO. CE0201 Test Date 1/5/84  
 Vehicle Manufacture/Make/Model 1984 Ford Tempo 4-door sedan

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  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

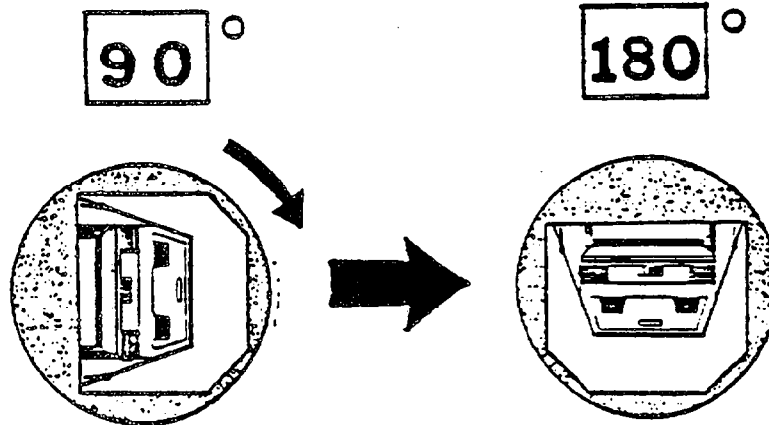


VEHICLE NHTSA ID NO. CE0201

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 52 seconds  
(Spec. Range = 1 to 3 min.)  
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds  
TOTAL = 7 minutes 52 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
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ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
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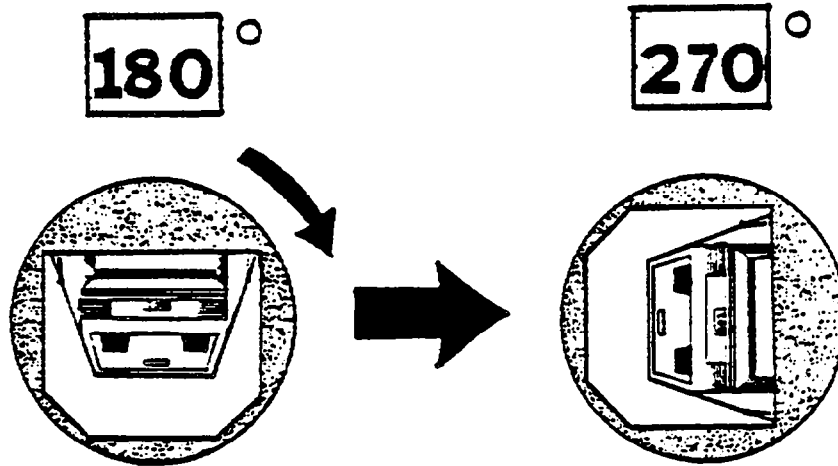
NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

None  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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.
--------------------------------------------	----------	----------	-------------------

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)

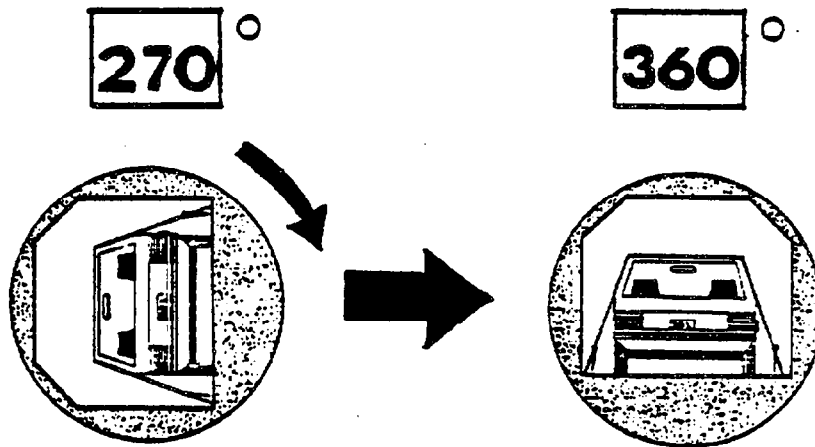
None  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

VEHICLE NHTSA ID NO. CE0201

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 58 seconds  
(Spec. Range = 1 to 3 min.)  
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds  
TOTAL = 7 minutes 58 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

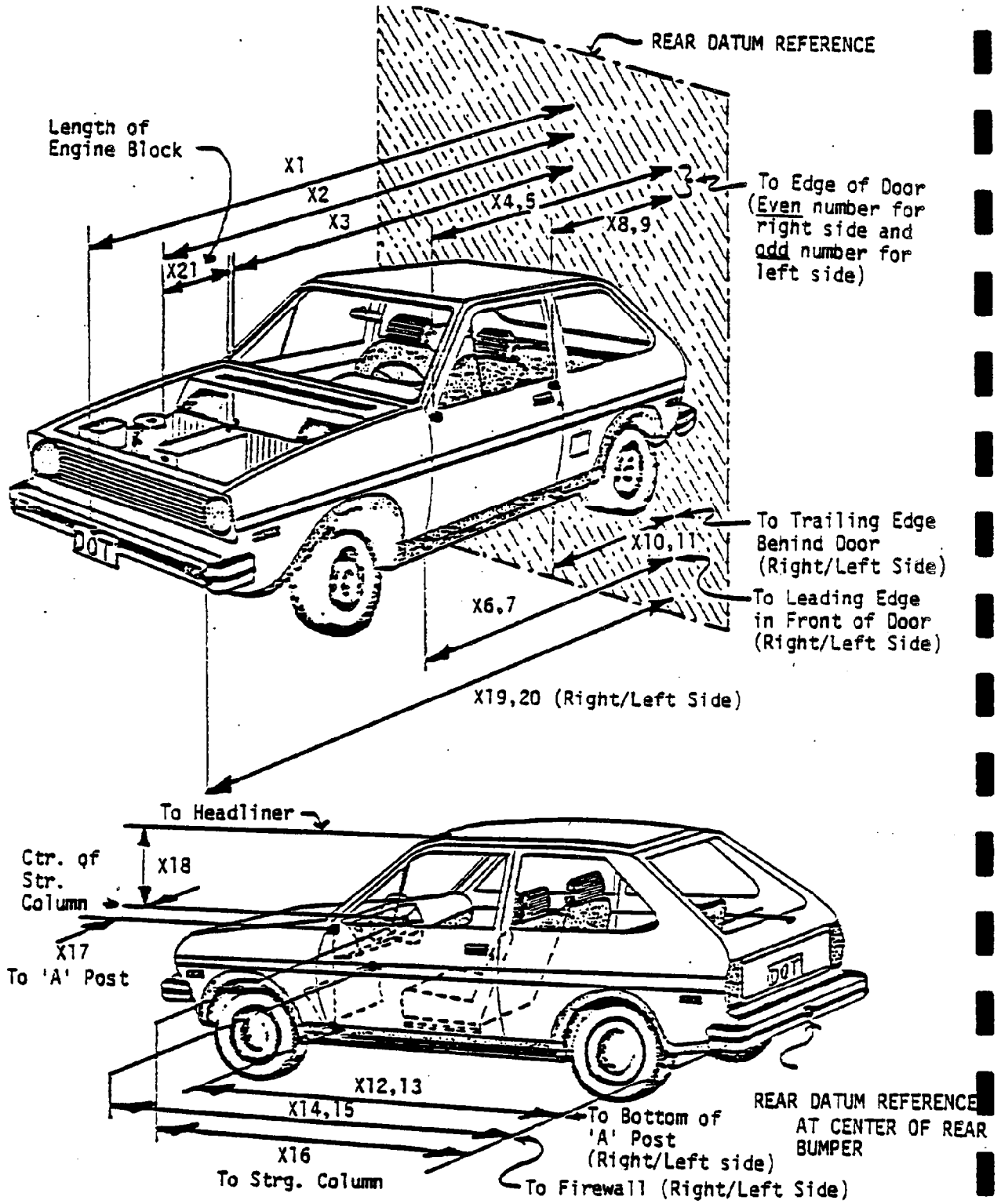
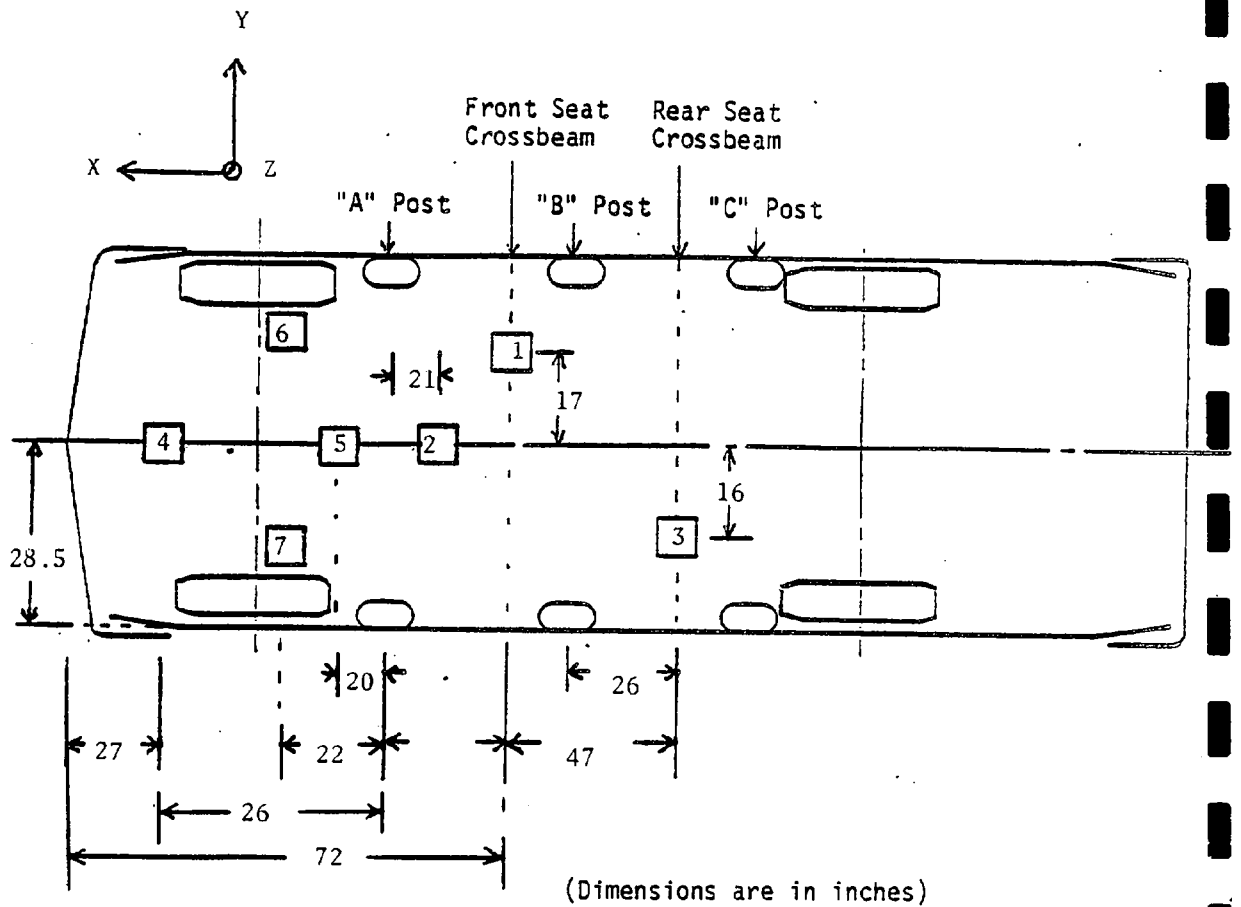


Figure 2 PRE- AND POST-TEST MEASUREMENT POINTS

Table 7

## VEHICLE MEASUREMENTS

		All Dimensions in Inches		
No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	177.3	154.8	22.5
X2	Rear Surface of Vehicle to Front of Engine	152.8	143.3	9.5
X3	Rear Surface of Vehicle to Firewall	135.7	129.1	6.6
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	123.1	123.0	.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	123.0	123.0	0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	121.4	121.4	0
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	121.4	121.4	0
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	83.4	83.4	0
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	83.3	83.6	-.3
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	84.1	84.1	0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	84.2	84.2	0
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	121.2	121.0	.2
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	121.1	121.0	.1
X14	Rear Surface of Vehicle to Firewall, Right Side	132.0	124.2	7.8
X15	Rear Surface of Vehicle to Firewall, Left Side	105.1	104.1	1.0
X16	Rear Surface of Vehicle to Steering Column	15.2	16.0	-.8
X17	Center of Steering Column to "A" Post	16.3	12.1	4.2
X18	Center of Steering Column to Headliner	174.5	155.0	19.5
X19	Rear Surface of Vehicle to Right Side of Front Bumper	174.5	154.8	19.7
X20	Rear Surface of Vehicle to Left Side of Front Bumper	15.0	15.0	0
X21	Length of Engine Block			



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 3 VEHICLE ACCELEROMETER LOCATIONS

36 LOAD CELLS  
 4 ROWS  
 9 COLUMNS

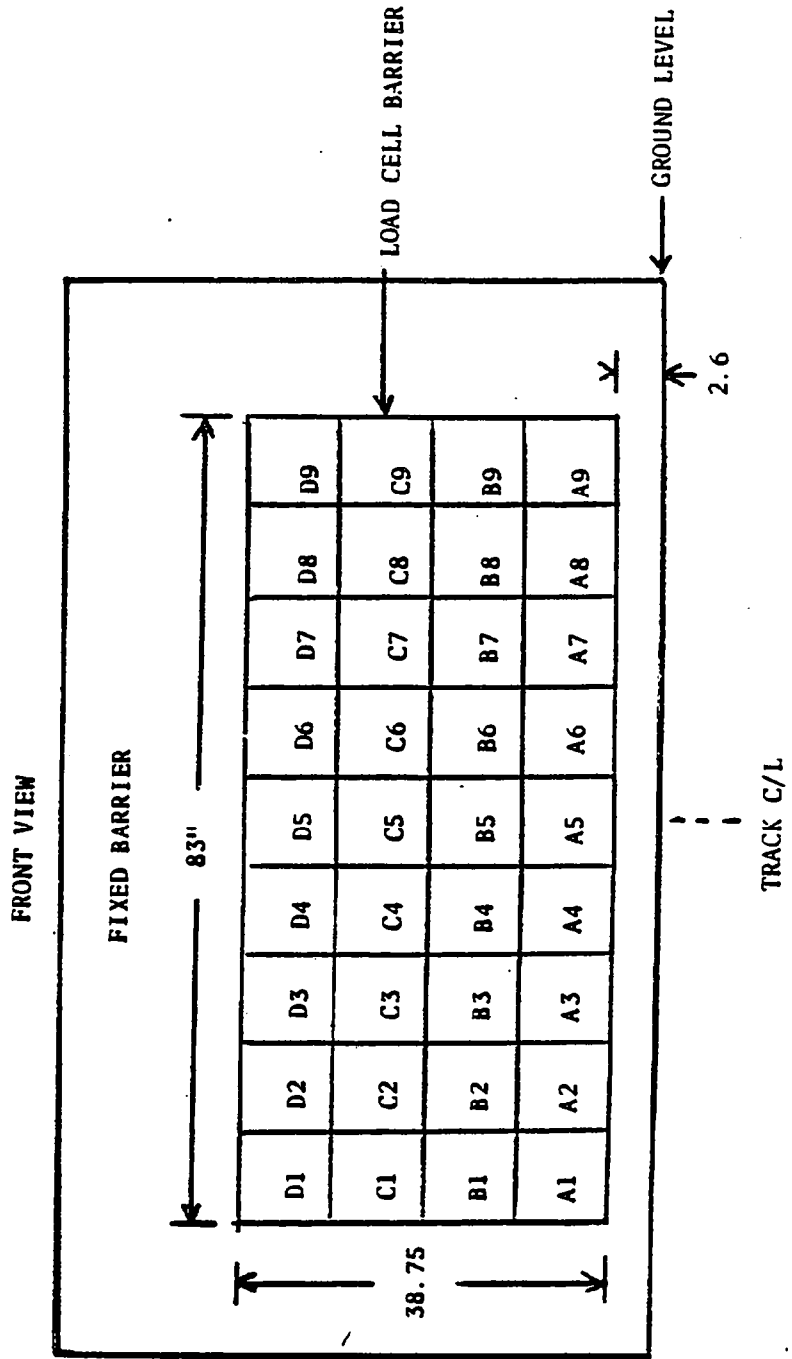


Figure 4 FIXED LOAD CELL BARRIER-LOAD CELL LOCATIONS

Table 8  
 ACCIDENT INVESTIGATION DIVISION  
Data Summary

Test No. CE0201

Date 1/5/84

Vehicle No. 1

Impact Description	Frontal load cell barrier
Make	Ford Tempo
Model	4-door sedan
Year	1984
Size Category	mid-size
Test Weight (lb.)	3080
Wheelbase (in.)	100
Front Overhang (in.)	34.5
Overall Width (in.)	66.2
Accelerometer Location	43.5 inches aft of front wheel C/L
Calibration Procedure	shaker table least squares
Accelerometer Linearity	$\pm 0.75\%$
Integration Algorithm	Hybrid Simpson-Newton 3/8
Impact Speed (mph)	35.0
Time of Separation (msec)	153.75
Velocity Change (mph)	38.96
CDC	12 FDEW3
Damage Length (in.)	L: 56.25
Crush Dimensions (in.)	C1: 19.75
	C2: 20.1
	C3: 21.5
	C4: 21.5
	C5: 20.0
	C6: 21.0
	D: 0
Midpoint of Damage	

National Accident Sampling System – Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

1984 FORD TEMPO GL 4 Door IFABP22R3EK106987

Complete When Applicable

End Damage	Side Damage
Undeformed end width <u>56.25</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 F D E W 3

Specific Impact Number	Plane* of C-Measurements	Direct Damage		Field L**	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	C <sub>5</sub>	C <sub>6</sub>	±D
		Width** (CDC)	Max*** Crush								
1	Bumper	56.25	22.5	56.25	22.5	21.6	22.0	22.0	21.5	23.75	0
	Free/space		-0		2.75	1.5	.5	.5	1.5	2.75	
1	ACTUAL CRUSH	56.25	22.5	56.25	19.75	20.1	21.5	21.5	20.0	21.0	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).

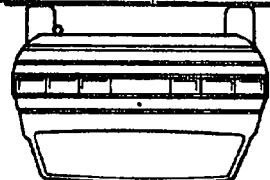
\*\*\*Measure and document on the vehicle diagram the location of the maximum crush.

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

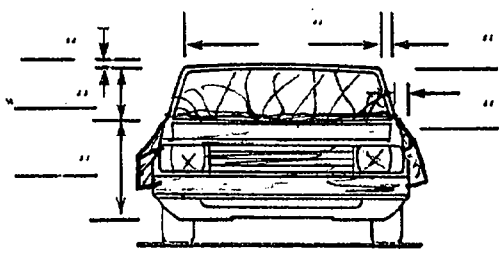
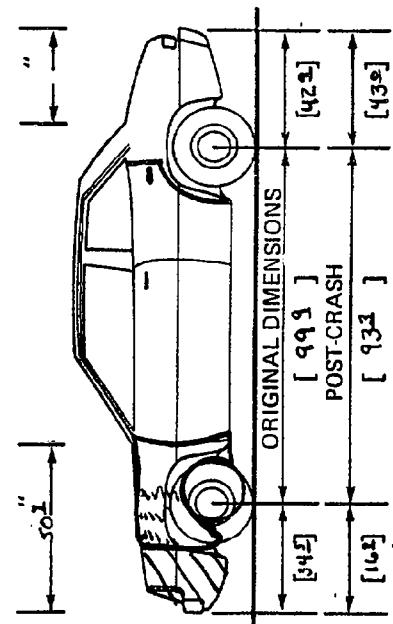
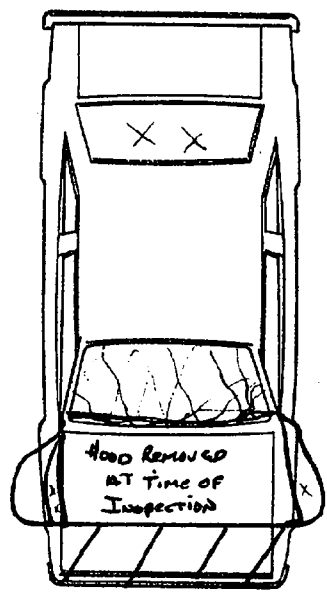
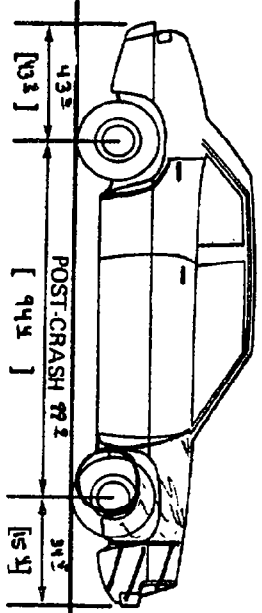


<b>DAMAGE DESCRIPTION</b>  Tire—Wheel Damage a. Rotation physically restricted RF <u>2</u> LF <u>2</u> RR <u>2</u> LR <u>2</u>  b. Tire deflated RF <u>2</u> LF <u>2</u> RR <u>2</u> LR <u>2</u>  (1) Yes, (2) No, (8) NA, (9) Unk.	<b>TYPE OF TRANSMISSION</b> ___ Manual <input checked="" type="checkbox"/> Automatic  Average Track: <u>N/A</u> Maximum Width: <u>N/A</u> Gross Weight: _____ Overall Length: <u>177.3</u> Engine Size: cyl. <u>4</u> displ. <u>2.3L</u>	<b>WHEEL STEER ANGLES</b> (For locked front wheels or displaced rear axles only)  RF ± <u>N/A</u> ° LF ± <u>N/A</u> ° RR ± <u>N/A</u> ° LR ± <u>N/A</u> °  Within ± 5 degrees
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Vehicle No.: 1  
1984 Ford Tempo GL

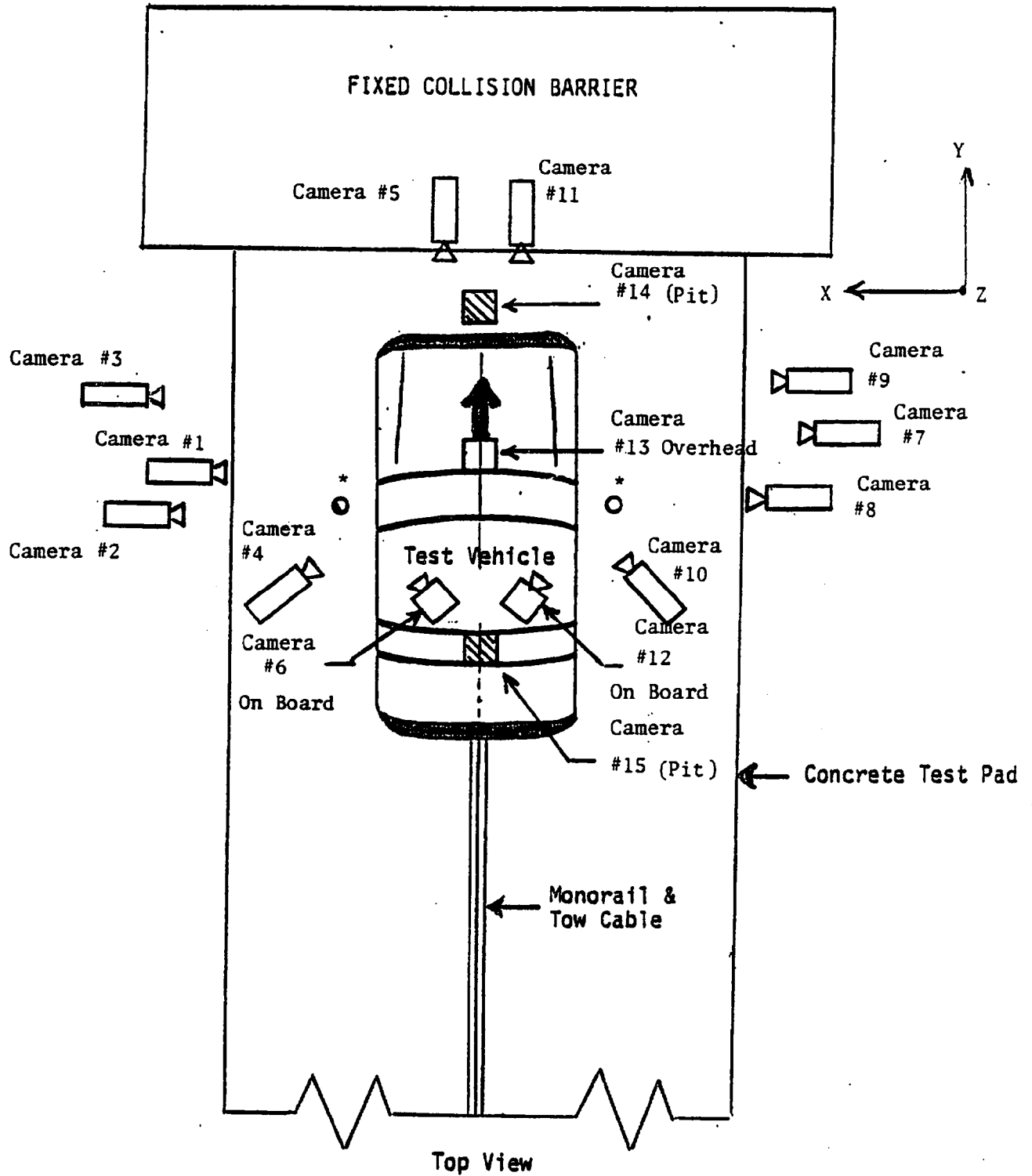


Centerline = 177.3  
-154.8  
-----  
22.5



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 6 -- CAMERA POSITION FOR FRONTAL IMPACTS

Table 9  
HIGH-SPEED CAMERA LOCATIONS

Test No. CE0201 Vehicle 1984 Ford Tempo 4-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	230	54	56	-6	-	13	NO TIMING
2	Driver	246	72	48	-0	208	35	720
3	Driver	315	26	59	-3	277	50	930
4	Driver	90	108	72	-20	-	13	630
5	Driver (Barrier)	20	0	70	-38	85	13	640
6	Left Belt Retractor	-	-	-	-	-	8	1490
7	Vehicle Right Side	281	41	48	-2	-	13	NO TIMING
8	Passenger	268	66	45	-3	230	35	NO TIMING
9	Passenger	228	24	44	-3	274	50	960
10	Passenger	90	104	69	-22	-	13	630
11	Passenger (Barrier)	20	0	70	-35	85	13	630
12	Right Belt Retractor	-	-	-	-	-	8	NO TIMING
13	Overhead	0	40	216	-90	-	25	700
14	Engine (Pit.)	0	36	-120	90	-	25	970
15	Fuel Tank (Pit.)	0	140	-120	90	-	25	1000

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

**BEFORE DRIVING YOUR VEHICLE**

**OCCUPANT RESTRAINT SYSTEM**

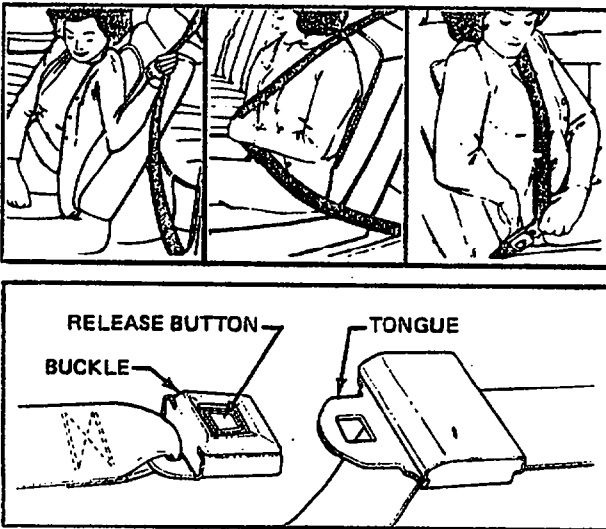
Ford Motor Company recommends that you always "buckle up" for safety. In some areas, seat belt usage is required by law.

**WARNING** — All vehicle occupants should wear their seat belts for maximum protection in the event of a collision or sudden stop.

**Front Lap-Shoulder Belts**

The belt system allows freedom of movement, locking tight only on hard braking or impacts of approximately 5 mph (8 km/h) or more. The system cannot be made to lock by jerking on the belt.

After entering your vehicle, close the door and adjust the front seat to obtain the best position for your driving comfort, access to controls, and visibility. Then pull the lap-shoulder belt from the retractor so the shoulder portion of the belt crosses your shoulder and chest and insert the belt tongue into the proper buckle until you hear a snap and feel it latch.



**BEFORE DRIVING YOUR VEHICLE**

As you drive and settle into a comfortable seating position, slight movements will cause the lap and shoulder portions of the belt to adjust automatically to a snug position. If the shoulder belt is uncomfortably tight, a tension reliever is provided in the shoulder belt retractor to reduce belt pressure against your chest. The shoulder belt is adjusted much like a window shade to maintain a small amount of slack in the belt. The adjacent door must be closed to use this comfort feature.

**Adjustment Procedure**

- Pull at least four inches of shoulder belt out of the retractors and allow it to fully retract (Figure A).
- To obtain slack, slowly pull out the shoulder belt until a "click" is heard (approximately 1-4 inches), then release the belt to set it (Figure B).
- For additional slack, pull out a slight additional amount of belt. If you pull out too much belt, it will return to a snug position and the above procedure must be repeated if slack is desired (see Warning).

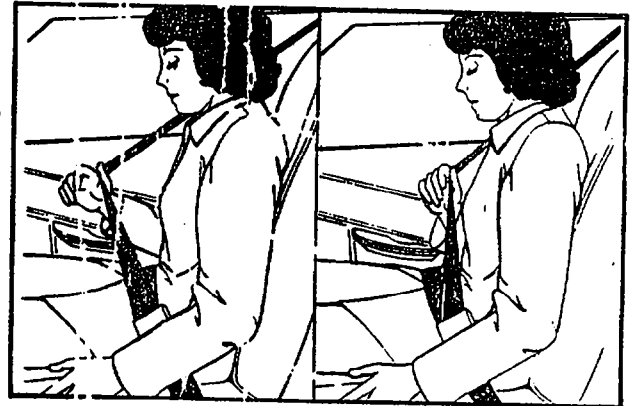


FIGURE A

FIGURE B

Figure 7 OWNER'S MANUAL SEAT BELT INSTRUCTIONS

Figure 8  
PART 572 DUMMY IN-VEHICLE POSITION

Test No. CE0201

Vehicle 1984 Ford Tempo

SEAT TYPE:

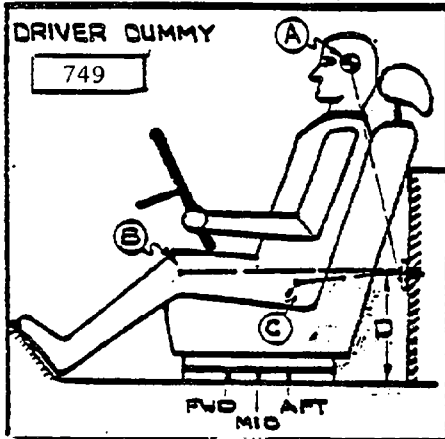
- Bench
- Bucket
- Split Bench

ADJUSTER TYPE:

- Manual
- Power

BUCKET SEAT BACK TYPE:

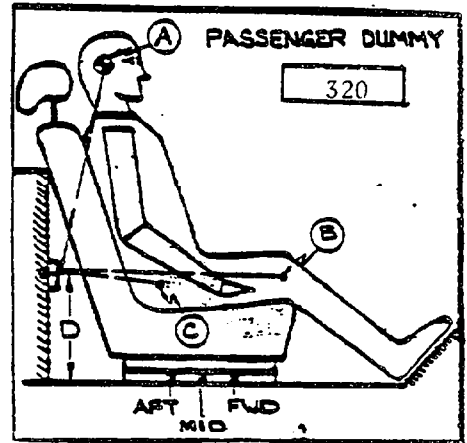
- Fixed
- Adjustable Reclining



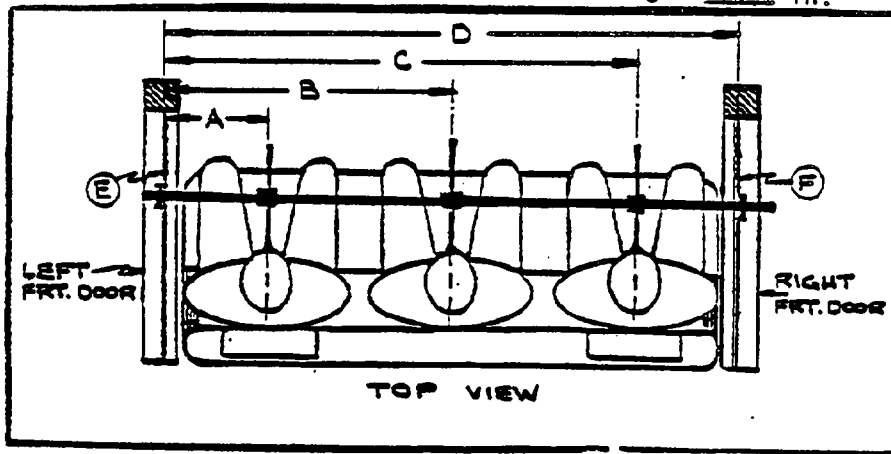
- A = 20.5 in. 1 Degrees
- B = 22.4 in. 97 Degrees
- C = 8.7 in. 135 Degrees
- D = 14.7 in.

MEASUREMENT LOCATION

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



- A = 20.6 in. 1 Degrees
- B = 21.5 in. 99 Degrees
- C = 8.5 in. 135 Degrees
- D = 14.7 in.



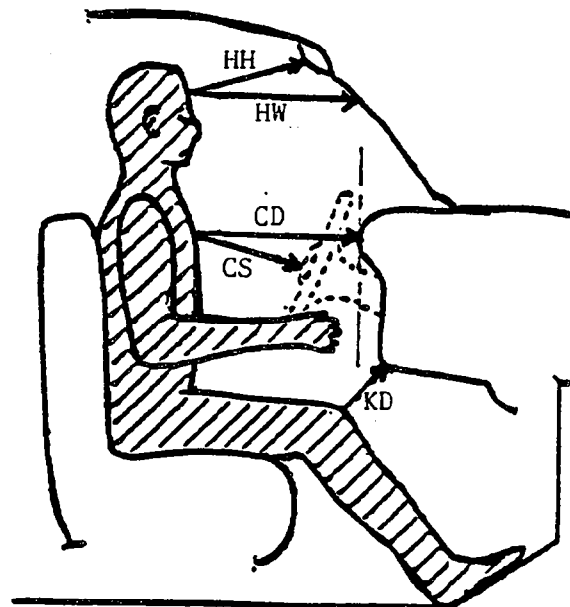
DUMMY ID

749

320

- A = Left Door to Driver Centerline 11.6 in.
- B = Left Door to Center Passenger Centerline 38.1 in.
- C = Left Door to Right Passenger Centerline -- in.
- D = Left Door to Right Door 49.5 in.
- E, F = Window Glass Height (Right and Left Must be Equal) 11.7 in.

	DRIVER	PASSENGER
HH	9.25"	9.0"
HW	16.7"	16.5"
CD	20.5"	21.0"
CS	13.5"	--
KDL	3.7"	5.0"
KDR	3.2"	5.0"
SA	--	--
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	5.0"	5.0"
HS	8.4"	8.5"
AD	3.5"	5.0"
HD	5.9"	6.8"

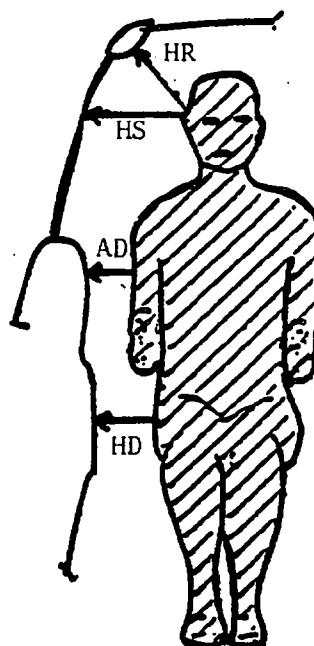


Figure 9 OCCUPANT CLEARANCE DIMENSIONS

Table 10  
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-260	38	136	298	-64	13	-27	62.9
DUMMY (2)	-59	7	83	99	-46	18	12	45.0
DUMMY (3)								
DUMMY (4)								

*WFL*  
*43-9*

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	480	750
DUMMY (2)	370	675
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)	1410	--	1050
DUMMY (2)	1820	1166	--
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t <sub>1</sub> (SEC)	t <sub>2</sub> (SEC)	AVE. ACC. (g) t <sub>1</sub> TO t <sub>2</sub>	HEAD
DUMMY (1)	2954.5	.06352	.07485	146.8	4555.5
DUMMY (2)	1104.3	.06427	.10170	61.4	1449.4
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 (in.)		
film	2.5	2.0
electronic	.1	.85
Belt Strain <sup>(1)</sup>	.9 inch per ft.	.5 inch per ft.
Belt Length Data (in.)		
total length <sup>(2)</sup>	--	--
retractor to "D" ring <sup>(2)</sup>	retractor covered	
torso belt <sup>(3)</sup>	30.5	30.5
lap belt <sup>(3)</sup>	32.4	32.6
remainder on spool	21.0	21.0

---

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

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

(3) as measured on Part 572 dummy

APPENDIX A  
PHOTOGRAPHS

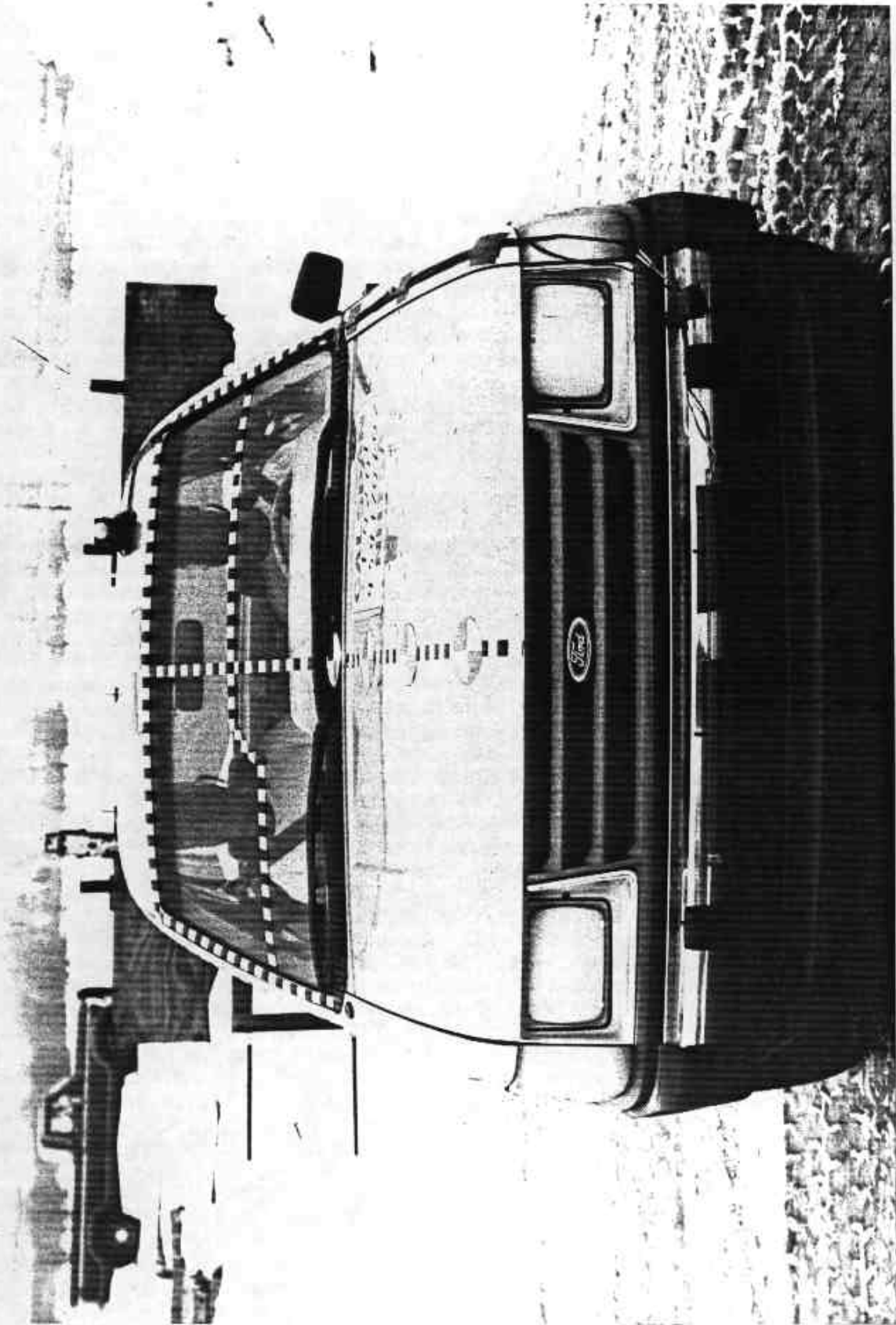


Figure A-1 PRE-TEST FRONT VIEW

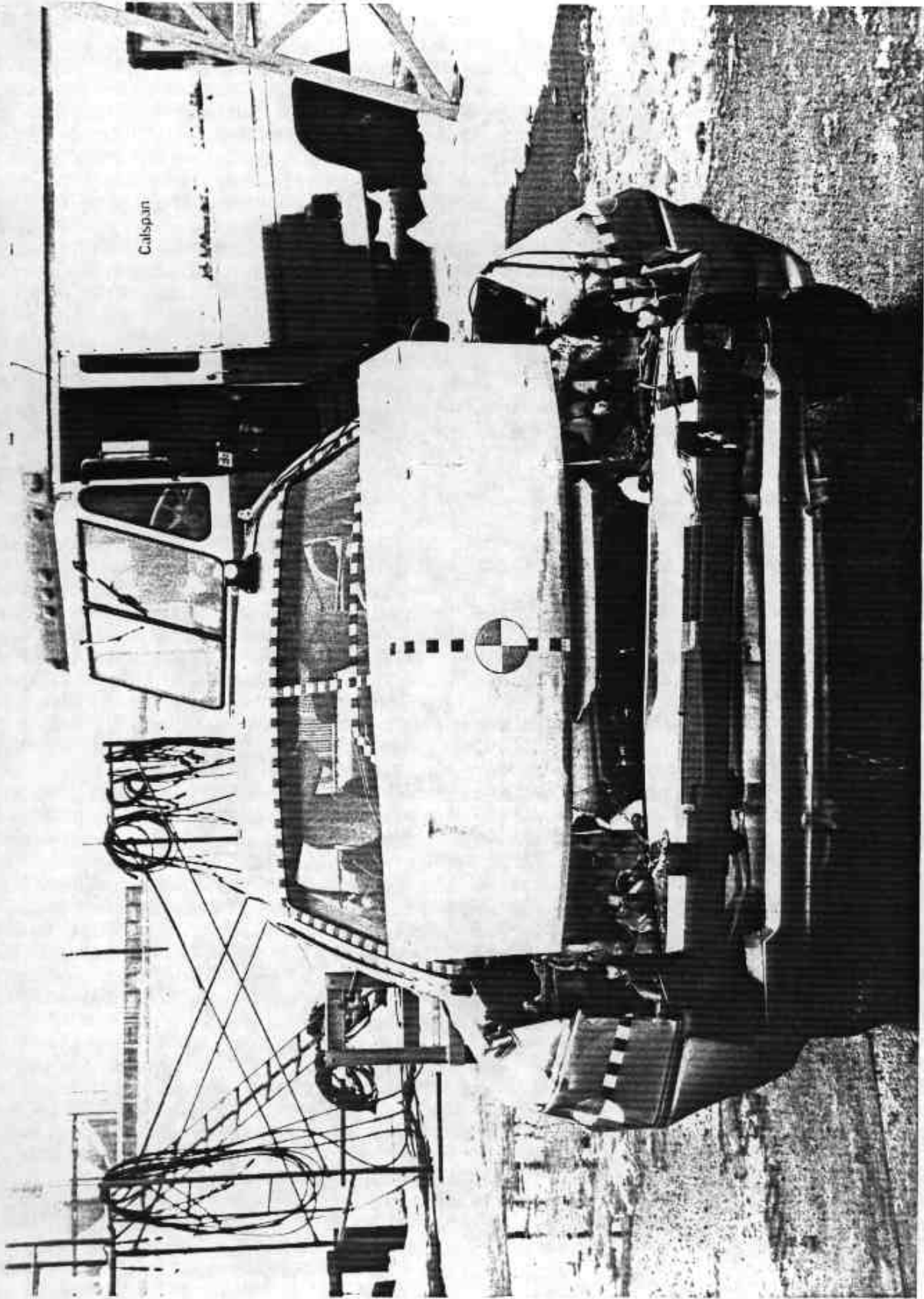


Figure A-2 POST-TEST FRONT VIEW

A-3

7103-V-18



A-4

7103-V-18

Figure A-3 PRE-TEST LEFT SIDE VIEW

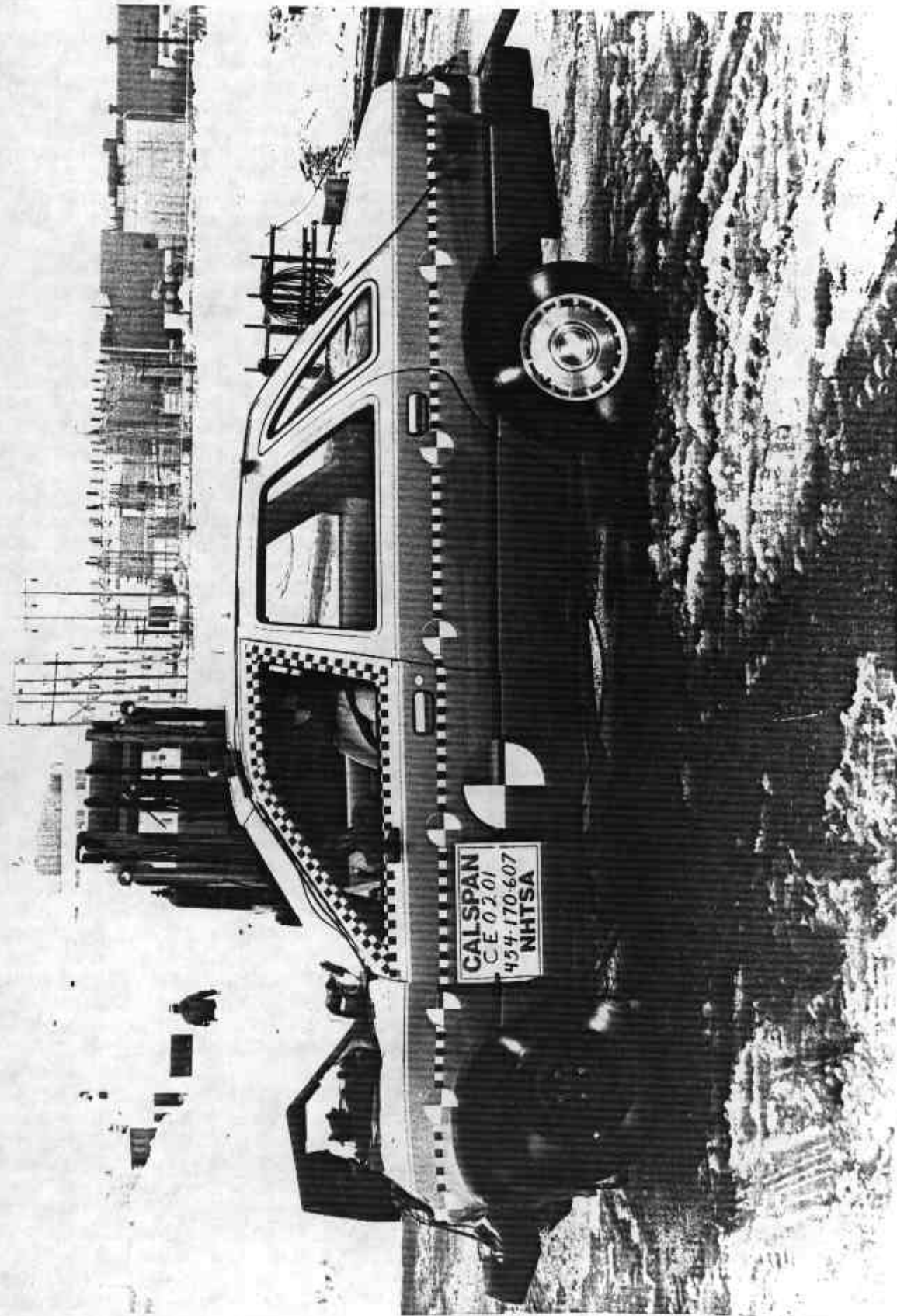


Figure A-4 POST-TEST LEFT SIDE VIEW

A-5

7103-V-18



A-6

7103-V-18

Figure A-5 PRE-TEST RIGHT SIDE VIEW

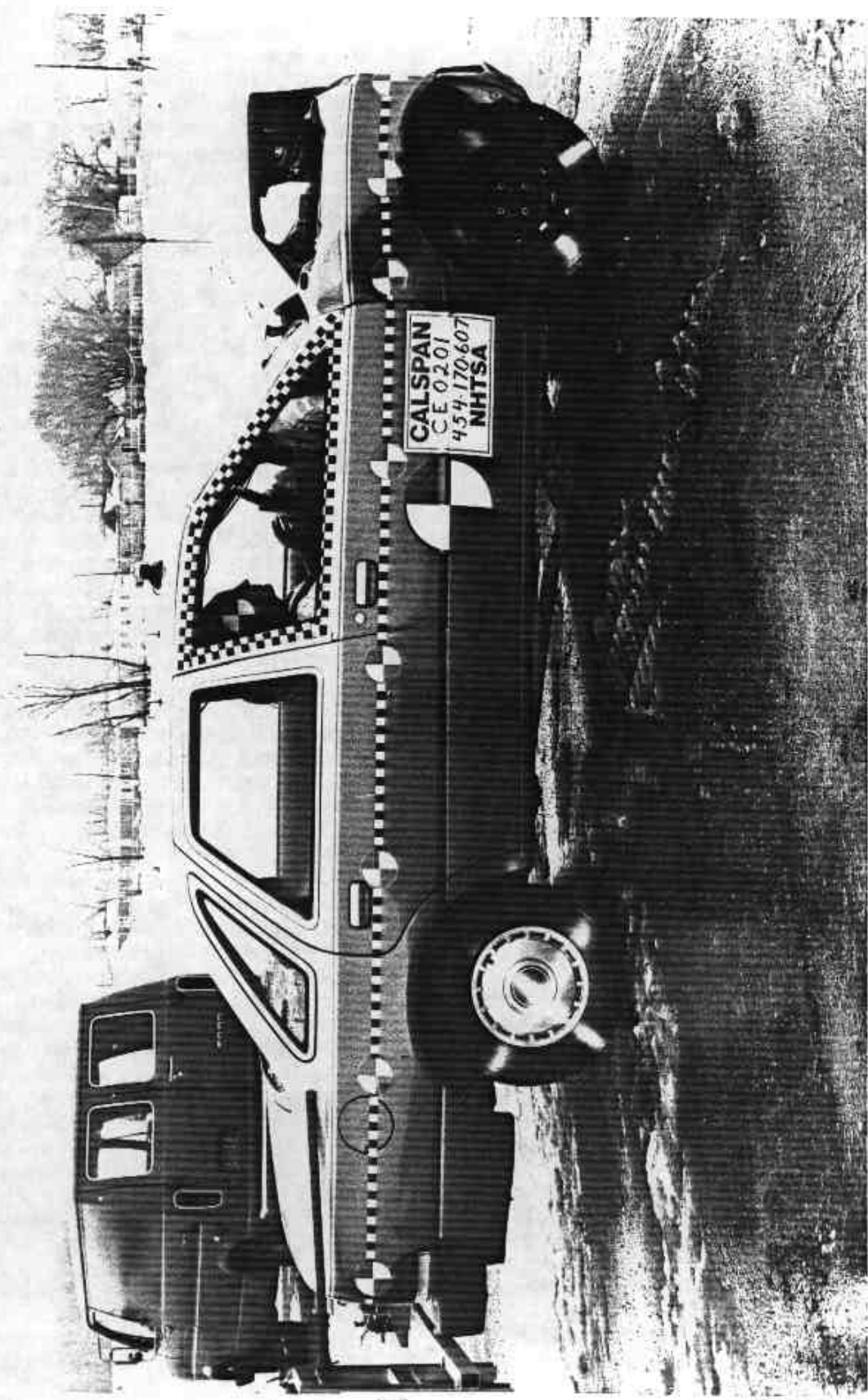


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-7

7103-V-18



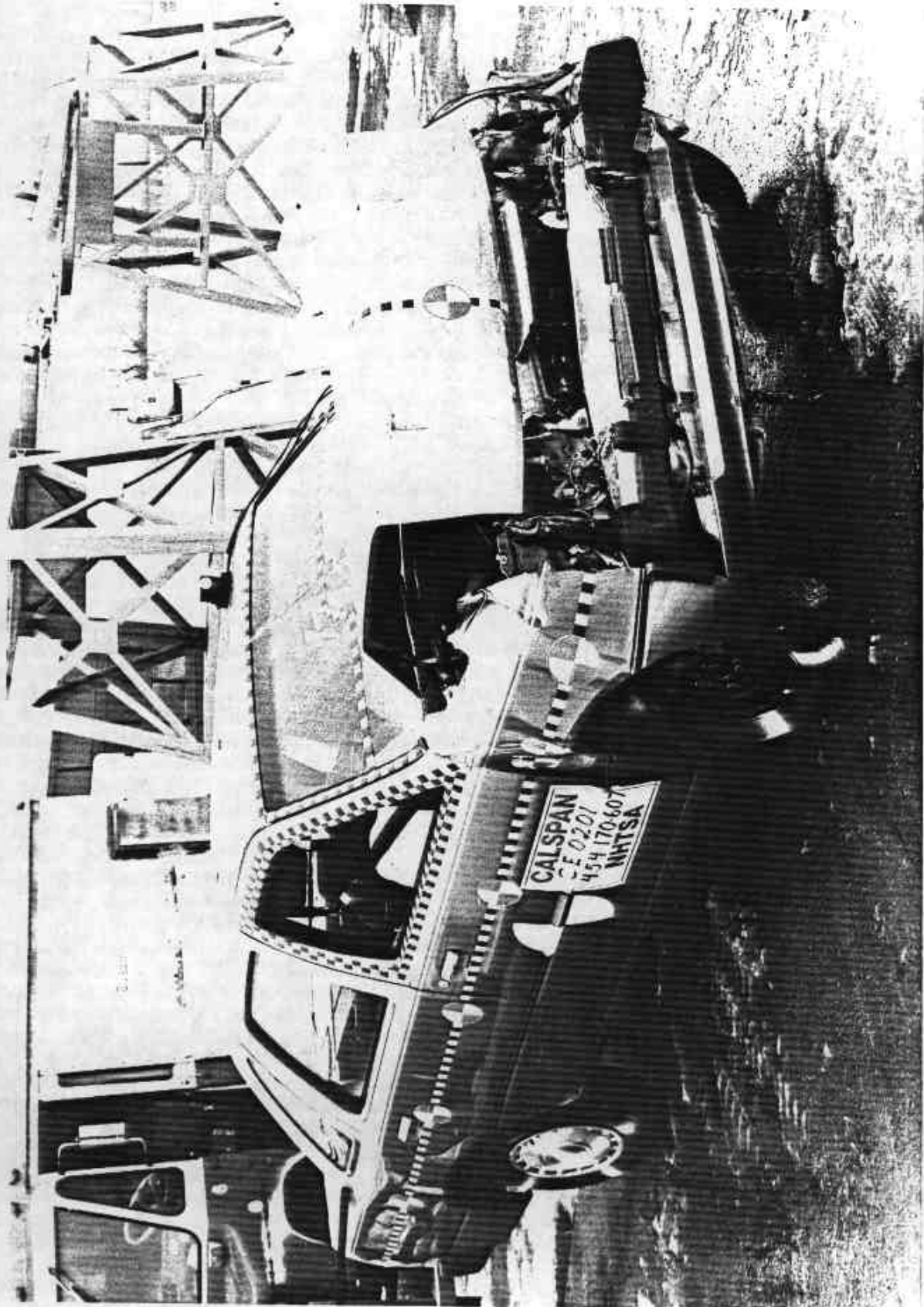


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-9

7103-V-18



A-10

7103-V-18

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



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

A-11

7103-V-18

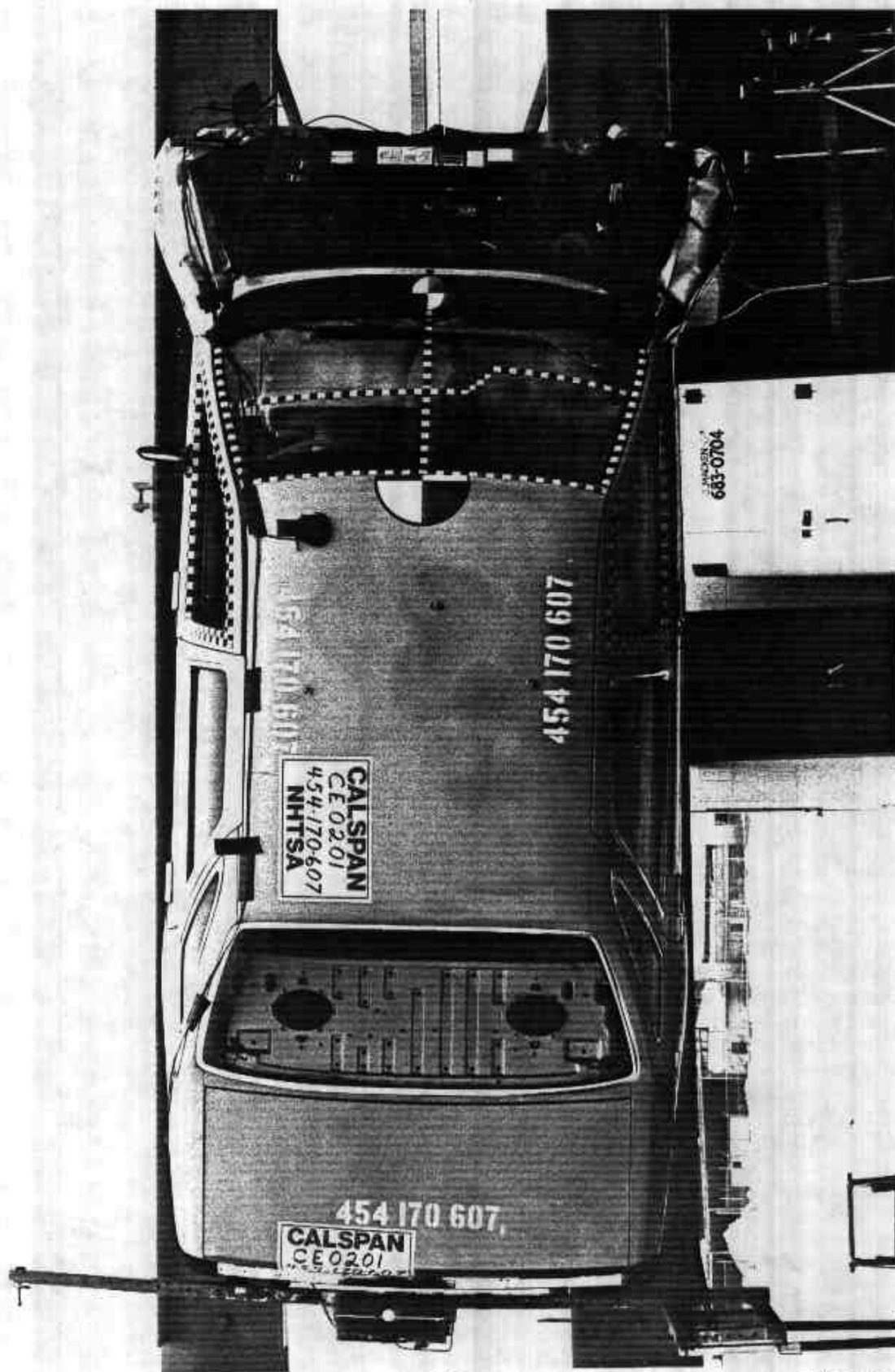


Figure A-11 POST-TEST TOP VIEW

A-12

7105-V-18

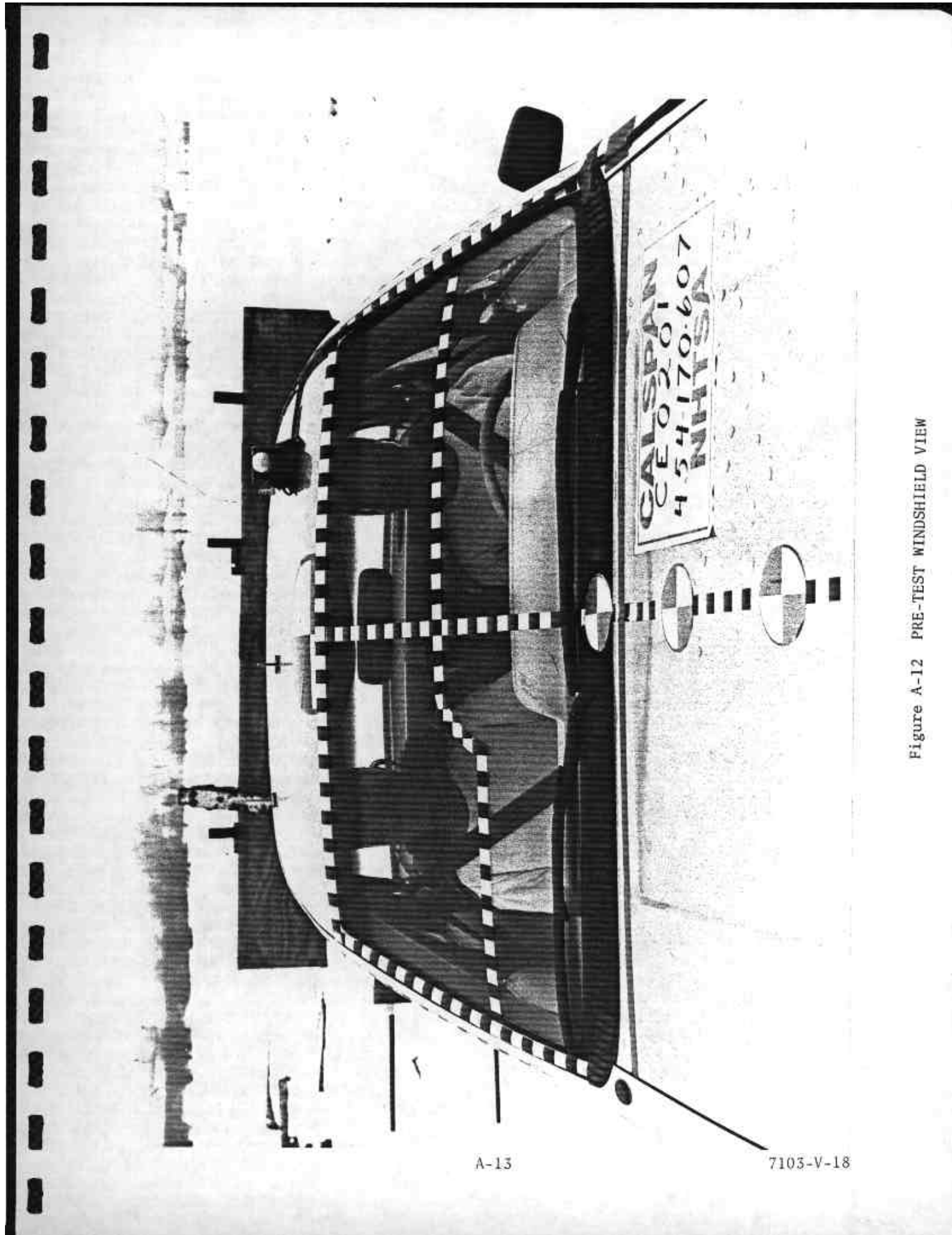
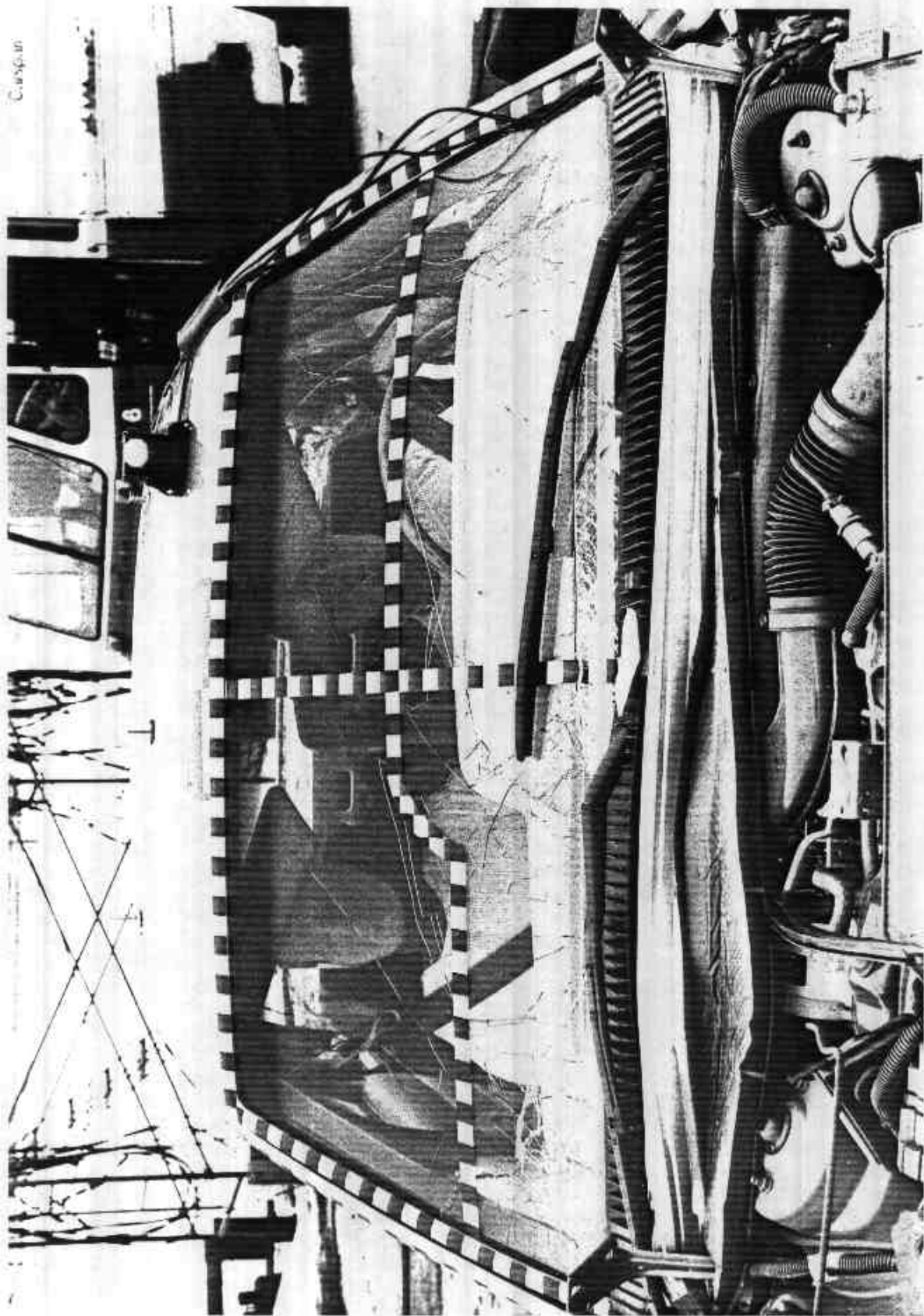


Figure A-12 PRE-TEST WINDSHIELD VIEW

A-15

7103-V-18



Carspan

A-14

7103-V-18

Figure A-13 POST-TEST WINDSHIELD VIEW



Figure A-14 POST-TEST BROKEN REAR WINDOW VIEW

A-15

7103-V-18

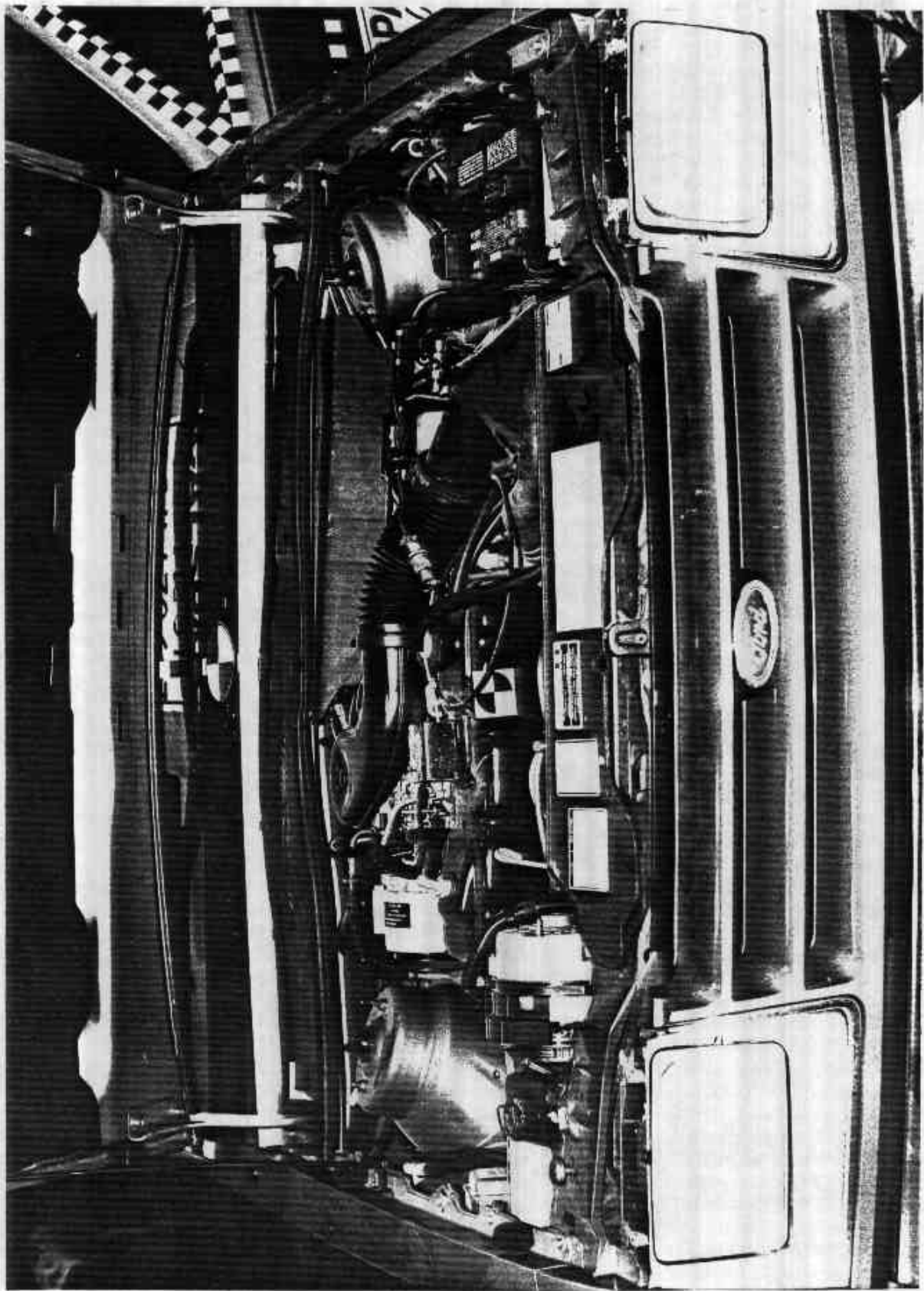
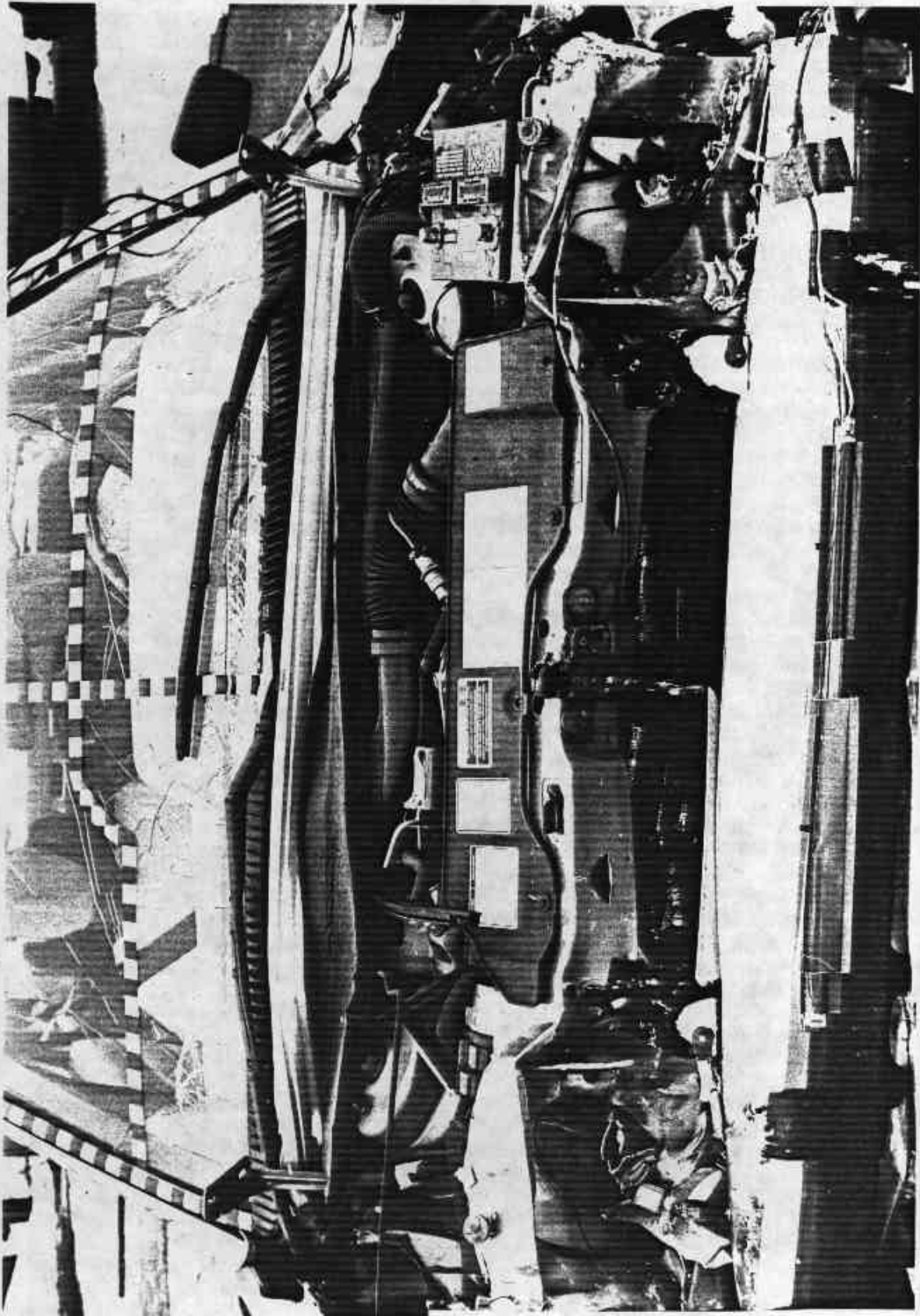


Figure A-15 PRE-TEST ENGINE COMPARTMENT VIEW

A-16

7103-V-18



A-17

7103-V-18

Figure A-16 POST-TEST ENGINE COMPARTMENT VIEW

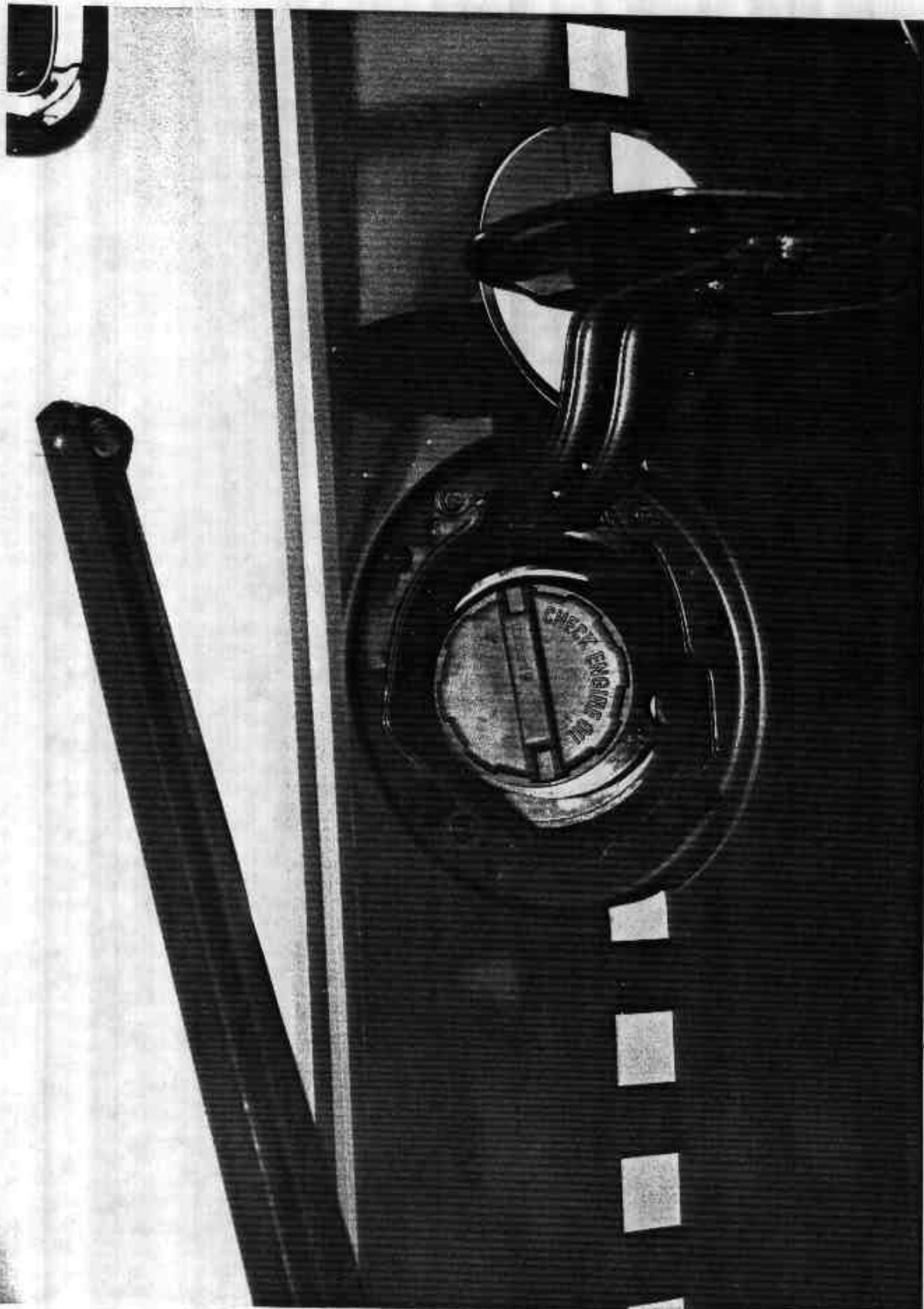


Figure A-17 PRE-TEST FILLER CAP VIEW

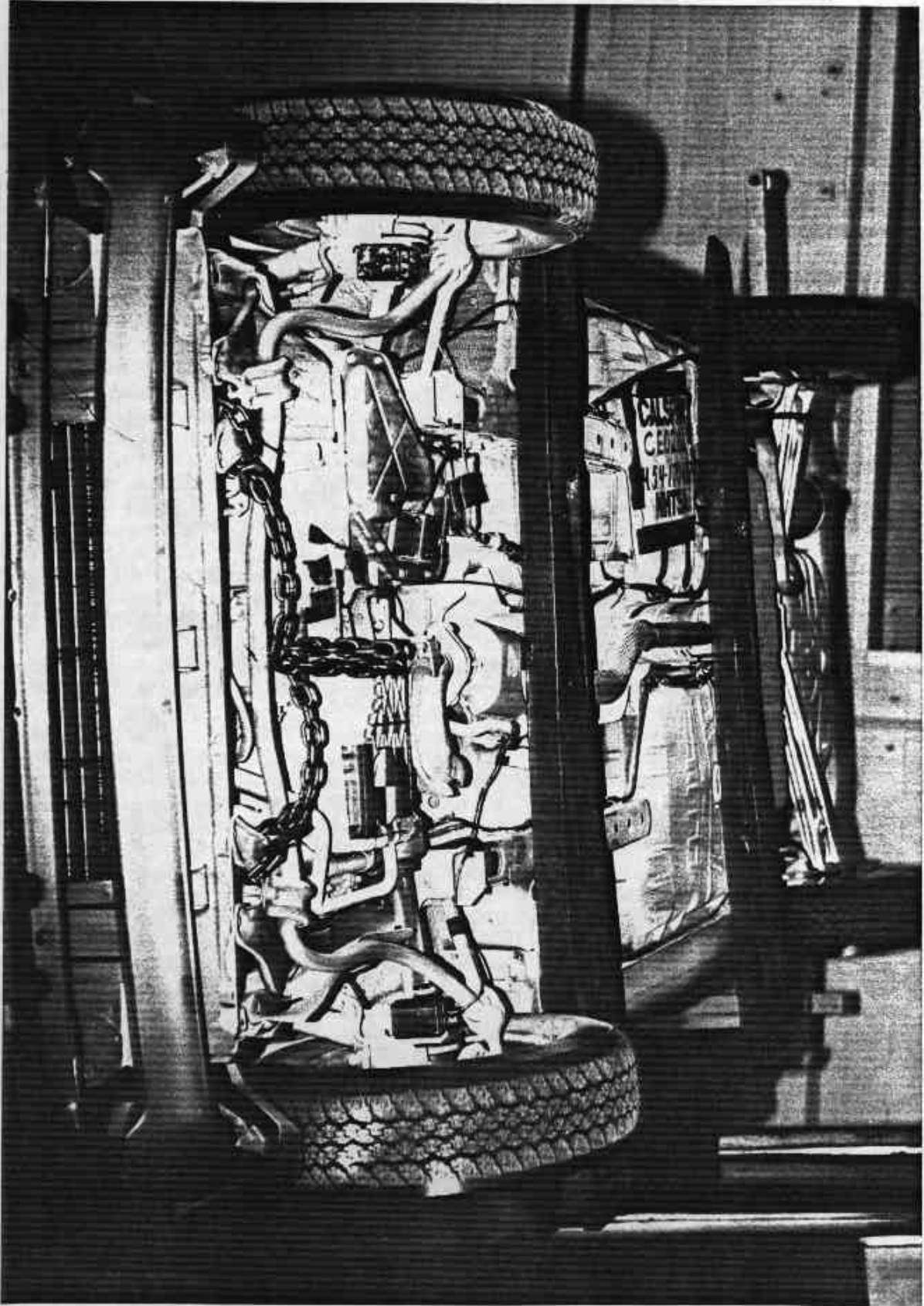


Figure A-18 PRE-TEST FRONT UNDERBODY VIEW

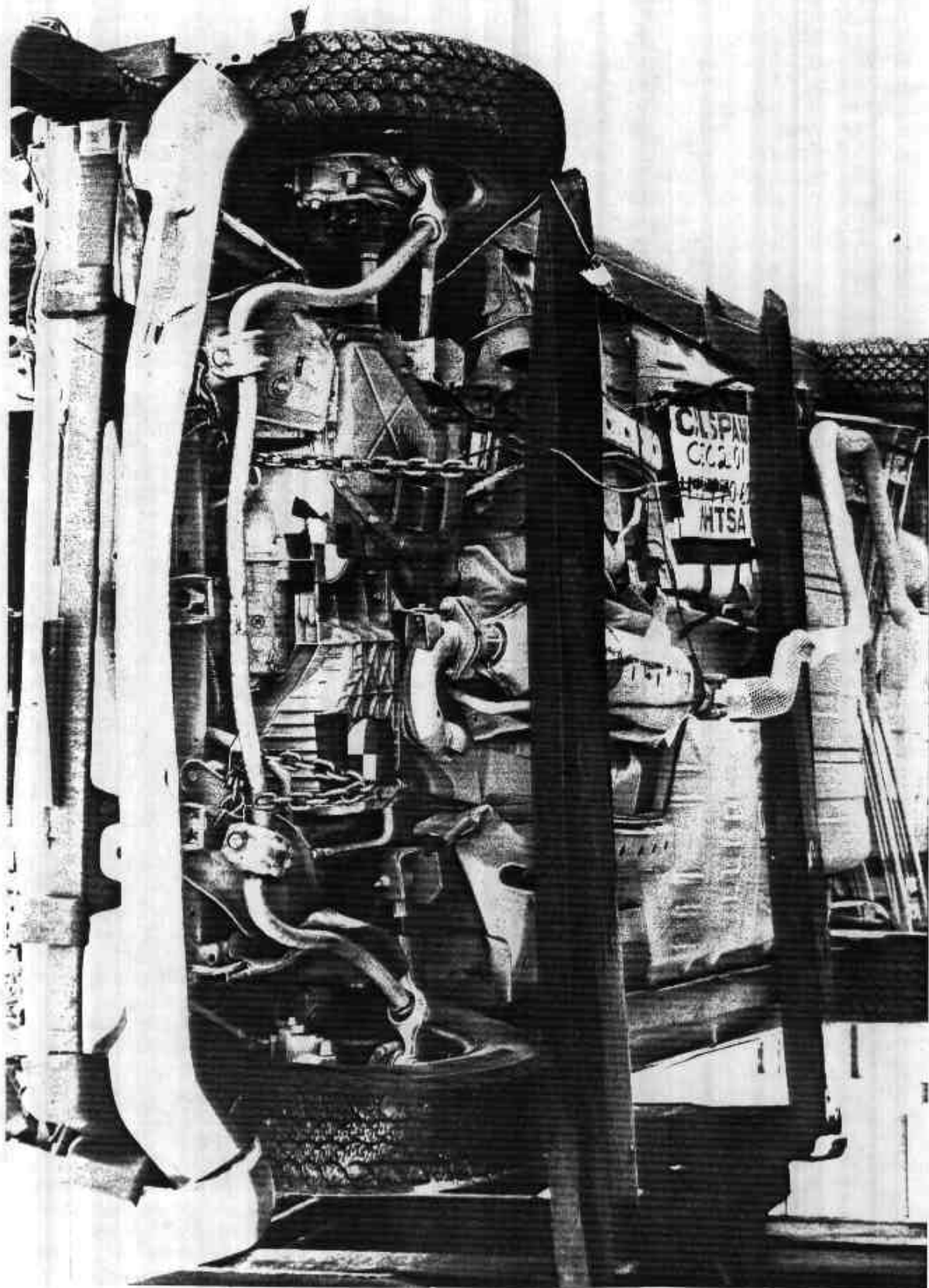


Figure A-19 POST-TEST FRONT UNDERBODY VIEW

A-20

7103-V-18

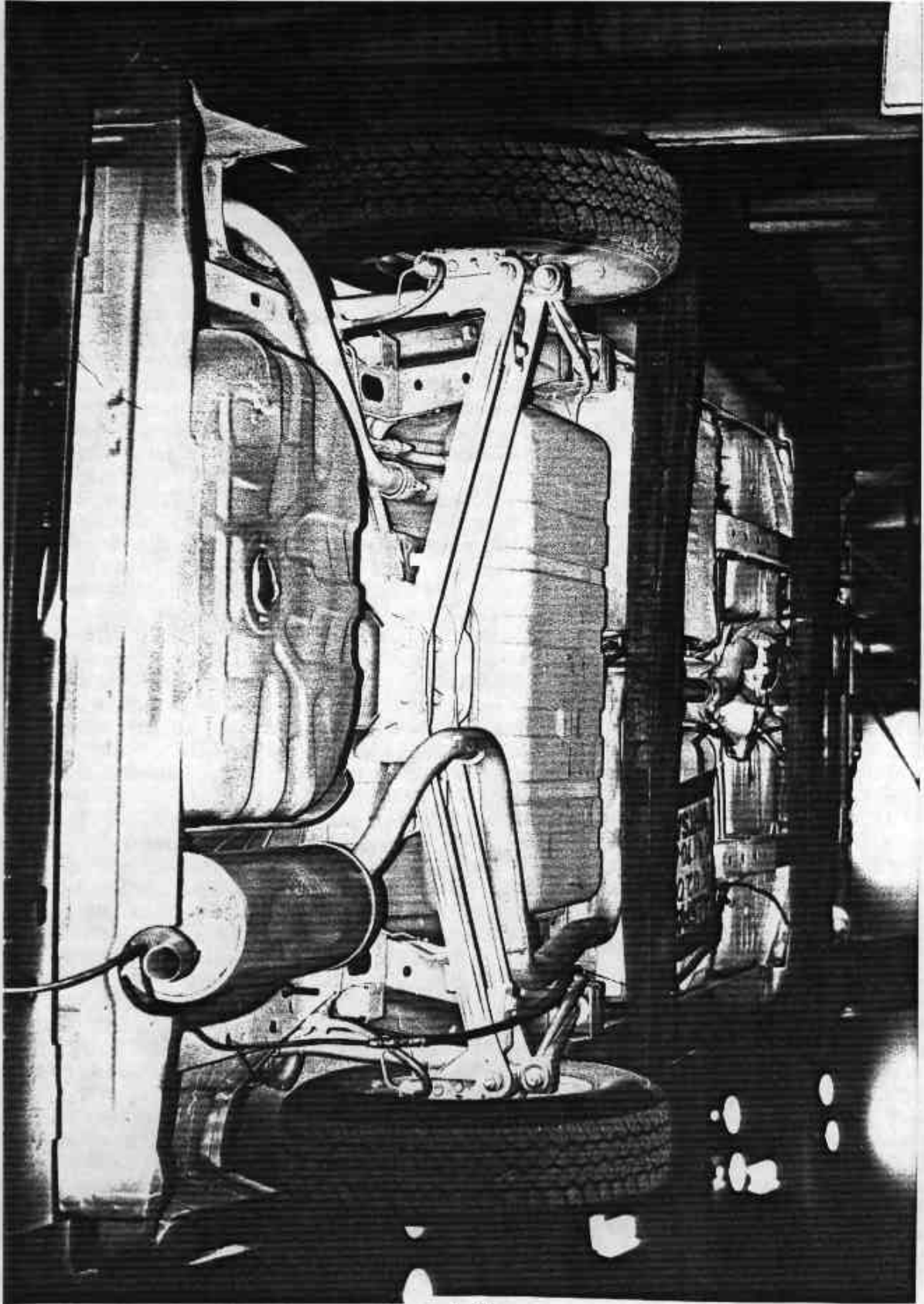


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

A-21

7103-V-18

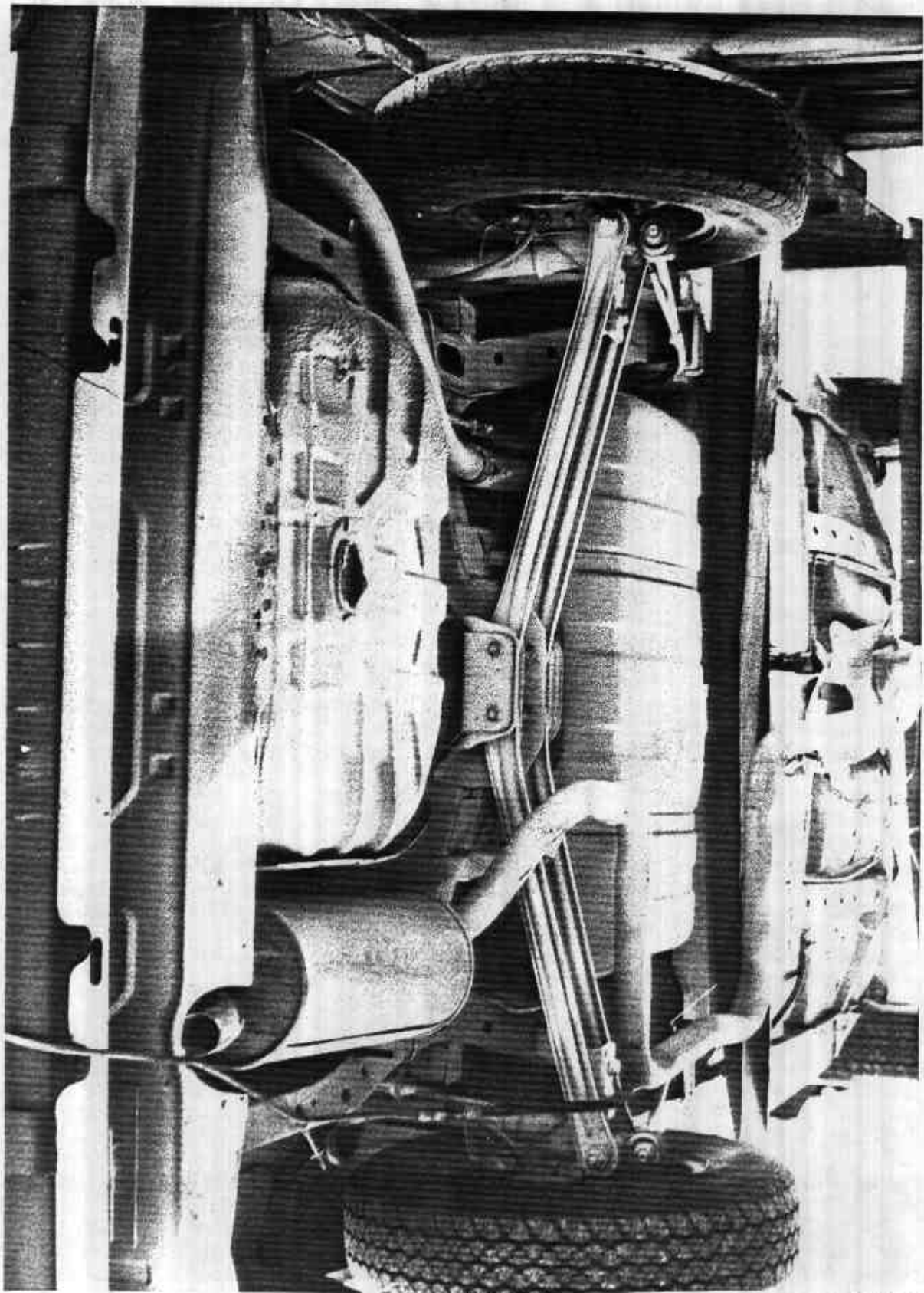


Figure A-21 POST-TEST REAR UNDERBODY VIEW

A-22

7103-V-18

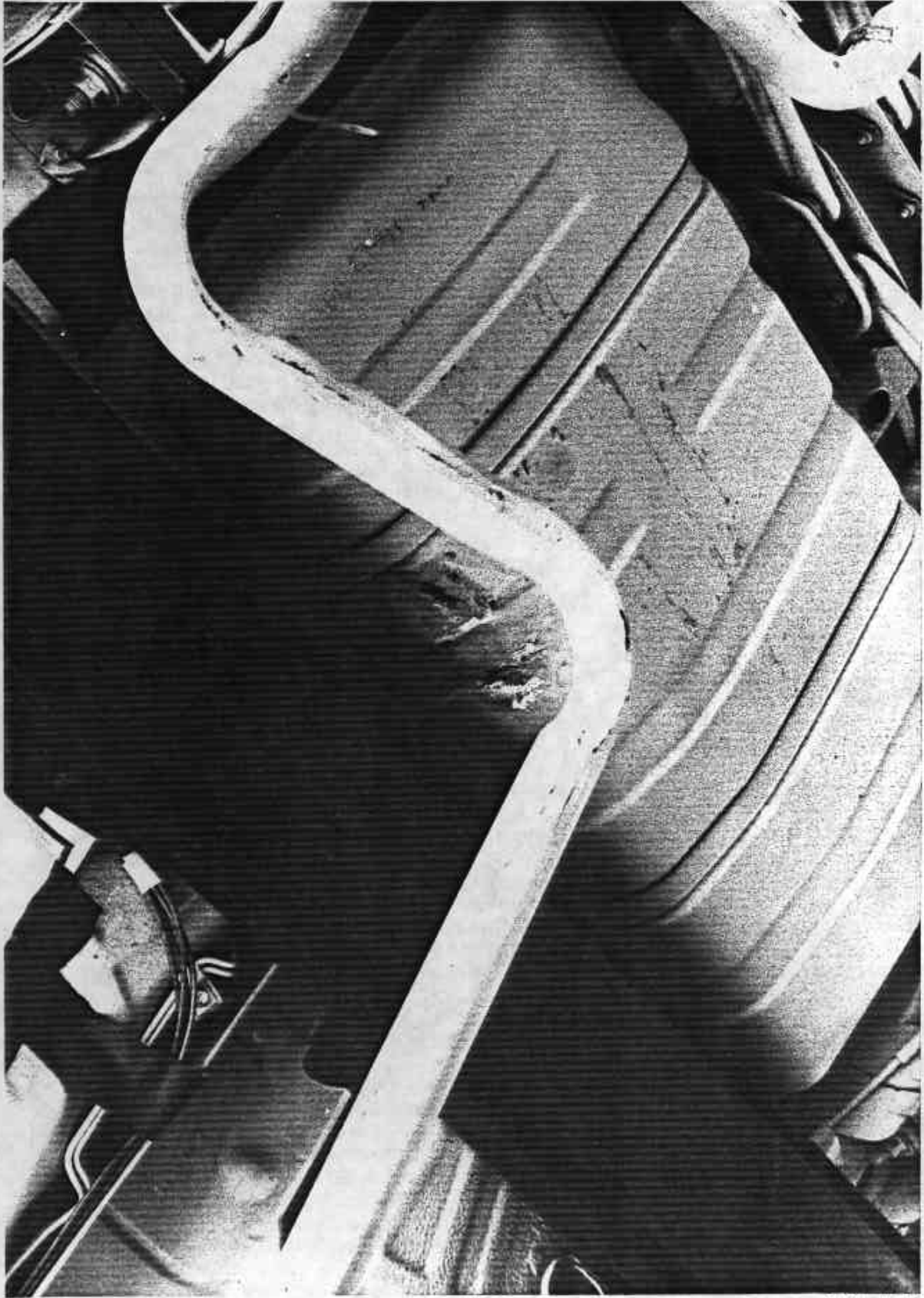


Figure A-22 POST-TEST FUEL TANK DENT FROM EXHAUST PIPE VIEW

A-23

7103-V-18

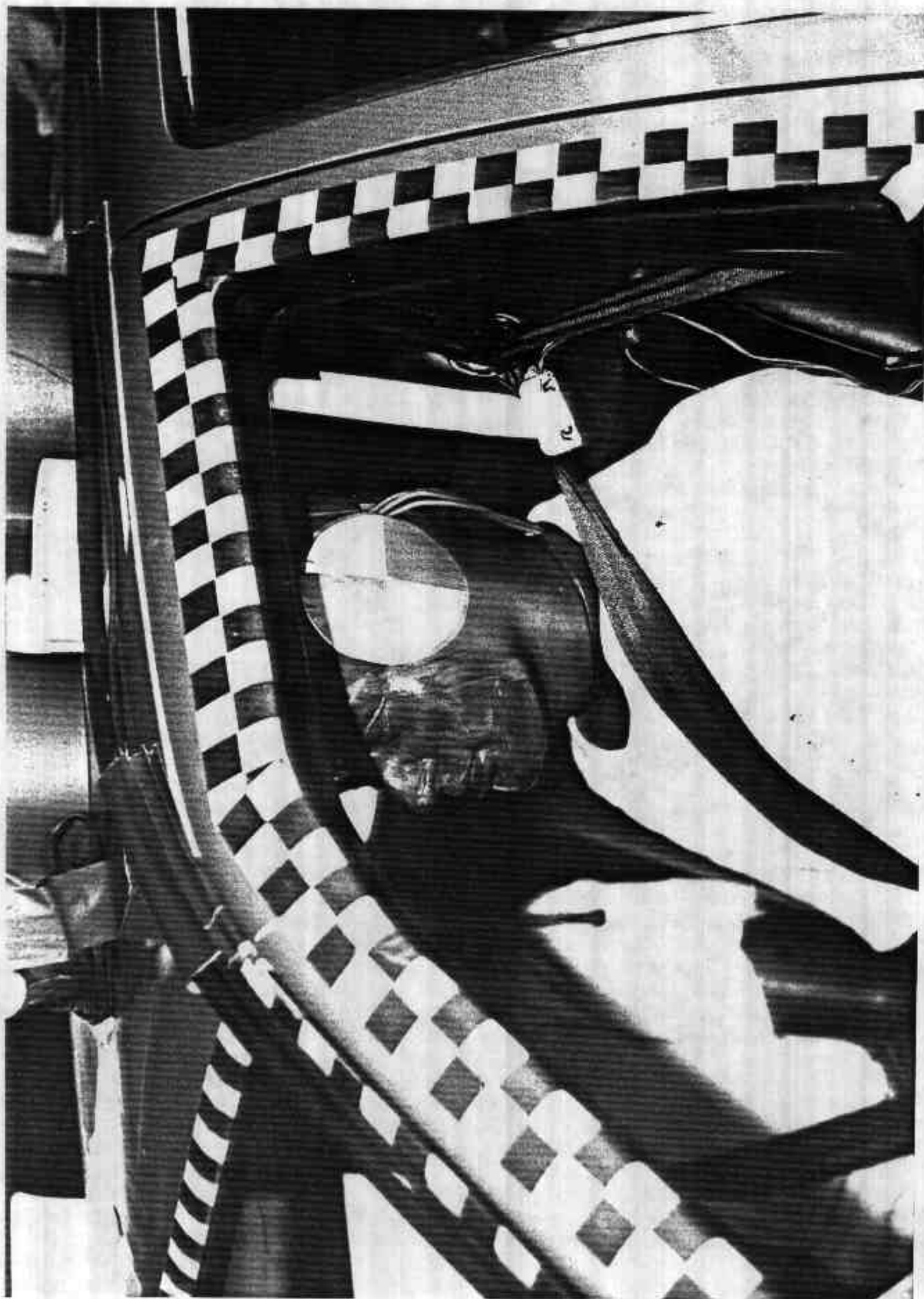


Figure A-23 PRE-TEST DRIVER POSITION VIEW

A-24

7103-V-18

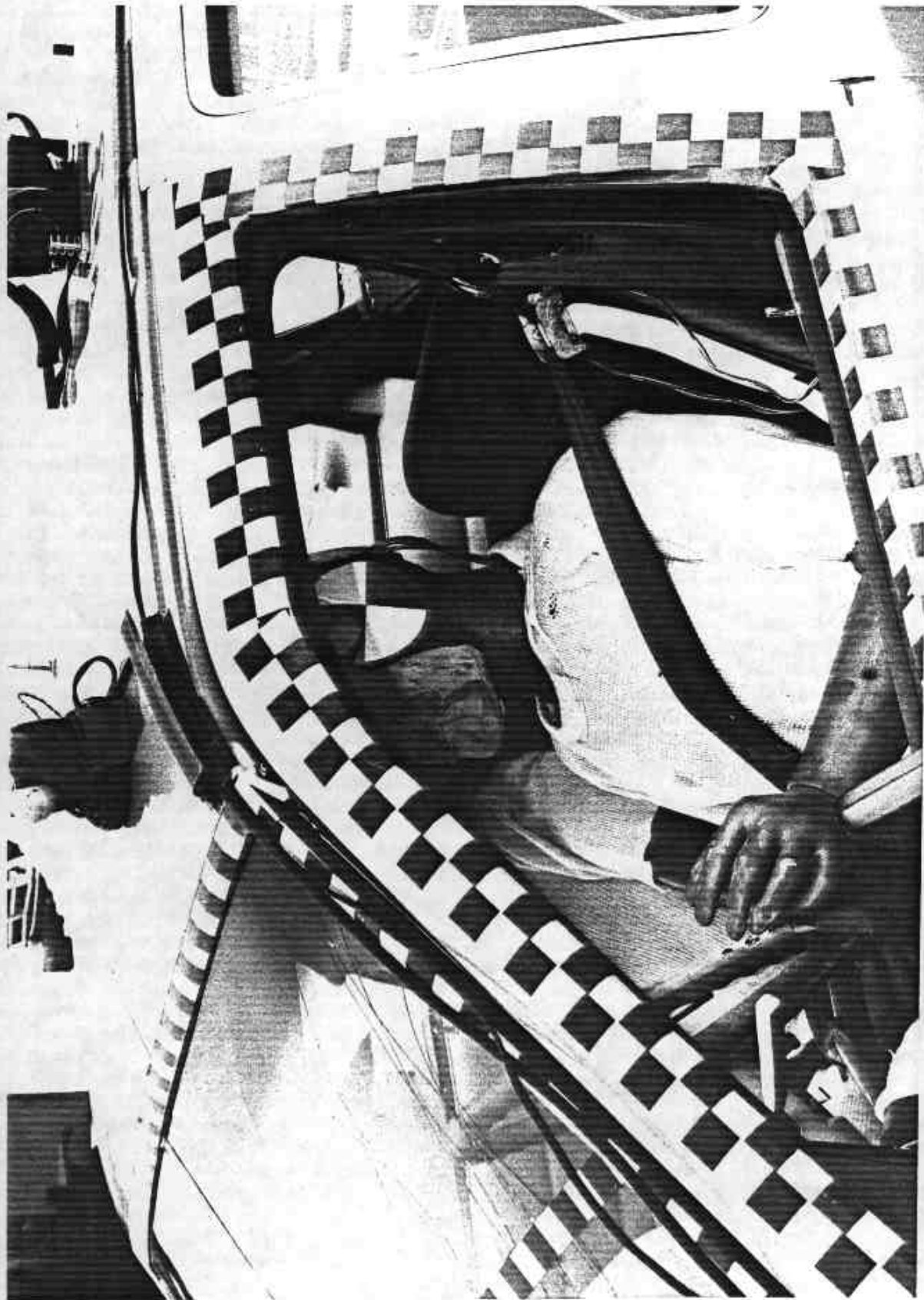
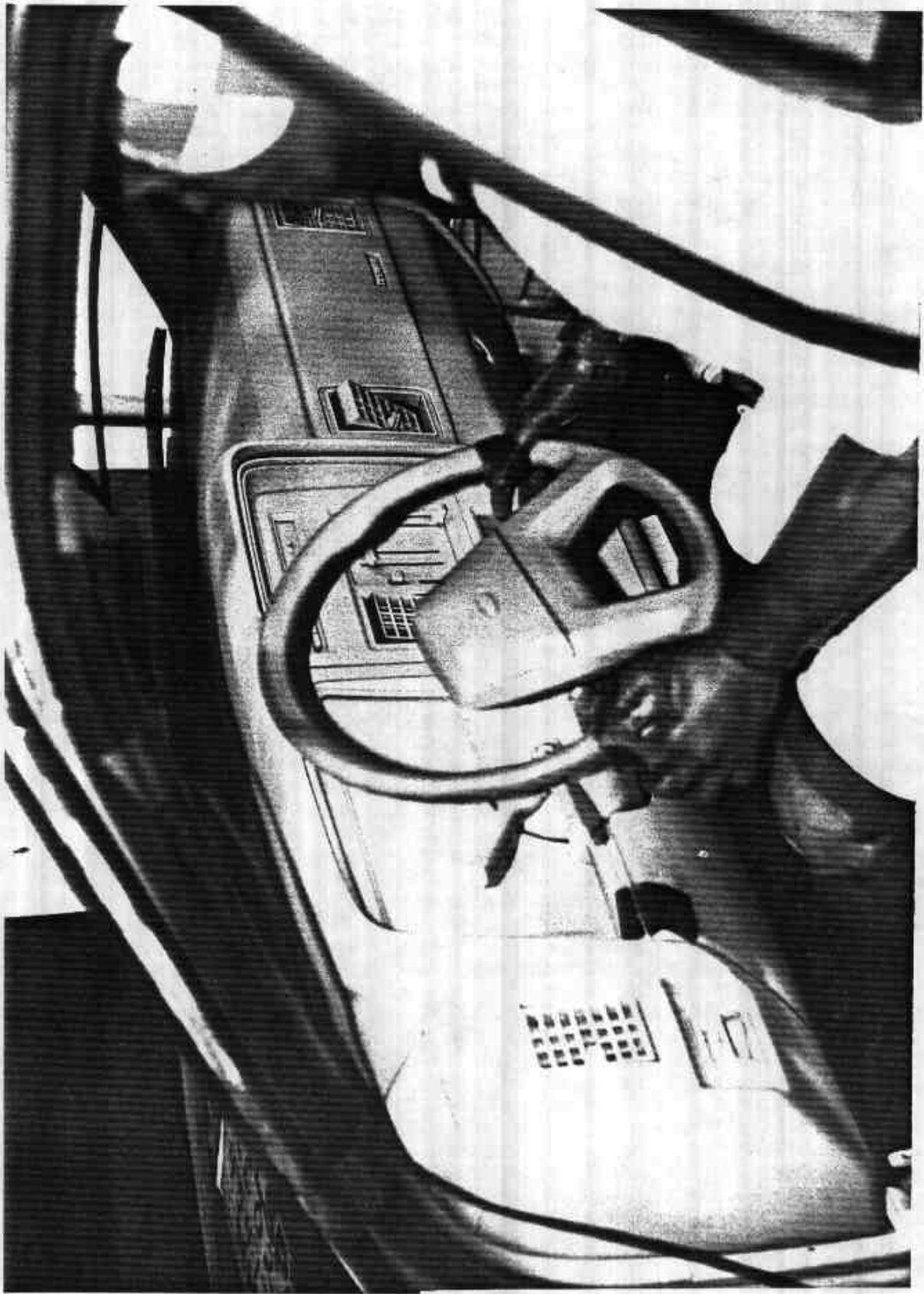


Figure A-24 POST-TEST DRIVER POSITION VIEW

A-25

7103-V-18



A-26

7103-V-18

Figure A-25 PRE-TEST DRIVER AND INTERIOR VIEW



Figure A-26 POST-TEST DRIVER AND INTERIOR VIEW

A-27

7103-V-18

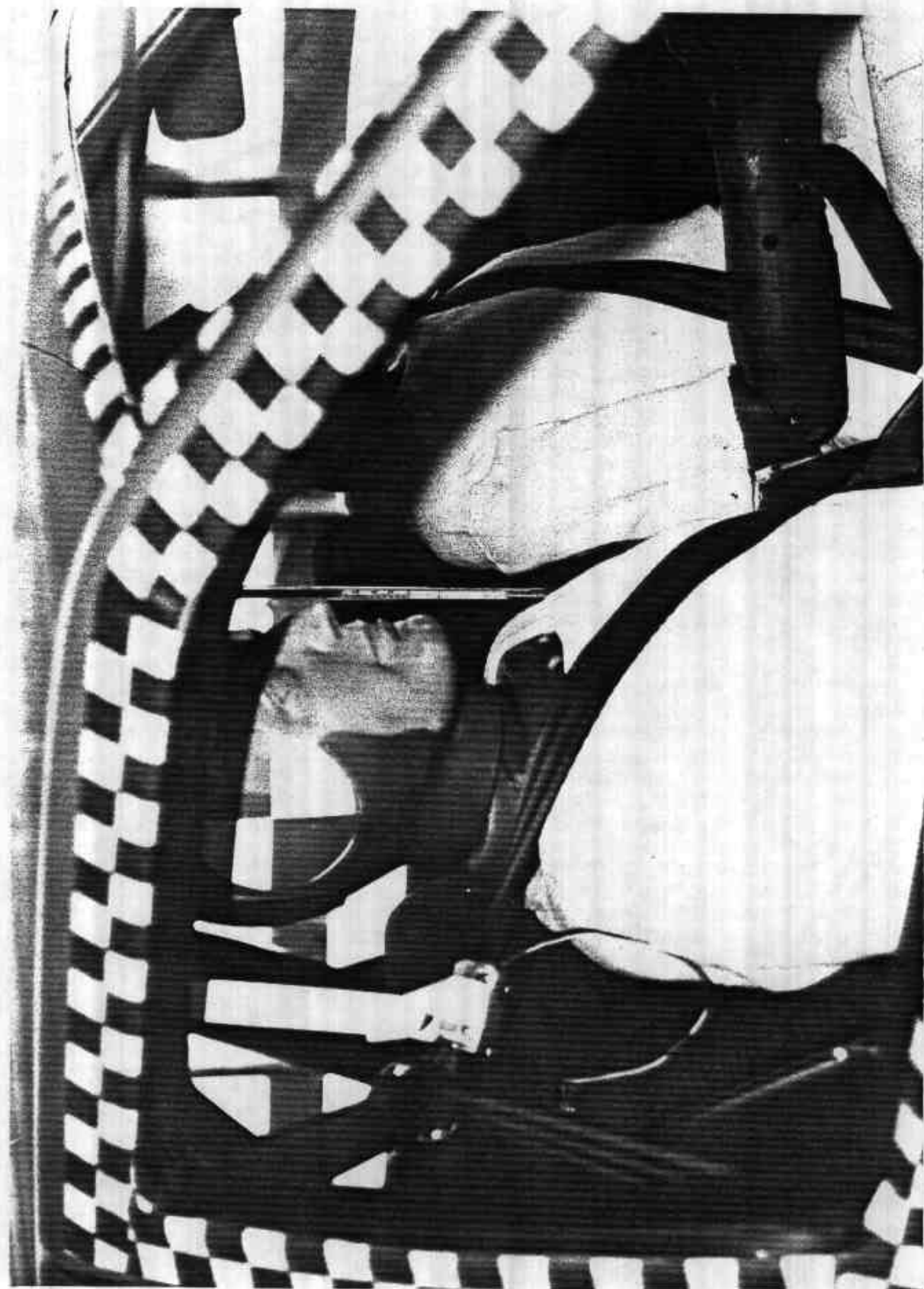


Figure A-27 PRE-TEST PASSENGER POSITION VIEW

A-28

7103-V-18



Figure A-28 POST-TEST PASSENGER POSITION VIEW

A-29

7103-V-18

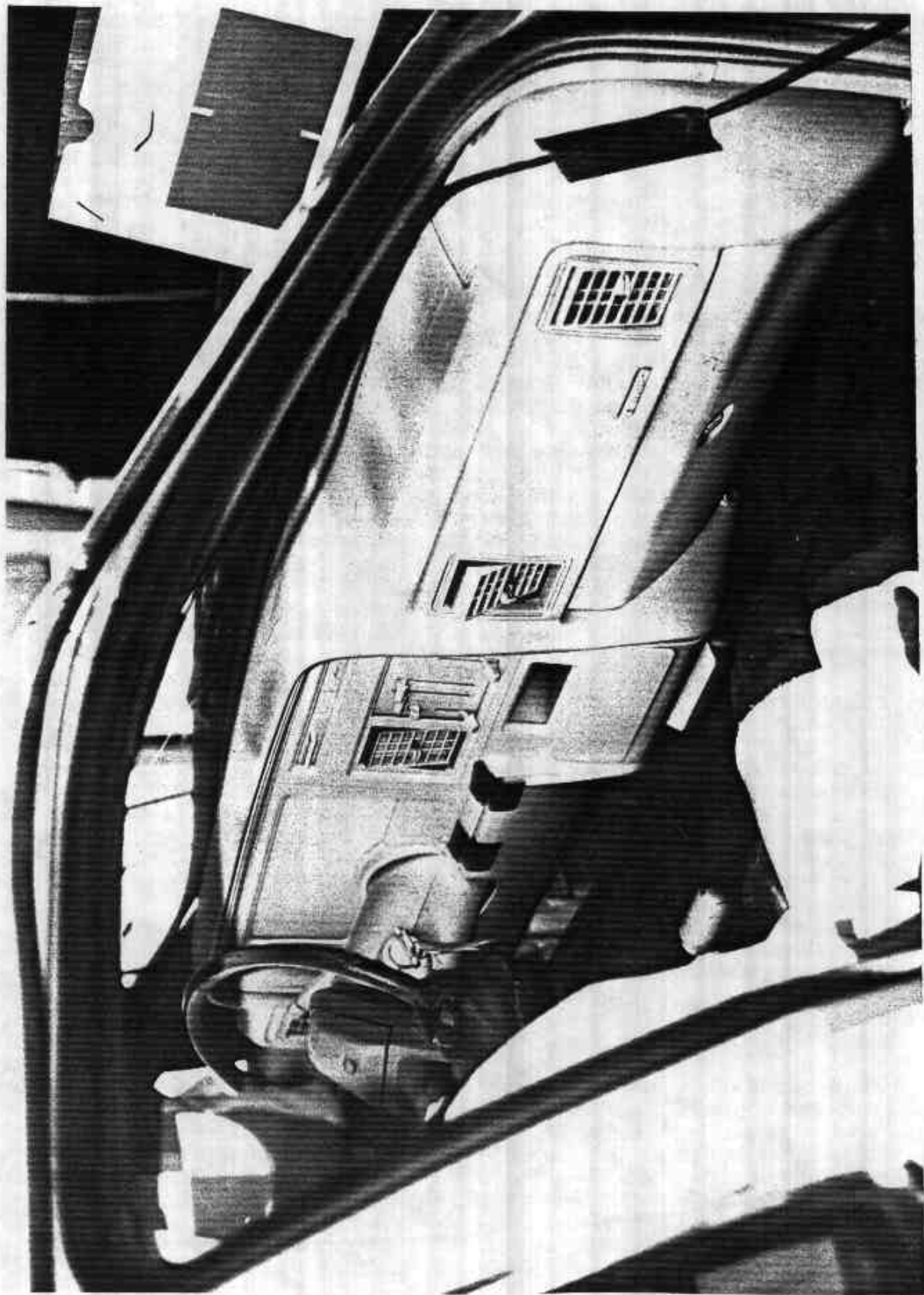


Figure A-29 PRE-TEST PASSENGER AND INTERIOR VIEW

A-30

7103-V-18

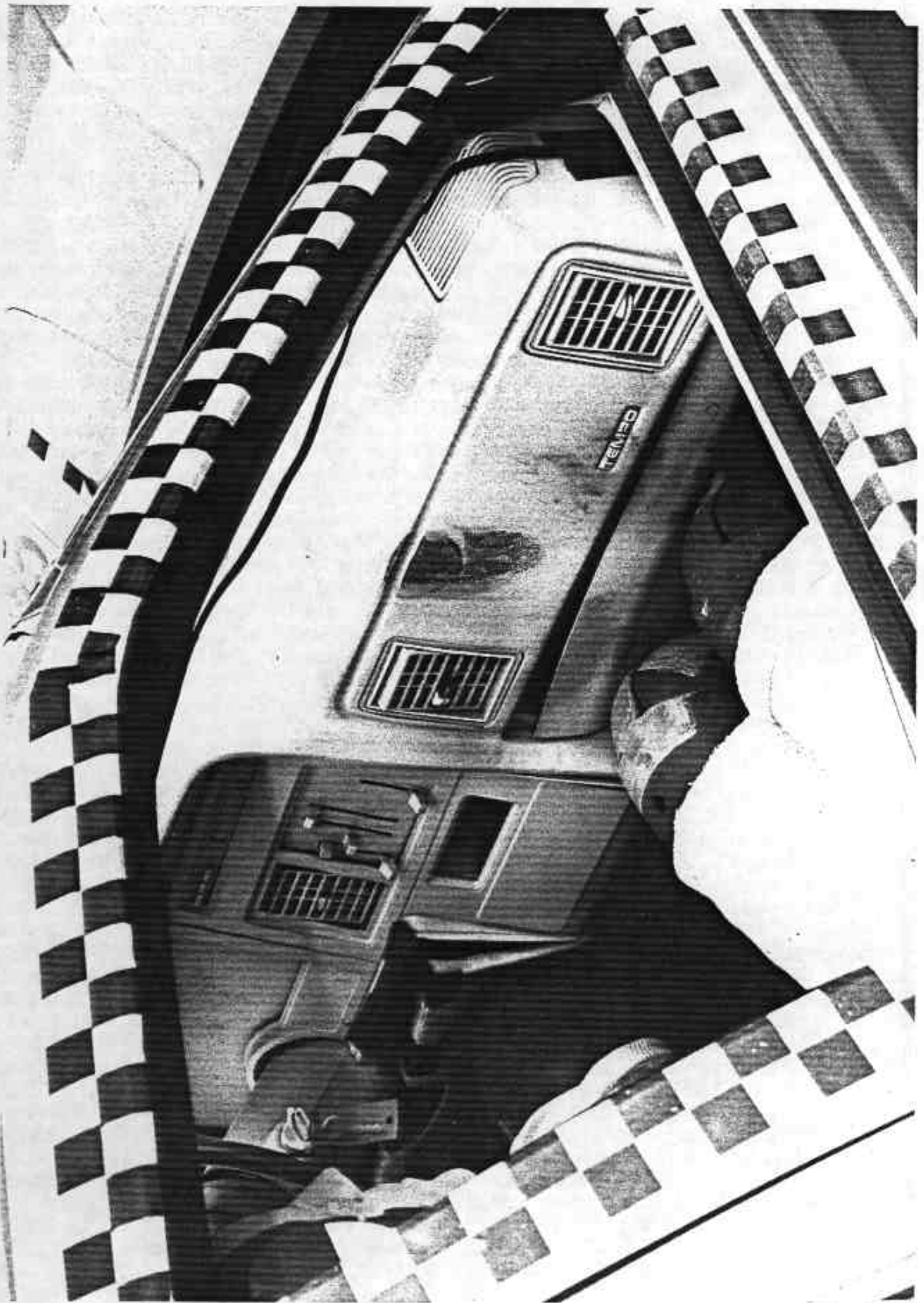


Figure A-30 POST-TEST PASSENGER AND INTERIOR VIEW

A-31

7103-V-18

APPENDIX B  
VEHICLE AND DUMMY RESPONSE DATA

TEST NO. CE0201

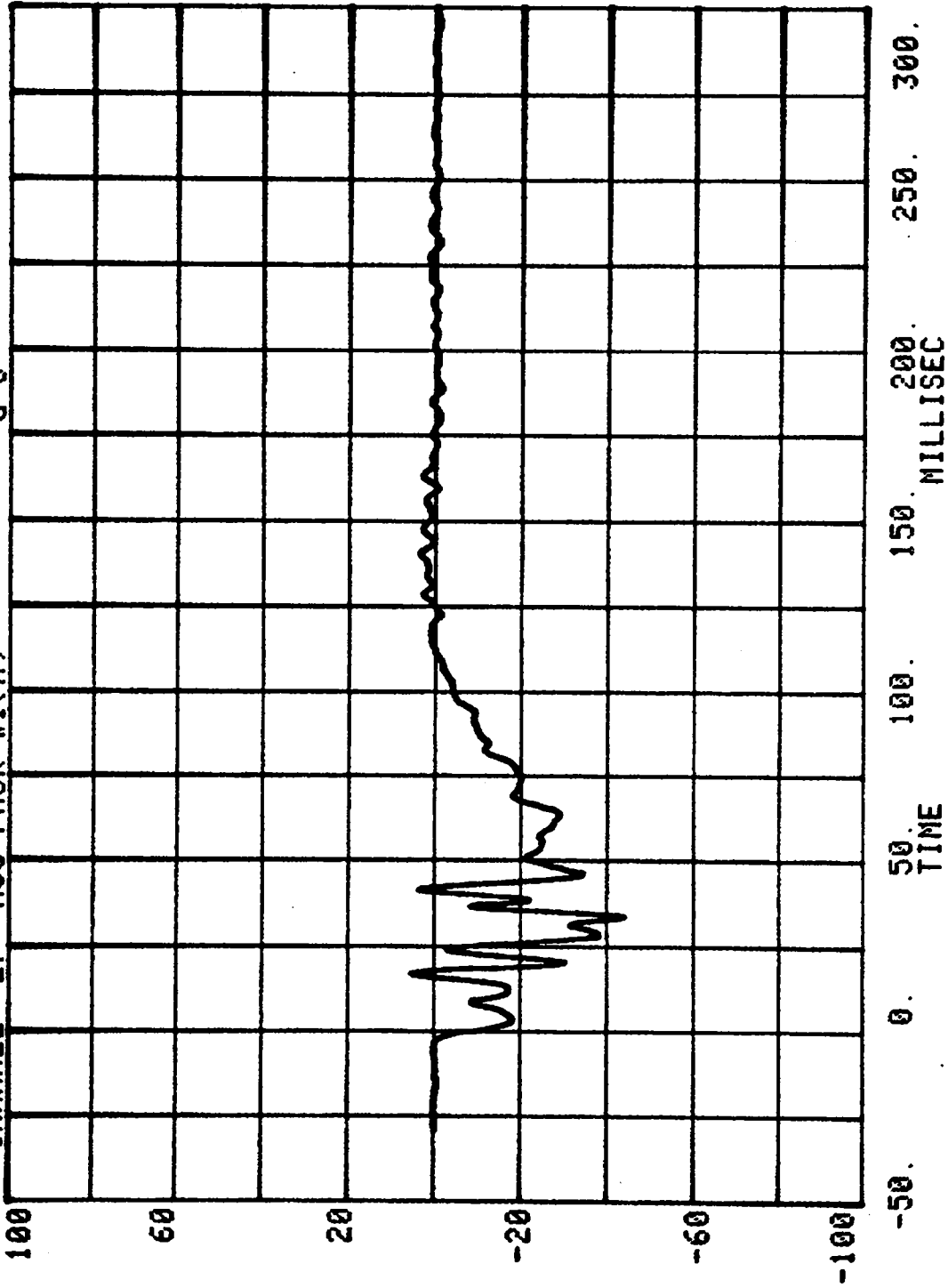
VEHICLE DATA

FILTER CHANNEL CLASS

60

CHANNEL 27 ACC PACK #1(X) G'S

RUN= 607 SERIES= 201

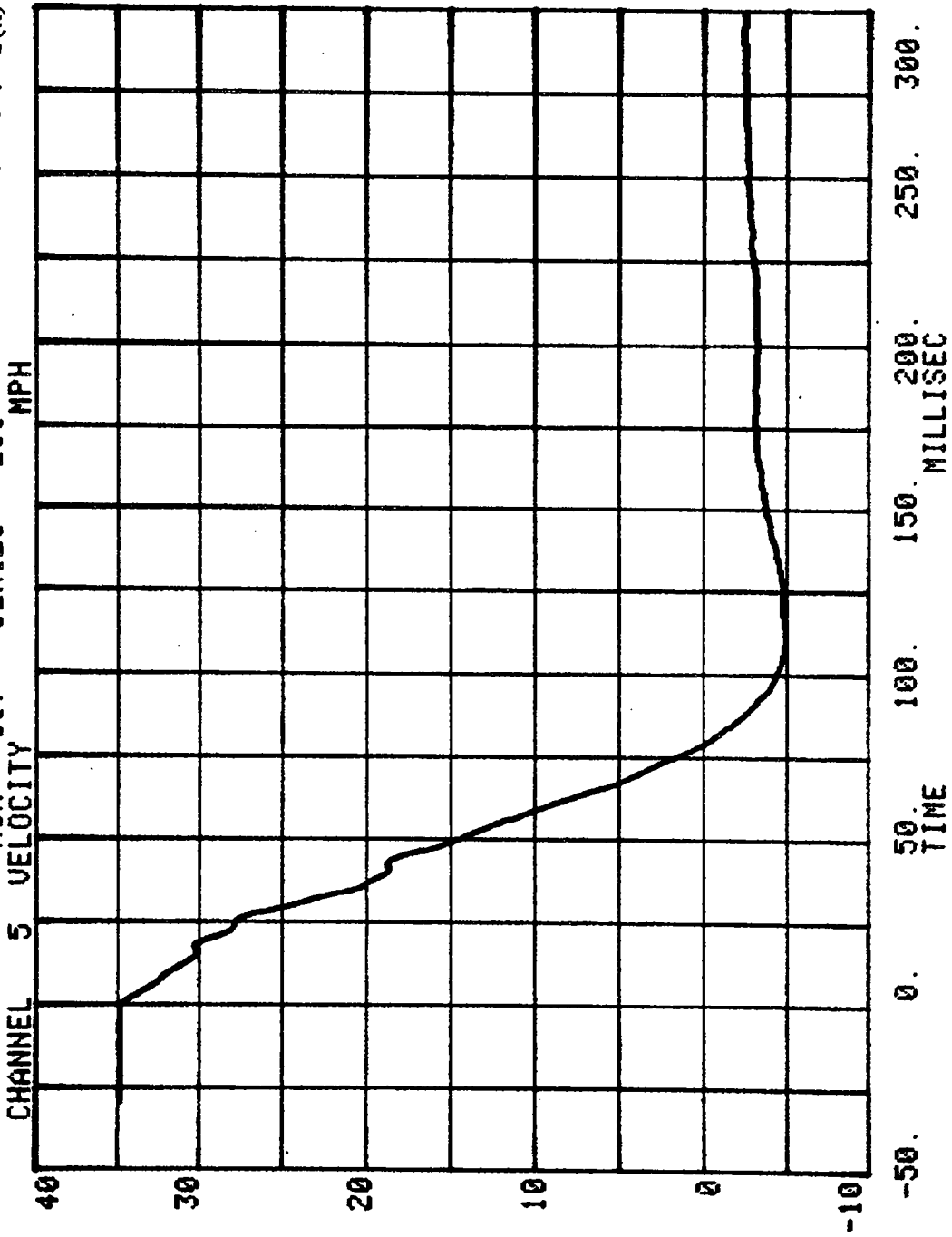


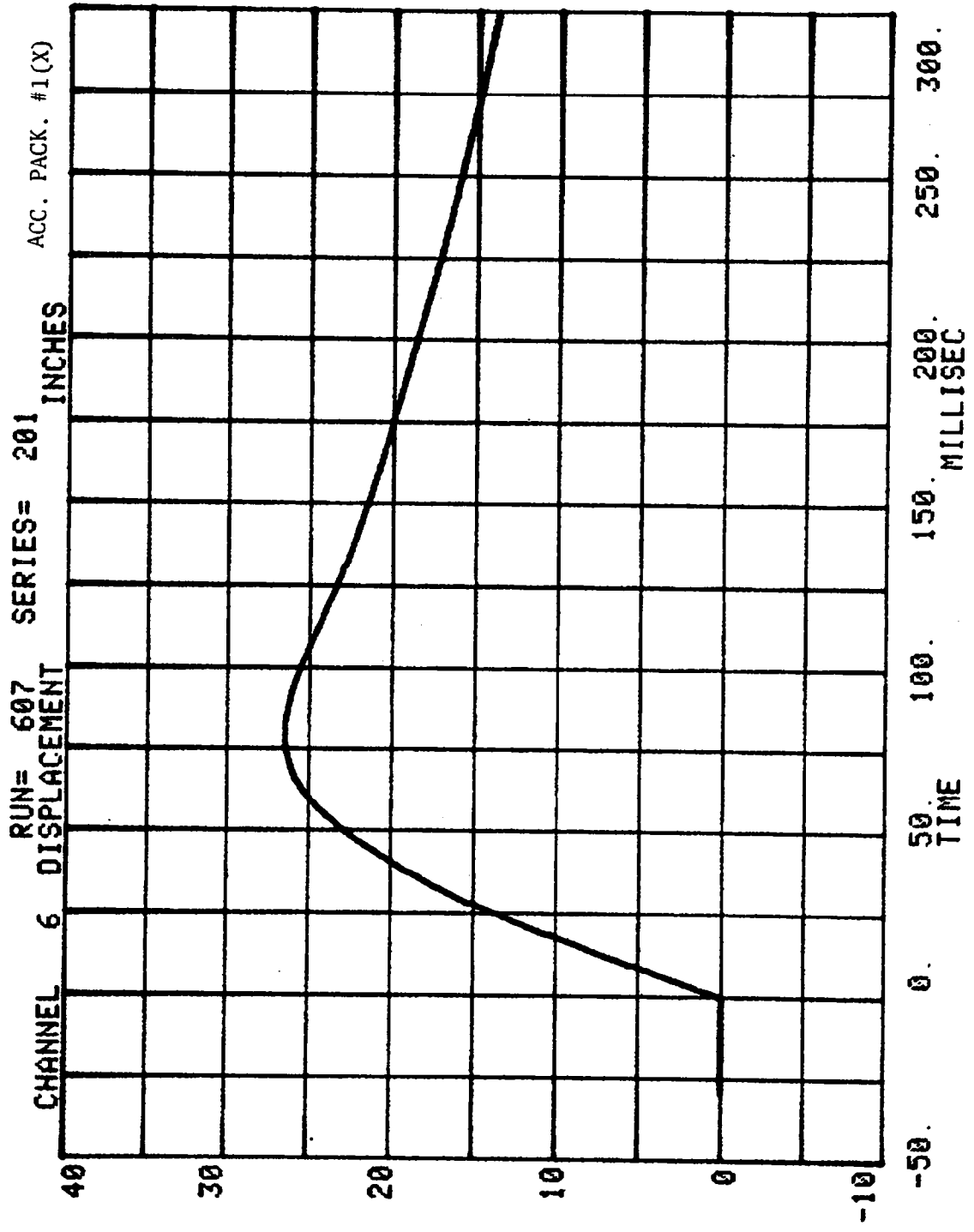
ACC. PACK. #1(X)

CHANNEL 5 VELOCITY SERIES= 201 MPH

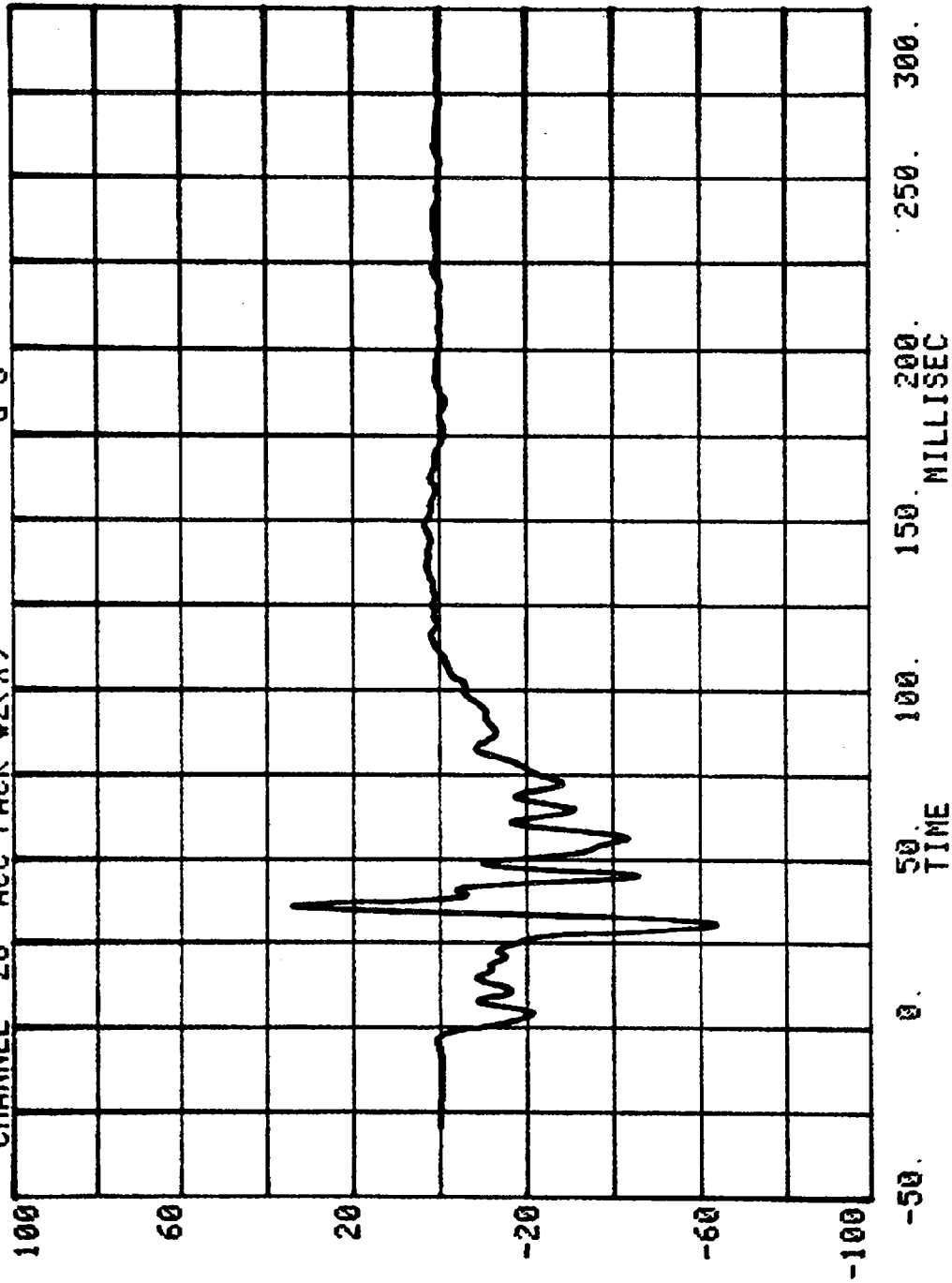
RUN= 607

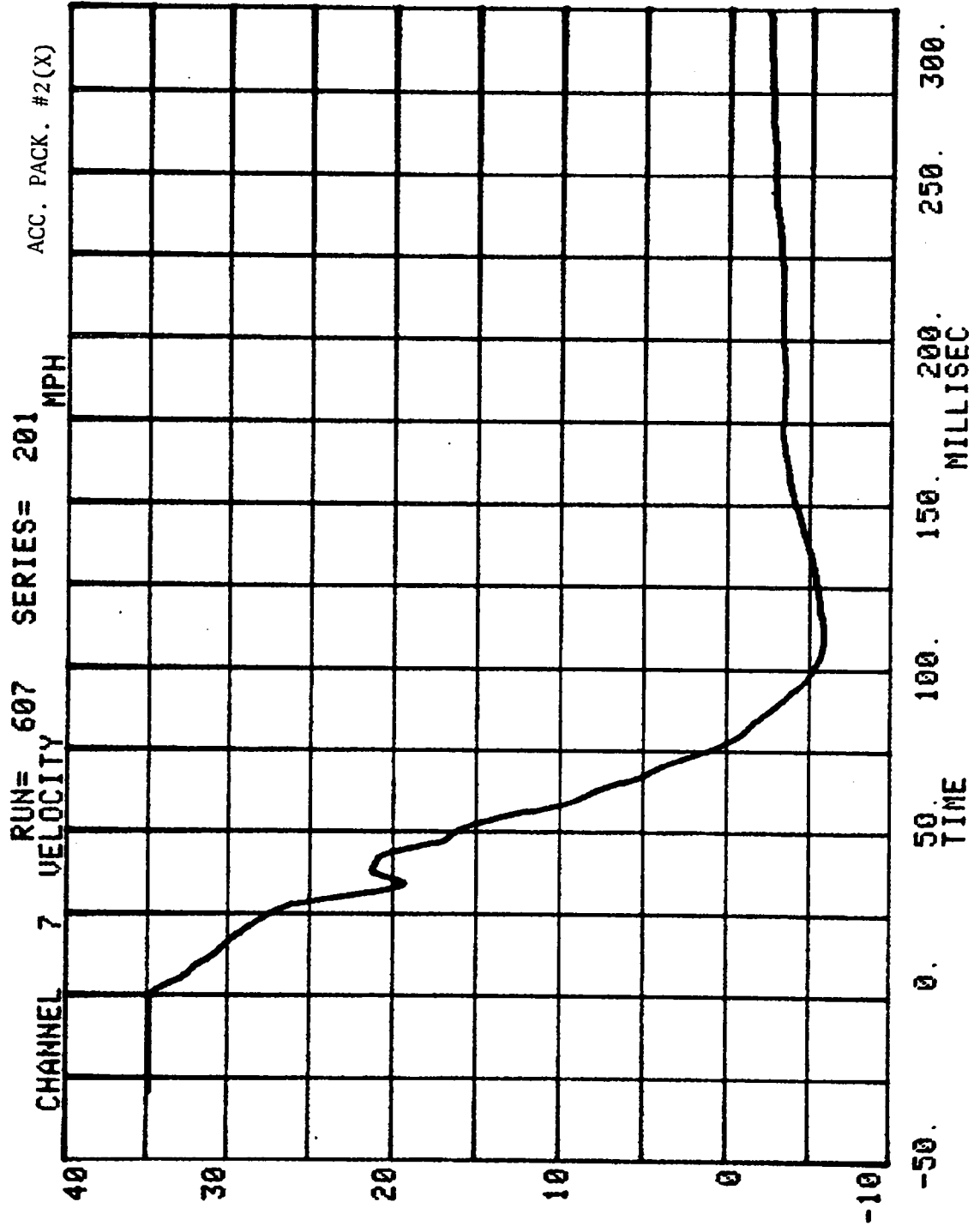
SERIES= 201



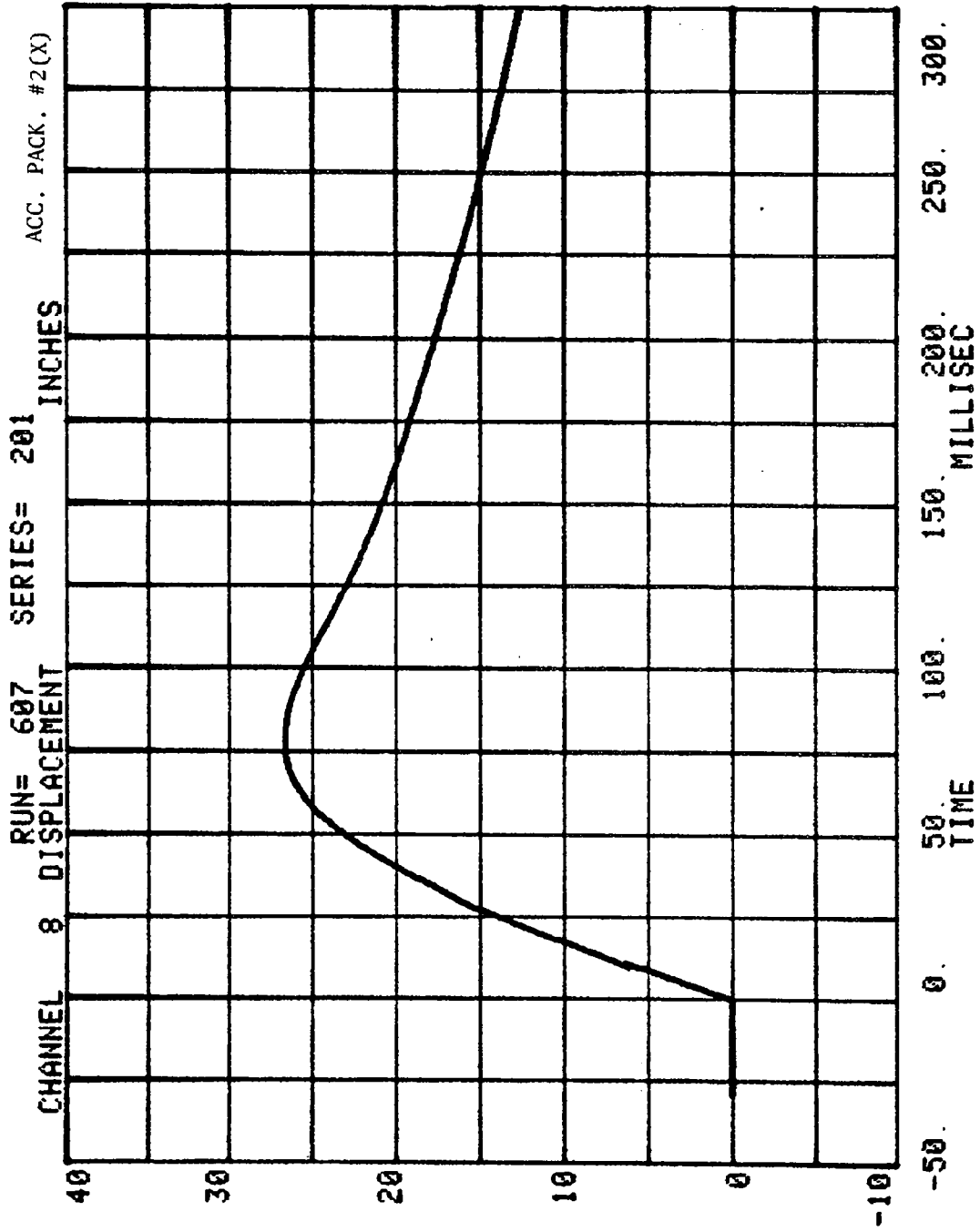


CHANNEL 28 ACC PACK #2(X) RUN= 607 SERIES= 201 G'S

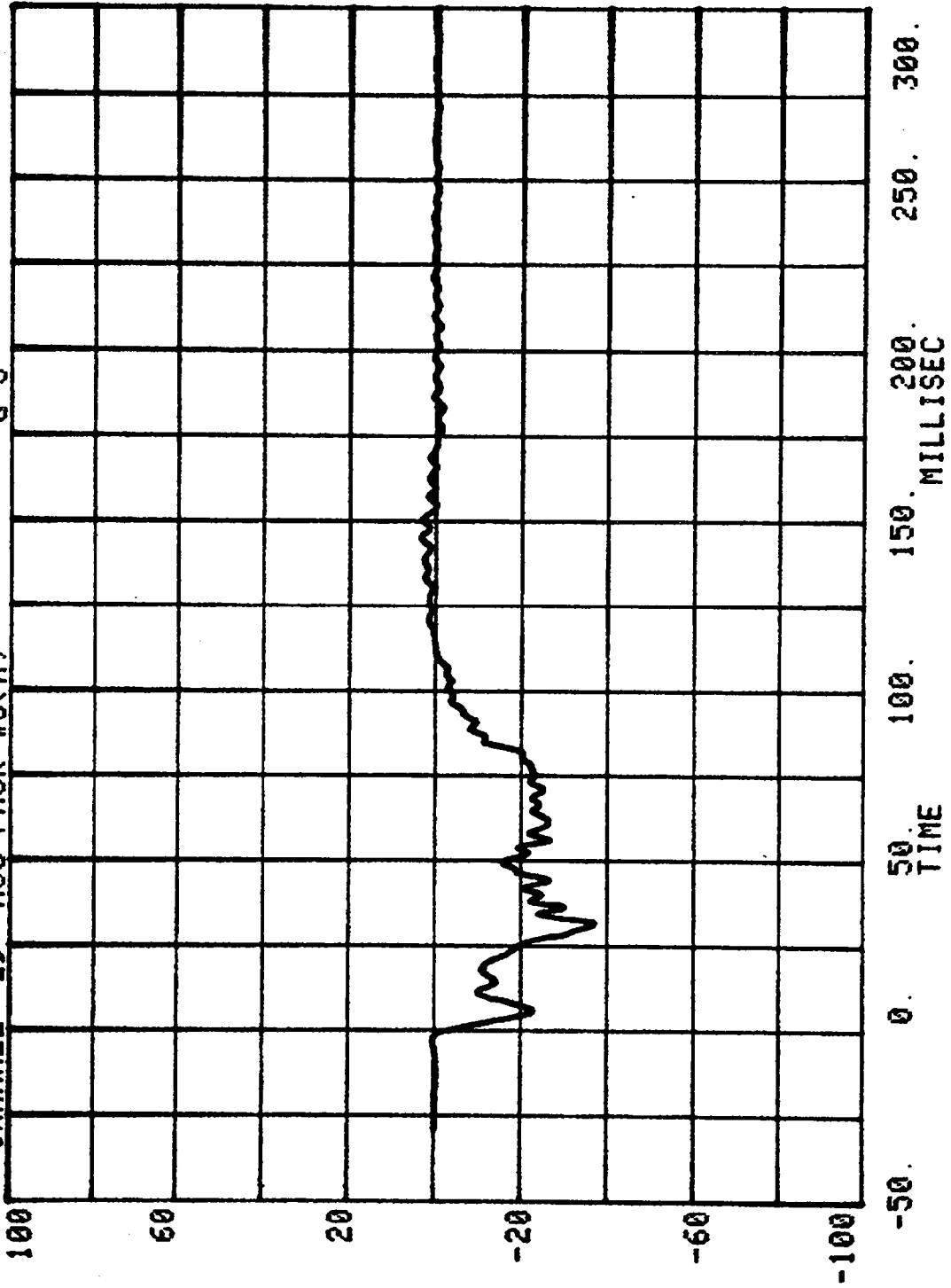




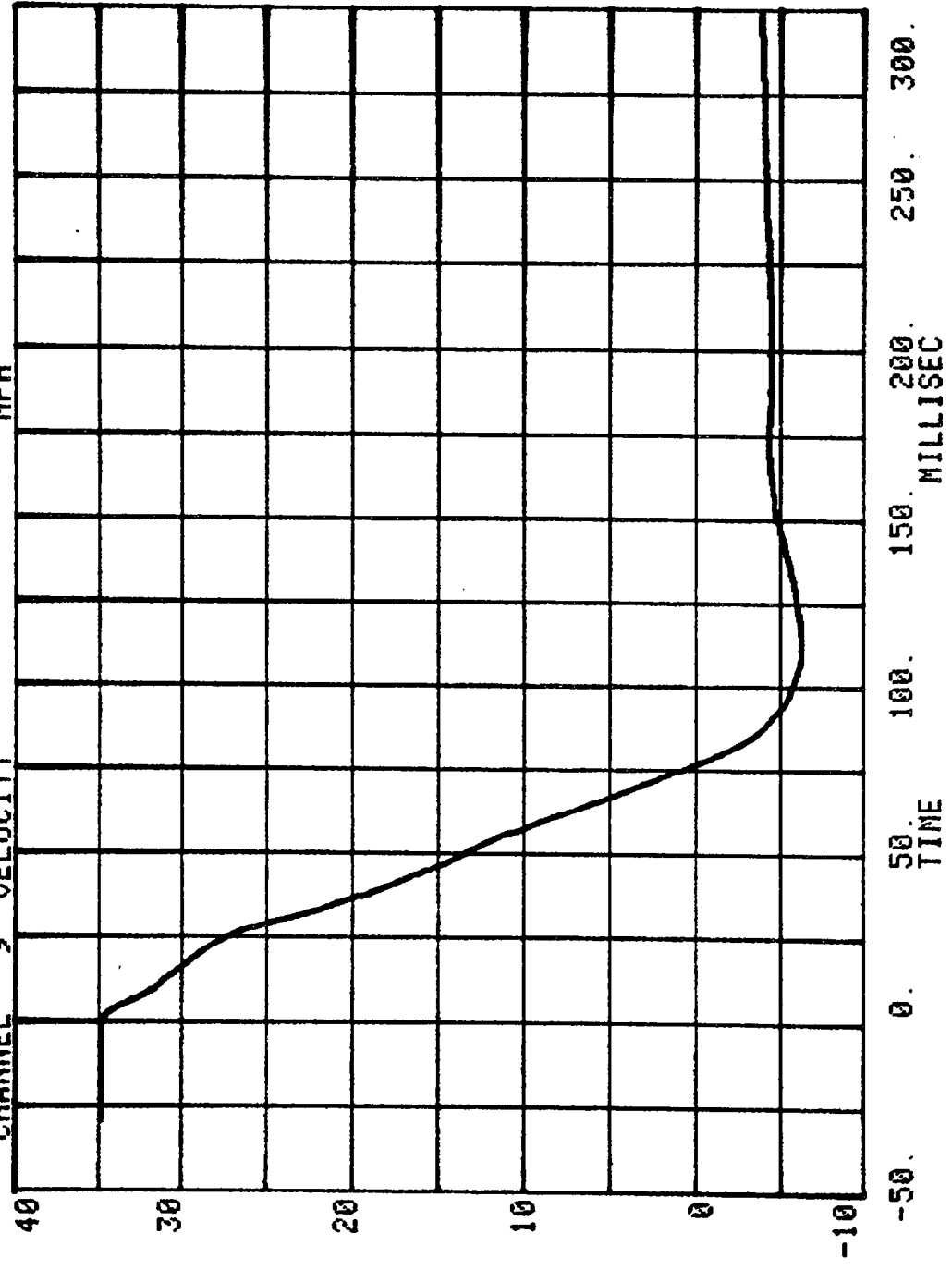
CHANNEL 8 DISPLACEMENT SERIES= 201 INCHES ACC. PACK. #2(X)



CHANNEL 29 ACC PACK #3(X) RUN= 607 SERIES= 201 G'S



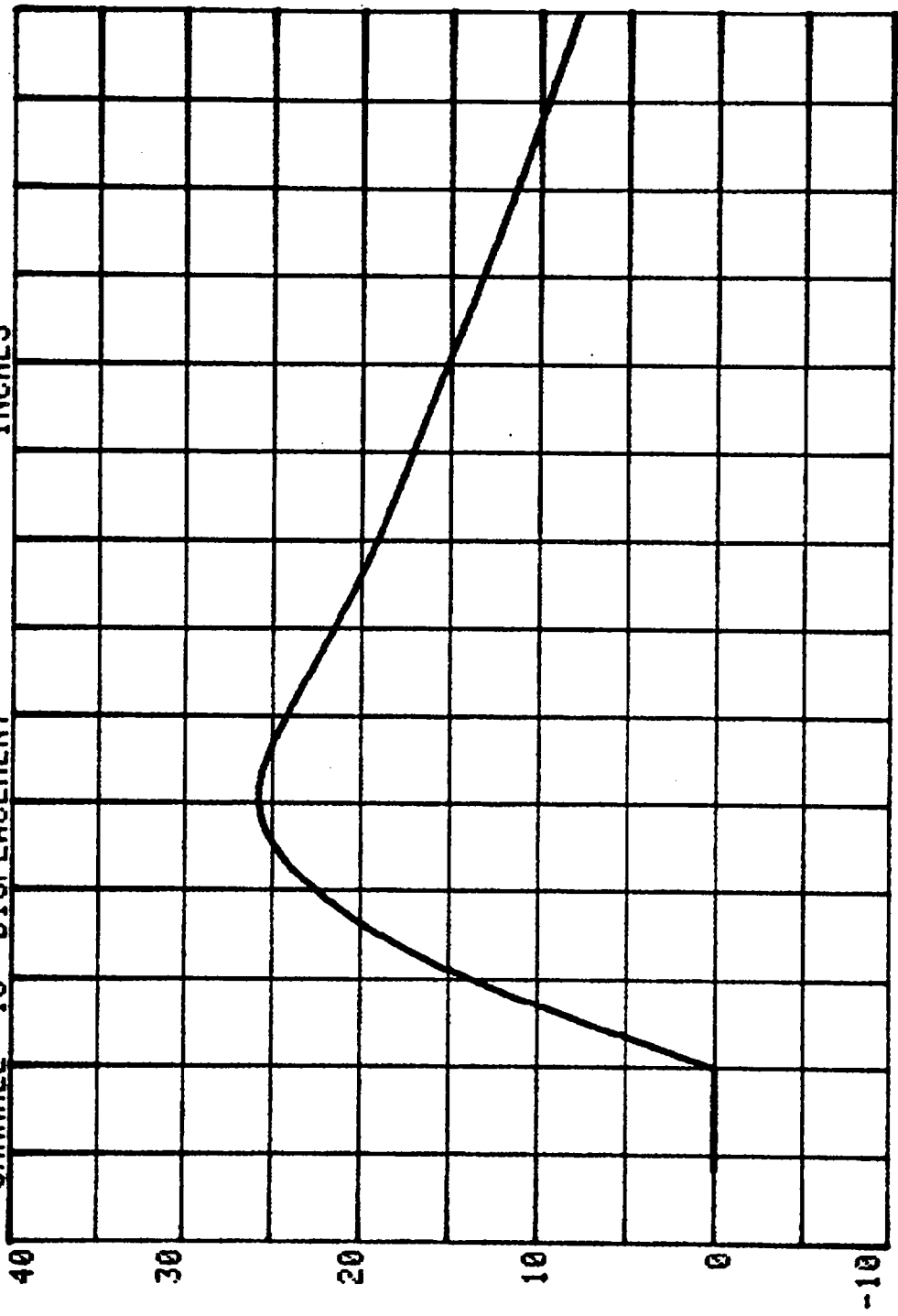
CHANNEL 9 VELOCITY RUN= 607 SERIES= 201 MPH ACC. PACK. #3(X)



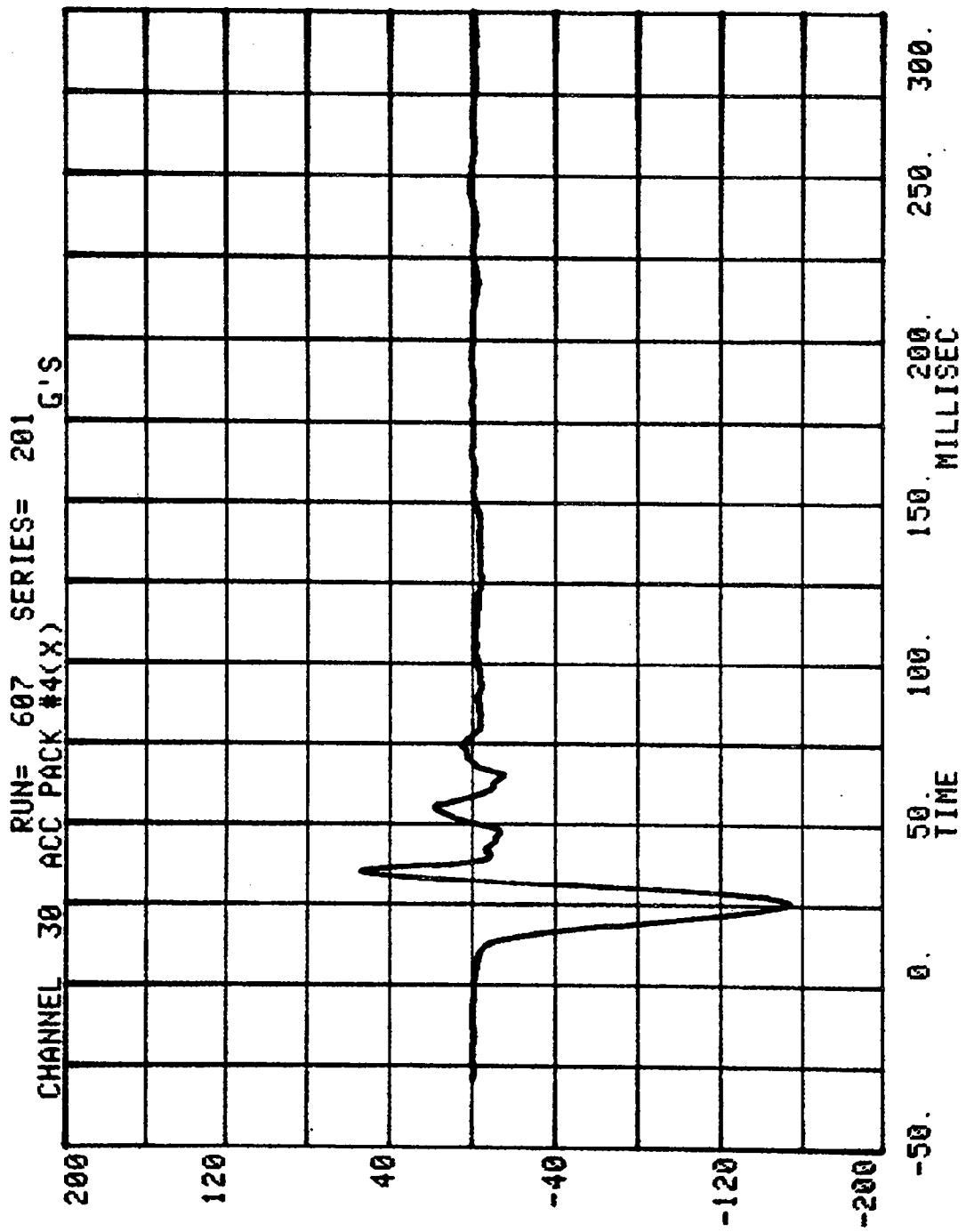
ACC. PACK. #3(X)

CHANNEL 10 DISPLACEMENT SERIES= 201 INCHES

RUN= 607



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



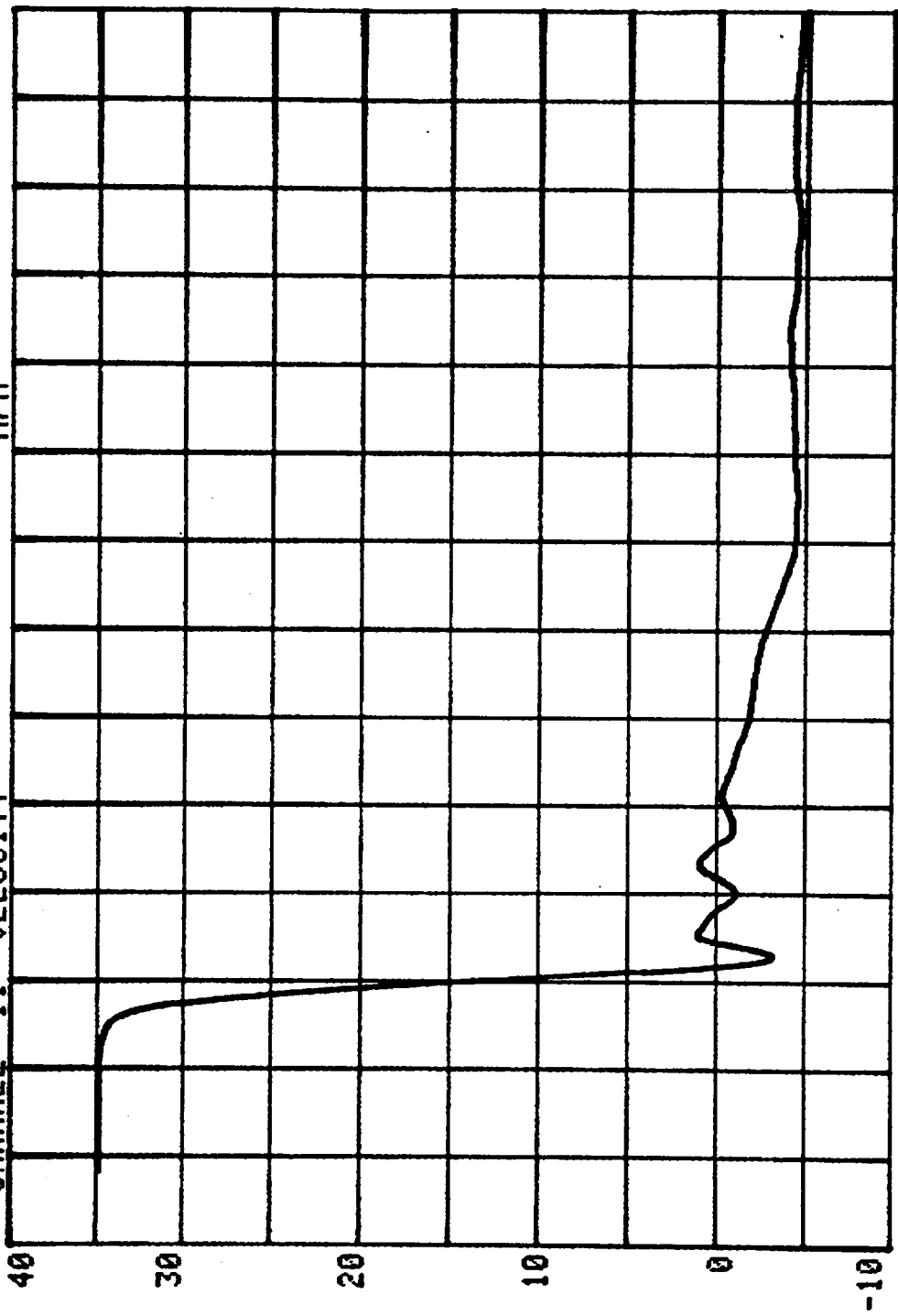
ACC. PACK. #4(X)

SERIES= 201

RUN= 607

CHANNEL 11 VELOCITY

MPH



250. 300.

150. 200. MILLISEC

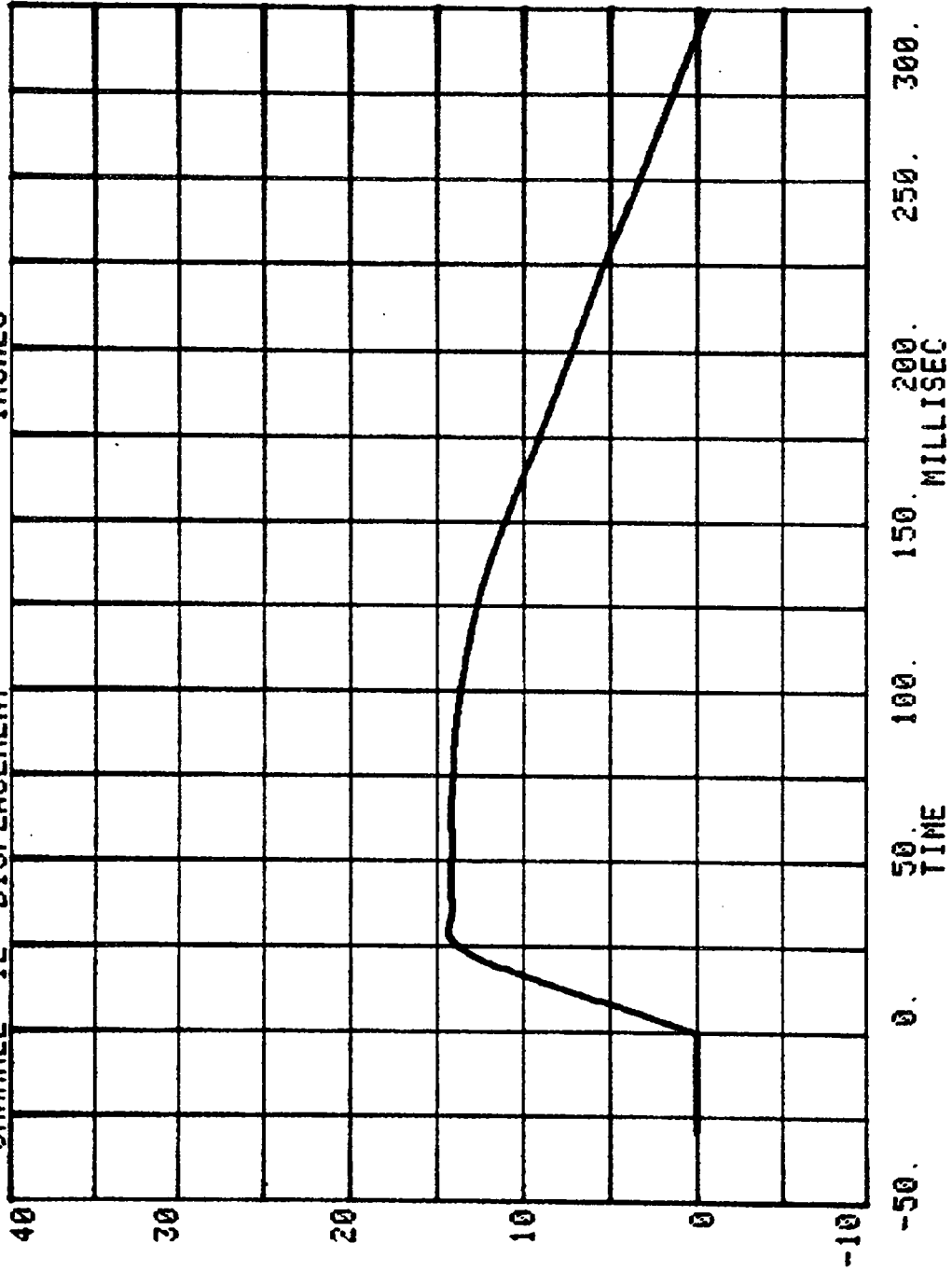
100.

50. TIME

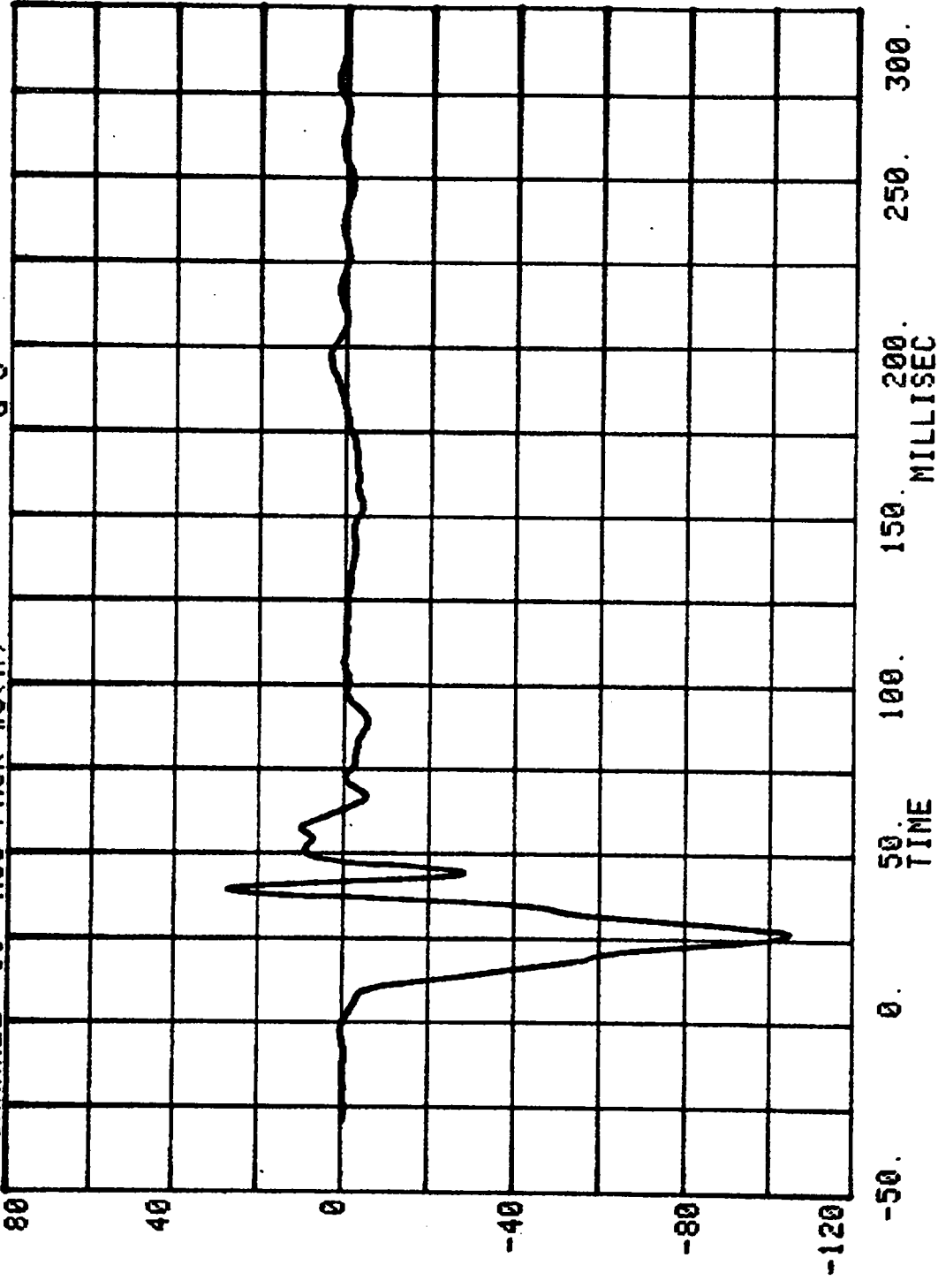
0.

-50.

CHANNEL 12 DISPLACEMENT  
RUN= 607  
SERIES= 201 INCHES  
ACC. PACK. #4(X)

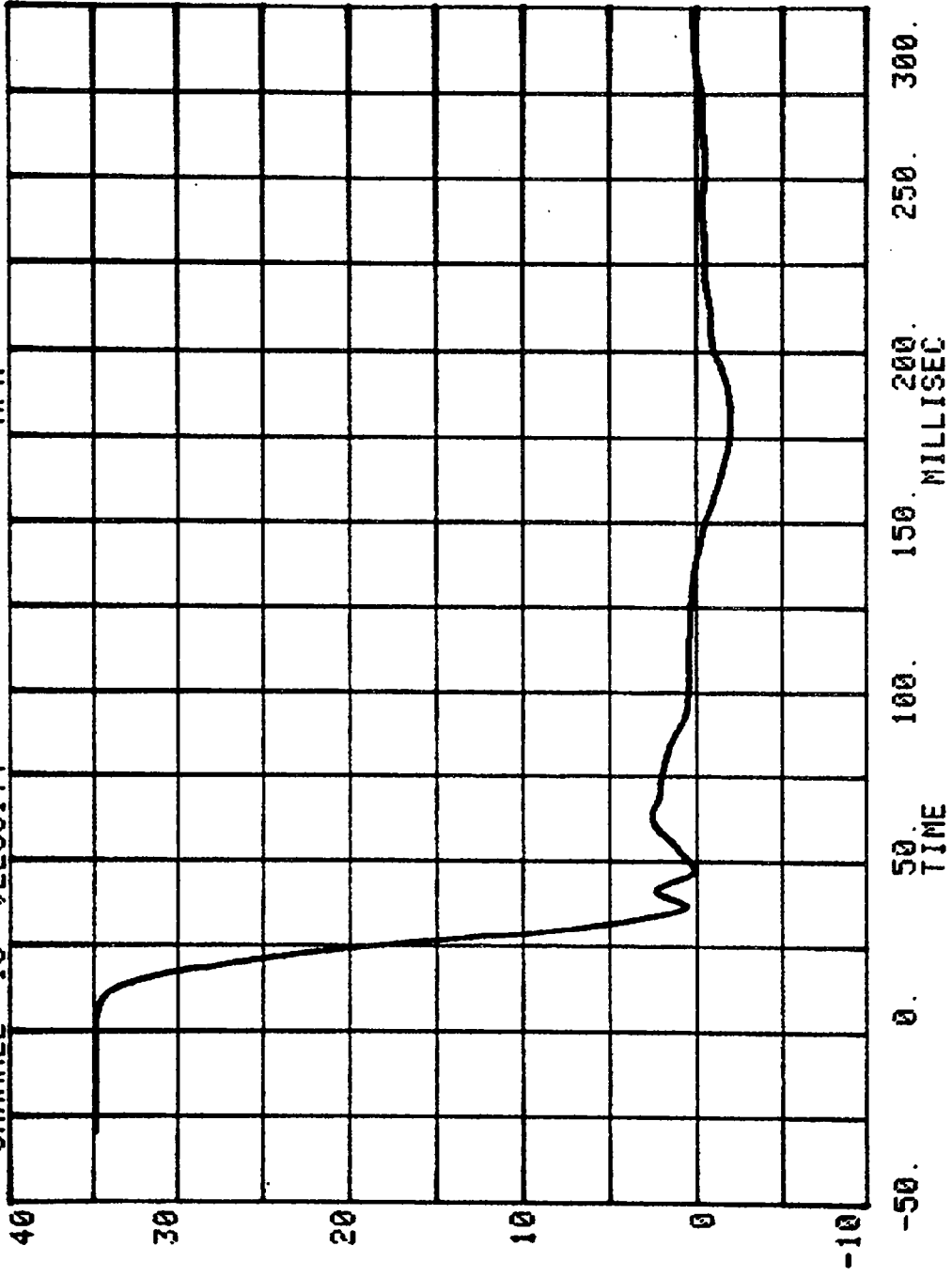


CHANNEL 31 ACC PACK #5(X) RUN= 607 SERIES= 201 G'S



ACC. PACK. #5(X)

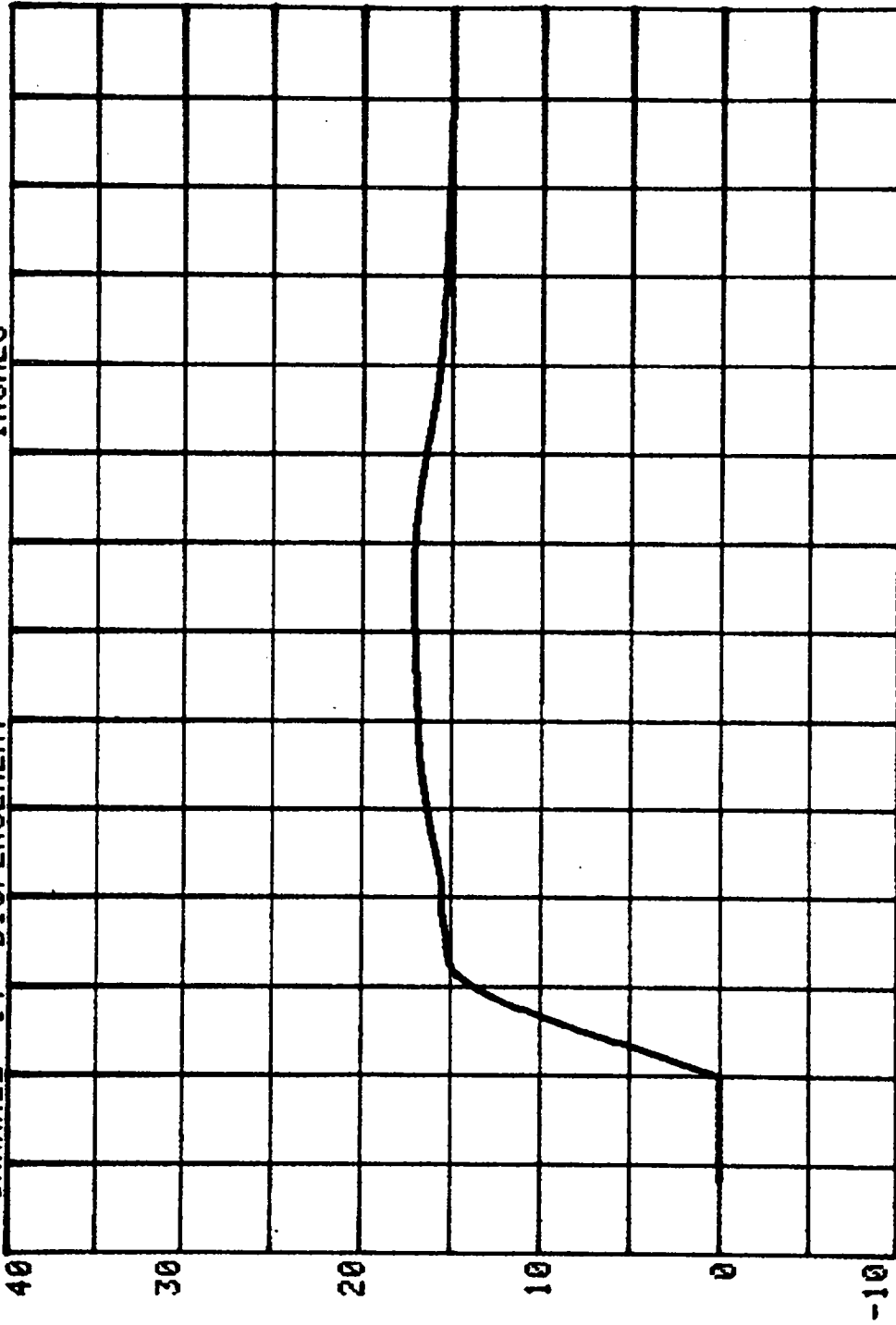
CHANNEL 13 VELOCITY  
RUN= 607 SERIES= 201 MPH



ACC. PACK. #5(X)

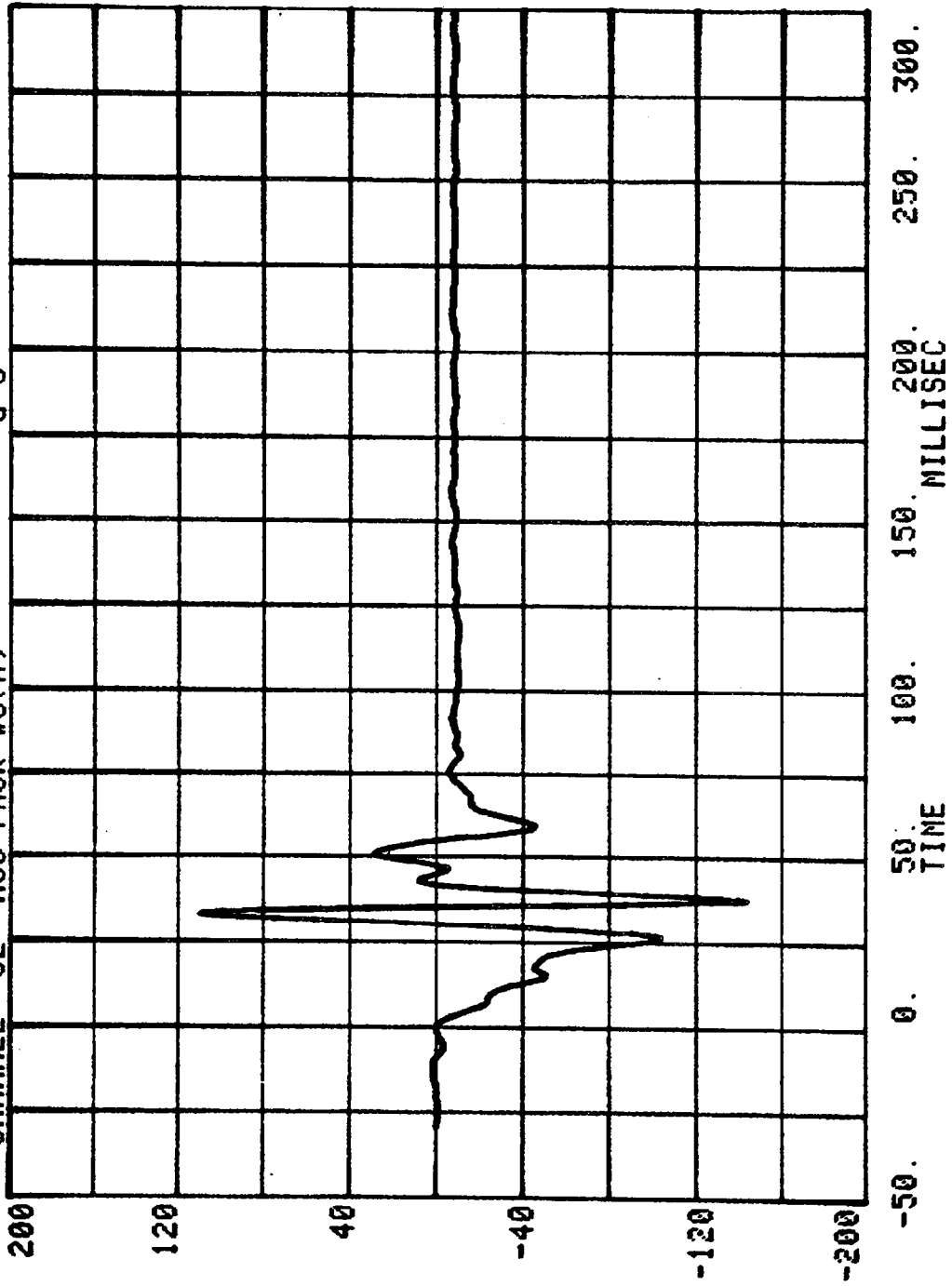
CHANNEL 14 DISPLACEMENT SERIES= 201 INCHES

RUN= 607

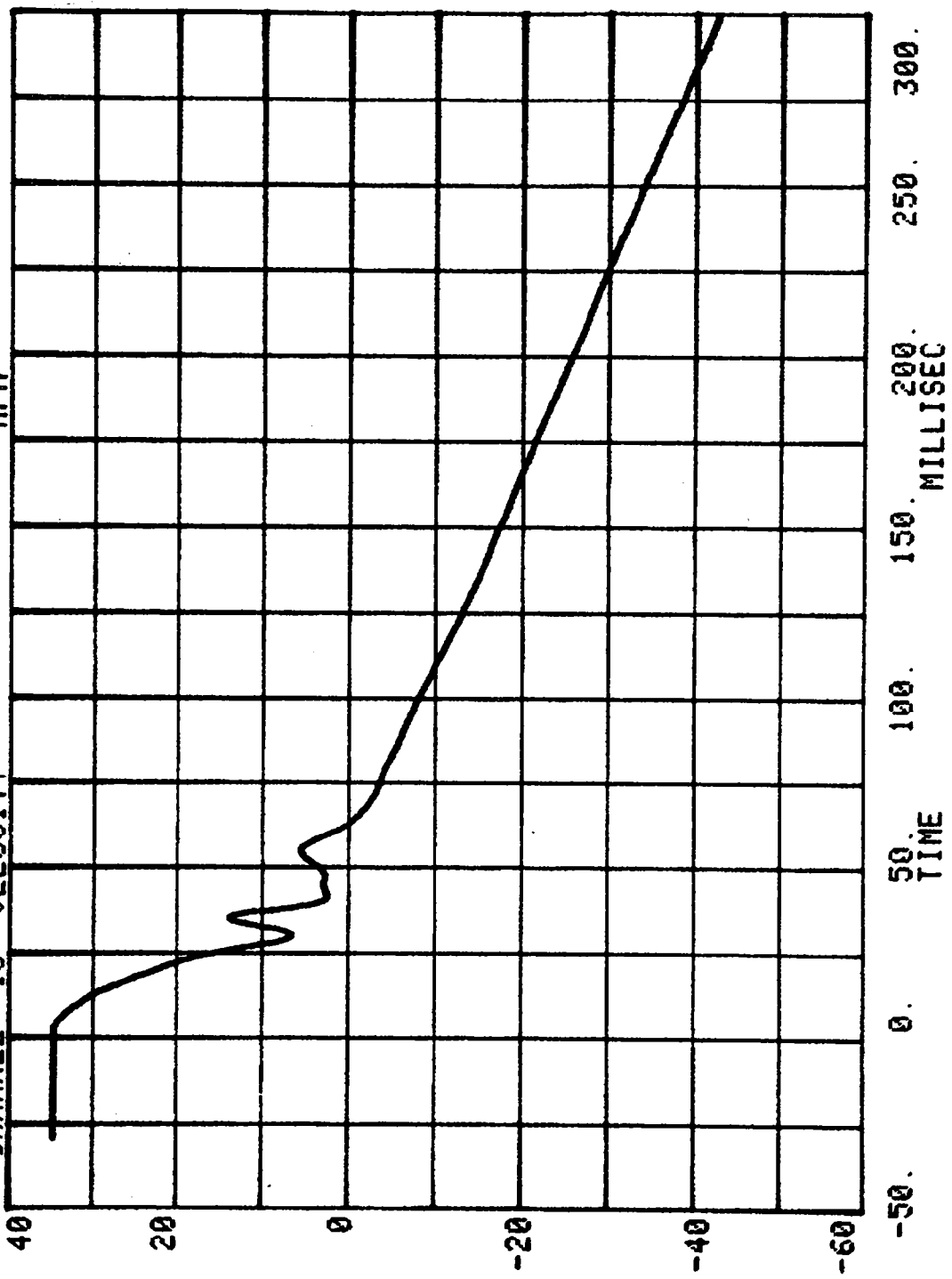


40  
30  
20  
10  
0  
-10  
-50  
0  
50  
100  
150  
200  
250  
300  
TIME  
MILLISEC

CHANNEL 32 ACC PACK #6(X) RUN= 607 SERIES= 201 G'S



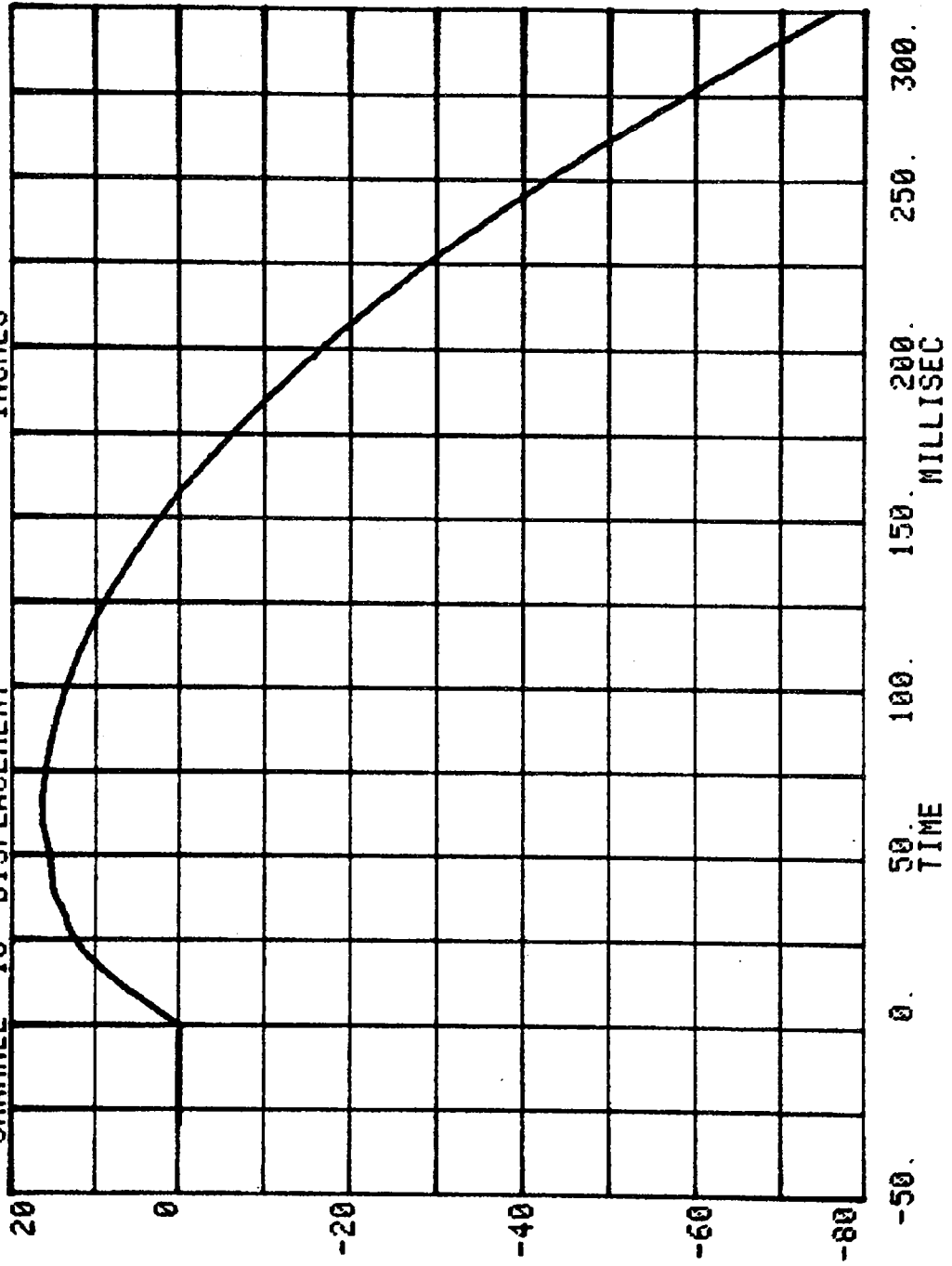
CHANNEL 15 VELOCITY      RUN= 607      SERIES= 201      ACC. PACK. #6(X)      MPH



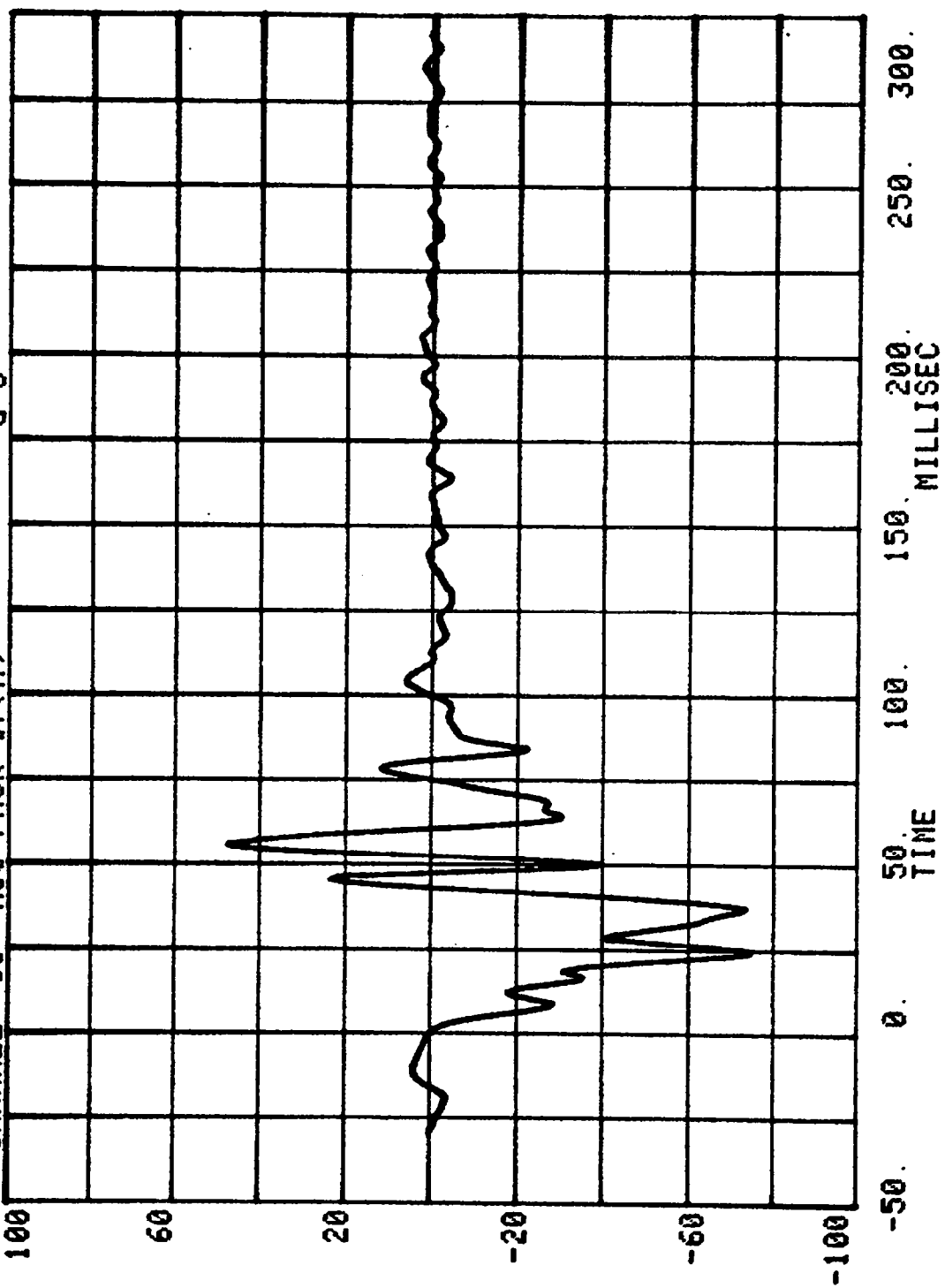
CHANNEL 16 DISPLACEMENT

RUN= 607 SERIES= 201 INCHES

ACC. PACK. #6 (X)

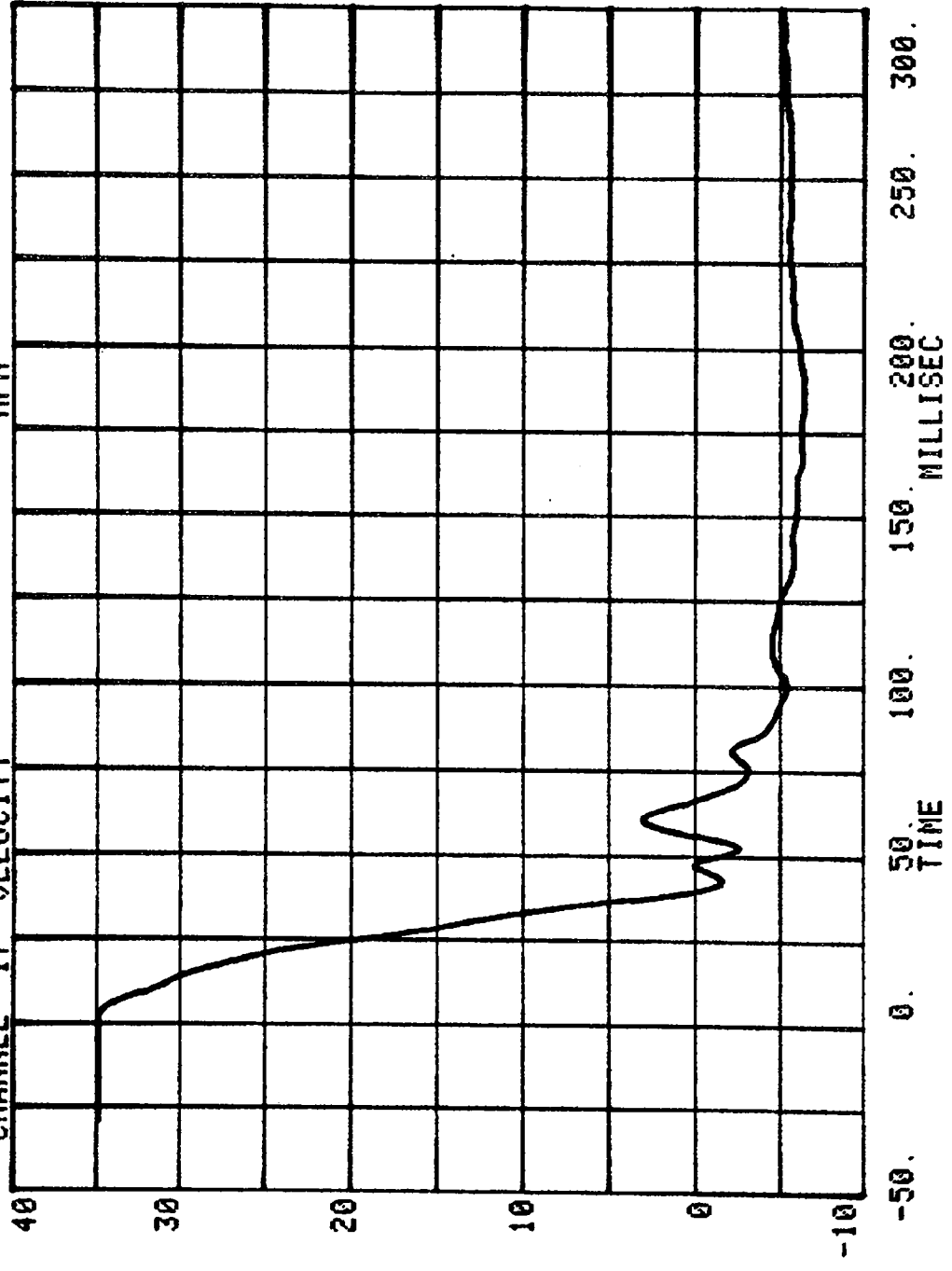


CHANNEL 33 ACC PACK #7(X) RUN= 607 SERIES= 201 G'S



ACC. PACK. #7(X)

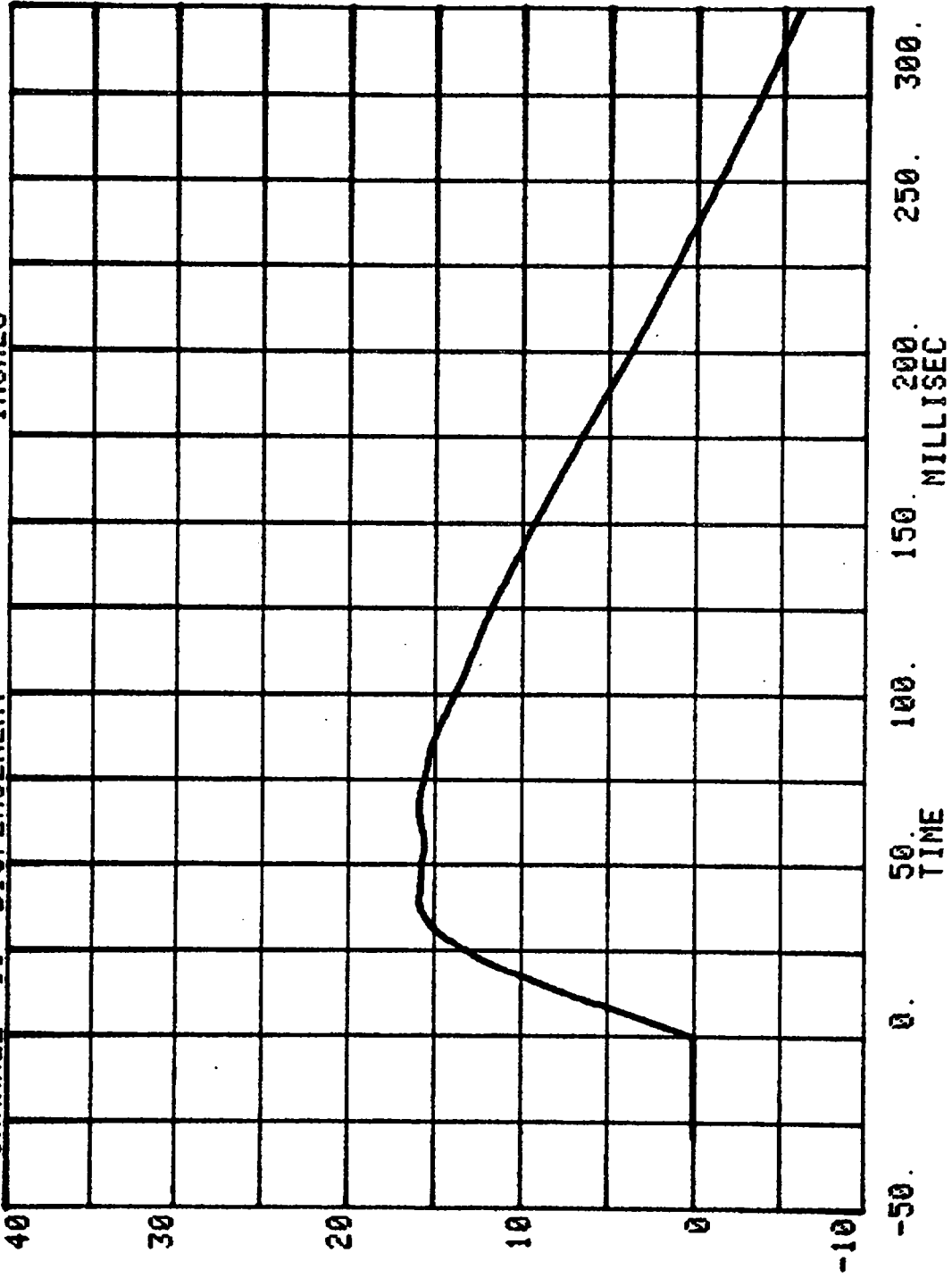
CHANNEL 17 VELOCITY  
RUN= 607 SERIES= 201 MPH



ACC. PACK. #7(X)

CHANNEL 18 DISPLACEMENT SERIES= 201 INCHES

RUN= 607



TEST NO. CE0201

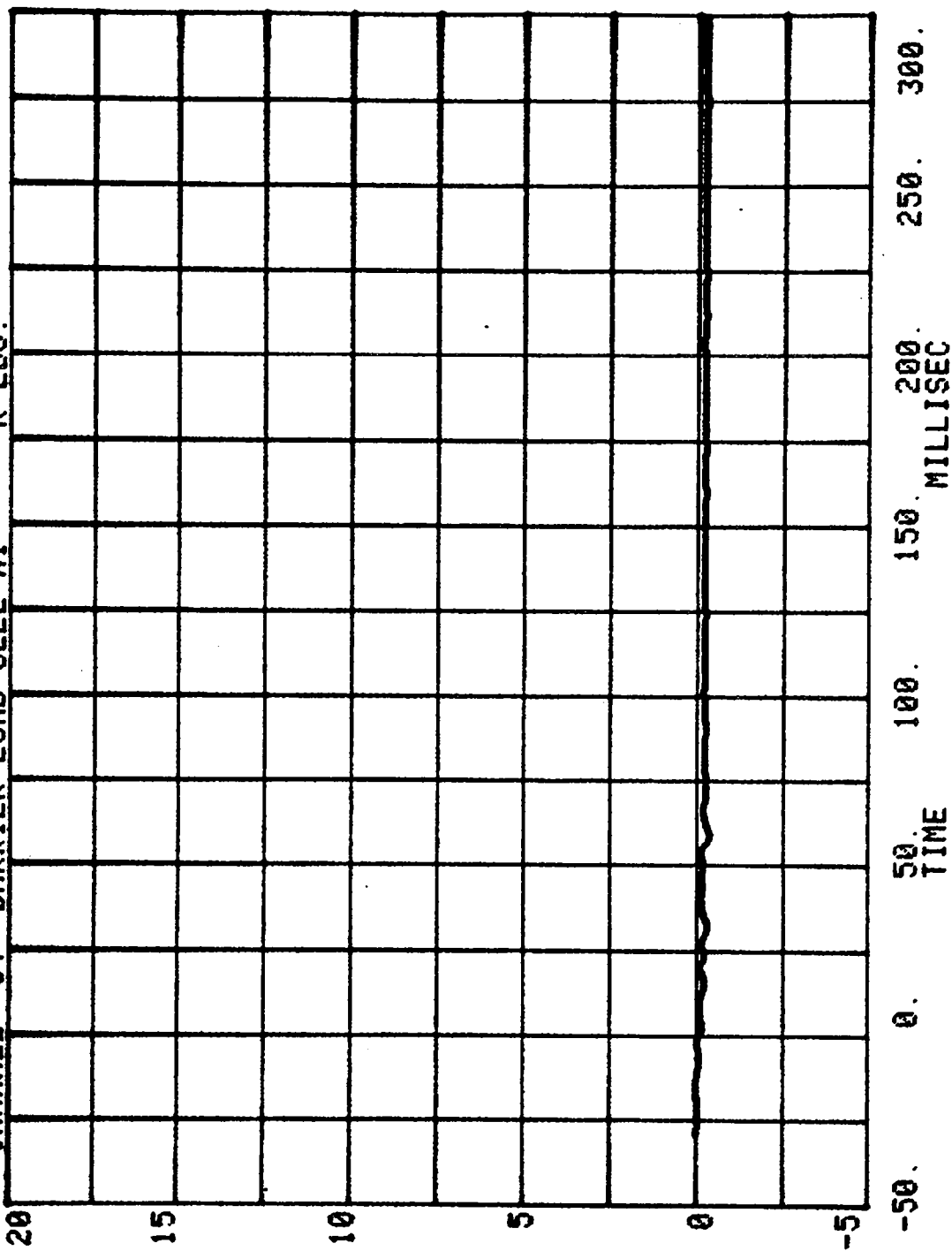
LOAD CELL BARRIER DATA  
FILTER CHANNEL CLASS

60

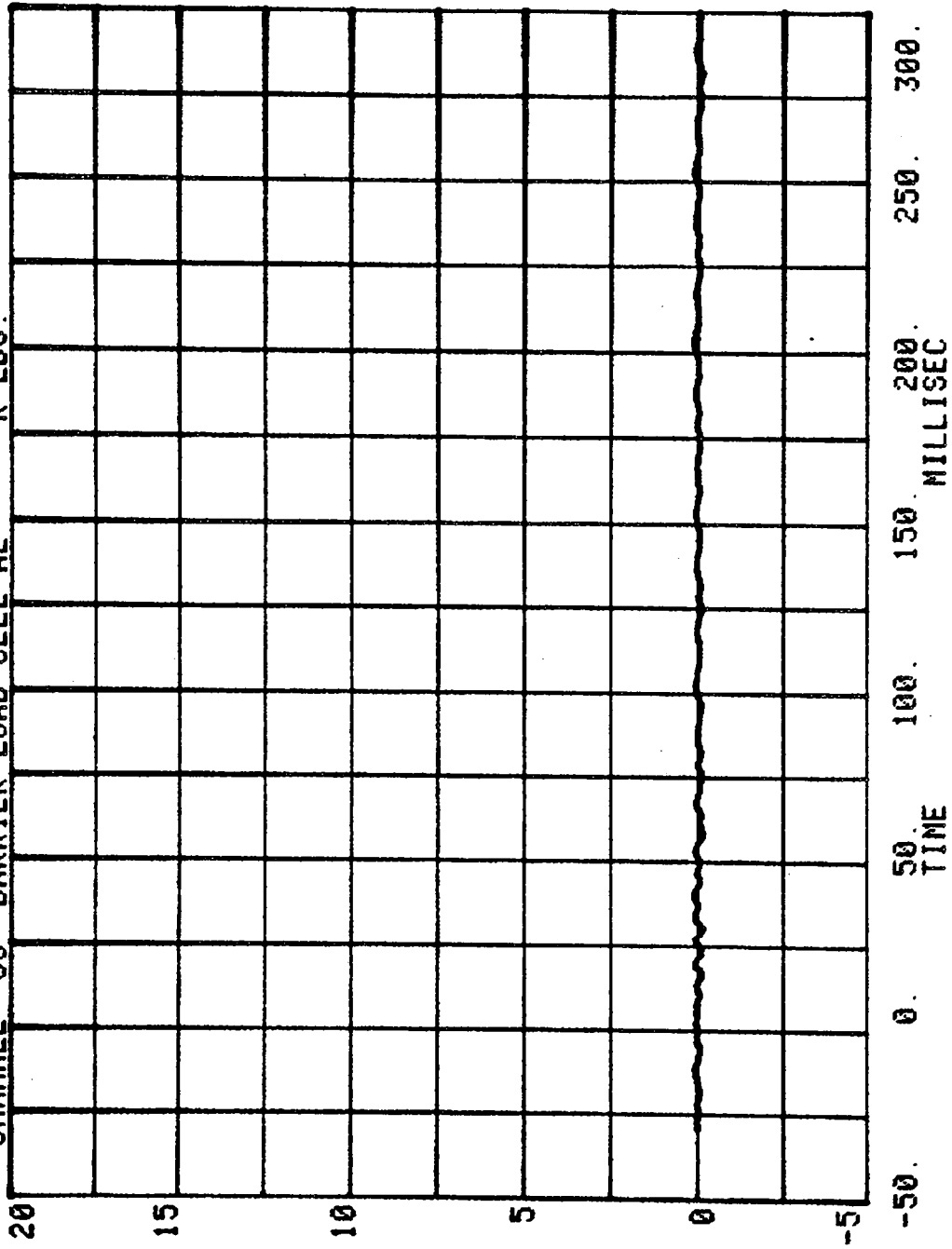
B-24

7103-V-18

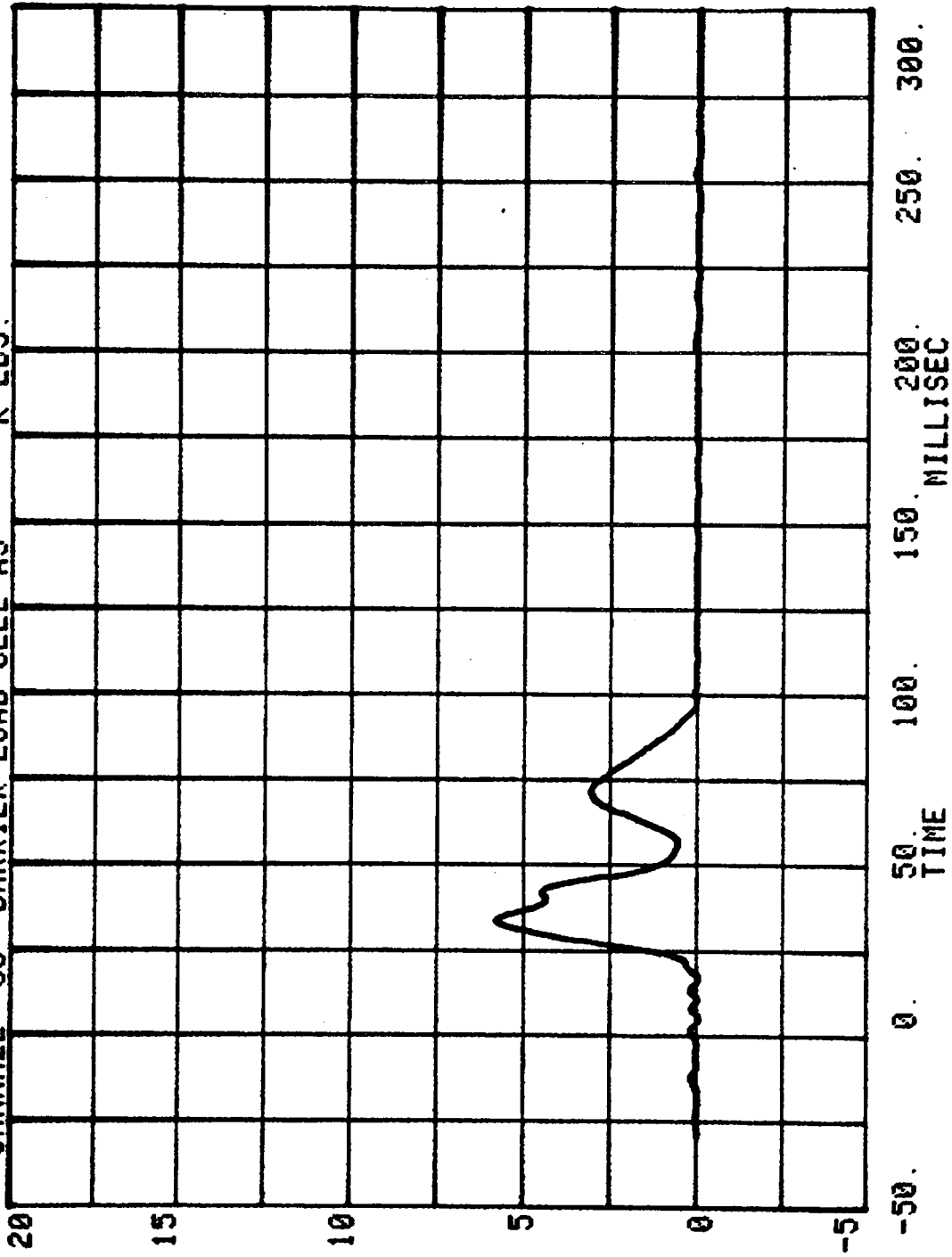
CHANNEL 34 BARRIER LOAD CELL A1 SERIES= 201 K LBS.



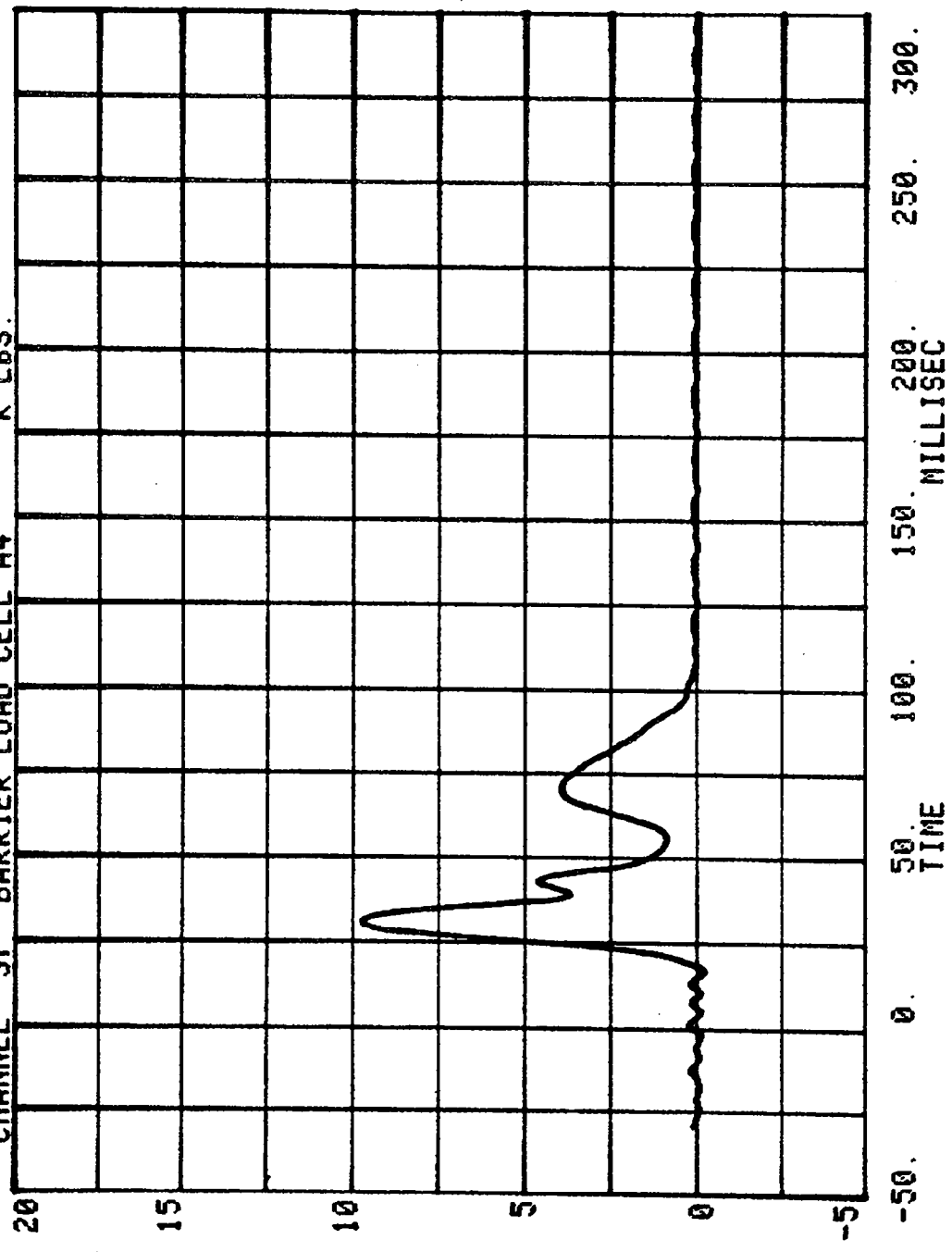
CHANNEL 35 BARRIER LOAD CELL A2  
RUN= 607 SERIES= 201 K LBS.



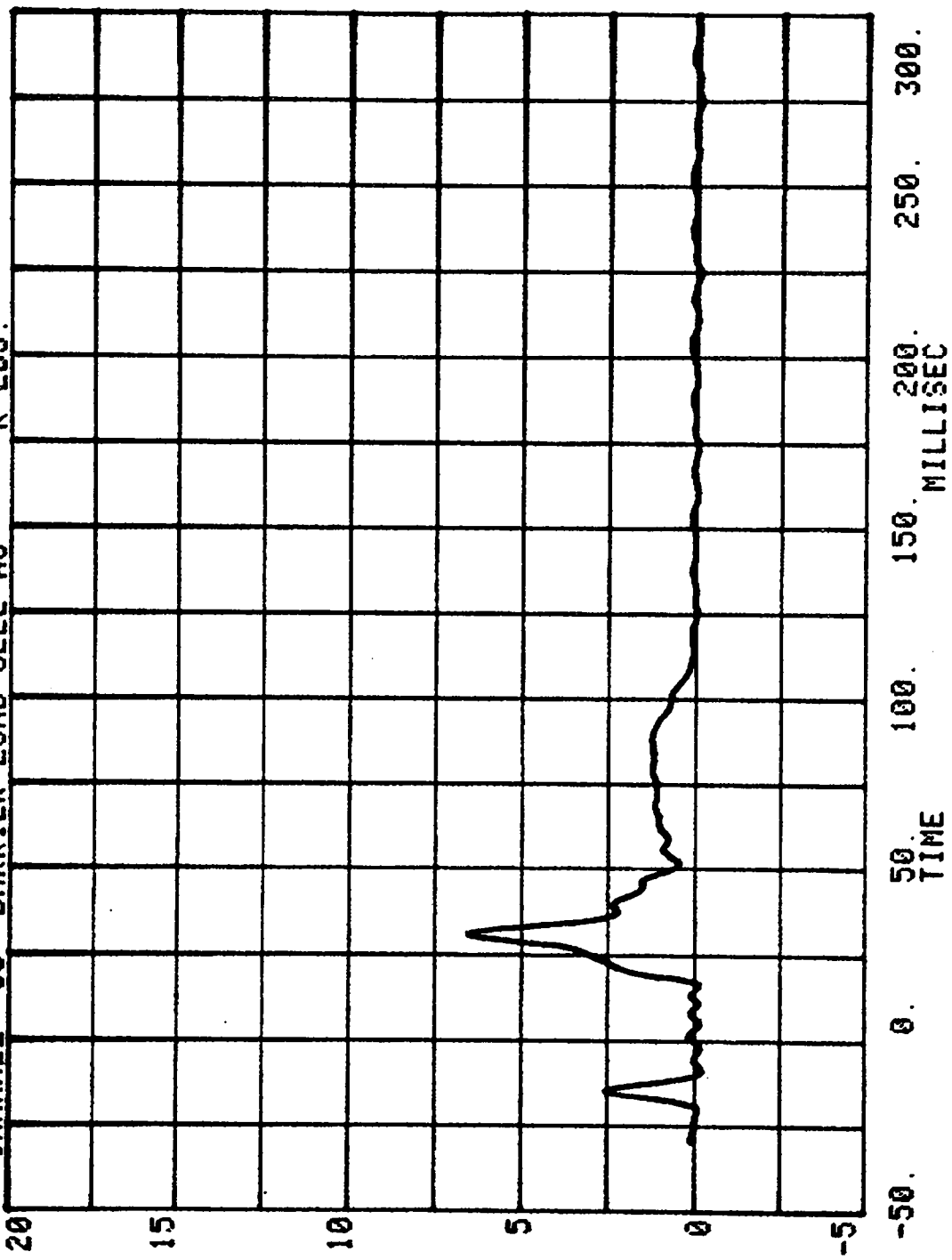
CHANNEL 36 BARRIER LOAD CELL A3  
RUN= 607 SERIES= 201 K LBS.

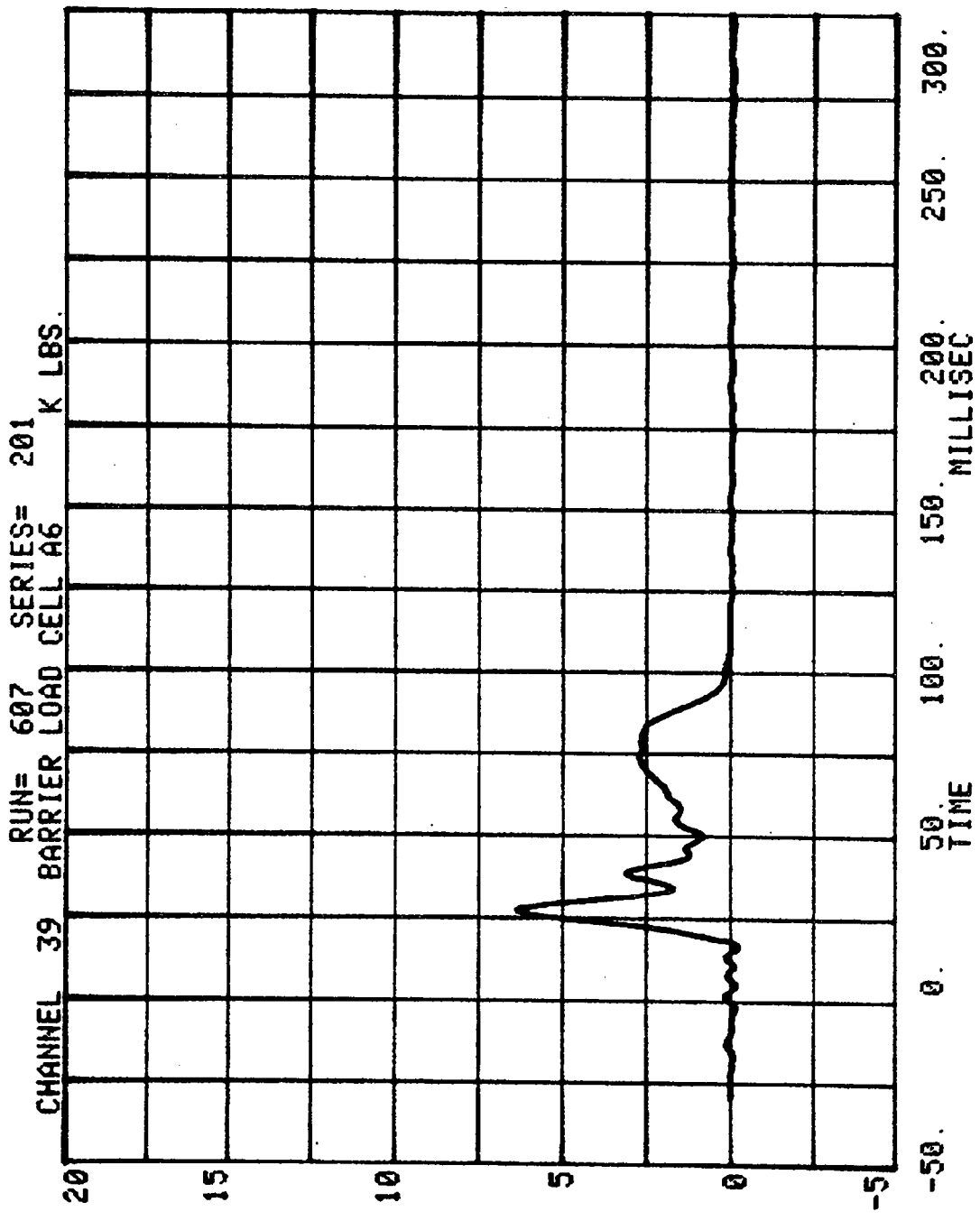


CHANNEL 37 BARRIER LOAD CELL A4  
RUN= 607 SERIES= 201 K LBS.



CHANNEL 38 BARRIER LOAD CELL A5  
RUN= 607 SERIES= 201 K LBS.





CHANNEL 40 BARRIER LOAD CELL A7

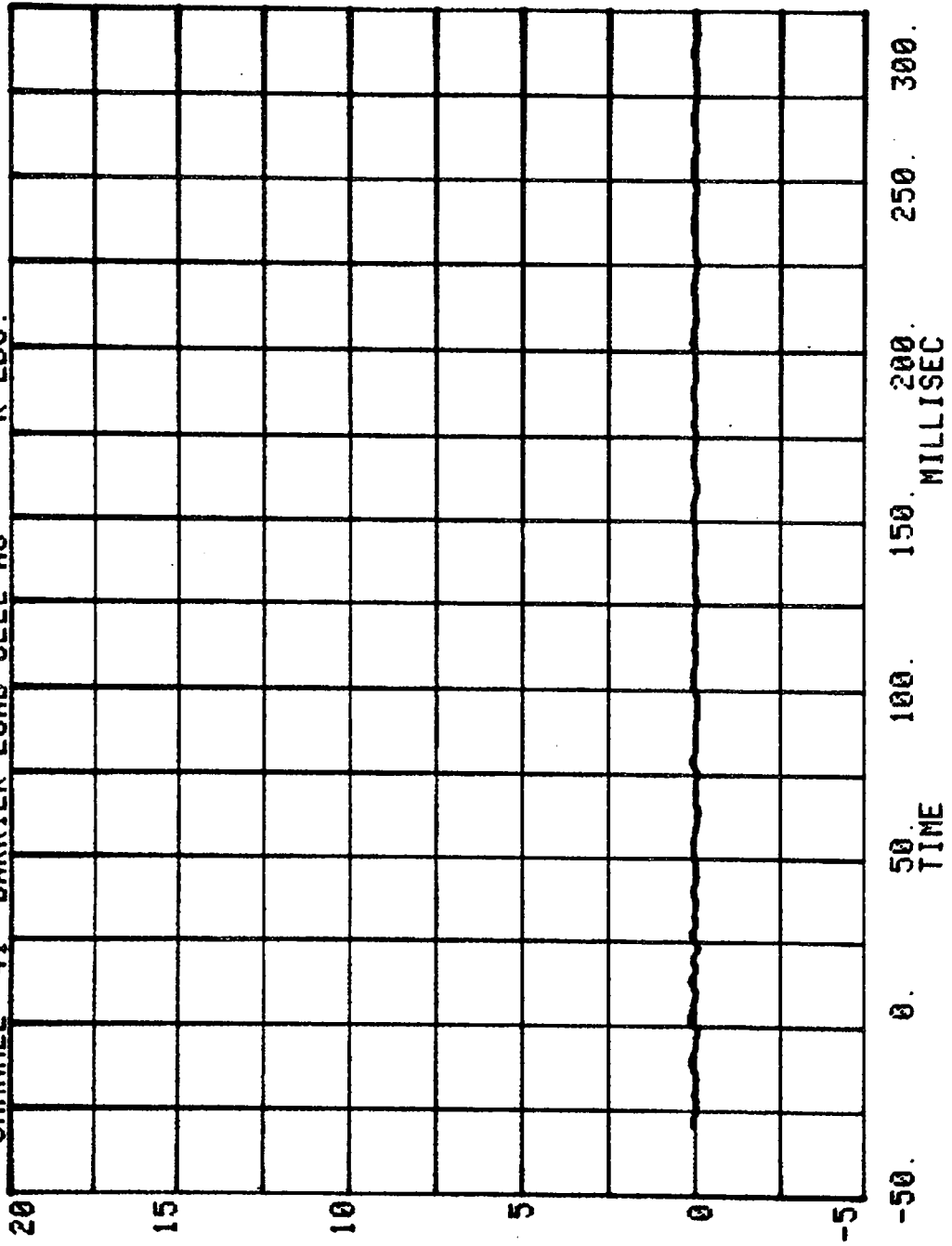
RUN= 607 SERIES= 201

K LBS.

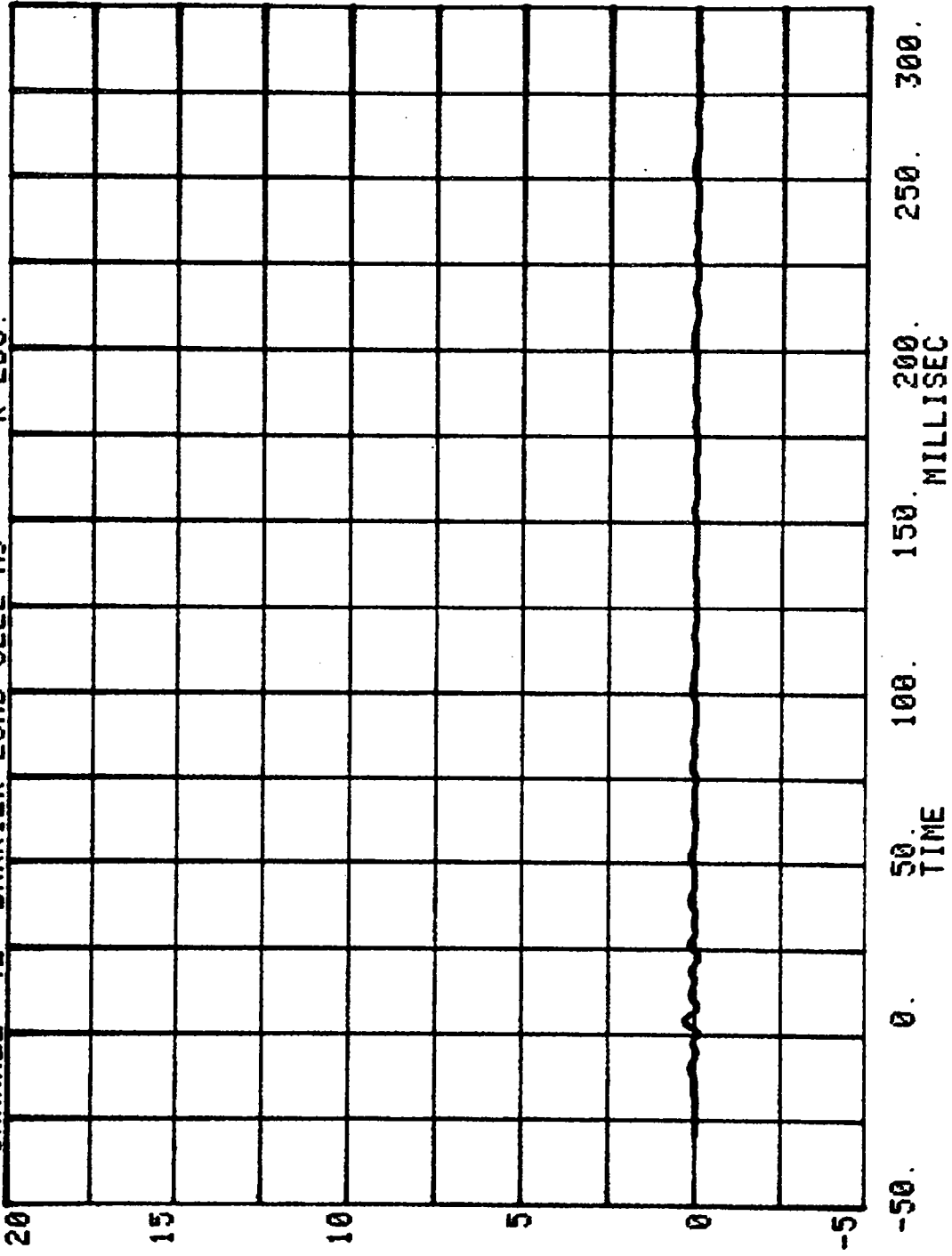


-50. 0. 50. 100. 150. 200. 250. 300.  
MILLISEC  
TIME

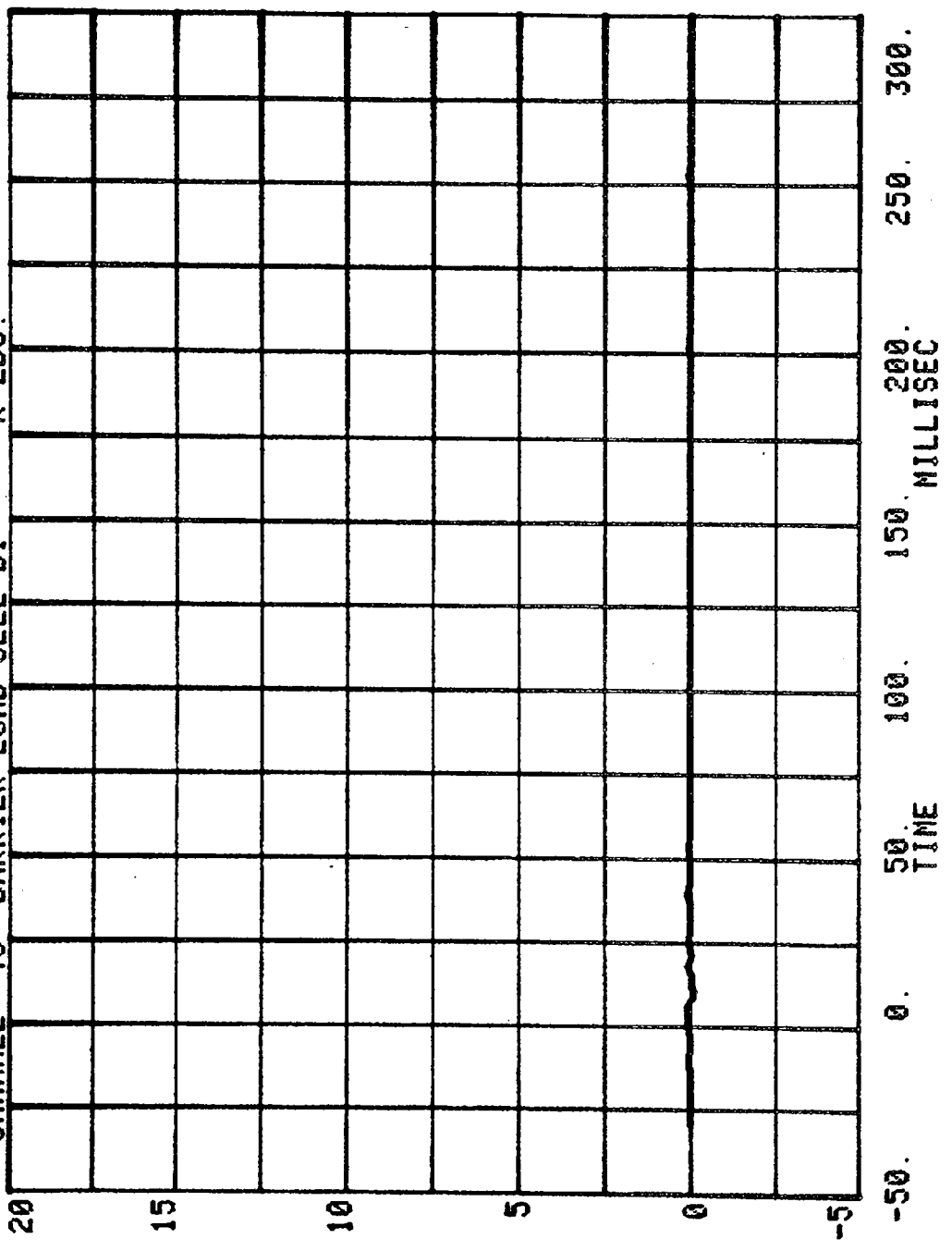
CHANNEL 41 BARRIER LOAD CELL A8 RUN= 607 SERIES= 201 K LBS.



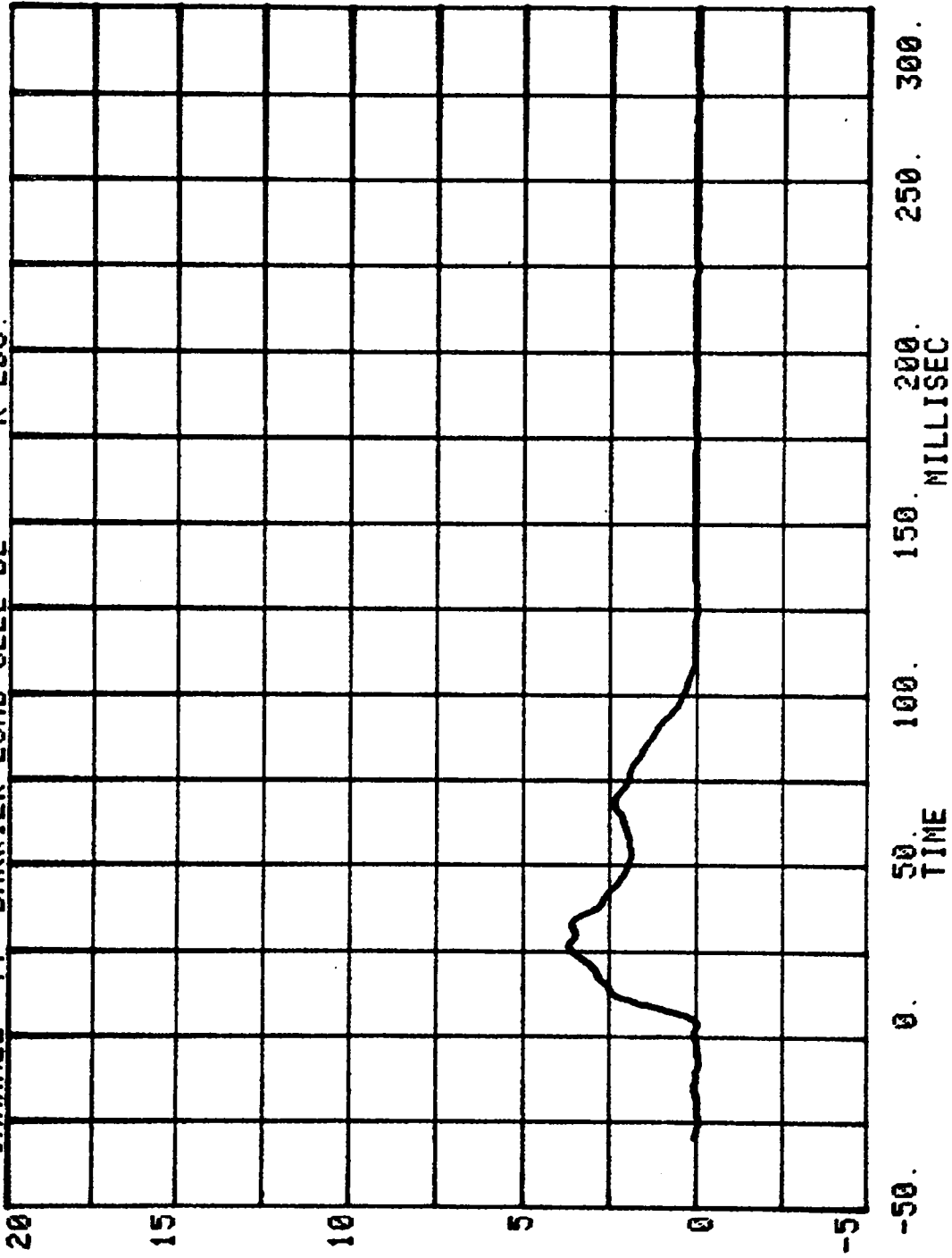
CHANNEL 42 BARRIER LOAD CELL A9  
RUN= 607 SERIES= 201 K LBS.

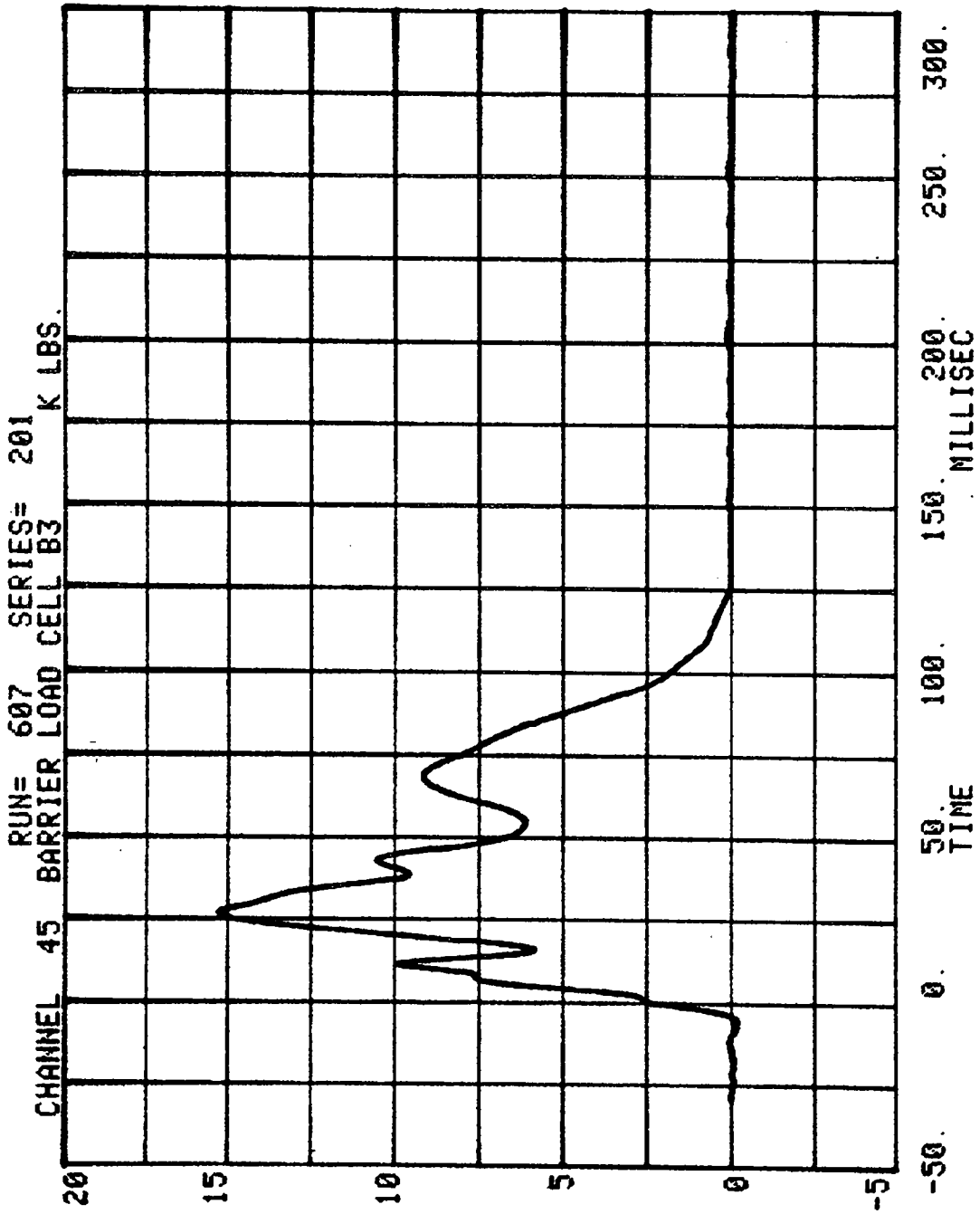


CHANNEL 43 BARRIER LOAD CELL B1  
RUN= 607 SERIES= 201 K LBS.

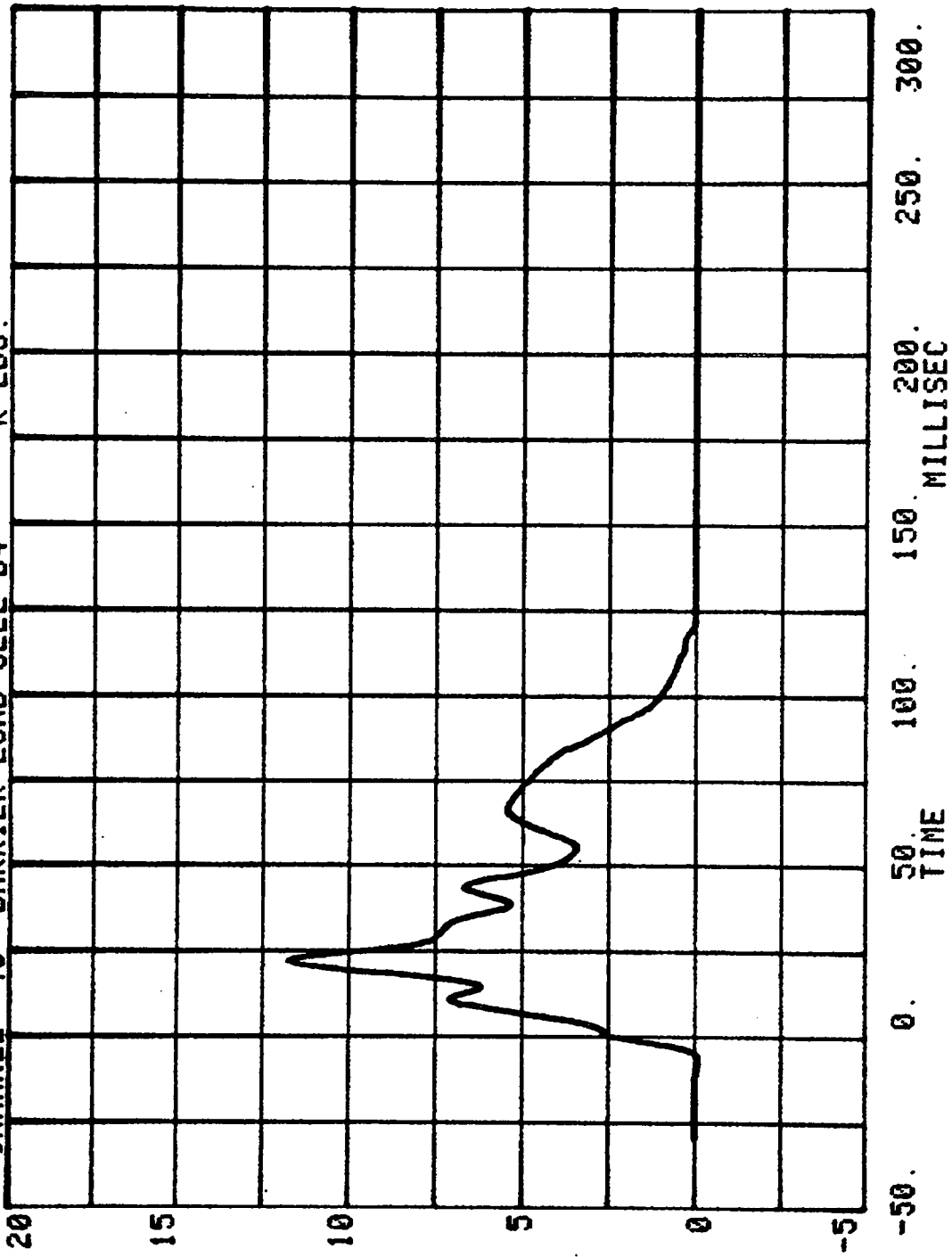


CHANNEL 44 BARRIER LOAD CELL B2  
RUN= 607 SERIES= 201  
K LBS.

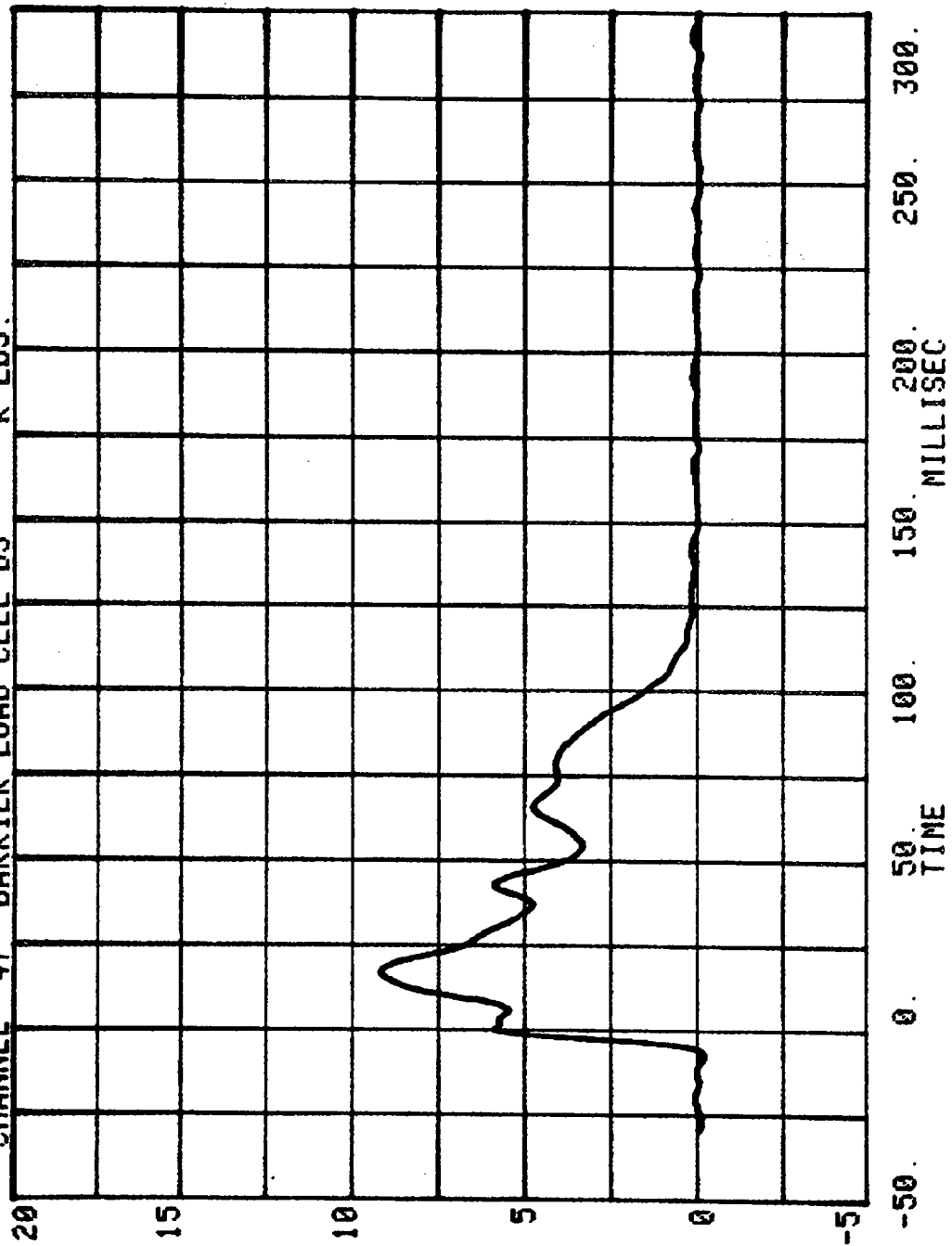




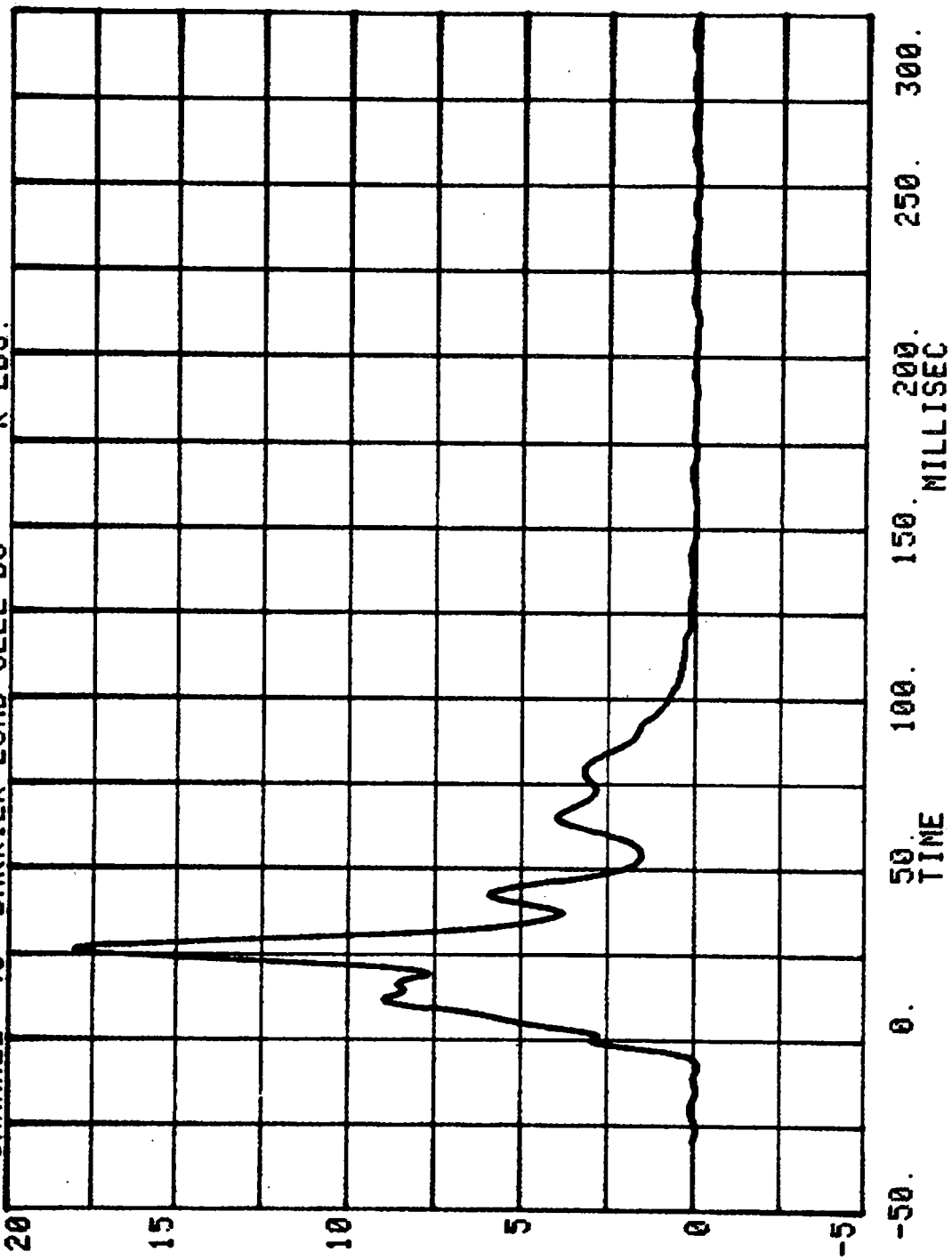
CHANNEL 46 BARRIER LOAD CELL B4 RUN= 607 SERIES= 201 K LBS.

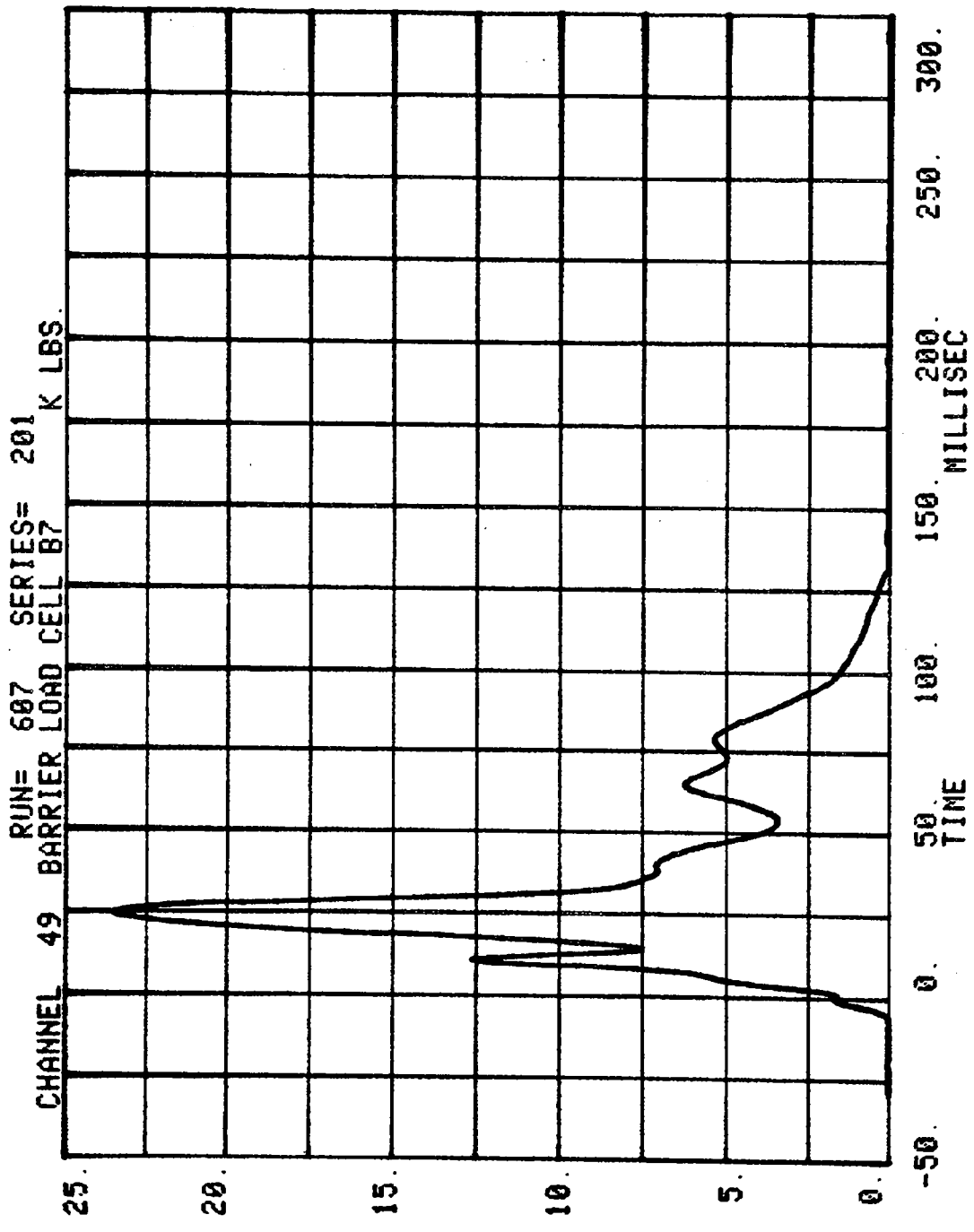


CHANNEL 47 BARRIER LOAD CELL B5  
RUN= 607 SERIES= 201 K LBS.

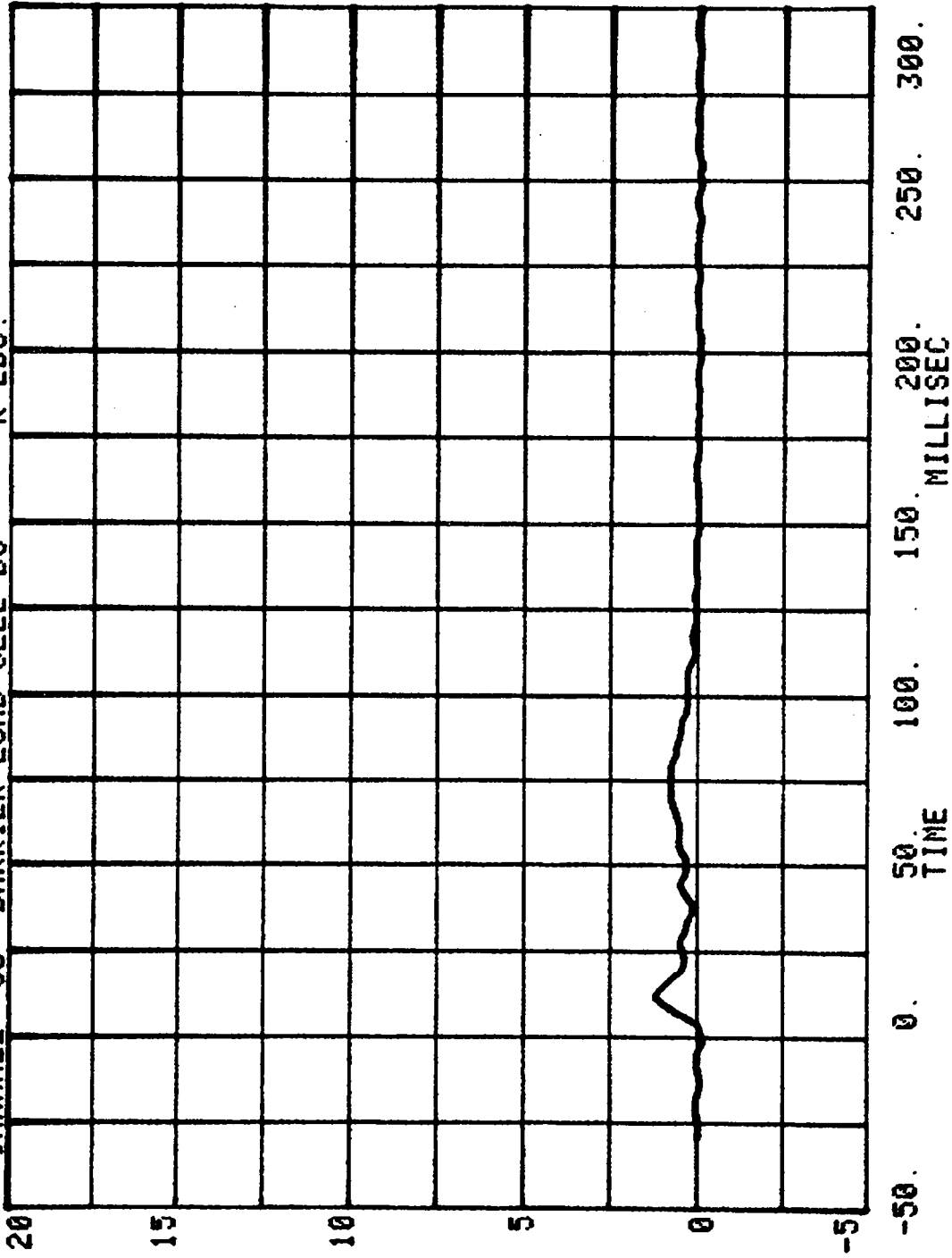


CHANNEL 48 BARRIER LOAD CELL B6 RUN= 607 SERIES= 201 K LBS.





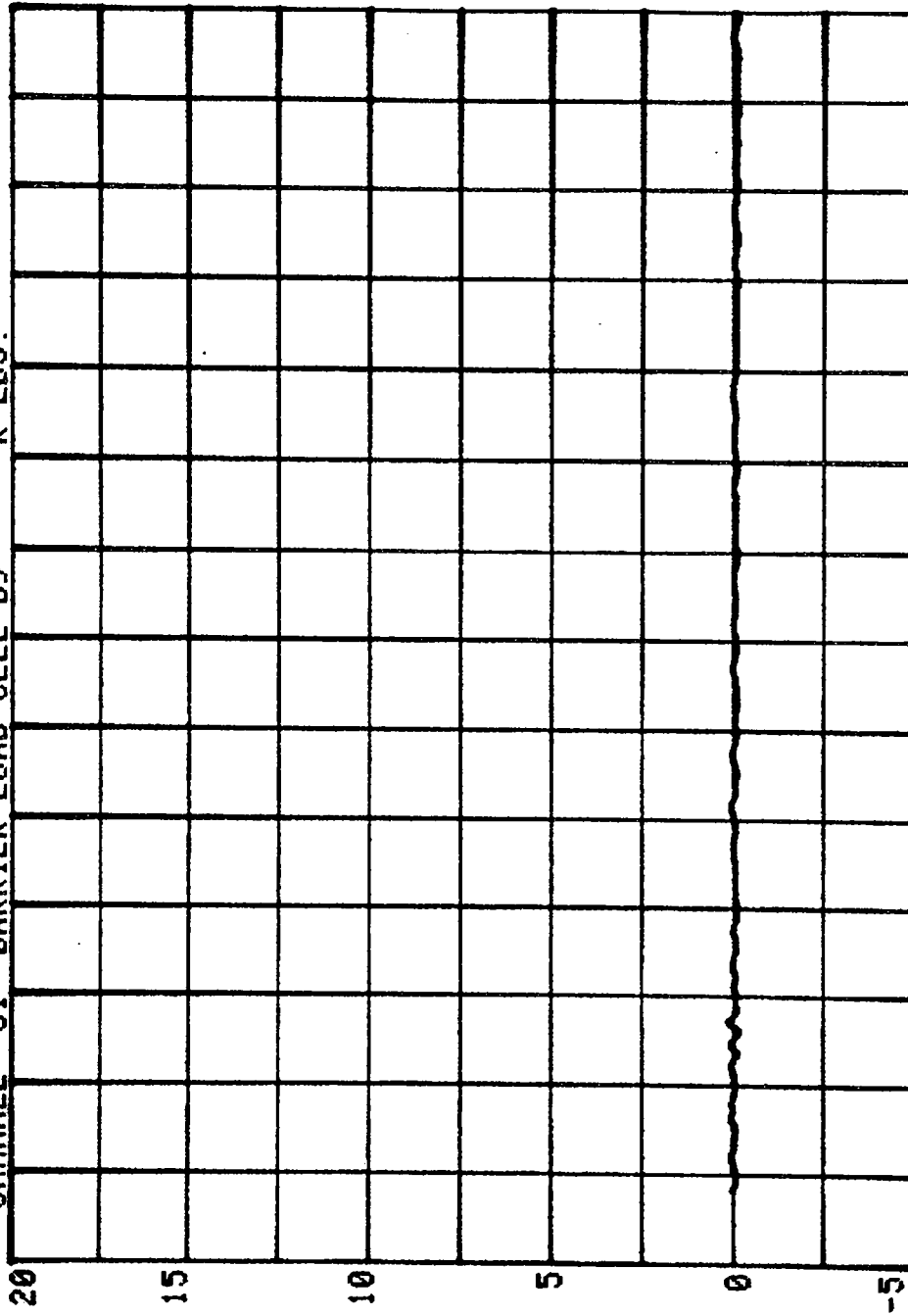
CHANNEL 50 BARRIER LOAD CELL 88 K LBS.  
RUN= 607 SERIES= 201



CHANNEL 51 BARRIER LOAD CELL B9

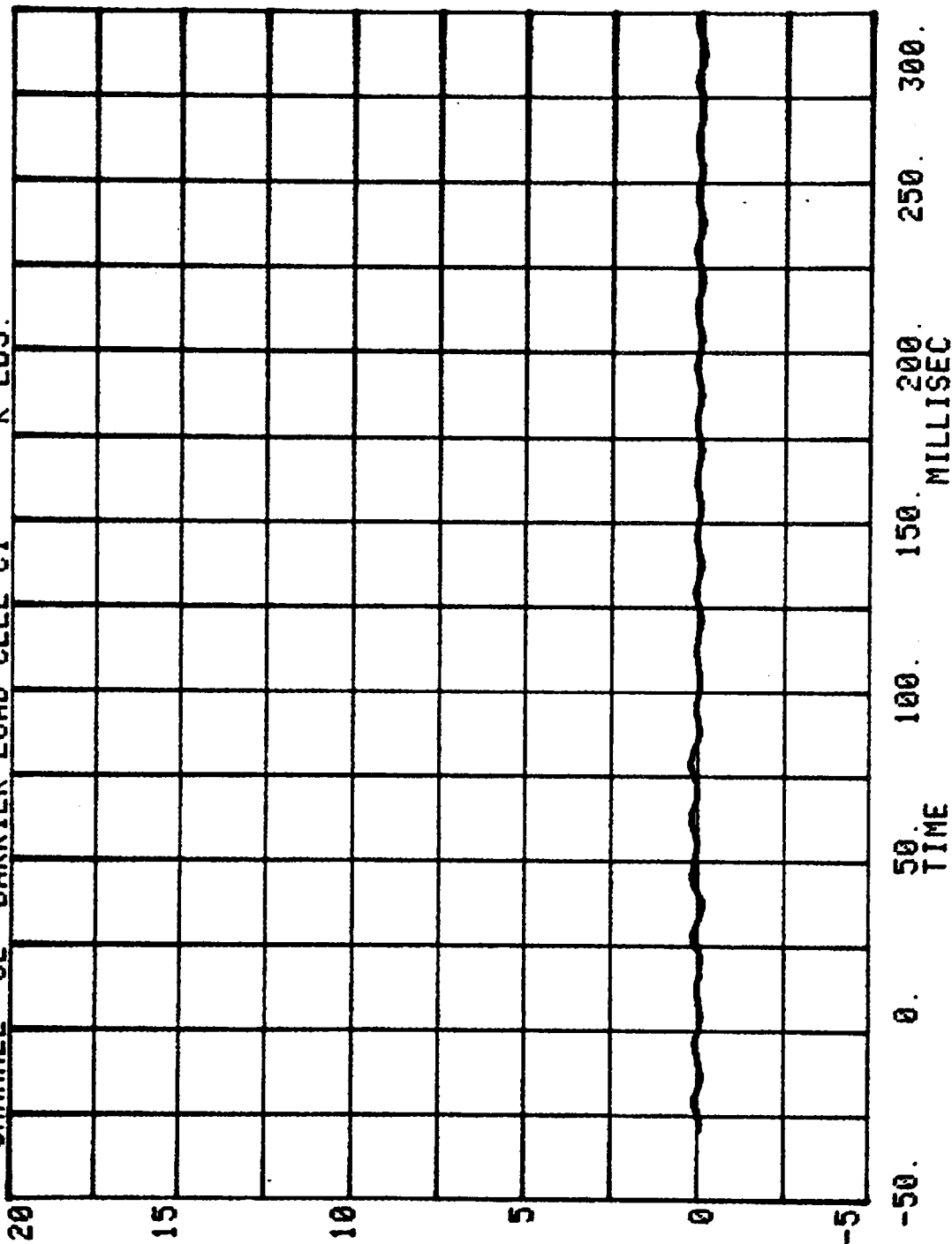
RUN= 607 SERIES= 201

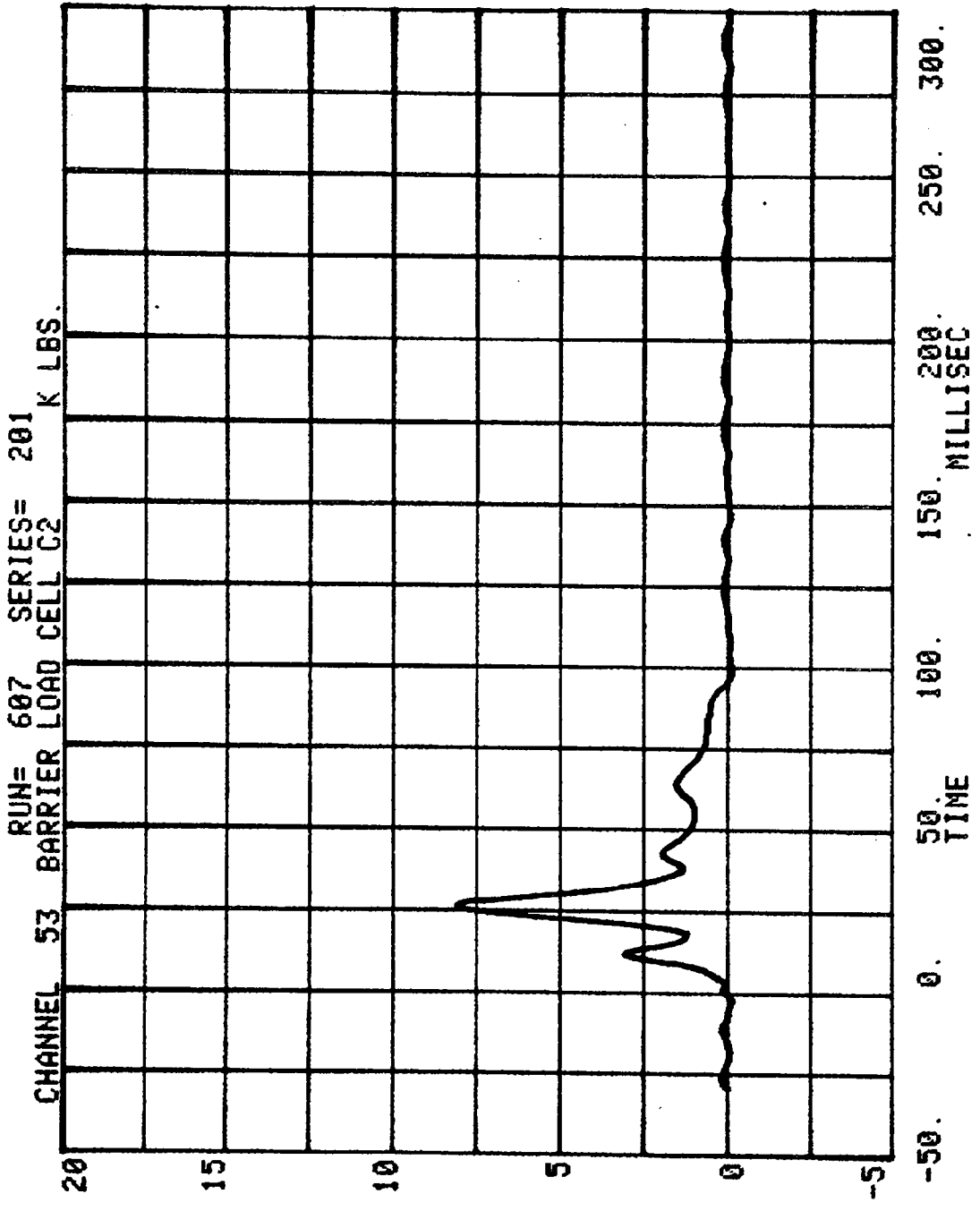
K LBS.



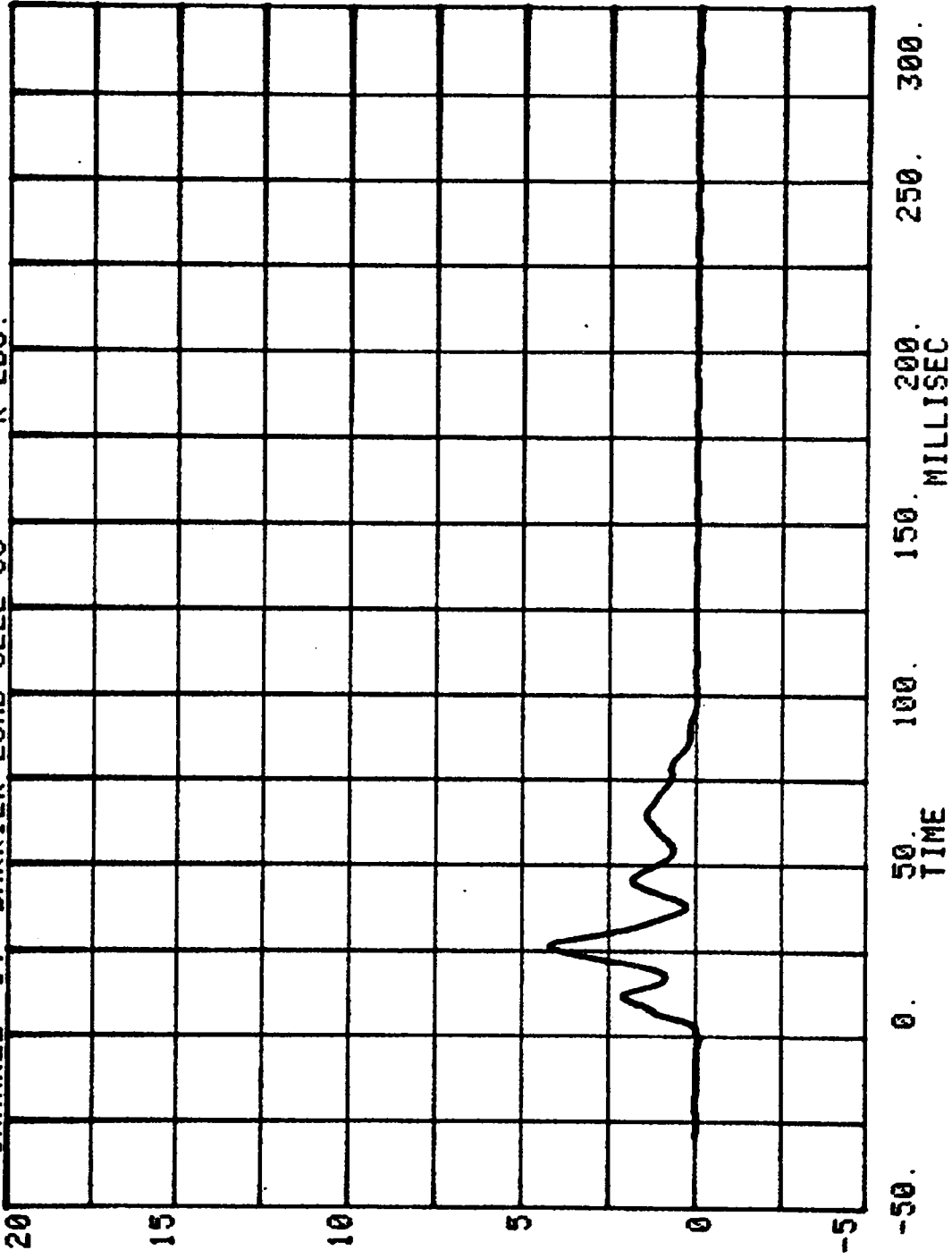
-50. 0. 50. 100. 150. 200. 250. 300.  
TIME MILLISEC

CHANNEL 52 BARRIER LOAD CELL C1 SERIES= 201 K LBS.

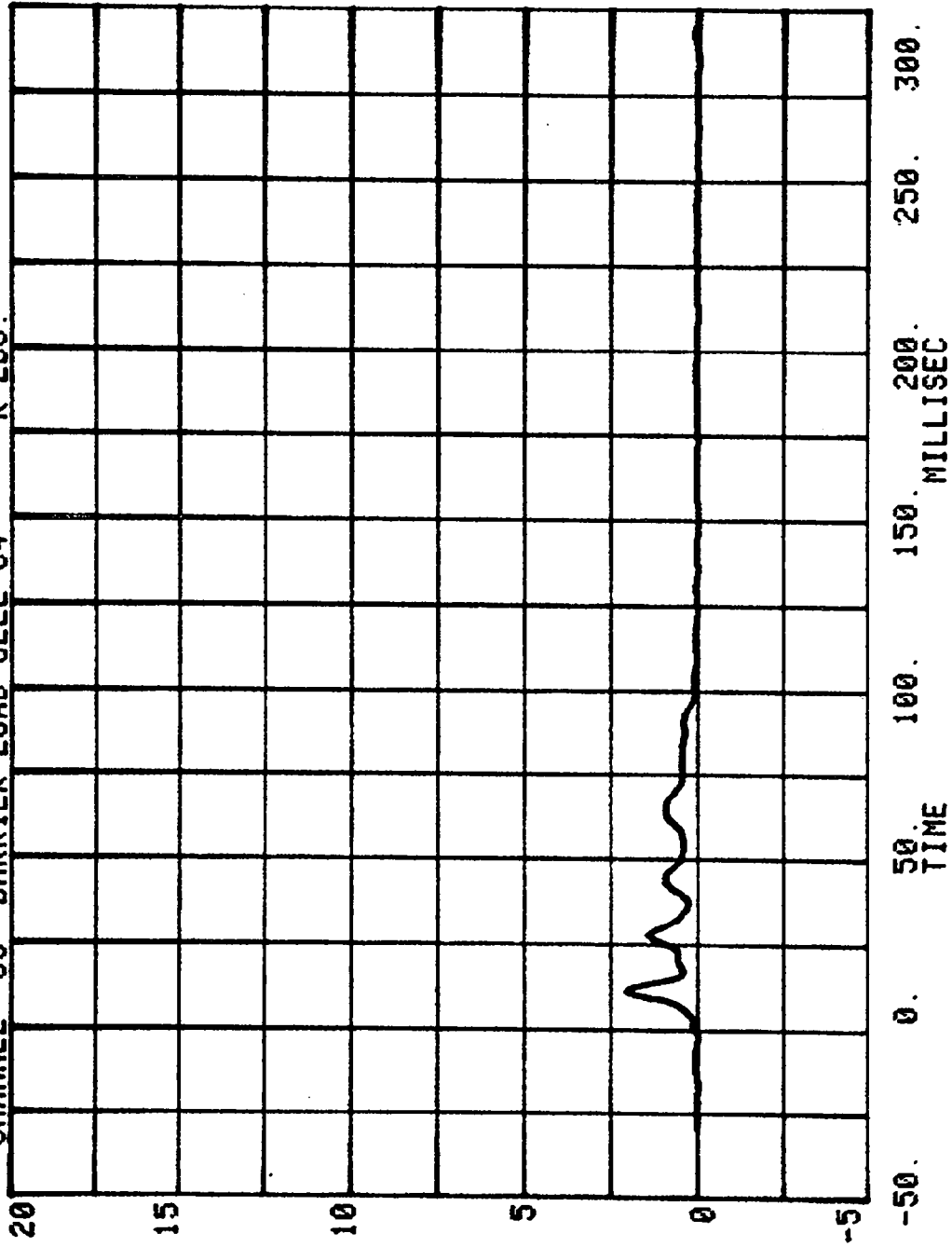




CHANNEL 54 BARRIER LOAD CELL C3  
RUN= 607 SERIES= 201 K LBS.

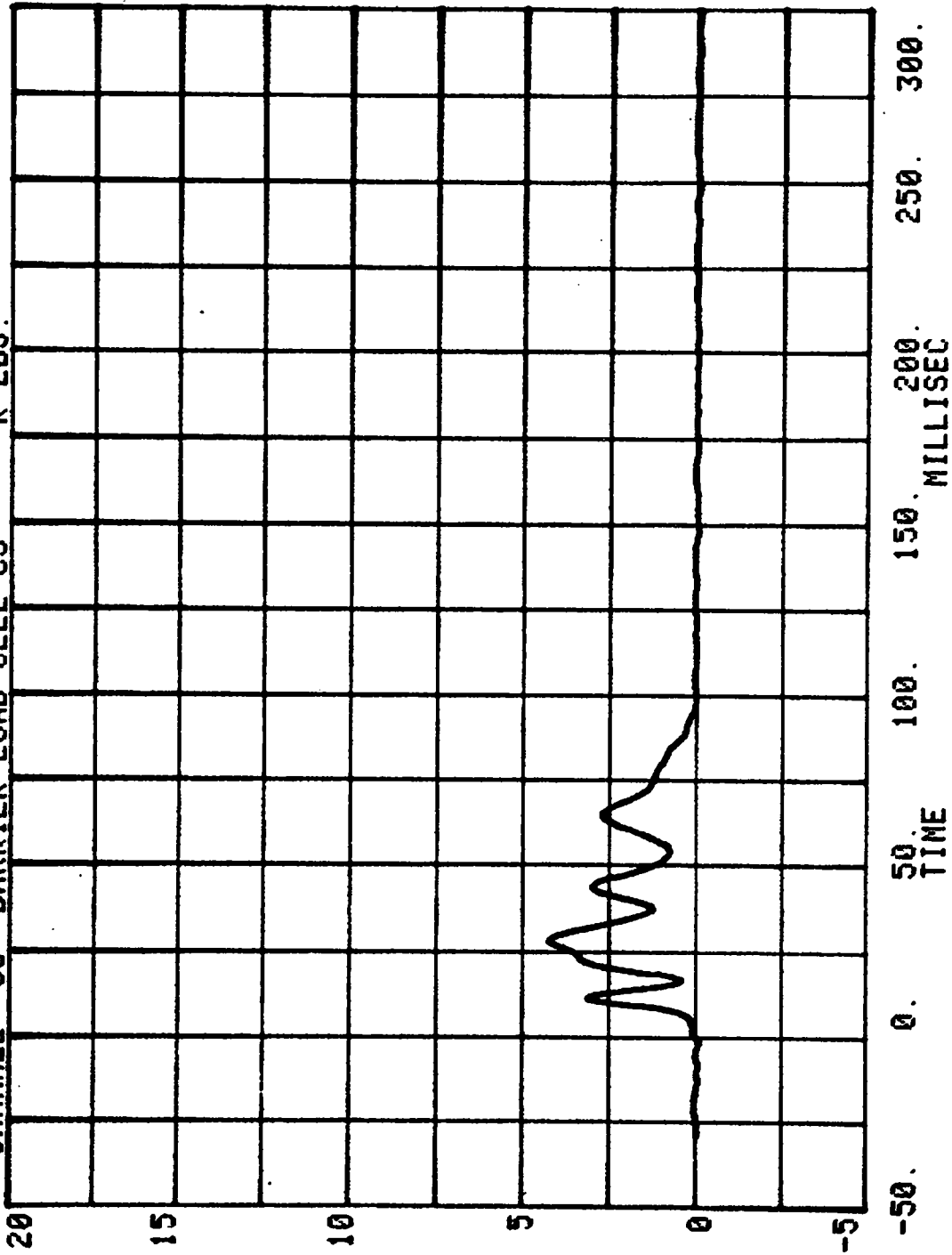


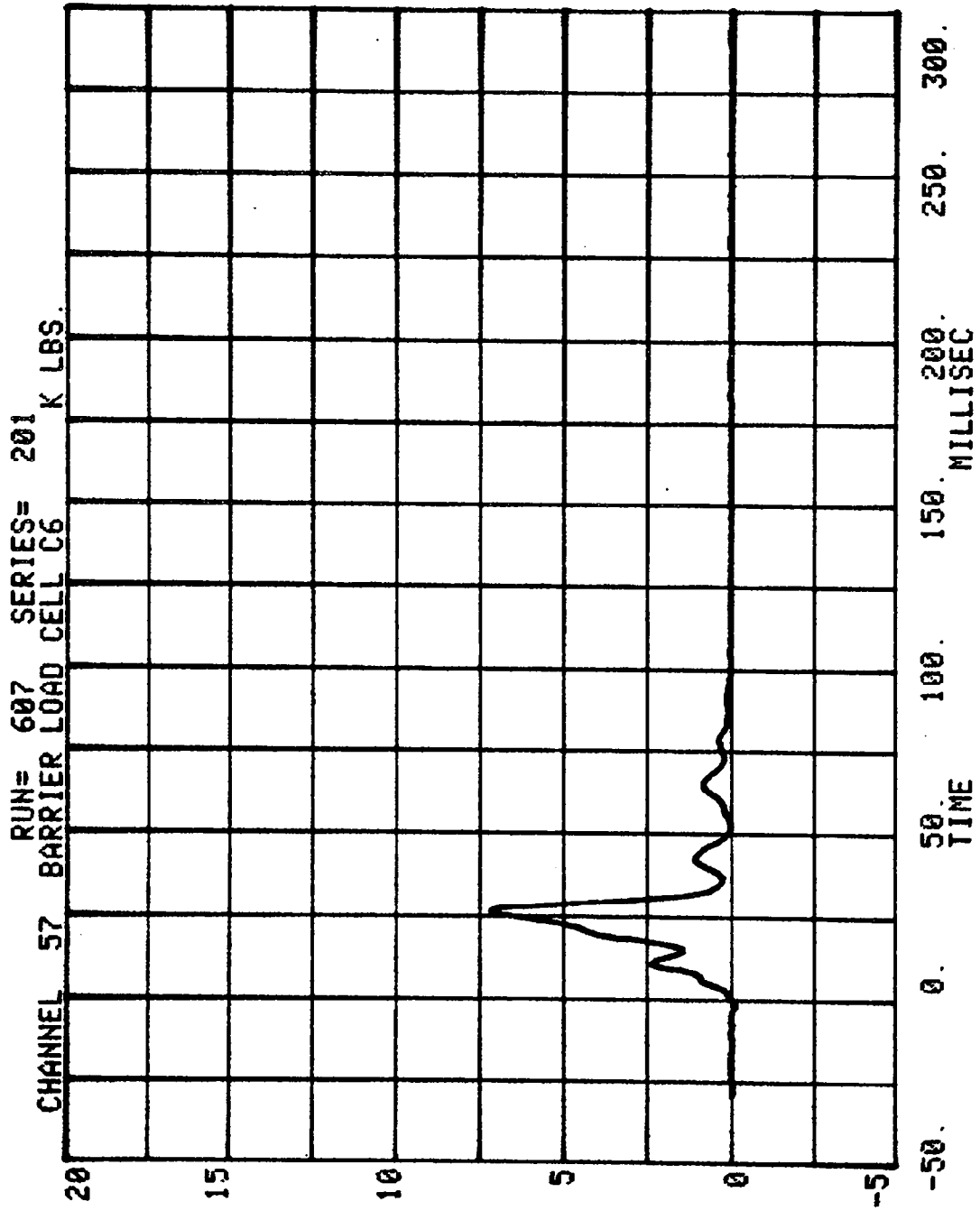
CHANNEL 55 BARRIER LOAD CELL C4  
RUN= 607 SERIES= 201 K LBS.



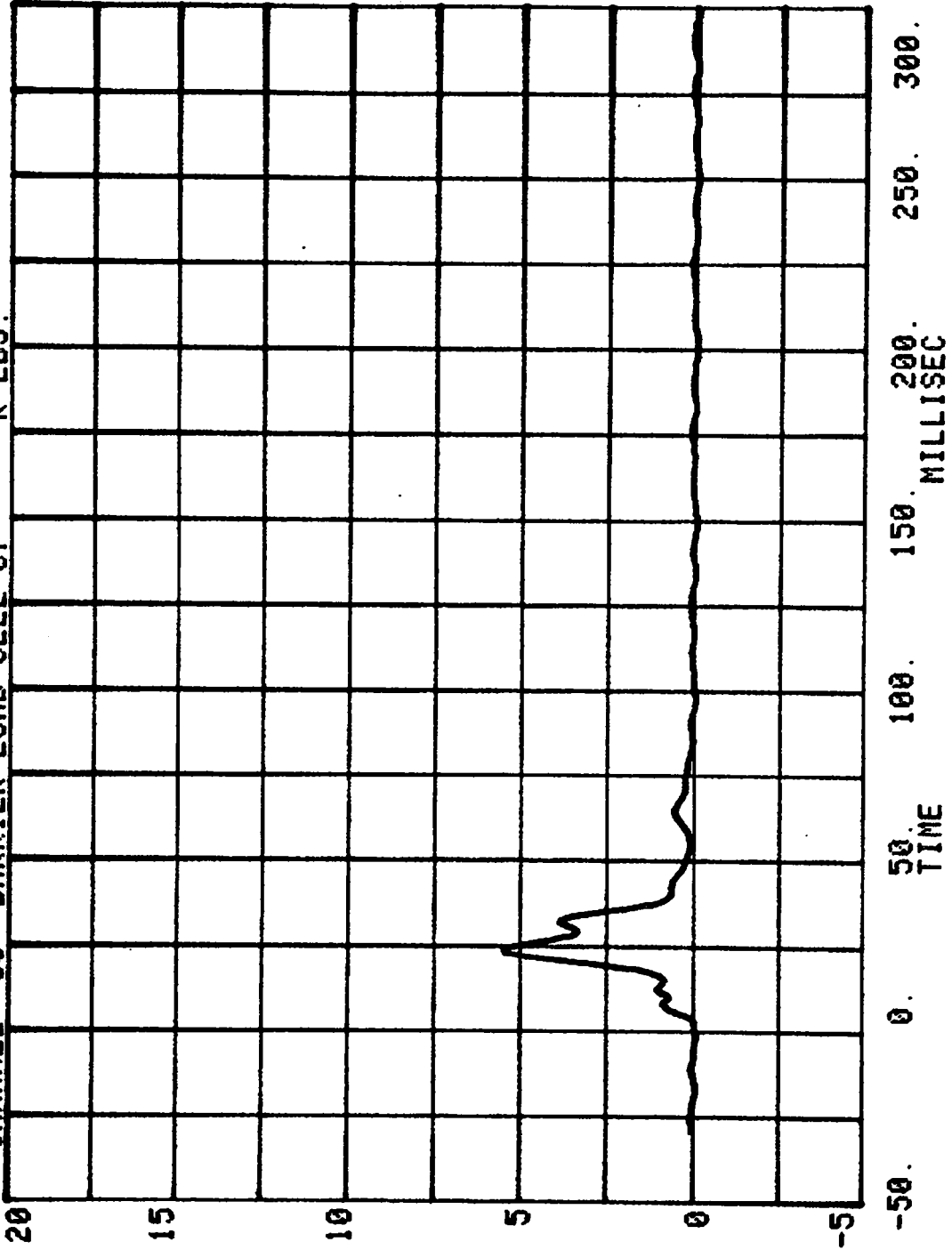
CHANNEL 56 BARRIER LOAD CELL C5 K LBS.

RUN= 607 SERIES= 201

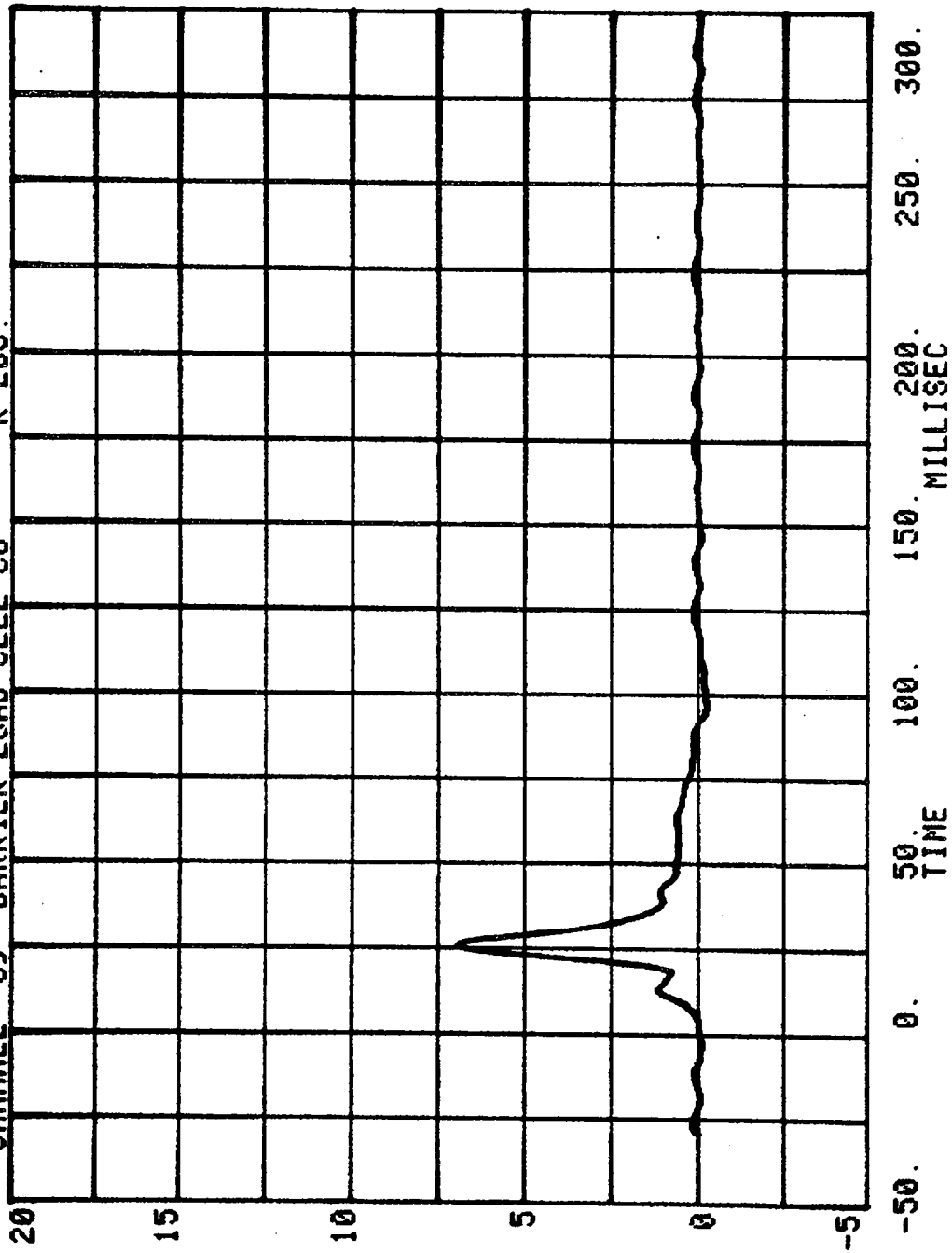




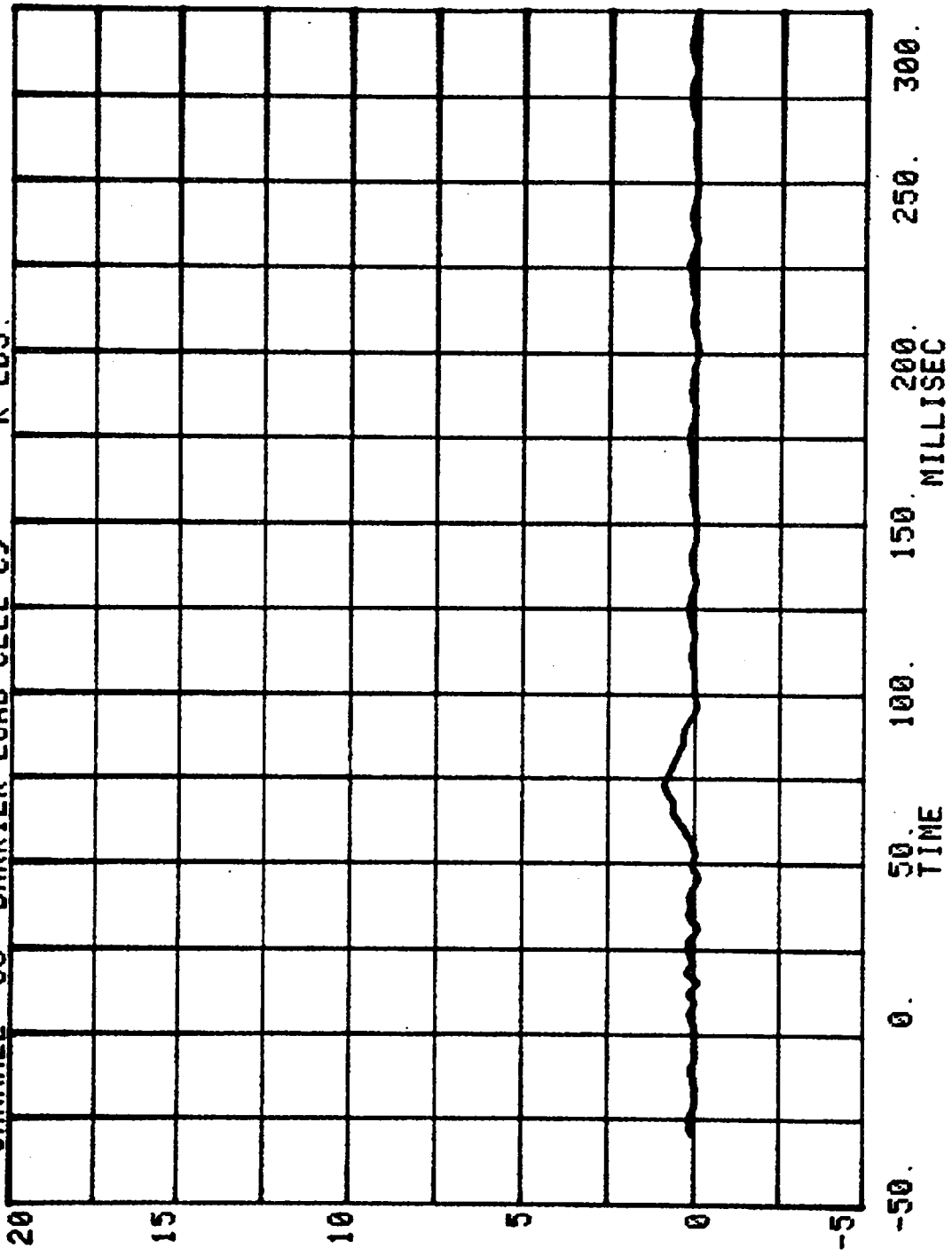
CHANNEL 58 BARRIER LOAD CELL C7 RUN= 607 SERIES= 201 K LBS.



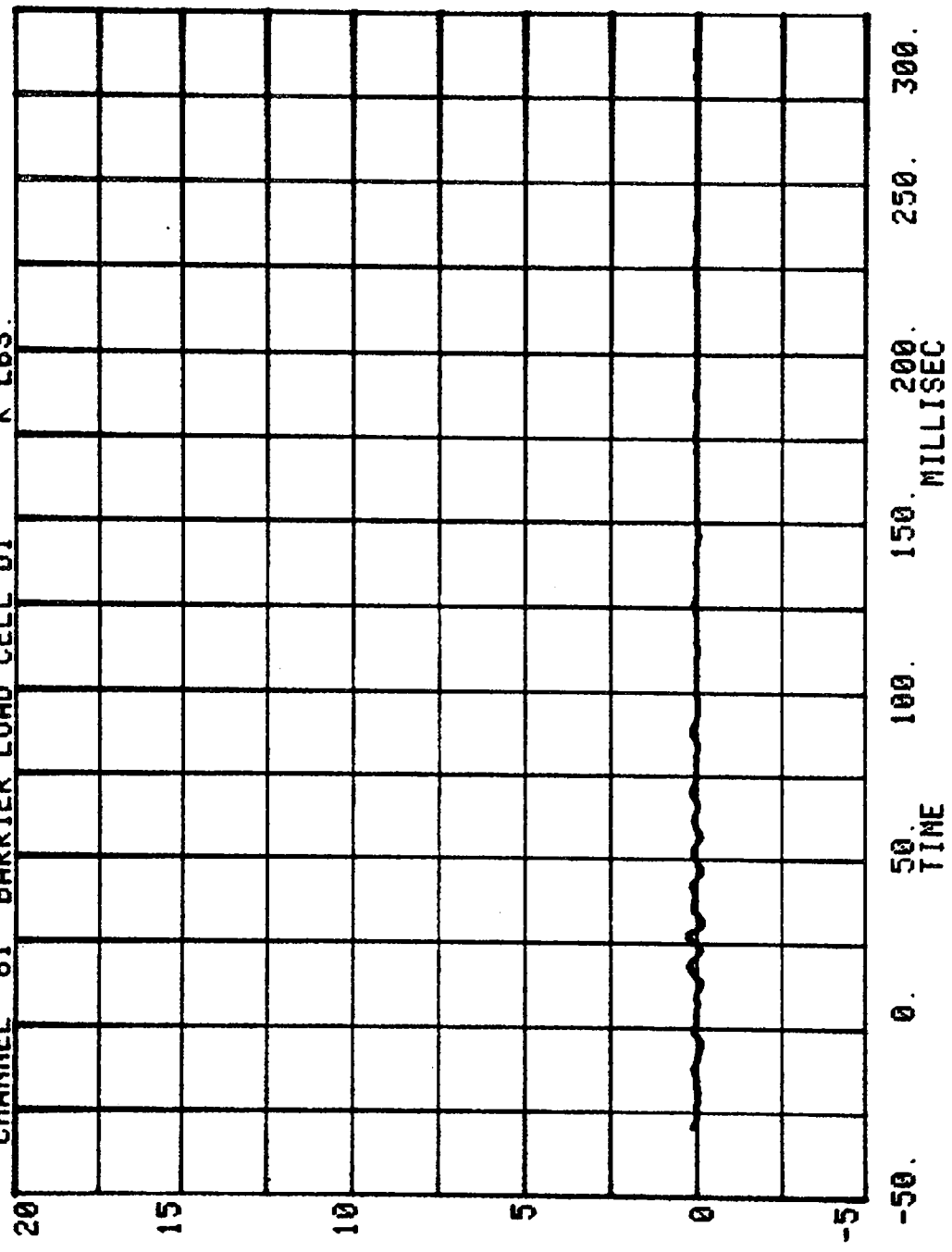
CHANNEL 59 BARRIER LOAD CELL C8  
RUN= 607 SERIES= 201 K LBS.



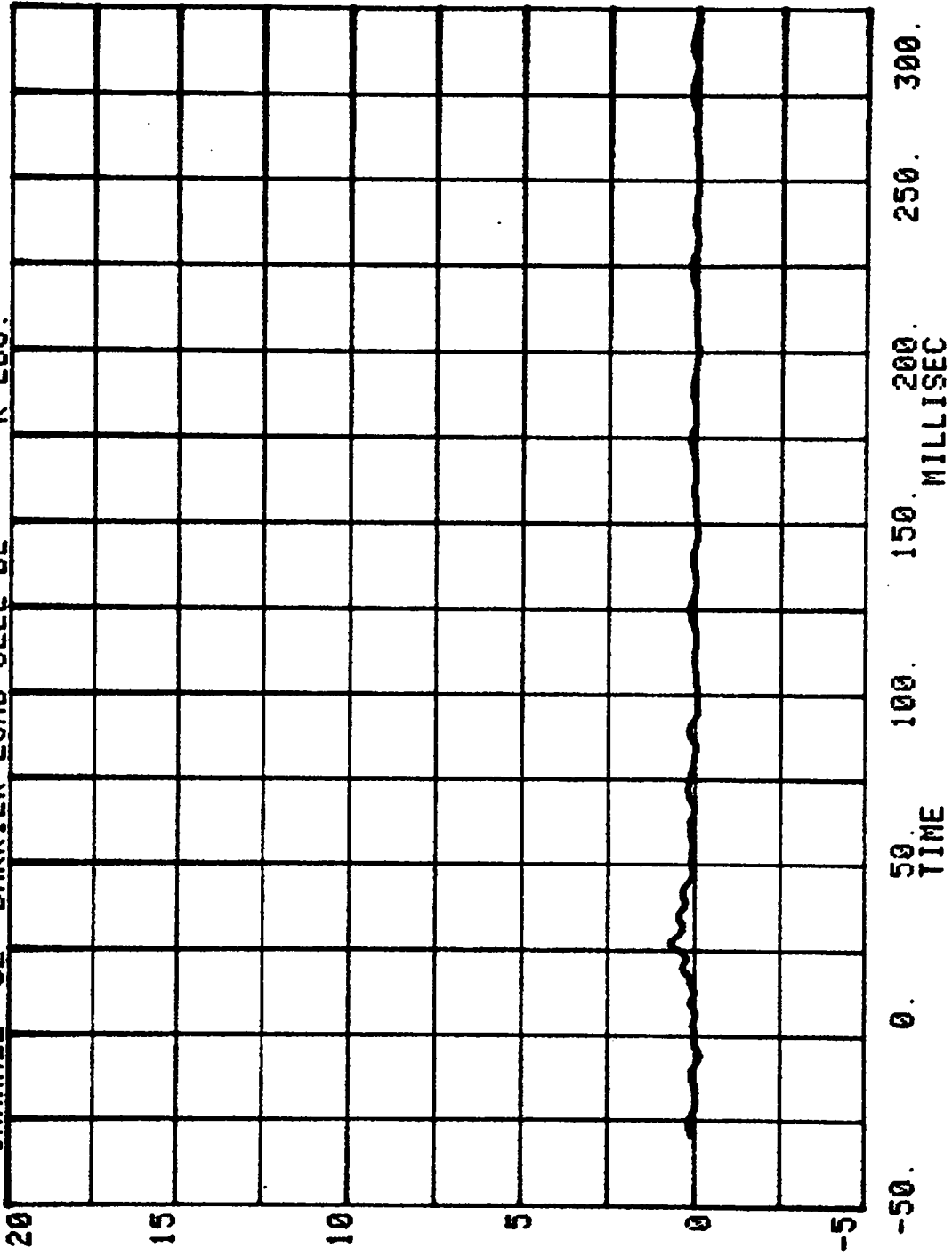
CHANNEL 60 BARRIER LOAD CELL C9 RUN= 607 SERIES= 201 K LBS.



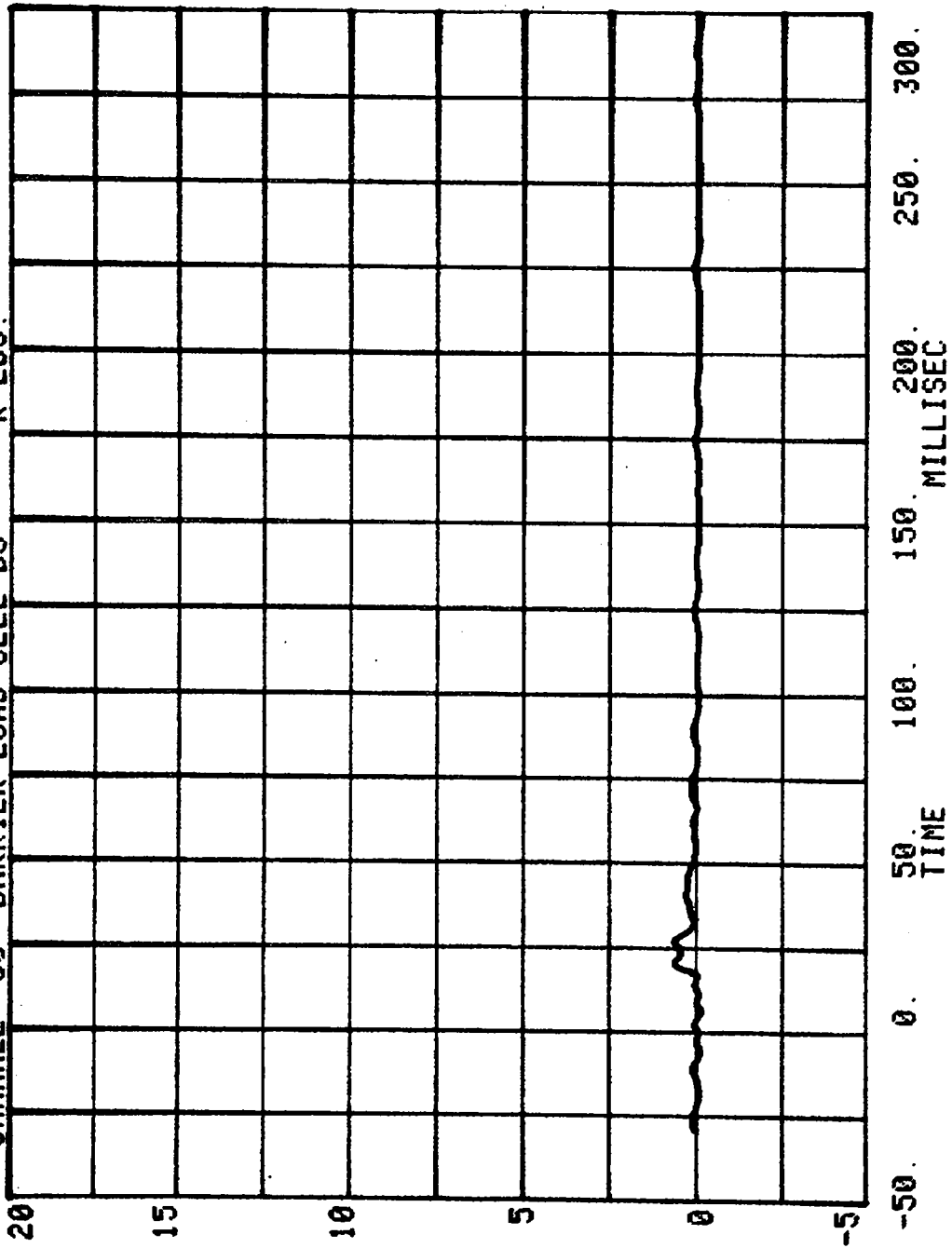
CHANNEL 61 BARRIER LOAD CELL D1  
RUN= 607 SERIES= 201 K LBS.



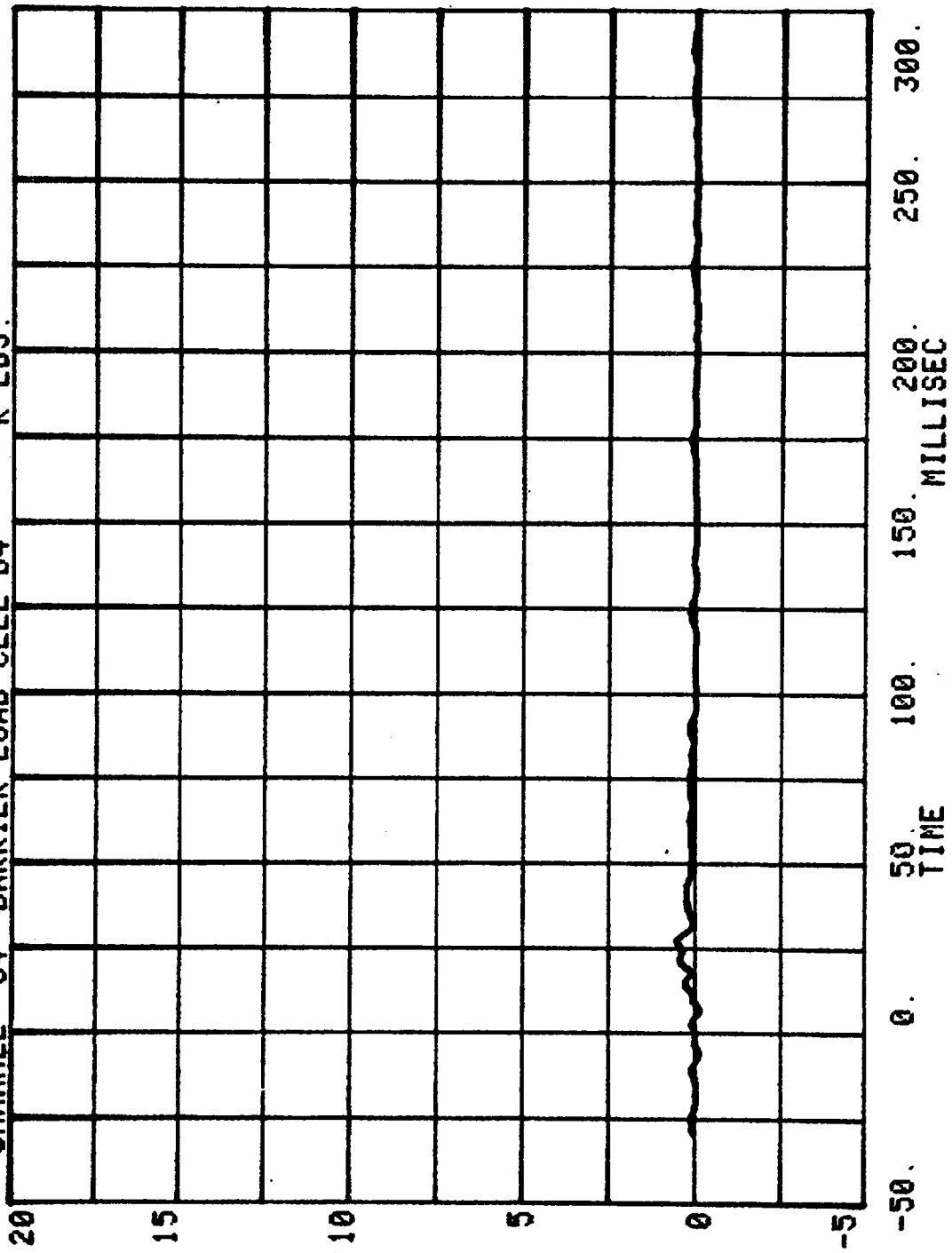
CHANNEL 62 BARRIER LOAD CELL D2  
RUN= 607 SERIES= 201 K LBS.

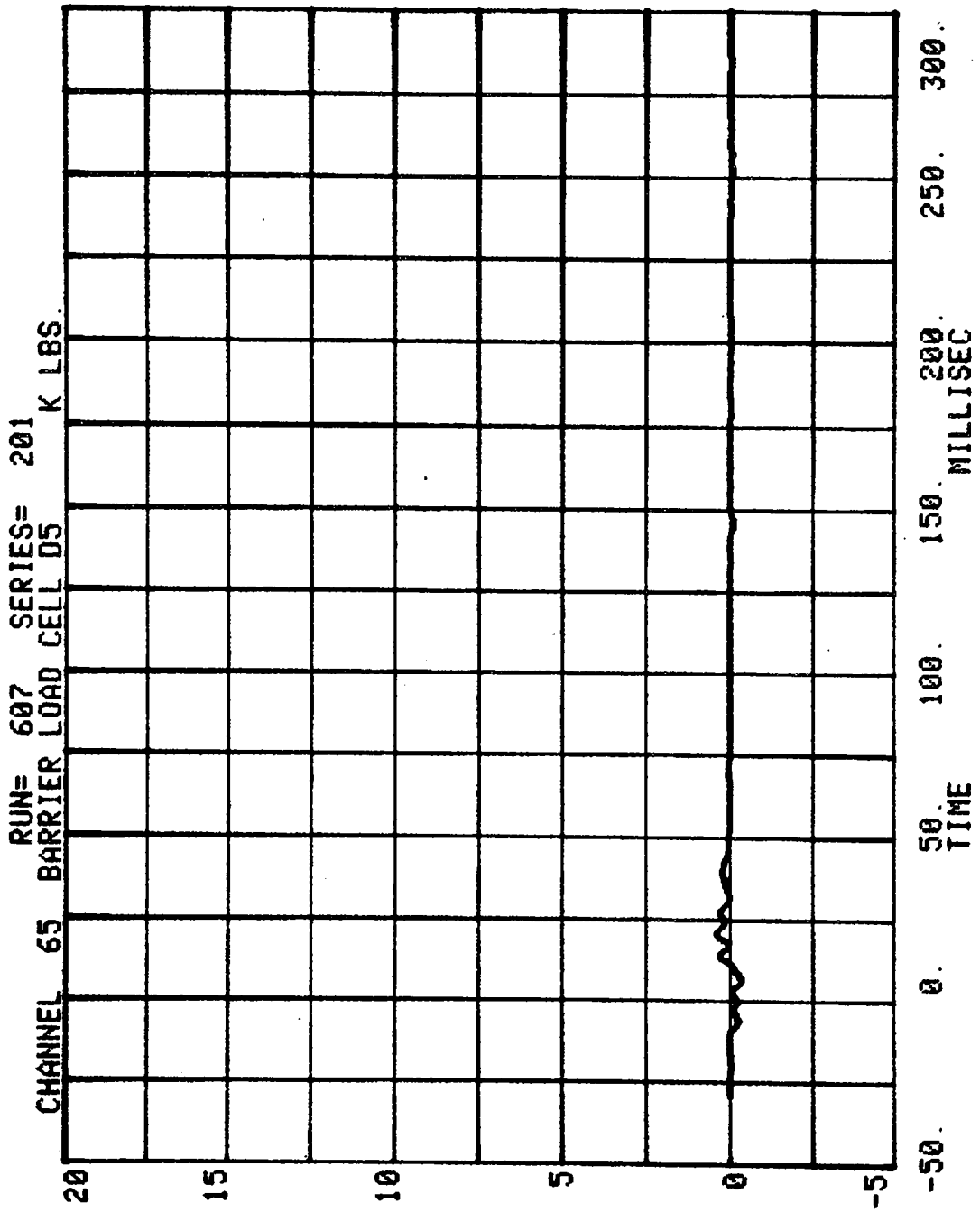


CHANNEL 63 BARRIER LOAD CELL D3  
RUN= 607 SERIES= 201 K LBS.

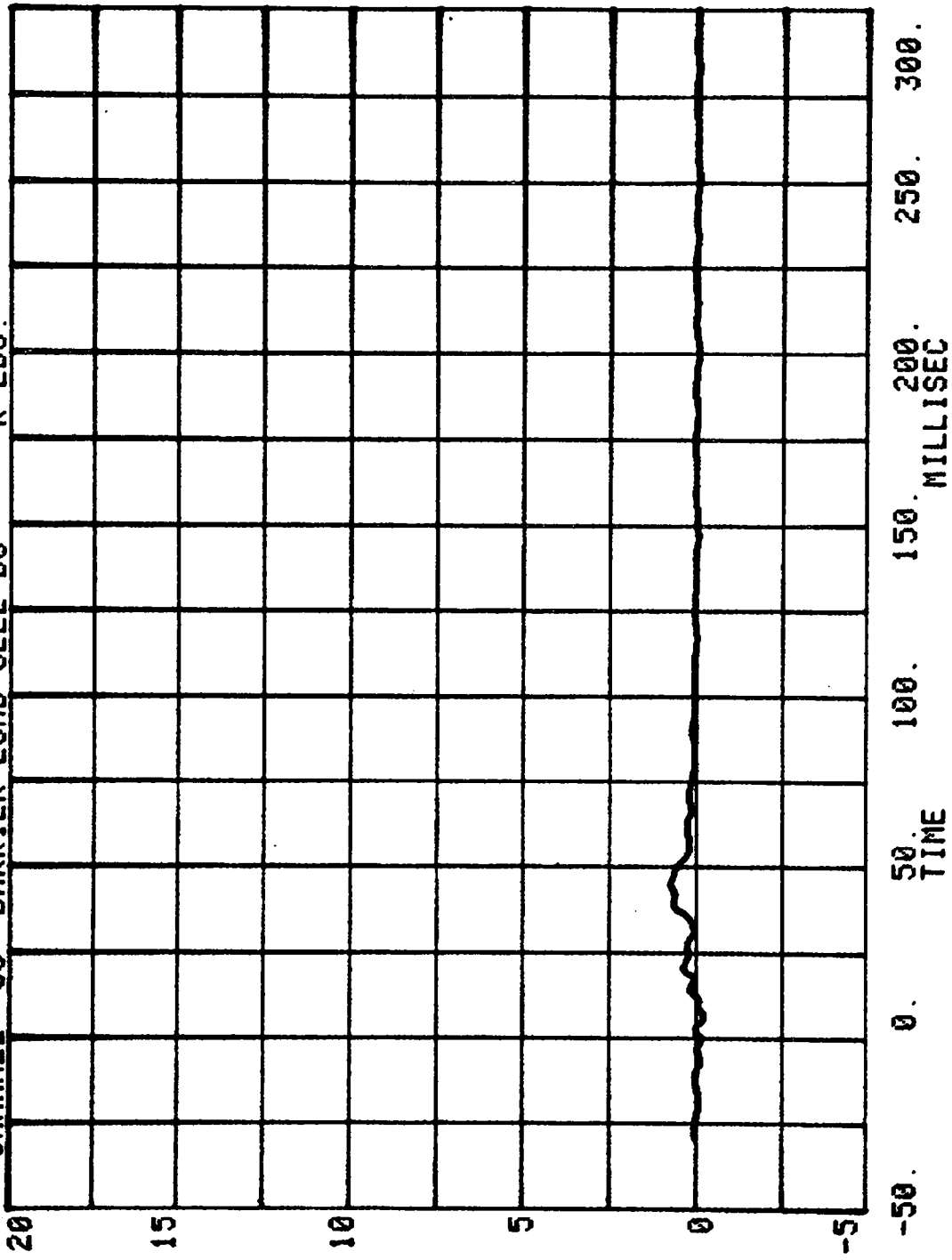


CHANNEL 64 BARRIER LOAD CELL D4 RUN= 607 SERIES= 201 K LBS.

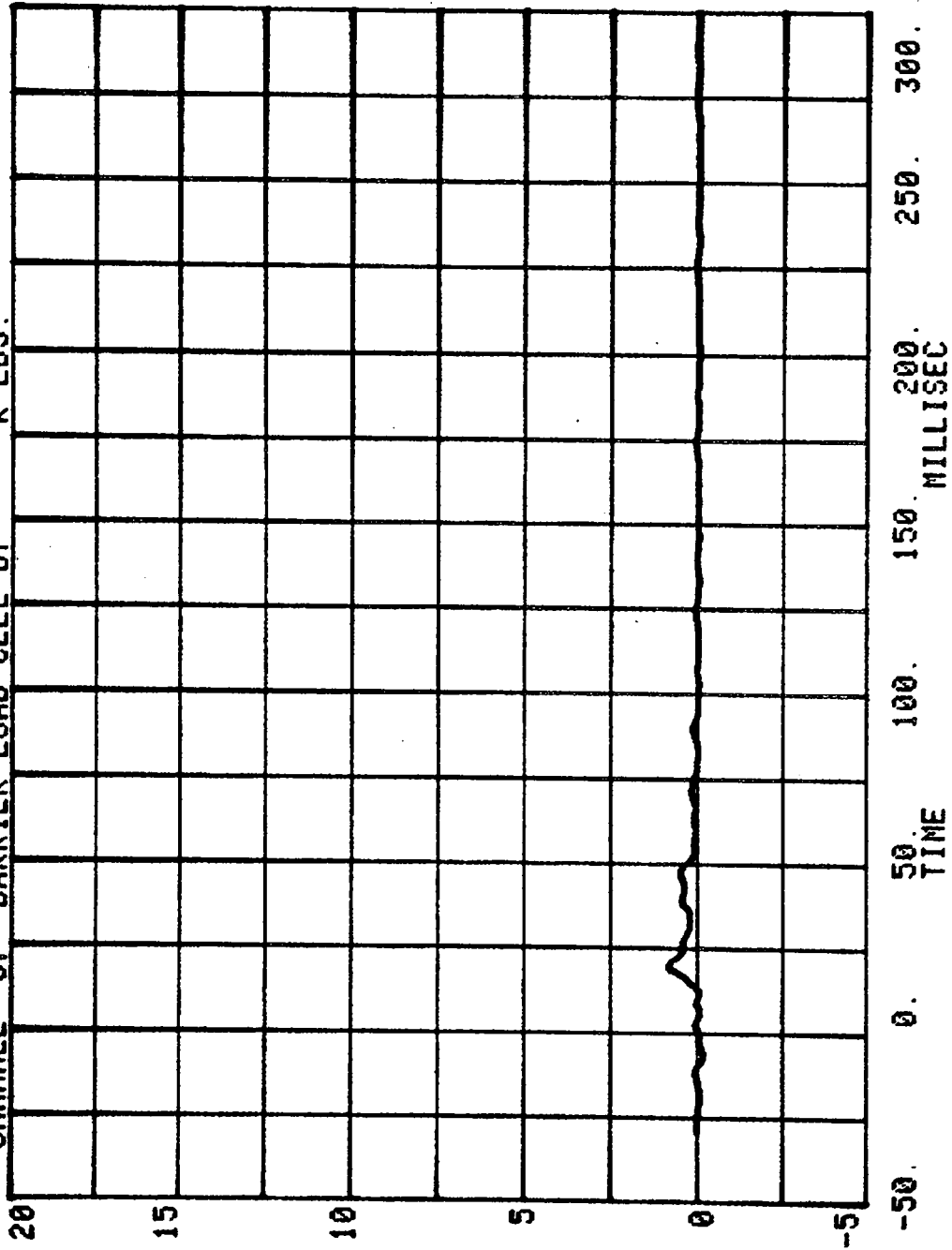




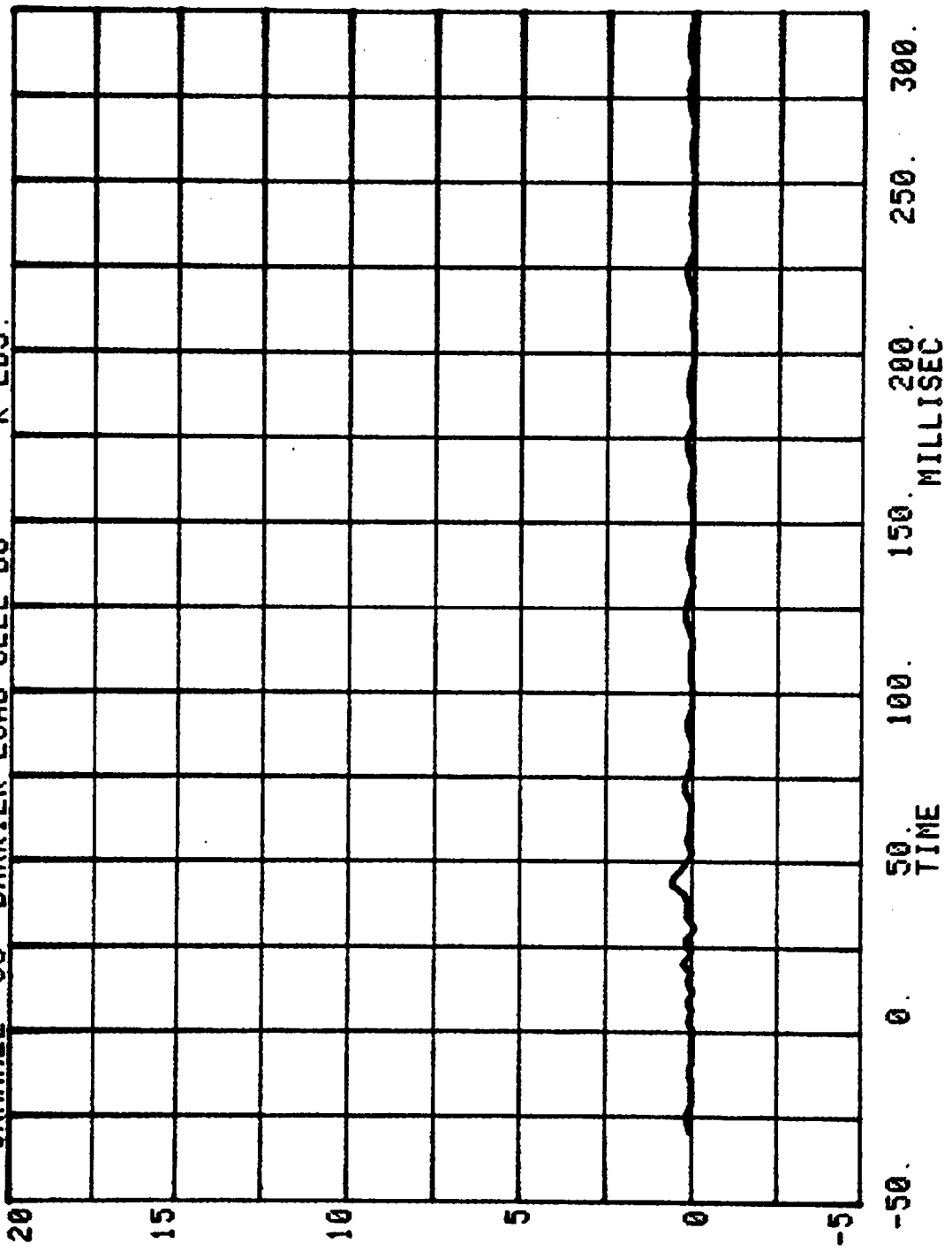
CHANNEL 66 BARRIER LOAD CELL D6  
RUN= 607 SERIES= 201  
K LBS.



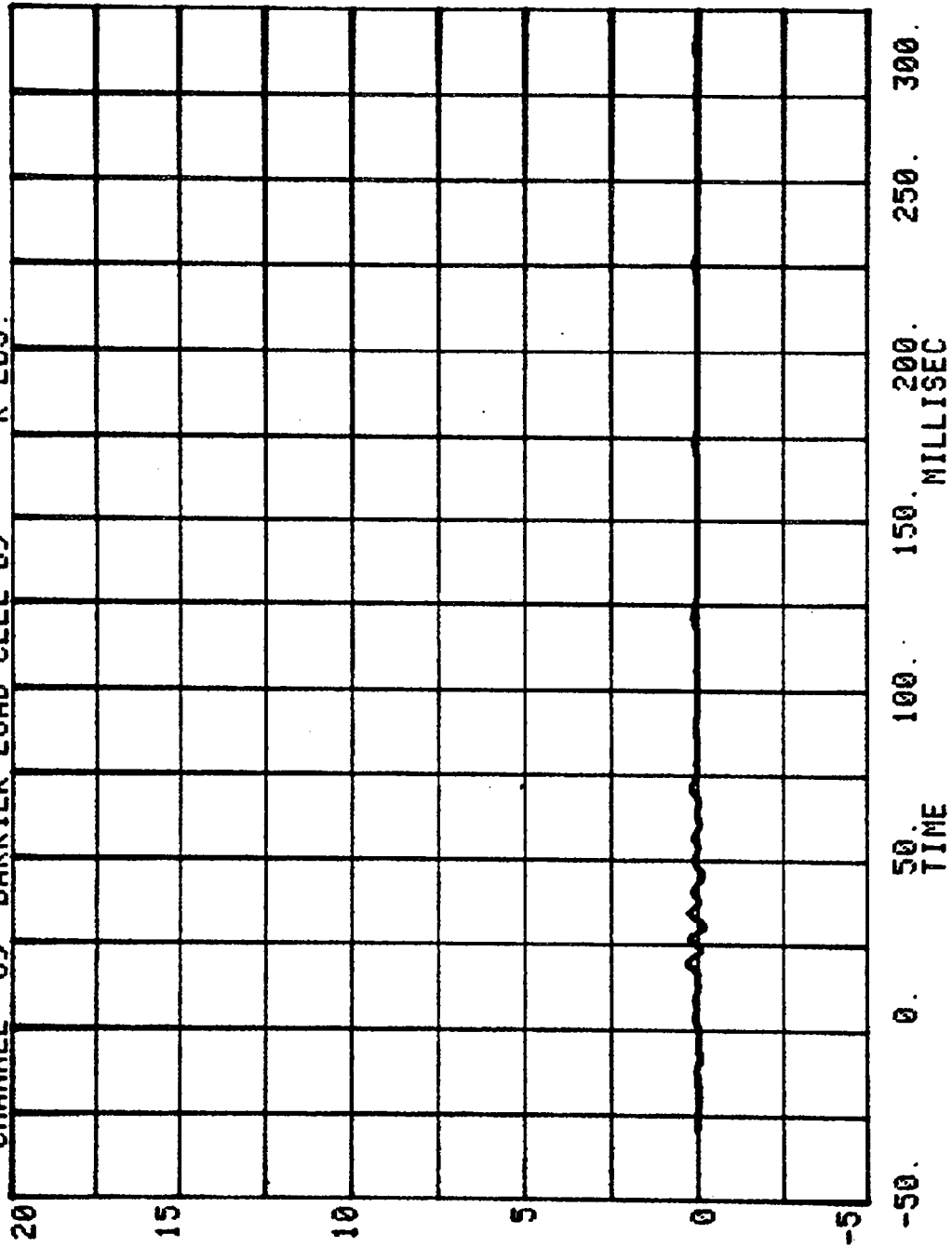
CHANNEL 67 BARRIER LOAD CELL 07  
RUN= 607 SERIES= 201 K LBS.



CHANNEL 68 BARRIER LOAD CELL D8 RUN= 607 SERIES= 201 K LBS.



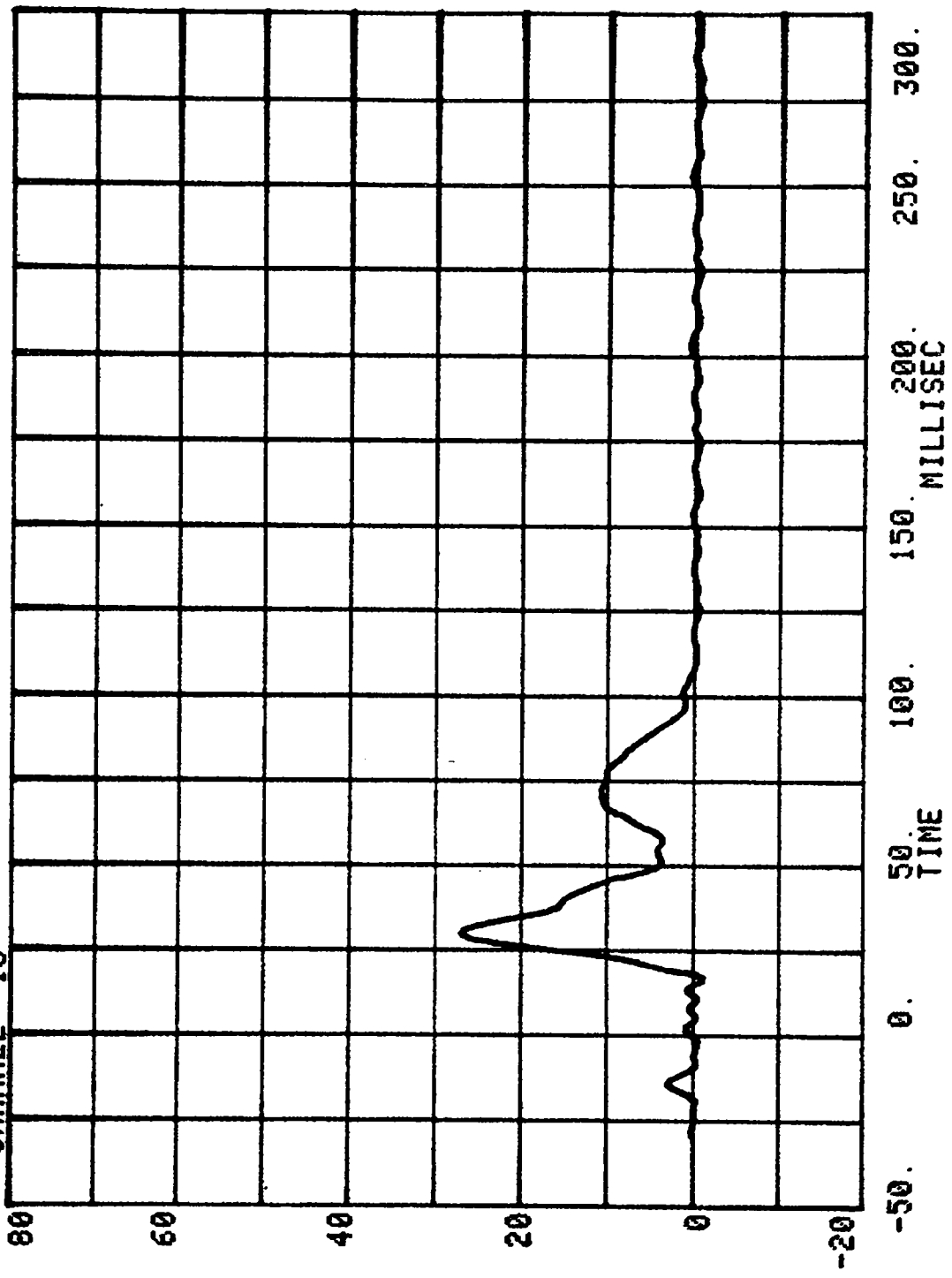
CHANNEL 69 BARRIER LOAD CELL D9 K LBS.  
RUN= 607 SERIES= 201



TOTAL ROW A

RUN= 607 SERIES= 201

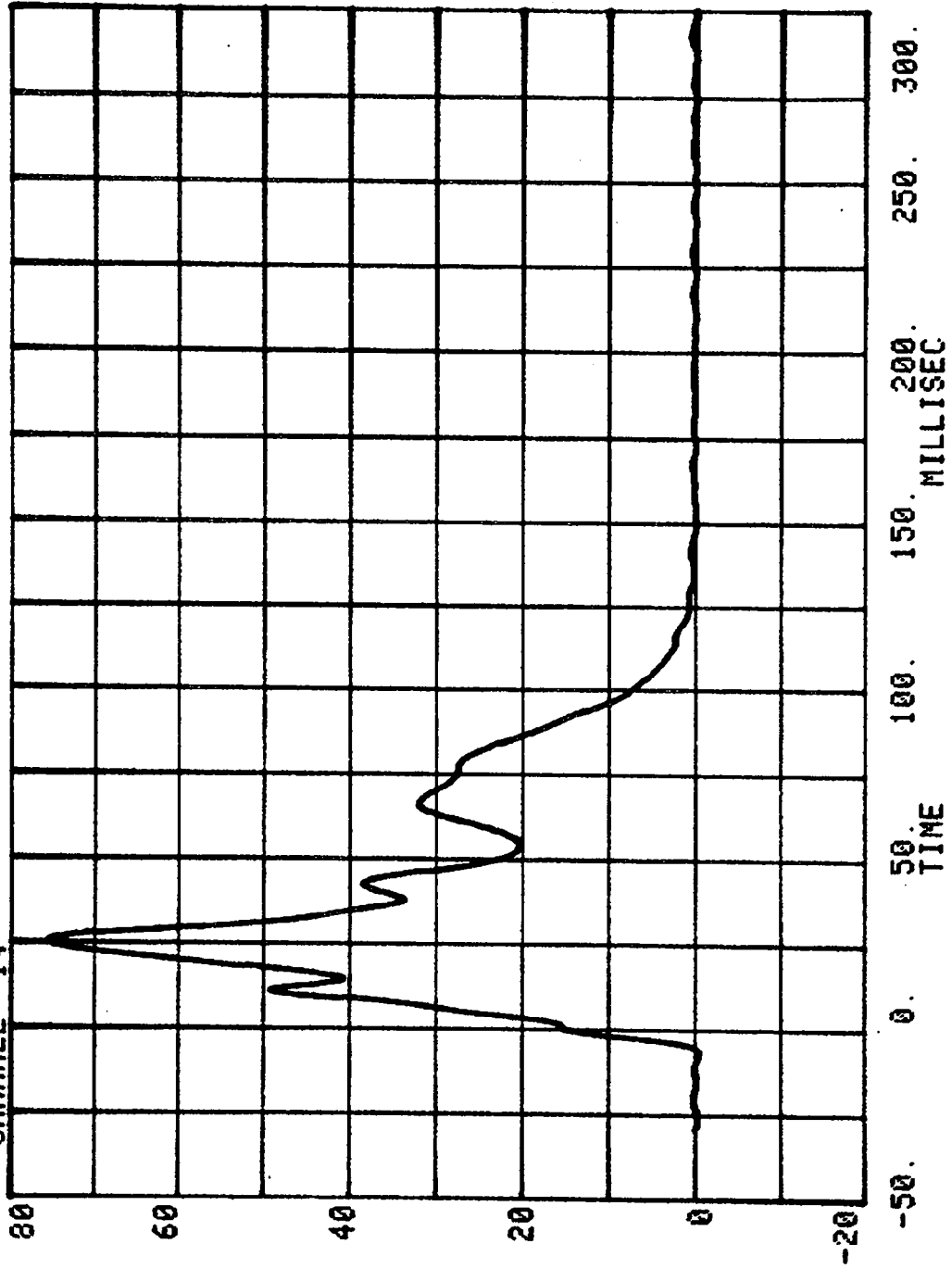
CHANNEL 13



TOTAL ROW B

RUN= 607 SERIES= 201

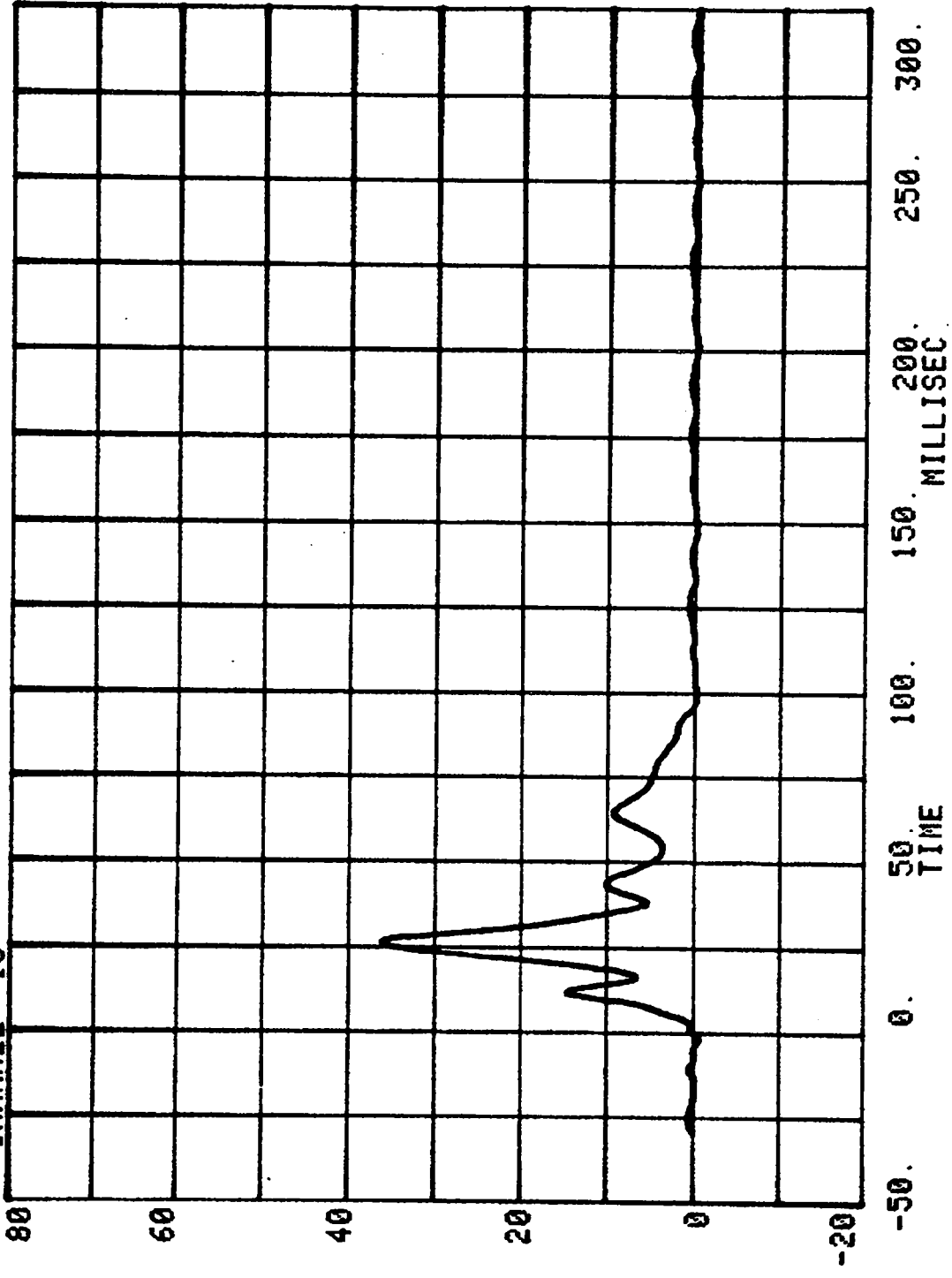
CHANNEL 14



TOTAL ROW C

RUN= 607 SERIES= 201

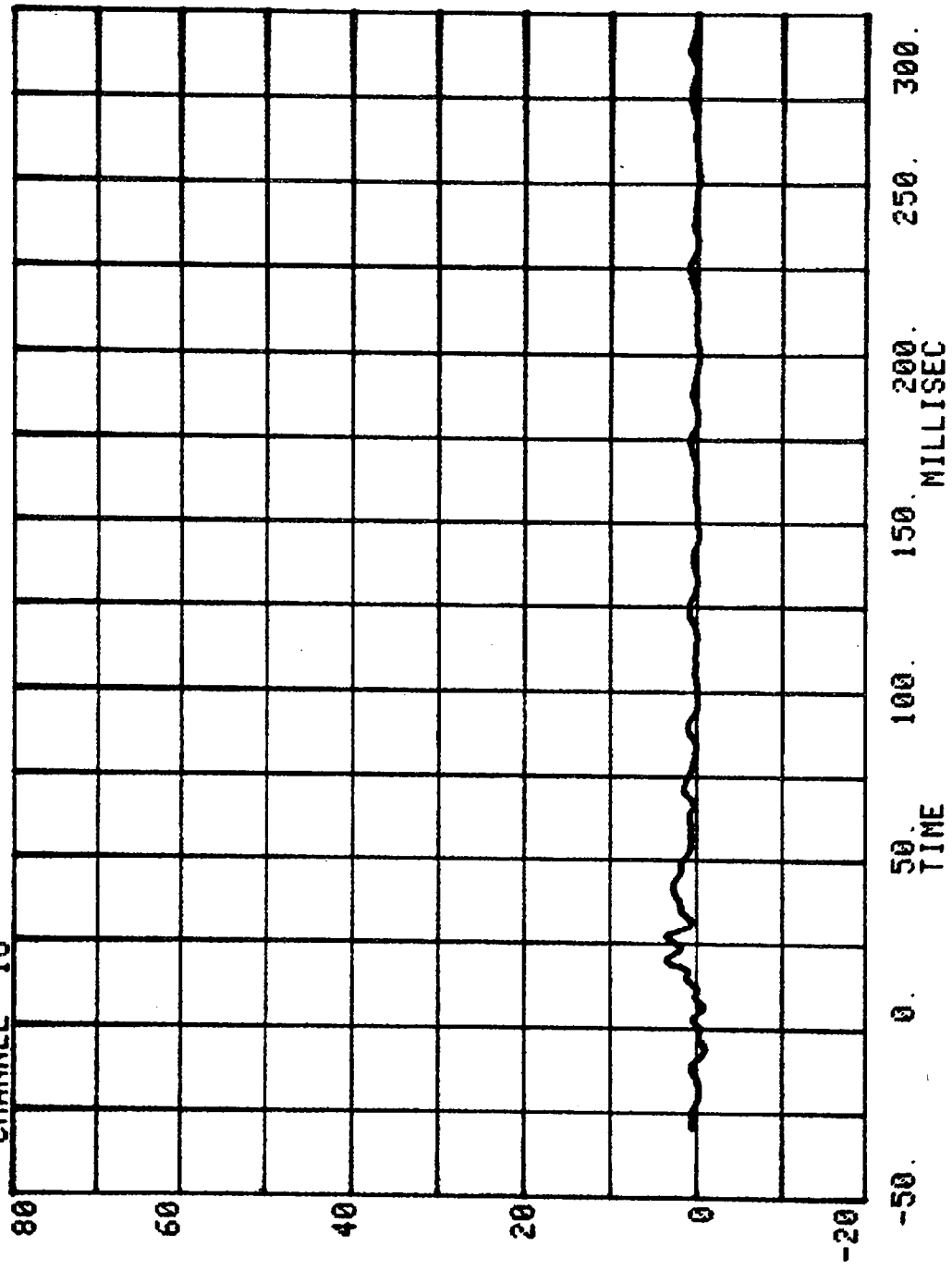
CHANNEL 15



TOTAL ROW D

RUN= 607 SERIES= 201

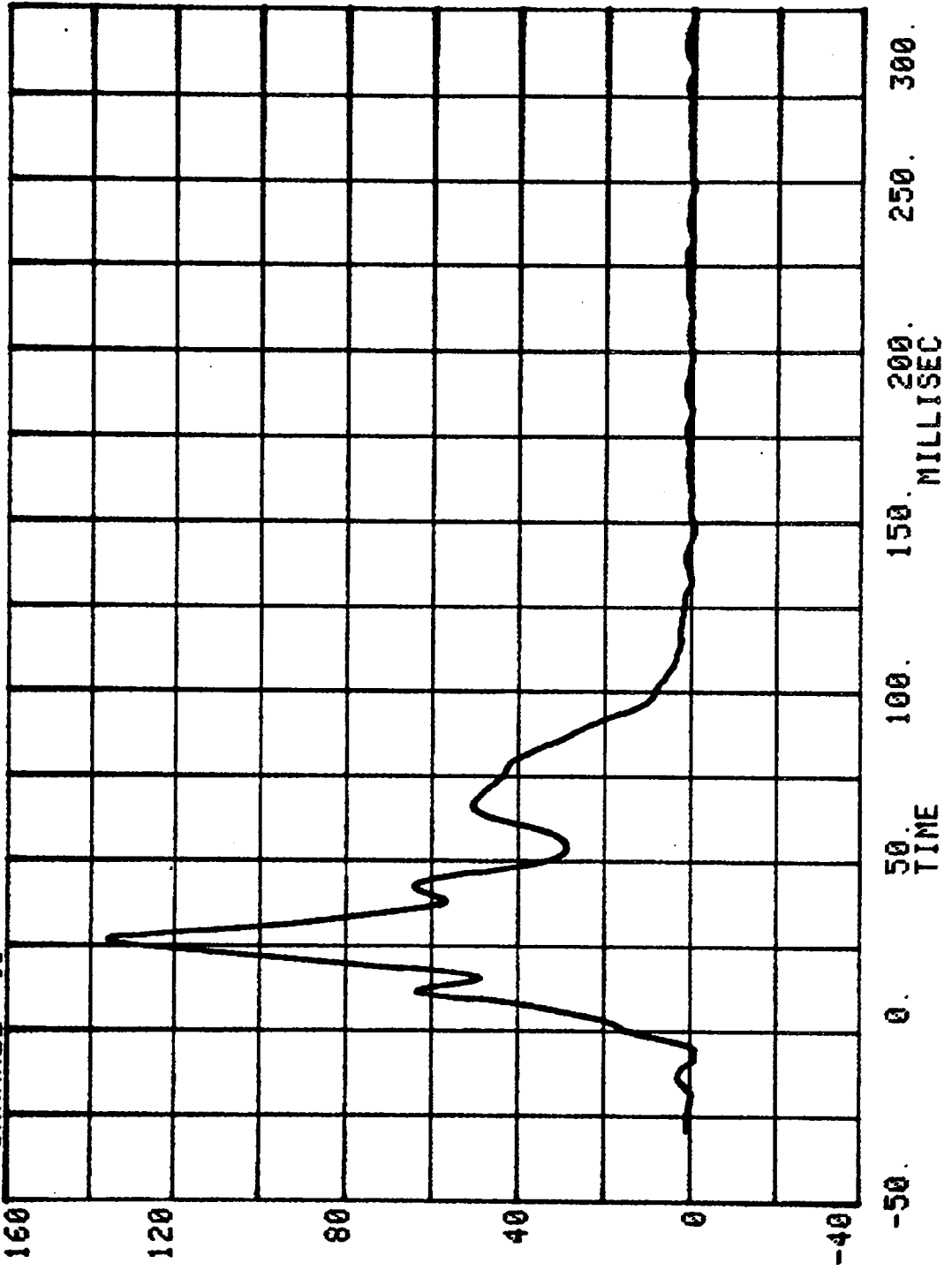
CHANNEL 16



TOTAL ROW A+B+C+D

RUN= 607 SERIES= 201

CHANNEL 19



TEST NO. CE0201

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= 607

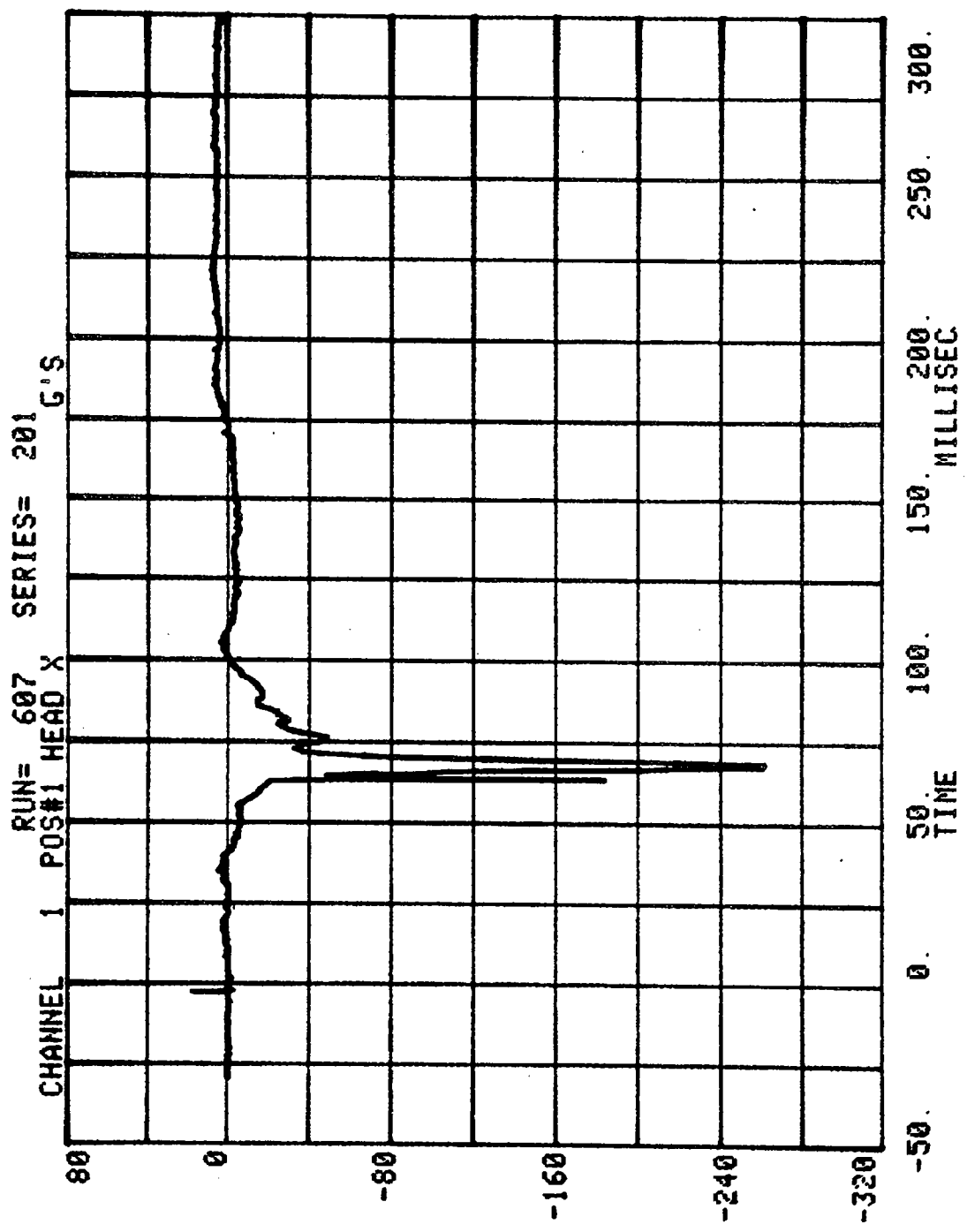
POS#1 HEAD RESULTANT

HIC#2954.5 FROM T1= .06352 TO T2= .07485

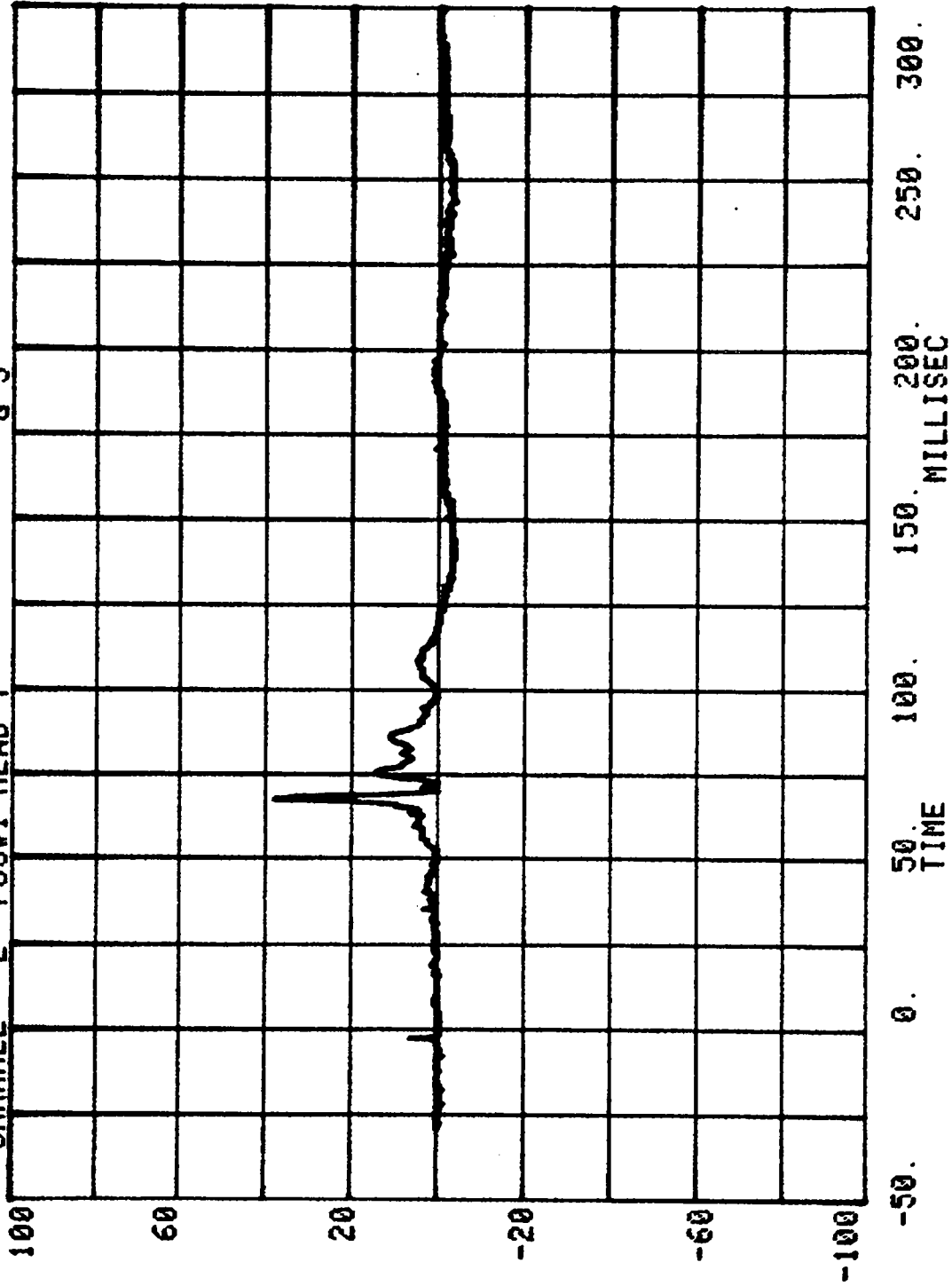
AVERAGE ACCELERATION BETWEEN T1 AND T2= 146.8G'S

EVENT TIME= 300.0 MSEC

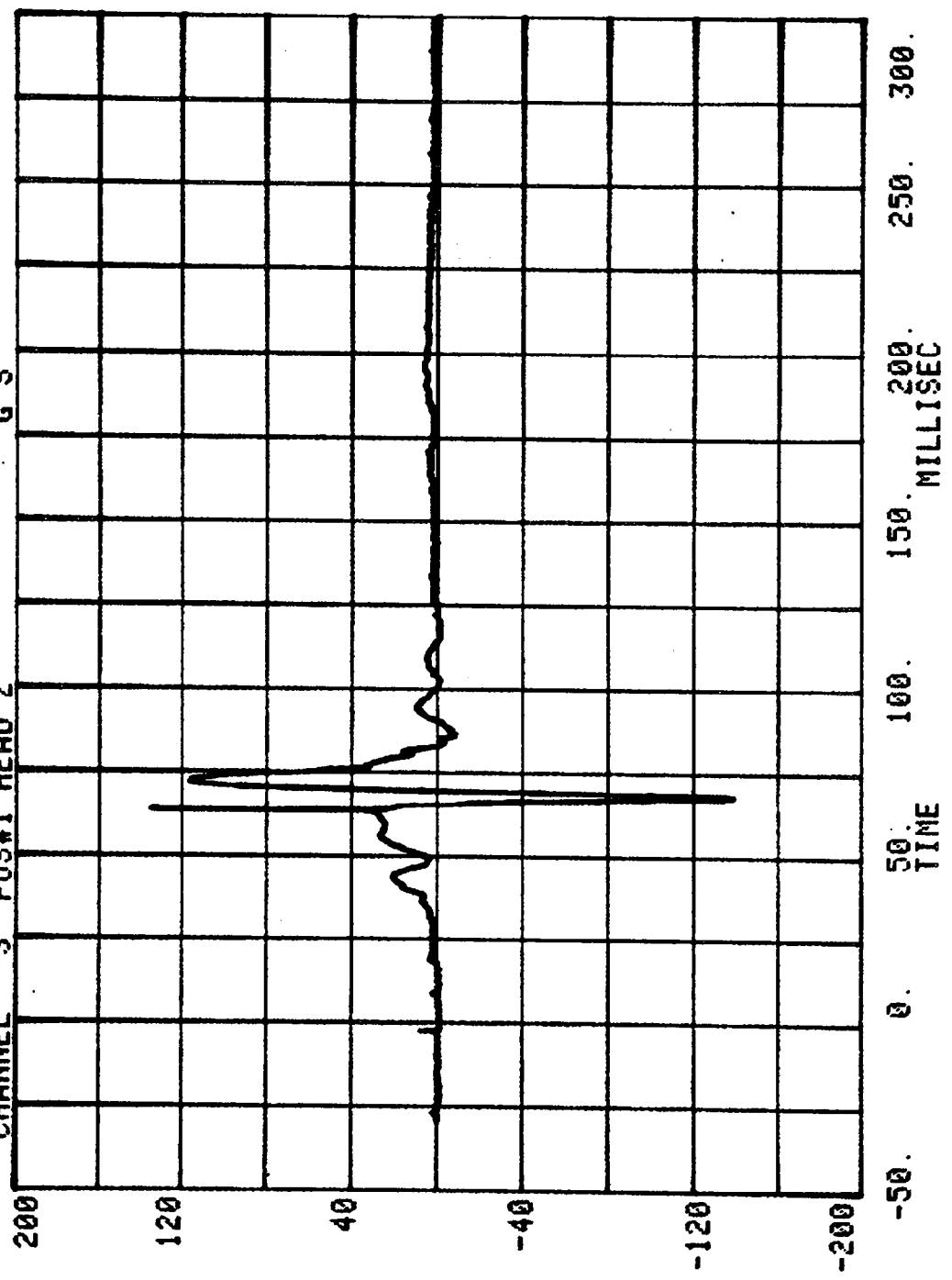
SEVERITY INDEX=4555.5



CHANNEL 2 POS#1 HEAD Y  
RUN= 607 SERIES= 201 G'S

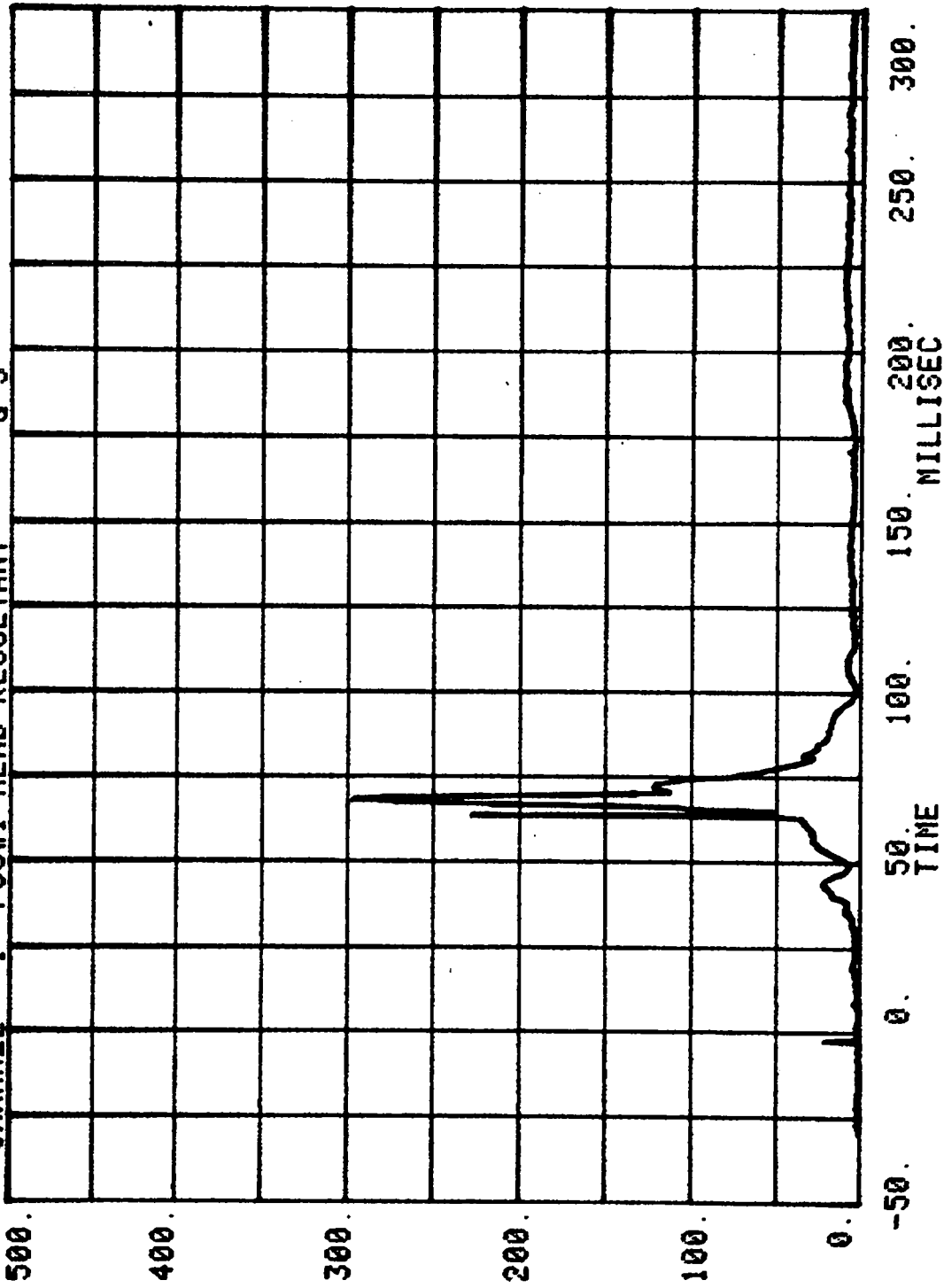


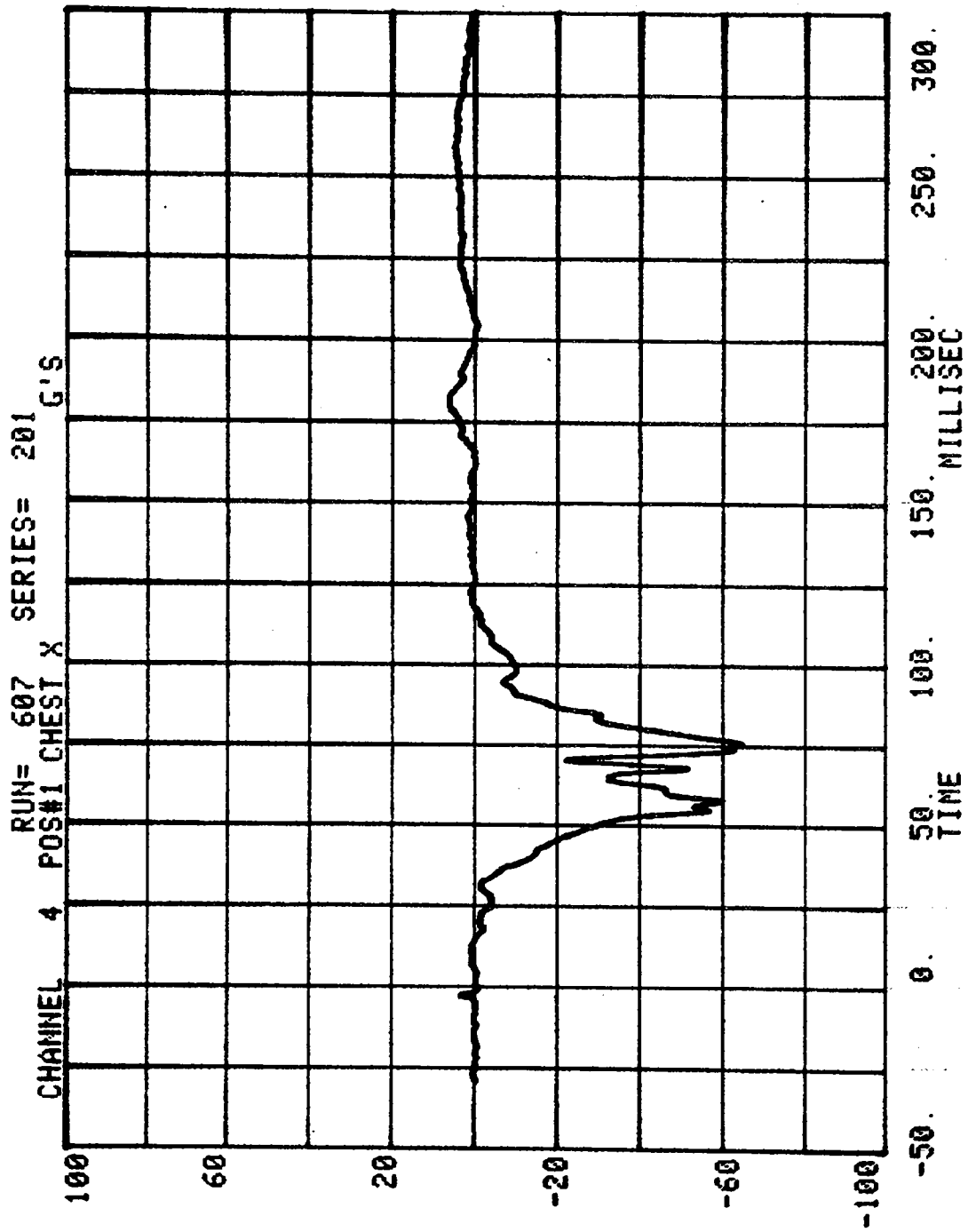
CHANNEL 3 POS#1 HEAD Z  
RUN= 607 SERIES= 201 G'S



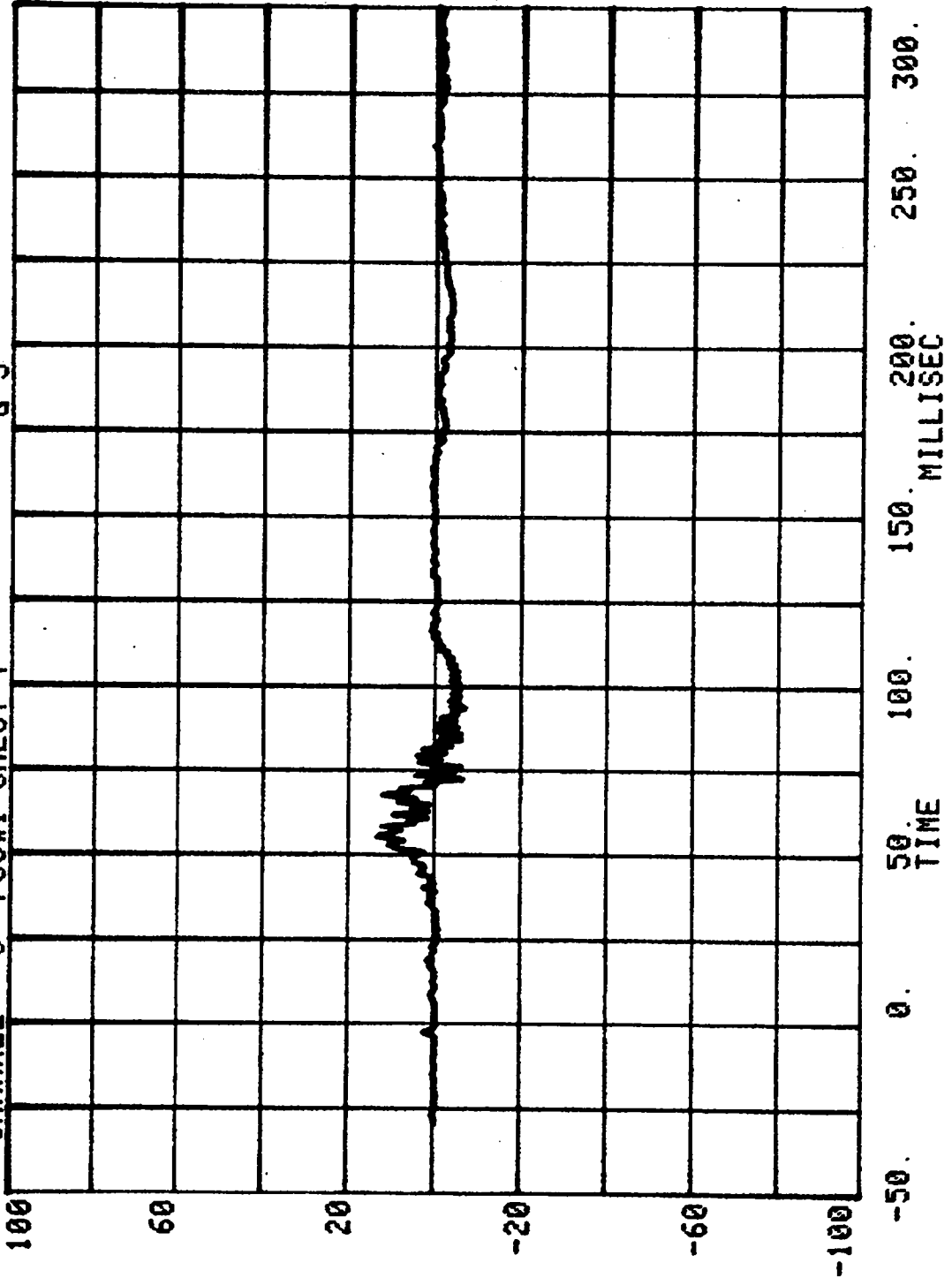
CHANNEL 1 POS#1 HEAD RESULTANT G'S

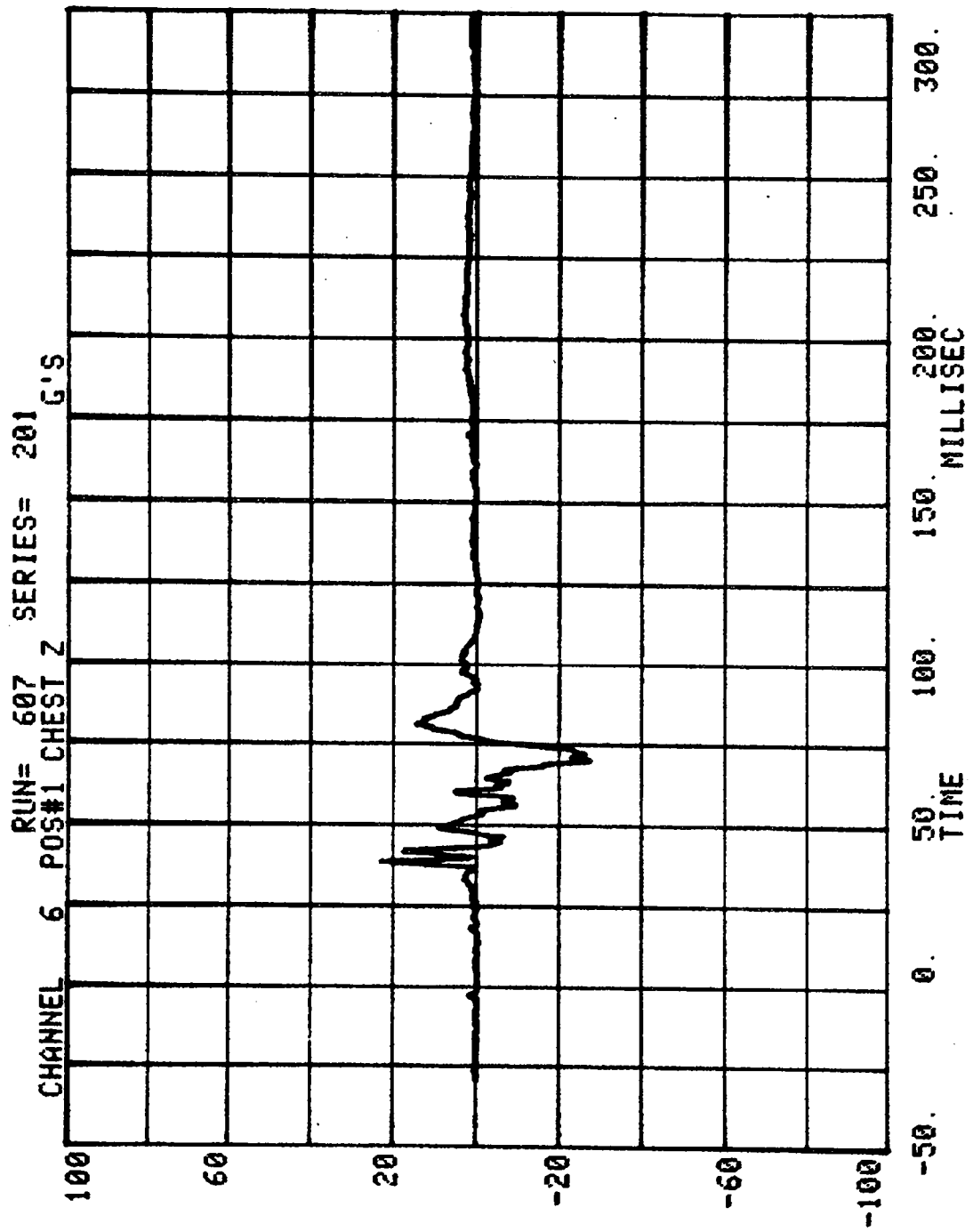
RUN= 607 SERIES= 201





CHANNEL 5 POS#1 CHEST Y SERIES= 201 G'S



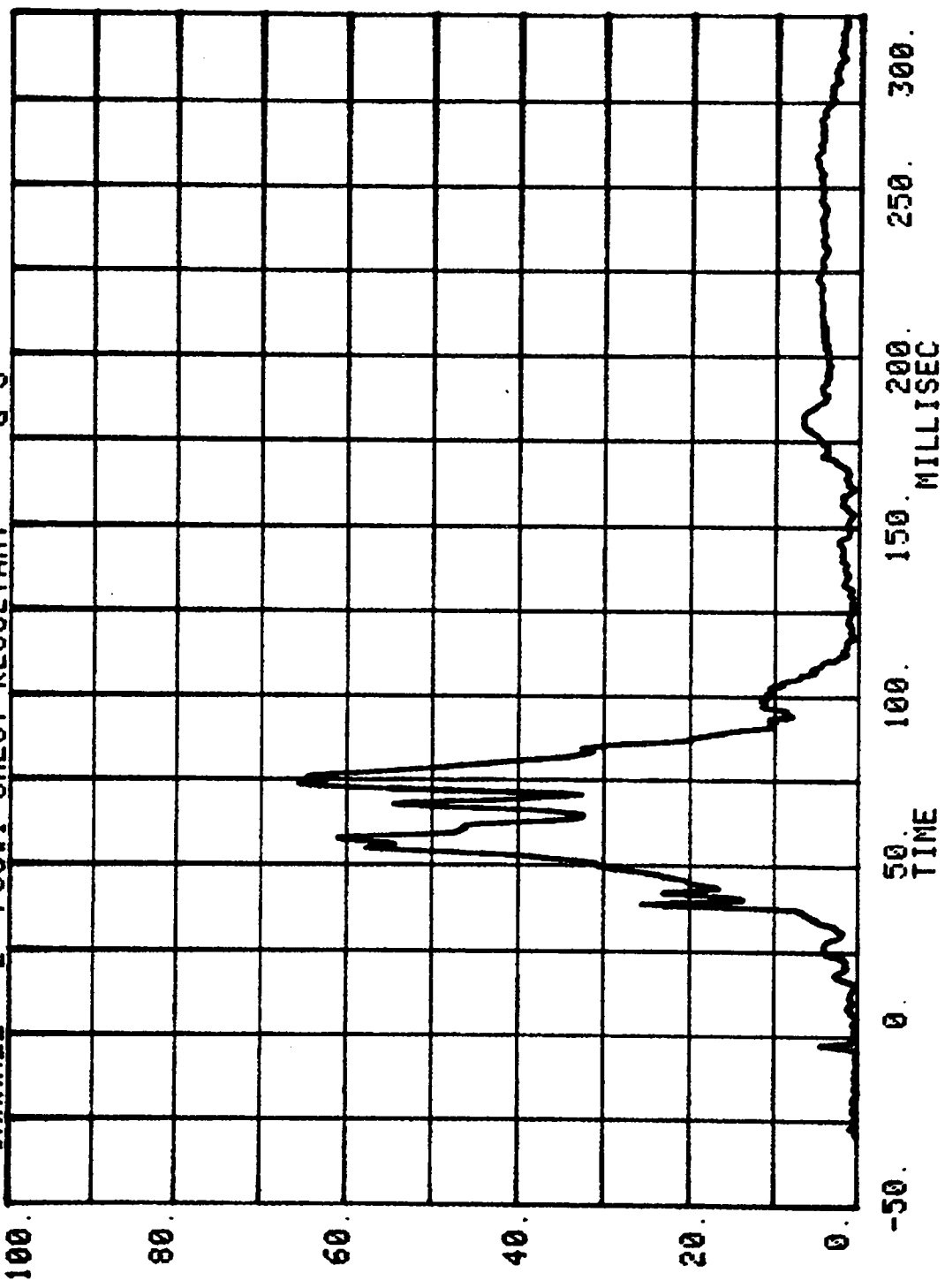


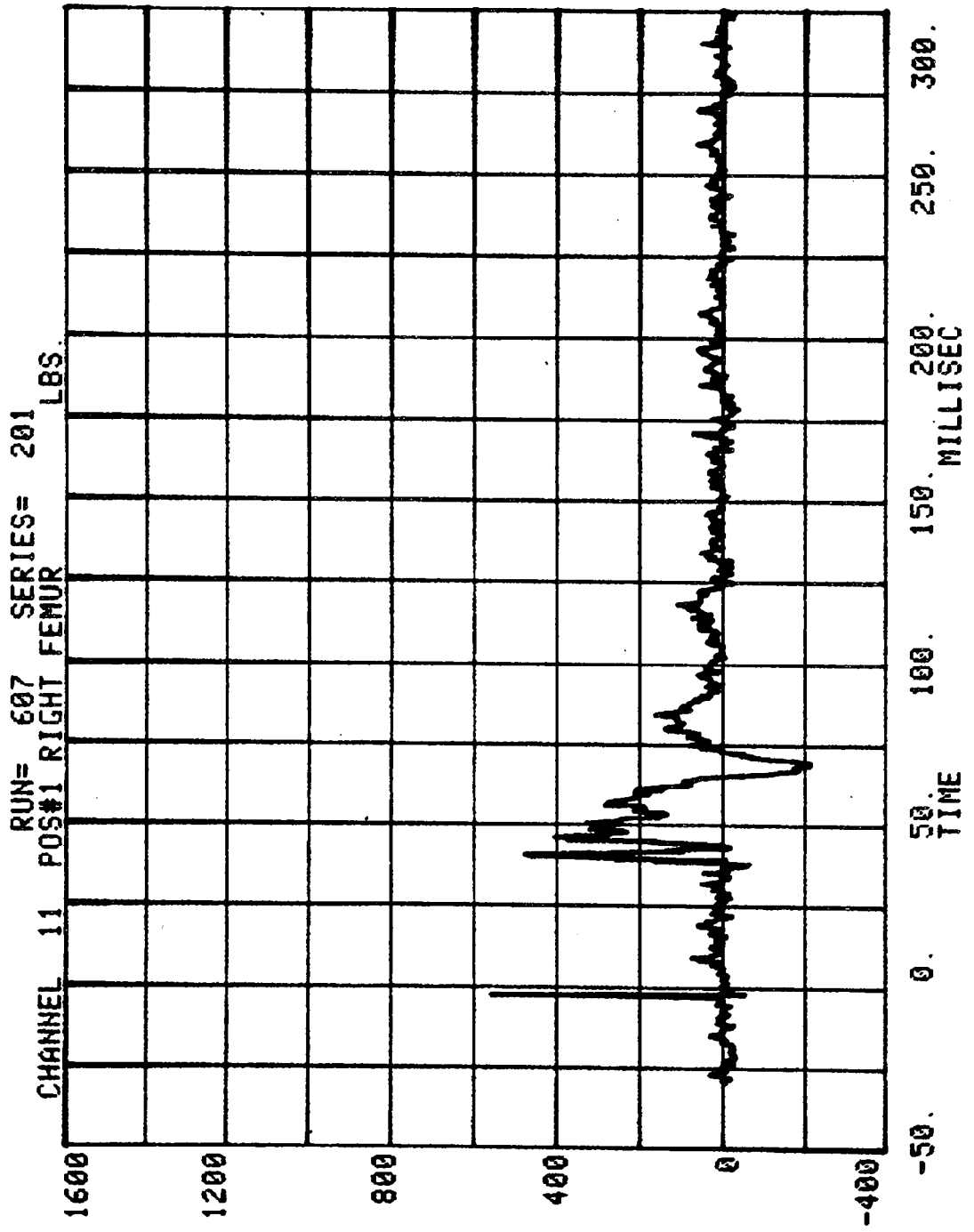
CHANNEL 2 POS#1 CHEST RESULTANT G'S

RUN= 607

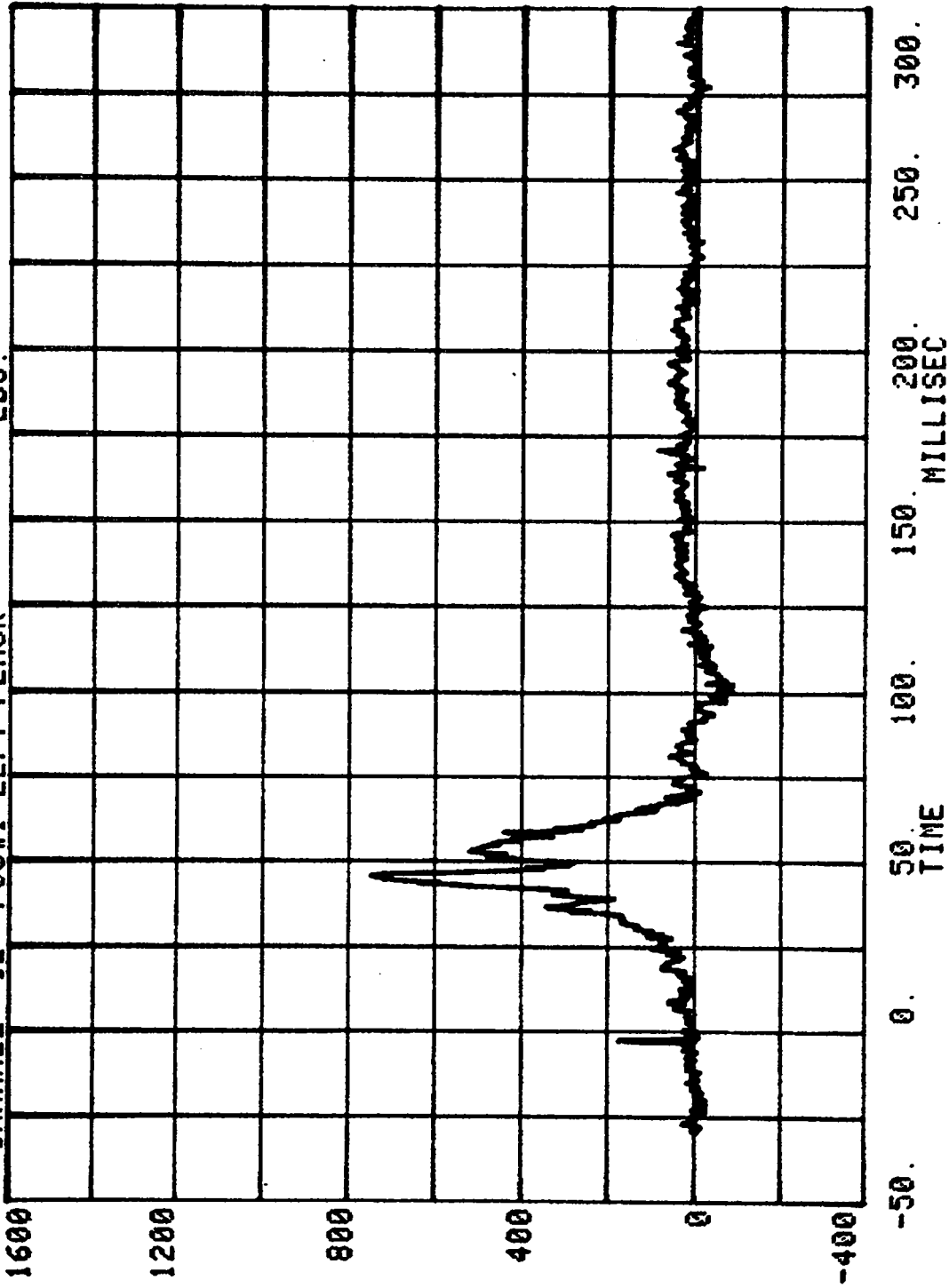
SERIES= 201

G'S





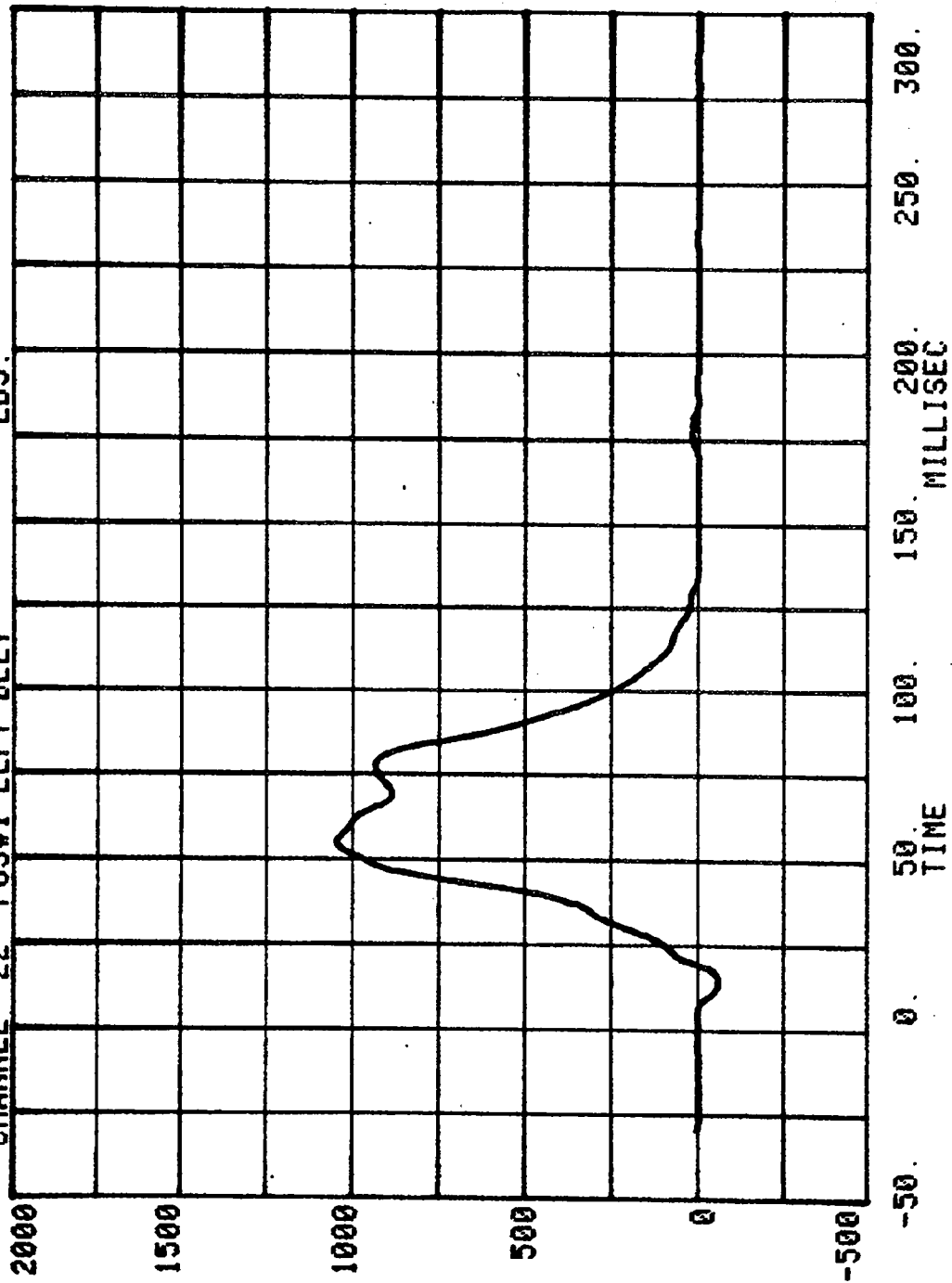
CHANNEL 12 POS#1 LEFT FEMUR  
RUN= 607 SERIES= 201 LBS.



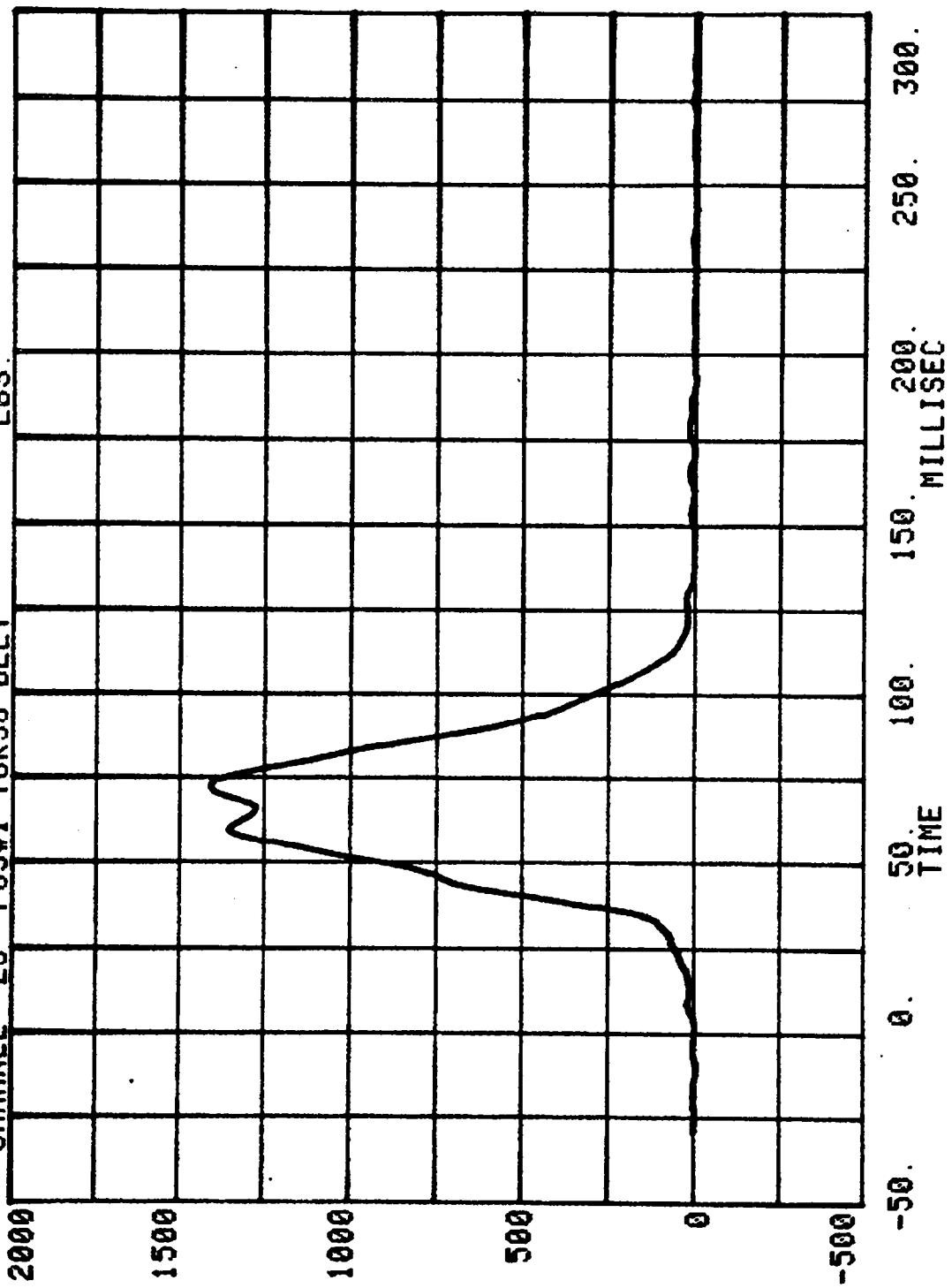
CHANNEL 22 POS#1 LEFT BELT

RUN= 607 SERIES= 201

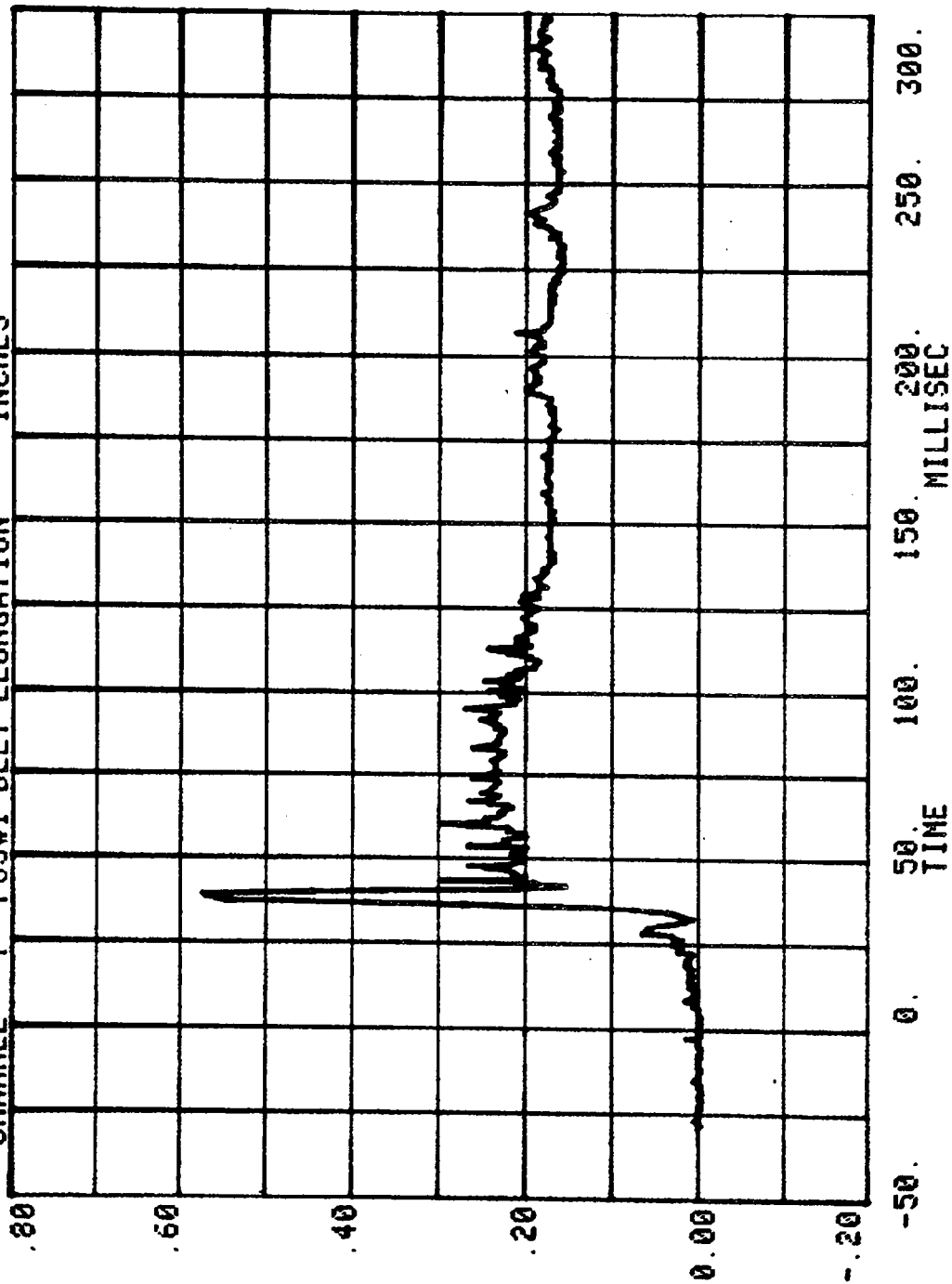
LBS.



CHANNEL 23 POS#1 TORSO BELT  
RUN= 607 SERIES= 201 LBS.

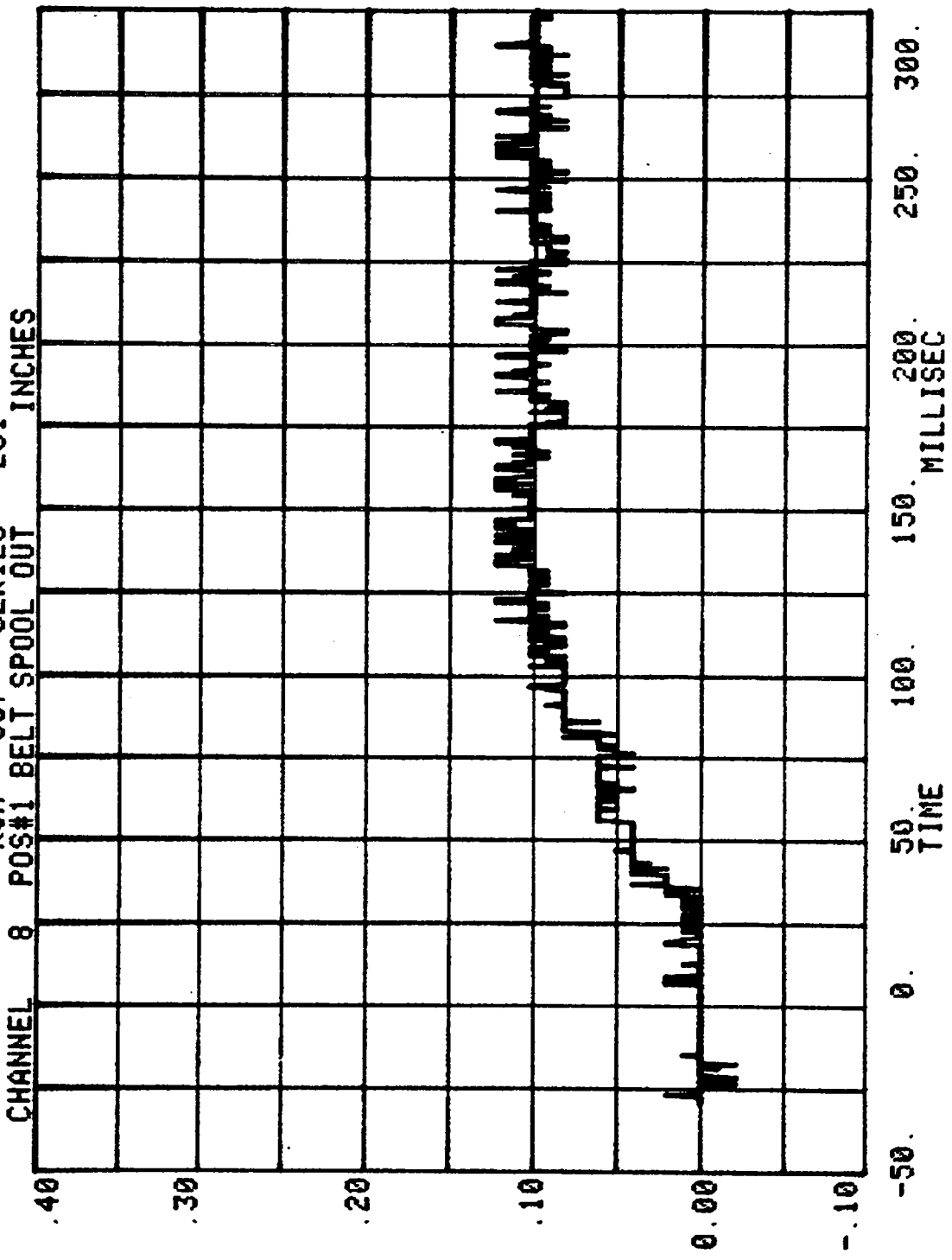


CHANNEL 7 POS#1 BELT ELONGATION SERIES= 201 INCHES MEASURED OVER 3 INCHES



CHANNEL 8 POS#1 BELT SPOOL OUT

RUN= 607 SERIES= 201



HEAD INJURY CRITERION  
HEAD SEVERITY INDEX

CAR TO LOAD CELL BARRIER

RUN= 607

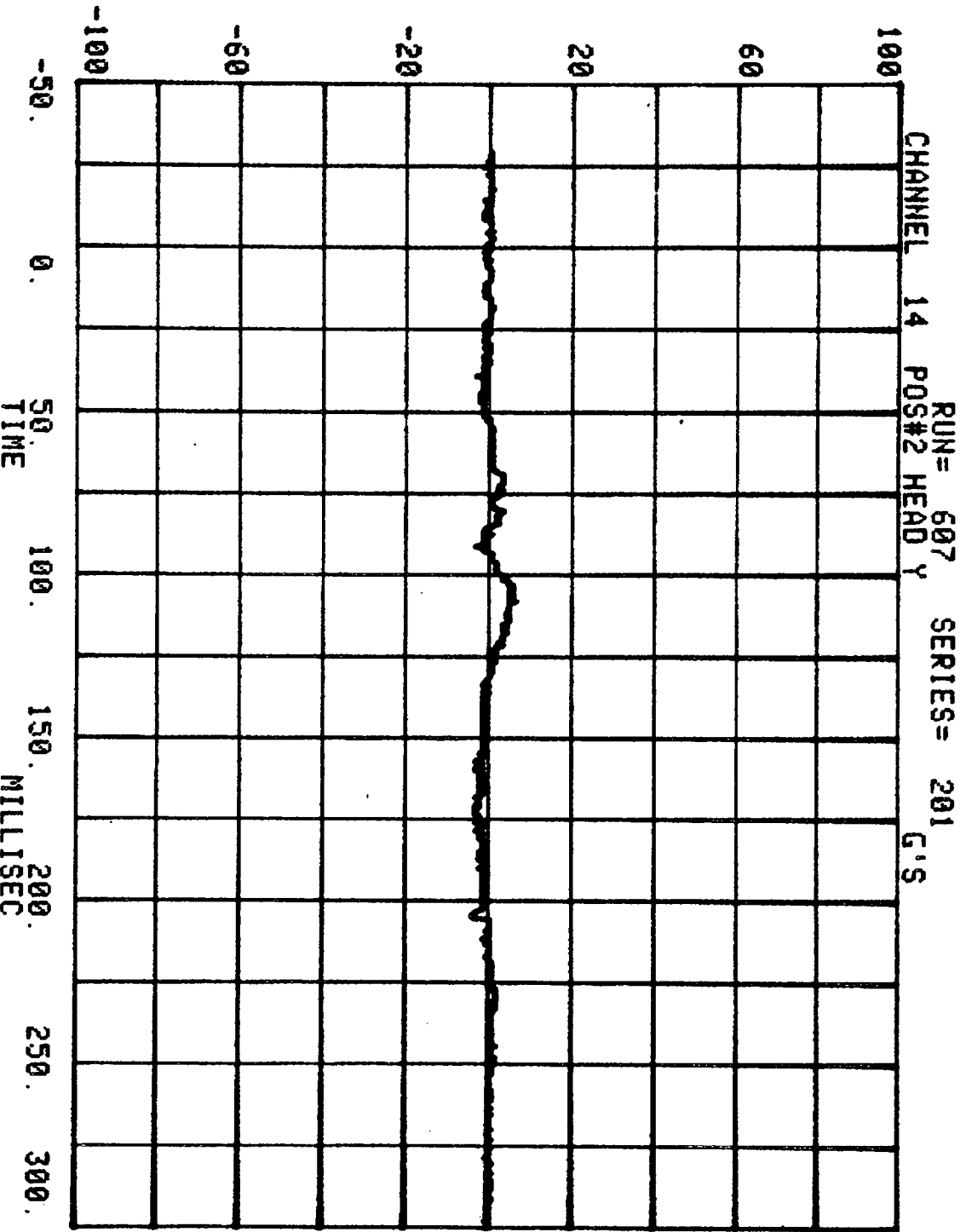
POS#2 HEAD RESULTANT

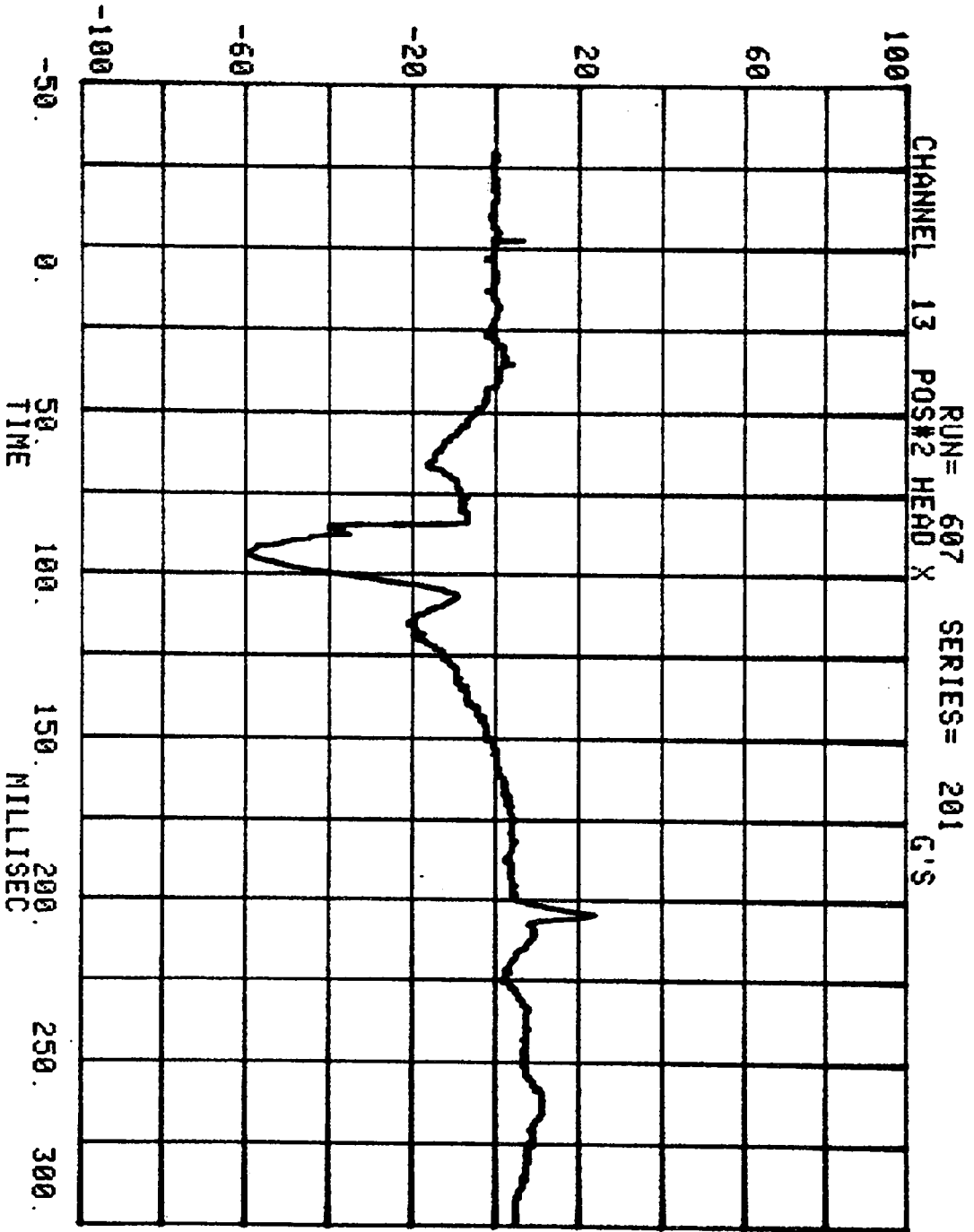
HIC=1104.3 FROM T1= .06427 TO T2= .10170

AVERAGE ACCELERATION BETWEEN T1 AND T2= 61.4G'S

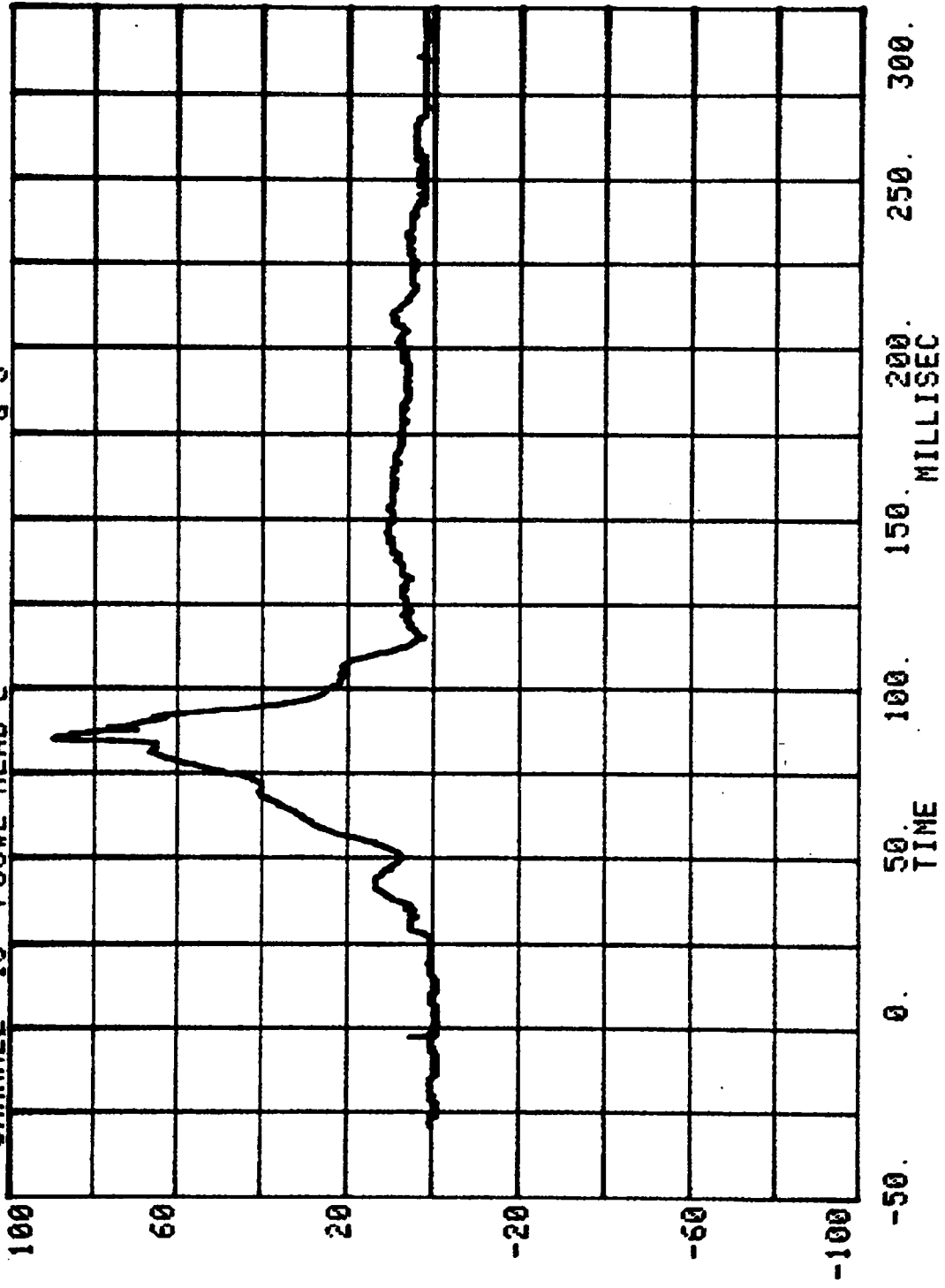
EVENT TIME= 300.0 MSEC

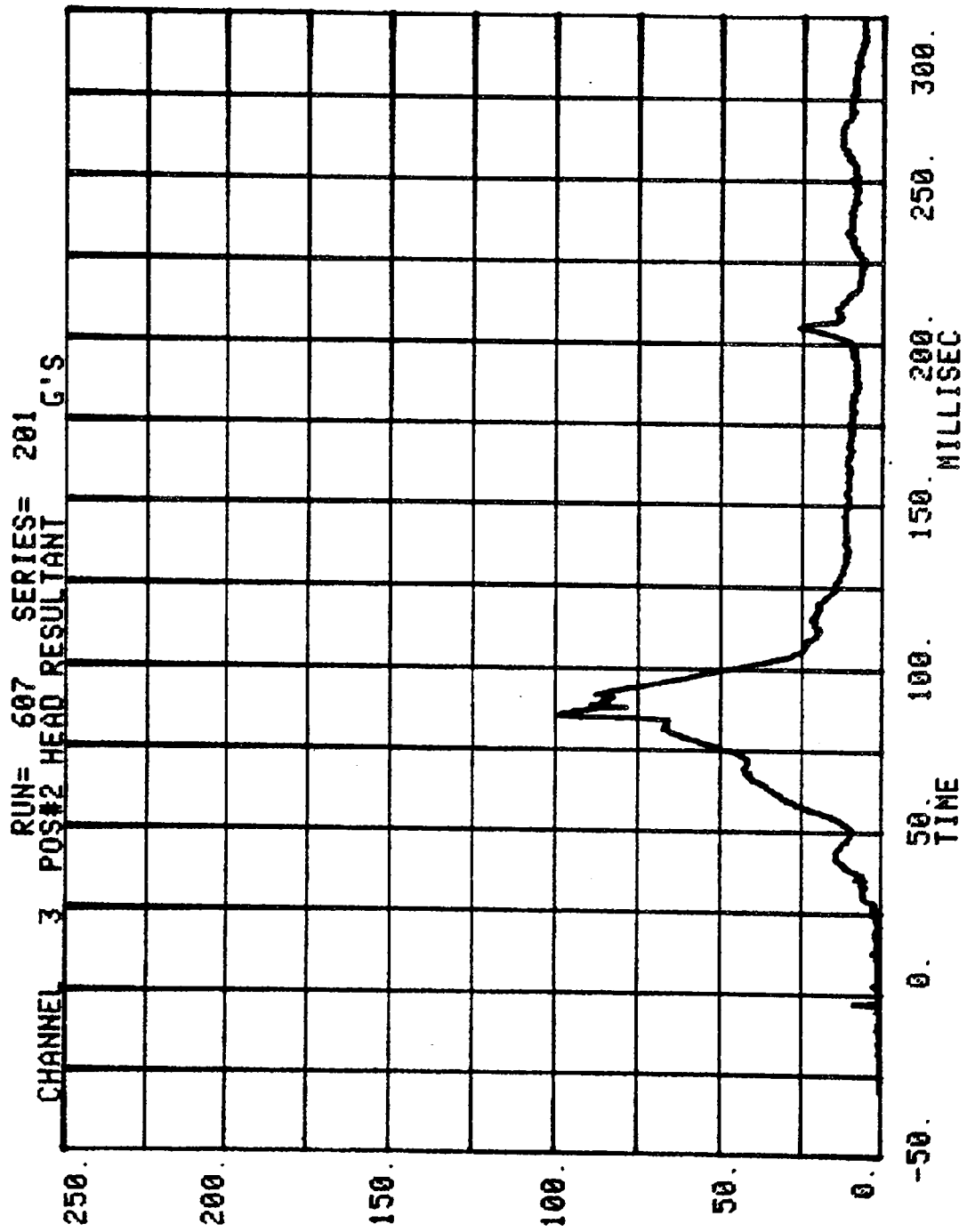
SEVERITY INDEX=1449.4



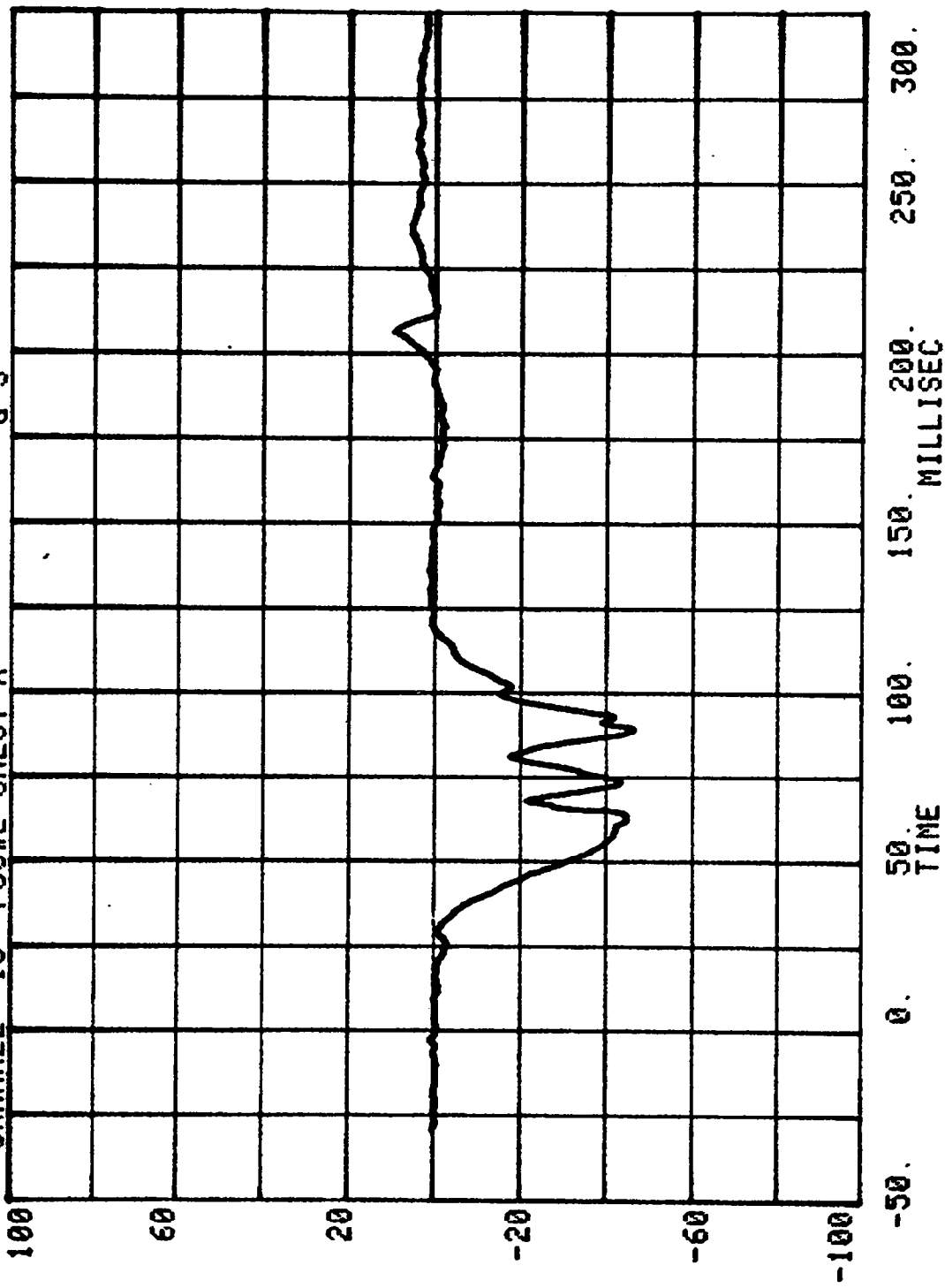


CHANNEL 15 POS#2 HEAD Z RUN= 607 SERIES= 201 G'S

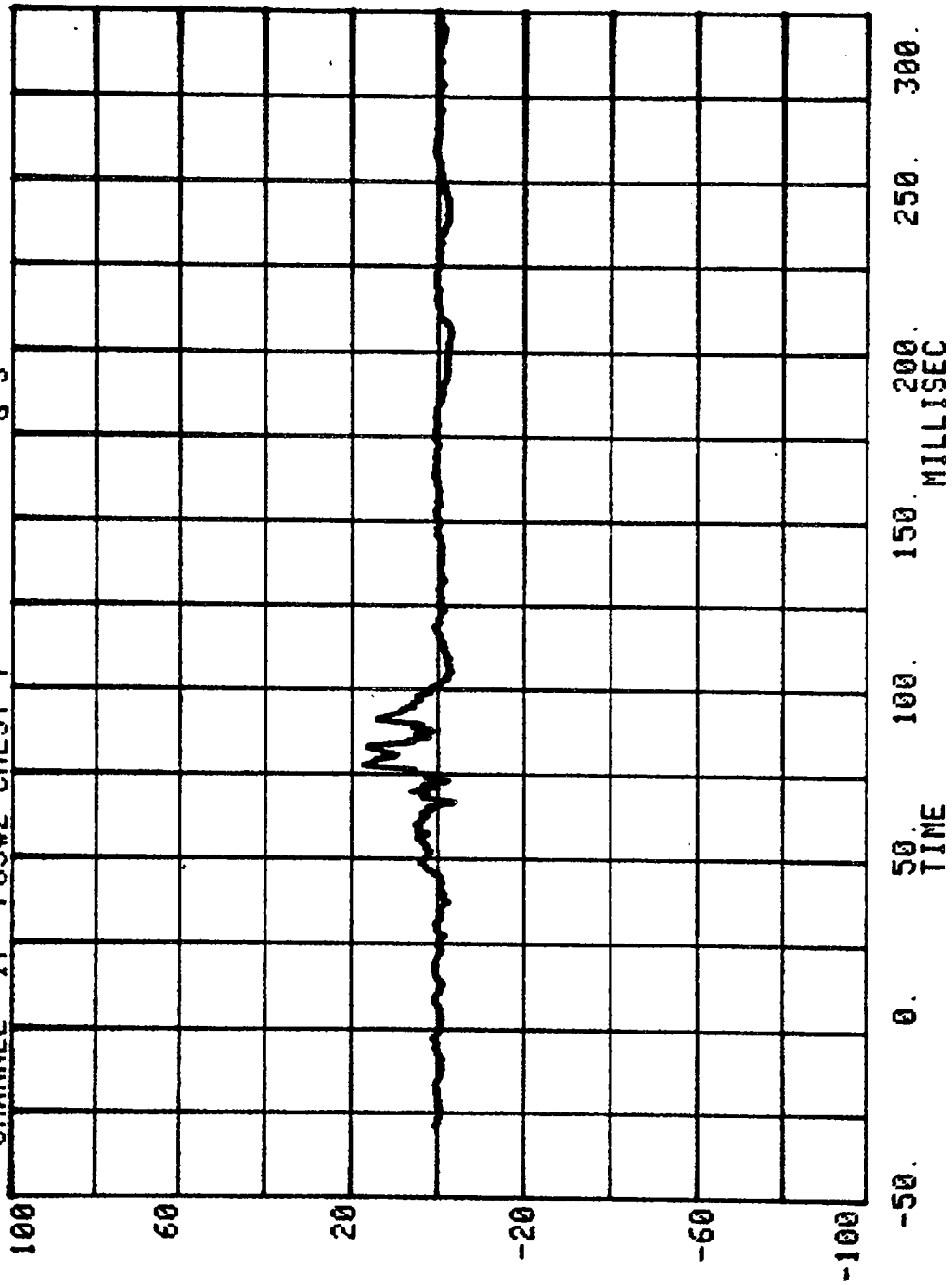




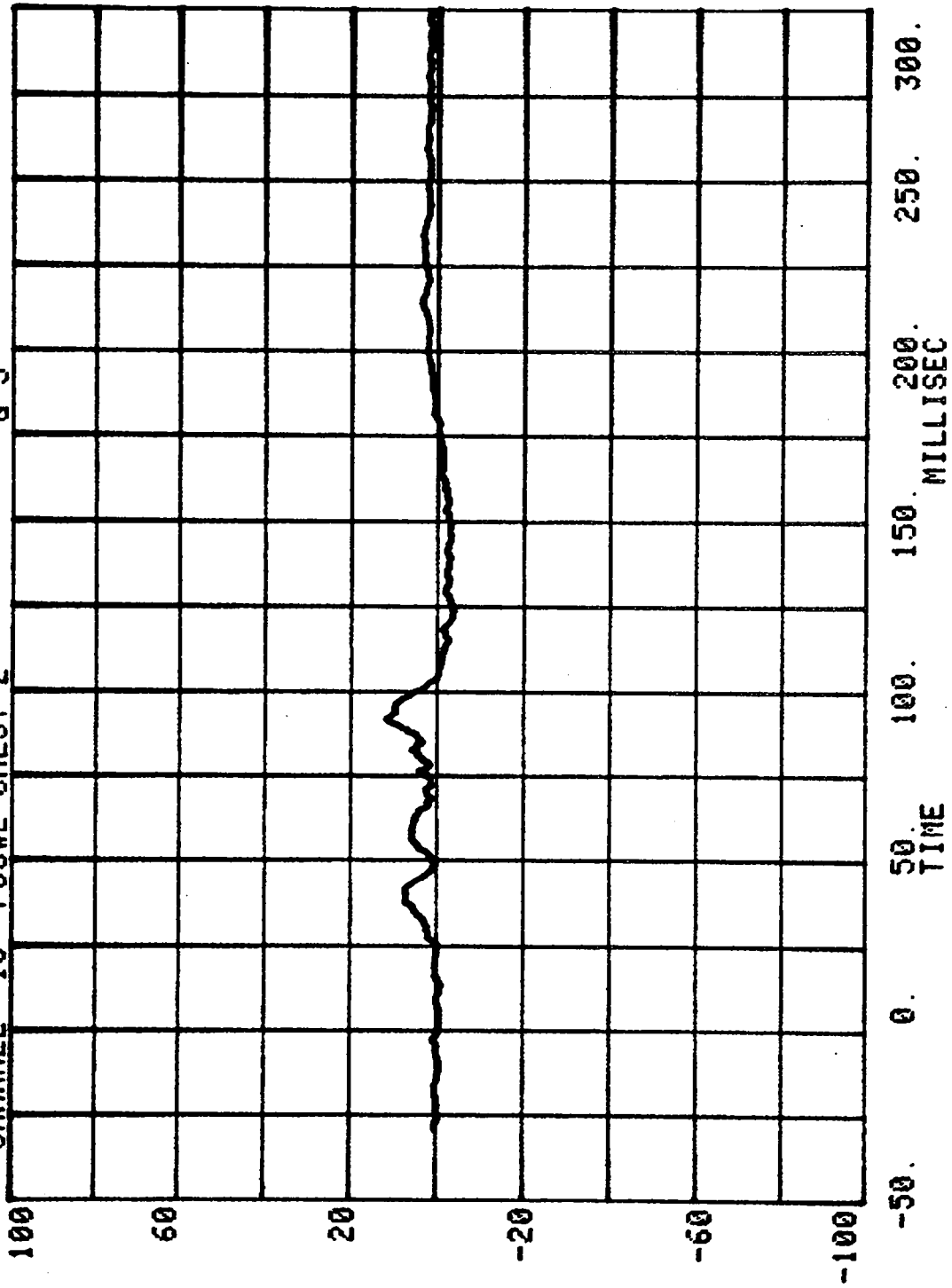
CHANNEL 16 POS#2 CHEST X  
RUN= 607 SERIES= 201 G'S

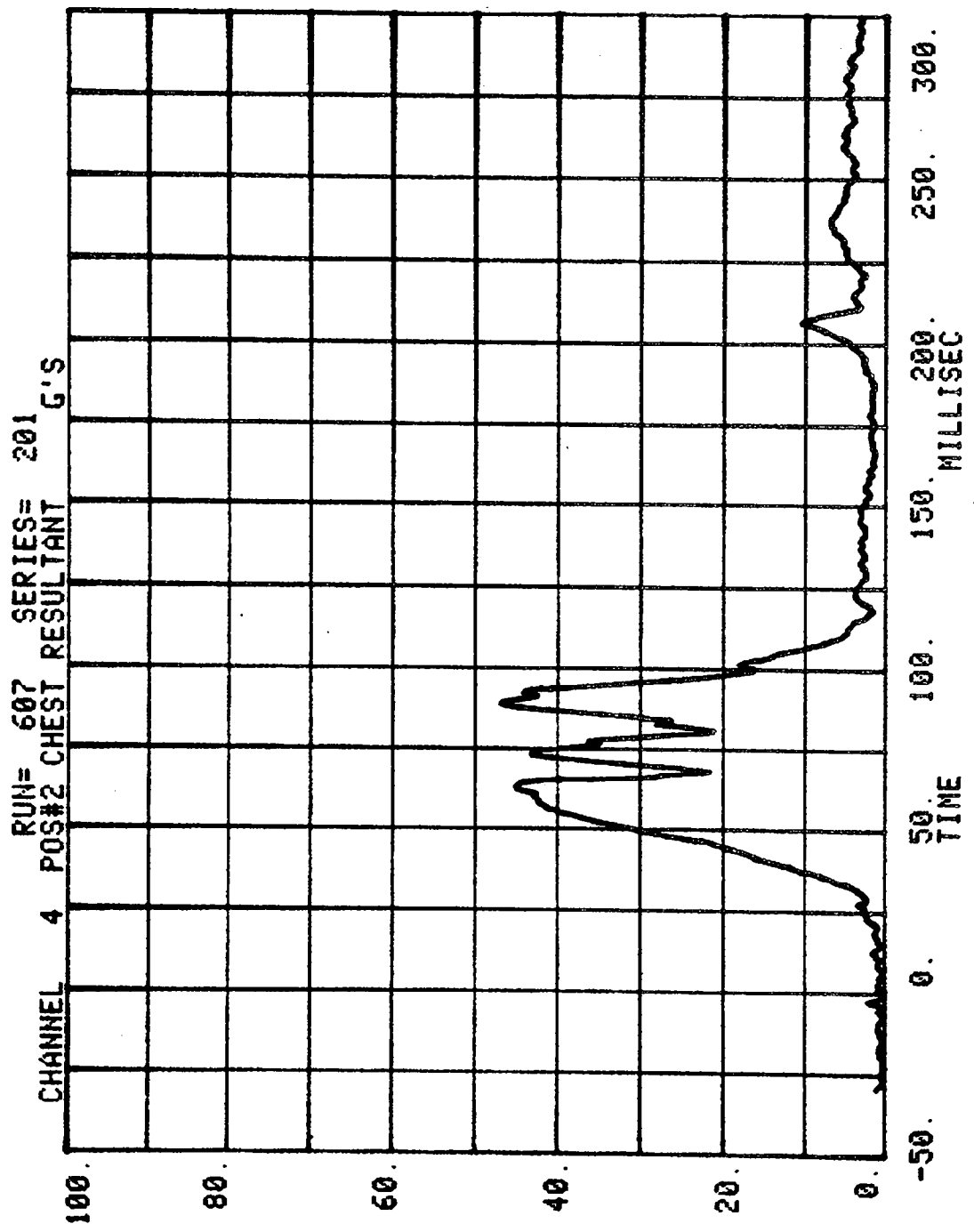


CHANNEL 17 POS#2 CHEST Y  
RUN= 607 SERIES= 201 G'S

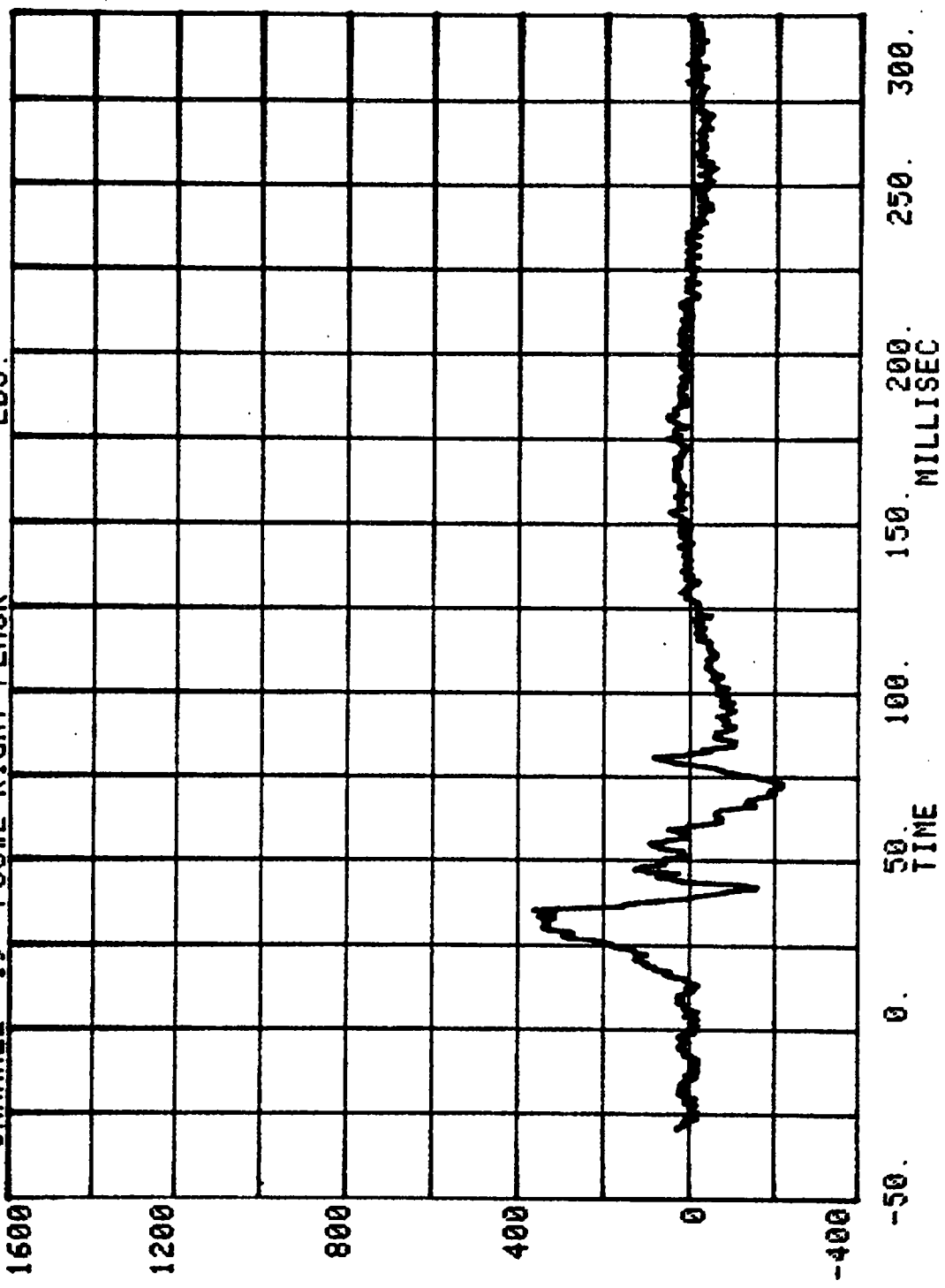


CHANNEL 18 POS#2 CHEST Z  
RUN= 607 SERIES= 201 G'S

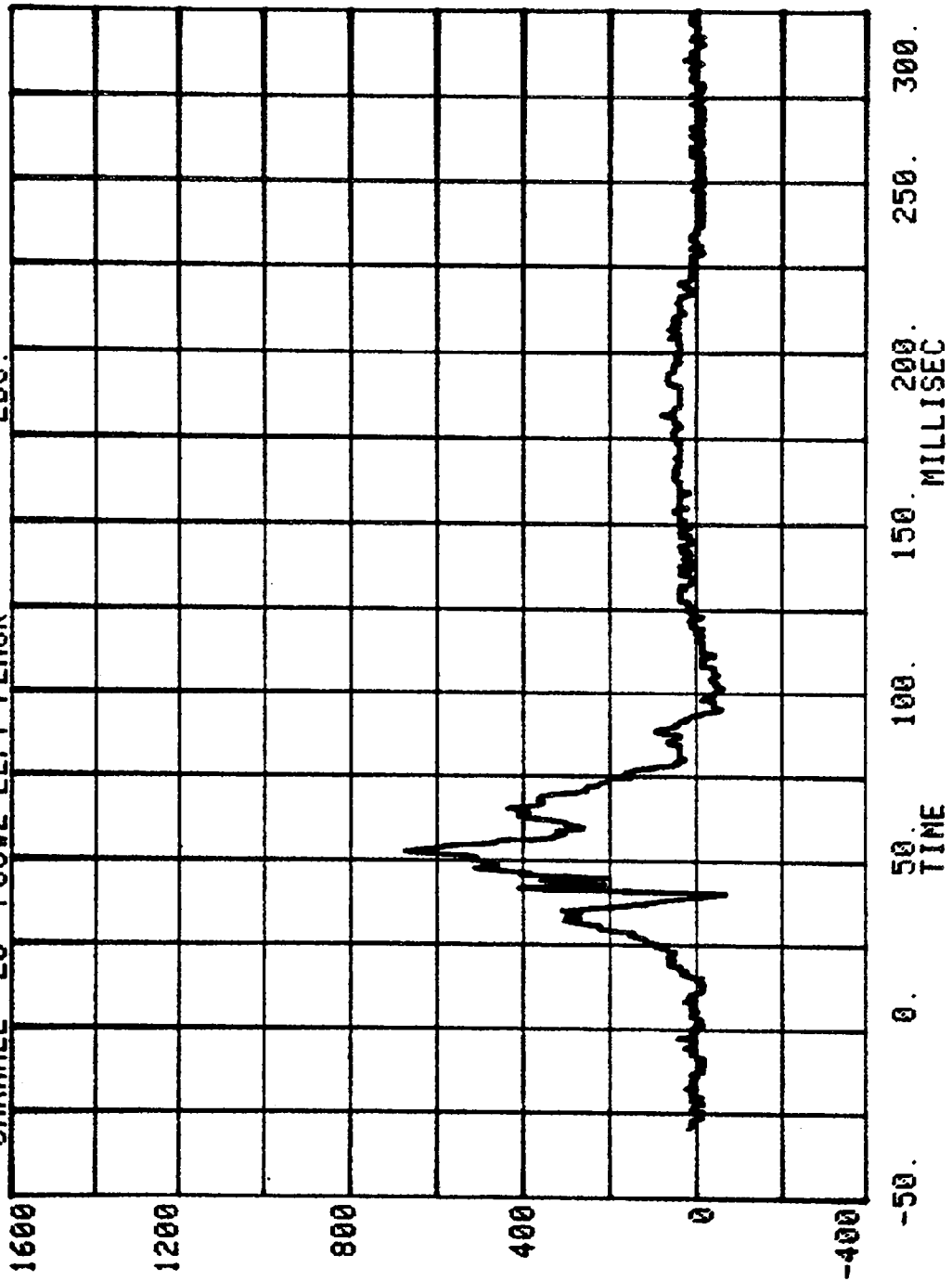




CHANNEL 19 POS#2 RIGHT FEMUR  
RUN= 607 SERIES= 201 LBS.

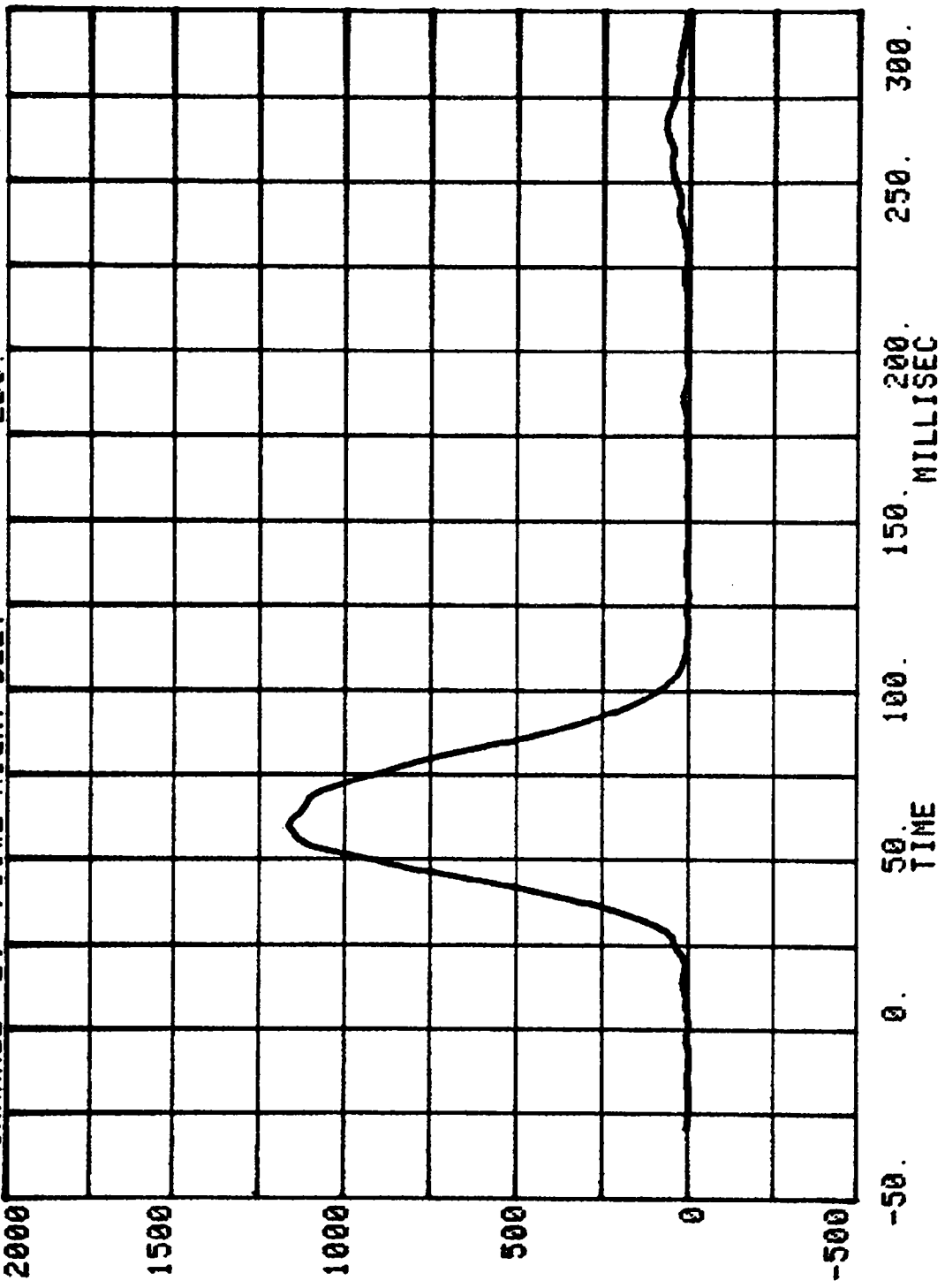


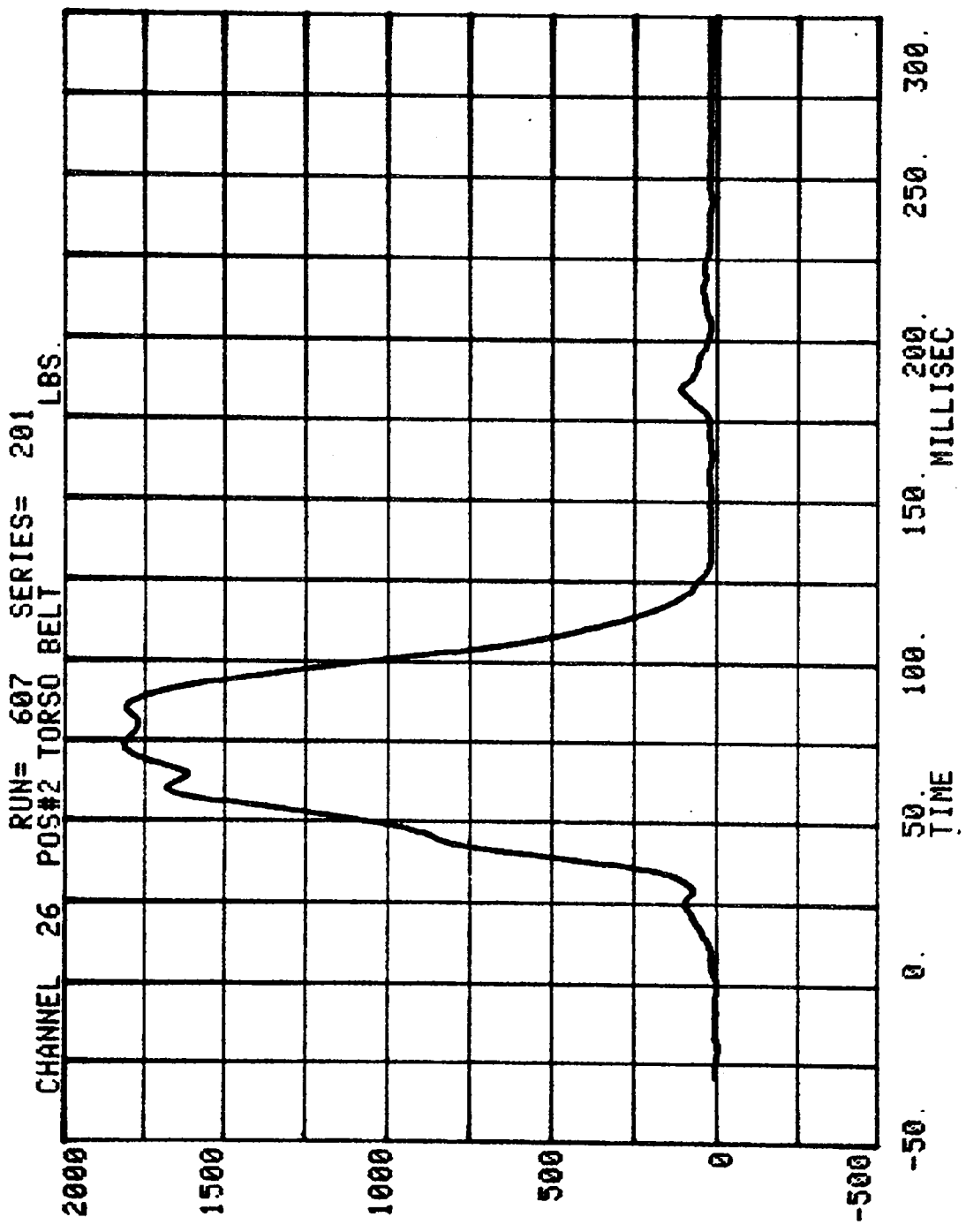
RUN= 607 SERIES= 201  
CHANNEL 20 POS#2 LEFT FEMUR LBS.



CHANNEL 24 POS#2 RIGHT BELT LBS.

RUN= 607 SERIES= 201



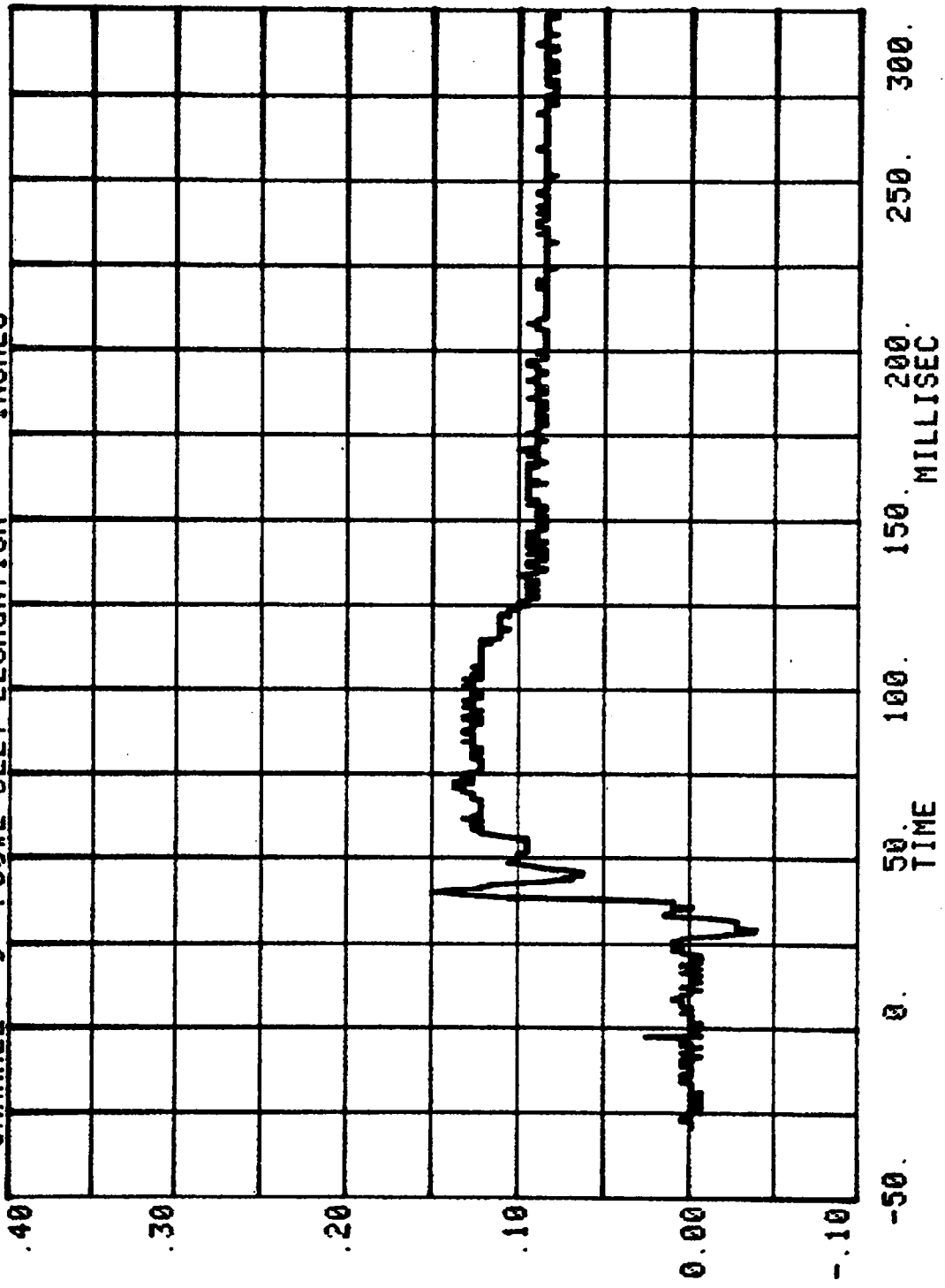


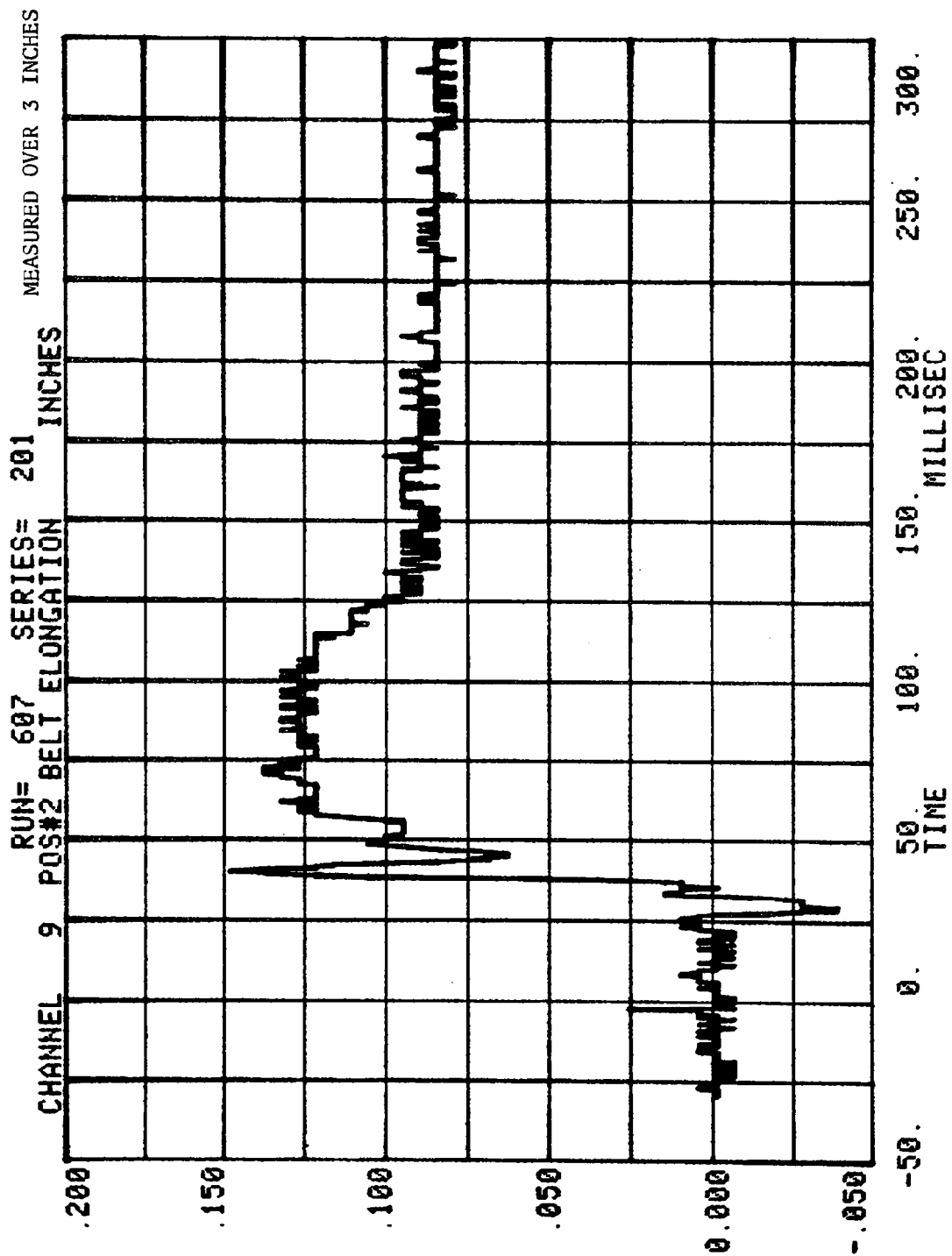
CHANNEL 9 POS#2 BELT ELONGATION SERIES= 201 INCHES

RUN= 607

SERIES= 201

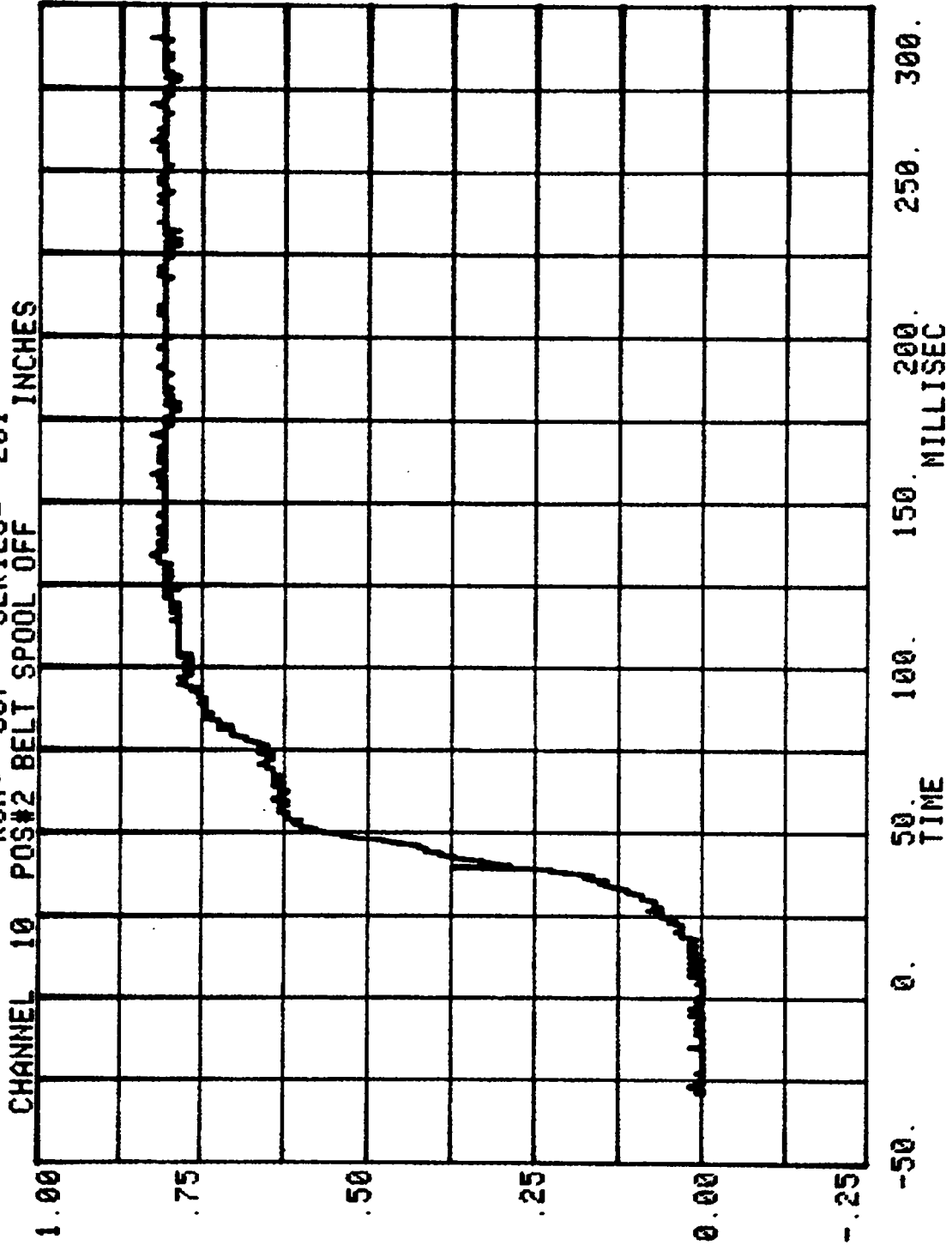
INCHES

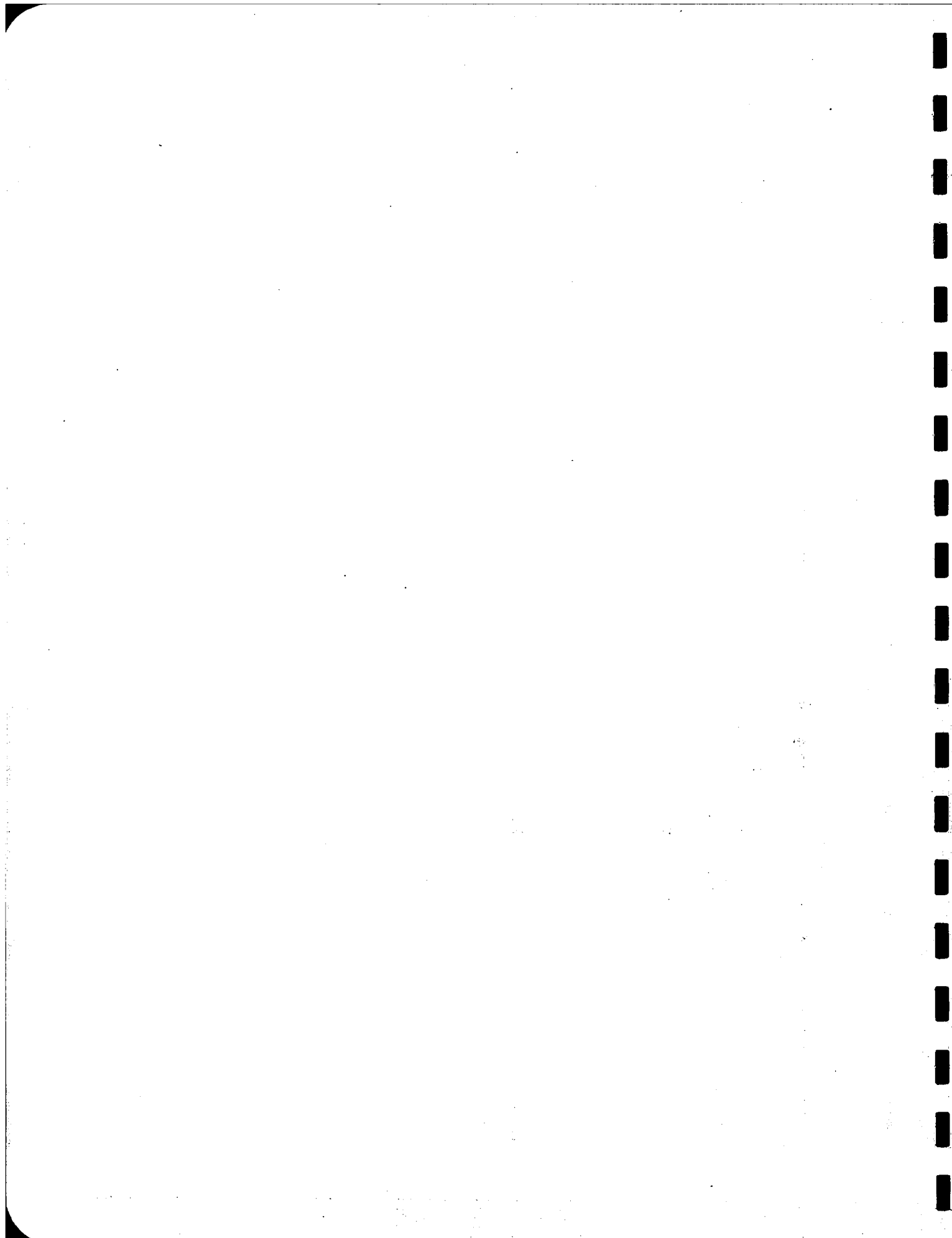




CHANNEL 10 POS#2 BELT SPOOL OFF

RUN= 607 SERIES= 201





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>
320	11/30/83
749	11/30/83

#### 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. 320

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: *Sarun P. Raju*

Date of Dummy Calibration - - - - -	11/28/83 - 11/30/83
Calibration Sequential Number for Dummy - - - -	18
Temperature in Lab. (Spec. = 66 to 78°F) - - - -	68° - 70°
Relative Humidity in Lab. (Spec. = 10 to 70%) -	36% - 38%

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
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<b>1. HEAD DROP TEST:</b>			
a. Peak Resultant Accel. -	210 to 260G	225 g	
b. Peak Lateral Accel. - -	≤10G	5 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.2 ms.	

<b>2. NECK BENDING TEST:</b>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	22.6 fps	
b. Pendulum Avg. Decel. (over t <sub>3</sub> - t <sub>2</sub> ) - - - -	20 to 24G	23 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	25 g	
d. Pendulum Decel. (t <sub>2</sub> -t <sub>1</sub> )	≤3 ms	2.8 ms.	
e. Pendulum Decel. (t <sub>3</sub> -t <sub>2</sub> )	25 to 30 ms	25.6 ms.	
f. Pendulum Decel. (t <sub>4</sub> -t <sub>3</sub> )	≤10 ms	7.5 ms.	
g. Pendulum Direction Reversal Time - - - -		112 ms.	
h. Max. Head Rotation - -	63 to 73°	66°	
i. Chordal Displacement:			

0°	Time	-2 to 2 ms	0 ms.
	Displ.	-.5 to .5 in	0.0 in.
30°	Time	25.6 to 34.4 ms	31 ms.
	Displ.	2.1 to 3.1 in.	3.0 in.
60°	Time	40.3 to 51.7 ms	46 ms.
	Displ.	4.3 to 5.3 in.	4.8 in.
Maximum (66°)	Time	53.2 to 66.8 ms	55.5 ms.
	Displ.	5.0 to 6.0 in.	5.3 in.

Continued

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
<b>2. NECK BENDING TEST ....</b>			
<u>Continued</u>			
i. Chordal Displacement:			
Head Rotation Angle --			
60°	Time	67.0 to 83.0 ms	68.5 ms.
	Displ.	4.3 to 5.3 in.	5.0 in.
30°	Time	85.4 to 104.6 ms	90 ms.
	Displ.	2.1 to 3.1 in.	2.6 in.
0°	Time	101.0 to 123.0 ms	107 ms.
	Displ.	-.5 to 0.5 in.	0.0 in.
<b>3. ABDOMINAL COMPRESSION TEST:</b>			
(Preload = 10 pounds)			
a. Force @ 1" - - - - -	50 to 63 lbs.	55 lbs.	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	87 lbs.	
<b>4. LUMBAR FLEXION TEST:</b>			
a. Force @ 20° - - - - -	22 to 34 lbs.	33 lbs.	
b. Force @ 30° - - - - -	34 to 46 lbs.	42.5 lbs.	
c. Force @ 40° - - - - -	46 to 58 lbs.	53.5 lbs.	
d. Return Angle - - - - -	12° maximum	6°	
<b>5. CHEST IMPACT TESTS:</b>			
a. High Speed			
(1) Probe Speed - - - - -	21.78-22.22 fps	22.10 fps	
(2) Peak Deflection - - - - -	1.7" maximum	1.68 in.	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	2000 lbs.	
(4) Internal Hysteresis - - - - -	50 to 70%	51.5%	
b. Low Speed			
(1) Probe Speed - - - - -	13.86-14.14 fps	14.01 fps	
(2) Peak Deflection - - - - -	1.1" maximum	.96 in.	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1220 lbs.	
(4) Internal Hysteresis - - - - -	50 to 70%	53.9%	

P.572 DUMMY CALIBRATION TEST DATA .....Continued:

NHTSA DUMMY ID NO. 320

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	6.92 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2200 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.1 ms.	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.89 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2000 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.8 ms.	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 320 CALIB. SEQ. NOS. FOR DUMMY: 18 &         

**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	7/83.	1/84
ENDEVCO	CX05	7/83	1/84
ENDEVCO	CJ54	7/83	1/84
GSE	312	7/83	1/84
GSE	311	7/83	1/84
CEC	22707	7/83	1/84
CEC	22958	7/83	1/84
TRANSDUCER INC	20051	7/83	1/84
BLH	72952	7/83	1/84
CIC	567-11	7/83	1/84

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 749

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: *Saverio M. Pagnano*

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	11/28/83 - 11/30/83	
Calibration Sequential Number for Dummy - - - -	4	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	68° - 70°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	36% - 38%	

TEST PARAMETER	SPECIFICATION		
<b>1. HEAD DROP TEST:</b>			
a. Peak Resultant Accel. -	210 to 260G	220 g	
b. Peak Lateral Accel. - -	≤10G	9 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.1 ms.	
<b>2. NECK BENDING TEST:</b>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.2 fps	
b. Pendulum Avg. Decel. (over t <sub>3</sub> - t <sub>2</sub> ) - - - -	20 to 24G	23.5 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	25 g	
d. Pendulum Decel. (t <sub>2</sub> -t <sub>1</sub> )	≤3 ms	2.8 ms.	
e. Pendulum Decel. (t <sub>3</sub> -t <sub>2</sub> )	25 to 30 ms	27.5 ms.	
f. Pendulum Decel. (t <sub>4</sub> -t <sub>3</sub> )	≤10 ms	5.3 ms.	
g. Pendulum Direction Reversal Time - - - -		109 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	29.5 ms.
	Displ.	2.1 to 3.1 in.	3.0 in.
60°	Time	40.3 to 51.7 ms	44 ms.
	Displ.	4.3 to 5.3 in.	4.8 in.
Maximum (70°)	Time	53.2 to 66.8 ms	54 ms.
	Displ.	5.0 to 6.0 in.	5.1 in.

Continued

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
<b>2. NECK BENDING TEST ....</b>			
<b>Continued</b>			
i. Chordal Displacement:			
Head Rotation Angle --			
60°	Time	67.0 to 83.0 ms	67 ms.
	Displ.	4.3 to 5.3 in.	4.7 in.
30°	Time	85.4 to 104.6 ms	86.5 in.
	Displ.	2.1 to 3.1 in.	2.4 in.
0°	Time	101.0 to 123.0 ms	101 ms.
	Displ.	-.5 to 0.5 in.	+0.2 in.
<b>3. ABDOMINAL COMPRESSION TEST:</b>			
(Preload = 10 pounds)			
a. Force @ 1" - - - -	50 to 63 lbs.	54 lbs.	
b. Force @ 1.3" - - - -	73 to 88 lbs.	78 lbs.	
<b>4. LUMBAR FLEXION TEST:</b>			
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.	52.5 lbs.	
d. Return Angle - - -	12° maximum	8°	
<b>5. CHEST IMPACT TESTS:</b>			
a. High Speed			
(1) Probe Speed - -	21.78-22.22 fps	21.89 fps	
(2) Peak Deflection -	1.7" maximum	1.42 in.	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	2070 lbs.	
(4) Internal Hysteresis - - - -	50 to 70%	51.8%	
b. Low Speed			
(1) Probe Speed - - -	13.86-14.14 fps	13.97 fps	
(2) Peak Deflection -	1.1" maximum	.94 in.	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1295 lbs.	
(4) Internal Hysteresis- - - -	50 to 70%	51.9%	

P.572 DUMMY CALIBRATION TEST DATA .....Continued:

NHTSA DUMMY ID NO. 749

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	6.98 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2400 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.8 ms.	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.92 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2250 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.75 ms.	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 749 CALIB. SEQ. NOS. FOR DUMMY: 4 &         

**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	7/83	1/84
ENDEVCO	CX05	7/83	1/84
ENDEVCO	CJ54	7/83	1/84
GSE	312	7/83	1/84
GSE	311	7/83	1/84
CEC	22707	7/83	1/84
CEC	22958	7/83	1/84
TRANSDUCER INC	20051	7/83	1/84
BLH	72952	7/83	1/84
CIC	567-11	7/83	1/84