

DOT 0471

REPORT NO. 7095-V-4

NEW CAR ASSESSMENT AND STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS NOS. 212, 219 AND 301-75

Ford Motor Company

1982 Granada L

4-Door Sedan

NHTSA TEST NO. 447-4-554

CALSPAN CORPORATION

ADVANCED TECHNOLOGY CENTER

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FINAL REPORT

NOVEMBER 1982

Prepared for:

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Contract Technical Manager

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16. Abstract A frontal load cell barrier test of a 1982 Ford Granada L, 4-door sedan, was performed at Calspan Corporation, Advanced Technology Center, Transportation Research Department facility for the New Car Assessment and Standards Enforcement Indicant Testing of FMVSS 212 - Windshield Mounting; FMVSS 219 - Windshield Zone Intrusion; FMVSS 301-75 - Fuel System Integrity for the Office of Vehicle Safety Compliance, the Office of Automotive Rating and for Research and Development. Impact speed was 34.56 mph. Ambient temperature on test date was 75°F. Post-test vehicle crush was 24.9 inches. Intrusion of firewall into compartment was 7.1 inches. The test vehicle complied in all respects with the following: FMVSS 212 - Windshield Retention FMVSS 219 - Windshield Intrusion FMVSS 301-75 - Fuel System Integrity FMVSS 208 - Injury Criteria Driver - Failed - chest 68 g's Right Front Passenger - Failed Head - HIC No. 1049.6					
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND TEST PROCEDURE	1-1
2	SUMMARY OF TEST NO. 447-4-554	2-1
3	SUMMARY OF RESULTS OF FMVSS NOS. 212, 219 AND 301-75	3-1
4	OCCUPANT AND VEHICLE INFORMATION	4-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE AND DUMMY RESPONSE DATA	B-1
APPENDIX C	DUMMY CERTIFICATION TESTS	C-1

SECTION 1
PURPOSE AND TEST PROCEDURE

This barrier test of a 1982 Ford Granada L is part of the New Car Assessment Program B.O.A., Task 12, sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract DTNH22-81-C-87088. The purpose of this test was to obtain structural information and dummy Injury Criteria Values with belted dummies in both driver and passenger seating positions at a nominal impact velocity of 35 mph.

The Calspan Corporation, Advanced Technology Center, Transportation Research Department Test Procedure for the New Car Assessment crash test submitted to, and approved by, the Contract Technical Manager (CTM) contains the specific procedures used to perform this test.

SECTION 2
SUMMARY OF TEST NO. 447-4-554

A load cell barrier consisting of 36 load cells (Figure 10) was impacted by a 1982 Ford Granada L at a velocity of 34.56 mph. The test was performed at the Calspan Corporation Advanced Technology Center on October 5, 1982. Pre- and post-test photographs of the vehicle and occupants can be found in Appendix A. Table 1 presents pertinent crash test information.

Two 572, 50th percentile male Anthropomorphic Test Devices (ATDs) were placed in the 1982 Ford Granada L in the driver and right-front passenger seating positions, according to dummy placement procedures specified in Laboratory Procedures for Vehicle Assessment TP-212-02.

The occupant dummies were instrumented with head and triaxial accelerometers and femur load cells. Load cells were also placed on the lap and shoulder belts to measure dummy torso and lap loading. Each of the dummies had been certified and had been used in a previous test (447-2-552). The FMVSS 208 Injury Criteria Value for each dummy was not exceeded in that test. The certification data sheets along with instrumentation data are presented in Appendix C.

The crash test was recorded by one real time camera and 13 high-speed cameras. Camera locations and other pertinent camera information are found in Section 4 of this report.

The 68 channels of data were recorded on six 14-channel FM tape recorders. Appendix B contains the vehicle and dummy response data traces. The injury criteria values are presented in Table 9. All 68 data channels checked out prior to the test. The only data loss experienced during impact was the driver chest (Z) - zero shift - 60 milliseconds after impact.

General Comments

The 1982 Ford Granada L, 4-door sedan, was equipped with a 200 cubic inch, 6 cylinder engine, 3 speed automatic transmission, power brakes and power steering. The total test weight with two 50th percentile dummies, instrumentation and cameras was 3,430 pounds.

The 1982 Ford Granada involved in a frontal load cell barrier crash at a velocity of 34.56 mph complied with FMVSS Nos. 212, Windshield Mounting; 219, Windshield Zone Intrusion; and 301-75, Fuel System Integrity. There was 100 percent windshield retention, no intrusion into the protected zone and no fuel leakage after impact on any phase of the rollover test.

The vehicle sustained 24.9 inches of static crush and approximately 32 inches of dynamic crush. Maximum post-test firewall intrusion into the occupant compartment was 7.1 inches on the left side. The maximum load cell barrier forces measured at the 36 load cells was 117,000 pounds at 40 milliseconds.

At impact the transmission was driven rearward and down causing the drive shaft to break away from the transmission (see Figure A-12).

The windshield sustained stress cracks but remained in place. Both driver and passenger doors were inoperable.

The driver chest Z accelerometers developed a zero shift 60 milliseconds after impact and therefore the resultant was calculated using only chest X and chest Y accelerations. The maximum chest deceleration over 3 milliseconds was 68 g's, which exceeds the FMVSS 208 Injury Criteria for the chest. Head and femur responses were acceptable. A HIC of 859.6 and femur loads of 800 and 980 pounds were obtained. Belt spool-out was 3.5 inches, and belt stretch was 0.4 inches per foot as measured between the retractor and "D" ring.

The right-front passenger head struck the dash panel and failed to comply with the FMVSS 208 Head Injury Criteria with a HIC of 1049.6. The remaining injury criteria values were satisfactory. A maximum chest deceleration over 3 milliseconds of 52 g's and femur loads of 340 and 460 pounds were recorded. The belt spool-out was 4.8 inches and belt stretch was 0.4 inches per foot as measured between the retractor and "D" ring.

Table 1

CRASH TEST SUMMARYTEST NO. 447-4-553PROJECT: NEW CAR ASSESSMENT PROGRAMDATE: 10/5/82TIME: 1317TEMP: 75°F

VEHICLE	<u>1982 Ford Granada L</u>
TEST WEIGHT (lbs)	<u>3430</u>
IMPACT ANGLE (deg)*	<u>0</u>
IMPACT VELOCITY (mph)**	<u>34.56</u>
MAX. CRUSH (in) static	<u>24.9</u>
MAX. INTRUSION (in) static	<u>7.1</u>

DUMMIES

TYPE	<u>Hybrid II Part 572</u>	<u>Hybrid II Part 572</u>
LOCATION	<u>LF(1) 97</u>	<u>RF(2) 818</u>
RESTRAINT	<u>Production 3-pt. belt system</u>	<u>Production 3-pt. belt system</u>
NUMBER OF DATA CHANNELS	<u>68</u>	
NUMBER OF HIGH SPEED CAMERAS	<u>13 + 1 real time</u>	

*With respect to tow track Centerline

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

Table 2

VEHICLE TEST WEIGHTS AS TESTED

Left Front 890 lbs
 Right Front 900 lbs
 TOTAL FRONT 1790 lbs

Left Rear 820 lbs
 Right Rear 820 lbs
 TOTAL REAR 1640 lbs

Total Weight = 3430 lbs

Wheel Base = 106 inches

$Cg_{F.W.} = \frac{1640 \text{ lbs} \times 106 \text{ inches}}{3430 \text{ lbs}} = 50.7 \text{ inches}$

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
 UDW = Unloaded Delivered Weight (2990 lbs)
 VCW = Vehicle Capacity Weight (850 lbs)
 DSC = Designated Seating Capacity (5)

RCLW = VCW - 150 (DSC)

RCLW = 850 - 150 (5) = 100 lbs

TEST WEIGHT = UDW + RCLW + (No. Dummies x 164 lbs)

TEST WEIGHT = 2990 lbs + 100 lbs + 2 (164 lbs)

TEST WEIGHT = 3418 lbs

SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION

Vehicle Manufacturer Ford Motor Company
Make/Model Granada L Sedan
Body Style 4-door sedan Model Year 1982
VIN 1FABP27B2CG160843 Build Date 5/82
NHTSA No. 447-4-553 Color Grey
Engine Data: 6 cylinders 200 in³/cc displacement
Transmission Data: 3 speed () Manual (X) Automatic
Date Rec'd 8/82 Air Cond. -- PW. STR. yes PW. BR. yes
Dealer's Name & Address West Seneca Ford, 2150 Union Road

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

Vehicle Manufactured by Ford Motor Company
Date of Manufacture 5/82 VIN 1FABP27B2CG160843
GVRW 4175 lbs GAWR: Front 2163 lbs Rear 2199 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 P175/75R14 Load Range: X B C D
Vehicle Capacity: Types of Seats Bench Bucket X Split Bench
Number of Occupants (Designated Seating Capacity):
2 Front
3 Rear
5 TOTAL
Cargo Load = 100 lbs
TOTAL = 850 lbs

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

Right Front = 840 lbs Right Rear = 650 lbs
Left Front = 860 lbs Left Rear = 640 lbs
TOTAL FRONT WEIGHT = 1700 lbs (56.9 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1290 lbs (43.1 % of Total Vehicle Weight)
TOTAL DELV. WEIGHT = 2990 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 112 lbs CARGO

Right Front = 900 lbs Right Rear = 820 lbs
Left Front = 890 lbs Left Rear = 820 lbs
TOTAL FRONT WEIGHT = 1790 lbs (52.2 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1640 lbs (47.8 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3430 lbs
Weight of ballast secured in vehicle trunk area = 0 lbs

SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS

Date of Test 10/5/82 Time of Test 1317 am/pm
Ambient Temperature 75 °F at impact area
Temperature in Occupant Compartment 74 °F
Windshield Molding Temperature _____ °F

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 24 5/8" LF 24 3/4" RR 23 3/4" LR 23 3/4"
Test Attitude: RF 25 LF 25 RR 22.1 LR 22.2

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 35 psi Rear = 35 psi
Recommended Tire Size P175/75R14 Load Range B
Tires on Vehicle P175/75R14
Is Spare Tire a "Space Saver" X yes _____ no
Is Spare Tire Standard Equipment X yes _____ no

TEST FLUID DATA

Test Fluid Type: Red Stoddard Solvent #2 Spec. Grav.: 0.764
Kinematic Viscosity 0.96 Centistokes
EPA Capacity* 16 gal
Test Volume 14.88 gal (93% of EPA Capacity)
Fuel System Capacity (data from Owner's Manual) 16 gal
Details of fuel system Fuel tank is located aft of rear axle and secured
in place by two tank straps. The filler tube is located on right side
of vehicle and sealed by a screw type cap which is concealed by a hinged
door.
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 _____ No

VEHICLE REBOUND AND CRUSH

Overall Length of Test Vehicle: Pre-Test = R 193.5 /L 193.5 inches
Post-Test = R 167.5 /L 168.5 inches
Crush = R 26.0 /L 25.0

FOR FRONTAL IMPACTS, distance from front of test vehicle to the barrier
after impact = 8.7 inches

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

SECTION 3

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

- Post-Impact Data
- Windshield Zone Intrusion FMVSS 219
- Protected Zone
- Summary of FMVSS 212 Data
- Fuel System Integrity FMVSS 301-75

Table 4

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

TYPE OF TEST X Frontal (90°) 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 10/5/82 TIME 1317 TEMP 75 °F

VEHICLE NHTSA NO. 447-4-554 VIN 1FABP27B2CG160843

REQUIRED VEHICLE VELOCITY RANGE to mph

IMPACT VELOCITY (traps within 5 feet of impact event)

Trap No. 1 = 34.57 mph Trap No. 2 = 34.55 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 = 25.0 in Passenger's Side = 26.0 in

Average = 25.5 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 = 8.7 in Passenger's Side = 8.7 in

Average = 8.7 in

REMARKS

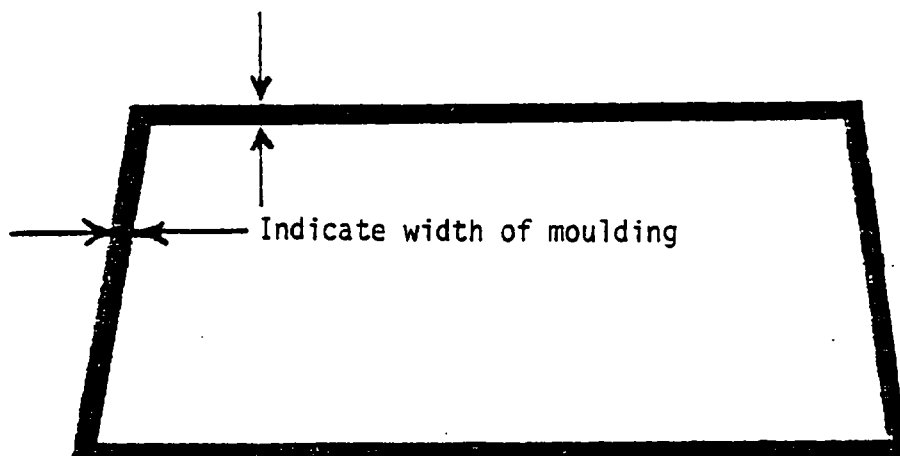
Details of windshield mounting (method of retention, type of trim, etc.):

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

	Windshield Periphery		
	Pre-Test	Post-Test	Retention %
Right Side	79.5	79.5	100
Left Side	79.5	79.5	100
TOTAL	159.0	159.0	100

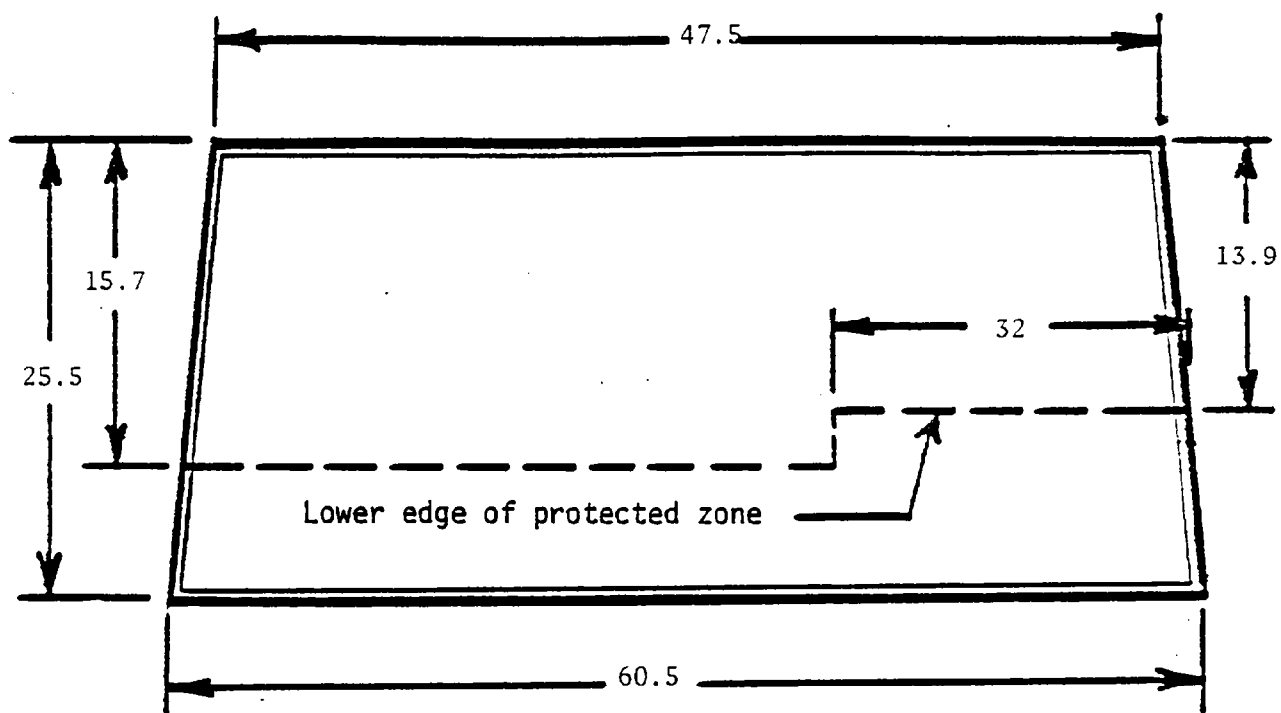
The standard requires that Post-Test be a minimum of 75 percent of the Pre-Test total periphery measurement for vehicle not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

AREA OF RETENTION FAILURE



FRONT VIEW

Figure 1 WINDSHIELD RETENTION, FMVSS NO. 212 DATA



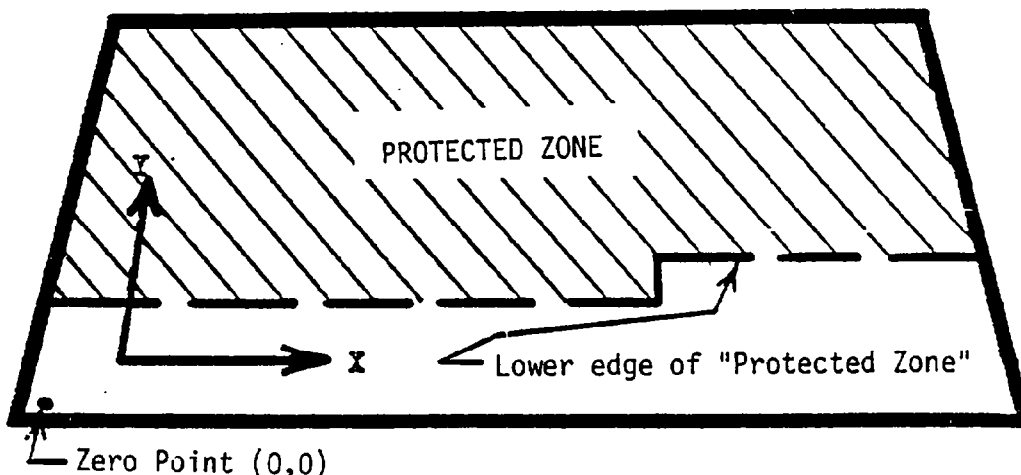
FRONT VIEW OF WINDSHIELD

Provide all dimensions necessary to reproduce the protected zone.

Method of adhering styrofoam to the windshield:

Silicone rubber sealant adhesive applied to windshield surface and
to backside of styrofoam which was then clamped in place until dry.

Figure 2 PROTECTED ZONE



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 SHEET

Table 5

"FUEL SYSTEM INTEGRITY" POST-IMPACT TEST DATA

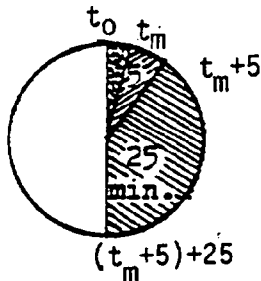
FMVSS No. 301-75

TEST VEHICLE NHTSA NO. 447-4-553 Test Date 10/5/82
 Vehicle Manufacture/Make/Model 1982 Ford Granada L

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

TEST VEHICLE STATIC ROLLOVER

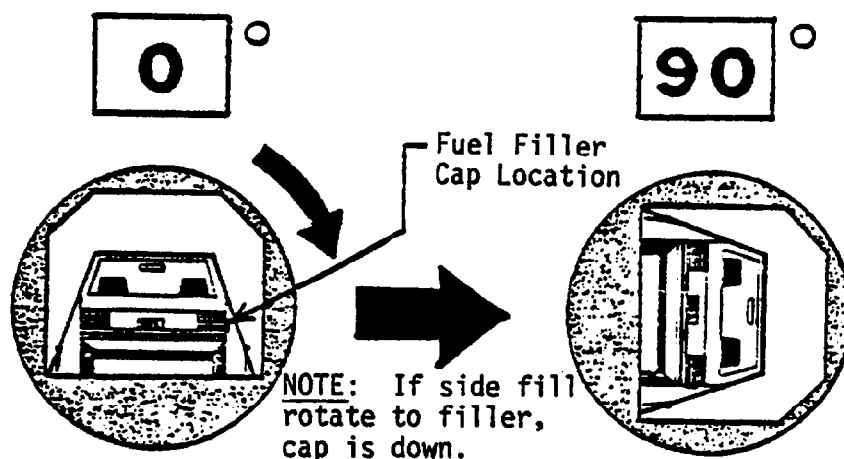
Test information will be added to the following static rollover data sheets

- (1) Table 5A - Rollover data for 0° to 90° test phase
- (2) Table 5B - Rollover data for 90° to 180° test phase
- (3) Table 5C - Rollover data for 180° to 270° test phase
- (4) Table 5D - Rollover data for 270° to 360° test phase

SOLVENT SPILLAGE DETAILS

None.

Table 5A

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

Rollover Fixture 90° Rotation Time = 2 minutes 47 seconds
 (Spec. Range = 1 to 3 min.)
 FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
 TOTAL = 7 minutes 47 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 ounces	0 ounce	0 ounce	0 ounce
----------	---------	---------	---------

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

SOLVENT SPILLAGE LOCATION(S)

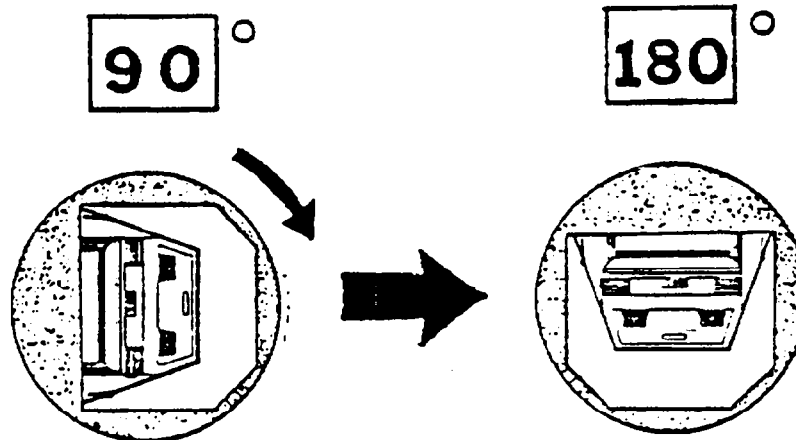
None.

VEHICLE NHTSA ID NO. 447-4-544

Table 5B

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
----------	---------	---------	---------

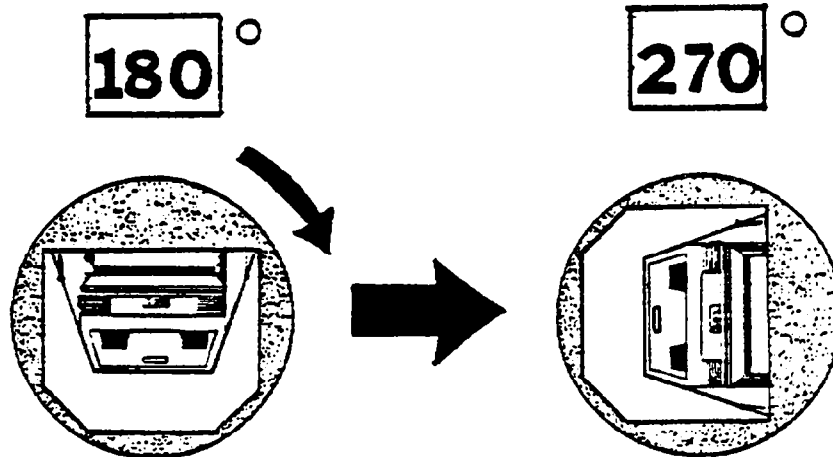
ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0 ounces	0 ounce	0 ounce	0 ounce
----------	---------	---------	---------

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 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
----------	---------	---------	---------

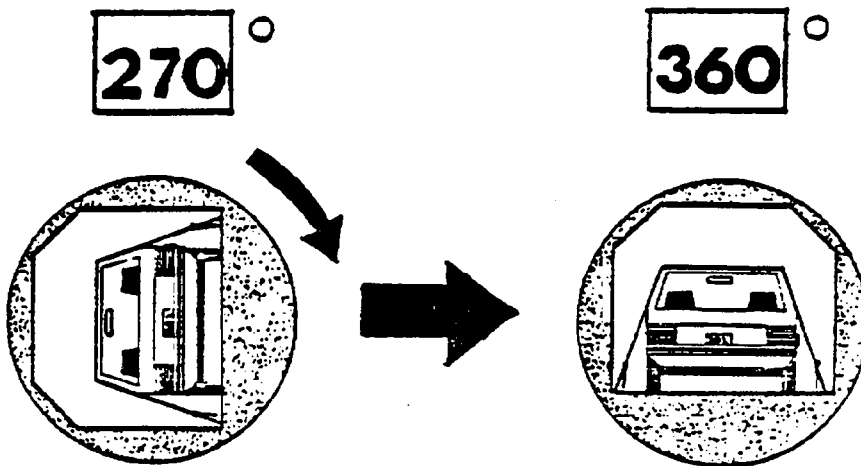
ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0 ounces	0 ounce	0 ounce	0 ounce
----------	---------	---------	---------

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 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 ounces	0 ounce	0 ounce	0 ounce
----------	---------	---------	---------

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

SOLVENT SPILLAGE LOCATION(S)

None.

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

- Vehicle Measurements
- Vehicle Accelerometer Locations
- Camera Positions and Locations
- Dummy In-Vehicle Position
- Dummy Injury Criteria Values

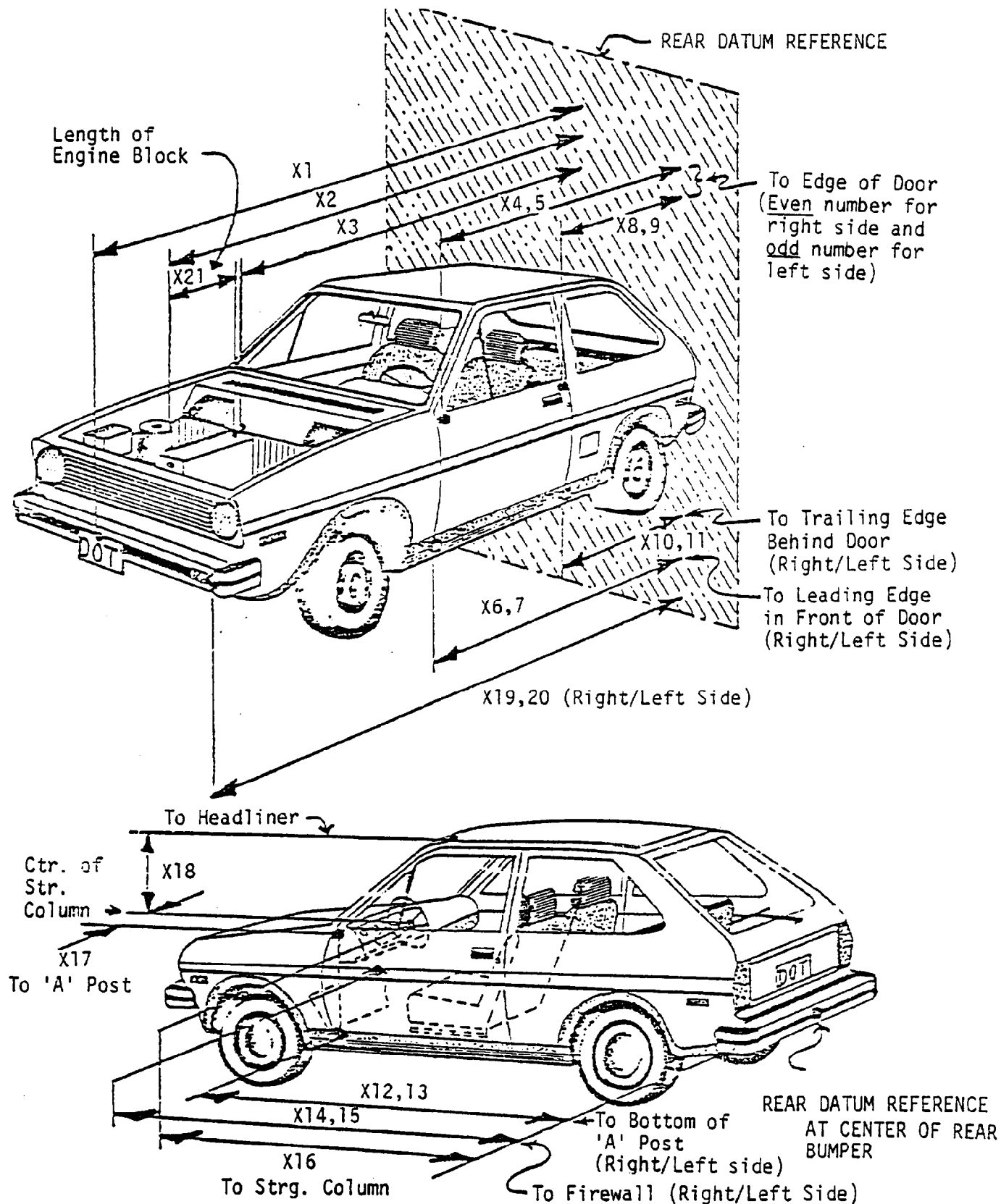
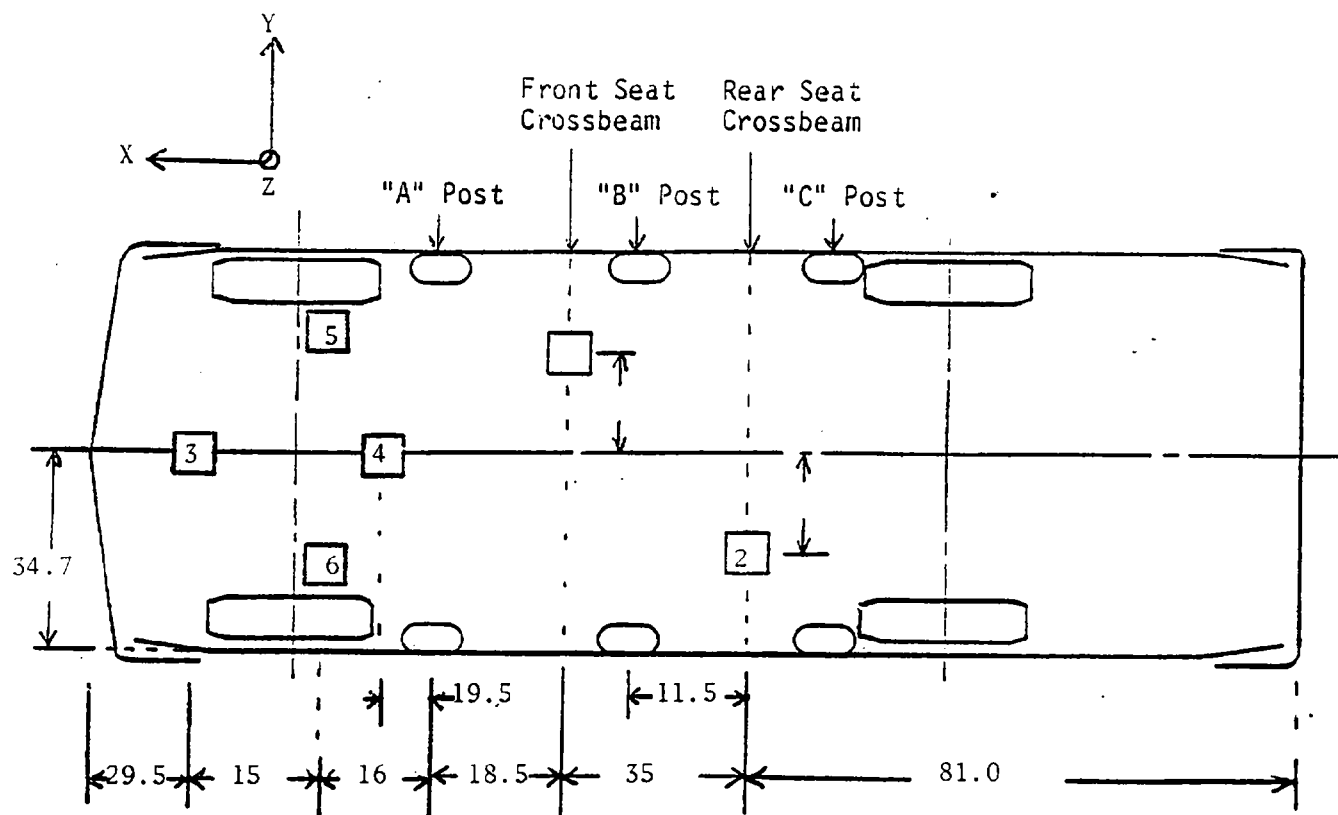


Figure 4 Pre- and Post-Test Measurement Points

Table 6

VEHICLE MEASUREMENTS

No. 1982 Ford Granada L		All Dimensions in Inches		
		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	195.0	170.1	24.9
X2	Rear Surface of Vehicle to Front of Engine	171.5	162.2	9.3
X3	Rear Surface of Vehicle to Firewall	143.1	137.6	5.5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	128.9	128.2	0.7
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	128.9	127.5	1.4
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	131.5	130.7	0.8
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	131.5	130.5	1.0
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	91.9	91.2	0.7
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	91.9	91.5	0.4
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	90.1	89.2	0.9
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	90.1	89.2	0.9
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	130.5	130.5	0.0
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	130.5	130.0	0.5
X14	Rear Surface of Vehicle to Firewall, Right Side	140.2	137.1	3.1
X15	Rear Surface of Vehicle to Firewall, Left Side	142.6	135.5	7.1
X16	Rear Surface of Vehicle to Steering Column	115.4	115.0	0.4
X17	Center of Steering Column to "A" Post	14.9	15.0	-0.1
X18	Center of Steering Column to Headliner	18.0	23.0	-5.0
X19	Rear Surface of Vehicle to Right Side of Front Bumper	193.5	167.5	26.0
X20	Rear Surface of Vehicle to Left Side of Front Bumper	193.5	168.5	25.0
X21	Length of Engine Block	27.5	27.5	0.0



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Front Seat Crossmember	x		
2	Rear Seat Crossmember	x		
3	Top of Engine	x		
4	Bottom of Engine	x		
5	RT Front Brake Caliper	x		
6	LF 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

NOTE: Camera Information Shown on Tables 7 and 8.

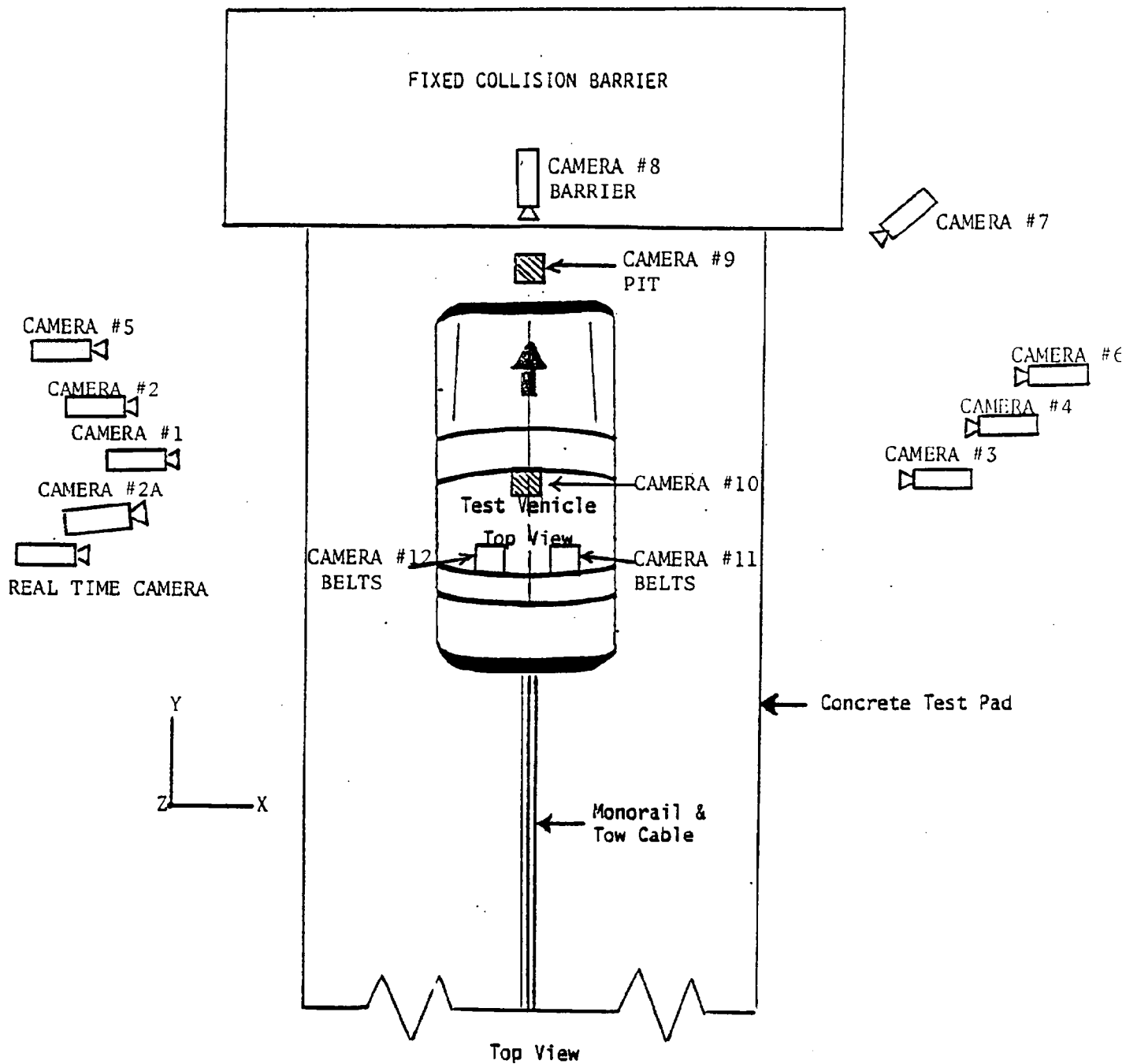


Figure 6 CAMERA POSITION FOR FRONTAL IMPACTS

Table 7

HIGH SPEED CAMERA LOCATIONSTest No.: 447-4-553

Vehicle

1982 Ford Granada L

CAMERA NUMBER	VIEW	CAMERA POSITIONS (IN)*			CAMERA ANGLE (DEG)**	FILM PLANE TO HEAD TARGET (IN) X
		X	Y	Z		
1	Driver (redundant)	285	108	60	-4	268
2 and 2A	Driver (close)	318	90	57	-3	89
3	Right Front Pass. (redundant)	268	141	51	-2	251
4	Right Front Pass. (close)	305	138	54	-3	288
5	Vehicle Left Side	318	87	40	1	---
6	Vehicle Right Side	268	90	41	-1	---
7	Windshield	72	-18	54	-6	---
8	Vehicle Front (Barrier)	0	0	120	-40	000
9	Pit Front (Engine)	0	45	-120	90	---
10	Pit Rear (Fuel Tank)	0	144	-120	90	---
11	Left Belt Retractor	---	---	--	---	---
12	Right Belt Retractor	---	---	--	---	---

* X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

** Referenced to Horizontal Plane

***Camera 2A was added to observe driver and steering wheel. No camera measurements were taken.

Table 8

HIGH SPEED CAMERA INFORMATION (TEST 447-4-554)

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)
1	Driver	Photosonic	35	880
2 and 2A	Driver	Photosonic	50	880
3	Right Front Passenger	Photosonic	35	880
4	Right Front Passenger	Photosonic	50	880
5	Vehicle Left Side	Photosonic	13	1000
6	Vehicle Right Side	Photosonic	13	880
7	Windshield	Photosonic	13	880
8	Vehicle Front	Photosonic	8	900
9	Pit Front	Photosonic	13	850
10	Pit Rear	Photosonic	13	880
11	Left Belt Retractor	Stalex	8	700
12	Right Belt Retractor	Stalex	8	700

NOTE: CAMERAS ARE NUMBERED ACCORDING TO SPLICING SEQUENCE OF FILM.

(24 fps) REAL TIME MOVIE FILM COVERAGE OF PRE-CRASH, POST-CRASH
AND CRASH EVENT SPLICED AT START and end of film.

BEFORE DRIVING YOUR VEHICLE

WARNING — Passengers should not be allowed to ride in the cargo area of any vehicle. Persons who are not riding in a seat with a fastened seat belt are much more likely to suffer serious bodily injury in the event of a collision.

Front Lap-Shoulder Belts

After entering your vehicle, adjust the front seat to obtain the best position for your driving comfort and visibility. Then use the following procedure for fastening belts.

- 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.



- The shoulder restraint portion of the belt adjusts automatically to a snug position.

BEFORE DRIVING YOUR VEHICLE

To relieve belt pressure on your shoulder after the belt is fastened, a shoulder harness comfort regulator is provided in the retractor. This regulator allows you to adjust your shoulder belt length for optimum comfort. This comfort regulator works like a window shade.

WARNING — Never allow more slack than is required to insert a fist between the shoulder belt and the chest. Never wear the shoulder belt under the arm. Never swing it around your neck over the inside shoulder. Never use a single belt for more than one person. Be sure the lap portion of the belt is fitted around the hips, not the waist. Use shoulder belt on outside shoulder only. Failure to follow these precautions could increase the chance and/or severity of injury in an accident.

- Close the door.
- Pull several inches of shoulder belt away from your body and release.
- Pull down a small amount of shoulder belt and release.
- If the desired setting is not achieved repeat the above procedure.
- The comfort regulator is designed to automatically release when the respective front door is opened. As the seat belt is unbuckled, it should be hand-guided back to the retractors to prevent the belt tongue from striking occupants or objects nearby during retraction.
- The inertia reel allows freedom of movement, locking tight only on hard braking or impacts of

BEFORE DRIVING YOUR VEHICLE

approximately 5 mph (8 km/h) or more. The reel cannot be made to lock by jerking on the webbing.

- The lap portion of the belt adjusts automatically to a snug position.

Center Front and Rear Lap Belts

Because the center lap belts do not have retractors, they should be shortened and fastened when not in use. To lengthen the belt, tip the tongue at a right angle to the belt, and pull the belt over your lap until the tongue reaches the buckle.

To fasten the belt, insert the tongue into the open end of the proper buckle until you hear a snap and feel the latch engage. The belt should be snug across the hips, never across the waist.

Rear Seat Entry (2-Door Models)

The rotating boot on the lap belt system is designed to facilitate both rear seat entry/exit and access to front seat passengers. To enter rear seat:

- rotate seat belt boot rearward
- enter rear seat in front of seat belts
- return rotating seat belt boot to forward position to facilitate use by front seat passengers

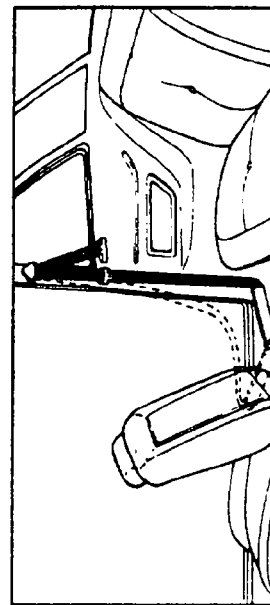


Figure 7 OWNER'S MANUAL SEAT BELT INSTRUCTIONS

FIGURE 8
PART 572 DUMMY IN-VEHICLE POSITION

Test No. 447-4-554

Vehicle 1982 Ford Granada L

SEAT TYPE:

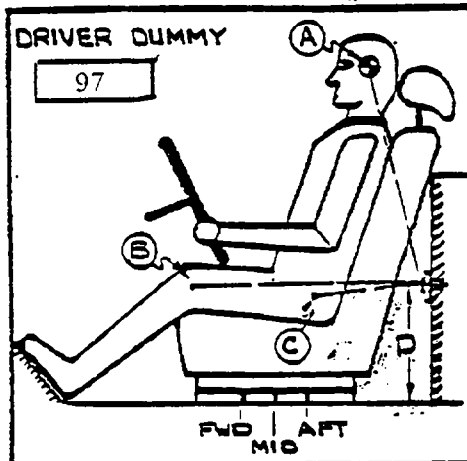
 Bench
 Bucket
 X Split Bench

ADJUSTER TYPE:

 X Manual
 Power

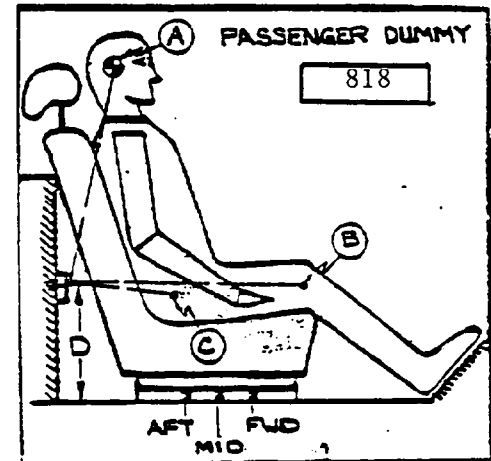
BUCKET SEAT BACK TYPE:

 Fixed
 X Adjustable Reclining



MEASUREMENT LOCATION

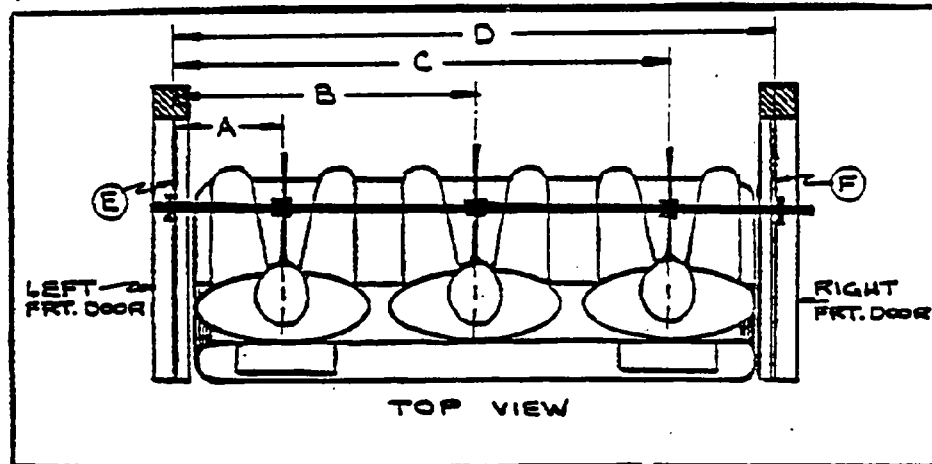
- A - Head Target
- B - Knee Joint
- C - Approximate 'H' Point
- D - Sill to Reference Point



Seat Angle 23.6°

A = 22.5 in. 1 Degrees
B = 22.7 in. 91 Degrees
C = 9.0 in. 117 Degrees
D = 13.5 in.

A = 22.7 in. 1 Degrees
B = 22.5 in. 91 Degrees
C = 9.1 in. 116 Degrees
D = 13.5 in.



DUMMY ID

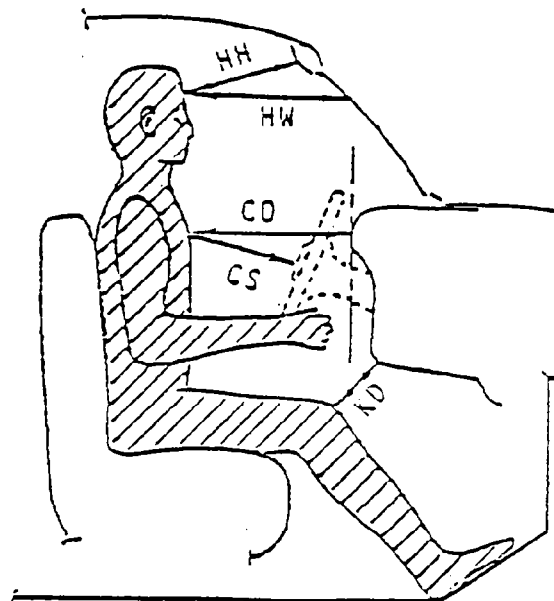
97

--

818

A	=	Left Door to Driver Centerline	<u>12</u> in.
B	=	Left Door to Center Passenger Centerline	<u>--</u> in.
C	=	Left Door to Right Passenger Centerline	<u>40</u> in.
D	=	Left Door to Right Door	<u>52.5</u> in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	<u>11.5</u> in.

	<u>DRIVER</u>	<u>PASS</u>
HH	12.4	12.7
HW	18.7	19.0
CD	21.2	23.0
CS	13.7	--
KDL	6.7	7.0
KDR	6.2	7.0



HR	6.0	6.3
HS	9.2	9.2
AD	4.5	4.7
HD	7.0	6.5

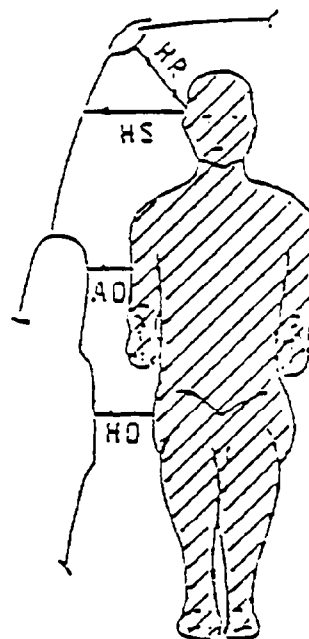


Figure 9 OCCUPANT CLEARANCE DIMENSIONS

Table 9
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G") *							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R
DUMMY (1)	-61	-40	67	88	-54	-44	***	**** 68
DUMMY (2)	-48	38	68	79	-37	38	20	52
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	800	980
DUMMY (2)	340	460
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)	1350	1980	1188
DUMMY (2)	1810	1625	2150
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)	859.6	.08415	.10575	69.2	1199.7
DUMMY (2)	1049.6	.0685	.12000	51.9	1343.9
DUMMY (3)					
DUMMY (4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

***BAD DATA - ZERO SHIFT

****RESULTANT CALCULATED USING CX AND CY.

36 LOAD CELLS
4 ROWS
9 COLUMNS

FRONT VIEW

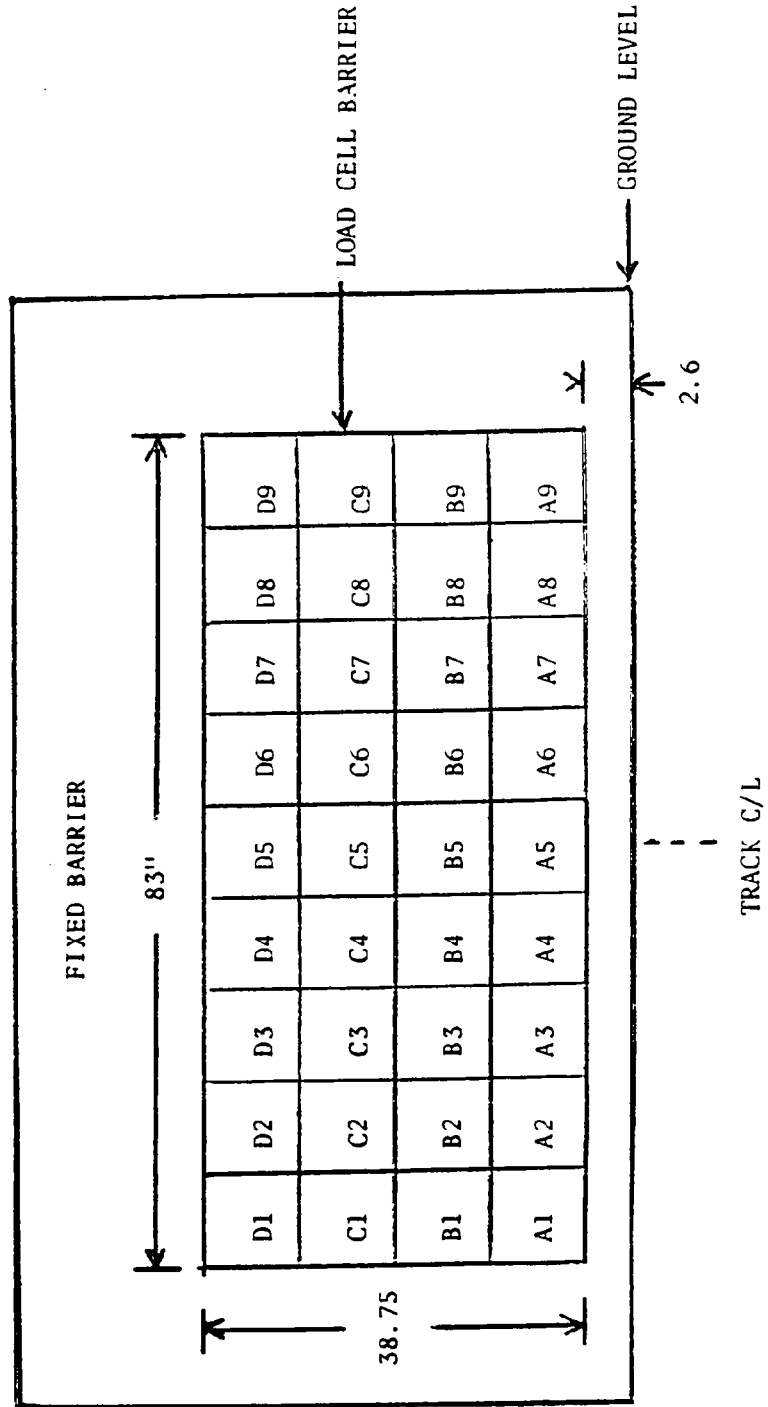


Figure 10 FIXED LOAD CELL BARRIER-LOAD CELL LOCATIONS

APPENDIX A
PHOTOGRAPHS

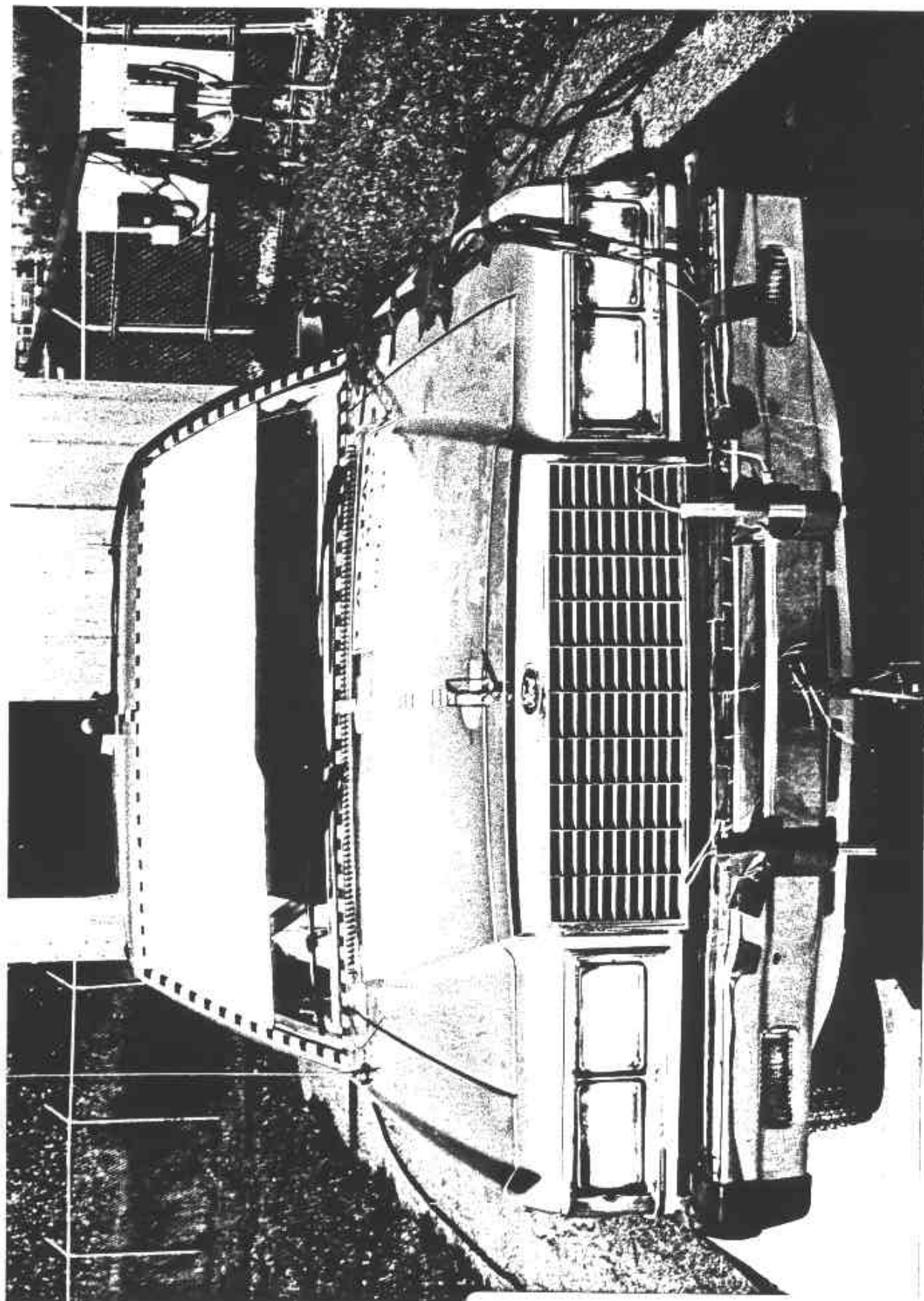


FIGURE A-1 PRE-TEST FRONT VIEW

A-2

7095-V-4

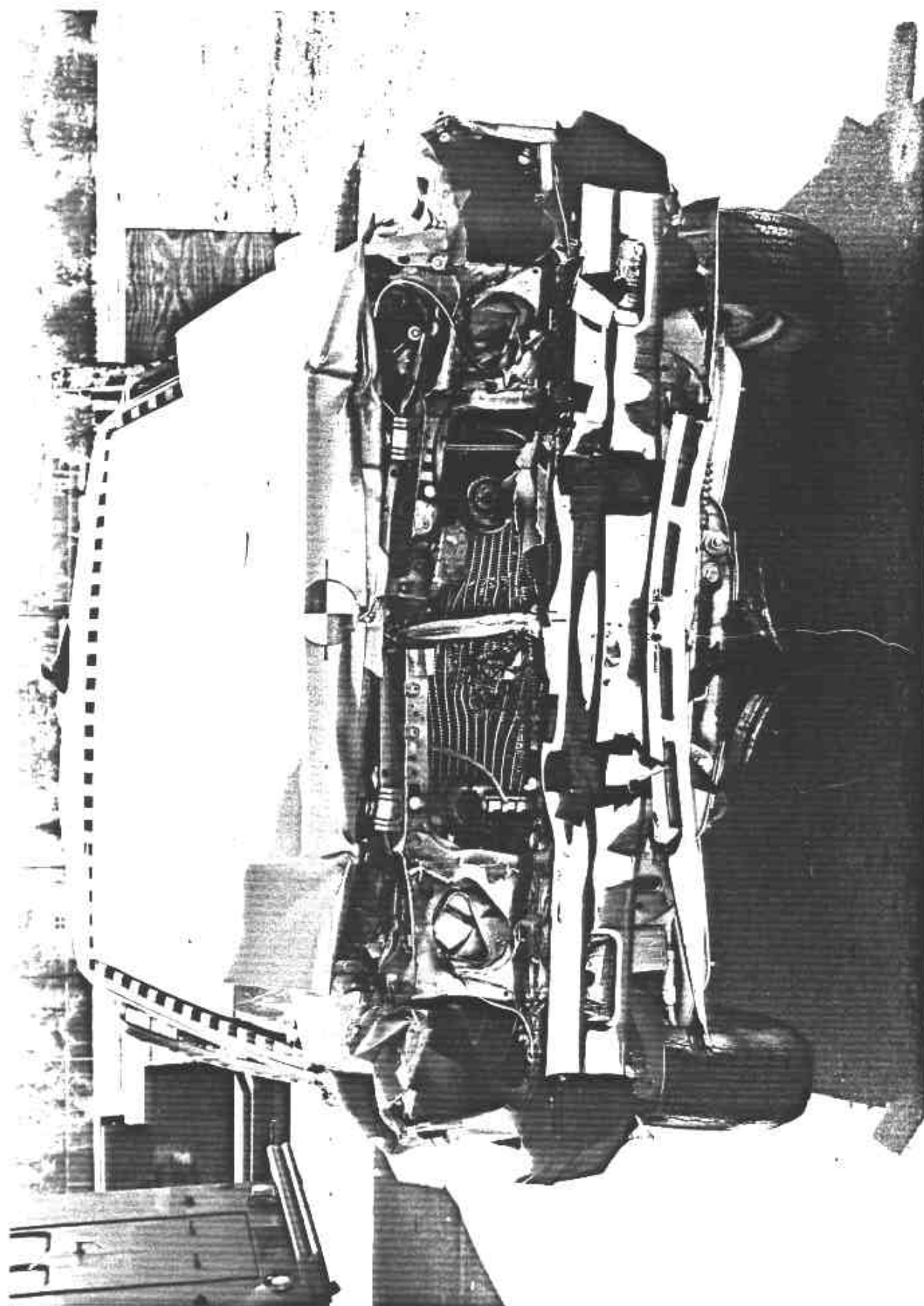


FIGURE A-2 POST-TEST FRONT VIEW

A-3

7095-V-4

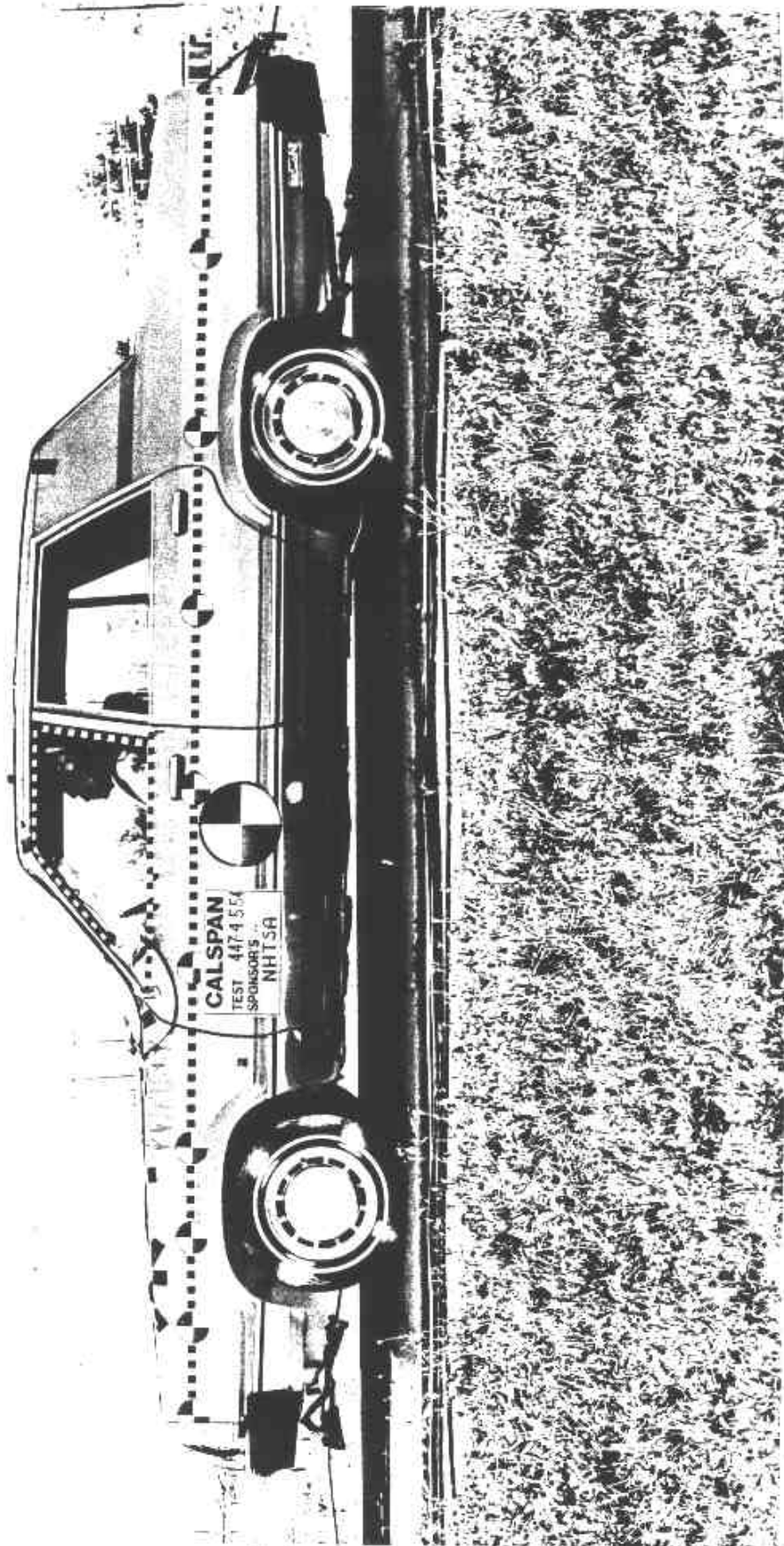


FIGURE A-3 PRE-TEST SIDE VIEW

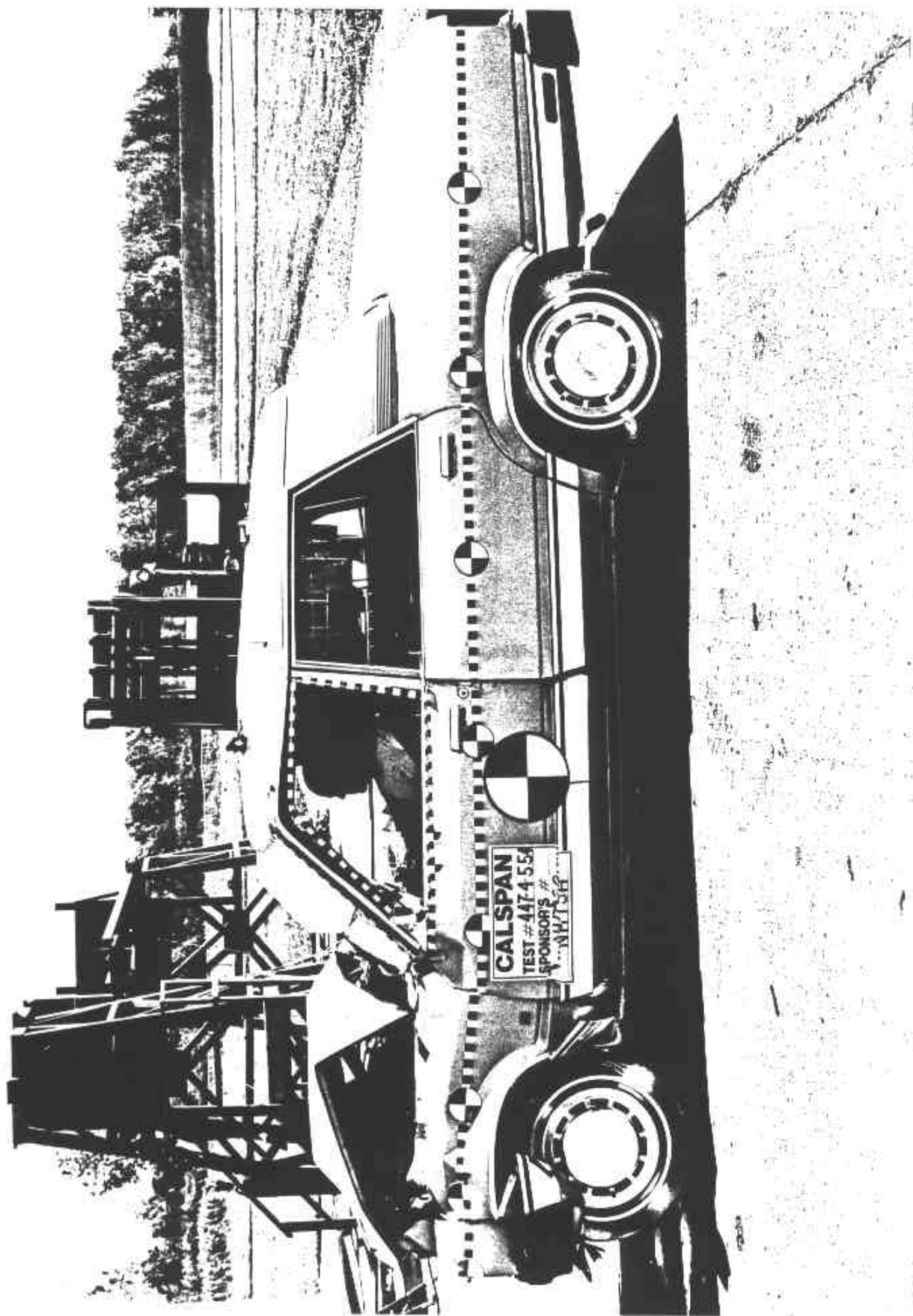


FIGURE A-4 POST-TEST SIDE VIEW

A-5

7095-V-4

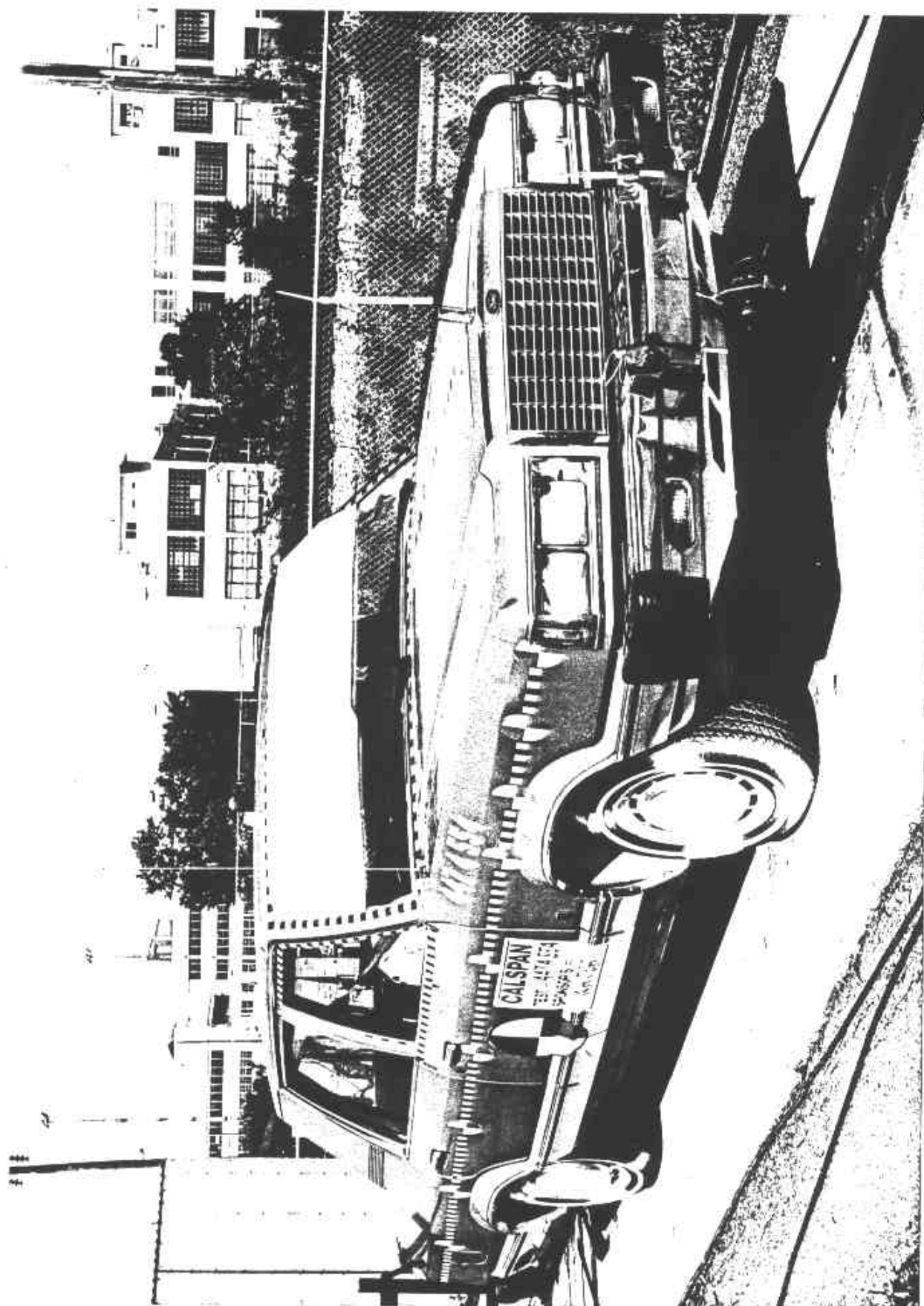


FIGURE A-5 PRE-TEST FRONT THREE-QUARTER VIEW

A-6

7095-V-4



FIGURE A-6 POST-TEST FRONT THREE-QUARTER VIEW

A-7

7095-V-4

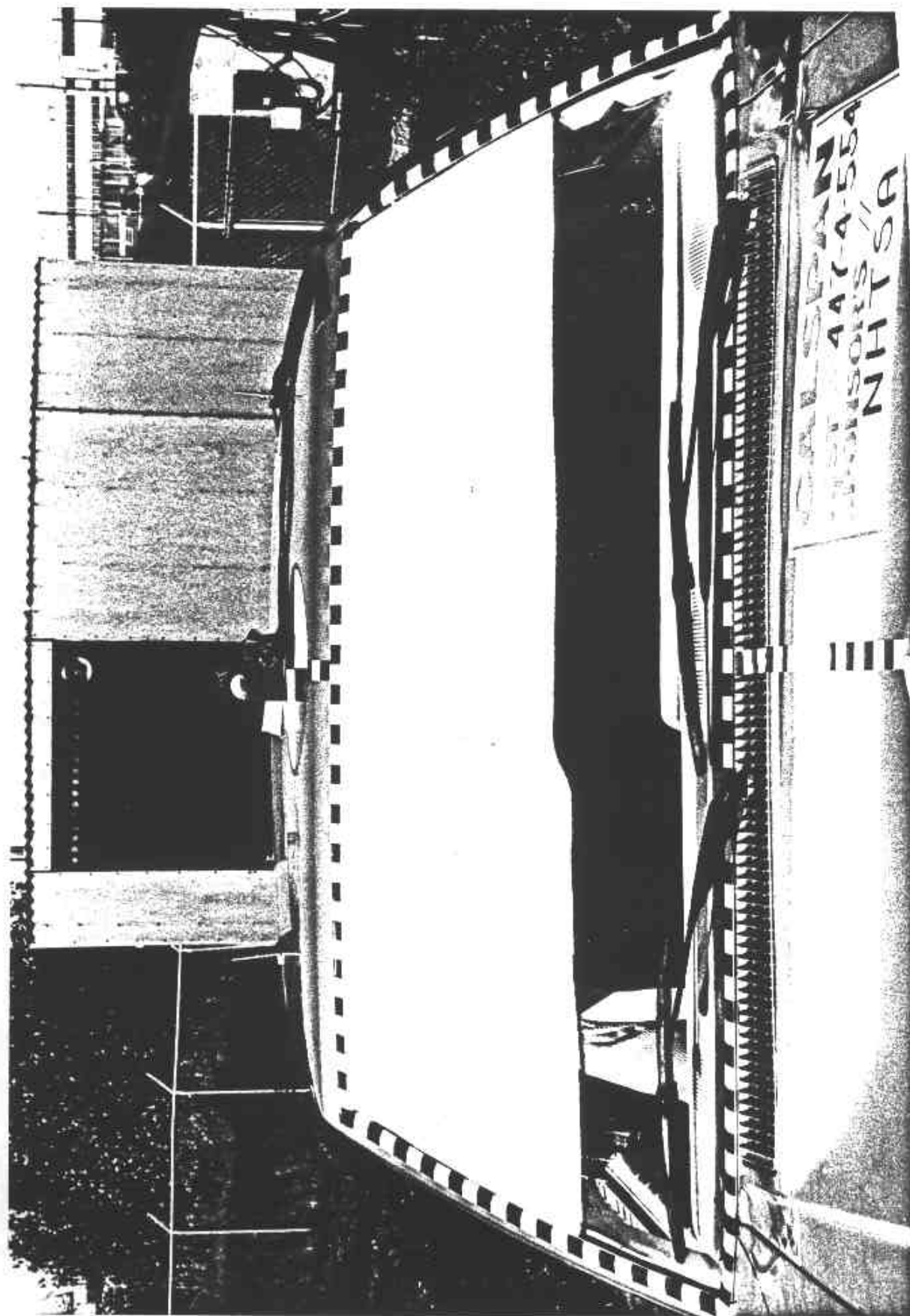


FIGURE A-7 PRE-TEST VIEW OF WINDSHIELD AND PROTECTED ZONE

A-8

7095-V-4

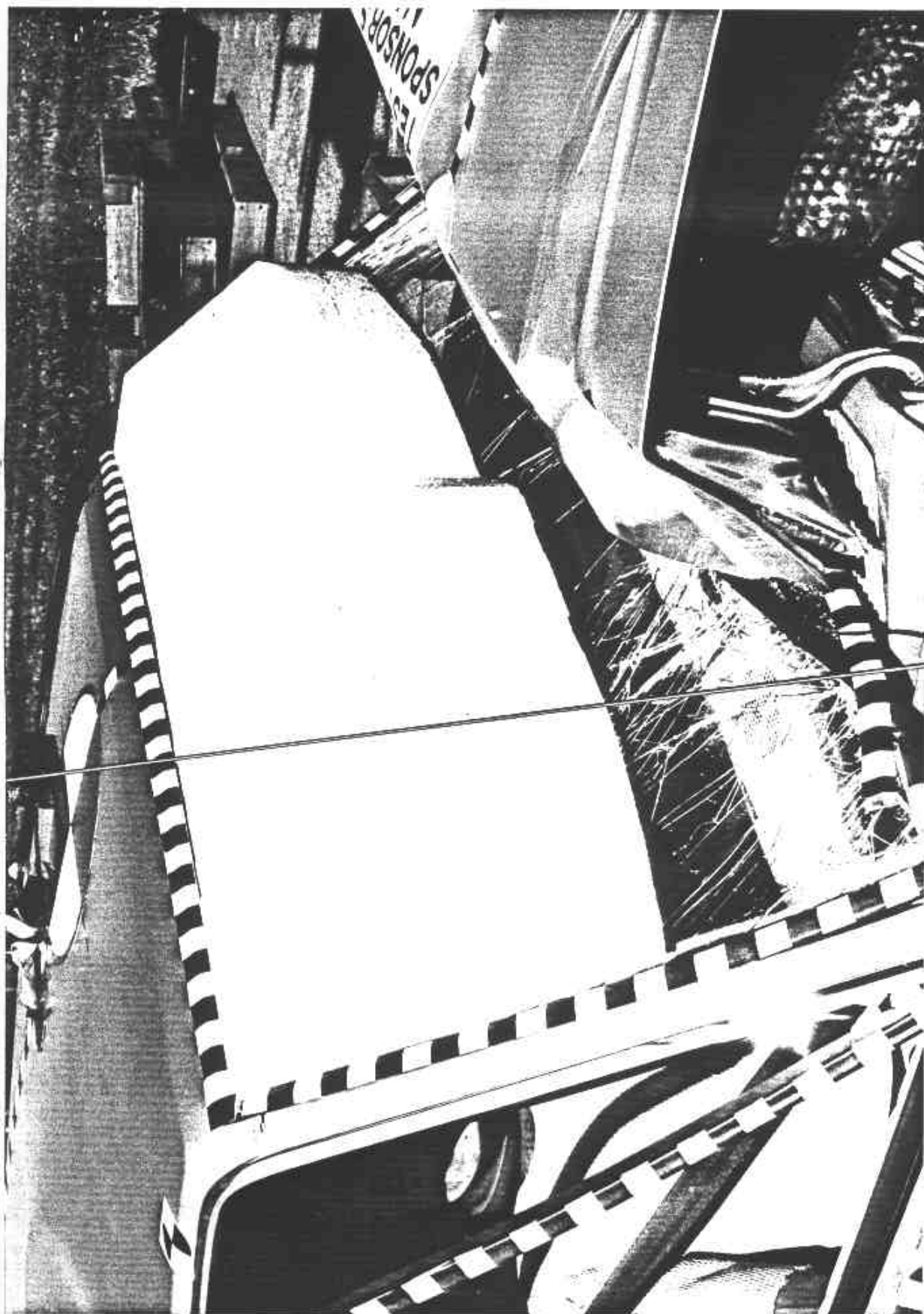


FIGURE A-8 POST-TEST VIEW OF WINDSHIELD AND PROTECTED ZONE

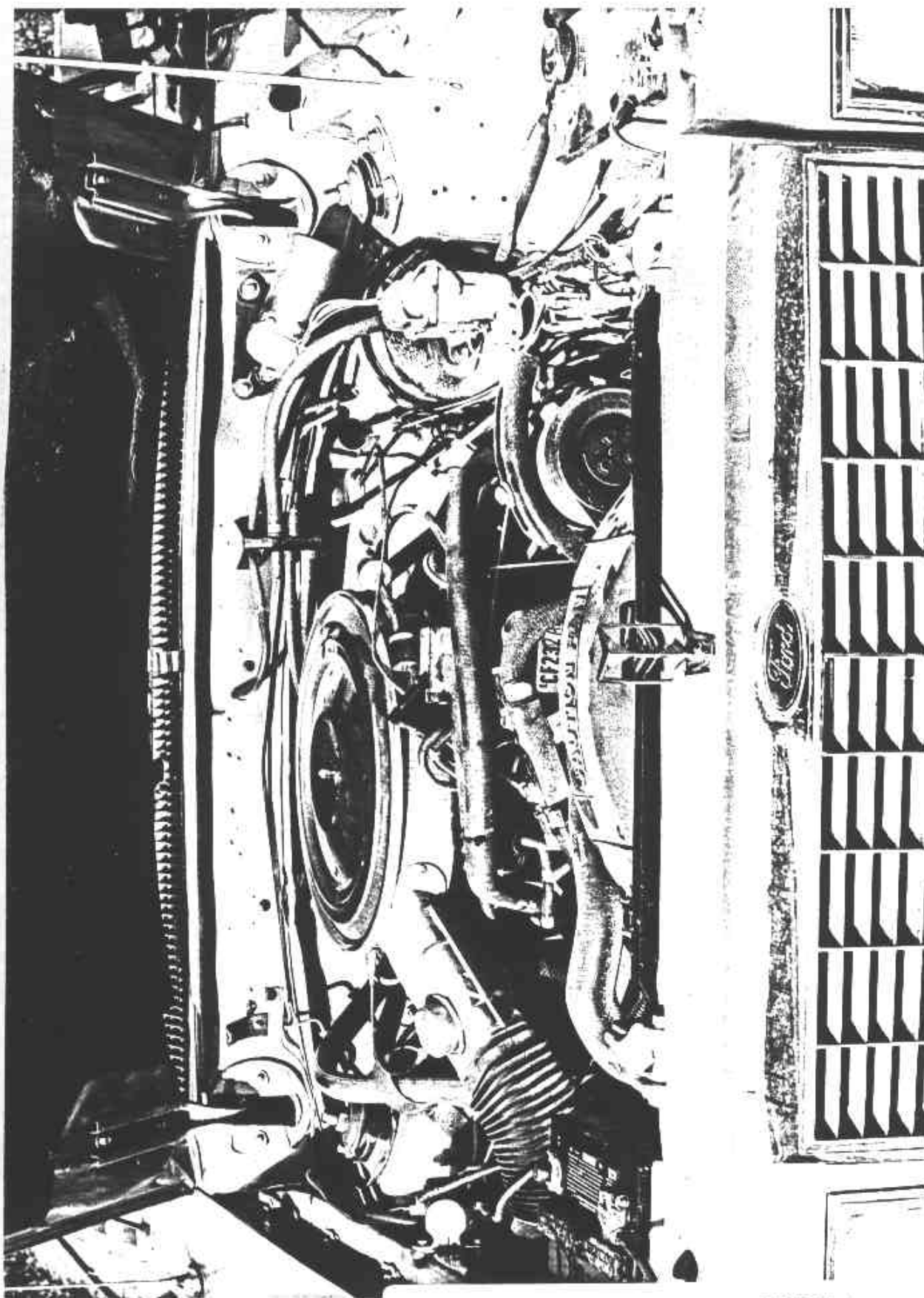


FIGURE A-9 PRE-TEST VIEW OF ENGINE COMPARTMENT

A-10

7095-V-4

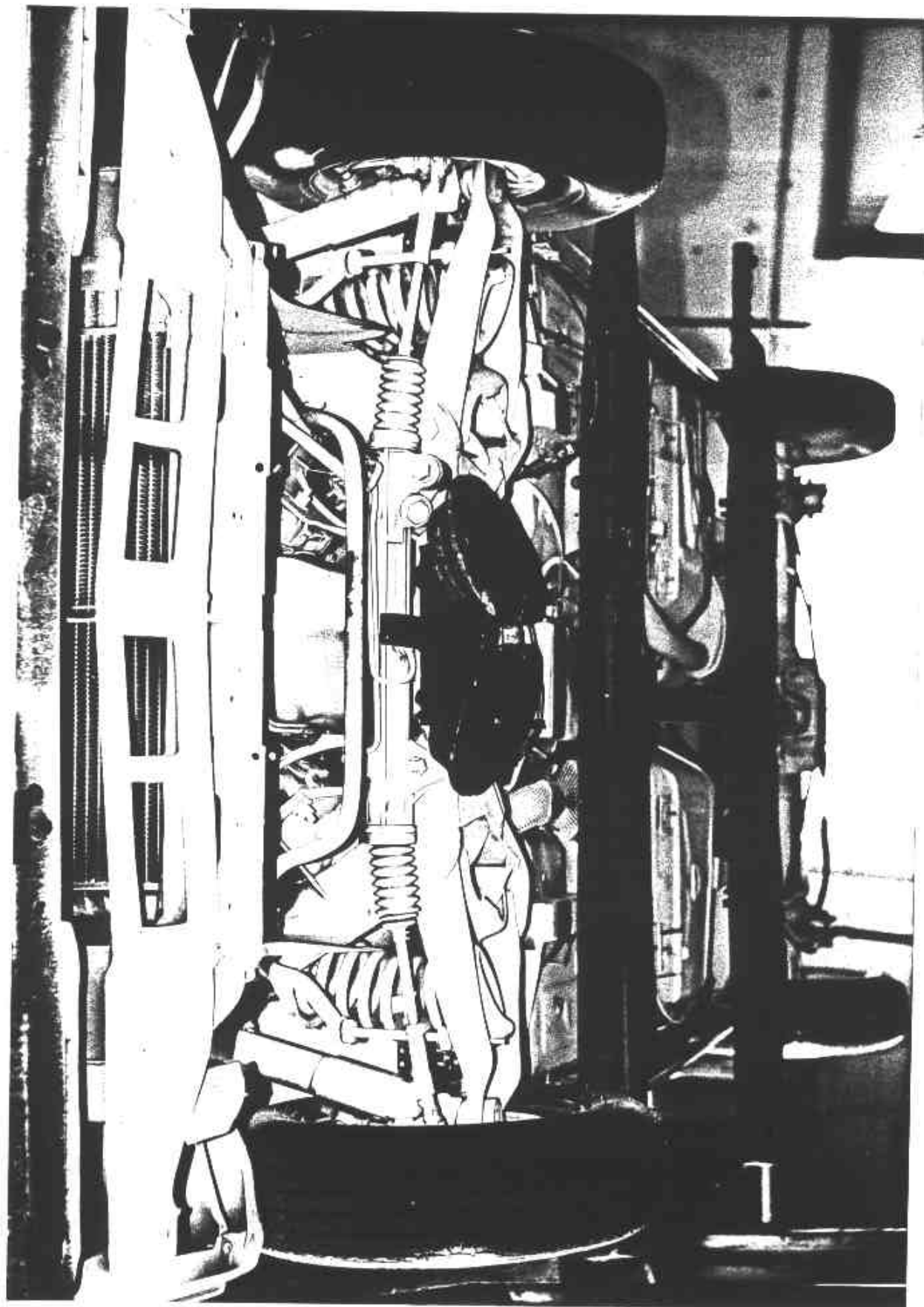


FIGURE A-10 PRE-TEST VIEW OF FRONT UNDERBODY

A-11

7095-V-4



FIGURE A-11 POST-TEST VIEW OF FRONT UNDERBODY

A-12

7095-V-4



FIGURE A-12 POST-TEST VIEW OF BROKEN DRIVE SHAFT AT THE TRANSMISSION

A-13

7095-V-4

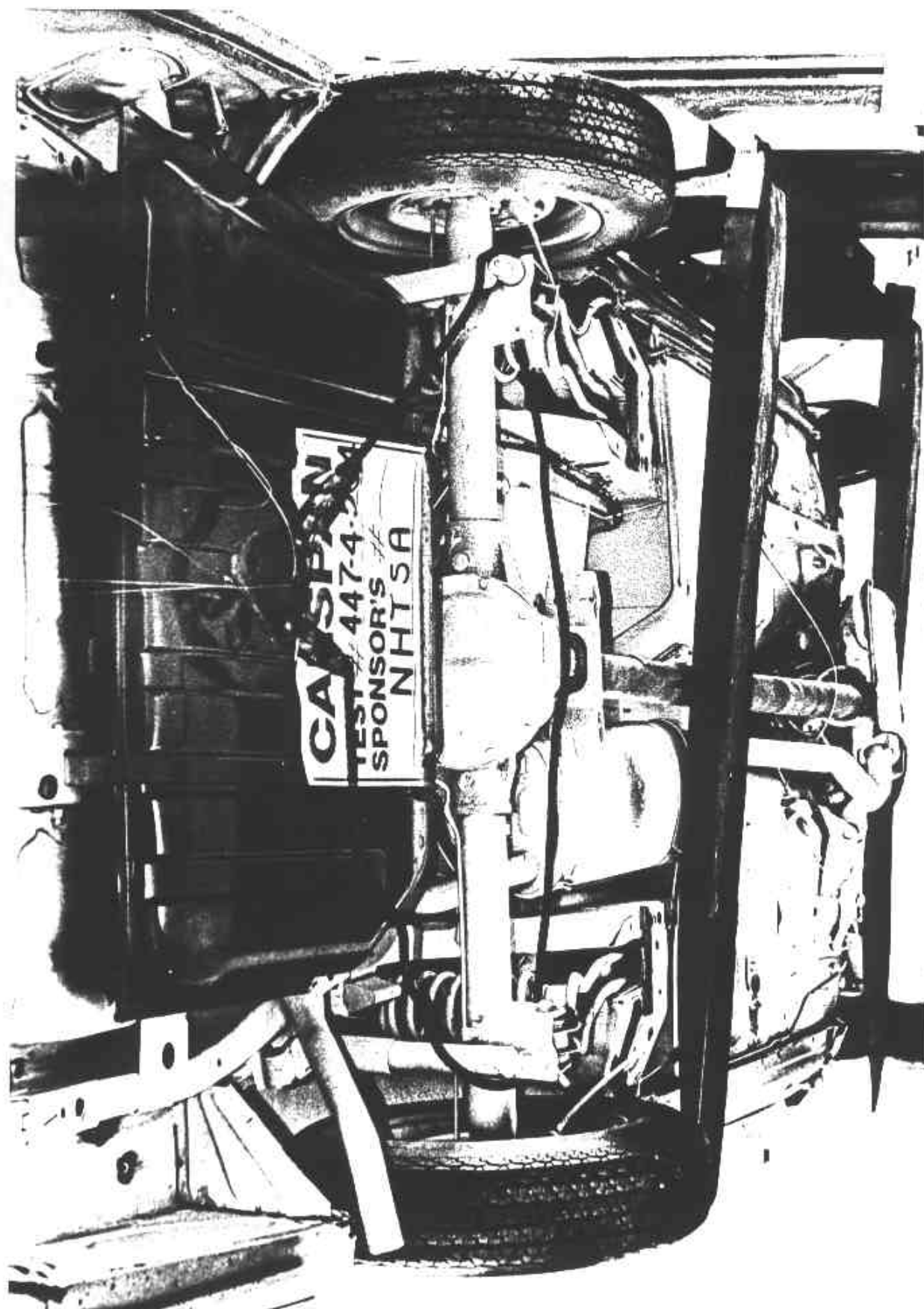


FIGURE A-13 POST-TEST VIEW OF REAR UNDERBODY AND FUEL TANK

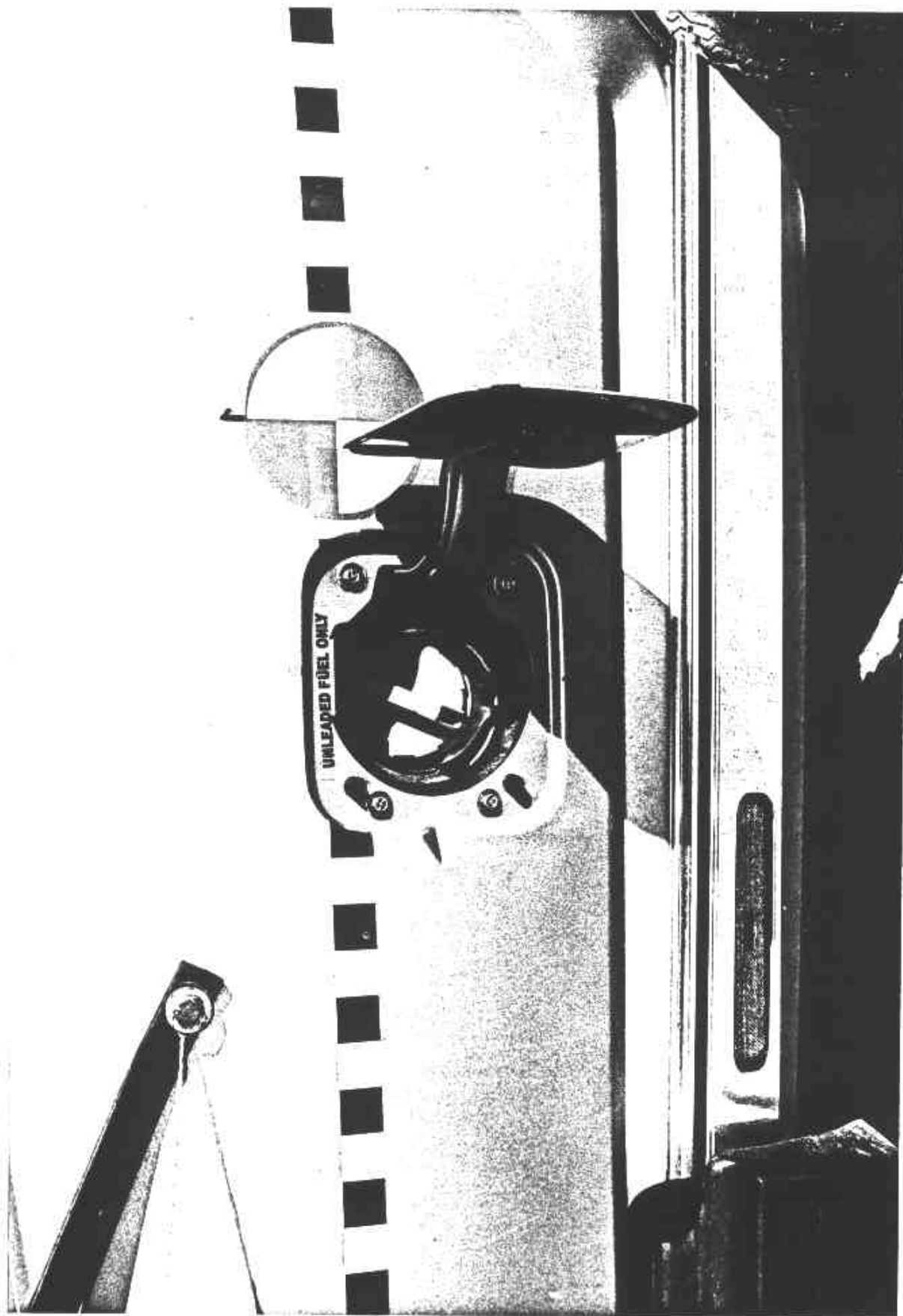


FIGURE A-14 VIEW OF FILLER TUBE AND CAP

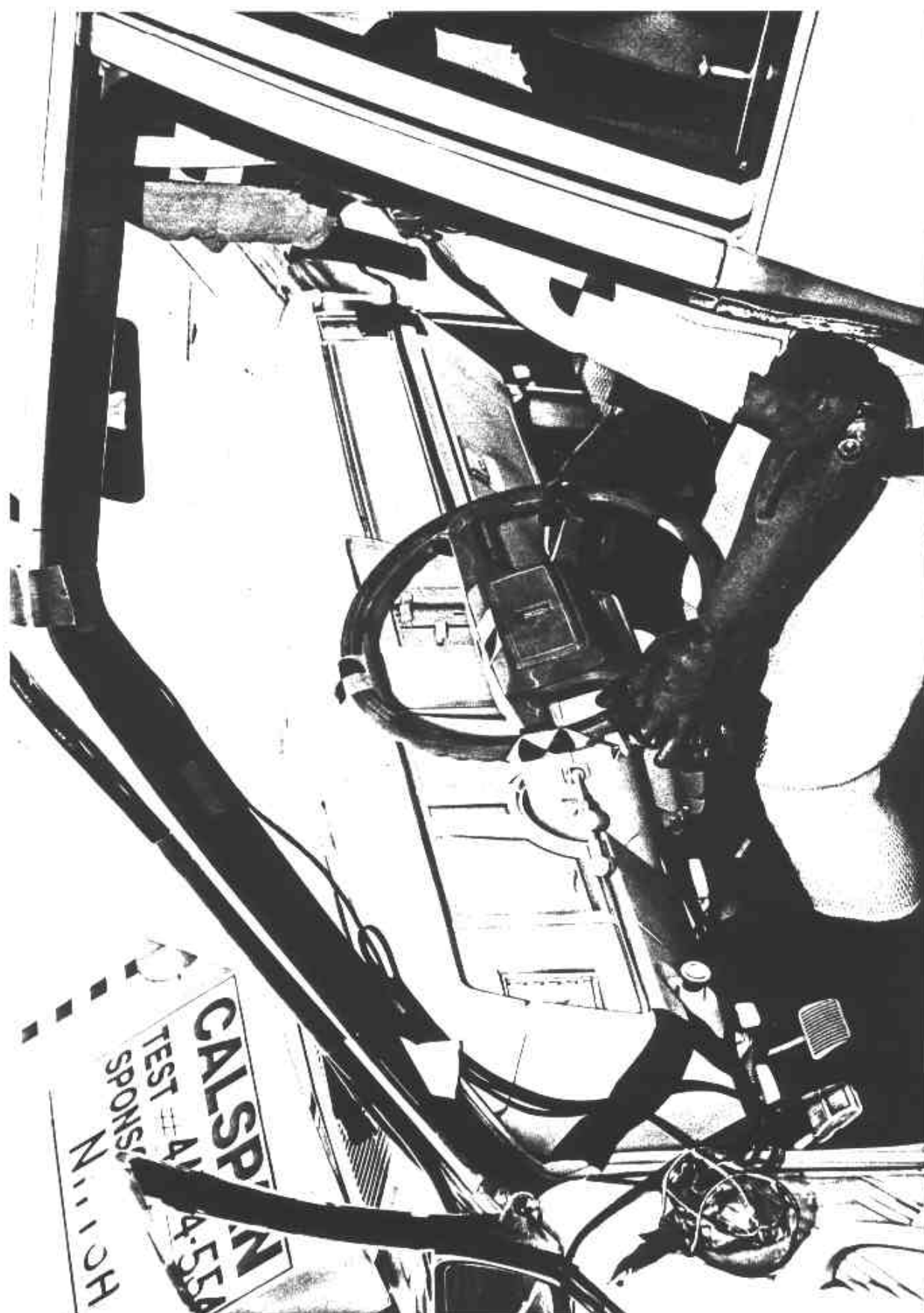


FIGURE A-15 PRE-TEST VIEW OF DRIVER

A-16

7095-V-4



FIGURE A-16 PRE-TEST VIEW OF RIGHT FRONT PASSENGER

A-17

7095-V-4



FIGURE A-17 POST-TEST VIEW OF DRIVER AND VEHICLE INTERIOR

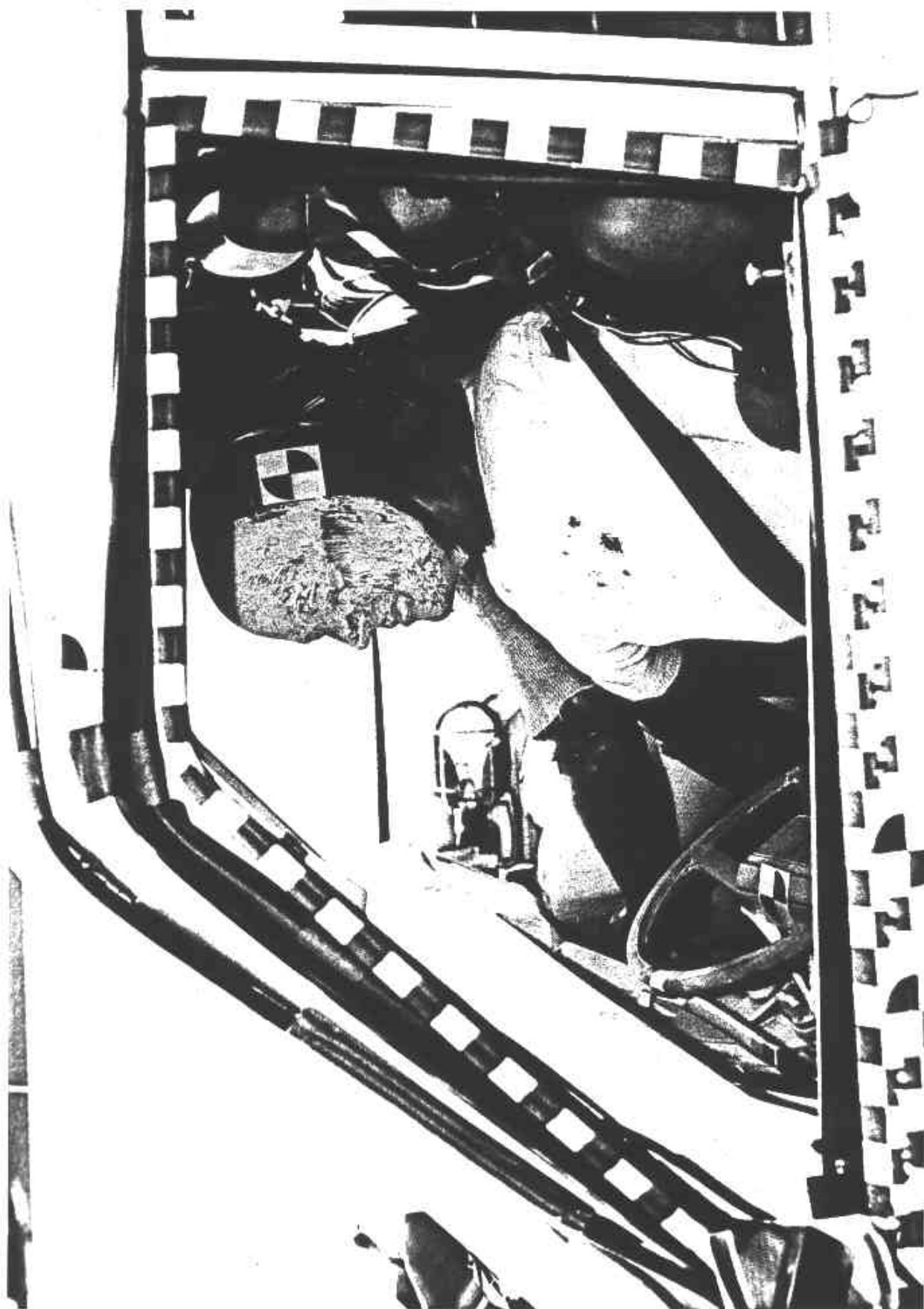


FIGURE A-18 POST-TEST VIEW OF FRONT OCCUPANTS

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA

TEST NO. 447-4-554

1982 FORD GRANADA

4-DOOR SEDAN

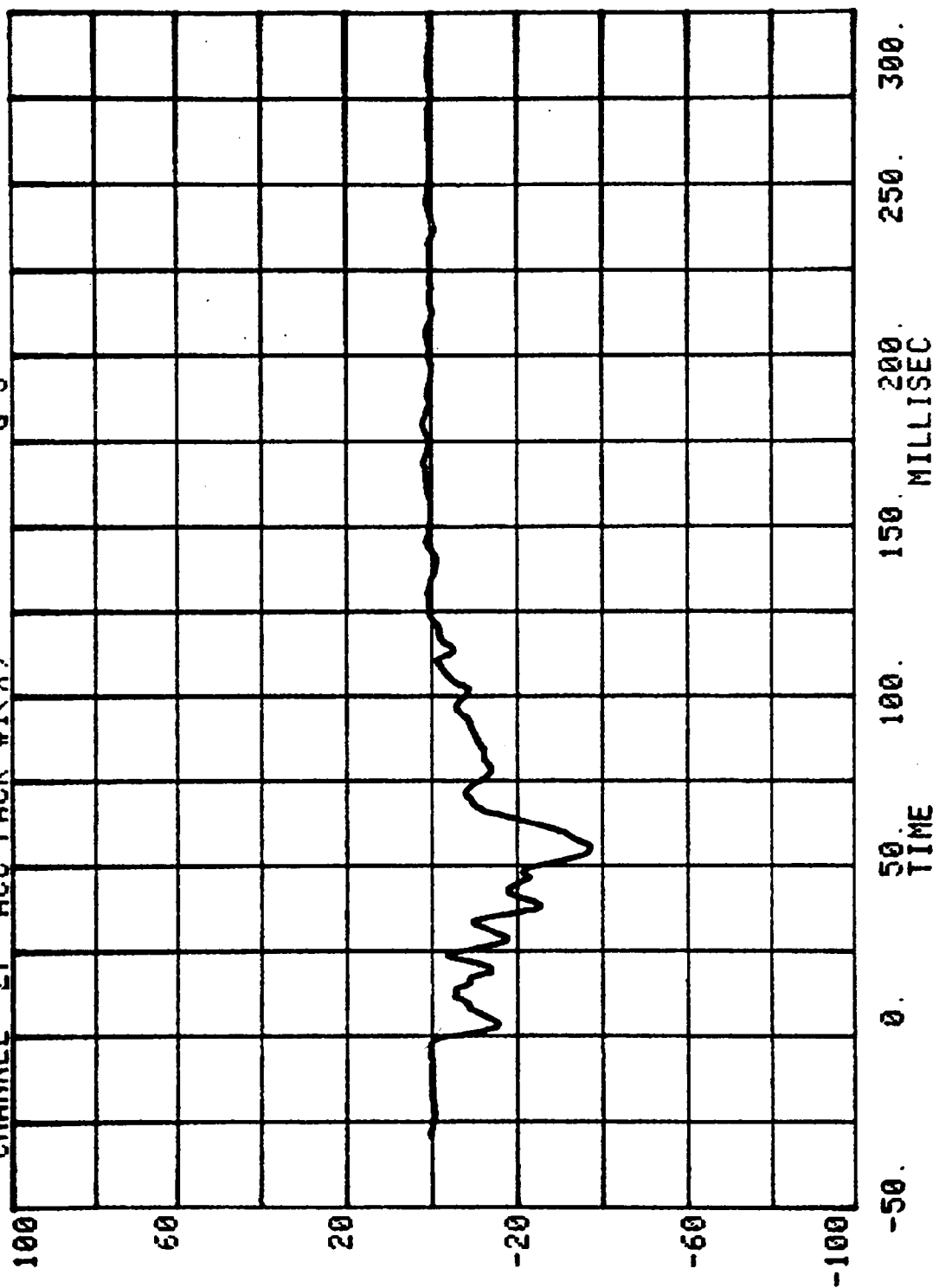
VEHICLE NO. 1 DATA

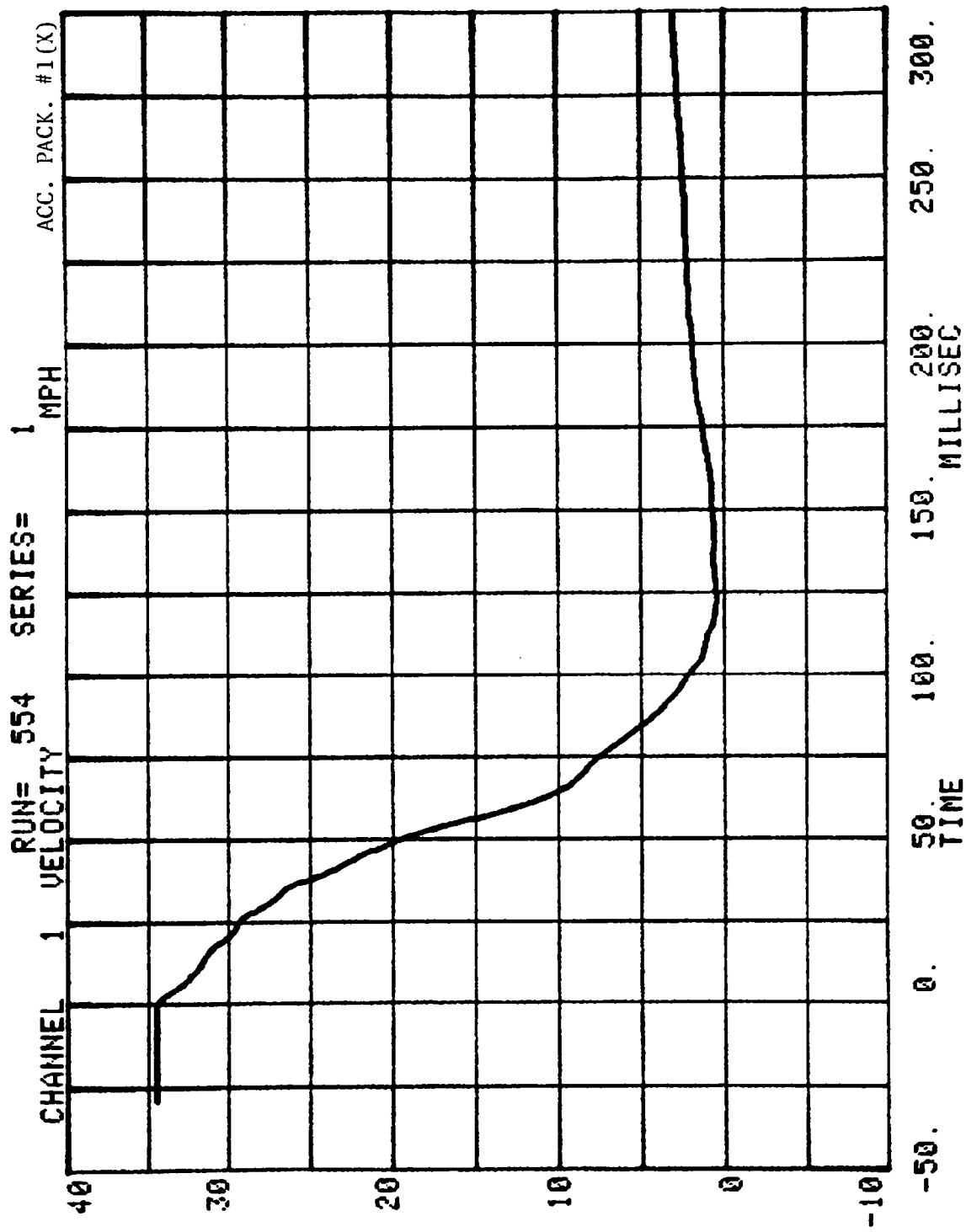
VEHICLE DATA

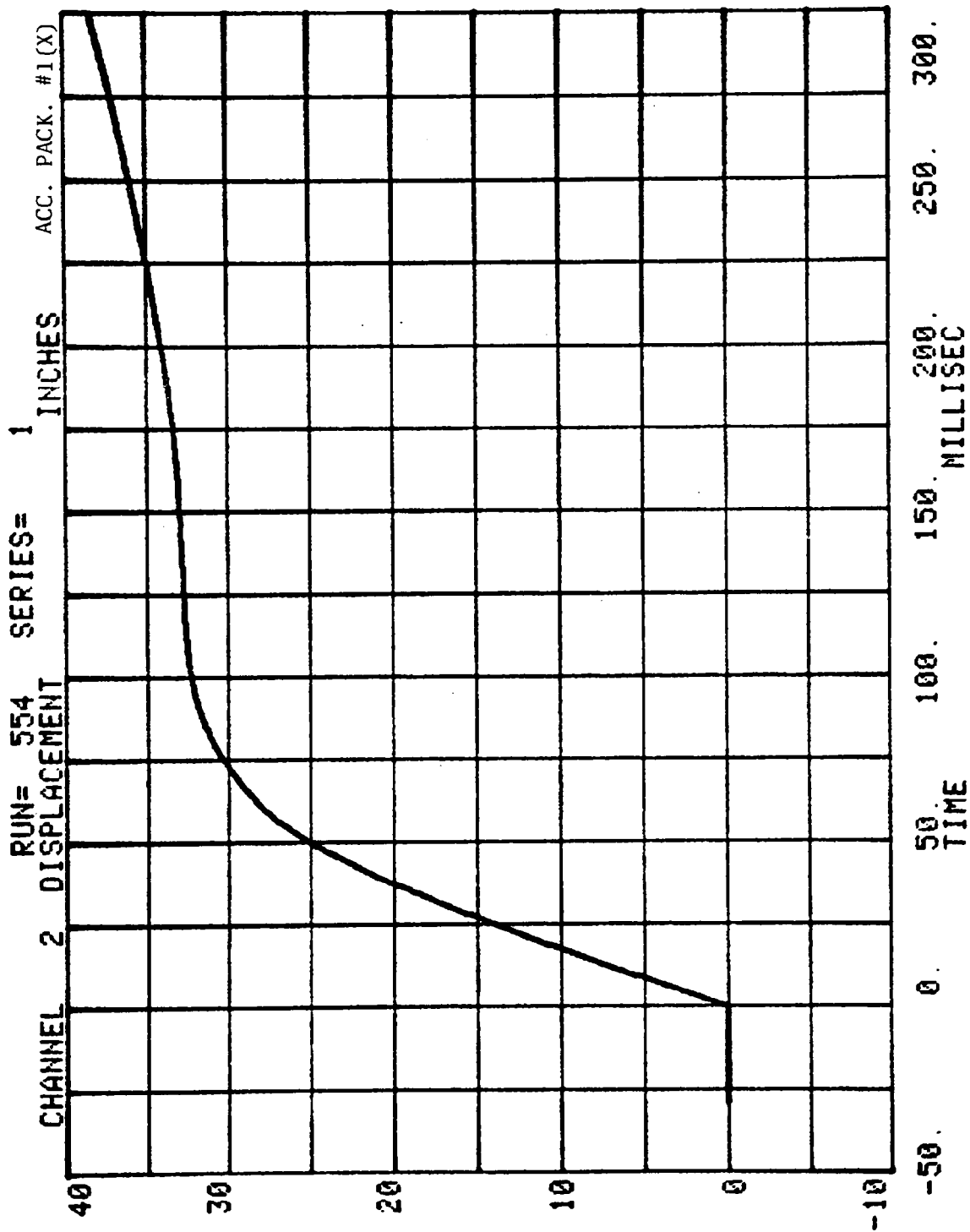
FILTER CHANNEL CLASS

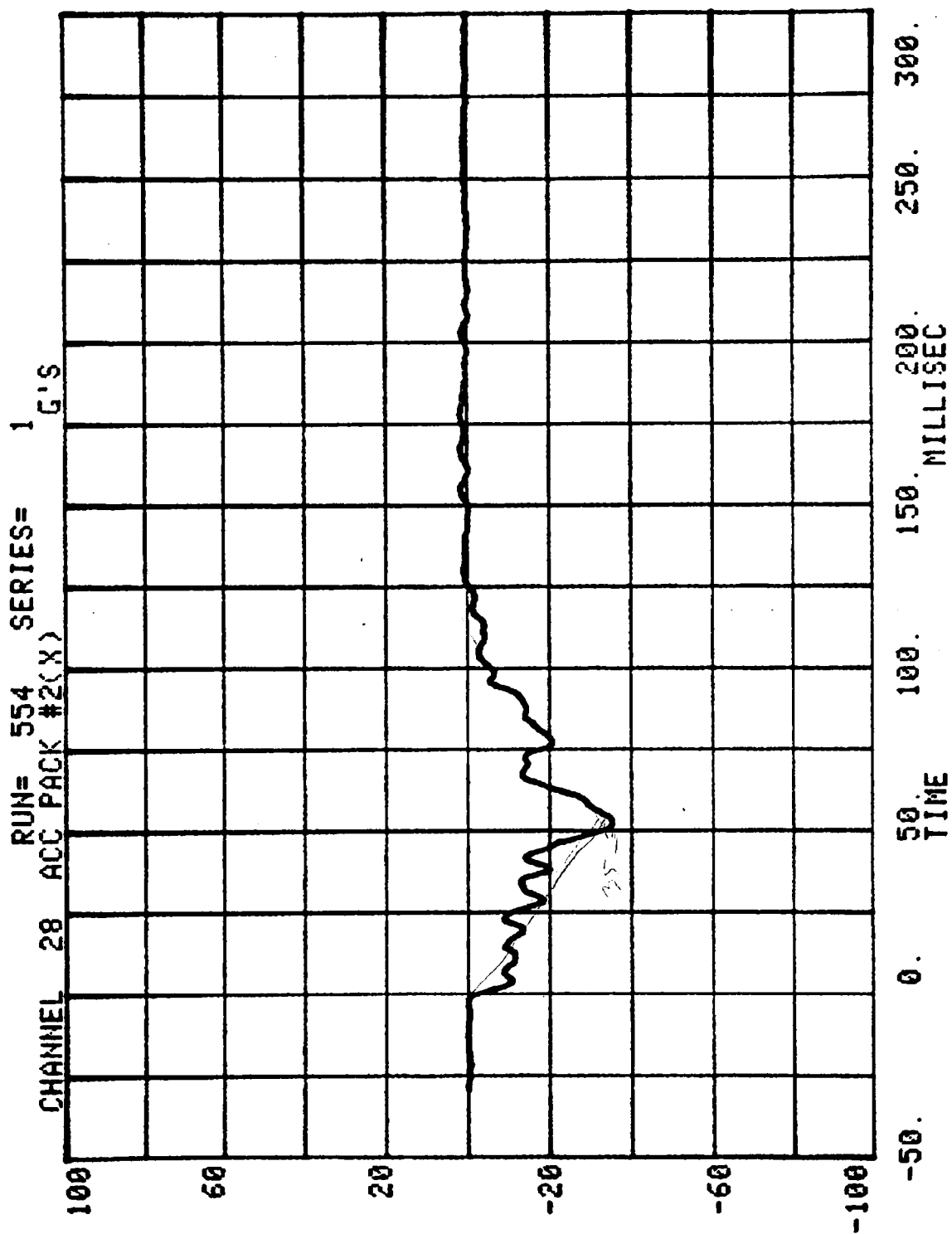
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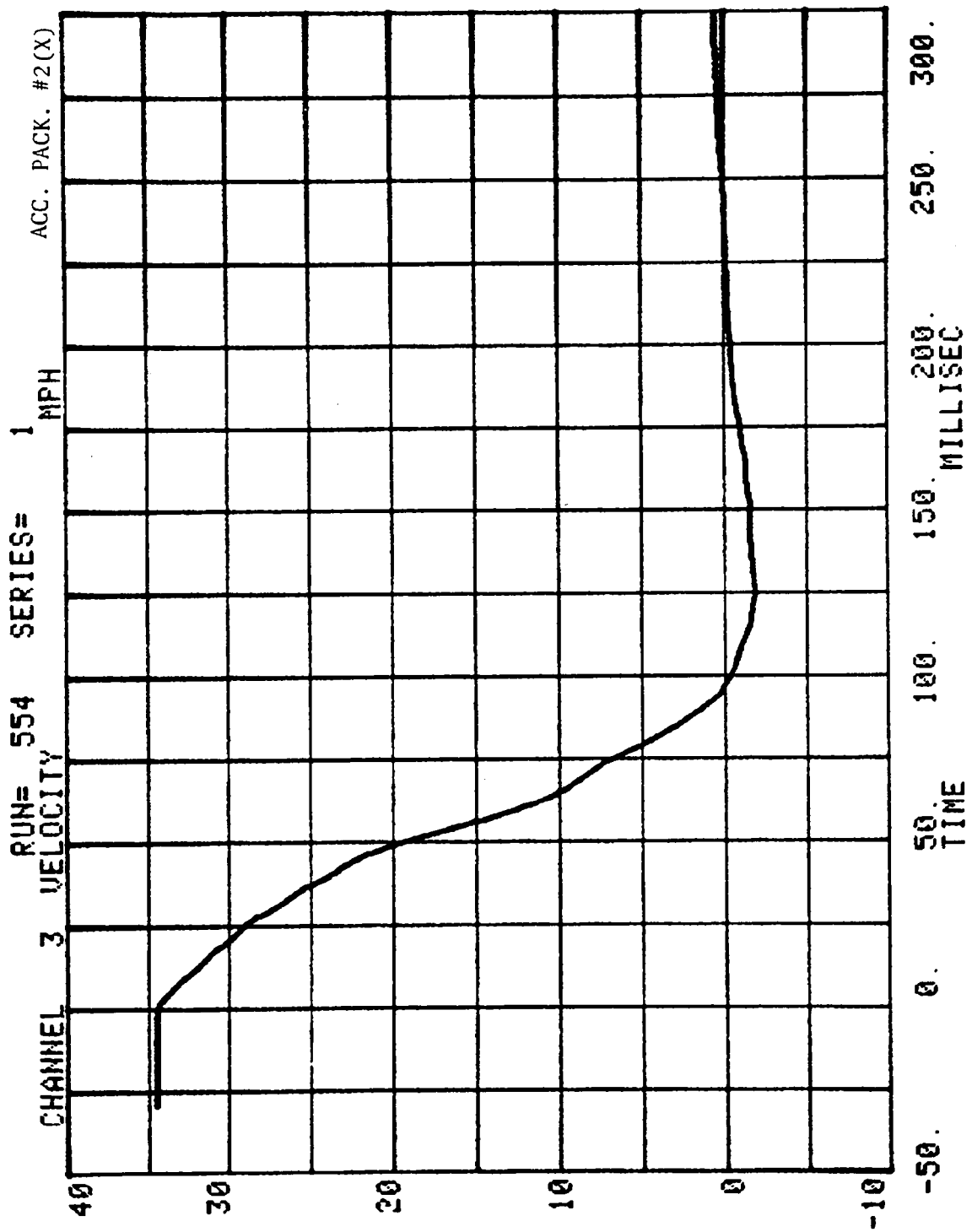
CHANNEL 27 ACC PACK #1(X) RUN= 554 SERIES= 1 G'S

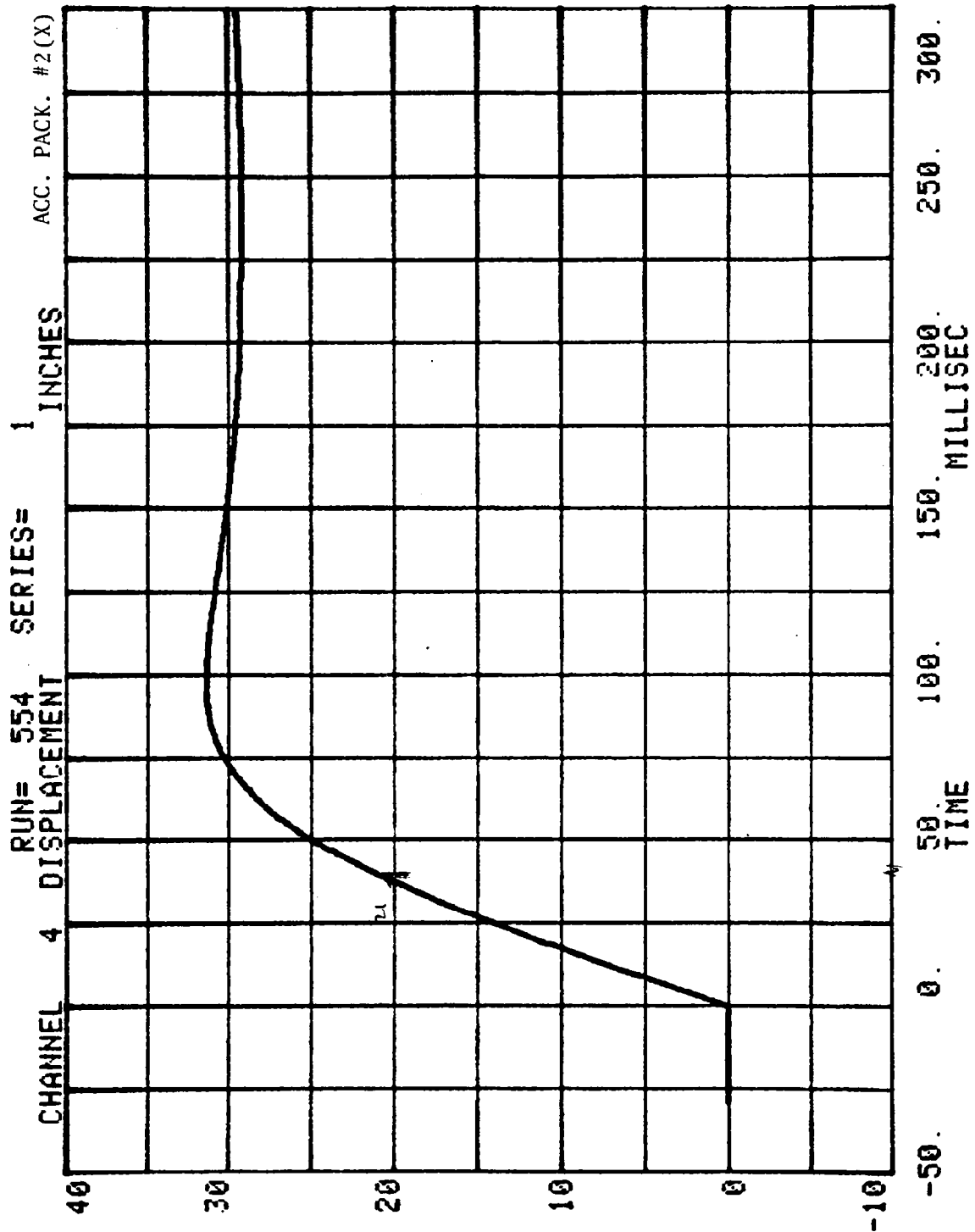




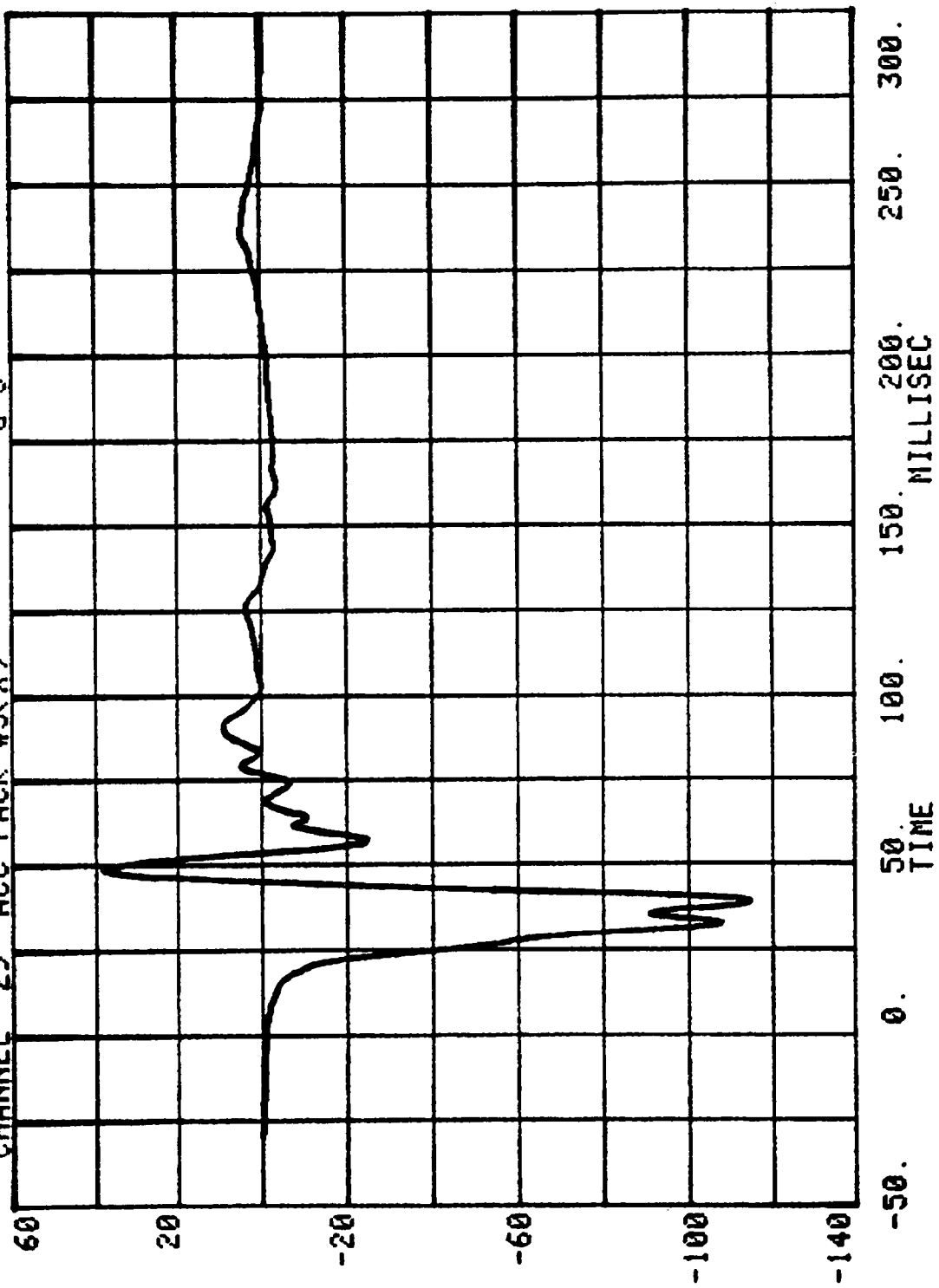


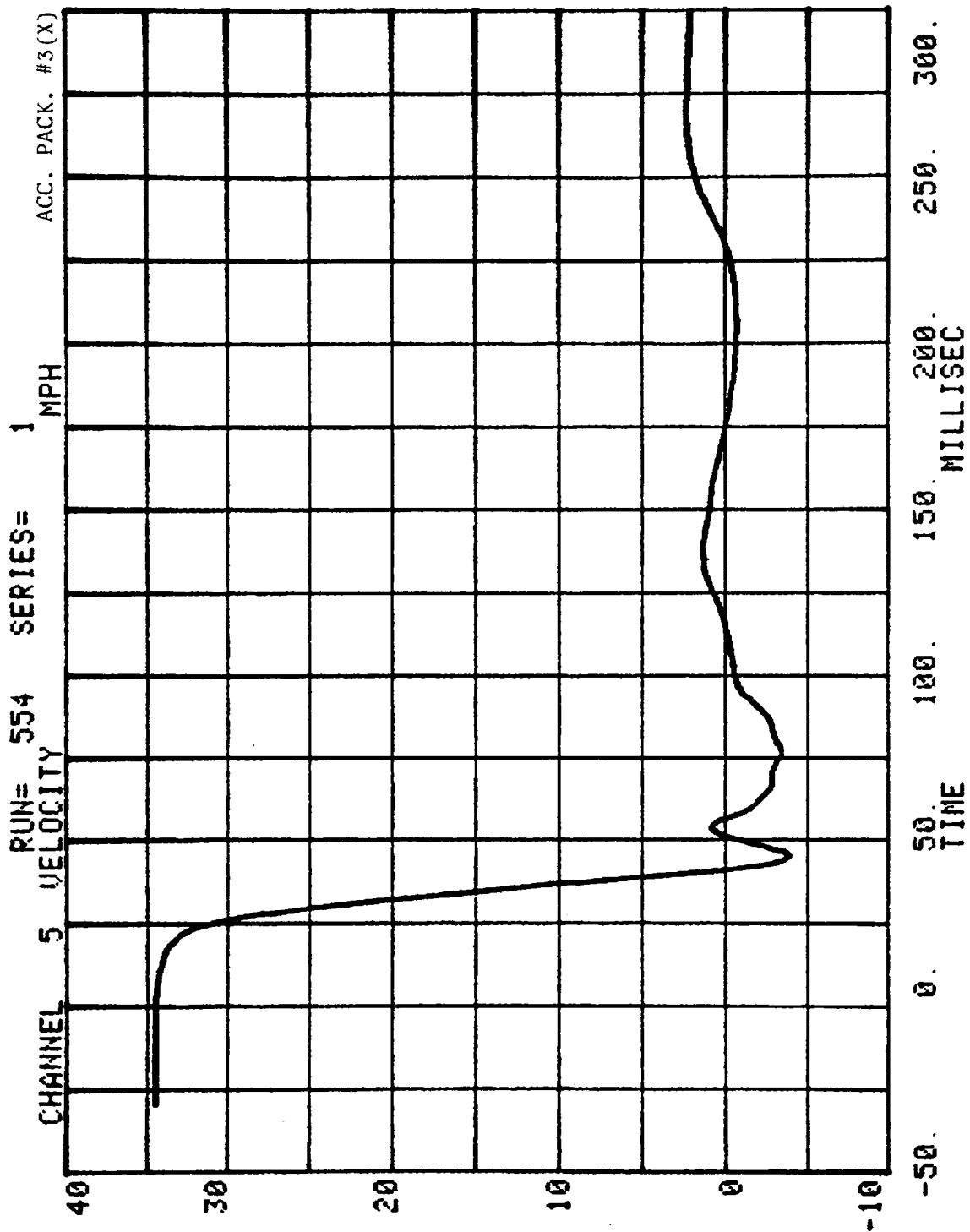


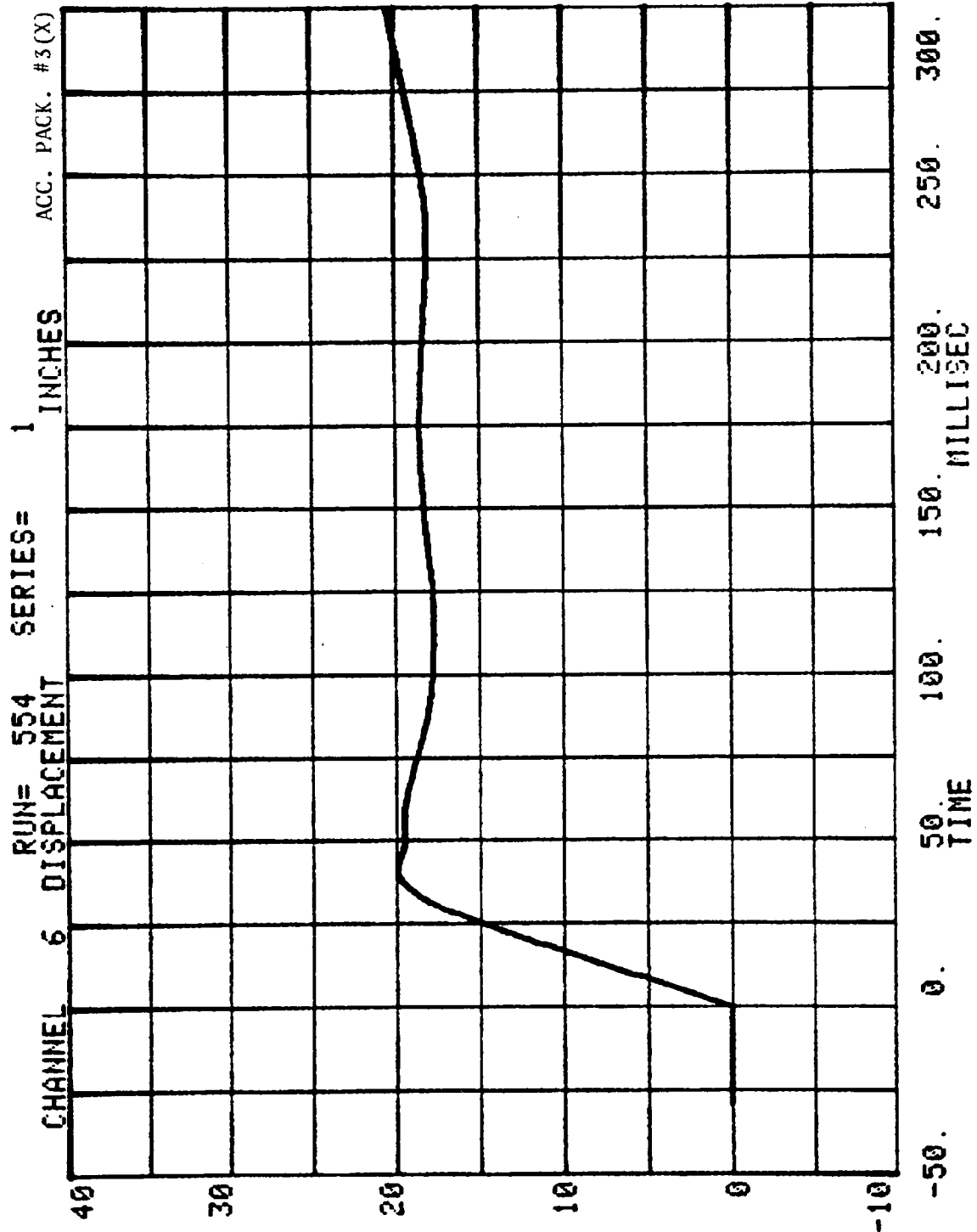




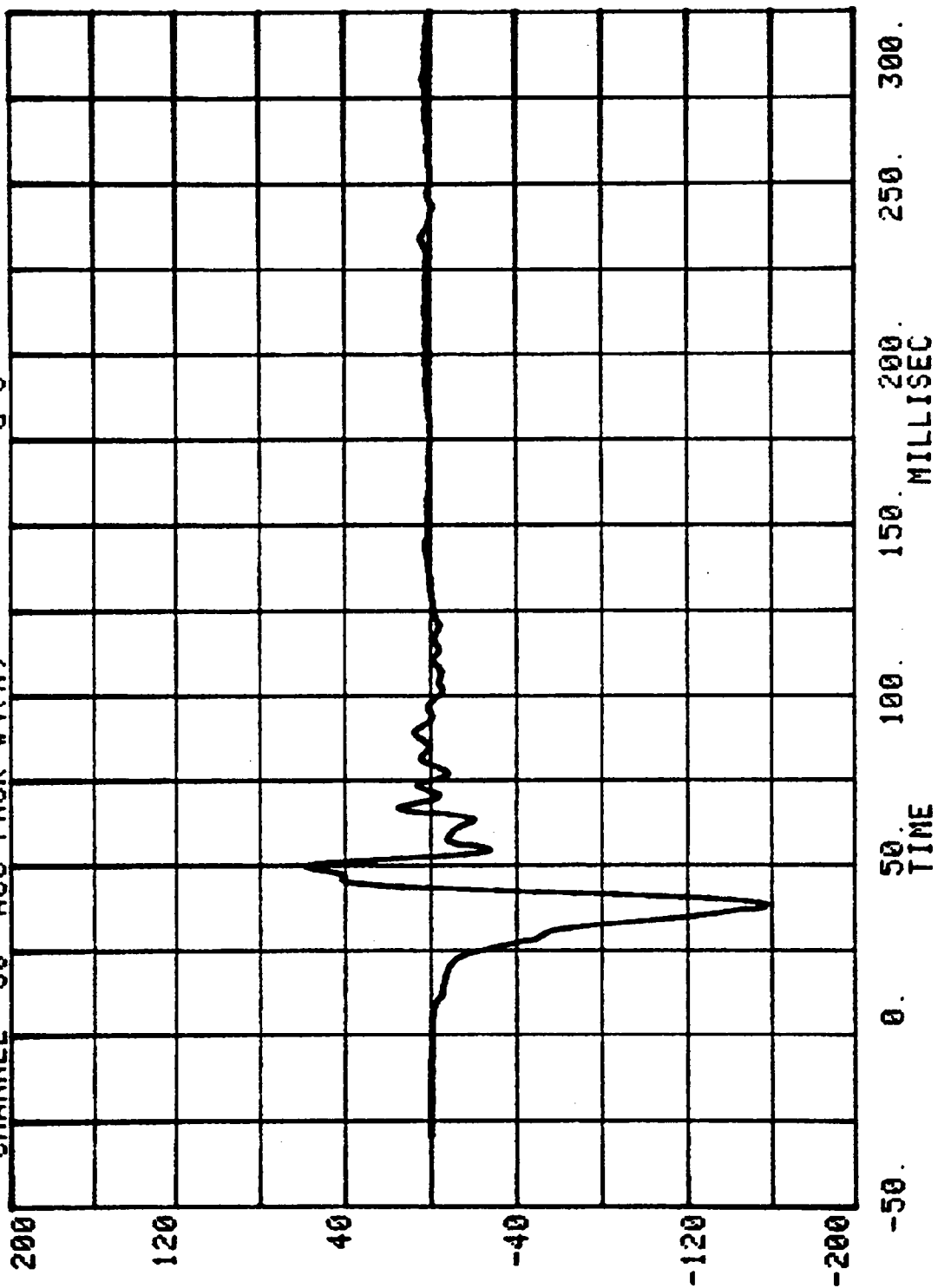
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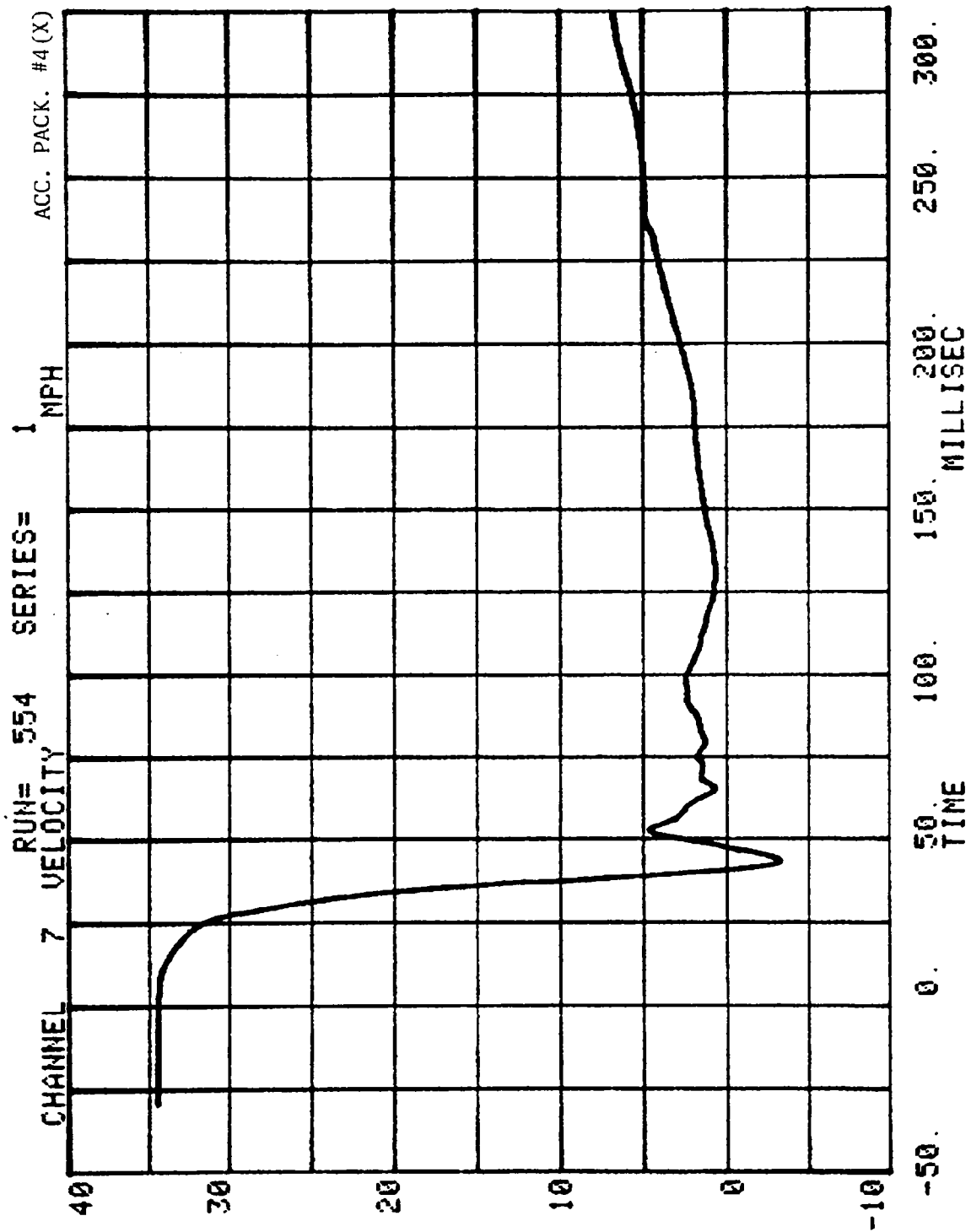


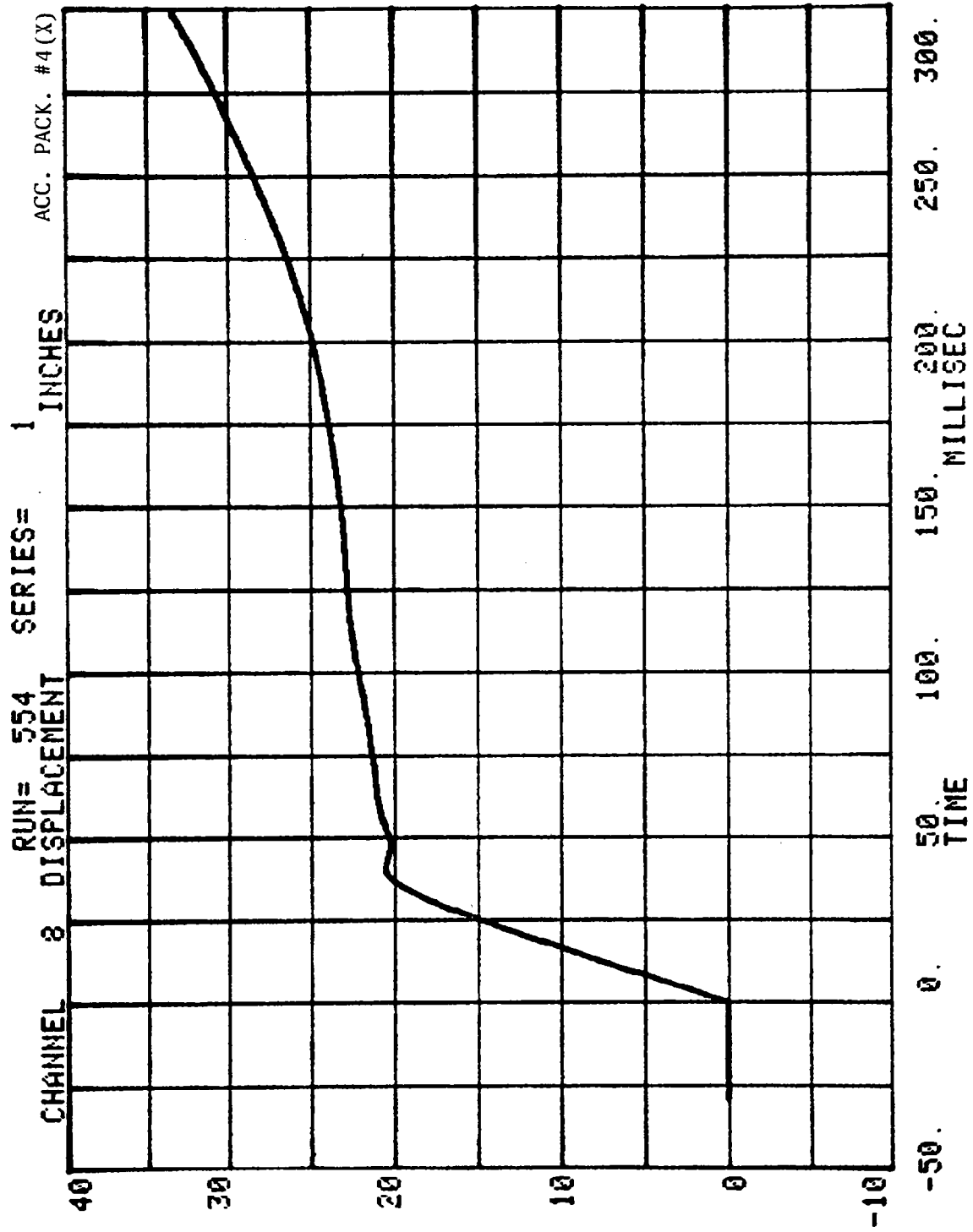


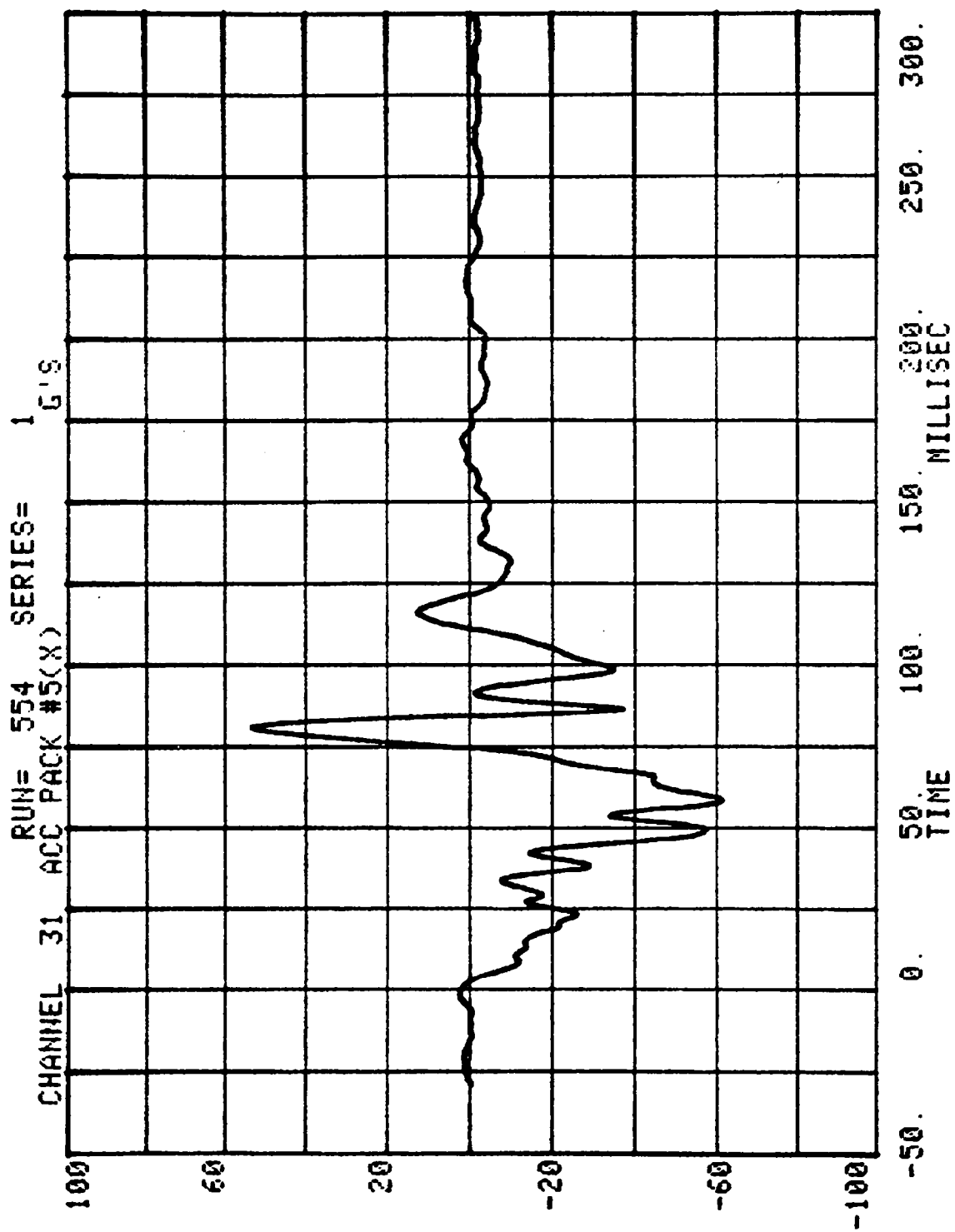


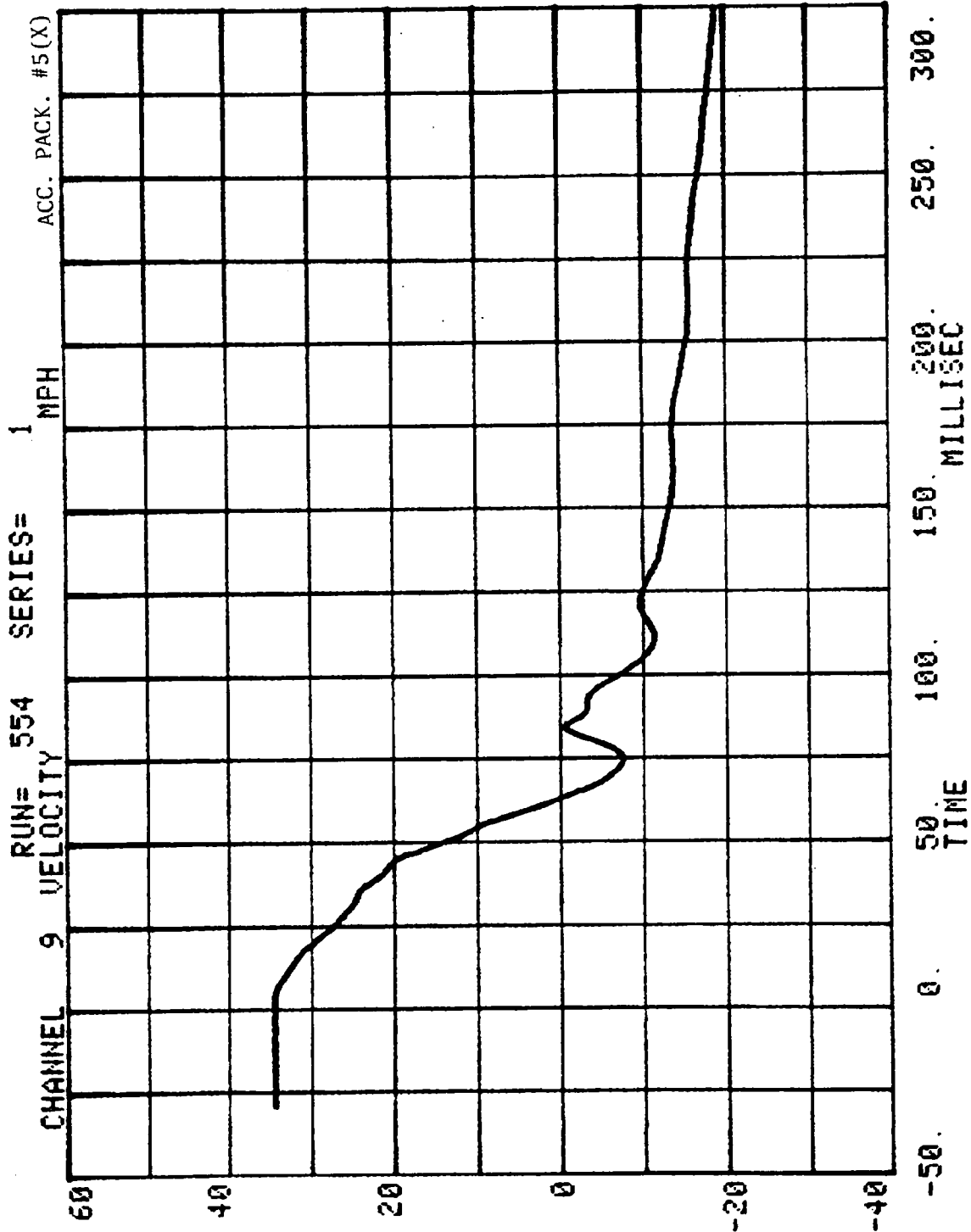
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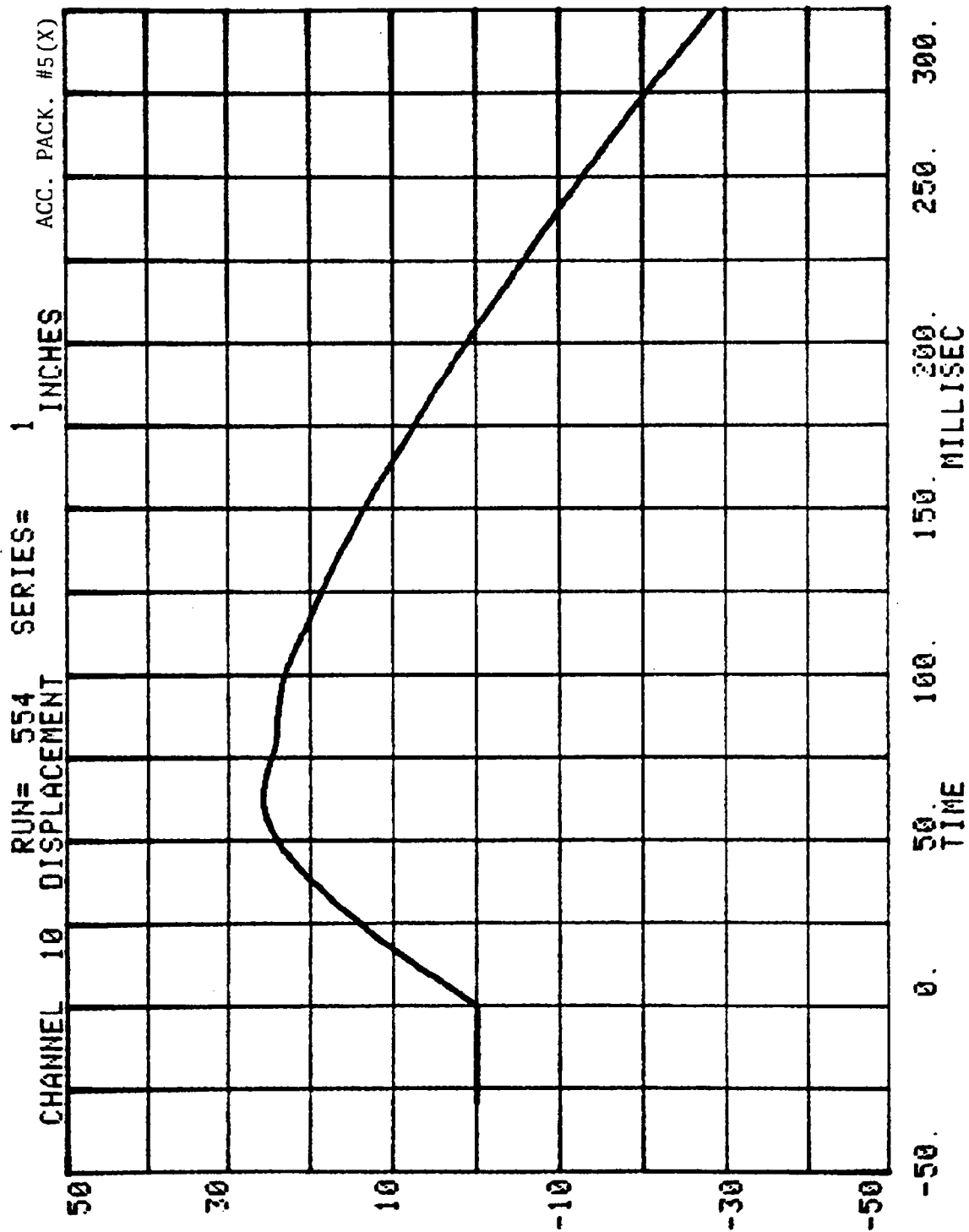




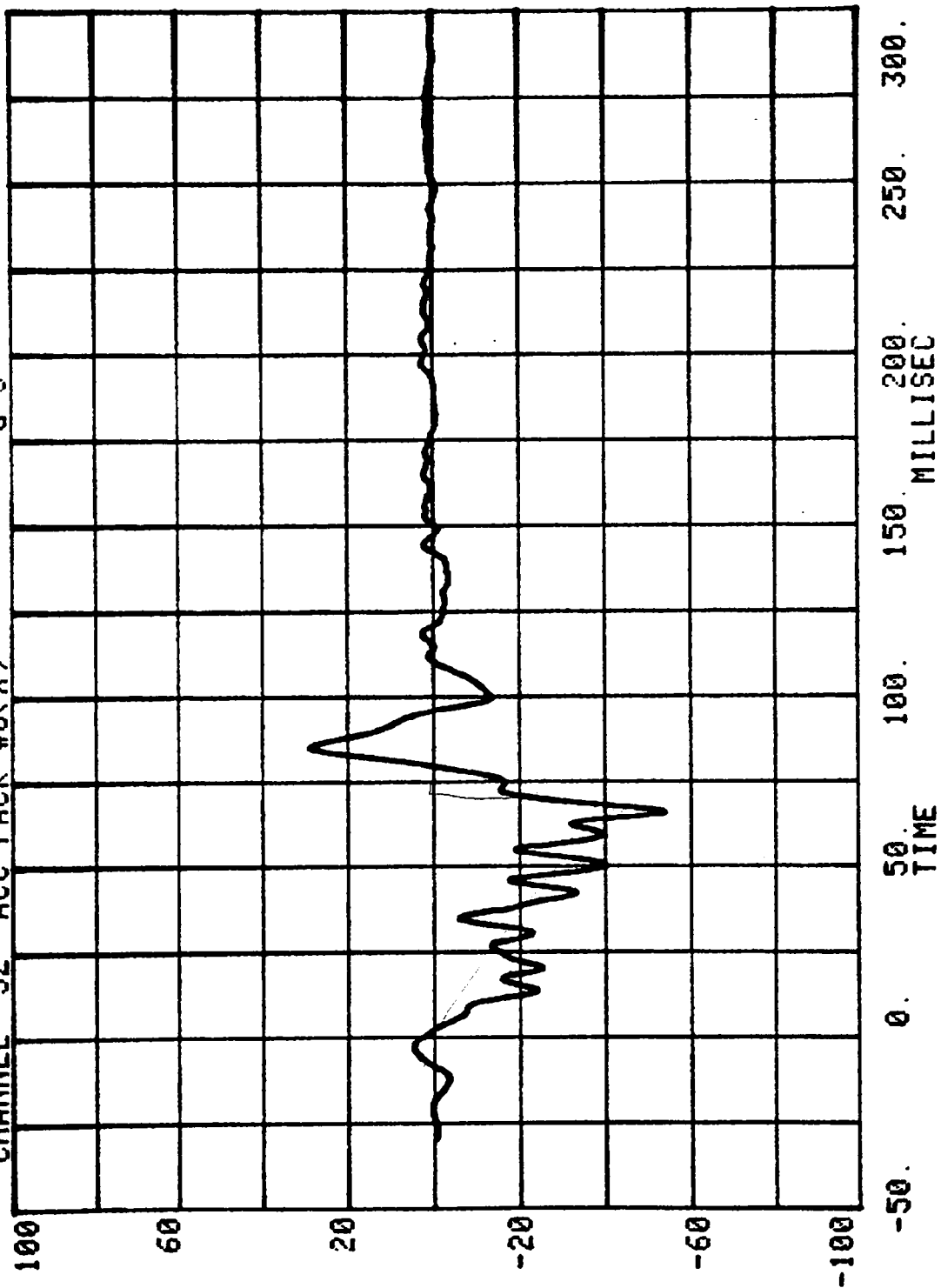


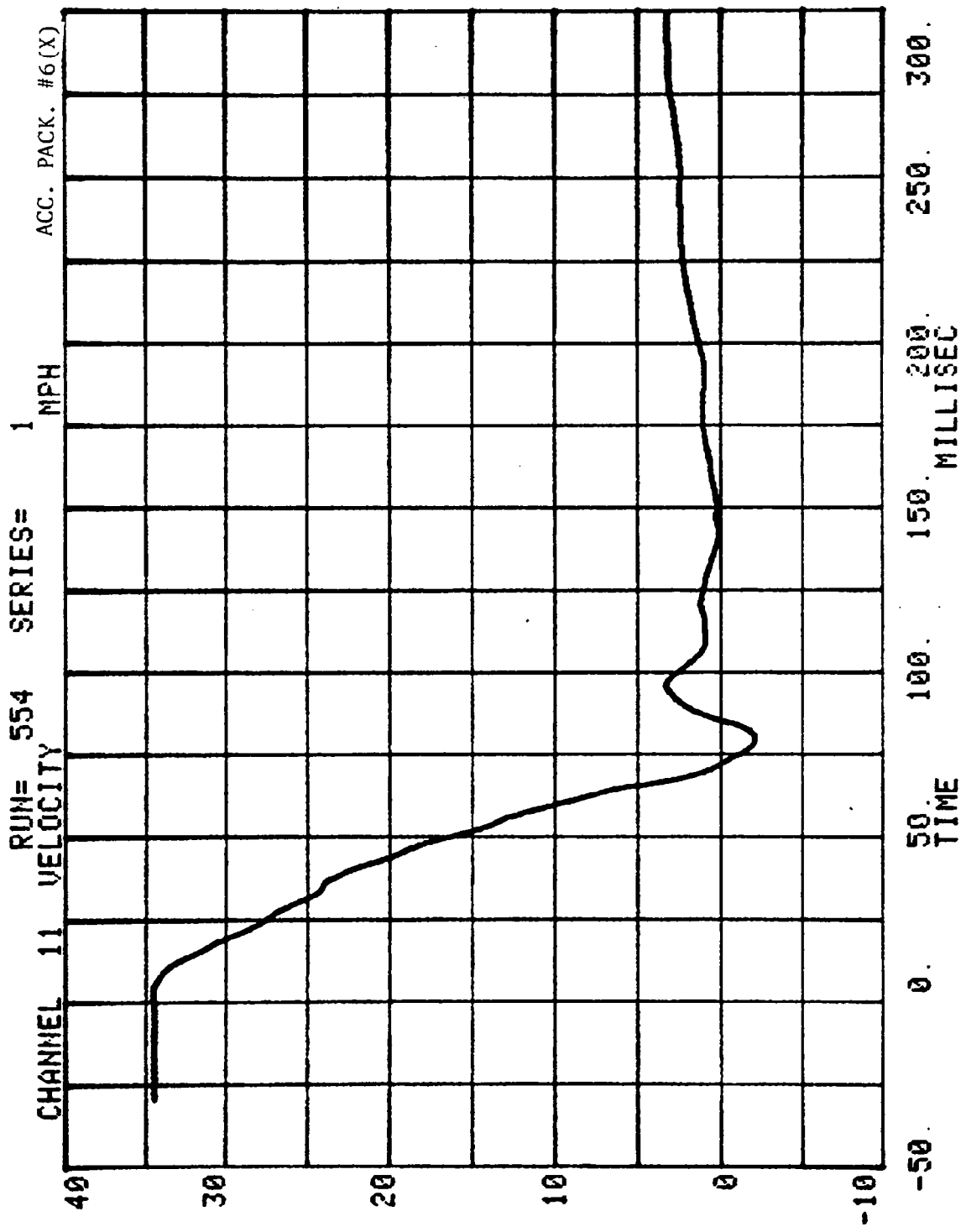


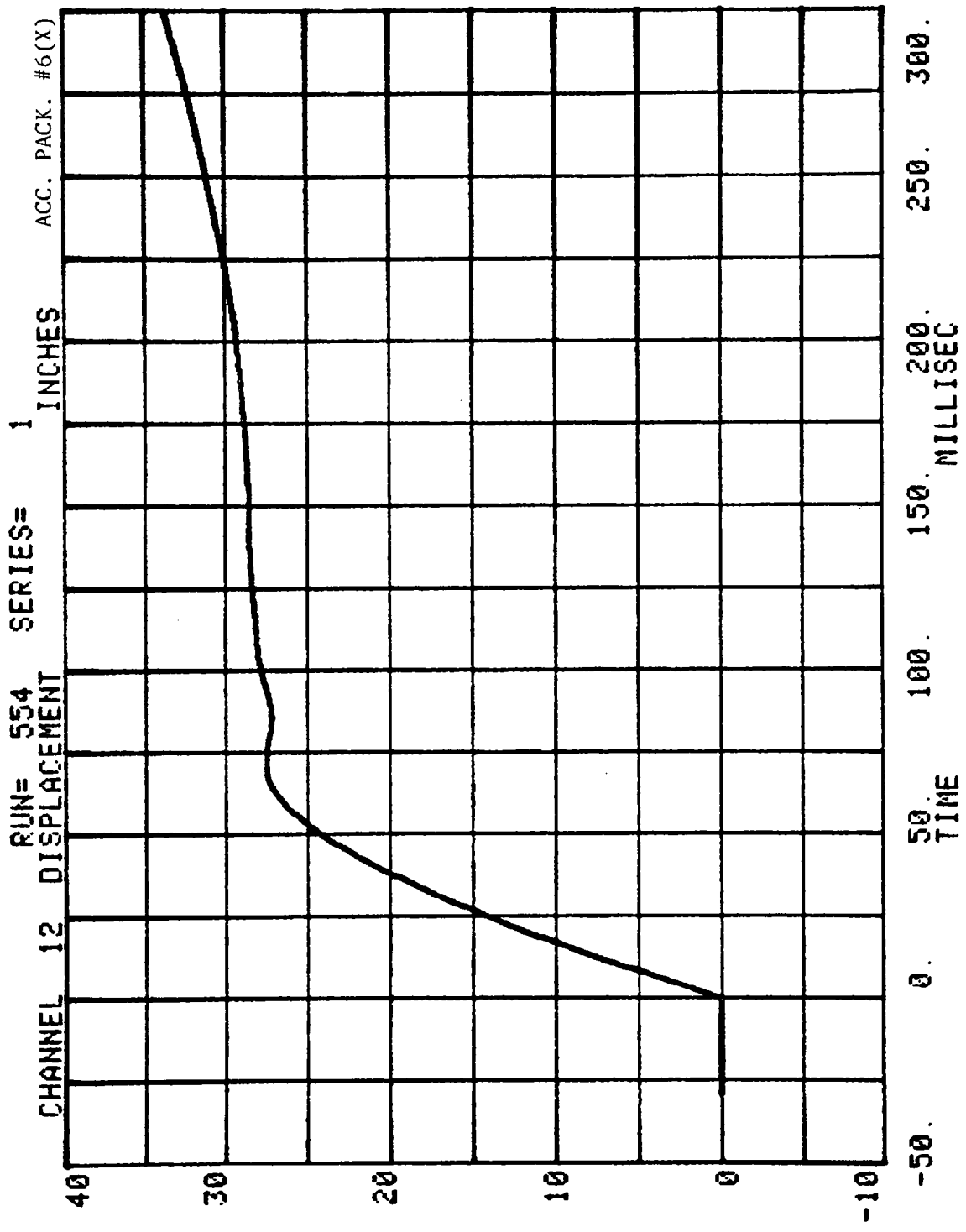




RUN= 554 SERIES= 1
CHANNEL 32 ACC PACK #6(X) G'S







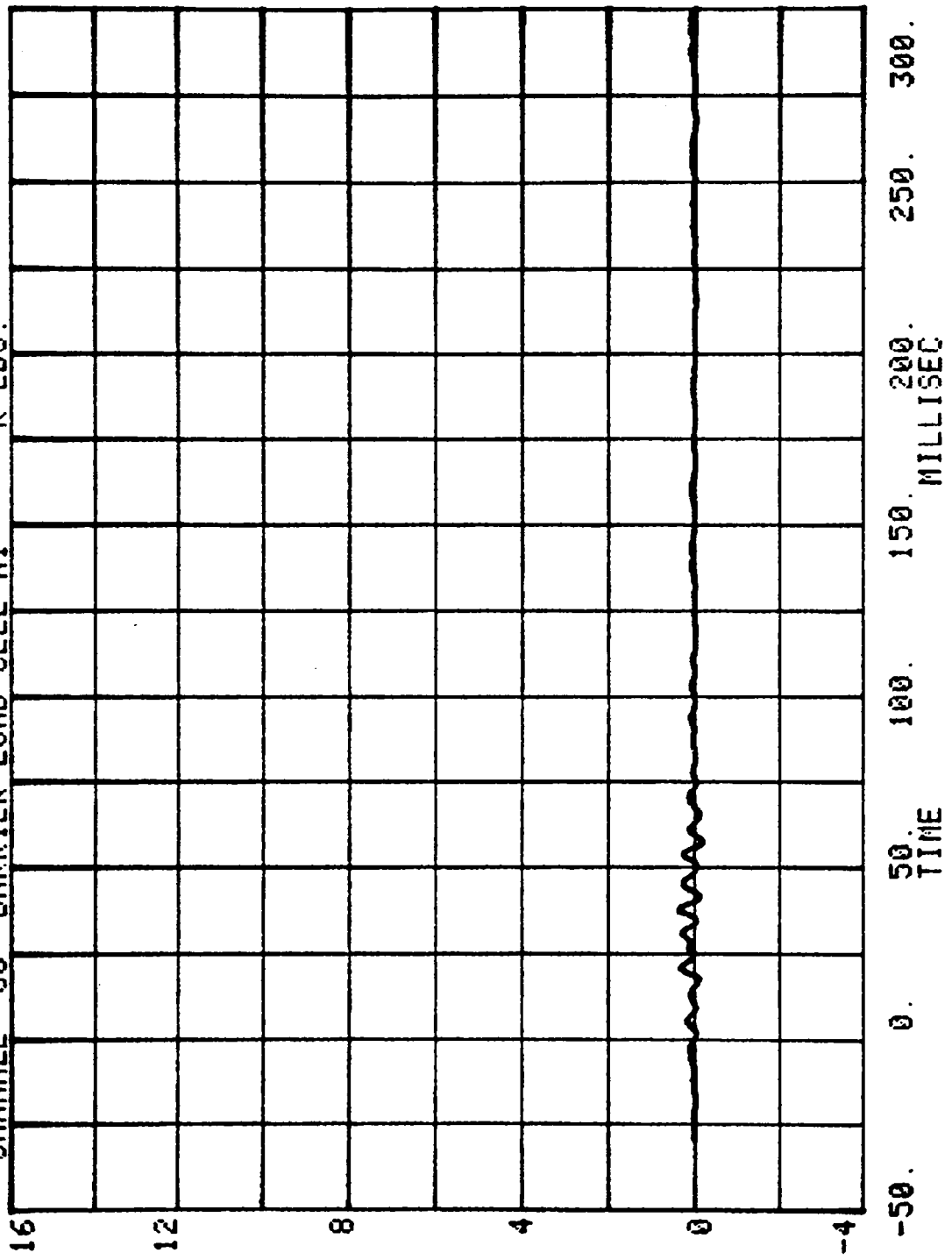
TEST NO. 447-4-554

1982 FORD GRANADA

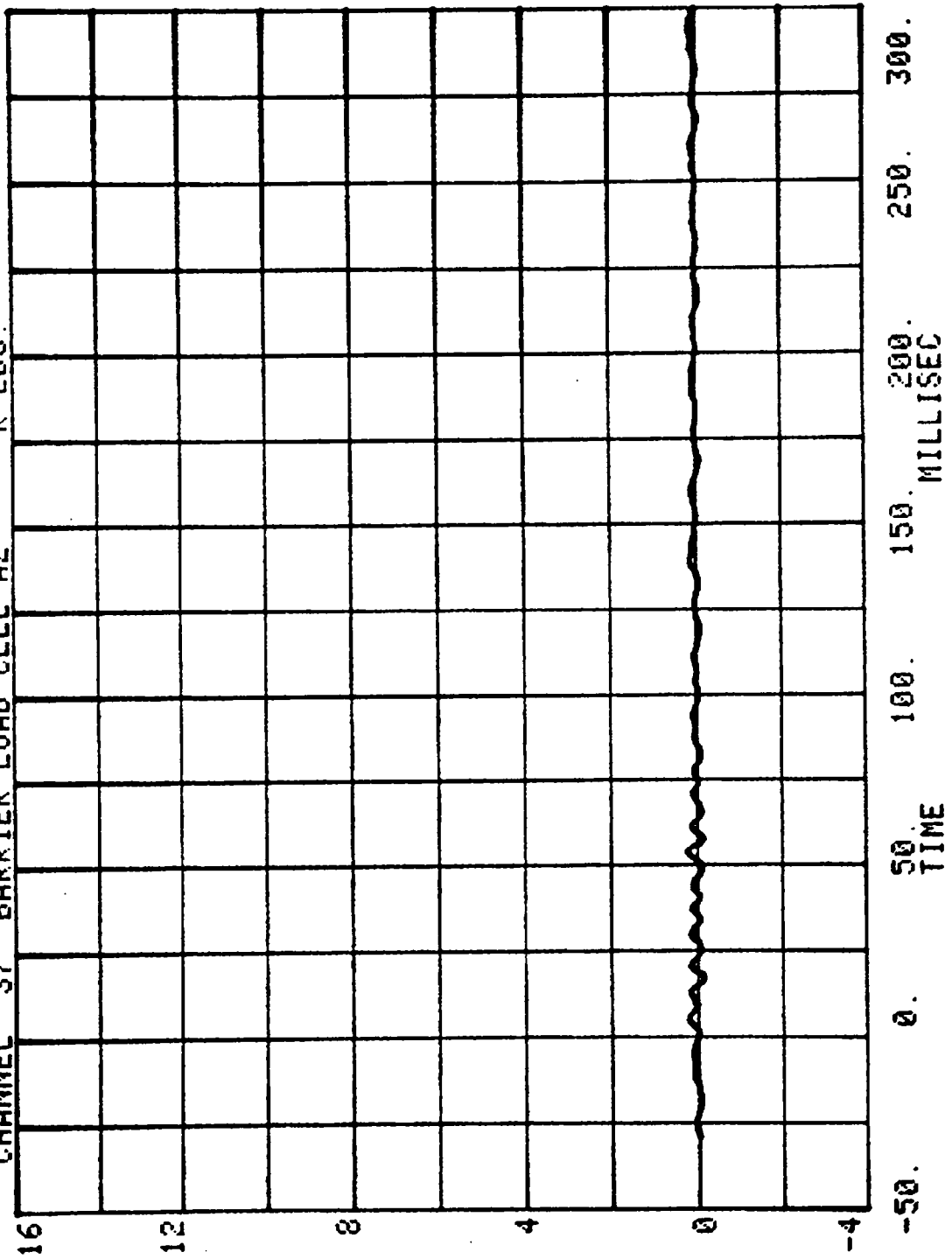
LOAD CELL BARRIER DATA
FILTER CHANNEL CLASS

60

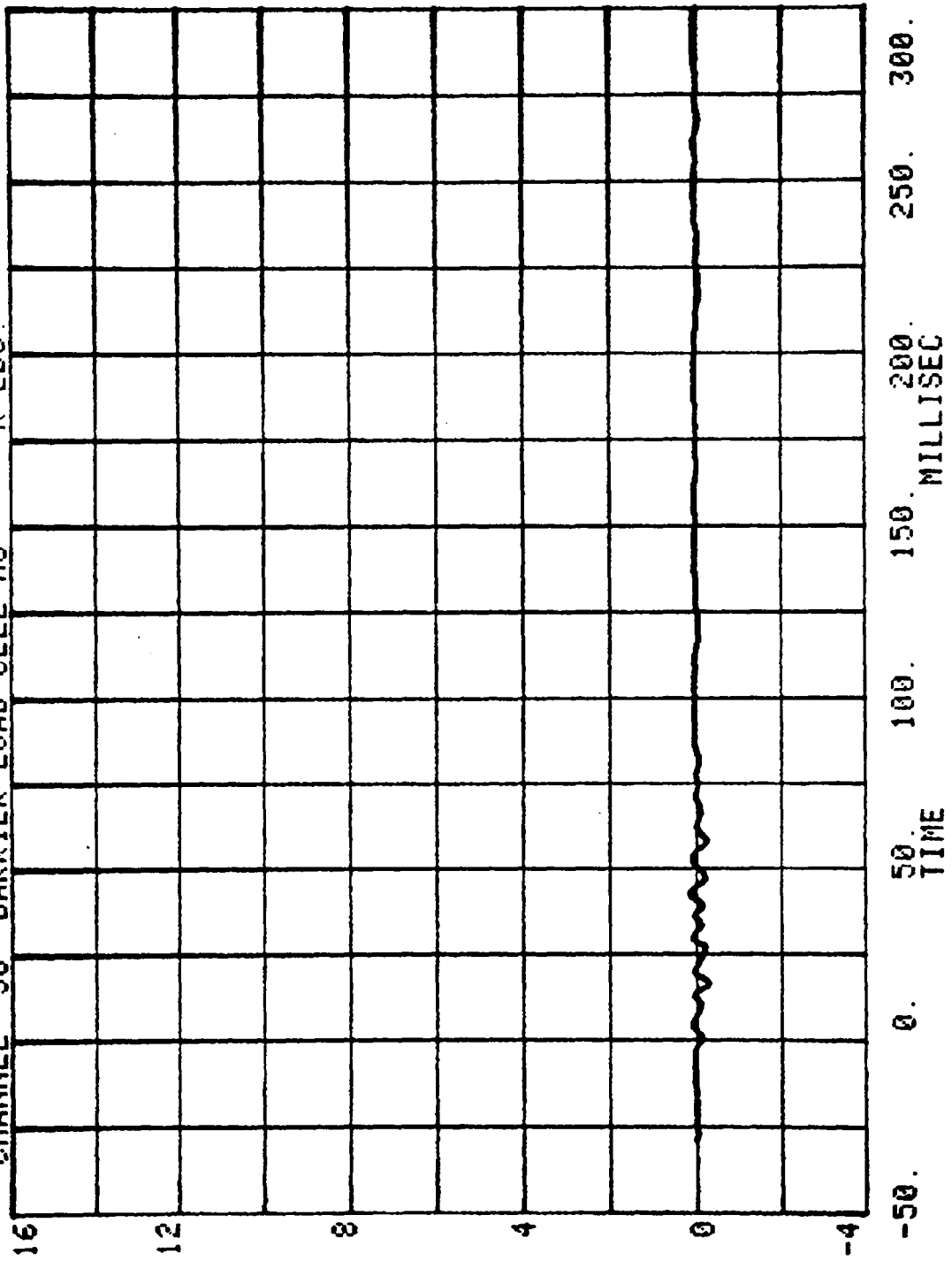
RUN= 554 SERIES= 1
CHANNEL 36 BARRIER LOAD CELL A1 K LBS.



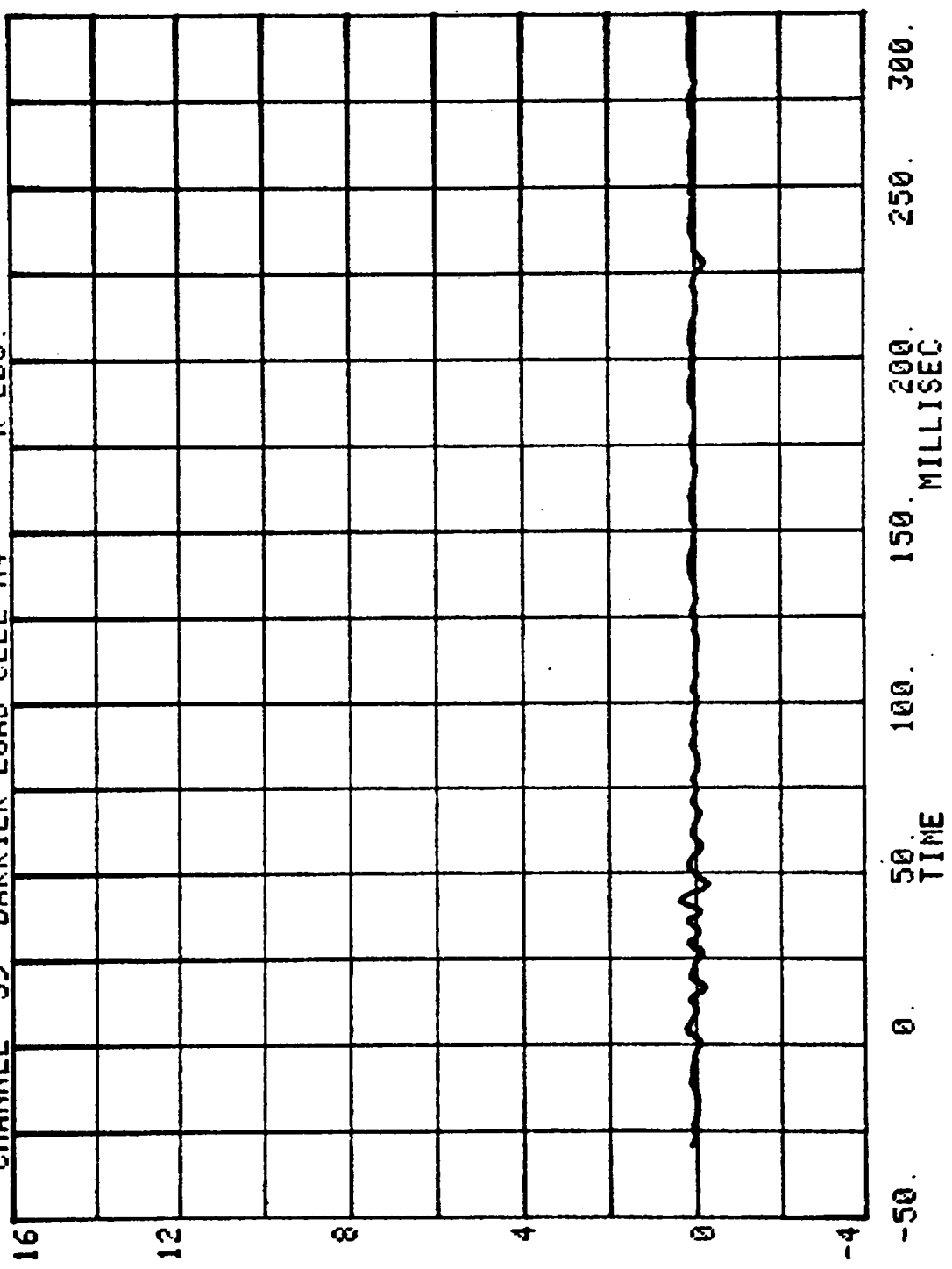
CHANNEL 37 BARRIER LOAD CELL A2 RUN= 554 SERIES= 1 K LBS.



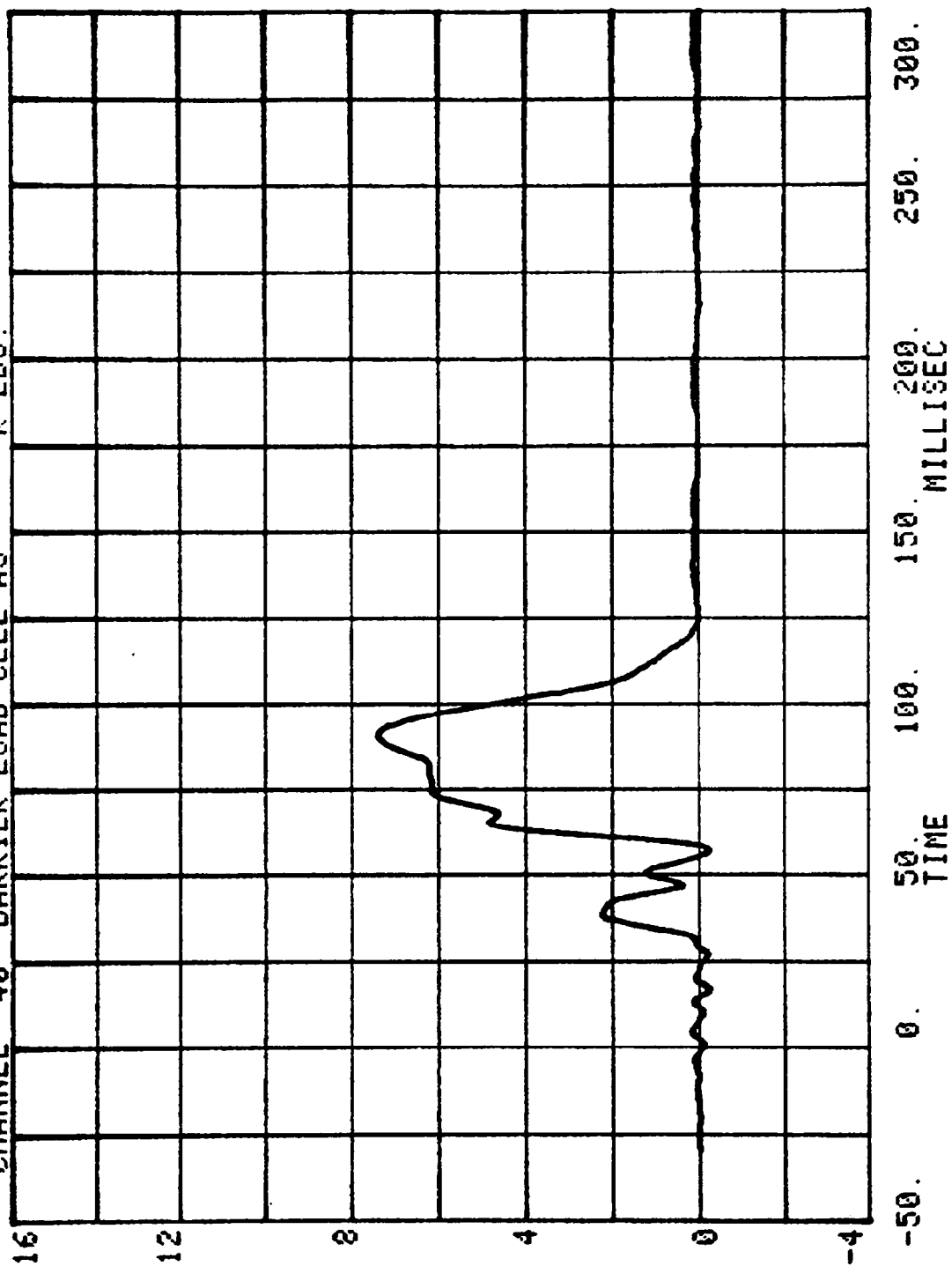
CHANNEL 38 BARRIER LOAD CELL A3
RUN= 554 SERIES= 1 K LBS.



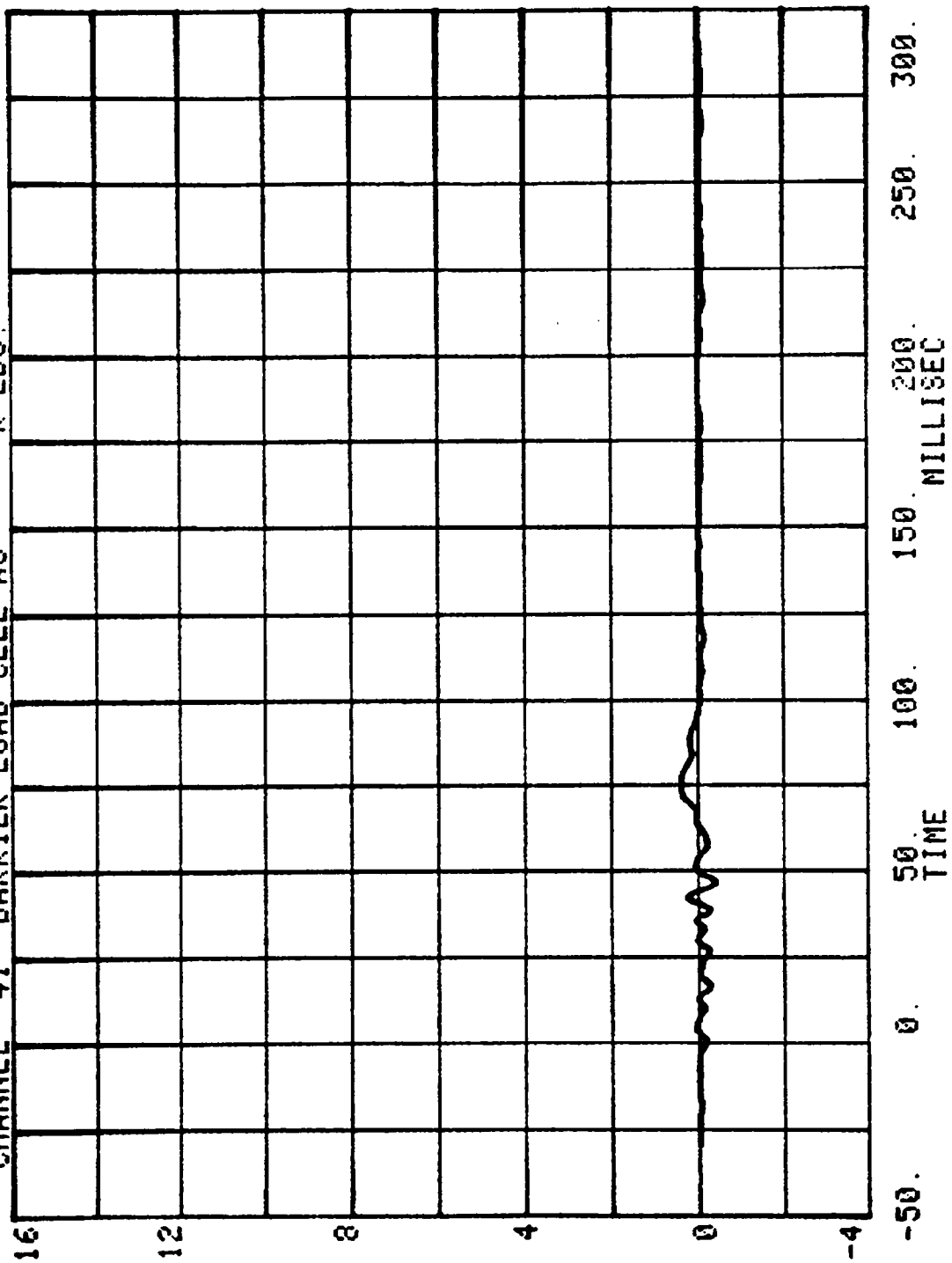
CHANNEL 39 BARRIER LOAD CELL A4 RUN= 554 SERIES= 1 K LBS.

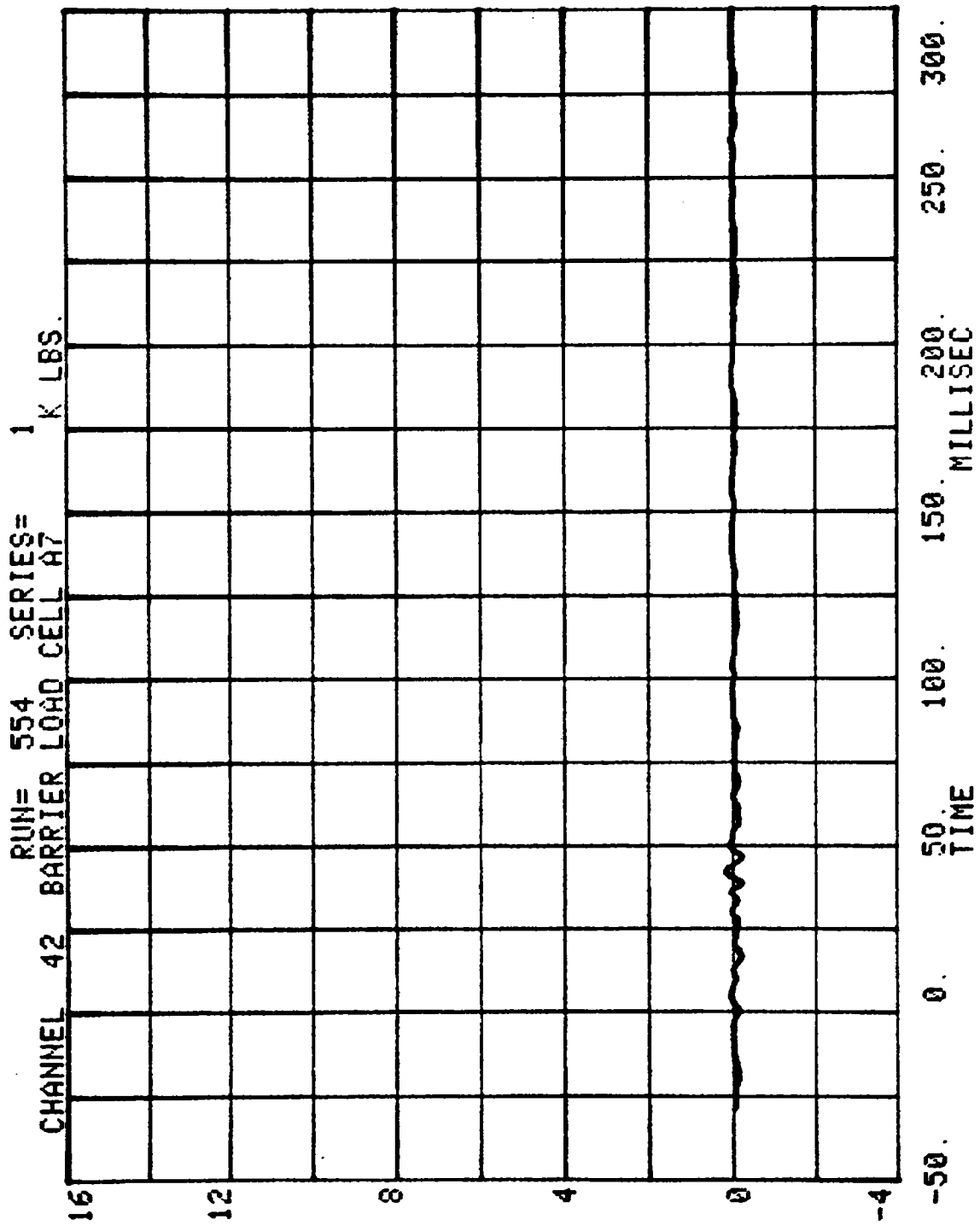


CHANNEL 40 BARRIER LOAD CELL A5 RUN= 554 SERIES= 1 K LBS.

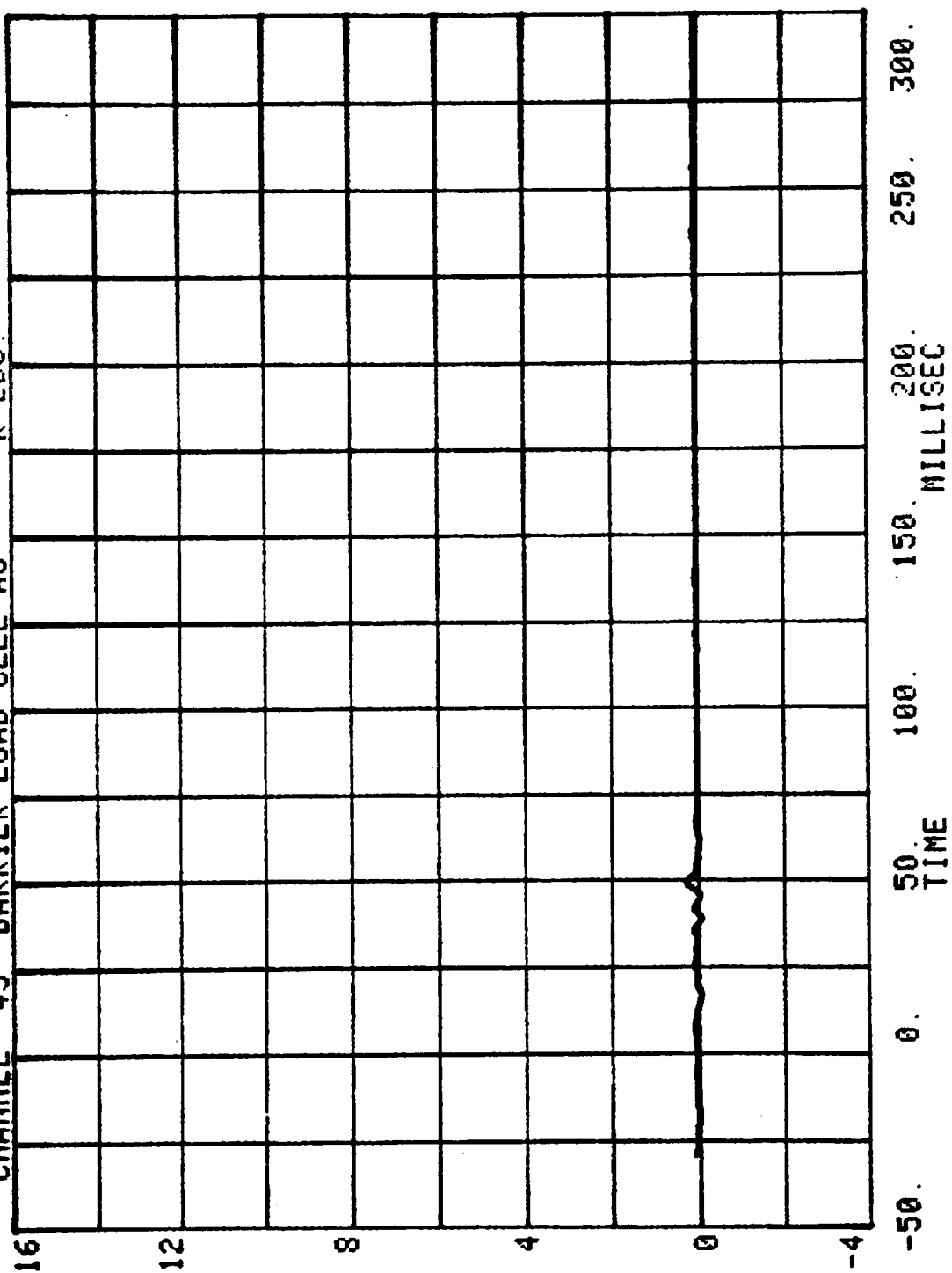


CHANNEL 41 BARRIER LOAD CELL A6 RUN= 554 SERIES= 1 K LBS.





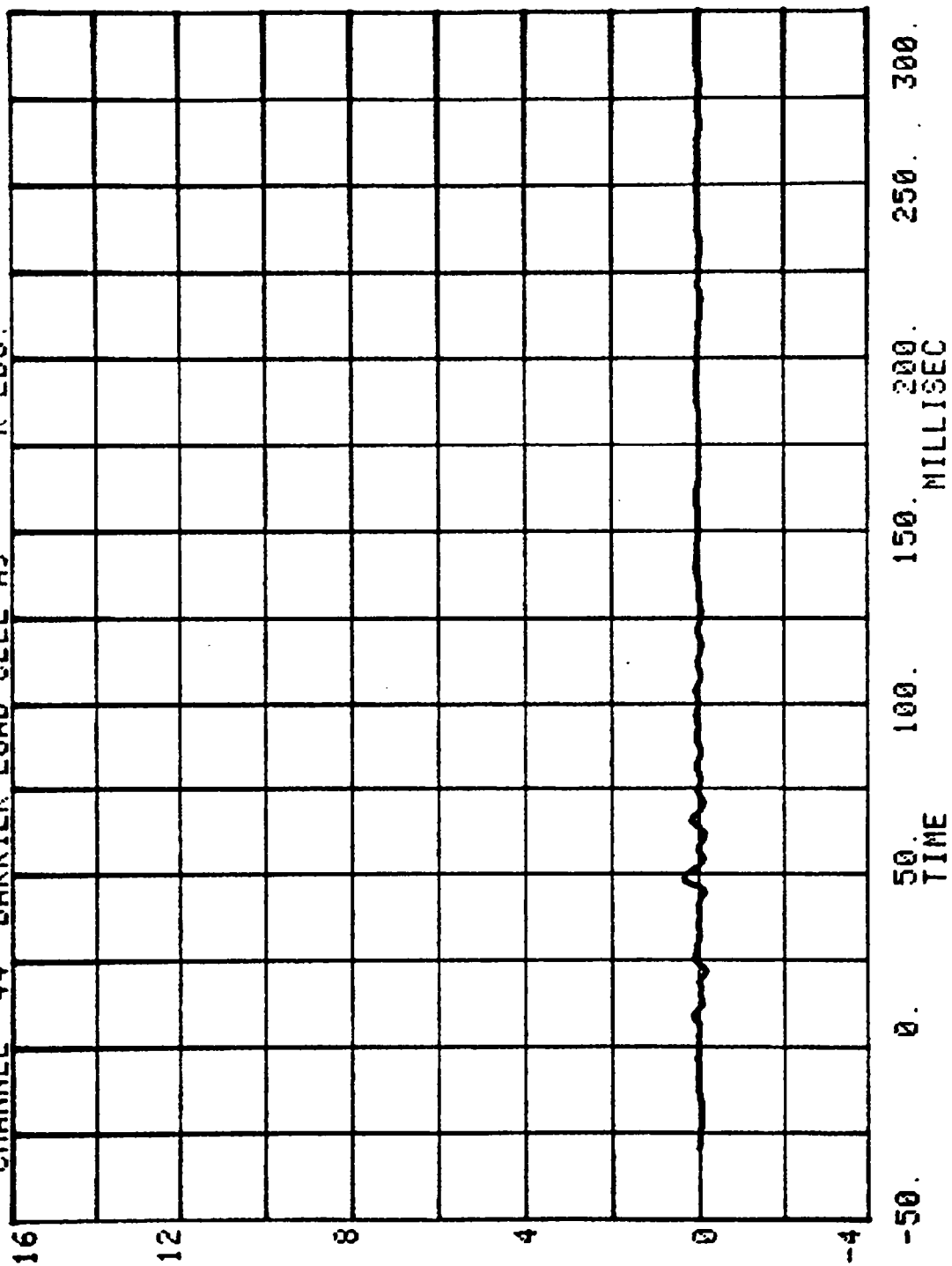
CHANNEL 43 BARRIER LOAD CELL A8 RUN= 554 SERIES= 1 K LBS.



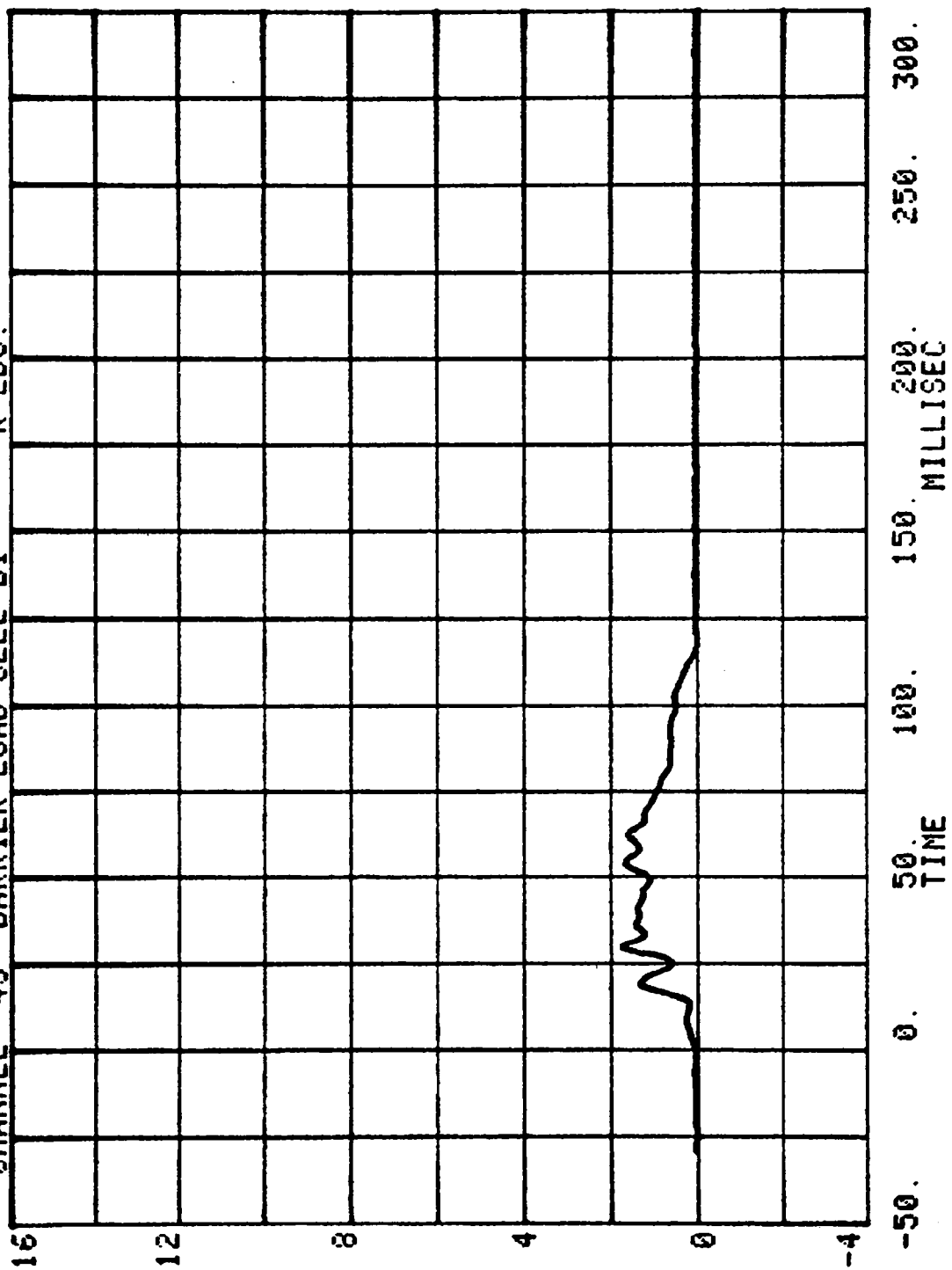
CHANNEL 44 BARRIER LOAD CELL A9

RUN= 554 SERIES= 1

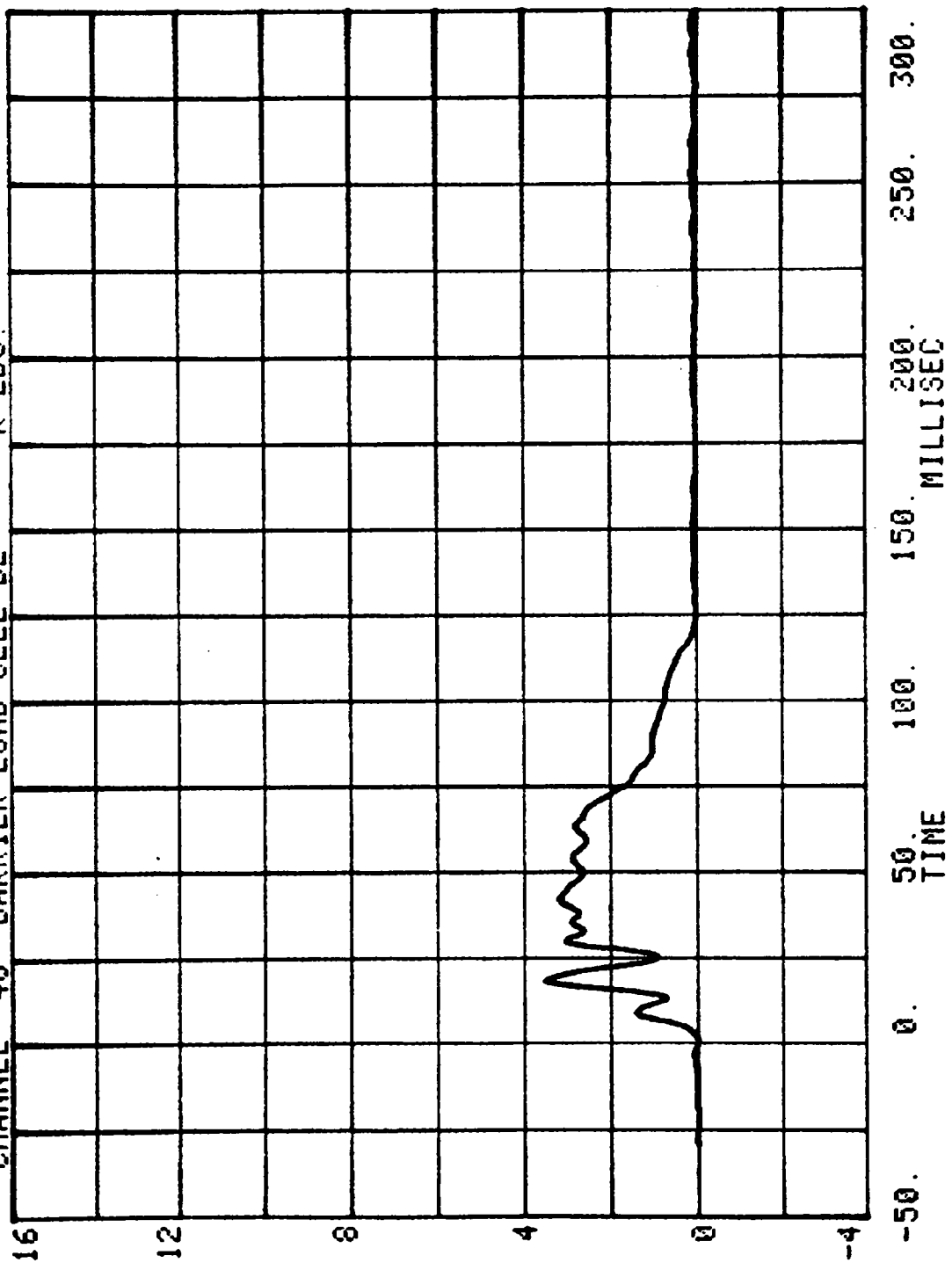
K LBS.



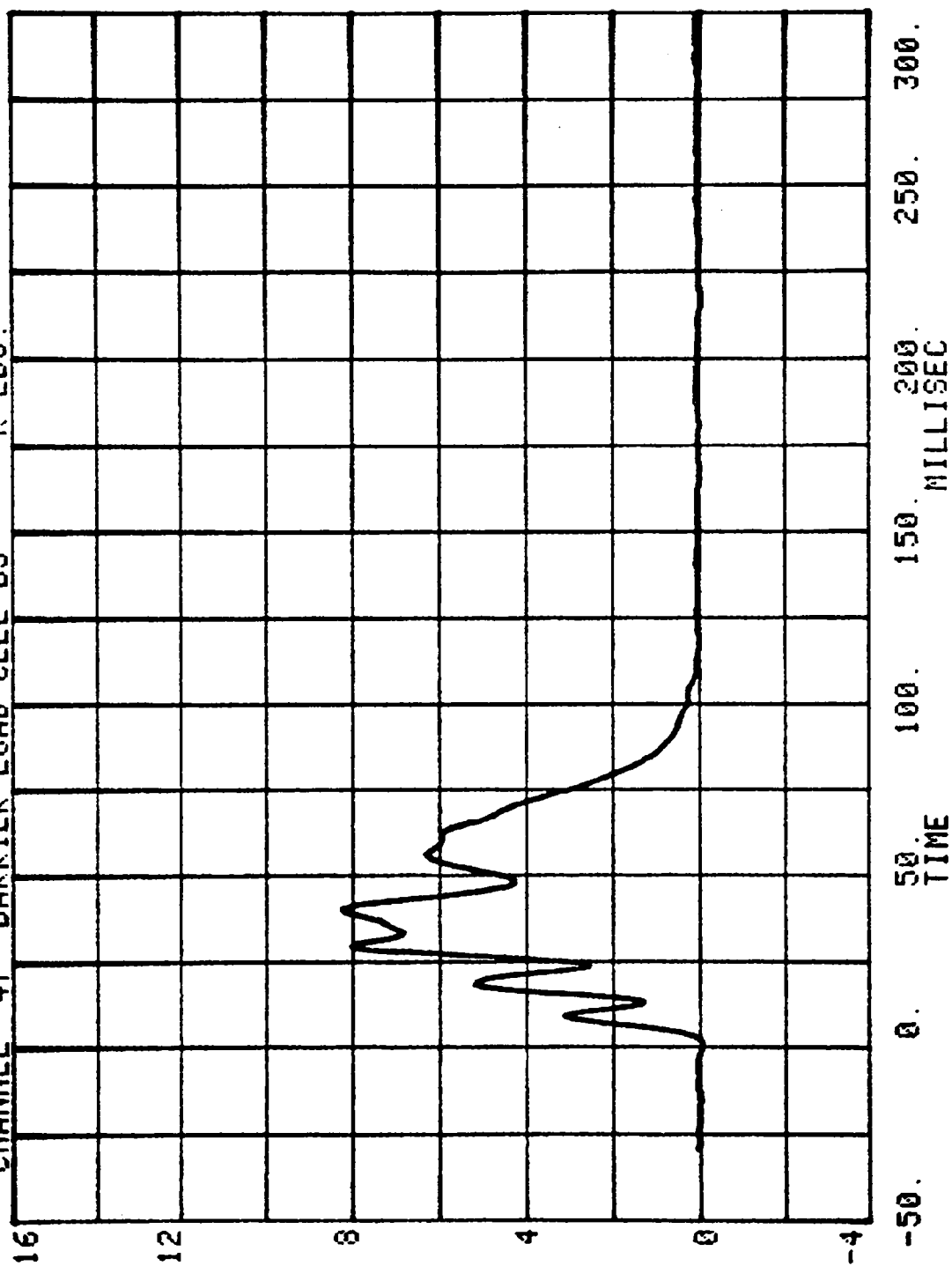
CHANNEL 45 RUN= 554 SERIES= 1 K LBS.
BARRIER LOAD CELL B1



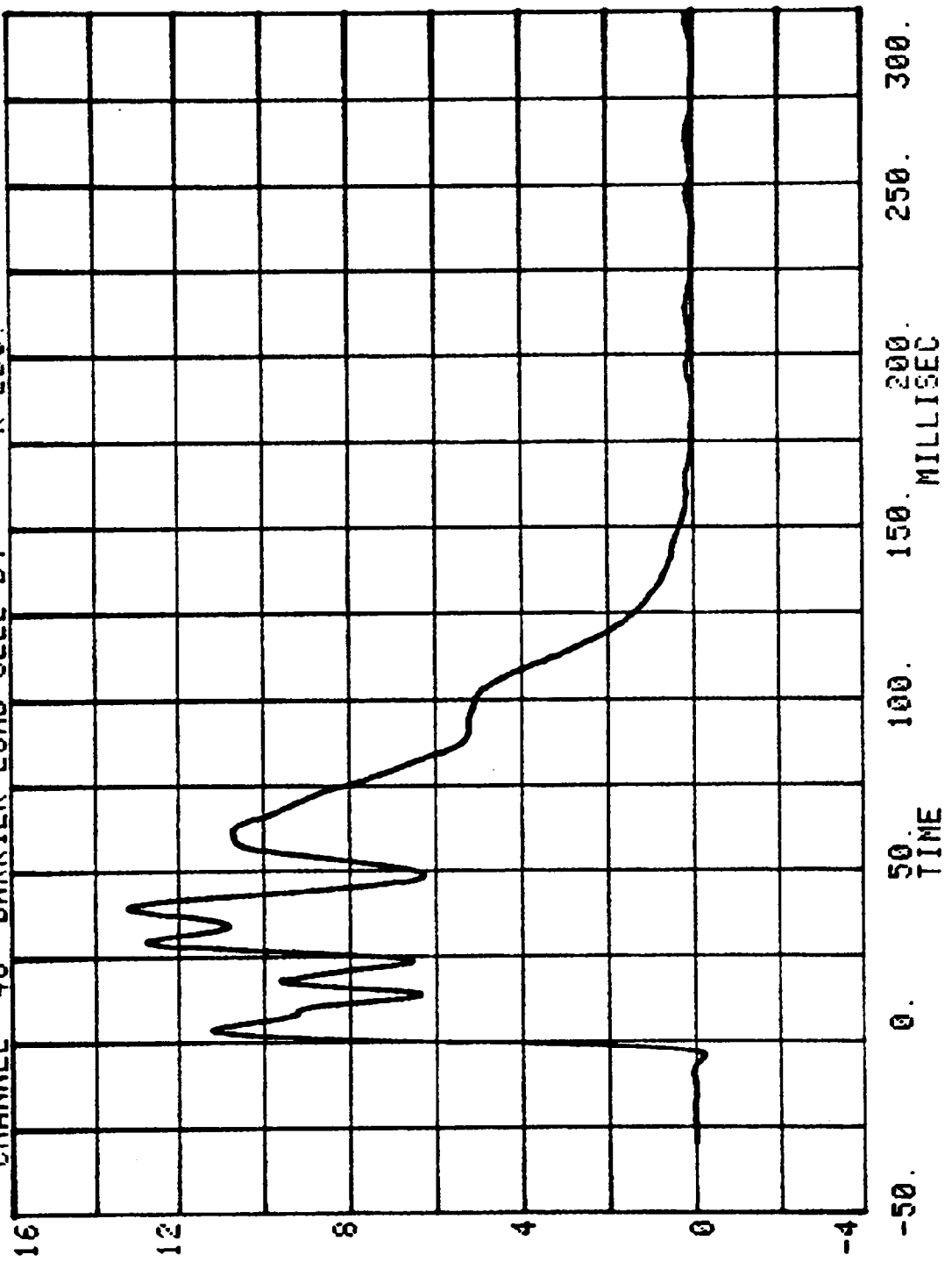
CHANNEL 46 RUN= 554 SERIES= 1 K LBS.
BARRIER LOAD CELL B2



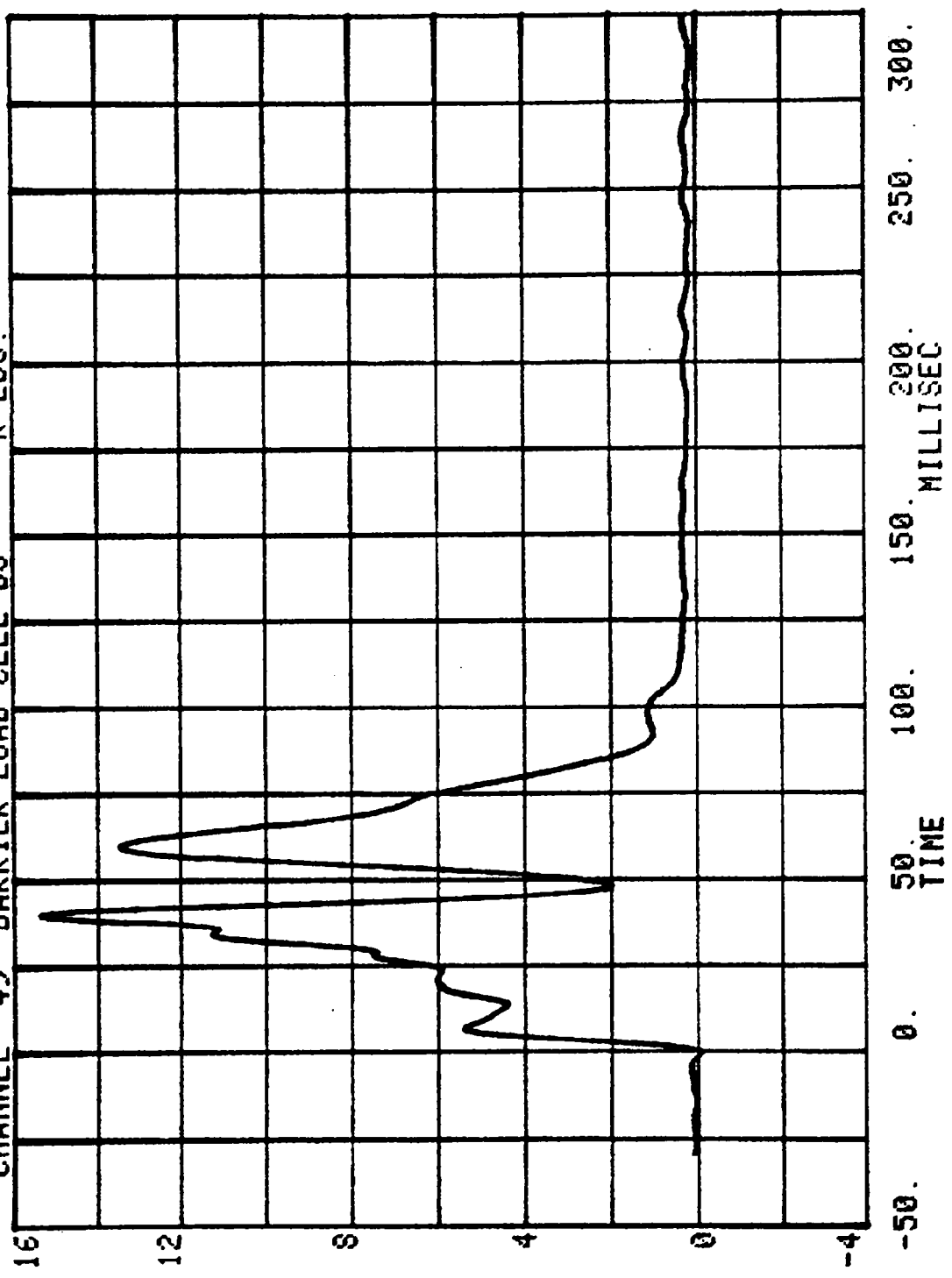
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RUN= 554 SERIES= 1 K LBS.



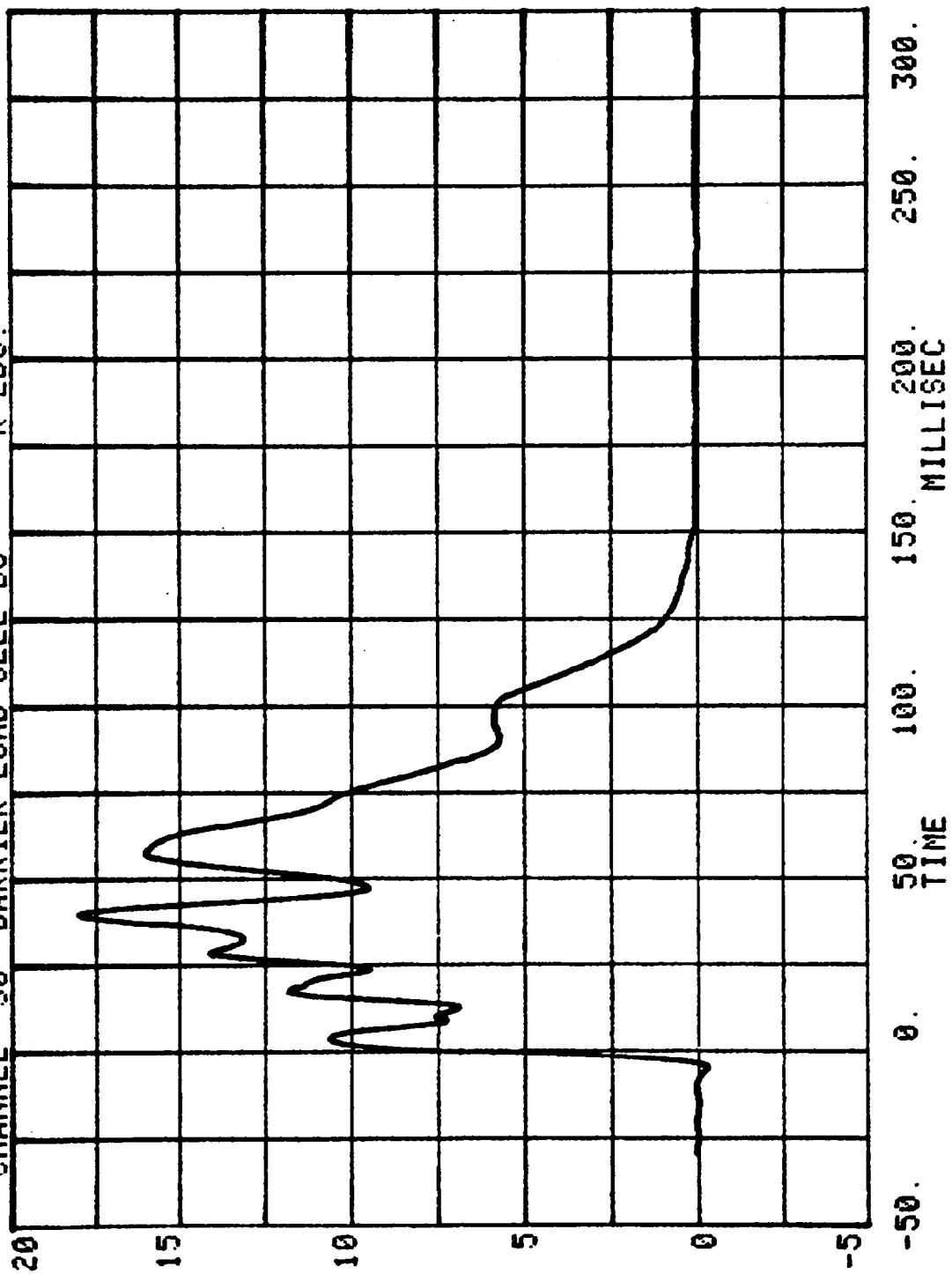
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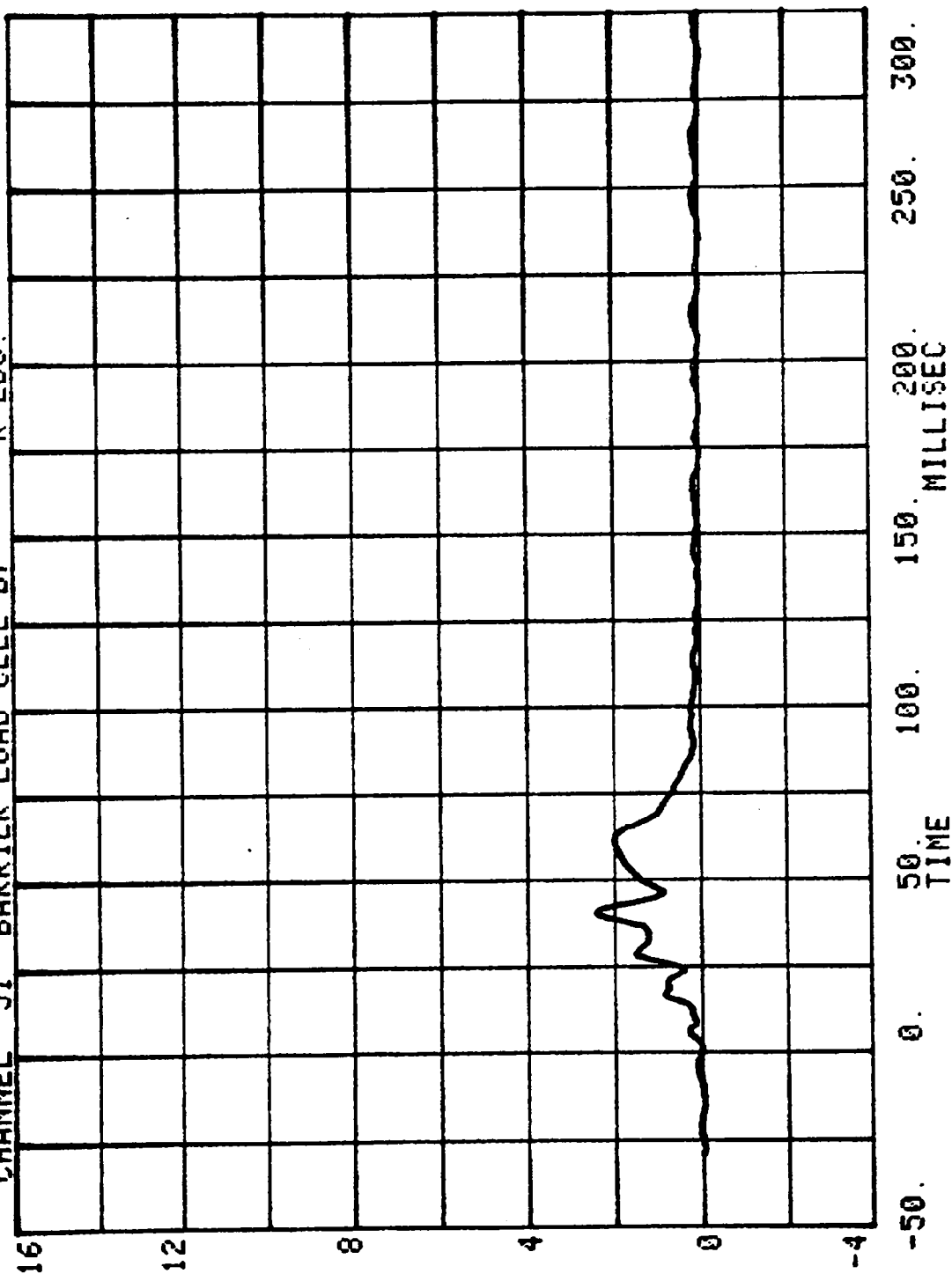
RUN= 554 SERIES= 1
CHANNEL 49 BARRIER LOAD CELL B5 K LBS.



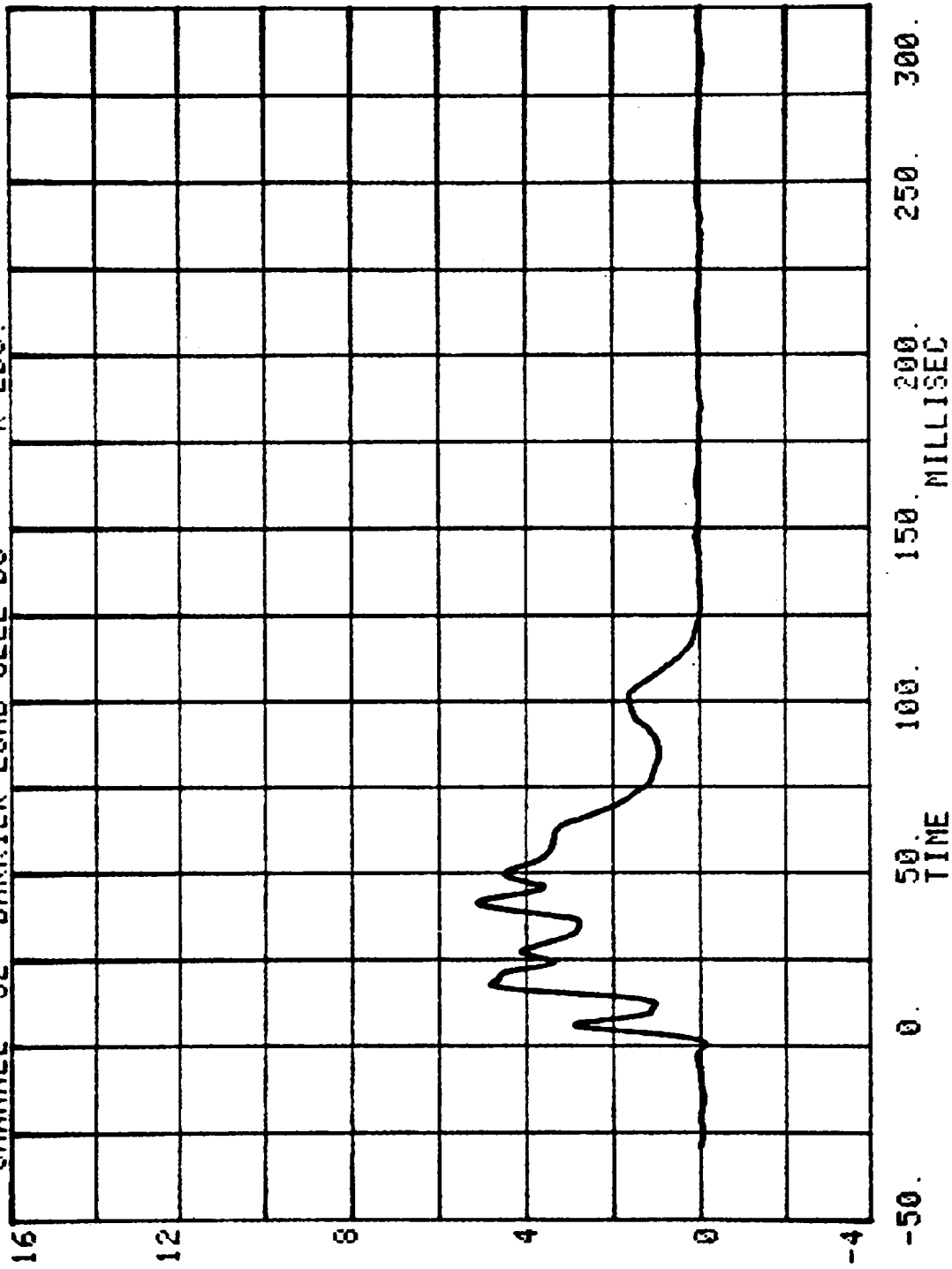
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CHANNEL 50 BARRIER LOAD CELL B6 K LBS.



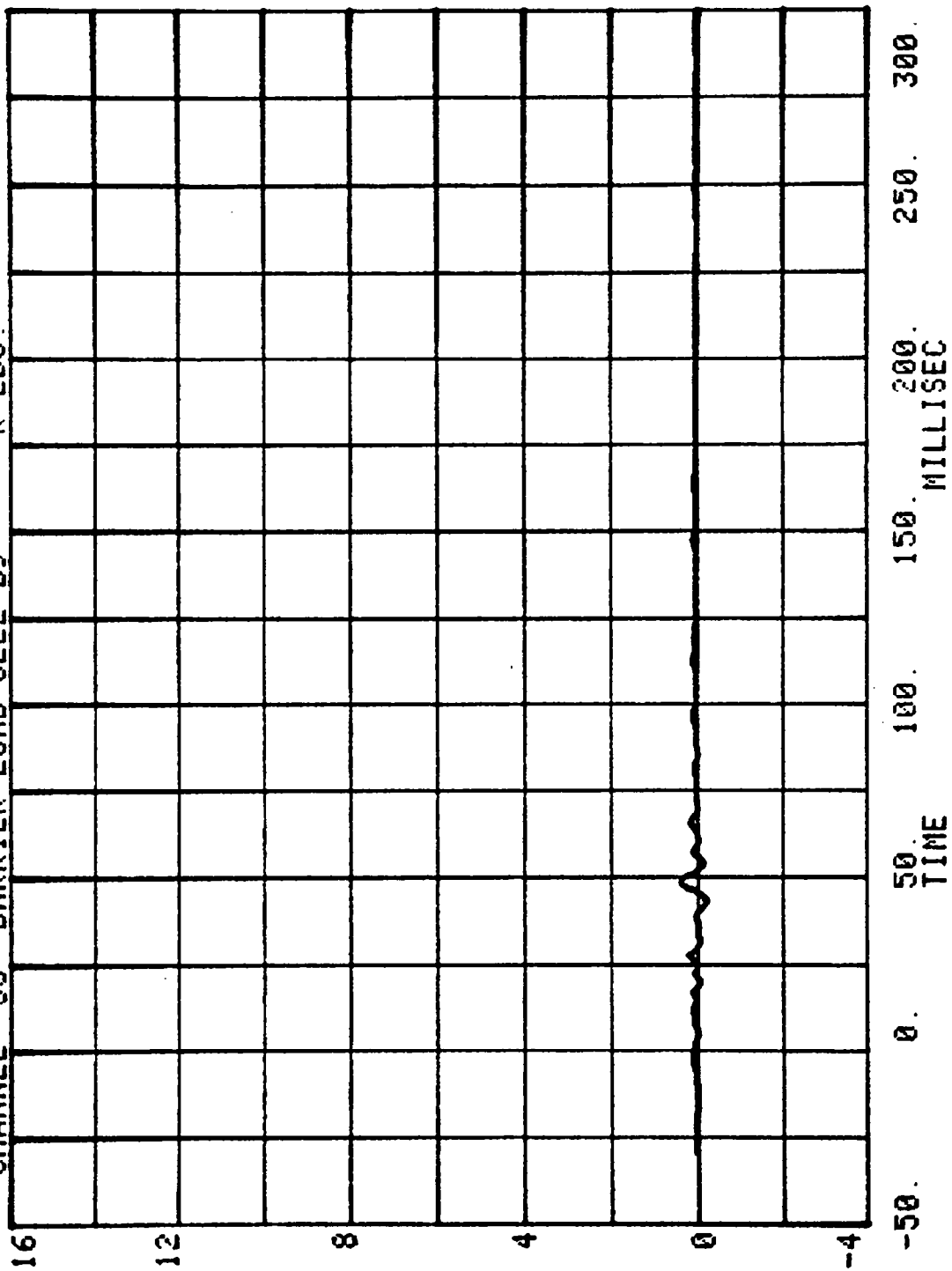
CHANNEL 51 BARRIER LOAD CELL B7 RUN= 554 SERIES= 1 K LBS.



CHANNEL 52 BARRIER LOAD CELL B8
RUN= 554 SERIES= 1 K LBS.



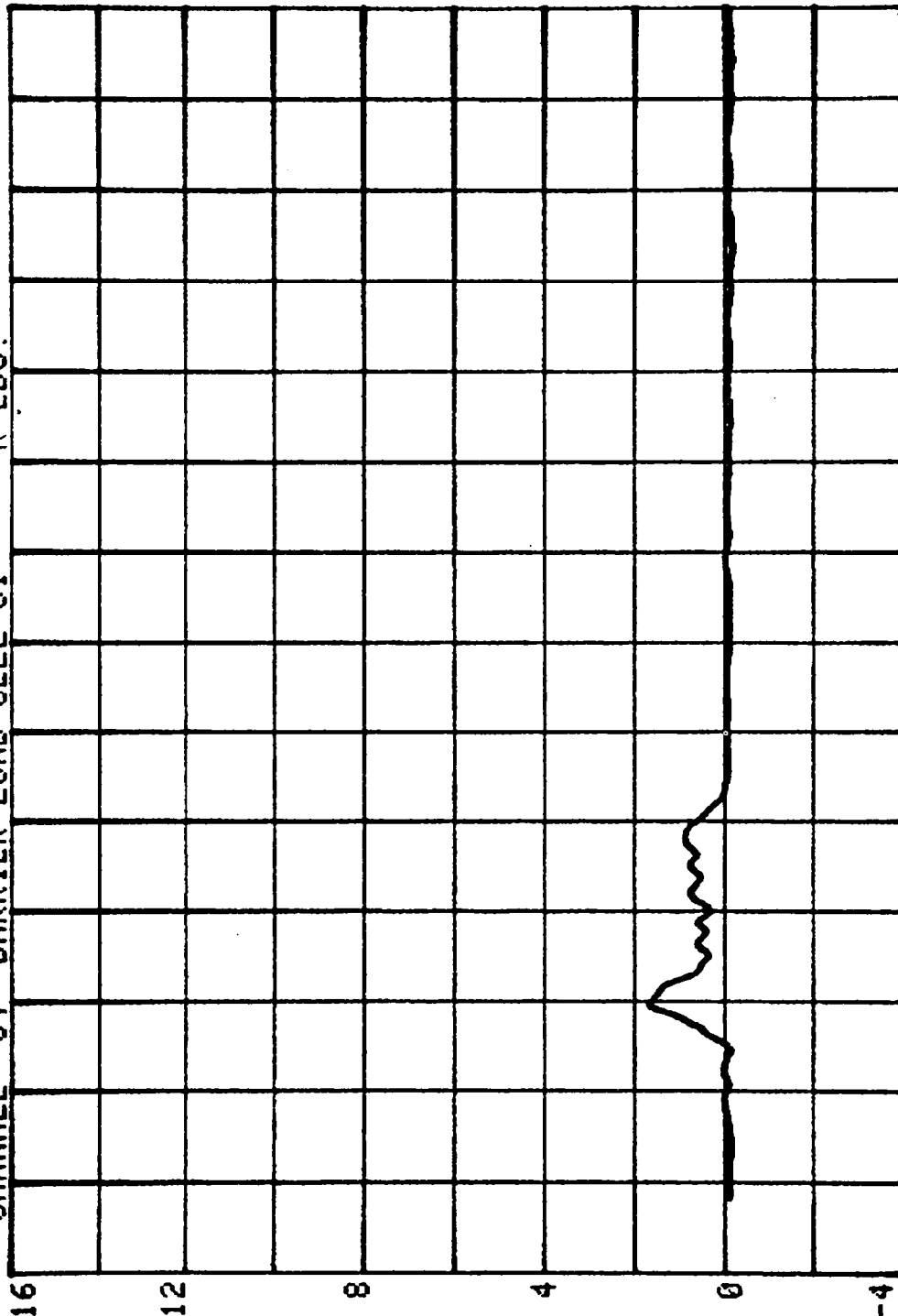
CHANNEL 53 BARRIER LOAD CELL B9
RUN= 554 SERIES= 1 K LBS.



CHANNEL 54 BARRIER LOAD CELL C1

RUN= 554 SERIES= 1

K LBS.

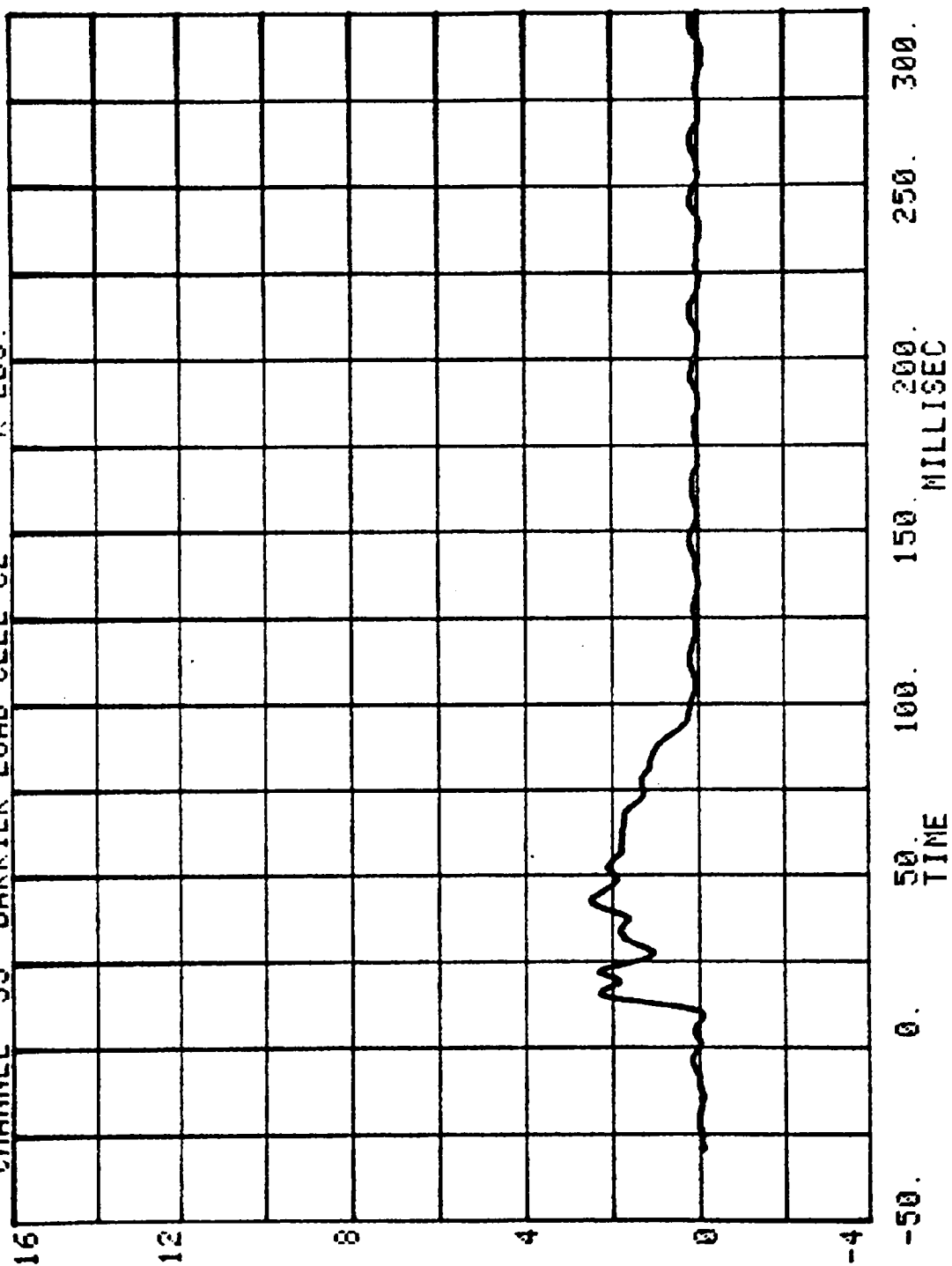


-50. 0. 50. 100. 150. 200. 250. 300.
TIME
MILLISEC

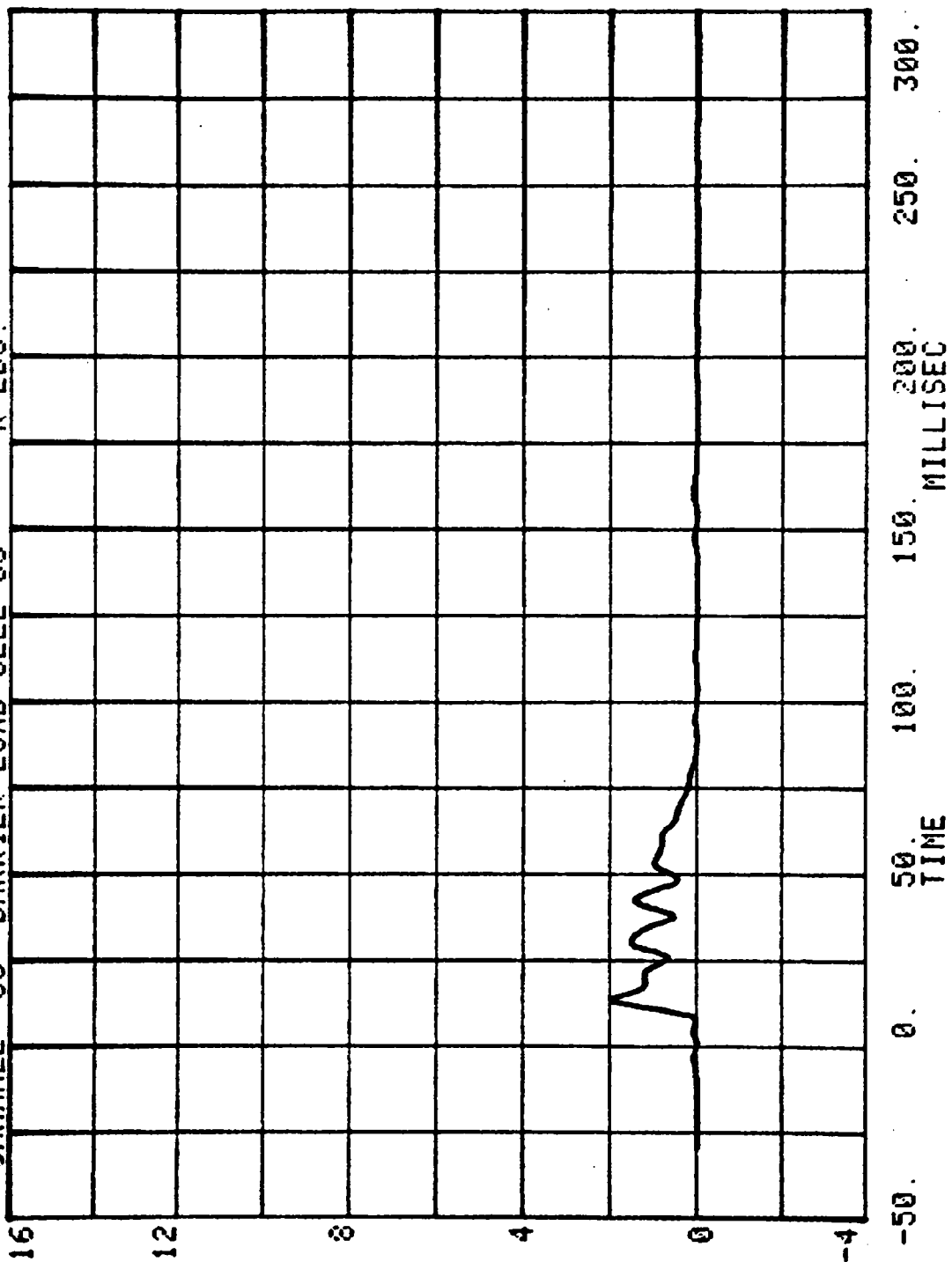
CHANNEL 55 BARRIER LOAD CELL C2

RUN= 554 SERIES= 1

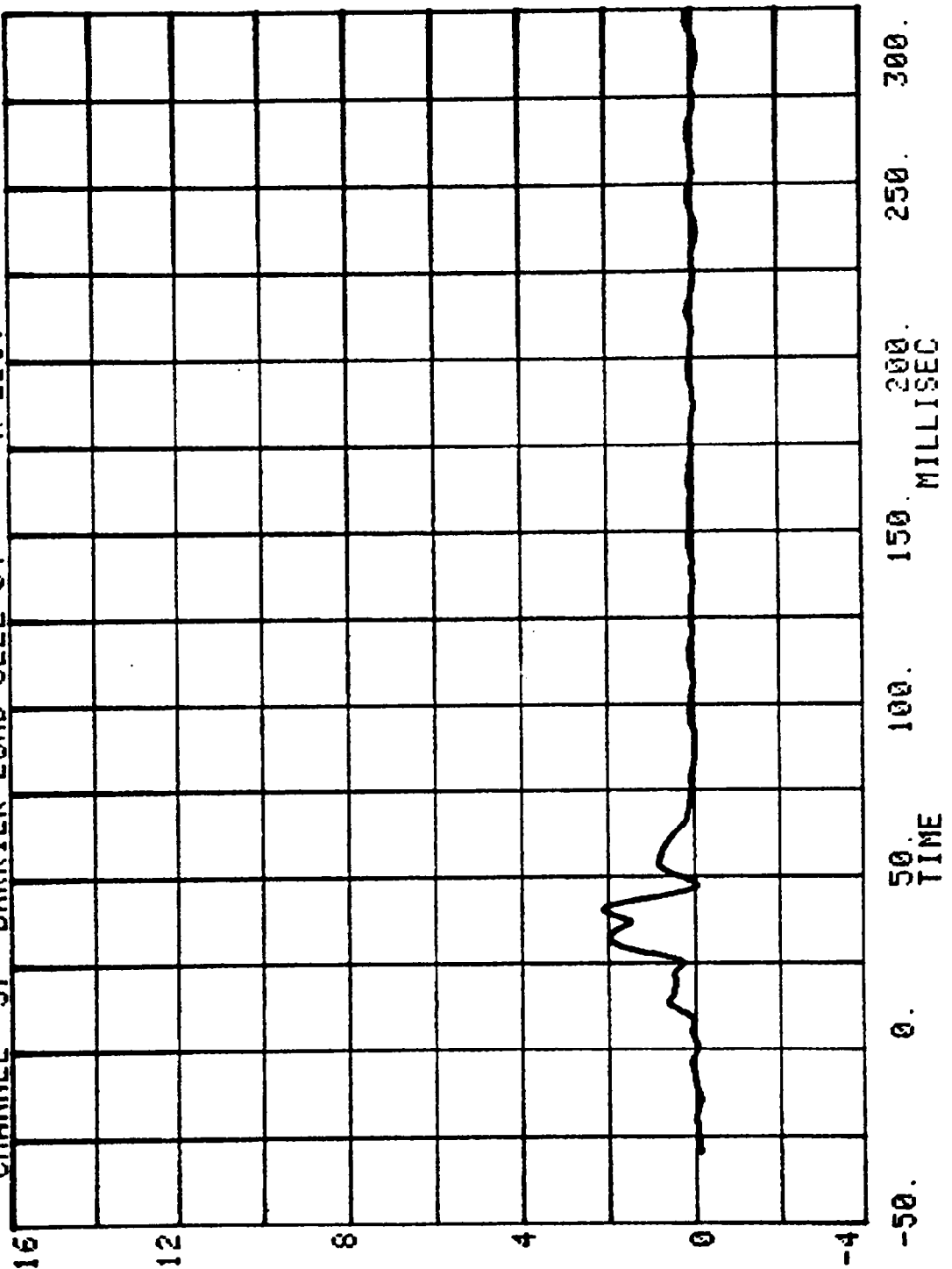
K LBS.

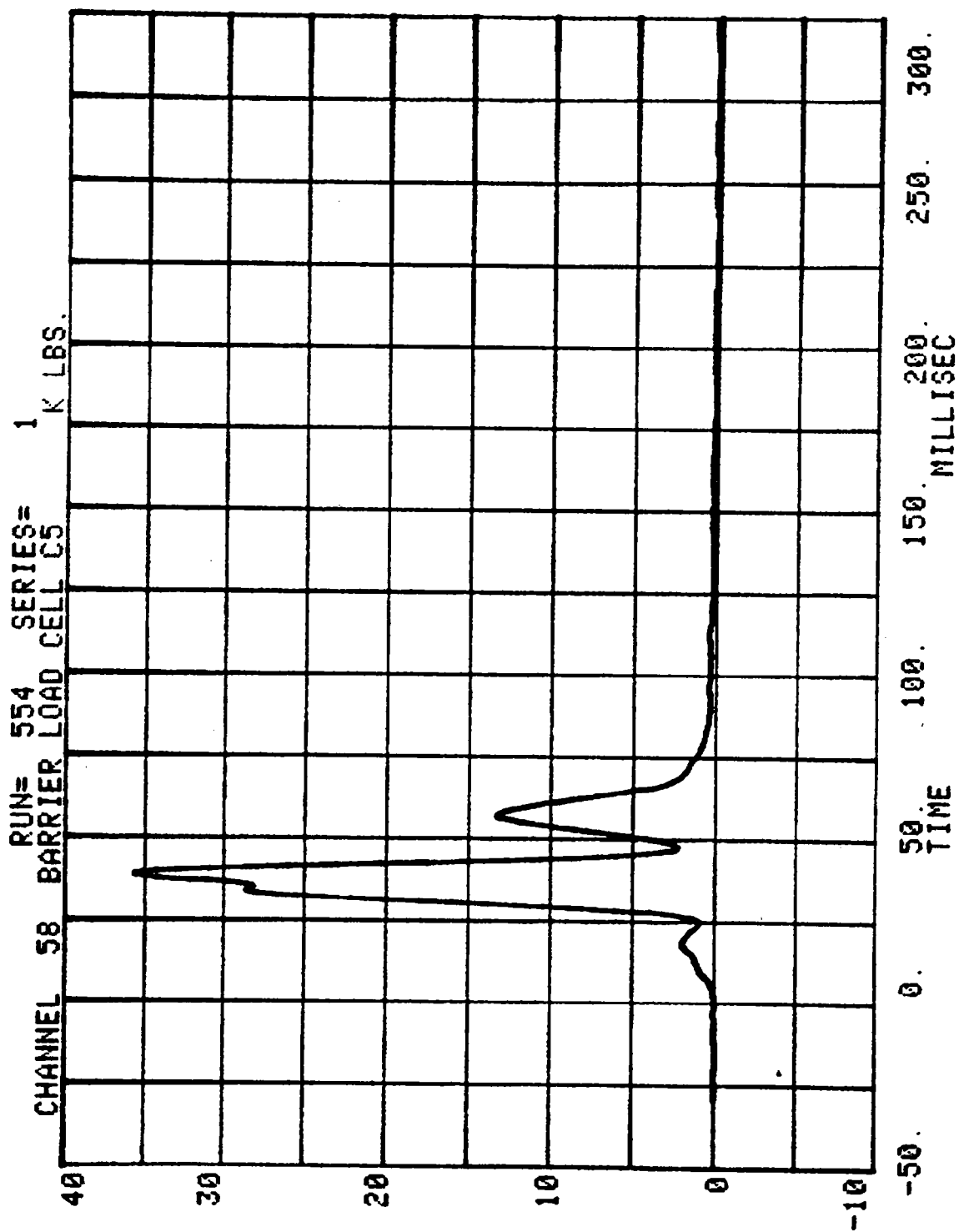


CHANNEL 56 BARRIER LOAD CELL C3 RUN= 554 SERIES= 1 K LBS.

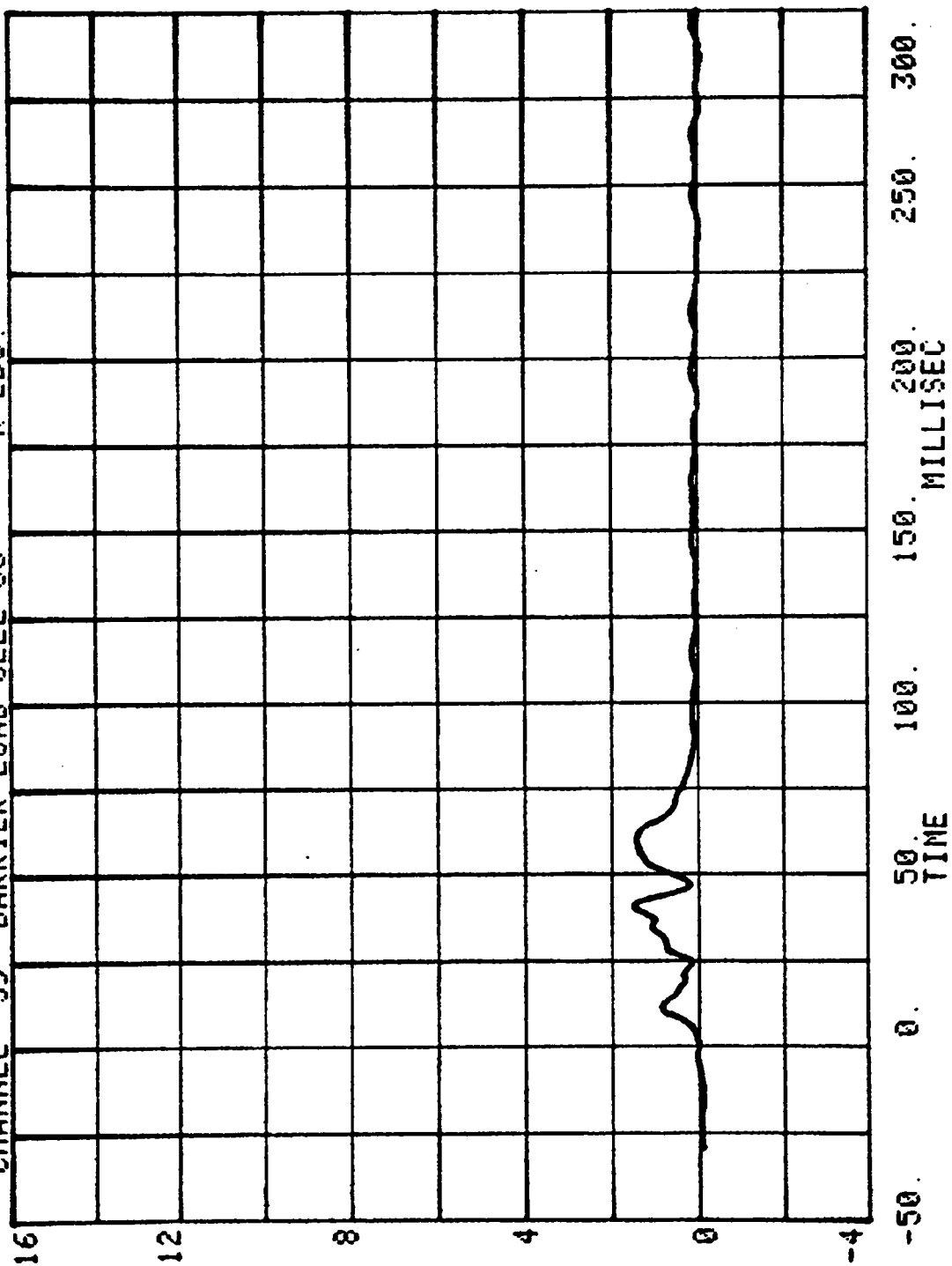


CHANNEL 57 RUN= 554 SERIES= 1 K LBS.
BARRIER LOAD CELL C4

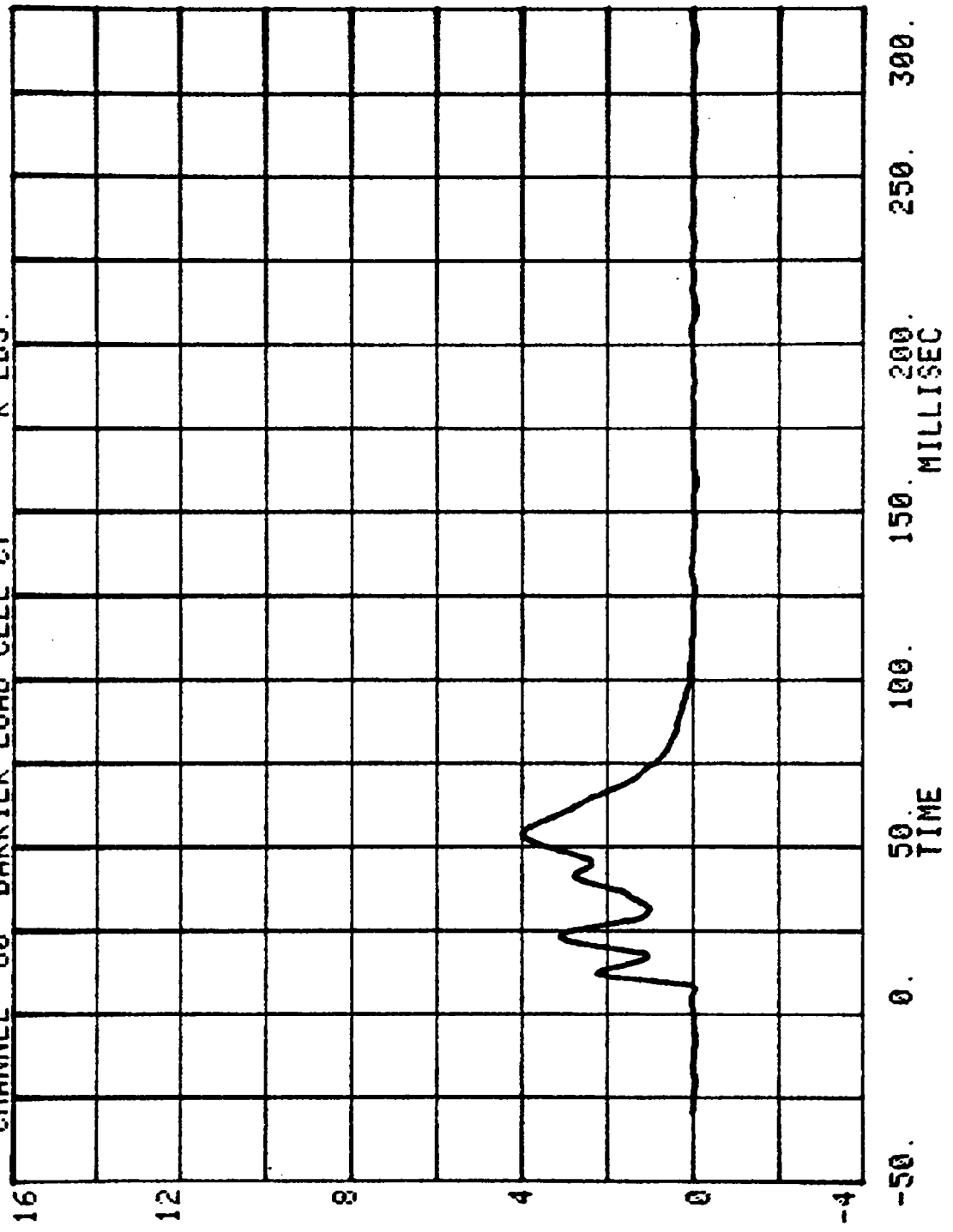




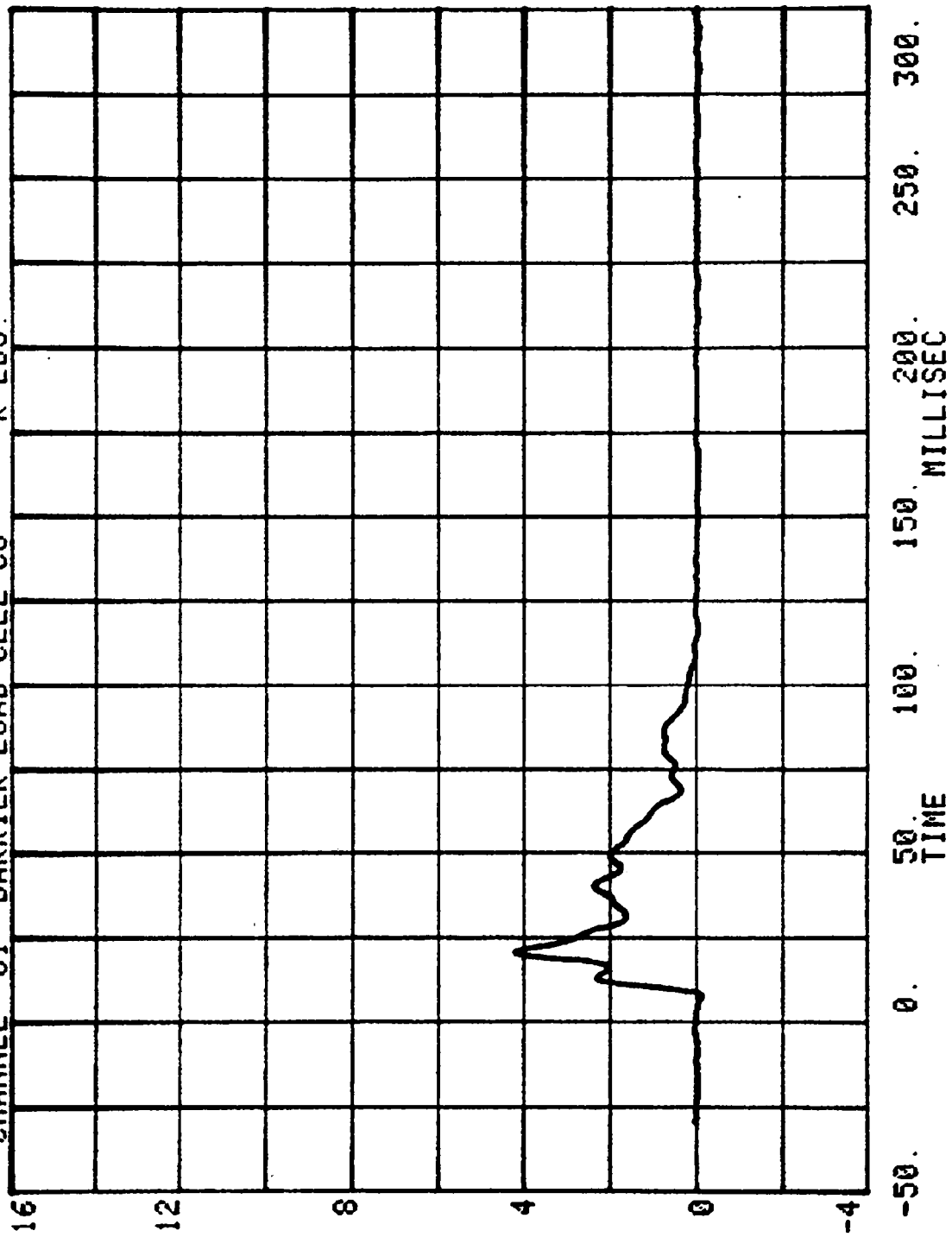
CHANNEL 59 BARRIER LOAD CELL C6
RUN= 554 SERIES= 1 K LBS.



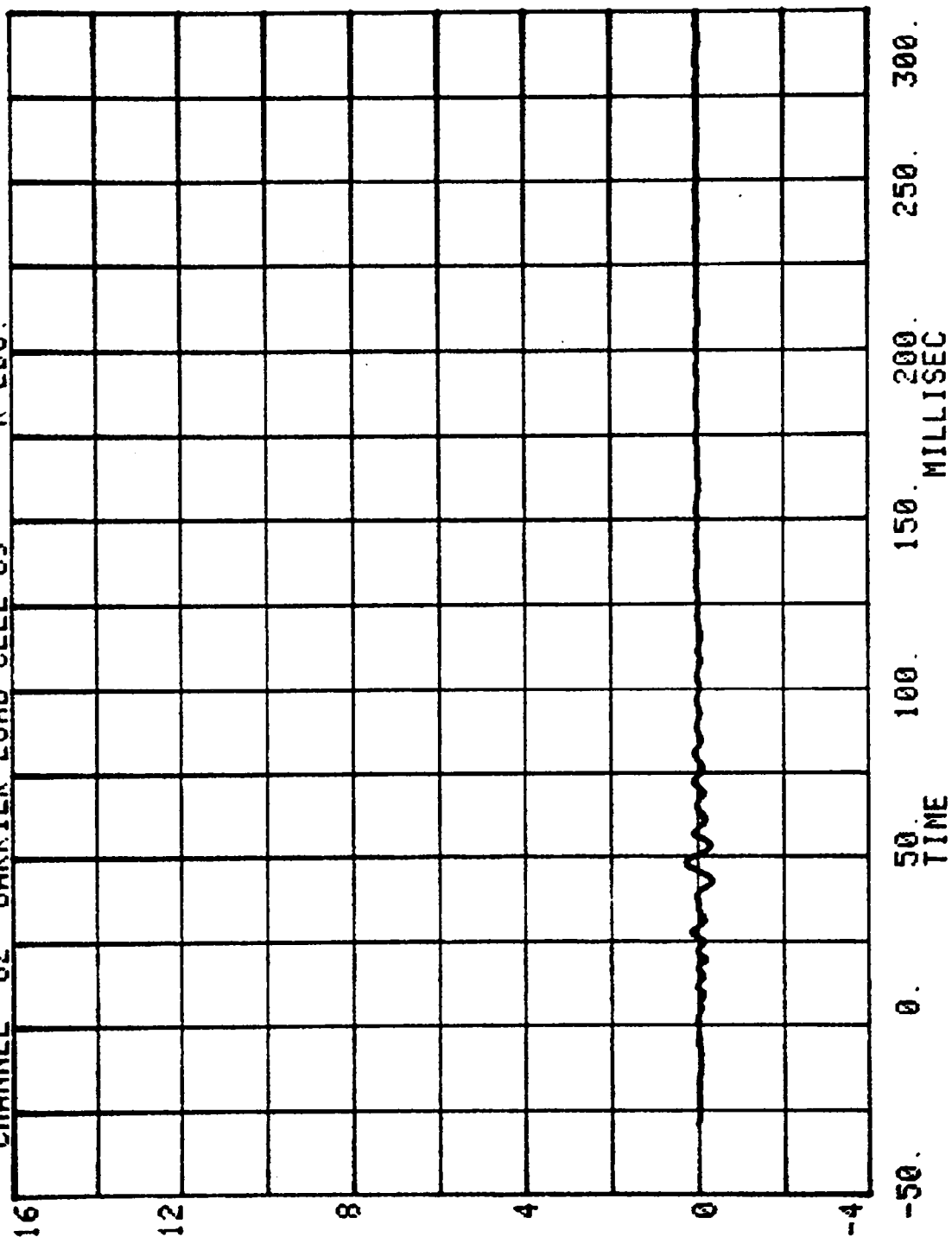
RUN= 554 SERIES= 1
CHANNEL 60 BARRIER LOAD CELL C7 K LBS.



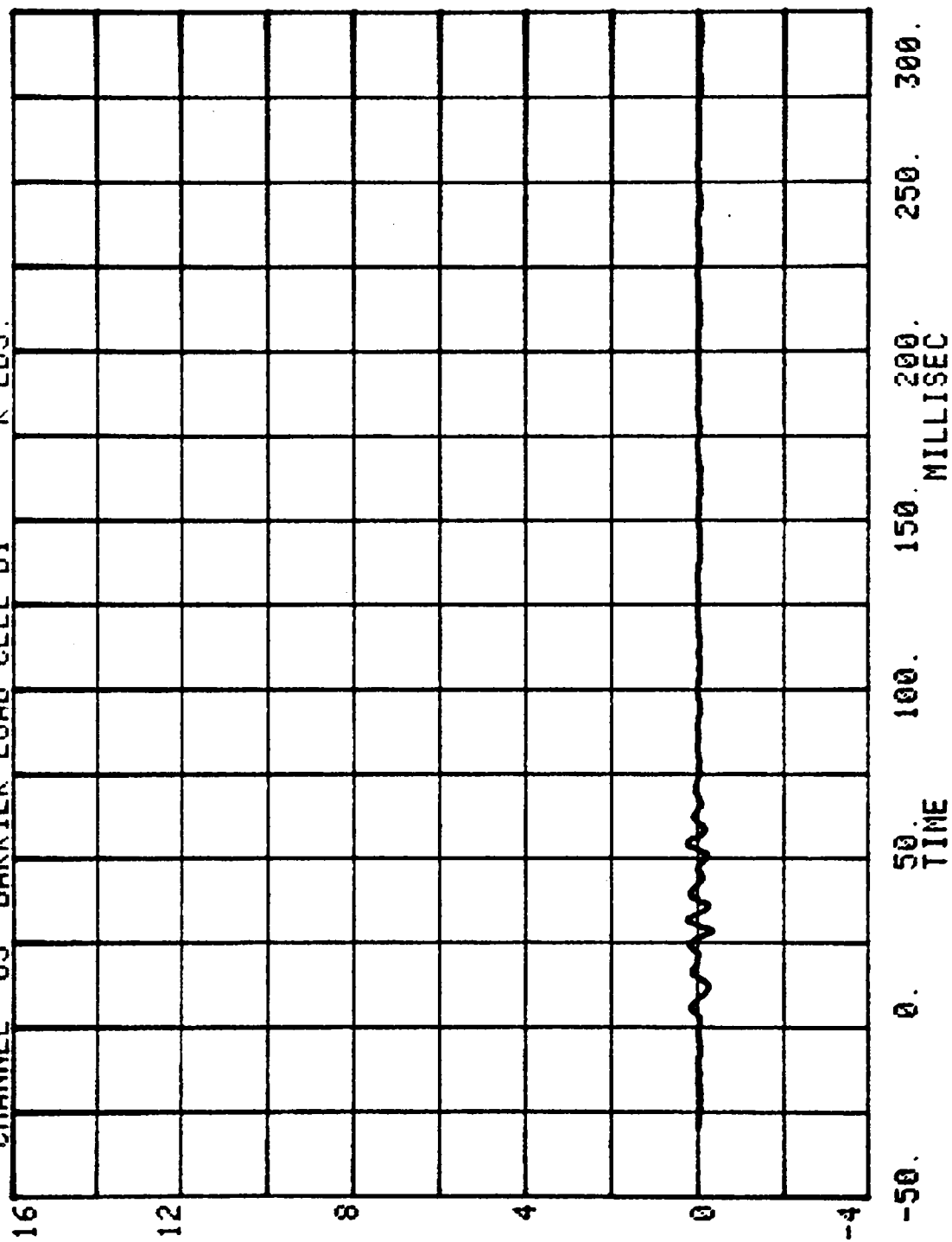
RUN= 554 SERIES= 1
CHANNEL 61 BARRIER LOAD CELL C8 K LBS.



CHANNEL 62 BARRIER LOAD CELL C9
RUN= 554 SERIES= 1
K LBS.

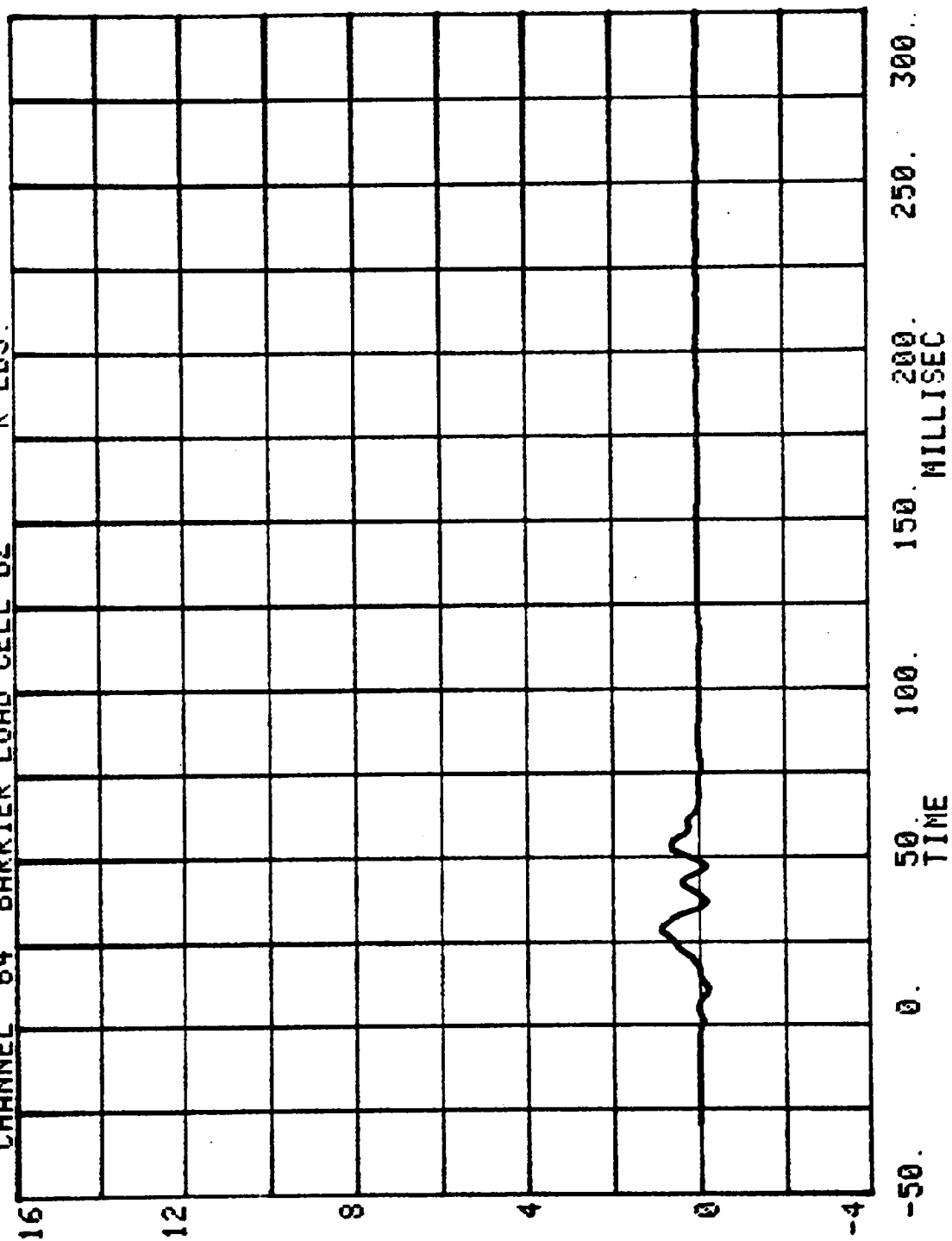


CHANNEL 63 BARRIER LOAD CELL D1
RUN= 554 SERIES= 1
K LBS.

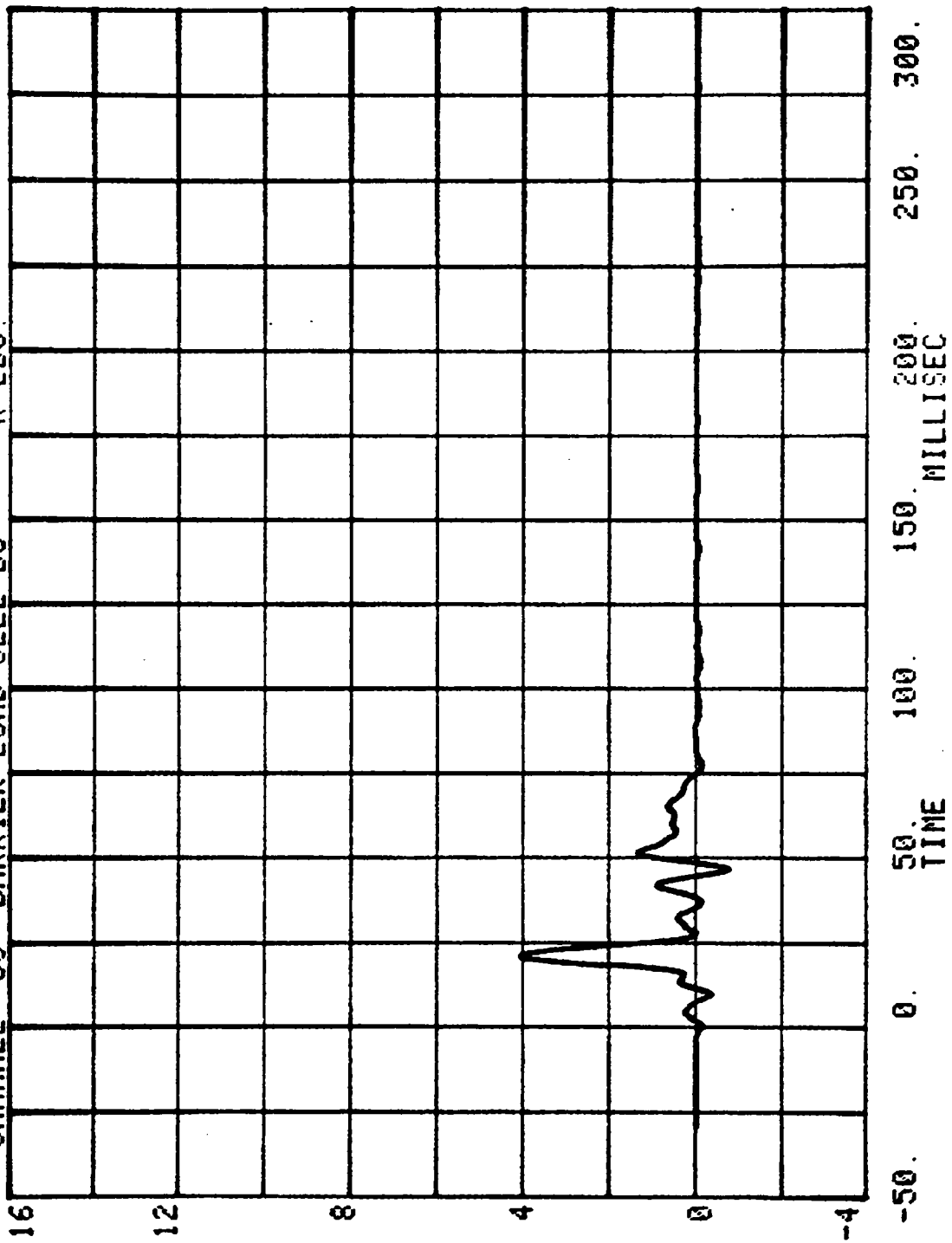


CHANNEL 64 BARRIER LOAD CELL 02 K LBS.

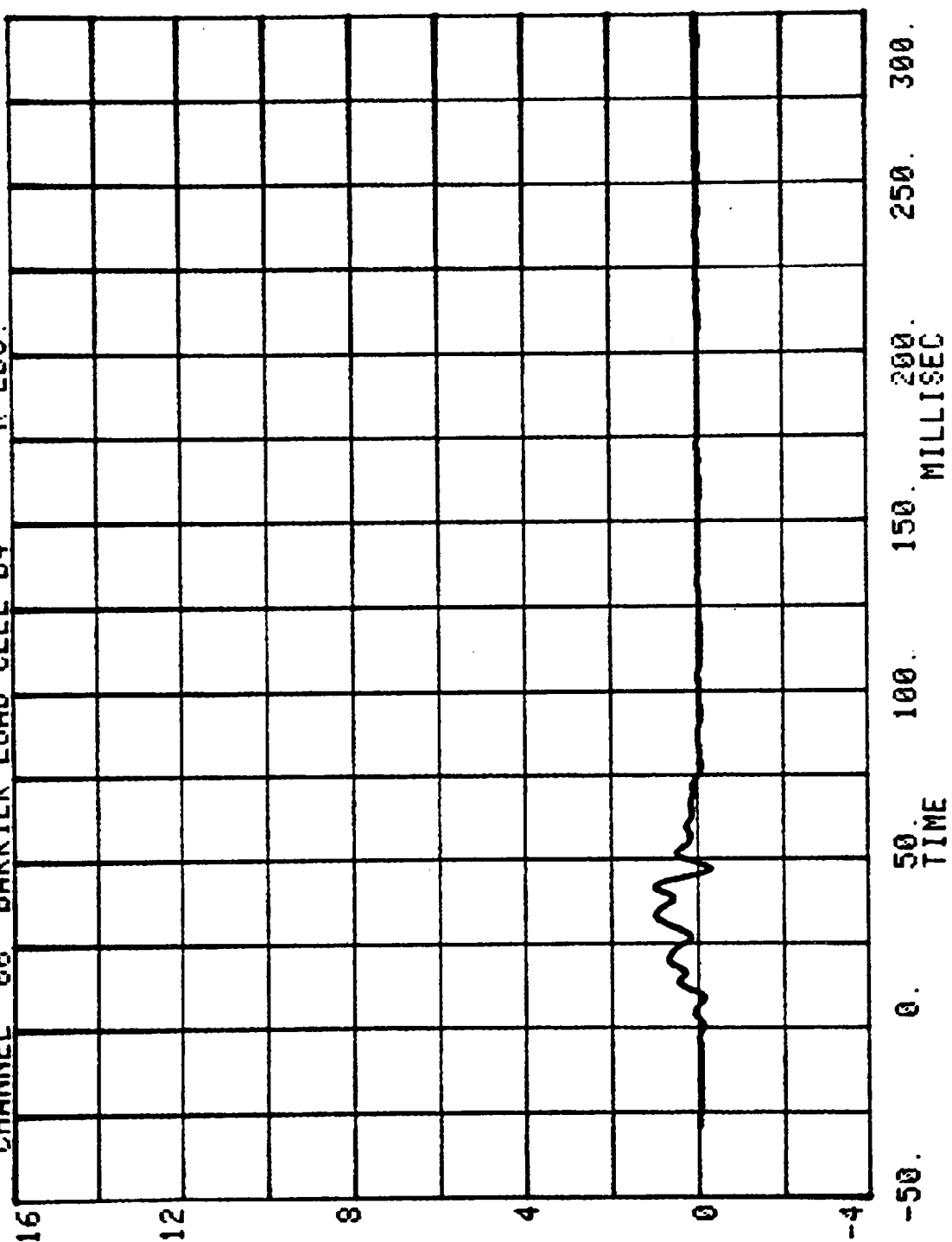
RUN= 554 SERIES= 1



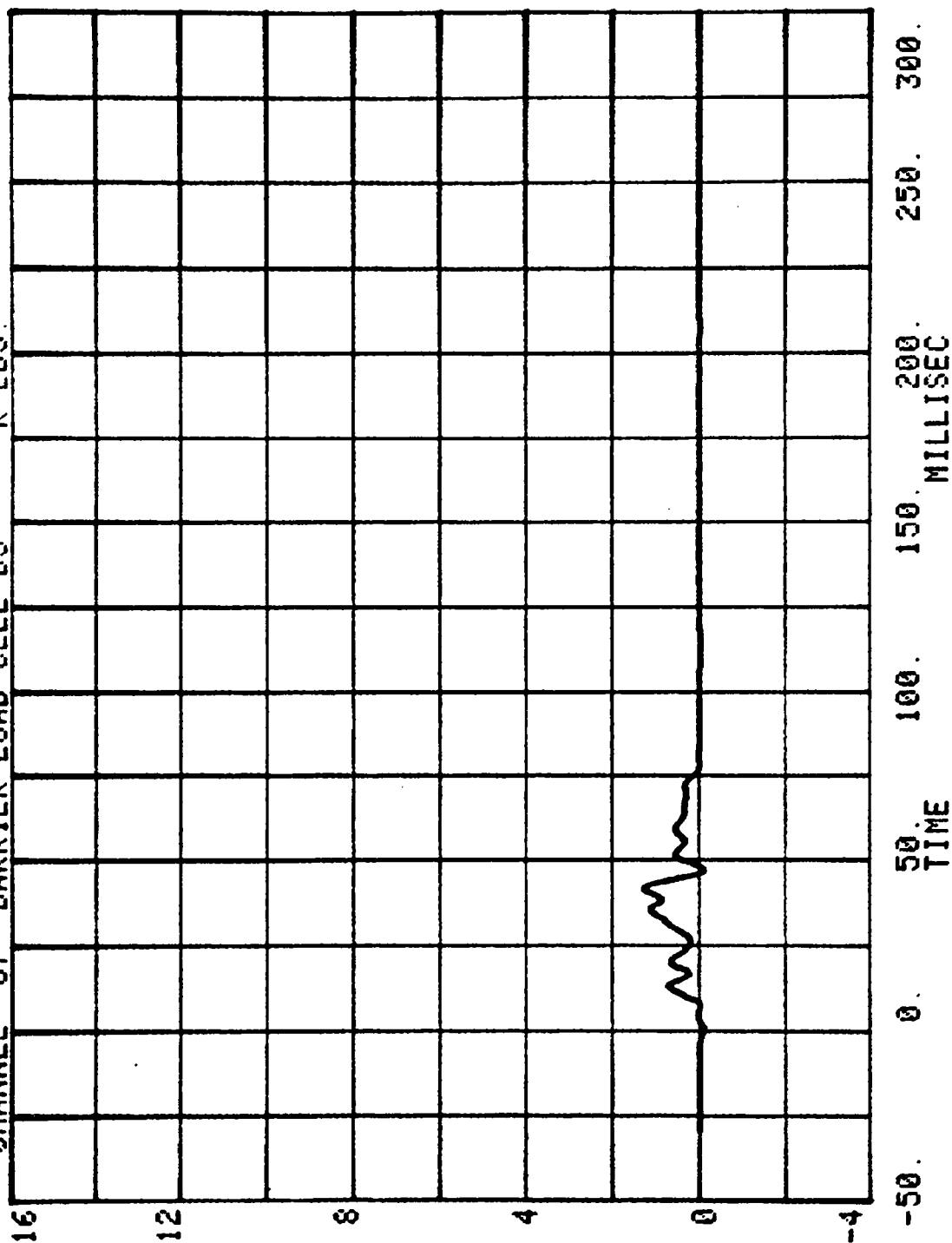
CHANNEL 65 BARRIER LOAD CELL 03 RUN= 554 SERIES= 1 K LBS.



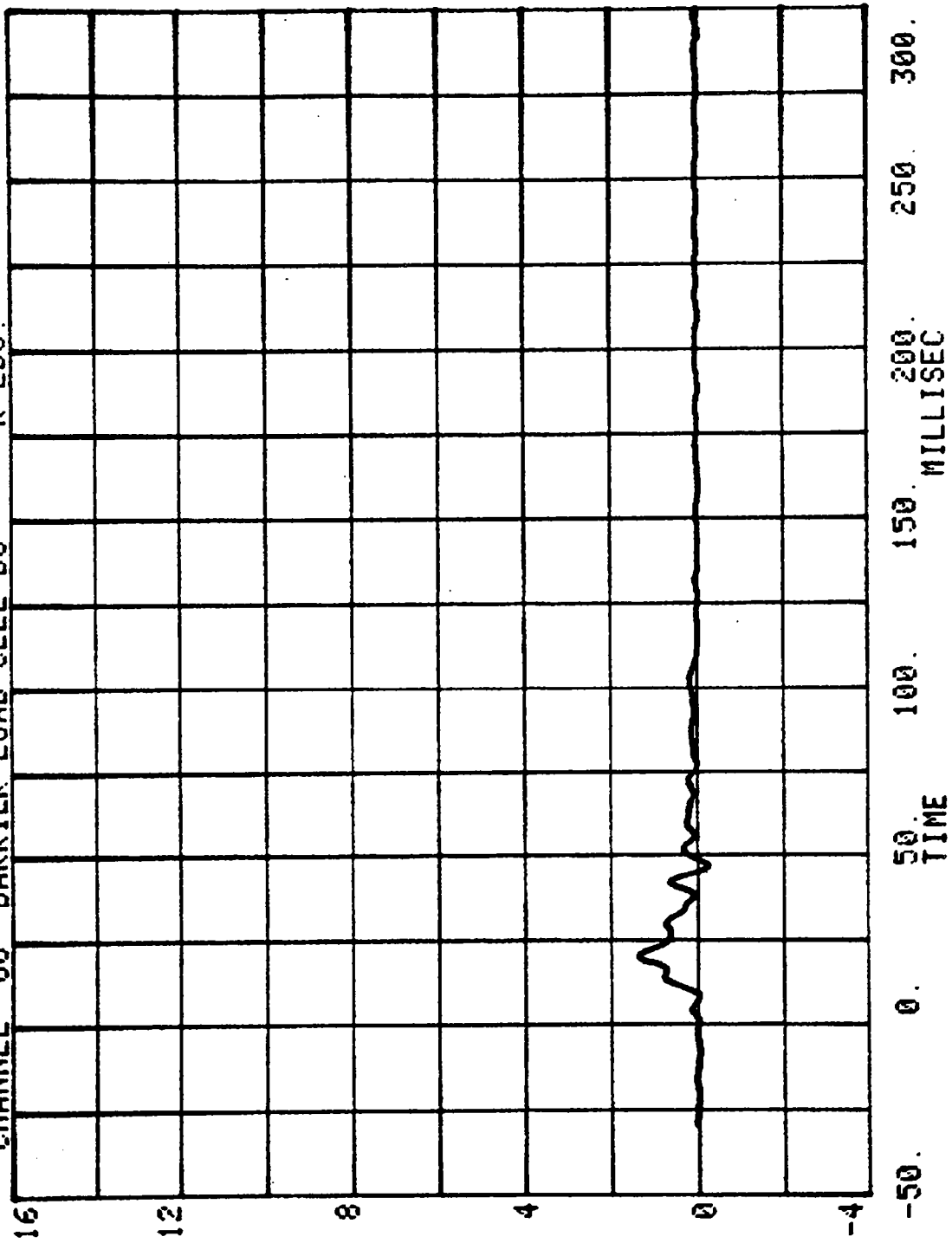
RUN= 554 SERIES= 1
CHANNEL 66 BARRIER LOAD CELL 04 K LBS.



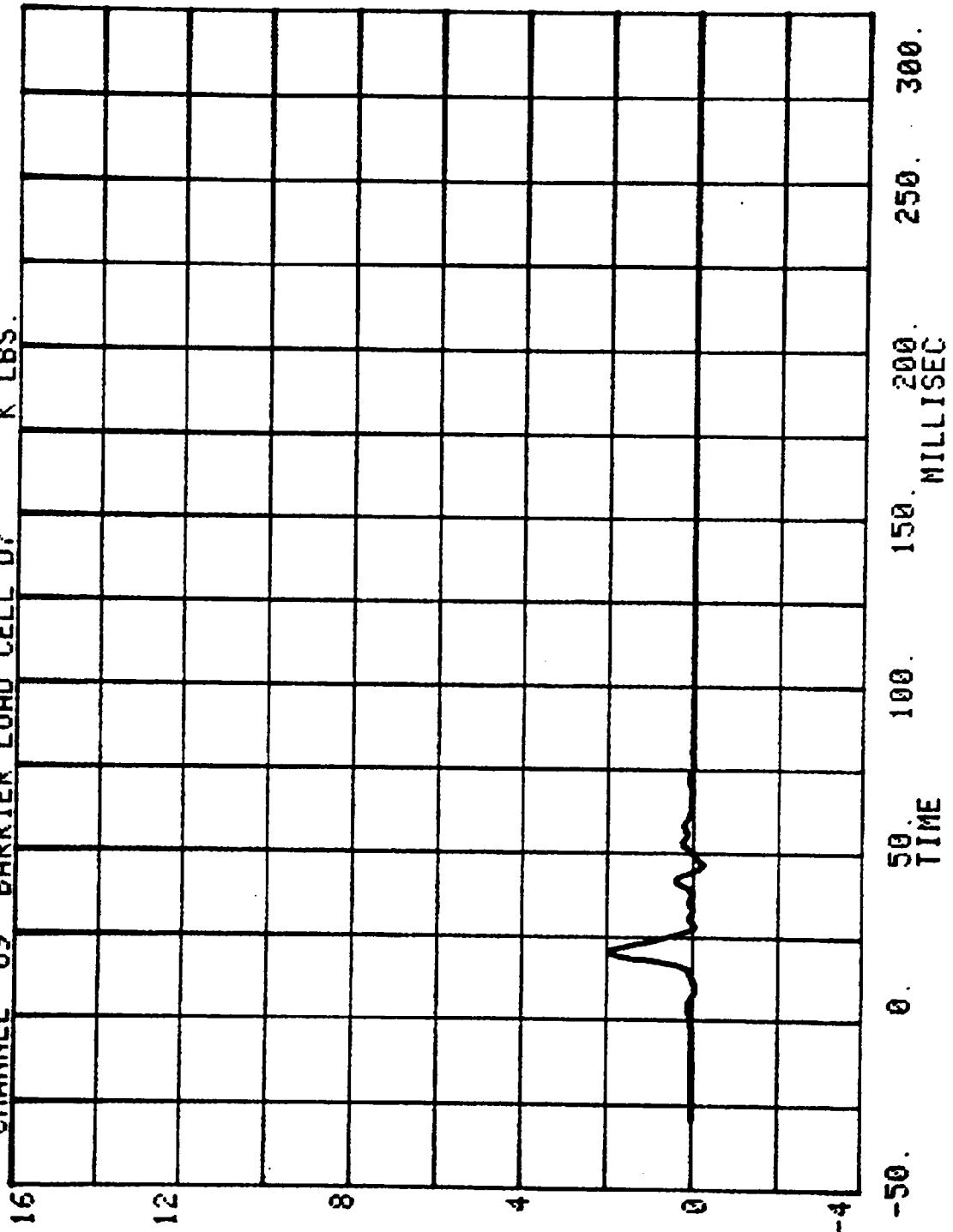
CHANNEL 67 BARRIER LOAD CELL 05 RUN= 554 SERIES= 1 K LBS.



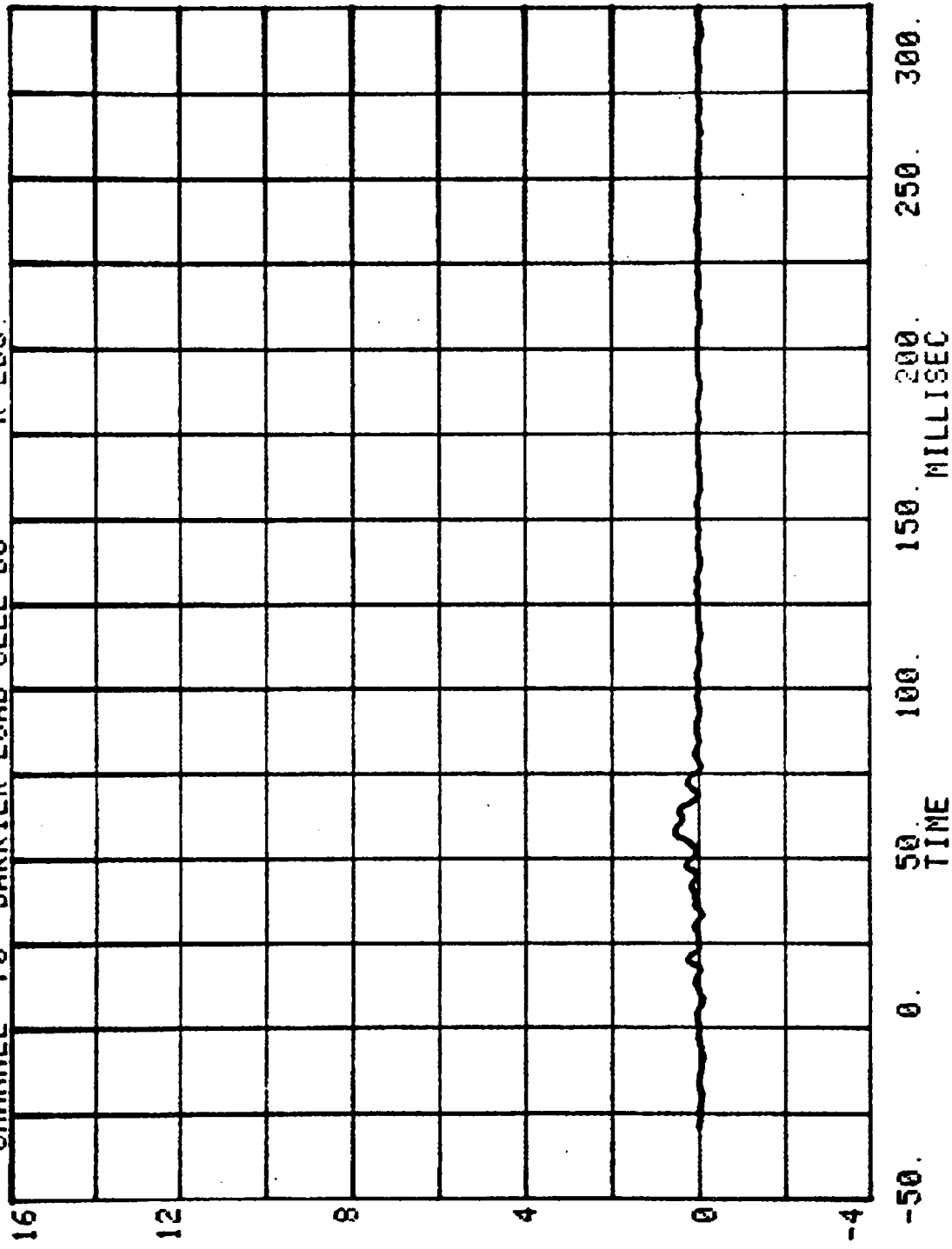
CHANNEL 68 BARRIER LOAD CELL D6
RUN= 554 SERIES= 1
K LBS.

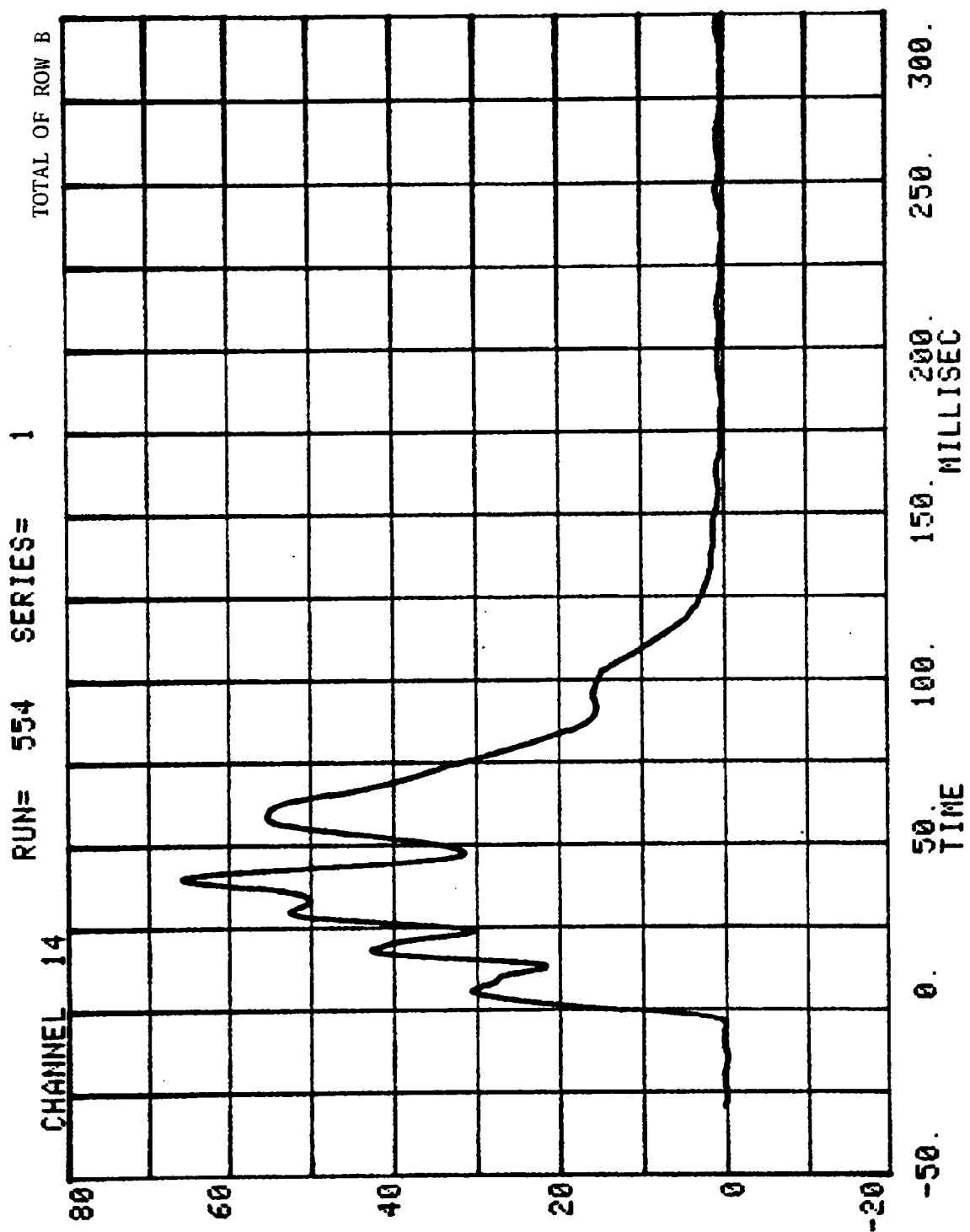


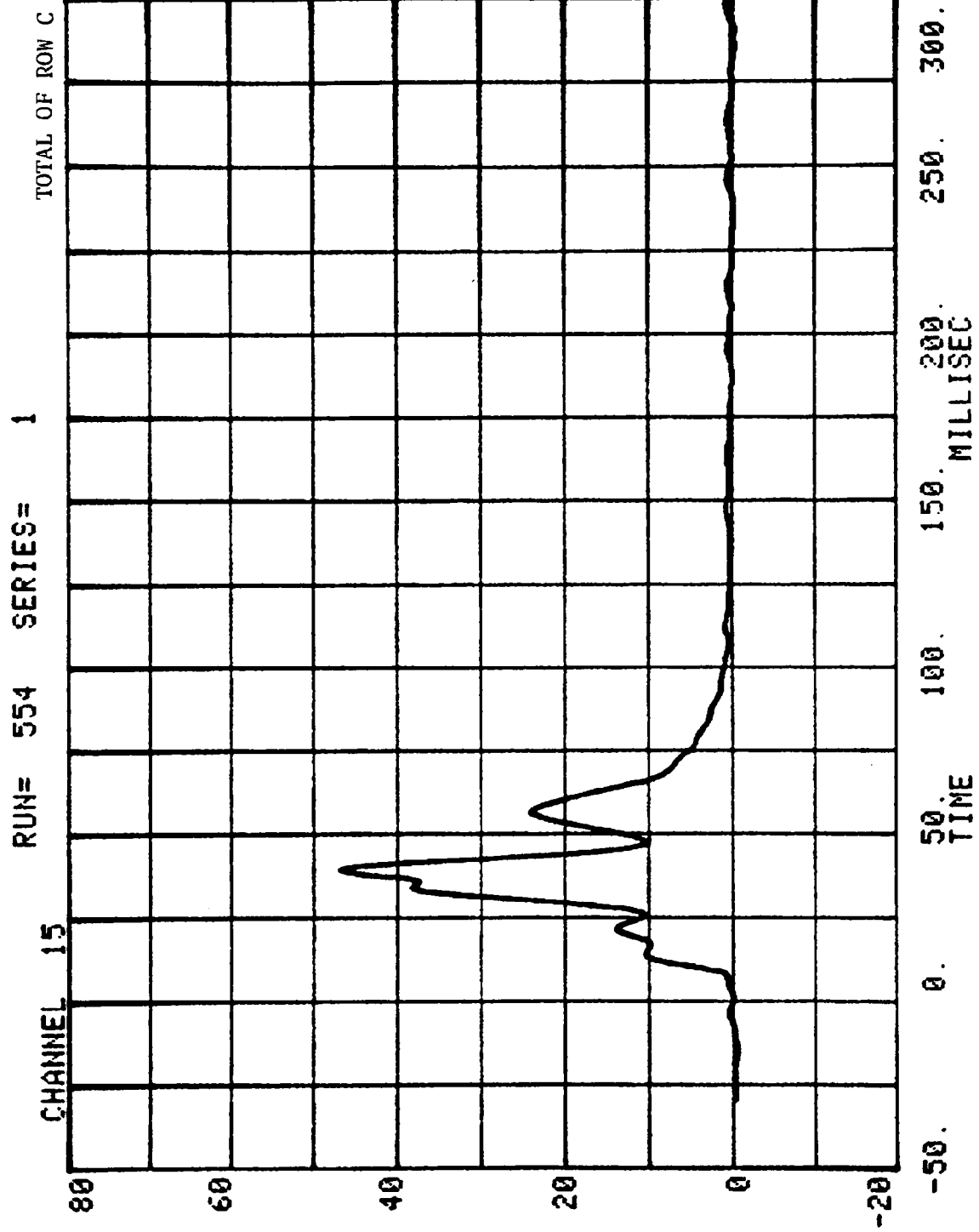
RUN= 554 SERIES= 1
CHANNEL 69 BARRIER LOAD CELL D7 K LBS.

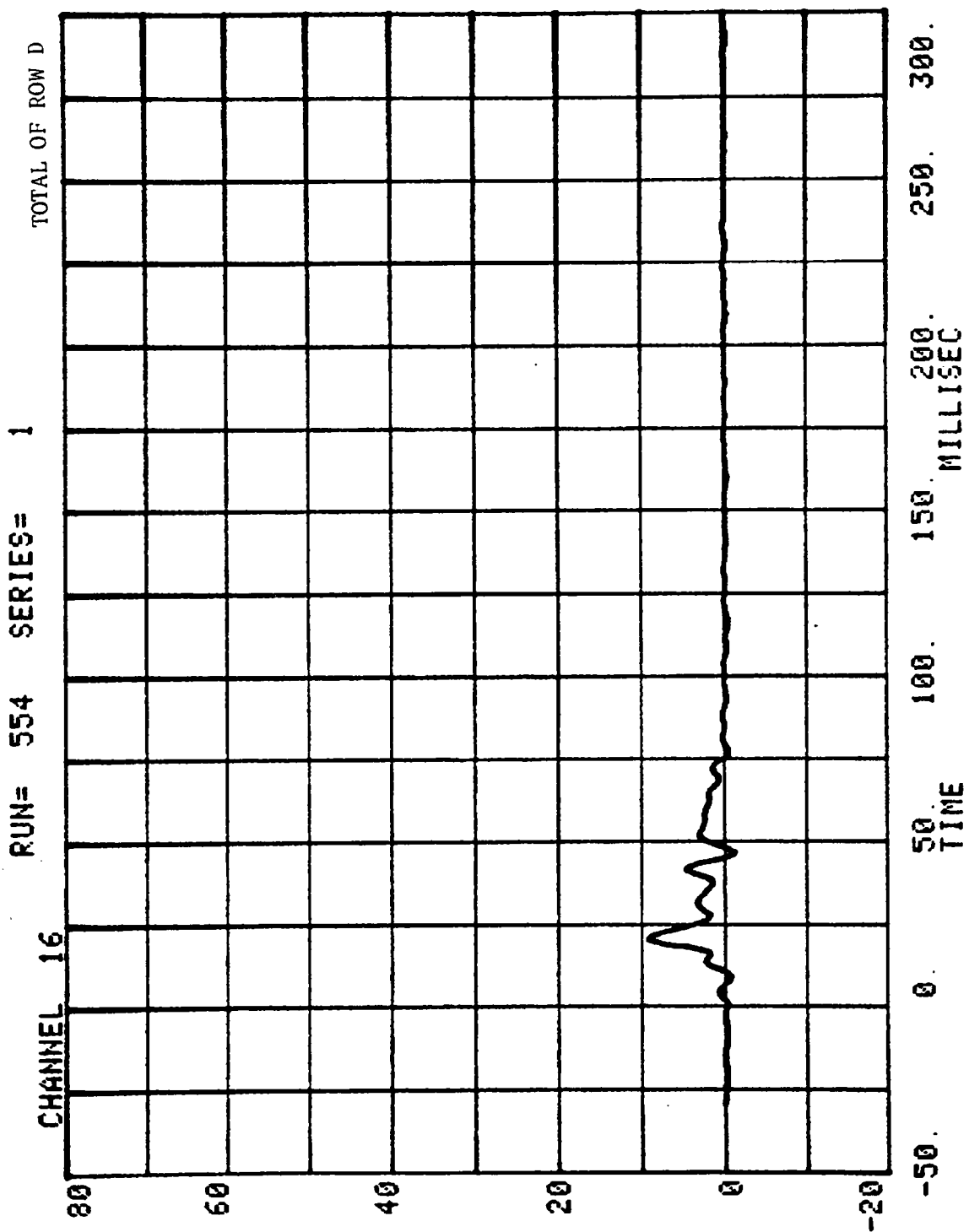


CHANNEL 70 BARRIER LOAD CELL 08 RUN= 554 SERIES= 1 K LBS.

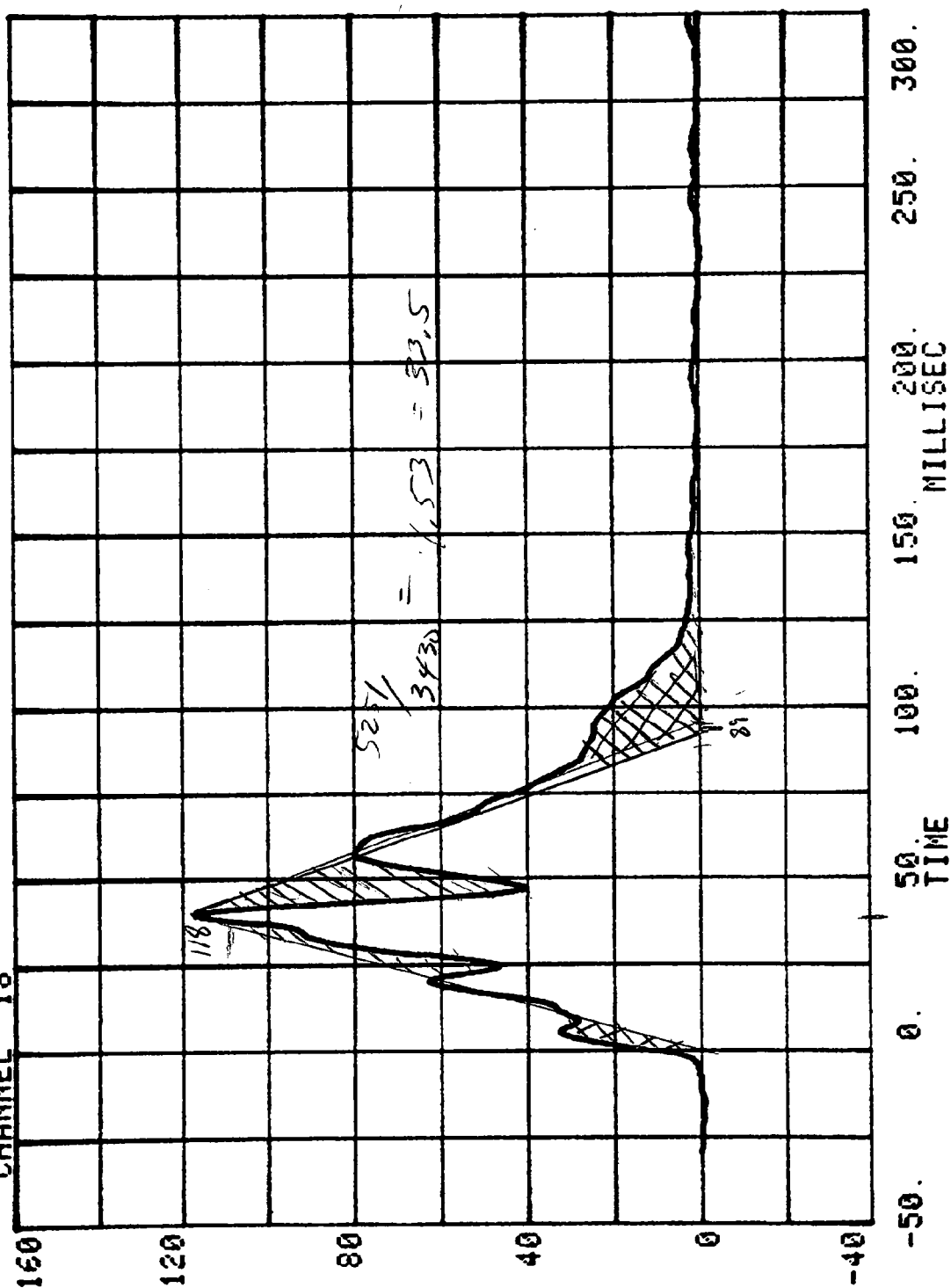


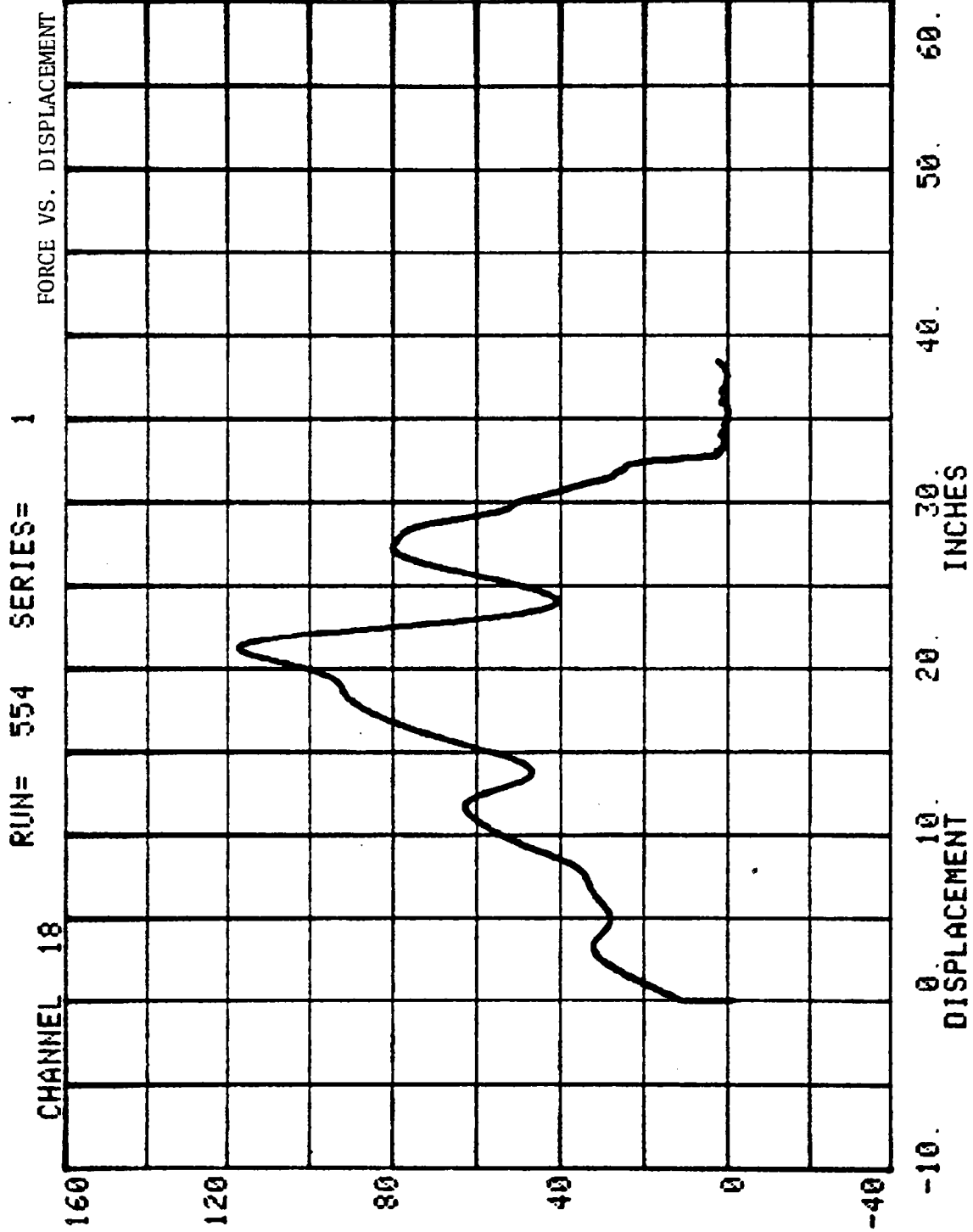






RUN= 554 SERIES= 1 TOTAL OF ROWS A + B + C + D
 CHANNEL 18





TEST NO. 447-4-554

1982 FORD GRANADA

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= 554

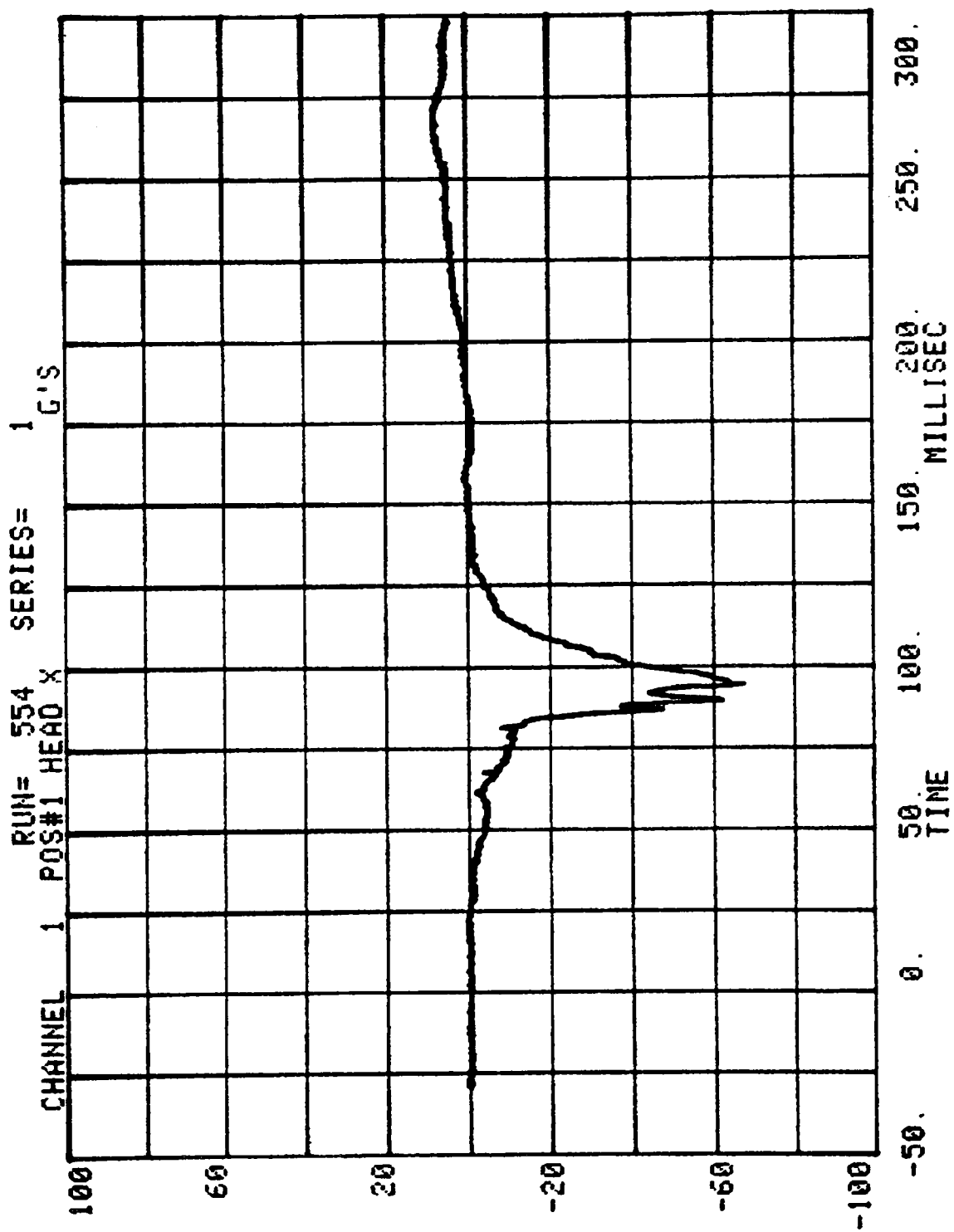
POS#1 HEAD RESULTANT

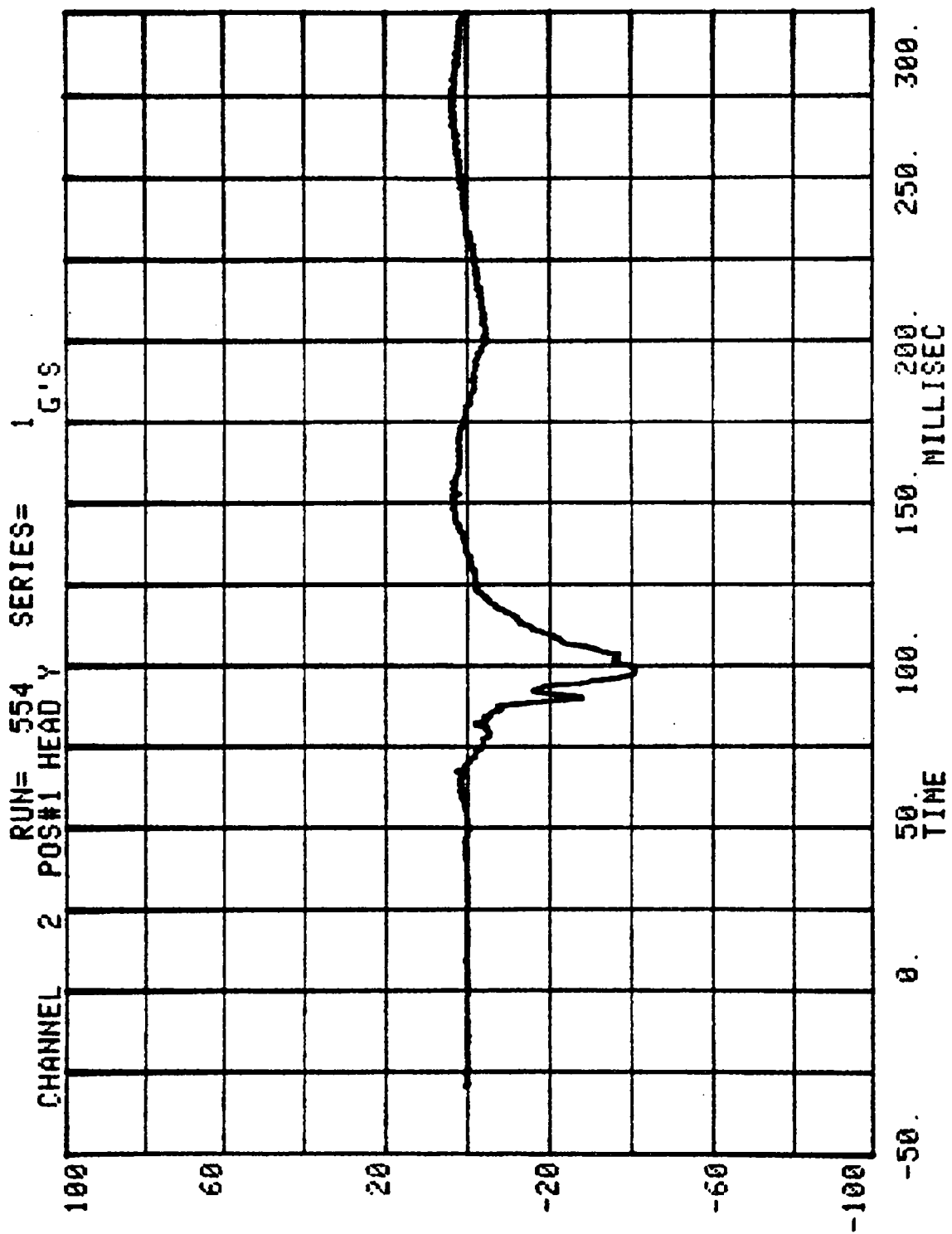
HIC= 859.6 FROM T1= .08415 TO T2= .10575

AVERAGE ACCELERATION BETWEEN T1 AND T2= 69.2G'S

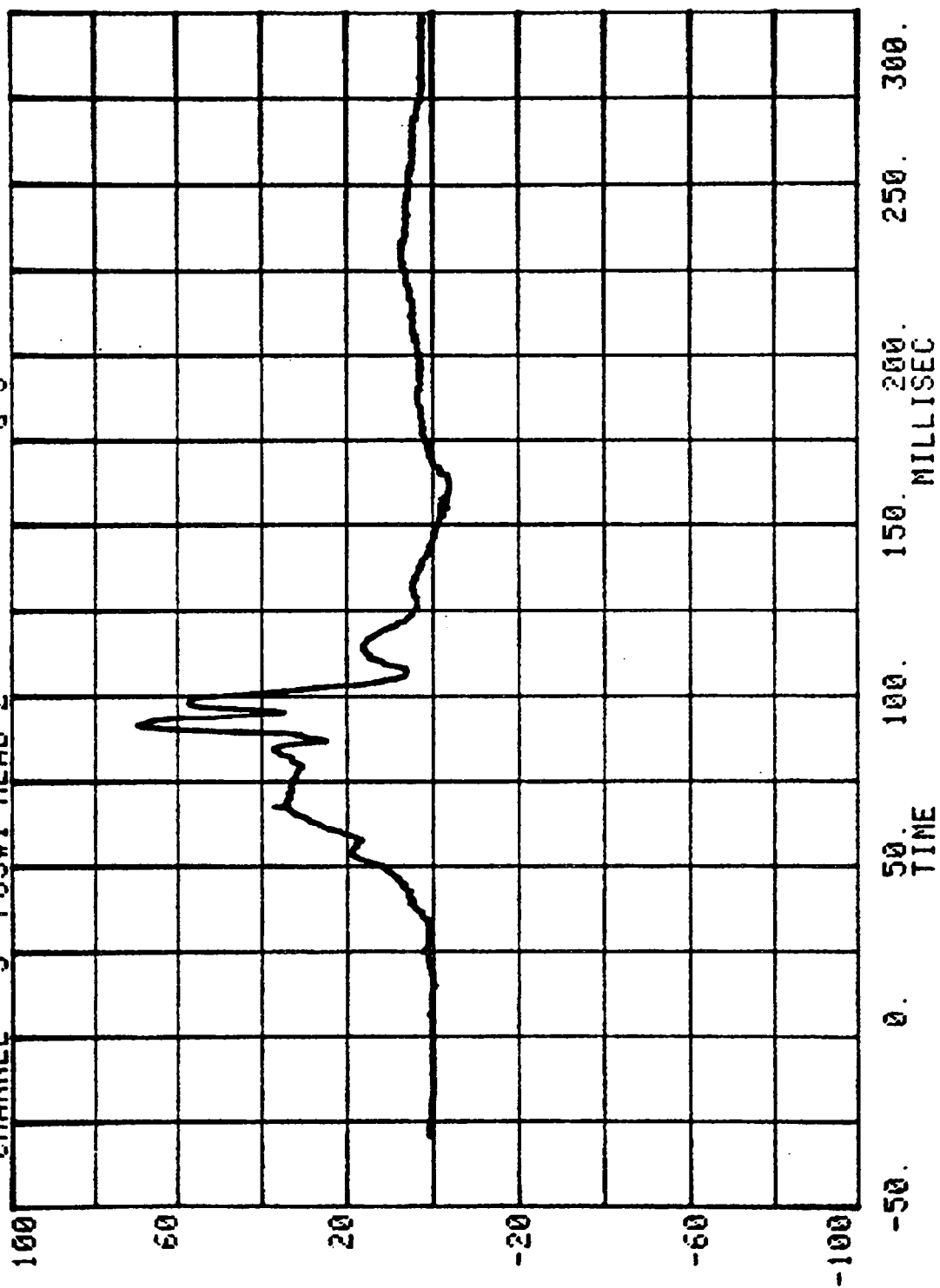
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1199.7

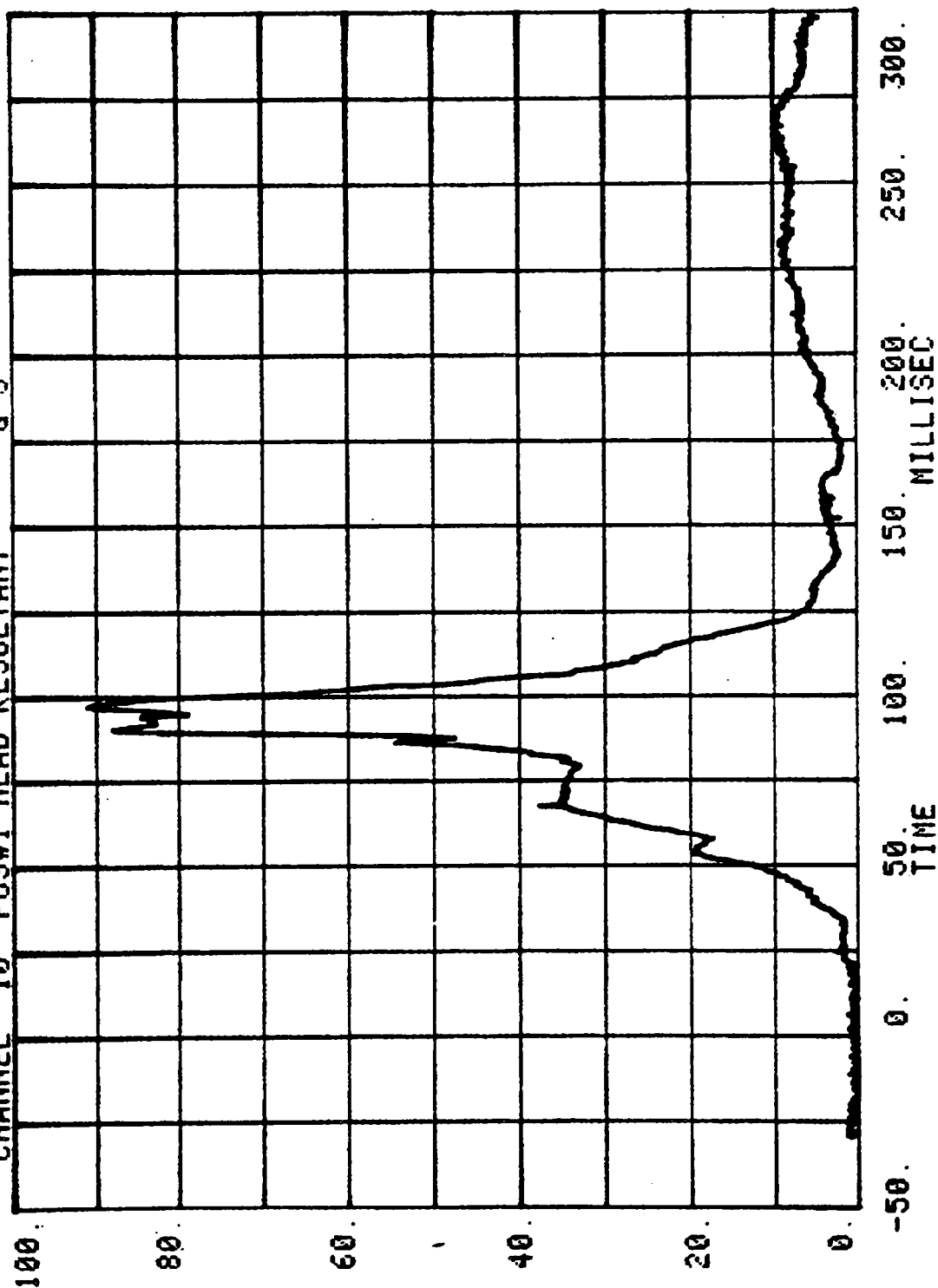


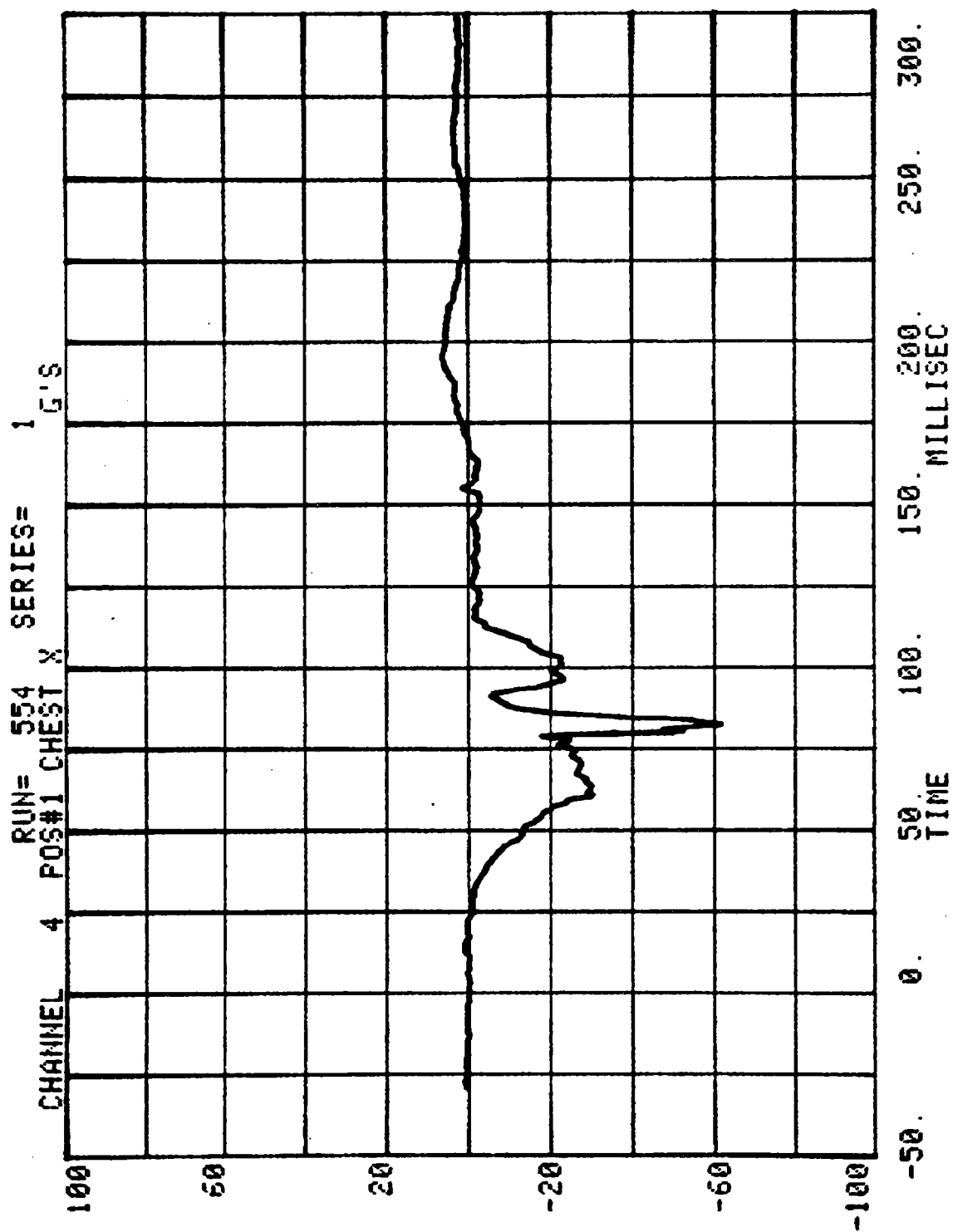


CHANNEL 3 POS#1 HEAD Z RUN= 554 SERIES= 1 G'S

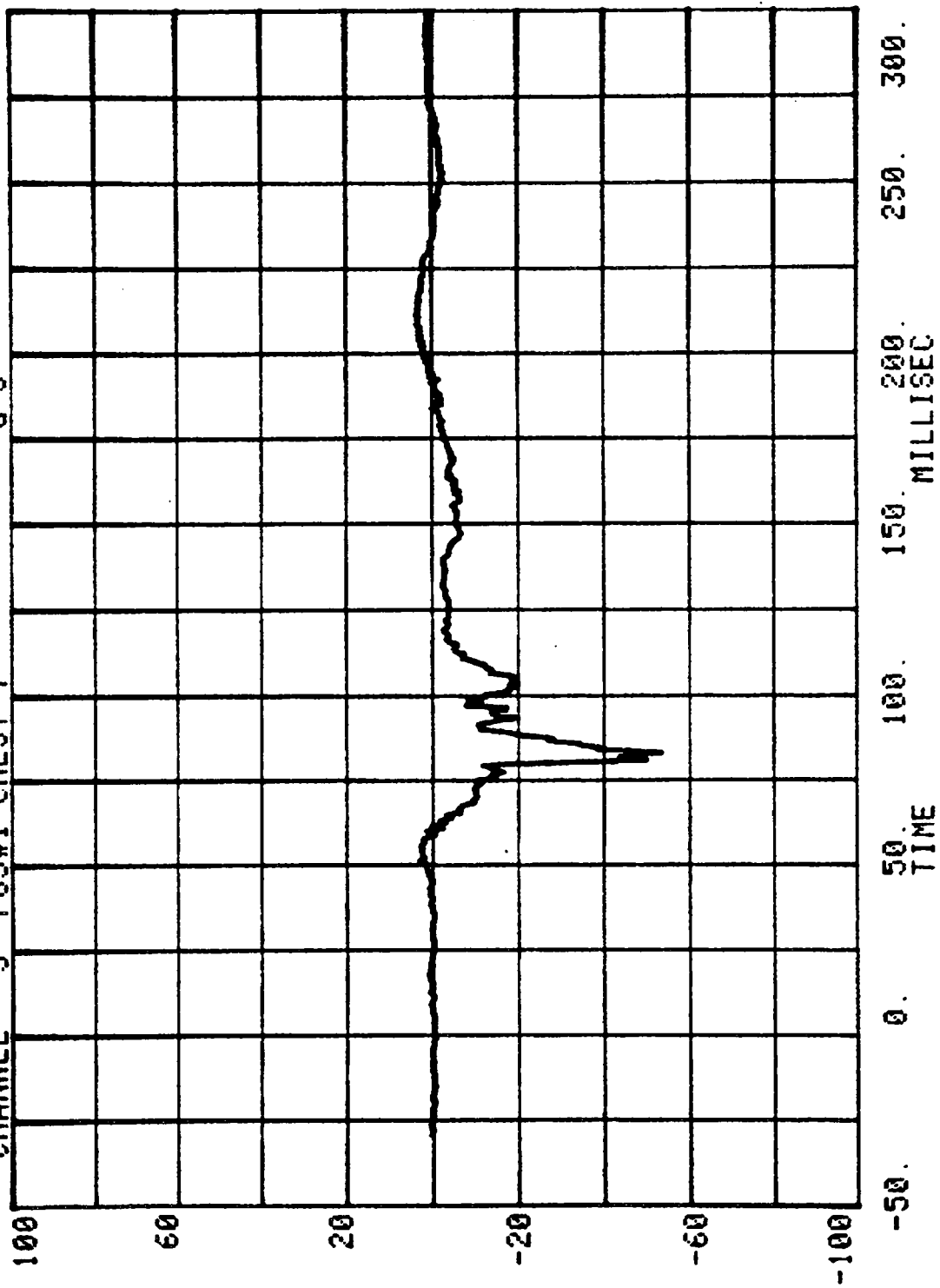


CHANNEL 10 POS#1 HEAD RESULTANT 1 G'S

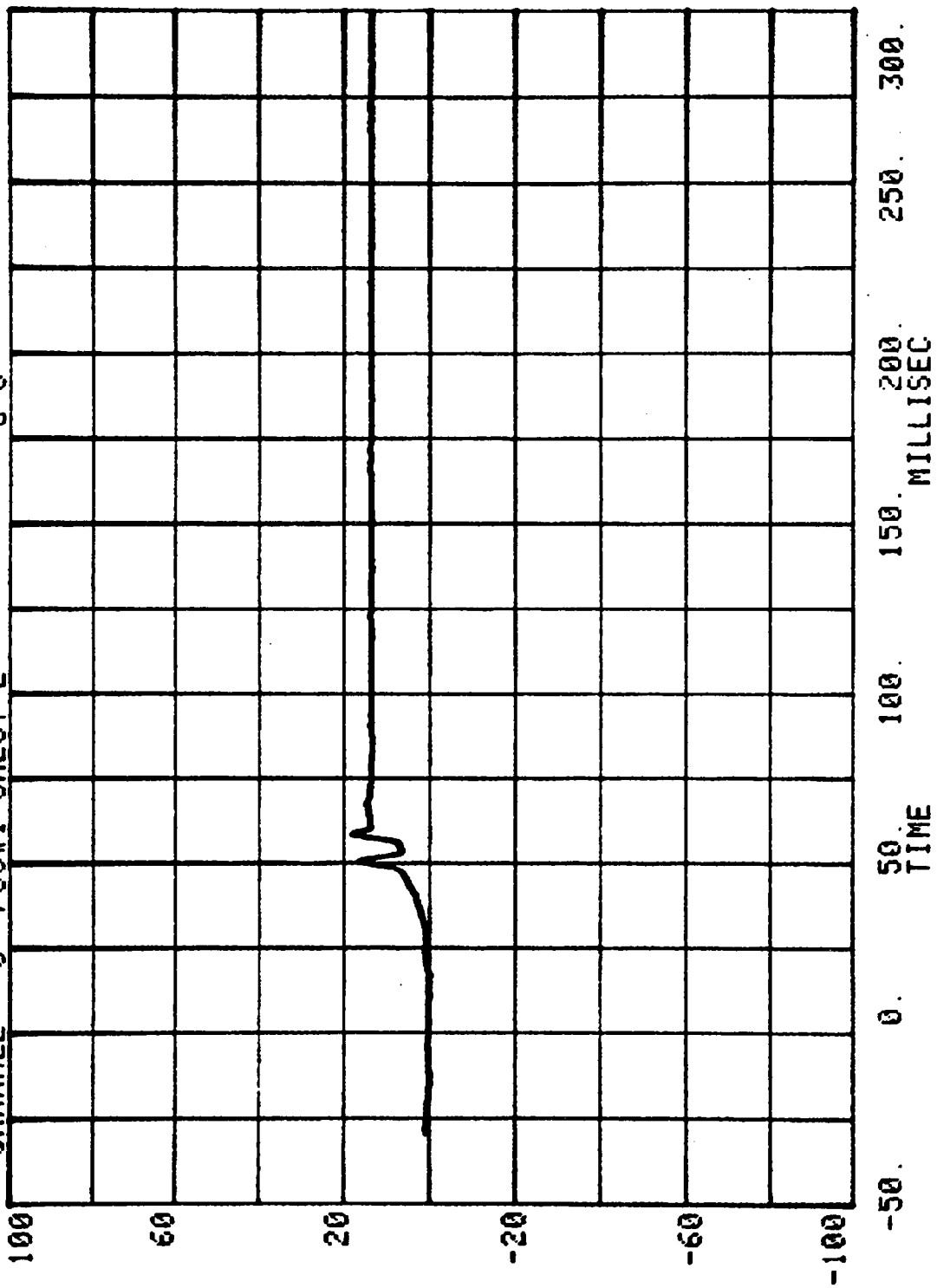


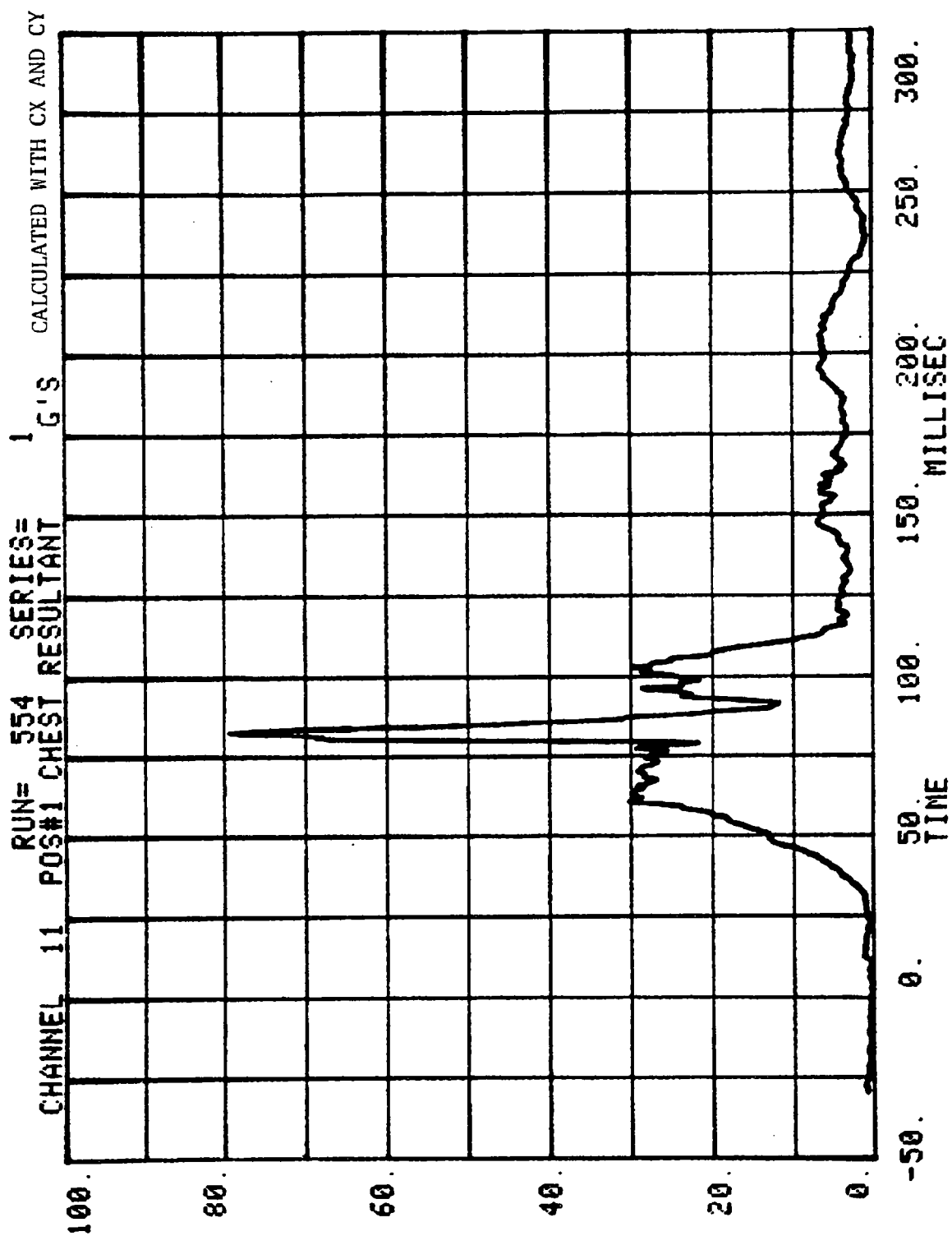


CHANNEL 5 POS#1 CHEST Y RUN= 554 SERIES= 1 G'S

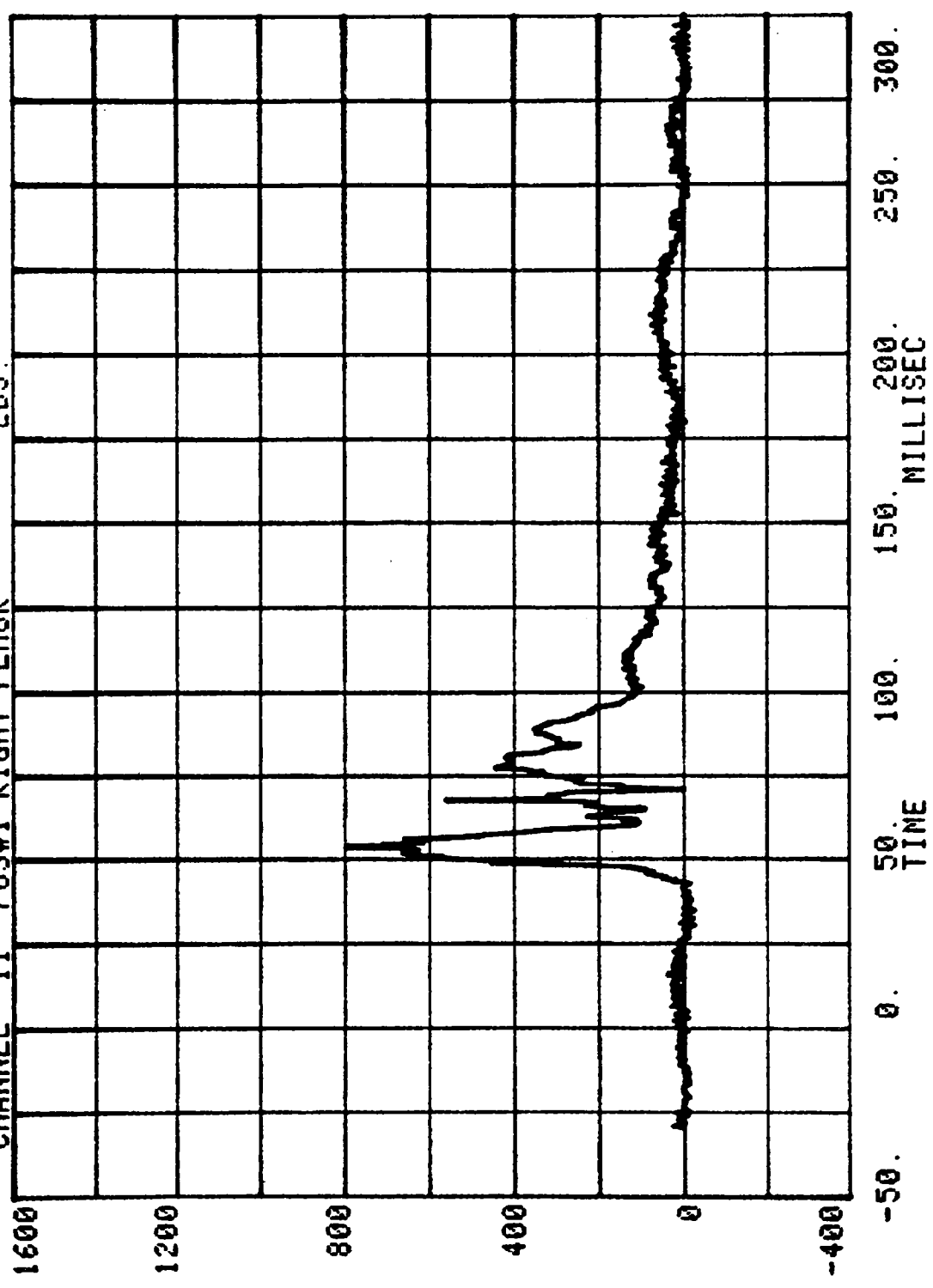


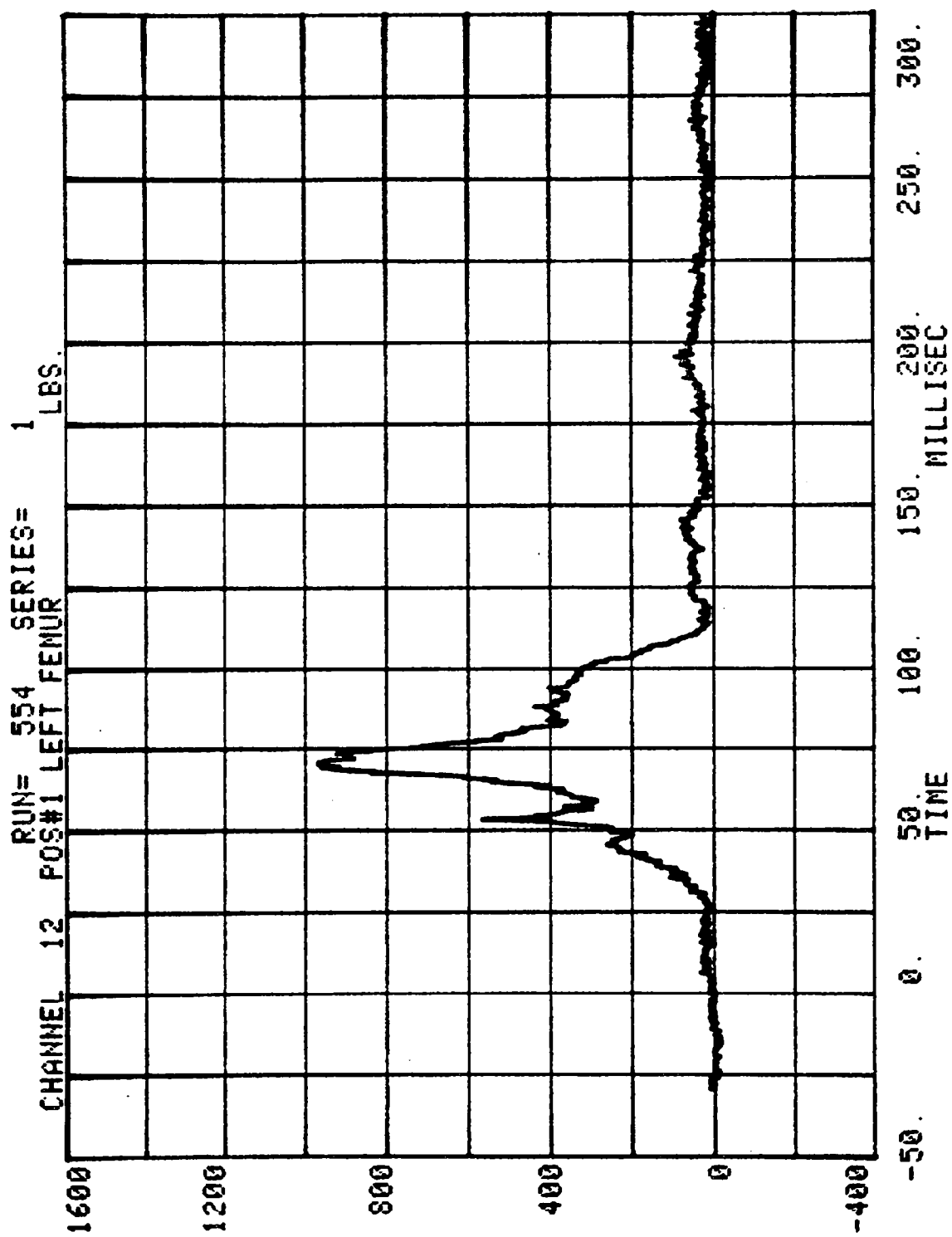
CHANNEL 6 POS#1 CHEST Z RUN= 554 SERIES= 1 G'S



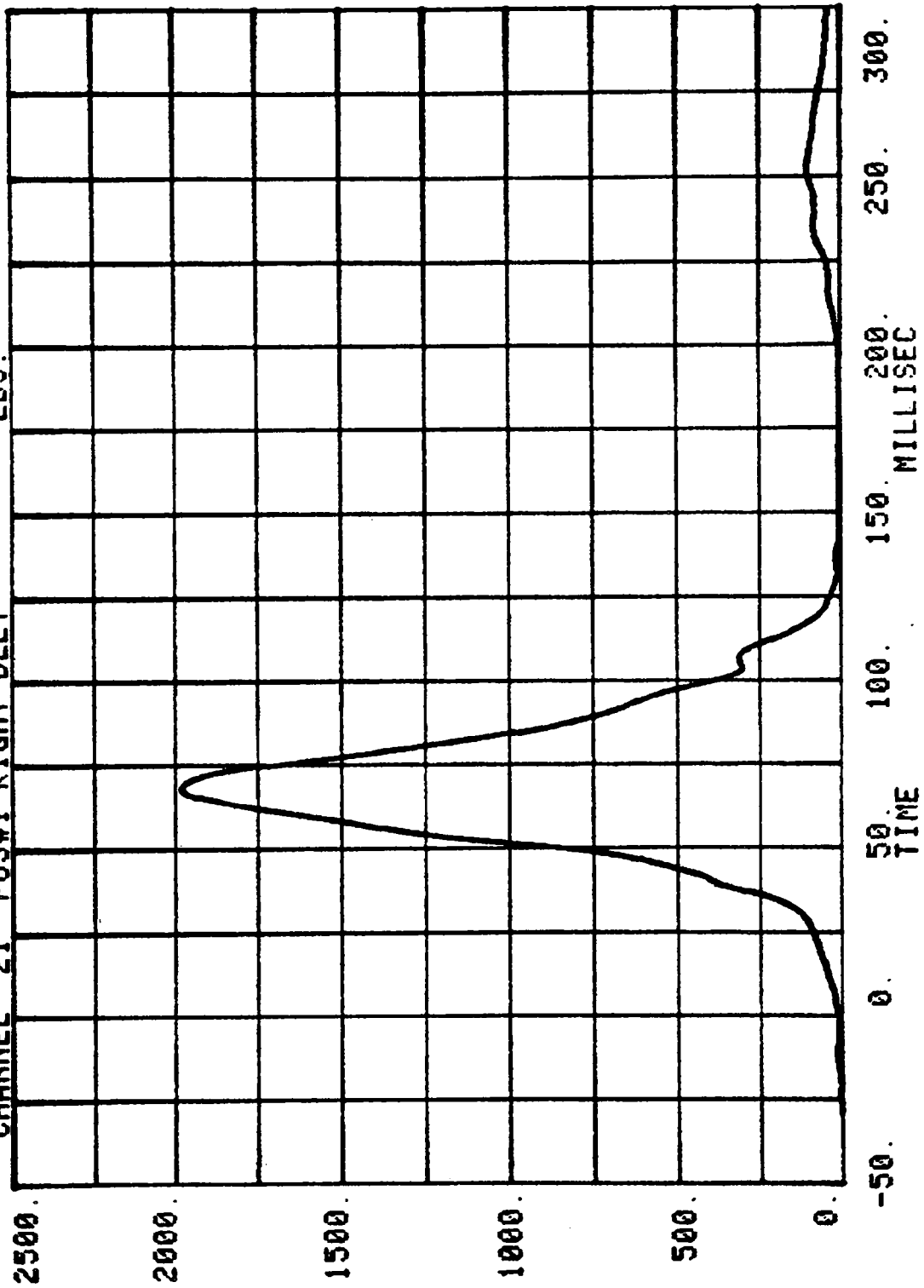


CHANNEL 11 POS#1 RIGHT FEMUR RUN= 554 SERIES= 1 LBS.

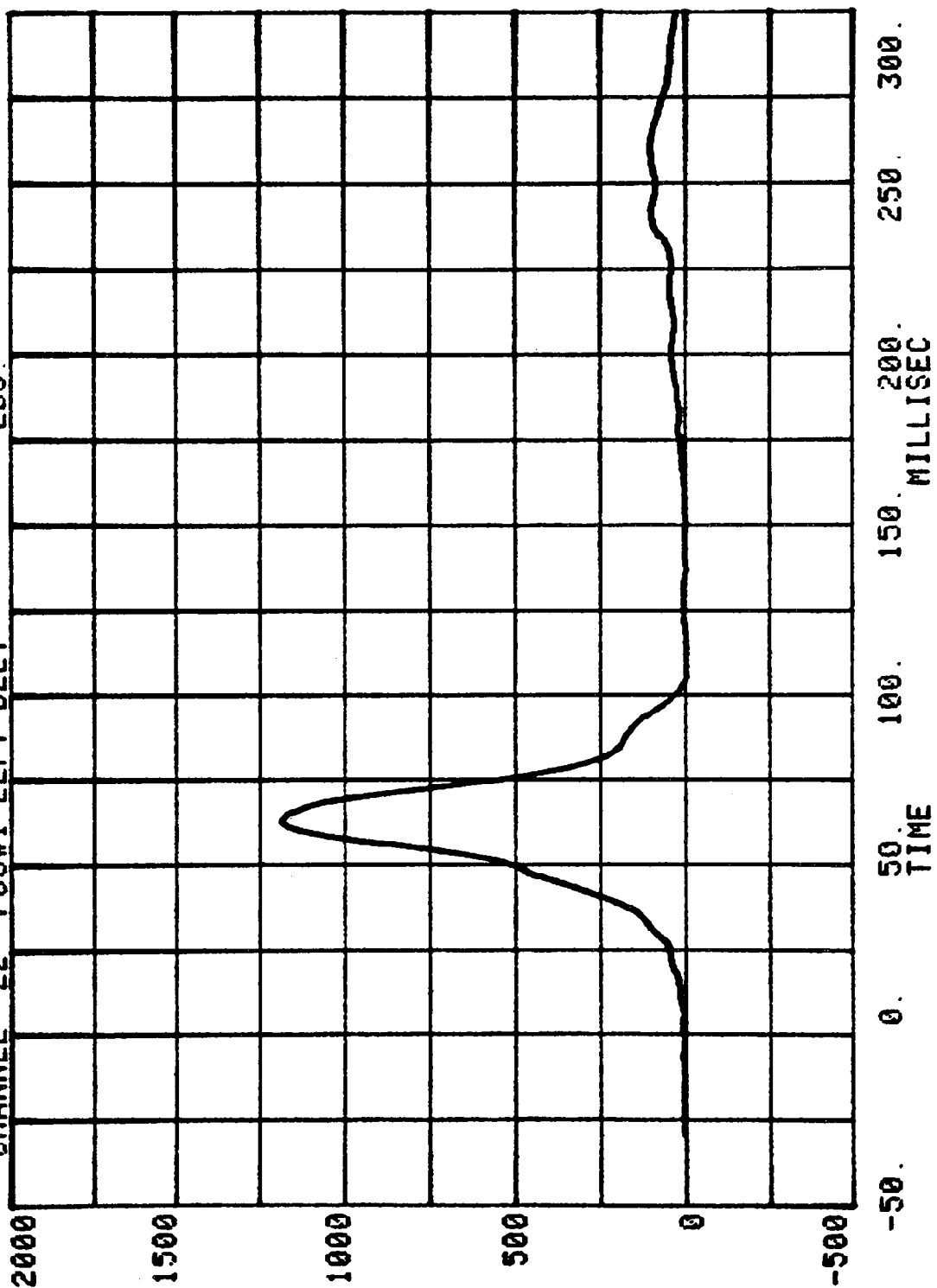


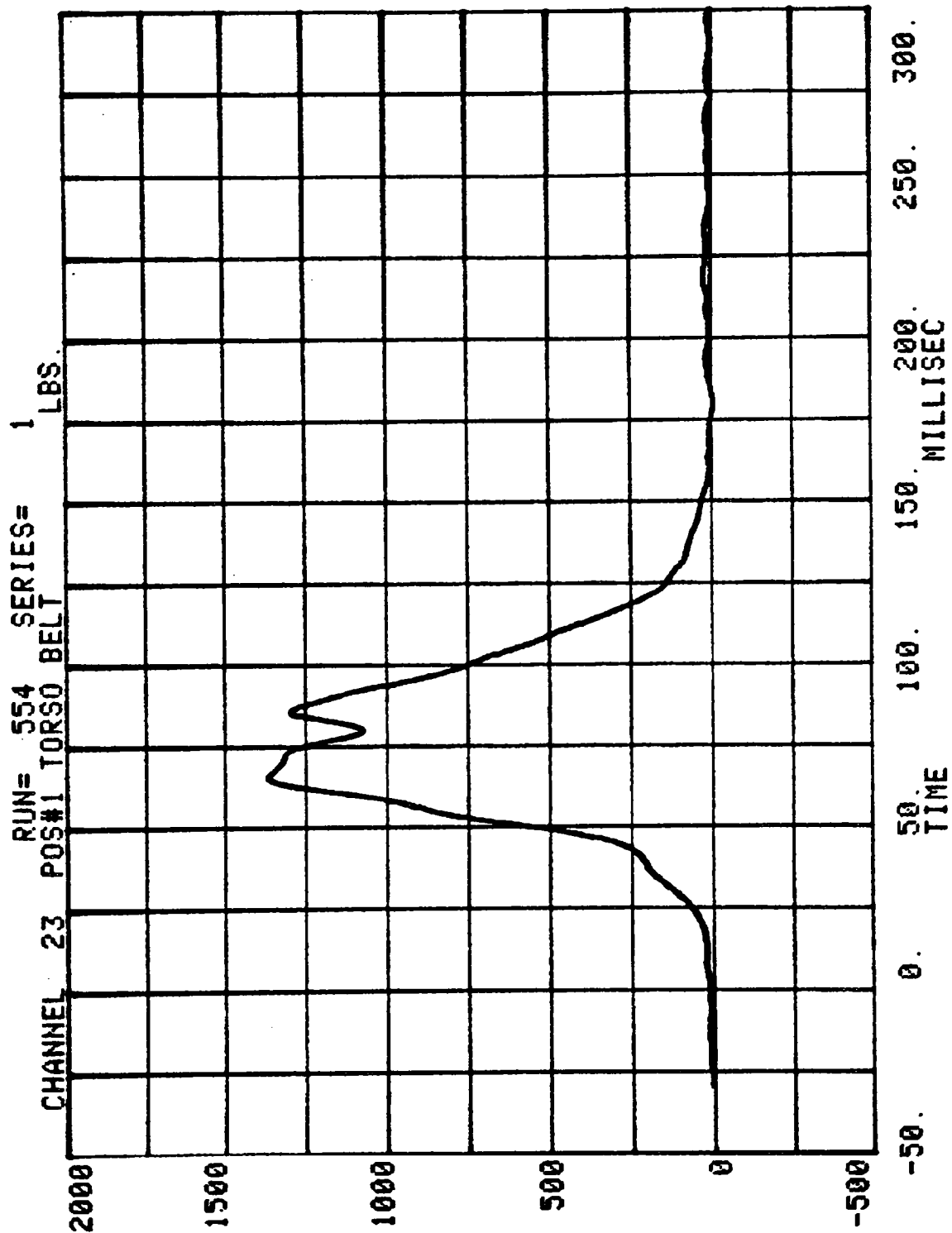


RUN= 554 SERIES= 1 LBS.
CHANNEL 21 POS#1 RIGHT BELT



CHANNEL 22 POS#1 LEFT BELT
RUN= 554 SERIES= 1 LBS.

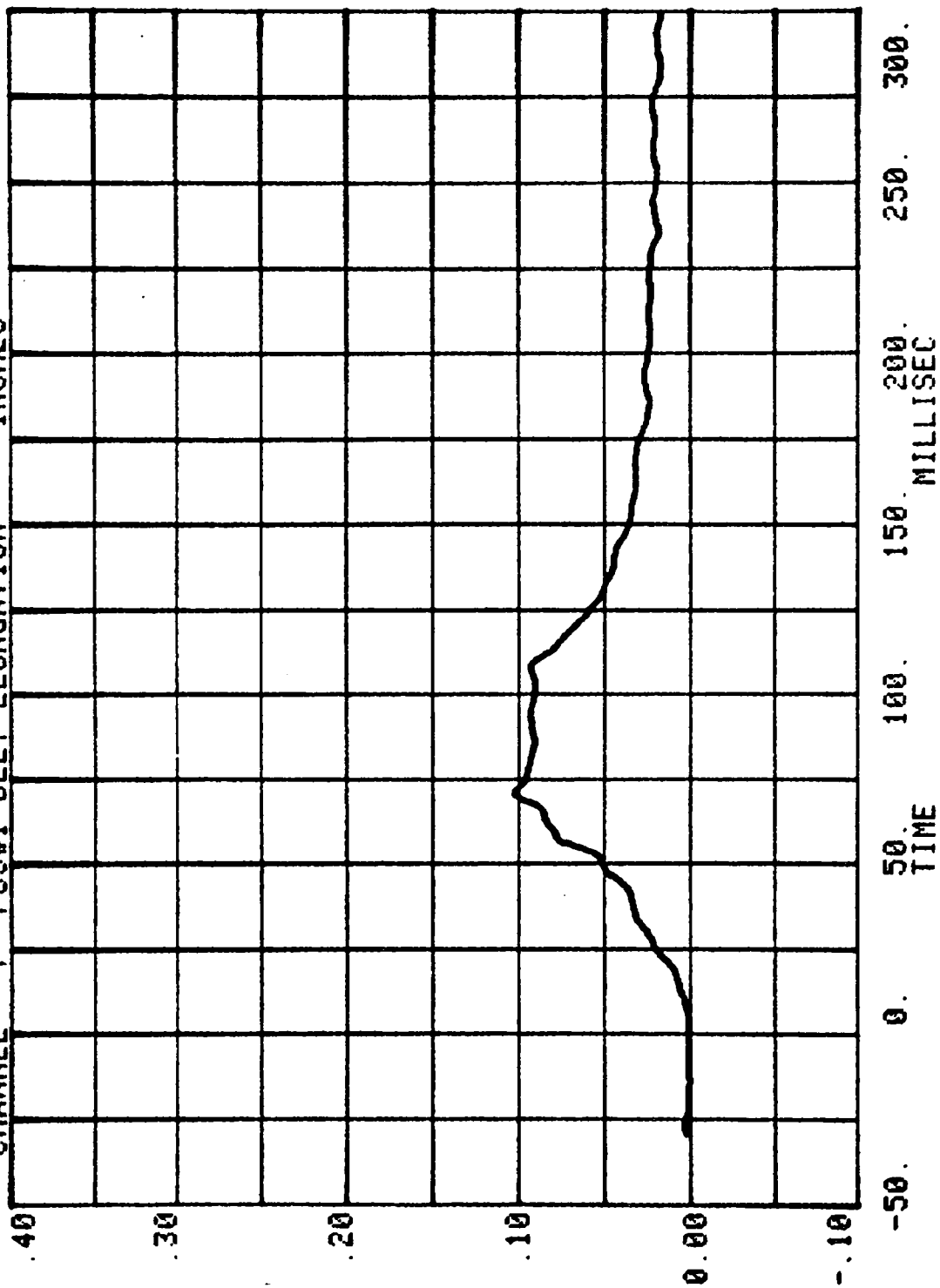




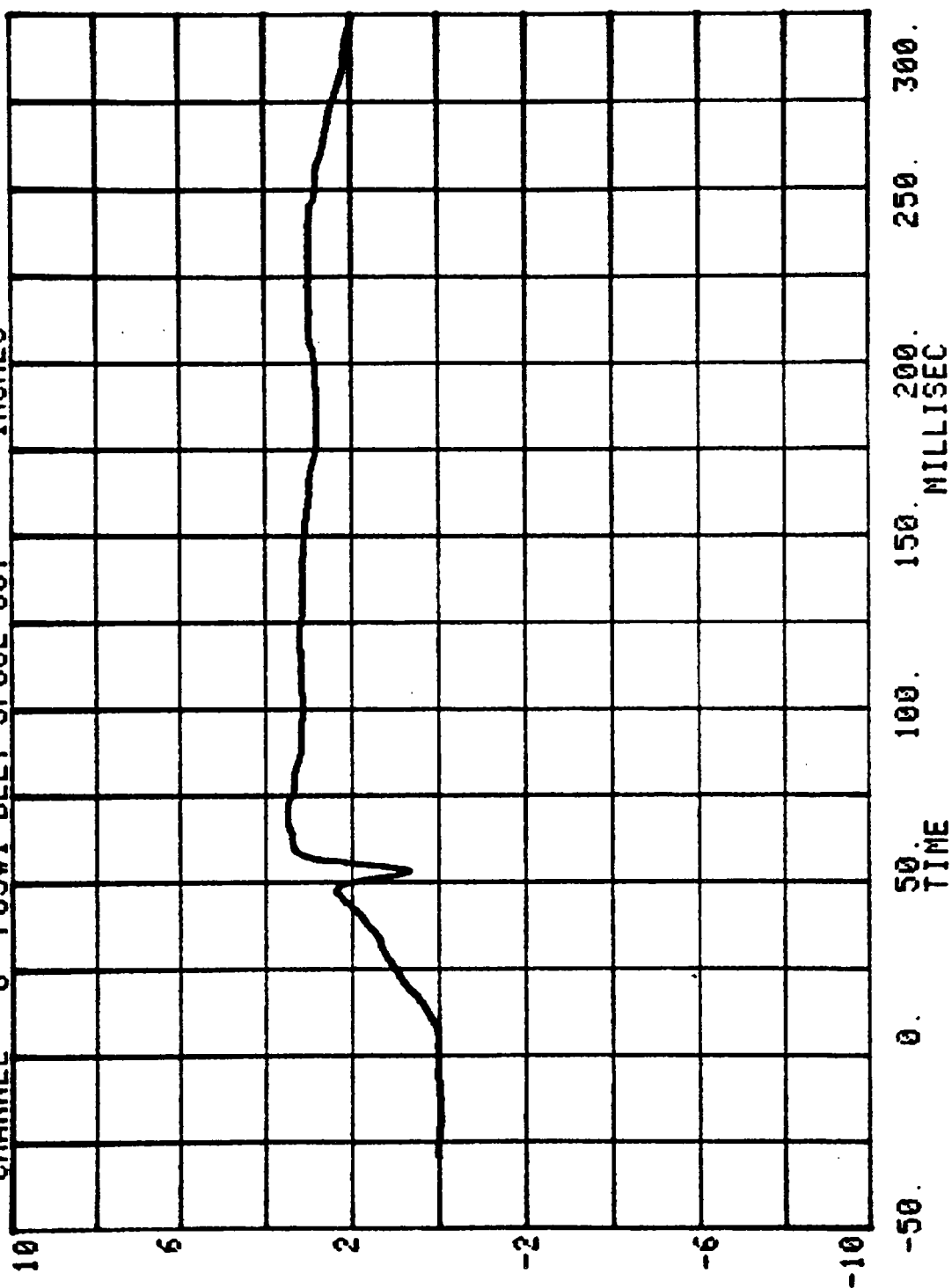
CHANNEL 7 POS#1 BELT ELONGATION

RUN= 554 SERIES= 1

INCHES



CHANNEL 8 POS#1 BELT SPOOL OUT 1 INCHES



HEAD INJURY CRITERION
HEAD SEVERITY INDEX

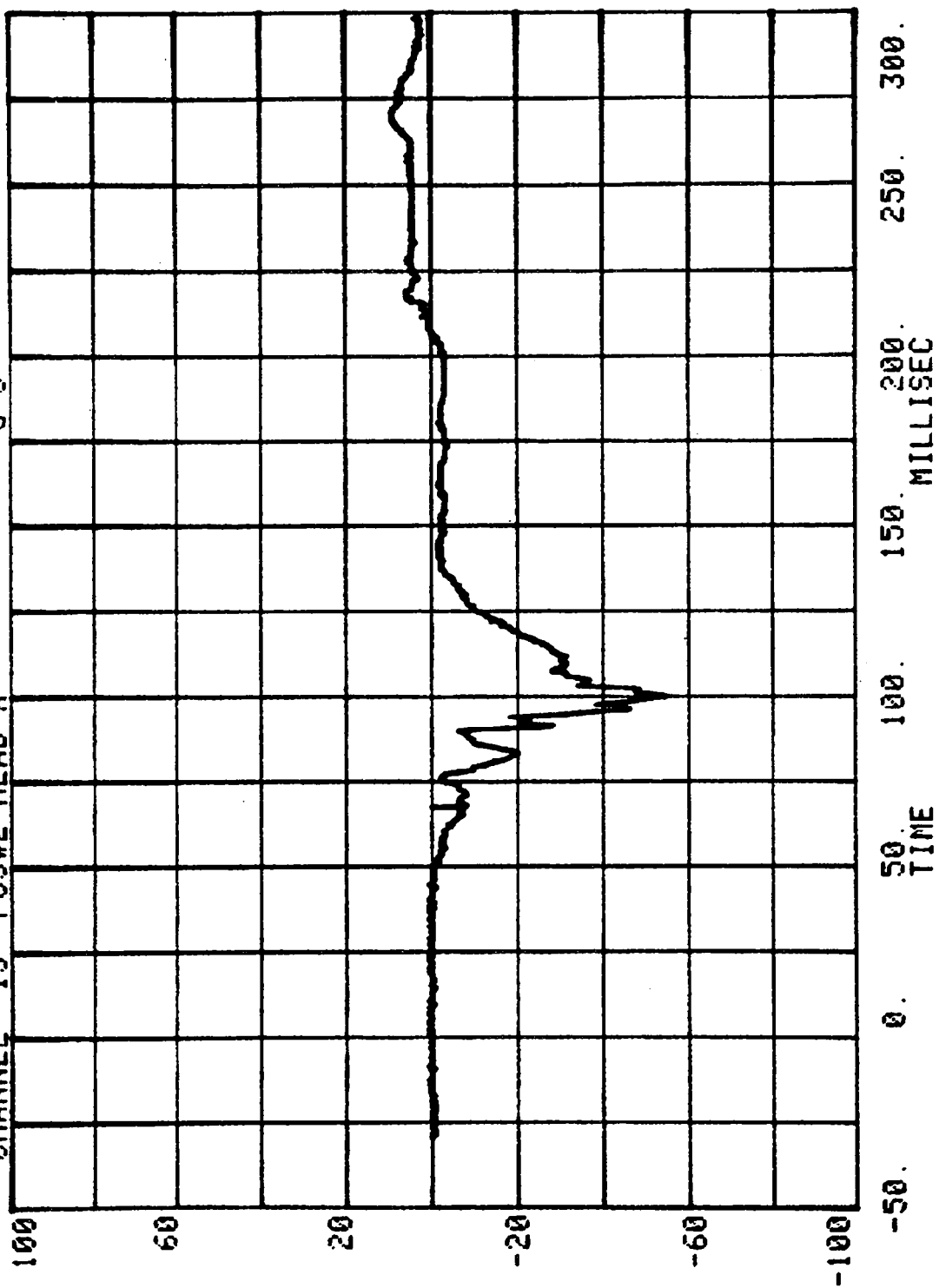
CAR TO LOAD CELL BARRIER

RUN= 554

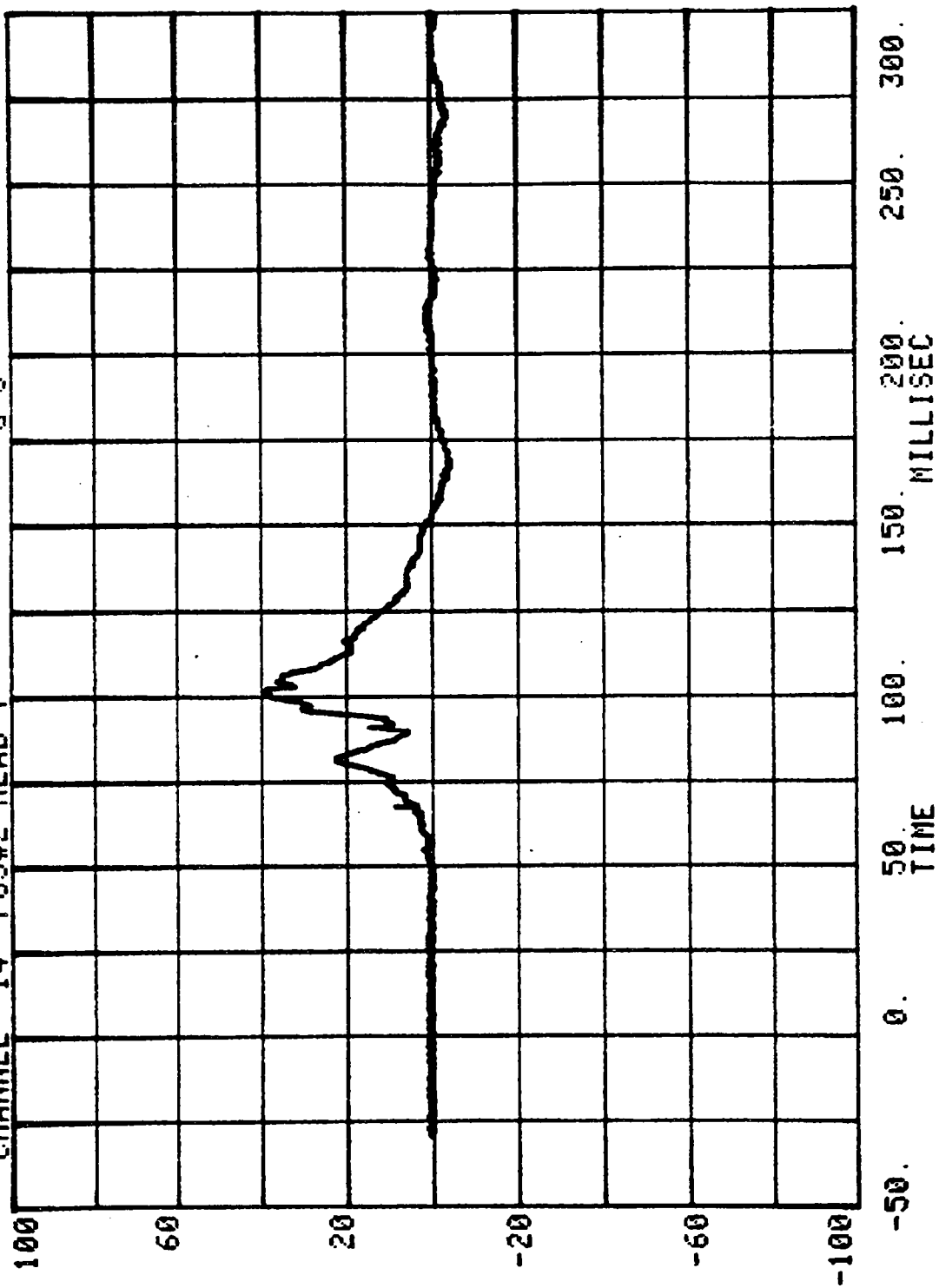
POS#2 HEAD RESULTANT

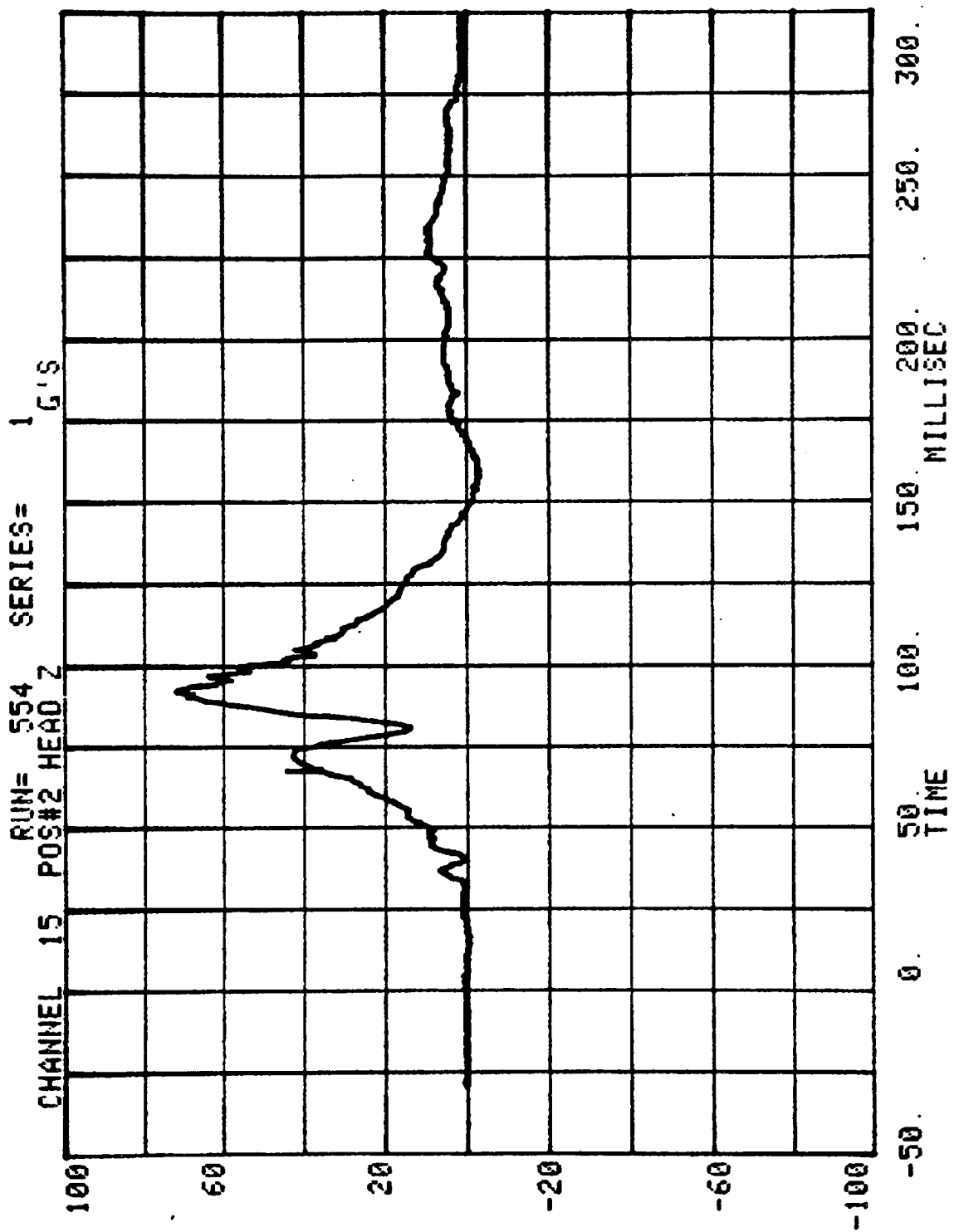
HIC=1049.6 FROM T1= .06585 TO T2= .12000
AVERAGE ACCELERATION BETWEEN T1 AND T2= 51.9G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1343.9

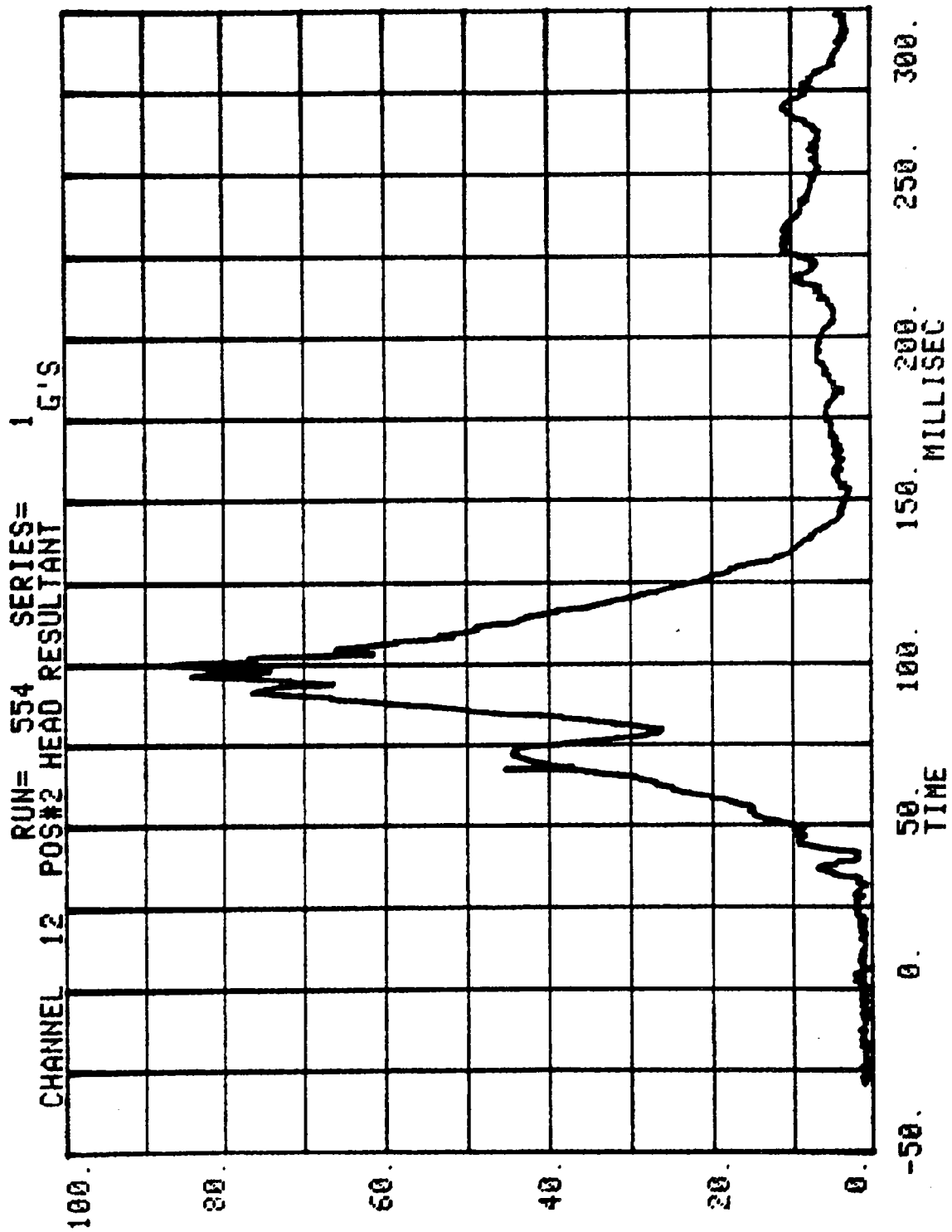
CHANNEL 13 POS#2 HEAD X
RUN= 554 SERIES= 1 G'S



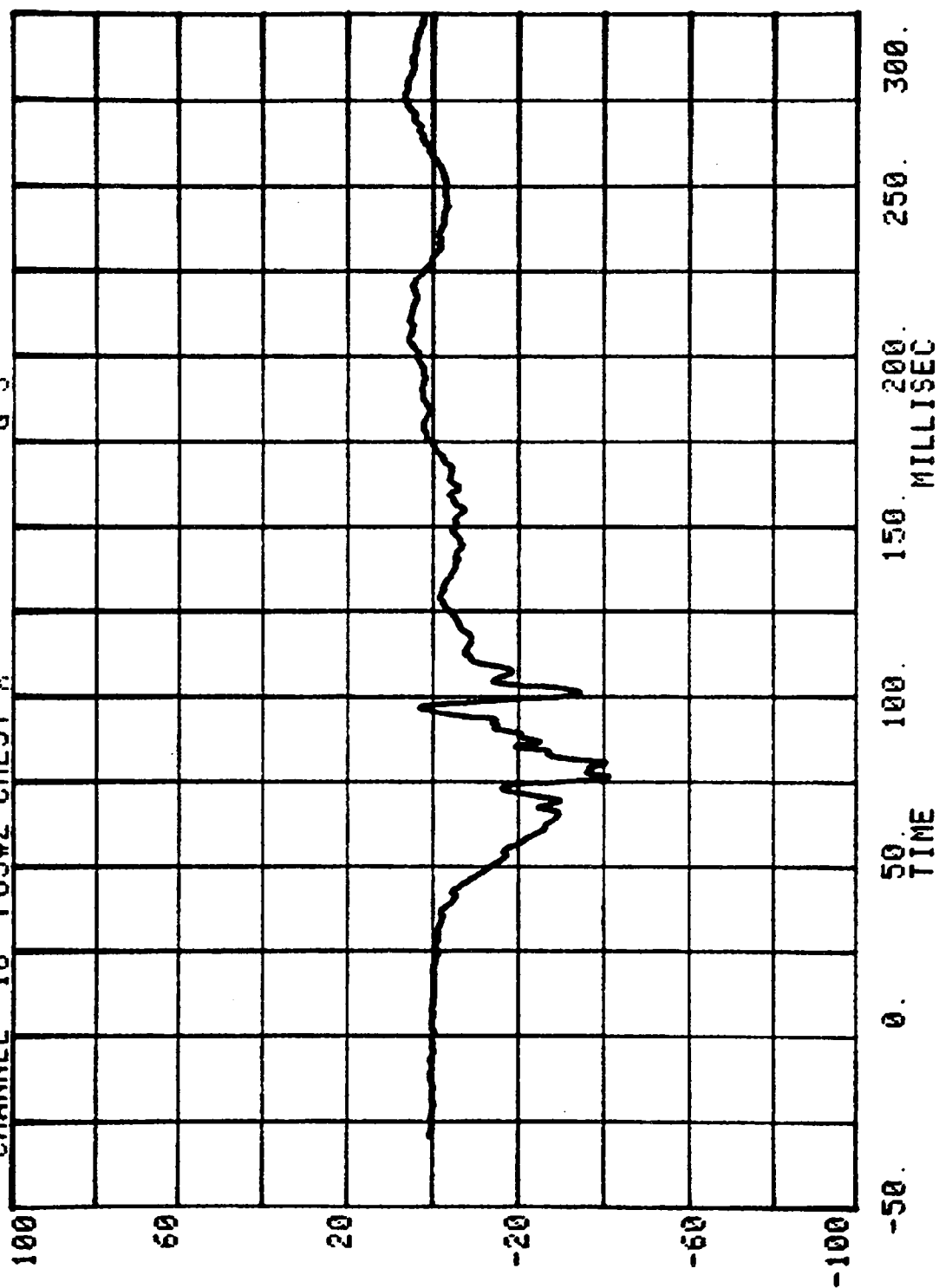
CHANNEL 14 POS#2 HEAD Y RUN= 554 SERIES= 1 G'S

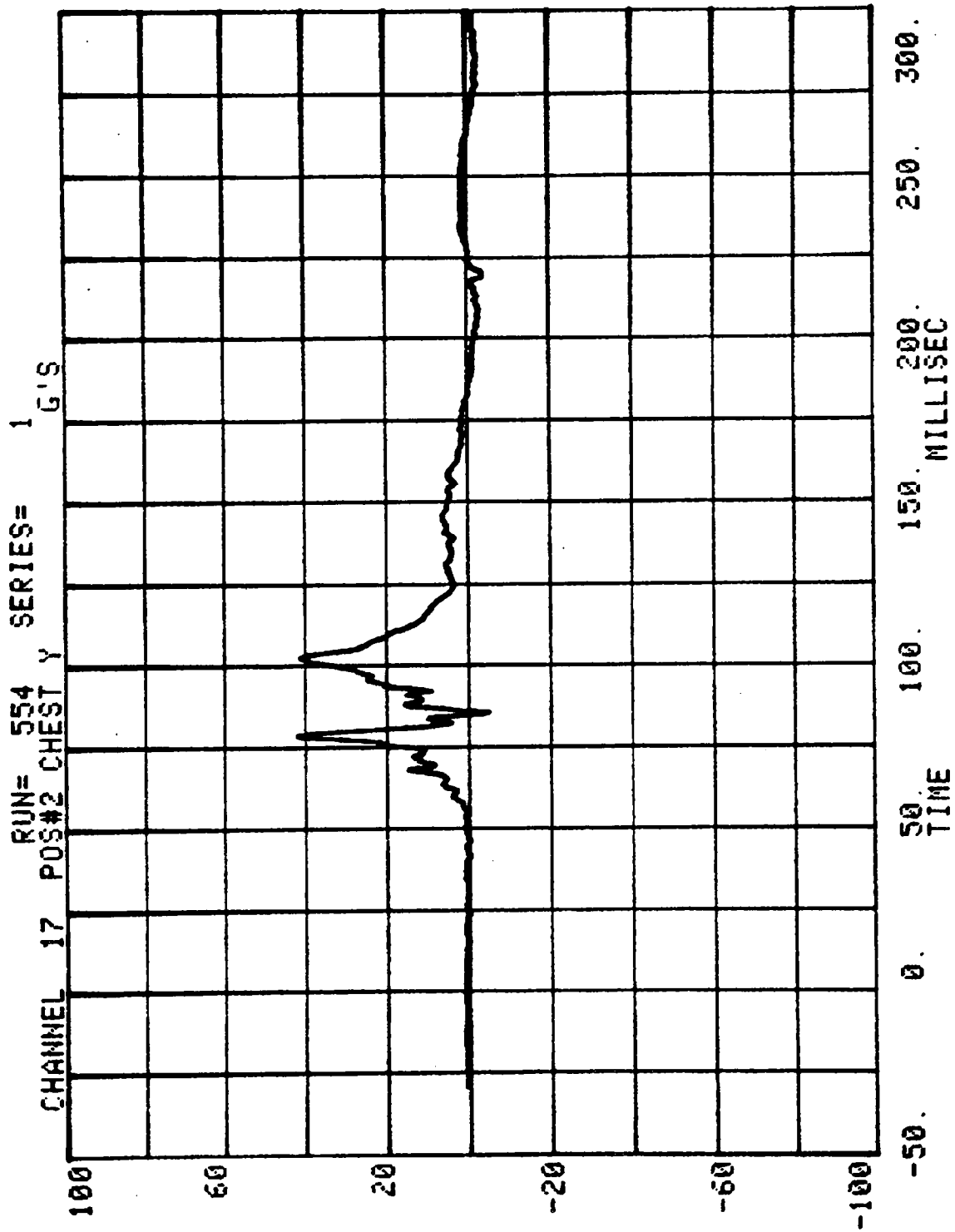




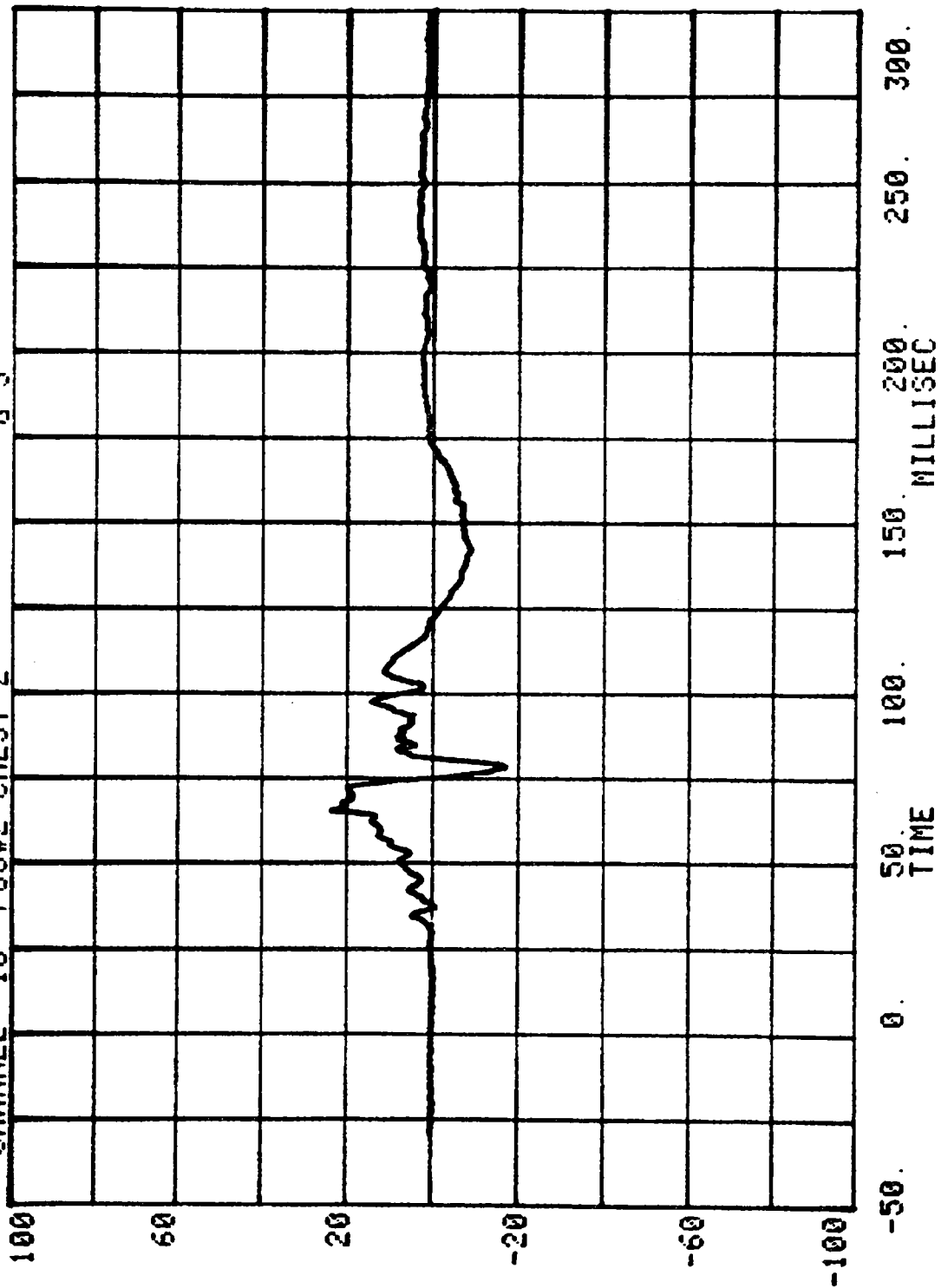


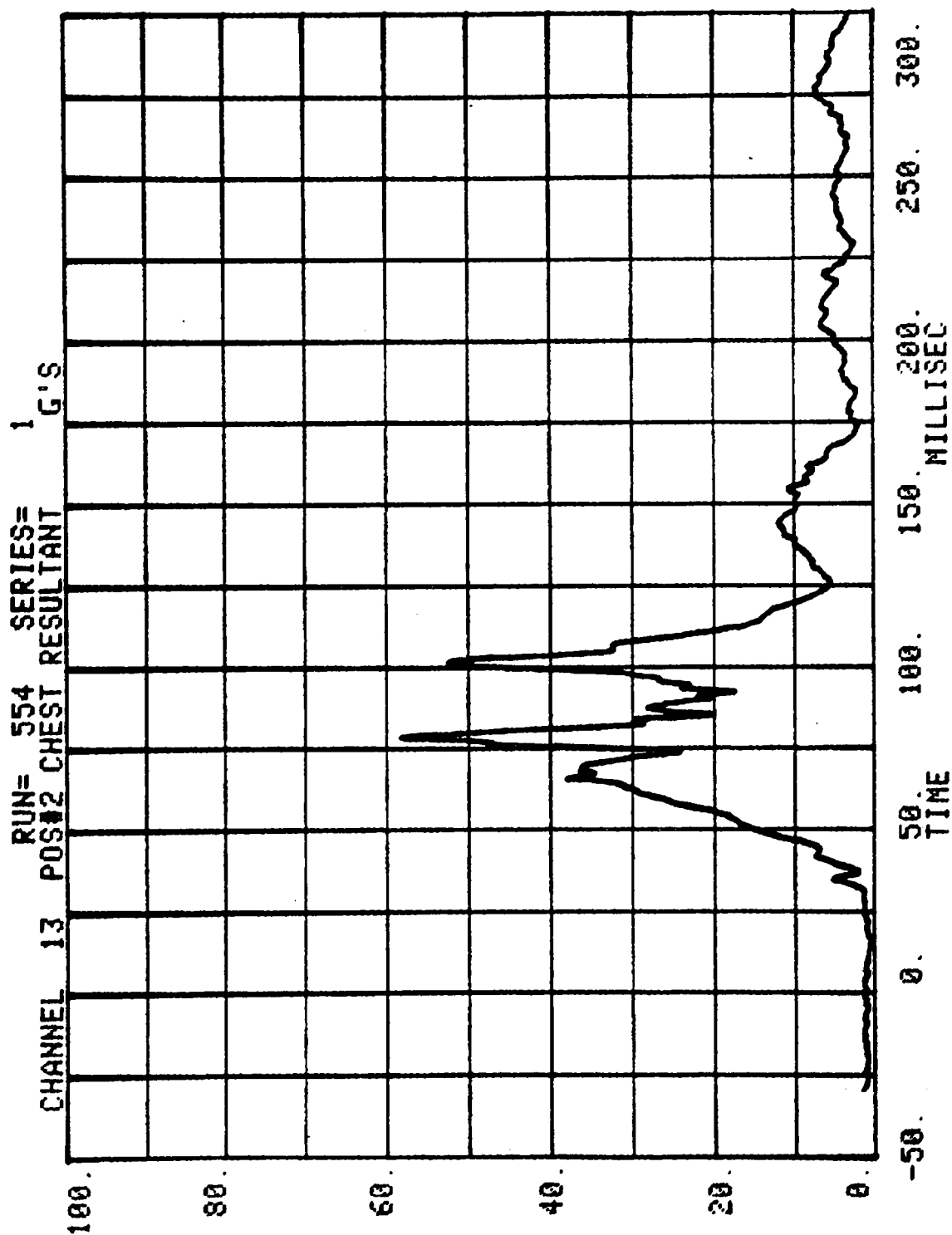
CHANNEL 16 POS#2 CHEST X
RUN= 554 SERIES= 1 G'S



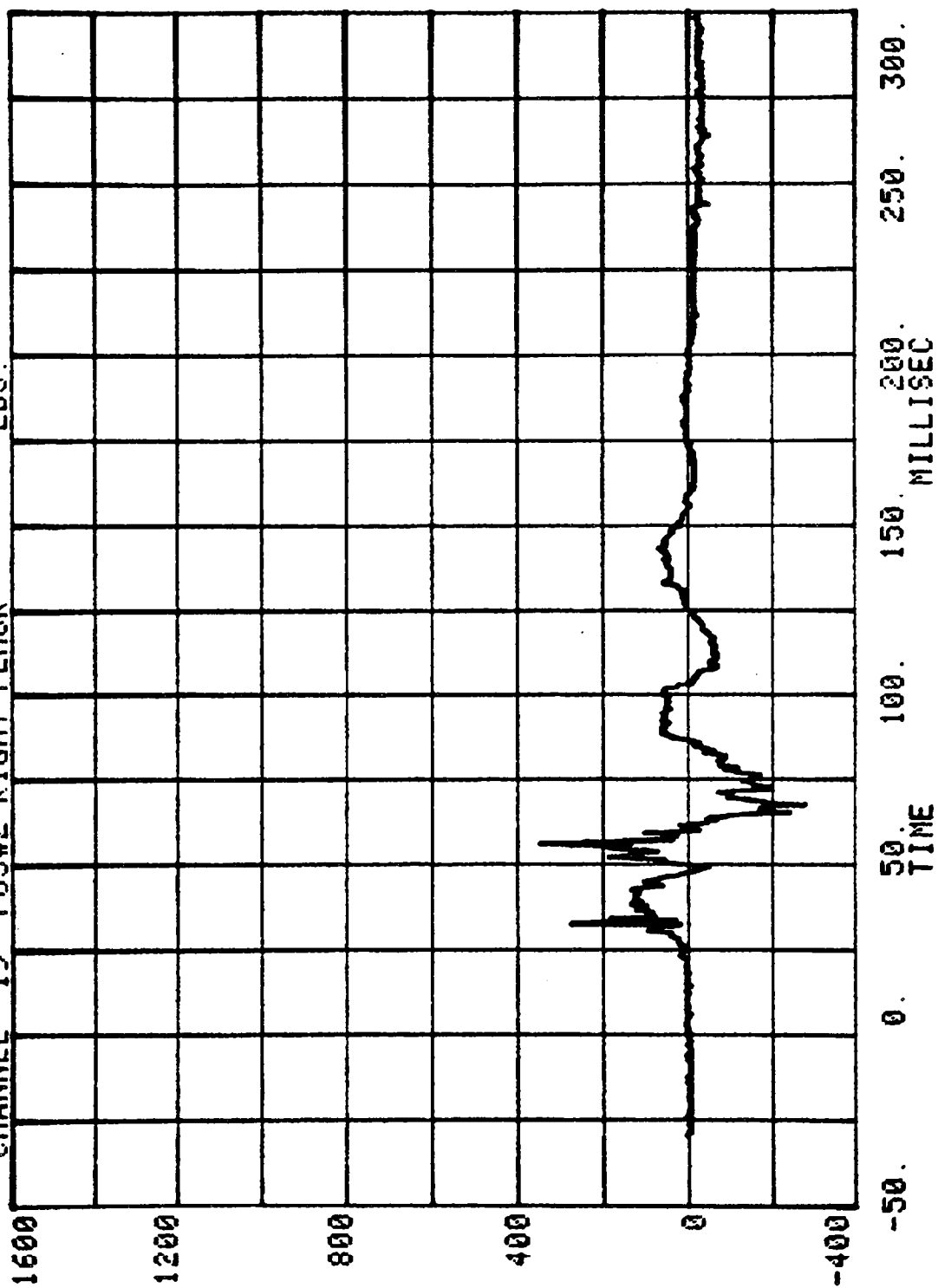


CHANNEL 18 POS#2 CHEST Z RUN= 554 SERIES= 1 G'S

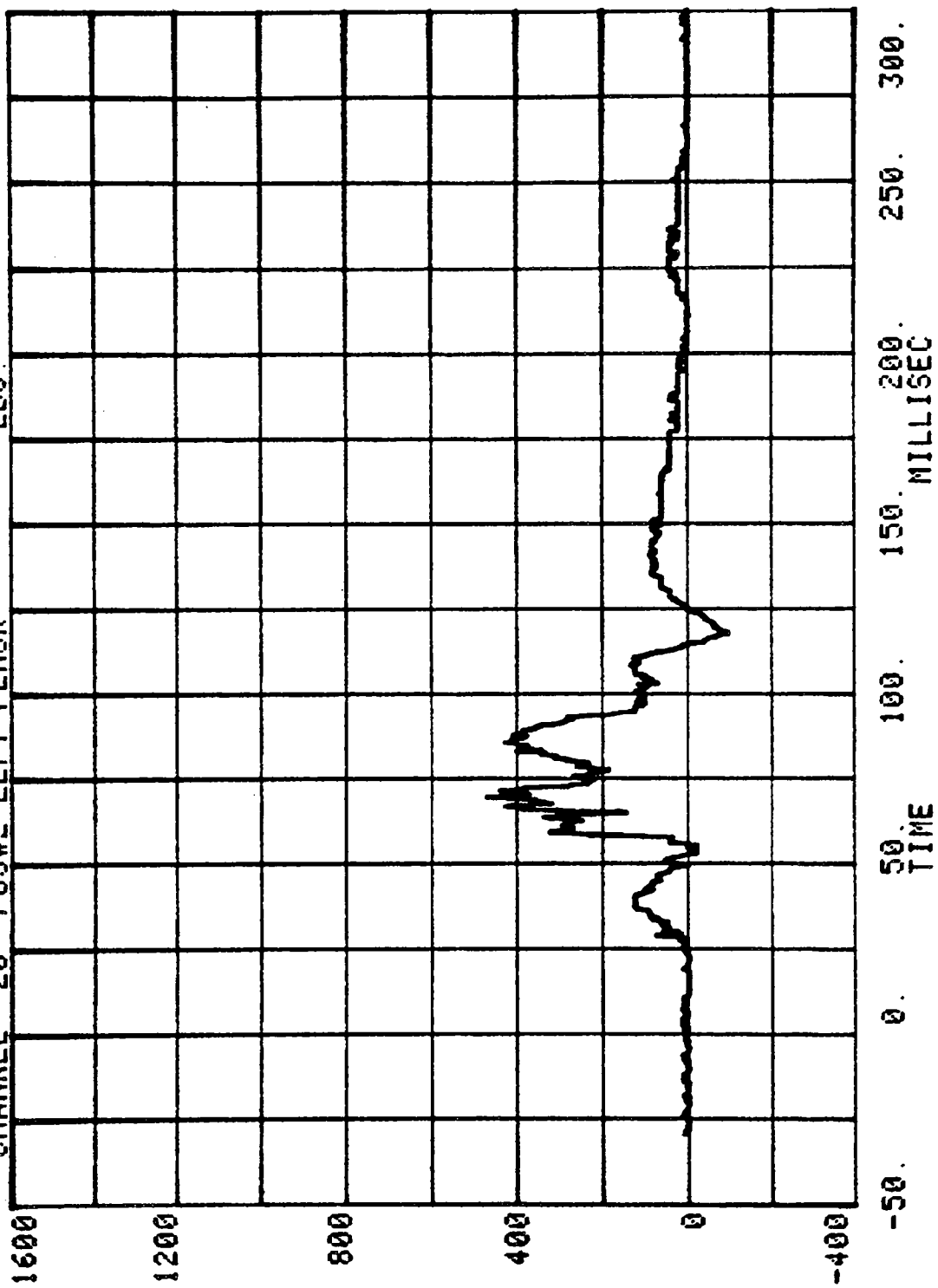




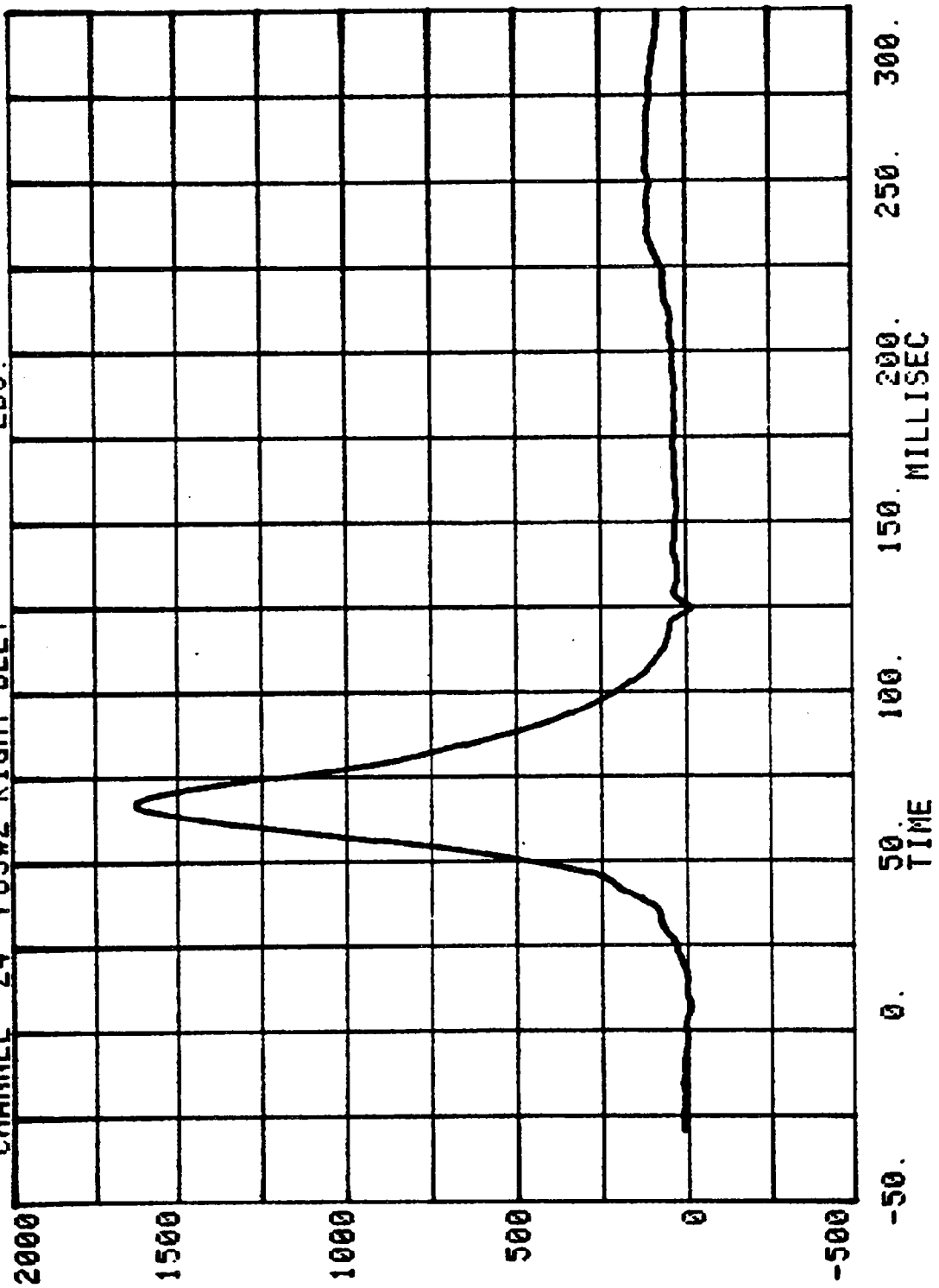
CHANNEL 19 POS#2 RIGHT FEMUR RUN= 554 SERIES= 1 LBS.

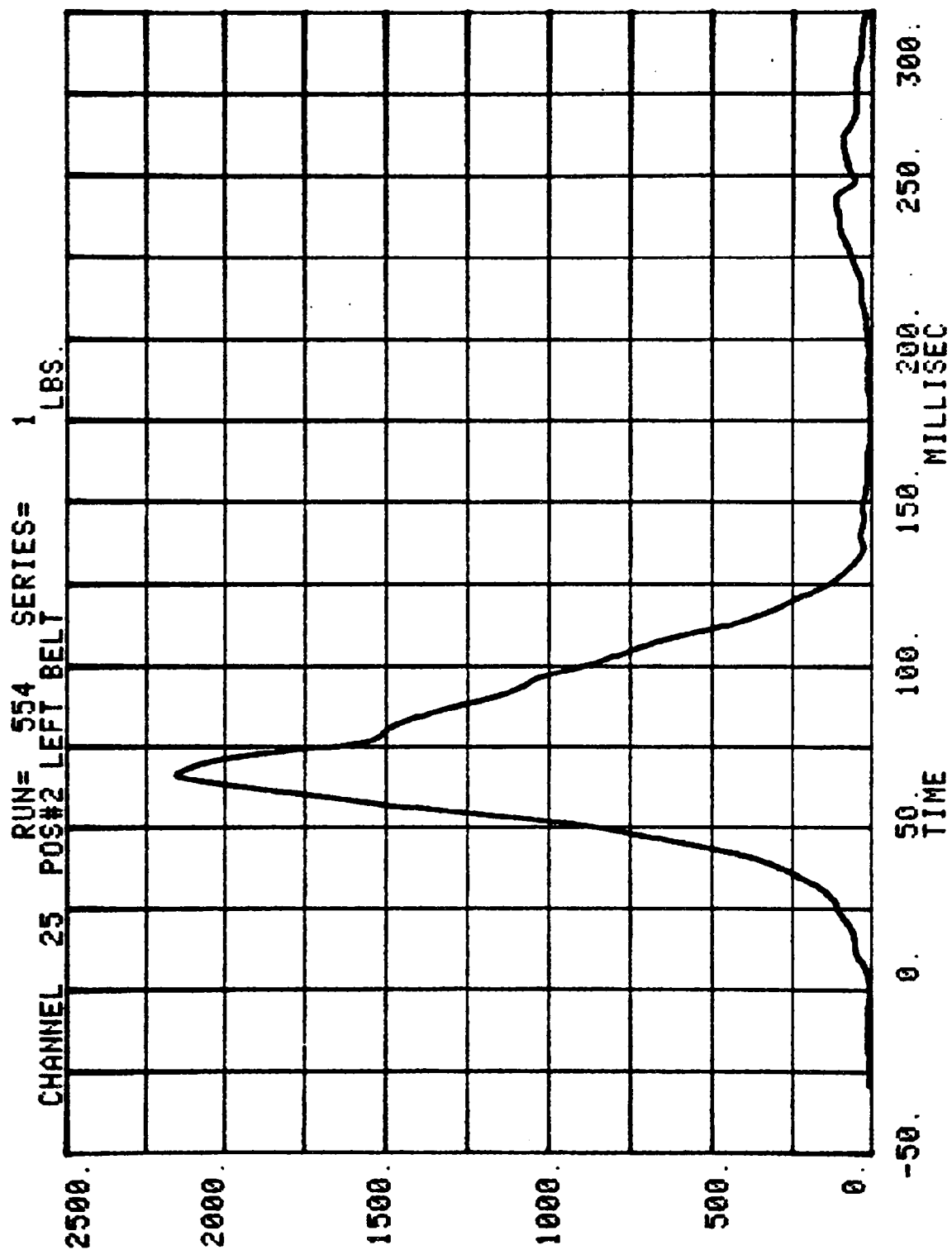


CHANNEL 20 POS#2 LEFT FEMUR RUN= 554 SERIES= 1 LBS.

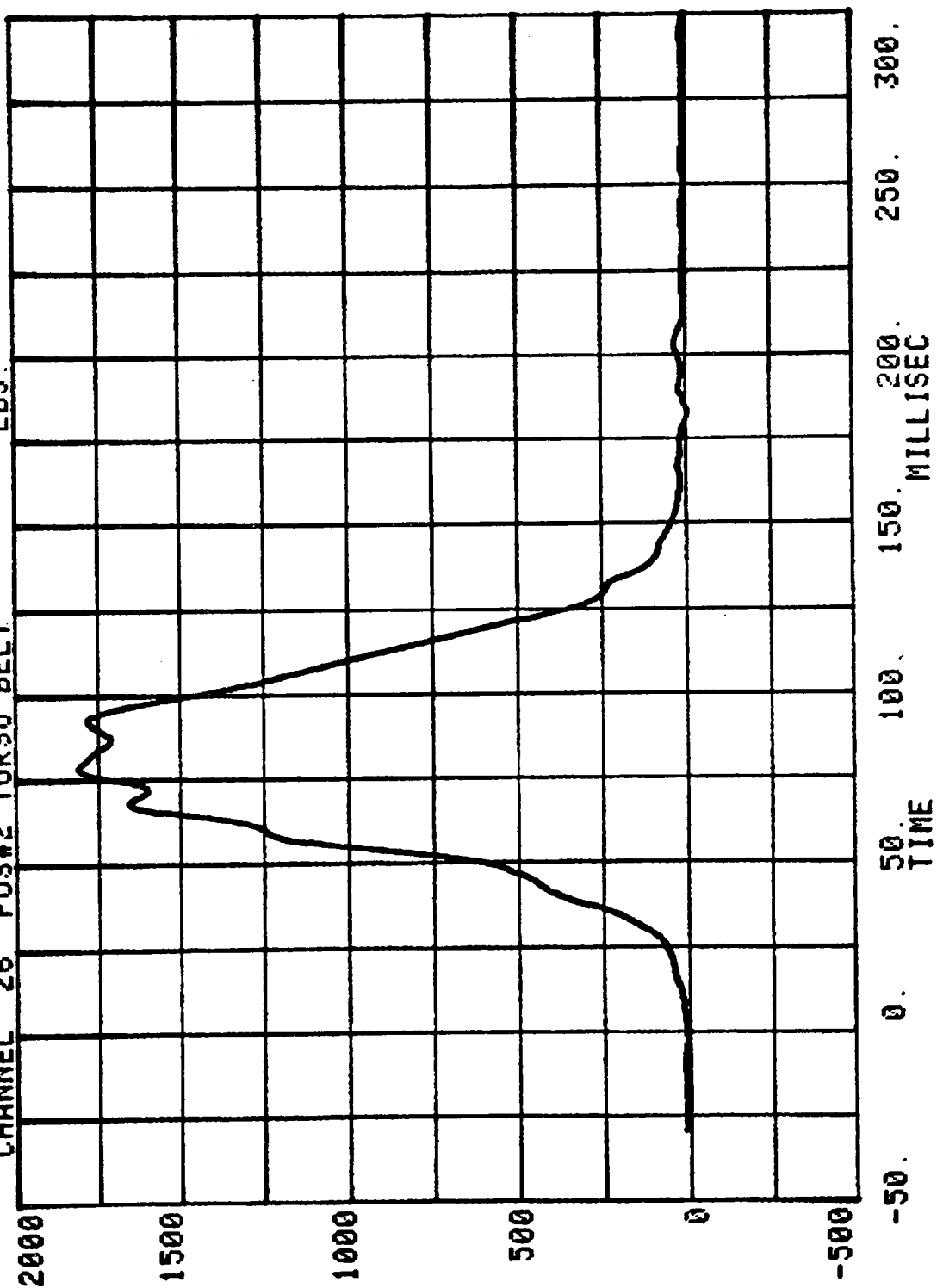


CHANNEL 24 POS#2 RIGHT BELT
RUN= 554 SERIES= 1 LBS.

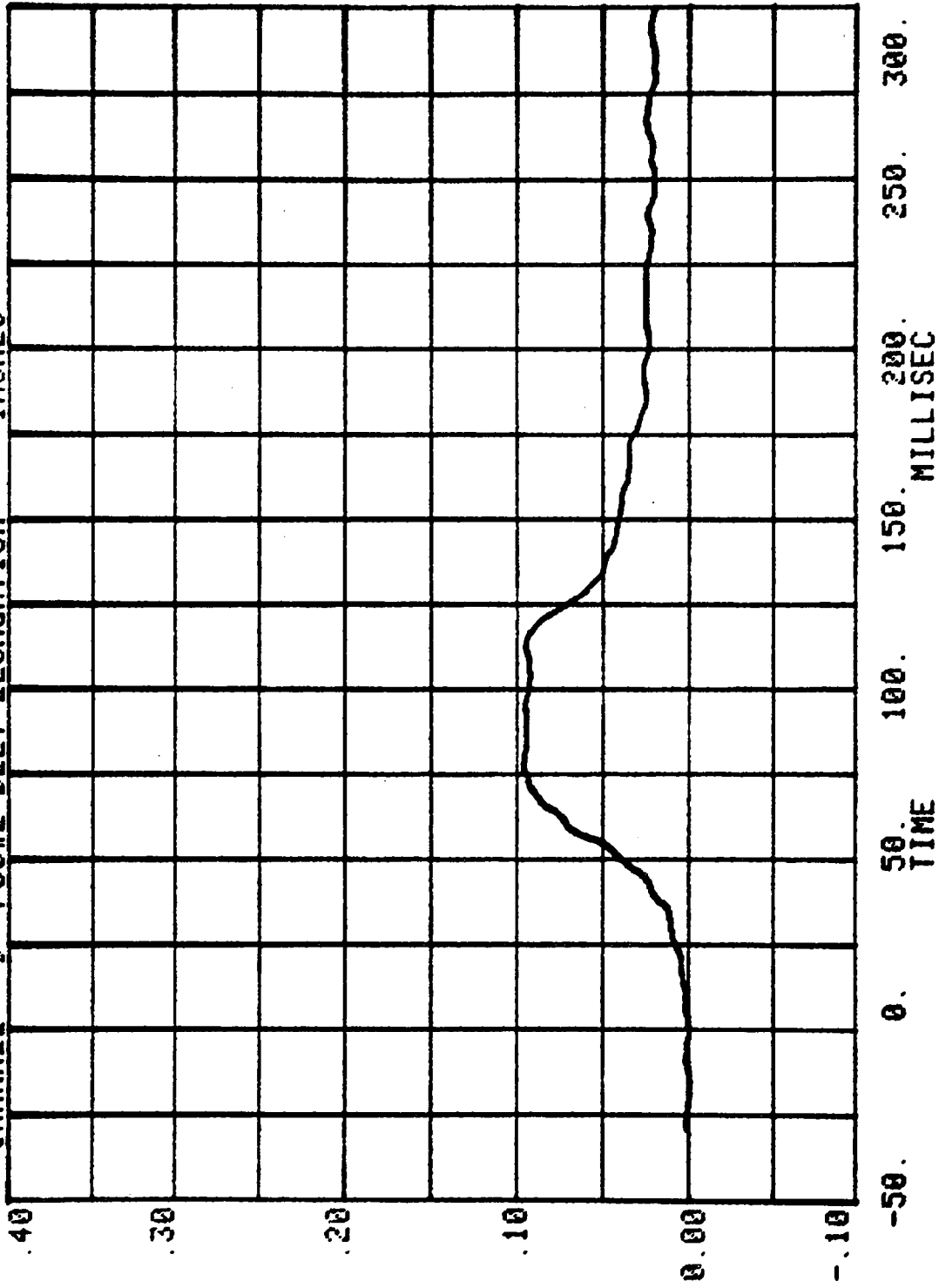




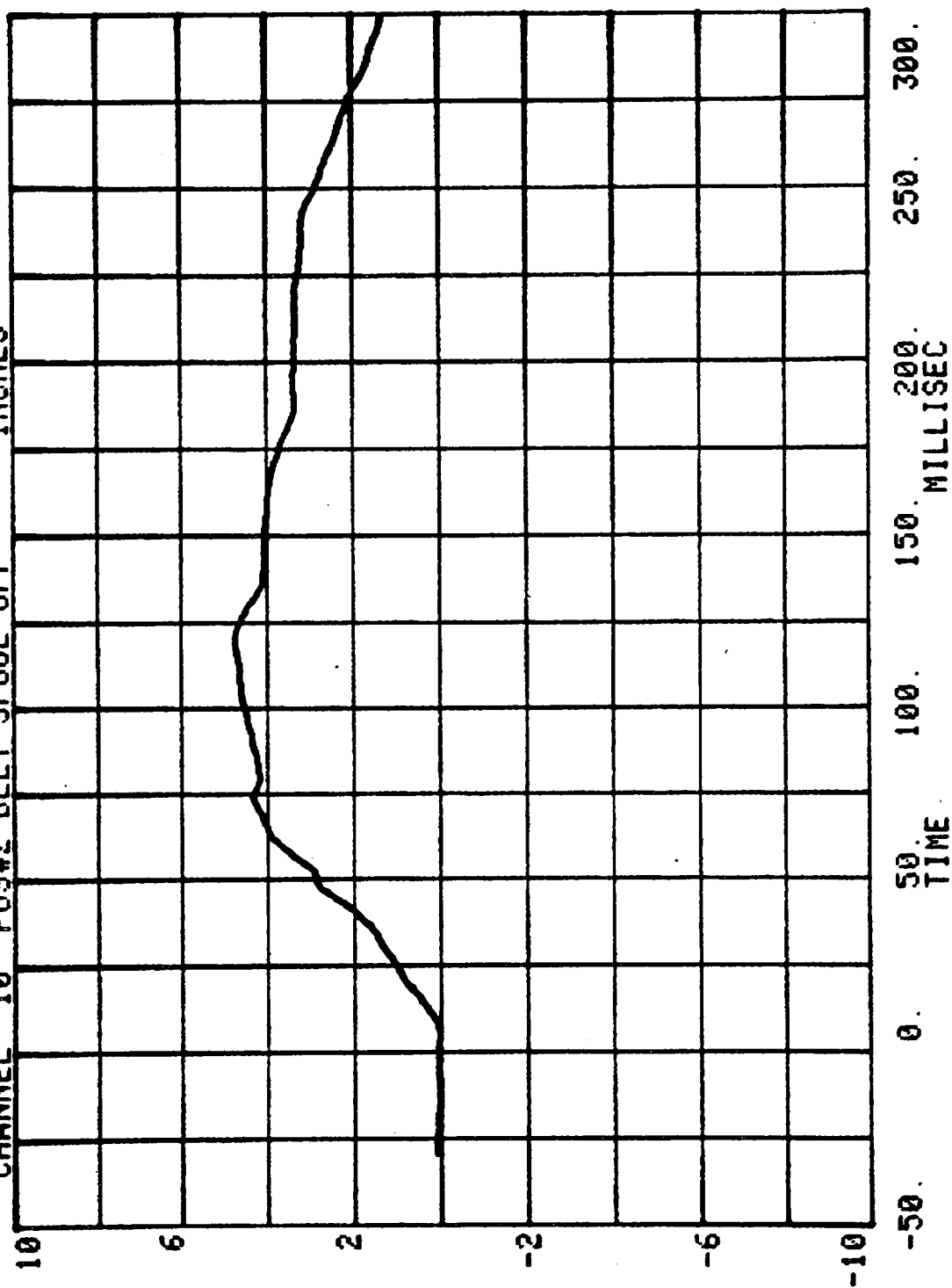
CHANNEL 26 POS#2 TORSO BELT
RUN= 554 SERIES= 1 LBS.



CHANNEL 9 POS#2 BELT ELONGATION RUN= 554 SERIES= 1 INCHES



CHANNEL 10 POS#2 BELT SPOOL OFF 1 INCHES



APPENDIX C
DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the Alderson Research Laboratories Model ATD 30034, 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, Vol. 42, No. 22, 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>
097	8/11/82
818	8/11/82

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. 097

LABORATORY TECHNICIAN: E. Cluckey

APPROVED BY: D. Cluckey

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		8/11/82	
Calibration Sequential Number for Dummy - - - -		7	
Temperature in Lab. (Spec. = 66 to 78°F) - - - -		68°-75°F	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		40-50%	
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel. -	210 to 260G	210 g	
b. Peak Lateral Accel. - -	≤10G	1 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.027 ms	
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.4 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	23.5 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	22.5 g	
d. Pendulum Decel. ($t_2 - t_1$)	≤3 ms	1.9 ms	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	26.25 ms	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	5.3 ms	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	106.8 ms	
h. Max. Head Rotation - -	63 to 73°	66°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in	0 in.
30°	Time	25.6 to 34.4 ms	28.75 ms
	Displ.	2.1 to 3.1 in.	2.6 in.
60°	Time	40.3 to 51.7 ms	44.5 ms
	Displ.	4.3 to 5.3 in.	4.7 in.
Maximum (°)	Time	53.2 to 66.8 ms	56.85 ms
	Displ.	5.0 to 6.0 in.	5.2 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	67.1 ms	
	Displ.	4.3 to 5.3 in.	4.7 in.	
30°	Time	85.4 to 104.6 ms	86.9 ms	
	Displ.	2.1 to 3.1 in.	2.4 in.	
0°	Time	101.0 to 123.0 ms	101.25 ms	
	Displ.	-.5 to 0.5 in.	0 in.	
3. <u>ABDOMINAL COMPRESSION TEST:</u> (Preload = 10 pounds)				
a. Force @ 1" - - - -		50 to 63 lbs.	60.0 lbs.	
b. Force @ 1.3" - - - -		73 to 88 lbs.	85.0 lbs.	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20° - - - -		22 to 34 lbs.	31.0 lbs.	
b. Force @ 30° - - - -		34 to 46 lbs.	38.5 lbs.	
c. Force @ 40° - - - -		46 to 58 lbs.	49.0 lbs.	
d. Return Angle - - -		12° maximum	4°	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	22.17 fps	
(2) Peak Deflection -		1.7" maximum	1.68 in.	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1950 lbs.	
(4) Internal Hysteresis - - - -		50 to 70%	54.9%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	13.91 fps	
(2) Peak Deflection -		1.1" maximum	.99 in.	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1200 lbs.	
(4) Internal Hysteresis- - - -		50 to 70%	54.5%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

NHTSA DUMMY ID NO. 097

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	6.82 fps	
(2) Maximum Force - -	1850 to 2500 lbs	1900 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.25 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.01 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2250 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 097

CALIB. SEQ. NOS. FOR DUMMY: 7 &

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	6/82	1/83
ENDEVCO	CX05	6/82	1/83
ENDEVCO	CJ54	6/82	1/83
GSE	312	6/82	1/83
GSE	311	6/82	1/83
CEC	22707	6/82	1/83
CEC	22958	6/82	1/83
TRANSDUCER INC.	20051	6/82	1/83
BLH	72952	6/82	1/83
CIC	567-11	6/82	1/83

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 818

LABORATORY TECHNICIAN: E. Cluckey

APPROVED BY: <u><i>E. Cluckey</i></u>		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		8/11/82	
Calibration Sequential Number for Dummy - - -		1	
Temperature in Lab. (Spec. = 66 to 78°F) - - -		68°-75°F	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		40-50%	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	240 g	
b. Peak Lateral Accel. - -	≤10G	6 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.0 ms	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.5 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	24 g	
d. Pendulum Decel. ($t_2 - t_1$)	≤3 ms	2.2 ms	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	27.2 ms	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	5.6 ms	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	106 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	26.5 ms
	Displ.	2.1 to 3.1 in.	2.6 in.
60°	Time	40.3 to 51.7 ms	42.5 ms
	Displ.	4.3 to 5.3 in.	4.6 in.
Maximum (°)	Time	53.2 to 66.8 ms	54 ms
	Displ.	5.0 to 6.0 in.	5.0 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	70 ms	
	Displ.	4.3 to 5.3 in.	4.63 in.	
30°	Time	85.4 to 104.6 ms	87 ms	
	Displ.	2.1 to 3.1 in.	2.2 in.	
0°	Time	101.0 to 123.0 ms	101 ms	
	Displ.	-.5 to 0.5 in.	0.0 in.	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	54.0 lbs.	
b. Force @ 1.3" - - - - -		73 to 88 lbs.	87.0 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	33.5 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	41.5 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	47.0 lbs.	
d. Return Angle - - - - -		12° maximum	10°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	14.08 fps	
(2) Peak Deflection -		1.7" maximum	1.54 in.	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1925 lbs.	
(4) Internal Hysteresis - - - - -		50 to 70%	61.4%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	13.94 fps	
(2) Peak Deflection -		1.1" maximum	1.02 in.	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1190 lbs.	
(4) Internal Hysteresis - - - - -		50 to 70%	52.7%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

NHTSA DUMMY ID NO. 818

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	6.99 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2200 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.2 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.04 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2300 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 818

CALIB. SEQ. NOS. FOR DUMMY: 1 &

A. DUMMY INSTRUMENTS:

1. Head Accelerometers--

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

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

a. Triaxial unit - - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

3. Chest Potentiometer - - -

4. Femur Load Cells--

a. Right Side - - - - -

b. Left Side

B. CALIB. LAB. INSTRUMENTS:

1. Pendulum Accelerometer - -

2. Test Probe Accelerometer -

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

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

5. Abdominal Compression Test
Displacement Gauge - - -

MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	DB47	6/82	1/83
ENDEVCO	CX05	6/82	1/83
ENDEVCO	CJ54	6/82	1/83
GSE	312	6/82	1/83
GSE	311	6/82	1/83
CEC	22707	6/82	1/83
CEC	22958	6/82	1/83
TRANSDUCER INC.	20051	6/82	1/83
BLH	72952	6/82	1/83
CIC	567-11	6/82	1/83