

REPORT NO. 6851-V-5

NEW CAR ASSESSMENT AND STANDARDS

ENFORCEMENT INDICANT TESTING

FMVSS Nos. 212, 219 and 301-75

VOLKSWAGENWERK AG WEST GERMANY

1982 VOLKSWAGEN SCIROCCO

2-DOOR HATCHBACK

NHTSA 703-5-540

CALSPAN CORPORATION

ADVANCED TECHNOLOGY CENTER

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BUFFALO, NY 14225



April 21, 1982

FINAL REPORT

Prepared for:

U. S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Enforcement

Office of Vehicle Safety Compliance

400 SEVENTH STREET, S.W.

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Contract Technical Manager

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16. Abstract A frontal load cell barrier impact of a 1982 Volkswagen Scirocco 2-door hatchback was performed at the Calspan Advanced Technology Center, Buffalo, New York, for the New Car Assessment and Standards Enforcement Indicant Testing of FMVSS 212 - Windshield Mounting; FMVSS 219 - Windshield Zone Intrusion; and FMVSS 301-75 - Fuel System Integrity for the Office of Vehicle Safety Compliance, the Office of Automotive Rating, and for Research and Development. Impact speed was 35.1 mph. Post-test maximum vehicle crush was 24.5 inches. Post-test maximum firewall intrusion was 8.3 inches. The vehicle complied with: FMVSS 212 - Windshield Retention FMVSS 219 - Windshield Intrusion FMVSS 301-75 - Fuel System Integrity FMVSS 208 Injury Criteria: Driver failed - head - HIC 1473. Right front passenger passed.					
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SECTION 1

PURPOSE AND TEST PROCEDURE

This barrier test of a 1982 Volkswagen Scirocco is part of the New Car Assessment Program B.O.A., Task 1, 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 NUMBER 703-5-540

A load cell barrier consisting of 36 load cells (Figure 9) was impacted by a 1982 Volkswagen Scirocco at a velocity of 35.1 mph. The test was performed at the Calspan Corporation Advanced Technology Center on April 21, 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 (ATD's) were placed in the 1982 Volkswagen Scirocco 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. The driver ATD (Serial No. 110) had been used in a previous test (703-4-539), and the FMVSS 208 Injury Criteria Value was not exceeded in that test. The right front passenger (Serial No. 153) had been certified prior to this test, and certification details along with instrumentation calibration data are found in Appendix C of this report.

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

The 71 channels of data were recorded on six 14-channel FM tape recorders. Appendix B contains the vehicle and dummy response data traces, and the Injury Criteria Value is presented in Table 9. All 71 data channels checked out prior to the test and the only data loss experienced during impact was Barrier Load Cell B9. Since load cell B9 is located on the far right side of the barrier (Figure 9), it probably experienced no force at impact. Load Cell B9 was not included in the summation of total load cell barrier forces.

Table 1

CRASH TEST SUMMARY

TEST NO. 703-5-540 PROJECT: NEW CAR ASSESSMENT PROGRAM

DATE: 4/21/82 TIME: 1220 TEMP: 46°F

VEHICLE 1982 Volkswagen Scirocco 2-door hatchback

TEST WEIGHT (lbs) 2680

IMPACT ANGLE (deg)* 0

IMPACT VELOCITY (mph)** 35.1

MAX. CRUSH (in) static 24.5

MAX. INTRUSION (in) static 8.3 (left side)

DUMMIES

TYPE	<u>Hybrid II Part 572</u>	<u>Hybrid II Part 572</u>
------	---------------------------	---------------------------

LOCATION	<u>LF(1) 110</u>	<u>RF(2) 153</u>
----------	------------------	------------------

RESTRAINT	<u>production 3-point belt system</u>	<u>production 3-point belt system</u>
-----------	---	---

NUMBER OF DATA CHANNELS 71

NUMBER OF HIGH-SPEED CAMERAS 12 + 1 real time

*With respect to tow track Centerline

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

GENERAL COMMENTS

The 1982 Volkswagen Scirocco was a 2-door hatchback having a 105 cubic inch, 4-cylinder engine, equipped with a 5-speed manual transmission. The total test weight with two dummies, instrumentation and cameras was 2,680 pounds.

The 1982 Volkswagen Scirocco 2-door hatchback involved in a frontal barrier crash at a velocity of 35.1 mph complied with FMVSS Nos. 212 - Windshield Mounting; 219 - Windshield Zone Intrusion and 301-75 - Fuel System Integrity. There was 95.5 percent retention of the windshield, no intrusion into the protected zone and no fuel leakage after impact or any phase of the rollover test.

The vehicle sustained 24.5 inches of static crush and approximately 29 inches of dynamic crush. The maximum post-test firewall intrusion was 8.3 inches on the left side. Maximum load cell barrier forces measured by the 36 load cells was 74,500 pounds at 44 milliseconds.

At impact the windshield cracked on the driver side (Figure A-9) and 6.5 inches of windshield retention loss occurred on the right side (Figure 3). All other windows remained intact.

Both front doors were operable after impact, however, while in the process of fully opening the right front passenger door the upper hinge mounting tore away from the door frame (Figure A-8).

The driver failed to comply with the FMVSS 208 Head Injury Criteria with a HIC number of 1473 but did comply with the chest and femur injury criteria with maximum chest decelerations over 3 milliseconds of 54 g's and femur loads of 275 and 330 pounds. The driver's head struck the upper steering wheel rim and center hub. Belt spool-out for the driver was 2.75 inches and belt stretch was .62 inches per foot, both measured between the retractor and the "D" ring.

The right front passenger complied with all FMVSS 208 Injury Criteria with a HIC number of 683, maximum chest deceleration over 3 milliseconds of 37 g's and femur loads of 175 and 200 pounds. Belt spool-out was 3 inches and belt stretch was .43 inches per foot between the retractor and "D" ring.

Table 2

VEHICLE TEST WEIGHTS AS TESTED

Left Front 730 lbs
 Right Front 760 lbs
 TOTAL FRONT 1490 lbs

Left Rear 620 lbs
 Right Rear 570 lbs
 TOTAL REAR 1190 lbs

Total Weight = 1490 + 1190 = 2680 lbs

Wheel Base = 94.3 inches

$Cg_{F.W.} = \frac{1190 \text{ lbs} \times 94.3 \text{ inches}}{2680 \text{ lbs}} = \underline{41.9} \text{ inches}$

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
 UDW = Unloaded Delivered Weight (2160 lbs)
 VCW = Vehicle Capacity Weight (795 lbs)
 DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC)

RCLW = 795 - 150 (4) = 195 lbs

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

TEST WEIGHT = 2160 lbs + 195 lbs + 2 (164 lbs)

TEST WEIGHT = 2683 lbs

Table 3
SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION

Vehicle Manufacturer Volkswagenwerk AG West Germany
 Make/Model VW Scirocco
 Body Style 2 door hatchback Model Year 1982
 VIN WVWCA0539CK009222 Build Date 9/81
 NHTSA No. 703-5-540 Color Grey
 Engine Data: 4 cylinders 105 in³/cc displacement
 Transmission Data: 5 speed (X) Manual () Automatic
 Date Rec'd -- Air Cond. no PW. STR. no PW. BR. yes
 Dealer's Name & Address VW Village Inc., Lockport, NY 14094

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

Vehicle Manufactured by Volkswagenwerk AG West Germany
 Date of Manufacture 9/81 VIN WVWCA0539CK009222
 GVRW 2594 lbs GAWR: Front 1675 lbs Rear 1300 lbs

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

Vehicle Load (up to capacity) - Front 27 psi
 Rear 31 psi
 Recommended Tire Size 175/70SR13 Load Range: X B C D
 Vehicle Capacity: Types of Seats Bench X Bucket Split Bench
 Number of Occupants (Designated Seating Capacity): 2 Front
2 Rear
4 TOTAL
 Cargo Load = 195 lbs
 TOTAL = 795 lbs

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

Right Front = 660 lbs Right Rear = 420 lbs
 Left Front = 660 lbs Left Rear = 420 lbs
 TOTAL FRONT WEIGHT = 1320 lbs (61 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 840 lbs (39 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 2160 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 192 lbs CARGO

Right Front = 760 lbs Right Rear = 570 lbs
 Left Front = 730 lbs Left Rear = 620 lbs
 TOTAL FRONT WEIGHT = 1490 lbs (55.6 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1190 lbs (44.4 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2680 lbs
 Weight of ballast secured in vehicle trunk area = 103 lbs

SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS

Date of Test 4/22/82 Time of Test 1220
Ambient Temperature 46 °F at impact area
Temperature in Occupant Compartment 70 °F
Windshield Molding Temperature 51 °F

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 27 3/8 LF 27 3/8 RR 25 7/8 LR 25 3/4
Test Attitude: RF 25.0 LF 25.1 RR 23.5 LR 23.3

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 27 psi Rear = 31 psi
Recommended Tire Size 175/70SR13 Load Range B
Tires on Vehicle 175/70SR13
Is Spare Tire a "Space Saver" yes X 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* 10 gal
Test Volume 9.3 gal (93% of EPA Capacity)
Fuel System Capacity (data from Owner's Manual) 10 gal
Details of fuel system Electric operated fuel pump. Fuel tank is located forward of rear wheels and held in place by two tank straps. The filler tube is on right side of vehicle and sealed by a twist type cap which is concealed by a hinged access door.
Electric Fuel Pump X Yes no Fuel Injection X Yes No
Does electric fuel pump operate with ignition switch "on" and the engine not operating yes X No

VEHICLE REBOUND AND CRUSH

Overall Length of Test Vehicle: Pre-Test = R 164.1 /L 164.1 inches
Post-Test = R 141.3 /L 141.3 inches
Crush = R 22.8 /L 22.8

FOR FRONTAL IMPACTS, distance from front of test vehicle to the barrier after impact = 17.6 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 - STANDARDS 219 AND 301DATA 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 4/21/82 TIME 1220 TEMP 46 °F

VEHICLE NHTSA NO. 703-5-540 VIN WVWCA0539CK009222

REQUIRED VEHICLE VELOCITY RANGE 34.5 to 35.5 mph

IMPACT VELOCITY (traps within 5 feet of impact event) 35.1

Trap No. 1 = 34.95 mph Trap No. 2 = 35.25 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 = 22.8 in Passenger's Side = 22.8 in

Average = 22.8 in

Crush Details:

VEHICLE STATIC CRUSH (for side impacts only)

Amount of Crush = -- inches on -- side

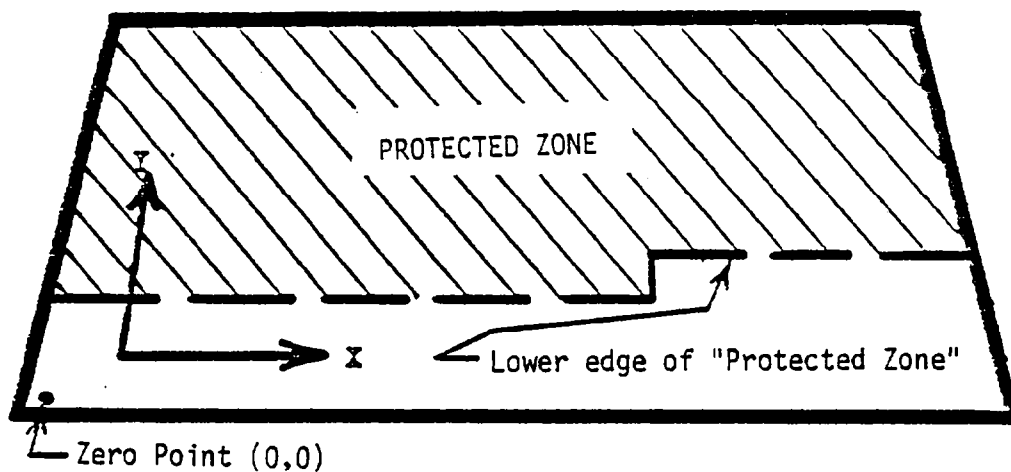
Crush Details:

VEHICLE REBOUND (from rigid barrier only)

Driver's Side = 17.2 in Passenger's Side = 18 in

Average = 17.6 in

REMARKS



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

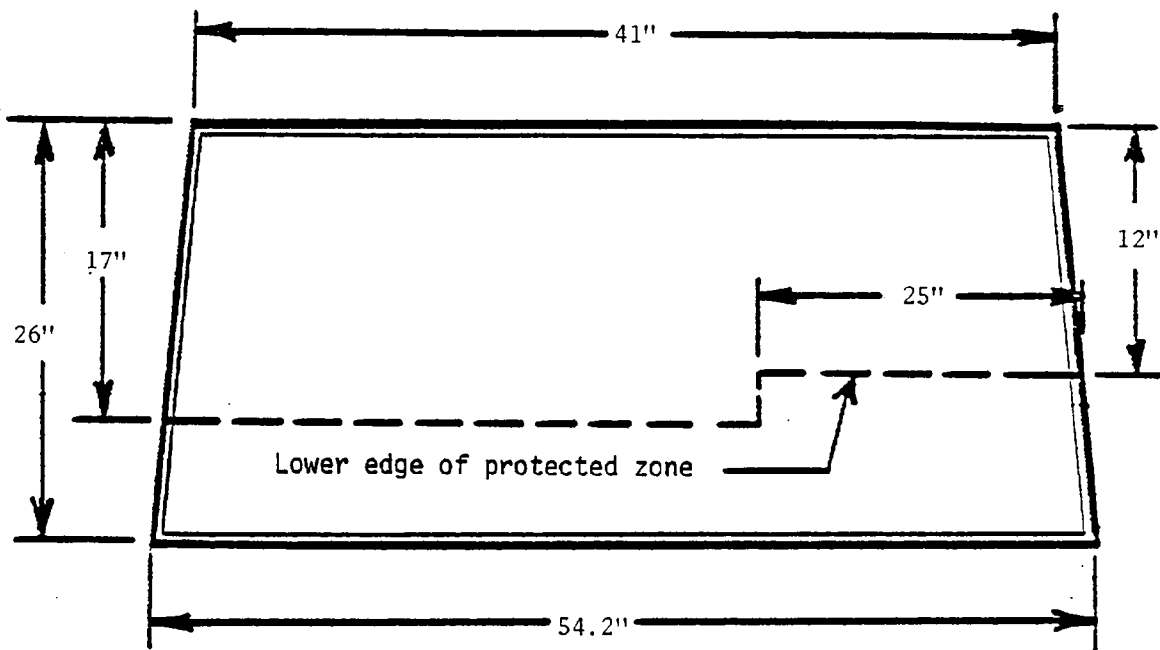
- (2) The area beneath the "Protected Zone" that the inner surface of the windshield was penetrated by a vehicle component.

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 1 WINDSHIELD ZONE INTRUSION, FMVSS 219 - DATA SHEET



FRONT VIEW OF WINDSHIELD

Provide all dimensions necessary to reproduce the protected zone.

Method of adhering styrofoam to the windshield:

RTV adhesive applied to windshield surface and to back-side of
styrofoam which was then clamped in place until dry.

Figure 2 PROTECTED ZONE

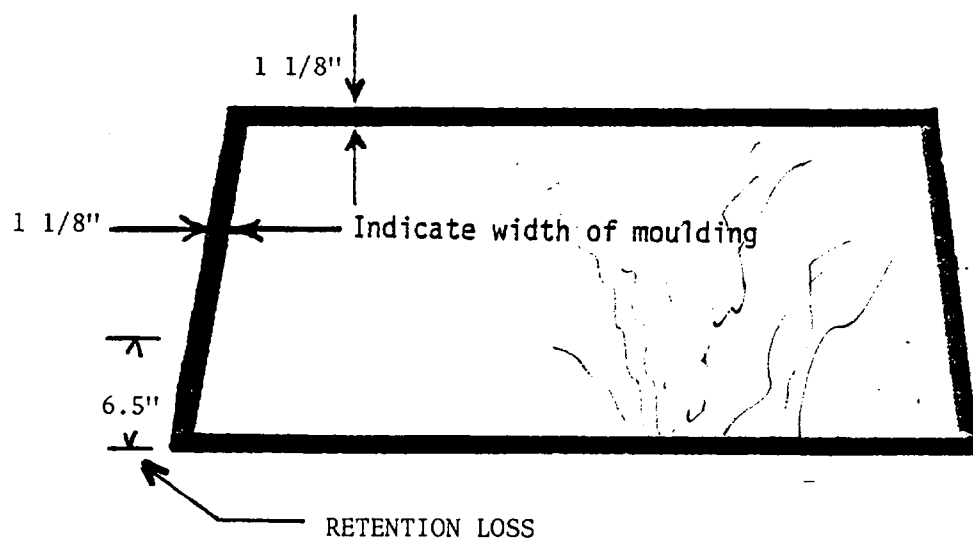
Details of windshield mounting (method of retention, type of trim, etc.):

Rubber molding holding windshield.

	Windshield Periphery		Retention %
	Pre-Test	Post-Test	
Right Side	73.6	67.1	91
Left Side	73.6	73.6	100
TOTAL	147.2	140.7	95.5

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 3 SUMMARY OF FMVSS 212 DATA

Table 5

TEST VEHICLE NHTSA NO. 703-5-540

Test Date 4/21/82

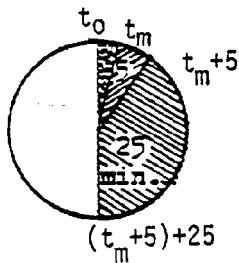
Vehicle Manufacture/Make/Model 1982 Volkswagen Scirocco

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

- X 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

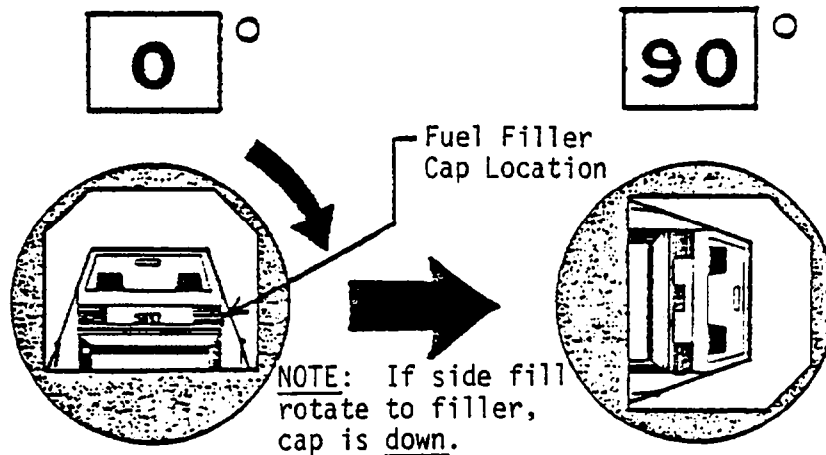
- (1) Figure 8A - Rollover data for 0° to 90° test phase
- (2) Figure 8B - Rollover data for 90° to 180° test phase
- (3) Figure 8C - Rollover data for 180° to 270° test phase
- (4) Figure 8D - Rollover data for 270° to 360° test phase

SOLVENT SPILLAGE DETAILS

No fuel leakage was observed for at least 30 minutes after impact.

Table 5A
FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time	=	<u>2</u> minutes	<u>56</u> seconds
(Spec. Range = 1 to 3 min.)			
FMVSS 301-75 Position Hold Time	=	<u>5</u> minutes	<u>00</u> seconds
TOTAL	=	<u>7</u> minutes	<u>56</u> seconds
Next Whole Minute Interval	=	<u>8</u> 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.

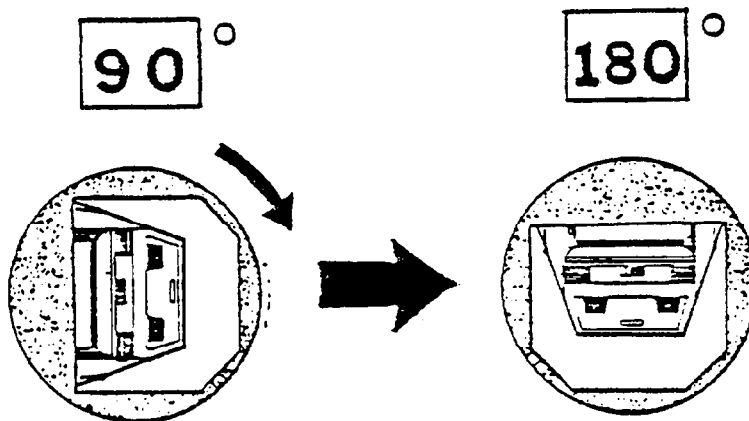
SOLVENT SPILLAGE LOCATION(S)

None.

VEHICLE NHTSA ID NO. 703-5-540

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 49 seconds
(Spec. Range = 1 to 3 min.)
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
TOTAL = 7 minutes 49 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
---	---	---	---

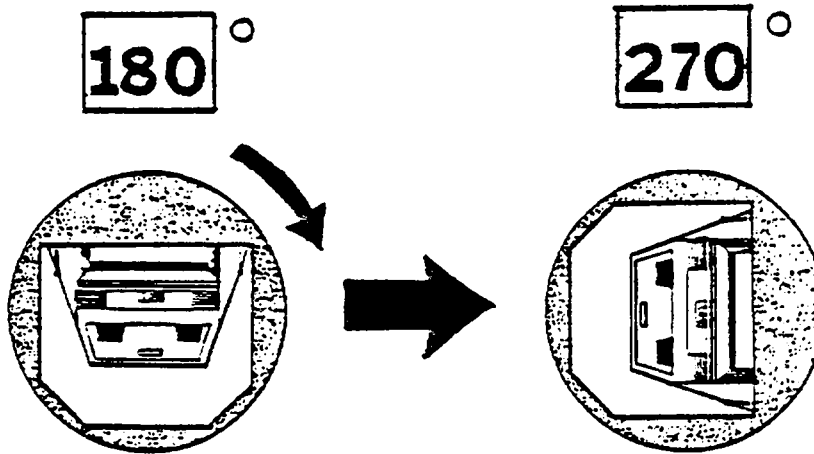
NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

None.

Table 5C
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)

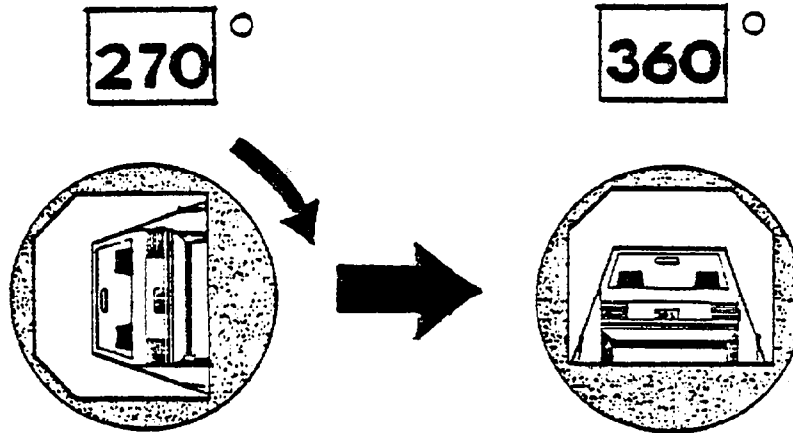
None.

VEHICLE NHTSA ID NO. 703-5-540

Table 5D

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 57 seconds
(Spec. Range = 1 to 3 min.)
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
TOTAL = 7 minutes 57 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

- Vehicle Measurements
- Vehicle Accelerometer Locations
- Camera Positions and Locations
- Dummy In-Vehicle Position
- Dummy Injury Criteria Values
- Fixed Load Cell Barrier Load Cell Locations

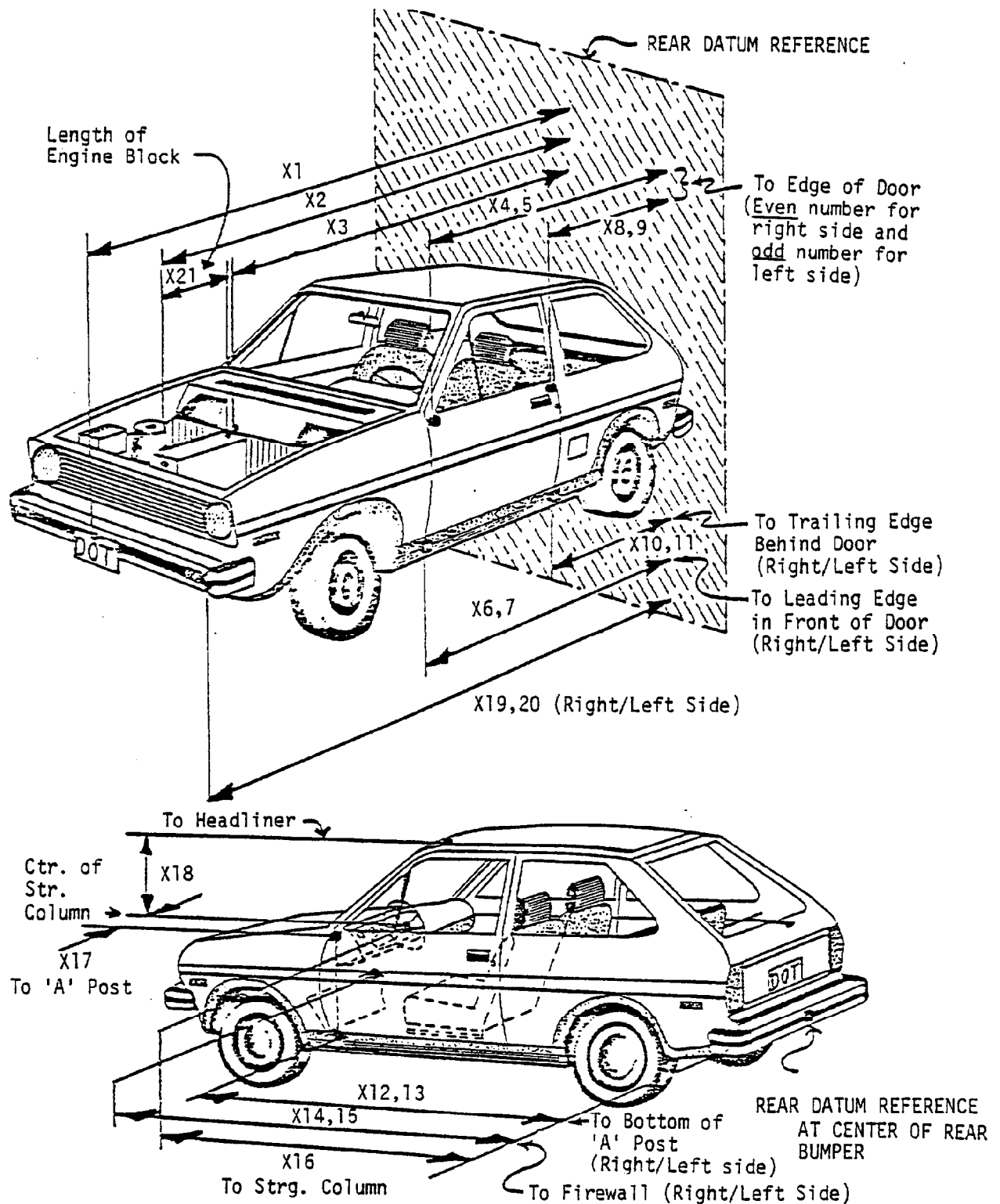


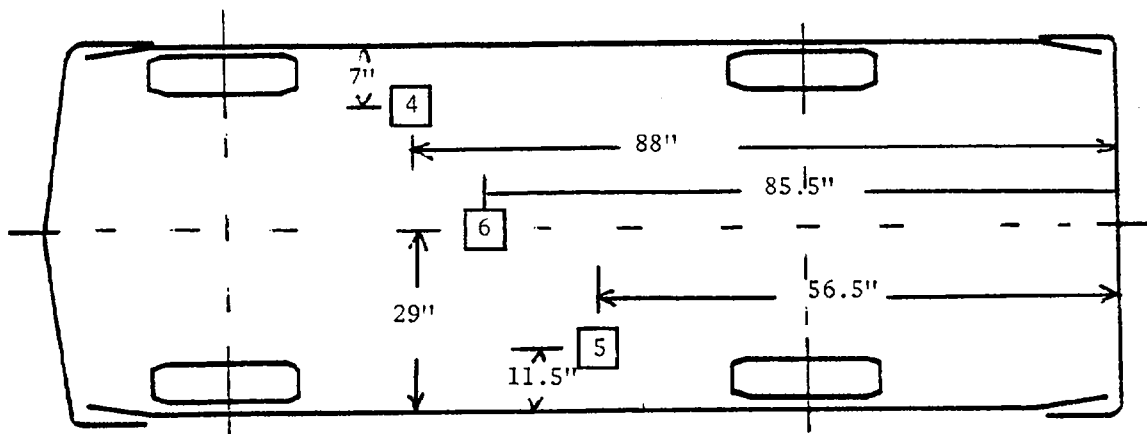
Figure 4 PRE-TEST AND POST-TEST MEASUREMENT POINTS

Table 6

VEHICLE MEASUREMENTS

1982 Volkswagen Scirocco 2-door hatchback

		All Dimensions in Inches		
No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	165.8	141.3	24.5
X2	Rear Surface of Vehicle to Front of Engine	134.7	127.8	6.9
X3	Rear Surface of Vehicle to Firewall	118.3	114.2	4.1
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	109.2	108.9	.3
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	108.9	109.0	-.1
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	109.2	109.0	.2
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	109.2	109.2	0.0
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	59.7	59.6	.1
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	60.2	60.2	0.0
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	61.5	61.0	.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	61.2	61.2	0.0
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	107.7	107.5	.2
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	107.1	107.0	.1
X14	Rear Surface of Vehicle to Firewall, Right Side	118.0	112.0	6.0
X15	Rear Surface of Vehicle to Firewall, Left Side	117.5	109.2	8.3
X16	Rear Surface of Vehicle to Steering Column	90.0	88.1	1.9
X17	Center of Steering Column to "A" Post	15.2	17.5	-2.3
X18	Center of Steering Column to Headliner	16.1	16.5	-.4
X19	Rear Surface of Vehicle to Right Side of Front Bumper	164.1	141.3	22.8
X20	Rear Surface of Vehicle to Left Side of Front Bumper	164.1	141.3	22.8
X21	Length of Engine Block	5.5	5.5	0.0



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
4	Front seat crossmember	X		X
4 (X) R	Same as 4 (redundant)	X		
5	Rear seat crossmember	X		X
5 (X) R	Same as 5 (redundant)	X		
6	Center of gravity	X	X	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 Table 7 and 8.

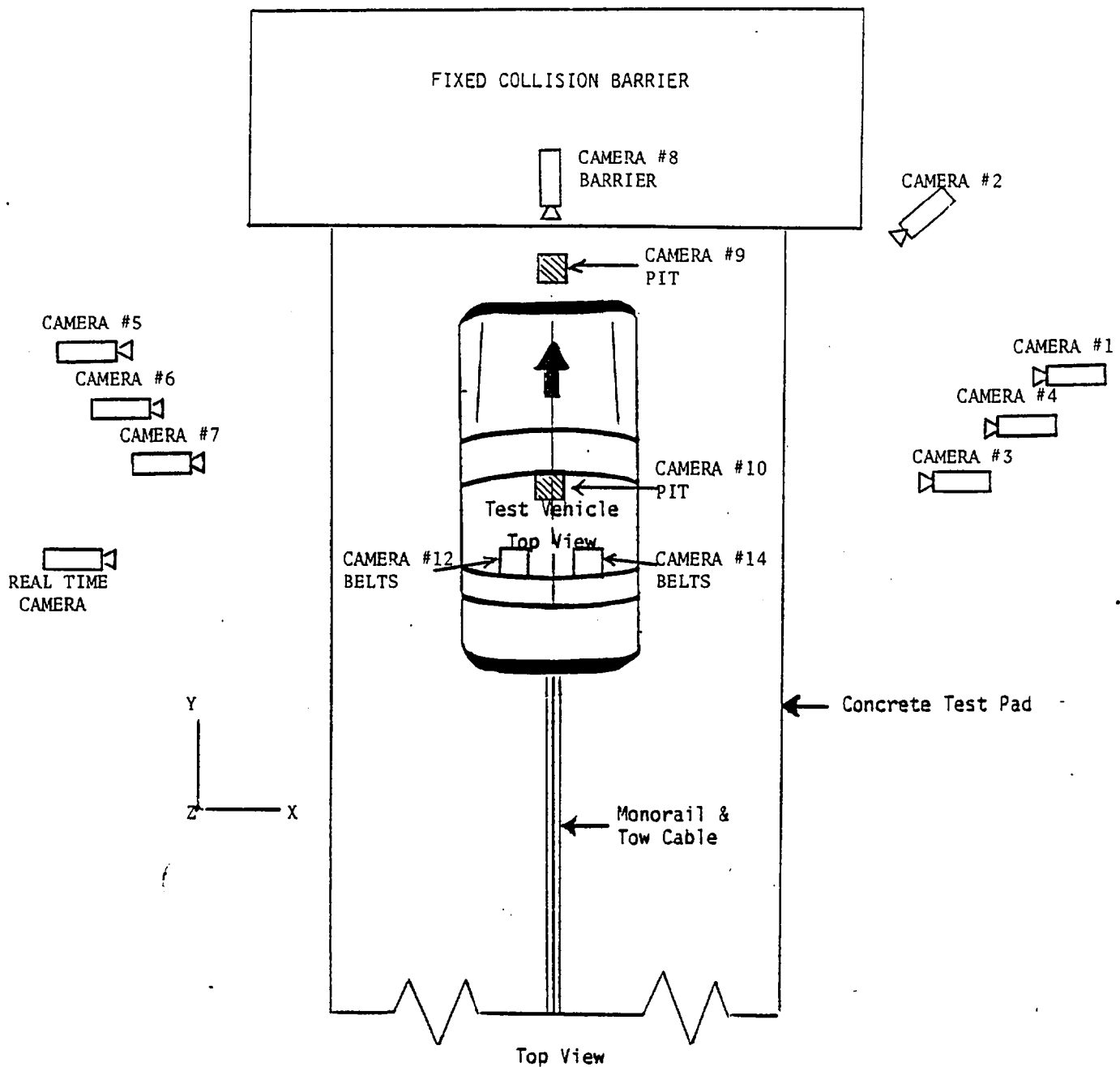


Figure 6 CAMERA POSITION FOR FRONTAL IMPACTS

Table 7

HIGH SPEED CAMERA LOCATIONS

Test No.: 703-5-540

Vehicle

1982 Volkswagen Scirocco

CAMERA NUMBER	VIEW	CAMERA POSITIONS (IN)*			CAMERA ANGLE (DEG)**	FILM PLANE TO HEAD TARGET (IN) X
		X	Y	Z		
1	Impact - Vehicle Right Side	348	36	43	-3	--
2	Windshield	120	-18	41	-3	--
3	Right Front Passenger	246	84	41	-2	230
4	Vehicle Right Side	324	66	41	0	208
5	Impact - Vehicle Left Side	288	34	41	-1	--
6	Vehicle Left Side	264	60	41	-3	248
7	Driver	204	96	40	-3	188
8	Front Impact (Barrier)	0	-9	59	-24	--
9	Pit Front - Engine	0	24	120	90	--
10	Pit Rear - Fuel Tank	0	96	120	90	--
11	Right Belt Retractor	--	--	--	--	--
12	Left Belt Retractor	--	--	--	--	--

*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

**Referenced to Horizontal Plane

Table 8

HIGH SPEED CAMERA INFORMATION (TEST 703-5-540)

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)
1	Impact rt. side	Photosonic	13 mm	1000
2	Windshield	Photosonic	13 mm	1000
3	Rt. front passenger	Photosonic	25 mm	900
4	Vehicle right side	Photosonic	35 mm	900
5	Impact Left side	Photosonic	13 mm	900
6	Vehicle left side	Photosonic	35 mm	900
7	Driver	Photosonic	25 mm	1000
8	Front impact (barrier)	Photosonic	8 mm	900
9	Pit front	Photosonic	13 mm	900
10	Pit rear	Photosonic	13 mm	No timing
11	Rt. belt retractor	Stalex	8 mm	1400
12	Lf. belt retractor	Stalex	8 mm	1300

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 OF FILM.

FIGURE 7
PART 572 DUMMY IN-VEHICLE POSITION

Test No. 703-5-540

Vehicle 1982 Volkswagen Scirocco

SEAT TYPE:

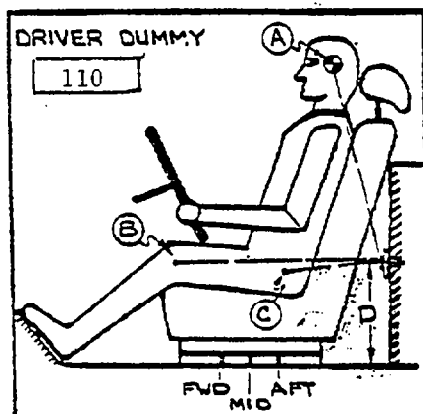
☐ Bench
☒ Bucket
☐ Split Bench

ADJUSTER TYPE:

☒ Manual
☐ Power

BUCKET SEAT BACK TYPE:

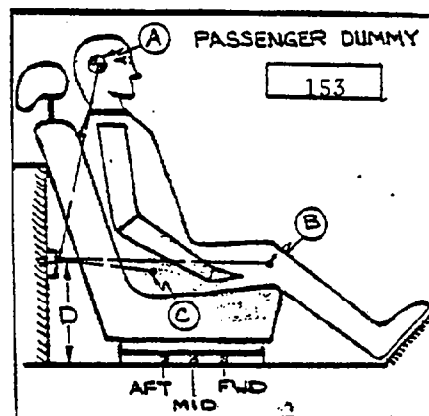
☐ Fixed
☒ Adjustable Reclining



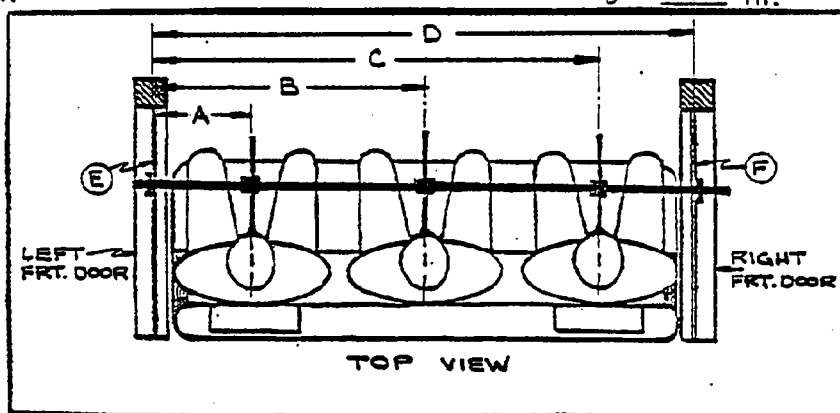
A = 19.5 in. 34 Degrees
B = 32.2 in. 102 Degrees
C = 20.2 in. 123 Degrees
D = 15.2 in.

MEASUREMENT LOCATION

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



A = 19.5 in. 33 Degrees
B = 33.5 in. 102 Degrees
C = 20.0 in. 124 Degrees
D = in.



DUMMY ID

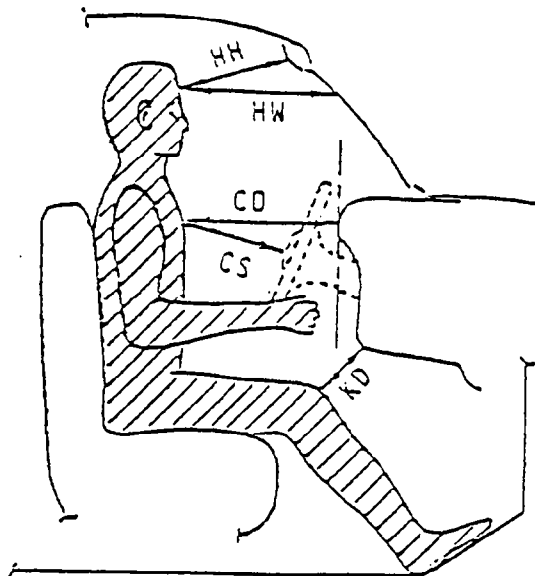
110

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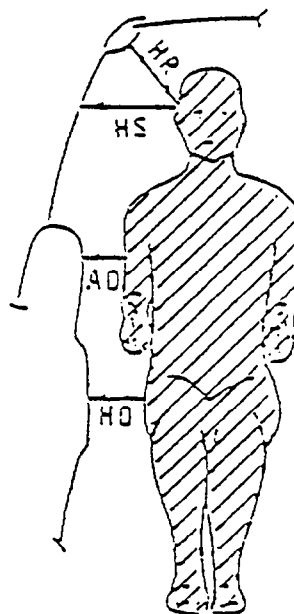
153

A	=	Left Door to Driver Centerline	12.0 in.
B	=	Left Door to Center Passenger Centerline	-- in.
C	=	Left Door to Right Passenger Centerline	37.2 in.
D	=	Left Door to Right Door	48.5 in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	11.0 in.

	<u>DRIVER</u>	<u>PASS</u>
HH	14.0	13.0
HW	19.5	19.2
CD	22.0	23.5
CS	15.7	--
KDL	7.0	8.0
KDR	8.2	8.0



HR	5.0	4.5
HS	8.5	8.2
AD	4.0	4.0
HD	4.5	4.5



1982 Volkswagen Scirocco

Figure 8 OCCUPANT CLEARANCE DIMENSIONS

DUMMY INJURY CRITERIA VALUES

Table 9

	MAXIMUM ACCELERATION ("G") *							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R
DUMMY (1)	-137	-27	29	139	-51	-20	-14	54
DUMMY (2)	-38	50	42	67	-35	19	13	37
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	275	330
DUMMY (2)	175	200
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)	1475	1490	1525
DUMMY (2)	1675	3150	1425
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)	1473	.0747	.0861	110.8	1946
DUMMY (2)	683	.0585	.1221	41.0	911
DUMMY (3)					
DUMMY (4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

36 LOAD CELLS
4 ROWS
9 COLUMNS

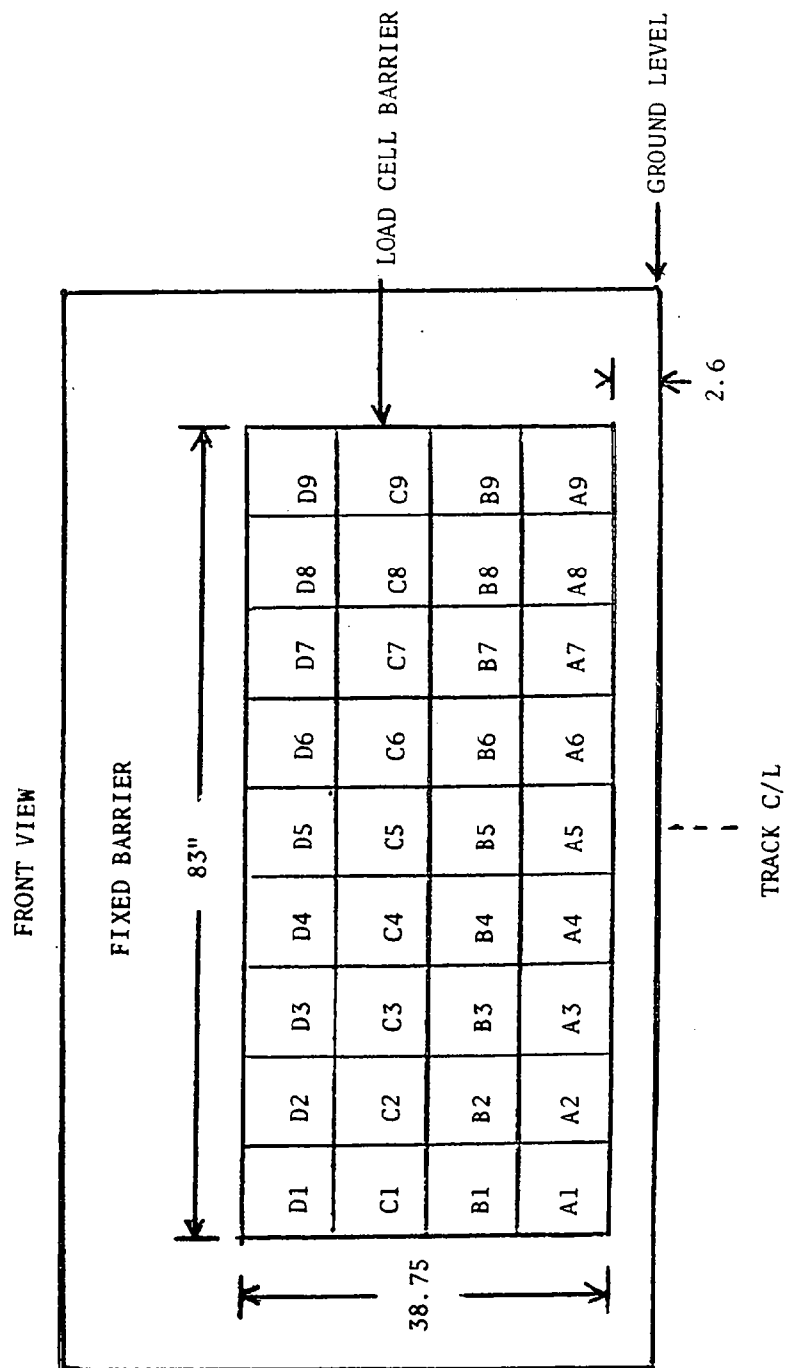


Figure 9 FIXED LOAD CELL BARRIER-LOAD CELL LOCATIONS

APPENDIX A
PHOTOGRAPHS

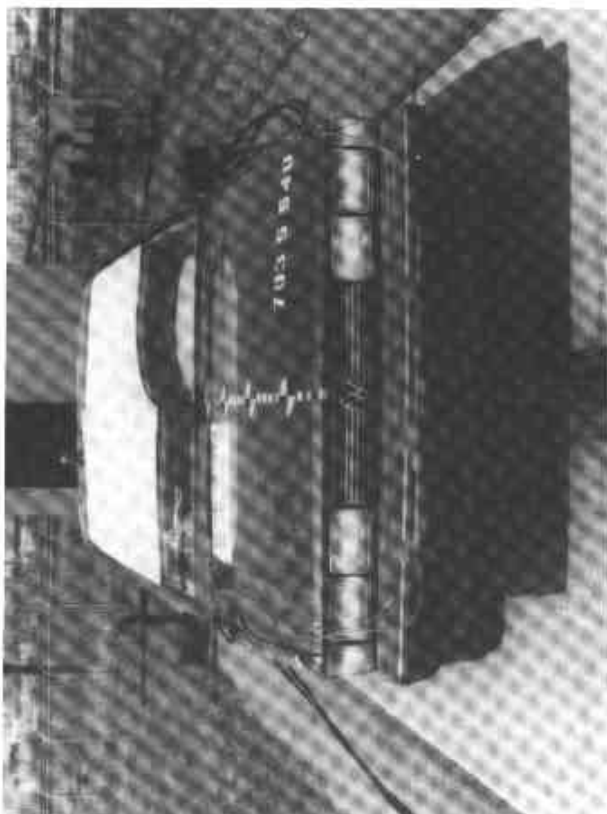


FIGURE A-1 PRE- AND POST-TEST FRONT AND REAR VIEWS

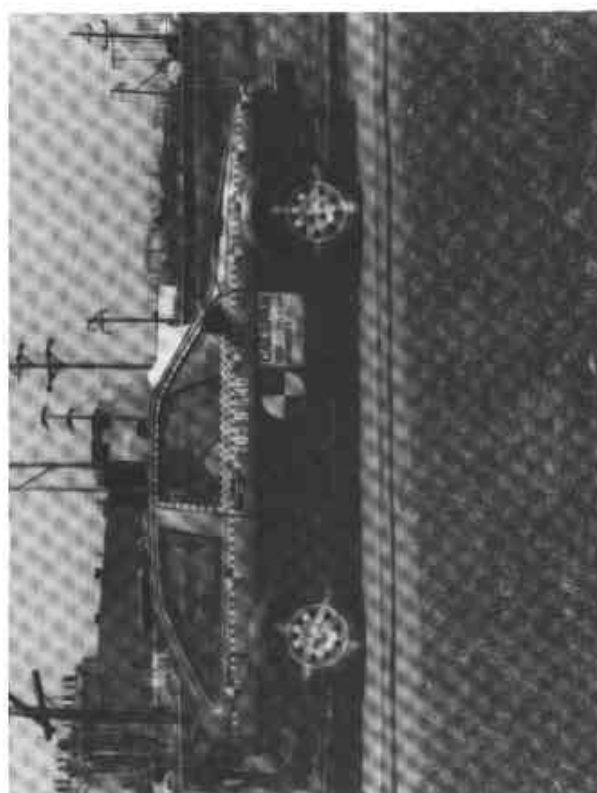
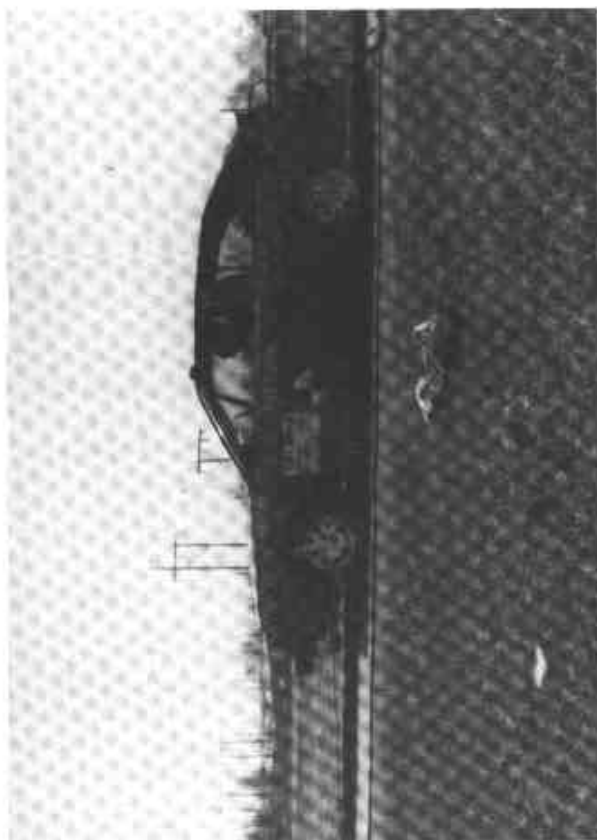


FIGURE A-2 PRE- AND POST-TEST RIGHT AND LEFT SIDE VIEWS

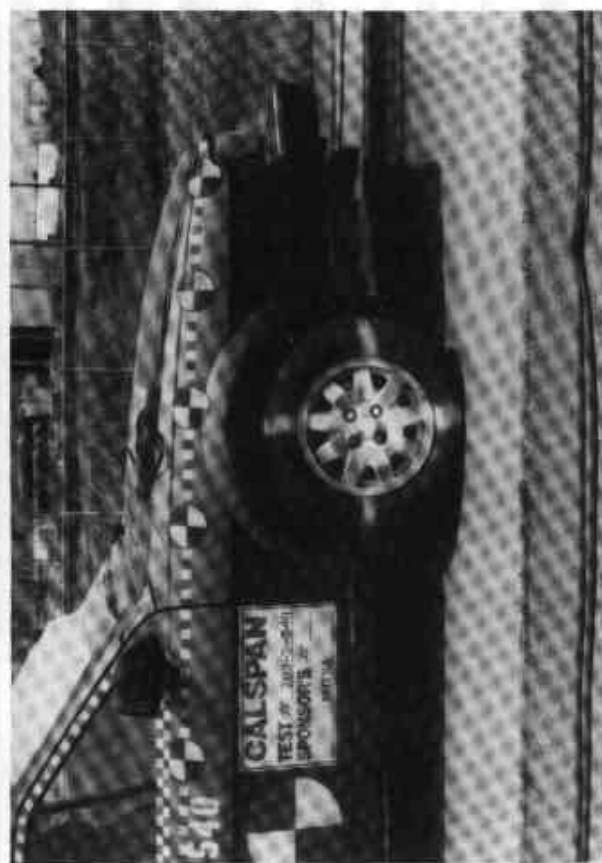


FIGURE A-3 PRE- AND POST-TEST RIGHT AND LEFT FRONT QUARTER PANEL VIEWS



FIGURE A-4 PRE- AND POST-TEST RIGHT AND LEFT FRONT THREE-QUARTER VIEWS

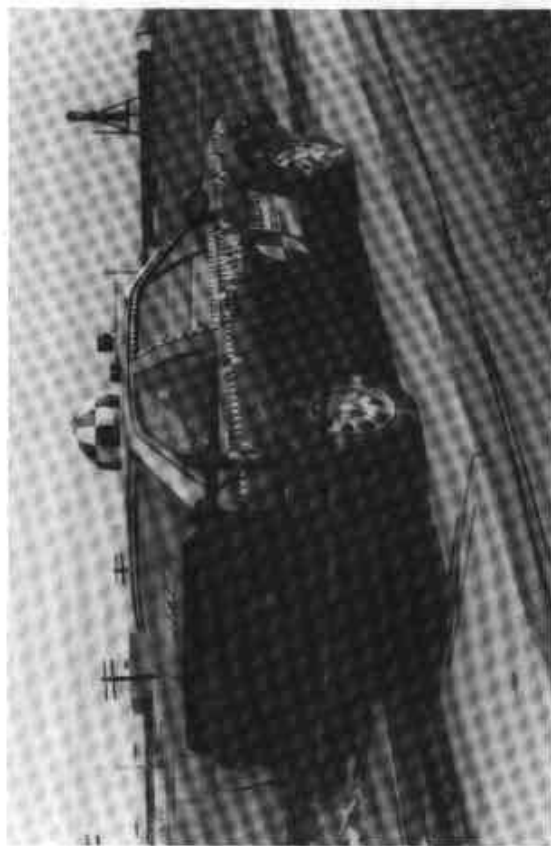


FIGURE A-5 PRE- AND POST-TEST RIGHT AND LEFT REAR THREE-QUARTER VIEWS

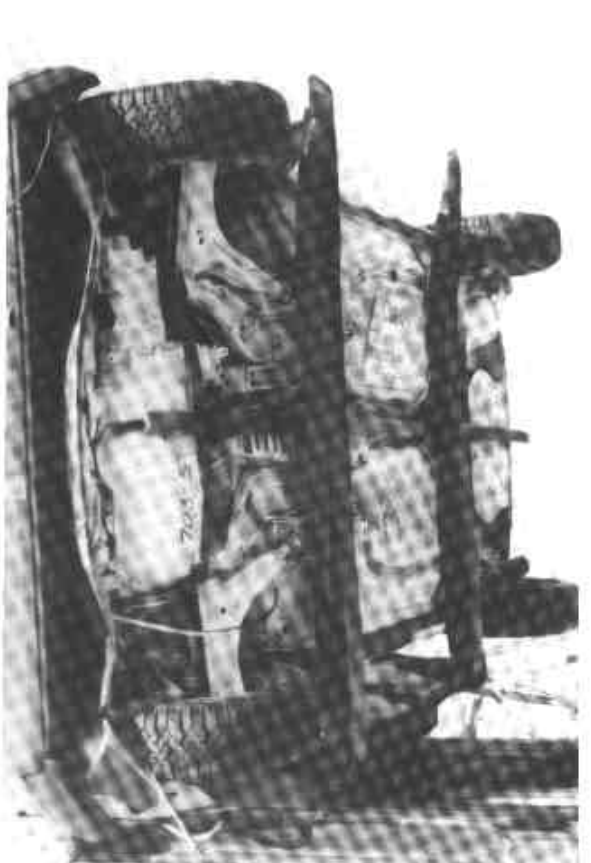
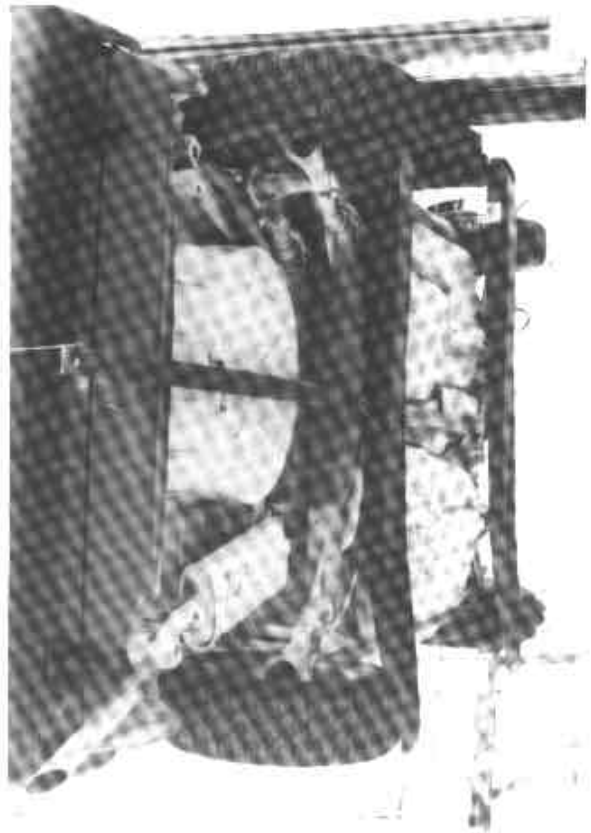
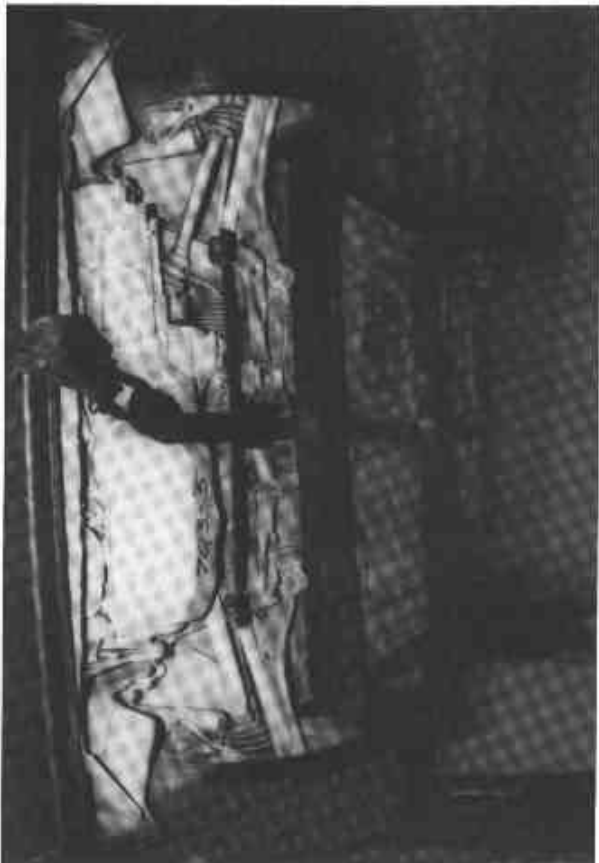
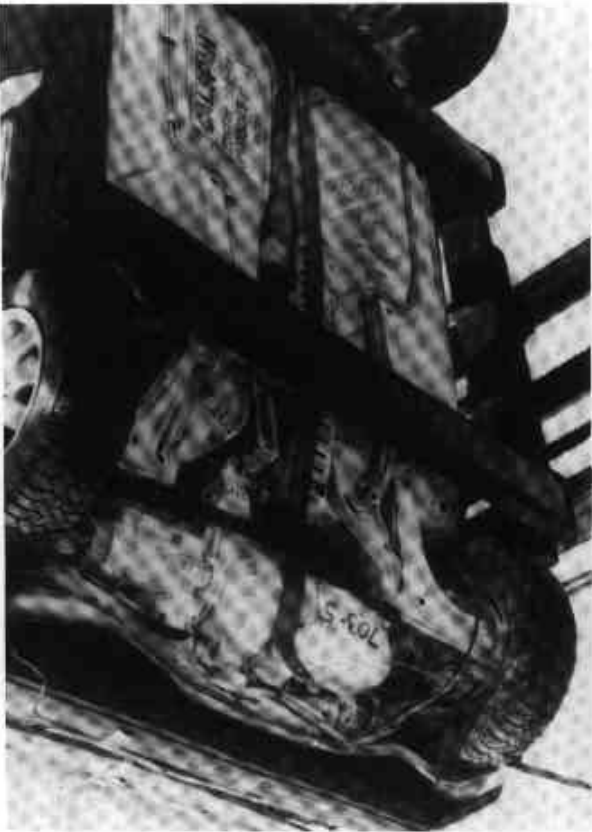


FIGURE A-6 PRE- AND POST-TEST FRONT AND REAR UNDERBODY VIEWS



FIGURE A-7 POST-TEST RIGHT AND LEFT UNDERBODY VIEWS



A-8

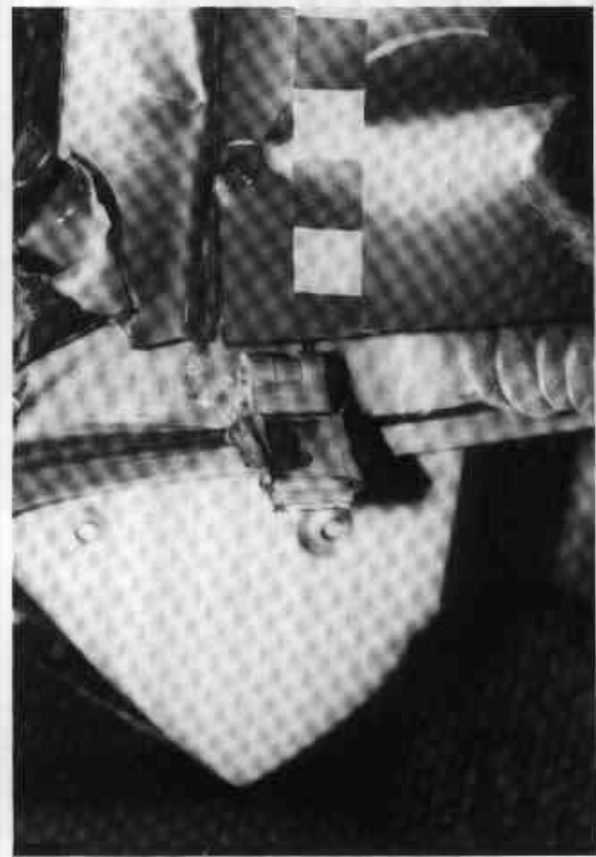


FIGURE A-8 POST-TEST DOOR HINGE MOUNTING FAILURE



6851-V-5

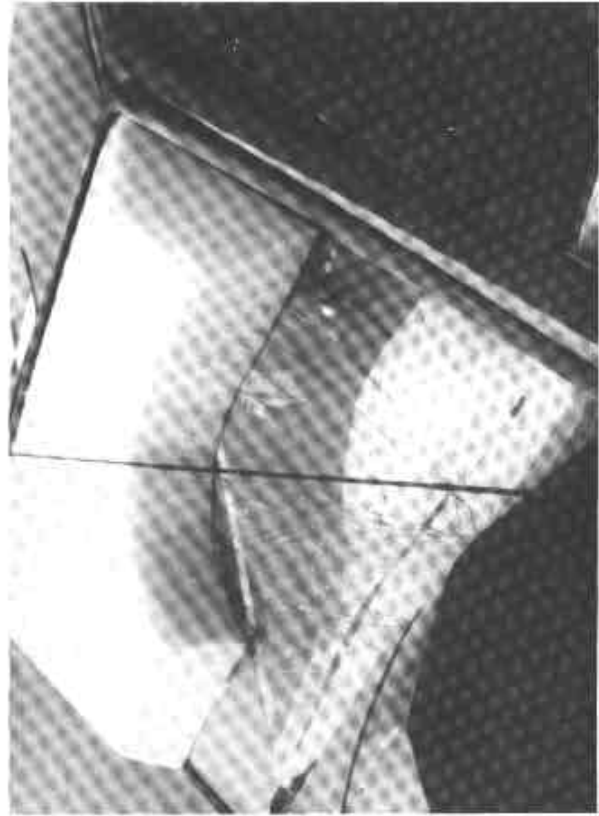


FIGURE A-9 PRE AND POST WINDSHIELD AND STYROFOAM VIEWS



FIGURE A-10 PRE- AND POST-TEST DRIVER VIEWS

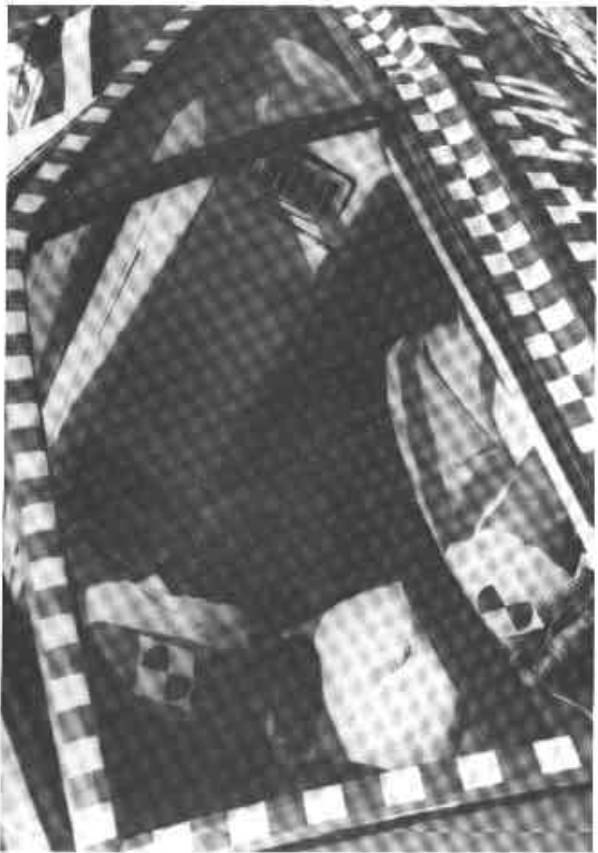


FIGURE A-11 PRE- AND POST-TEST RIGHT FRONT PASSENGER VIEWS

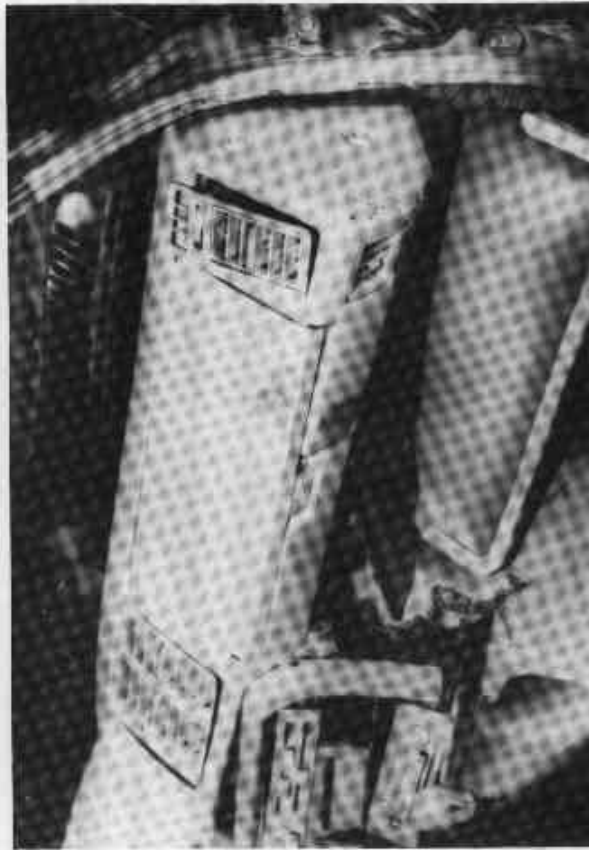
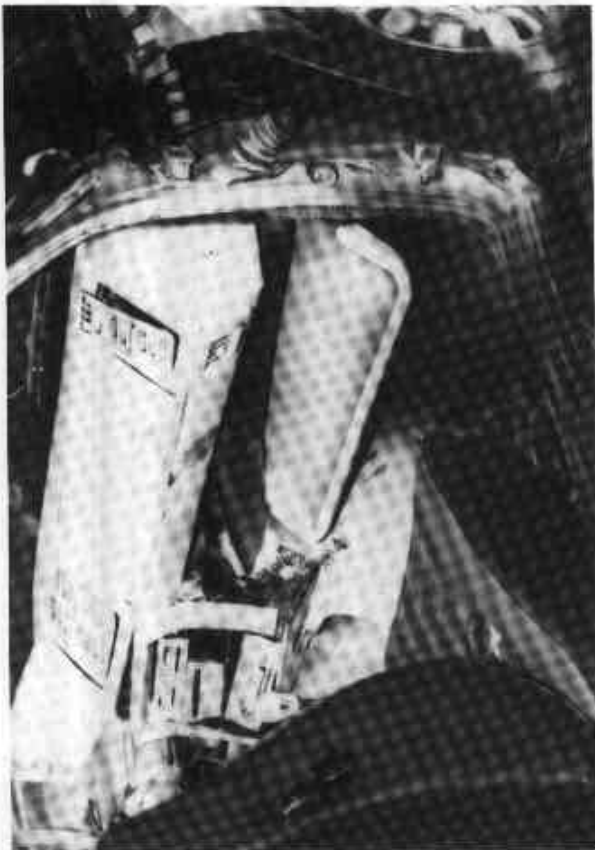


FIGURE A-12 POST-TEST VEHICLE INTERIOR VIEWS

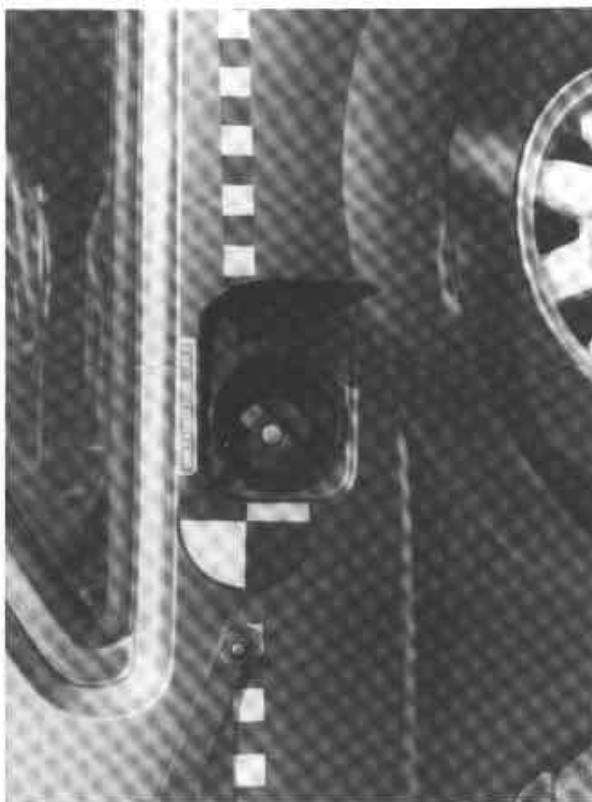


FIGURE A-13 PRE-TEST FUEL FILLER CAP AND FUEL TANK VIEWS



FIGURE A-14 PRE-TEST ENGINE COMPARTMENT VIEW

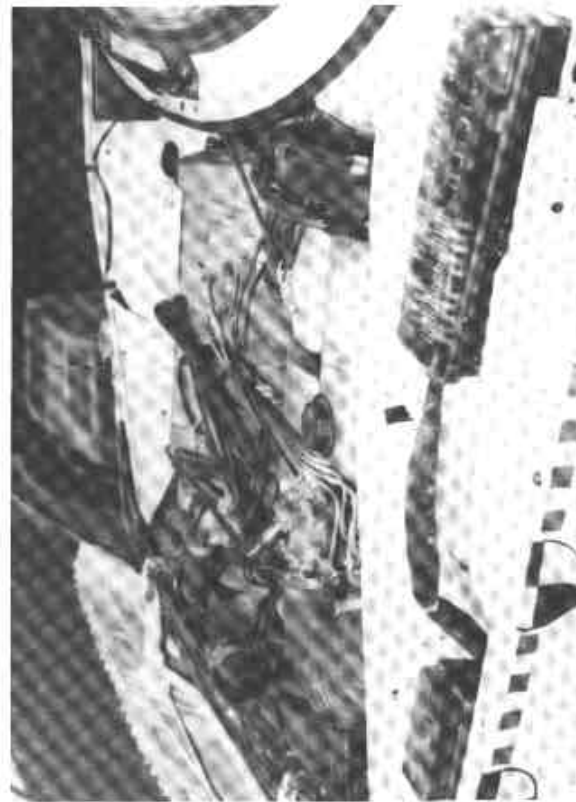


FIGURE A-15 VELOCITY TRAP COUNTER

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA

Test No. 703-5-540
1982 Volkswagen Scirocco

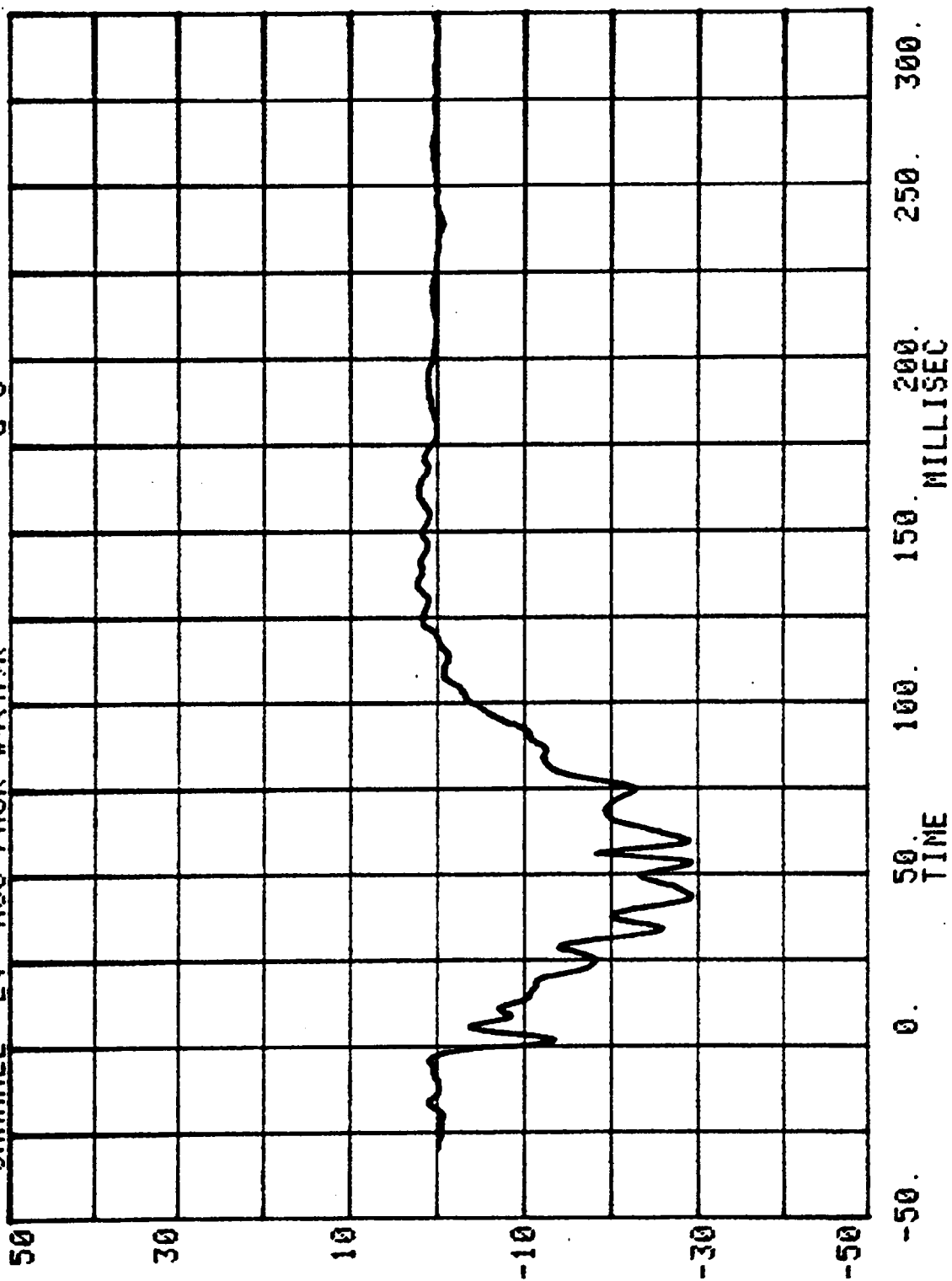
VEHICLE DATA

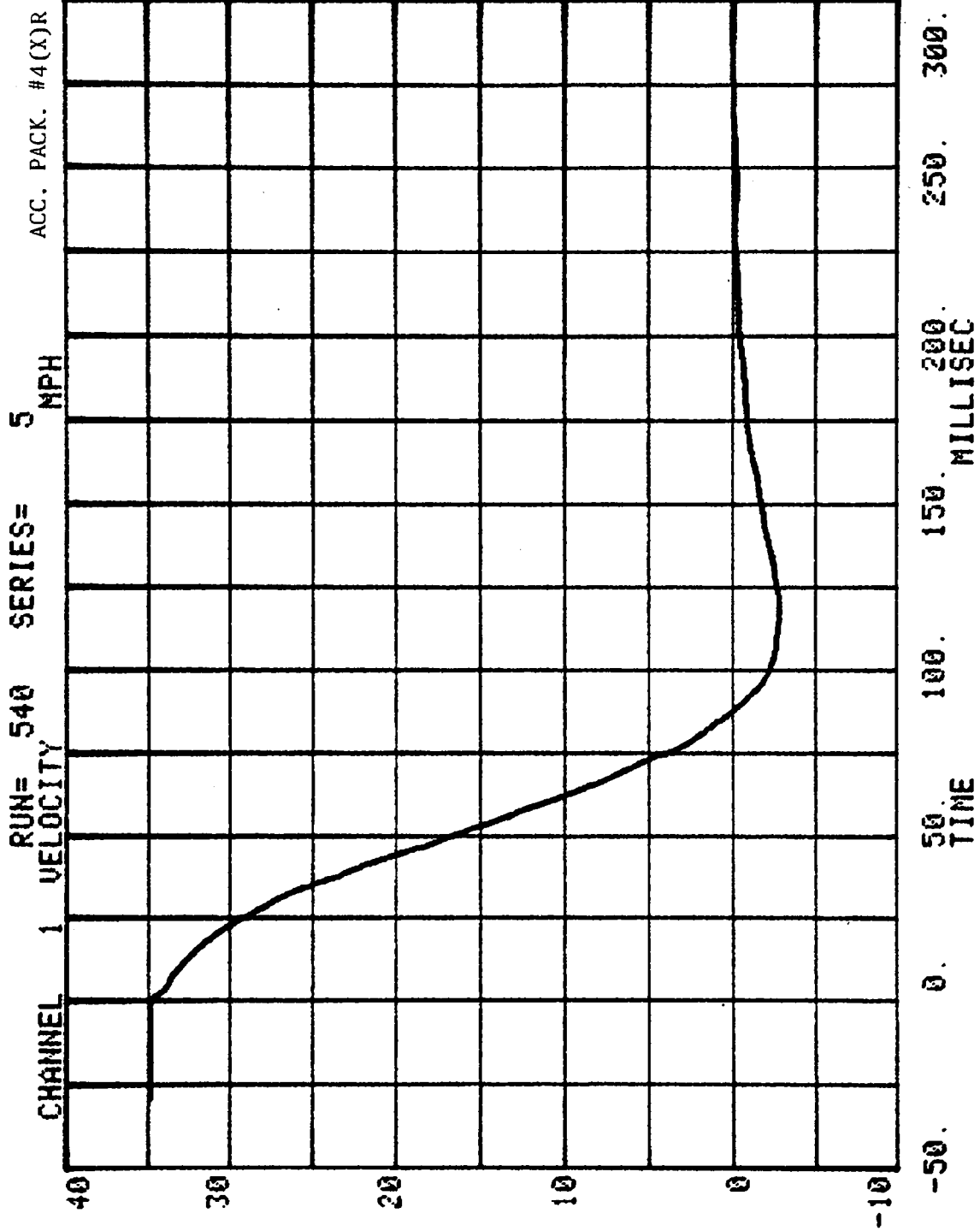
VEHICLE DATA

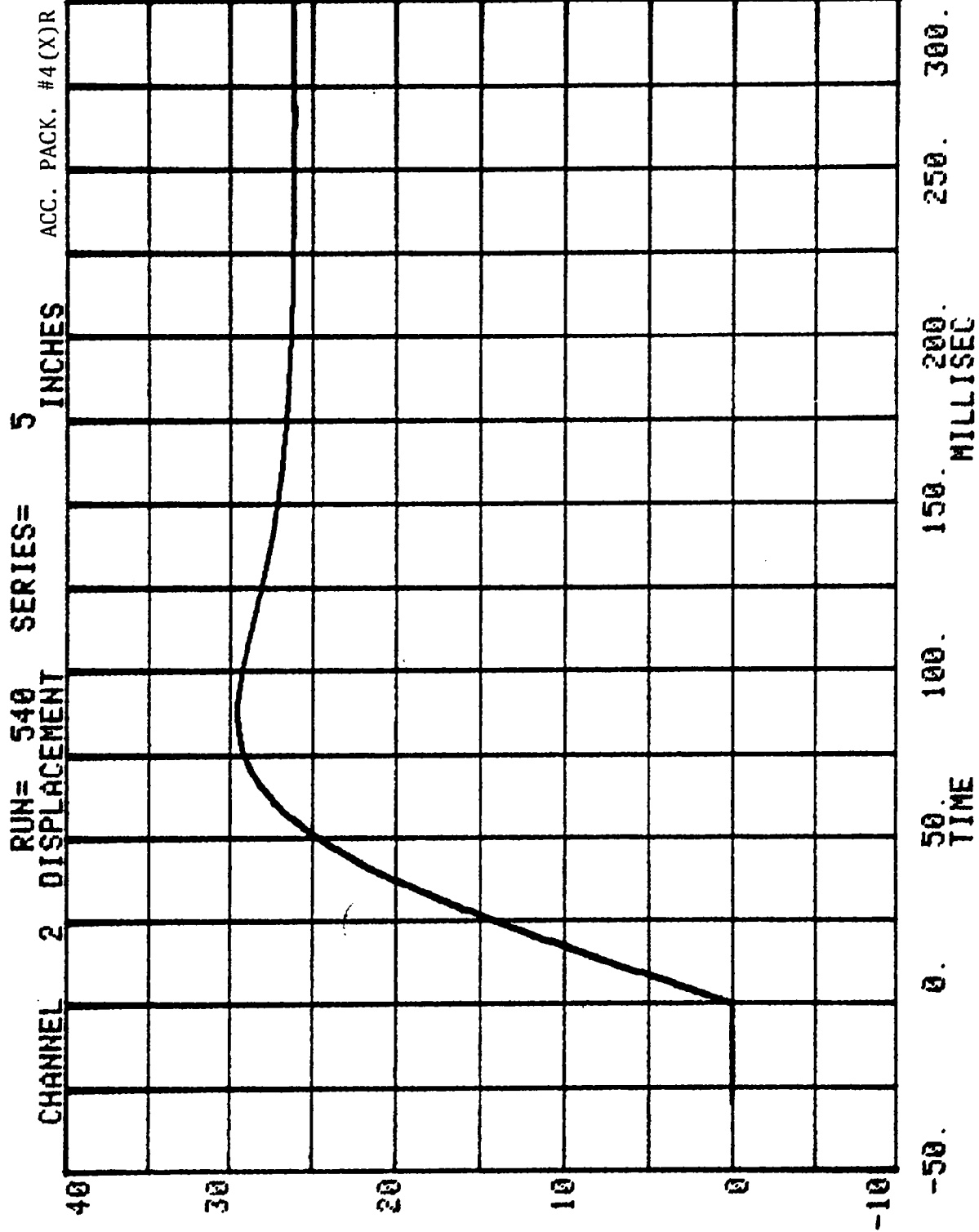
FILTER CHANNEL CLASS

60

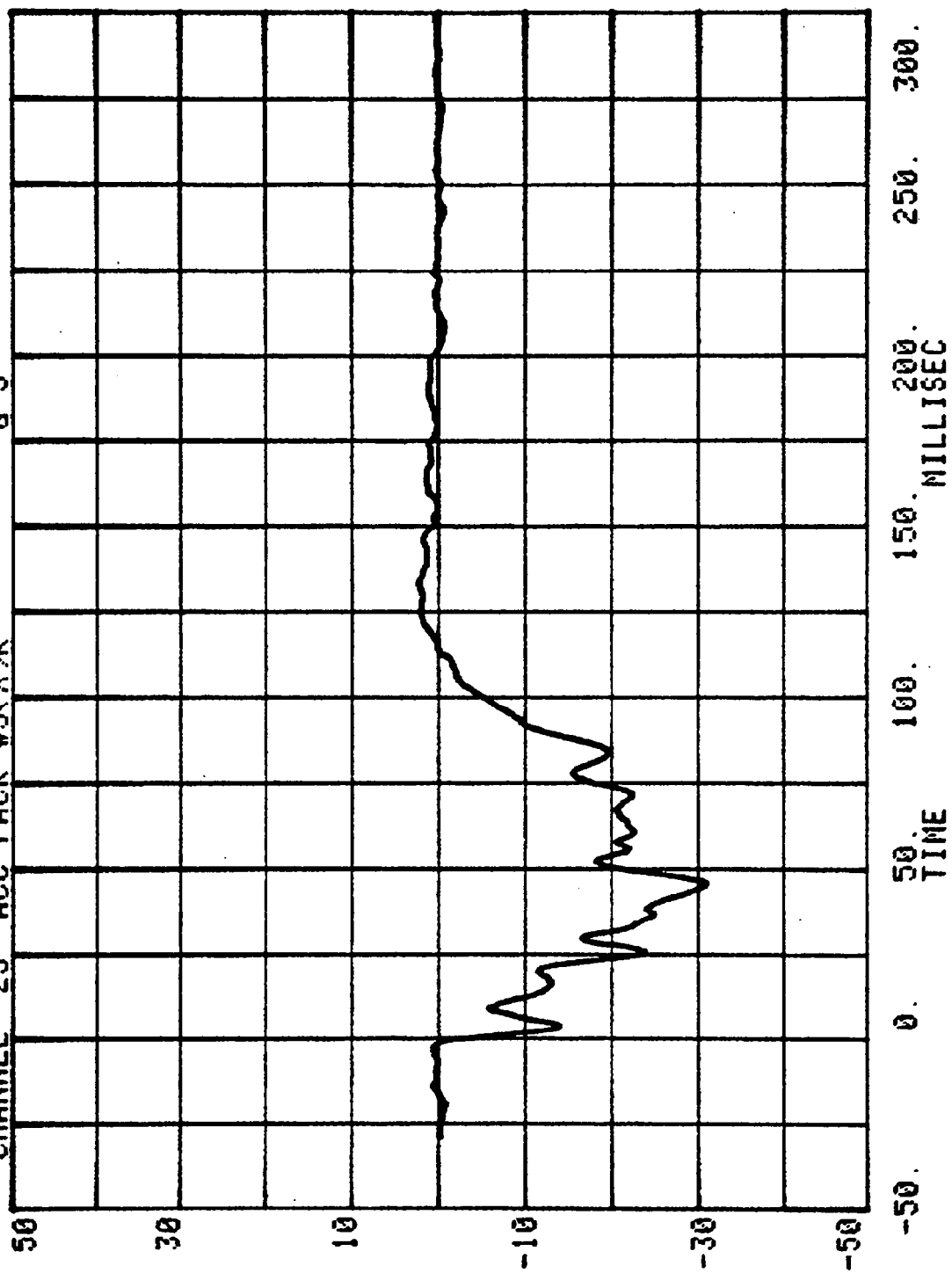
RUN= 540 SERIES= 5
CHANNEL 24 ACC PACK #4(X)R G'S

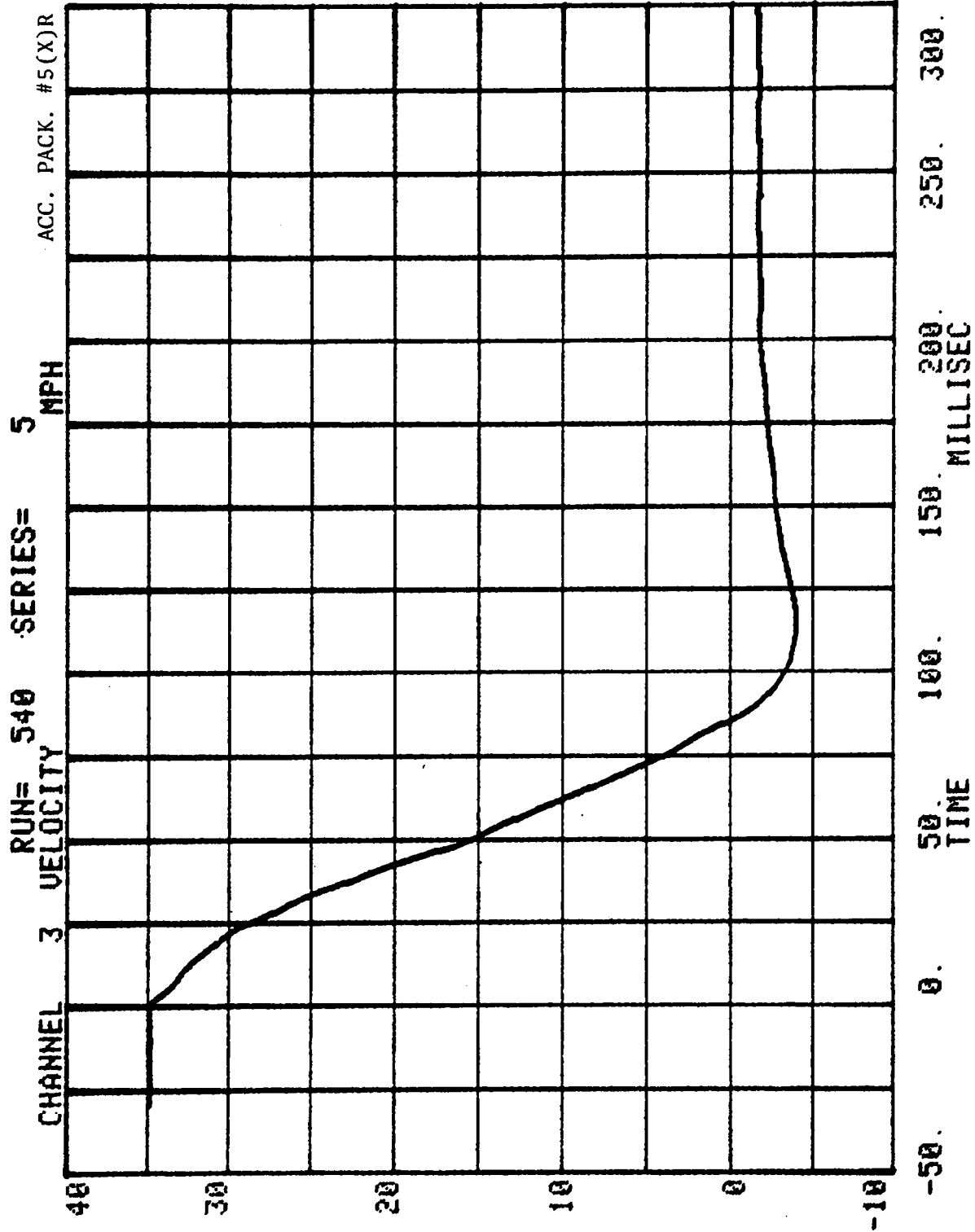


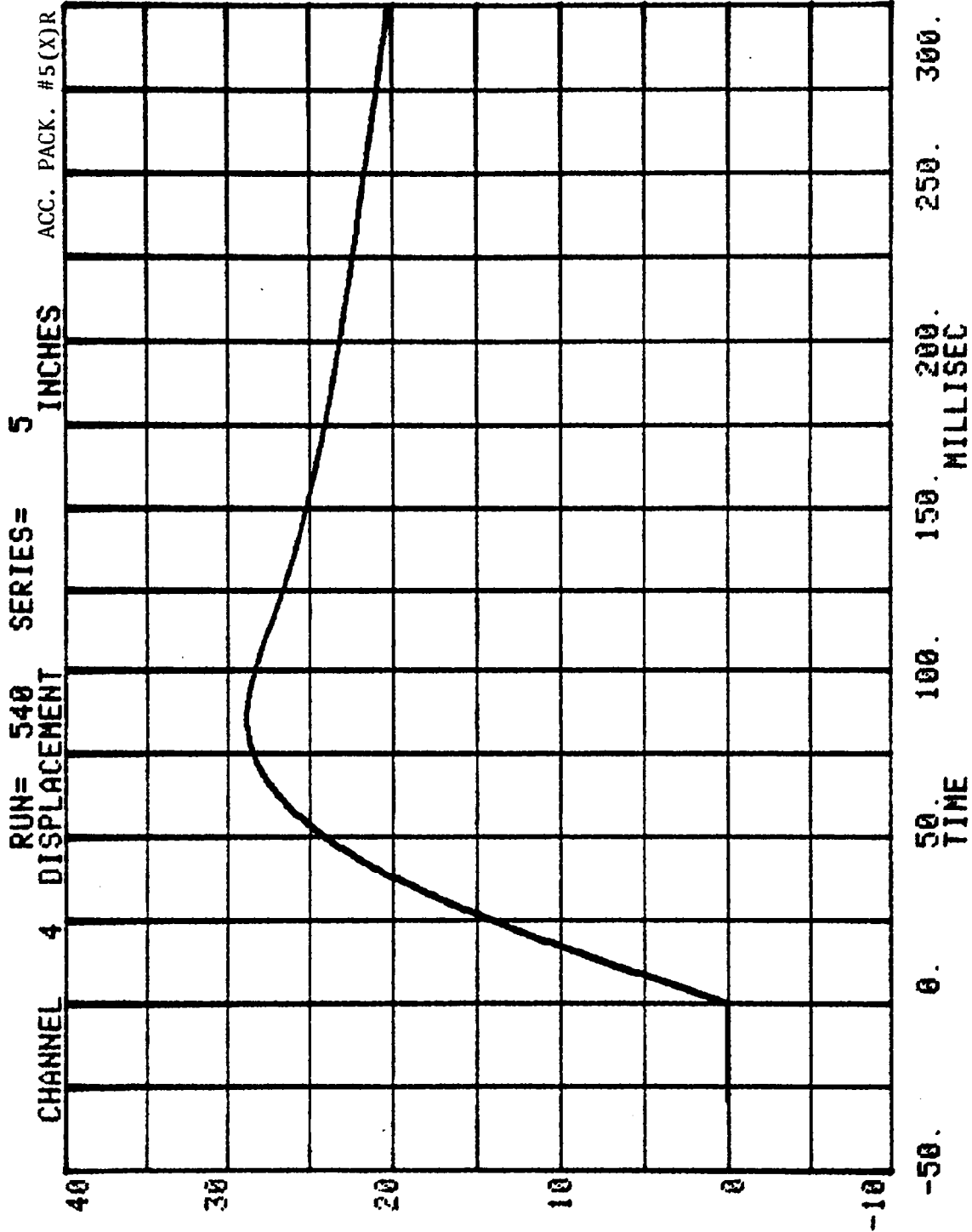




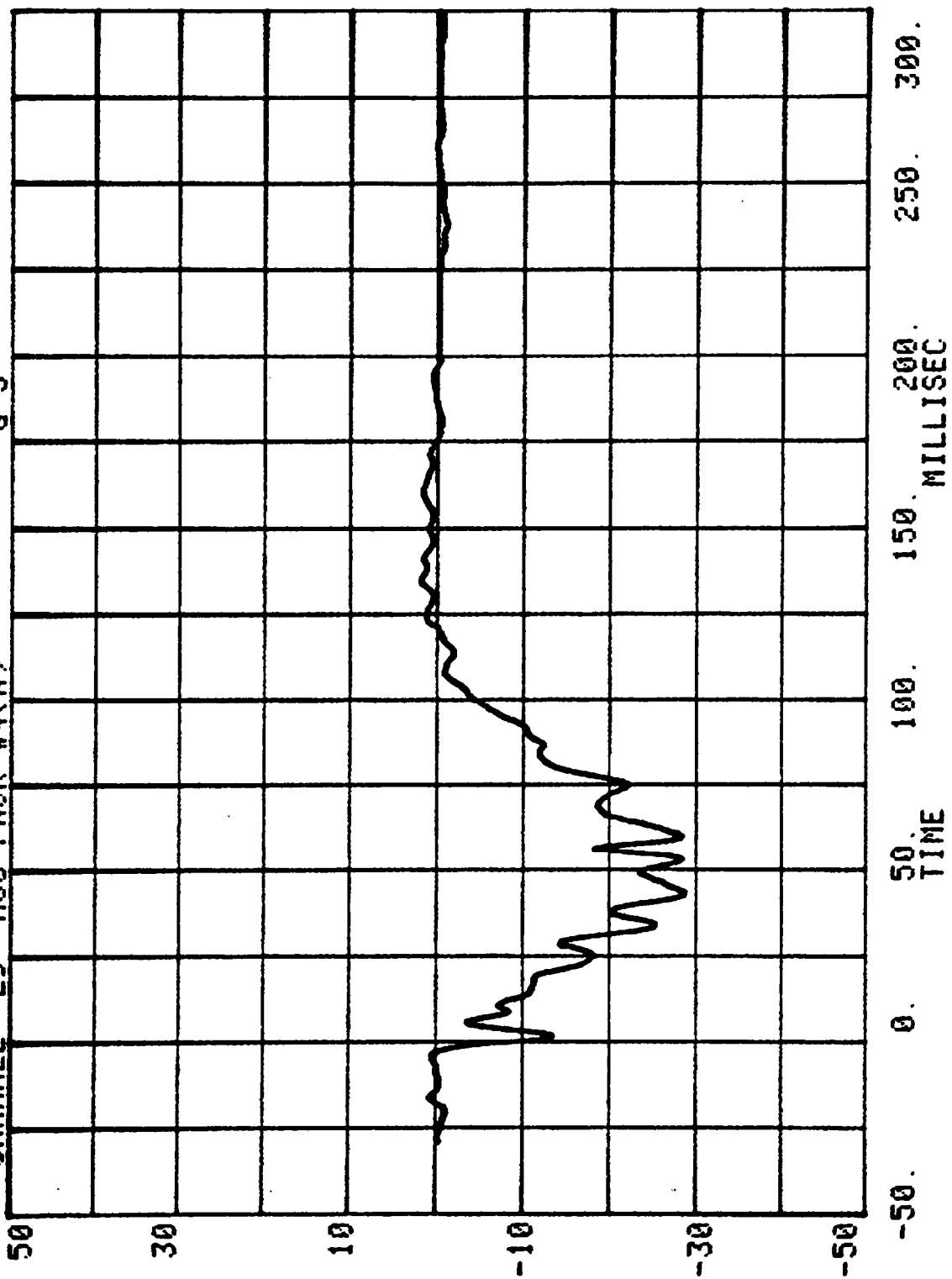
CHANNEL 25 ACC PACK #5(X)R RUN= 540 SERIES= 5 G'S

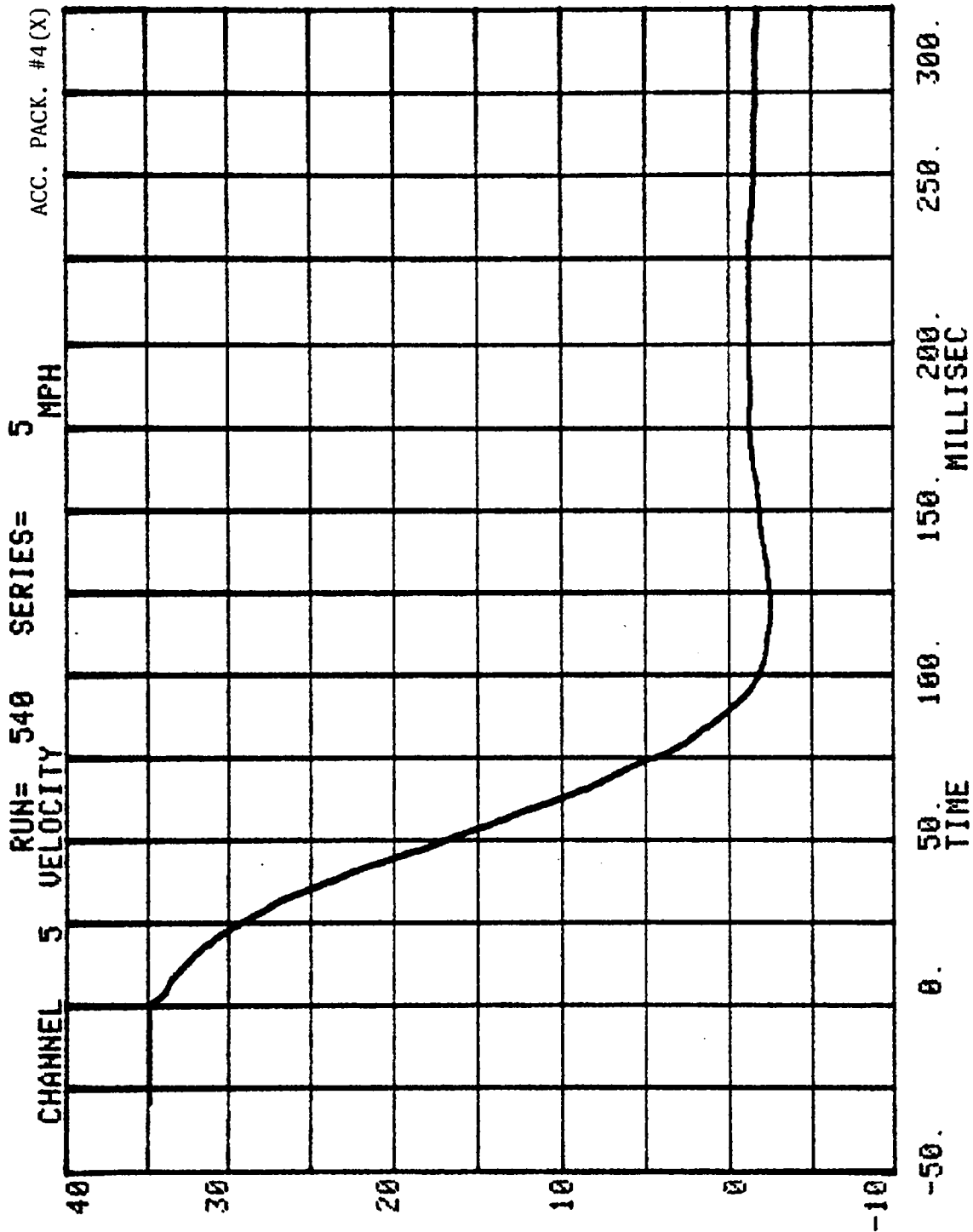


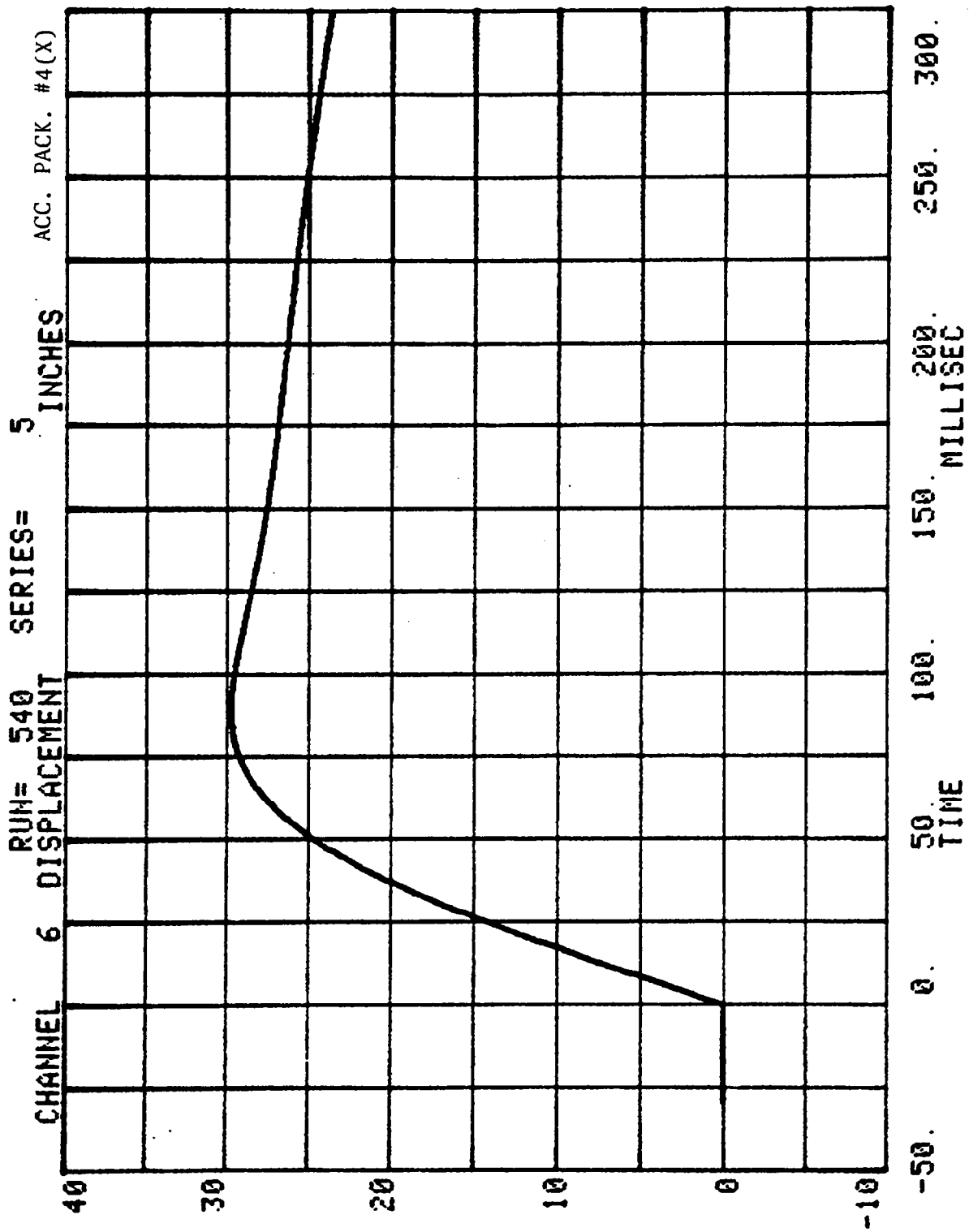




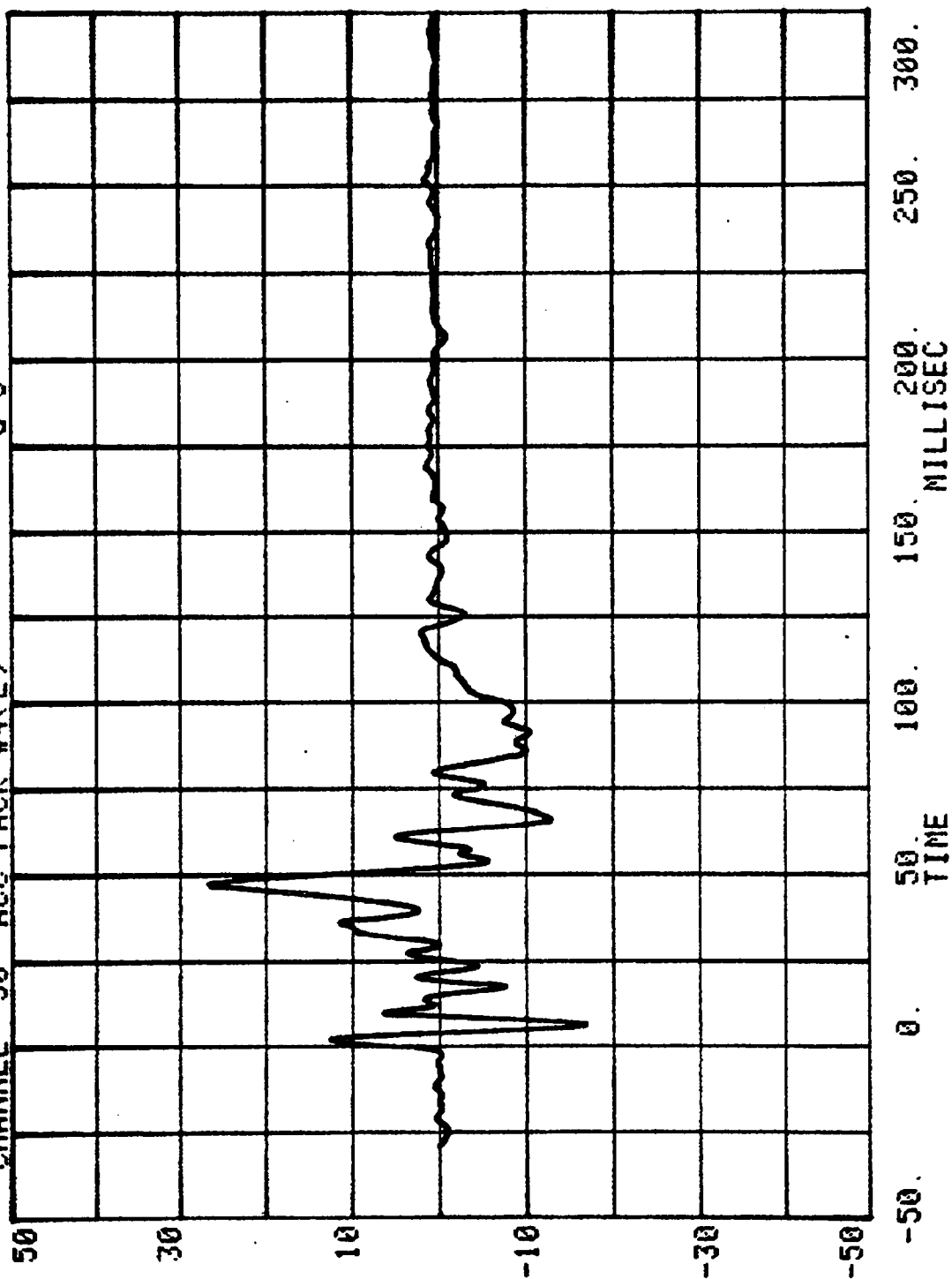
CHANNEL 29 ACC PACK #4(X) RUN= 540 SERIES= 5 G'S

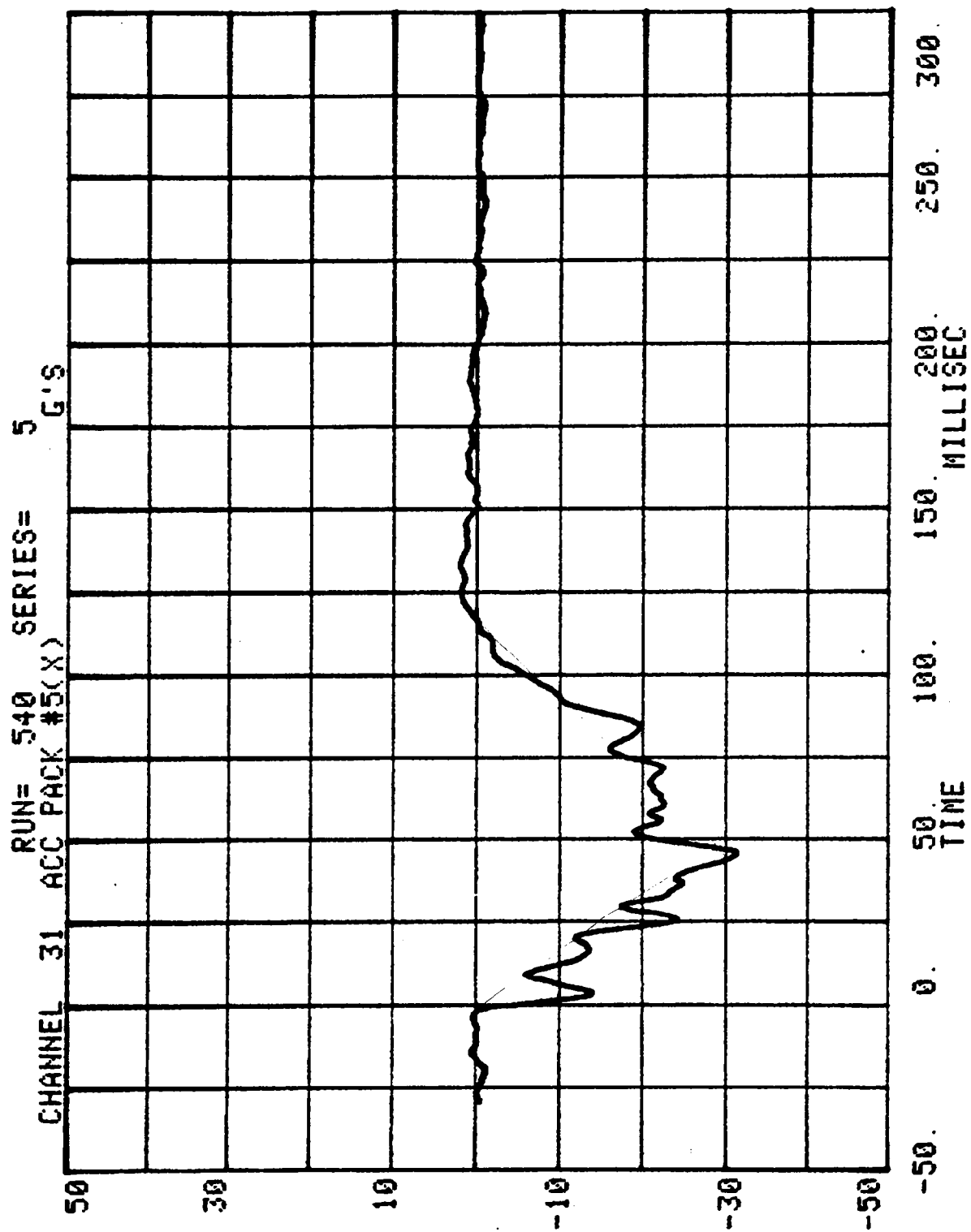


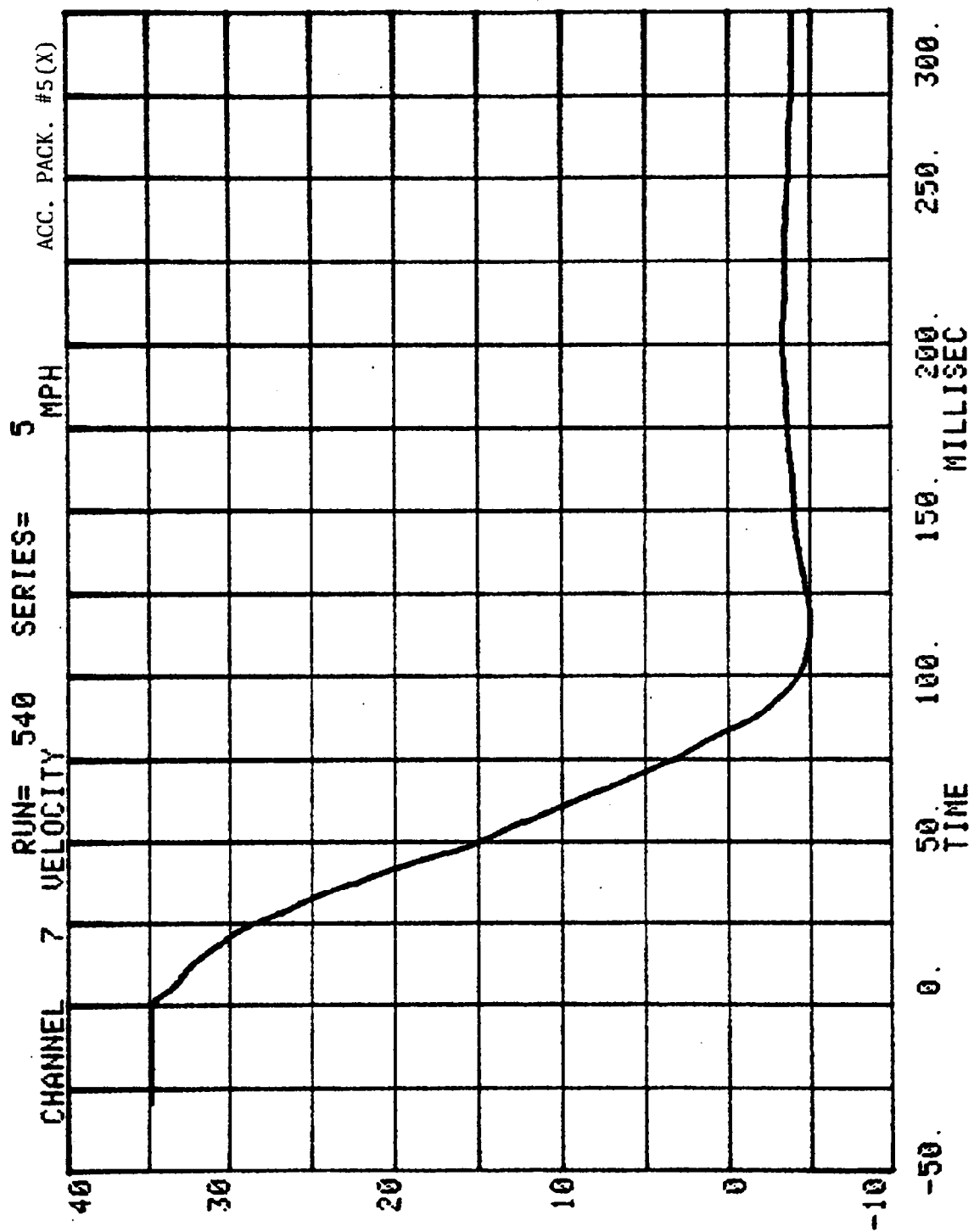


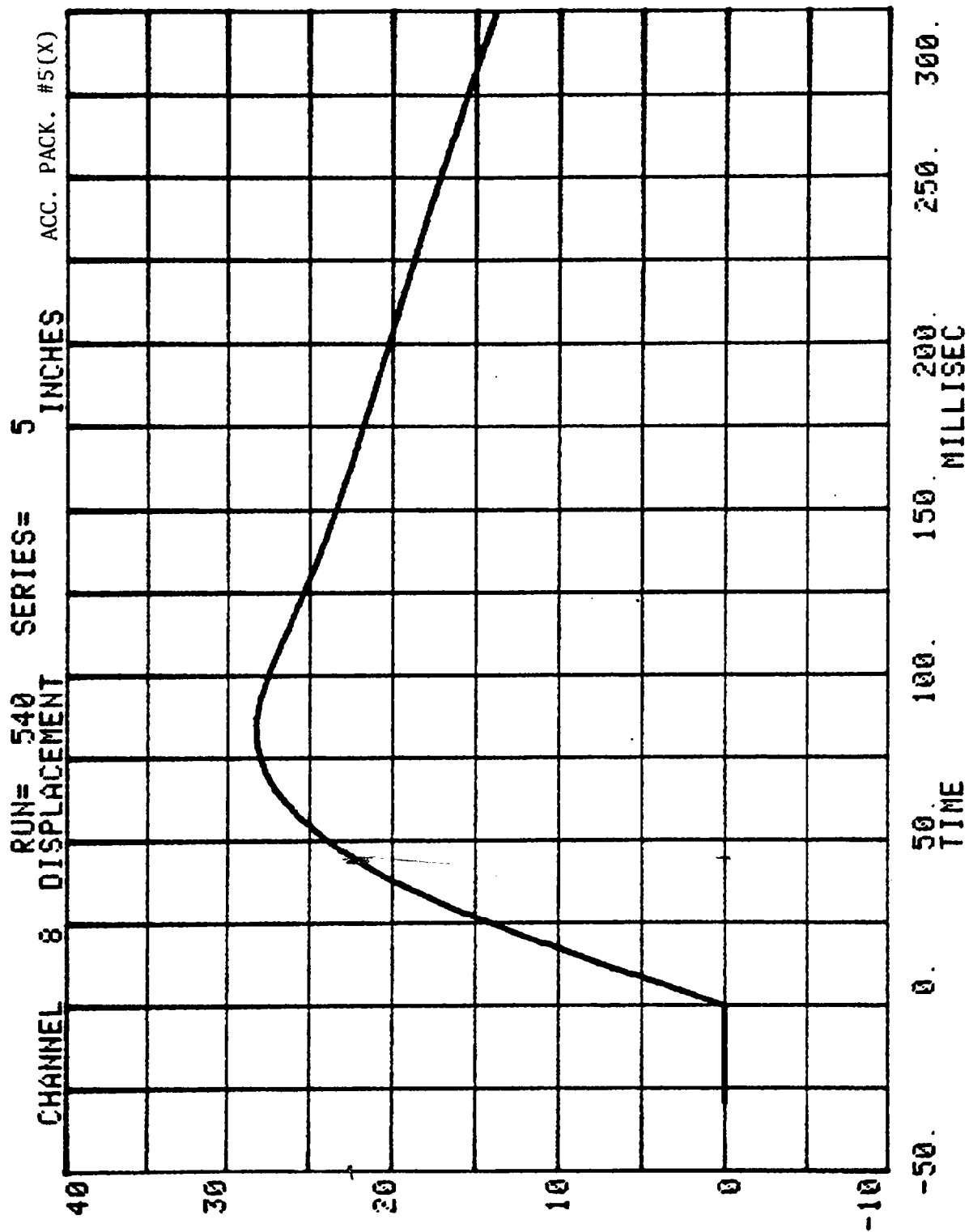


CHANNEL 30 ACC PACK #4(2) RUN= 540 SERIES= 5 G'S

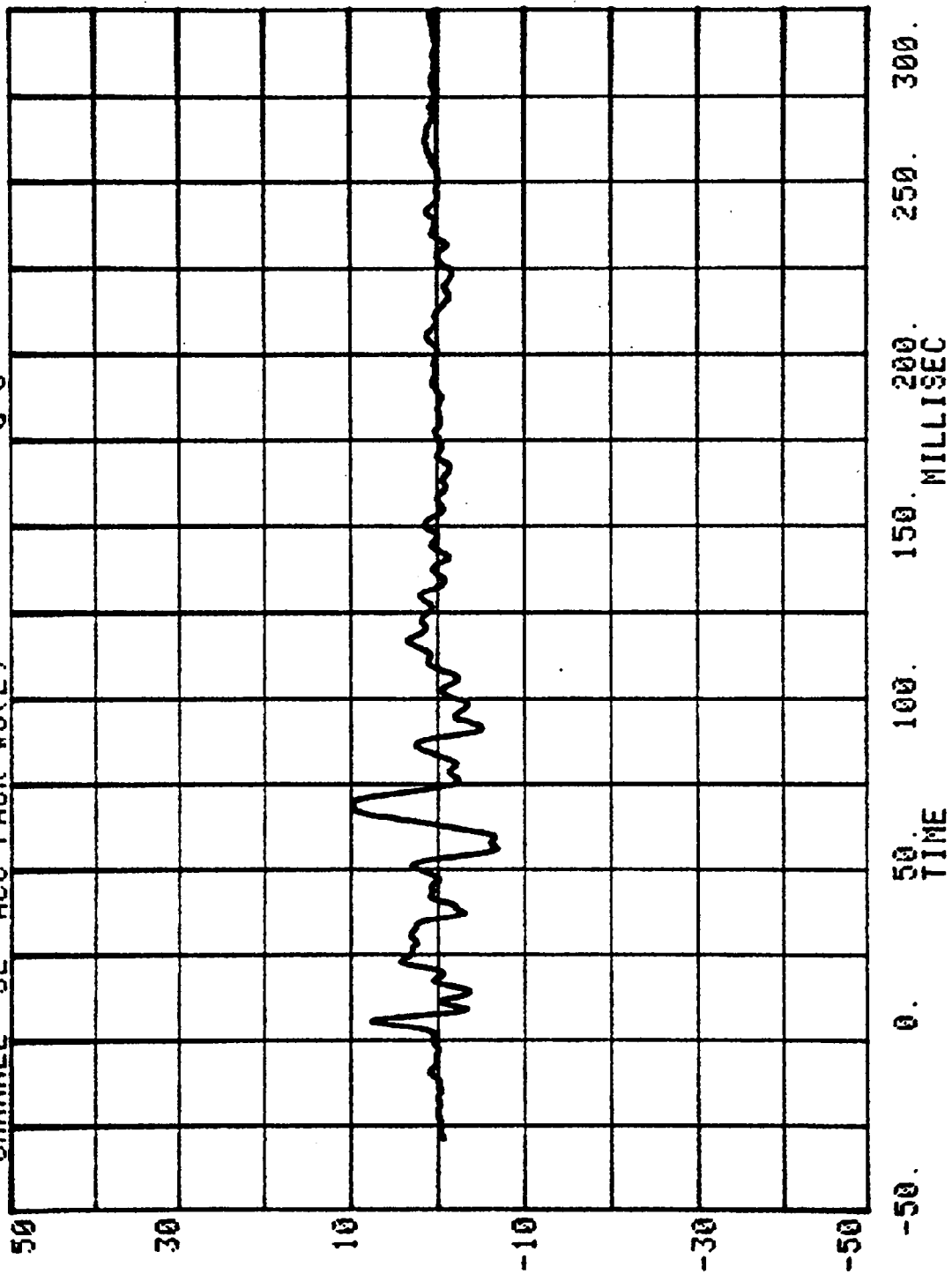


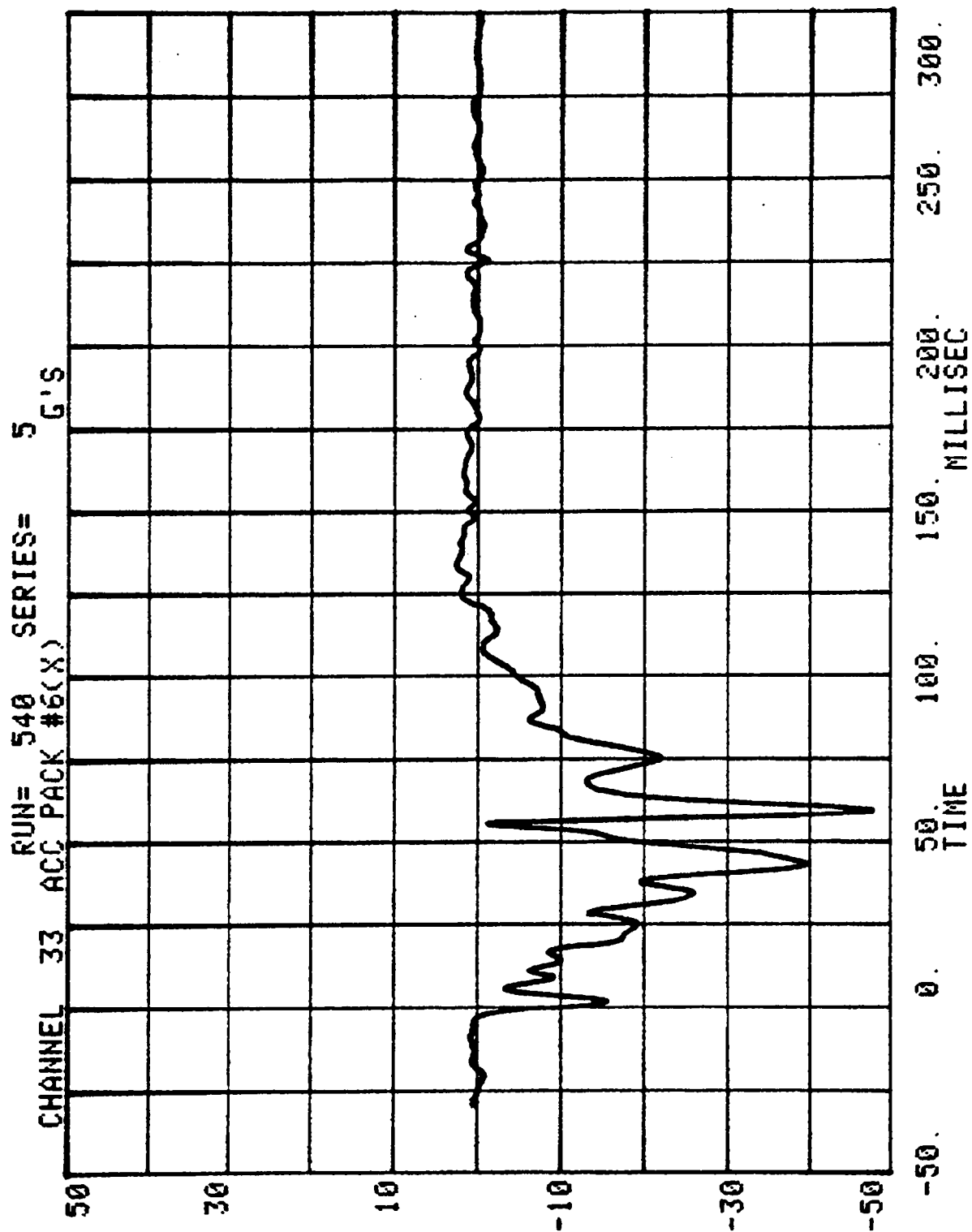


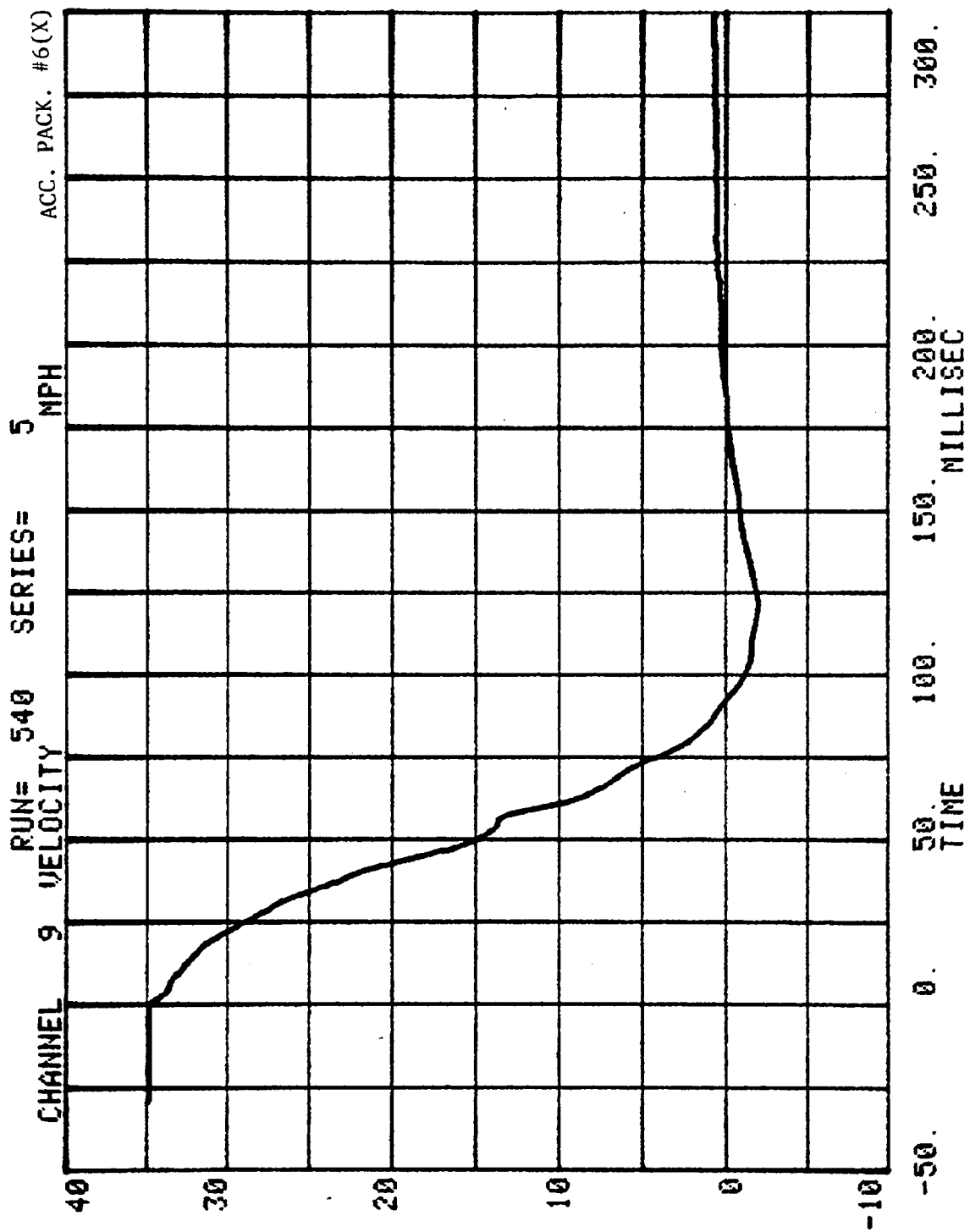


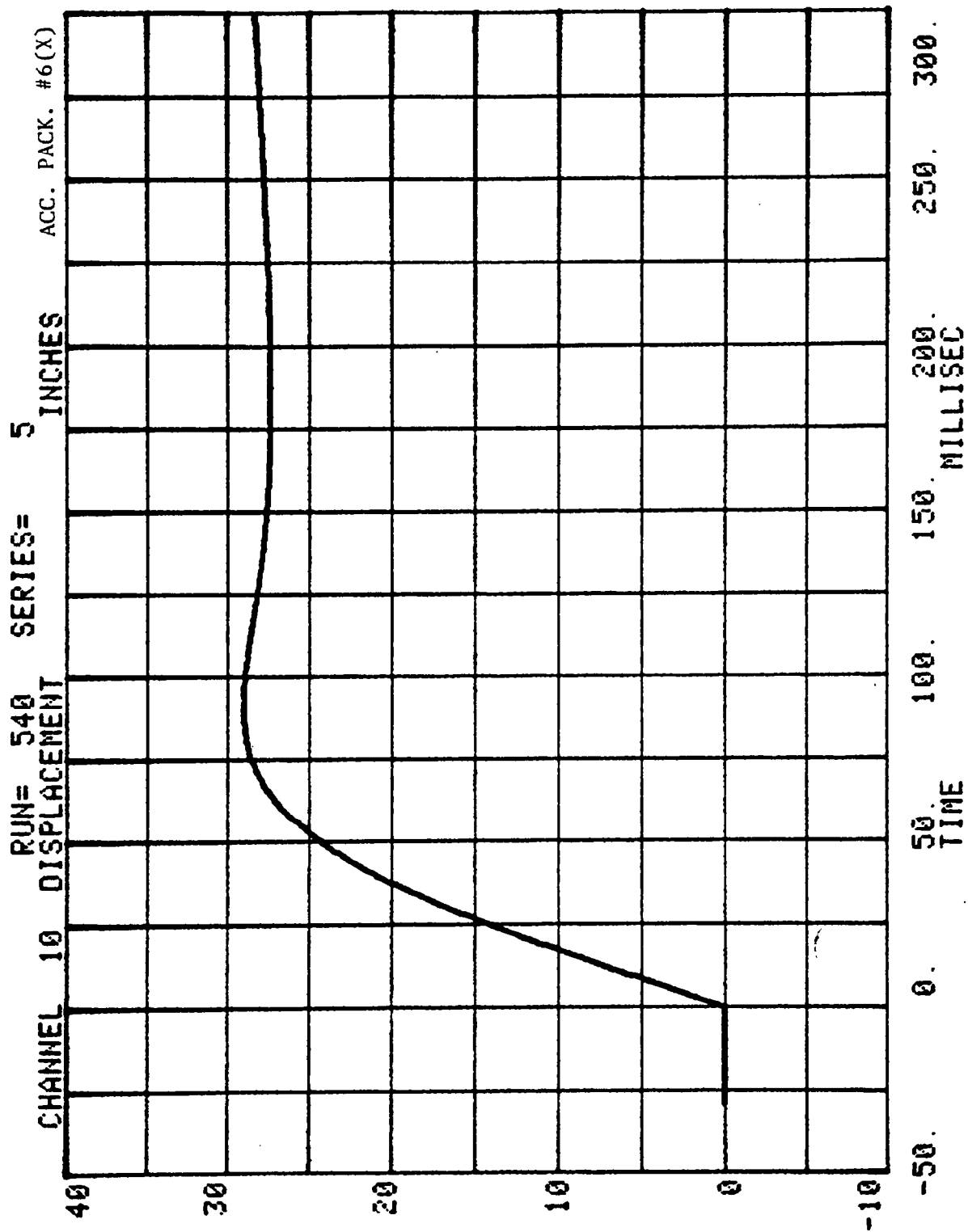


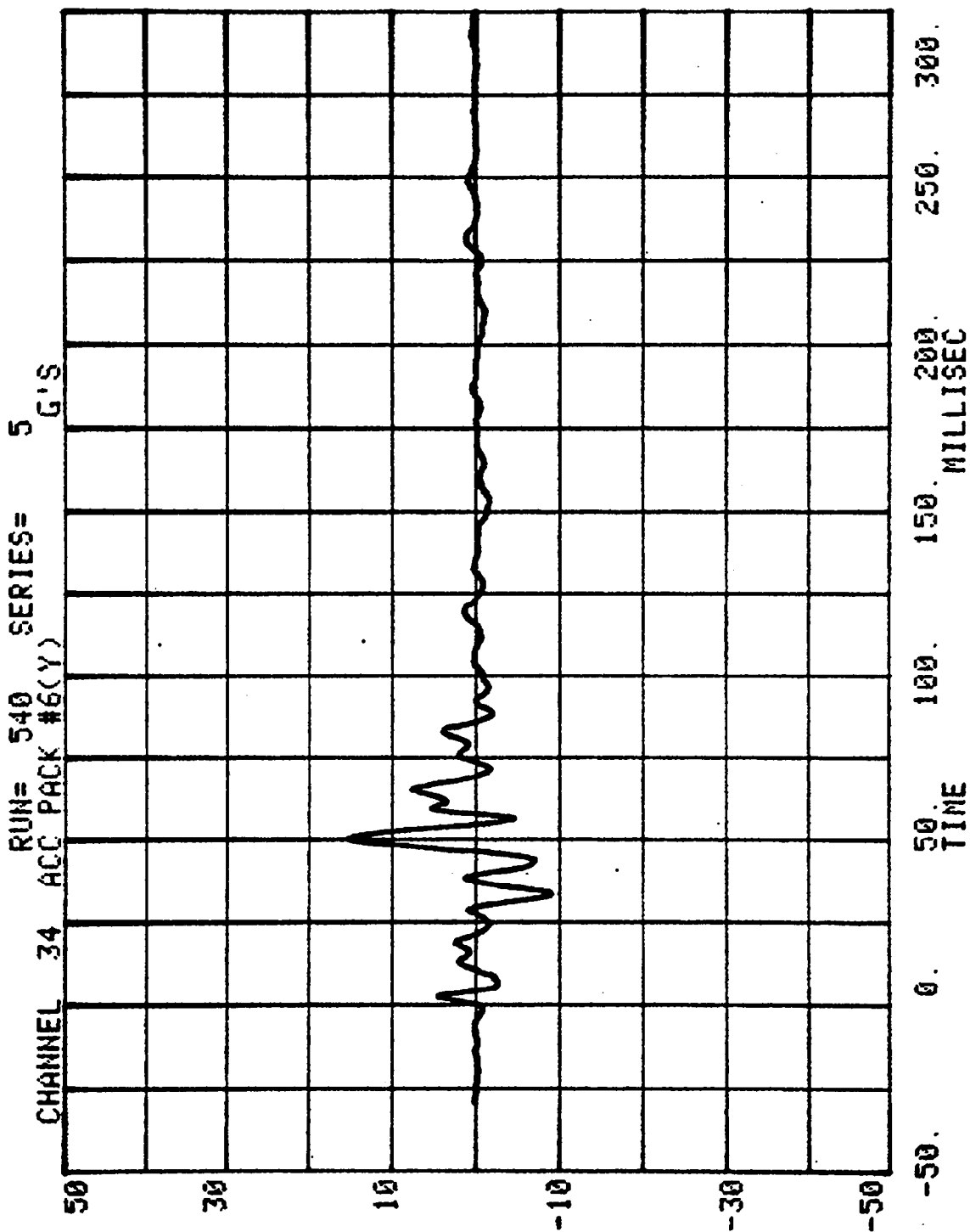
CHANNEL 32 ACC PACK #5(Z) RUN= 540 SERIES= 5 G'S



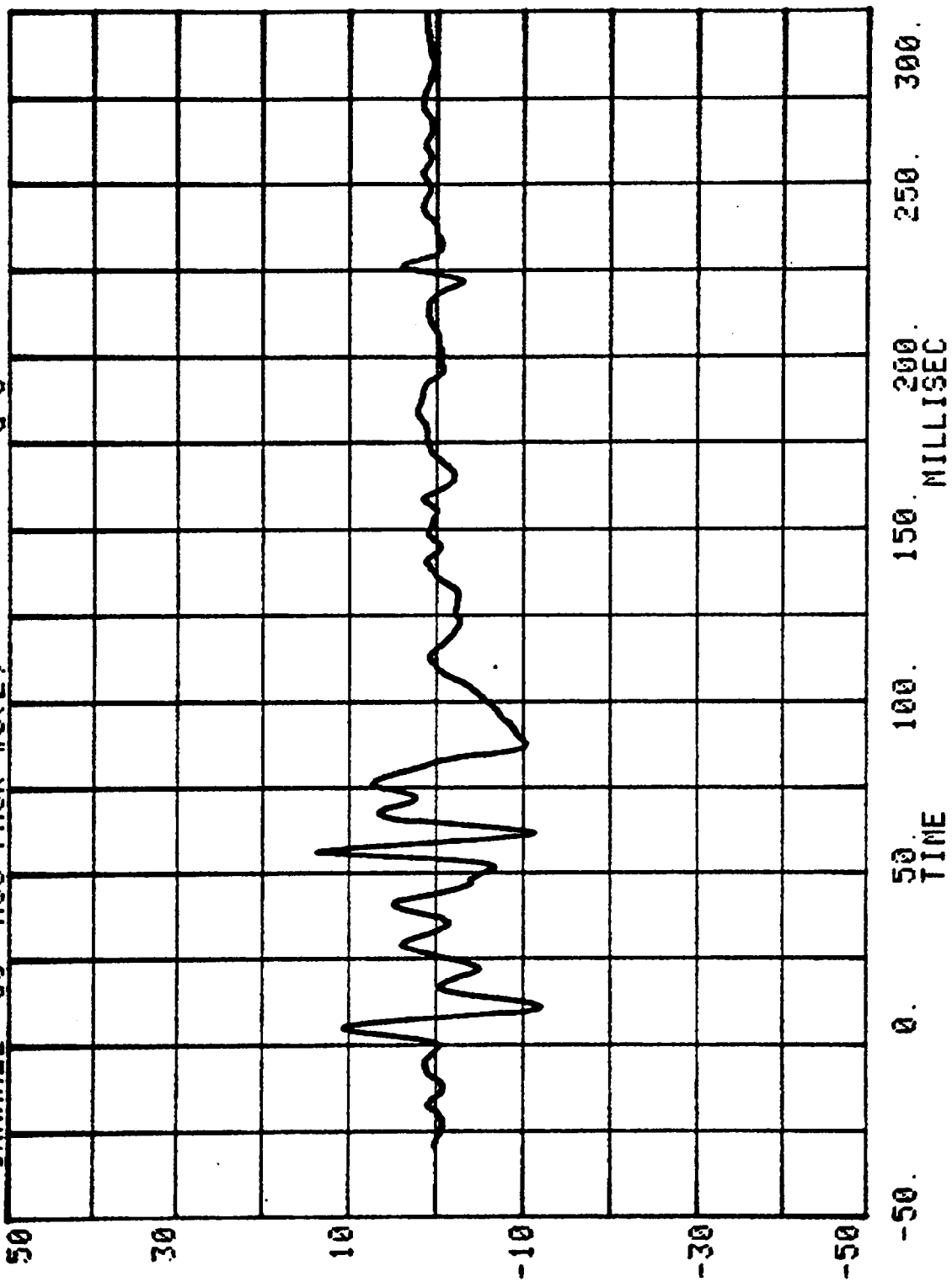








CHANNEL 35 ACC PACK #6(Z) RUN= 540 SERIES= 5 G'S



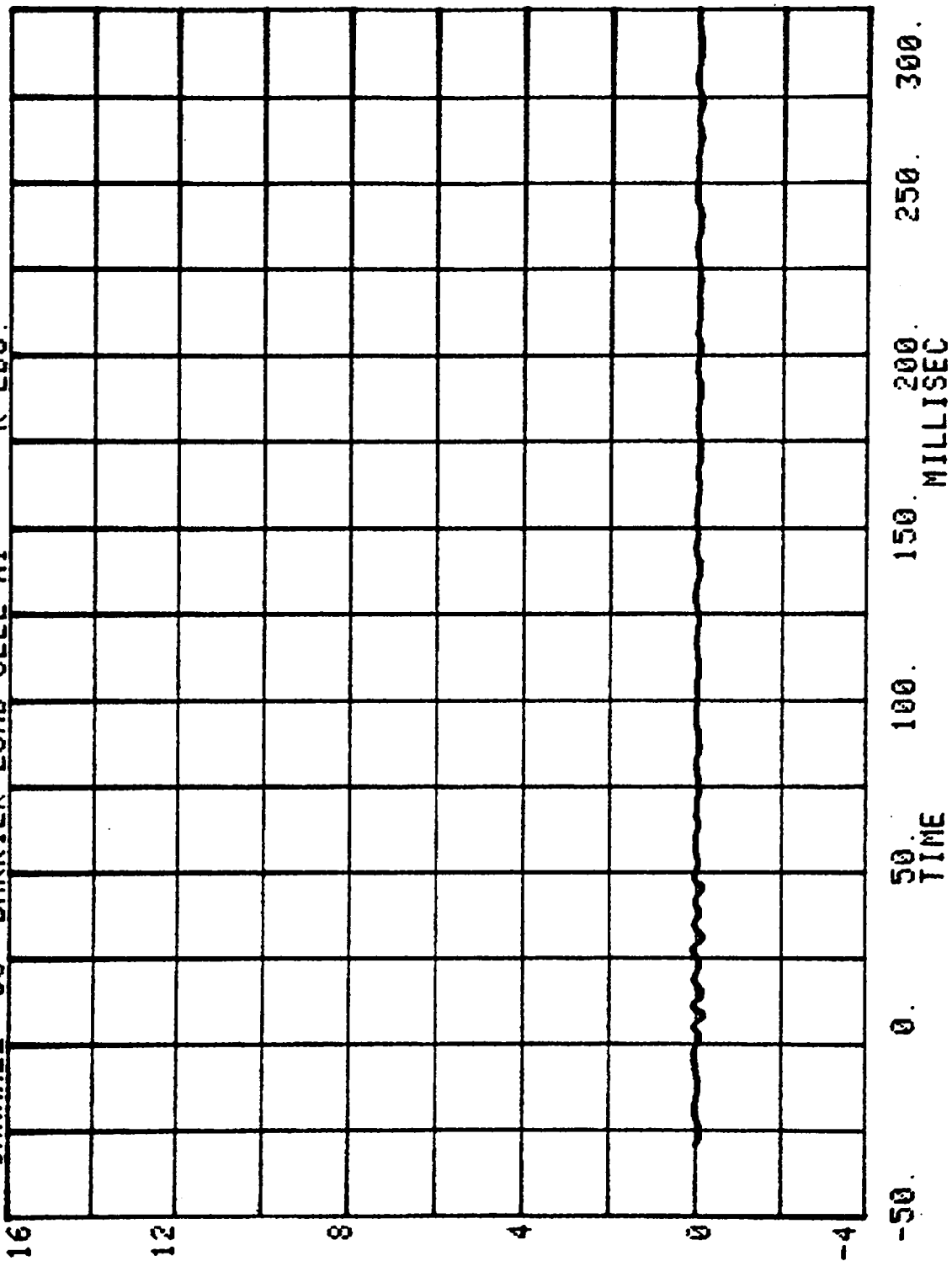
Test No. 703-5-540
1982 Volkswagen Scirocco

LOAD CELL BARRIER DATA

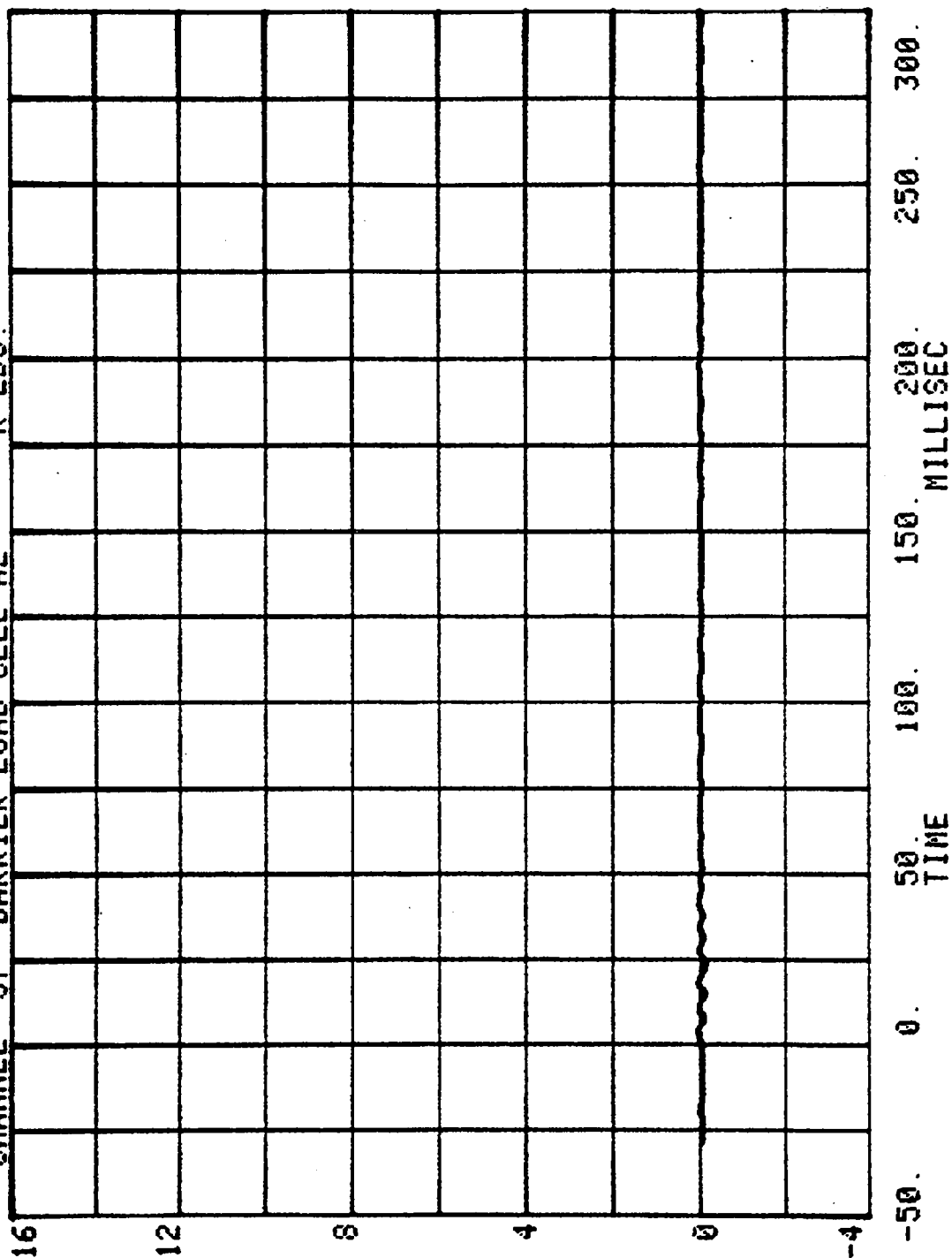
FILTER CHANNEL CLASS

60

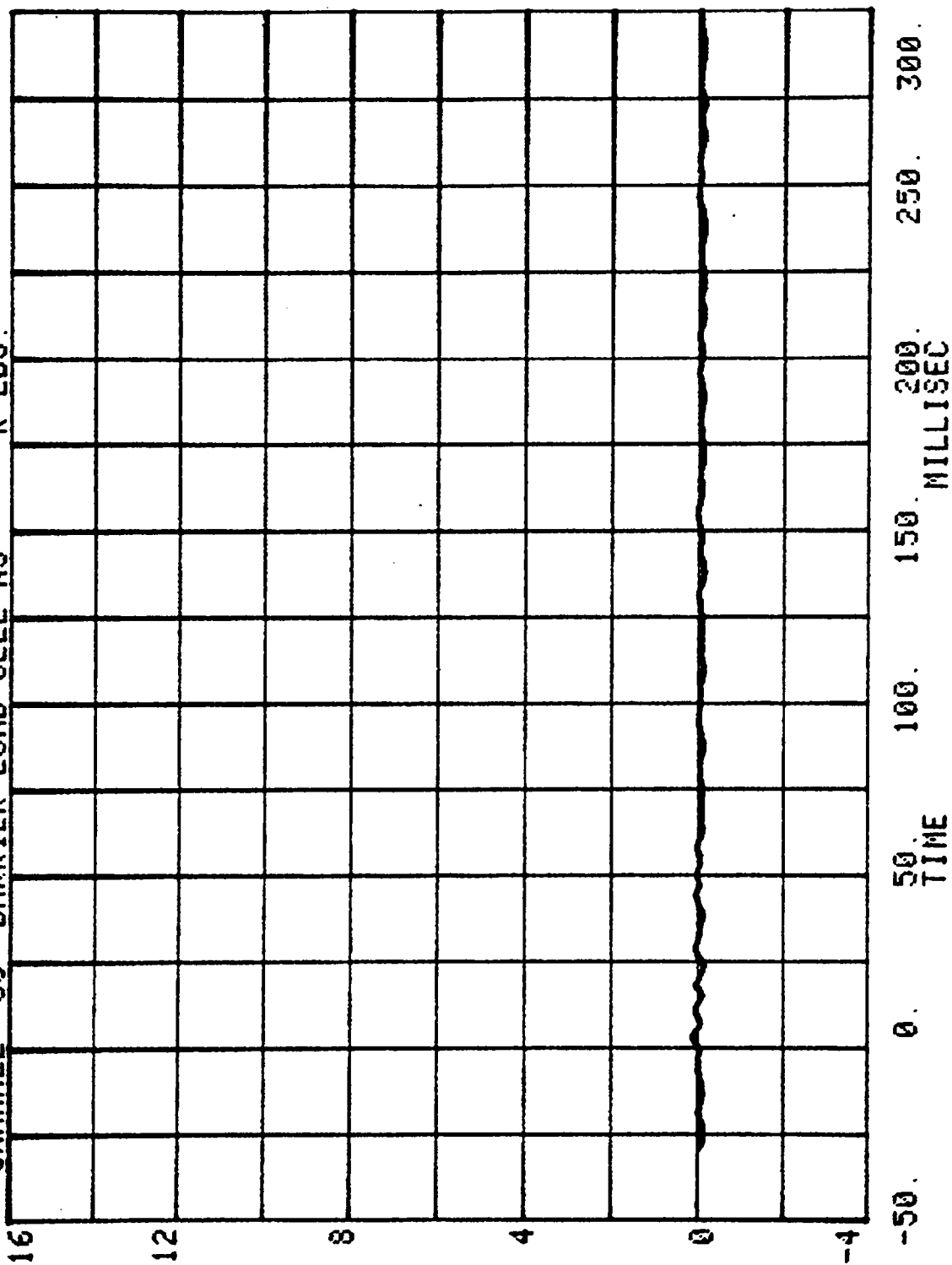
CHANNEL 36 BARRIER LOAD CELL A1 RUN= 540 SERIES= 5 K LBS.



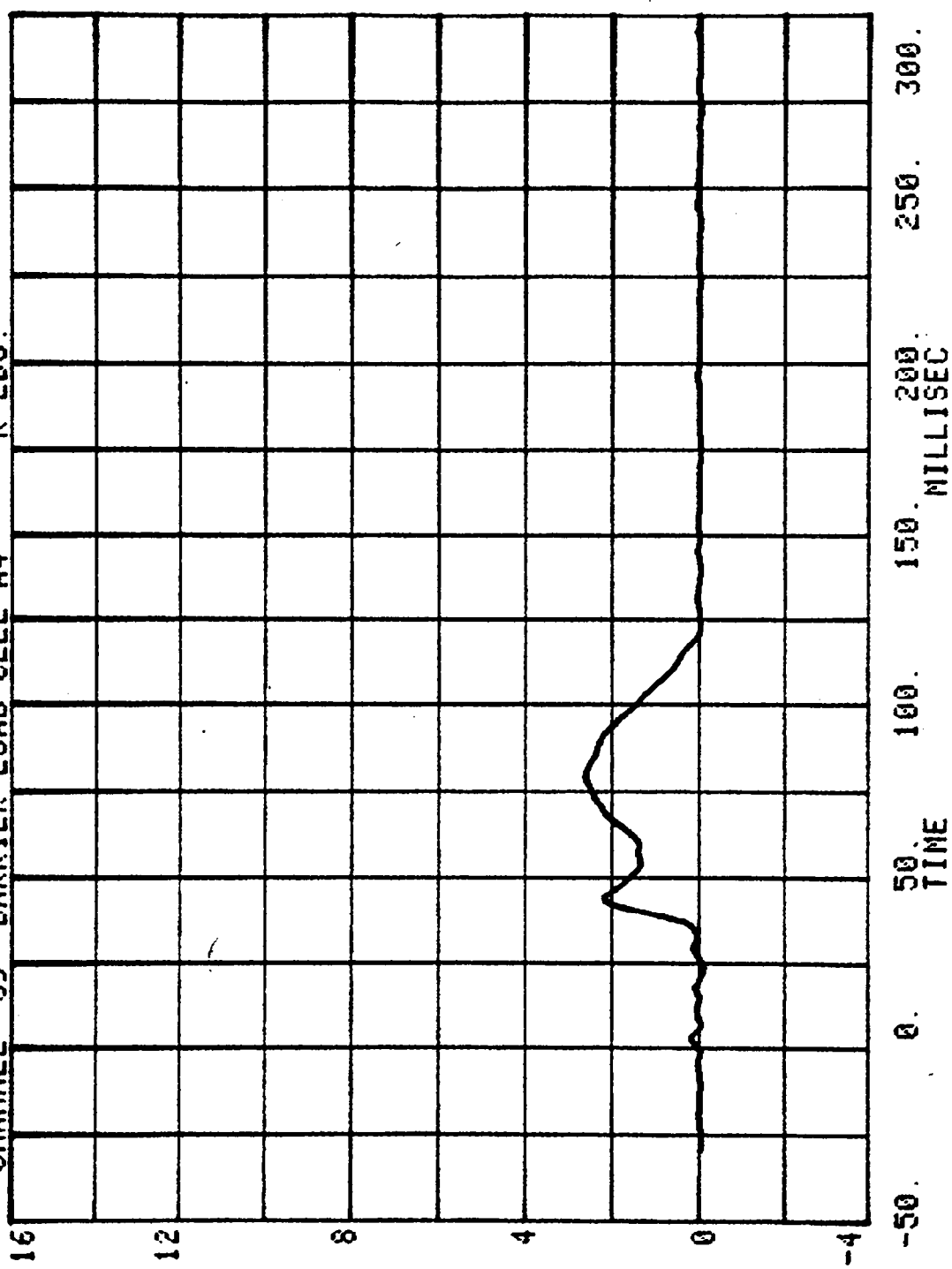
CHANNEL 37 BARRIER LOAD CELL A2 RUN= 540 SERIES= 5 K LBS.

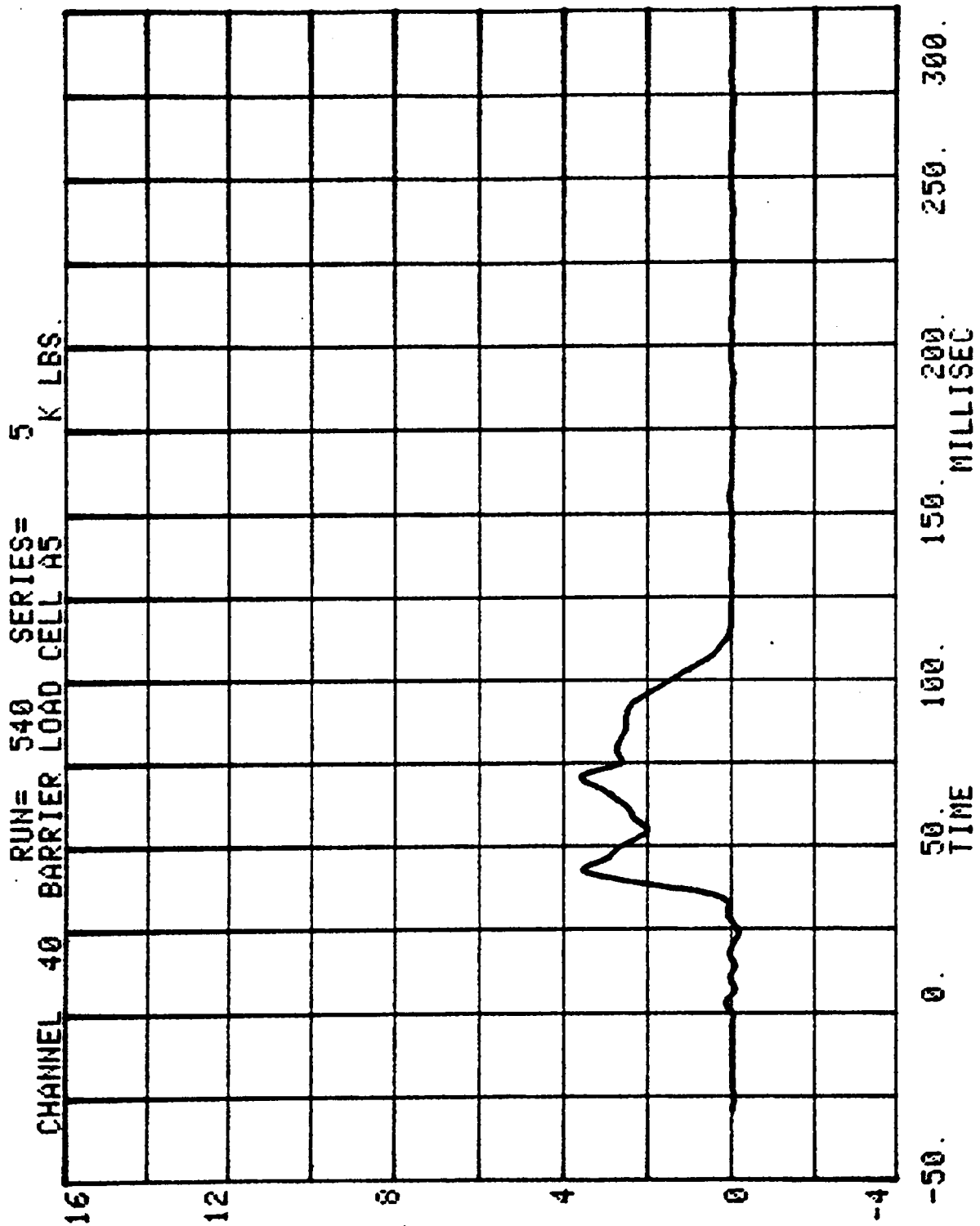


CHANNEL 38 BARRIER LOAD CELL A3 RUN= 540 SERIES= 5 K LBS.

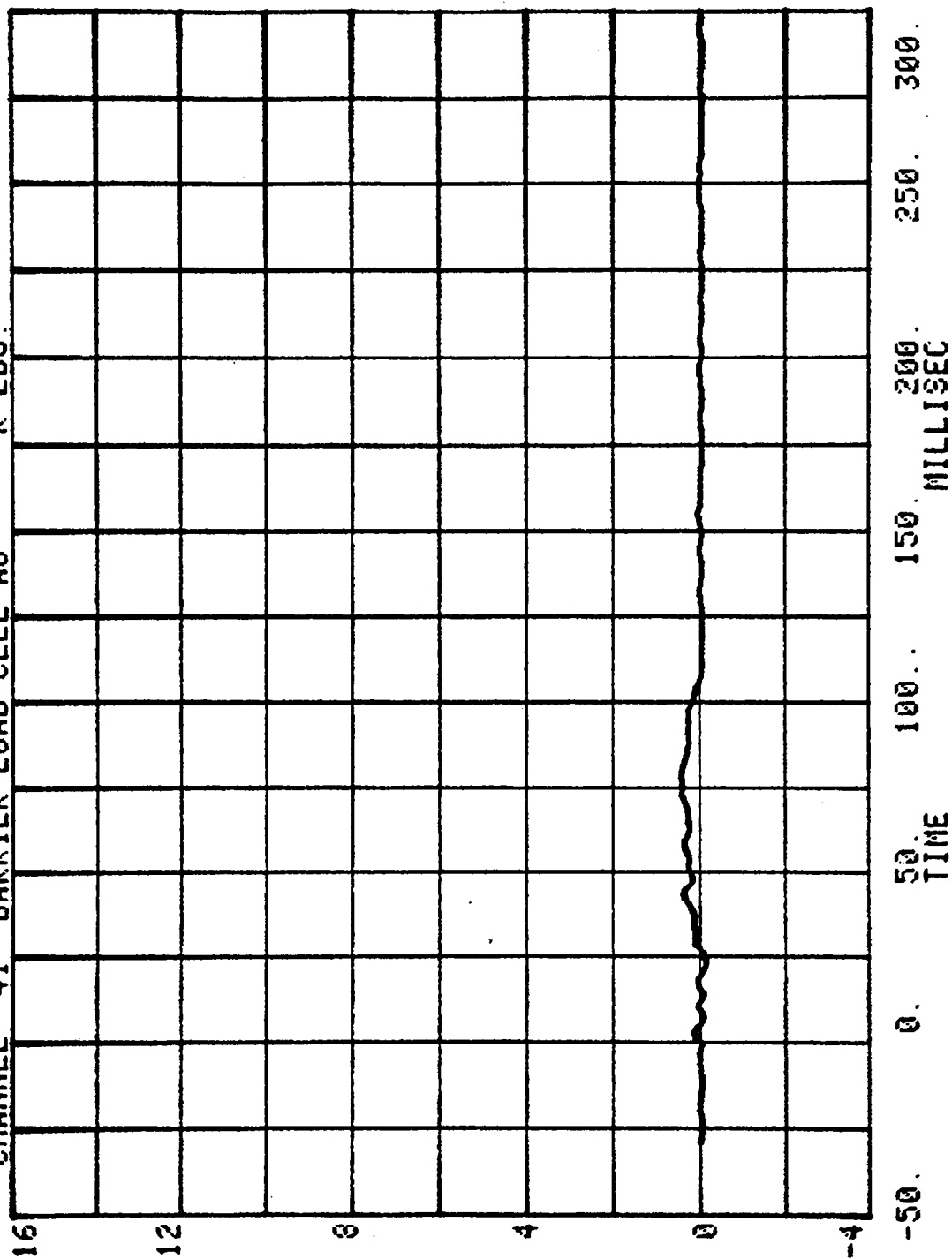


CHANNEL 39 BARRIER LOAD CELL A4 RUN= 540 SERIES= 5 K LBS.

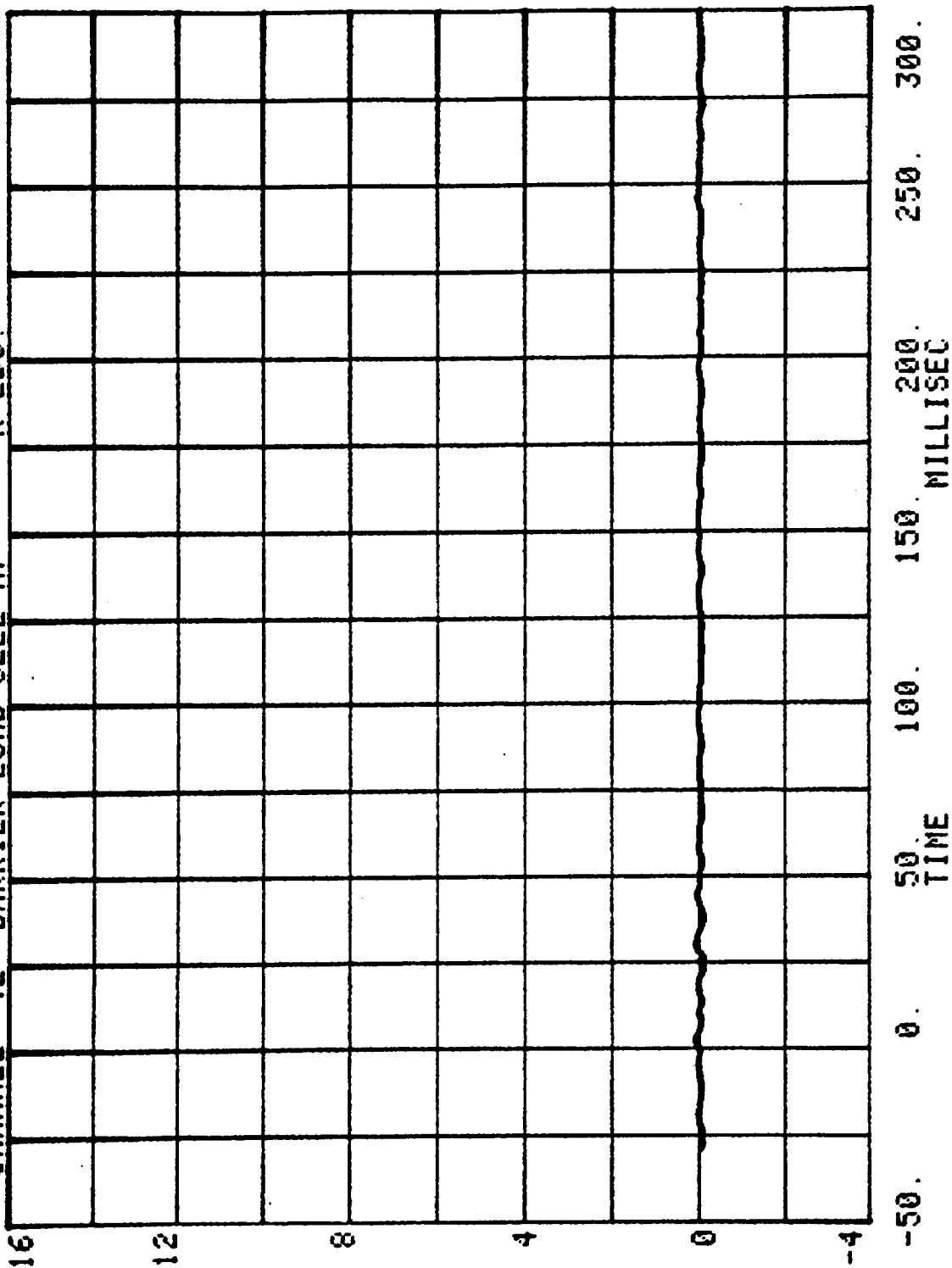




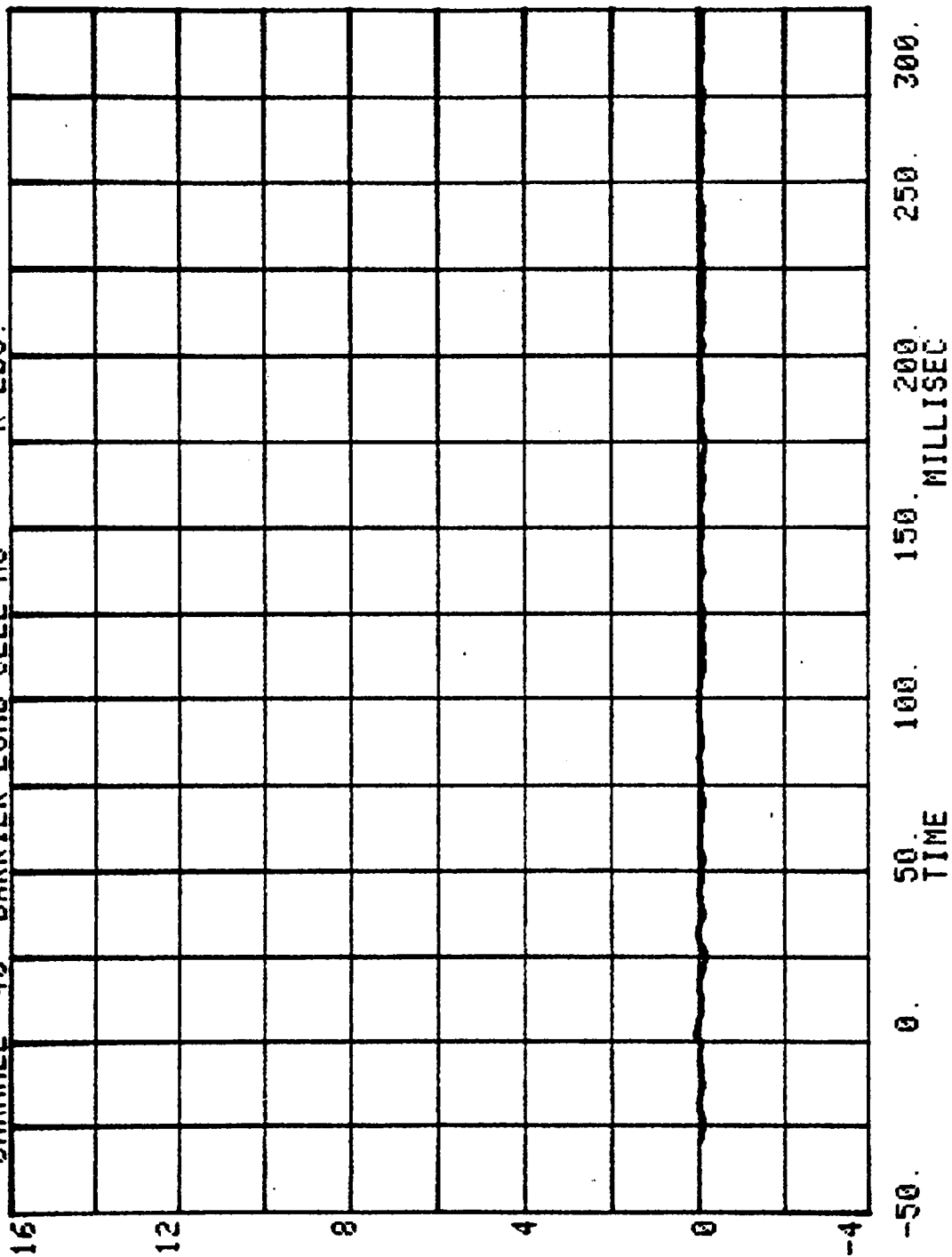
CHANNEL 41 RUN= 540 SERIES= 5
BARRIER LOAD CELL A6 K LBS.



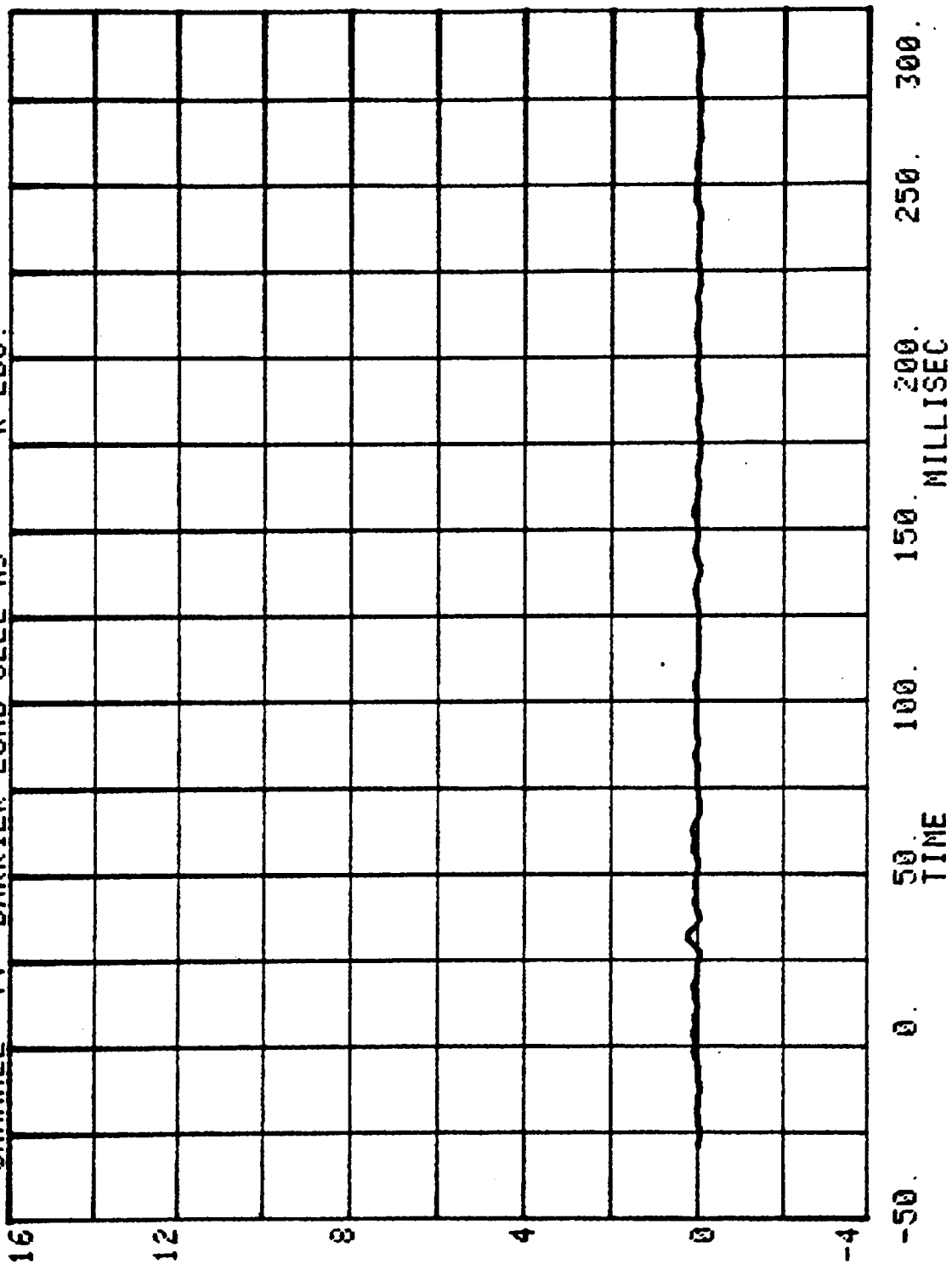
CHANNEL 42 (BARRIER LOAD CELL A7) RUN= 540 SERIES= 5 K LBS.



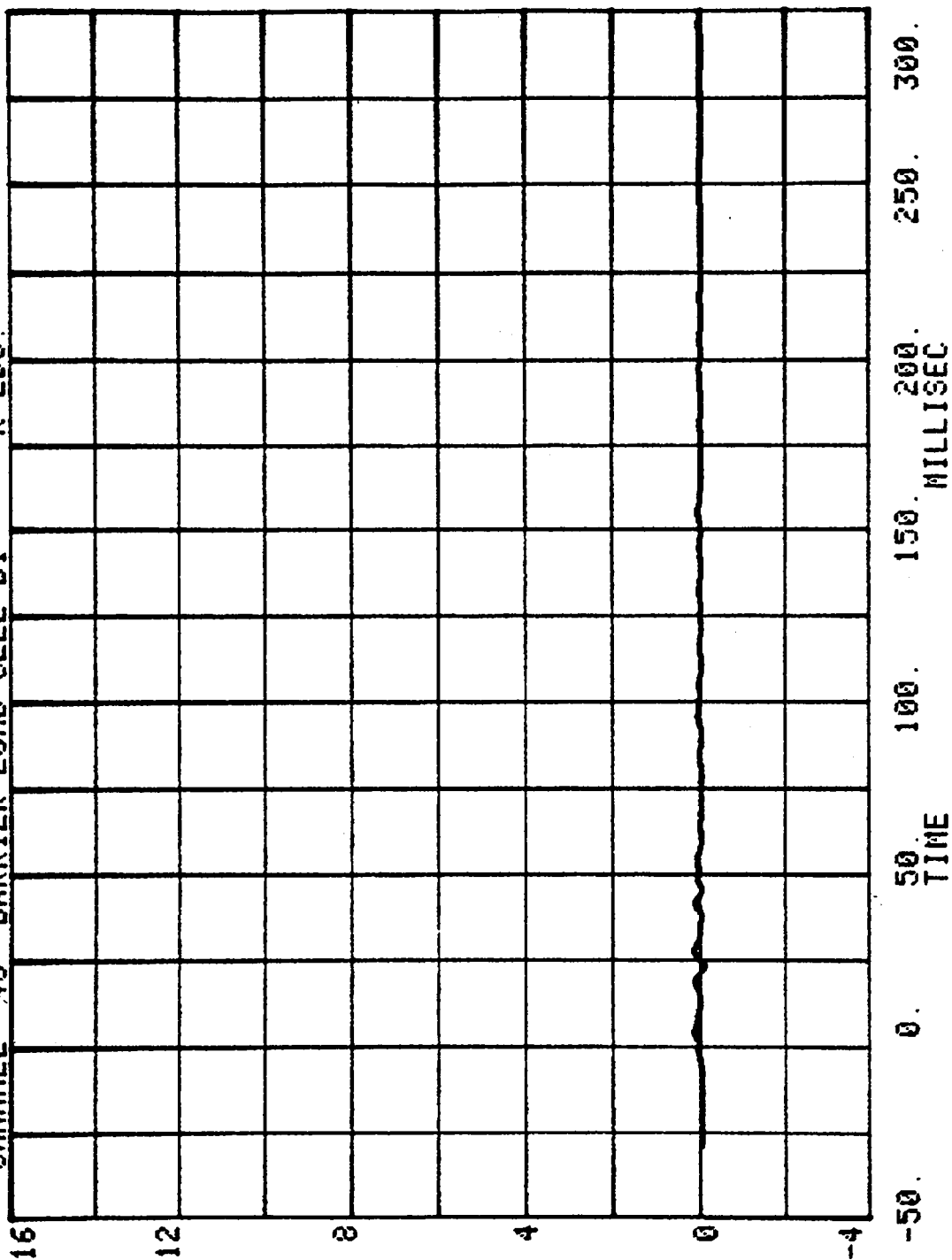
CHANNEL 43 BARRIER LOAD CELL A8 RUN= 540 SERIES= 5 K LBS.

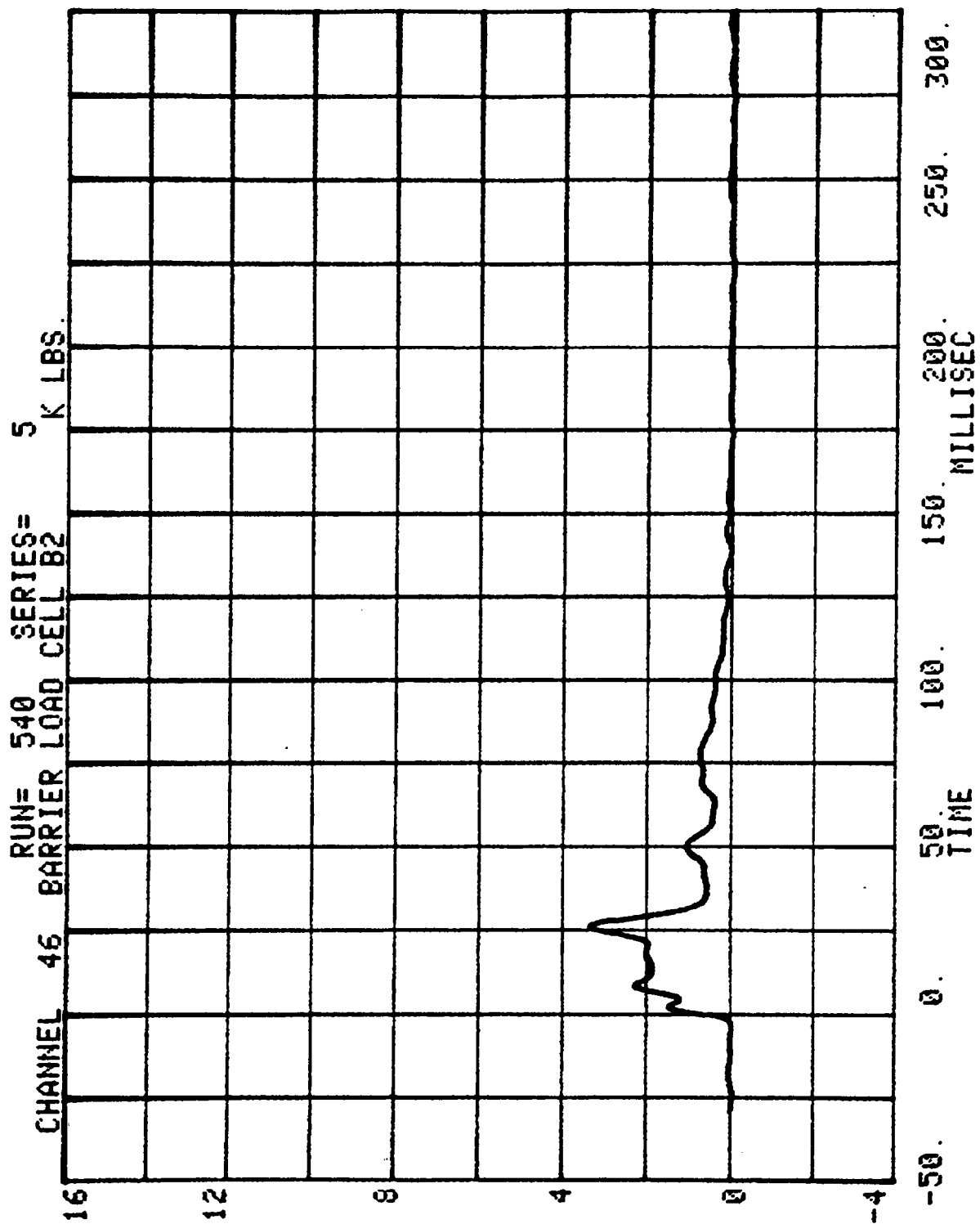


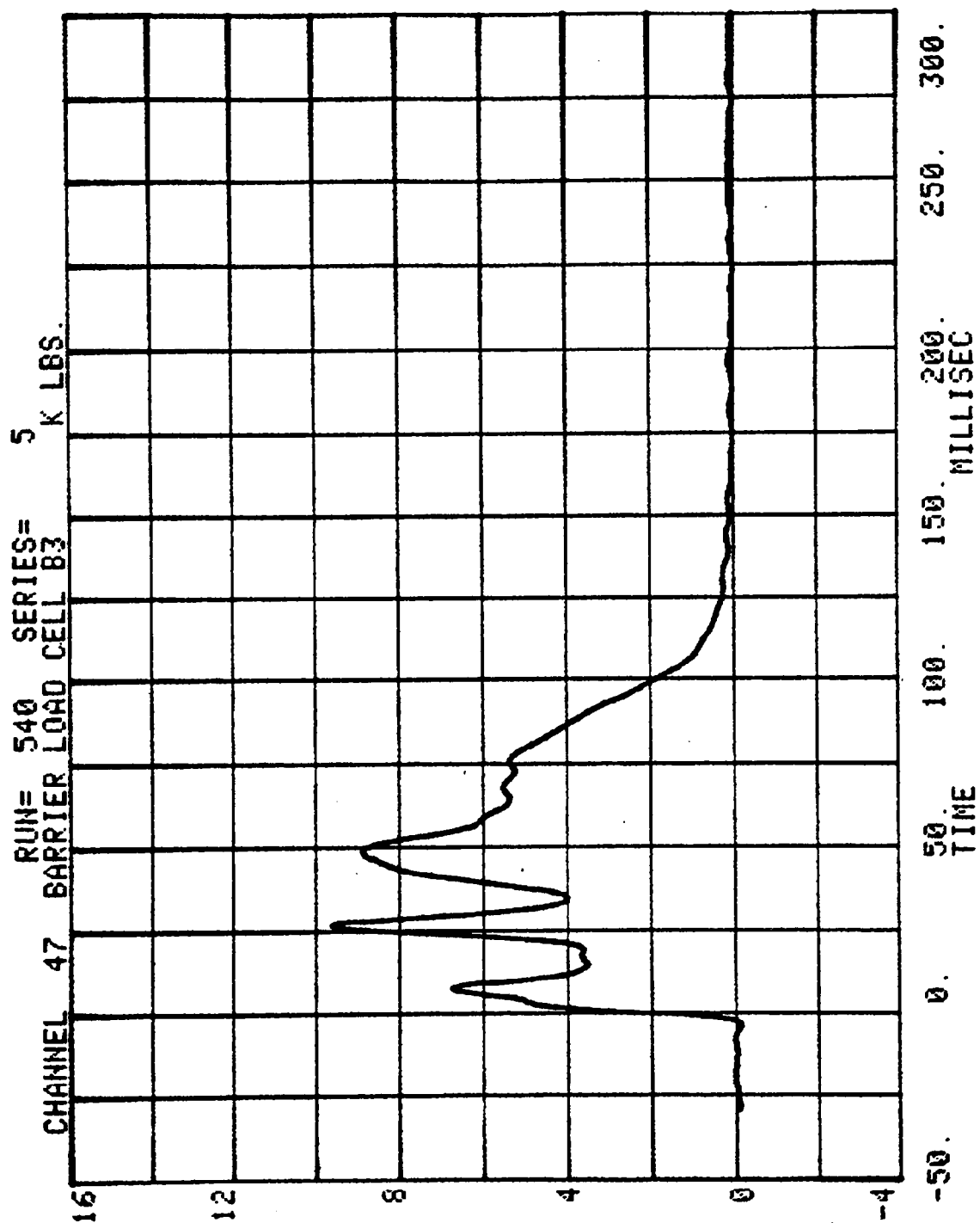
CHANNEL 44 RUN= 540 SERIES= 5 K LBS.
BARRIER LOAD CELL A9

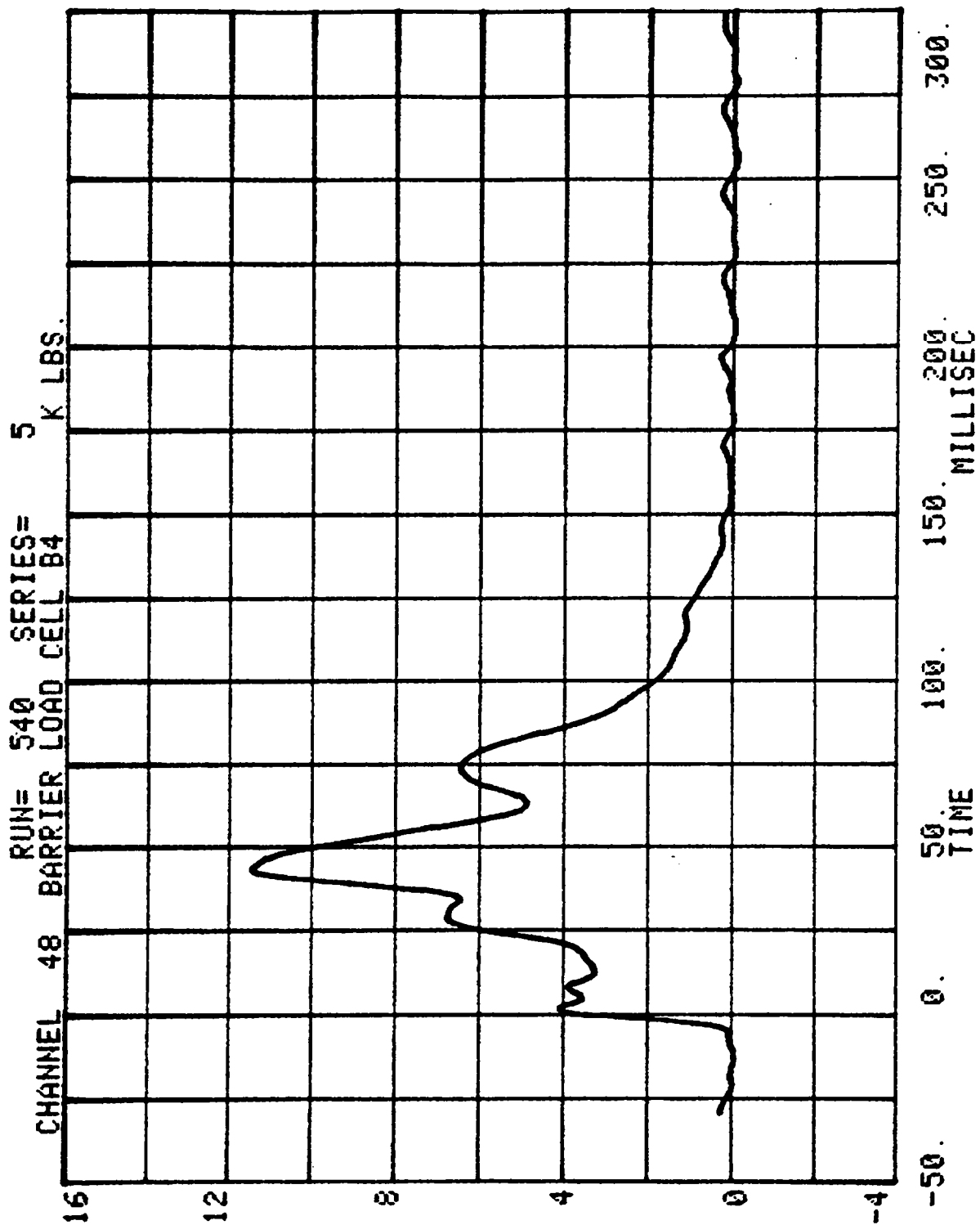


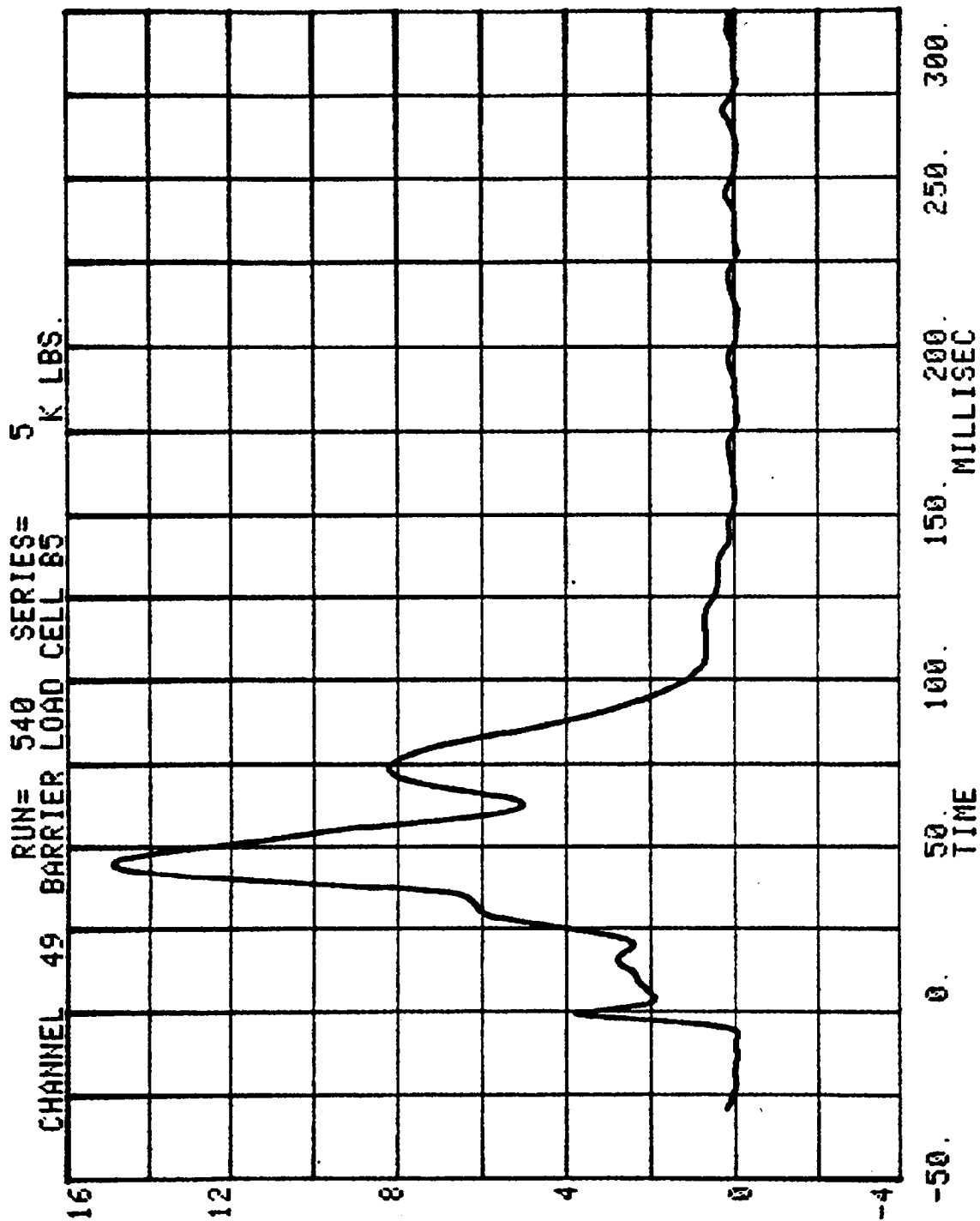
RUN= 540 SERIES= 5
CHANNEL 45 BARRIER LOAD CELL B1 K LBS.

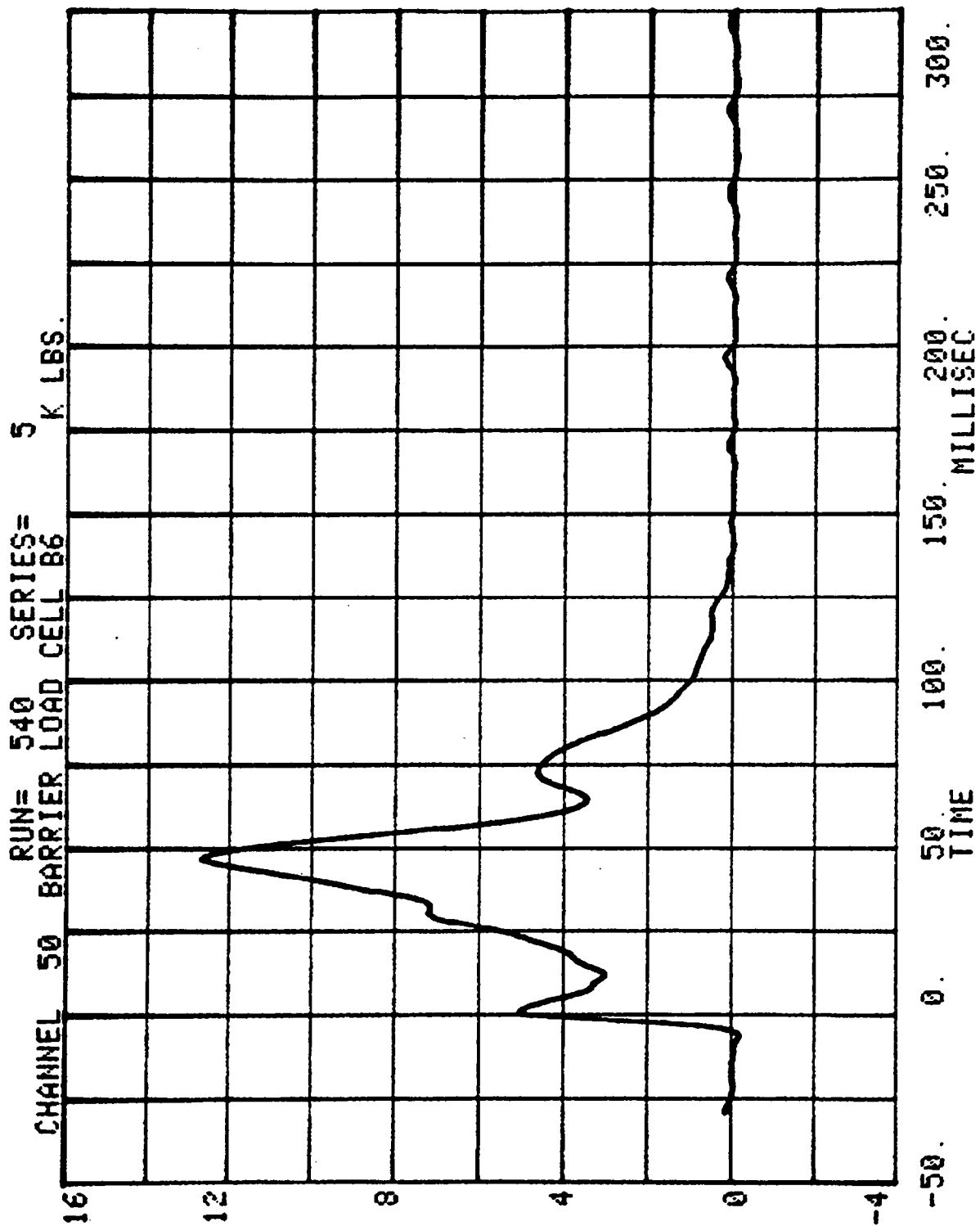


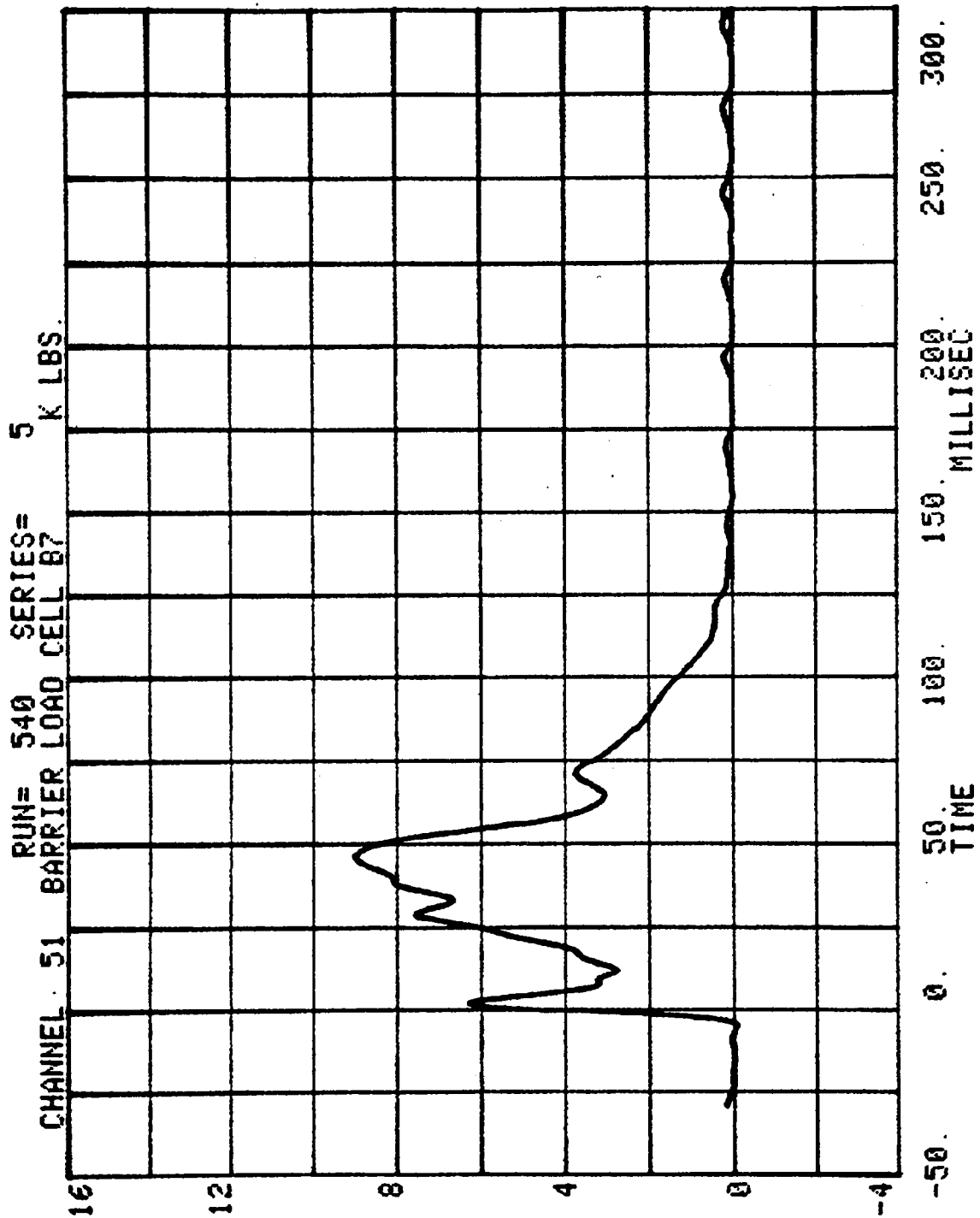








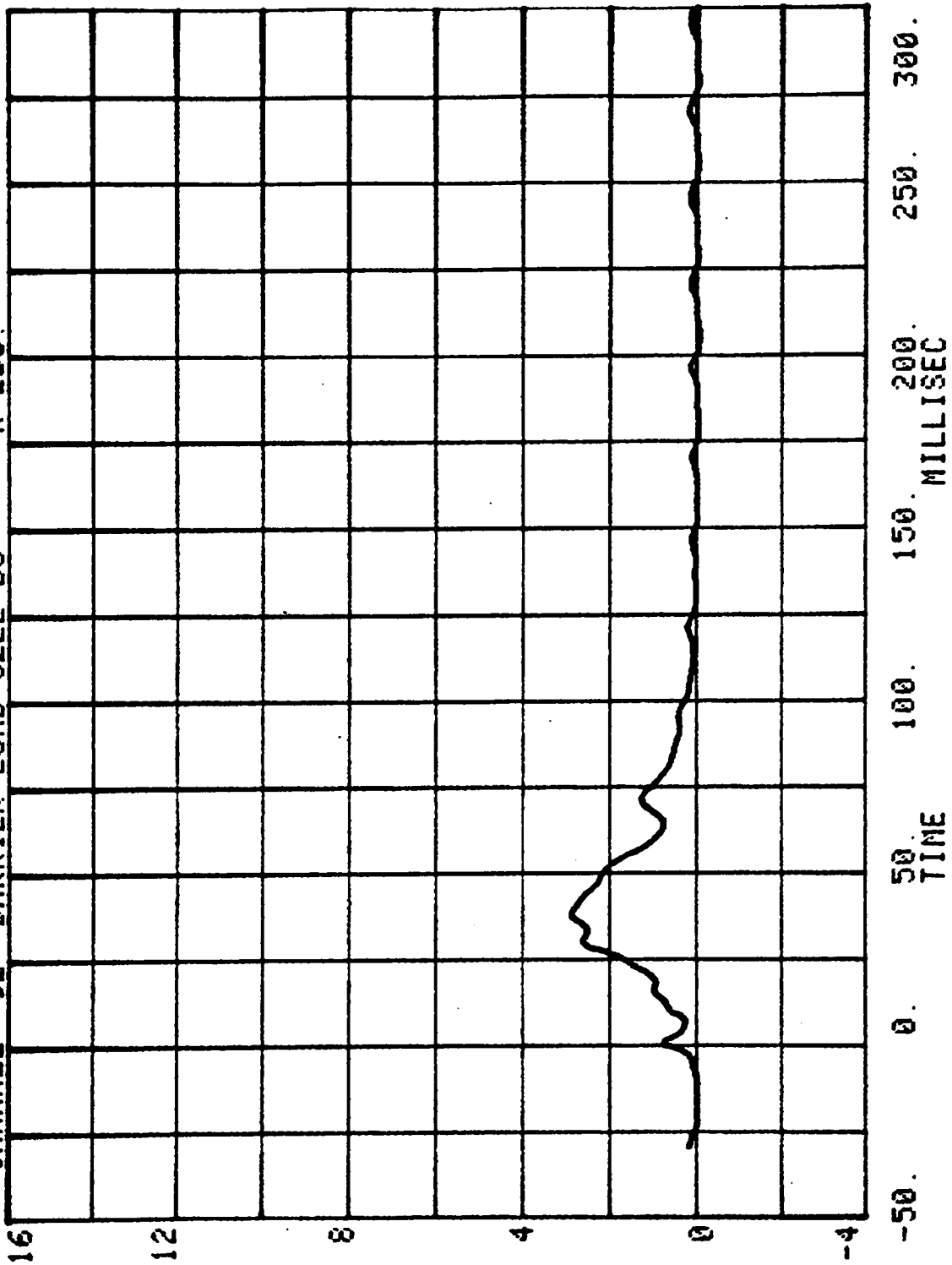


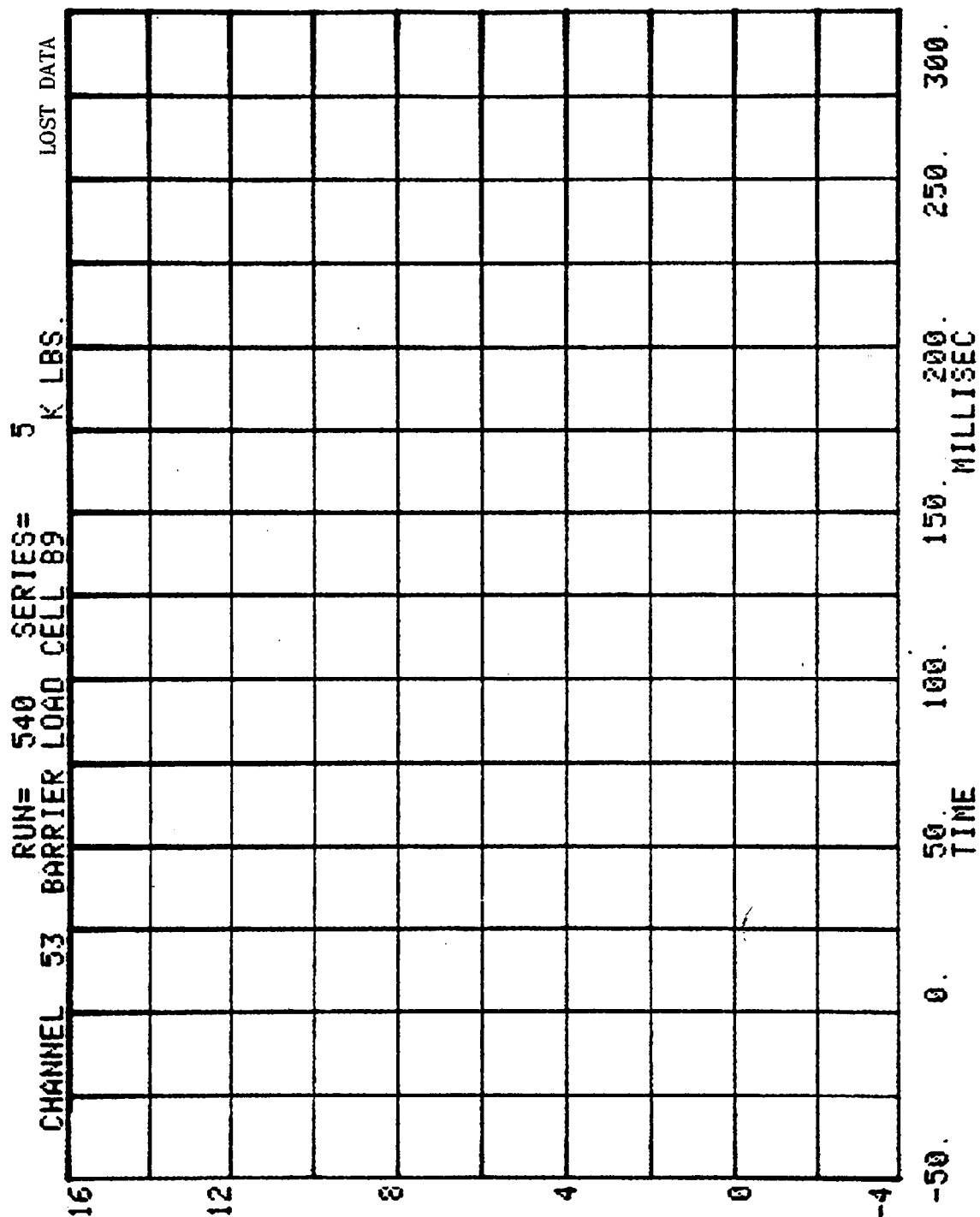


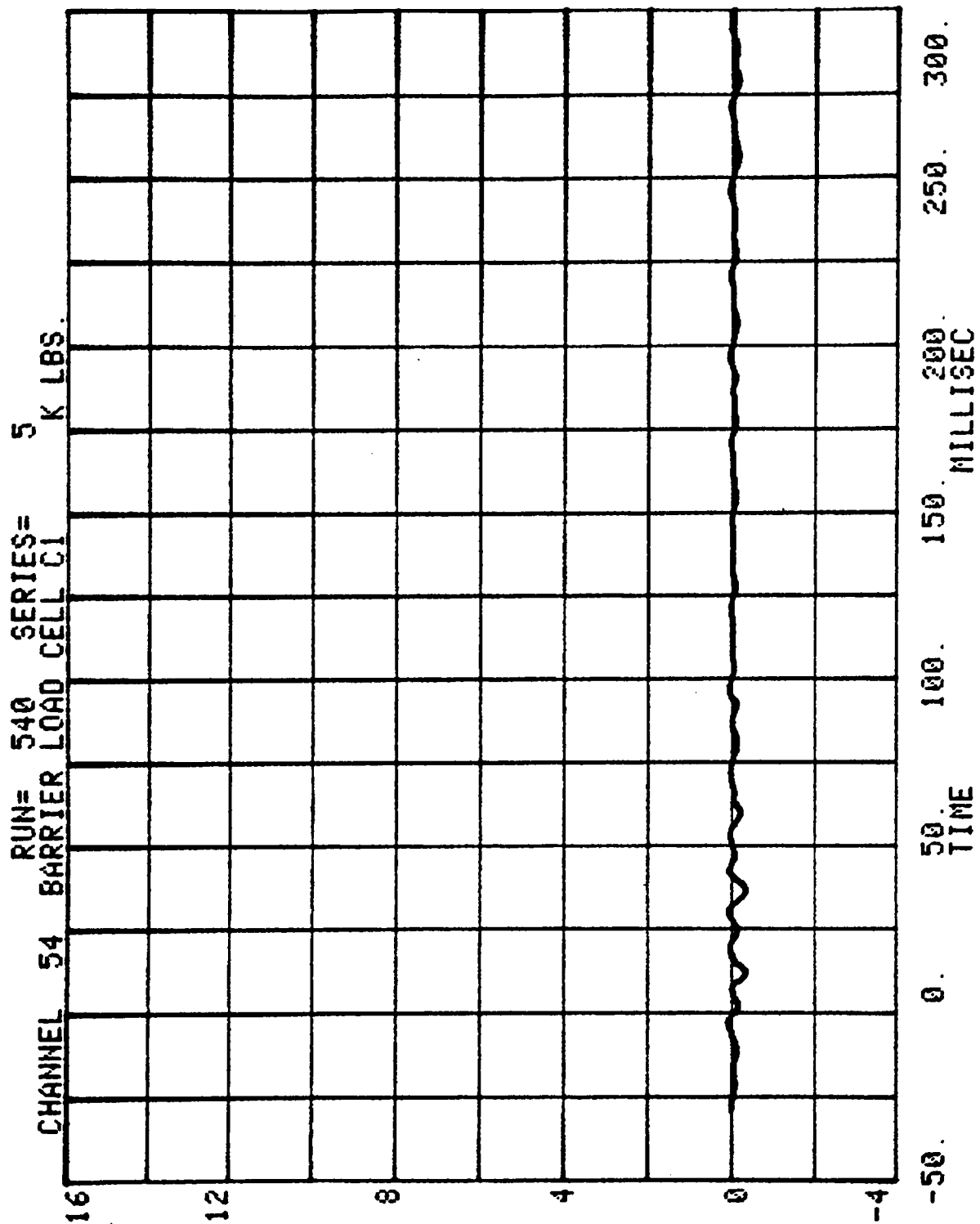
CHANNEL 52 BARrier LOAD CELL B8

RUN= 540 SERIES= 5

K LBS.



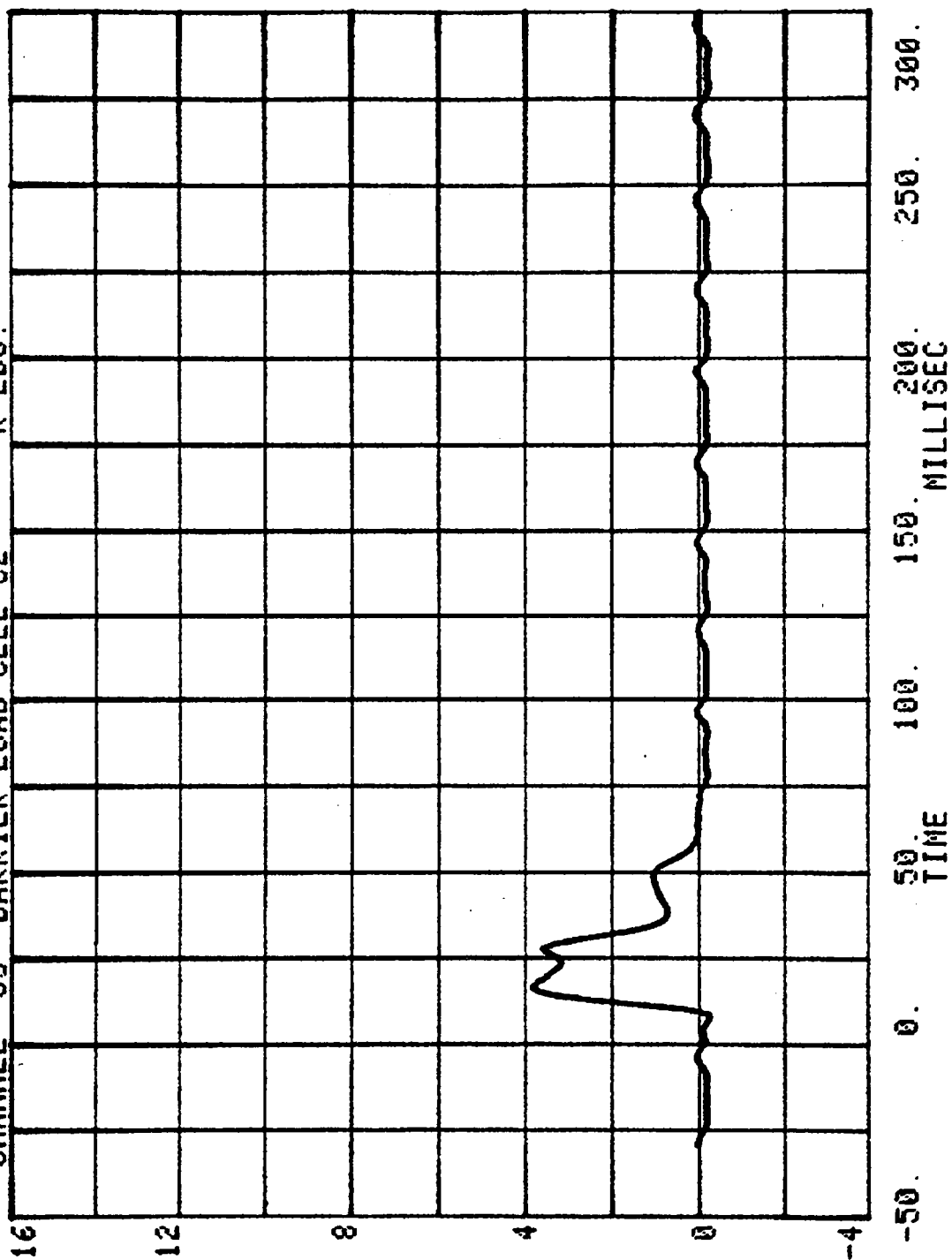




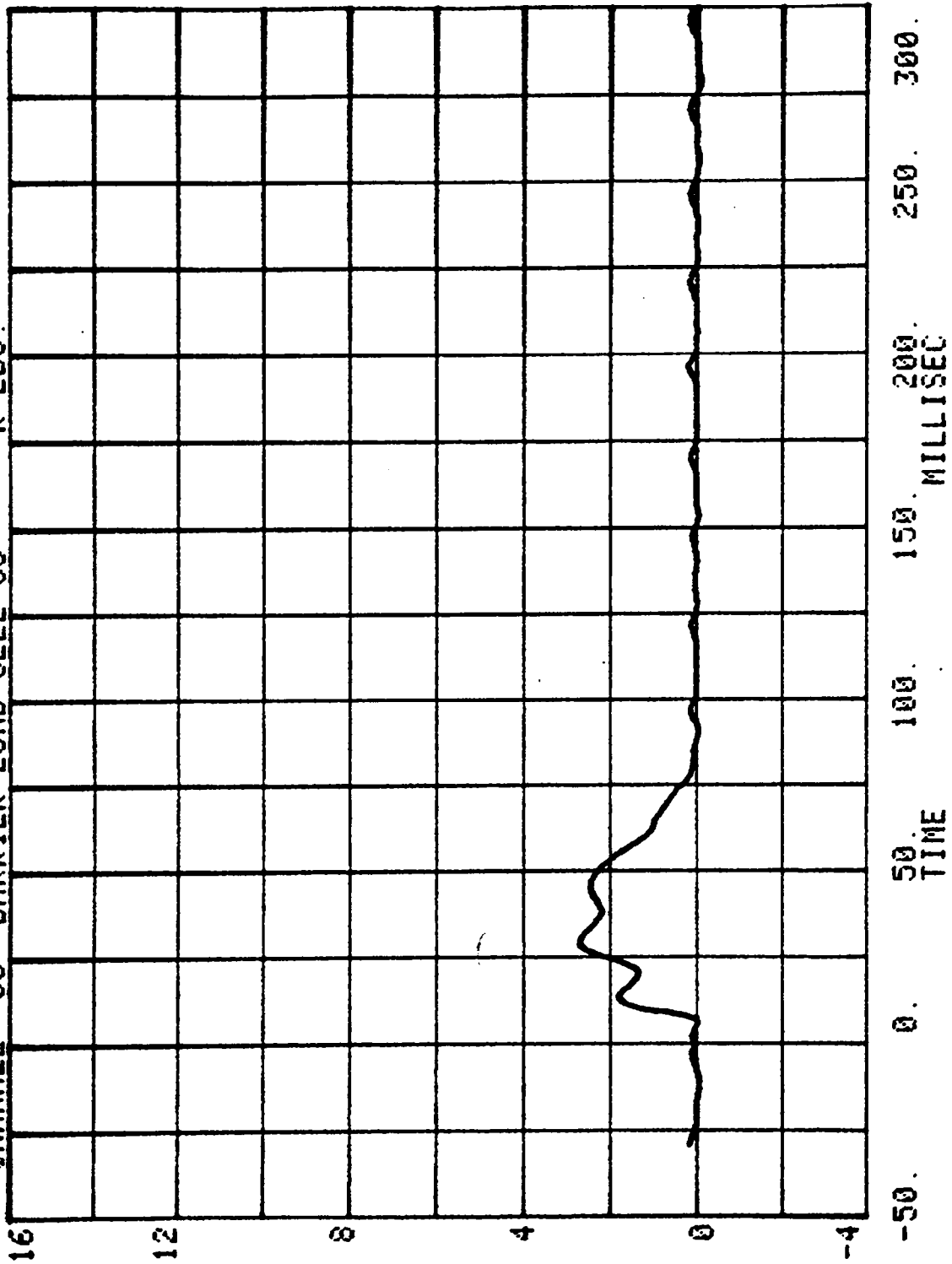
CHANNEL 55 BARRIER LOAD CELL C2

RUN= 540 SERIES= 5

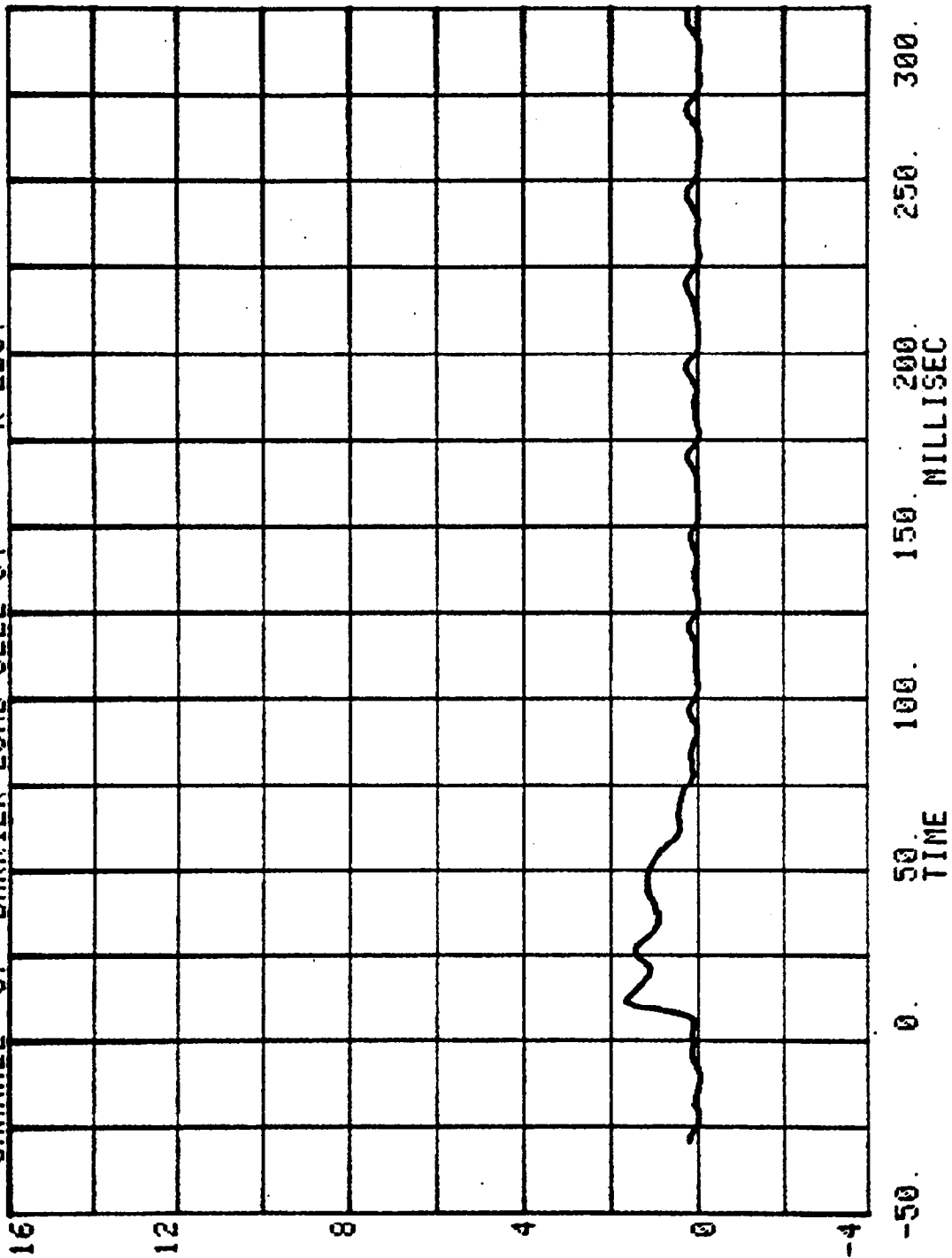
K LBS.



CHANNEL 56 BARRIER LOAD CELL C3 RUN= 540 SERIES= 5 K LBS.



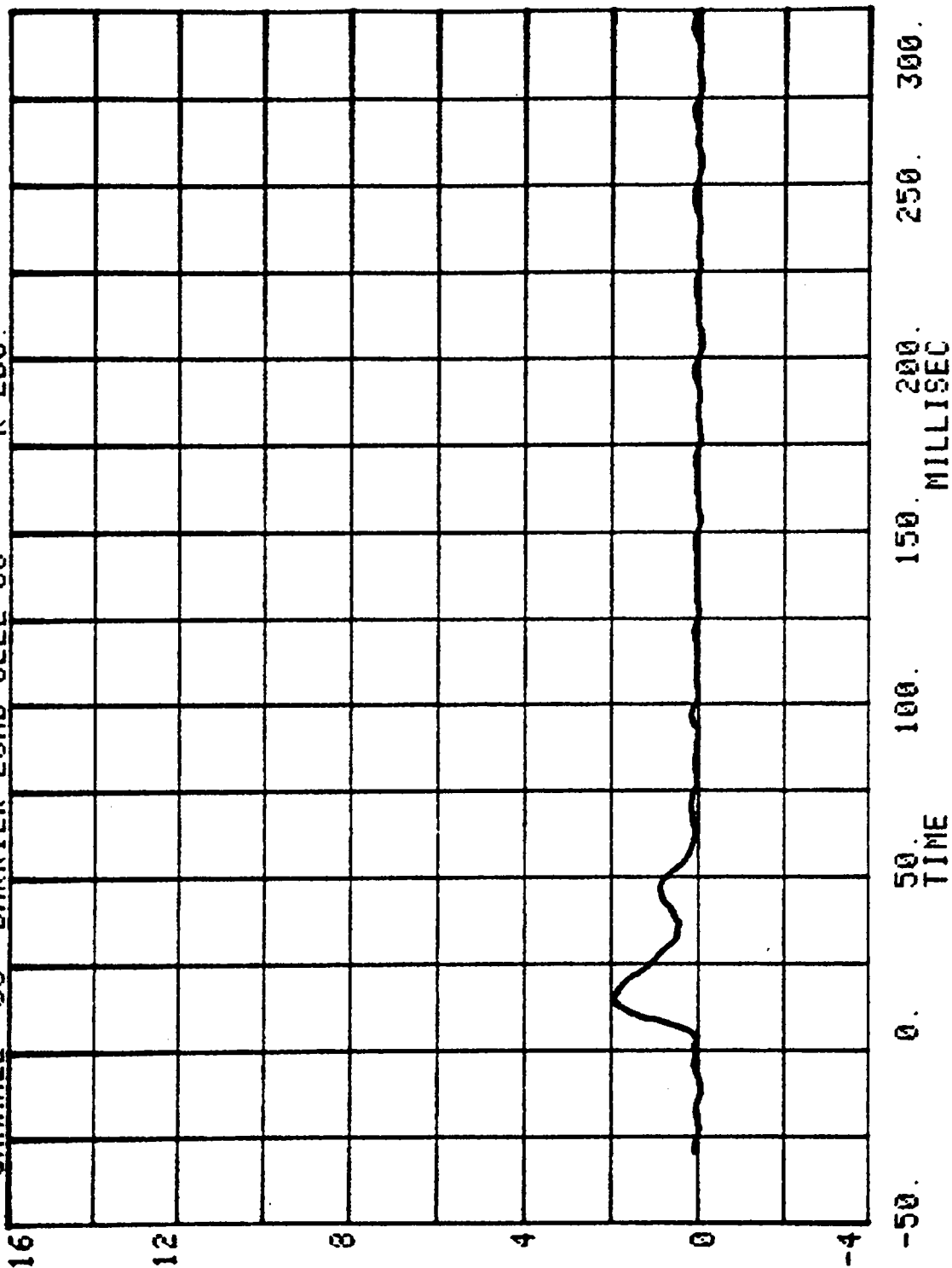
CHANNEL 57 RUN= 540 SERIES= 5 K LBS.
BARRIER LOAD CELL C4

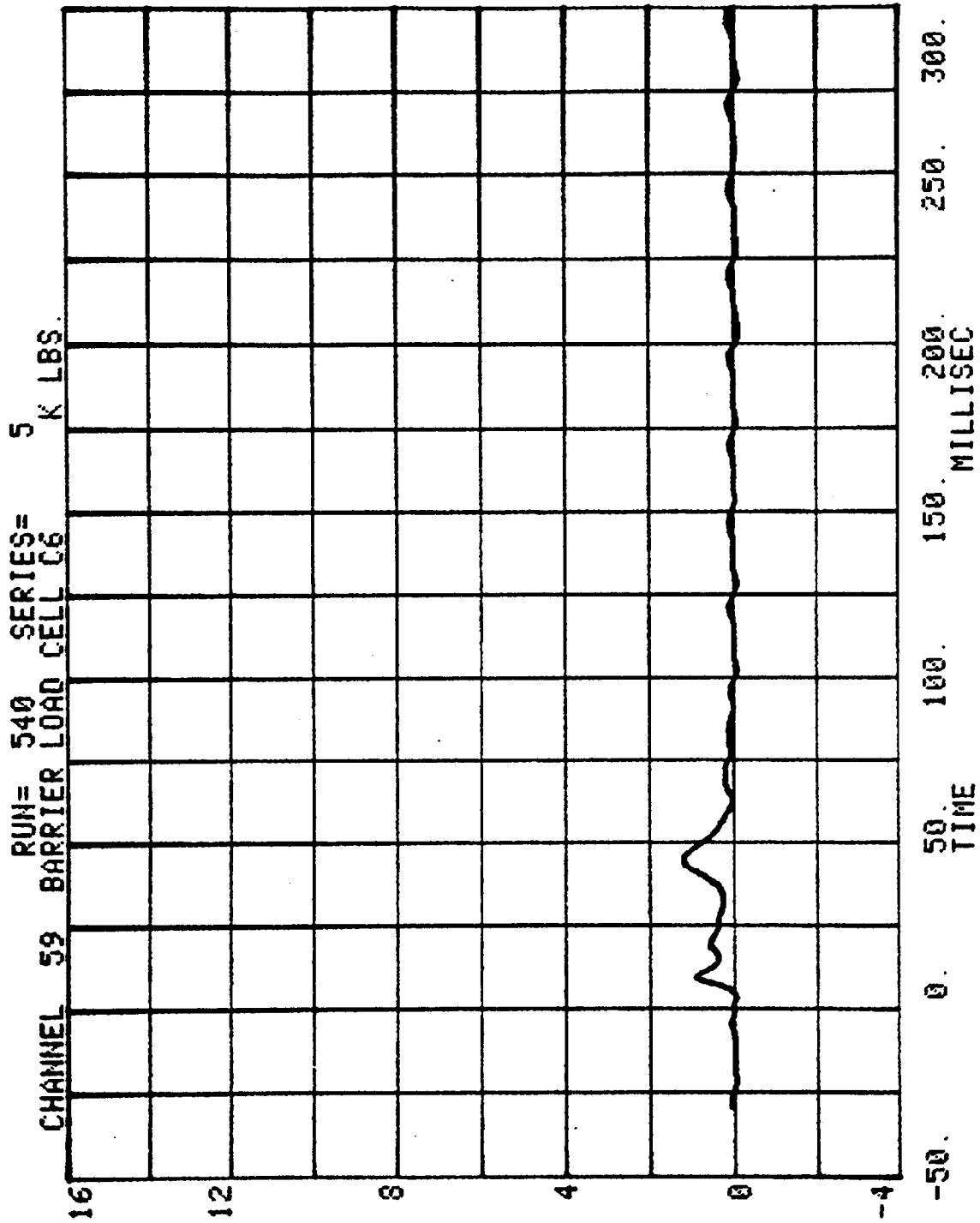


CHANNEL 58 BARRIER LOAD CELL C5

RUN= 540 SERIES= 5

K LBS.





CHANNEL 60 BARRIER LOAD CELL C7

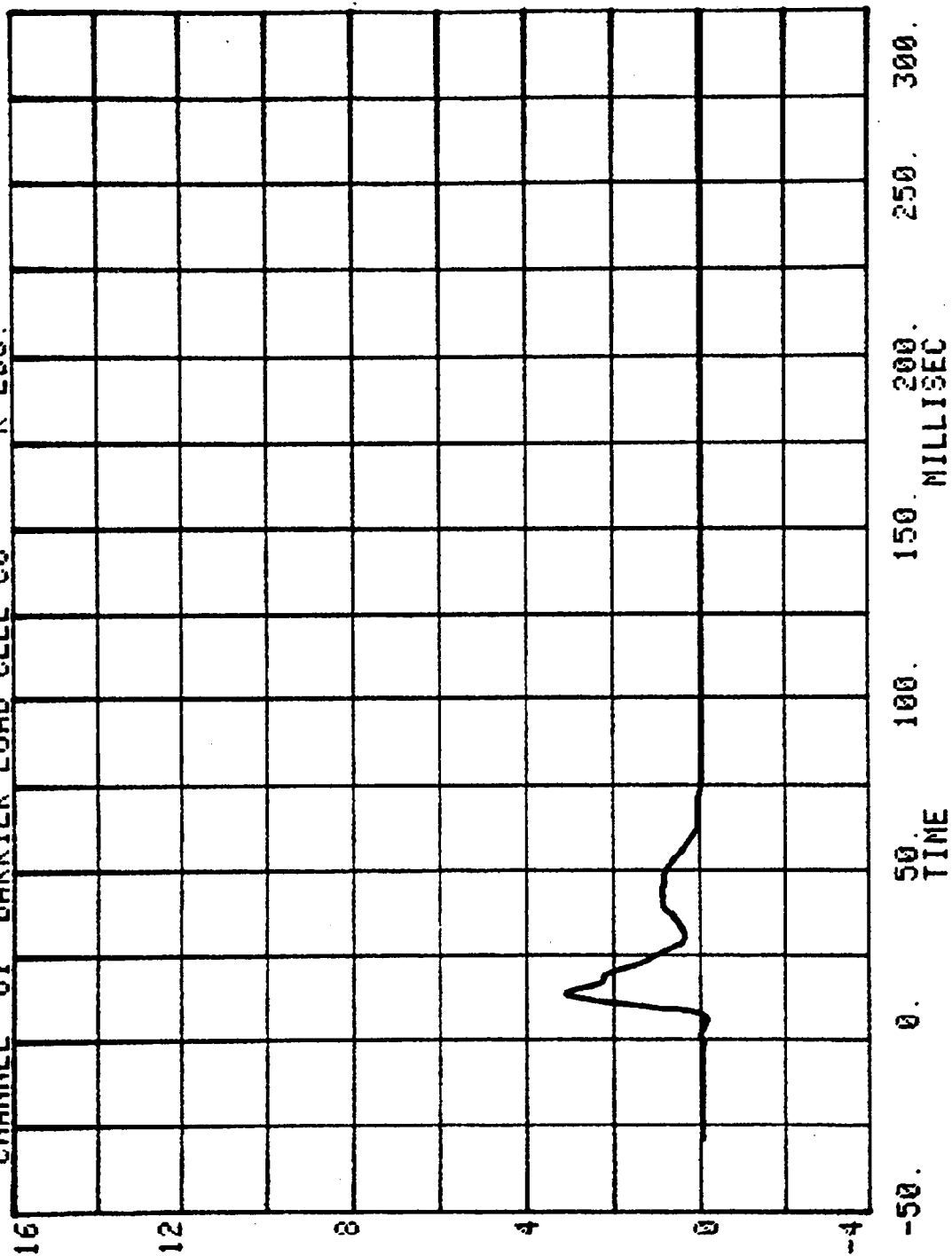
RUN= 540 SERIES= 5

K LBS.

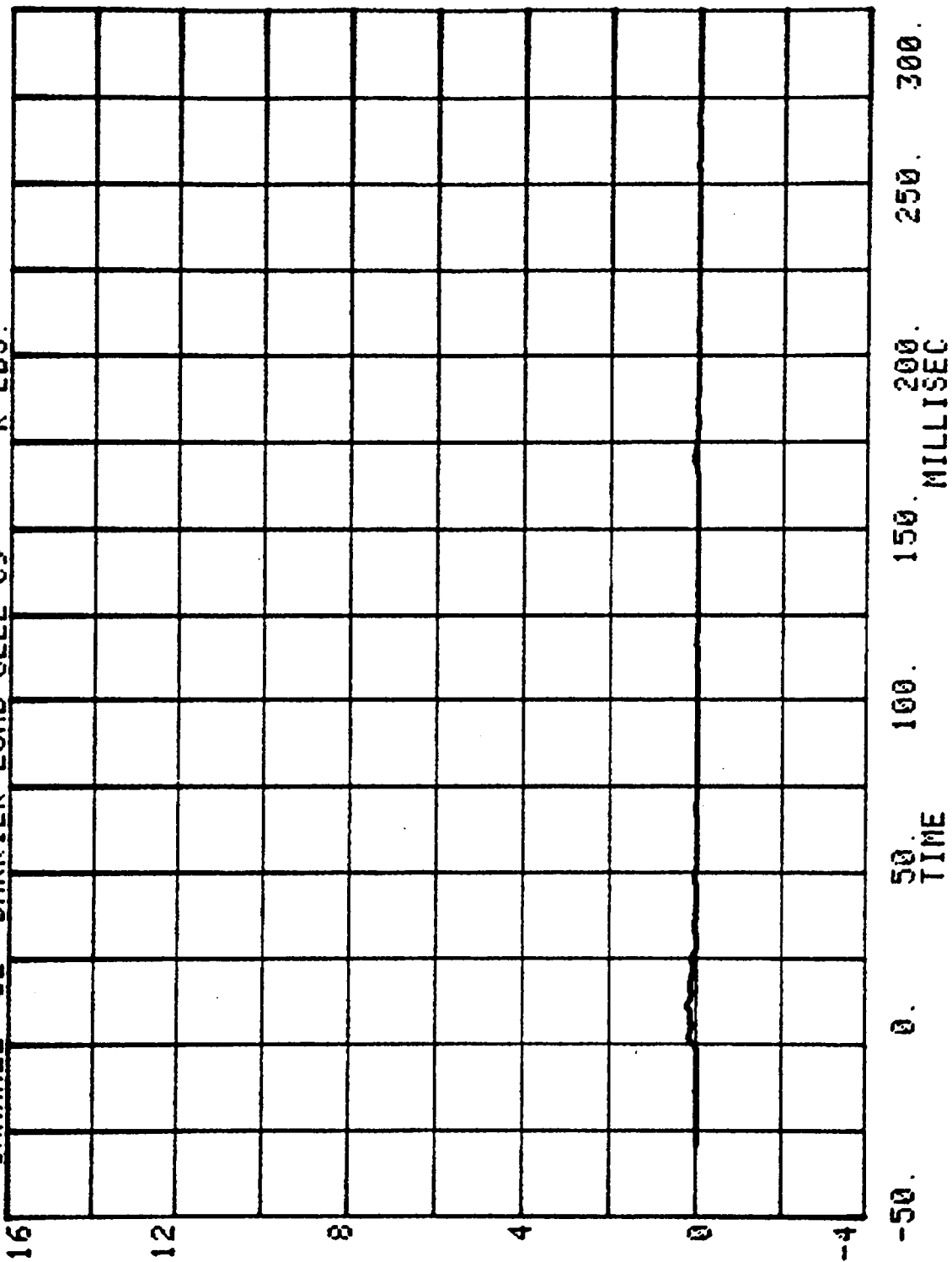


TIME
-50. 0. 50. 100. 150. 200. 250. 300.
MILLISEC

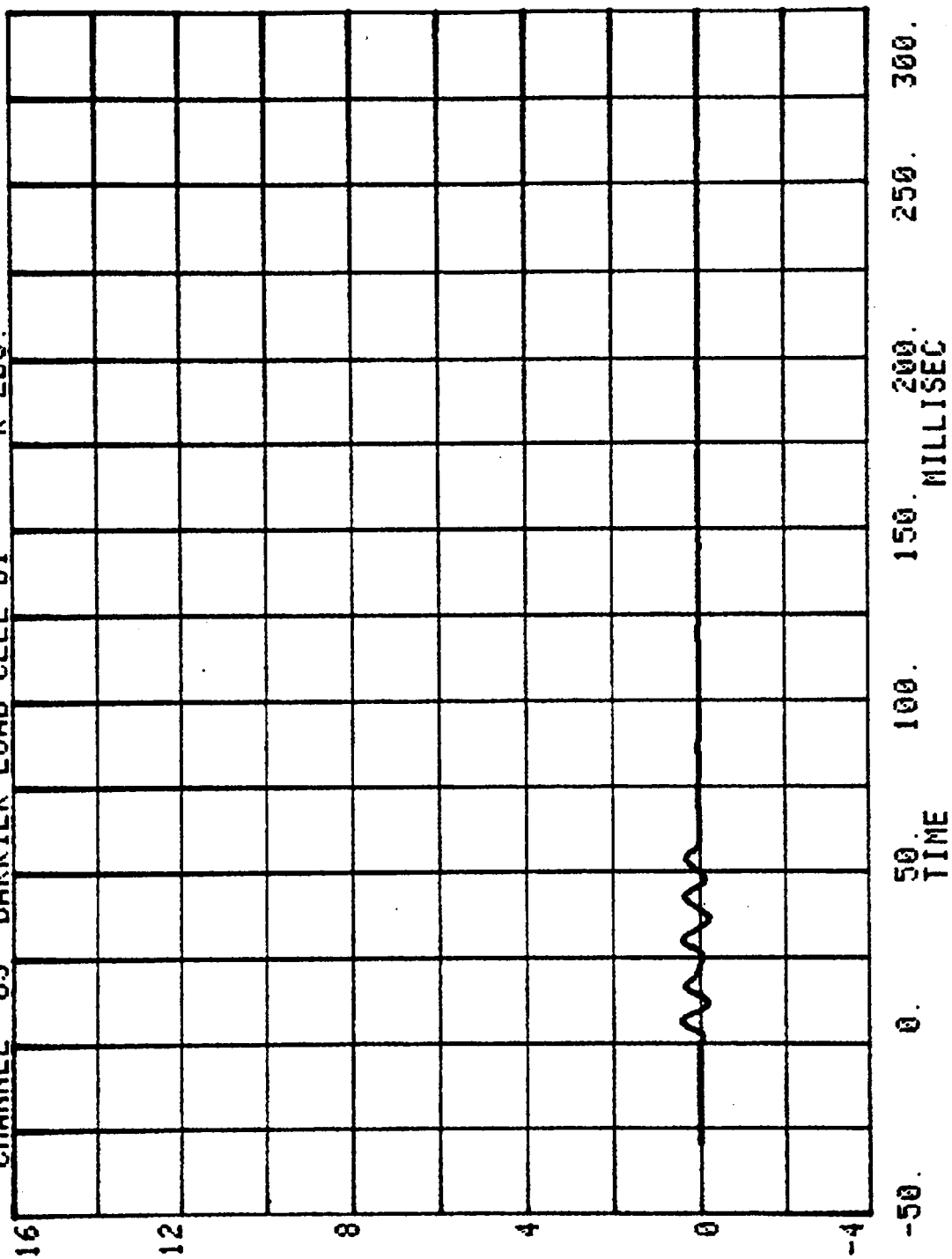
CHANNEL 61 BARRIER LOAD CELL C8 RUN= 540 SERIES= 5 K LBS.



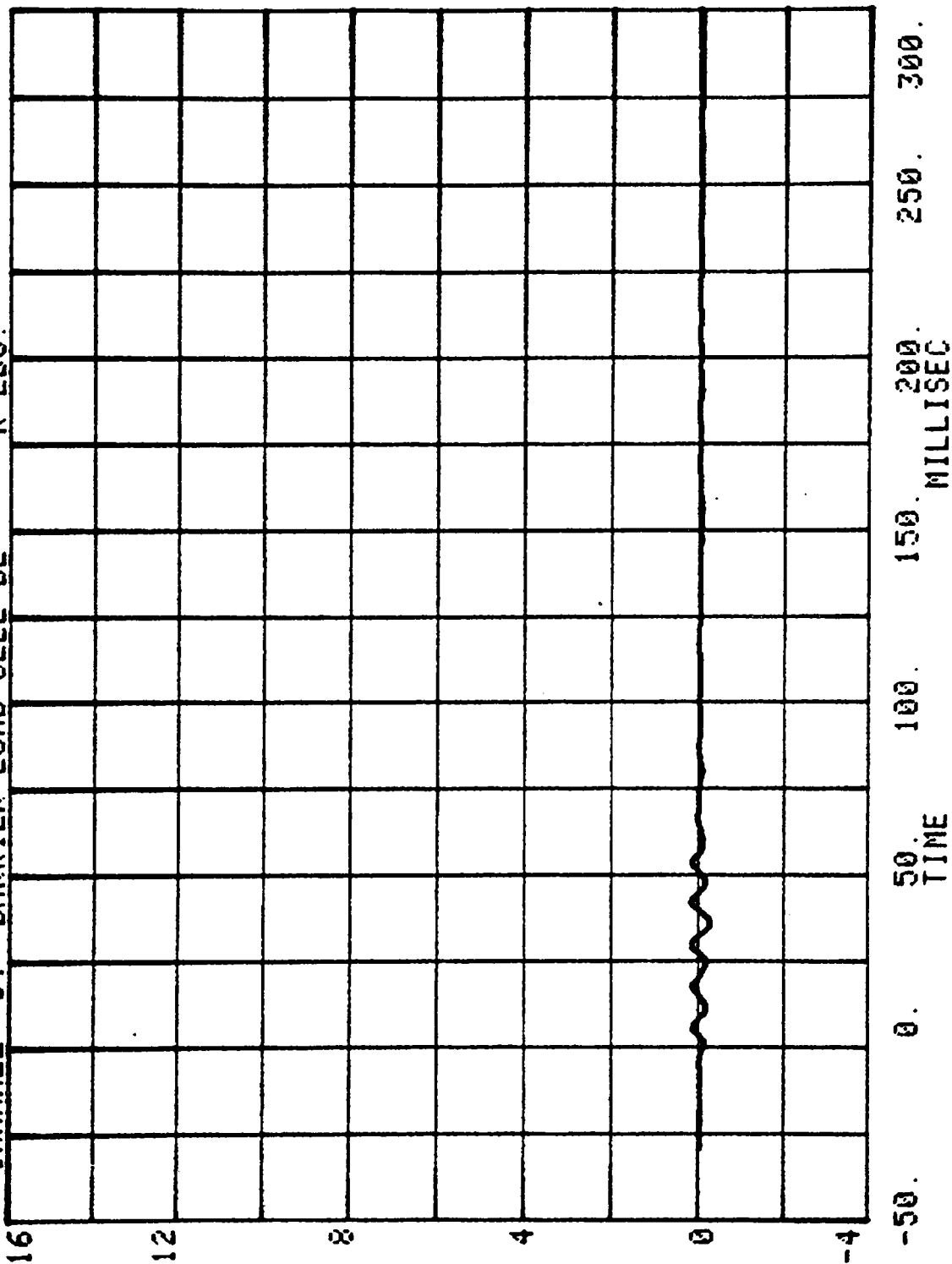
CHANNEL 62 BARRIER LOAD CELL C9 RUN= 540 SERIES= 5 K LBS.



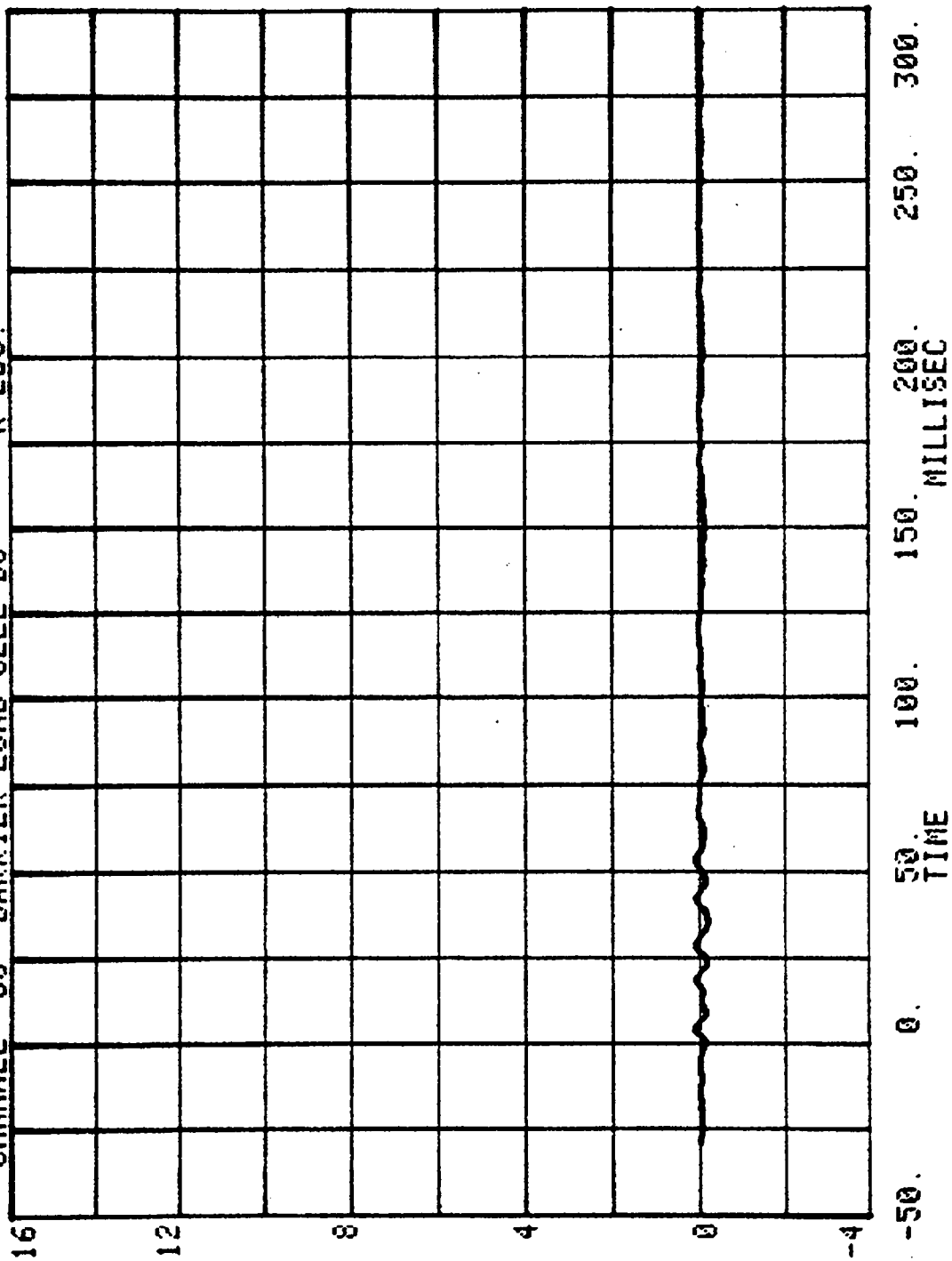
CHANNEL 63 RUN= 540 SERIES= 5 K LBS.
BARRIER LOAD CELL D1



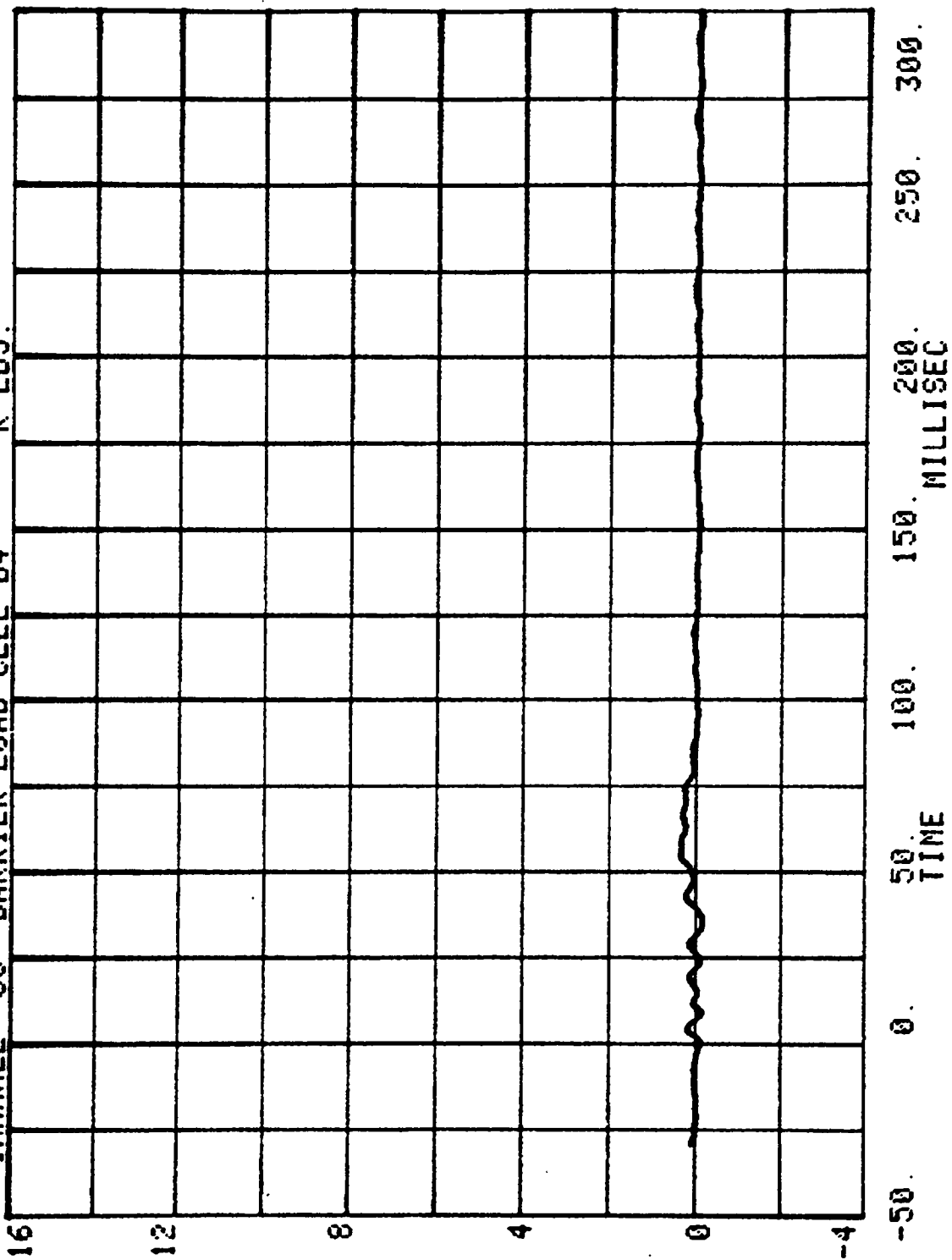
CHANNEL 64 RUN= 540 SERIES= 5
BARRIER LOAD CELL D2 K LBS.



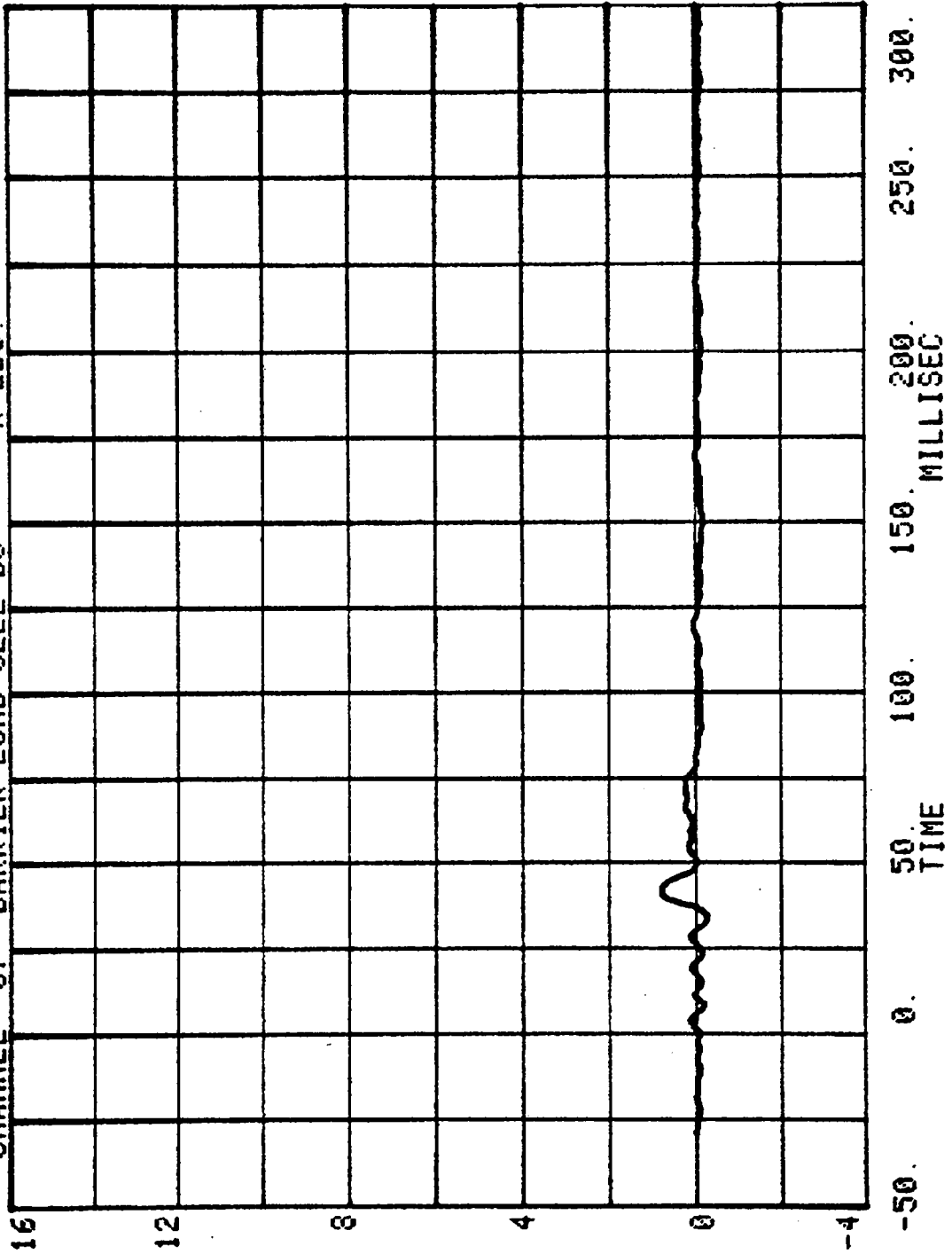
CHANNEL 65 BARRIER LOAD CELL D3 RUN= 540 SERIES= 5 K LBS.



CHANNEL 66 RUN= 540 SERIES= 5 K LBS.
BARRIER LOAD CELL D4



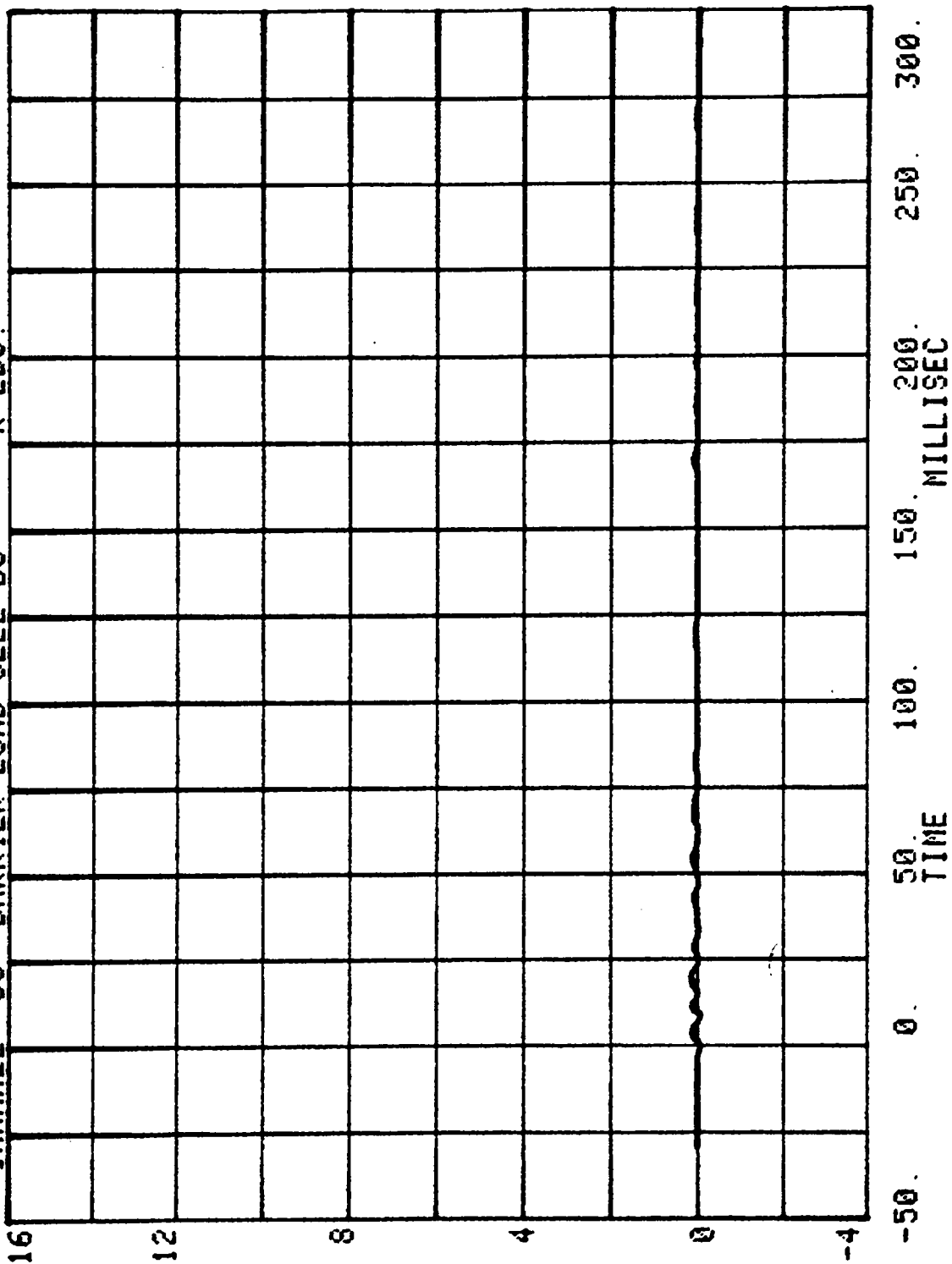
CHANNEL 67 RUN= 540 SERIES= 5 K LBS.



CHANNEL 68 BARRIER LOAD CELL D6

RUN= 540 SERIES=

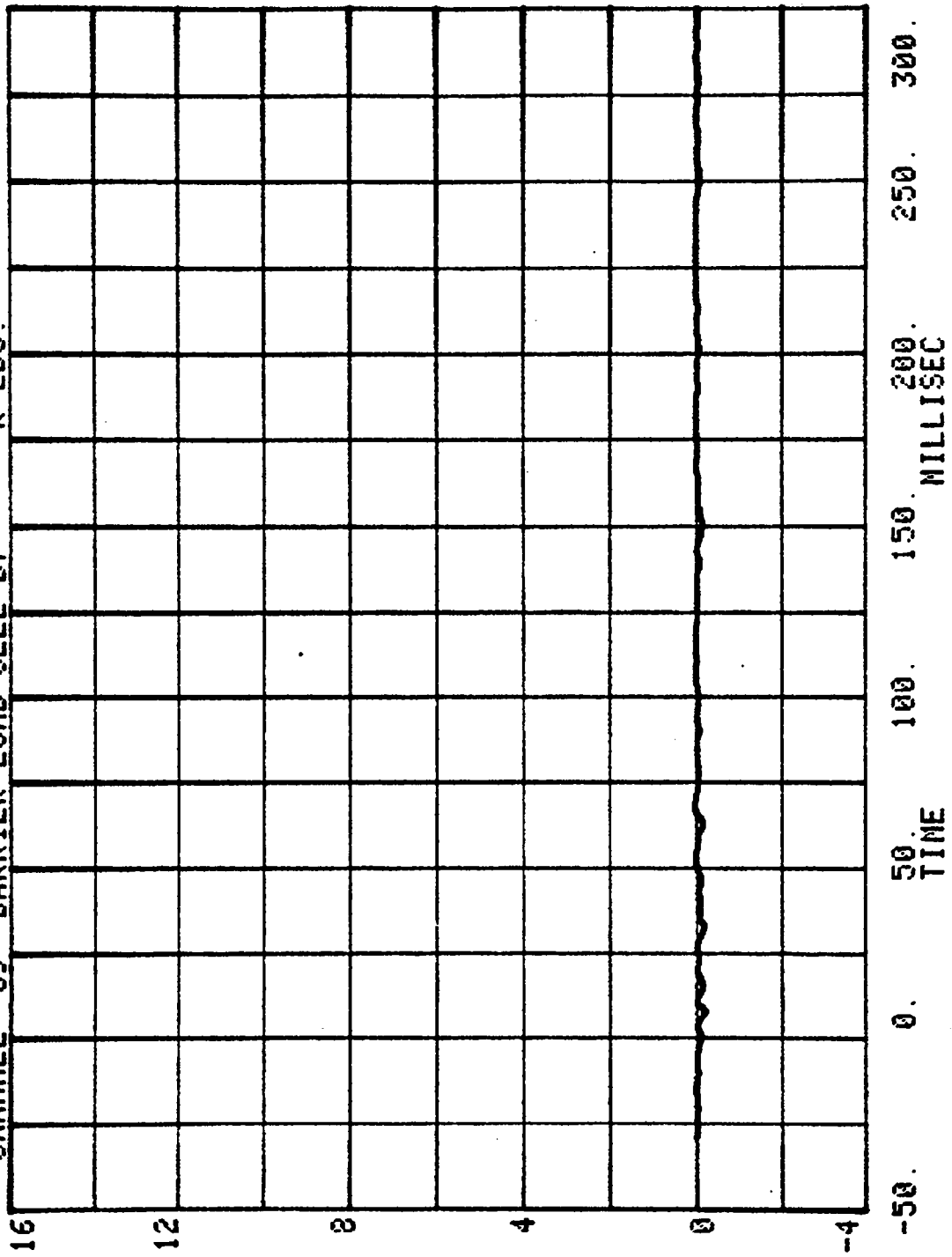
5 K LBS.



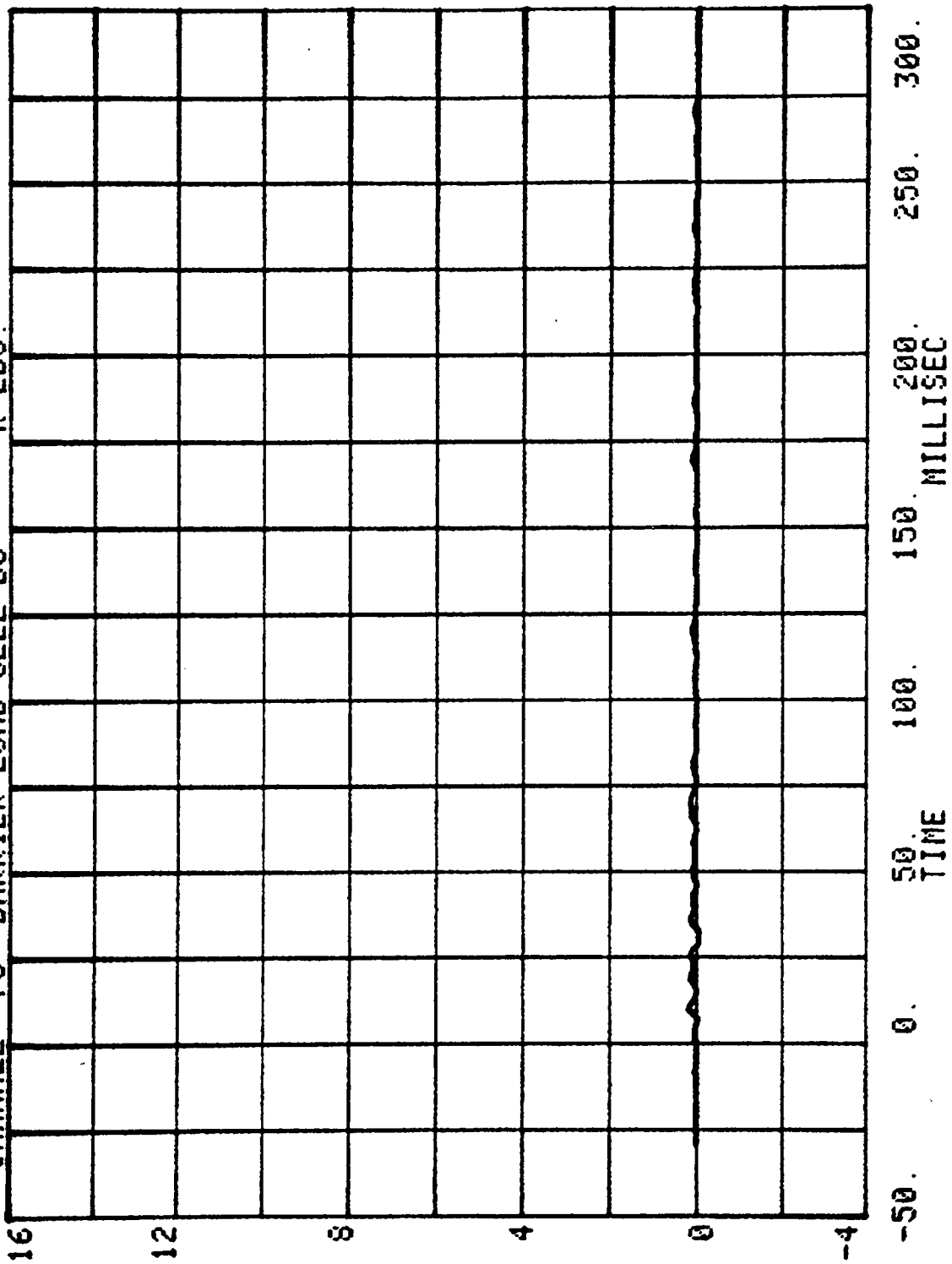
CHANNEL 69 BARRIER LOAD CELL D7

RUN= 540 SERIES= 5

K LBS.



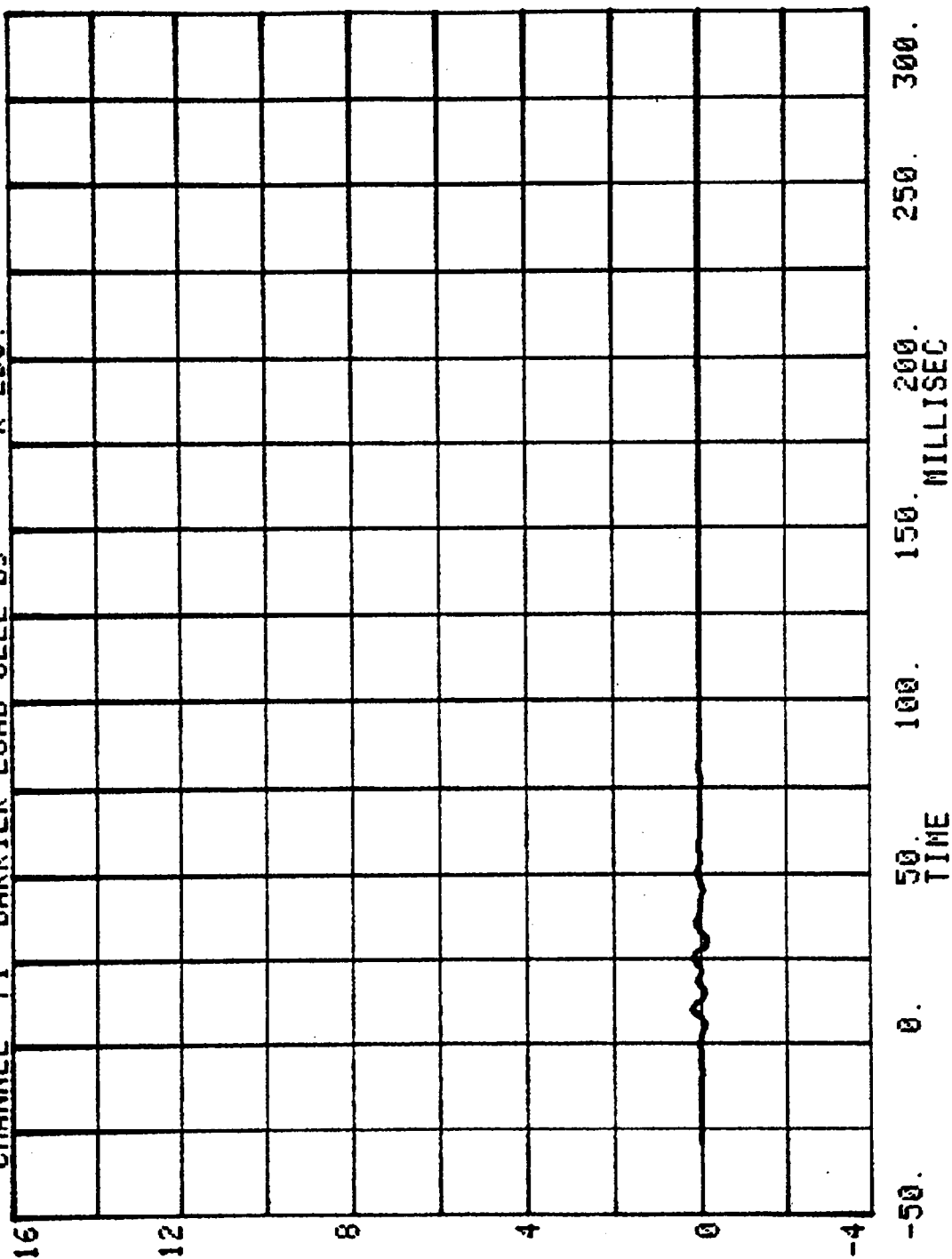
CHANNEL 70 BARRIER LOAD CELL D8 RUN= 540 SERIES= 5 K LBS.

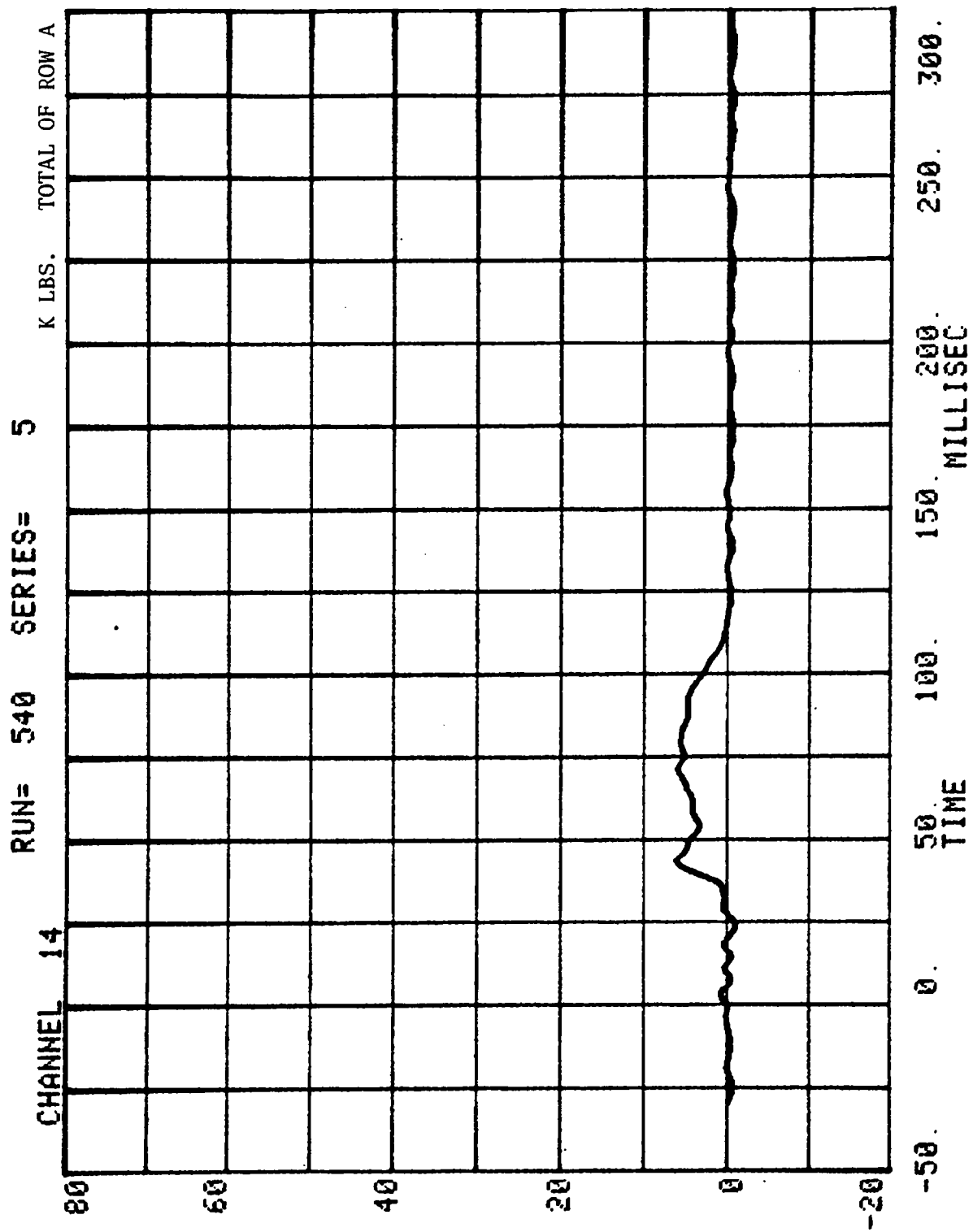


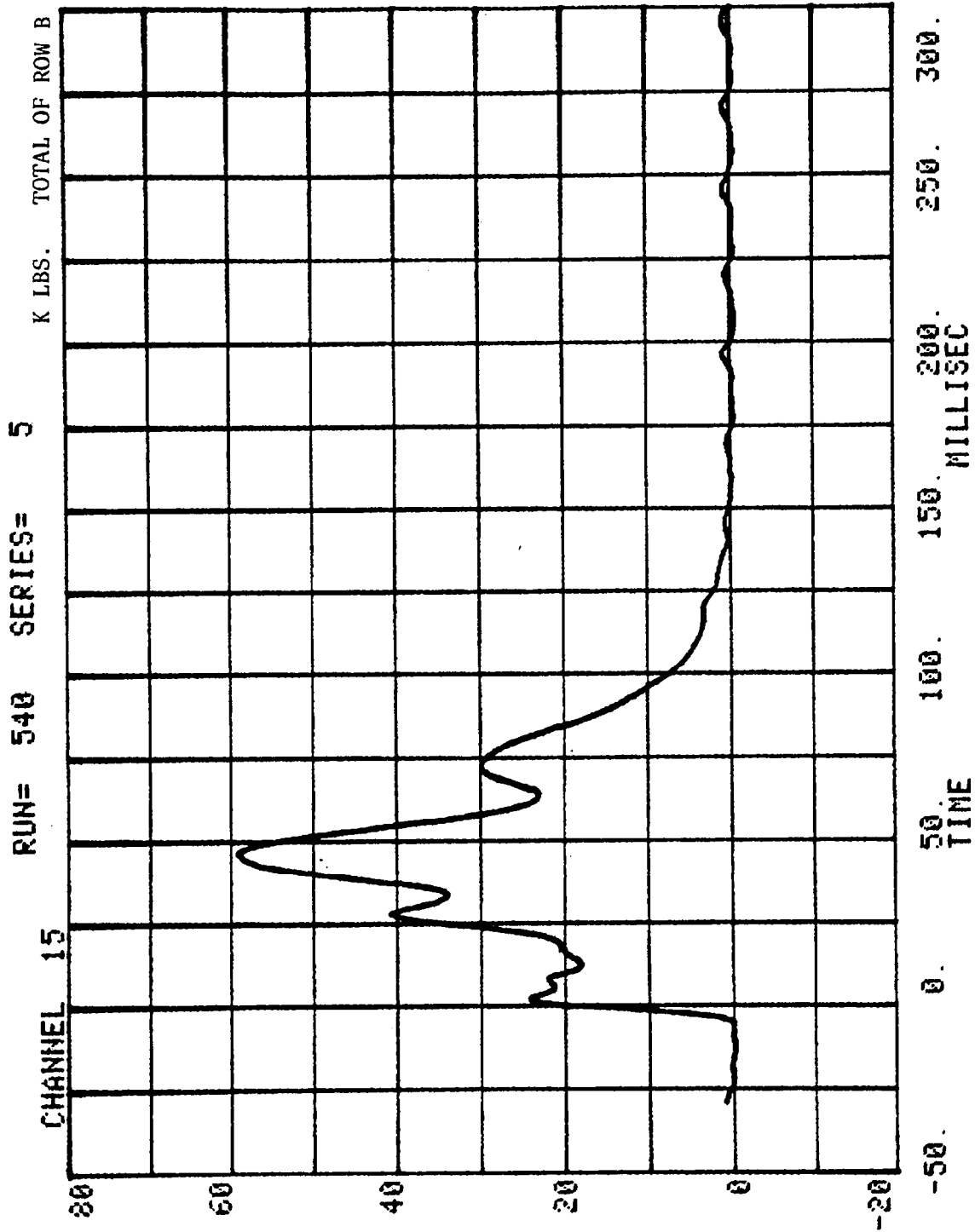
CHANNEL 71 BARRIER LOAD CELL D9

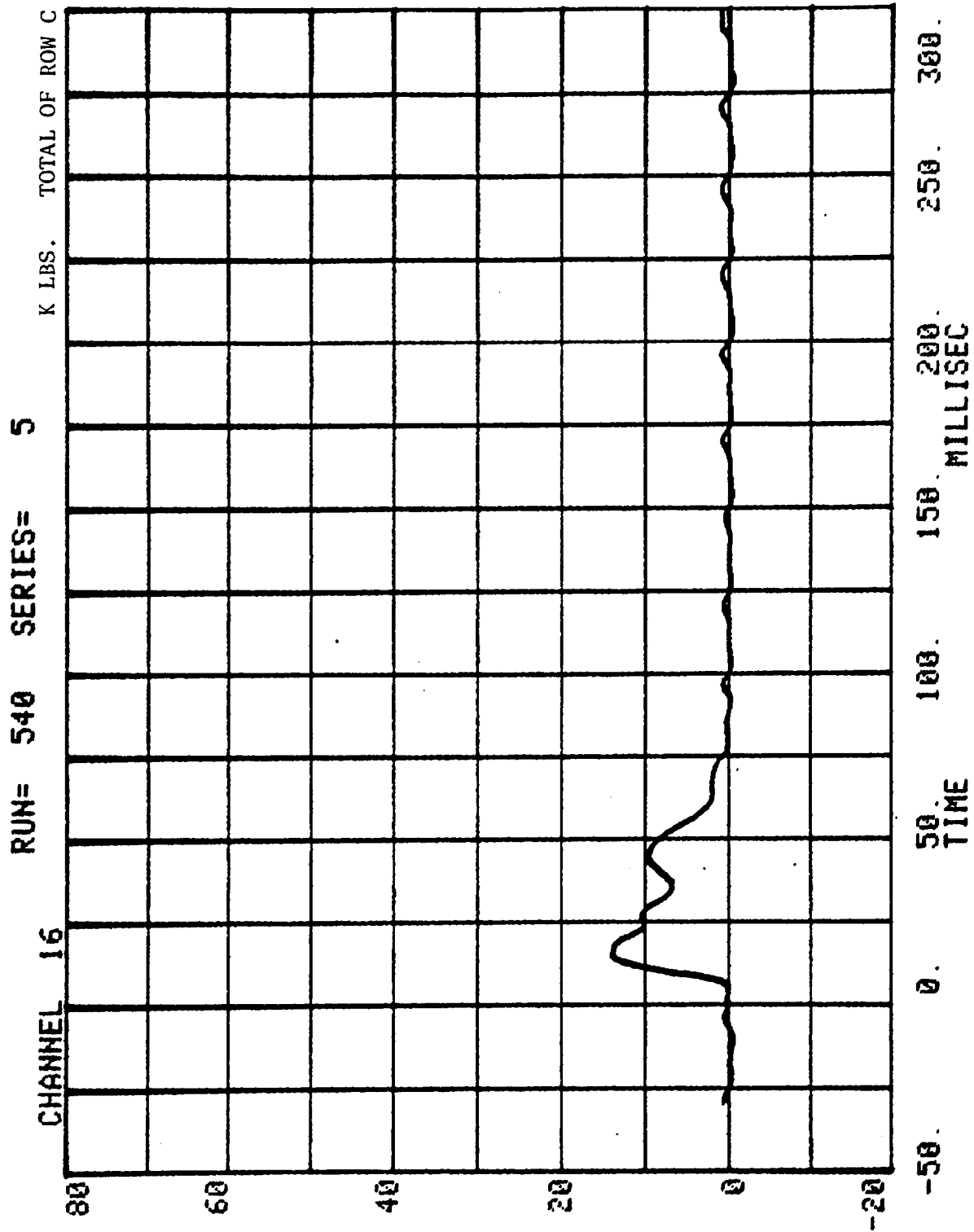
RUN= 540 SERIES= 5

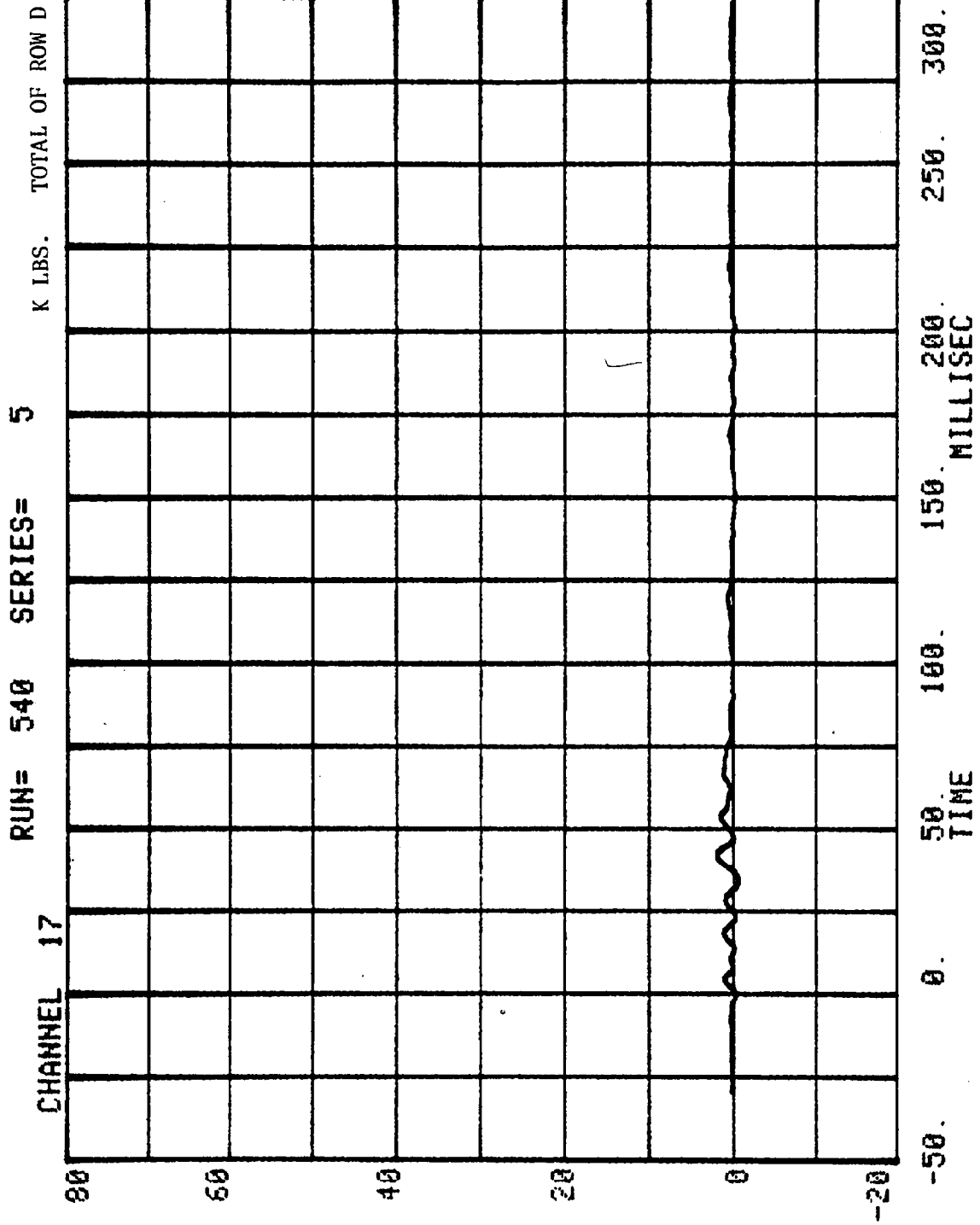
K LBS.











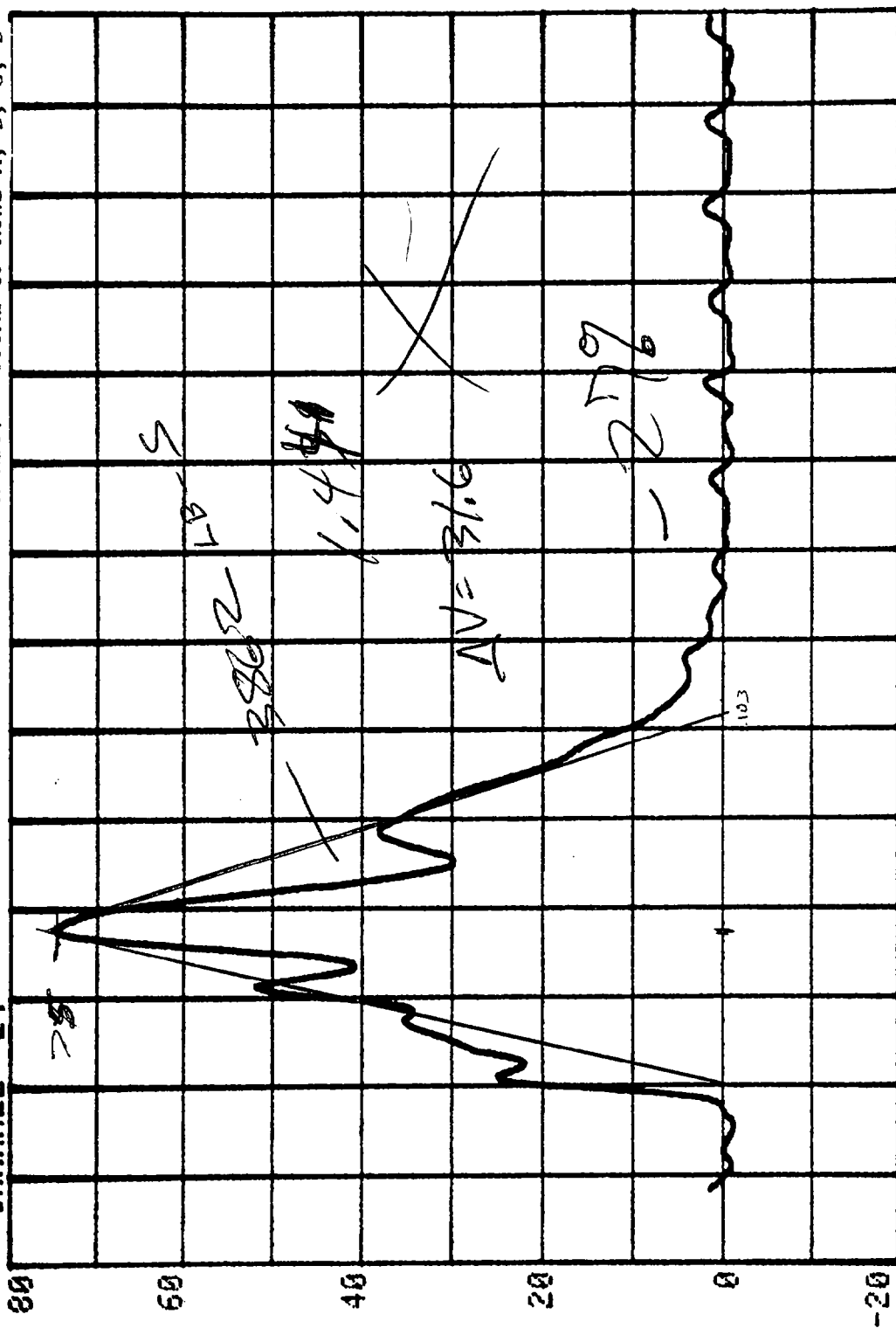
RUN= 540 SERIES=

5

K LBS.

TOTAL OF ROWS A, B, C, D

CHANNEL 24



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

Test No. 703-5-540
1982 Volkswagen Scirocco

DUMMY DATA

	FILTER CHANNEL CLASS
HEAD ACCELERATIONS	1000
CHEST ACCELERATIONS	180
FEMUR FORCES	600
BELT LOADS	60

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NCA TEST #5 - FRONTAL BARRIER

RUN= 540

POS#1 HEAD RESULTANT

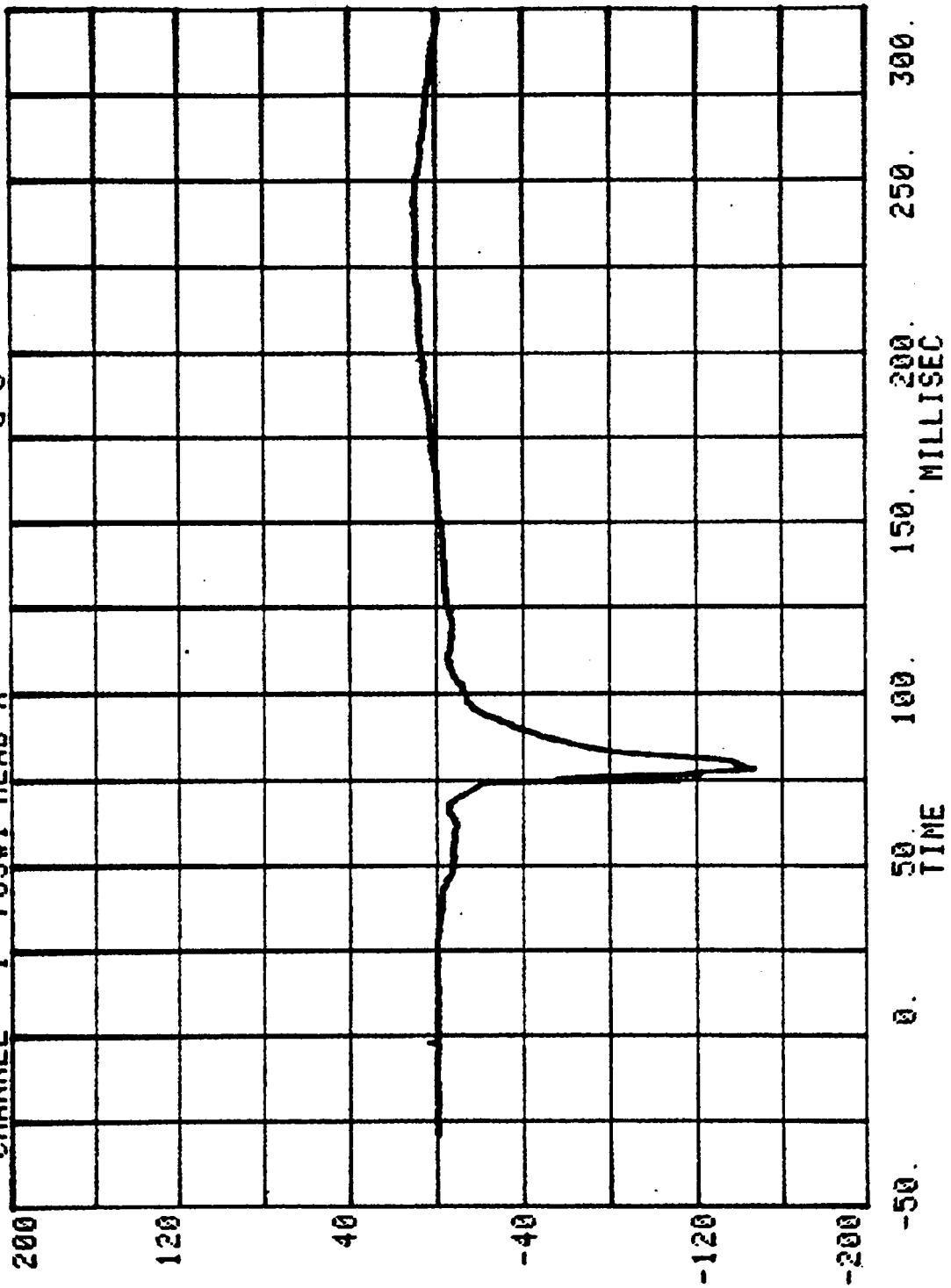
HIC=1473.0 FROM T1= .07470 TO T2= .08610

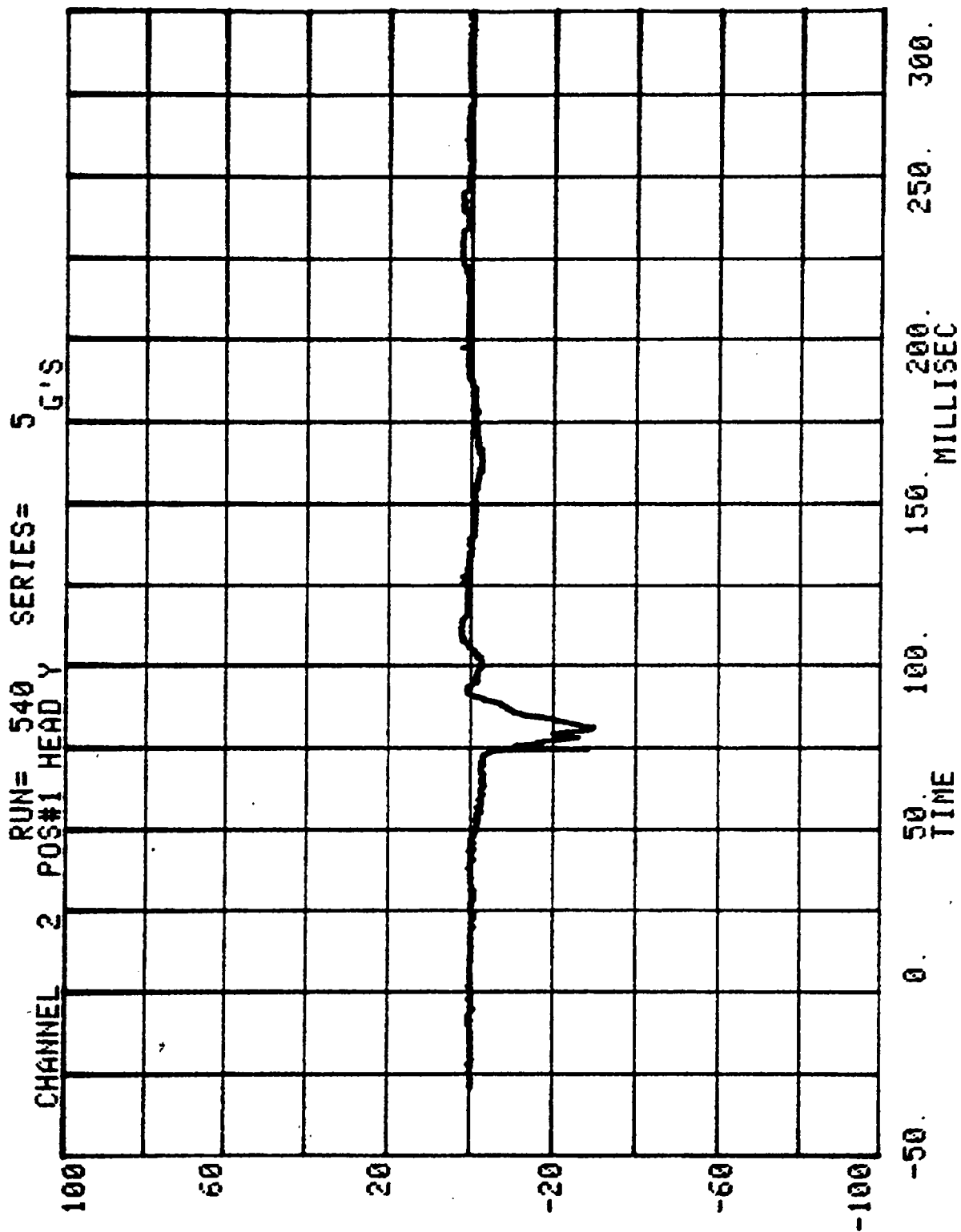
AVERAGE ACCELERATION BETWEEN T1 AND T2= 110.8G'S

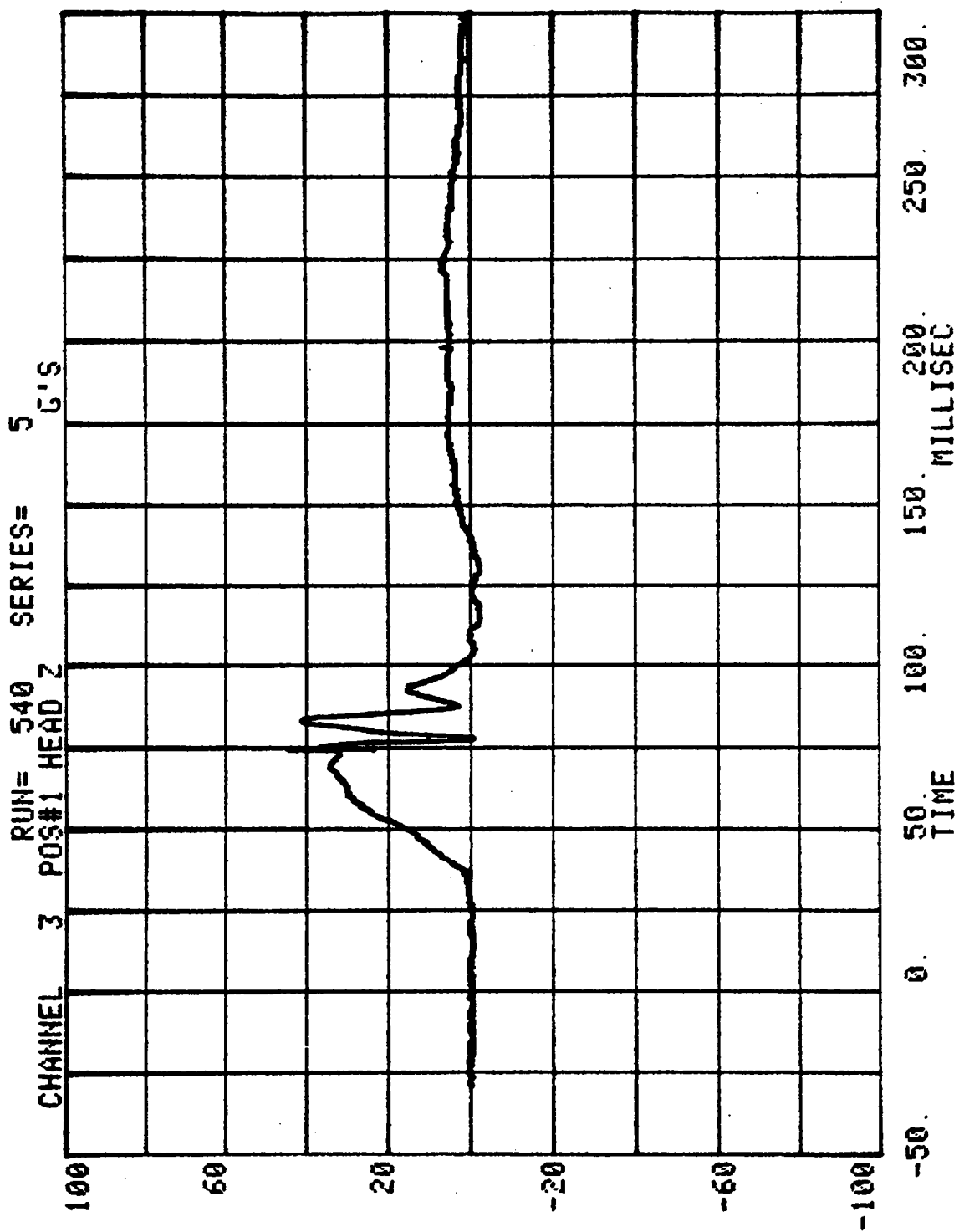
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1946.7

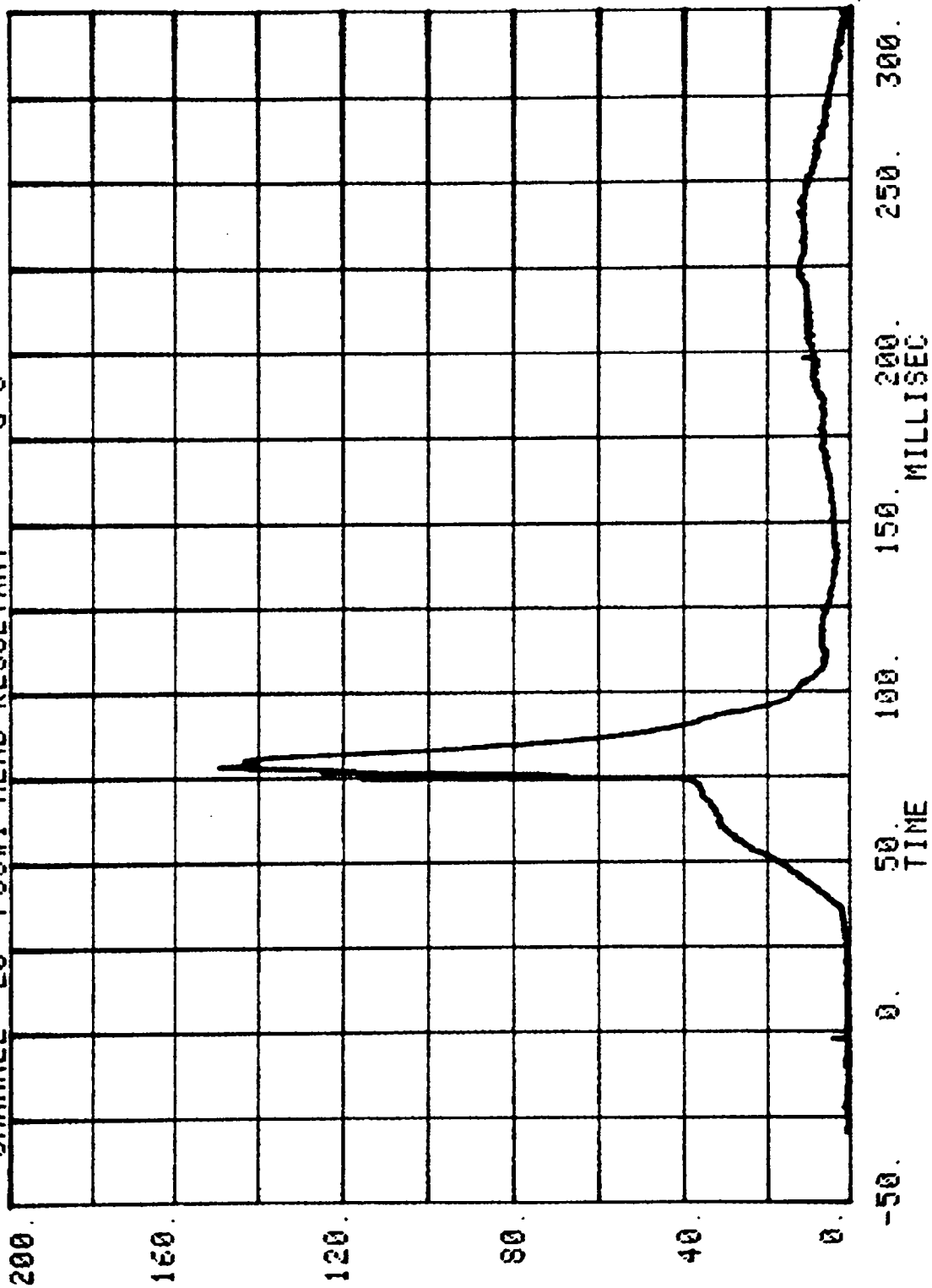
CHANNEL 1 POS#1 HEAD X
RUN= 540 SERIES= 5 G'S

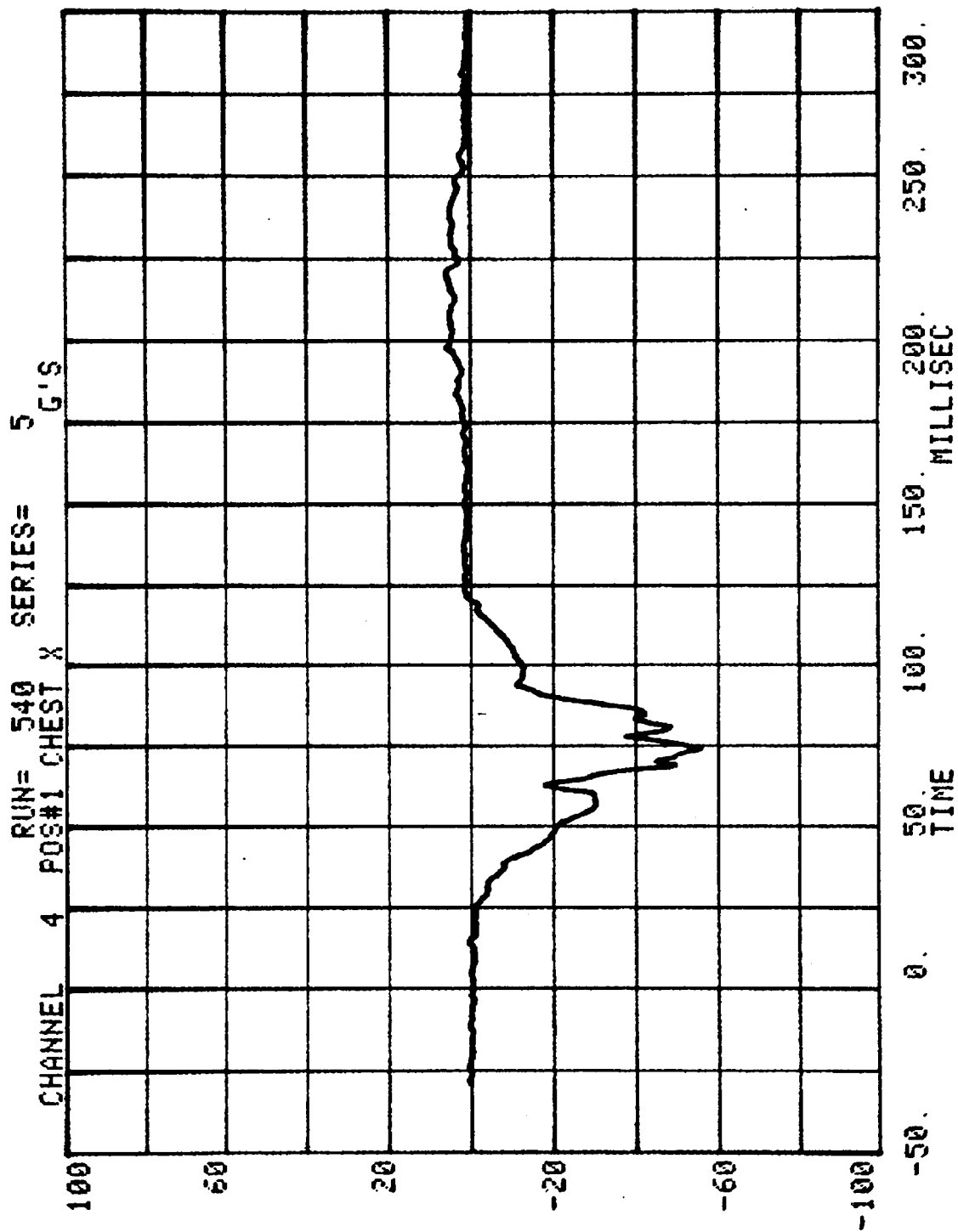


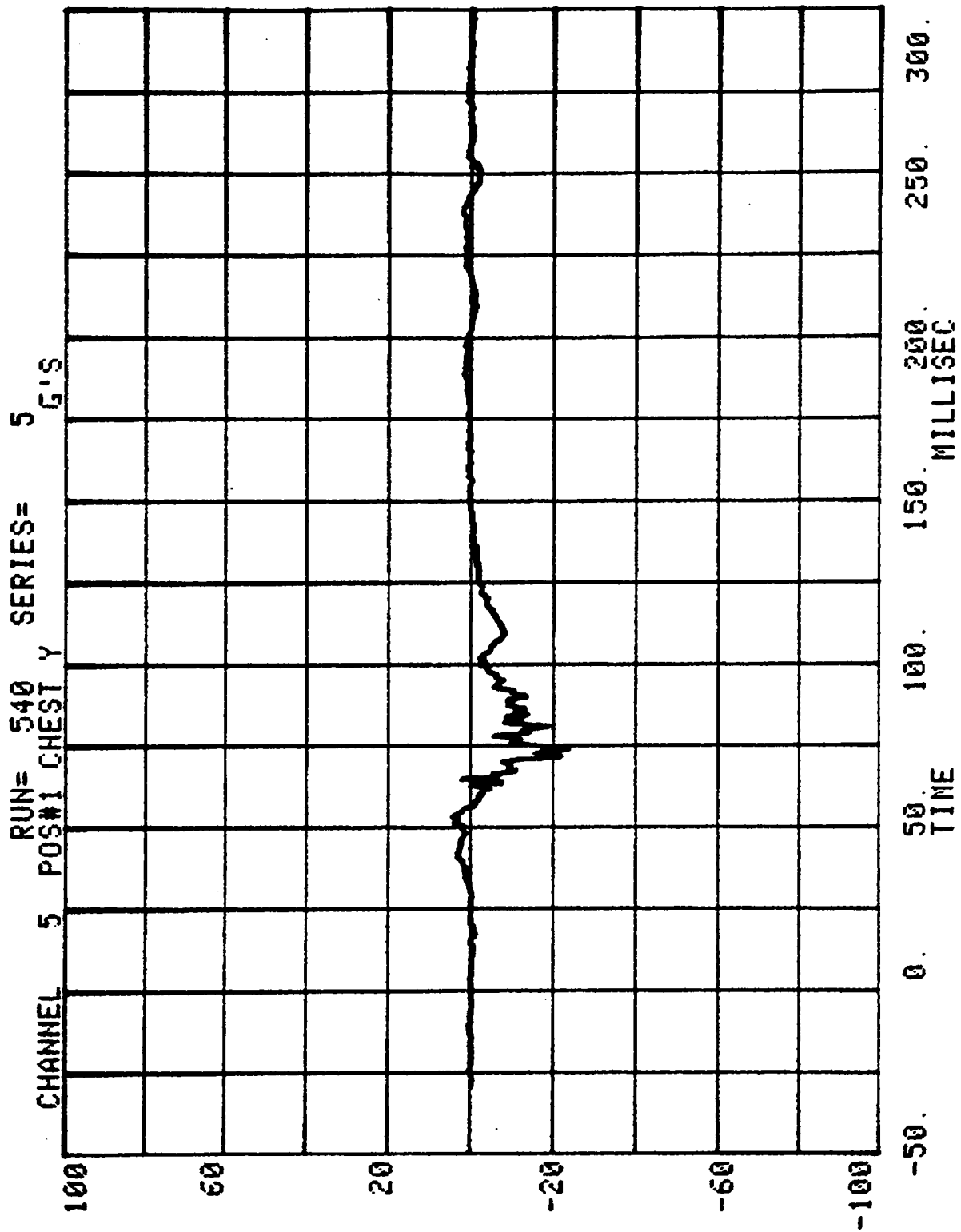




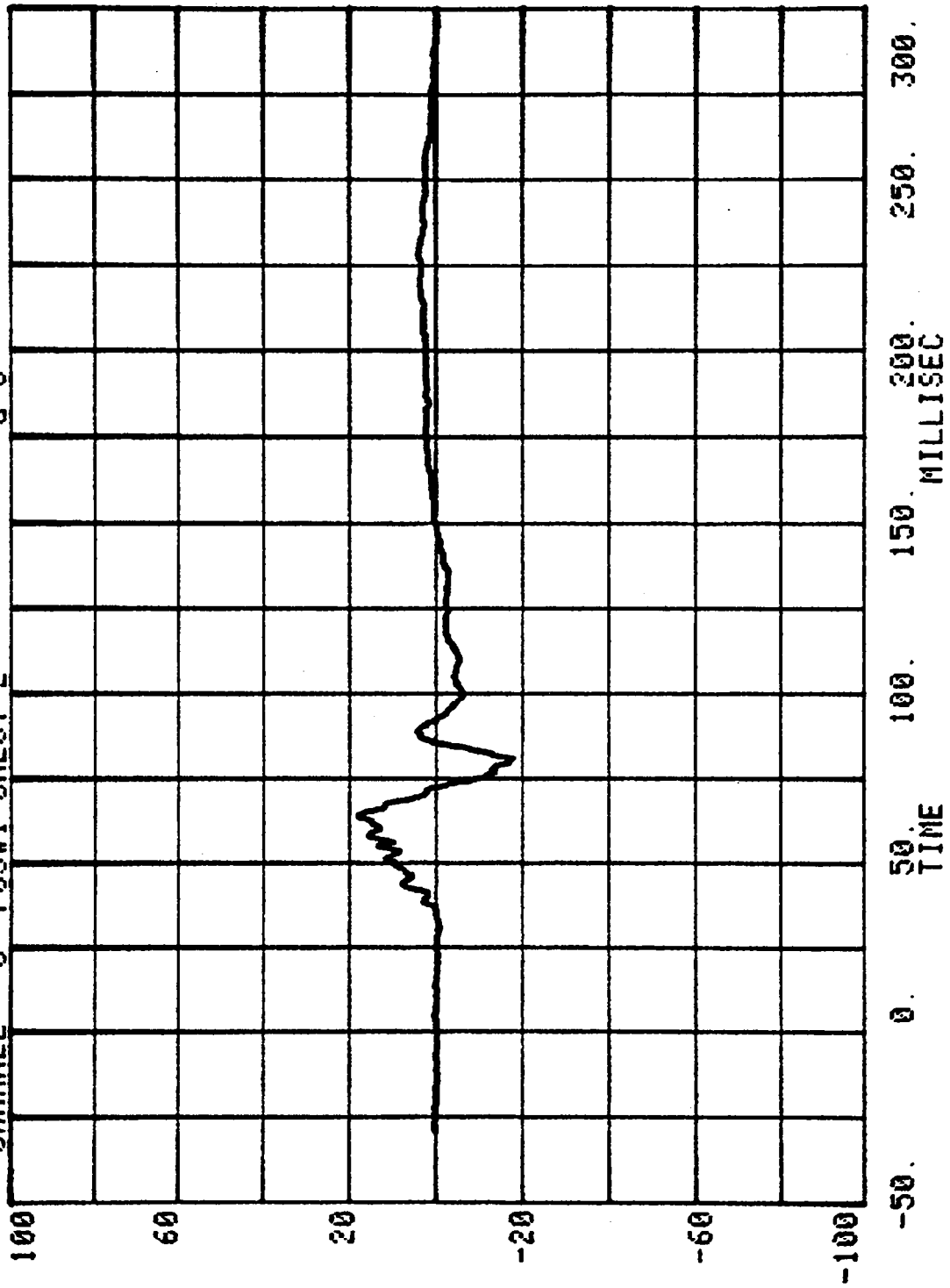
CHANNEL 20 POS#1 HEAD RESULTANT 5 G'S





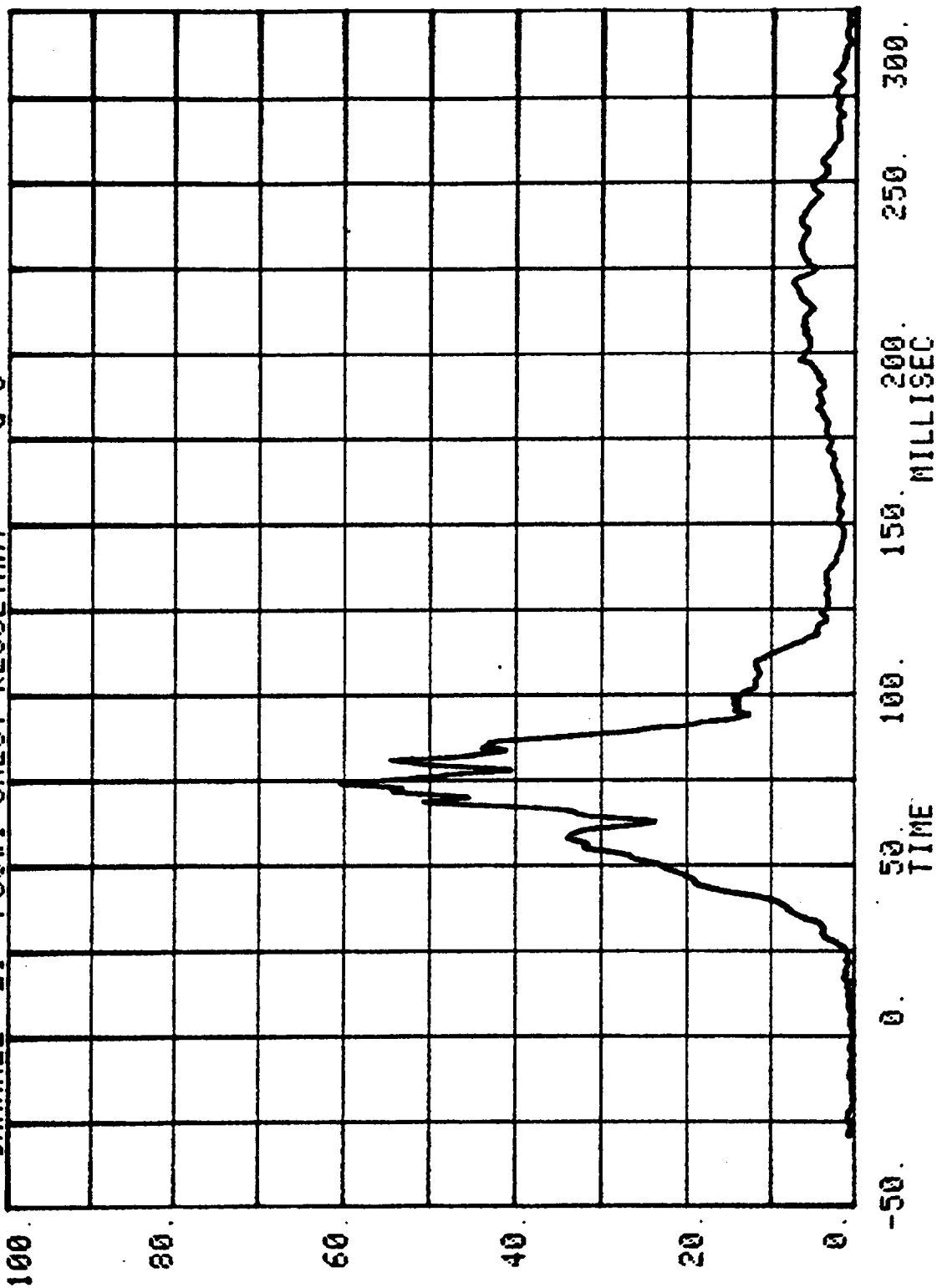


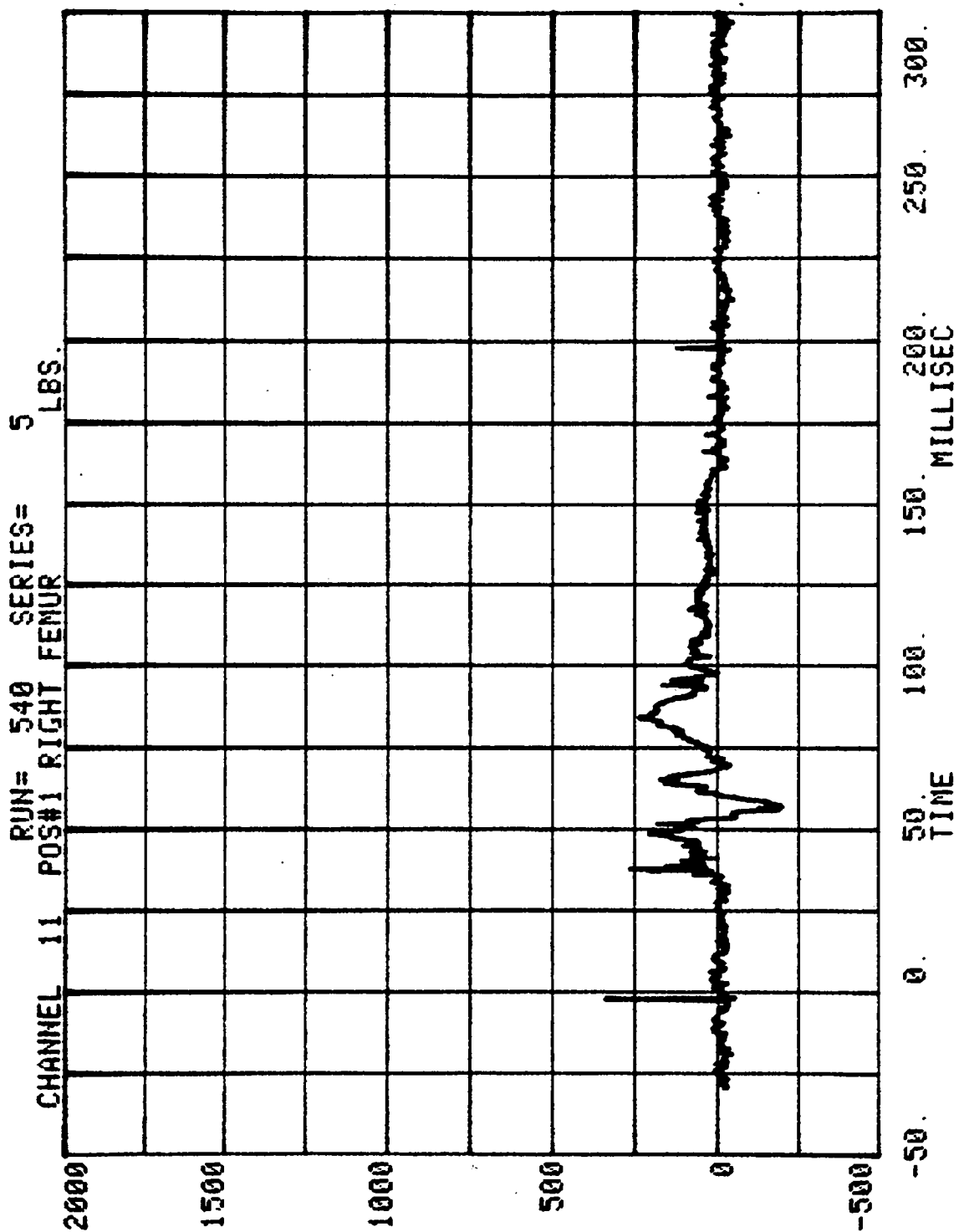
CHANNEL 6 POS#1 CHEST Z RUN= 540 SERIES= 5 G'S



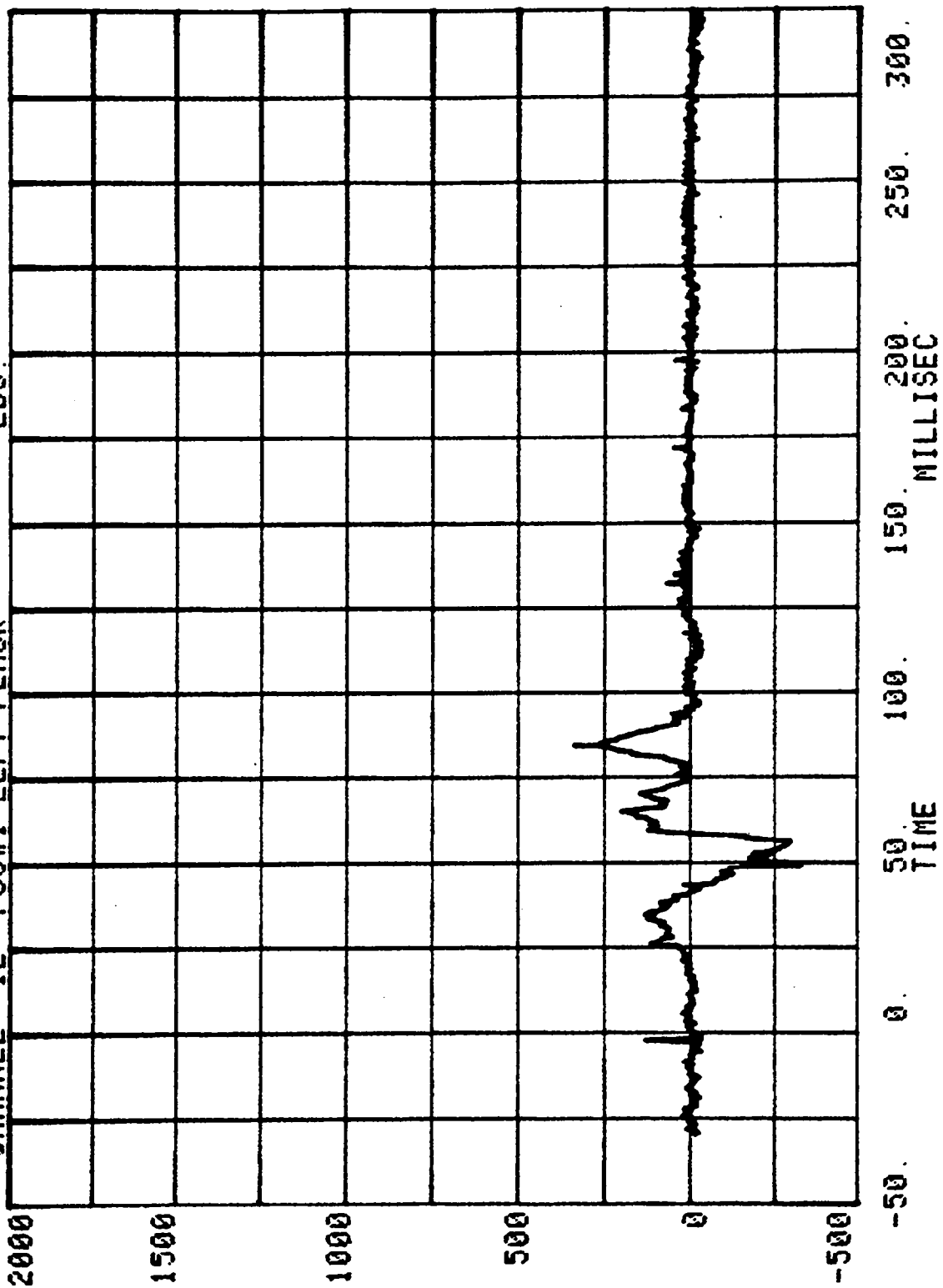
CHANNEL 21 POS#1 CHEST RESULTANT 5 G'S

RUN= 540 SERIES=





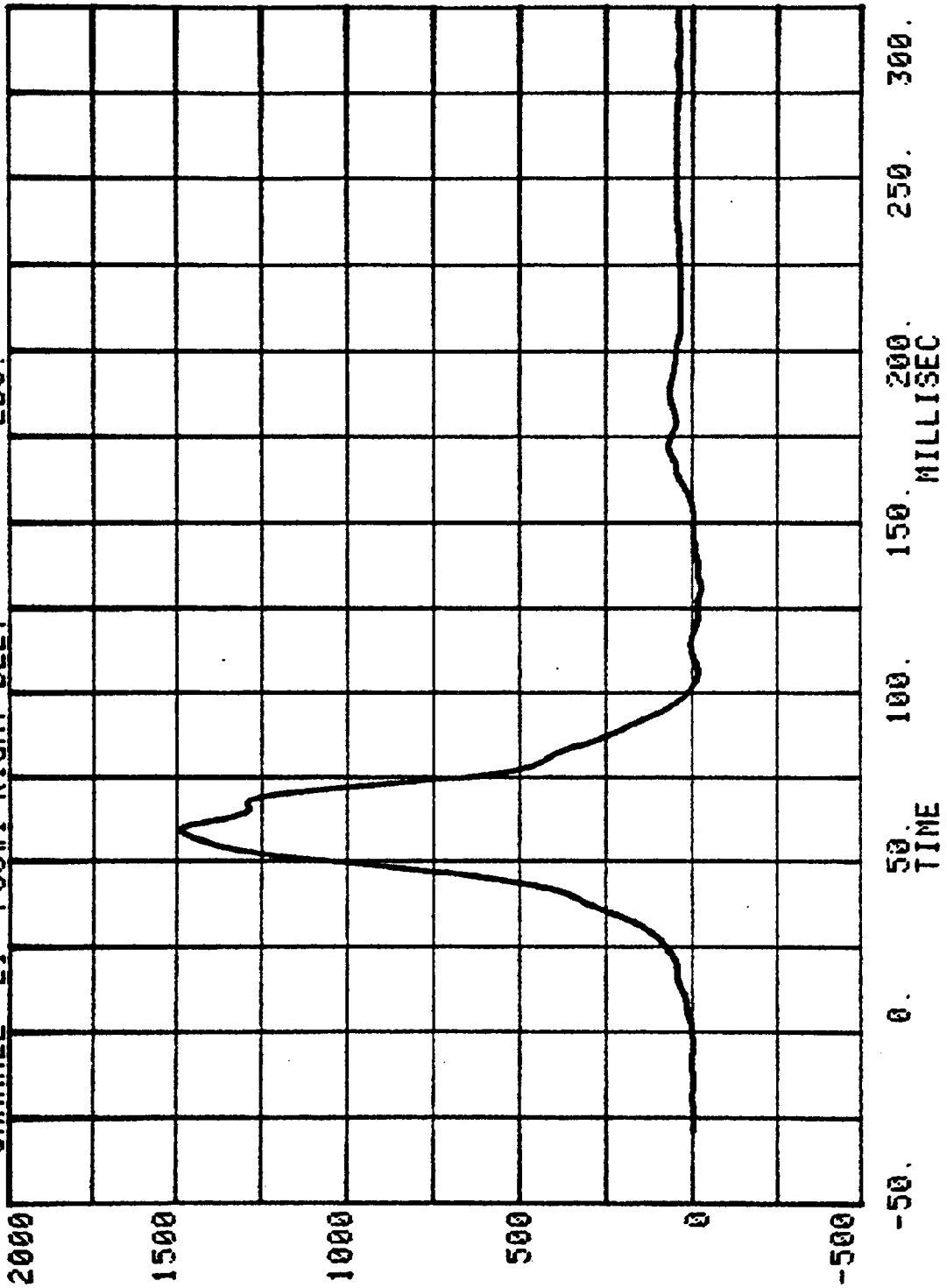
CHANNEL 12 POS#1 LEFT FEMUR RUN= 540 SERIES= 5 LBS.

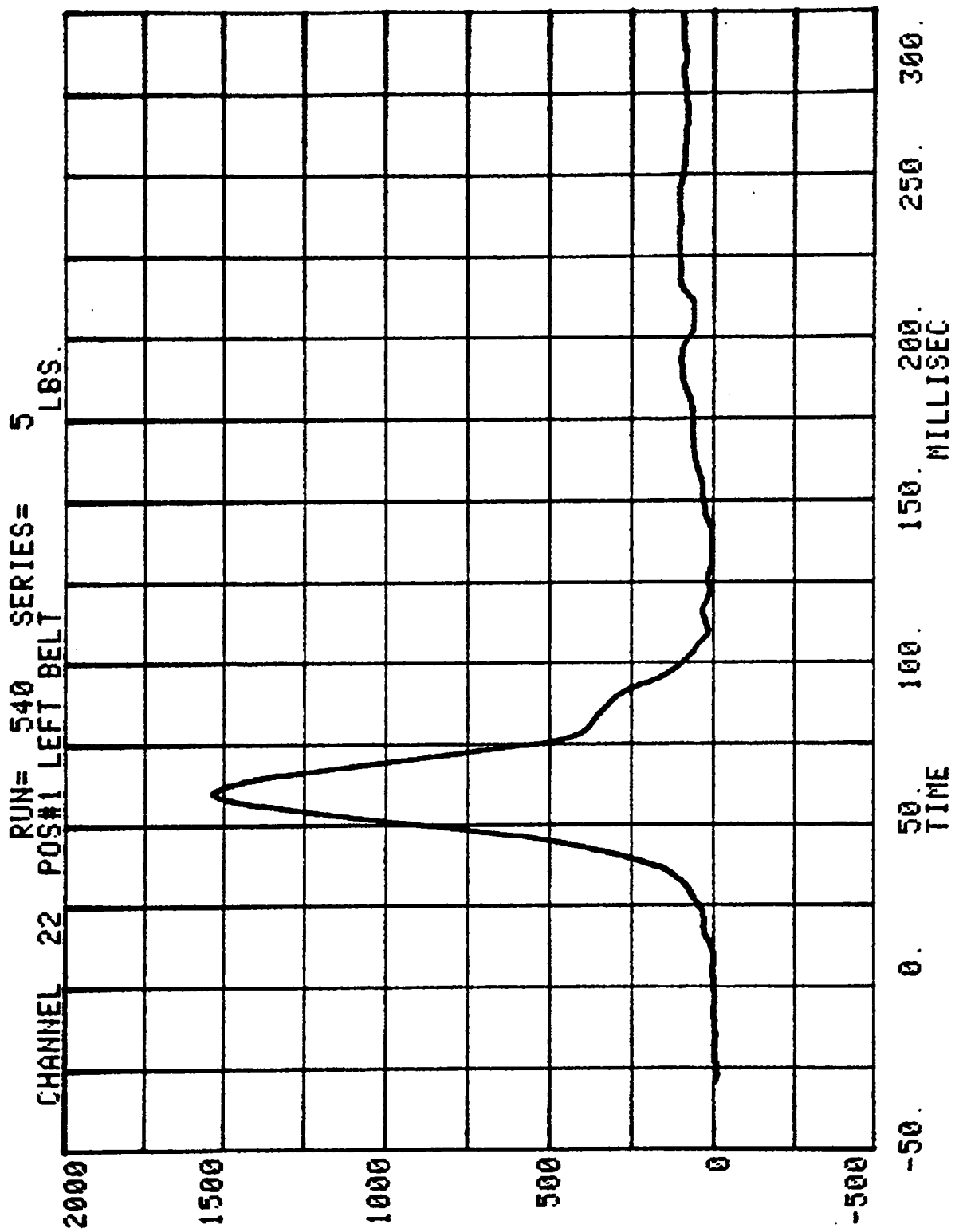


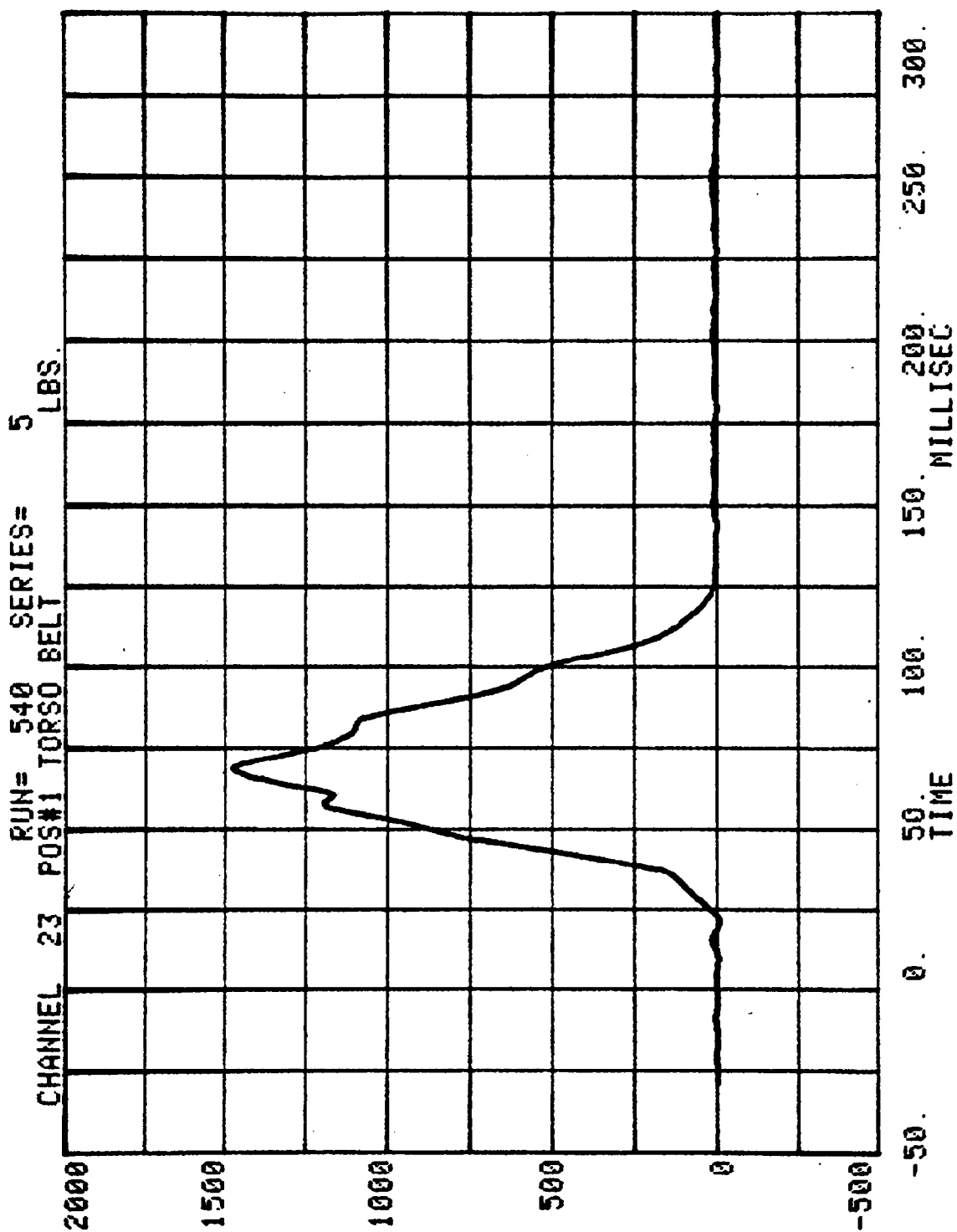
CHANNEL 21 POS#1 RIGHT BELT

RUN= 540 SERIES= 5

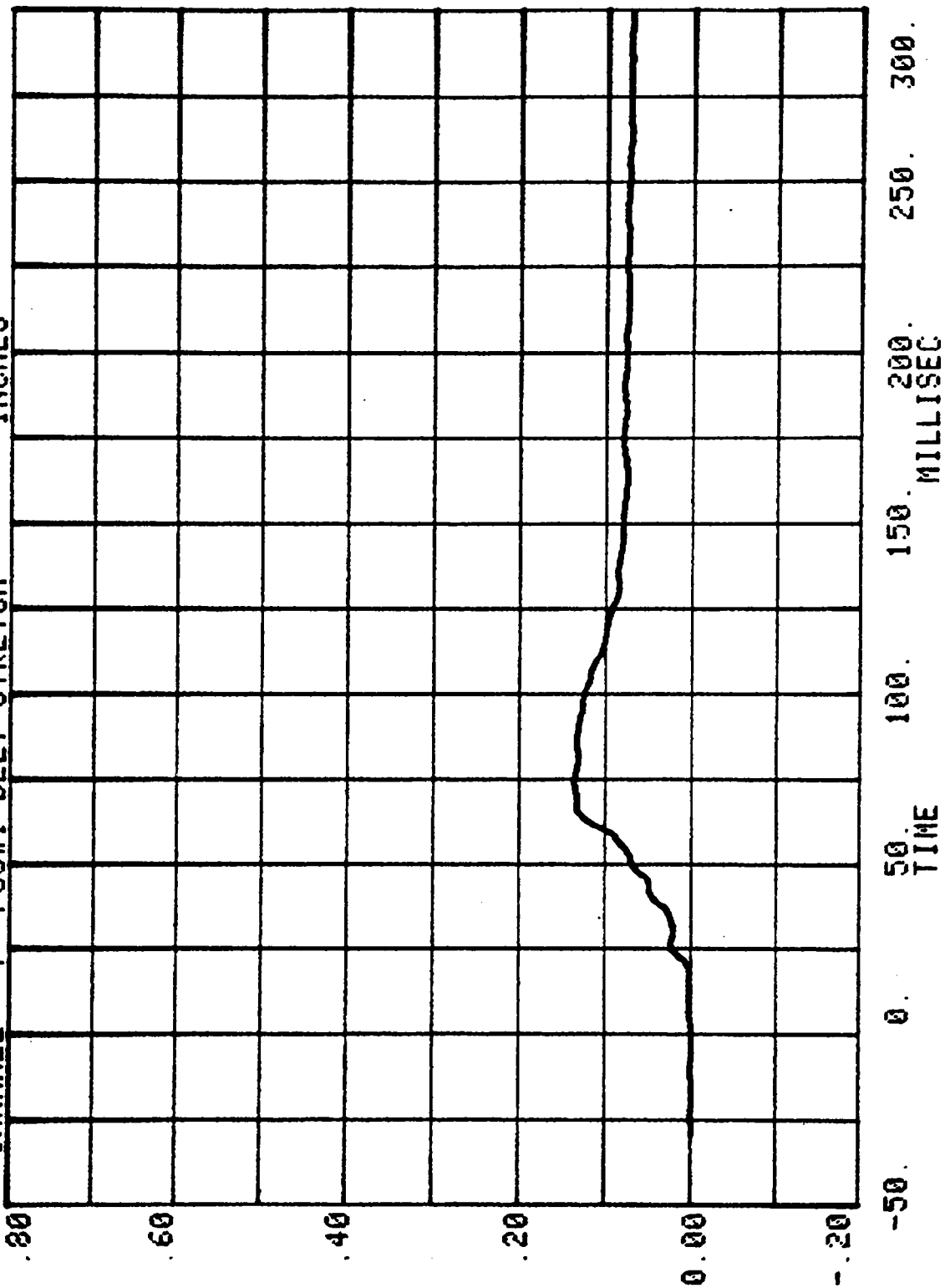
LBS.



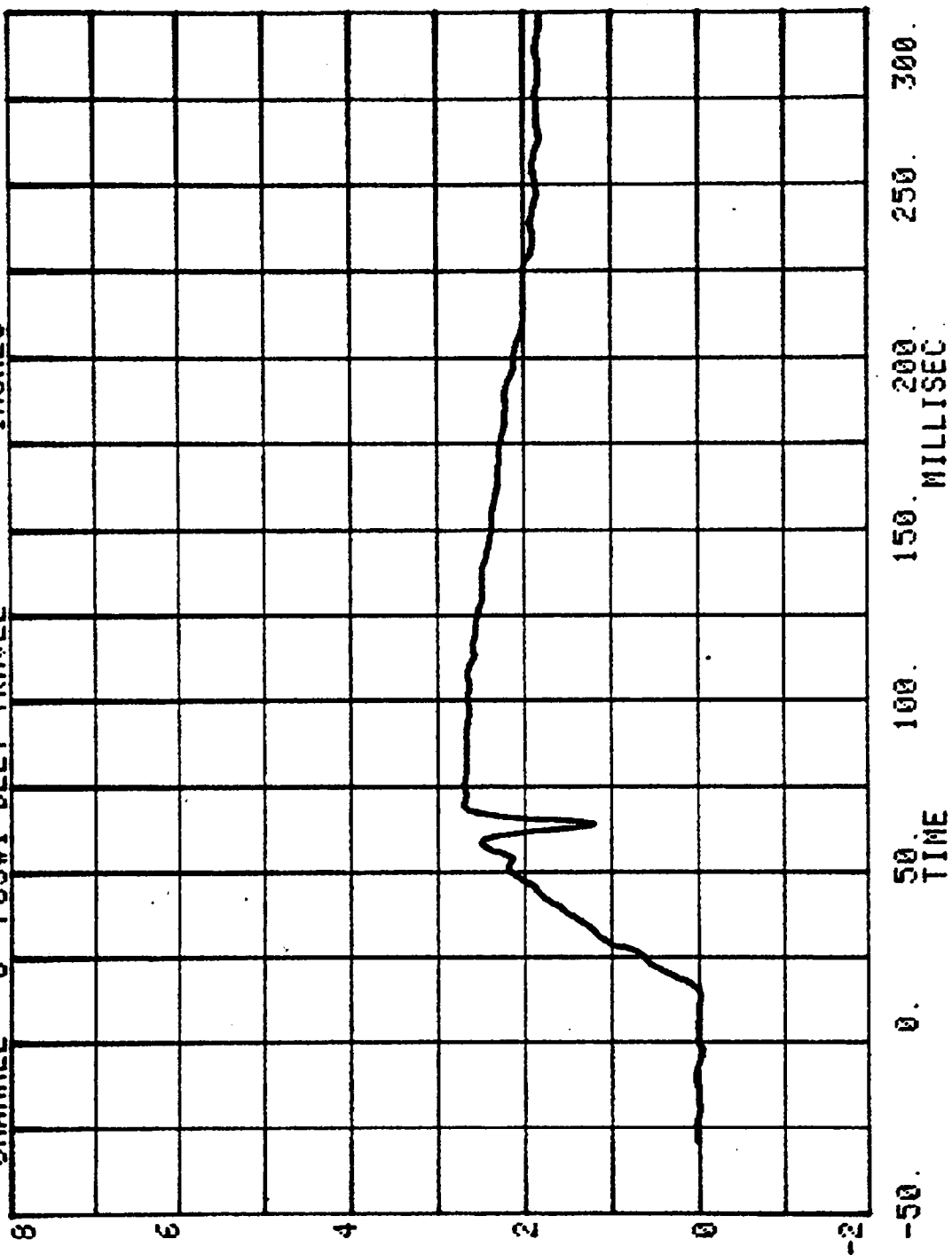




CHANNEL 7 POS#1 BELT STRETCH RUN= 540 SERIES= 5 INCHES MEASURED OVER 2.5 INCHES



CHANNEL 8 POS#1 BELT TRAUER RUN= 540 SERIES= 5 INCHES



HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NCA TEST #5 - FRONTAL BARRIER

RUN= 540

POS#2 HEAD RESULTANT

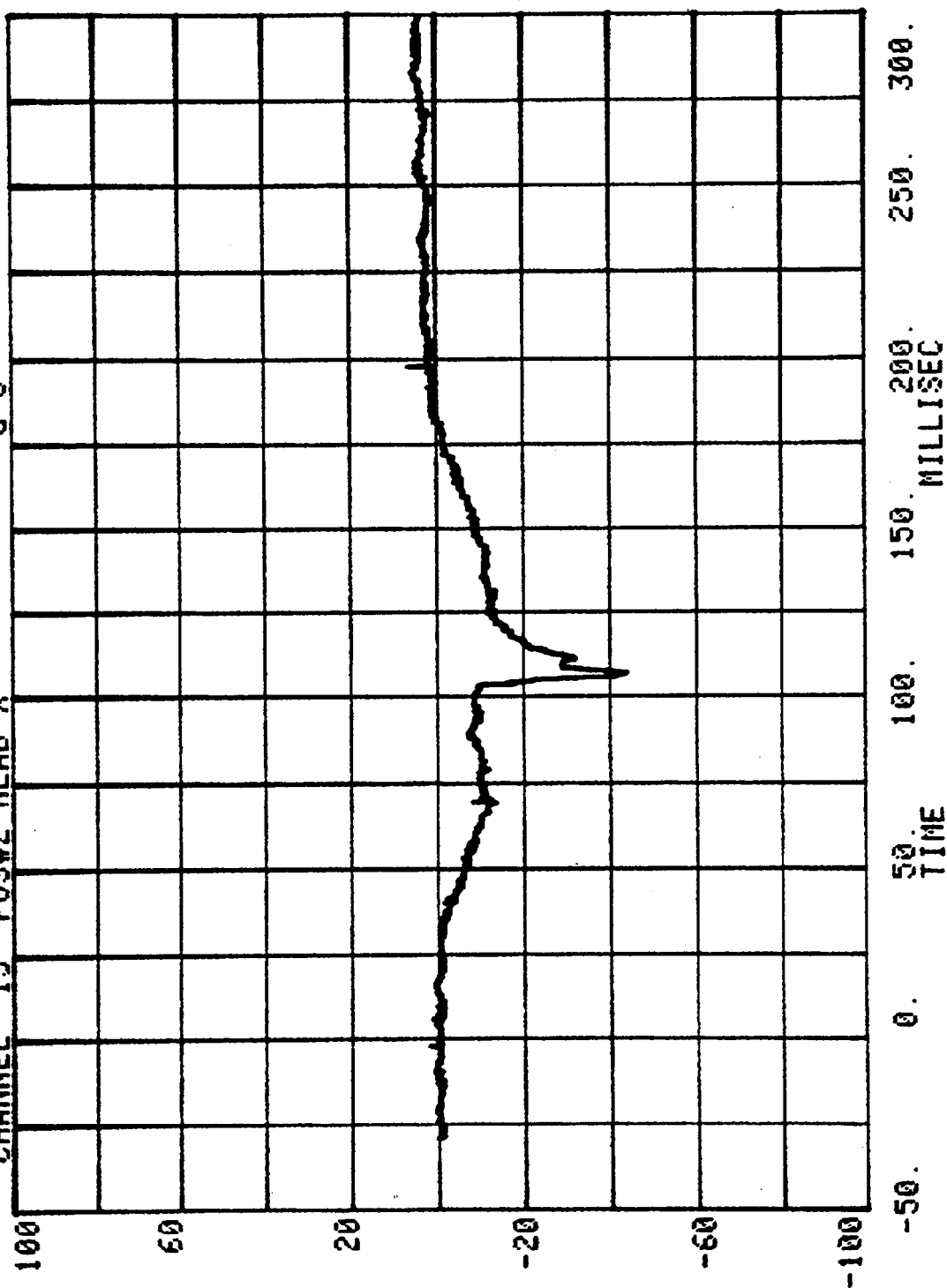
HIC= 683.4 FROM T1= .05850 TO T2= .12210

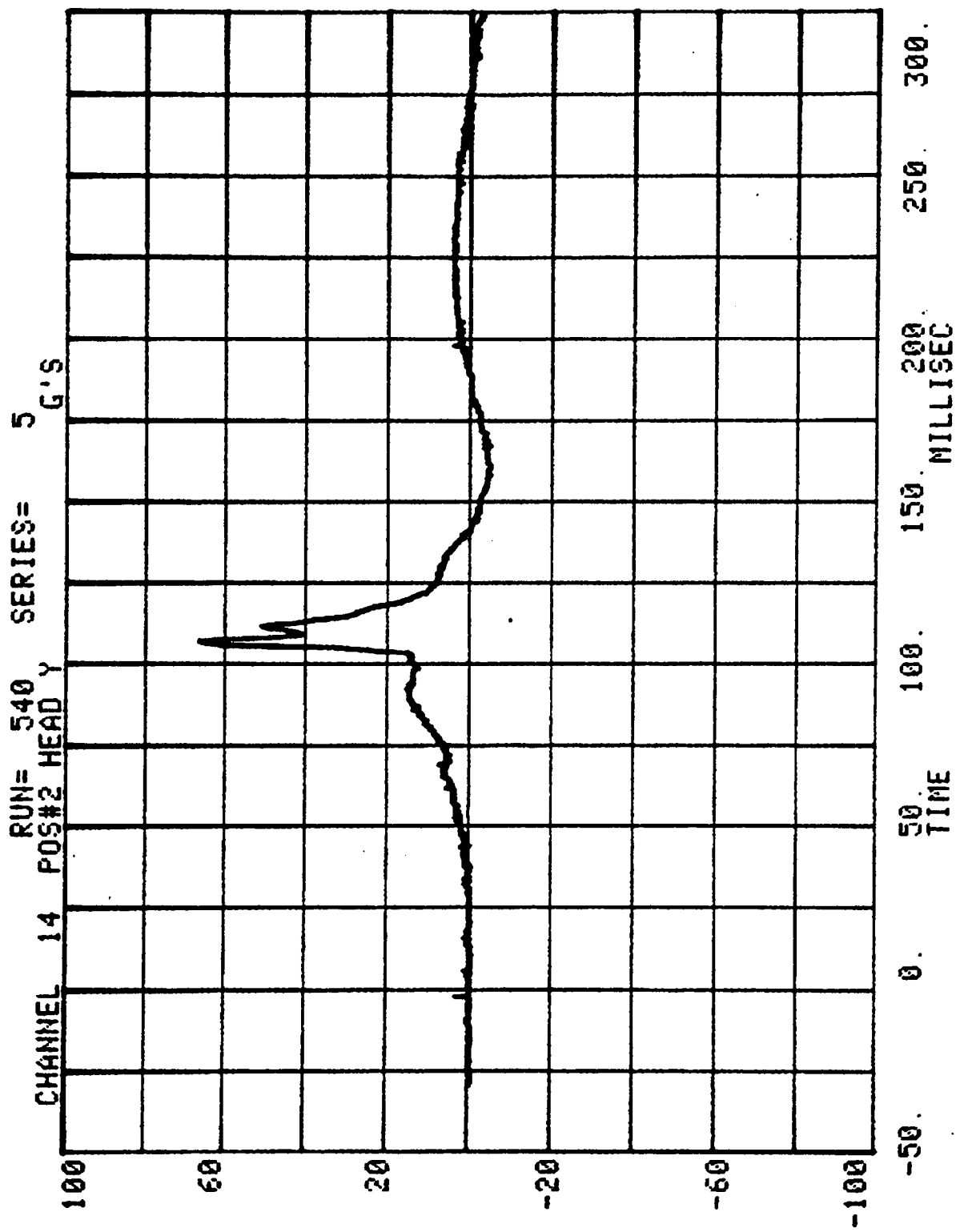
AVERAGE ACCELERATION BETWEEN T1 AND T2= 41.0G'S

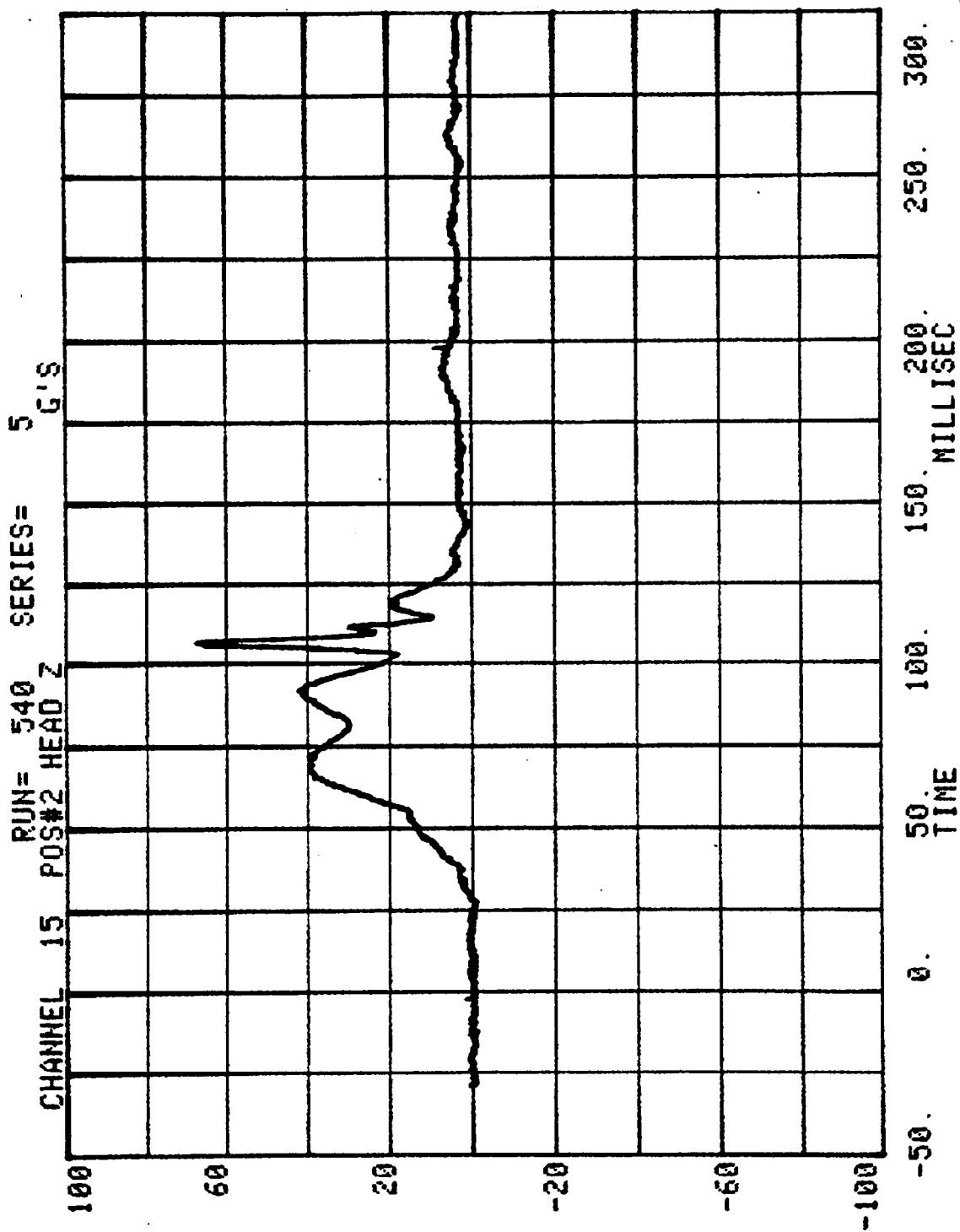
EVENT TIME= 300.0 MSEC

SEVERITY INDEX= 911.4

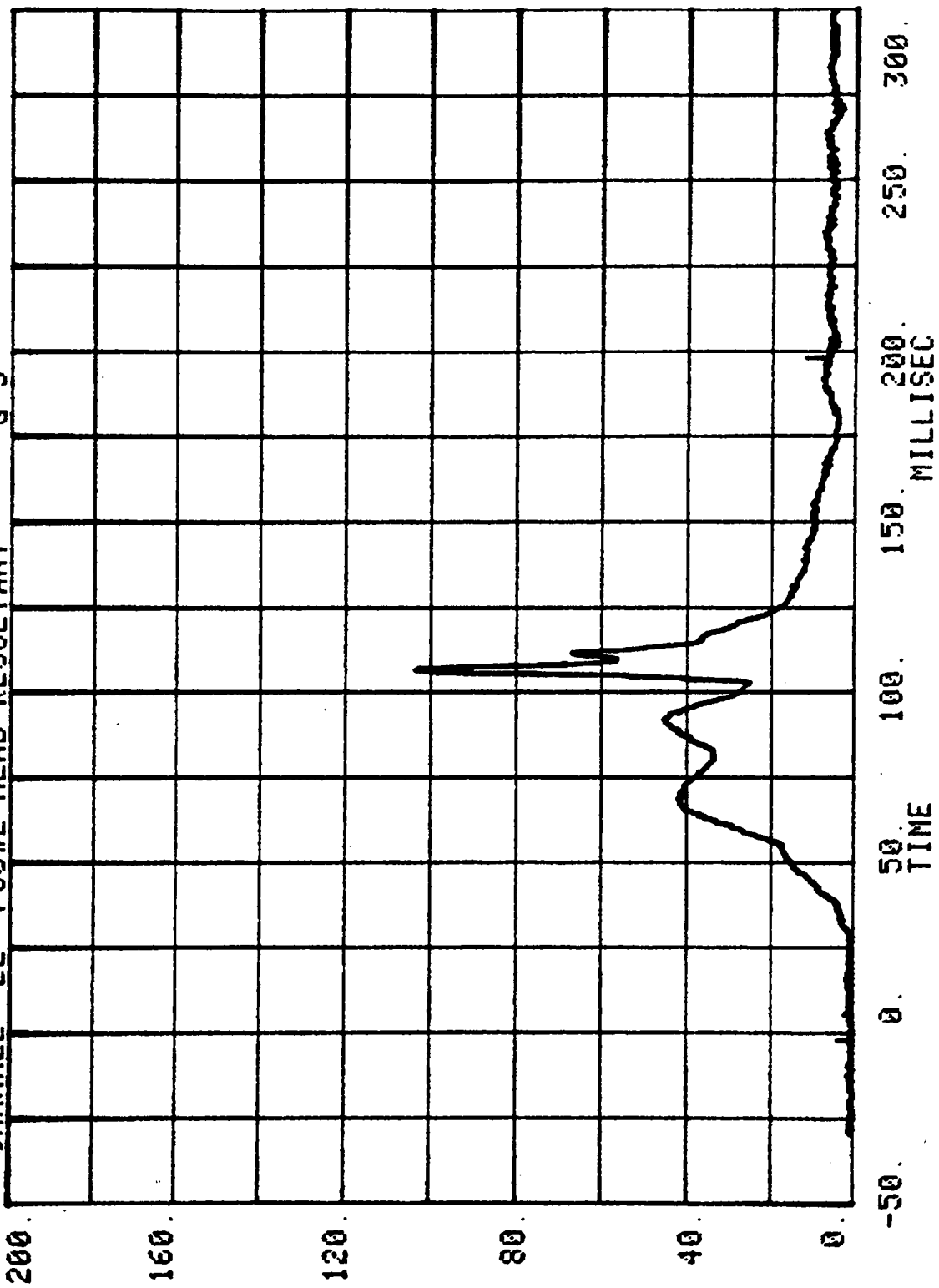
CHANNEL 13 POS#2 HEAD X RUN= 540 SERIES= 5 G'S

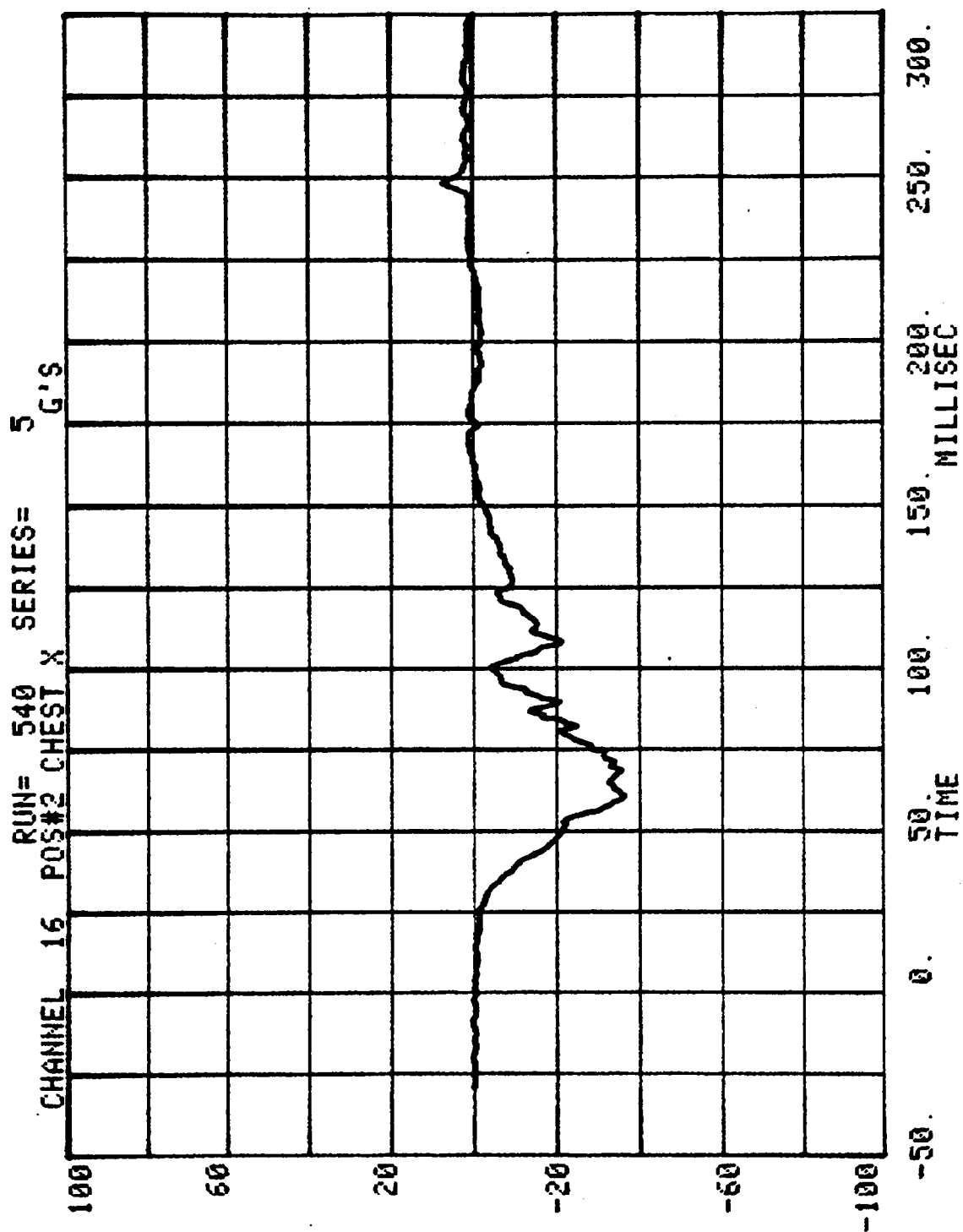






CHANNEL 22 POS#2 HEAD RESULTANT 5 G'S

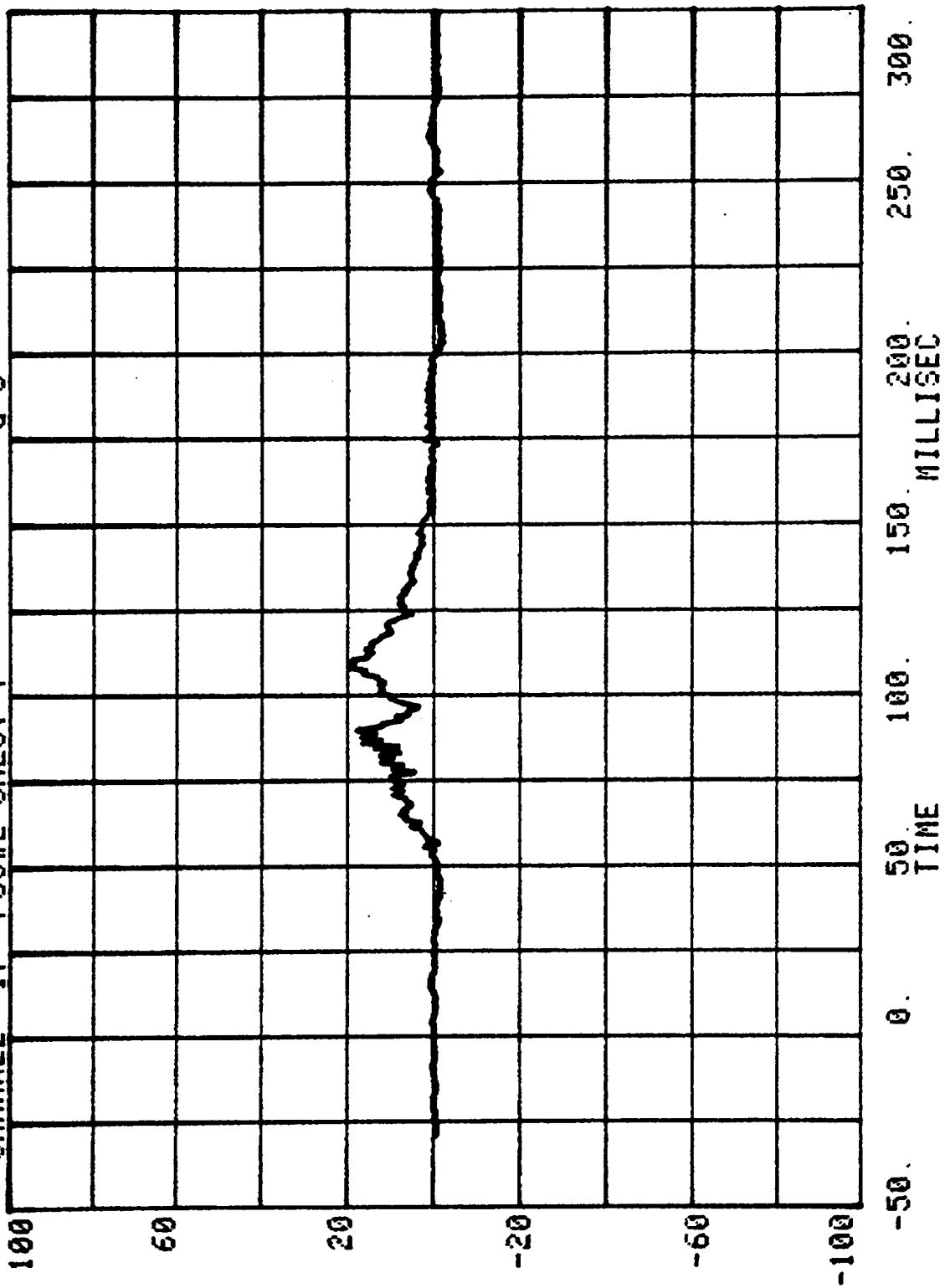




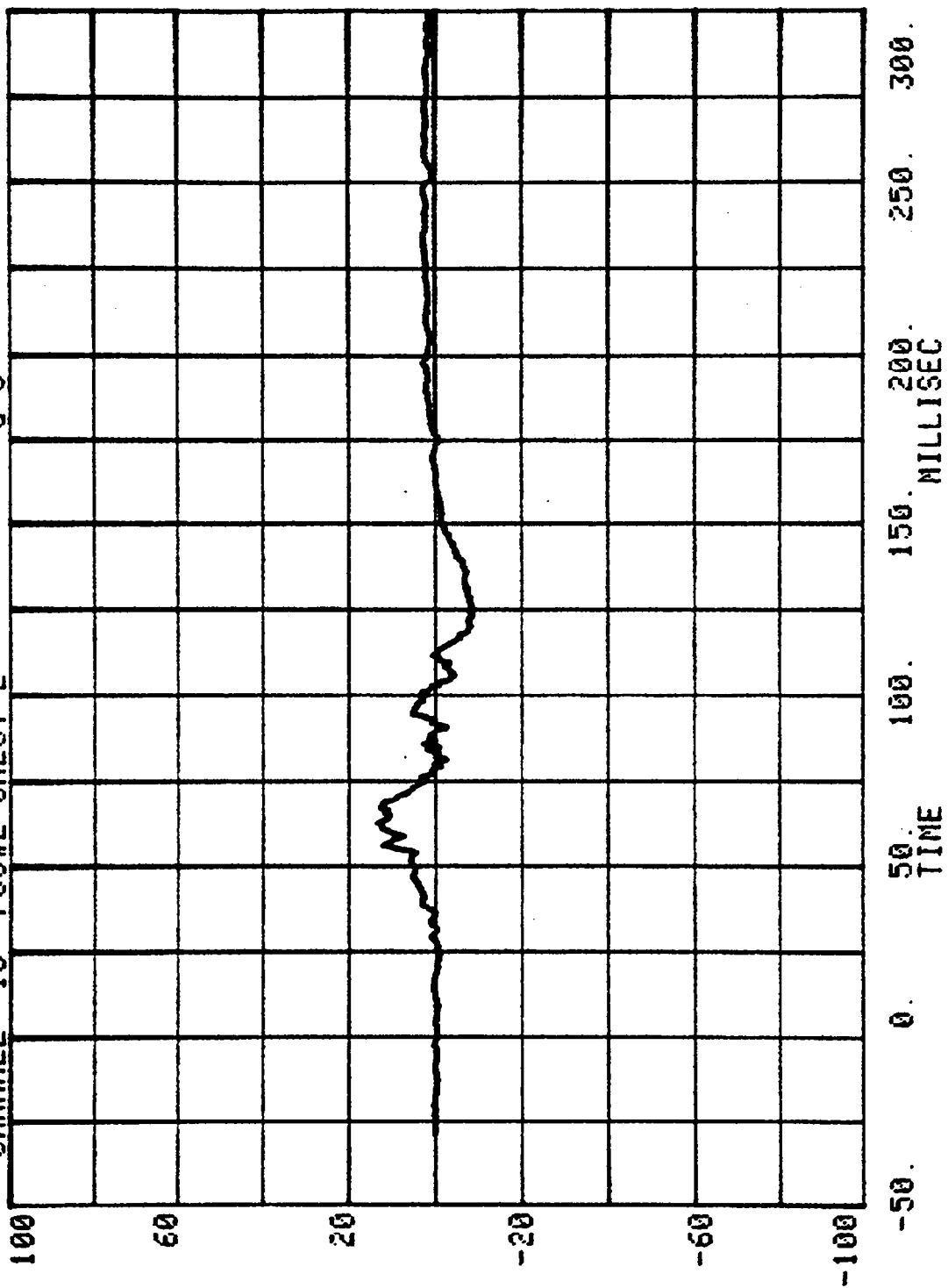
B-86

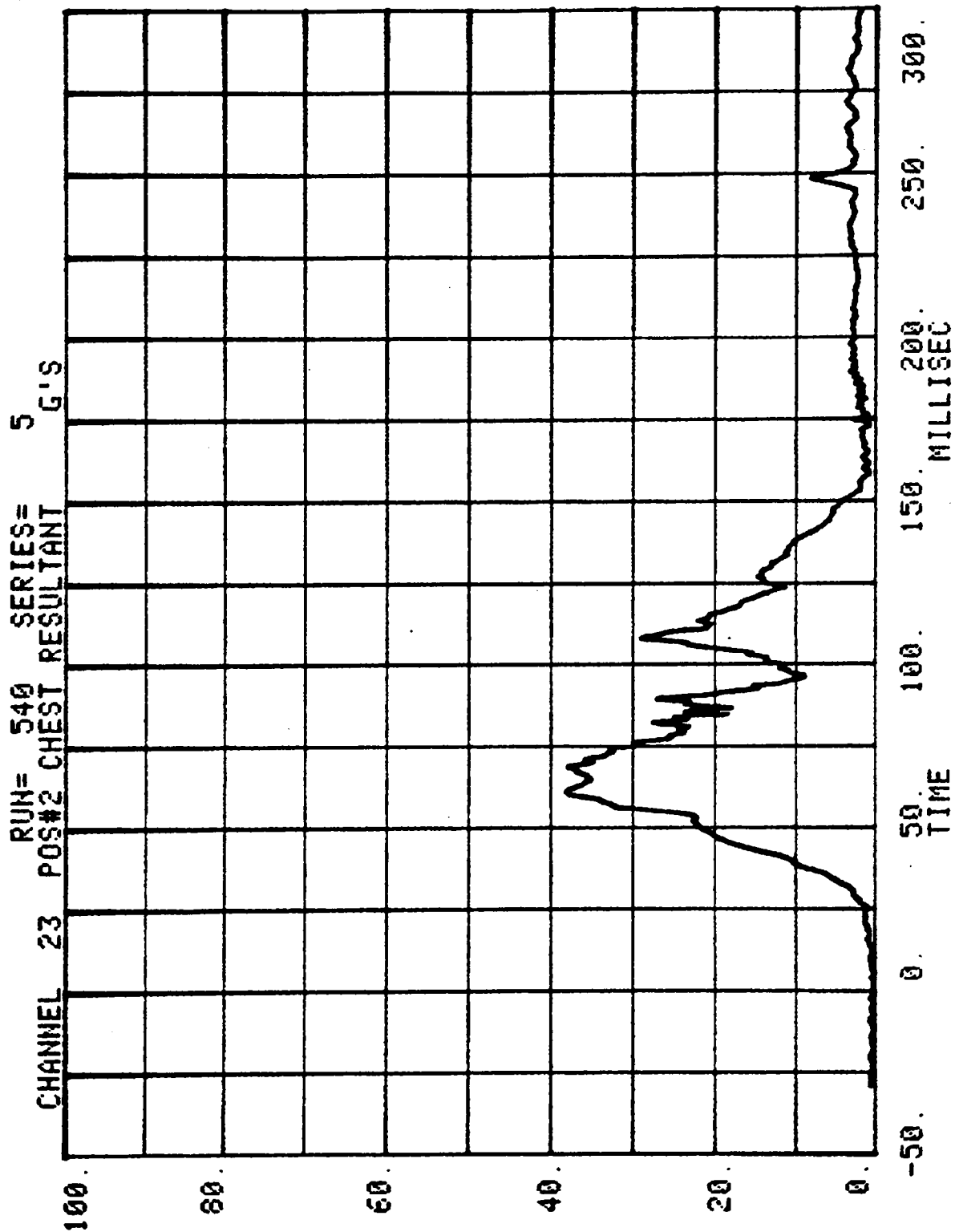
6851-V-5

CHANNEL 17 POS#2 CHEST Y SERIES= 5 G'S

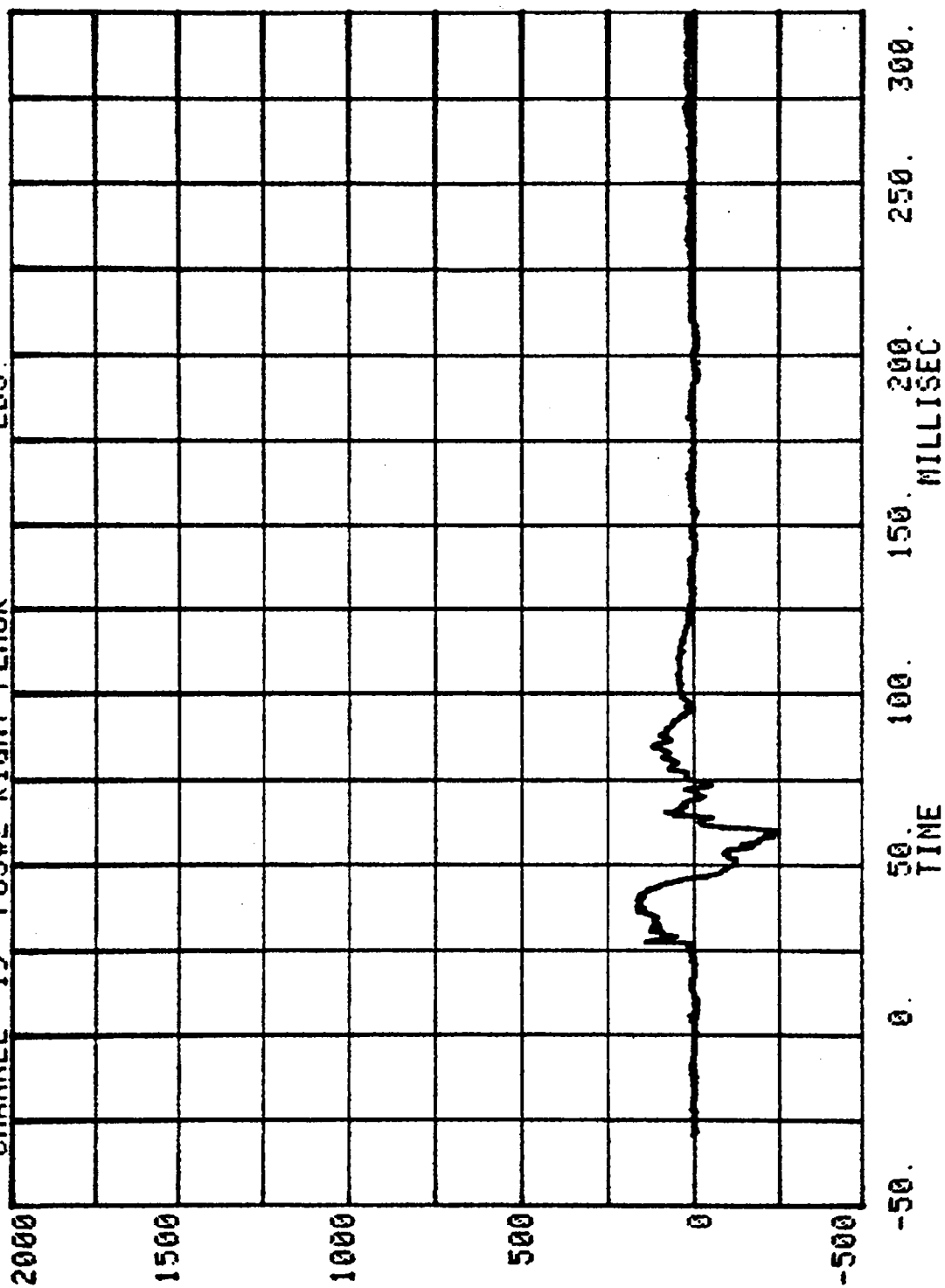


CHANNEL 18 POS#2 CHEST Z RUN= 540 SERIES= 5 G'S

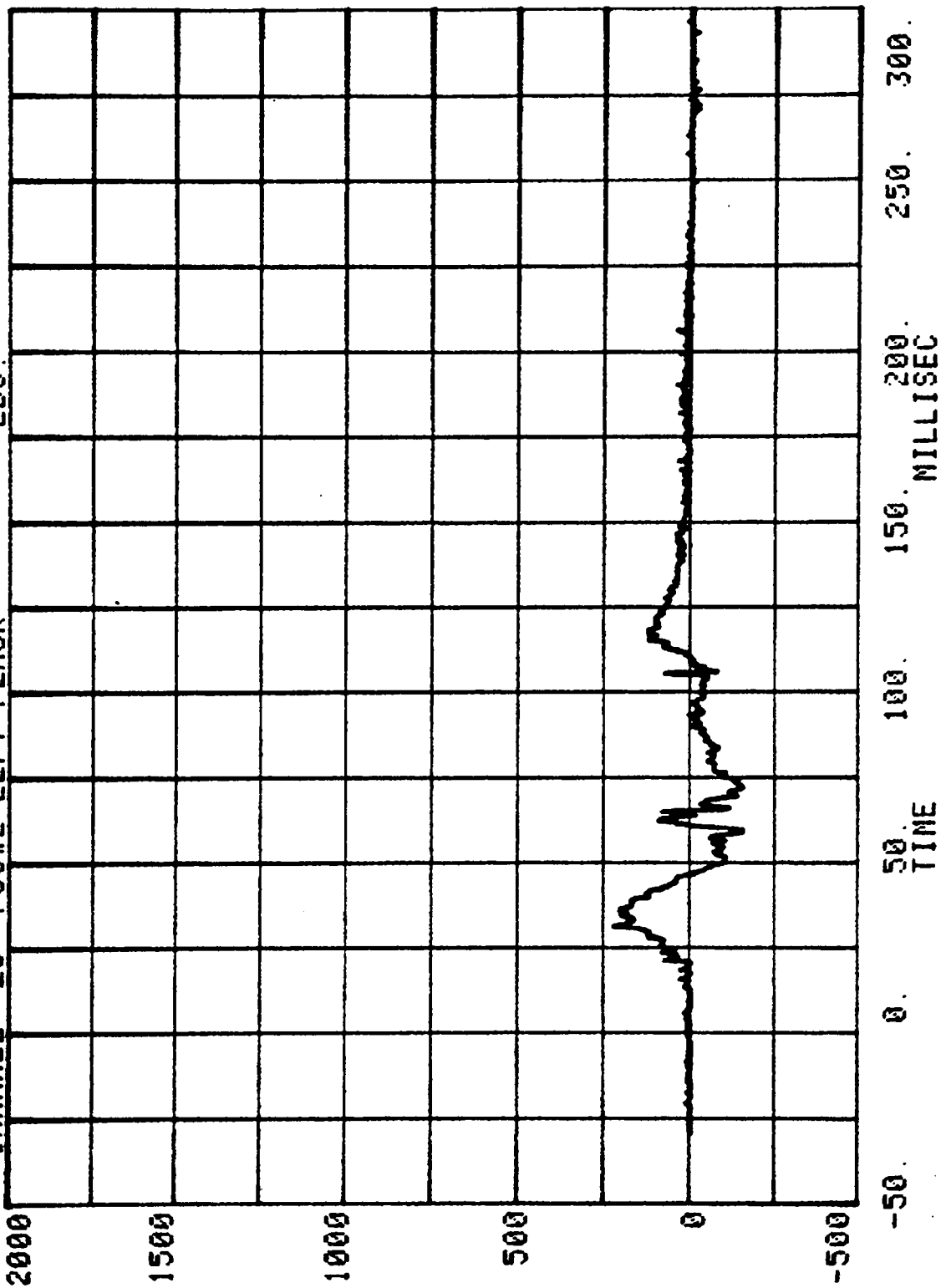




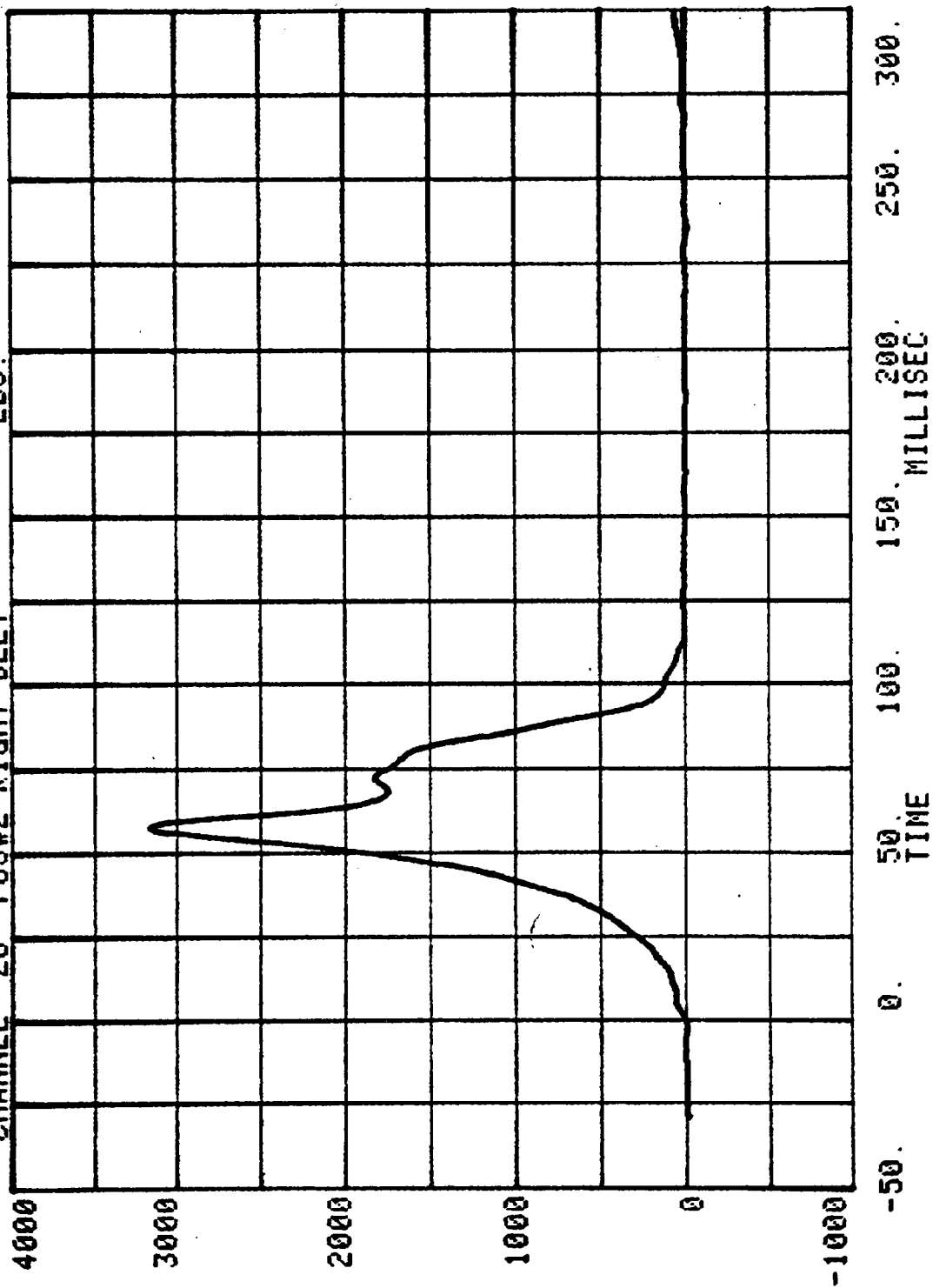
CHANNEL 19 POS#2 RIGHT FEMUR RUN= 540 SERIES= 5 LBS.



RUN= 540 SERIES= 5 LBS.
CHANNEL 20 POS#2 LEFT FEMUR



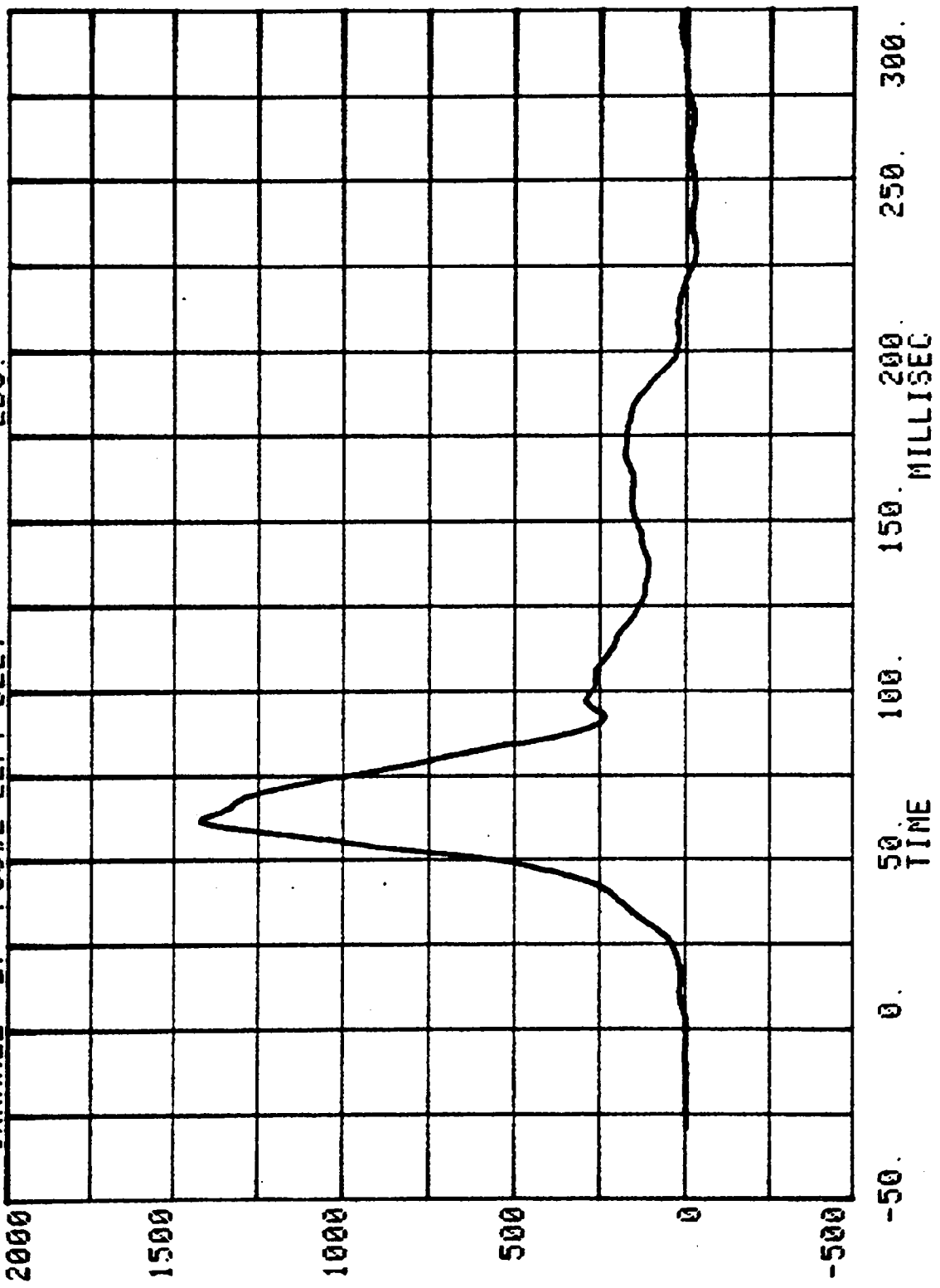
CHANNEL 26 POS#2 RIGHT BELT
RUN= 540 SERIES= 5 LBS.



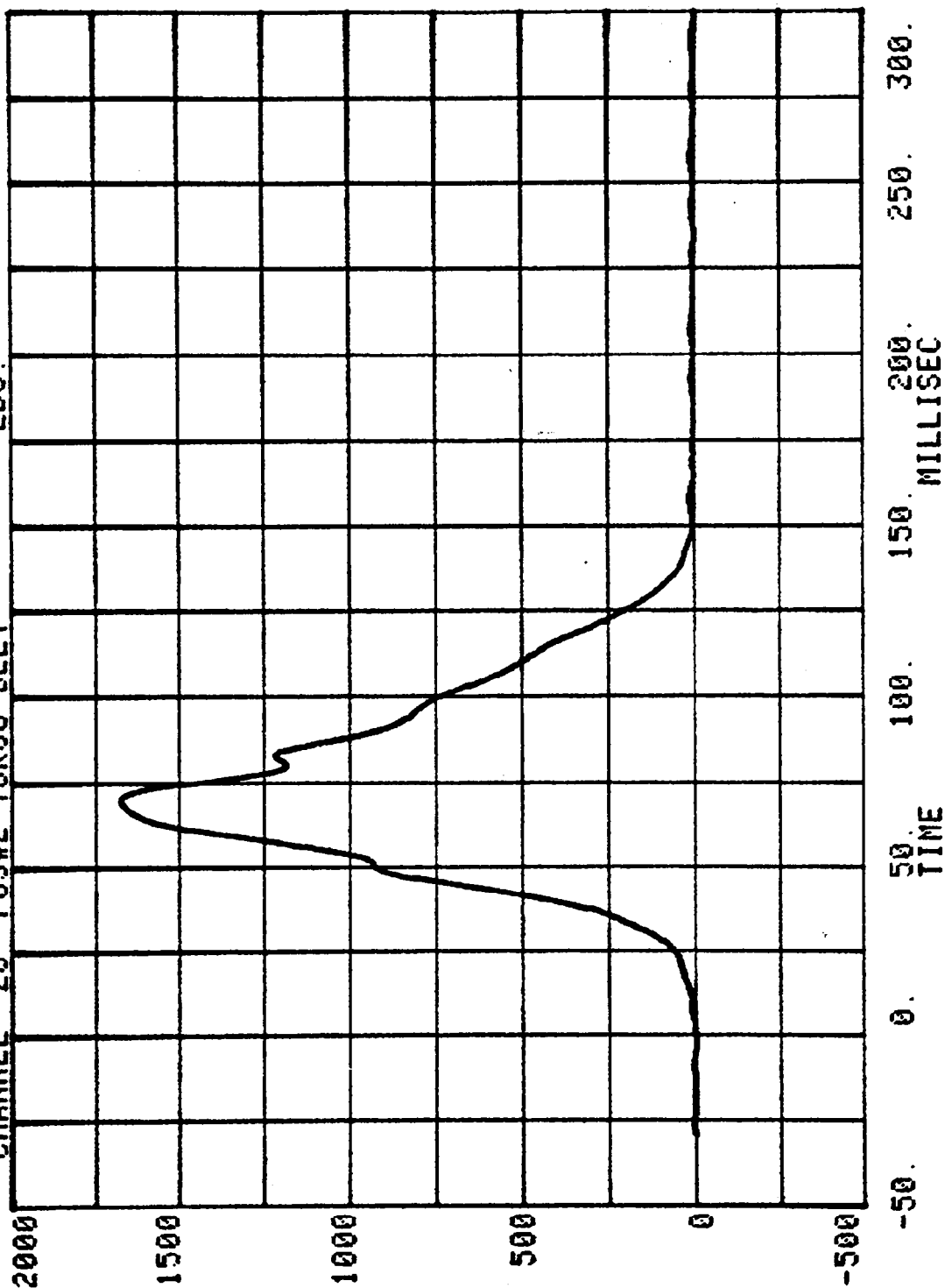
CHANNEL 27 POS#2 LEFT BELT

RUN= 540 SERIES= 5

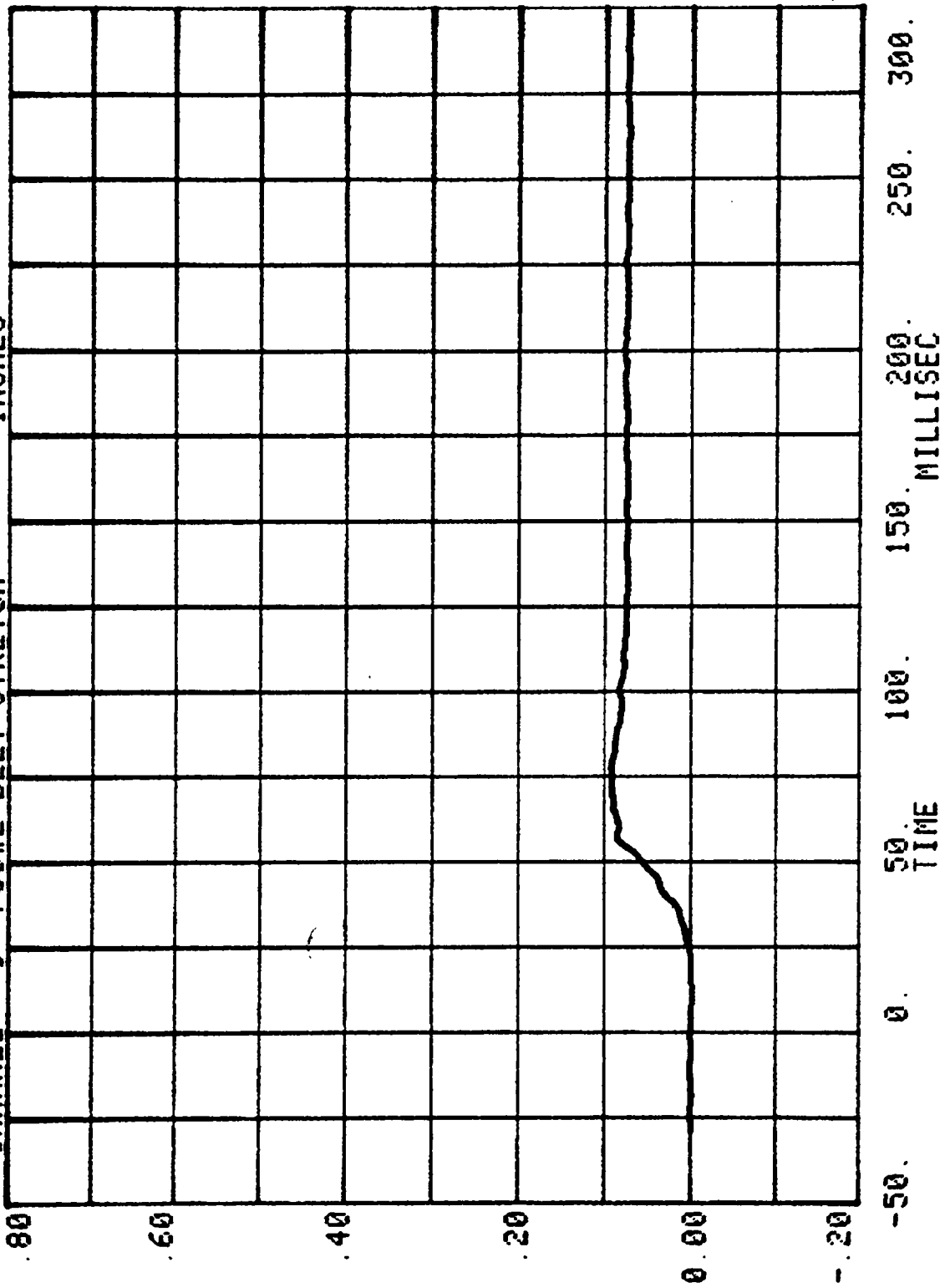
LBS.



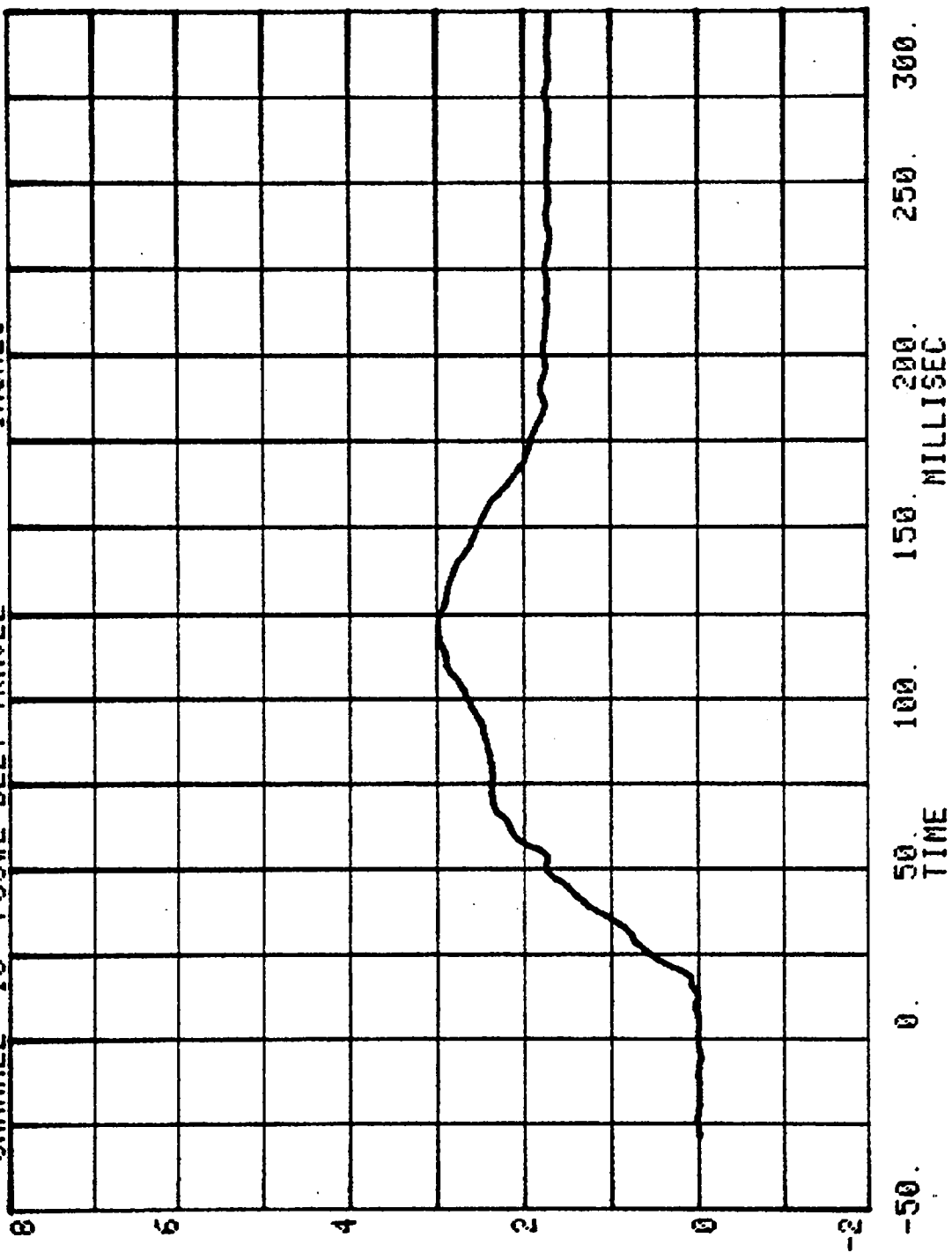
CHANNEL 28 POS#2 TORSO BELT RUN= 540 SERIES= 5 LBS.



CHANNEL 9 POS#2 BELT STRETCH RUN= 540 SERIES= 5 INCHES MEASURED OVER 2.5 INCHES



RUN= 540 SERIES= 5
CHANNEL 10 POS#2 BELT TRAVEL 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 anthropomorphic 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. 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>
110	4/16/82
153	4/16/82

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 Number 6525-V-1.

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 110

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: _____

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		4/12-4/16/82	
Calibration Sequential Number for Dummy - - -		12	
Temperature in Lab. (Spec. = 66 to 78°F) - - -		68 to 70°F	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		42 to 56%	
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel. -	210 to 260G	245 g	
b. Peak Lateral Accel. - -	≤10G	7 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.12 ms	
2. <u>NECK BENDING TEST:</u>			see 109
a. Pendulum Speed - - - -	21.5 to 25.5 fps	22.86 fps	10/1/81
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	22.5 g	Tape 1031
c. Peak Resultant Head Acceleration - - - -	26G maximum	26 g	
d. Pendulum Decel. ($t_2 - t_1$)	≤3 ms	1.25 ms	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	28.1 ms	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	5.3 ms	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	105 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	27.5 ms
	Displ.	2.1 to 3.1 in.	2.5 in.
60°	Time	40.3 to 51.7 ms	41.5 ms
	Displ.	4.3 to 5.3 in.	4.5 in.
Maximum	Time	53.2 to 66.8 ms	55.5 ms
(°)	Displ.	5.0 to 6.0 in.	5.2 in.

Continued

P. 572 DUMMY CALIBRATION TEST DATA Continued:

NHTSA DUMMY ID NO. 110

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	74 ms	
	Displ.	4.3 to 5.3 in.	4.5 in.	
30°	Time	85.4 to 104.6 ms	90.5 ms	
	Displ.	2.1 to 3.1 in.	2.4 in.	
0°	Time	101.0 to 123.0 ms	104 ms	
	Displ.	-.5 to 0.5 in.	-.2 in.	
3. <u>ABDOMINAL COMPRESSION TEST:</u>				
(Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	54.0 lbs.	
b. Force @ 1.3" - - - - -		73 to 88 lbs.	82.0 lbs.	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20° - - - - -		22 to 34 lbs.	32.0 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	37.5 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	47.5 lbs.	
d. Return Angle - - - - -		12° maximum	5°	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed - - - - -		21.78-22.22 fps	21.91 fps	
(2) Peak Deflection - - - - -		1.7" maximum	1.6 in.	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1890 lbs.	
(4) Internal Hysteresis - - - - -		50 to 70%	56.13%	
b. Low Speed				
(1) Probe Speed - - - - -		13.86-14.14 fps	14.06 fps	
(2) Peak Deflection - - - - -		1.1" maximum	.98 in.	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1217 lbs.	
(4) Internal Hysteresis - - - - -		50 to 70%	53.01%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

NHTSA DUMMY ID NO. 110

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	6.83 fps	
(2) Maximum Force - -	1850 to 2500 lbs	1850 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.84 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.92 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1925 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.92 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. i10

CALIB. SEQ. NOS. FOR DUMMY: _____ & _____

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	CX05	1/82	7/82
ENDEVCO	DB47	1/82	7/82
ENDEVCO	CJ54	1/82	7/82
GSE	312	1/82	7/82
GSE	311	1/82	7/82
CEC	16929	1/82	7/82
CEC	22958	1/82	7/82
TRANSDUCER INC	20051	1/82	7/82
BLH	72952	1/82	7/82
CIC	567-11	1/82	7/82

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 153

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: _____

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		4/12-4/16/82	
Calibration Sequential Number for Dummy - - -		4	
Temperature in Lab. (Spec. = 66 to 78°F) - - -		68 to 70°F	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		42 to 56%	
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel. -	210 to 260G	210 g	
b. Peak Lateral Accel. - -	≤10G	3 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.28 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	22.5 g	see 163 10/1/81 Tape 1031
c. Peak Resultant Head Acceleration - - - -	26G maximum	24 g	
d. Pendulum Decel. ($t_2 - t_1$)	≤3 ms	1.25 ms	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	28.1 ms	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	5 ms	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	103 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	0.0 in
30°	Time	25.6 to 34.4 ms	29.5 ms
	Displ.	2.1 to 3.1 in.	2.7 in
60°	Time	40.3 to 51.7 ms	45.5 ms
	Displ.	4.3 to 5.3 in.	4.8 in
Maximum	Time	53.2 to 66.8 ms	57.5 ms
(°)	Displ.	5.0 to 6.0 in.	5.2 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	67.5 ms	
	Displ.	4.3 to 5.3 in.	4.8 in.	
30°	Time	85.4 to 104.6 ms	87 ms	
	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.	0.0 in.	
3. ABDOMINAL COMPRESSION TEST: (Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	57.0 lbs.	
b. Force @ 1.3" - - - - -		73 to 88 lbs.	84.0 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	30.5 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	42.0 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	54.0 lbs.	
d. Return Angle - - - - -		12° maximum	3.5°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - - - - -		21.78-22.22 fps	21.88 fps	
(2) Peak Deflection - - - - -		1.7" maximum	1.52 in.	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1917 lbs.	
(4) Internal Hysteresis - - - - -		50 to 70%	52.49%	
b. Low Speed				
(1) Probe Speed - - - - -		13.86-14.14 fps	13.98 fps	
(2) Peak Deflection - - - - -		1.1" maximum	1.03 in.	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1217 lbs.	
(4) Internal Hysteresis - - - - -		50 to 70%	54.10%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

NHTSA DUMMY ID NO. 153

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	6.96 fps	
(2) Maximum Force - -	1850 to 2500 lbs	1975 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.91 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1950 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.08 fps	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 153

CALIB. SEQ. NOS. FOR DUMMY: _____ & _____

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	CX05	1/82	7/82
ENDEVCO	DB47	1/82	7/82
ENDEVCO	CJ54	1/82	7/82
GSE	312	1/82	7/82
GSE	311	1/82	7/82
CEC	16929	1/82	7/82
CEC	22958	1/82	7/82
TRANSDUCER INC	20051	1/82	7/82
BLH	72952	1/82	7/82
CIC	567-11	1/82	7/82