

REPORT NO. 6851-V-4

NEW CAR ASSESSMENT AND STANDARDS

ENFORCEMENT INDICANT TESTING

FMVSS NOS. 212, 219 and 201-75

CHRYSLER CORPORATION

1982 DODGE OMNI

4-DOOR HATCHBACK

NHTSA 703-4-539

CALSPAN CORPORATION

ADVANCED TECHNOLOGY CENTER

P. O. BOX 400

BUFFALO, NY 14225



April 20, 1982

FINAL REPORT

Prepared for:

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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Contract Technical Manager

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16. Abstract A frontal load cell barrier impact test of a 1982 Dodge Omni 4-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 35.2 mph. Post-test maximum vehicle crush was 24.9 inches. Post-test maximum firewall intrusion was 11 inches. The vehicle complied with: FMVSS 212 - Windshield Retention FMVSS 219 - Windshield Intrusion FMVSS 301-75 - Fuel System Integrity FMVSS 208 - Injury Criteria Driver passed. Right front passenger failed: head - HIC = 1667					
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TABLE OF CONTENTS

	<u>Page No.</u>
SECTION 1 PURPOSE AND TEST PROCEDURE	1-1
SECTION 2 SUMMARY OF TEST NUMBER 703-4-539	2-1
SECTION 3 SUMMARY OF RESULTS OF FMVSS NOS. 212, 219 AND 301-75	3-1
SECTION 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

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	Windshield Zone Intrusion, FMVSS 219 - Data Sheet	3-3
2	Protected Zone	3-4
3	Summary of FMVSS 212 Data	3-5
4	Pre-Test and Post-Test Measurement Points	4-2
5	Vehicle Accelerometer Locations	4-4
6	Camera Position for Frontal Impacts	4-5
7	Part 572 Dummy In-Vehicle Position	4-8
8	Occupant Clearance Dimensions	4-9
9	Fixed Load Cell Barrier-Load Cell Locations	4-11
A-1	Pre- and Post-Test Front and Rear Views	A-2
A-2	Pre- and Post-Test Right and Left Side Views	A-3
A-3	Pre- and Post-Test Right and Left Front Quarter Panel Views	A-4
A-4	Pre- and Post-Test Right and Left Front Three-Quarter Views	A-5
A-5	Pre- and Post-Test Right and Left Rear Three-Quarter Views	A-6
A-6	Pre- and Post-Test Front and Rear Underbody Views	A-7
A-7	Post-Test Right and Left Underbody Views	A-8
A-8	Post-Test Stub Frame Separation Views	A-8
A-9	Post-Test Windshield and Windshield Retention Loss Views	A-9
A-10	Pre- and Post-Test Driver Views	A-10
A-11	Pre- and Post-Test Right Front Passenger Views	A-11
A-12	Post-Test Vehicle Interior Views	A-12
A-13	Pre-Test Fuel Filler Cap and Fuel Tank Views	A-13
A-14	Pre-Test Engine Compartment View	A-13
A-15	Velocity Trap Counter	A-13

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	Crash Test Summary	2-2
2	Vehicle Test Weights as Tested	2-5
3	Summary of Test Conditions	2-6
4	Post-Impact Data - Standards 219 and 301 - Data Sheet	3-2
5	"Fuel System Integrity" Post- Impact Test Data - FMVSS No. 301-75	3-6
6	Vehicle Measurements	4-3
7	High Speed Camera Locations	4-6
8	High Speed Camera Information (Test 703-4-539)	4-7
9	Dummy Injury Criteria Values	4-10

SECTION 1
PURPOSE AND TEST PROCEDURE

Purpose

The purpose of this test was to determine whether the subject vehicle (a 1982 Dodge Omni 4-door hatchback) meets the requirements of FMVSS Nos. 212, 219 and 301-75 at a higher test speed and also to obtain structural information and dummy injury criteria values for Research and Development and the Office of Automotive Ratings of the NHTSA. This test is part of the New Car Assessment Program B.O.A., Task 1, sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-81-C-87088.

Test Procedure

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.

With the exception of a higher test speed, this procedure is not in conflict with any portion of FMVSS Procedures issued by the Office of Standard Enforcement and the amendments in effect as noted by the applicable contract.

SECTION 2
SUMMARY OF TEST NUMBER 703-4-539

A load cell barrier consisting of 36 load cells (Figure 9) was impacted by a 1982 Dodge Omni at a velocity of 35.2 mph. The test was performed at the Calspan Corporation, Advanced Technology Center on April 20, 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 Part 573, 50th percentile male Anthropomorphic Test Devices (ATDs) were placed in the 1982 Dodge Omni in the driver and right front passenger seating positions, according to dummy placement procedures specified in Laboratory Procedures for Vehicle Assessment TP-212-02.

Both ATDs were fully instrumented with femur load cells and triaxial accelerometers in the head and chest areas. These ATDs had been certified prior to the test and certification details, along with instrumentation calibration data, are found in Appendix C.

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

The 71 channels of data were recorded on 6-14 channel FM tape recorders. All data channels checked out prior to and after the test.

Table 1

CRASH TEST SUMMARY

TEST NO. 703-4-539

PROJECT: NEW CAR ASSESSMENT PROGRAM

DATE: 4/20/82

TIME: 1405

TEMP: 41°F

VEHICLE	<u>1982 Dodge Omni</u>
TEST WEIGHT (lbs)	<u>2670</u>
IMPACT ANGLE (deg)*	<u>0</u>
IMPACT VELOCITY (mph)**	<u>35.2</u>
MAX. CRUSH (in) static	<u>24.9</u>
MAX. INTRUSION (in) static	<u>11.0 right side</u>

DUMMIES

TYPE	<u>Hybrid II Part 572</u>	<u>Hybrid II Part 572</u>
LOCATION	<u>LF(1) 110</u>	<u>RF (2) 97</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 ($\pm$.05% accuracy)

GENERAL COMMENTS

The 1982 Dodge Omni was a 4-door hatchback having a 1.7 liter, 4 cylinder engine, equipped with a 4-speed manual transmission. The total test weight with two dummies, instrumentation and cameras was 2,670 pounds.

The 1982 Dodge Omni 4-door hatchback involved in a frontal barrier crash at a velocity of 35.2 mph complied with FMVSS Nos. 212 - Windshield Mounting; 219 - Windshield Zone Intrusion and 301-75 - Fuel System Integrity. There was 82.7 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 24.9 inches of static crush and approximately 32 inches of dynamic crush. The maximum post-test firewall intrusion was 11 inches on the right side. The maximum load cell barrier force measured by the 36 load cells was 65,000 pounds at 28 milliseconds.

The fuel lines running to the engine are attached to the right stub frame and at impact both the right and left stub frames separated from the vehicle's underbody (Figure A-8). No fuel spillage occurred from these lines or any other part of the fuel system.

At impact the windshield shattered, and all other windows remained intact. Neither of the front doors was operable after impact.

The driver complied with all FMVSS 208 Injury Criteria with a HIC number of 638, maximum chest deceleration over 3 milliseconds of 58 g's and femur loads of 825 and 460 pounds. The driver's head struck the upper steering wheel rim, the chest and abdomen appeared to strike the lower wheel rim and both femurs contacted the dash panel.

The right front passenger failed to comply with the FMVSS 208 Head Injury Criteria with a HIC number of 1672 but did comply with the chest and femur injury criteria with maximum chest deceleration over 3 milliseconds of 43 g's and femur loads of 1450 and 600 pounds. Both femurs contacted the underside of the dash panel, and the occupant's head also struck the right knee as evident by the head and right femur data traces.

Table 2

VEHICLE TEST WEIGHTS AS TESTED

Left Front 750 lbs
 Right Front 750 lbs
 TOTAL FRONT 1500 lbs

Left Rear 600 lbs
 Right Rear 570 lbs
 TOTAL REAR 1170 lbs

Total Weight = 2670 lbs

Wheel Base = 99.25 inches

$Cg_{F.W.} = \frac{1170 \text{ lbs} \times 99.25 \text{ inches}}{2670 \text{ lbs}} = \underline{43.49} \text{ inches}$

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
 UDW = Unloaded Delivered Weight (2210 lbs)
 VCW = Vehicle Capacity Weight (865 lbs)
 DSC = Designated Seating Capacity (5)

RCLW = VCW - 150 (DSC)

RCLW = 865 - 150 (5) = 115 lbs

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

TEST WEIGHT = 2210 lbs + 115 lbs + 2 (164 lbs)

TEST WEIGHT = 2653 lbs

Table 3
SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION

Vehicle Manufacturer Chrysler Corporation
Make/Model Dodge Omni
Body Style 4-door hatchback Model Year 1982
VIN 1B3BZ18A1CD200224 Build Date 1/82
NHTSA No. 703-4-539 Color morocco red
Engine Data: 4 cylinders 1.7 l displacement
Transmission Data: 4 speed (☒) Manual (☐) Automatic
Date Rec'd _____ Air Cond. no PW. STR. no PW. BR. no
Dealer's Name & Address Mid City Dodge, Buffalo, NY 14225

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

Vehicle Manufactured by Chrysler Corporation
Date of Manufacture 1/82 VIN 1B3BZ18A1CD200224
GVRW 3315 lbs GAWR: Front 1785 lbs Rear 1580 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 P175-75R13 Load Range: ☒ B ☐ C ☐ D
Vehicle Capacity: Types of Seats ☐ Bench ☒ Bucket ☐ Split Bench
Number of Occupants (Designated Seating Capacity): 2 Front
3 Rear
5 TOTAL
Cargo Load = 115 lbs
TOTAL = 865 lbs

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

Right Front = 660 lbs Right Rear = 430 lbs
Left Front = 690 lbs Left Rear = 430 lbs
TOTAL FRONT WEIGHT = 1350 lbs (61.1 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 860 lbs (38.9 % of Total Vehicle Weight)
TOTAL DELV. WEIGHT = 2210 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 132 lbs CARGO

Right Front = 750 lbs Right Rear = 570 lbs
Left Front = 750 lbs Left Rear = 600 lbs
TOTAL FRONT WEIGHT = 1500 lbs (56.2 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1170 lbs (43.8 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 2670 lbs
Weight of ballast secured in vehicle trunk area = 0 lbs

SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS

Date of Test 4/20/82 Time of Test 1405
Ambient Temperature 41 °F at impact area
Temperature in Occupant Compartment 73 °F
Windshield Molding Temperature 46 °F

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 24 3/4 LF 25 3/8 RR 25 1/4 LR 25 1/4
Test Attitude: RF 24.2 LF 24.6 RR 23.8 LR 23.8

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 35 psi Rear = 35 psi
Recommended Tire Size P175-75R13 Load Range B
Tires on Vehicle P175-75R13
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* 13 gal
Test Volume 12.1 gal (93% of EPA Capacity)
Fuel System Capacity (data from Owner's Manual) 13 gal
Details of fuel system Engine 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 screw type cap which is
concealed by a hinged access 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 X No

VEHICLE REBOUND AND CRUSH

Overall Length of Test Vehicle: Pre-Test = R 160.8 /L 161.5 inches
Post-Test = R 137.6 /L 137.6 inches
Crush = R 23.2 /L 23.9

FOR FRONTAL IMPACTS, distance from front of test vehicle to the barrier
after impact = 20.87 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 301

DATA 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 4/20/82 TIME 1405 TEMP 41 °F

VEHICLE NHTSA NO. 703-4-539 VIN 1B3BZ18A1CD200224

REQUIRED VEHICLE VELOCITY RANGE 34.5 to 35.5 mph

IMPACT VELOCITY (traps within 5 feet of impact event) 35.2

Trap No. 1 = 35.1 mph Trap No. 2 = 35.3 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 = 23.9 in Passenger's Side = 23.2 in

Average = 23.55 in

Crush Details:

VEHICLE STATIC CRUSH (for side impacts only)

Amount of Crush = -- inches on -- side

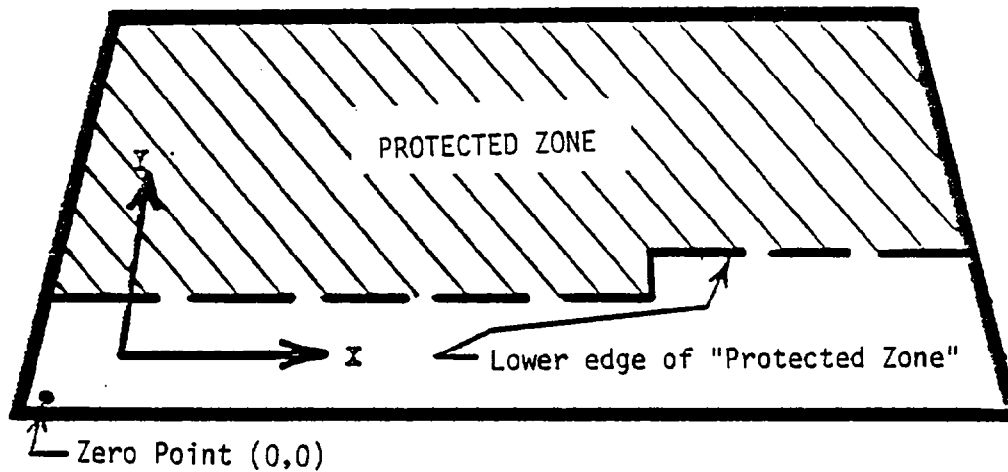
Crush Details:

VEHICLE REBOUND (from rigid barrier only)

Driver's Side = 20.75 in Passenger's Side = 21.0 in

Average = 20.87 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

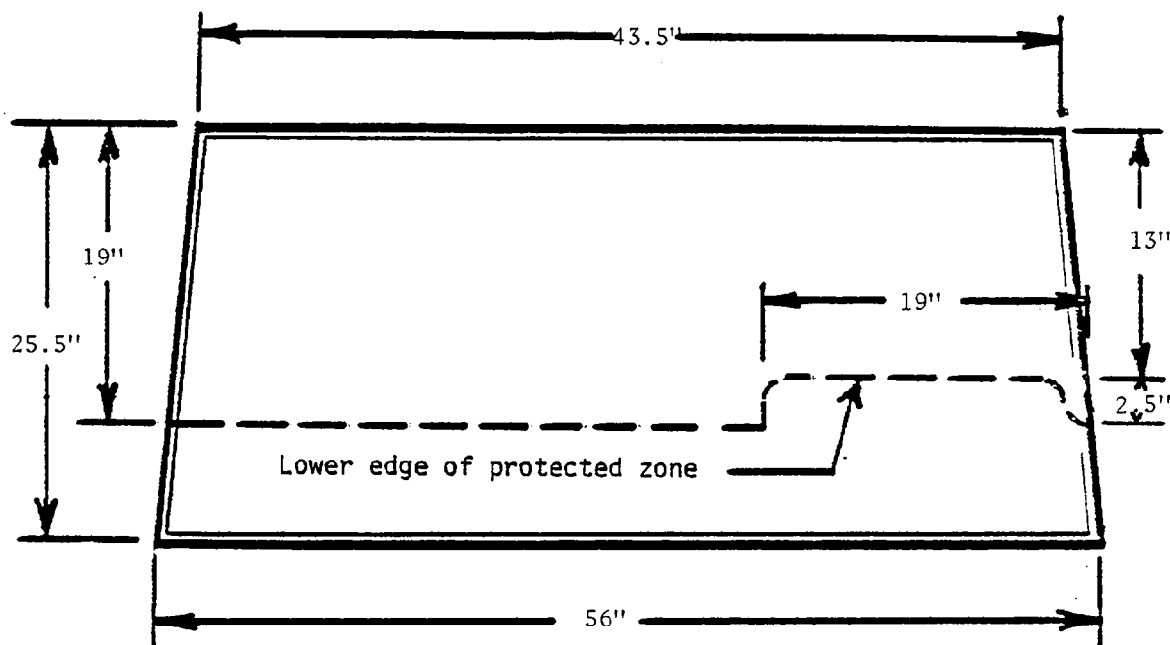
- (2) The area beneath the "Protected Zone" that the inner surface of the windshield was penetrated by a vehicle component.

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

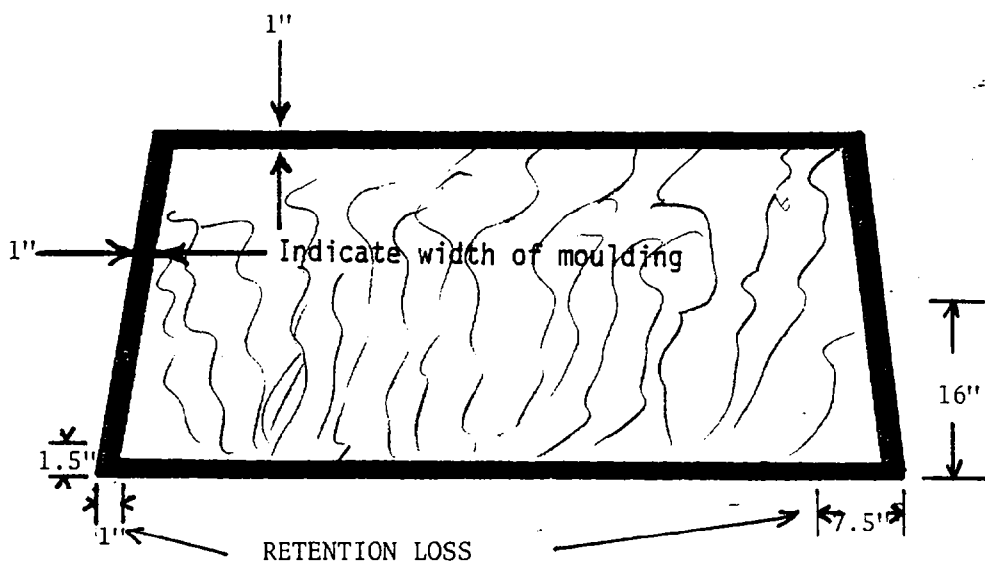
Details of windshield mounting (method of retention, type of trim, etc.):

Windshield is bonded in place and has a one inch chrome piece around the perimeter of the window.

	Windshield Periphery		
	Pre-Test	Post-Test	Retention %
Right Side	75.25	51.75	68.8
Left Side	75.25	72.75	96.7
TOTAL	150.50	124.5	82.7

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

FMVSS No. 301-75

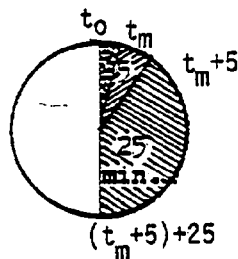
TEST VEHICLE NHTSA NO. 703-4-539 Test Date 4/20/82
Vehicle Manufacture/Make/Model 1982 Dodge Omni

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

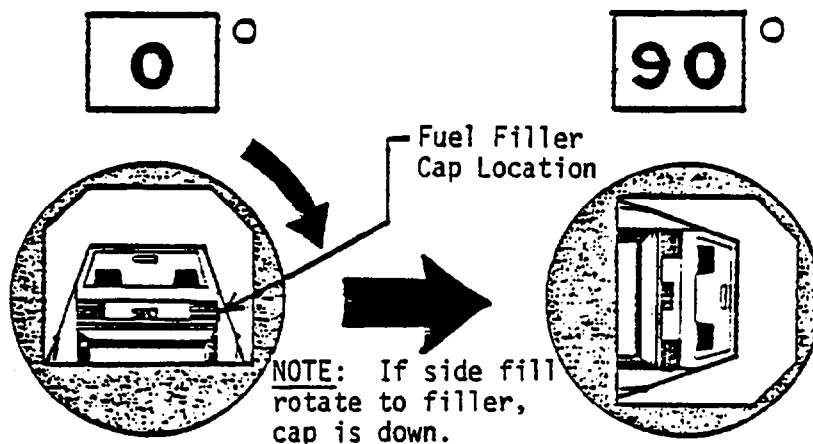
- (1) Figure 8A - Rollover data for 0° to 90° test phase
- (2) Figure 8B - Rollover data for 90° to 180° test phase
- (3) Figure 8C - Rollover data for 180° to 270° test phase
- (4) Figure 8D - Rollover data for 270° to 360° test phase

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 = 2 minutes 51 seconds
 (Spec. Range = 1 to 3 min.)
 FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
 TOTAL = 7 minutes 51 seconds
 Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

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

Maximum Allowable Solvent Spillage

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

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

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

SOLVENT SPILLAGE LOCATION(S)

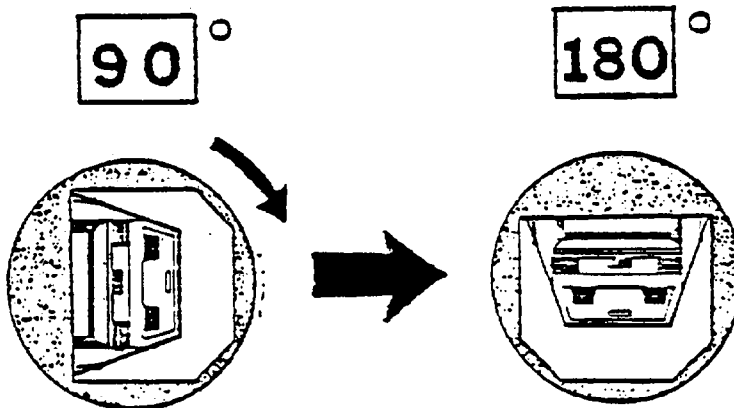
None.

VEHICLE NHTSA ID NO. 703-4-539

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
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ACTUAL TEST VEHICLE SOLVENT SPILLAGE

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

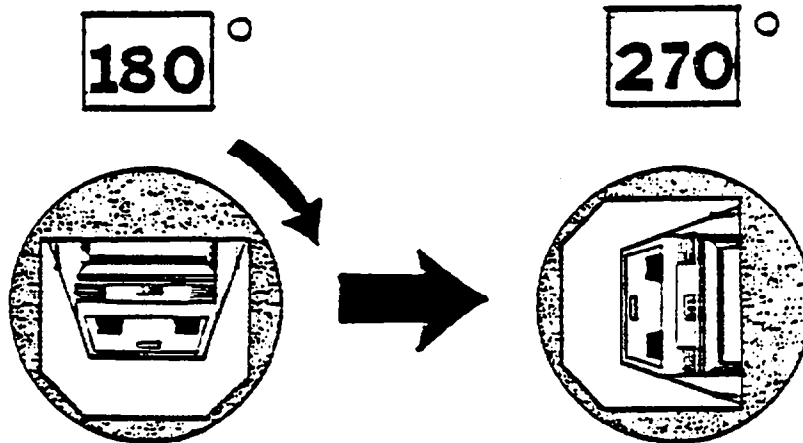
NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

None.

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 55 seconds
(Spec. Range = 1 to 3 min.)
FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
TOTAL = 7 minutes 55 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)

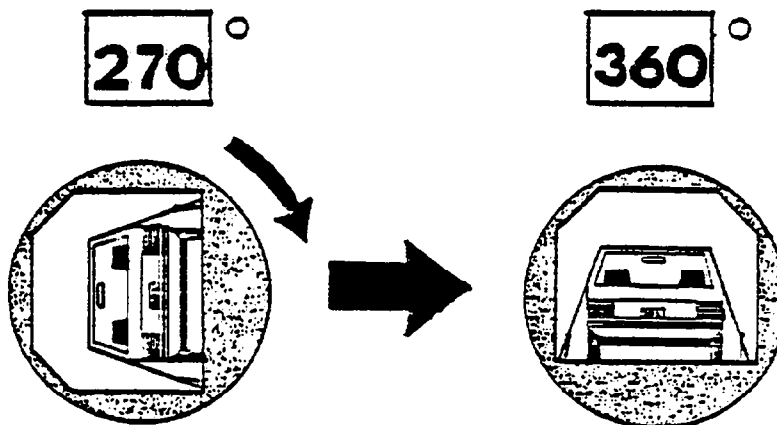
None.

VEHICLE NHTSA ID NO. 703-4-539

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 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. from 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

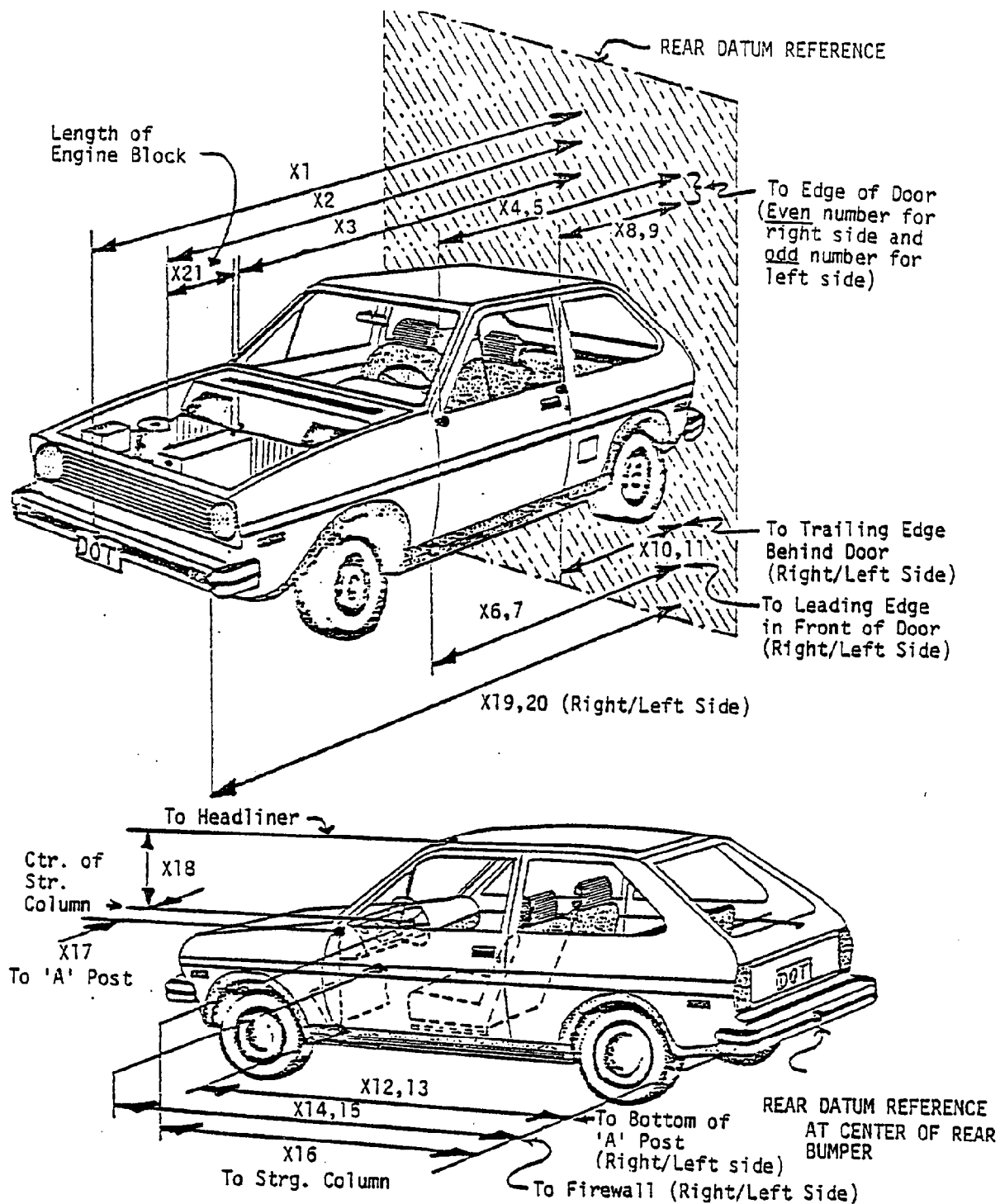
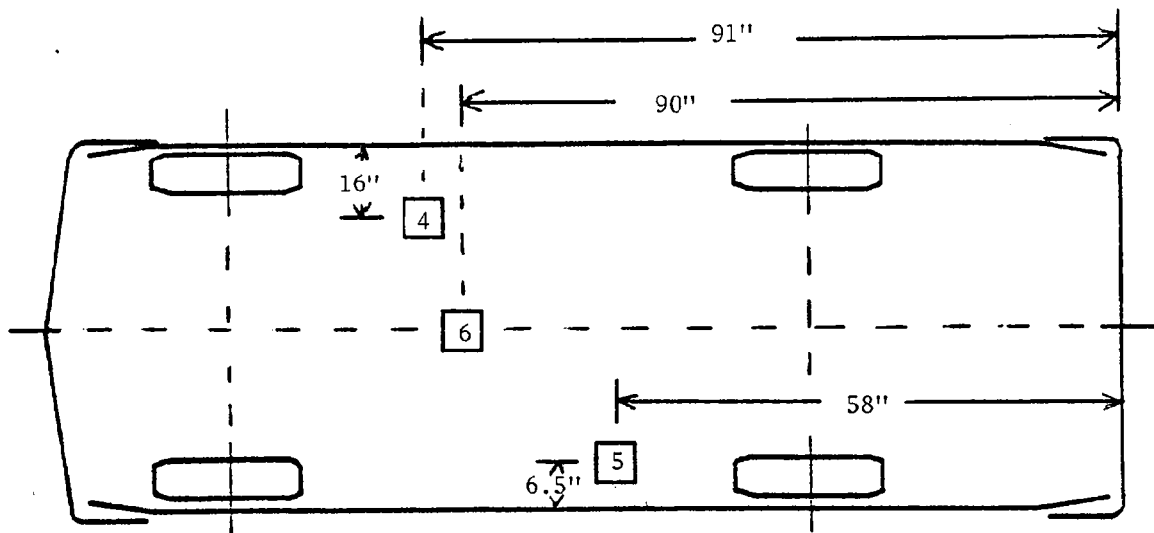


Figure 4 PRE-TEST AND POST-TEST MEASUREMENT POINTS

Table 6

VEHICLE MEASUREMENTS

No. 1982 Dodge Omni 4-door Hatchback		All Dimensions in Inches			
			Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	386" <i>386"</i>	162.50	137.60	24.90
X2	Rear Surface of Vehicle to Front of Engine		138.25	130.25	8.00
X3	Rear Surface of Vehicle to Firewall		123.90	115.90	8.00
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door		107.25	106.25	1.00
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door		107.75	106.90	.85
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door		109.50	109.25	.25
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door		110.30	110.10	.20
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door		70.75	70.25	.50
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door		71.3	70.50	.80
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door		70.60	70.50	.10
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door		71.50	71.25	.25
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side		110.50	109.75	.75
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side		111.30	111.40	-.10
X14	Rear Surface of Vehicle to Firewall, Right Side		123.00	112.00	11.00
X15	Rear Surface of Vehicle to Firewall, Left Side		122.60	112.90	9.70
X16	Rear Surface of Vehicle to Steering Column		97.00	94.50	2.50
X17	Center of Steering Column to "A" Post		11.60	15.10	-3.50
X18	Center of Steering Column to Headliner		20.00	18.10	1.90
X19	Rear Surface of Vehicle to Right Side of Front Bumper		160.80	137.60	23.20
X20	Rear Surface of Vehicle to Left Side of Front Bumper		161.50	137.60	23.90
X21	Width of Engine Block		5.50	5.50	0.00



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
4	Front Seat Crossmember	X		X
4 (XR)	Same as 4 (redundant)	X		
5	Rear Seat Crossmember	X		X
5 (XR)	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 & 8

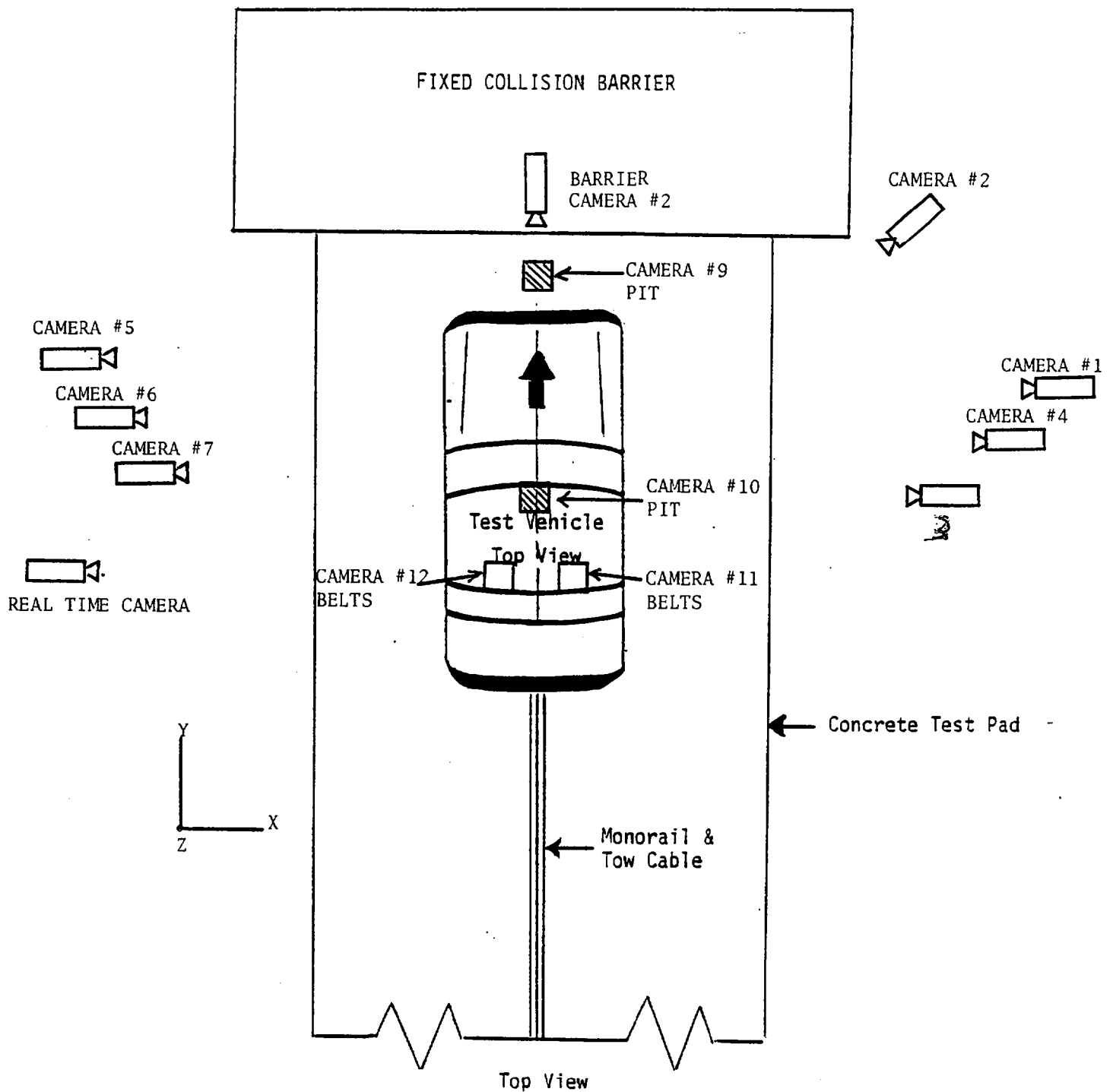


Figure 6 CAMERA POSITION FOR FRONTAL IMPACTS

Table 7

HIGH SPEED CAMERA LOCATIONS

Test No.: 703-4-539

Vehicle

1982 Dodge Omin

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	308
5	Impact - Vehicle Left Side	288	34	41	-1	--
6	Vehicle Left Side	264	60	41	-2	248
7	Driver	204	96	40	-3	188
8	Barrier	0	-9	59	-23	--
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 703-4-539)

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 Pass.	Photosonic	25 mm	900
4	Veh. Rt. Side - Close	Photosonic	35 mm	900 ✓
5	Impact - Lt. Side	Photosonic	13 mm	900
6	Veh. Lt. Side - Close	Photosonic	35 mm	900
7	Driver	Photosonic	25 mm	1000
8	Barrier	Photosonic	8 mm	900
9	Pit Front	Photosonic	13 mm	1000
10	Pit Rear	Photosonic	13 mm	900
11	Rt. Belt Retractor	Stalex	8 mm	1400
12	Lt. 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. 703-4-539

Vehicle 1982 Dodge Omni

SEAT TYPE:

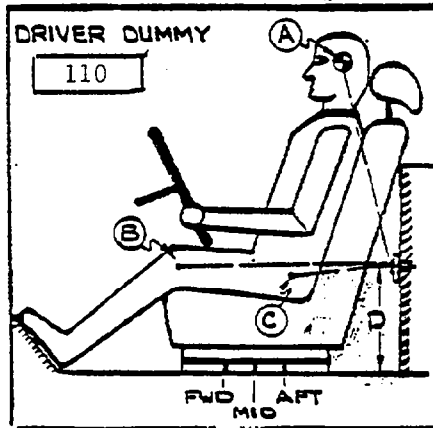
 Bench
 X Bucket
 Split Bench

ADJUSTER TYPE:

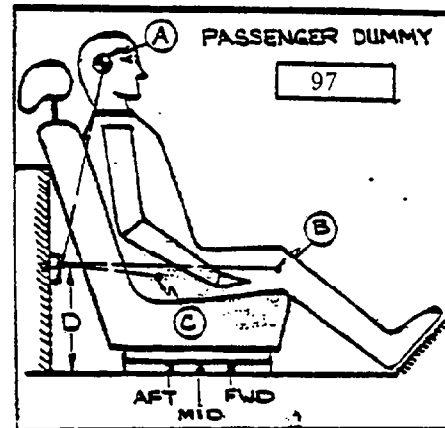
 X Manual
 Power

BUCKET SEAT BACK TYPE:

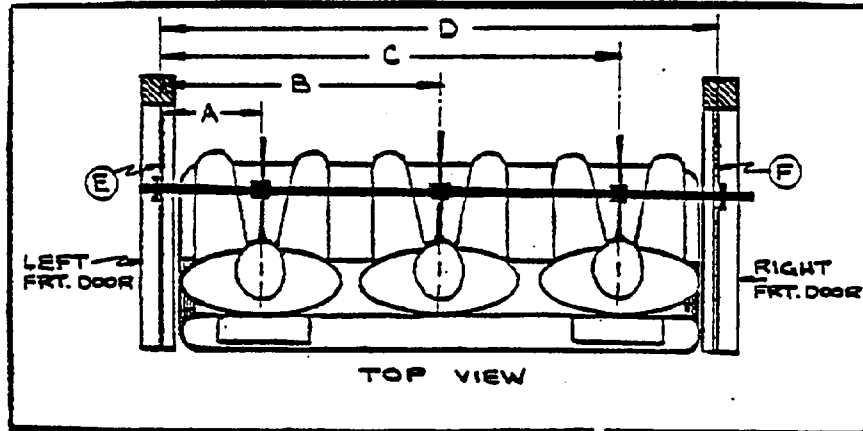
 X Fixed
 Adjustable Reclining



A = 21.6 in. 12 Degrees
B = 25.5 in. 95 Degrees
C = 10.0 in. 120 Degrees
D = 13.2 in.



A = 21.7 in. 12 Degrees
B = 26.5 in. 92 Degrees
C = 11.2 in. 115 Degrees
D = 13.2 in.



DUMMY ID

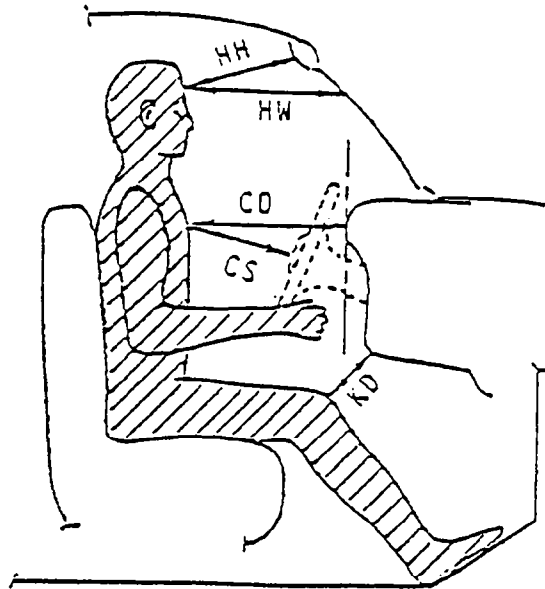
110

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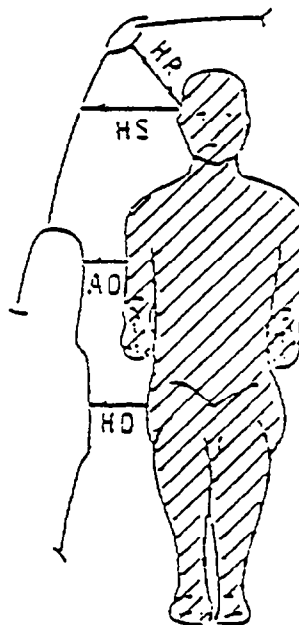
97

A	=	Left Door to Driver Centerline	<u>13.5</u> in.
B	=	Left Door to Center Passenger Centerline	<u>--</u> in.
C	=	Left Door to Right Passenger Centerline	<u>37.7</u> in.
D	=	Left Door to Right Door	<u>50.2</u> in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	<u>9.2</u> in.

	<u>DRIVER</u>	<u>PASS</u>
HH	12.5	12.2
HW	18.5	18.2
CD	20.7	25.5
CS	17.2	--
KDL	7.0	7.0
KDR	8.0	7.0



HR	6.5	6.5
HS	9.5	9.5
AD	4.0	4.2
HD	7.0	6.5



1982 Dodge Omni

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)	-72	35	27	76	-57	10	15	58
DUMMY (2)	-109	20	65	109	-32	19	10	43
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	825	460
DUMMY (2)	1450	600
DUMMY (3)		
DUMMY (4)		

*Derive
Passage*

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)	825	1800	1225
DUMMY (2)	1325	1200	1000
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)	638.4	.0621	.0972	50.6	1083.8
DUMMY (2)	1672.6	.0864	.0888	217.4	2670.1
DUMMY (3)					
DUMMY (4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

36 LOAD CELLS
4 ROWS
9 COLUMNS

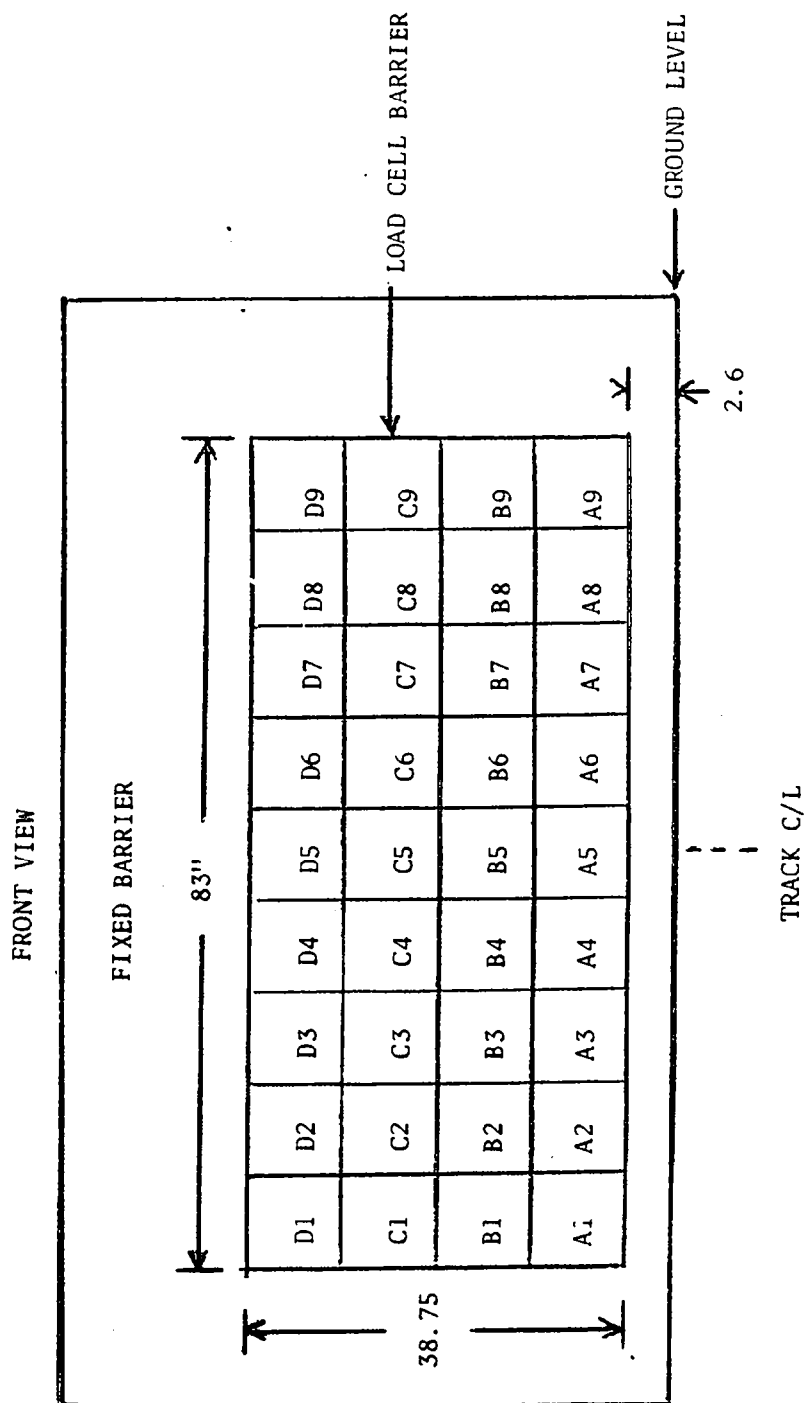


Figure 9 FIXED LOAD CELL BARRIER-LOAD CELL LOCATIONS

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA

Test No. 703-4-539

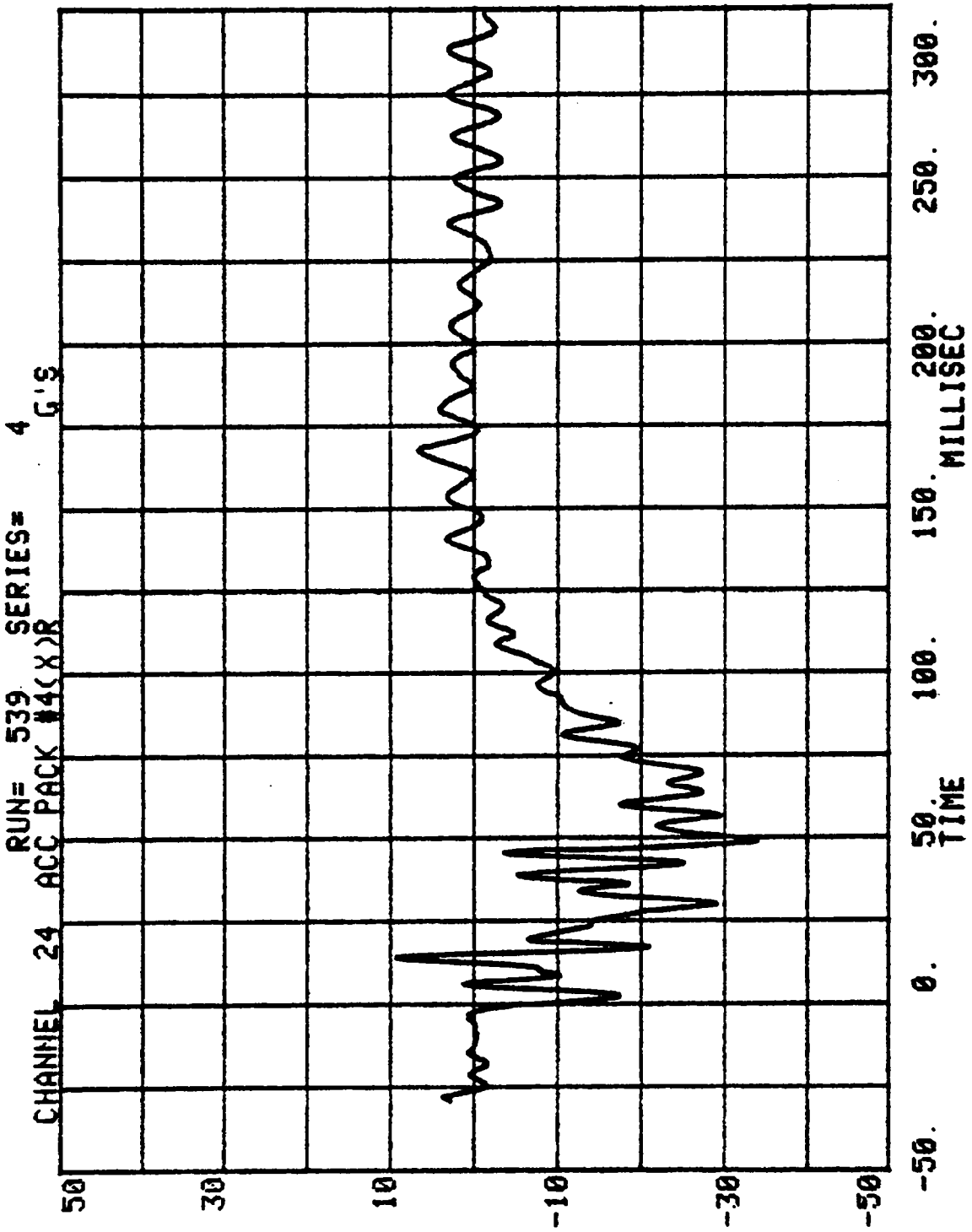
1982 Dodge Omni

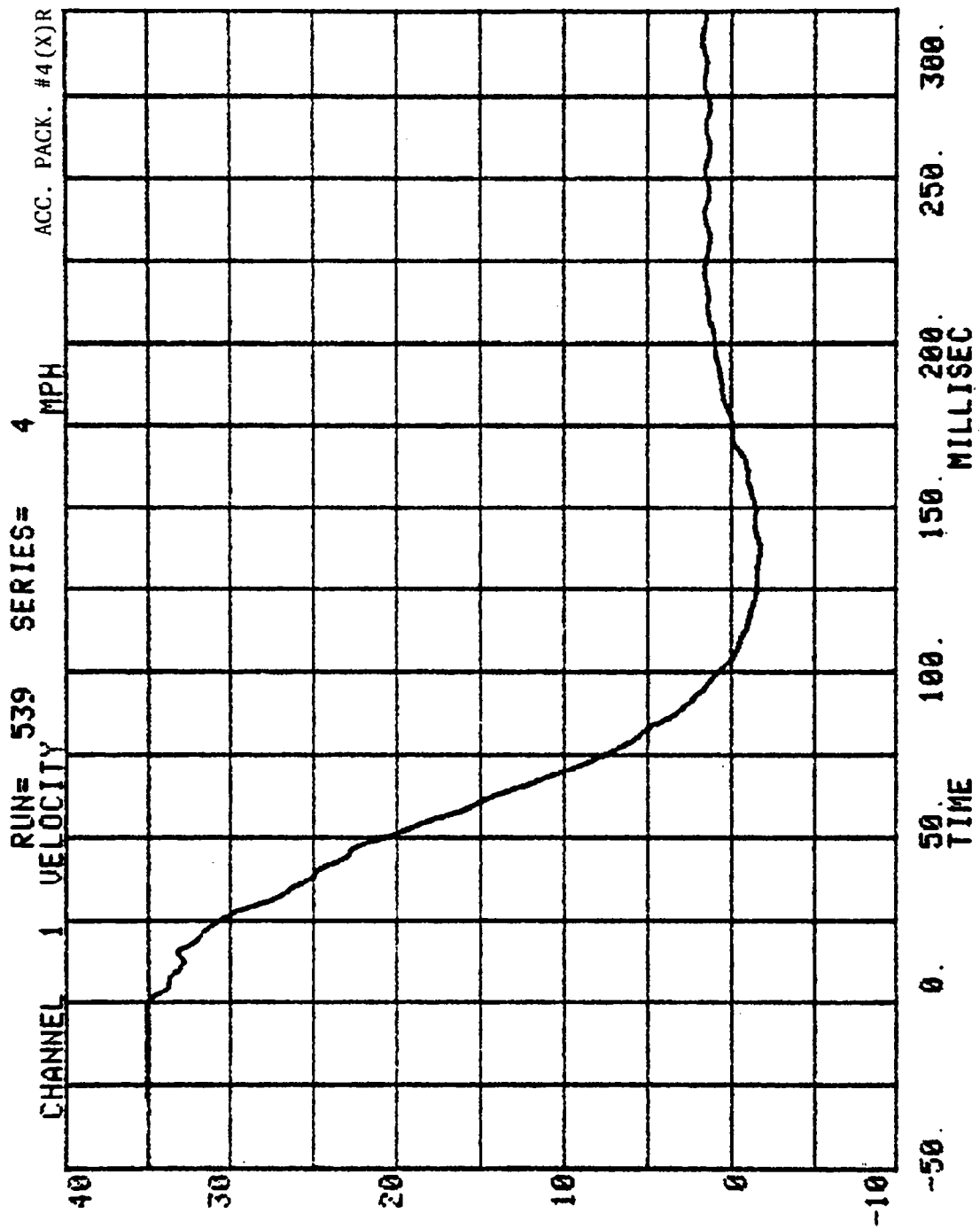
VEHICLE DATA

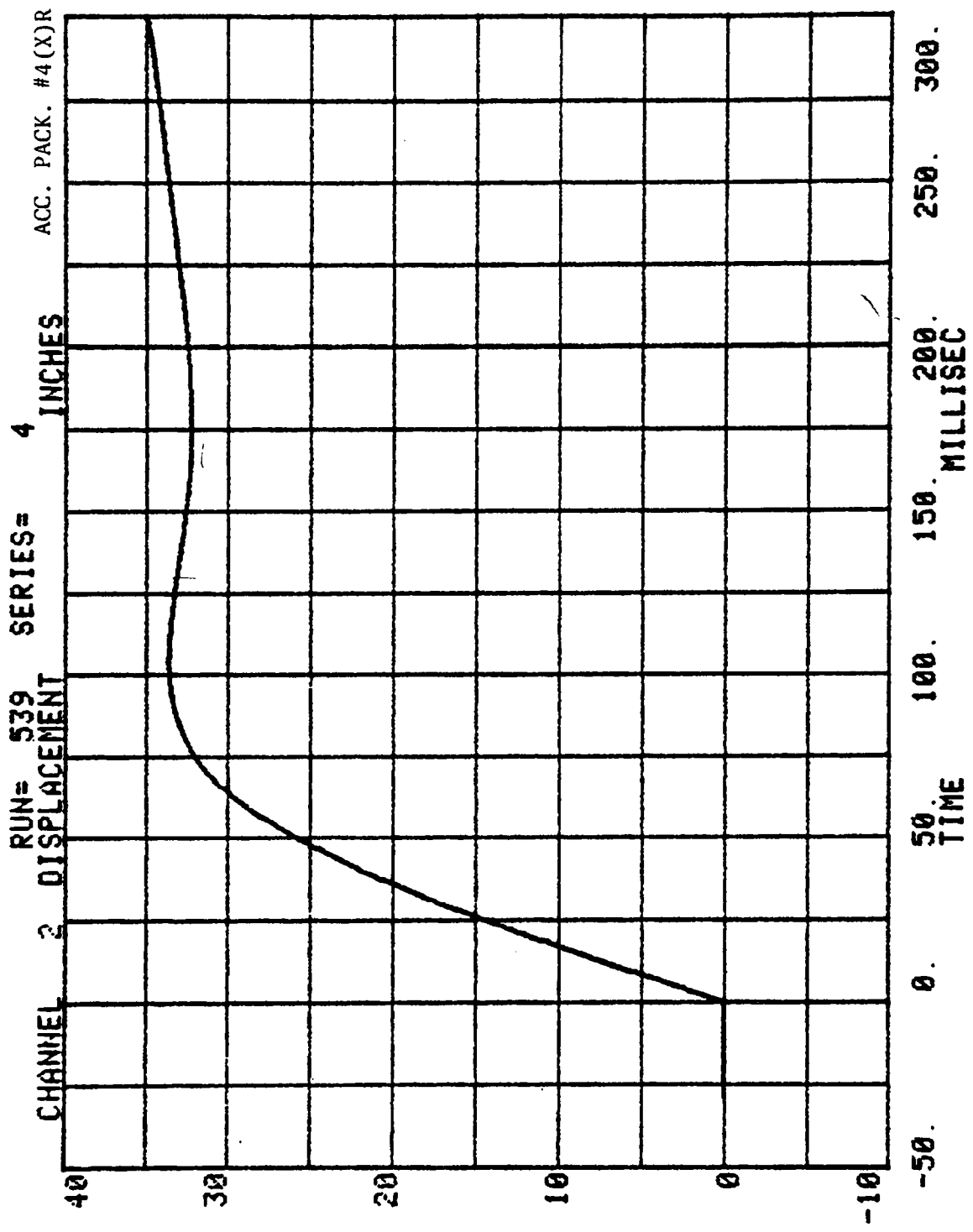
VEHICLE DATA

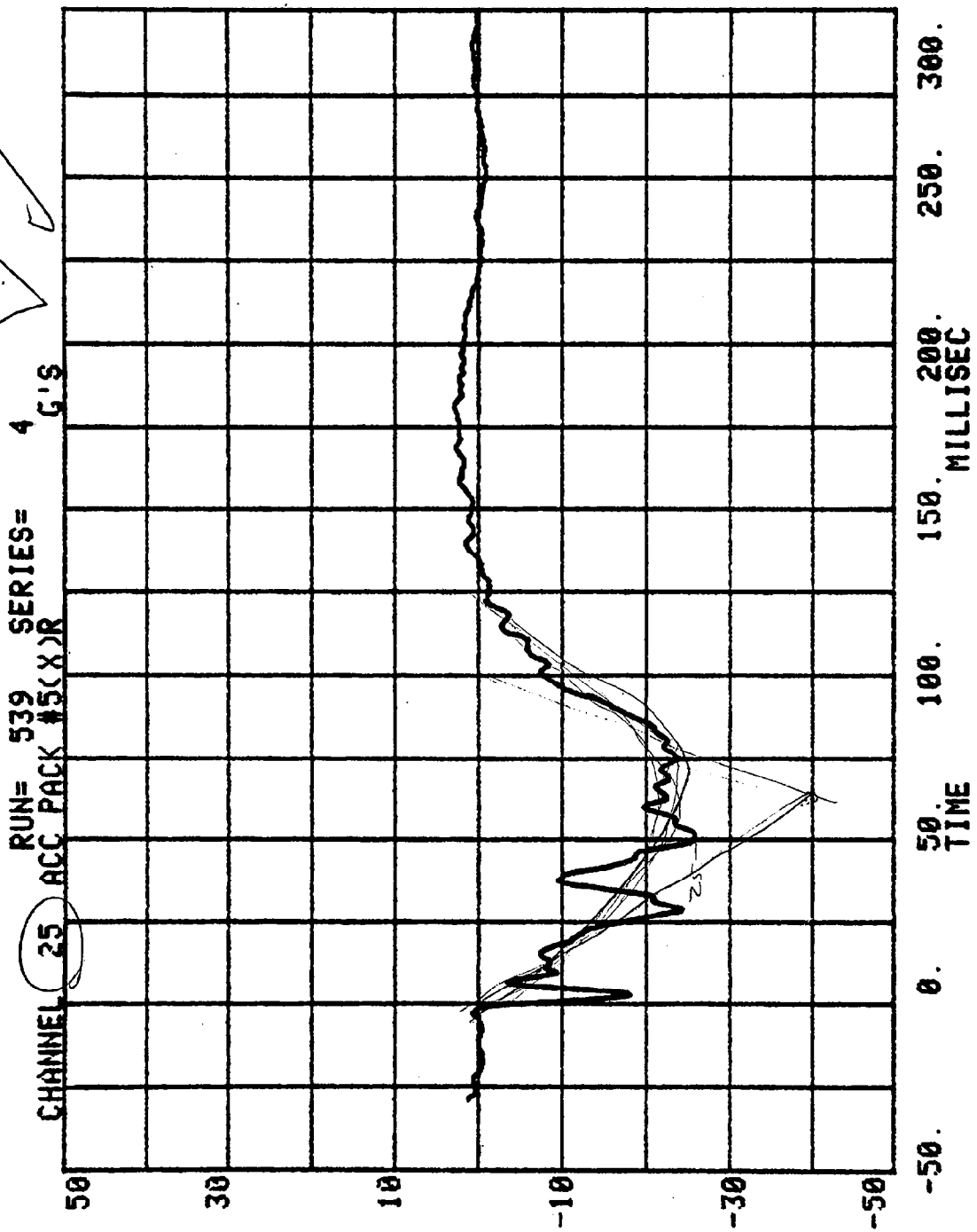
FILTER CHANNEL CLASS

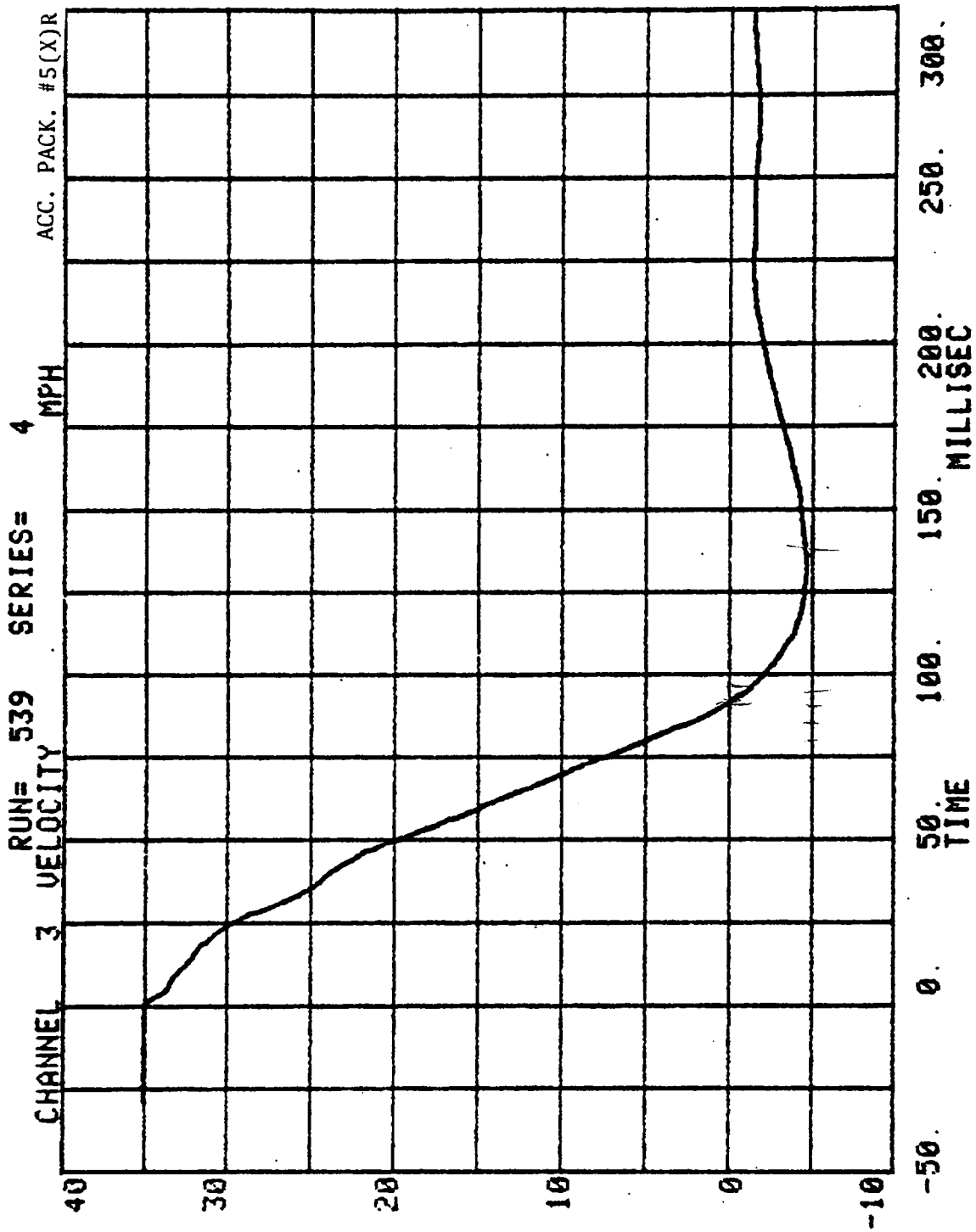
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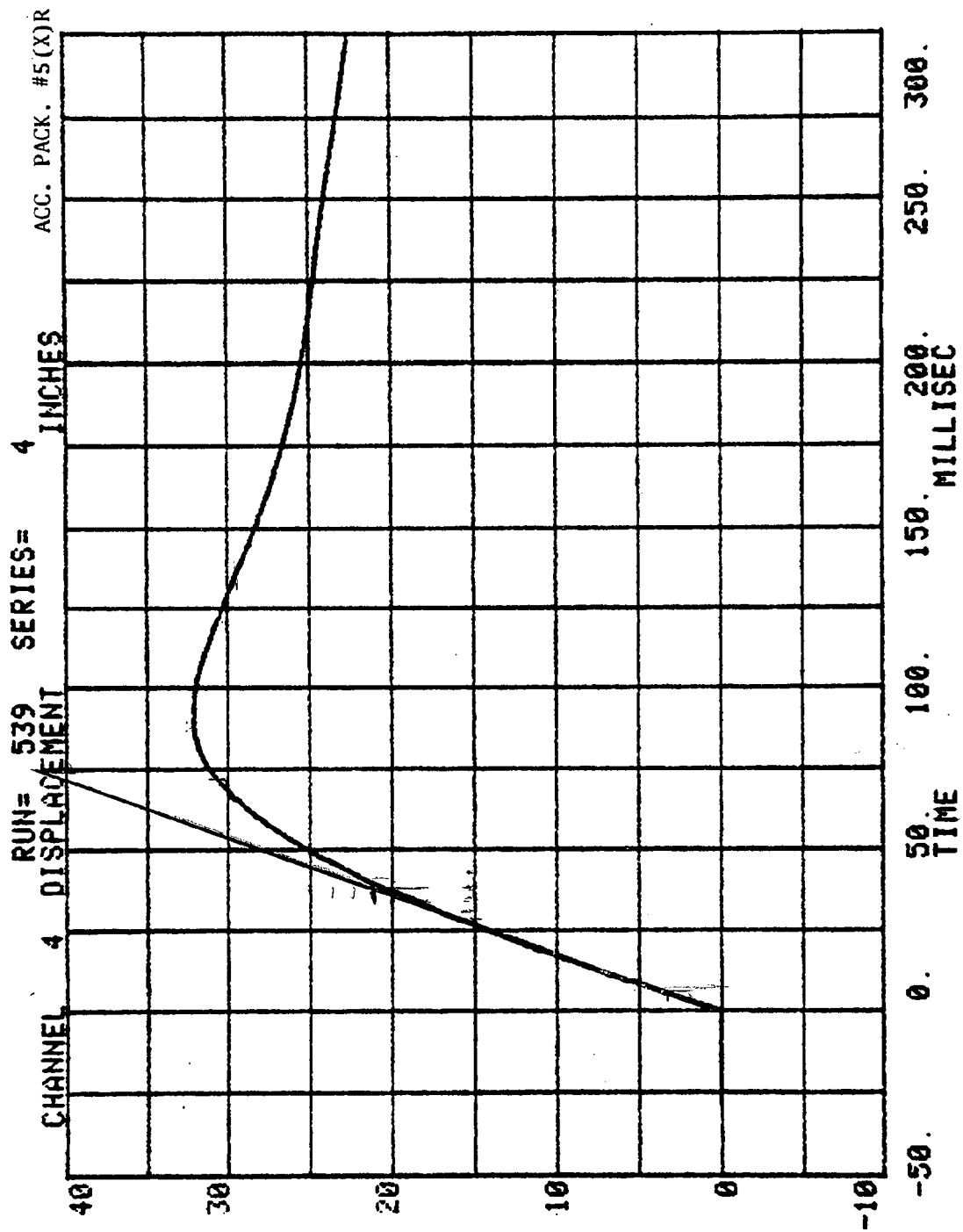




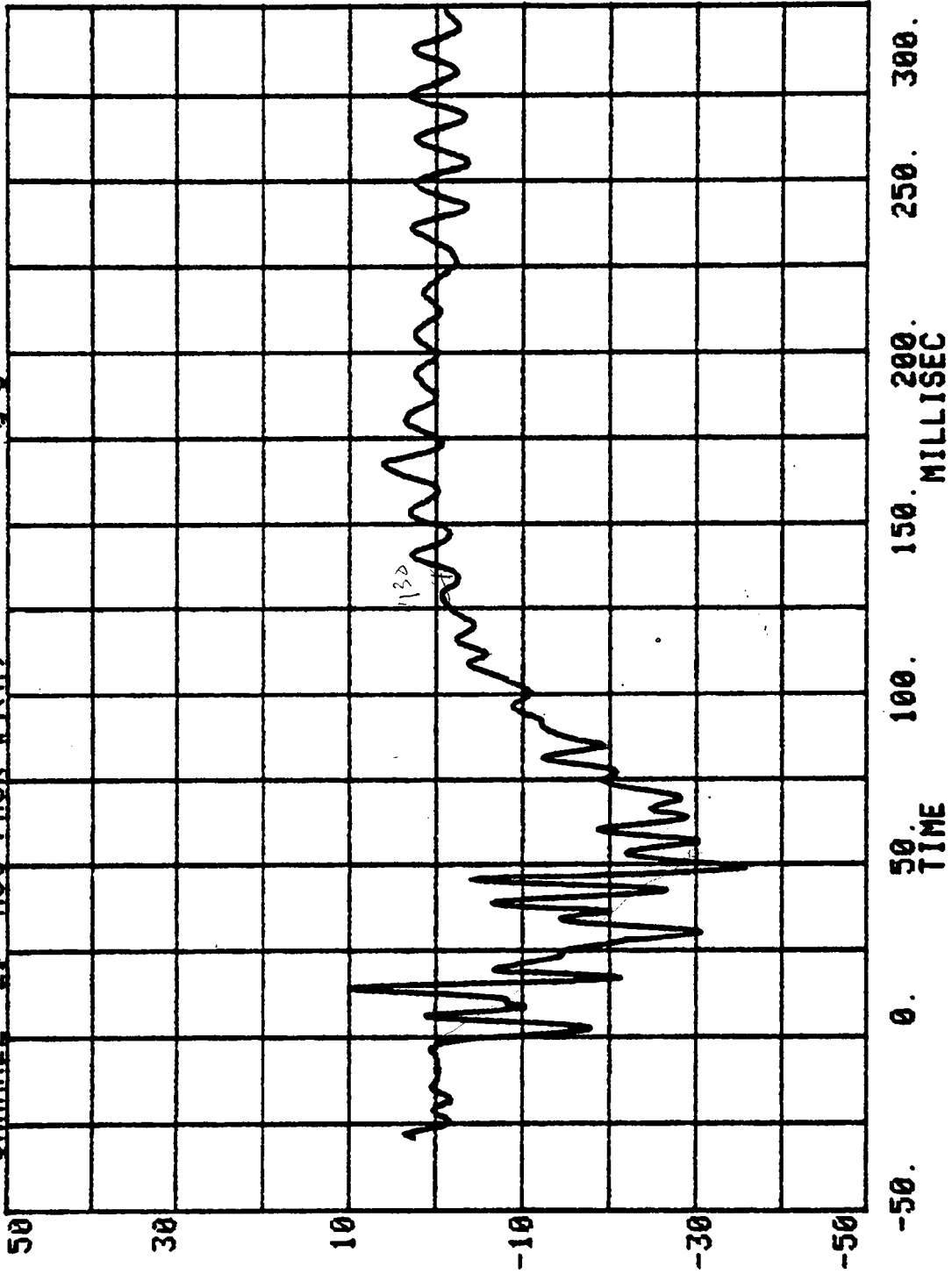


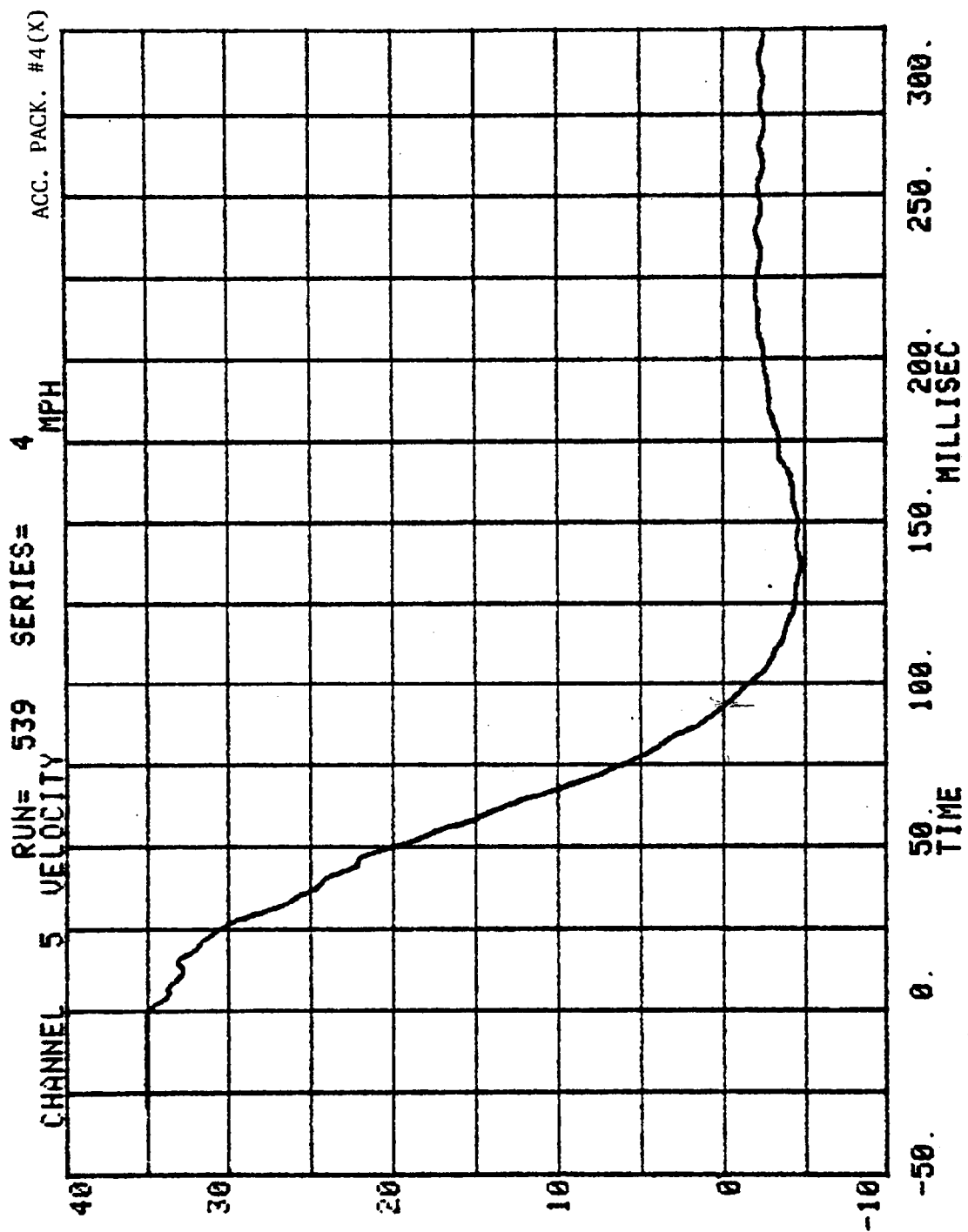


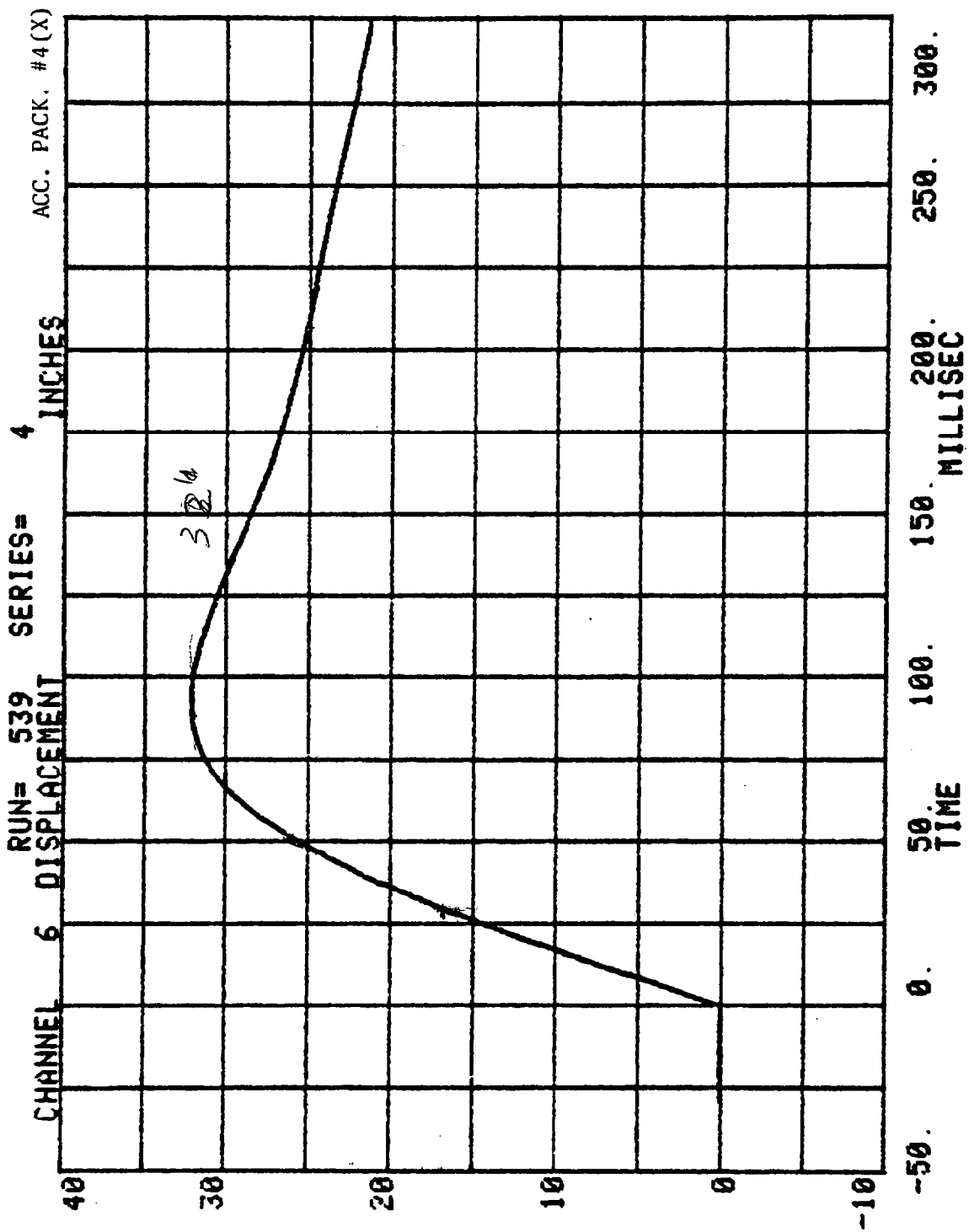


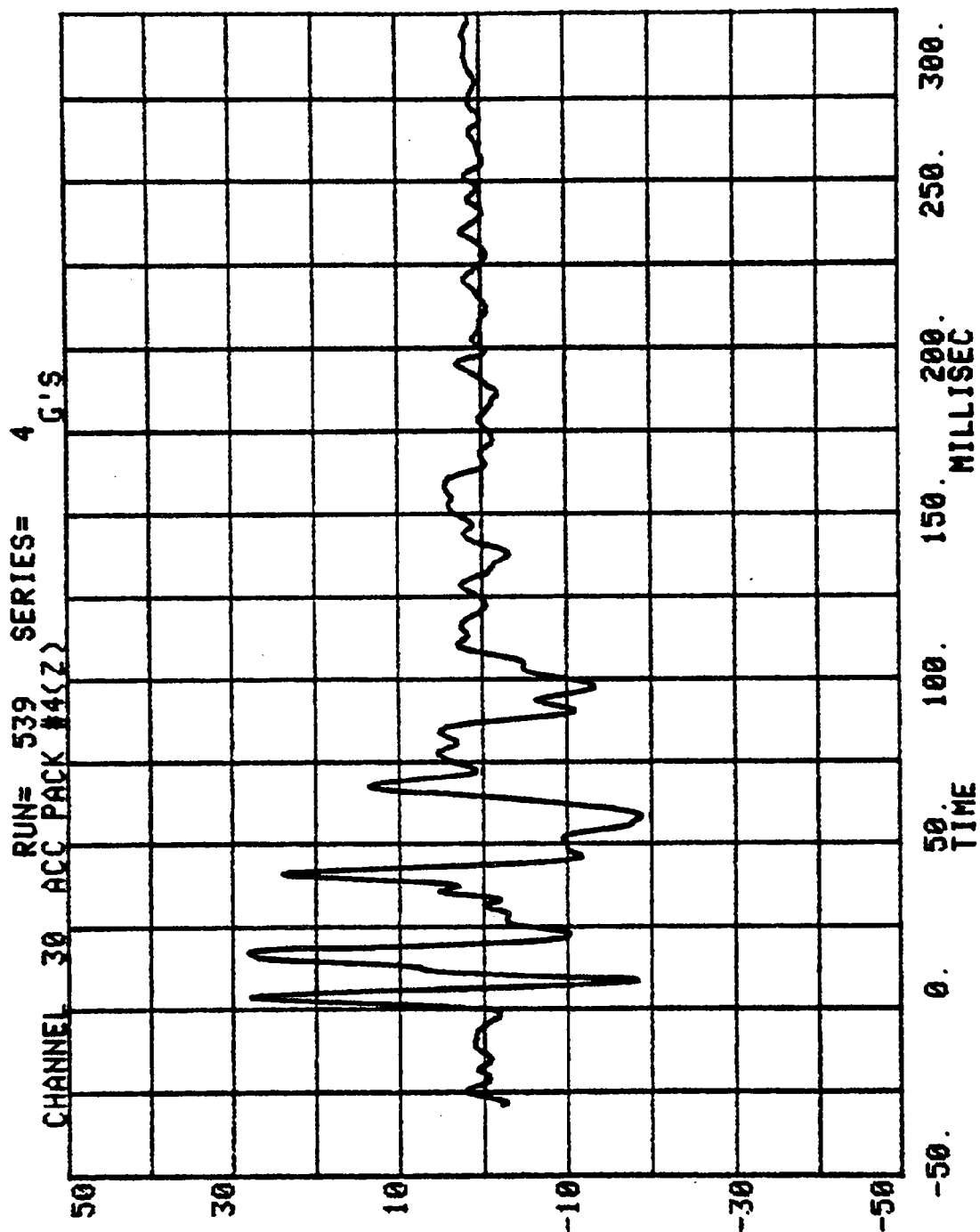


CHANNEL 29 ACC PACK #4(X) RUN= 539 SERIES= 4 G'S



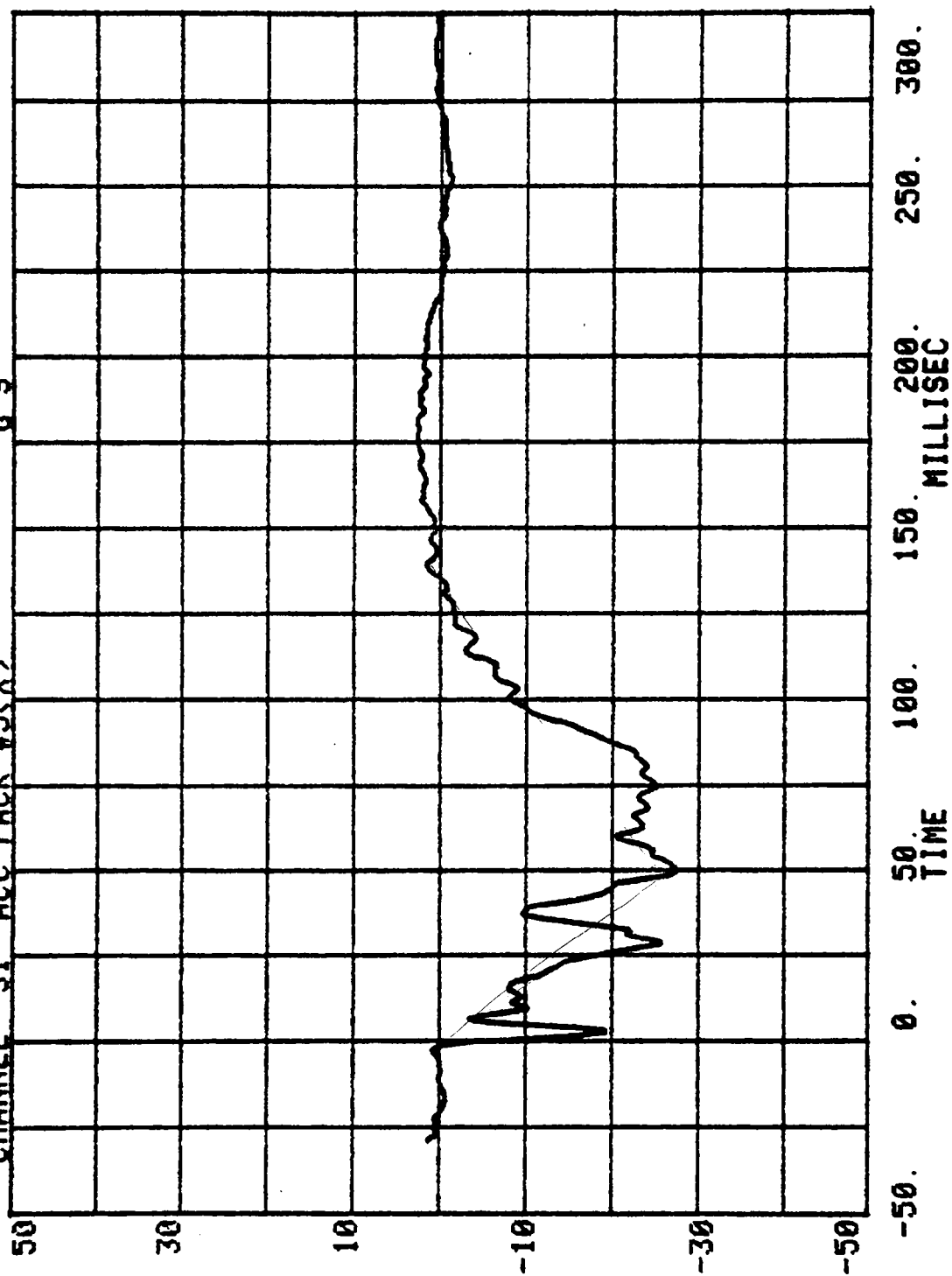


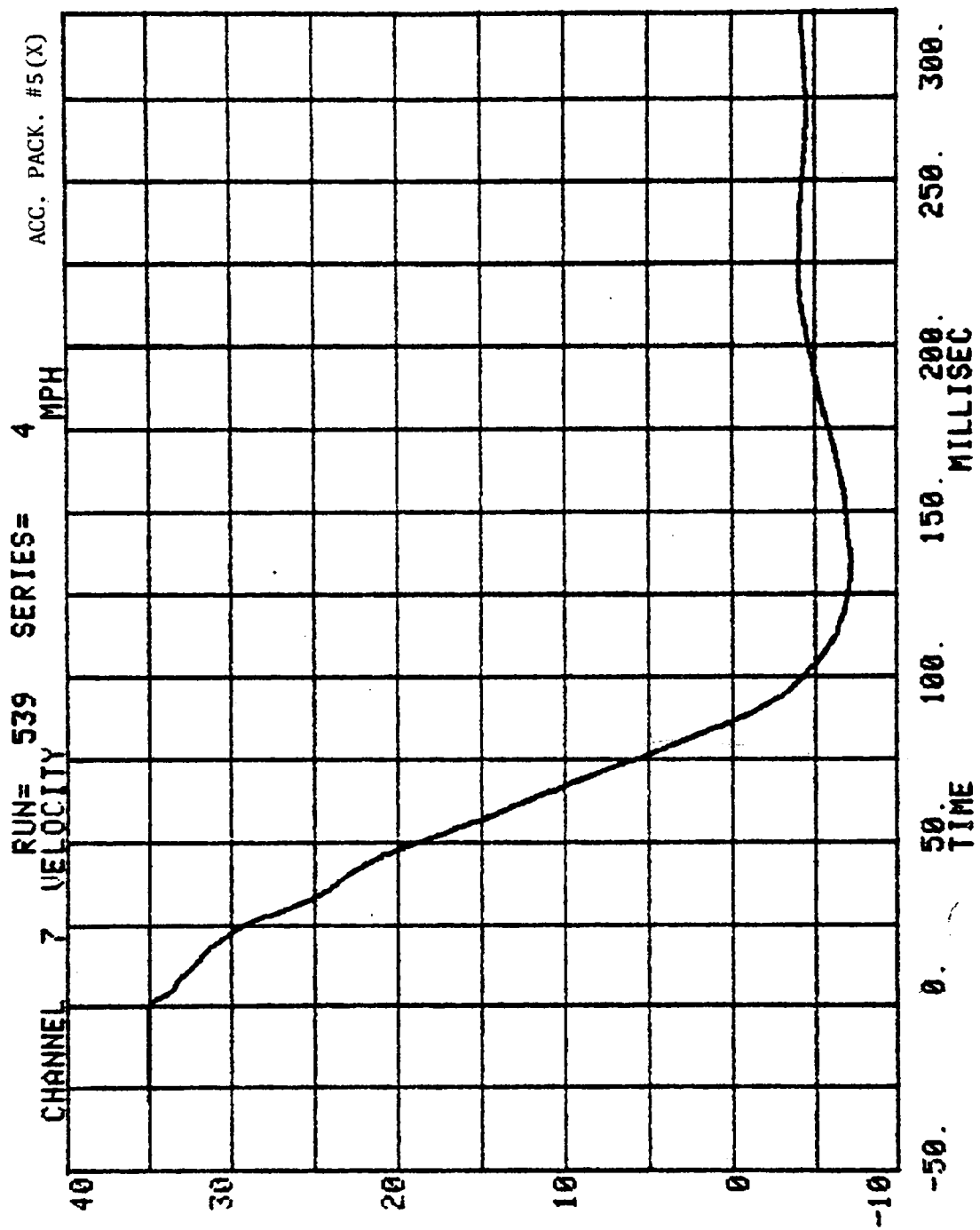


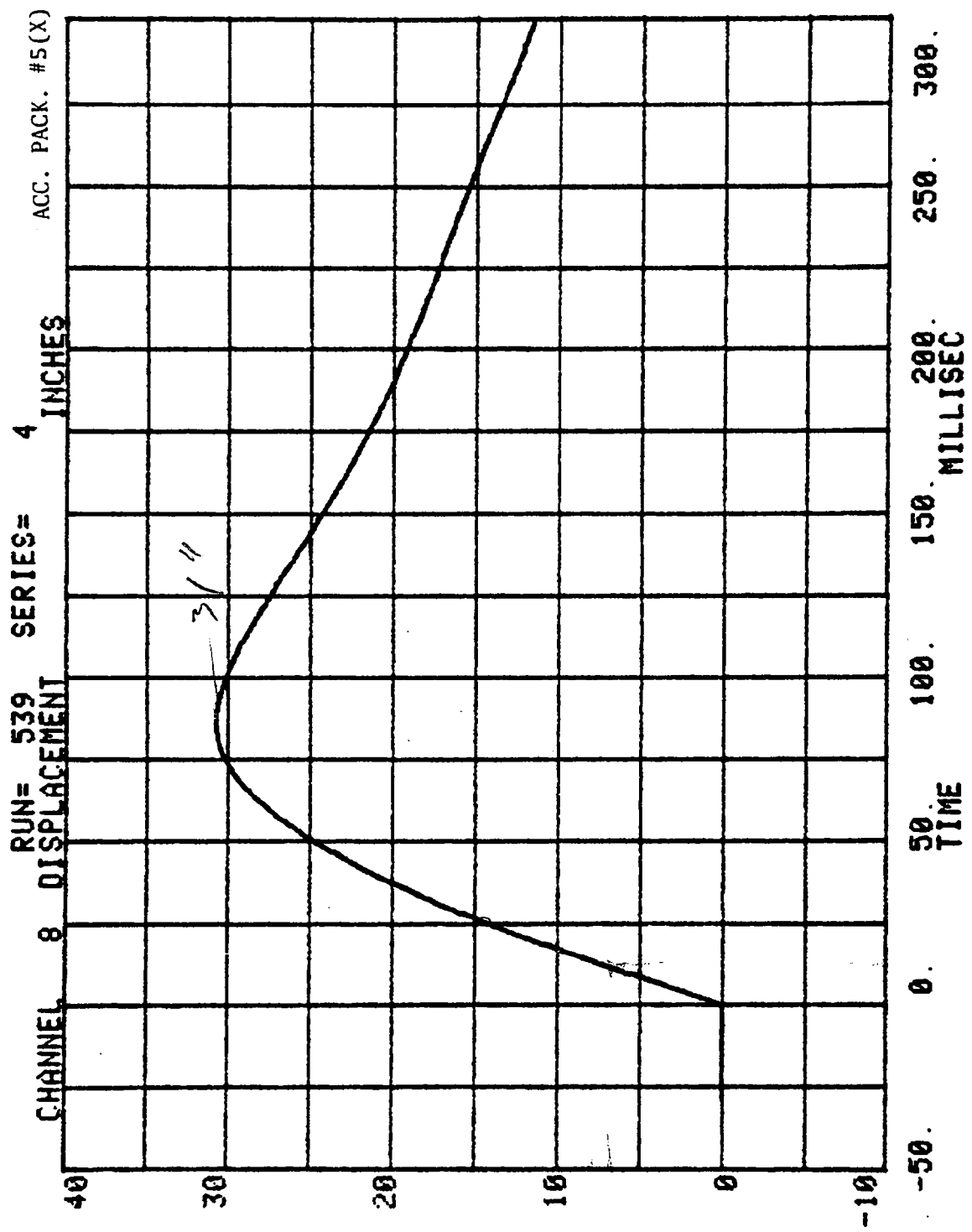


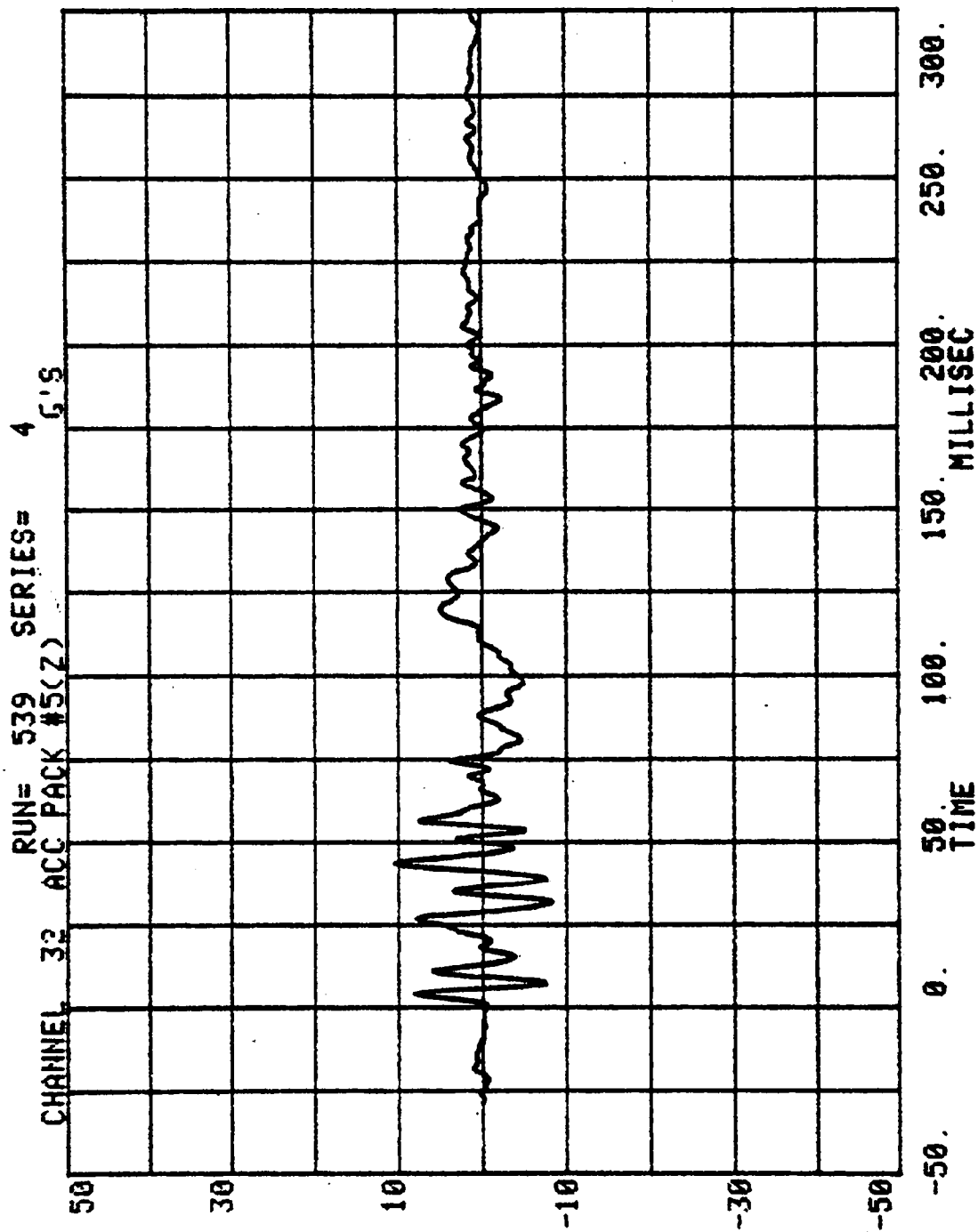
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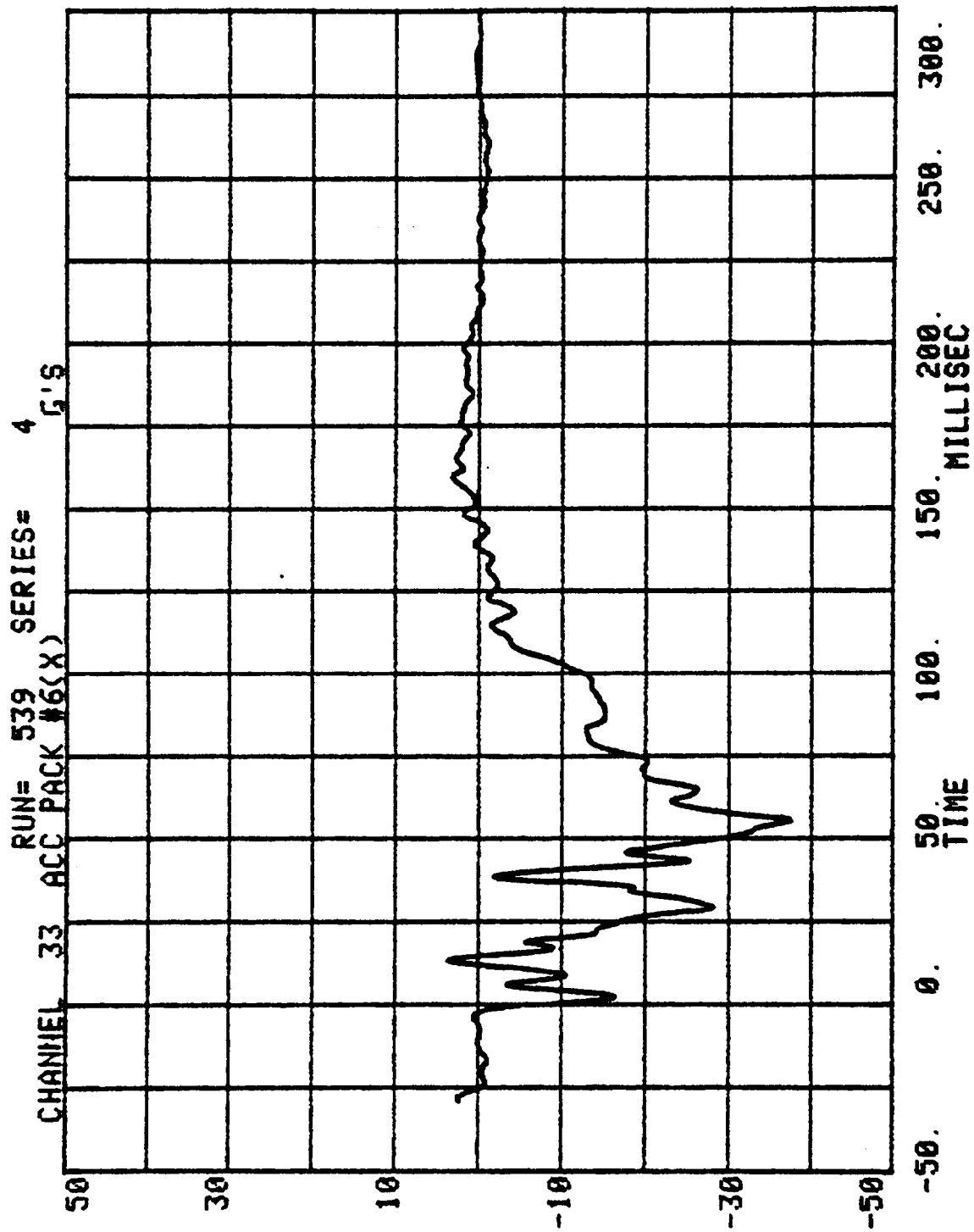
CHANNEL 31 ACC PACK #5(X) RUN= 539 SERIES= 4 G'S

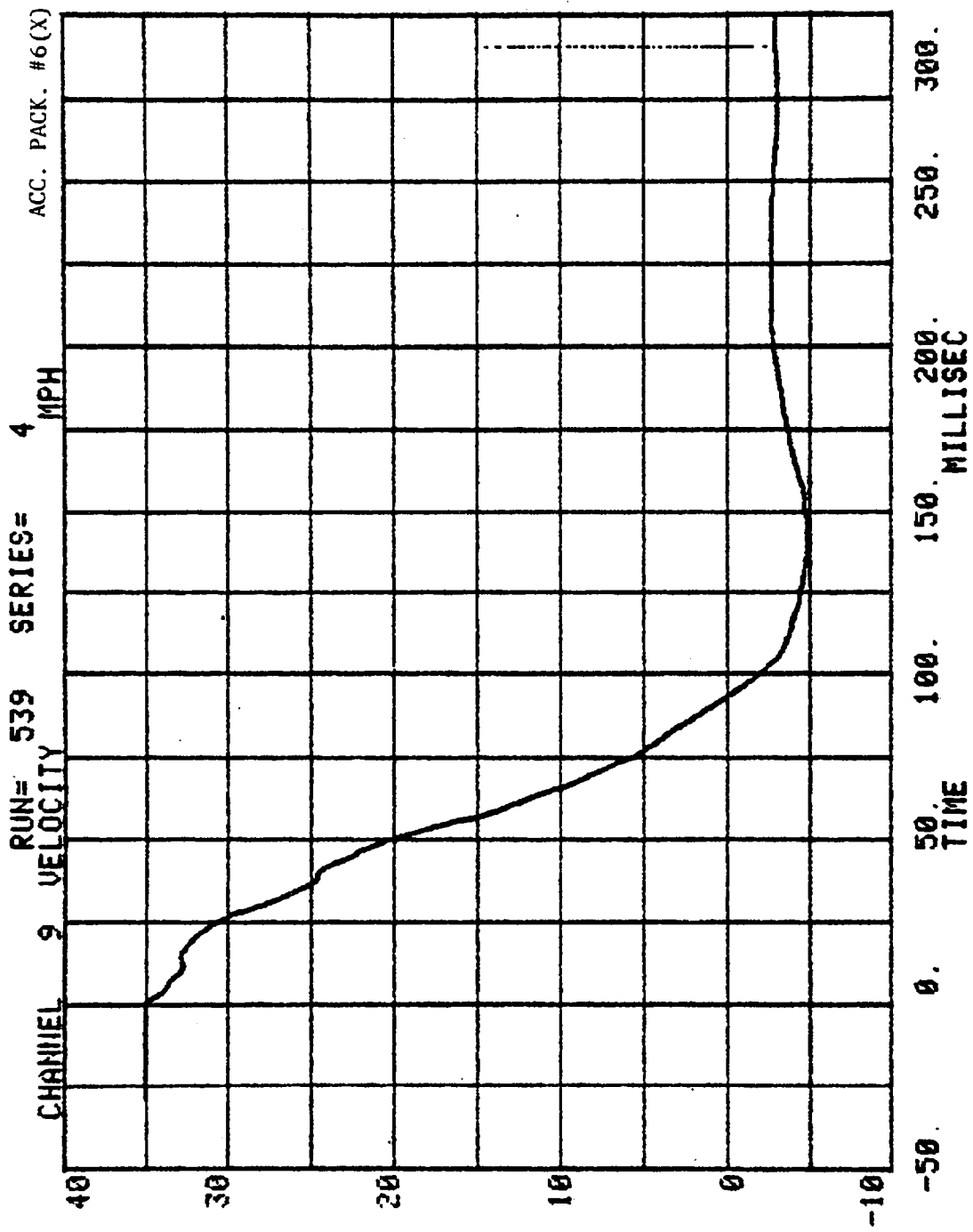


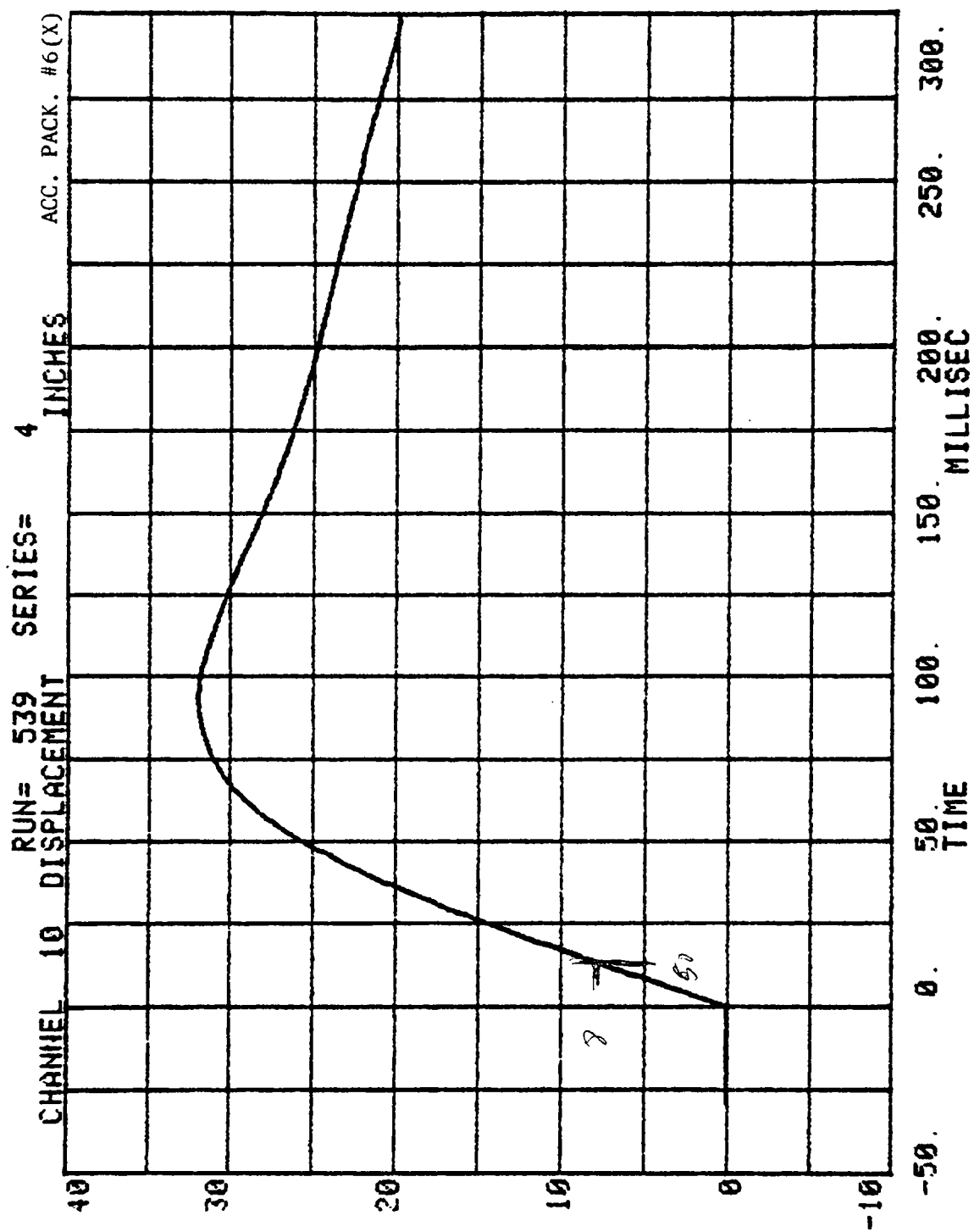


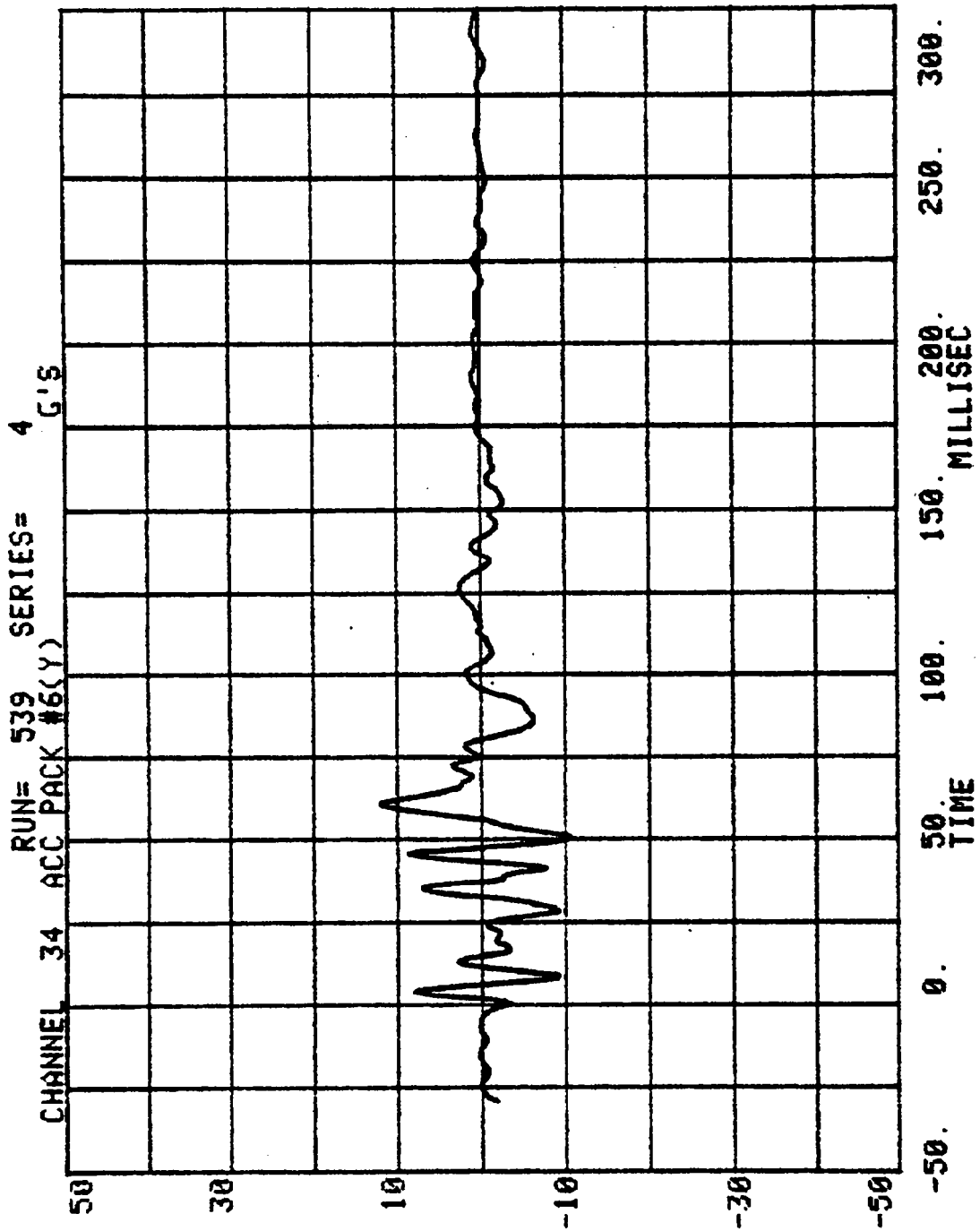


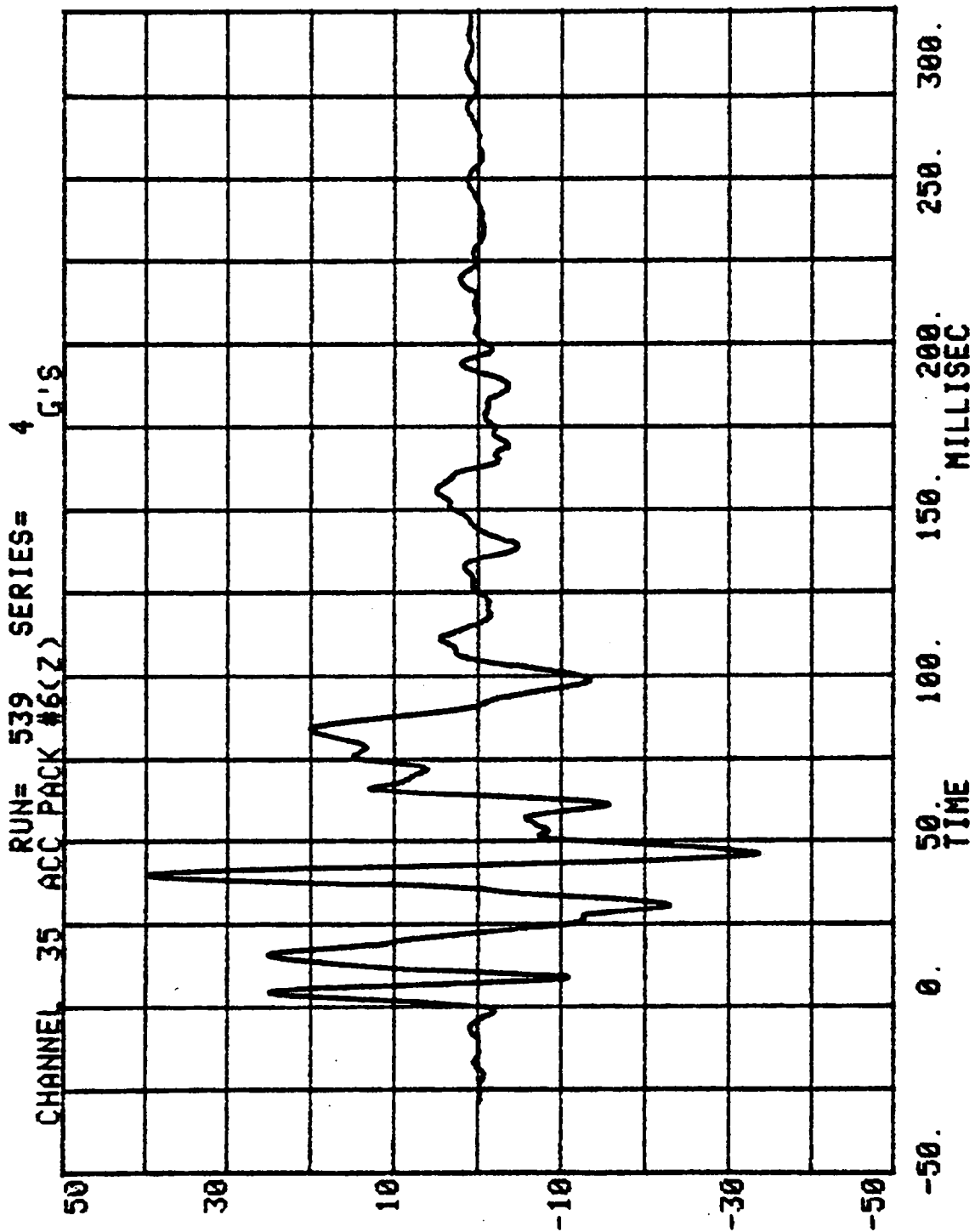












Test No. 704-4-539

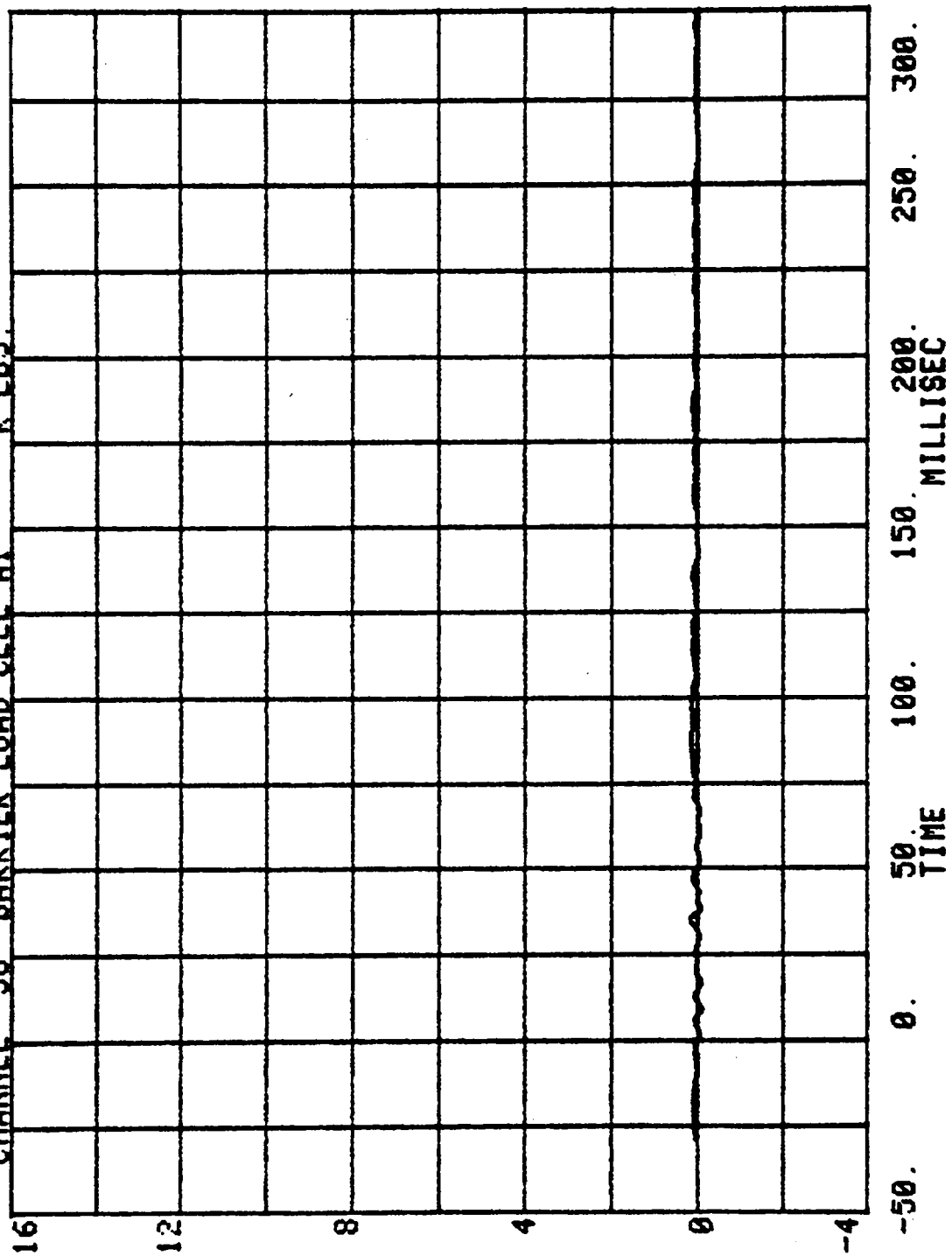
1982 Dodge Omni

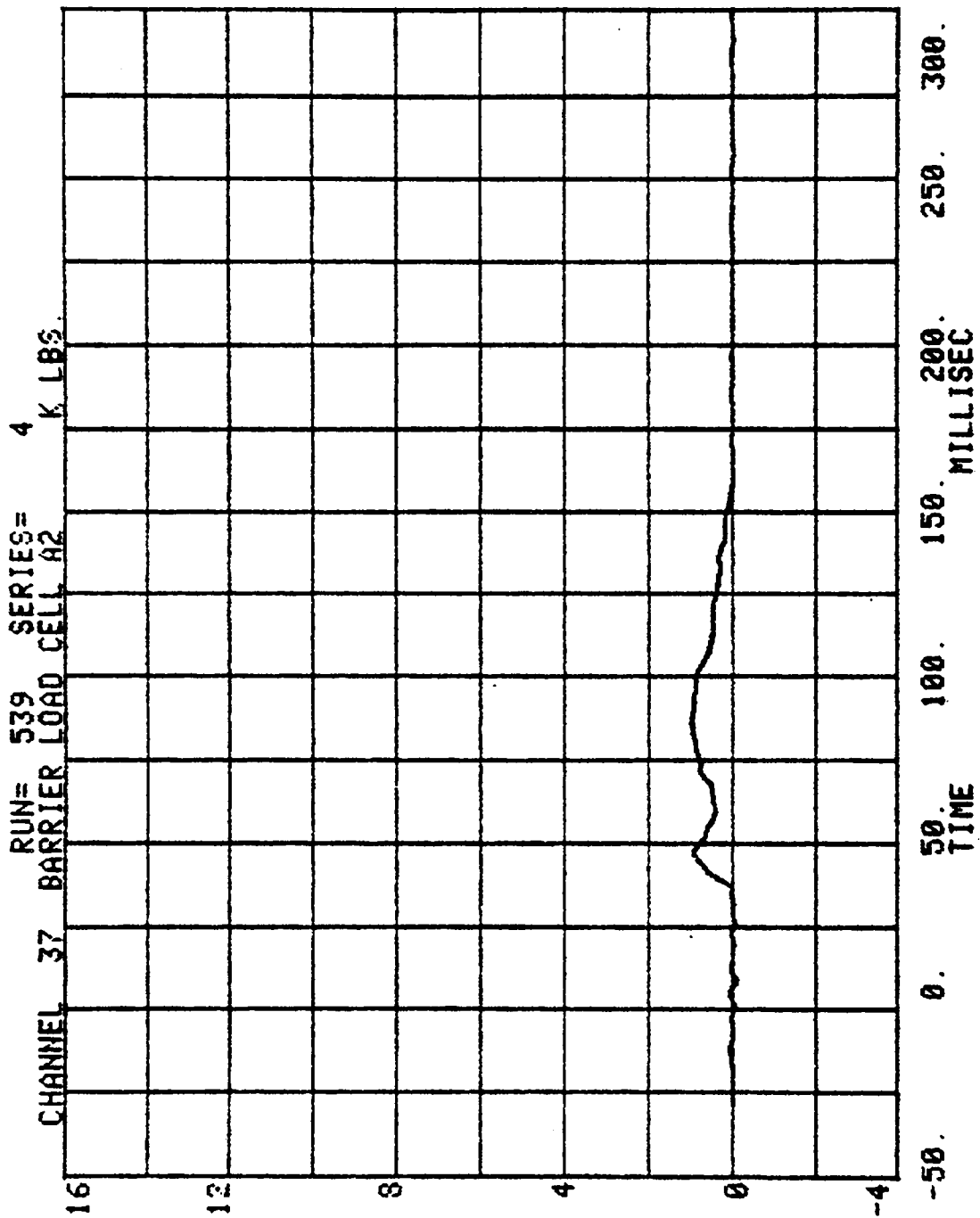
LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

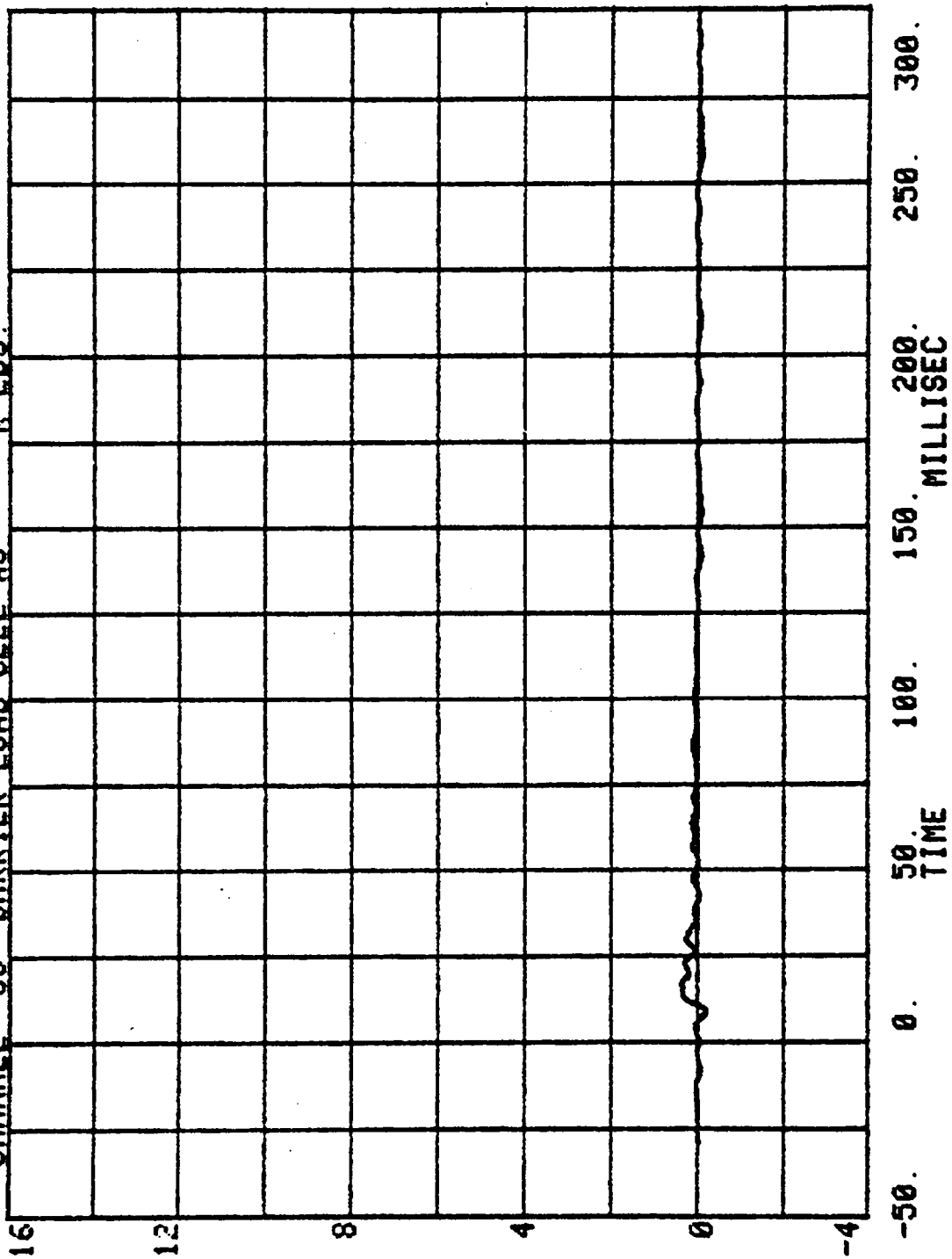
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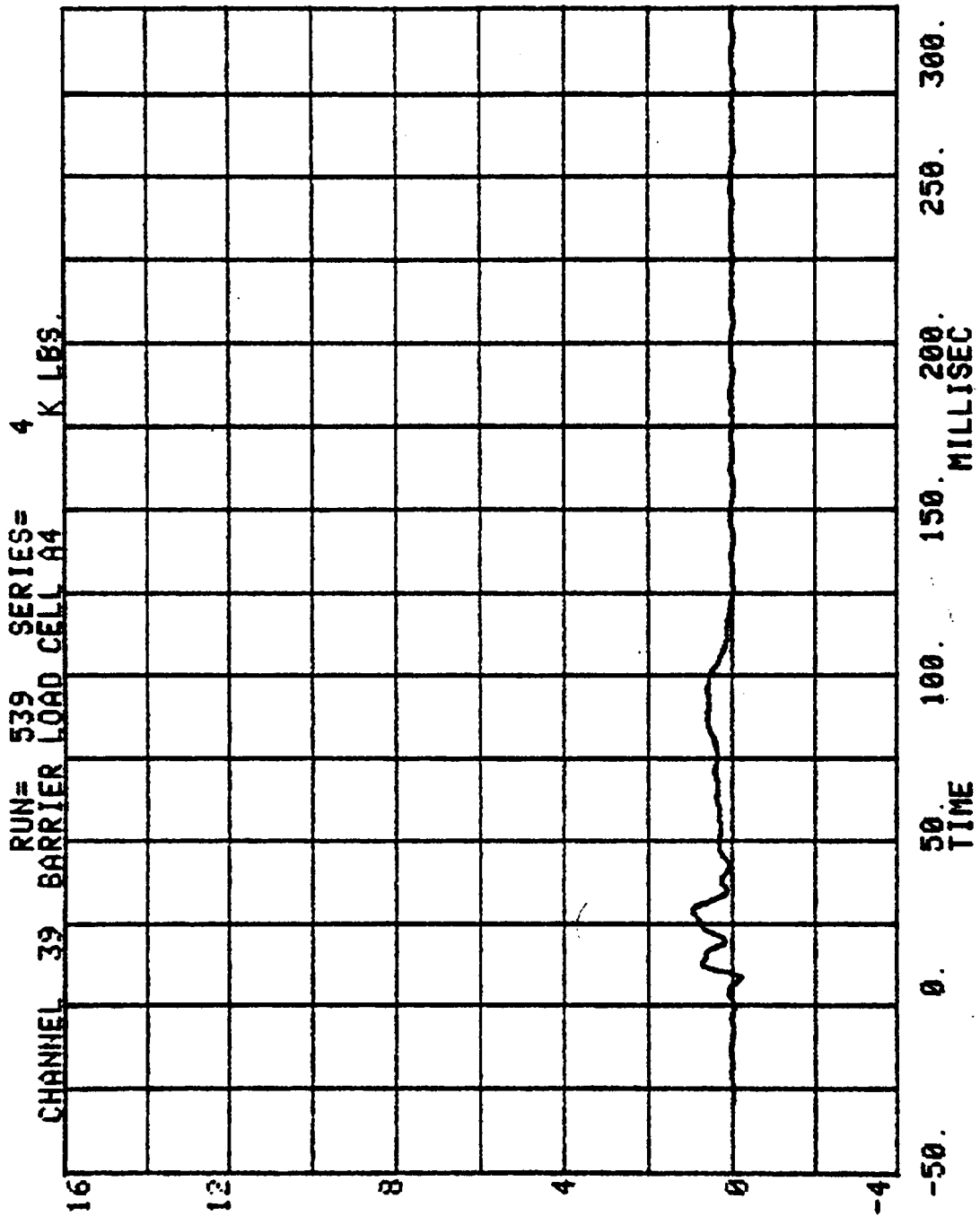
CHANNEL 36 BARRIER LOAD CELL A1
RUN= 539 SERIES= 4
K LBS.



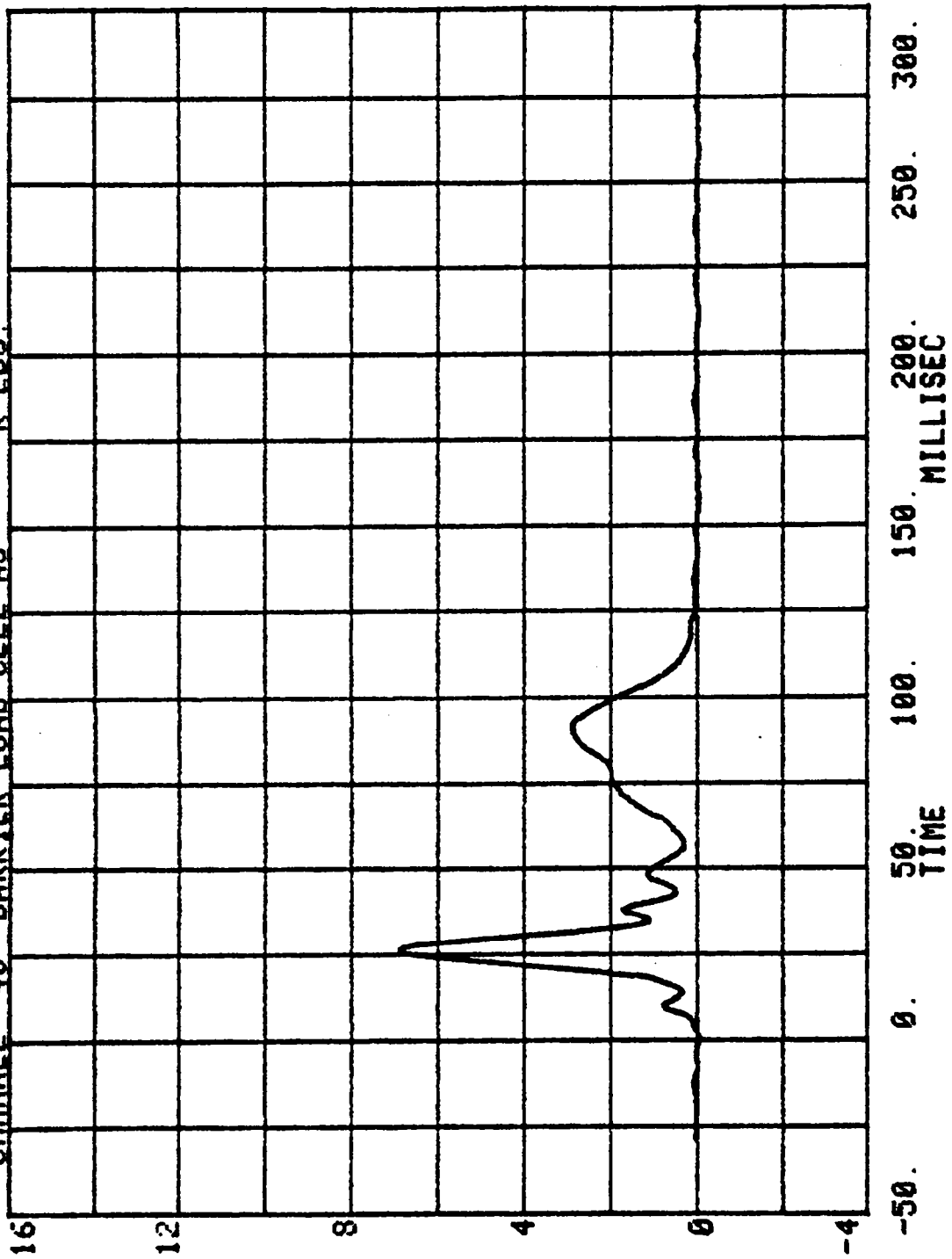


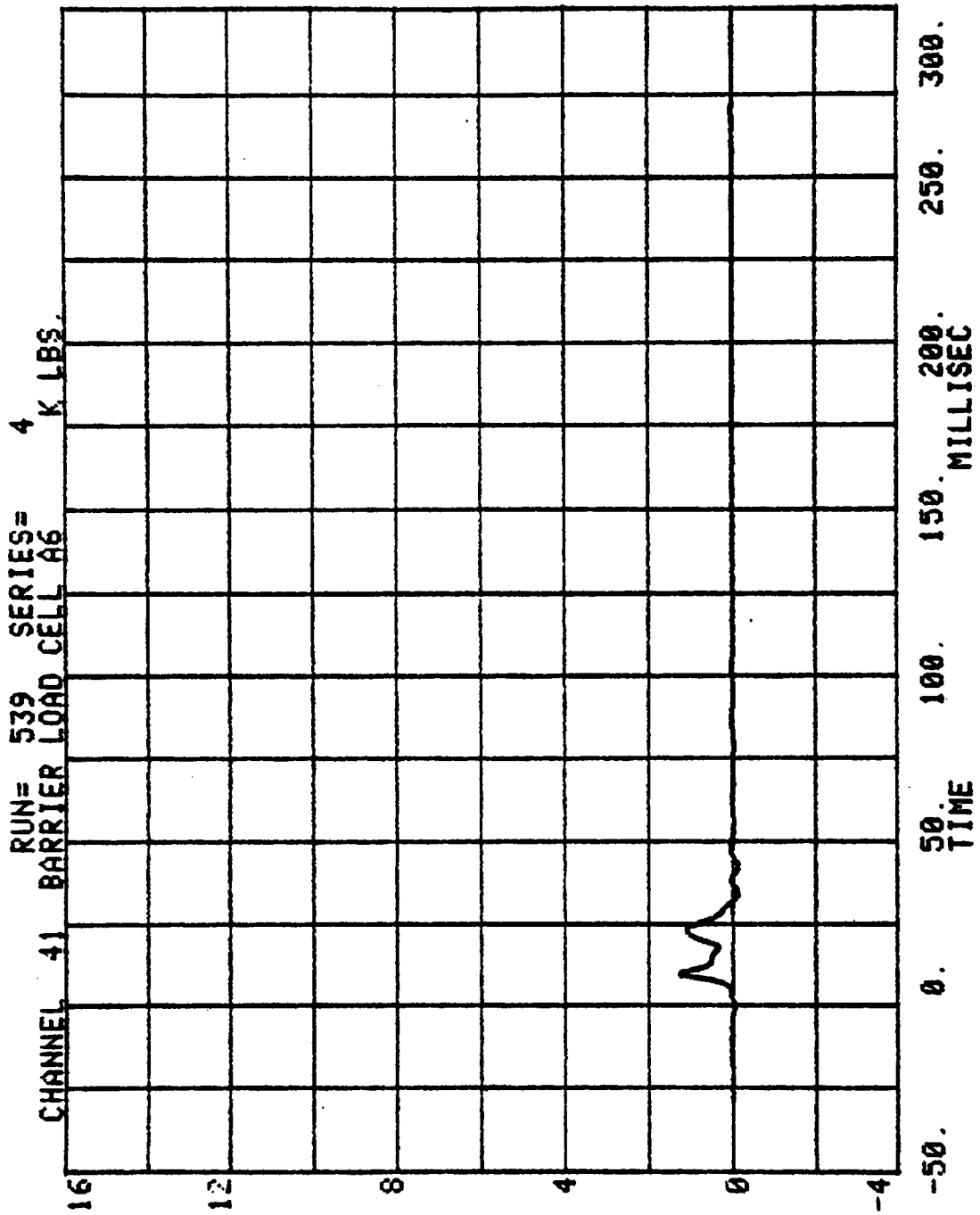
CHANNEL 38 BARRIER LOAD CELL A3 RUN= 539 SERIES= 4 K LBS.

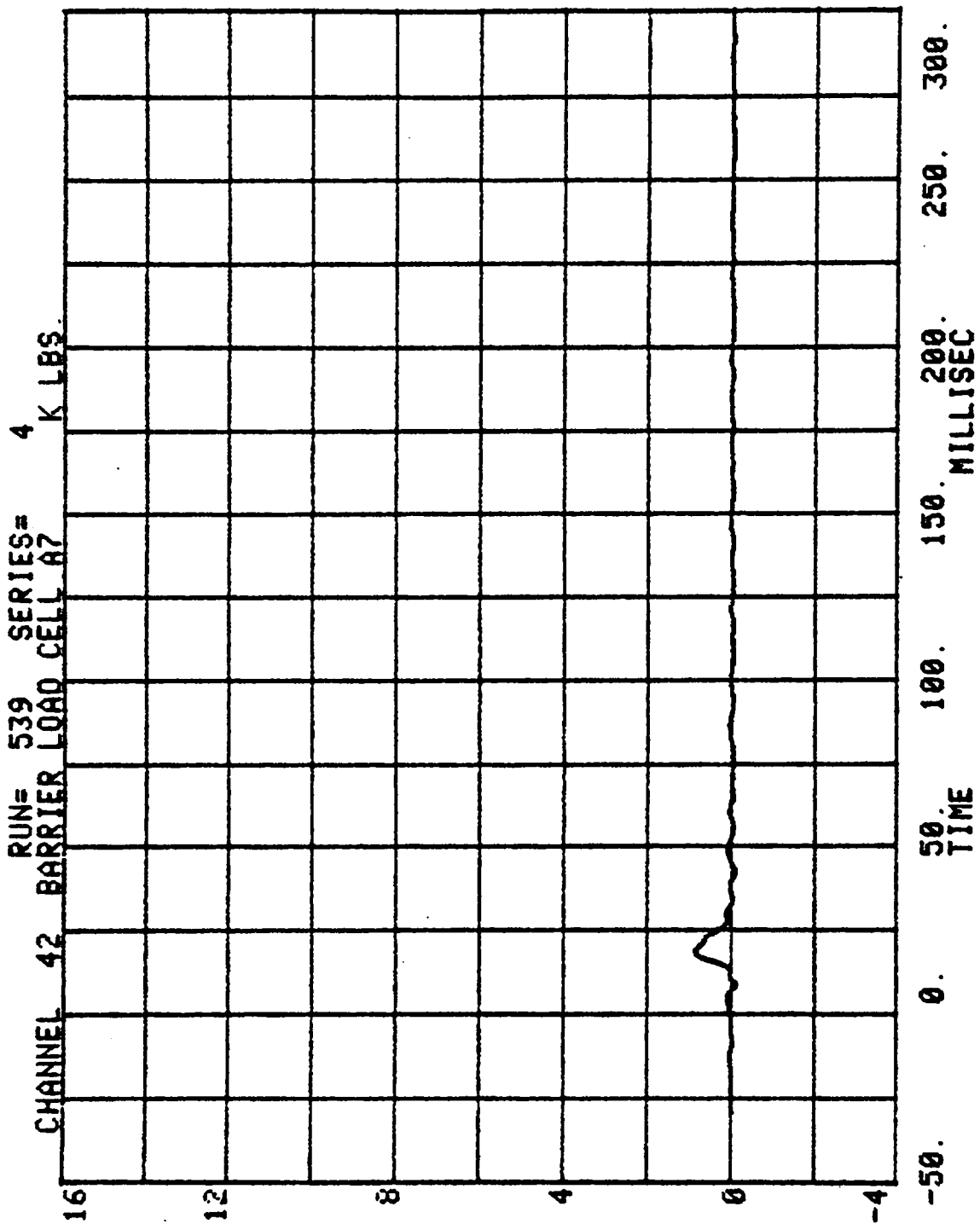


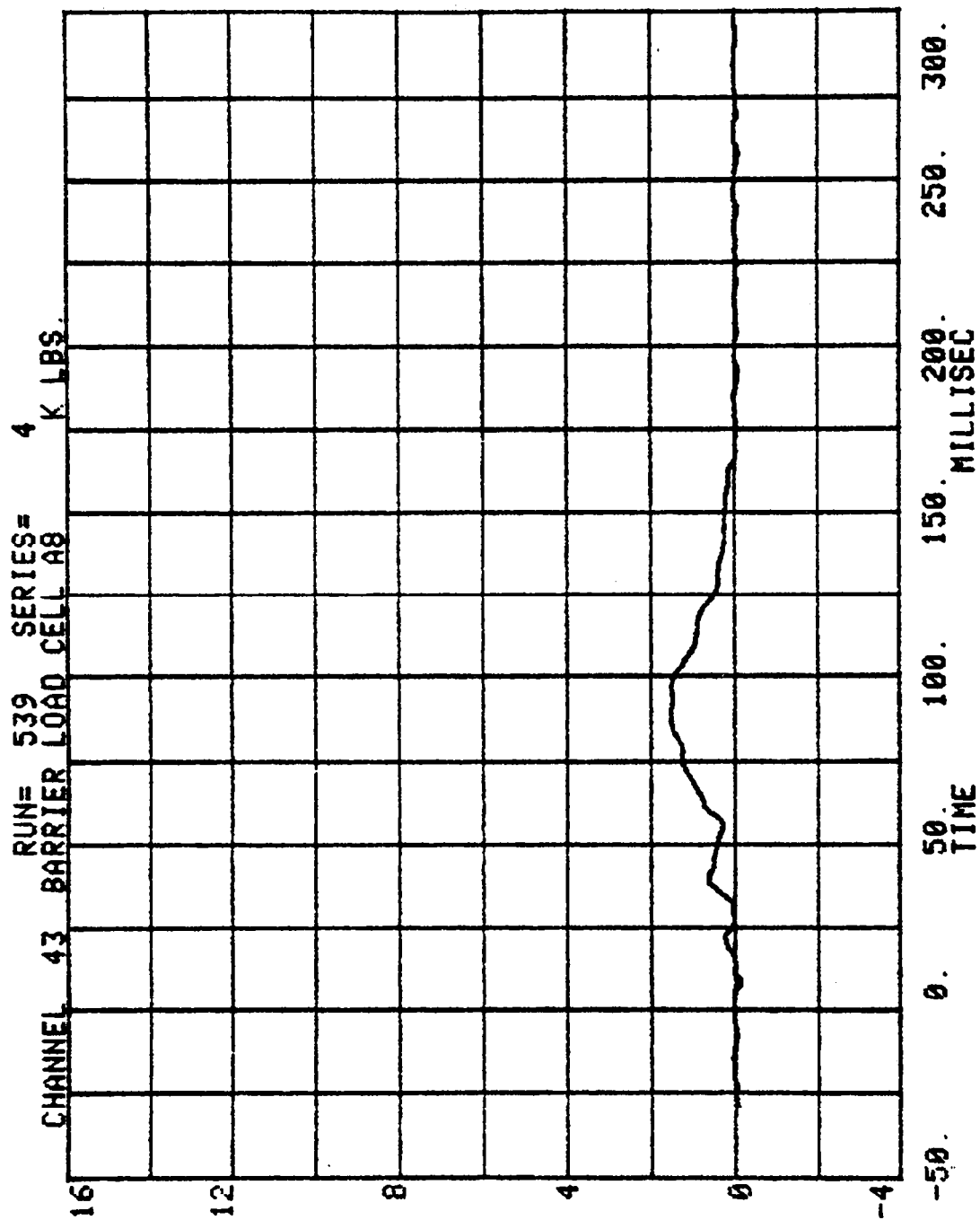


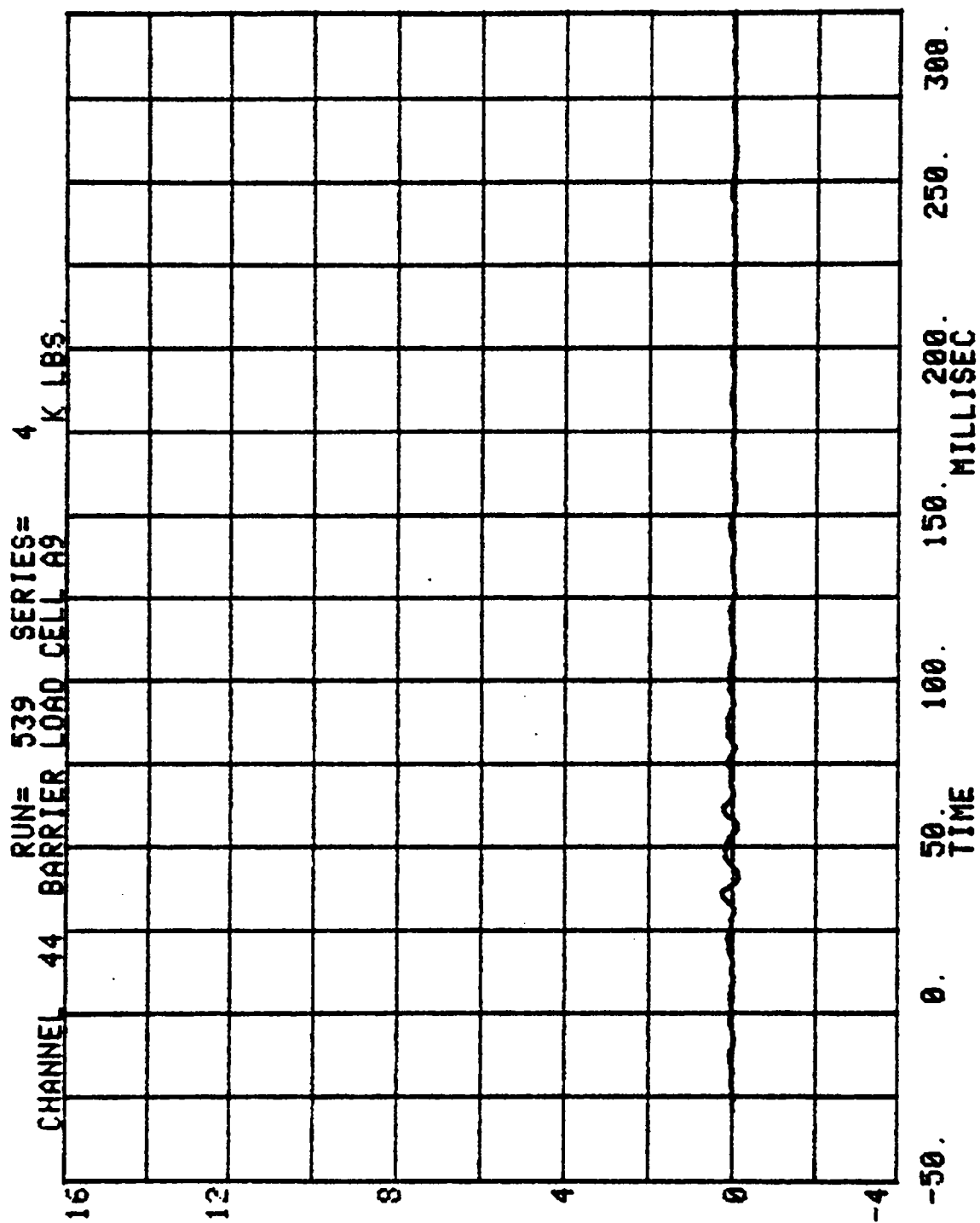
CHANNEL 40 BARRIER LOAD CELL A5 RUN= 539 SERIES= 4 K LBS.

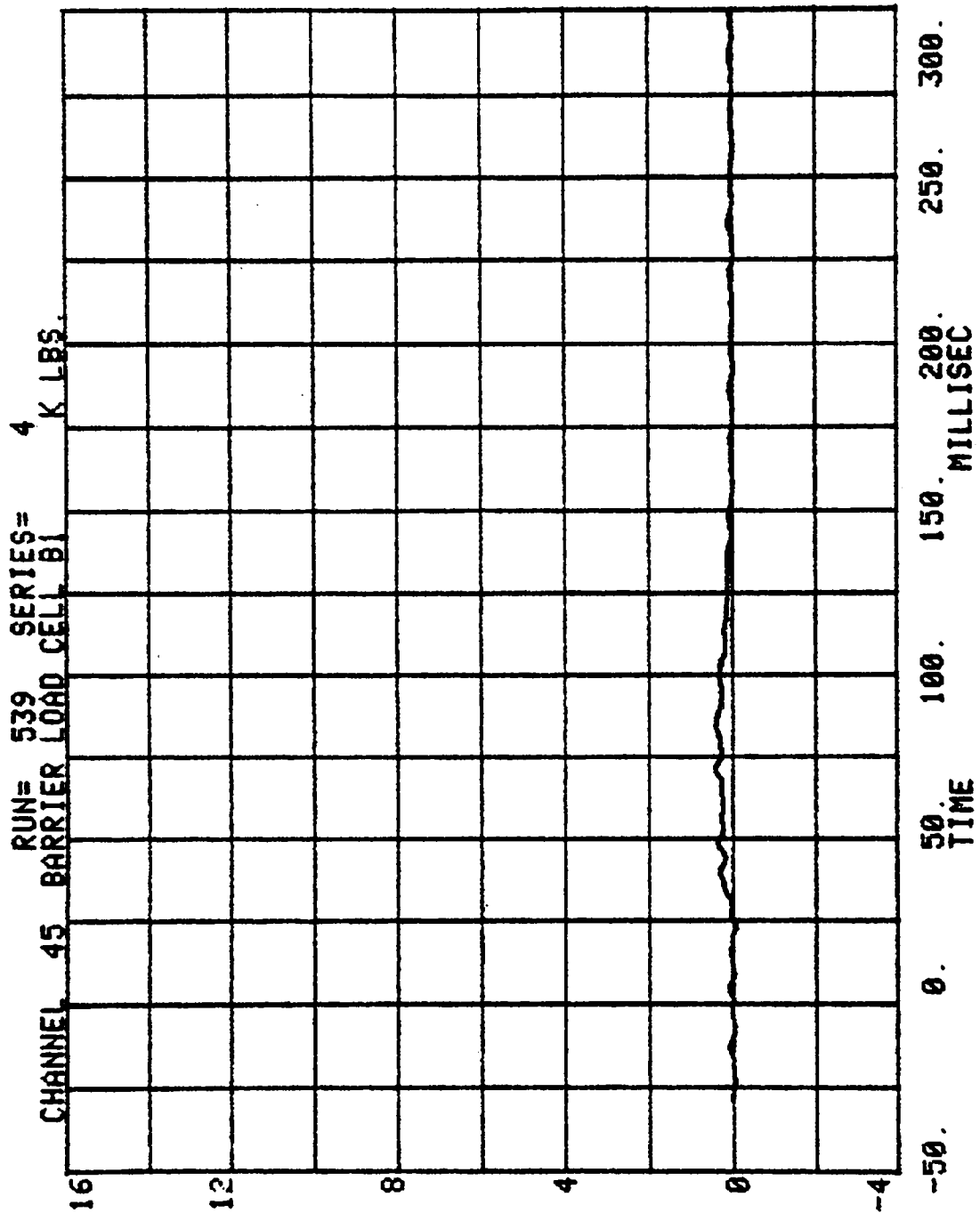




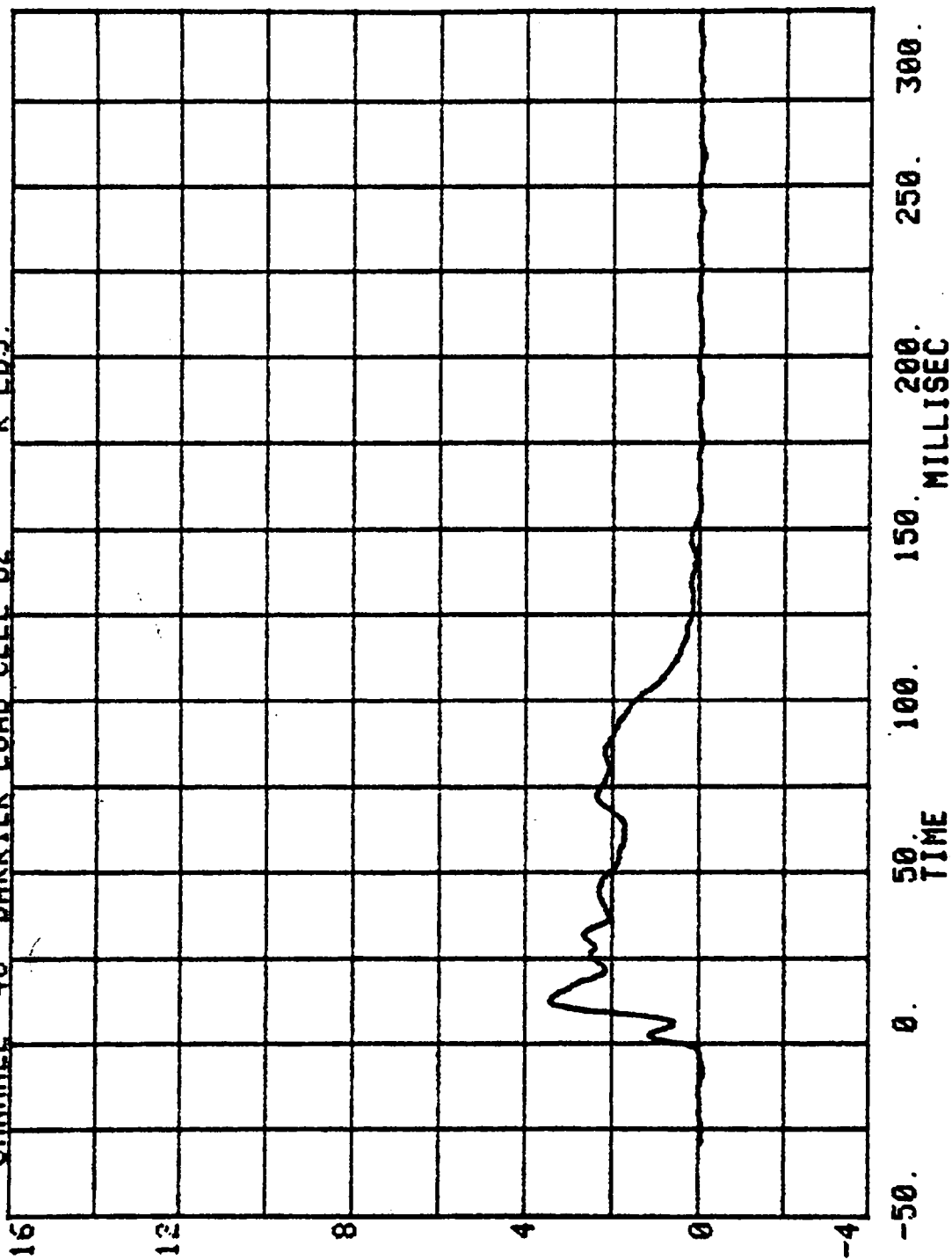


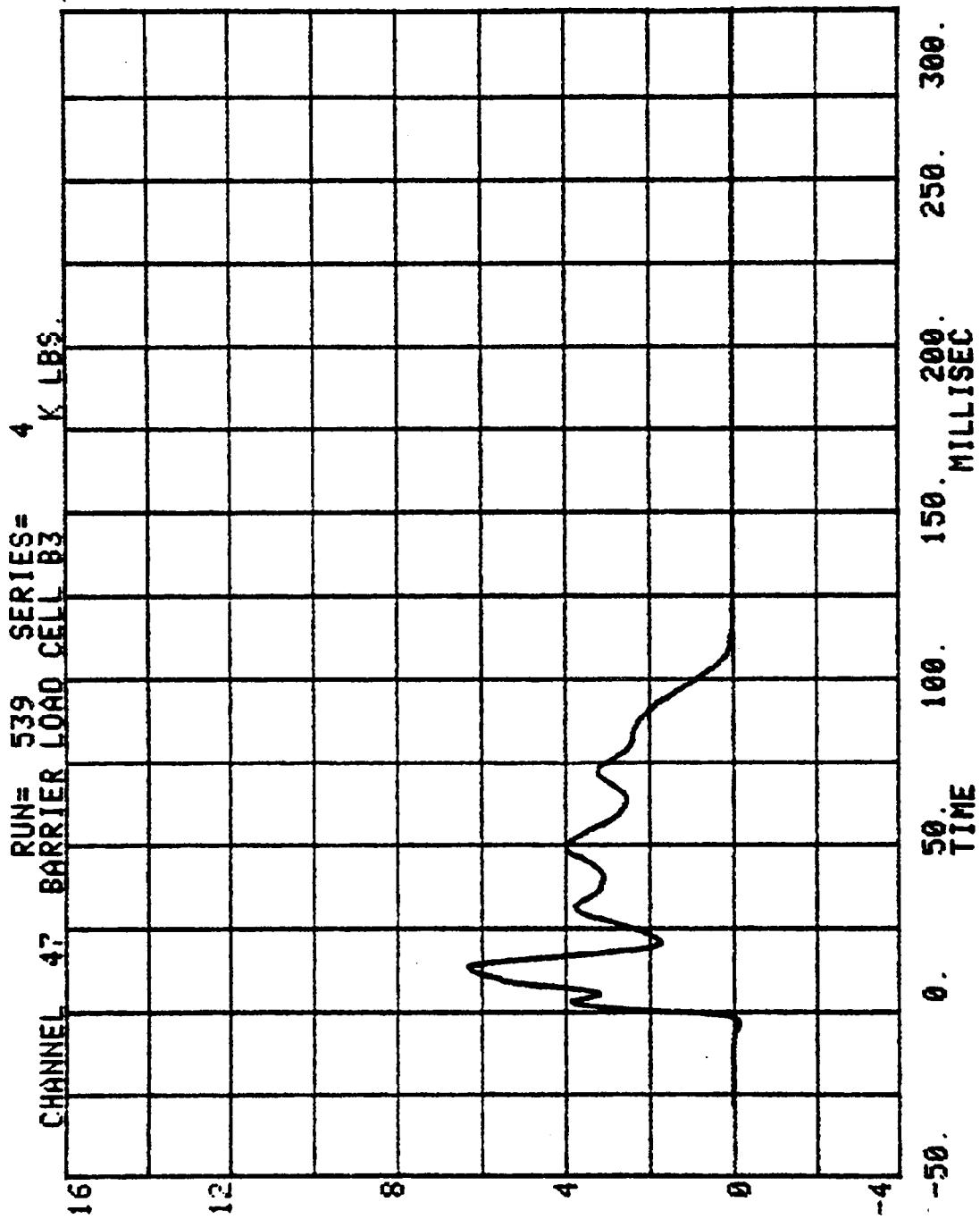


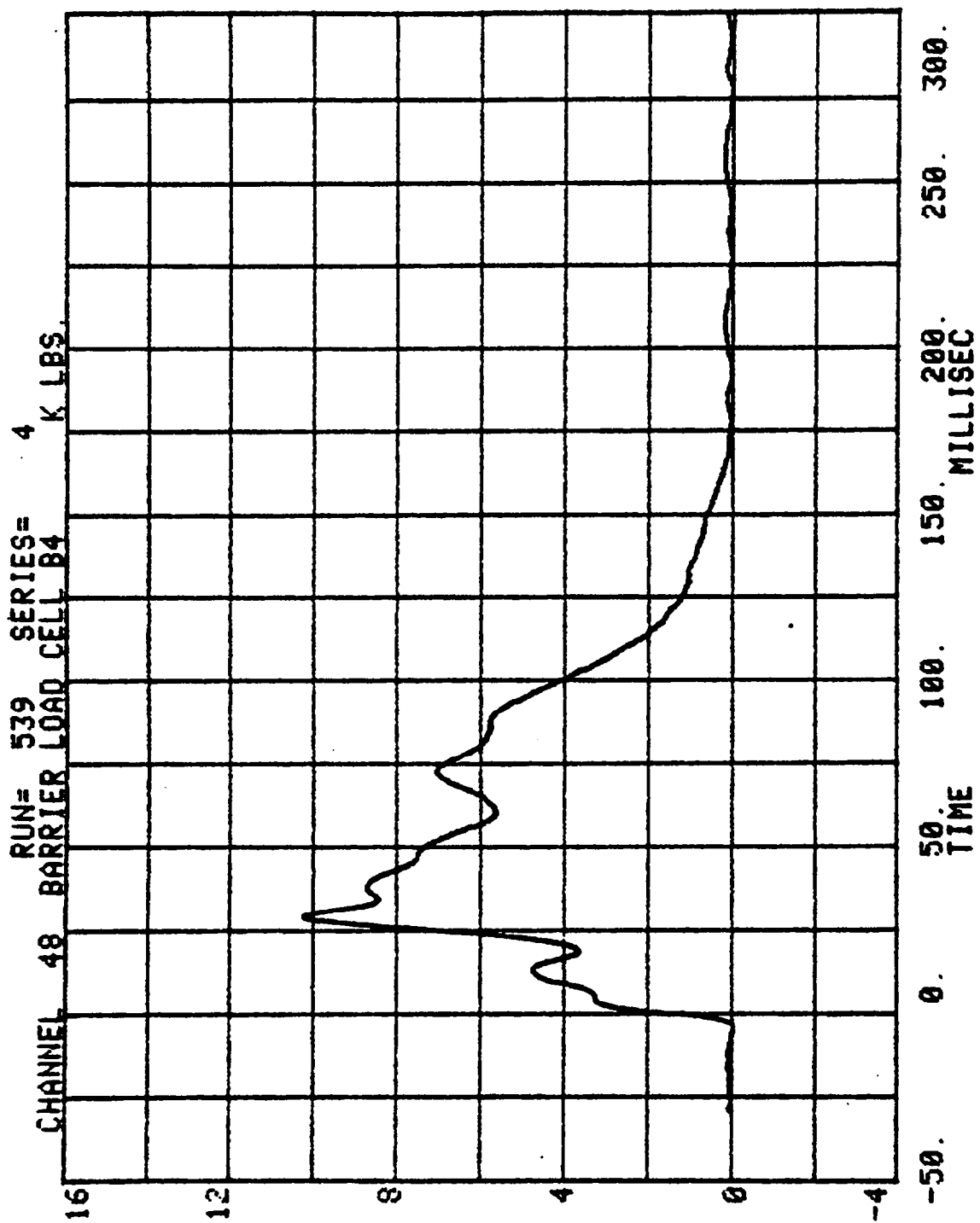


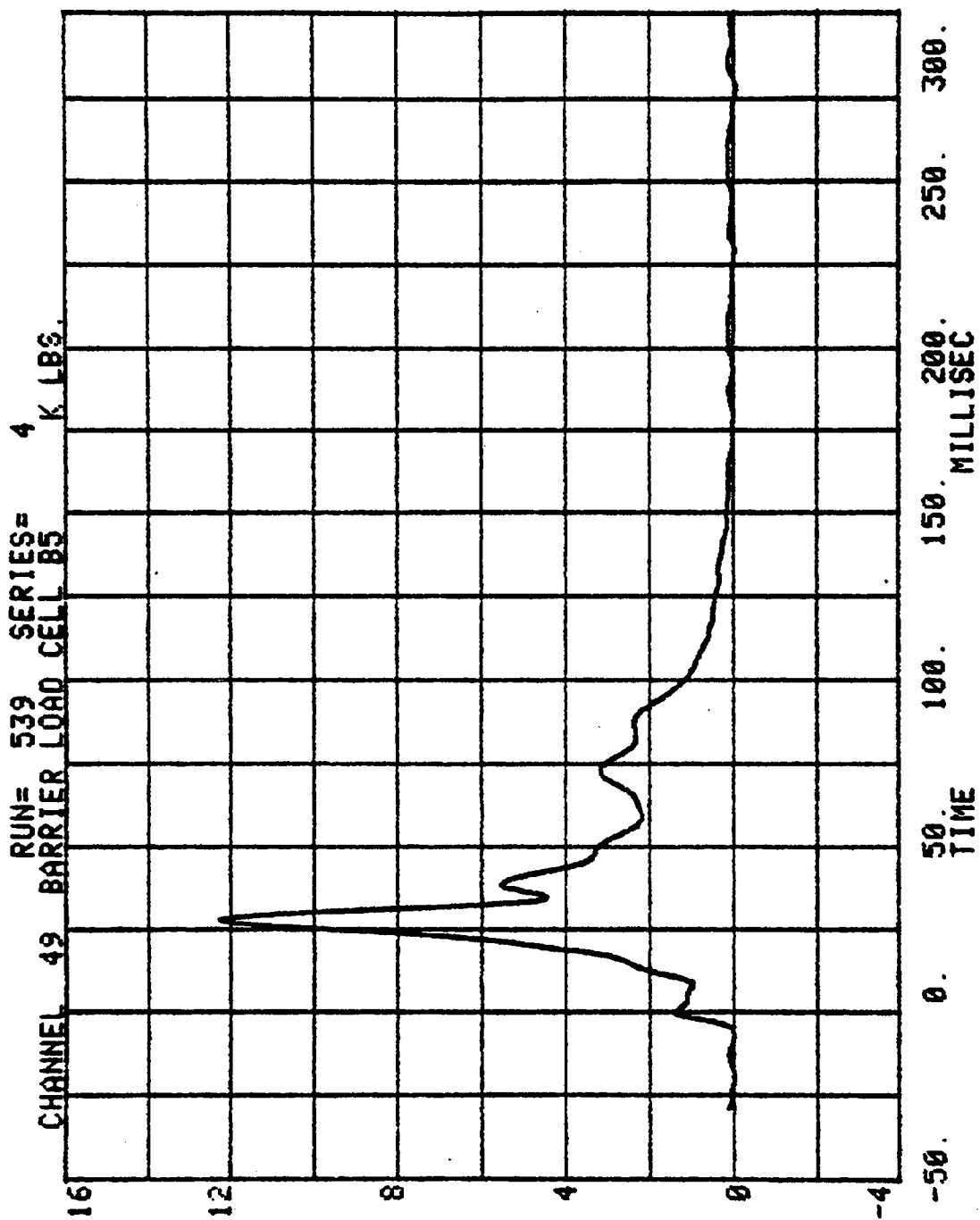


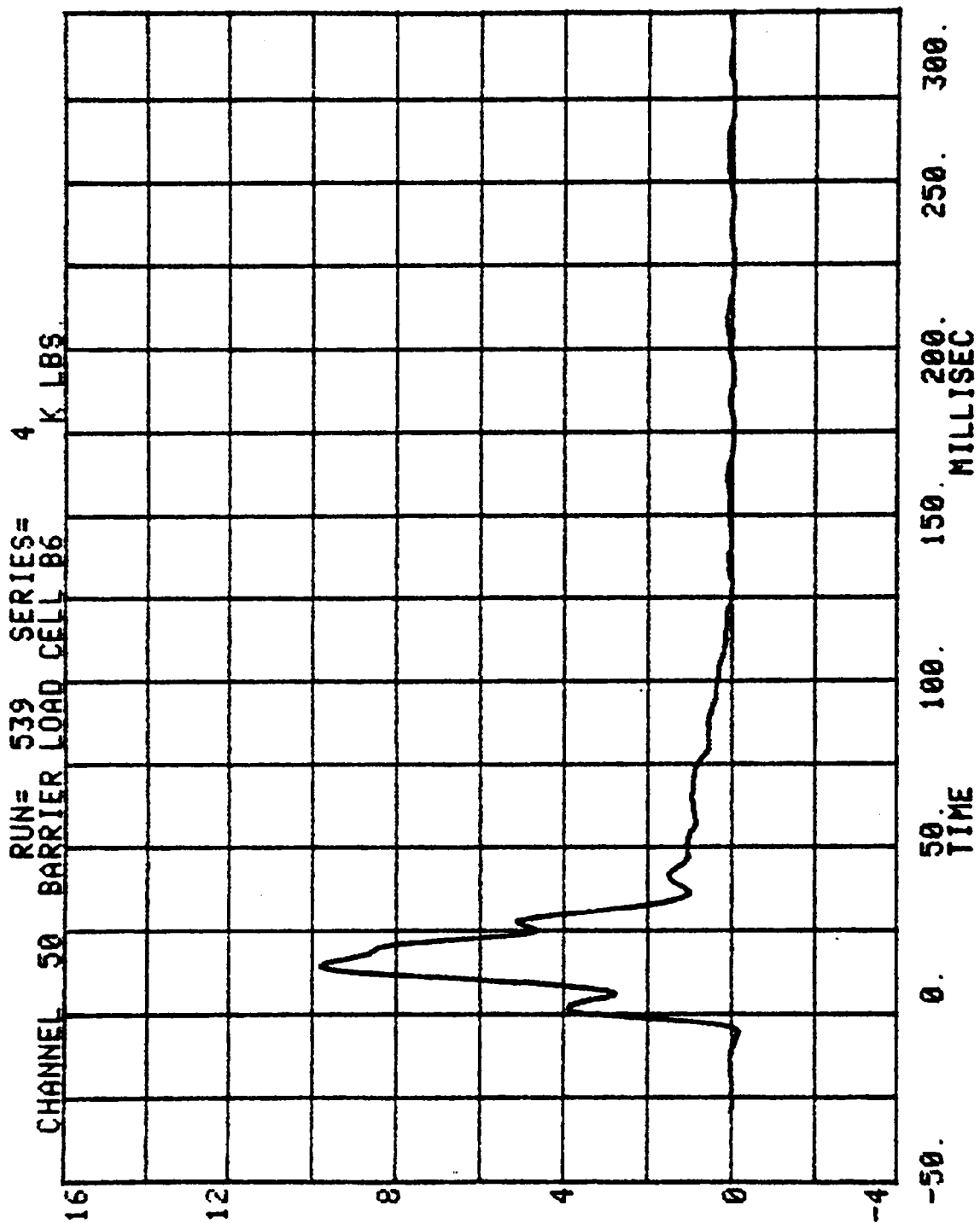
CHANNEL 46 BARRIER LOAD CELL B2 RUN= 539 SERIES= 4 K LBS.

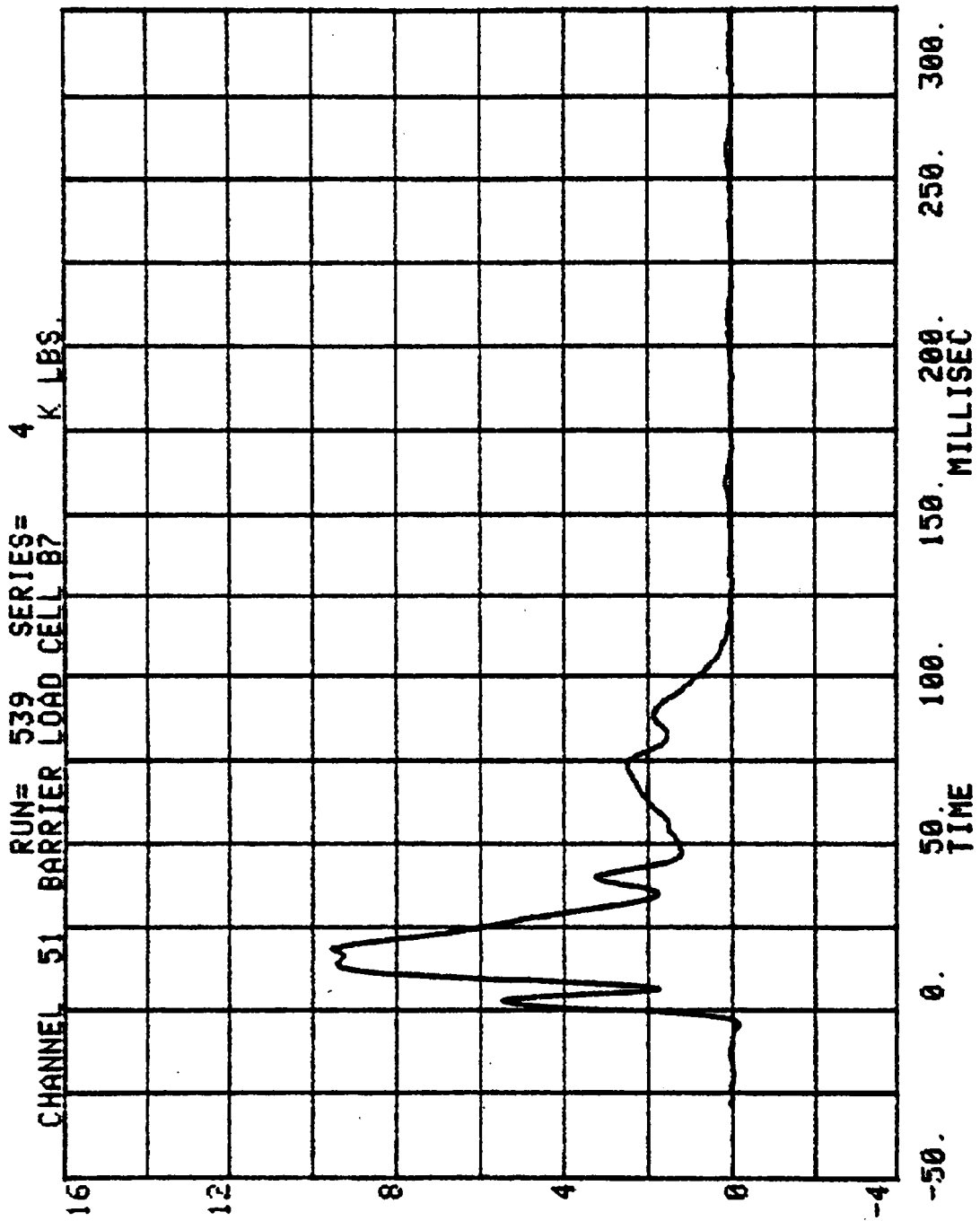


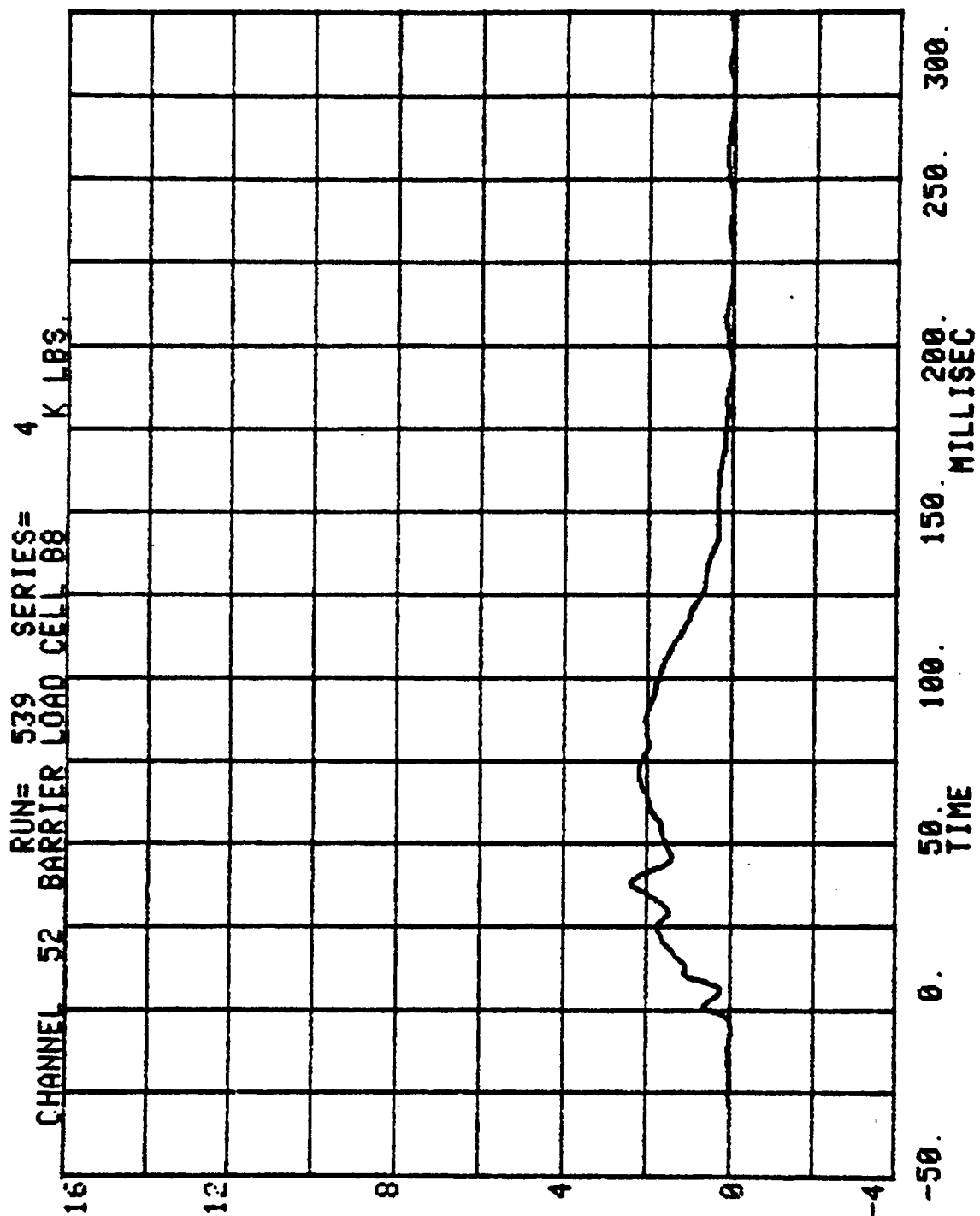




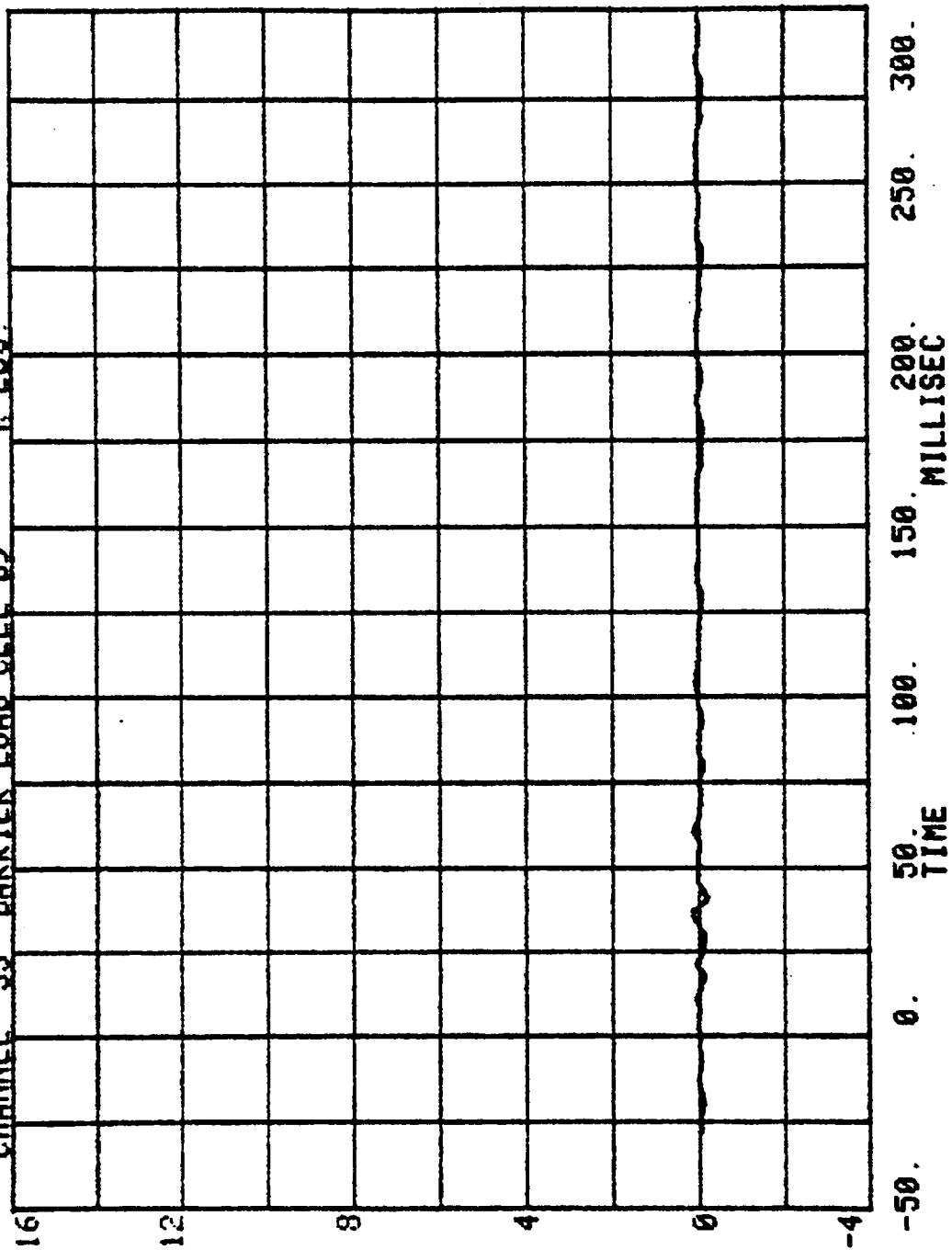


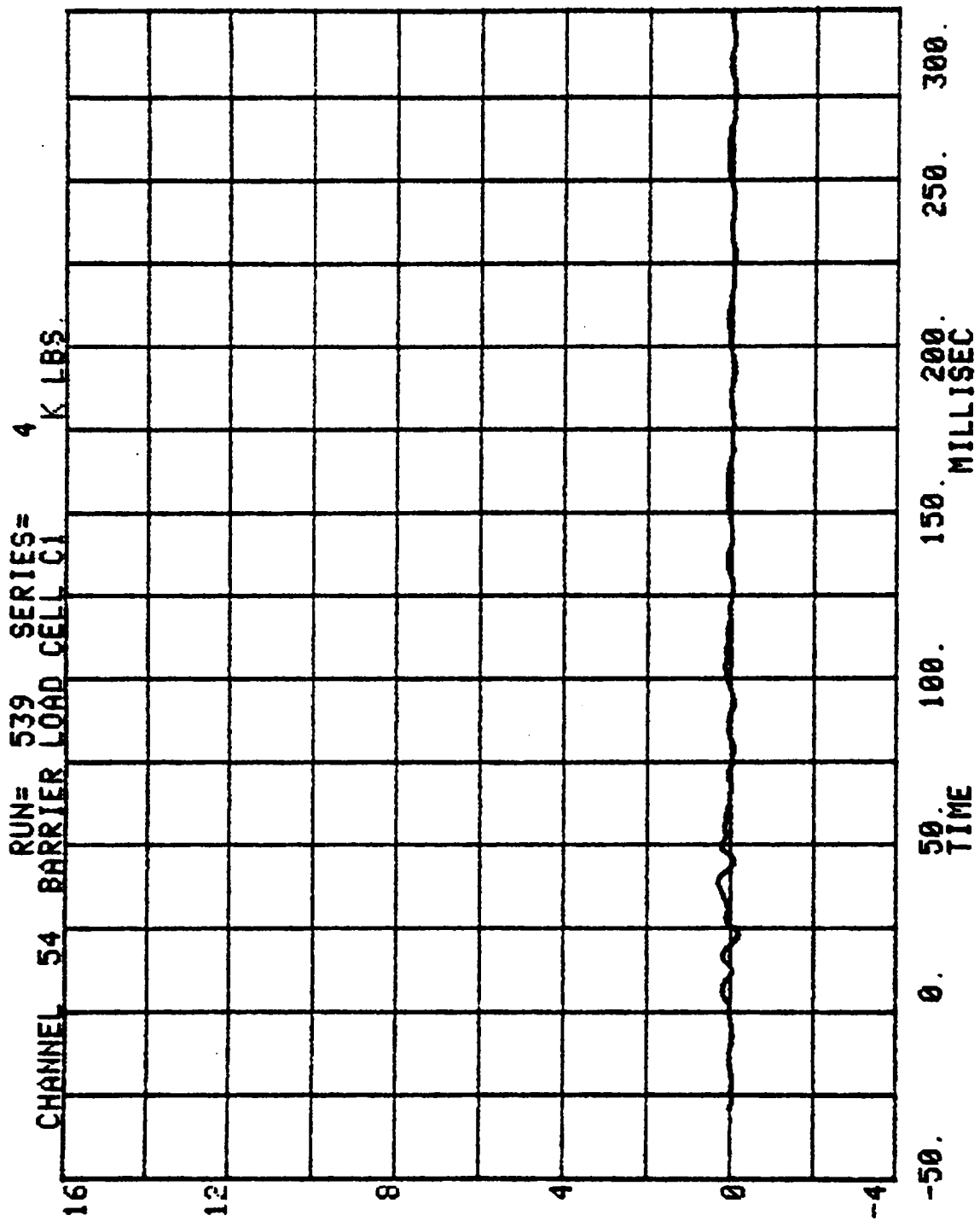


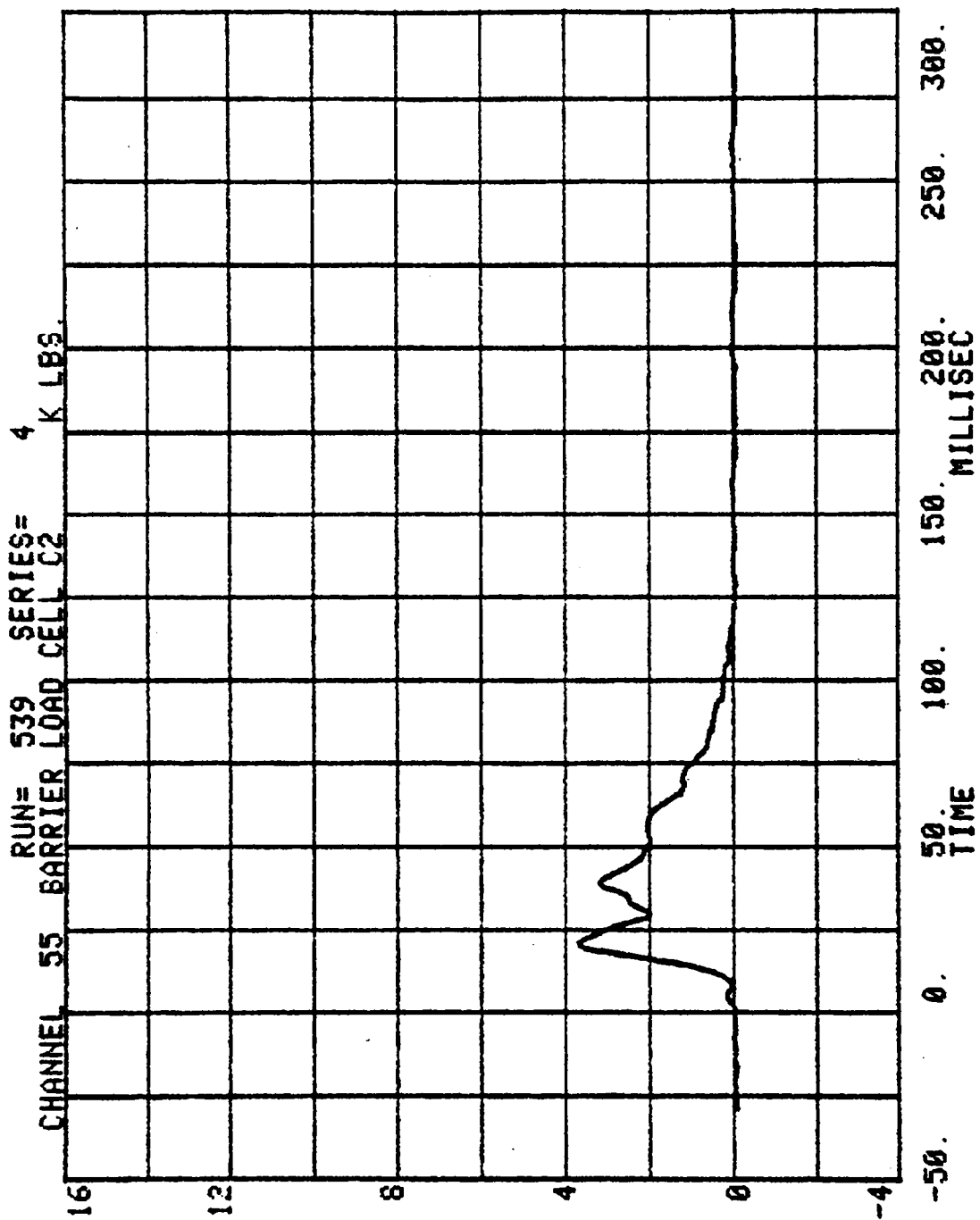




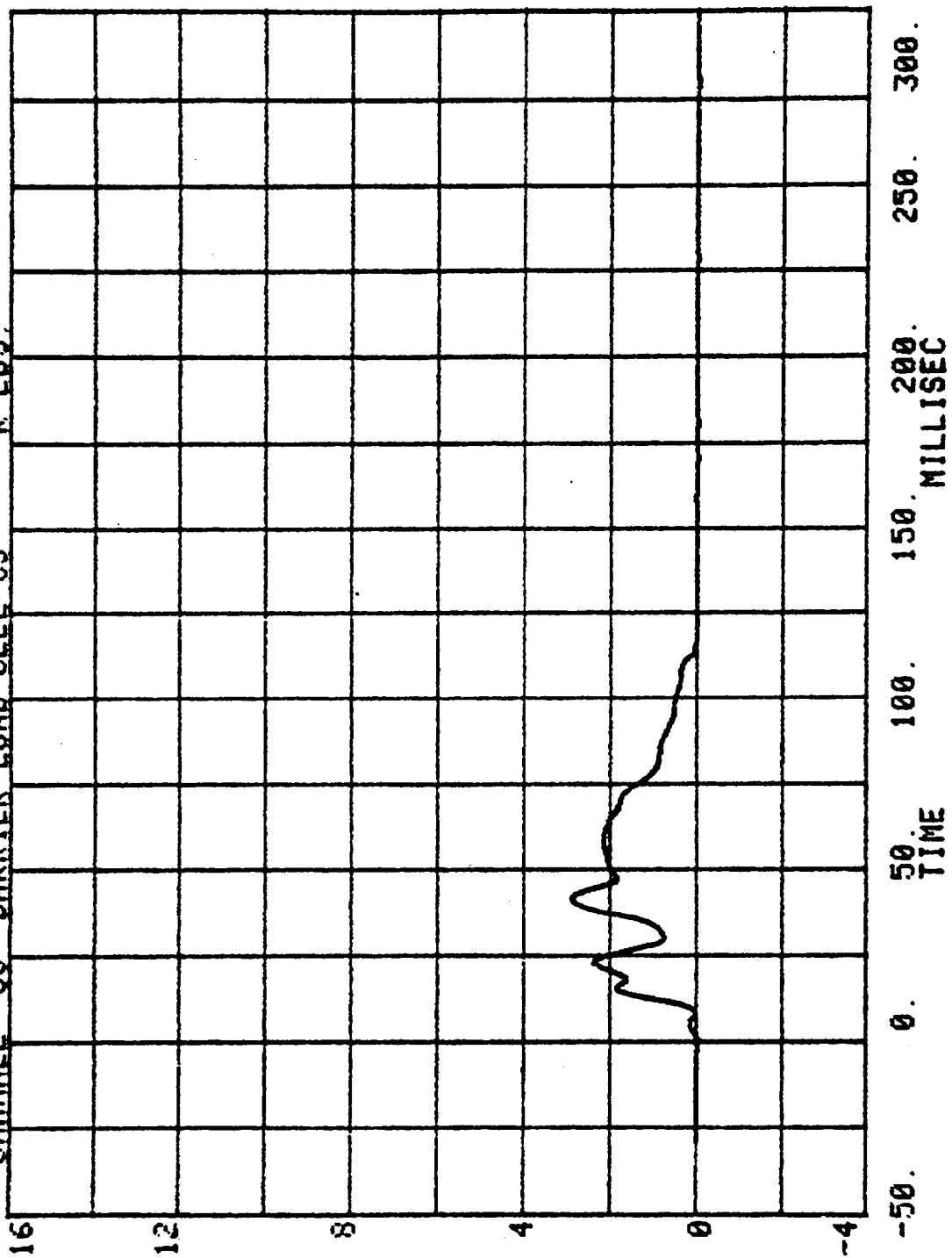
CHANNEL 53 BARRIER LOAD CELL B9 RUN= 539 SERIES= 4 K LBS.

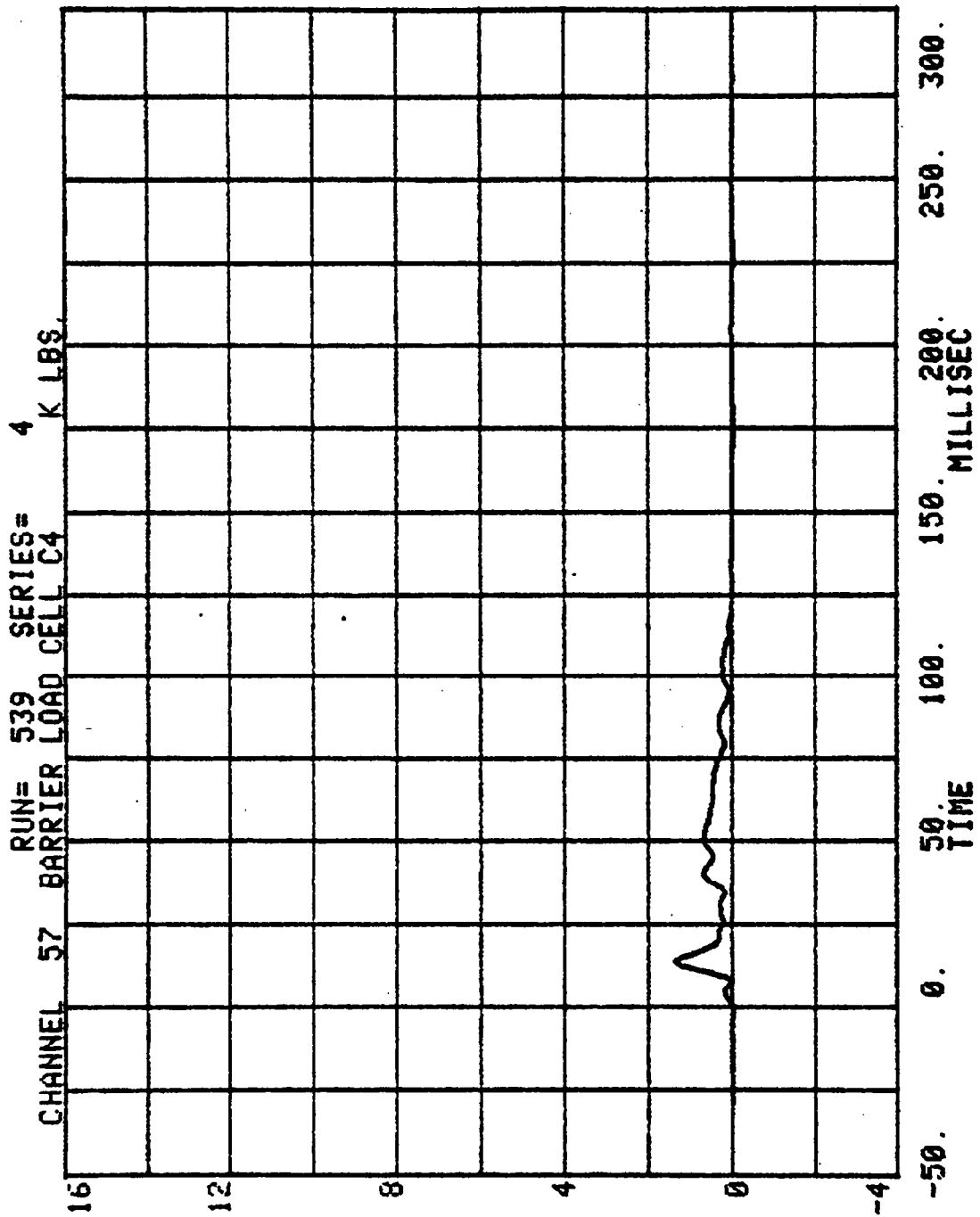


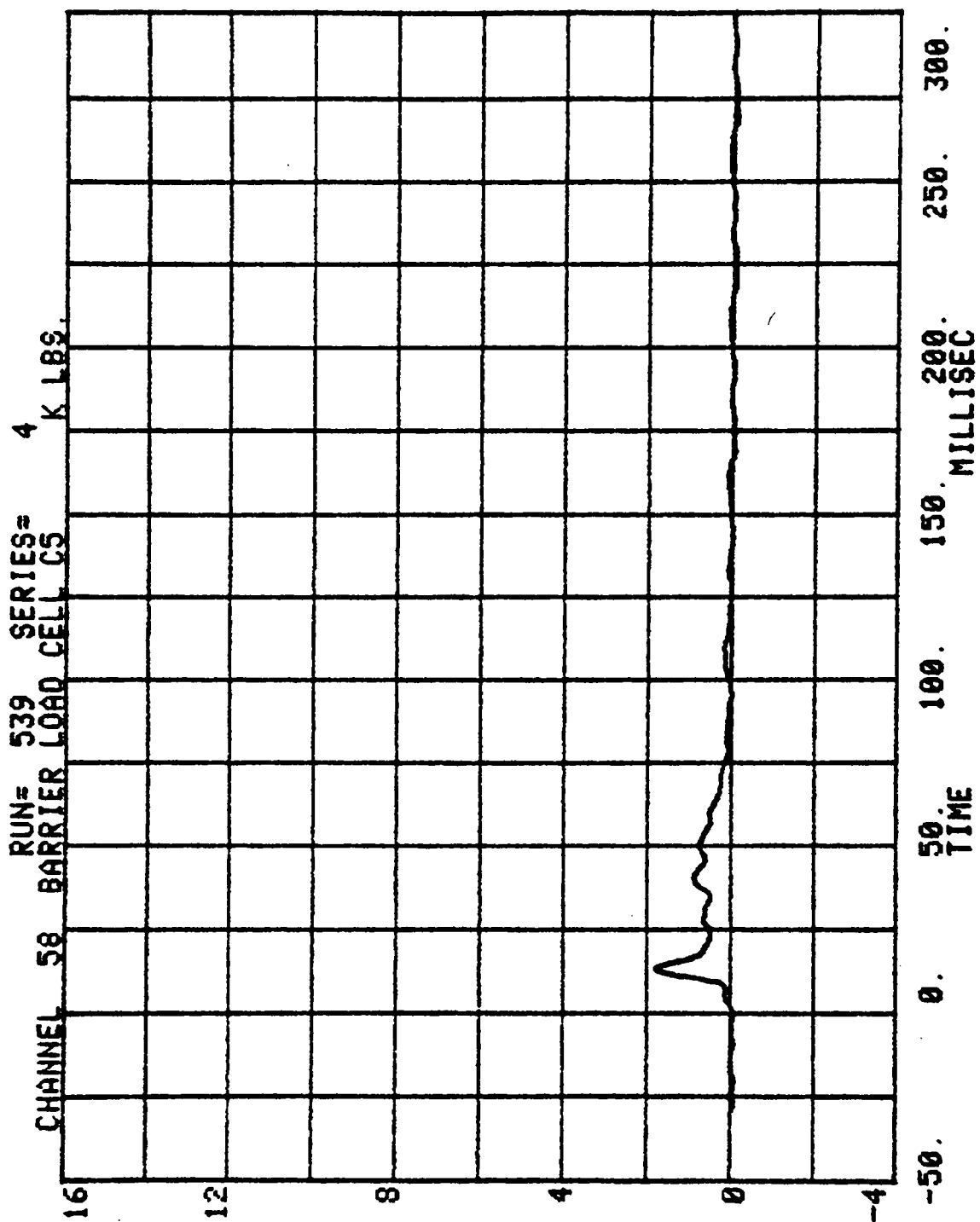


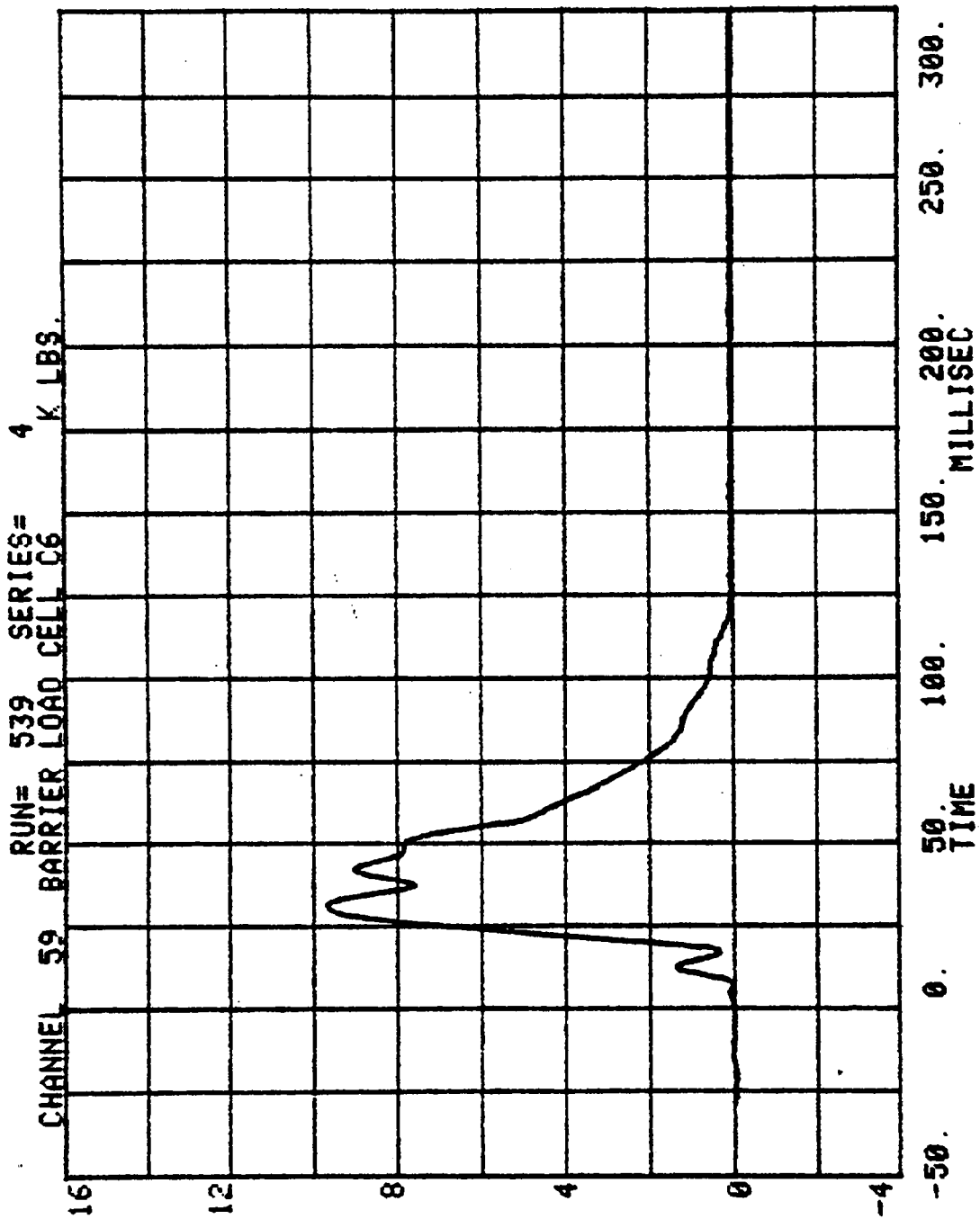


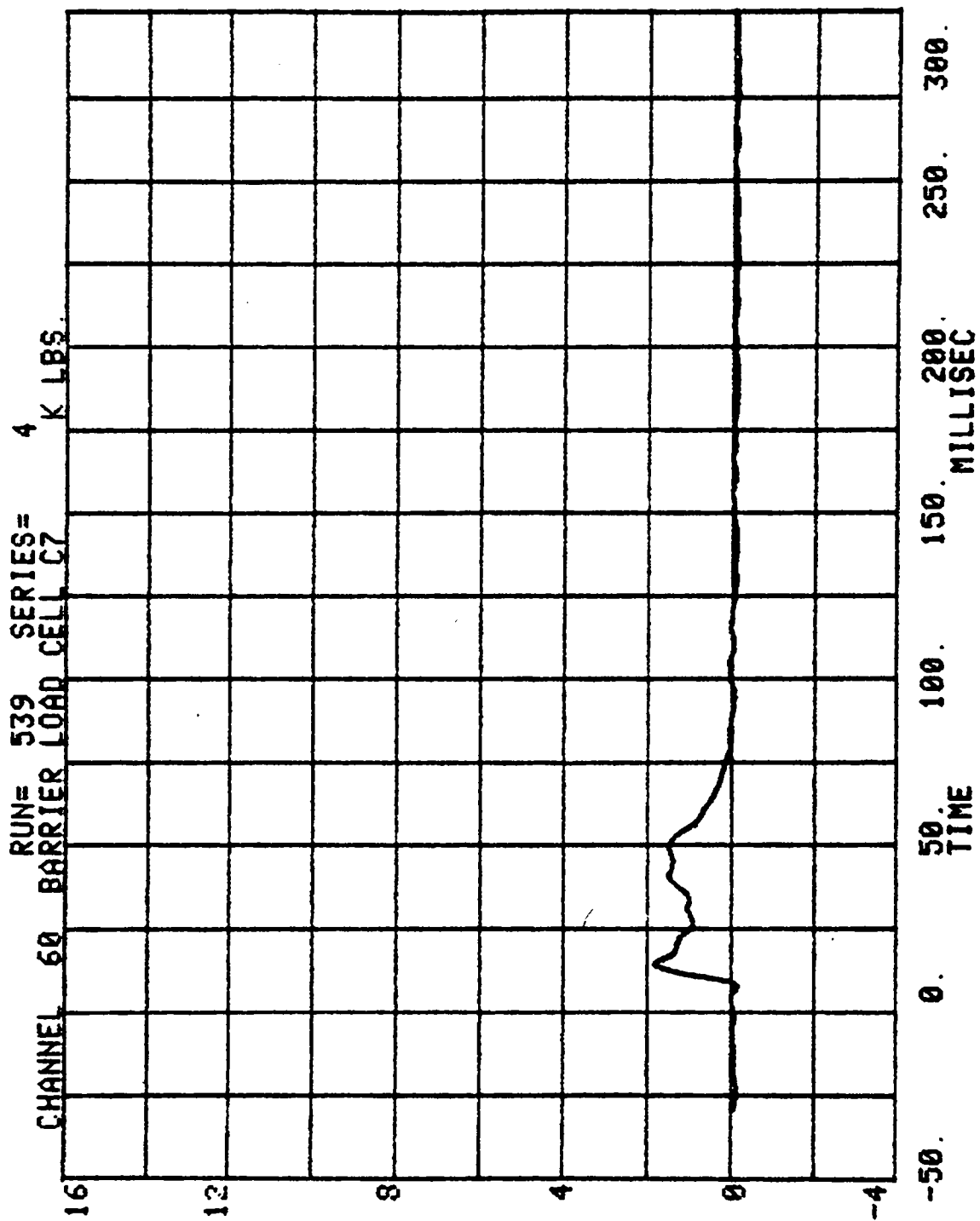
CHANNEL 56 BARRIER LOAD CELL C3 RUN= 539 SERIES= 4 K LBS.

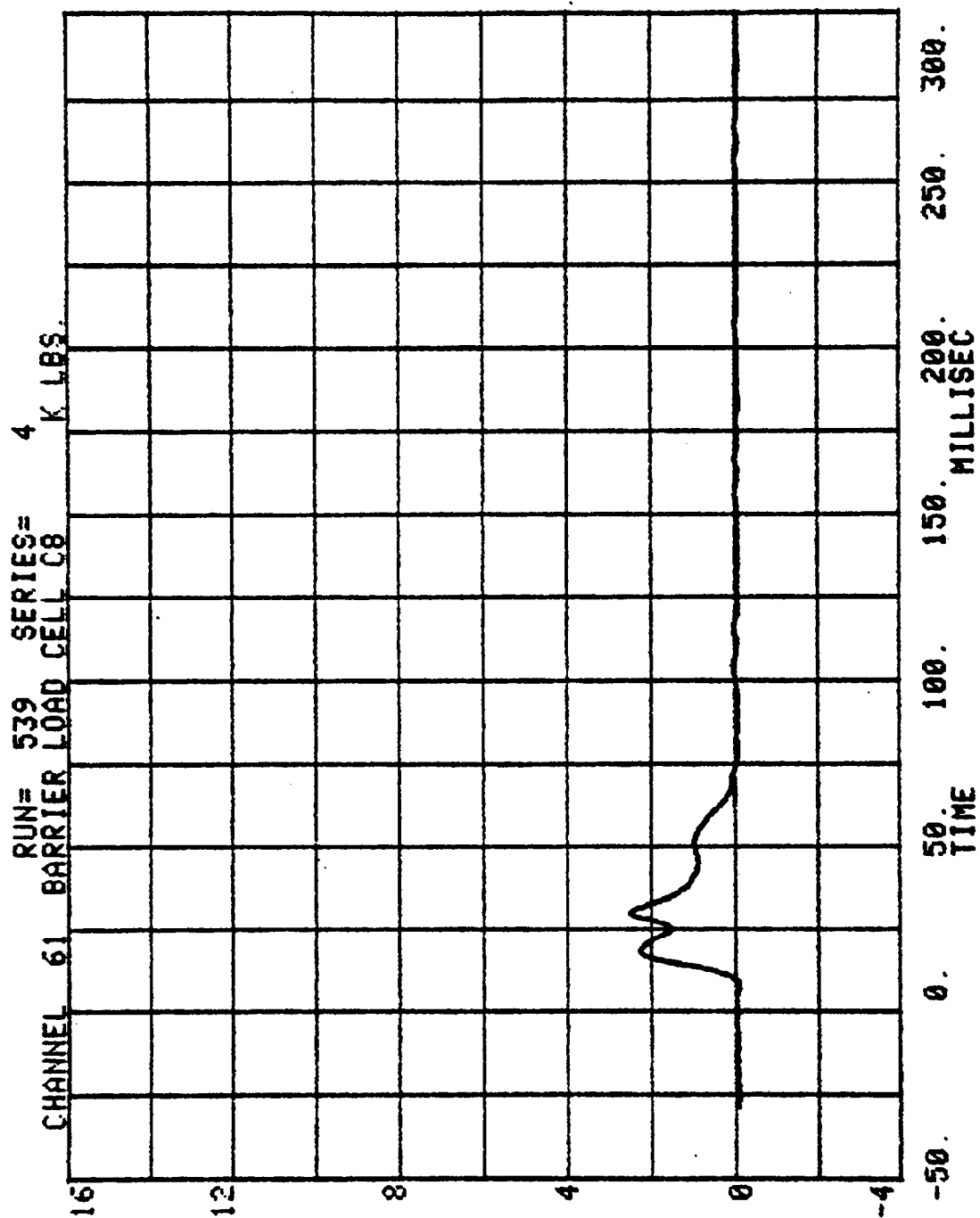


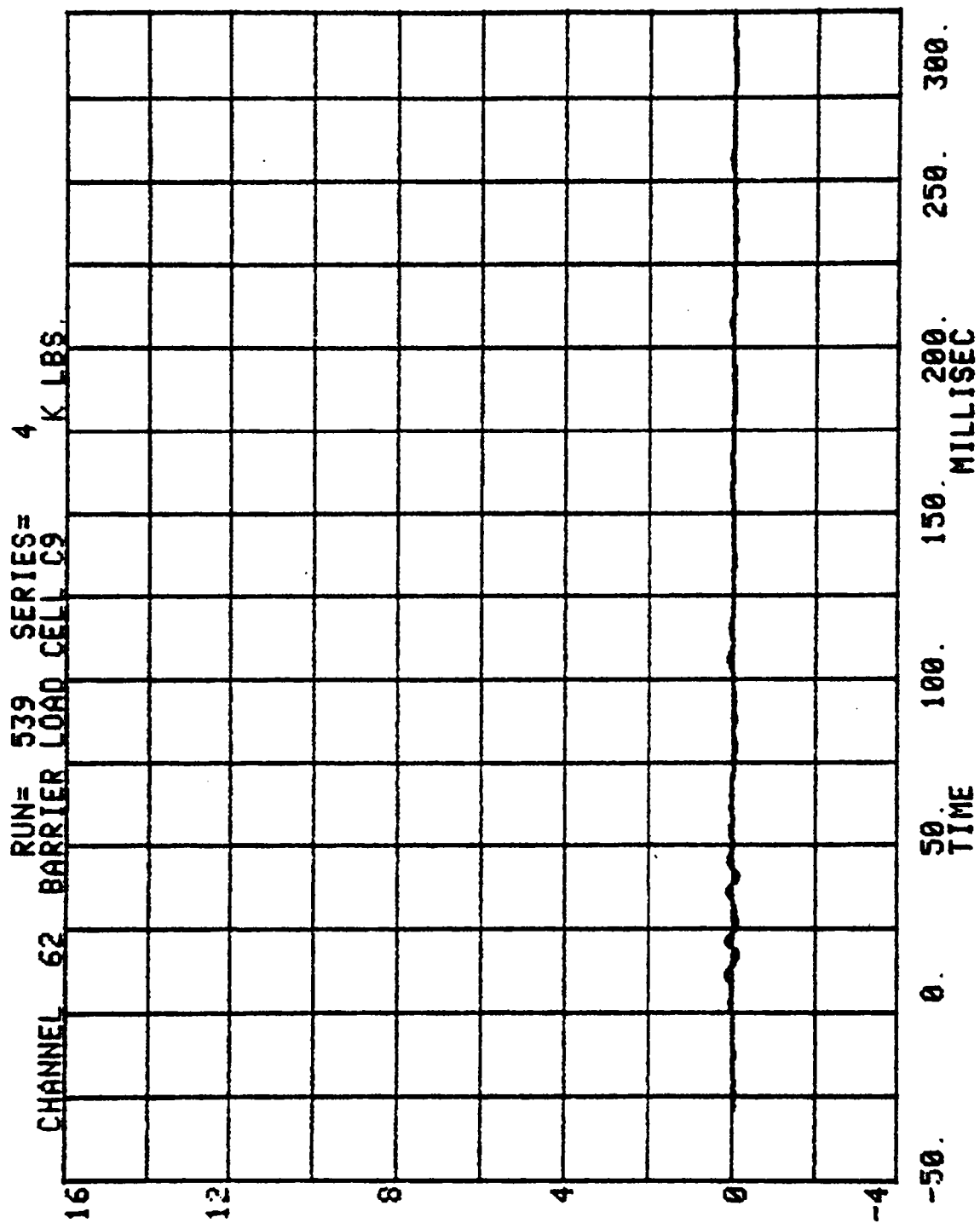


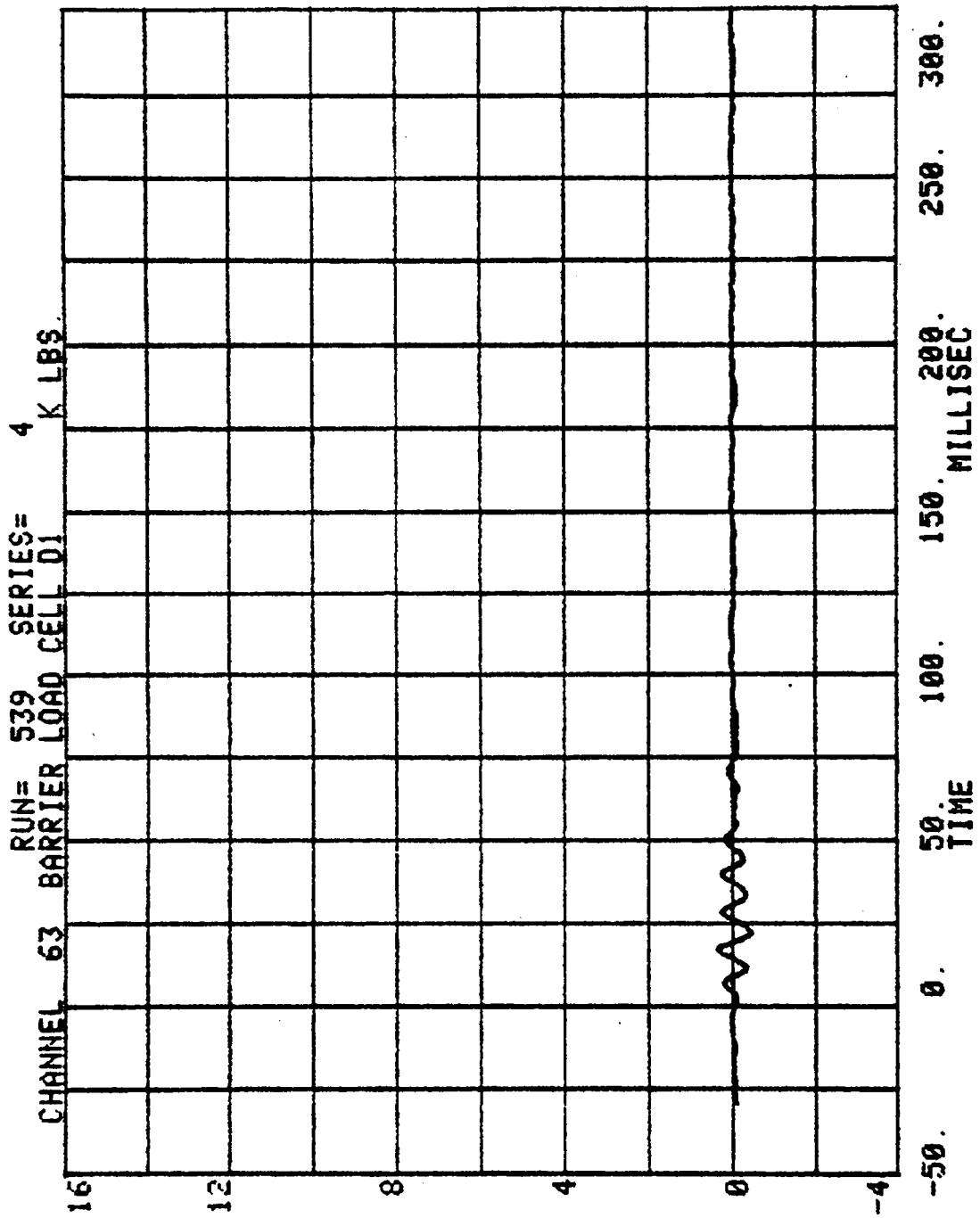


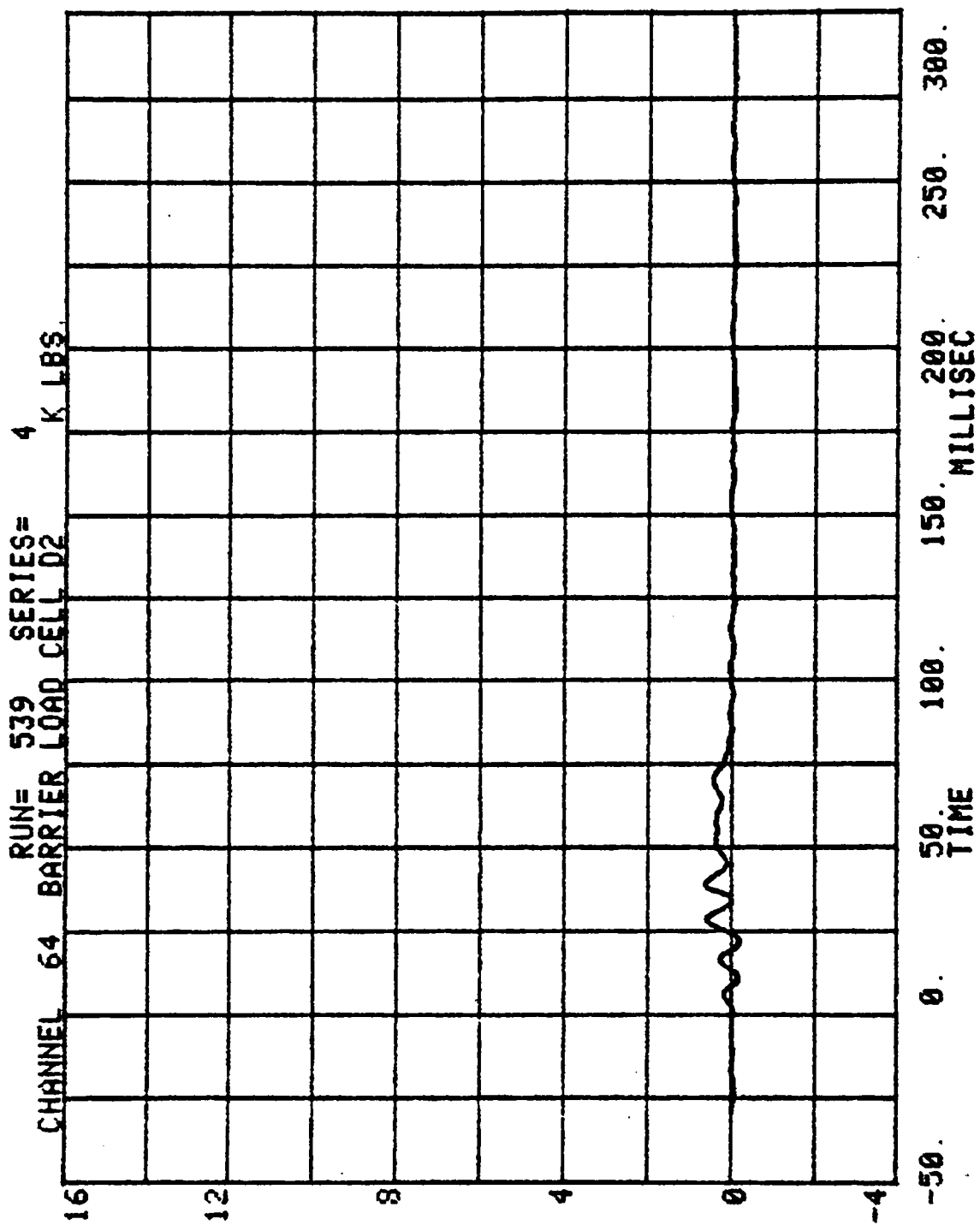


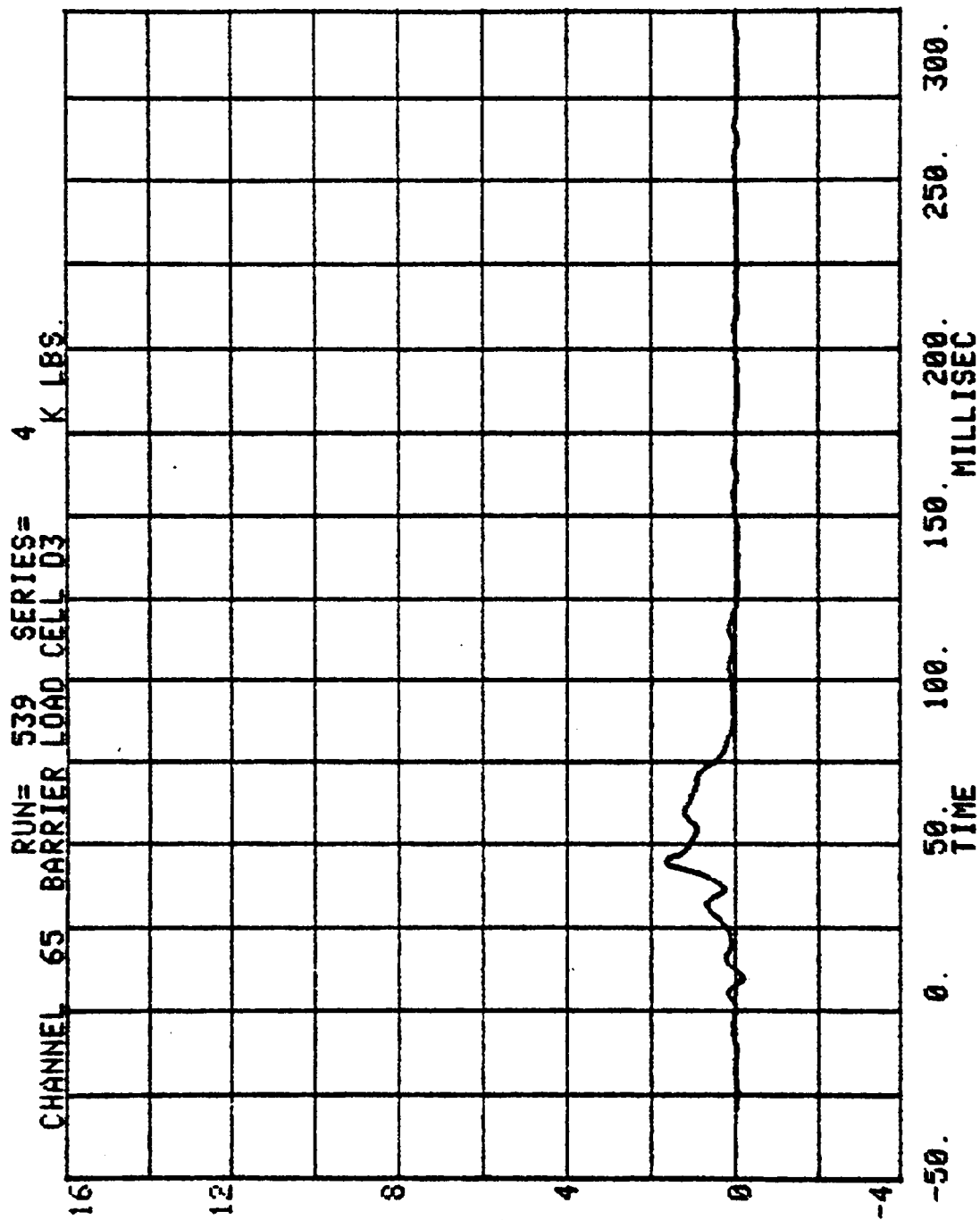




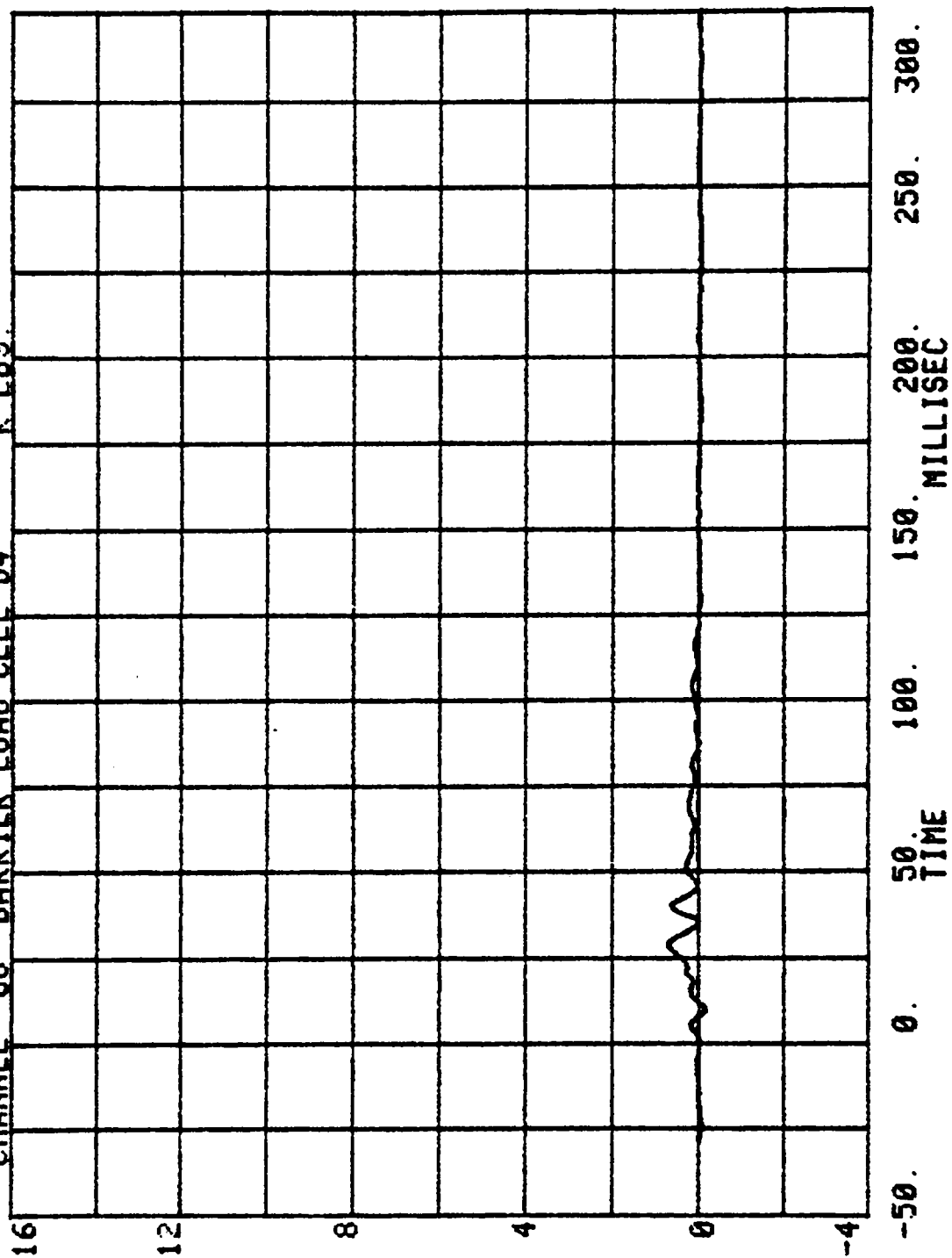


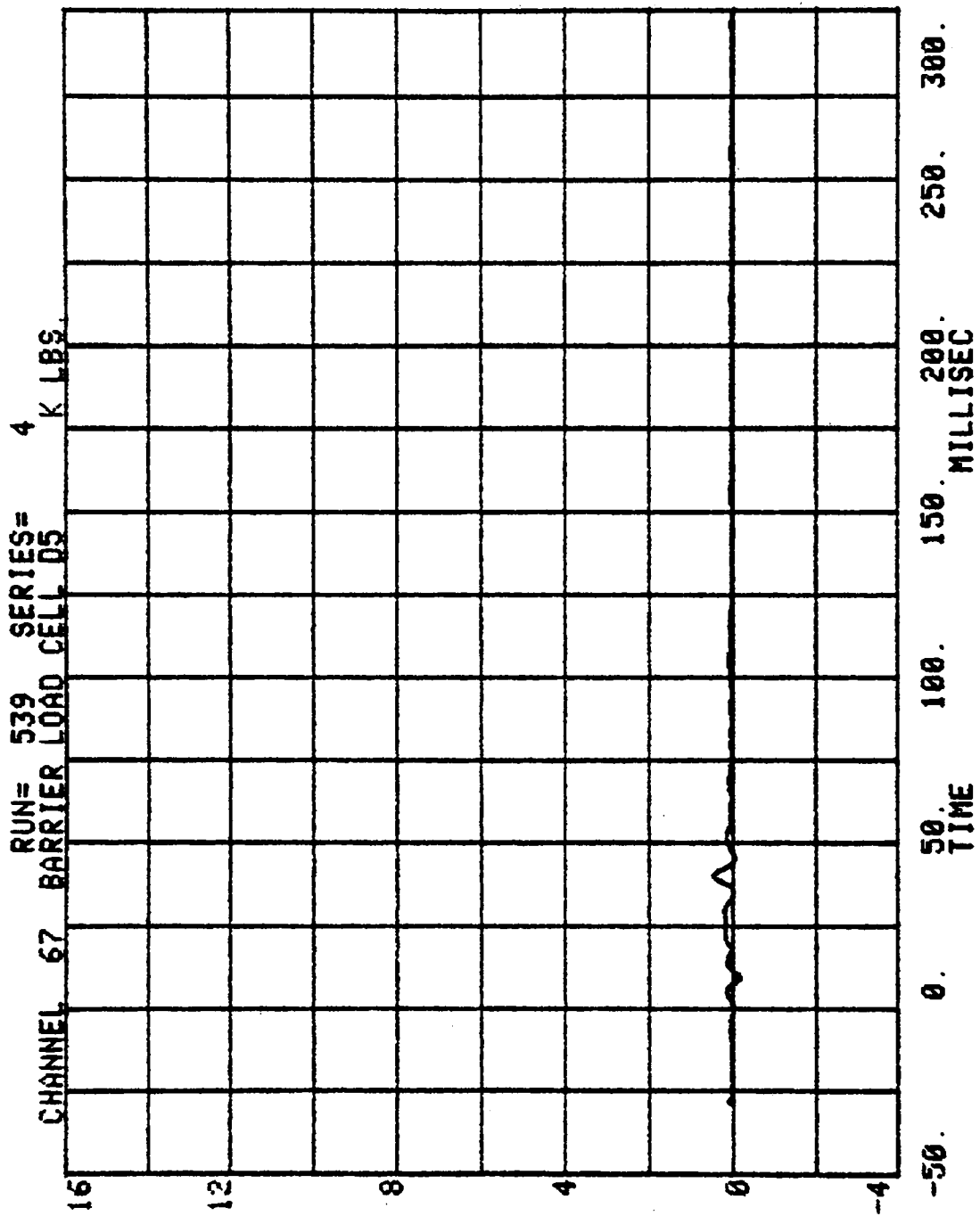




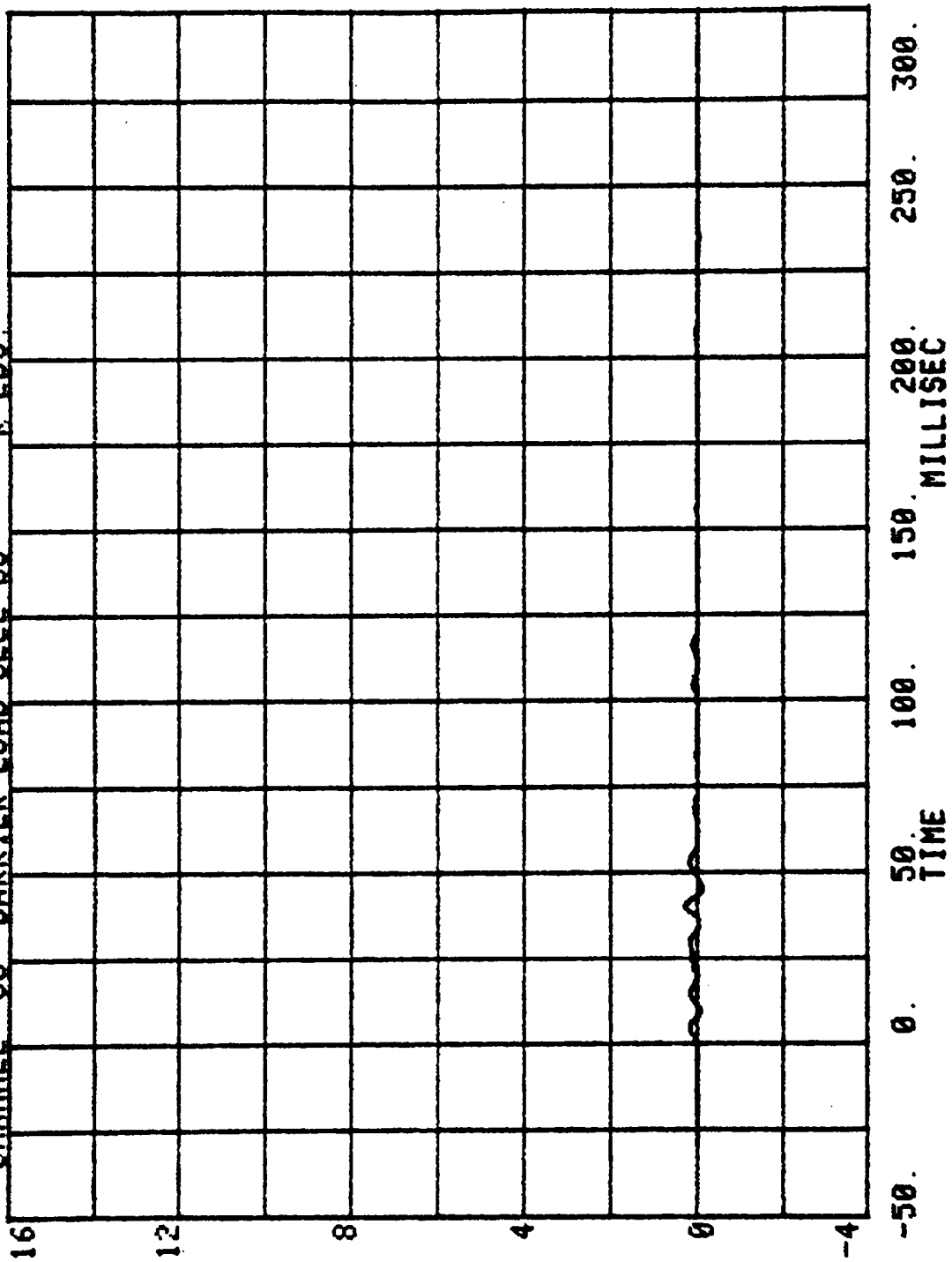


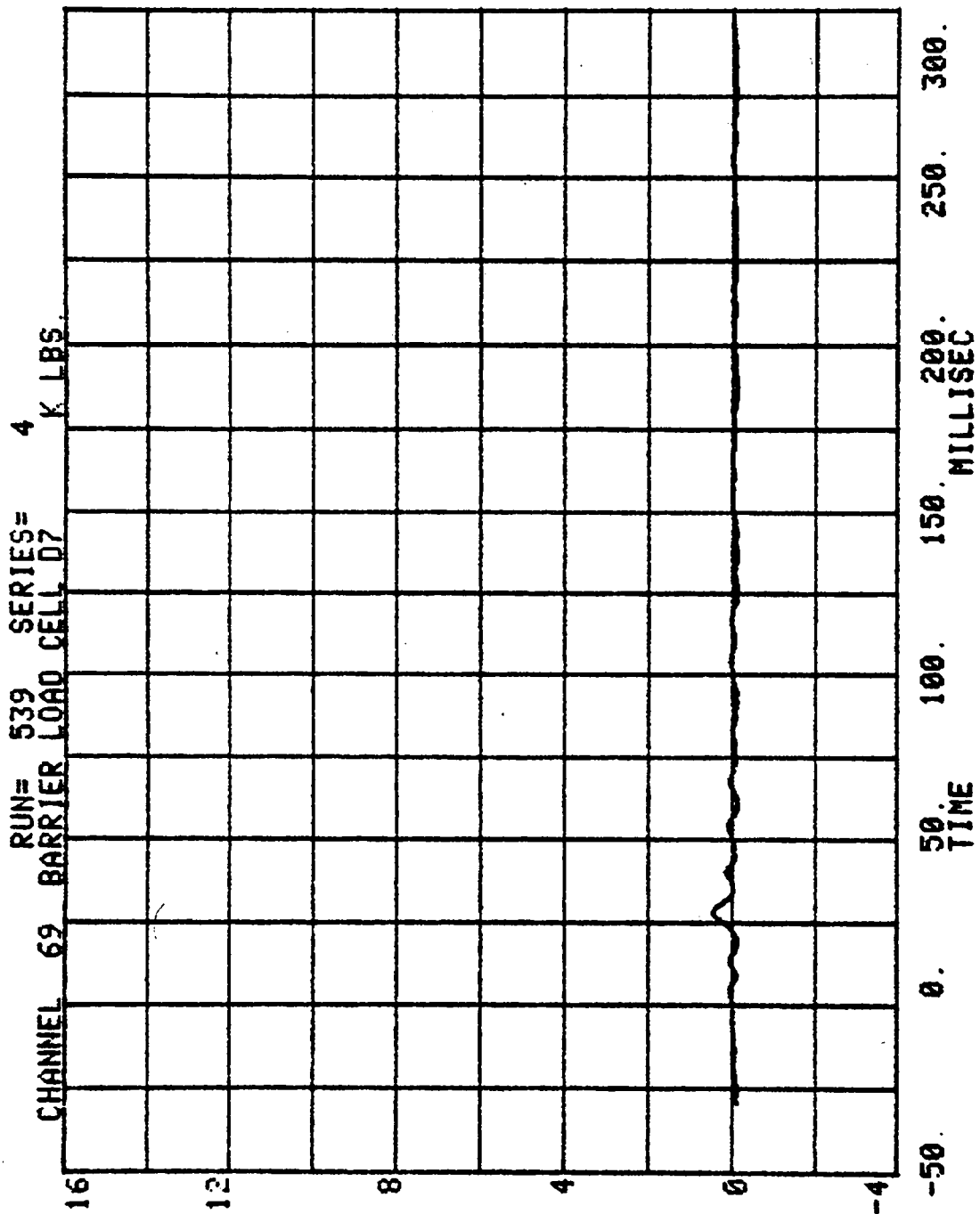
RUN= 539 SERIES= 4
CHANNEL 66 BARRIER LOAD CELL 04 K LBS.



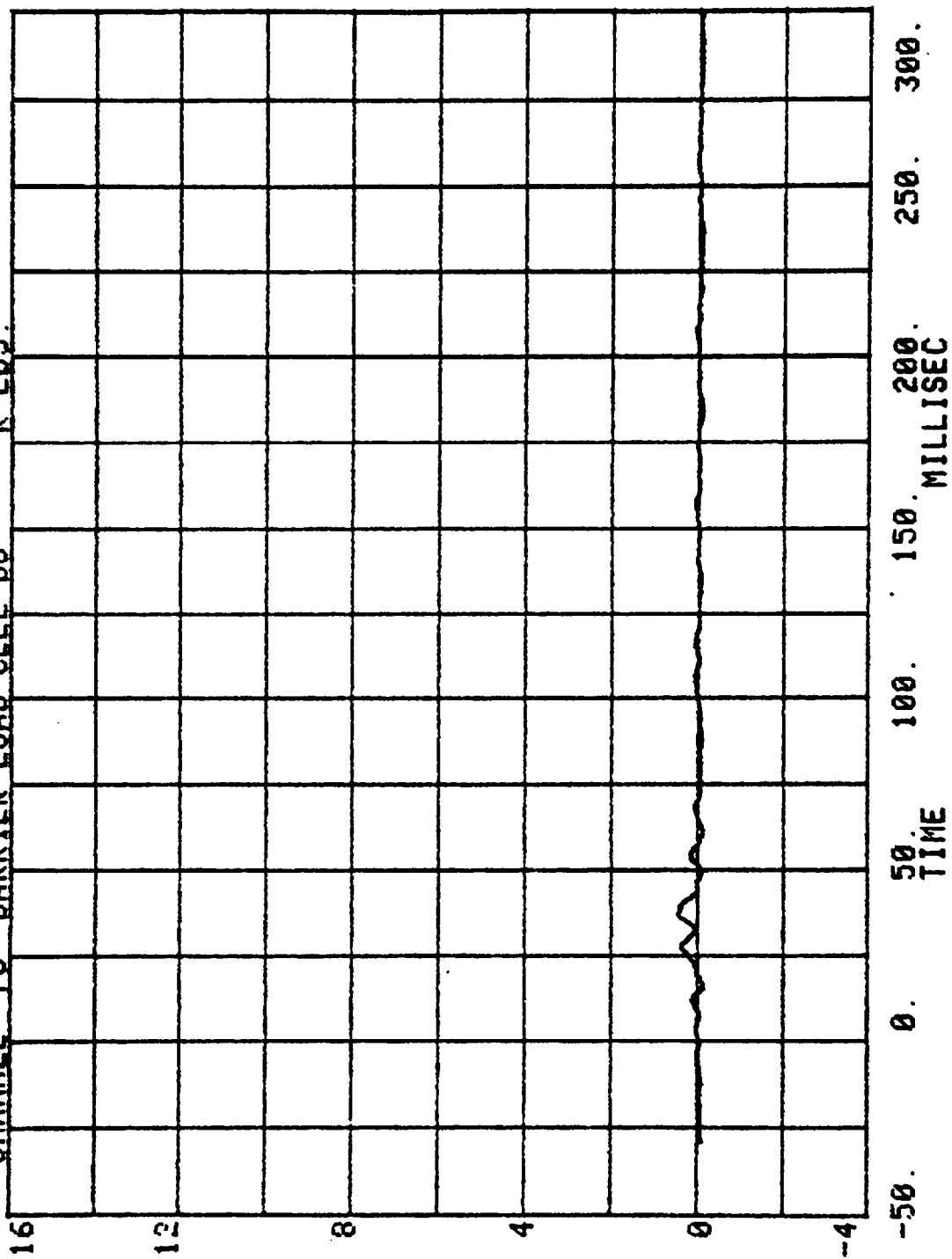


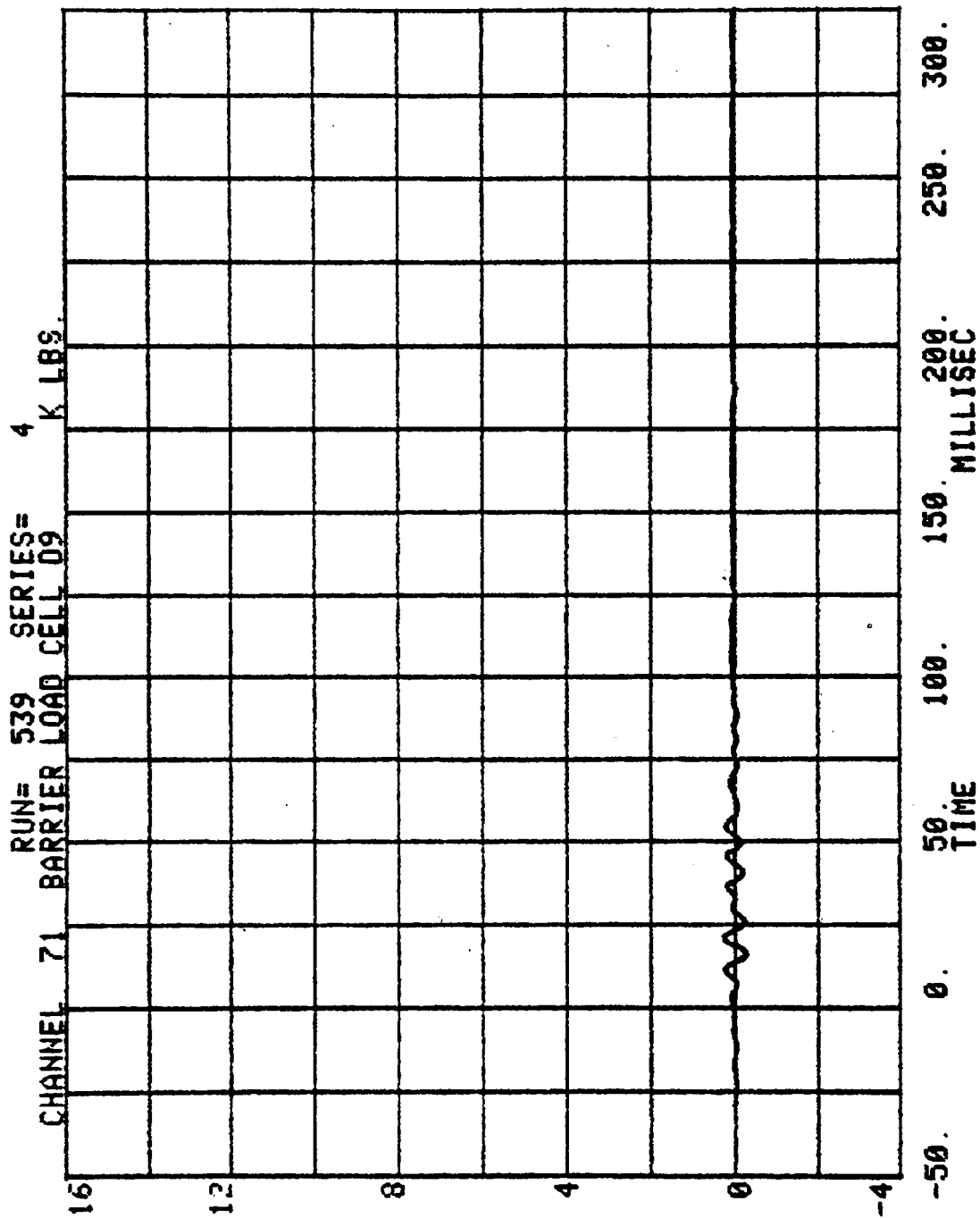
CHANNEL 68 RUN= 539 SERIES= 4
BARRIER LOAD CELL 06 K LBS.

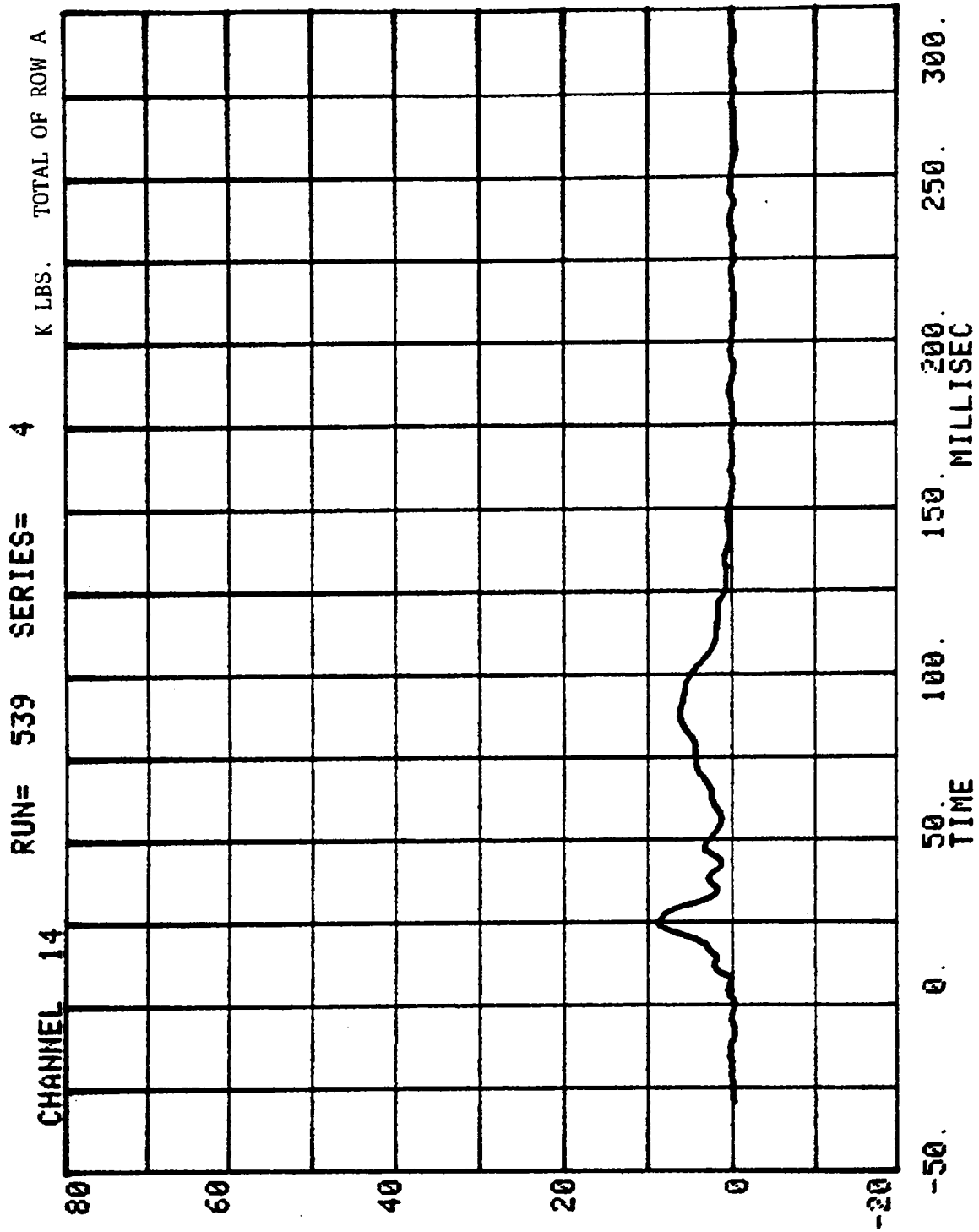




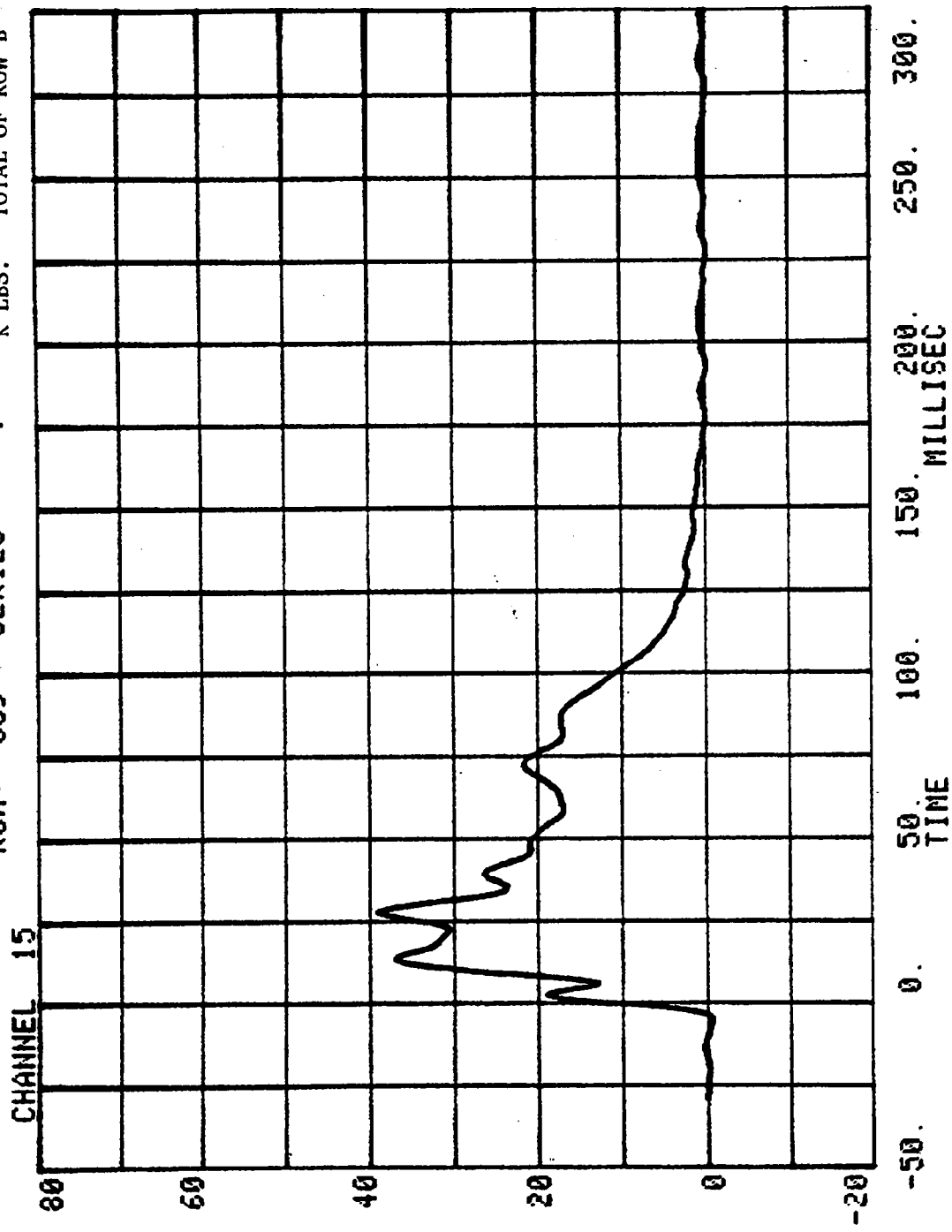
CHANNEL 70 BARRIER LOAD CELL D8
RUN= 539 SERIES= 4
K LBS.

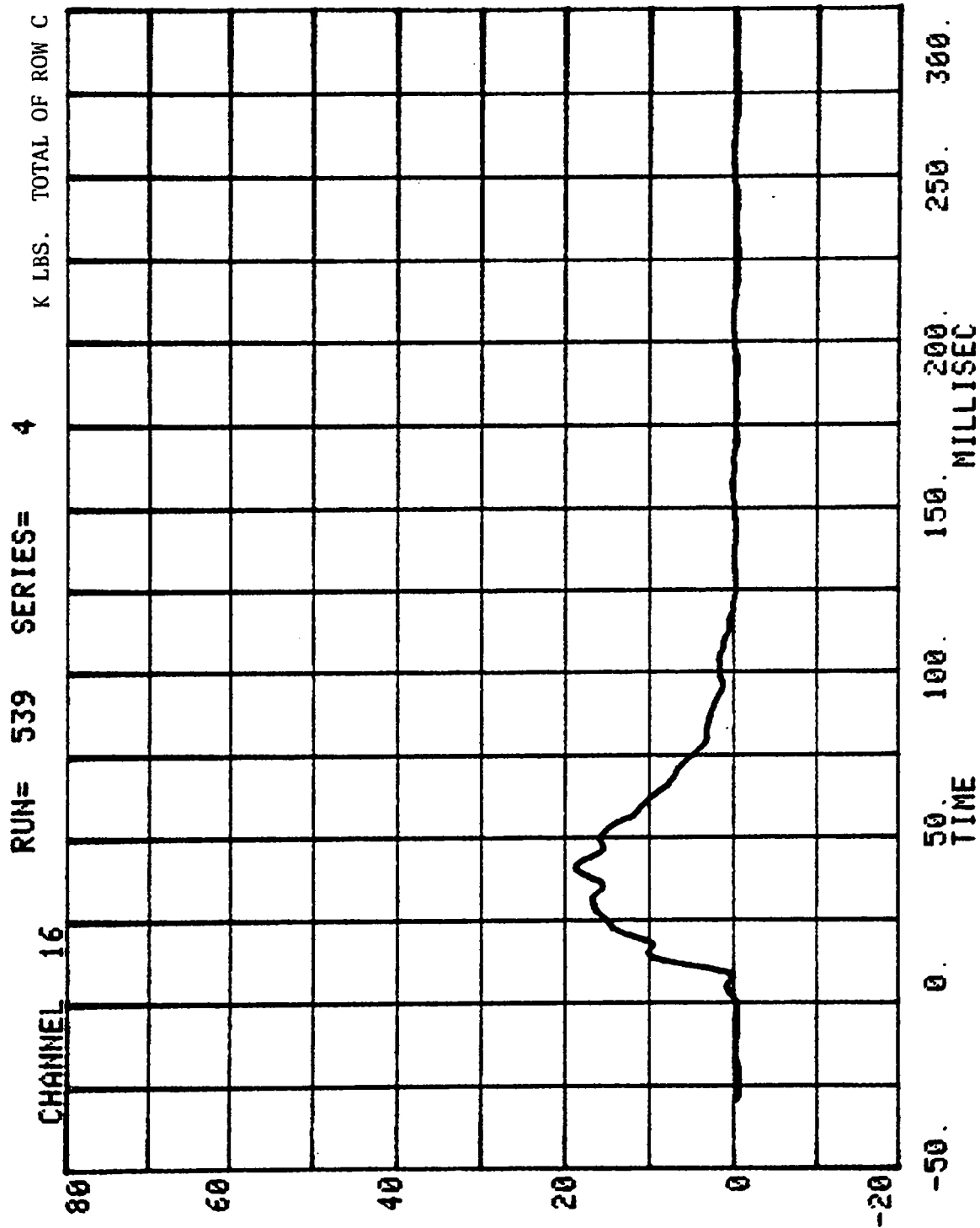


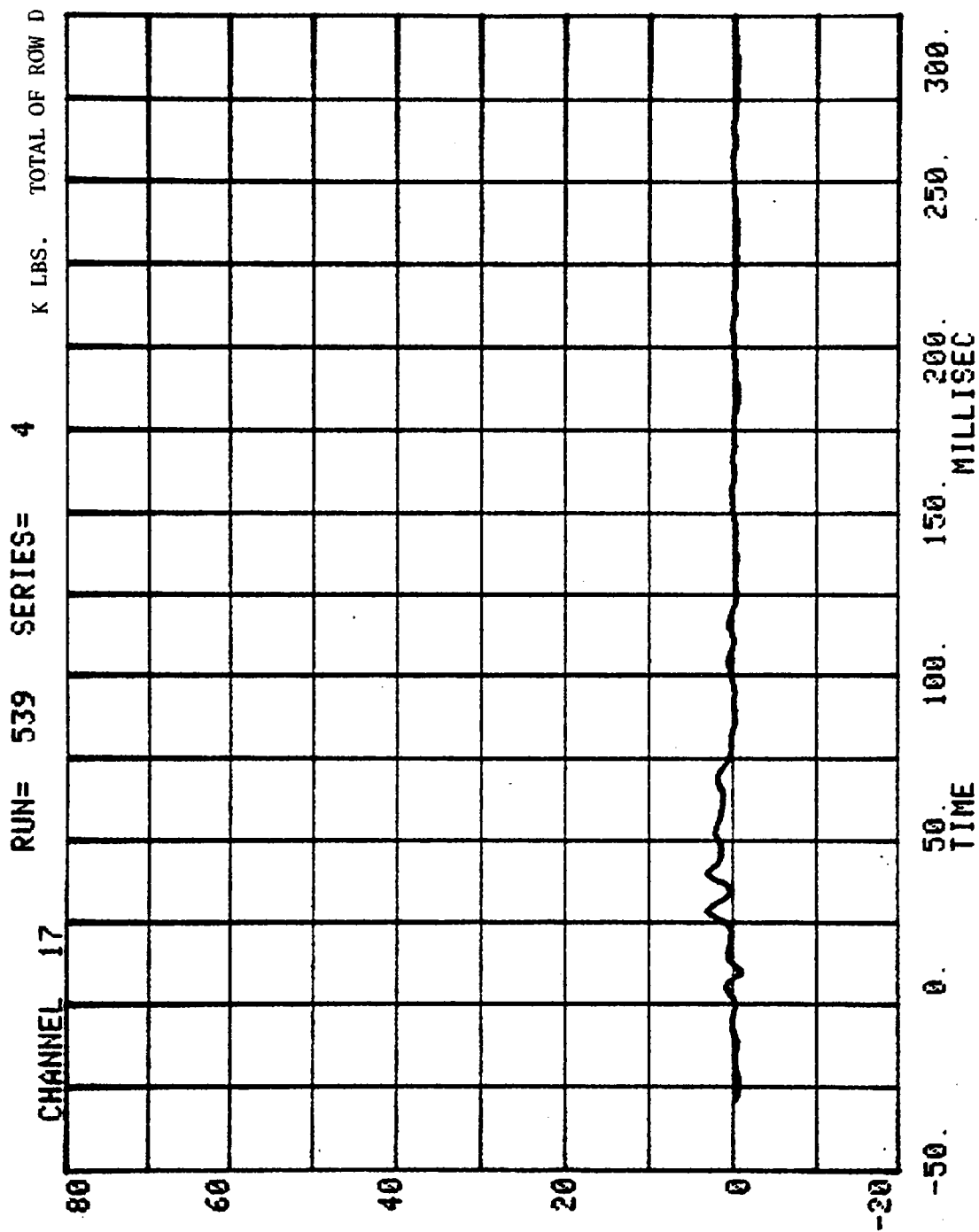


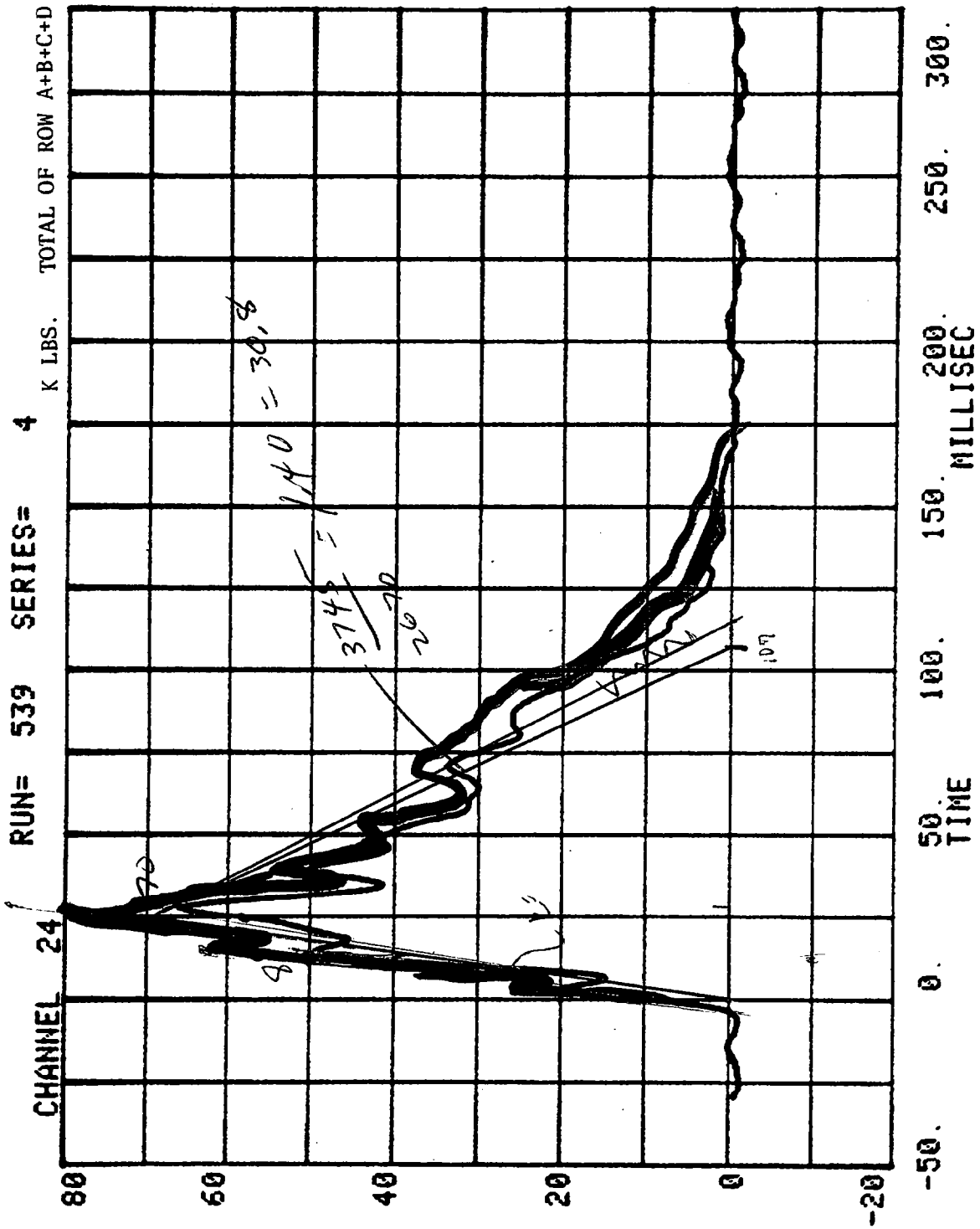


RUN= 539 SERIES= 4 K LBS. TOTAL OF ROW B







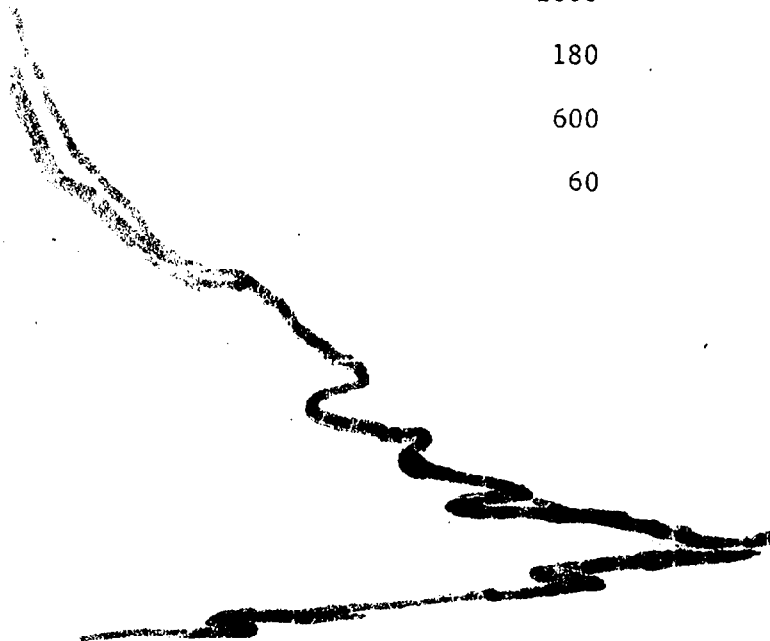


Test No. 703-4-539

1982 Dodge Omni

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 #4 - FRONTAL BARRIER

RUN= 539

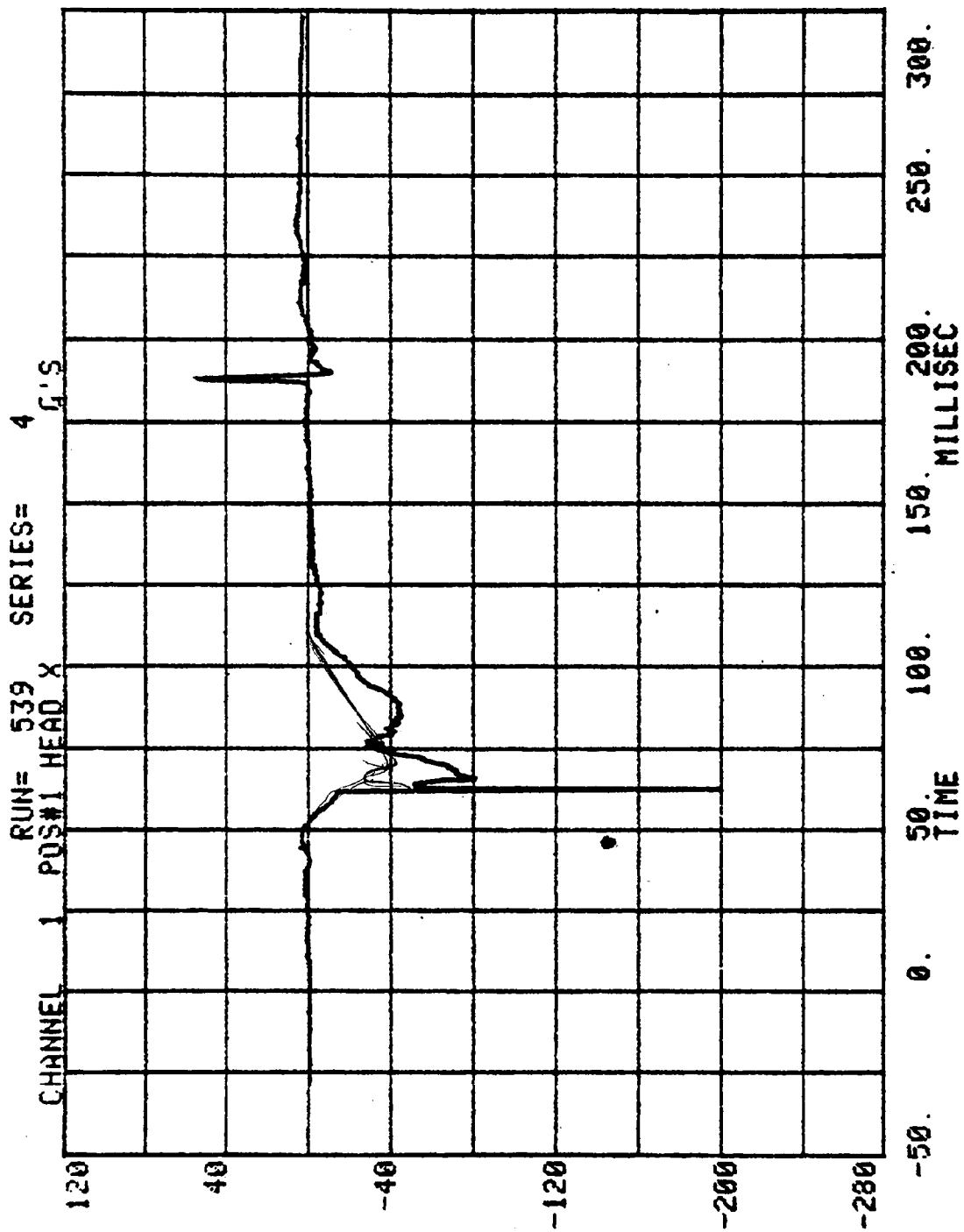
POS#1 HEAD RESULTANT

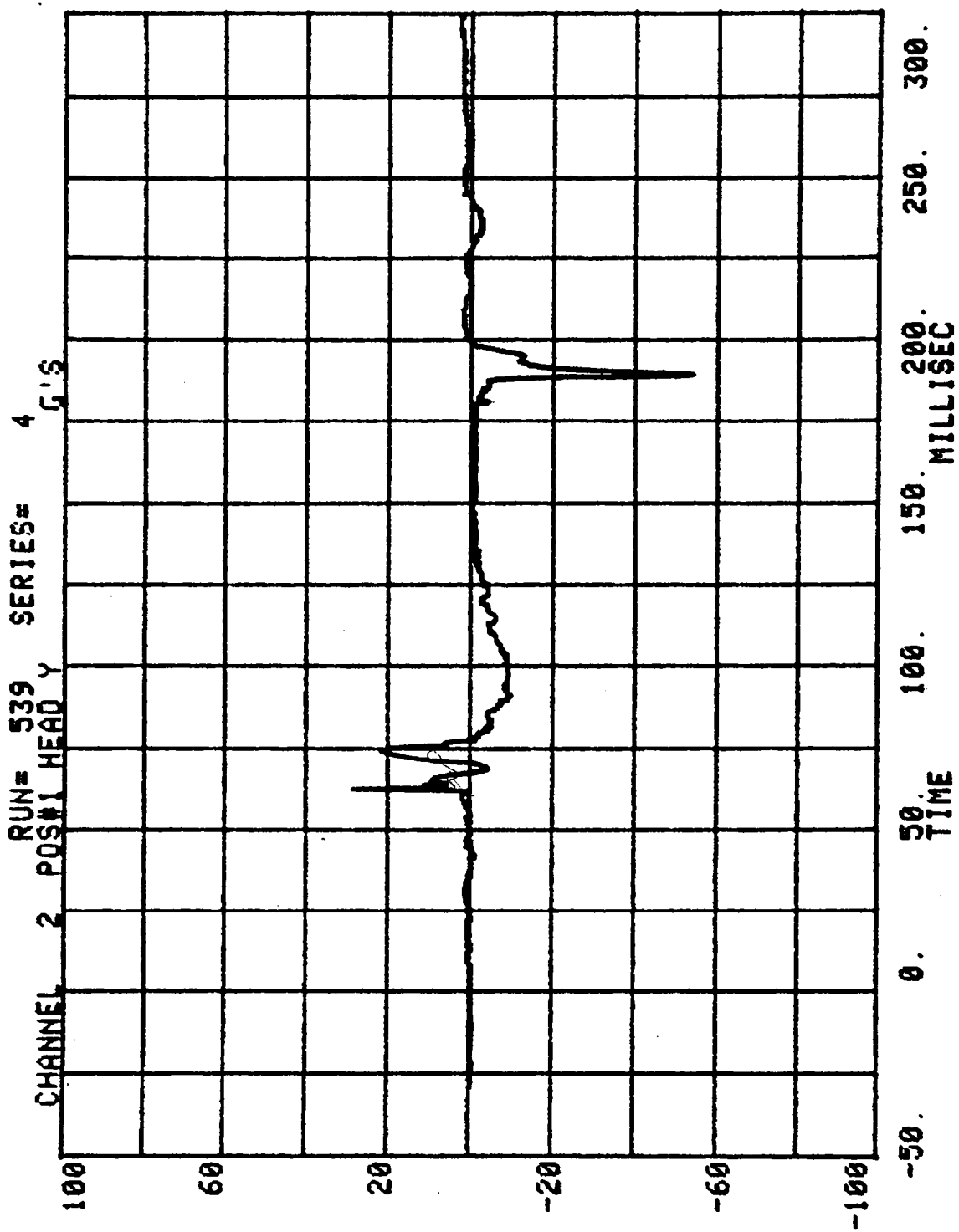
HIC= 638.4 FROM T1= .06210 TO T2= .09720

AVERAGE ACCELERATION BETWEEN T1 AND T2= 50.6G'S

EVENT TIME= 300.0 MSEC

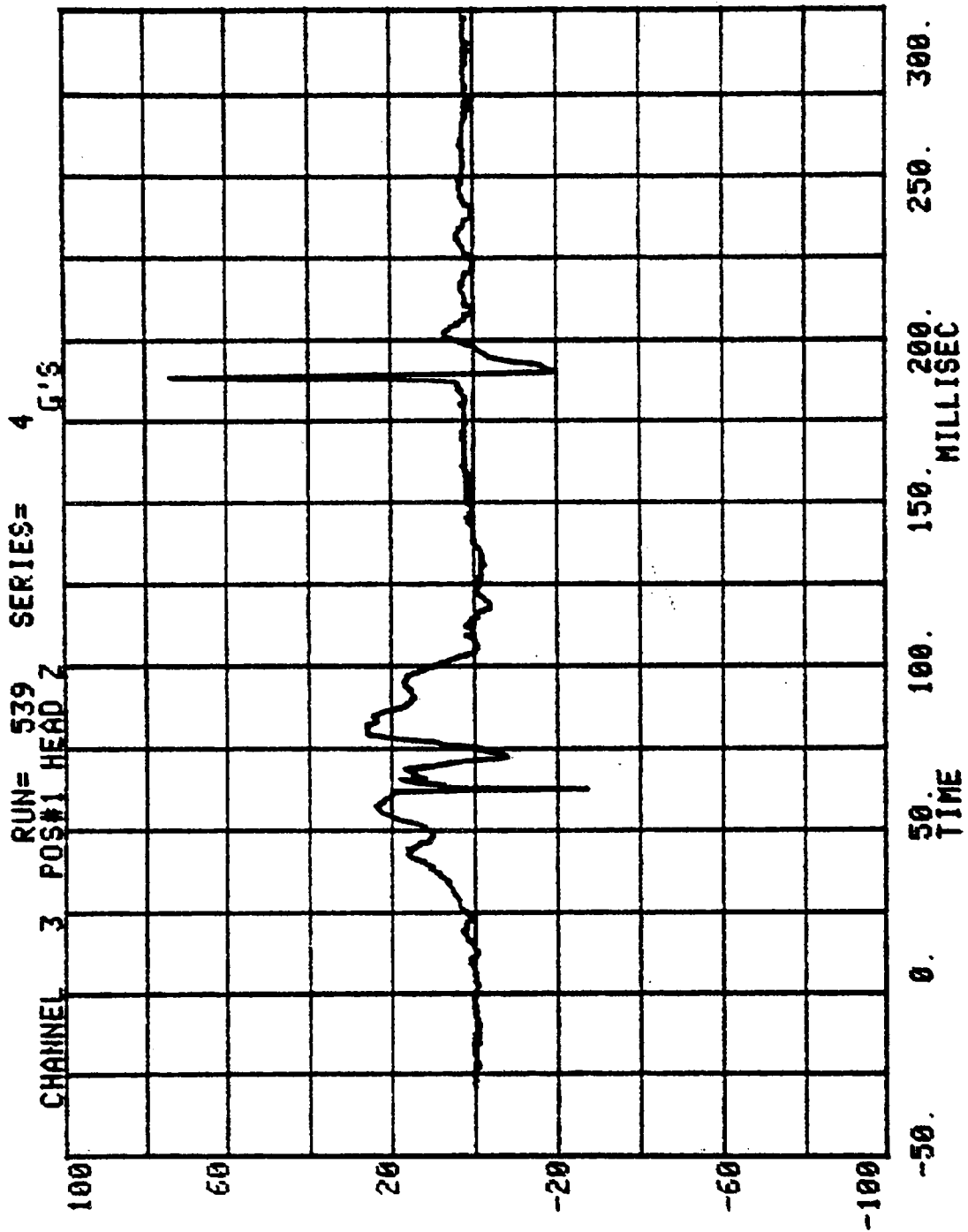
SEVERITY INDEX=1083.8



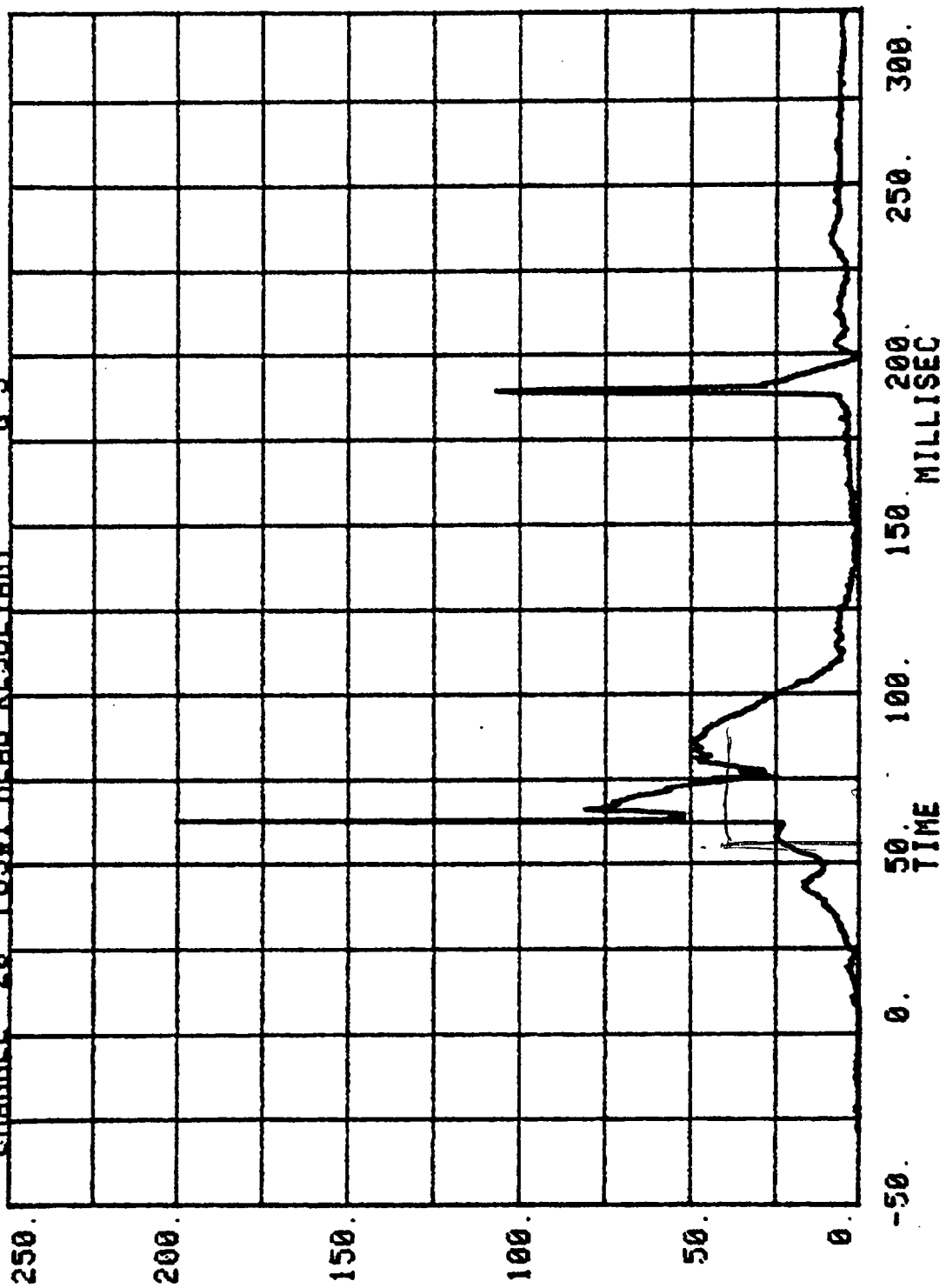


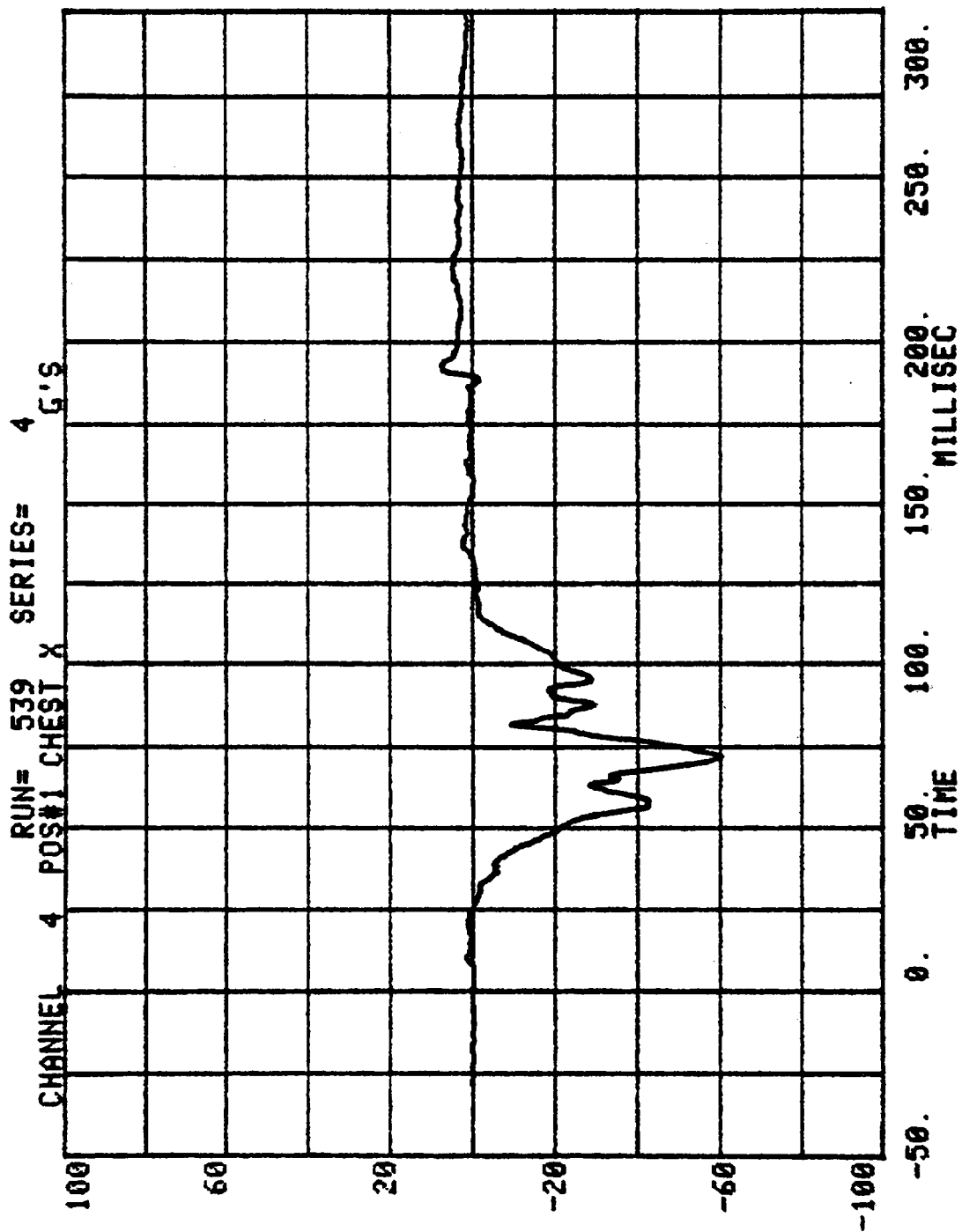
B-67

6851-V-4



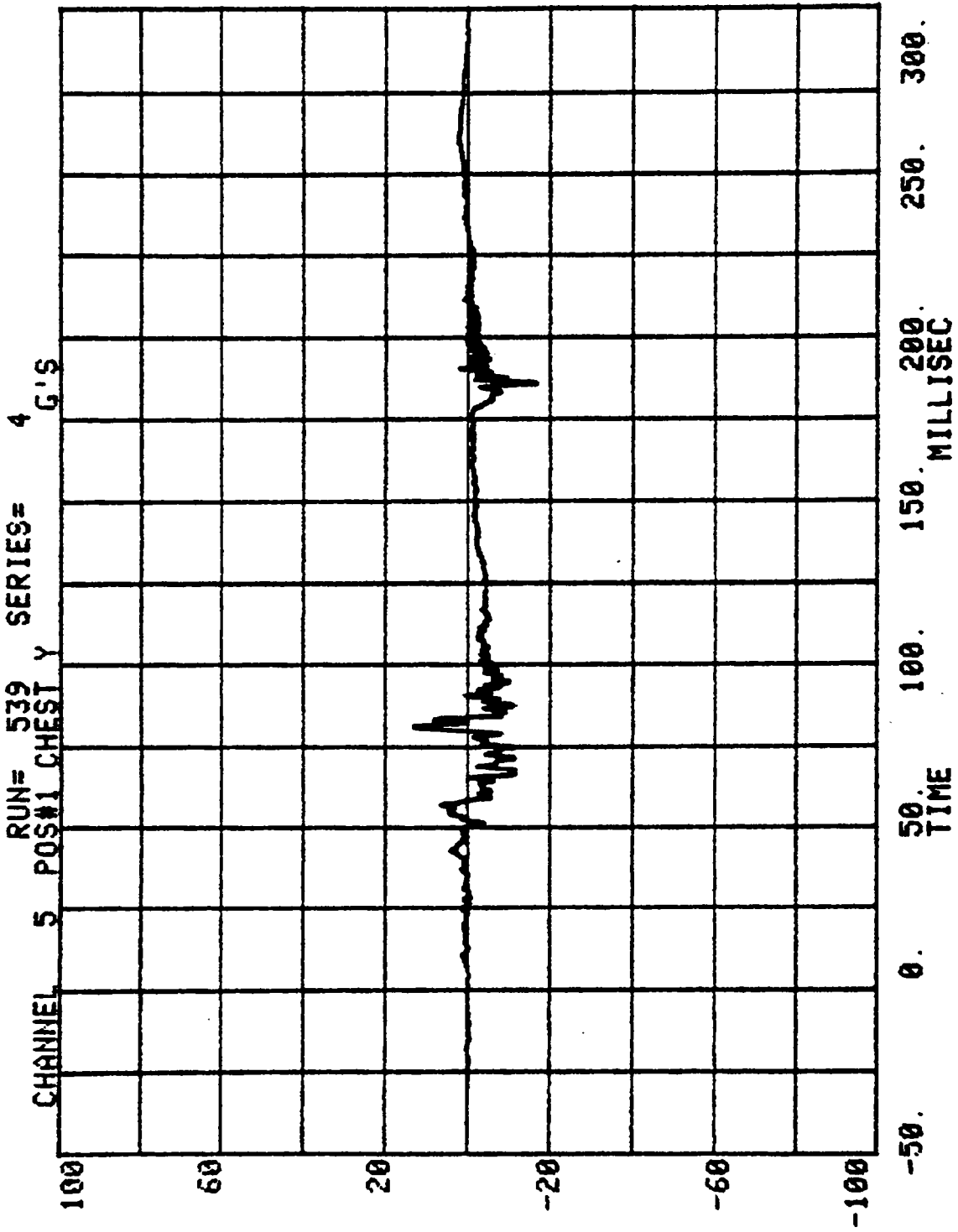
CHANNEL 20 POS#1 HEAD RESULTANT 4 G'S

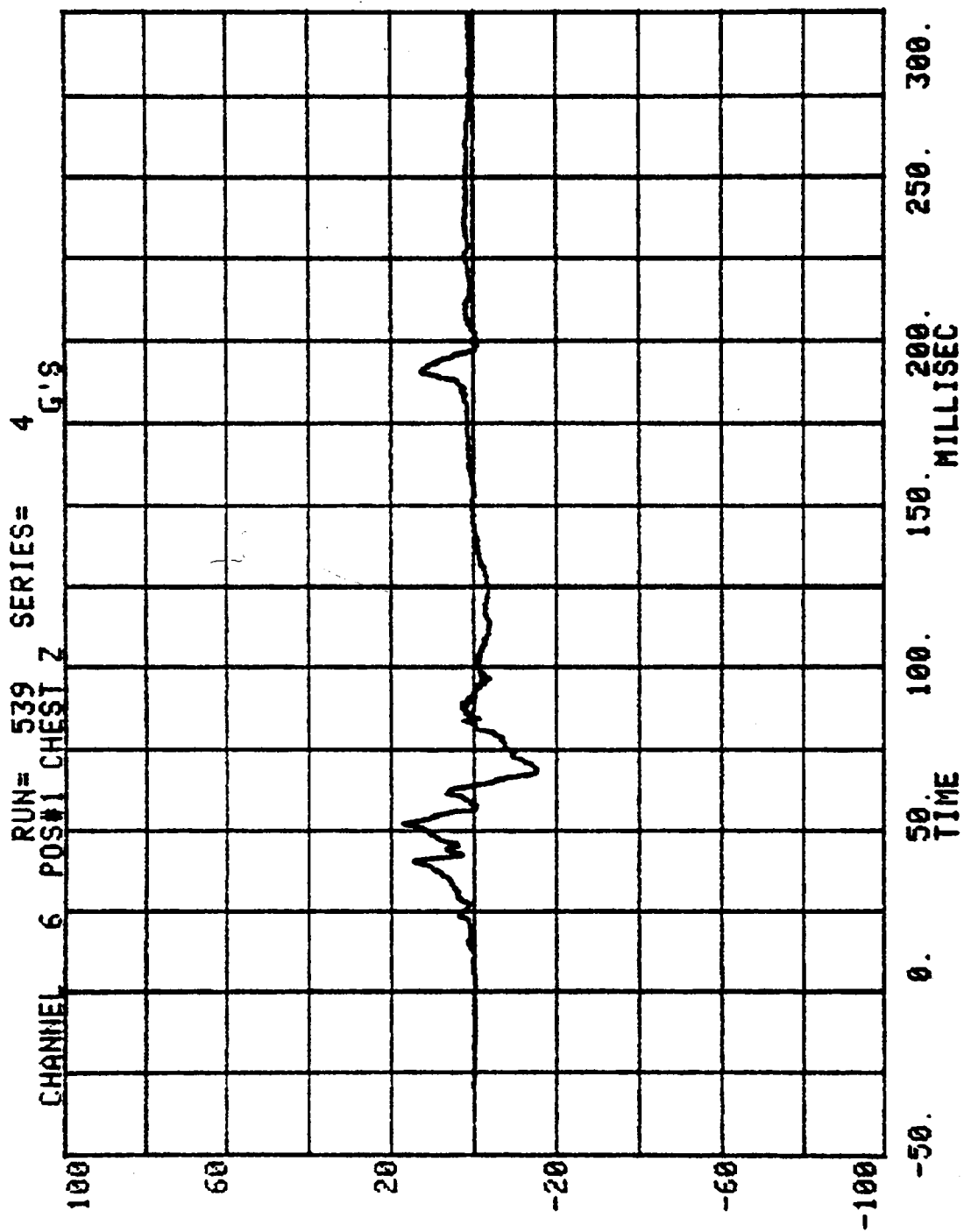


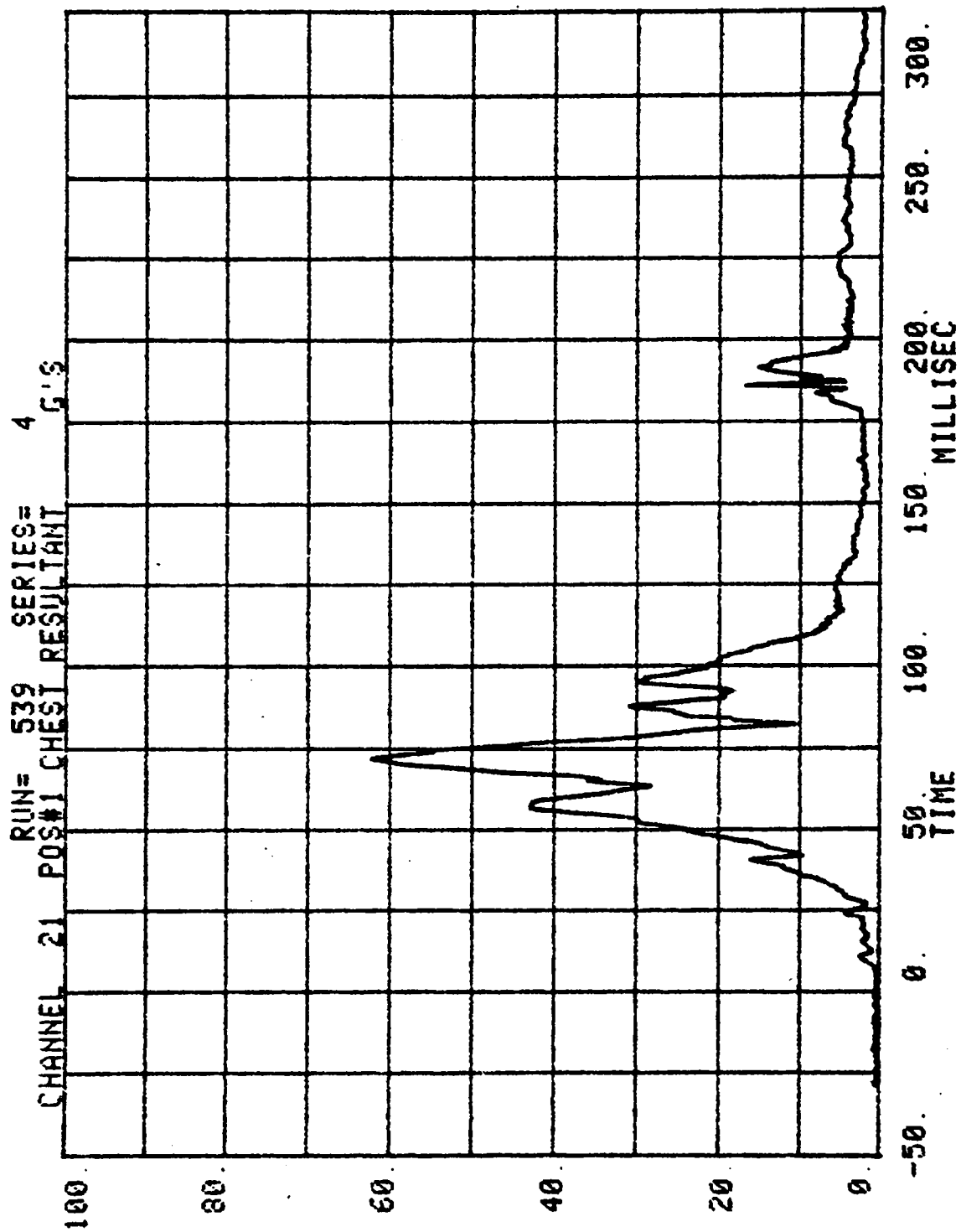


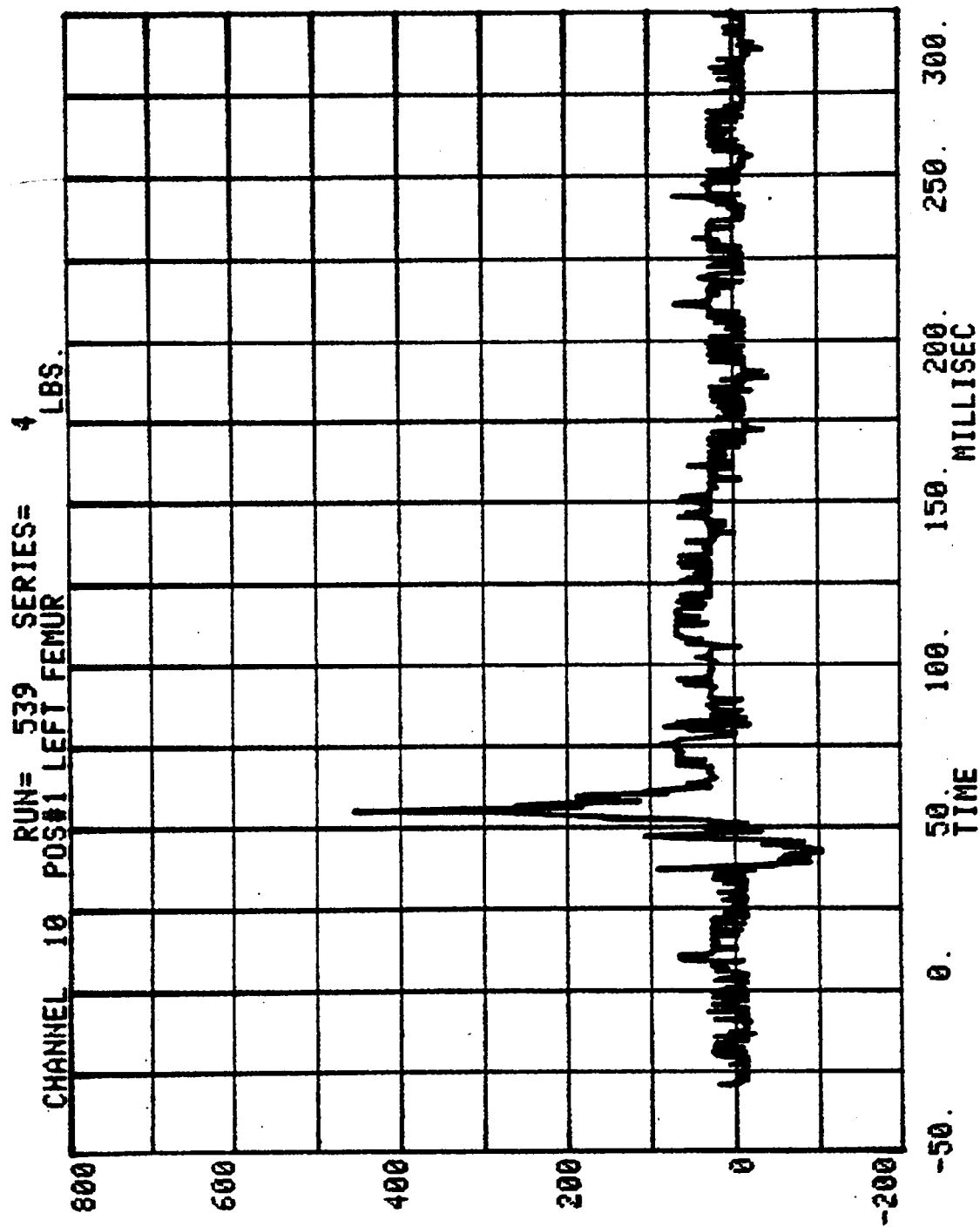
B-70

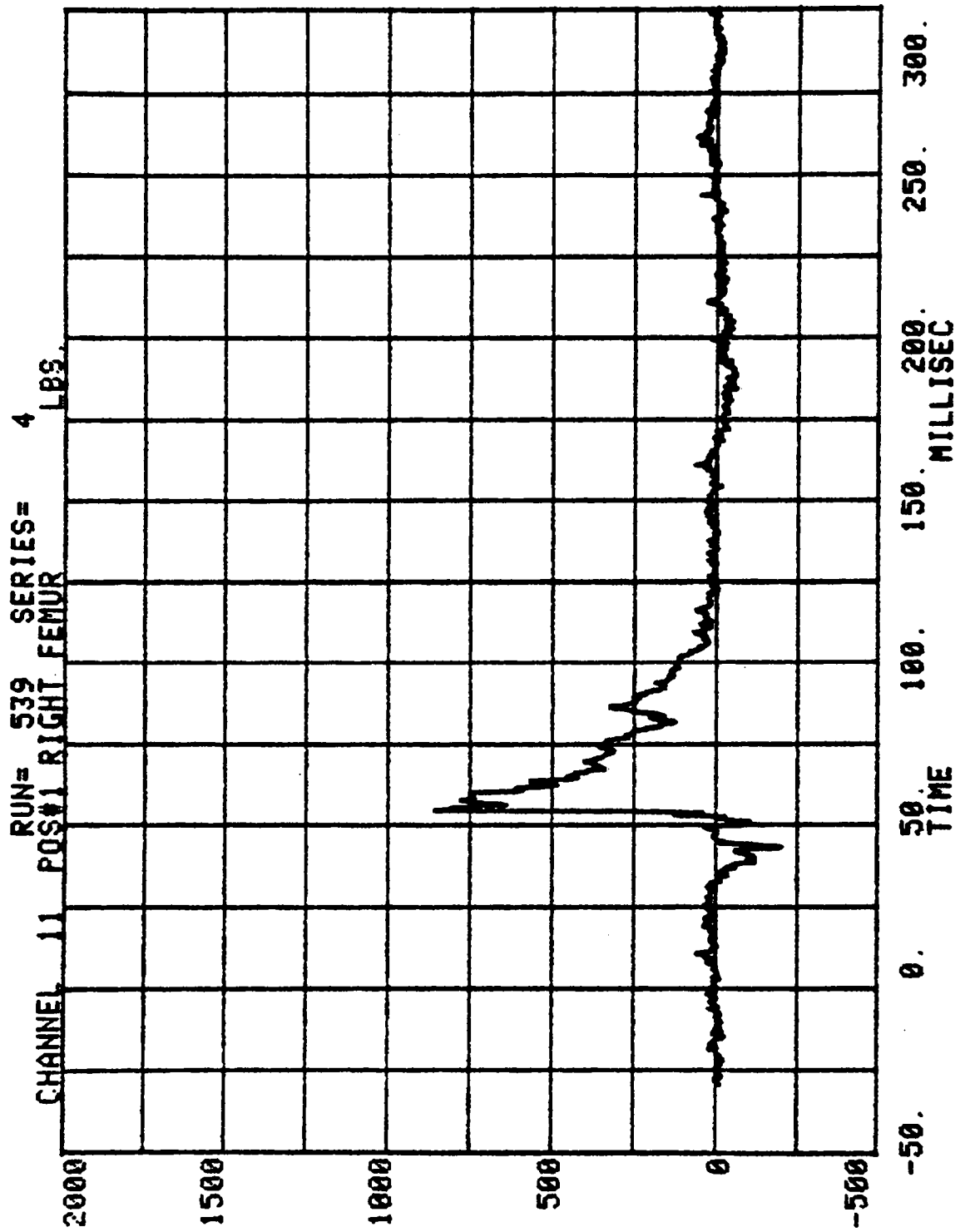
6851-V-4

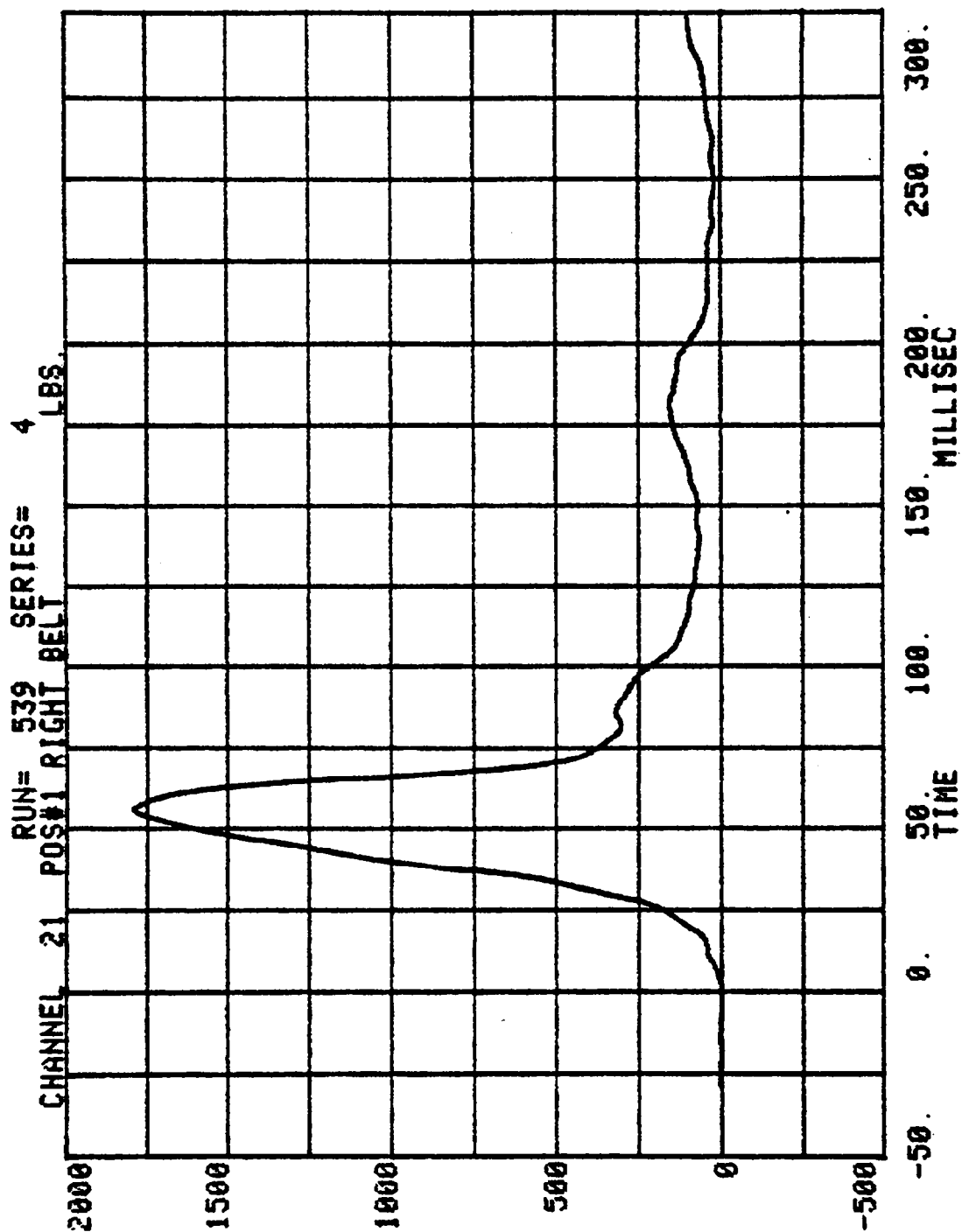


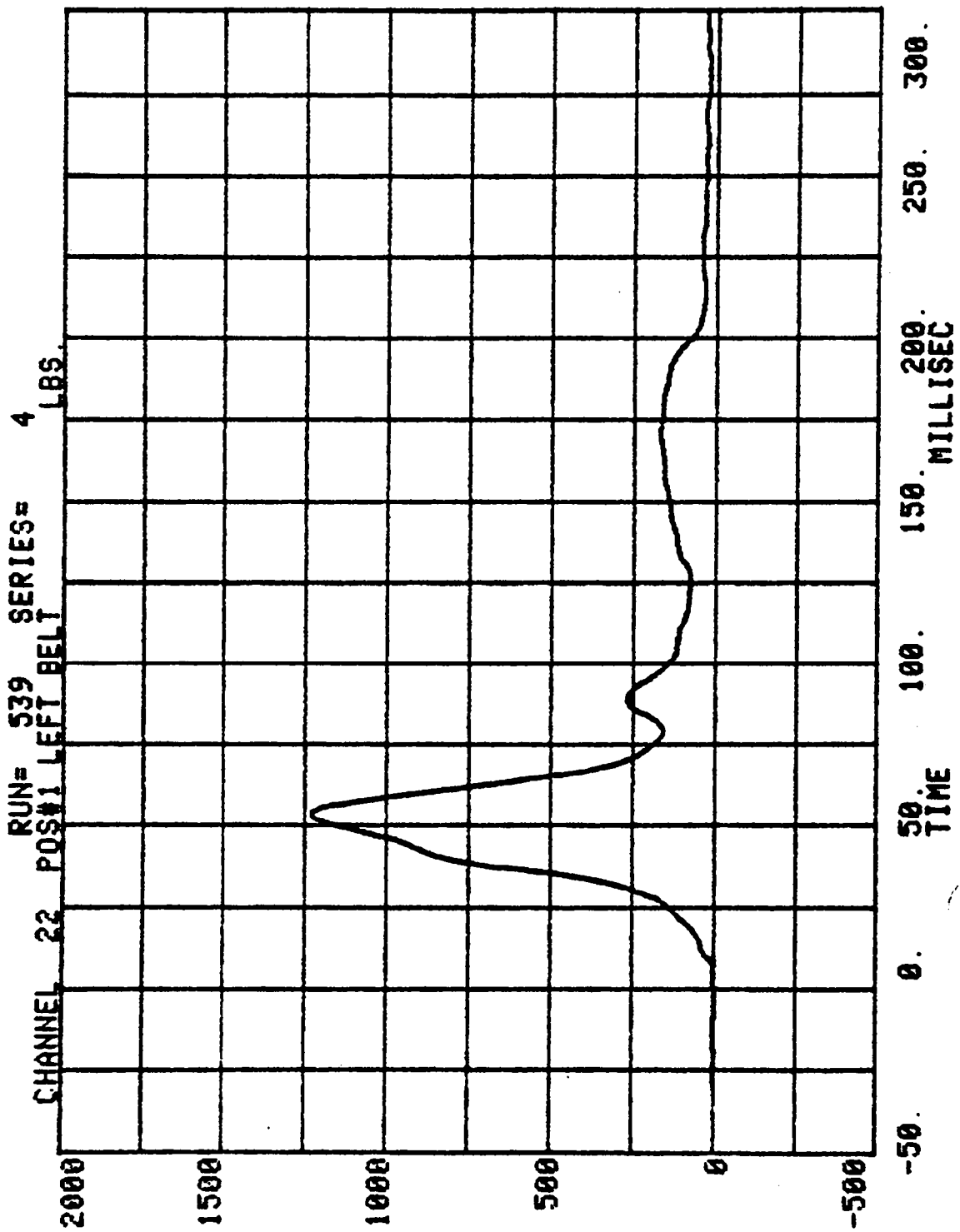


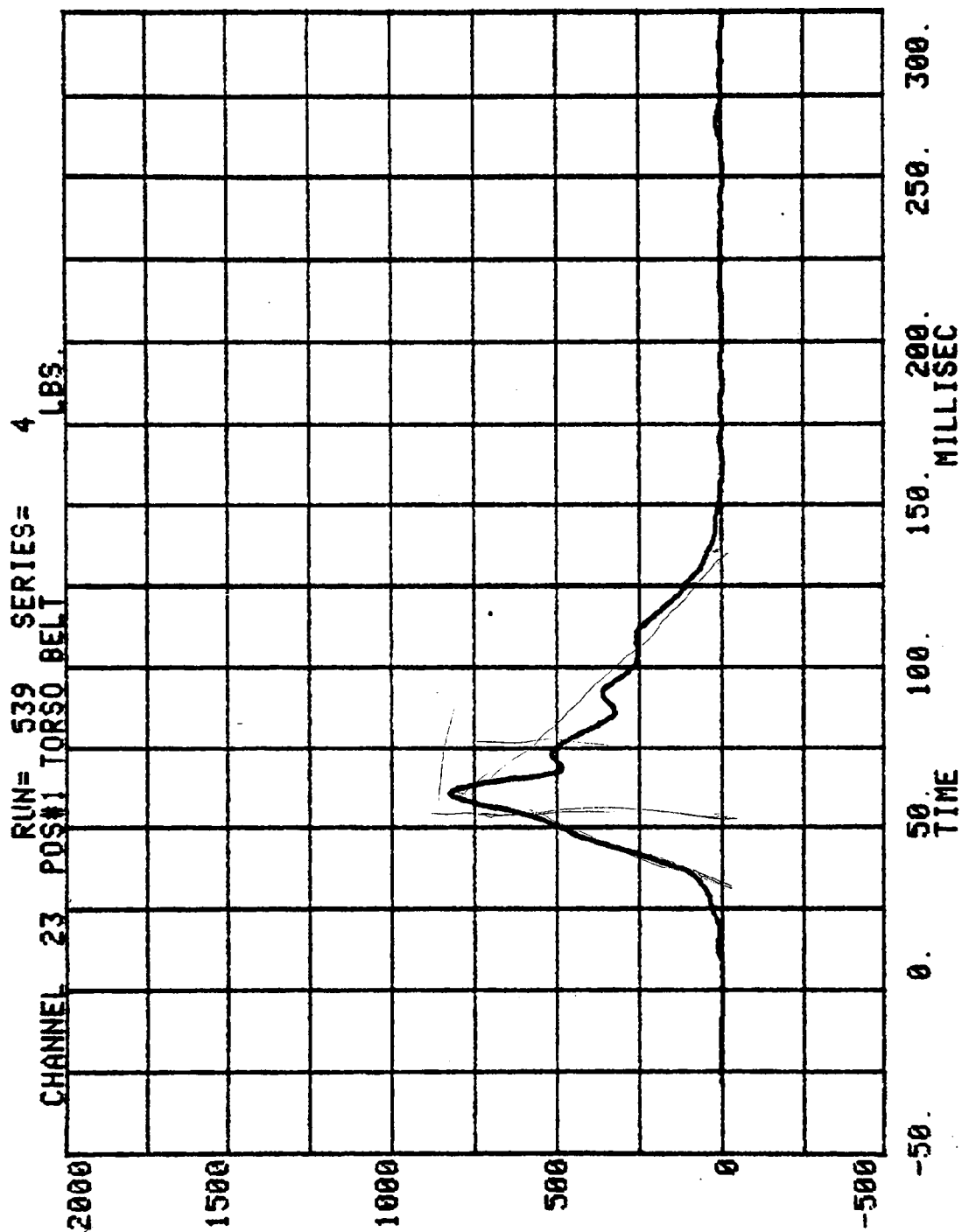




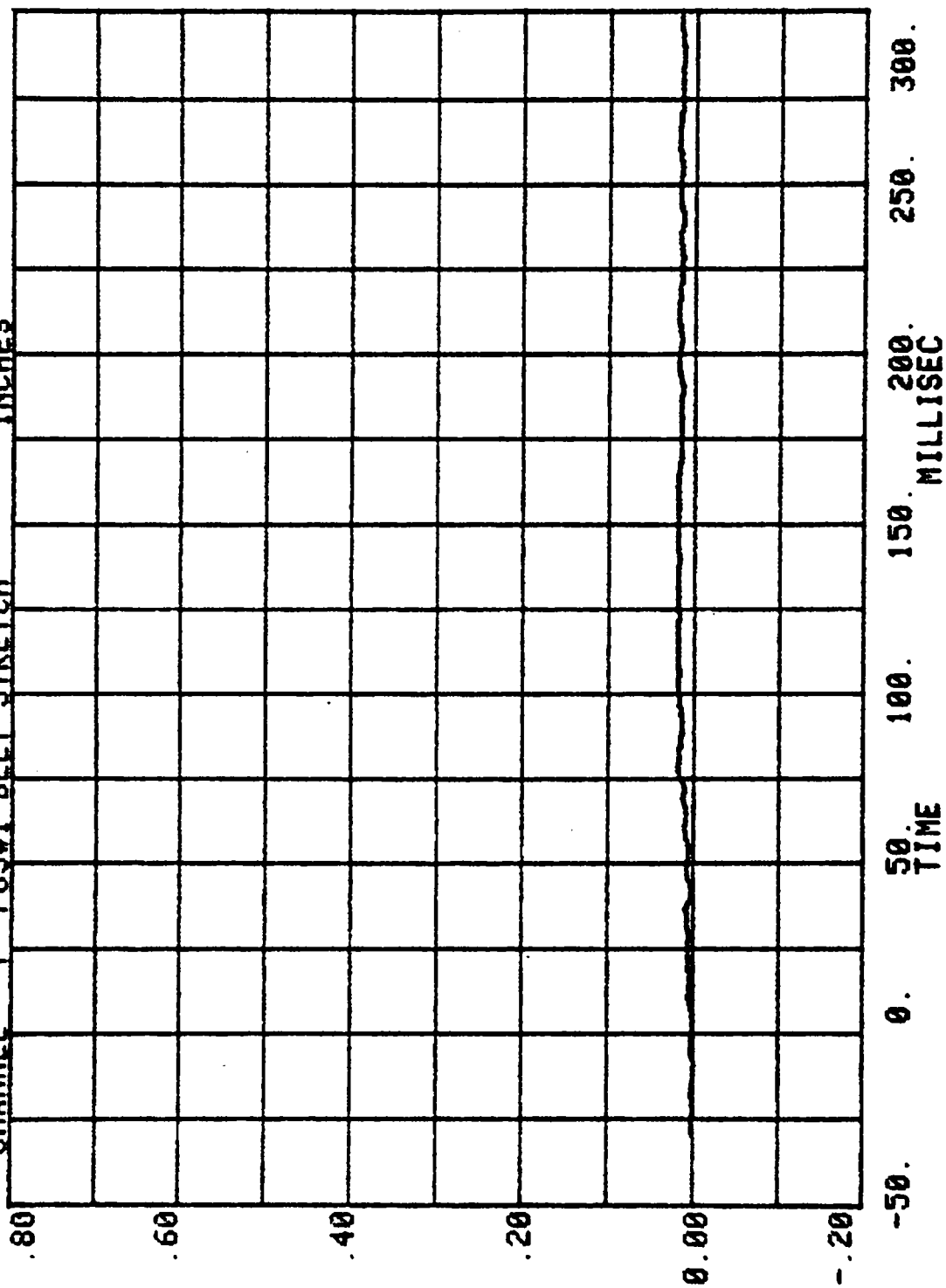


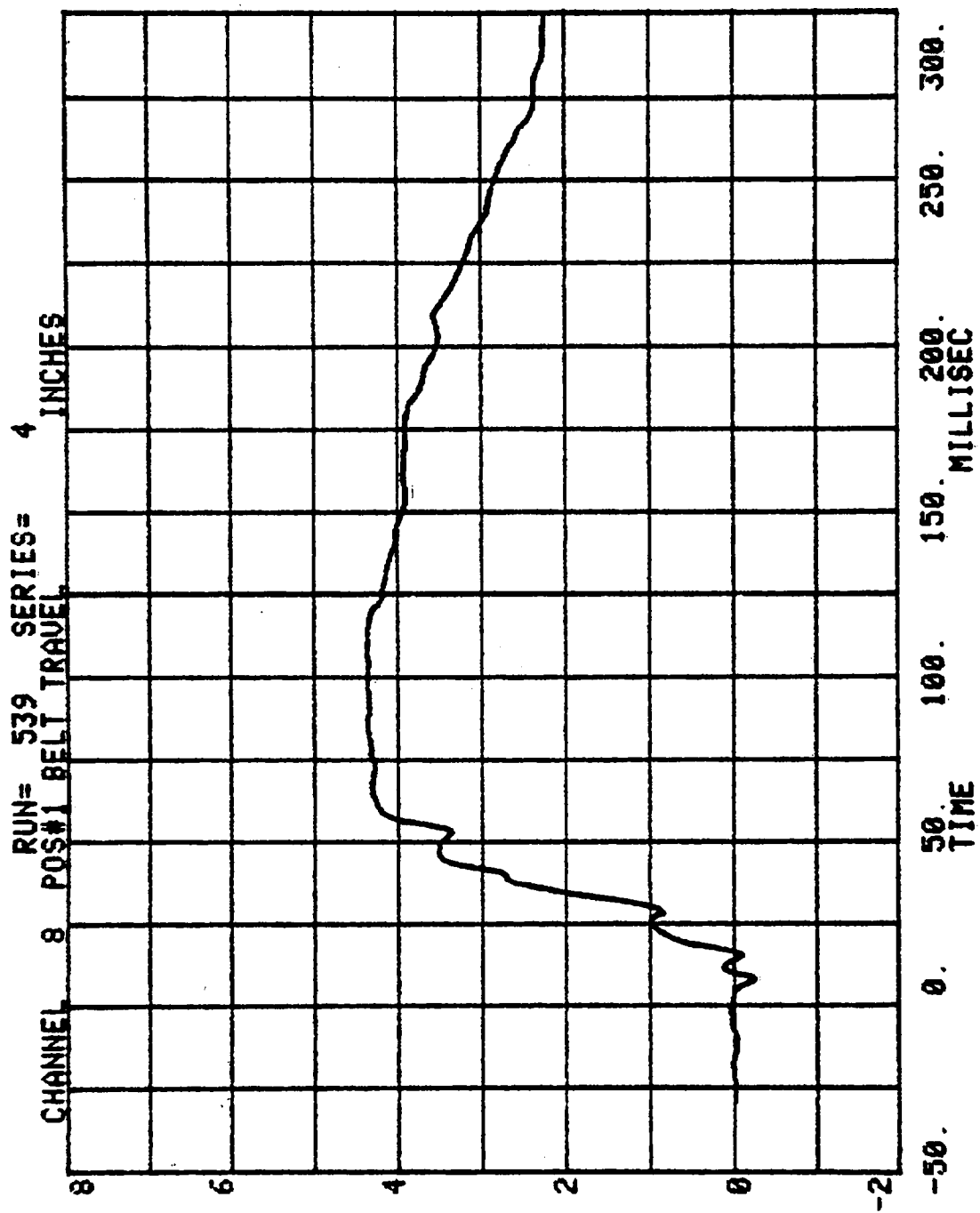






CHANNEL 7 POS#1 BELT STRETCH RUN= 539 SERIES= 4 INCHES MEASURED OVER 2.5 INCHES





B-80

6851-V-4

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NCA TEST #4 - FRONTAL BARRIER

RUN= 539

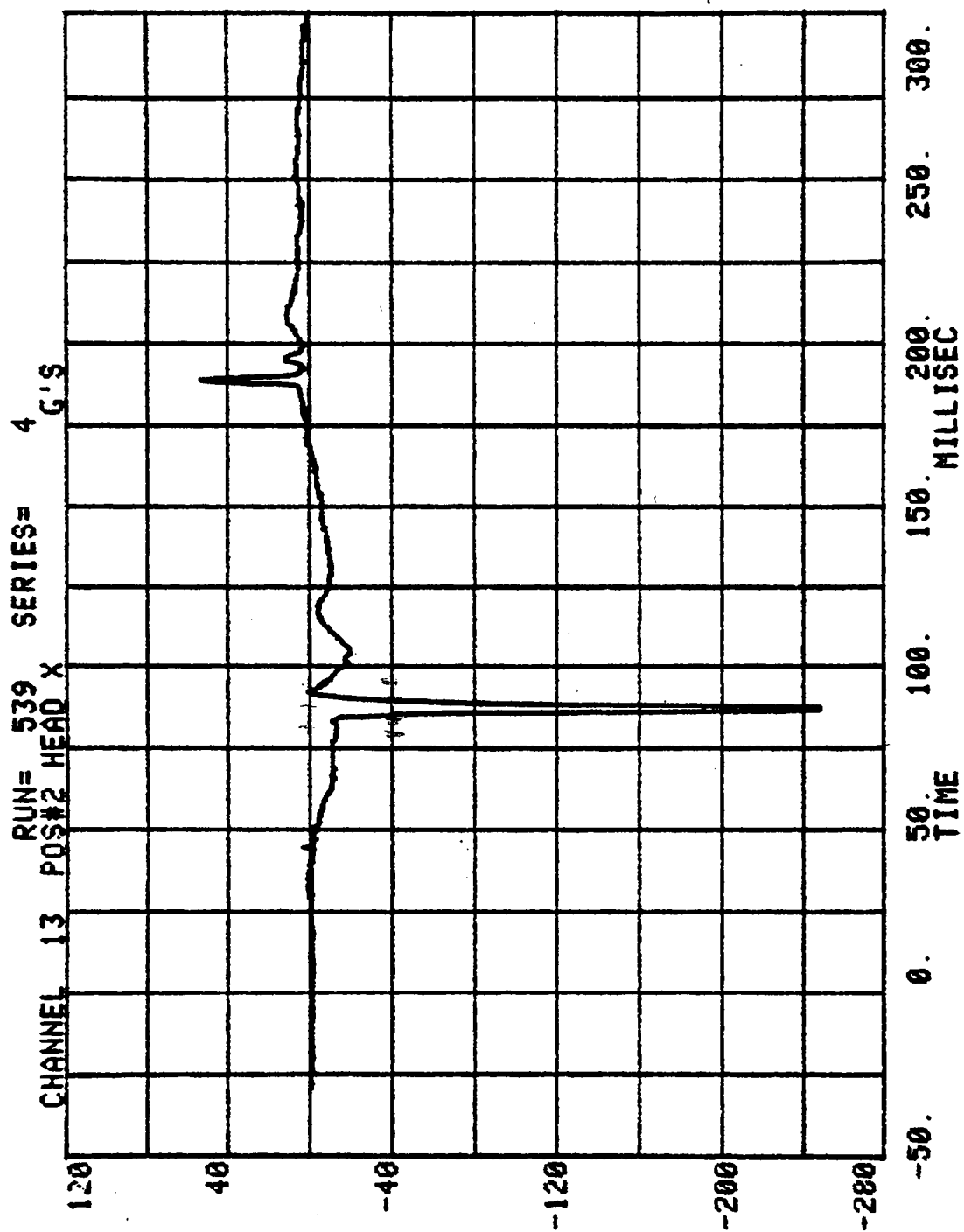
POS#2 HEAD RESULTANT

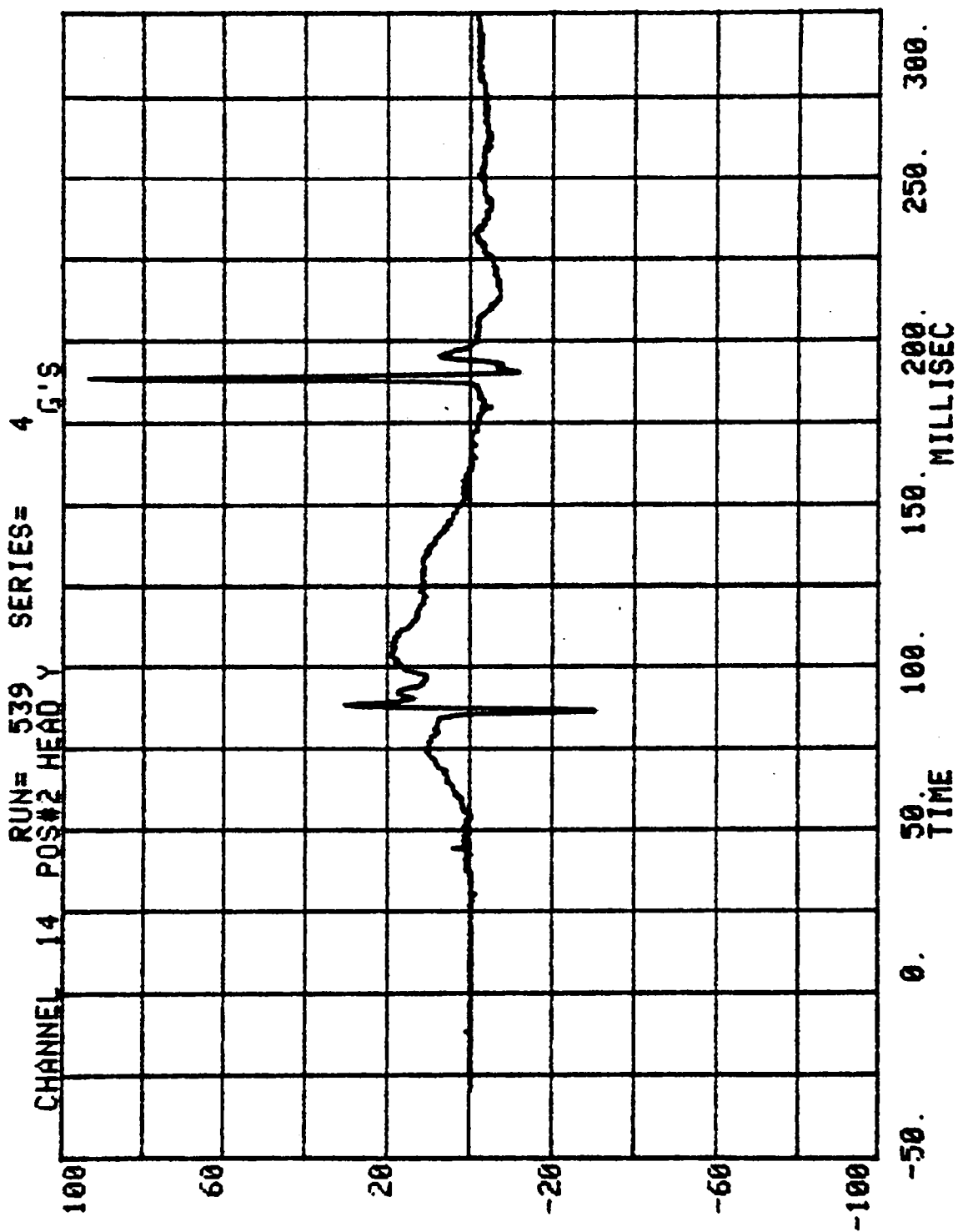
HIC=1672.6 FROM T1= .08640 TO T2= .08880

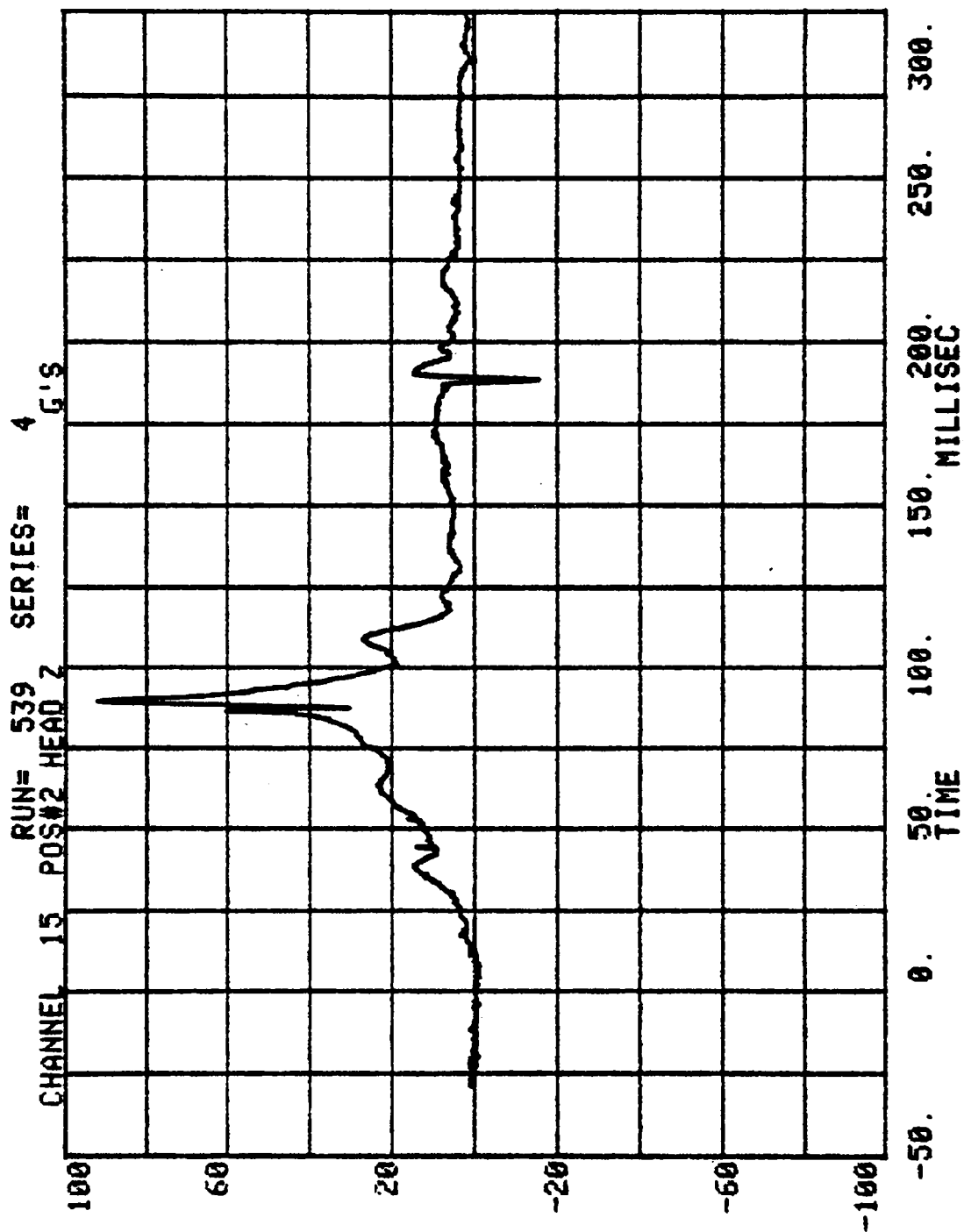
AVERAGE ACCELERATION BETWEEN T1 AND T2= 217.4G'S

EVENT TIME= 300.0 MSEC

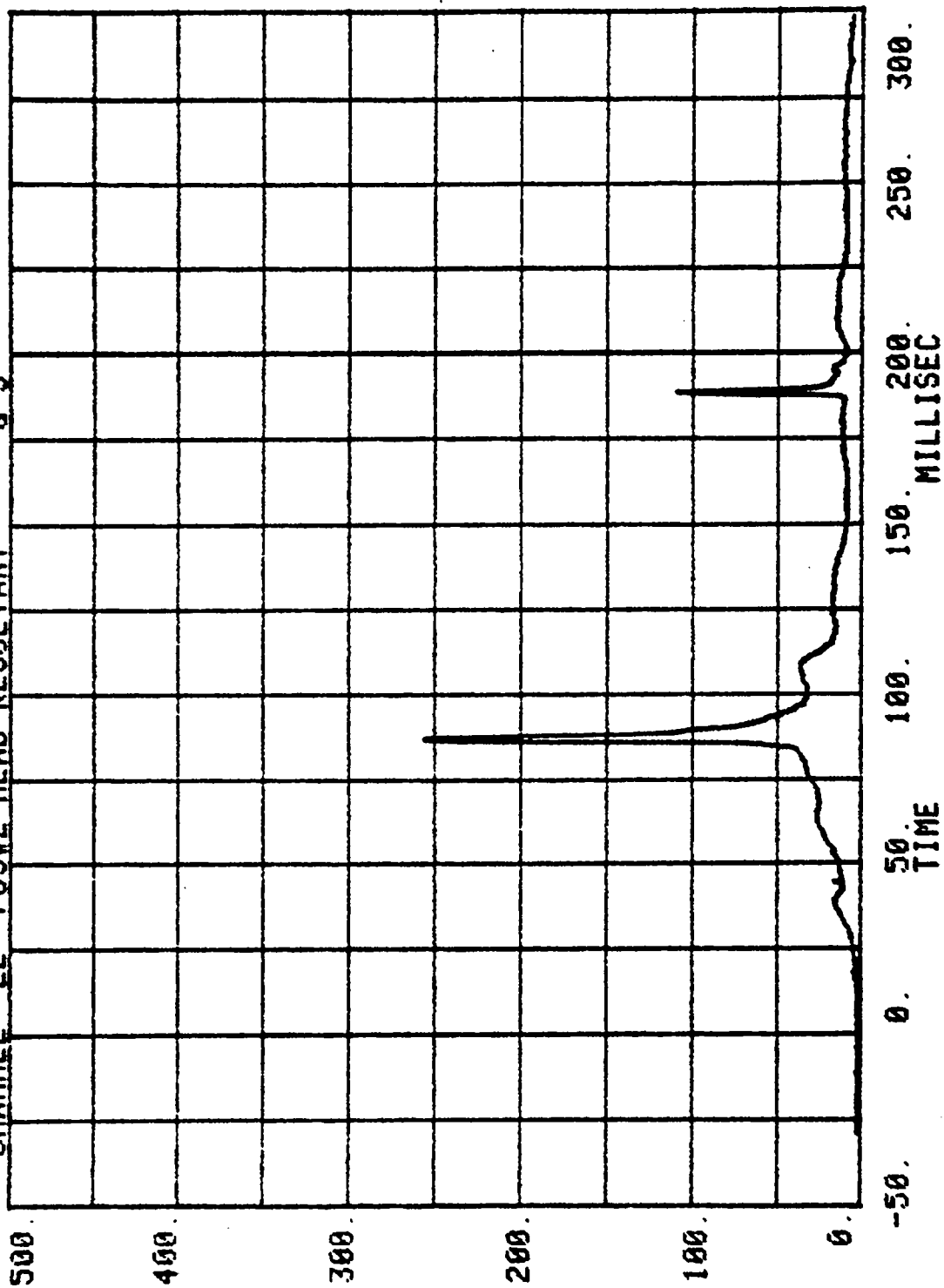
SEVERITY INDEX=2670.1

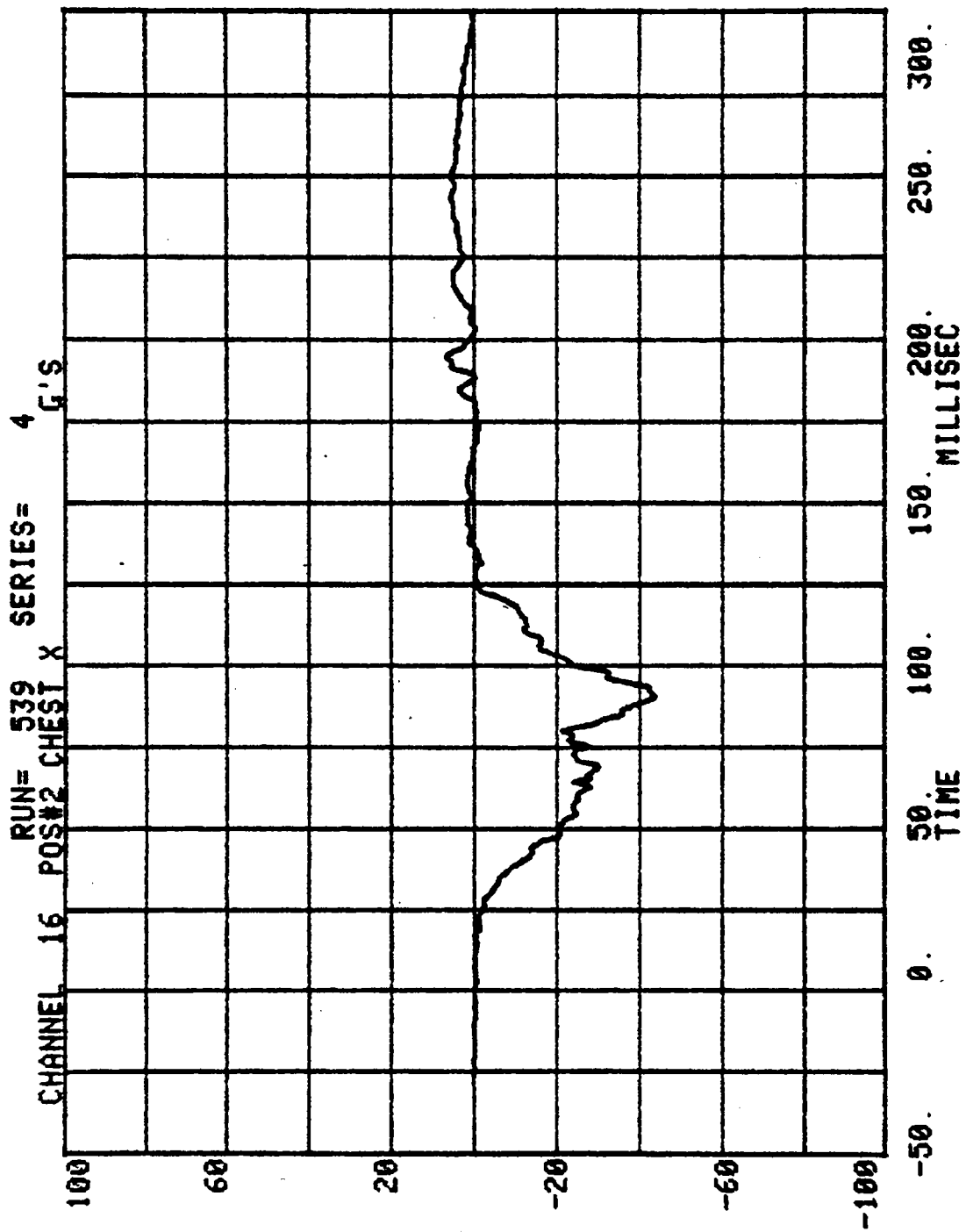






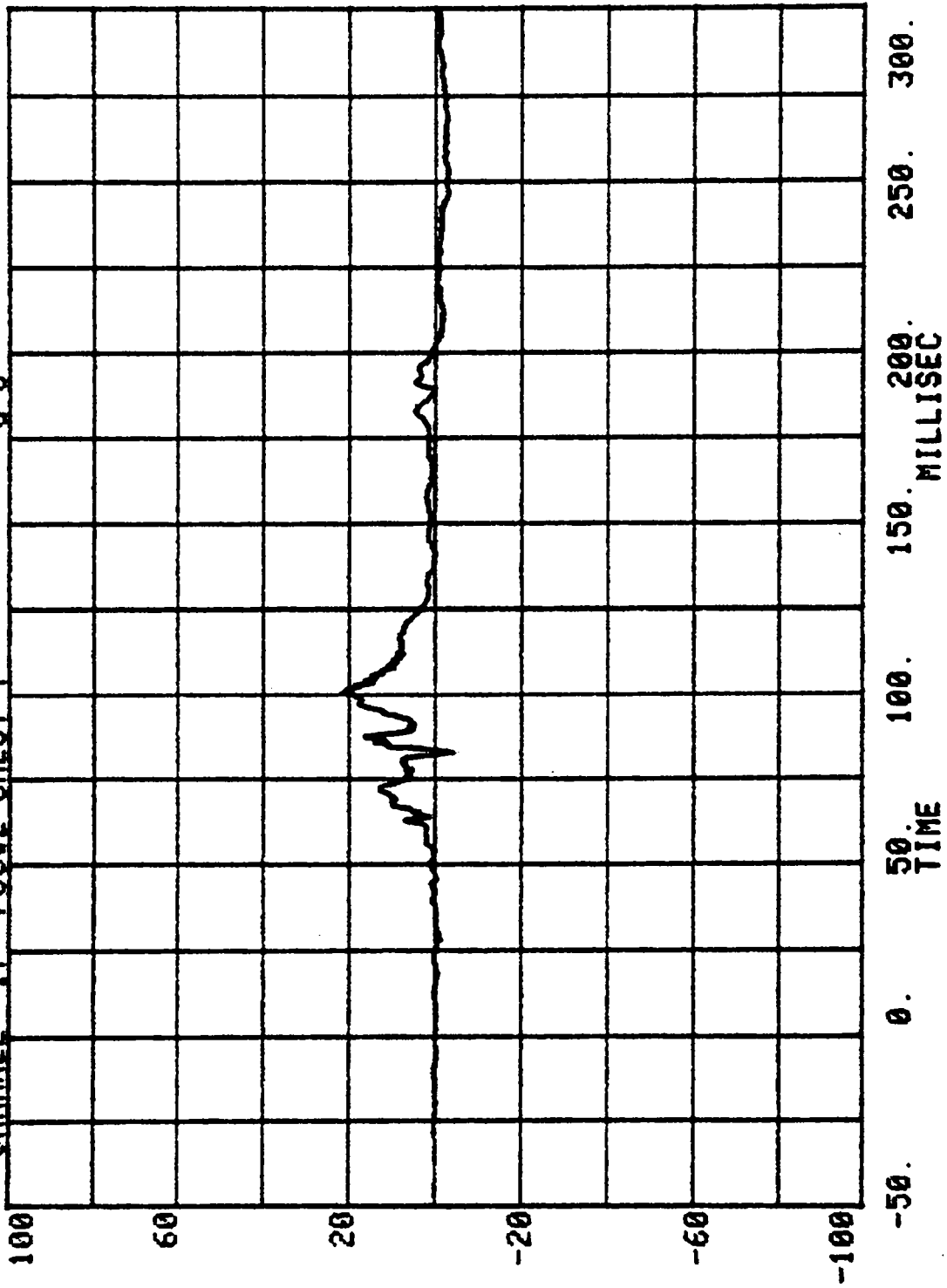
CHANNEL 22 POS#2 HEAD RESULTANT 4 G'S

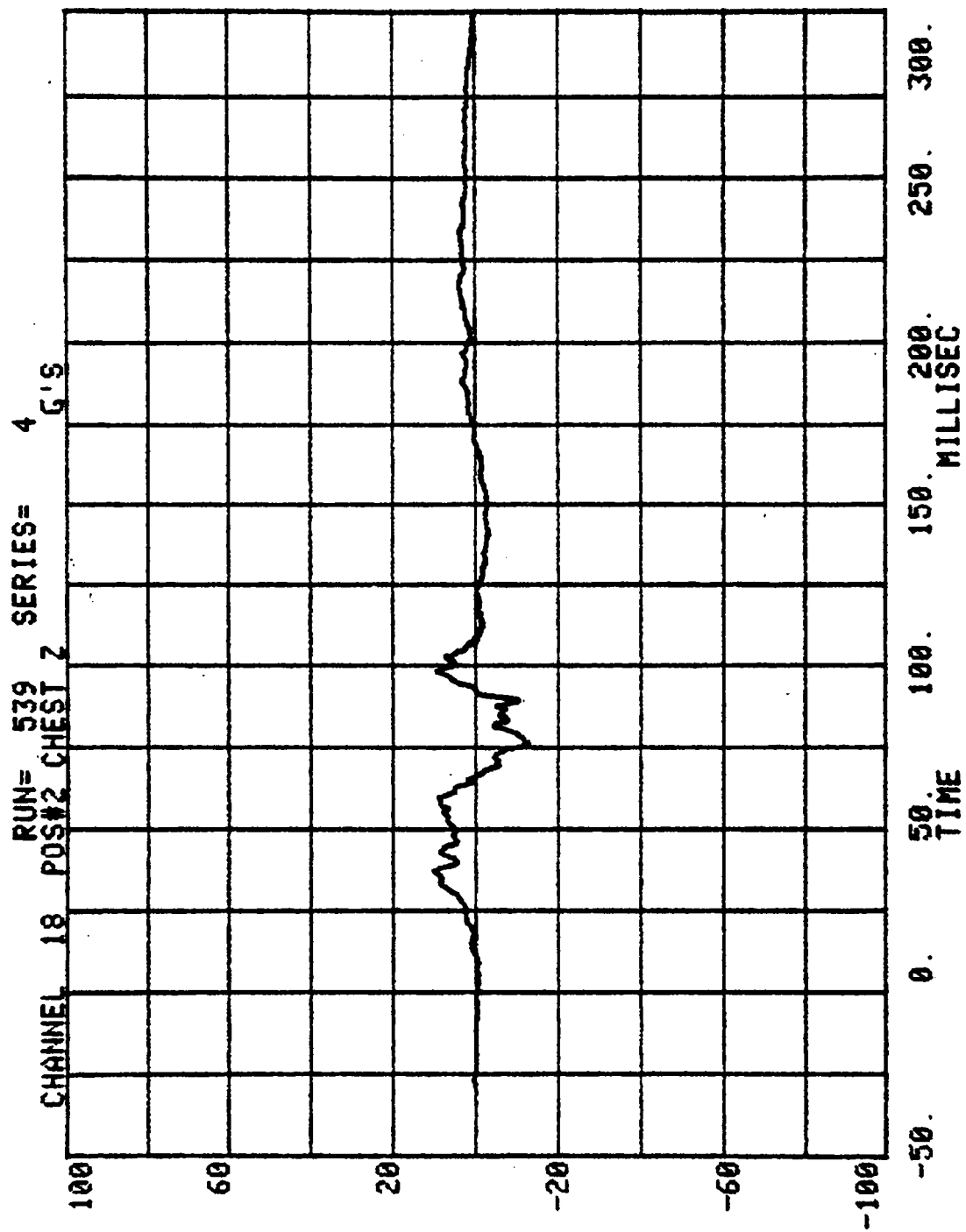




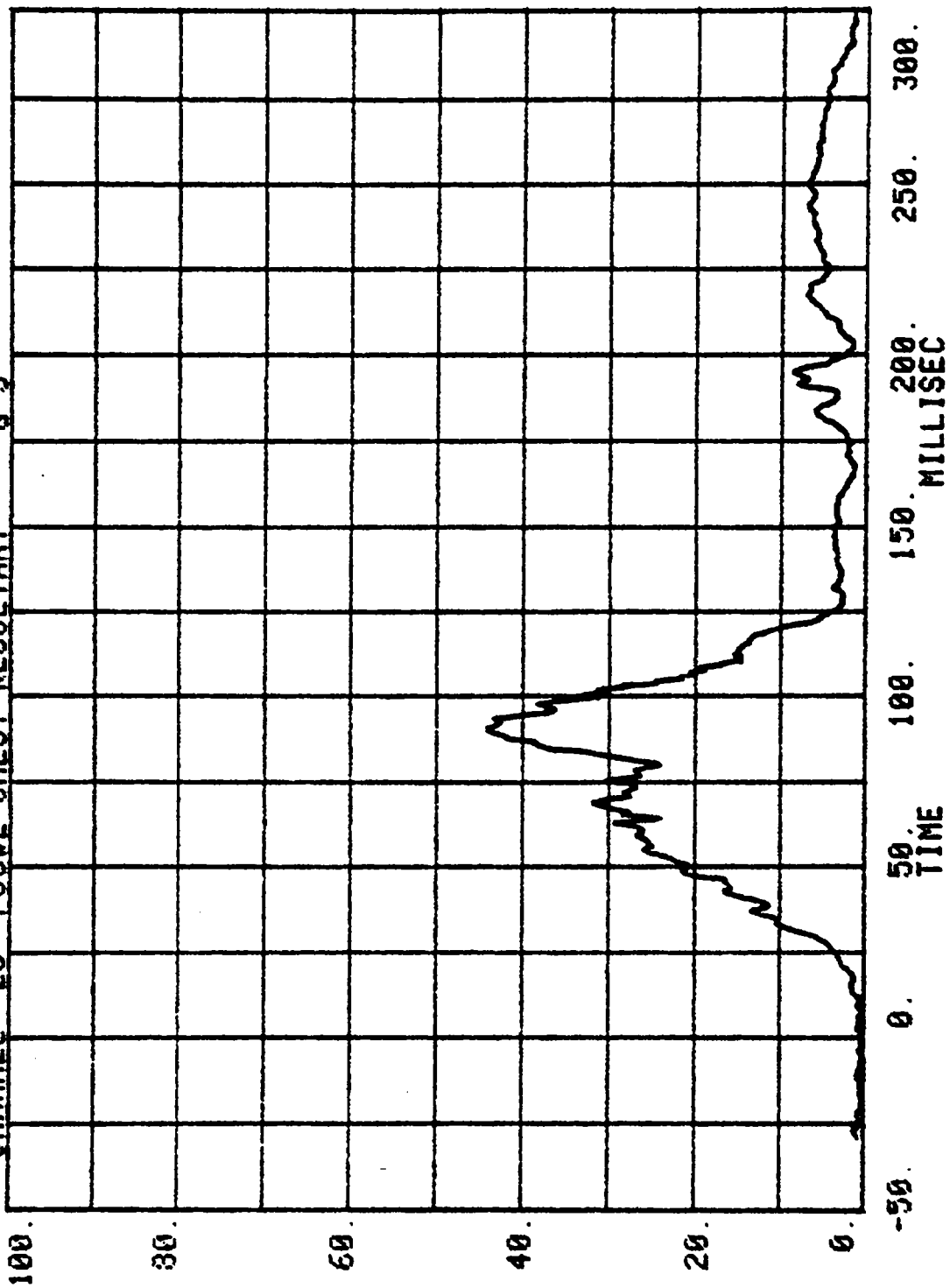
CHANNEL 17 POS#2 CHEST Y G'S

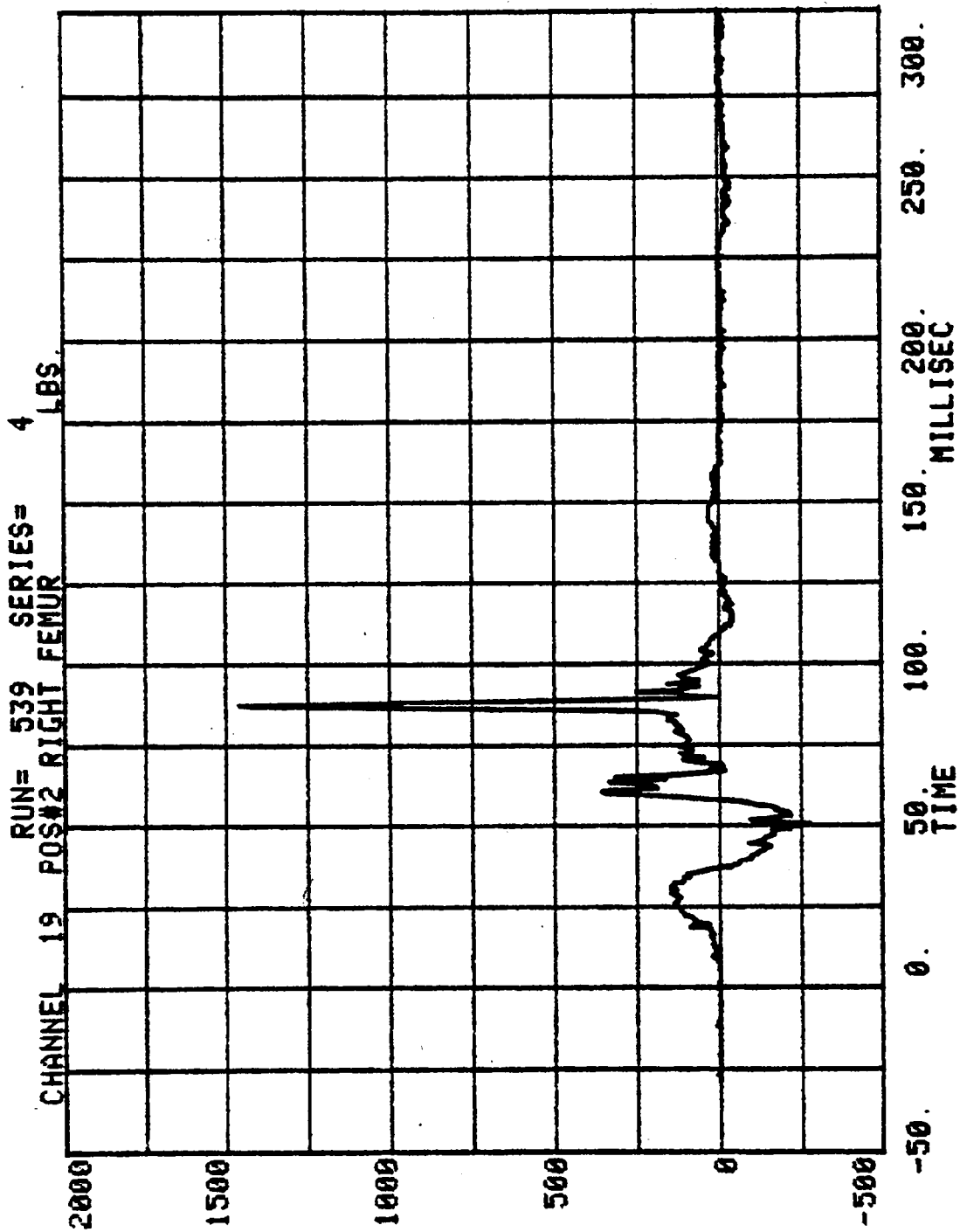
RUN= 539 SERIES= 4

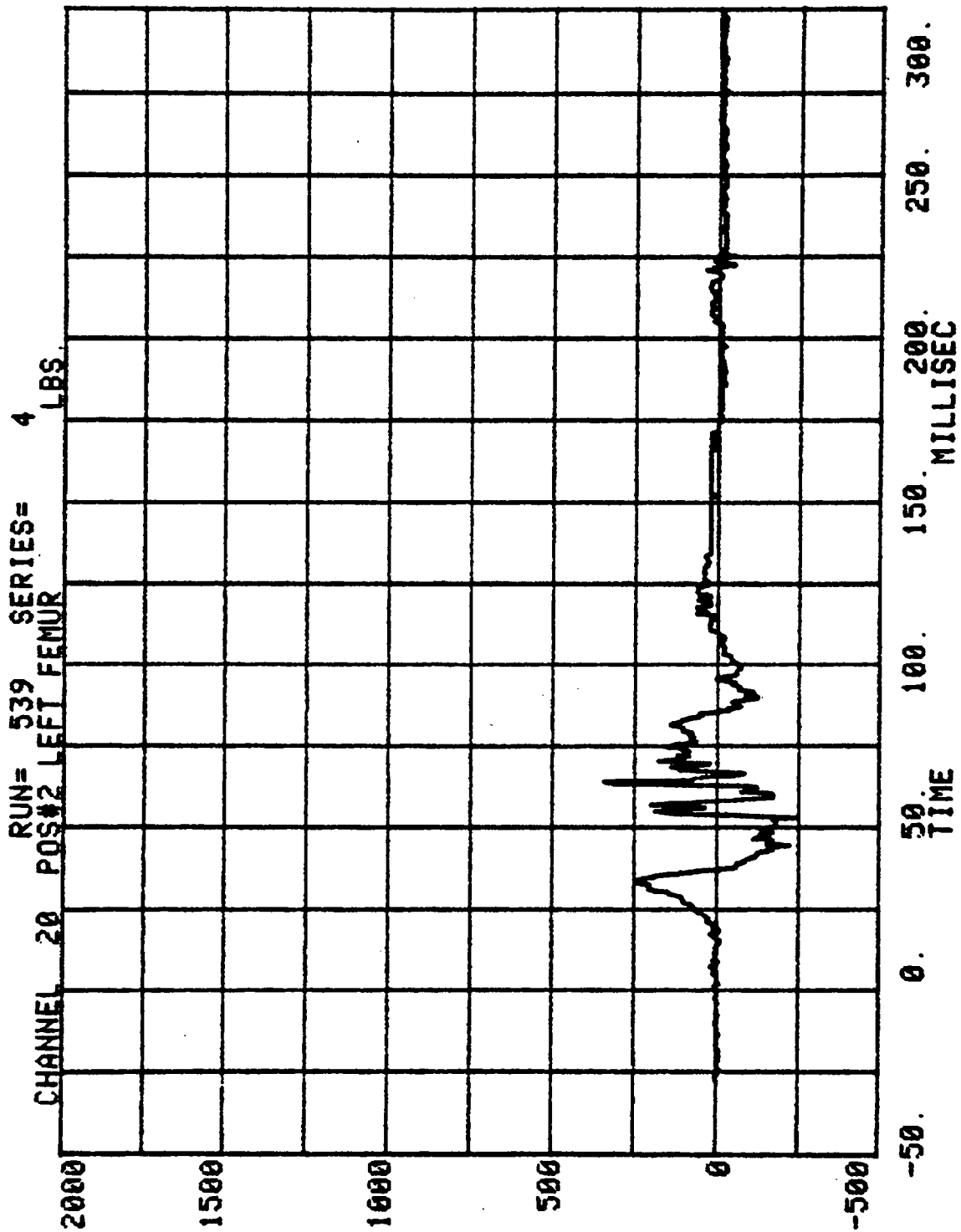


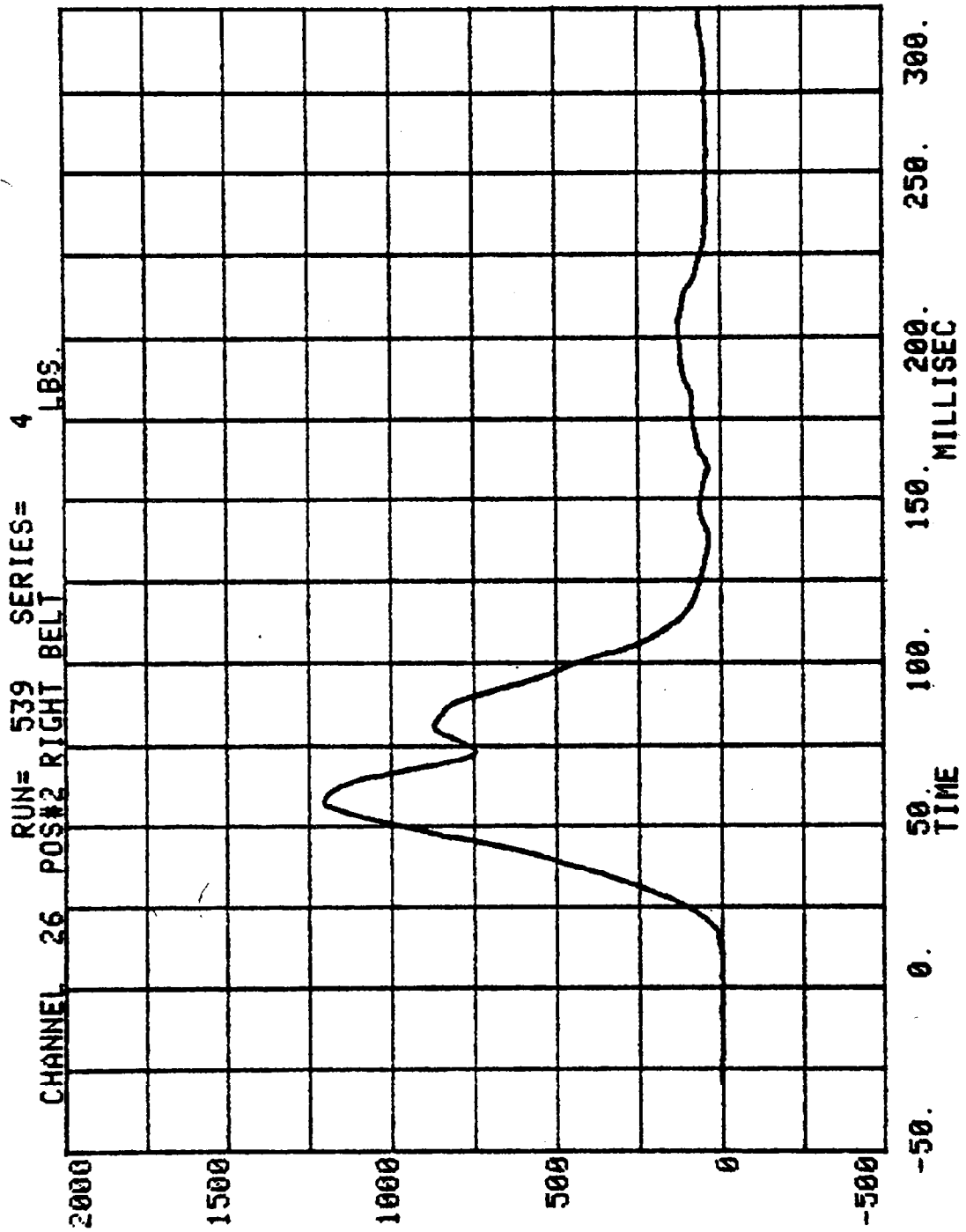


CHANNEL 23 RUN= 539 SERIES= 4
POS#2 CHEST RESULTANT G'S

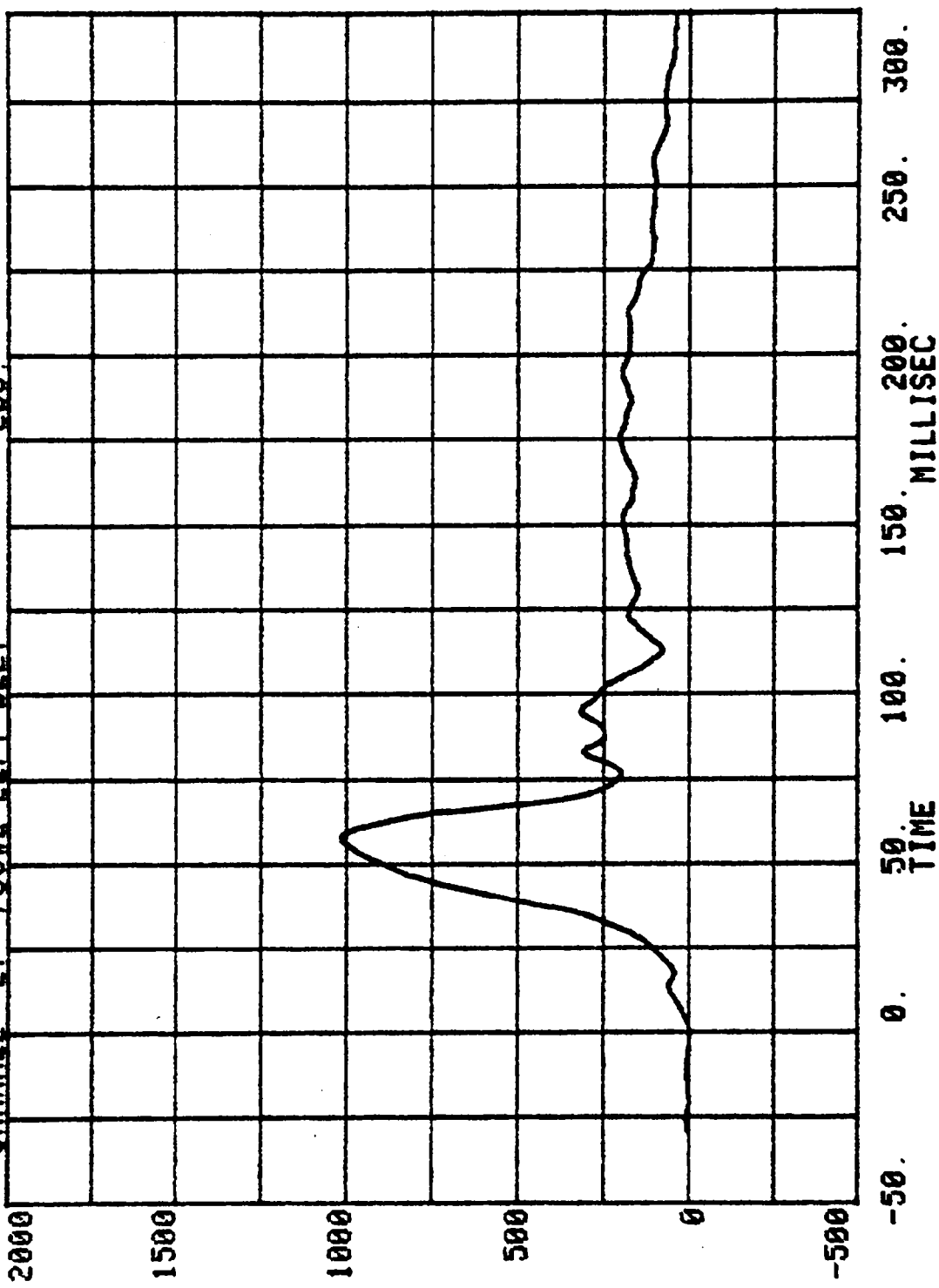


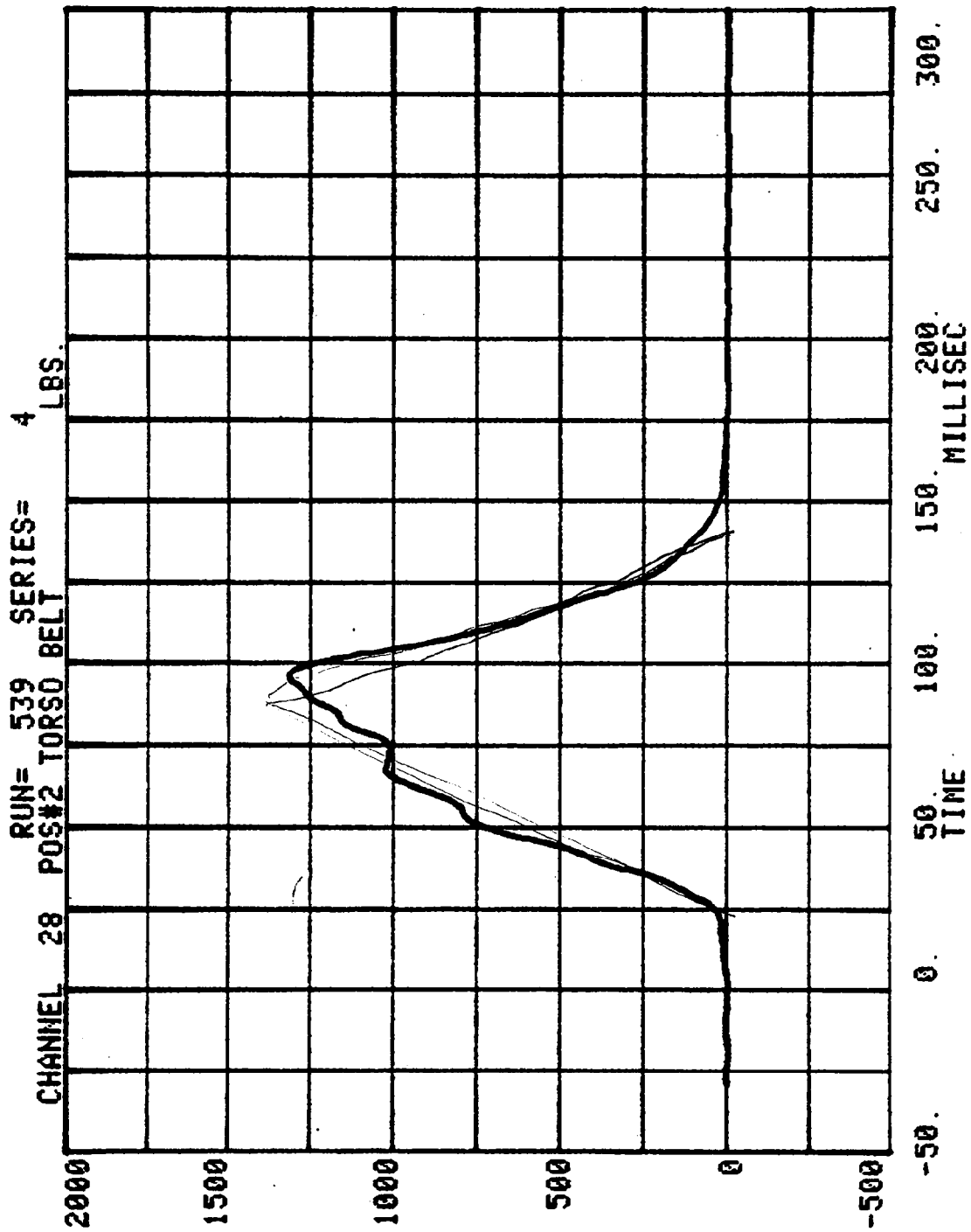






CHANNEL 27 POS#2 LEFT BELT
RUN= 539 SERIES= 4 LBS.





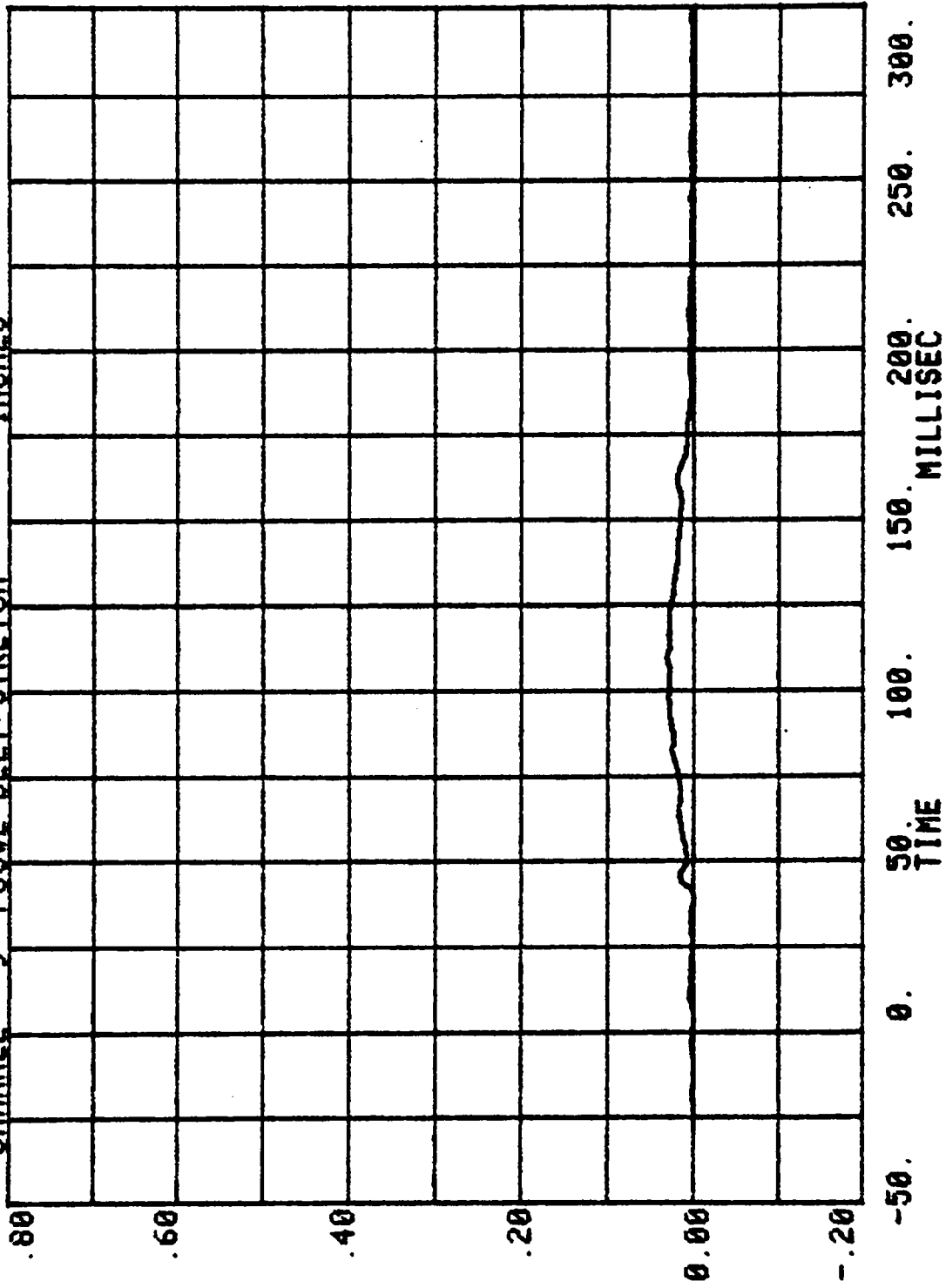
B-94

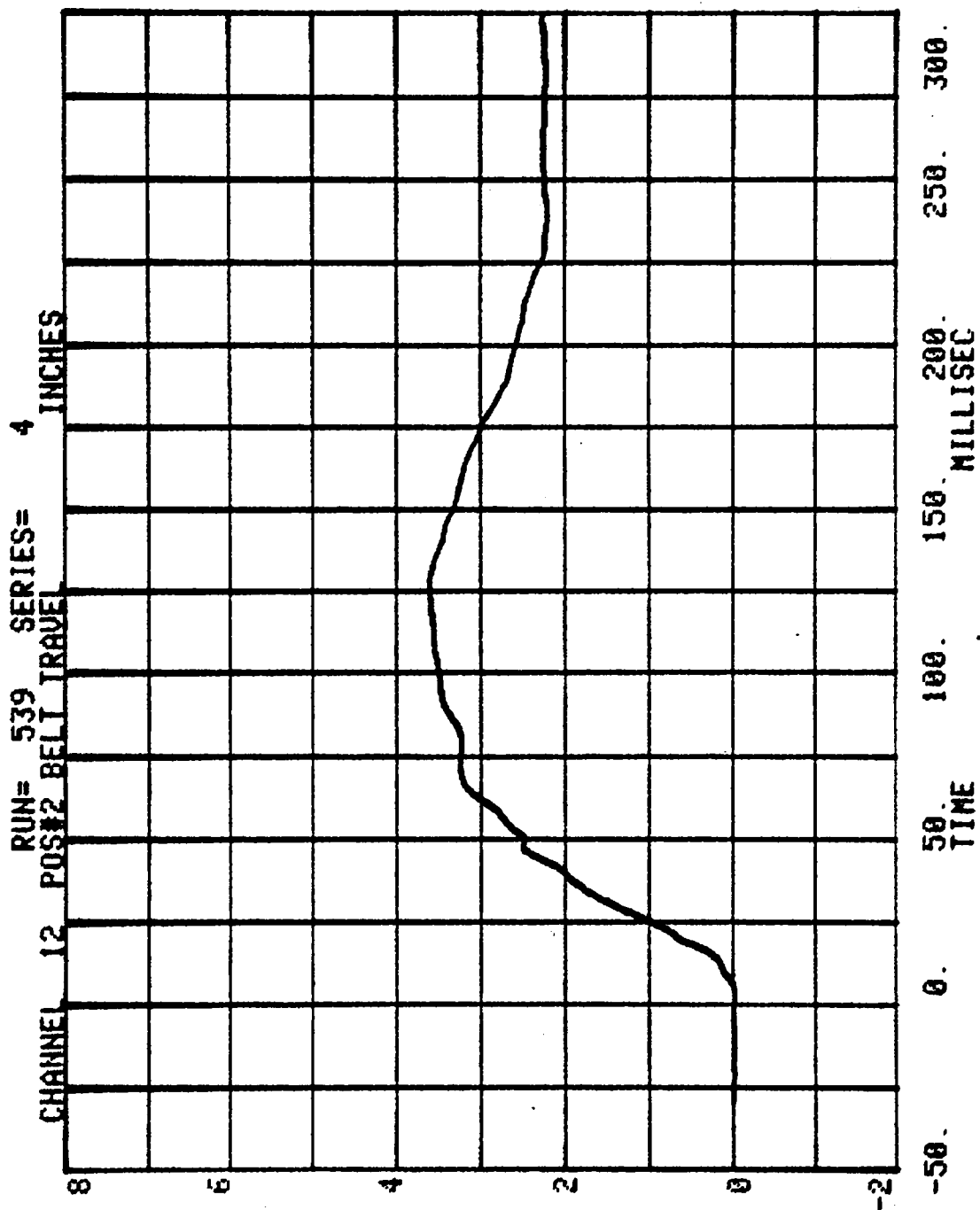
6851-V-4

MEASURED OVER 2.5 INCHES

CHANNEL 9 POS#2 BELT STRETCH

RUN= 539 SERIES= 4





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 573, 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
97	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: _____

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. HEAD DROP TEST:			
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. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	22.86 fps	see 109 10/1/81 Tape 1031
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	22.5 g	
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

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	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. ABDOMINAL COMPRESSION TEST: (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. LUMBAR FLEXION TEST:				
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. CHEST IMPACT TESTS:				
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. 110

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. 097

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 - - - -		5	
Temperature in Lab. (Spec. = 66 to 78°F) - - - -		68° - 70°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		42% - 56%	
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel. -	210 to 260G	235 g	
b. Peak Lateral Accel. - -	≤10G	8 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.12 ms	
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.08 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	23 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	21.5 g	
d. Pendulum Decel. ($t_2 - t_1$)	≤ 3 ms	1.25 ms	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	28.125 ms	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	6.25 ms	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	105 ms	
h. Max. Head Rotation - -	63 to 73°	65°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in	0.0"
30°	Time	25.6 to 34.4 ms	30.5 ms
	Displ.	2.1 to 3.1 in.	3.0"
60°	Time	40.3 to 51.7 ms	47.5 ms
	Displ.	4.3 to 5.3 in.	5.3"
Maximum (°)	Time	53.2 to 66.8 ms	61 ms
	Displ.	5.0 to 6.0 in.	5.7"

Continued

P. 572 DUMMY CALIBRATION TEST DATA Continued:

NHTSA DUMMY ID NO. 097

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST Continued				
i. Chordal Displacement: Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	68 ms	
	Displ.	4.3 to 5.3 in.	5.3"	
30°	Time	85.4 to 104.6 ms	88 ms	
	Displ.	2.1 to 3.1 in.	2.7"	
0°	Time	101.0 to 123.0 ms	102 ms	
	Displ.	-.5 to 0.5 in.	.2 ms	
3. ABDOMINAL COMPRESSION TEST: (Preload = 10 pounds)				
a. Force @ 1" - - - -		50 to 63 lbs.	52.0 lbs.	
b. Force @ 1.3" - - - -		73 to 88 lbs.	73.0 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - -		22 to 34 lbs.	32.0 lbs.	
b. Force @ 30° - - - -		34 to 46 lbs.	44.0 lbs.	
c. Force @ 40° - - - -		46 to 58 lbs.	55.5 lbs.	
d. Return Angle - - -		12° maximum	4°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	21.82 fps	
(2) Peak Deflection -		1.7" maximum	1.48"	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1994 lbs.	
(4) Internal Hysteresis - - - -		50 to 70%	57.96%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	14.10 fps	
(2) Peak Deflection -		1.1" maximum	1.0"	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1295 lbs.	
(4) Internal Hysteresis - - - -		50 to 70%	59.46%	

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	7.01 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2275 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.92 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.98 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2025 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.16 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 097

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