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EVALUATION OF AGGRESSIVENESS TEST TECHNIQUES

Walter E. Levan

CALSPAN REPORT NO. 6705-V-2



TEST:	Test No. 615-2-530
TYPE OF TEST:	Frontal Car-to-Load Cell Barrier Impact 1980 AMC Concord DL
TEST DATE:	October 15, 1981
CONTRACT NO.:	DOT-HS-8-01938
TASK ORDER NO.:	6

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Contract Technical Manager

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16. Abstract A frontal load cell barrier impact test of a 1980 AMC Concord DL was performed at Calspan Advanced Technology Center, Transportation Research Department, Buffalo, New York, on October 15, 1981. Impact speed was 34.5 mph in a frontal (0°) mode. Ambient temperature on the test date was 60°F. Both the driver and right front passenger complied with FMVSS 208, injury criteria for head, chest, and femurs. Maximum static crush of the vehicle was 24.0 inches. The total load cell barrier force was 133,000 pounds.					
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SECTION 1

TEST OBJECTIVE

The test program's objective is to obtain baseline data, using vehicles judged to have dissimilar aggressiveness when impacting a fixed load cell barrier (LCB). Secondly, it is to determine the feasibility of using such a barrier to evaluate vehicle aggressiveness.

This test was a frontal impact of a 1980 AMC Concord DL impacting a fixed load cell barrier with a closing speed of 34.5 mph. This test was performed at Calspan Corporation Advanced Technology Center on October 15, 1981.

This test program is part of the National Highway Safety Administration (NHTSA) Contract DOT-HS-8-01938, Task 6 to evaluate aggressiveness test techniques.

SECTION 2

SUMMARY OF TEST NUMBER 615-2-530

A load cell barrier consisting of 36 load cells (Fig. 5) was impacted by a 1980 AMC Concord DL at a velocity of 34.5 mph. The test was performed at the Calspan Corporation Advanced Technology Center on October 15, 1981. Pre- and post-test photographs of the vehicle and occupants can be found in Appendix A. Table 1 presents pertinent crash test information.

Two Part 572, 50th percentile male Anthropometric Test Devices (ATDs) were placed in the 1980 AMC Concord DL 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 chest triaxial accelerometers and femur load cells. Both of the ATDs were used in prior tests (Serial No. 162 in 752-1-527 and 752-2-520, Serial No. 183 in 752-1-527), and neither ATD exceeded FMVSS 208 Injury Criteria for head, chest and femurs in those tests. Certification data sheets, along with instrumentation calibration data, are presented in Appendix C.

The crash event was recorded by one Real Time camera and 10 high-speed cameras. Camera locations and other pertinent camera information are found in Section 3 of this report.

The 78 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. 615-2-530

Evaluation of Aggressiveness
PROJECT: Test Techniques

DATE: 10/15/81

TIME: 12:25 p.m. TEMP: 60°F

VEHICLE	<u>1980 AMC Concord DL</u>
TEST WEIGHT (lbs)	<u>3930</u>
IMPACT ANGLE (deg)*	<u>0°</u>
IMPACT VELOCITY (mph)**	<u>34.5</u>
MAX. CRUSH (in) (static)	<u>24</u>
MAX. INTRUSION (in)	<u>8.5</u>

DUMMIES

TYPE	<u>Hhbird II, Part 572, 50th</u>	<u>Hybrid II, Part 572, 50th</u>
LOCATION	<u>LF (1) 162</u>	<u>RF (2) 183</u>
RESTRAINT	<u>3-point belt system</u>	<u>3-point belt system</u>

NUMBER OF DATA CHANNELS 78

NUMBER OF HIGH SPEED CAMERAS 10 + 1 Real Time

*With respect to tow track Centerline

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

TABLE 1 (cont'd)

OBSERVATIONS (VEHICLE NO. 1) 1980 AMC Concord DL

GLAZING Windshield has stress cracks, and there was less than 5 percent retention loss along the windshield bottom (Figure A-8)

DOORS Driver and passenger door were not operable after impact.

SEAT ANCHORAGES Intact.

RESTRAINTS Intact - see general comments below.

GENERAL COMMENTS The production-type 3-point retractor belt system was
modified to a fixed 3-point belt system.

Table 2

VEHICLE TEST WEIGHTS AS TESTED

Left Front 1090 1bs
 Right Front 1030 1bs
 TOTAL FRONT 2120 1bs

Left Rear 900 1bs
 Right Rear 910 1bs
 TOTAL REAR 1810 1bs

Total Weight = $\frac{2120 + 1810}{1} = 3930$ lbs

Wheel Base = $\frac{108.25}{1}$ inches

$Cg_{F.W.} = \frac{1810 \text{ lbs} \times 108.25 \text{ inches}}{3930 \text{ lbs}} = 49.8$ inches

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (3190 lbs)

VCW = Vehicle Capacity Weight (775 lbs)

DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC)

RCLW = $\frac{775}{1} - 150 (4) = 175$ lbs

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

TEST WEIGHT = $\frac{3190}{1} \text{ lbs} + \frac{175}{1} \text{ lbs} + 2 (164 \text{ lbs})$

TEST WEIGHT = 3693 lbs (calculated)

Table 3
SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS

Date of Test 10/15/81 Time of Test 12:25 am/pm
Ambient Temperature 60 °F at impact area
Temperature in Occupant Compartment 70 °F
Windshield Molding Temperature 69 °F

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude:	RF <u>27.5</u>	LF <u>27.7</u>	RR <u>27.25</u>	LR <u>27.5</u>
Test Attitude:	RF <u>26.6</u>	LF <u>26.5</u>	RR <u>25.1</u>	LR <u>25.2</u>

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 24 psi Rear = 24 psi
Recommended Tire Size D78-14 Load Range B
Tires on Vehicle Goodyear D78-14
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* gal
Test Volume gal (93% of EPA Capacity)
Fuel System Capacity (data from Owner's Manual) gal
Details of fuel system Fuel tank was drained, and two gallons of Red
Stoddard Solvent #2 was added.

Electric Fuel Pump Yes X No Fuel Injection Yes X No
Does electric fuel pump operate with ignition switch "on" and the engine
not operating Yes No

VEHICLE REBOUND AND CRUSH

Overall Length of Test Vehicle: Pre-Test = R 184.7 /L 184.7 inches
Post-Test = R 160.7 /L 160.8 inches
Crush = R 24 /L 23.9
FOR FRONTAL IMPACTS, distance from front of test vehicle to the barrier
after impact = 6.2 inches

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

SECTION 3

VEHICLE AND OCCUPANT INFORMATION

The production-type 3-point retractor belt system in the 1980 AMC Concord DL was modified by cutting the belt at the retractor and replacing the "D" ring with a web-type clamp for both the driver and right-front passenger position.

The driver's seat was adjusted with respect to the brake pedal using a box beam measuring 20.5 inches long, 3 inches high, and 2 inches wide. The box beam was placed on the driver seat cushion, and the seat was adjusted per instruction of the CTM as shown in Figure 7. The passenger seat was then adjusted so that the seat back was in line with the driver's seat back.

The 1980 AMC Concord DL was a 2-door sedan having a 258 cubic inch, 6 cylinder engine equipped with a three-speed automatic transmission, power steering and power brakes. The total test weight with two dummies, instrumentation and cameras was 3930 pounds.

Post-Test Observations

Both the driver and right-front passenger passed FMVSS 208 Injury Criteria for head, chest, and femurs. The driver's head struck the upper rim of the steering wheel and both occupant femurs contacted the underside of the dash panel. Upon rebound, both dummies rolled in board, and head contact occurred at 260 milliseconds after impact.

Occupant results are summarized in Table 9, and the data traces, along with vehicle data traces, are presented in Appendix B.

Maximum dynamic crush on the vehicle was approximately 27.1 inches as measured on the high-speed film and represented in Figure 2. The maximum

static crush measured was 24 inches on the right side and maximum fire wall intrusion was 8.5 inches.

The maximum load cell barrier force measured by the 36 load cells was 133,000 pounds at 32.5 milliseconds.

Other Post-Test Observations

- Windshield shattered, and there was less than 5 percent retention loss, Figure A-8. All other windows on the vehicle were intact.
- Neither front door was operable after impact.
- Both front tires remained inflated.

FIGURE 1

PRE-TEST AND POST-TEST MEASUREMENT POINTS

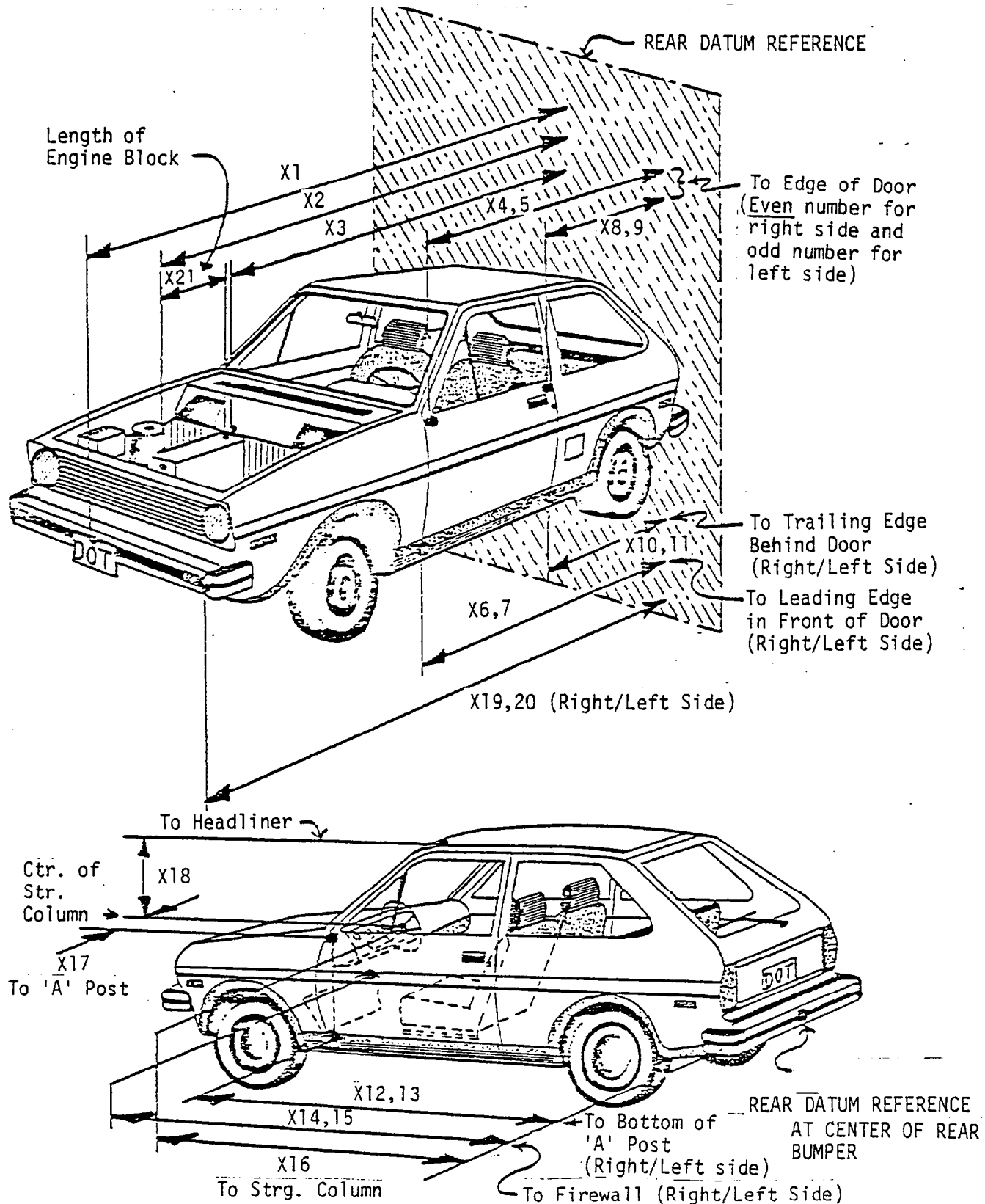


TABLE 4

VEHICLE MEASUREMENTS

No. 1980 AMC Concord DL		All Dimensions in Inches		
		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	186.4	164.1	22.3
X2	Rear Surface of Vehicle to Front of Engine	166.3	157.8	8.5
X3	Rear Surface of Vehicle to Firewall	136.4	133.6	2.8
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	129.6	129.7	-.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	129.5	129.7	-.2
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	128.9	128.7	.2
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	128.8	128.9	-.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	78.9	79.0	-.1
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	78.9	79.1	-.2
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	79.0	78.7	.3
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	79.1	78.8	.3
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	126.0	125.8	.2
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	126.0	125.9	.1
X14	Rear Surface of Vehicle to Firewall, Right Side	136.9	134.0	2.9
X15	Rear Surface of Vehicle to Firewall, Left Side	136.5	130.5	6.0
X16	Rear Surface of Vehicle to Steering Column	109.5	105.3	4.2
X17	Center of Steering Column to "A" Post	16.1	14.1	2.0
X18	Center of Steering Column to Headliner	17.1	18.8	-1.7
X19	Rear Surface of Vehicle to Right Side of Front Bumper	184.7	160.7	24.0
X20	Rear Surface of Vehicle to Left Side of Front Bumper	184.7	160.8	23.9
X21	Length of Engine Block	28.7	28.7	0

Table 5

VEHICLE WEIGHTS AND RIDE HEIGHTS

Vehicle No. 1980 AMC Concord DL

		WEIGHTS & RIDE HEIGHTS				L. BUMPER		R. BUMPER		CENTERLINE E.A.	
		L.F.	R.F.	R.R.	L.R.	Upper	Lower	Upper	Lower	Left	Right
CURB WEIGHT	Pounds	940	910	660	680						
RIDE HEIGHTS	Inches	27.7	27.5	27.25	27.5	20.3	14.9	20.6	15.2	16.0	16.3
CURB WEIGHT PLUS DUMMIES	Pounds	1060	1040	760	750						
RIDE HEIGHTS	Inches	28	27 1/2	26 1/2	27 1/8	21.5	16.1	21.3	15.9	17.2	17
FINAL WEIGHT INSTRUMENTATION AND DUMMIES	Pounds	1090	1030	910	900						
RIDE HEIGHTS	Inches	26.5	26.6	25.1	25.2	20.2	14.8	20.2	14.8	15.7	15.2

TABLE 6

CAR 1980 AMC Concord DLDATE 10/15/81REFERENCE DISTANCE FROM REAR 186.4

VERTICAL HEIGHTS

		Inches Left						C/L	Inches Right					
		36	30	24	18	12	6	0	6	12	18	24	30	36
Lower Bumper	Pre		←					14.7						→
	Post		←					19.2						→
Upper Bumper	Pre		←					19.0						→
	Post		←					24.7						→
1/2 Bumper To Hood	Pre		←					25.7						→
	Post		←					30.0						→
Hood	Pre		←					30.2						→
	Post		←					35.7						→

HORIZONTAL DISTANCE FROM REFERENCE

Lower Bumper	Pre		2.5	2.0	1.7	1.4	1.0	.7	1.0	1.4	1.7	2.0	2.5
	Post		25.5	24.9	23.5	23.3	23.0	22.7	22.8	23.0	23.4	24.6	25.2
	Diff.		23.0	22.9	21.8	21.9	22.0	22.0	21.8	21.6	21.7	22.6	22.7
Upper Bumper	Pre		1.7	1.4	1.0	.6	.3	0	.3	.6	1.0	1.3	1.7
	Post		26.0	25.3	24.6	23.9	23.4	23.1	23.3	23.7	24.2	24.8	25.4
	Diff.		24.3	23.9	23.6	23.3	23.1	23.1	23.0	23.1	23.2	23.5	23.7
1/2 Bumper To Hood	Pre		6.5	7.5	7.1	5.2	4.8	4.6	4.8	5.2	7.0	7.4	6.4
	Post		24.0	25.6	24.6	23.2	23.4	23.3	23.9	24.2	25.8	26.0	25.4
	Diff.		17.5	18.1	17.5	18.0	18.6	18.7	19.1	19.0	18.8	18.6	19.0
Hood	Pre		8.5	7.3	7.0	6.5	6.2	5.9	6.2	6.4	6.9	7.2	8.4
	Post		24.9	25.3	25.1	24.7	24.4	24.2	24.3	24.3	24.3	24.6	25.5
	Diff.		16.4	18.0	18.1	18.2	18.2	18.3	18.1	17.9	17.4	17.4	17.1

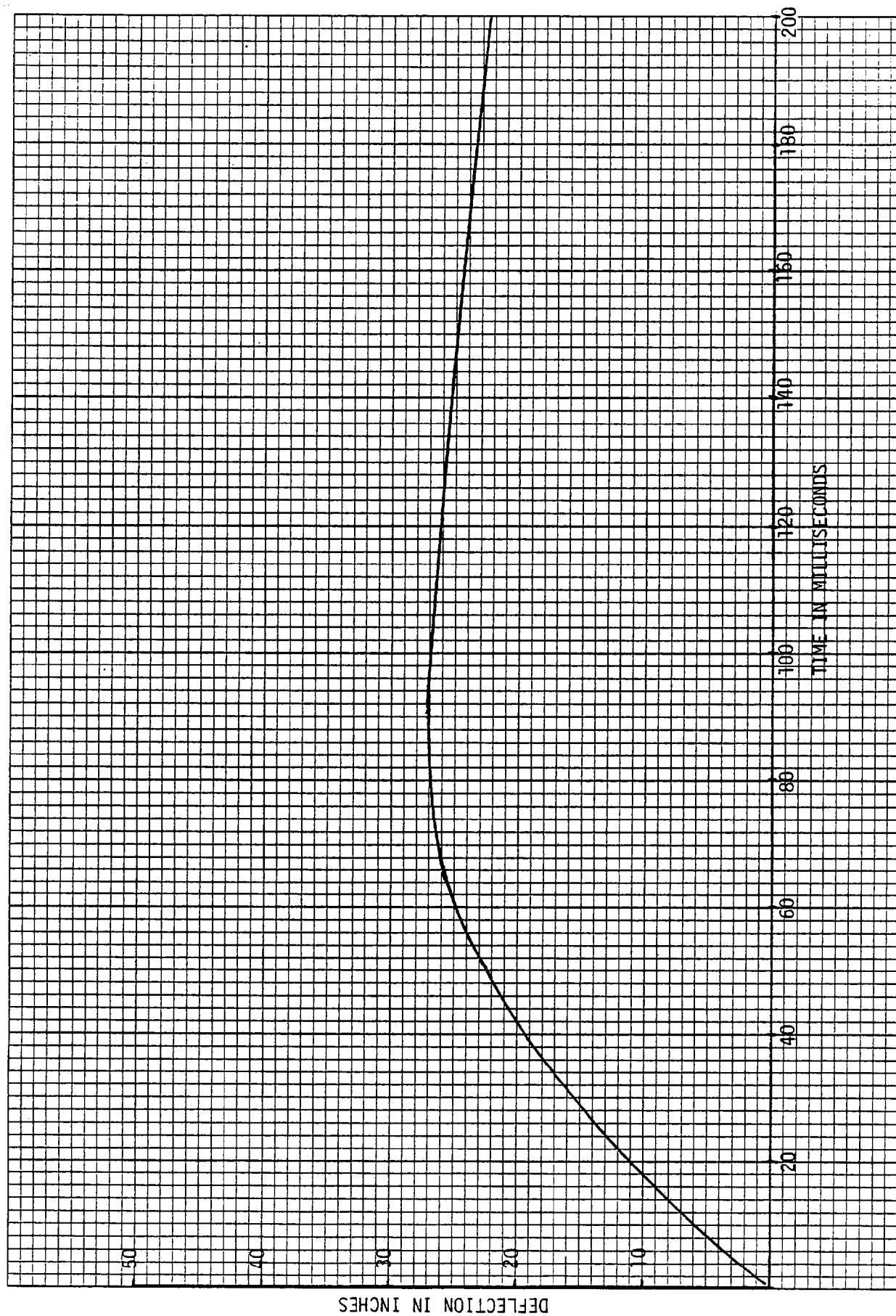
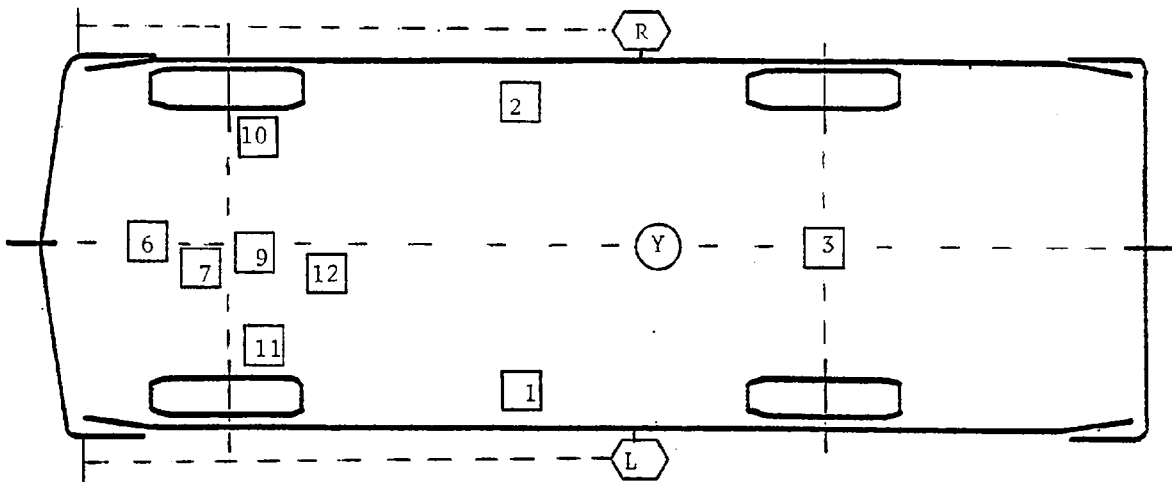


Figure 2 REAR TARGET DISPLACEMENT WITH RESPECT TO FIXED GROUND REFERENCE



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Rocker Panel Near LF "B" Pillar	x		x
2	Rocker Panel Near RT "B" Pillar	x		x
3	C/L of Rear Deck Above Rear Axle	x	x	x
6	Top of Engine Block	x		x
7	Front Crossmember	x		x
9	Bottom of Engine	x		x
10	RT Brake Caliber	x		
11	LF Brake Caliber	x		
12	Firewall	x		x
(Y)	Yaw Rate Gyro			x
(R)	RT Bumper Deflection	x		
(L)	LF Bumper Deflection	x		

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

1980 AMC CONCORD DL
Figure 3 VEHICLE TRANSDUCER LOCATIONS

VEHICLE 1980 AMC CONCORD DL

TEST 615-2-530

DATE 10/15/81

TRANSDUCER NUMBER	INCHES FROM REAR	INCHES LEFT OF C/L	ON C/L	INCHES RIGHT OF C/L
1	69.8	18.5		
2	69.6			17.6
3	46.5		X	
6	157.4			1.5
7	149.0	7.0		
9	143.9	2.2		
10	146.0			26.0
11	146.3	26.0		
12	138.9	9.3		
13	67.7		X	

FIGURE 4 VEHICLE TRANSDUCER LOCATION MEASUREMENTS

36 LOAD CELLS
4 ROWS
9 COLUMNS

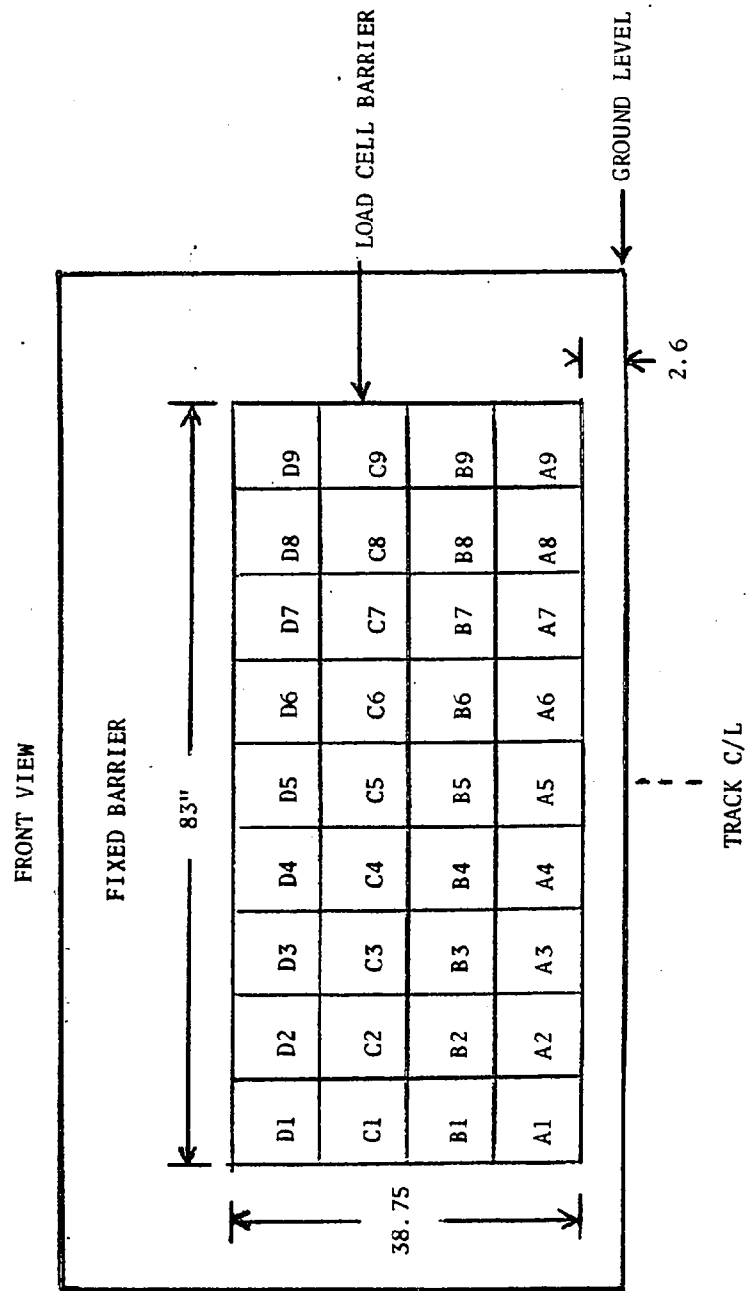


Figure 5 FIXED LOAD CELL BARRIER-LOAD CELL LOCATIONS

NOTE: Camera Information Shown on Table 7 and 8.

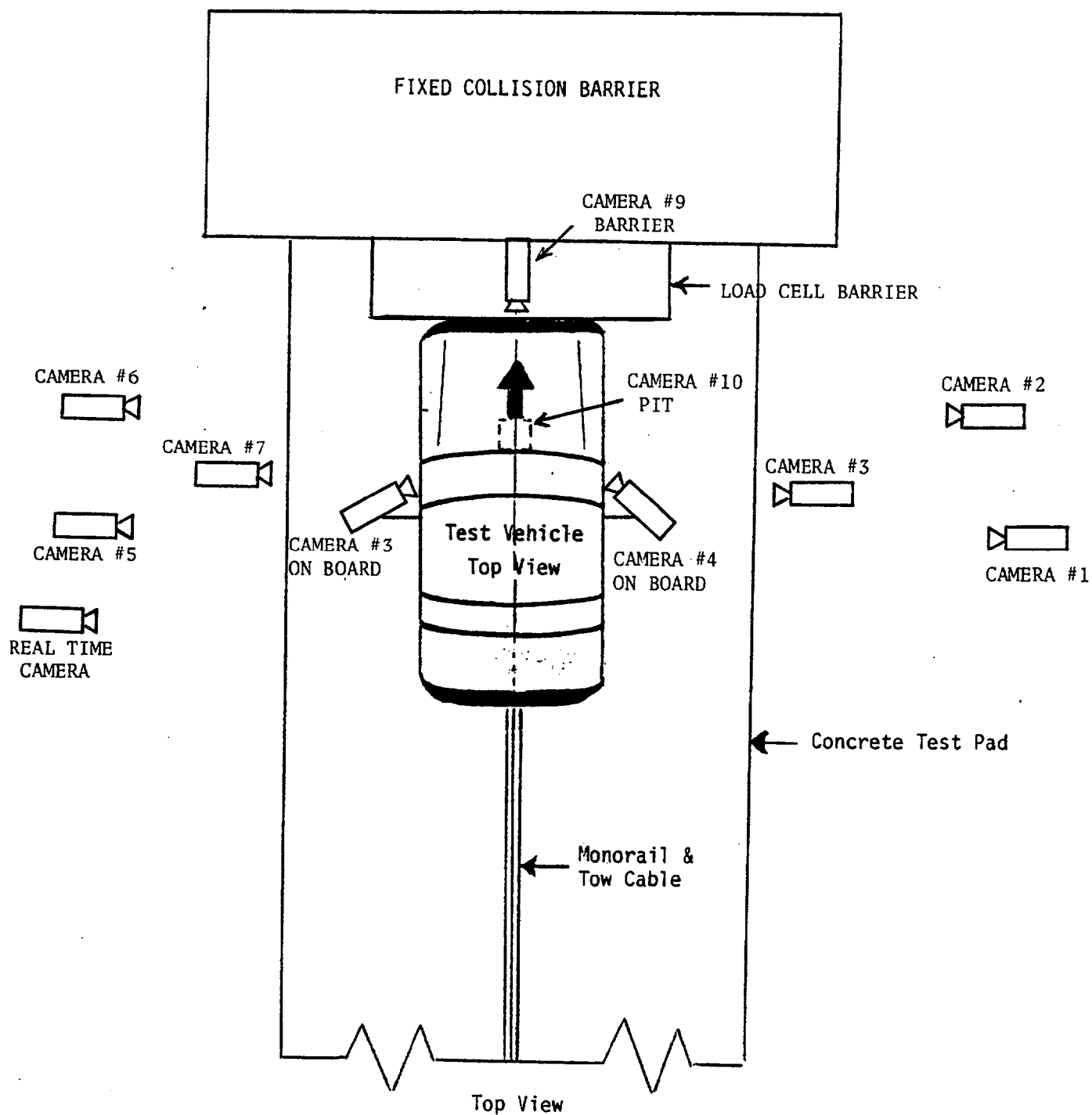


Figure 6 CAMERA POSITION FOR FRONTAL IMPACTS

Table 7

HIGH SPEED CAMERA LOCATIONSTest No.: 615-2-530Vehicle No. 1980 AMC Concord DL

CAMERA NUMBER	VIEW	CAMERA POSITIONS (IN)*			CAMERA ANGLE (DEG)**	FILM PLANE TO HEAD TARGET (IN) X
		X	Y	Z		
1	Vehicle and barrier - RT side	306	102	42	-1	---
2	Vehicle - front half RT side	300	48	41	-2	283
3	Right front passenger	219	72	41	-2	202
4	Right front passenger (on board)	---	ON BOARD		--	---
5	Vehicle and barrier - LF side	306	126	42	-4	---
6	Vehicle - front half LF side	306	64	42	-2	289
7	Driver	228	96	52	-5	211
8	Driver (on board)	---	ON BOARD		--	---
9	Front view (barrier)	0	0	60	-23	---
10	Underbody (pit)	0	36	120	+90	---

* 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 615-2-530)

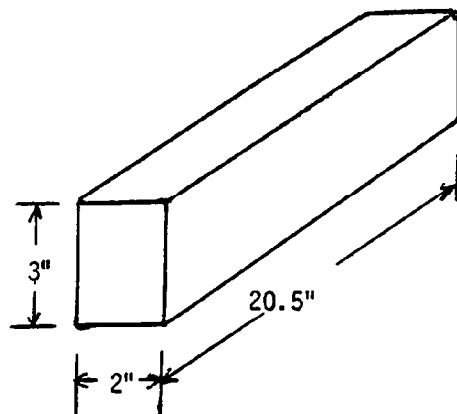
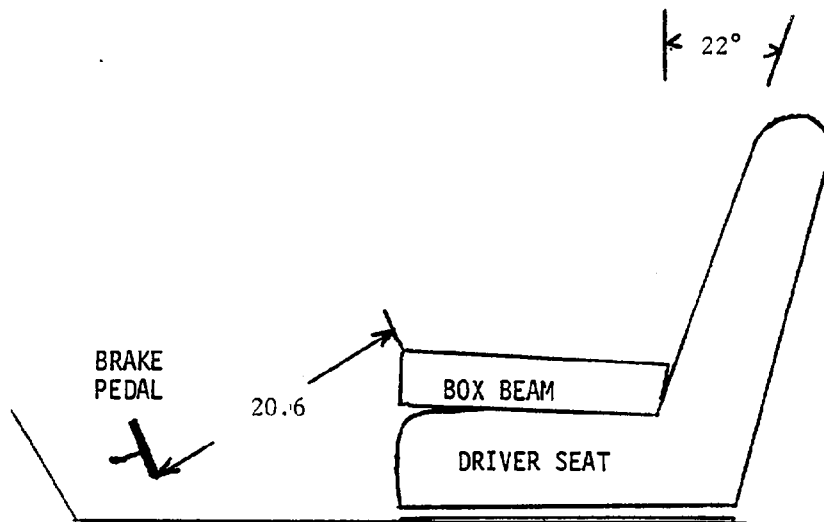
CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)
1	Vehicle RT side	Photosonic	13 mm	900
2	Vehicle right side	Photosonic	25 mm	900
3	Right front passenger	Photosonic	25 mm	900
4	Right front passenger	Stalex	8 mm	900
5	Vehicle LF side	Photosonic	13 mm	900
6	Vehicle LF side	Photosonic	25 mm	850
7	Driver	Photosonic	25 mm	900
8	Driver	Stalex	8 mm	1100
9	Barrier]	Photosonic	8 mm	900
10	Underbody (pit)	Photosonic	13 mm	1050

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.

TEST NO. 615-2-530

VEHICLE NO. 1980 AMC Concord DL



BOX BEAM DIMENSIONS

FIGURE 7 DRIVER SEAT POSITION

FIGURE 8
PART 572 DUMMY IN-VEHICLE POSITION

Test No. 615-2-530

Vehicle 1980 AMC Concord DL

SEAT TYPE:

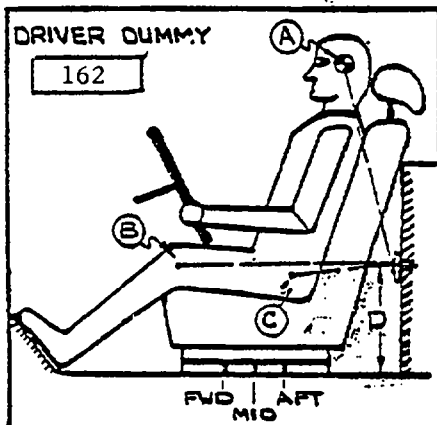
 Bench
 X Bucket
 Split Bench

ADJUSTER TYPE:

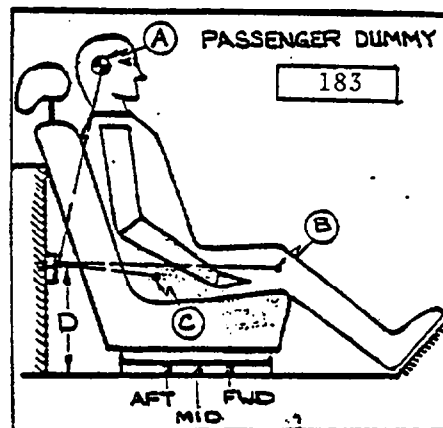
 X Manual
 Power

BUCKET SEAT BACK TYPE:

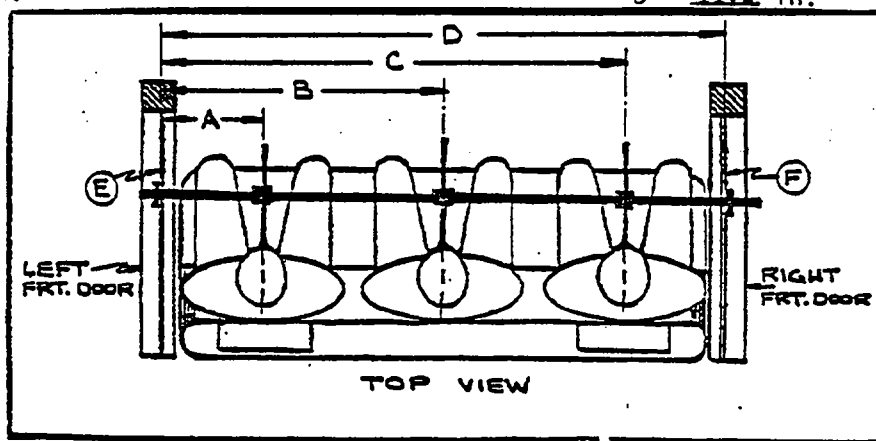
 Fixed
 X Adjustable Reclining



A = 23.2 in. 14 Degrees
B = 31.0 in. 86 Degrees
C = 15.1 in. 102 Degrees
D = 11.2 in.



A = 23.2 in. 14 Degrees
B = 32.0 in. 94 Degrees
C = 15.5 in. 101 Degrees
D = 11.2 in.



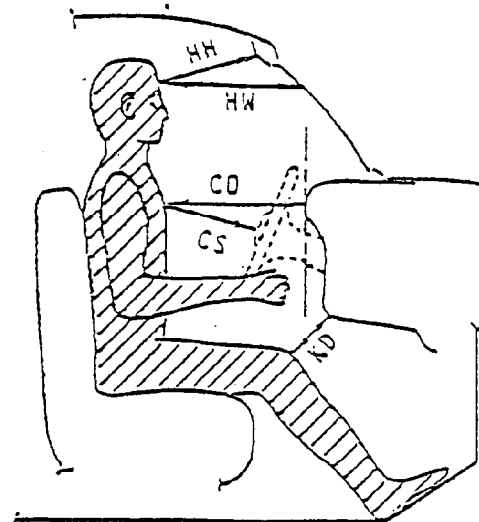
DUMMY ID

162

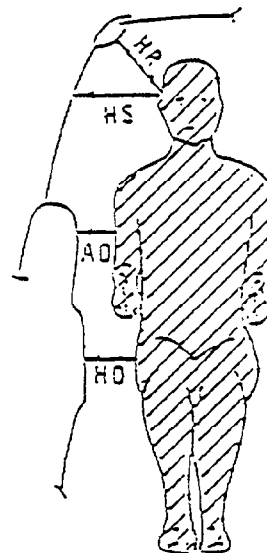
183

A	=	Left Door to Driver Centerline	<u>13.6</u> in.
B	=	Left Door to Center Passenger Centerline	<u>--</u> in.
C	=	Left Door to Right Passenger Centerline	<u>40.2</u> in.
D	=	Left Door to Right Door	<u>52.5</u> in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	<u>11.0</u> in.

	<u>DRIVER</u>	<u>PASS</u>
HH	14.0	14.0
HW	21.0	20.5
CD	24.5	24.0
CS	15.7	
KDL	12.1	11.5
KDR	11.7	11.5



HR	6.6	6.3
HS	9.2	9.5
AD	4.7	5.0
HD	6.7	7.0



1980 AMC Concord DL

Figure 9 OCCUPANT CLEARANCE DIMENSIONS

TABLE 9
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G") *							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R
DUMMY (1)	-40	-32	36	51.4	-44	-25	12	52.4
DUMMY (2)	-9	30	53	57.3	-25	30	12	37.4
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	725	475
DUMMY (2)	325	525
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)	1575	***	1085
DUMMY (2)	2025	1100	***
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)	418.4	.0438	.1077	33.6	587.3
DUMMY (2)	559.1	.0627	.1281	37.4	773.1
DUMMY (3)					
DUMMY (4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

***UNABLE TO INSTALL IN BOARD LAP BELT LOAD CELLS

TABLE 10

TEST PROCEDURE CHECK LIST

ITEM NO.	DESCRIPTION	CHECK BY	DATE	COMMENTS
1.	Inflate tires to recommended mfg's cold pressure for vehicle capacity weight (including spare). Check tires for recommended size.	10-12	71.78	
2.	Fill out summary sheet. Apply identification number to vehicle.	10-12	71.78	
3.	Inspect vehicle and record any damage or missing parts.	10-12	71.78	
4.	Add fluids to specified levels or fill to capacity.	10-12	71.78	
5.	Weigh vehicle and record weight at each wheel on summary sheet.	10-12	71.78	
6.	Apply reference height marks at each wheel and record on summary sheet.	10-12	71.78	
7.	Pump fuel from tank and run engine until fuel lines are empty.	10-12	71.78	
8.	Drain following fluids from vehicle and check N/A if not applicable: ___ a) coolant ___ b) engine oil ___ c) transmission fluid ___ d) windshield washer fluid ___ e) battery acid (drain & flush) ___ f) power steering fluid	10-12	71.78	
9.	Fill fuel tank to recommended EPA capacity with red dyed Stoddard solvent. Record volume of Stoddard on Summary Sheet. Crank engine to fill carburetor.	/		
10.	Siphon 7% of solvent from fuel tank and record amount removed on Summary Sheet.	/		

TABLE 10 (cont'd)

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
11.	Perform pre-test vehicle measurements			
12.	Mark forward-most and rear-most positions of seat. Measure and mark seat and sill mid-positions.	10-12	M.R.	
13.	Install mounting plates for accelerometers as specified in the Test Plan.	10-12	M.R.	
14.	Install mounting plate and instrumentation in trunk area.	10-12	M.R.	
15.	Install accelerometers.	10-12	M.R.	
16.	Place certified dummies in both front seats with seats in correct position.	10-13	DLH	
17.	Install seat belt load cells on lap and torso portions on both front seat belts and make provisions to remove weight of the load cells.	10-13	DLH	
18.	Install on-board lighting to illuminate field of view of ground cameras.	10-14	DLH	
19.	Route and secure all electrical cables.	10-13	DLH	
20.	Install speed trap breaker bar on vehicle.	10-14	M.R.	
21.	Install guide rollers and abort straps to vehicle.	10-14	M.R.	
22.	Weigh vehicle and add ballast if required. Place ballast so that weight distribution will be as close as possible to delivered distribution. Record on Summary Sheet.	10-14	M.R.	
23.	Measure and record ride height.	10-14	M.R.	
24.	Apply targets and tape striping as specified in TP-212-02 - (Laboratory Procedure for Vehicle Assessment.)	10-13	M.P.	

AT IMPACT SITE

TABLE 10 (cont'd)

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
25.	Position vehicle front to bumper at impact point.	10-15	M.R.	
26.	Photograph the following:			
	a) Vehicle overall & closeup left and right views.	W.L.		
	b) Windshields overall and close-up left and right quarter views	W.L.	10/6/81	
	c) Real time documentary	W.L.		
27.	Align and focus stationary high speed cameras.	W.L.		
		W.L.	10/6/81	
28.	Measure and document camera positions.	W.L.	10/5/81	
29.	Test operation of all high speed cameras.			
30.	Set up speed traps and measure breaker bar when vehicles are at impact point.	10-15	M.R.	
31.	Check vehicle attitude and ride height and document on summary sheet.			
32.	Check speed traps operation.	W.S.	10-15	
33.	Move test vehicles to starting point	W.S.	10-15	
		10-15	M.R.	
<u>STARTING POINT PROCEDURE</u>				
34.	Adjust dummy positions as per dummy positioning check list and make required measurements.	W.L.	10/6/81	
35.	Connect umbilical cables.	10-15	M.R.	
36.	Make operation check of all instrumentation and calibrate system.	10-15	D.L.H.	
37.	Take all pre-test photographs.	W.L.	10/15/81	

TABLE 10 (cont'd)

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
38.	Check operation of camera interlock and flash bulbs correlation.	WZ	10/15/81	
39.	Latch trunk and leave key in lock.	WZ	10/15/81	
40.	Verify that fuel tank cap is tight.	10-15	WZ	
41.	Place transmission in neutral. Release parking brake.	10-15	WZ	
42.	Verify that hood latch is latched.	WZ	10/15/81	
43.	Close all windows & vents (except front windows).	WZ	10/15/81	
44.	Close doors leave unlocked.	WZ	10/15/81	
45.	Check operation of all systems.	W. S	10-15	
46.	Record temperature of interior of vehicle.	WZ	10/15/81	
47.	Complete countdown procedures and proceed with test.	W. S	10-15	
POST-TEST PROCEDURES				
48.	Make operational check of all instrumentation.	10-15	DLH	
49.	Photograph with real time camera:			
a)	Post-test overall scene.	WZ	10/15/81	
b)	Close-up of pertinent damage to windshield or fuel system.	WZ	✓	
c)	Dummies failed restraints or failed seat anchorages.	WZ	✓	
d)	Any other type of failure.	WZ	✓	
e)	Opening of vehicle doors.	WZ	✓	

TABLE 10 (cont'd)

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
50.	Take post-test still photographs. Record visual observations of vehicle condition, dummy positions, any anomalies, etc.	CHZ	10/5/81	
51.	Separate vehicles and photograph front of each vehicle.			
52.	Remove umbilicals.	10-15	M-R	
	Remove vehicles from test track.	10-15	M-R	
		10-15	M-R	

APPENDIX A

PHOTOGRAPHS

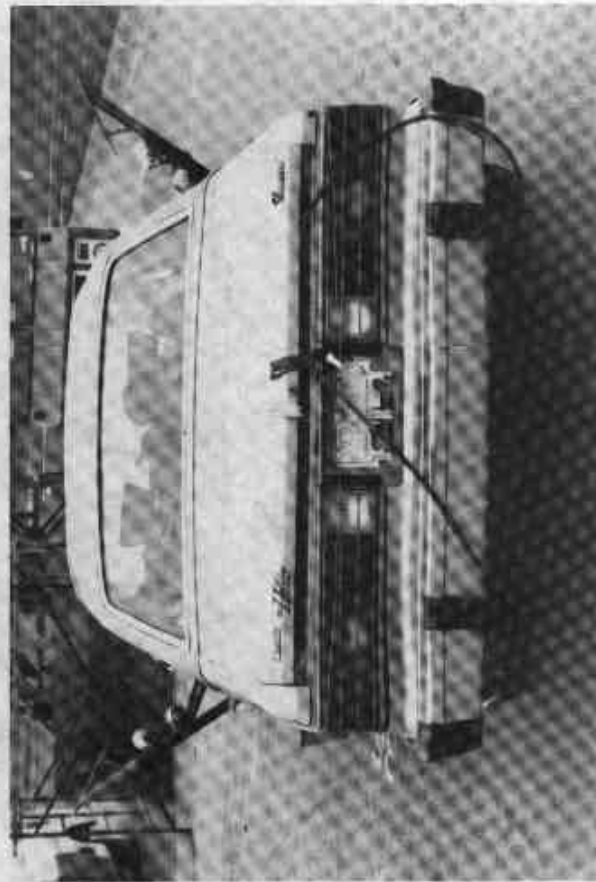
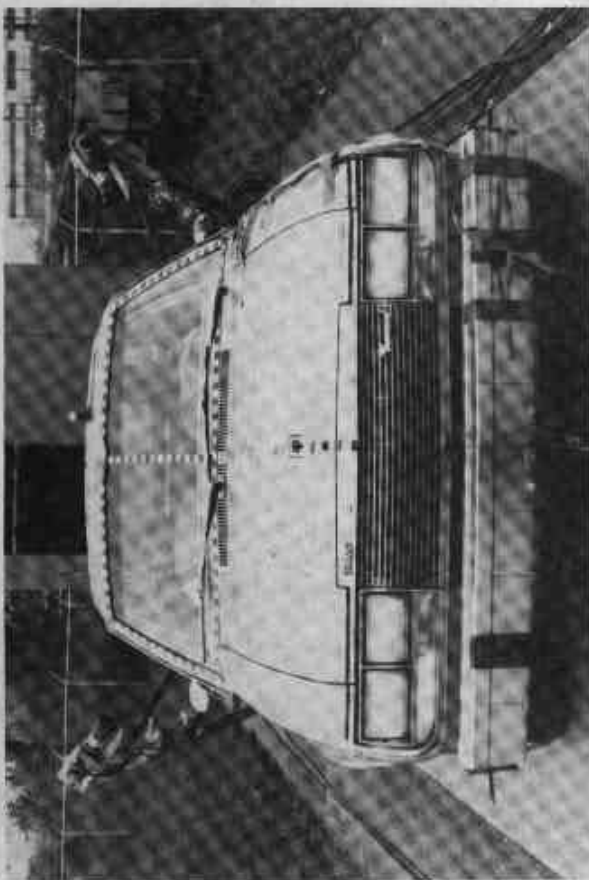
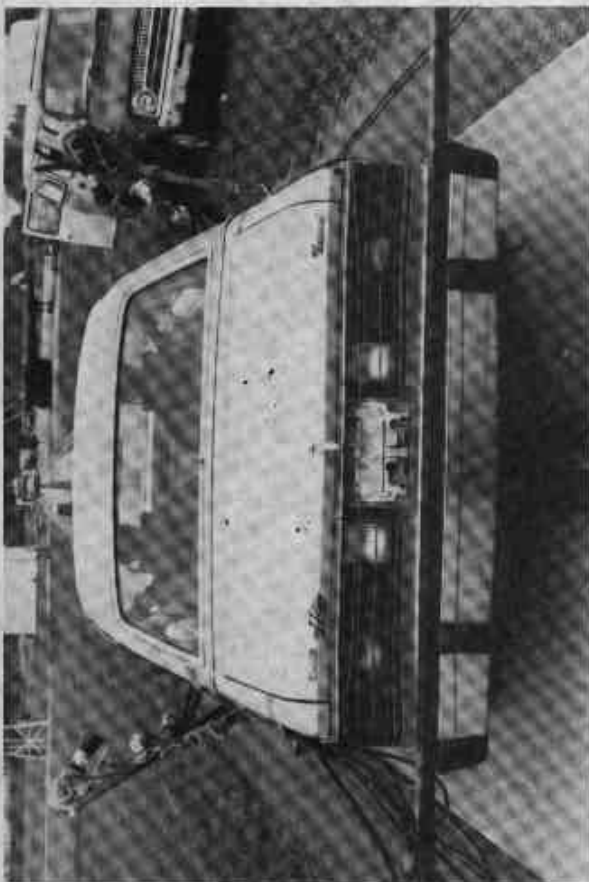


Figure A-1 Pre- and Post-Test Front and Rear Views

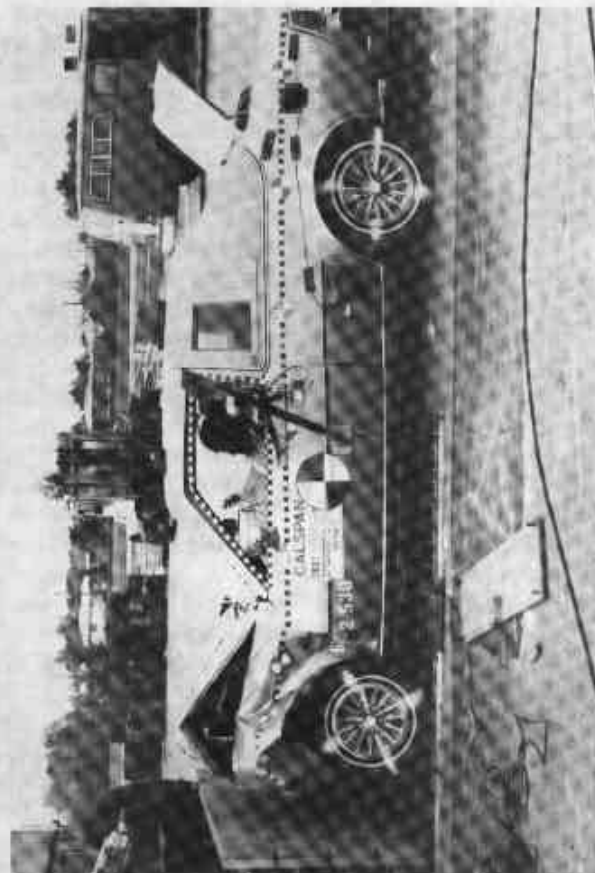
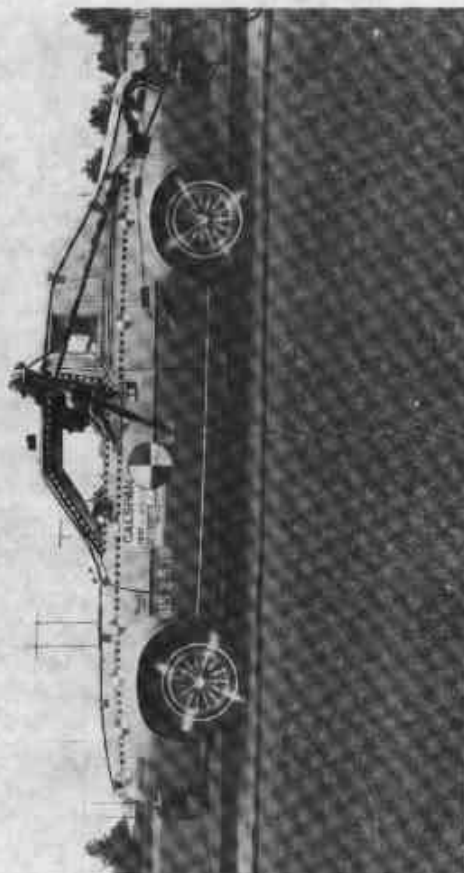
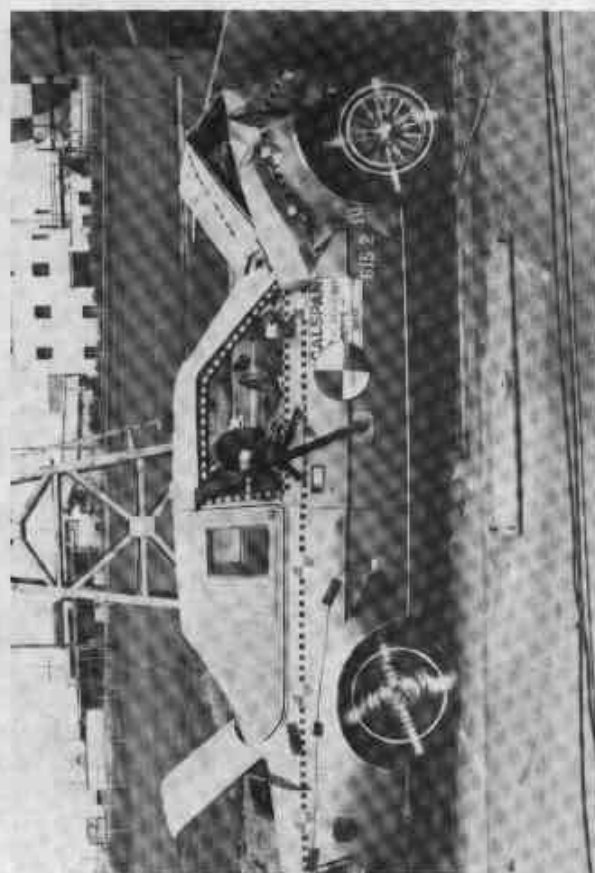


Figure A-2 Pre- and Post-Test Right and Left Side Views

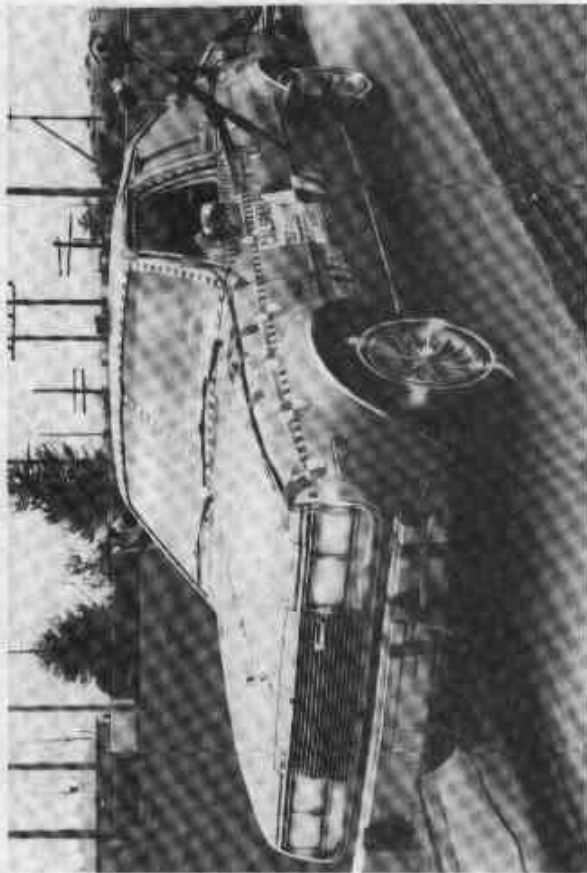
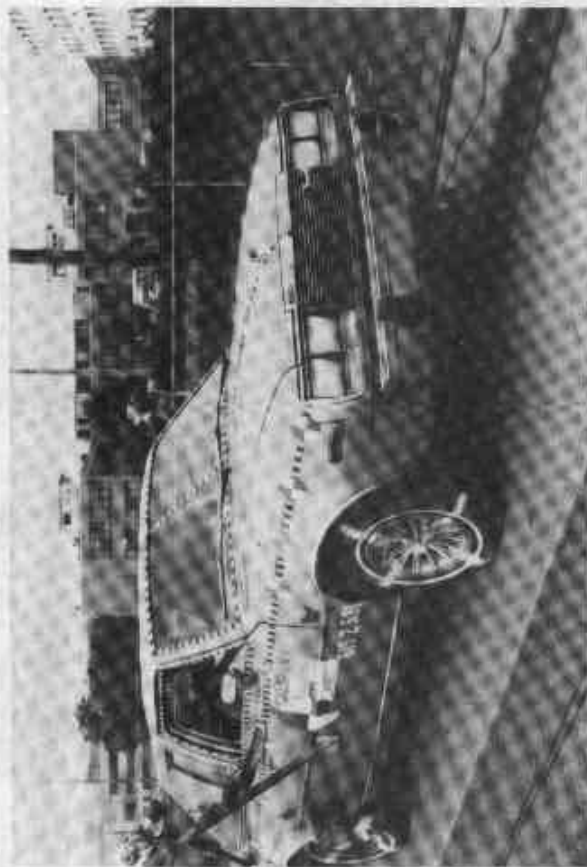


Figure A-3 Pre- and Post-Test Right and Left Three-Quarter Views

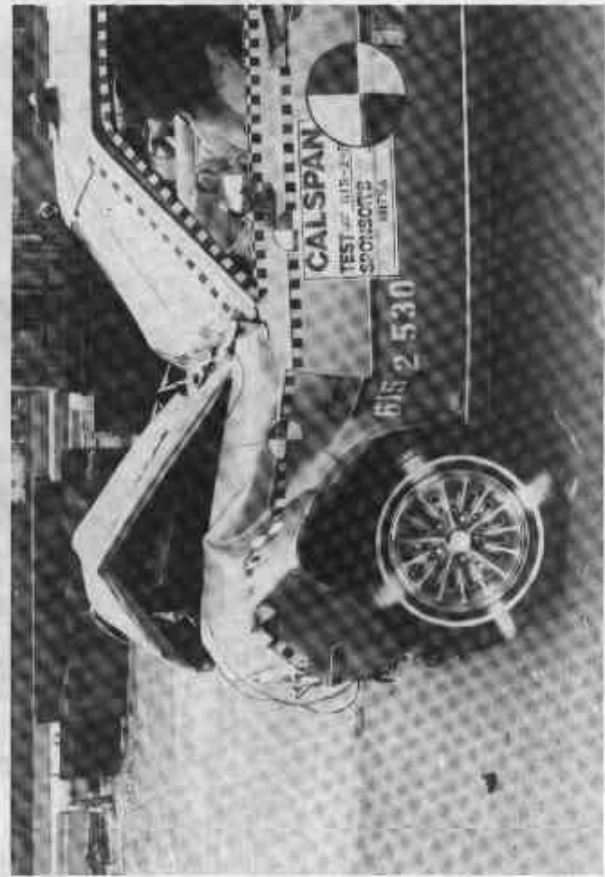
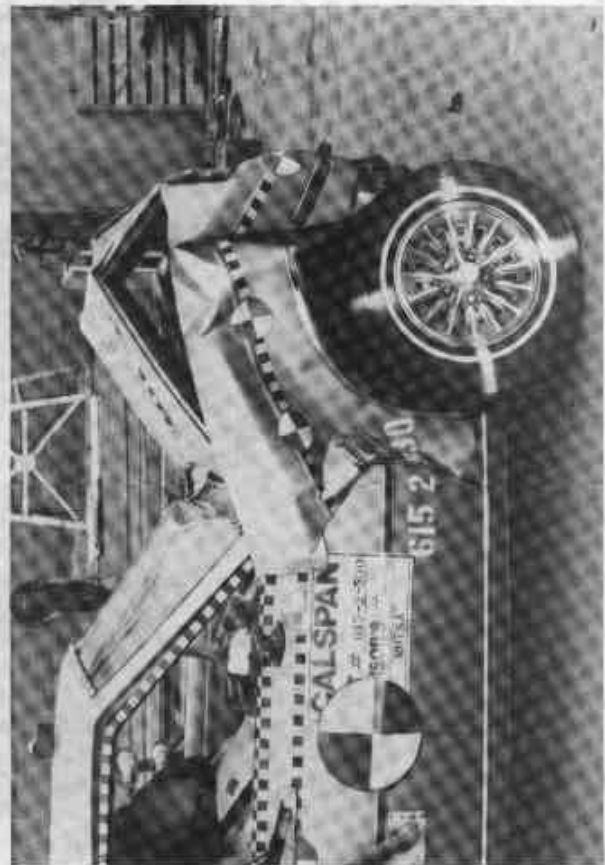
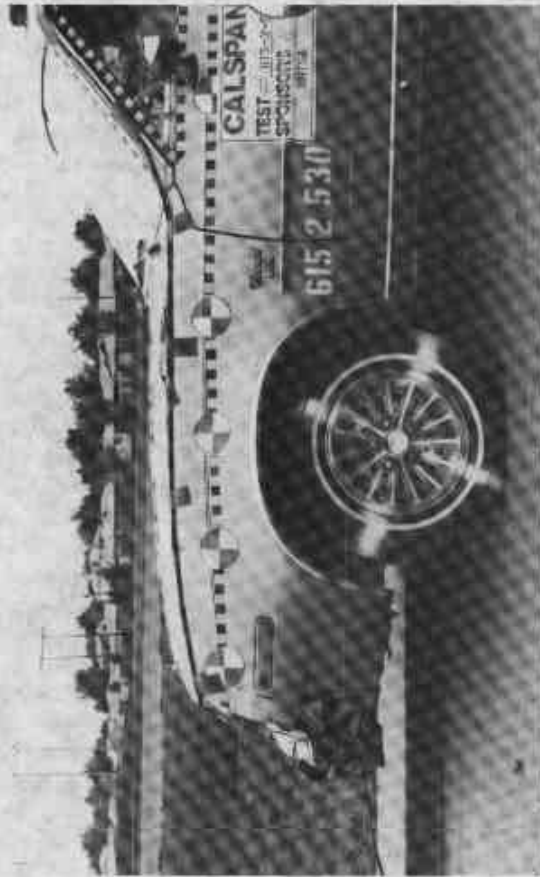
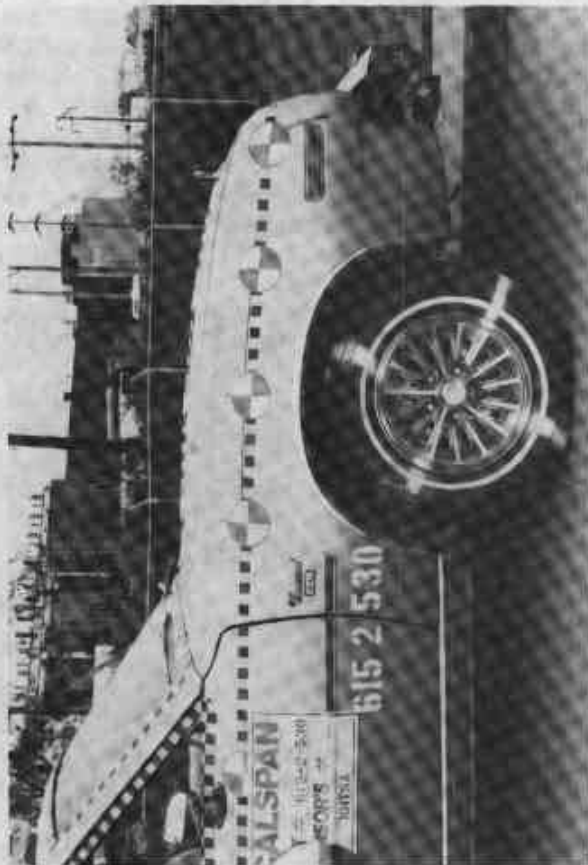


Figure A-4 Pre- and Post-Test Right and Left Front Quarter Views

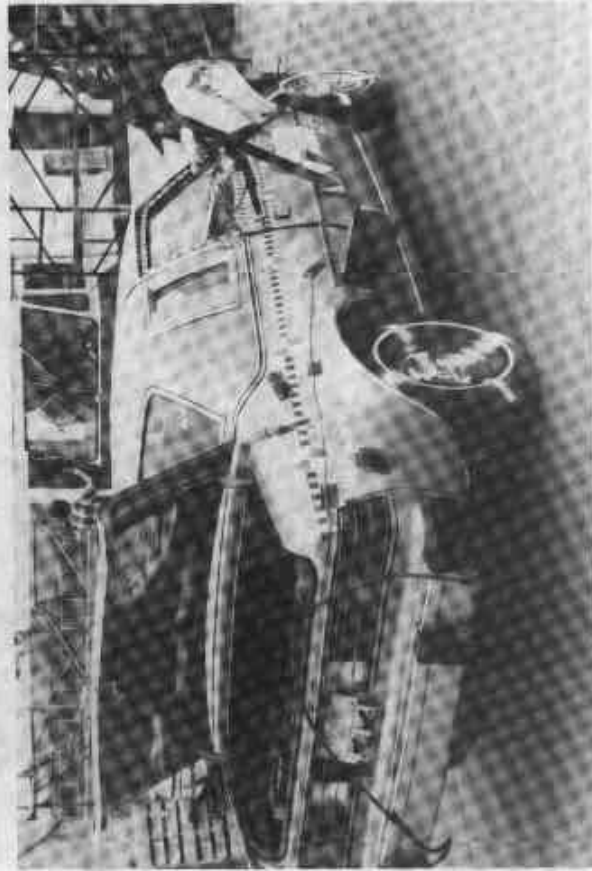
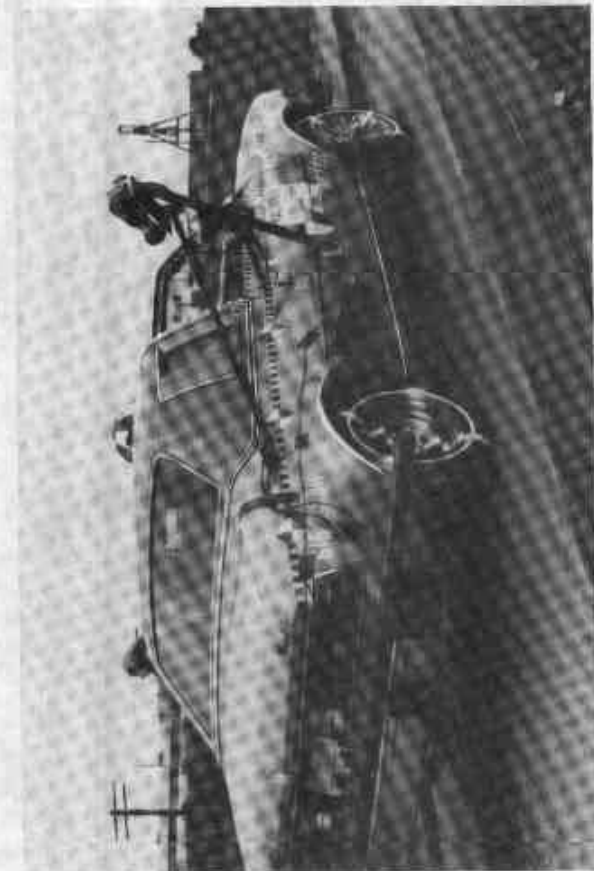
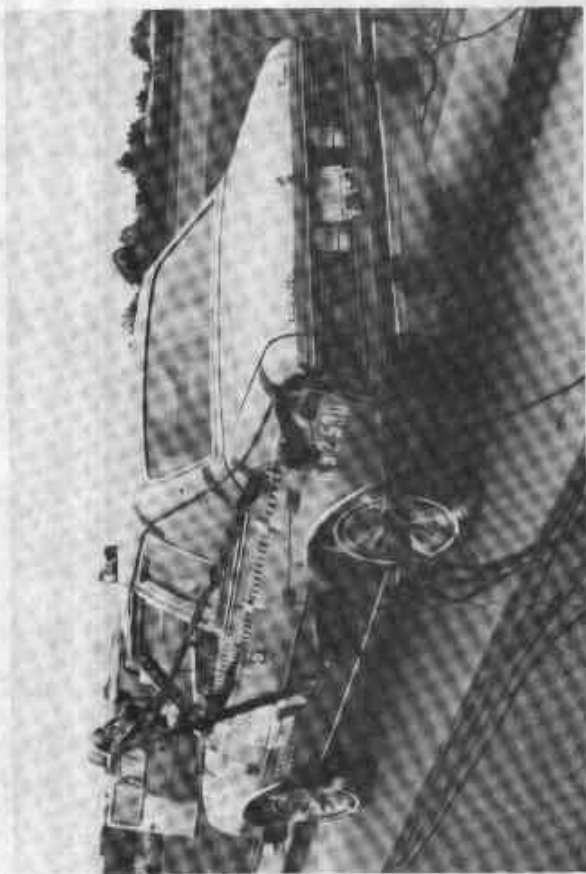


Figure A-5 Pre- and Post-Test Right and Left Three-Quarter Views

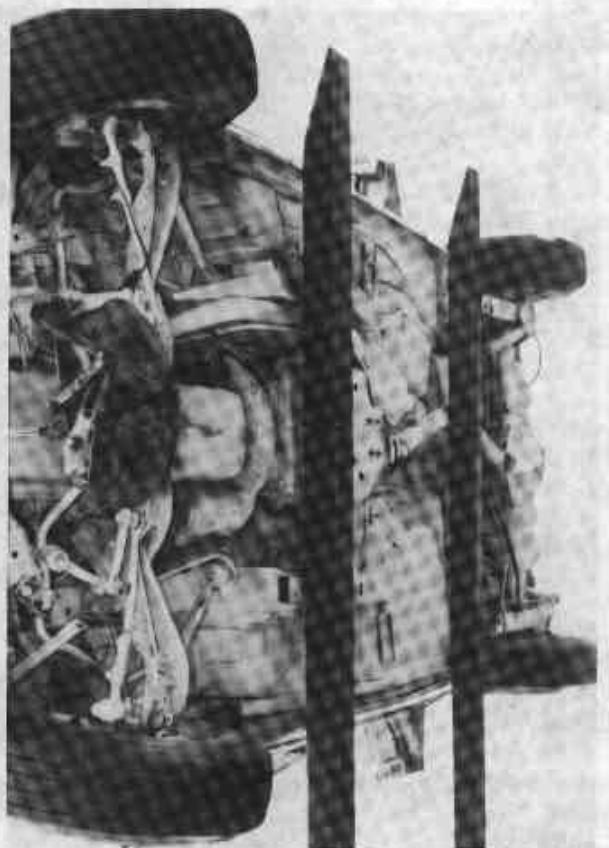
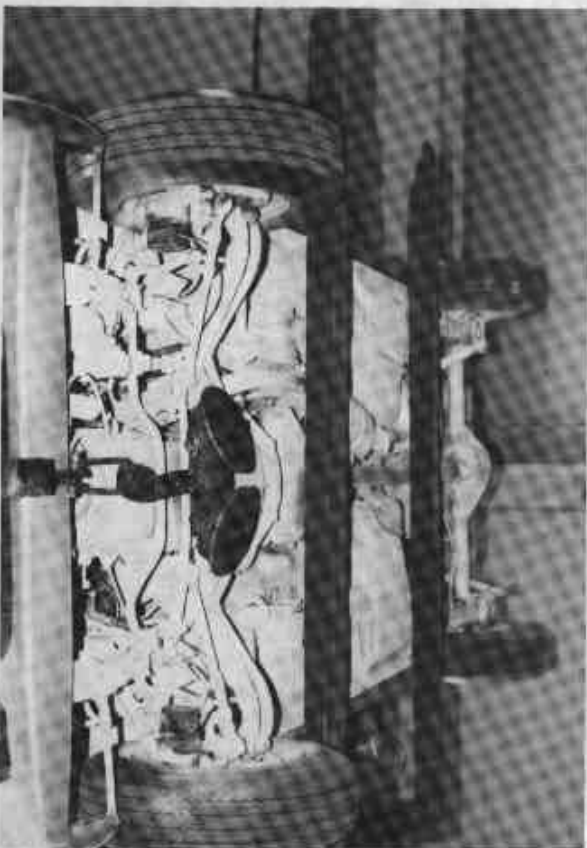


Figure A-6 Pre- and Post-Test Front Underbody Views

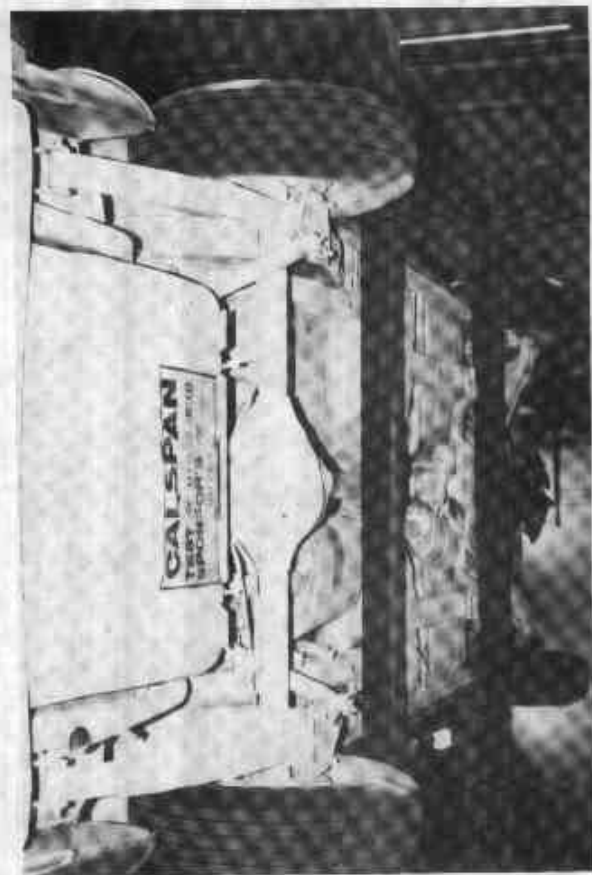


Figure A-7 Pre- and Post-Test Rear Underbody Views

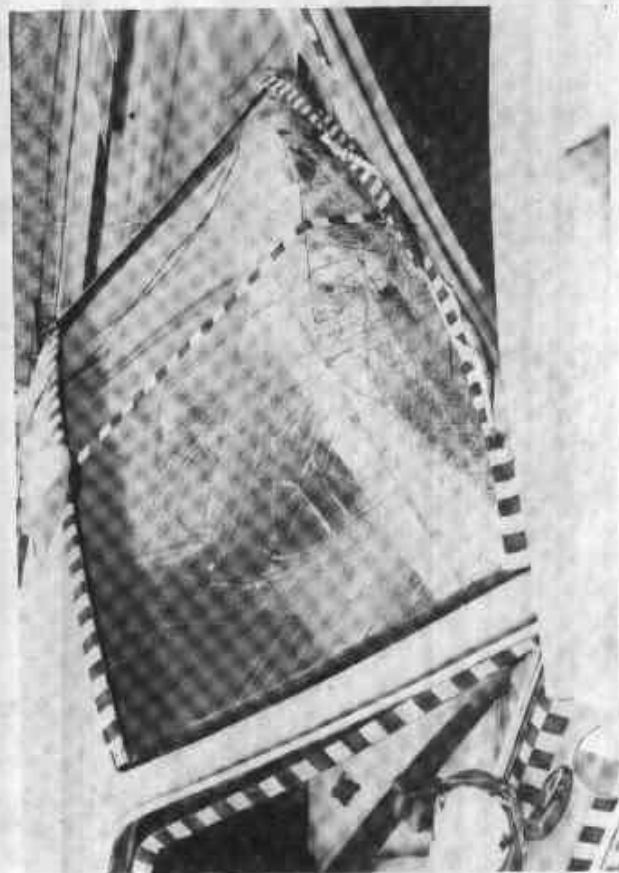


Figure A-8 Post-Test View of Windshield Stress Cracks



Figure A-9 Pre- and Post-Test Driver Positions

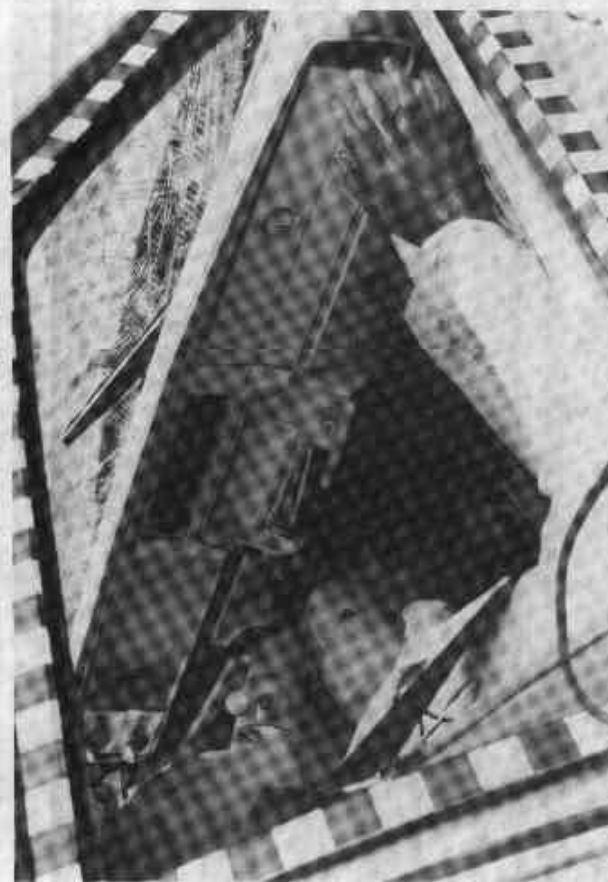
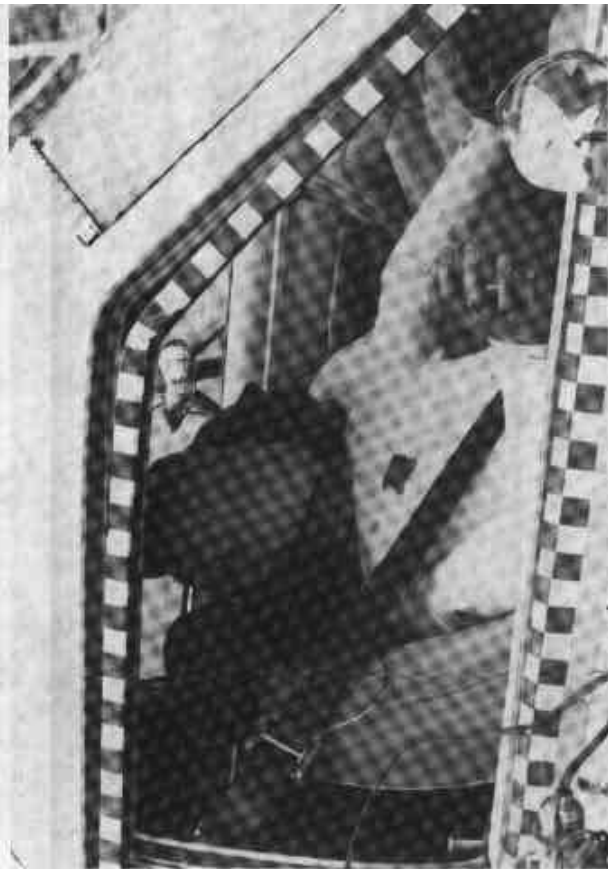
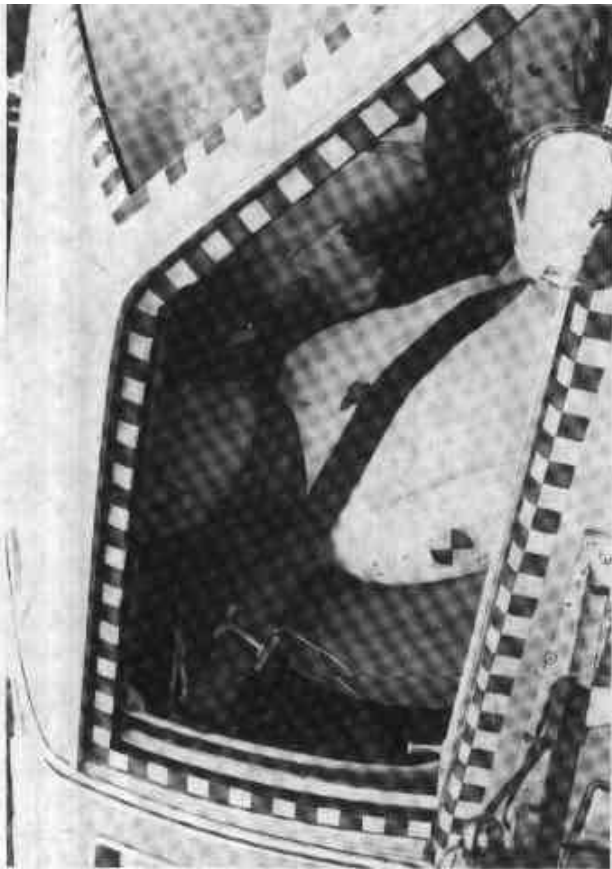


Figure A-10 Pre- and Post-Test Right Front Passenger Views



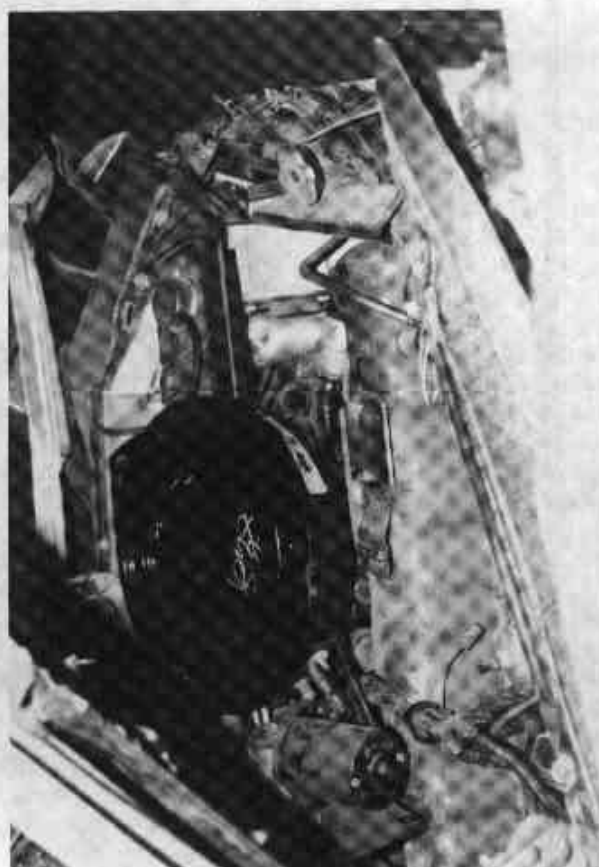
Figure A-11 Post-Test View of Vehicle Interior



Figure A-12 Post-Test View of Engine Compartment



Figure A-13 Velocity Trap Counter Display



APPENDIX B

VEHICLE, LOAD CELL BARRIER AND DUMMY DATA

TEST NO. 615-2-530

1980 AMC CONCORD

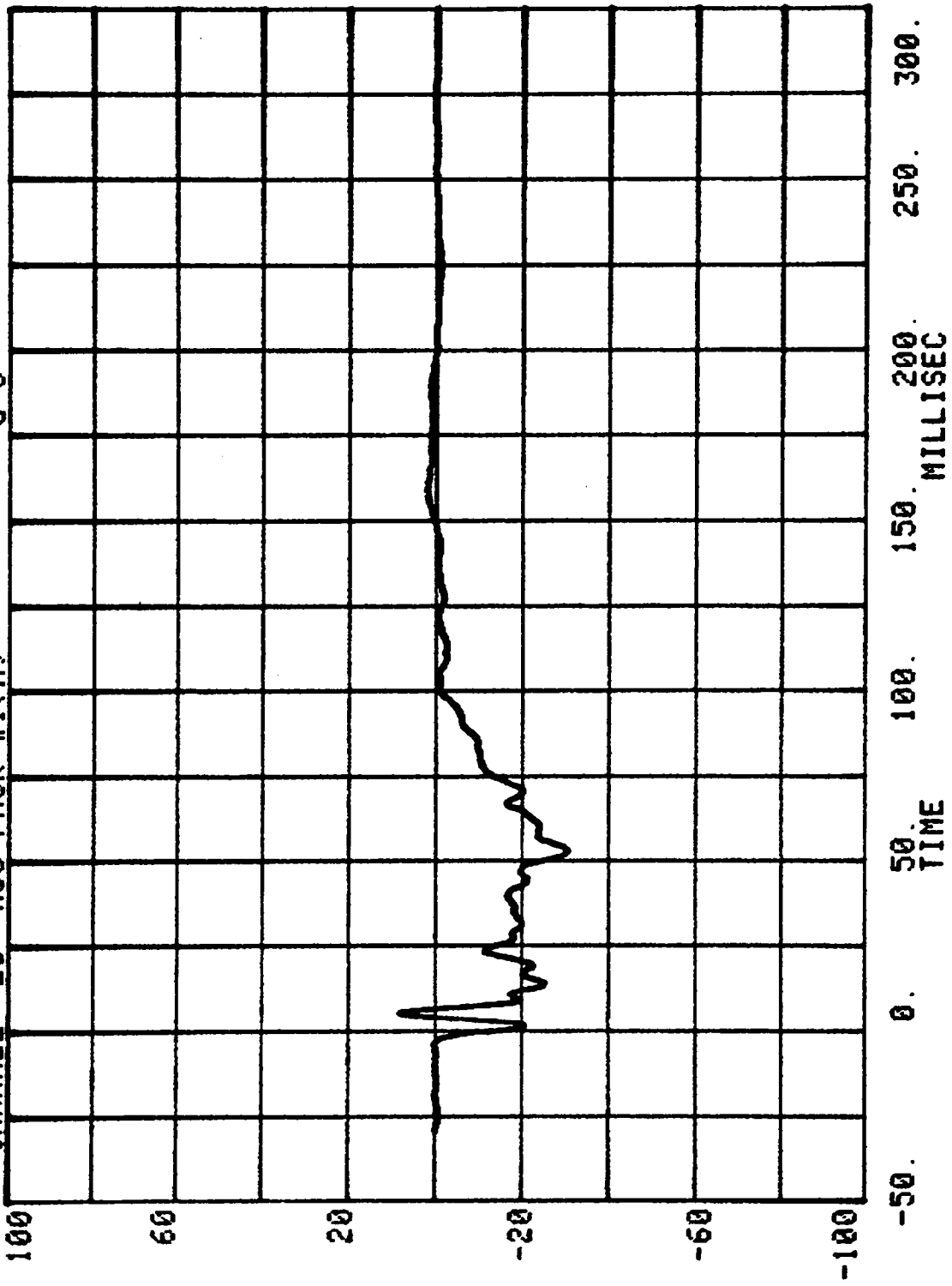
VEHICLE NO. 1 DATA

VEHICLE DATA

FILTER CHANNEL CLASS

60

RUN= 530 SERIES= 2
CHANNEL 25 ACC PACK #1(X) G'S



ACC. PACK. #1(X)

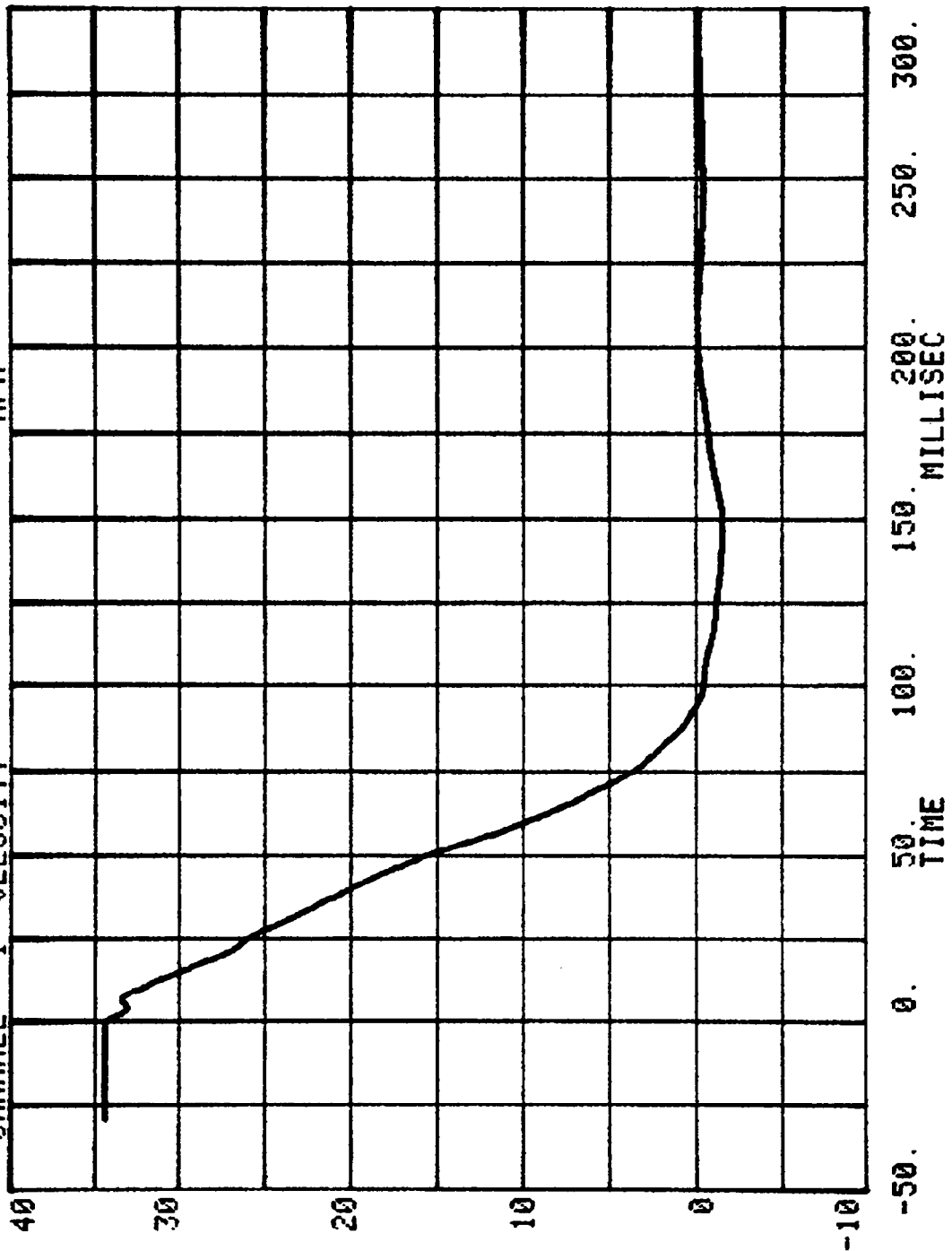
2 MPH

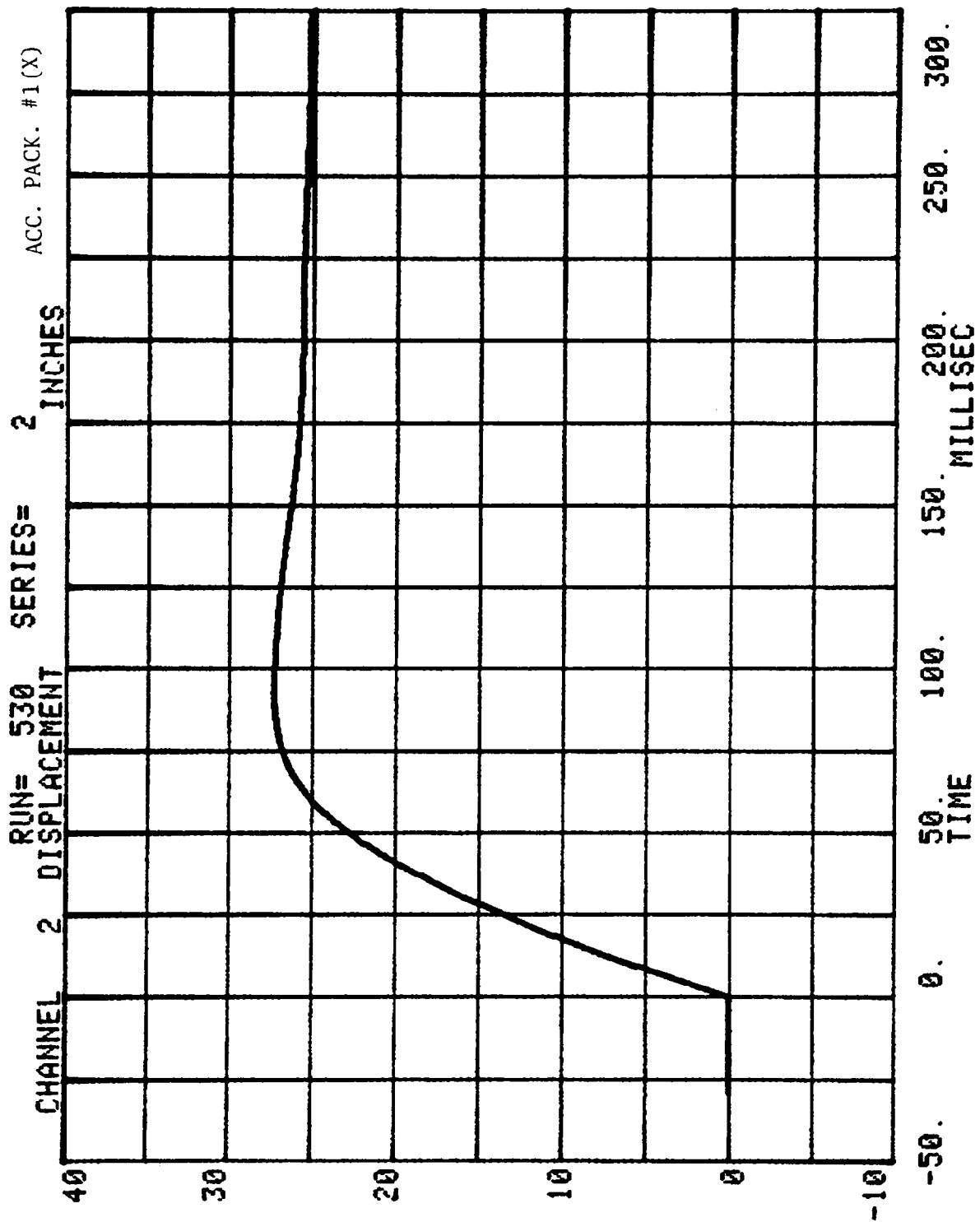
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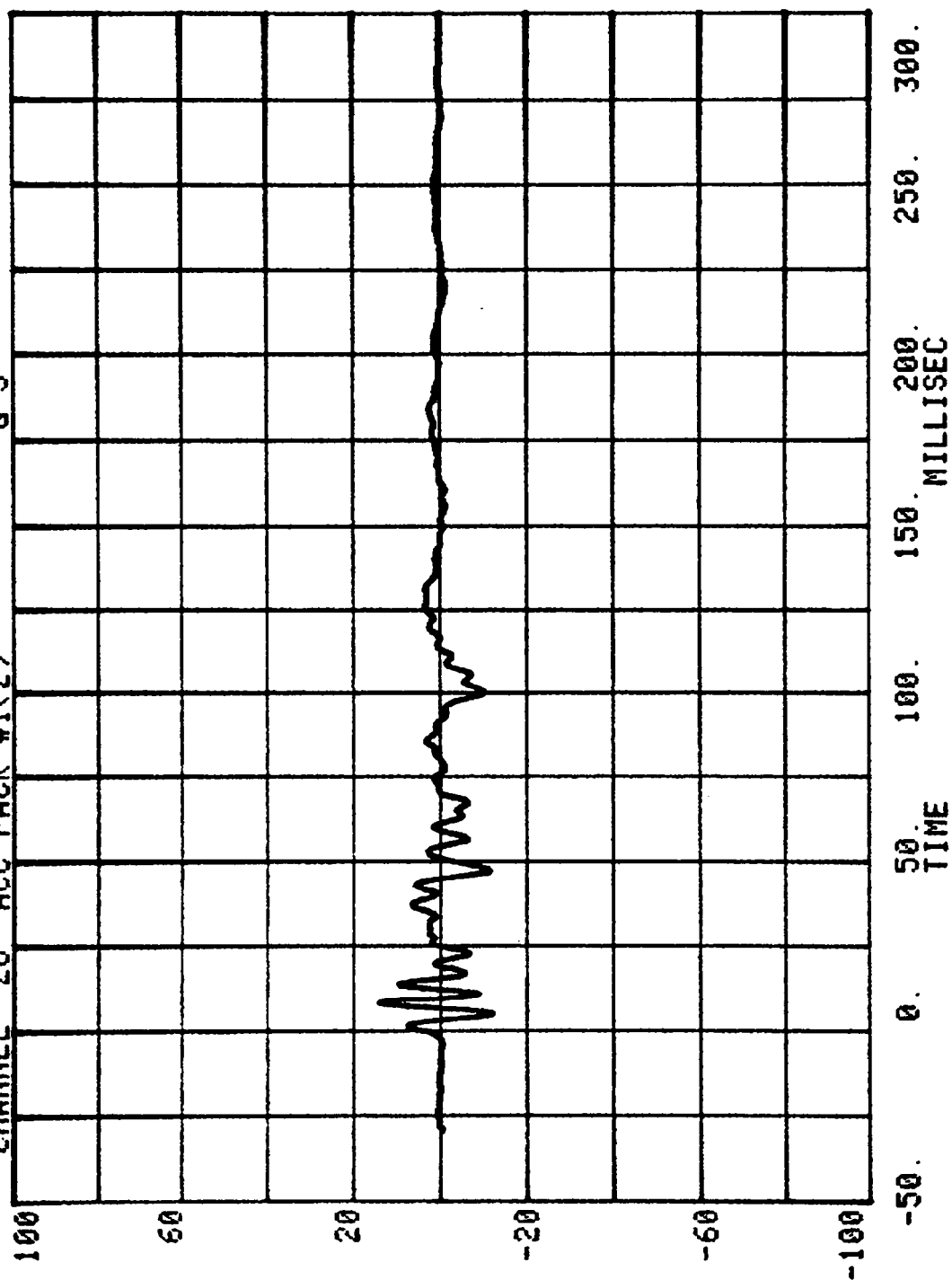
VELOCITY

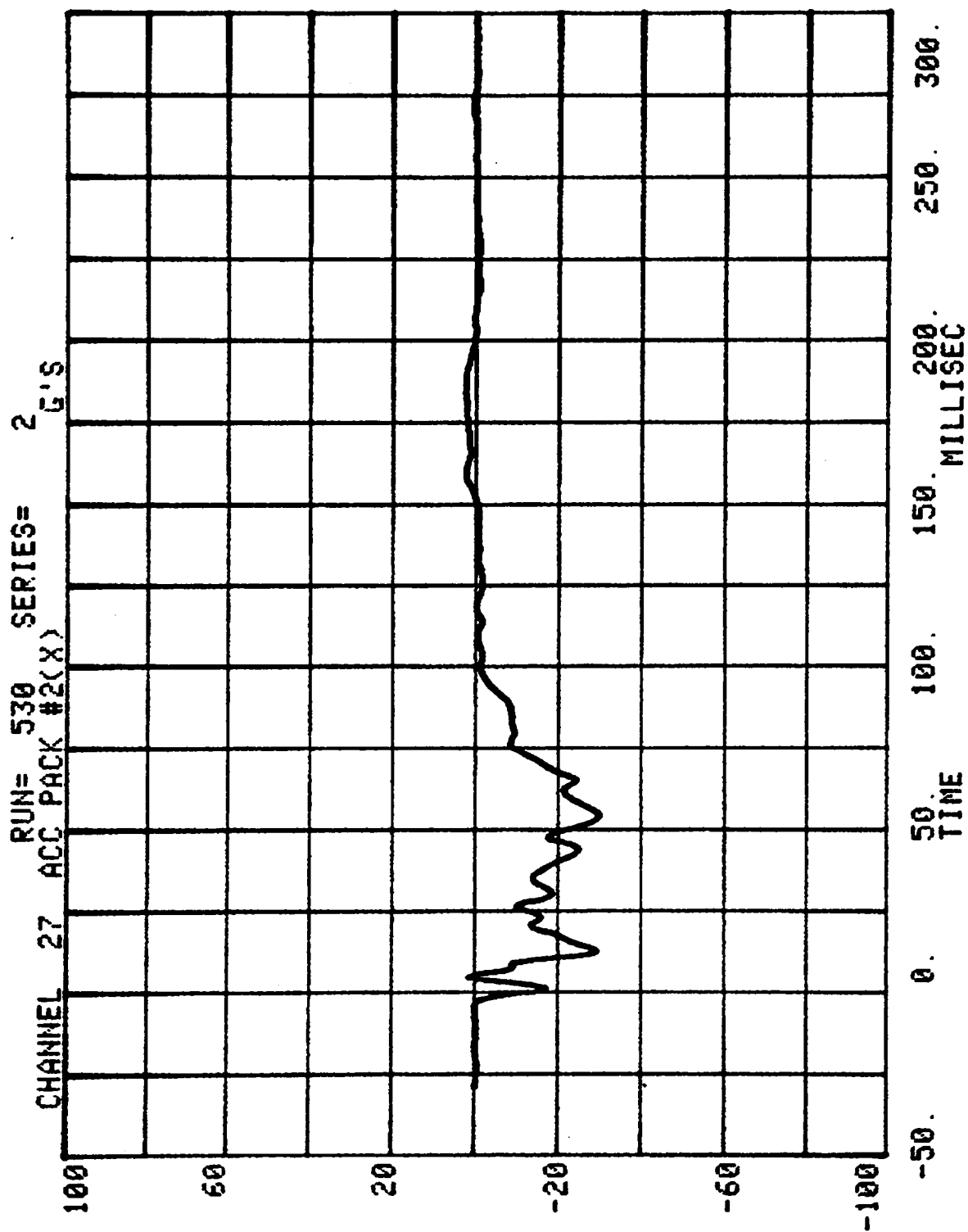
CHANNEL 1





CHANNEL 26 ACC PACK #1(2) RUN= 530 SERIES= 2 G'S



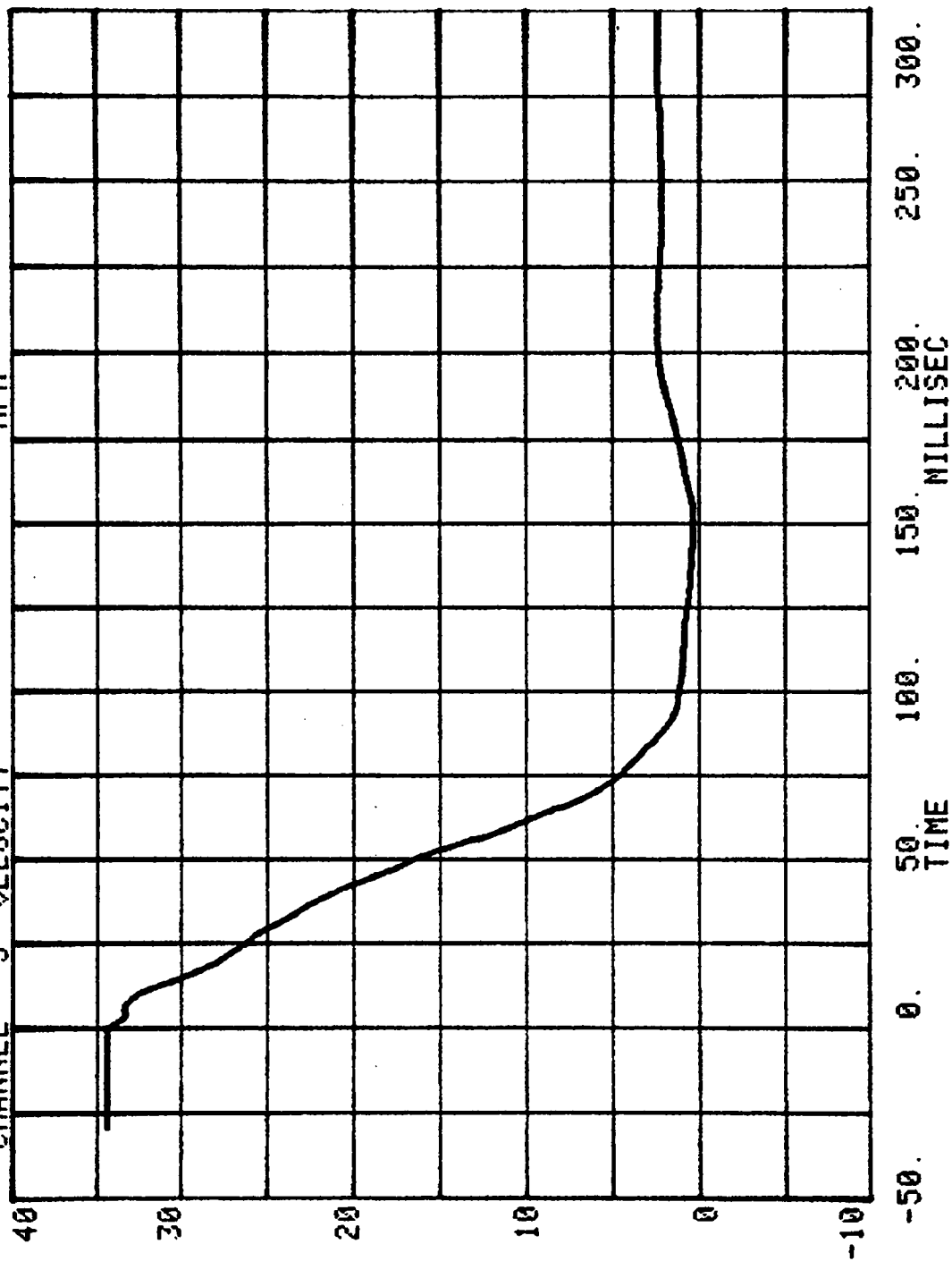


ACC. PACK. #2(X)

CHANNEL 3 VELOCITY 2 MPH

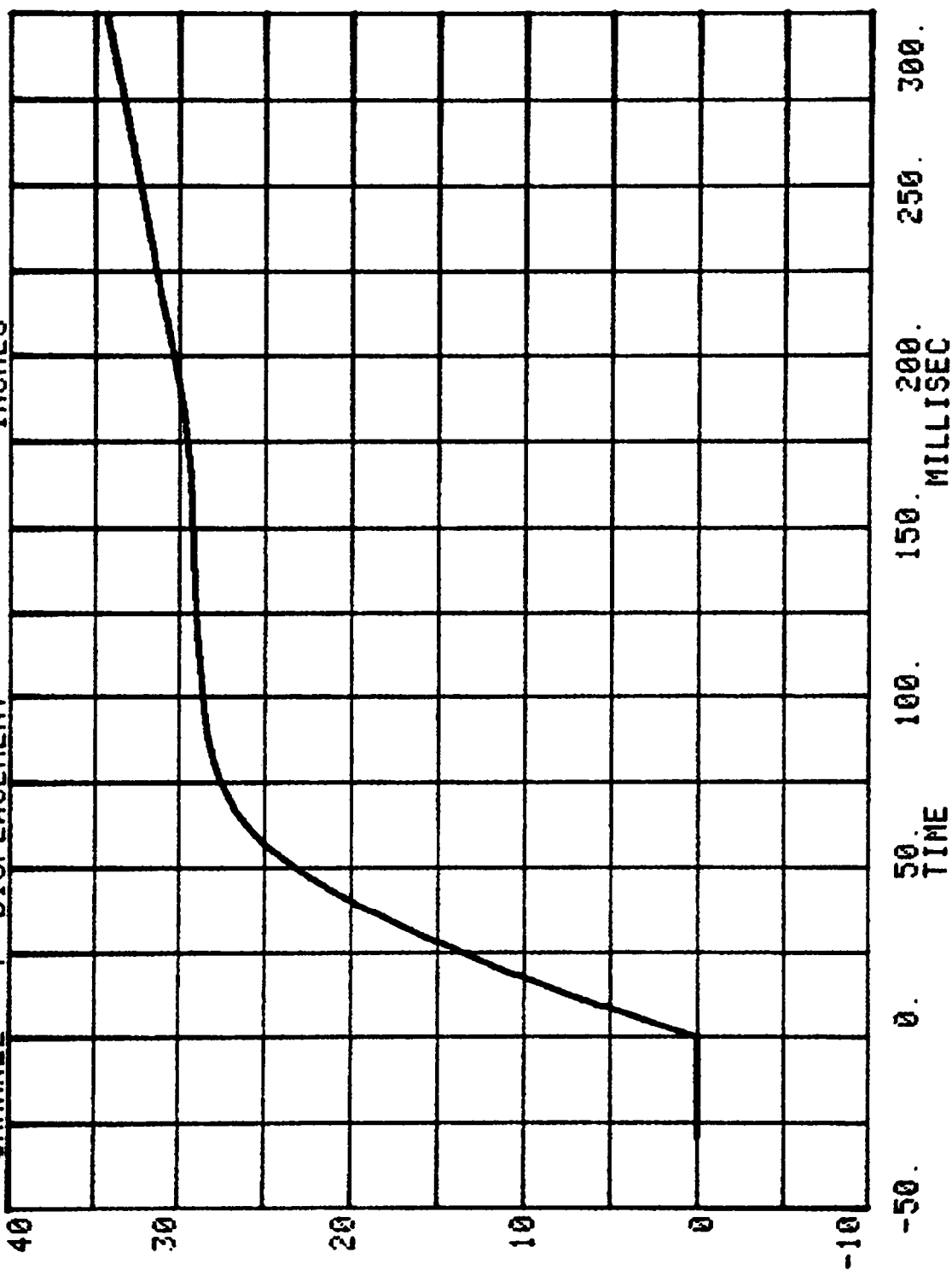
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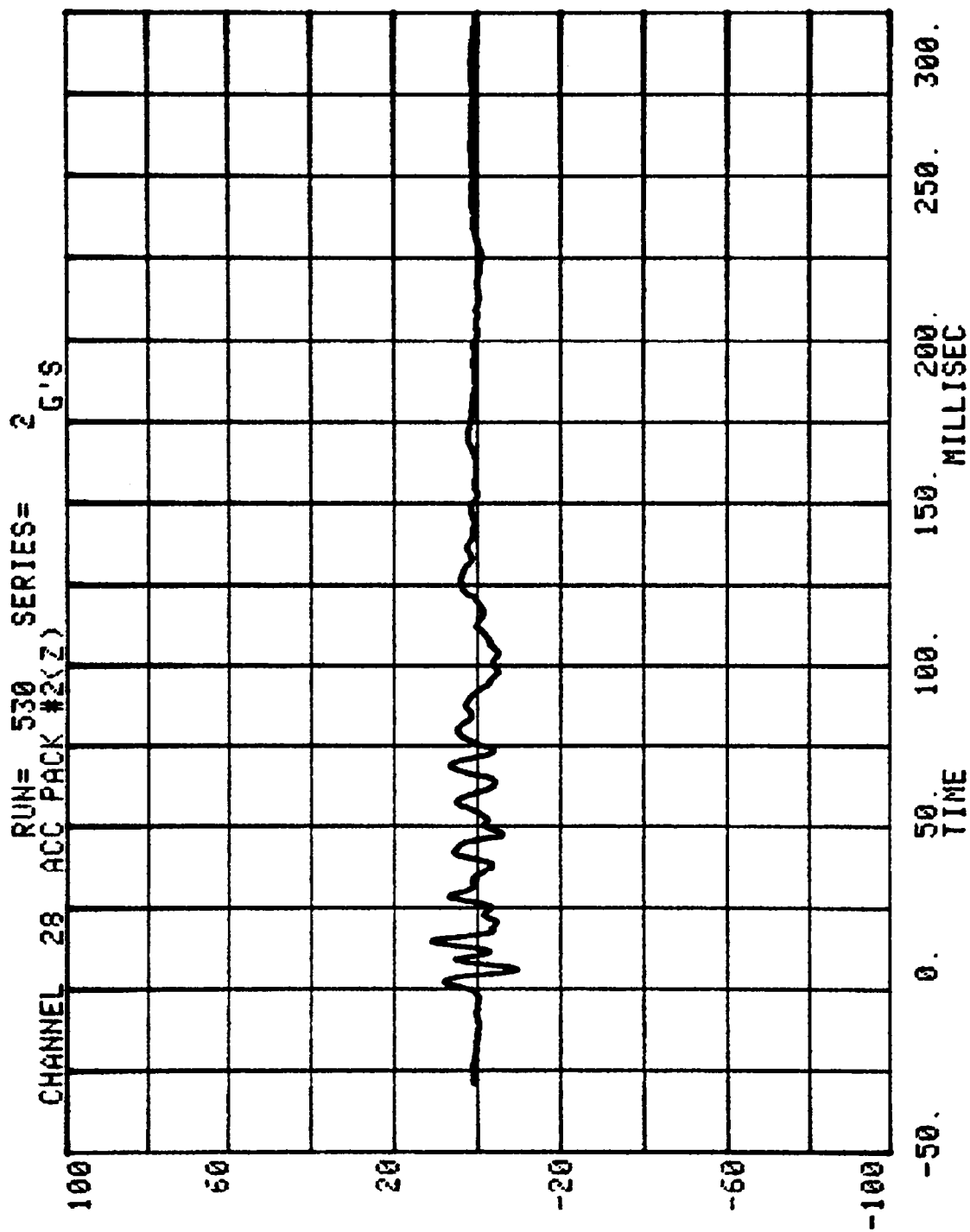
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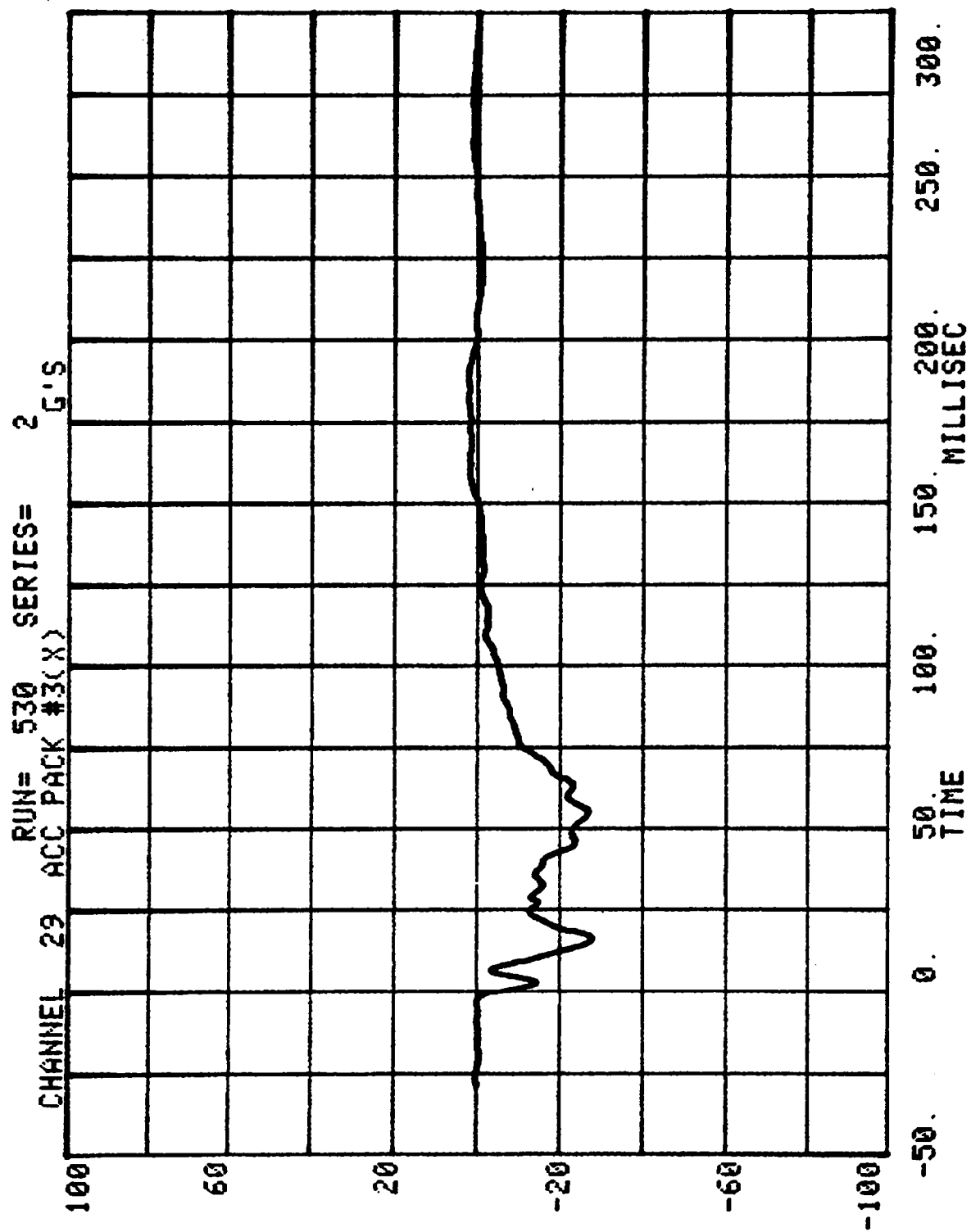


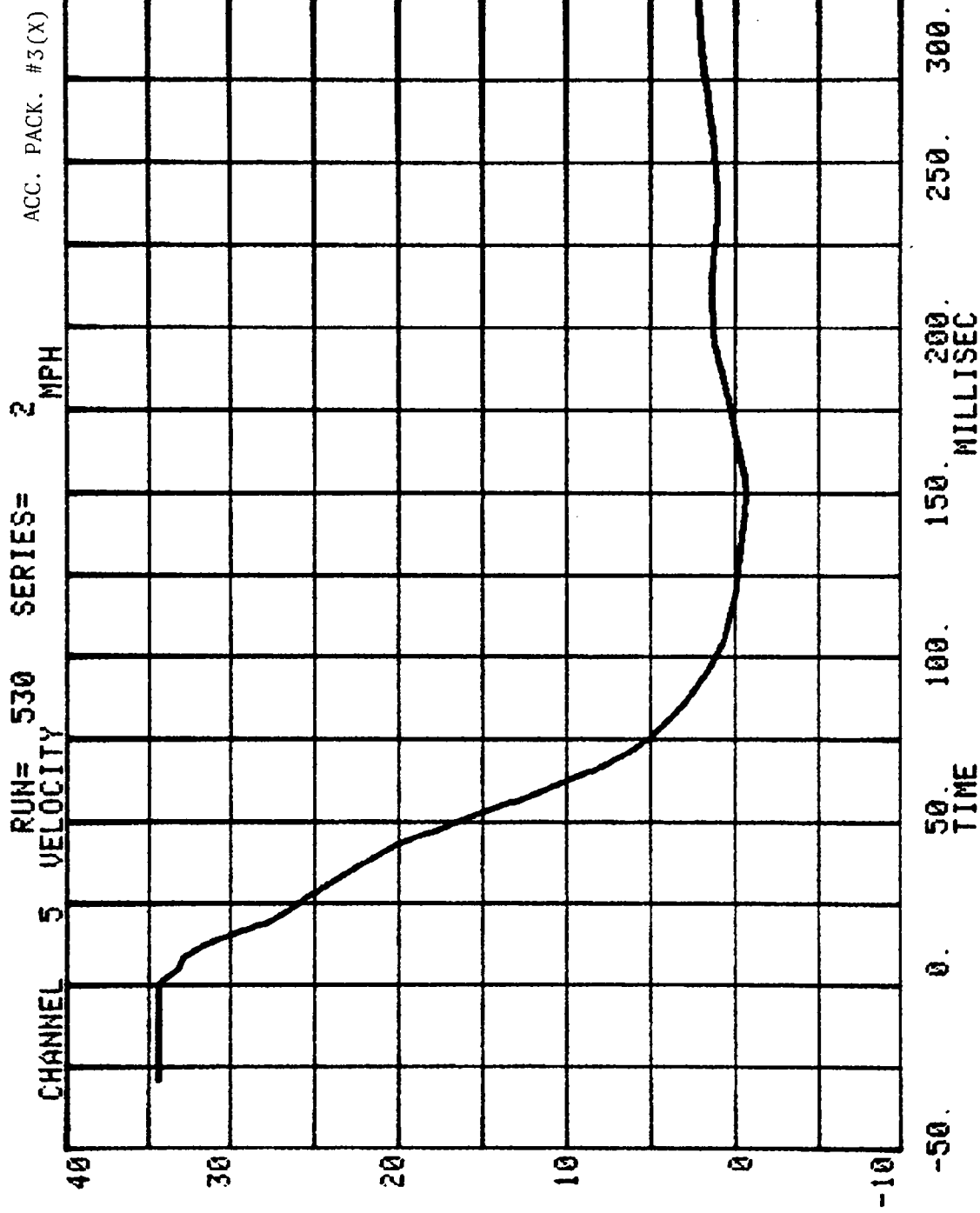
ACC. PACK. #2(X)

CHANNEL 4 DISPLACEMENT
RUN= 530
SERIES= 2 INCHES

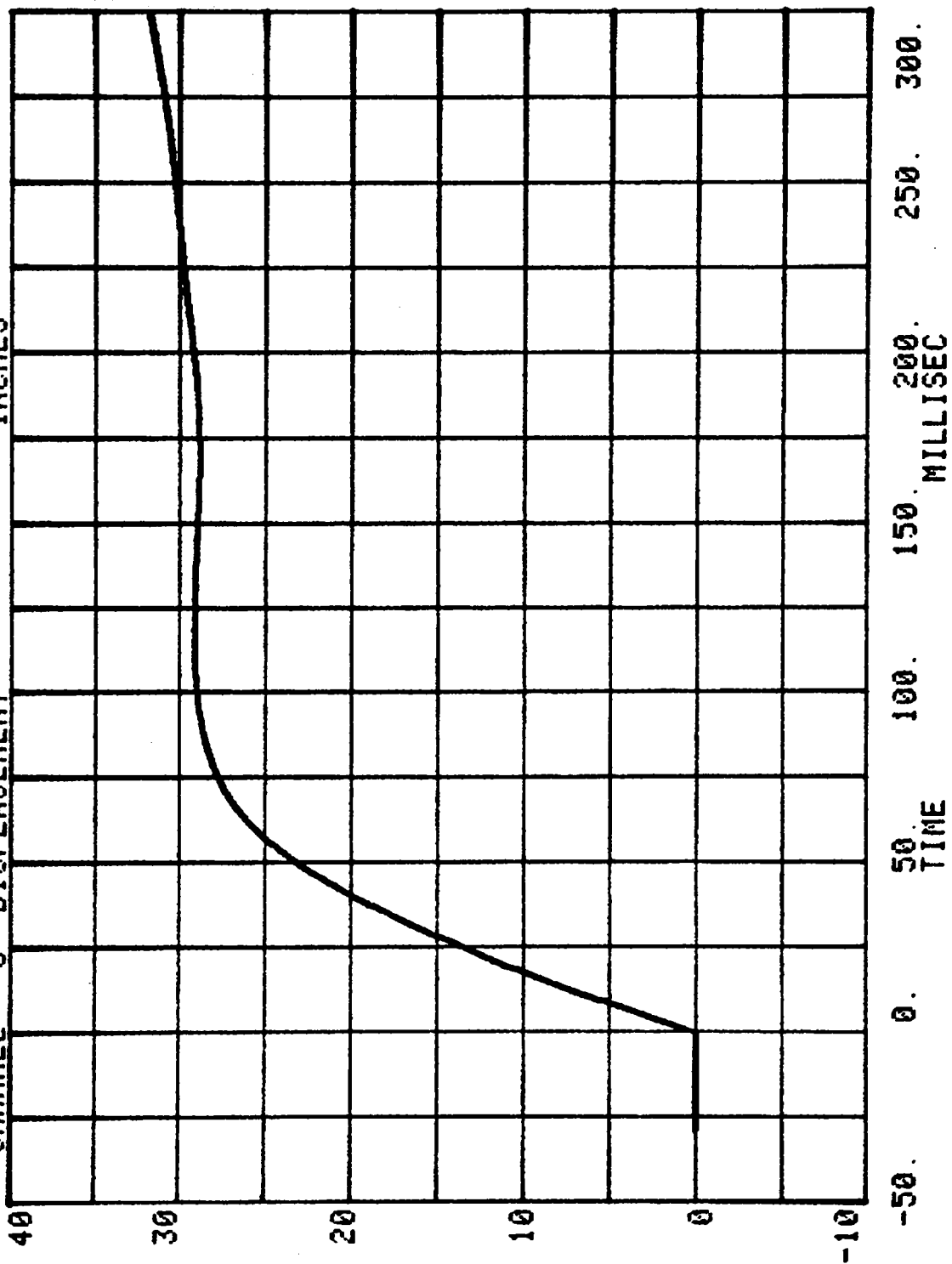


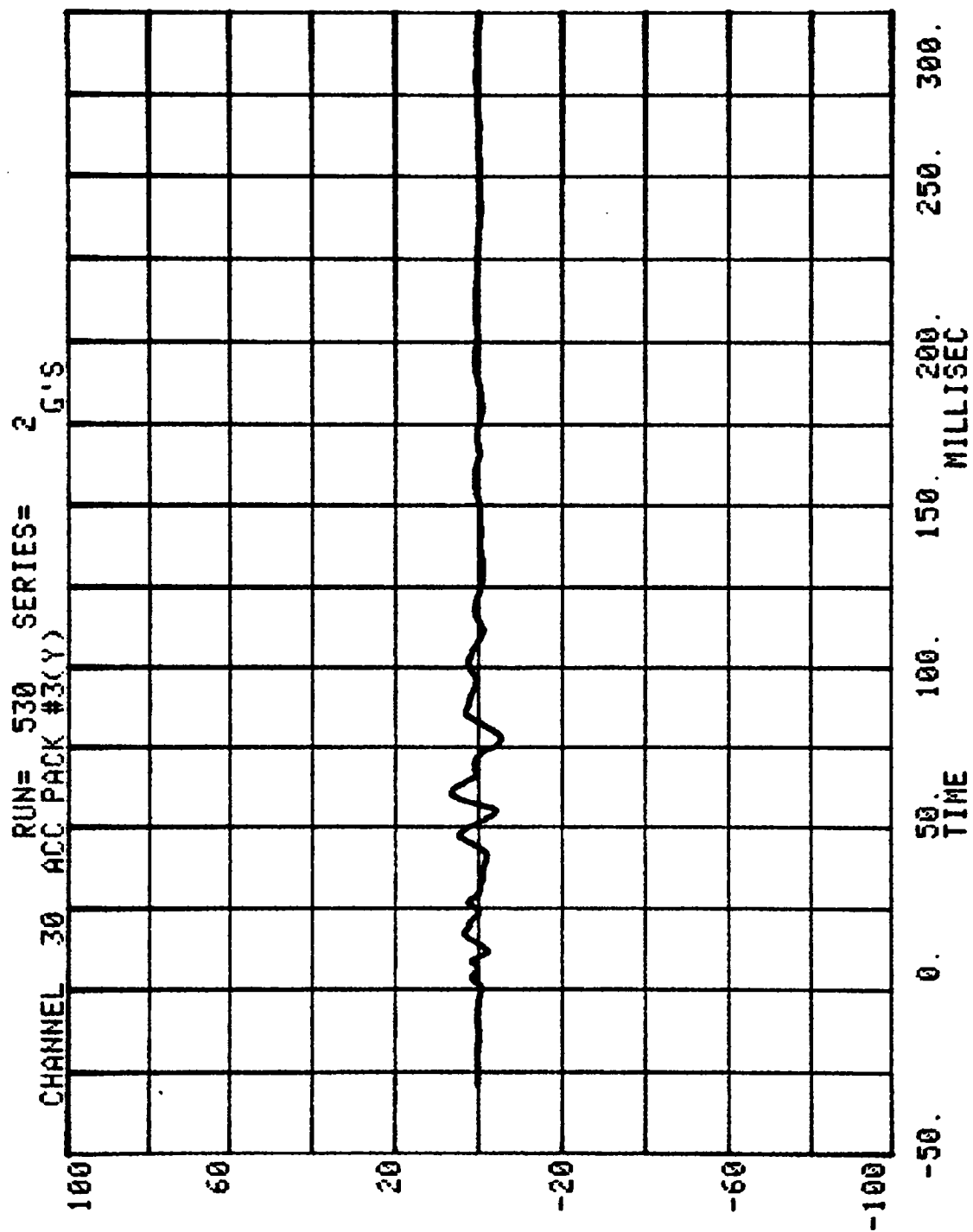




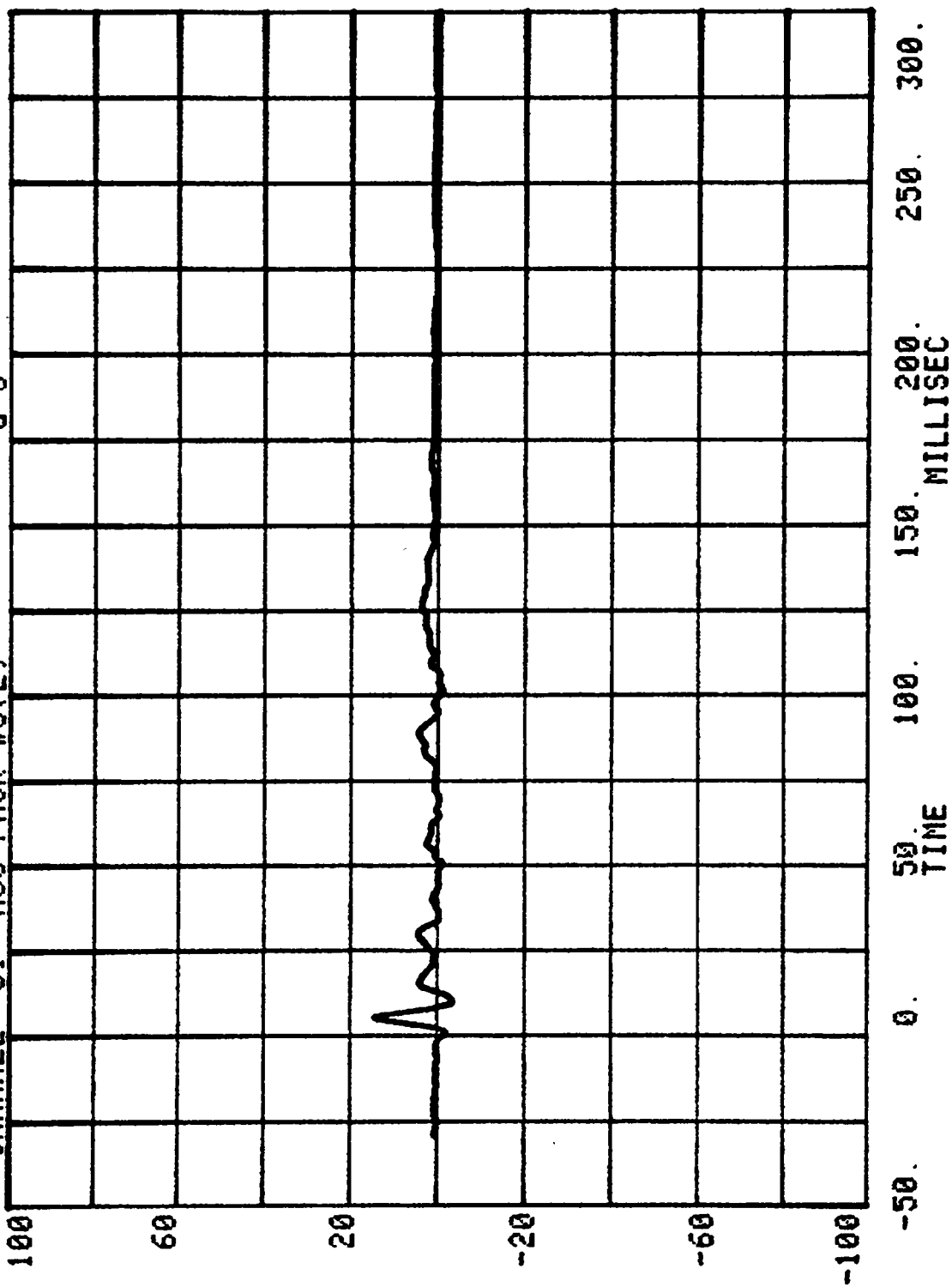


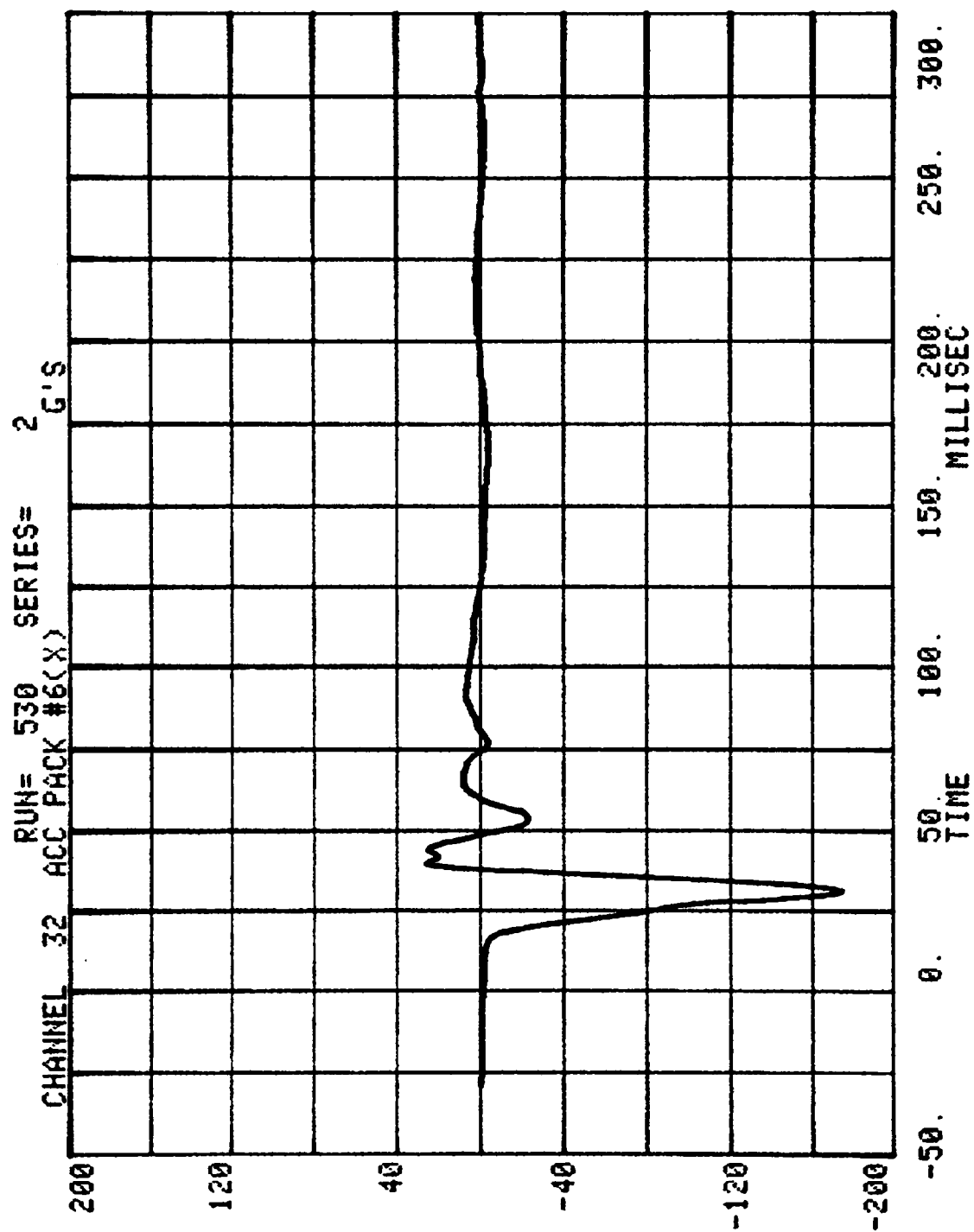
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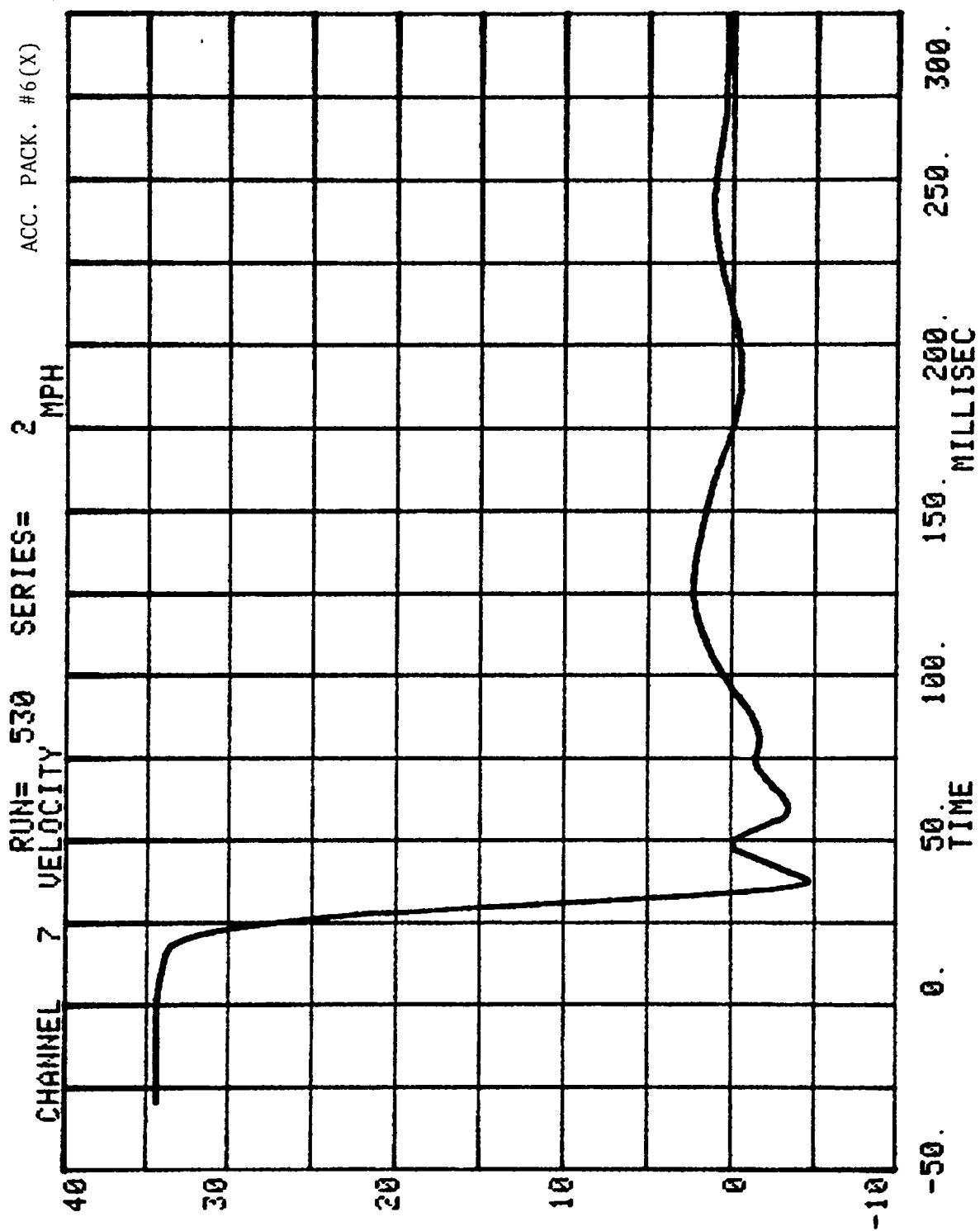




CHANNEL 31 ACC PACK #3(2) RUN= 530 SERIES= 2 G'S





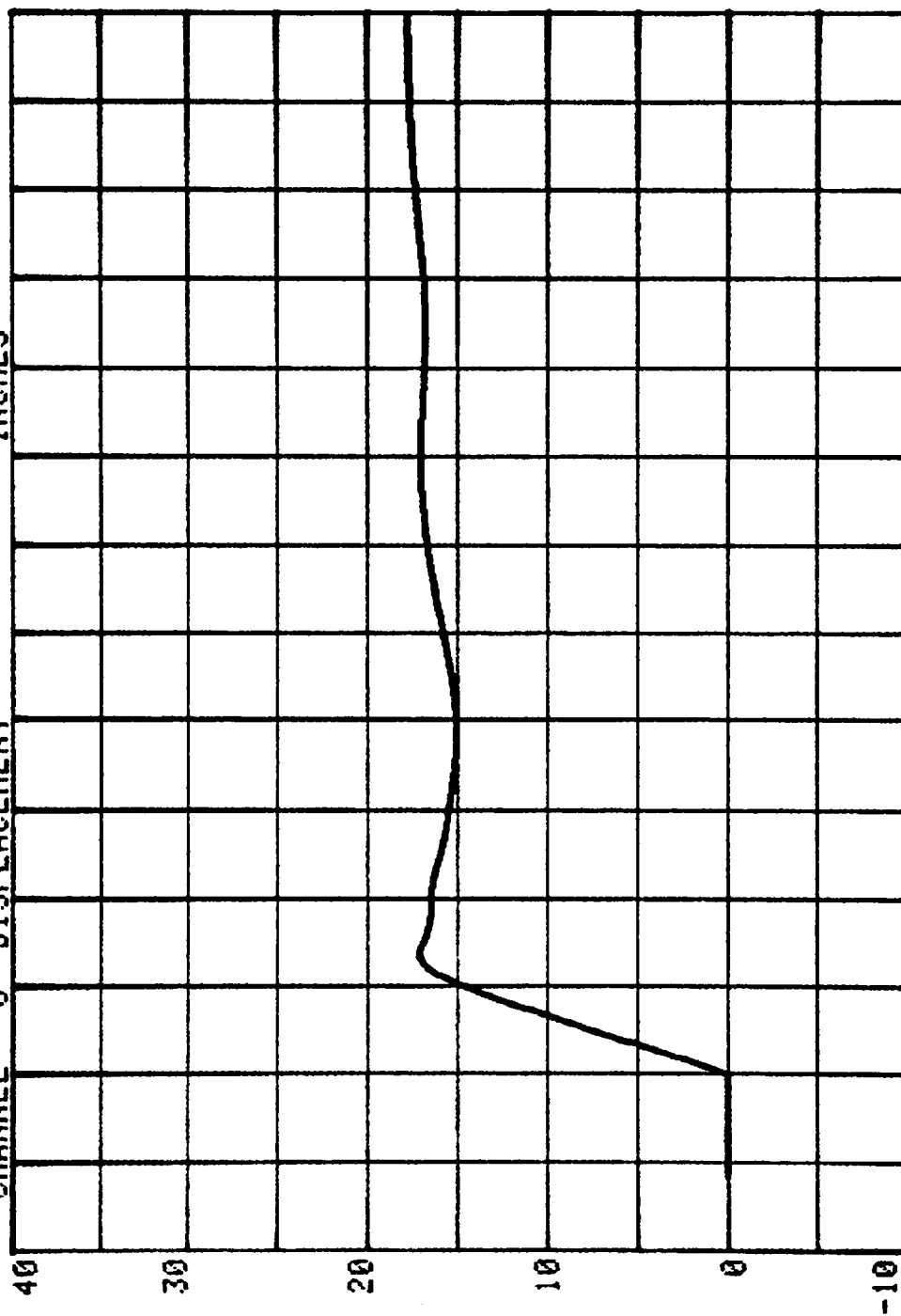


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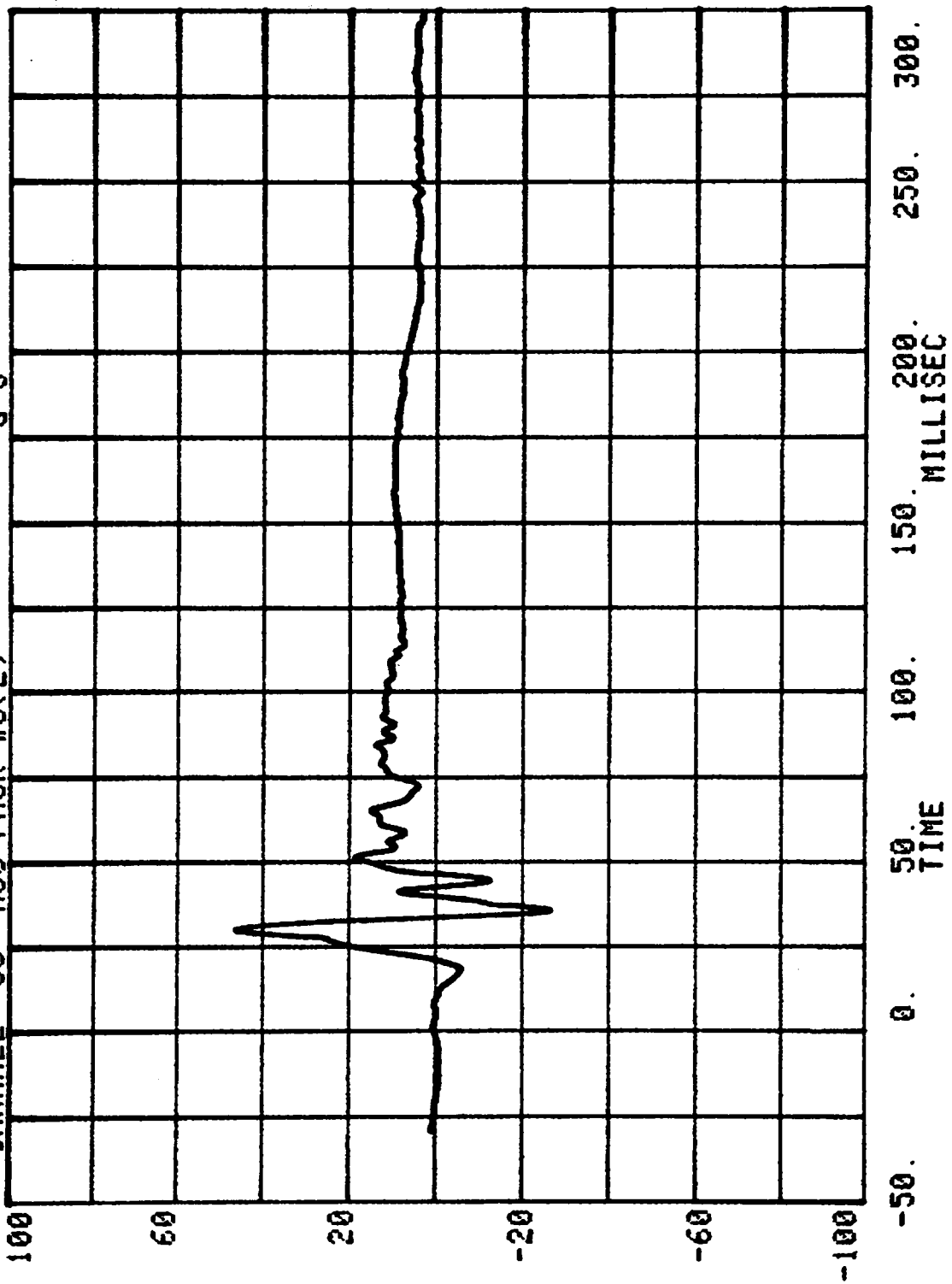
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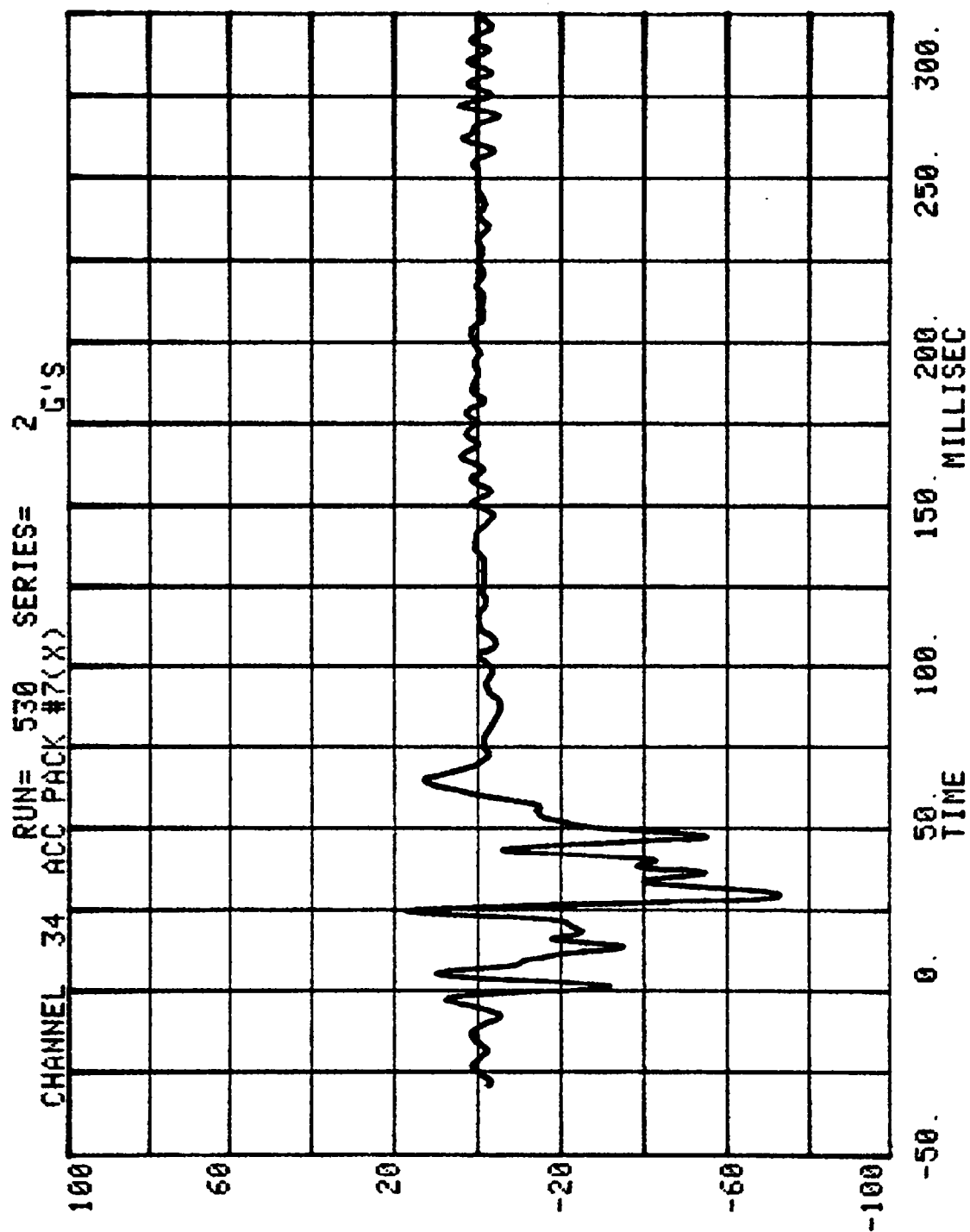
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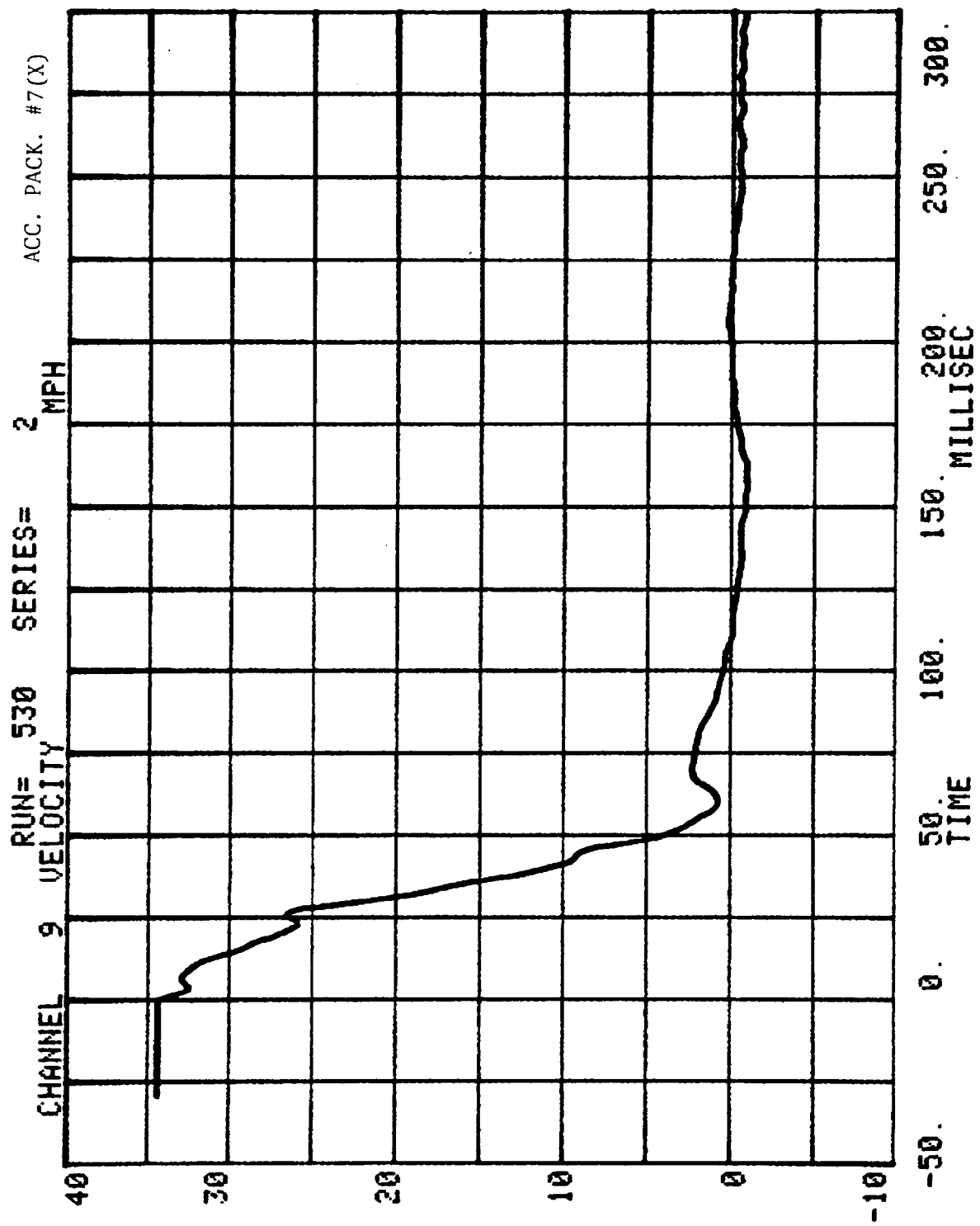
CHANNEL 8



CHANNEL 33 ACC PACK #6(Z) RUN= 530 SERIES= 2 G'S





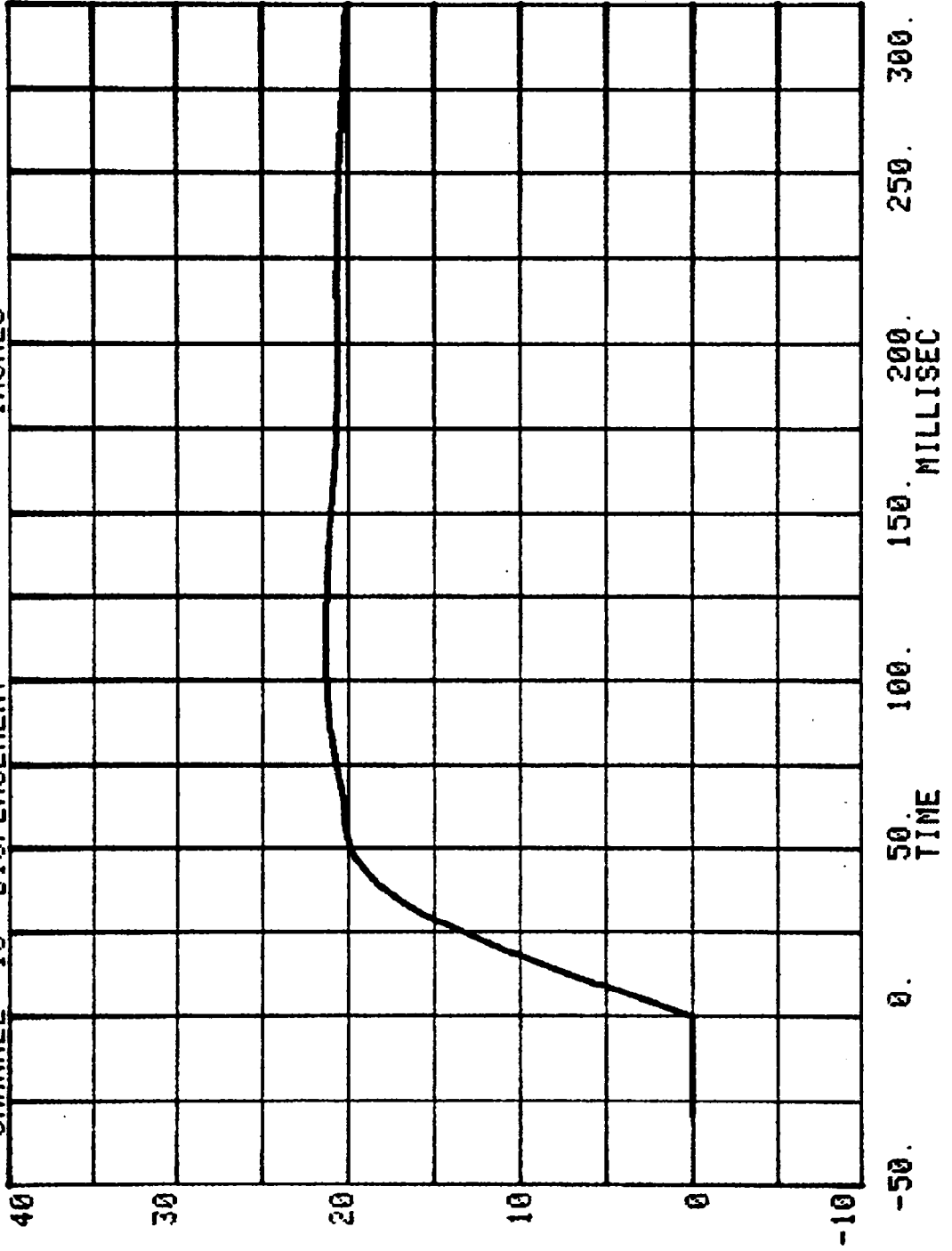


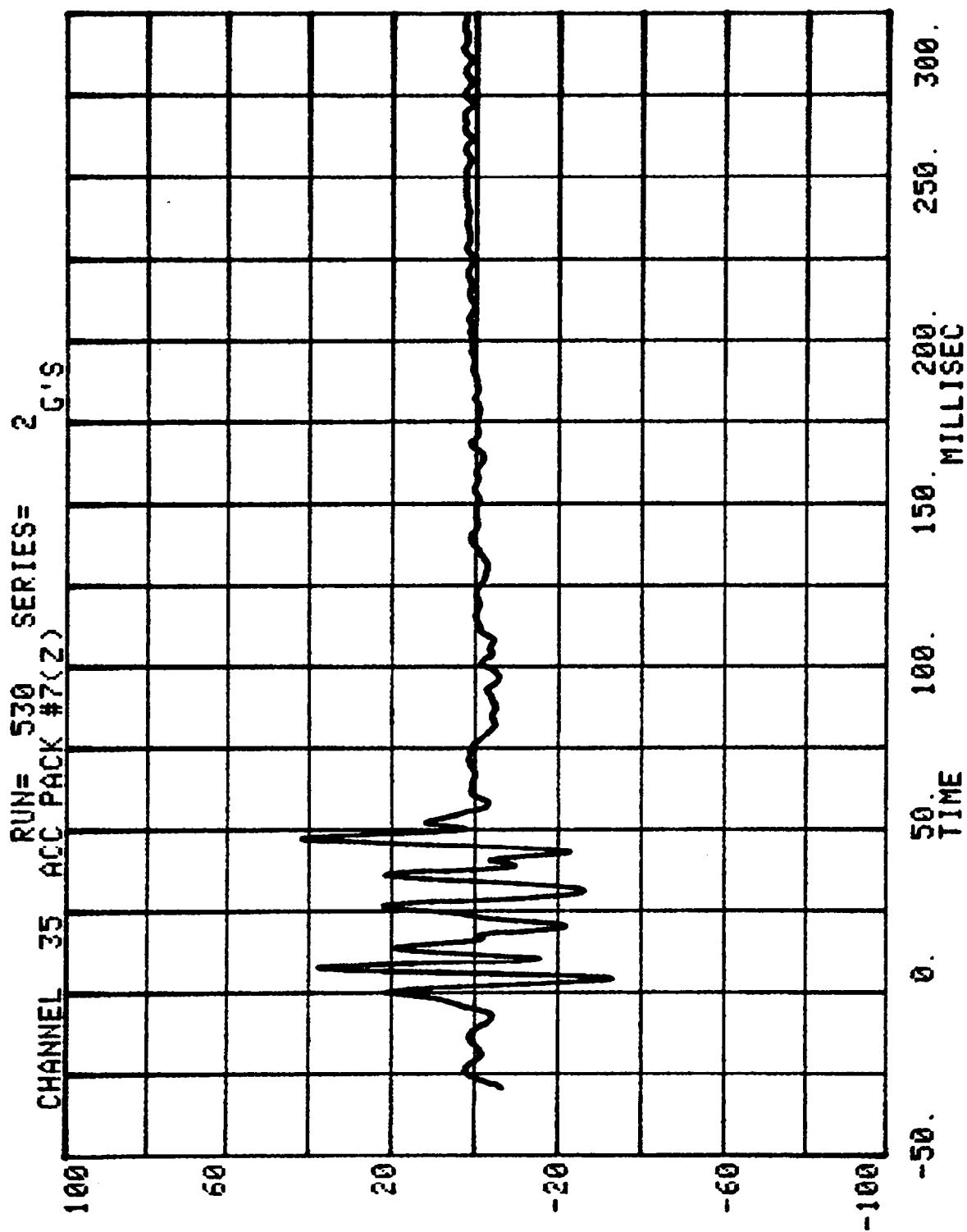
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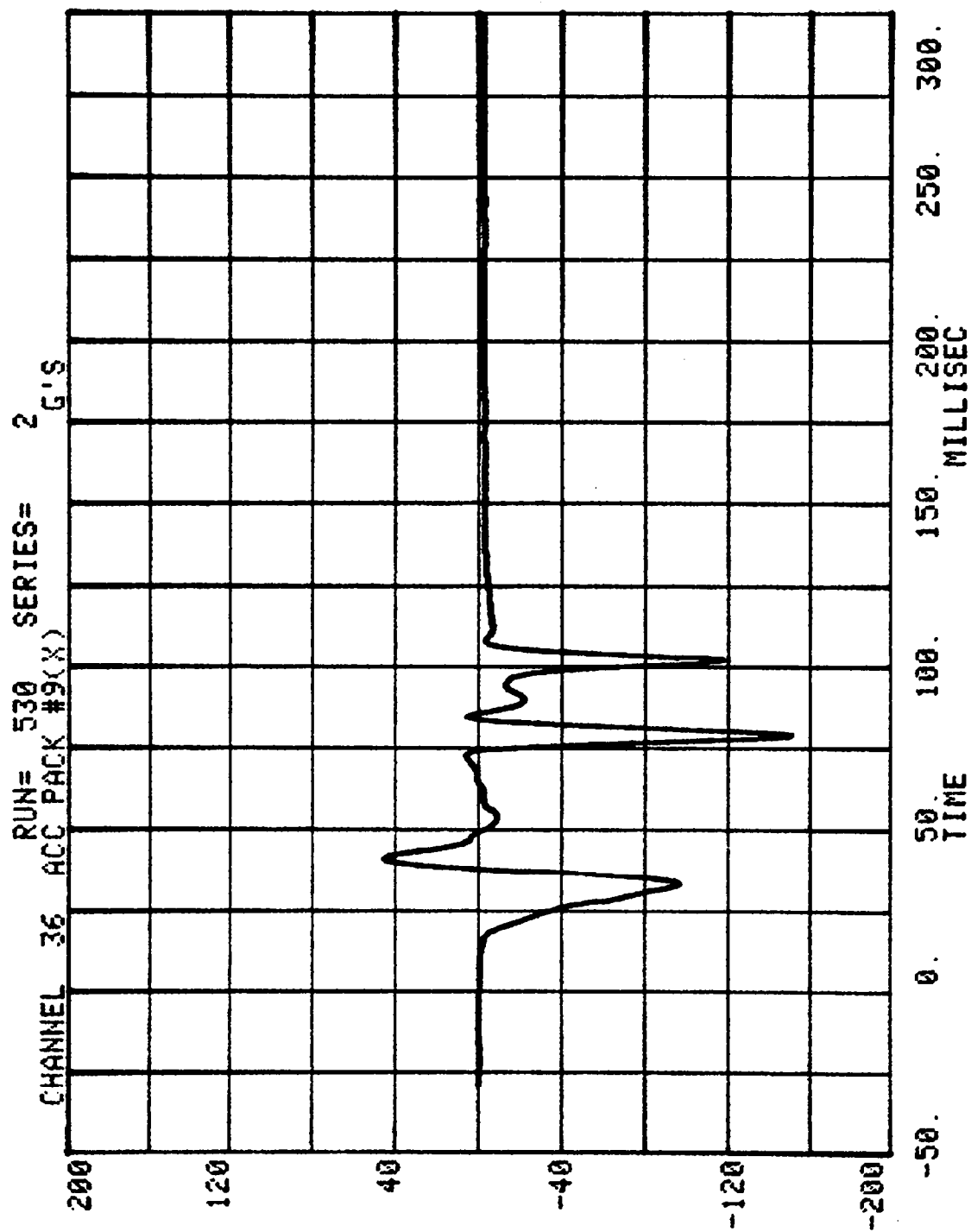
SERIES= 2 INCHES

RUN= 530

CHANNEL 10 DISPLACEMENT







ACC. PACK. #9(X)

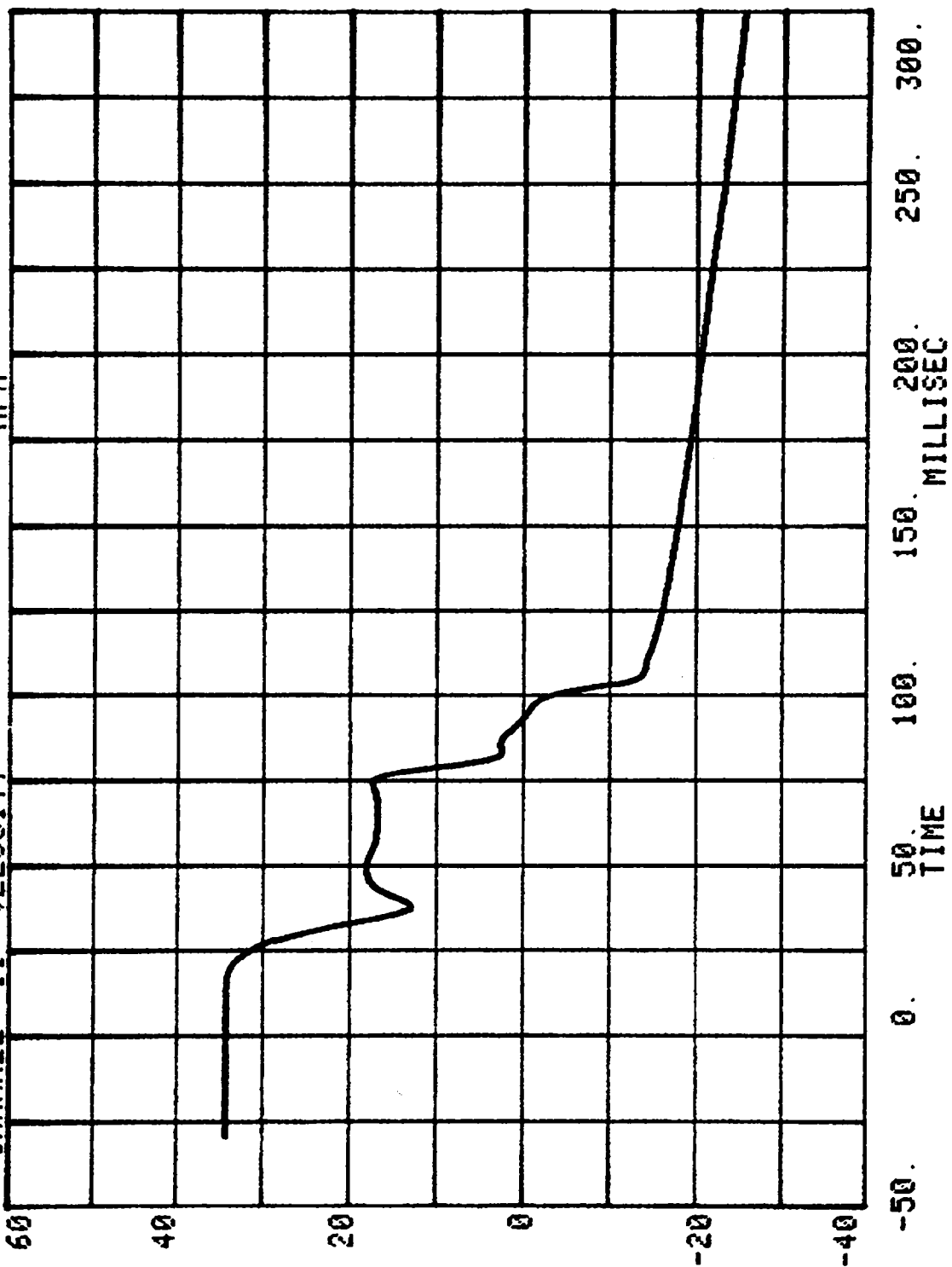
2 MPH

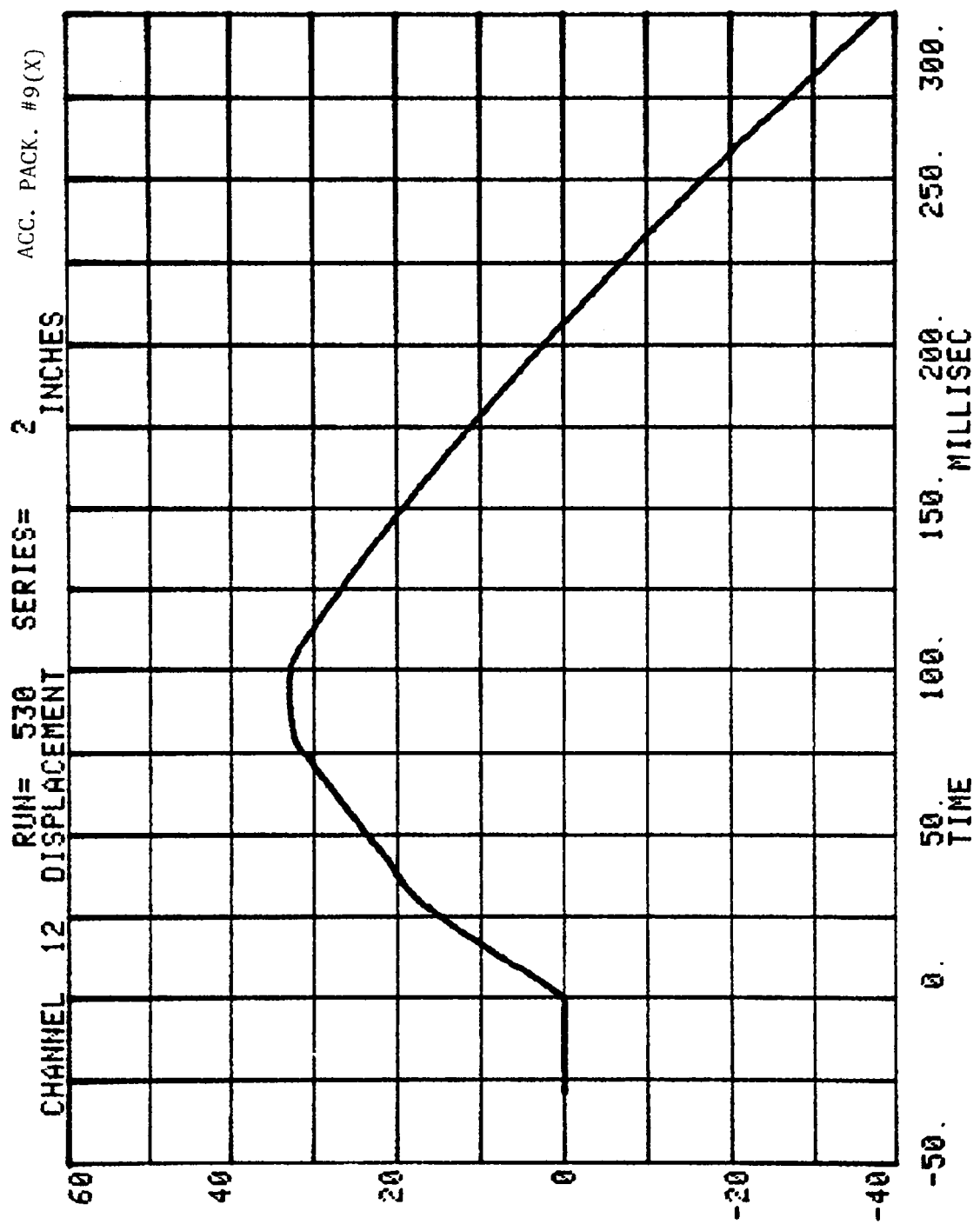
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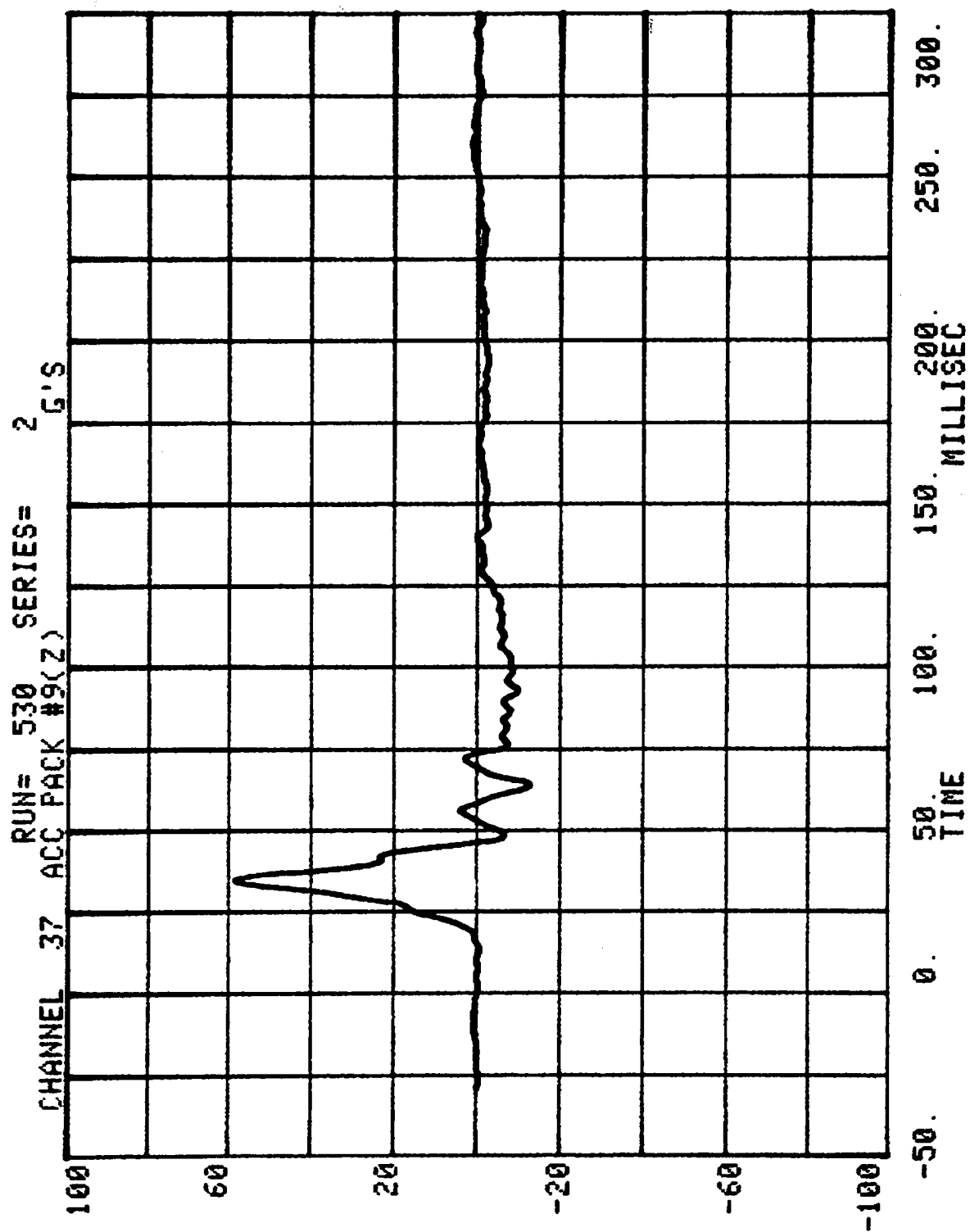
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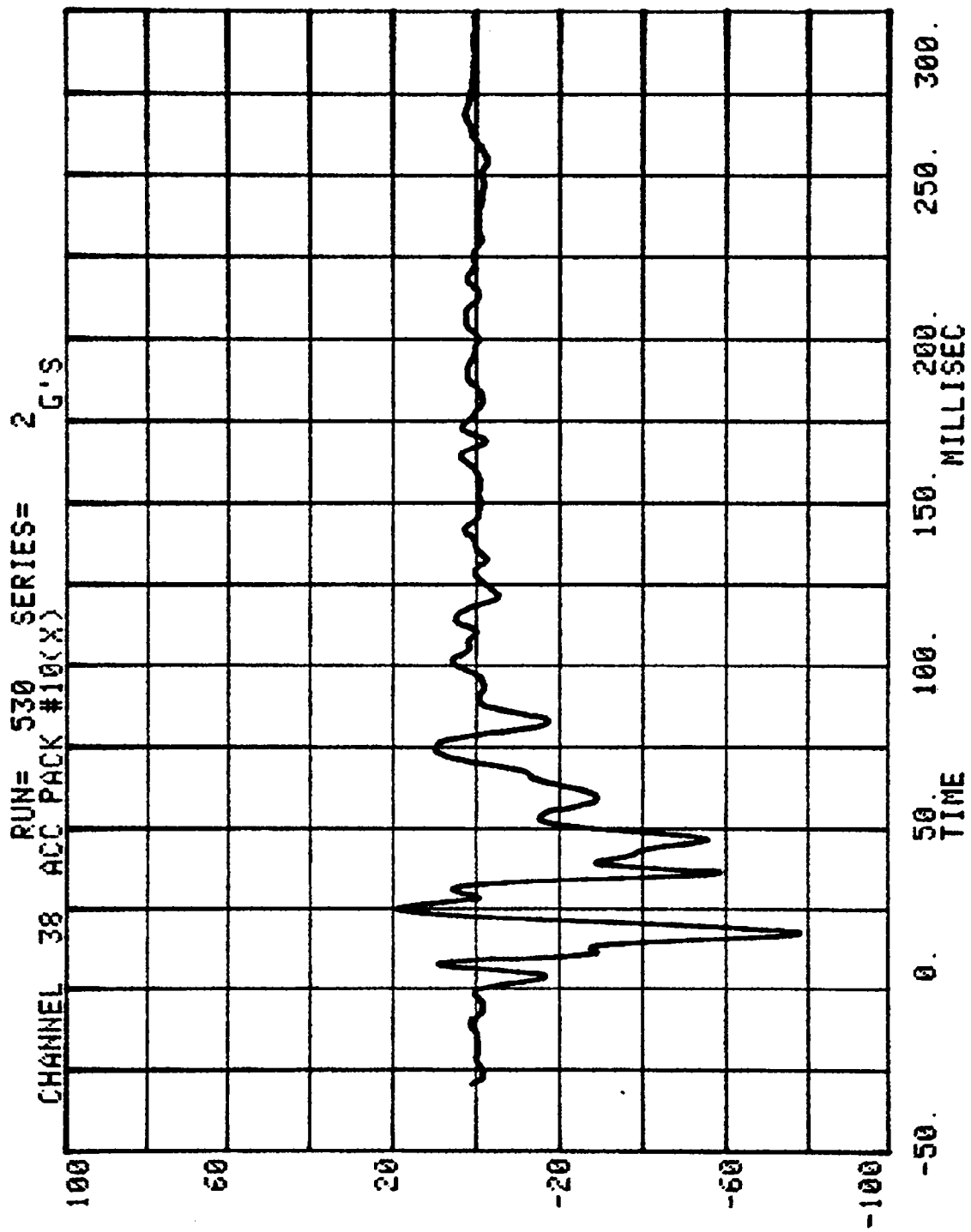
VELOCITY

CHANNEL 11



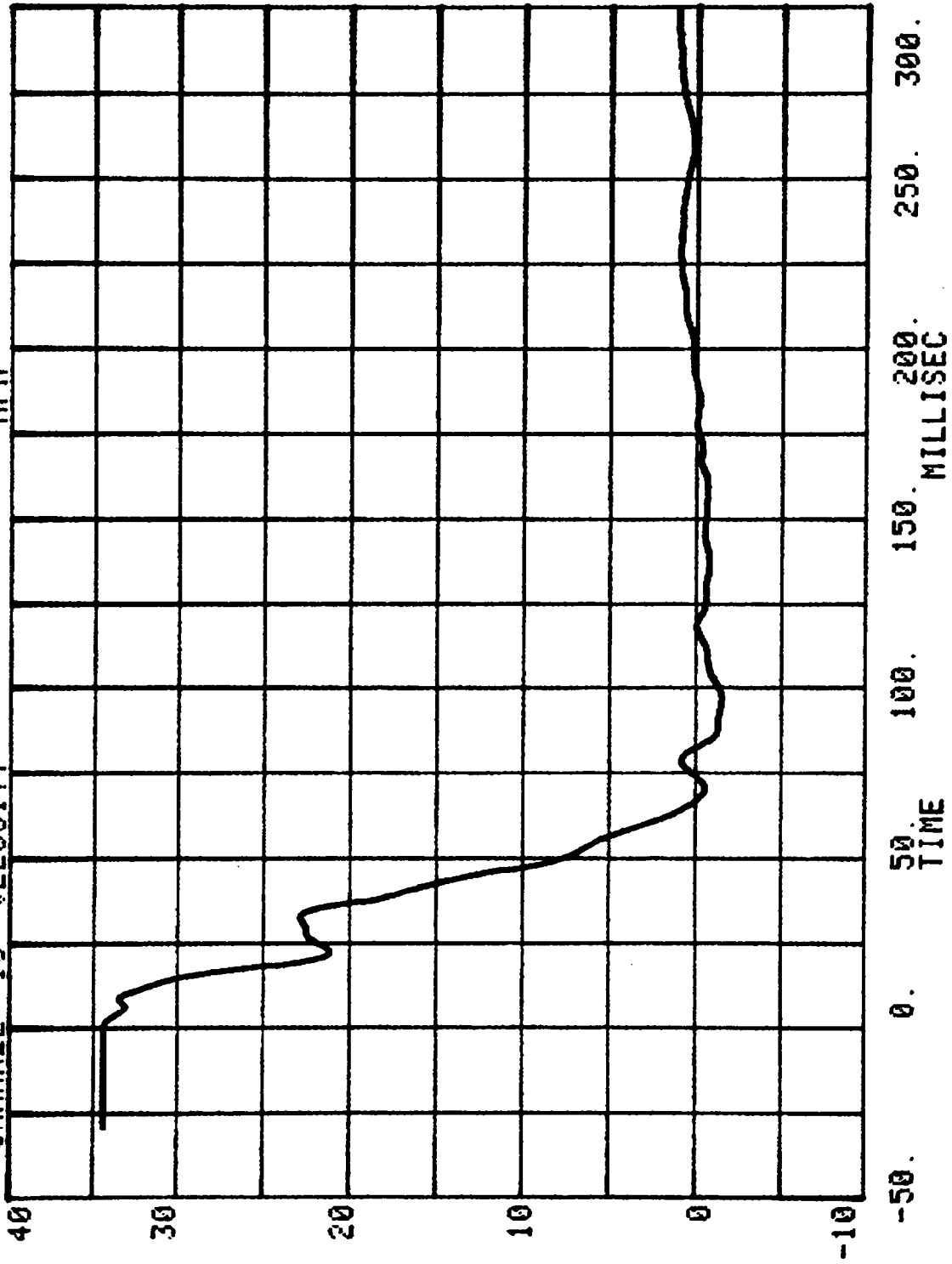


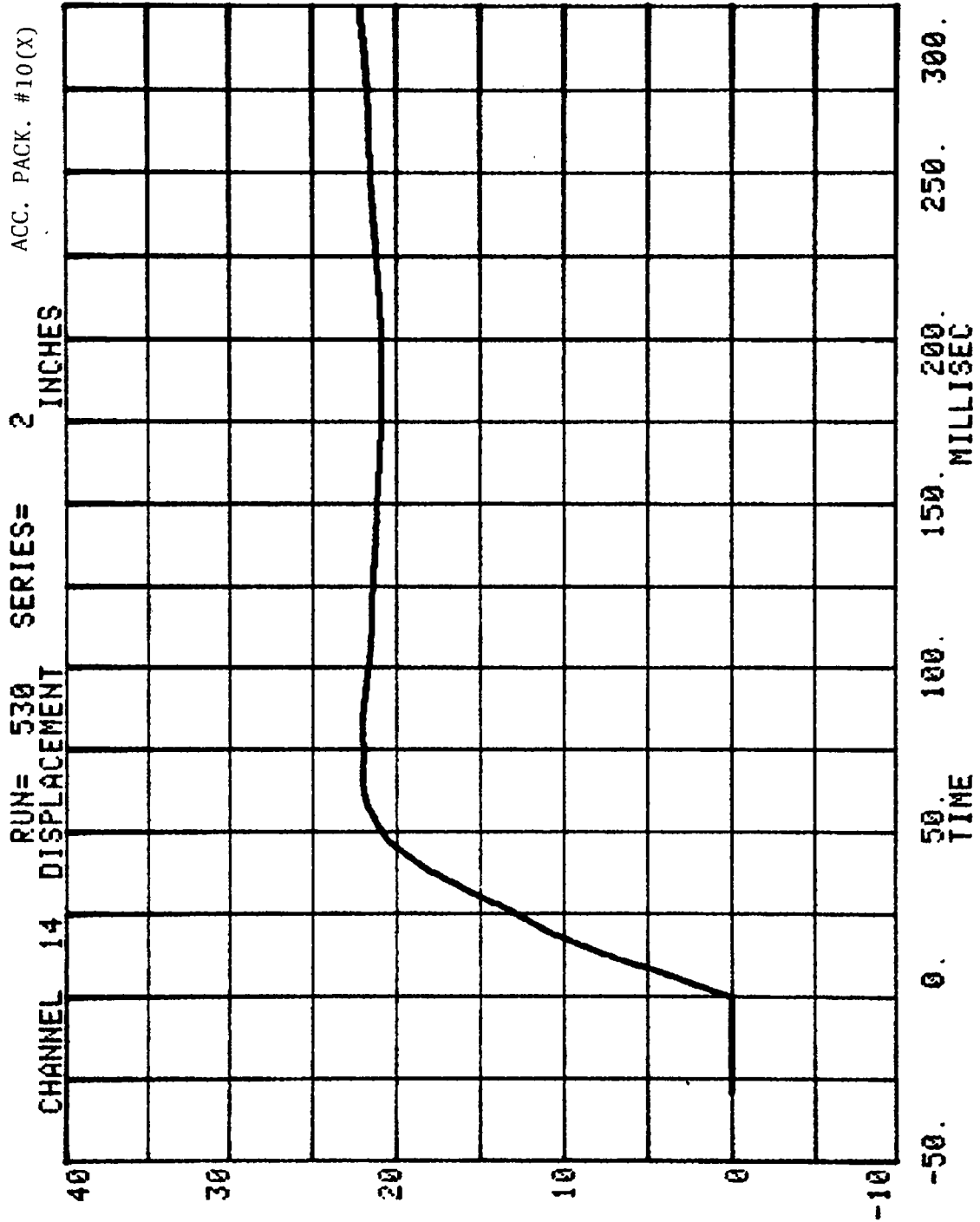


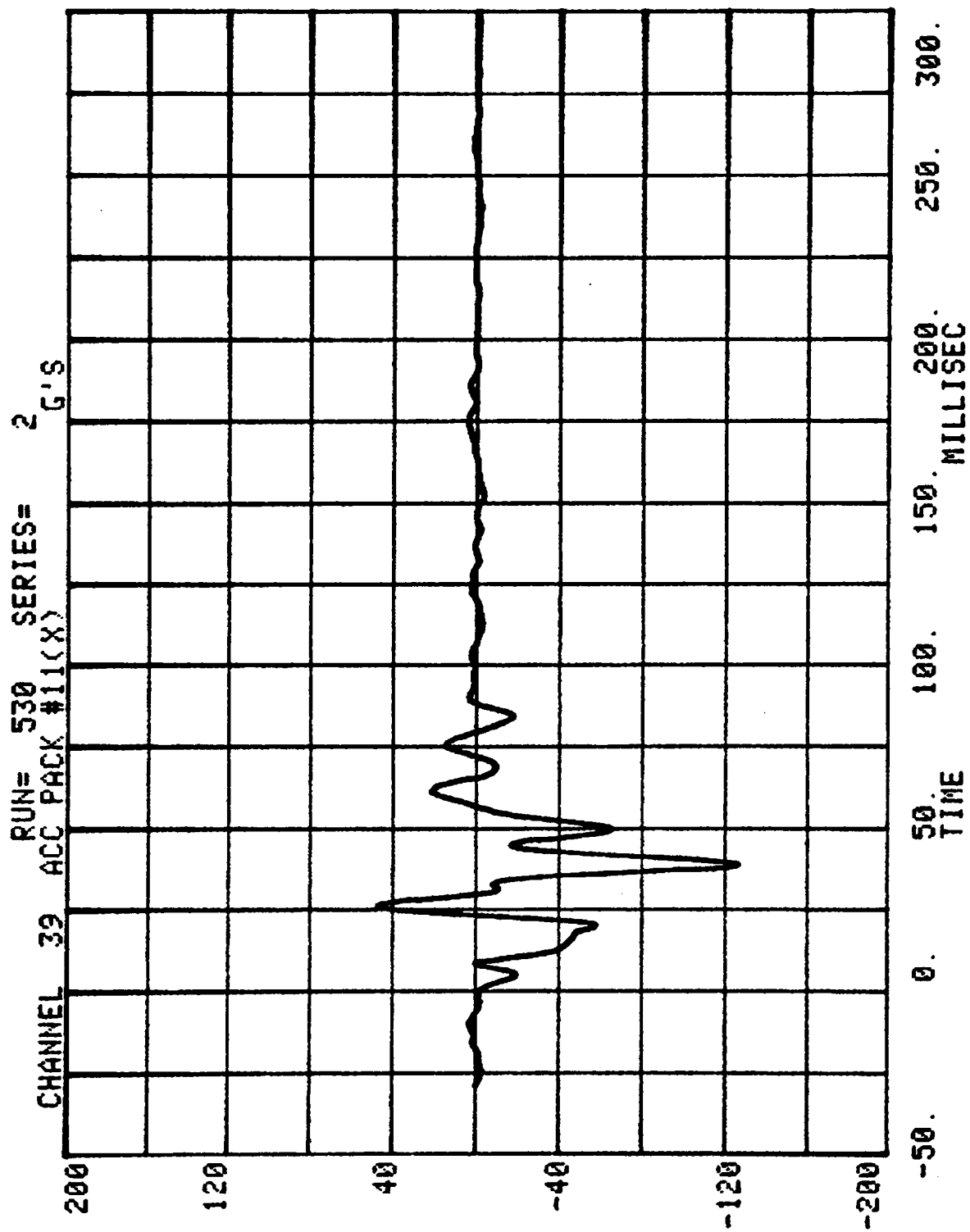


ACC. PACK. #10(X)

CHANNEL 13 VELOCITY
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ACC. PACK #11(X)

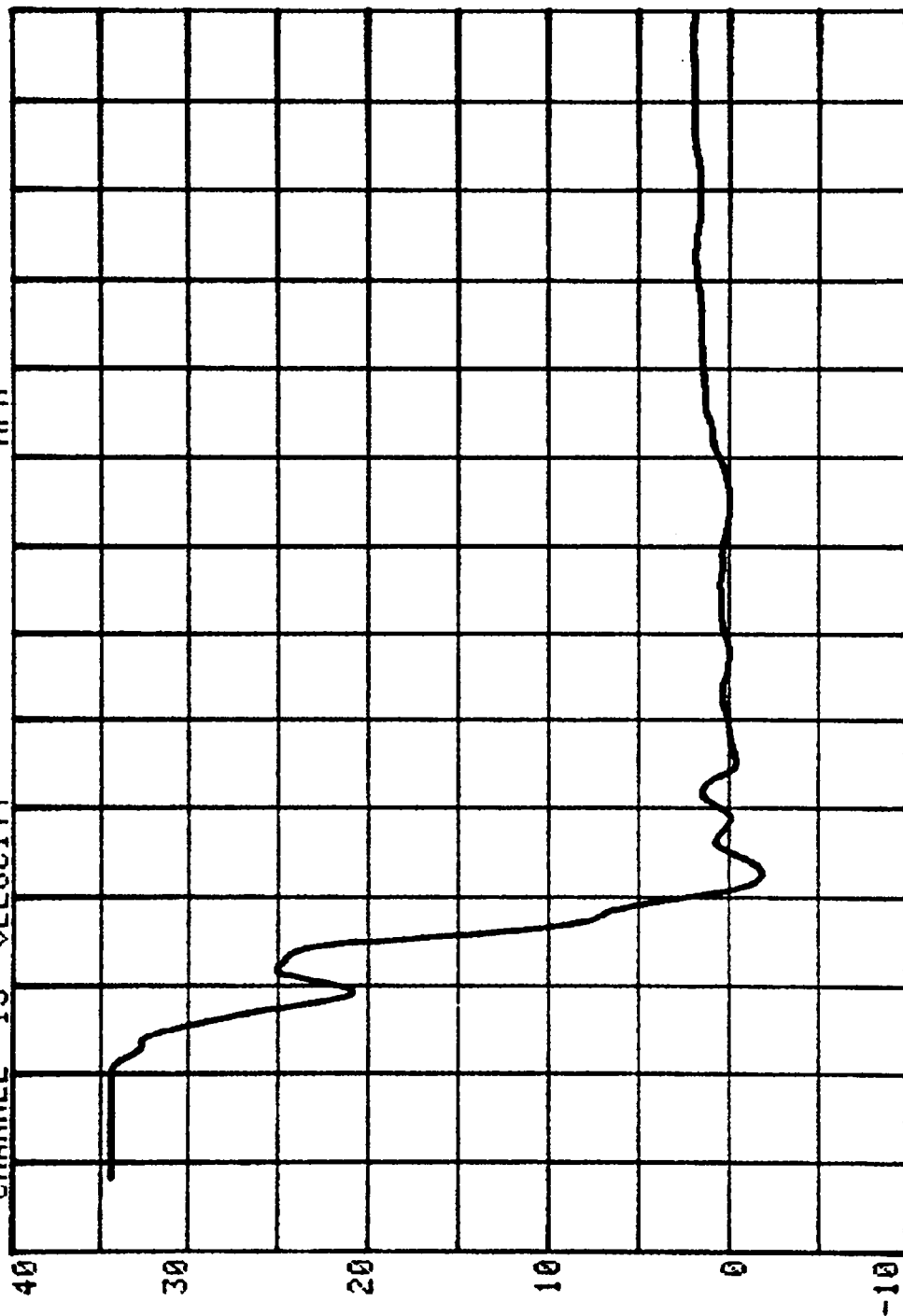
2 MPH

SERIES=

RUN= 530

VELOCITY

CHANNEL 15

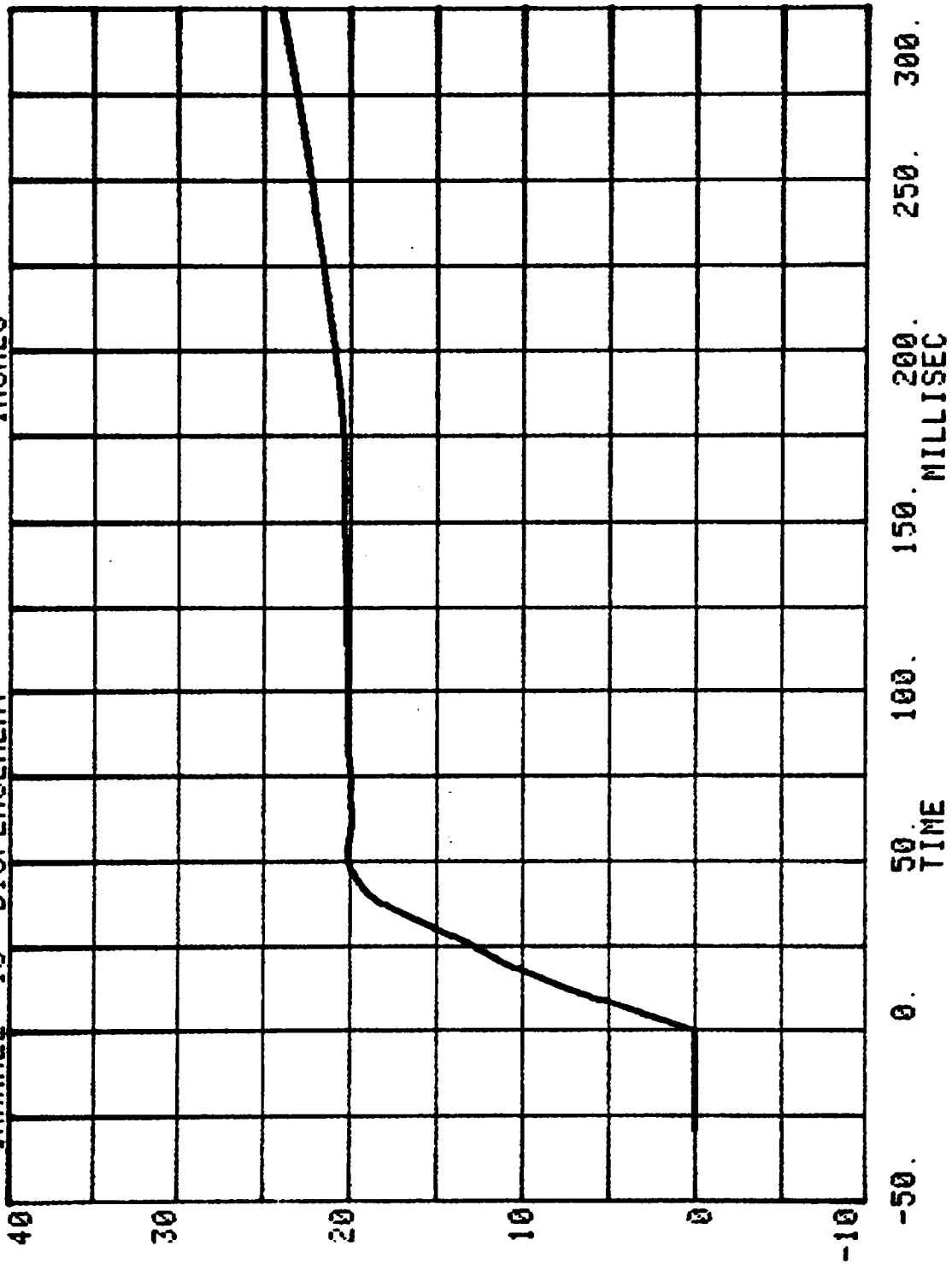


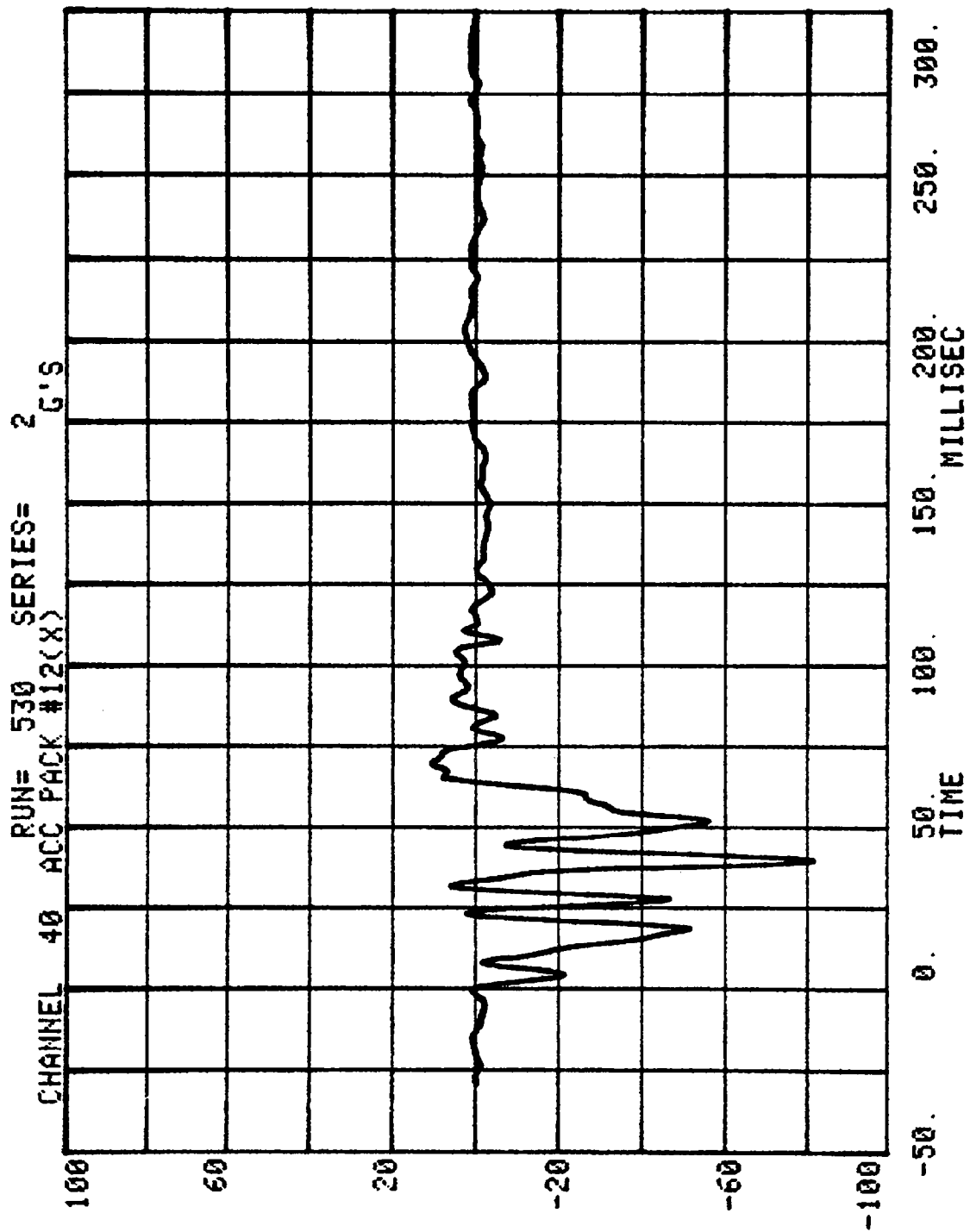
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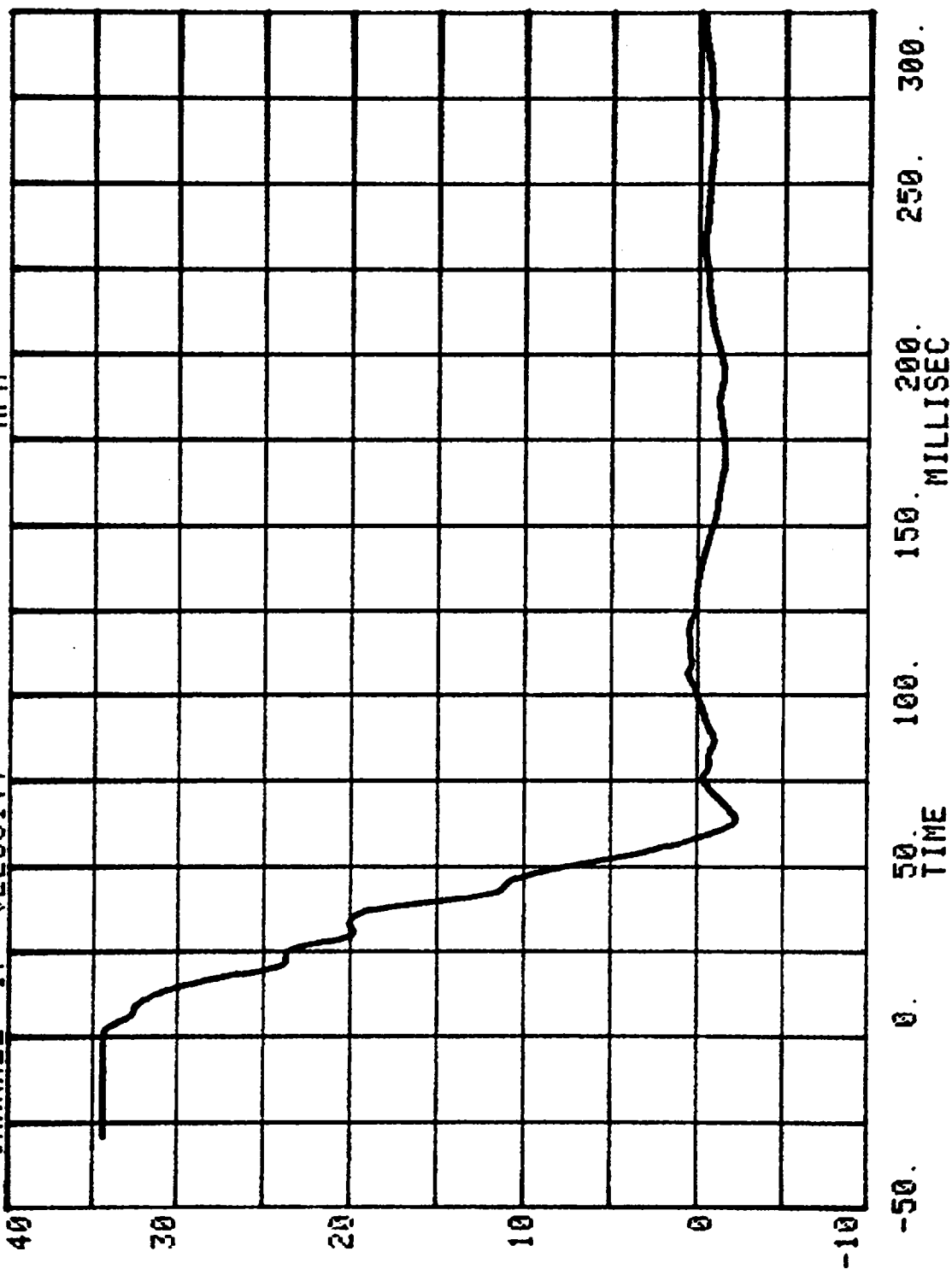
CHANNEL 16 DISPLACEMENT

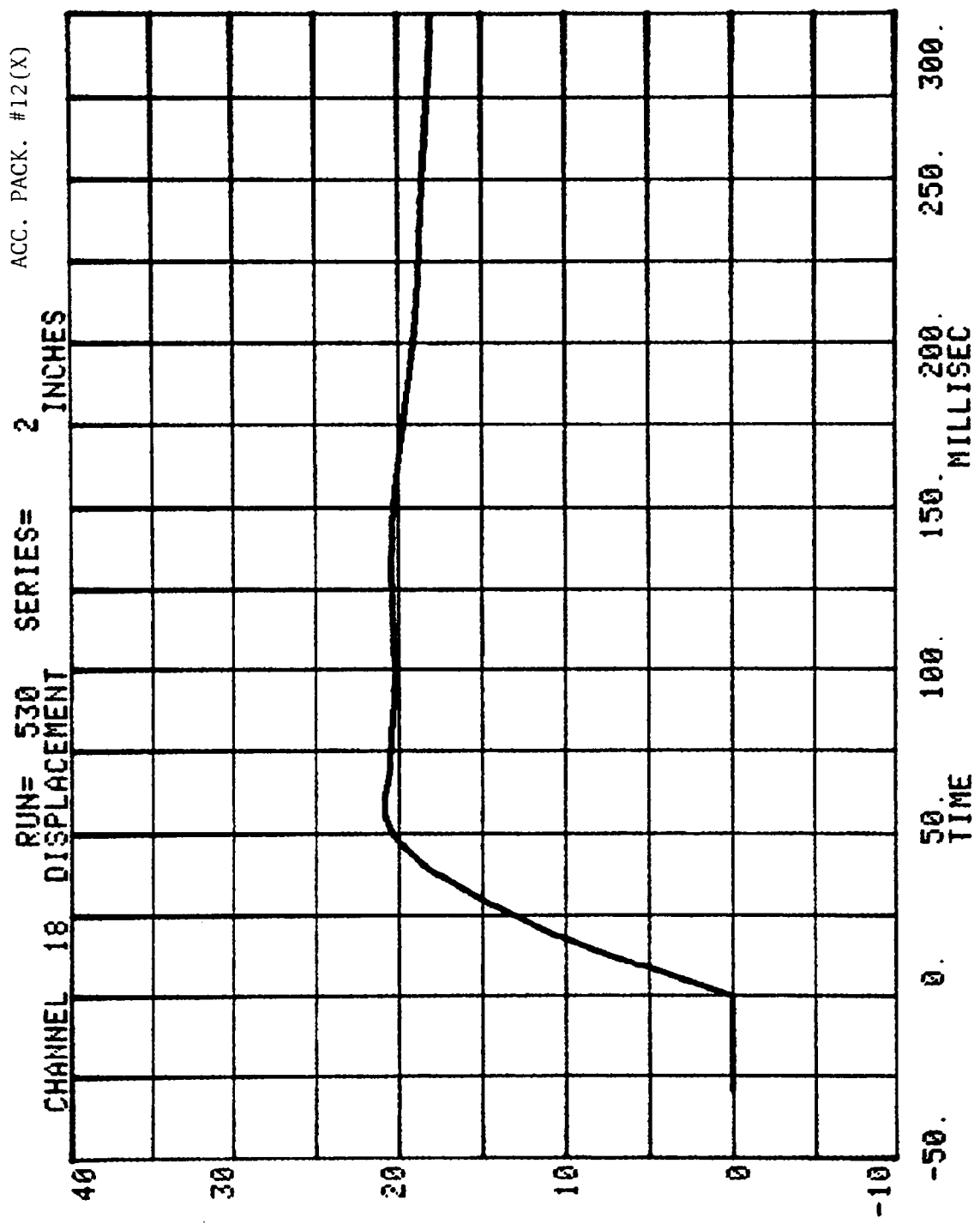




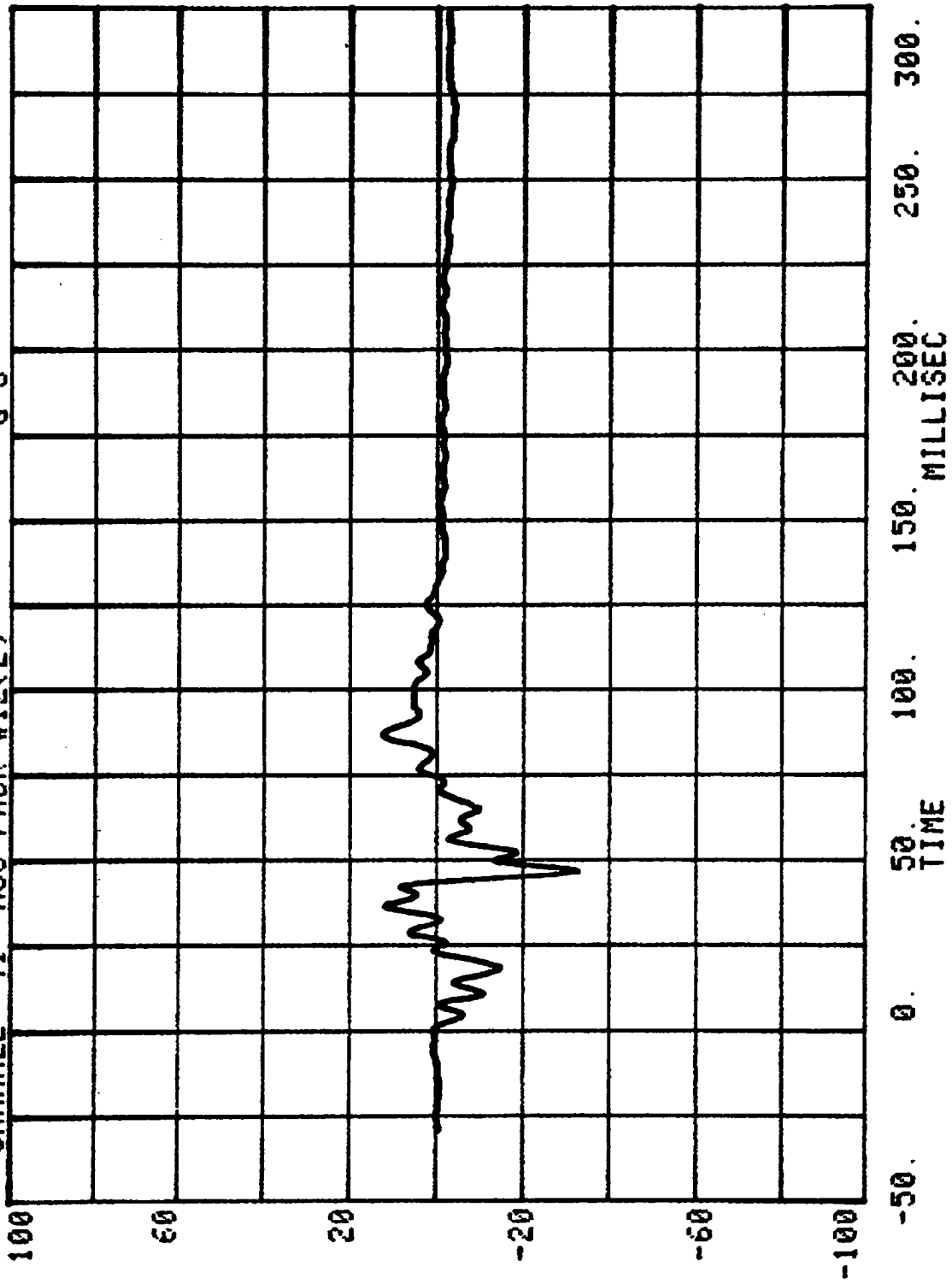
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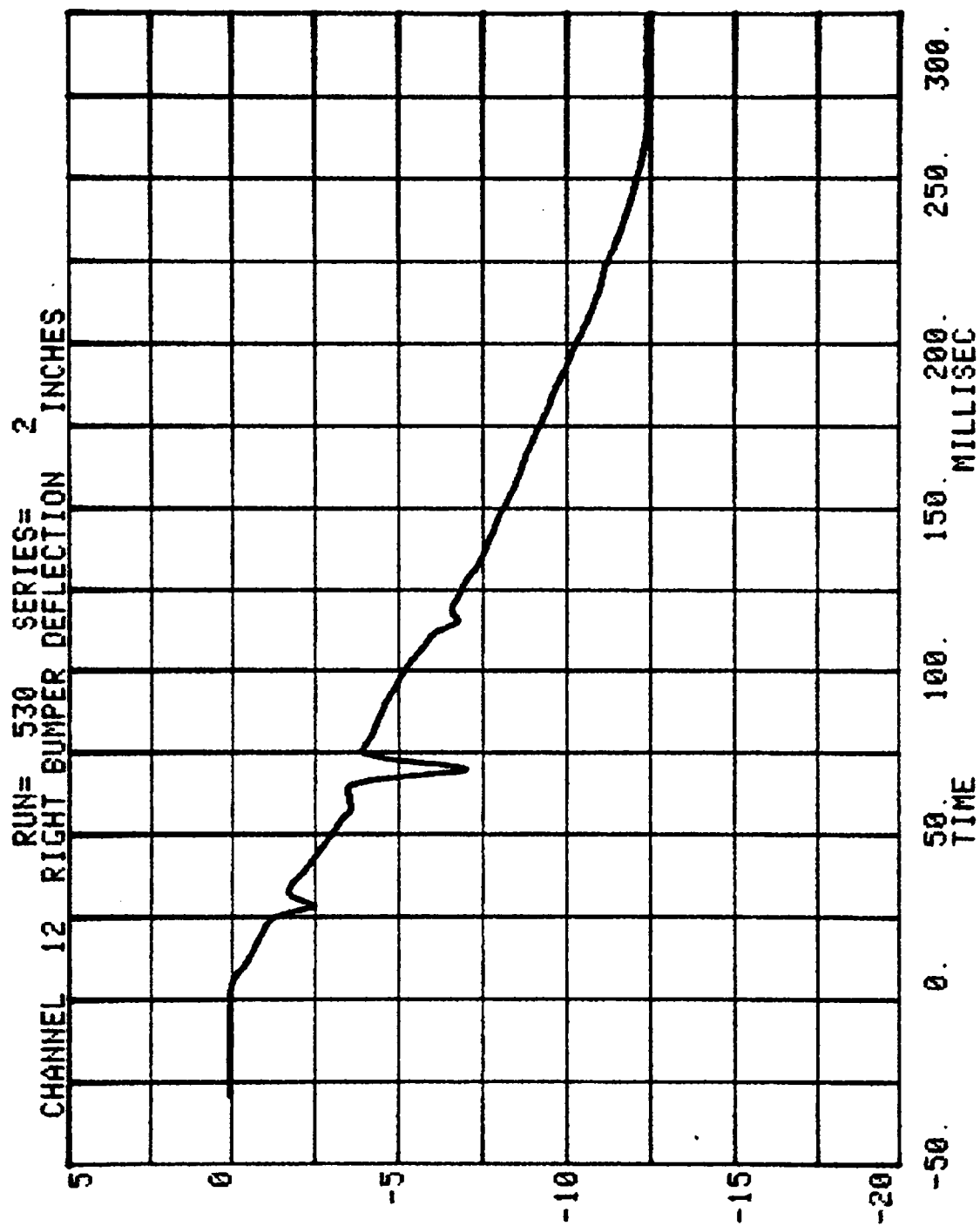
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RUN= 530 SERIES= 2 MPH

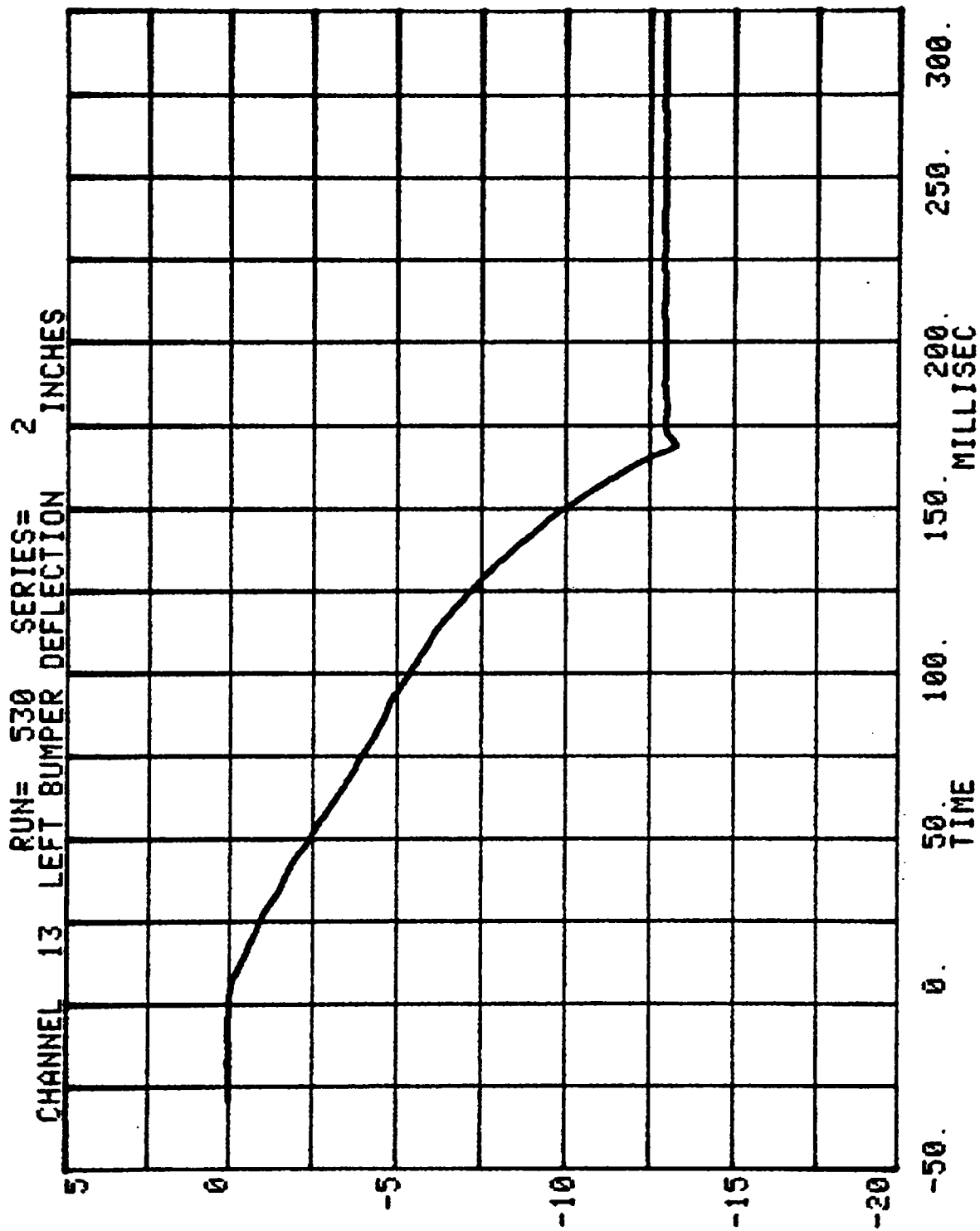


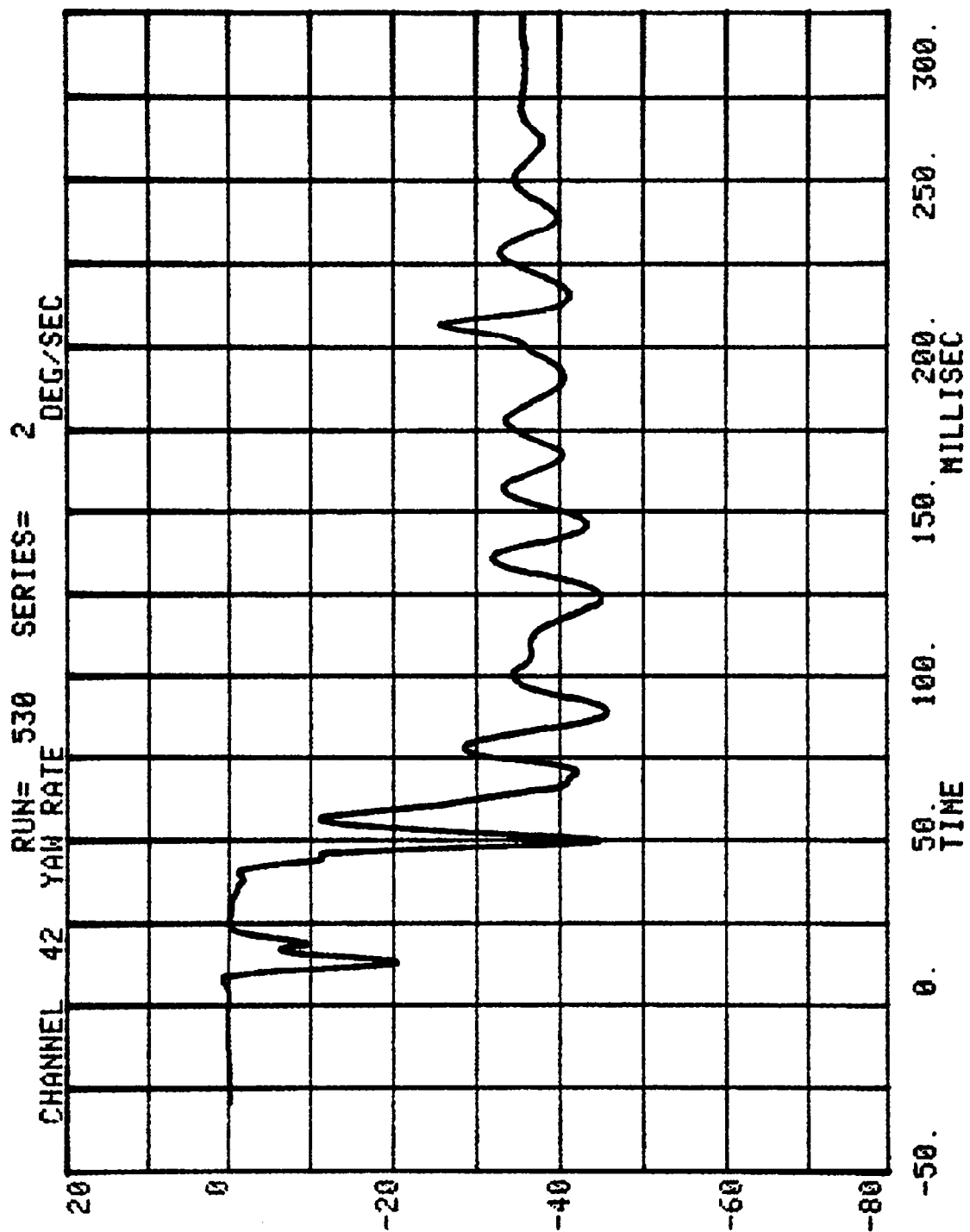


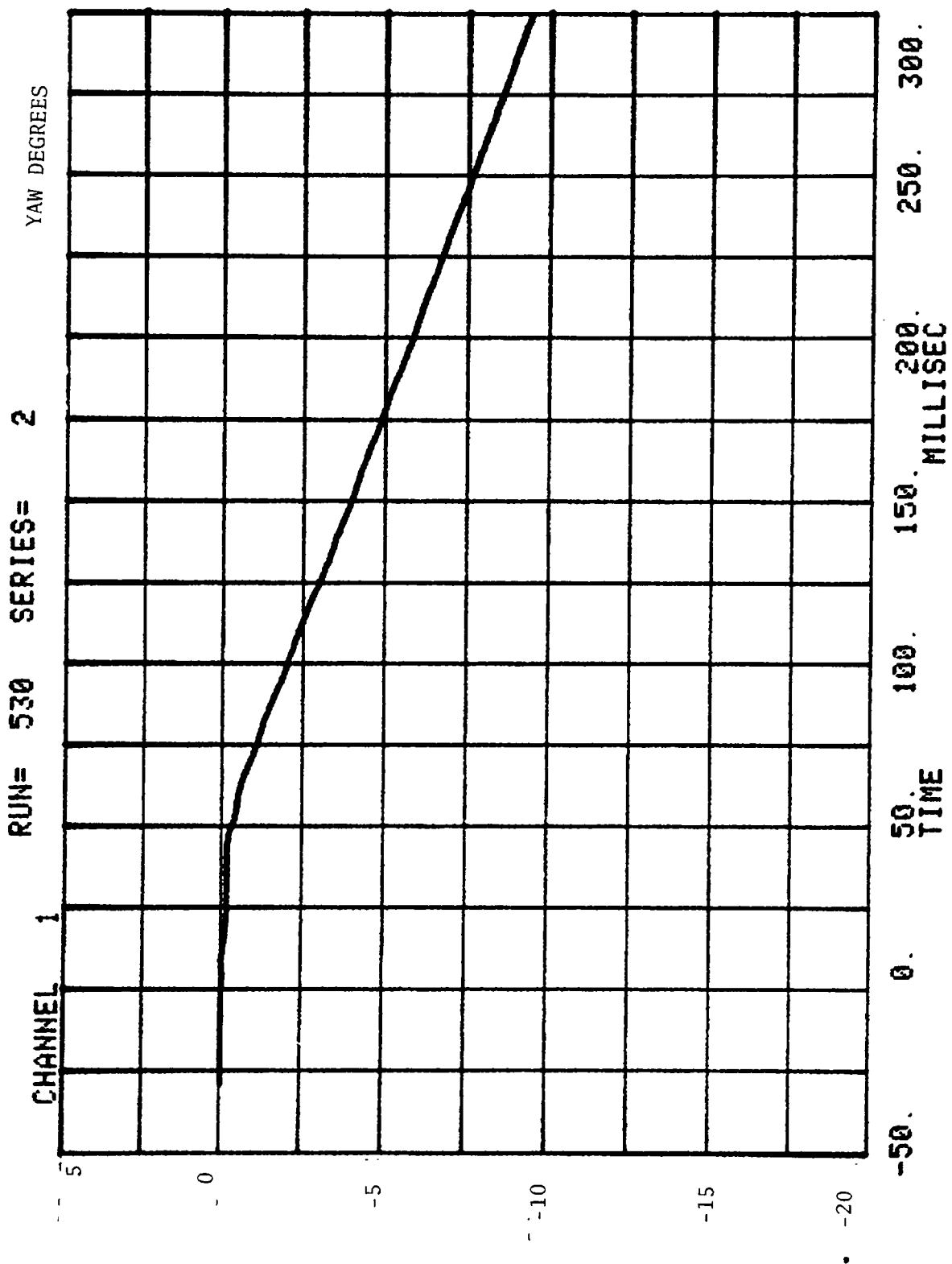
CHANNEL 41 ACC PACK #12(Z) RUN= 530 SERIES= 2 G'S











TEST NO. 615-2-530

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

P.572 DUMMY CALIBRATION TEST DATAContinued:

NHTSA DUMMY ID NO. 162

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
6. <u>KNEE IMPACT TESTS:</u>			
a. Right Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.82 fps	
(2) Maximum Force - -	1850 to 2500 lbs	1925 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.88 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.88 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2100 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.2 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 162

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	CS75	7/81	1/82
ENDEVCO	C462	7/81	1/82
ENDEVCO	CE18	7/81	1/82
GSE	312	7/81	1/82
GSE	311	7/81	1/82
CEC	22958	7/81	1/82
CEC	26929	7/81	1/82
TRANSDUCER INC.	20051	7/81	1/82
BLH	72952	7/81	1/82
CIC	567-11	7/81	1/82

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 183 (Tape 1030)

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: D. Celiunello

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		8/28/81	
Calibration Sequential Number for Dummy - - - -		3	
Temperature in Lab. (Spec. = 66 to 78°F) - - - -		66°-75°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		60%-69%	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	210 G	
b. Peak Lateral Accel. - -	≤10G	7 G	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.2 ms	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	22.3 fps	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	24 G	
c. Peak Resultant Head Acceleration - - - -	26G maximum	26 G	
d. Pendulum Decel. (t ₂ -t ₁)	≤ 3 ms	1.5 ms	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	27.5 ms	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	4.3 ms	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	103 ms	
h. Max. Head Rotation - -	63 to 73°	67°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0.0 ms
	Displ.	-.5 to .5 in	0.0 in.
30°	Time	25.6 to 34.4 ms	28.7 ms
	Displ.	2.1 to 3.1 in.	2.7 in.
60°	Time	40.3 to 51.7 ms	43 ms
	Displ.	4.3 to 5.3 in.	4.7 in.
Maximum	Time	53.2 to 66.8 ms	56.8 ms
(°)	Displ.	5.0 to 6.0 in.	5.2 in.

Continued

P, 572 DUMMY CALIBRATION TEST DATA Continued:

NHTSA DUMMY ID NO. 183

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 Displ. 4.3 to 5.3 in.	67.5 ms 4.7 in.	
30°	Time 85.4 to 104.6 ms Displ. 2.1 to 3.1 in.	86.25 ms 2.4 in.	
0°	Time 101.0 to 123.0 ms Displ. -.5 to 0.5 in.	101 ms -.2 in.	
3. <u>ABDOMINAL COMPRESSION TEST:</u> (Preload = 10 pounds)			
a. Force @ 1" - - - - -	50 to 63 lbs.	51.0 lbs.	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	80.0 lbs.	
4. <u>LUMBAR FLEXION TEST:</u>			
a. Force @ 20° - - - - -	22 to 34 lbs.	33.5 lbs.	
b. Force @ 30° - - - - -	34 to 46 lbs.	45.0 lbs.	
c. Force @ 40° - - - - -	46 to 58 lbs.	55.0 lbs.	
d. Return Angle - - - - -	12° maximum	4°	
5. <u>CHEST IMPACT TESTS:</u>			
a. High Speed			
(1) Probe Speed - - - - -	21.78-22.22 fps	22.10 fps	
(2) Peak Deflection - - - - -	1.7" maximum	1.7 in.	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1839 lbs.	
(4) Internal Hysteresis - - - - -	50 to 70%	51.48%	
b. Low Speed			
(1) Probe Speed - - - - -	13.86-14.14 fps	14.08 fps	
(2) Peak Deflection - - - - -	1.1" maximum	1.07 in.	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1166 lbs.	
(4) Internal Hysteresis - - - - -	50 to 7%	53.4%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

NHTSA DUMMY ID NO. 183

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	6.79 fps	
(2) Maximum Force - -	1850 to 2500 lbs	1950 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.8 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.81 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2025 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.12 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 183

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 -

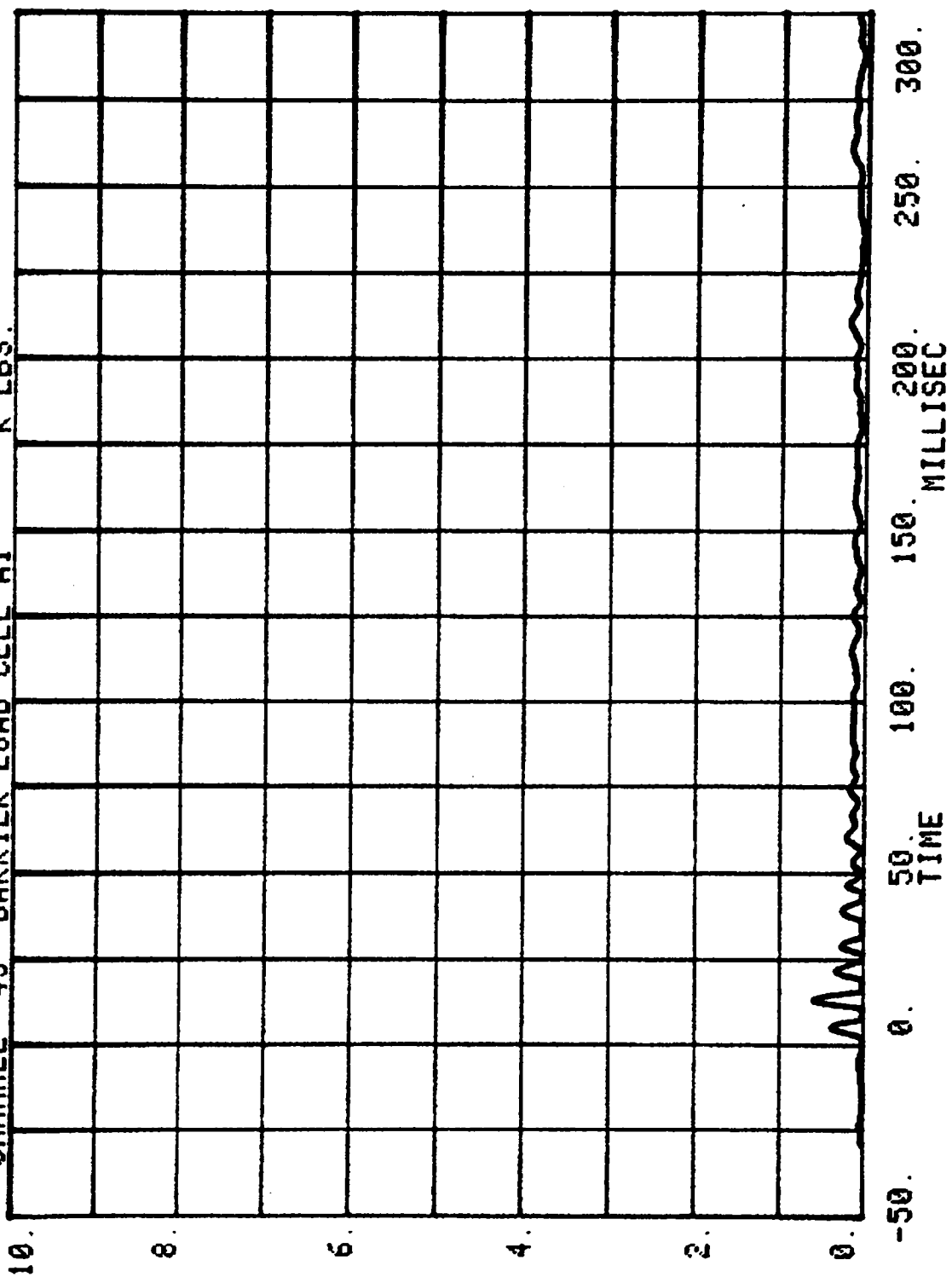
3. Lumbar Flexion Test Push
Force Gauge - - - - -

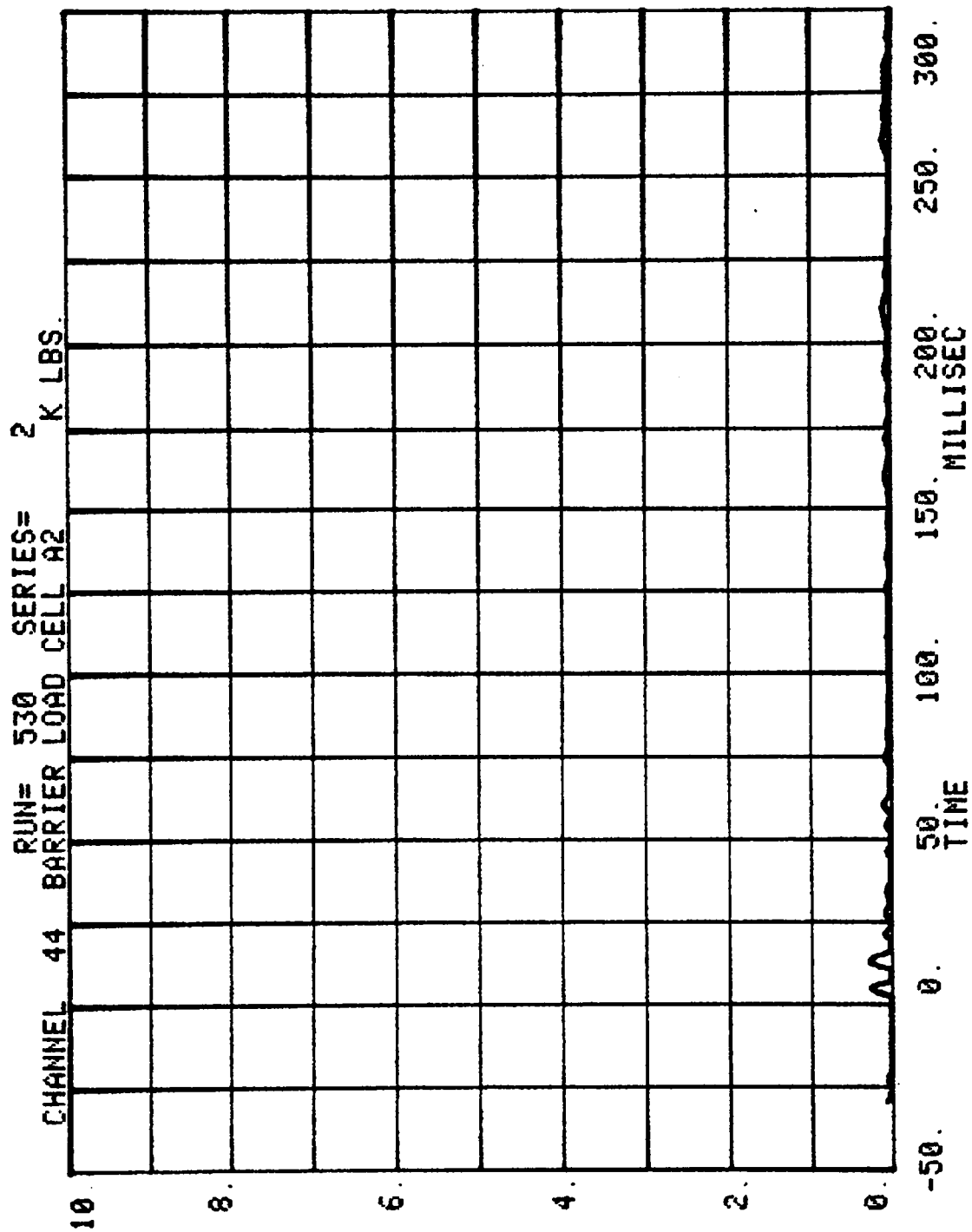
4. Abdominal Compression Test
Force Gauge - - - - -

5. Abdominal Compression Test
Displacement Gauge - - -

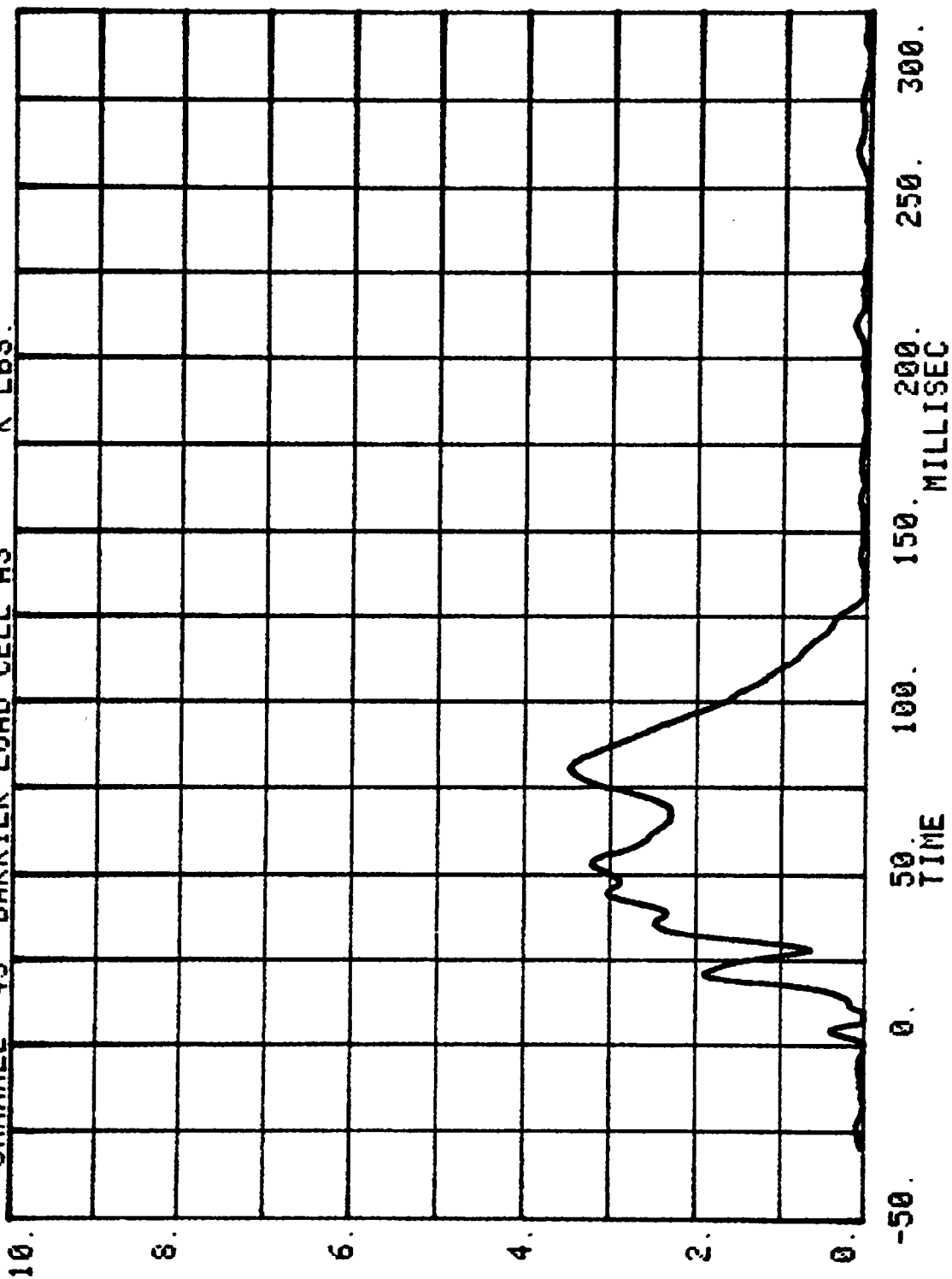
MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	CS75	7/81	1/82
ENDEVCO	C462	7/81	1/82
ENDEVCO	CE18	7/81	1/82
GSE	312	7/81	1/82
GSE	311	7/81	1/82
CEC	22958	7/81	1/82
CEC	26929	7/81	1/82
TRANSDUCER INC.	20051	7/81	1/82
BLH	72952	7/81	1/82
CIC	567-11	7/81	1/82

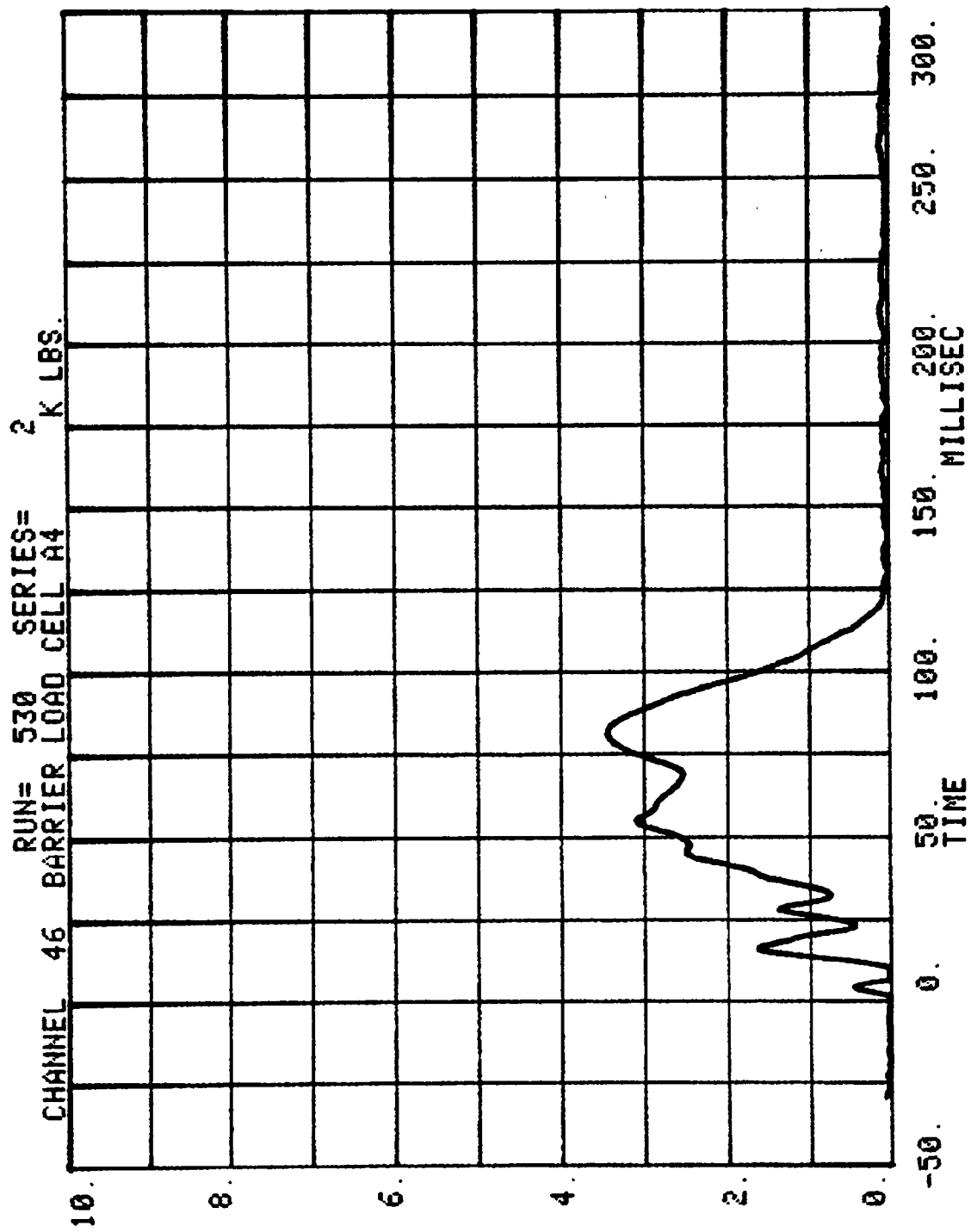
RUN= 530 SERIES= 2
CHANNEL 43 BARRIER LOAD CELL A1 K LBS.

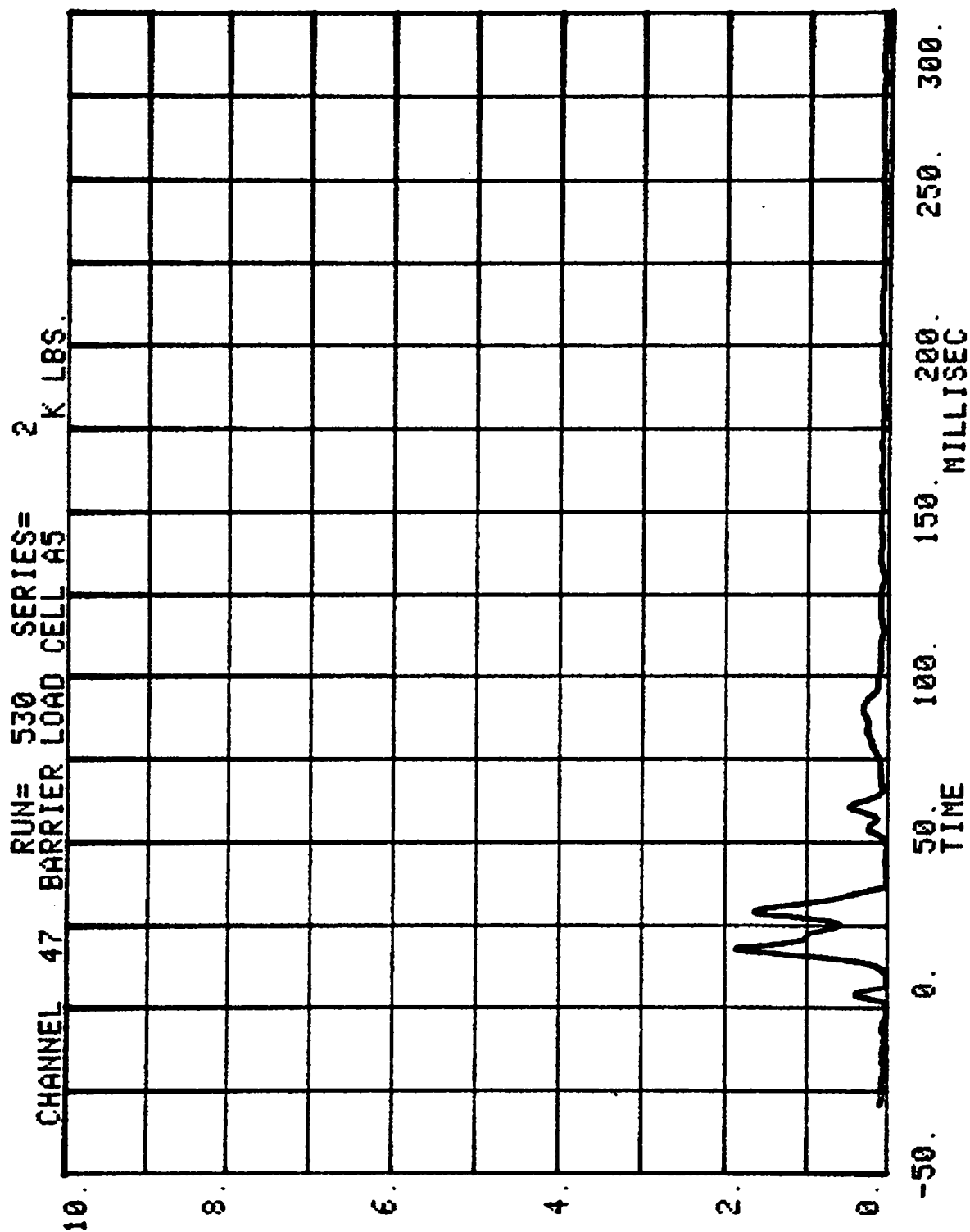


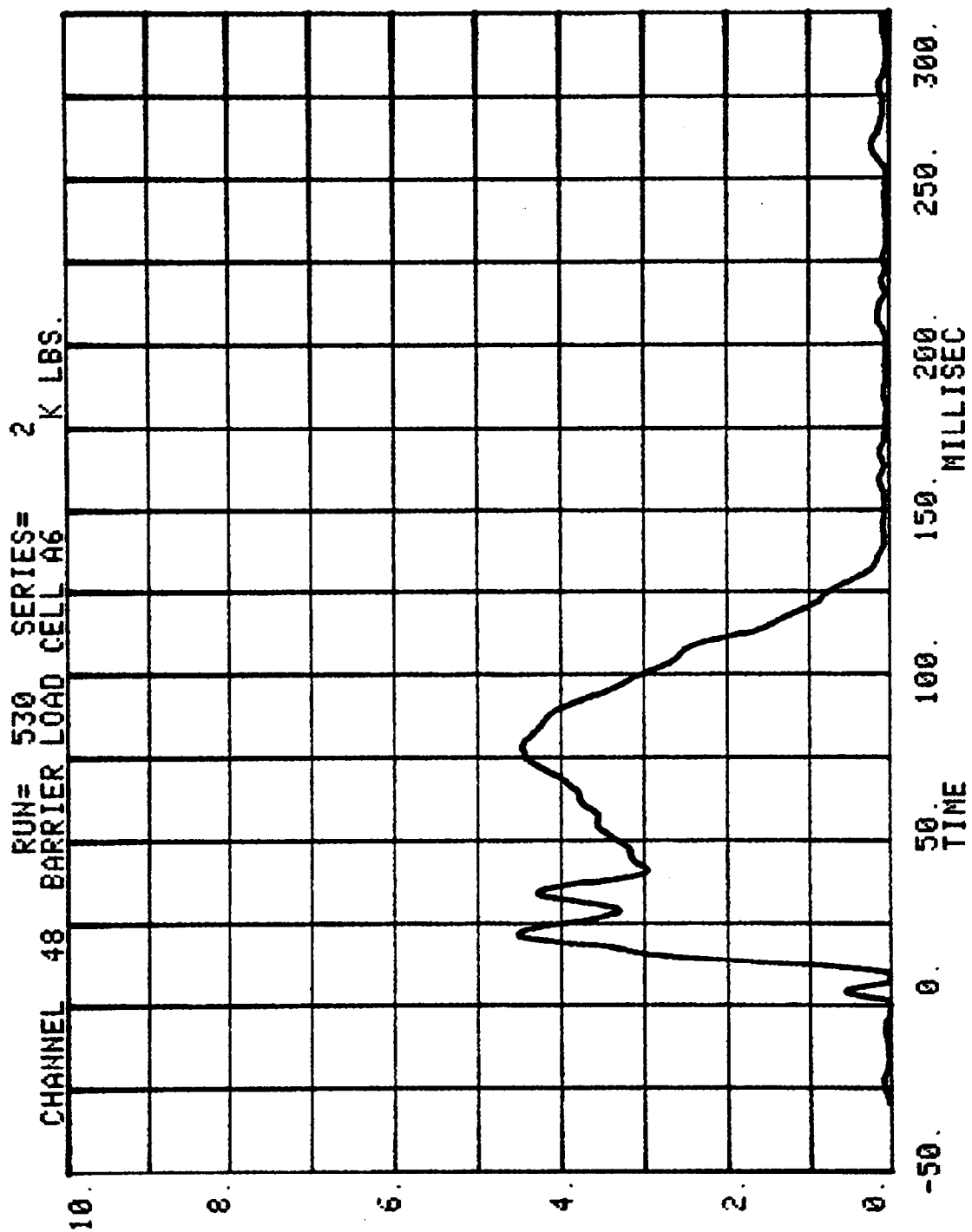


CHANNEL 45 RUN= 530 SERIES= 2
BARRIER LOAD CELL A3 K LBS.

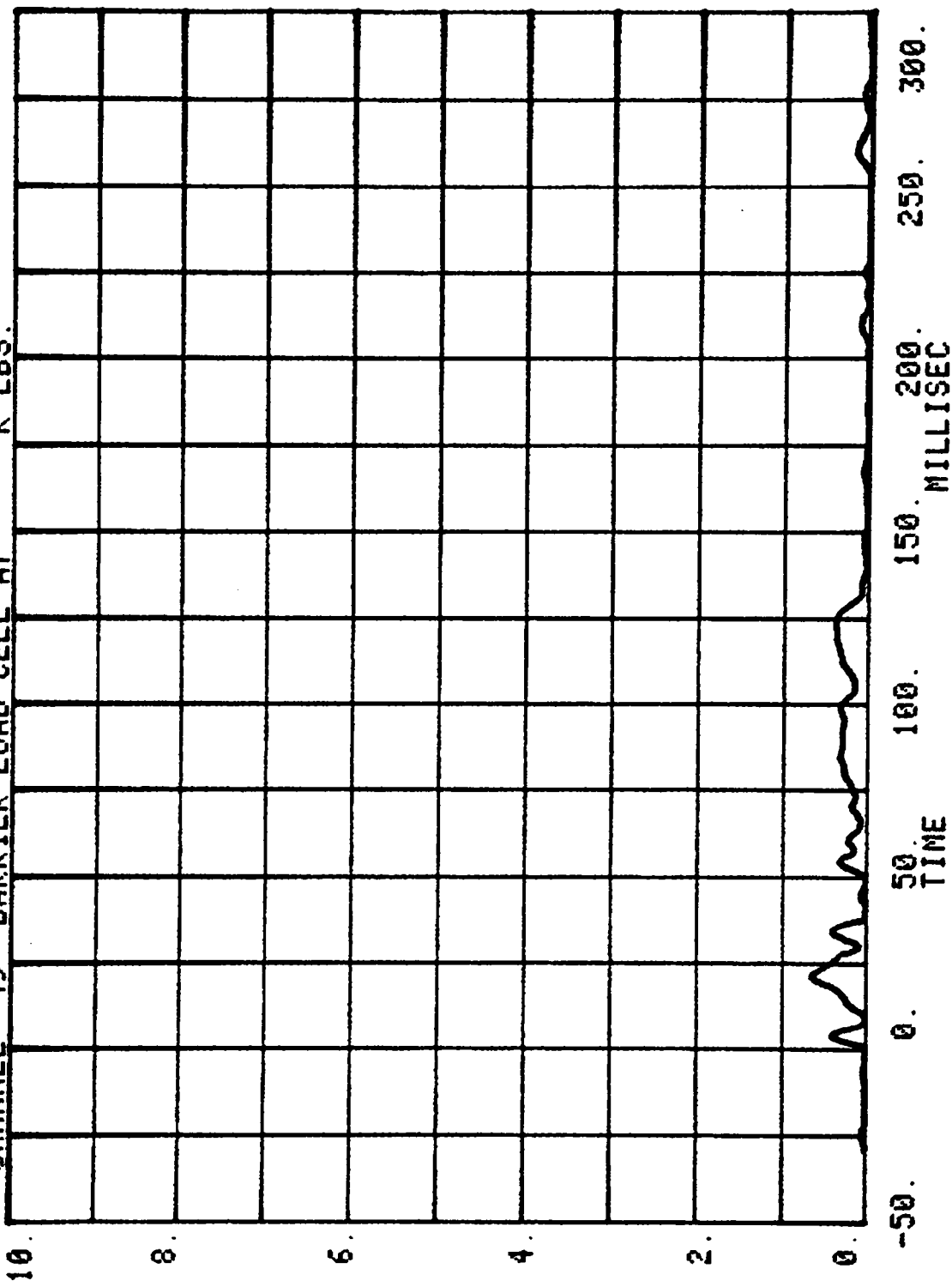




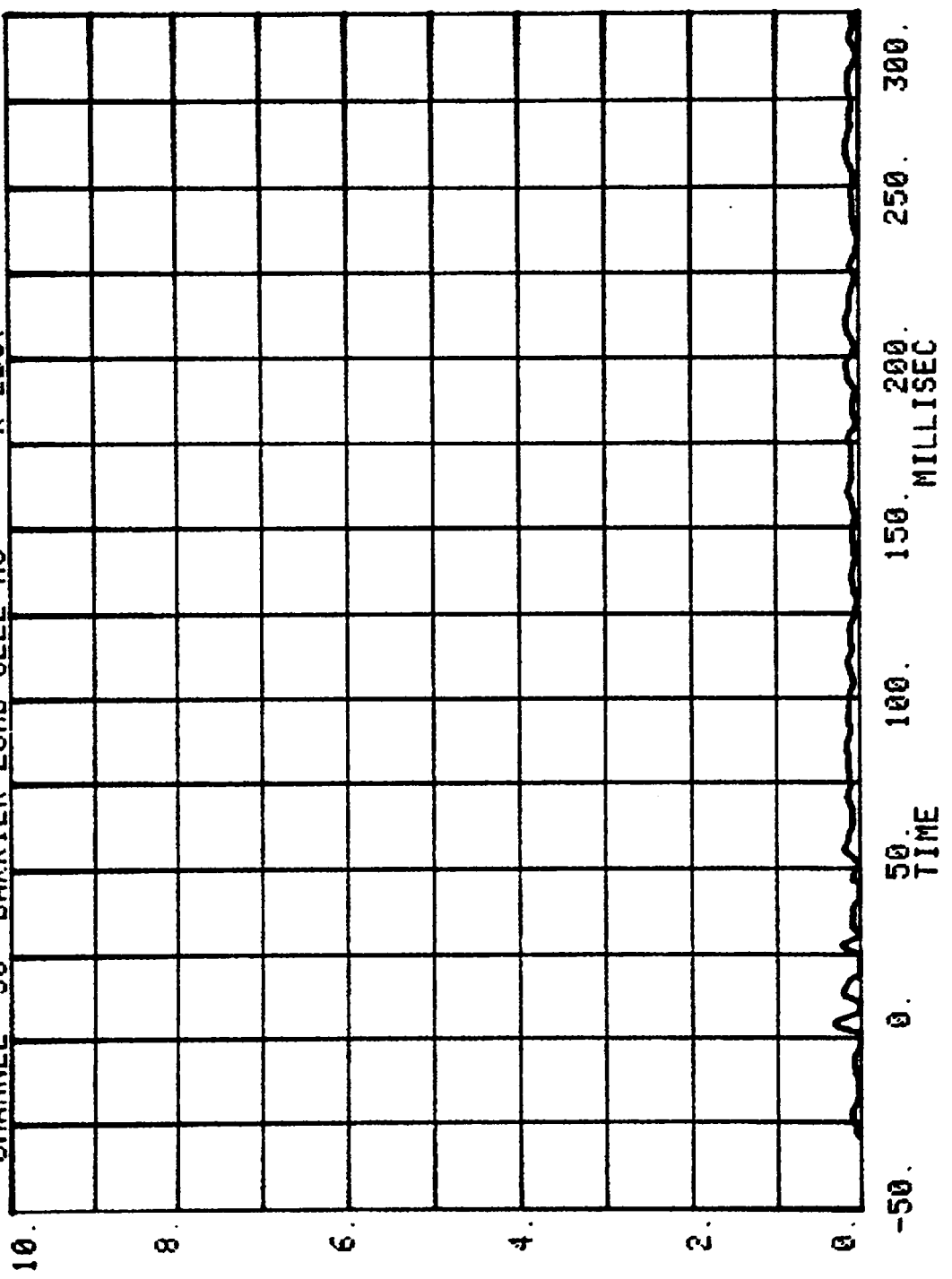




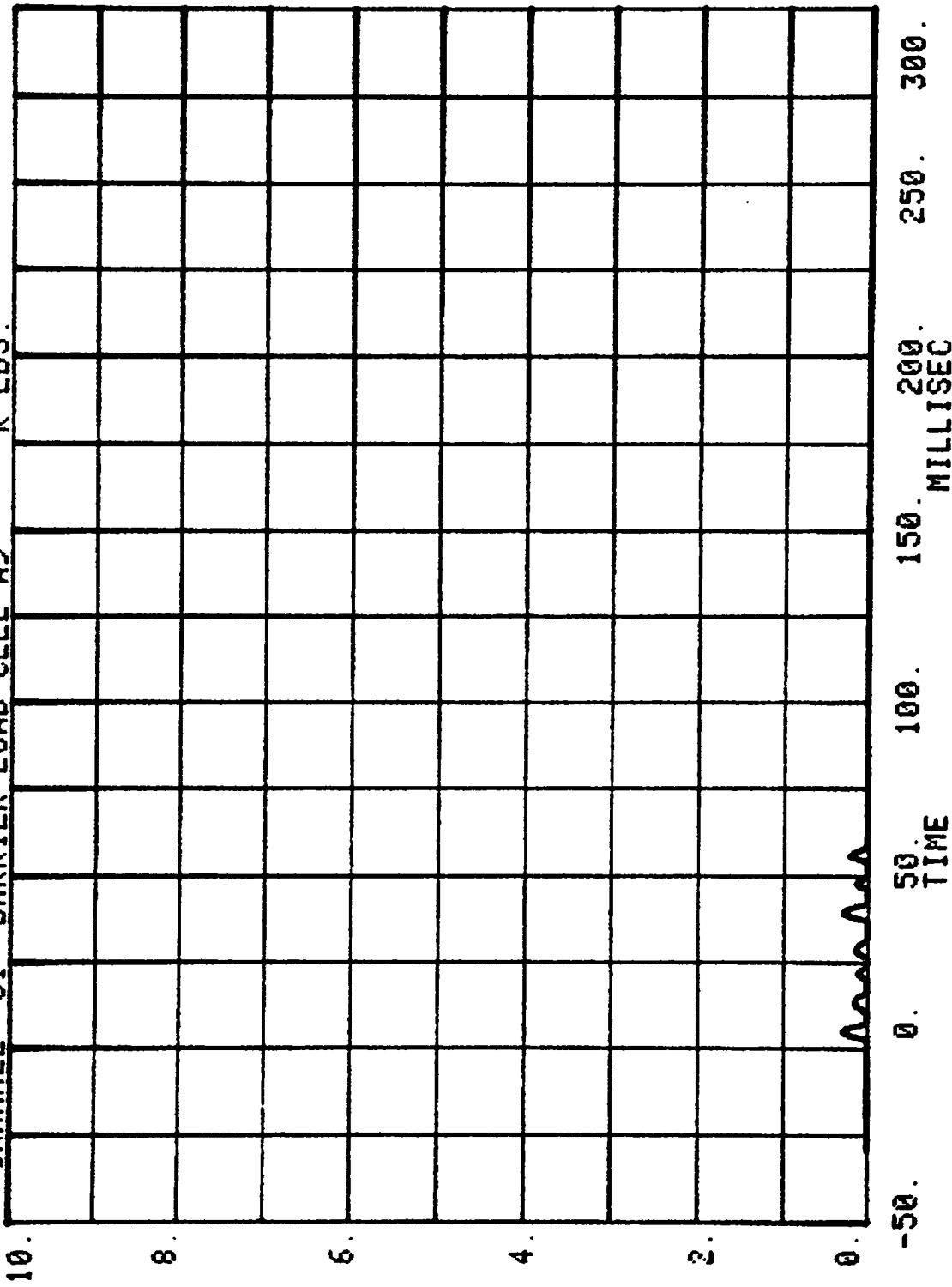
CHANNEL 49 RUN= 530 SERIES= 2
BARRIER LOAD CELL A7 K LBS.

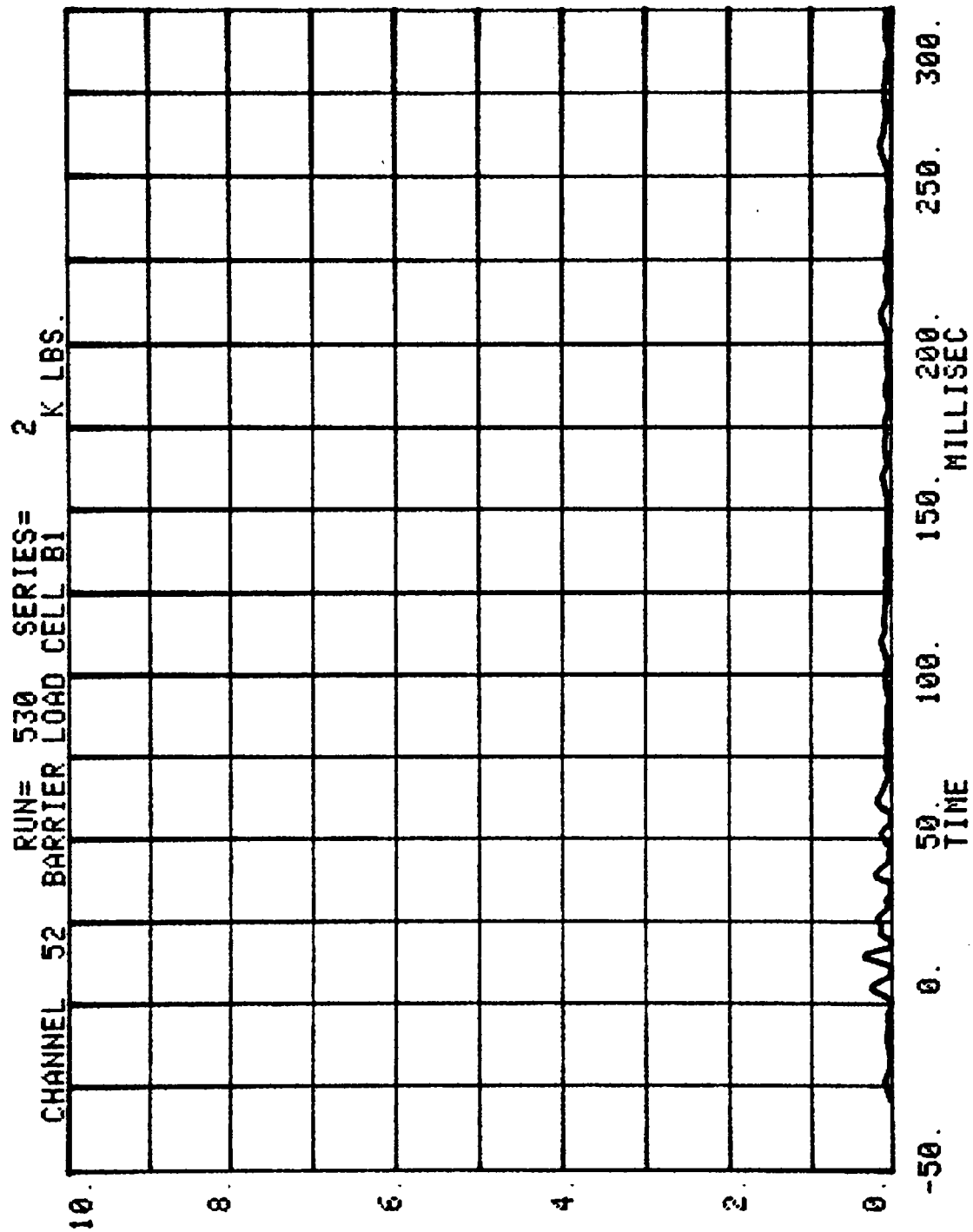


CHANNEL 50 BARRIER LOAD CELL A8 RUN= 530 SERIES= 2 K LBS.

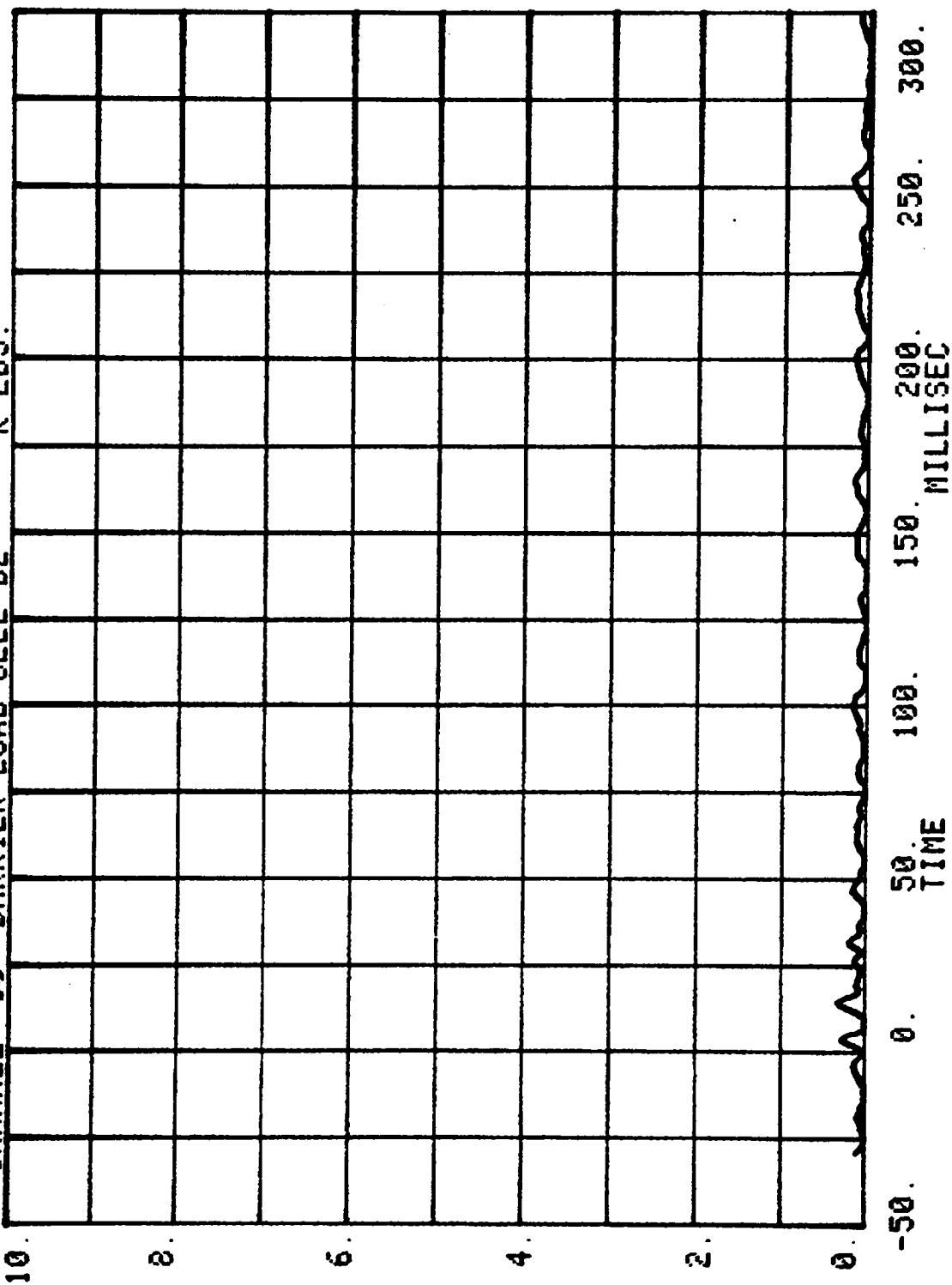


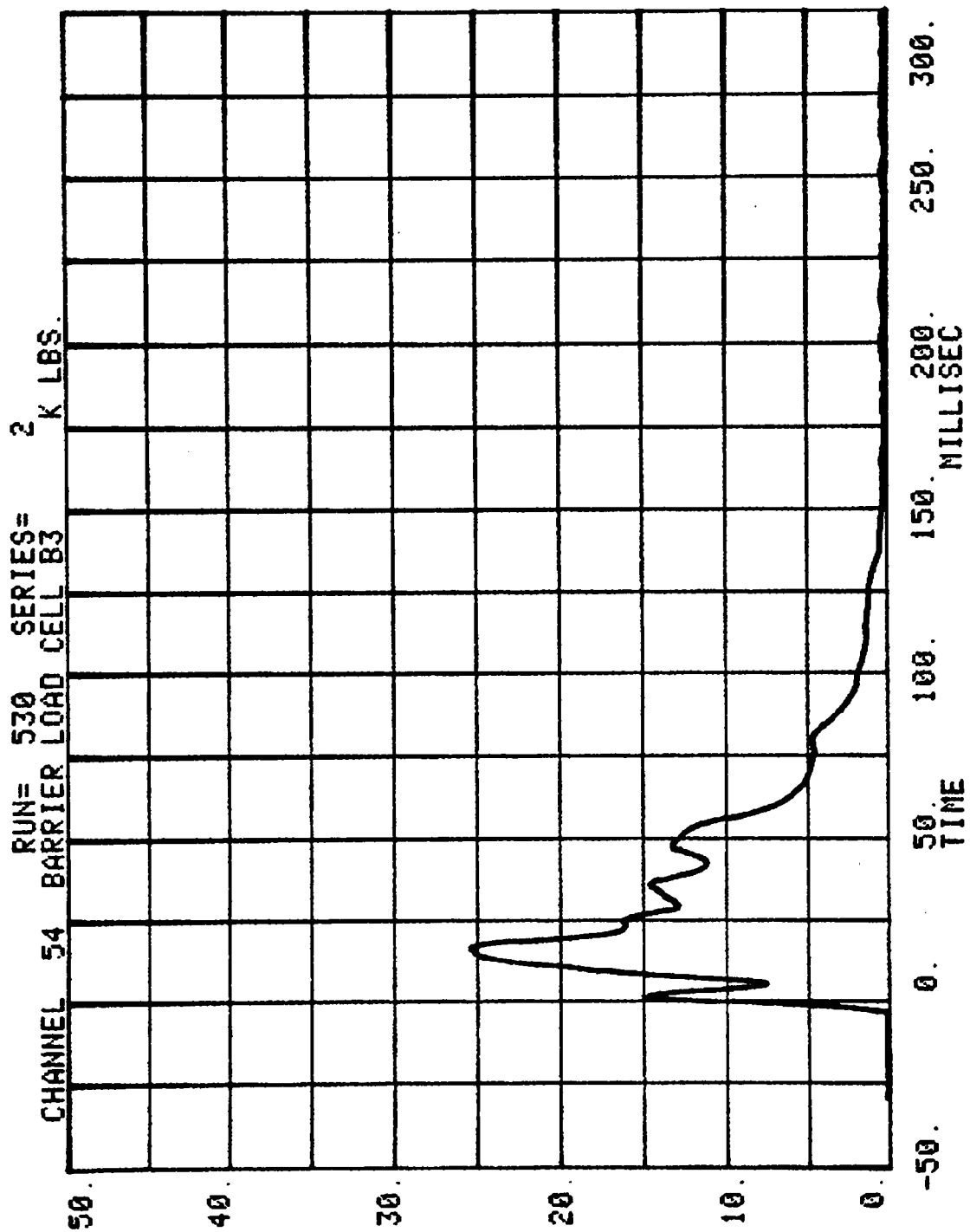
CHANNEL 51 RUN= 530 SERIES= 2 K LBS.
BARRIER LOAD CELL A9



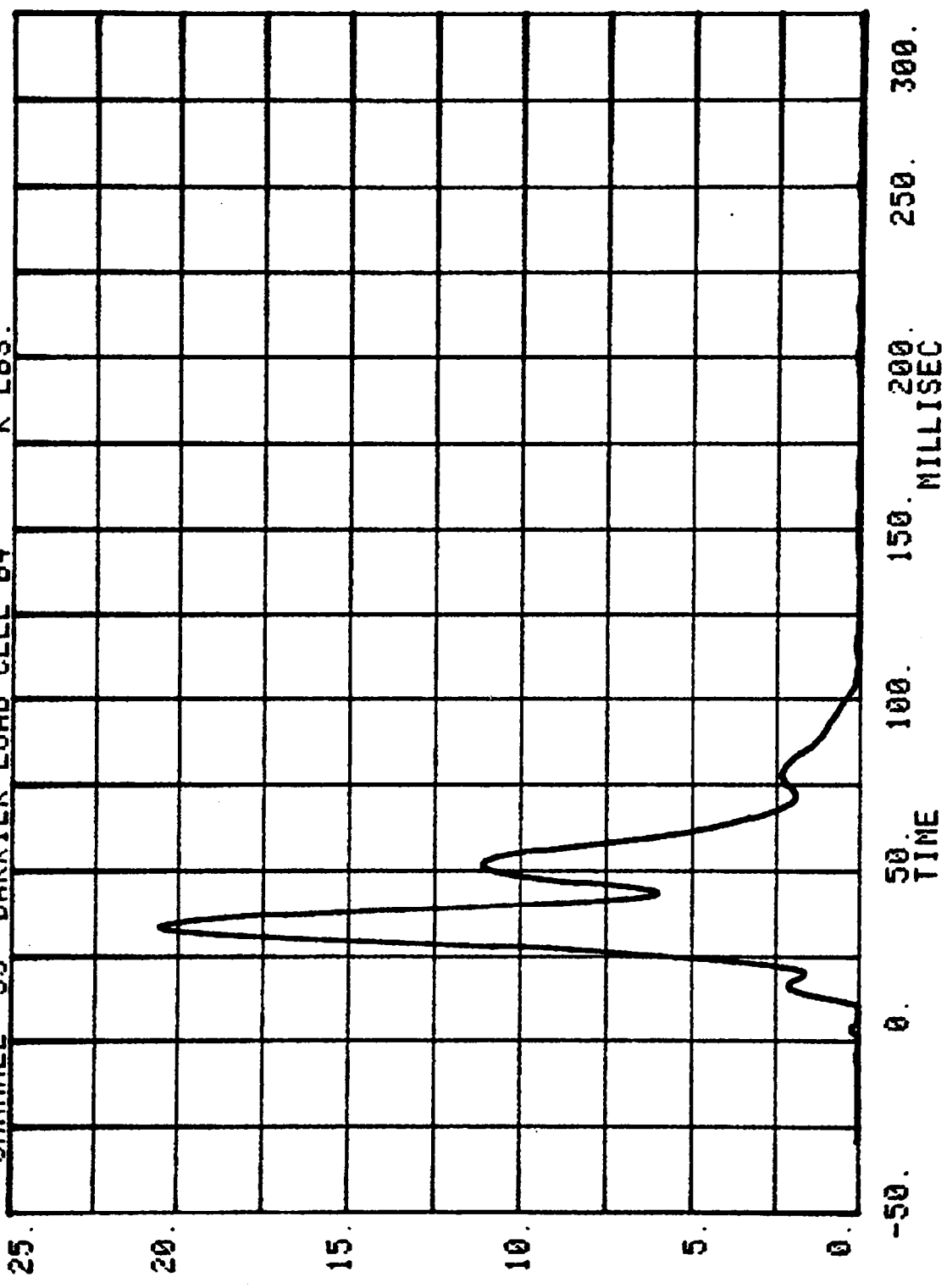


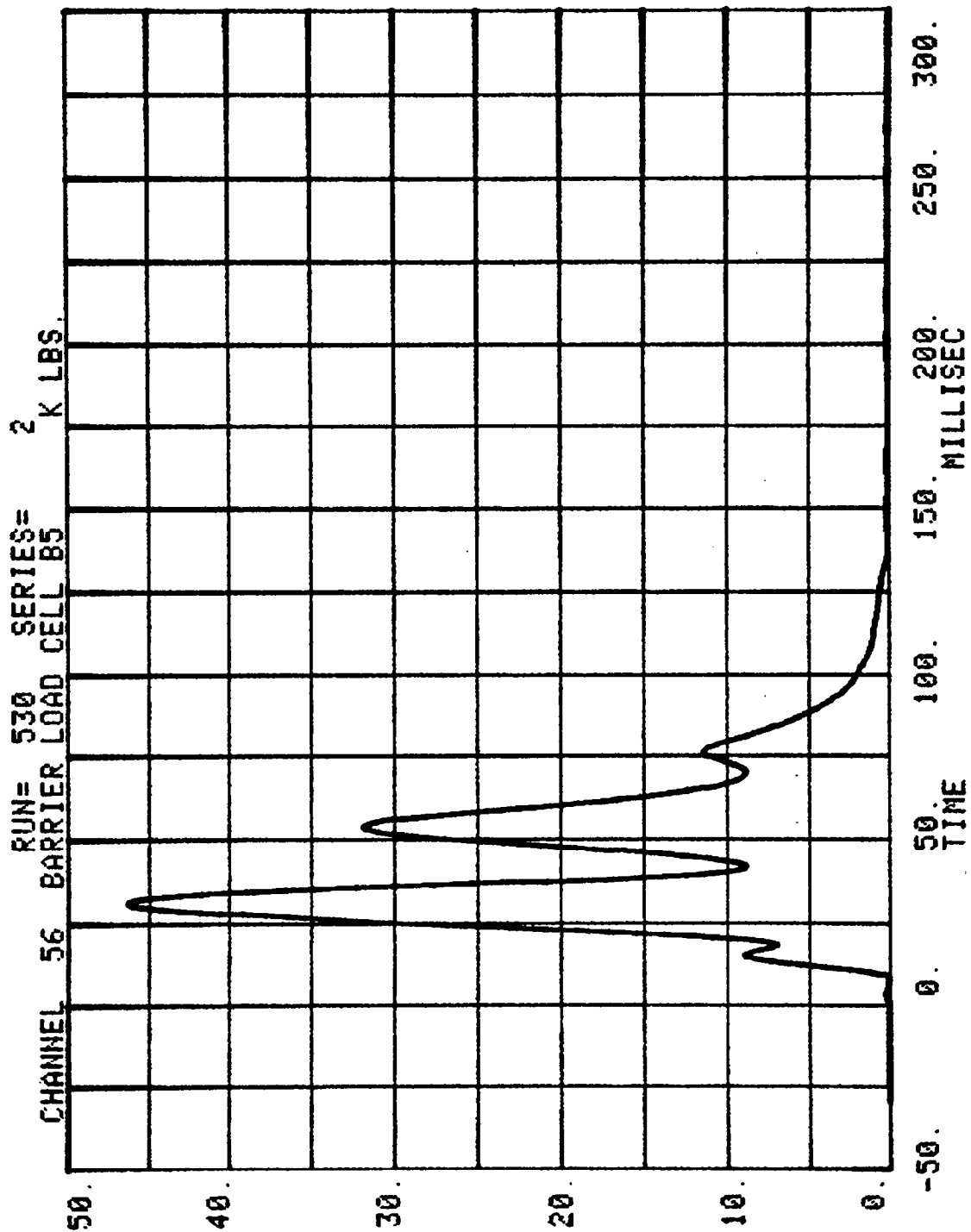
CHANNEL 53 RUN= 530 SERIES= 2
BARRIER LOAD CELL B2 K LBS.



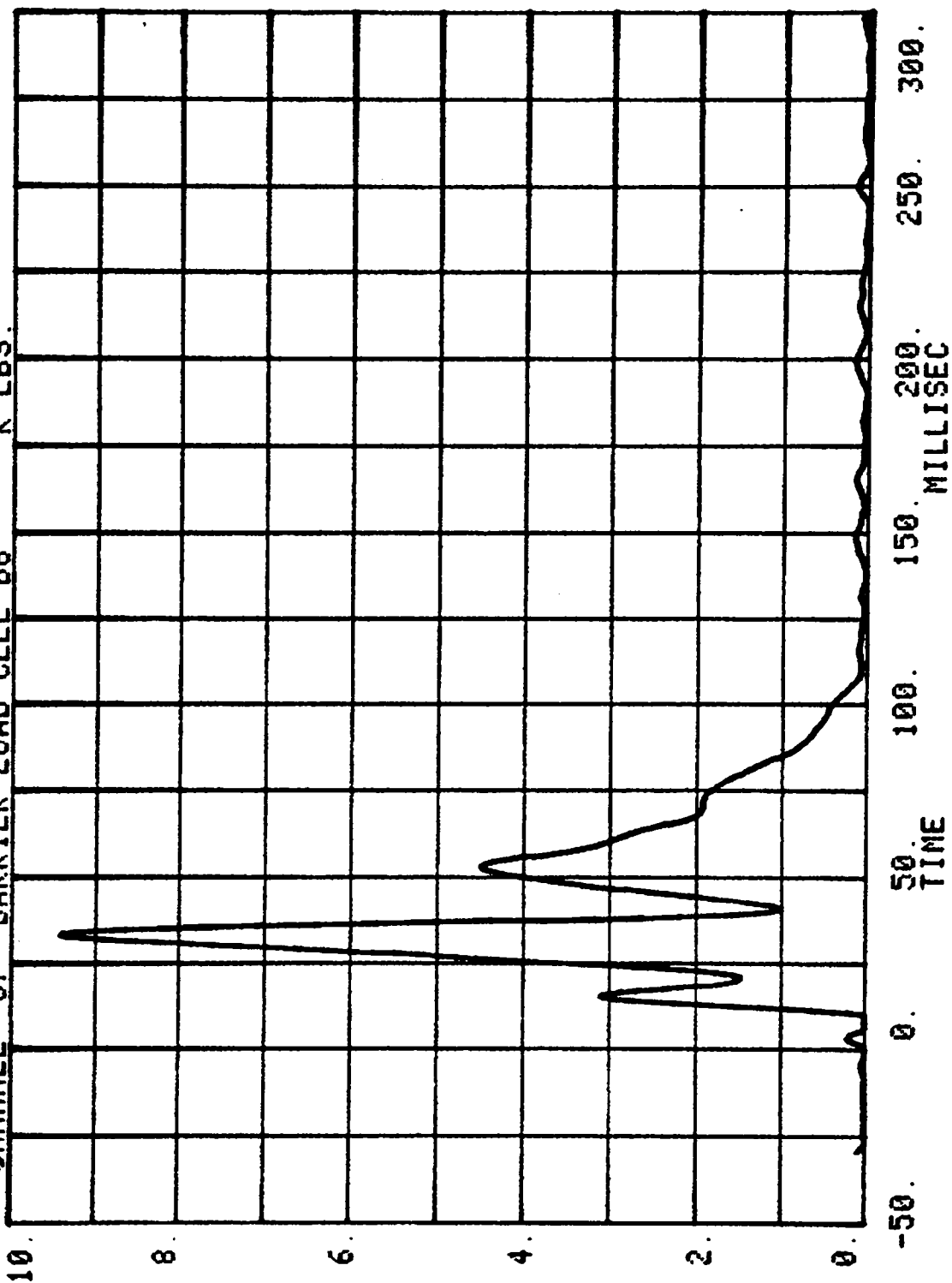


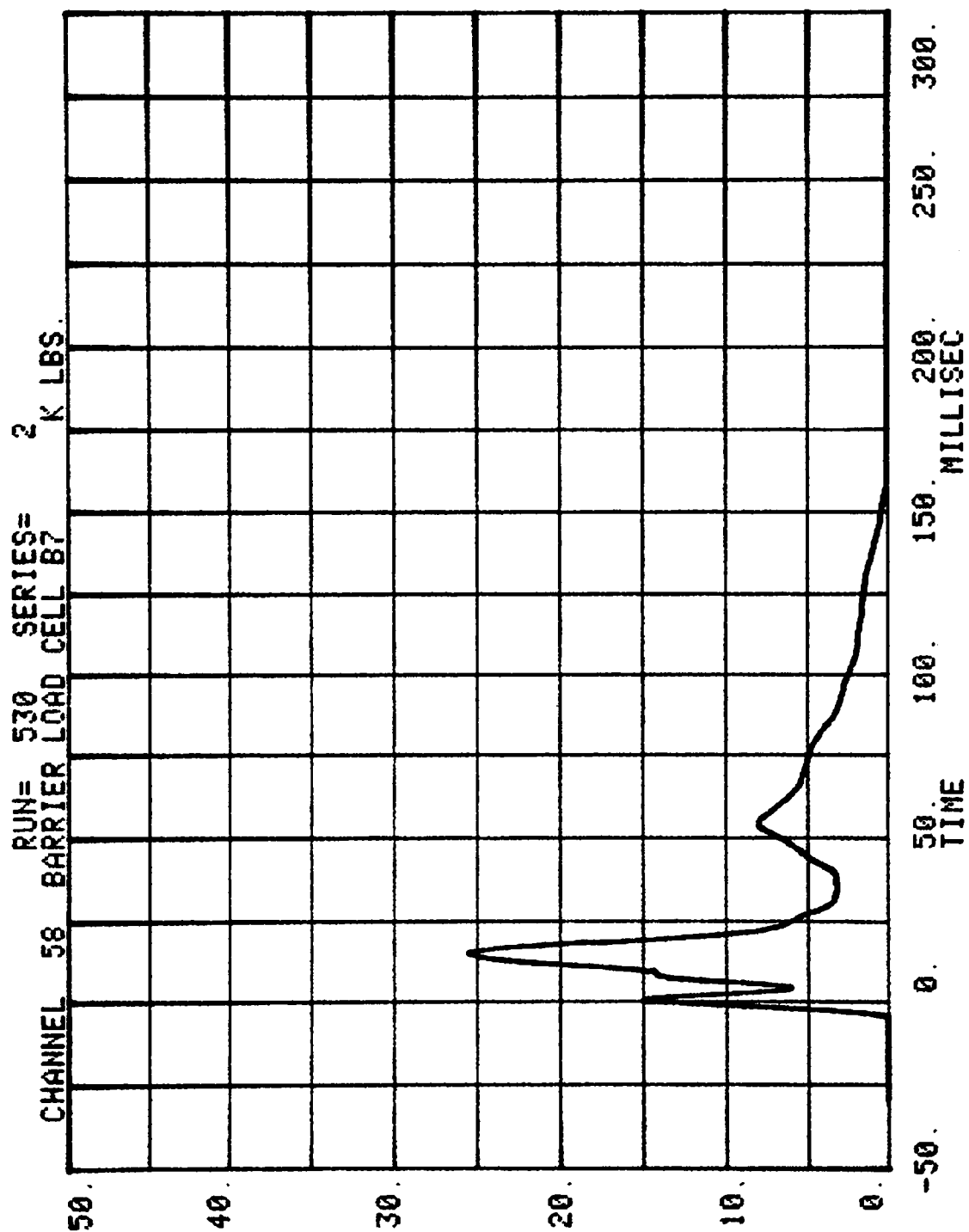
CHANNEL 55 RUN= 530 SERIES= 2 K LBS.
BARRIER LOAD CELL B4



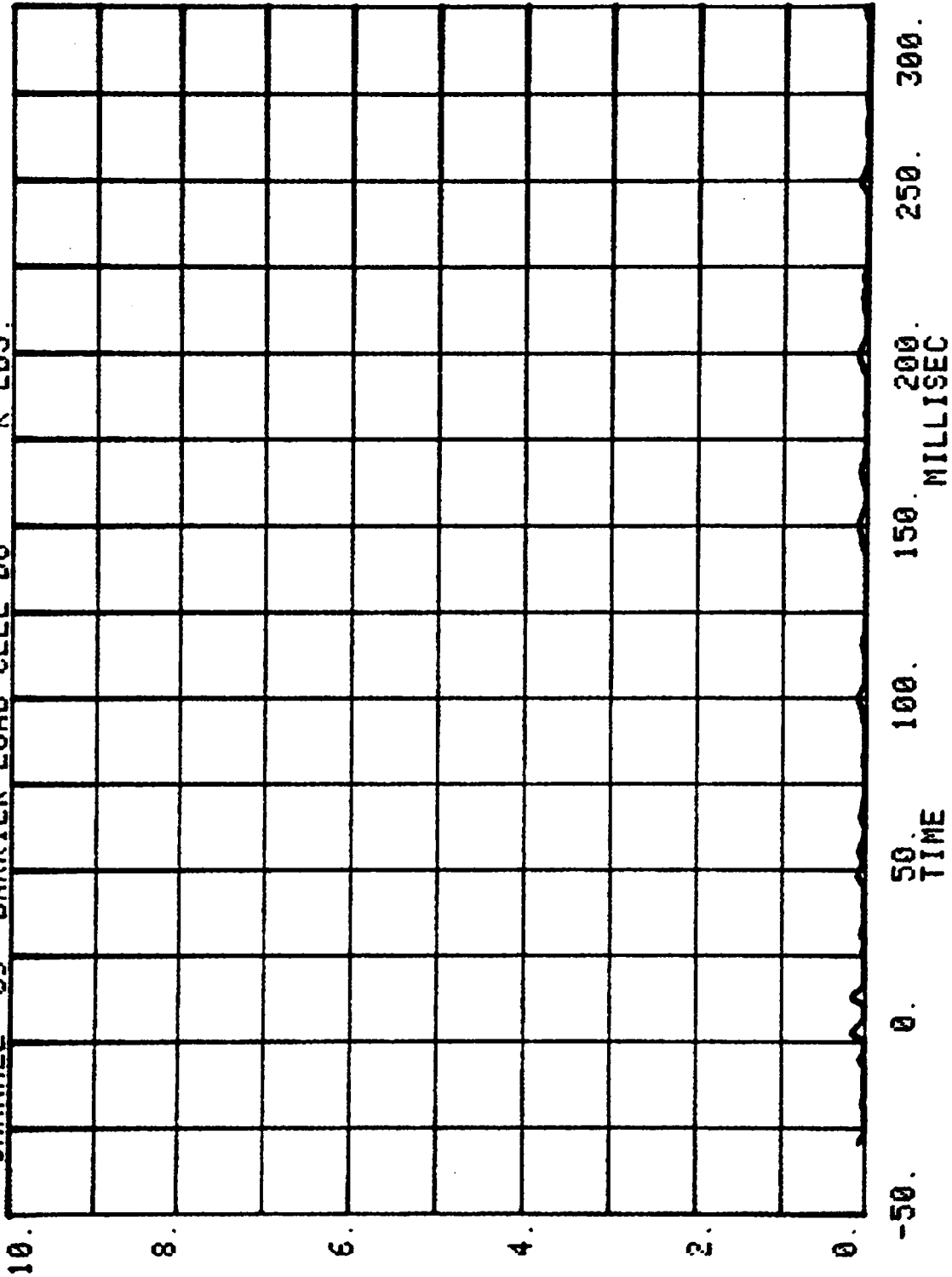


CHANNEL 57 RUN= 530 SERIES= 2 K LBS.
BARRIER LOAD CELL B6





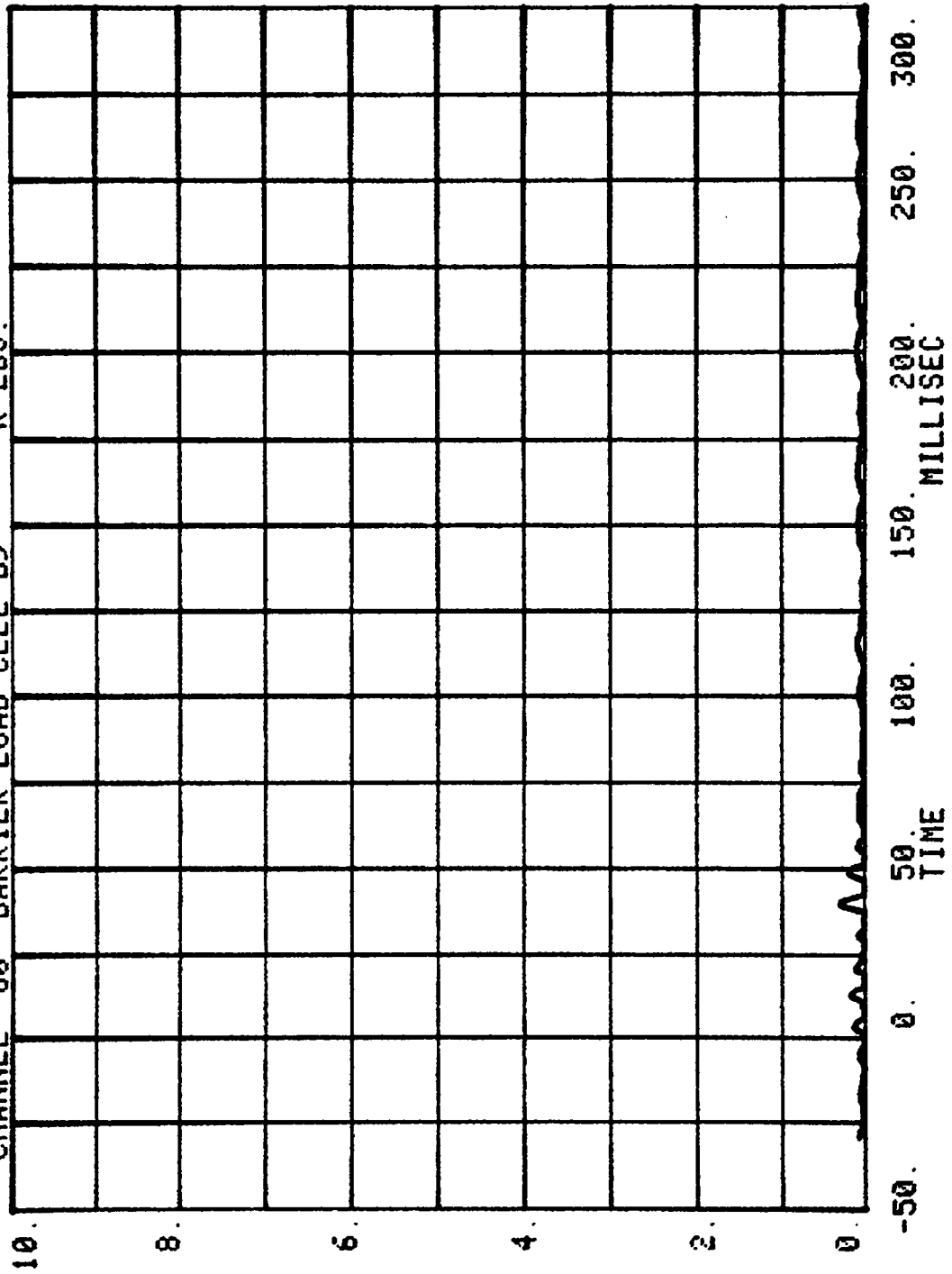
CHANNEL 59 RUN= 530 SERIES= 2 K LBS.
BARRIER LOAD CELL B8



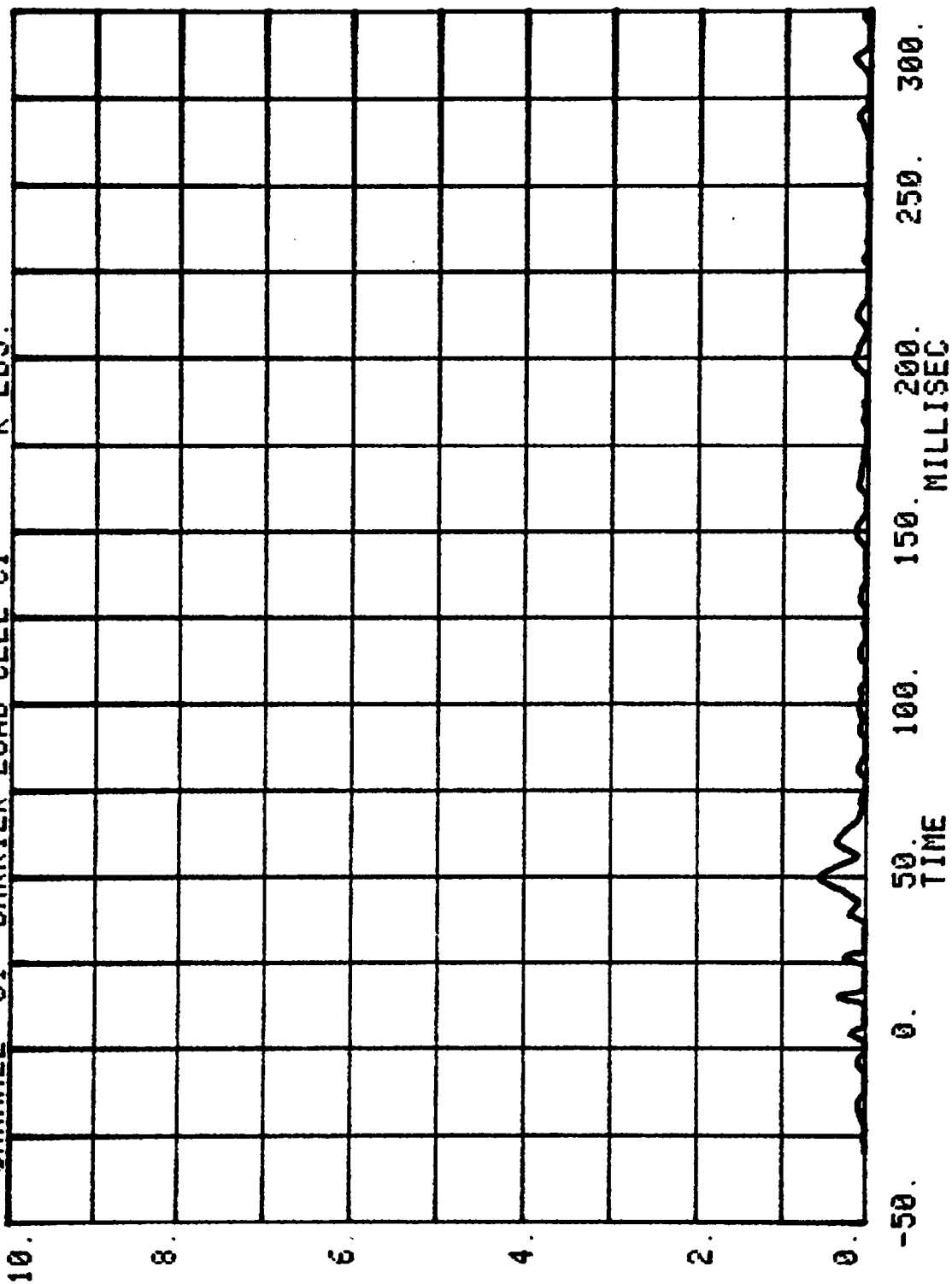
CHANNEL 60 BARRIER LOAD CELL B9

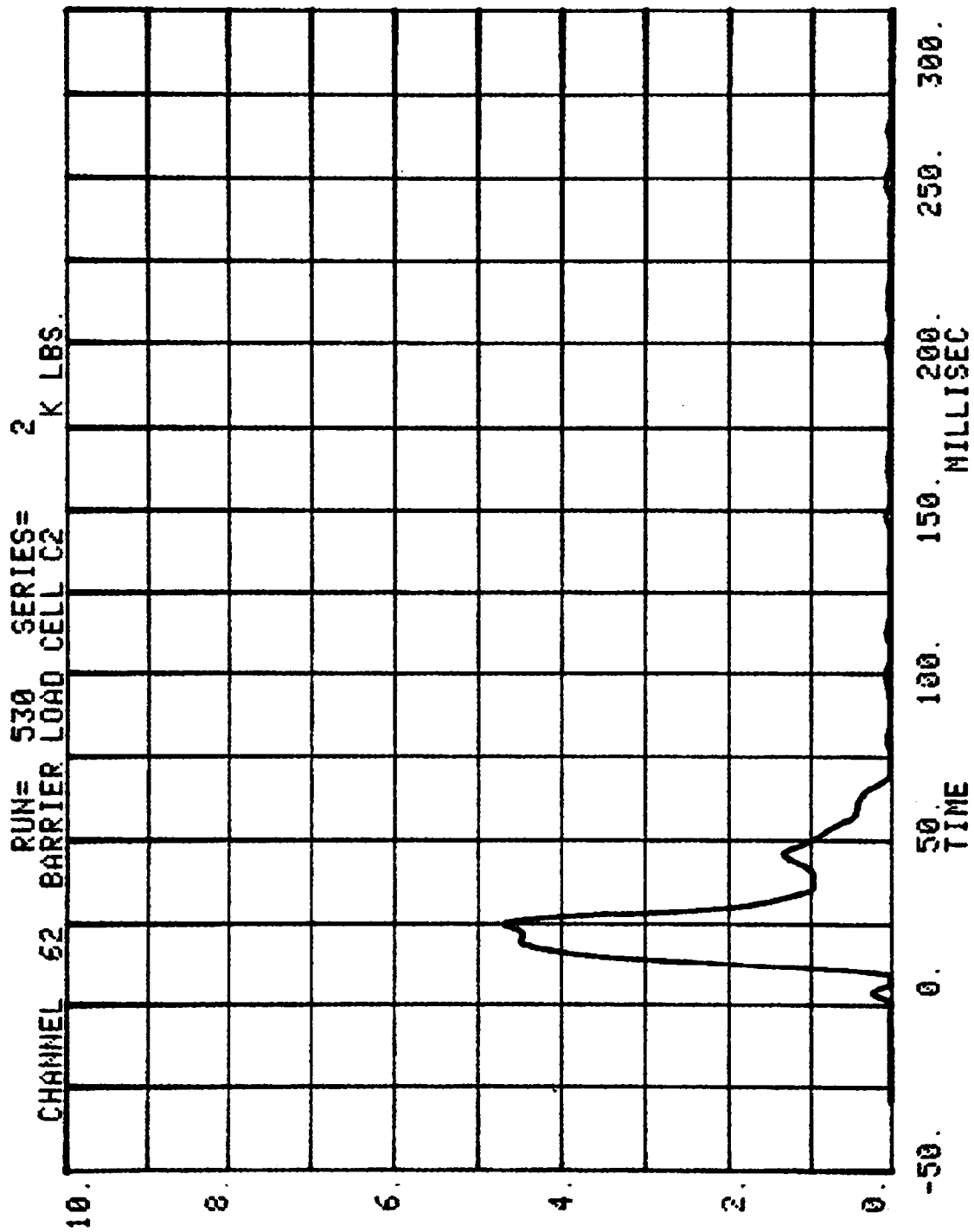
RUN= 530 SERIES= 2

K LBS.



RUN= 530 SERIES= 2
CHANNEL 61 BARRIER LOAD CELL C1 K LBS.

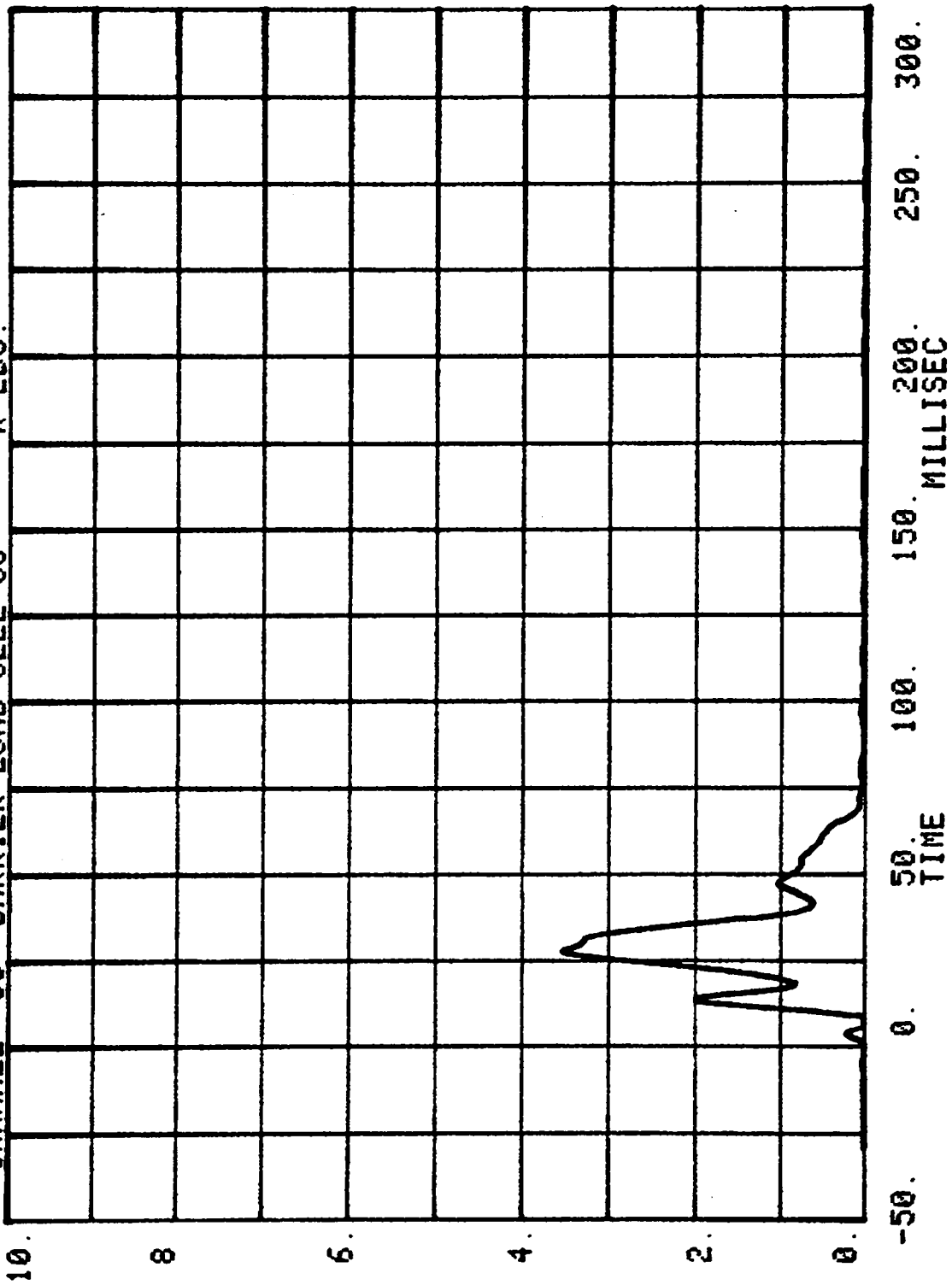




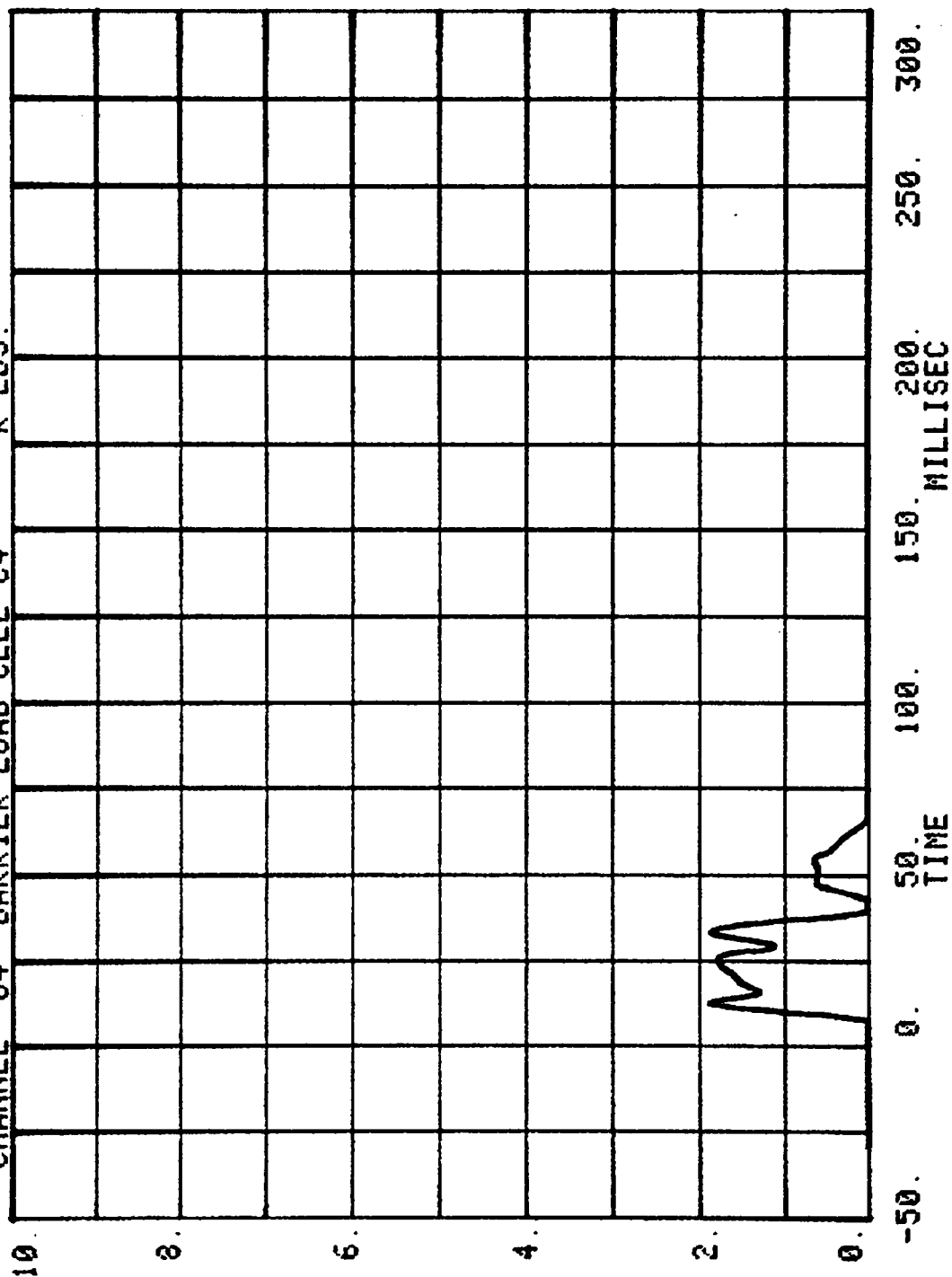
CHANNEL 63 BARRIER LOAD CELL C3

RUN= 530 SERIES= 2

K LBS.



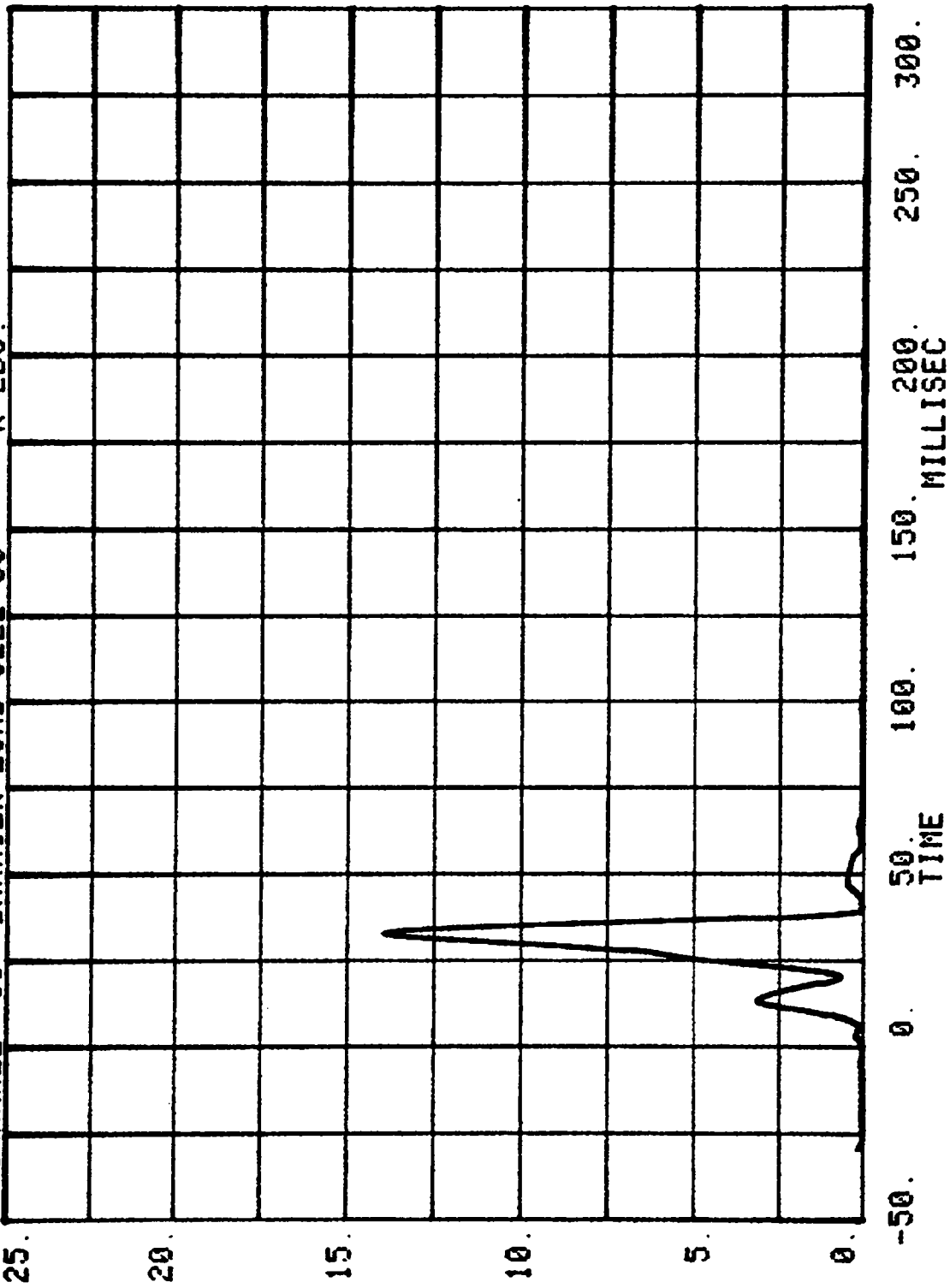
CHANNEL 64 BARRIER LOAD CELL C4 RUN= 530 SERIES= 2 K LBS.



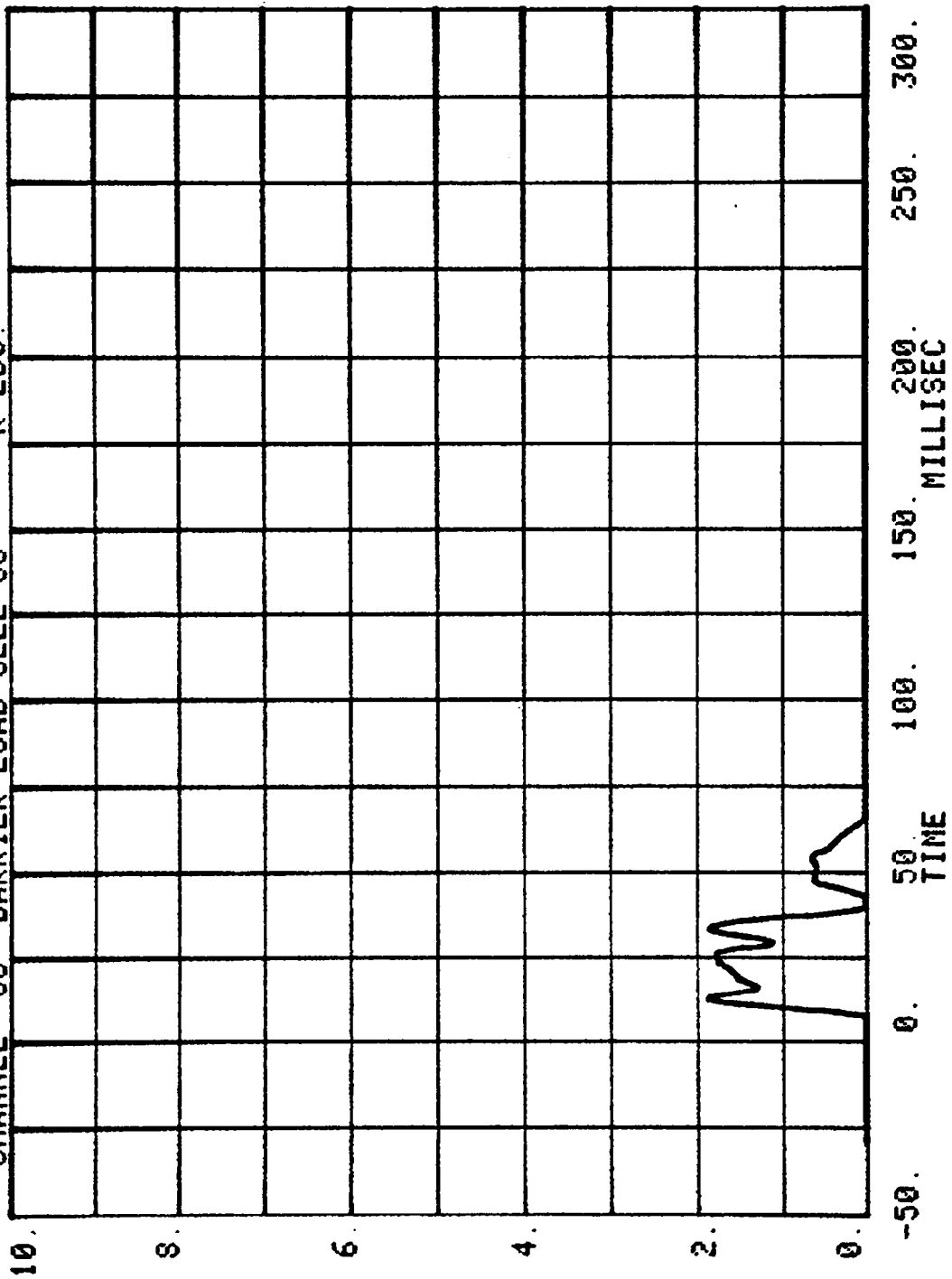
CHANNEL 65 BARRIER LOAD CELL C5

RUN= 530 SERIES= 2

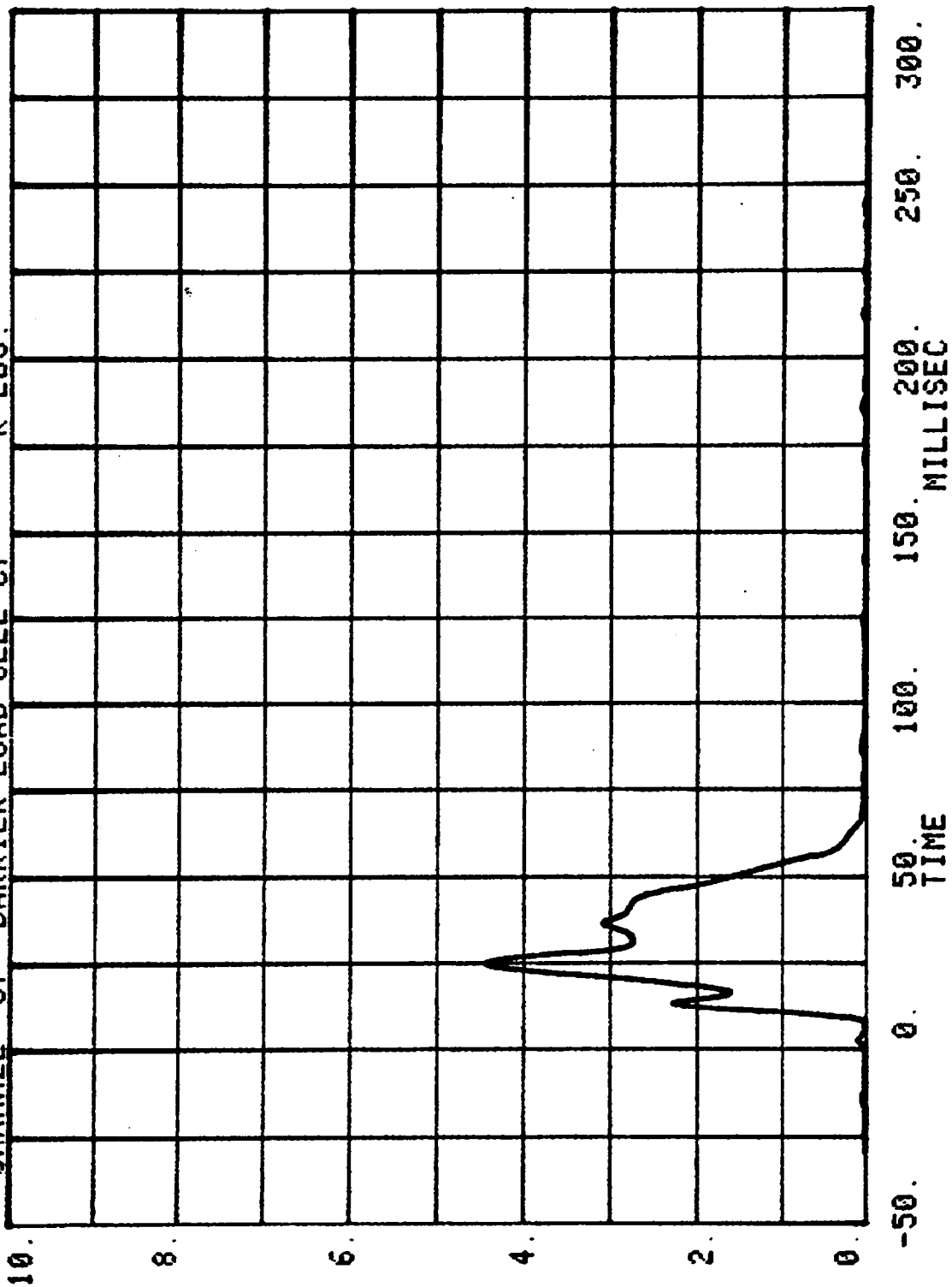
K LBS.

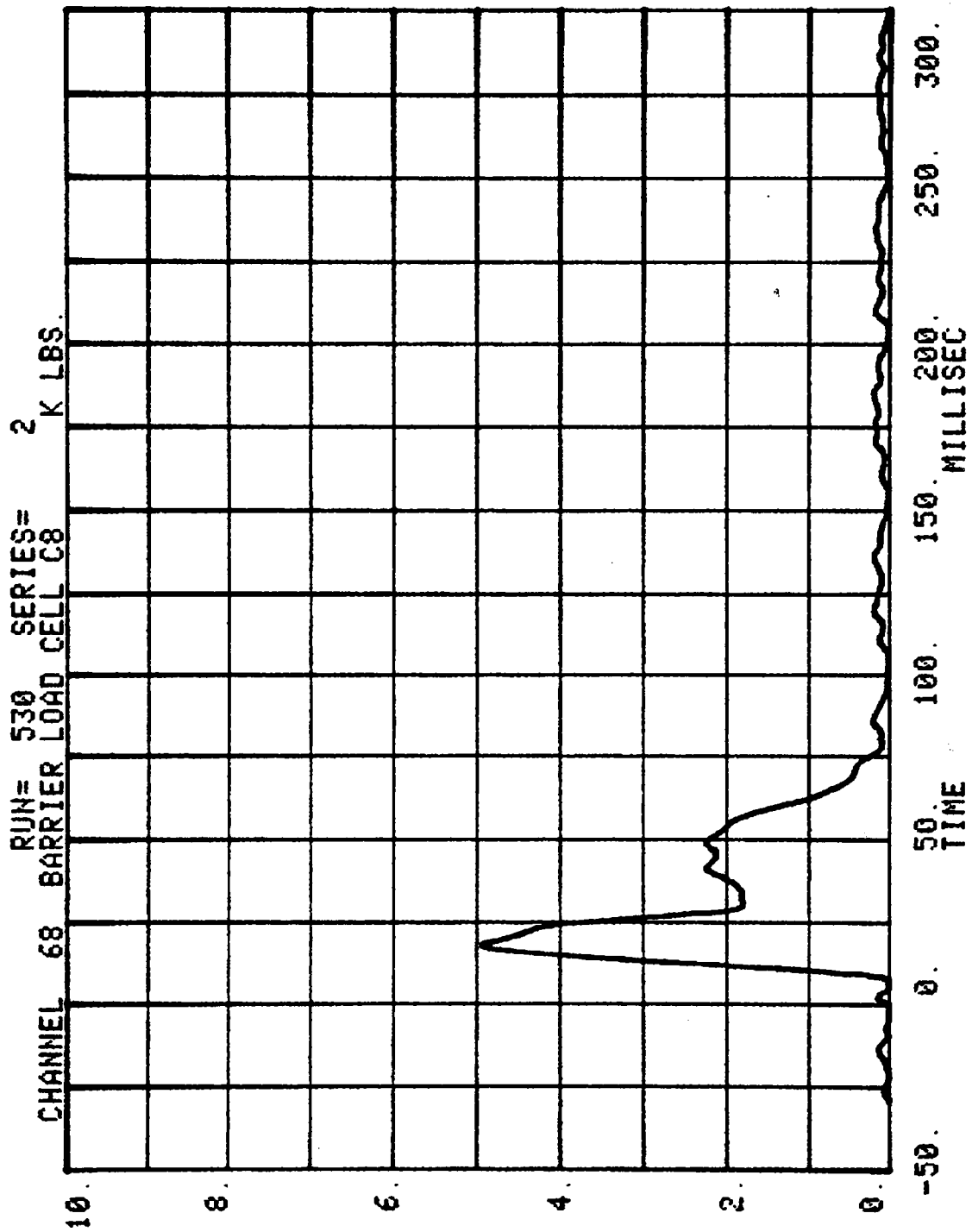


CHANNEL 66 BARRIER LOAD CELL C6
RUN= 530 SERIES= 2 K LBS.

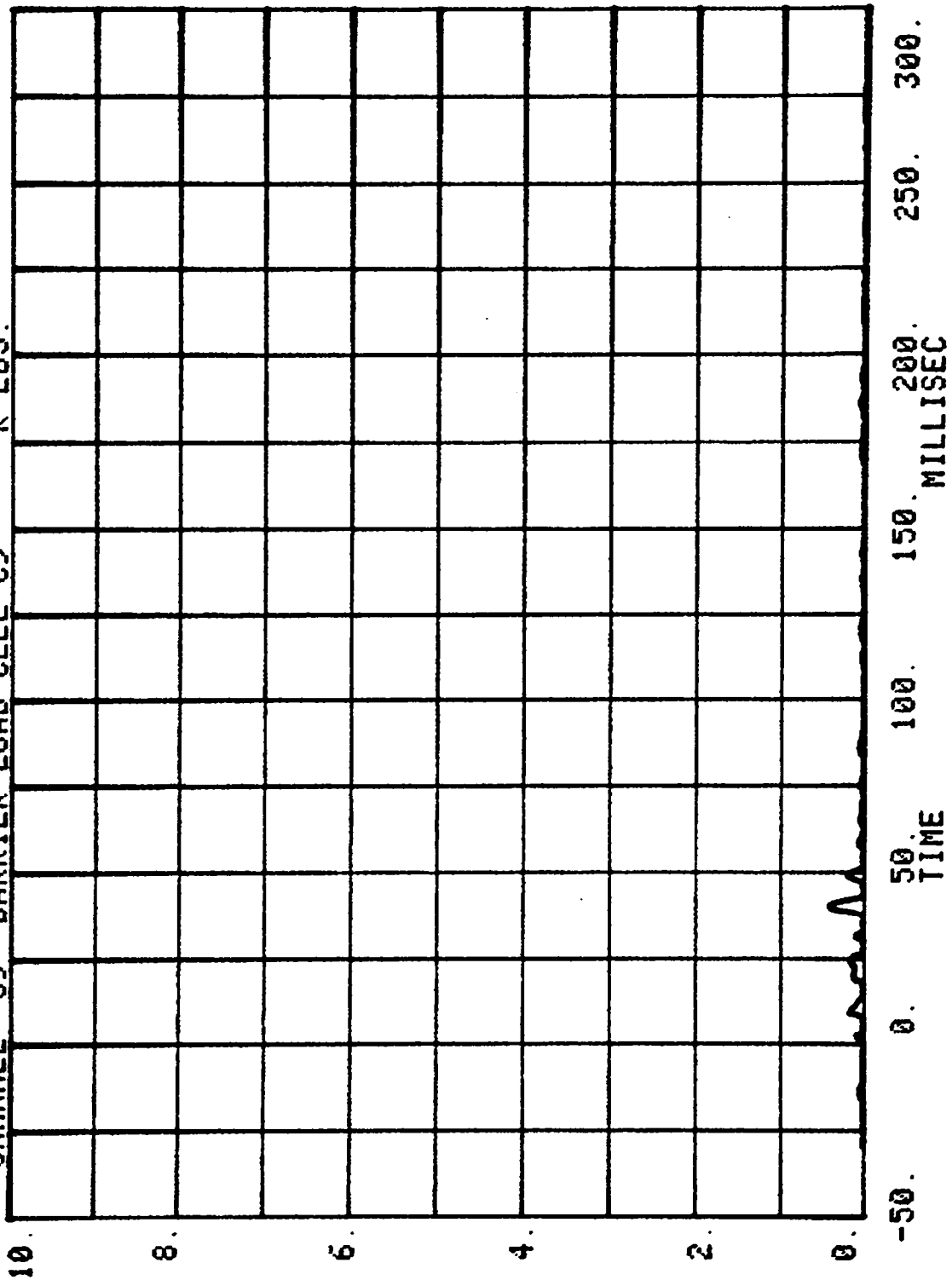


RUN= 530 SERIES= 2 K LBS.
CHANNEL 67 BARRIER LOAD CELL C7

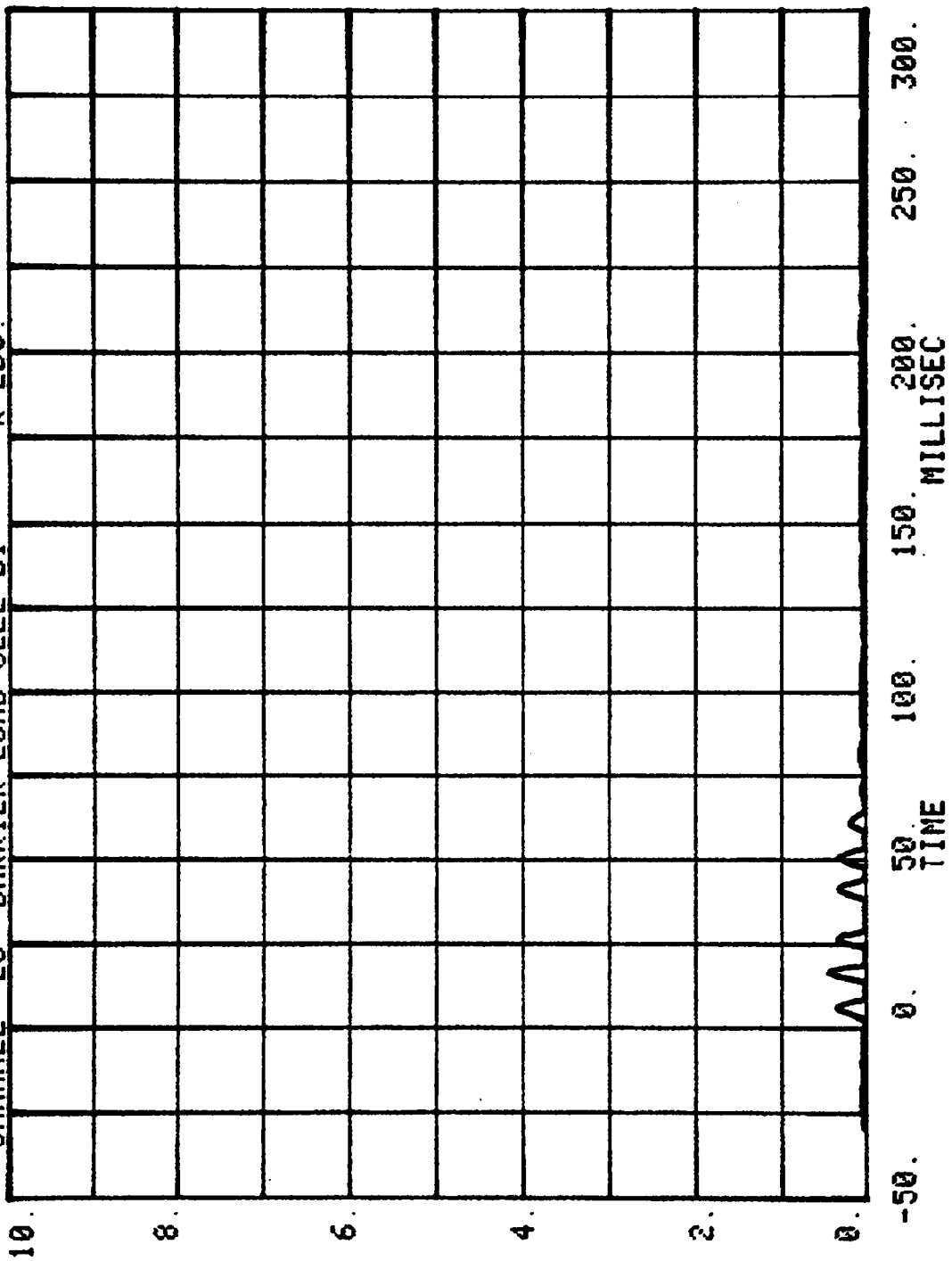




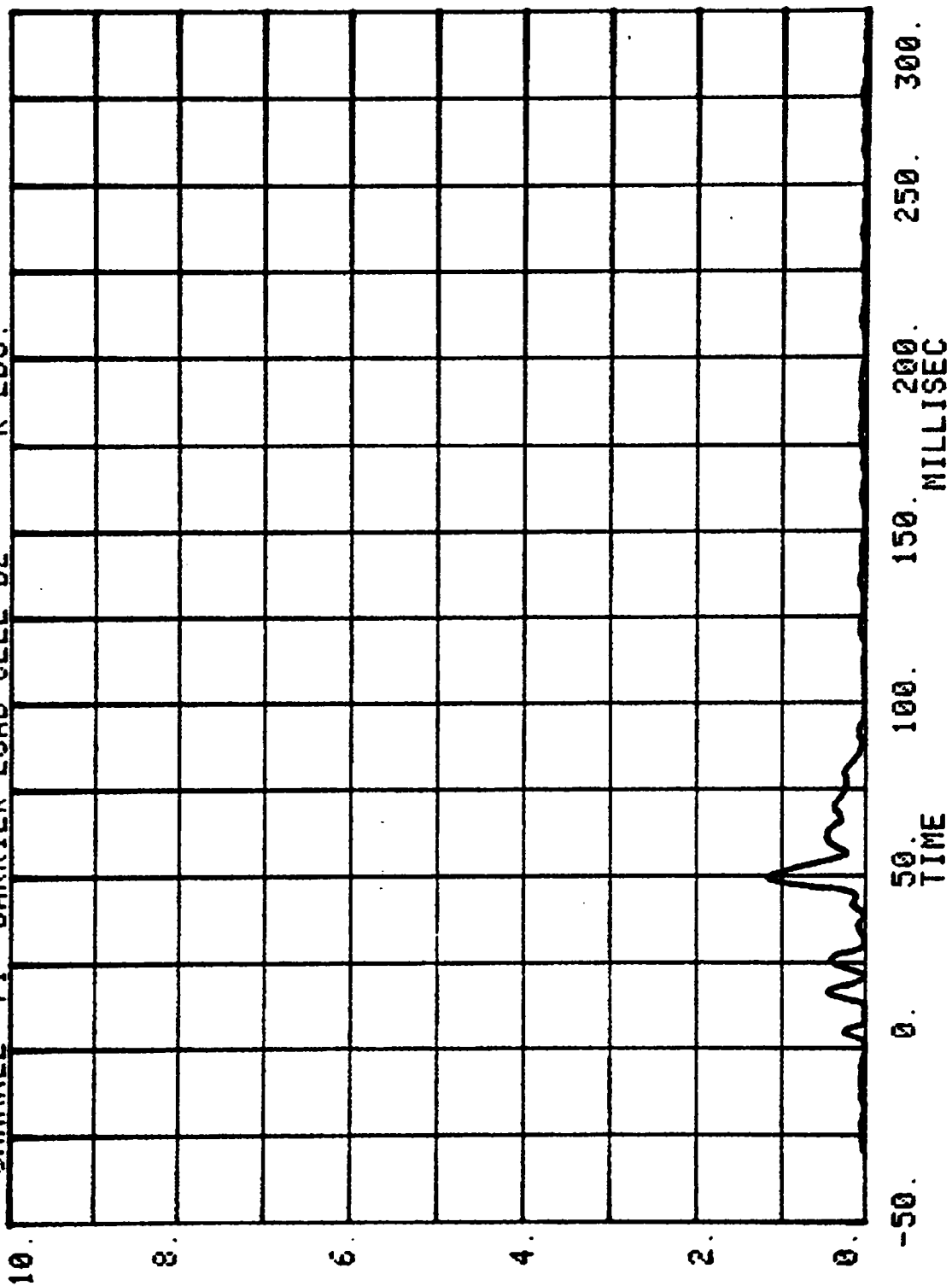
CHANNEL 69 BARRIER LOAD CELL C9 RUN= 530 SERIES= 2 K LBS.



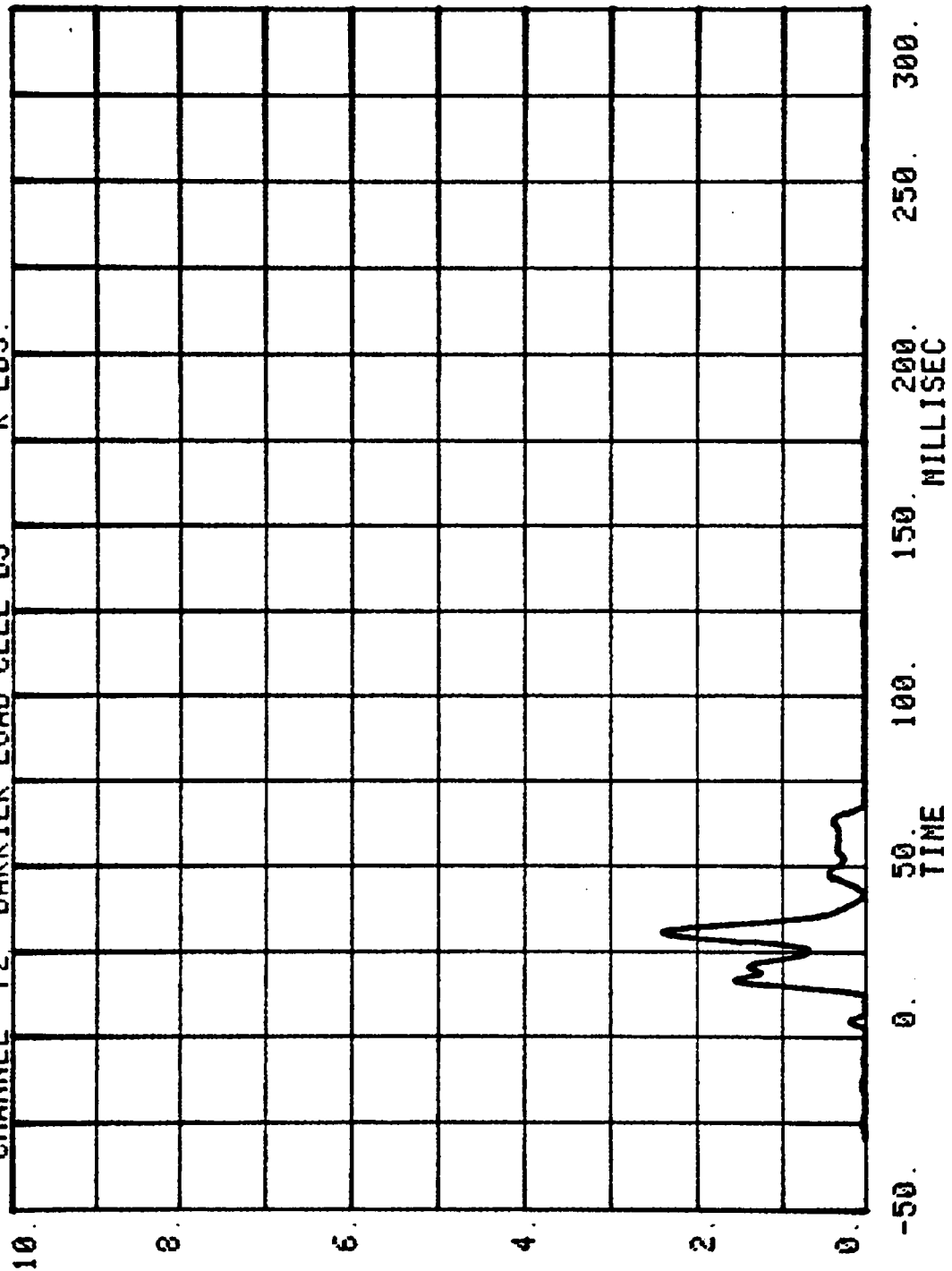
CHANNEL 23 RUN= 530 SERIES= 2 K LBS.
BARRIER LOAD CELL D1



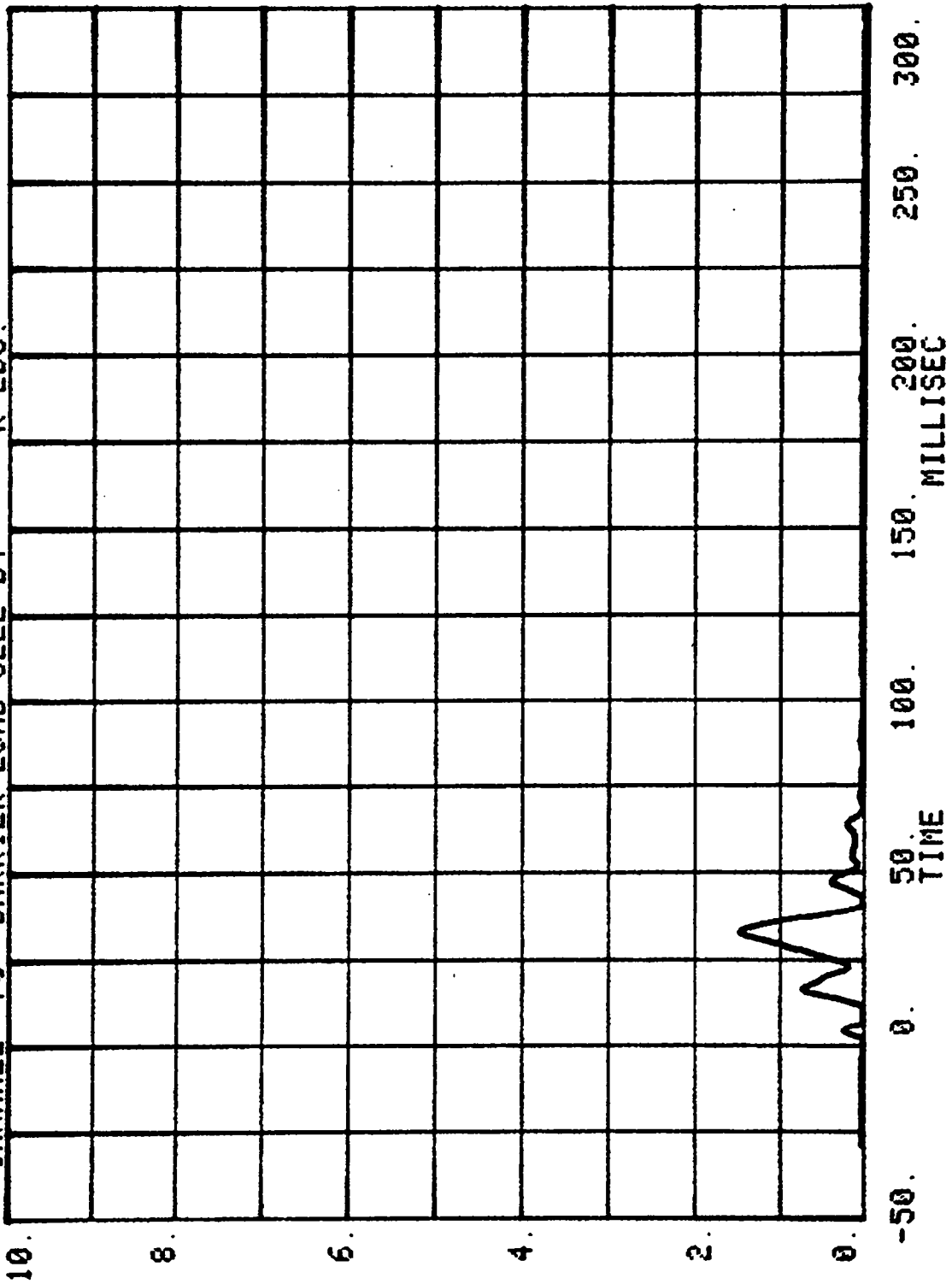
CHANNEL 71 RUN= 530 SERIES= 2 K LBS.
BARRIER LOAD CELL D2

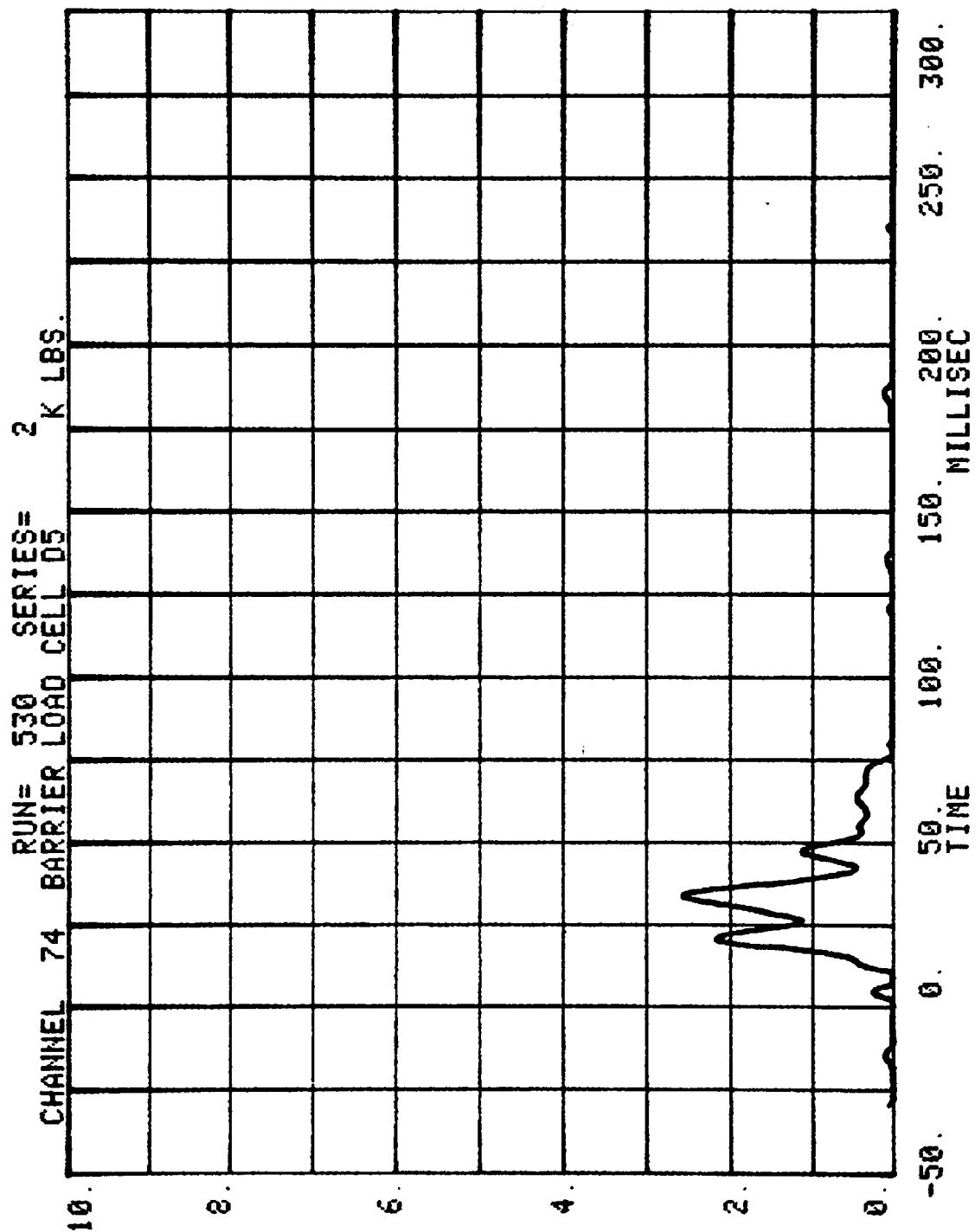


CHANNEL 72 BARRIER LOAD CELL D3 RUN= 530 SERIES= 2 K LBS.



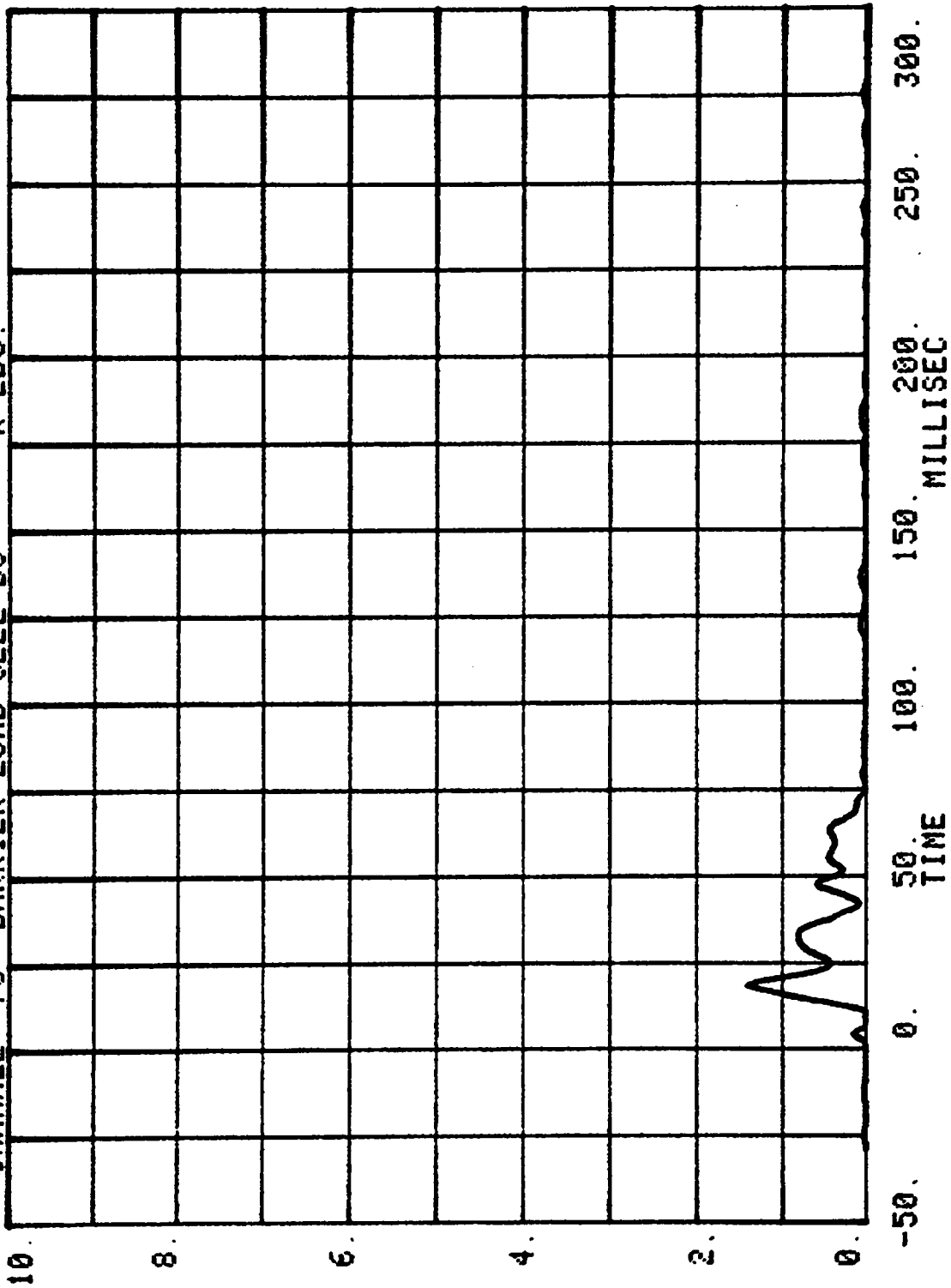
CHANNEL 73 RUN= 530 SERIES= 2
BARRIER LOAD CELL D4 K LBS.

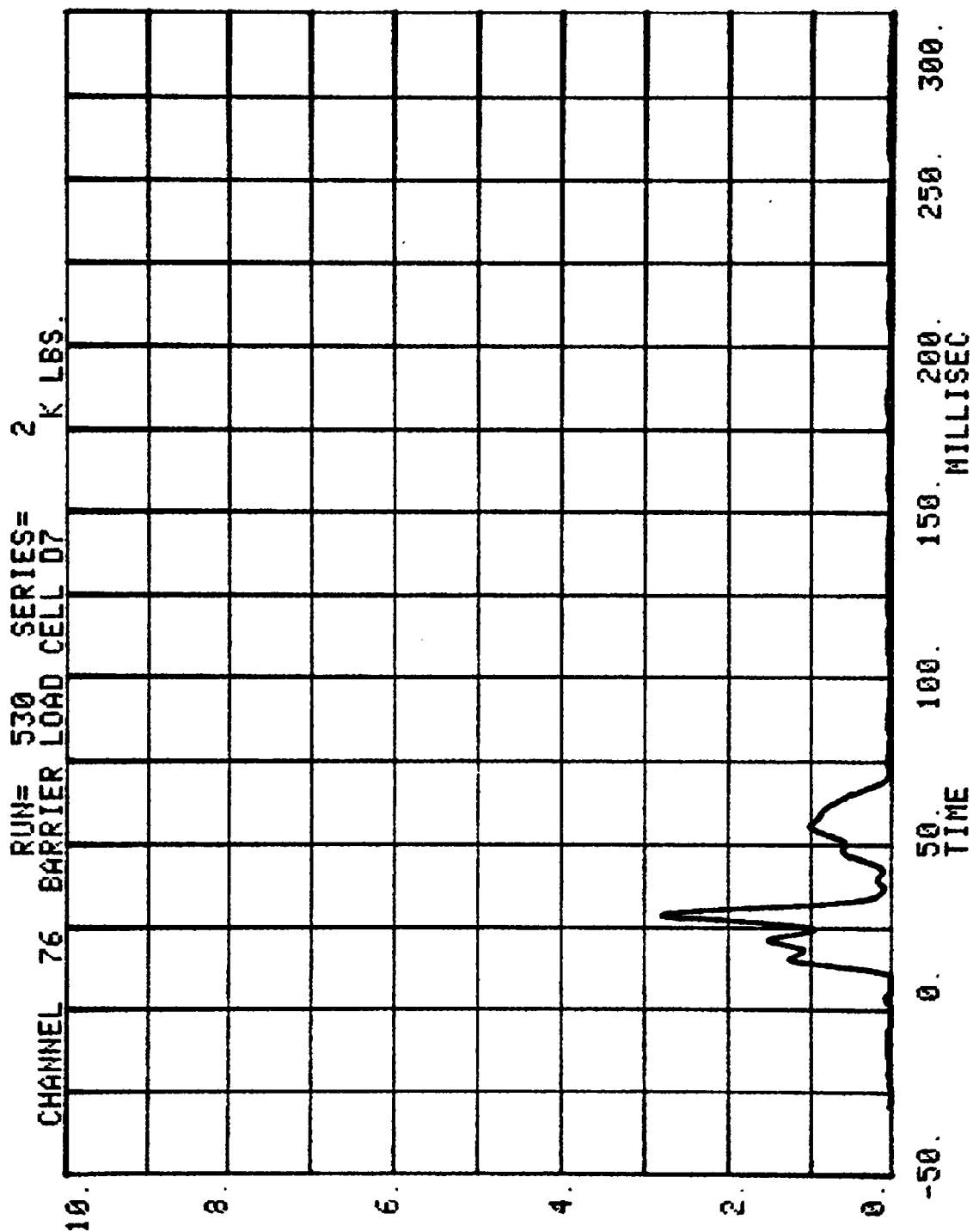




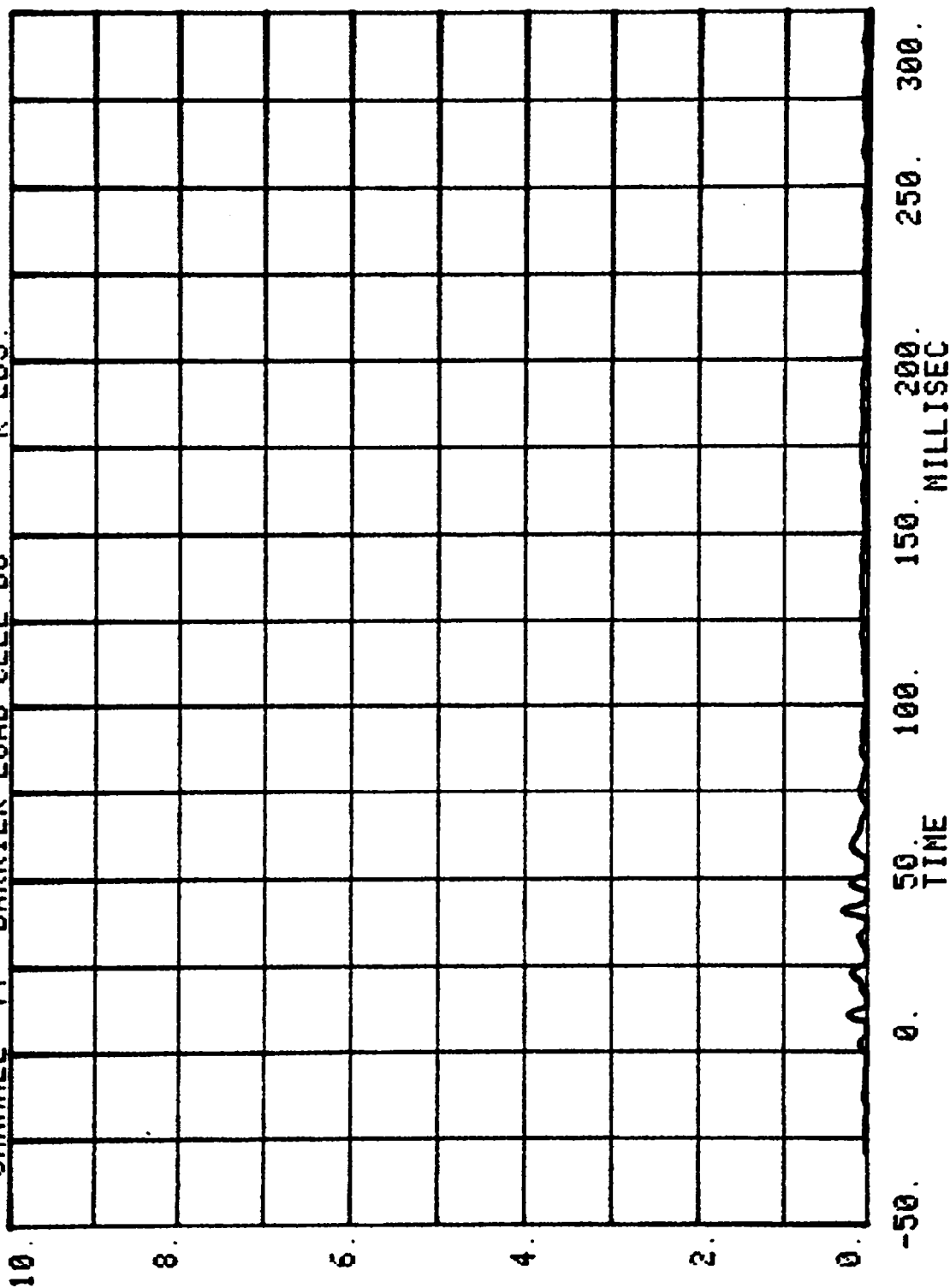
CHANNEL 75 BARRIER LOAD CELL D6 2 K LBS.

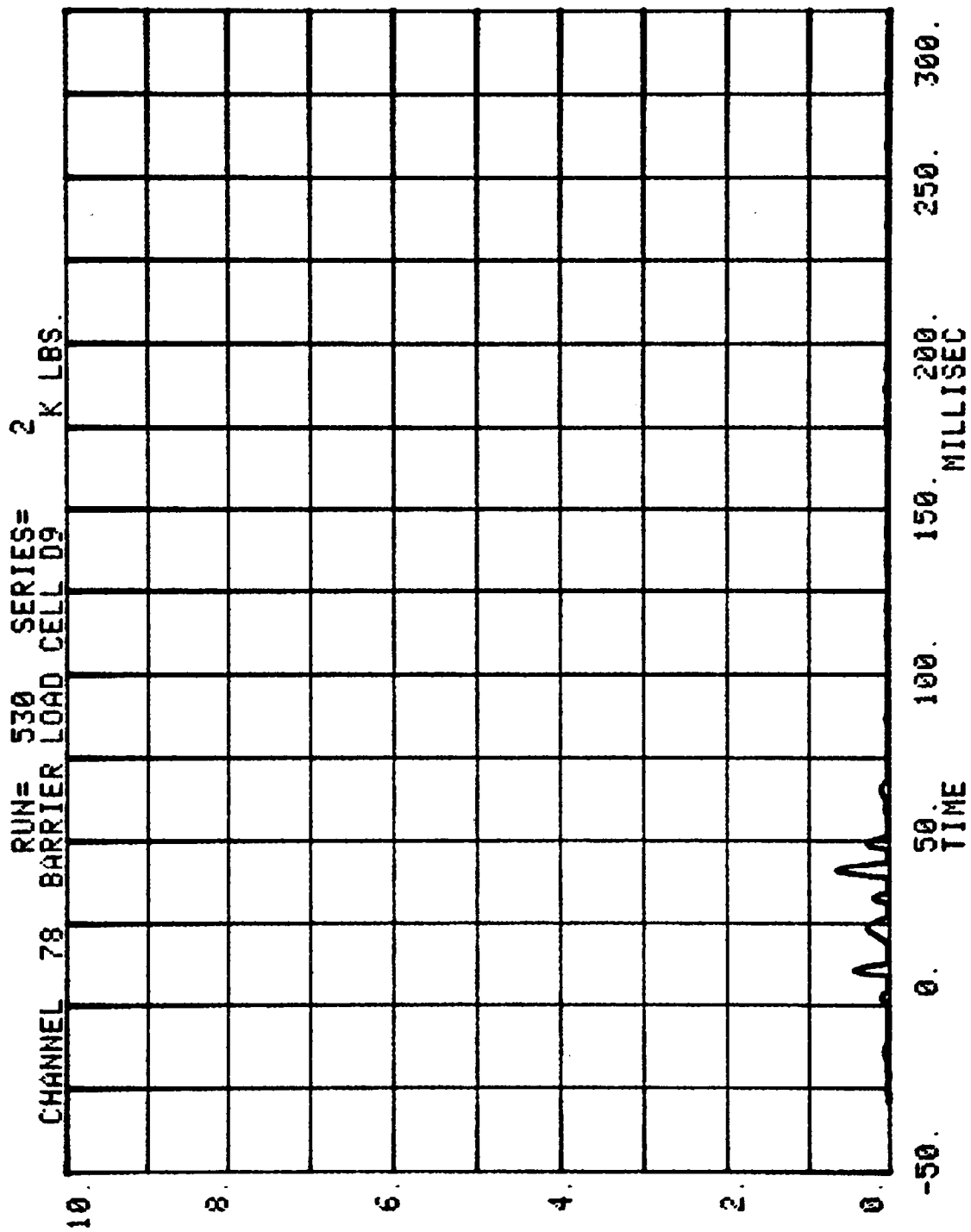
RUN= 530 SERIES=

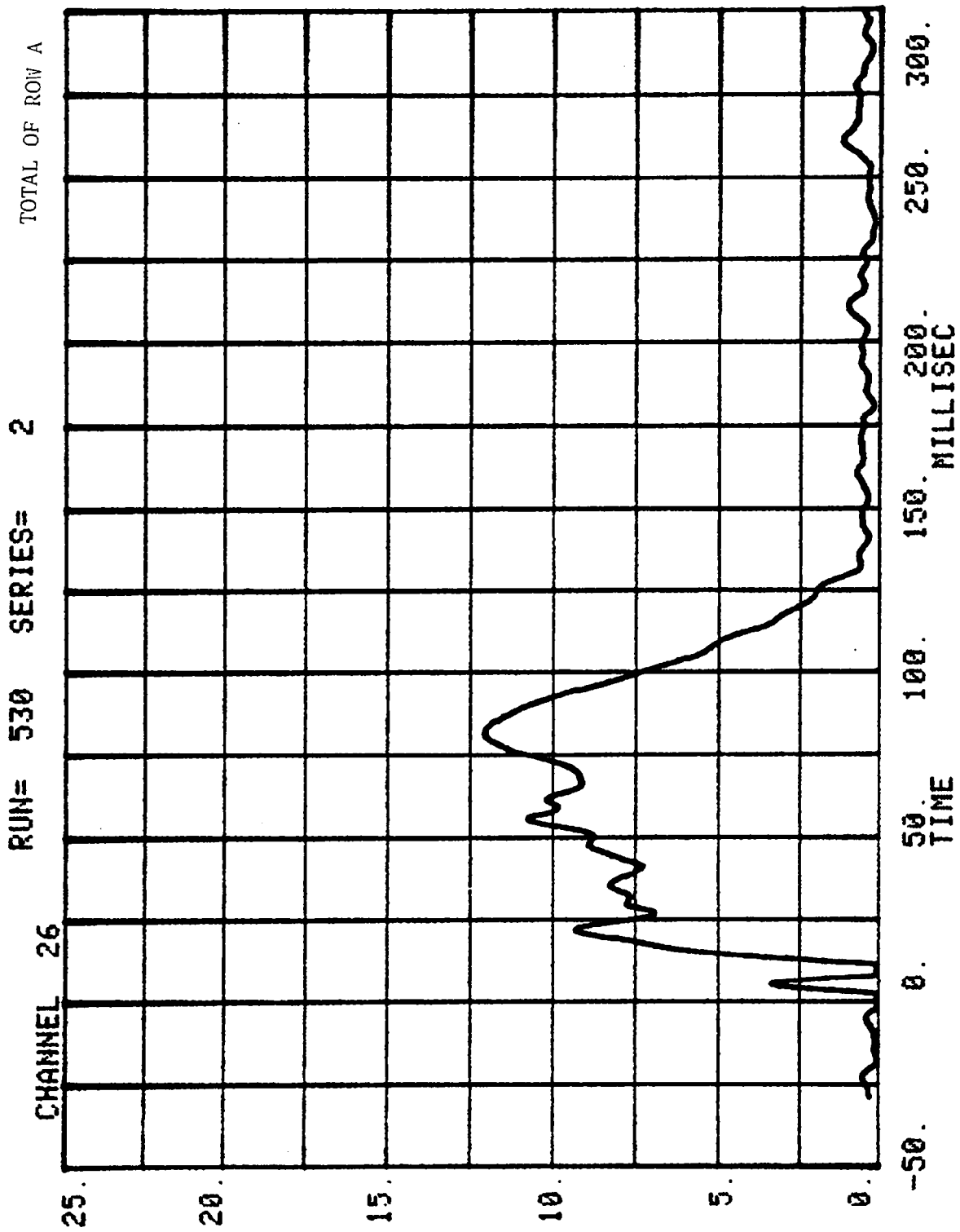


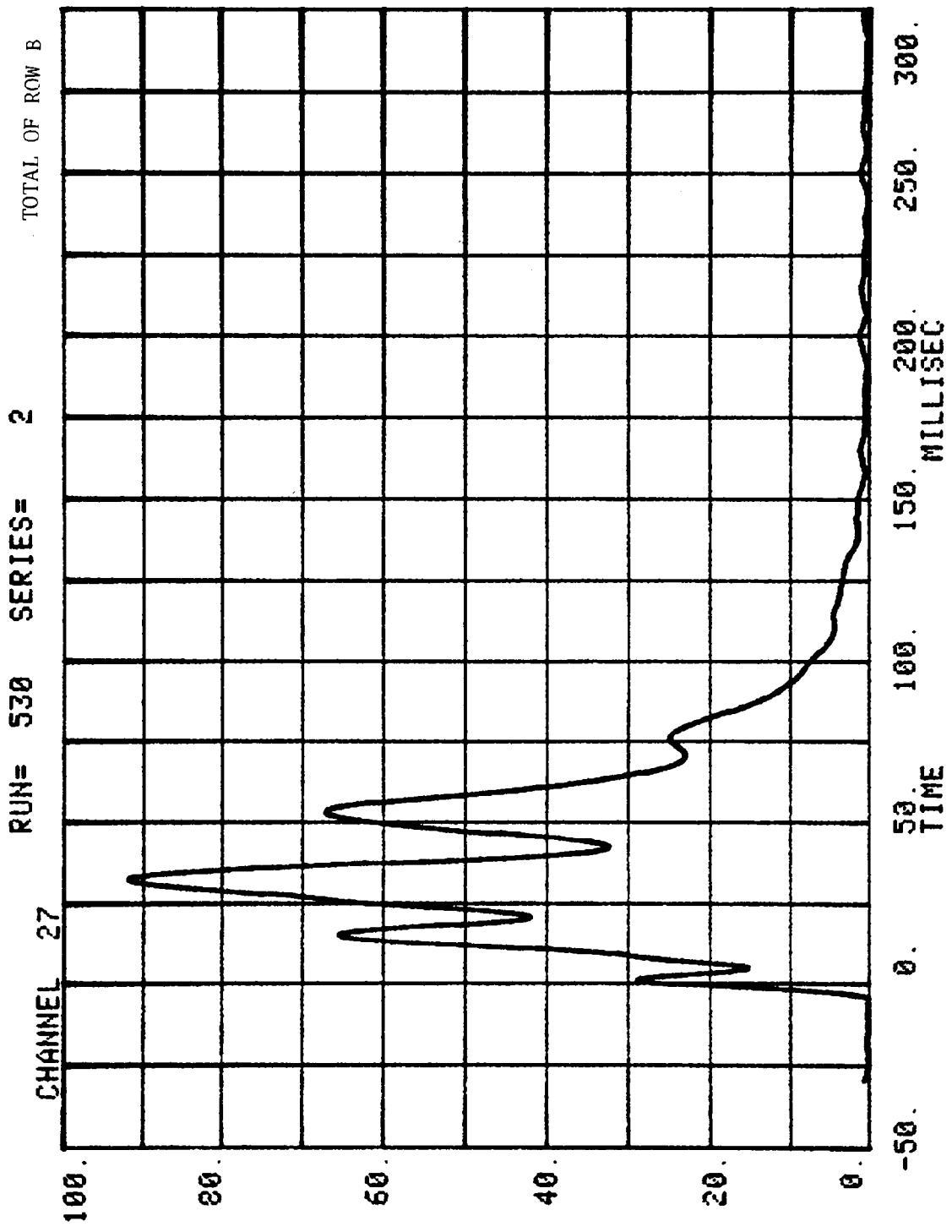


CHANNEL 77 RUN= 530 SERIES= 2 K LBS.
BARRIER LOAD CELL D8









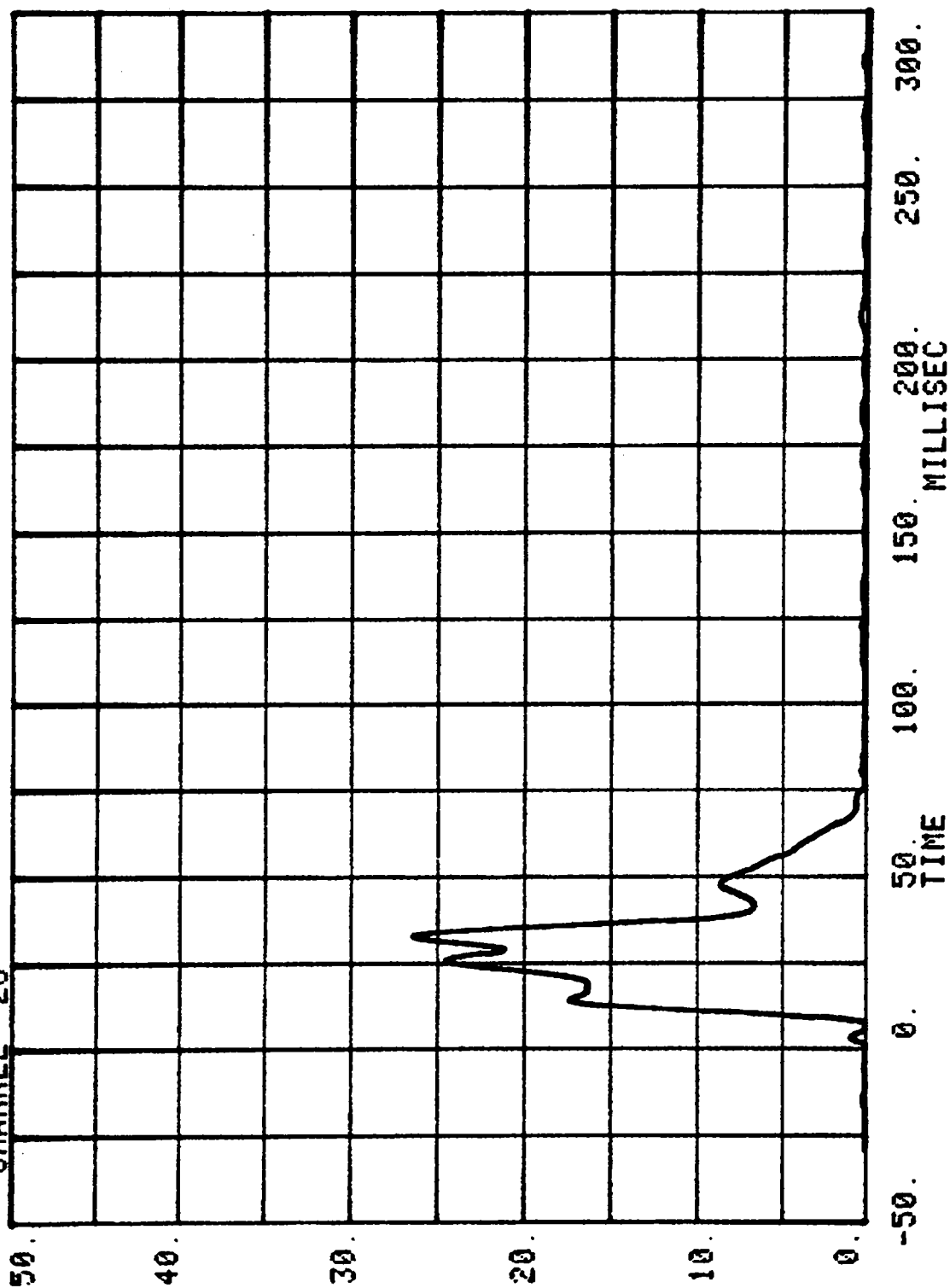
TOTAL OF ROW C

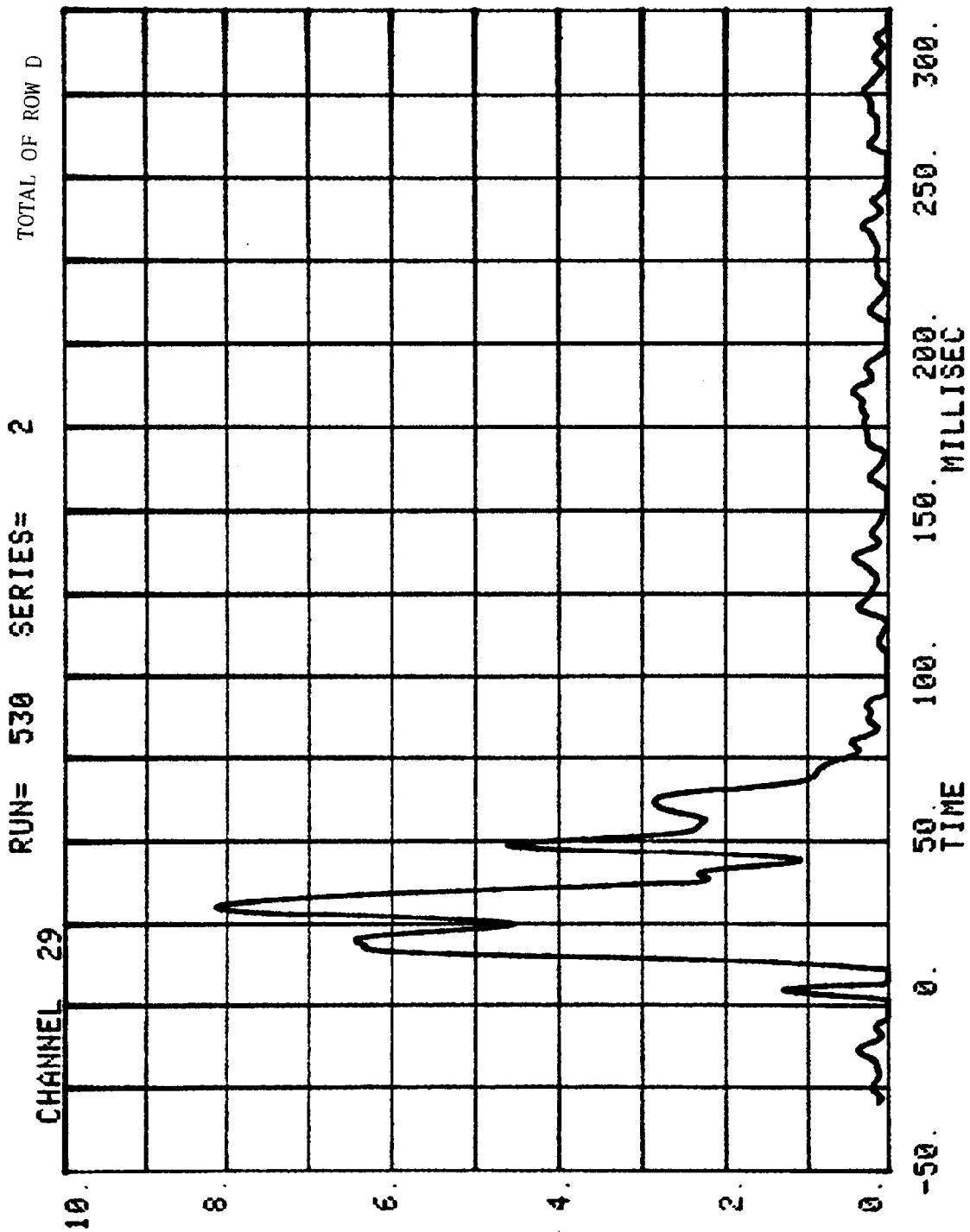
2

SERIES=

RUN= 530

CHANNEL 28





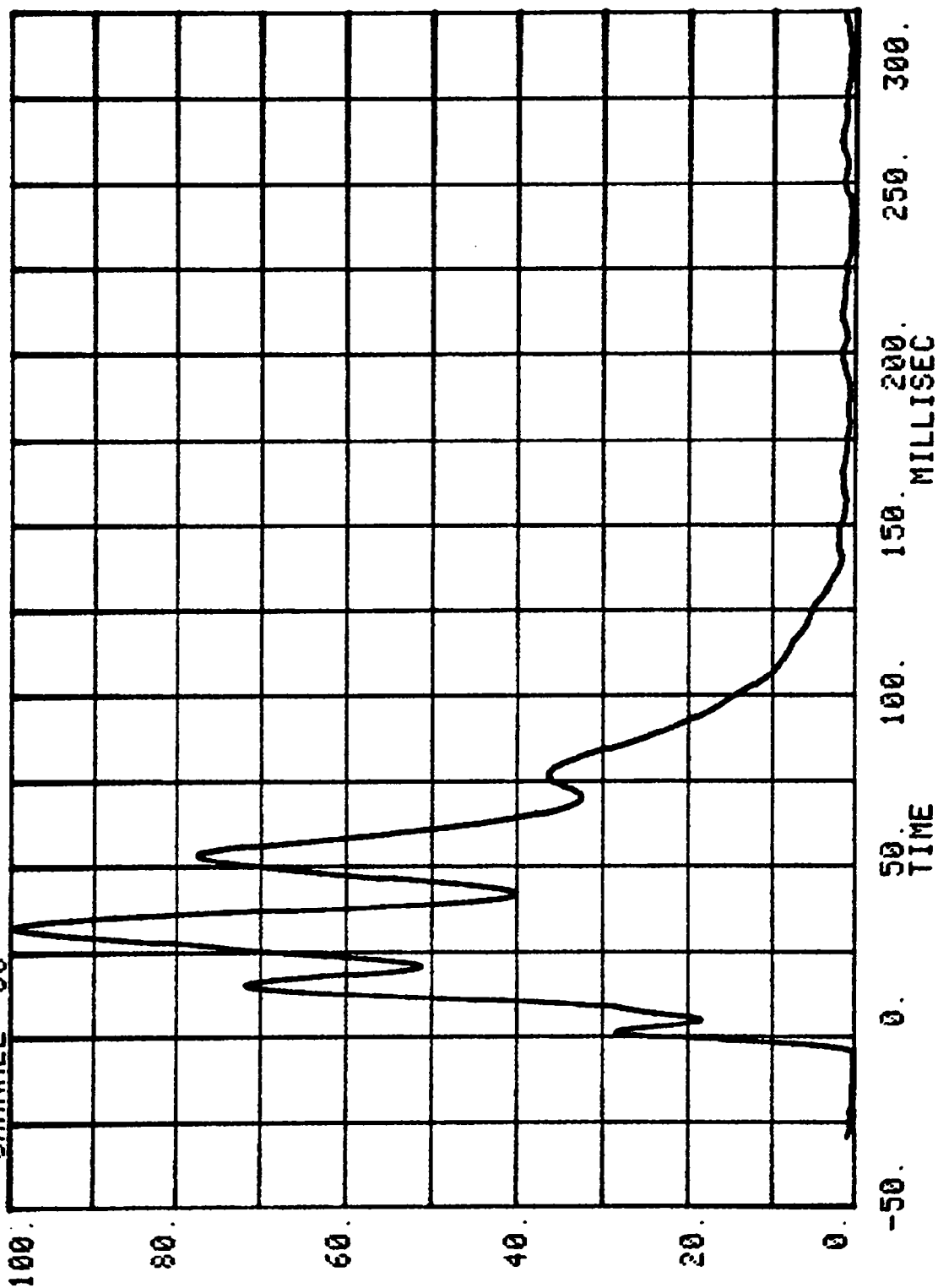
TOTAL OF ROW A AND B

2

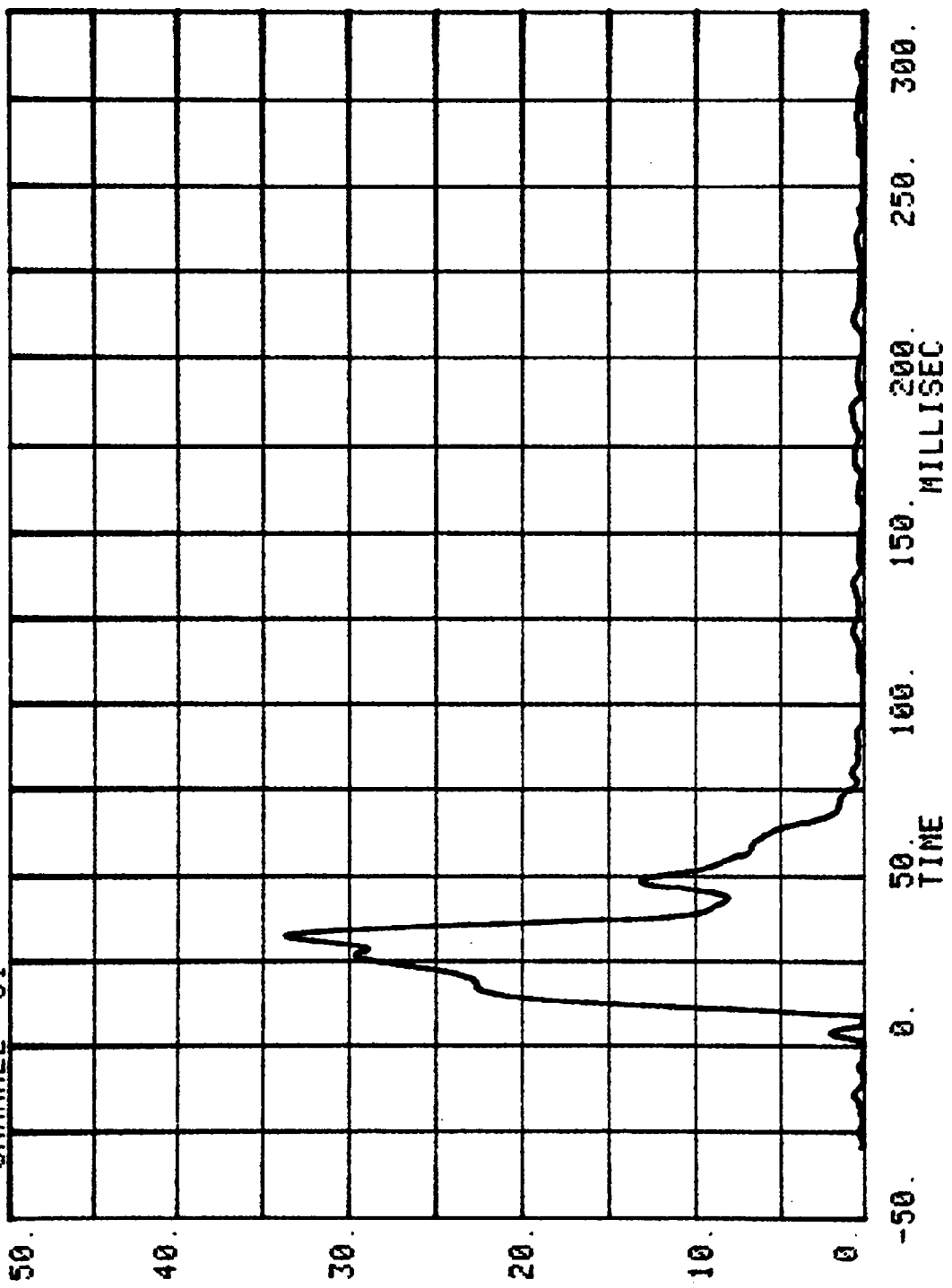
SERIES=

RUN= 530

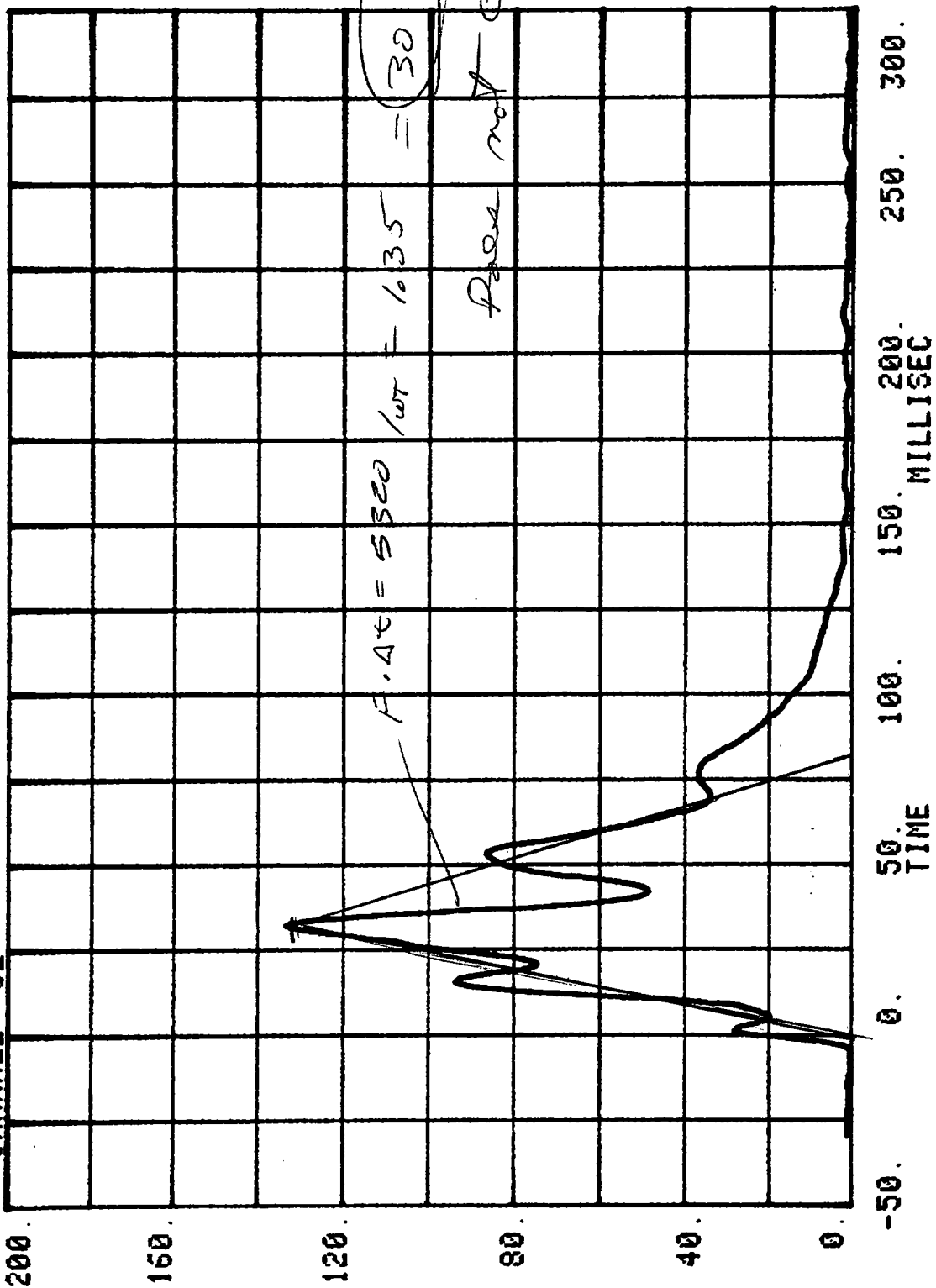
CHANNEL 30



CHANNEL 31 RUN= 530 SERIES= 2 TOTAL OF ROW C AND D



CHANNEL 32 RUN= 530 SERIES= 2 TOTAL OF ROW A + B + C + D



TEST NO. 615-2-530

1980 AMC CONCORD

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

CAR TO LOAD CELL BARRIER

RUN= 530

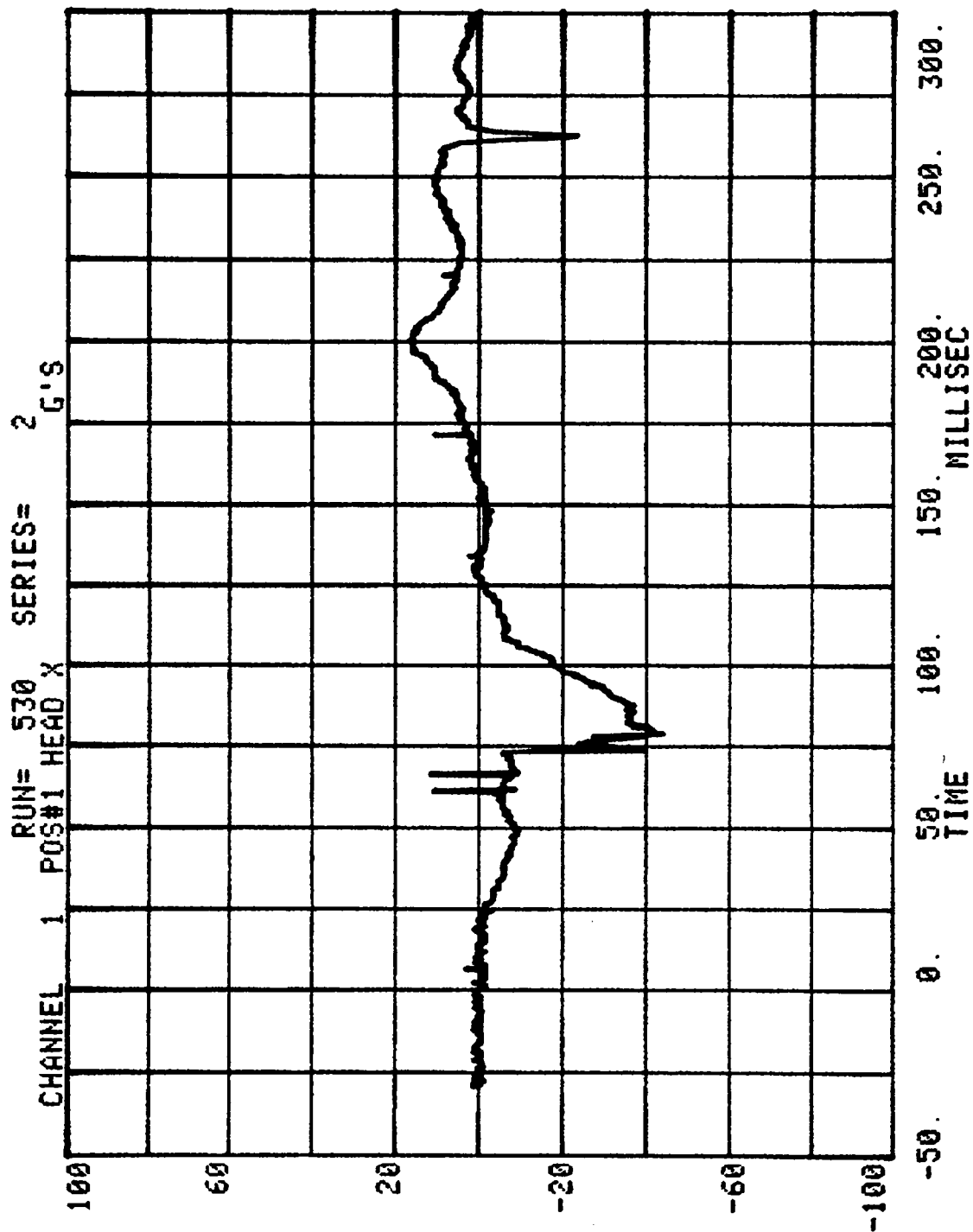
POS#1 HEAD RESULTANT

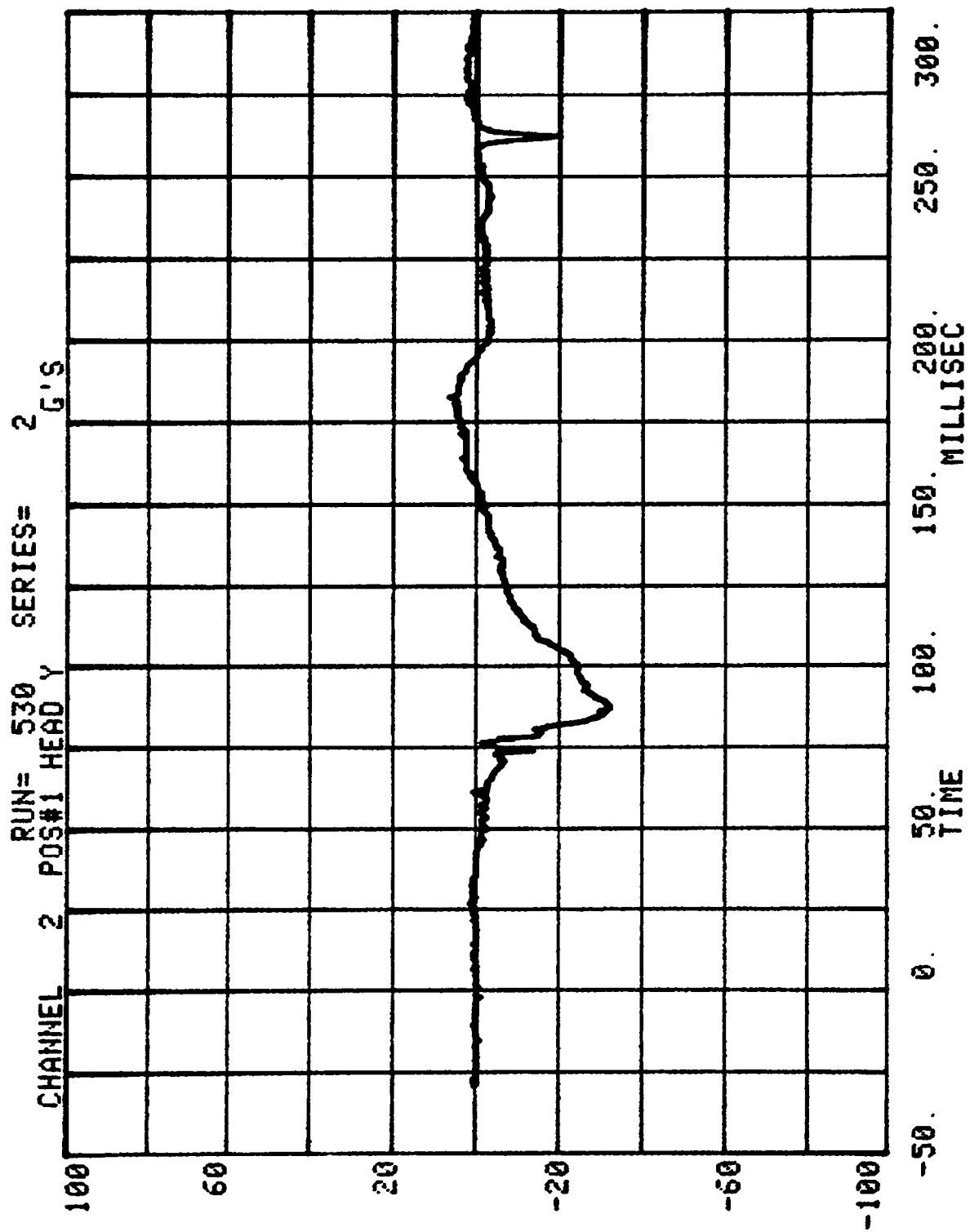
HIC= 418.4 FROM T1= .04380 TO T2= .10770

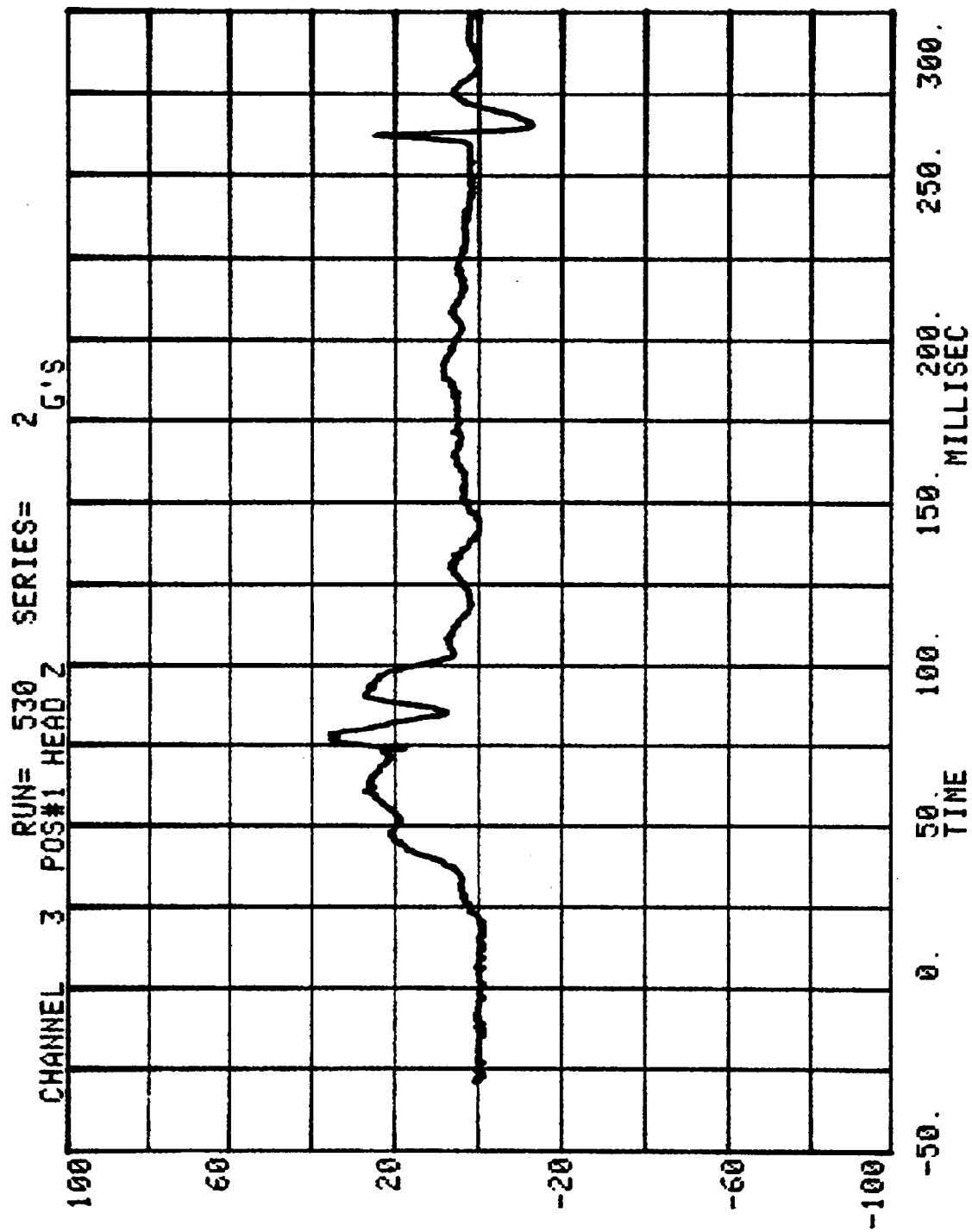
AVERAGE ACCELERATION BETWEEN T1 AND T2= 33.6G'S

EVENT TIME= 300.0 MSEC

SEVERITY INDEX= 587.3



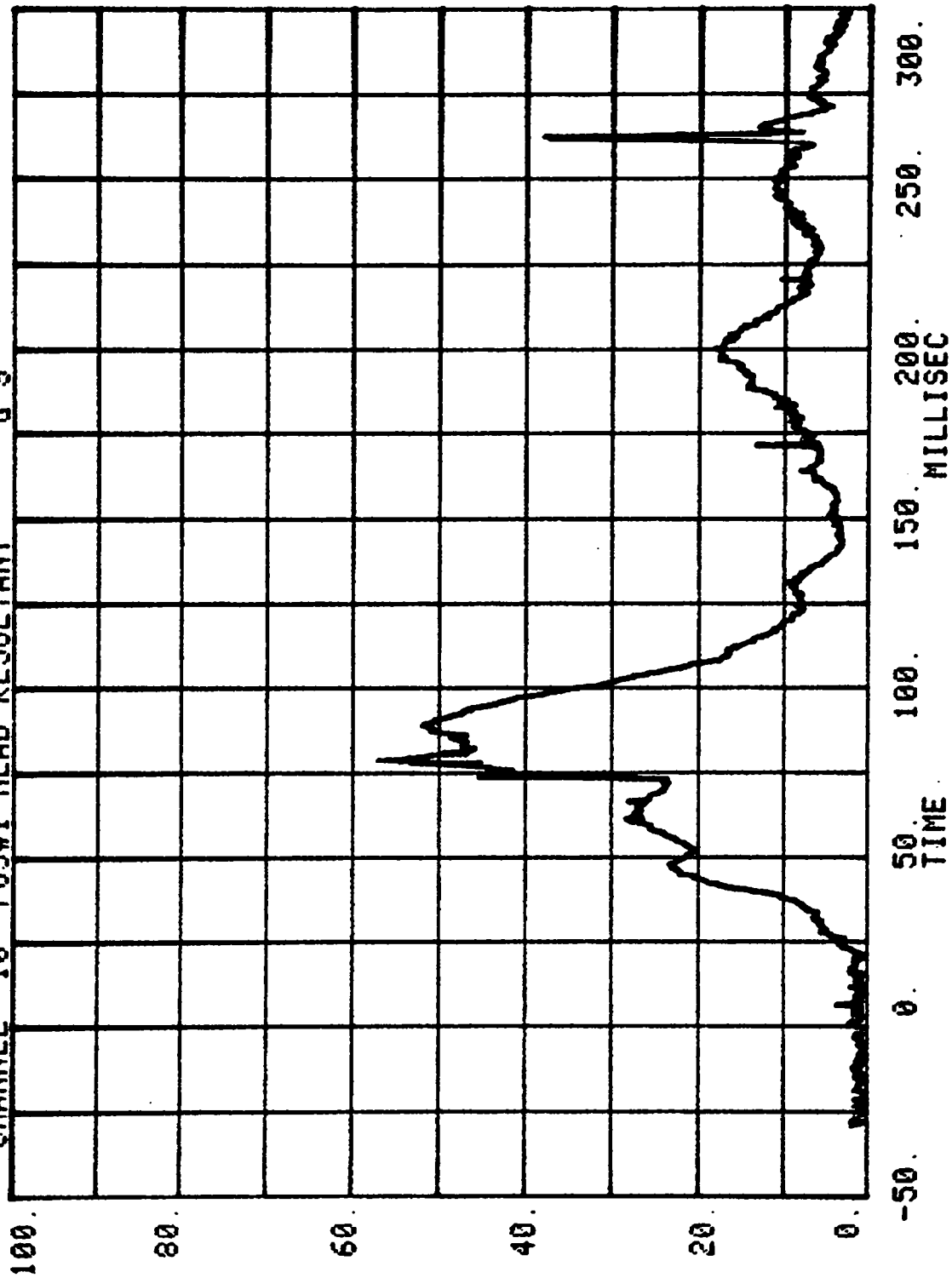


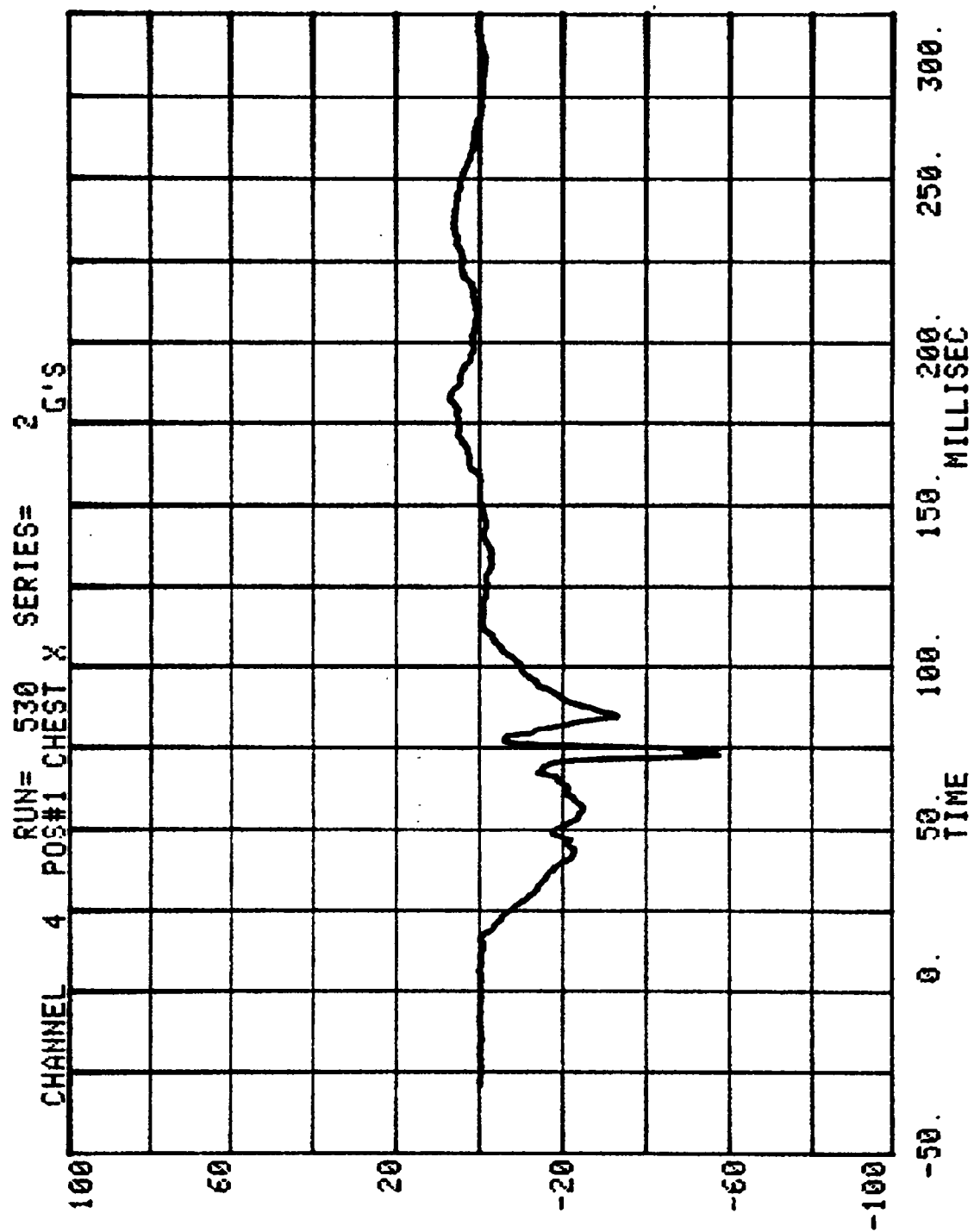


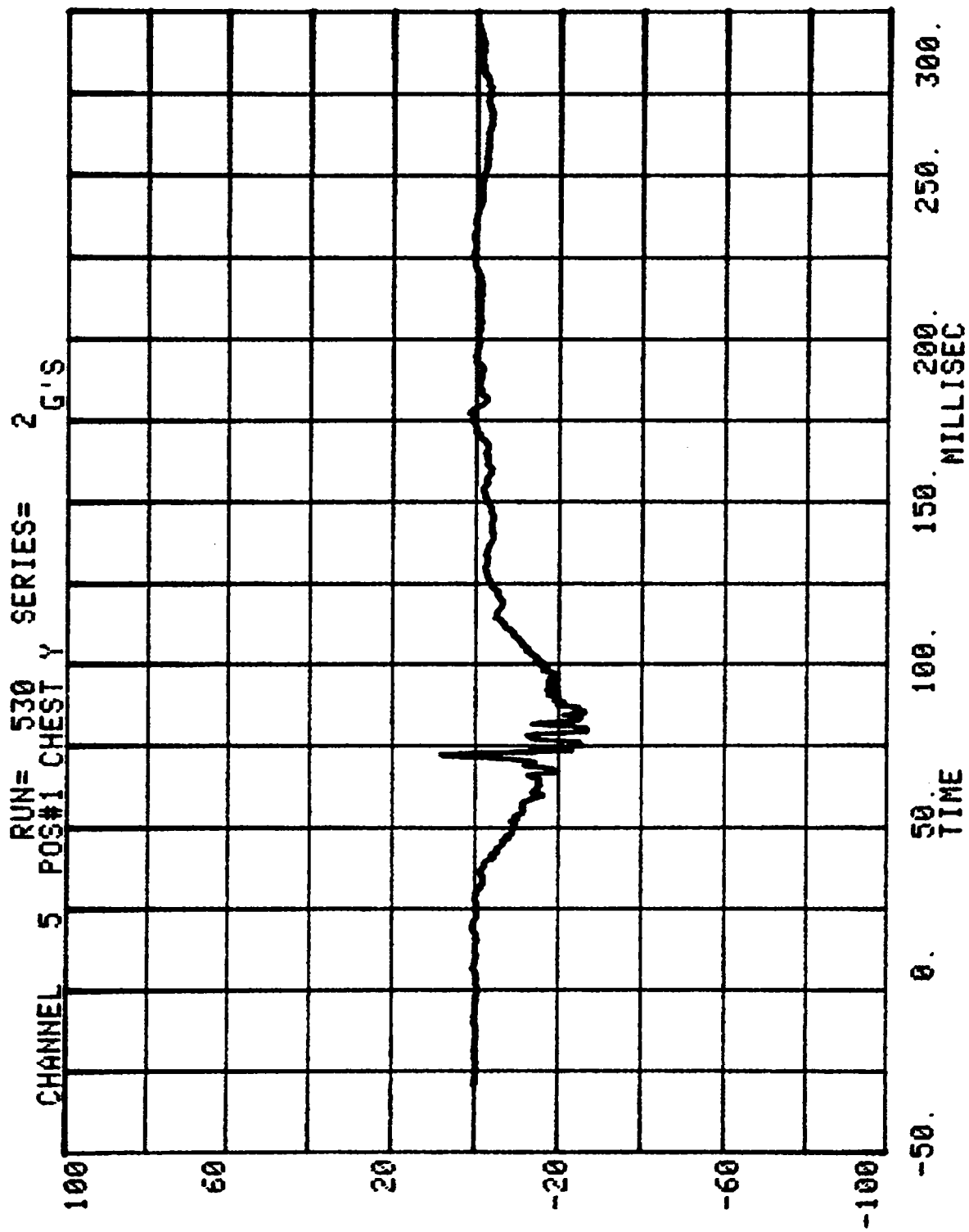
B-89

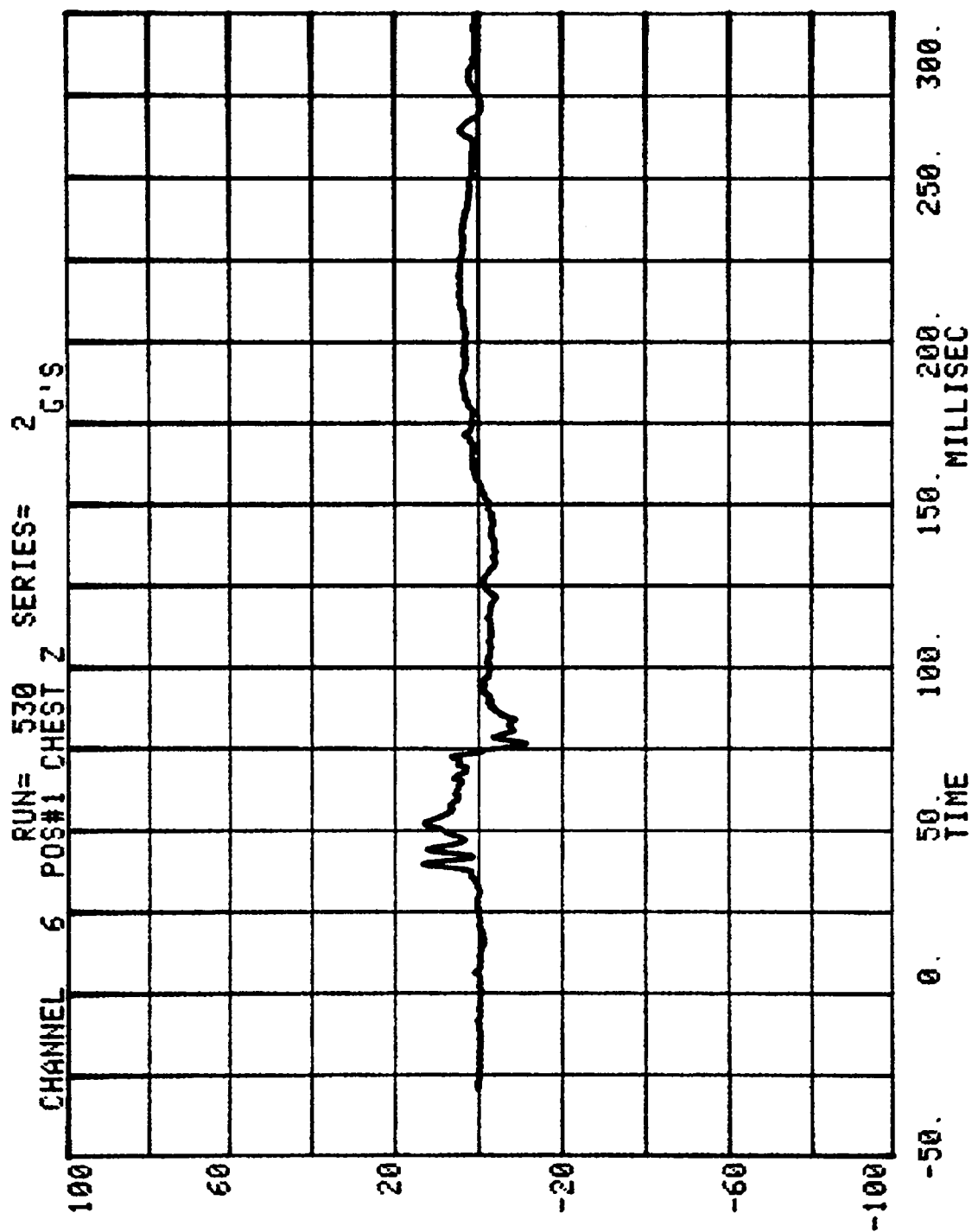
6705-V-2

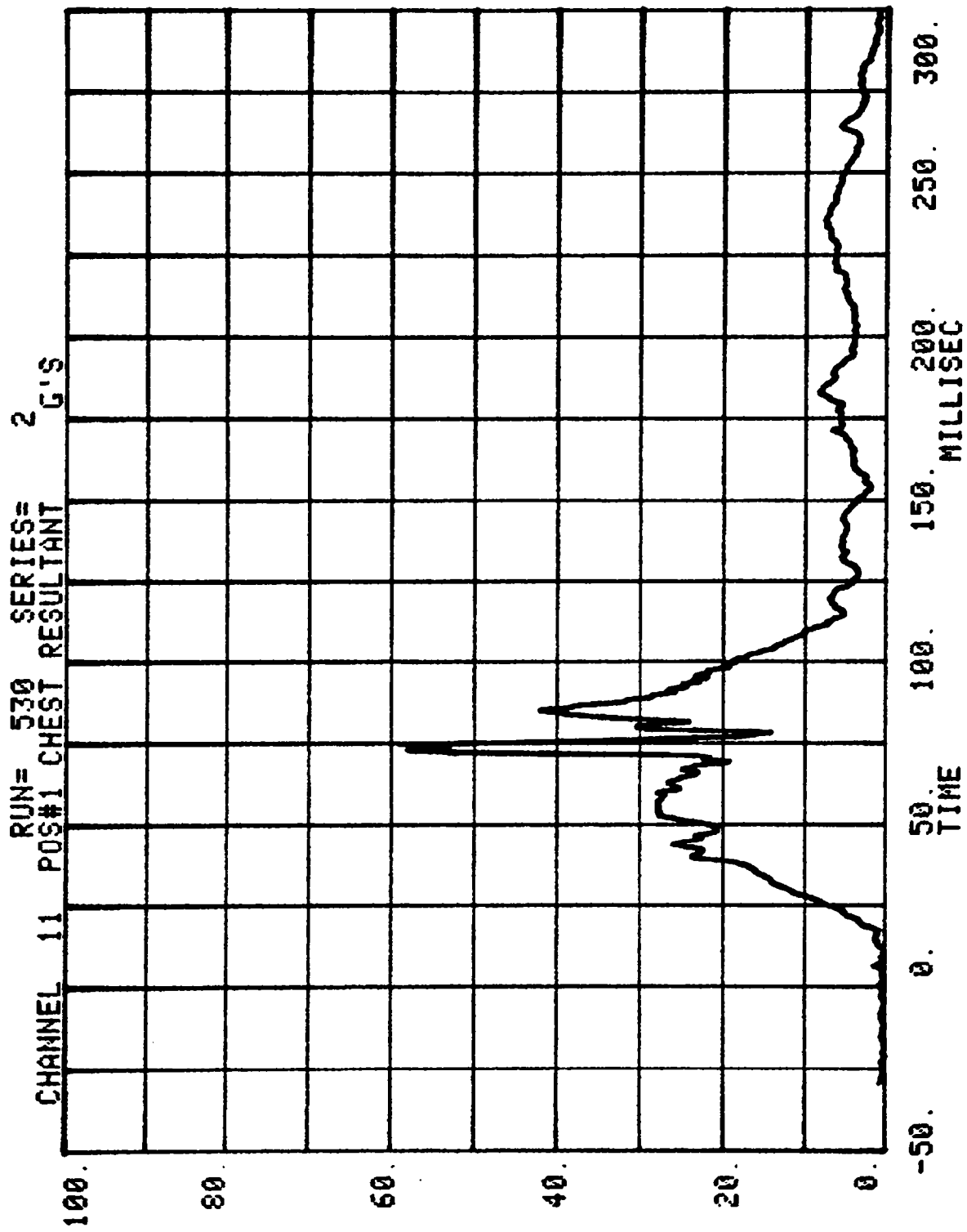
RUN= 530 SERIES= 2
CHANNEL 10 POS#1 HEAD RESULT G'S

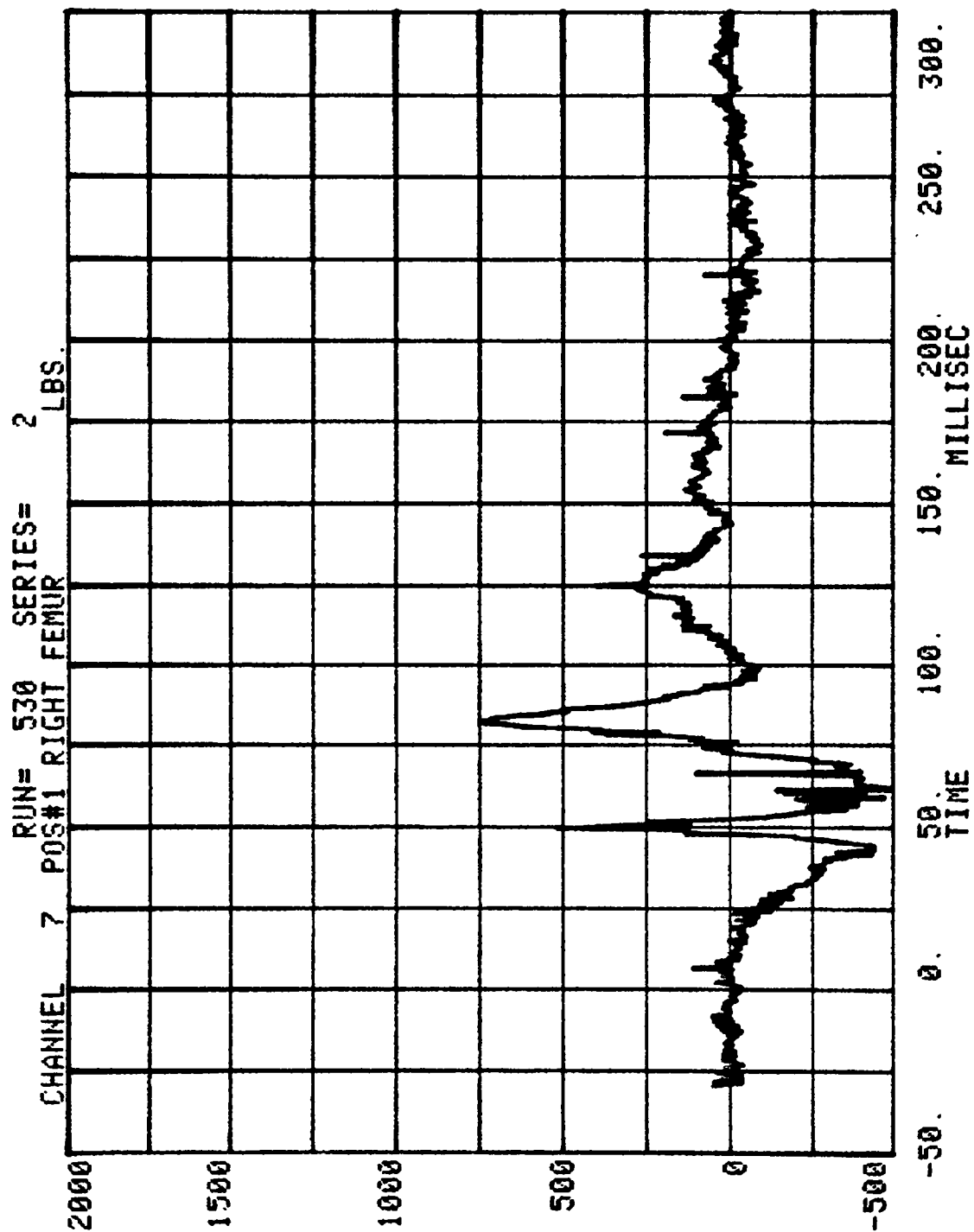


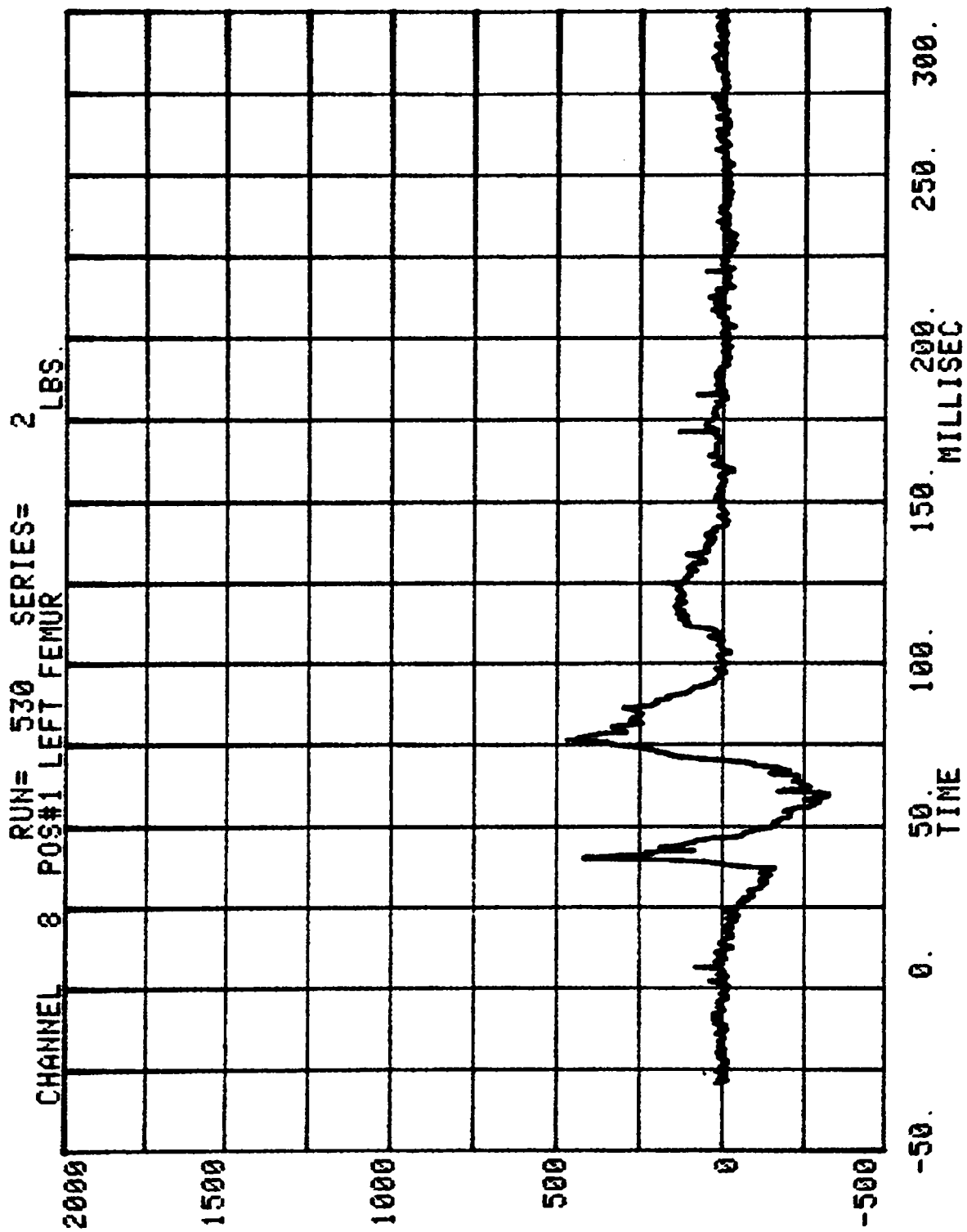


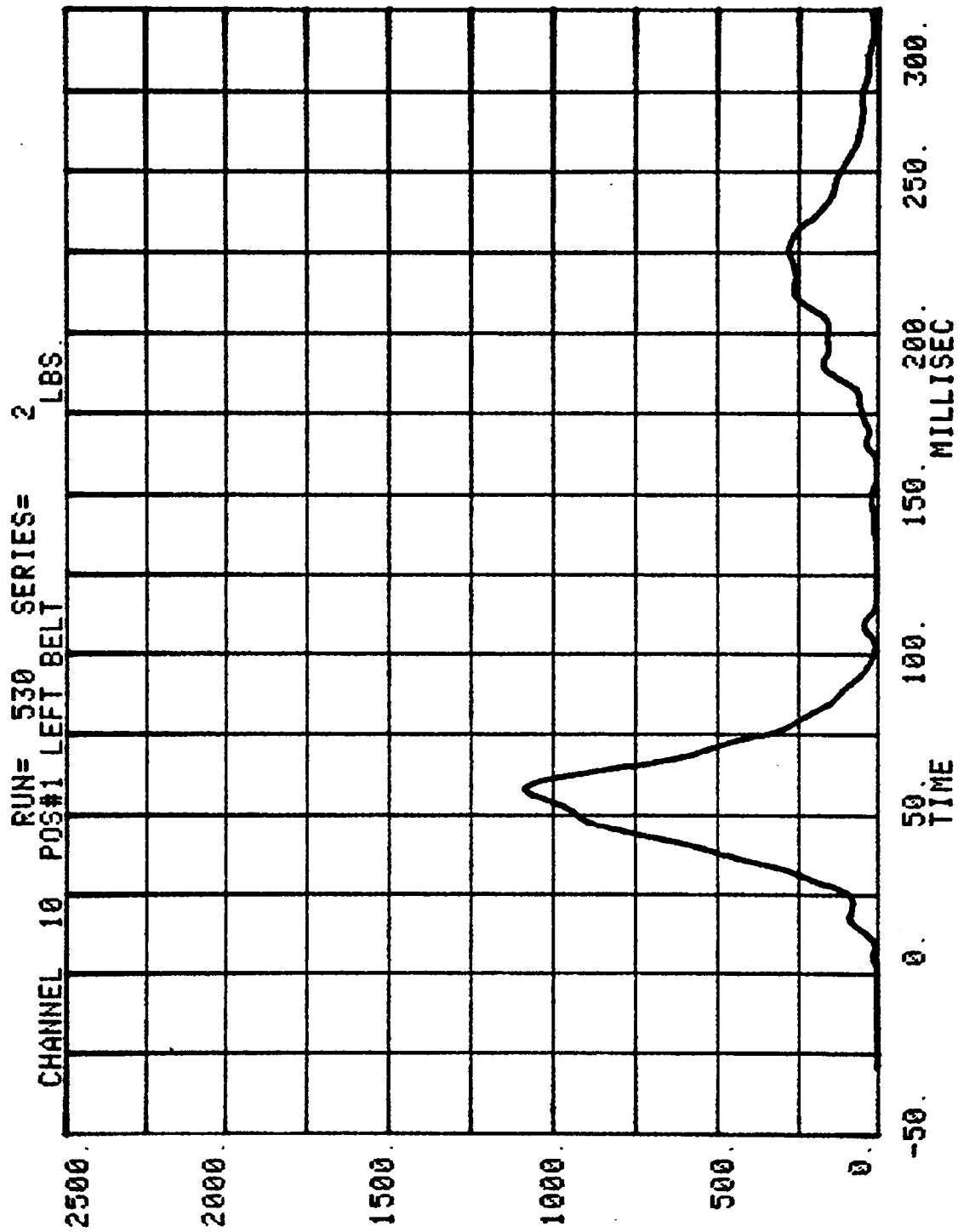




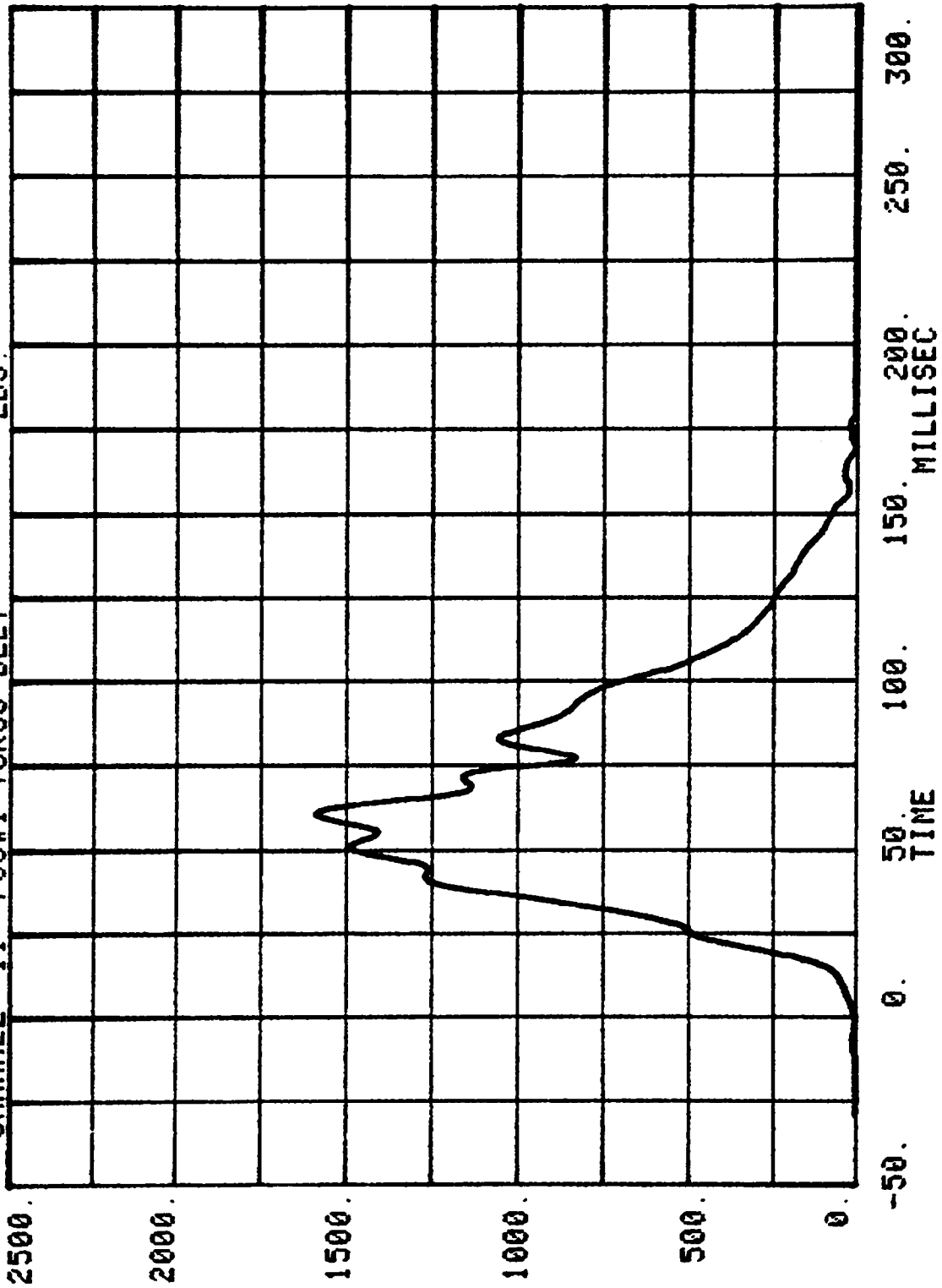








CHANNEL 11 POS#1 TORSO BELT
RUN= 530 SERIES= 2 LBS.



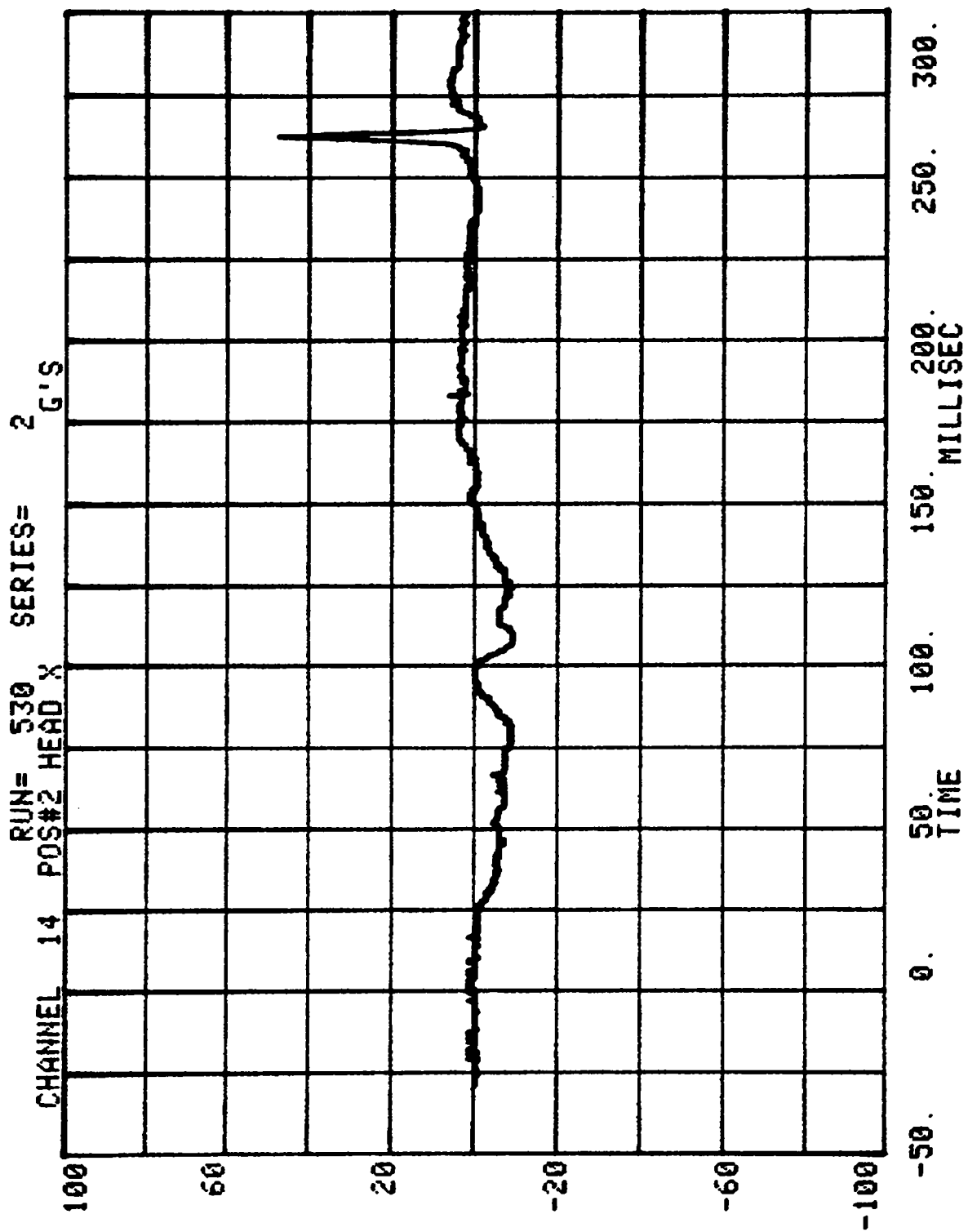
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

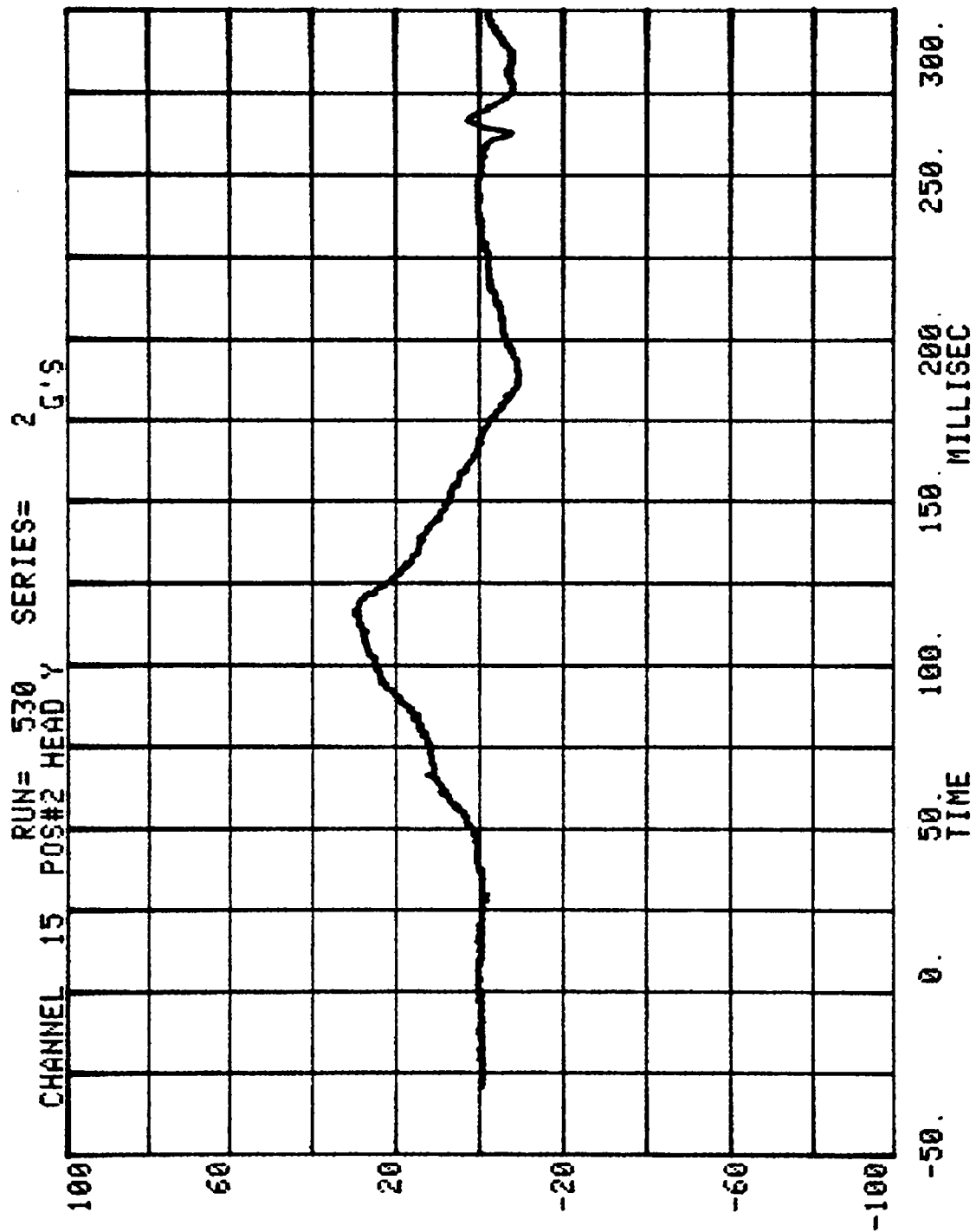
CAR TO LOAD CELL BARRIER

RUN= 530

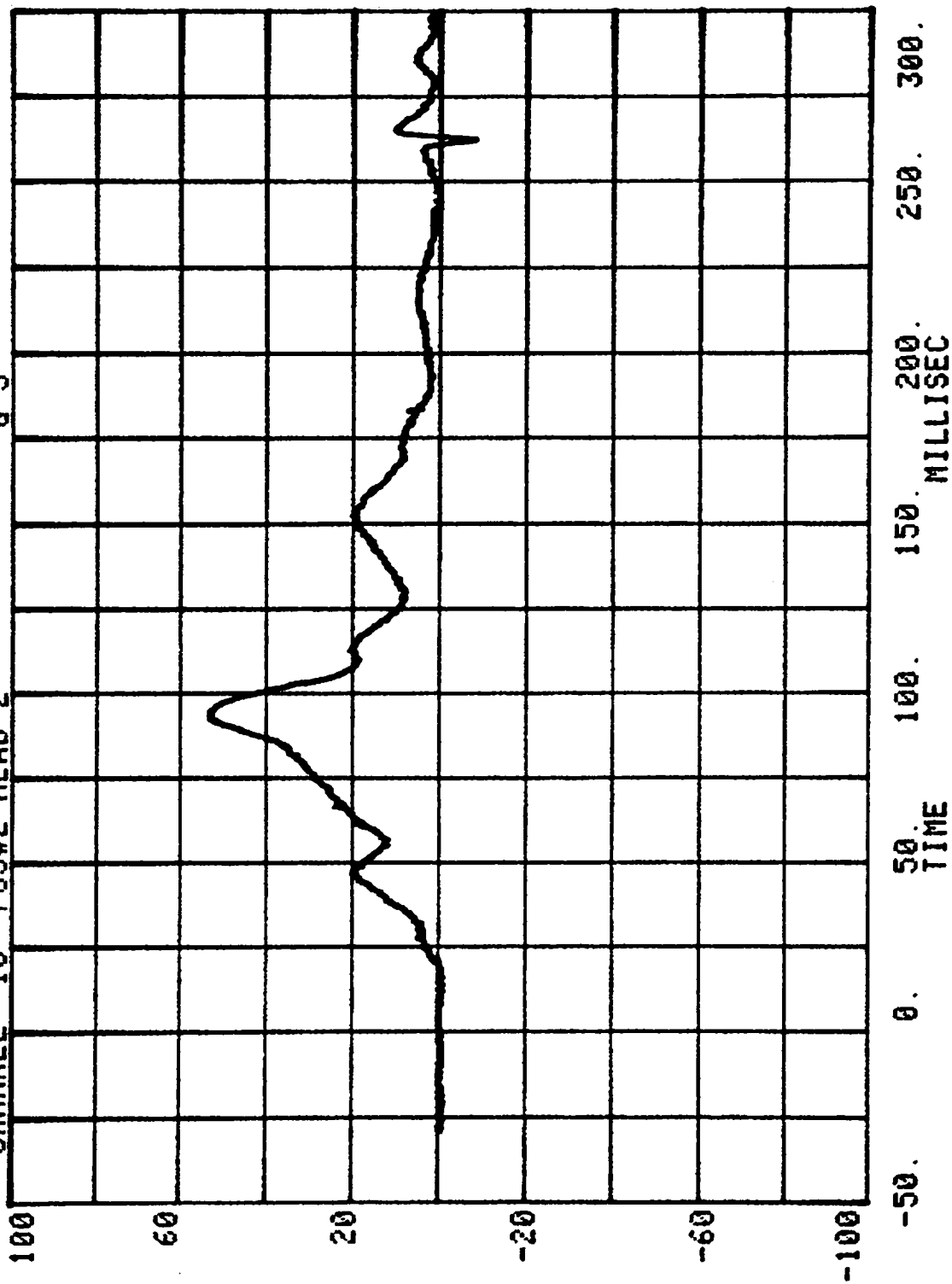
POS#2 HEAD RESULTANT

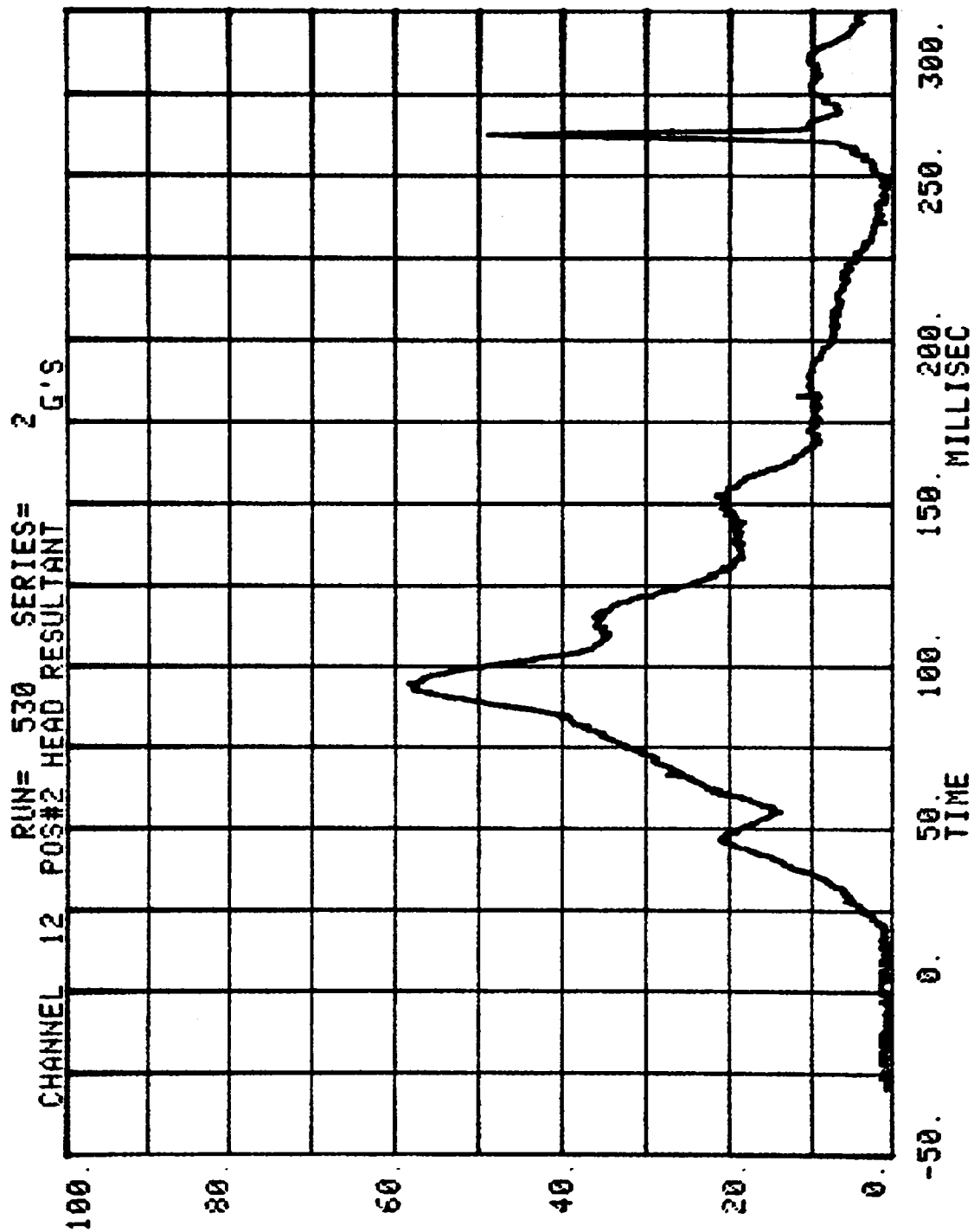
HIC= 559.1 FROM T1= .06270 TO T2= .12810
AVERAGE ACCELERATION BETWEEN T1 AND T2= 37.4G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX= 773.1

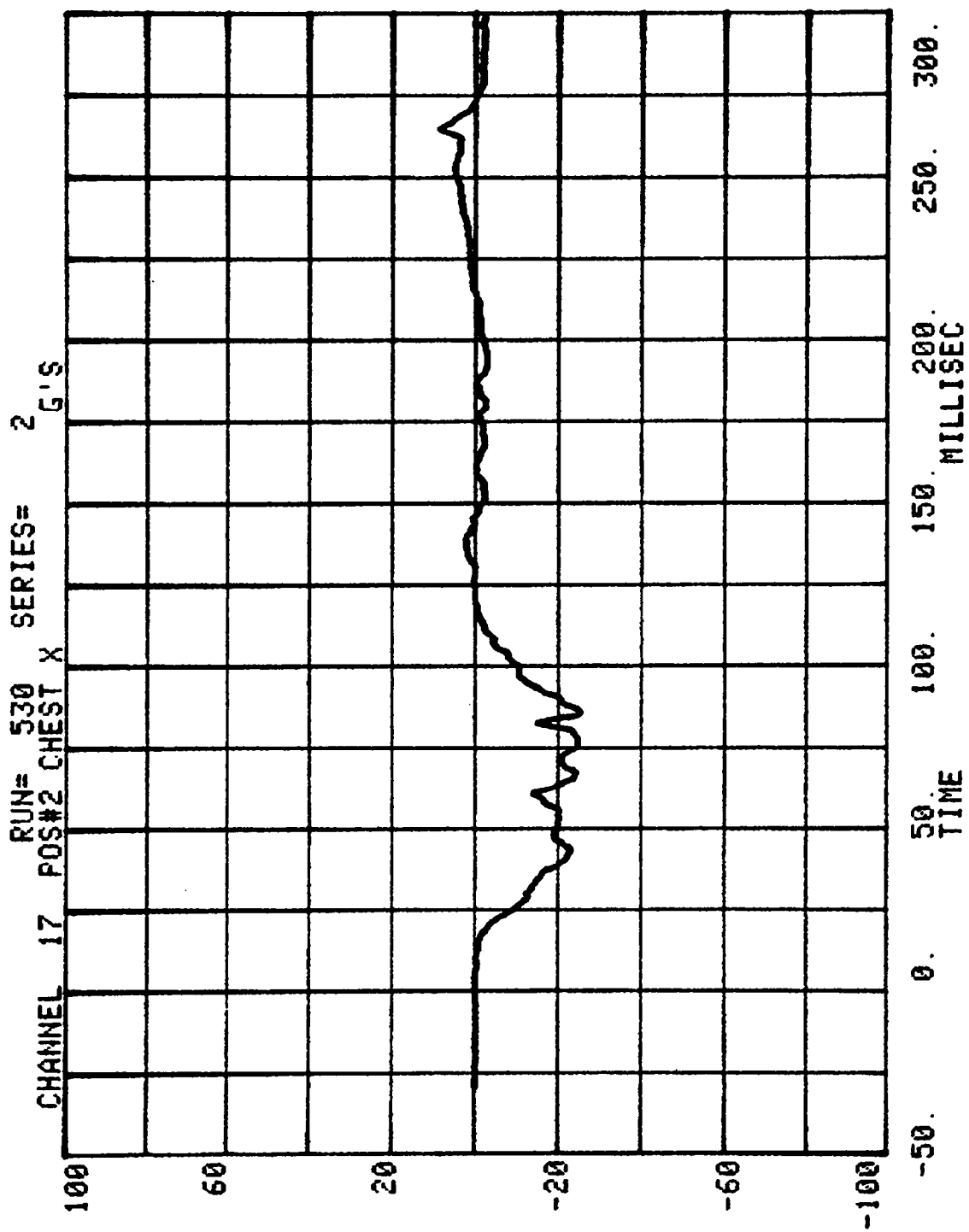


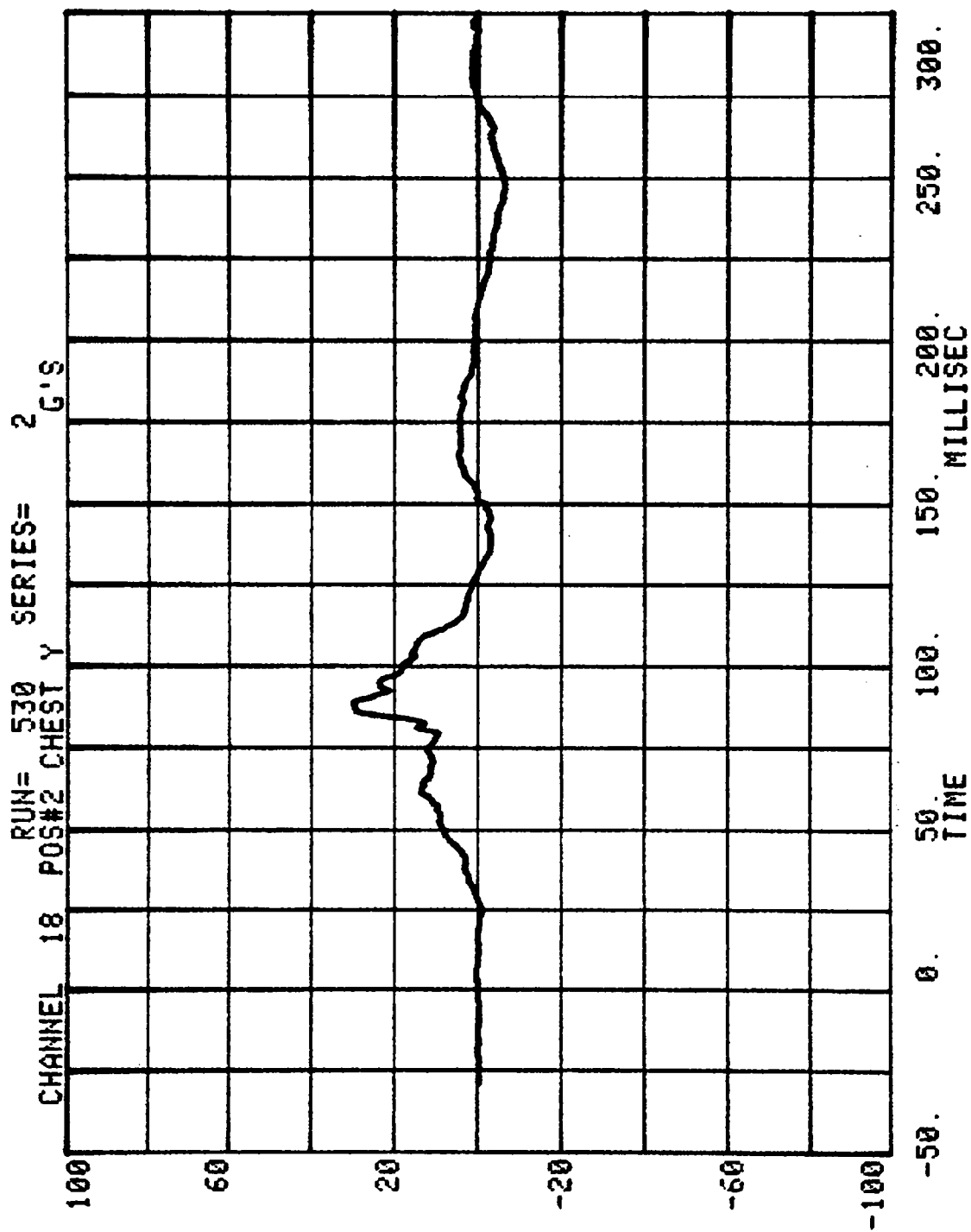


CHANNEL 16 POS#2 HEAD 2 RUN= 530 SERIES= 2 G'S



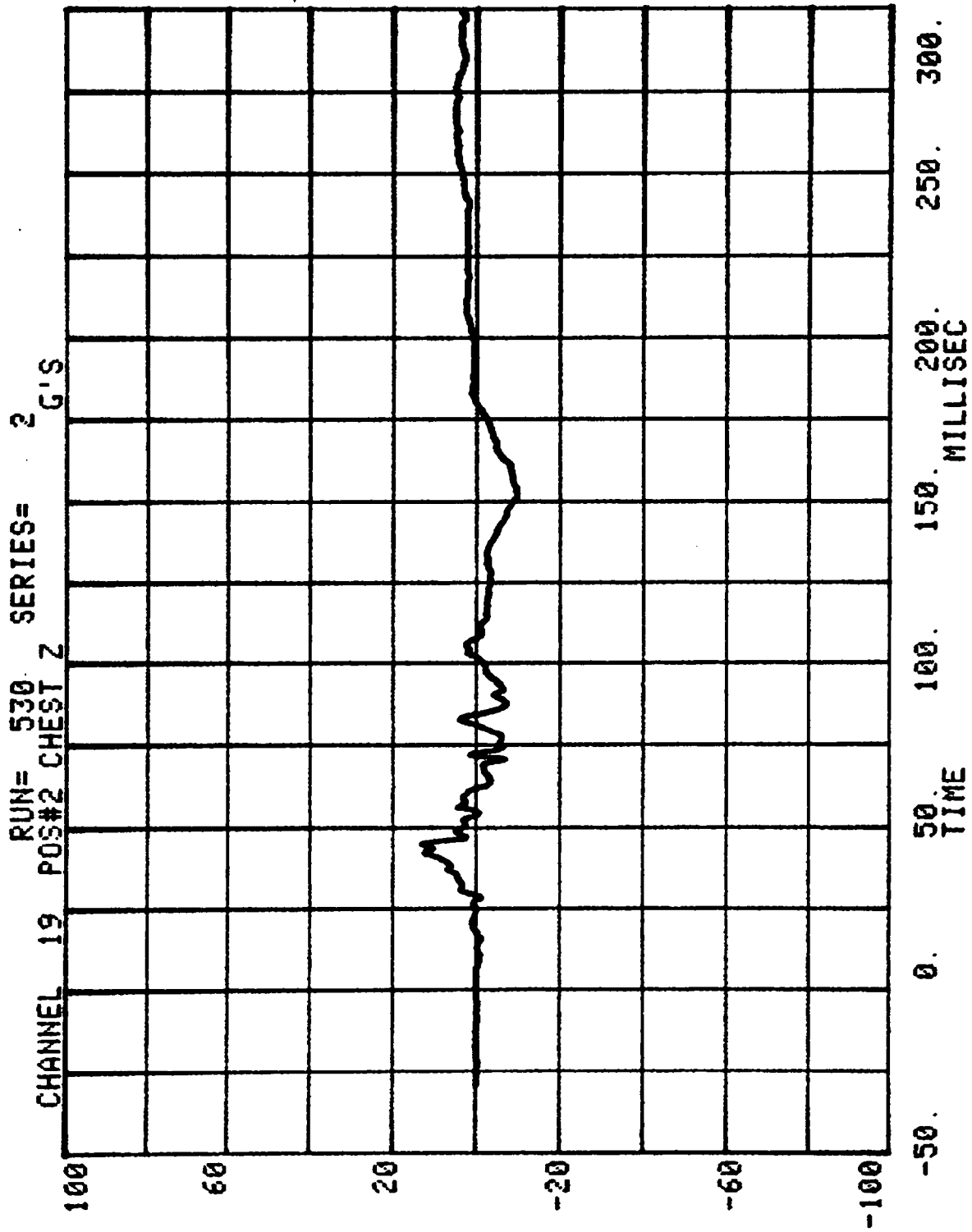


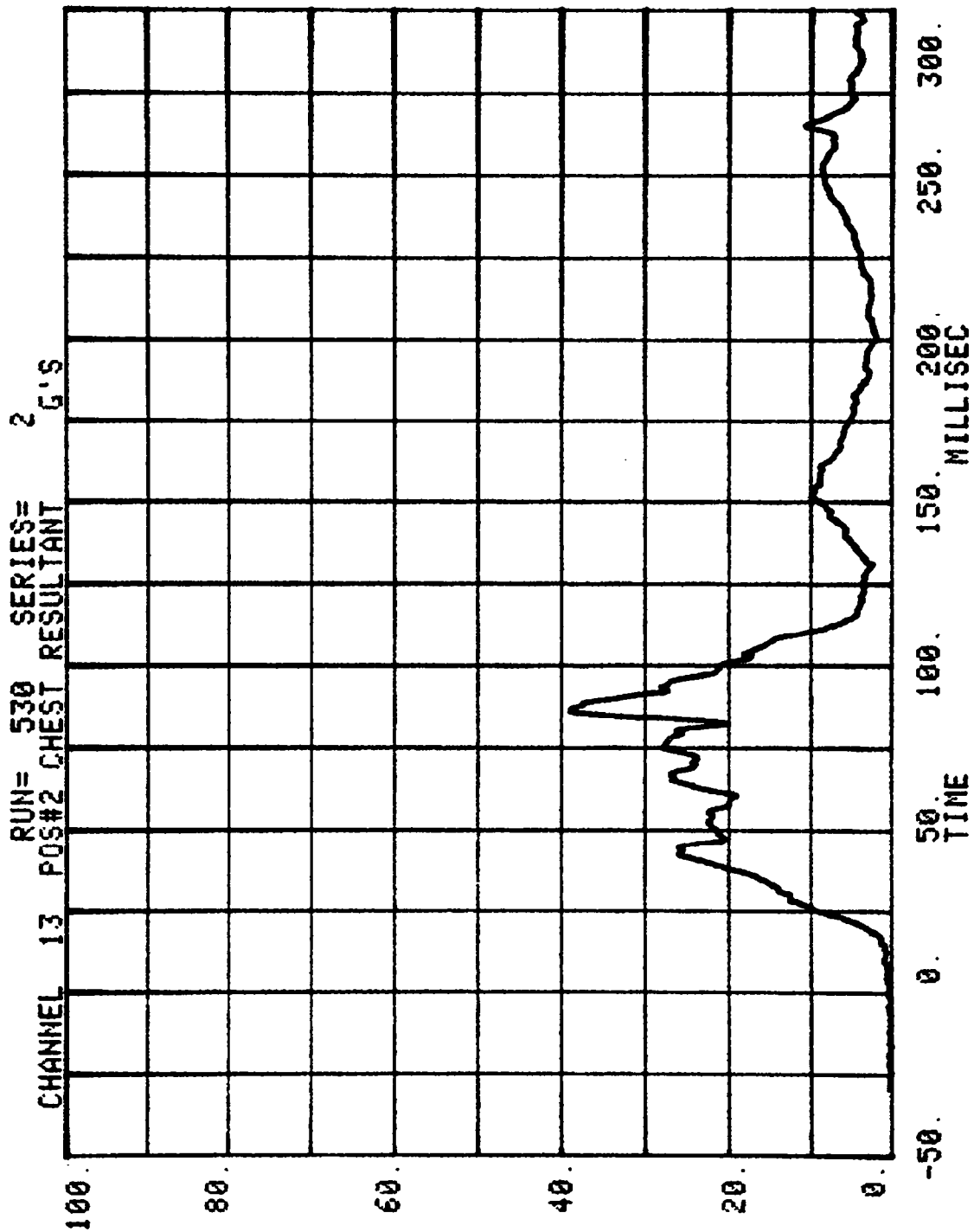


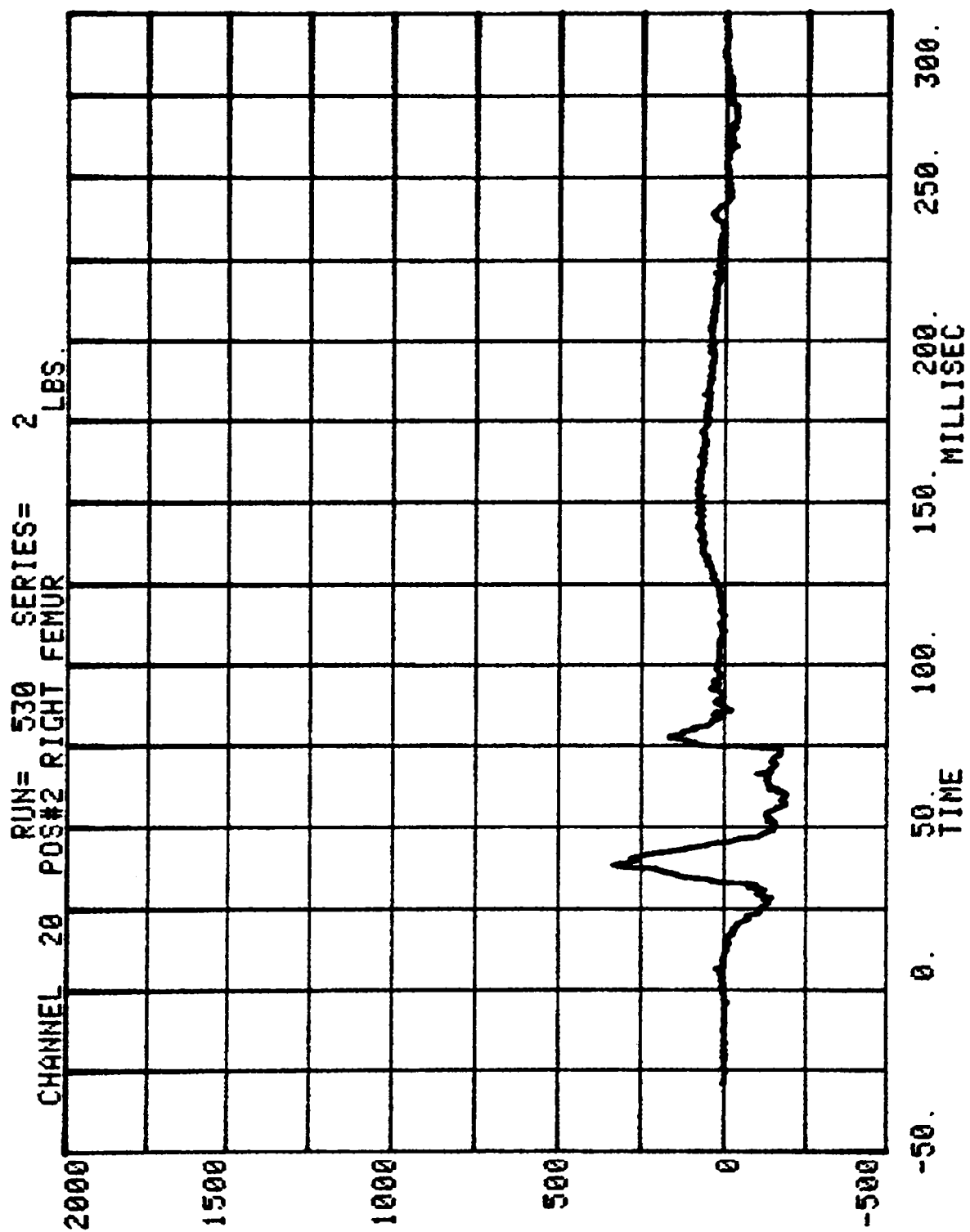


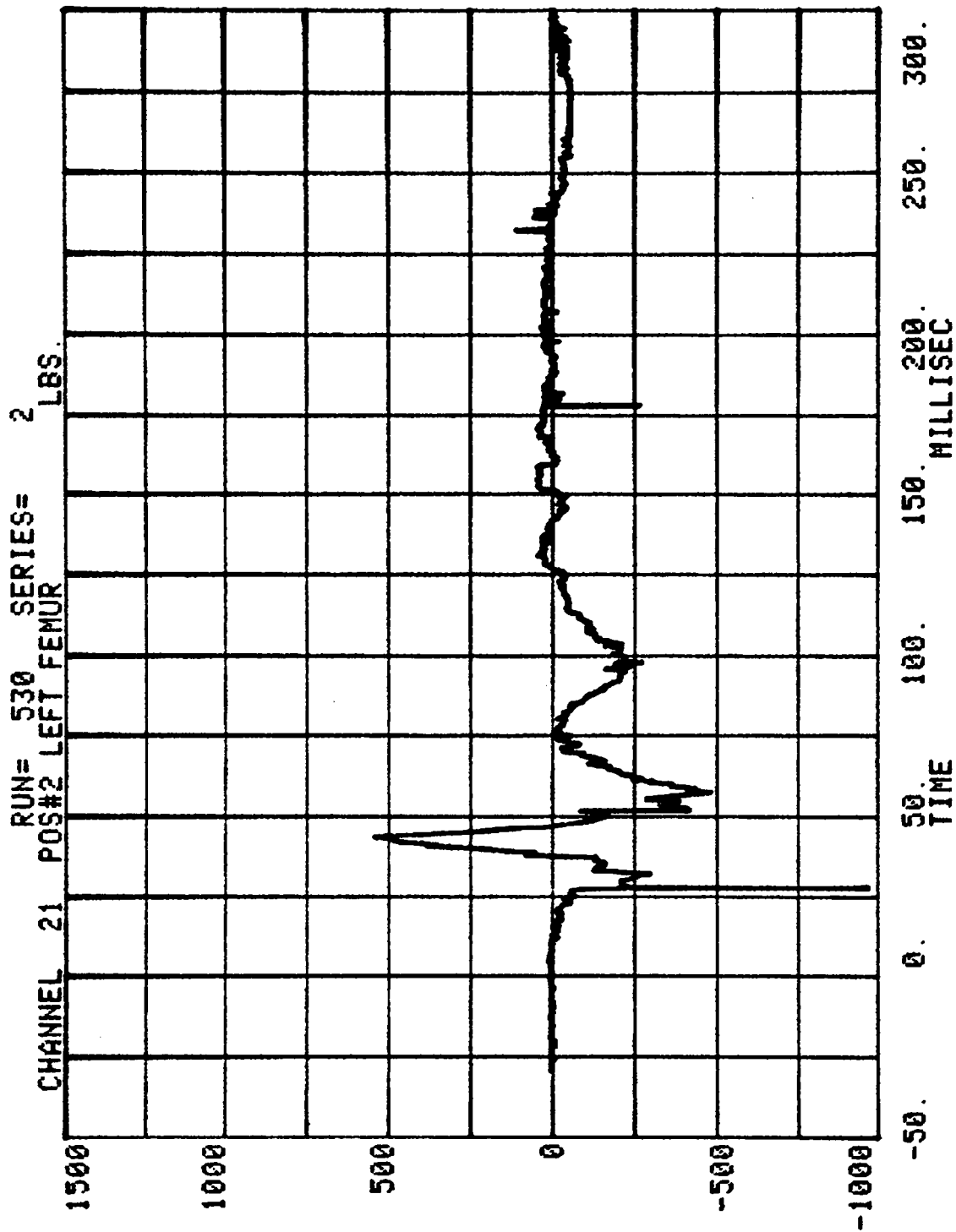
B-105

6705-V-2





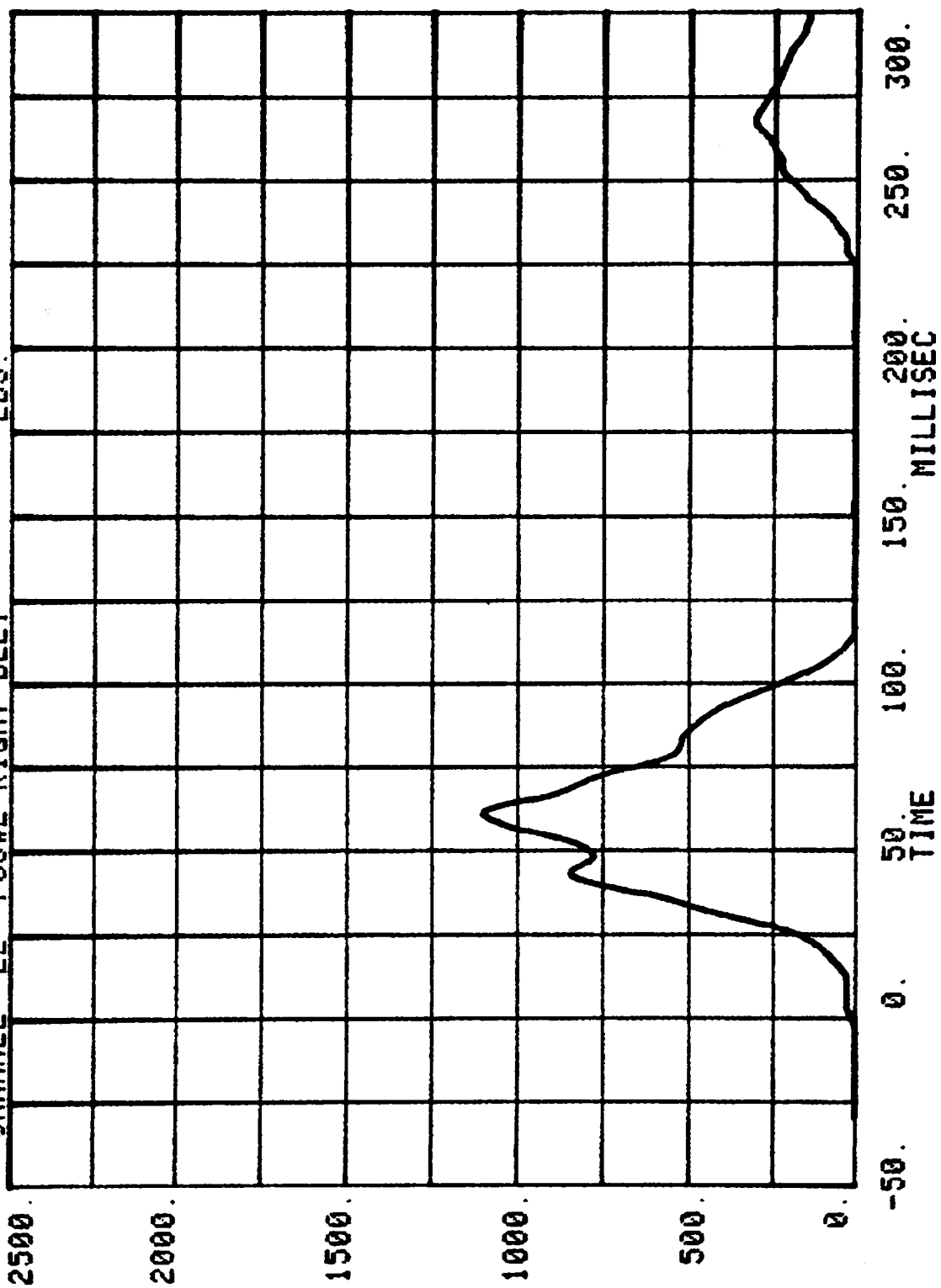


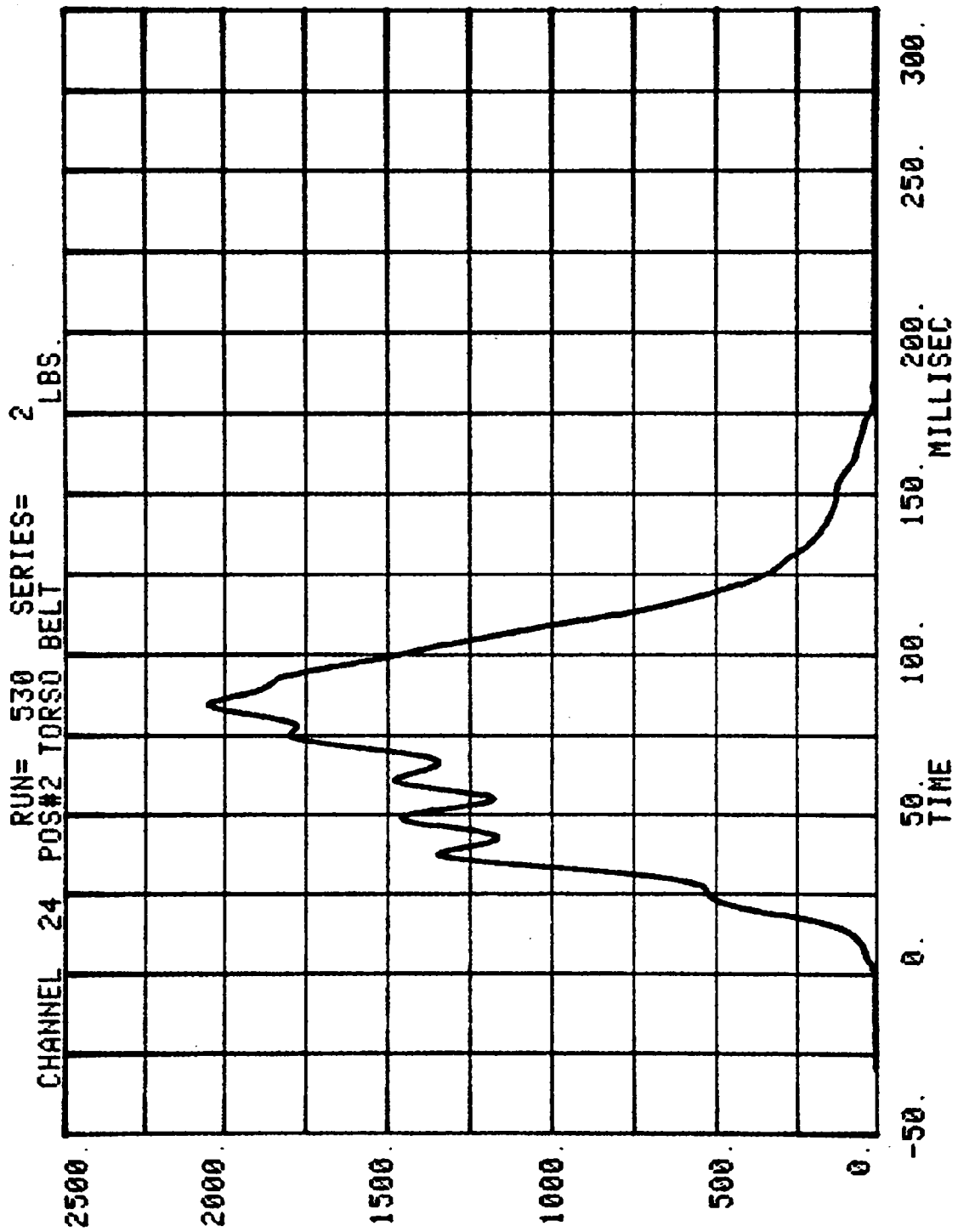


CHANNEL 22 POS#2 RIGHT BELT

RUN= 530 SERIES= 2

LBS.





APPENDIX C

DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the Alderson Research Laboratories Model ATD 30034, 50th percentile male anthropometric test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Vol. 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan Corporation, Advanced Technology Center. A summary of the test results, Part 572 specifications and instrument calibration information is included in this appendix.

Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
162	8/28/81
183	8/28/81

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. 162 (Tape 1030)

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: D. Albanello

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		8/28/81	
Calibration Sequential Number for Dummy - - - -		6	
Temperature in Lab. (Spec. = 66 to 78°F) - - - -		66°-75°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		60%-69%	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	220 G	
b. Peak Lateral Accel. - -	≤10G	8 G	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.15 ms	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	22.8 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	22.25 G	
c. Peak Resultant Head Acceleration - - - -	26G maximum	26 G	
d. Pendulum Decel. ($t_2 - t_1$)	≤3 ms	2.6 ms	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	27.5 ms	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	5.6 ms	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	106 ms	
h. Max. Head Rotation - -	63 to 73°	66°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0.0 ms
	Displ.	-.5 to .5 in	0.0 in.
30°	Time	25.6 to 34.4 ms	29 ms
	Displ.	2.1 to 3.1 in.	2.7 in.
60°	Time	40.3 to 51.7 ms	45 ms
	Displ.	4.3 to 5.3 in.	4.7 in.
Maximum (°)	Time	53.2 to 66.8 ms	55 ms
	Displ.	5.0 to 6.0 in.	5.1 in.

Continued

P, 572 DUMMY CALIBRATION TEST DATA Continued:

NHTSA DUMMY ID NO. 162

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.	4.7 in.	
30°	Time	85.4 to 104.6 ms	87 ms	
	Displ.	2.1 to 3.1 in.	2.5 in.	
0°	Time	101.0 to 123.0 ms	102 ms	
	Displ.	-.5 to 0.5 in.	0.0 in.	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	56.0 lbs.	
b. Force @ 1.3" - - - - -		73 to 88 lbs.	88.0 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	33.5 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	44.0 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	57.5 lbs.	
d. Return Angle - - - - -		12° maximum	3°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - - - - -		21.78-22.22 fps	21.89 fps	
(2) Peak Deflection - - - - -		1.7" maximum	1.44 in.	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1813 lbs.	
(4) Internal Hysteresis - - - - -		50 to 70%	64.04%	
b. Low Speed				
(1) Probe Speed - - - - -		13.86-14.14 fps	13.97 fps	
(2) Peak Deflection - - - - -		1.1" maximum	.92 in.	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1217 lbs.	
(4) Internal Hysteresis - - - - -		50 to 7%	58.76%	