REPORT NUMBER: CAL-90-N21

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

CHRYSLER MOTOR CORPORATION
1990 DODGE DAKOTA
PICKUP

NHTSA NUMBER: ML0302

CALSPAN TEST NUMBER: 7776-21

CALSPAN CORPORATION
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BUFFALO, NEW YORK 14225

May 22, 1990

FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Market Incentives
400 Seventh Street, S.W.
Room No. 5313 (NRM-20)
Washington, DC 20590

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15. Supplementary Notes

16. Abstract

A frontal load cell barrier test of a 1990 Dodge Dakota Pickup was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on May 22, 1990.

The impact speed was 34.8 mph and the ambient temperature at the barrier face at the time of impact was 58°F. The maximum post-test vehicle crush was 18.2 inches. The test vehicle was equipped with a 3-point continuous restraint system at each of the front outboard seating position.

With regard to FMVSS 208-"Occupant Crash Protection," injury criteria, the driver appears to have exceeded the maximum HIC value. The driver appears to satisfy the chest and femur requirements. The passenger appears to satisfy the head, chest, and femur requirements.

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Section I

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 90 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-90-P-02095. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph requirements.

The 35 mph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test procedure.

Section 2

SUMMARY OF TEST NUMBER ML0302

A load cell barrier consisting of 36 load cells was impacted by a 1990 Dodge Dakota Pickup at a velocity of 34.8 mph. The test was performed at the Calspan Corporation Advanced Technology Center on May 22, 1990. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 15 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 45) and the right-front passenger ATD (Serial No. 150) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 81 channels of data were recorded on six 14-channel FM tape recorders. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Position #1 Left Belt Force, did not record accurately after approximately 51 milliseconds. Position #1 Upper Neck Force Z contained questionable data between approximately 31 and 38 milliseconds. This is an assumption since the maximum value does not seem reasonable. Position #2 Neck Moment Z, did not record accurately. Barrier load cells C4 and D8 did not record accurately. These load cells were not used in the load cell sum calculations. Accelerometer Pack #5 did not record accurately.

The driver's head struck the steering wheel rim and his HIC was 1169.4. The maximum chest deceleration over 3 milliseconds was 57.4 g's and femur loads were 575.3 and 846.0 pounds.

The right front passenger's HIC was 557.8. The maximum chest deceleration over 3 milliseconds was 55.5 g's and femur loads were 502.1 and 624.7 pounds.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1990 Dodge Dakota Pickup

NHTSA No.: ML0302 VIN.: 1B7GG26X9LS644714

Body Color: Red/Black Date Of Manufacture: October 1989

Engine: 6 Cylinders; 239 C.I.D.; 3.9 Liters; - CC
X Gas; - Diesel; - Turbocharged
X Longitudinal; - Transverse

Transmission: 3 Speed; - Manual; X Automatic; - Overdrive

Final Drive: - Front Wheel; - Rear Wheel; X Four Wheel

Date Received: 01-22-90 Odometer Reading: 26

- A/C; X P/S; X P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint: 3 Point Continuous Belt System.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 35 psi, Rear 35 psi

Recommended Tire Size: P195/75R15

Recommended Cold Tire Pressure: Front 35 psi, Rear 35 psi

Tires on Vehicle: P2205/75R15 ; Manufacturer: Michelin

Number of Occupants: 3 Front; - Rear; - 3rd Seat; 3 TOTAL

Type of Front Seats: - Bucket; X Bench; - Split Bench

Type of Front Seat Back: X Fixed; - Adj. With - Lever - Rot. Knob

Rated Cargo and Luggage
Weight (RCLW) A-B = 300 lbs.

GVWR 5090 lbs. GAWR: Front 2570 lbs. Rear 2684 lbs.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = 1060 lbs. Right Rear = 720 lbs.

Left Front = 1170 lbs. Left Rear = 790 lbs.

TOTAL FRONT WEIGHT = 2230 lbs. (60 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1510 lbs. (40 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 3740 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (3740 lbs.)

DSC = Designated Seating Capacity (3)

RCLW = 300 lbs.

Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)

Target Test Weight = 4368 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 340 POUNDS CARGO:

Right Front = 1200 lbs. Right Rear = 1000 lbs.

Left Front = 1210 lbs. Left Rear = 1000 lbs.

TOTAL FRONT WEIGHT = 2410 lbs. (55 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 2000 lbs. (45 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 4410 lbs.

Weight of ballast secured in vehicle trunk area = 200 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 32.9 LF 32.7 RR 35.4 LR 35.3

Test Attitude: RF 32.6 LF 32.6 RR 33.9 LR 34.2

Wheel Base: 112.1 in.; C.G. - 50.8 in. rearward of front wheel C/L

Remarks: 13.9 gallons of stoddard solution has been placed in the fuel tank

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°

Date of Test: May 22, 1990 Time of Test: 12:15

Ambient Temperature: 58 °F at impact area

Temperature in Occupant Compartment: 72 °F

Windshield Molding Temperature: 72 °F

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 34.8 mph, secondary = 34.7 mph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 52 inches

Exiting Speed Trap: 12 inches

VEHICLE REBOUND AND CRUSH (inches):

Vehicle Length:				
Pre-test	= R 189.9	C_L 192.1	L 190.0
Post-test	= R 171.7	C_L 174.0	L 172.5
Crush	= R 18.2	C_L 18.1	L 17.5

Distance from front of test vehicle to point of impact:

R 8.7" C_L 9.6" L 11.3"

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Upper Steering Rim and Hub	Contacted Roof on Rebound
Chest	Lower Steering Rim	No Contact
Abdomen	No Contact	No Contact
Left Knee	Dash Panel	Glove Box
Right Knee	Dash Panel	Glove Box

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front		Rear	
	Left	Right	Left	Right
Door Opening	operable	operable	-	-

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Failure	none	none	-	-
Seat Shift (in.)	0.0	0.0	-	-

Glazing Damage

Backlight/Windshield: The windshield sustained stress fractures, but remained intact.

Other Notable impact Effects: None.

Section 3

OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

1. Dummy Injury Criteria Data Summary
2. Dummy Positioning Data
3. Seat Belt Positioning Data
4. Seat Belt Performance Assessment Data
5. Driver Dummy to Steering Column Dimensions
6. Camera Locations
7. Vehicle Target Locations

II. OVR DATA

1. Load Cell Barrier Data
2. Vehicle Accelerometer Data
3. Test Vehicle Measurements

Table 2

DUMMY INJURY CRITERIA VALUES

NHTSA No.: ML0302 Vehicle: 1990 Dodge Dakota Pickup

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-197.1	-24.2	51.6	198.3
Position #2 - Passenger	-45.5	7.2	61.3	67.7

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-59.3	-7.6	26.7	57.4
Position #2 - Passenger	-56.2	16.5	28.4	55.5

The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	575.3	846.0
Position #2 - Passenger	502.1	624.7

	MAXIMUM FORCE - SEAT BELT LOADS (lbs.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	1833.0	-	2640.2
Position #2 - Passenger	1829.0	2846.7	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t_1 (SEC)	t_2 (SEC)	Average Acceleration t_1 TO t_2
Position #1 - Driver	1169.4	.05685	.08415	71.2 g's
Position #2 - Passenger	557.8	.05992	.09592	47.4 g's

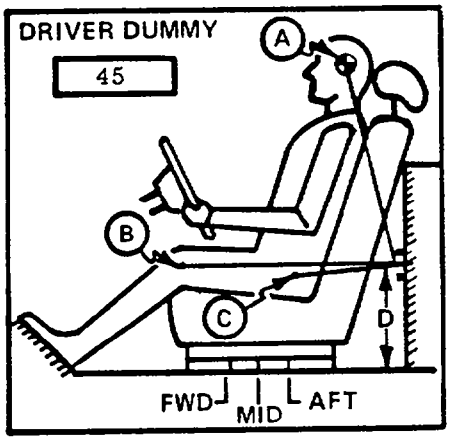
HIC is as defined in FMVSS 208. The maximum time interval from t_1 to t_2 is 36 milliseconds.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

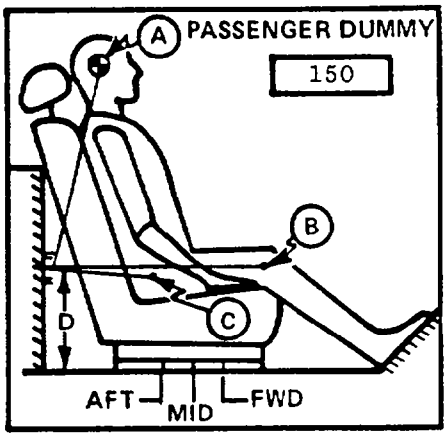
Test No.: ML0302 Vehicle: 1990 Dodge Dakota Pickup

SEAT TYPE:	ADJUSTER TYPE:	SEAT BACK TYPE:
X Bench	X Manual	X Fixed
– Bucket	– Power	– Adjustable Reclining
– Split Bench		

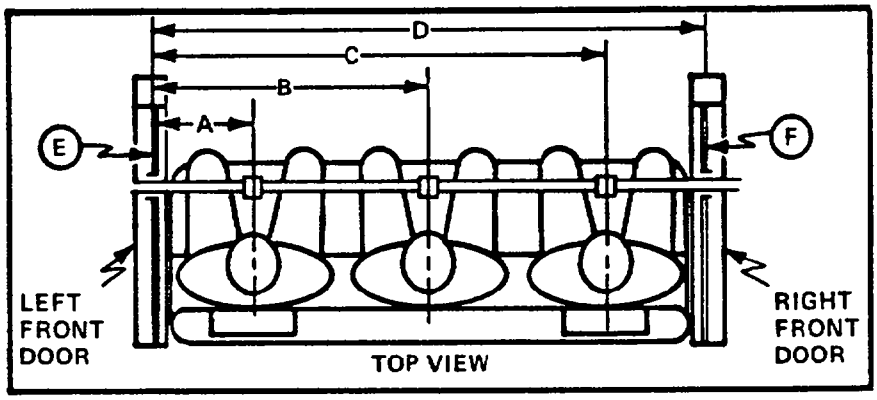


MEASUREMENT LOCATION

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



A =	19.8 in.	31 Degrees	A =	19.9 in.	29 Degrees
B =	28.3 in.	99 Degrees	B =	28.8 in.	102 Degrees
C =	13.5 in.	126 Degrees	C =	13.3 in.	124 Degrees
D =	18.8 in.		D =	18.8 in.	



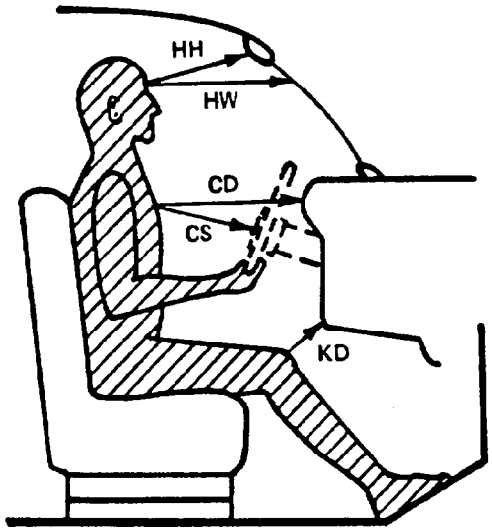
45 DUMMY ID 150

A =	Left Door to Driver Centerline	13.2	in.
B =	Left Door to Center Passenger Centerline	–	in.
C =	Left Door to Right Passenger Centerline	41.8	in.
D =	Left Door to Right Door	55.5	in.
E,F =	Window Glass Height (Right and Left Must Be Equal)	9.5	in.

Figure 2

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	16.1	16.1
HW	20.1	20.7
CD	19.8	20.6
CS	12.4	-
KDL	7.1	5.7
KDR	6.7	6.0
SA	Fixed	Fixed
TA	12°	12°



HH = Head to Windshield Header

HW = Head to Windshield

CD = Chest to Dash

CS = Chest to Steering Wheel

KD(L/R) = Knee to Dash (Left/Right)

SA = Seat Back Angle

TA = Torso Angle

HA = Head Target to "A" Pillar

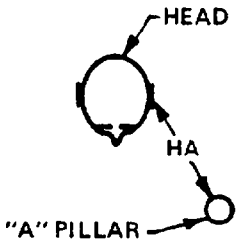
HR = Head to Side Roof

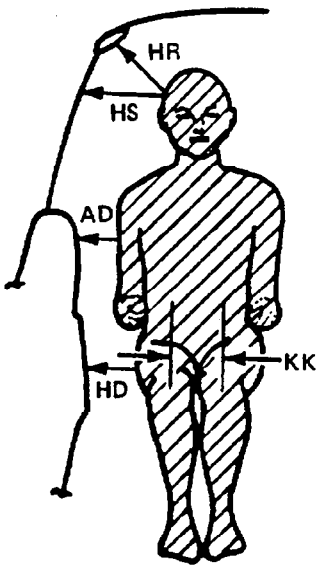
HS = Head to Side Window

AD = Arm to Door

HD = Hip to Door

KK = Knee to Knee

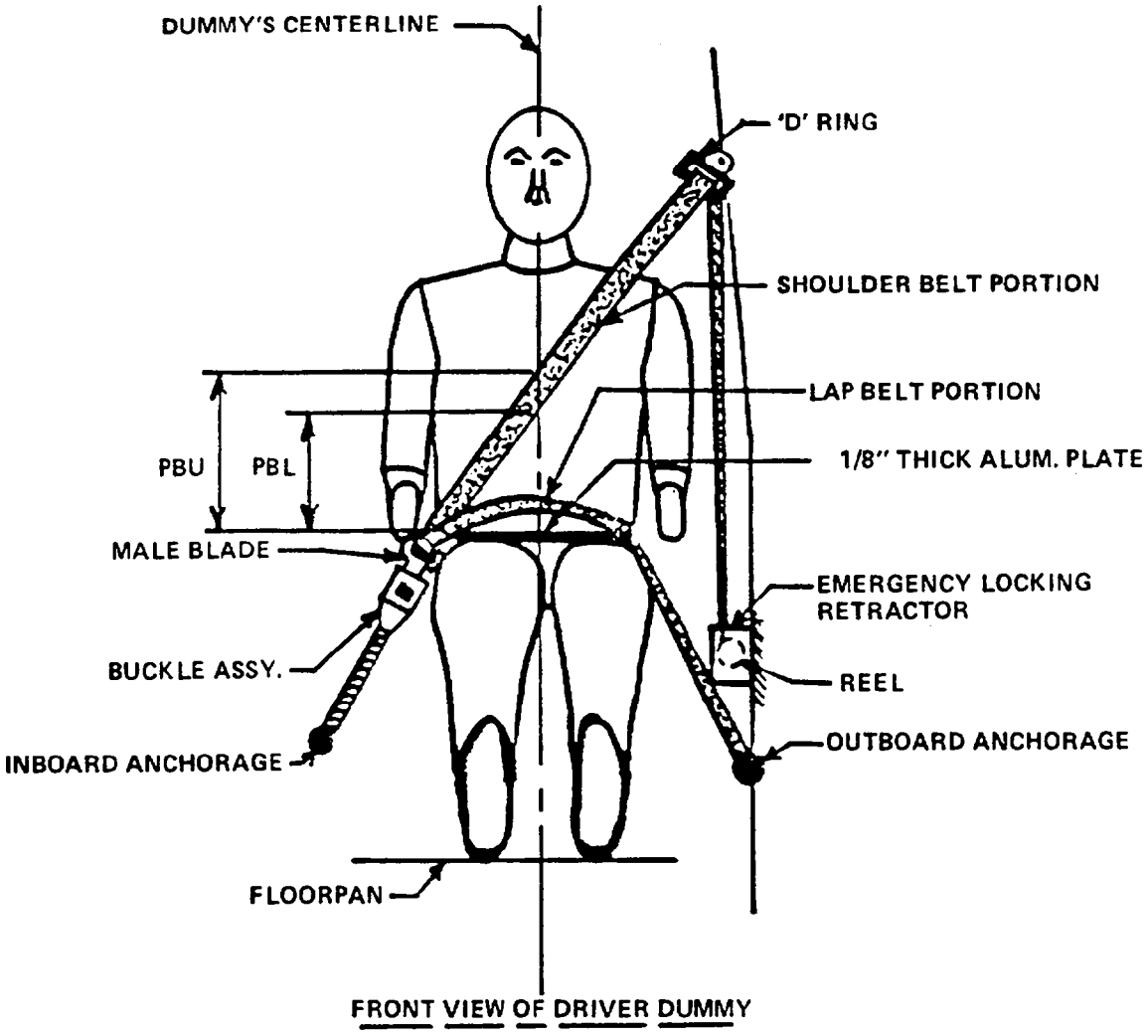




	DRIVER	PASSENGER
HR	8.4	8.2
HS	10.4	10.7
AD	4.8	5.1
HD	7.1	6.7
KK	7.3	6.5
HA	21.7	21.8

Figure 3

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	13.6	13.5
PBL -- Top surface of alum. plate to belt lower edge	10.6	10.5
LAP BELT TENSION	2.0 lbs.	2.0 lbs.

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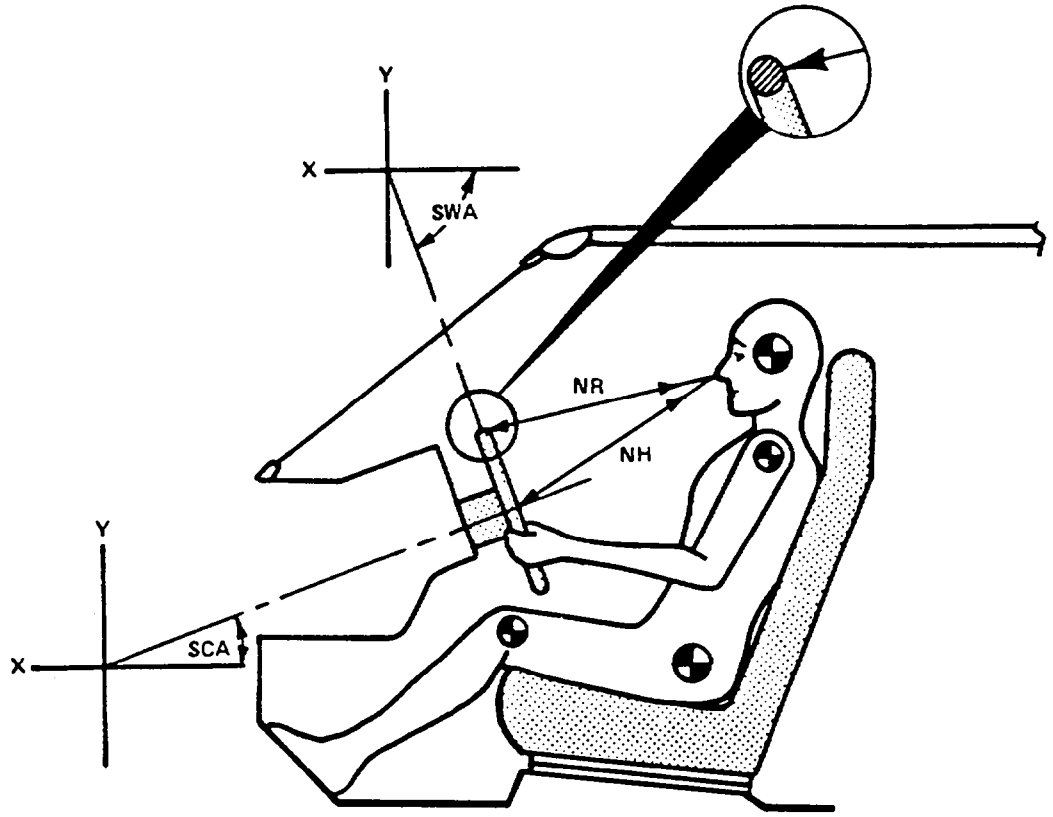
Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	90.2"	91.0"
Shoulder belt length as measured on Part 572 Dummy.	34.2"	34.0"
Lap belt length as measured on Part 572 Dummy.	30.2"	31.0"
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis.	4.5"	4.5"
As determined mechanically.	4.2"	3.7"
As determined electronically	3.1"	4.3"
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	0.5 in/ft	1.1 in/ft
Measured mechanically	0.5 in/ft	0.5 in/ft

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



LEFT SIDE VIEW

	MEASUREMENTS	
NR -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	14.6	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	15.6	Inches
SCA -- Angle of steering column relative to the horizontal X axis	26	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-64	Degrees

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

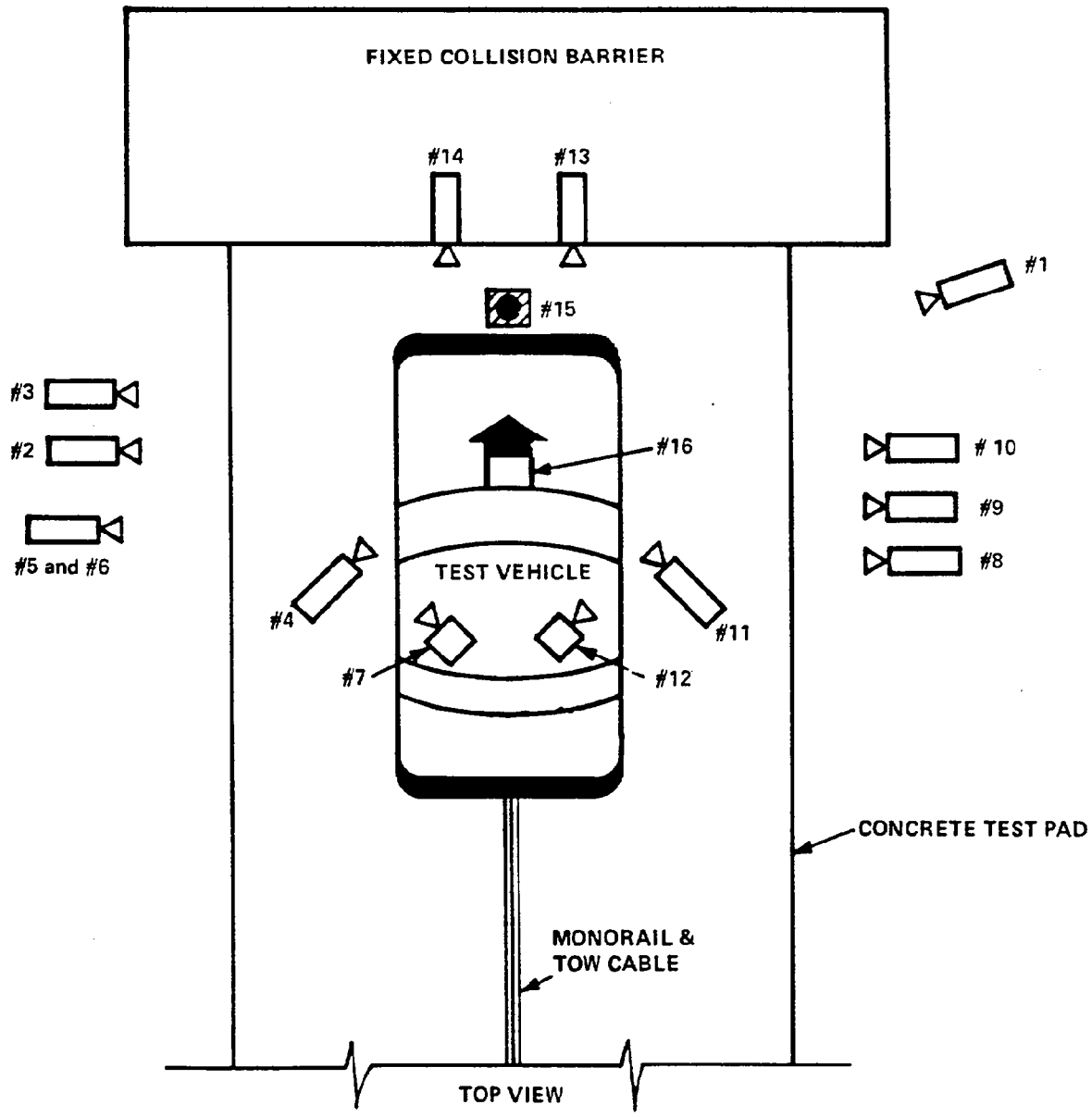


Table 4

HIGH-SPEED CAMERA LOCATIONS

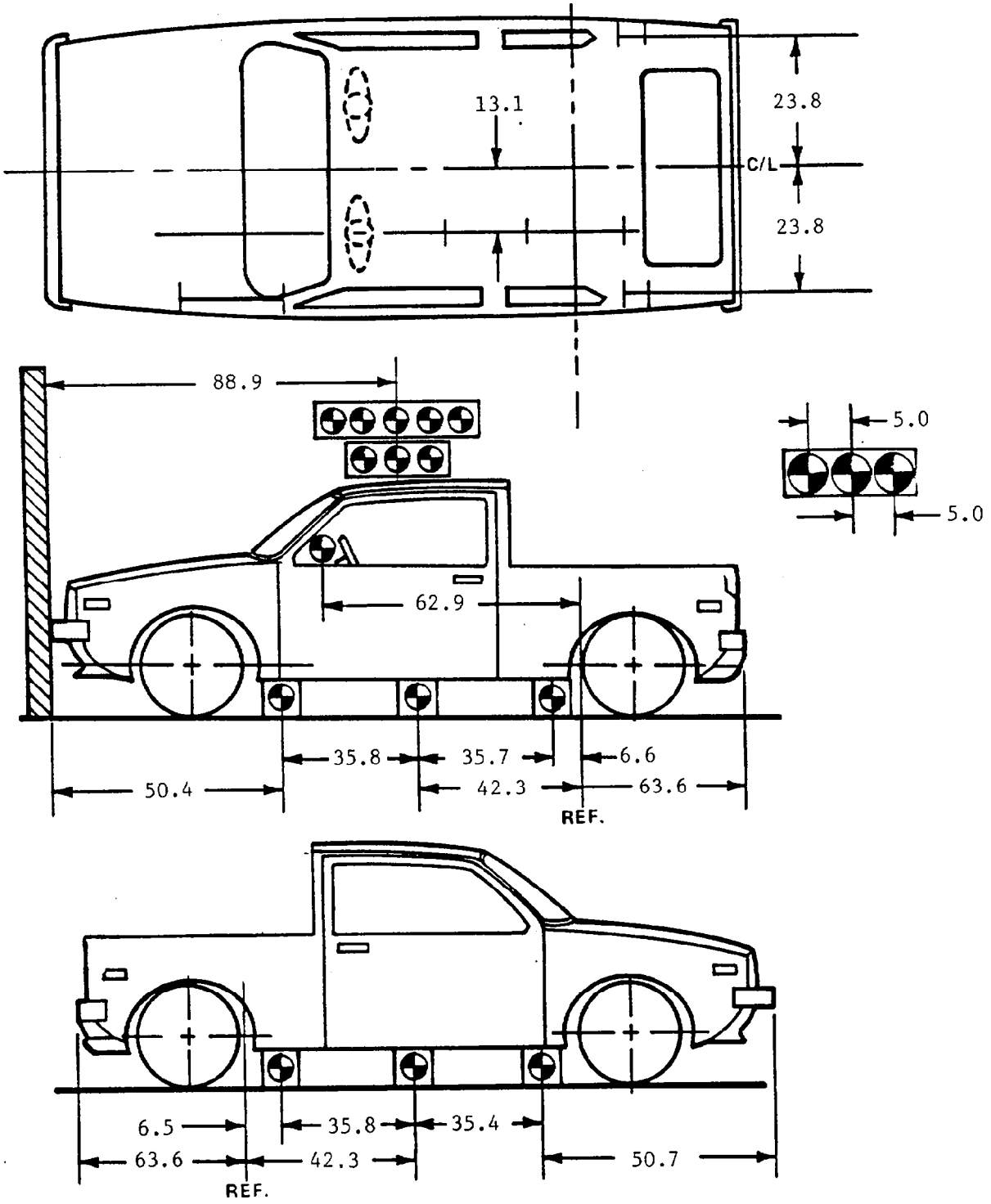
Test No. ML0302 Vehicle: 1990 Dodge Dakota Pickup

CAMERA NO.	VIEW	CAMERA POSITIONS (in)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	–	–	–	–	–	–	24
2	Overall Left Side	233	62	41	-2	216.9	13	540
3	Left Side View	321	41	41	-1	304.9	25	535
4	Driver and Interior View	114	98	78	-17	97.9	13	615
5	Steering Column (Bottom)	292	81	46	-1	275.9	25	570
6	Steering Column (Top)	292	81	71	-6	275.9	25	570
7	Left Belt	–	–	–	–	–	8	560
8	Overall Right Side	245	67	42	-2	228.9	13	795
9	Right Side View	307	42	41	-1	290.9	25	750
10	Right Passenger View	310	60	59	-3	293.9	35	655
11	Passenger and Interior View	109	104	76	-18	92.9	25	645
12	Right Belt	–	–	–	–	–	8	505
13	Passenger Front View	24	-5	73	-33	–	13	540
14	Driver Front View	24	-5	73	-31	–	13	535
15	Windshield View	0	0	126	-45	–	13	500
16	Pit View of Engine	0	32	-120	90	–	13	820

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

Figure 6

VEHICLE TARGET LOCATIONS

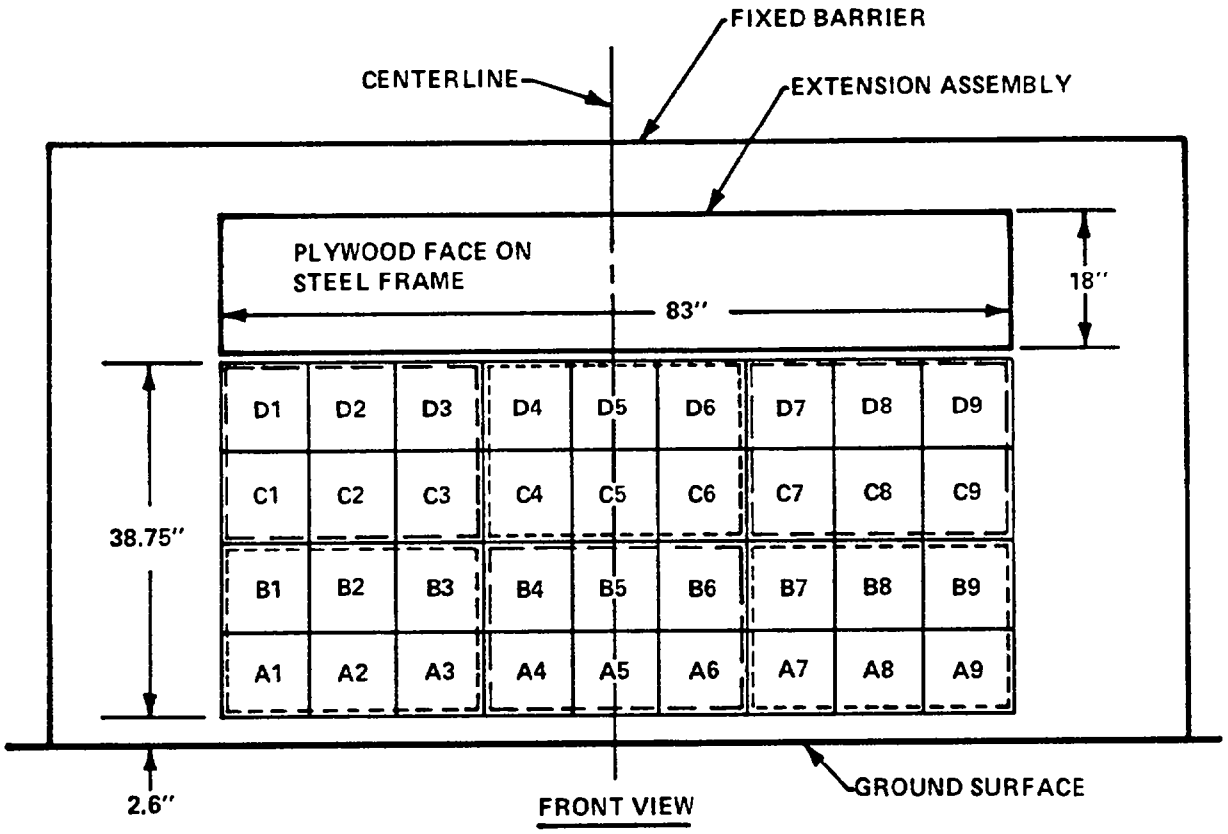


(DIMENSIONS IN INCHES)

Figure 7

LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells
4 Rows
9 Columns
6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

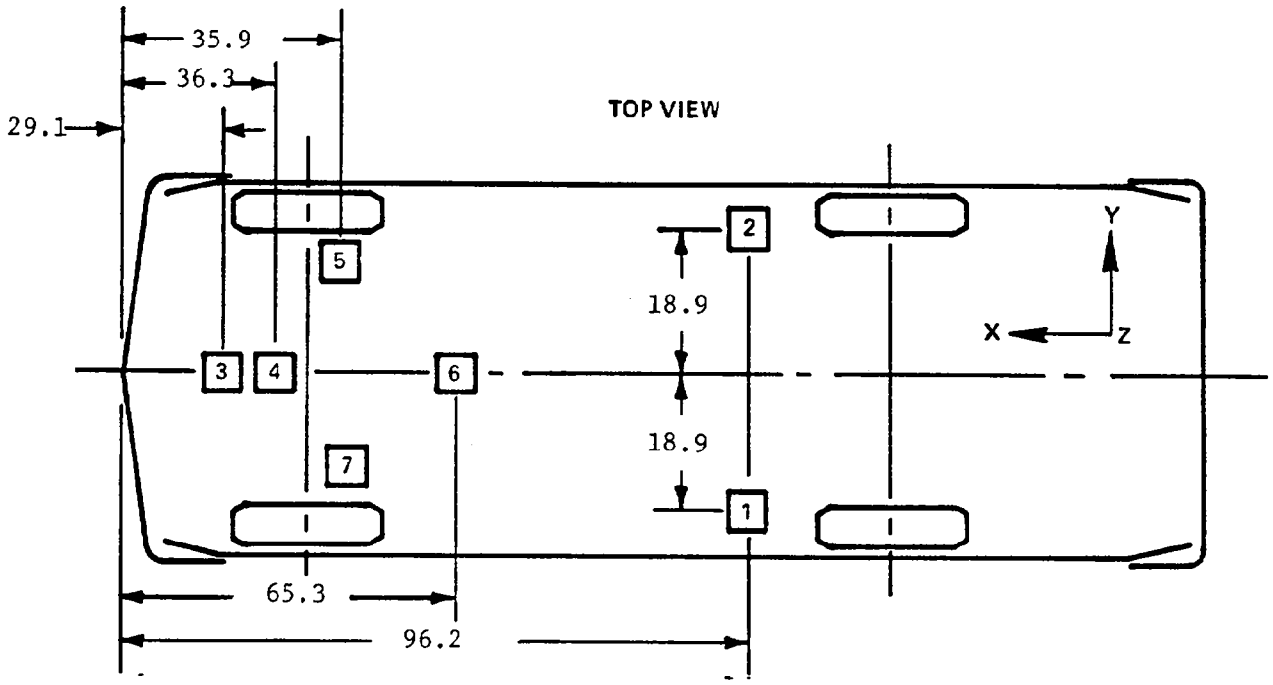
(1) Data from 36 individual load cells

(2) Total or Sum of 36 individual load cells

(3) Data from 6 Groupings shown above (6 cells/group)

Figure 8

VEHICLE ACCELEROMETER LOCATIONS



ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Left Rear Seat Crossmember	X		
2	Right Rear Seat Crossmember	X		
3	Top of Engine	X		
4	Bottom of Engine	X		
5	Right Disc Brake Caliper	X		
6	Instrument Panel	X		
7	Left Disc Brake Caliper	X		

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

Figure 9

TEST VEHICLE MEASUREMENTS

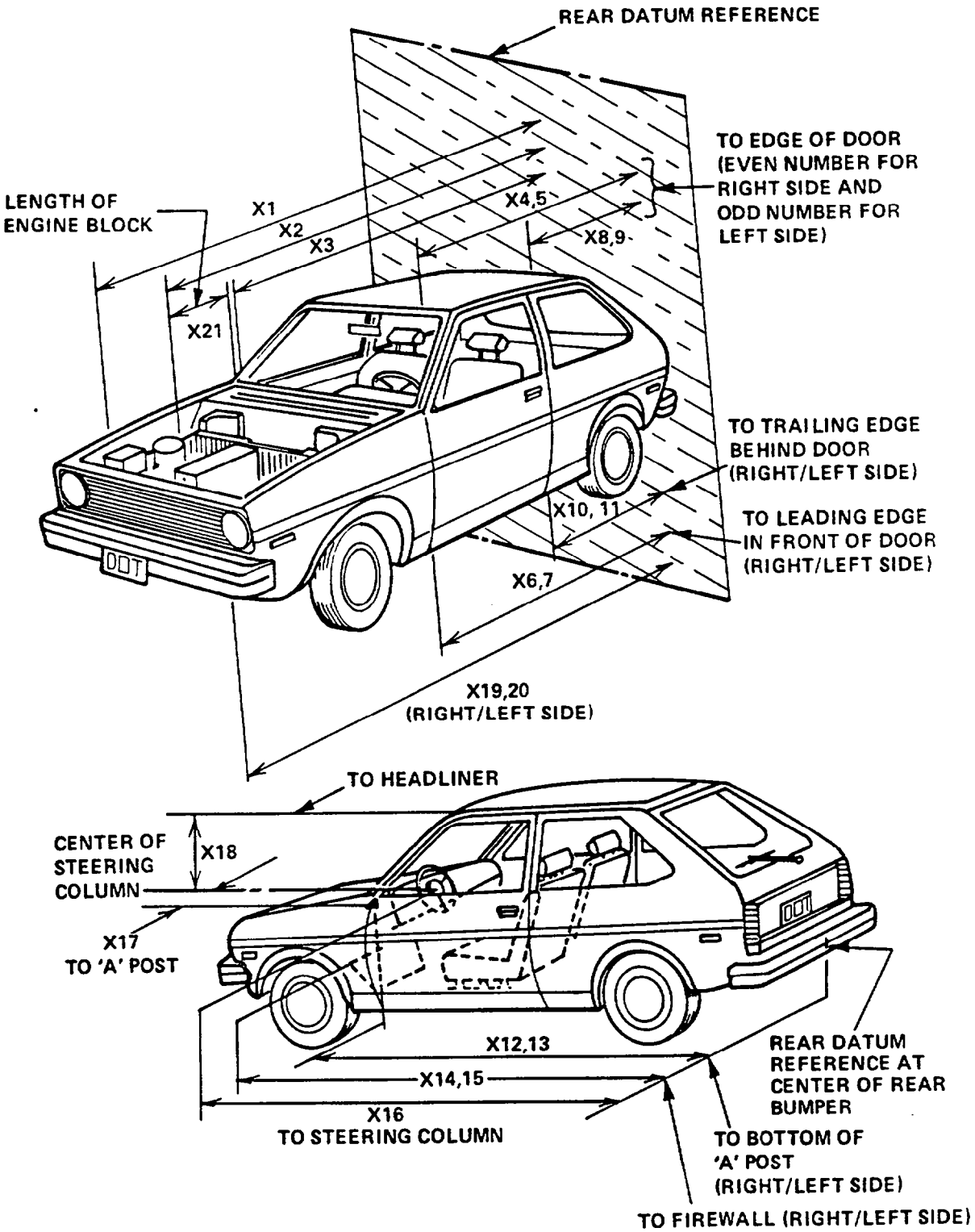


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	192.1	174.0	18.1
X2	Rear Surface of Vehicle to Front of Engine	173.1	165.5	7.6
X3	Rear Surface of Vehicle to Firewall	148.9	148.2	0.7
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	138.0	138.0	0.0
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	138.0	137.8	0.2
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	136.6	135.8	0.8
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	136.6	135.5	1.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	95.2	95.3	-0.1
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	95.6	95.8	-0.2
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	94.2	93.4	0.8
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	94.2	93.2	1.0
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	136.8	136.2	0.6
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	136.9	135.8	1.1
X14	Rear Surface of Vehicle to Firewall, Right Side	149.4	148.6	0.8
X15	Rear Surface of Vehicle to Firewall, Left Side	149.5	149.0	0.5
X16	Rear Surface of Vehicle to Steering Column	121.2	120.1	1.1
X17	Center of Steering Column to "A" Post	15.9	15.6	0.3
X18	Center of Steering Column to Headliner	18.8	16.8	2.0
X19	Rear Surface of Vehicle to Right Side of Front Bumper	189.9	171.7	18.2
X20	Rear Surface of Vehicle to Left Side of Front Bumper	190.0	172.5	17.5
X21	Length of Engine Block	20.0	20.0	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	135.0	135.0	0.0
CD	Rear Surface of Vehicle to Center of Dash Panel	136.9	137.4	-0.5
LD	Rear Surface of Vehicle to Left Side of Dash Panel	127.7	129.3	-1.6

Appendix A

PHOTOGRAPHS

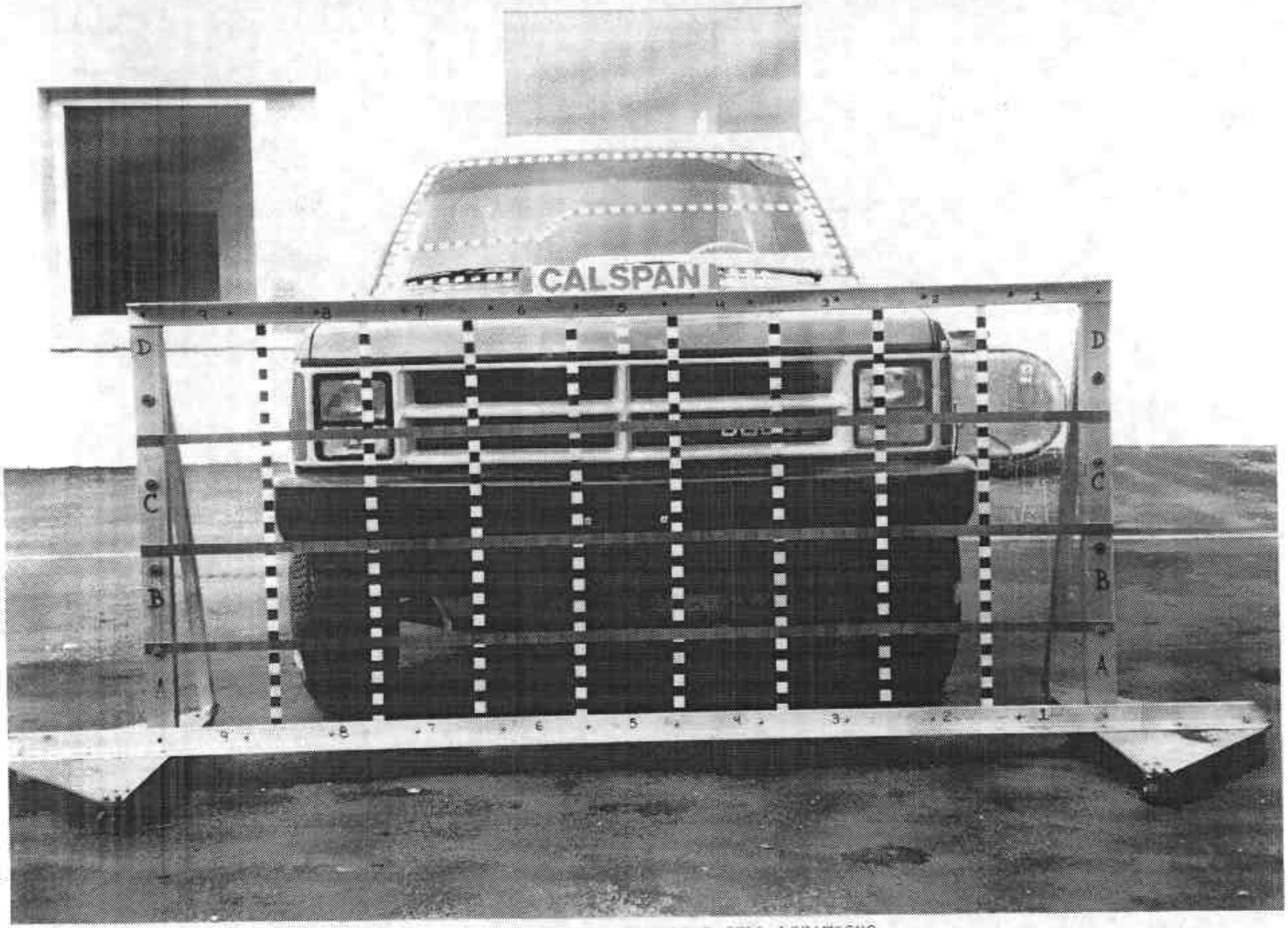


Figure A-1 LOAD CELL LOCATIONS

Figure A-2 PRE-TEST FRONT VIEW

Figure A-3 POST TEST FRONT VIEW

Figure A-4 PRE-TEST LEFT SIDE VIEW

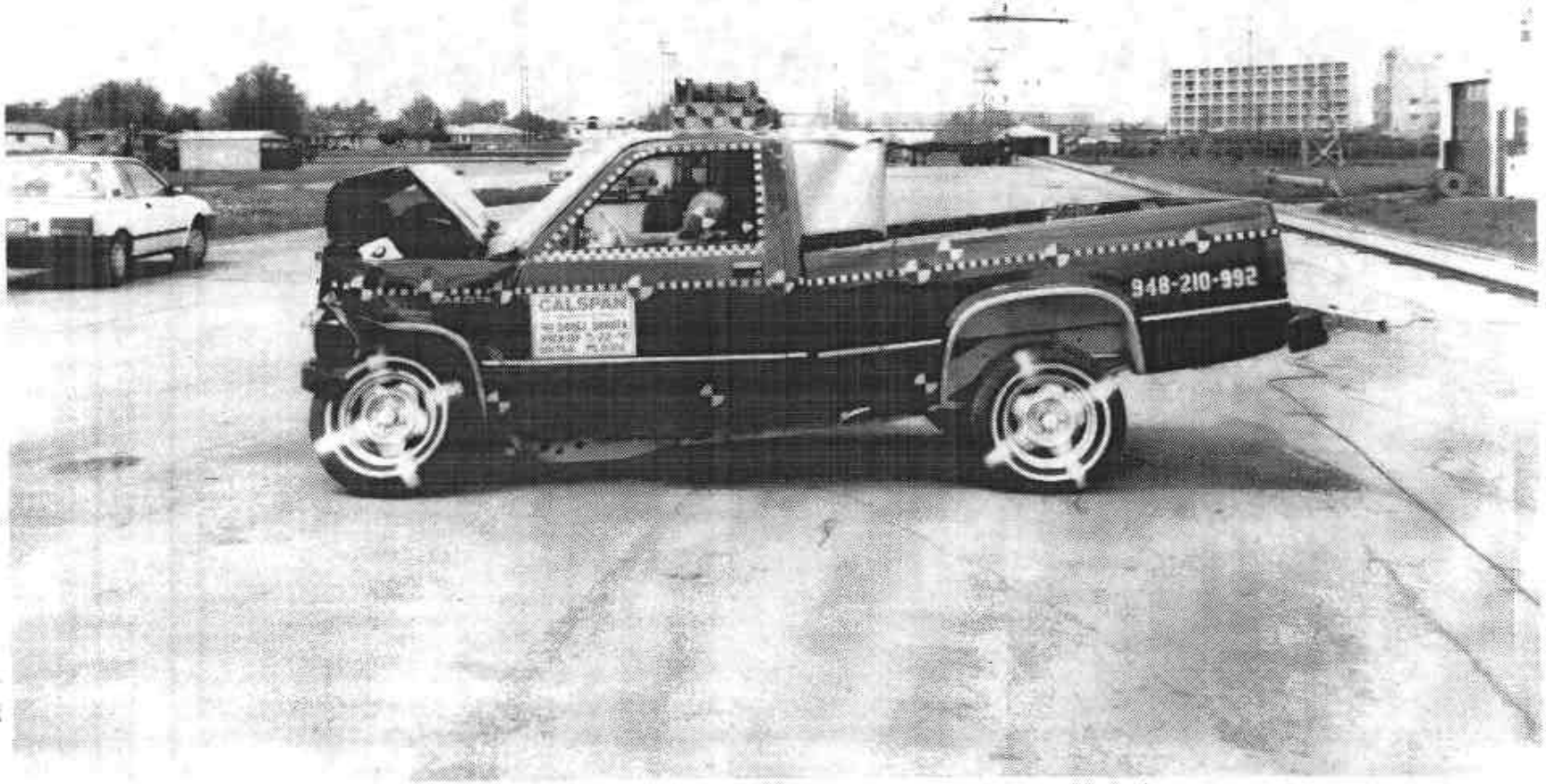


Figure A-5 POST TEST LEFT SIDE VIEW

Figure A-6 PRE-TEST RIGHT SIDE VIEW

Figure A-7 POST-TEST RIGHT SIDE VIEW

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

Figure A-9 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

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

Figure A-11 POST-TEST LEFT REAR THREE-QUARTER VIEW

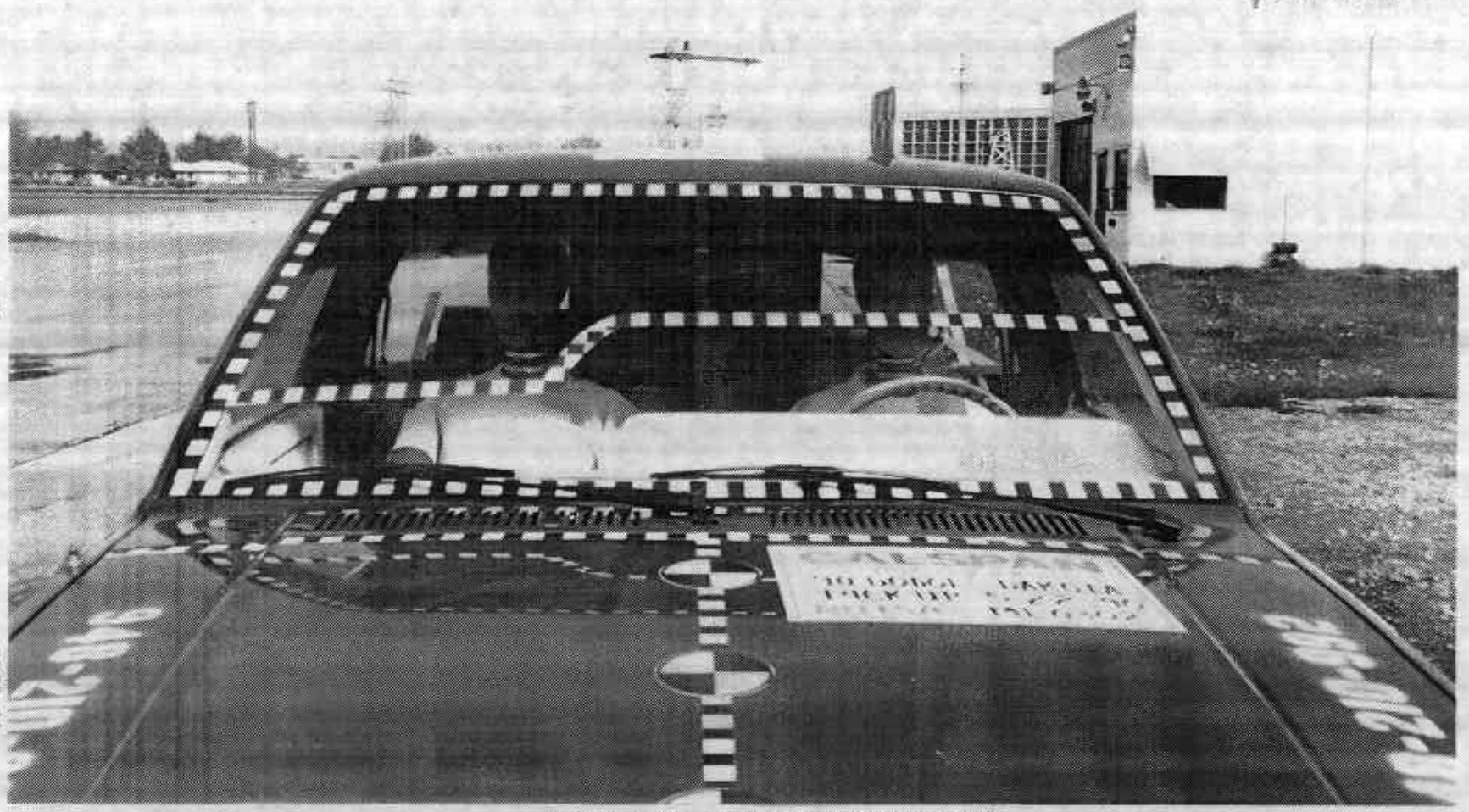


Figure A-12 PRE-TEST WINDSHIELD VIEW

Figure A-13 POST-TEST WINDSHIELD VIEW

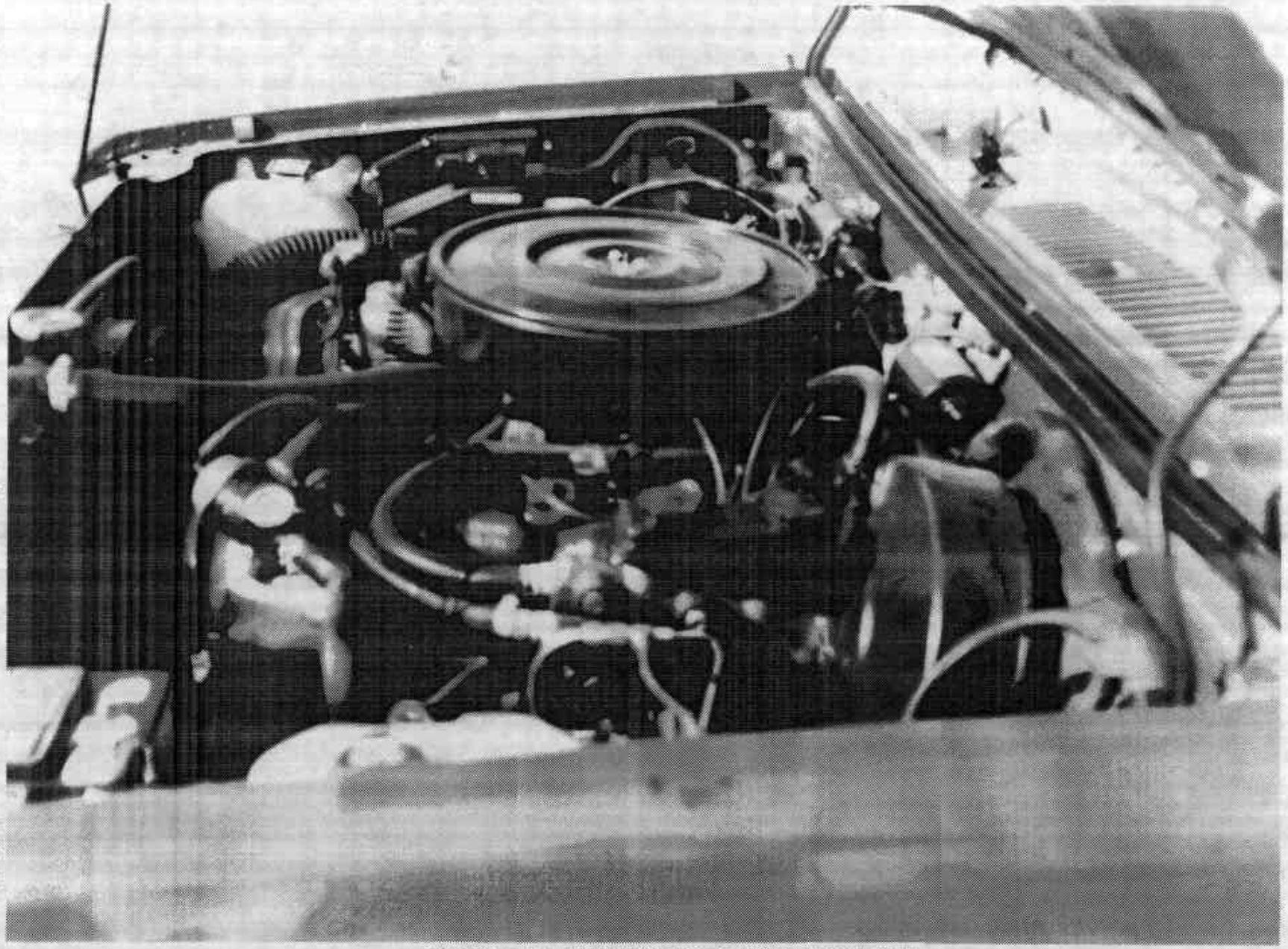


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

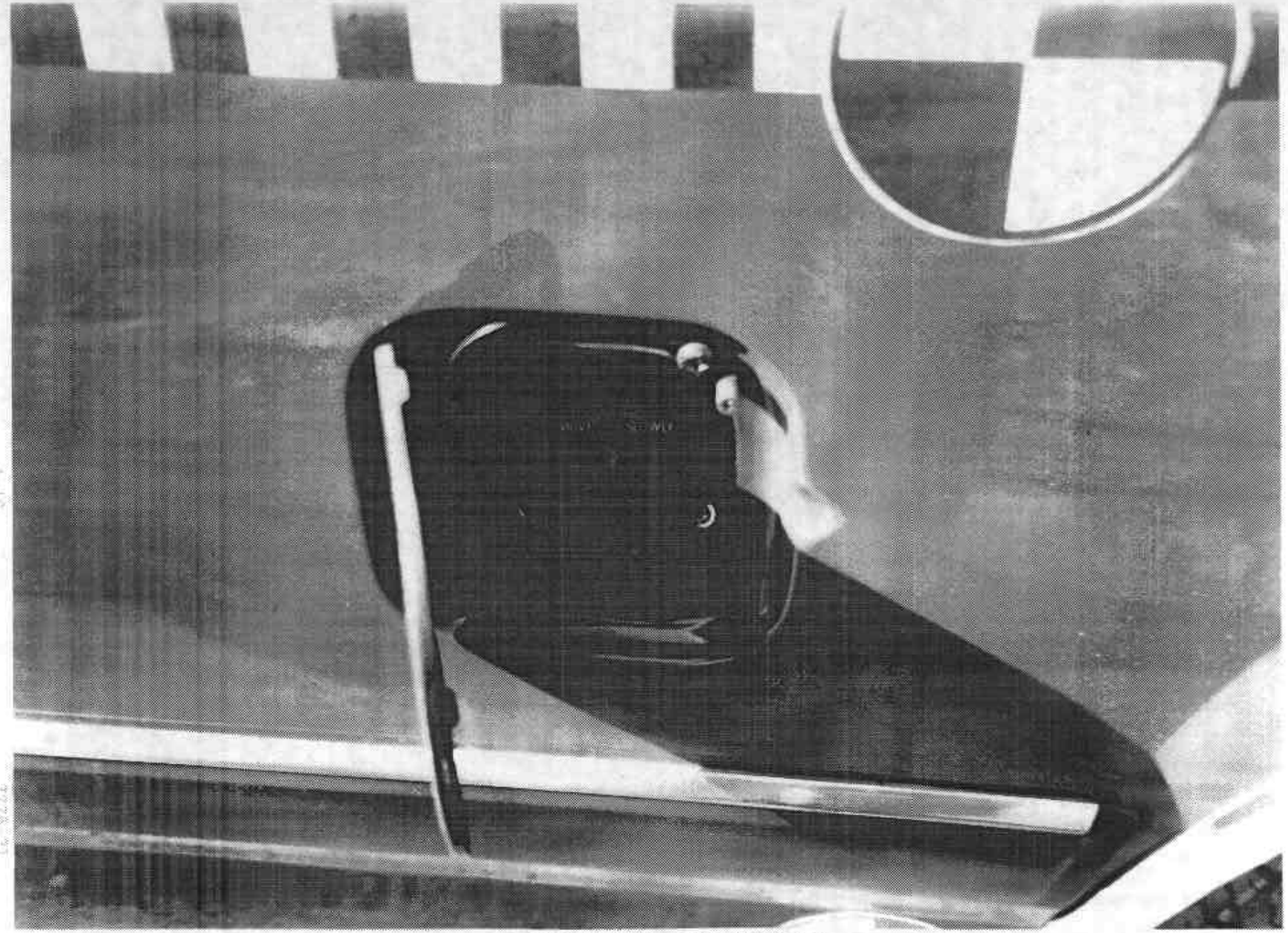


Figure A-15 FUEL CAP VIEW

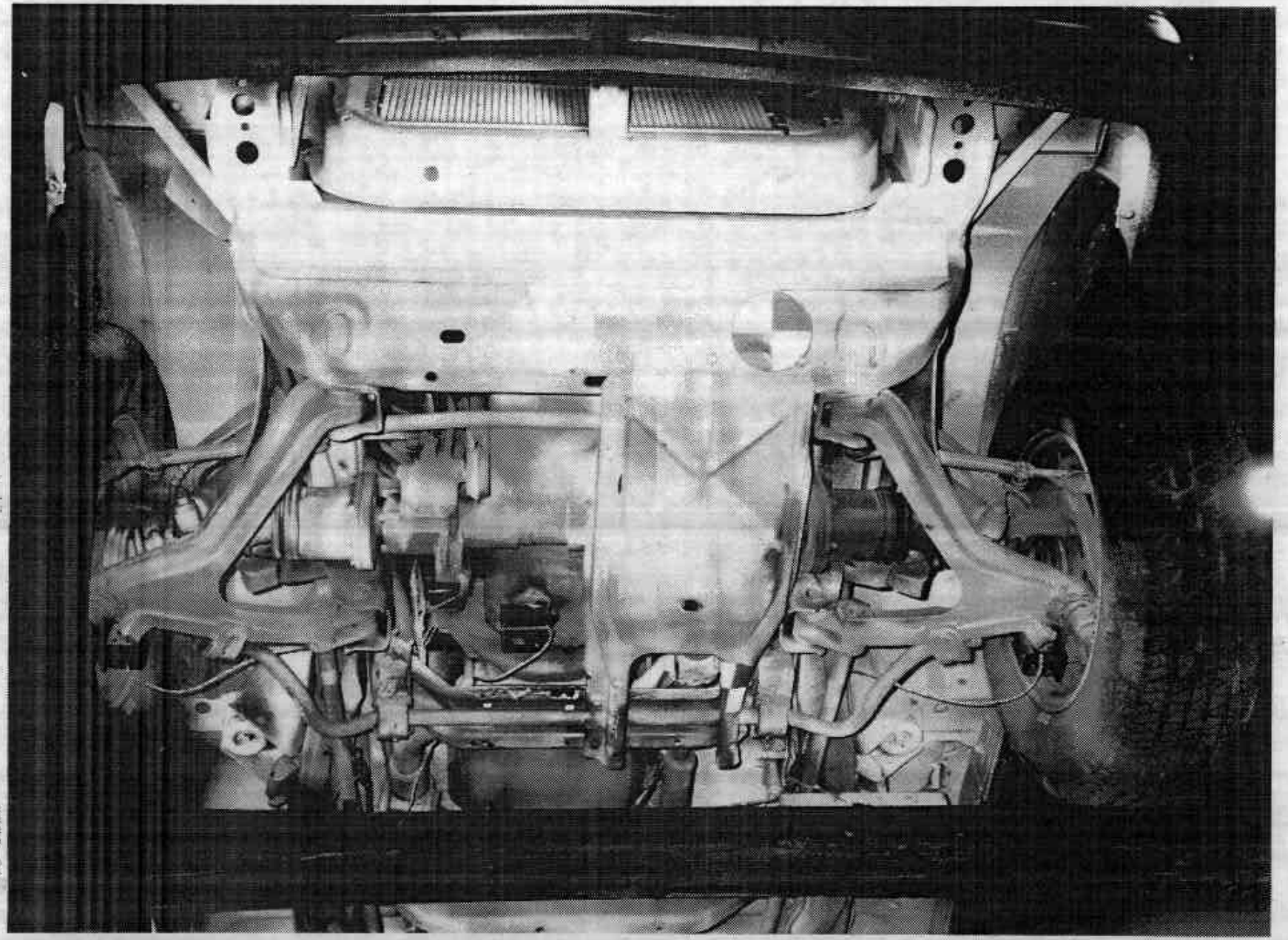


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

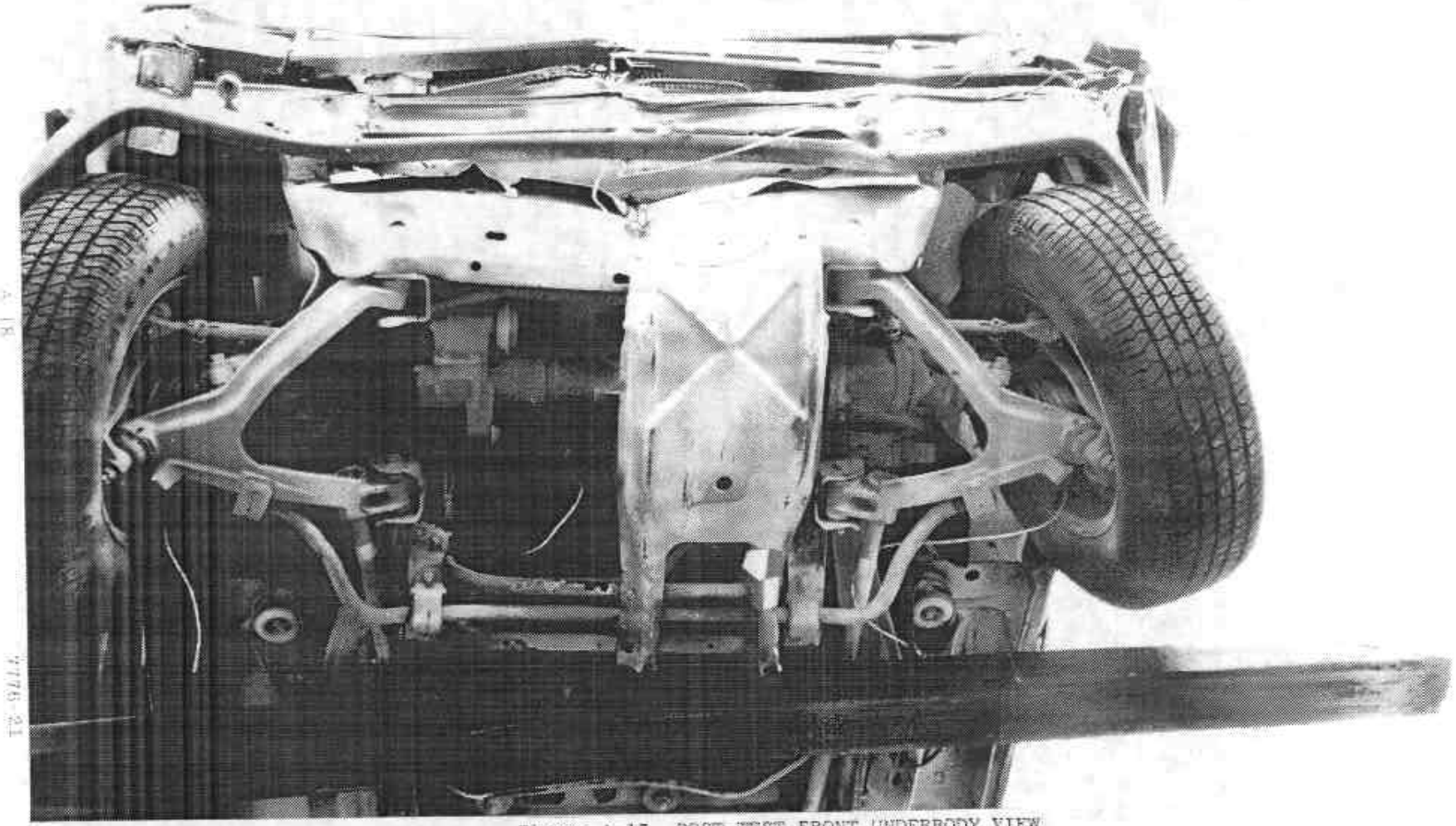


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

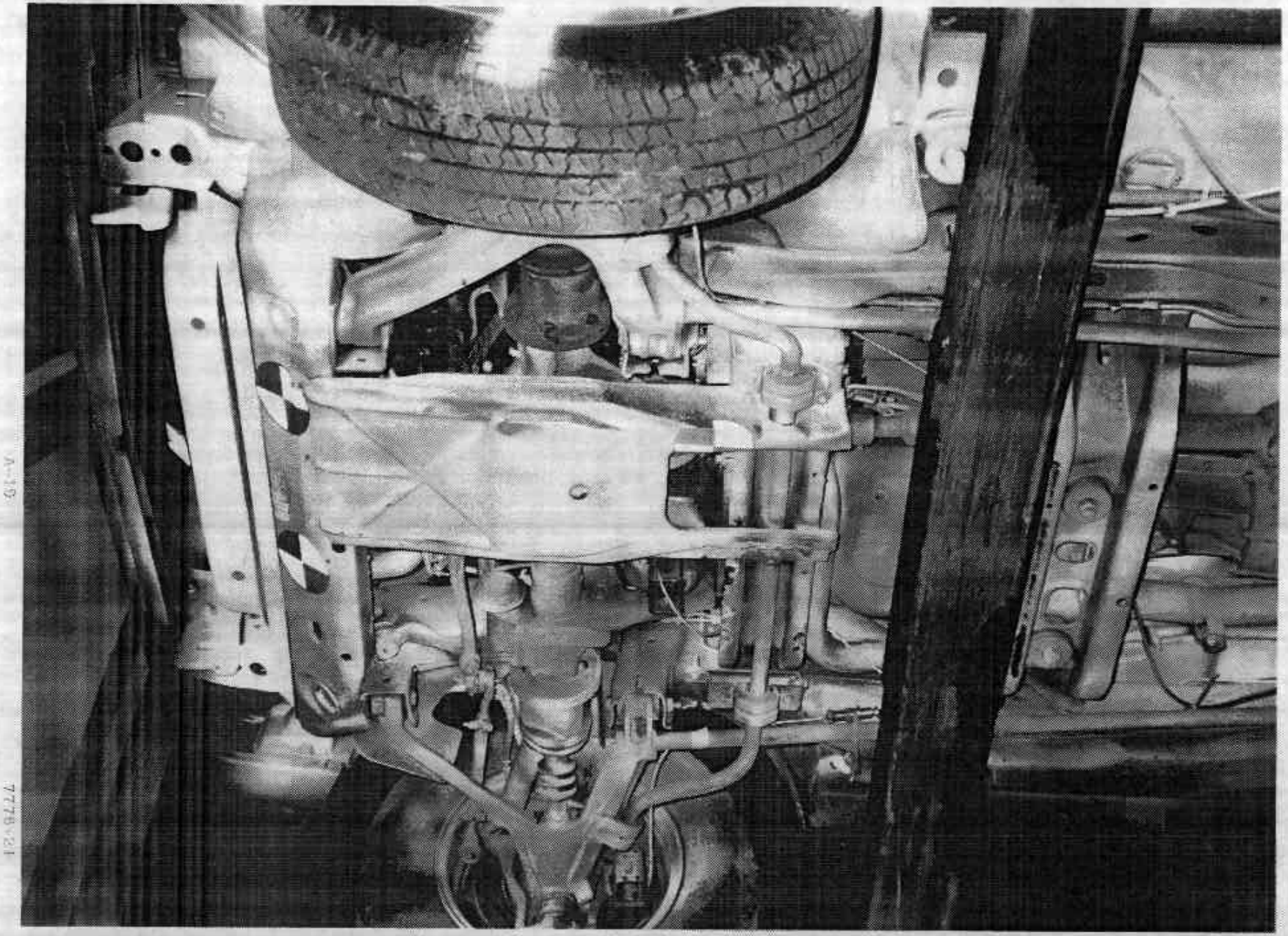


Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

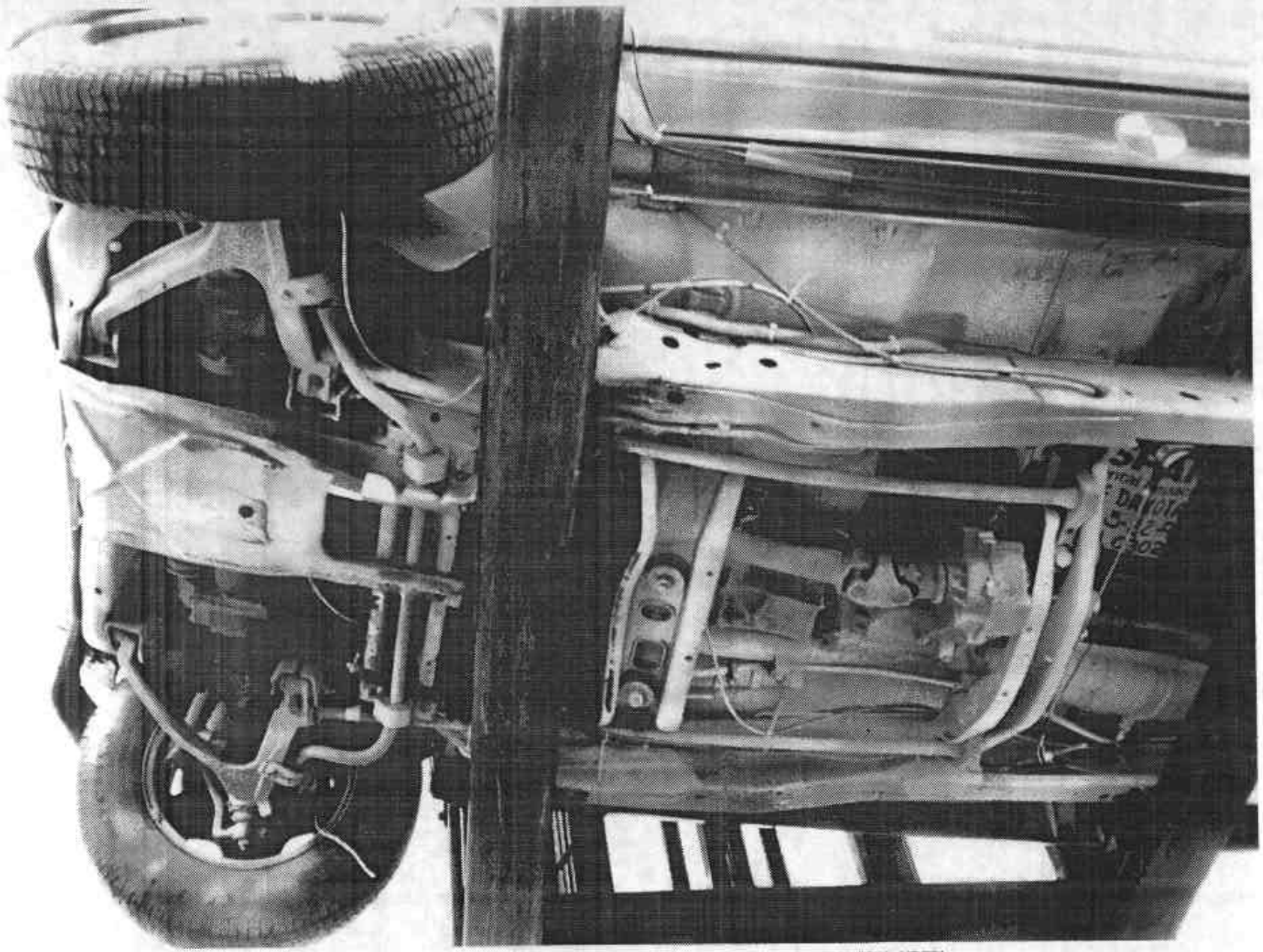


Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

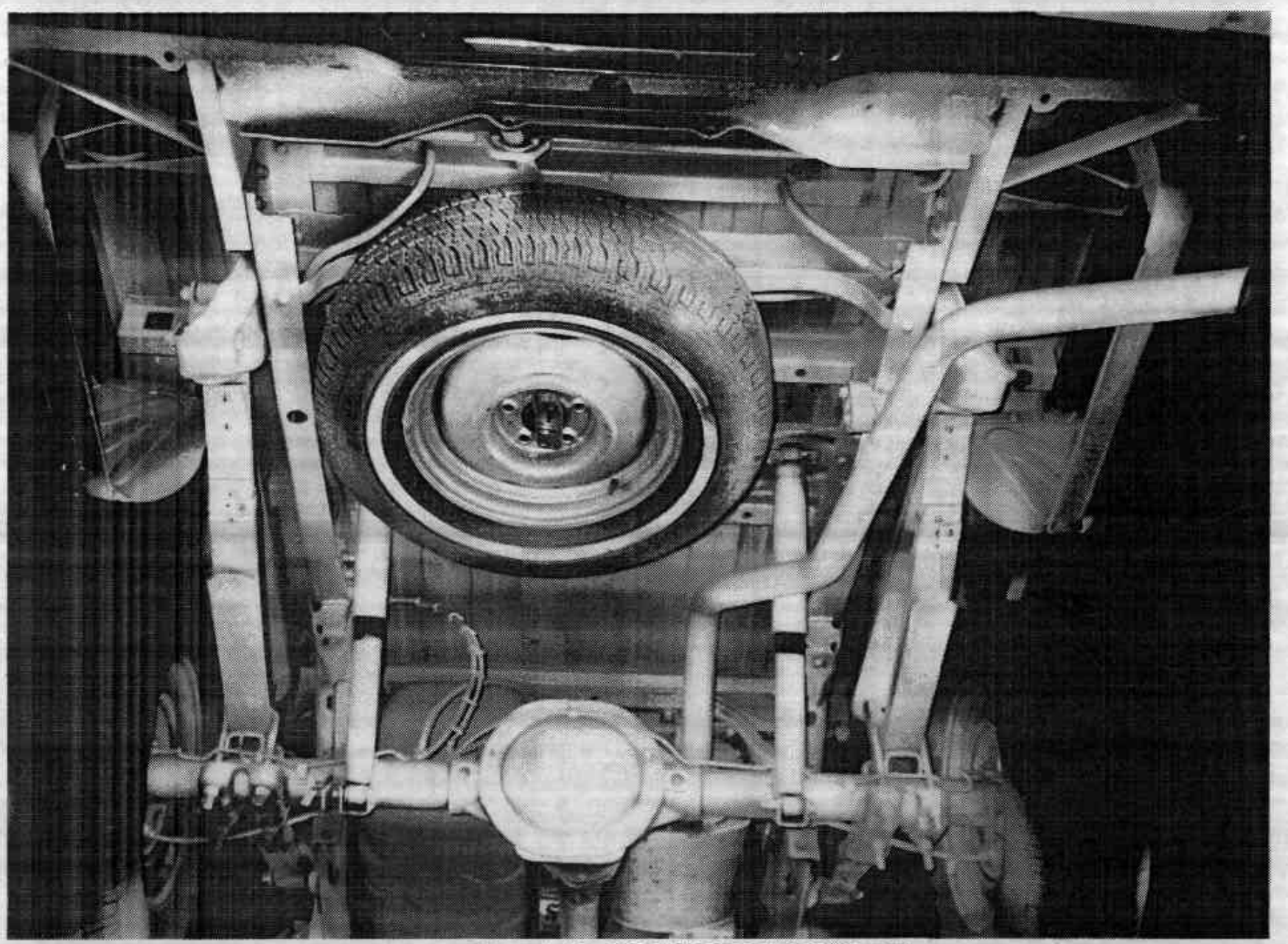


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

Figure A-21 POST-TEST REAR UNDERBODY VIEW

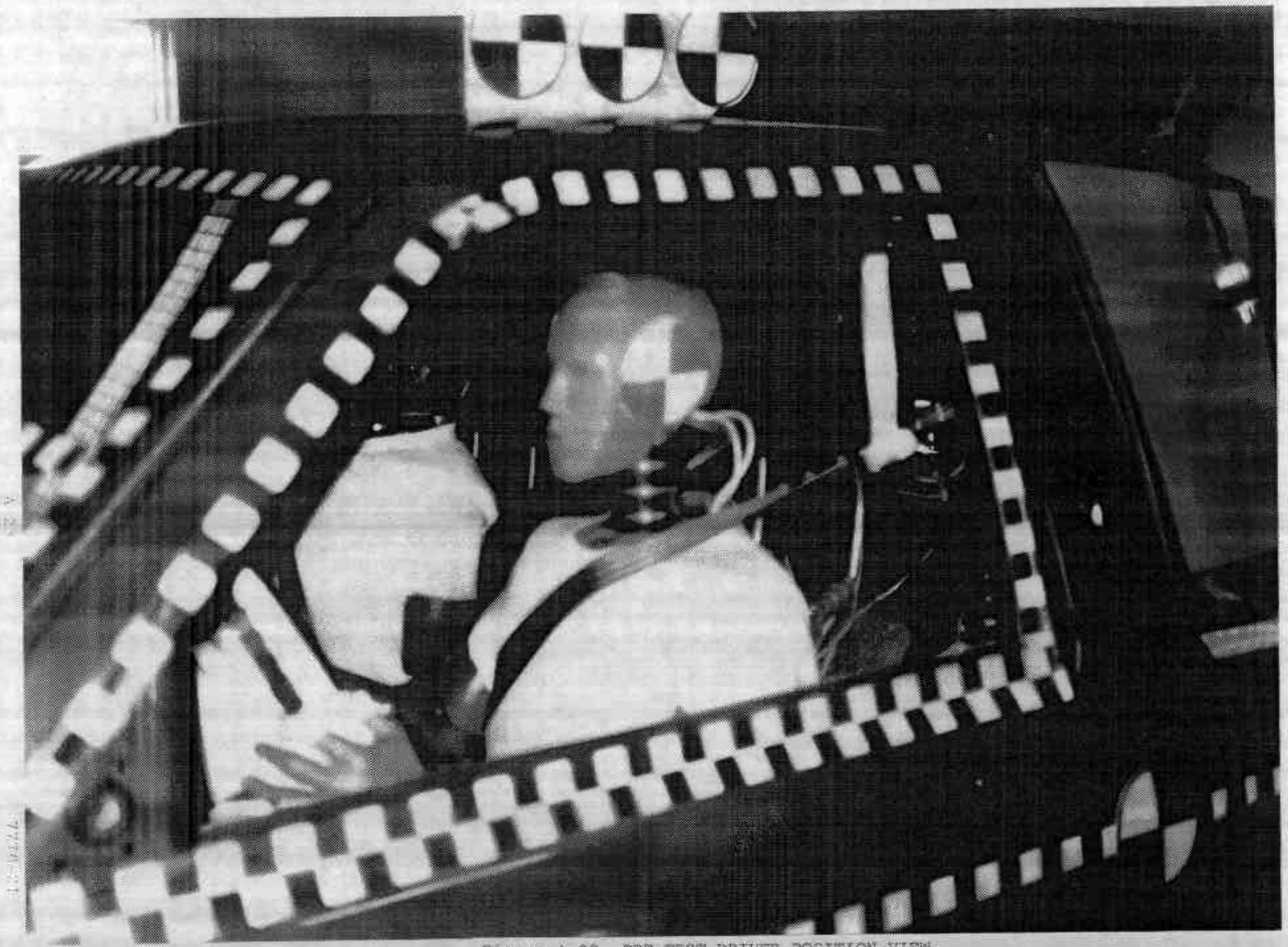


Figure A-22 PRE-TEST DRIVER POSITION VIEW

Figure A-23 POST-TEST DRIVER POSITION VIEW

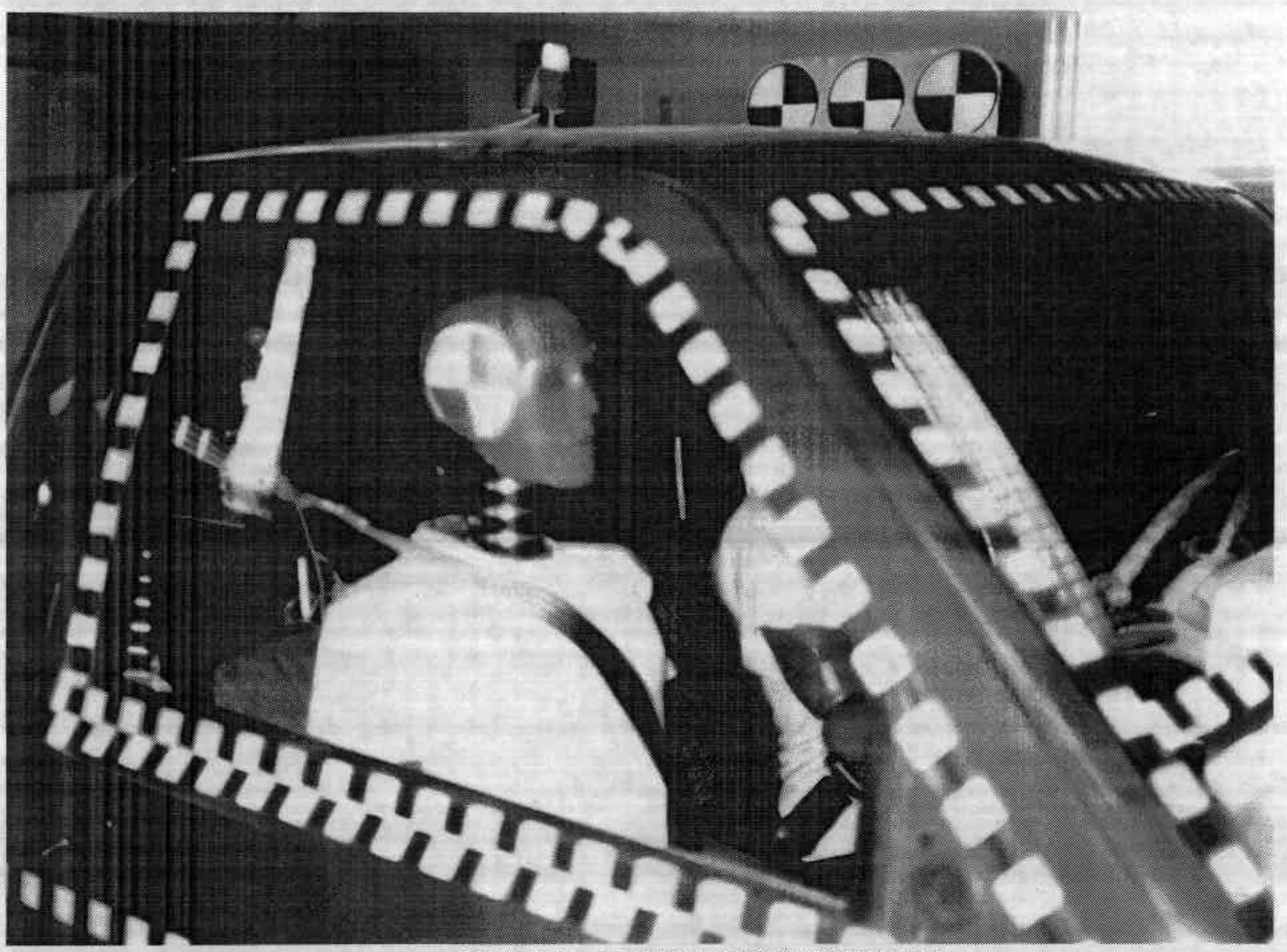


Figure A-24 PRE-TEST PASSENGER POSITION VIEW

Figure A-25 POST-TEST PASSENGER POSITION VIEW

Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

A-28

7770-21

Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

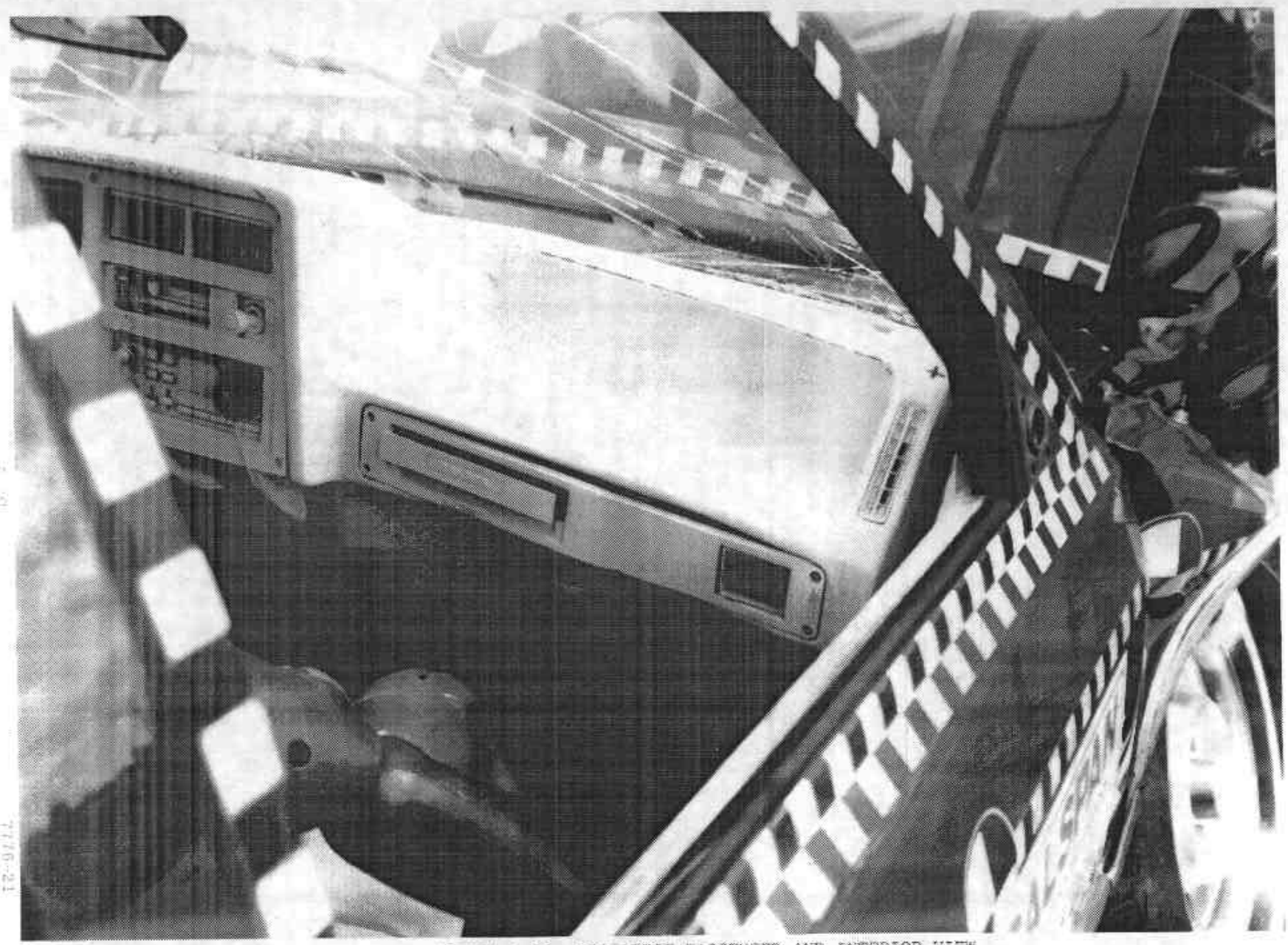


Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

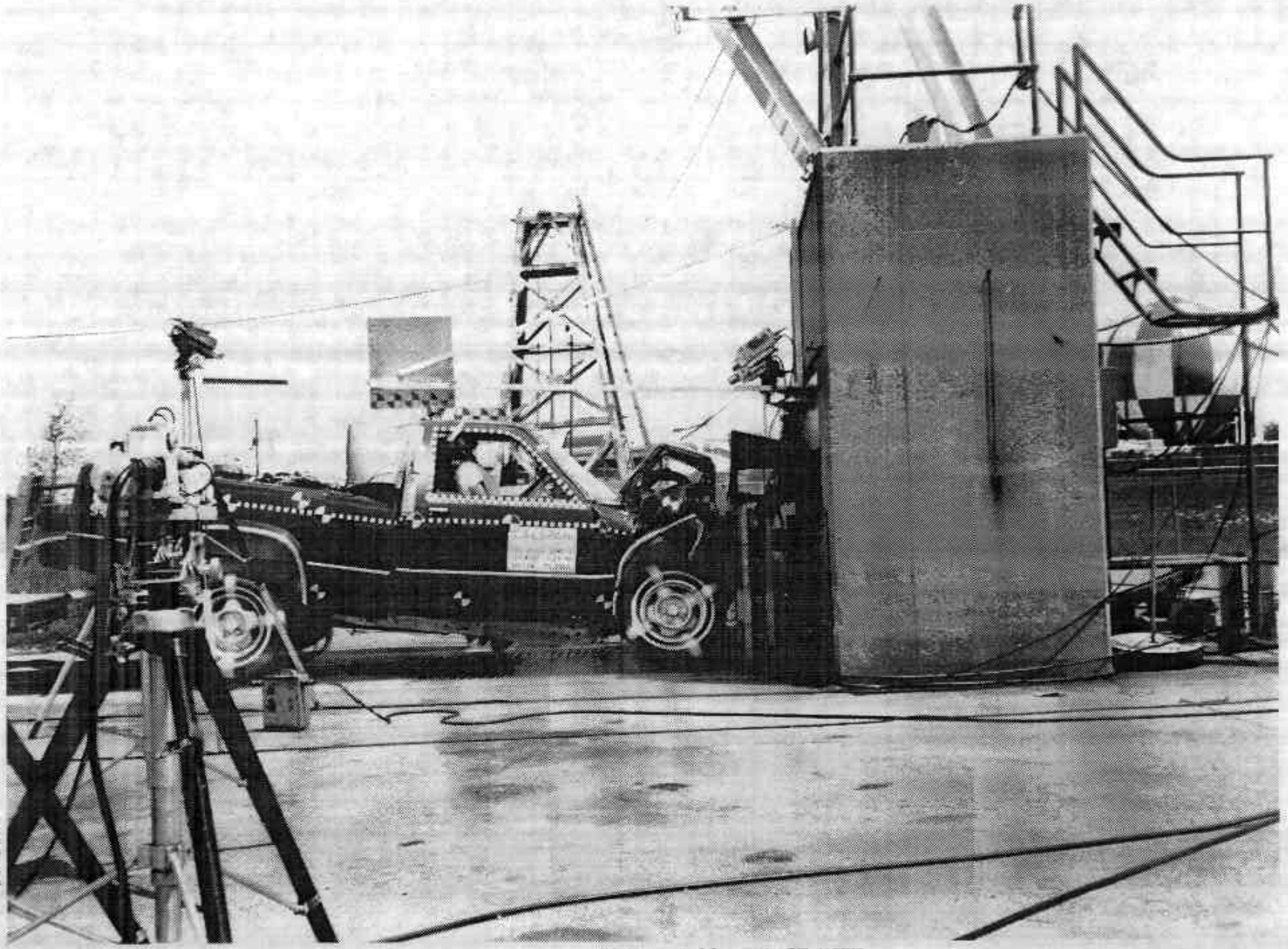


Figure A-30 IMPACT VIEW

Appendix B

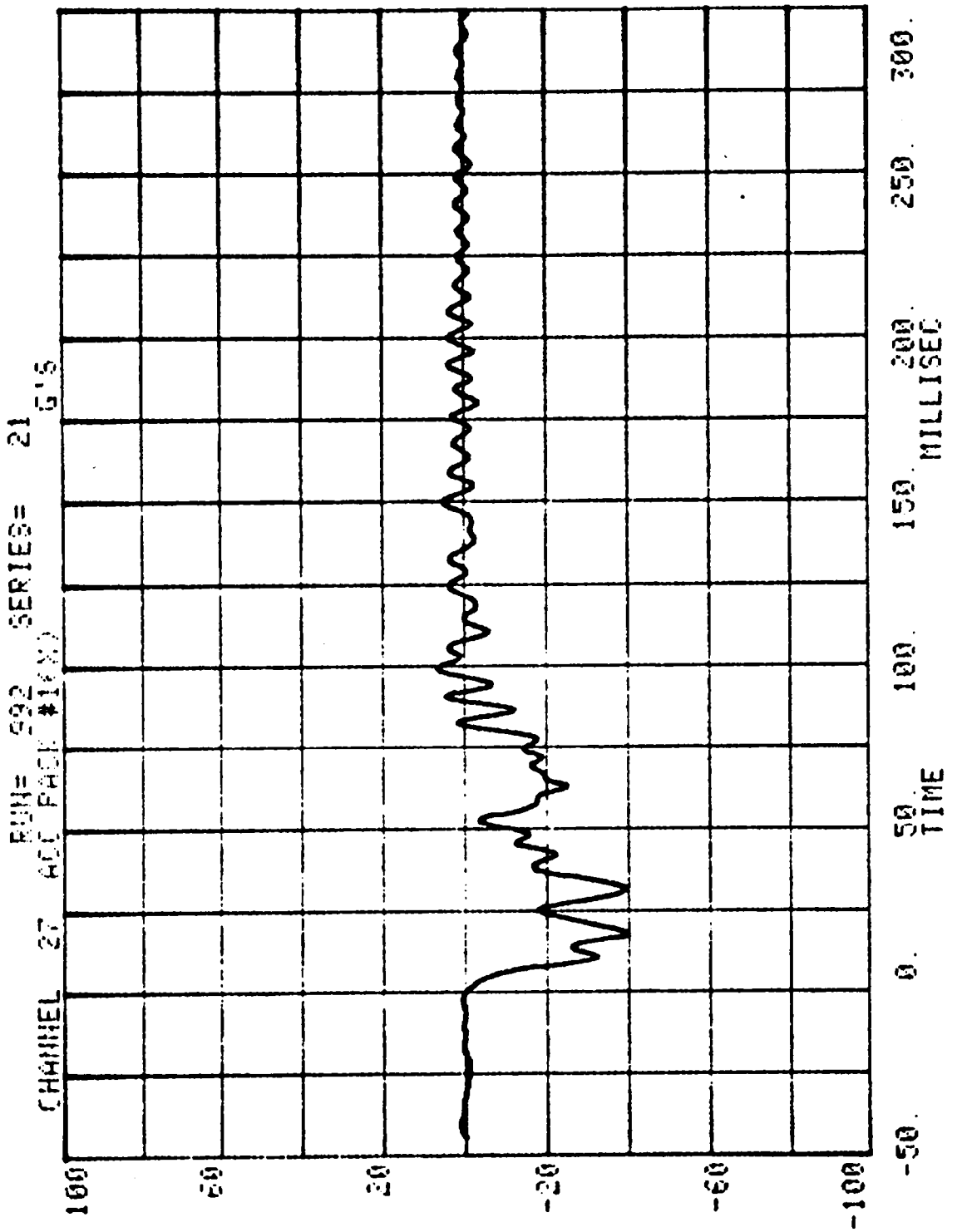
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. ML0302

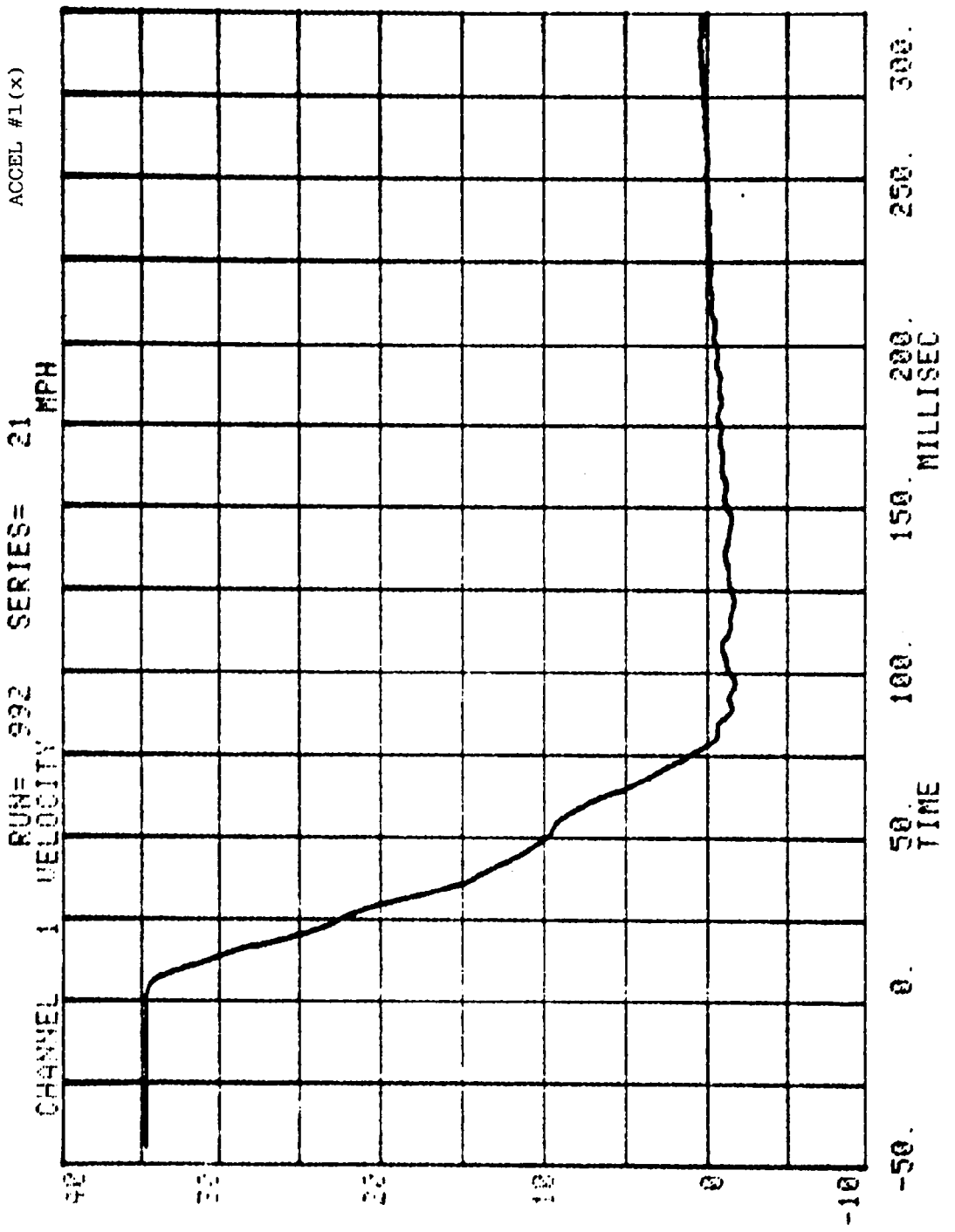
VEHICLE DATA

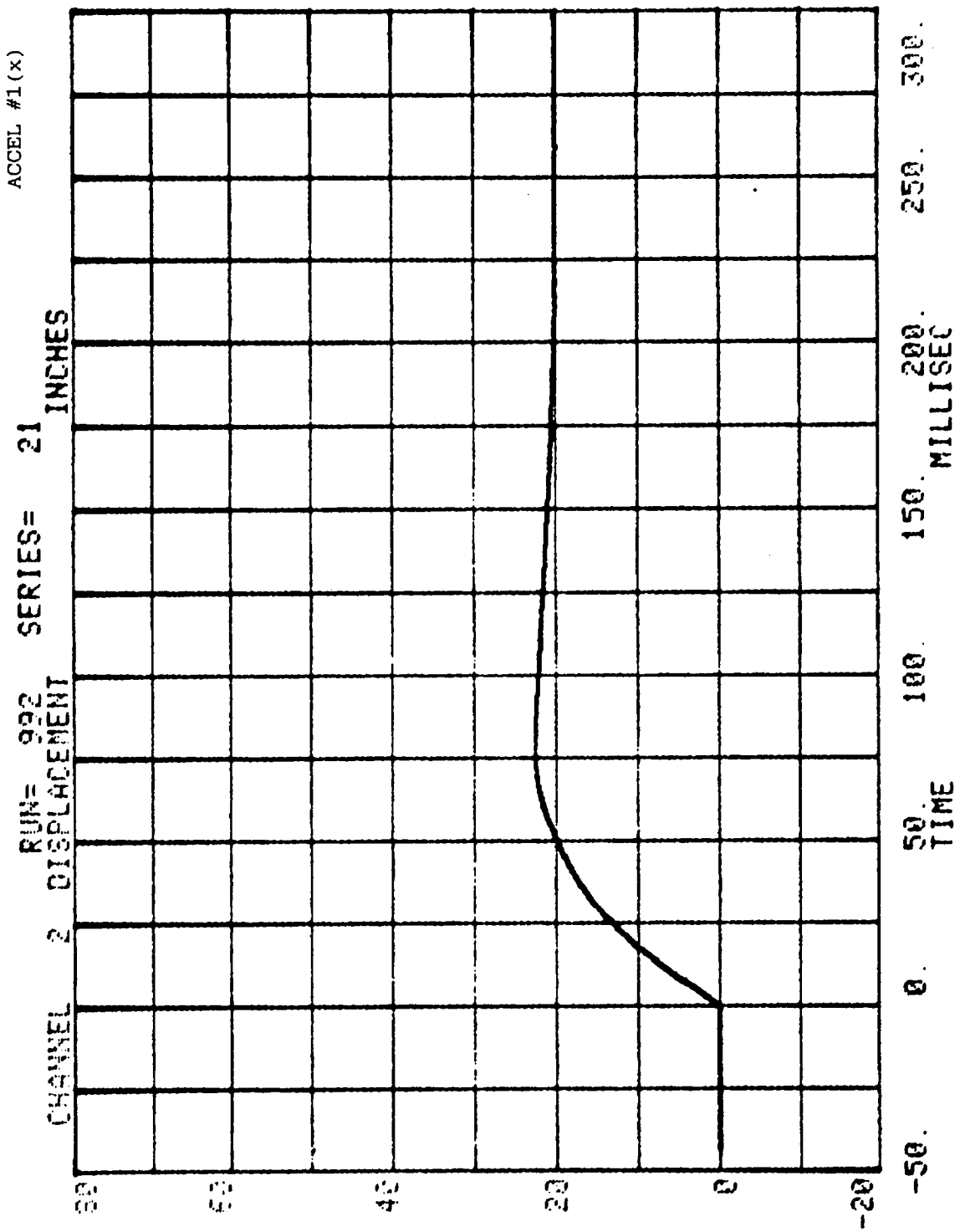
FILTER CHANNEL CLASS

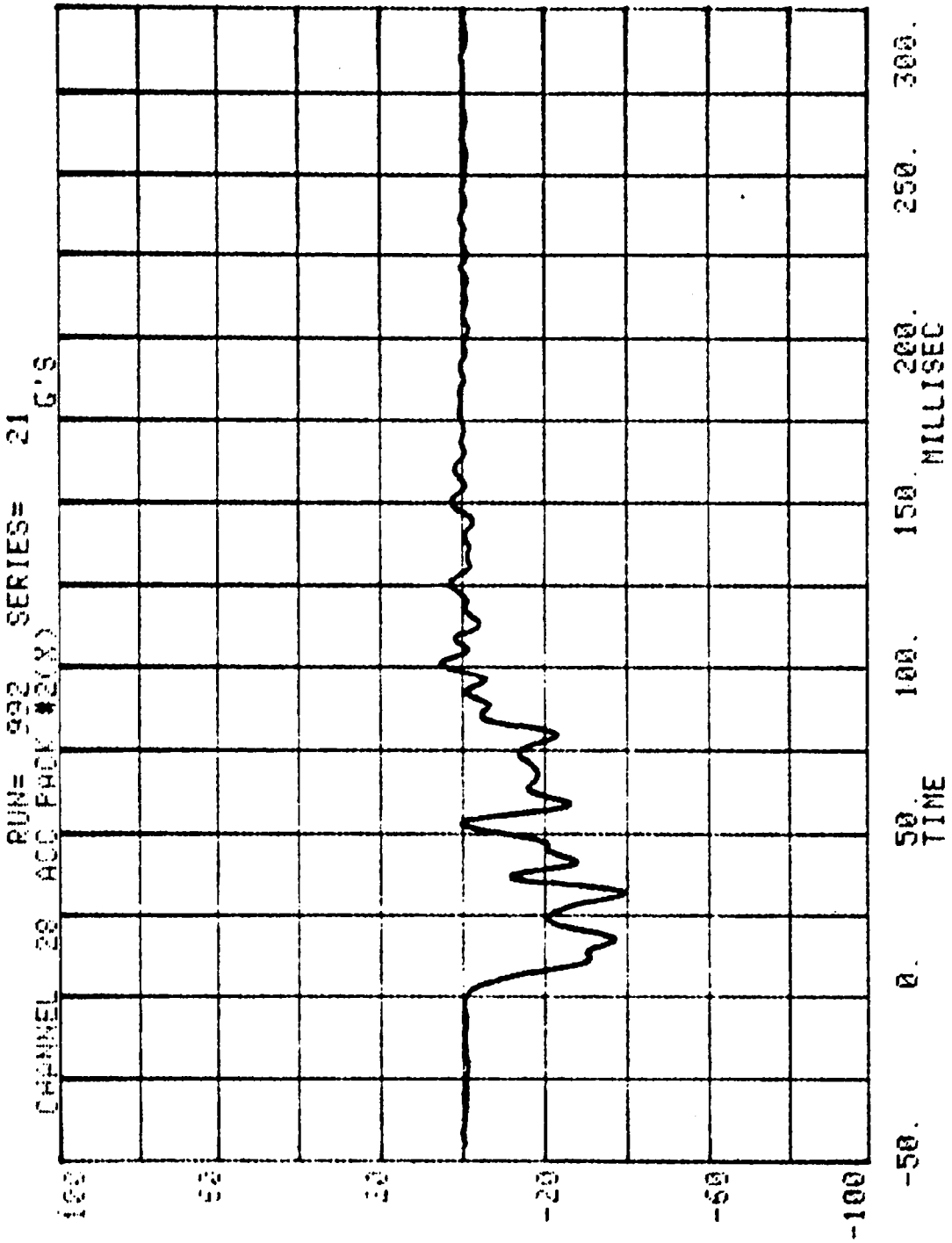
60

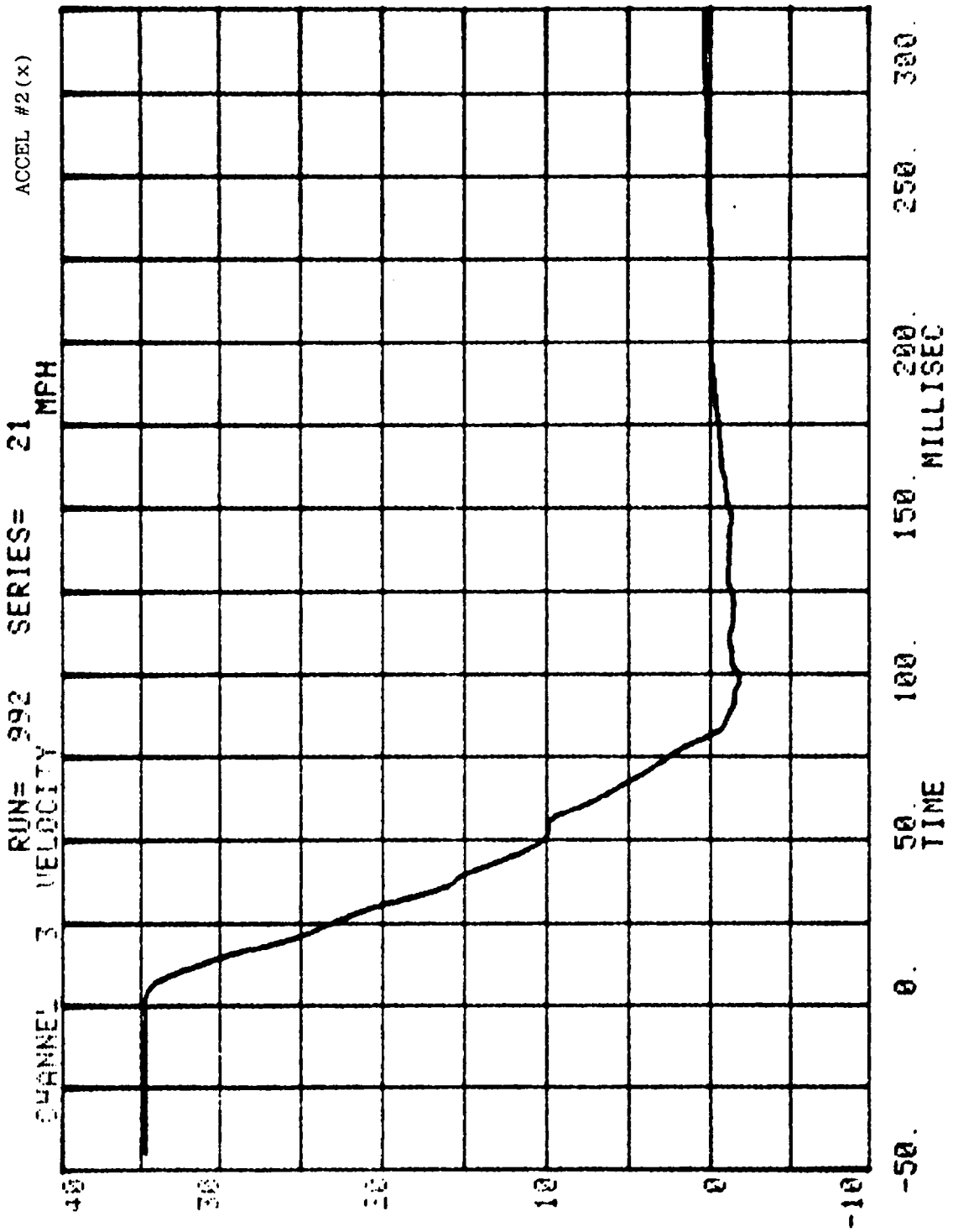

CHANNEL 27 ACC PACK #1(X)
RUN= 992 SERIES= 21
G'S
100
50
0
-50
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

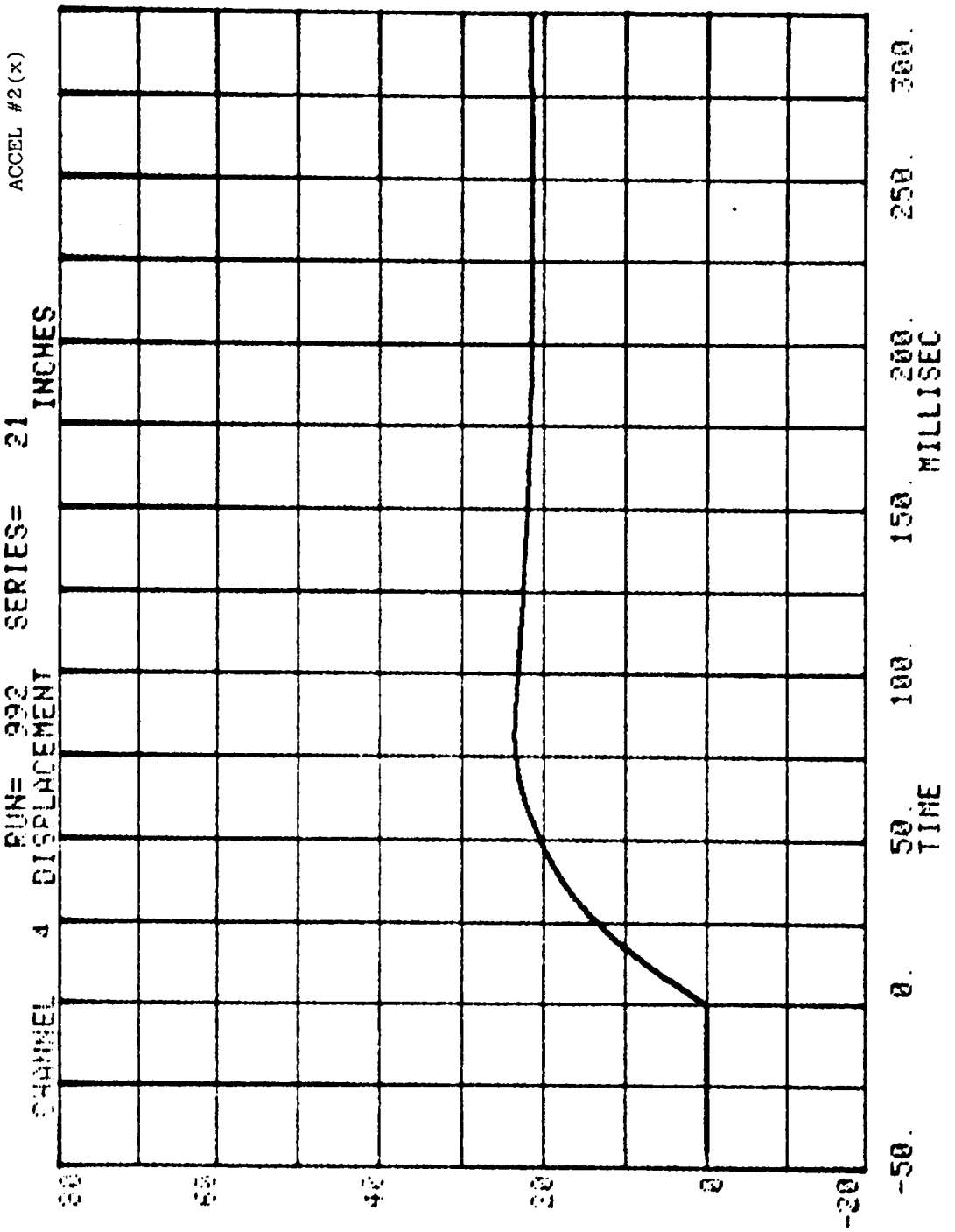
7776-21


ACCEL #1(x)
CHANNEL 1 VELOCITY
RUN= 992 SERIES= 21 MPH
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC
-10
0
10
20
30
40

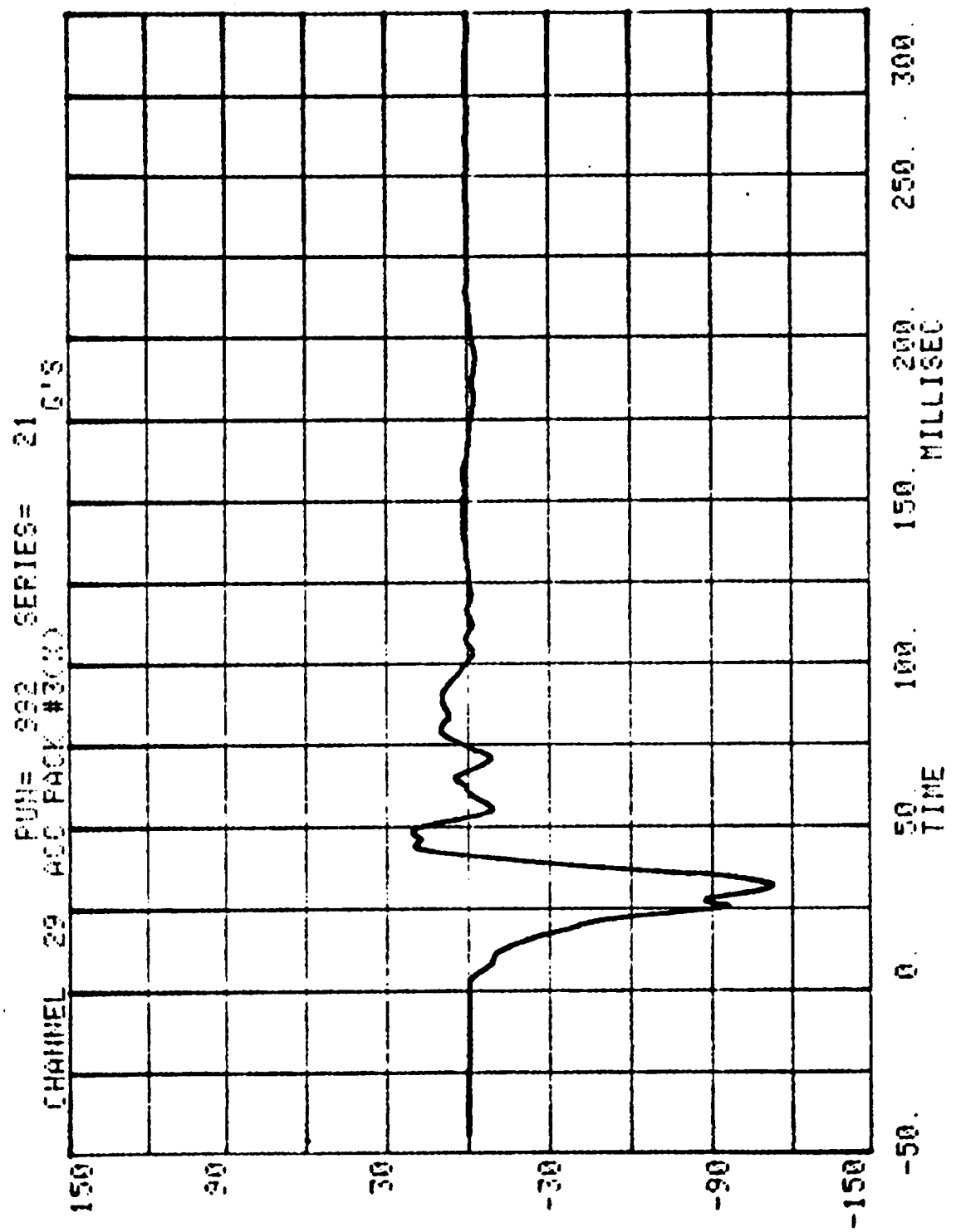

ACCEL #1(x)
CHANNEL 2 DISPLACEMENT
RUN= 992 SERIES= 21
INCHES
60.
40.
20.
0.
-20.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 932 SERIES= 21
CHANNEL 28 ACC PACK #2(X) G'S
100.
50.
0.
-20.
-50.
-100.
-50. 0. 50. 100. 150. 200. 250. 300.
TIME MILLISEC

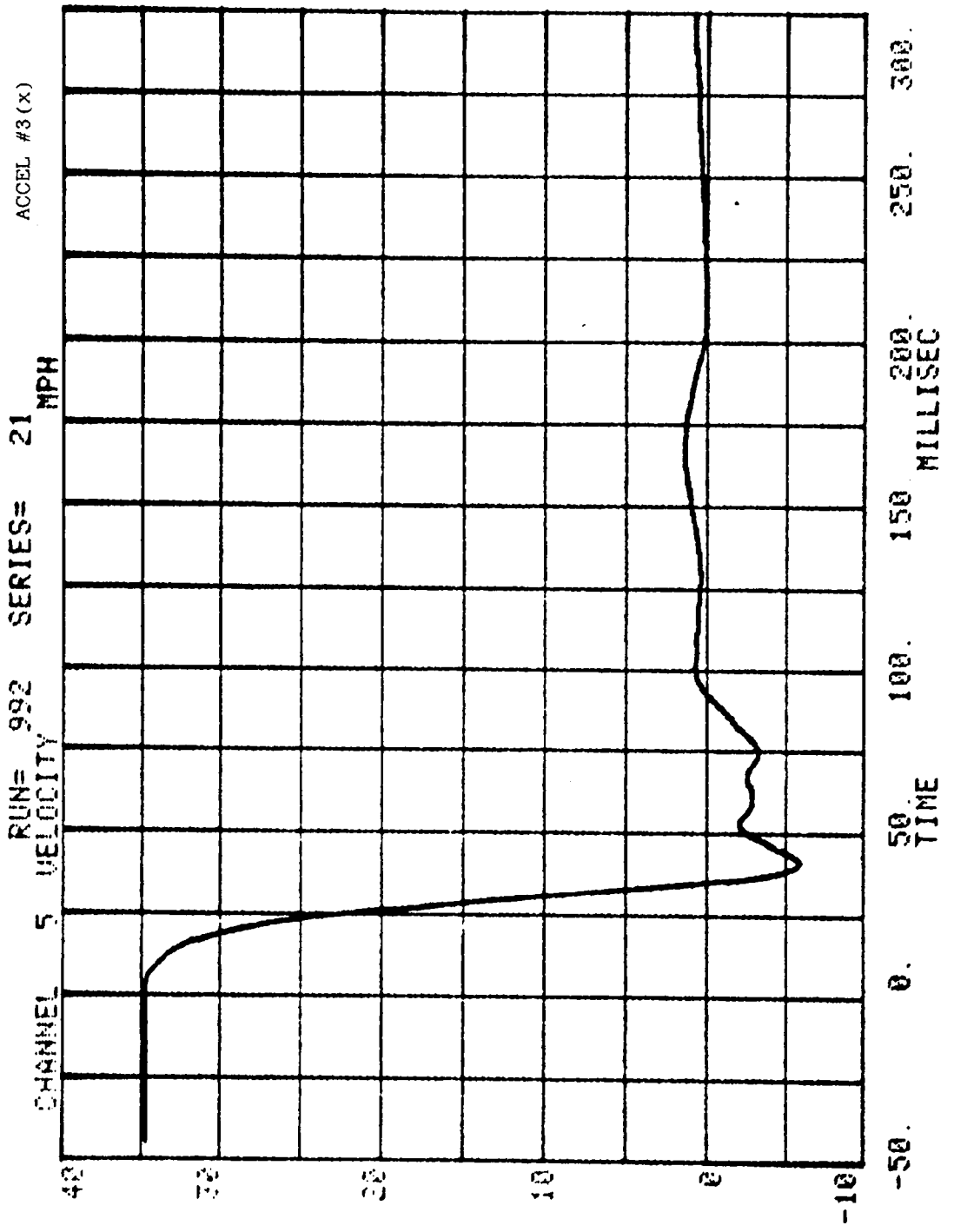

ACCEL #2(x)
RUN= 992 SERIES= 21
CHANNEL 3 VELOCITY MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

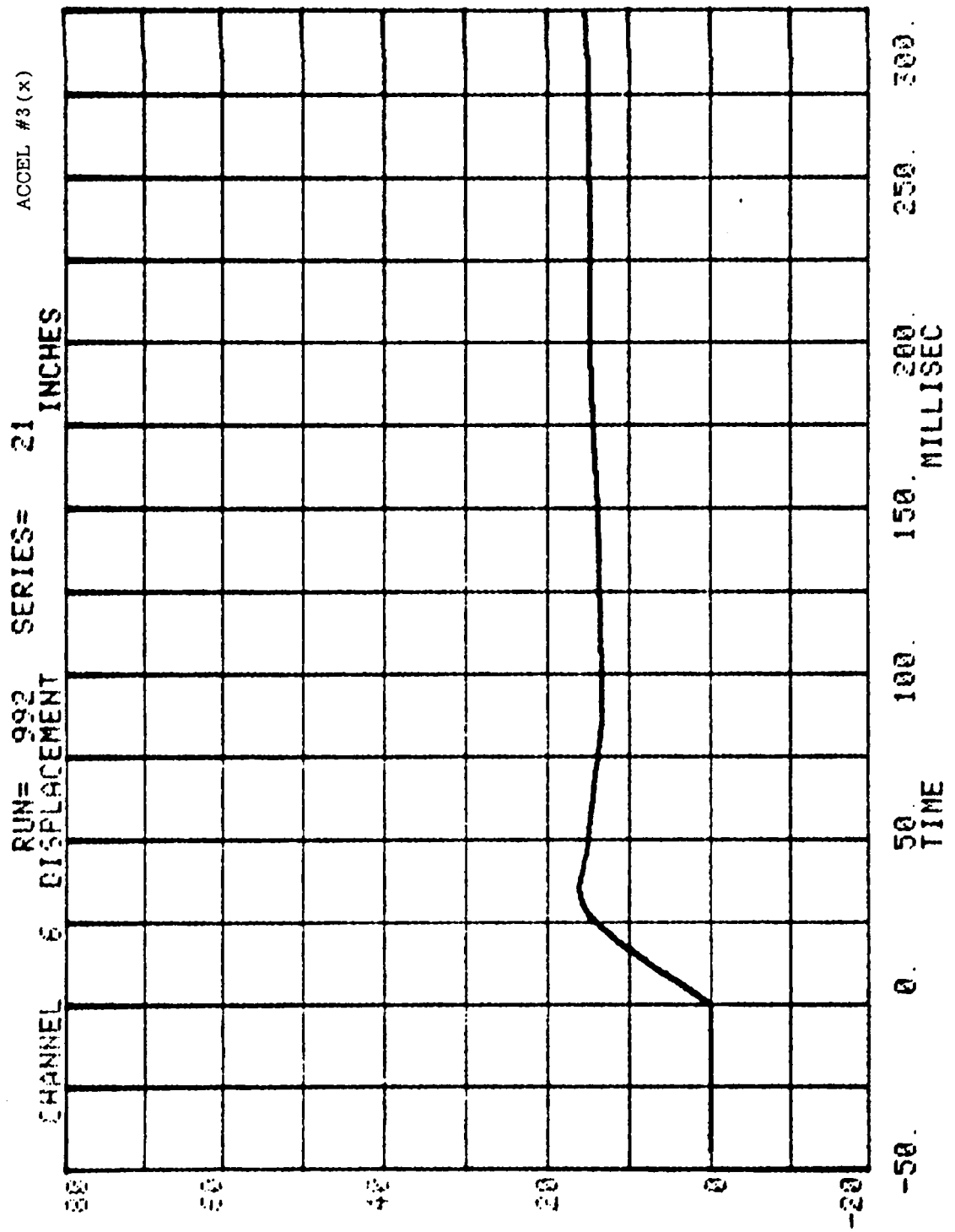

ACCEL #2(x)
CHANNEL 4 DISPLACEMENT
RUN= 992 SERIES= 21 INCHES
60
40
20
0
-20
-50.
0.
50.
100
150.
200.
250.
300.
TIME
MILLISEC

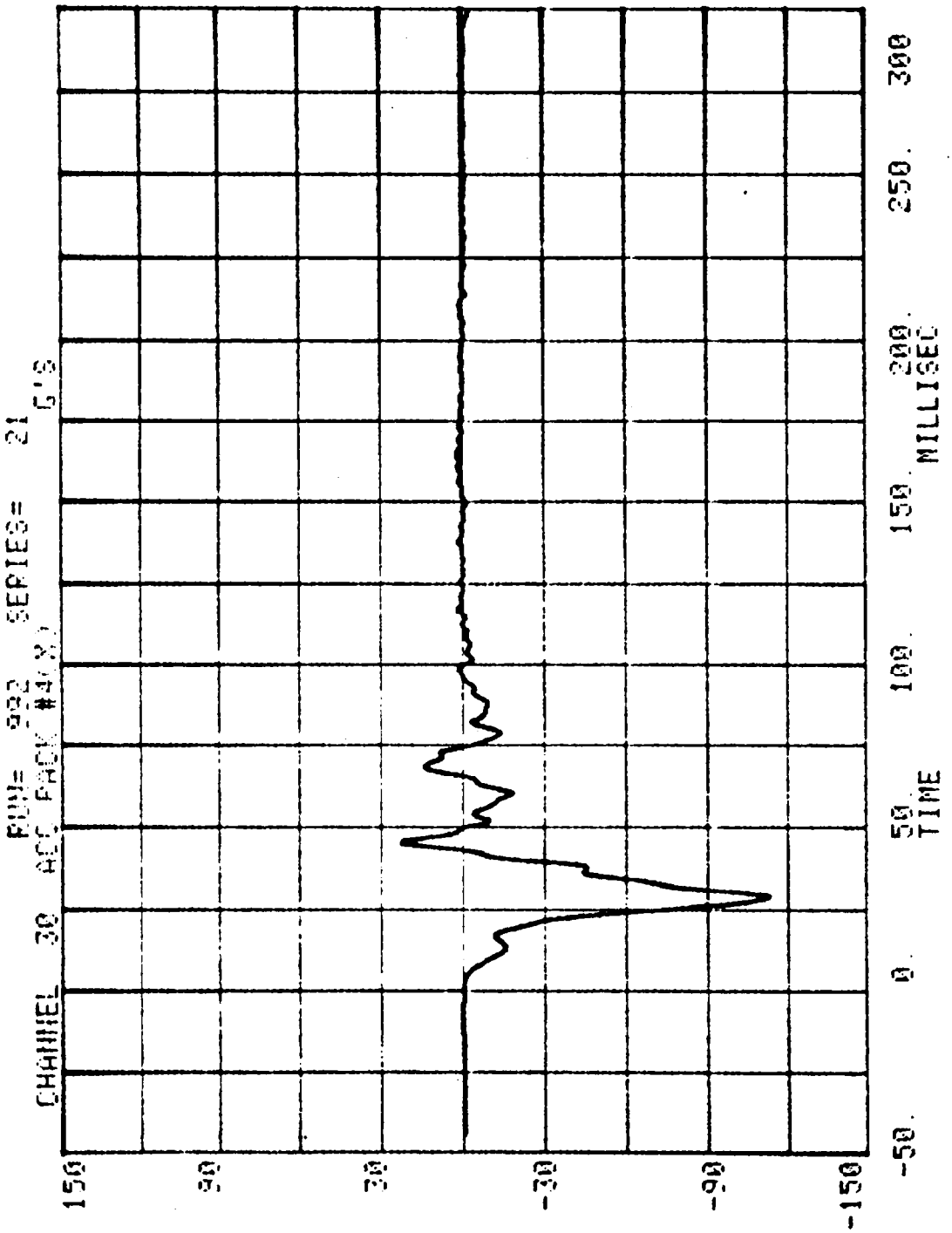
7776-21

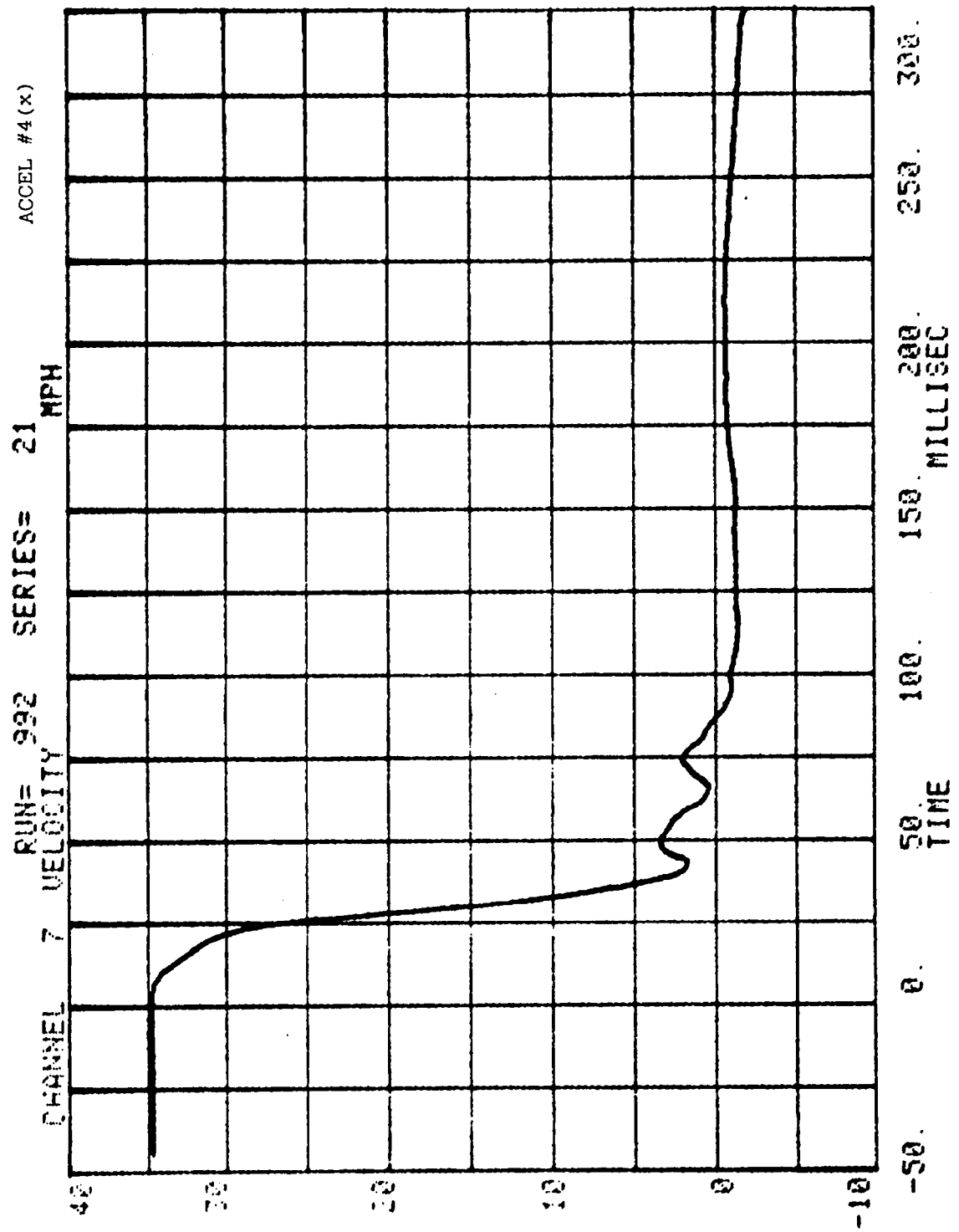

CHANNEL 29 ACC PACK #3(X)
RUN= 992 SERIES= 21
G'S
150
90
30
-30
-90
-150
-50.
0
50
TIME
100.
150.
200.
MILLISEC
250.
300.

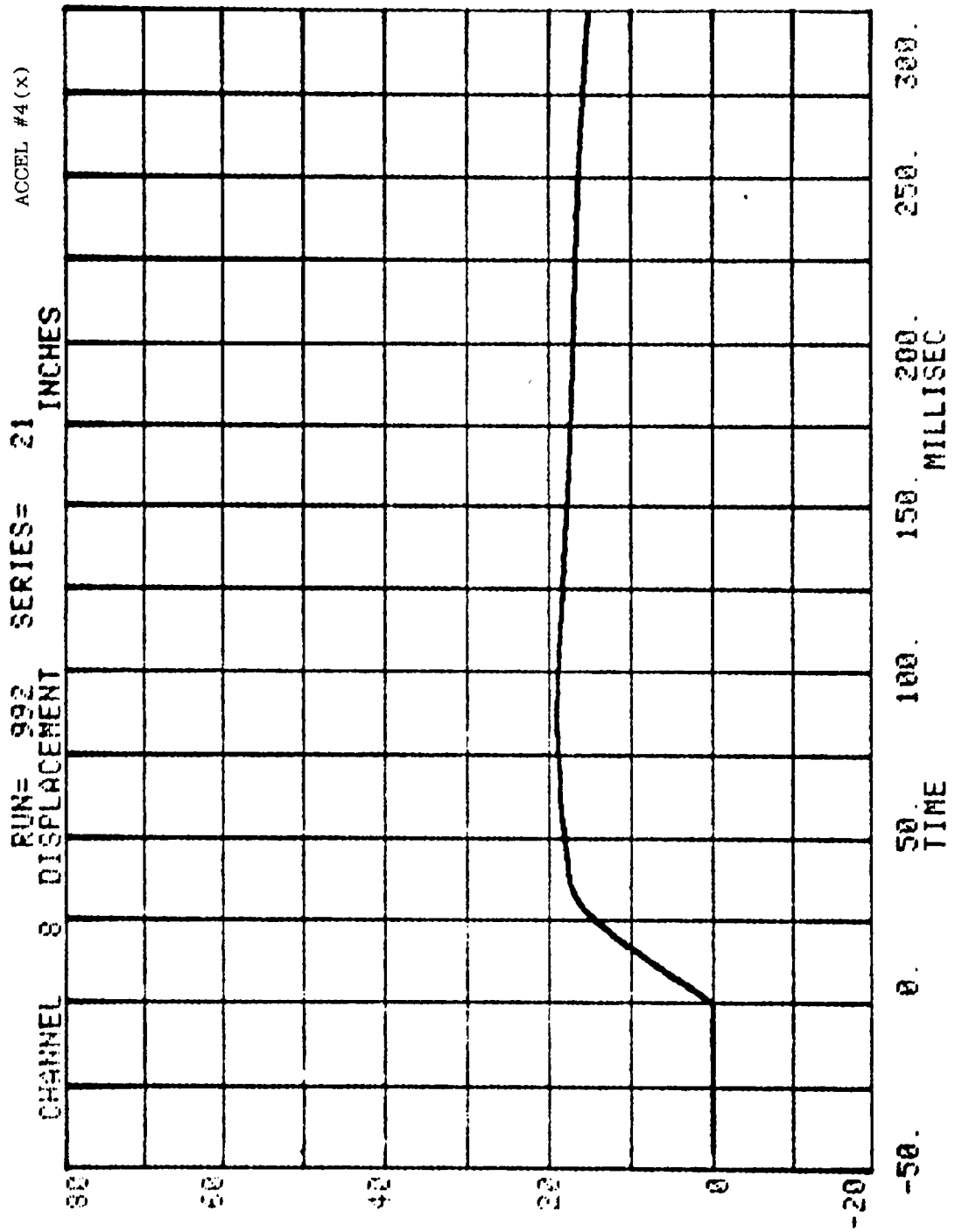
7776-21


ACCEL #3(X)
CHANNEL 5 VELOCITY
RUN= 992 SERIES= 21 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150
200.
250.
300.
TIME
MILLISEC

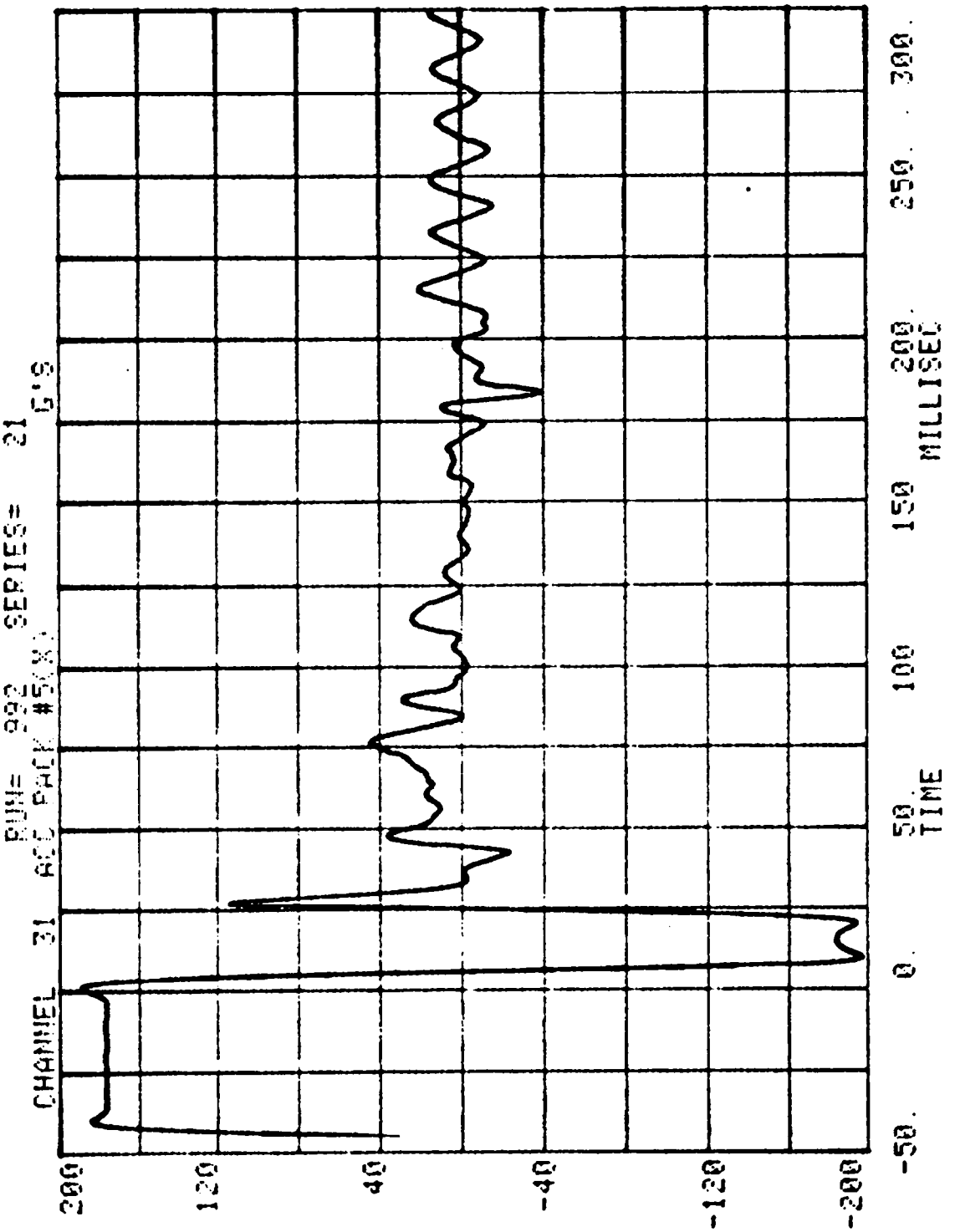

ACCEL #3(x)
CHANNEL 6 DISPLACEMENT
RUN= 992 SERIES= 21
INCHES
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 30
SERIES= 21
150
90
30
-30
-90
-150
-50
0
50
100
150
200
250
300
TIME
MILLISEC

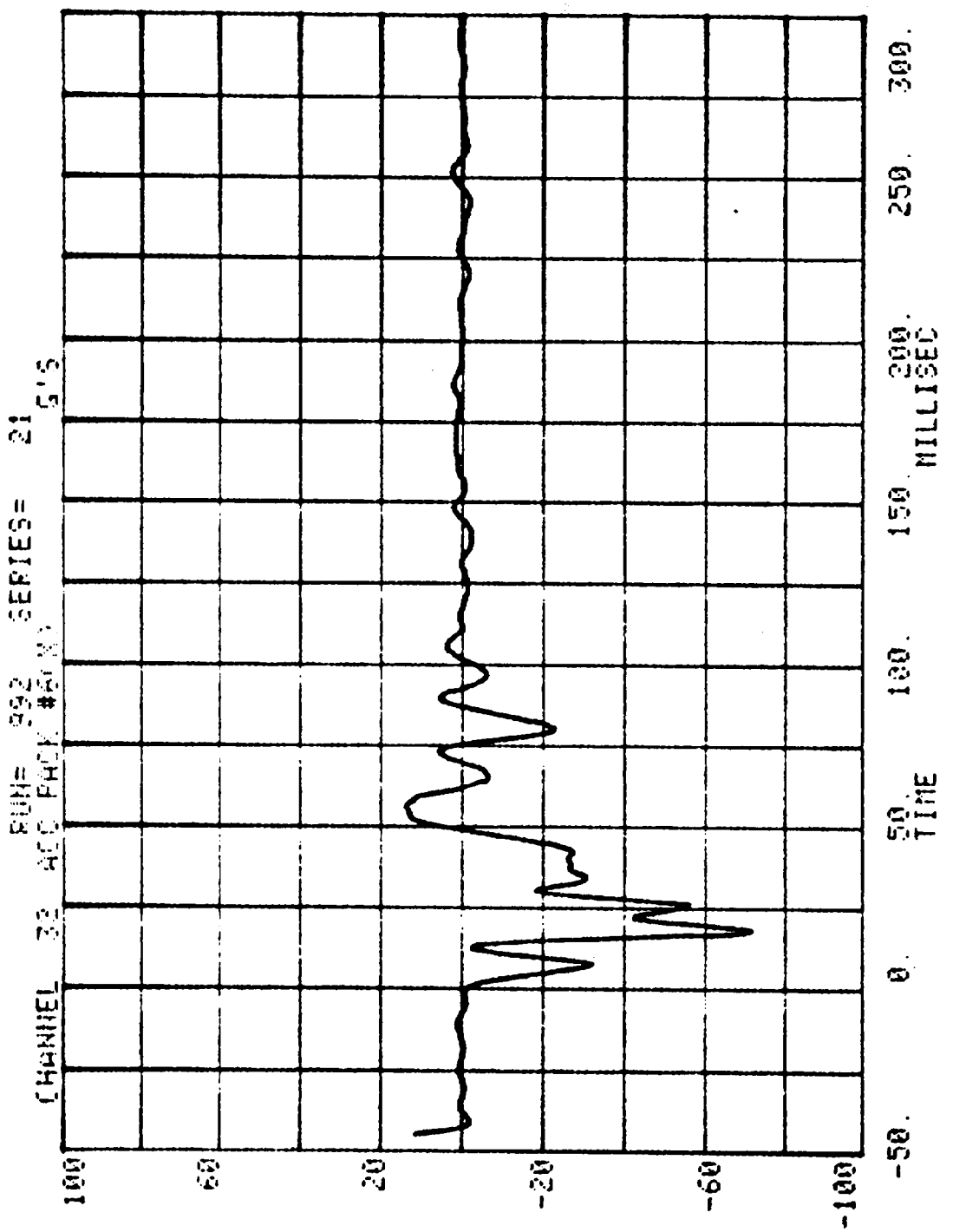

ACCEL #4(x)
CHANNEL 7 VELOCITY
RUN= 992 SERIES= 21 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACCEL #4(X)
CHANNEL 8 DISPLACEMENT RUN= 992 SERIES= 21 INCHES
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

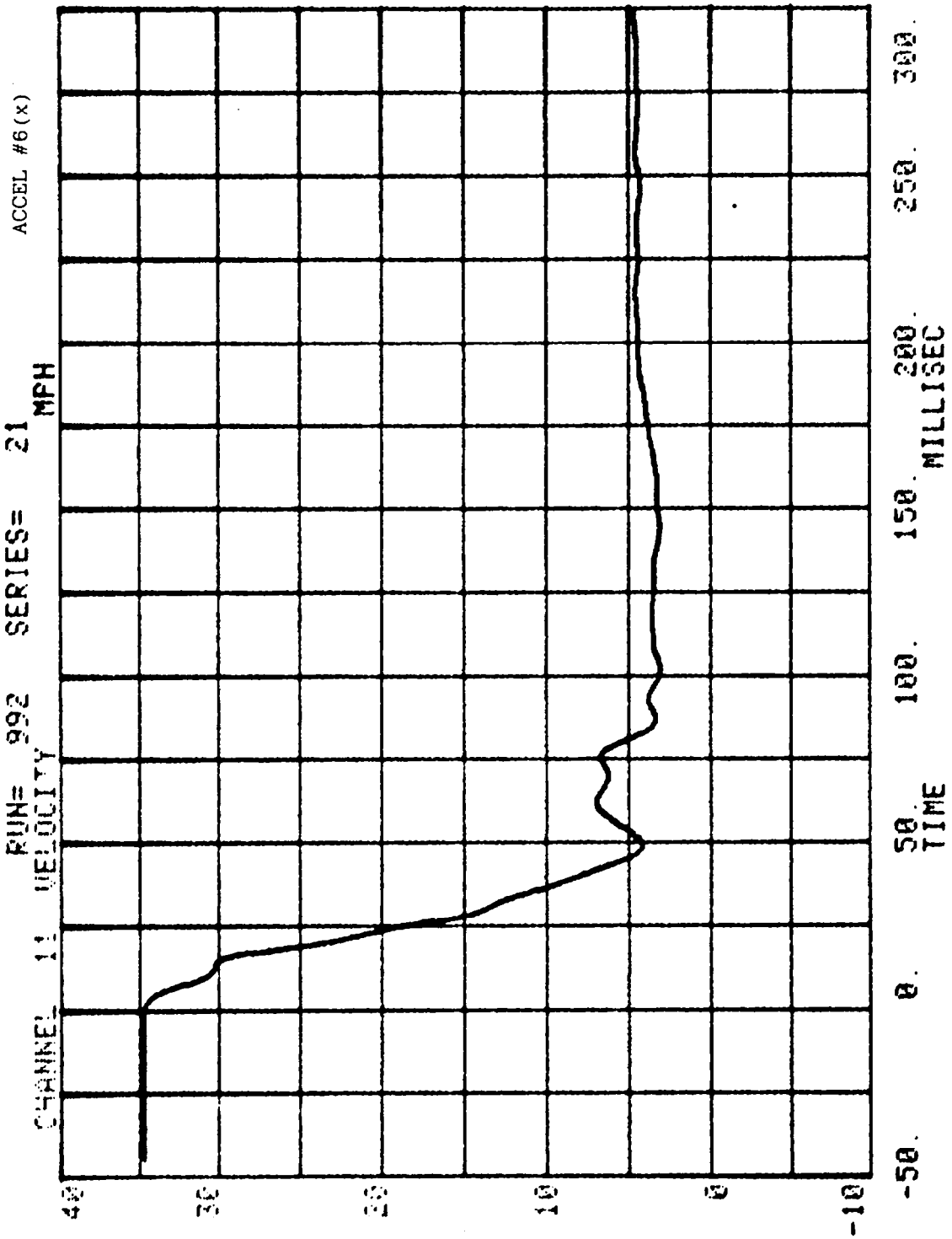
7776-21


CHANNEL 31
RUN= 992
SERIES= 21
G'S
200
120
40
-40
-120
-200
-50.
0.
50.
100
150
200.
250.
300.
TIME
MILLISEC

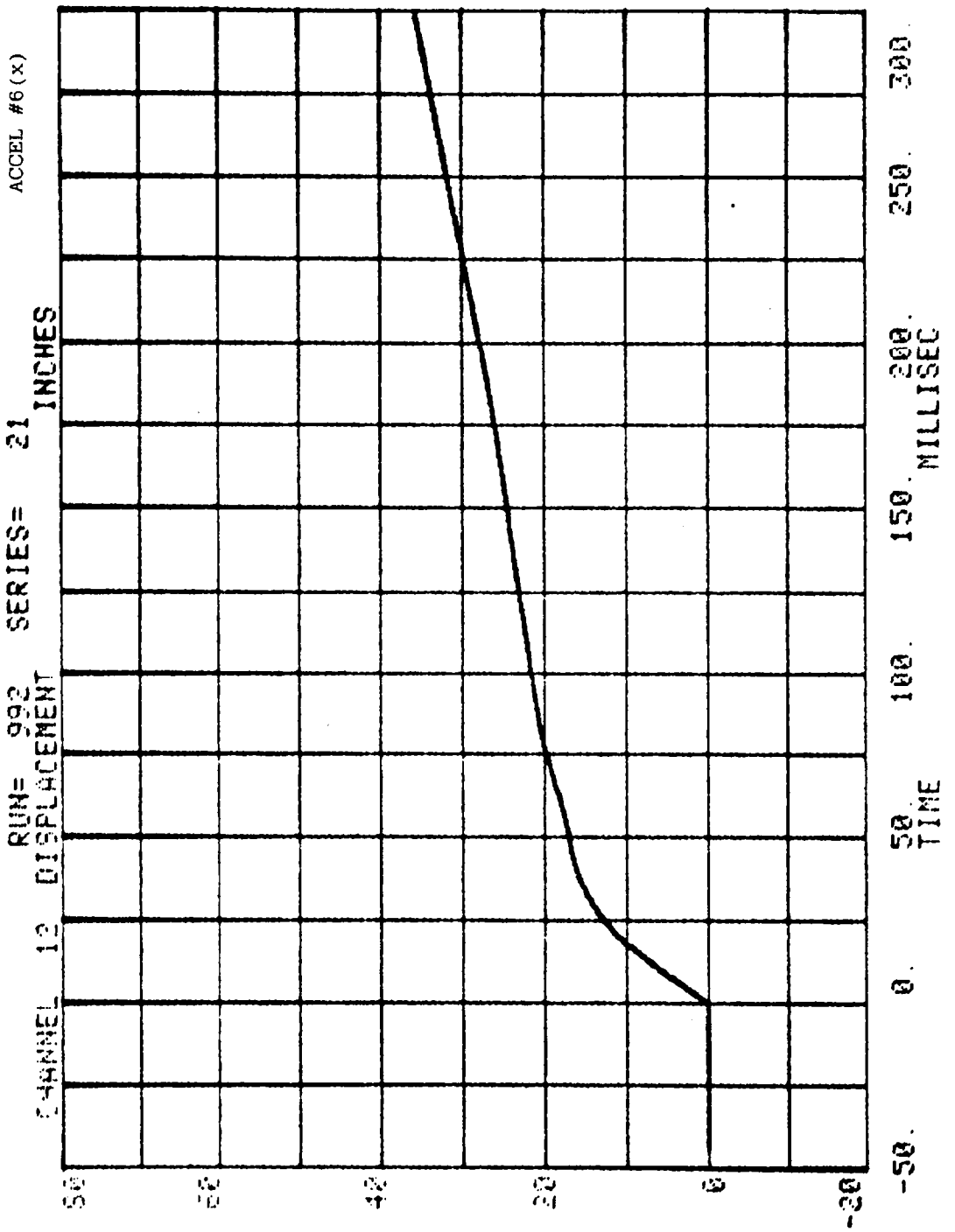
7776-21


CHANNEL 32
RUN= 992 SERIES= 21
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

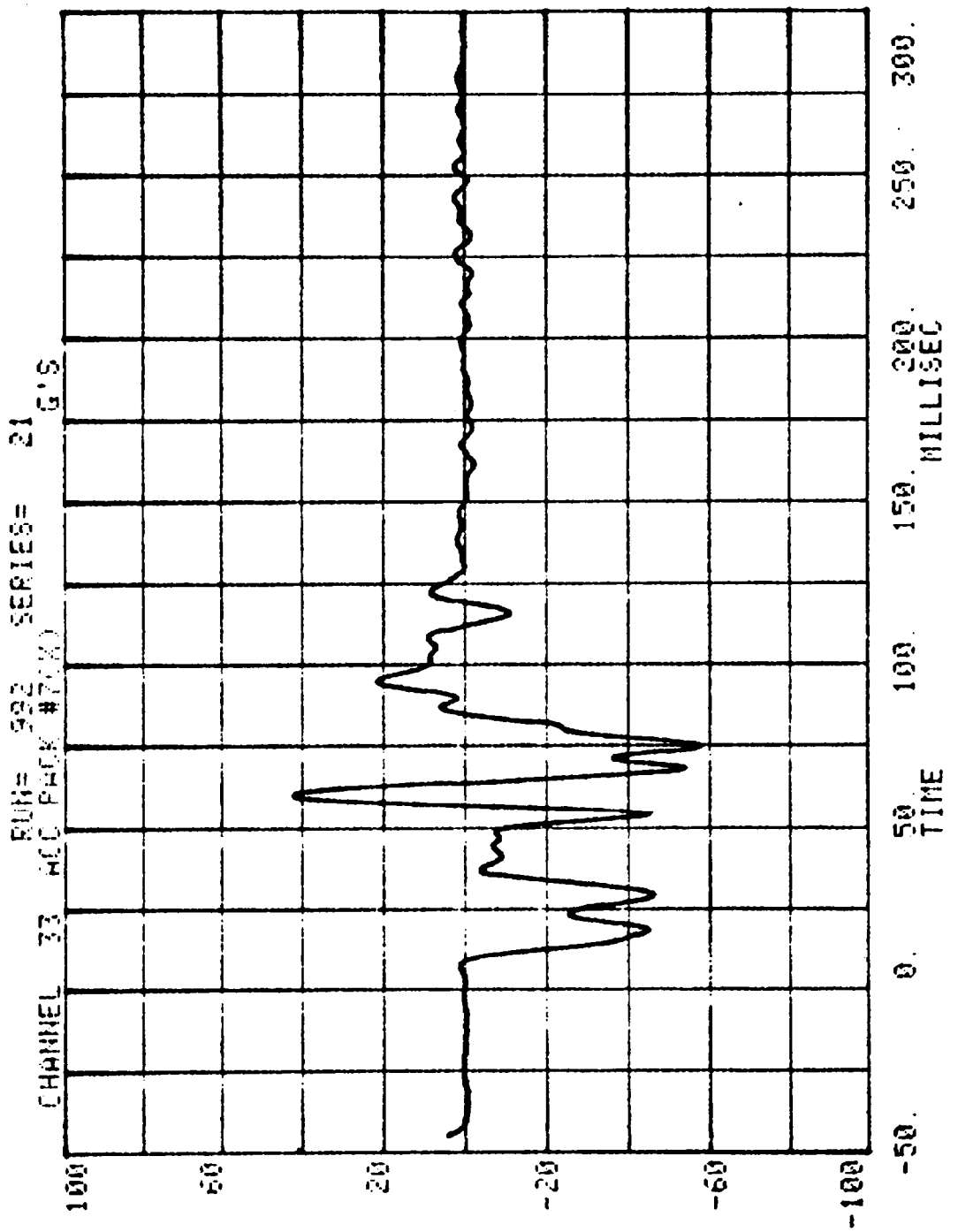
7776-21


ACCEL #6(x)
RUN= 992 SERIES= 21
CHANNEL 11 VELOCITY
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

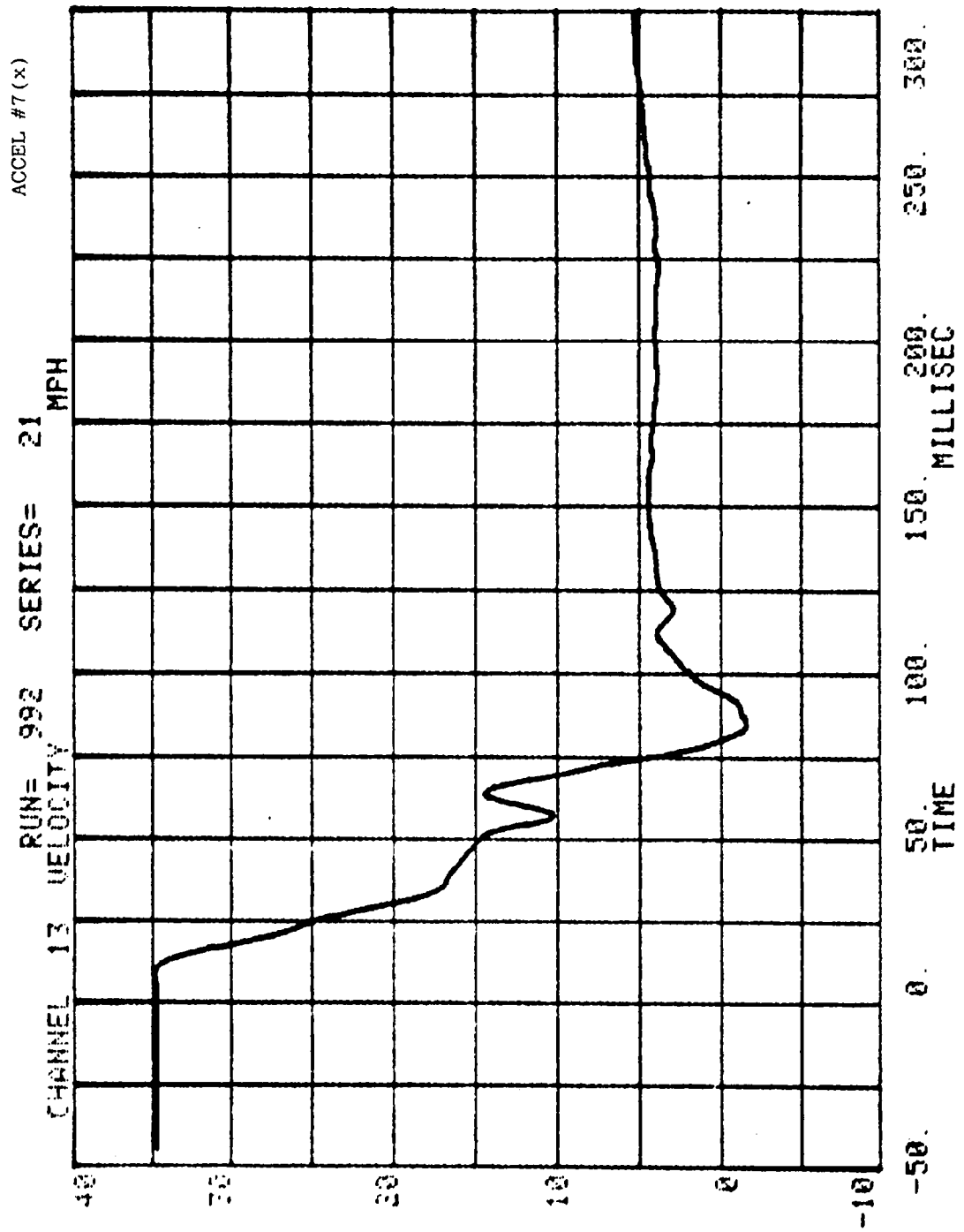
7776-21

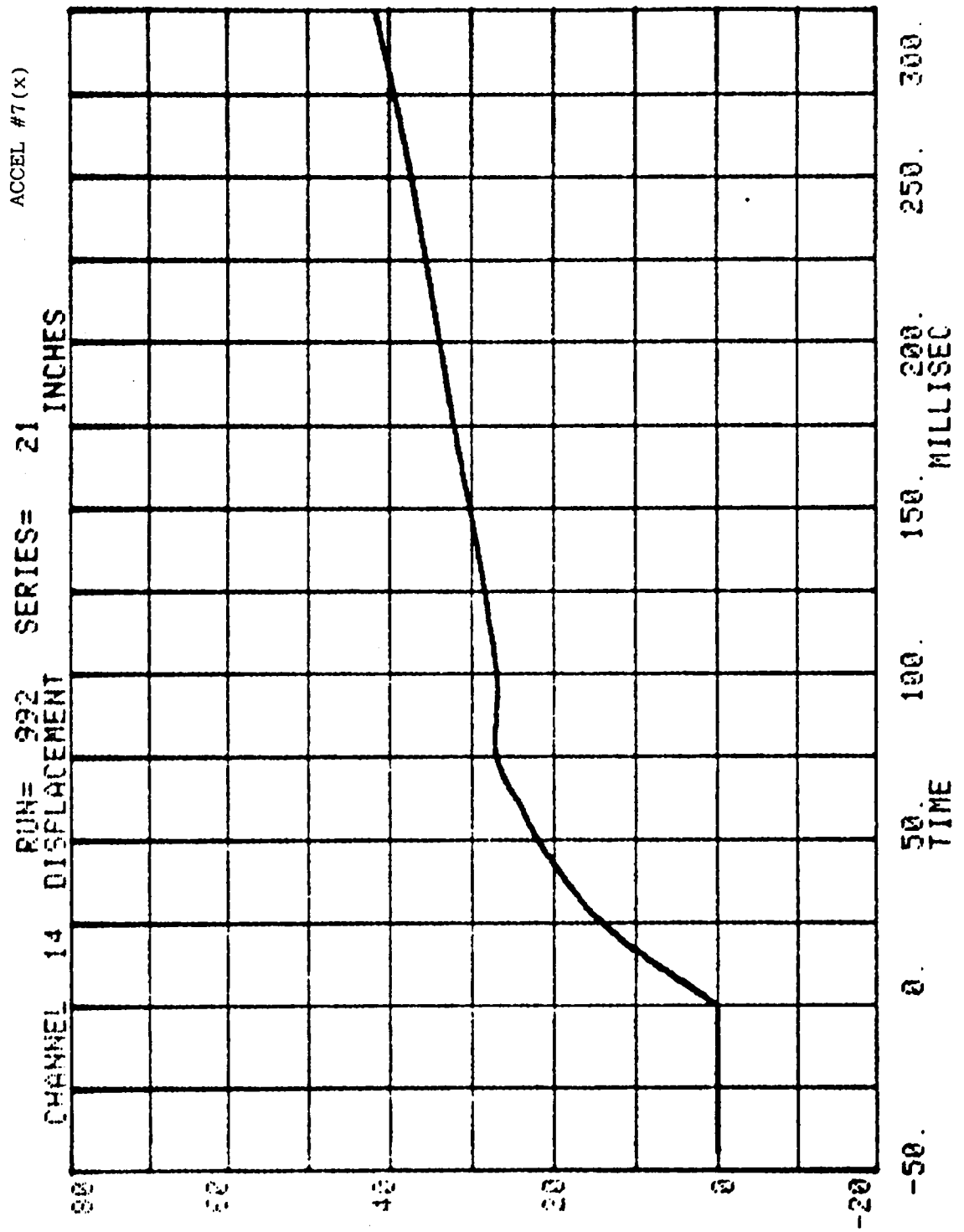

ACCEL #6(x)
CHANNEL 12 DISPLACEMENT
RUN= 992 SERIES= 21
INCHES
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21


CHANNEL 33
RUN= 992 SERIES= 21 G'S
100
50
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21


ACCEL #7(x)
CHANNEL 13 VELOCITY
RUN= 992 SERIES= 21 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

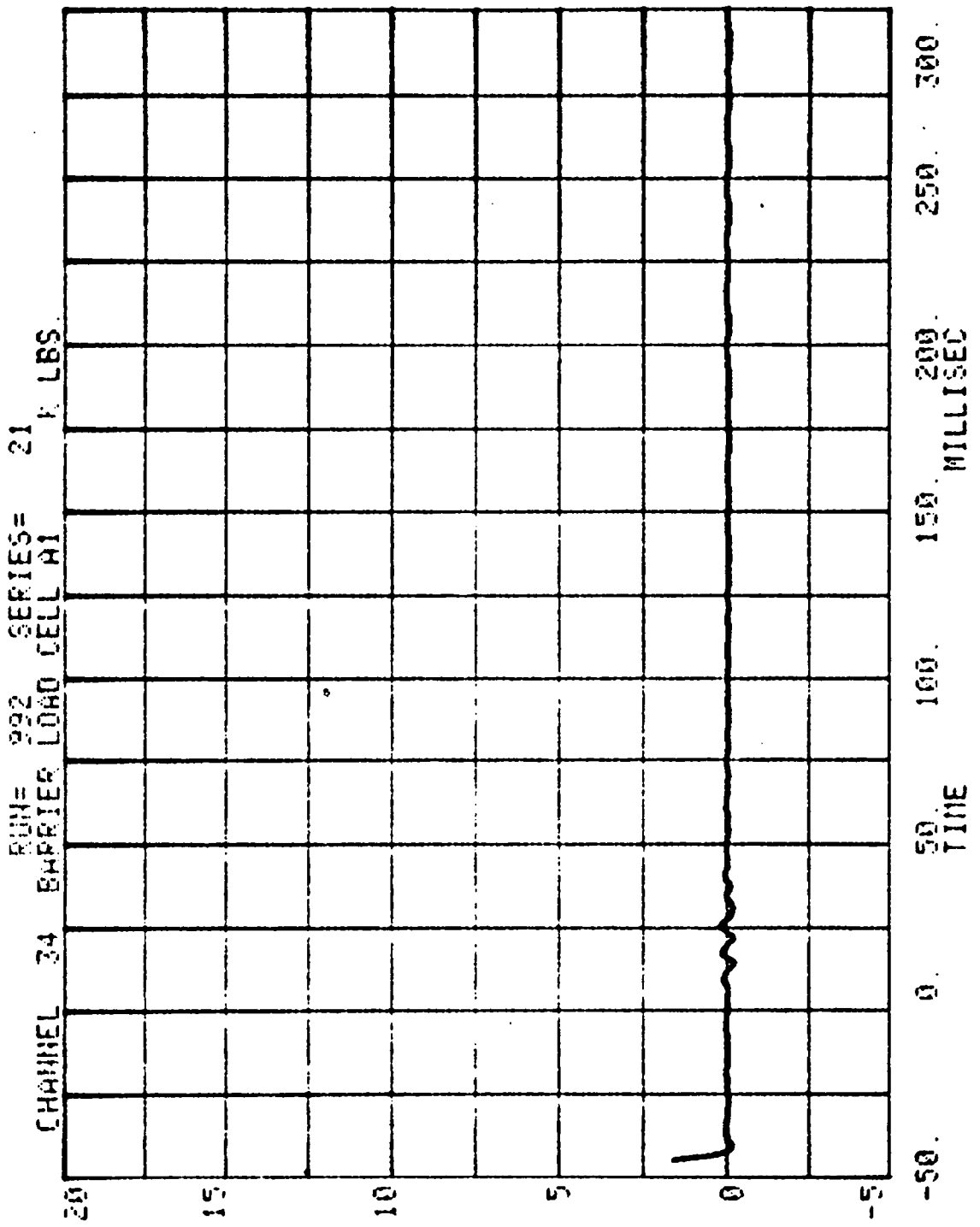

ACCEL #7(x)
CHANNEL 14 DISPLACEMENT
RUN= 922 SERIES= 21
INCHES
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

TEST NO. ML0302

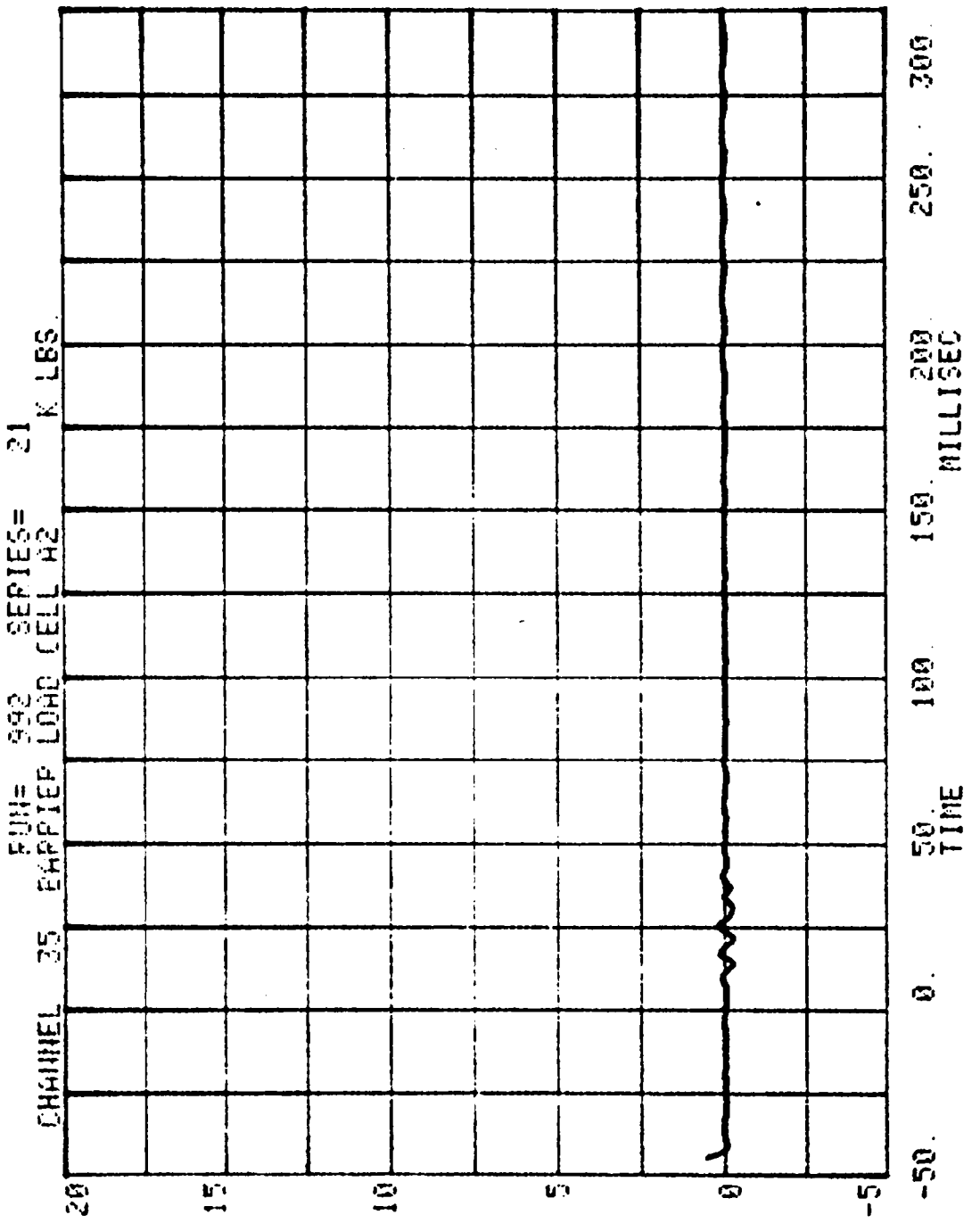
LOAD CELL BARRIER DATA

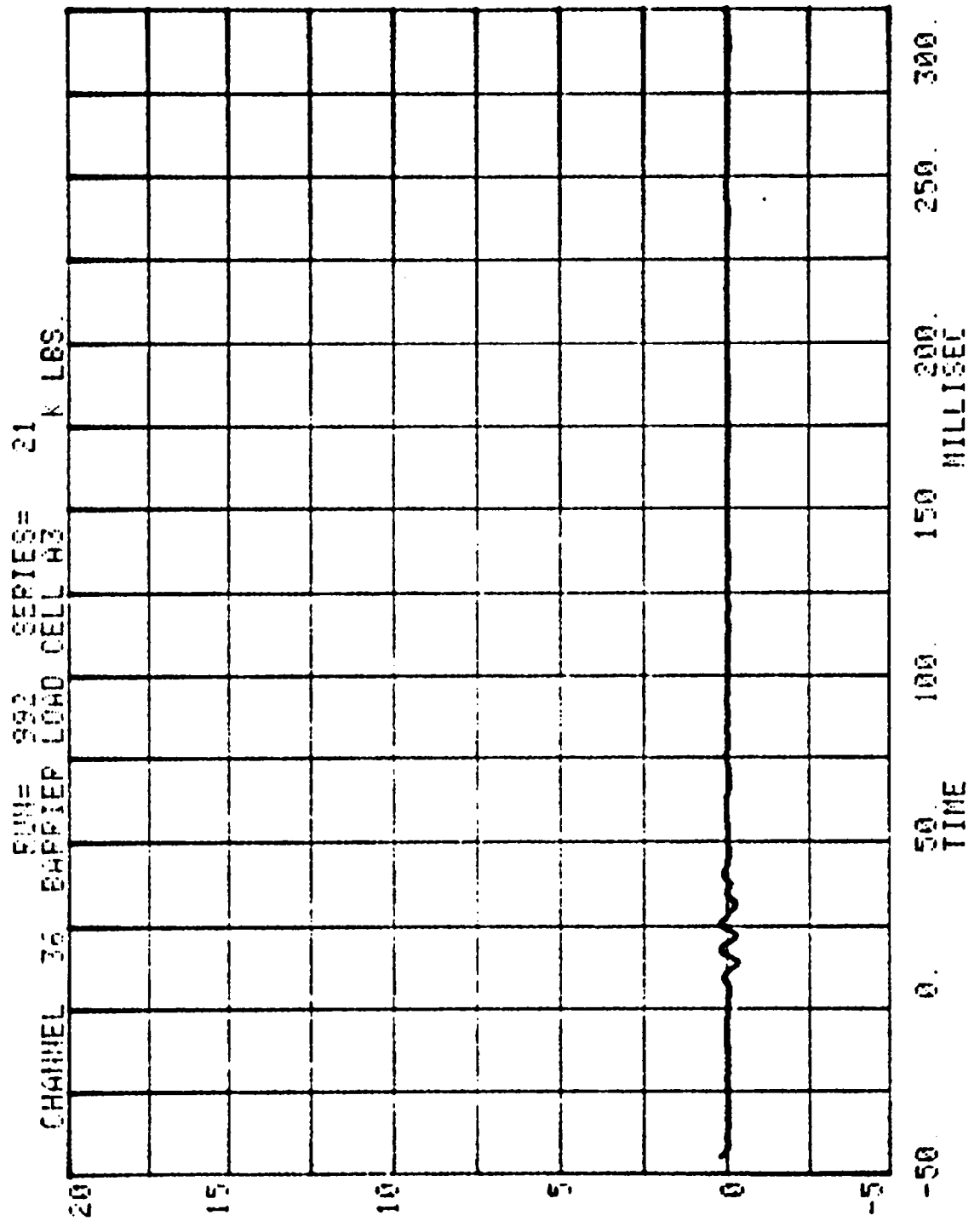
FILTER CHANNEL CLASS

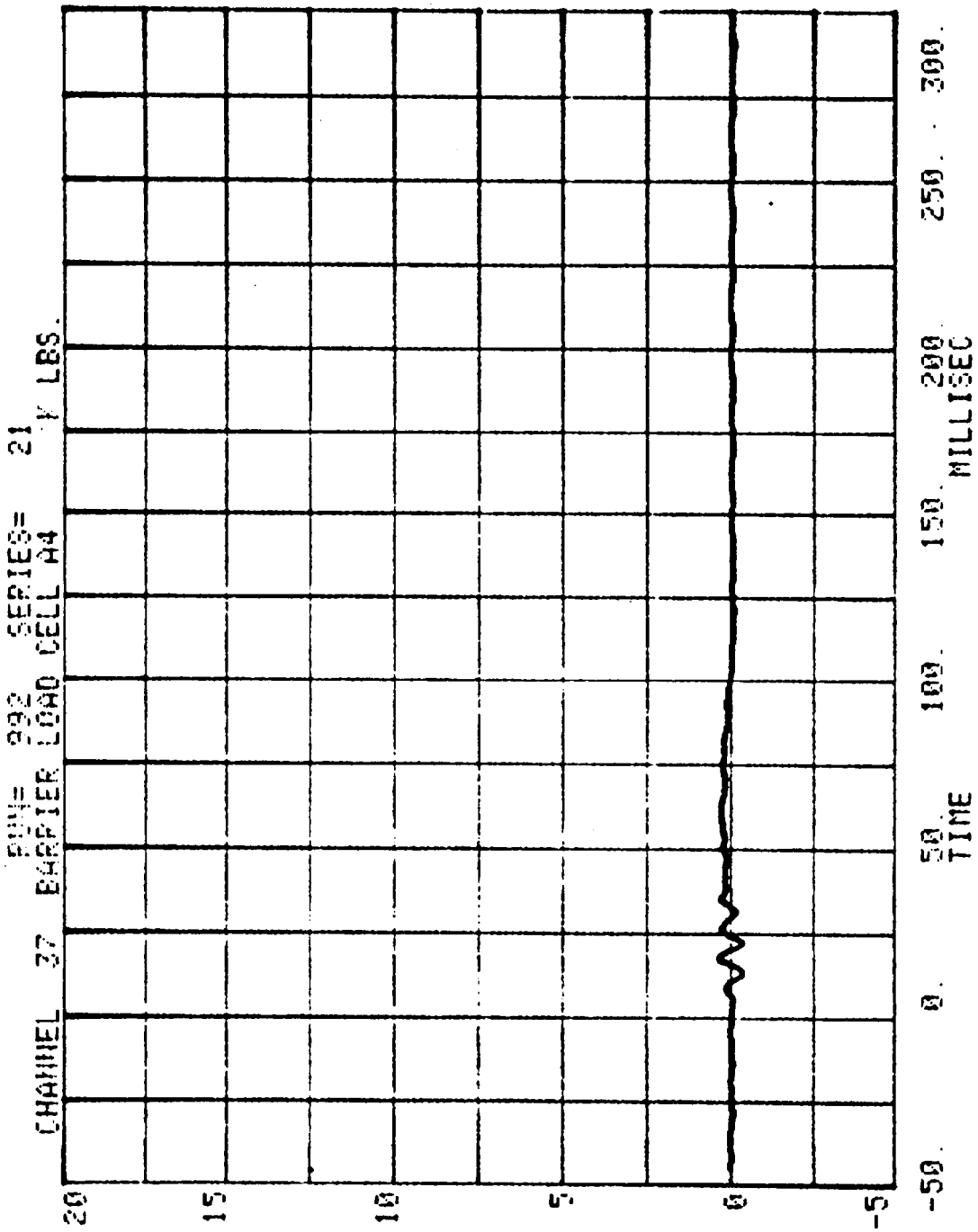
60

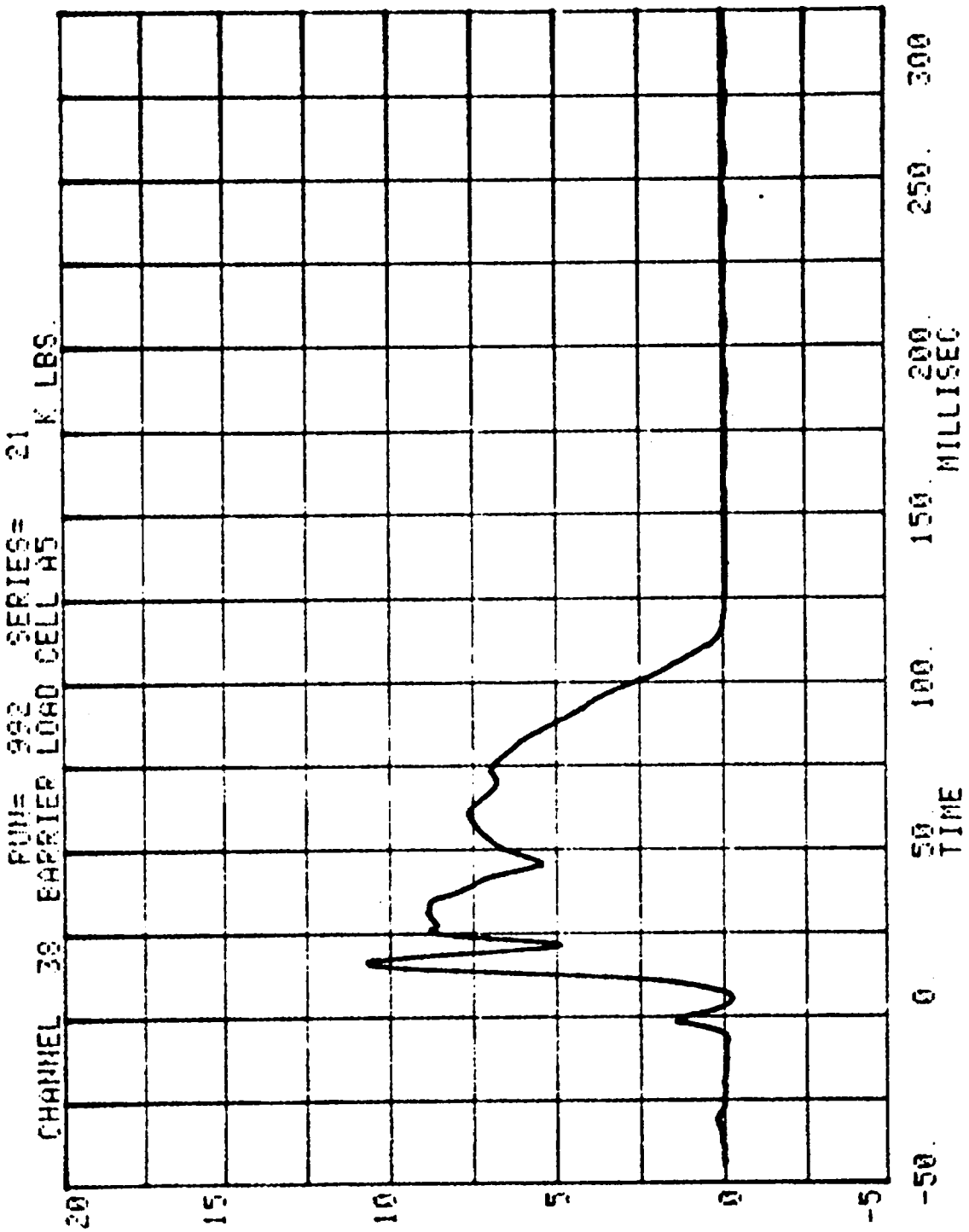

CHANNEL 34 RUN= 222 SERIES= 21
BURSTER LOAD CELL A1
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21

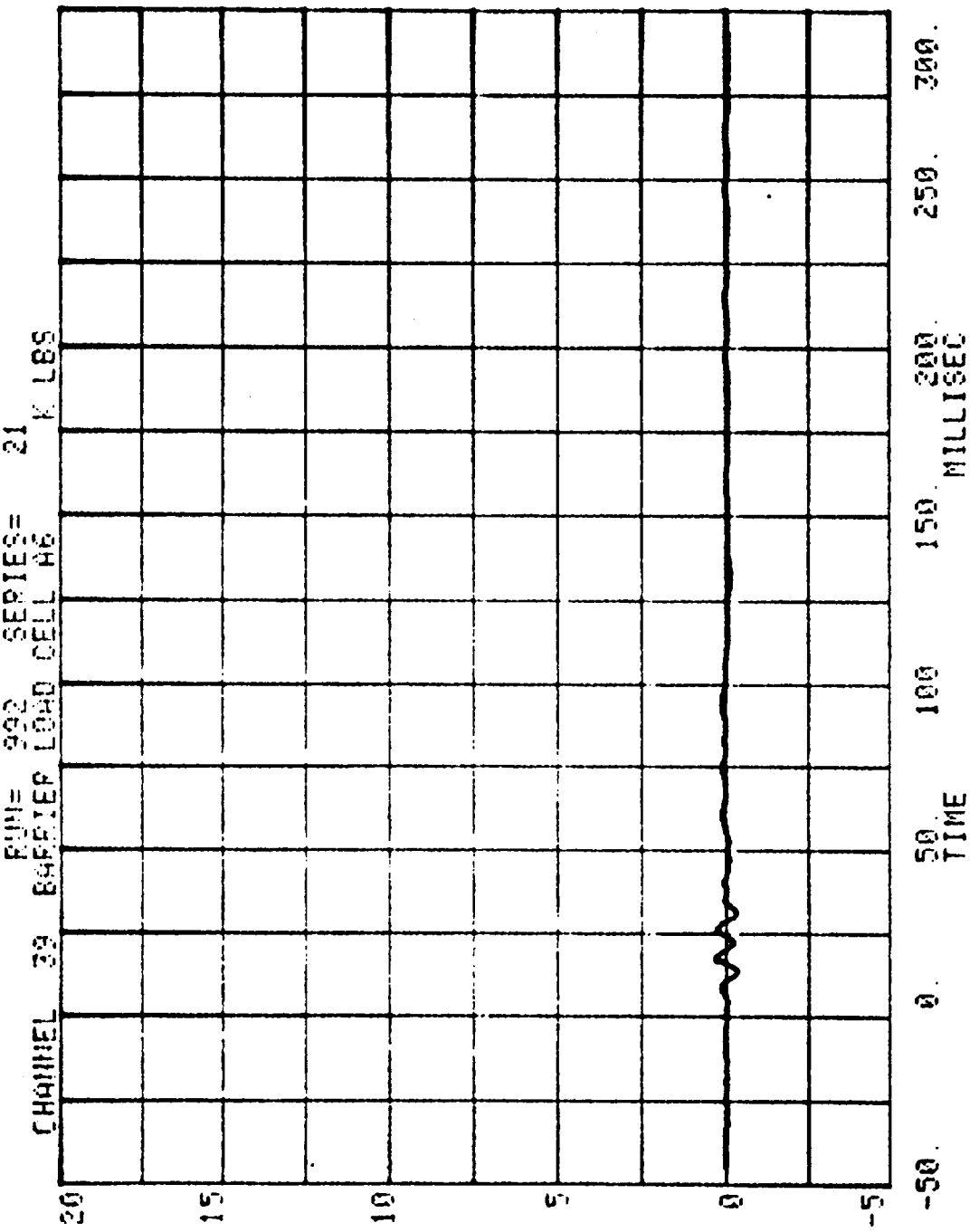

CHANNEL 35 EARTIEP LOAD CELL #2
RUN= 992 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100
150.
200
250.
300
TIME
MILLISEC

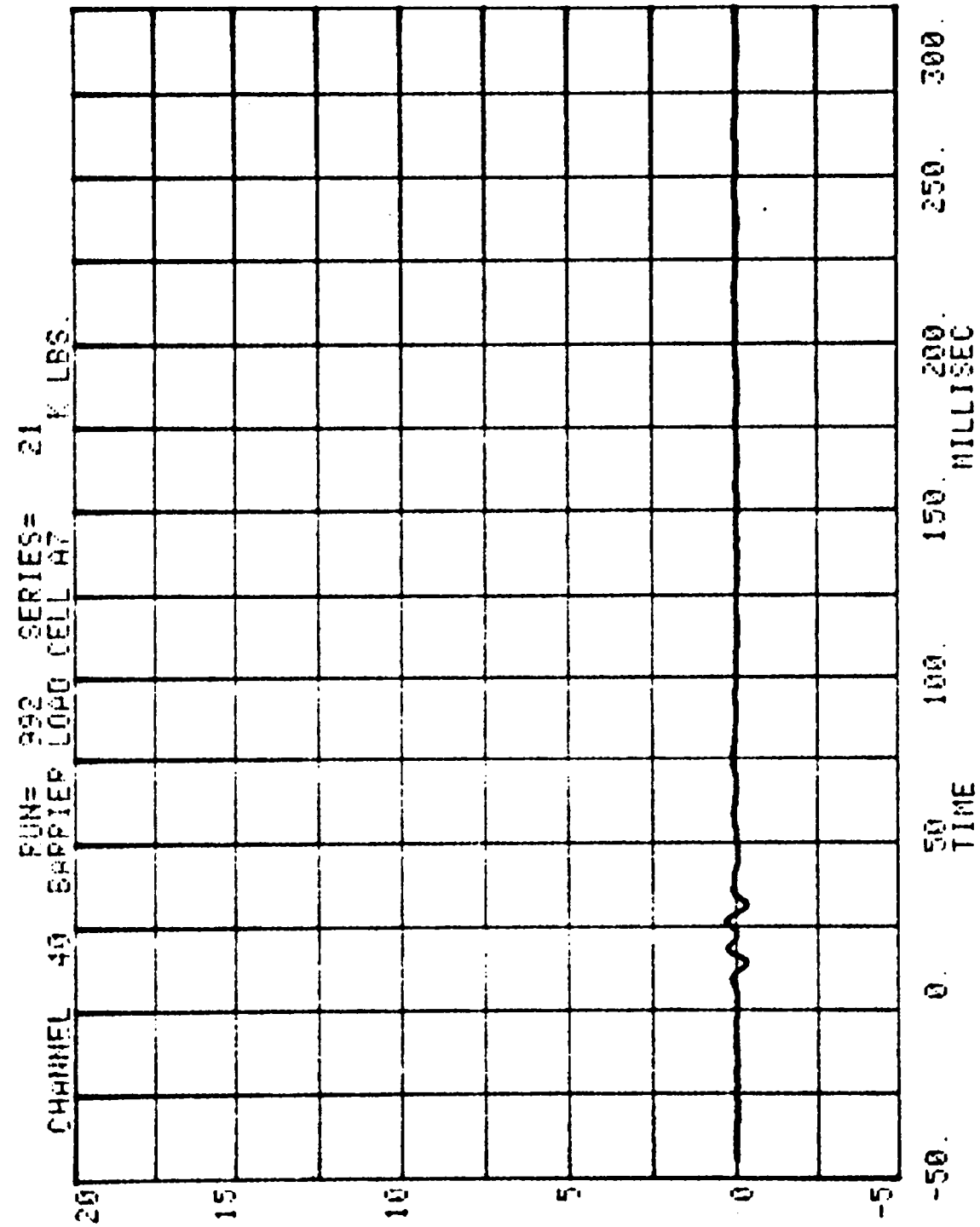

CHANNEL 36 BARRIER LOAD CELL #3
RUN= 992 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50
0.
50.
100.
150
200.
250.
300.
TIME
MILLISEC

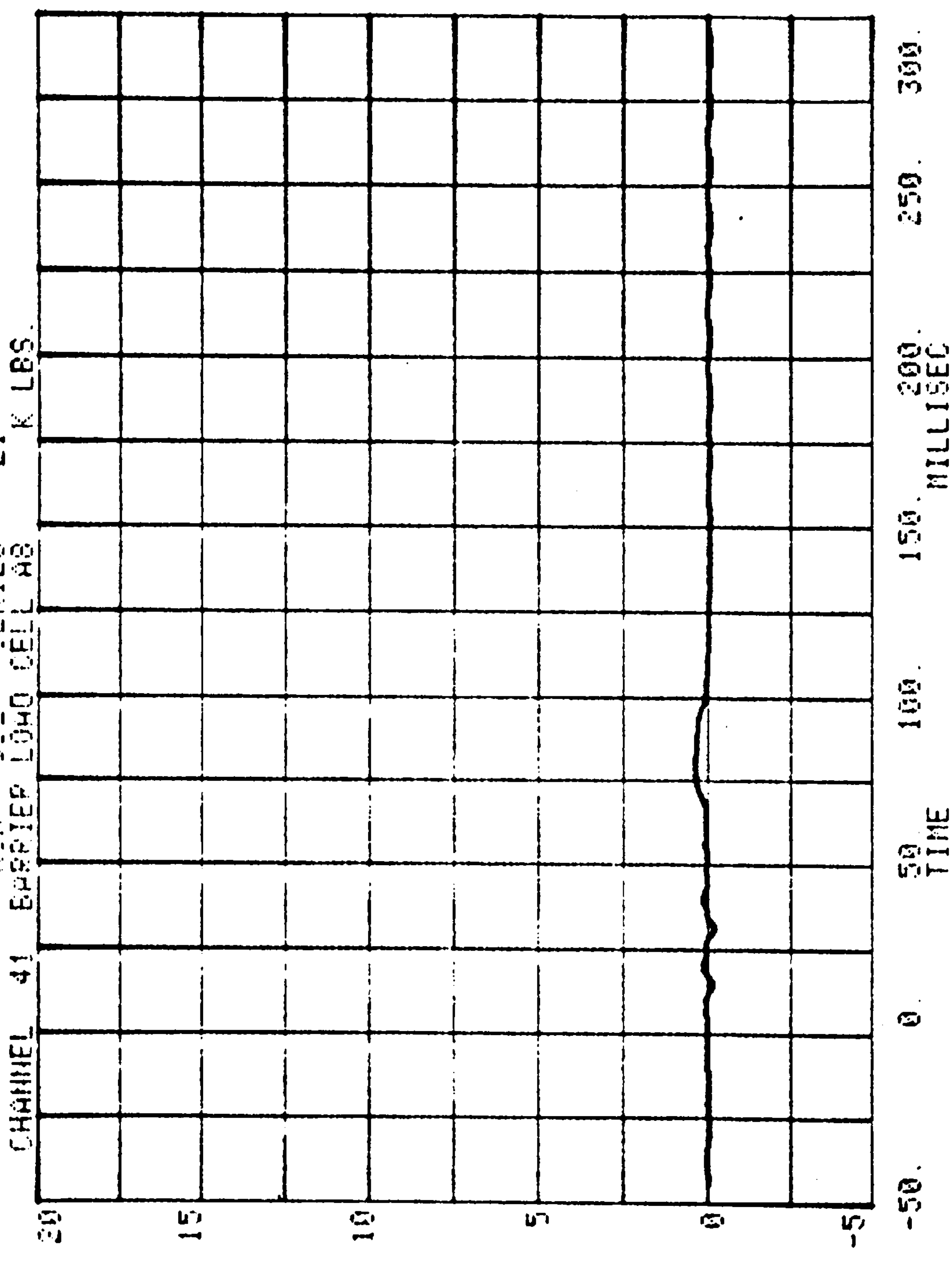

CHANNEL 37 BARRIER LOAD CELL A4
RUN= 292 SERIES= 21
Y LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

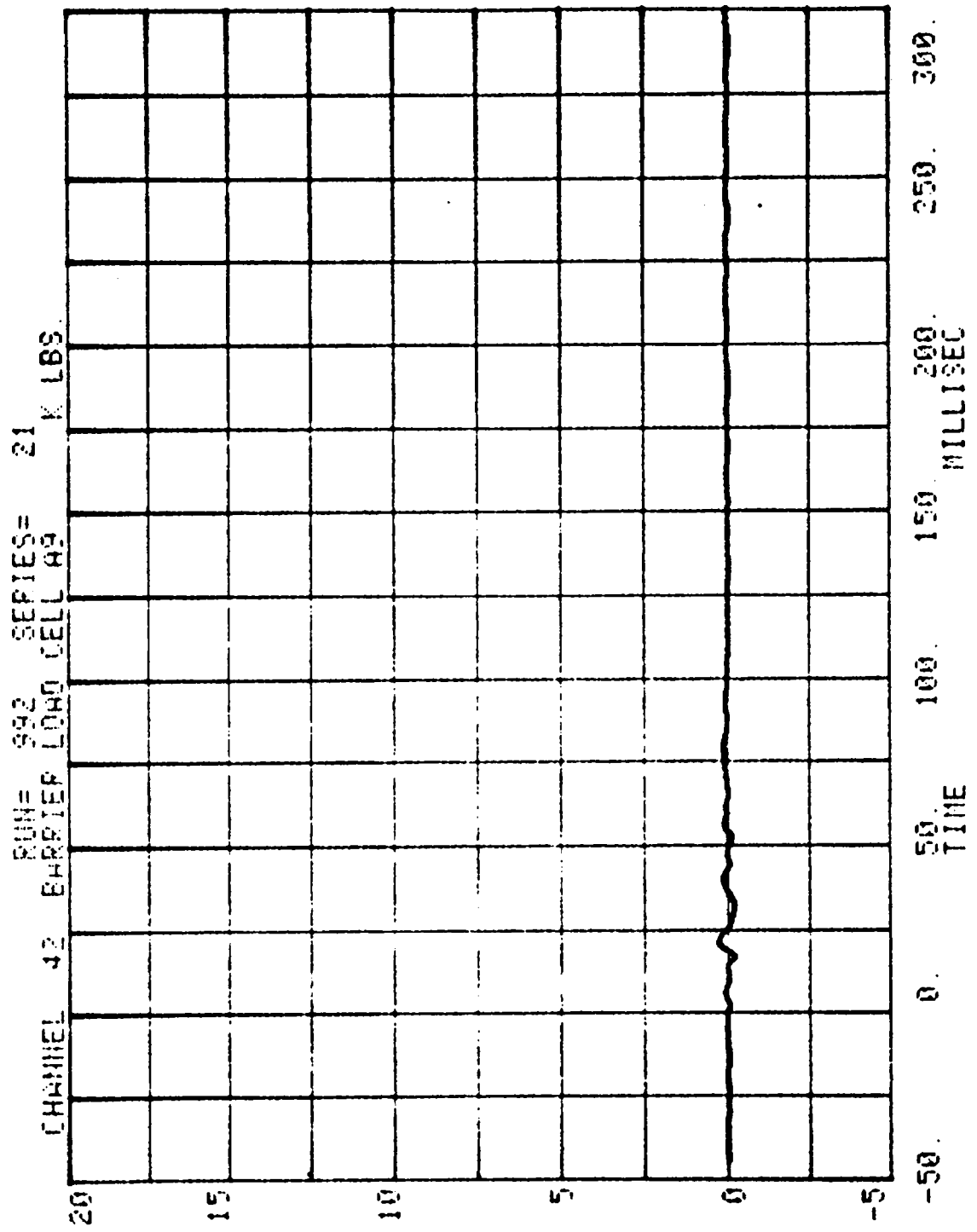

CHANNEL 38 EARRIED
PWR= 992
LOAD CELL AS
SERIES= 21
N LBS.
20
15
10
5
0
-5
-50
0
50
100
150
200
250
300
TIME
MILLISEC

7776-21

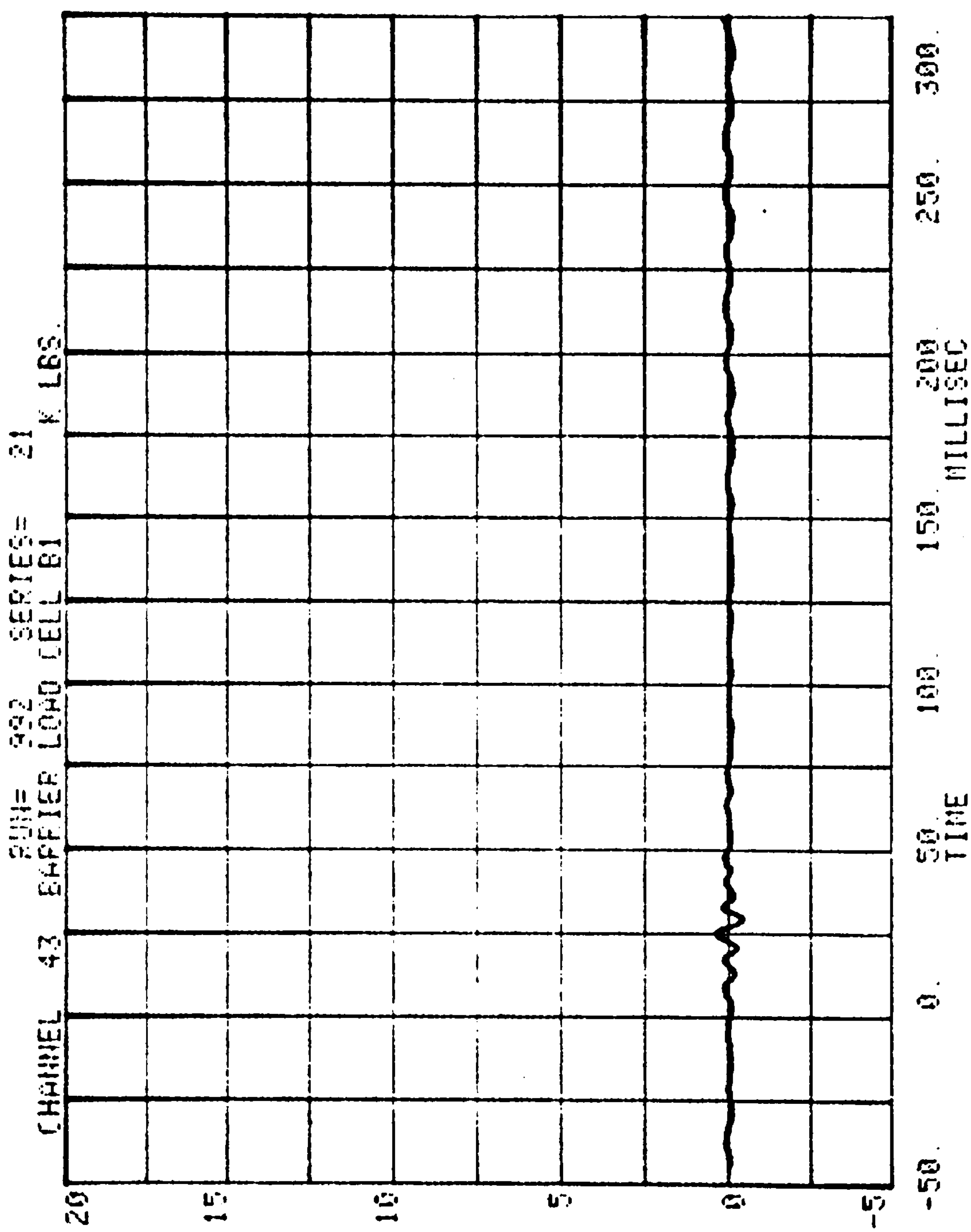

CHANNEL 33 BARRIER LOAD CELL AE
RUN= 992 SERIES= 21
K LBS
20
15
10
5
0
-5
-50.
0.
50.
100
150.
200.
250.
300.
TIME
MILLISEC

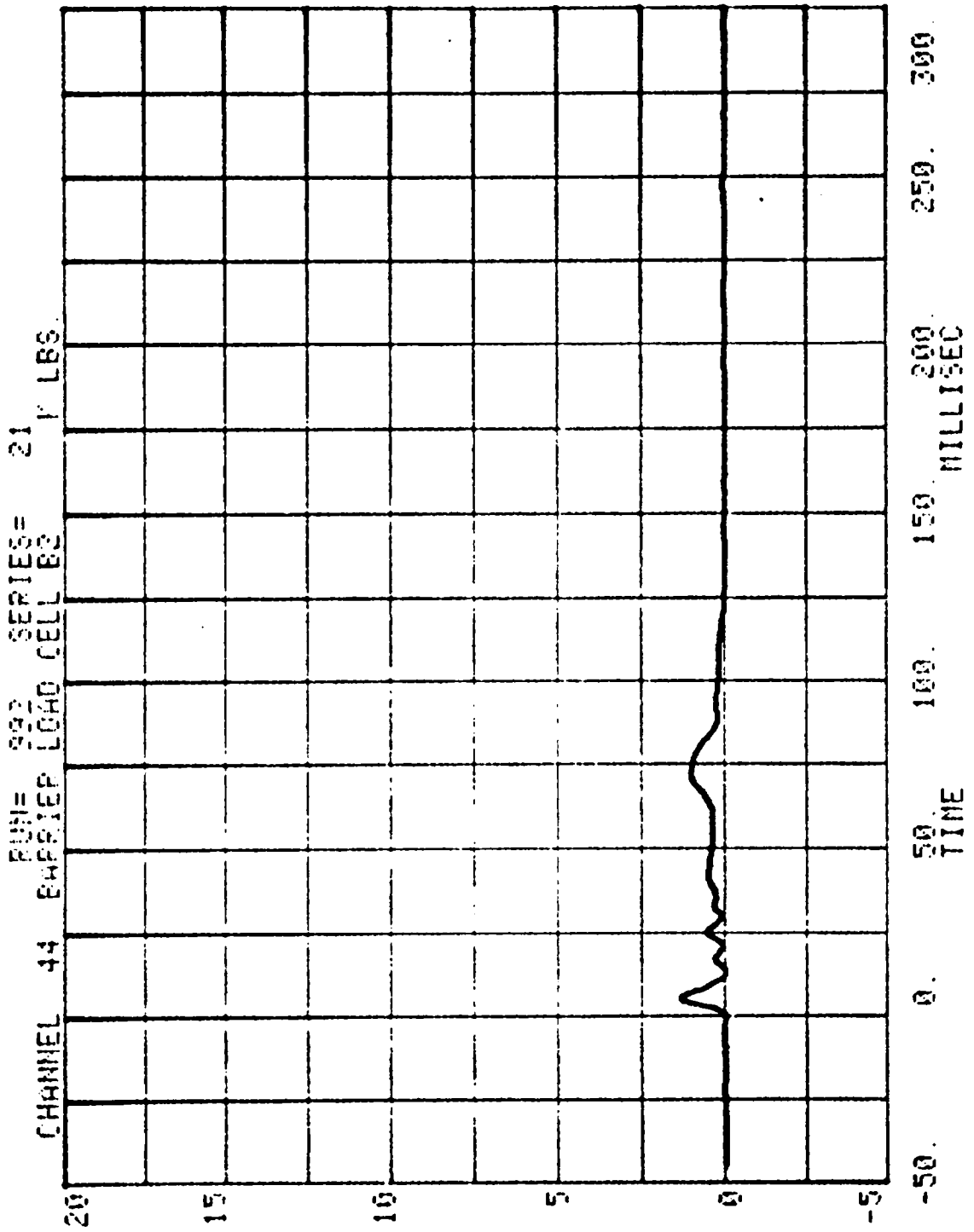

CHANNEL 40 SAMPLES
RUN= 392 SERIES= 21
LOAD CELL #7
LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 41 RUN= 993 SERIES= 21
BARRIER LOAD CELL AB K LBS.
20
15
10
5
0
-5
-50.
0
50
100.
150.
200.
250.
300.
TIME MILLISEC

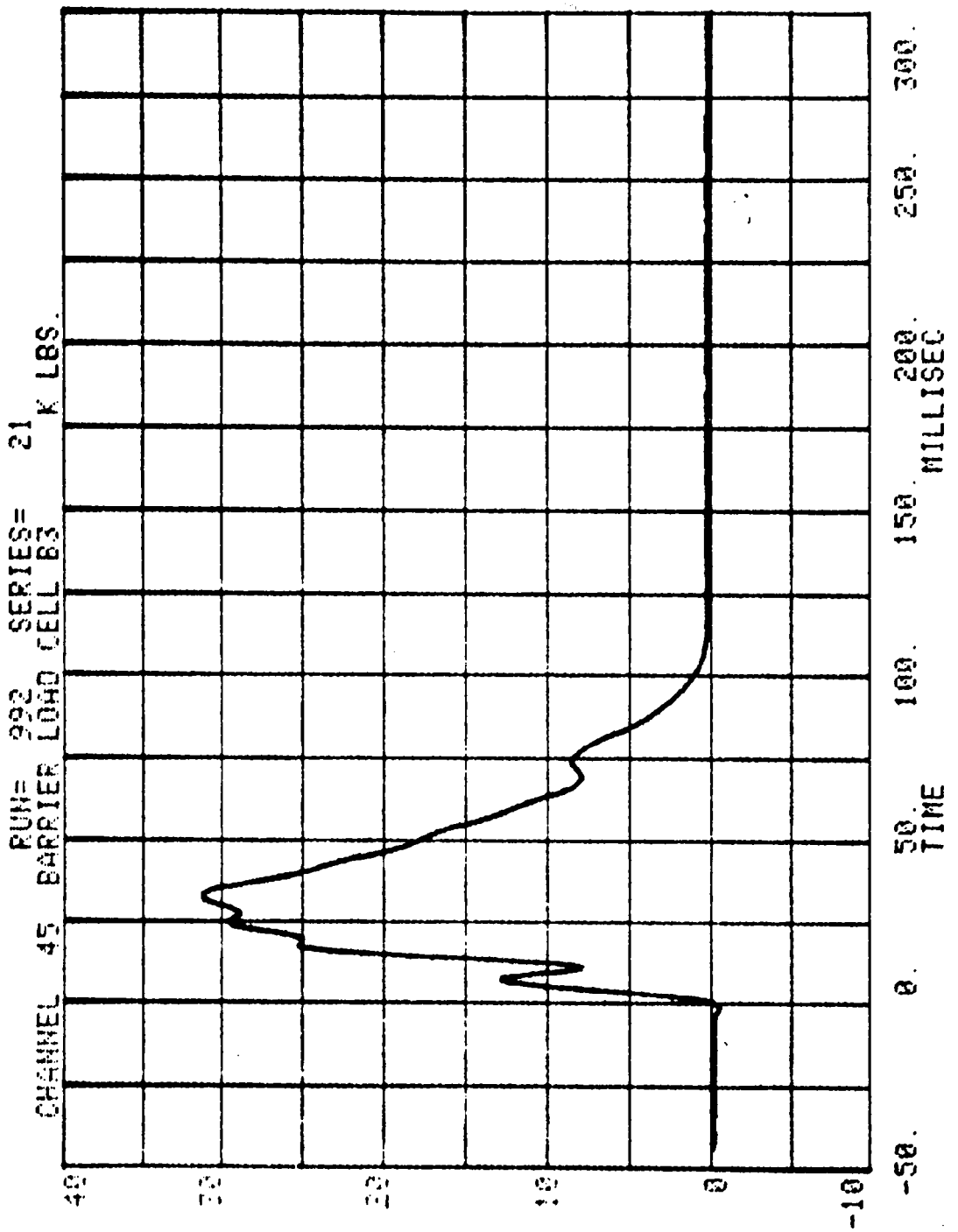

CHANNEL 42 BARRIER LOAD CELL #3
RUN= 342 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150
200.
250.
300.
TIME
MILLISEC

7776-21

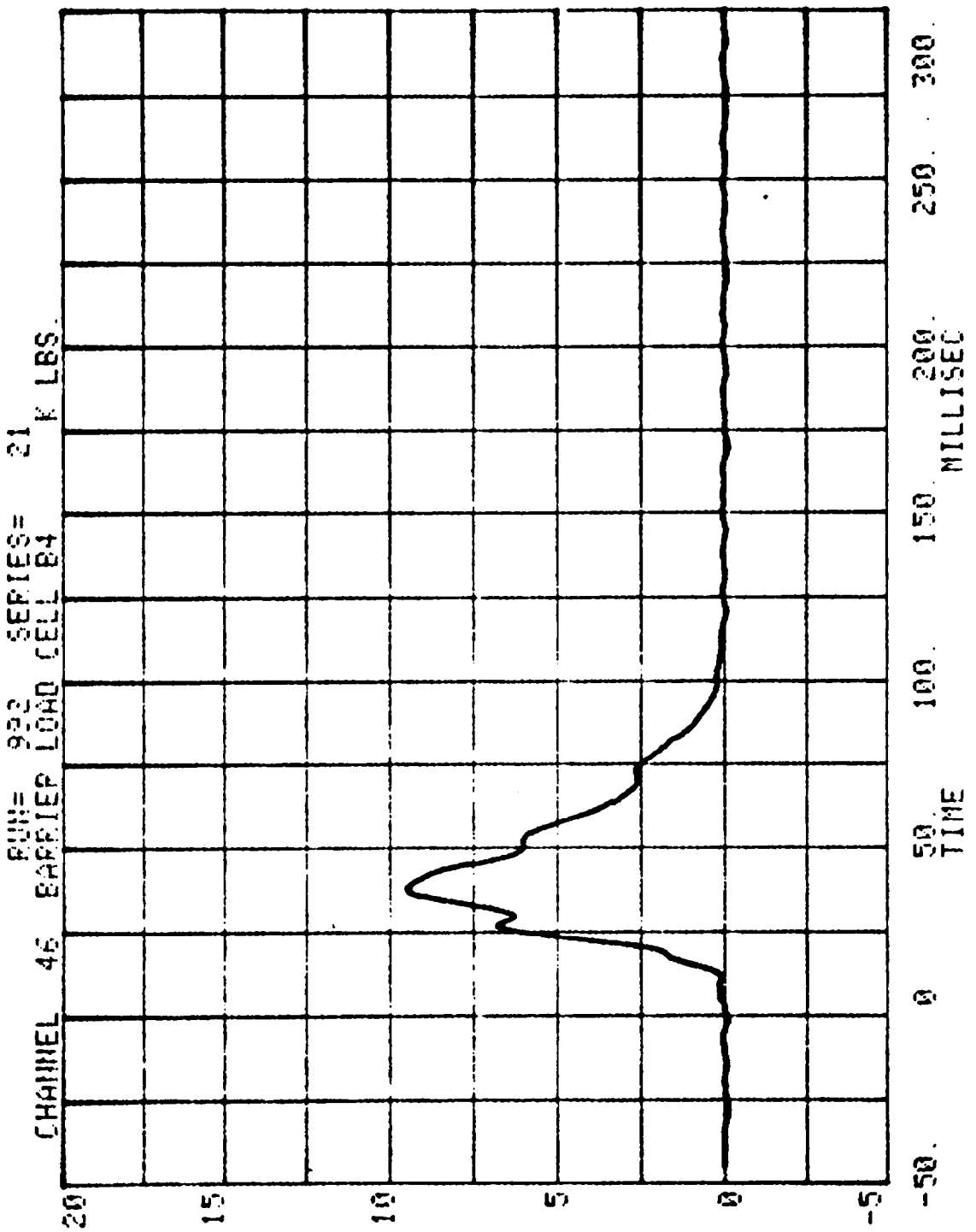

CHANNEL 43 RUN= 992 SERIES= 21
BARRIER LOAD CELL B1 K LBS.
TIME MILLISEC
-50 0 50 100 150 200 250 300
20 15 10 5 0 -5

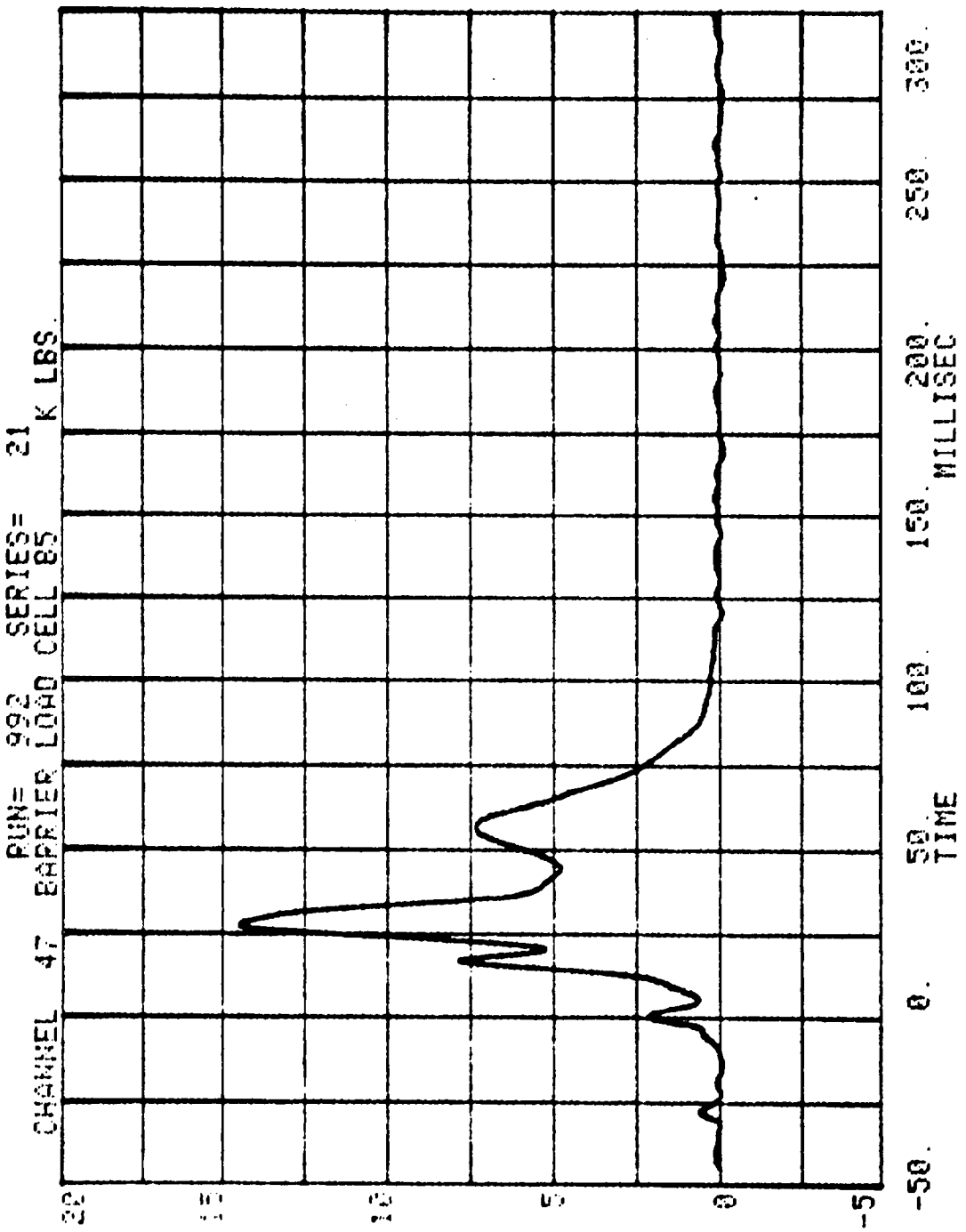

CHANNEL 44
RUN= 992 SERIES= 21
BARRIER LOAD CELL B2
F LBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21

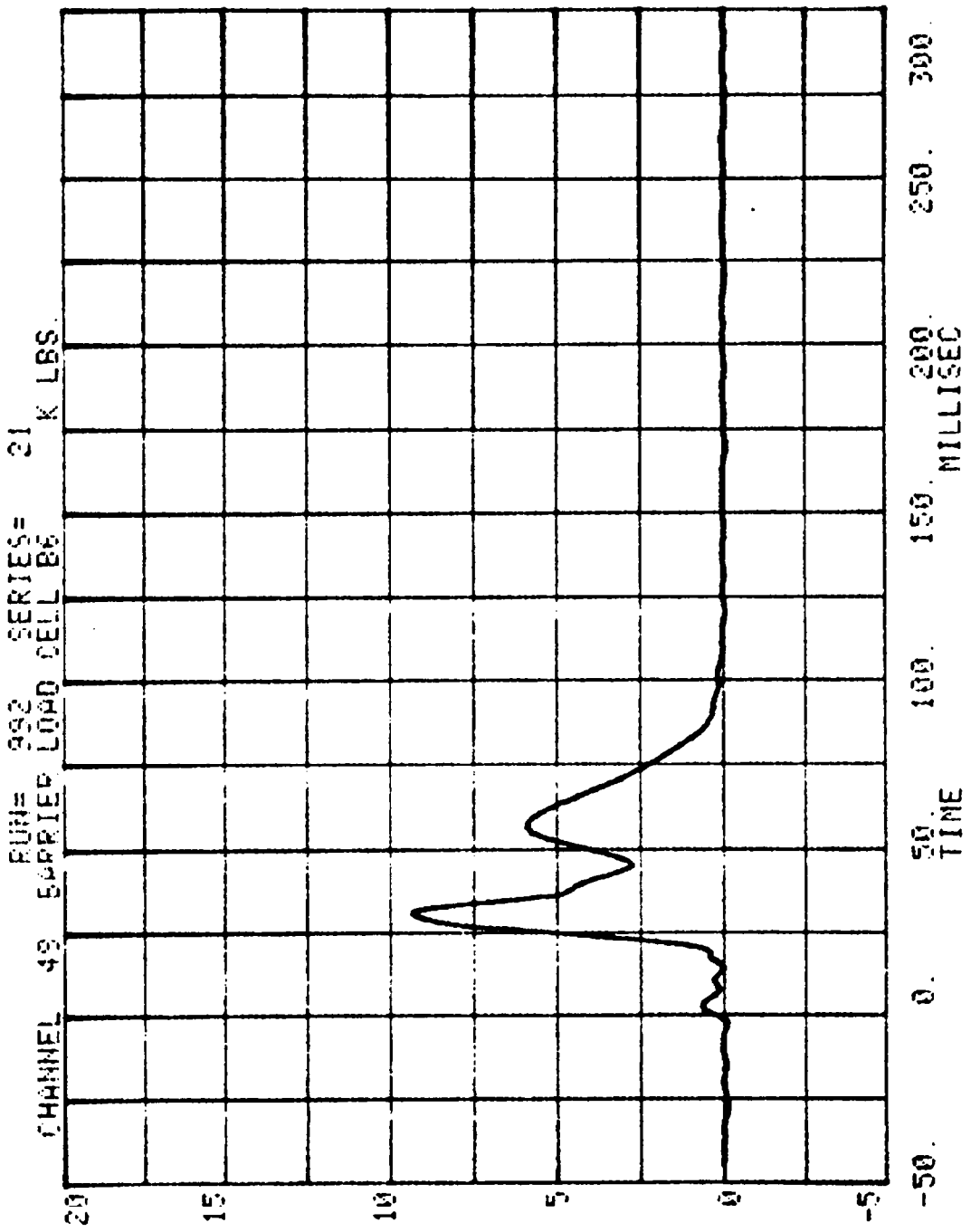

CHANNEL 45 BARRIER LOAD CELL 83
RUN= 292 SERIES= 21
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

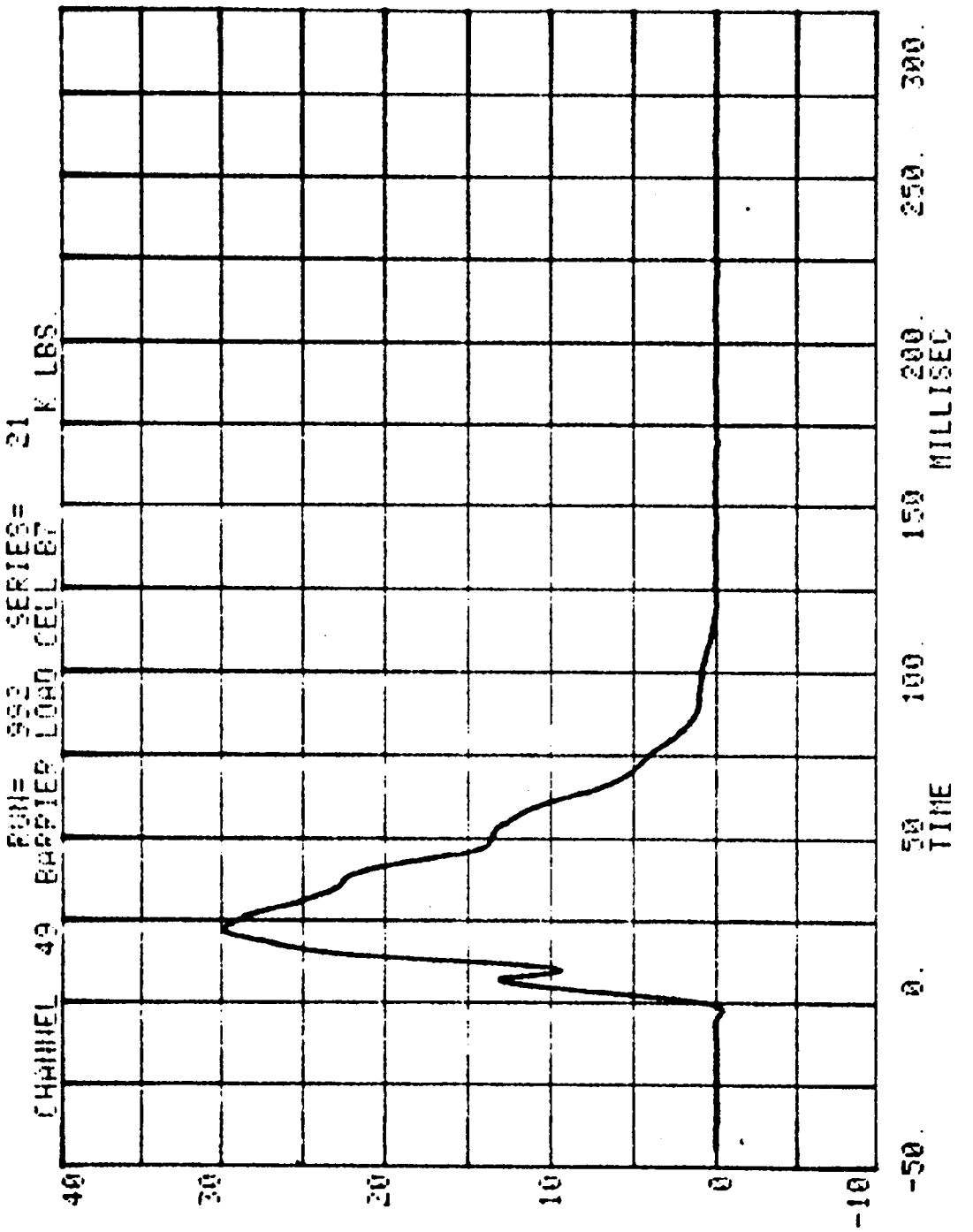
7776-21

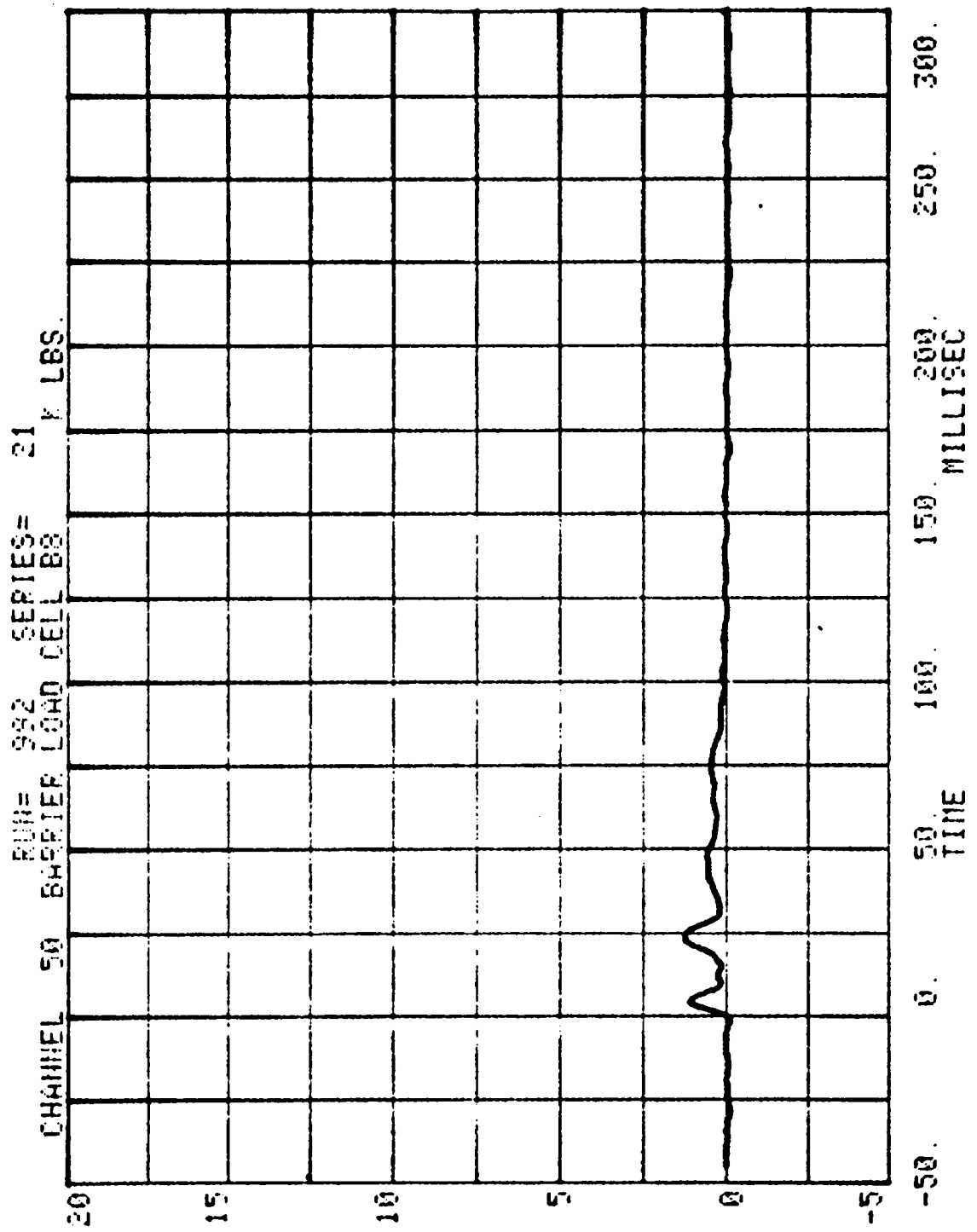

CHANNEL 46 BARRIER LOAD CELL B4
RUN= 933 SERIES= 21
K LBS
20
15
10
5
0
-5
-50.
0
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

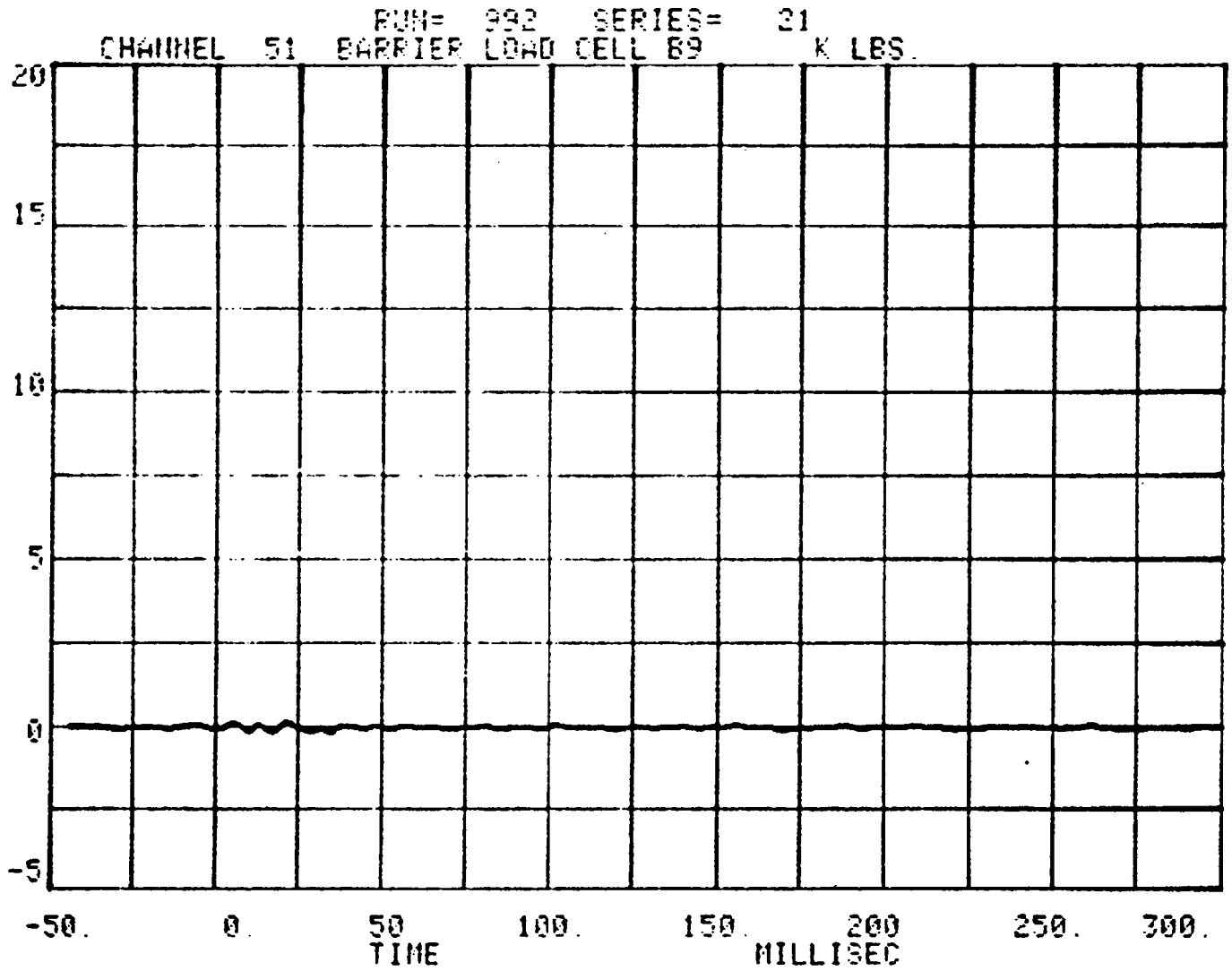

CHANNEL 47 BARRIER LOAD CELL 85
RUN= 992 SERIES= 21
K LBS.
-50. 0. 50. 100 150. 200. 250 300.
TIME
MILLISEC
20 15 10 5 0 -5

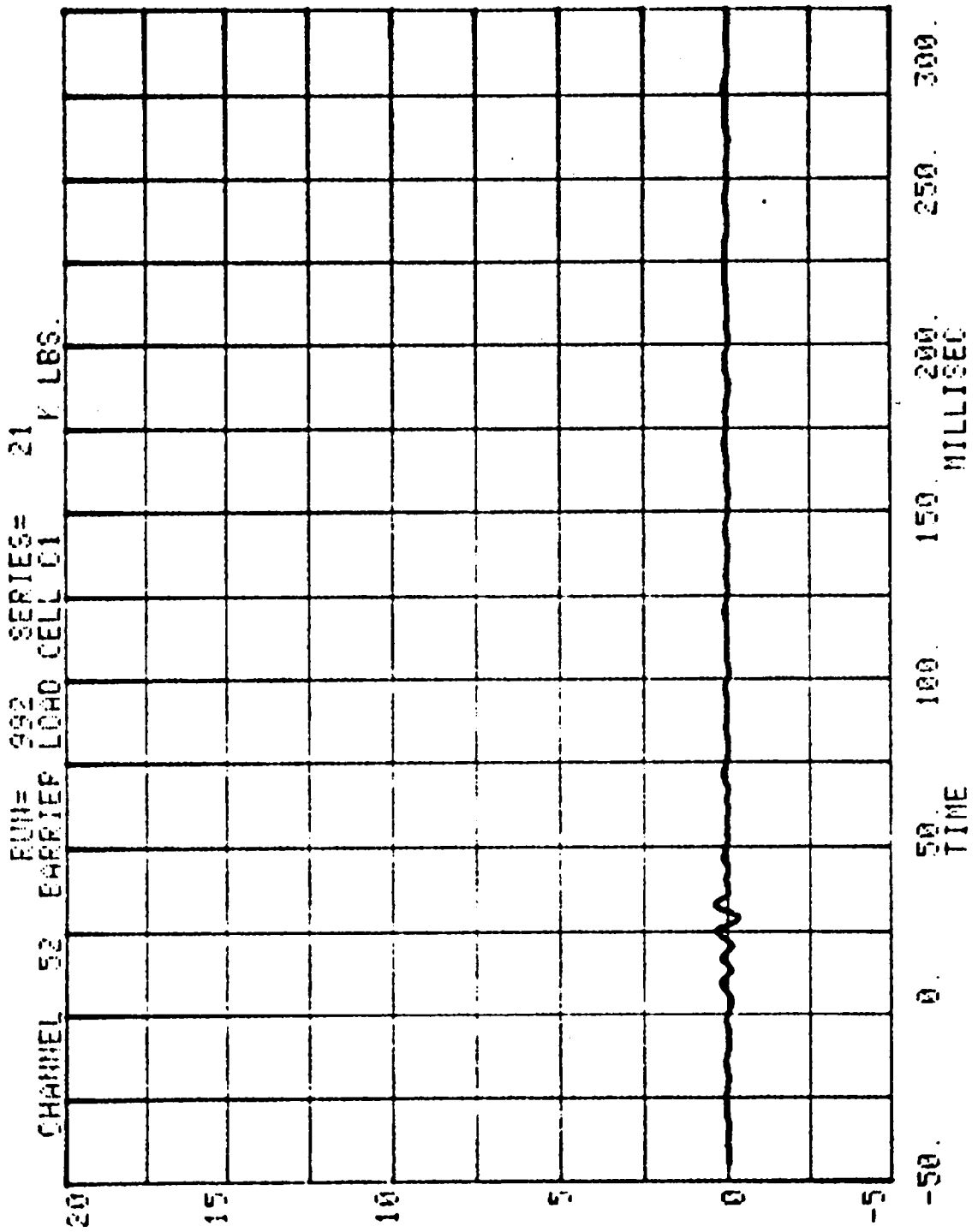
7776-21


CHANNEL 49 SAMPLED
RUN= 992 SERIES= 21
LOAD CELL B6
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

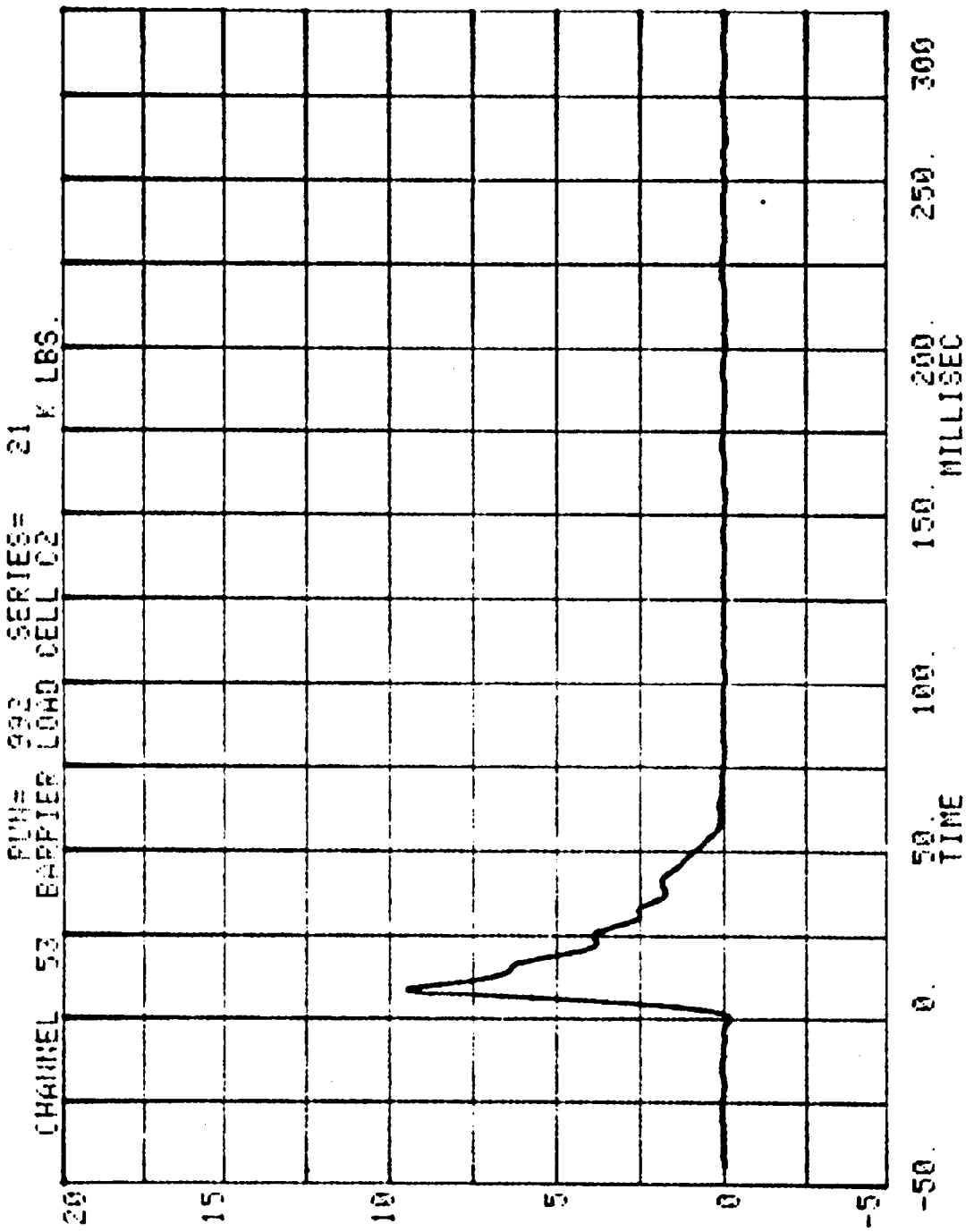

CHANNEL 49 BARRIER LOAD CELL B1
RUN= 993 SERIES= 21
K LBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

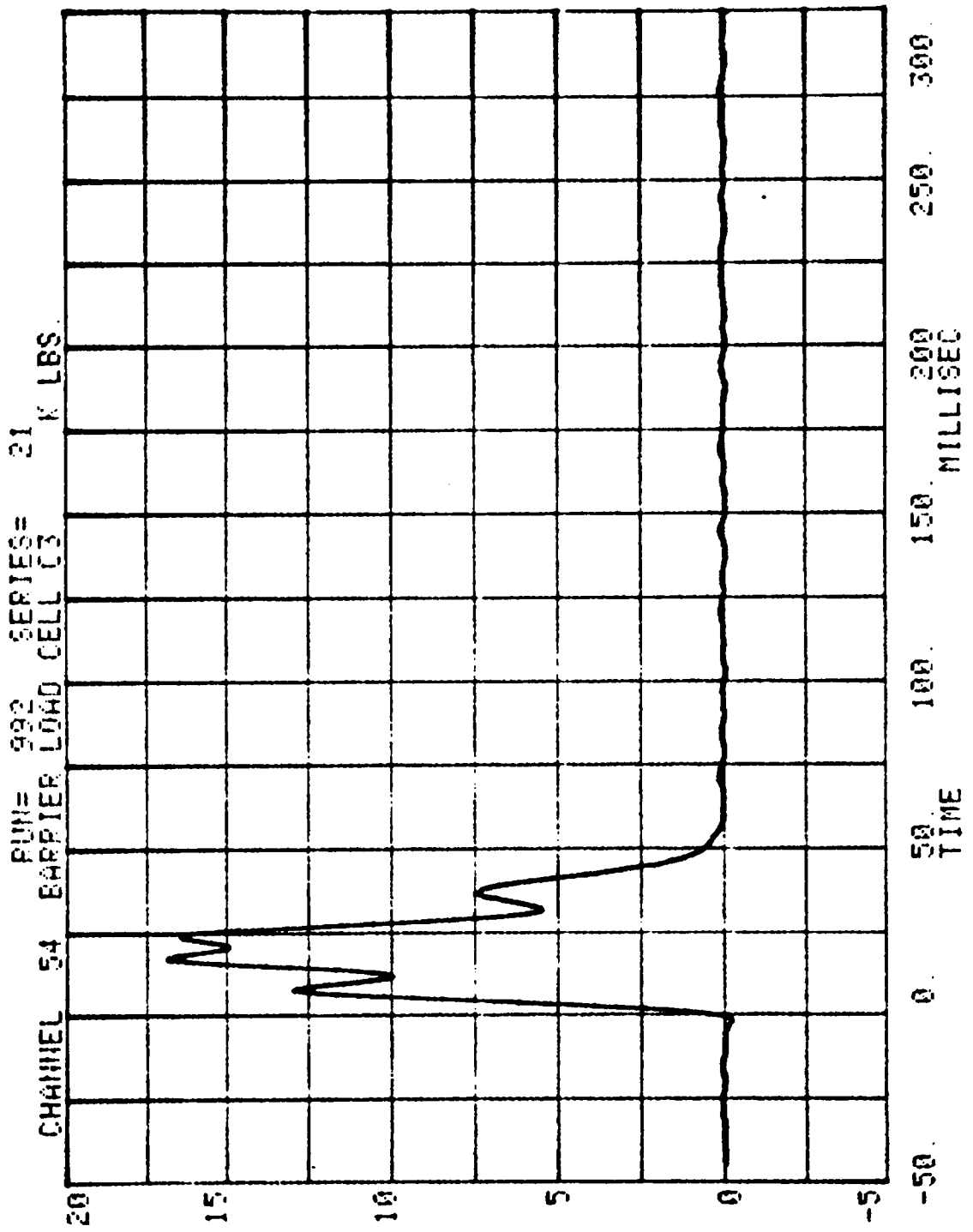

CHANNEL 50 BASTIER LOAD CELL B8
RUN= 332 SERIES= 21
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC
LBS.


RUN= 992 SERIES= 21
CHANNEL 51 BARRIER LOAD CELL 89 K LBS.
20
15
10
5
0
-5
-50.
0.
50
100.
150.
200
250.
300.
TIME
MILLISEC

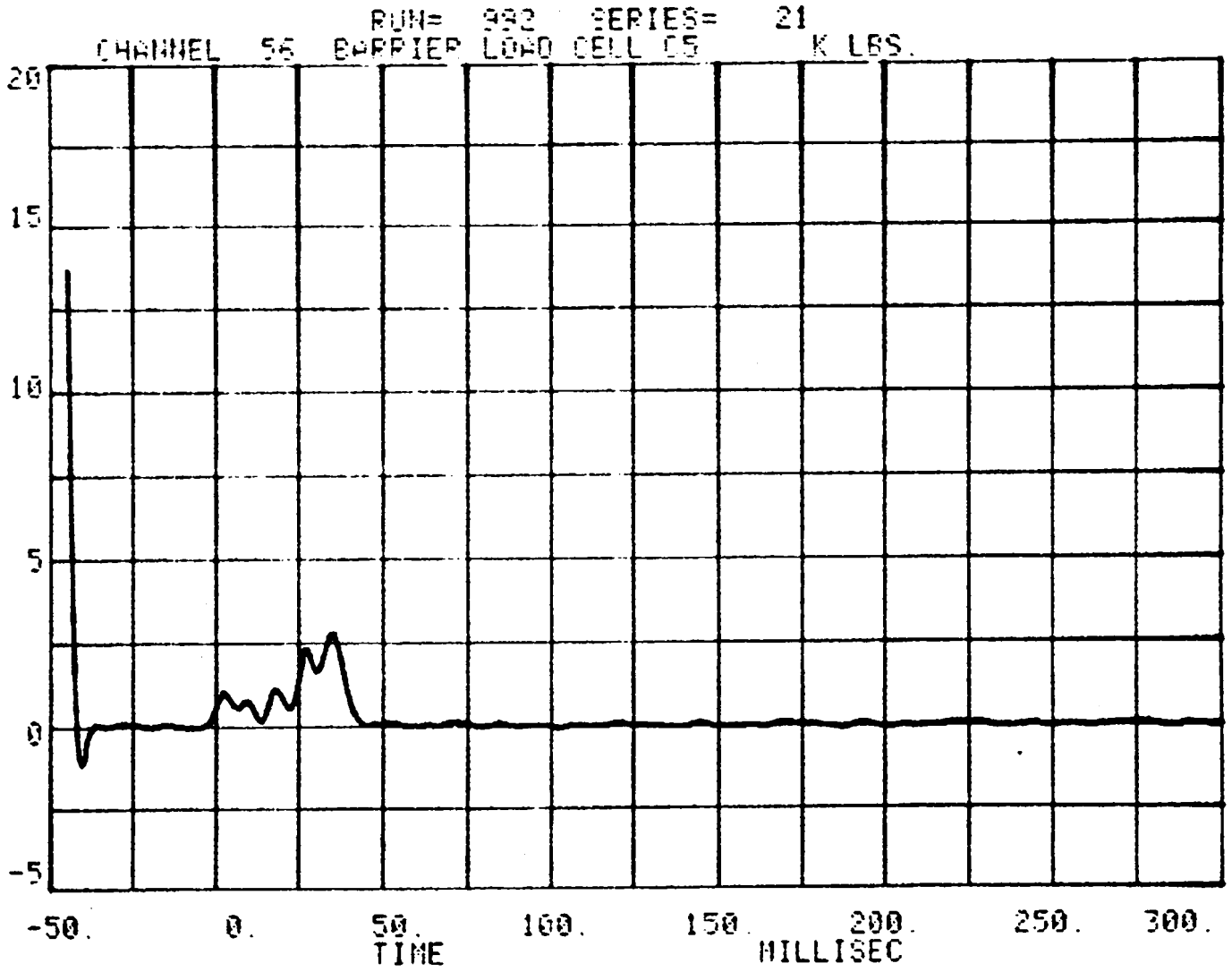

CHANNEL 52 EARRIER
RUN= 992 SERIES= 21
LOAD CELL C1
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

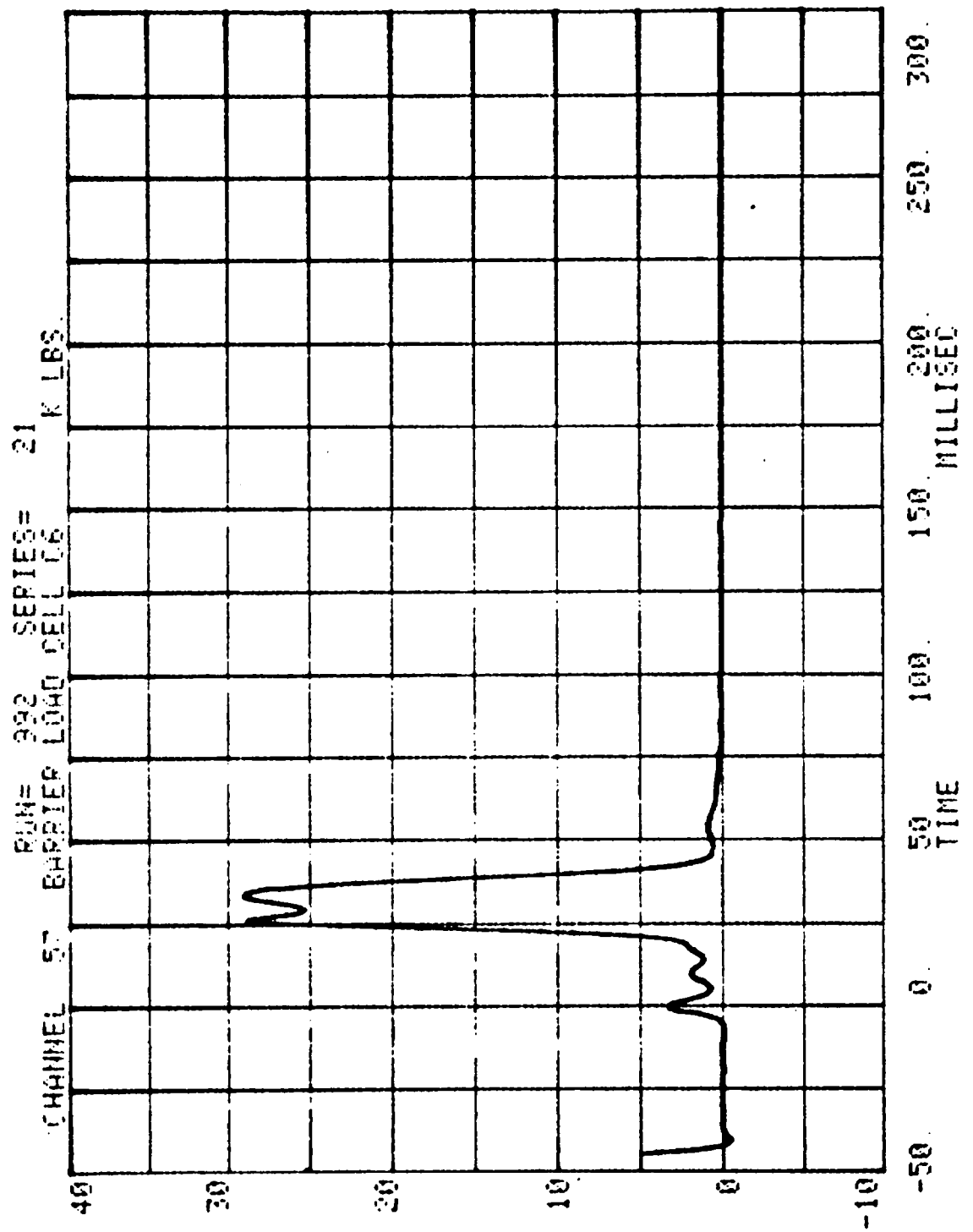
7776-21


CHANNEL 53 EARPIER LOAD CELL C2
RUN= 492 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300
TIME
MILLISEC

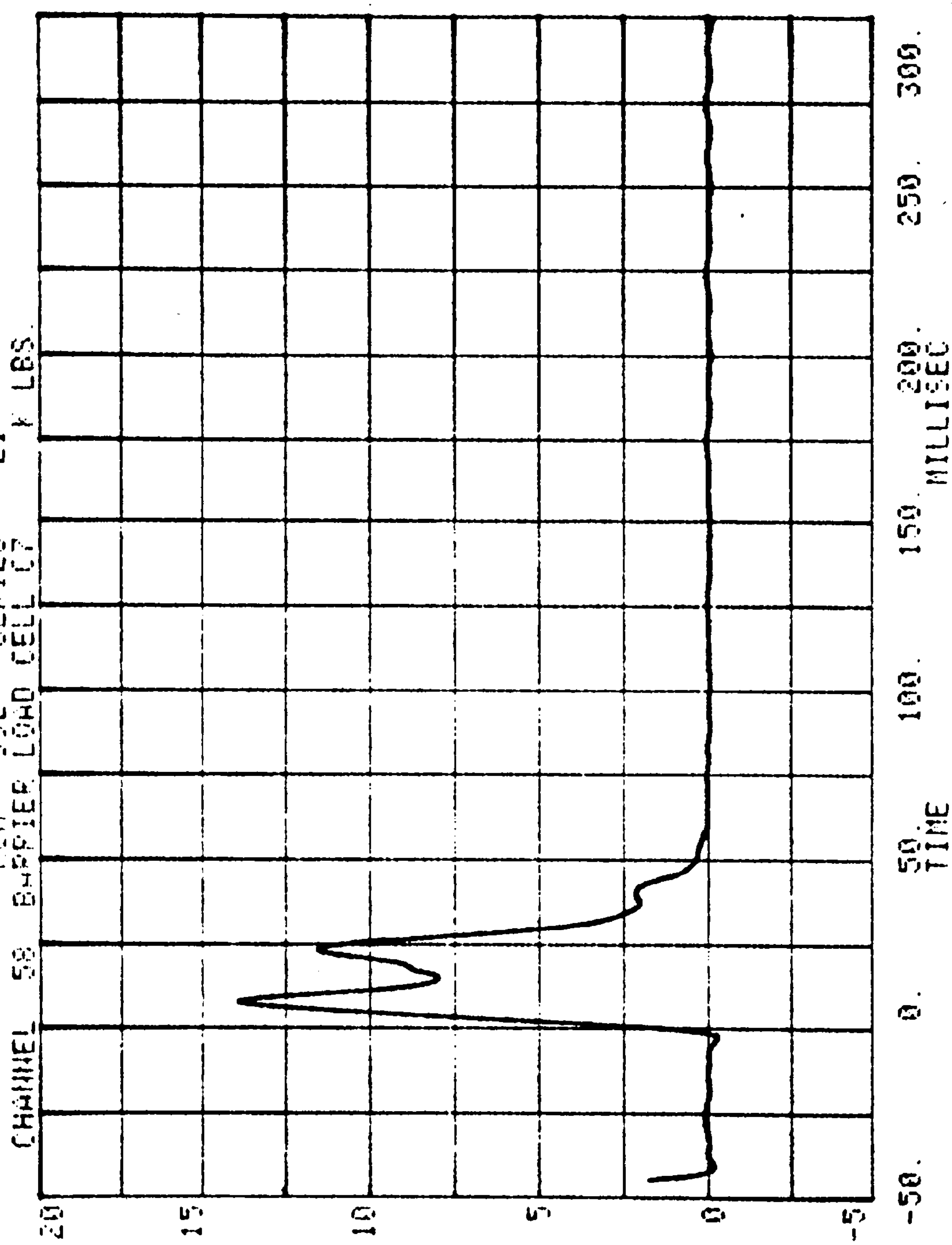

CHANNEL 54 BARRIER LOAD CELL C3
RUN= 992 SERIES= 21
K LBS
MILLISEC
TIME
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.

7776-21

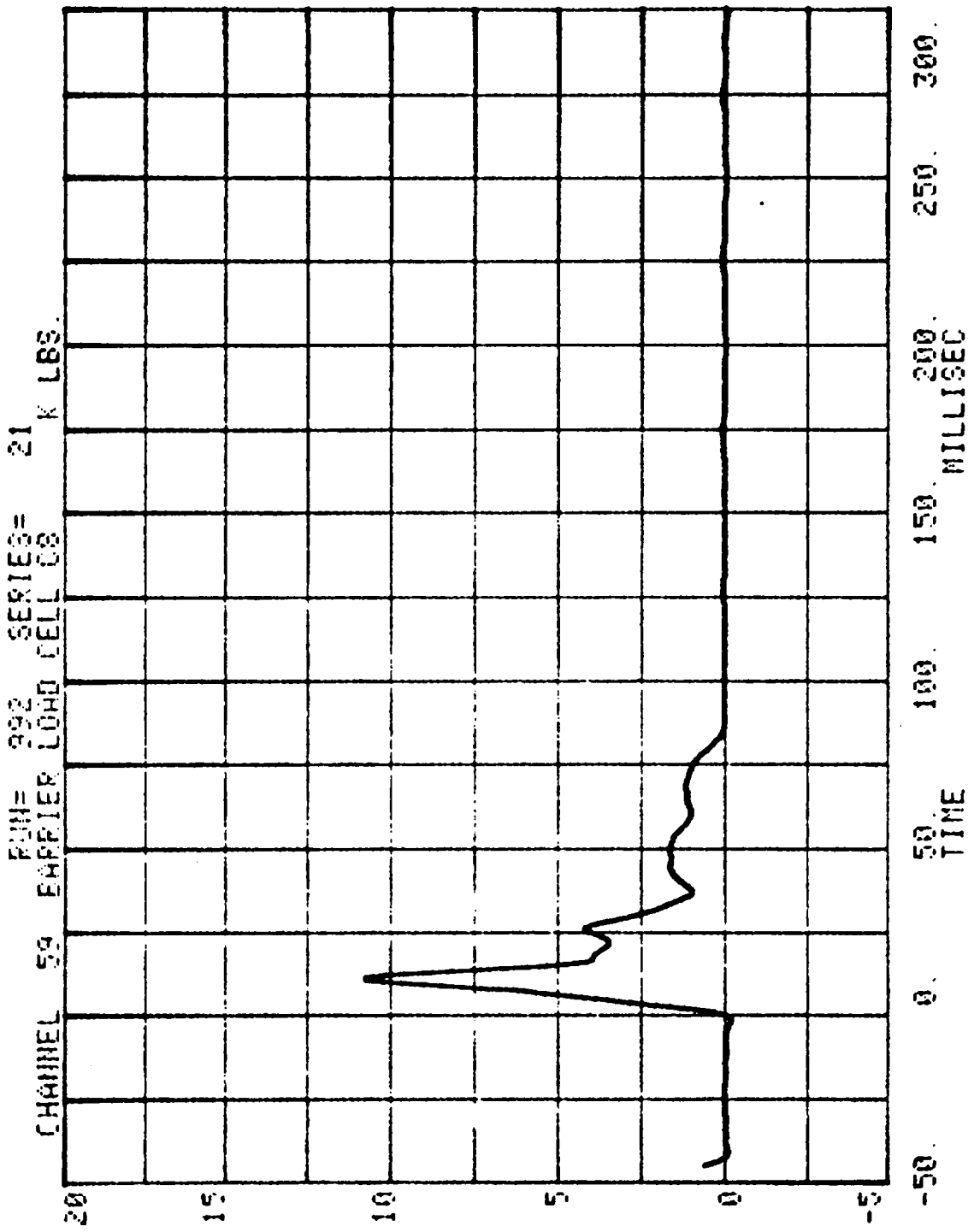

RUN= 992 SERIES= 21
CHANNEL 56 BARRIER LOAD CELL 05 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

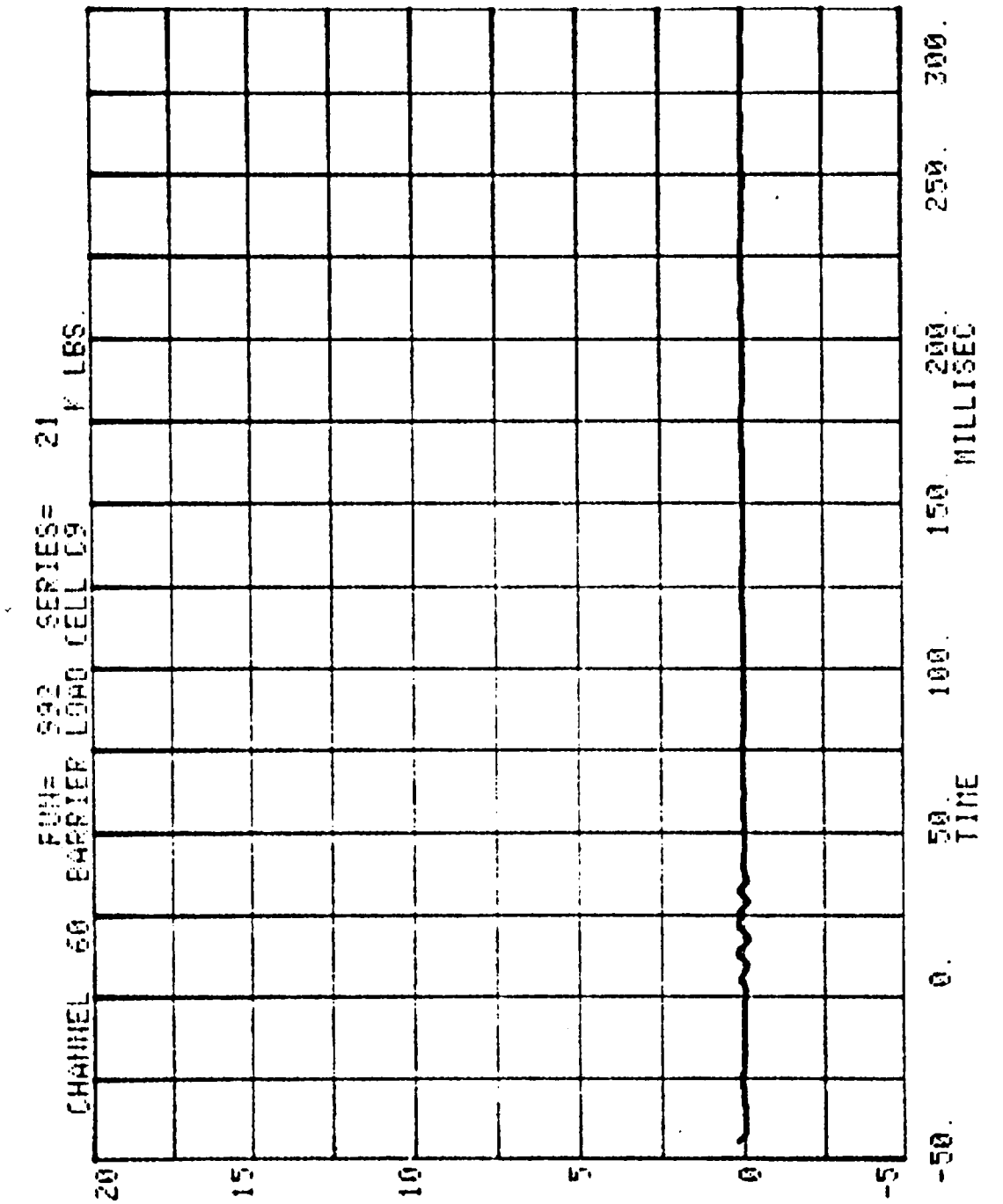

CHANNEL 57 BARRIER LOAD CELL CG
RUN= 992 SERIES= 21
K LBS.
40
30
20
10
0
-10
-50
0
50
100
150
200
250
300
TIME
MILLISEC

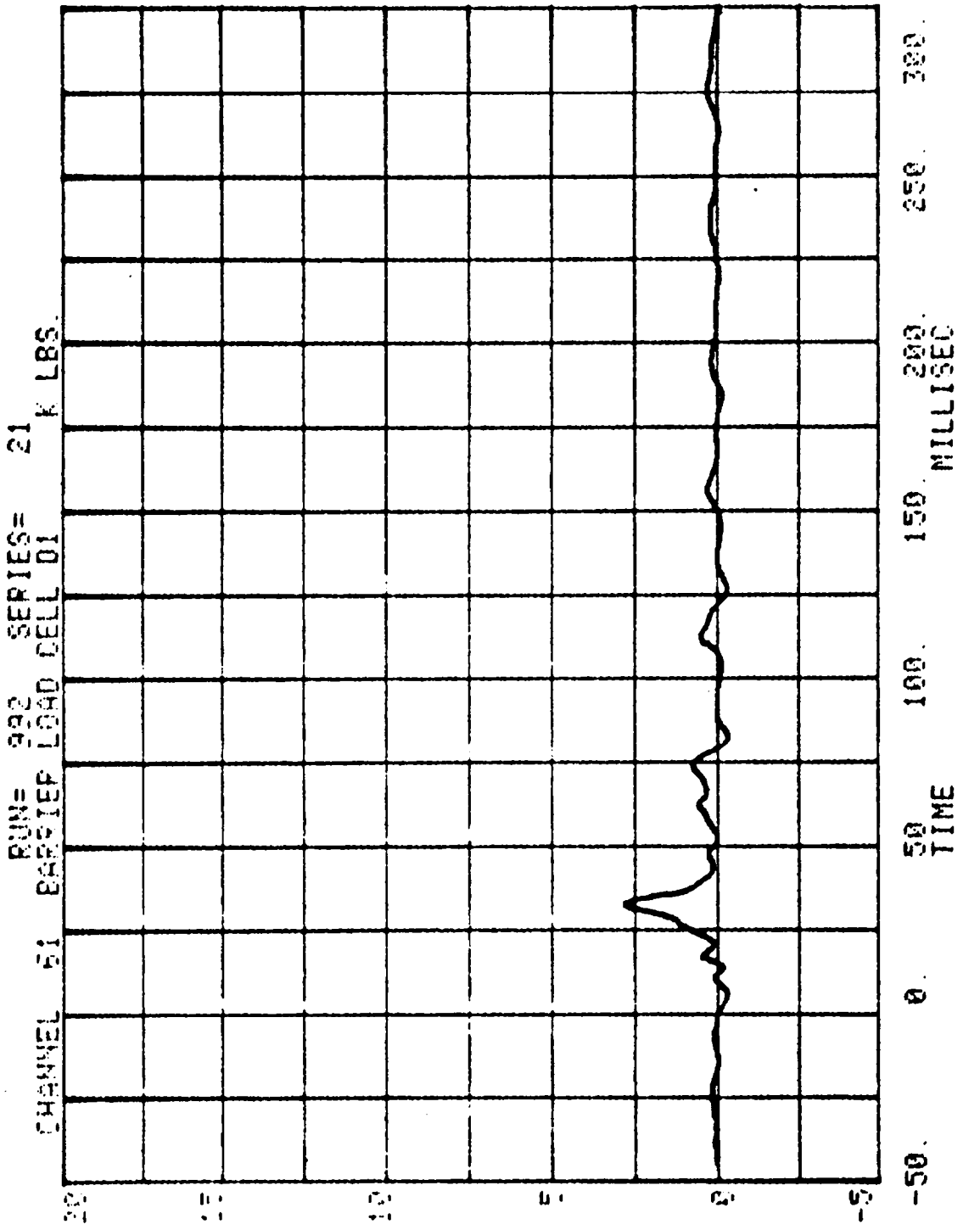
7776-21



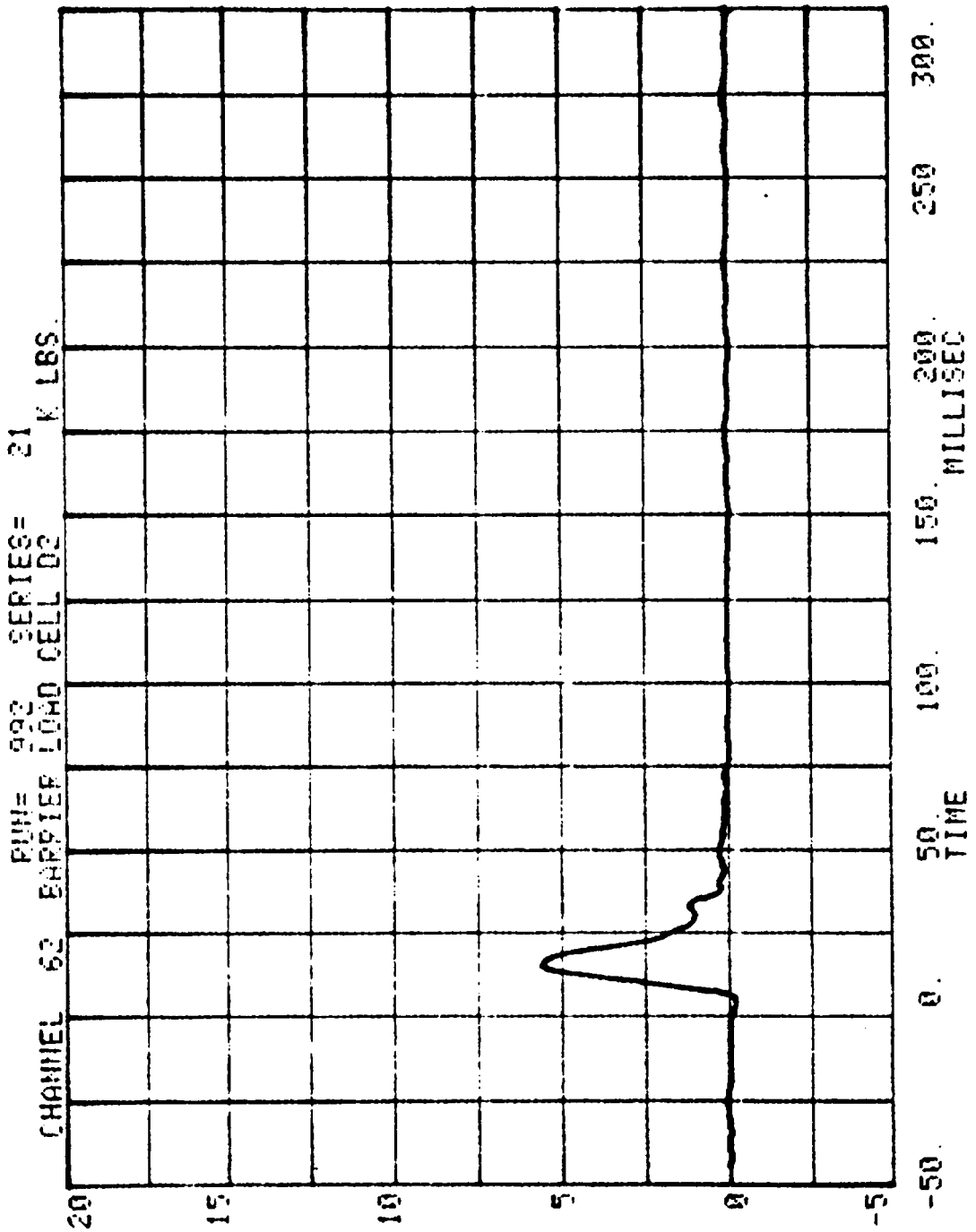
CHANNEL 58 RUN= 392 SERIES= 21
BARRIER LOAD CELL C7 K LBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 59 BARRIER LOAD CELL 08
RUN= 992 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

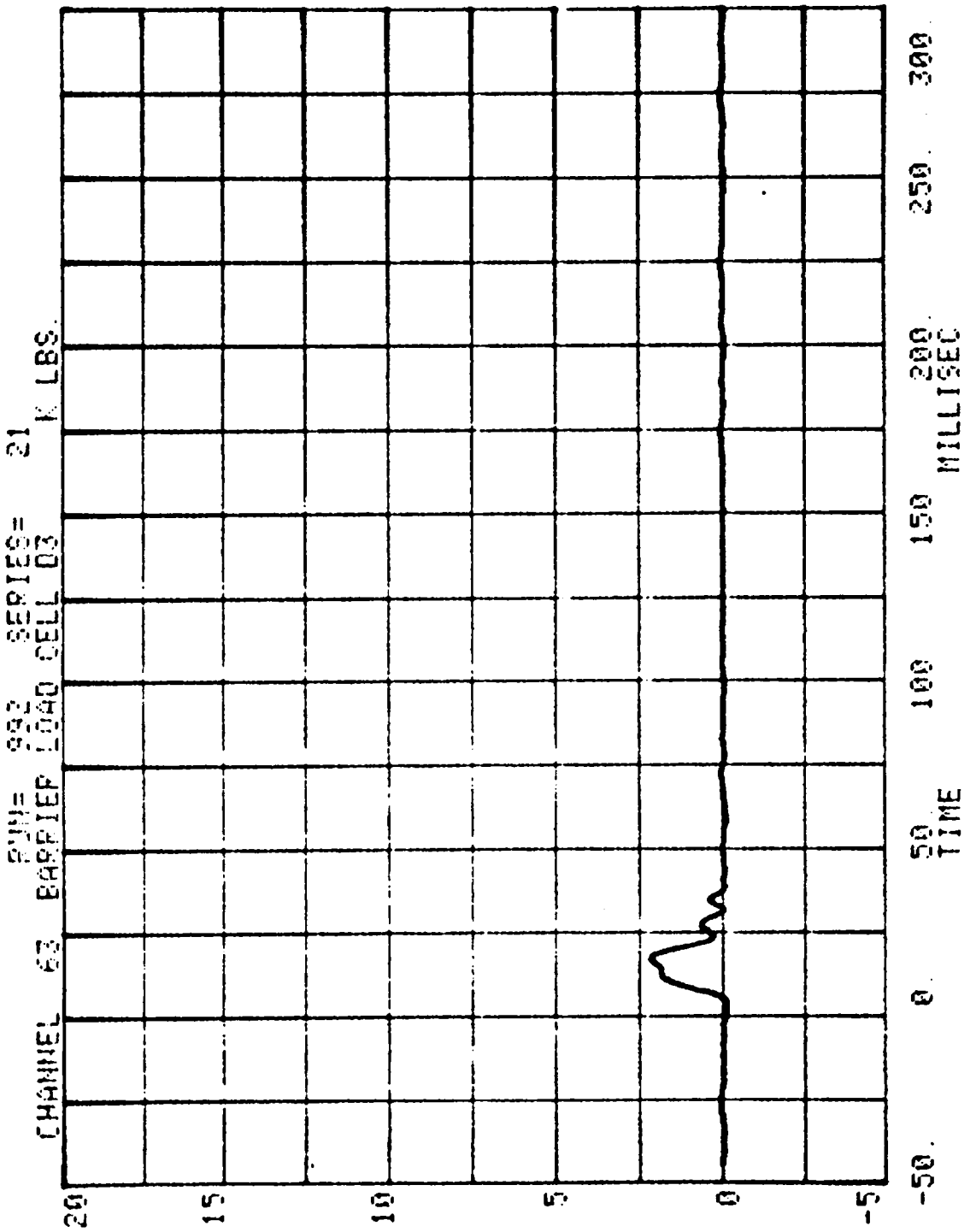

CHANNEL 60 BARRIER LOAD CELL C9
RUN= 592 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150
200.
250.
300.
TIME
MILLISEC


CHANNEL 51 BARSTEP LOAD CELL 01
RUN= 992 SERIES= 21
K LBS.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC
20
15
10
5
0
-5

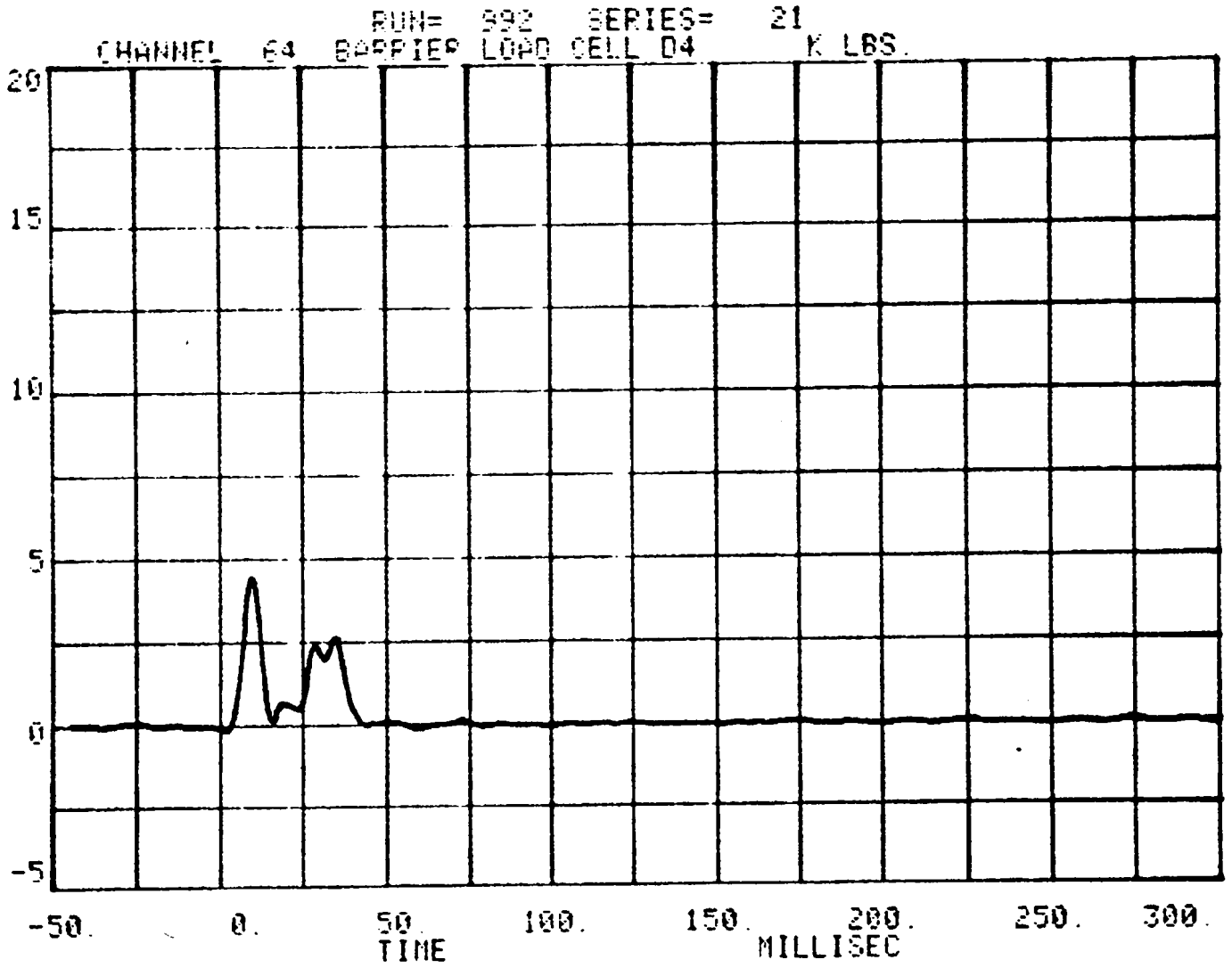
7776-21


CHANNEL 62 BARRIER LOAD CELL 02
RUN= 992 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250
300.
TIME
MILLISEC

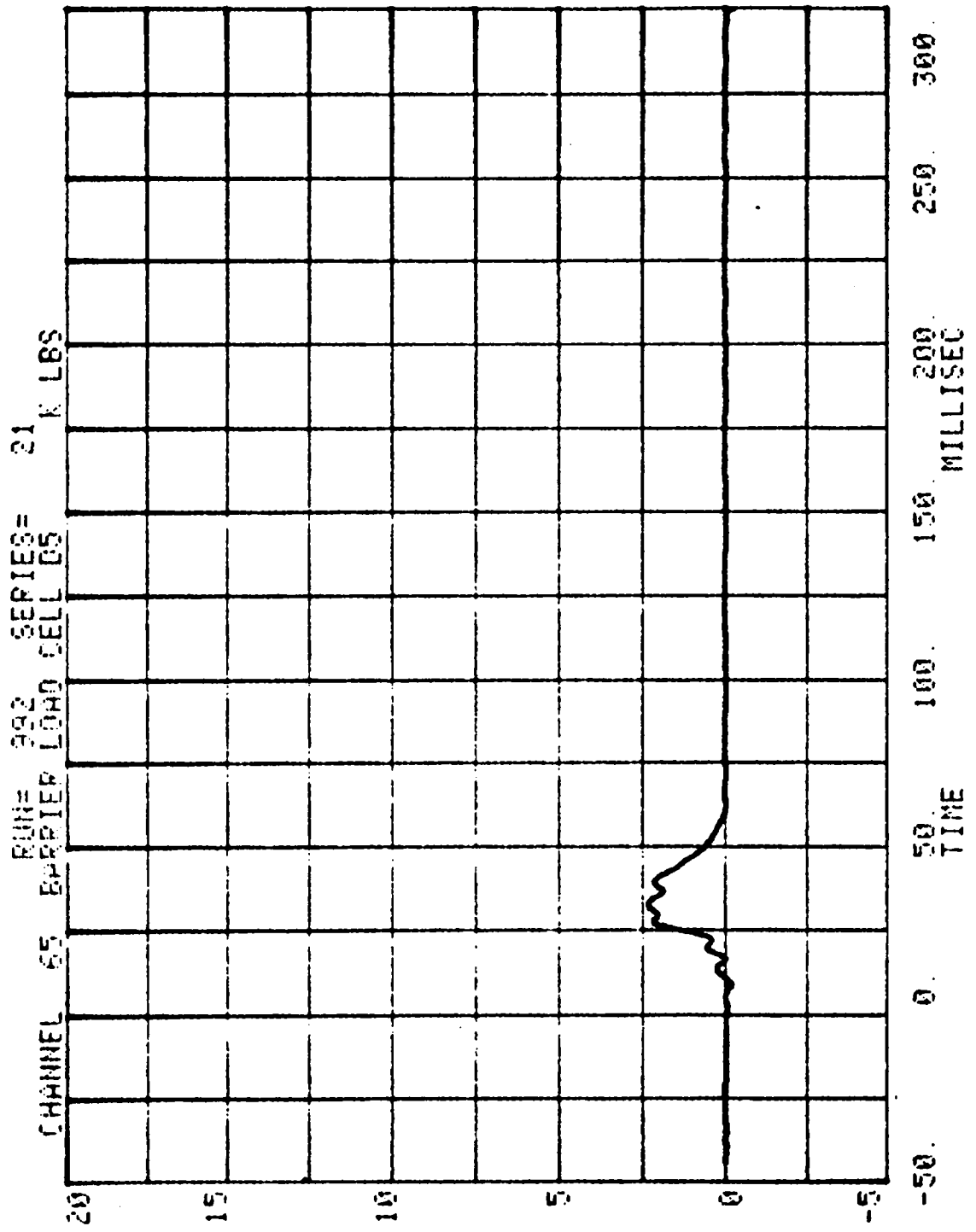
7776-21


CHANNEL 63 BARRIER LOAD CELL 03
RUN= 992 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50.
0
50
100
150
200
250
300
TIME
MILLISEC

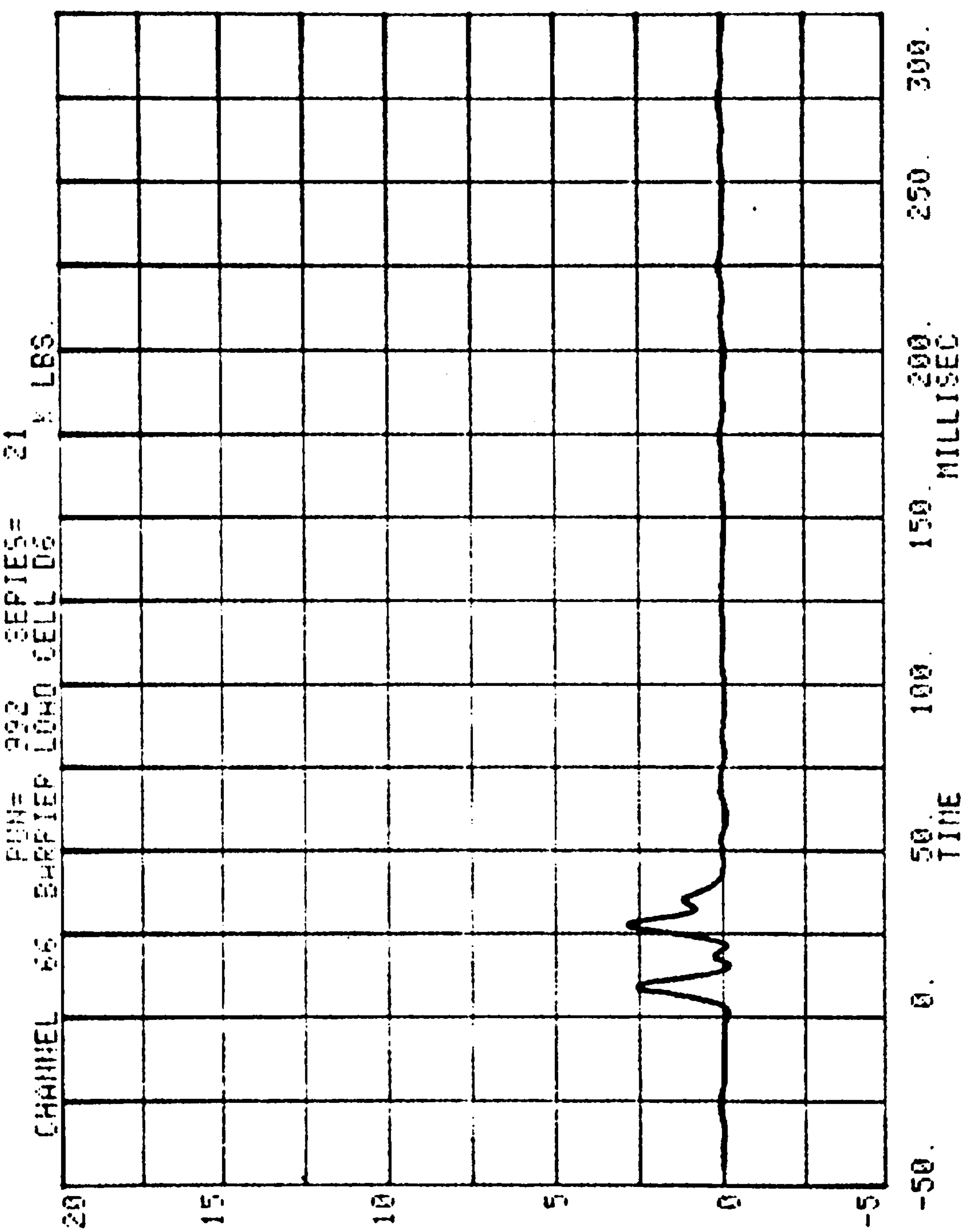
7776-21

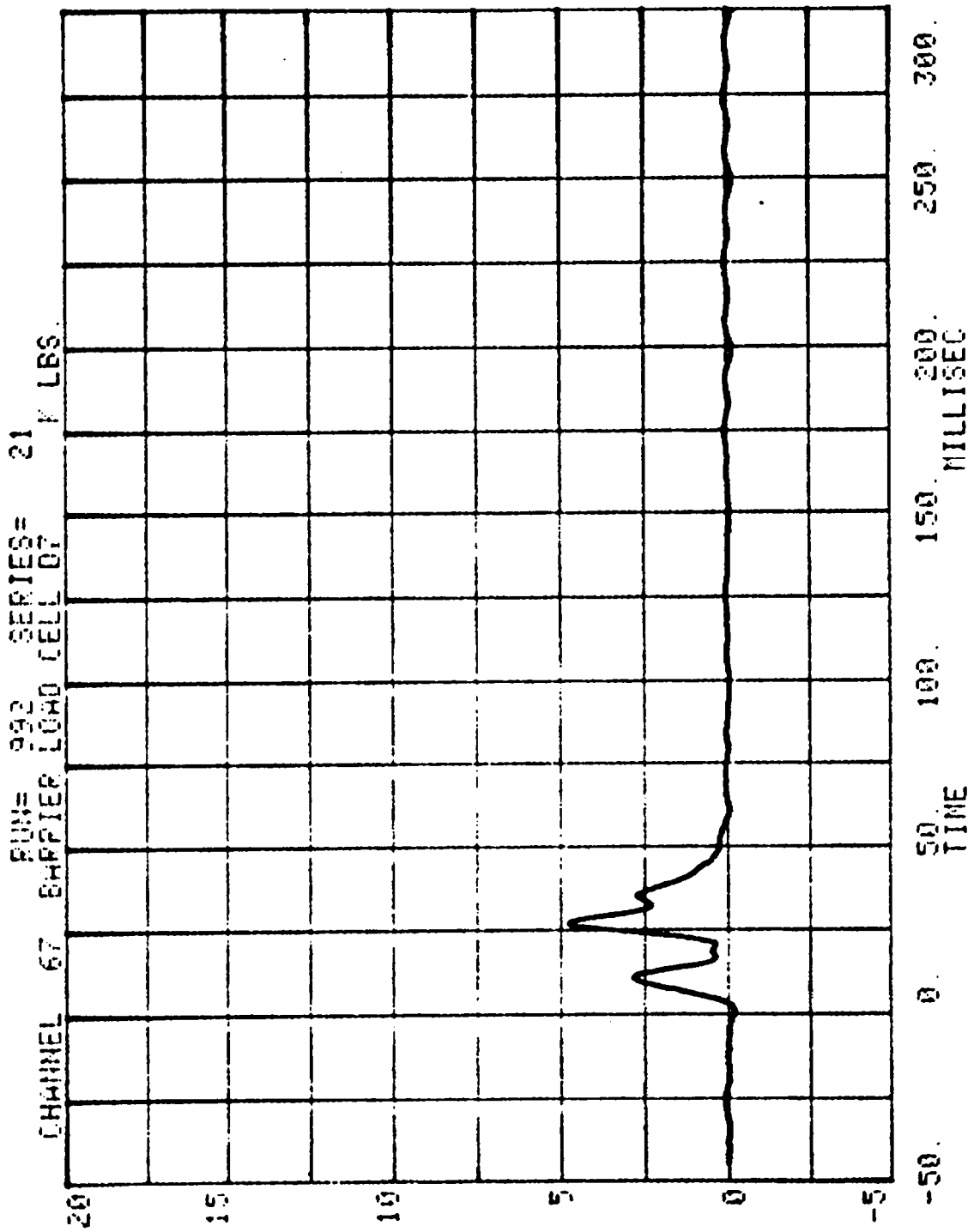

RUN= 992 SERIES= 21
CHANNEL 64 BARRIER LOAD CELL D4
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

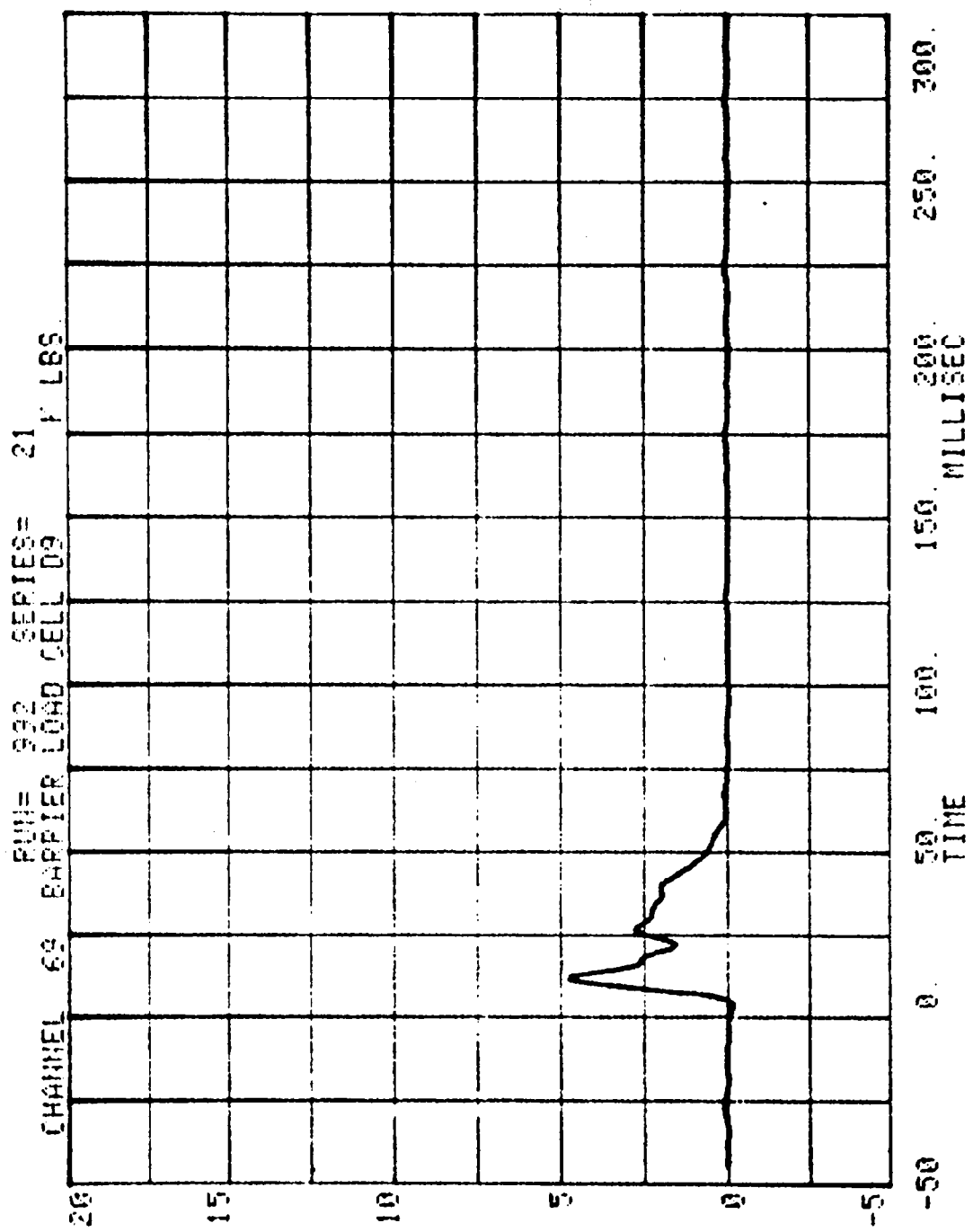
7776-21


CHANNEL 65 BARRIER LOAD CELL 05
RUN= 392 SERIES= 21
K LBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21


CHANNEL 55 RUN= 222 SERIES= 21
BARRIER LOAD CELL DS K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

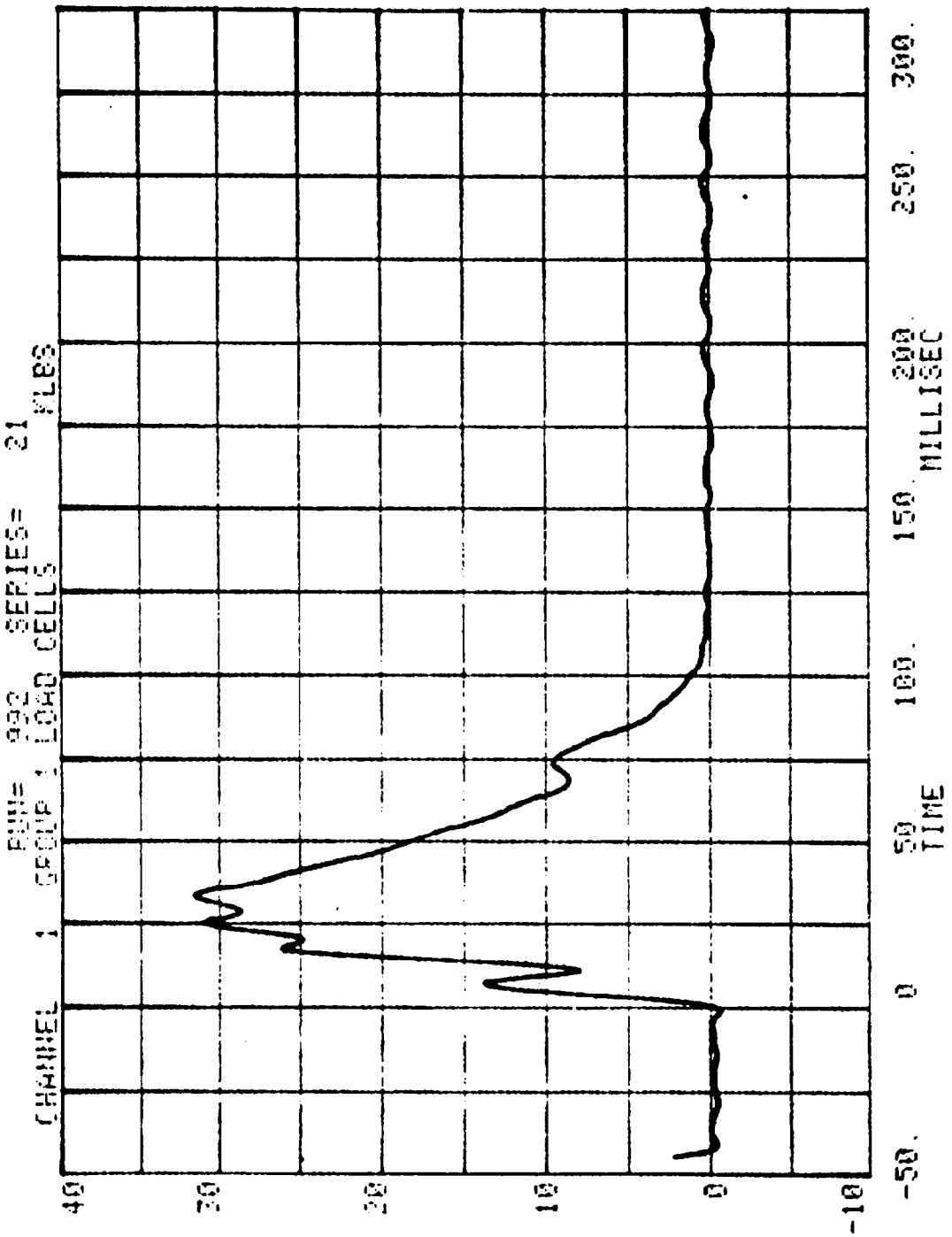

CHANNEL 67 BAFFLER LOAD CELL DT
RUN= 992 SERIES= 21
K LBS.
20
15
10
5
0
-5
-50.
0
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

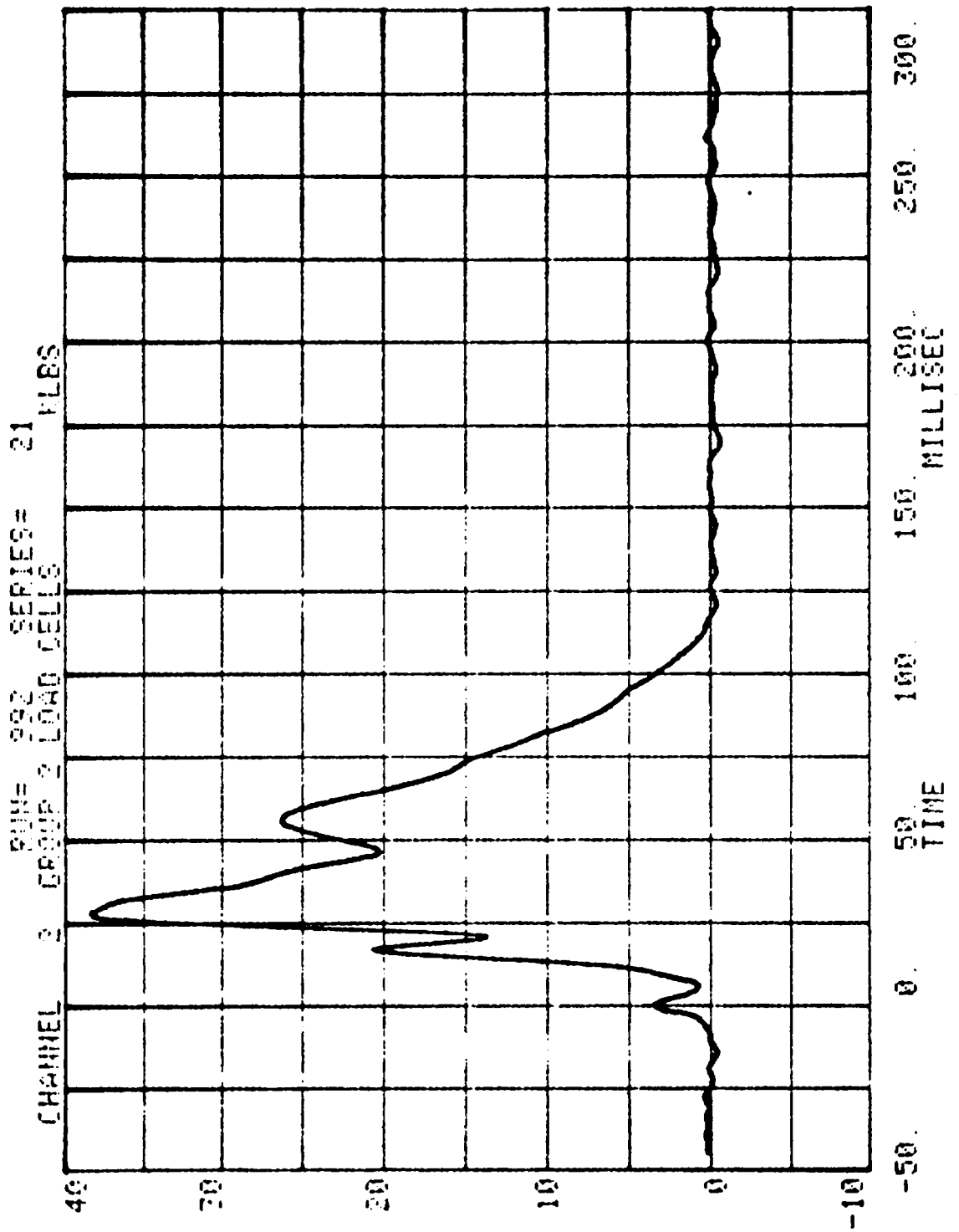

CHANNEL 69 BARRIER LOAD CELL 09
RUN= 922 SERIES= 21
F LBS
20
15
10
5
0
-5
-50
0
50
100.
150.
200.
250.
300.
TIME
MILLISEC

NCAP TEST #21

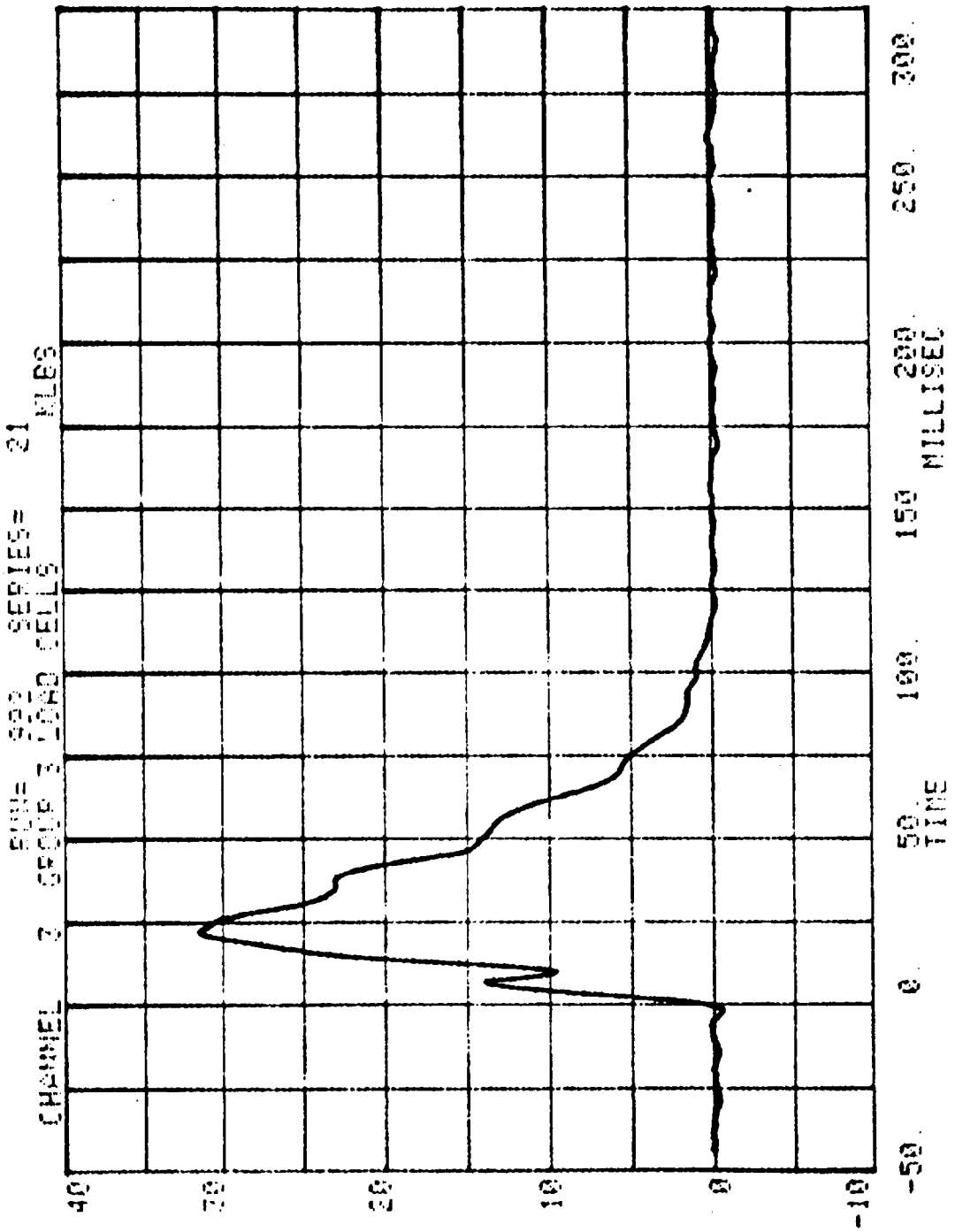
RUN # 993 SERIES # 21

CHAN	TITLE	MINIMUM	MAXIMUM	AT TIME
1	GROUP 1 LOAD CELLS	-.588 KLBS		-.83 MS.
		71.565 KLBS		33.30 MS
2	GROUP 2 LOAD CELLS	-.620 KLBS		170.03 MS.
		38.463 KLBS		22.05 MS.
3	GROUP 3 LOAD CELLS	-.493 KLBS		-1.88 MS.
		31.529 KLBS		22.27 MS.
4	GROUP 4 LOAD CELLS	-.631 KLBS		300.00 MS.
		31.067 KLBS		17.10 MS.
5	GROUP 5 LOAD CELLS	-1.530 KLBS		-40.80 MS.
		37.439 KLBS		34.20 MS.
6	GROUP 6 LOAD CELLS	-.822 KLBS		299.85 MS.
		28.530 KLBS		10.57 MS.
7	TOTAL LOAD CELL SUM	-1.780 KLBS		-40.95 MS.
		175.795 KLBS		26.32 MS.

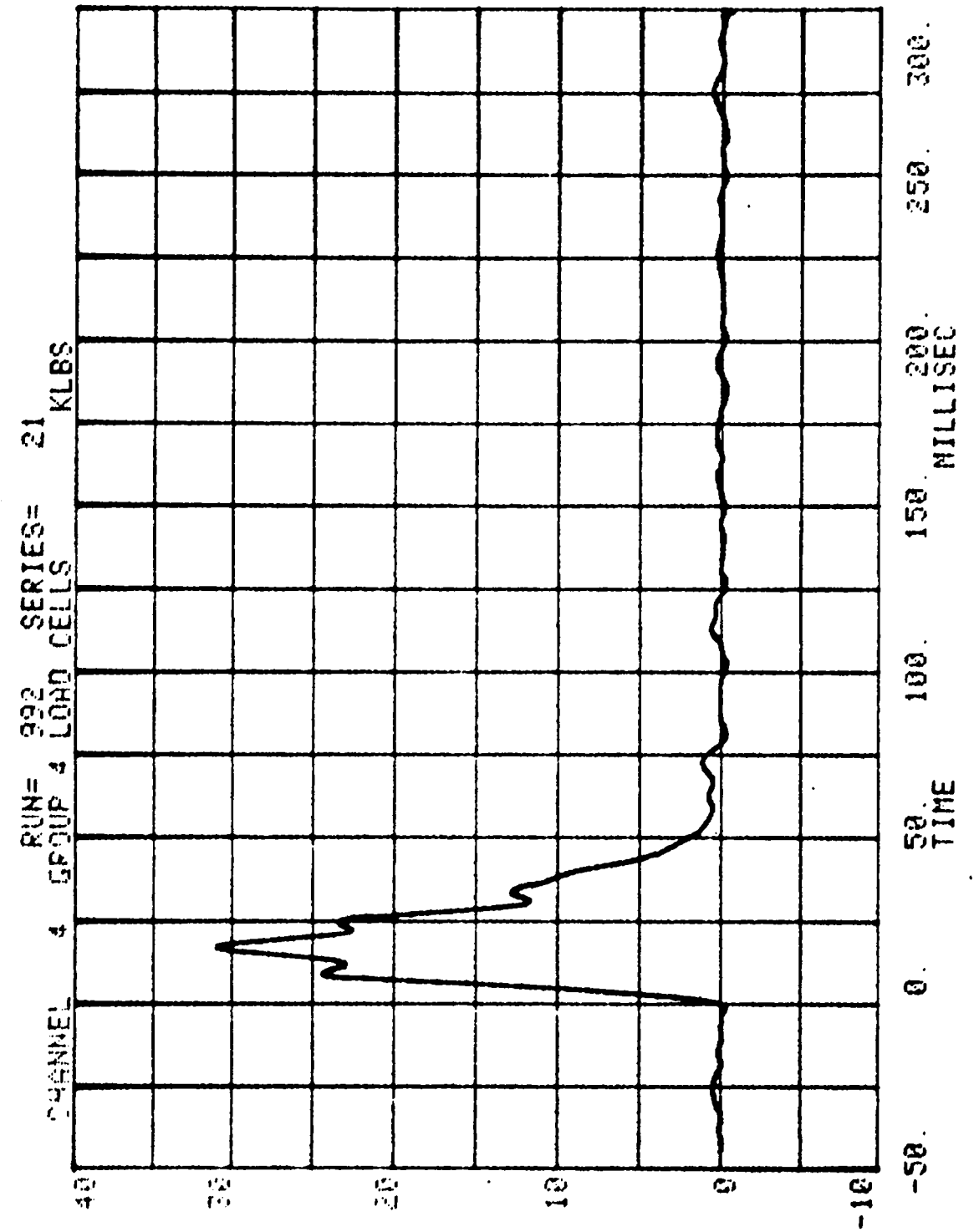

CHANNEL 1 SCOPE 1 LOAD CELLS
RUN= 992 SERIES= 21
#LBS
40
30
20
10
0
-10
-50.
0
50
100.
150
200
250.
300.
TIME
MILLISEC

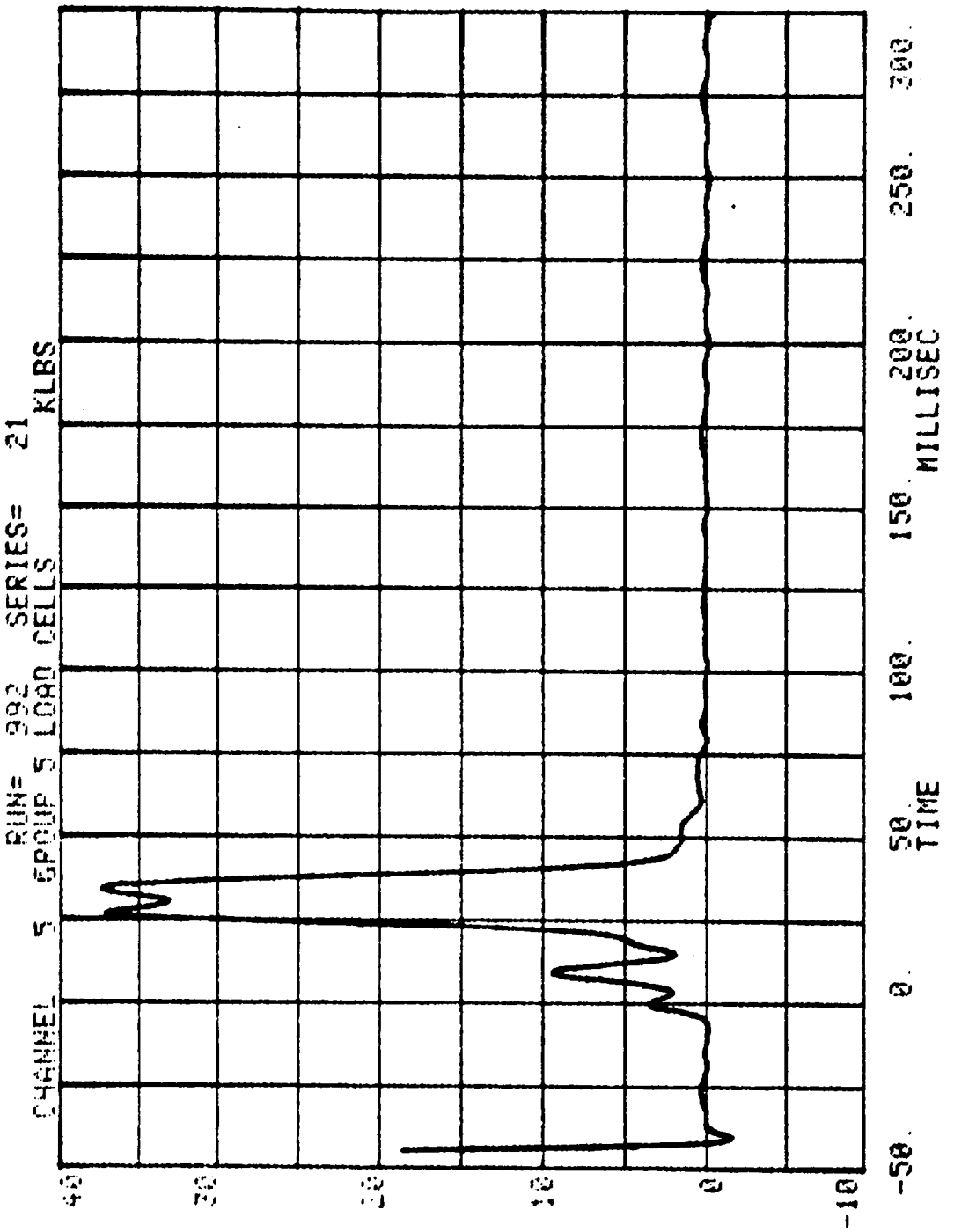

CHANNEL 2 GROUP 2 LOAD CELLS
RUN= 992 SERIES= 21
LBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

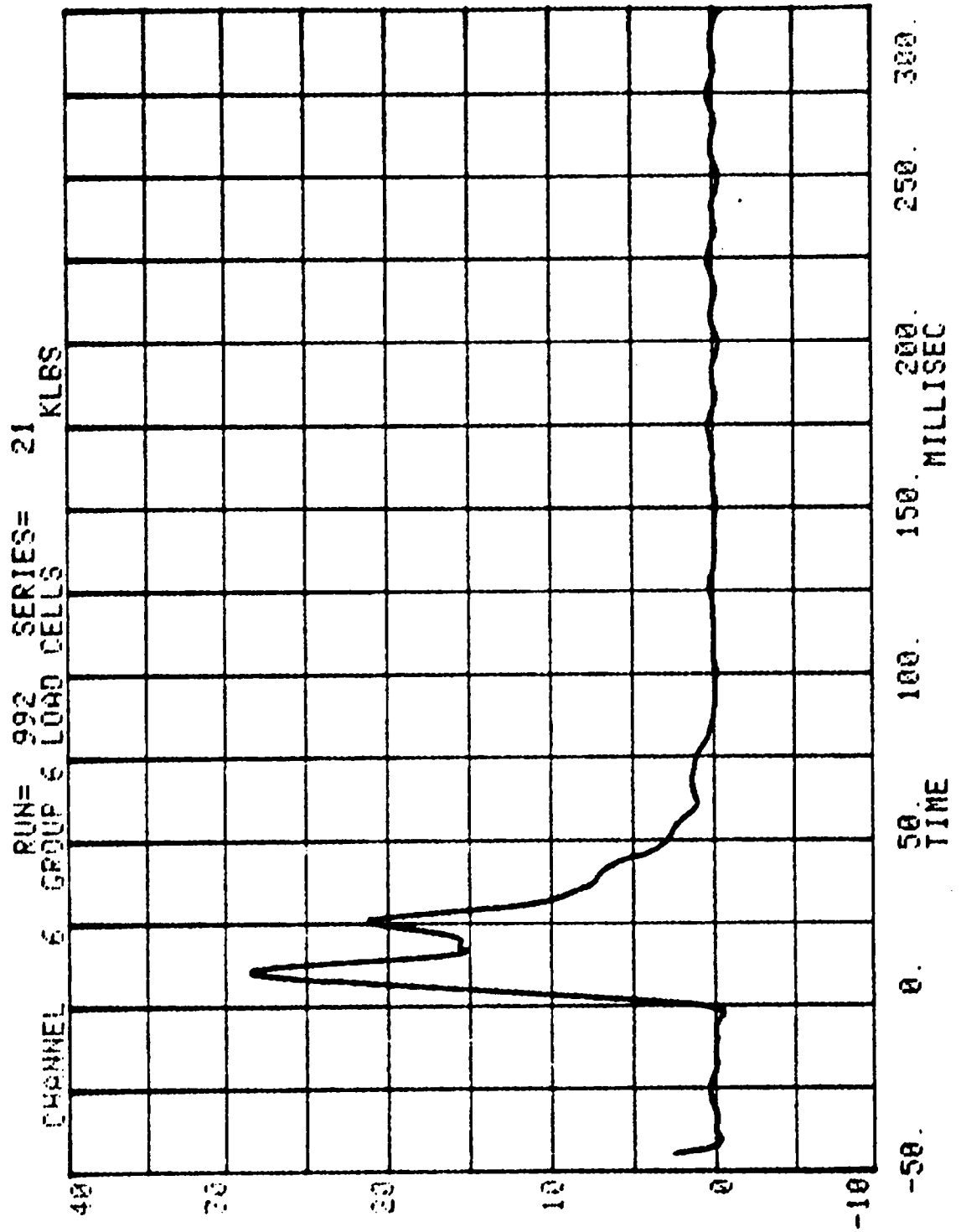
7776-21

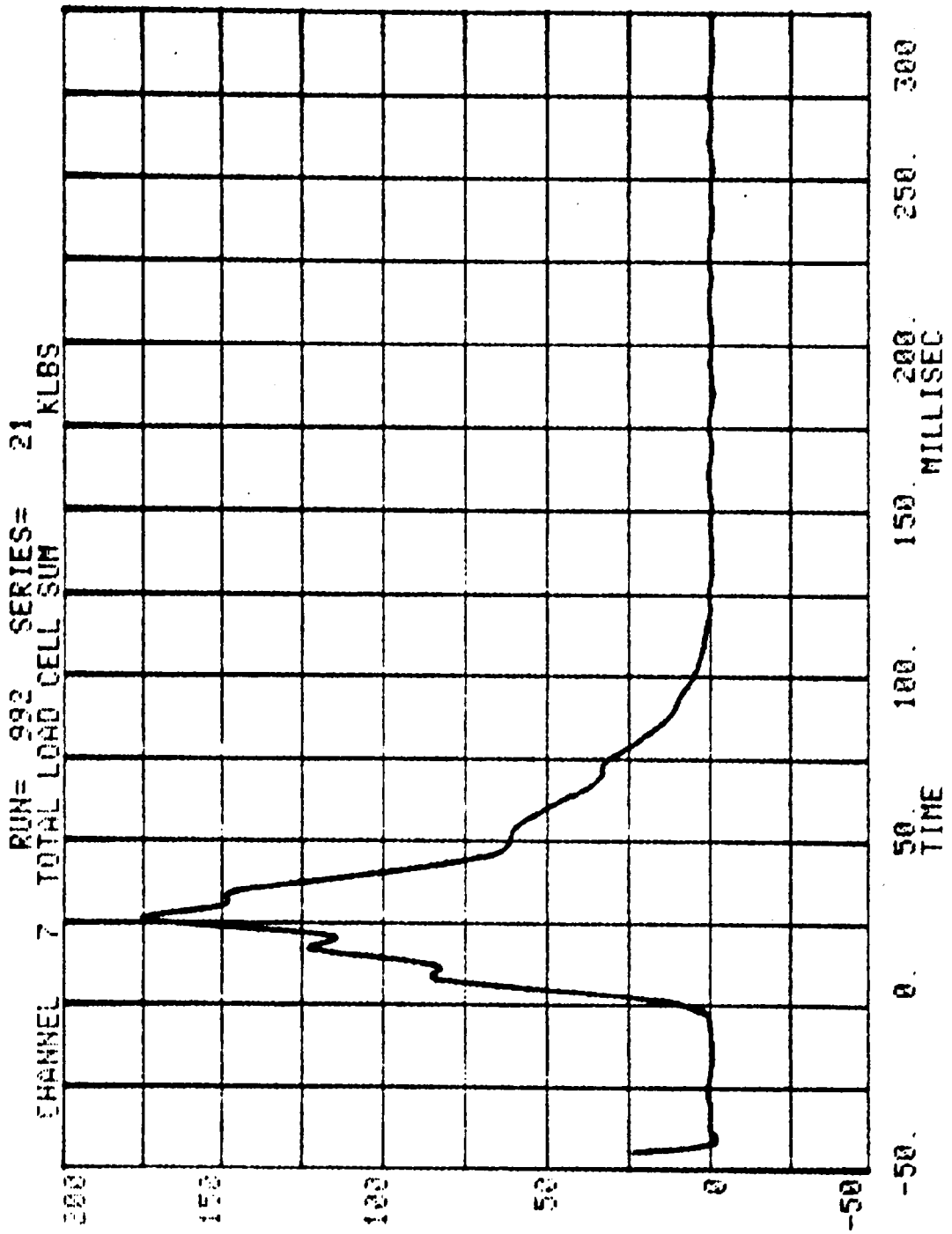

CHANNEL 2 SCALE 3 LOAD CELLS
RUN= 999 SERIES= 21
MLBS
40
20
0
-10
-50
0
50
100
150
200
250
300
TIME
MILLISEC

7776-21


CHANNEL 4 GROUP 4 RUN= 992 SERIES= 21
LOAD CELLS KLBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 5 GROUP 5 LOAD CELLS
RUN= 992 SERIES= 21
KLBS
60
30
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 6 GROUP 6 LOAD CELLS
RUN= 992 SERIES= 21
KLBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 7 TOTAL LOAD CELL SUM
RUN= 992 SERIES= 21
KLBS
200
150
100
50
0
-50
-50. 0. 50. 100. 150. 200. 250. 300
TIME
MILLISEC

TEST NO. ML0302

DUMMY DATA

CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Femur Forces	600
Belt Loads	60

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
3MS. MAXIMUM DURATION

DUMMY TEST #21

POV= 992

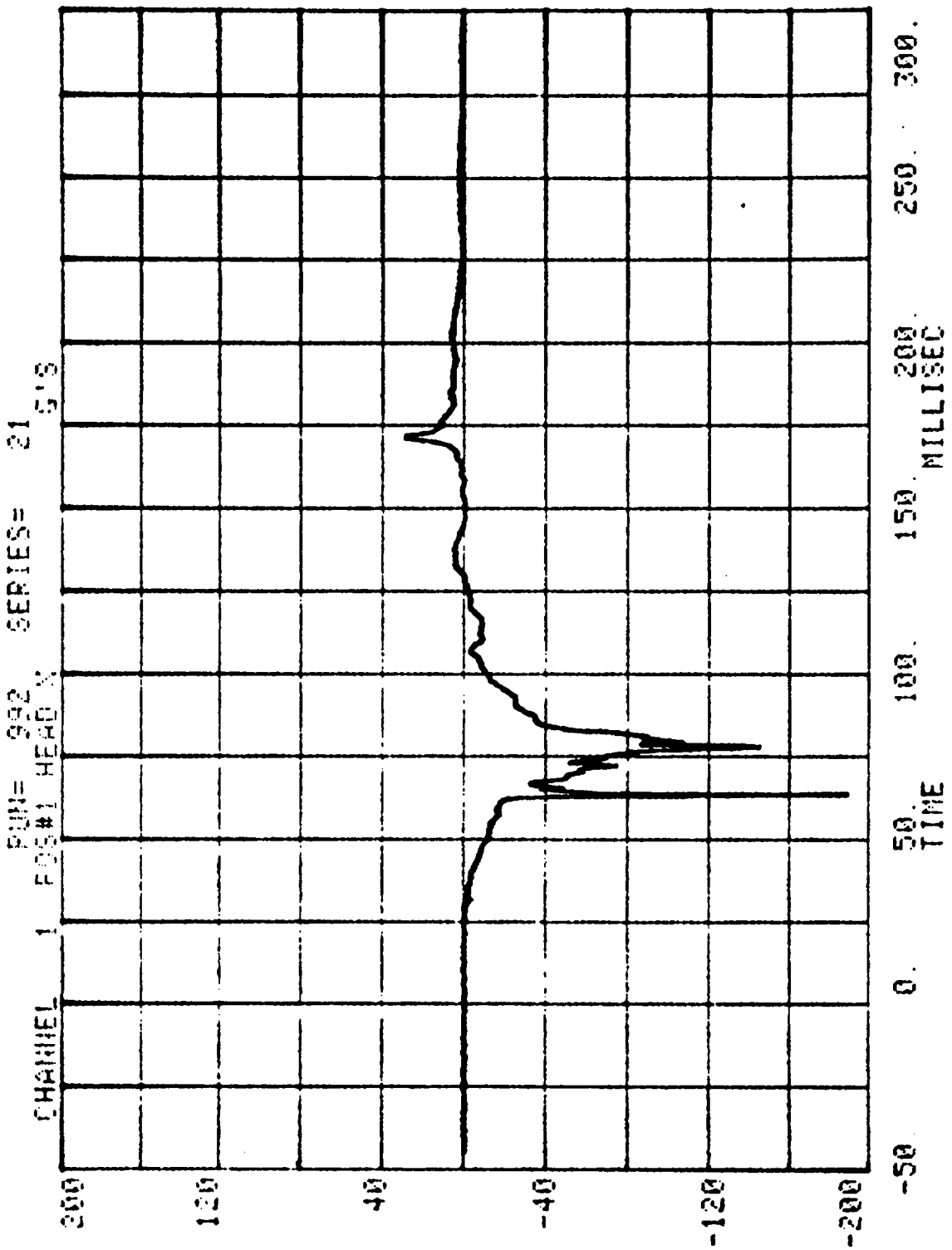
POS #1 HEAD R

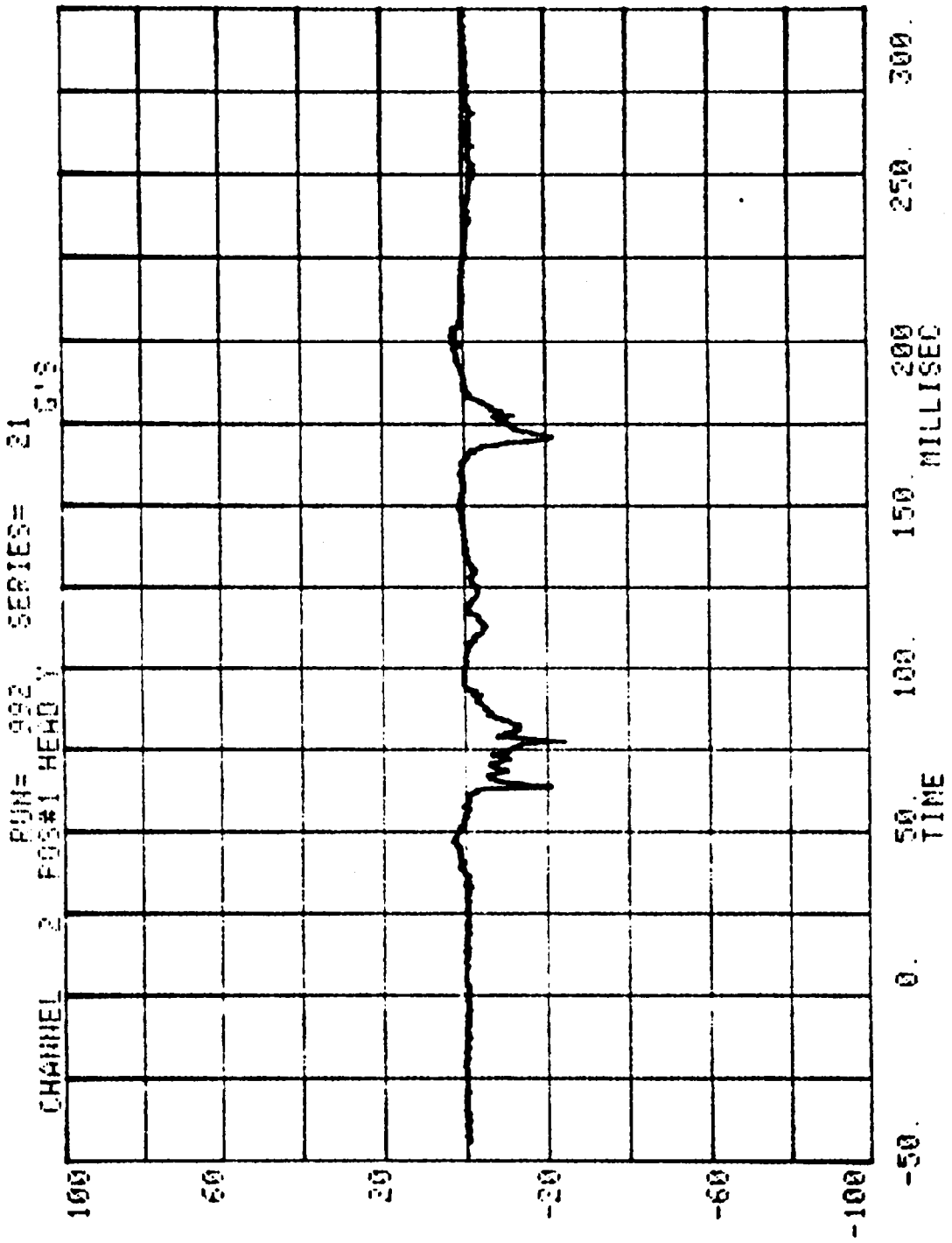
HIC=1169.4 FROM T1= .05685 TO T2= .08415

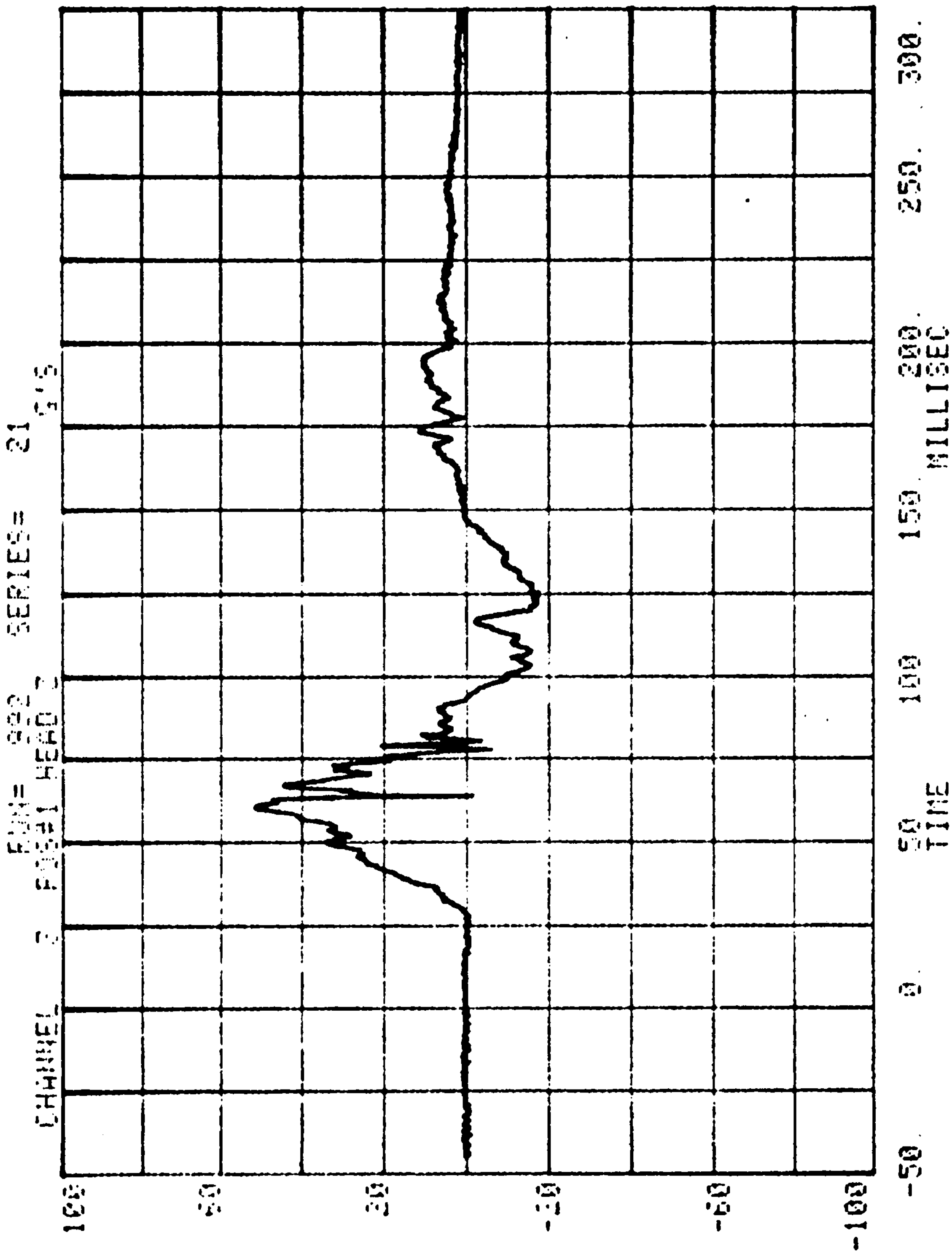
AVERAGE ACCELERATION BETWEEN T1 AND T2= 71.253

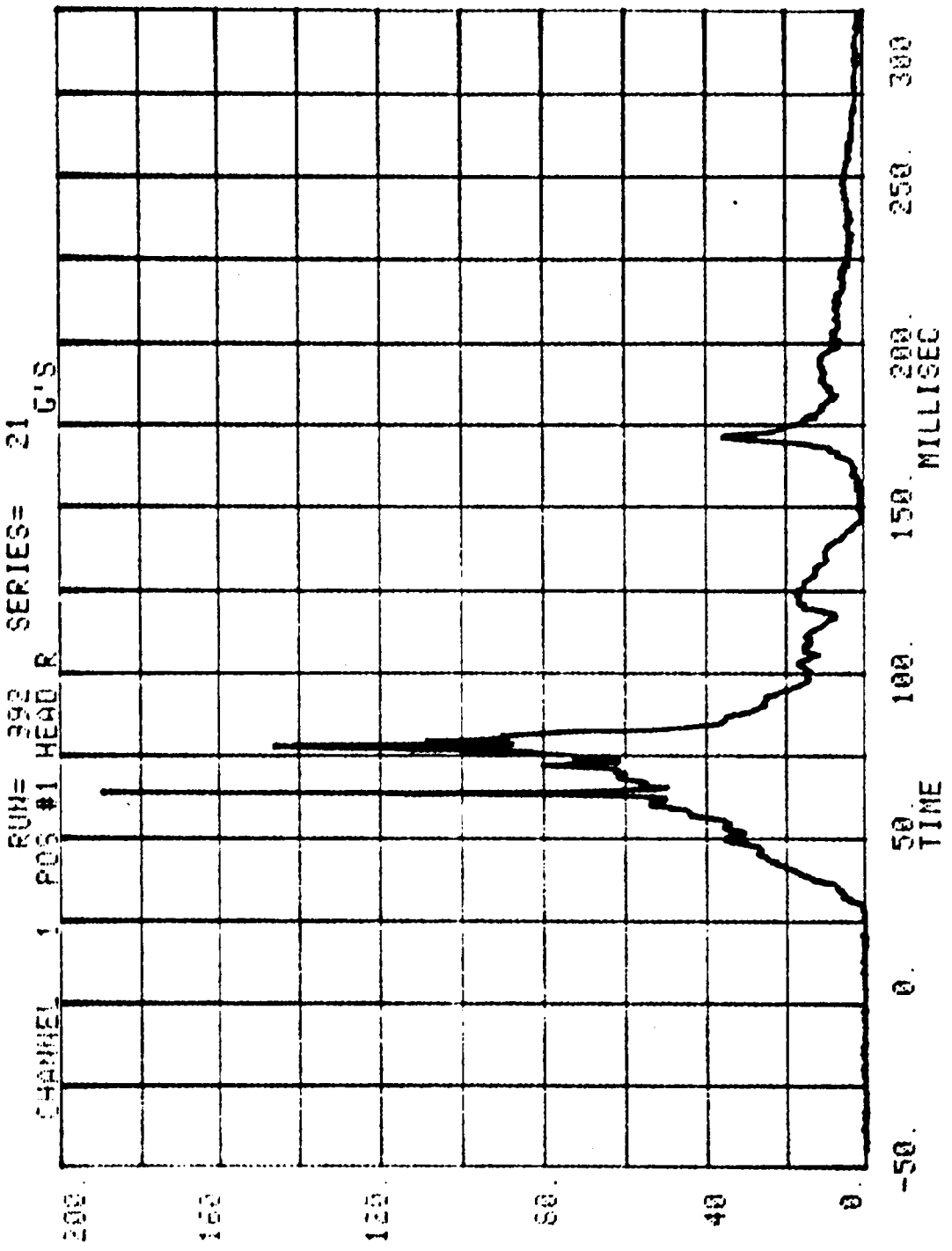
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1719.1

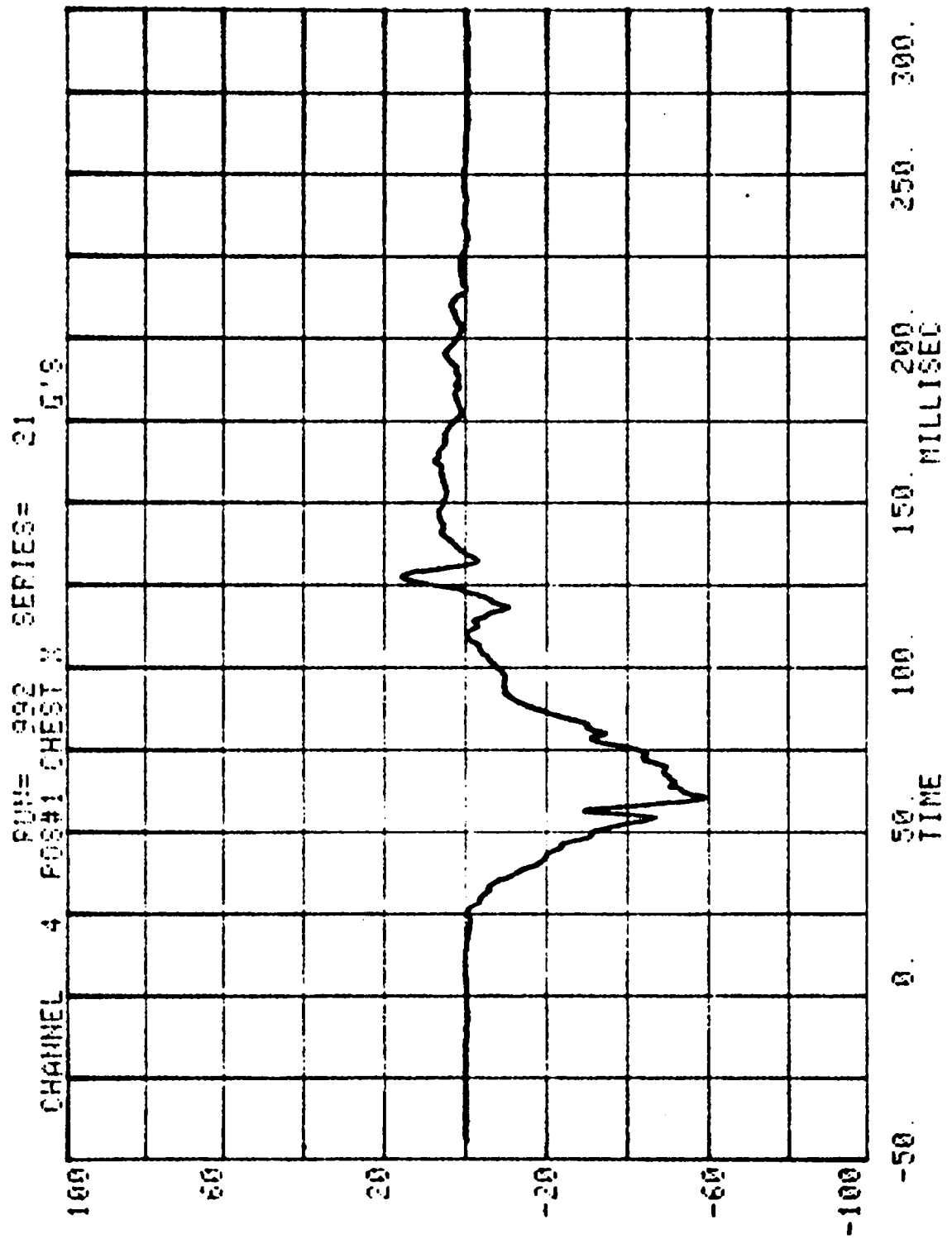

CHANNEL 1 POS#1 HEAD 0
RUN= 992 SERIES= 21 5'S
200
120
40
-40
-120
-200
-50
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

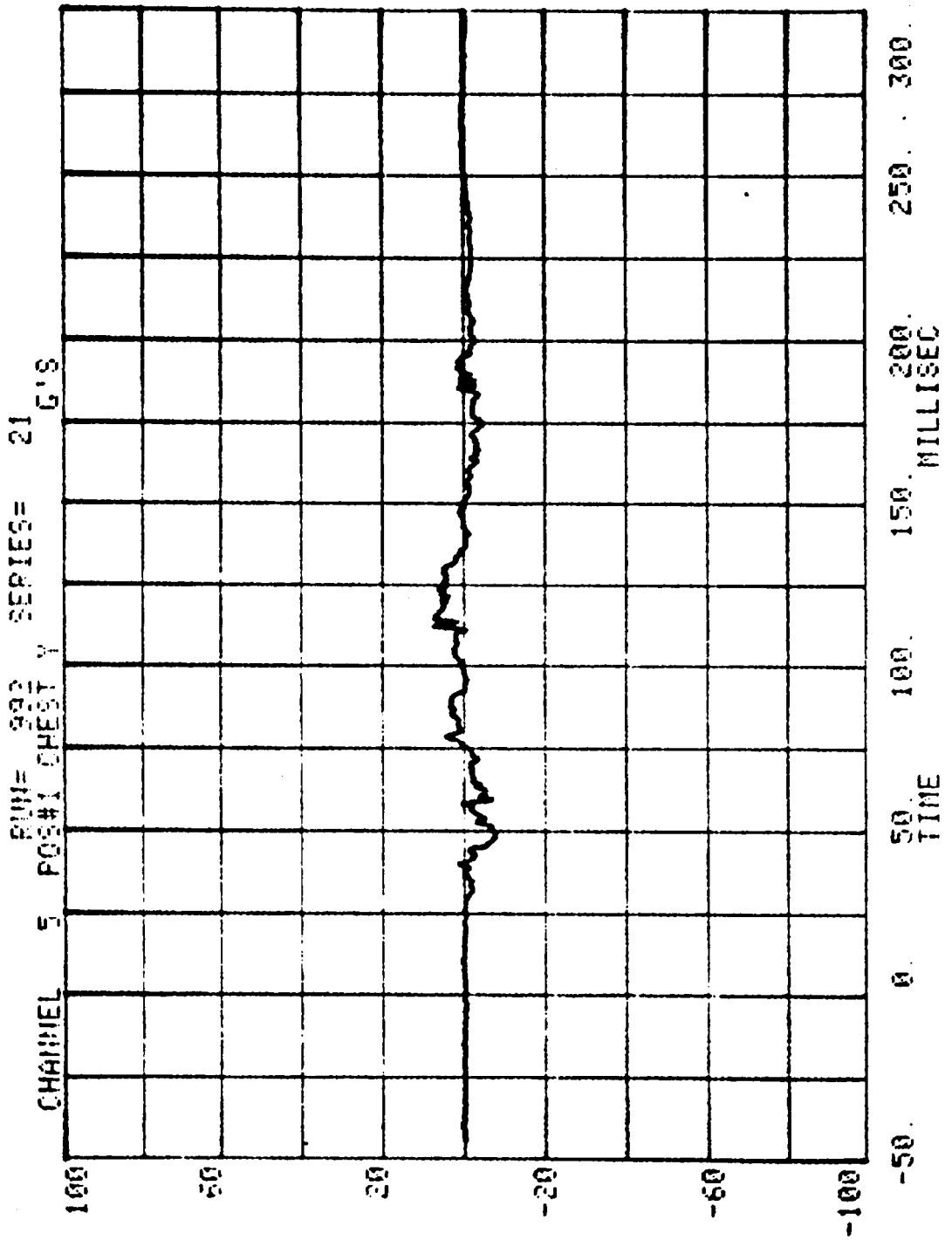

CHANNEL 2 FOS#1 HEAD Y
RUN= 992 SERIES= 21 G'S
100
50
0
-50
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

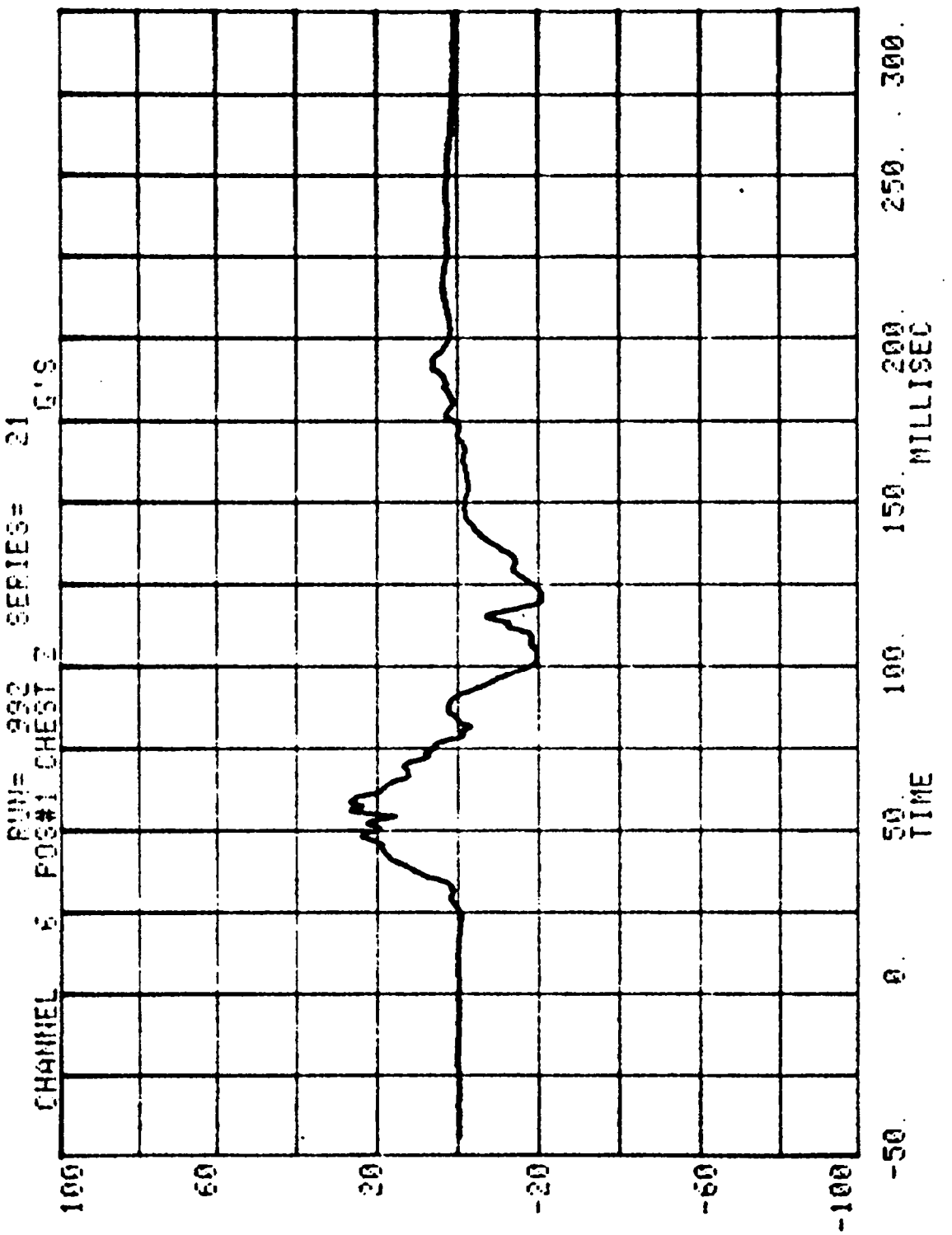

CHANNEL
RUN=
SERIES= 21
G'S
TIME
MILLISEC
-50
0
50
100
150
200
250
300.
100
50
30
-10
-60
-100

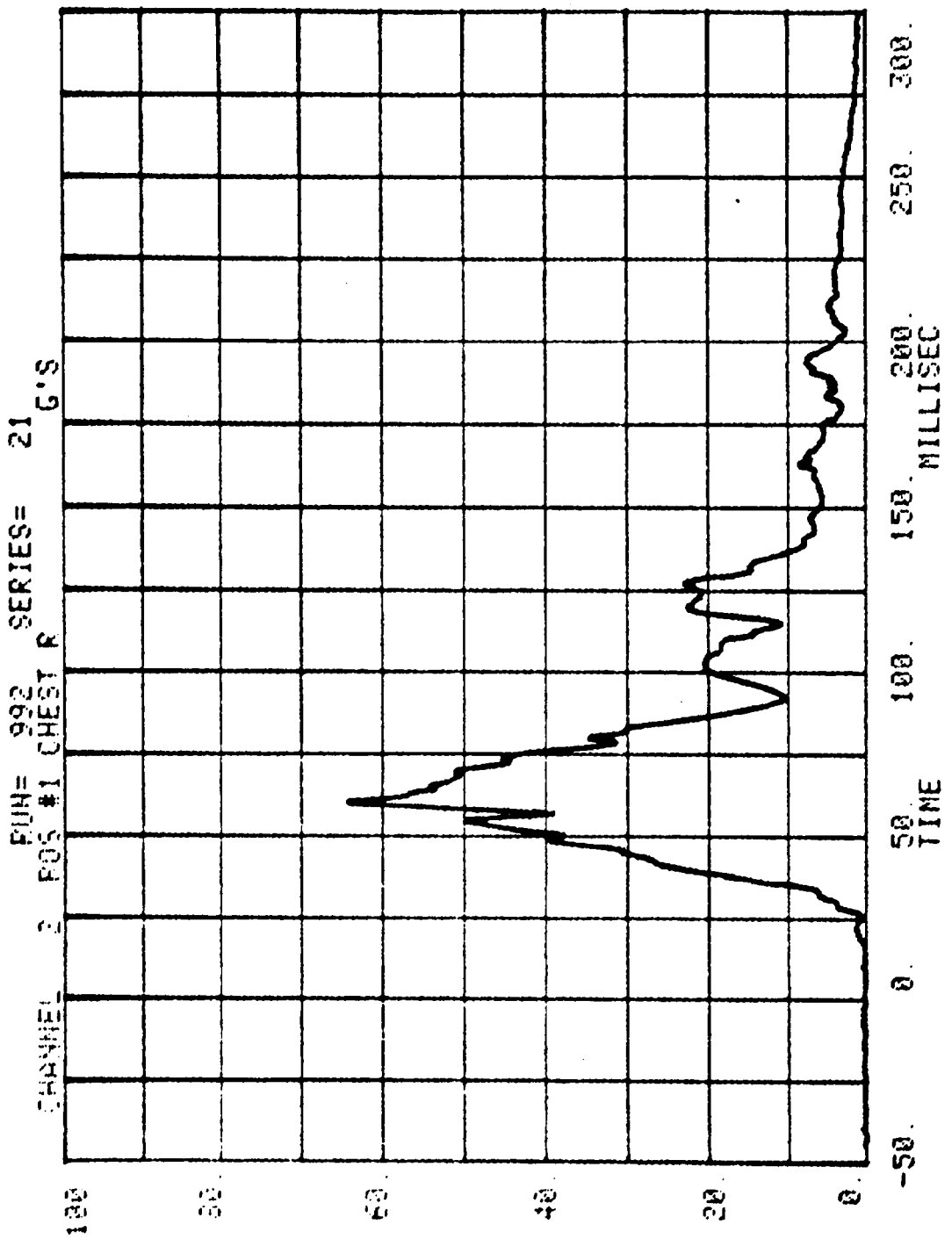

CHANNEL 1 POS #1 HEAD R
RUN= 392 SERIES= 21
G'S
200.
150.
100.
50.
0.
-50. 0. 50. 100. 150. 200. 250. 300.
TIME
MILLISEC

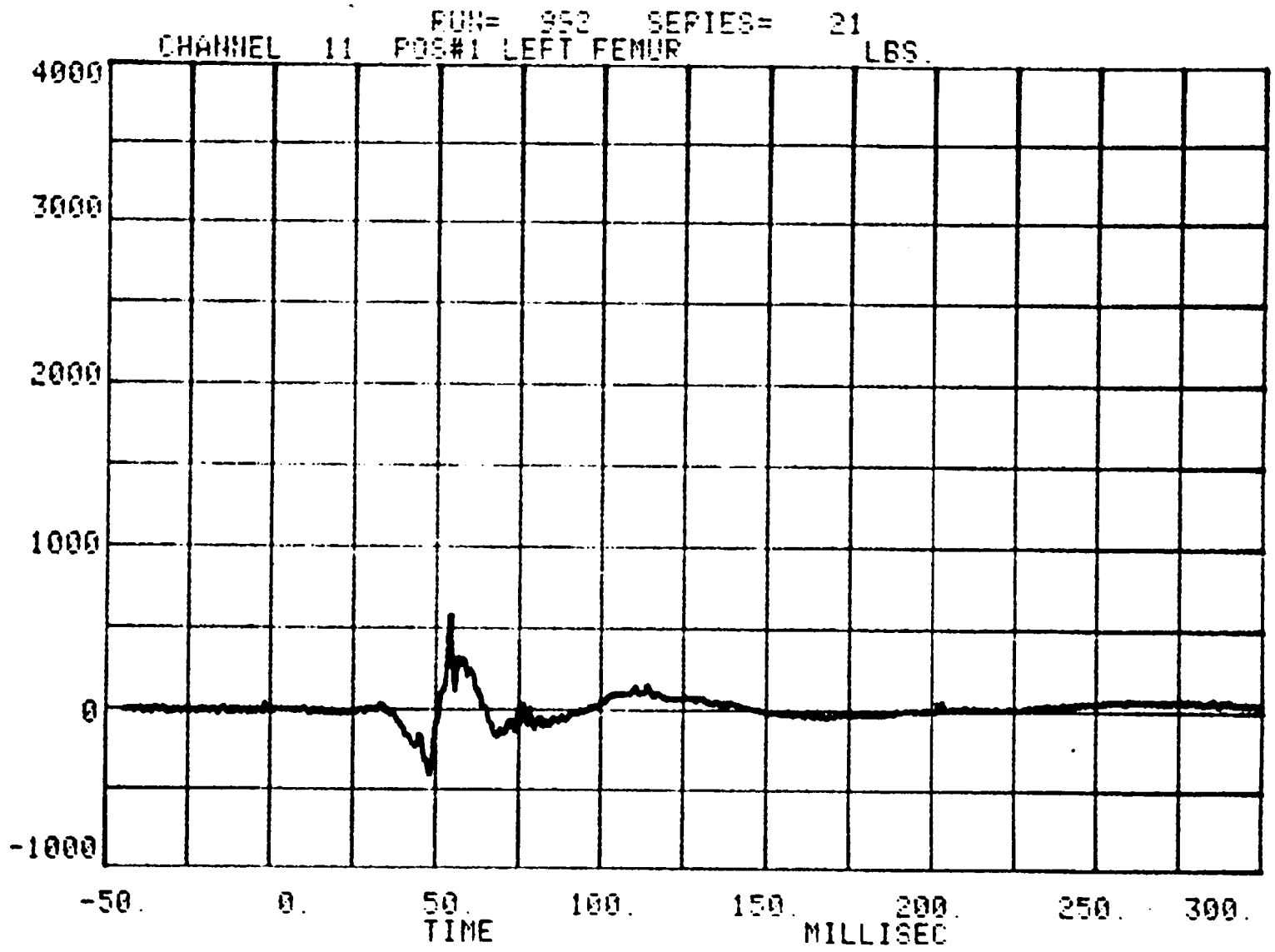
7776-21

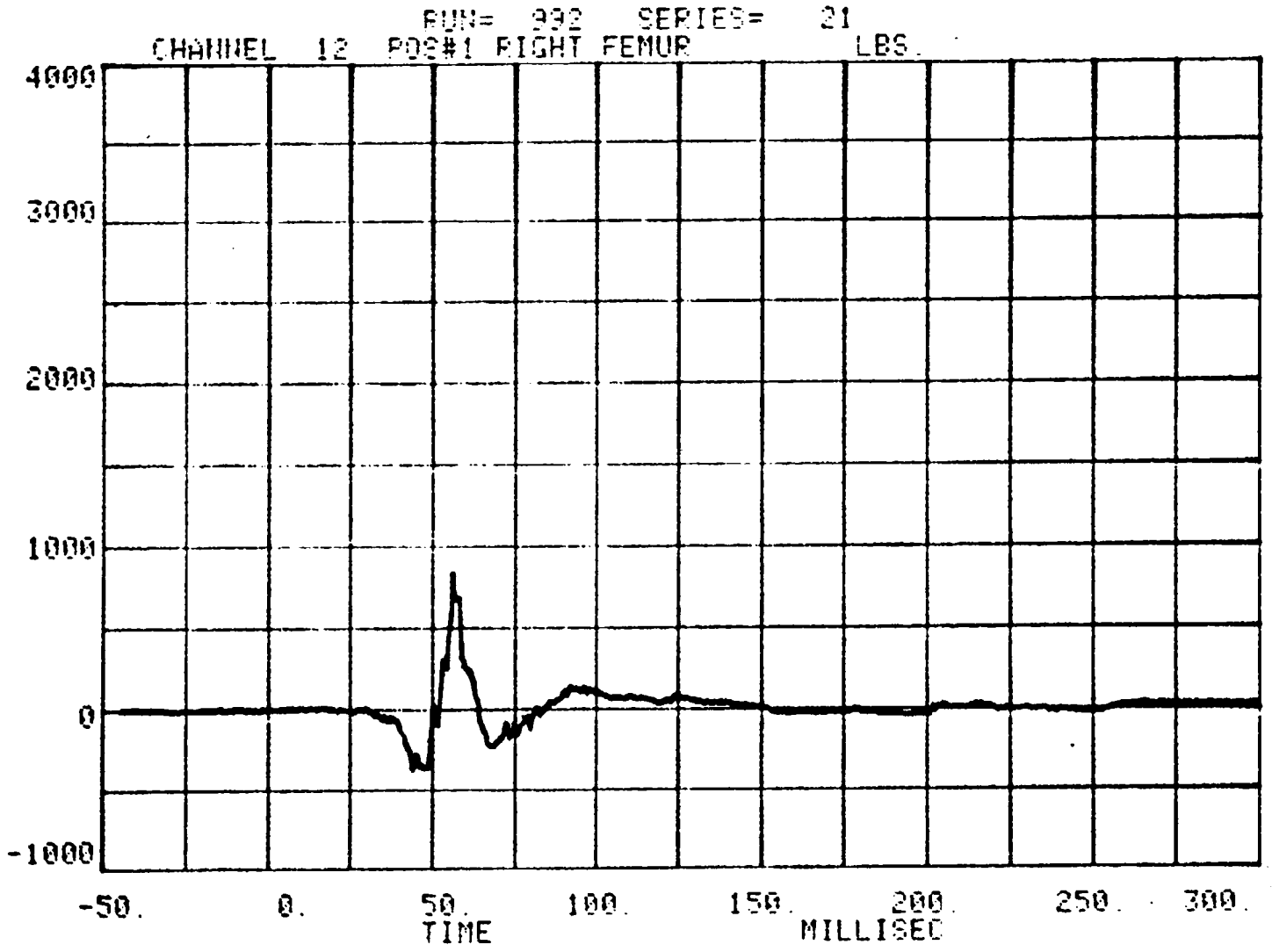

CHANNEL 4 FOSM1 CHEST X
RUN= 992 SERIES= 21 G'S
100
50
0
-50
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

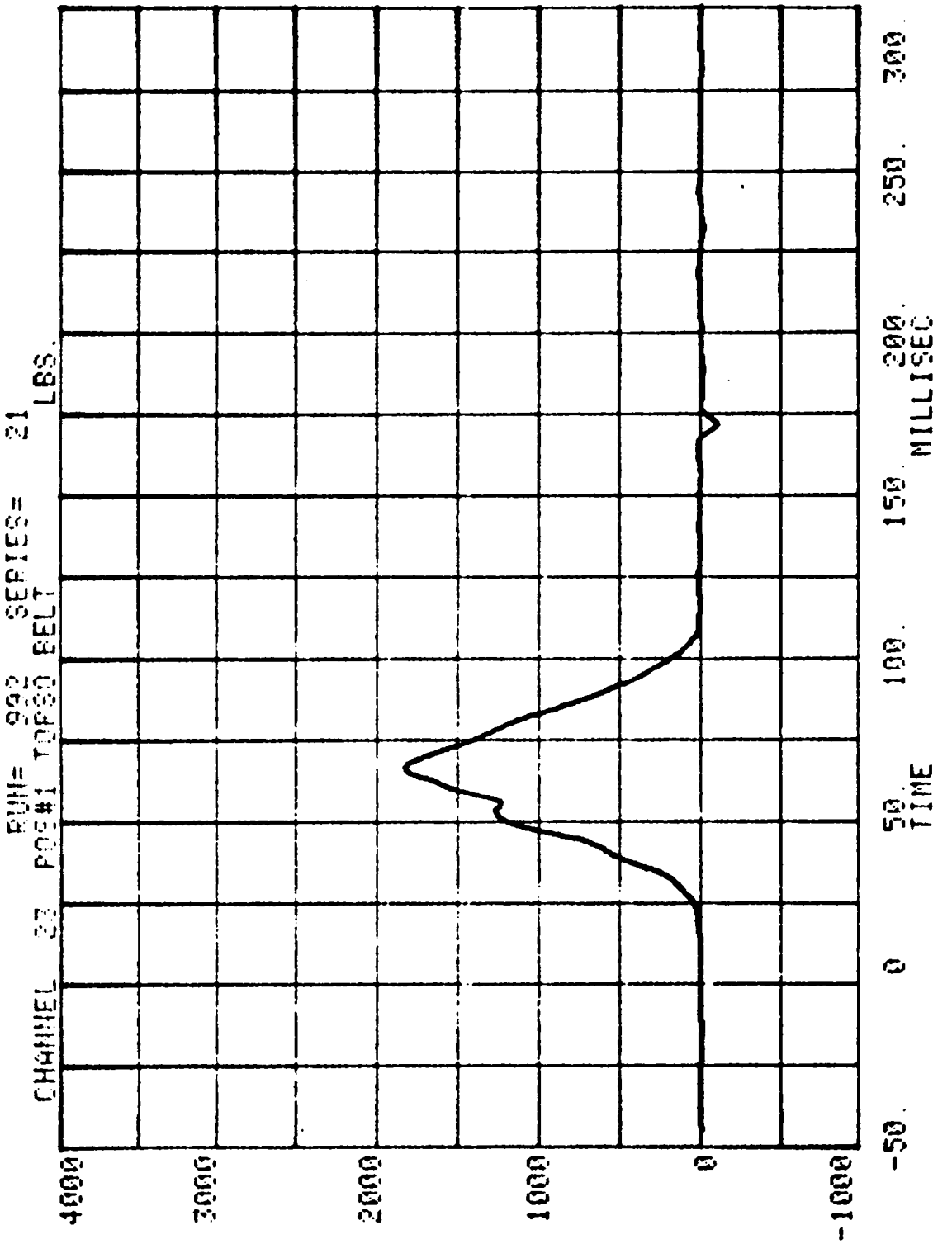

CHANNEL 5 POS#1 CHEST Y
RUN= 333 SERIES= 21
G'S
100
50
20
-20
-60
-100
-50.
0
50.
TIME
100.
150.
200.
MILLISEC
250.
300.

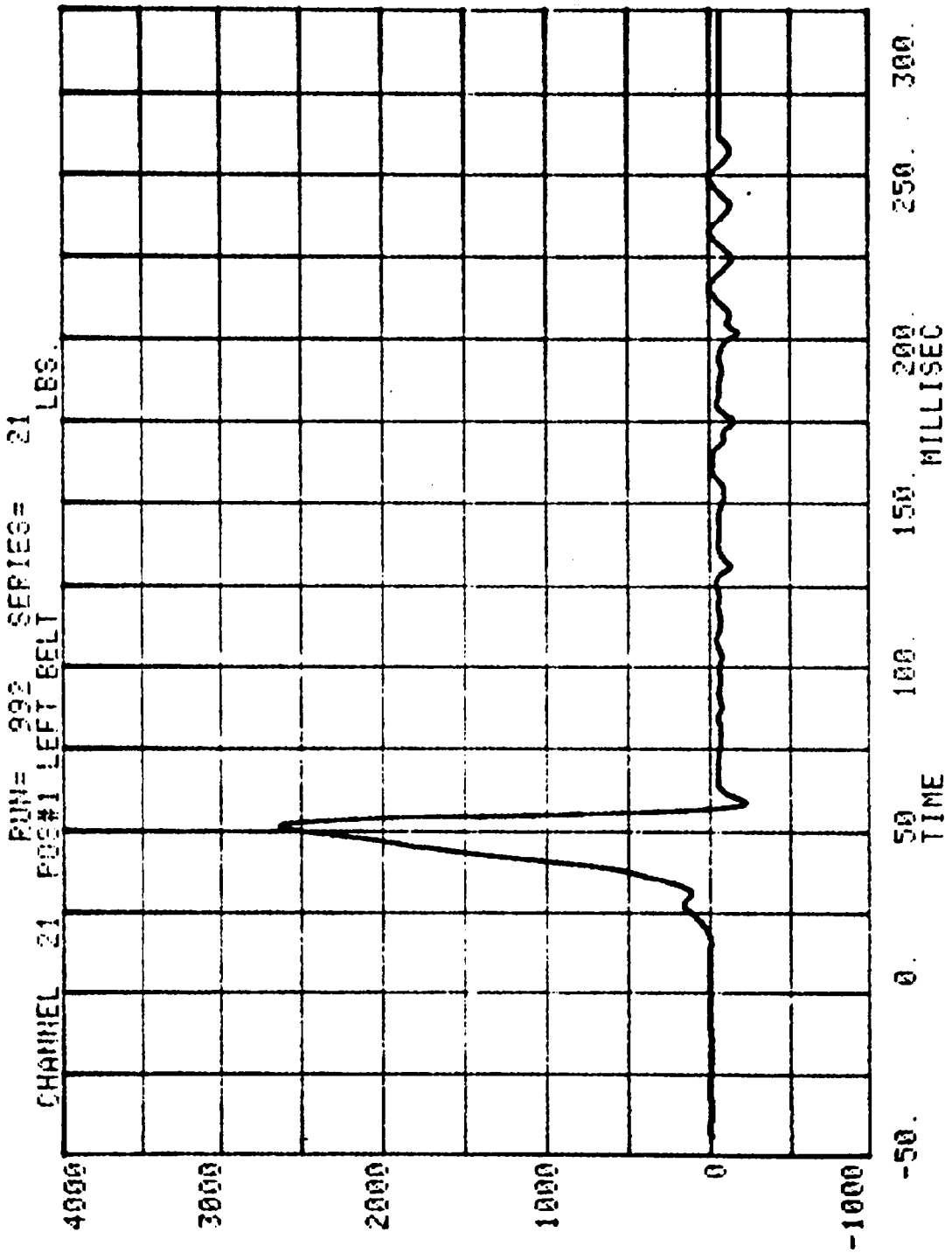

CHANNEL 2 POS#1 CHEST 2
RUN= 992 SERIES= 21
G'S
100
60
20
-20
-60
-100
-50
0
50
100
150
200
250
300
TIME
MILLISEC


RUN= 992 SERIES= 21
CHANNEL 3 POS #1 CHEST R
G'S
MILLISEC
TIME
-50.
0.
50.
100.
150.
200.
250.
300.
0.
20.
40.
60.
80.
100.


RUN= 952 SERIES= 21
CHANNEL 11 POS#1 LEFT FEMUR LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

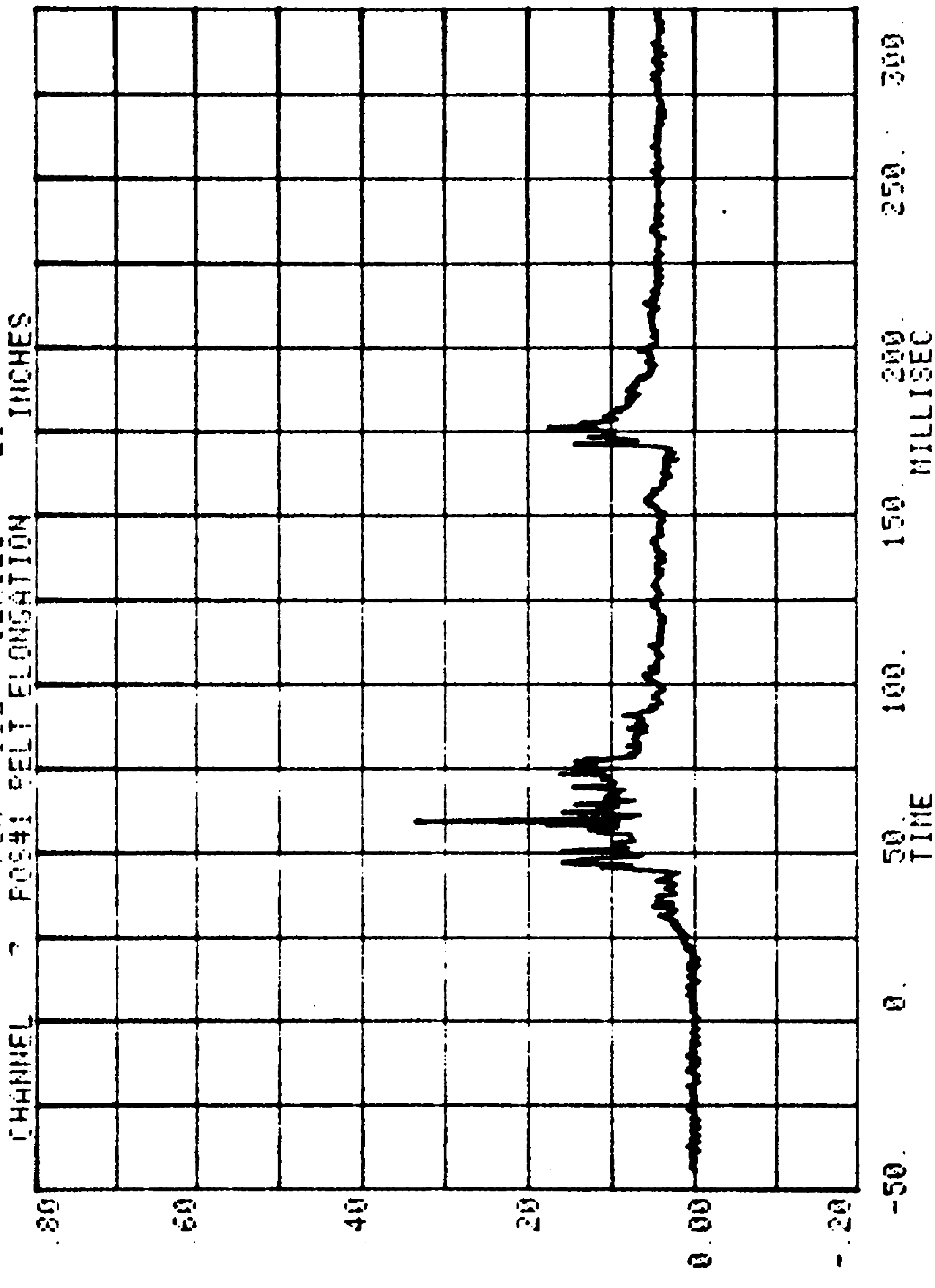

RUN= 992 SERIES= 21
CHANNEL 12 POS#1 RIGHT FEMUR LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

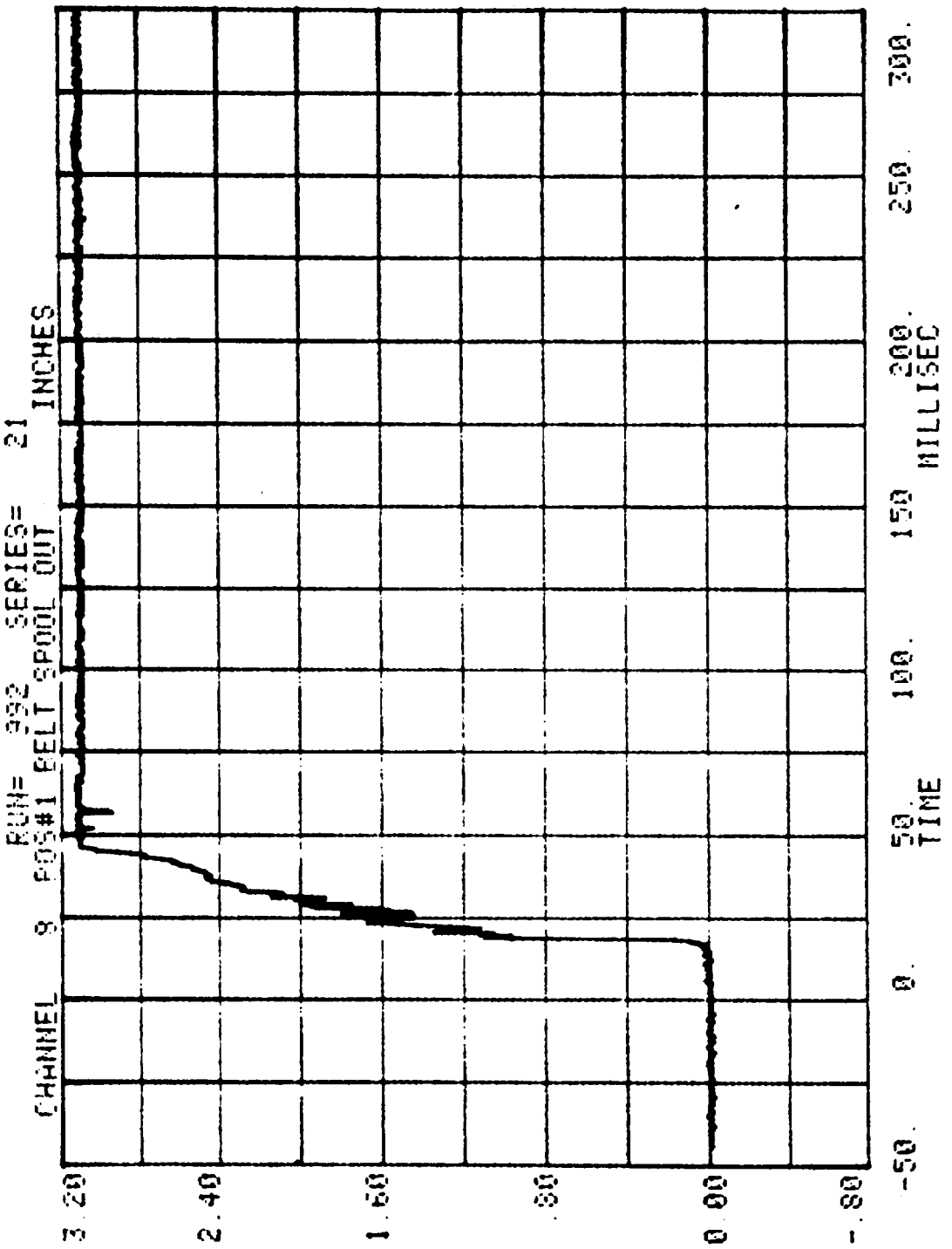

CHANNEL 22 POS#1 TORSO BELT
RUN= 992 SERIES= 21
LBS.
4000
3000
2000
1000
0
-1000
-50
0
50
100
150
200
250
300
TIME
MILLISEC


CHANNEL 21 POS#1 LEFT BELT
RUN= 992 SERIES= 21
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50
100
150.
200.
250.
300.
TIME
MILLISEC

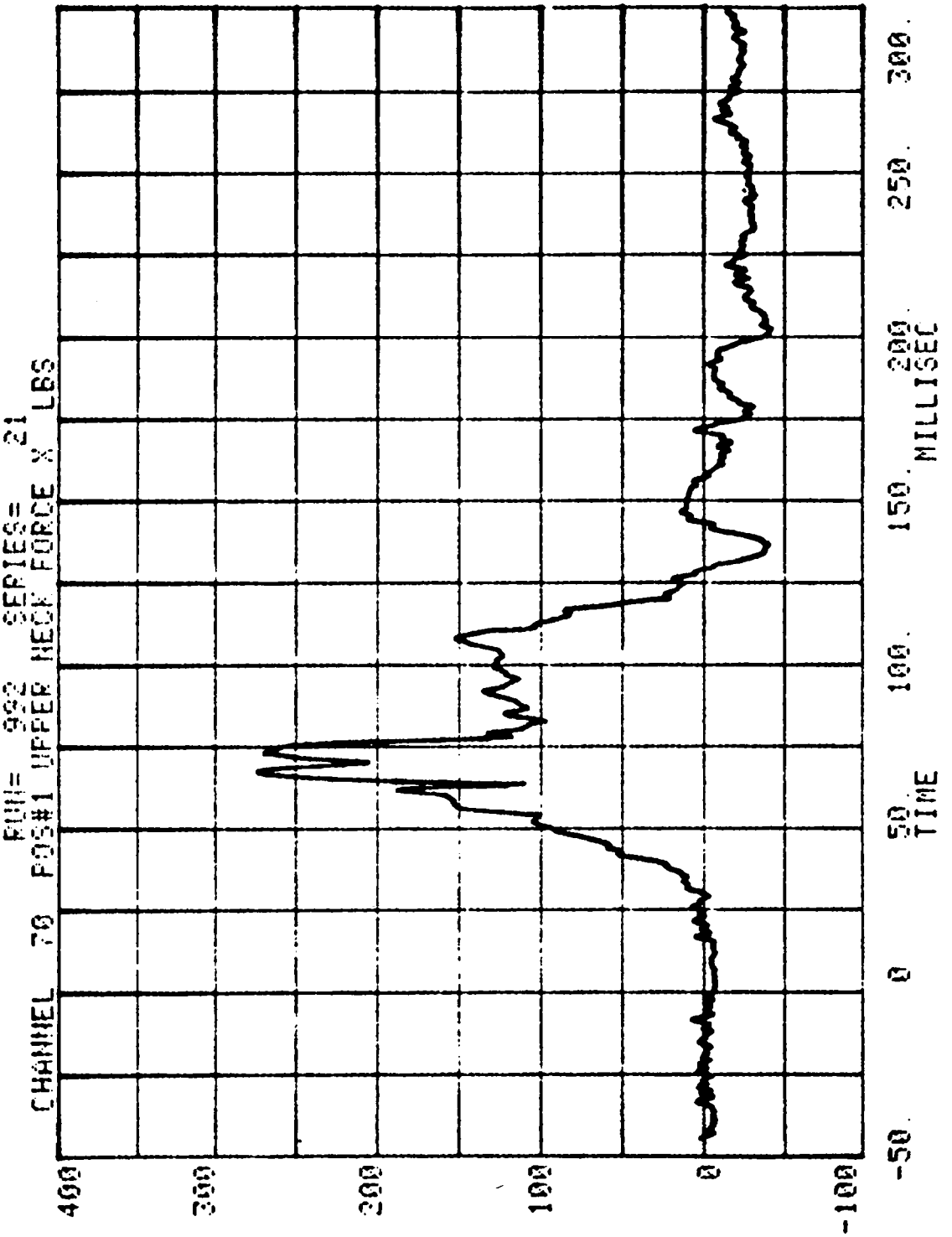
7776-21

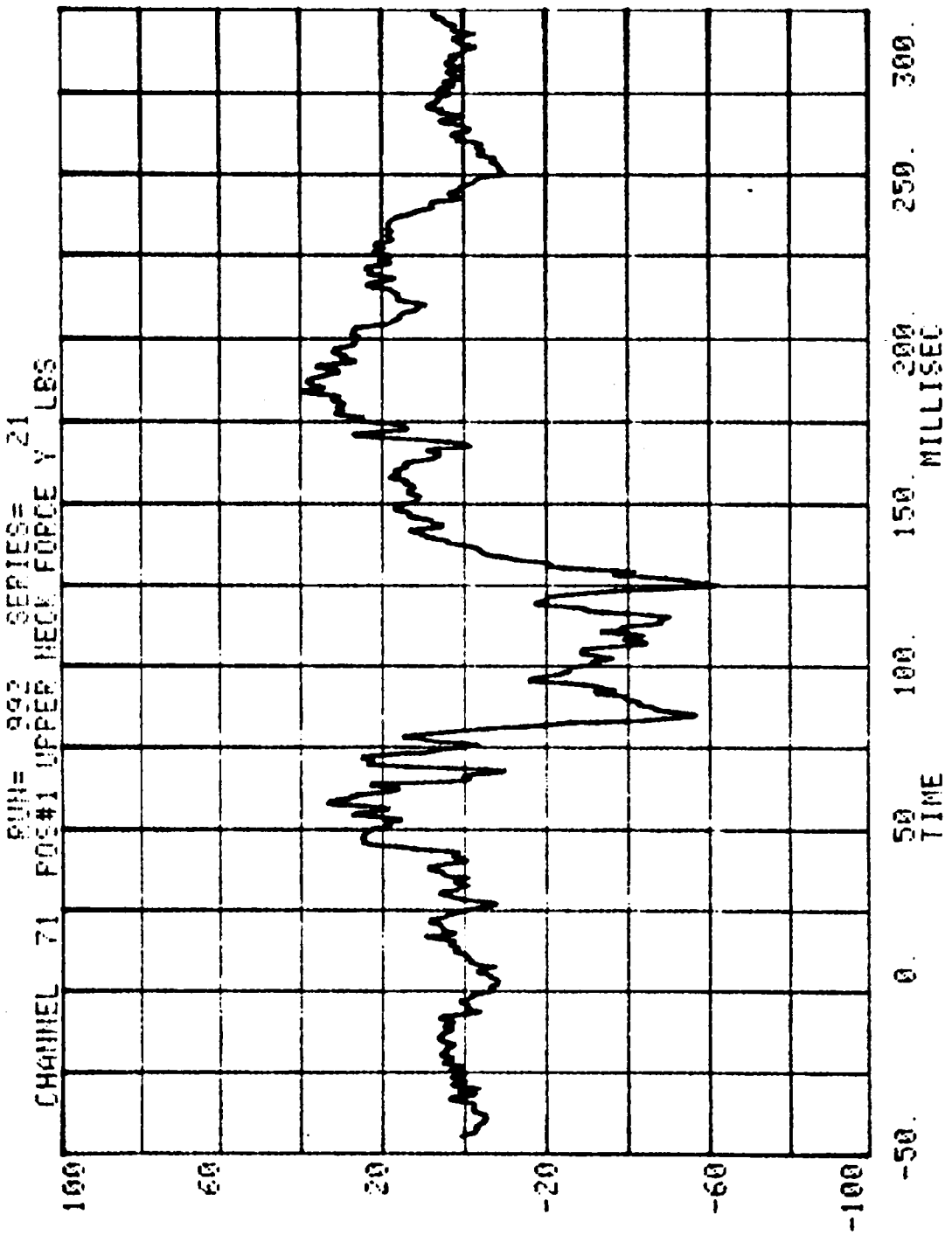
Measured over
2.5 inches



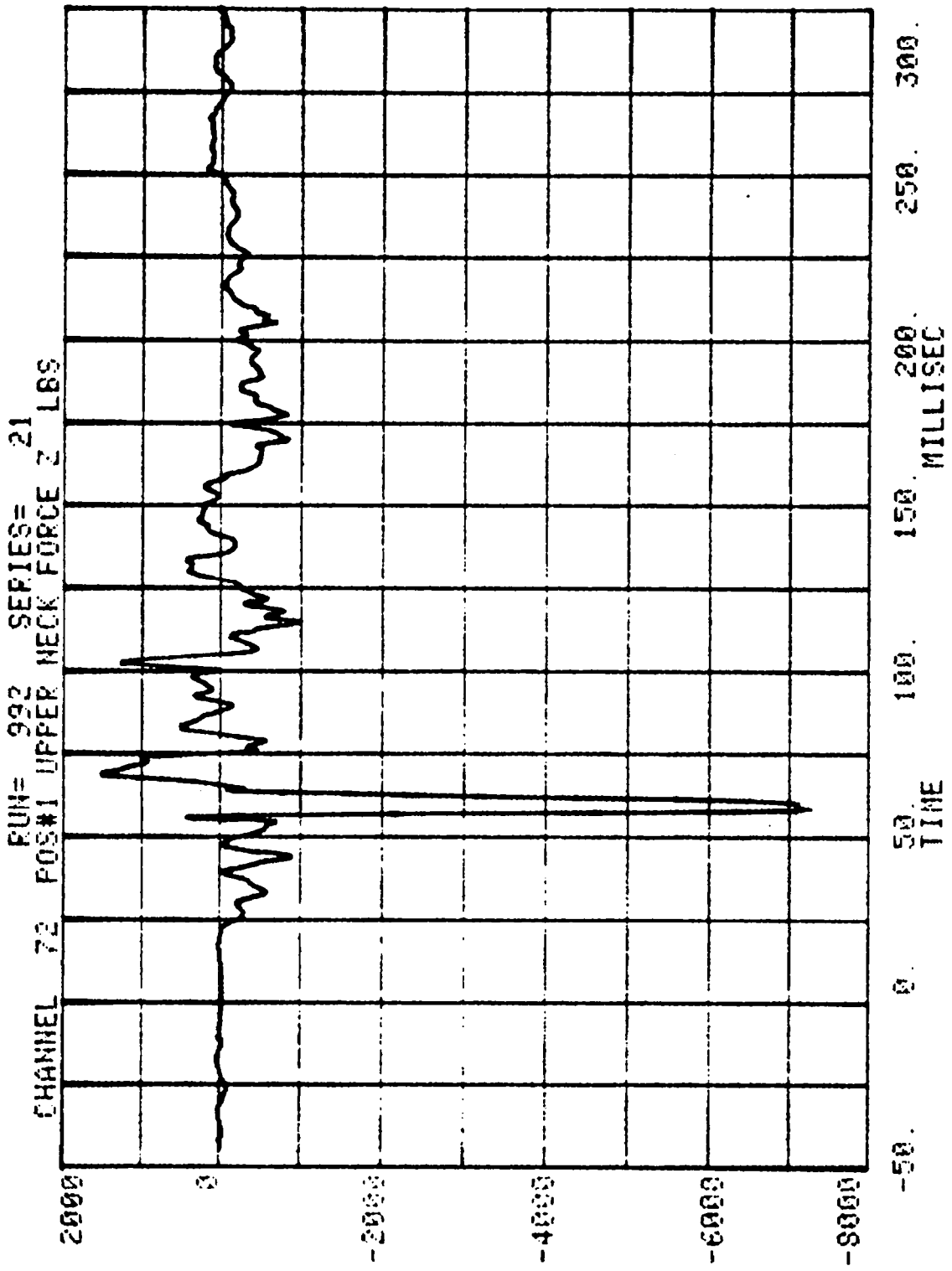

CHANNEL 8 POS#1 BELT SPOOL OUT
RUN= 392 SERIES= 21
INCHES
3.20
2.40
1.60
.80
0.00
-.80
-50.
0.
50.
100.
150
200.
250
300.
TIME
MILLISEC

7776-21

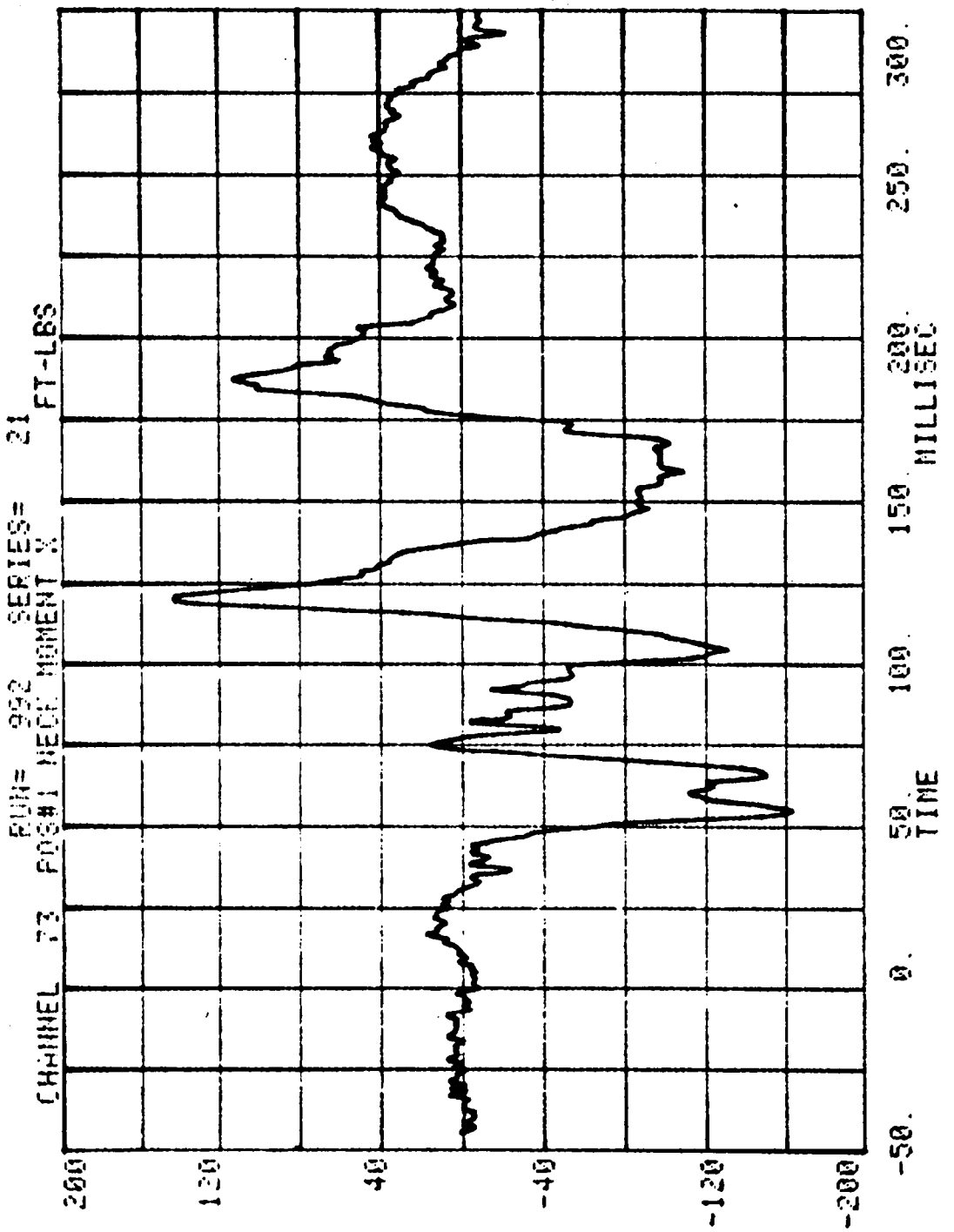

CHANNEL 70 POS#1 UPPER NECK FORCE X LBS
RUN= 922 SERIES= 21
400
300
200
100
0
-100
-50
0
50
100
150
200
250
300
TIME
MILLISEC

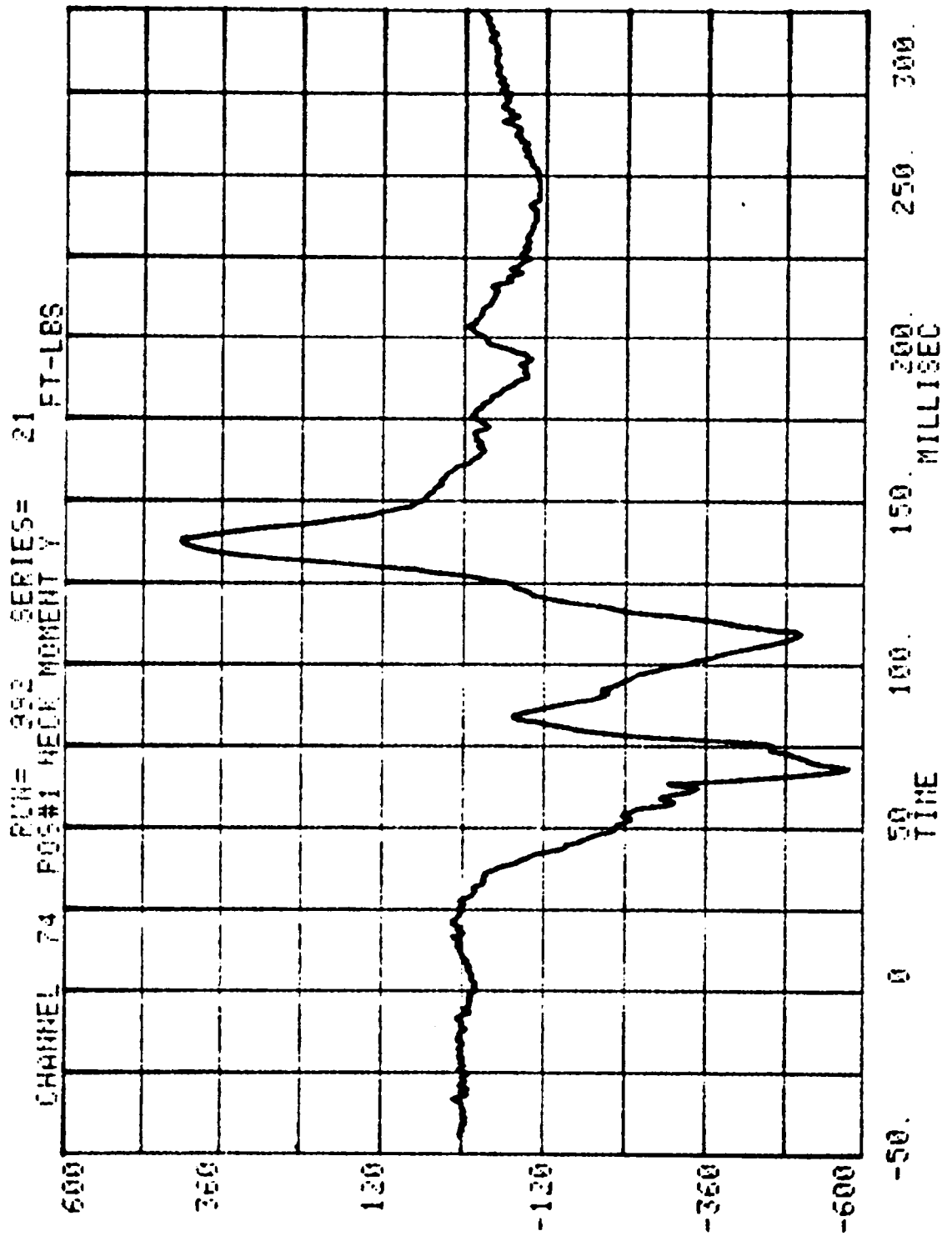

CHANNEL 71 POS#1 UPPER NECK FORCE Y LBS
RUN= 992 SERIES= 21
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

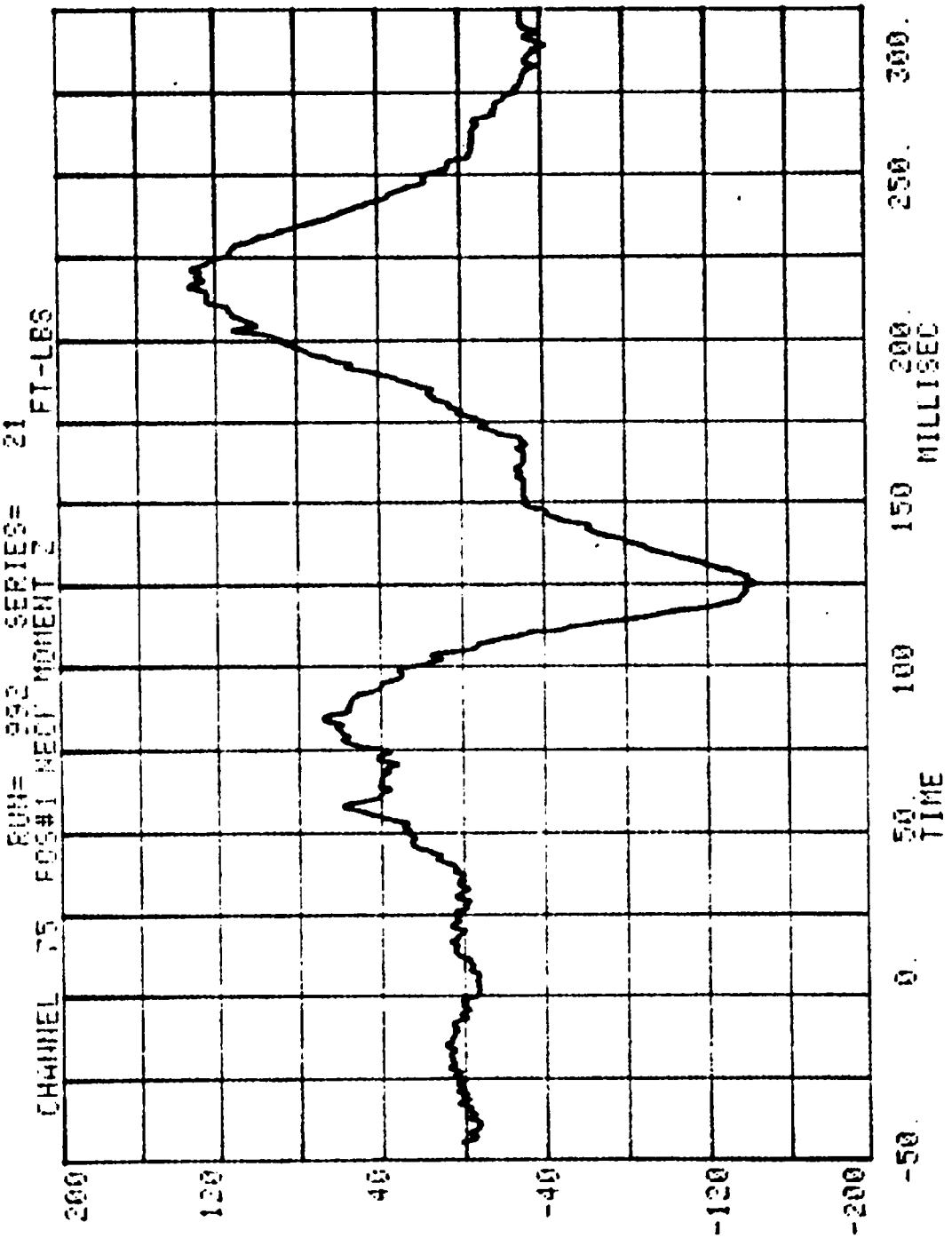
7776-21

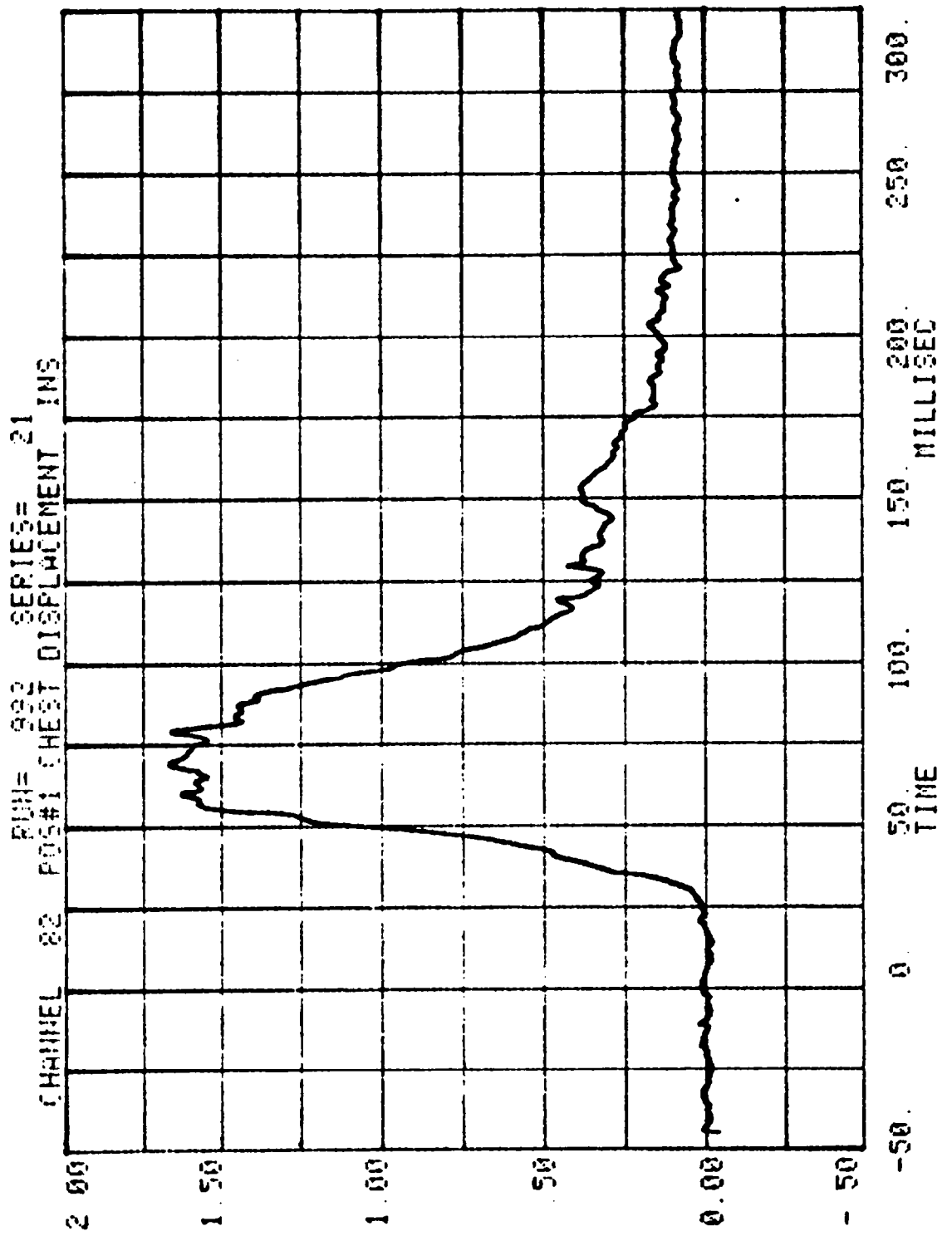

CHANNEL 72 POS#1 UPPER NECK FORCE Z LBS
RUN= 992 SERIES= 21
2000
0
-2000
-4000
-6000
-8000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21


CHANNEL 73 POS#1 NECK MOMENT X
RUN= 992 SERIES= 21
FT-LBS
200
120
40
-40
-120
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 74 POS#1 NECK MOMENT Y
RUN= 952 SERIES= 21
FT-LBS
600
300
130
-130
-300
-600
-50.
0
50
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 75 FOS#1 HEAD MOMENT 2
RUN= 332 SERIES= 21
FT-LBS
200
100
0
-40
-120
-200
-50
50
100
150
200
250
300
TIME
MILLISEC


CHANNEL 82 POS#1 CHEST DISPLACEMENT INS
RUN= 999 SERIES= 21
2.00
1.50
1.00
.50
0.00
-.50
-50.
0
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS MAXIMUM DURATION

NIAR TEST #21

RUN= 992

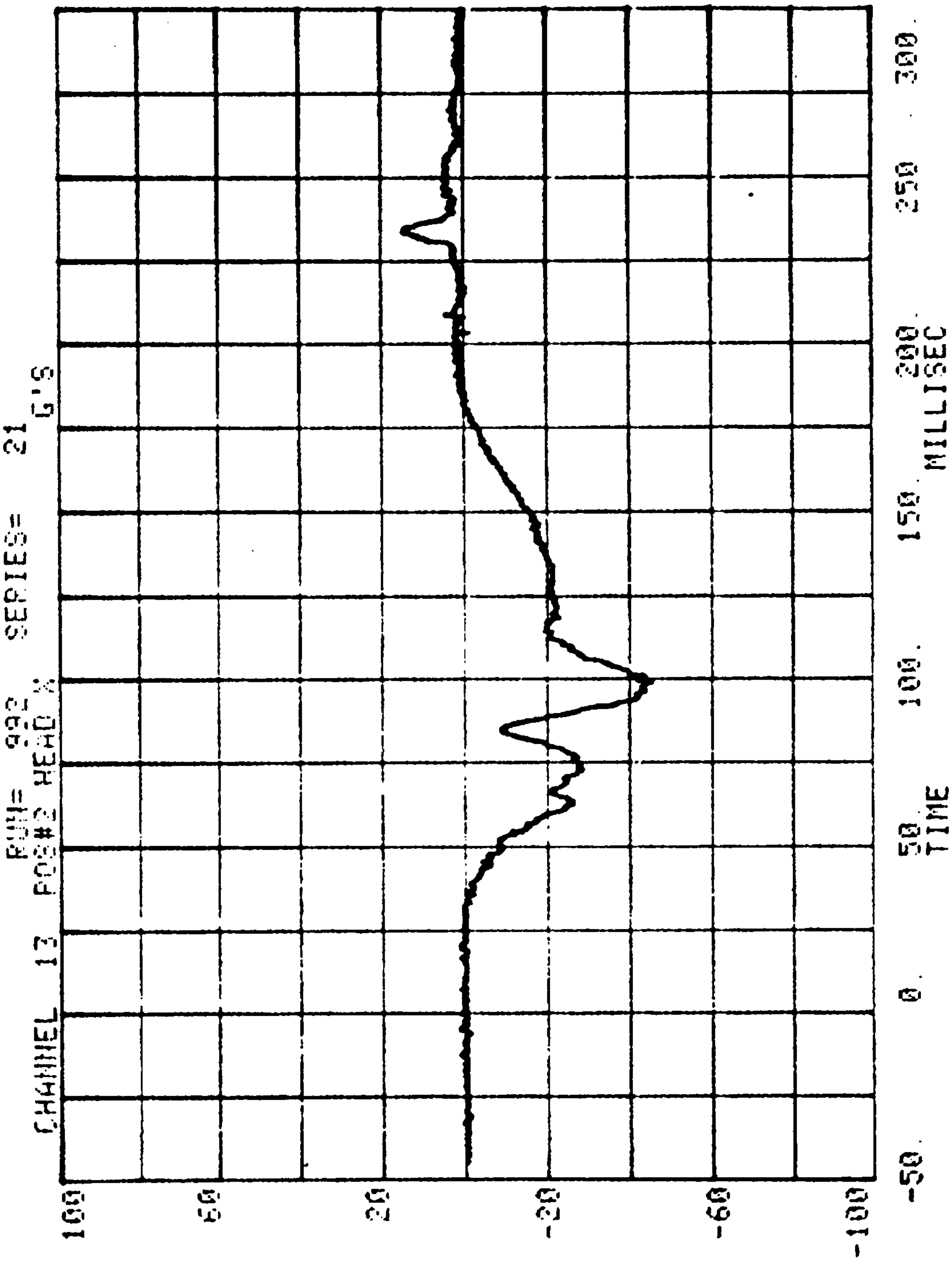
POS #3 HEAD R

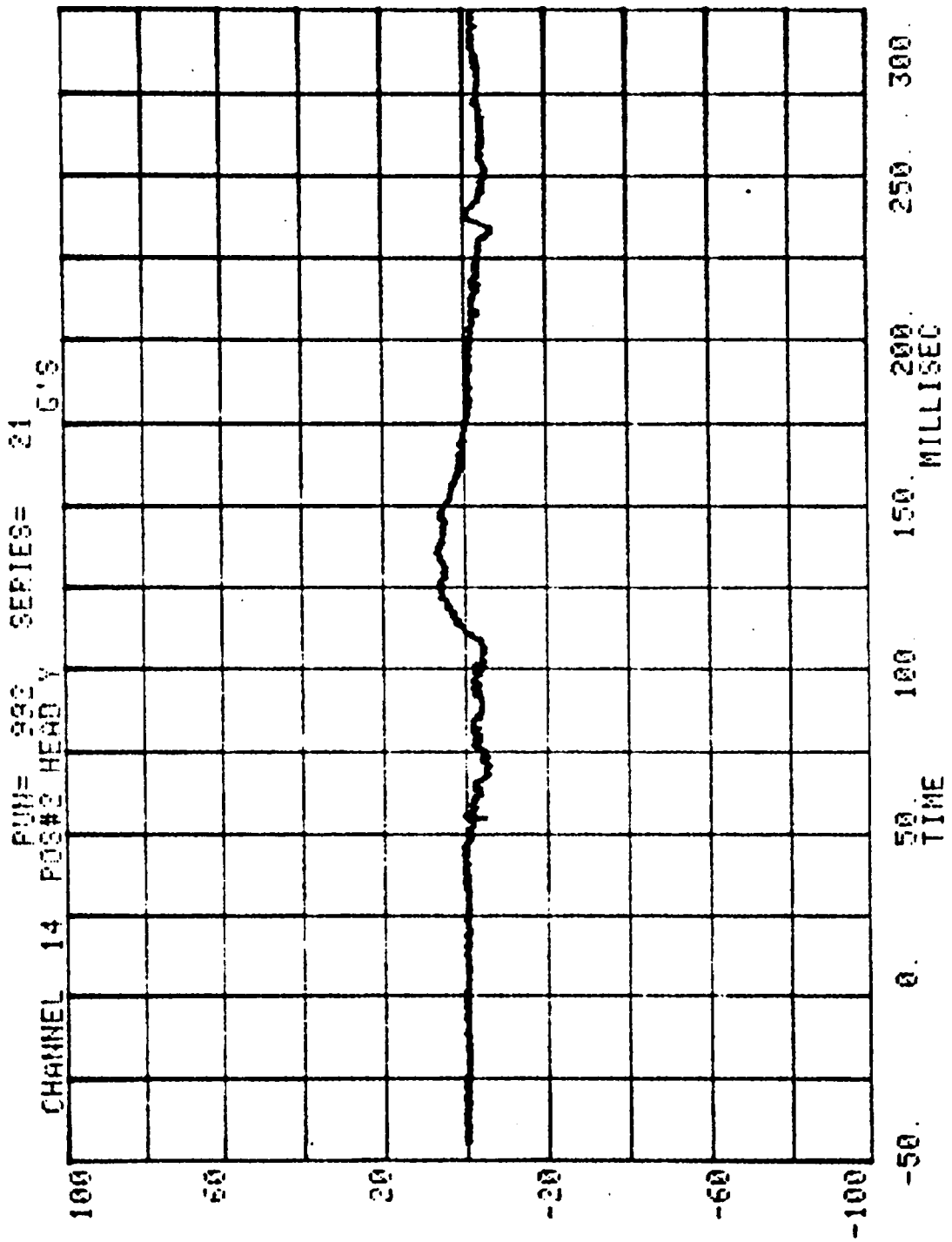
HIC= 557.8 FROM T1= .05392 TO T2= .09532

AVERAGE ACCELERATION BETWEEN T1 AND T2= 17.4G'S

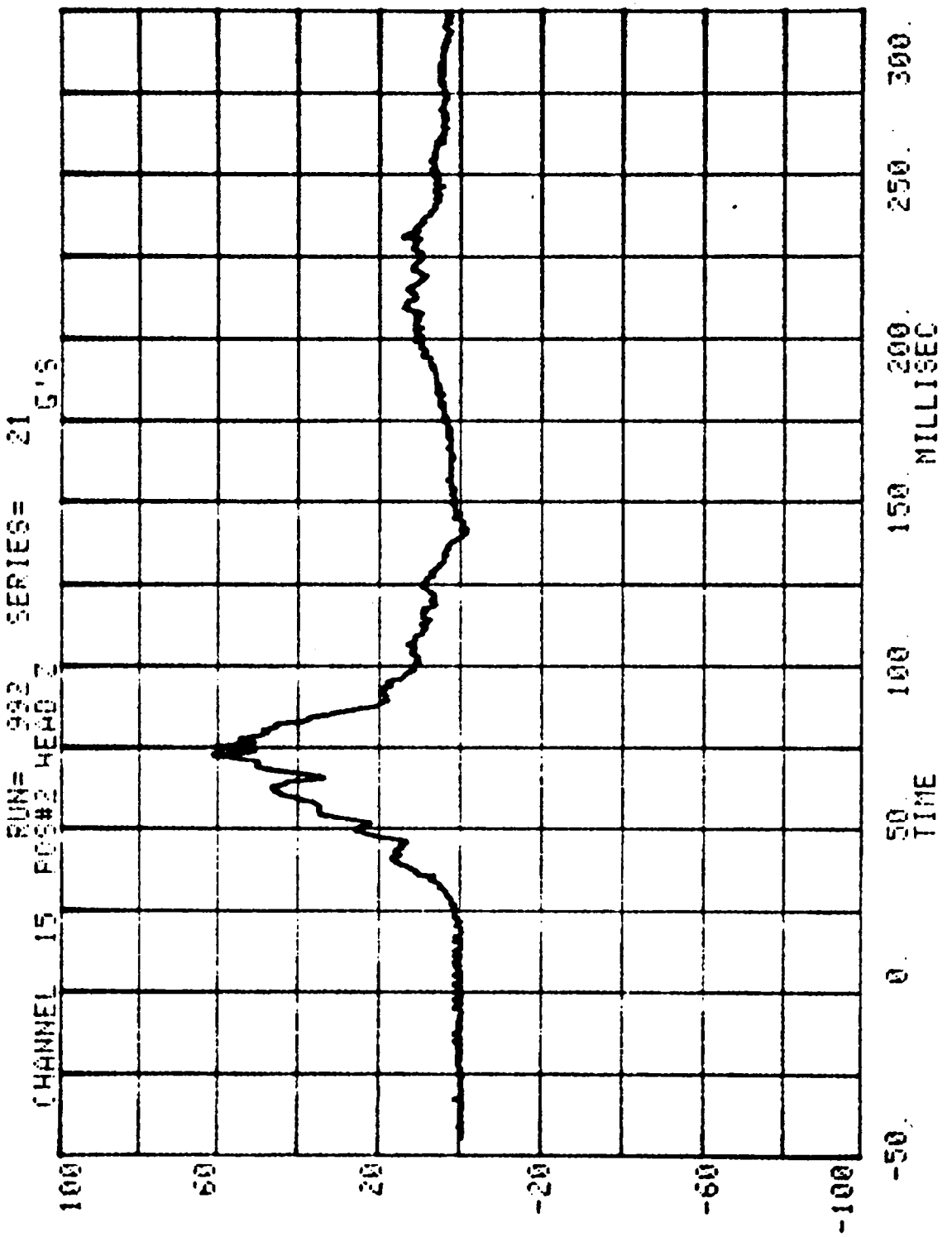
EVENT TIME= 300.0 MSEC

SEVERITY INDEX= 975.6

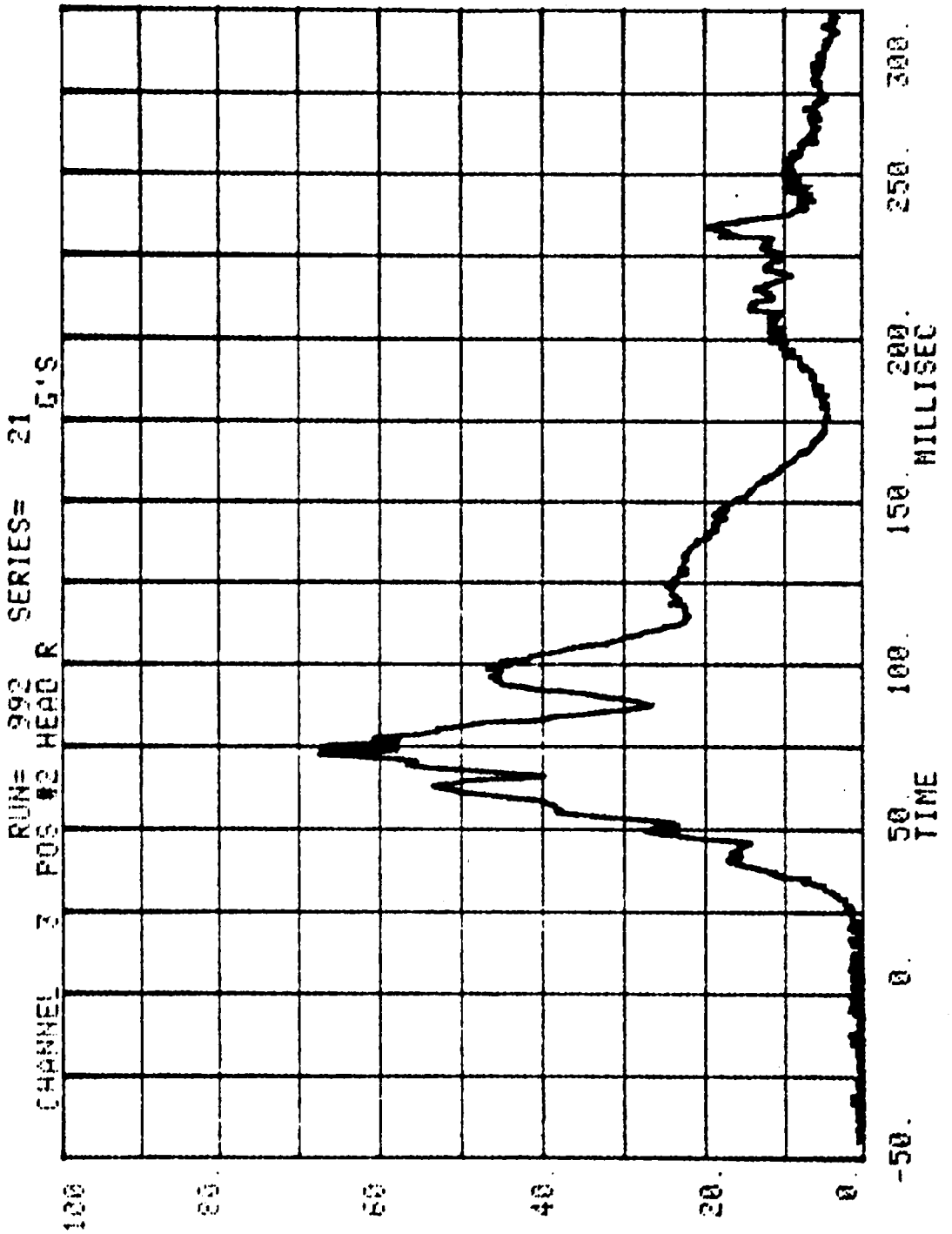

CHANNEL 13 RUN= 992 SERIES= 21
POS#2 HEAD X
G'S
100
60
20
-20
-60
-100
-50
0
50
100
150
200
250
300
TIME MILLISEC


CHANNEL 14 POS#2 HEAD Y
RUN= 992 SERIES= 21
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100
150.
200.
250
300
TIME
MILLISEC

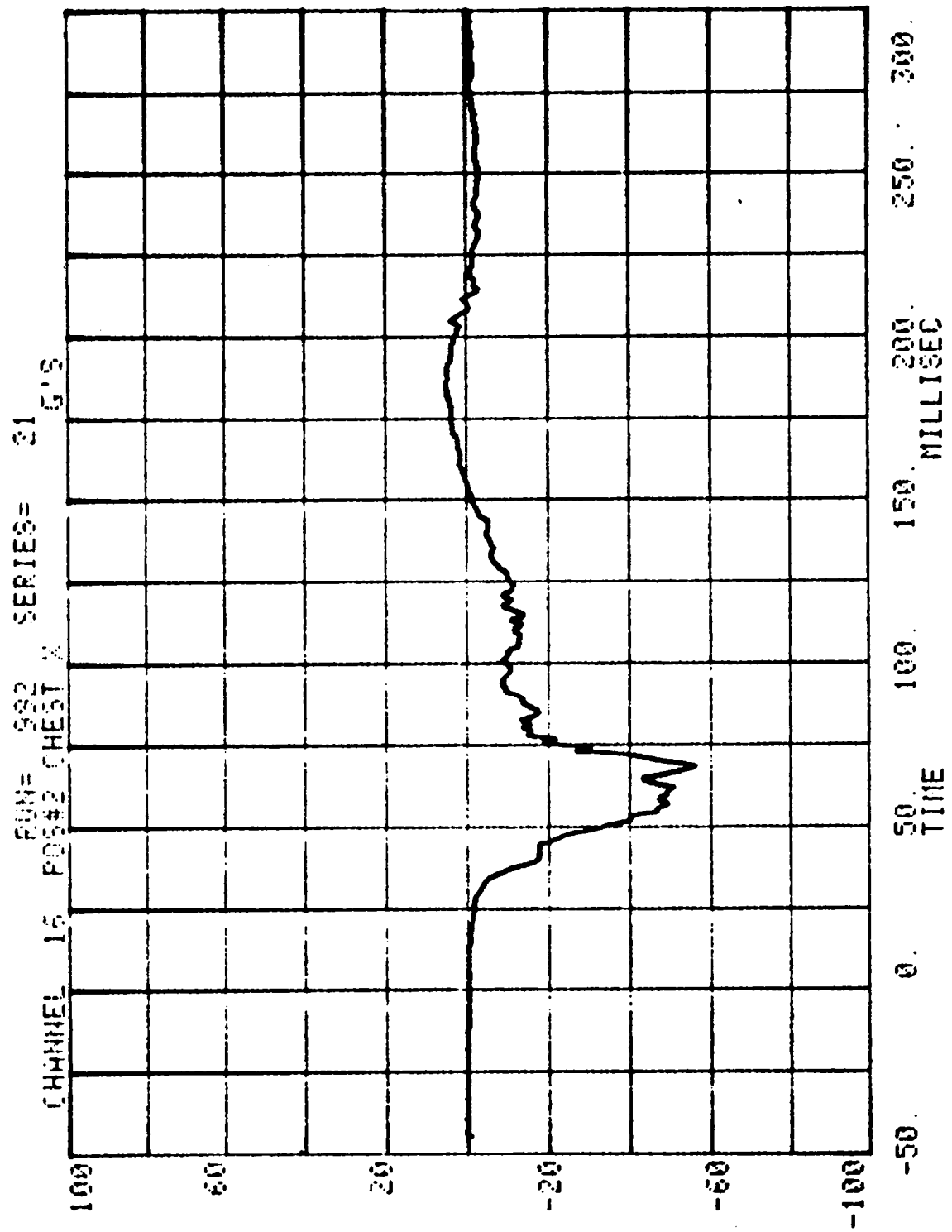
7776-21


CHANNEL 15 POS#2 HEAD 2
RUN= 992 SERIES= 21
S'S
100
60
20
-20
-60
-100
-50.
0
50
100
150
200.
250.
300.
TIME
MILLISEC

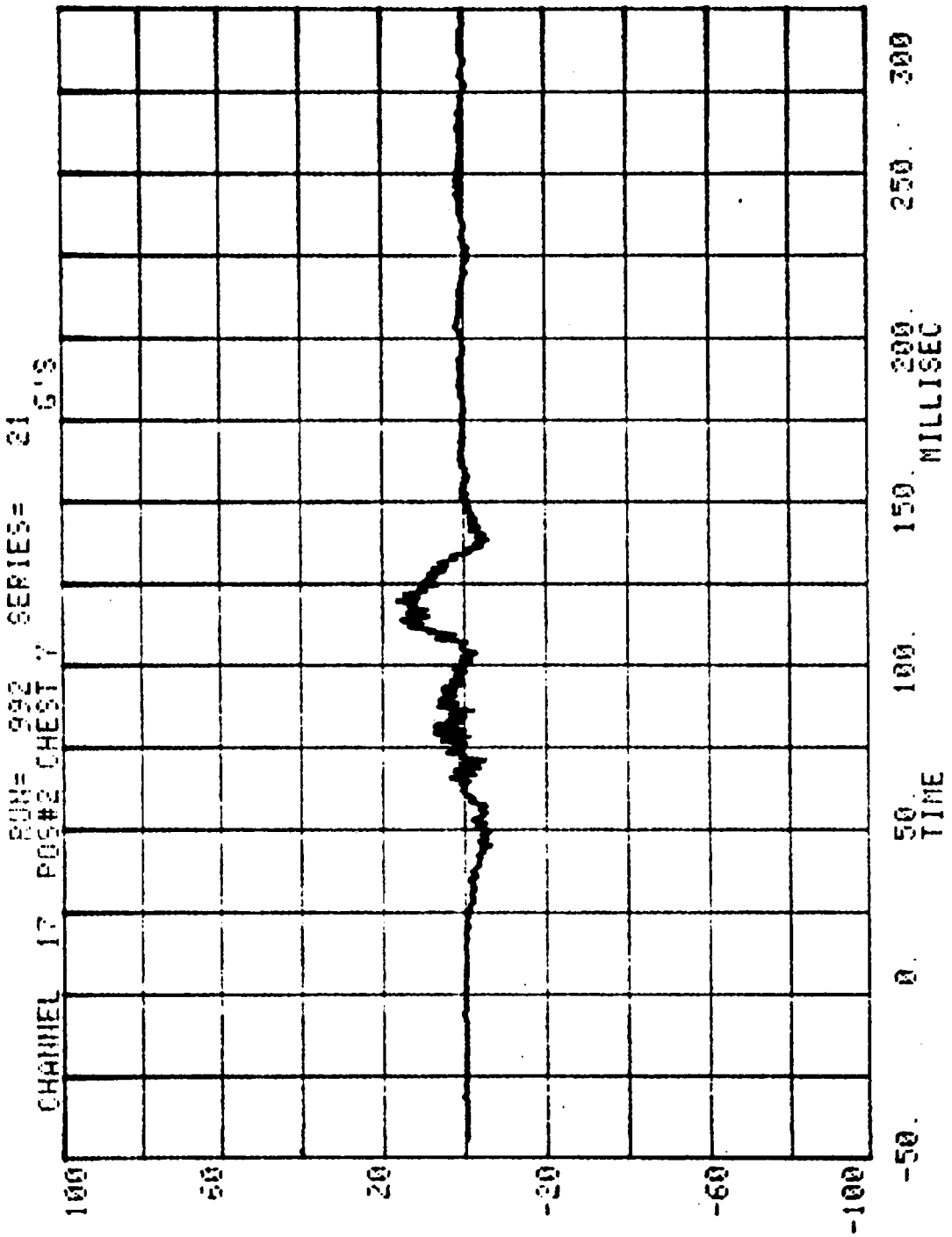
7776-21


CHANNEL 3 POS #2 HEAD R
RUN= 992 SERIES= 21
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

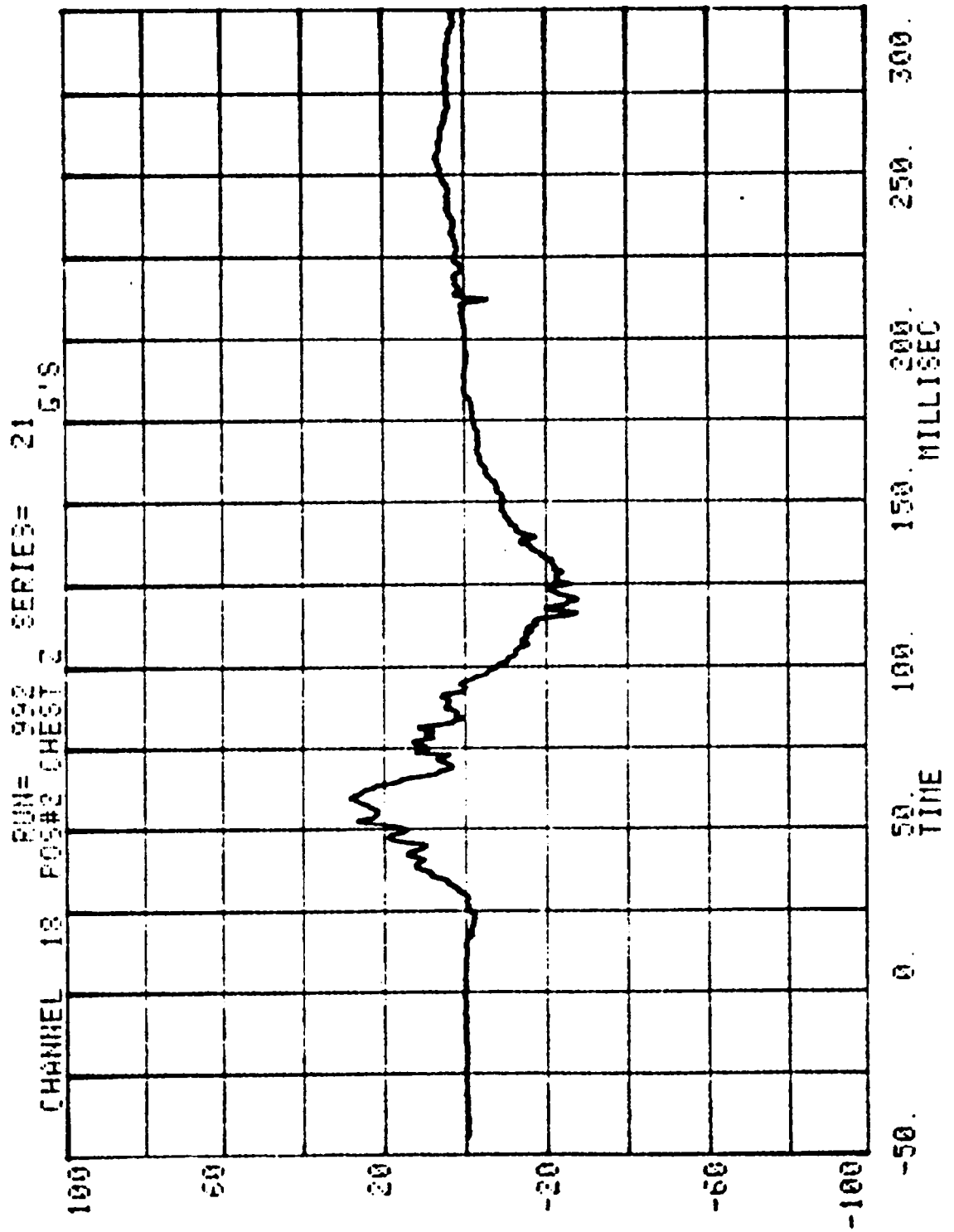
7776-21

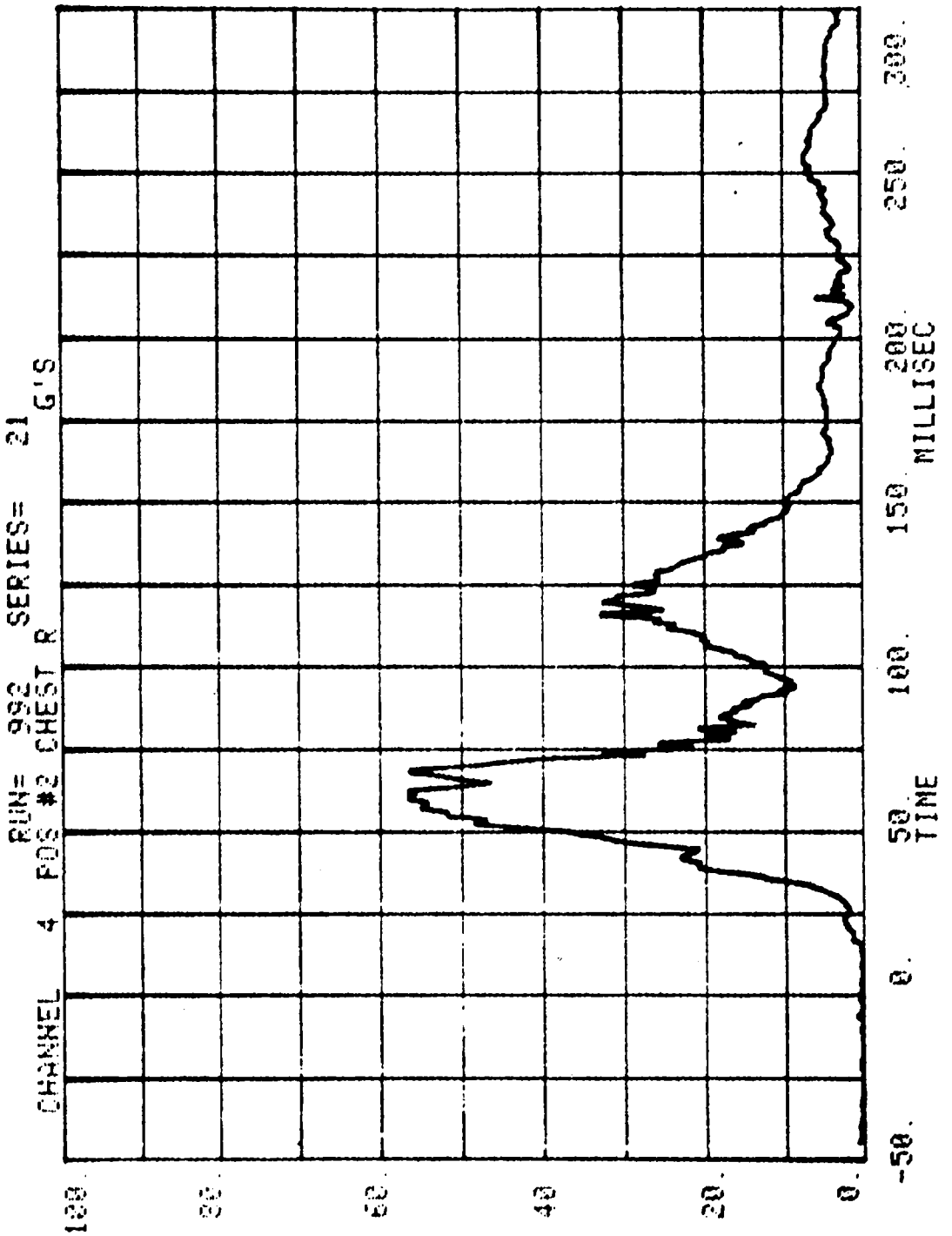

CHANNEL 15 POS#2 CHEST A
RUN= 592 SERIES= 31 G'S
100
50
0
-50
-100
-50. 0. 50. 100. 150. 200. 250. 300.
TIME
MILLISEC

7776-21

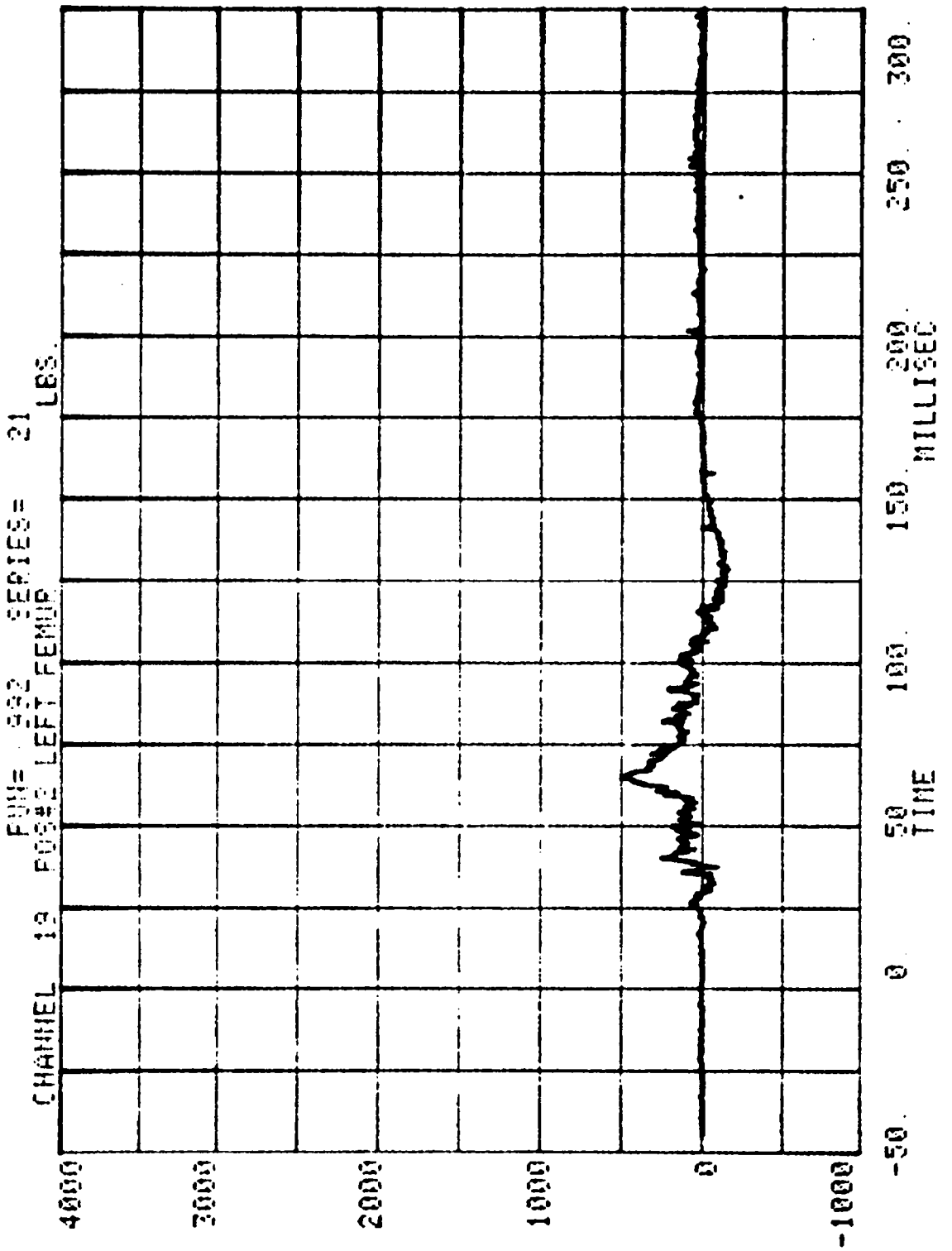

CHANNEL 17 POS#2 CHEST Y
RUN= 992 SERIES= 21
G'S
100
50
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300
TIME
MILLISEC

7776-21

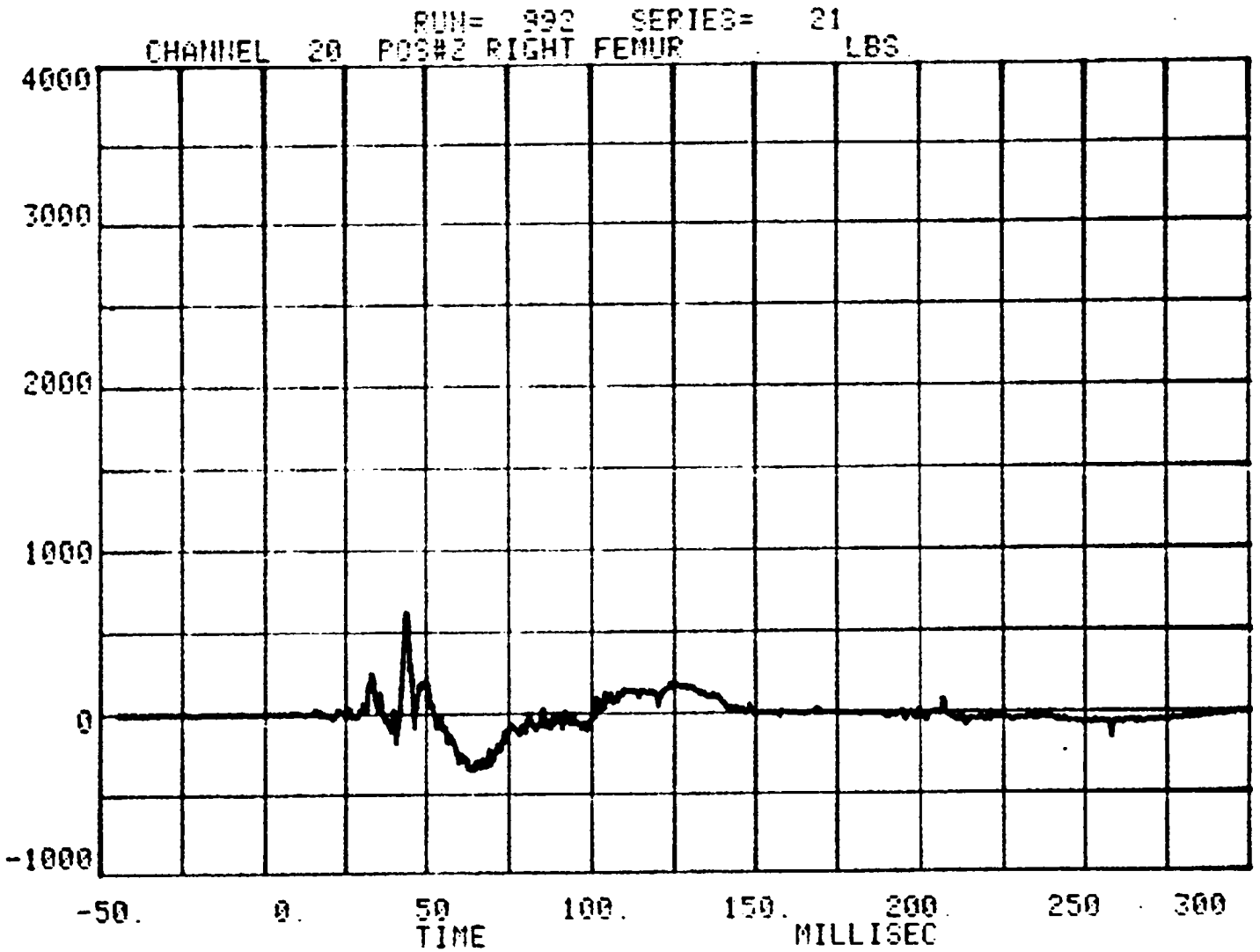

CHANNEL 18 POS#2 CHEST
RUN= 999 SERIES= 21
5'S
100
50
20
-20
-50
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

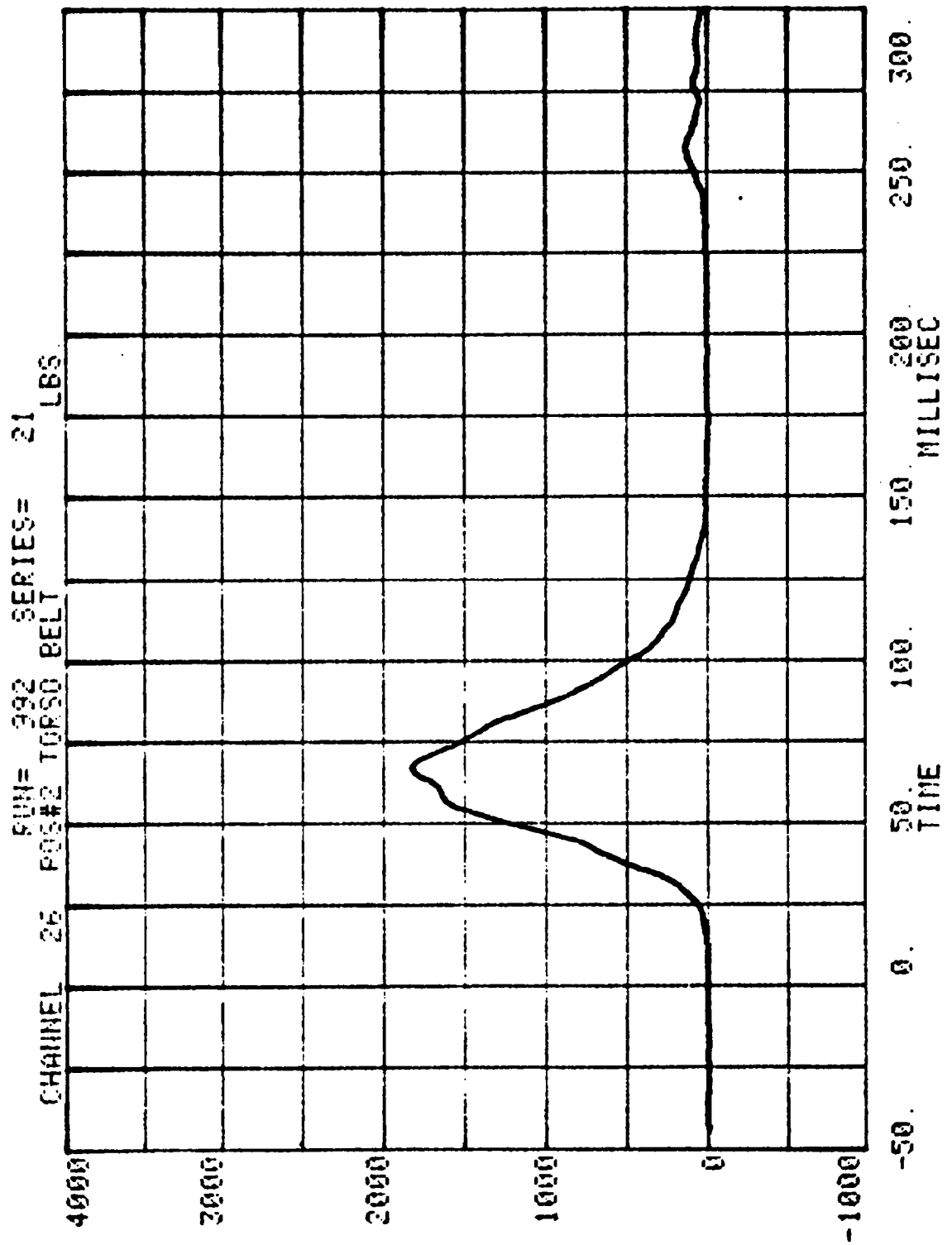

CHANNEL 4 POS #2 CHEST R
RUN= 992 SERIES= 21
G'S
120.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21

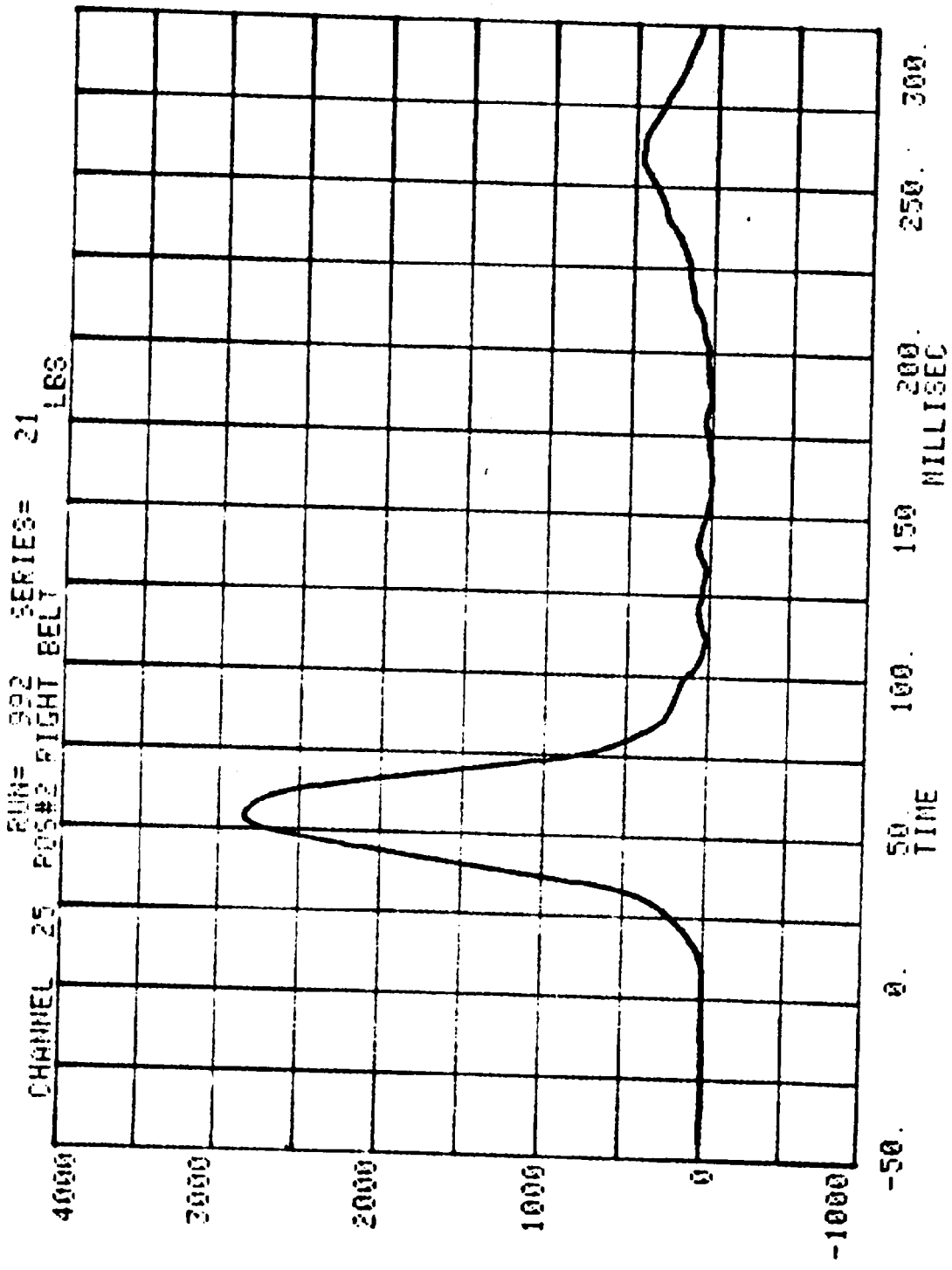

CHANNEL 12 FORCE LEFT FEMUR
FUN= 332 SERIES= 21
LBS
4000
3000
2000
1000
0
-1000
-50
0
50
100
150
200
250
300
TIME
MILLISEC

7776-21


RUN= 992 SERIES= 21
CHANNEL 20 POS#2 RIGHT FEMUR LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50
100.
150.
200
250
300
TIME
MILLISEC

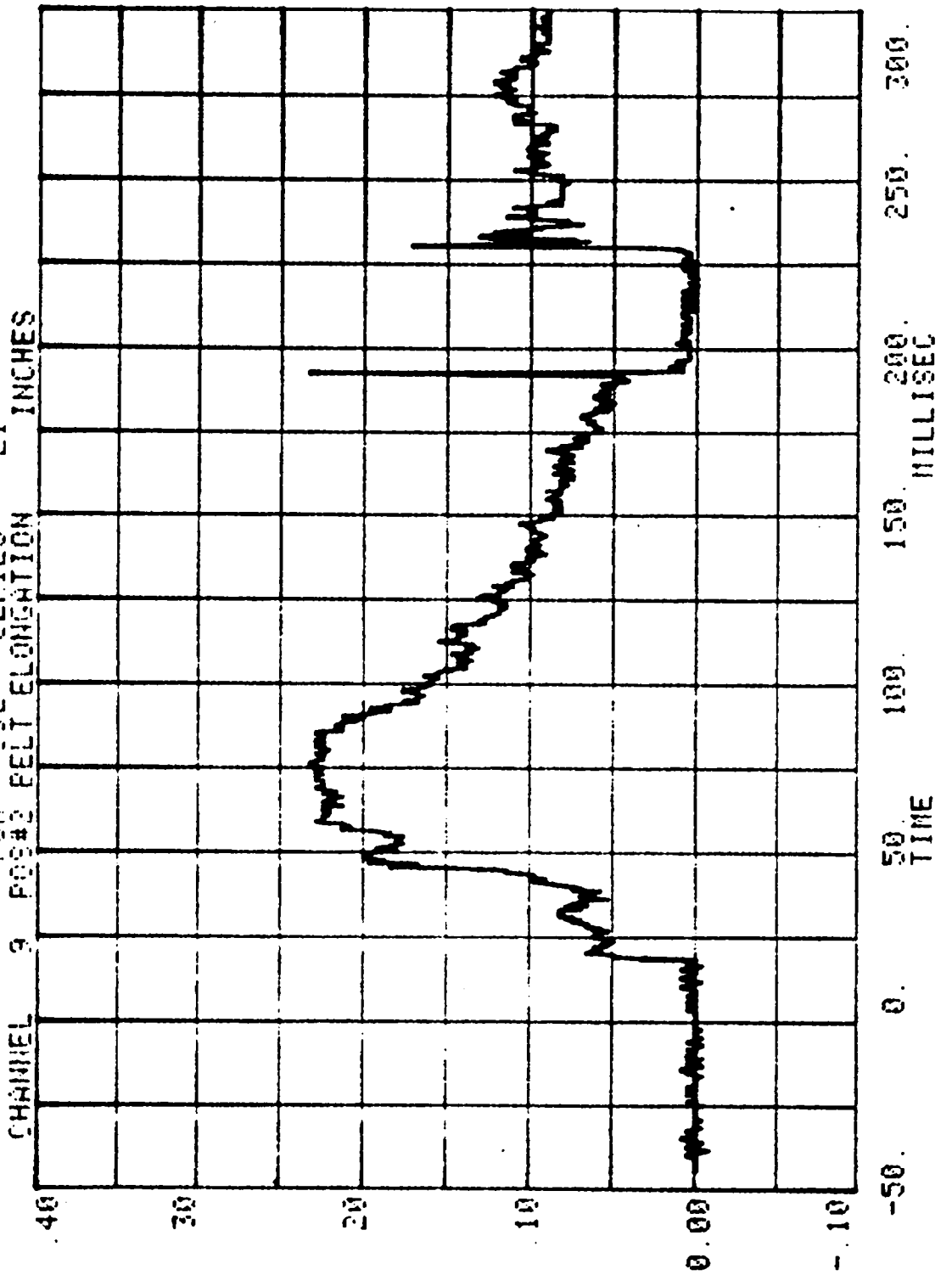

CHANNEL 22 POS#2 TOPSD BELT SERIES= 21
RUN= 292
LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150
200
250.
300.
TIME
MILLISEC

7776-21

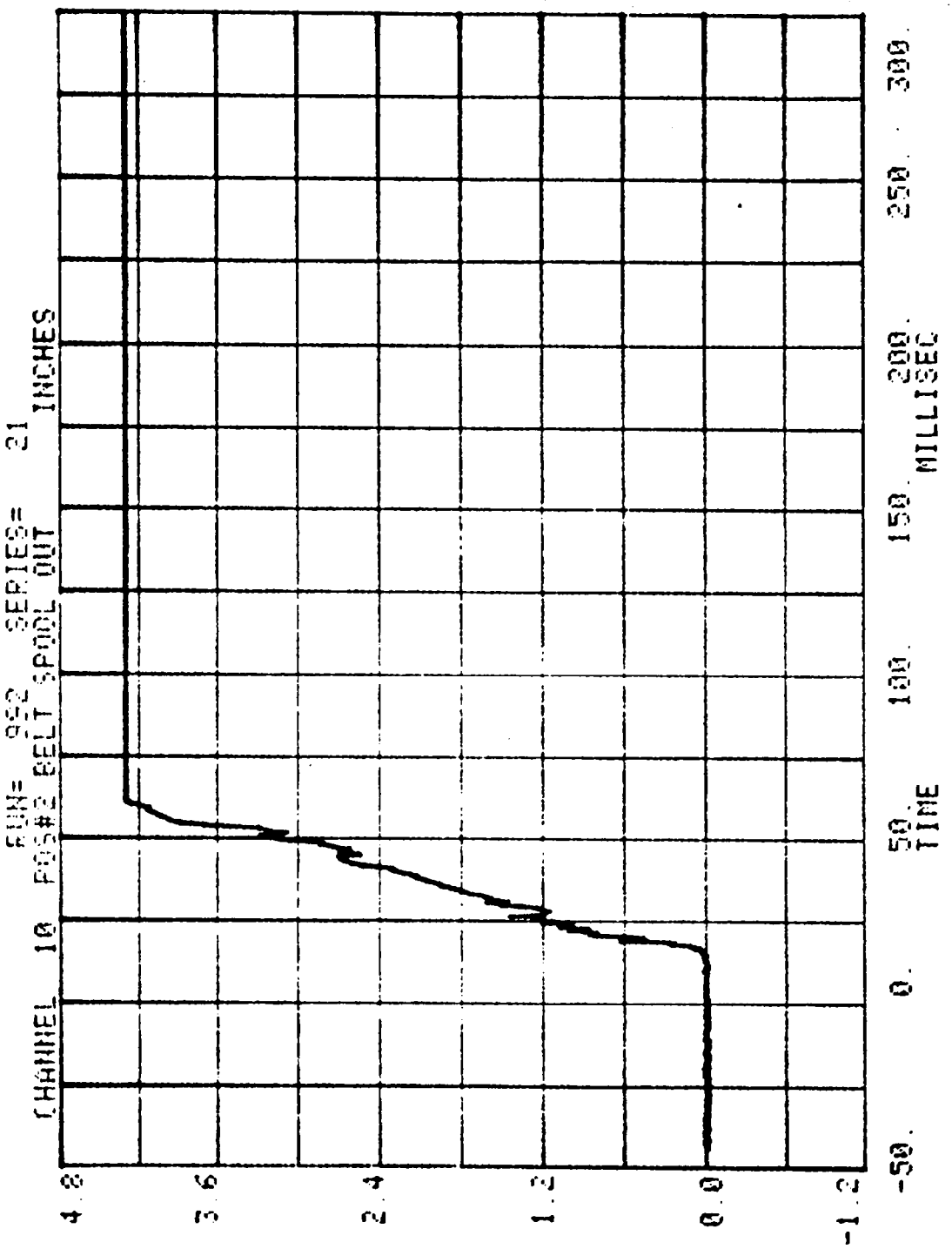

CHANNEL 25 POS#2 RIGHT BELT
RUN= 992 SERIES= 21
LBS
4000
2000
2000
1000
0
-1000
-50.
0.
50
TIME
100.
150
200.
MILLISEC
250.
300.

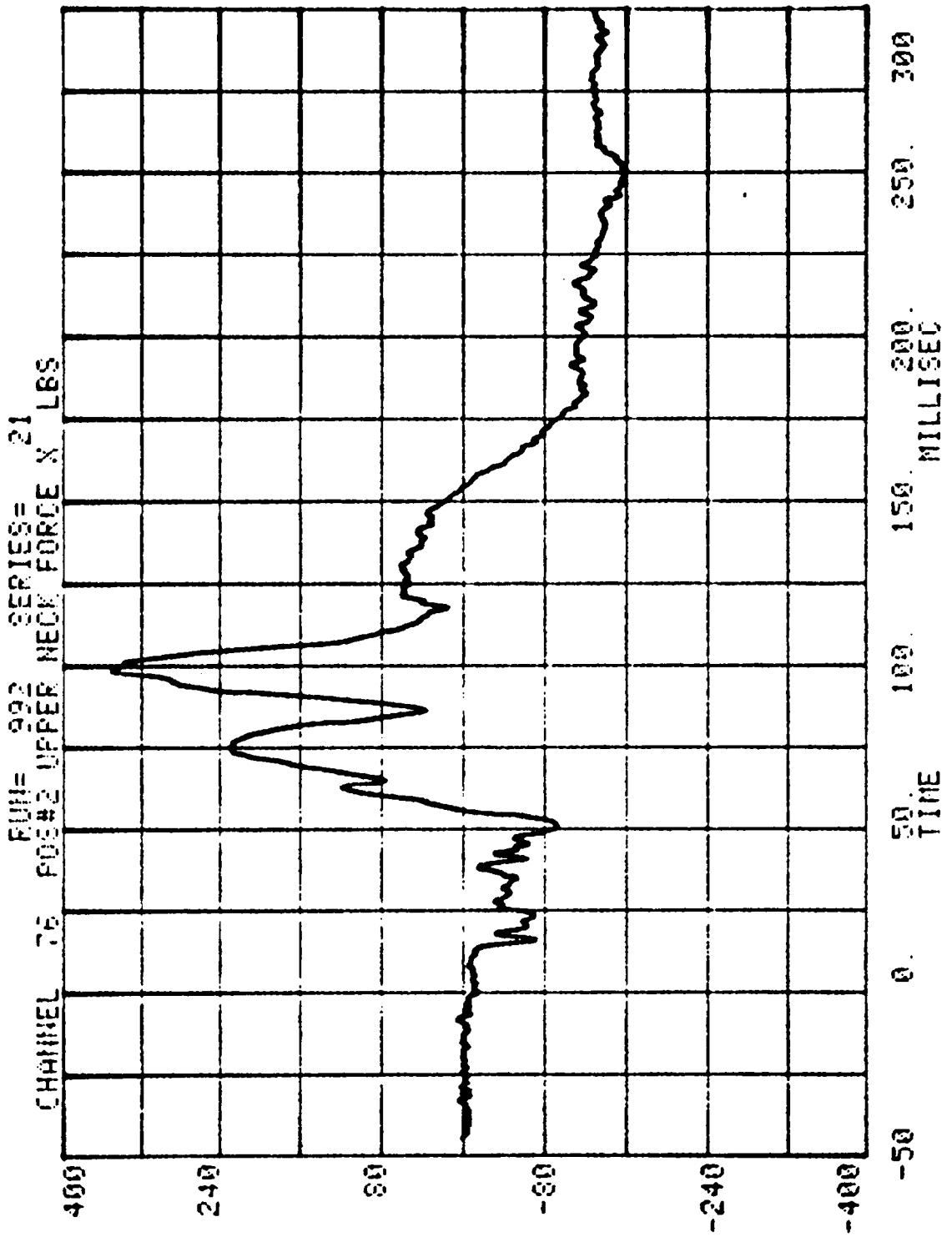
7776-21

Measured over
2.5 inches

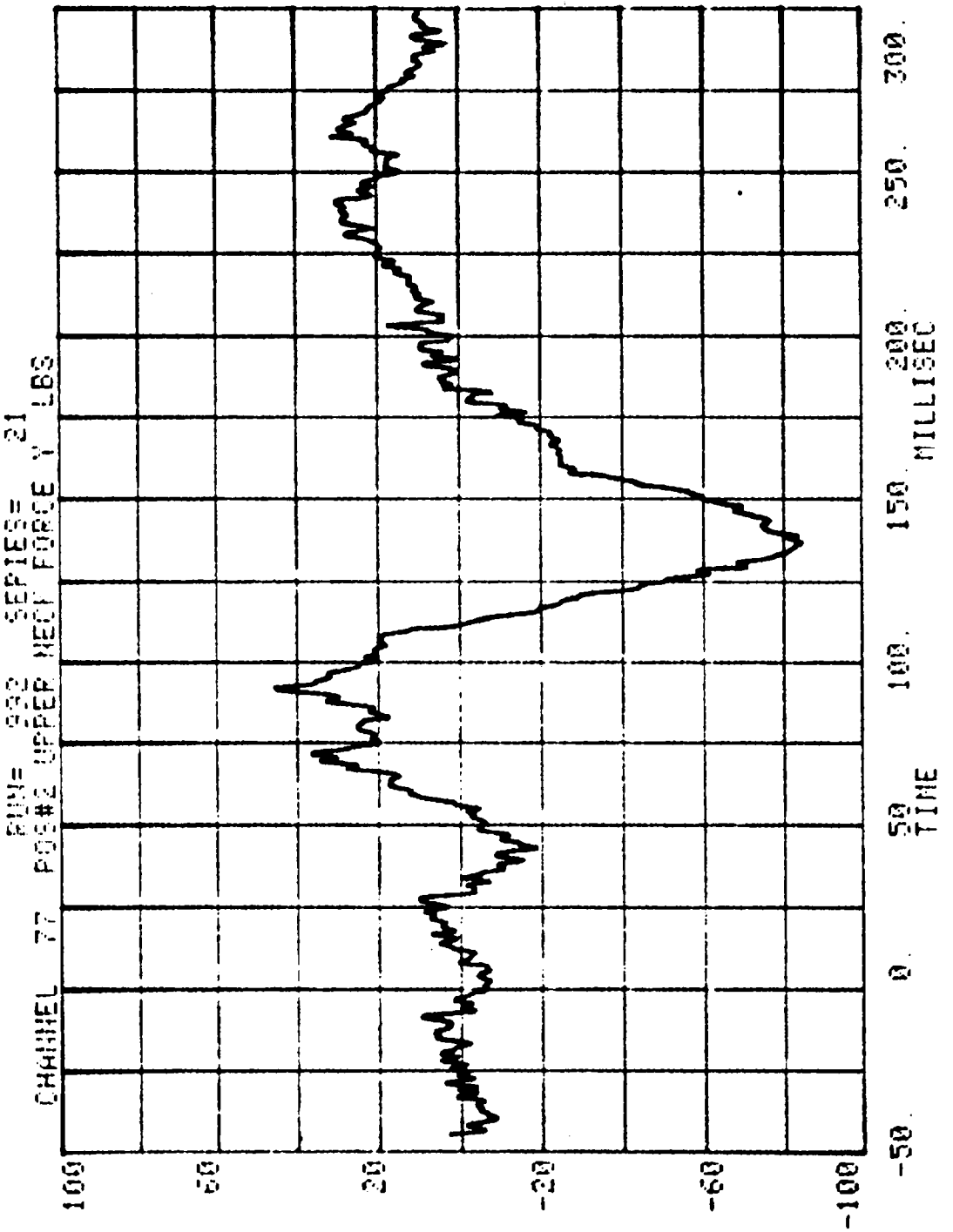


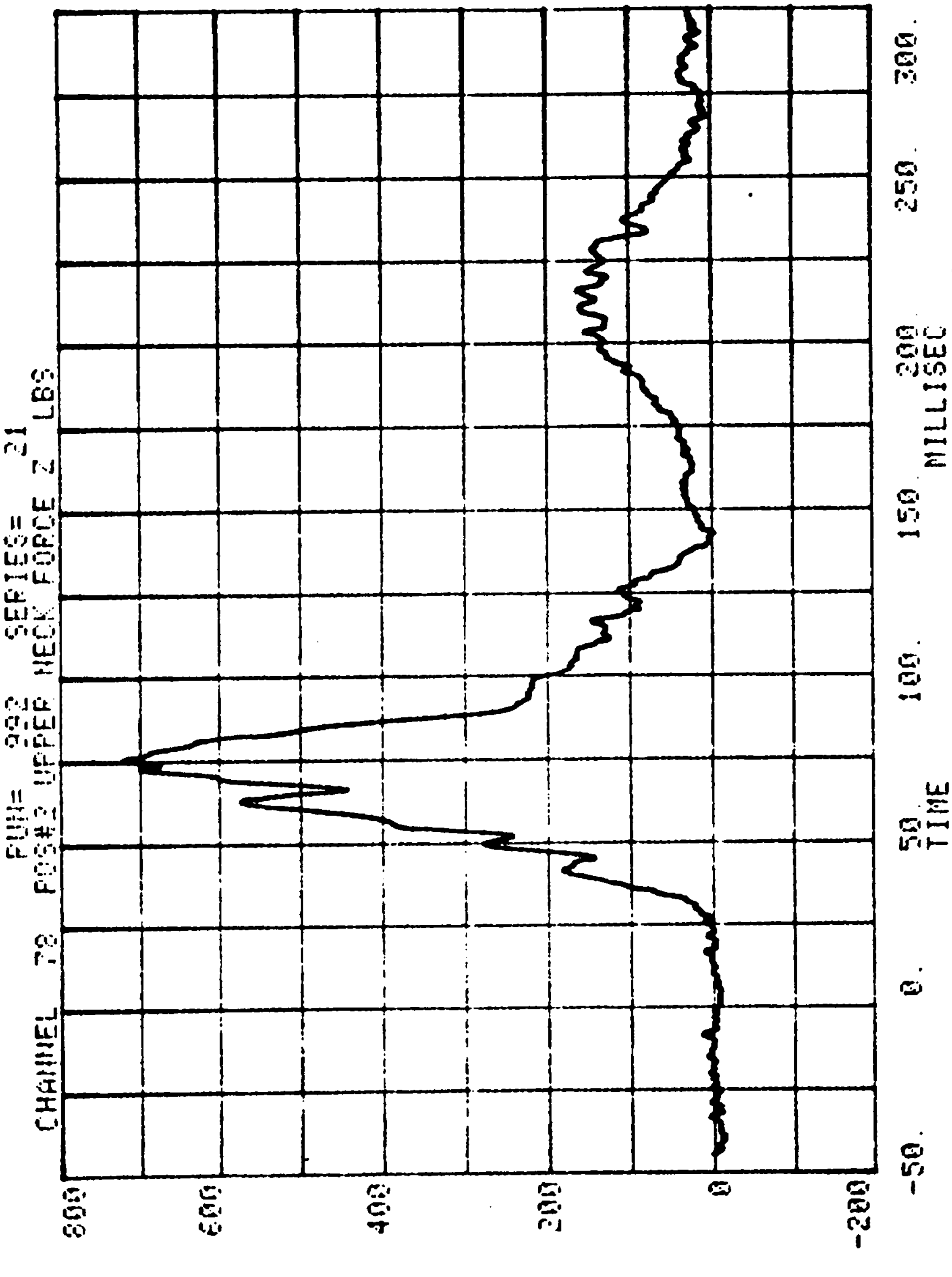
7776-21

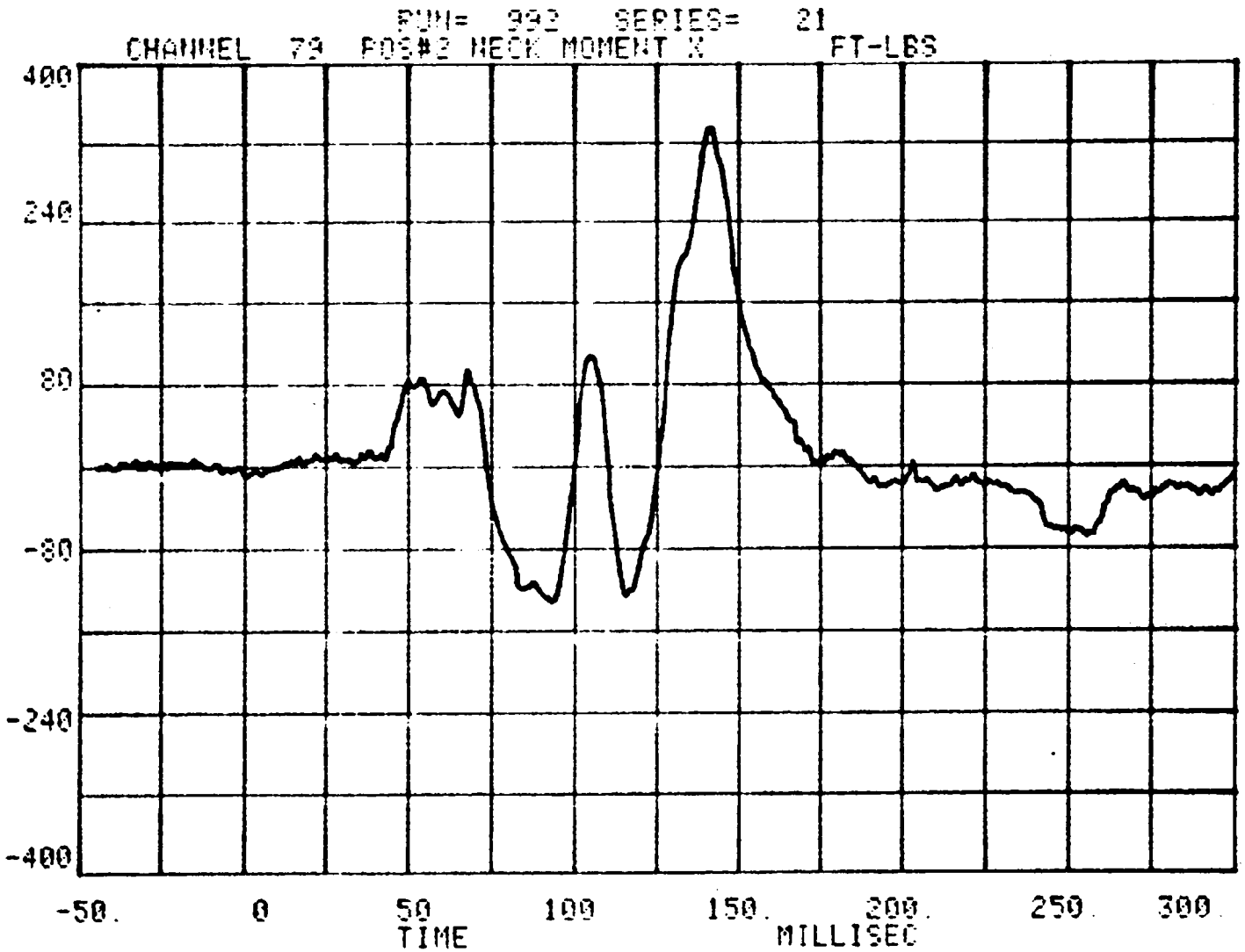

CHANNEL 10 RUN= 952 SERIES= 21
POS#2 BELT SPOOL OUT INCHES
4.8
3.6
2.4
1.2
0.0
-1.2
-50. 0. 50. 100. 150. 200. 250. 300.
TIME MILLISEC


CHANNEL 76 POS#2 UPPER NECK FORCE X LBS
RUN= 992 SERIES= 21
400
240
80
-80
-240
-400
-50
0.
50.
100.
150.
200.
250.
300
TIME
MILLISEC

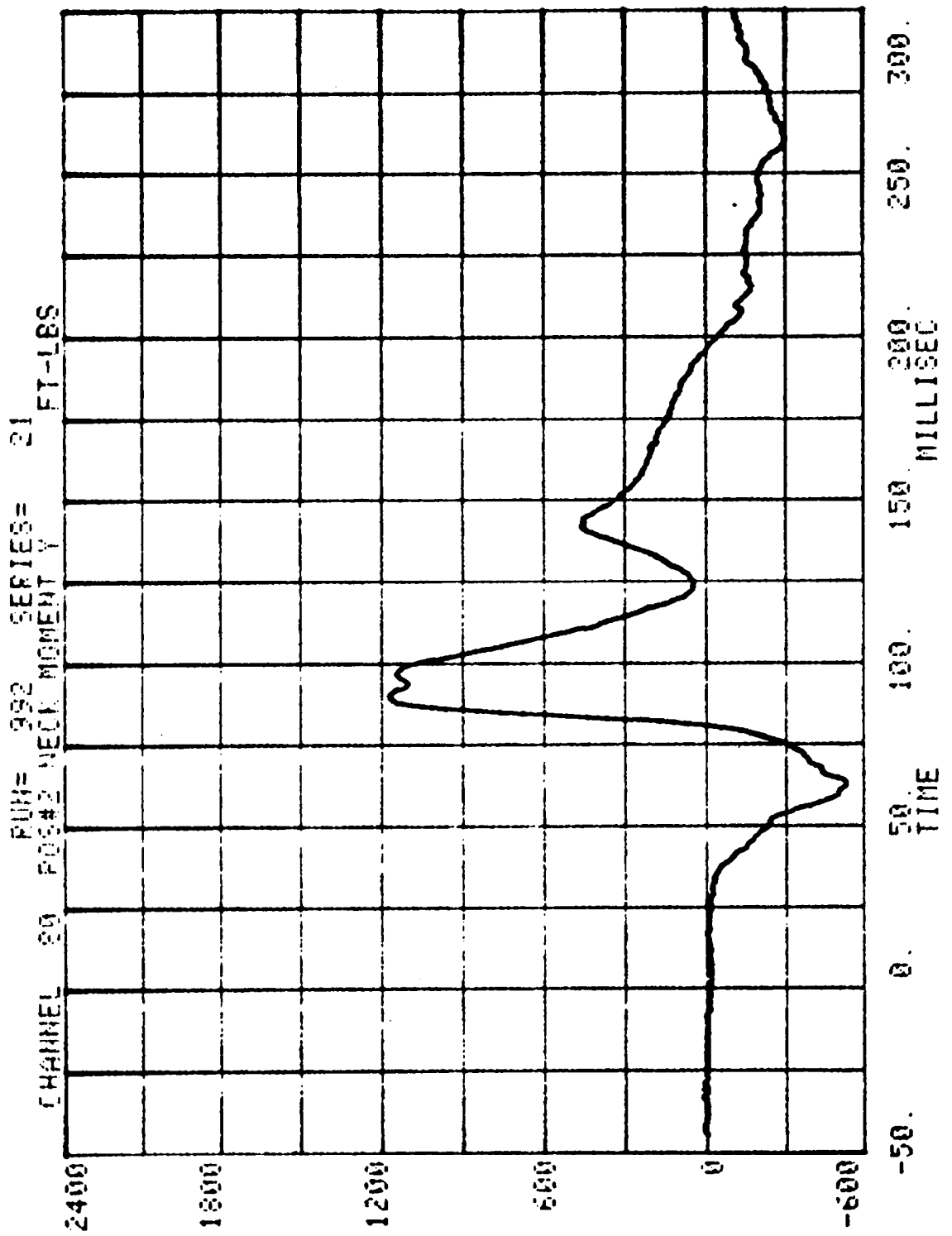
7776-21


CHANNEL 77 RUN= 332 SERIES= 21
POS#2 UPPER NECK FORCE Y LBS
100
50
20
-20
-60
-100
-50
0
50
100
150
200
250
300
TIME
MILLISEC

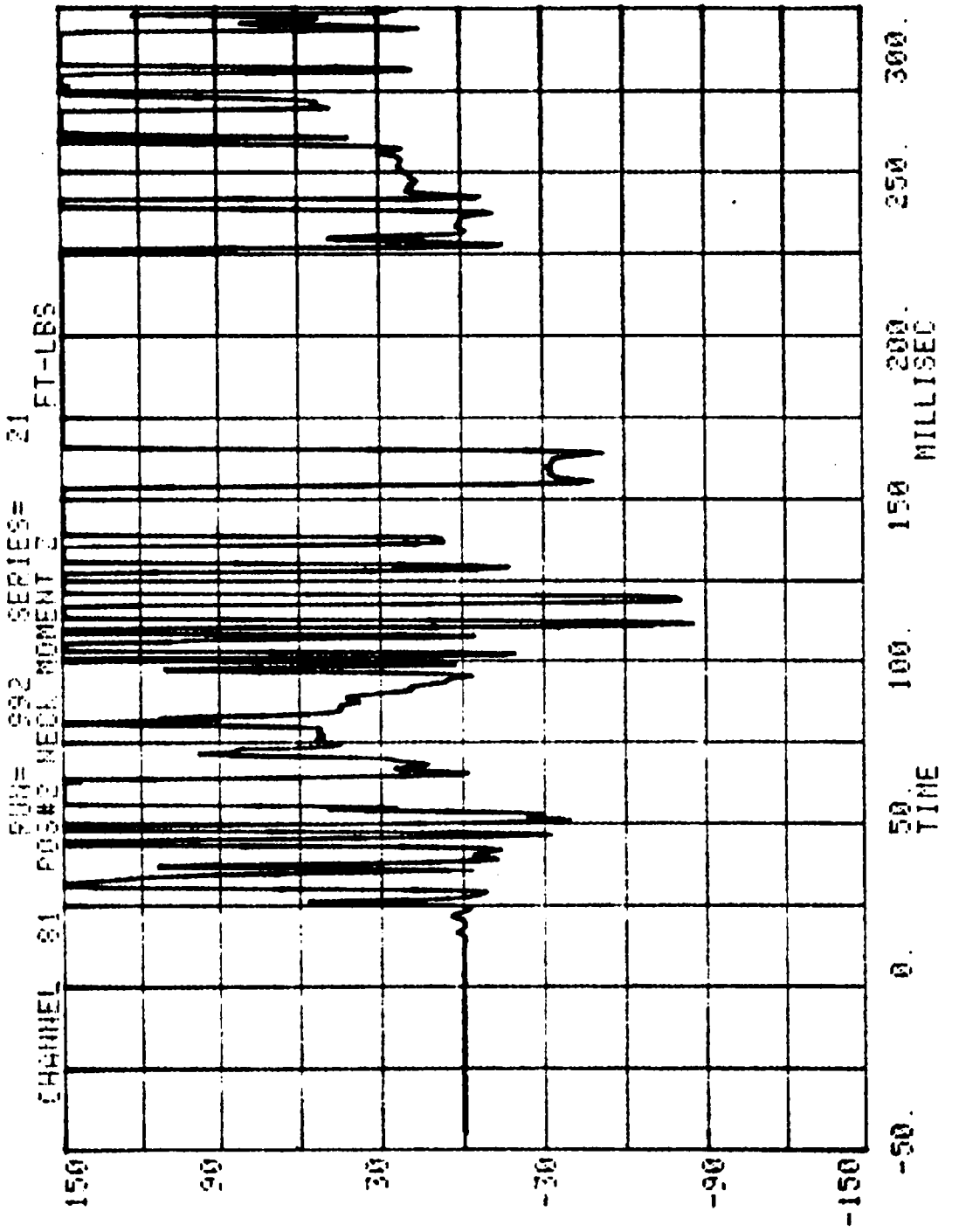

CHANNEL 78 RUN= 992 SERIES= 21
POS#2 UPPER NECK FORCE Z LBS
800
600
400
200
0
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

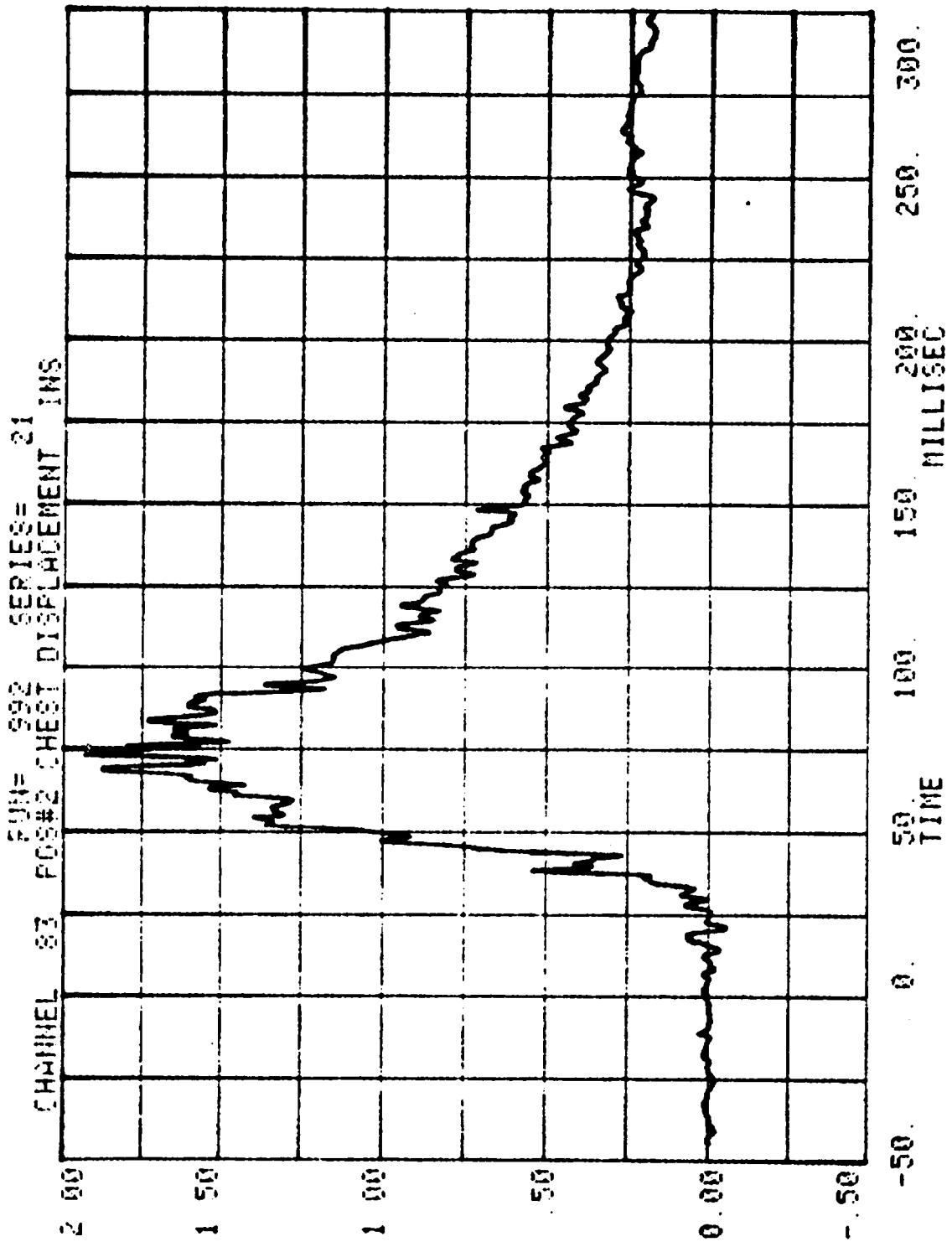

RUN= 992 SERIES= 21
CHANNEL 79 POS#2 NECK MOMENT X FT-LBS
400
240
80
-80
-240
-400
-50.
0
50
100
150.
200.
250
300
TIME MILLISEC

7776-21


CHANNEL 80 FOR#2 NECK MOMENT Y
RUN= 992 SERIES= 21
FT-LBS
2400
1800
1200
600
0
-600
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21


CHANNEL 81
SUB= 332 SERIES= 21
POS#2 NECK MOMENT FT-LBS
150
90
30
-30
-90
-150
-50.
0.
50.
100.
150
200.
250.
300.
TIME
MILLISEC


CHANNEL 83 POS#2 CHEST DISPLACEMENT IMS
RUN= 992 SERIES= 21
2.00
1.50
1.00
.50
0.00
-.50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-21

Appendix C

DUMMY CERTIFICATION TESTS

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

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

Dummy serial numbers and certification dates are:

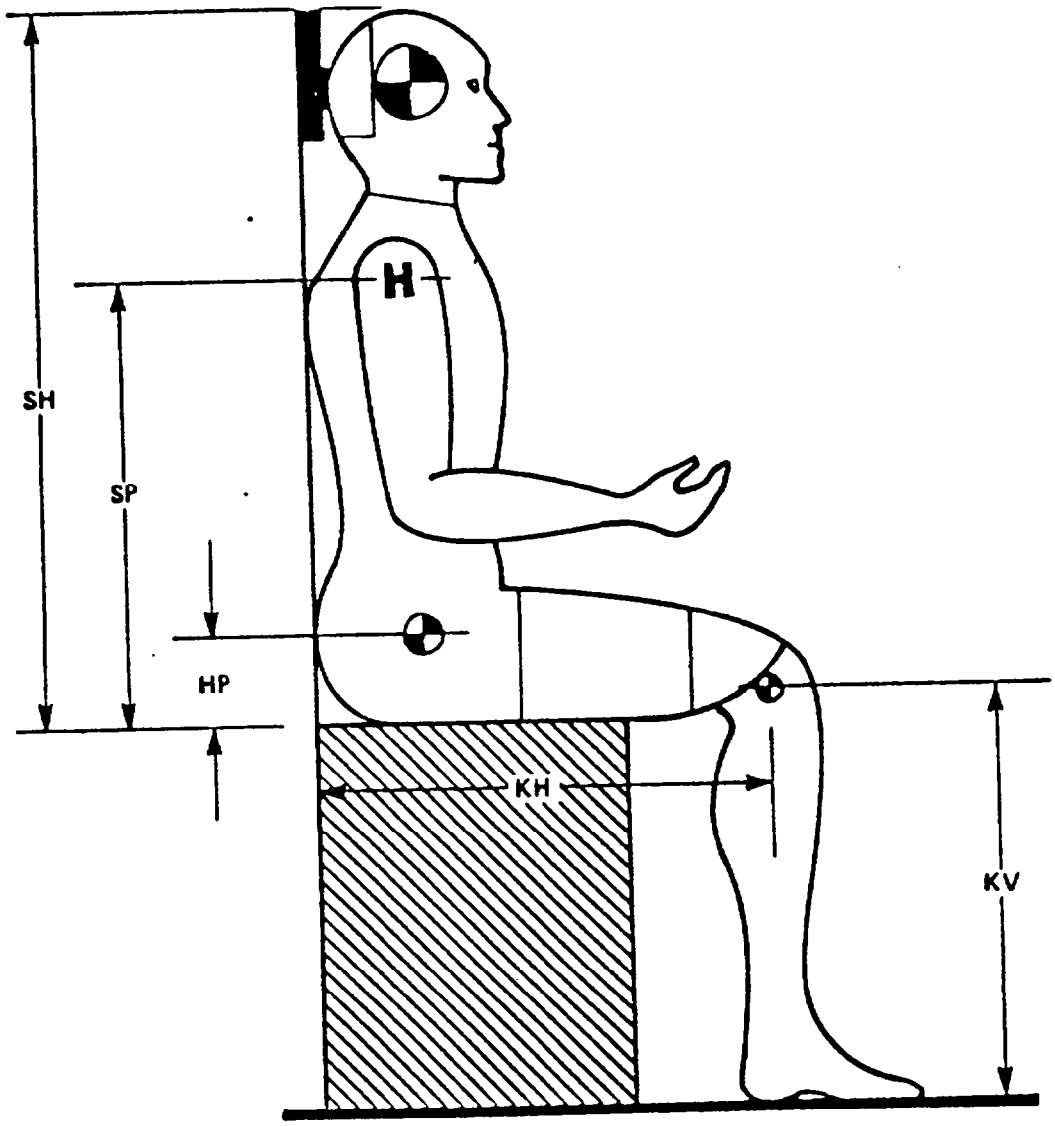
Serial No.	Completion Data
45	05-18-90
150	05-18-90

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 No. 6525-V-1.

Figure 10

DUMMY CONFIGURATION DIMENSIONS



CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 5-17-90

CALSPAN HY3 SN 45 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	70 DEG. F
RELATIVE HUMIDITY	10% - 70%	43 %
PEAK RESULTANT ACCELERATION	225 - 275 G	228 G
PEAK LATERAL ACCELERATION	15 G MAX	2.9 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ___IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 5-17-90 6 AXIS NECK TRANSDUCER

CALSPAN HY3 SN 45 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70 DEG. F
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		22.6 - 23.4 FPS	22.6 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.98 G
	20 MS	17.60 - 22.60 G	21.25 G
	30 MS	12.50 - 18.50 G	18.21 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	18.21 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	39.63 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	72.21 DEG.
	TIME	57 - 64 MS	59.75 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	79.15 FT.-LBS.
	TIME	47 - 58 MS	54.5 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	115.13 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	103.38 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ___IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 5-17-90 6 AXIS NECK TRANSDUCER

CALSPAN HY3 SN 45 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70 DEG. F
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		19.50 - 20.30 FPS	20.1 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.79 G
	20 MS	14.00 - 19.00 G	17.48 G
	30 MS	11.00 - 16.00 G	15.07 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	15.07 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	43.38 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	93.51 DEG.
	TIME	72 - 82 MS	73.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-59.0/-39.0 FT.-LBS.	58.47 FT.-LBS.
	TIME	65 - 79 MS	69.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	149.63 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	131.38 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ___IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

THORAX IMPACT TEST

HYBRID III

DATE : 5-16-90

CALSPAN HY3 SN 45 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	35 %
PENDULUM VELOCITY	21.6 - 22.4 FT/SEC	22.0 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.54 INCHES
MAXIMUM RESISTIVE FORCE	1080 - 1245 POUNDS	1219 POUNDS
INTERNAL HYSTERESIS	69% - 85%	73.1 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ___IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 5-18-90 KNEE : LEFT

CALSPAN HY3 SN 45 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1077 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ____IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 5-18-90 KNEE : RIGHT

CALSPAN HY3 SN 45 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1096 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ____IVAN MINKEWICZ_____

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER ____45_____

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CH83	11-89	5-90
HY LATERAL--	ENDEVCO	CU62	11-89	5-90
HZ VERTICAL--	ENDEVCO	CM86	11-89	5-90
2. CHEST ACCELEROMETER-				
CX LONGITUDINAL--	CEC	A73	11-89	5-90
CY LATERAL--	ENDEVCO	CE06	11-89	5-90
CZ VERTICAL--	CEC	A44	11-89	5-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	74	12-89	6-90
RIGHT SIDE	GSE	1927	12-89	6-90
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A160	1-90	7-90
2. TEST PROBE ACCELEROMETER--	CEC	A161	1-90	7-90
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS-DUCER INC	20051	2-90	8-90
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	2-90	8-90
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	2-90	8-90

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 5-17-90

CALSPAN HY3 SN 150 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	42 %
PEAK RESULTANT ACCELERATION	225 - 275 G	270.6 G
PEAK LATERAL ACCELERATION	15 G MAX	9.6 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ___IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 5-16-90 6 AXIS NECK TRANSDUCER

CALSPAN HY3 SN 150 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY		10% - 70%	44 %
IMPACT VELOCITY		22.6 - 23.4 FPS	22.9 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	23.32 G
	20 MS	17.60 - 22.60 G	22.42 G
	30 MS	12.50 - 18.50 G	17.82 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	17.82 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	38.25 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	75.52 DEG
	TIME	57 - 64 MS	58 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	71.71 FT.-LBS.
	TIME	47 - 58 MS	50.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	116.13 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	98.88 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ___IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 5-16-90 6 AXIS NECK TRANSDUCER

CALSPAN HY3 SN 150 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY		10% - 70%	44 %
IMPACT VELOCITY		19.50 - 20.30 FPS	20.2 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.51 G
	20 MS	14.00 - 19.00 G	17.45 G
	30 MS	11.00 - 16.00 G	14.51 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	14.51 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	45.38 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	100.65 DEG.
	TIME	72 - 82 MS	75.13 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-59.0/-39.0 FT.-LBS.	-52.67 FT.-LBS.
	TIME	65 - 79 MS	69.38 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	159.25 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	127.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ___IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

THORAX IMPACT TEST

HYBRID III

DATE : 5-16-90

CALSPAN HY3 SN 150 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70 DEG. F
RELATIVE HUMIDITY	10% - 70%	44 %
PENDULUM VELOCITY	21.6 - 22.4 FT/SEC	21.7 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.55 INCHES
MAXIMUM RESISTIVE FORCE	1080 - 1245 POUNDS	1225 POUNDS
INTERNAL HYSTERESIS	69% - 85%	71.5 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ___IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 5-18-90 KNEE : LEFT

CALSPAN HY3 SN 150 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1137 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ____IVAN MINKEWICZ_____

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 5-18-90 KNEE : RIGHT

CALSPAN HY3 SN 150 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1081 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN ____IVAN MINKEWICZ_____

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER _____150_____

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CS75	1-90	7-90
HY LATERAL--	ENDEVCO	CY89	1-90	7-90
HZ VERTICAL--	ENDEVCO	CE76	1-90	7-90
2. CHEST ACCELEROMETER-				
CX LONGITUDINAL--	CEC	A129	3-90	9-90
CY LATERAL--	ENDEVCO	CN64	3-90	9-90
CZ VERTICAL--	CEC	A56	3-90	9-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	311	12-89	6-90
RIGHT SIDE	GSE	312	12-89	6-90
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A160	1-90	7-90
2. TEST PROBE ACCELEROMETER--	CEC	A161	1-90	7-90
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS-DUCER INC	20051	2-90	8-90
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	2-90	8-90
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	2-90	8-90

Appendix D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

system, or, if they are large enough, they should use the available safety belts. *This is required by law in all states and Canadian provinces. Failure to use a proper restraint system can result in severe or fatal injury to your child in the event of a collision, and fines and other penalties being assessed against you.*

Infants and Small Children

Two different child restraint systems are generally available: the infant carrier for babies weighing up to 20 lbs. (9kg.), and the child seat for small children over 20 lbs. In addition, some manufacturers make systems that can be used first as an infant carrier, and then converted to a child seat as the child grows older. Both an infant carrier and a child seat are available from your dealer.

Before purchasing a restraint system, make sure that it has a label certifying that it meets Motor Vehicle Safety Standard 213.

The restraint system should be appropriate for your child's weight and height. This information can be found on the restraint system's label.

Infant and child restraint systems are designed to be secured in vehicle seats by the lap belt or the lap portion of the lap/shoulder belt. If the belt cannot be tightened because of buckle or latch plate location on a particular child restraint system, disconnect the latch plate from the buckle end and twist the short buckle-end belt several turns to shorten it. Reassemble the latch plate to the buckle with the release button turned so that it is accessible.

In the front center seating position, if the belt still cannot be tightened, or if pulling or pushing on the restraint system loosens the belt, disconnect the latch plate from the buckle, turn it over, and reassemble it to the buckle. If the child restraint system is still not secure, try a different seating position.

After purchasing the restraint system, carefully follow the instructions that come with it. *Failure to do so can result in severe or fatal injury to your child.*

Children Too Large For Child Seats

Children who are too large for child seats and who can sit upright by themselves should use the available lap belt or lap/shoulder belt. For the best protection in the event of a collision, the lap/shoulder belt is preferred. If the shoulder belt contacts the face or neck, move the child closer to the middle of the vehicle. If belt contact is still objectionable, move the child to the center seating position and use the lap belt.

Make sure that the child is seated upright in the seat with the lap belt fastened low on the hips and as snug as possible. Belt fit should be checked periodically, in case the belt has been mispositioned by the child's squirming or slouching.

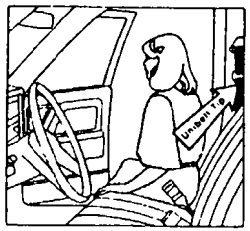
Booster seats are also available for use with lap/shoulder belts. Before purchasing a booster seat, make sure that it has a label certifying that it meets applicable Motor Vehicle Safety Standards, and that it is satisfactory for use in this vehicle.

Seat Belt Locking Clip

A seat belt locking clip must be used with your child seat when used in the right front seating position and in the right and left rear seating positions in the Club Cab model. If a locking clip has not been supplied with your child seat, one may be purchased where child seats are sold or from your dealer. *Failure to use the seat belt locking clip as directed may result in severe or fatal injury to your child in the event of an accident.*

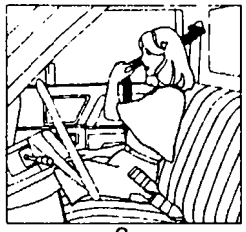
To use the locking clip, install the child seat according to the instructions supplied with the child seat. Make sure that the seat belt is snug on the child seat. Grasp the webbing and the latch plate and unbuckle the seat belt. Do not allow the latch plate to slide along the webbing.

UNIBELT OPERATING INSTRUCTIONS

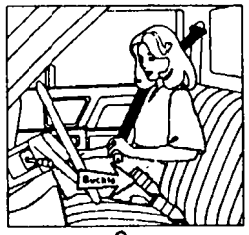


1

1. Enter the vehicle and close the door. Sit back and erect and adjust the seat. Note the metal tip of the unibelt in its stowed position.


2

2. Grasp the metal tip and slide it up the webbing as far as necessary to go around your lap as you pull out the webbing.



3

3. As you pull the webbing across your lap and over your shoulder, move the metal tip toward the buckle.

Insert the tip into the buckle until a "click" is heard.

Do not wear the shoulder belt under your arm or otherwise out of position. Such use could increase the chance and/or severity of injury in a collision.


4

4. Position the lap belt with the upper edge of the belt drawn across the thighs and snug against the hips. Slack will automatically be removed due to tension created by the retractor.

The shoulder belt will allow unrestricted movement of the upper body under normal conditions.

5

5. To release the belt, push the red button marked "Press" on the buckle. The belt will automatically retract to its stowed position.

Center Front Seat Lap Belts
The center front seating position is equipped with lap belts only. The lap belts should be worn with the upper edge of the belt drawn across the thighs and snug against the hips. To lengthen the belt, tilt the latch plate relative to the webbing and pull to the desired length. To reduce the risk of injury, it should be adjusted as tight as comfort will allow, WHILE SITTING WELL BACK AND ERECT IN THE SEAT.

To Unfasten — Push the red button marked "Press" on the buckle.

Never use a seat belt on more than one person at a time.

Use of Seat Belts During Pregnancy
Chrysler Motors recommends that pregnant women use the available safety belts. This will reduce the likelihood of injury to both the woman and the unborn child. The lap belt should be worn across the thighs and as snug against the hips as possible, *but not across the waist.*

Safety Belt Extender
If the safety belt is too short, even when fully extended, a safety belt extender can be purchased from your dealer. This extender should only be used if the existing belt is not long enough. When not required, it must be removed and stowed. Failure to do so could result in injury to the occupant.

CHILD RESTRAINT
When transporting children in your vehicle, they should be properly restrained in an adequate child restraint