REPORT NO. CAL-88-N02

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

VOLKSWAGEN AG WEST GERMANY

1988 VOLKSWAGEN VANAGON

VAN

NHTSA NO. MJ5801

CALSPAN TEST NO. 7626-2

CALSPAN CORPORATION

ADVANCED TECHNOLOGY CENTER

P.O. BOX 400

BUFFALO, NEW YORK 14225

JANUARY 14, 1988

FINAL REPORT

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF MARKET INCENTIVES

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16. Abstract

A frontal load cell barrier test of a 1988 Volkswagen Vanagon Van was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on January 14, 1988.

Impact speed was 34.9 mph and the ambient temperature at the barrier face at the time of impact was 6°F. The maximum post-test vehicle crush was 16.0 inches. The test vehicle was equipped with a manual 3-point continuous belt system at each of the front outboard seating positions.

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Section 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 88 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-87-D-02012. 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.

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 MJ5801

A load cell barrier consisting of 36 load cells was impacted by a 1988 Volkswagen Vanagon Van at a velocity of 34.9 mph. The test was performed at the Calspan Corporation Advanced Technology Center on January 14, 1988. 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 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. These ATDs had been certified prior to the test, and certification details along with instrumentation calibration data, are found in Appendix C.

The 67 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.

The driver's head struck the steering wheel rim and hub. His HIC was 1320. The maximum chest deceleration over 3 milliseconds was 59 g's and femur loads were 1963 and 2930 pounds.

The right front passenger's head struck the dash panel and his HIC was 899. The maximum chest deceleration over 3 milliseconds was 48 g's and femur loads were 1014 and 1911 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: Volkswagen Vanagon GL

NHTSA NO.: MJ5801 VIN.: WV2YB0255J4019301

BODY COLOR: RED DATE OF MANUFACTURE: 9/87

Engine: 4 cylinders; 129 C.I.D.; 2.1 Liters; - CC REAR x
x Gas; - Diesel; - Turbocharged
- Longitudinal; - Transverse

Transmission: 4 Speed X Manual; - Automatic; - Overdrive
Final Drive: - Front Wheel; x Rear Wheel; - Four Wheel

Date Received: -11-23 Odometer Reading: 00004
x 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 39 psi, Rear 48 psi

Recommended Tire Size: 185 R 14

Recommended Cold Tire Pressure: Front 39 psi, Rear 48 psi

Tires on Vehicle: 185 R14; Manufacturer: Continental

Number of Occupants: 2 Front; 2 Rear; 3 3rd Seat; 7 TOTAL

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

Type of Front Seat Back: - Fixed; x Adj. With x Lever - Rot. Knot

Vehicle Capacity Weight (VCW) = - lbs. (A)

No. of Occupants x 150 lbs. = - lbs. (B)

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

GVWR 5269 lbs. GAWR: Front 2646 lbs. Rear 2866 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 = 930 lbs. Right Rear = 830 lbs.

Left Front = 890 lbs. Left Rear = 870 lbs.

TOTAL FRONT WEIGHT = 1820 lbs. (51.7 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1700 lbs. (48.3 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 3520 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (3520 lbs.)

VCW = Vehicle Capacity Weight (-- lbs.)

DSC = Designated Seating Capacity (7)

RCLW = VCW - 150 (DSC) = 300 lbs.

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

Target Test Weight = 4148 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 114 POUNDS CARGO:

Right Front = 1160 lbs. Right Rear = 920 lbs.

Left Front = 1160 lbs. Left Rear = 880 lbs.

TOTAL FRONT WEIGHT = 2320 lbs. (56.3 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1800 lbs. (43.7 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 4120 lbs.

Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 28" LF 28.2" RR 28.2" LR 28.2"

Test Attitude: RF 26.7" LF 27.0" RR 28.4" LR 28.5"

Wheel Base: 97.0 in.; C.G. = 42.4 in. rearward of front wheel C/L

Remarks: None

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0 °

Date of Test: 1-14-88 Time of Test: 12:30

Ambient Temperature: 6 °F at impact area

Temperature in Occupant Compartment: 68 °F.

Windshield Molding Temperature: 60 °F.

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 34.9 mph, secondary = 34.8 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	176.5	C_L	181.4	L	176.5
	Post-test	= R	162.9	C_L	165.4	L	164.3
	Crush	= R	13.6	C_L	16.0	L	12.2

Distance from front of test vehicle to point of impact:

R 8.9 C/L 9.5 L 10.7

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Steering Wheel Rim & Hub	Dash Panel
Chest	Steering Wheel Rim	None
Abdomen	None	None
Left Knee	Dash Panel	Dash Panel
Right Knee	Dash Panel	Dash Panel

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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TOTAL REAR WEIGHT = 1700 lbs. (48.3 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 3520 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (3250 lbs.)

VCW = Vehicle Capacity Weight (-- lbs.)

DSC = Designated Seating Capacity (7)

RCLW = VCW - 150 (DSC) = 300 lbs.

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

Target Test Weight = 4148 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 114 POUNDS CARGO:

Right Front = 1160 lbs. Right Rear = 920 lbs.

Left Front = 1160 lbs. Left Rear = 880 lbs.

TOTAL FRONT WEIGHT = 2320 lbs. (56.3 % of Total Vehicle Weight)

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TOTAL TEST WEIGHT = 4120 lbs.

Weight of ballast secured in vehicle trunk area = 0 lbs.

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Wheel Base: 97.0 in.; C.G. = 42.4 in. rearward of front wheel C/L

Remarks: None

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GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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	Crush	= R	13.6	C_L	16.0	L	12.2

Distance from front of test vehicle to point of impact:

R 8.9 C/L 9.5 L 10.7

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Steering Wheel Rim & Hub	Dash Panel
Chest	Steering Wheel Rim	None
Abdomen	None	None
Left Knee	Dash Panel	Dash Panel
Right Knee	Dash Panel	Dash Panel

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front	
	Left	Right
Door Opening	Not Operable	Not Operable

	Front	
Seat Movement	Left	Right
Seat Back Failure	Intact	Intact
Seat Shift (in.)	None	None

Glazing Damage

Backlight/Windshield Windshield shattered and separate from vehicle at impact.

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

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-112	9	120	152	-62	-17	21	59
DUMMY (2)	-114	28	71	131	-45	33	24	48
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1963	2930
DUMMY (2)	1014	1911
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)	1755	-	1086
DUMMY (2)	1862	1452	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
		36 millisecond max.		AVE. ACC. (g)
	HIC	t_1 (SEC)	t_2 (SEC)	t_1 TO t_2
DUMMY (1)	1320	.06292	.07612	100
DUMMY (2)	899	.07740	.08641	99
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Figure 1

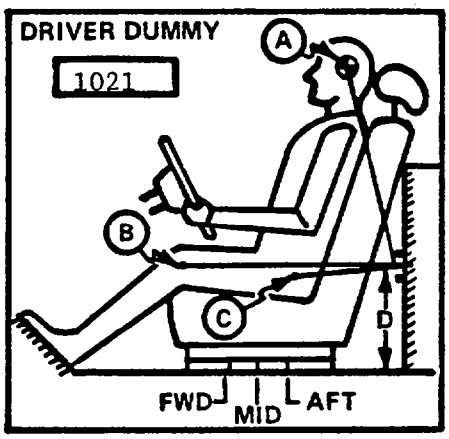
PART 572 DUMMY IN-VEHICLE POSITION

TEST NO.: MJ5801 **VEHICLE:** 1988 Volkswagen Vanagon

SEAT TYPE:
- ____ Bench
- x Bucket
- ____ Split Bench

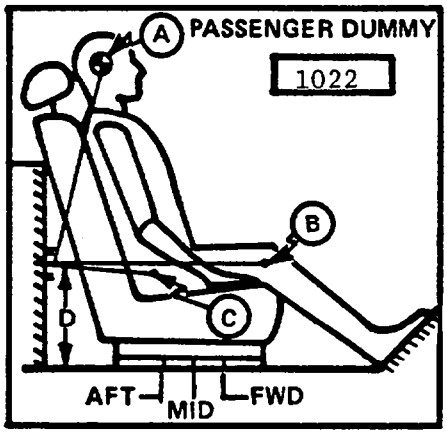
ADJUSTER TYPE:
- x Manual
- ____ Power

BUCKET SEAT BACK TYPE:
- ____ Fixed
- x Adjustable Reclining

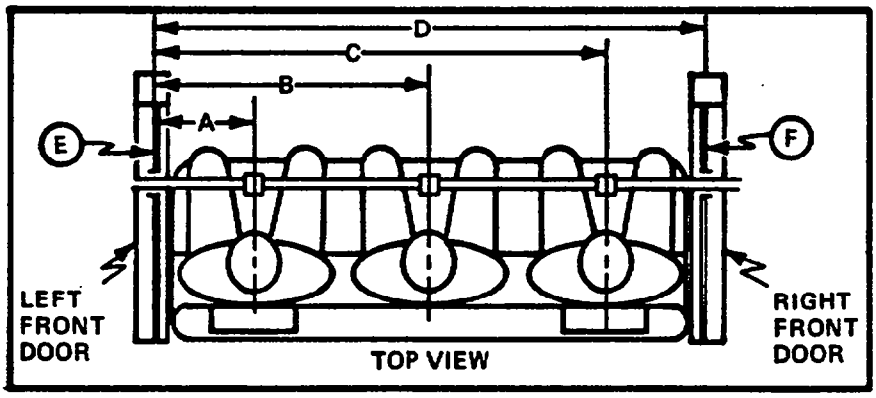


MEASUREMENT LOCATION

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



A =	21.0 in.	27 Degrees	A =	21.4 in. 28 Degrees
B =	31.2 in.	102 Degrees	B =	31.2 in. 101 Degrees
C =	17.5 in.	120 Degrees	C =	16.4 in. 120 Degrees
D =	12.5 in.		D =	12.5 in.



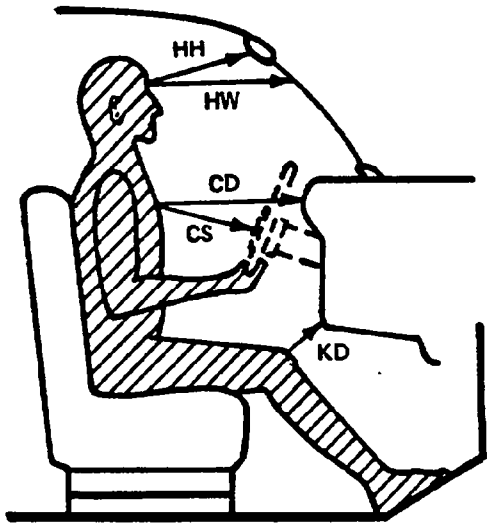
DUMMY ID

		1021	1022
A	=	Left Door to Driver Centerline	12.1 in.
B	=	Left Door to Center Passenger Centerline	-- in.
C	=	Left Door to Right Passenger Centerline	47.0 in.
D	=	Left Door to Right Door	59.2 in.
E, F	=	Window Glass Height (Right and Left Must Be Equal)	12.0 in.

Figure 2

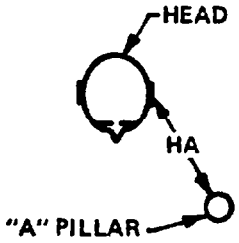
OCCUPANT CLEARANCE DIMENSIONS

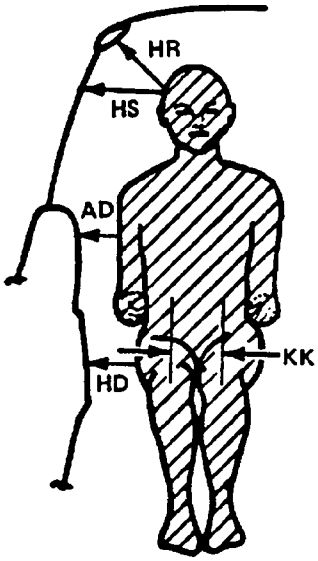
	DRIVER	PASSENGER
HH	21.2	20.9
HW	25.3	24.3
CD	23.0	21.8
CS	14.5	--
KDL	4.3	5.7
KDR	4.5	5.3
SA	21°	19°
TA	25°	24°



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	8.0	8.0
HS	8.5	9.0
AD	3.4	4.1
HD	6.7	6.8
KK	10.0	8.0
HA	27.0	26.6

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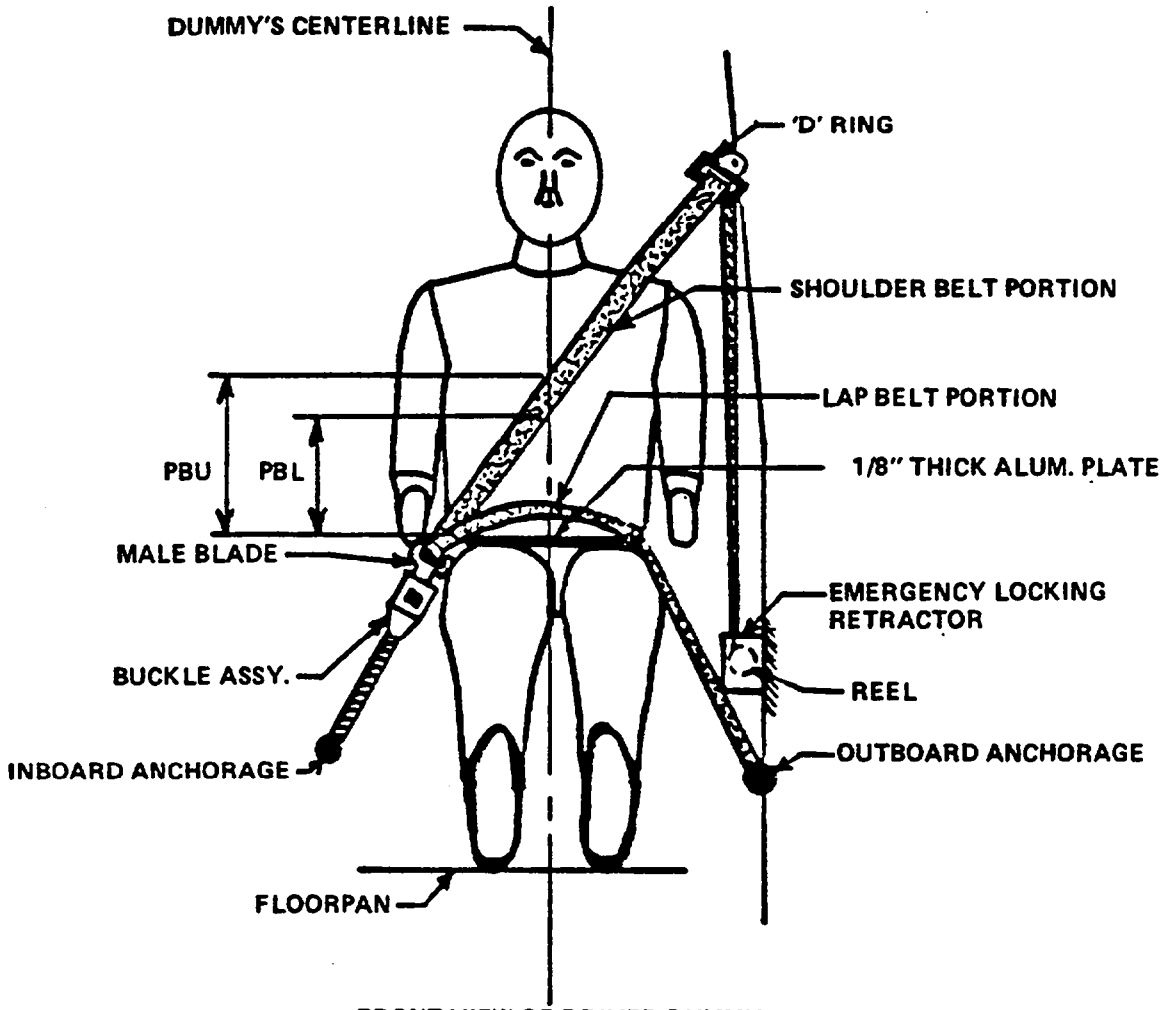
Figure 3

SEAT BELT POSITIONING DATA



FRONT VIEW OF DRIVER DUMMY

	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	13.5	13.1
PBL -- Top surface of alum. plate to belt lower edge	10.5	10.3
LAP BELT TENSION	--	--
SHOULDER BELT TENSION	2.5	2.5

Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

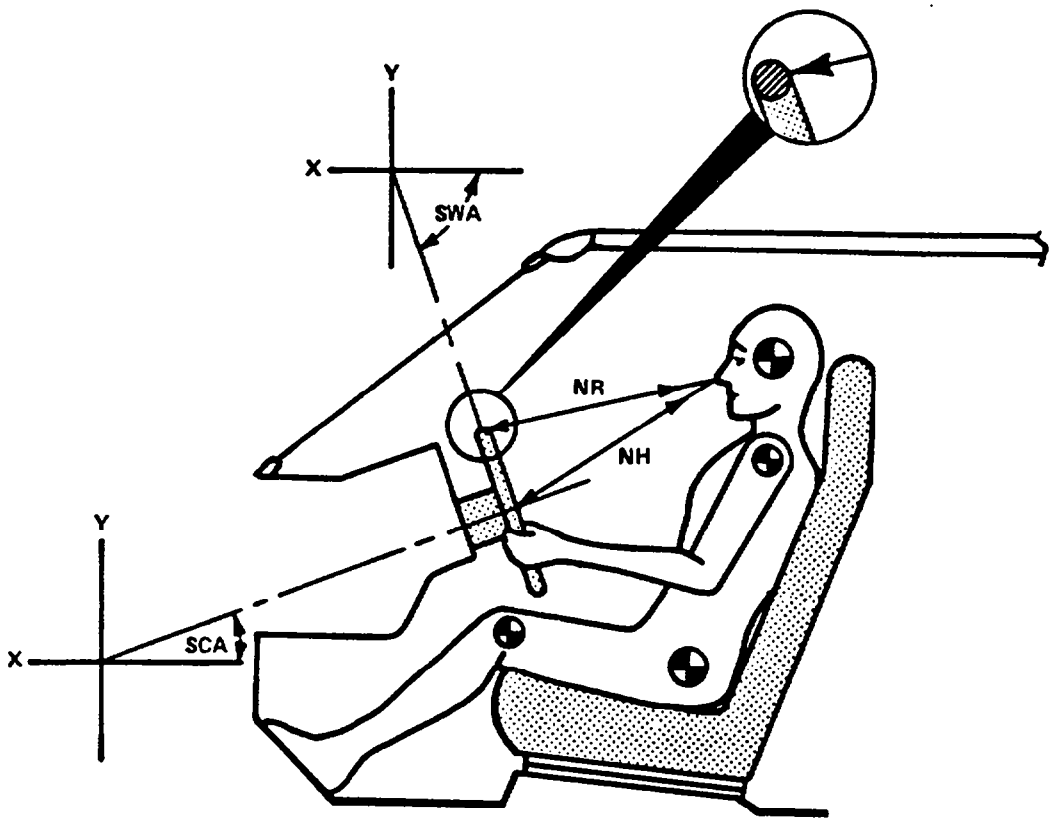
BELT LENGTH DATA:	Driver	Passenger
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	94.7	94.3
Should belt length as measured on Part 572 Dummy.	44.0	44.0
Lap belt length as measured on Part 572 Dummy.	38.0	38.0
BELT SPOOL-OFF DATA:		
As determined by film analysis.	2.0	Note #1
As determined mechanically.	2.2	2.0
As determined electronically.	2.8	2.5
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	.9 in per ft	.8 in per ft
Measured Mechanically	.6 in per ft	.6 in per ft

All measurements are in inches.

NOTE #1 Unable to read film due to sun reflection

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY REFERENCE DIMENSIONS



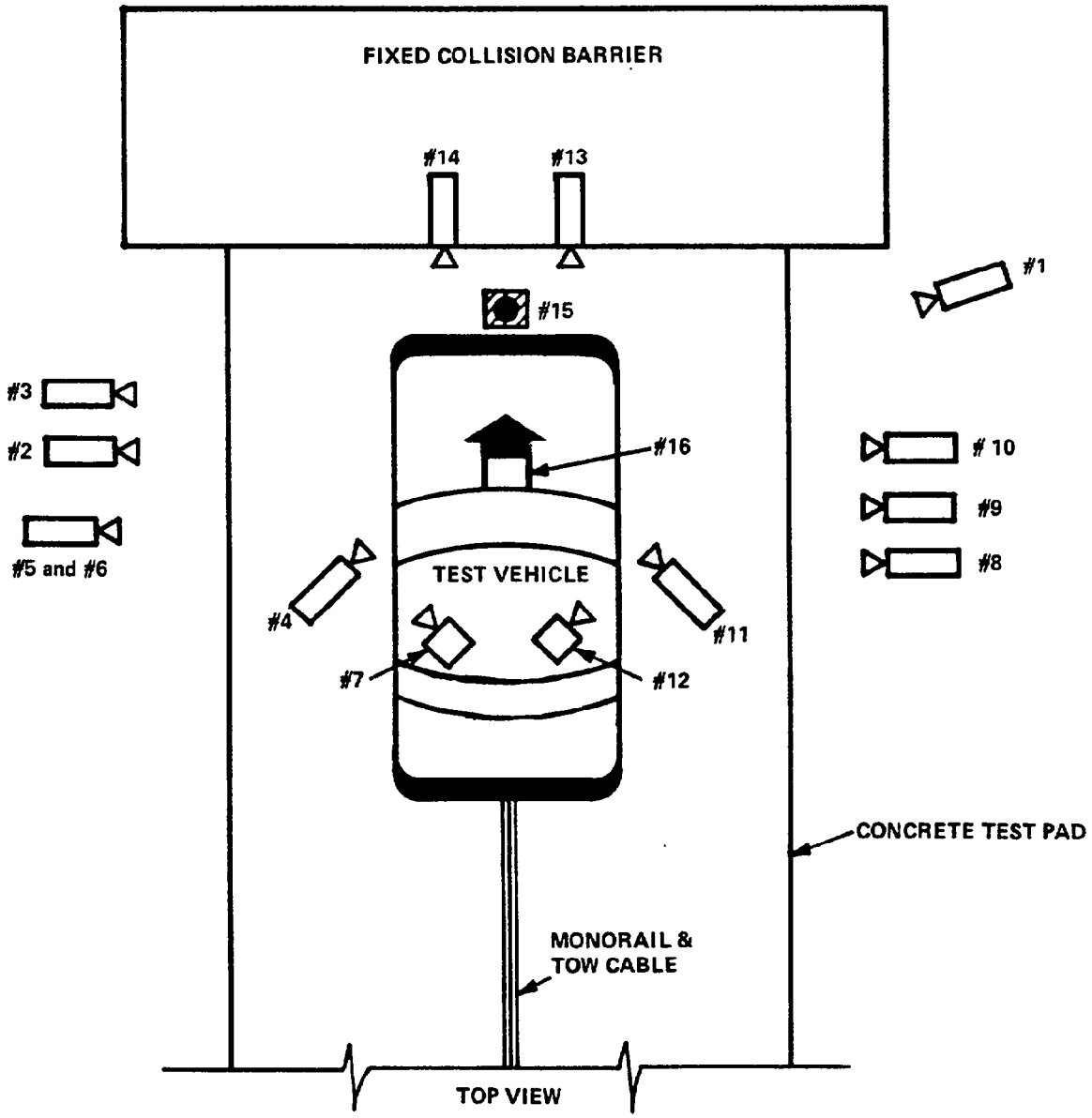
LEFT SIDE VIEW

	MEASUREMENTS	
NR -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	20.8	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	20.0	Inches
SCA -- Angle of steering column relative to the horizontal X axis	45°	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-45°	Degrees

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4



7626-2

HIGH-SPEED CAMERA LOCATIONS

Test No. MJ5801 Vehicle 1988 Volkswagen Vanagon

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	37	45	-2	-	13	540
3	Left Side View	297	18	42	-3	-	25	540
4	Driver and Interior View	81	68	75	-15	-	13	810
5	Steering Column (Bottom)	379	61	49	-4	358	25	550
6	Steering Column (Top)	379	61	73	-8	358	25	550
7	Left Belt	-	-	-	-	-	8	860
8	Overall Right Side	213	74.5	42.5	-2	-	13	800
9	Right Side View	241	54.5	44.5	-2	220	25	850
10	Right Passenger View	264	30	55	-2	243	35	740
11	Passenger and Interior View	66	72	74	-16	-	13	600
12	Right Belt	-	-	-	-	-	8	1000
13	Passenger Front View	20	0	56	-35	-	13	550
14	Driver Front View	20	0	56	-33	-	13	540
15	Windshield View	0	0	125	-45	-	13	550
16	Pit View of Engine	0	35	-120	90	-	13	875
17	Pit View of Fuel Tank							

* 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

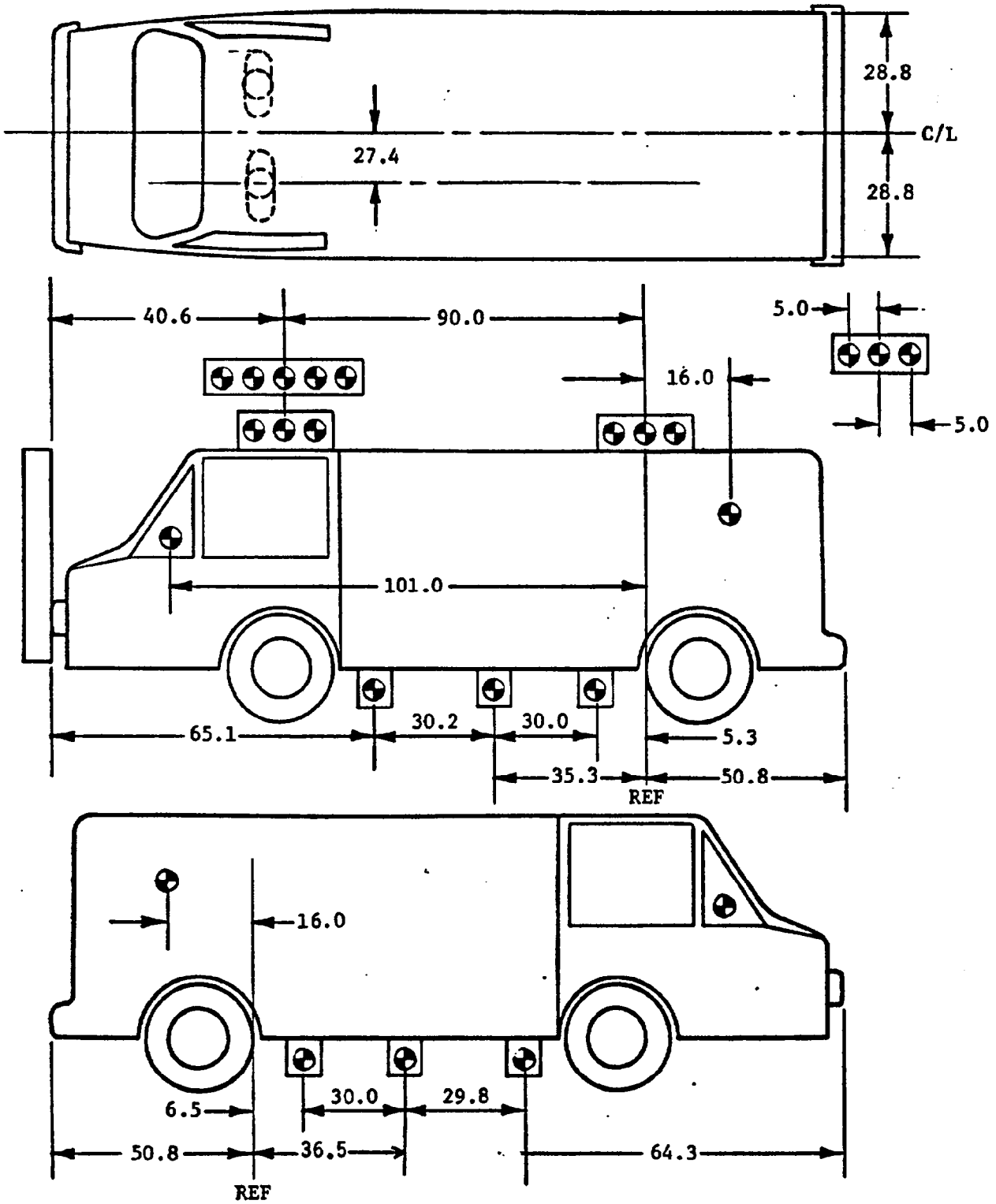
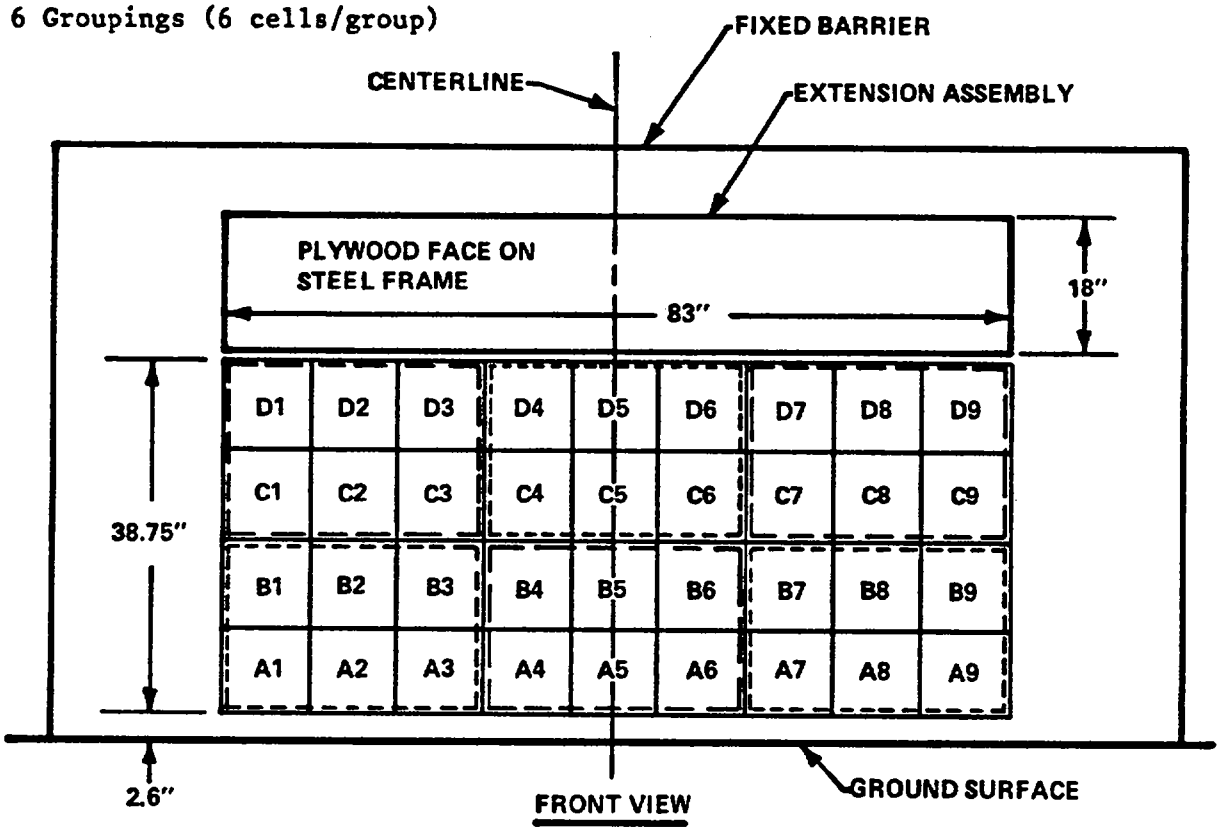


Figure 7

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

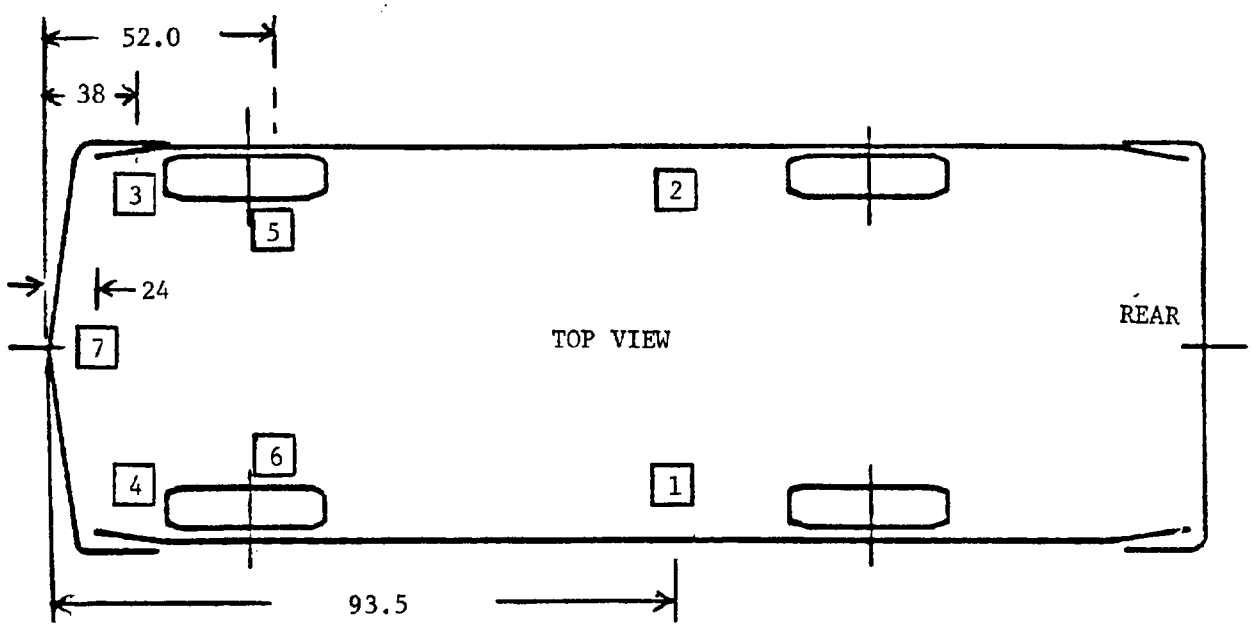
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

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



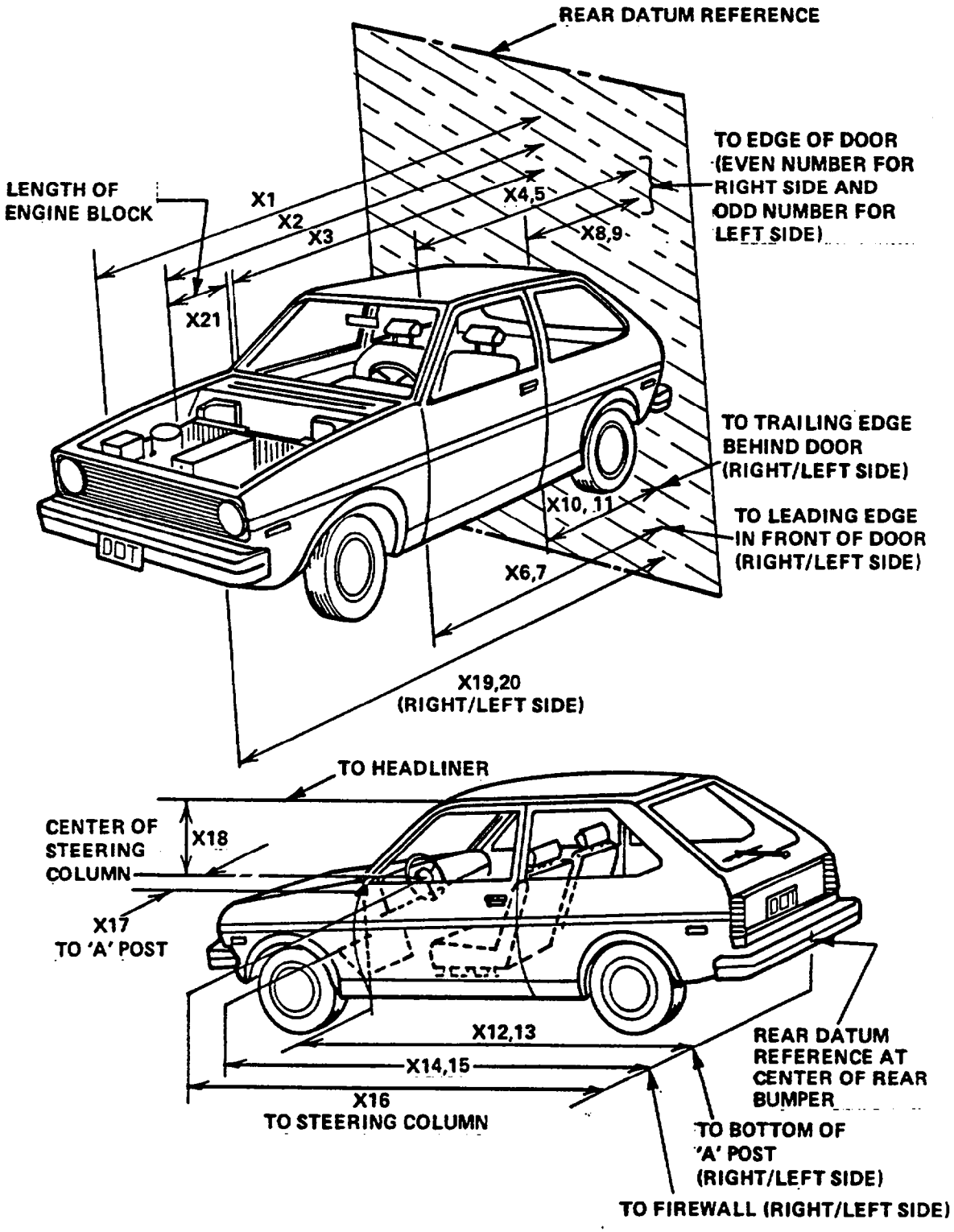
DIMENSIONS IN INCHES

ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Left Rear Crossmember	x		
2	Right Rear Crossmember	x		
3	Right Frame	x		
4	Left Frame	x		
5	Right Disc Brake Caliper	x		
6	Left Disc Brake Caliper	x		
7	Instrument Panel	x		

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

Figure 9

TEST VEHICLE MEASUREMENTS



7626-2

Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	181.4	165.4	16.0
X2	Rear Surface of Vehicle to Front of Engine Rear Engine	30.7	30.7	0.0
X3	Rear Surface of Vehicle to Firewall Rear Engine	34.5	34.5	0.0
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	164.4	158.9	5.5
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	165.1	161.5	3.6
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	163.2	154.1	9.1
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	164.2	155.2	9.0
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	117.4	116.1	1.3
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	117.9	117.1	.8
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	117.4	113.4	4.0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	117.9	117.6	.3
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	162.1	154.0	8.1
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	162.4	155.2	7.2
X14	Rear Surface of Vehicle to Firewall, Right Side	169.1	156.2	12.9
X15	Rear Surface of Vehicle to Firewall, Left Side	169.1	156.0	13.1
X16	Rear Surface of Vehicle to Steering Column	147.7	145.1	2.6
X17	Center of Steering Column to "A" Post	14.5	14.0	.5
X18	Center of Steering Column to Headliner	20.1	18.7	1.4
X19	Rear Surface of Vehicle to Right Side of Front Bumper	176.5	162.9	13.6
X20	Rear Surface of Vehicle to Left Side of Front Bumper	176.5	164.3	12.2
X21	Length of Engine Block	13.2	13.2	0

Appendix A

PHOTOGRAPHS

Figure A-1 PRE-TEST FRONT VIEW

7626-2

Figure A-2 POST-TEST FRONT VIEW

7626-2

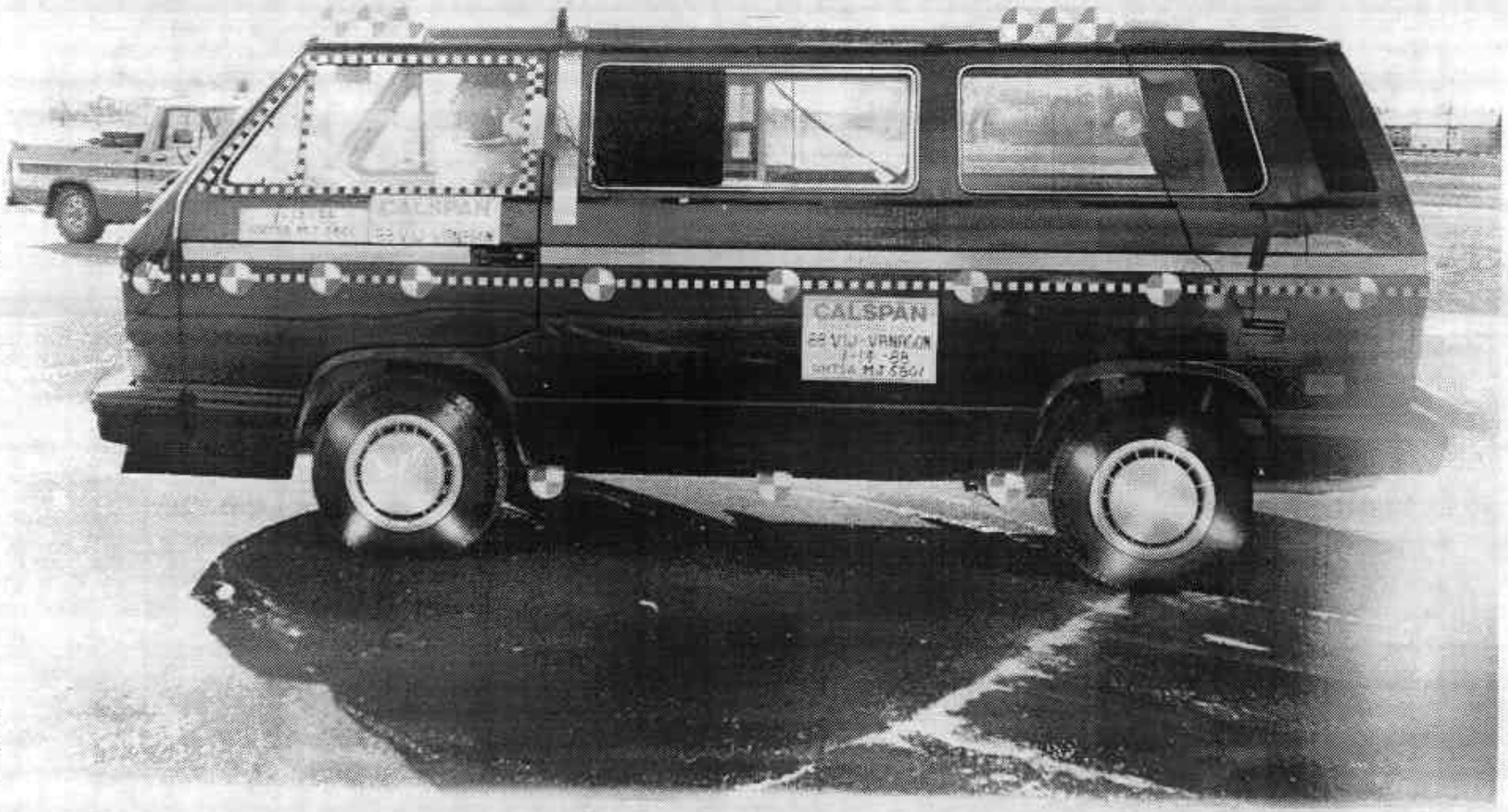


Figure A-3 PRE-TEST LEFT SIDE VIEW

Figure A-4 POST-TEST LEFT SIDE VIEW

7626-2

Figure A-5 PRE-TEST RIGHT SIDE VIEW

7626-2

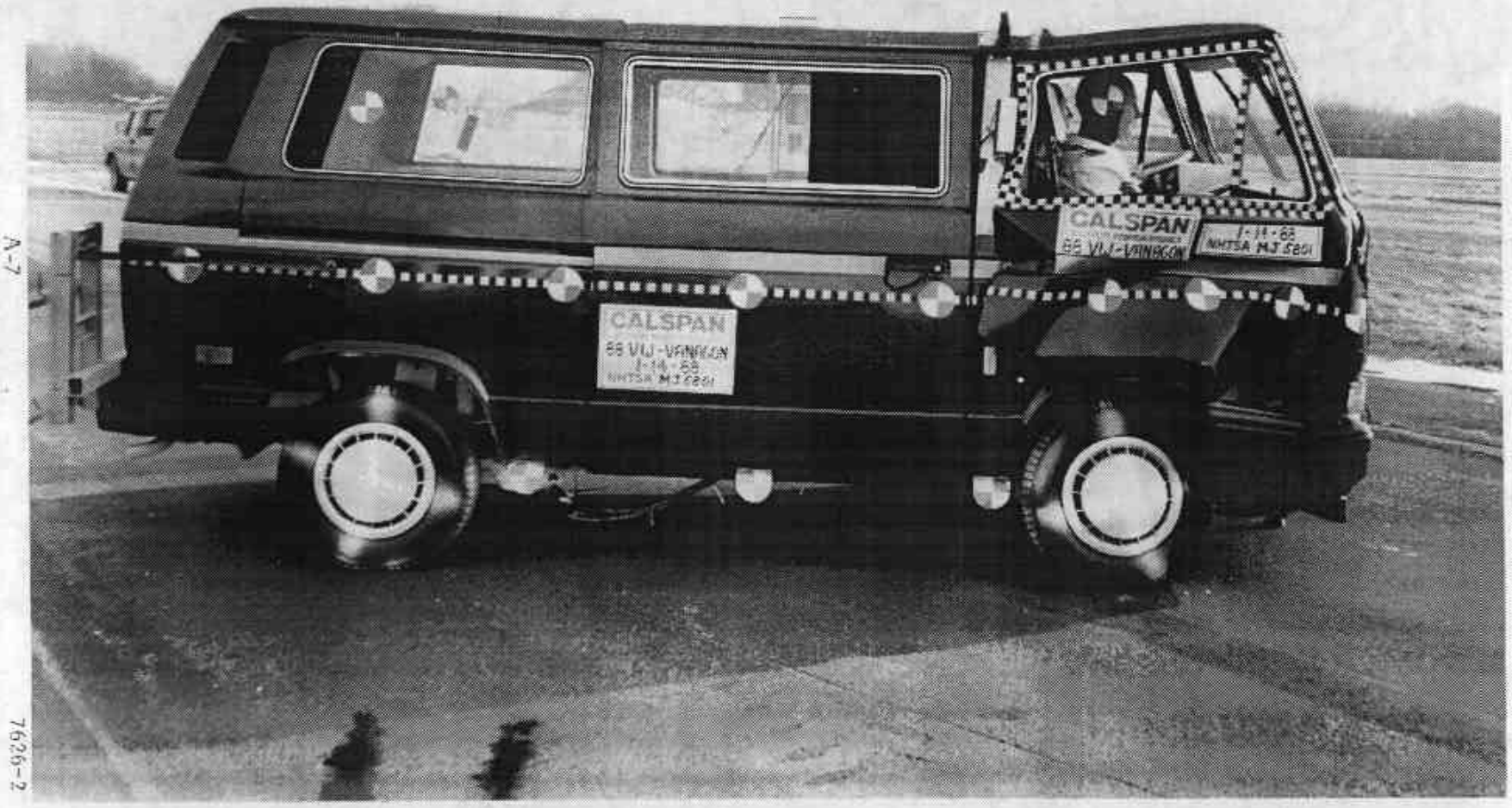


Figure A-6 POST-TEST RIGHT SIDE VIEW

7626-2

Figure A-7 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

7626-2

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

7626-2

Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

7626-2

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

7626-2

Figure A-11 PRE-TEST WINDSHIELD VIEW

7626-2

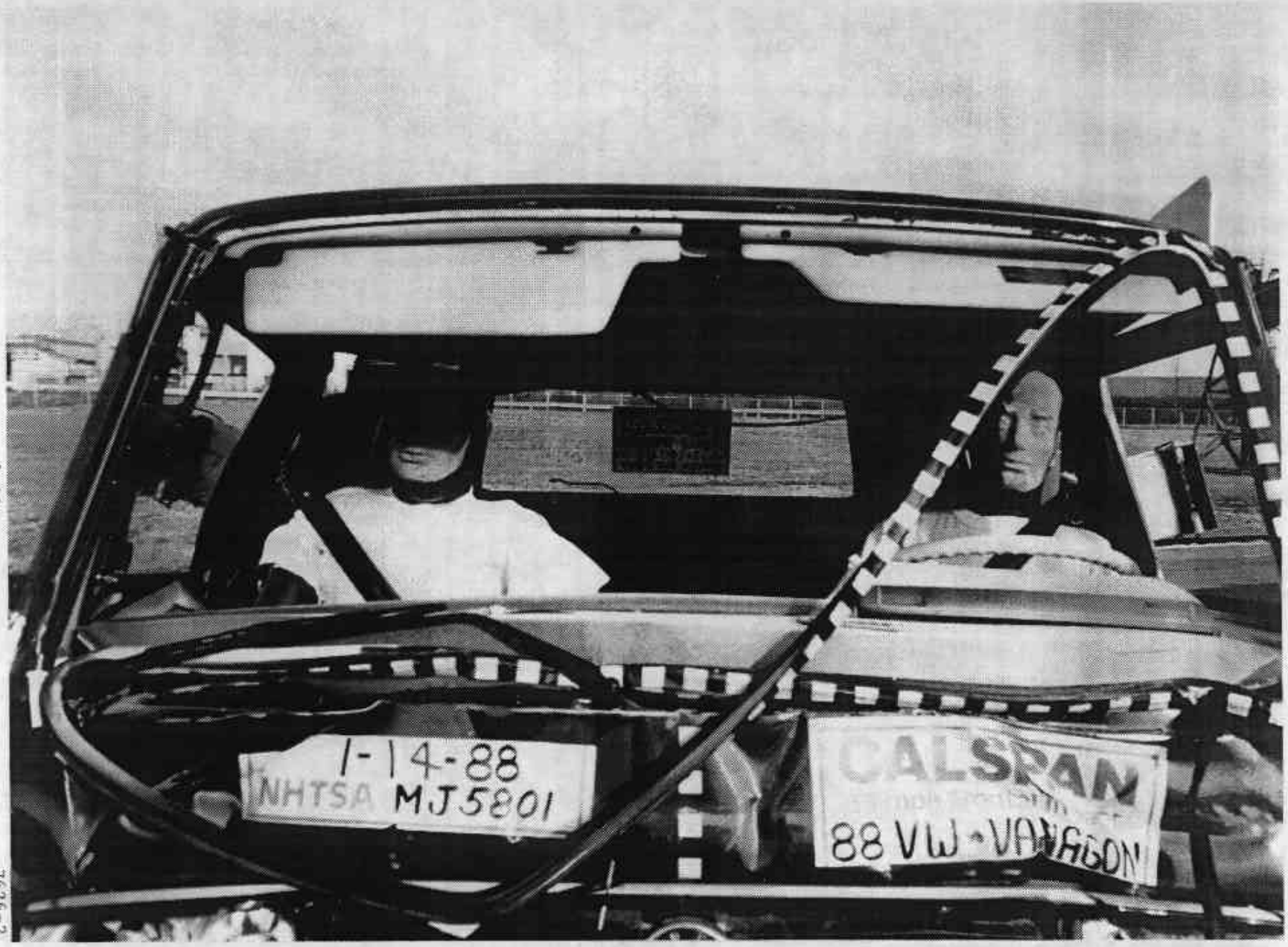


Figure A-12 POST-TEST WINDSHIELD VIEW

7626-2

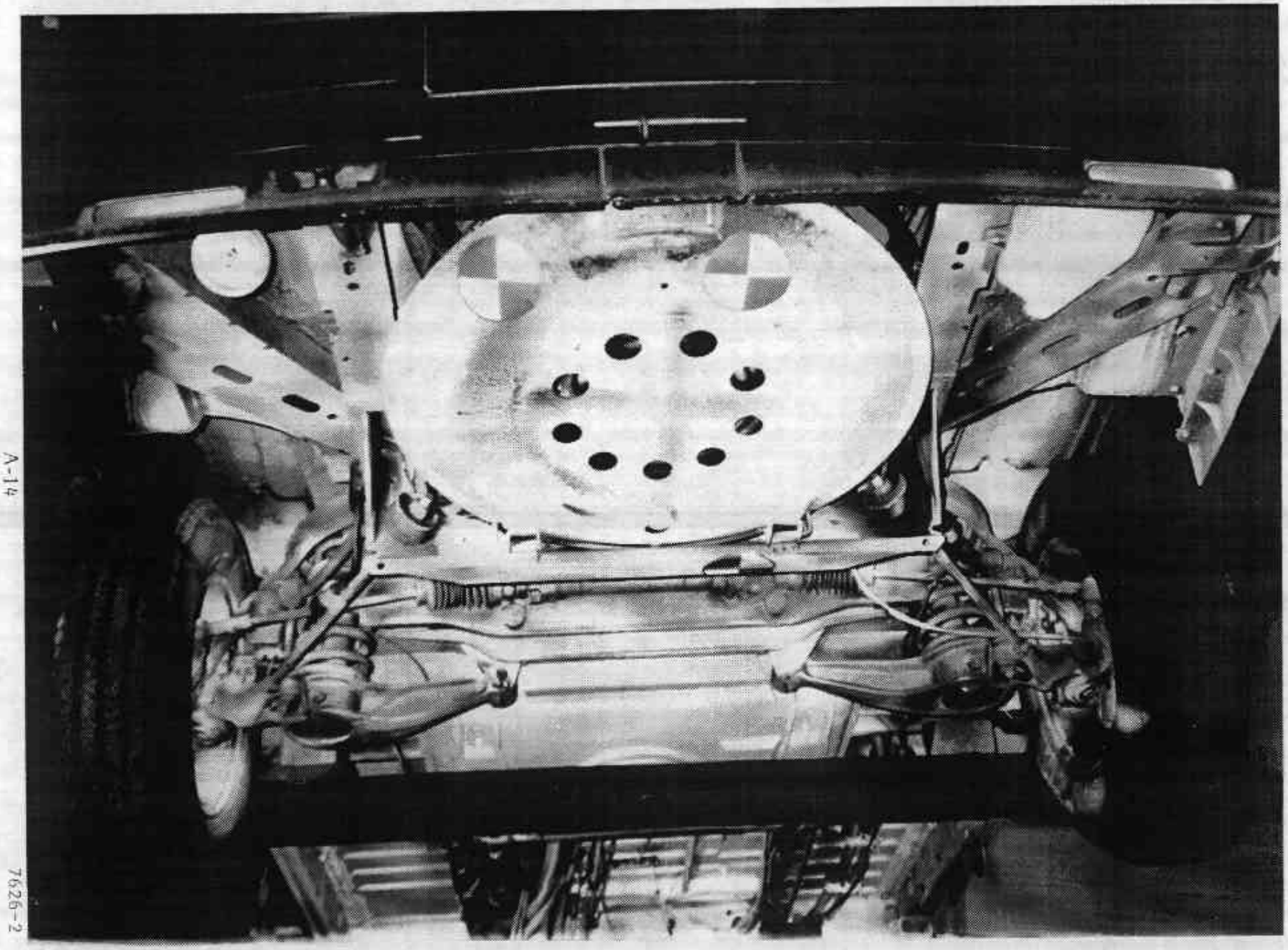


Figure A-13 PRE-TEST FRONT UNDERBODY VIEW

7626-2

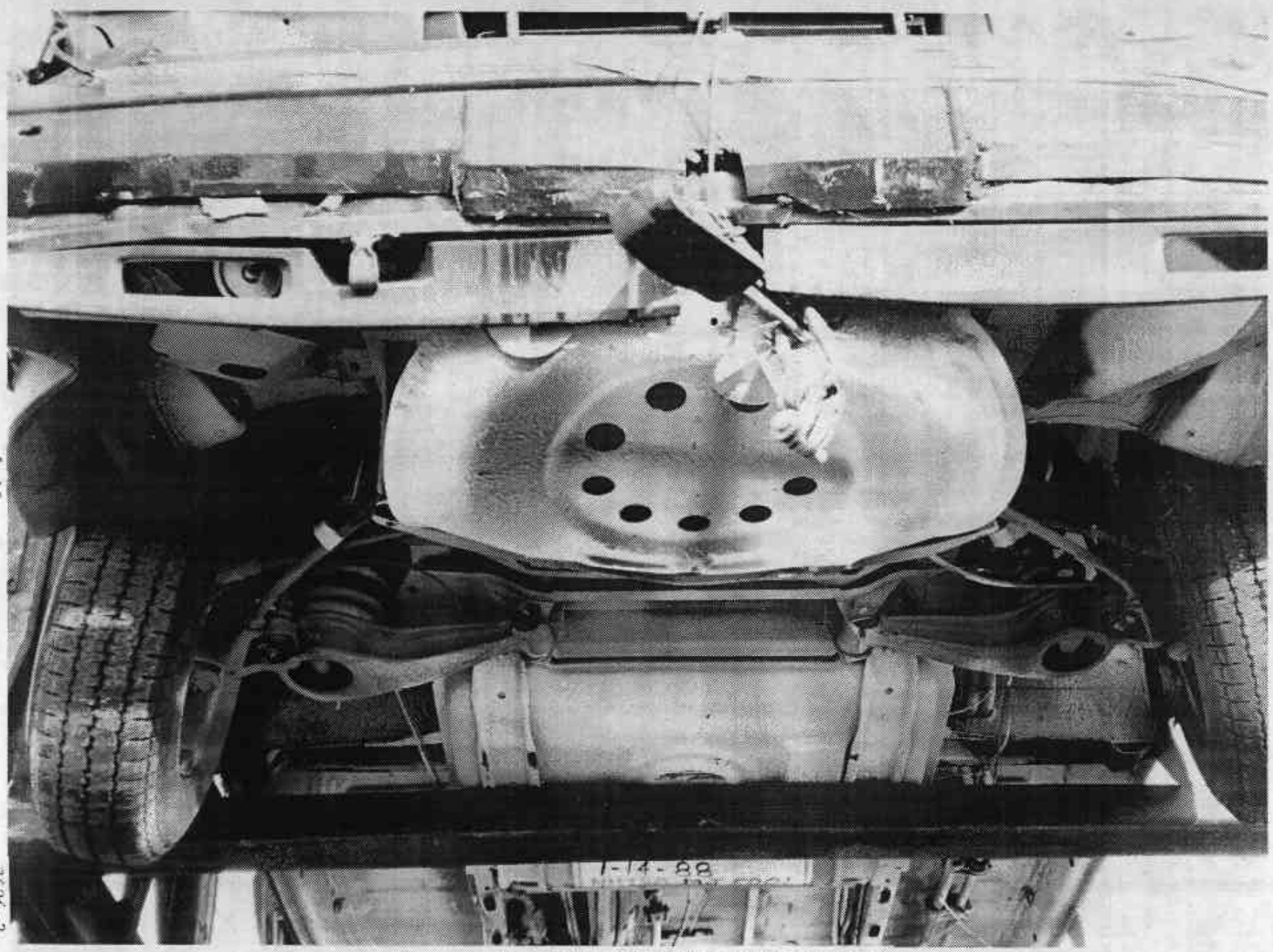


Figure A-14 POST-TEST FRONT UNDERBODY VIEW

7626-2

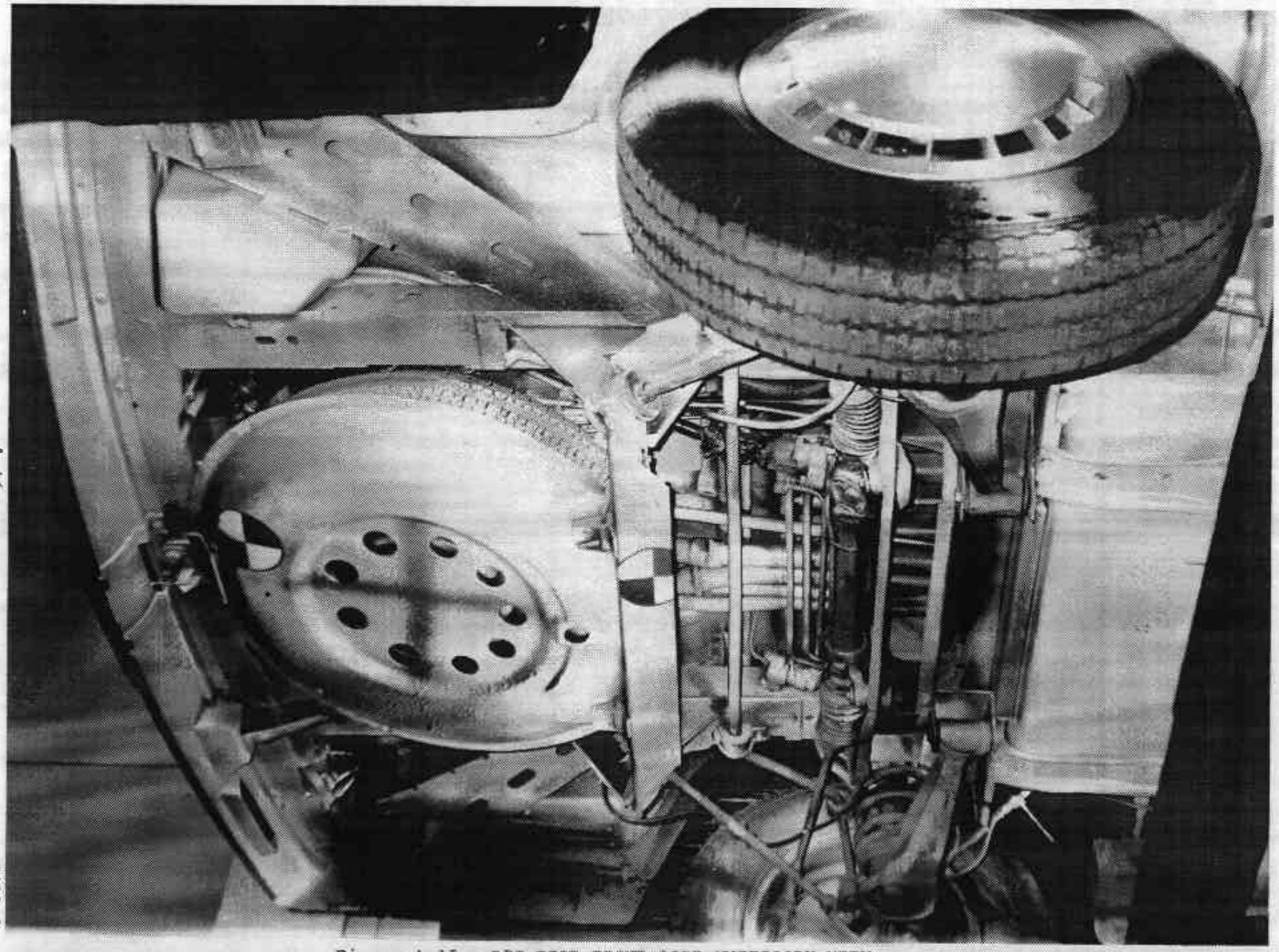


Figure A-15 PRE-TEST FRONT-SIDE UNDERBODY VIEW

7626-2

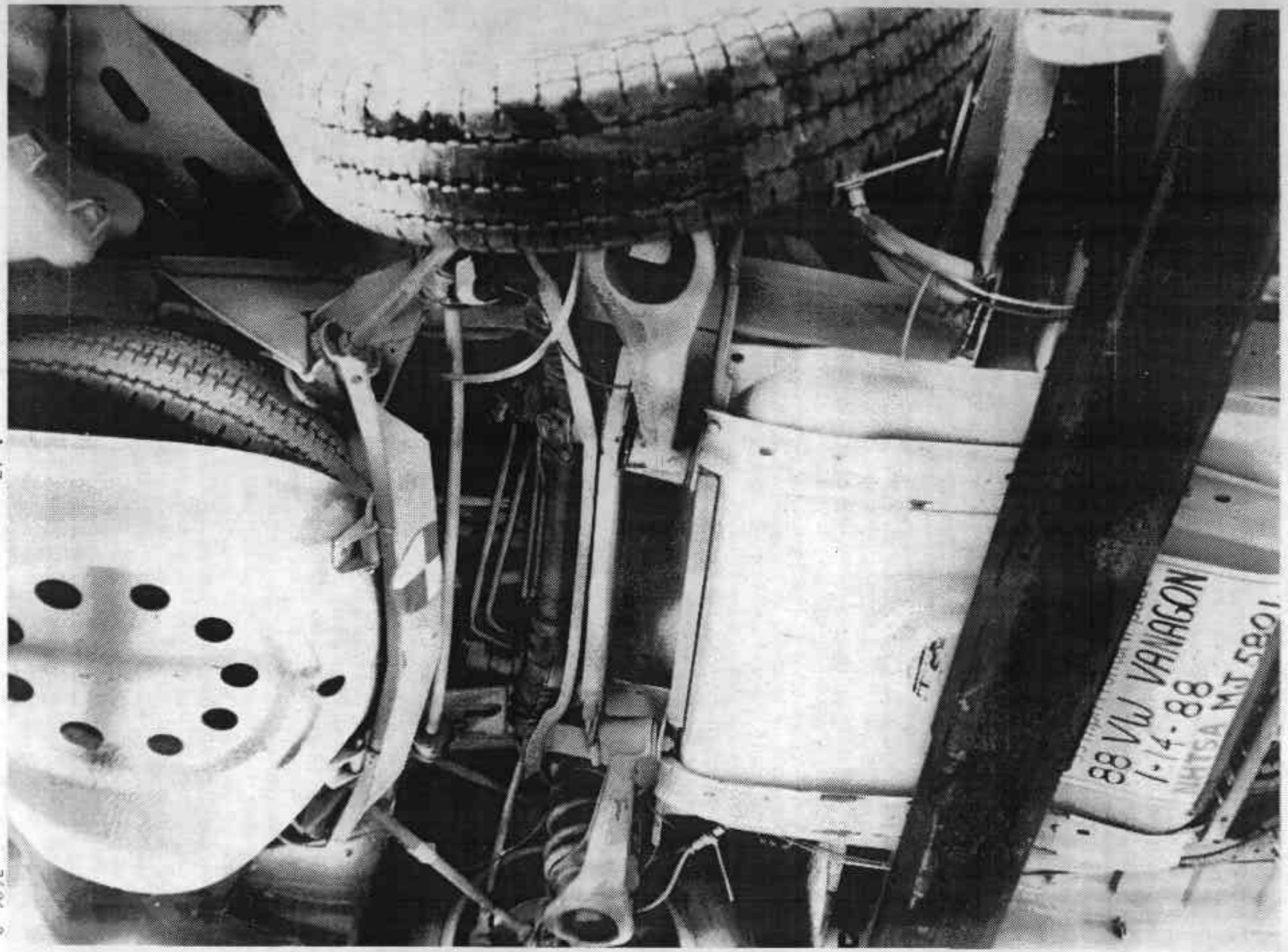


Figure A-16 POST-TEST FRONT-SIDE UNDERBODY VIEW

7626-2

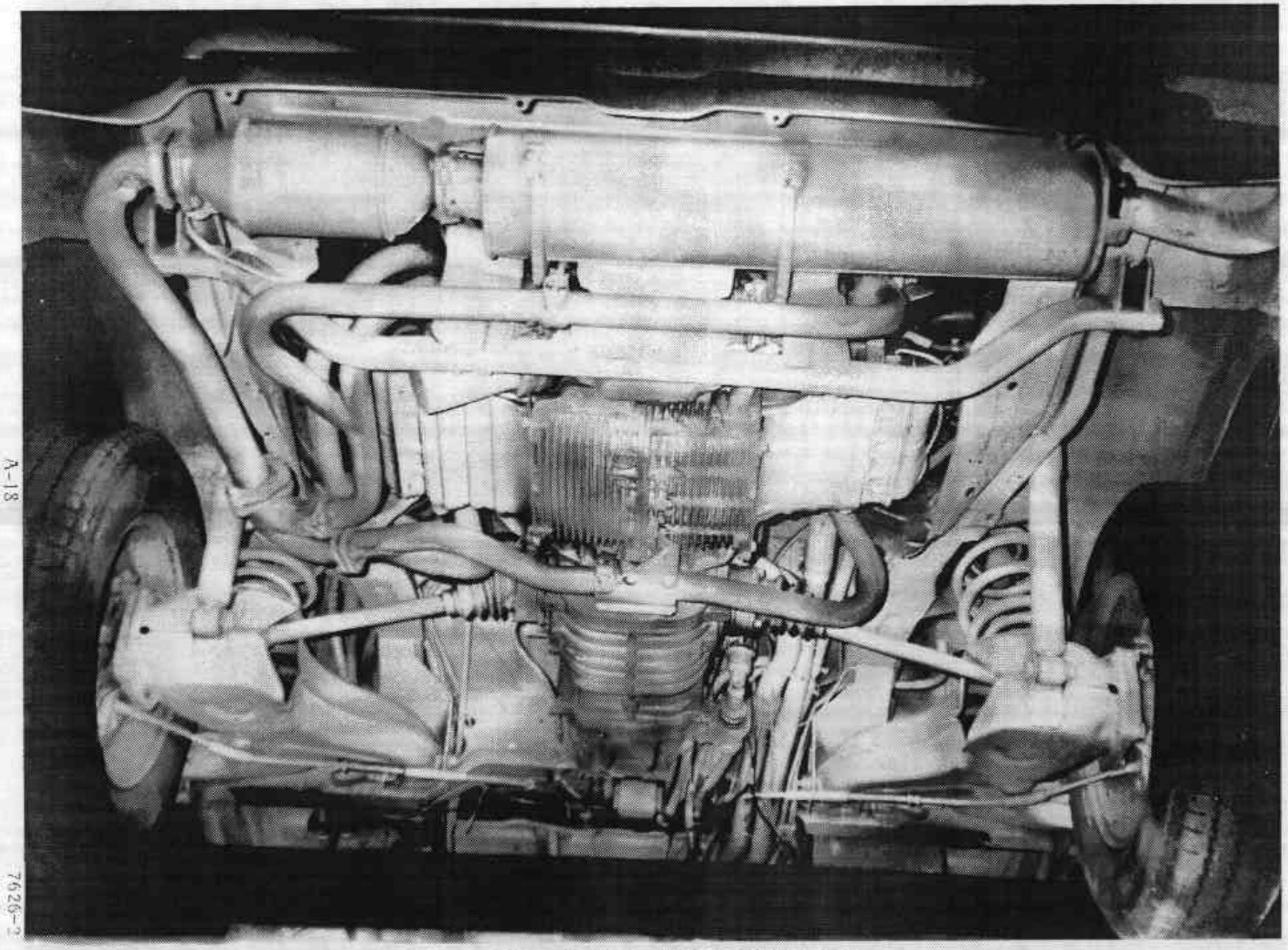


Figure A-17 PRE-TEST REAR UNDERBODY VIEW

7626-2

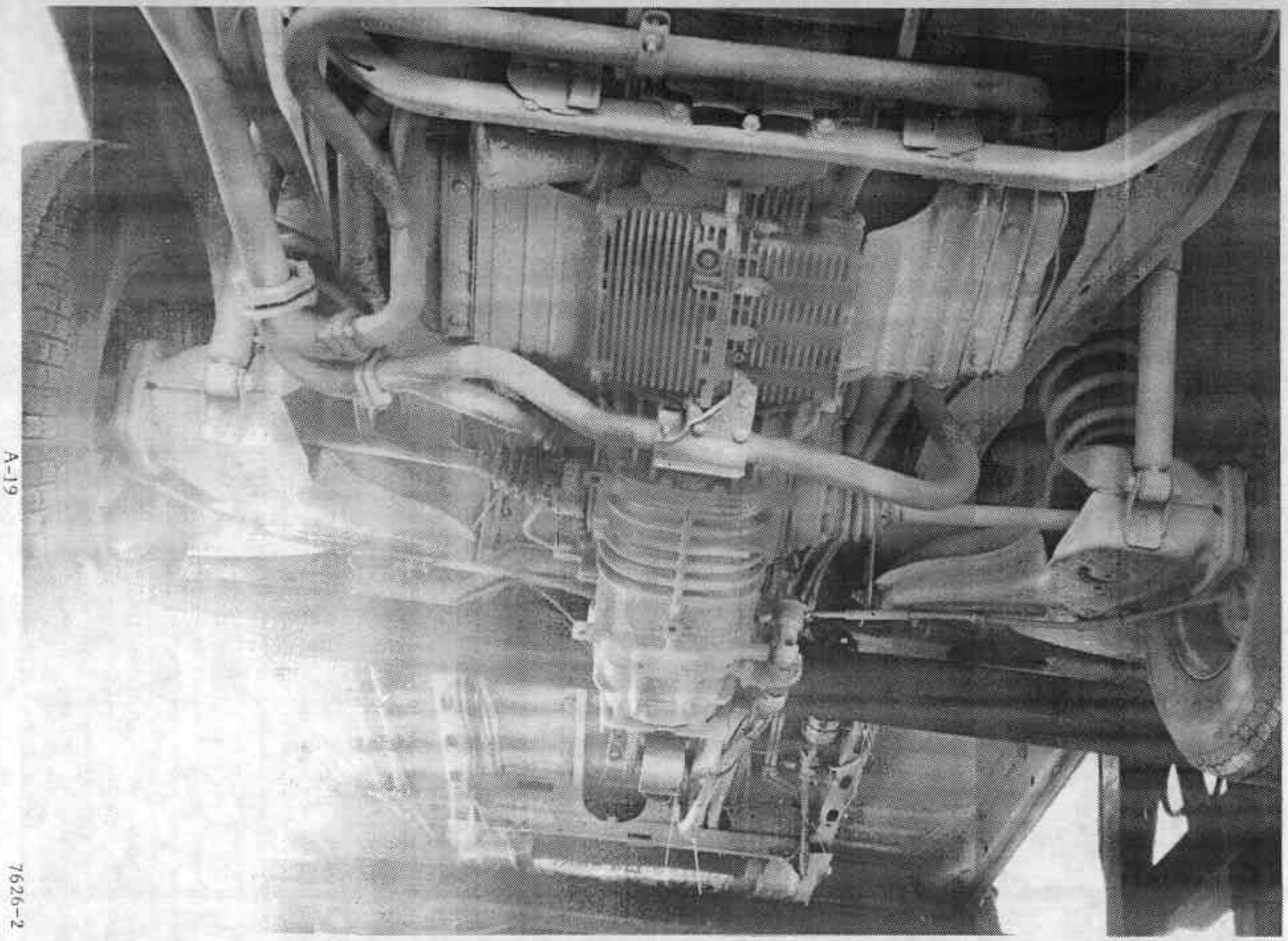


Figure A-18 POST-TEST REAR UNDERBODY VIEW

Figure A-19 PRE-TEST DRIVER POSITION VIEW

7626-2

Figure A-20 POST-TEST DRIVER POSITION VIEW

7626-2

Figure A-21 PRE-TEST PASSENGER POSITION VIEW

7626-2

Figure A-22 POST-TEST PASSENGER POSITION VIEW

7626-2

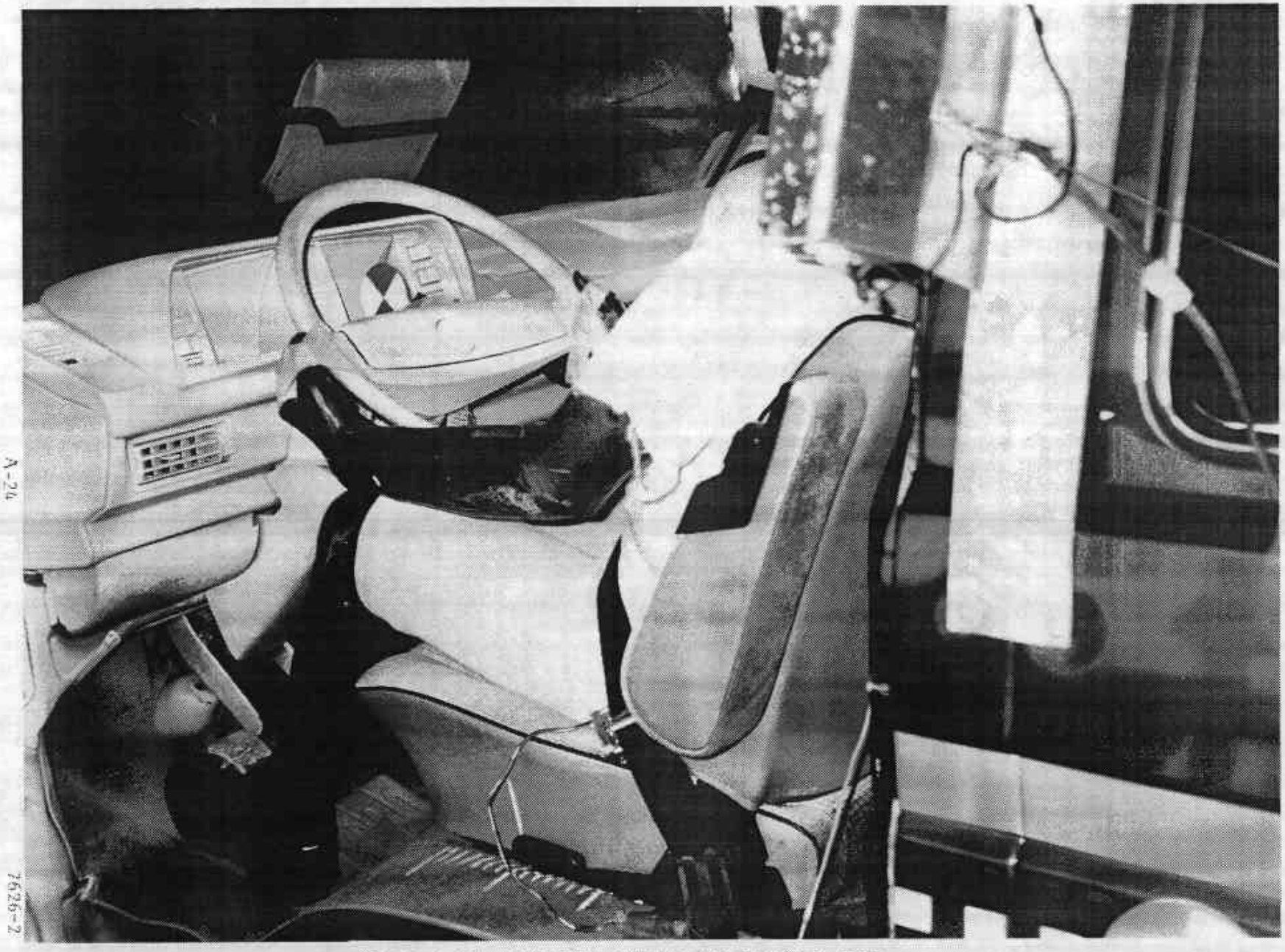


Figure A-23 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-24 POST-TEST DRIVER AND INTERIOR VIEW

7636-2

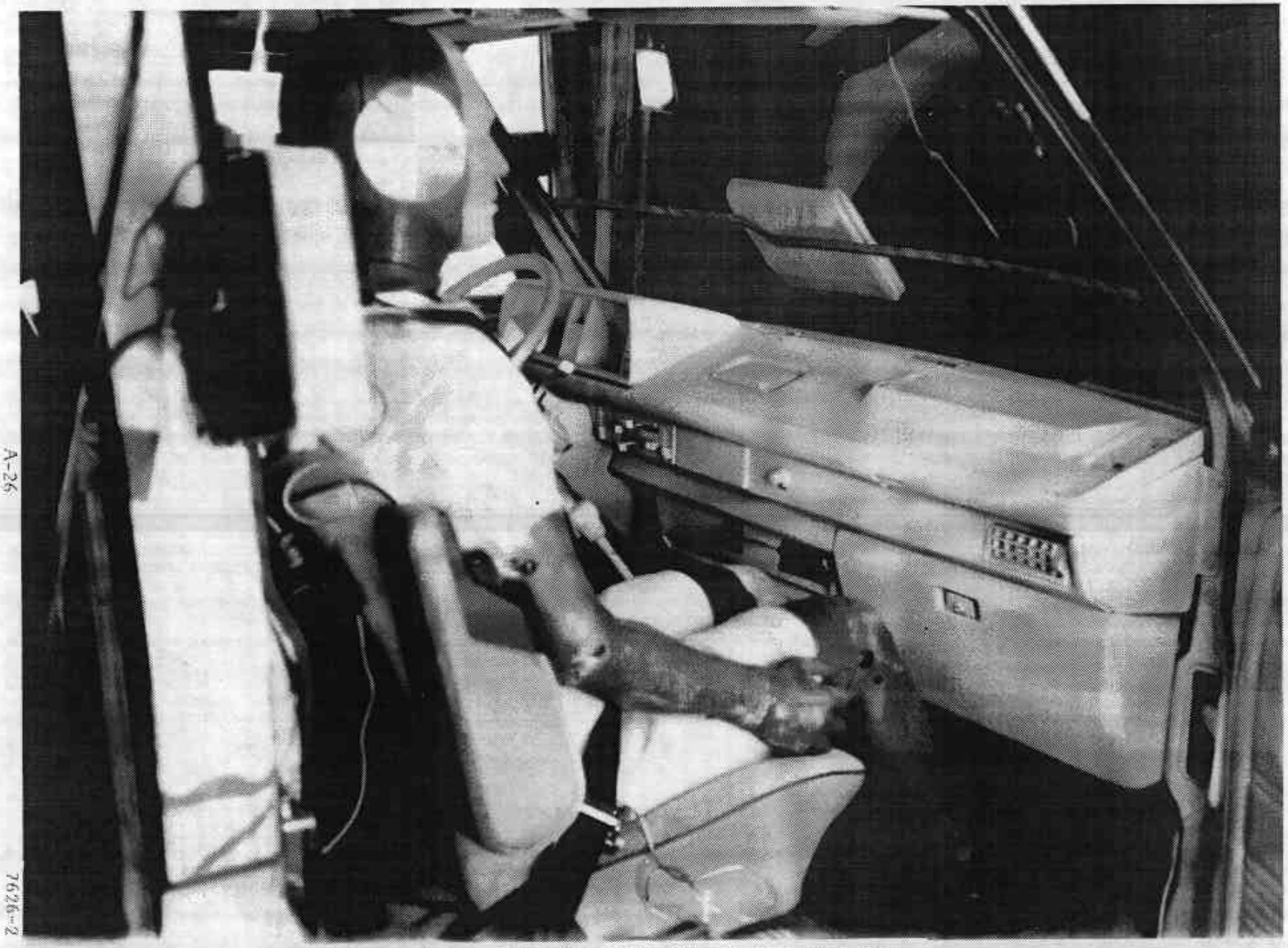


Figure A-25 PRE-TEST PASSENGER AND INTERIOR VIEW

7626-2

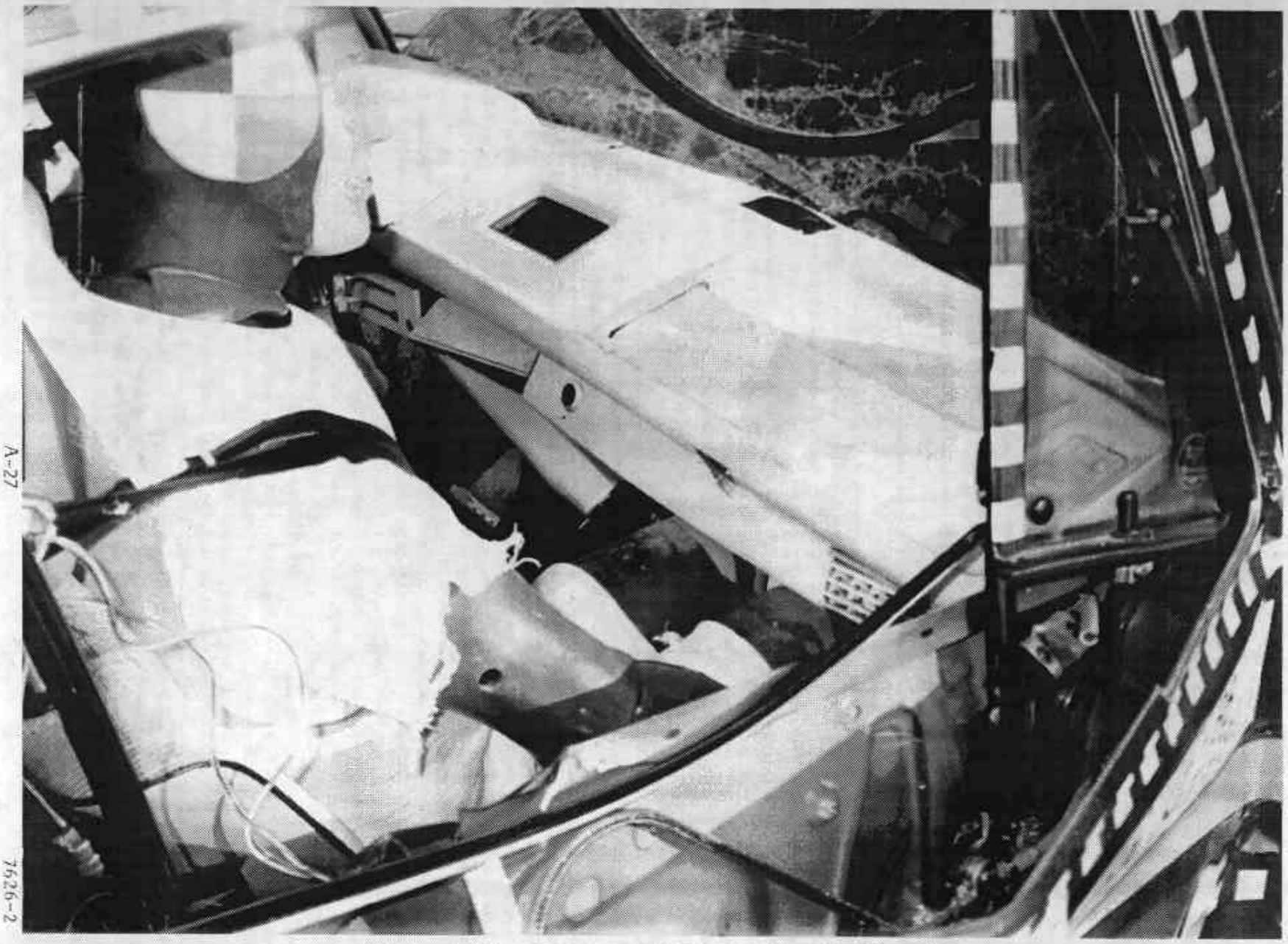


Figure A-26 POST-TEST PASSENGER AND INTERIOR VIEW

7626-2

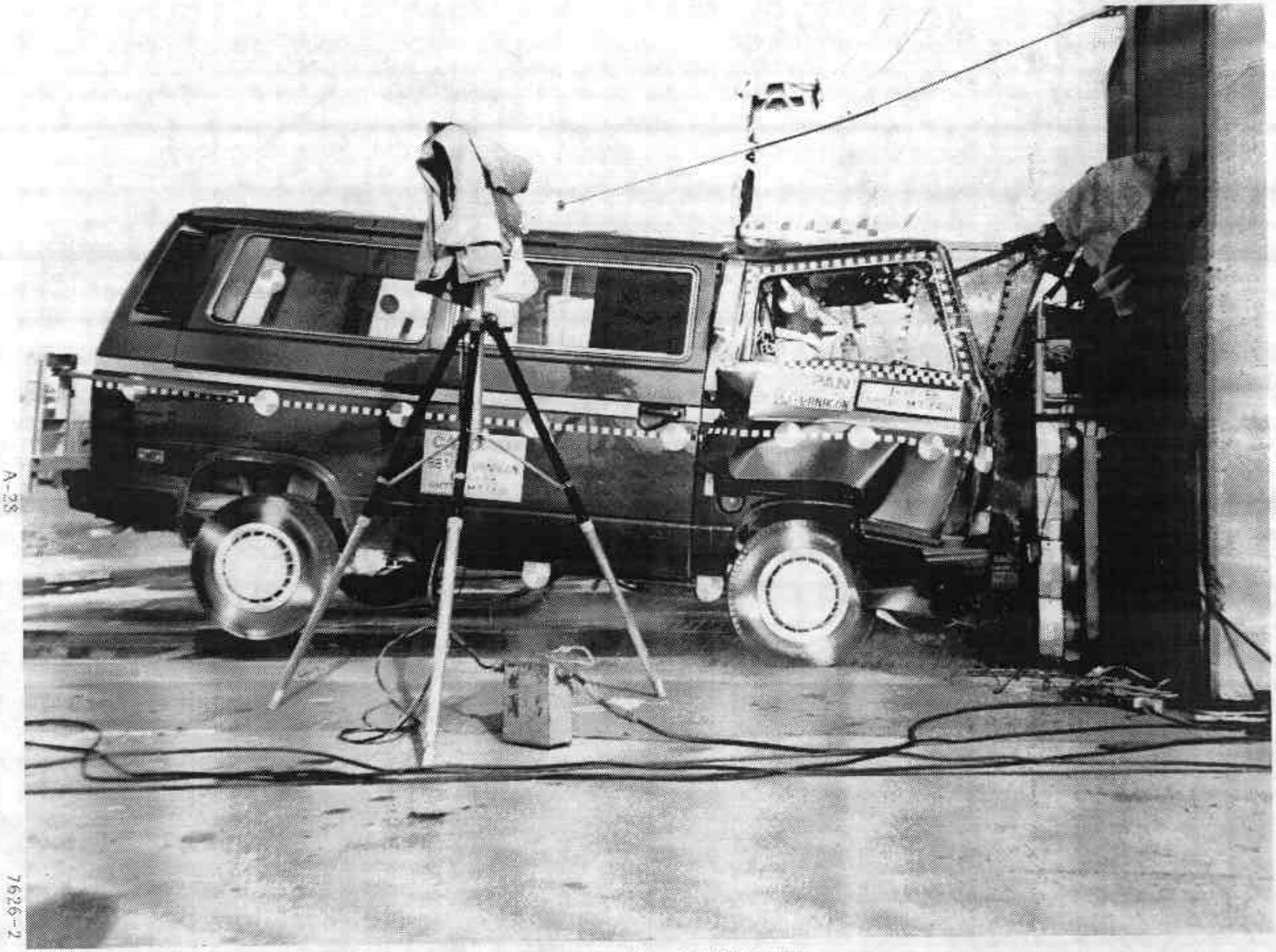


Figure A-27 IMPACT VIEW

Appendix B

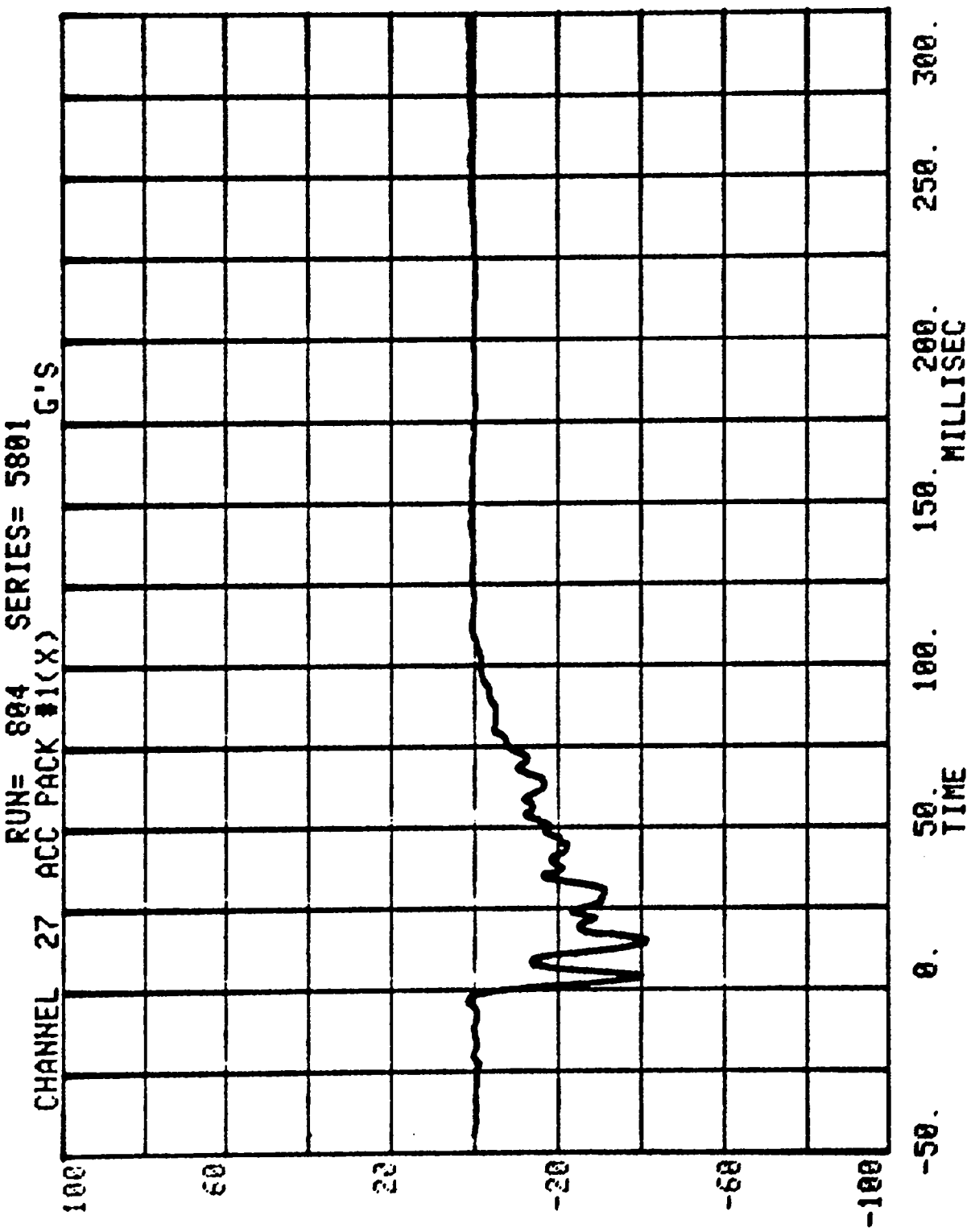
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MJ5801

VEHICLE DATA

FILTER CHANNEL CLASS

60


CHANNEL 27 RUN= 804 SERIES= 5801
ACC PACK #1(X)
G'S
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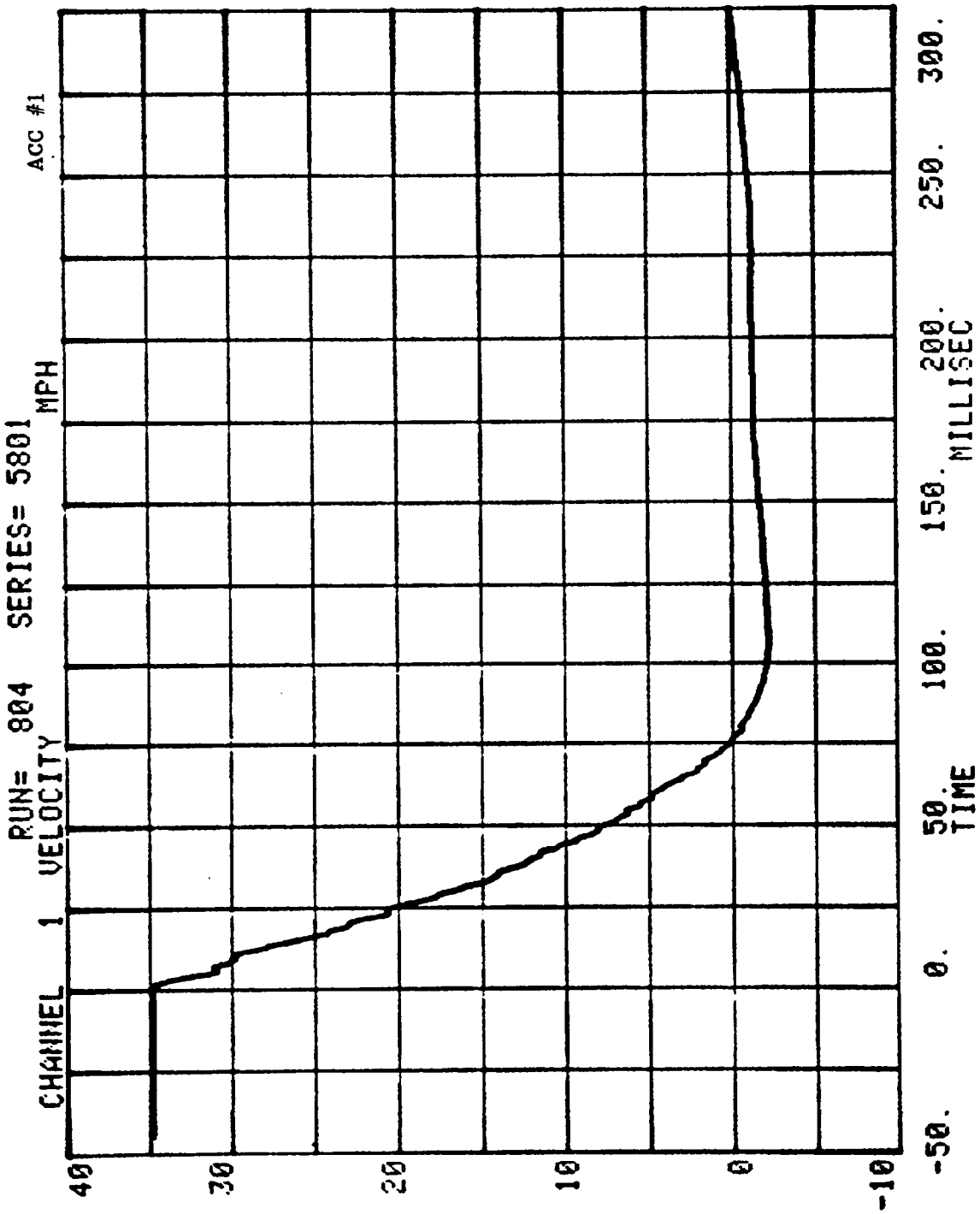
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 1 VELOCITY
RUN= 804 SERIES= 5801
MPH
ACC #1
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30
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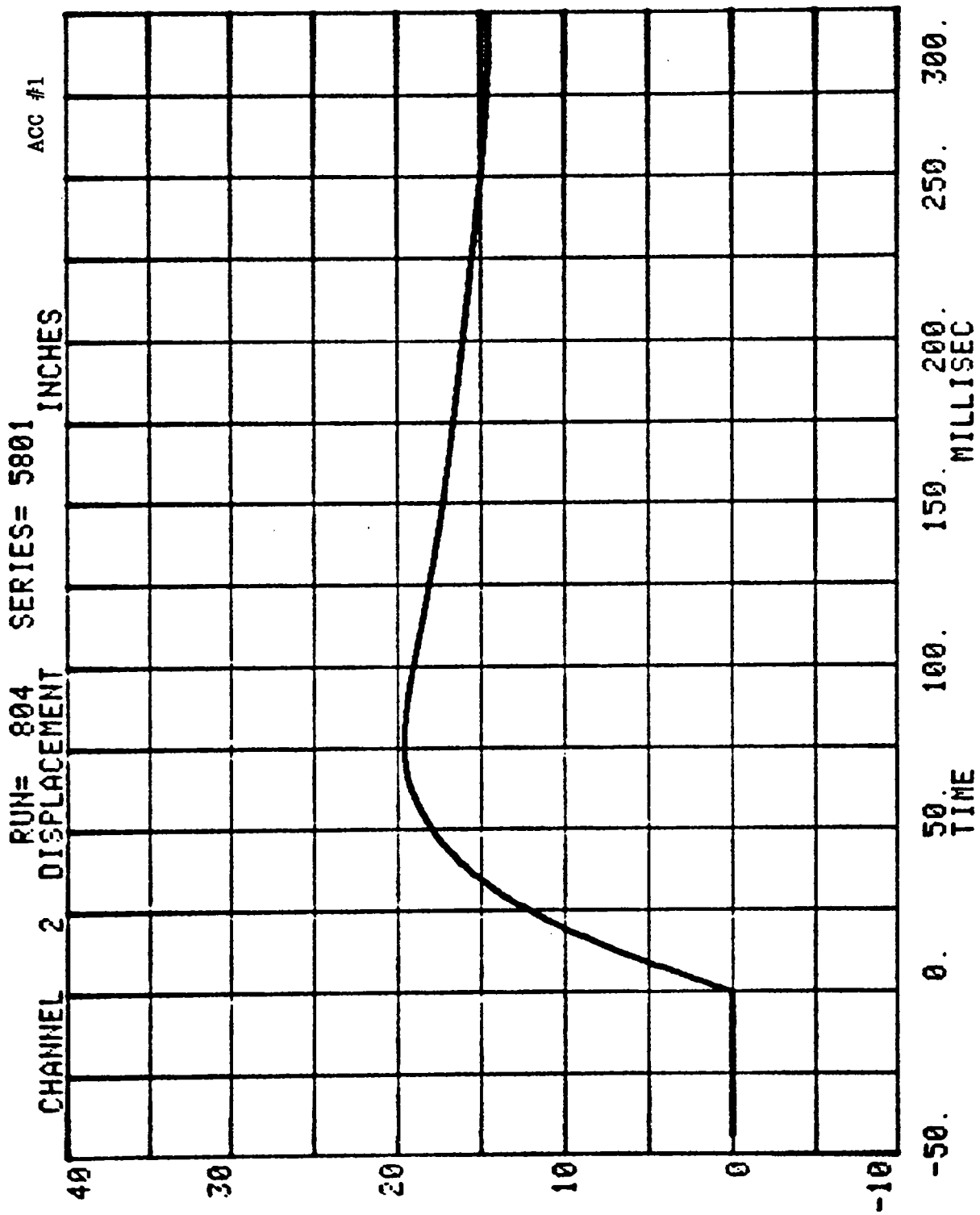
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 2 RUN= 804 SERIES= 5801
DISPLACEMENT INCHES
ACC #1
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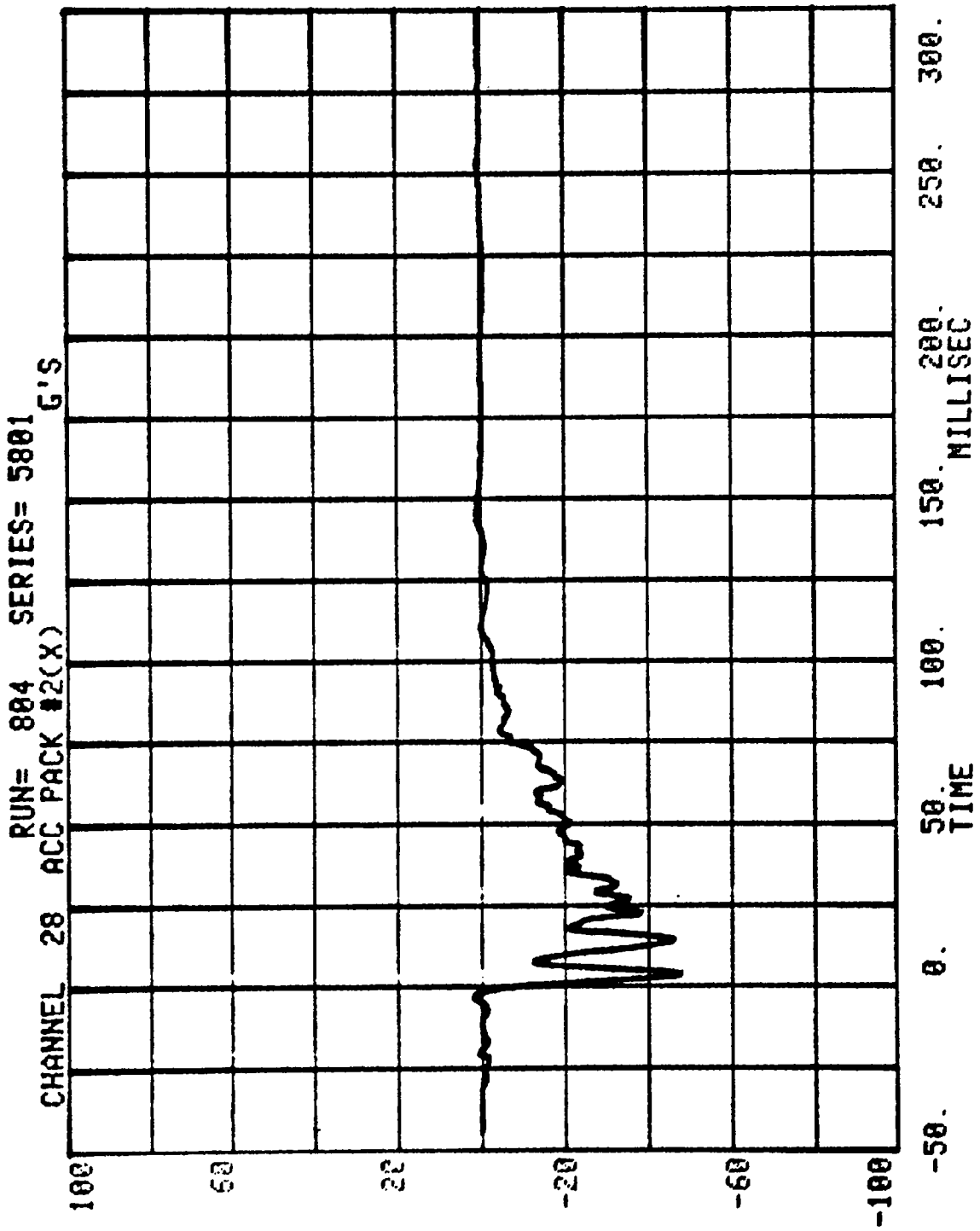
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 28 ACC PACK #2(X)
RUN= 804 SERIES= 5801
G'S
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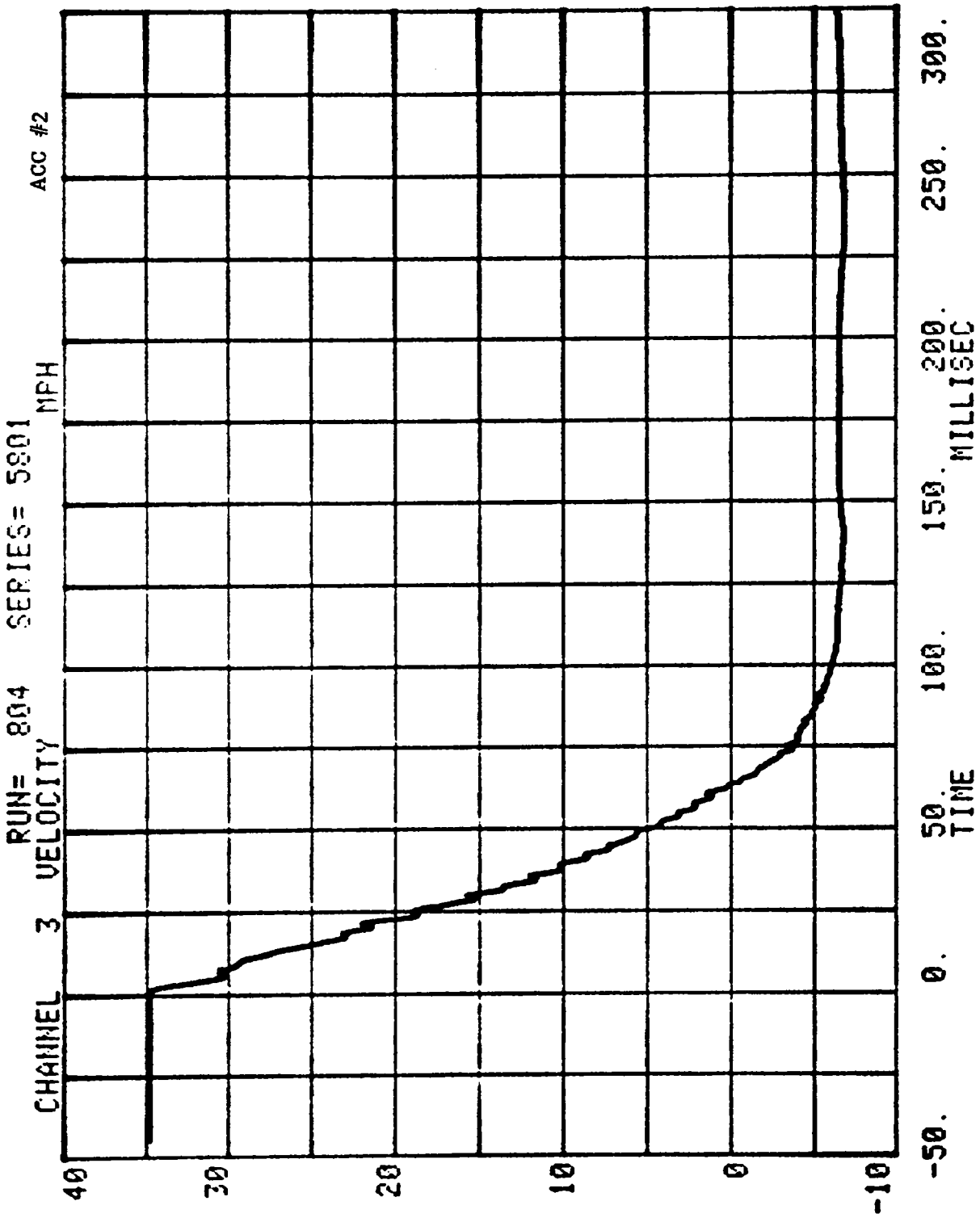
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 3 VELOCITY
RUN= 804 SERIES= 5801
MPH
ACC #2
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30
20
10
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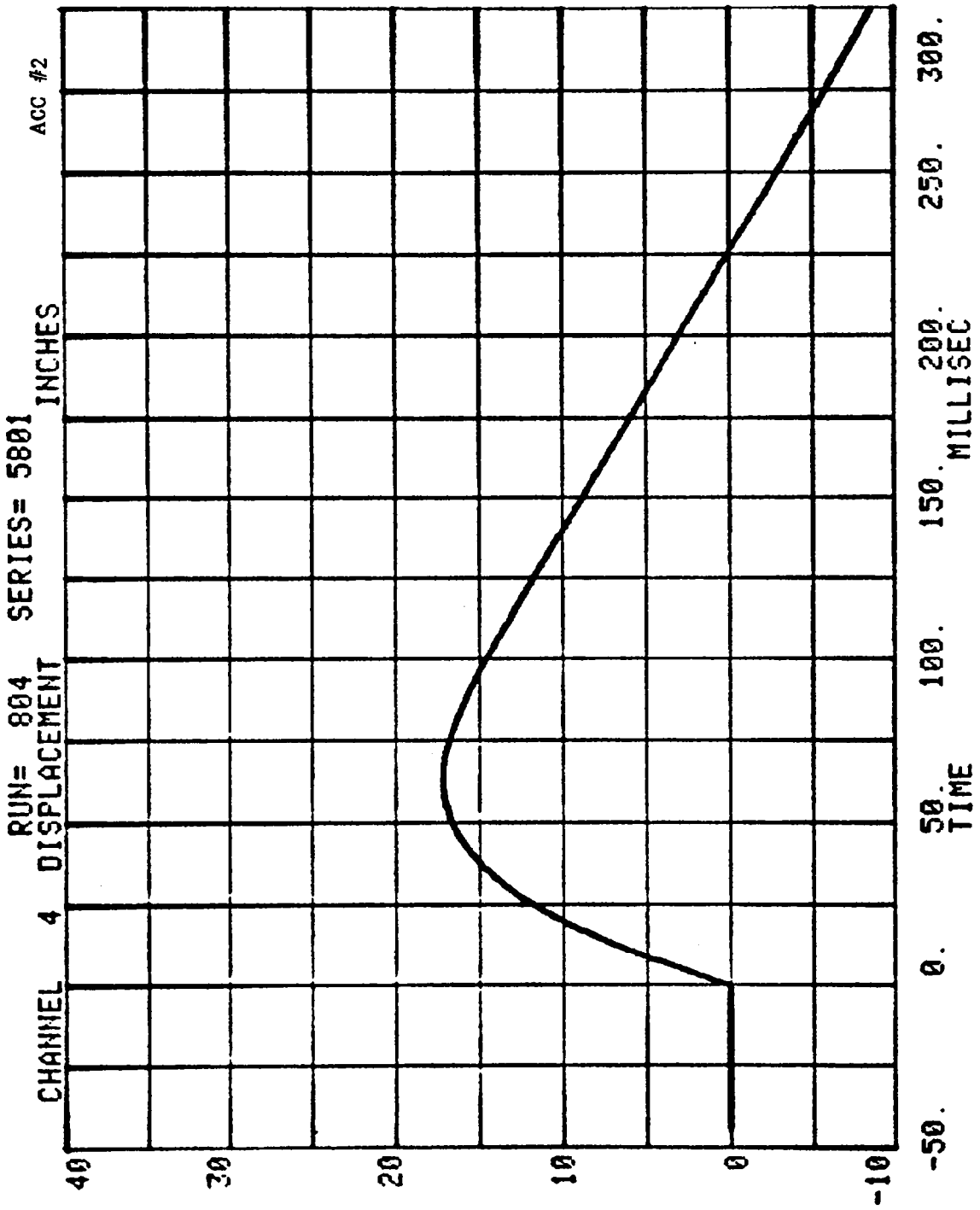
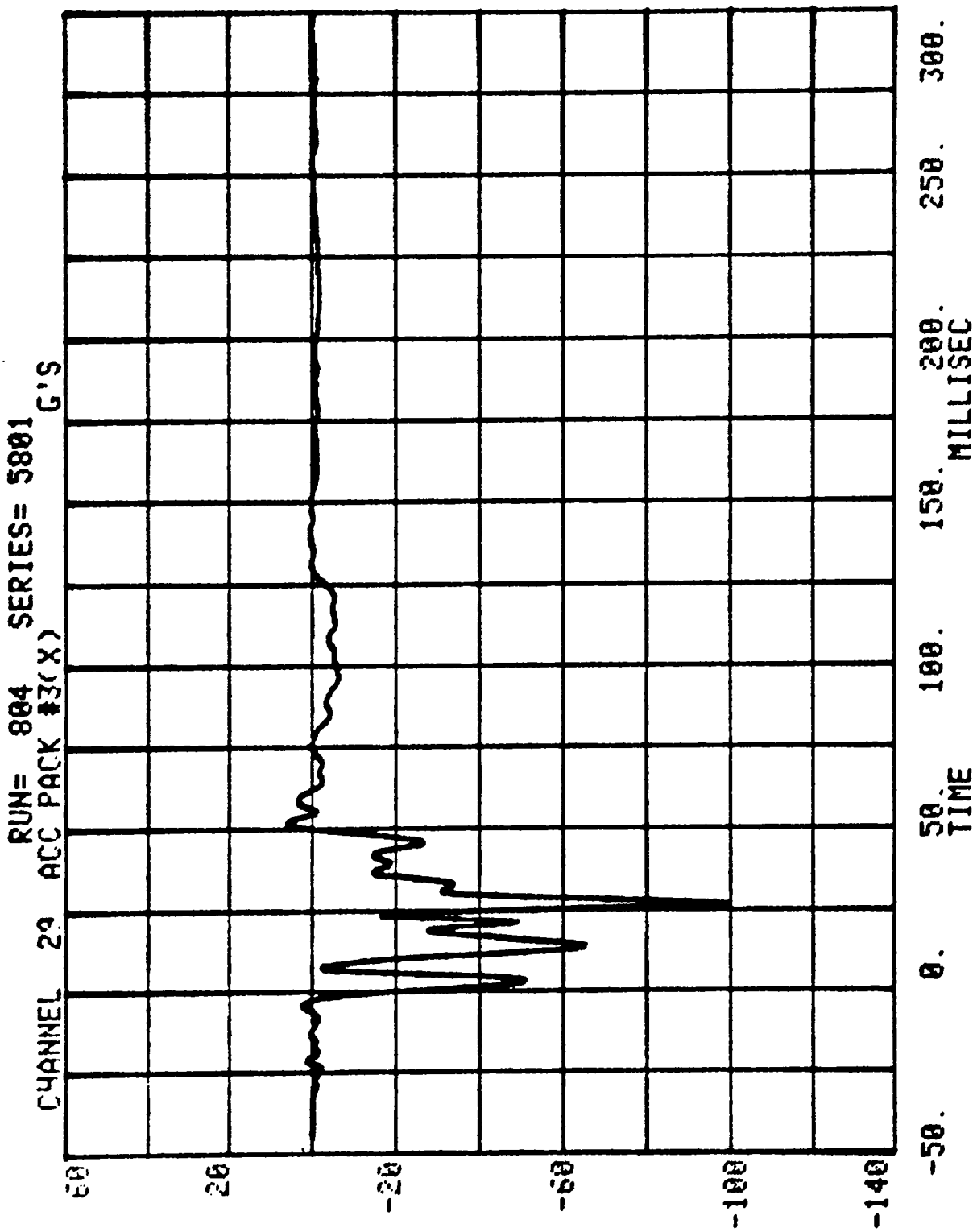
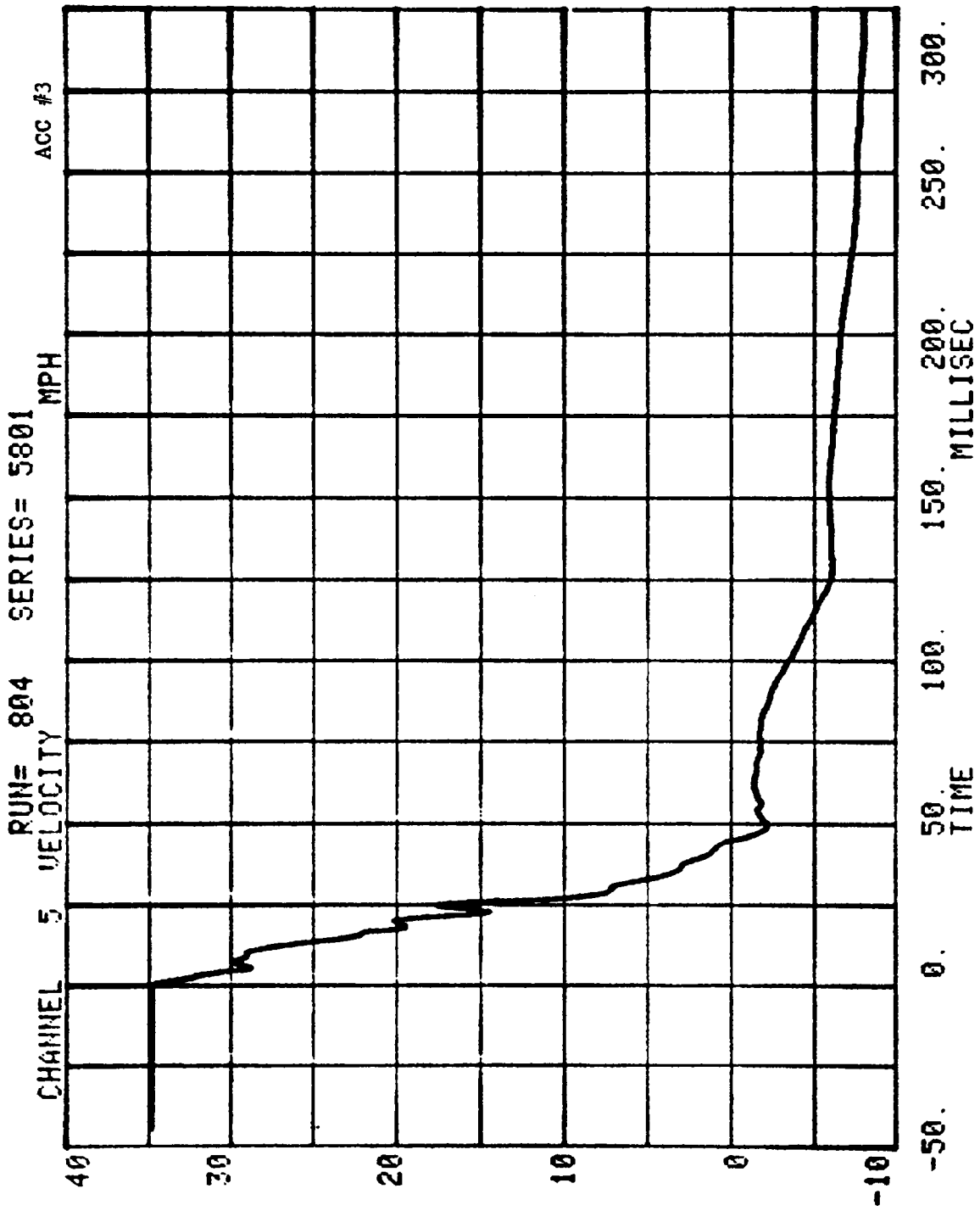
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 4 RUN= 804 SERIES= 5801
DISPLACEMENT INCHES
ACC #2
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

7626-2


CHANNEL 29 ACC PACK #3(X)
RUN= 804 SERIES= 5801
G'S
60
20
-20
-60
-100
-140
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 5 VELOCITY
RUN= 804 SERIES= 5801
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ACC #3
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-10
-50.
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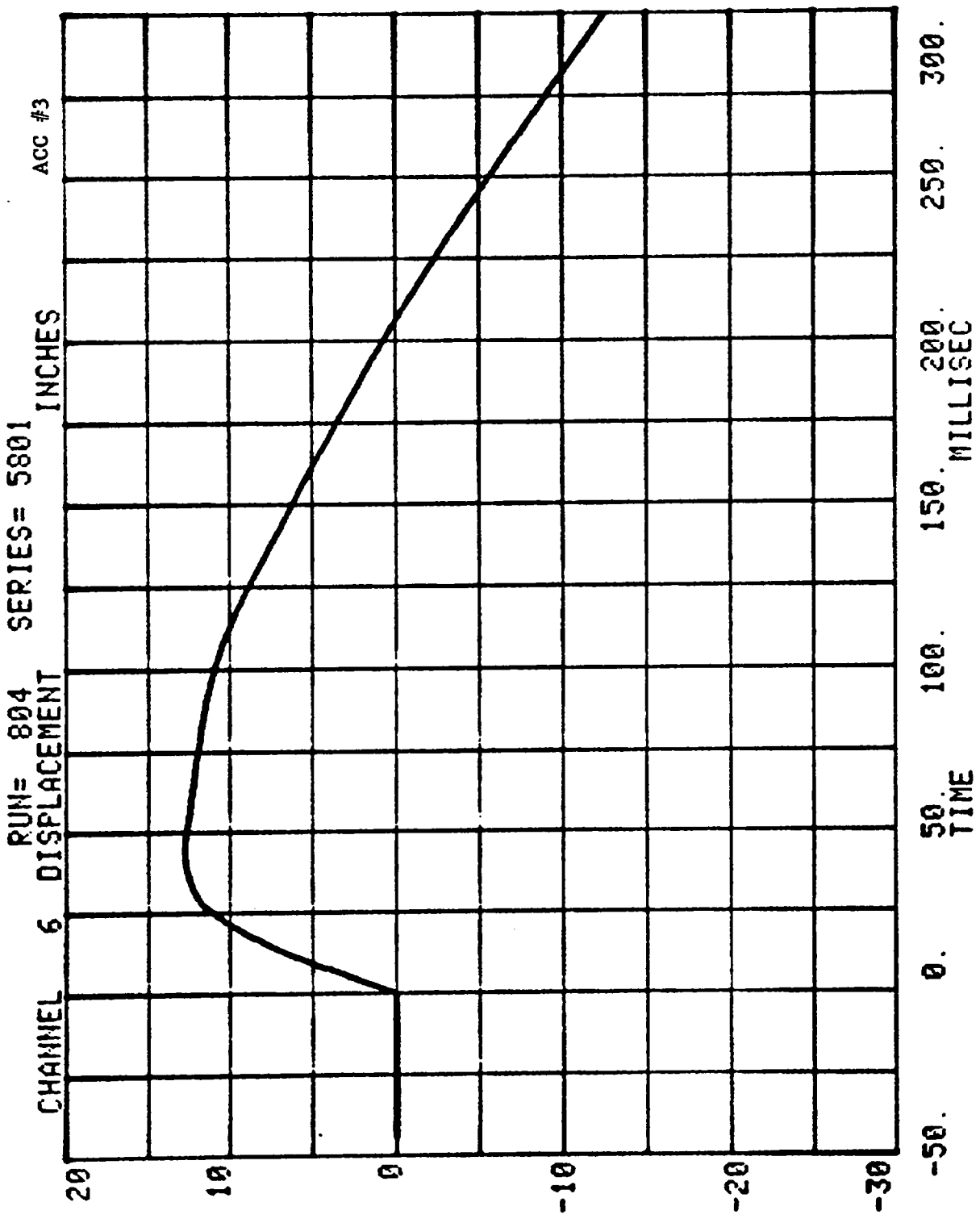
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 6 DISPLACEMENT
RUN= 804
SERIES= 5801
INCHES
ACC #3
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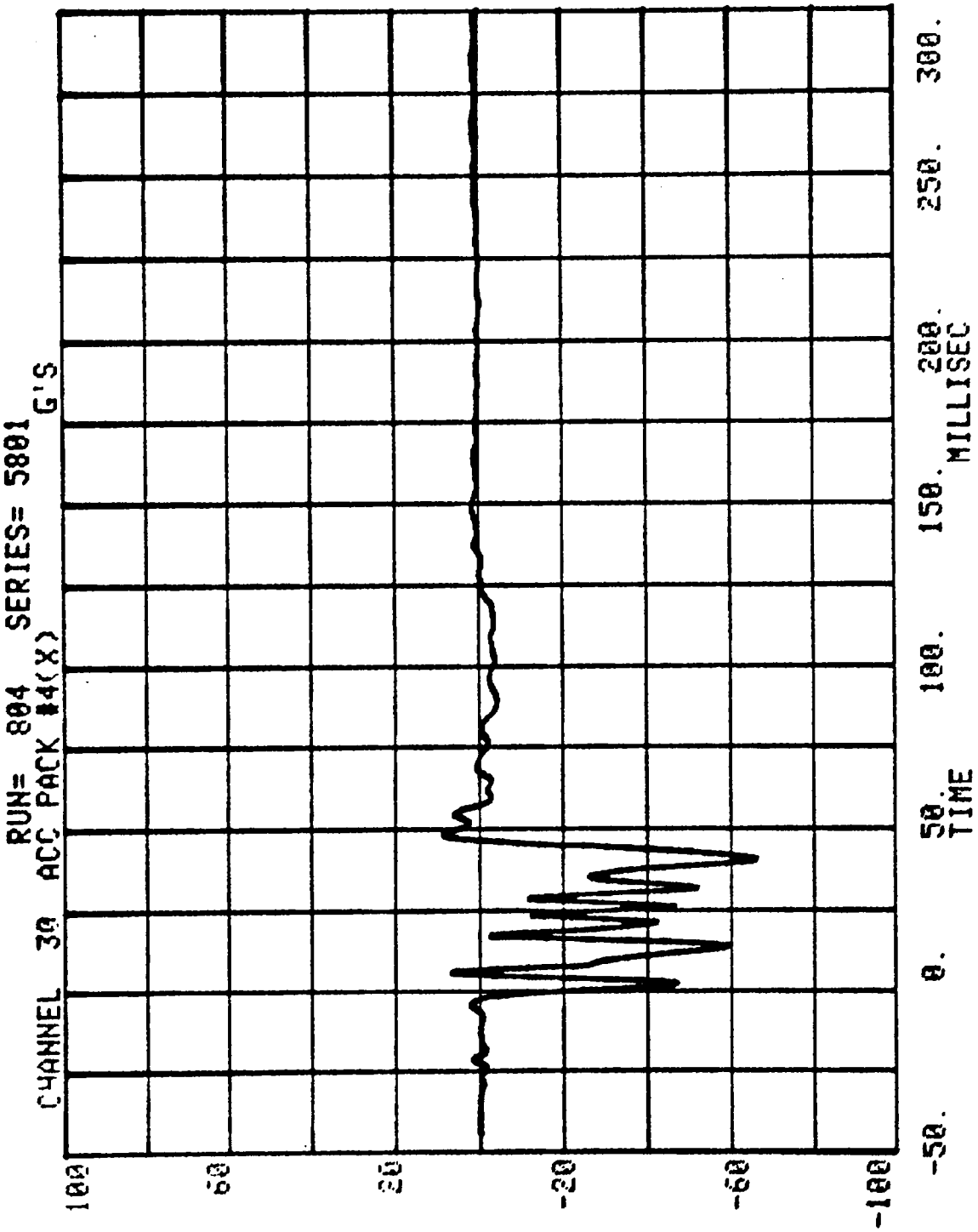
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 30 RUN= 804 SERIES= 5801
ACC PACK #4(X)
G'S
100
60
20
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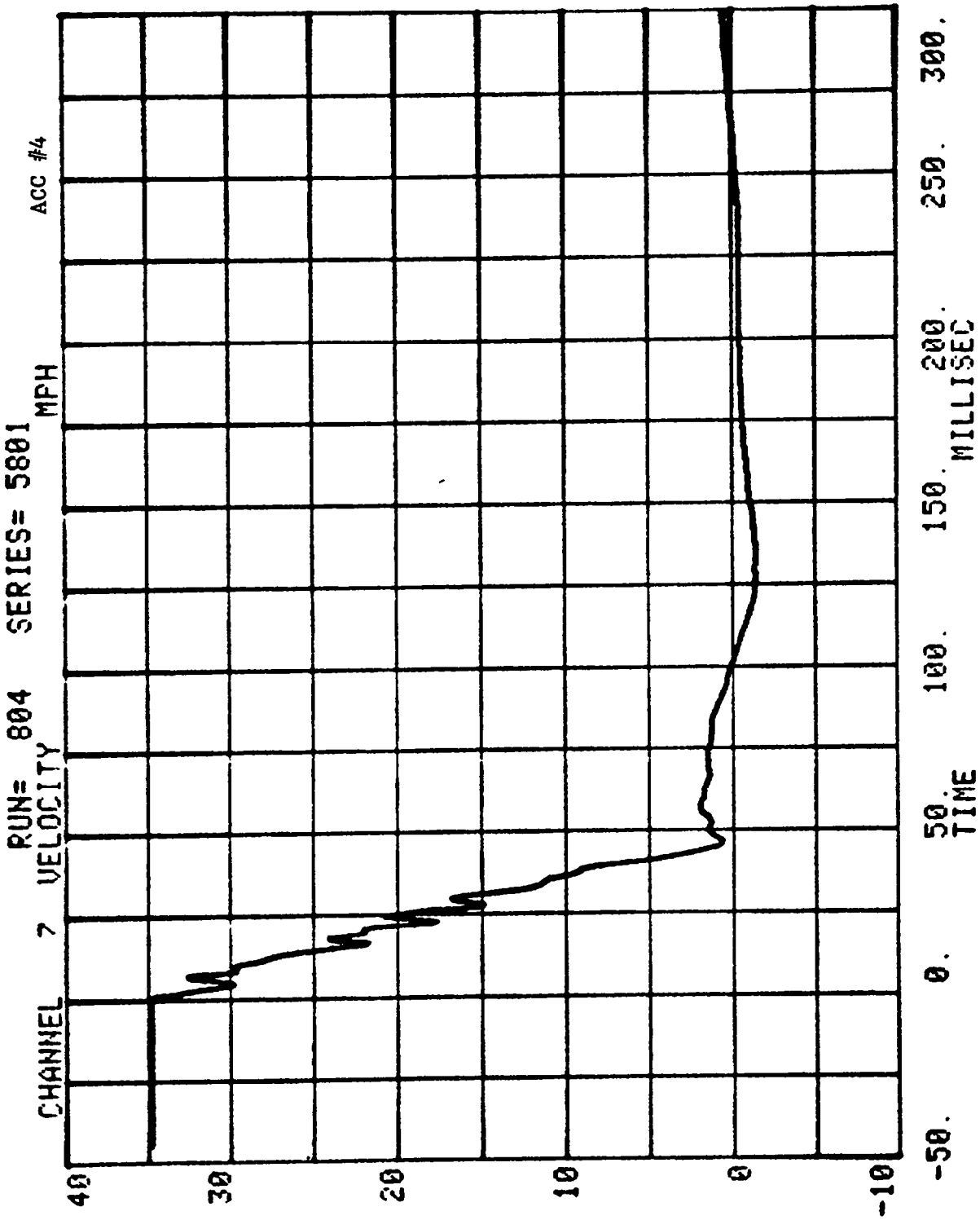
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 7 VELOCITY
RUN= 804 SERIES= 5801
MPH
ACC #4
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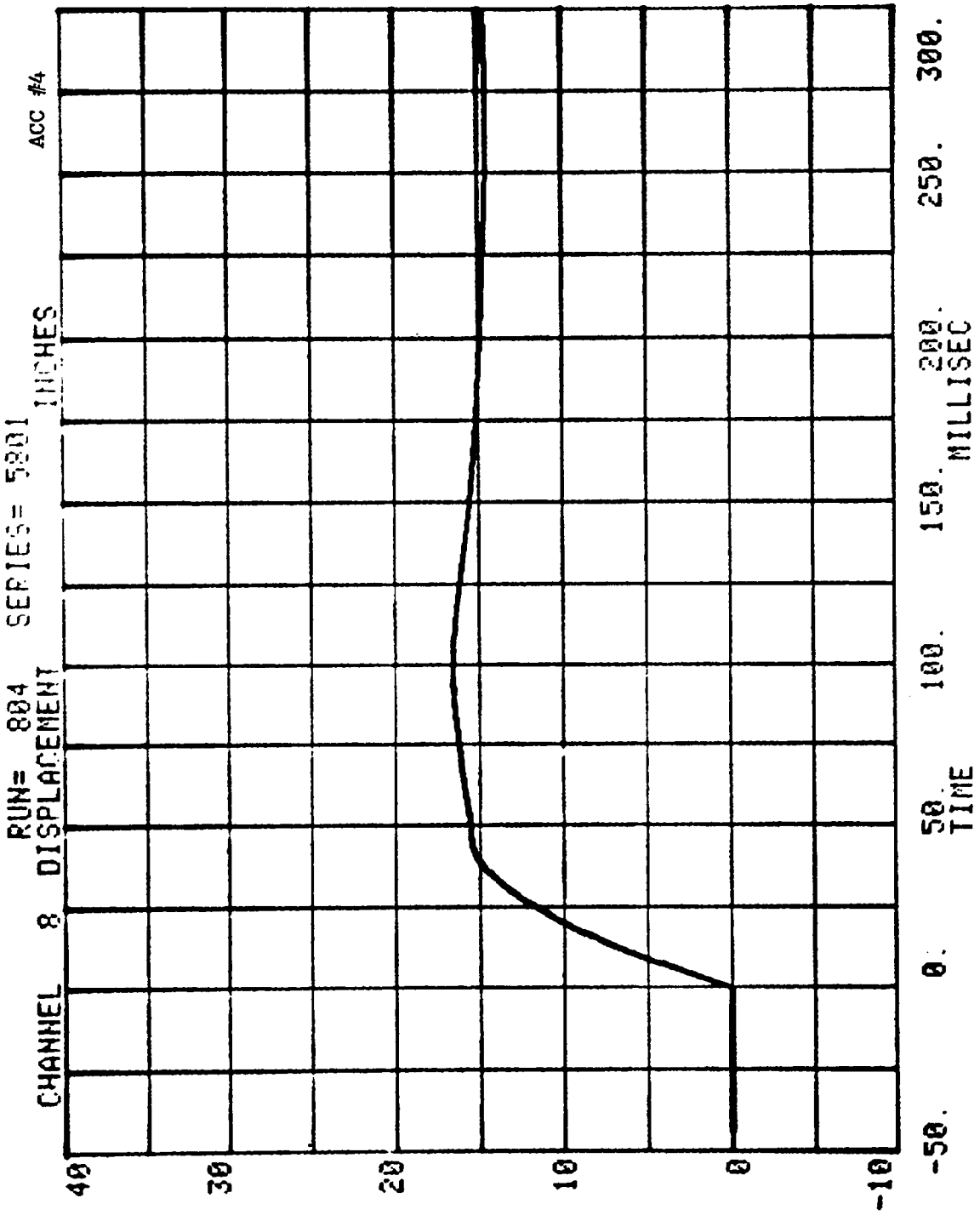
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 8 RUN= 804 SERIES= 5801
DISPLACEMENT INCHES
ACC #4
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-10
-50.
0.
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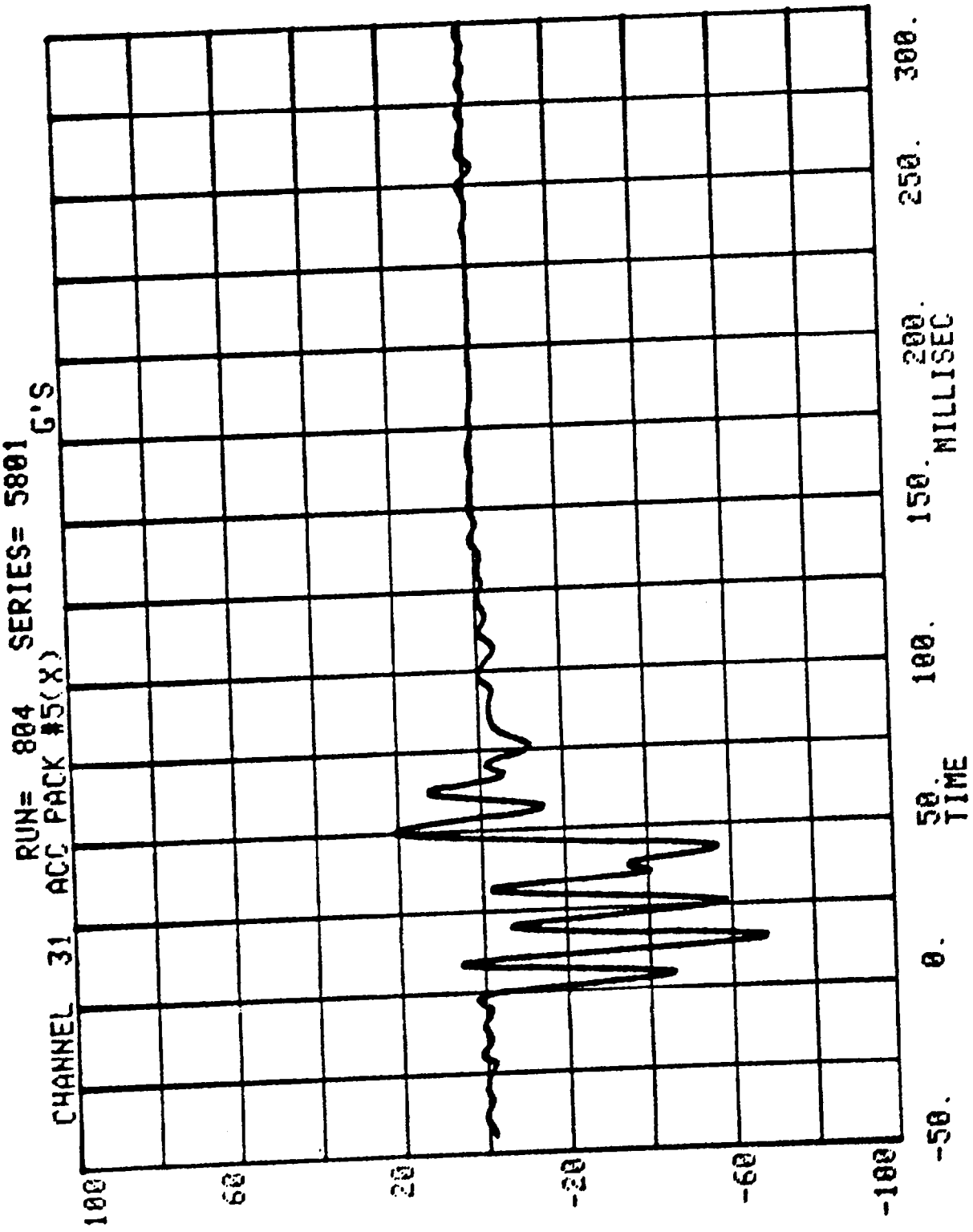
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 31
RUN= 804
ACC PACK #5(X)
SERIES= 5801
G'S
100
60
20
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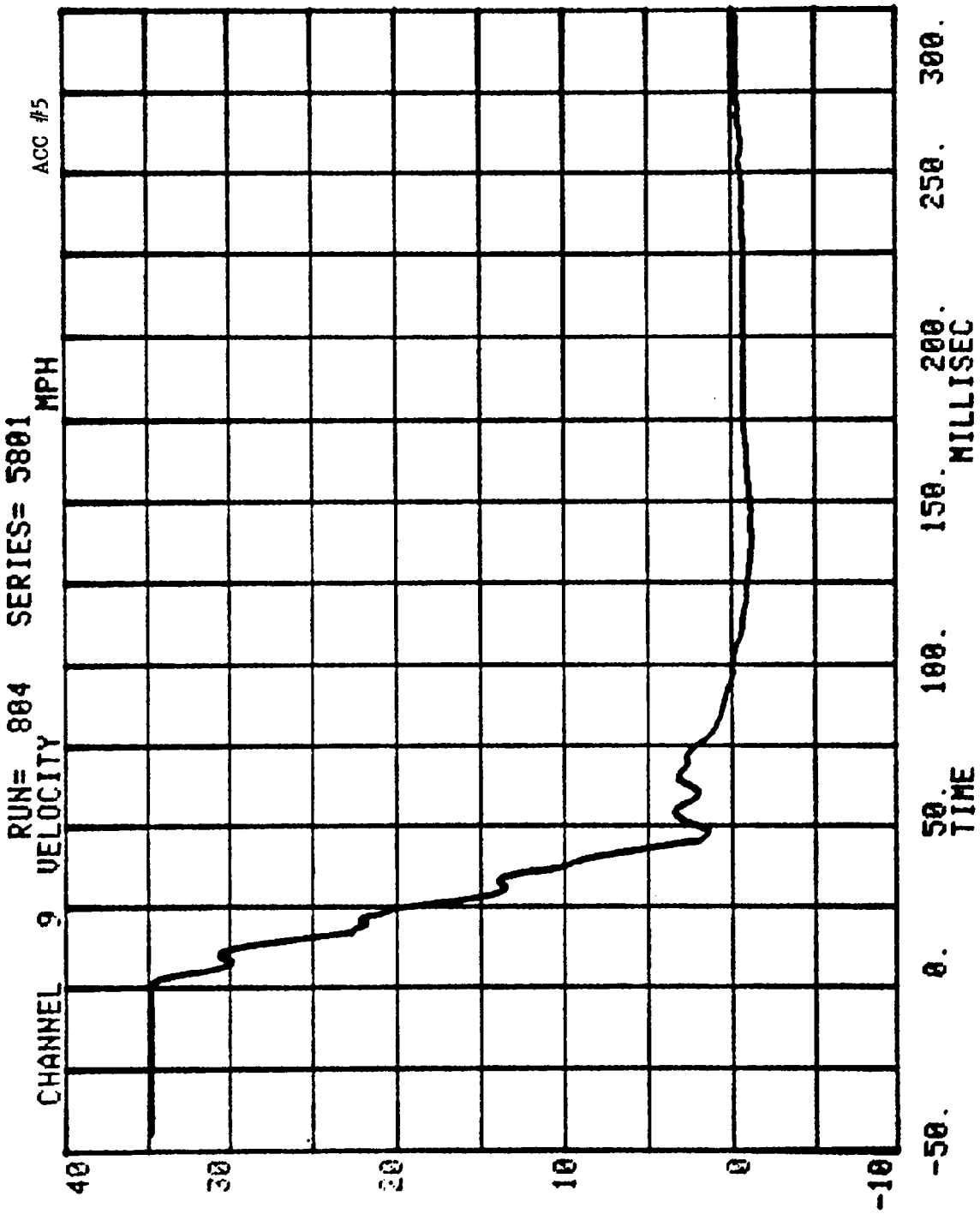
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 9 VELOCITY
RUN= 804 SERIES= 5801
MPH
ACC #5
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30
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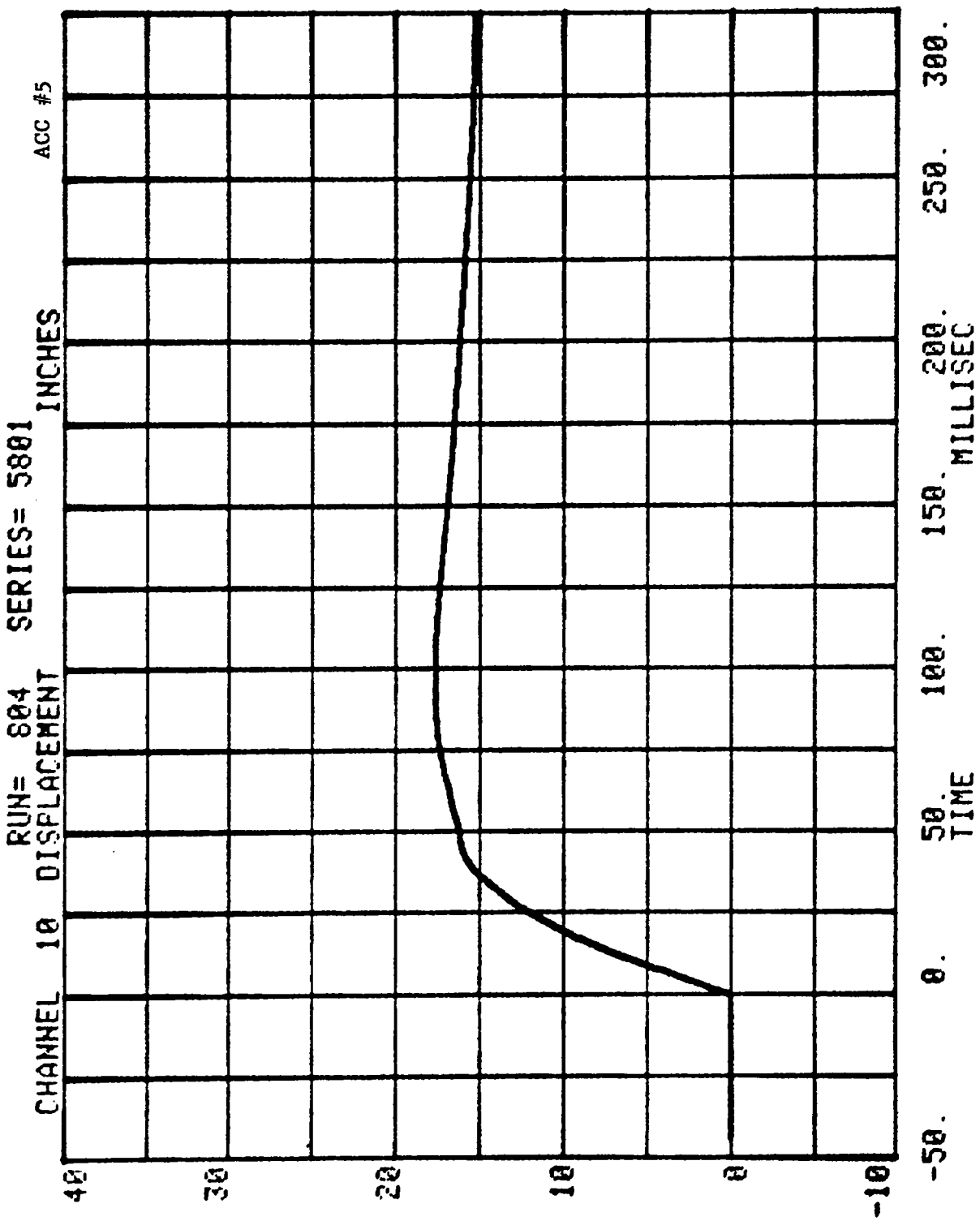
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 10 DISPLACEMENT
RUN= 804 SERIES= 5801
INCHES
ACC #5
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20
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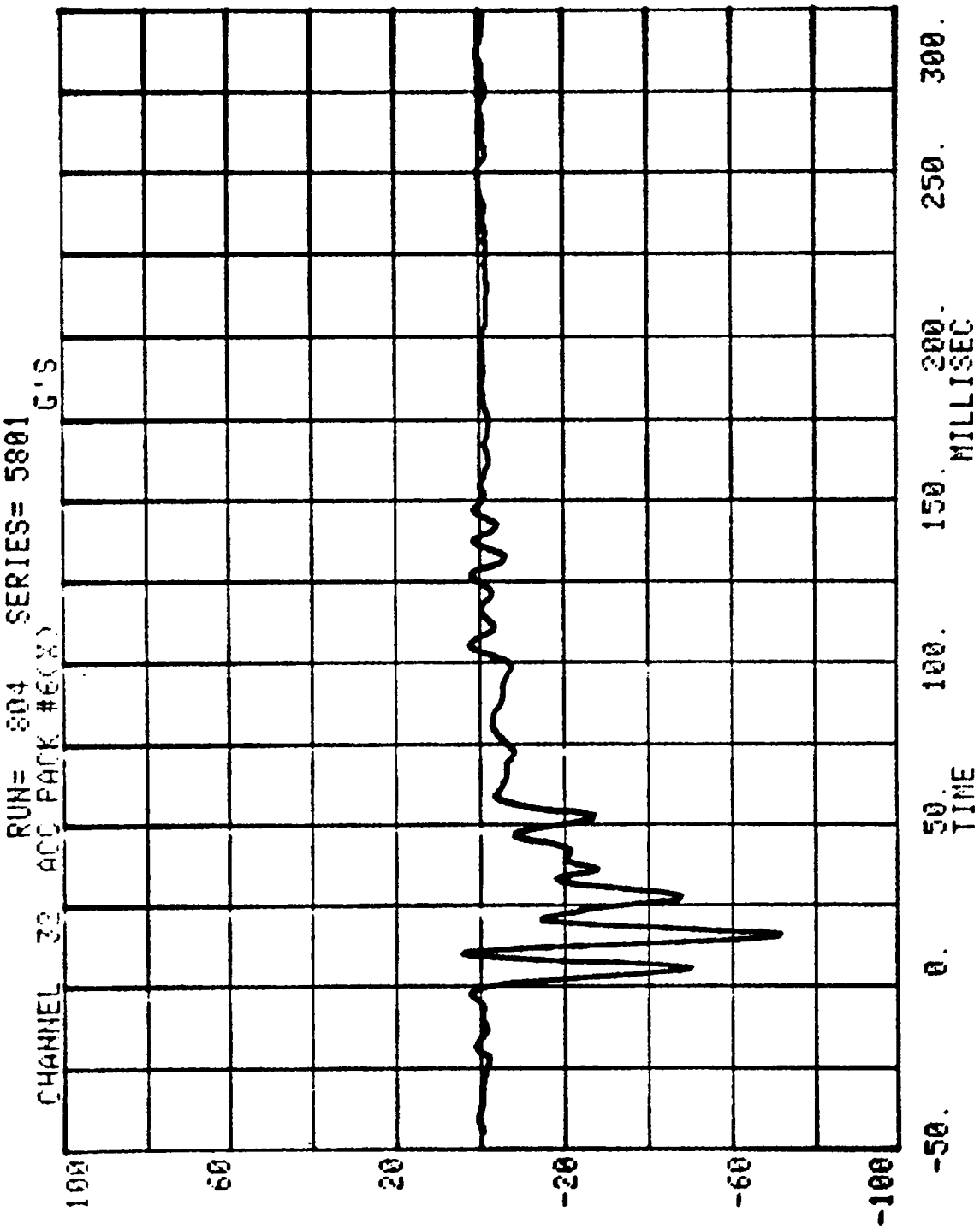
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 22 ACC PACK #6(X)
RUN= 804 SERIES= 5801
G'S
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20
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50.
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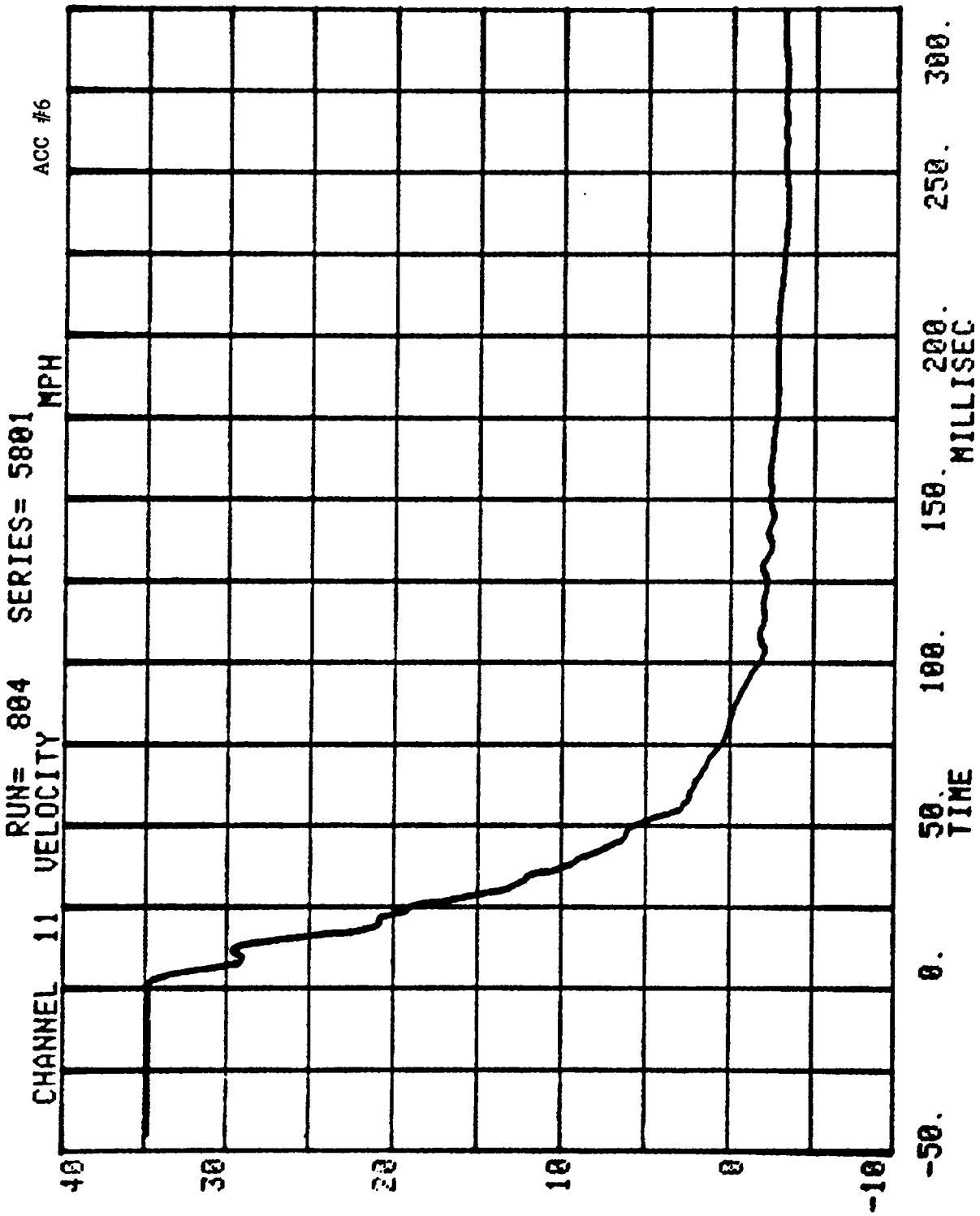
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 11 VELOCITY
RUN= 804 SERIES= 5801
MPH
ACC #6
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30
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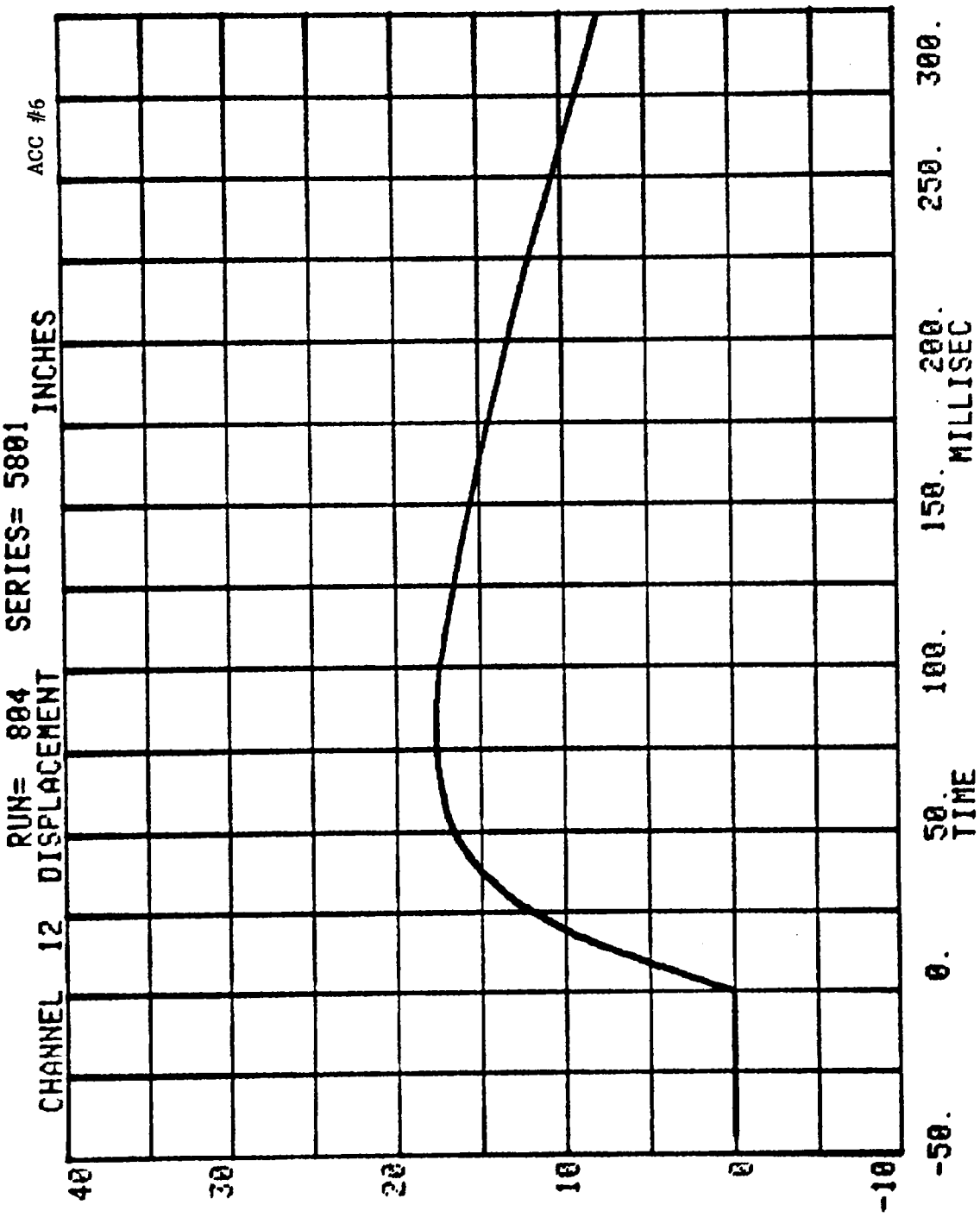
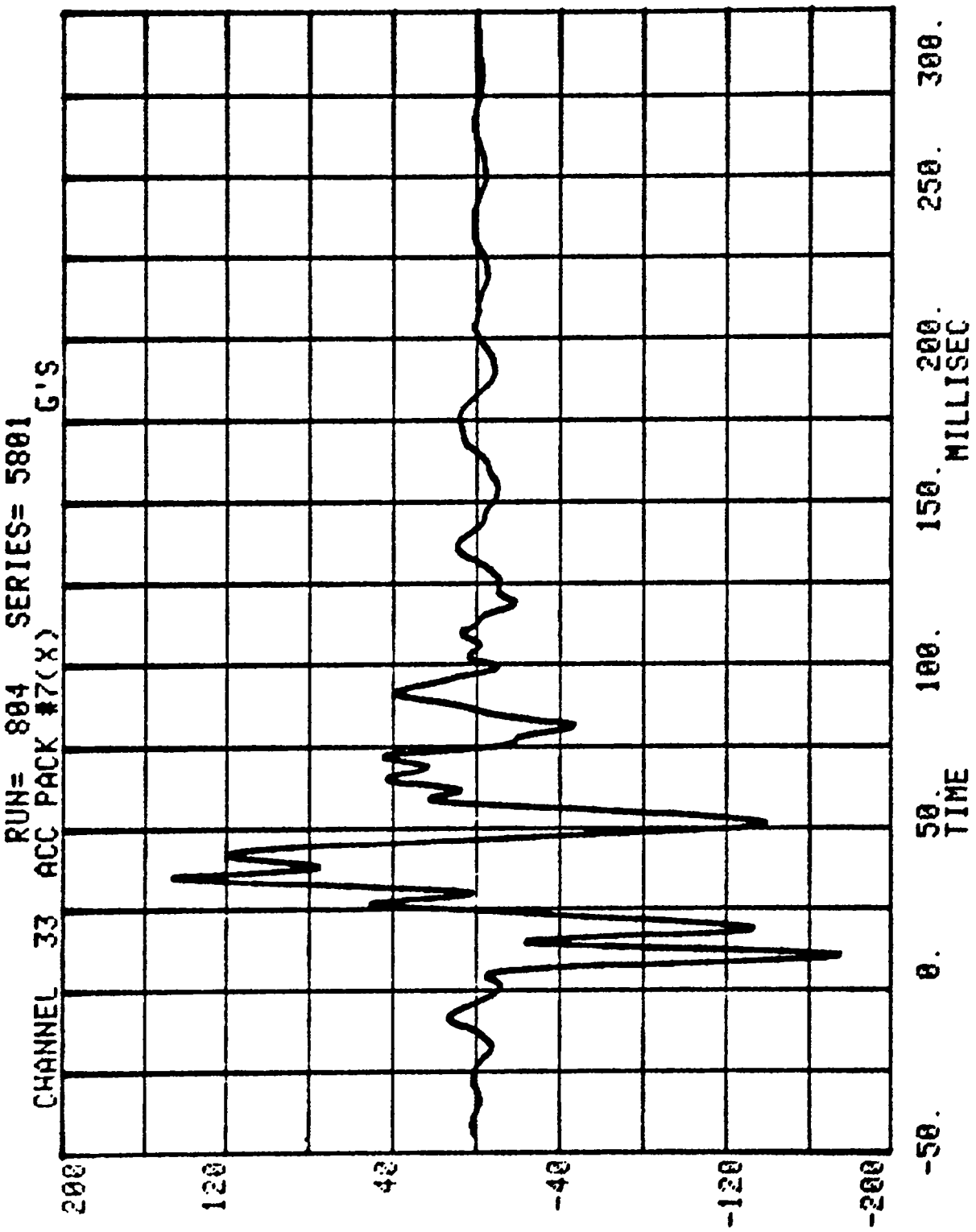
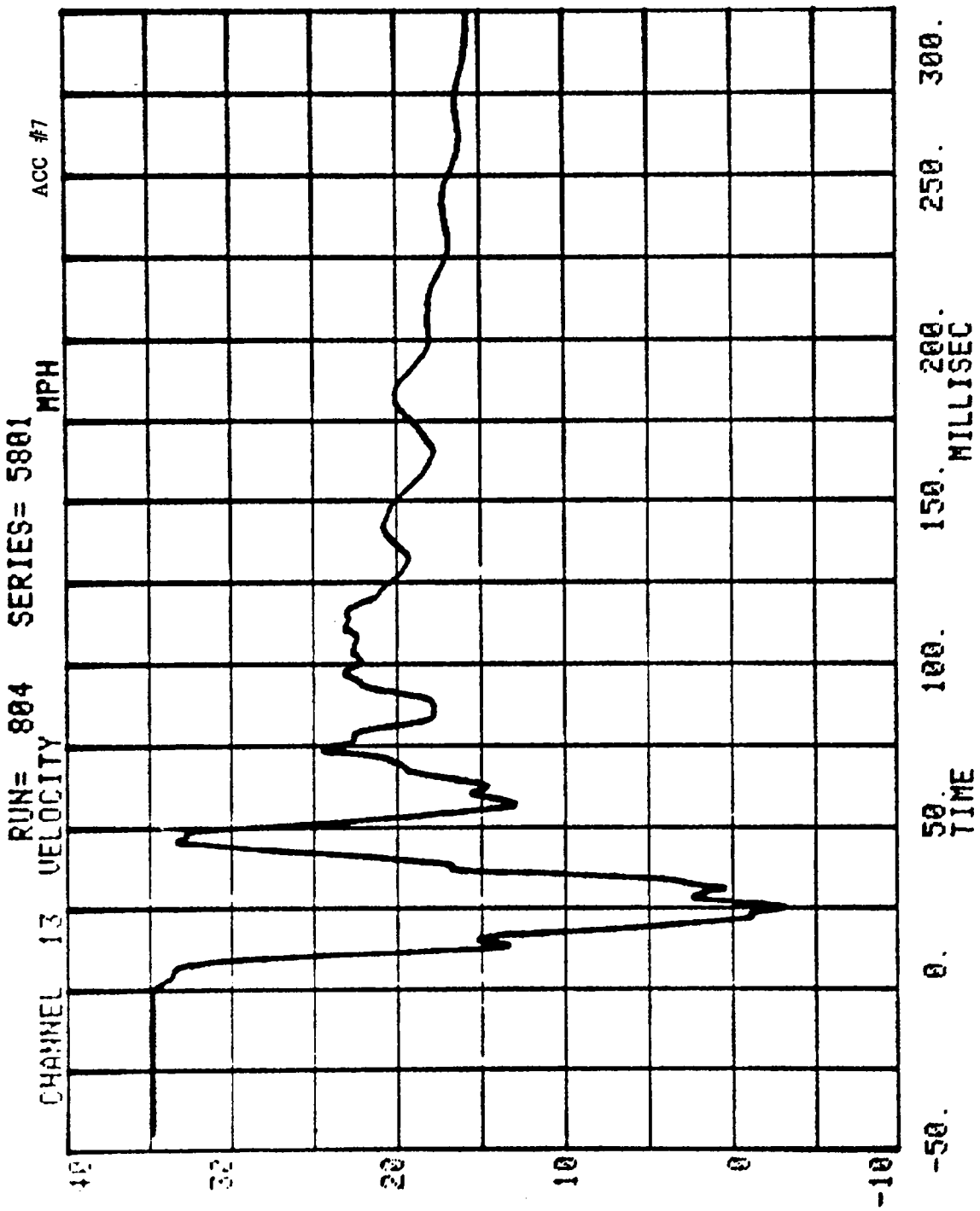
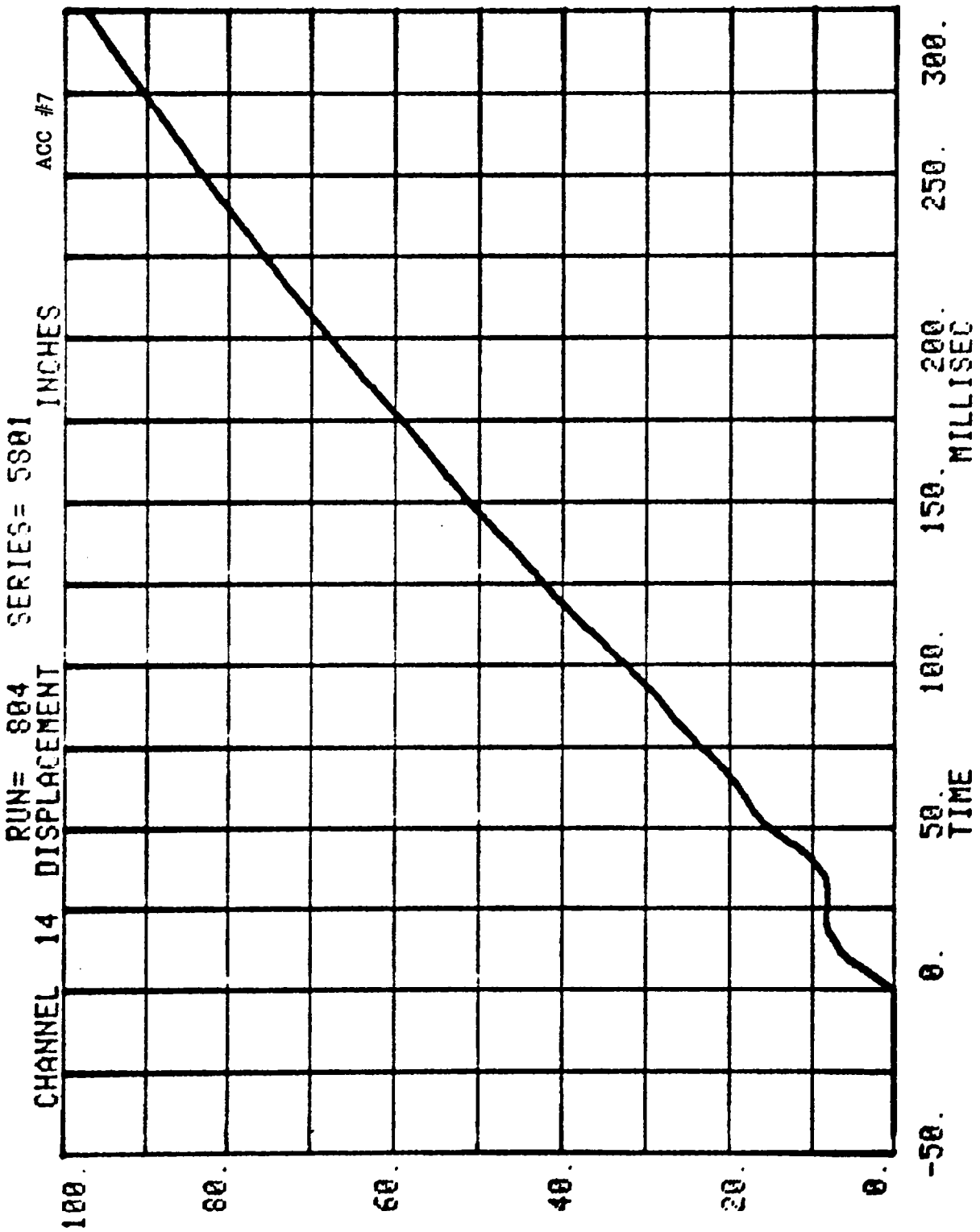
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 12 RUN= 804 SERIES= 5801
DISPLACEMENT INCHES
ACC #6
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 33 ACC PACK #7(X)
RUN= 804 SERIES= 5801
G'S
200
120
40
-40
-120
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 13 VELOCITY
RUN= 804 SERIES= 5801
MPH
ACC #7
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

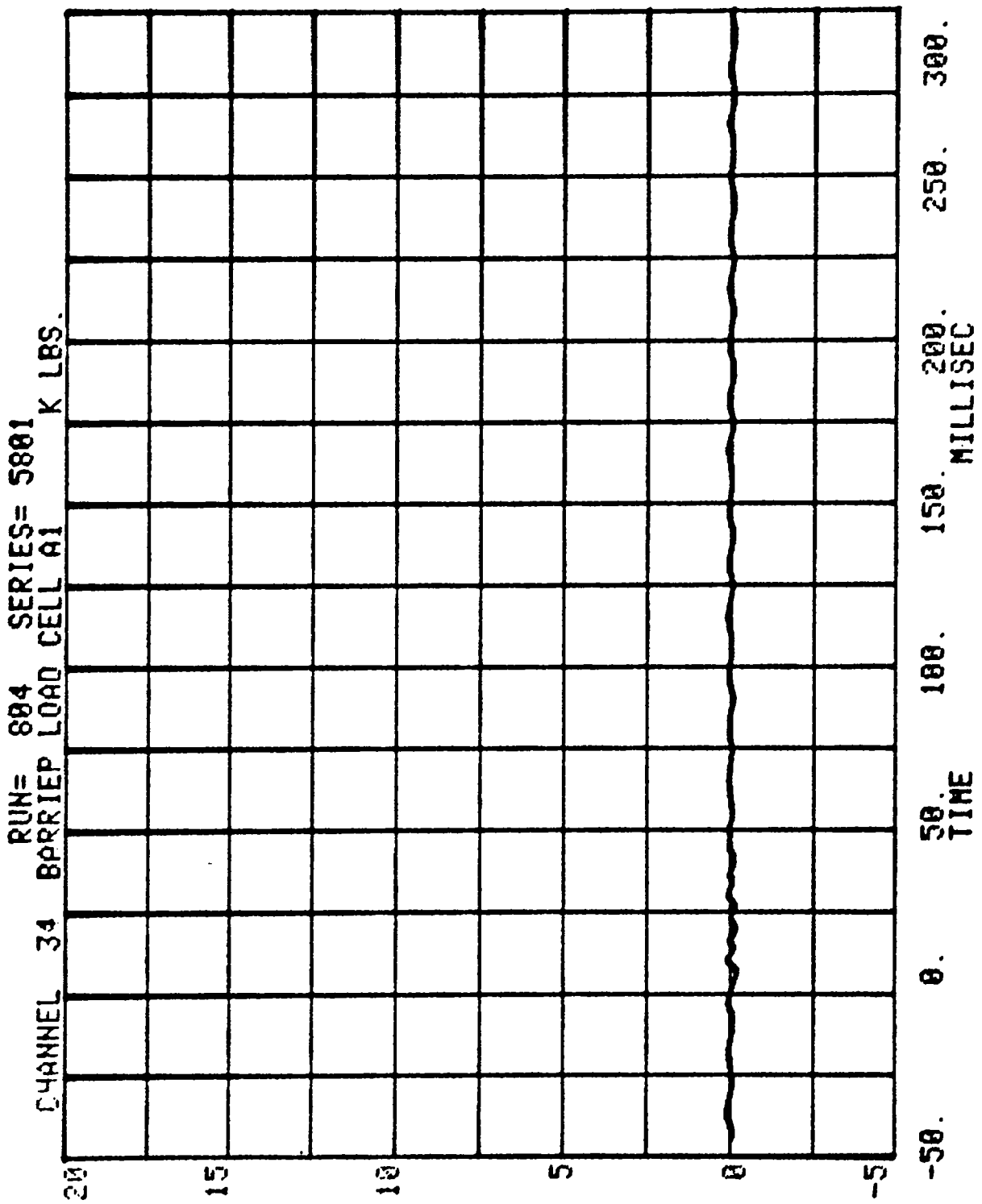

CHANNEL 14 DISPLACEMENT
RUN= 804 SERIES= 5801
INCHES
ACC #7
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

TEST NO. MJ5801

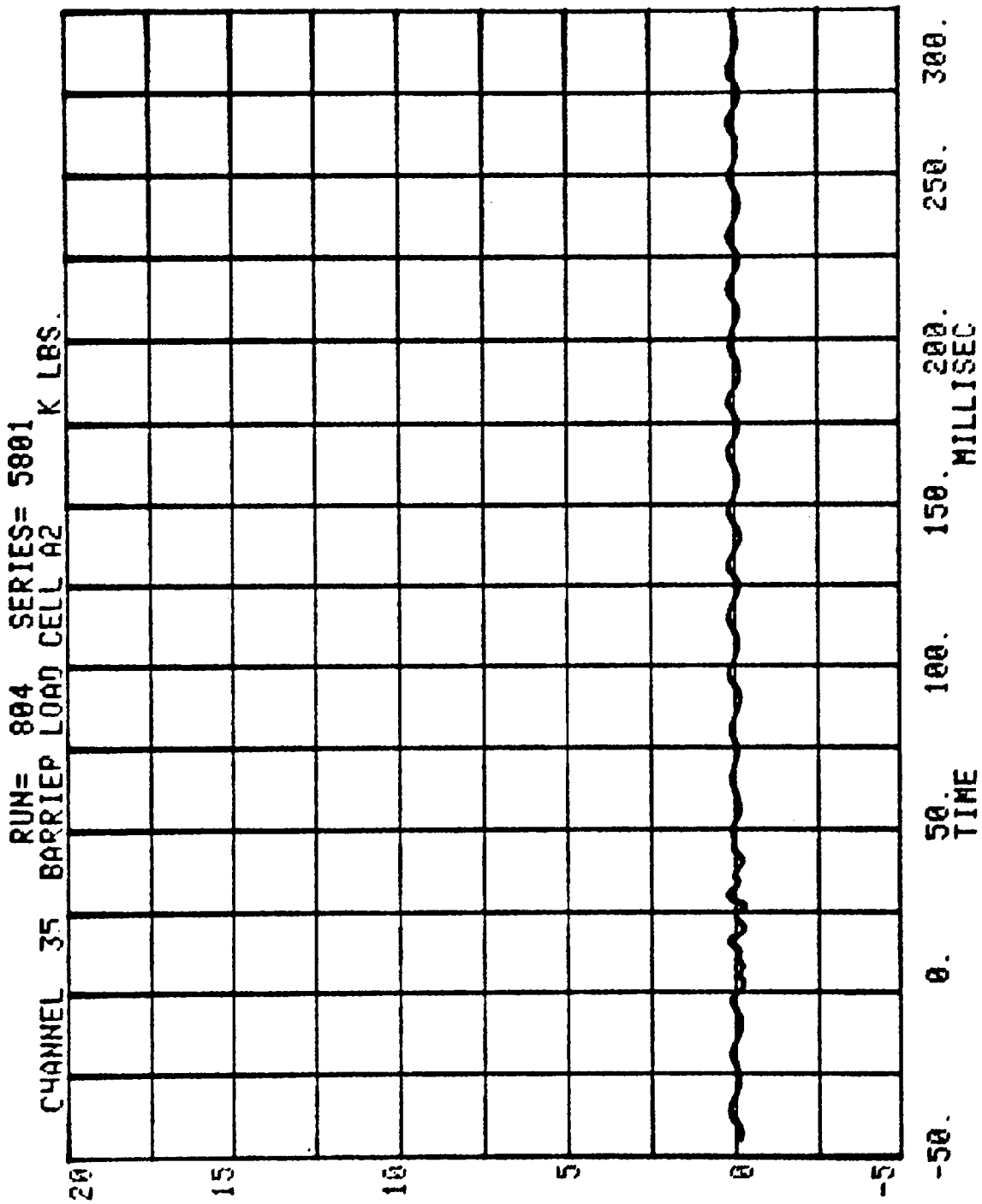
LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

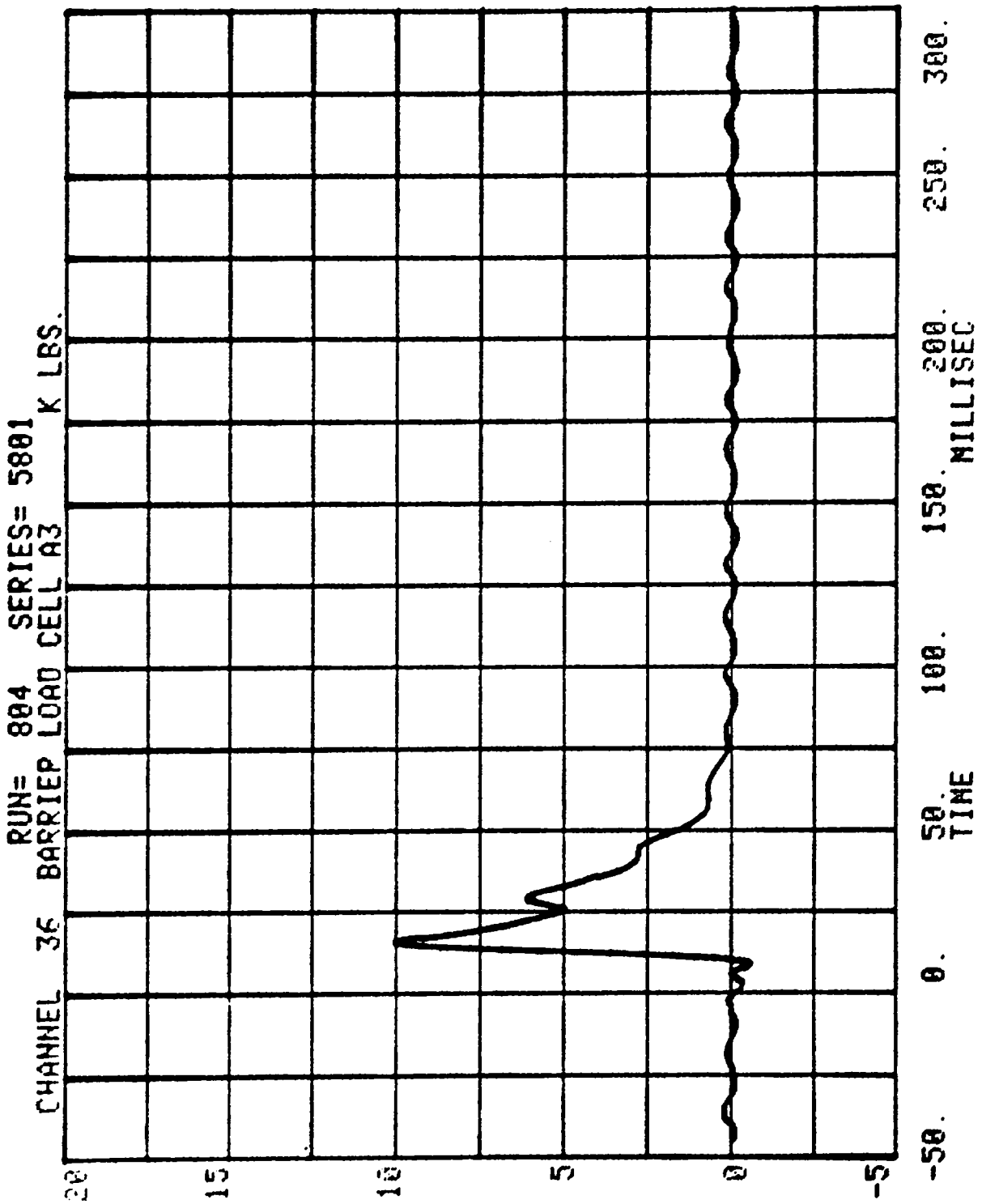
60


CHANNEL 34 BARRIER LOAD CELL A1
RUN= 804 SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 35 RUN= 804 SERIES= 5801
BARRIEP LOAD CELL A2
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 36 BARRIEP LOAD CELL A3
RUN= 804 SERIES= 5801
K LBS.
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15
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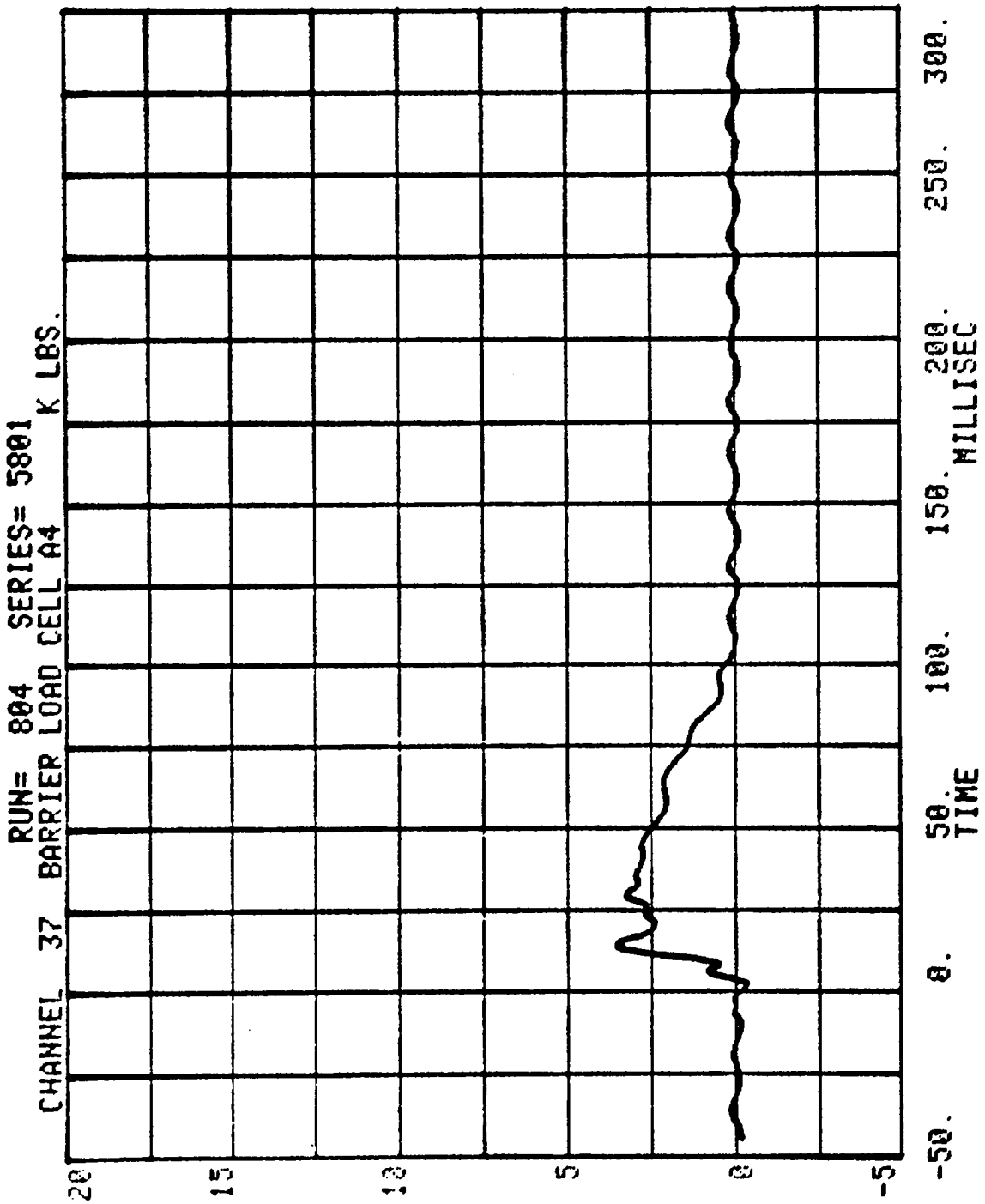
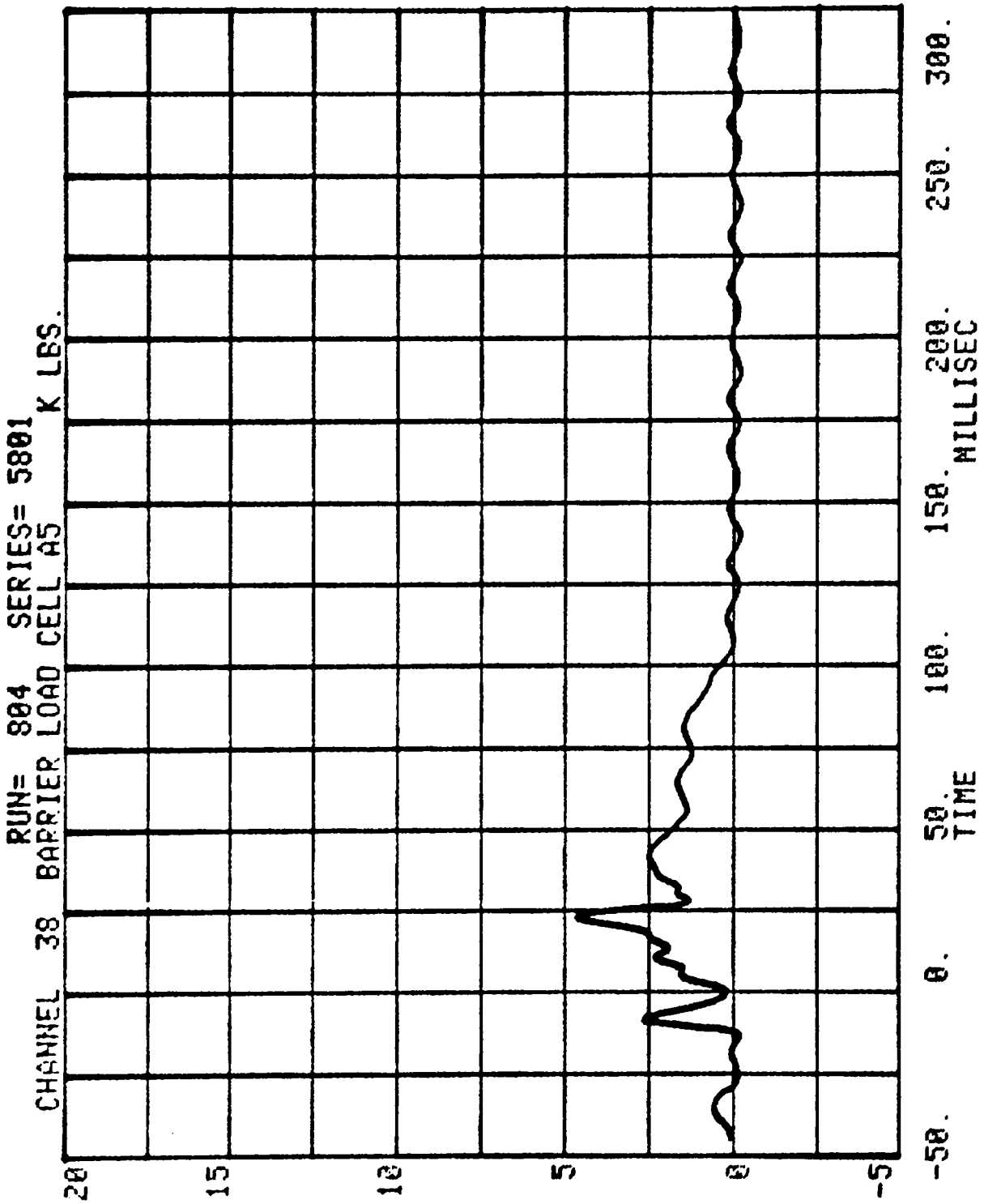
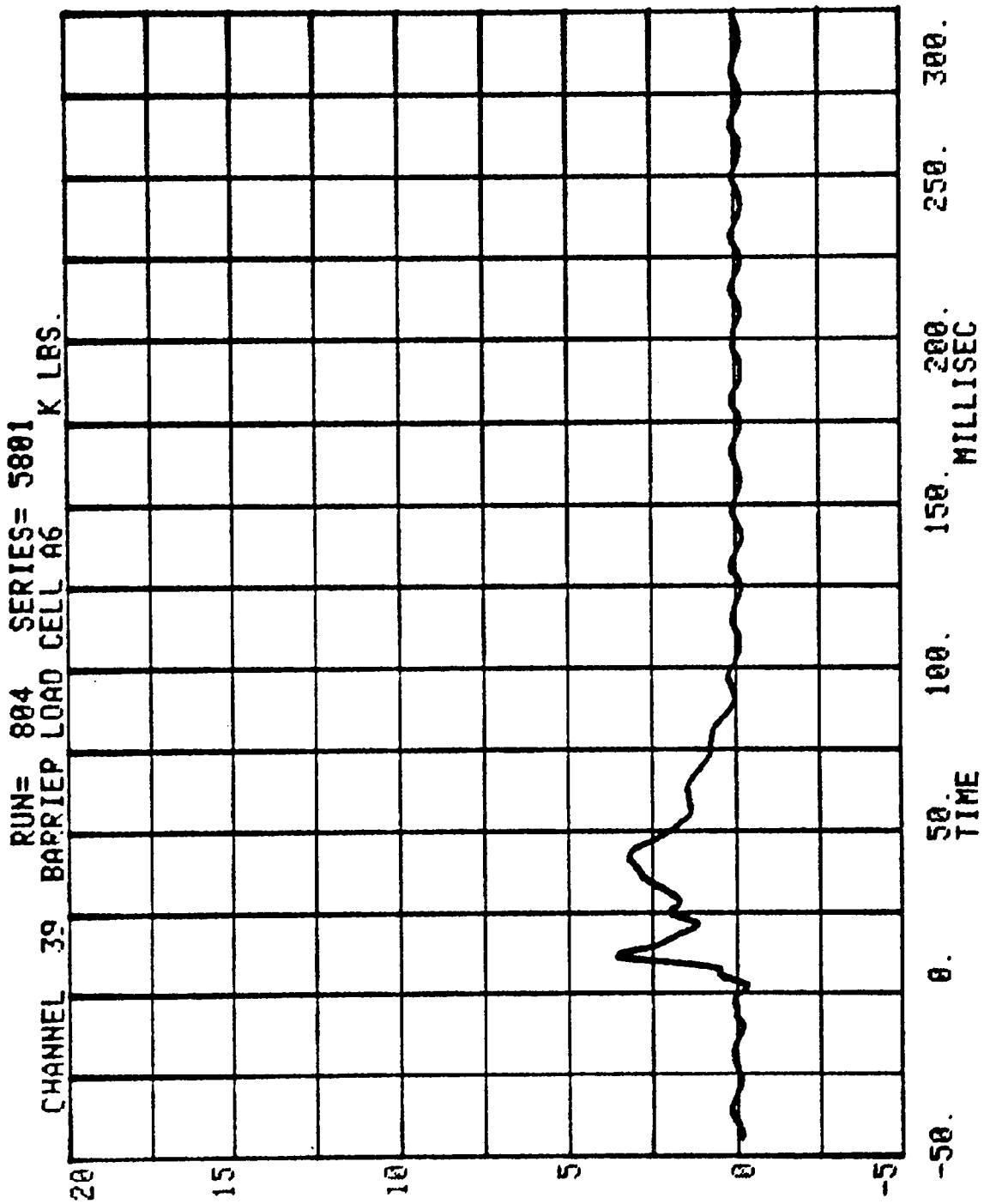
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

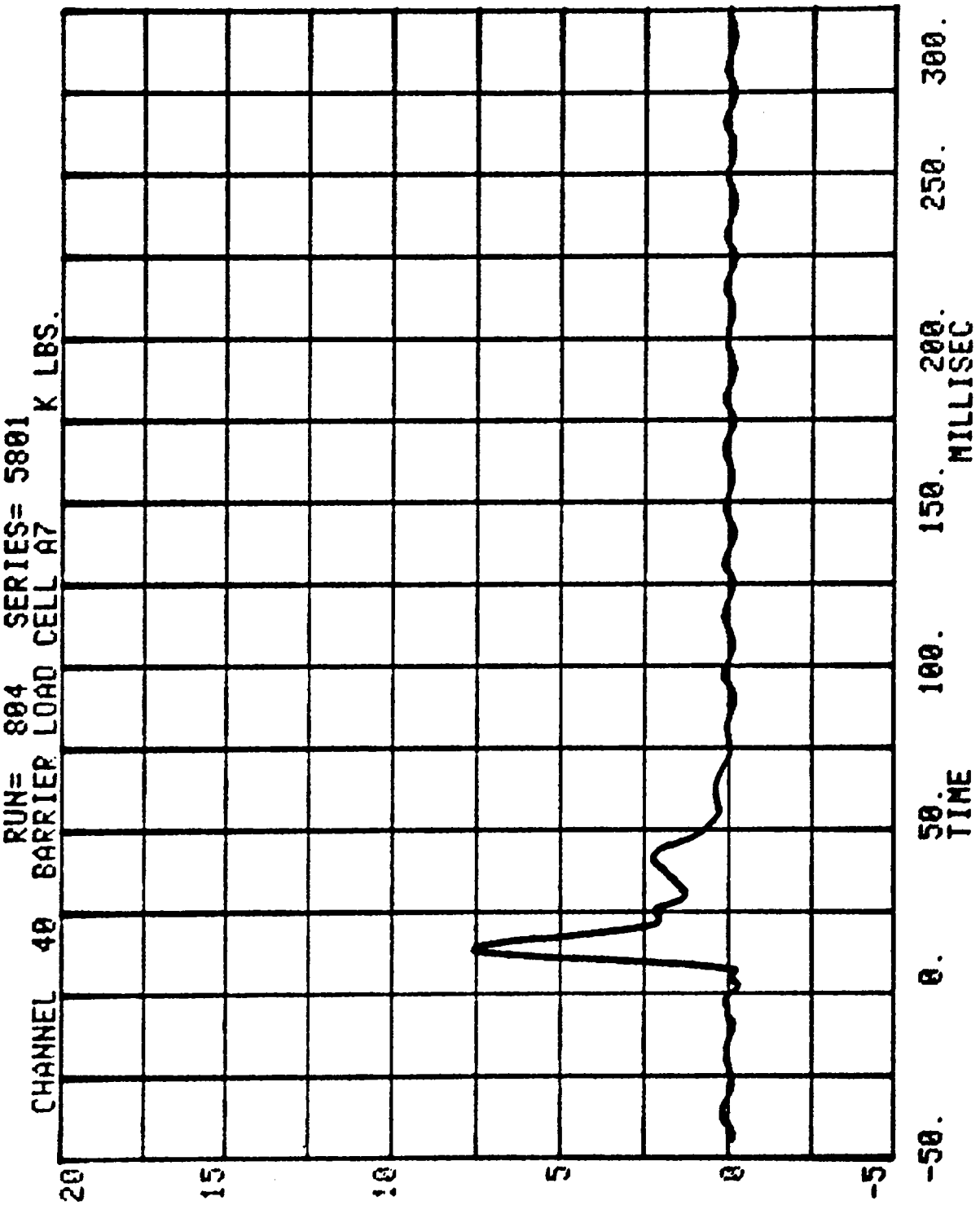

CHANNEL 37 BARRIER LOAD CELL A4
RUN= 804 SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2

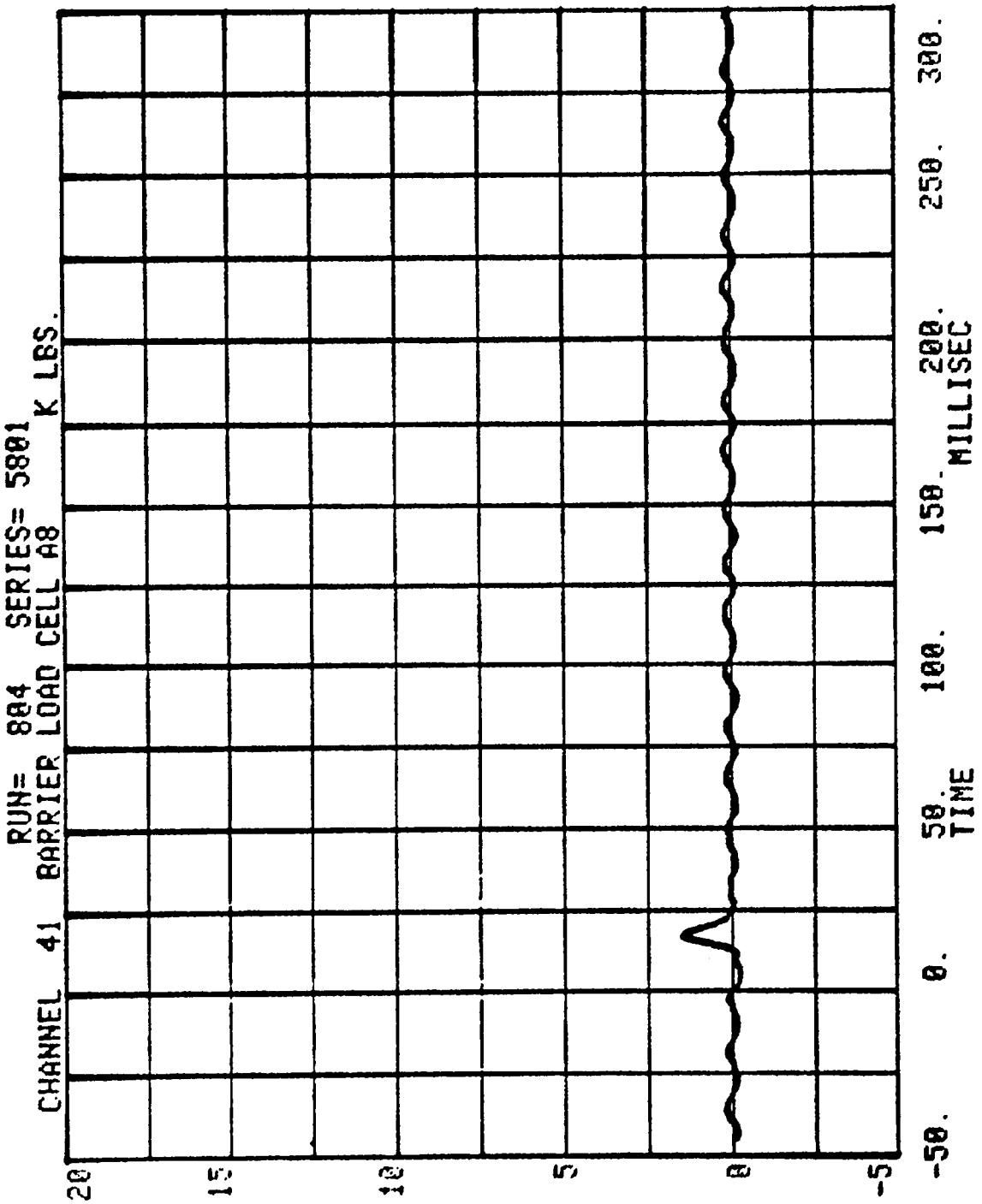

CHANNEL 38 RUN= 804 SERIES= 5801
BARRIER LOAD CELL A5
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2

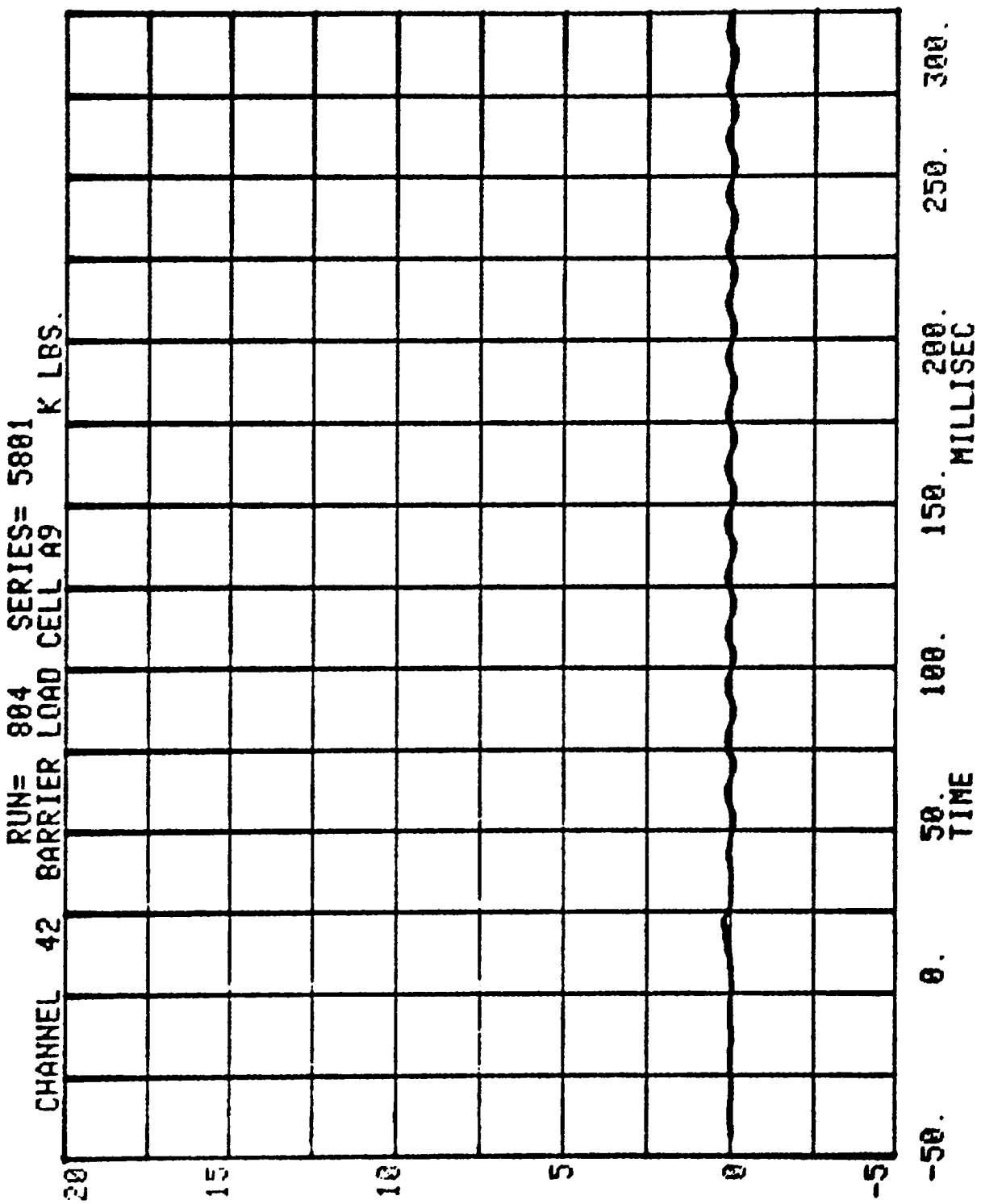

CHANNEL 39 RUN= 804 SERIES= 5801
BARRIER LOAD CELL A6
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 40 BARRIER LOAD CELL A7
RUN= 804 SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

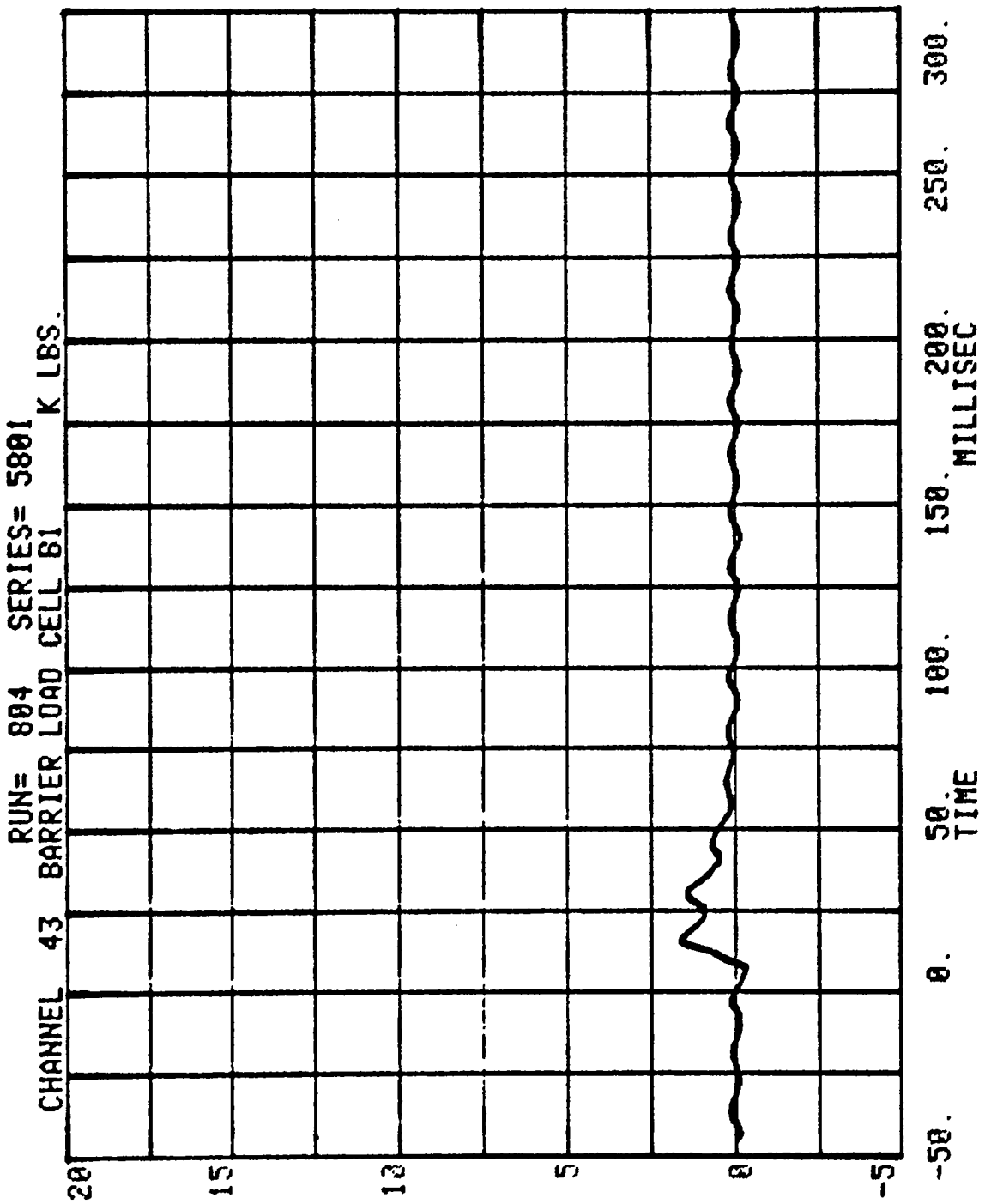
7626-2

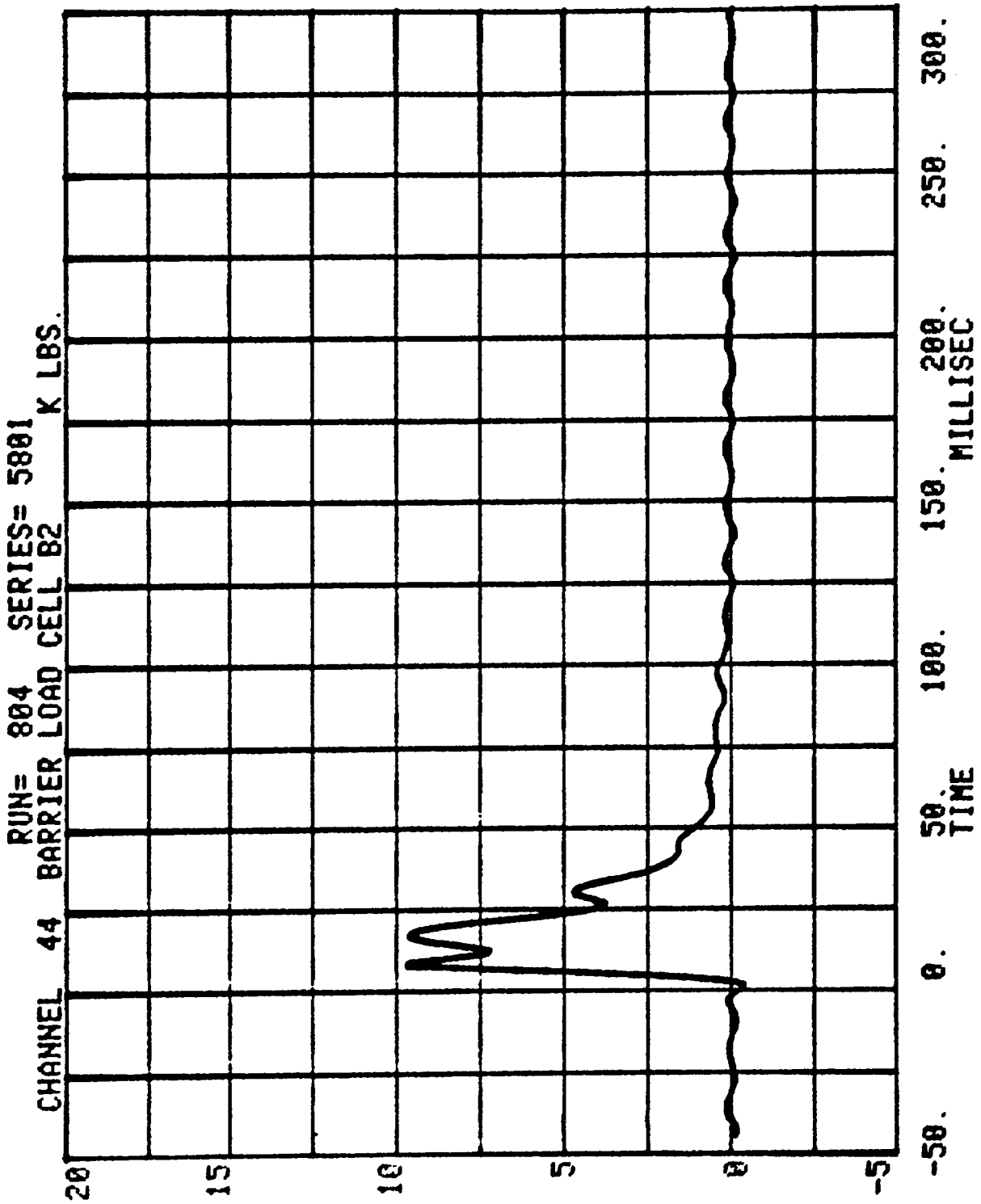

CHANNEL 41 RUN= 804 SERIES= 5801
BARRIER LOAD CELL A8
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

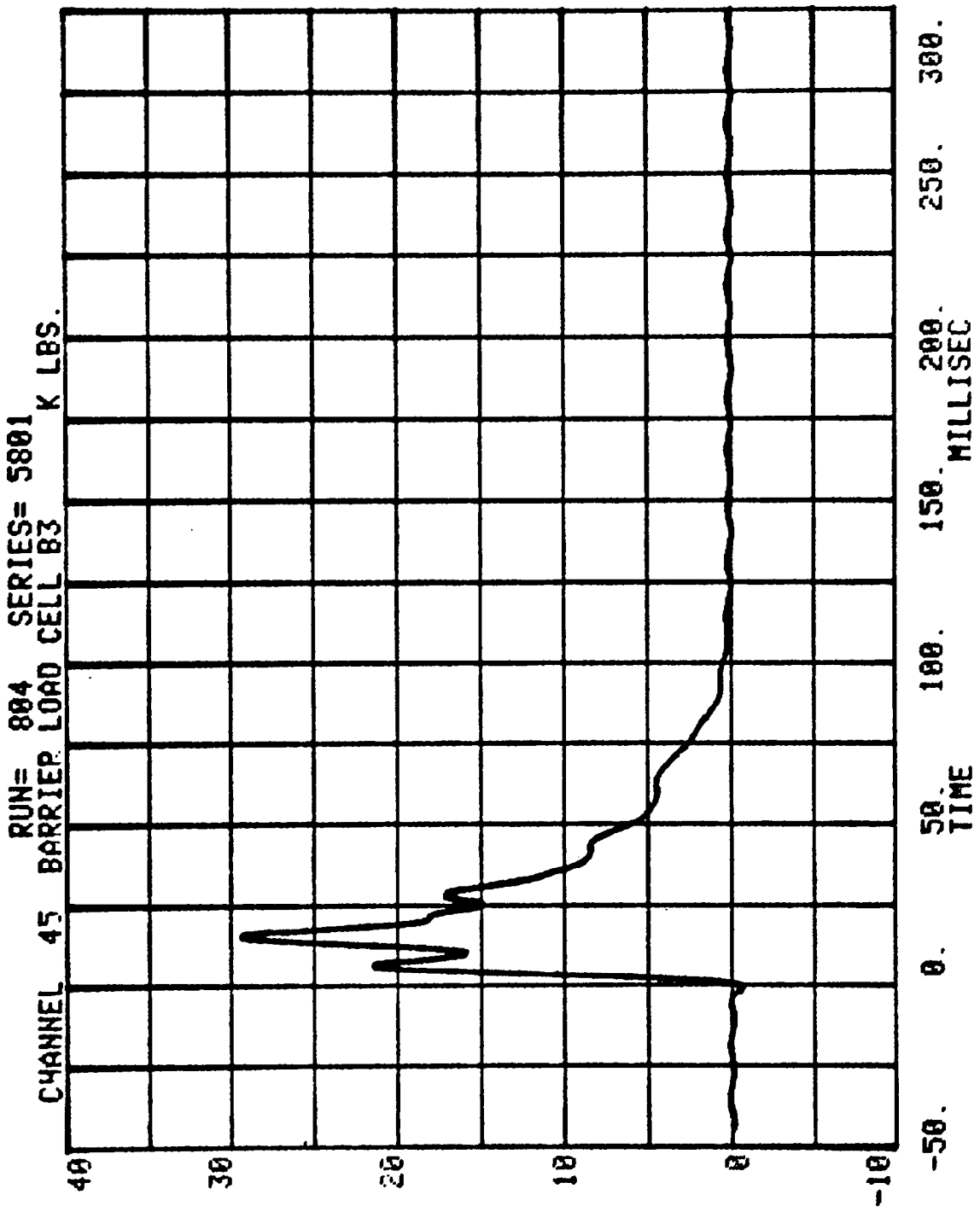
7626-2


RUN= 804 SERIES= 5801
CHANNEL 42 BARRIER LOAD CELL A9
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

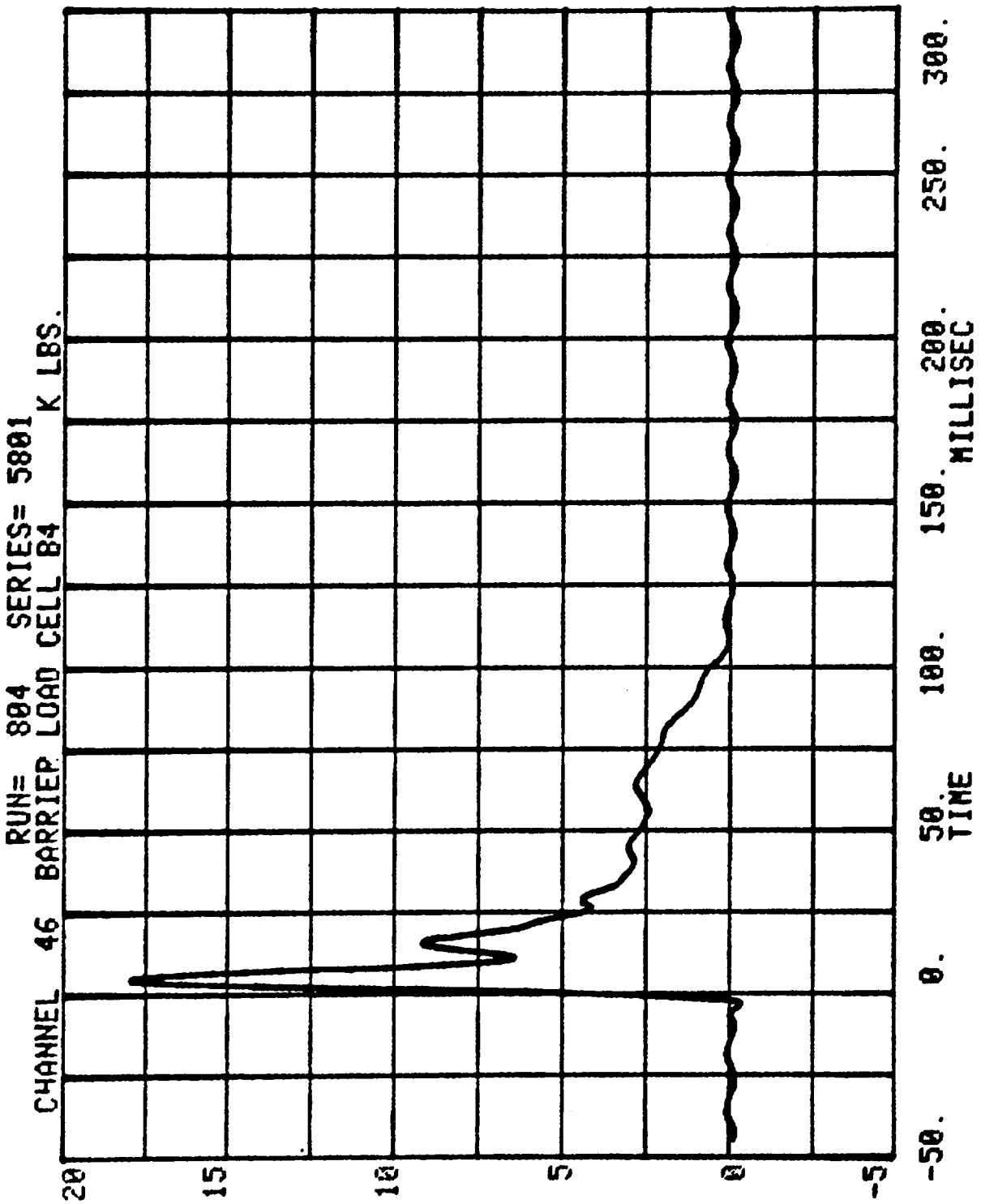
7626-2

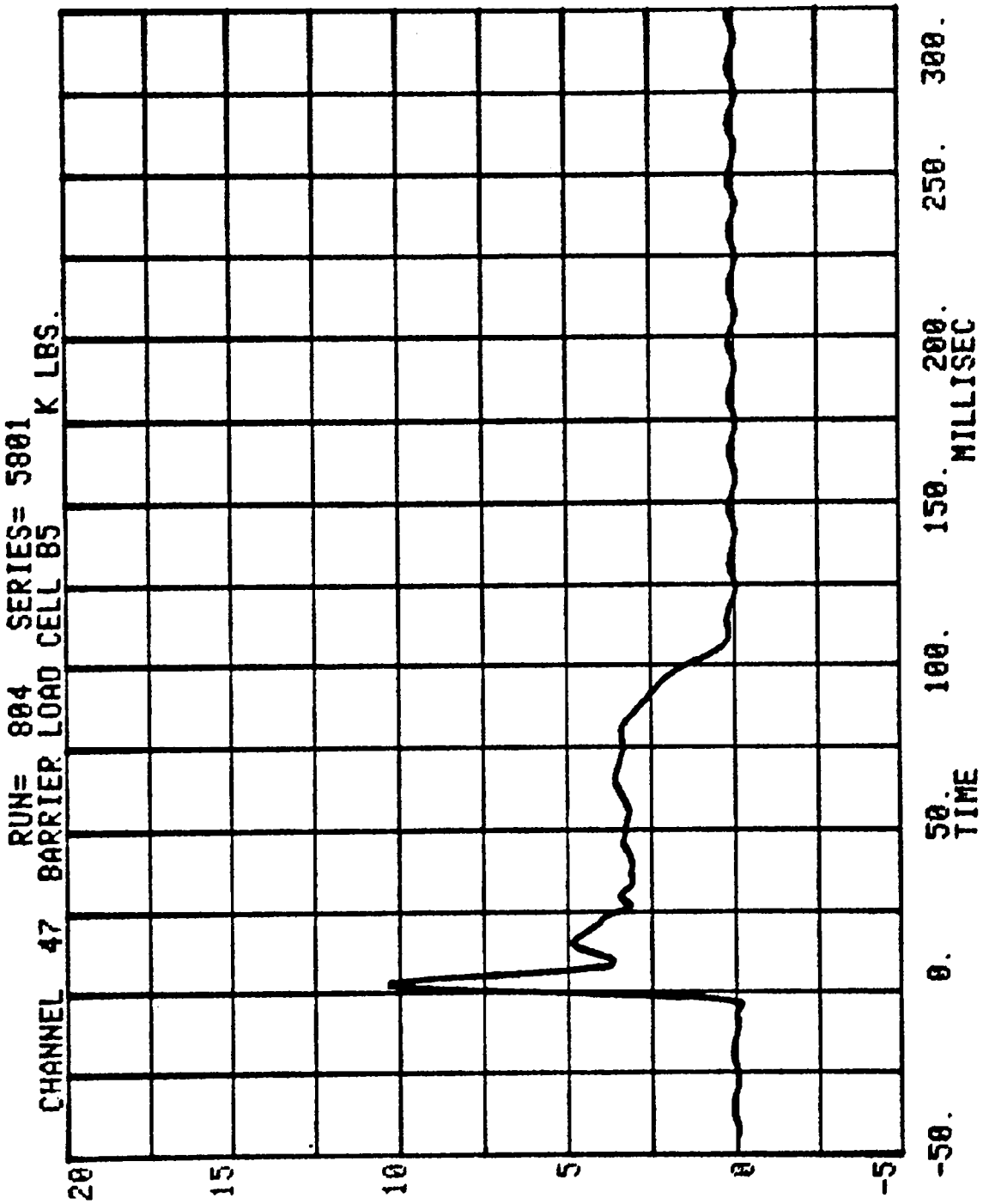

CHANNEL 43 BARRIER LOAD CELL B1
RUN= 804 SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

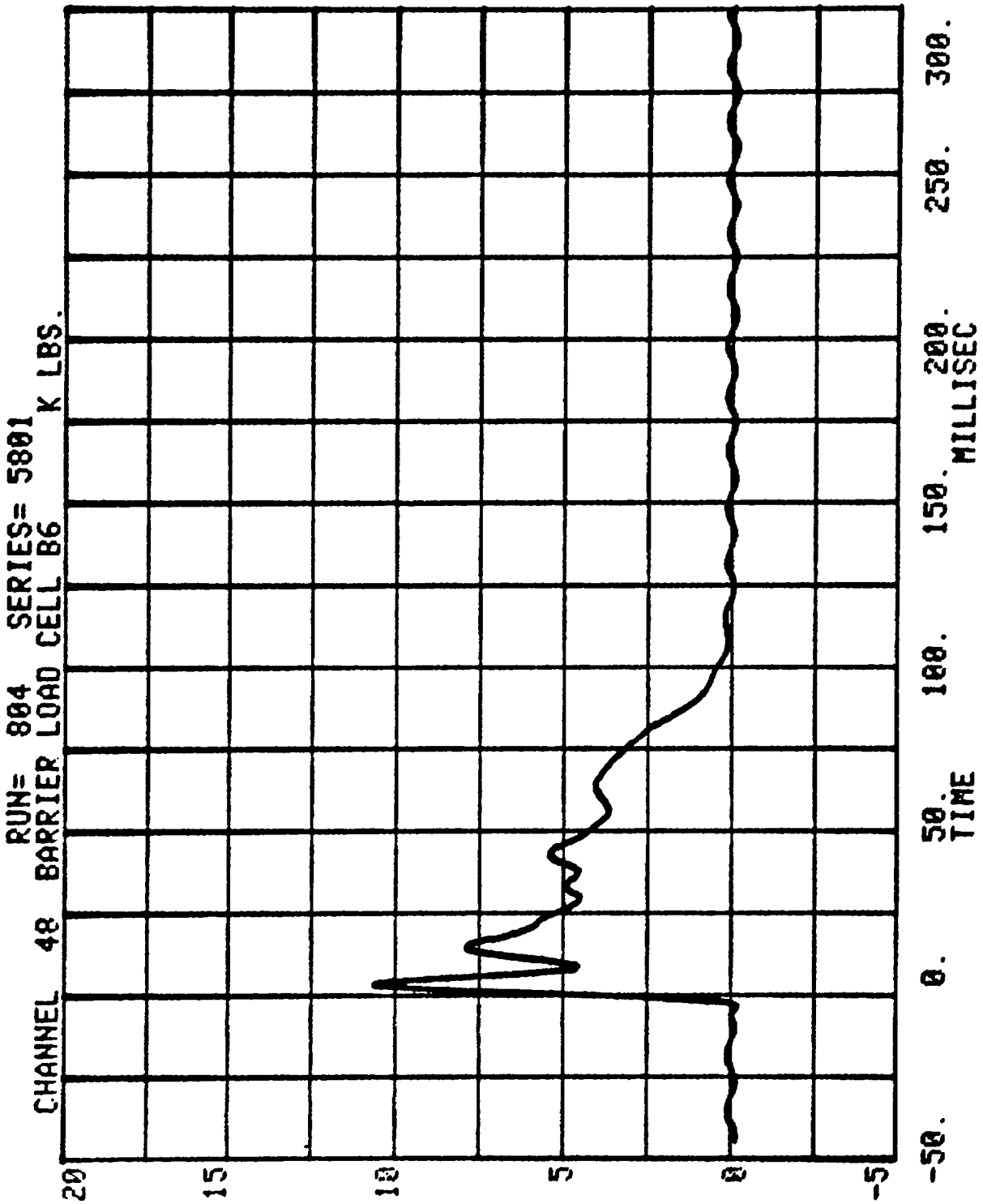

CHANNEL 44 BARRIER LOAD CELL B2
RUN= 804 SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 45 RUN= 804 SERIES= 5801
BARRIER LOAD CELL B3
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

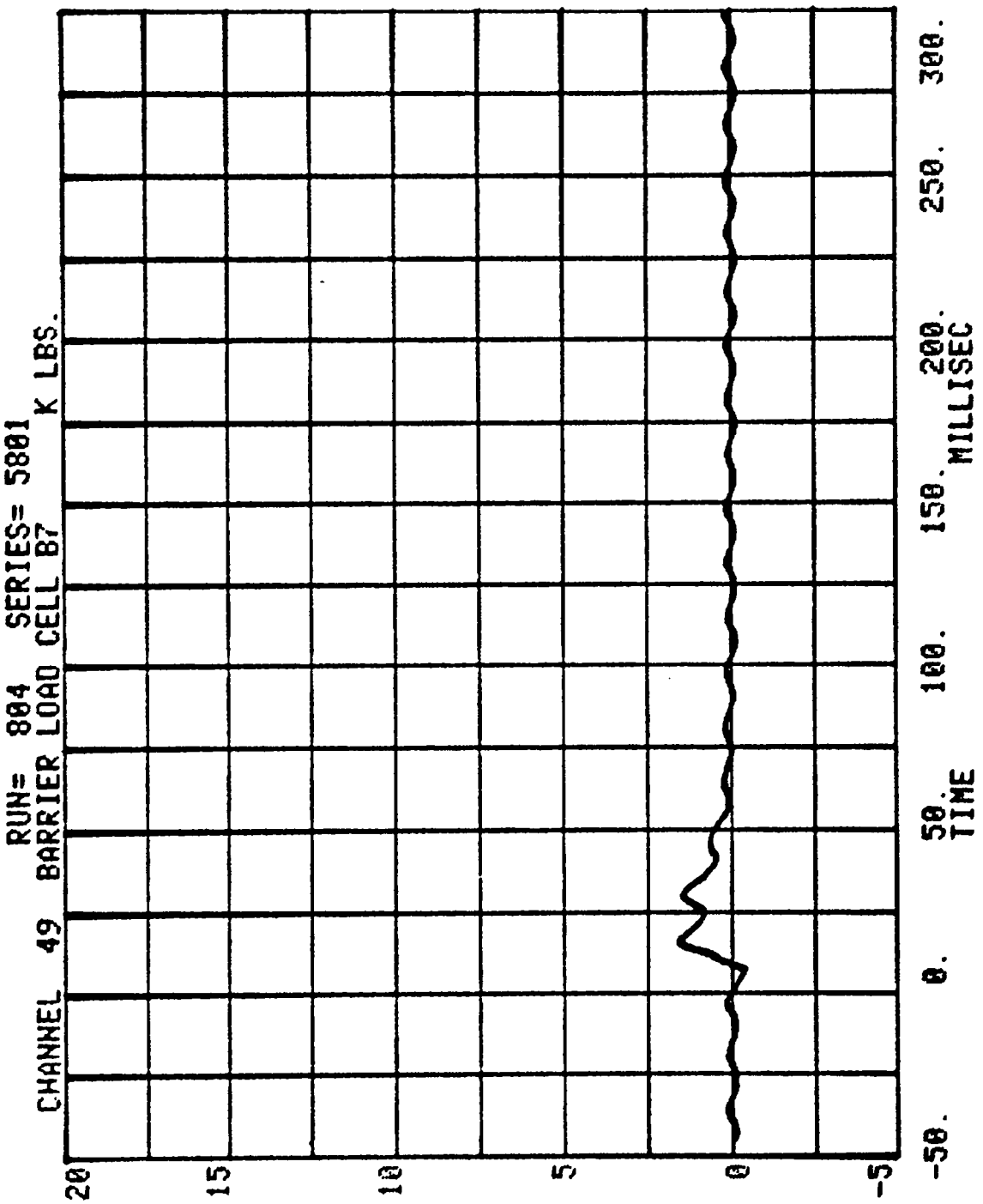
7626-2


CHANNEL 46 BARRIER LOAD CELL B4
RUN= 804 SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

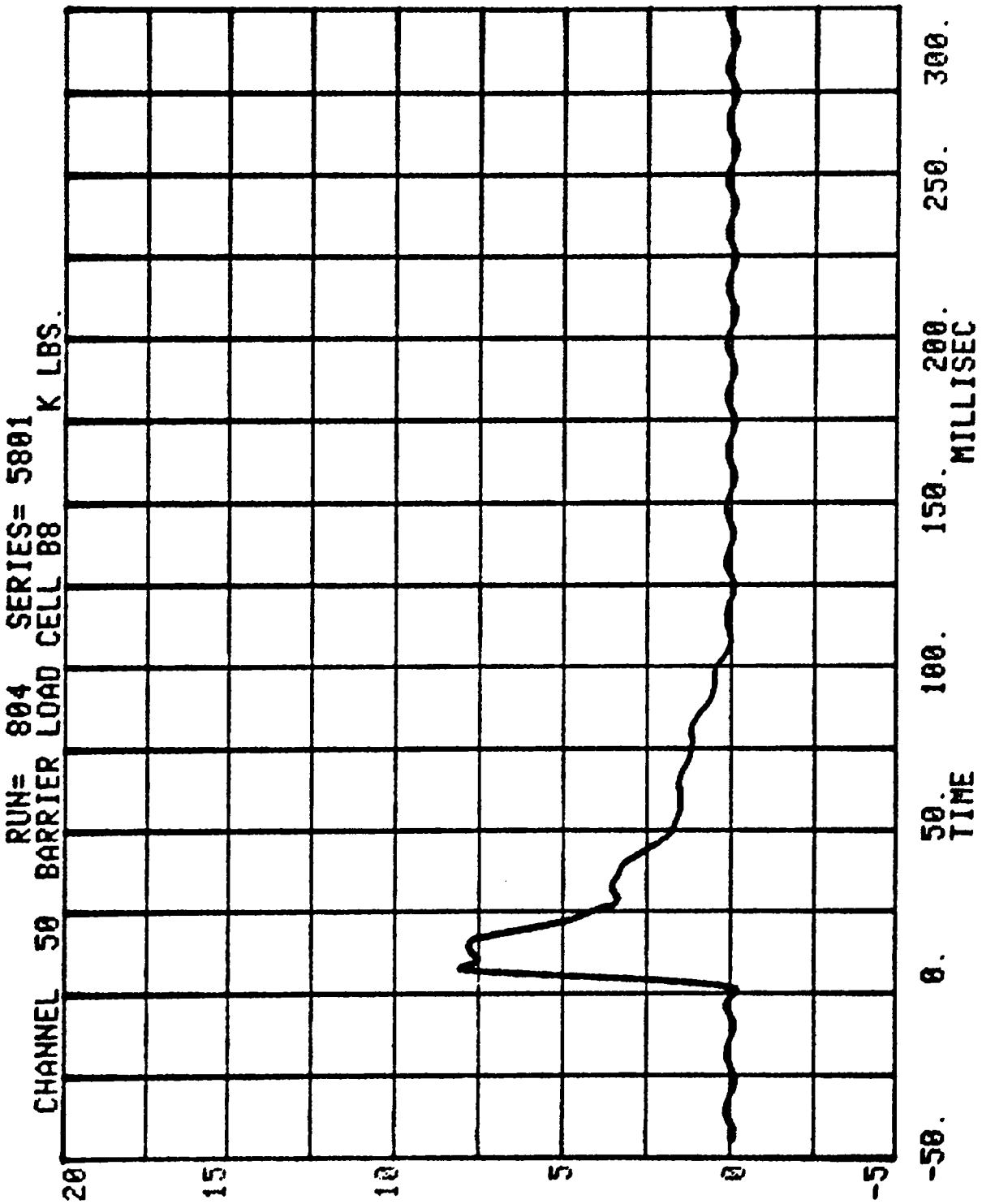

CHANNEL 47 RUN= 804 SERIES= 5801
BARRIER LOAD CELL B5
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 804 SERIES= 5801
CHANNEL 48 BARRIER LOAD CELL B6
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

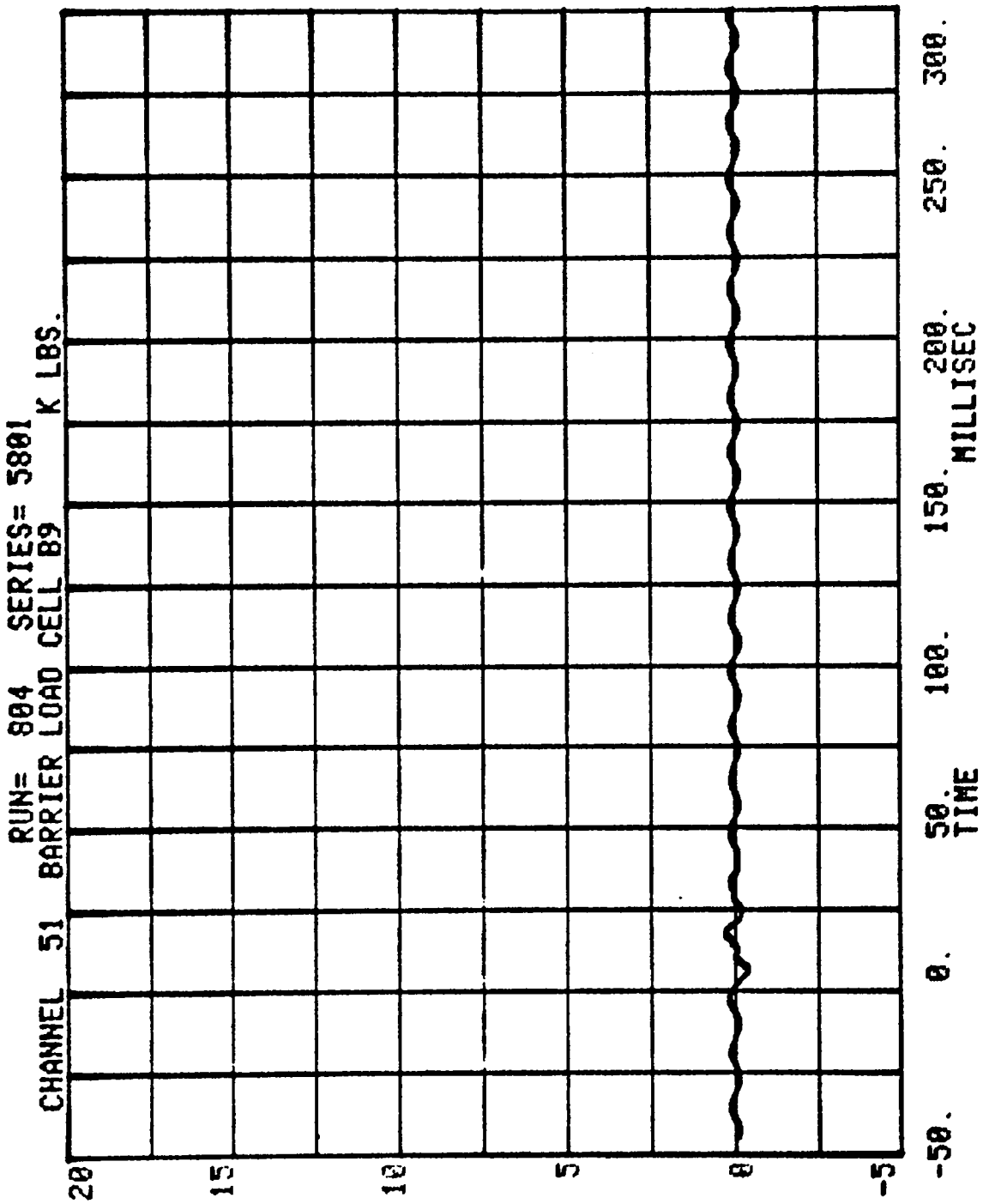
7626-2


CHANNEL 49 RUN= 804 SERIES= 5801
BARRIER LOAD CELL B7
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

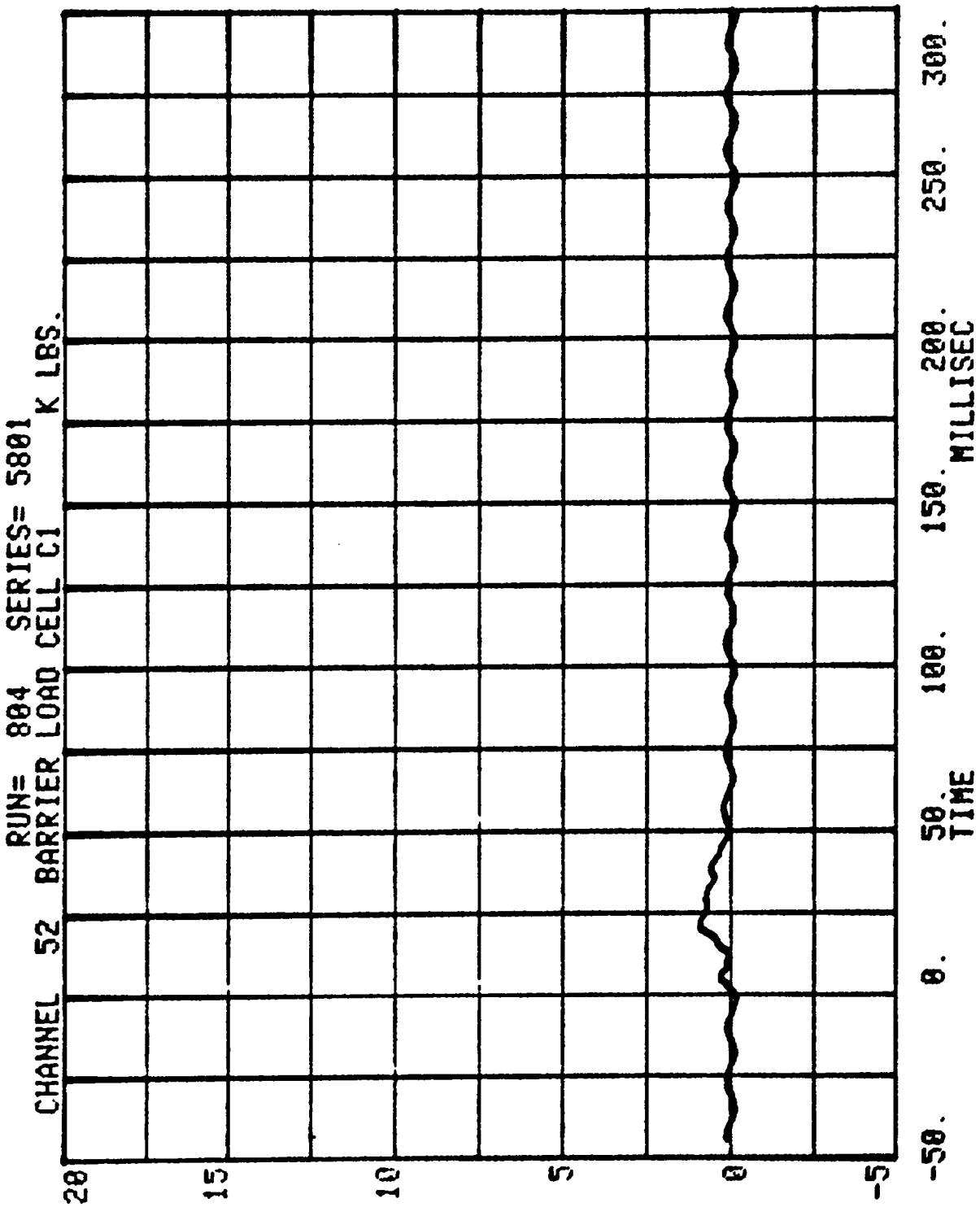
7626-2

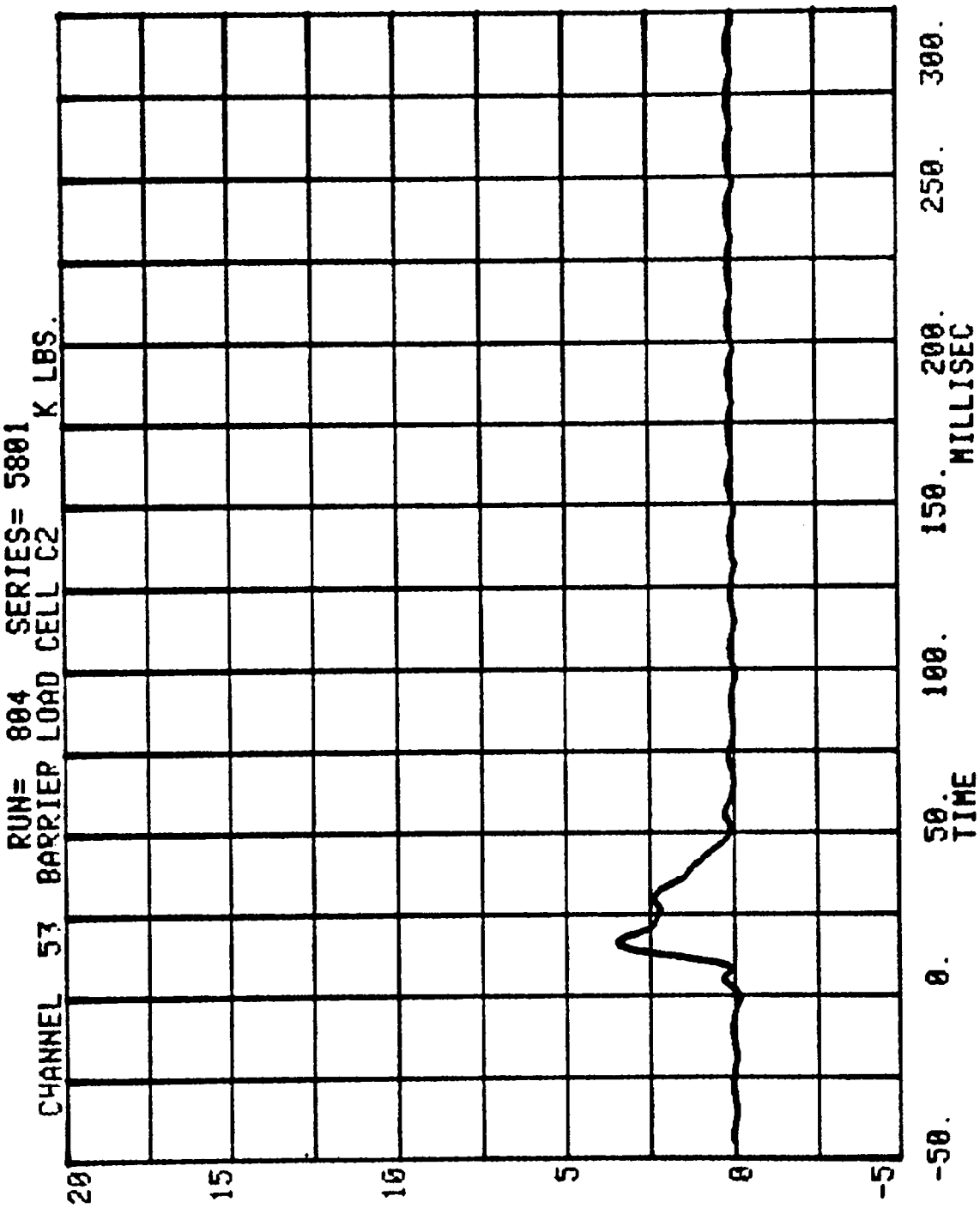

RUN= 804 SERIES= 5801
CHANNEL 50 BARRIER LOAD CELL B8
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2

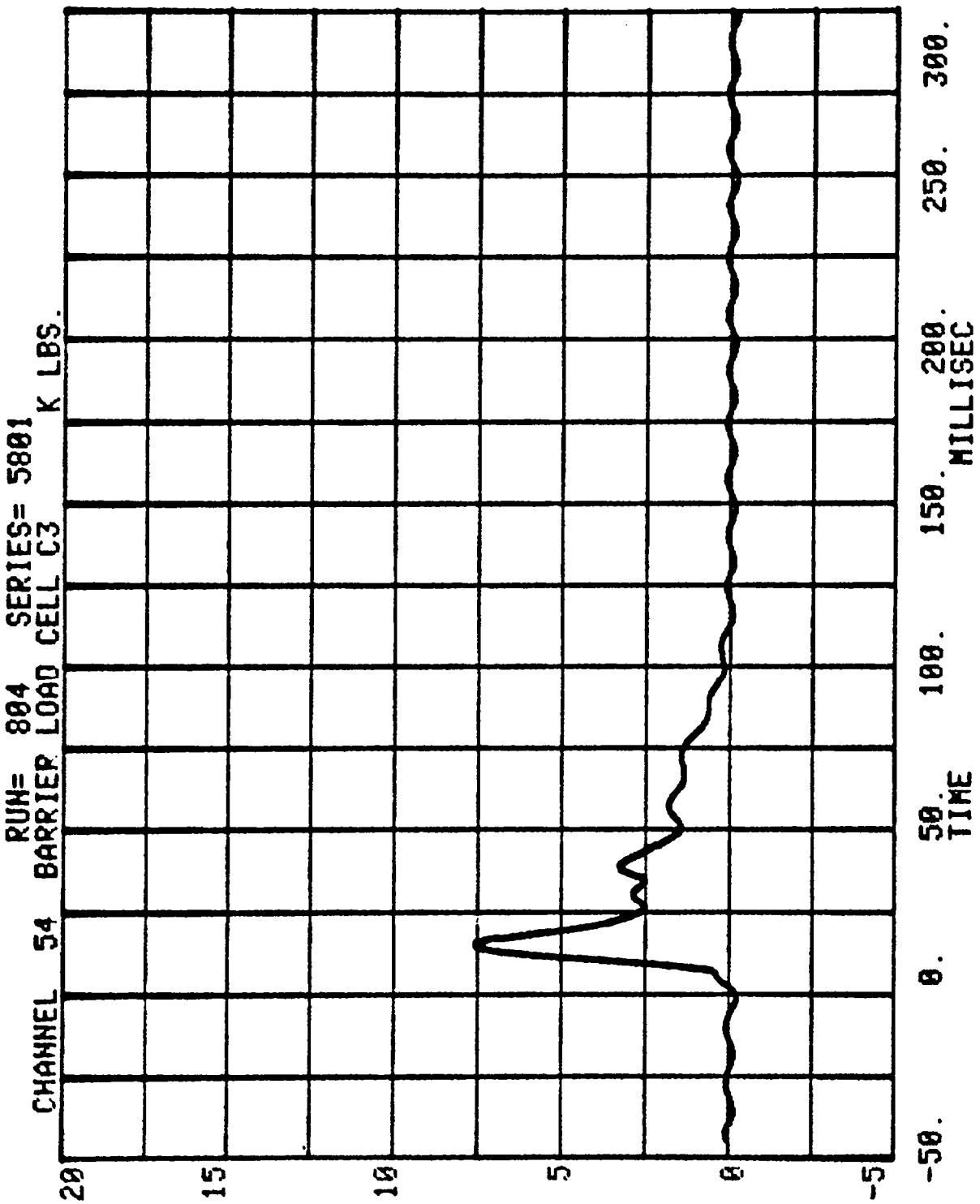

CHANNEL 51 RUN= 804 SERIES= 5801
BARRIER LOAD CELL B9
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

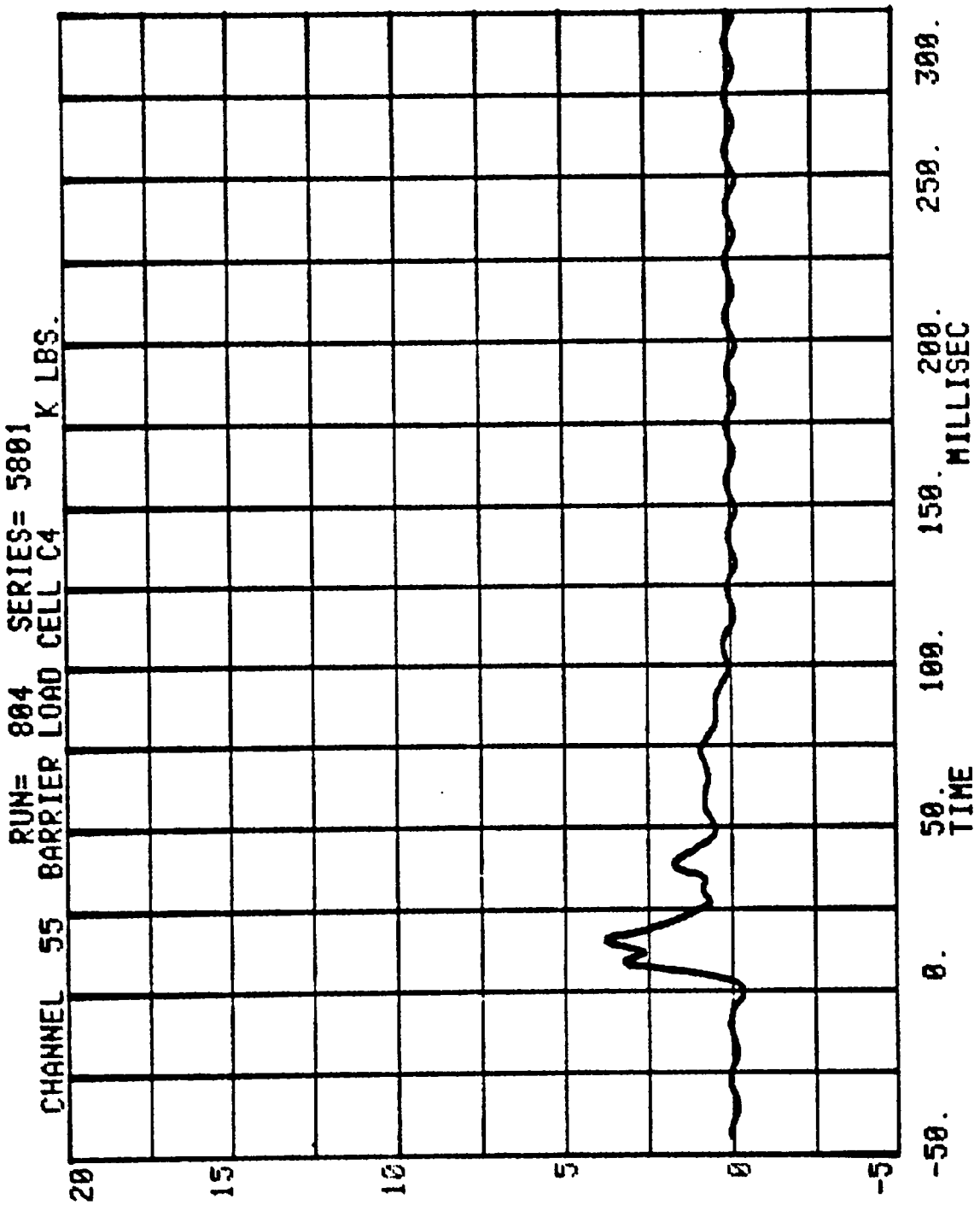
7626-2

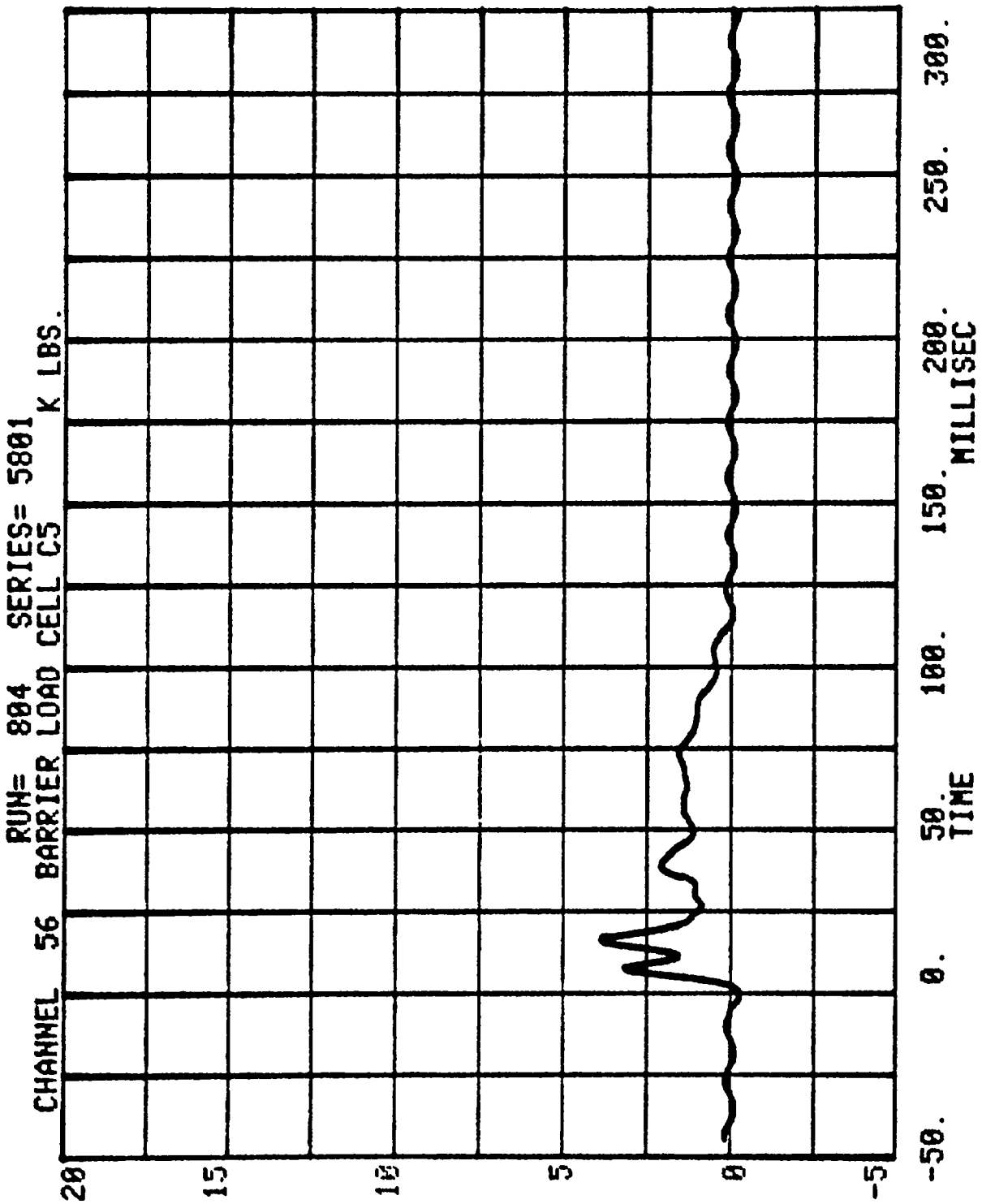

CHANNEL 52 BARRIER LOAD CELL C1
RUN= 804 SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

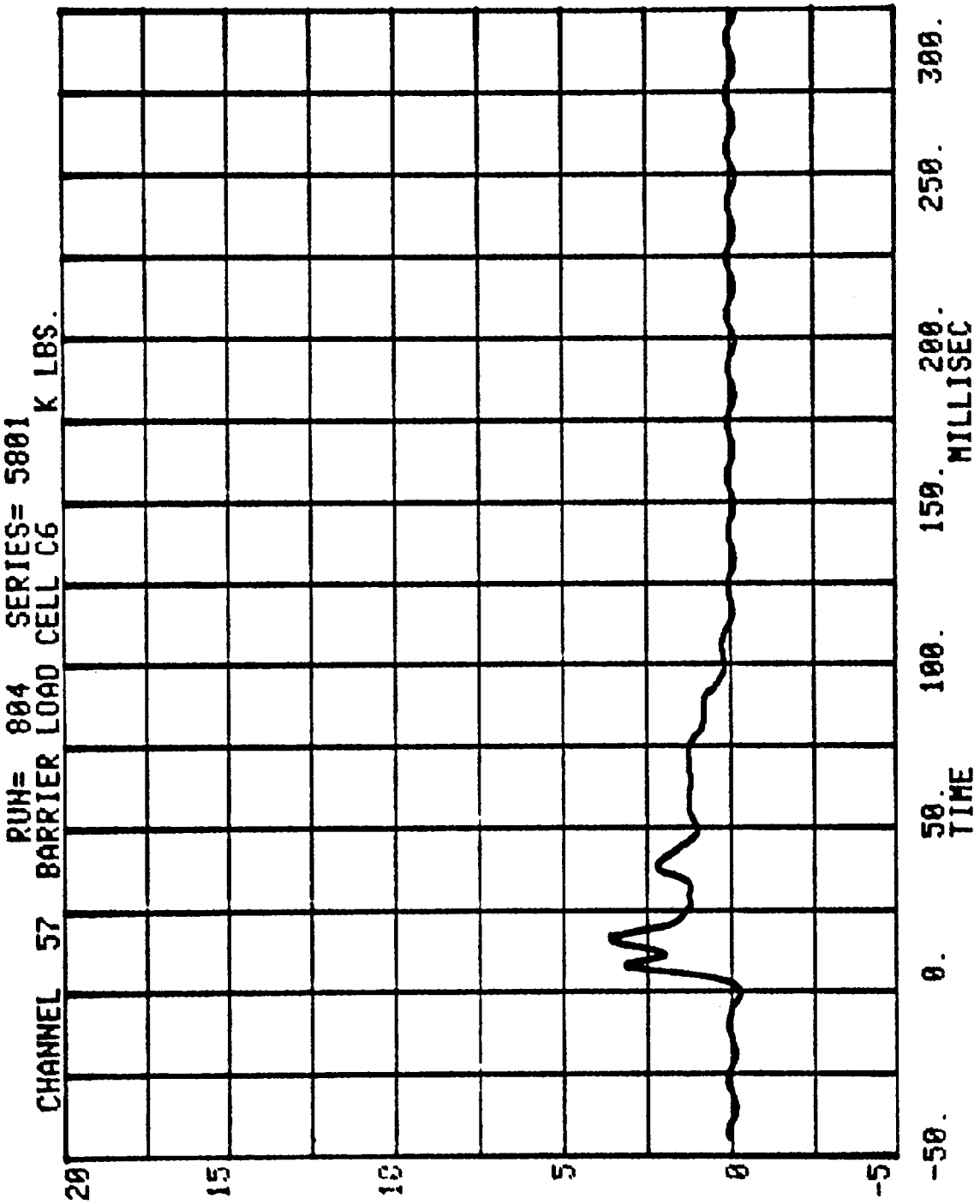

CHANNEL 53 BARRIER LOAD CELL C2
RUN= 804 SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


RUN= 804 SERIES= 5801
CHANNEL 54 BARRIER LOAD CELL C3
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 55 RUN= 804 SERIES= 5801
BARRIER LOAD CELL C4
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 56 RUN= 804 SERIES= 5801
BARRIER LOAD CELL C5
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 57 RUN= 804 SERIES= 5001
BARRIER LOAD CELL C6
K LBS.
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15
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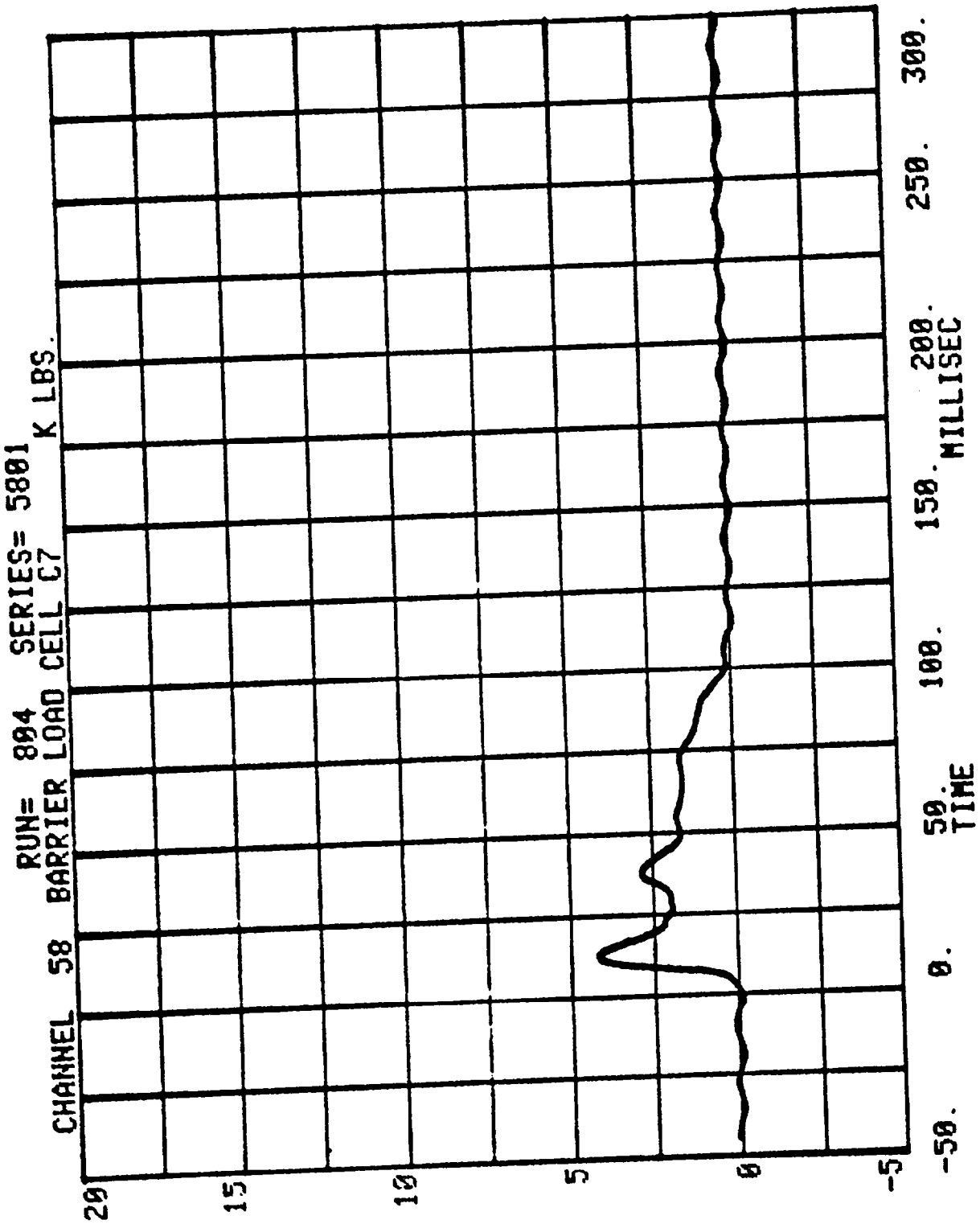
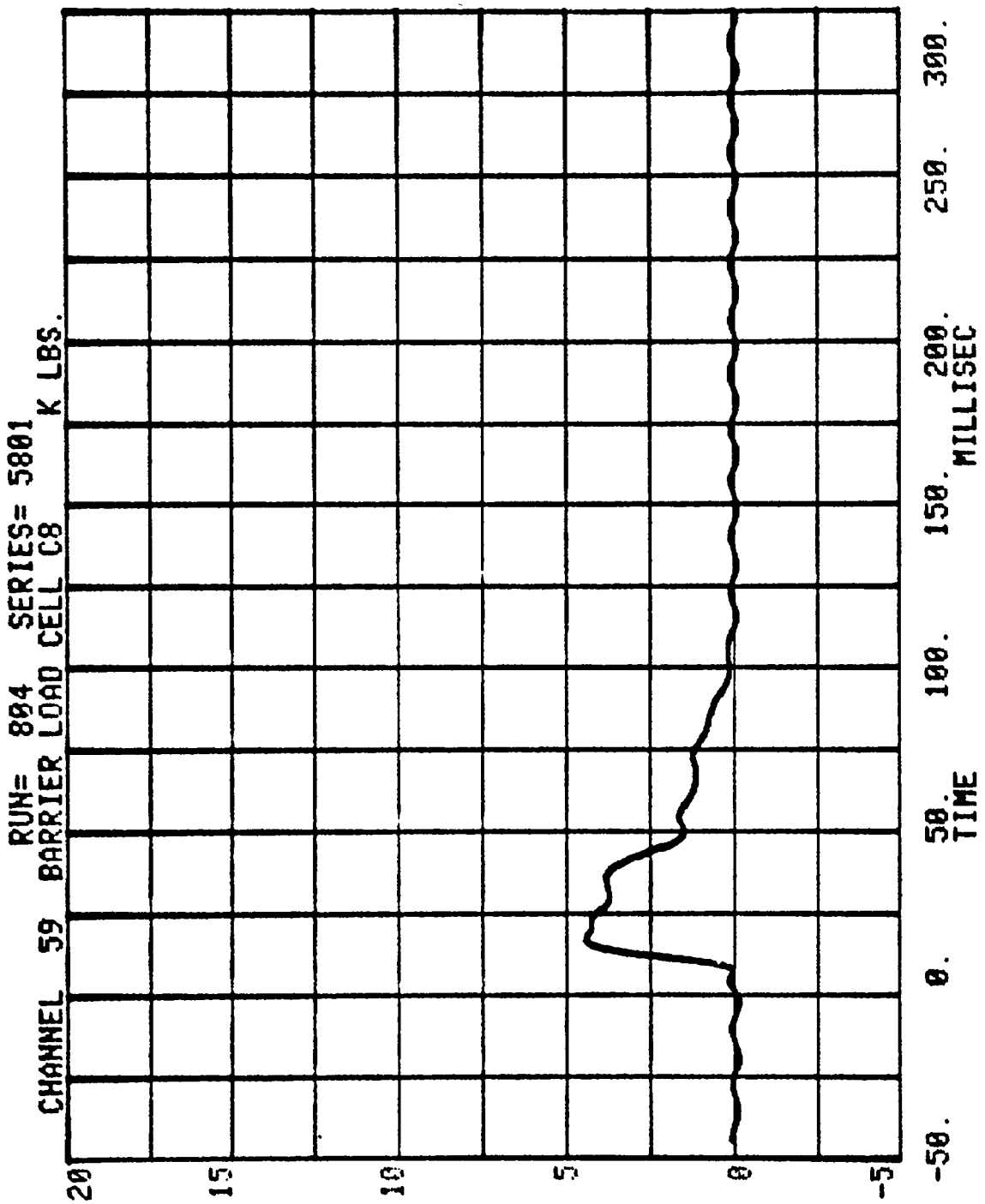
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 58
RUN= 804
BARRIER LOAD CELL C7
SERIES= 5801
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 59 RUN= 804 SERIES= 5801
BARRIER LOAD CELL C8
K LBS.
20
15
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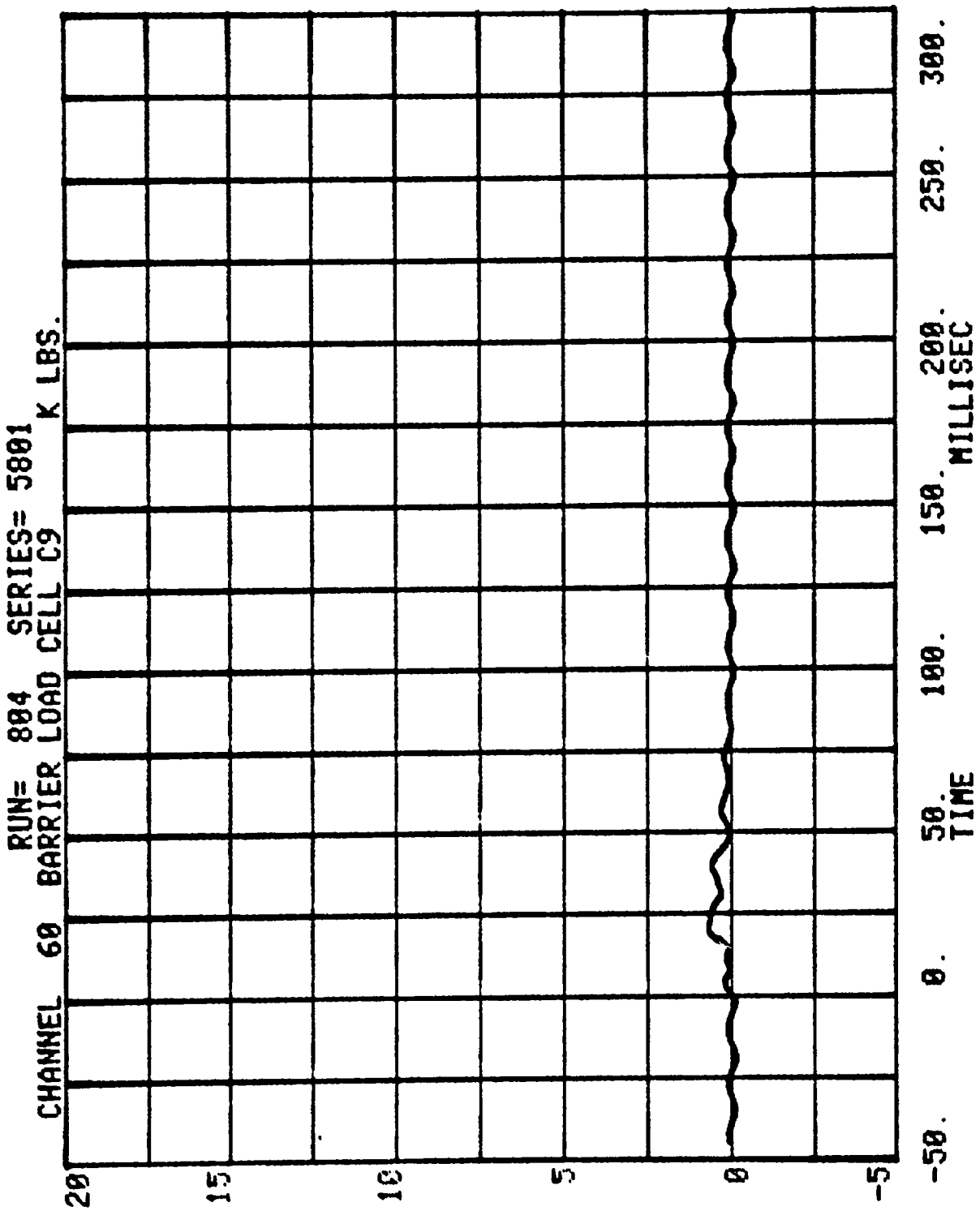
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 60 RUN= 804 SERIES= 5801
BARRIER LOAD CELL C9
K LBS.
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-5
-50.
0.
50.
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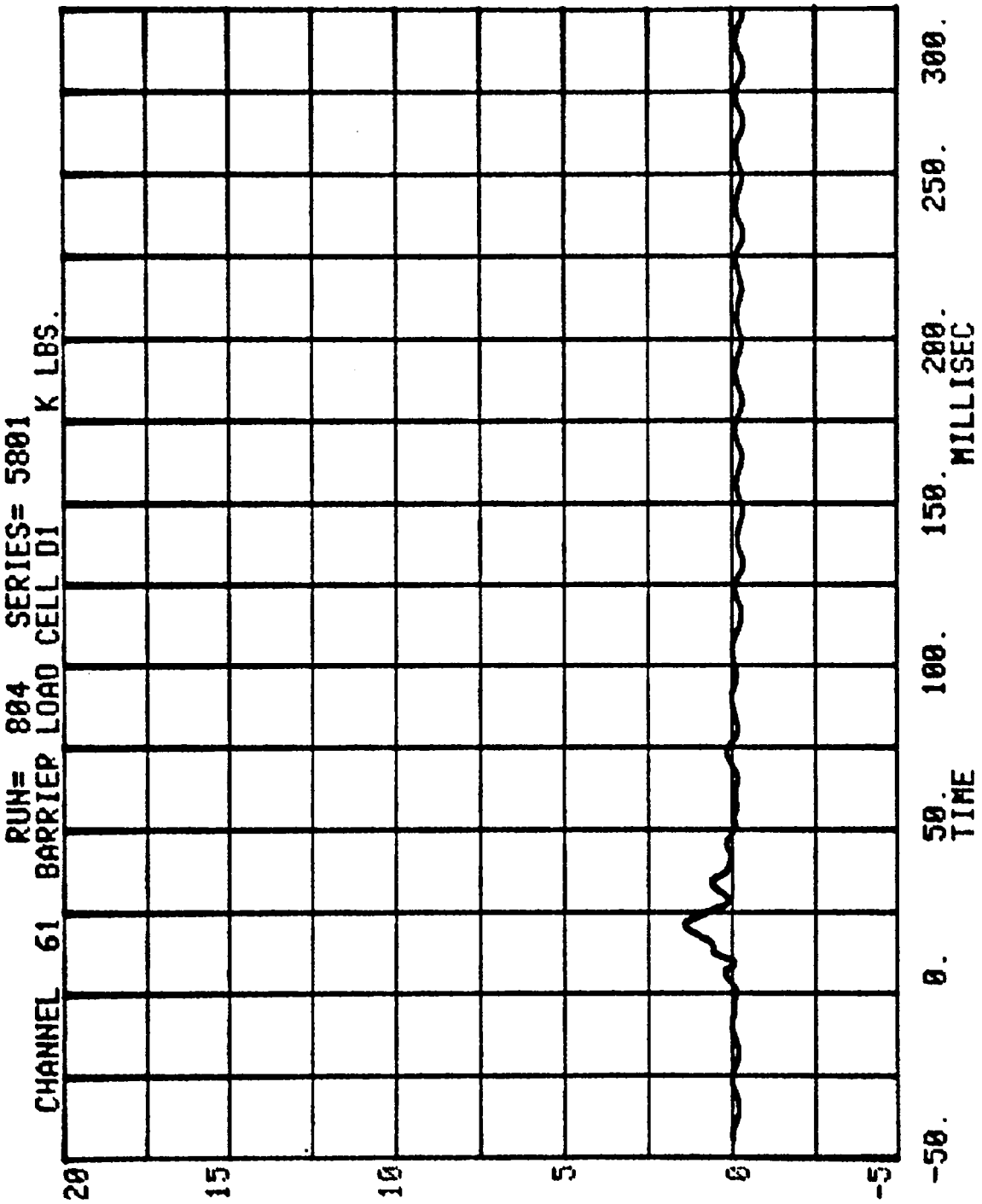
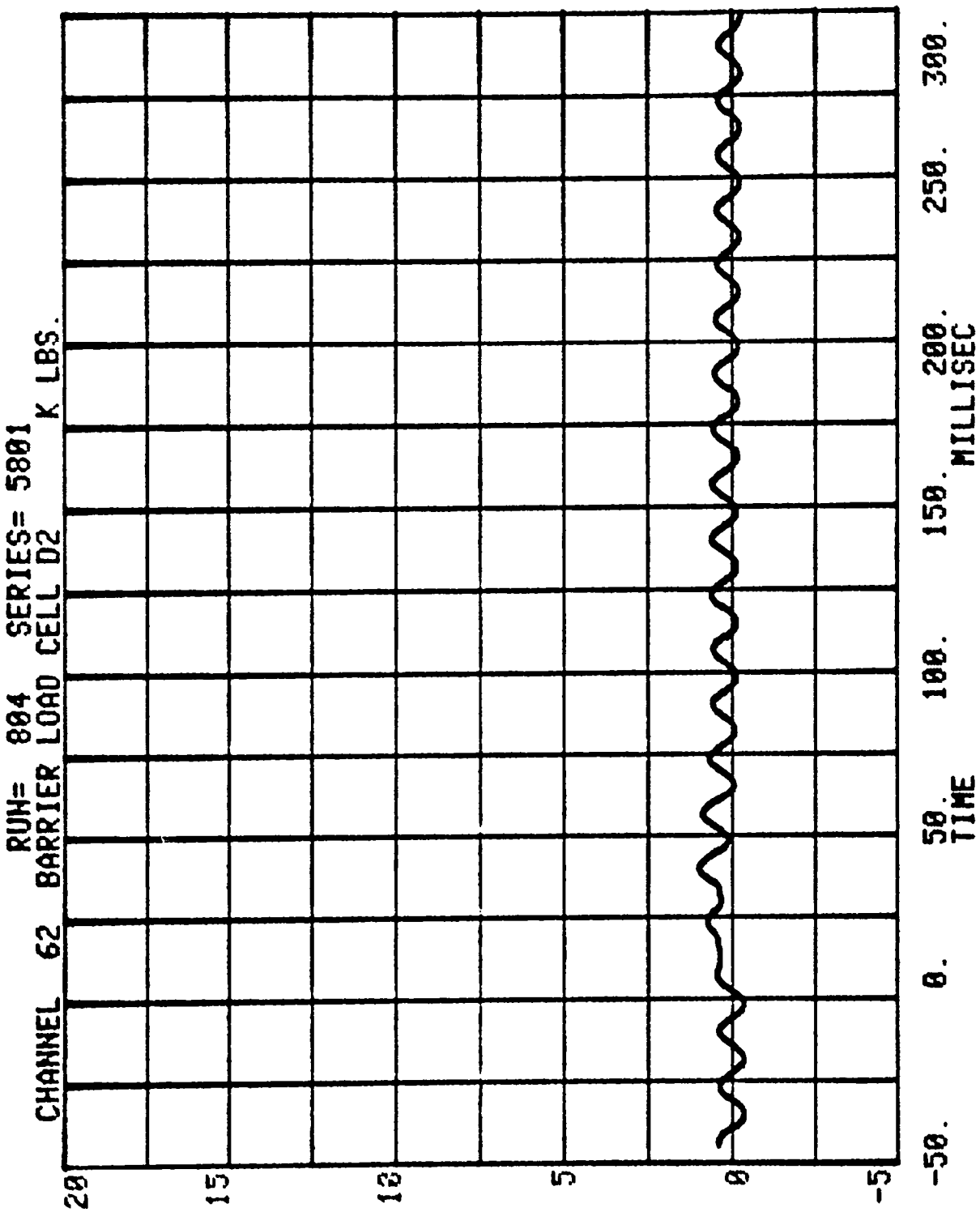
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 61 RUN= 804 SERIES= 5801
BARRIER LOAD CELL D1
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 62 RUN= 804 SERIES= 5801
BARRIER LOAD CELL D2
K LBS.
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15
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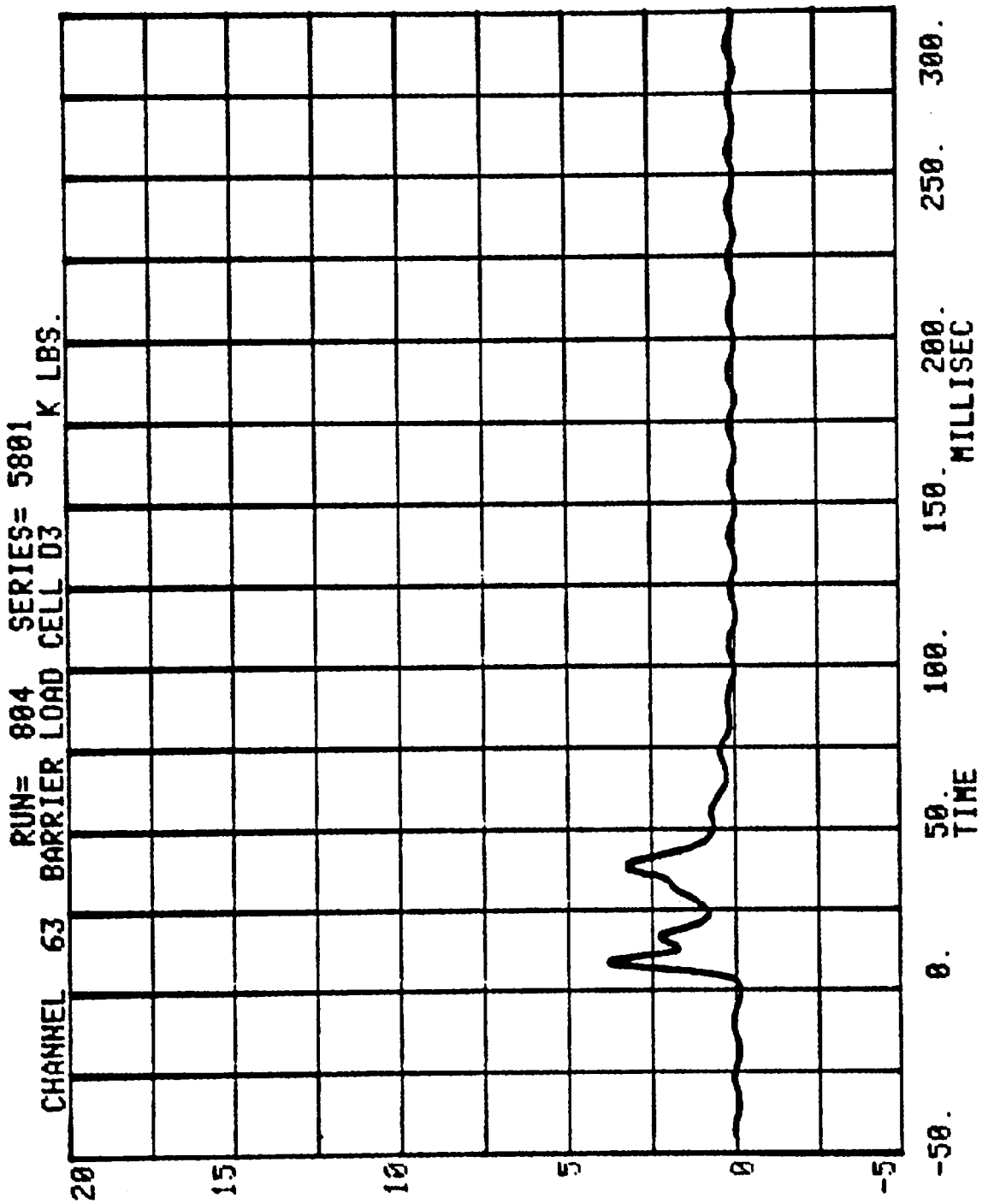
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 63 RUN= 804 SERIES= 5801
BARRIER LOAD CELL D3
K LBS.
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-5
-50.
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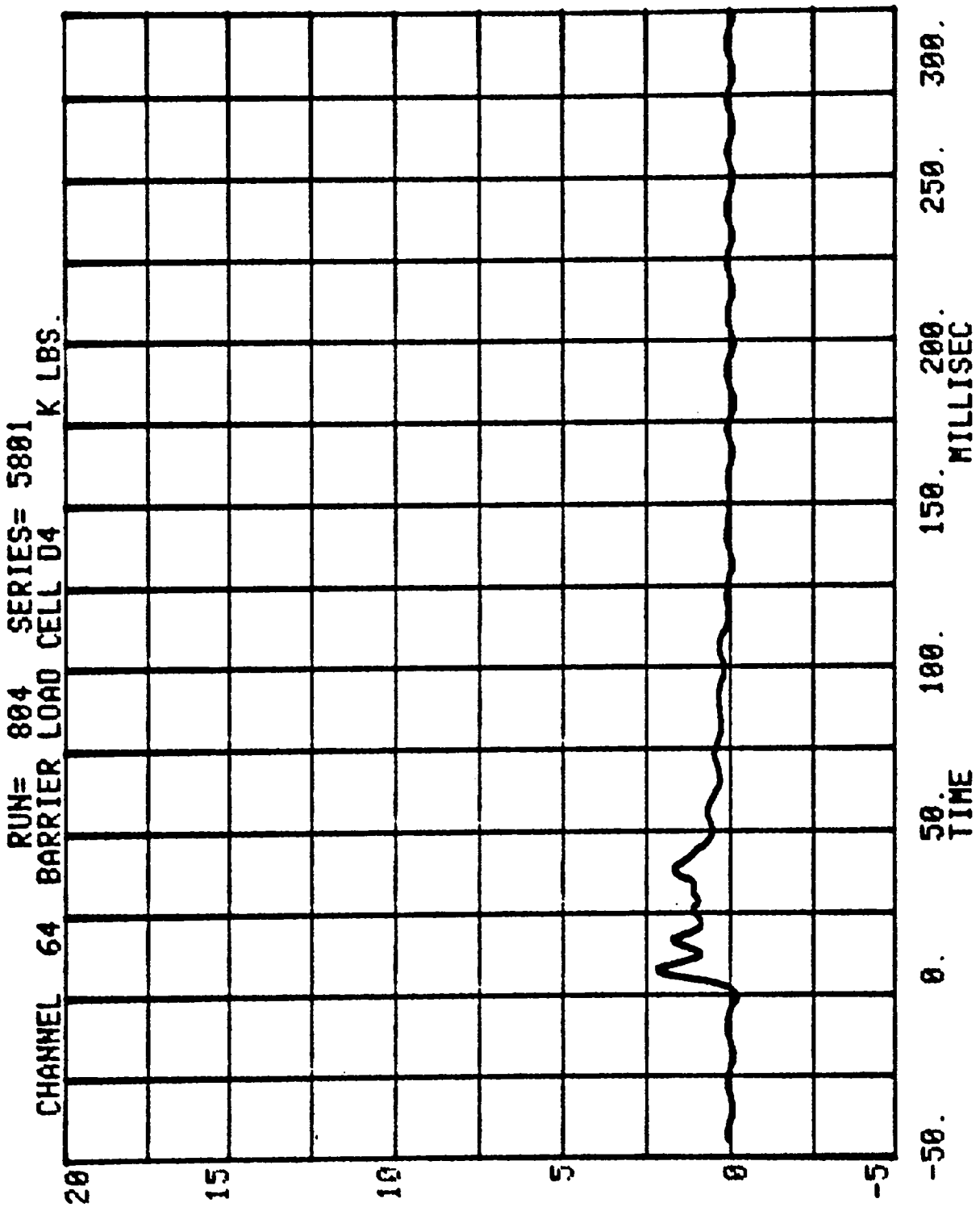
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 64 BARRIER LOAD CELL D4
RUN= 804 SERIES= 5801
K LBS.
20
15
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-5
-50.
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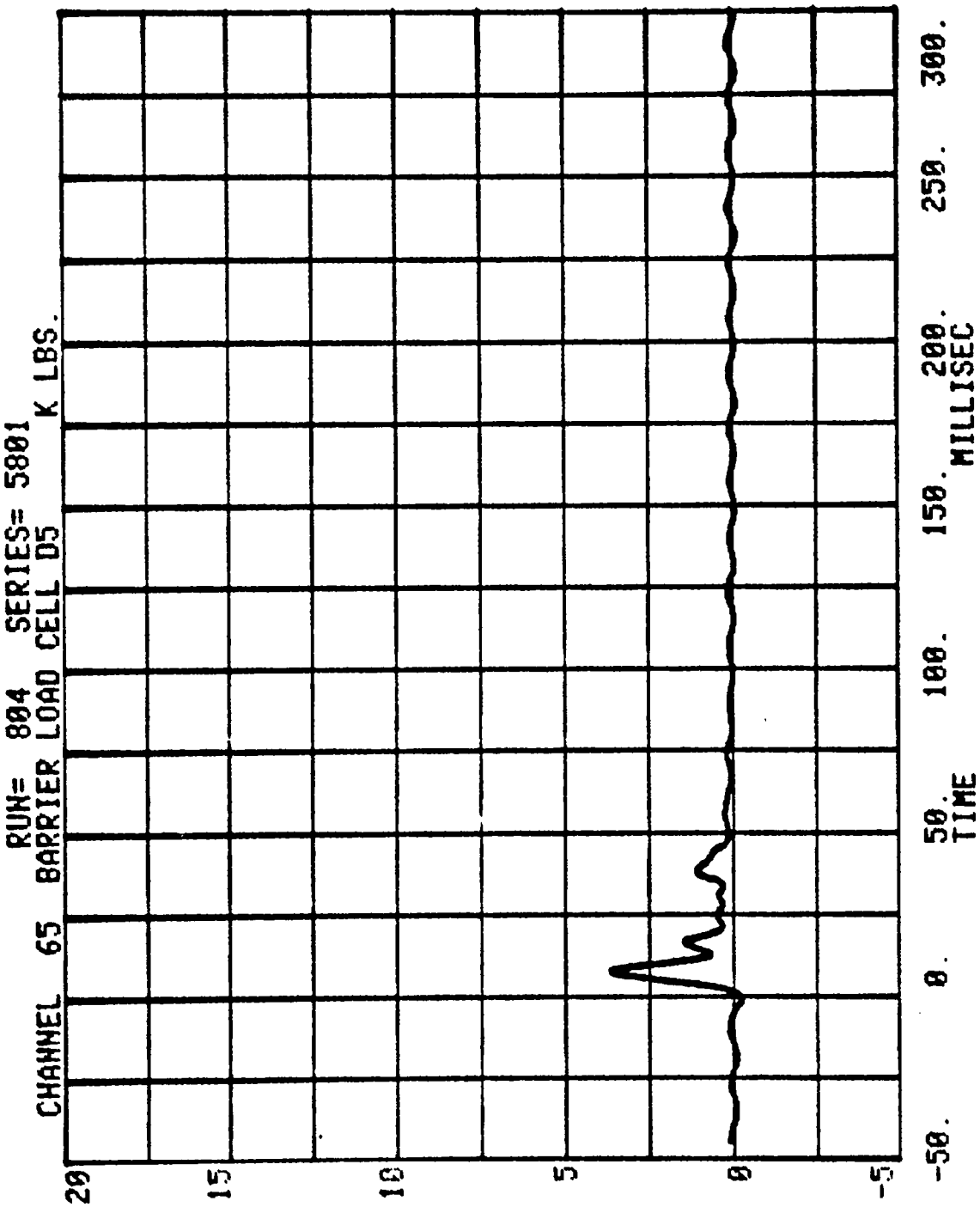
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 65 BARRIER LOAD CELL D5
RUN= 804 SERIES= 5801
K LBS.
20
15
10
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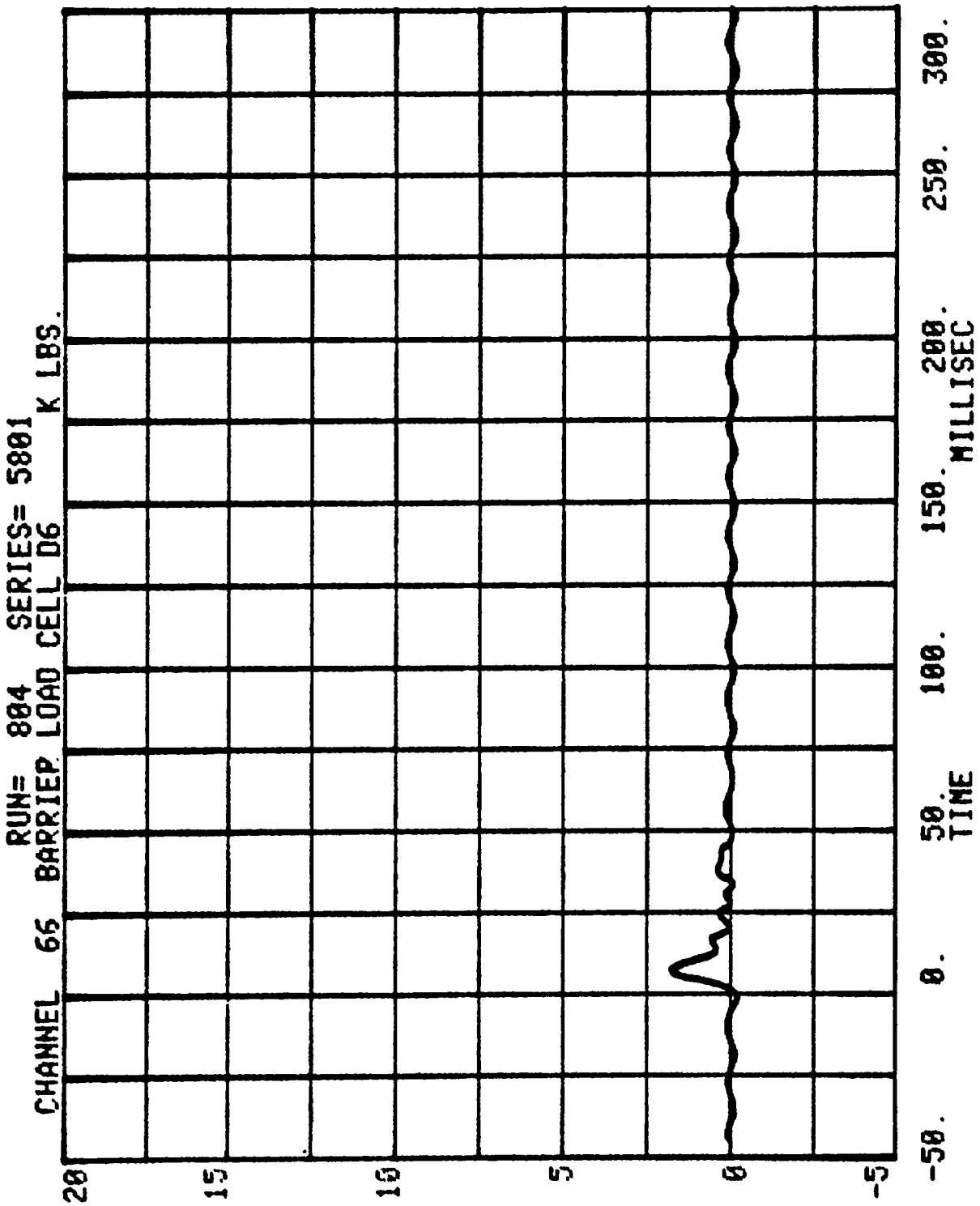
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 66 BARRIER LOAD CELL D6
RUN= 804 SERIES= 5801
K LBS.
20
15
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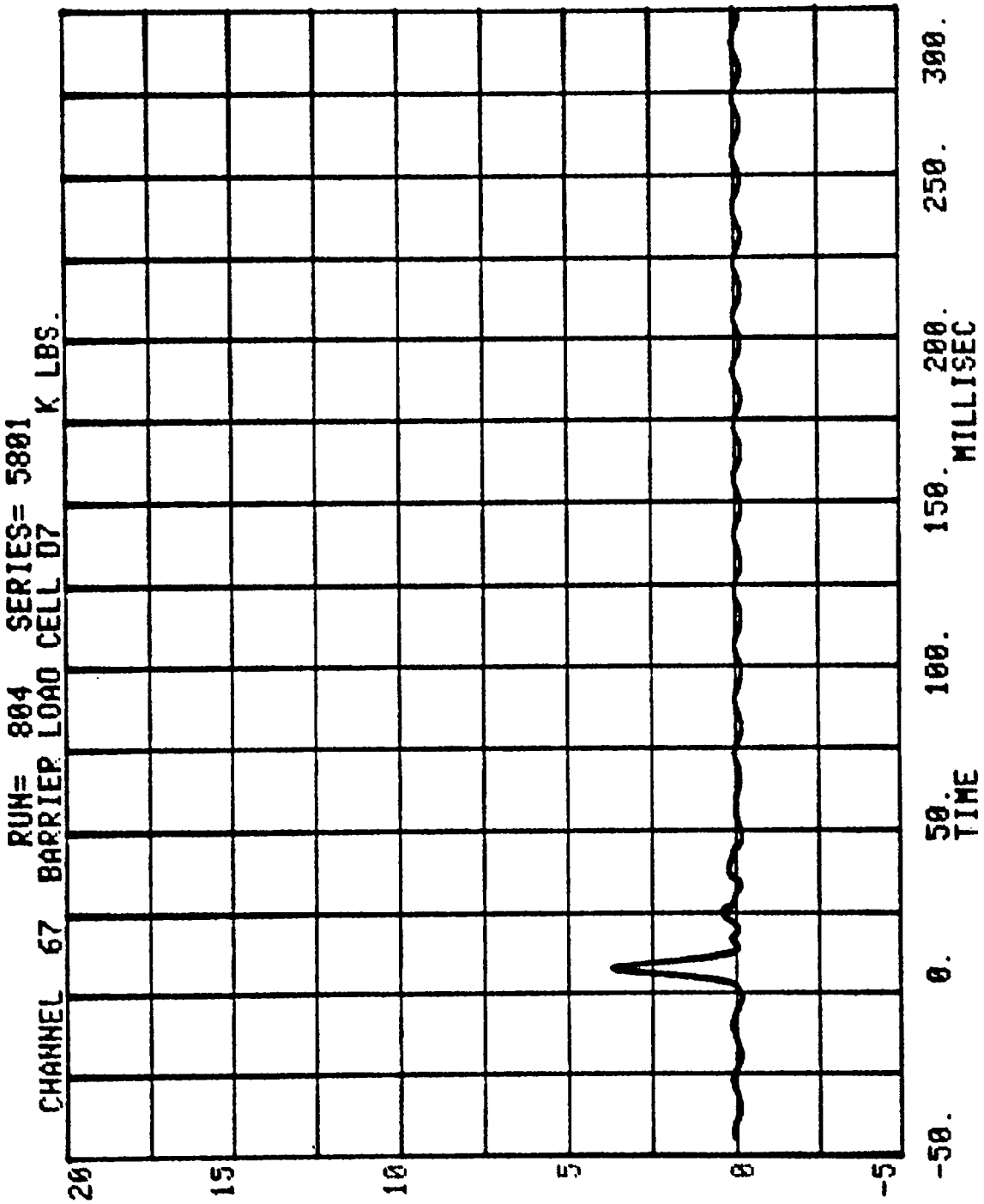
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 67 RUN= 804 SERIES= 5801
BARRIER LOAD CELL D7
K LBS.
20
15
10
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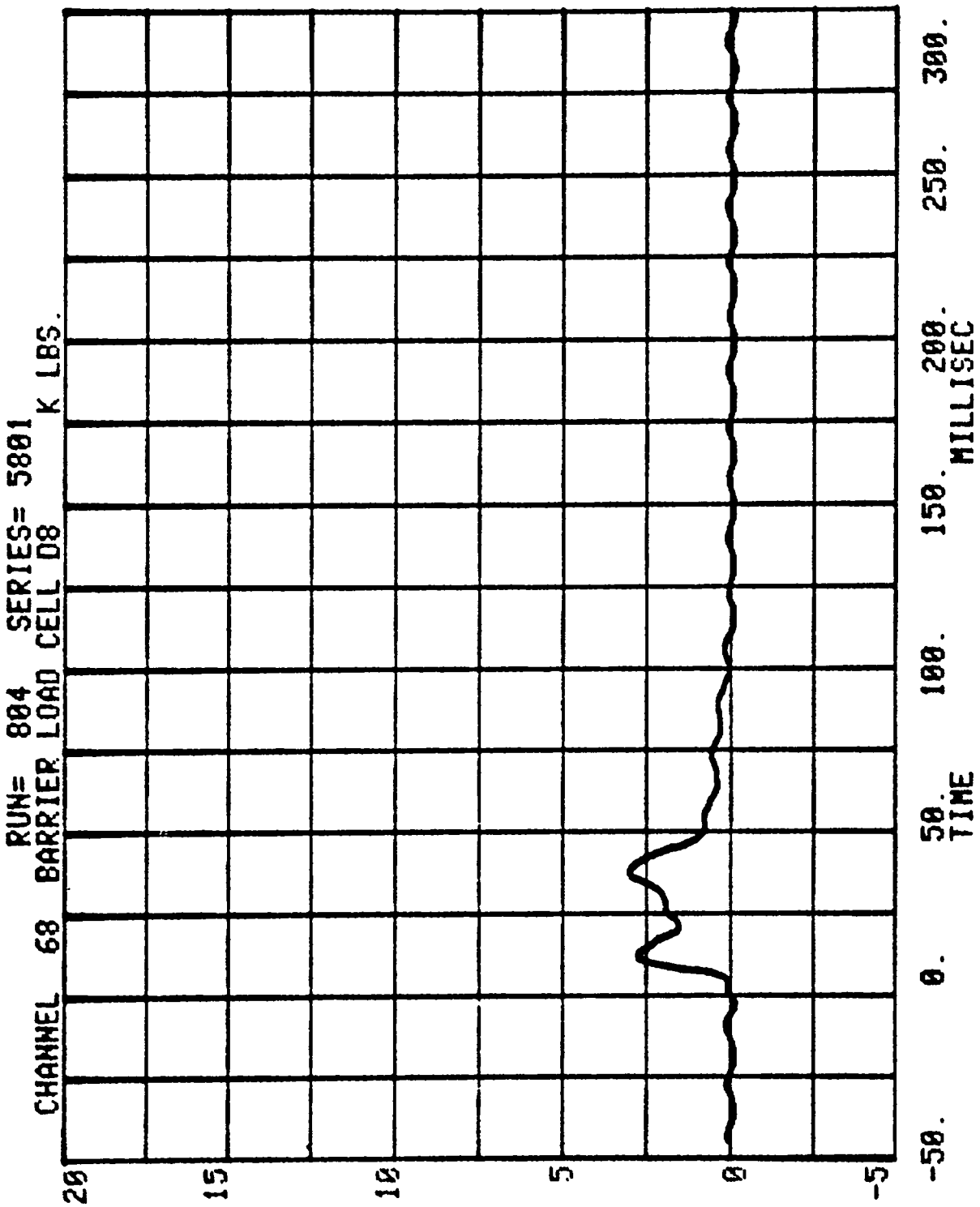
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 68 BARRIER LOAD CELL D8
RUN= 804 SERIES= 5801
K LBS.
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15
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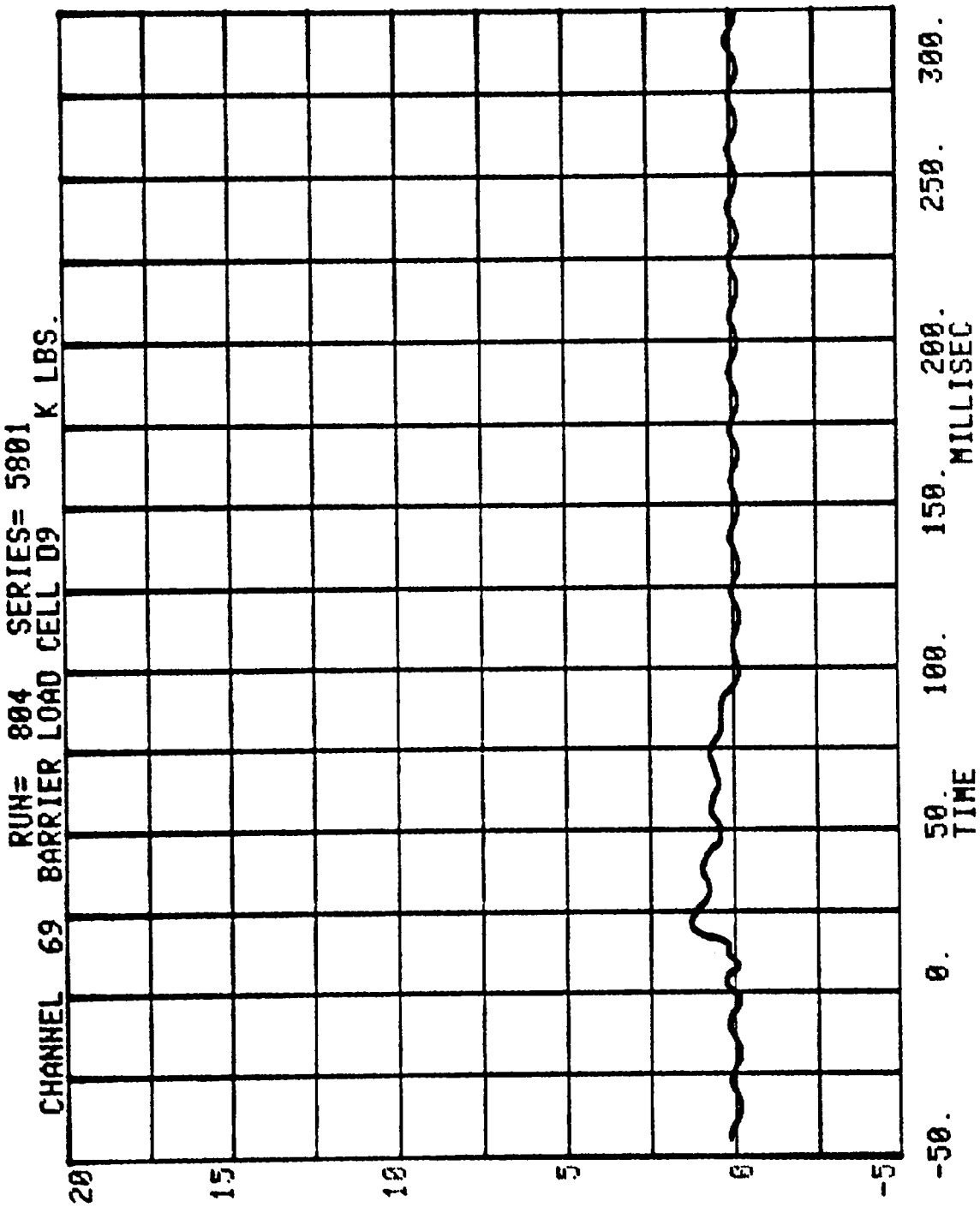
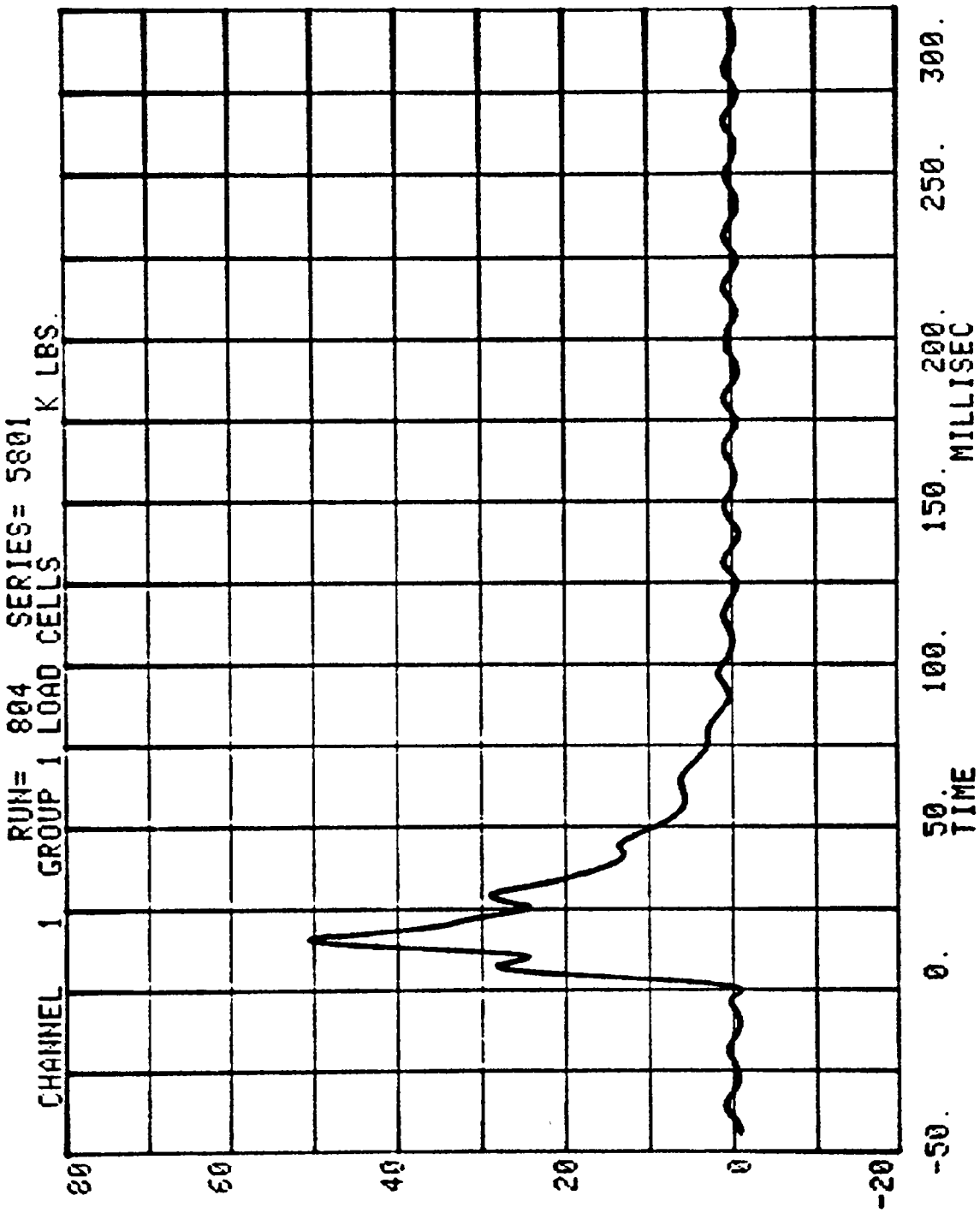
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 69 RUN= 804 SERIES= 5801
BARRIER LOAD CELL D9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

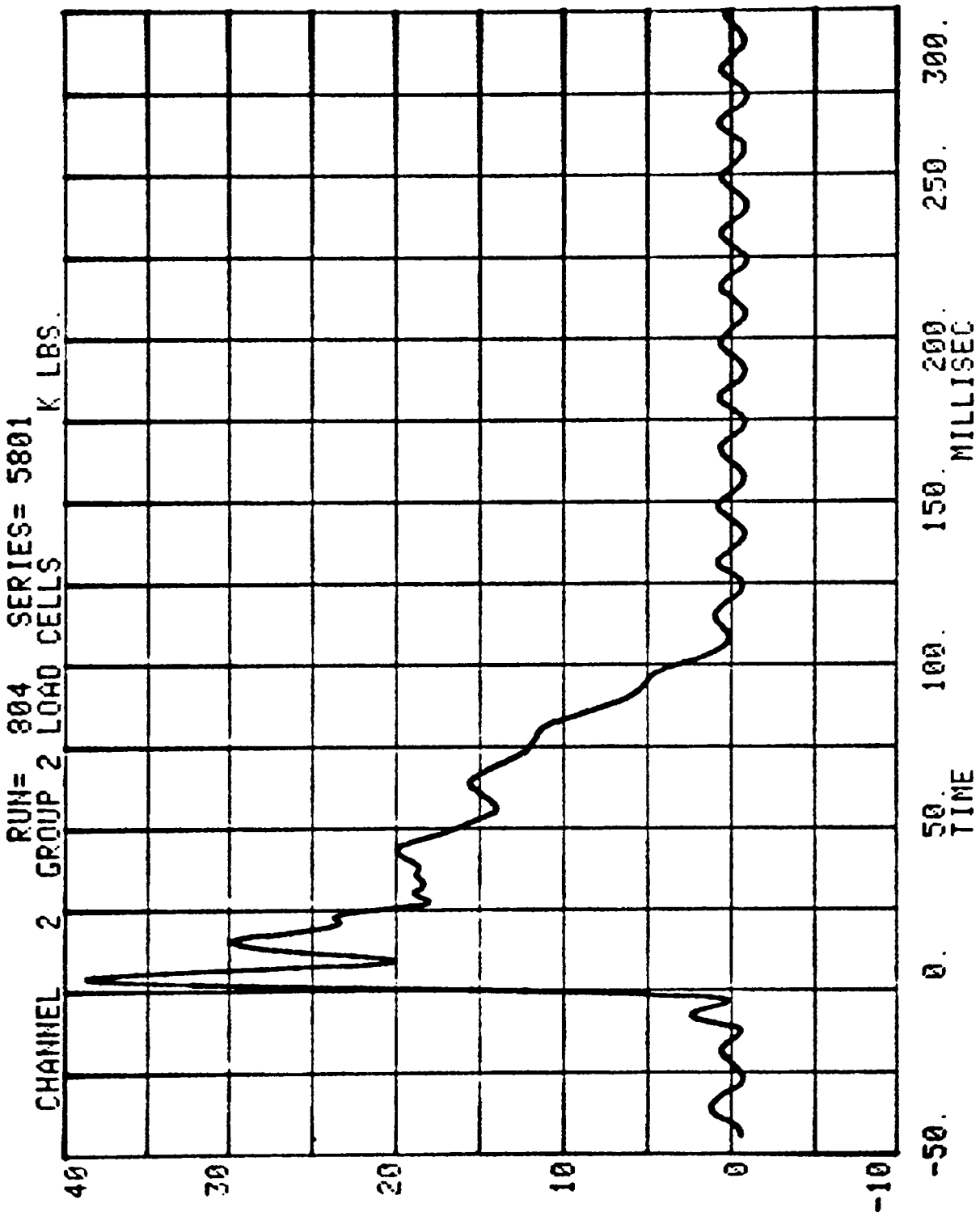
NEW CAR ASSESSMENT BARRIER TEST - 1988

RUN # 804 SERIES # 5801

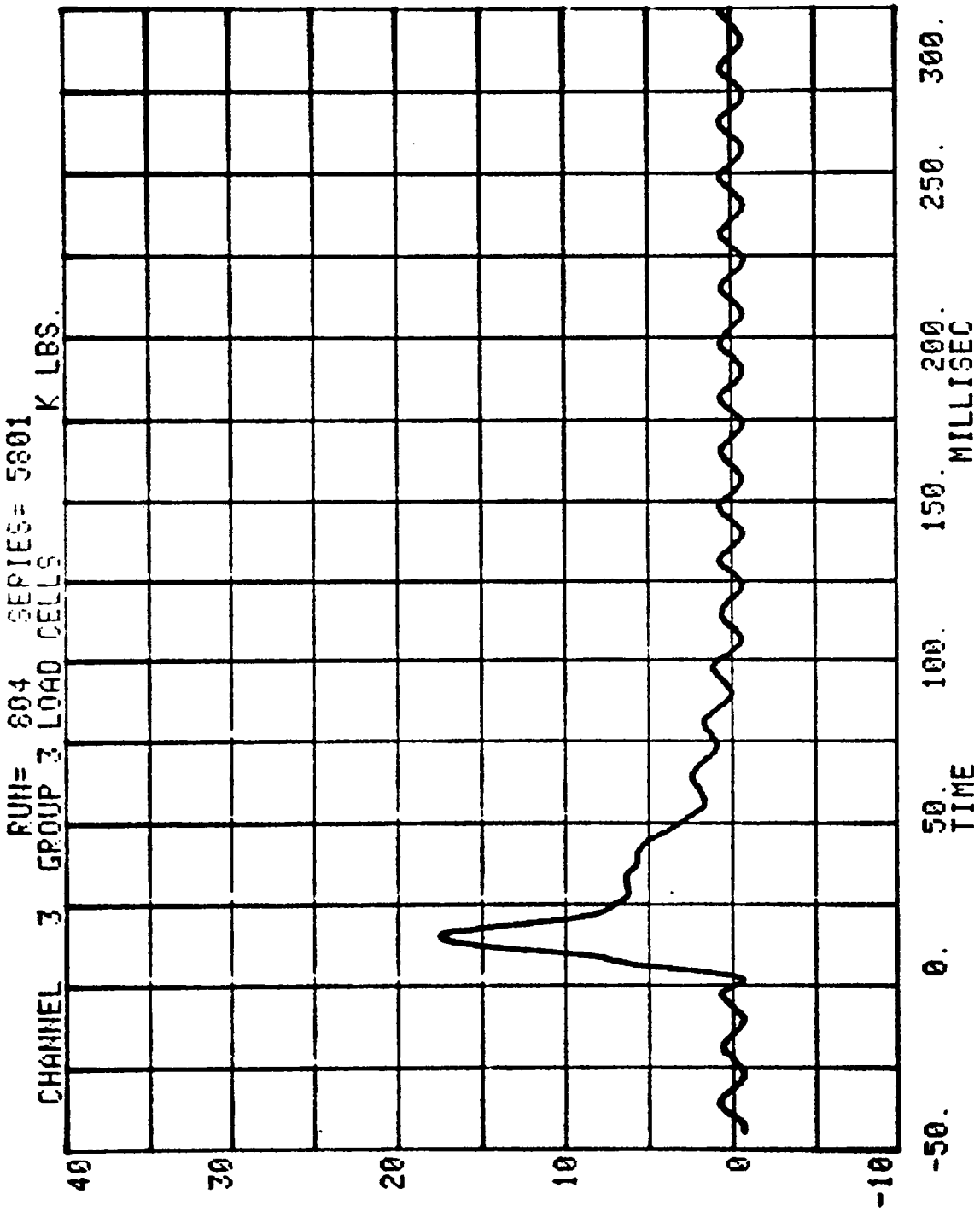
CHAN	TITLE	MINIMUM/MAXIMUM	AT TIME
1	GROUP 1 LOAD CELLS	-.927 K LBS.	0.00 MS.
		50.524 K LBS.	15.75 MS.
2	GROUP 2 LOAD CELLS	-.934 K LBS.	240.82 MS.
		38.358 K LBS.	3.90 MS.
3	GROUP 3 LOAD CELLS	-.730 K LBS.	223.80 MS.
		17.499 K LBS.	15.22 MS.
4	GROUP 4 LOAD CELLS	-1.040 K LBS.	248.92 MS.
		14.499 K LBS.	15.90 MS.
5	GROUP 5 LOAD CELLS	-1.358 K LBS.	0.00 MS.
		16.607 K LBS.	7.80 MS.
6	GROUP 6 LOAD CELLS	-.893 K LBS.	282.00 MS.
		11.279 K LBS.	37.72 MS.
7	TOTAL LOAD CELL SUM	-1.232 K LBS.	297.97 MS.
		137.471 K LBS.	15.67 MS.


CHANNEL 1 GROUP 1 RUN= 804 LOAD CELLS SERIES= 5801
K LBS.
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

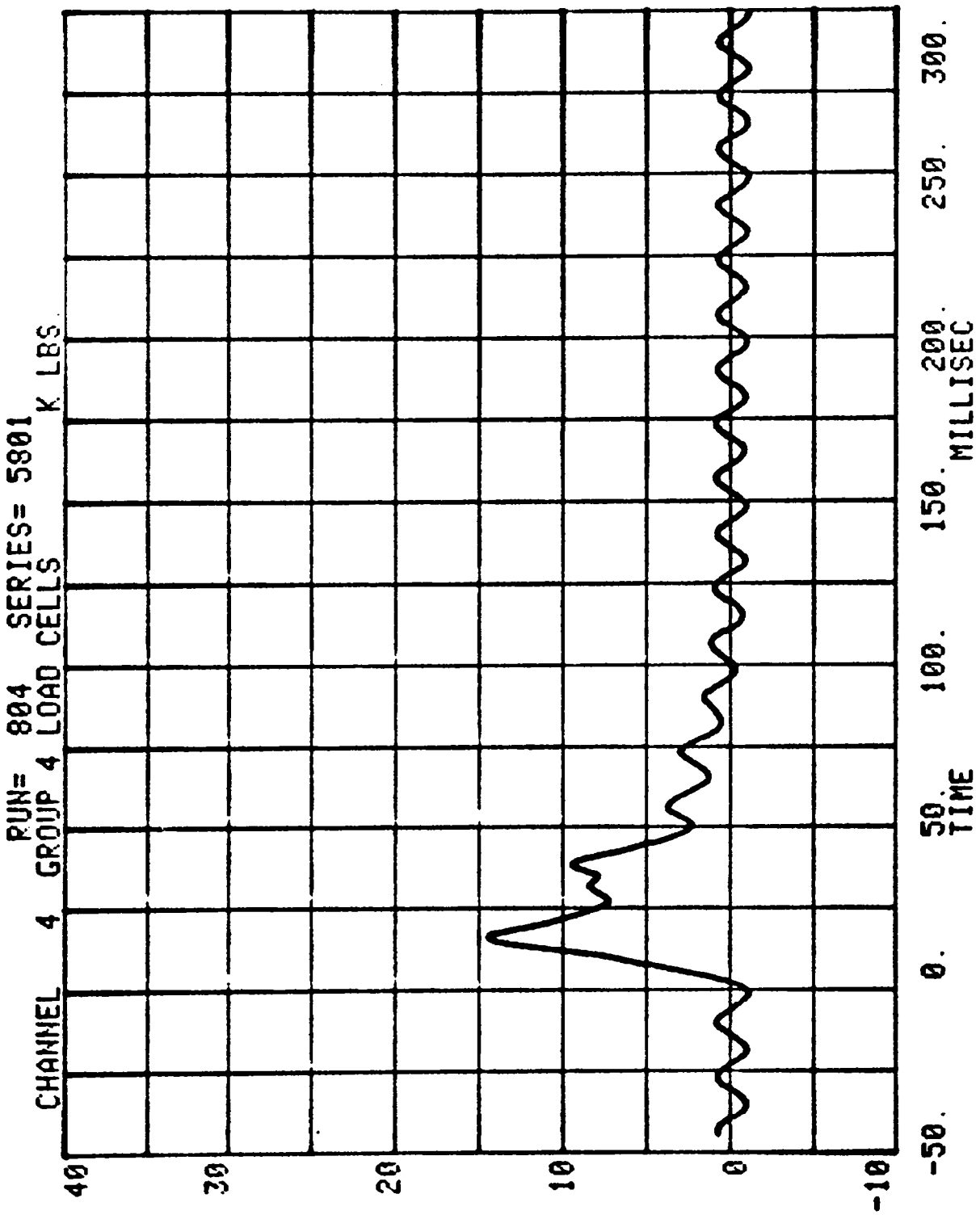
7626-2


RUN= 804 SERIES= 5801
GROUP 2 LOAD CELLS
CHANNEL 2
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

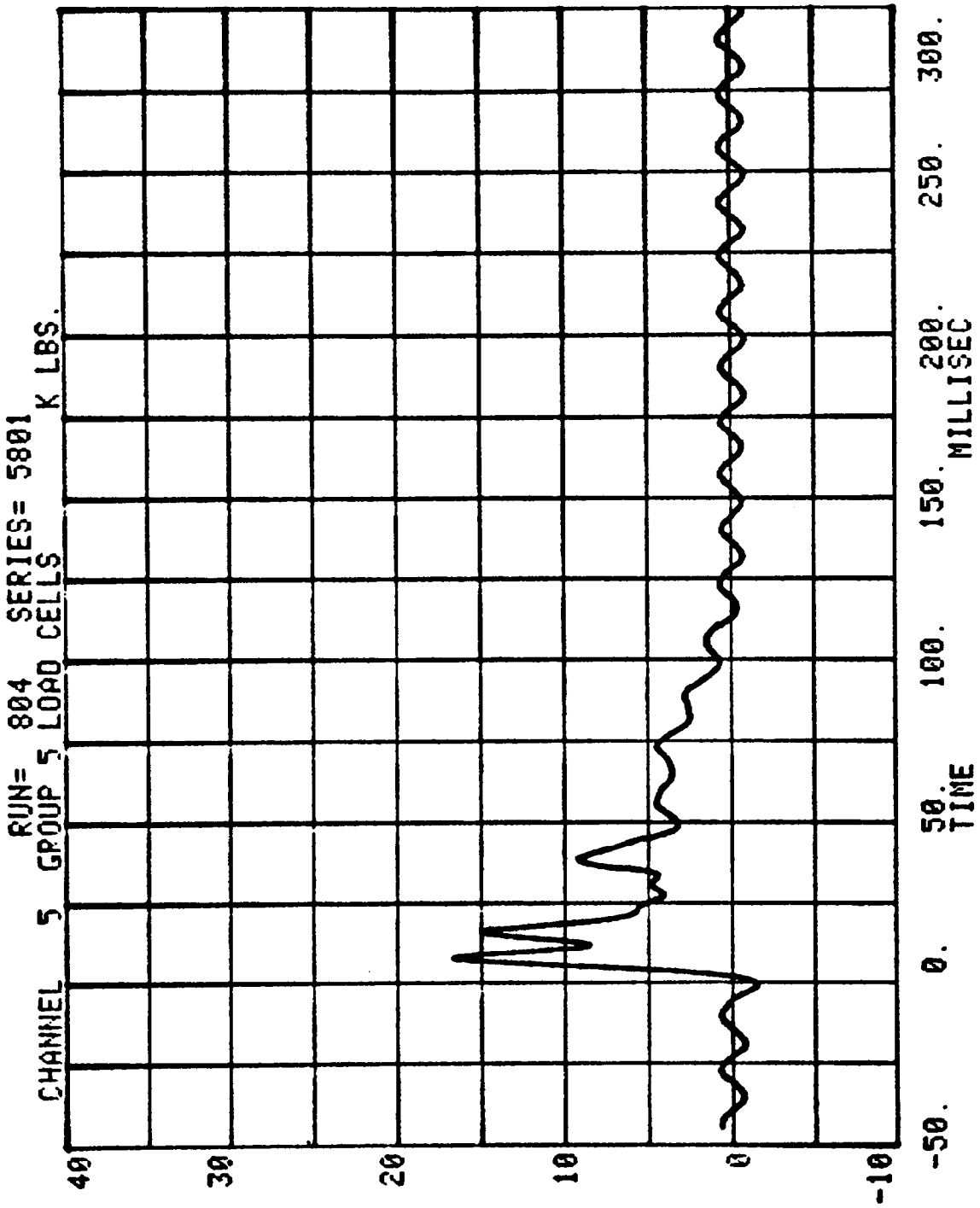
7626-2


CHANNEL 3 GROUP 3 LOAD CELLS
RUN= 804 SERIES= 5801
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

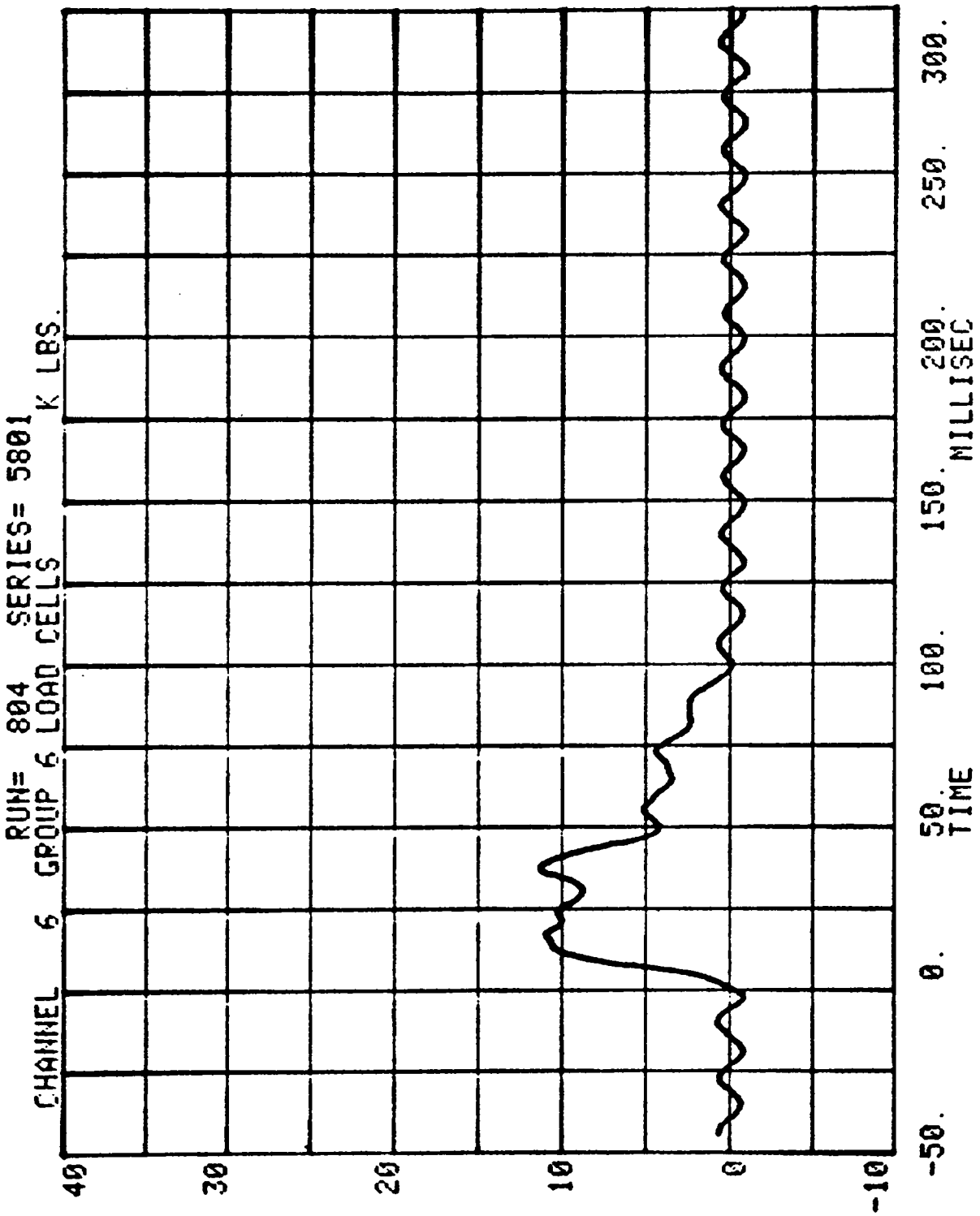
7626-2

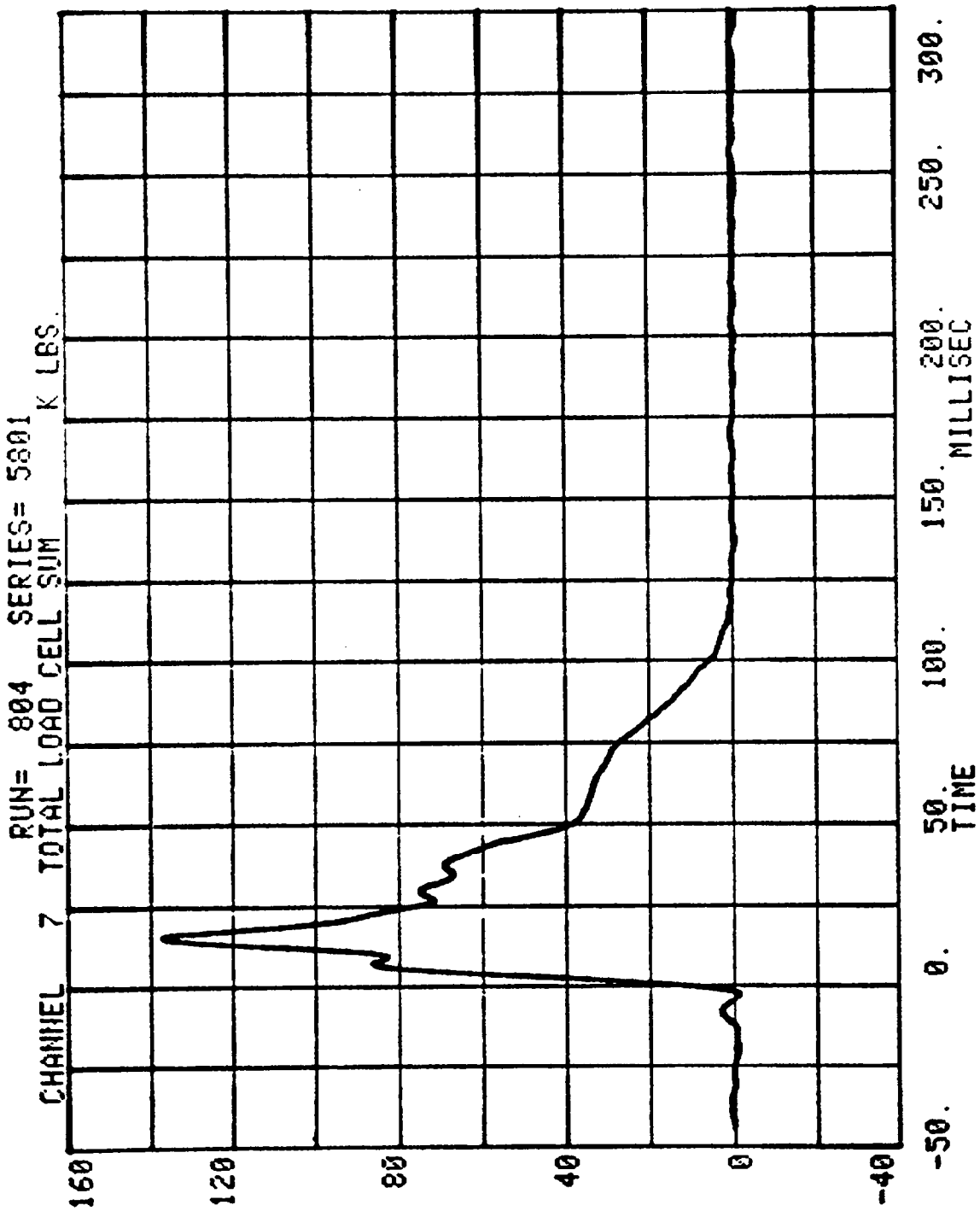

CHANNEL 4 GROUP 4 LOAD CELLS
RUN= 804 SERIES= 5801
K LBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 5 GROUP 5 RUN= 804 LOAD CELLS SERIES= 5801
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 6 GROUP 6 LOAD CELLS
RUN= 804 SERIES= 5801
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 7 RUN= 804 SERIES= 5801
TOTAL LOAD CELL SUM
K LBS.
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

TEST NO. MJ5801

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NEW CAR ASSESSMENT BARRIER TEST - 1988

RUN= 804

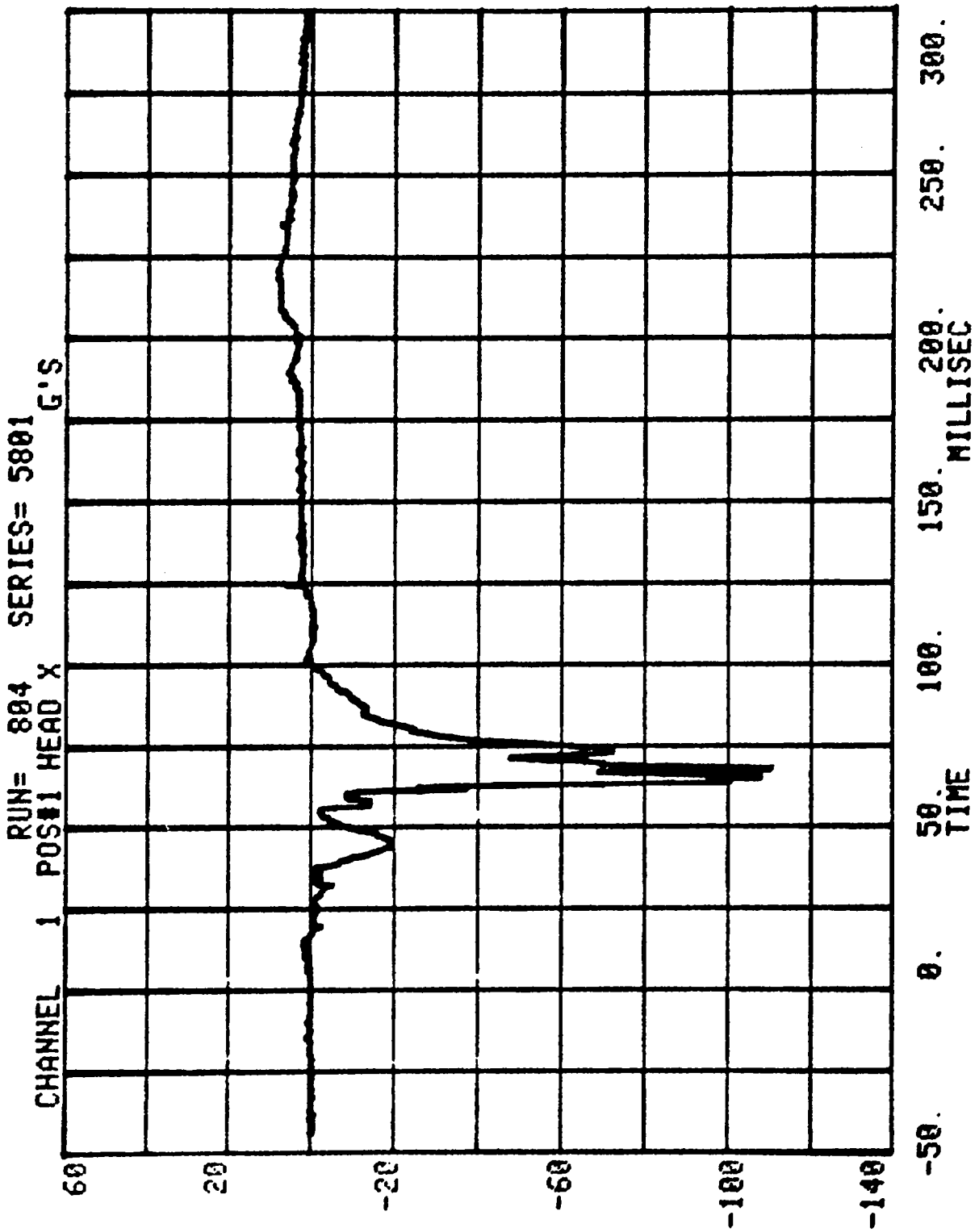
POS#1 HEAD R

HIC=1320.1 FROM T1= .06292 TO T2= .07612

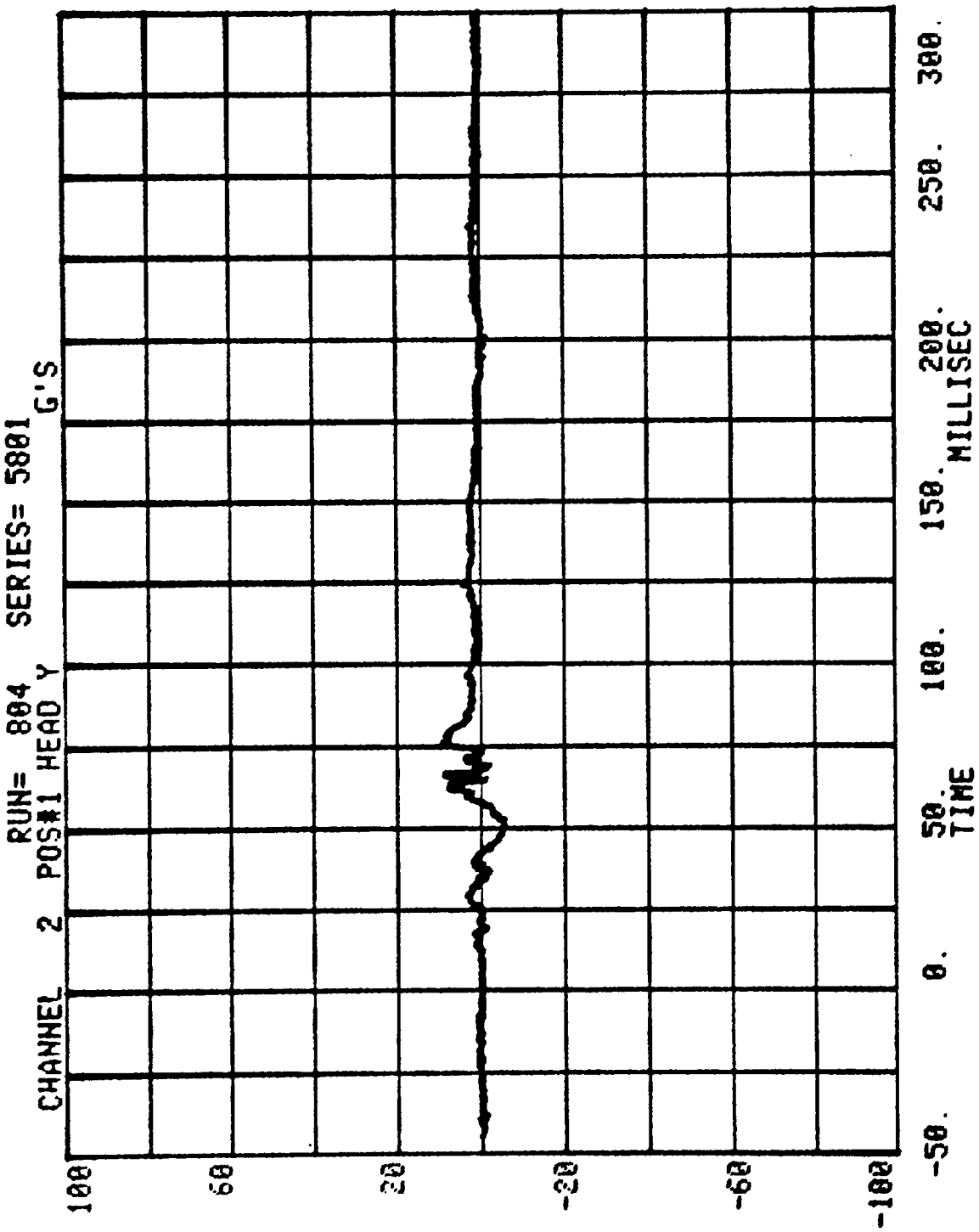
AVERAGE ACCELERATION BETWEEN T1 AND T2= 100.0G'S

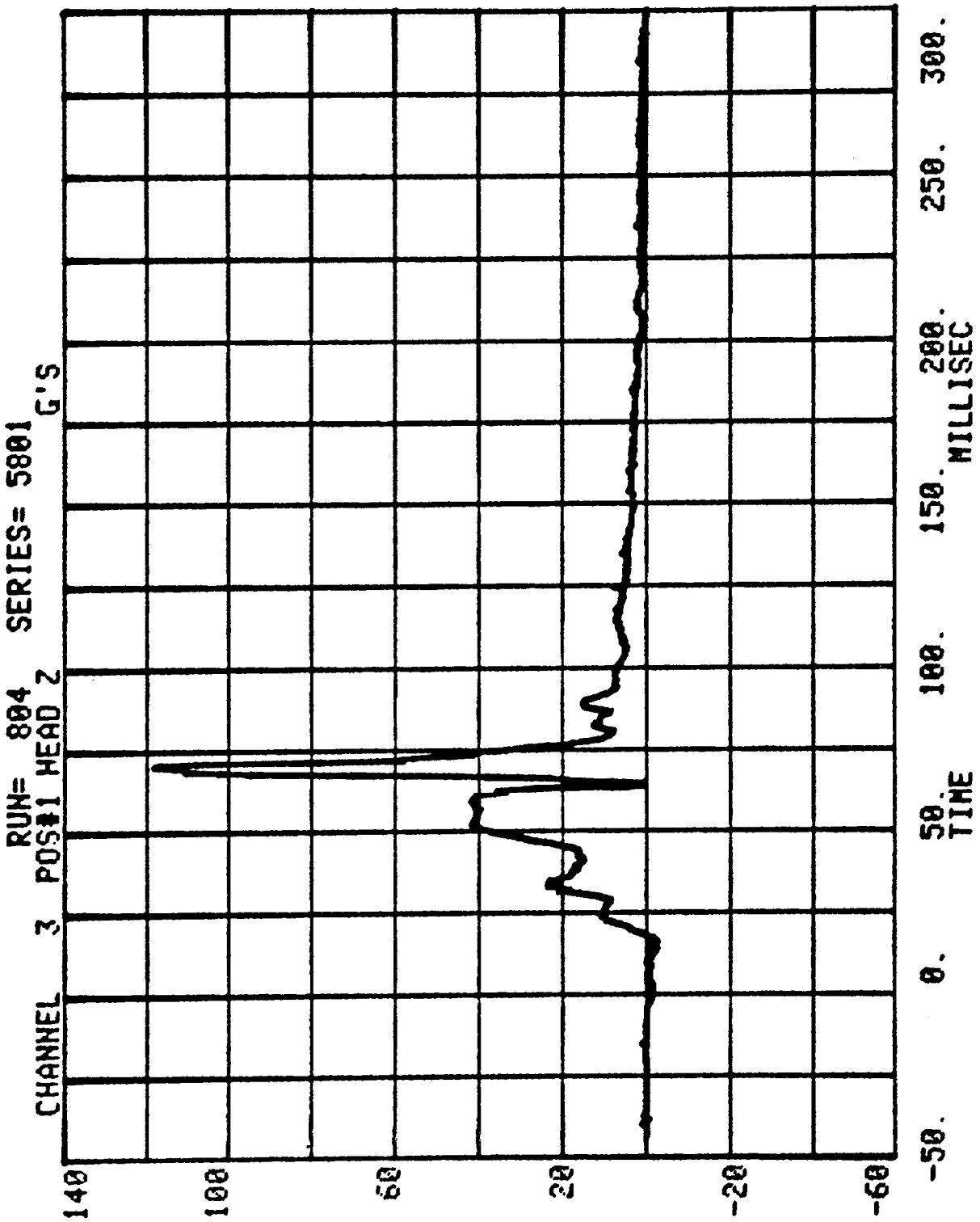
EVENT TIME= 300.0 MSEC

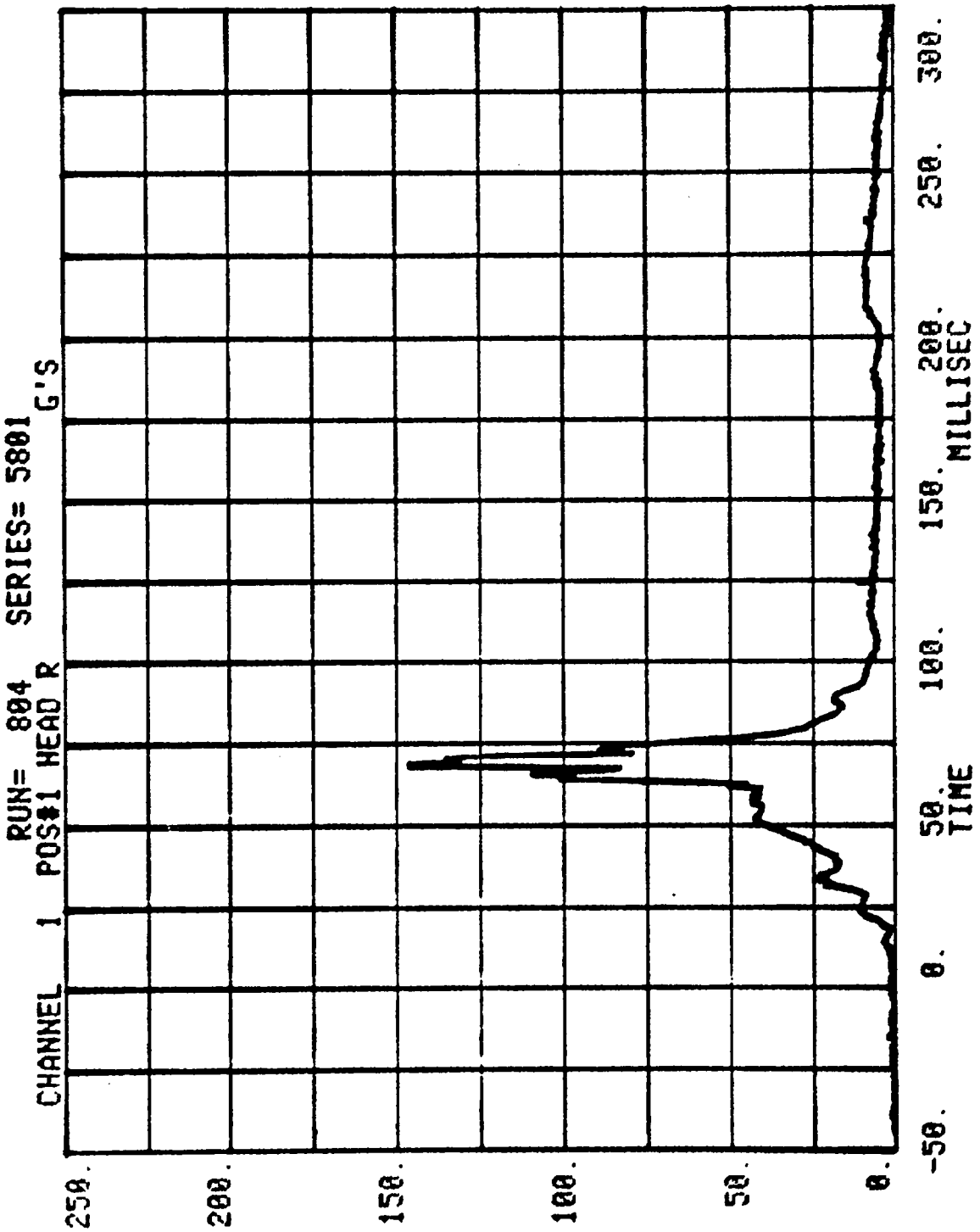
SEVERITY INDEX=1751.8

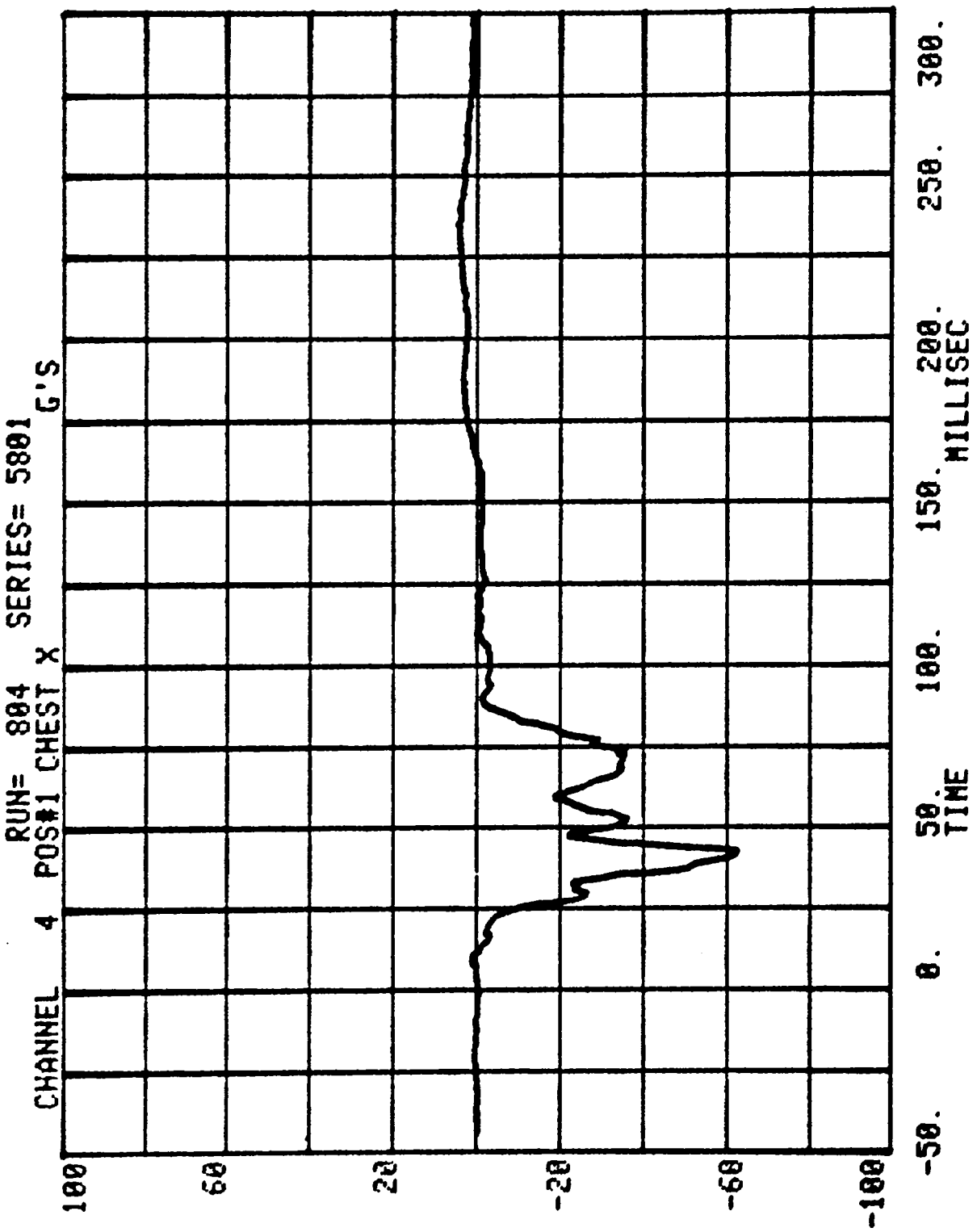

CHANNEL 1 POS#1 HEAD X
RUN= 804 SERIES= 5801
G'S
60
20
-20
-60
-100
-140
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2

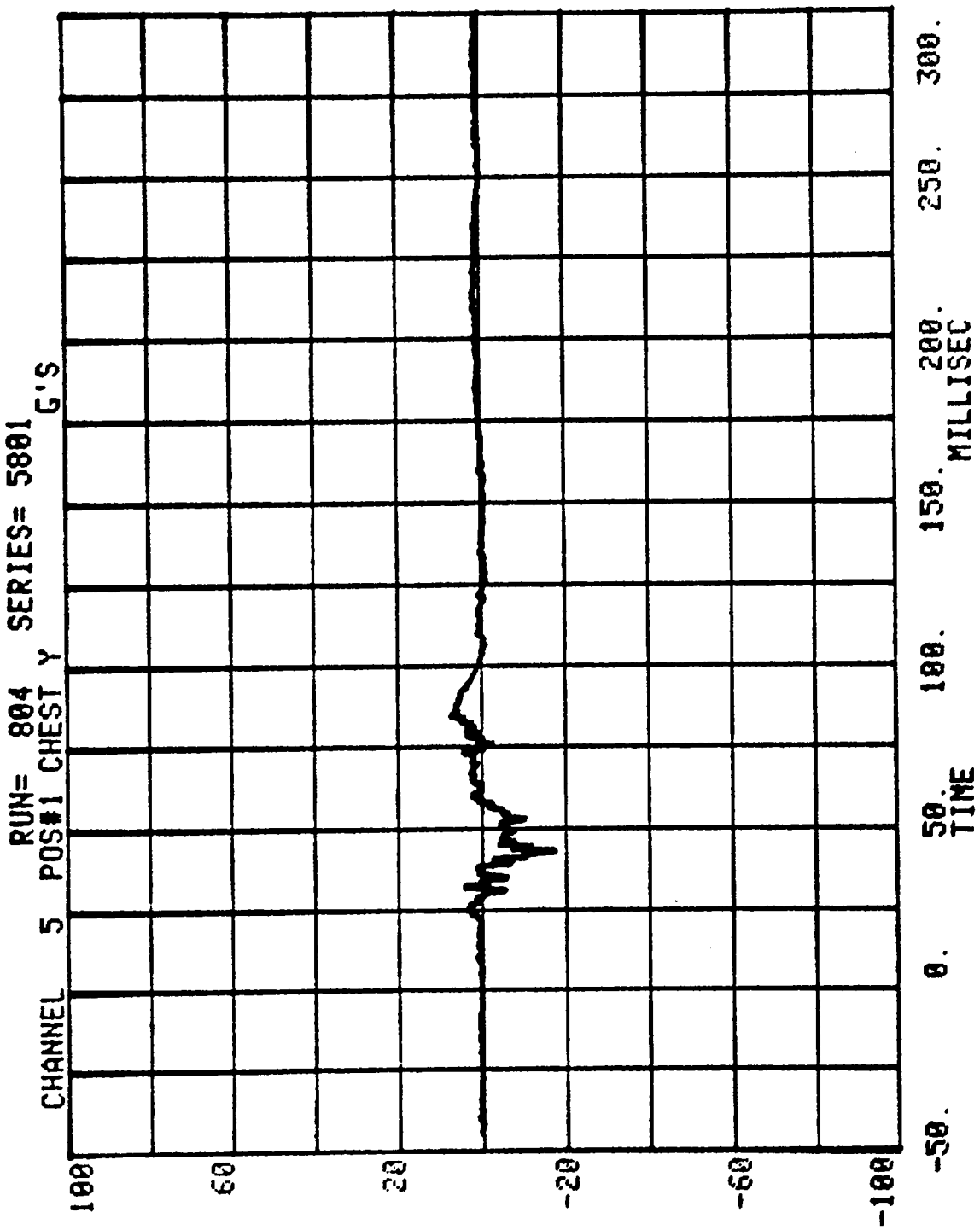

CHANNEL 2 RUN= 804 SERIES= 5801
POS#1 HEAD Y
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 3 POS#1 HEAD Z
RUN= 804 SERIES= 5801
G'S
140
100
60
20
-20
-60
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

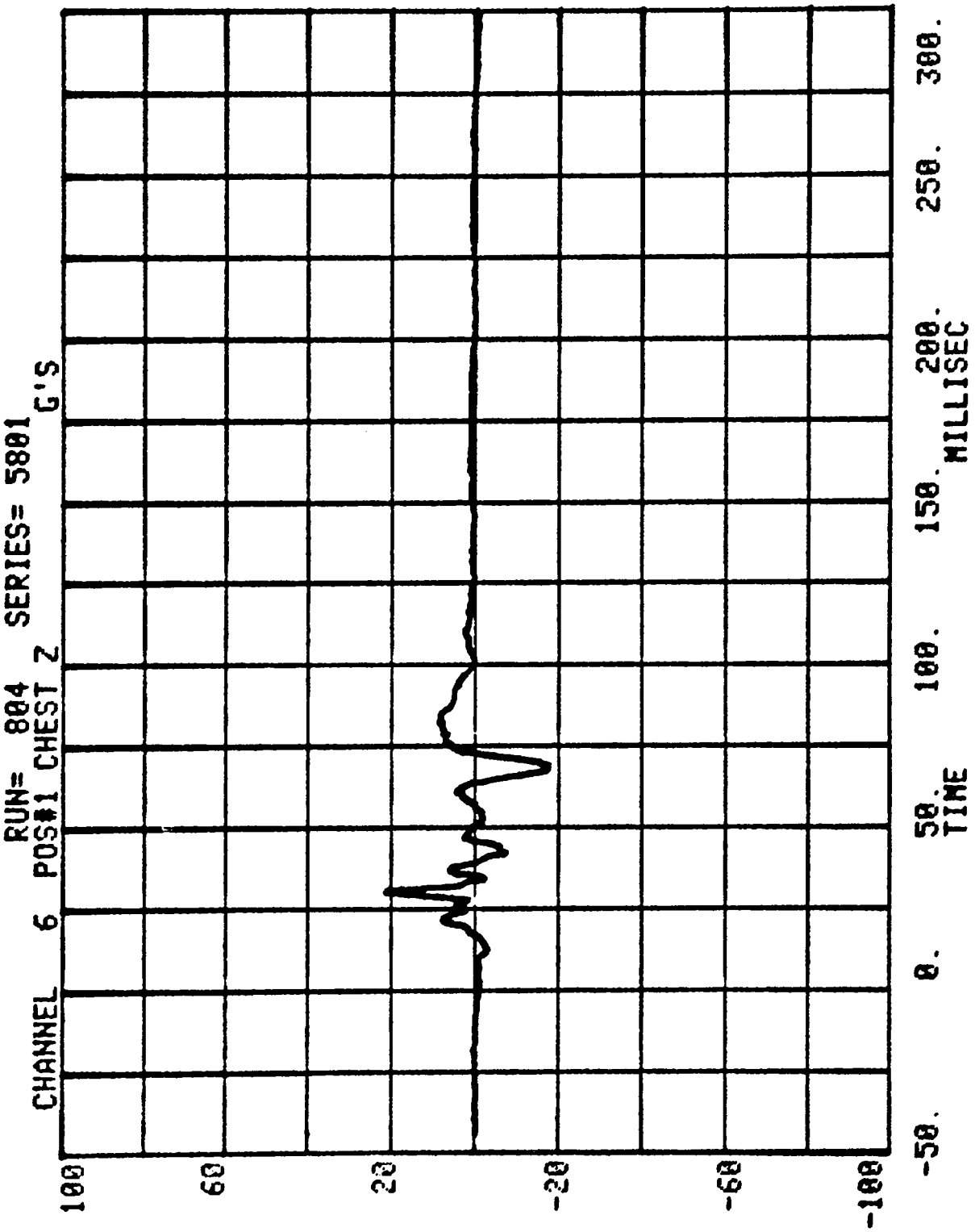

CHANNEL 1 POS#1 HEAD R
RUN= 804 SERIES= 5801
G'S
250.
200.
150.
100.
50.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 4 POS#1 CHEST X
RUN= 804 SERIES= 5801
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

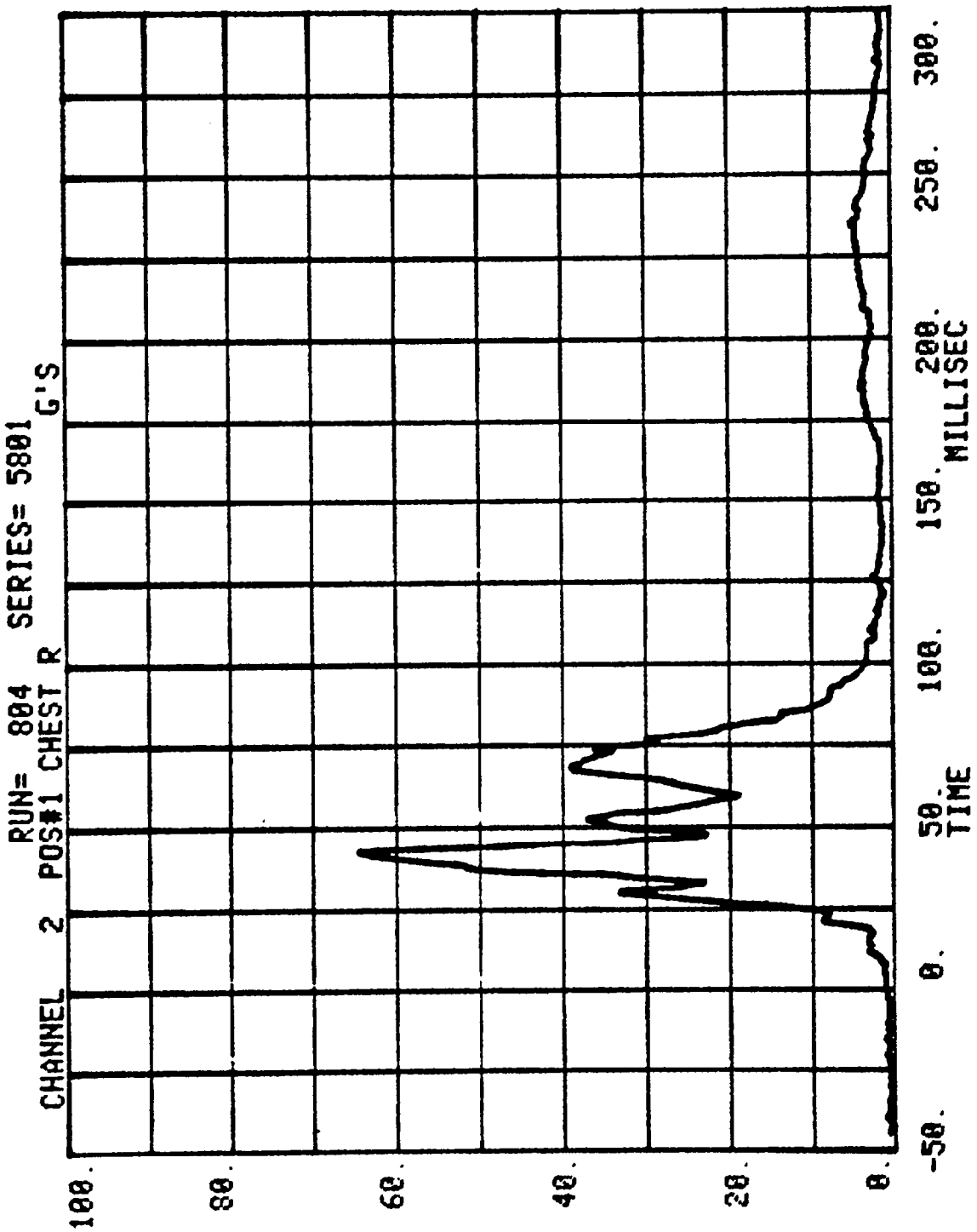
7626-2

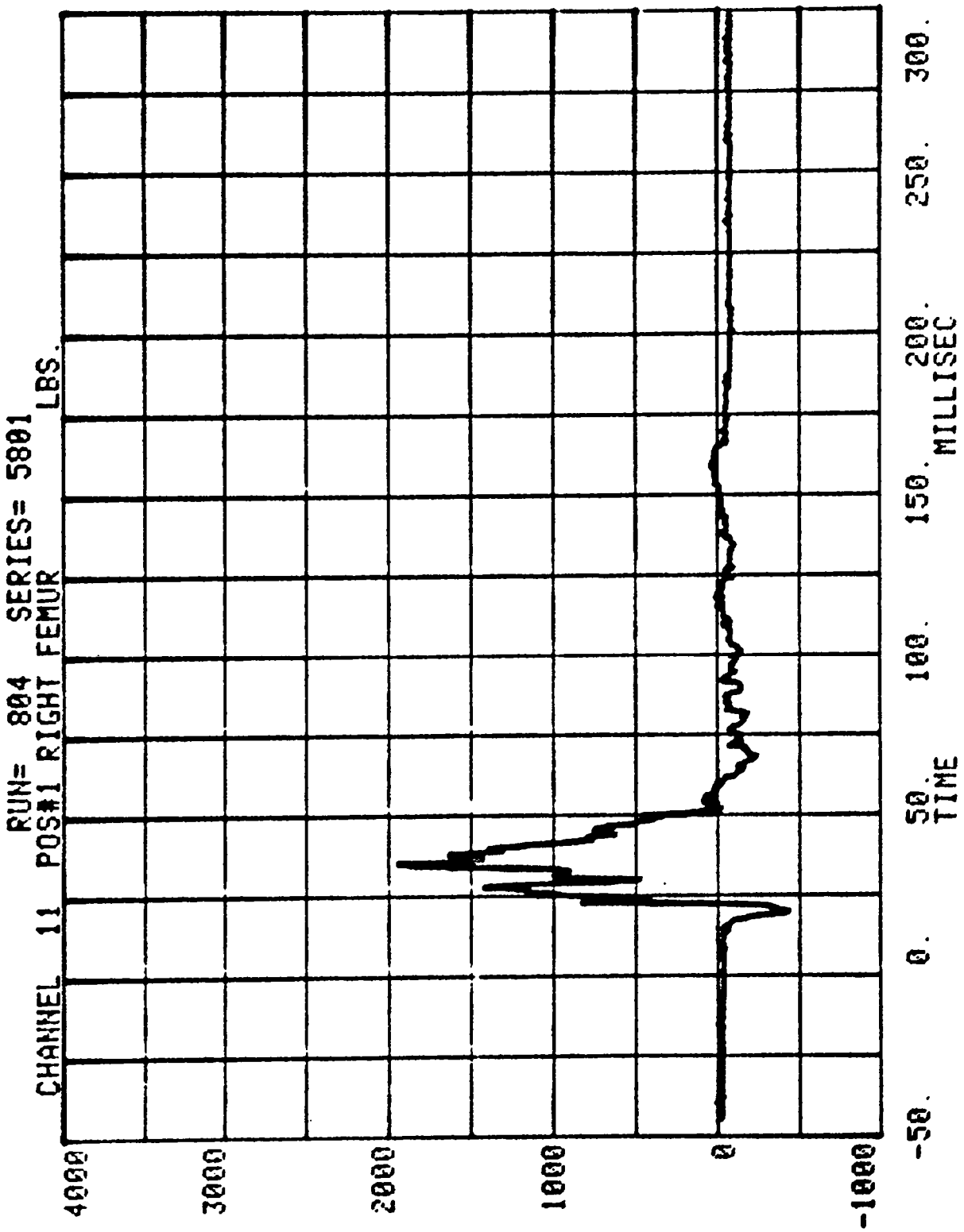

CHANNEL 5 POS#1 CHEST Y
RUN= 804 SERIES= 5801
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

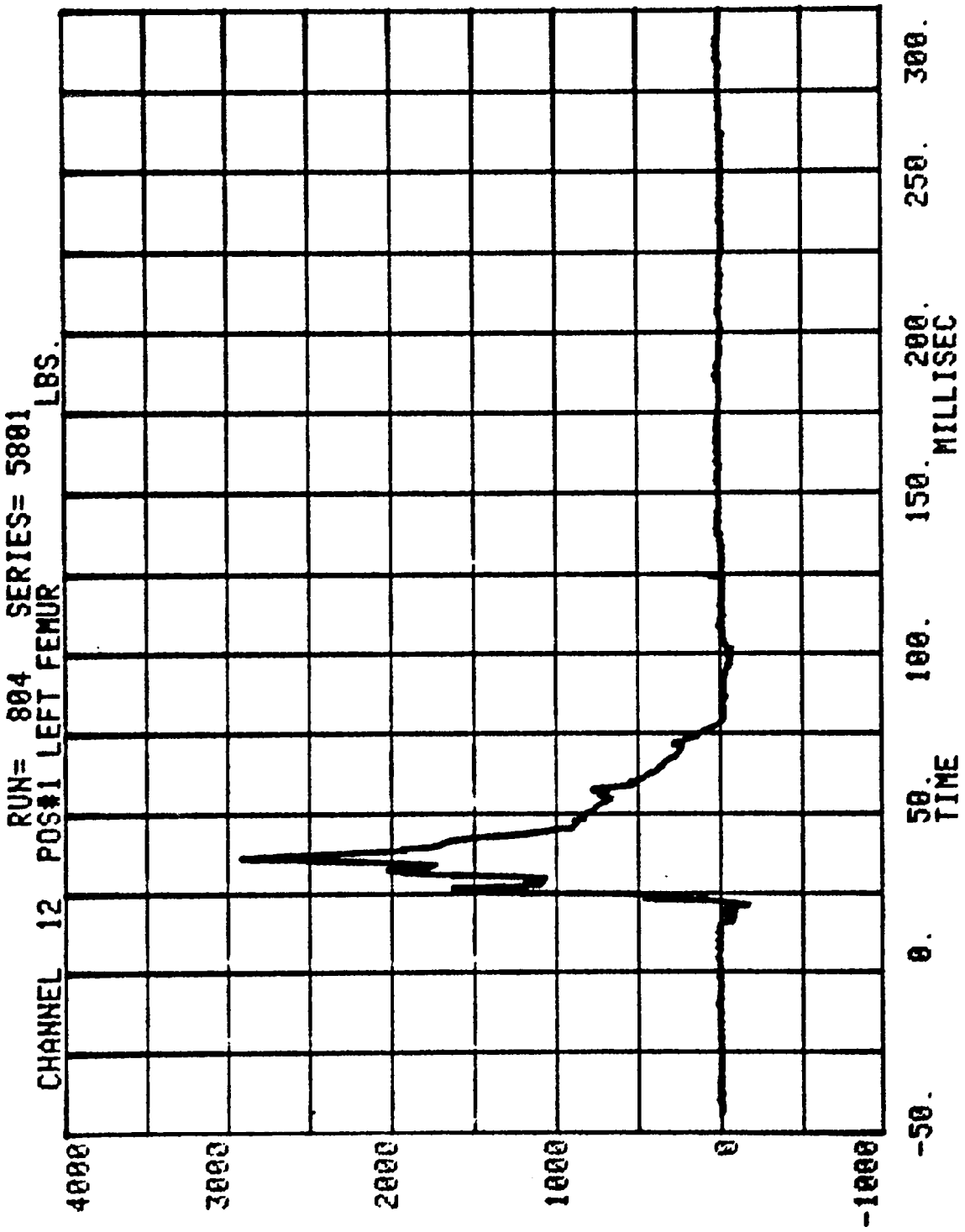
7626-2


CHANNEL 6 POS#1 CHEST Z
RUN= 804 SERIES= 5801
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

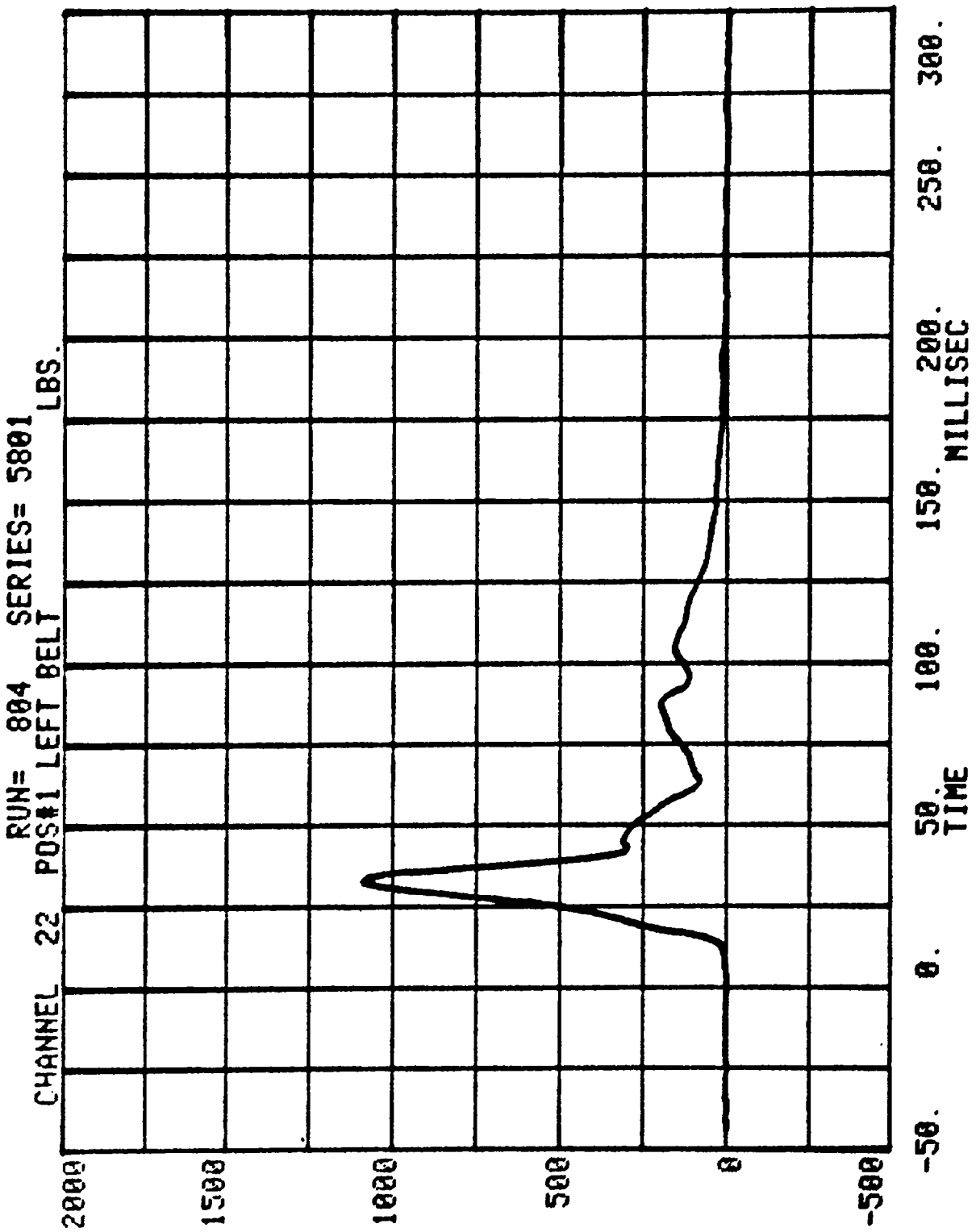
7626-2

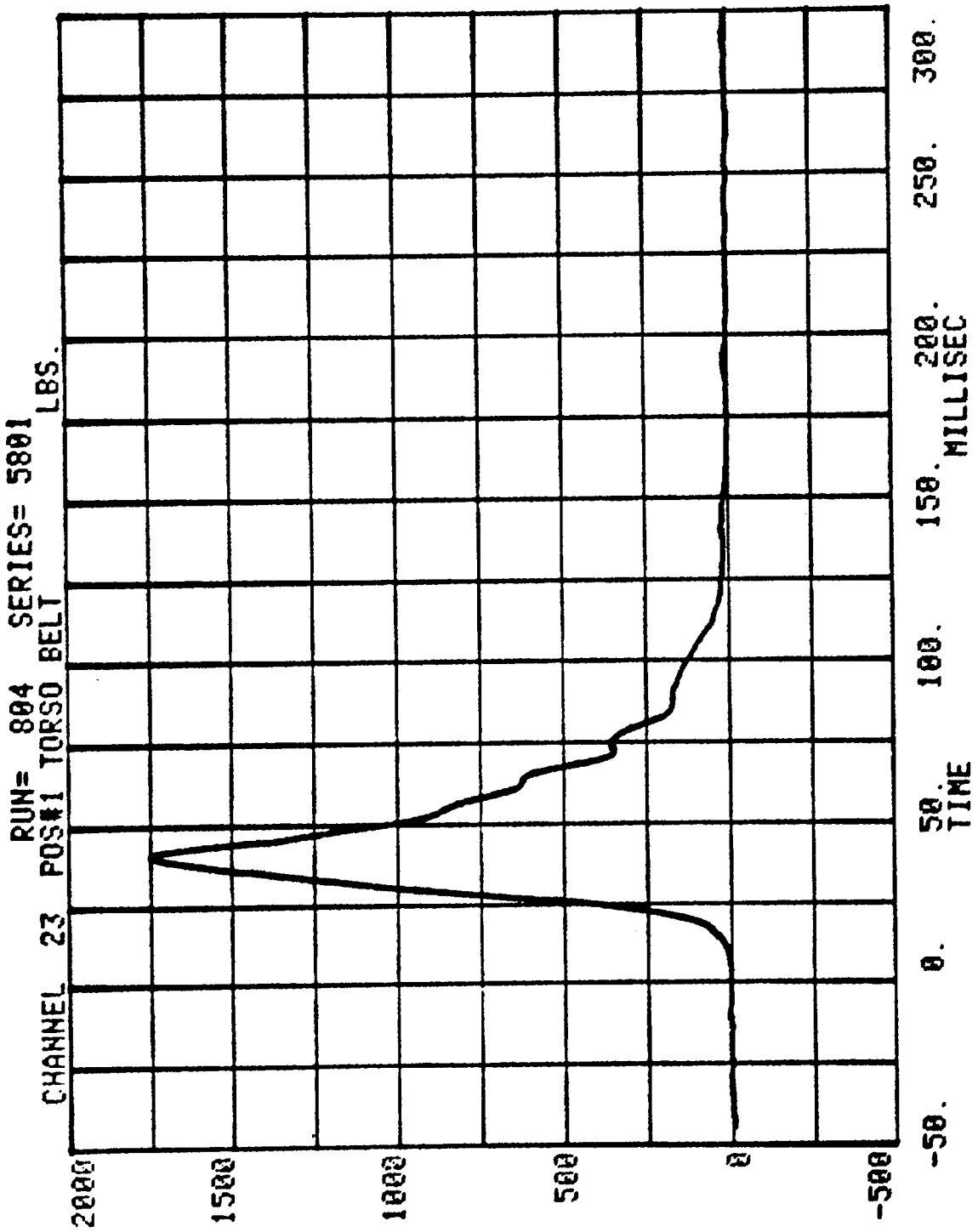

CHANNEL 2 POS#1 CHEST R
RUN= 804 SERIES= 5801
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

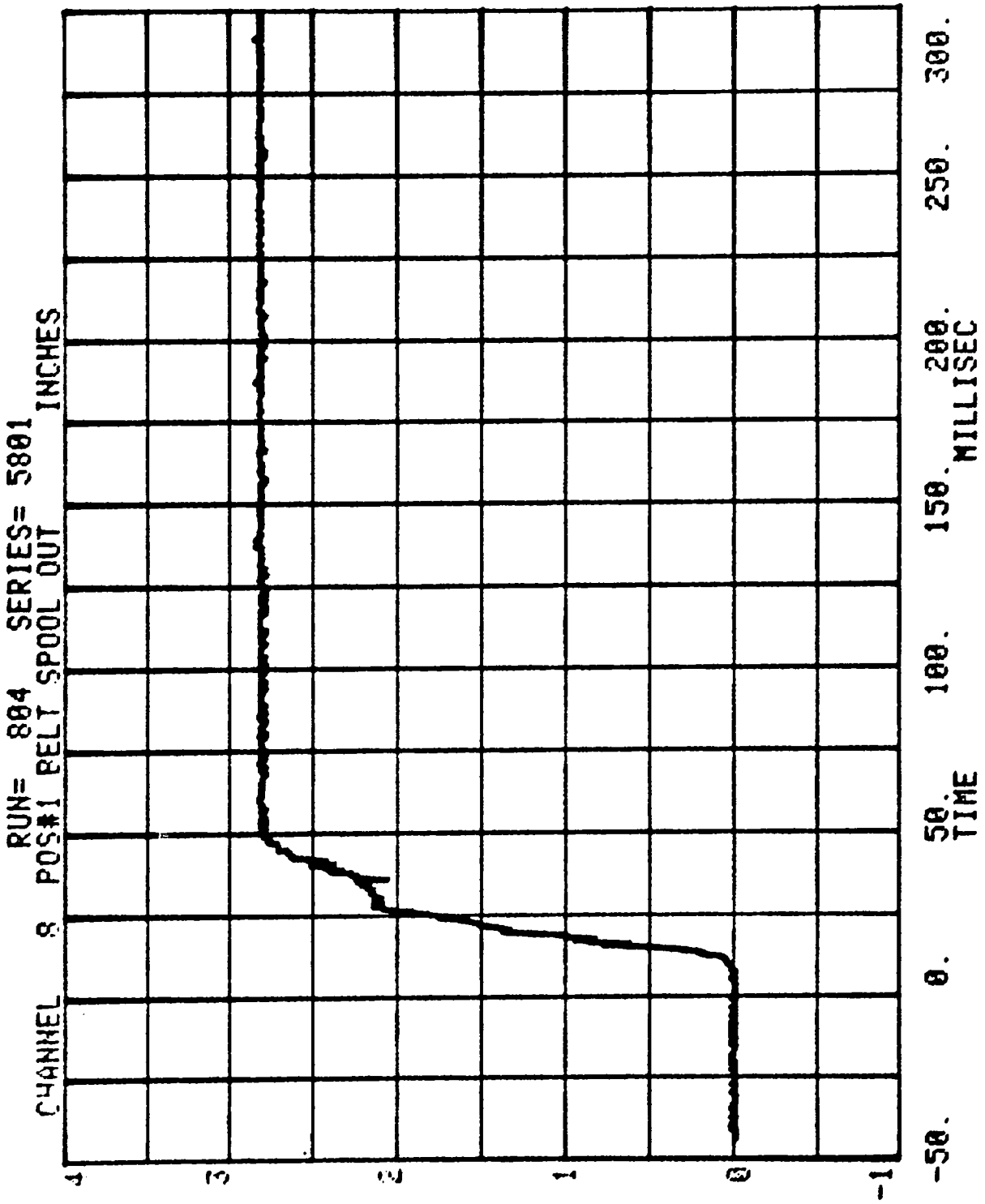

CHANNEL 11 POS#1 RIGHT FEMUR
RUN= 804 SERIES= 5801
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 12 RUN= 804 SERIES= 5801
POS#1 LEFT FEMUR
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

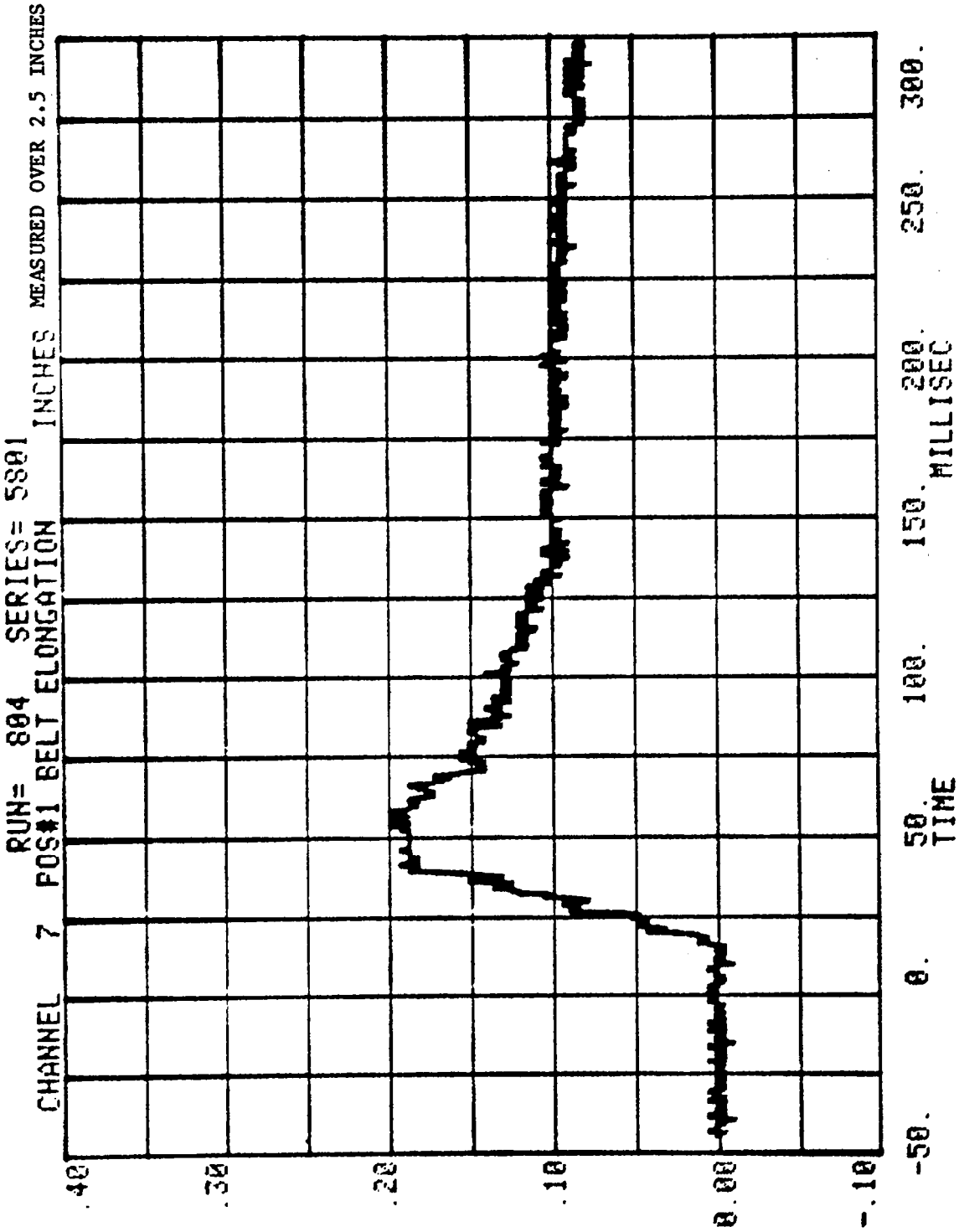
7626-2


CHANNEL 22 POS#1 LEFT BELT
RUN= 804 SERIES= 5801
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 23 RUN= 804 SERIES= 5801
POS#1 TORSO BELT
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 8 POS#1 BELT SPOOL OUT
RUN= 804 SERIES= 5801
INCHES
4
3
2
1
0
-1
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 7 RUN= 804 SERIES= 5801
POS#1 BELT ELONGATION INCHES MEASURED OVER 2.5 INCHES
.40
.30
.20
.10
0.00
-.10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NEW CAR ASSESSMENT BARRIER TEST - 1988

RUN= 804

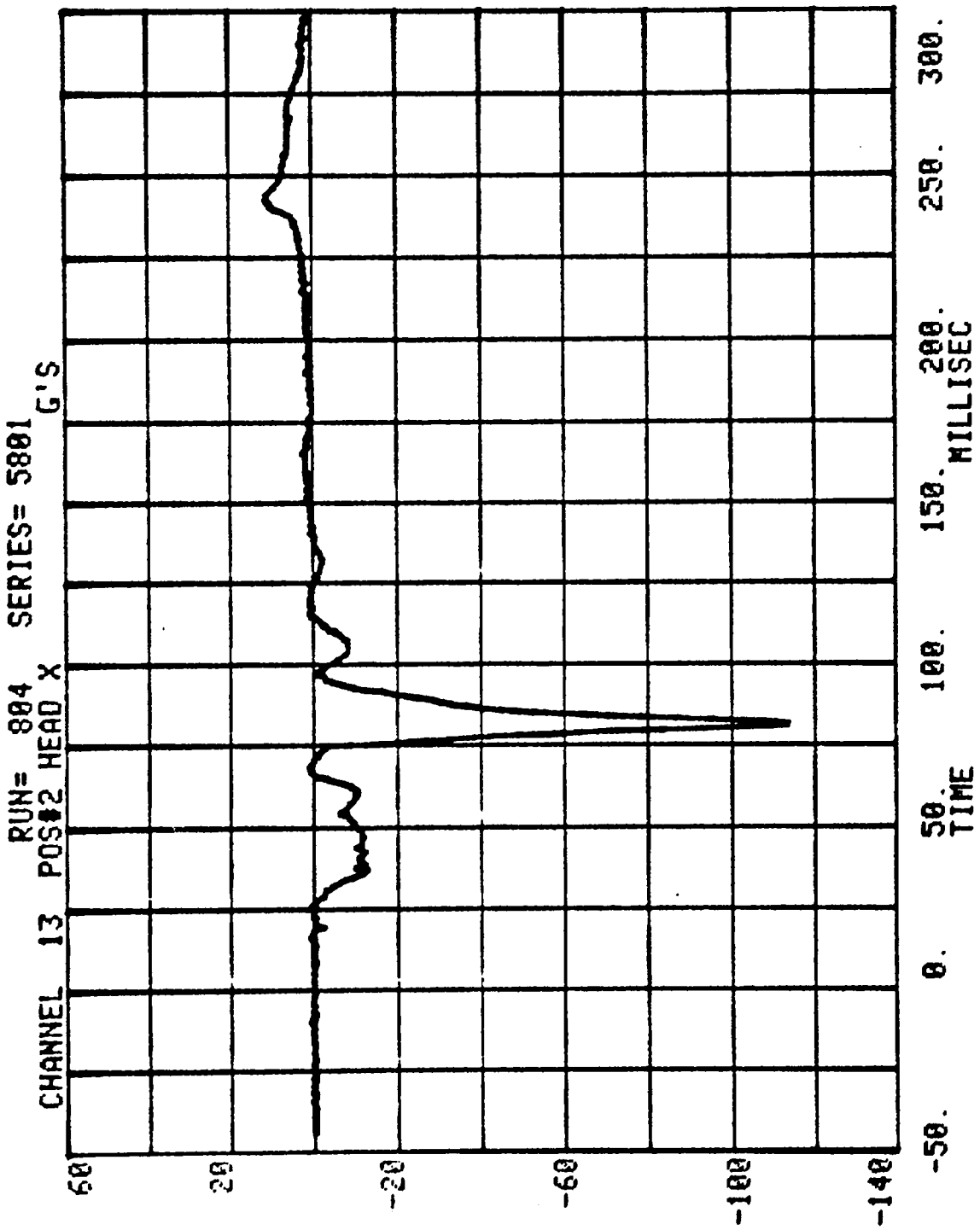
POS#2 HEAD R

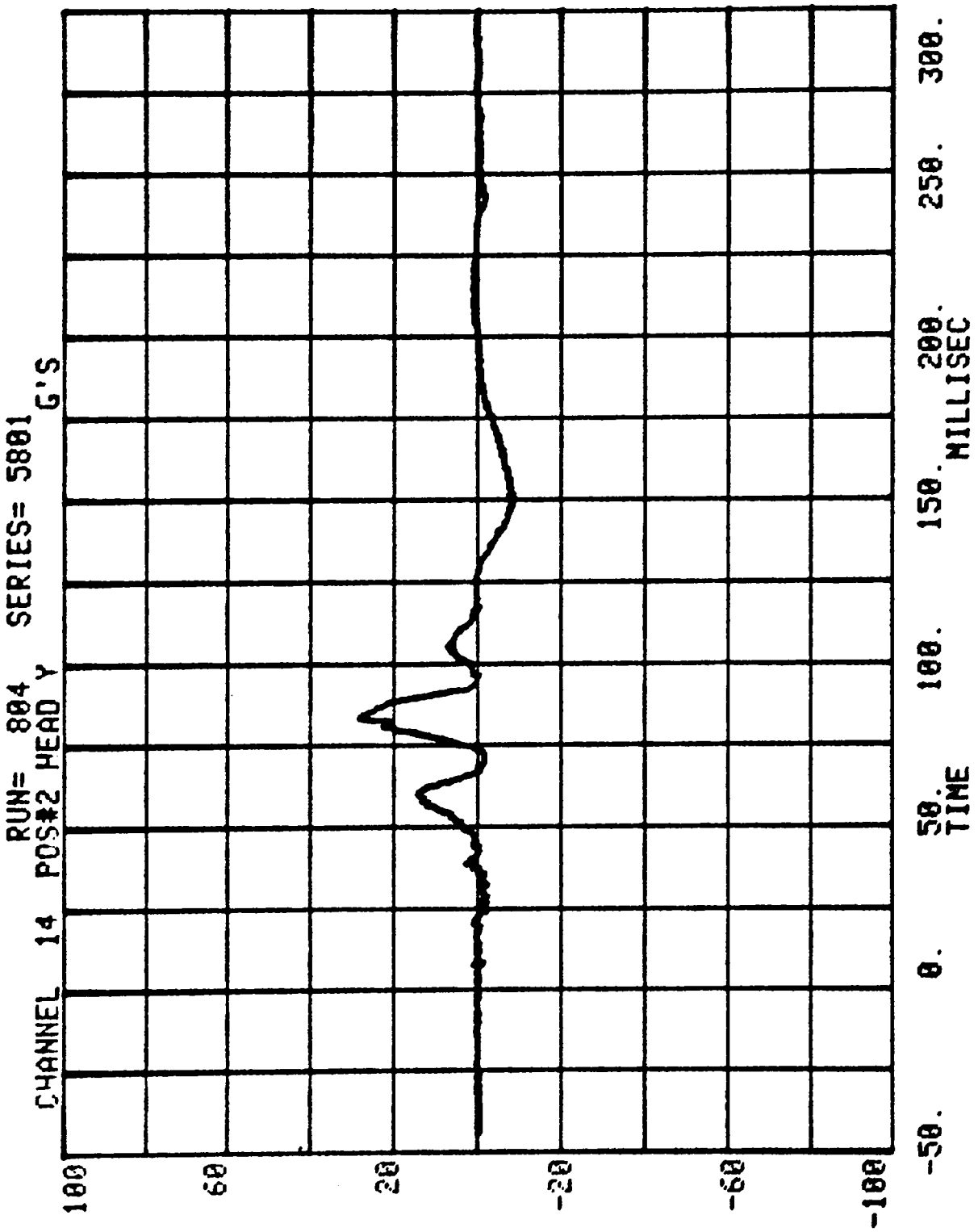
HIC= 899.1 FROM T1= .07740 TO T2= .08647

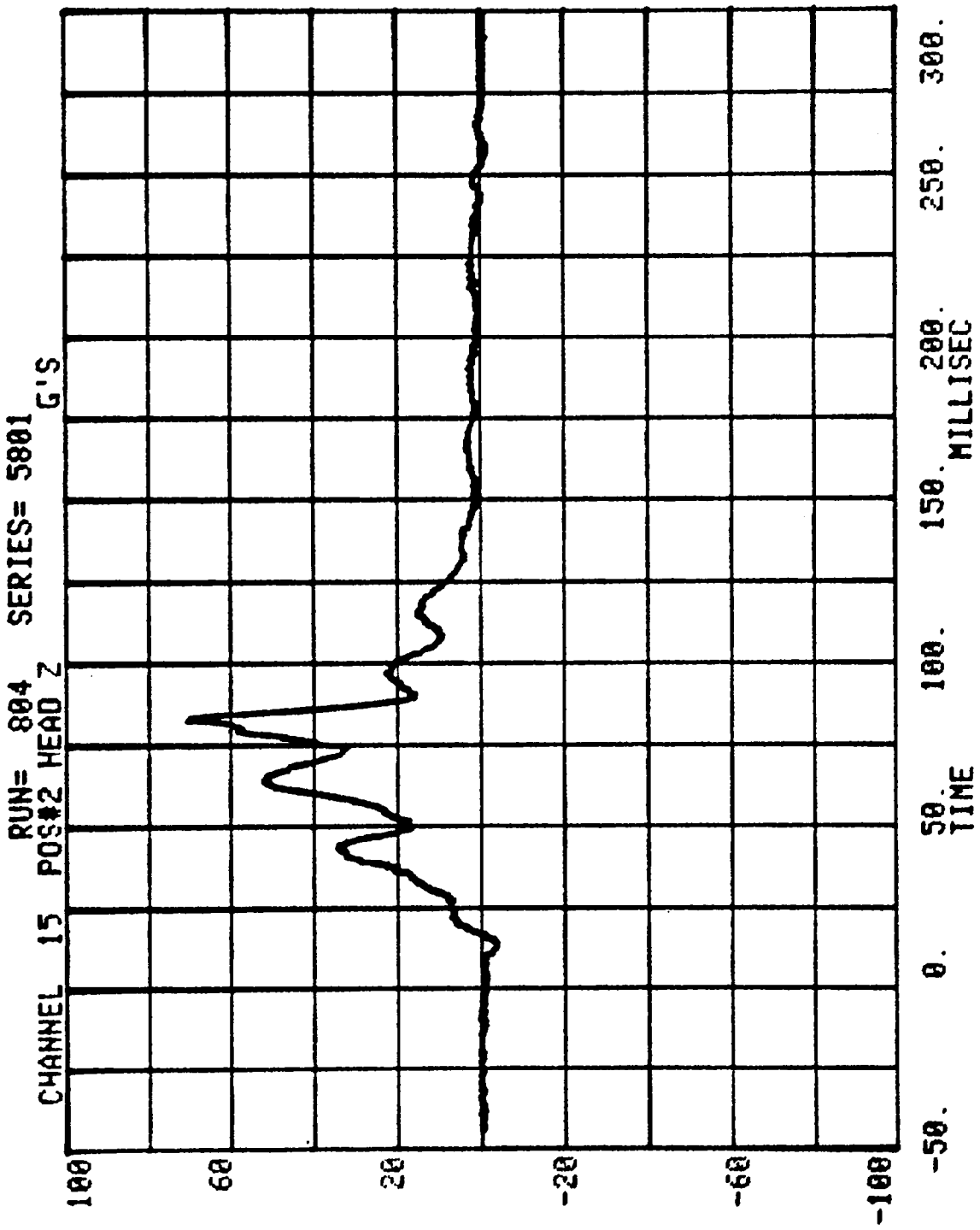
AVERAGE ACCELERATION BETWEEN T1 AND T2= 99.6G'S

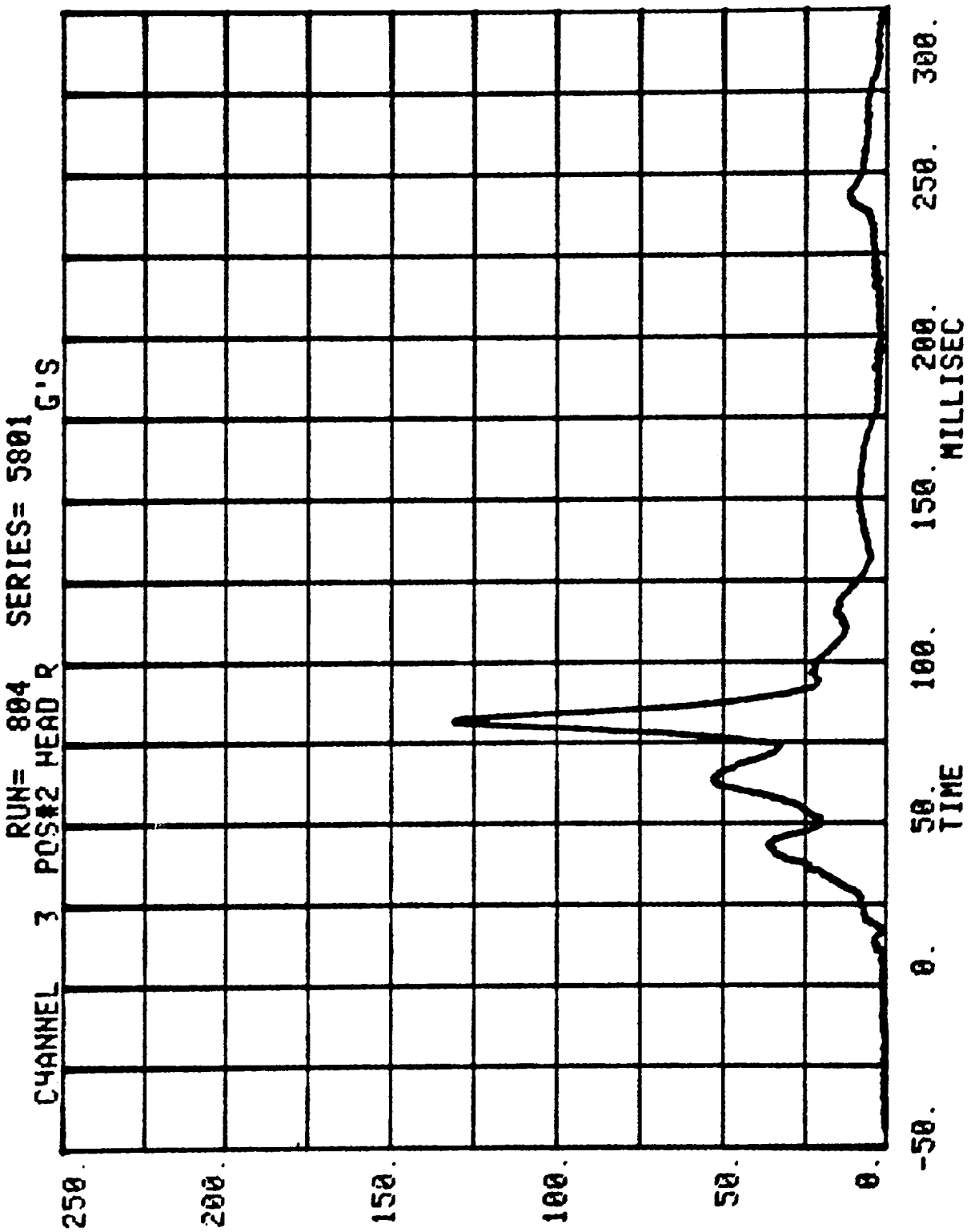
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1466.1

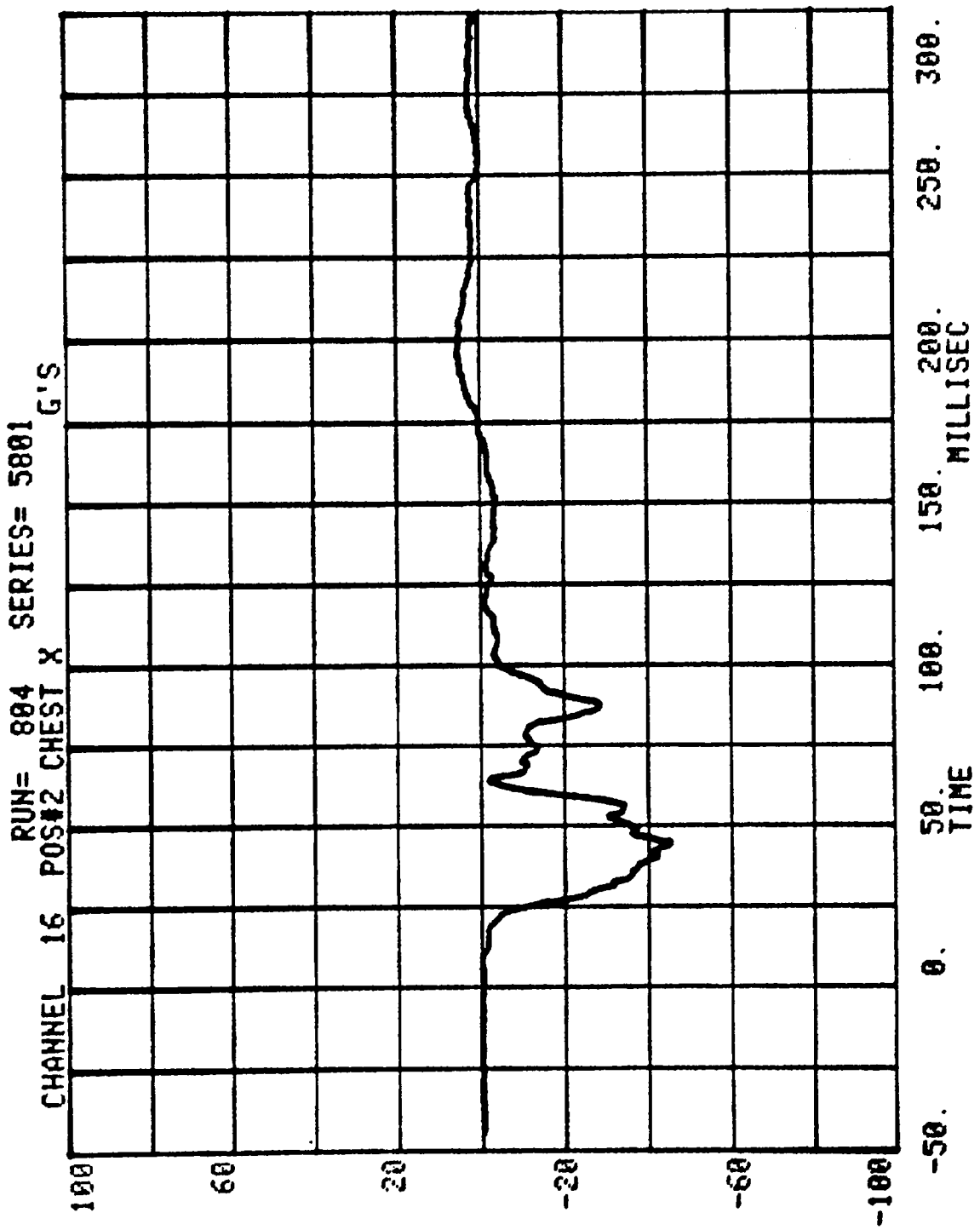

CHANNEL 13 POS#2 HEAD X
RUN= 804 SERIES= 5801
G'S
60
20
-20
-60
-100
-140
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

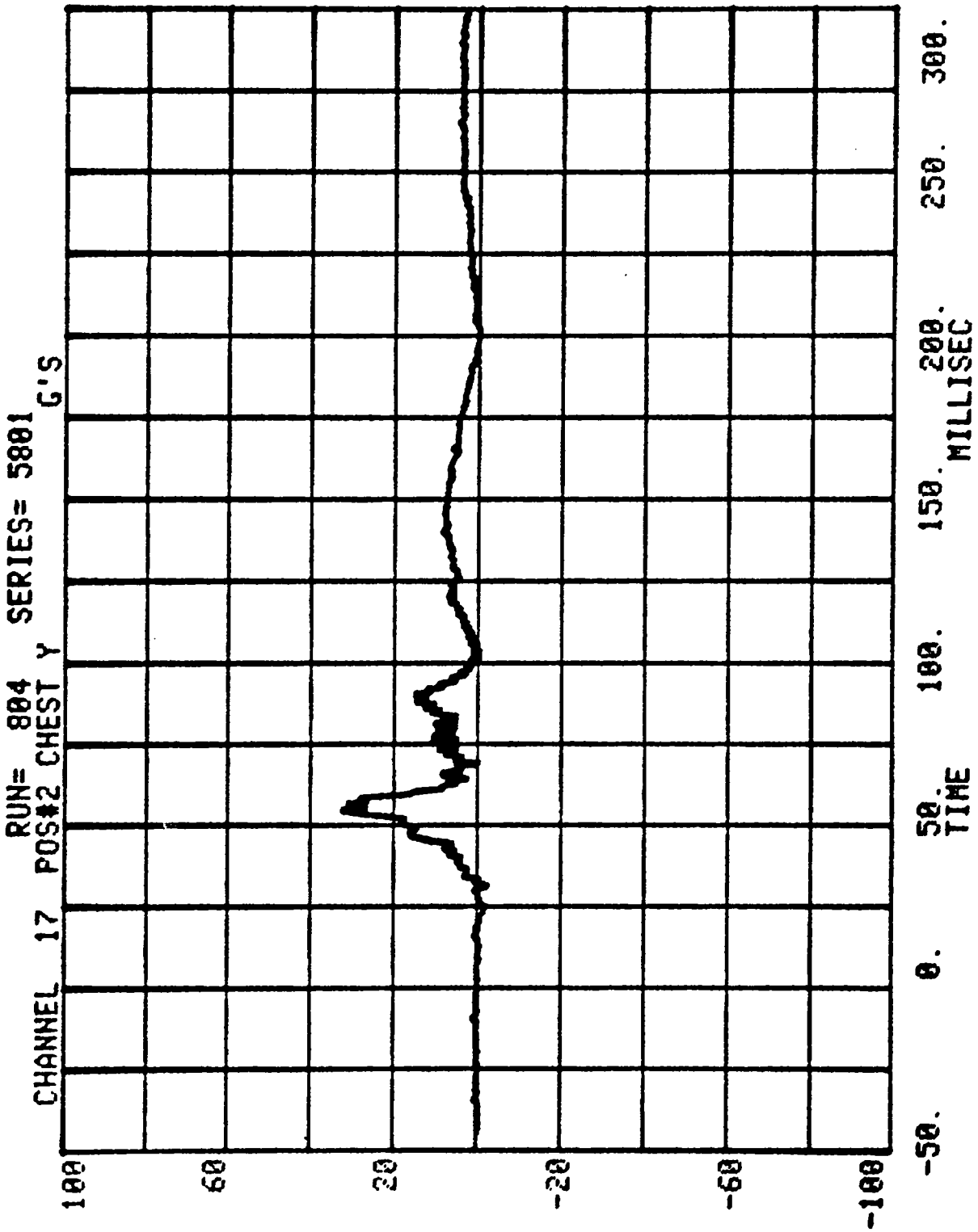

CHANNEL 14 POS#2 HEAD Y
RUN= 804 SERIES= 5801
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 15 POS#2 HEAD Z
RUN= 804 SERIES= 5801
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

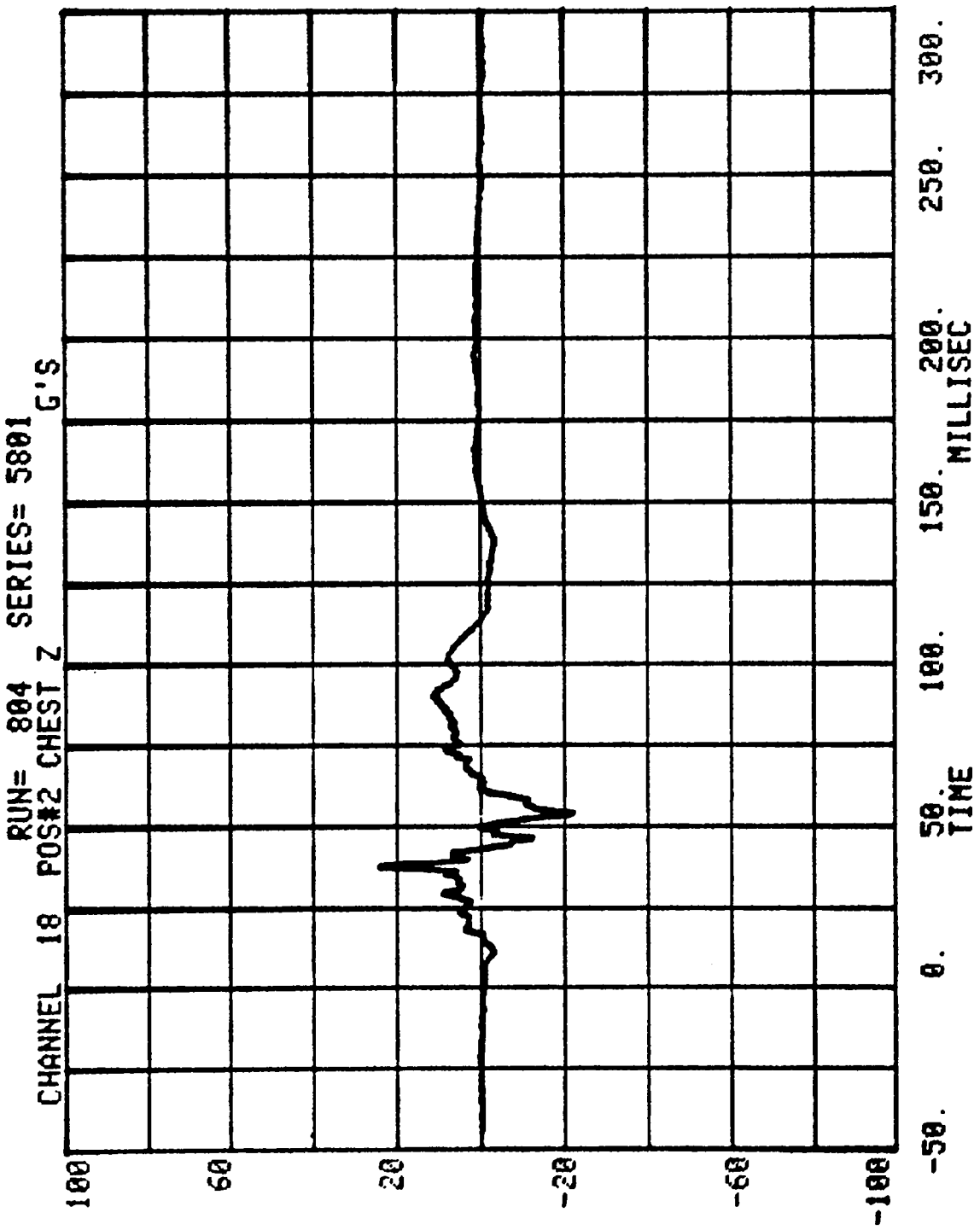

CHANNEL 3 POS#2 HEAD R
RUN= 804 SERIES= 5801
G'S
250.
200.
150.
100.
50.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

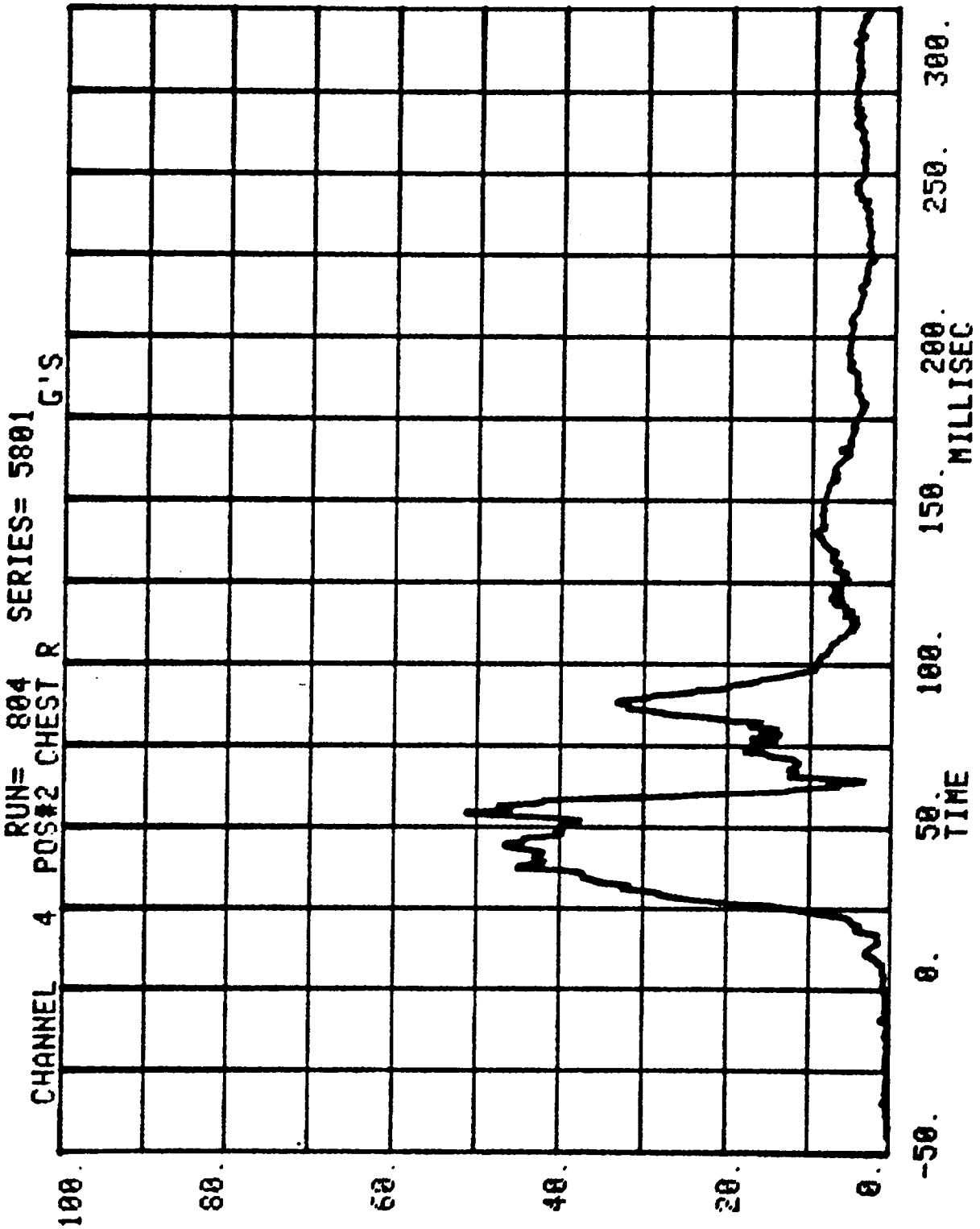
7626-2


CHANNEL 16 POS#2 CHEST X
RUN= 804 SERIES= 5801
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

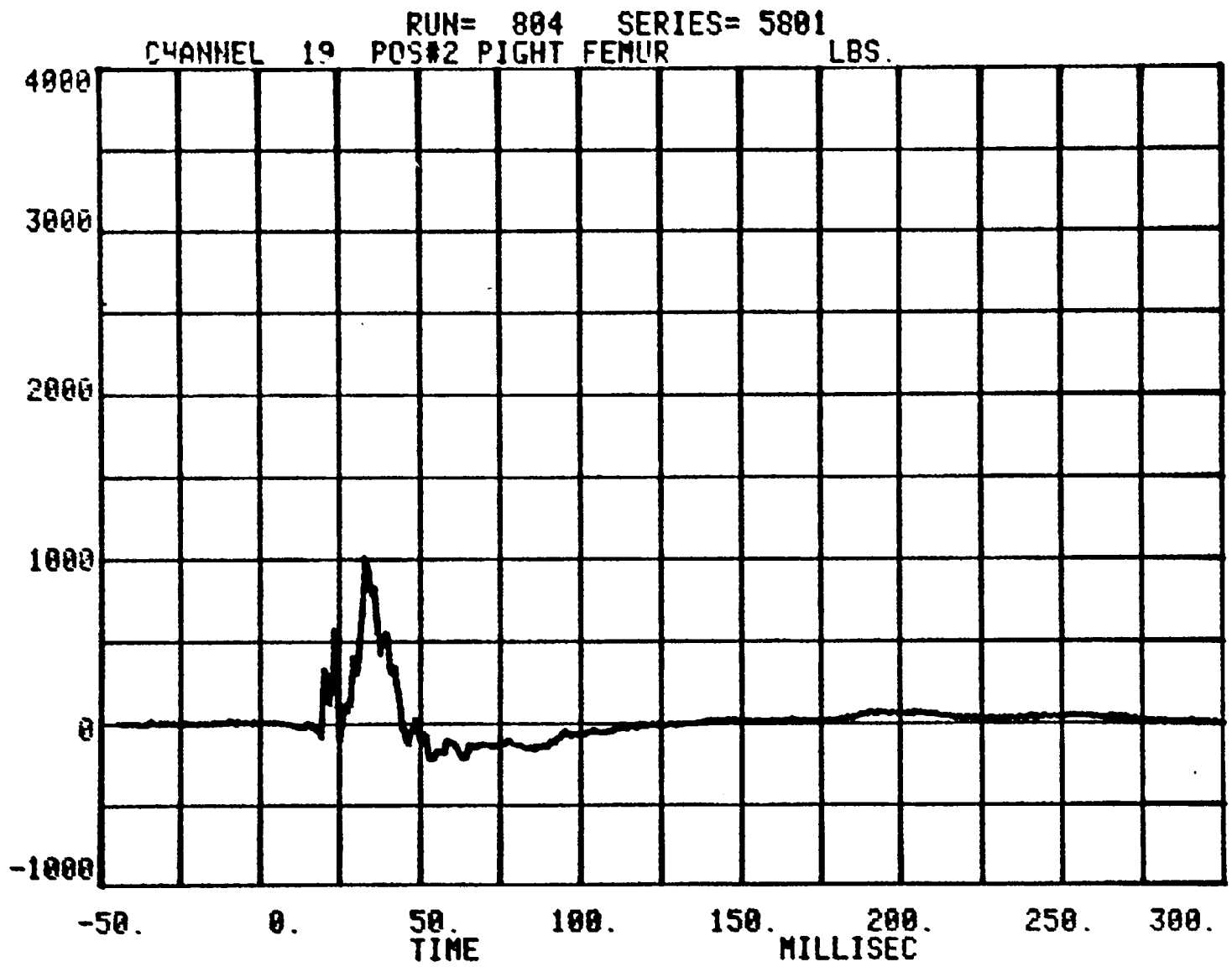

CHANNEL 17 POS#2 CHEST Y
RUN= 804 SERIES= 5801
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

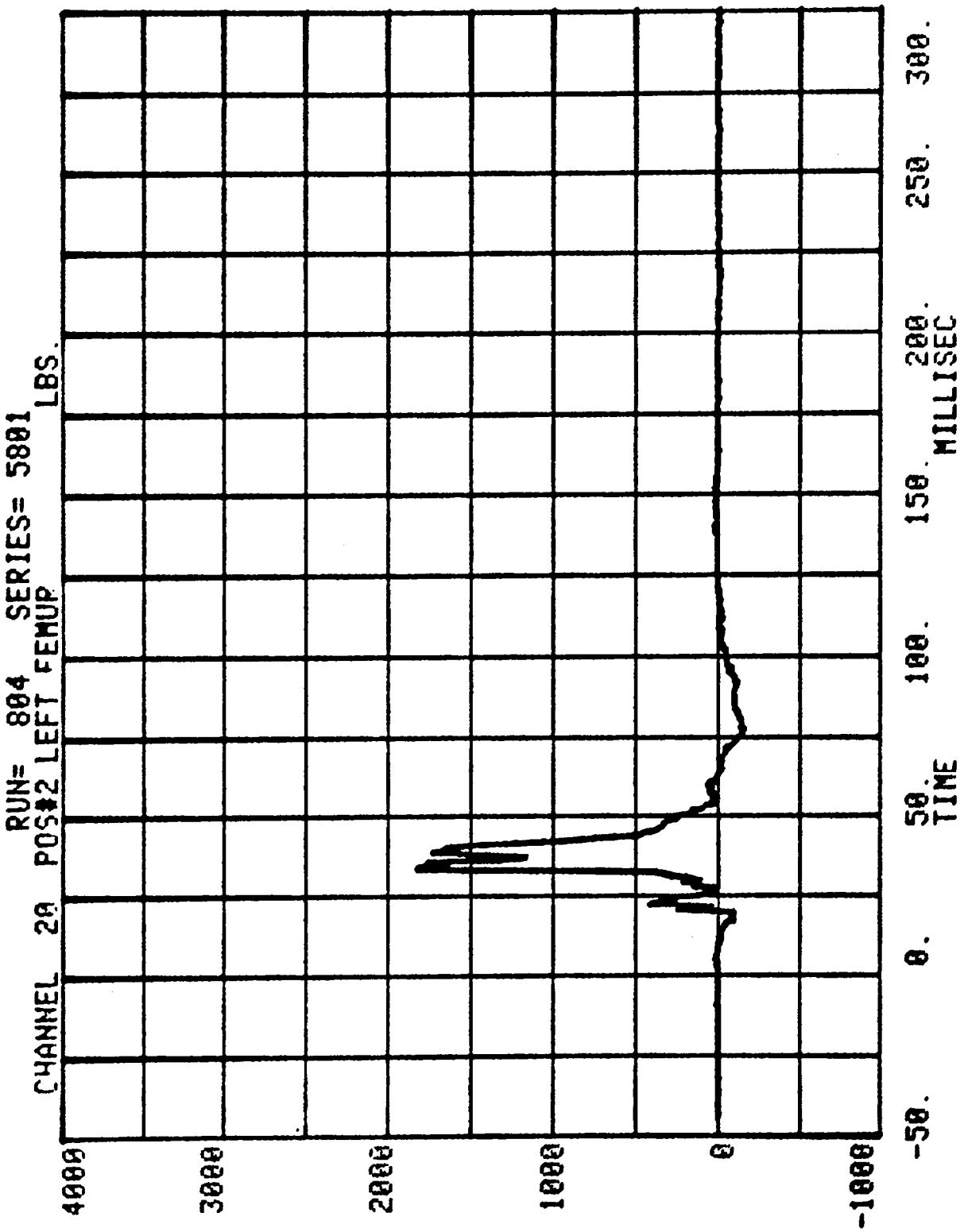
7626-2


CHANNEL 18 RUN= 804 SERIES= 5801
POS#2 CHEST Z G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

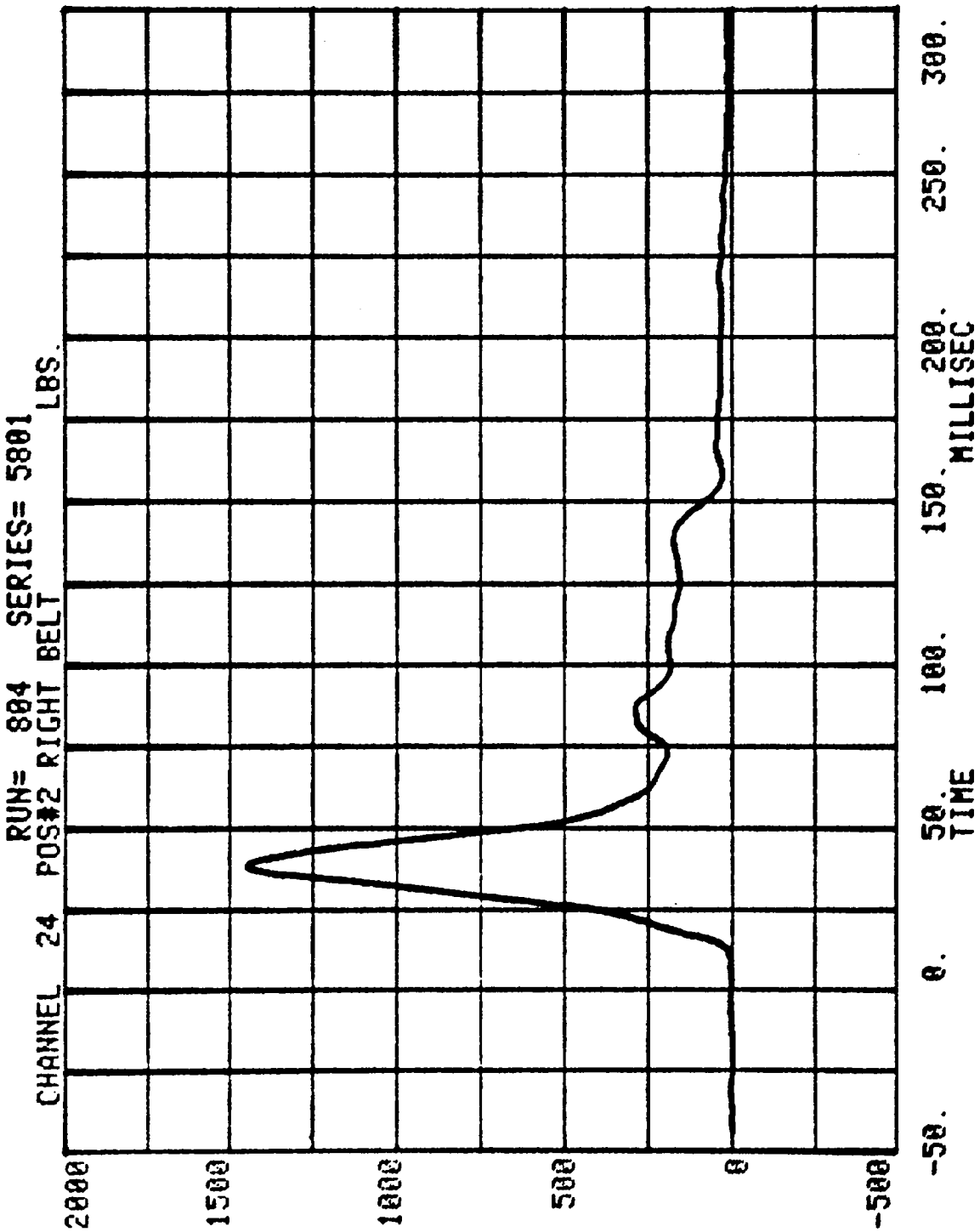

CHANNEL 4 POS#2 CHEST R
RUN= 804 SERIES= 5801
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2

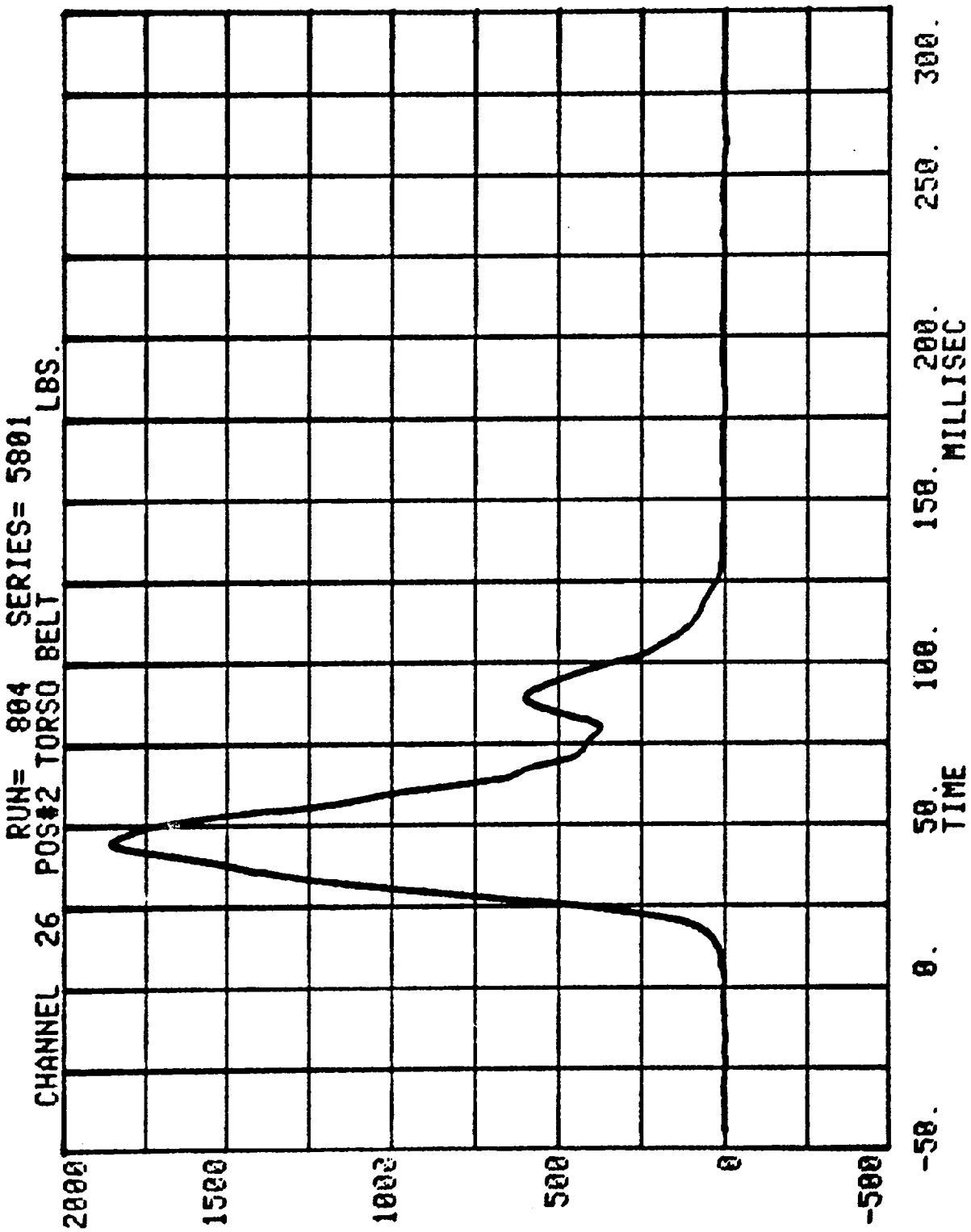

RUN= 804 SERIES= 5801
CHANNEL 19 POS#2 RIGHT FEMUR LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

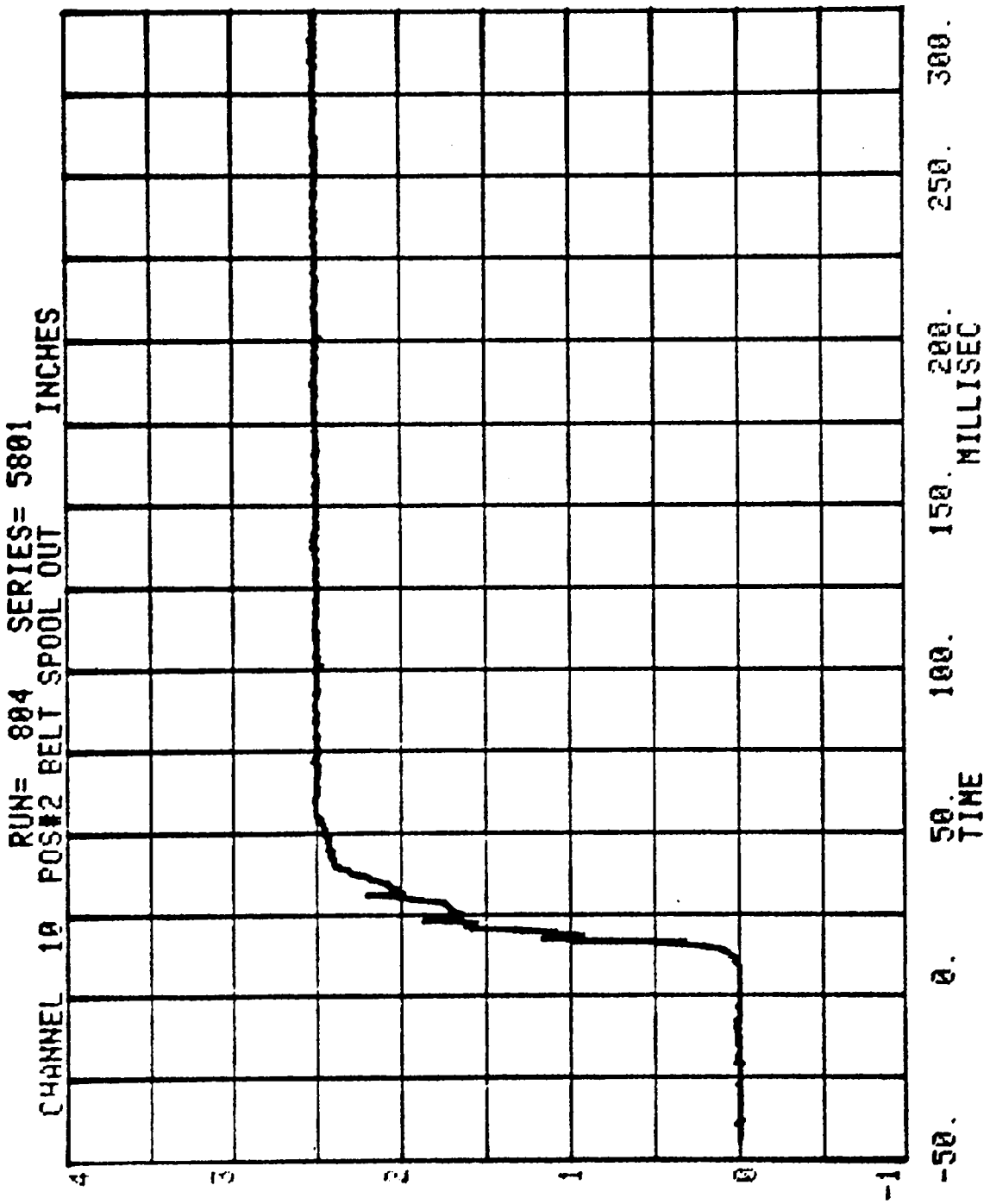

RUN= 804 SERIES= 5801
CHANNEL 20 POS#2 LEFT FEMUR
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

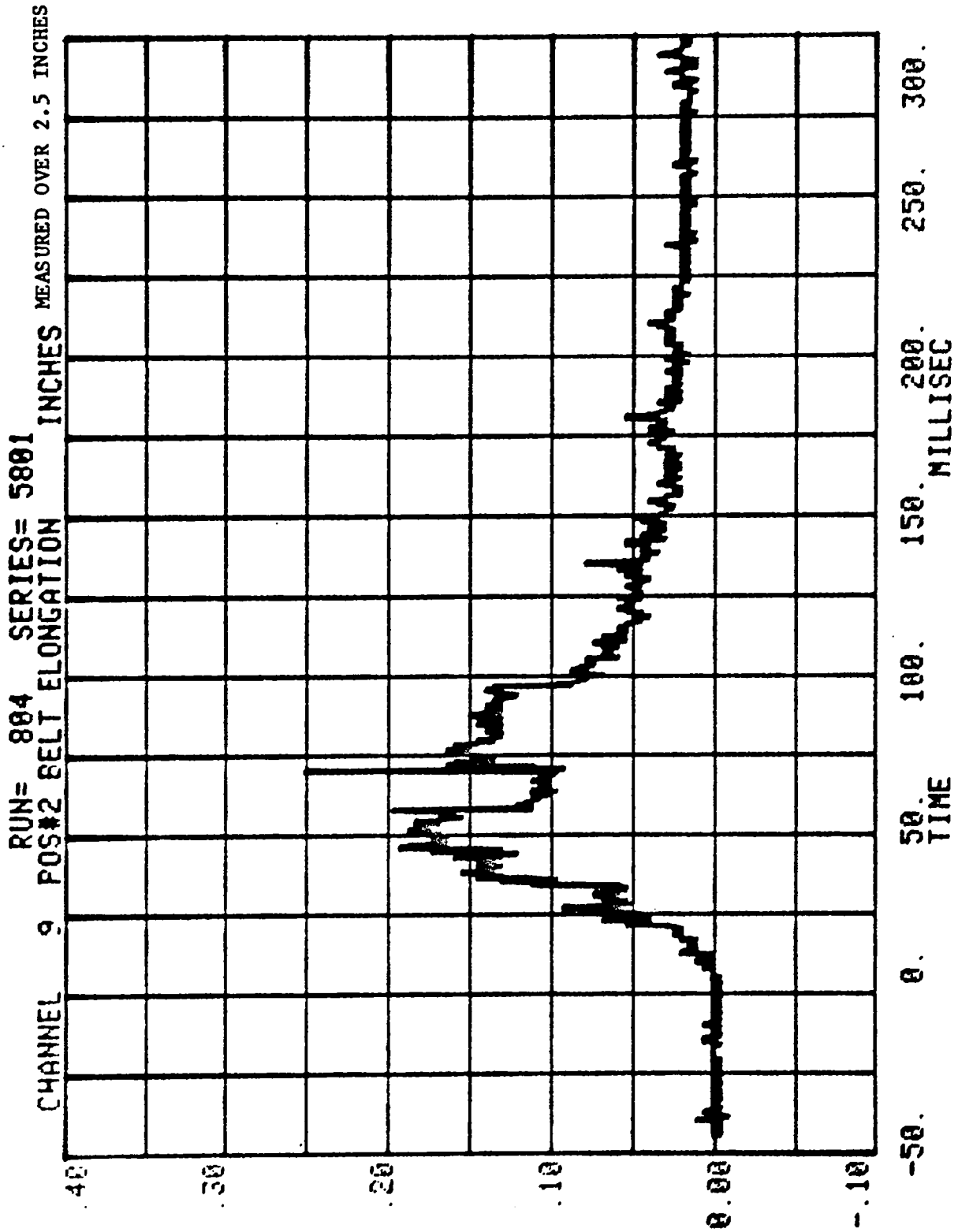
7626-2


CHANNEL 24 POS#2 RIGHT BELT
RUN= 804 SERIES= 5801
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7626-2


CHANNEL 26 POS#2 TORSO BELT
RUN= 804 SERIES= 5801
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 10 POS#2 BELT SPOOL OUT
RUN= 804 SERIES= 5801
INCHES
4
3
2
1
0
-1
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 9 RUN= 804 SERIES= 5801
POS#2 BELT ELONGATION INCHES MEASURED OVER 2.5 INCHES
.40
.30
.20
.10
0.00
-.10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

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.

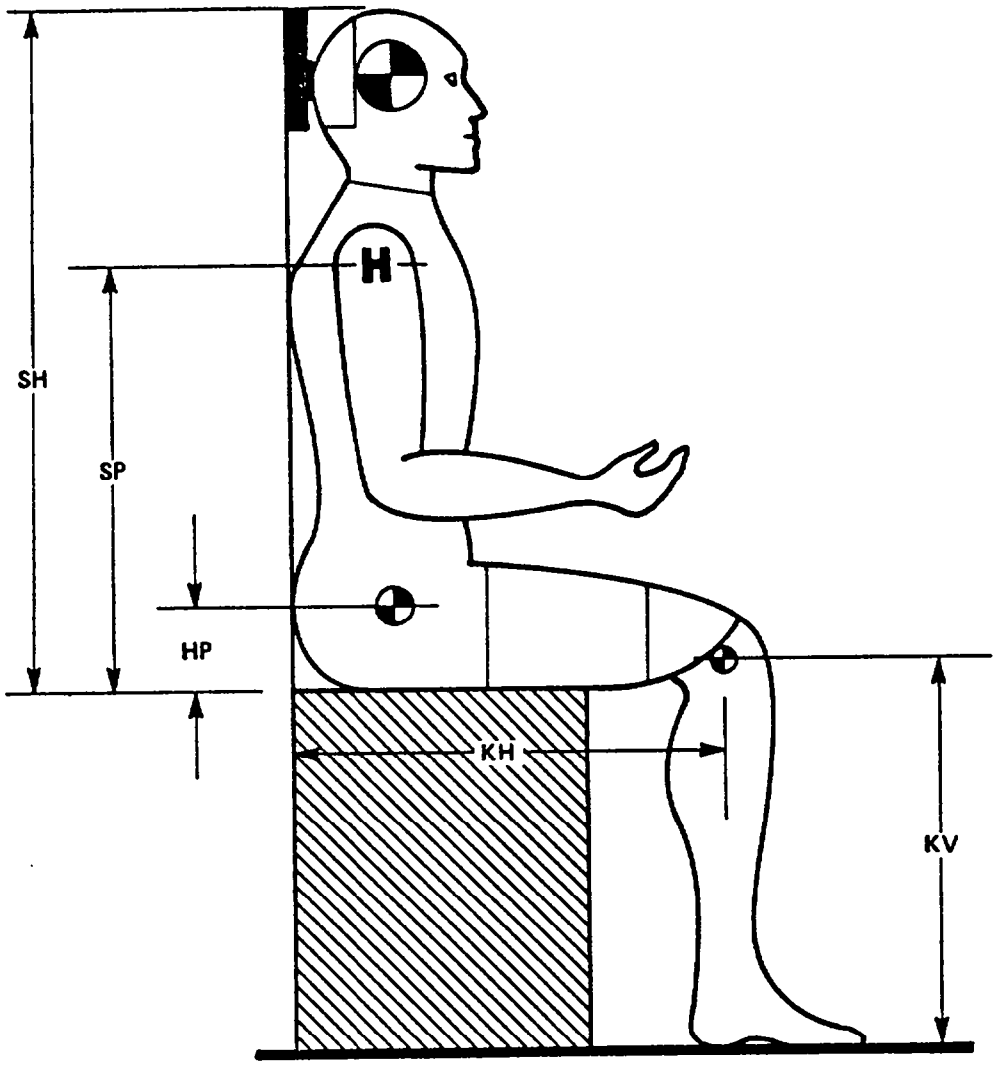
Dummy serial numbers and certification dates are:

Serial No.	Completion Date
1021	1- 6-88
1022	1- 6-88

Electronic Test Equipment

The complement of signal conditioning recording and display equipment in conjunction with dummy certification testing can be found in New Car Assessment and Standards Indicant Testing Final Report, Report No. 6525-V-1.

Figure 10 DUMMY CONFIGURATION DIMENSIONS



PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 1021

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	1-6-88	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	2	
SH - Seated Height	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height	21.8 to 22.4"	22.1"	
HP - Hip Pivot Height	3.9" ref.	3.9"	
KH - Knee Pivot from Back Line	20.1 to 20.7"	20.4"	
KV - Knee Pivot from floor	19.3 to 19.9"	19.6"	
SW - Shoulder Width	17.8 to 18.4"	18.1"	
HW - Hip Width	14.0 to 15.4"	14.7"	

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required
DATE OF PERFORMANCE VERIFICATION		1-6-88	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		2	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		66-71 deg	
VERIFICATION LAB HUMIDITY (10 TO 70 %)		20-30%	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	235 G's	
b. peak lateral accel.	<= 10 G's	4 G's	
c. Time above 100 G's	0.9 to 1.5 ms.	1.2 ms	

* Sequential number beginning with "1" at the start of each fiscal years's crash test program.

TECHNICIAN'S NAME: Donald W Hess

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. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1021

EST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required
. NECK BENDING TEST			
a. Pendulum Speed	21.5 to 25.5 fps.	21.5 fps	
b. Pend. Avg. Decel. over t3 to t2	20 to 24 G's	23 G's	
c. Peak Resultant Head Acceleration	26 G's max.	25 G's	
d. Pendulum Decel. (t2-t1)	<= 3 ms.	2 ms	
e. Pendulum Decel. (t3-t2)	25 to 30 ms.	26.7 ms	
f. Pendulum Decel. (t4-t3)	<= 10 ms.	3.4 ms	
g. Max. Head Rotation	63 to 73 deg.	68 deg	

h. Chordal Displacement

HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0"	
30 deg.	Time	25.6 to 34.4 ms.	27.7 ms	
	Displ.	2.1 to 3.1"	2.6"	
60 deg.	Time	40.3 to 51.7 ms.	42.8 ms	
	Displ.	4.3 to 5.3"	4.8"	
Maximum (68 deg)	Time	53.2 to 66.8 ms.	56.1 ms	
	Displ.	5.0 to 6.0"	5.4"	
60 deg.	Time	67.0 to 83.0 ms.	70.5 ms	
	Displ.	4.3 to 5.3"	4.7"	
30 deg.	Time	85.4 to 104.6 ms.	89.3 ms	
	Displ.	2.1 to 3.1"	2.3"	
0 deg.	Time	101.0 - 123.0 ms.	104.8 ms	
	Displ.	-.5 to 0.5"	0.0"	

ECHNICIANS NAME: D W Hess

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DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1021

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required
3. ABDOMINAL COMPRESSION TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	24.5 lbs	
b. Force @ 0.75"	36 to 50 lbs.	37.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	56.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	84 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	31.5 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	43 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	56 lbs	
d. Return Angle	12 deg. maximum	8 deg	
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.8 fps	
(2) Peak Deflection	1.7" maximum	1.42"	
(3) Peak Resistive Force	2250 lbs maximum	2249 lbs	
(4) Internal Hysteresis	50 to 70%	51.3%	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	.74"	
(3) Peak Resistive Force	1450 lbs maximum	1352 lbs	
(4) Internal Hysteresis	50 to 70%	61.9%	

TECHNICIAN'S NAME: D. W. Hess

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II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1021

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required
6. KNEE IMPACT TEST			
A. Right Side			
(1) Probe Speed	6.76 to 7.04 fps	6.9 fps	
(2) Maximum Force	1850 to 2500 lbs	2100 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.75 ms	
B. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	6.9 fps	
(2) Maximum Force	1850 to 2500 lbs	2062 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.8 ms	

REMARKS:

TECHNICIAN'S NAME: D.W. Hess

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INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1021 CALIB. SEQ. NOS. FOR DUMMY: 2

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS				
1. Head Accelerometers				
a. Triaxial unit	NA	---	---	---
b. Uniaxial units				
(1) Longitudinal (A_x)	Endevco	CJ22	9-87	3-88
(2) Lateral (A_y)	Endevco	CS41	9-87	3-88
(3) Vertical (A_z)	Endevco	CH31	9-87	3-88
2. Chest Accelerometers (Vehicle Crash Test Usage)				
a. Triaxial unit	NA	---	---	---
b. Uniaxial units				
(1) Longitudinal (A_x)	CEC	A73	9-87	3-88
(2) Lateral (A_y)	Endevco	CE06	9-87	3-88
(3) Vertical (A_z)	CEC	A44	9-87	3-88
3. Chest Potentiometer	NA	---	---	---
4. Femur Load Cells				
a. Right Side	GSE	77	10-87	4-88
b. Left Side	GSE	76	10-87	4-88
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer	CED	18259	11-87	5-88
2. Test Probe Accelerometer	CED	17815	11-87	5-88
3. Lumbar Flexion Test Push Force Gauge	Transducer Inc.	20051	11-87	5-88
4. Abdominal Compression Test Force Gauge	BLH	72952	11-87	5-88
5. Abdominal Compression Test Displacement Gauge	CIC	567-11	11-87	5-88

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 1022

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
ATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	1-6-88	
ERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	2	
I - Seated Height	35.6 to 35.8"	35.6"	
P - Shoulder Pivot Height	21.8 to 22.4"	22.1"	
P - Hip Pivot Height	3.9" ref.	3.9"	
I - Knee Pivot from Back Line	20.1 to 20.7"	20.4"	
F - Knee Pivot from floor	19.3 to 19.9"	19.6"	
S - Shoulder Width	17.8 to 18.4"	18.1"	
S - Hip Width	14.0 to 15.4"	14.7"	

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required
ATE OF PERFORMANCE VERIFICATION		1-6-88	
EQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		2	
ERIFICATION LAB TEMPERATURE (66 to 78 deg.)		66-71 deg	
ERIFICATION LAB HUMIDITY (10 TO 70 %)		20-30%	
EST PARAMETER	SPECIFICATION		
. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	235 G's	
b. peak lateral accel.	<= 10 G's	8 G's	
c. Time above 100 G's	0.9 to 1.5 ms.	1.2 ms	

Sequential number beginning with "1" at the start of each fiscal years's crash test program.

TECHNICIAN'S NAME: D.W. Hess

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II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1022

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	22.3 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23 G's	
c. Peak Resultant Head Acceleration		26 G's max.	24 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	28.8 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	4.9 ms	
g. Max. Head Rotation		63 to 73 deg.	66.5 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0"	
30 deg.	Time	25.6 to 34.4 ms.	29 ms	
	Displ.	2.1 to 3.1"	2.6"	
60 deg.	Time	40.3 to 51.7 ms.	45.3 ms	
	Displ.	4.3 to 5.3"	4.8"	
Maximum (66.5 deg)	Time	53.2 to 66.8 ms.	57.2 ms	
	Displ.	5.0 to 6.0"	5.2"	
60 deg.	Time	67.0 to 83.0 ms.	67.5 ms	
	Displ.	4.3 to 5.3"	4.8"	
30 deg.	Time	85.4 to 104.6 ms.	86.8 ms	
	Displ.	2.1 to 3.1"	2.4"	
0 deg.	Time	101.0 - 123.0 ms.	101.8 ms	
	Displ.	-.5 to 0.5"	0.0"	

TECHNICIANS NAME: D. W. Hess

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II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1022

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required
3. ABDOMINAL COMPRESSION TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	24 lbs	
b. Force @ 0.75"	36 to 50 lbs.	38 lbs	
c. Force @ 1.0"	50 to 63 lbs.	55 lbs	
d. Force @ 1.3"	73 to 88 lbs.	80.5 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	30 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	43.5 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	55 lbs	
d. Return Angle	12 deg. maximum	10 deg	
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.8 fps	
(2) Peak Deflection	1.7" maximum	1.62"	
(3) Peak Resistive Force	2250 lbs maximum	2184 lbs	
(4) Internal Hysteresis	50 to 70%	56.5%	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	.96"	
(3) Peak Resistive Force	1450 lbs maximum	1352 lbs	
(4) Internal Hysteresis	50 to 70%	62.9%	

TECHNICIAN'S NAME: D. W. Hess

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1022

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required
6. KNEE IMPACT TEST			
A. Right Side			
(1) Probe Speed	6.76 to 7.04 fps	6.9 fps	
(2) Maximum Force	1850 to 2500 lbs	2250 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.75 ms	
B. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	6.9 fps	
(2) Maximum Force	1850 to 2500 lbs	1875 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.8 ms	

REMARKS:

TECHNICIAN'S NAME: D.W. Hess

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INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1022 CALIB. SEQ. NOS. FOR DUMMY: 2

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS				
1. Head Accelerometers				
a. Triaxial unit	NA	---	---	---
b. Uniaxial units				
(1) Longitudinal (A_x)	Endevco	CK54	9-87	3-88
(2) Lateral (A_y)	Endevco	CK78	9-87	3-88
(3) Vertical (A_z)	Endevco	CD75	9-87	3-88
2. Chest Accelerometers (Vehicle Crash Test Usage)				
a. Triaxial unit	NA	---	---	---
b. Uniaxial units				
(1) Longitudinal (A_x)	CEC	A115	9-87	3-88
(2) Lateral (A_y)	Endevco	CS09	9-87	3-88
(3) Vertical (A_z)	CEC	A29	9-87	3-88
3. Chest Potentiometer				
4. Femur Load Cells				
a. Right Side	GSE	077	10-87	4-88
b. Left Side	GSE	076	10-87	4-88
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer	CED	18259	11-87	5-88
2. Test Probe Accelerometer	CED	17815	11-87	5-88
3. Lumbar Flexion Test Push Force Gauge	Transducer Inc.	20051	11-87	5-88
4. Abdominal Compression Test Force Gauge	BLH	72952	11-87	5-88
5. Abdominal Compression Test Displacement Gauge	CIC	567-11	11-87	5-88

APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

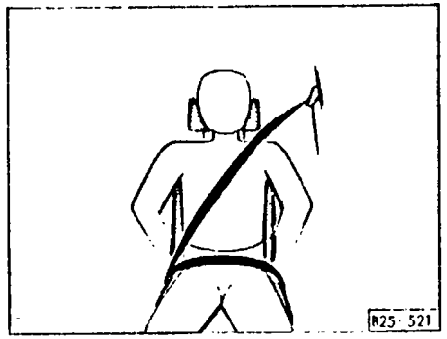
Lap-shoulder belt

The combination lap-shoulder belt is equipped with a locking retractor. The system adjusts automatically to your size and movements as long as the pull on the belt is slow.

Hard braking or a collision locks the belt. The belt will also lock when you drive up or down a steep hill or in a sharp curve.

■ To fasten, grasp belt tongue and pull belt in continuous slow motion across your chest and lap.

■ Insert belt tongue into buckle on inboard side of seat. Push down until it is securely locked with an audible click. Pull belt to check.



■ Pull shoulder section to make sure belt fits snugly across the pelvis.

The shoulder belt must be positioned midway over the shoulder – **it must never rest against the neck.** See illustration.

■ Belts should fit snugly across the pelvis and chest. Make sure any slack is wound up on the retractor.

■ Adjust height of belt anchorage, if necessary. Do not wear shoulder part of belt under your arm or otherwise out of position. This would increase the possibility of serious injury in case of an accident.

■ To unfasten belt, push in release button on buckle. Belt will spring out of buckle.

■ To release a locked belt, lean back to take the body pressure off the belt.

■ To store lap-shoulder belt, allow belt to wind up on retractor as you guide belt tongue to its stowed position.