REPORT NO. CAL-89-NO3

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

Mitsubishi Motor Corporation

1989 Mitsubishi Galant

4-Door Sedan

NHTSA NO. MK5600

CALSPAN TEST NO. 7689-3

CALSPAN CORPORATION

ADVANCED TECHNOLOGY CENTER

P.O. BOX 400

BUFFALO, NEW YORK 14225

October 27, 1988

FINAL REPORT

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF MARKET INCENTIVES

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15. Supplementary Notes

16. Abstract

A frontal load cell barrier test of a 1989 Mitsubishi Galant 4-Door Sedan was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on October 27, 1988.

The impact speed was 35.4 mph and the ambient temperature at the barrier face was 38°F. The maximum post-test vehicle crush was 20.1 inches. The test vehicle was equipped a 3-point belt at each of the front outboard seating positions.

With regard to FMVSS 208, "Occupant Crash Protection," injury criteria, both the driver and passenger dummies appear to satisfy the head, chest, and femur requirements.

17. Key Words	18. Distribution Statement
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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Section 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 89 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 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 MK5600

A load cell barrier consisting of 36 load cells was impacted by a 1989 Mitsubishi Galant 4-Door Sedan at a velocity of 35.4 mph. The test was performed at the Calspan Corporation Advanced Technology Center on October 27, 1988. Pre-test 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 14 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. 1020) and the right-front passenger ATD (Serial No. 1021) were calibrated previous to this test. Certification details along with the 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; the HIC was 971. The maximum chest deceleration over 3 milliseconds was 50 g's and femur loads were 1229 and 1613 pounds.

The right front passenger's HIC was 998 and maximum chest deceleration over 3 milliseconds was 40 g's. Femur loads were 526 and 584 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1989 Mitsubishi Galant 4 Door Sedan

NHTSA NO.: MK5600 VIN.: JA3BR4GV6KZ013177

BODY COLOR: Ascot Silver DATE OF MANUFACTURE: July 1988

Engine: 4 cylinders; _____ C.I.D.; ___ Liters; 1997 CC
X Gas; _____ Diesel; _____ Turbocharged
___ Longitudinal; X Transverse

Transmission: 4 Speed ___ Manual; X Automatic; X Overdrive
Final Drive: X Front Wheel; _____ Rear Wheel; _____ Four Wheel

Date Received: 8/30/88 Odometer Reading: 8
_____ A/C; X P/S; X P/B; _____ P/wdo.; ___ Tilt Wheel
_____ P/seats; _____ Cruise Control

Type of Occupant Restraint: 3 Point Belts

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 29 psi, Rear 26 psi

Recommended Tire Size: P185/70R14

Recommended Cold Tire Pressure: Front 29 psi, Rear 26 psi

Tires on Vehicle: P185/70R14; Manufacturer: Yokohama

Number of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 827 lbs. (A)

No. of Occupants x 150 lbs. = 750 lbs. (B)

Rated Cargo and Luggage Weight (RCLW) A-B = 77 lbs.

GVWR 3747 lbs. GAWR: Front 1984 lbs. Rear 1763 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 = 820 lbs. Right Rear = 520 lbs.

Left Front = 880 lbs. Left Rear = 520 lbs.

TOTAL FRONT WEIGHT = 1700 lbs. (62 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1040 lbs. (38 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 2740 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2740 lbs.)

VCW = Vehicle Capacity Weight (827 lbs.)

DSC = Designated Seating Capacity (5)

RCLW = VCW - 150 (DSC) = 77 lbs.

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

Target Test Weight = 3145 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 192 POUNDS CARGO:

Right Front = 920 lbs. Right Rear = 710 lbs.

Left Front = 920 lbs. Left Rear = 710 lbs.

TOTAL FRONT WEIGHT = 1840 lbs. (56 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1420 lbs. (44 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3260 lbs.

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

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 27.4 LF 27.4 RR 26.6 LR 26.3

Test Attitude: RF 26.7 LF 26.9 RR 24.5 LR 24.5

Wheel Base: 122.5 in.; C.G. = 53.4 in. rearward of front wheel C/L

Remarks: Tail lights and hubcaps were removed to achieve test weight.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0 °

Date of Test: 10/27/88 Time of Test: 12.35

Ambient Temperature: 38 °F at impact area

Temperature in Occupant Compartment: 68 °F.

Windshield Molding Temperature: 62 °F.

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 35.4 mph, secondary = 35.4 mph

Distance From Front Bumper to Barrier Face When Entering Speed Trap: 50 inches; Exiting Speed Trap: 12 inches

VEHICLE REBOUND AND CRUSH (inches):

Vehicle Length:	Pre-test	= R	180.6	C_L	183.5	L	180.7
	Post-test	= R	161.4	C_L	163.4	L	161.0
	Crush	= R	19.2	C_L	20.1	L	19.7

Distance from front of test vehicle to point of impact:

R 17.6 C/L 16.7 L 17.8

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Upper Steering Rim Upper Steering Hub	No Contact
Chest	No Contact	No Contact
Abdomen	Bottom of Steering Rim	No Contact
Left Knee	Dash	Dash
Right Knee	Dash	Dash

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front		Rear	
	Left	Right	Left	Right
Door Opening	Operable	Operable	Operable	Operable

	Front	
Seat Movement	Left	Right
Seat Back Failure	None	None
Seat Shift (in.)	0.0	0.0

Glazing Damage

Backlight/Windshield None

Other Notable Impact Effects: Windshield shattered along lower edge. No retention lost.

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)	-115	-25	57	120	-53	-29	19	50
DUMMY (2)	-34	30	85	90	-39	39	-24	40
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1229	1613
DUMMY (2)	526	584
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)	1534	-	892
DUMMY (2)	1769	1127	-
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)	971	.07117	.10515	60.6
DUMMY (2)	998	.07732	.10980	62.4
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Figure 1

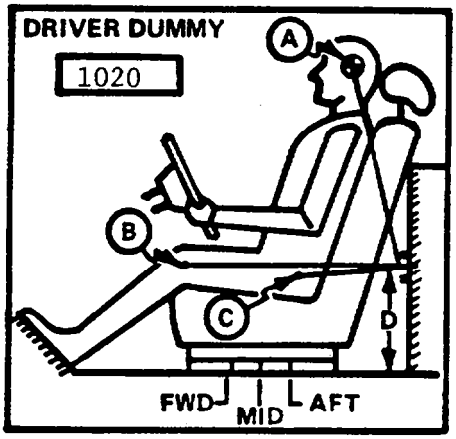
PART 572 DUMMY IN-VEHICLE POSITION

TEST NO.: MK5600 **VEHICLE:** 1989 Mitsubishi Galant

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

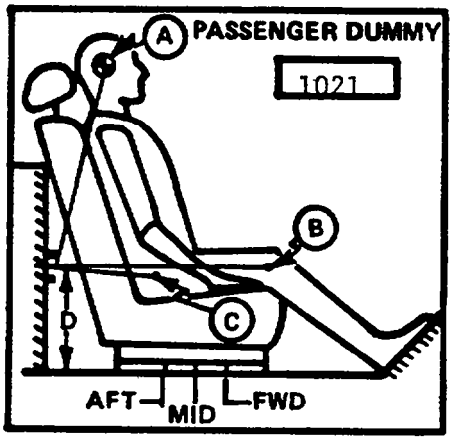
ADJUSTER TYPE:
- X Manual
- ____ Power

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

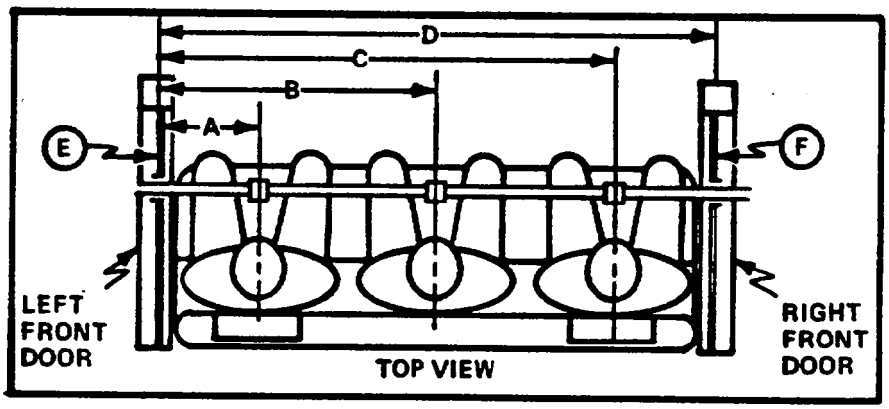


MEASUREMENT LOCATION

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



A =	22.5	in.	1	Degrees	A =	22.3	in.	0	Degrees
B =	23.8	in.	97	Degrees	B =	23.5	in.	97	Degrees
C =	8.3	in.	126	Degrees	C =	7.8	in.	124	Degrees
D =	13.5	in.			D =	13.5	in.		

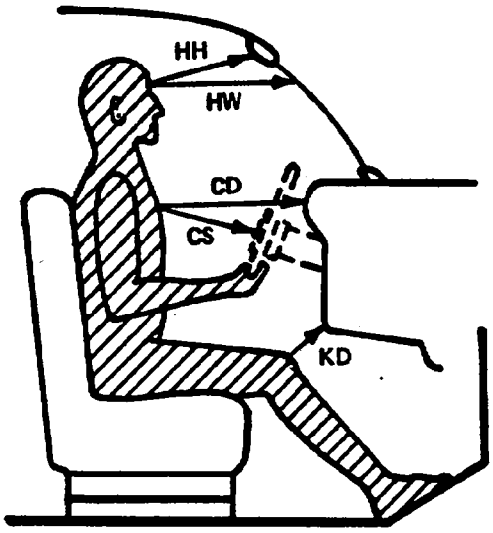


DUMMY ID	1020	1021
A = Left Door to Driver Centerline	11.8 in.	
B = Left Door to Center Passenger Centerline	- in.	
C = Left Door to Right Passenger Centerline	40.0 in.	
D = Left Door to Right Door	51.2 in.	
E, F = Window Glass Height (Right and Left Must Be Equal)	12.0 in.	

Figure 2

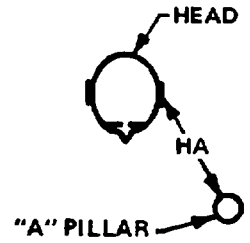
OCCUPANT CLEARANCE DIMENSIONS

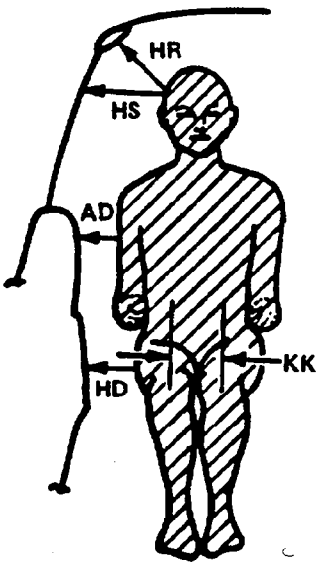
	DRIVER	PASSENGER
HH	16.0	15.8
HW	20.0	20.0
CD	22.1	29.6
CS	14.5	-
KDL	5.5	5.7
KDR	5.8	5.7
SA	See Note	See Note
TA	25°	25°



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



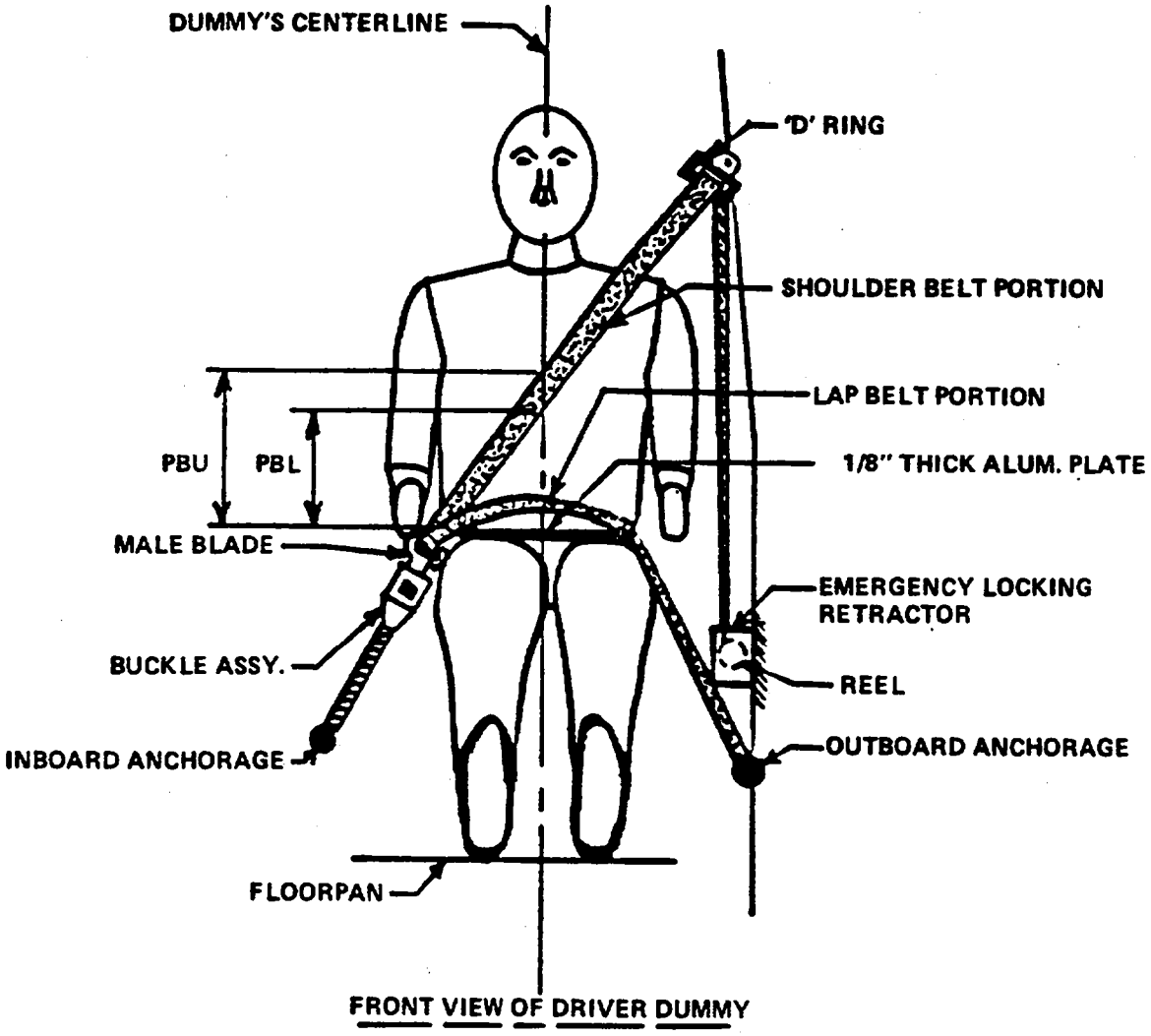


	DRIVER	PASSENGER
HR	5.5	5.4
HS	8.3	8.4
AD	3.7	4.4
HD	6.1	5.8
KK	10.1	8.4
HA	19.8	19.5

Note: Seat angle was set in 10th notch as specified by manufacturers. First Notch = 0

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	10.5	10.4
LAP BELT TENSION	-	-
SHOULDER BELT TENSION	1.5 lbs.	1.5 lbs.

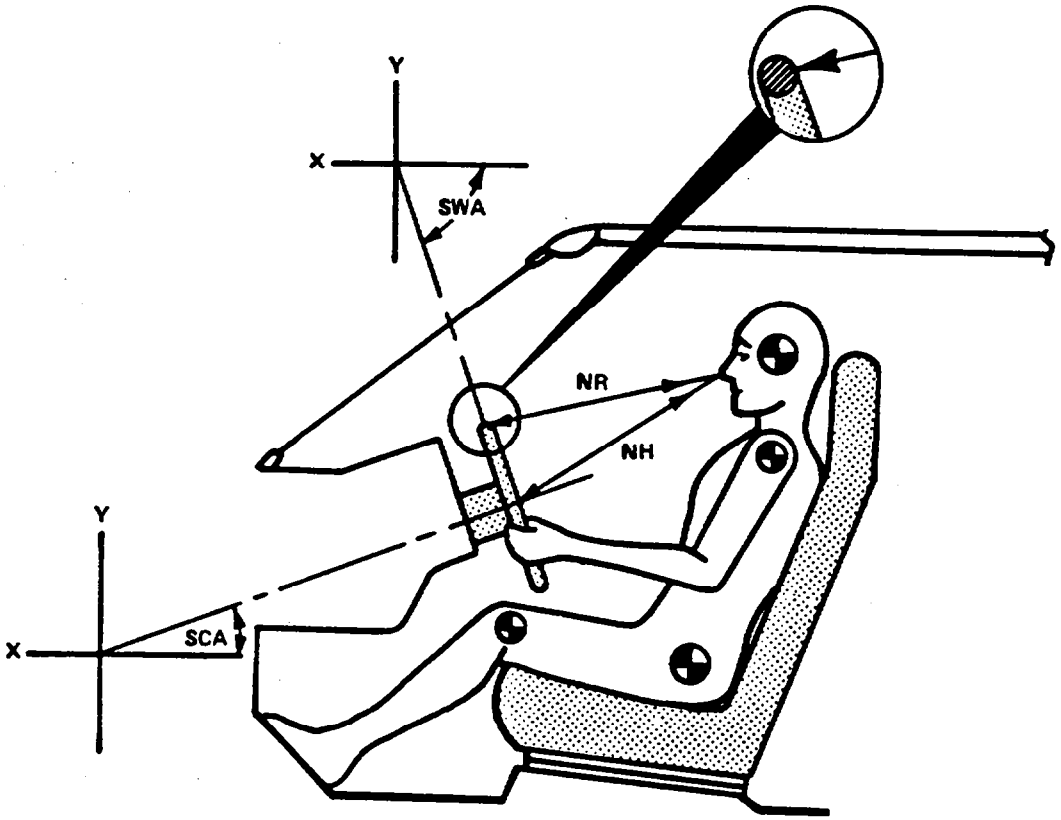
Table 3

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.	75.3"	75.3"
Should belt length as measured on Part 572 Dummy.	33.0"	33.0"
Lap belt length as measured on Part 572 Dummy.	33.0"	33.0"
BELT SPOOL-OFF DATA:		
As determined by film analysis.	1.8"	2.0"
As determined mechanically.	2.2"	2.4"
As determined electronically.	1.7"	1.9"
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	0.4"/ft	0.9"/ft
Measured Mechanically	0.0"/ft	0.0"/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	19.9	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	21.2	Inches
SCA -- Angle of steering column relative to the horizontal X axis	23	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-67	Degrees

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

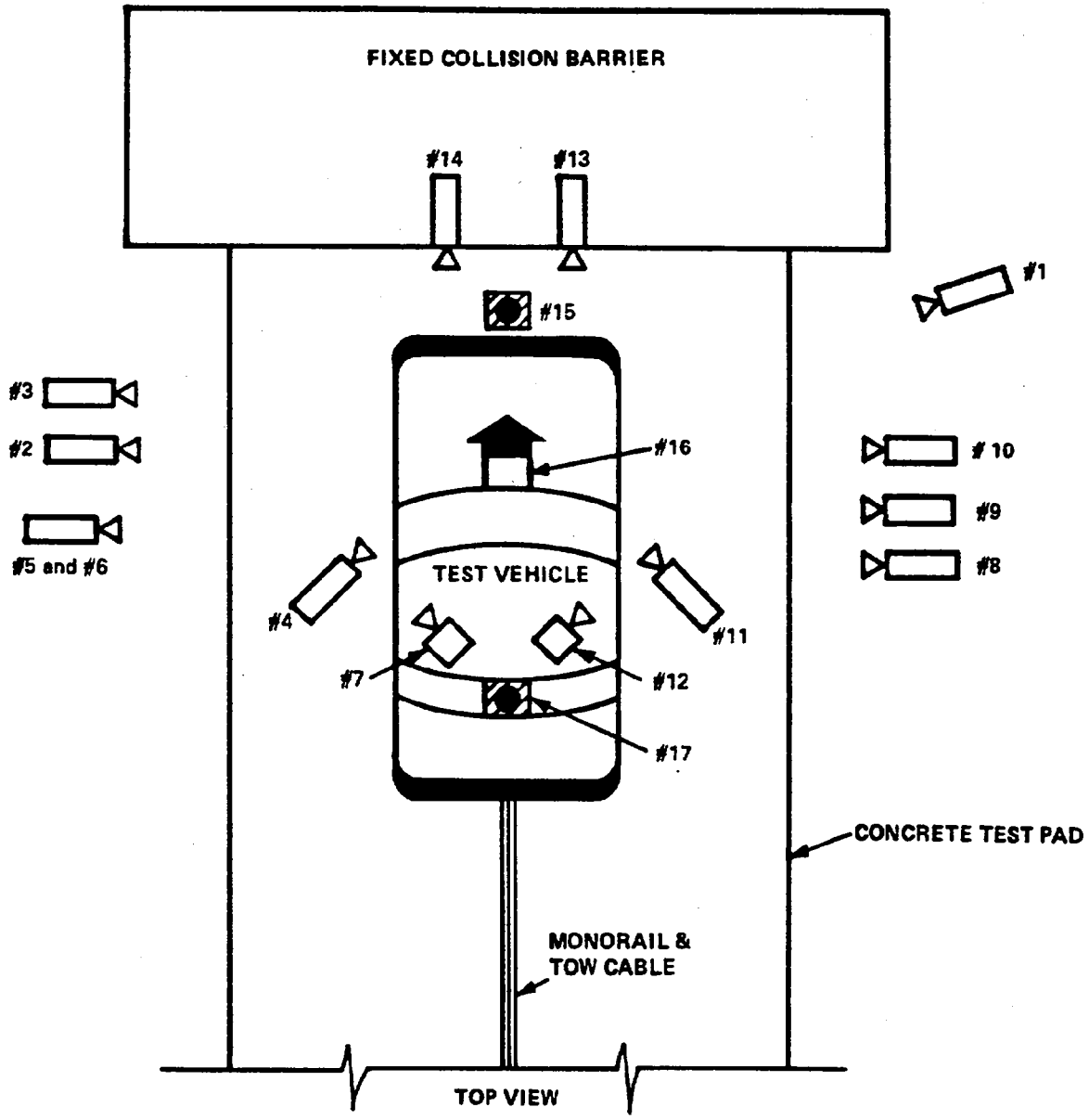


Table 4
HIGH-SPEED CAMERA LOCATIONS

Test No. MK5600 Vehicle 1989 Mitsubishi Galant 4-Door Se

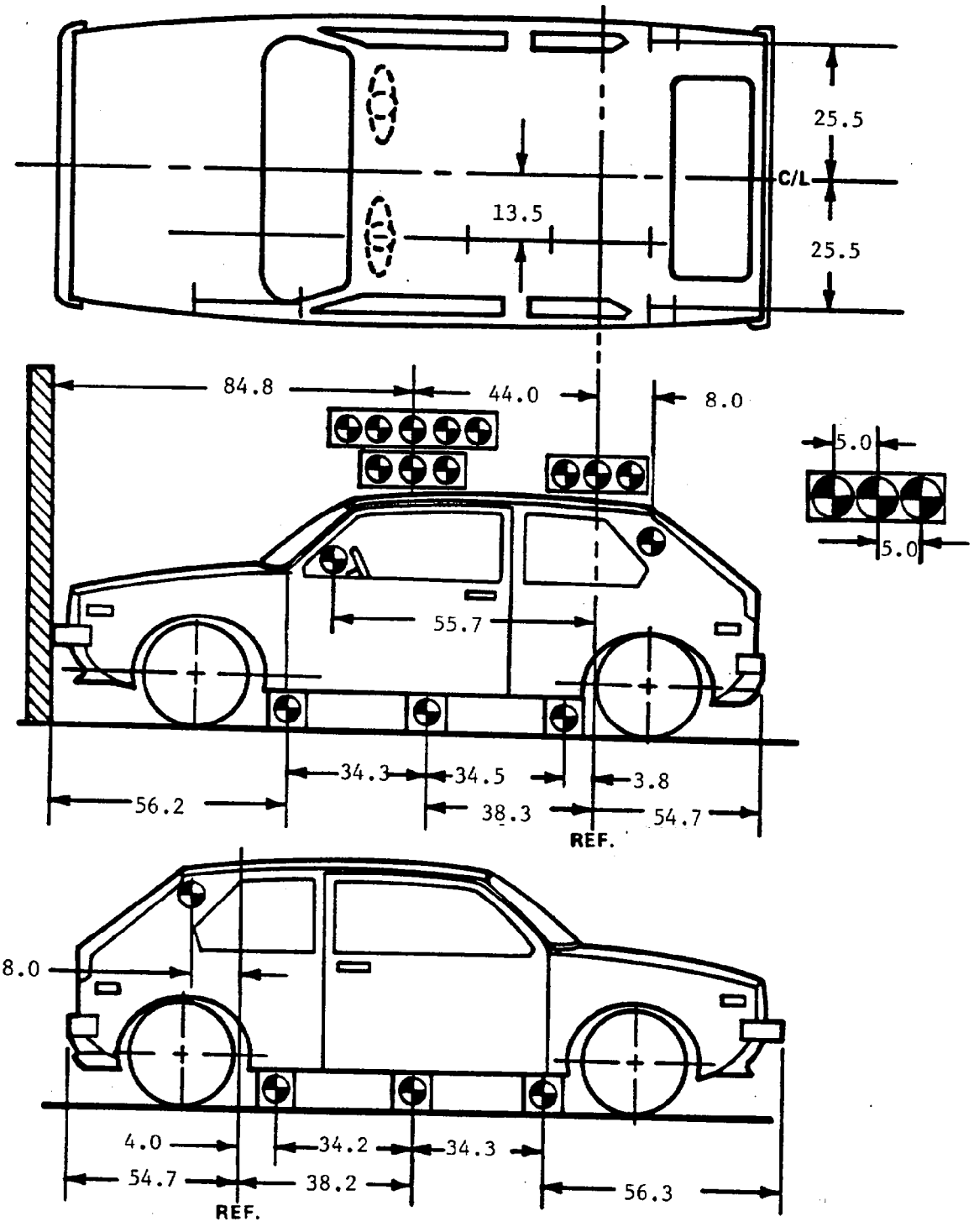
CAMERA NO.	VIEW	CAMERA POSITIONS (in)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	247	71	41.5	-4	230	13	540
3	Left Side View	311	52	41.5	-3	294	25	(1)
4	Driver and Interior View	90	129	70.0	-16	73	13	660
5	Steering Column (Bottom)	319	90	46.5	-3	302	25	545
6	Steering Column (Top)	319	90	70.5	-8	302	25	550
7	Left Belt	-	-	-	-	-	8	300
8	Overall Right Side	265	72	42.0	-1	248	13	790
9	Right Side View	309	60	41.5	-3	292	25	765
10	Right Passenger View	328	80	58.0	4	311	35	720
11	Passenger and Interior View	82	115	70.0	-18	-	25	600
12	Right Belt	-	-	-	-	-	-	600
13	Passenger Front View					-	13	550
14	Driver Front View	23	0	76.0	38	-	13	540
15	Windshield View	23	0	76.0	33	-	13	540
16	Pit View of Engine	0	36	-120.0	90	-	13	(1)

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

(1) No timing.

Figure 6

VEHICLE TARGET LOCATIONS

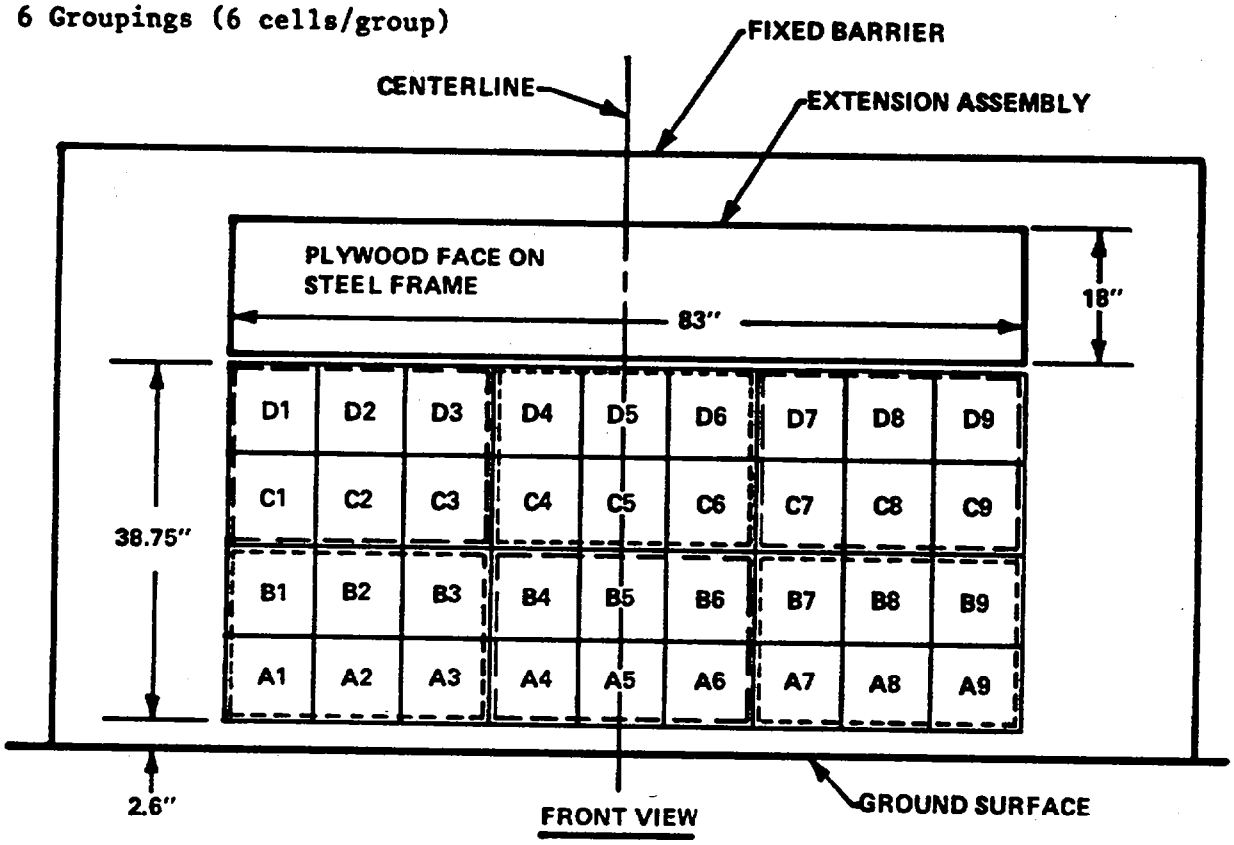


(DIMENSIONS IN INCHES)

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

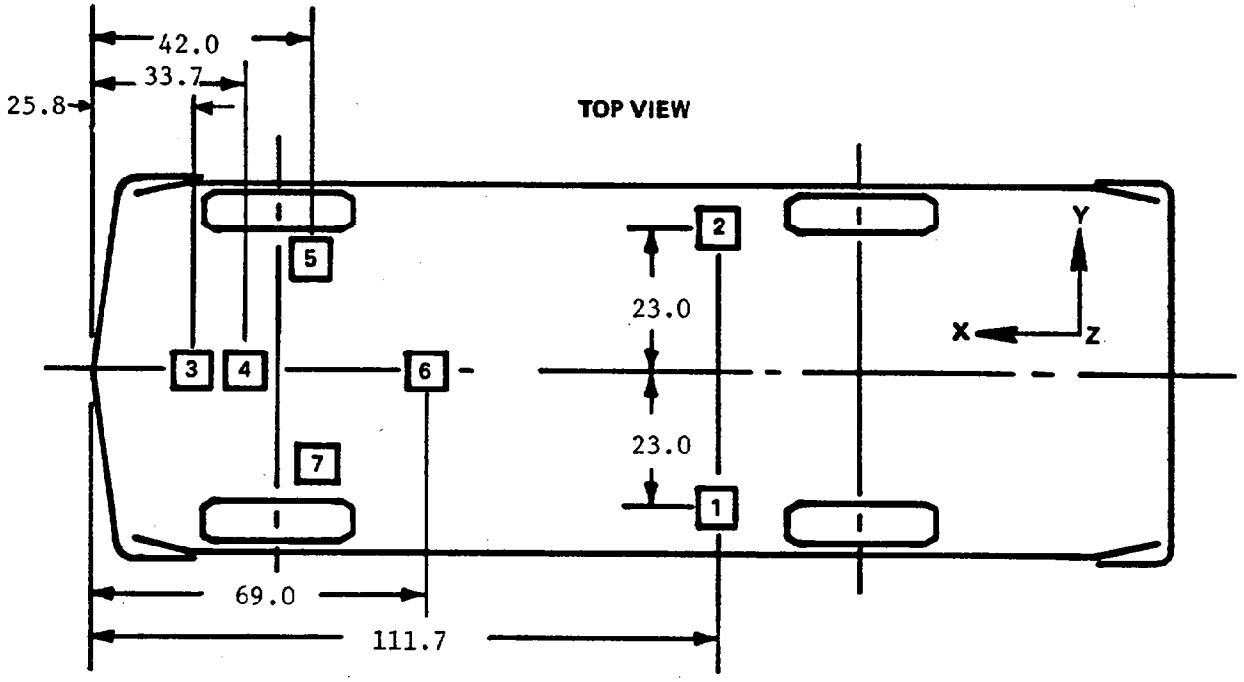
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

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

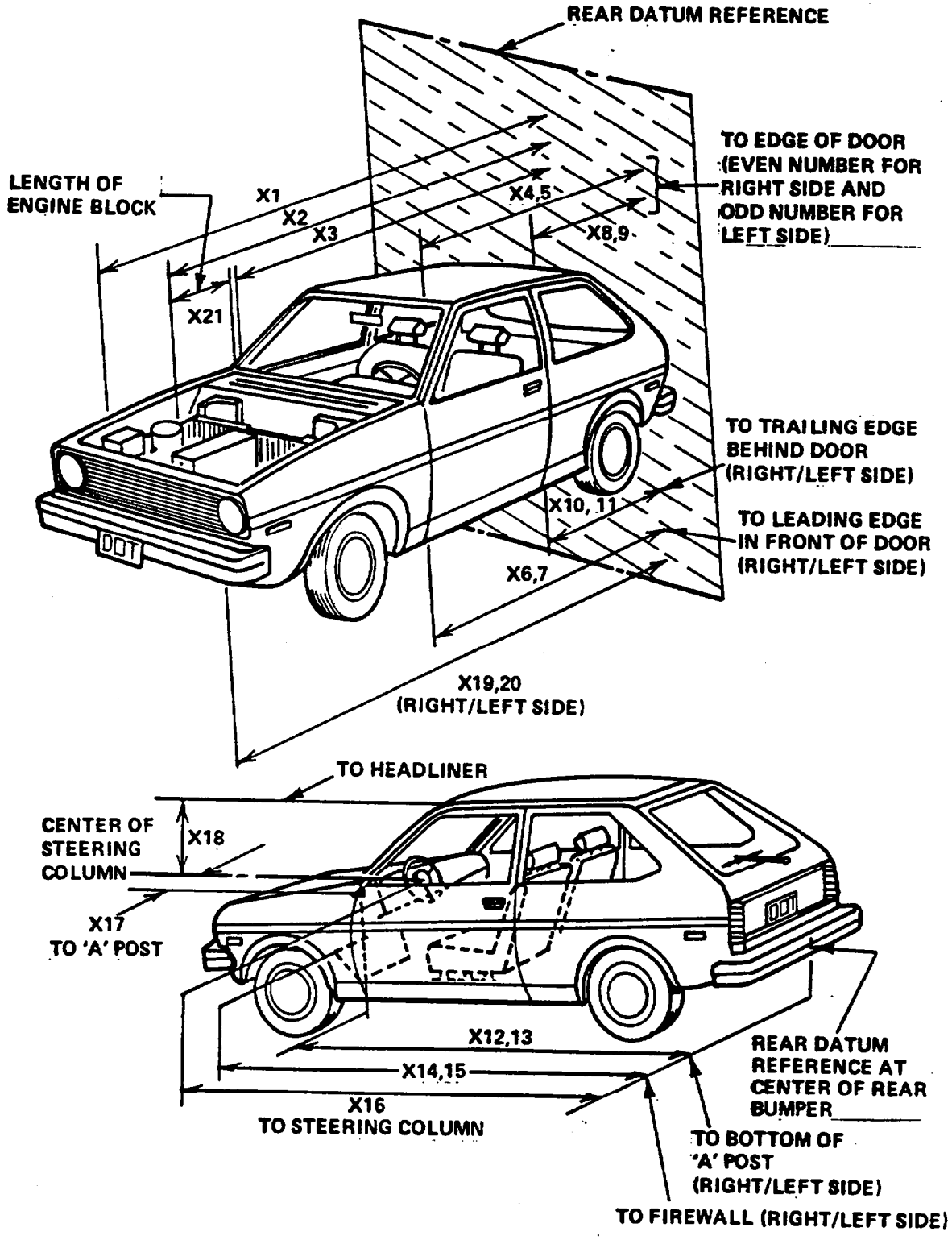


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	183.5	163.4	20.1
X2	Rear Surface of Vehicle to Front of Engine	161.0	149.9	11.1
X3	Rear Surface of Vehicle to Firewall	137.8	132.6	5.2
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	125.3	125.4	-0.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	125.6	125.3	0.3
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	124.4	124.3	0.1
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	124.5	124.3	0.2
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	83.8	84.2	-0.4
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	84.1	83.7	0.4
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	84.1	84.3	-0.2
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	84.3	84.3	0.0
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	124.8	124.1	0.7
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	124.8	124.5	0.3
X14	Rear Surface of Vehicle to Firewall, Right Side	135.7	130.6	5.1
X15	Rear Surface of Vehicle to Firewall, Left Side	134.9	130.4	4.5
X16	Rear Surface of Vehicle to Steering Column	107.8	106.2	1.6
X17	Center of Steering Column to "A" Post	16.5	16.6	-0.1
X18	Center of Steering Column to Headliner	17.5	16.9	0.6
X19	Rear Surface of Vehicle to Right Side of Front Bumper	180.6	161.4	19.2
X20	Rear Surface of Vehicle to Left Side of Front Bumper	180.7	161.0	19.7
X21	Length of Engine Block	12.0	12.0	0.0

Appendix A

PHOTOGRAPHS

A-2

7689-3

Figure A-1 PRE-TEST FRONT VIEW

Figure A-2 POST-TEST FRONT VIEW

A-4

7689-3

Figure A-3 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-5

7689-3

Figure A-4 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

Figure A-5 PRE-TEST RIGHT VIEW

A-7

7689-3

Figure A-6 POST-TEST RIGHT VIEW

7689-3

Figure A-7 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-9

7689-3

Figure A-8 POST-TEST LEFT REAR THREE-QUARTER VIEW

A-10

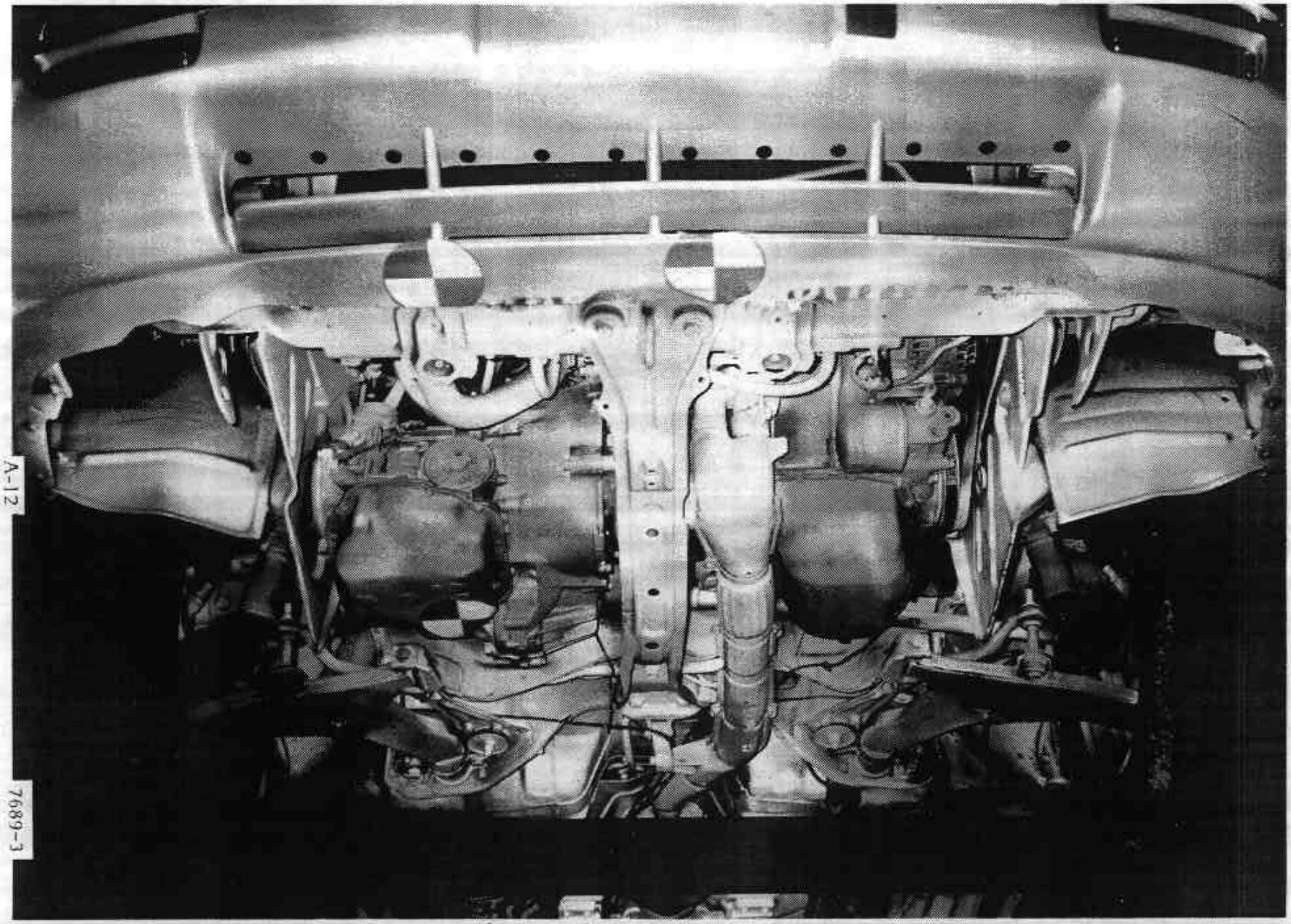
7689-3

Figure A-9 PRE-TEST LEFT VIEW

A-11

7689-3

Figure A-10 POST-TEST LEFT VIEW



A-12

7689-3

Figure A-11 PRE-TEST FRONT UNDERBODY VIEW

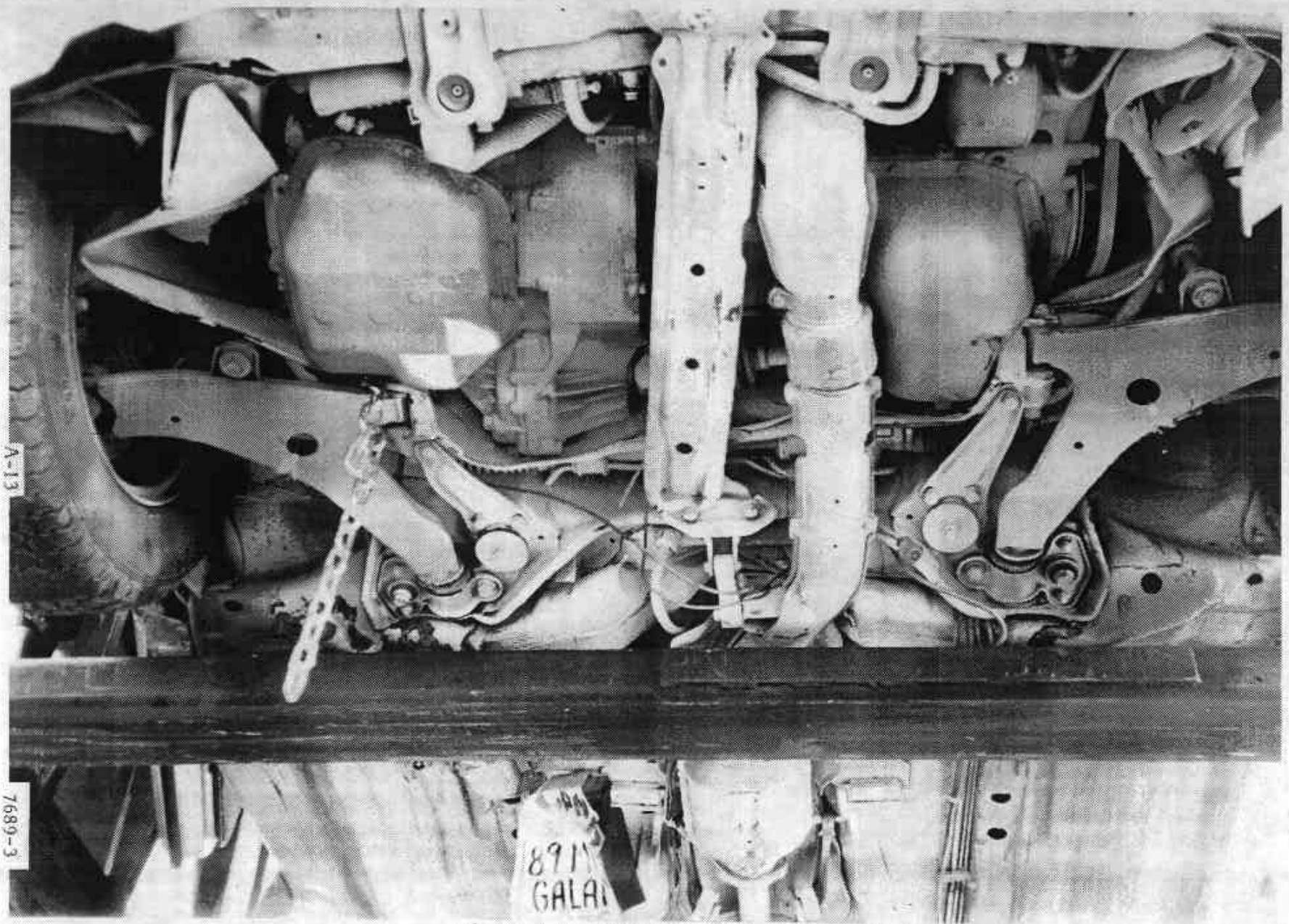
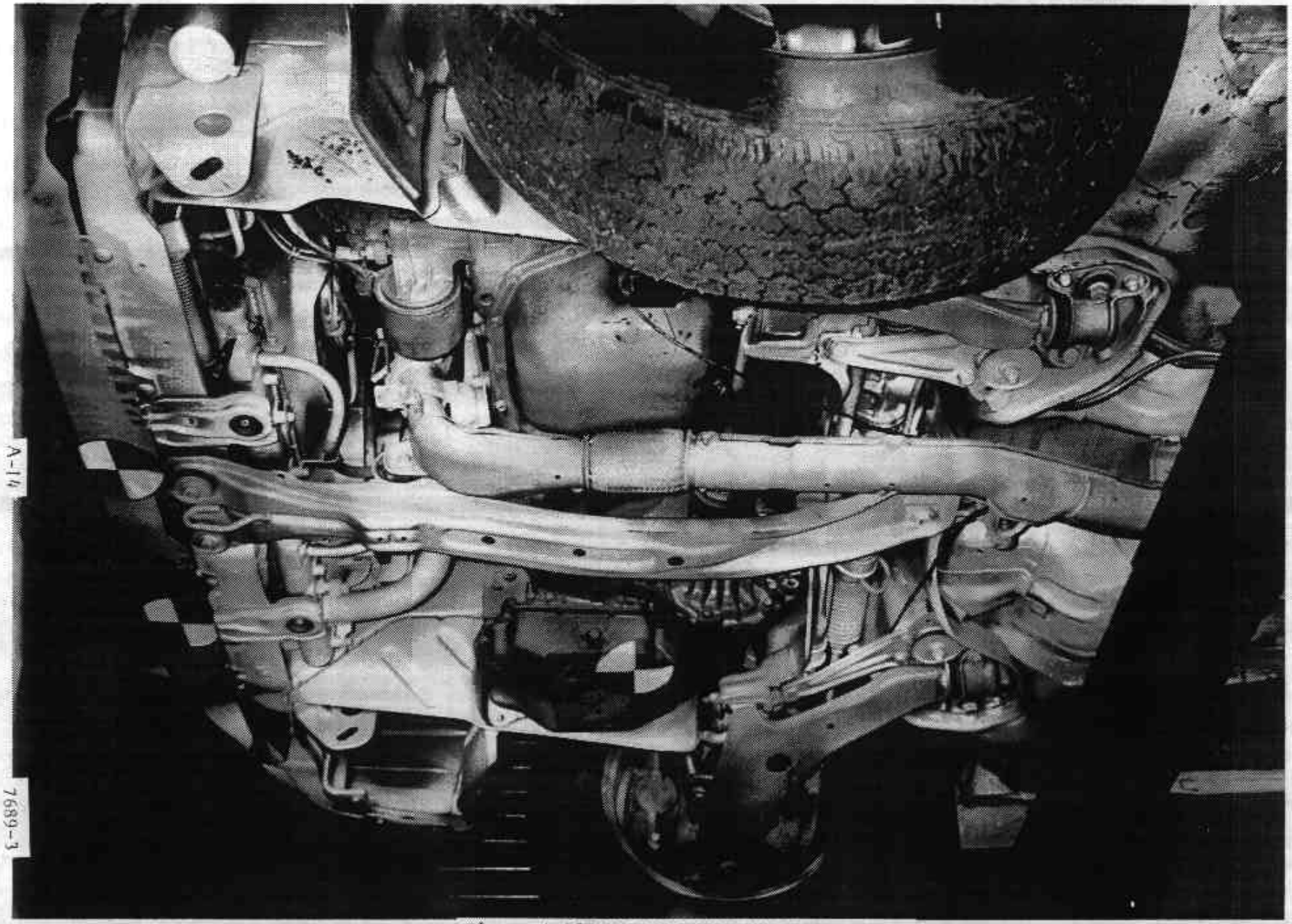


Figure A-12 POST-TEST FRONT UNDERBODY VIEW



A-14

7689-3

Figure A-13 PRE-TEST SIDE UNDERBODY VIEW

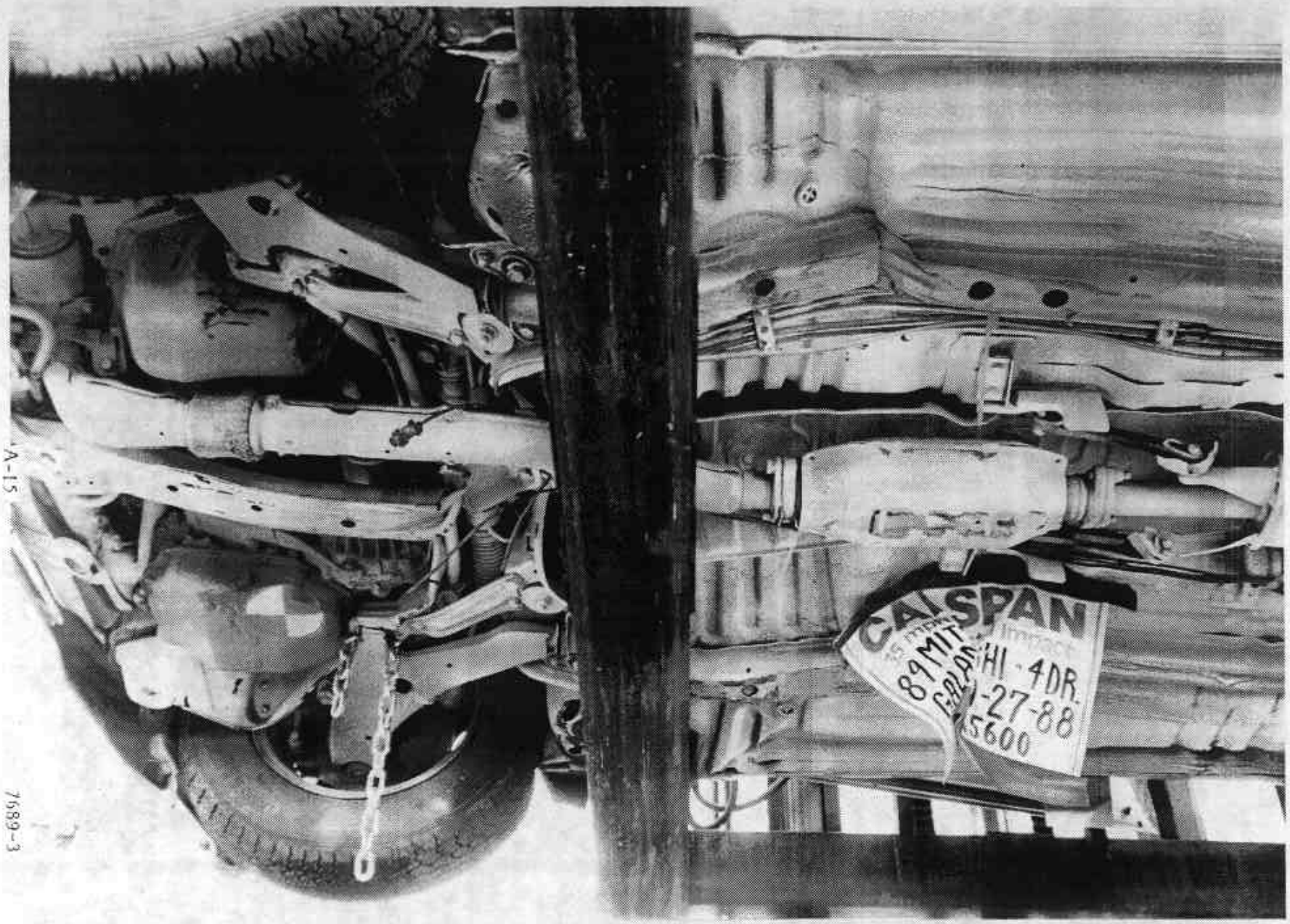


Figure A-14 POST-TEST SIDE UNDERBODY VIEW

7689-3

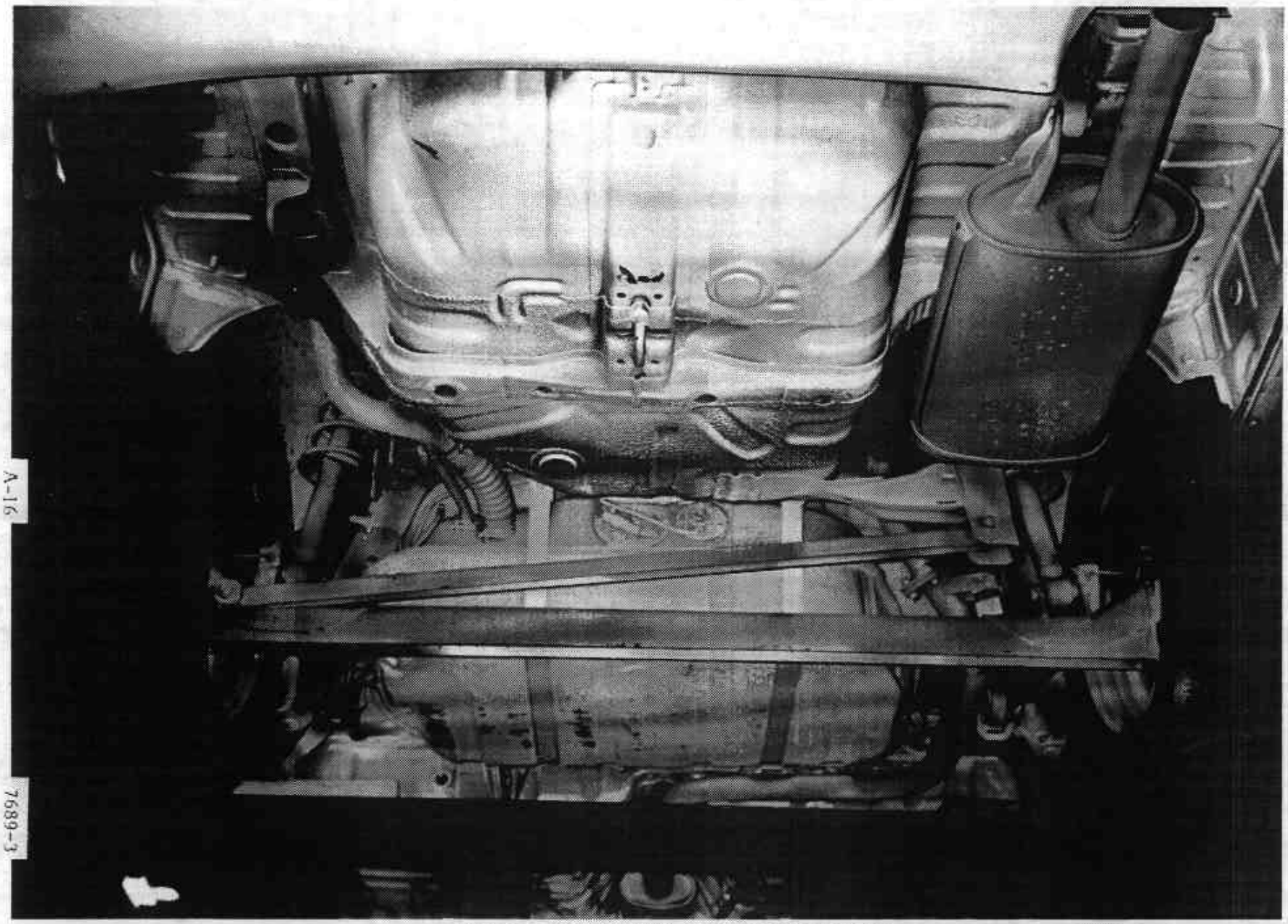


Figure A-15 PRE-TEST REAR UNDERBODY VIEW

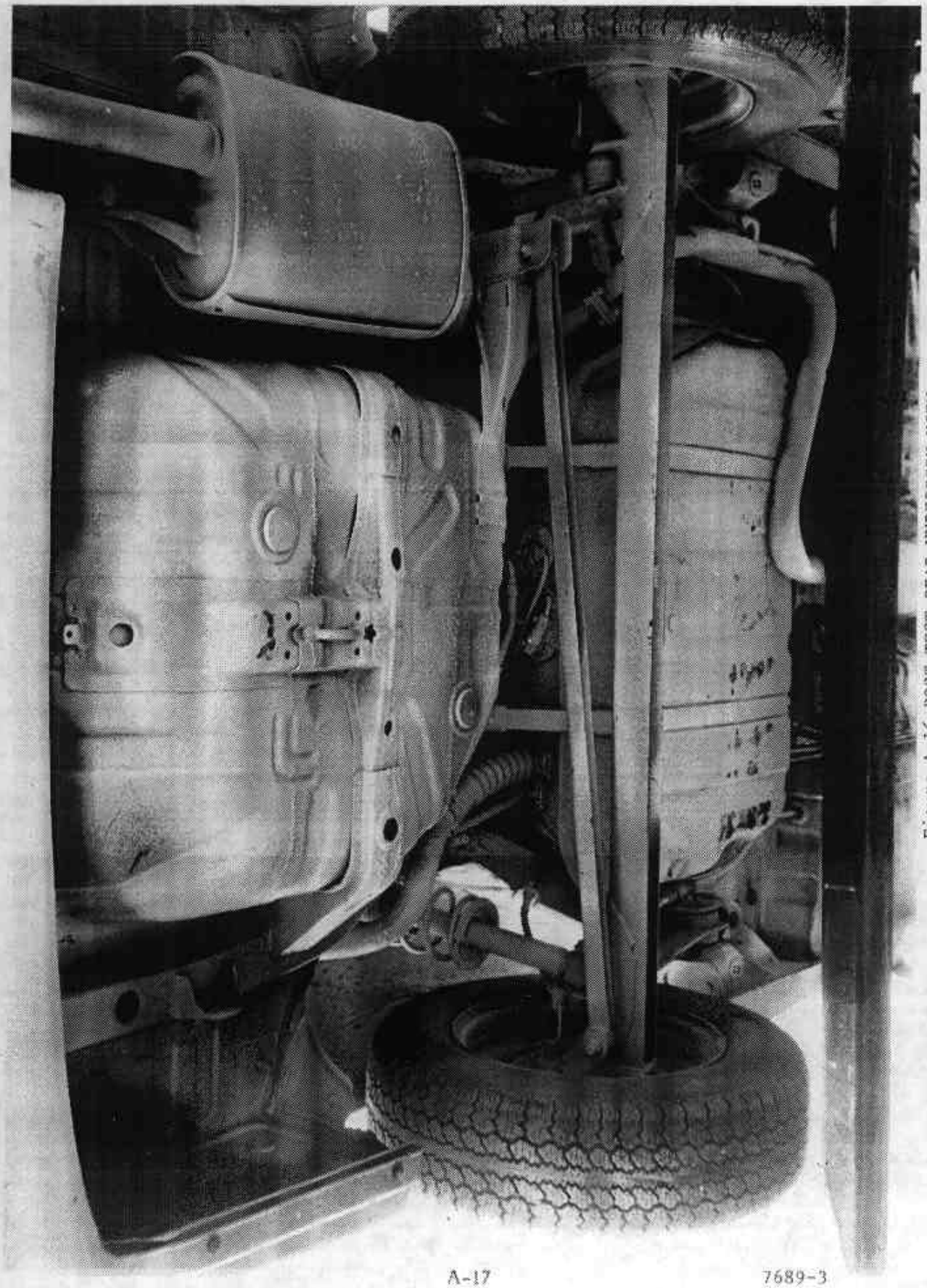


Figure A-16 POST-TEST REAR UNDERBODY VIEW

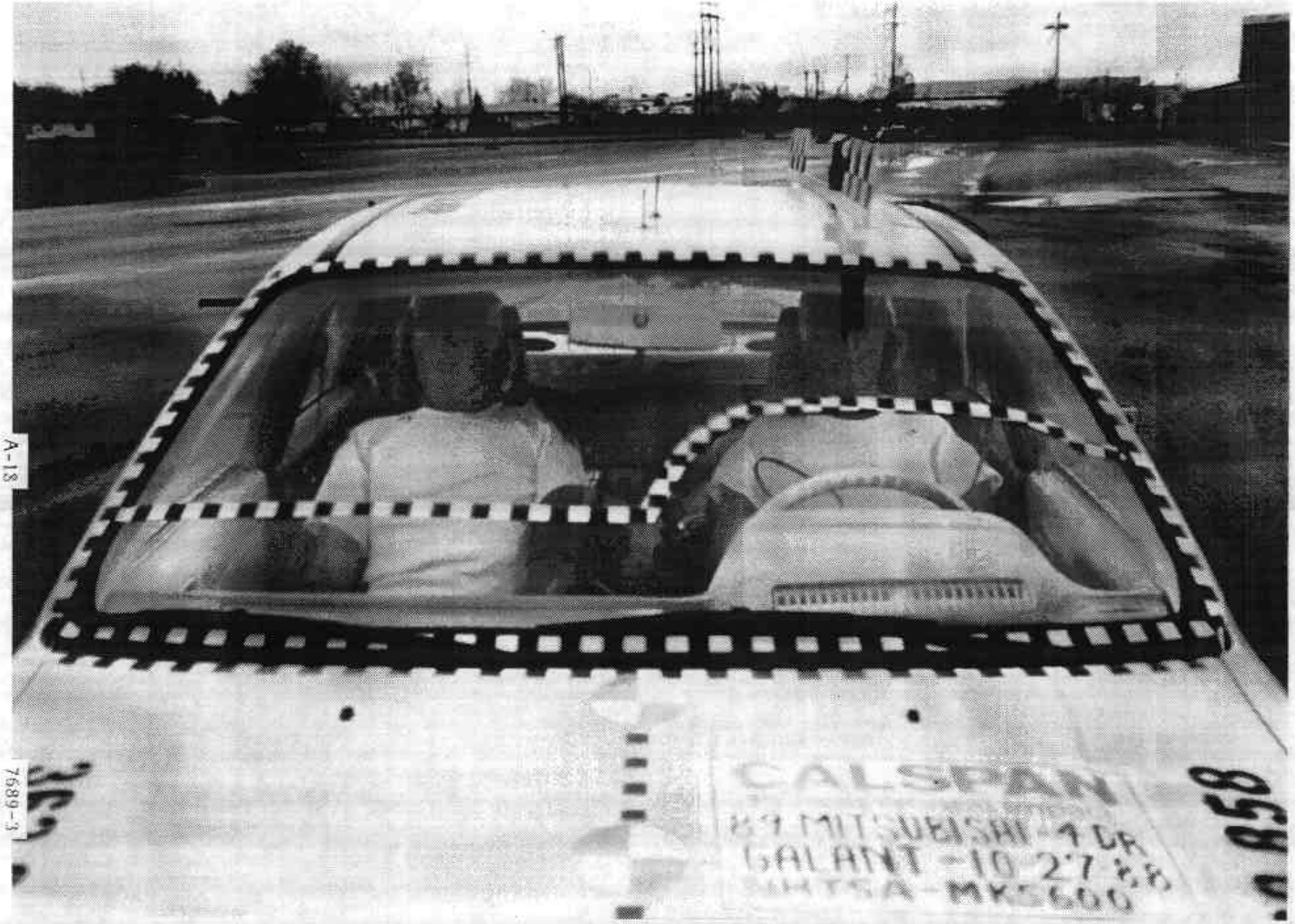
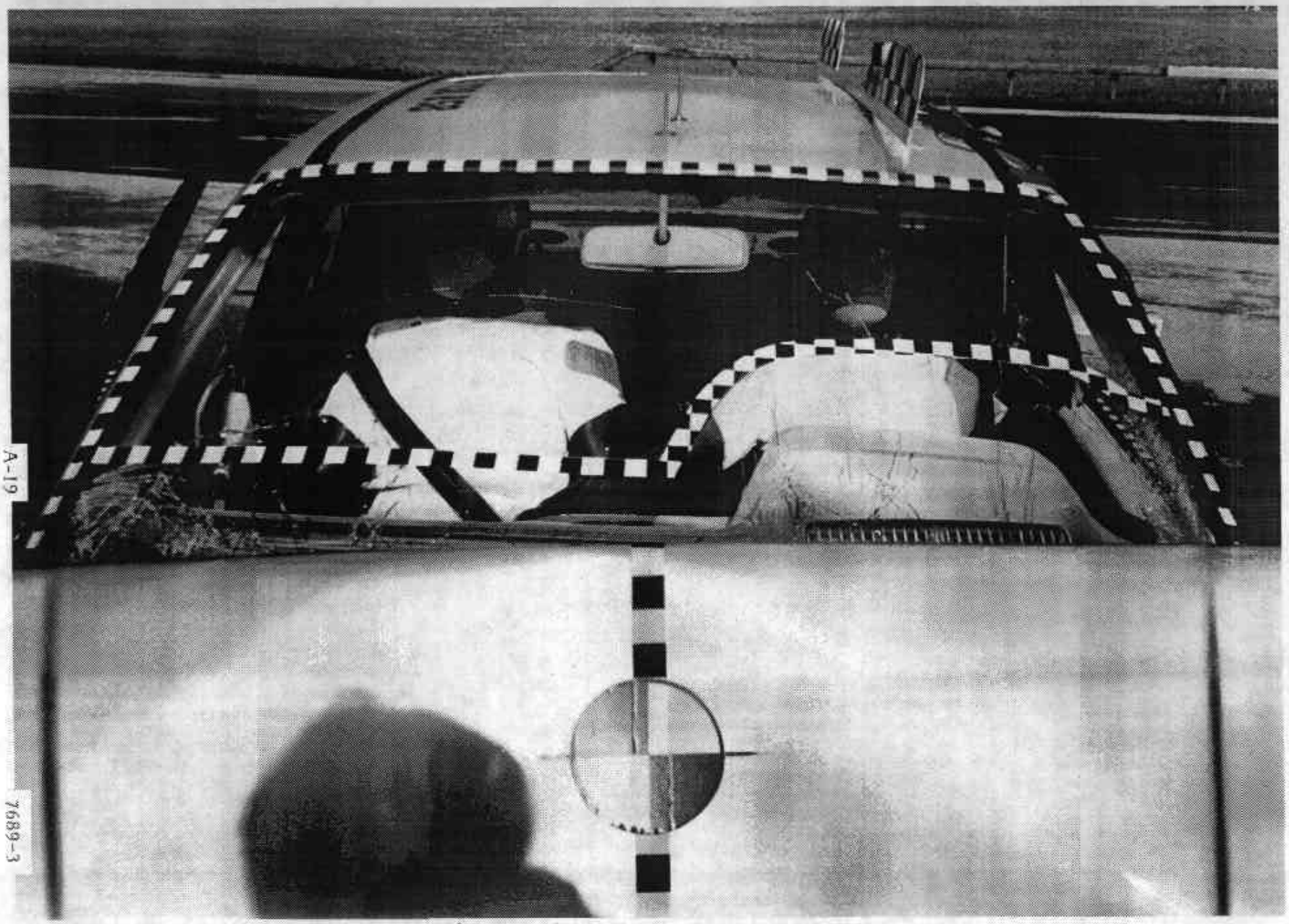


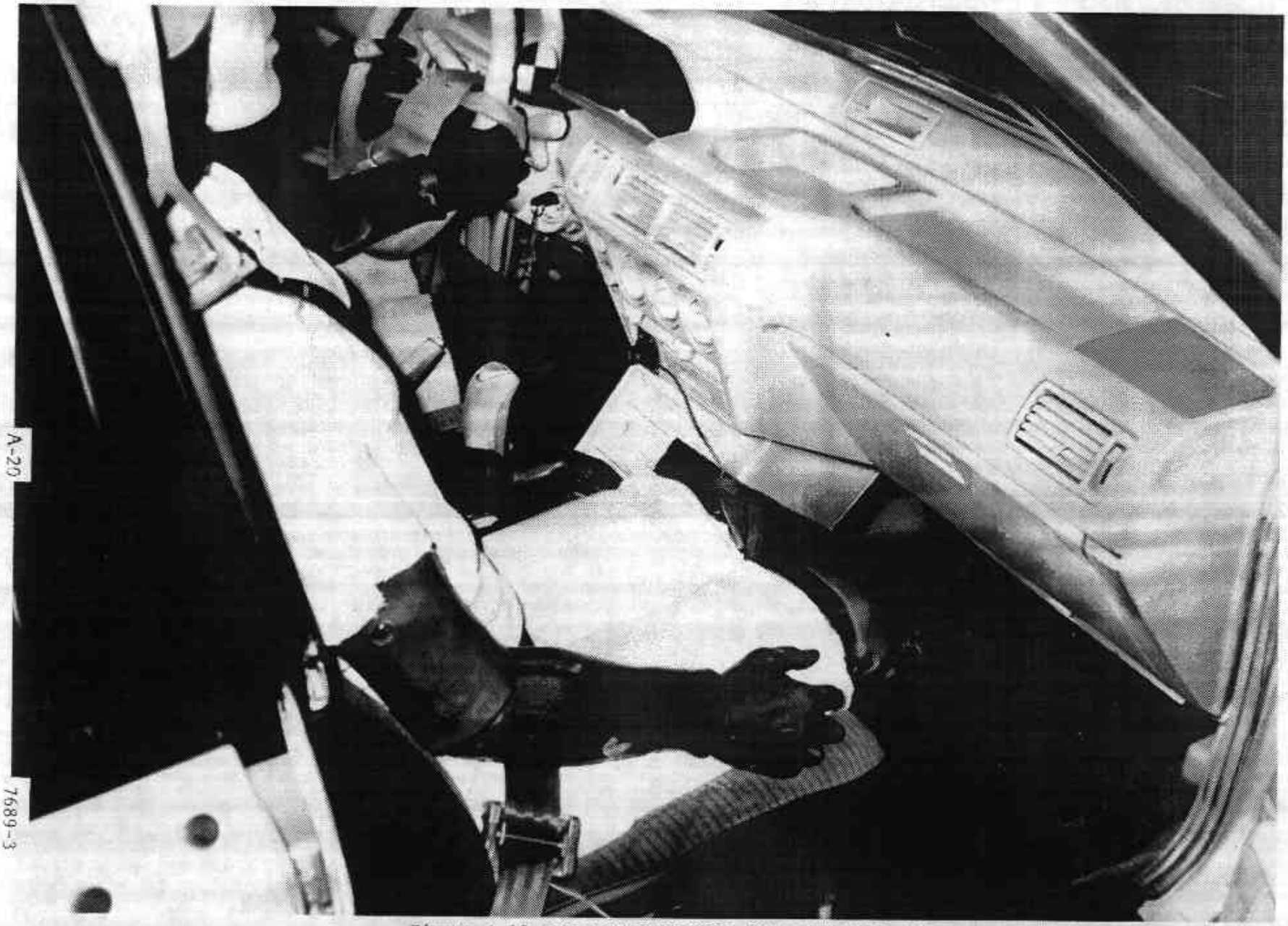
Figure A-17 PRE-TEST FRONT WINDSHIELD



A-19

7689-3

Figure A-18 POST-TEST FRONT WINDSHIELD



A-20

7689-3

Figure A-19 PRE-TEST PASSENGER SIDE INTERIOR VIEW

Figure A-20 POST-TEST PASSENGER SIDE INTERIOR VIEW

Figure A-21 PRE-TEST DRIVER SIDE INTERIOR VIEW

A-23

7689-3

Figure A-22 POST-TEST DRIVER SIDE INTERIOR VIEW

Appendix B

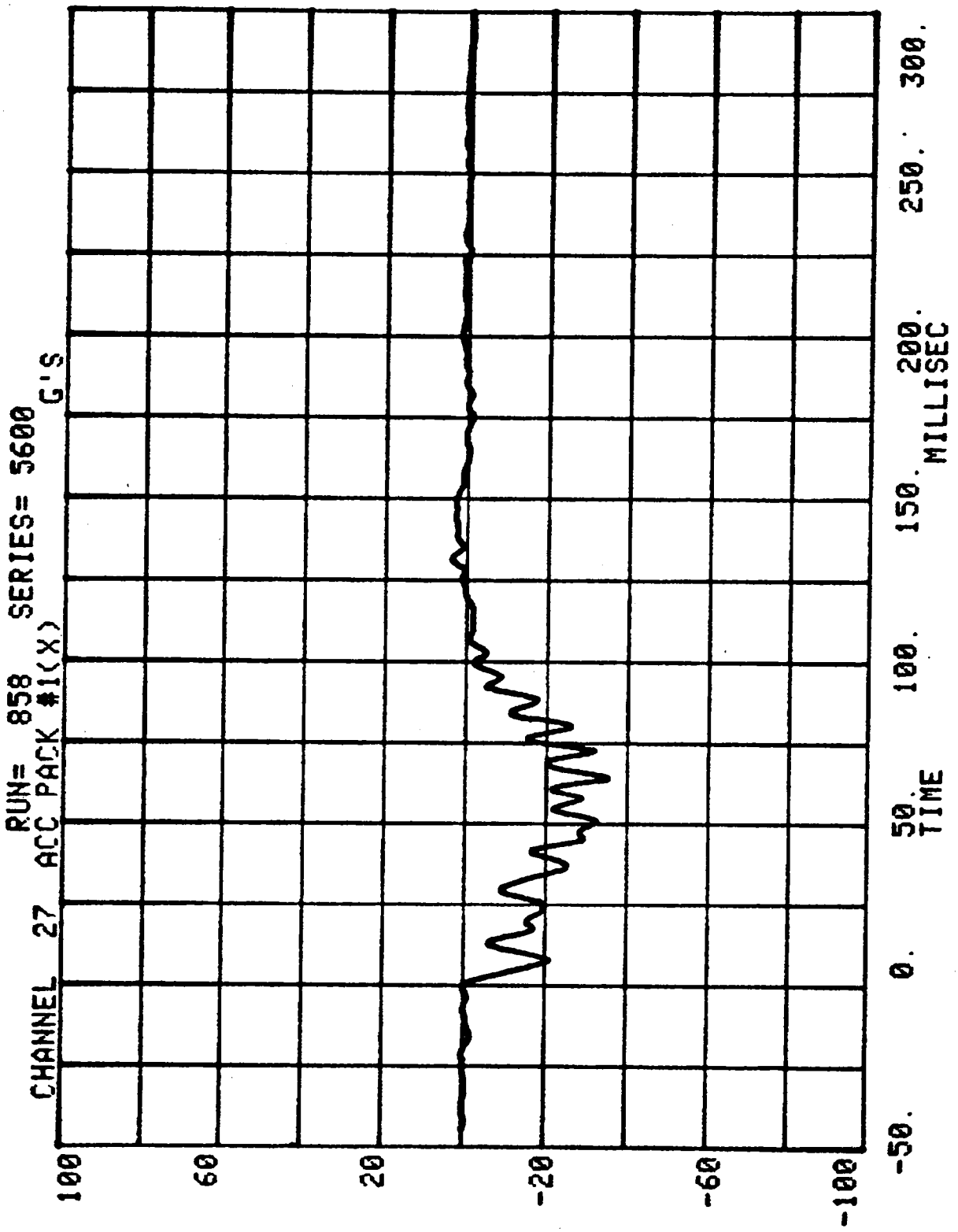
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MK5600

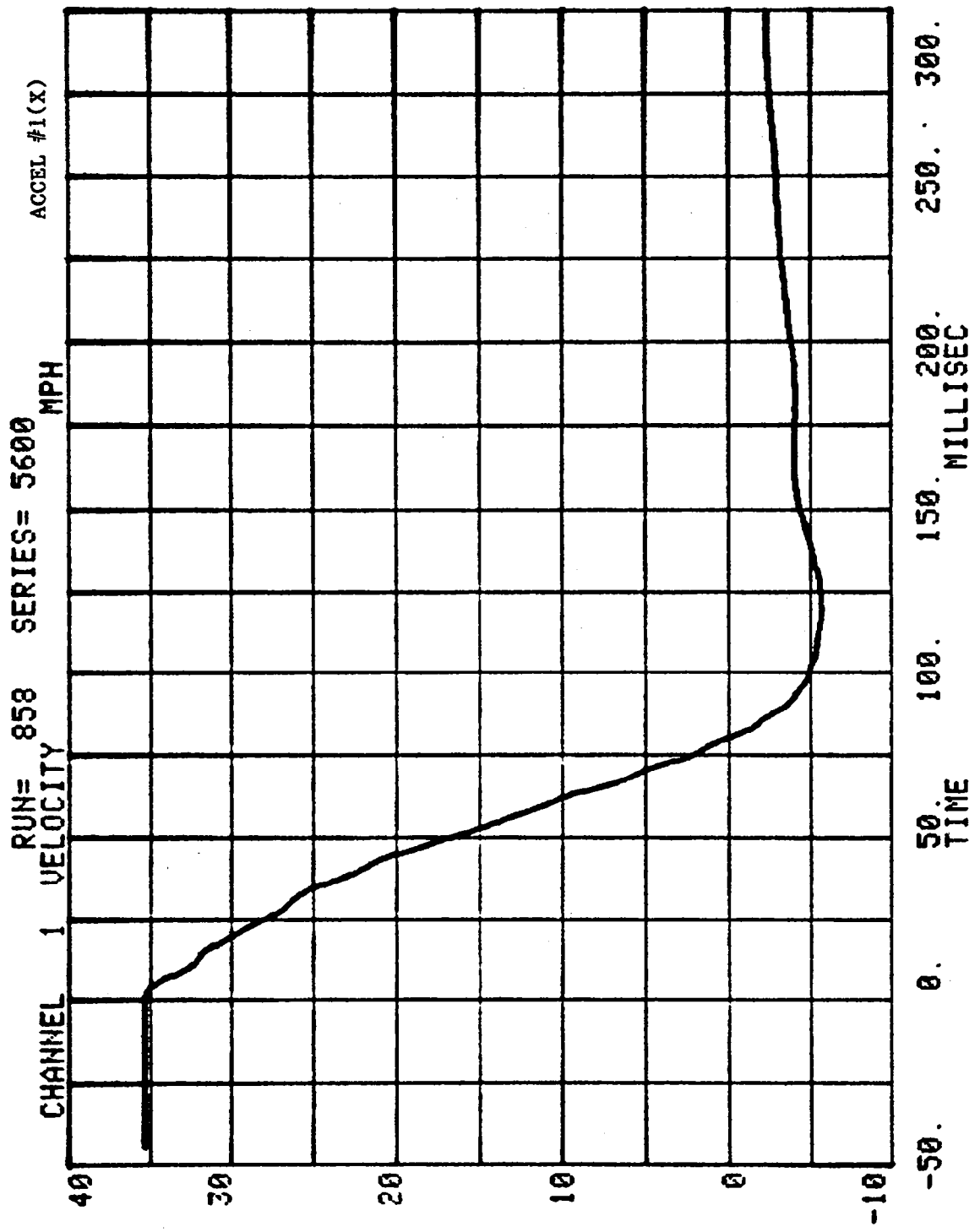
VEHICLE DATA

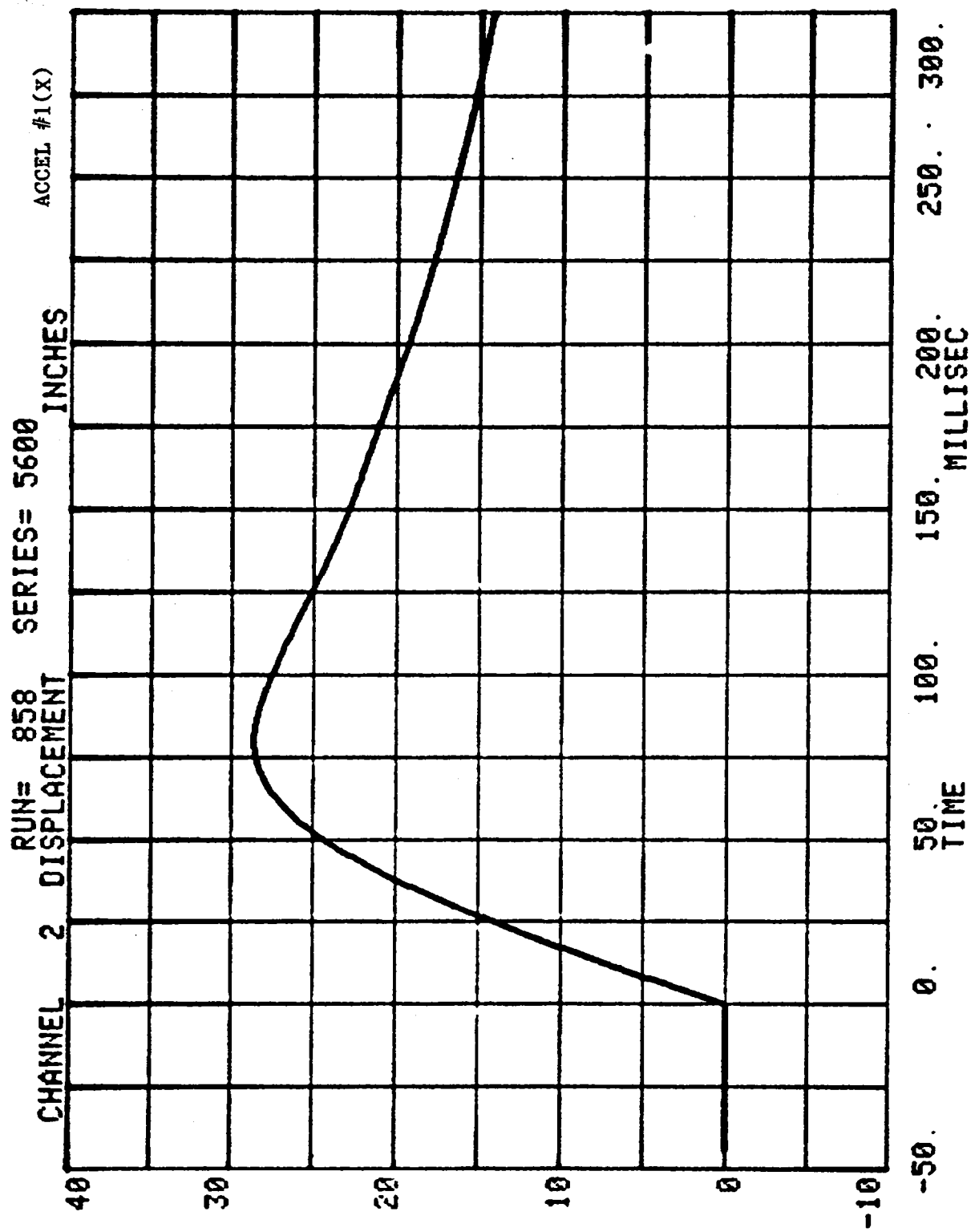
FILTER CHANNEL CLASS

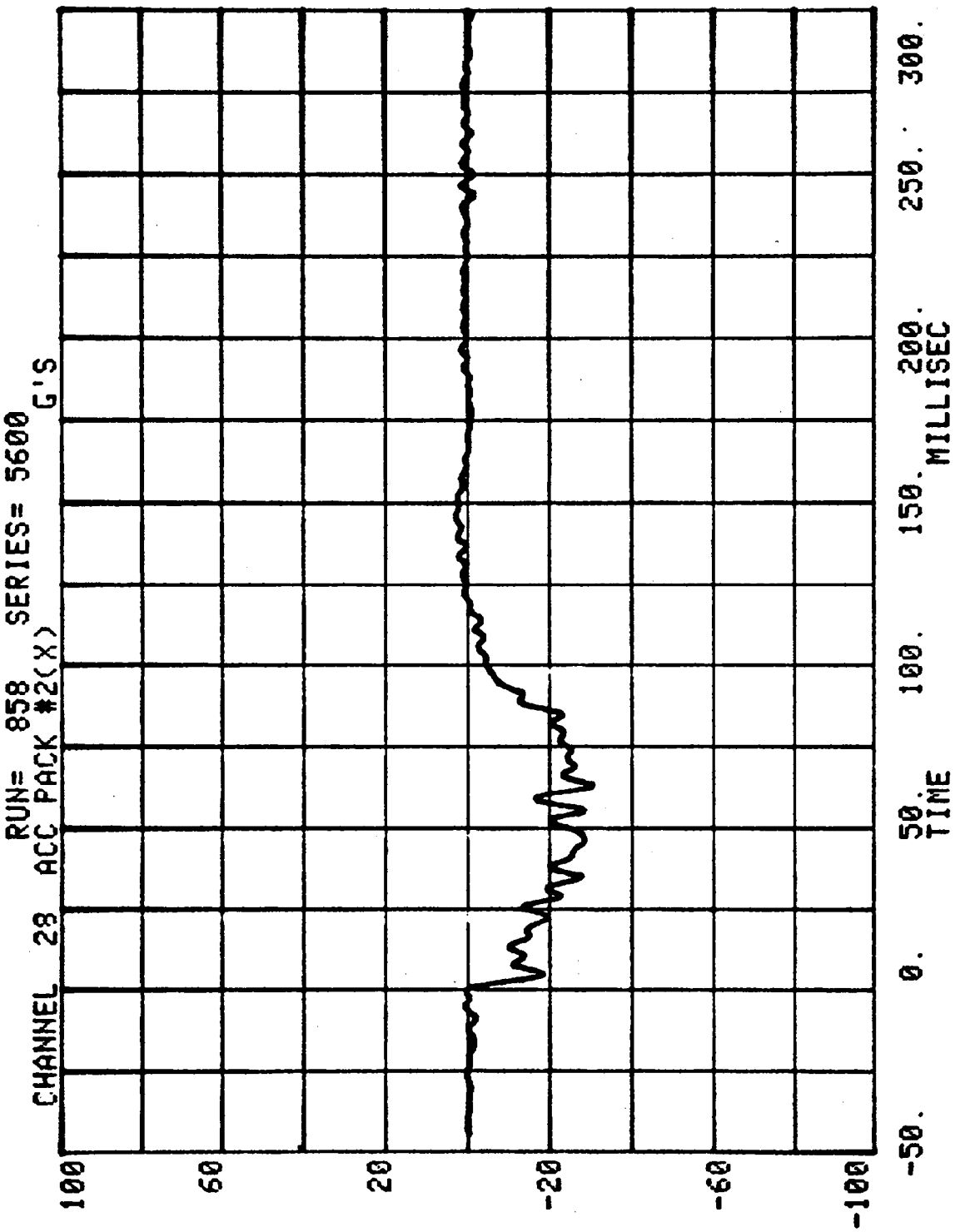
60


RUN= 858 SERIES= 5600
CHANNEL 27 ACC PACK #1(X)
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

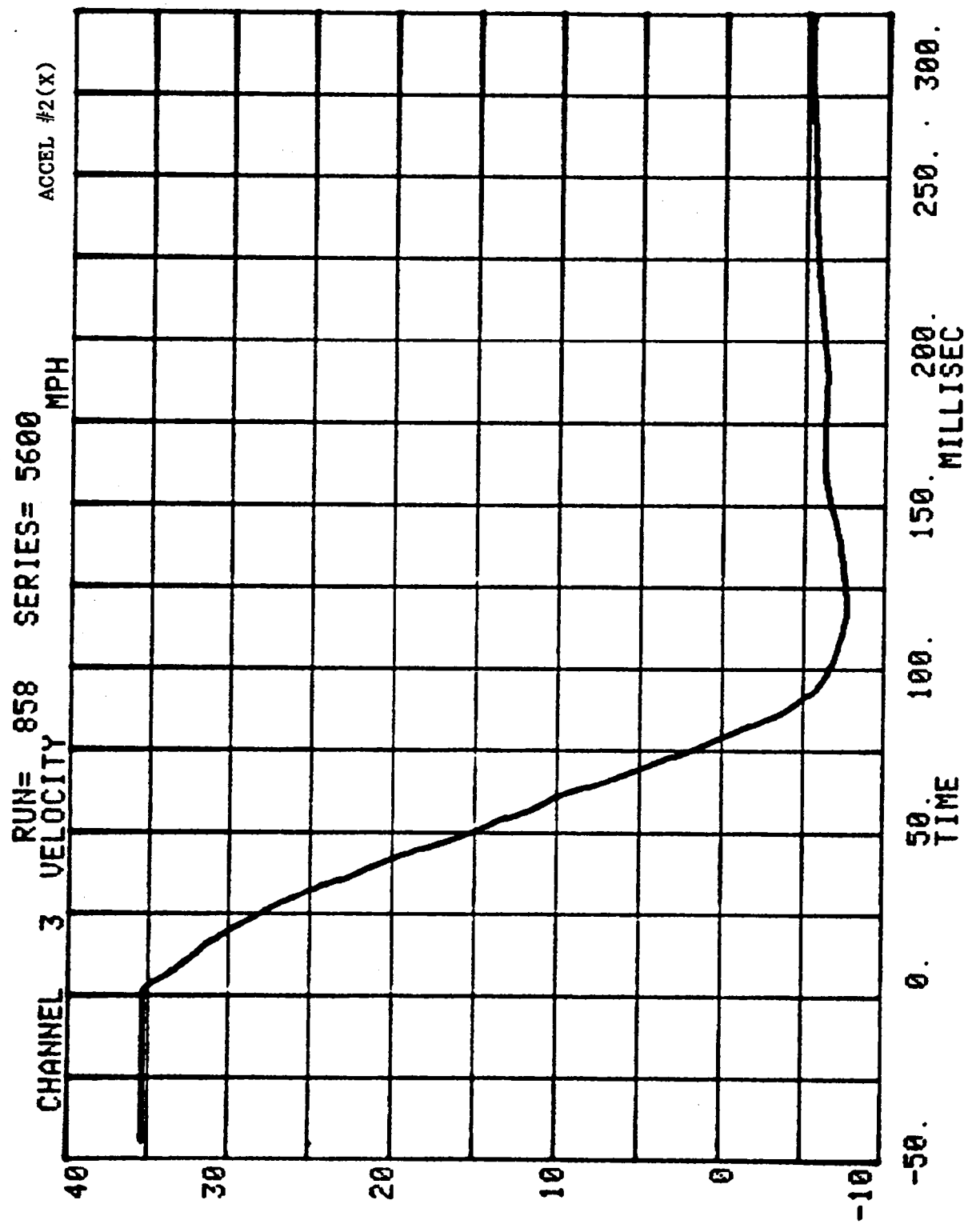
7689-3


ACCEL #1(X)
CHANNEL 1 VELOCITY
RUN= 858 SERIES= 5600
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

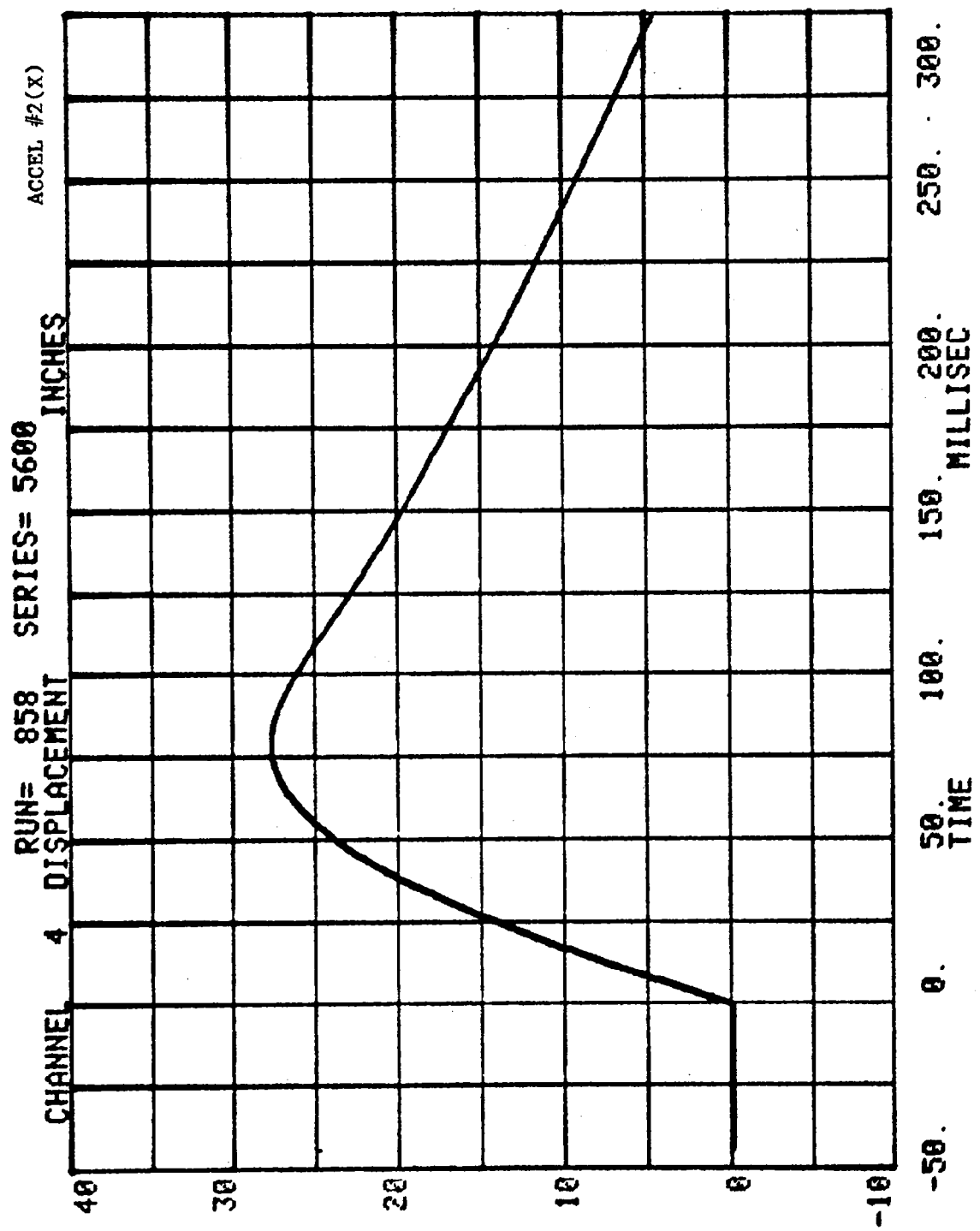

ACCEL #1(X)
CHANNEL 2 DISPLACEMENT
RUN= 858 SERIES= 5600
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

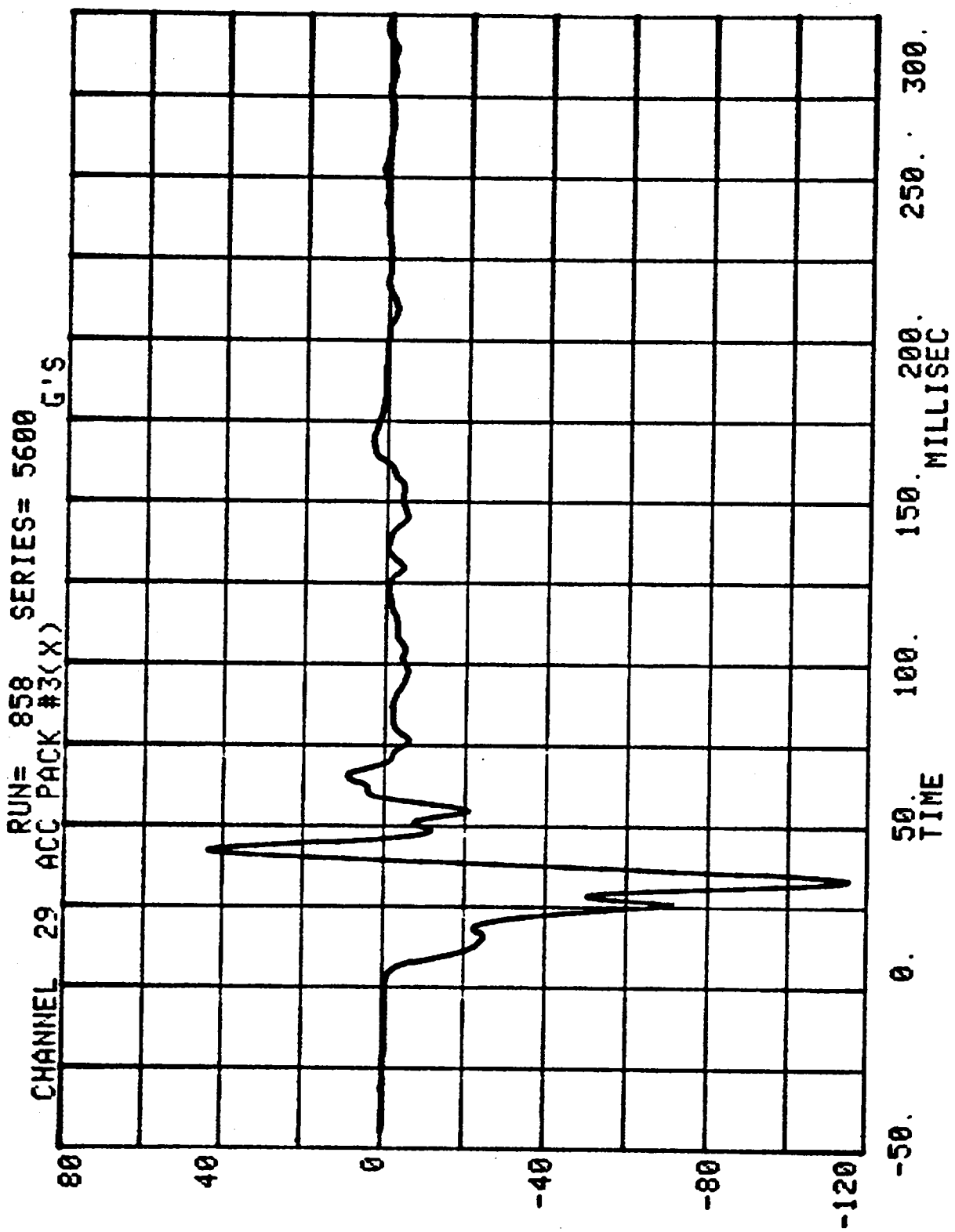

RUN= 858 SERIES= 5600
CHANNEL 28 ACC PACK #2(X)
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

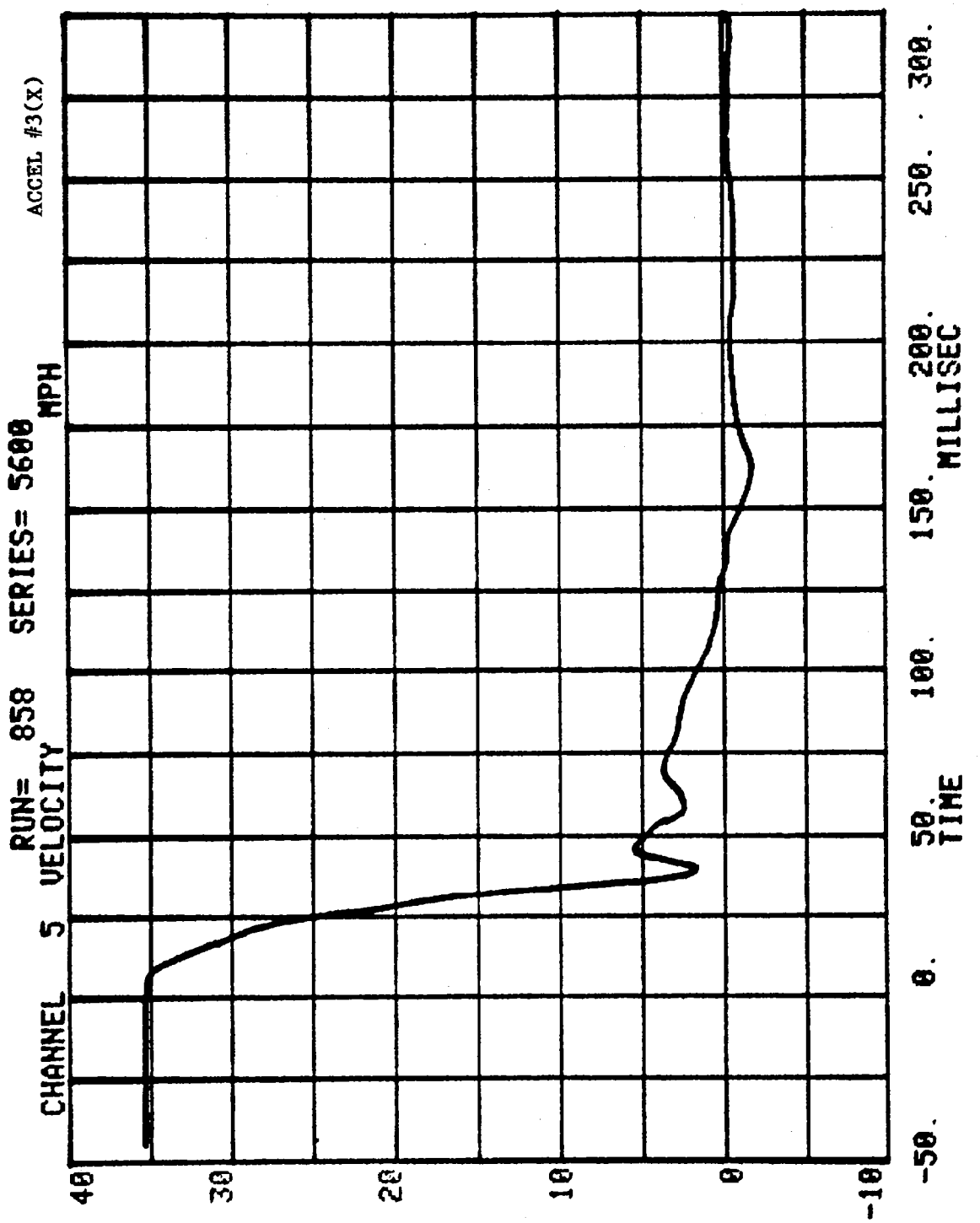
7689-3


ACCEL #2(X)
CHANNEL 3 VELOCITY
RUN= 858 SERIES= 5600 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

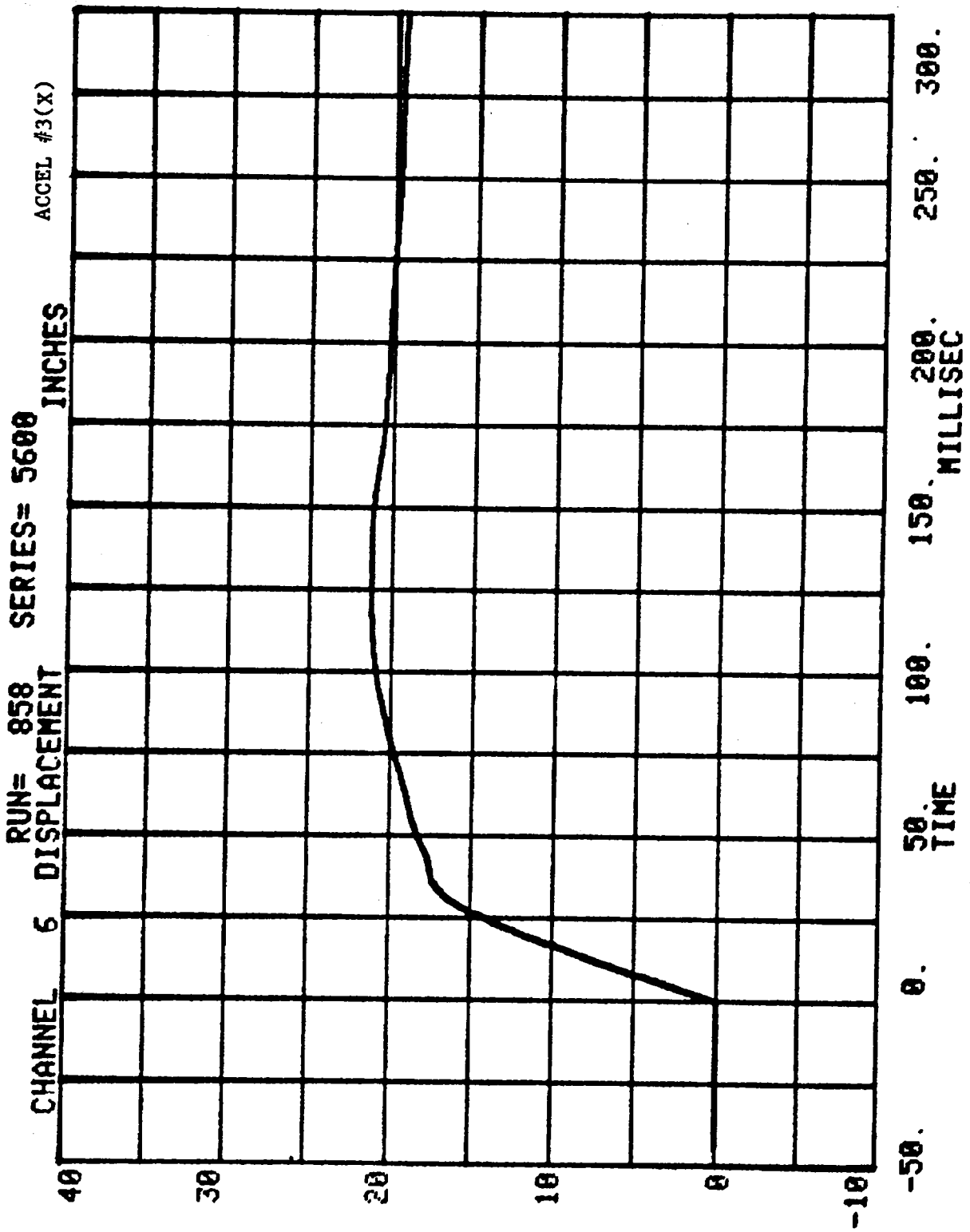
7689-3

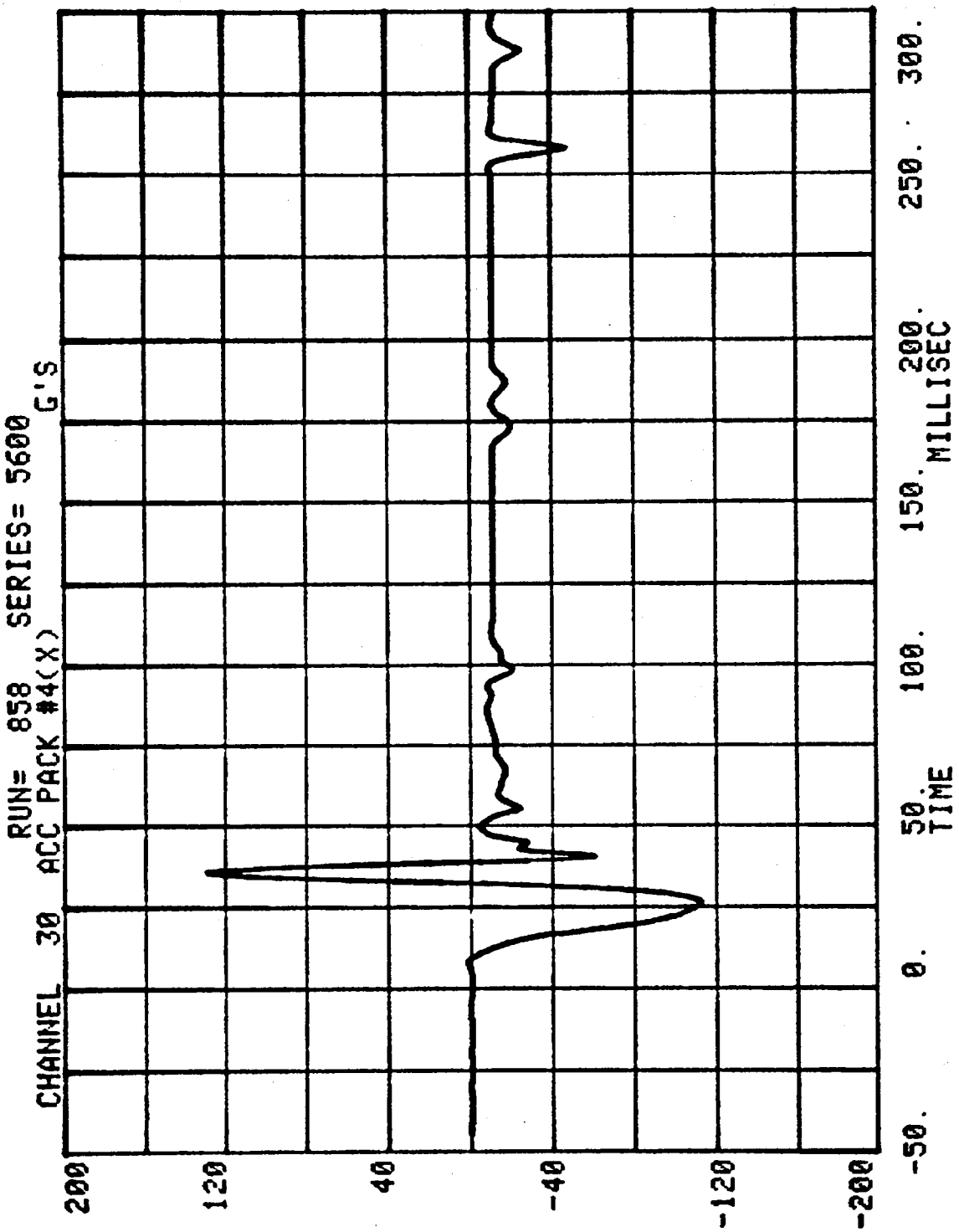

ACCEL #2(X)
CHANNEL 4 DISPLACEMENT
RUN= 858 SERIES= 5600
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 29 ACC PACK #3(X)
RUN= 858 SERIES= 5600
G'S
80
40
0
-40
-80
-120
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

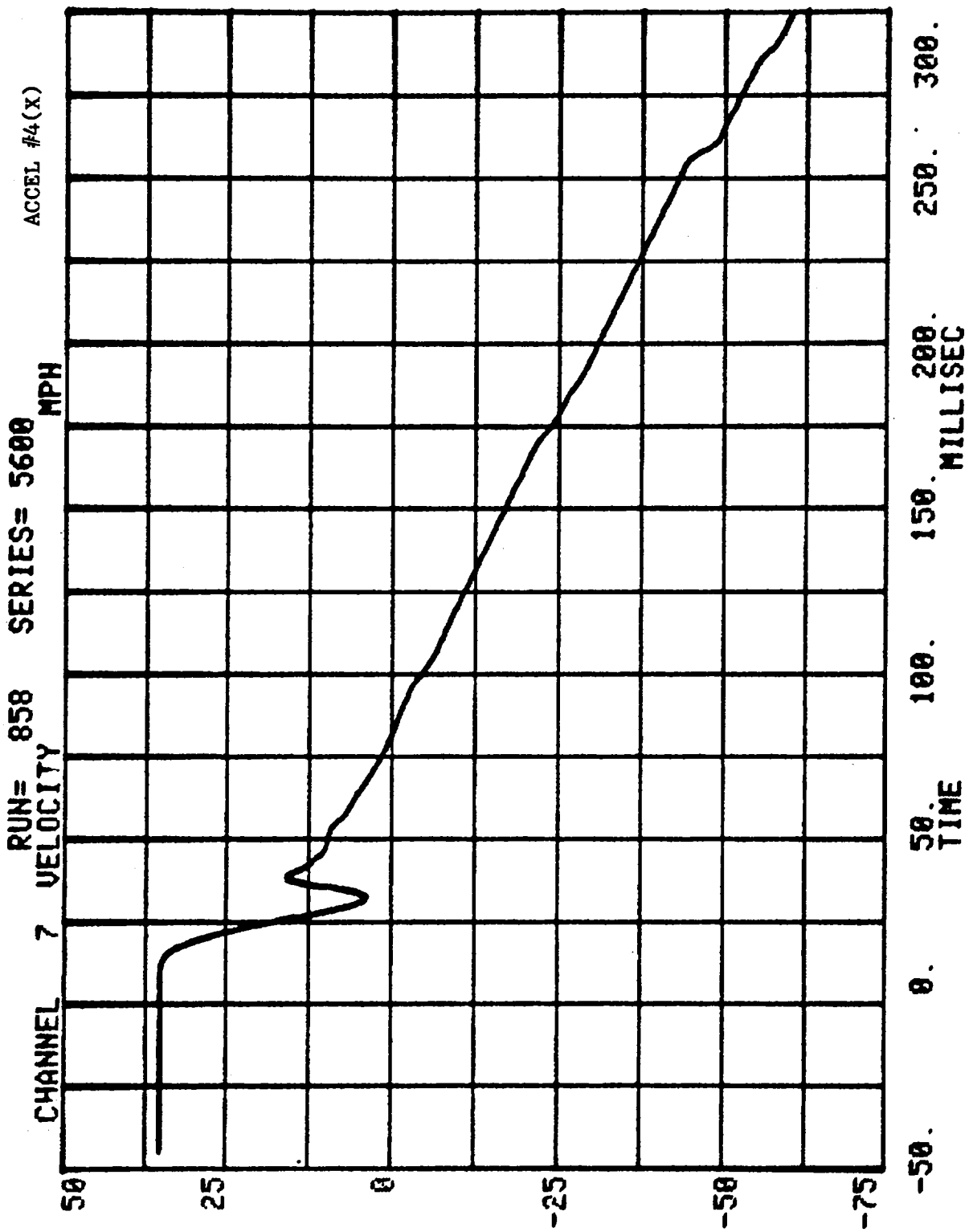

ACCEL #3(X)
CHANNEL 5 VELOCITY
RUN= 858 SERIES= 5600 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

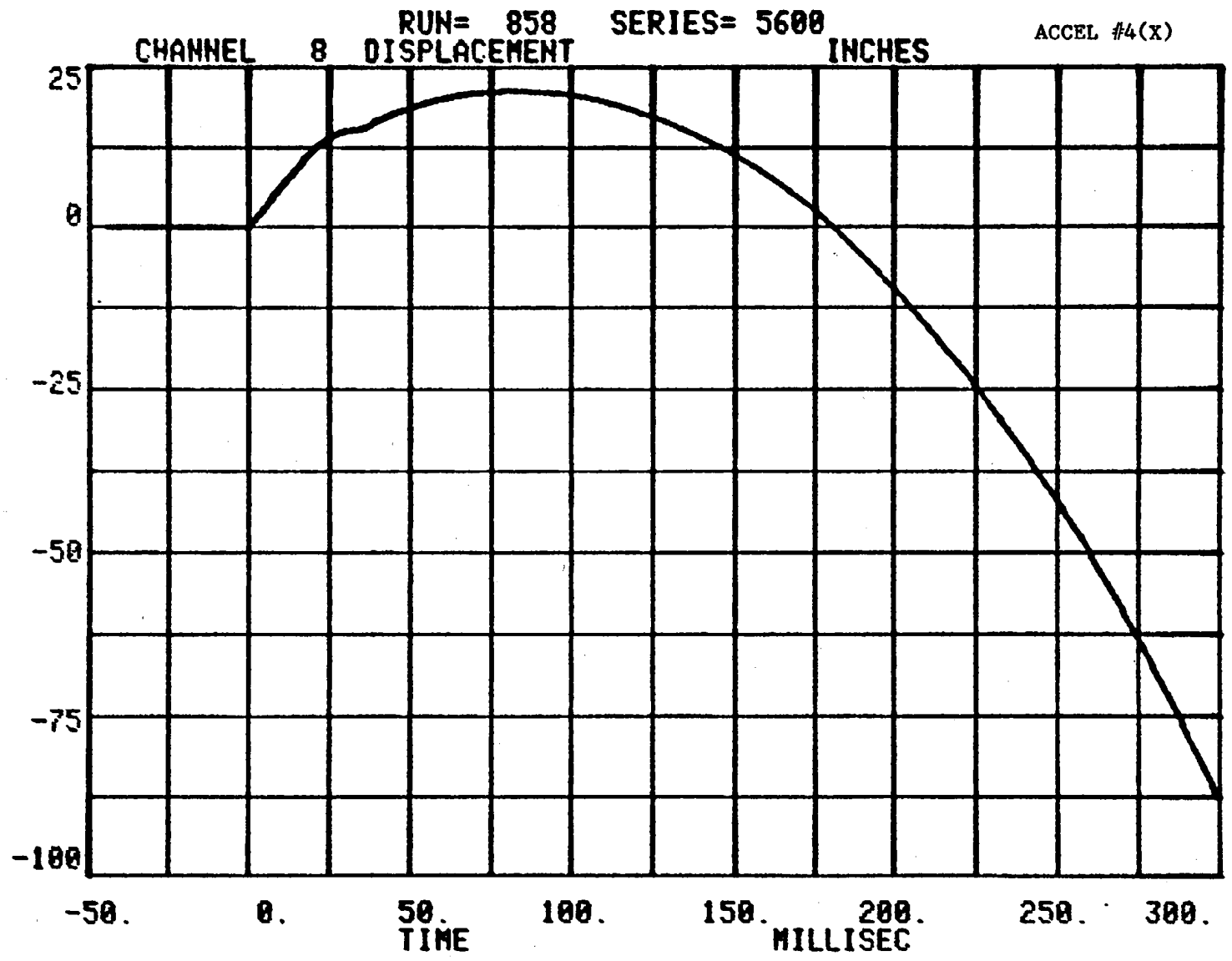

ACCEL #3(X)
CHANNEL 6 DISPLACEMENT
RUN= 858 SERIES= 5600
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

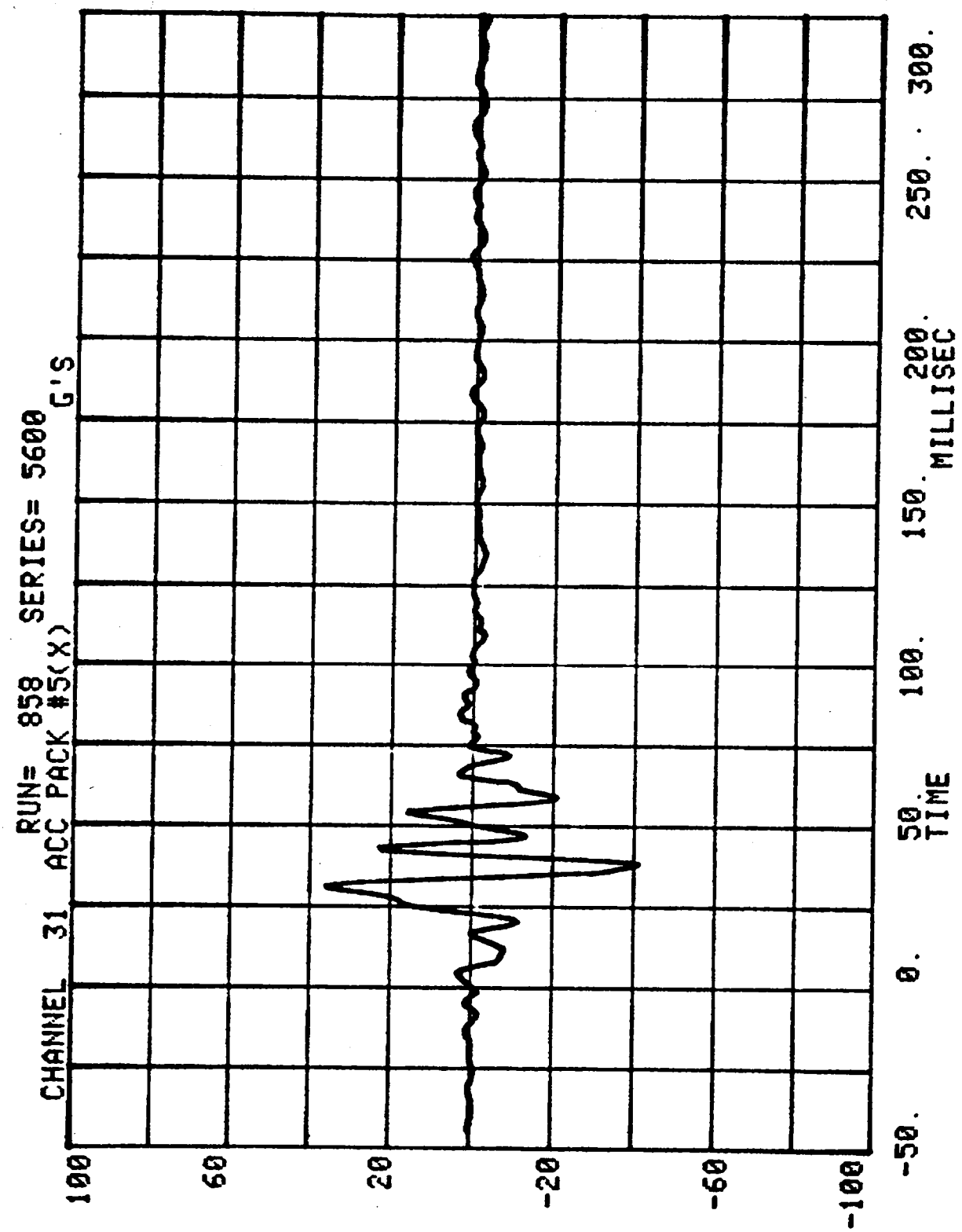

RUN= 858 SERIES= 5600
CHANNEL 30 ACC PACK #4(X)
G'S
200
120
40
-40
-120
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

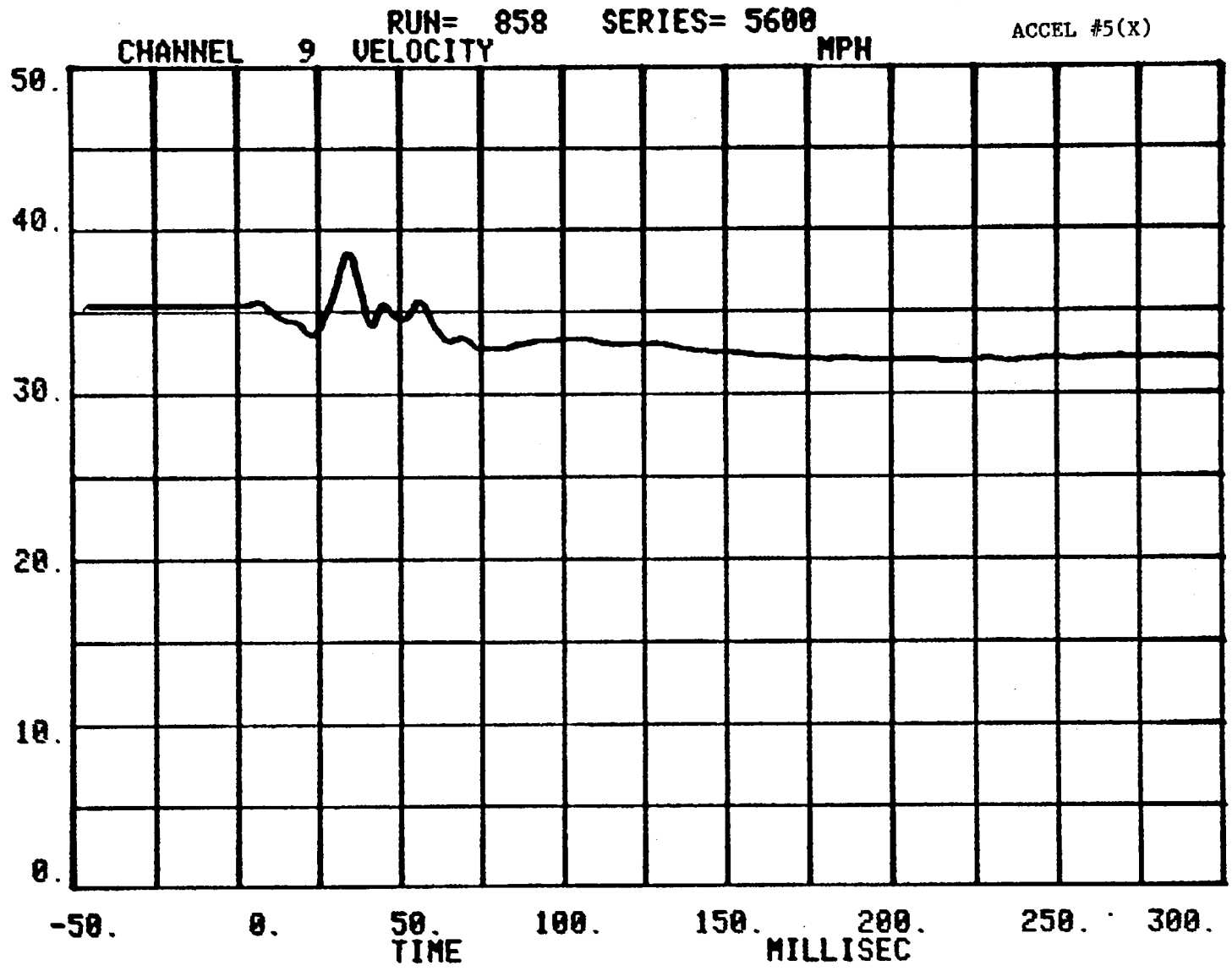
7689-3


ACCEL #4(X)
CHANNEL 7 VELOCITY
RUN= 858 SERIES= 5600 MPH
50
25
0
-25
-50
-75
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

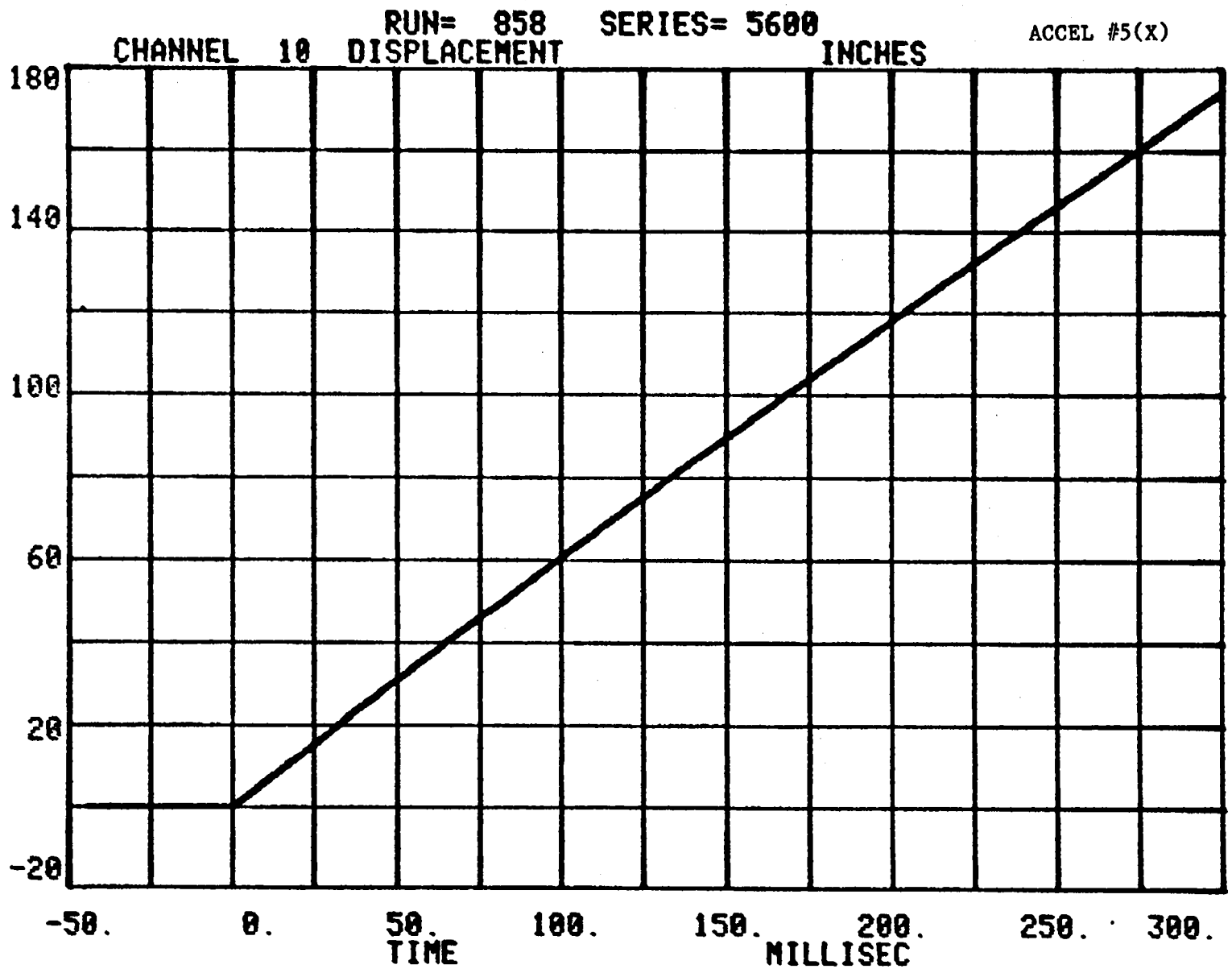
7689-3

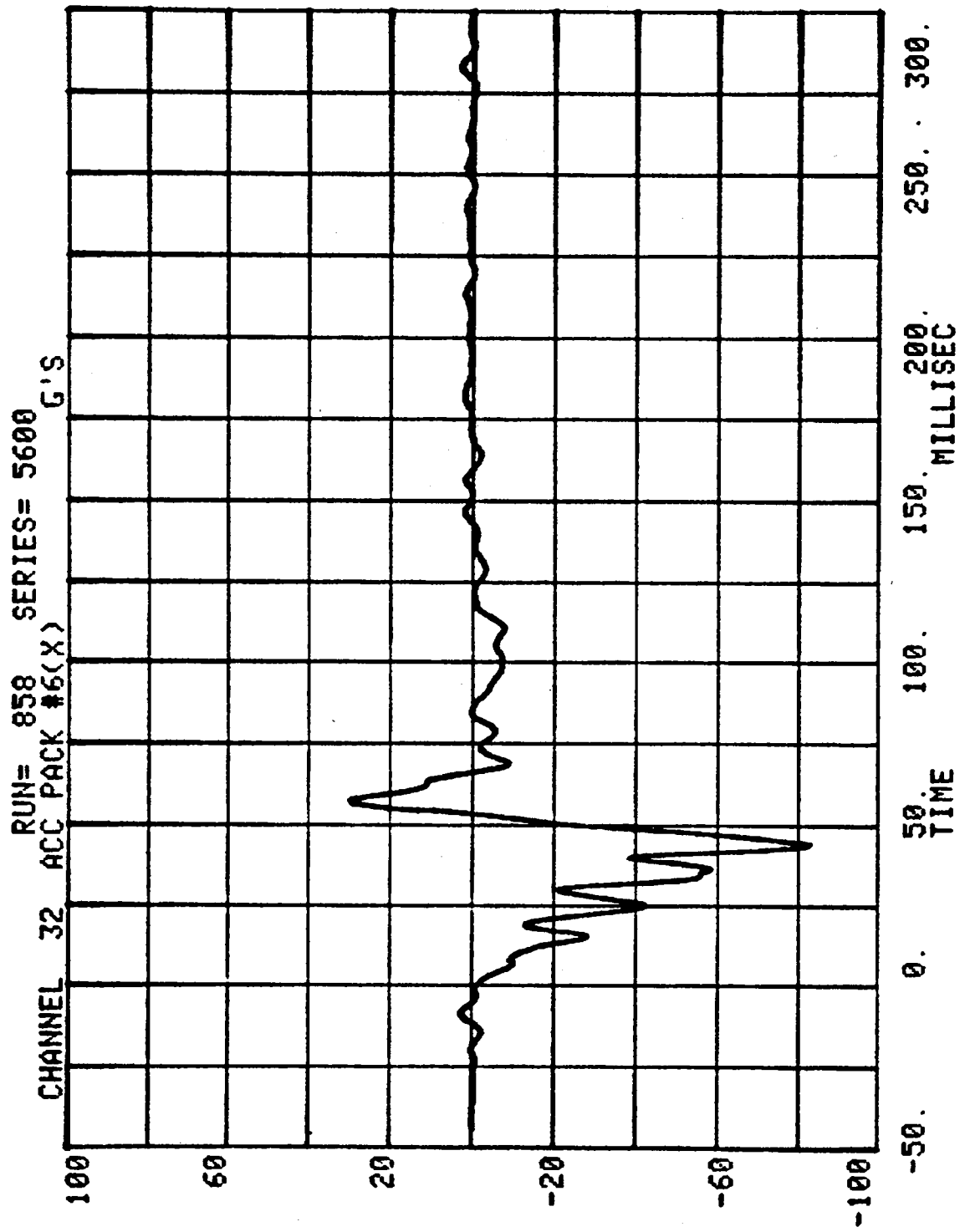

RUN= 858 SERIES= 5600
CHANNEL 8 DISPLACEMENT
INCHES
ACCEL #4(X)
25
0
-25
-50
-75
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 31 ACC PACK #5(X)
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

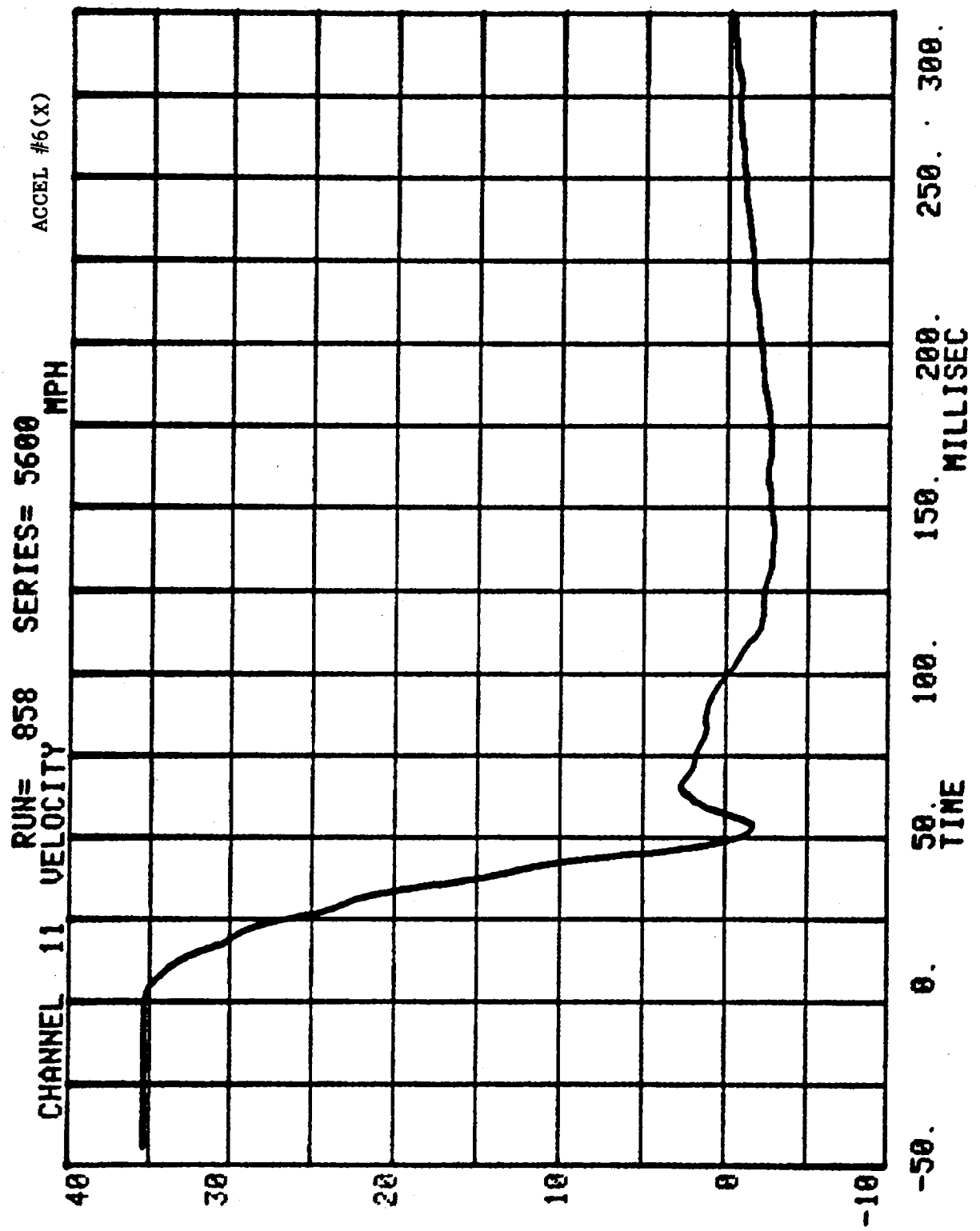

RUN= 858 SERIES= 5600
ACCEL #5(X)
CHANNEL 9 VELOCITY
MPH
50.
40.
30.
20.
10.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

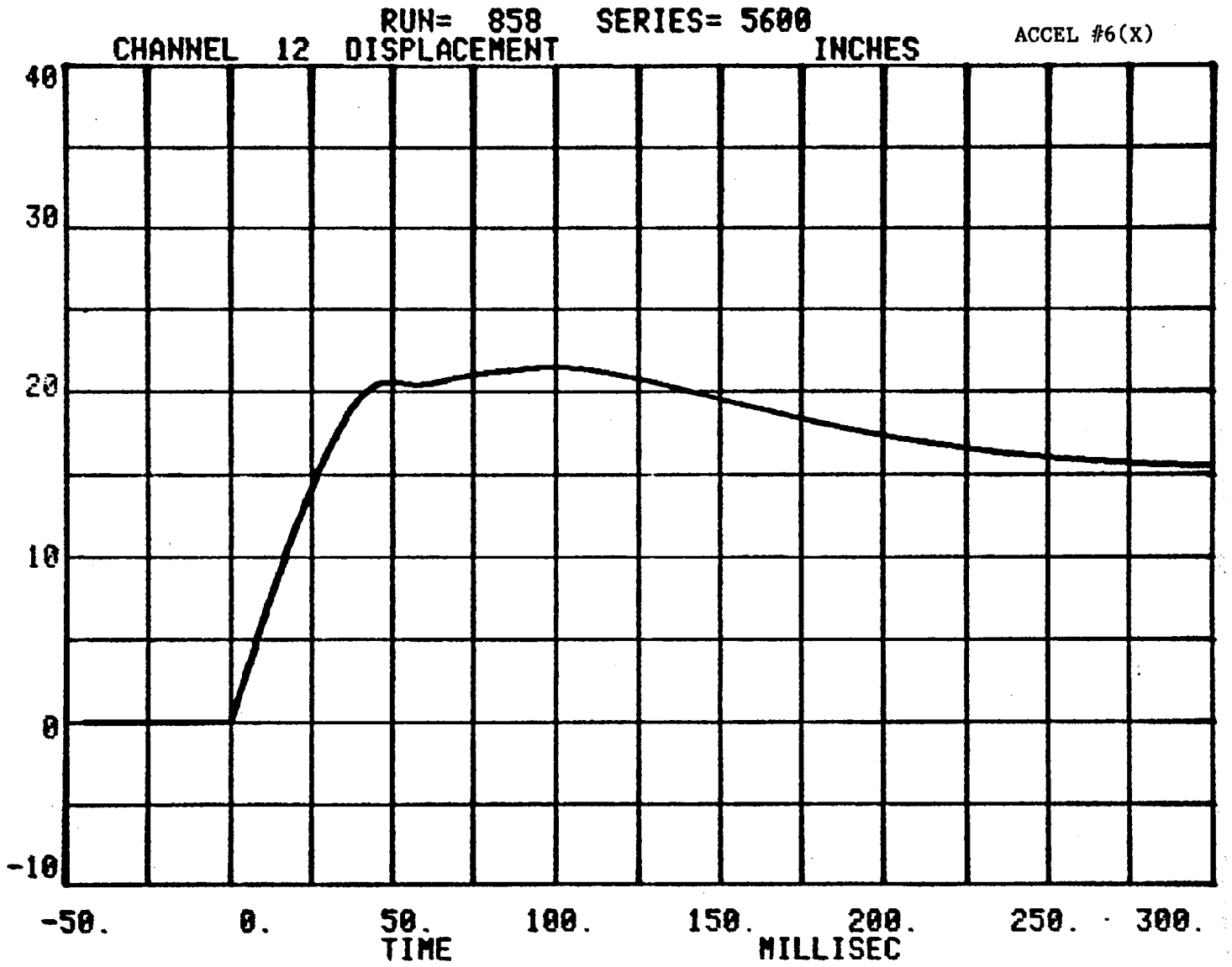
7689-3

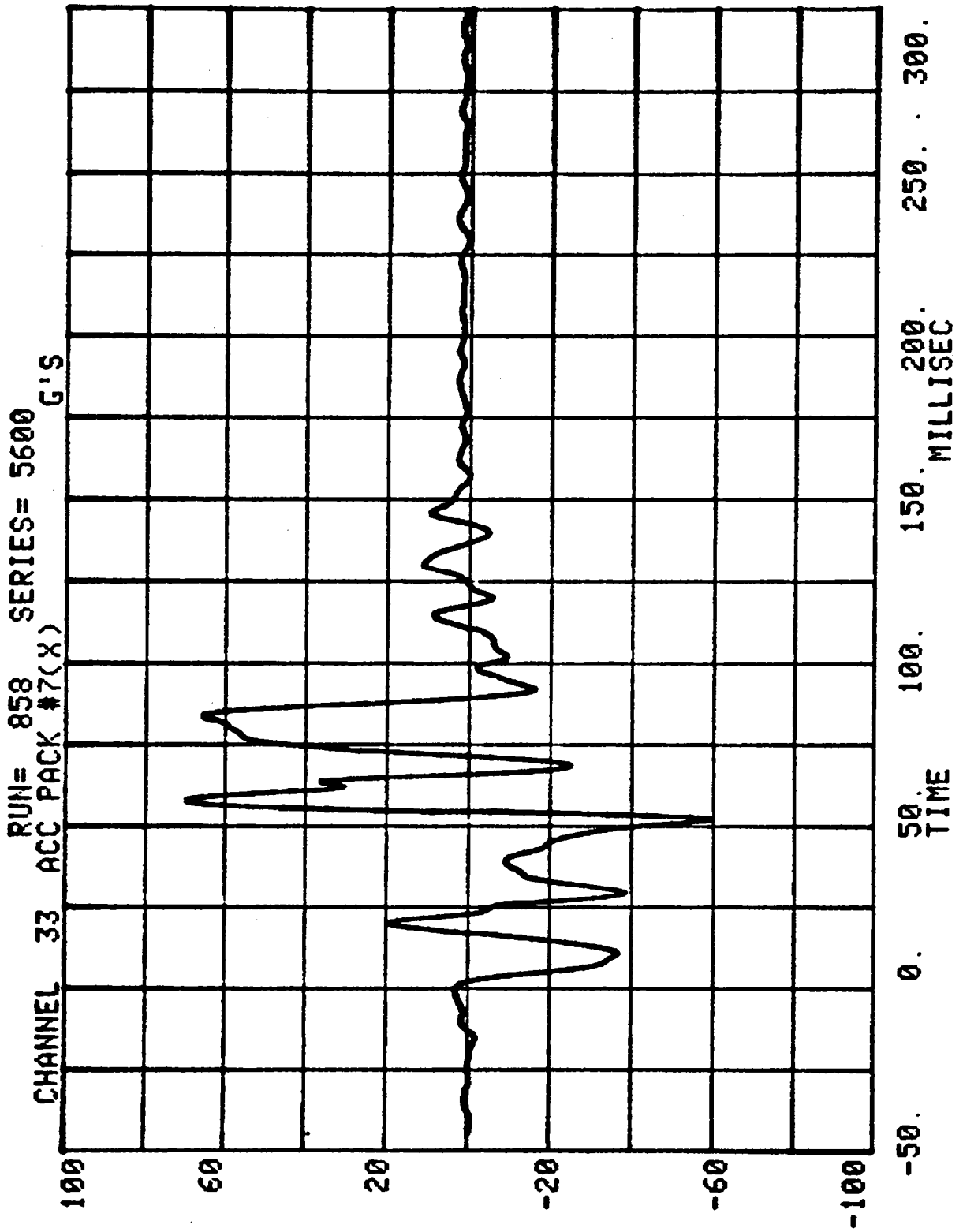

RUN= 858 SERIES= 5600
CHANNEL 10 DISPLACEMENT INCHES
ACCEL #5(X)
180
140
100
60
20
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

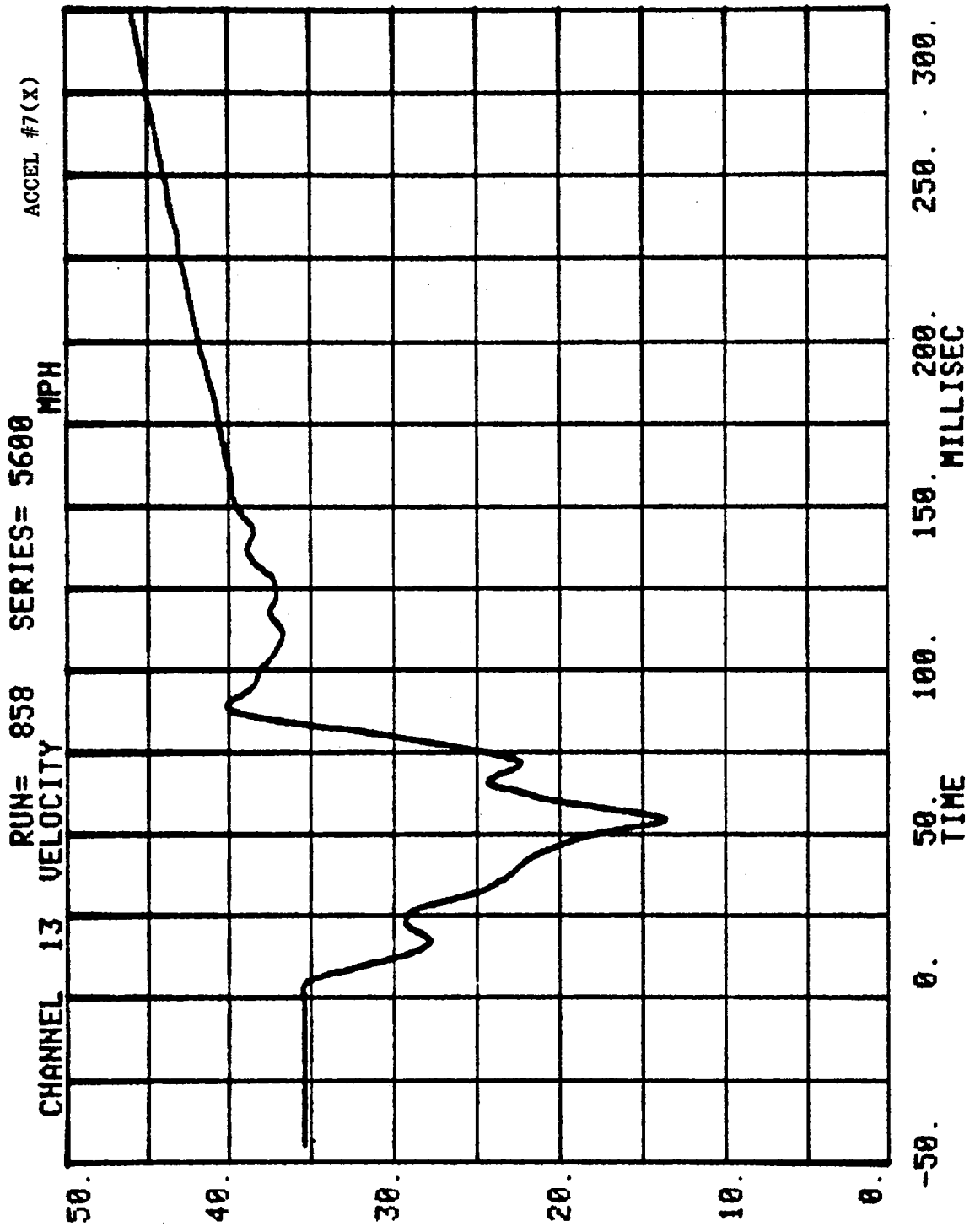

CHANNEL 32 ACC PACK #6(X)
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

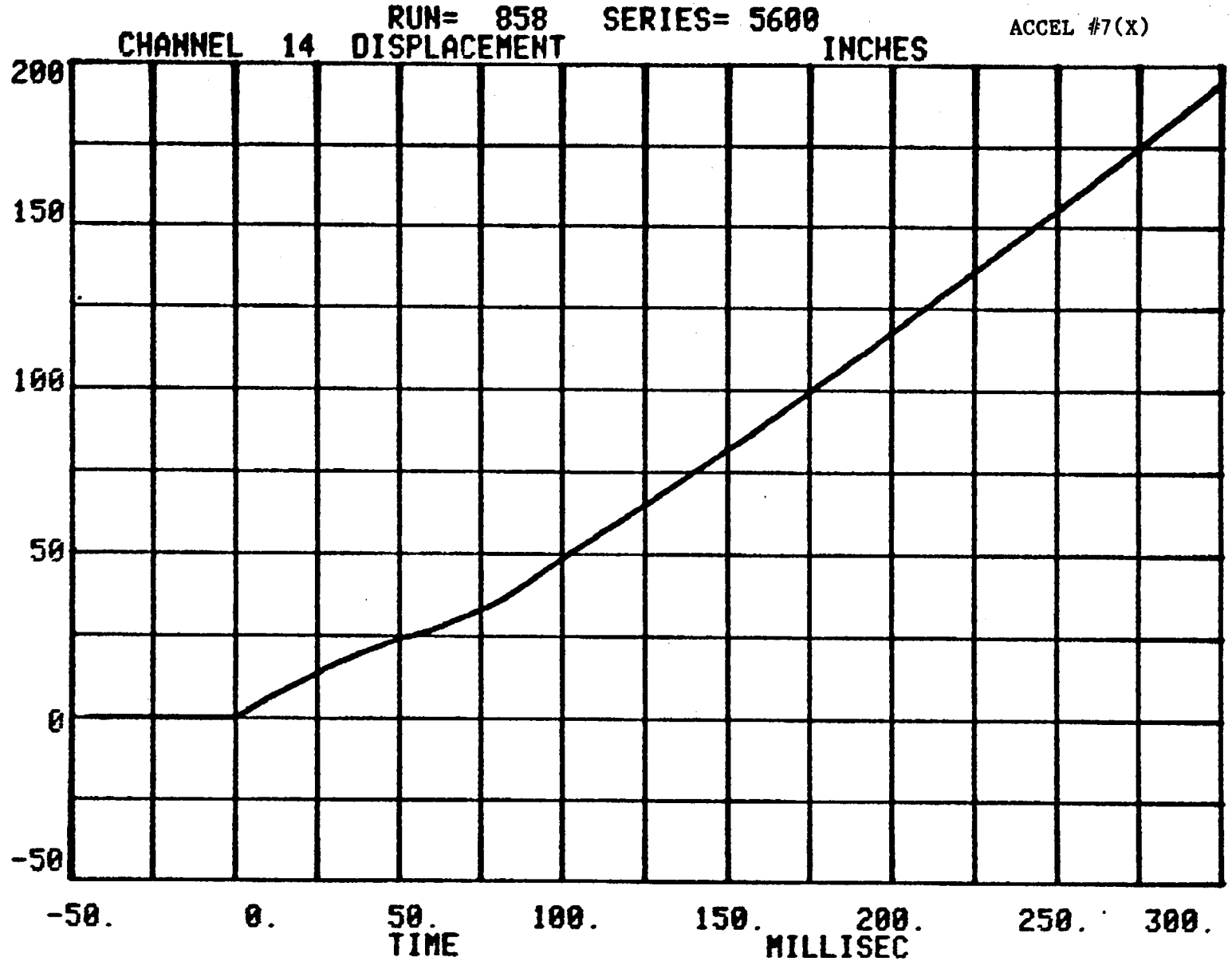

ACCEL #6(X)
CHANNEL 11 VELOCITY
RUN= 858 SERIES= 5600 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 12 DISPLACEMENT INCHES
ACCEL #6(X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 33 ACC PACK #7(X)
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACCEL #7(X)
CHANNEL 13 VELOCITY
RUN= 858 SERIES= 5600
MPH
50.
40.
30.
20.
10.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

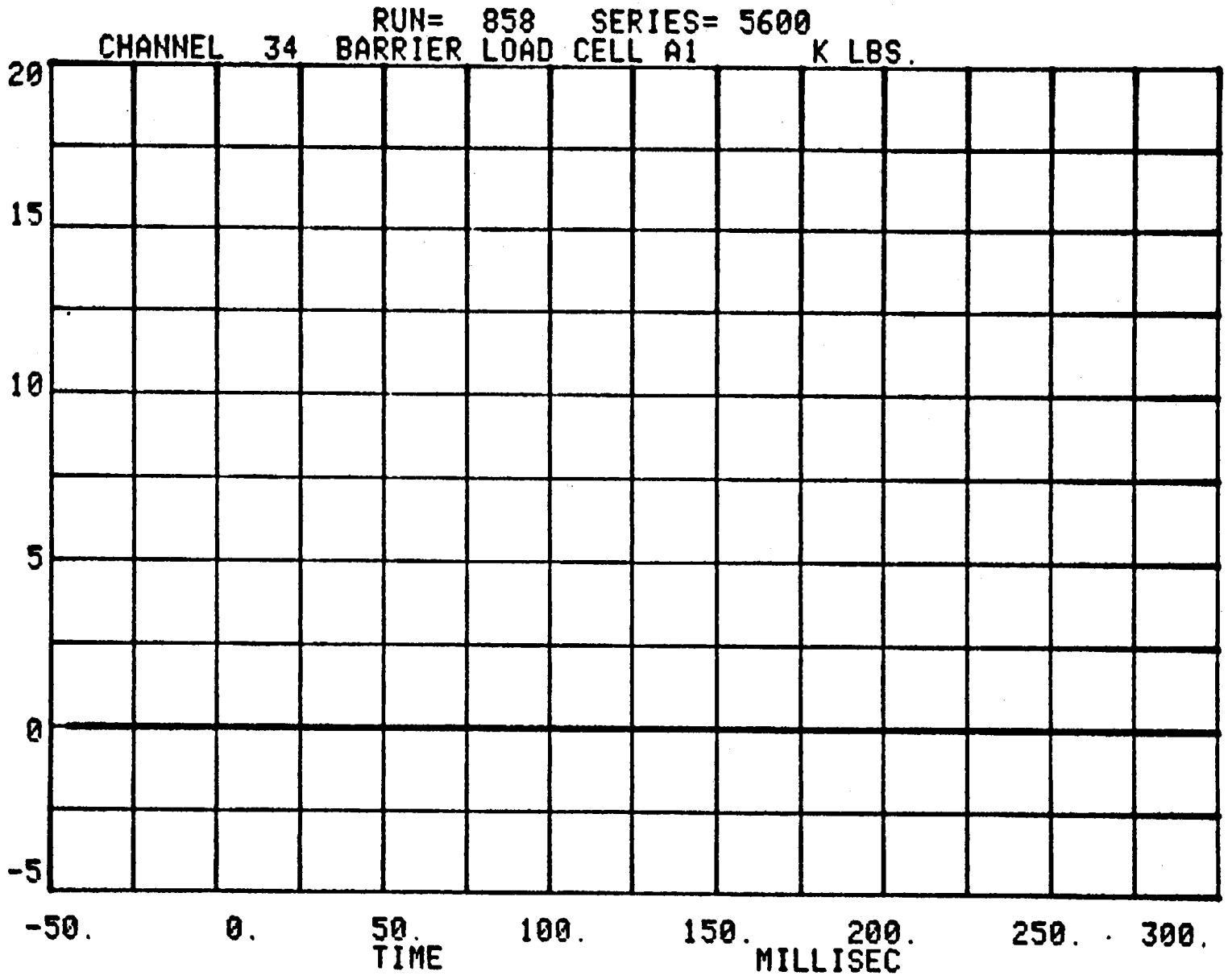

RUN= 858 SERIES= 5600
CHANNEL 14 DISPLACEMENT
INCHES
ACCEL #7(X)
200
150
100
50
0
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

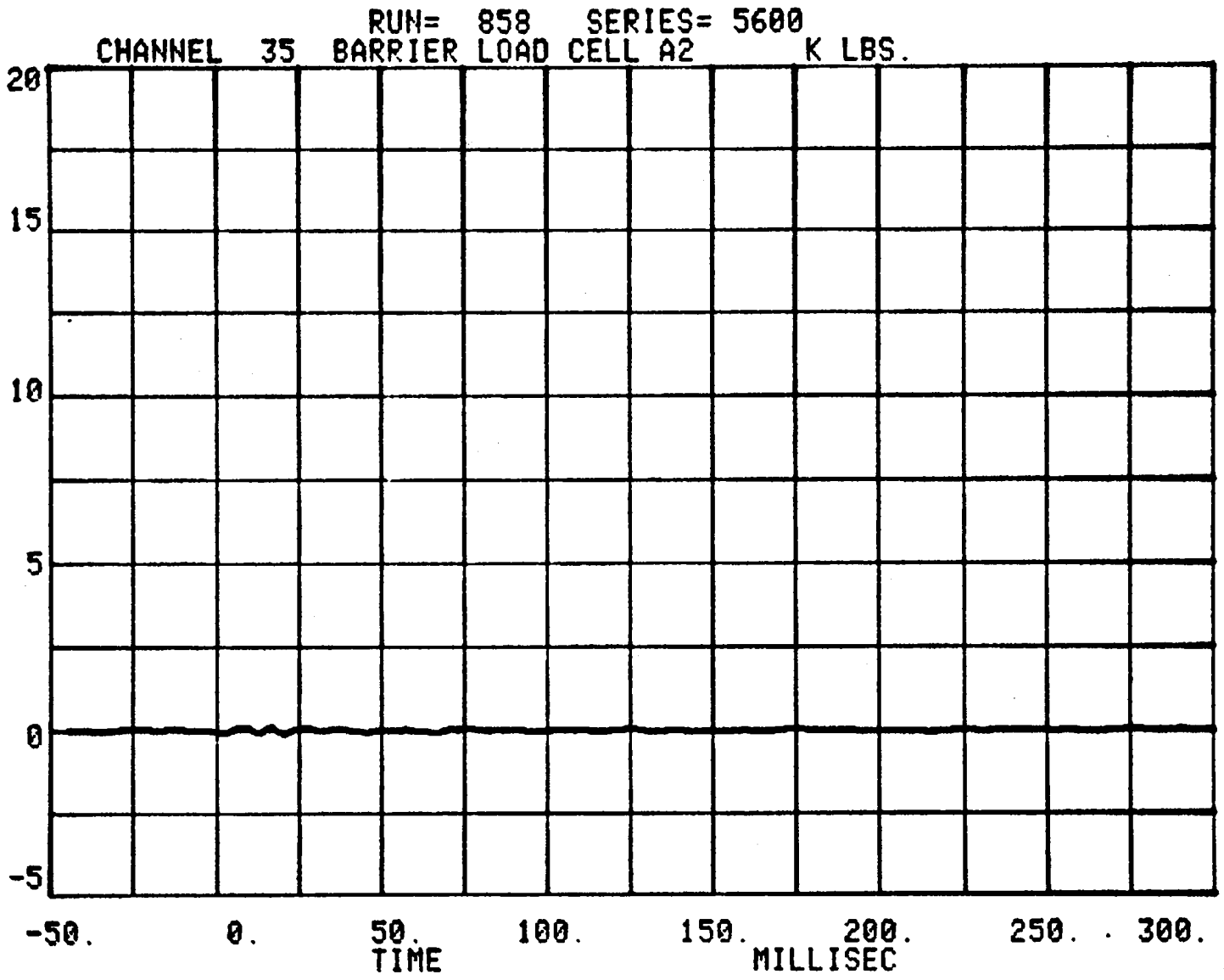
TEST NO. MK5600

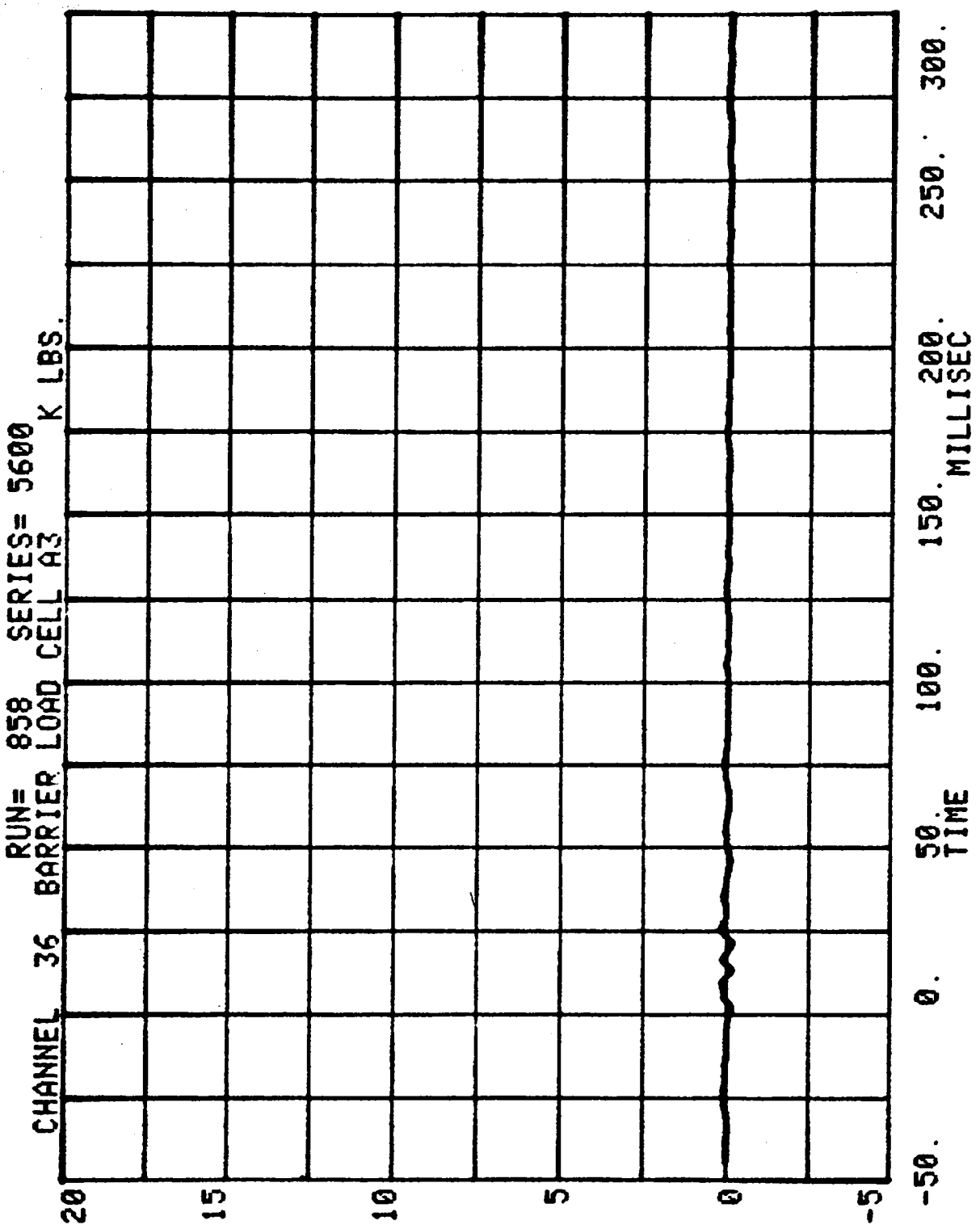
LOAD CELL BARRIER DATA

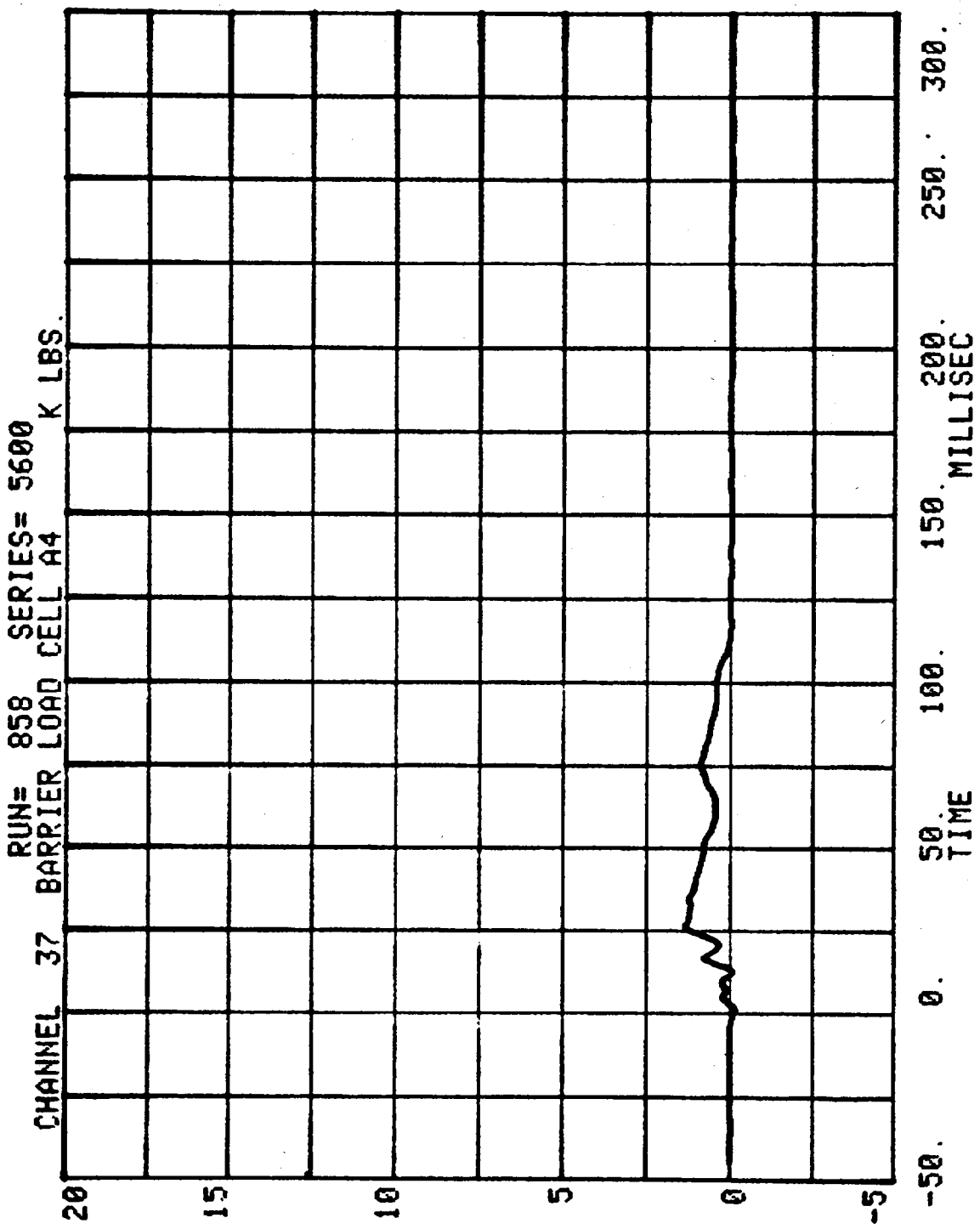
FILTER CHANNEL CLASS

60

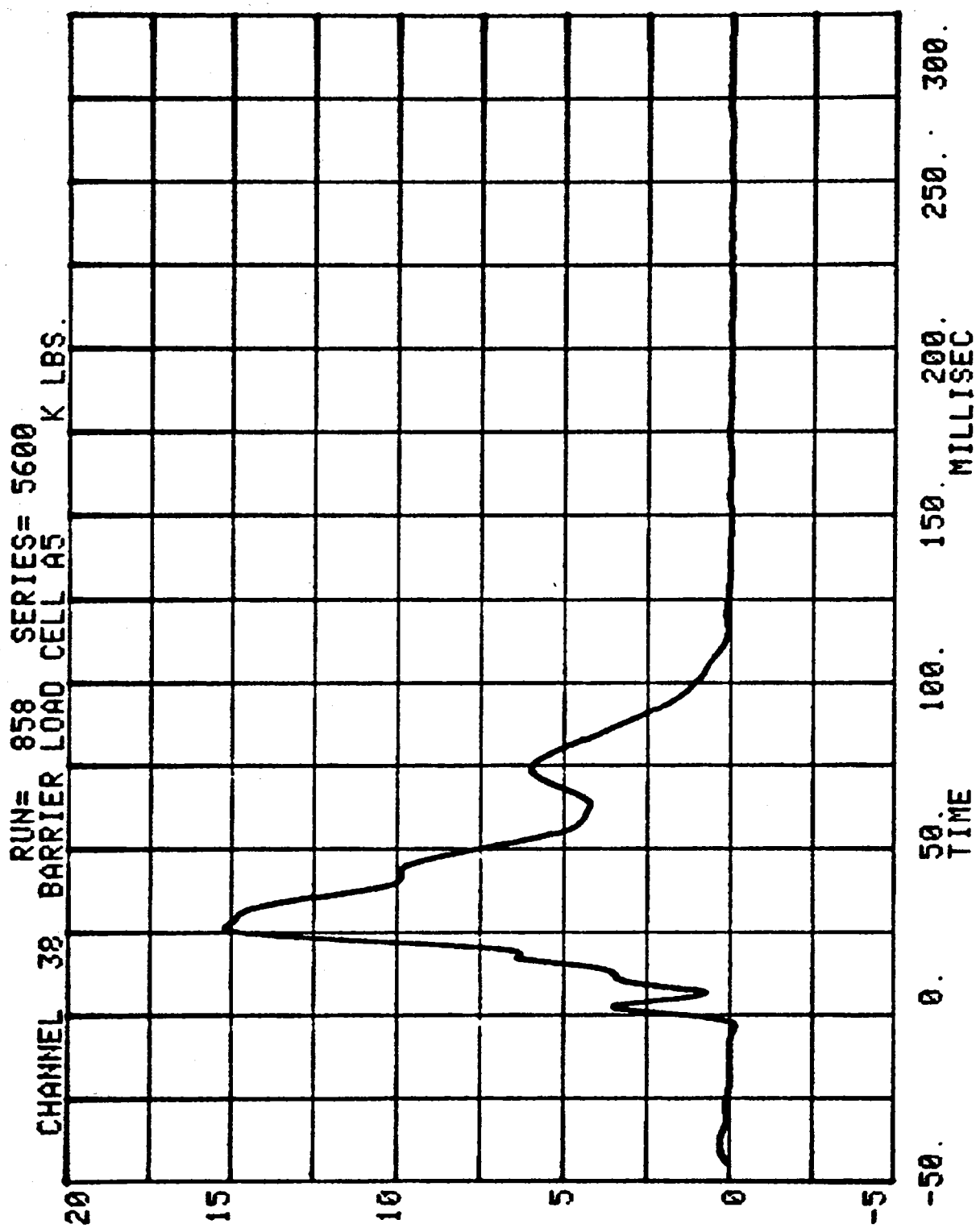

RUN= 858 SERIES= 5600
CHANNEL 34 BARRIER LOAD CELL A1 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 35 BARRIER LOAD CELL A2
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

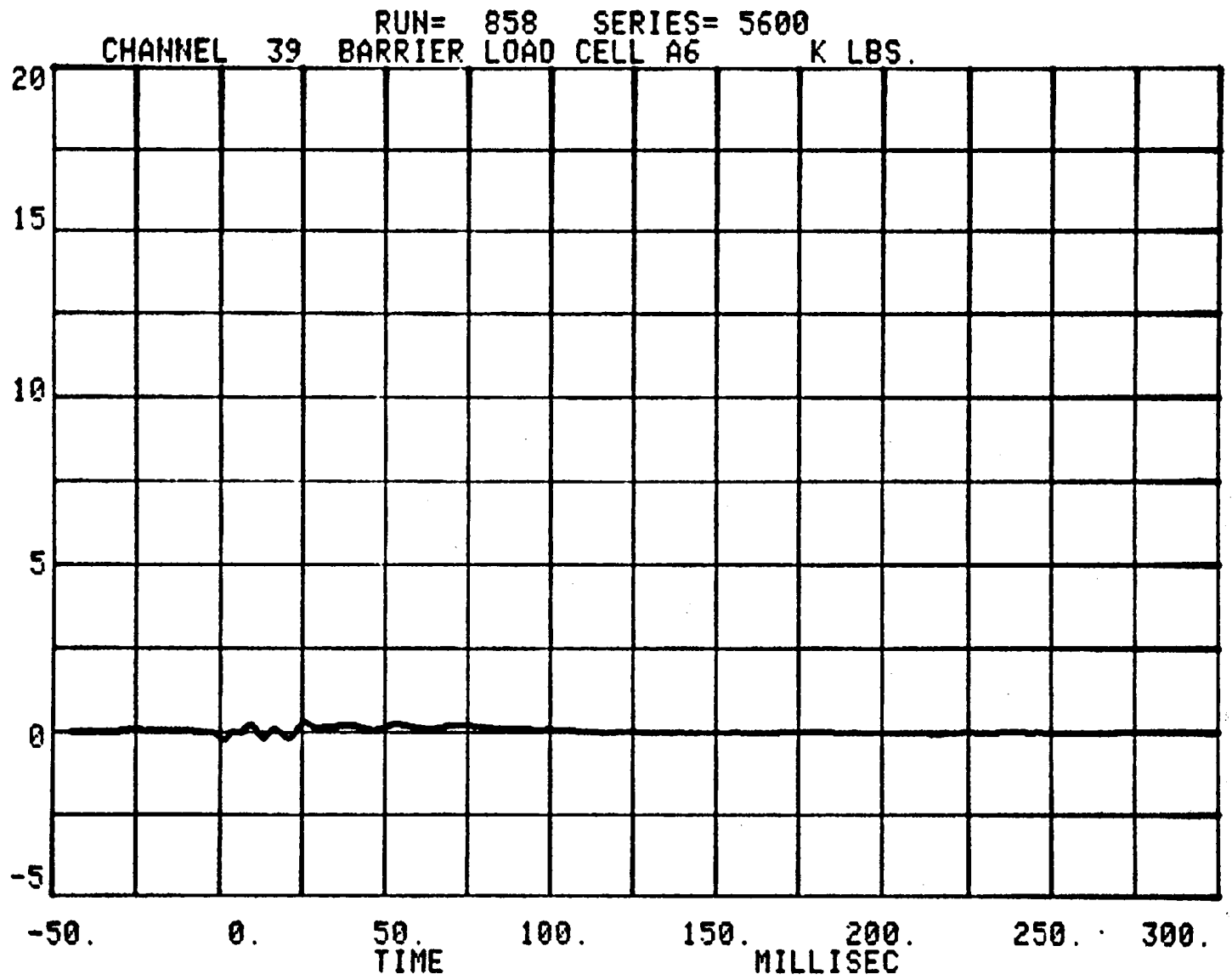

CHANNEL 36 BARRIER LOAD CELL A3
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 37 BARRIER LOAD CELL A4
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

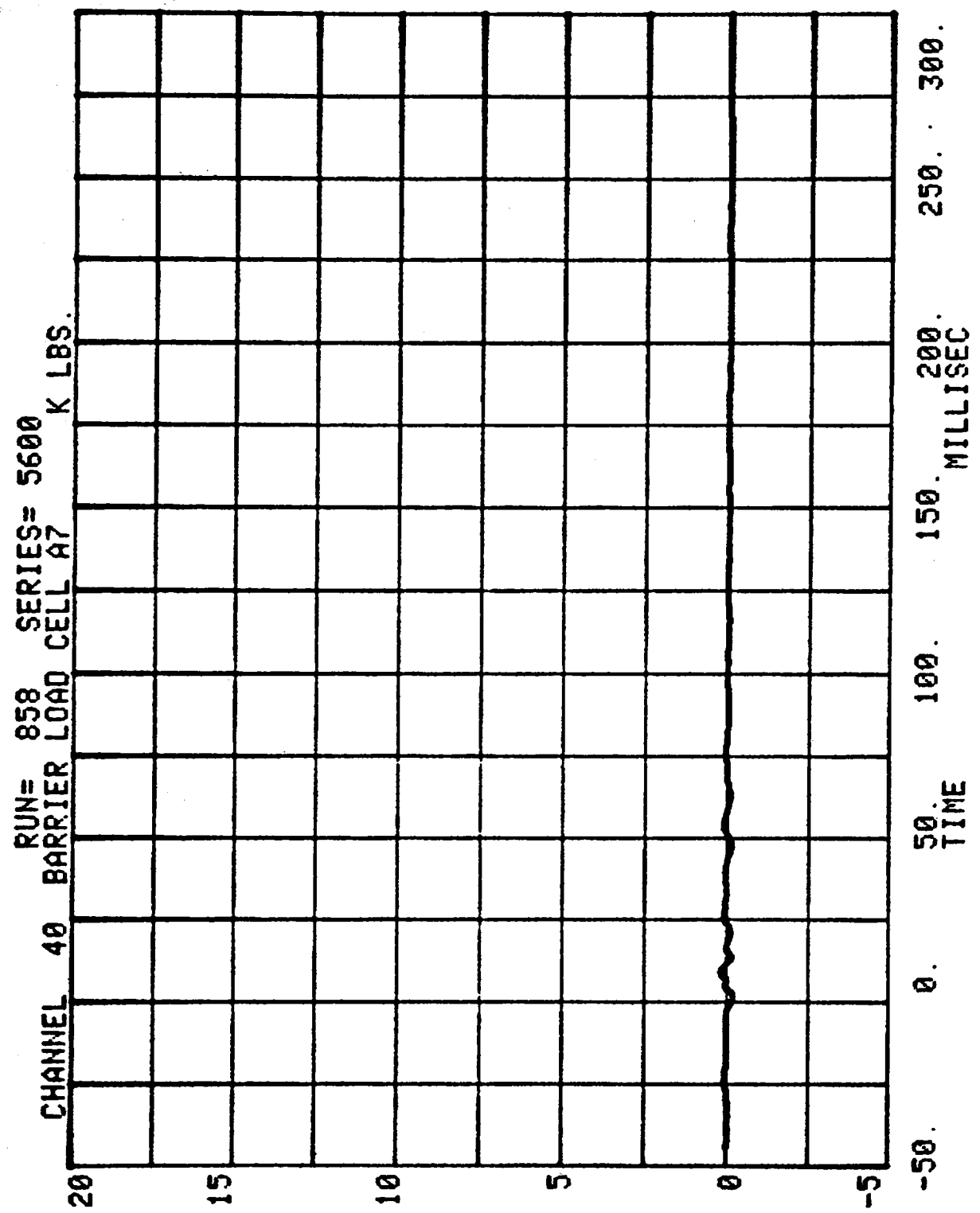
7689-3

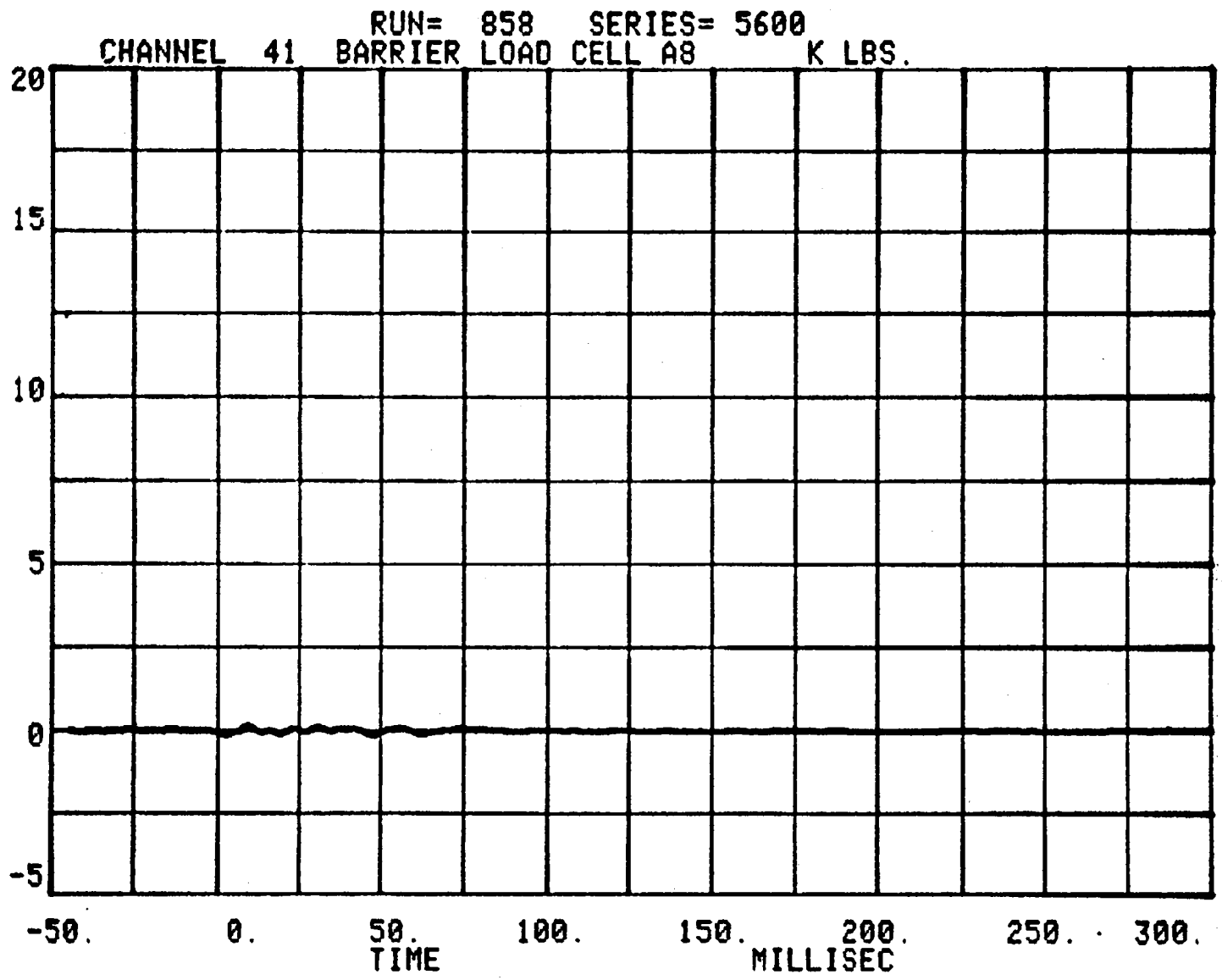

CHANNEL 32 BARRIER LOAD CELL A5
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

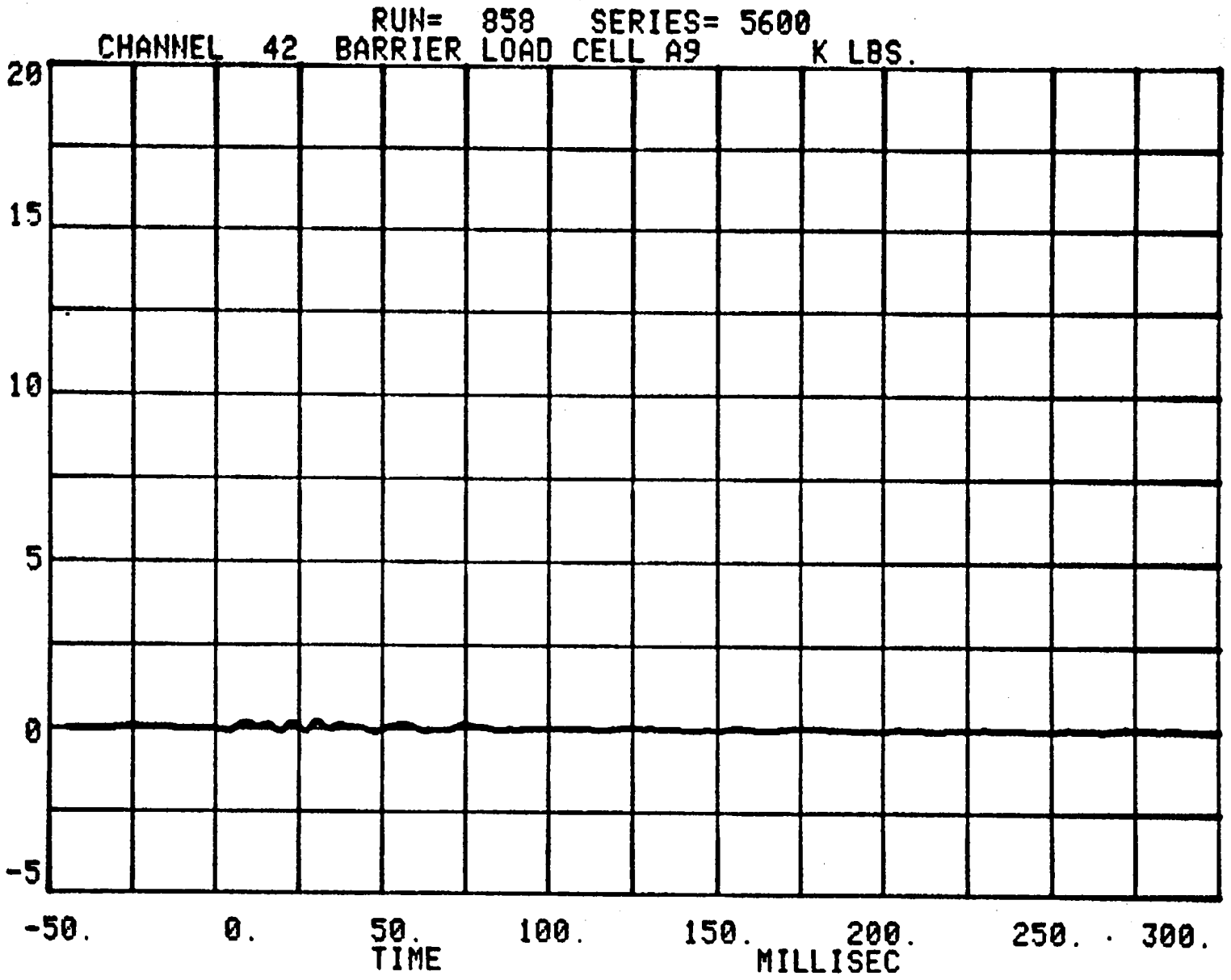
7689-3

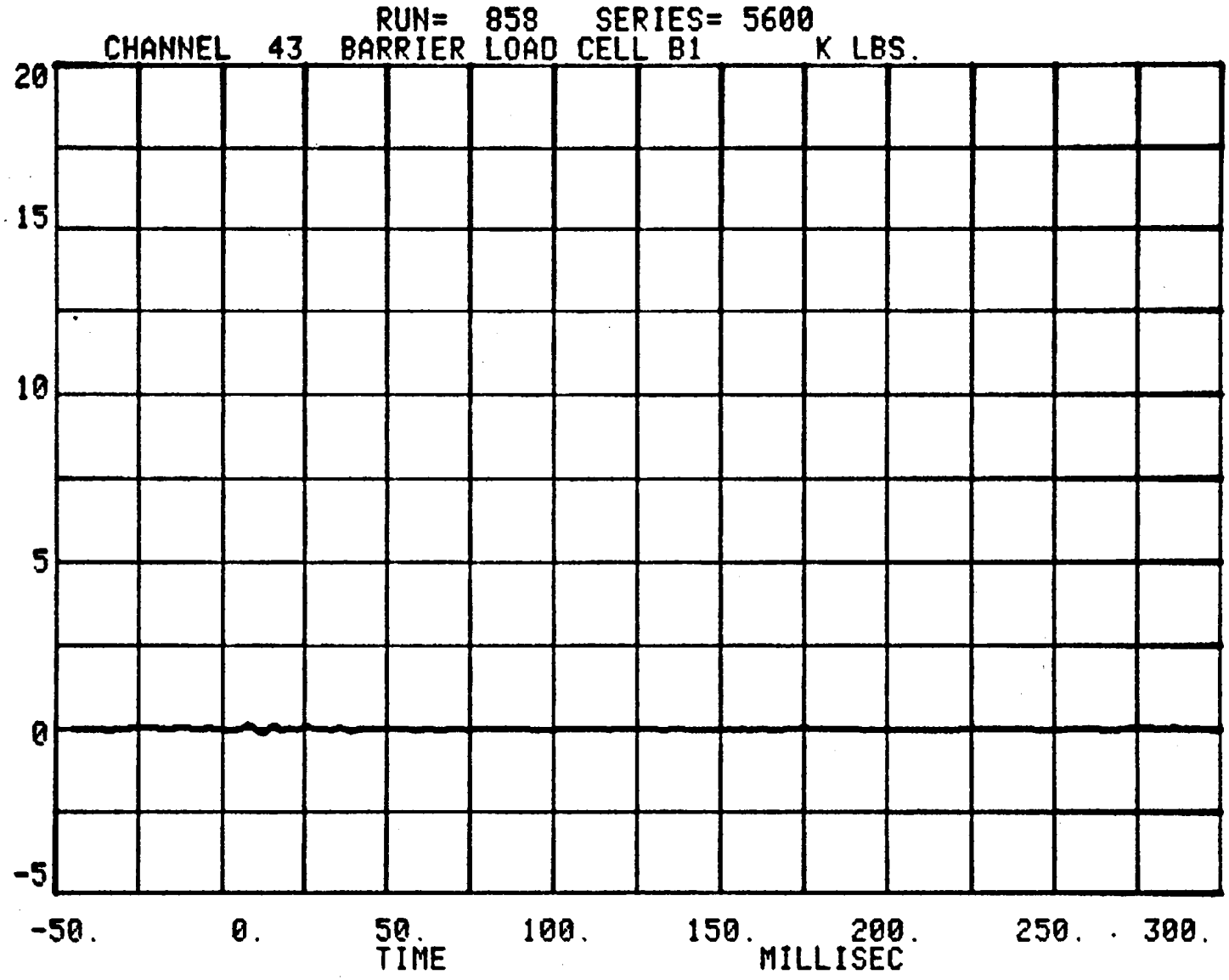

RUN= 858 SERIES= 5600
CHANNEL 39 BARRIER LOAD CELL A6 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

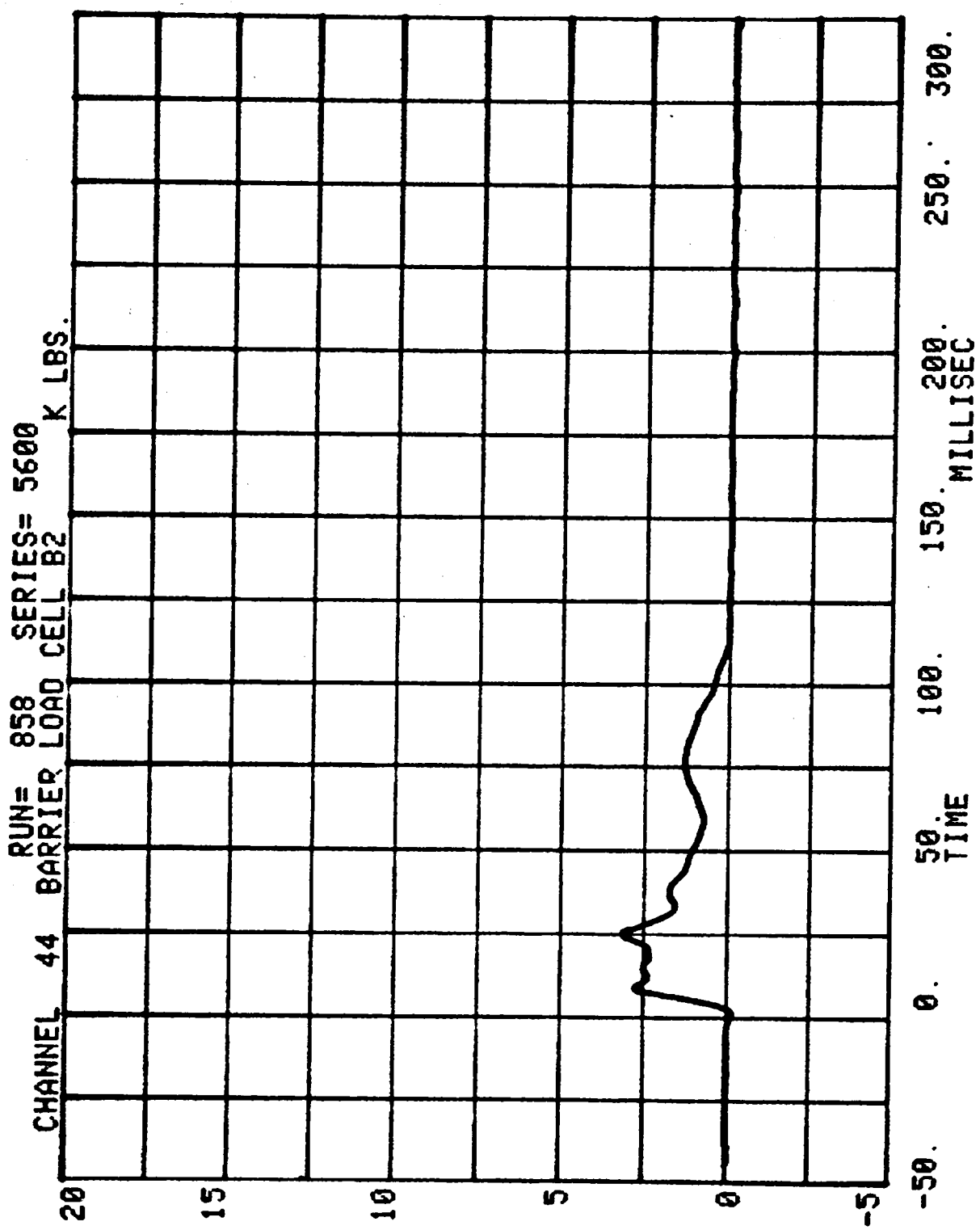

CHANNEL 40 BARRIER LOAD CELL A7
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 41 BARRIER LOAD CELL A8 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

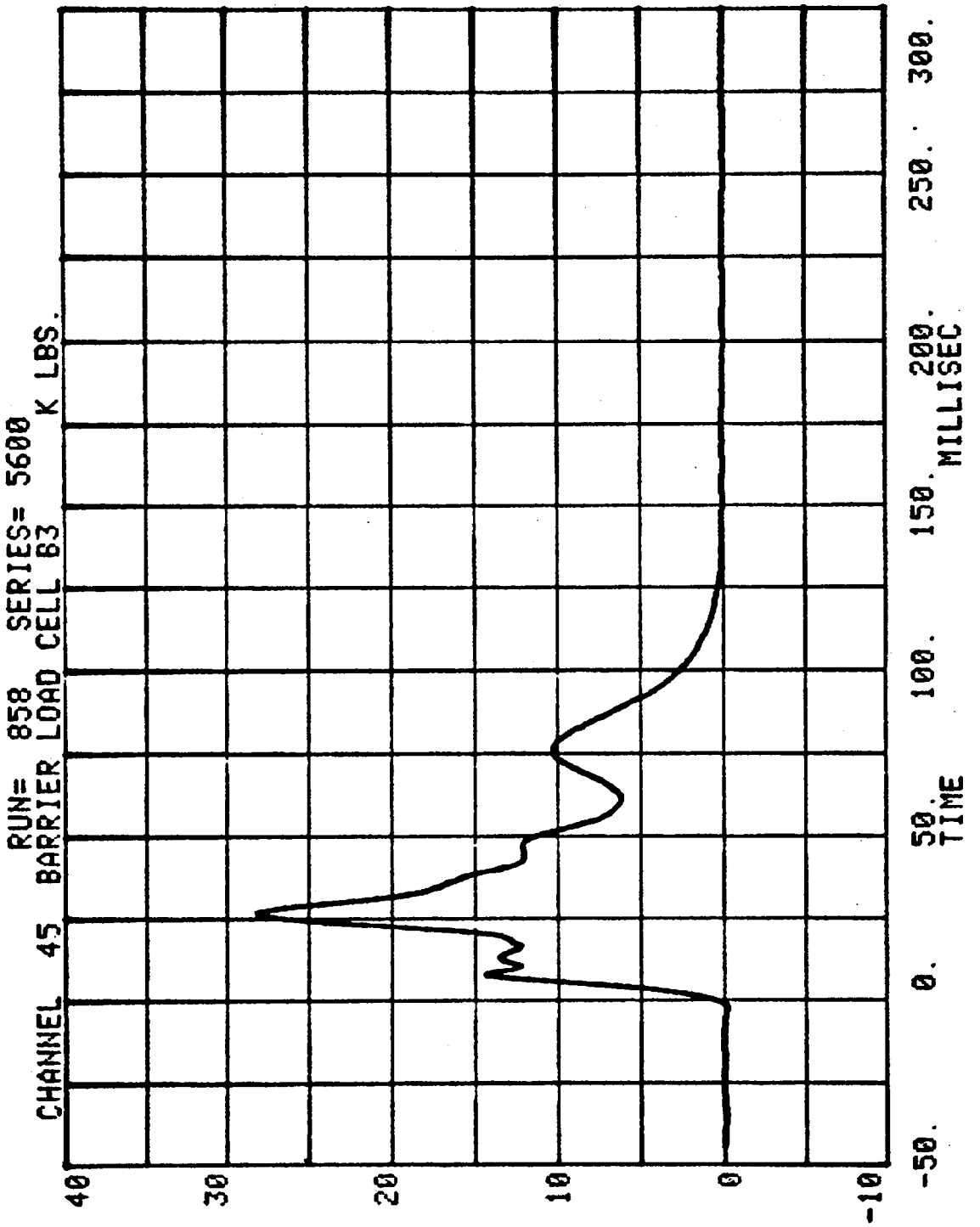

RUN= 858 SERIES= 5600
CHANNEL 42 BARRIER LOAD CELL A9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

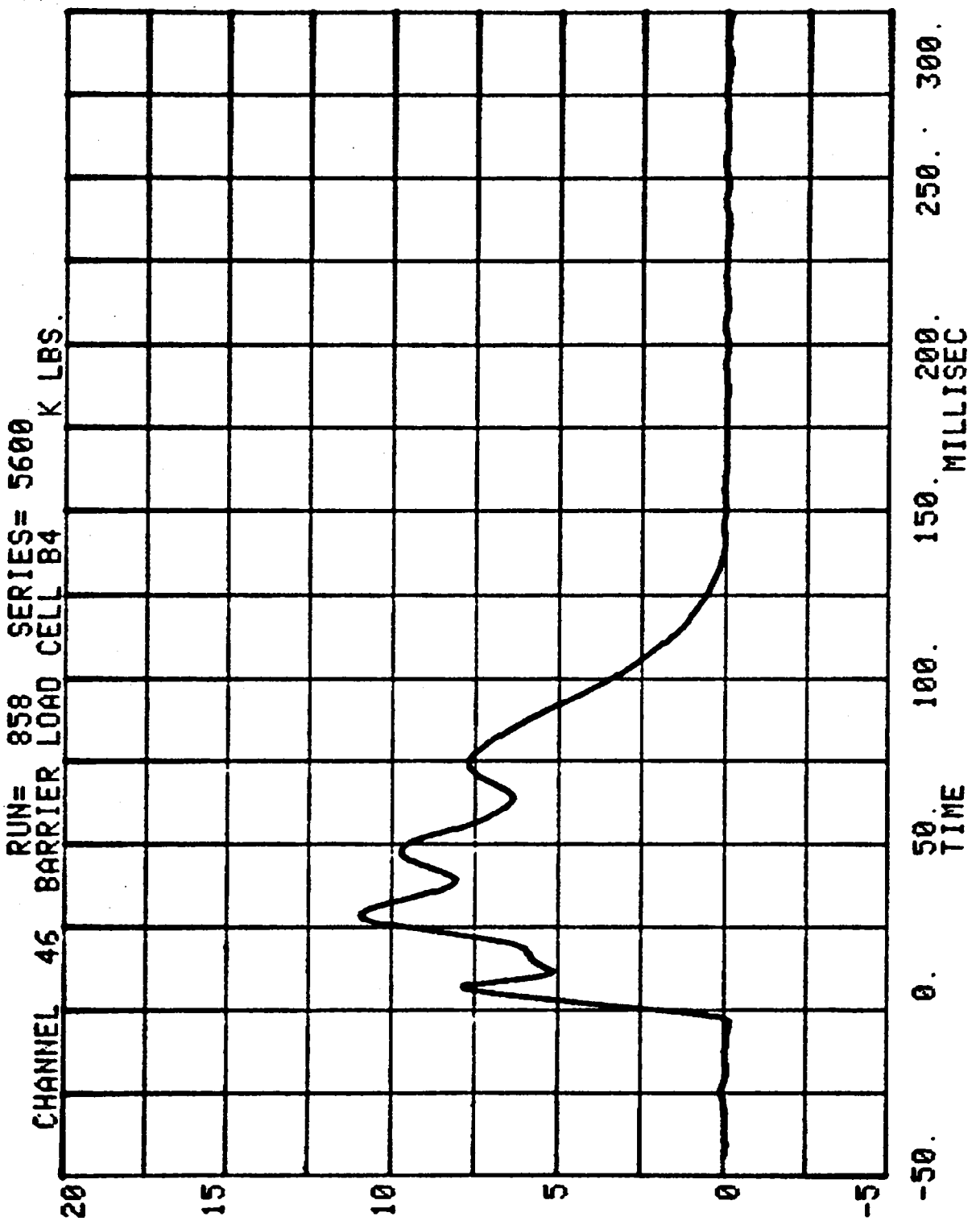

RUN= 858 SERIES= 5600
CHANNEL 43 BARRIER LOAD CELL B1 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

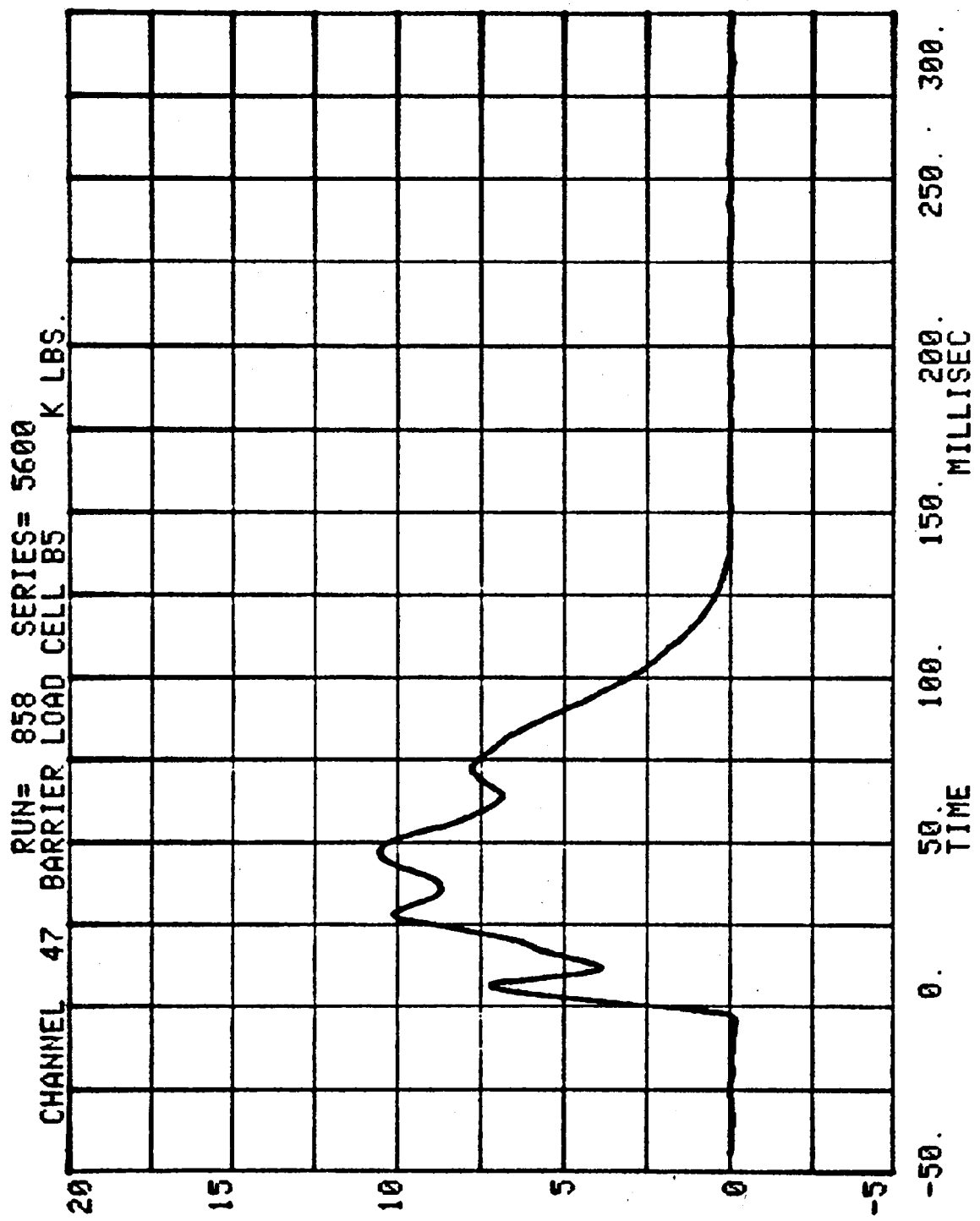
7689-3

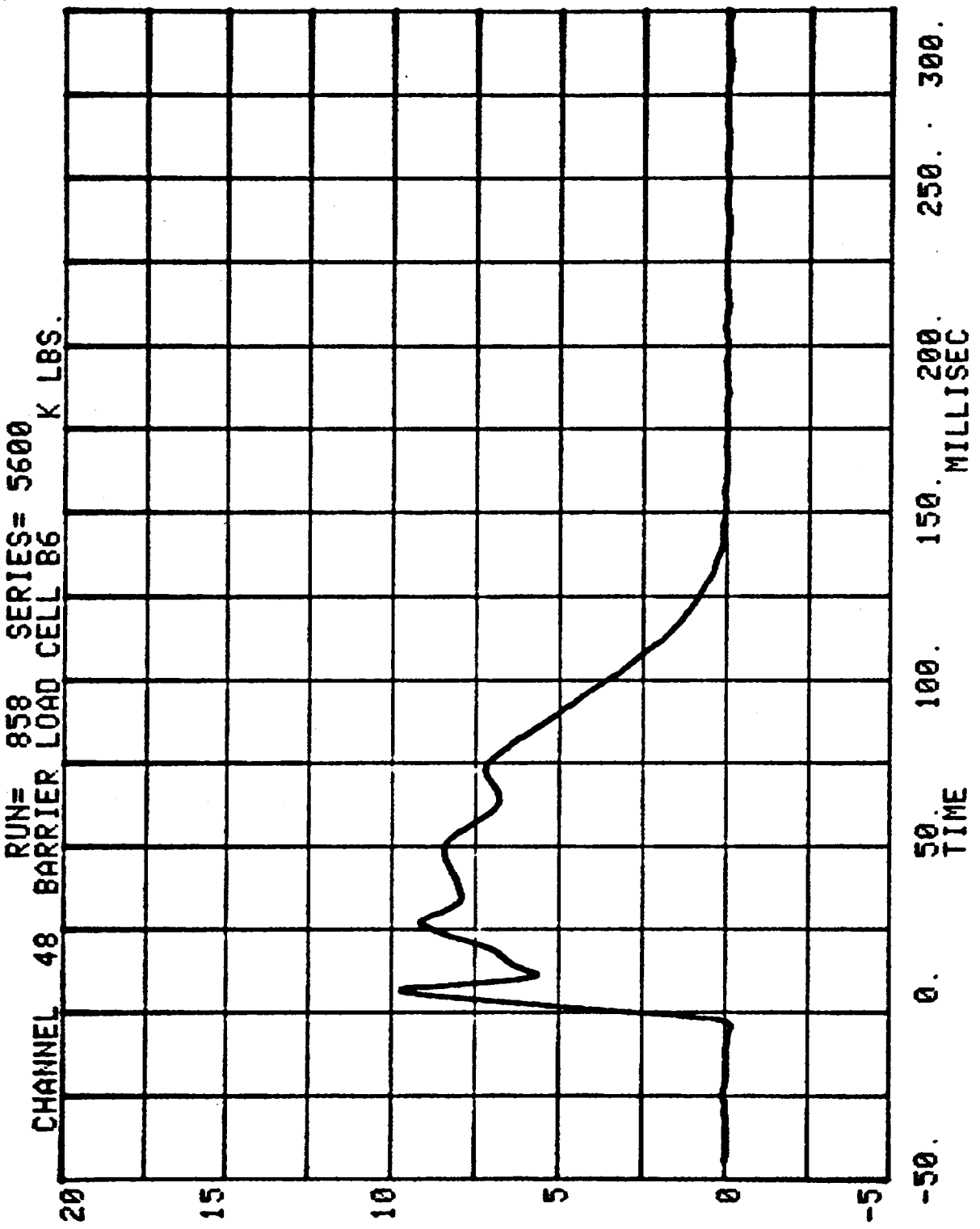

CHANNEL 44 BARRIER LOAD CELL B2
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

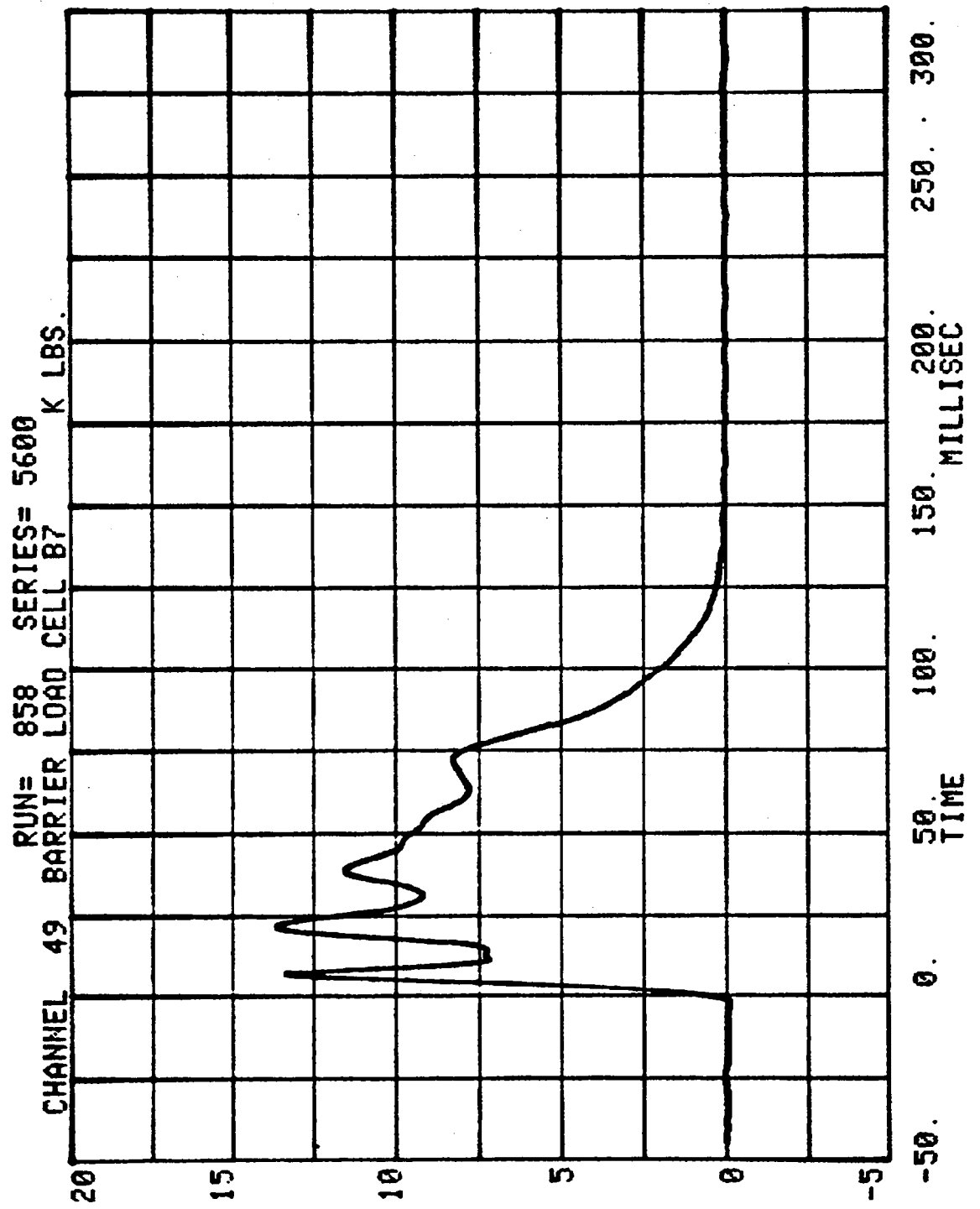
7689-3


CHANNEL 45 BARRIER LOAD CELL B3
RUN= 858 SERIES= 5600
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

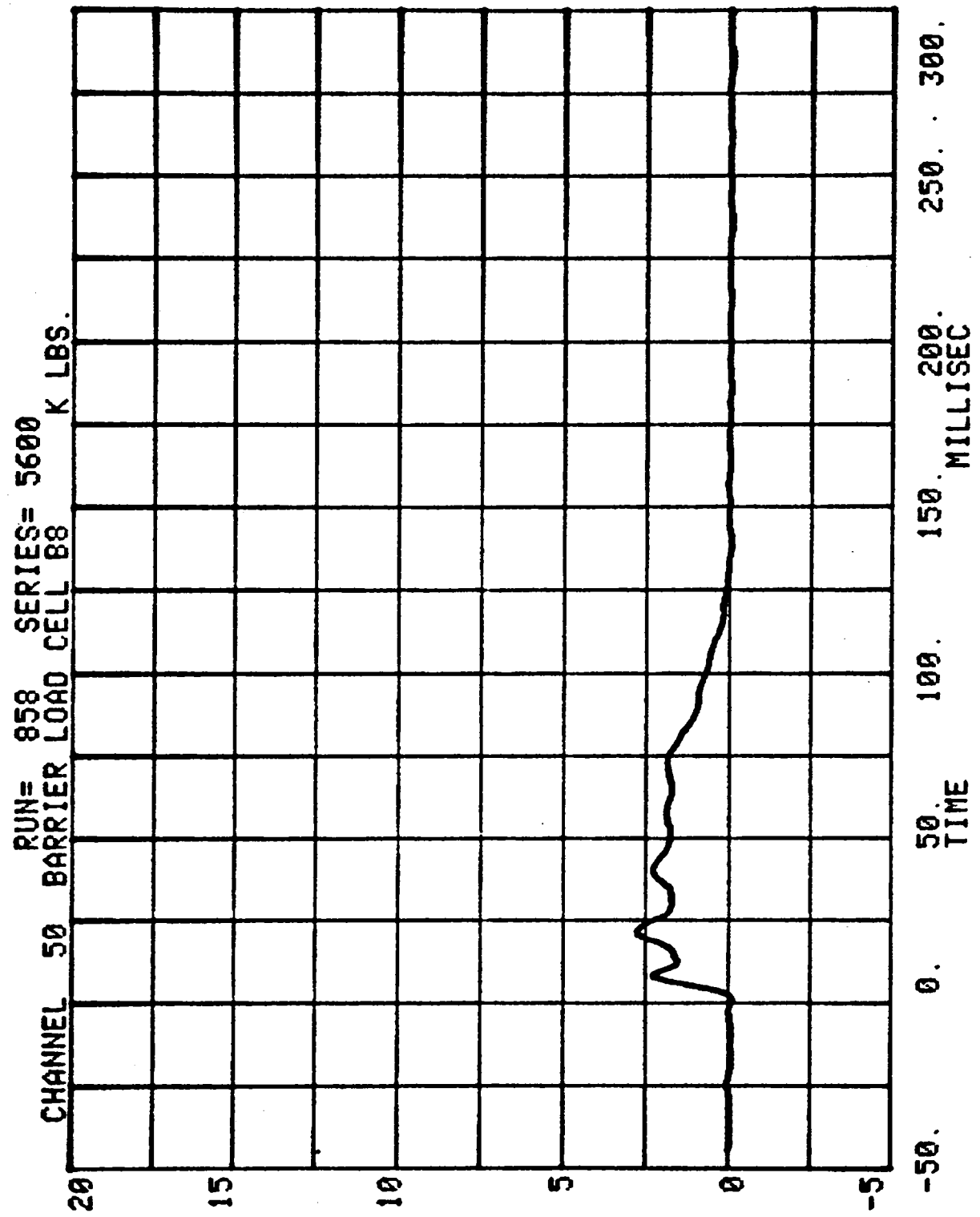

RUN= 858 SERIES= 5600
CHANNEL 46 BARRIER LOAD CELL B4
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
BARRIER LOAD CELL B5 K LBS.
CHANNEL 47
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

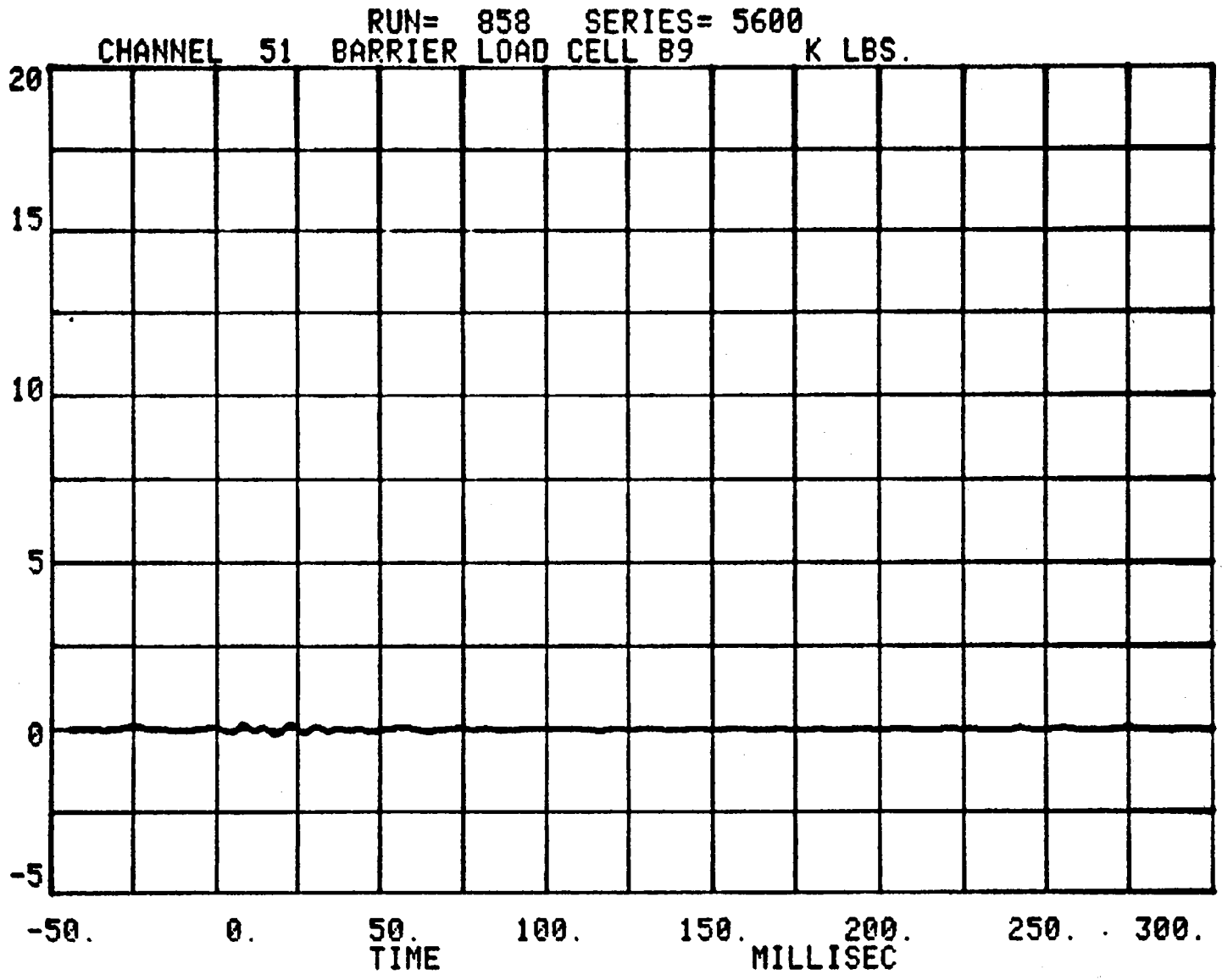

CHANNEL 48 BARRIER LOAD CELL B6
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

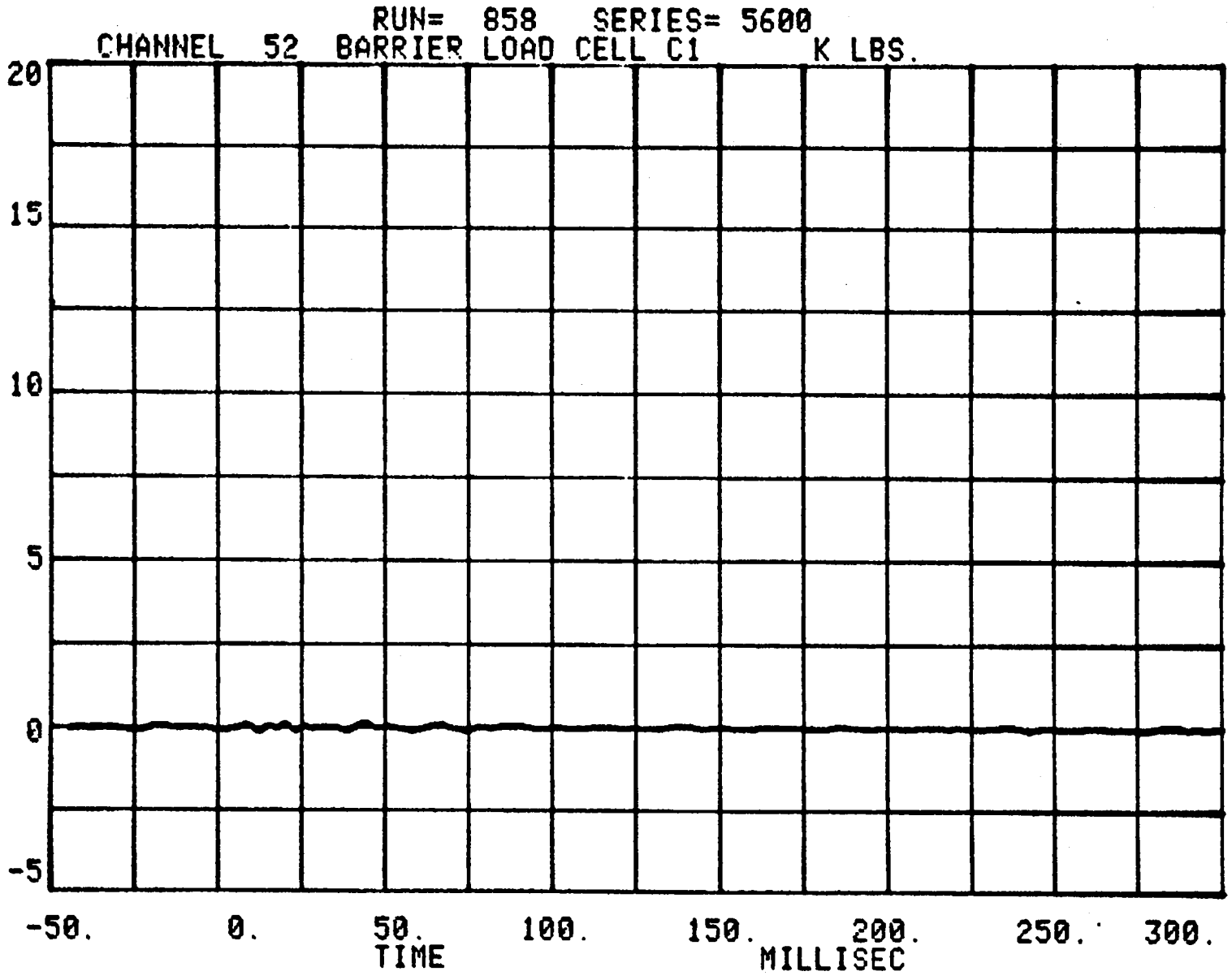

CHANNEL 49 BARRIER LOAD CELL B7
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

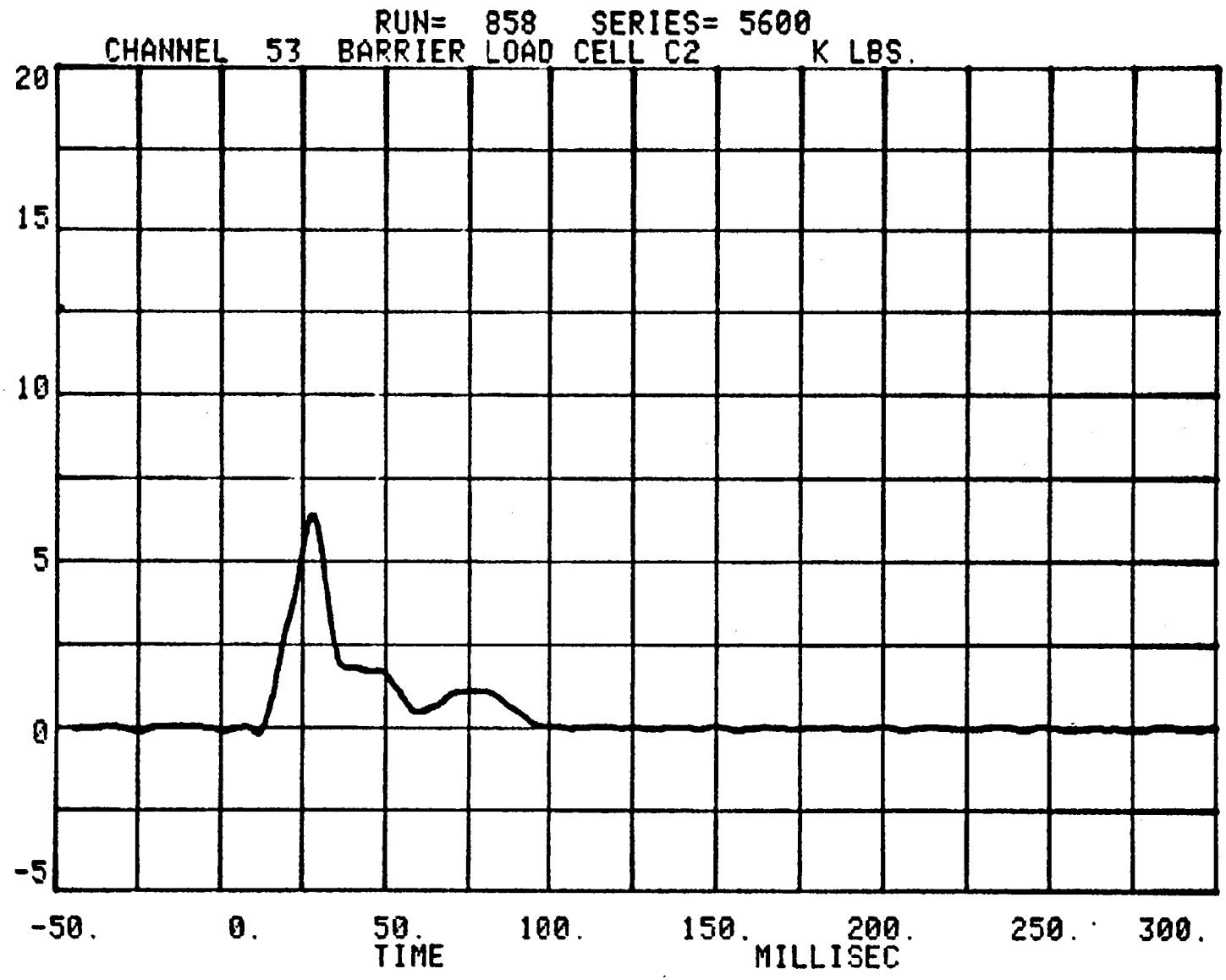
7689-3


CHANNEL 50 BARRIER LOAD CELL B8
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

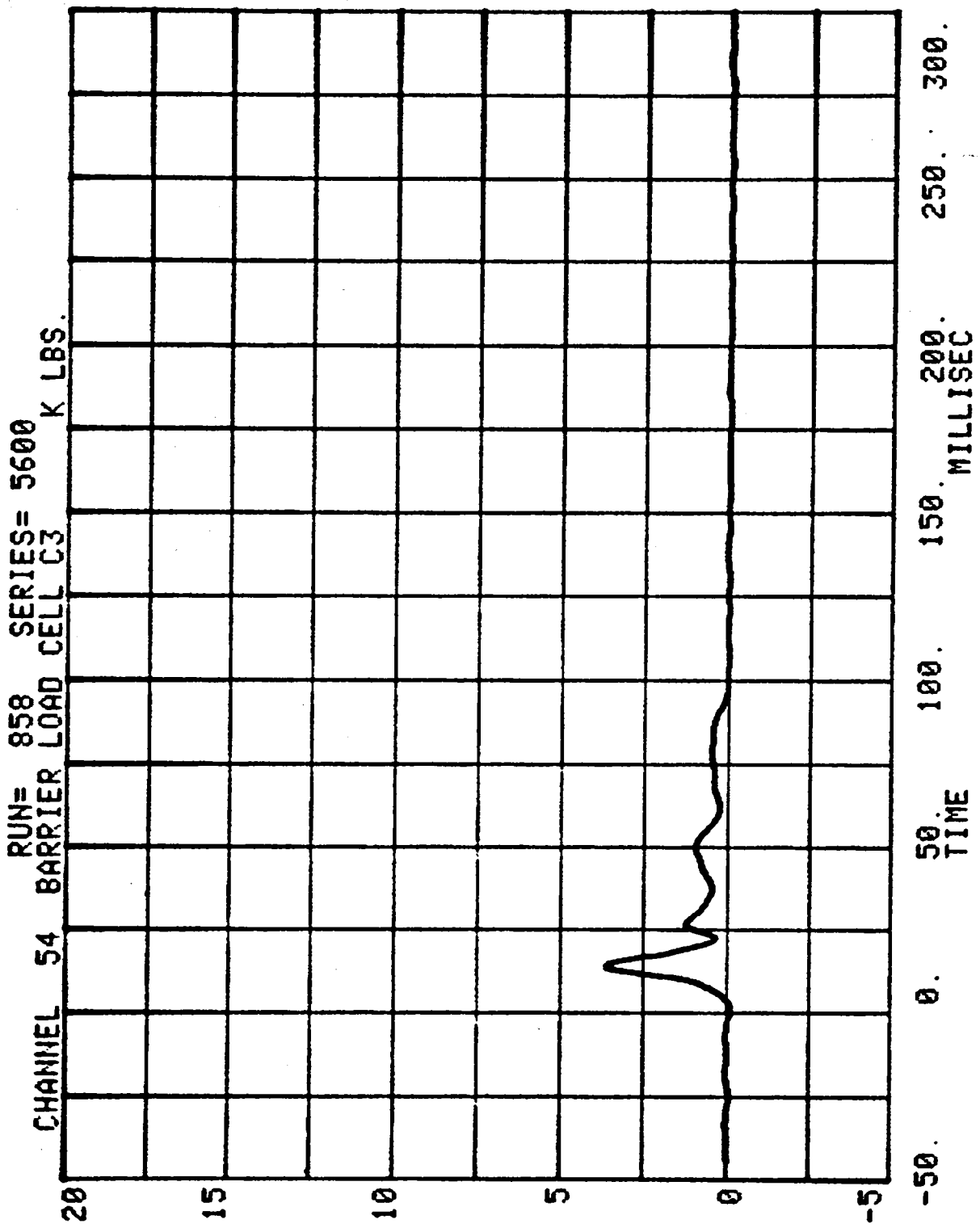
7689-3


RUN= 858 SERIES= 5600
CHANNEL 51 BARRIER LOAD CELL 89 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

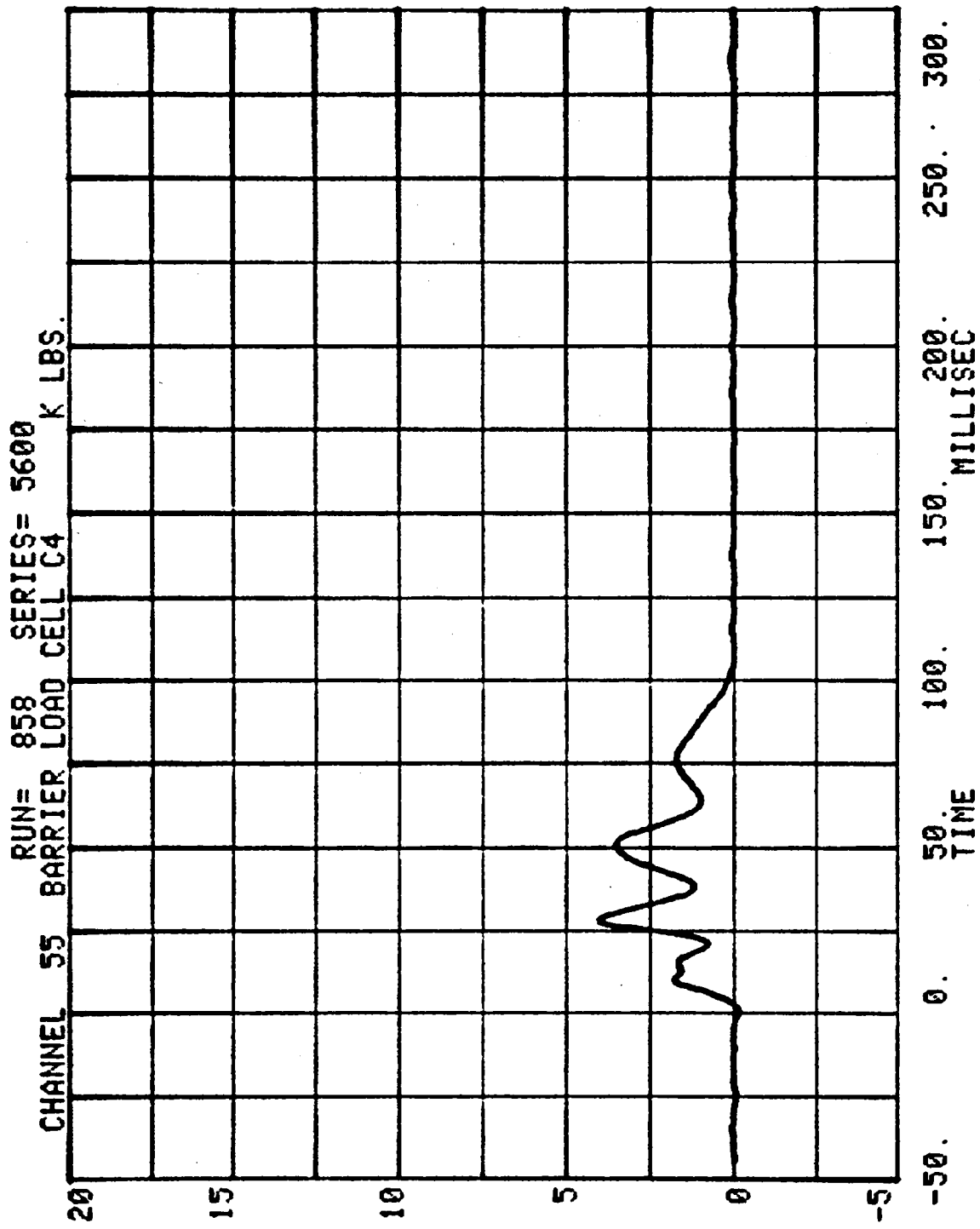

RUN= 858 SERIES= 5600
CHANNEL 52 BARRIER LOAD CELL C1 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 53 BARRIER LOAD CELL C2 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

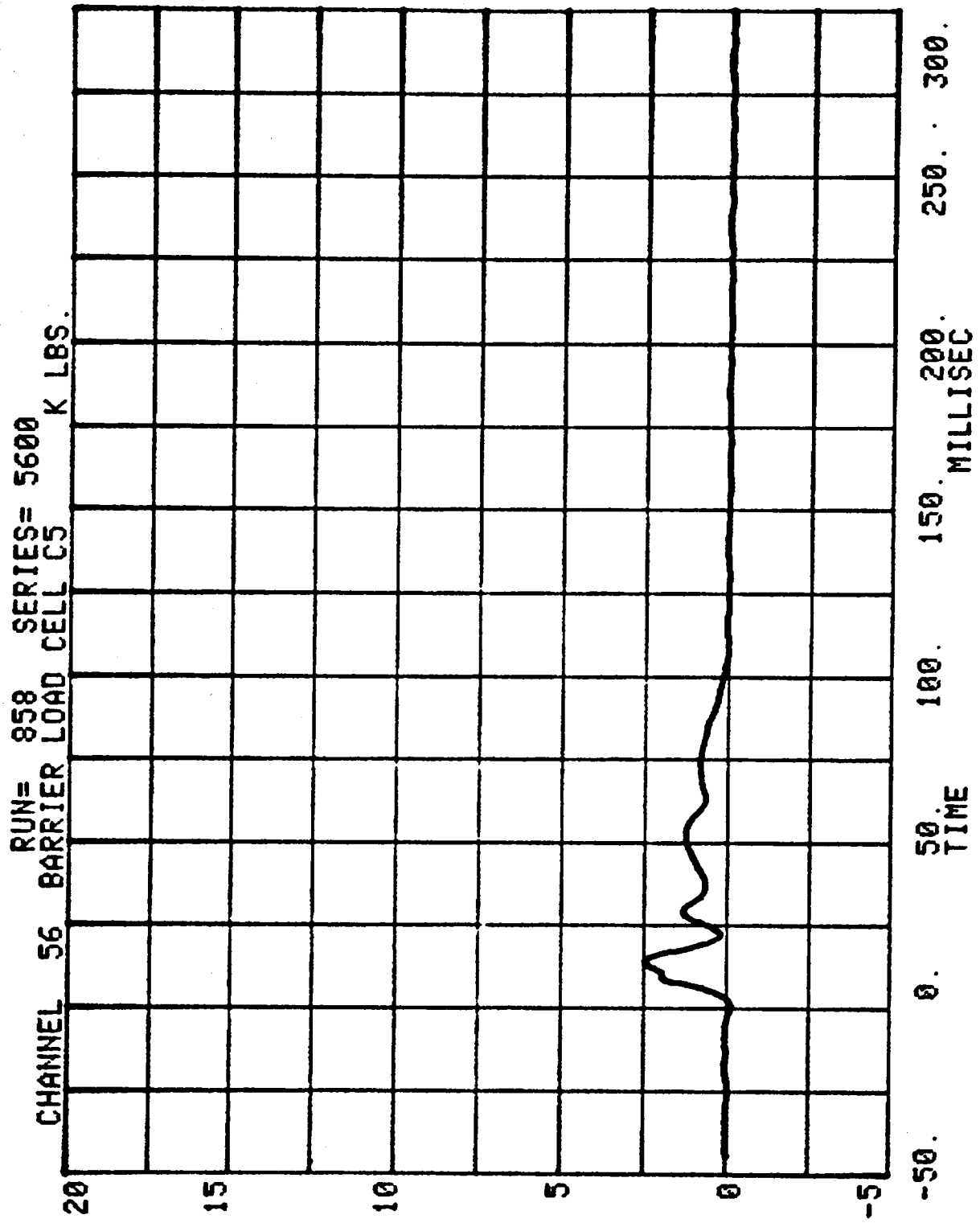
7689-3


CHANNEL 54 BARRIER LOAD CELL C3
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

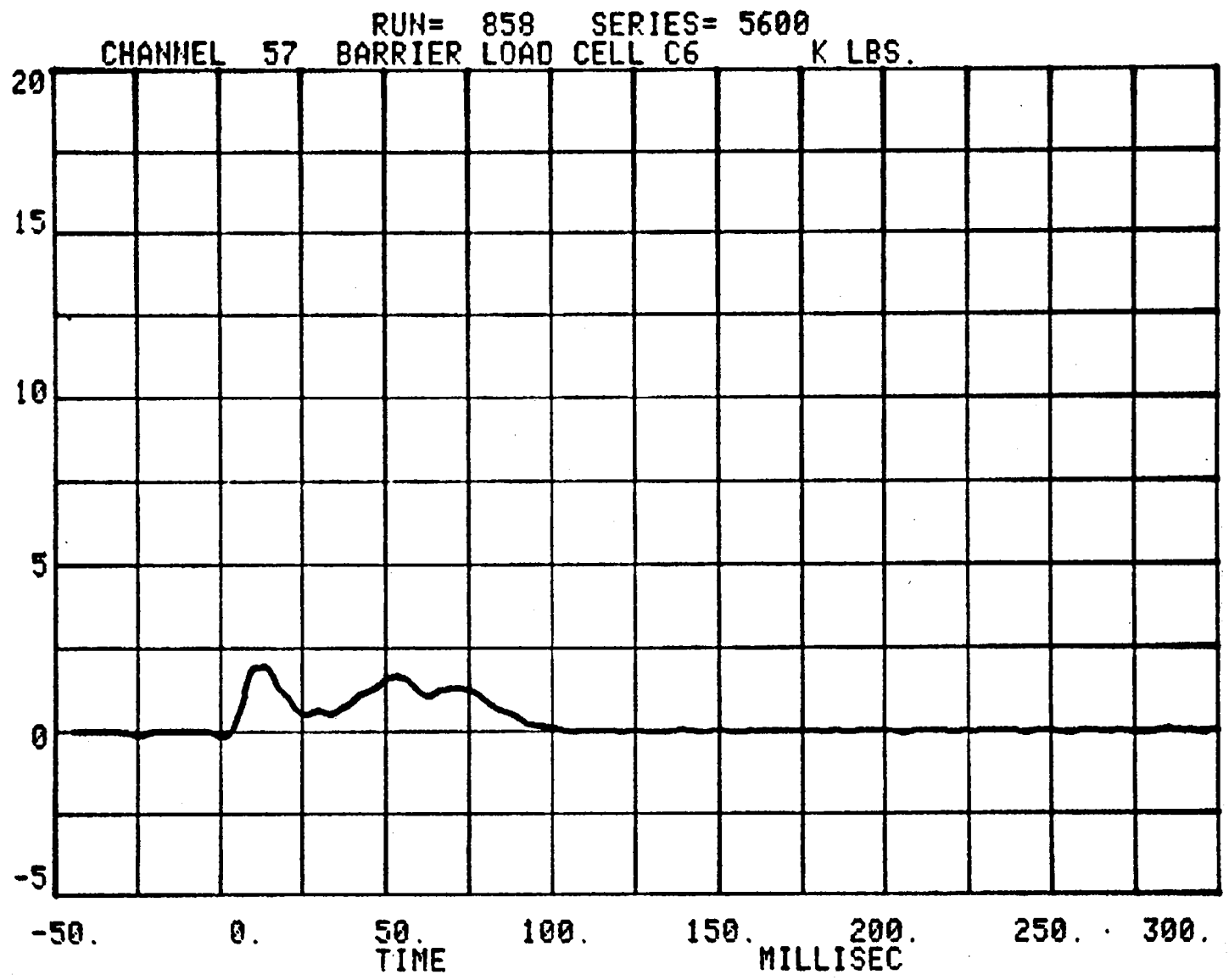
7689-3


CHANNEL 55 BARRIER LOAD CELL C4
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

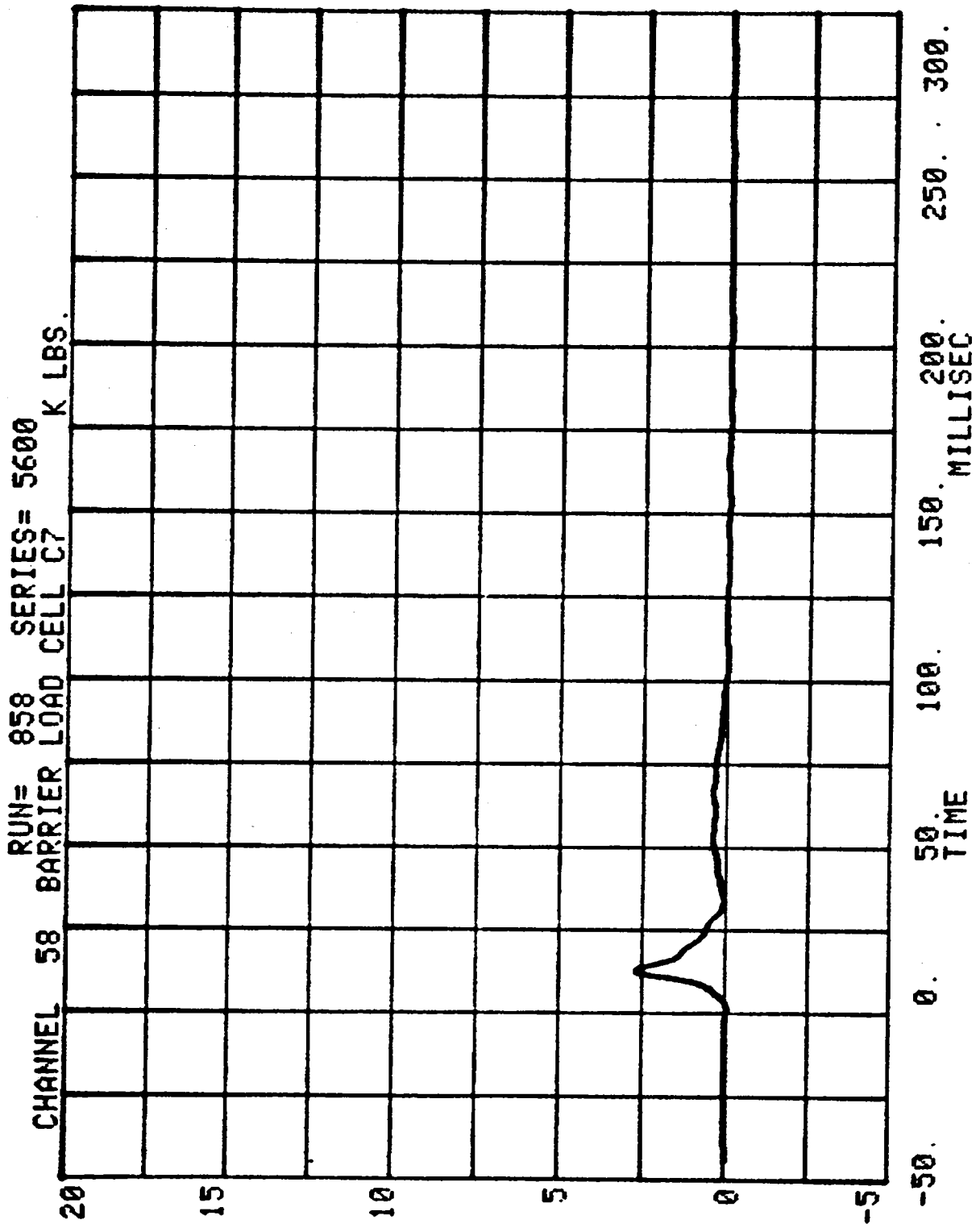
7689-3


CHANNEL 56 BARRIER LOAD CELL C5
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

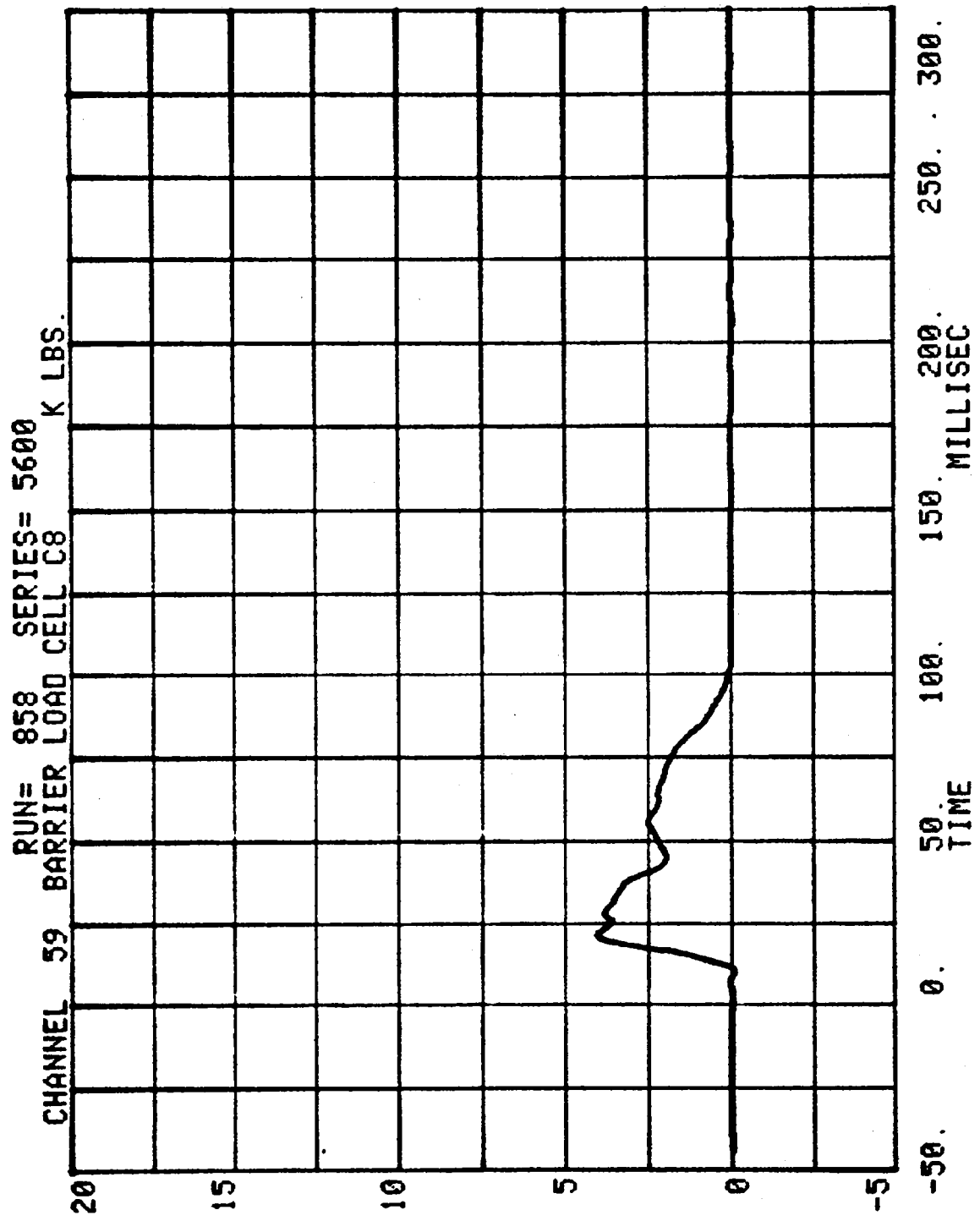
7689-3


RUN= 858 SERIES= 5600
CHANNEL 57 BARRIER LOAD CELL C6 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

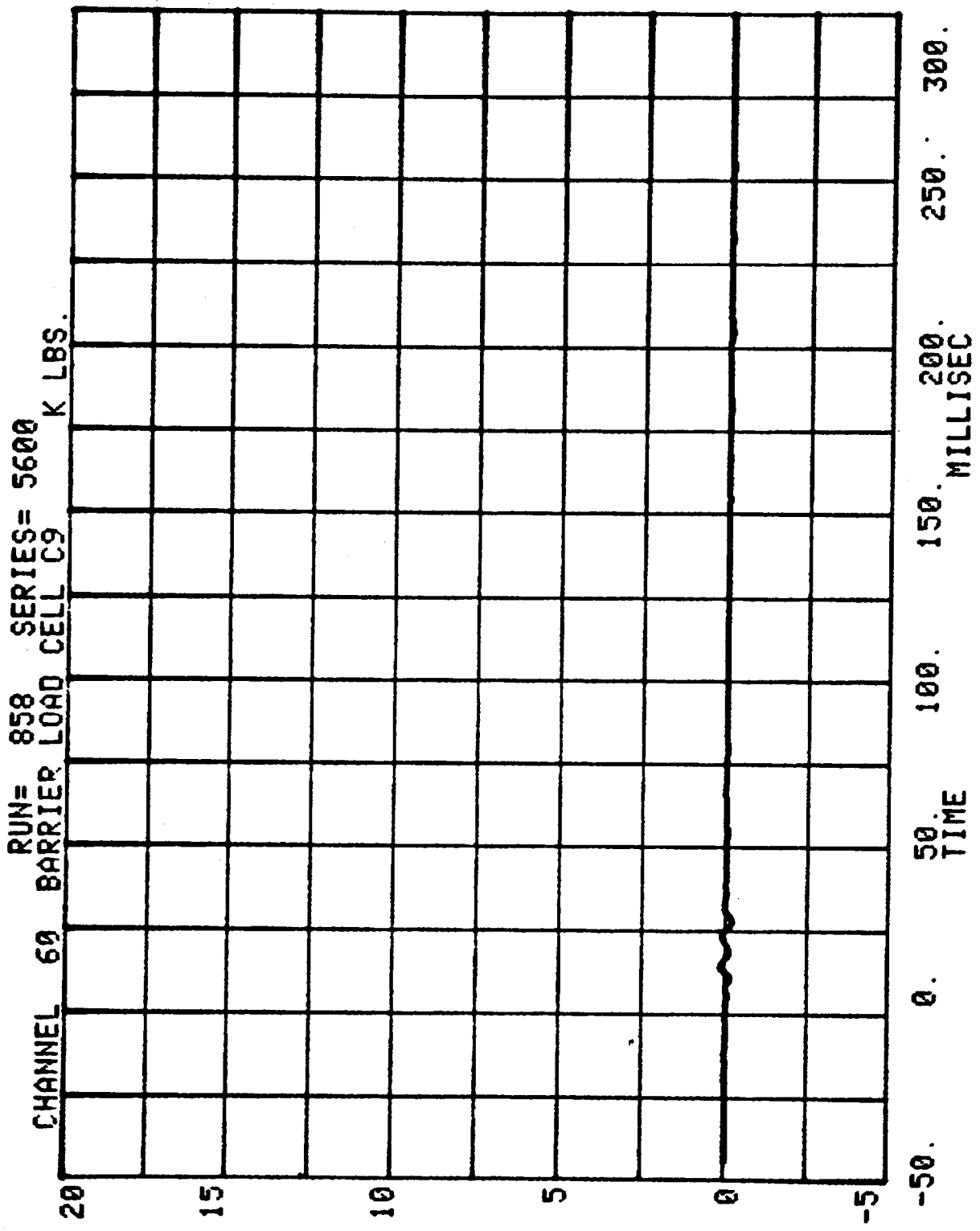
7689-3

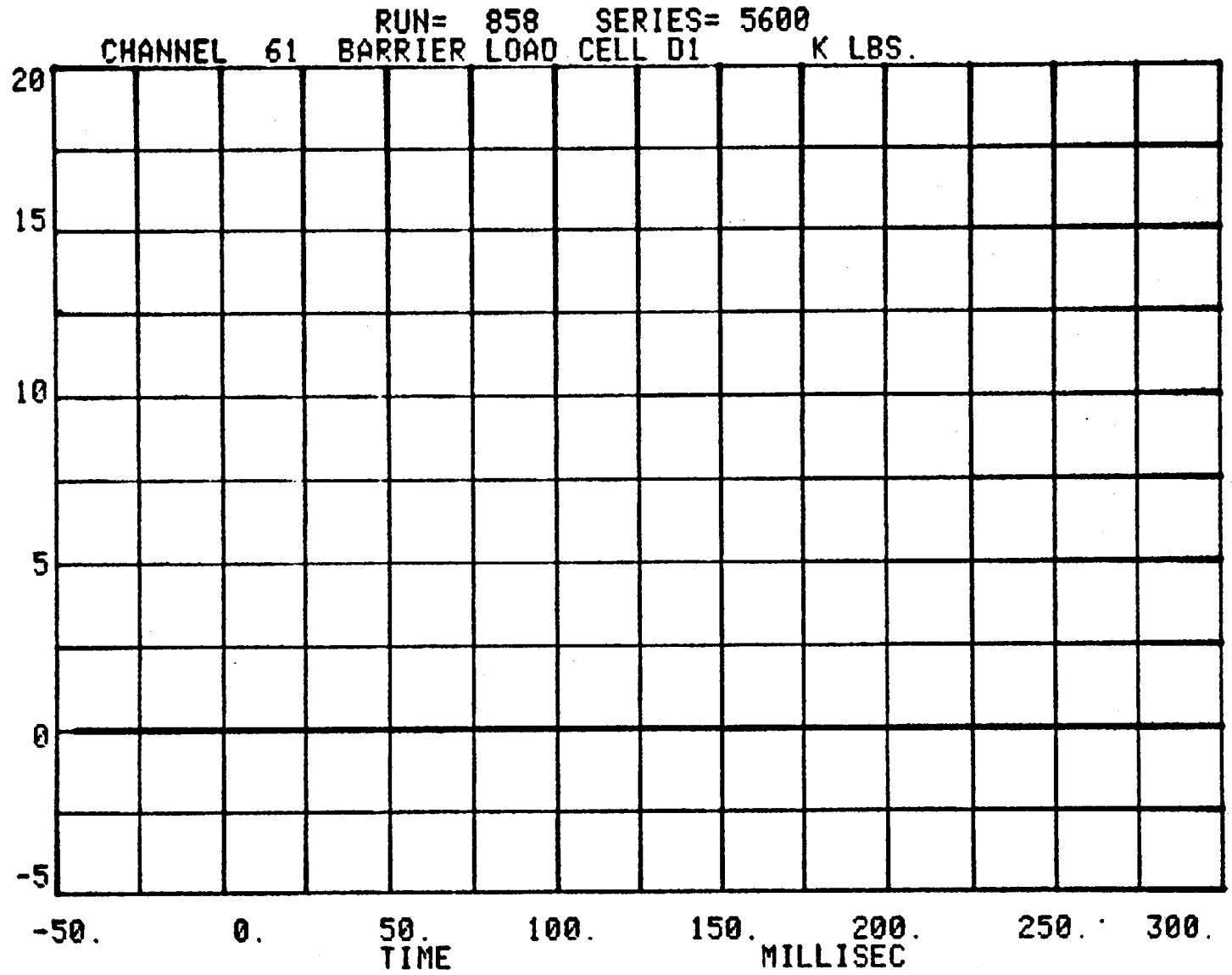

CHANNEL 58 BARRIER LOAD CELL C7
RUN= 858 SERIES= 5600 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

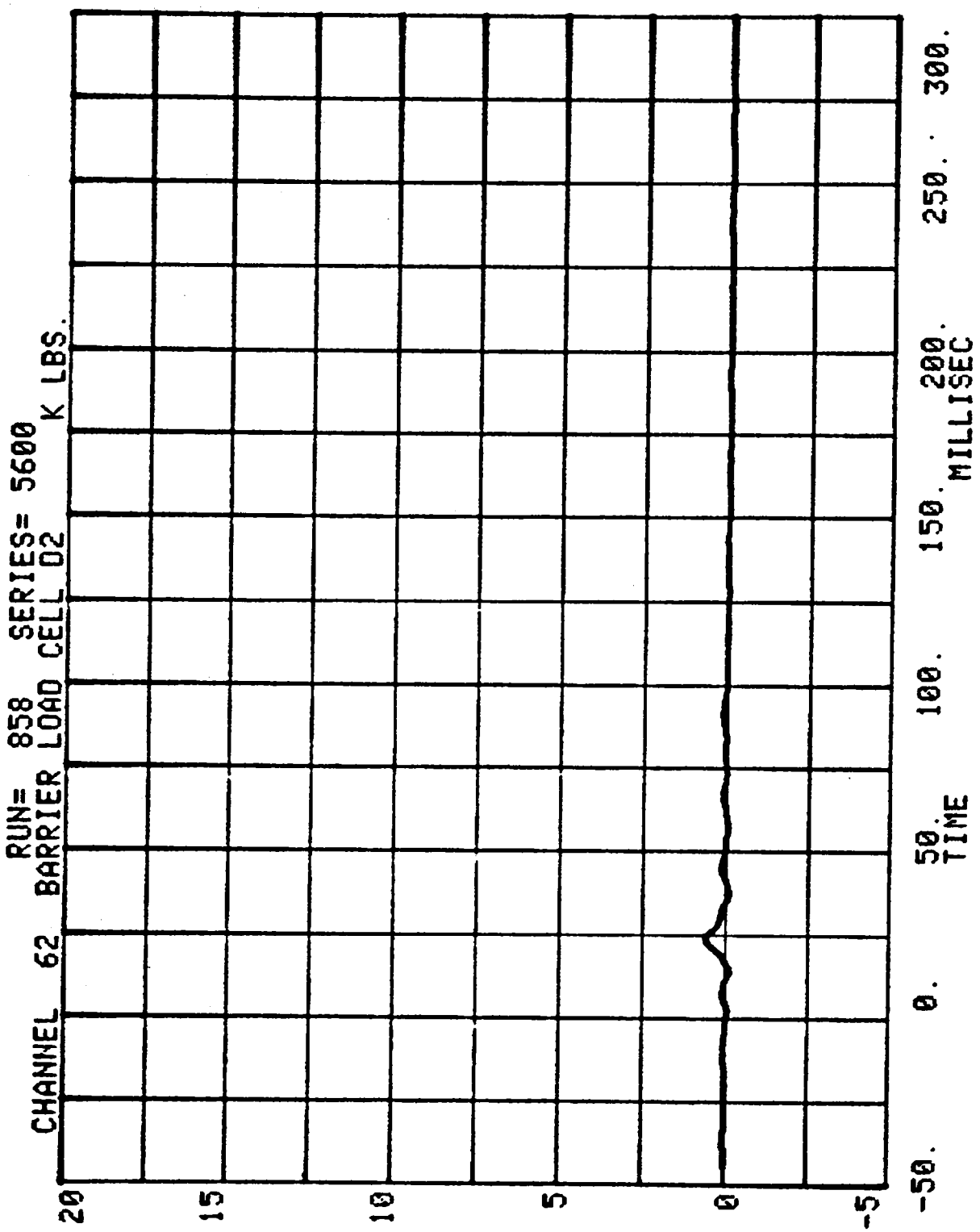

CHANNEL 59
RUN= 858 SERIES= 5600
BARRIER LOAD CELL C8
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

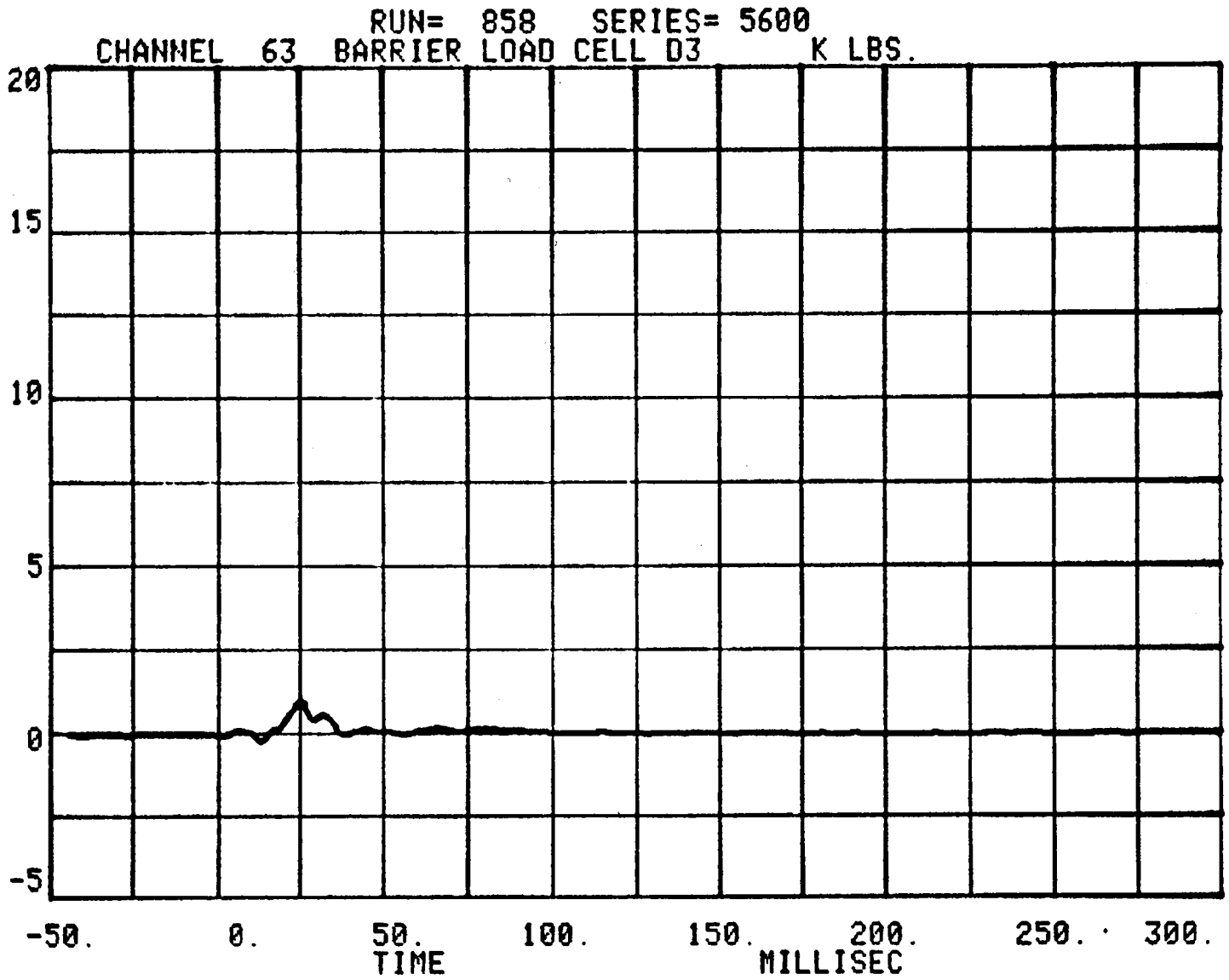

RUN= 858 SERIES= 5600
CHANNEL 60 BARRIER LOAD CELL C9
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 61 BARRIER LOAD CELL D1 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

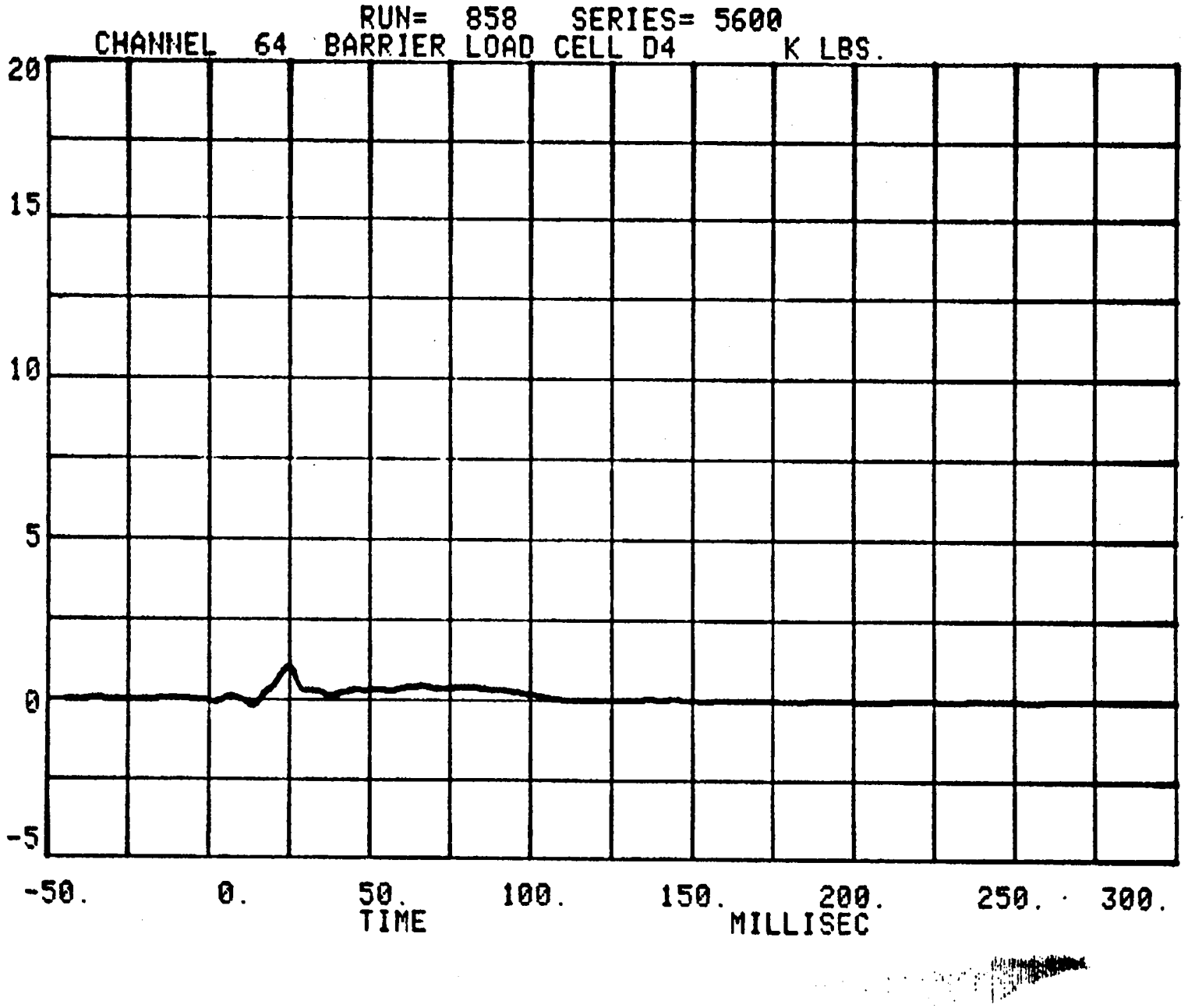
7689-3

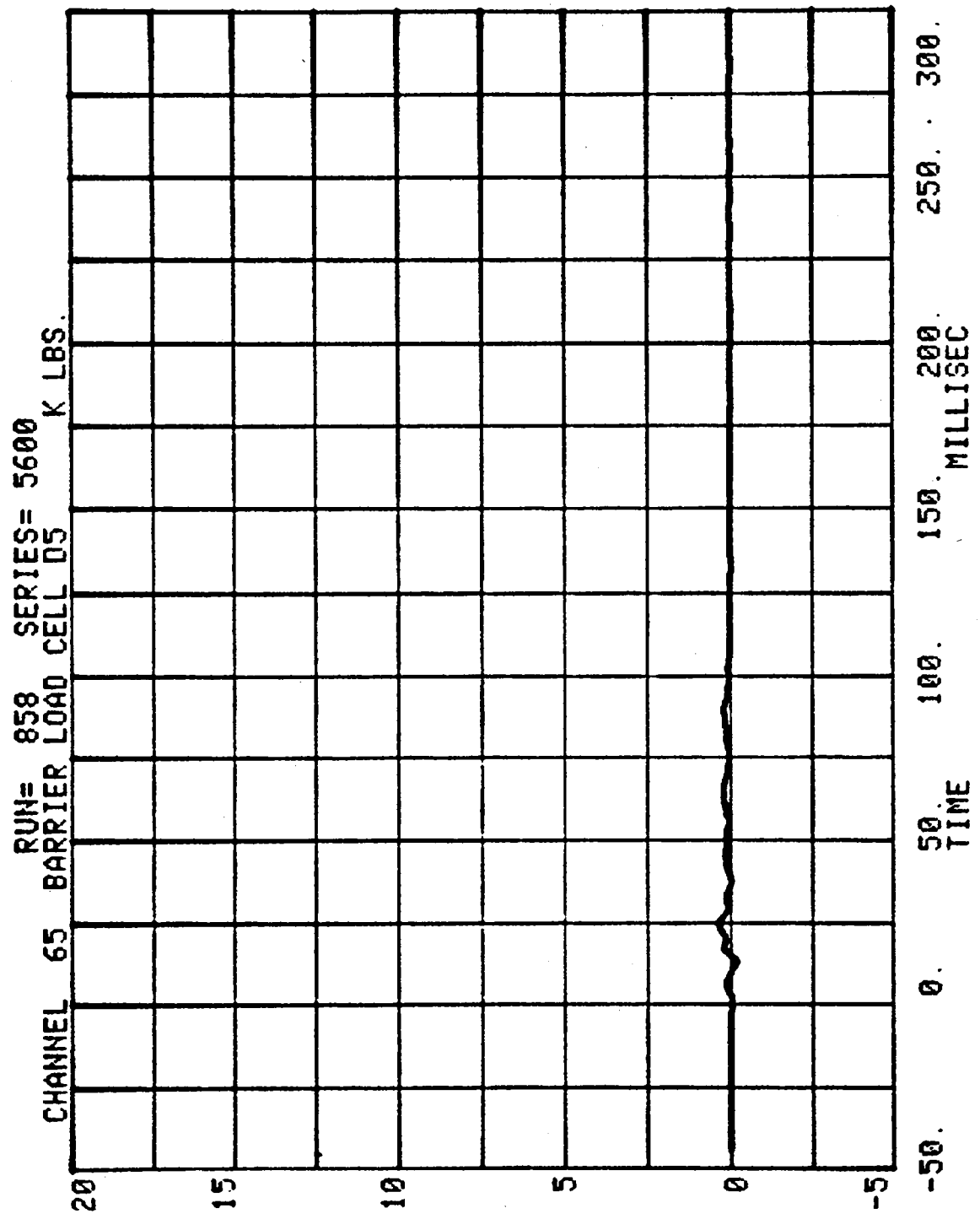

CHANNEL 62 BARRIER LOAD CELL D2
RUN= 858 SERIES= 5600 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

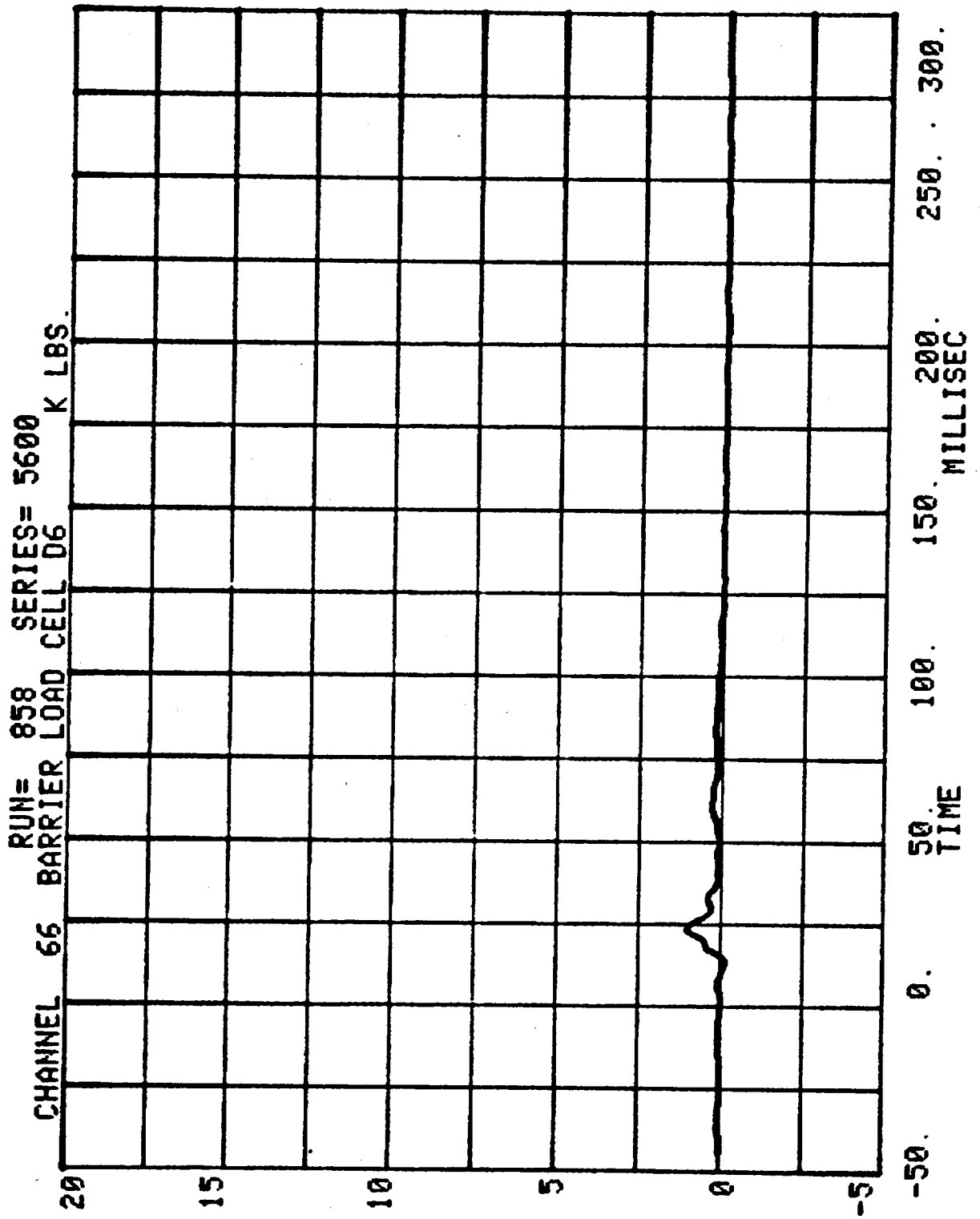
7689-3

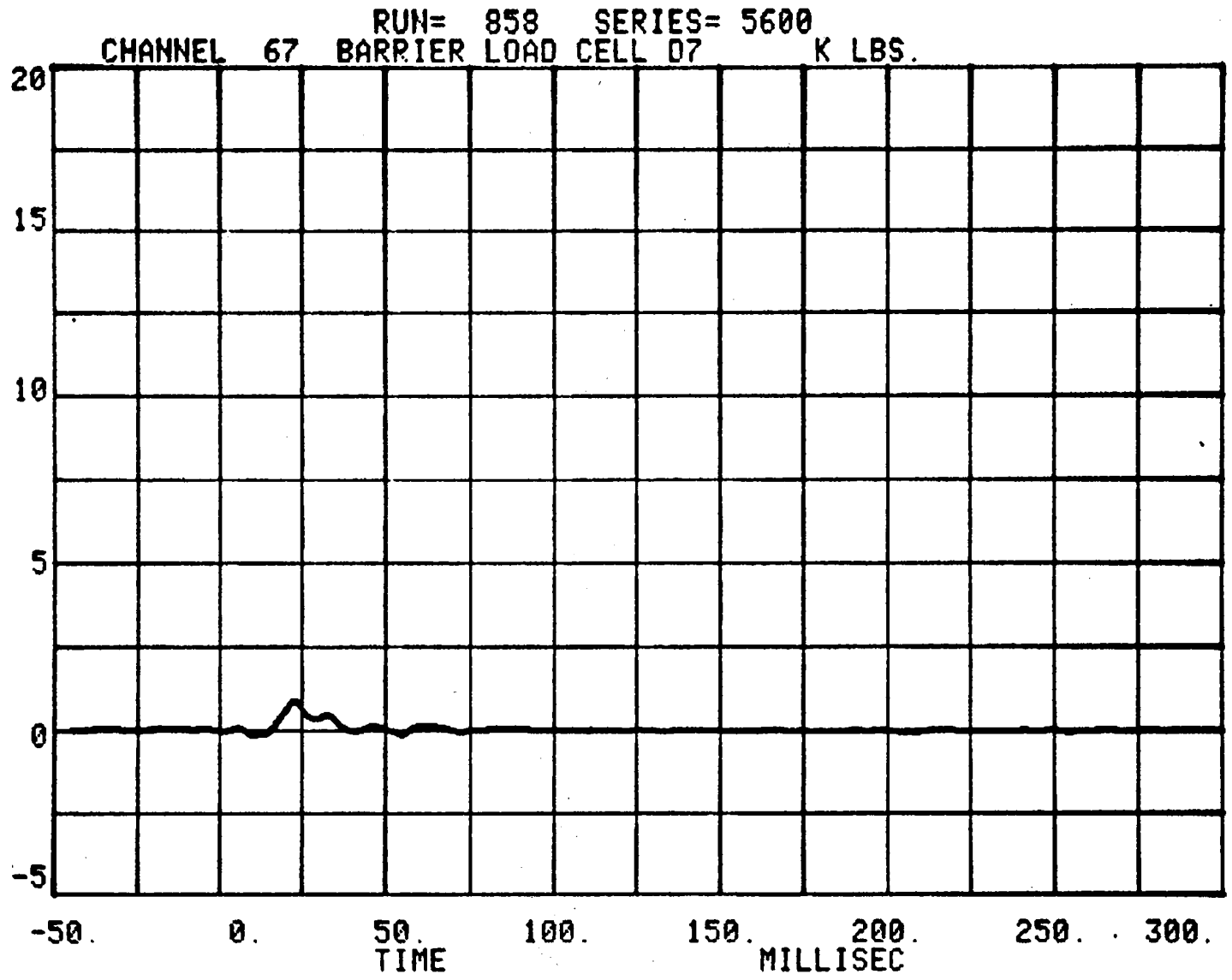

RUN= 858 SERIES= 5600
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

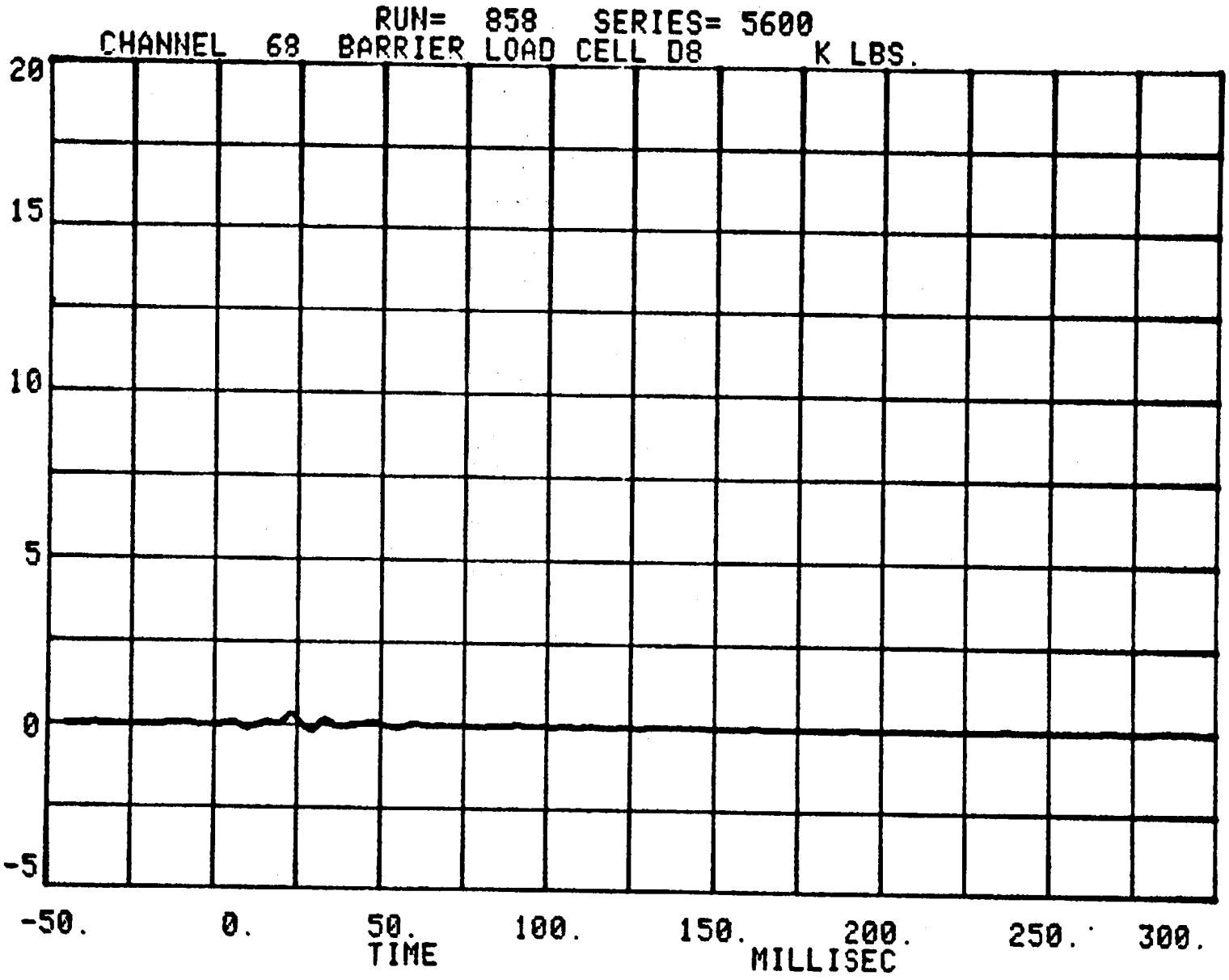

RUN= 858 SERIES= 5600
CHANNEL 64 BARRIER LOAD CELL D4 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

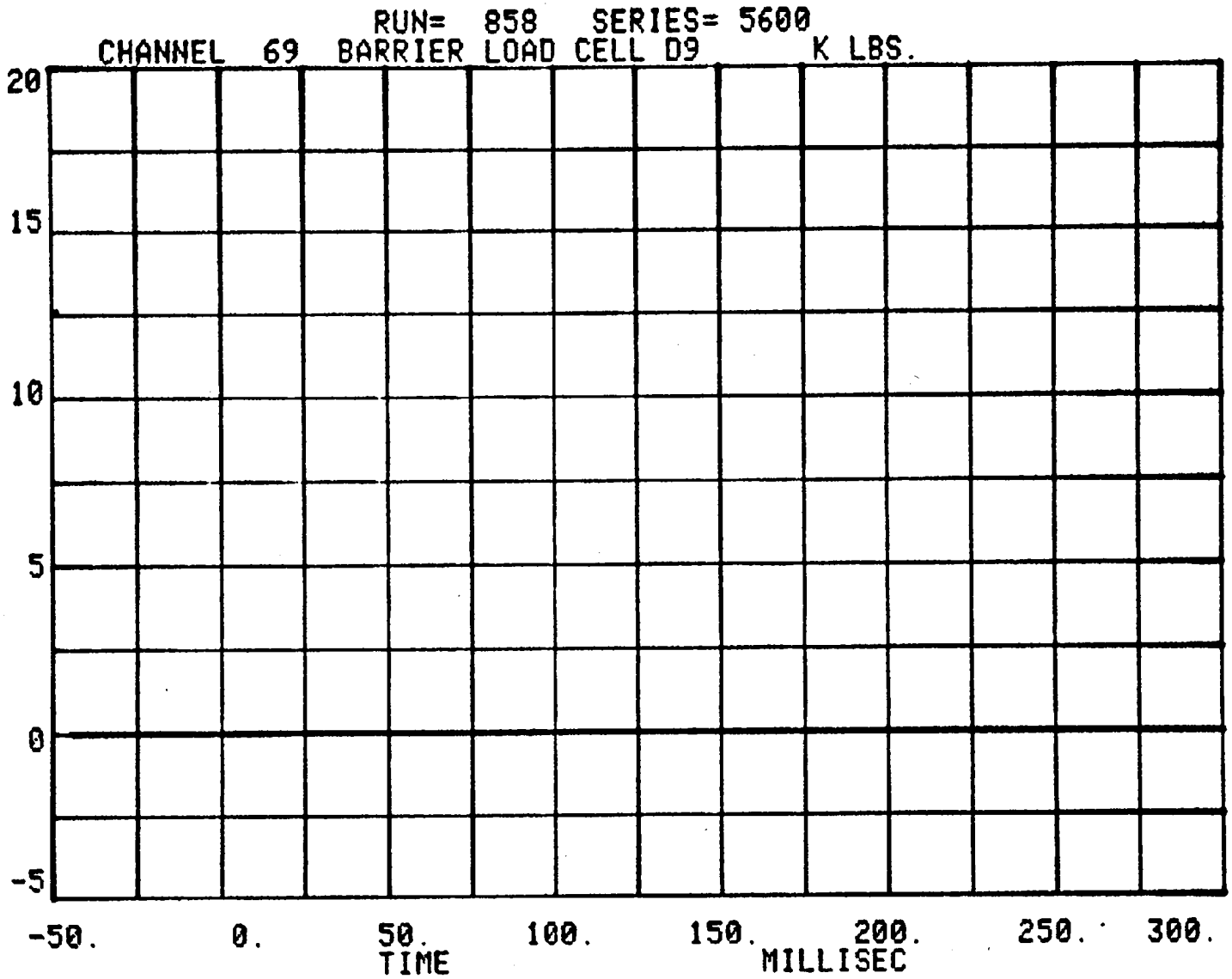

RUN= 858 SERIES= 5600
CHANNEL 65 BARRIER LOAD CELL 05
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 66 BARRIER LOAD CELL 06
RUN= 858 SERIES= 5600
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 67 BARRIER LOAD CELL 07 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3


RUN= 858 SERIES= 5600
CHANNEL 68 BARRIER LOAD CELL D8
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

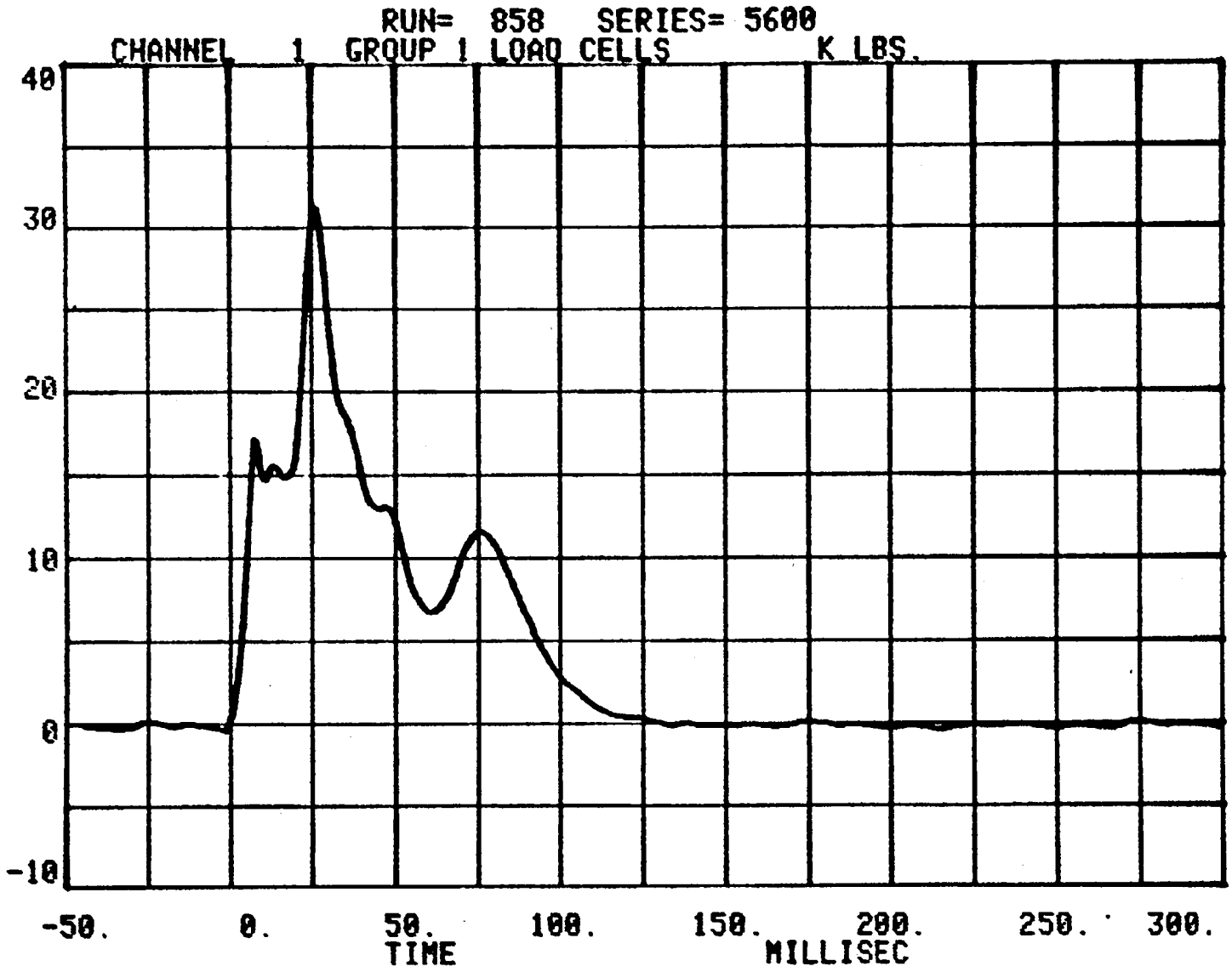

RUN= 858 SERIES= 5600
CHANNEL 69 BARRIER LOAD CELL D9
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

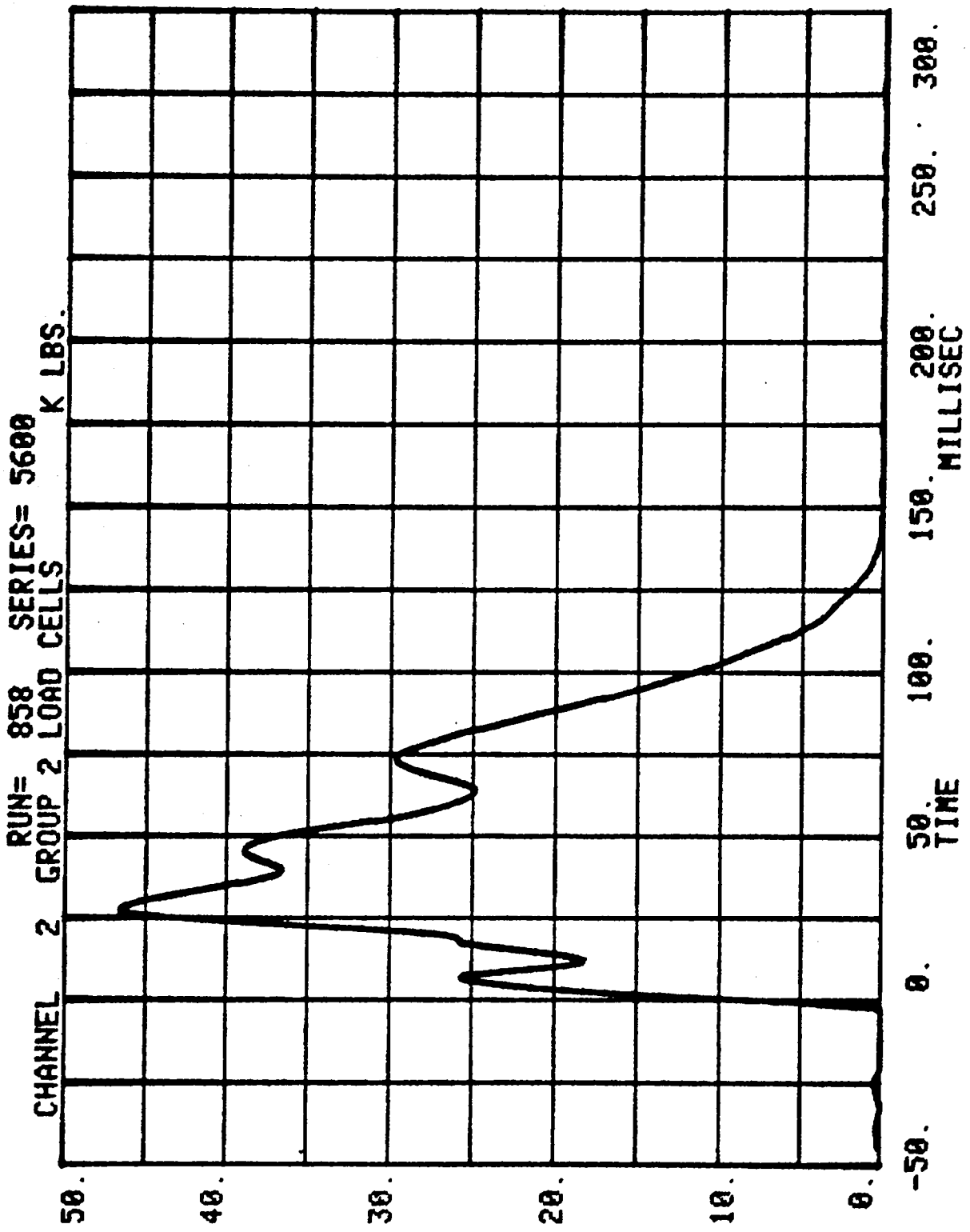
NEW CAR ASSESSMENT BARRIER TEST - 1989

RUN # 858 SERIES # 5600

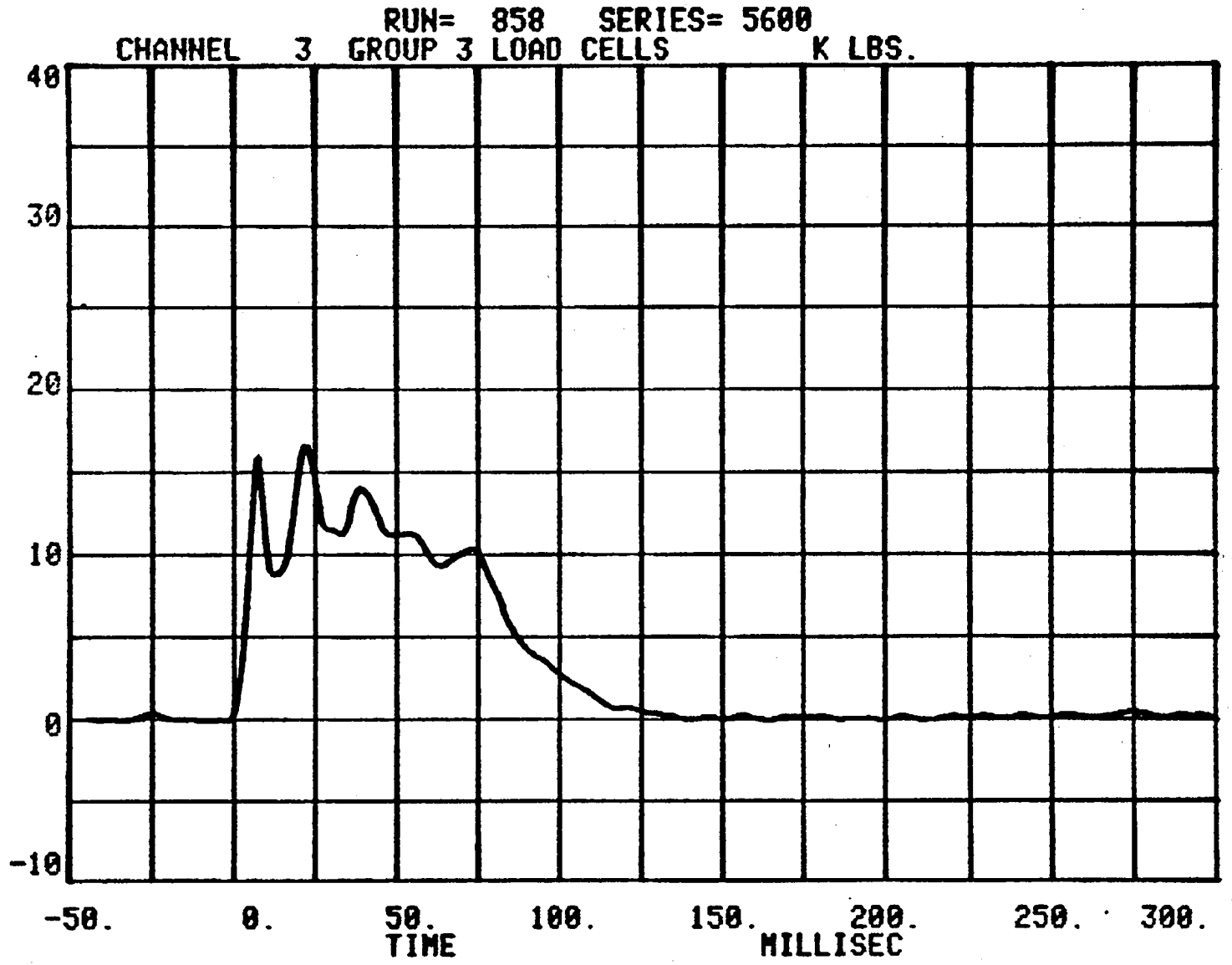
CHAN	TITLE	MINIMUM/MAXIMUM	AT TIME
1	GROUP 1 LOAD CELLS	-.212 K LBS.	299.85 MS.
		31.438 K LBS.	26.40 MS.
2	GROUP 2 LOAD CELLS	-.550 K LBS.	-4.12 MS.
		46.649 K LBS.	27.67 MS.
3	GROUP 3 LOAD CELLS	-.121 K LBS.	212.33 MS.
		16.606 K LBS.	22.20 MS.
4	GROUP 4 LOAD CELLS	-.356 K LBS.	1.27 MS.
		8.576 K LBS.	26.62 MS.
5	GROUP 5 LOAD CELLS	-.470 K LBS.	.82 MS.
		6.971 K LBS.	51.82 MS.
6	GROUP 6 LOAD CELLS	-.280 K LBS.	204.83 MS.
		6.042 K LBS.	22.35 MS.
7	TOTAL LOAD CELL SUM	-.419 K LBS.	299.85 MS.
		109.888 K LBS.	26.62 MS.


RUN= 858 SERIES= 5600
CHANNEL 1 GROUP 1 LOAD CELLS K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

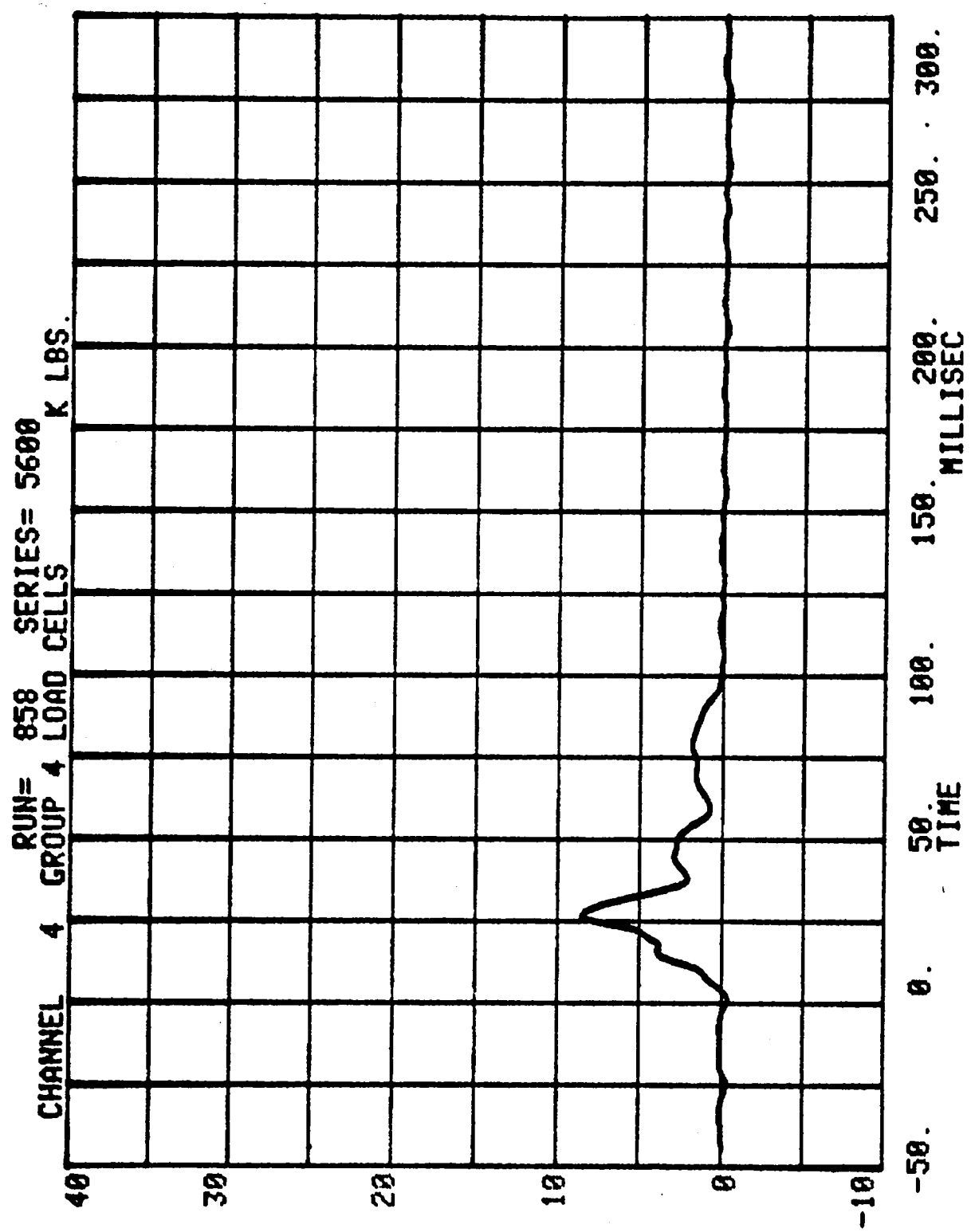
7689-3

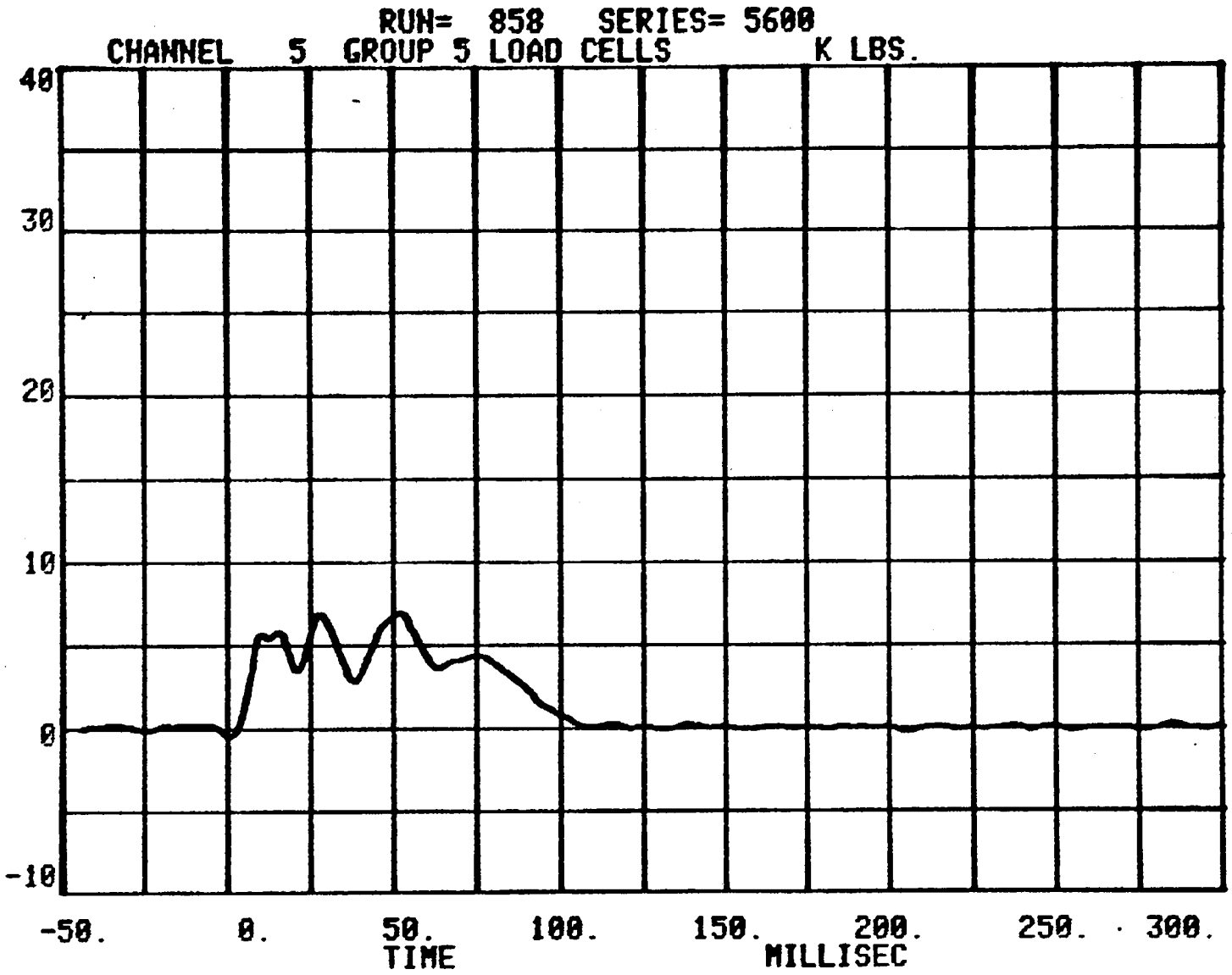

RUN= 858 SERIES= 5600
GROUP 2 LOAD CELLS
CHANNEL 2
K LBS.
50.
40.
30.
20.
10.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

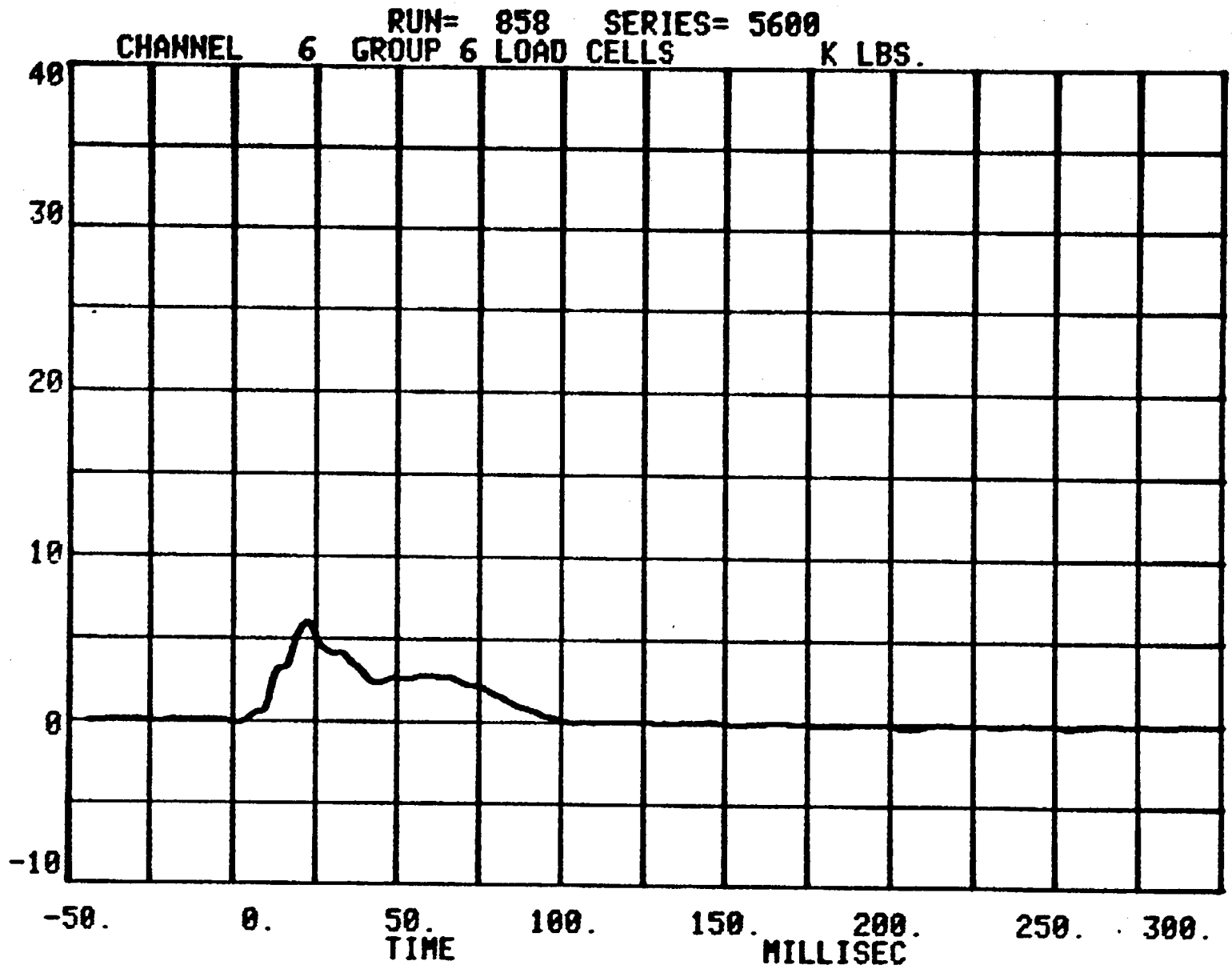

RUN= 858 SERIES= 5600
CHANNEL 3 GROUP 3 LOAD CELLS K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

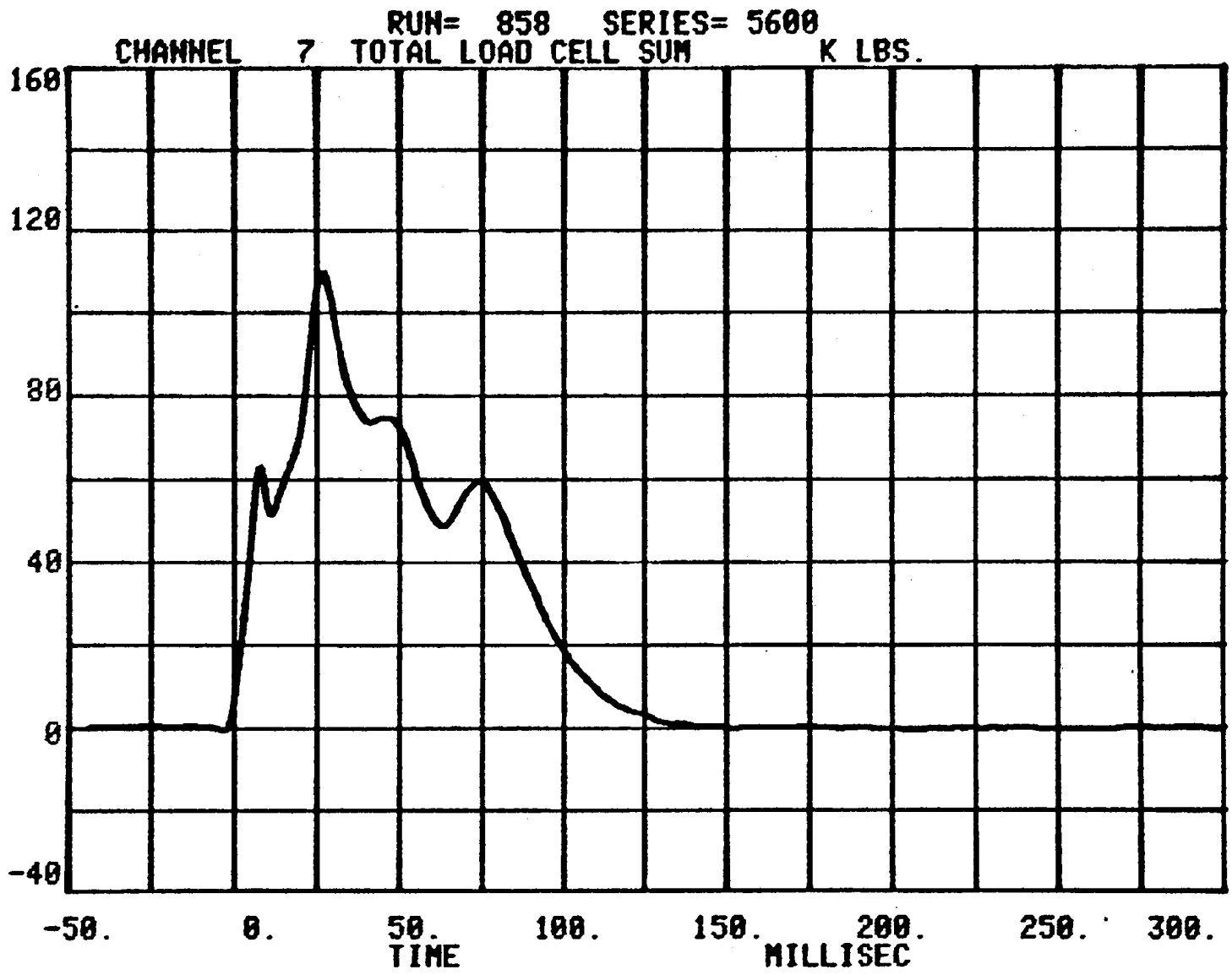
7689-3


CHANNEL 4 GROUP 4 LOAD CELLS
RUN= 858 SERIES= 5600
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 5 GROUP 5 LOAD CELLS
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3


RUN= 858 SERIES= 5600
CHANNEL 6 GROUP 6 LOAD CELLS
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 7 TOTAL LOAD CELL SUM K LBS.
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

TEST NO. MK5600

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 - 1989

RUN= 858

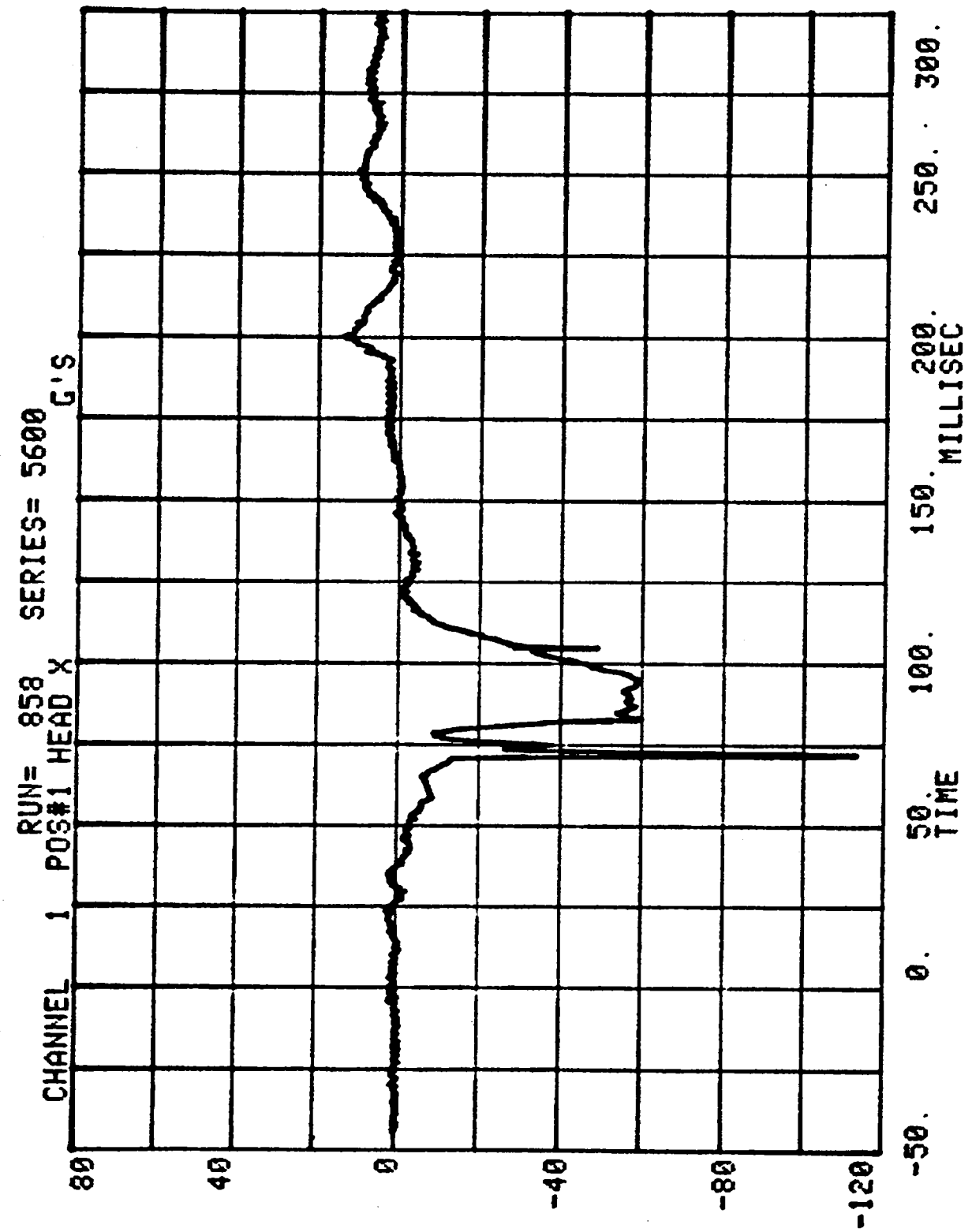
POS#1 HEAD R

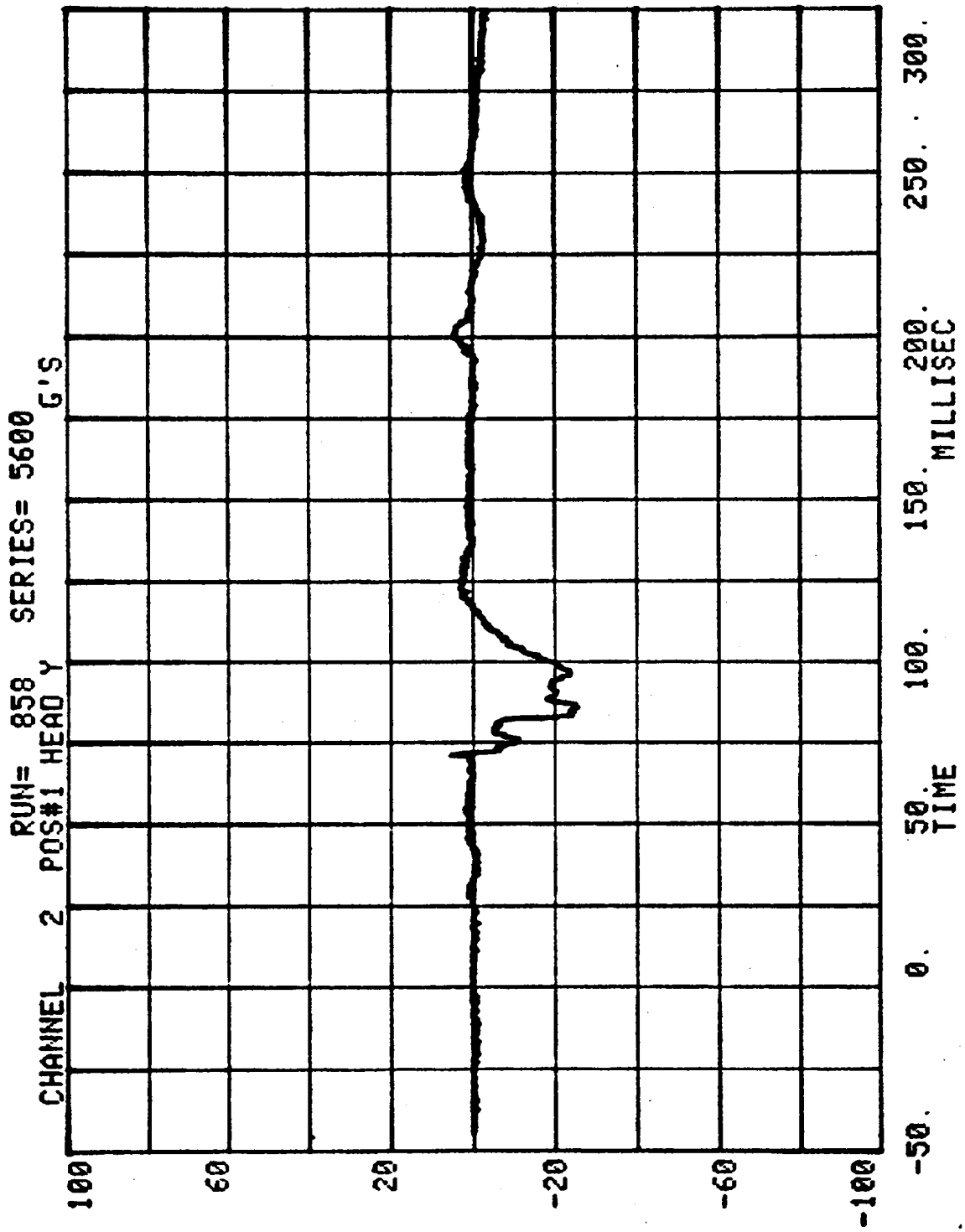
HIC= 970.7 FROM T1= .07117 TO T2= .10515

AVERAGE ACCELERATION BETWEEN T1 AND T2= 60.6G'S

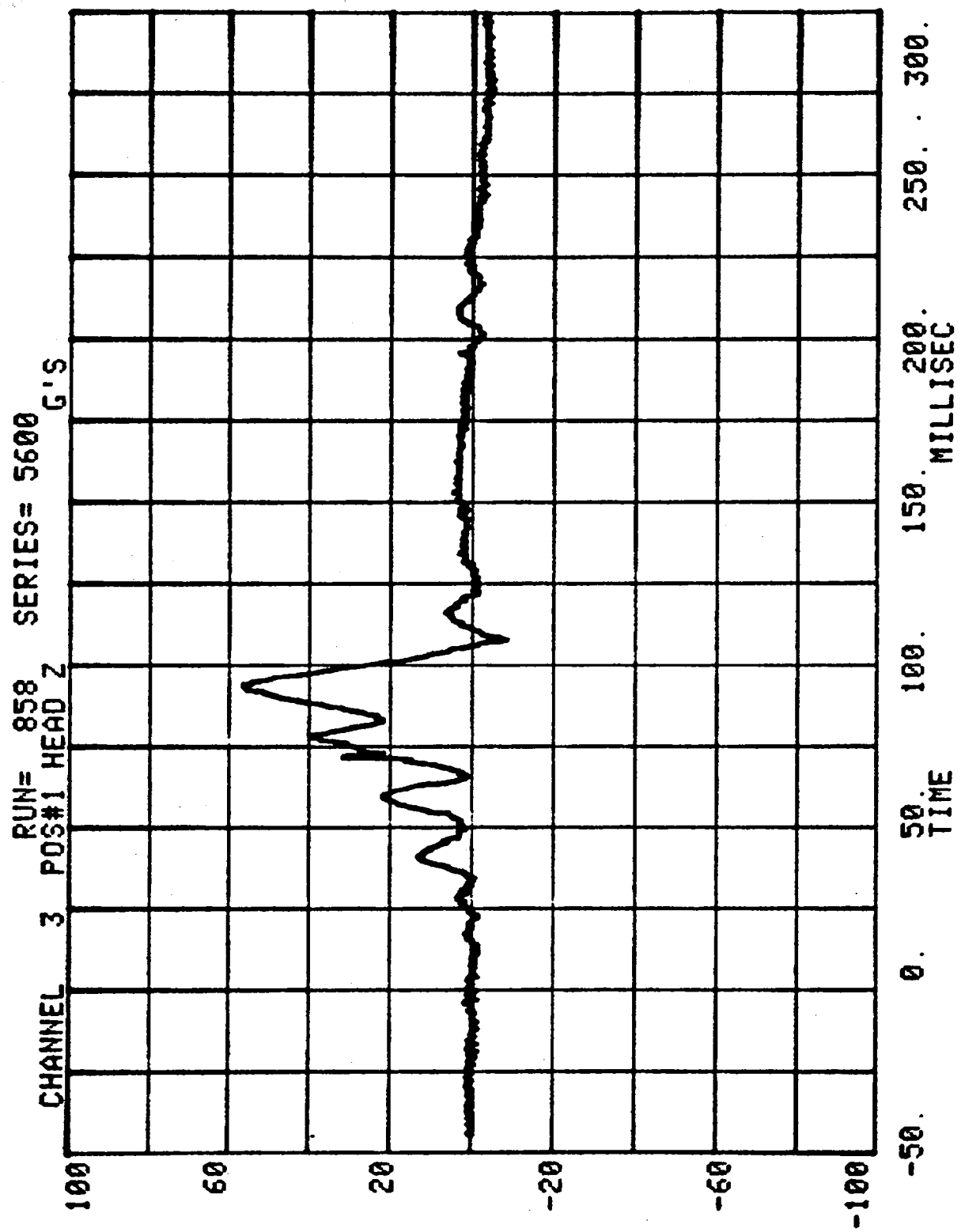
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1196.6

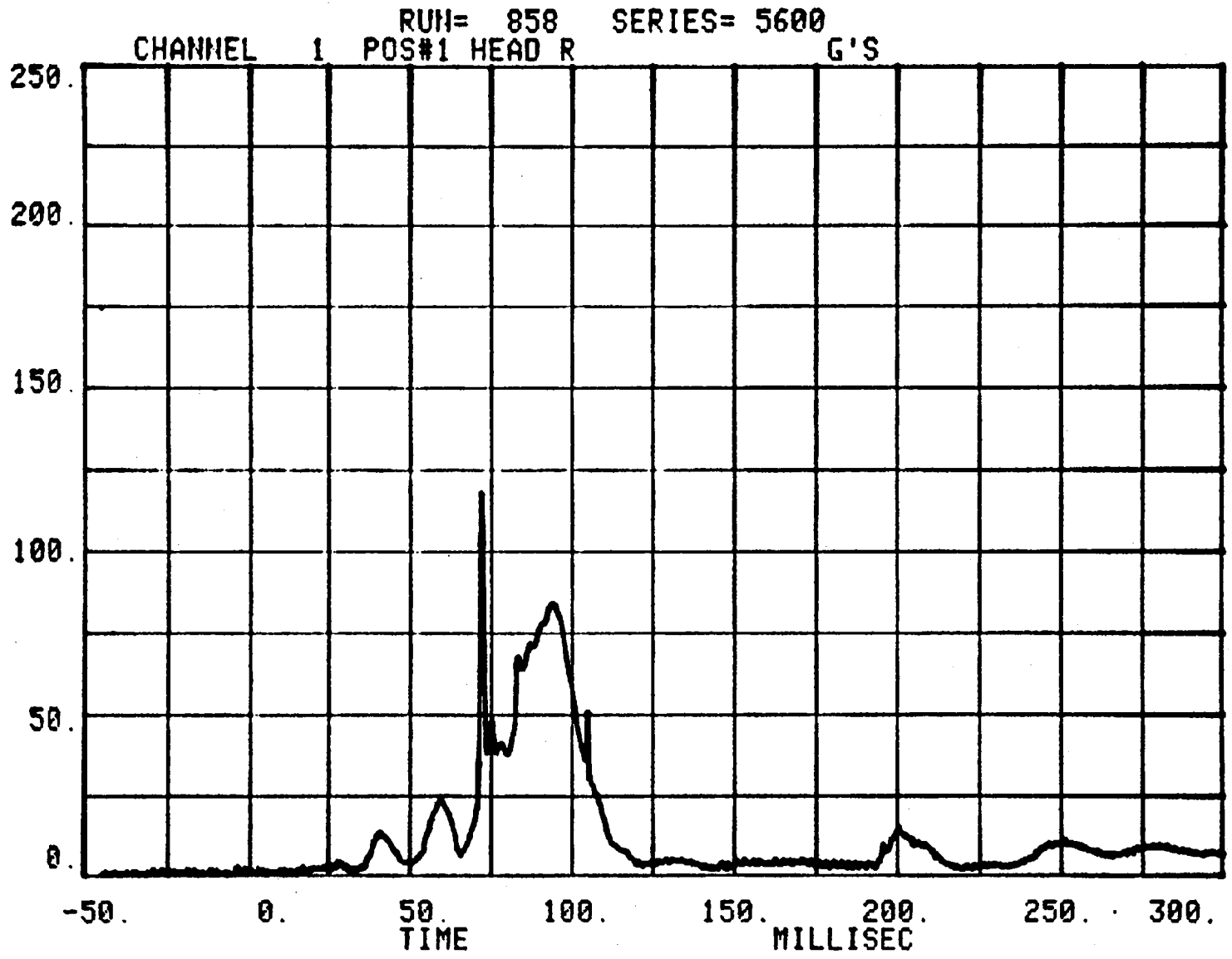

CHANNEL 1 POS#1 HEAD X
RUN= 858 SERIES= 5600
G'S
80
40
0
-40
-80
-120
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 2 POS#1 HEAD Y
RUN= 858 SERIES= 5600 G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

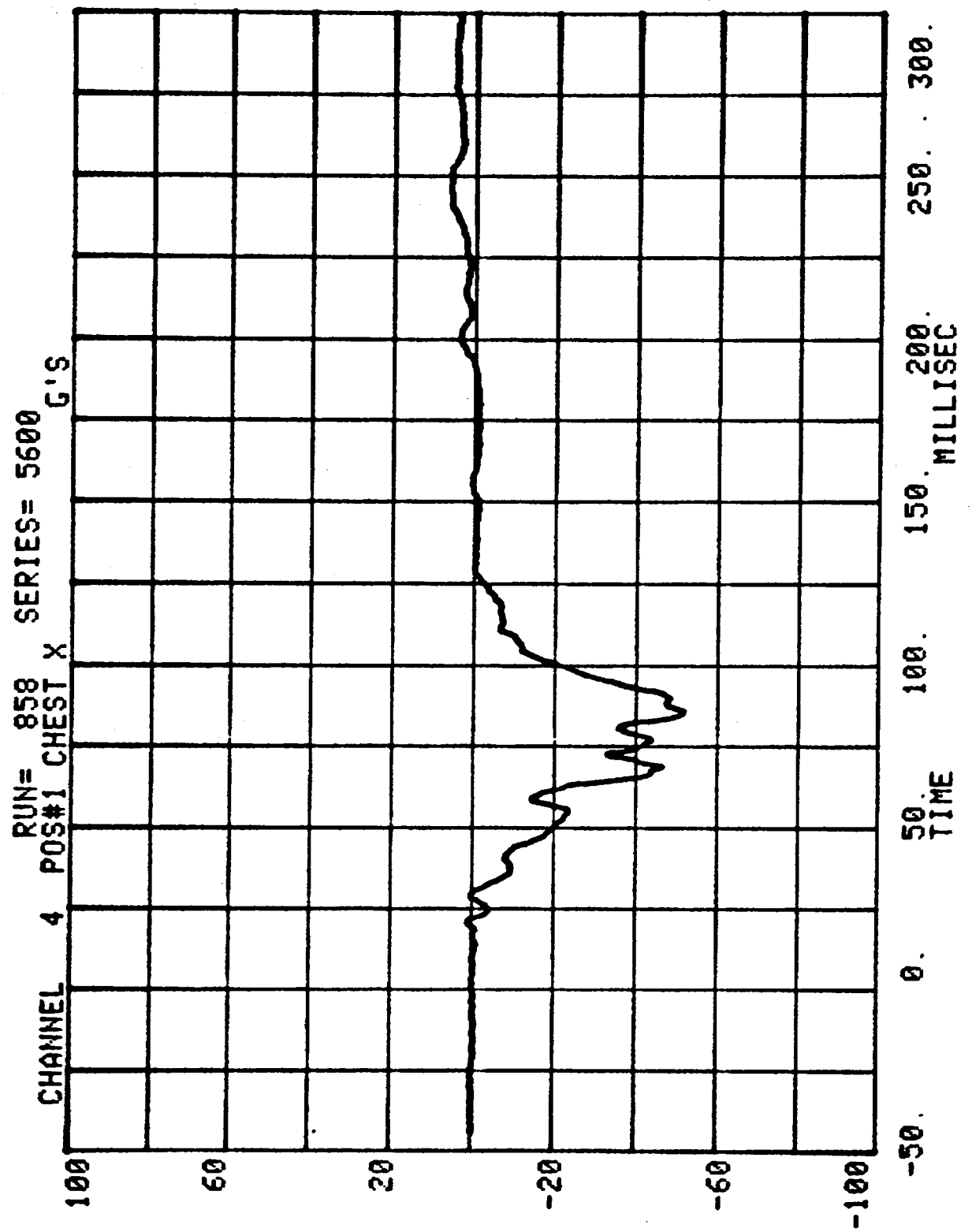
7689-3

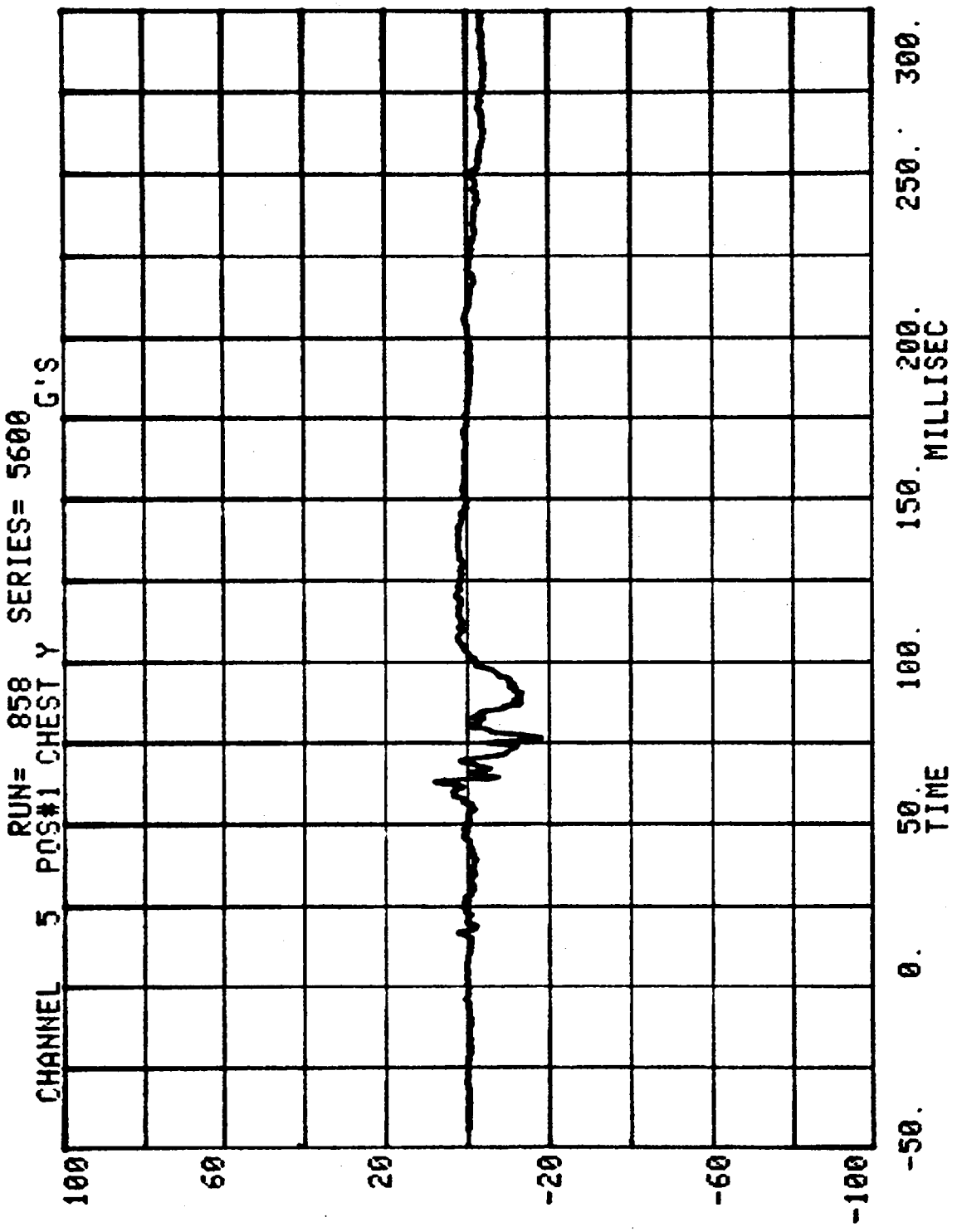

CHANNEL 3 POS#1 HEAD 2
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

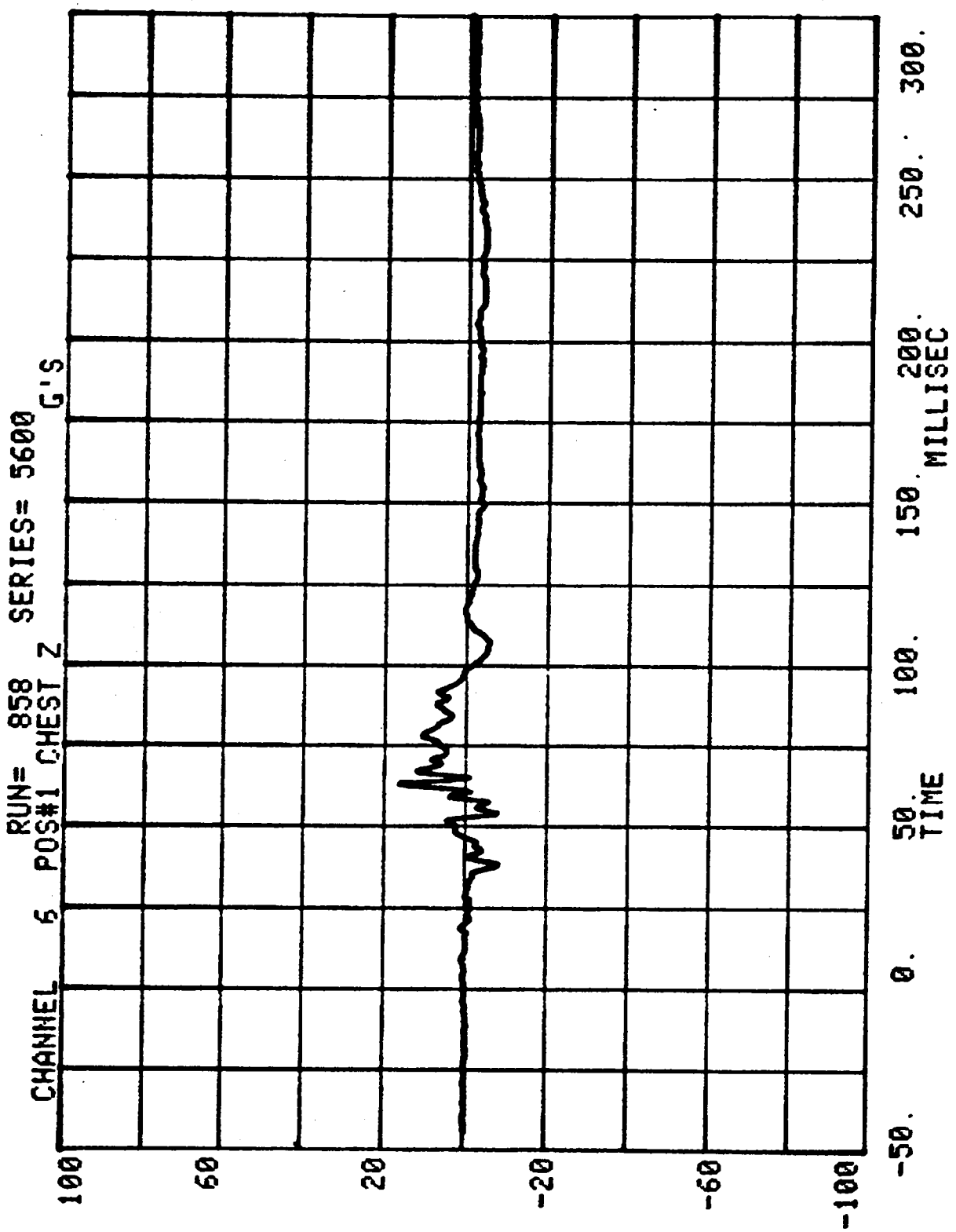
7689-3


RUN= 858 SERIES= 5600
CHANNEL 1 POS#1 HEAD R
G'S
250.
200.
150.
100.
50.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

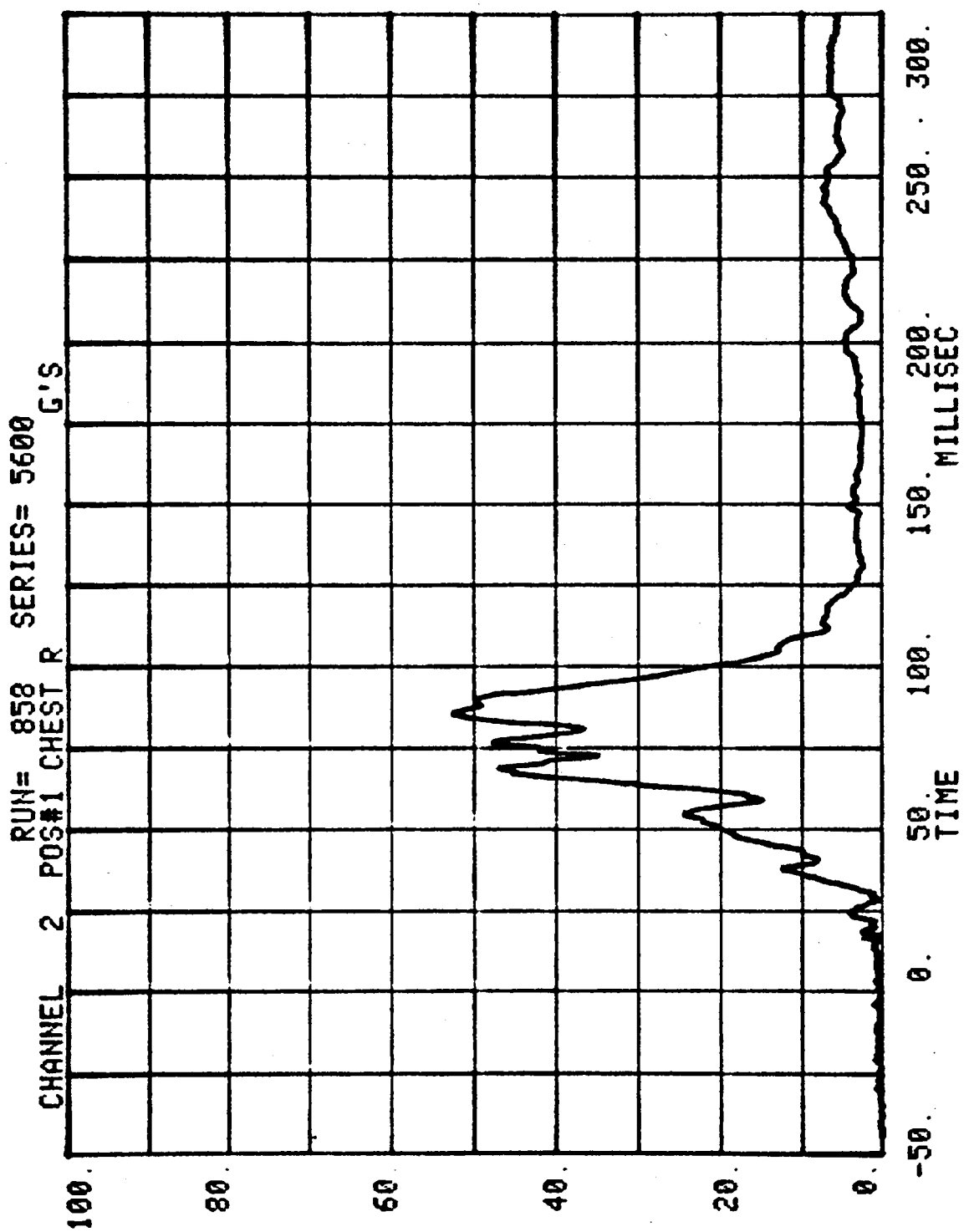
7689-3


CHANNEL 4 POS#1 CHEST X
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

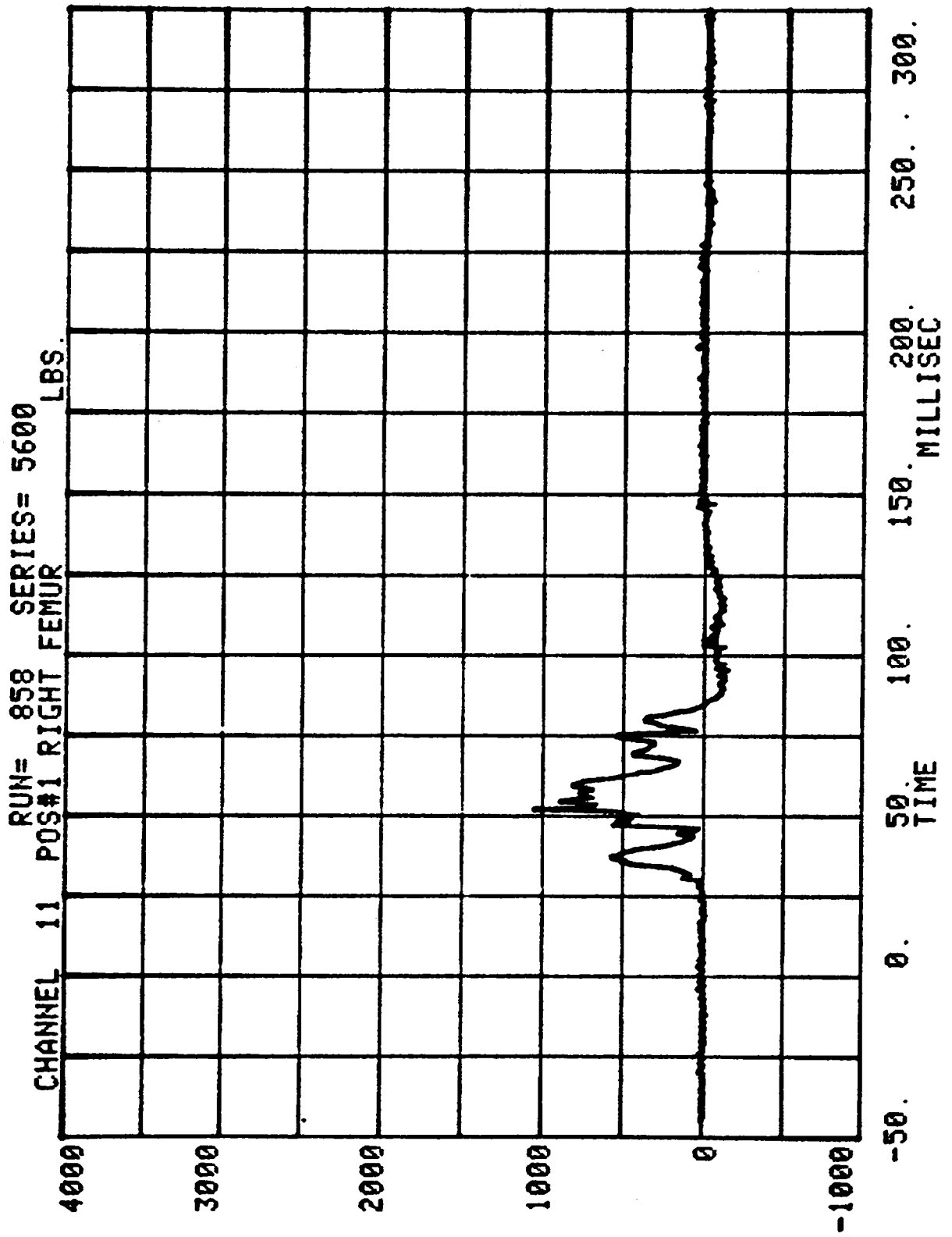

CHANNEL 5 POS#1 CHEST Y
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

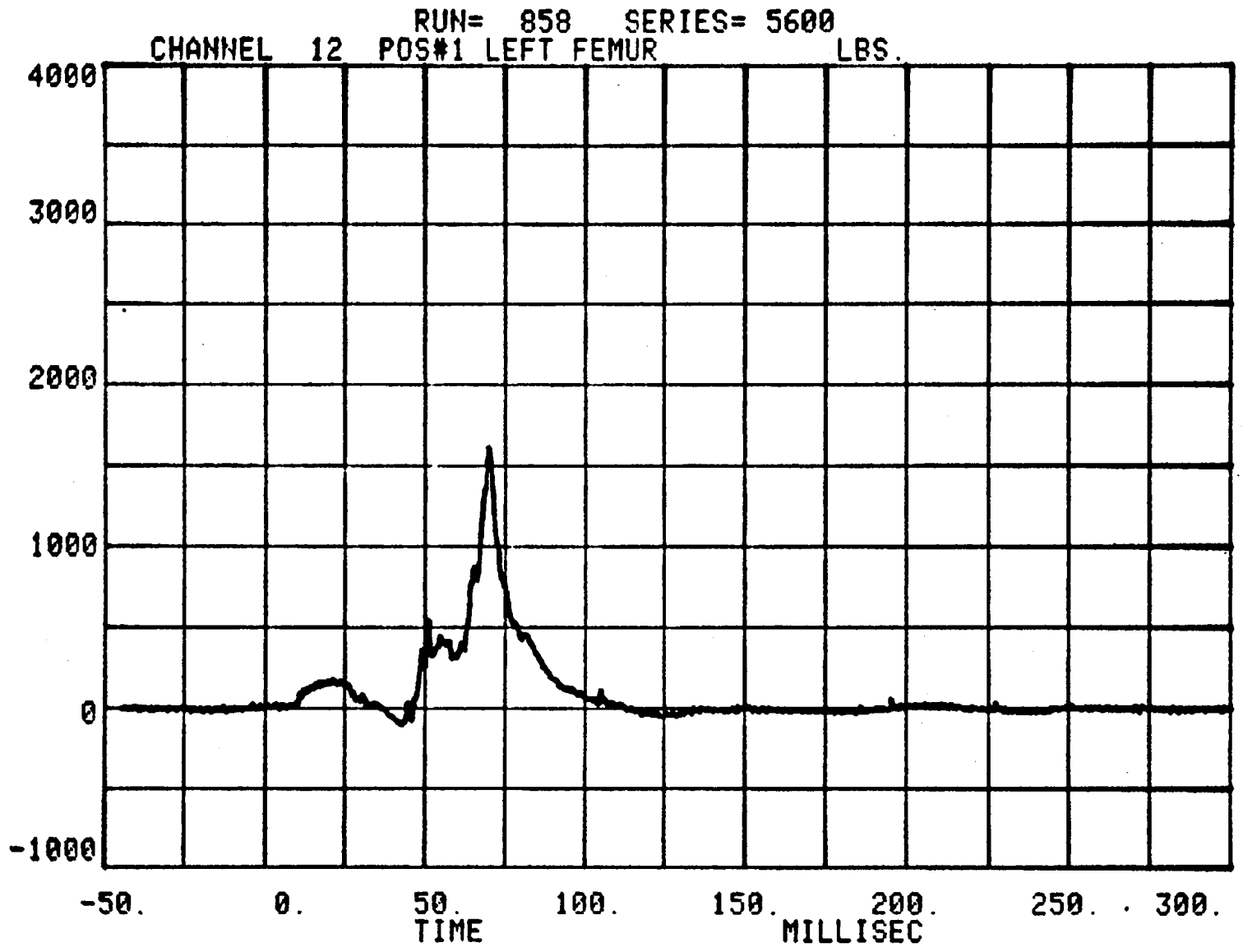

CHANNEL 5 POS#1 CHEST Z
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

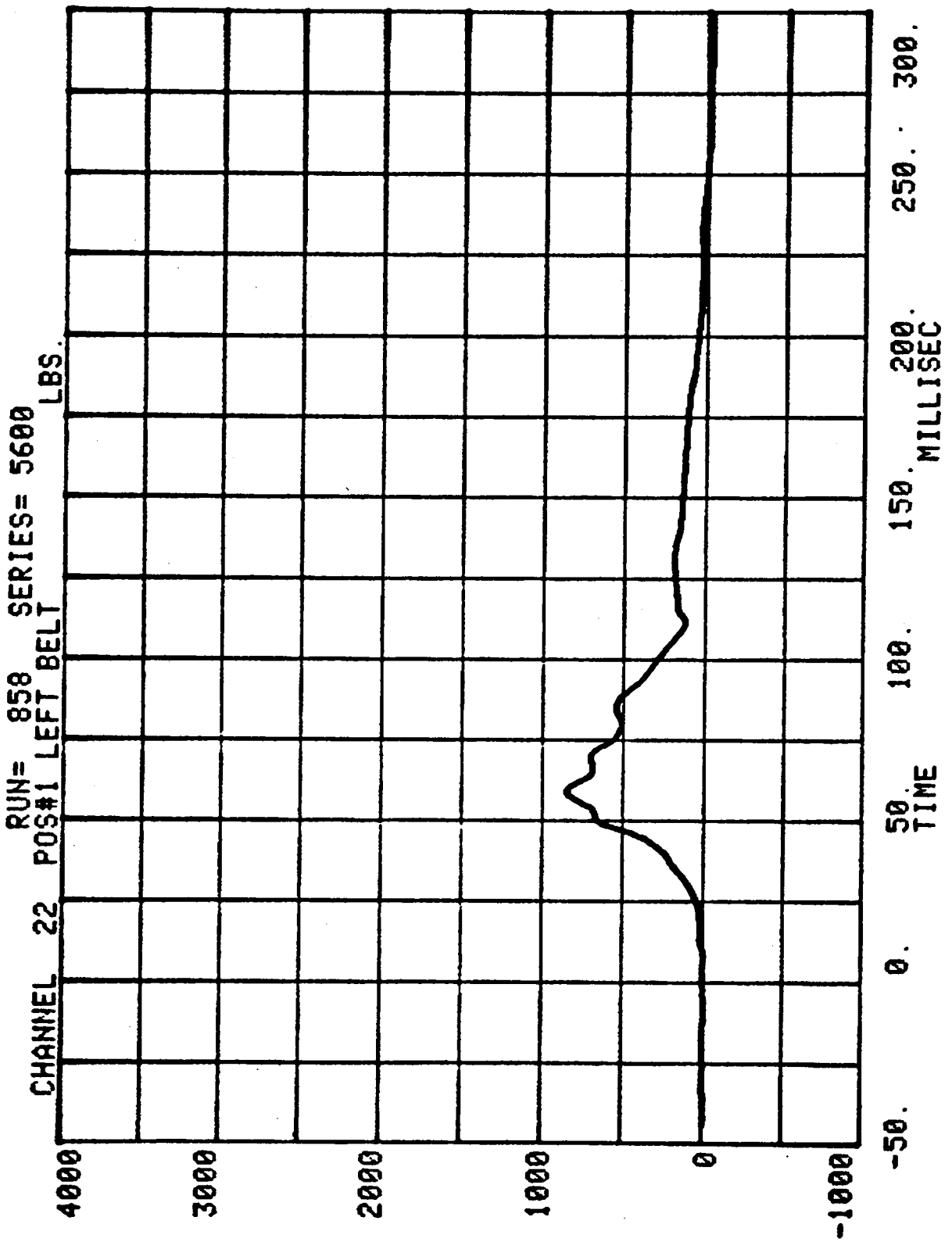

CHANNEL 2 RUN= 858 SERIES= 5600
POS#1 CHEST R
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

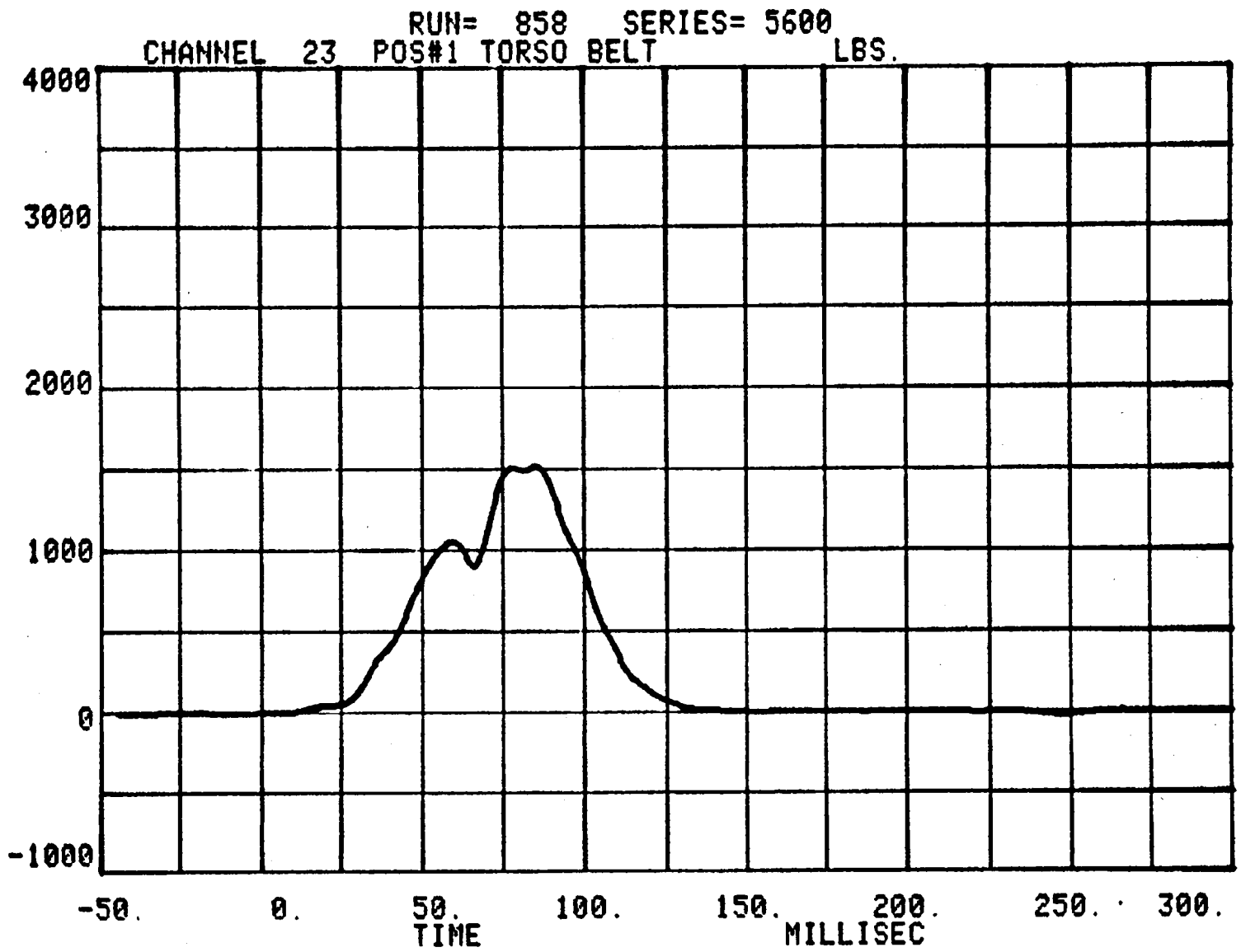
7689-3


CHANNEL 11 POS#1 RIGHT FEMUR
RUN= 858 SERIES= 5600
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

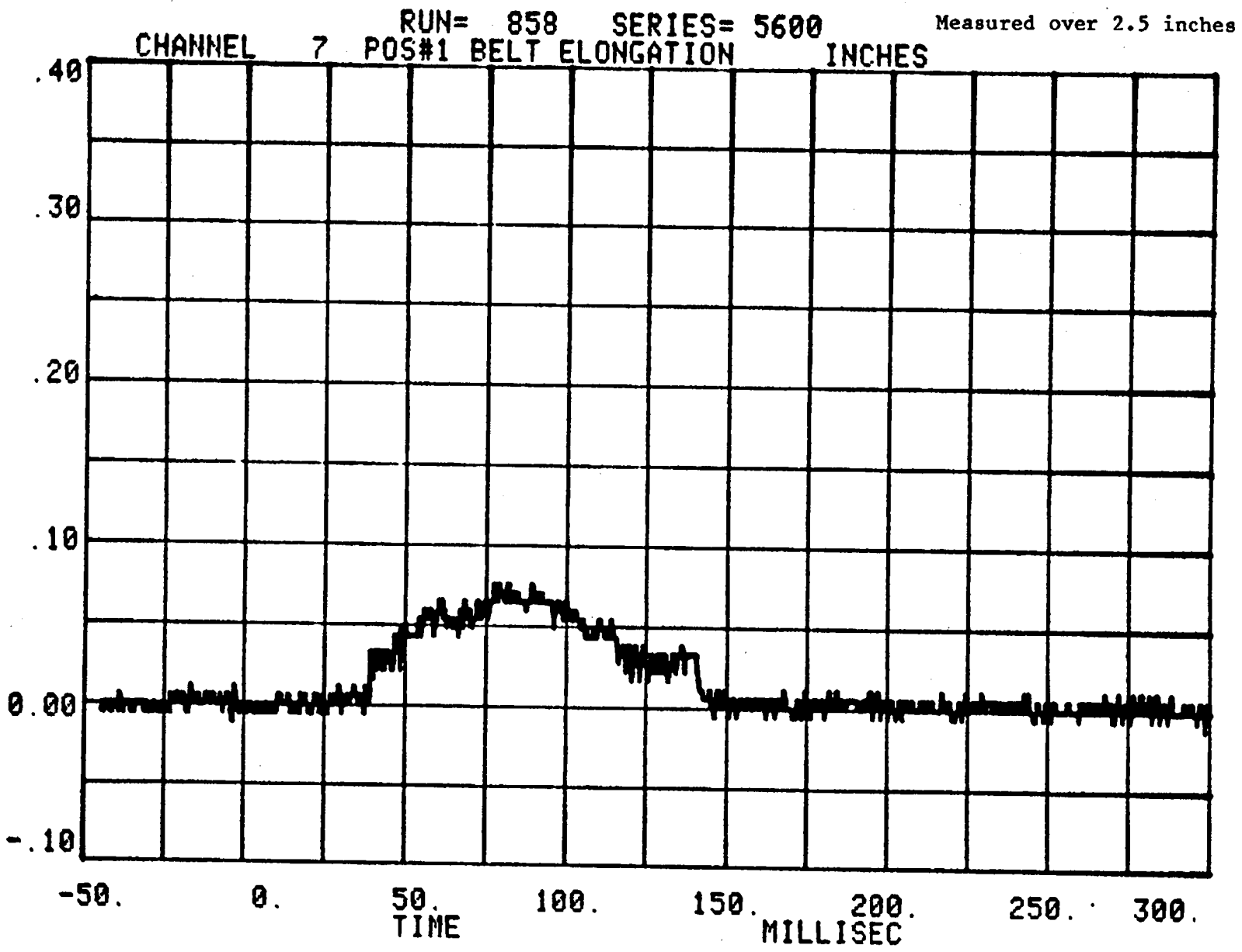

RUN= 858 SERIES= 5600
CHANNEL 12 POS#1 LEFT FEMUR LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

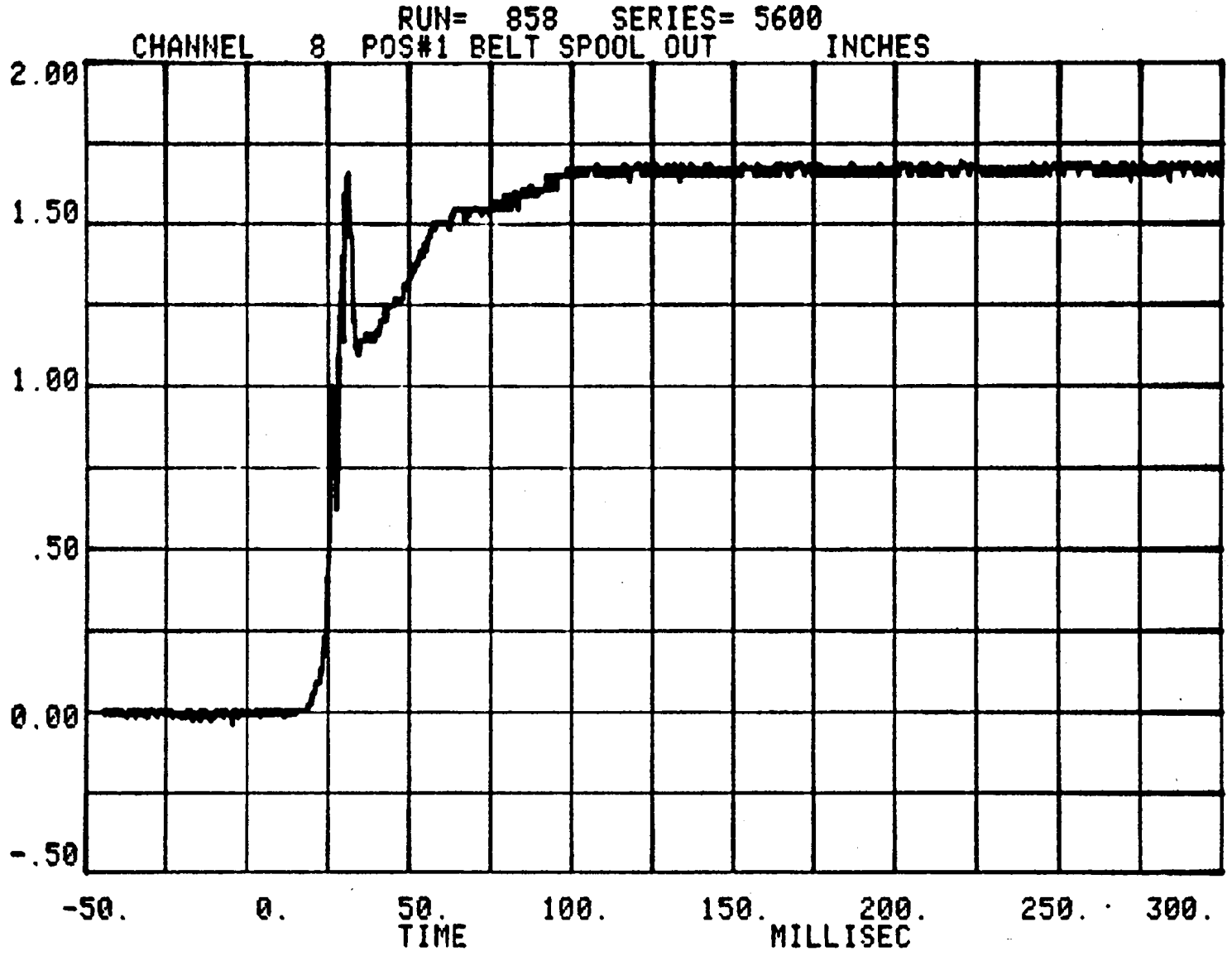
7689-3


CHANNEL 22 POS#1 LEFT BELT
RUN= 858 SERIES= 5600
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 23 POS#1 TORSO BELT LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3


RUN= 858 SERIES= 5600
Measured over 2.5 inches
CHANNEL 7 POS#1 BELT ELONGATION INCHES
.40
.30
.20
.10
0.00
-.10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 8 POS#1 BELT SPOOL OUT INCHES
2.00
1.50
1.00
.50
0.00
-.50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NEW CAR ASSESSMENT BARRIER TEST - 1989

RUN= 858

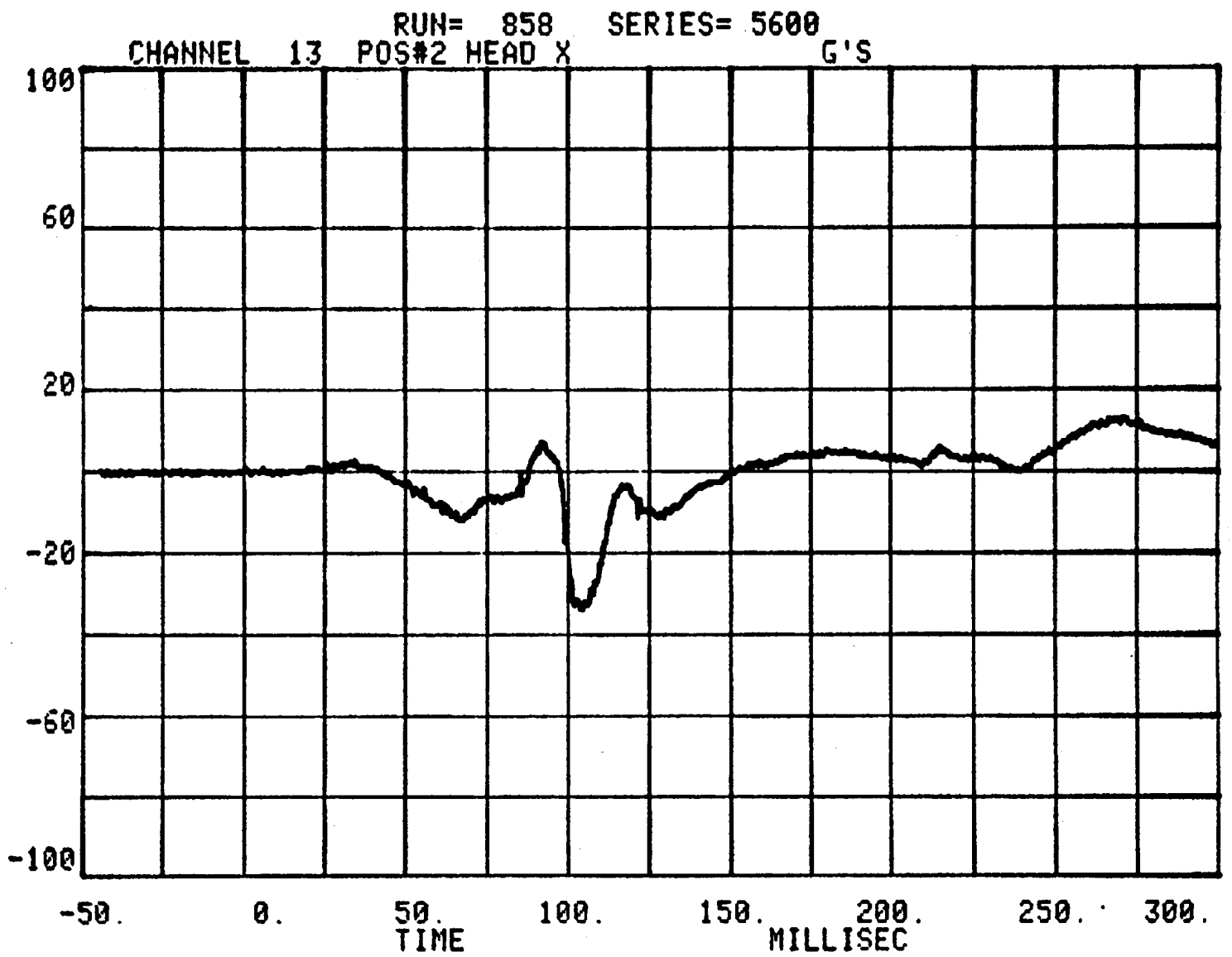
POS#2 HEAD R

HIC= 997.6 FROM T1= .07732 TO T2= .10980

AVERAGE ACCELERATION BETWEEN T1 AND T2= 62.4G'S

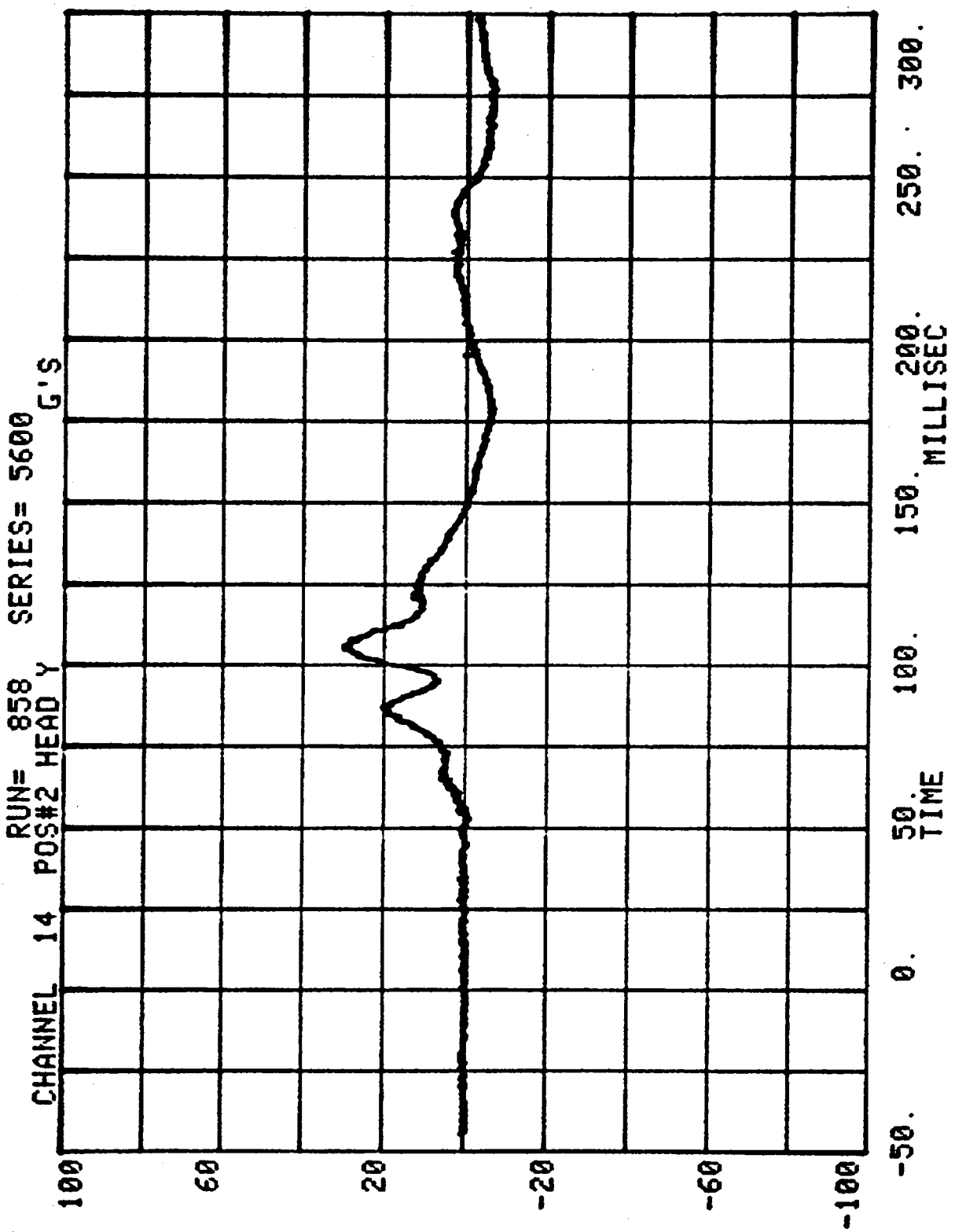
EVENT TIME= 300.0 MSEC

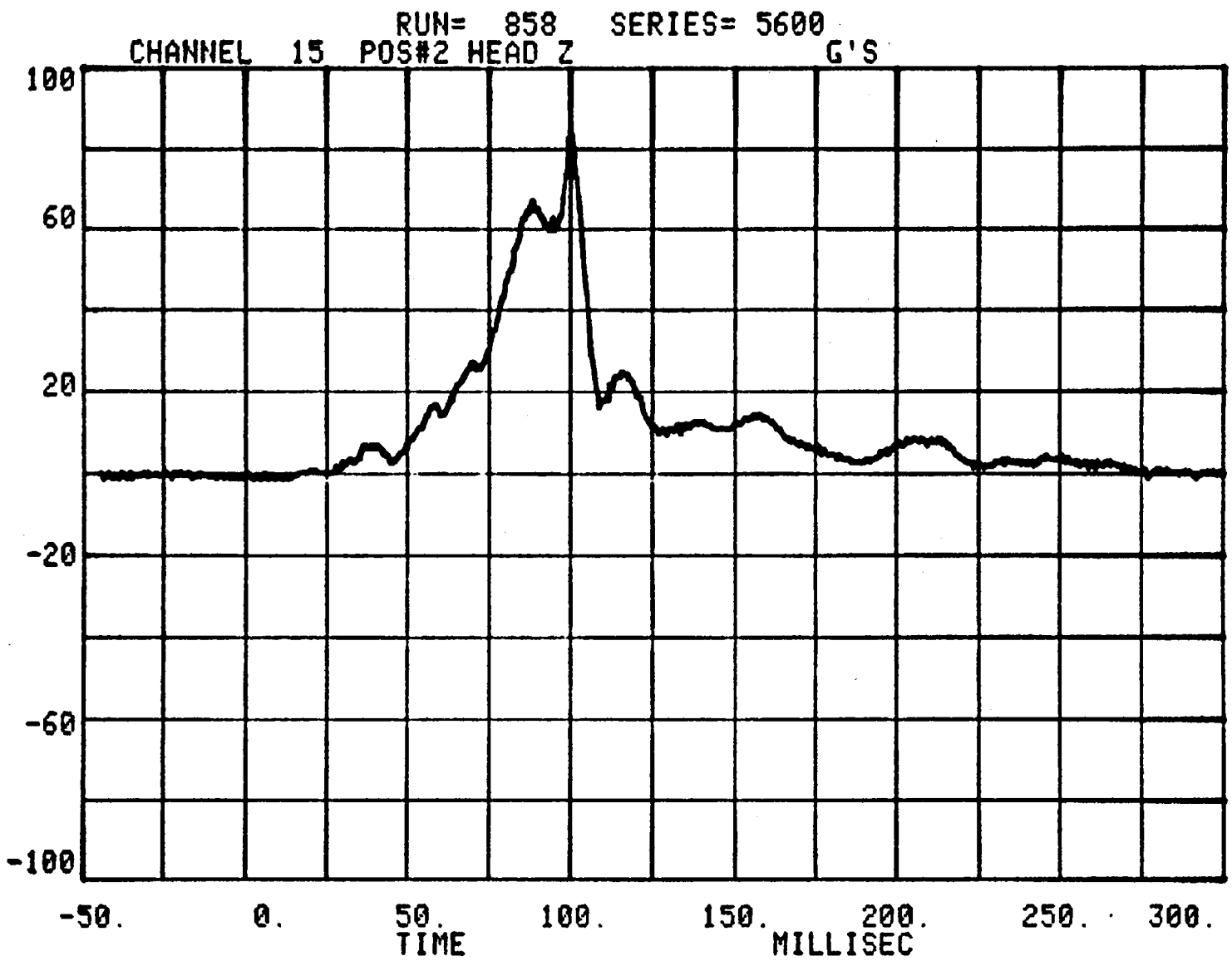
SEVERITY INDEX=1272.7


RUN= 858 SERIES= 5600
CHANNEL 13 POS#2 HEAD X
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

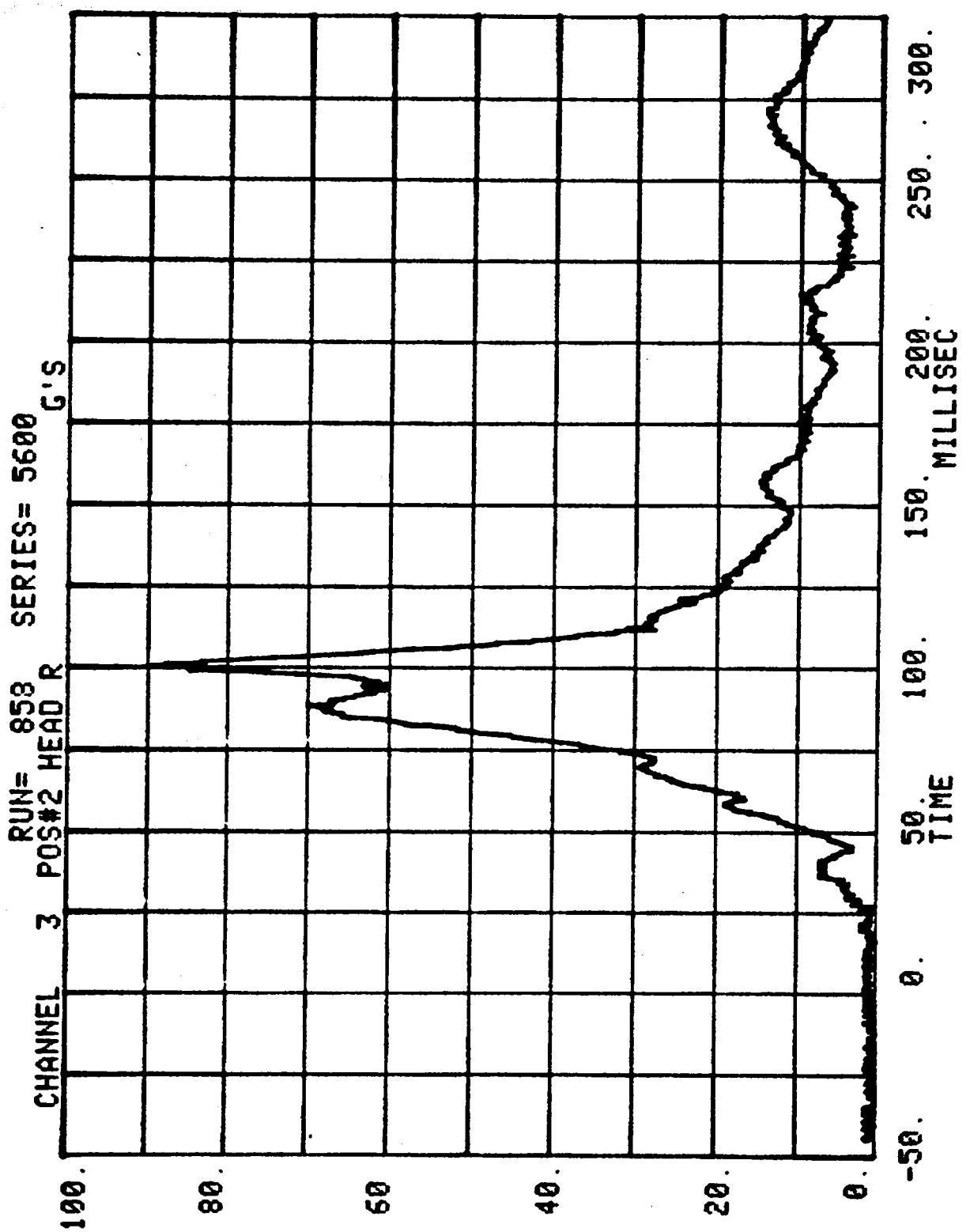
B-86

7689-3

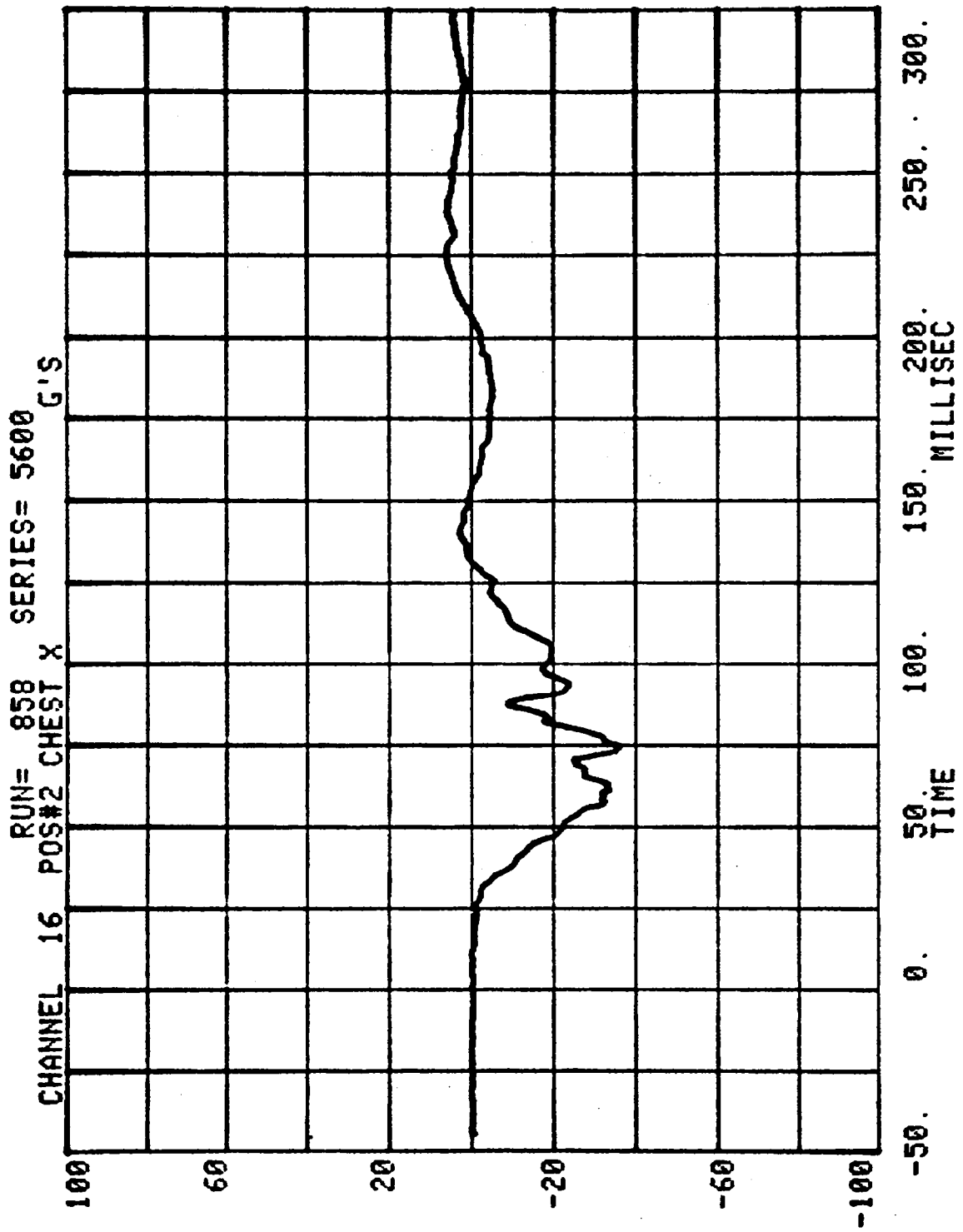

CHANNEL 14 POS#2 HEAD Y
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 15 POS#2 HEAD Z
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

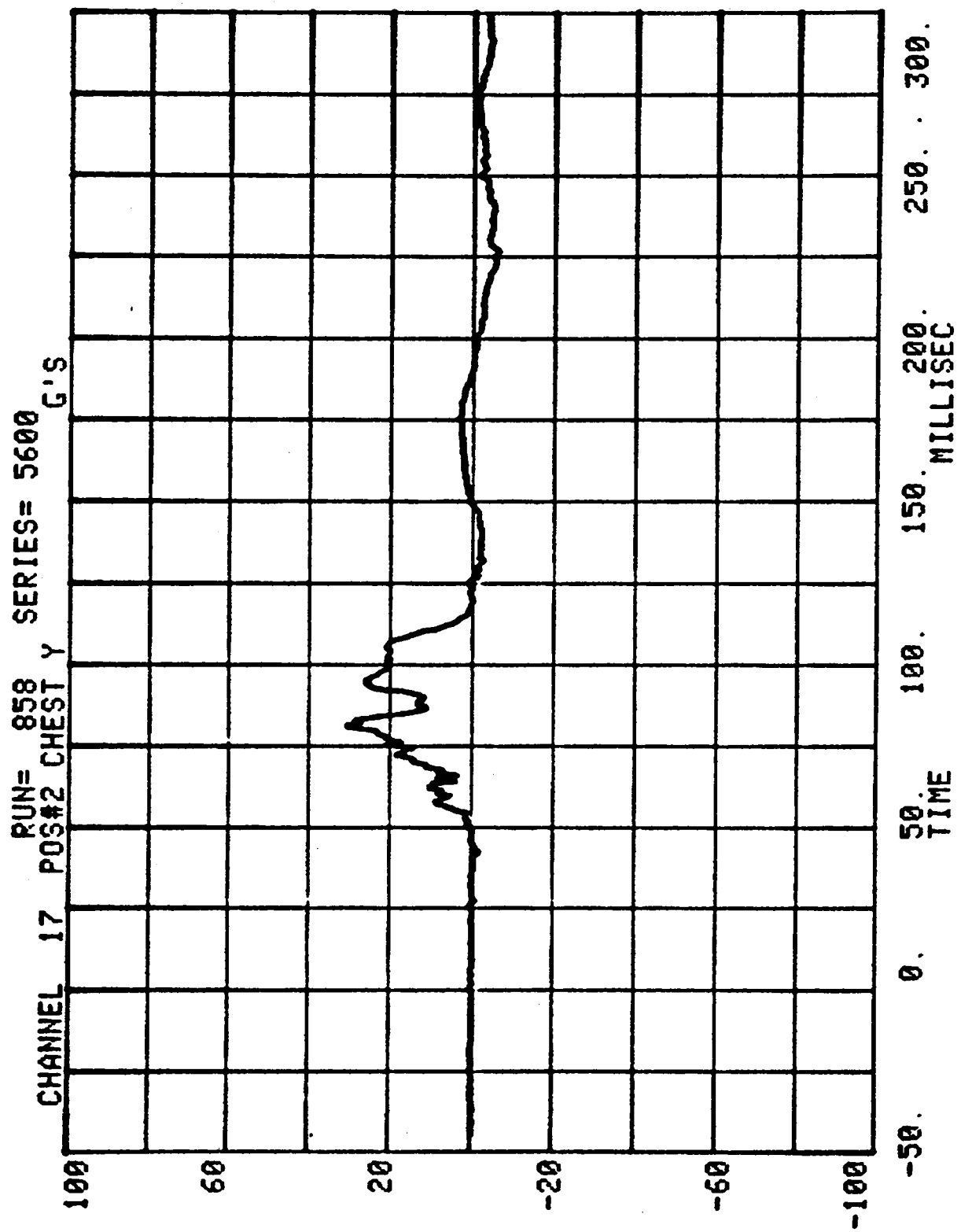
7689-3


CHANNEL 3 POS#2 HEAD R
RUN= 853 SERIES= 5600
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

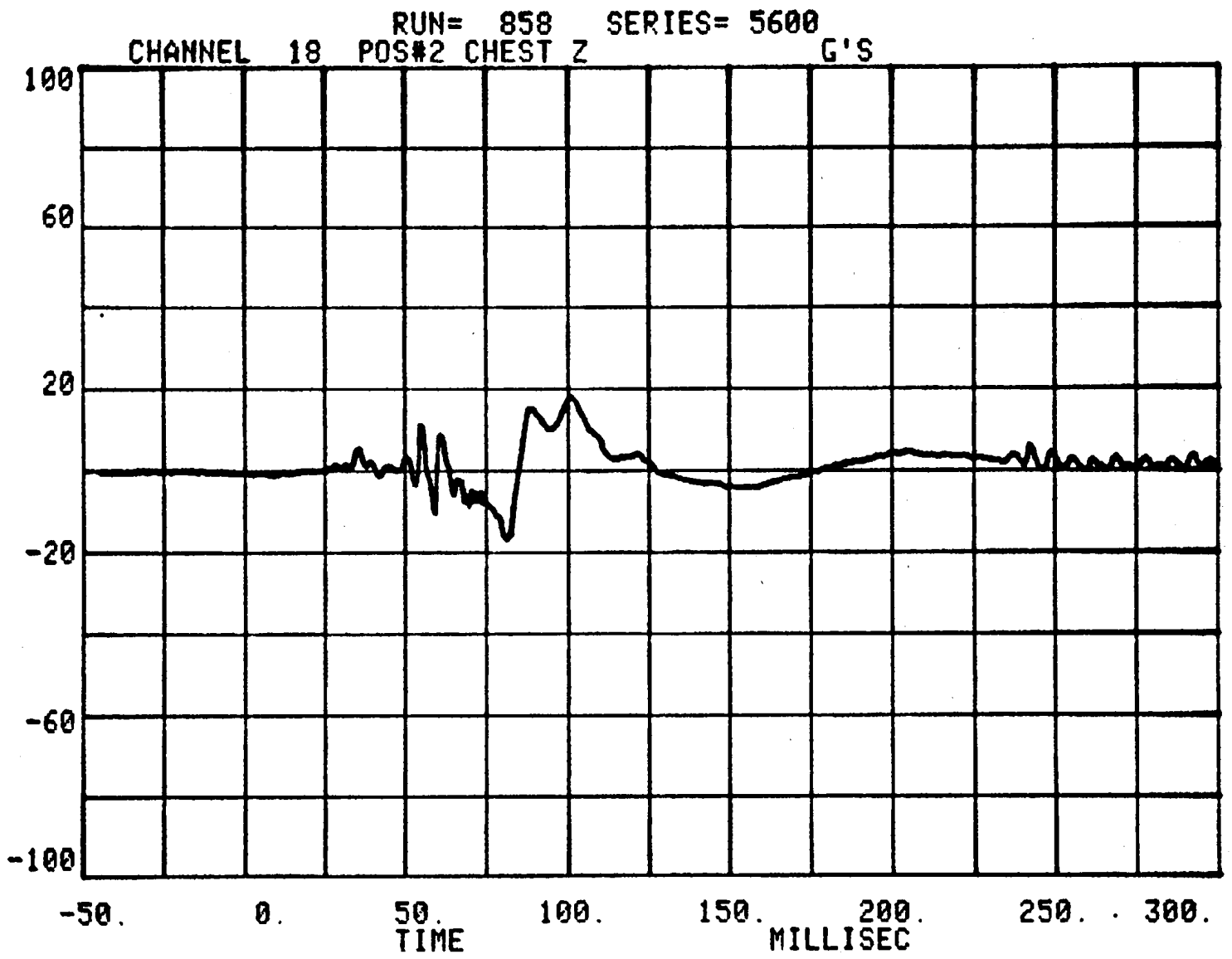
7689-3


CHANNEL 16 POS#2 CHEST X
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

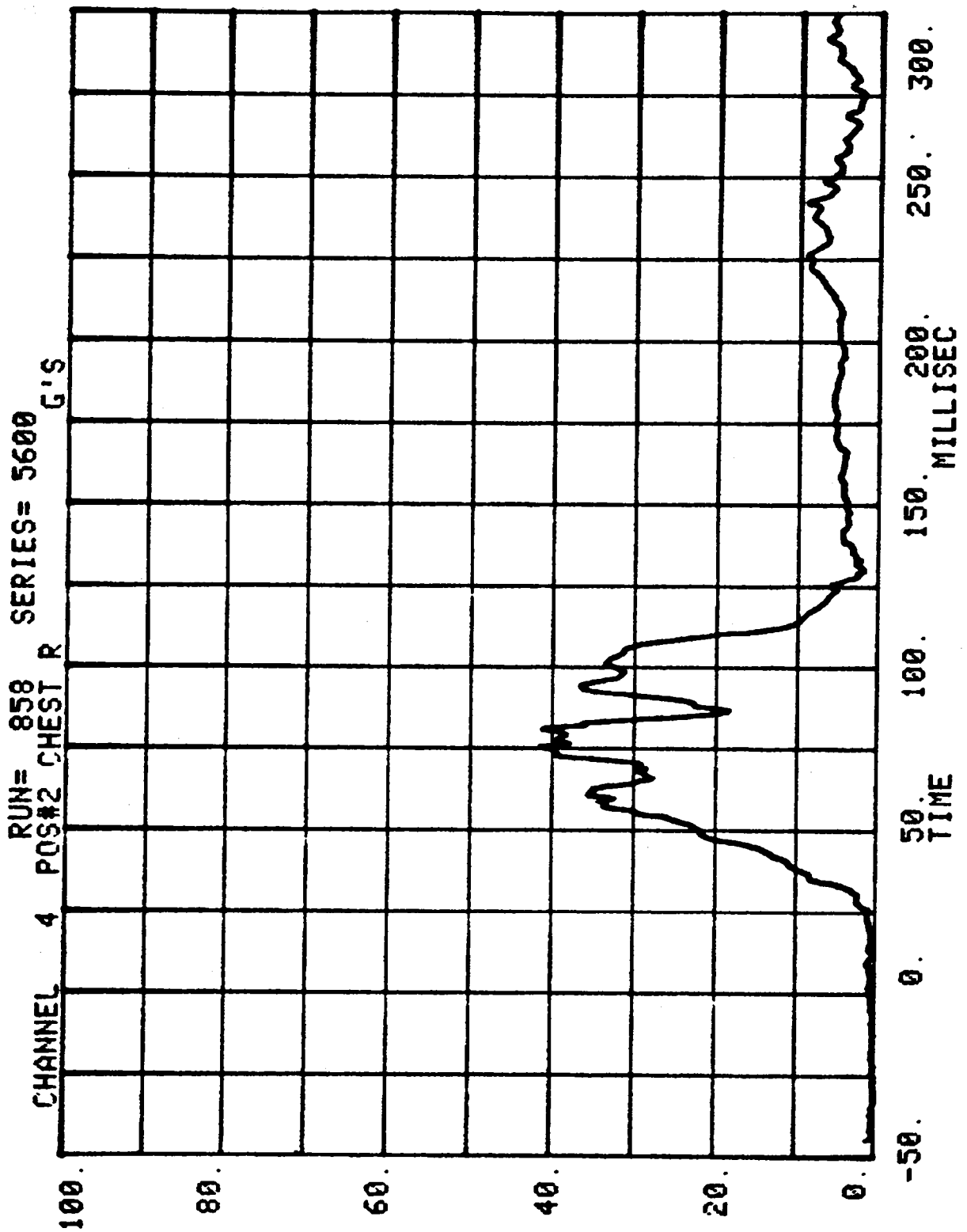
7689-3

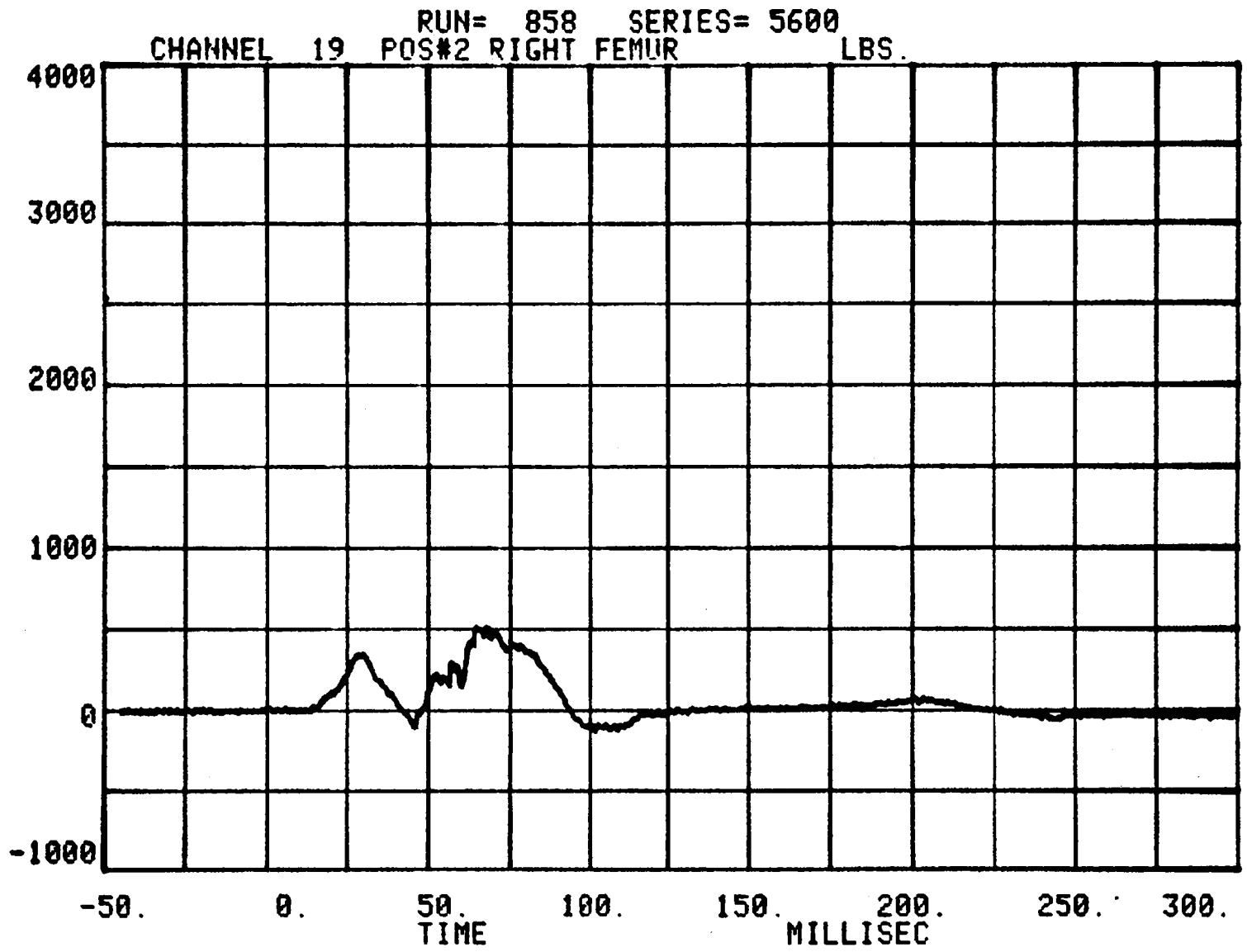

CHANNEL 17 POS#2 CHEST Y
RUN= 858 SERIES= 5600
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

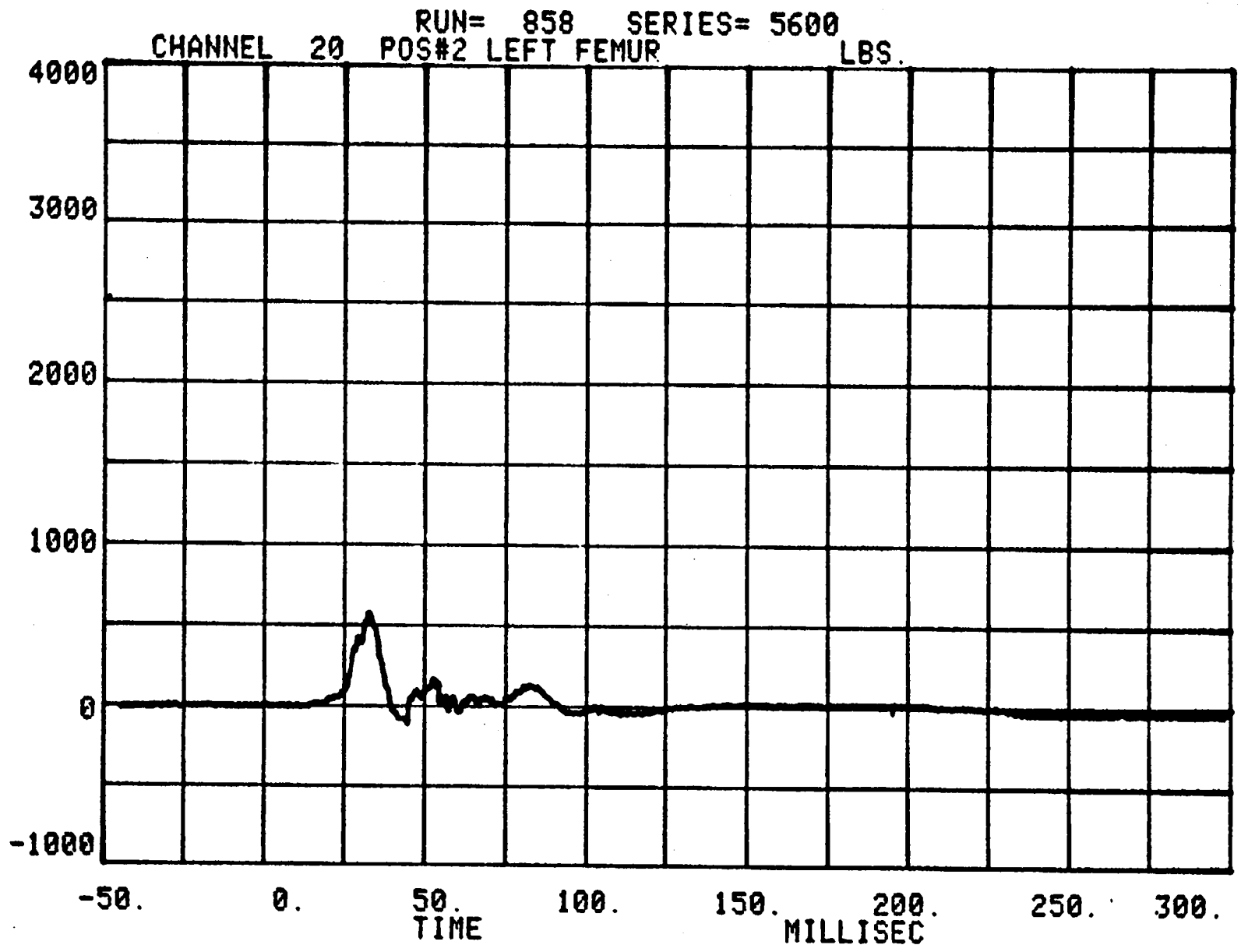

RUN= 858 SERIES= 5600
CHANNEL 18 POS#2 CHEST Z G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

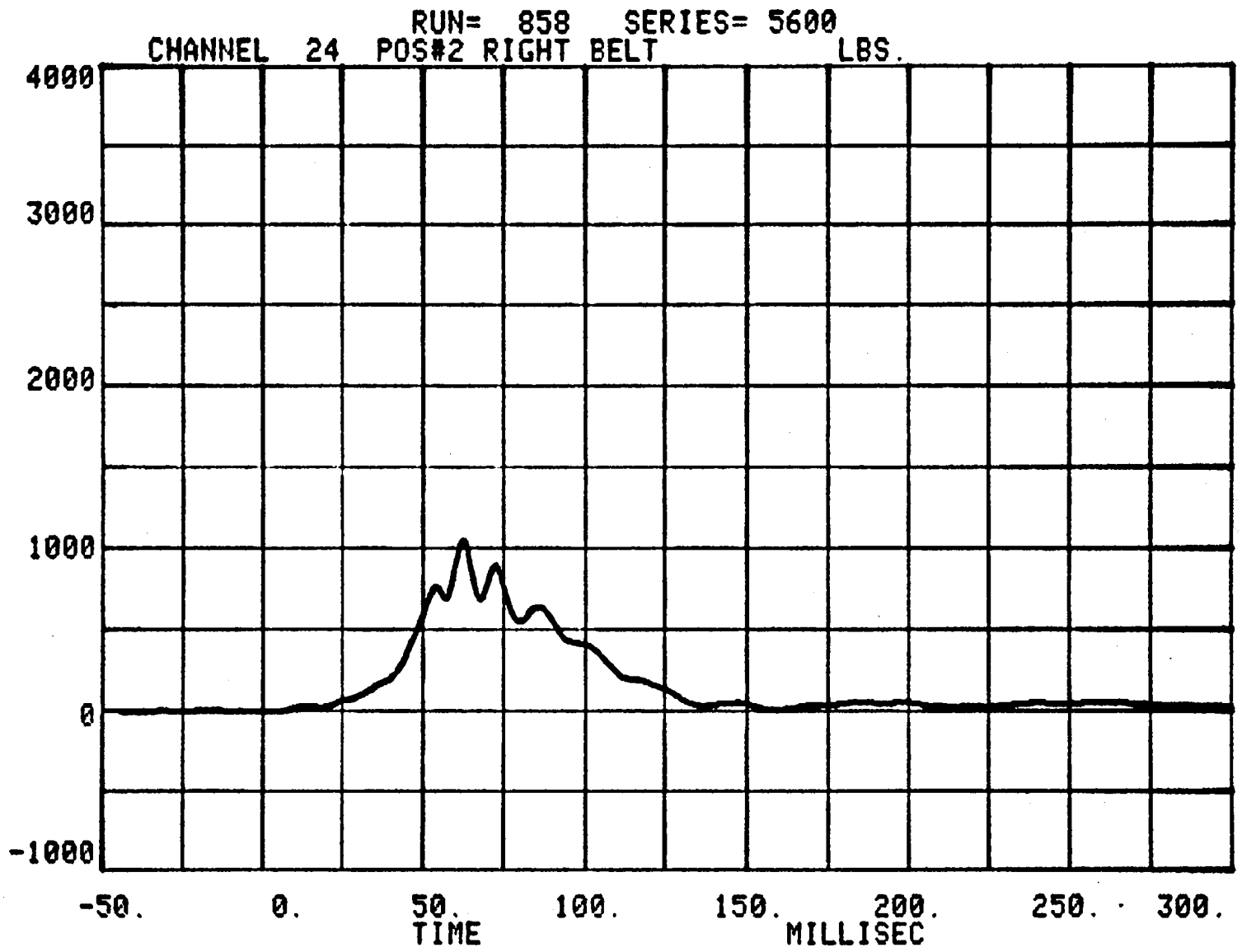
7689-3


CHANNEL 4 POS#2 CHEST R
RUN= 858 SERIES= 5600
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
TIME
100.
150.
200.
250.
300.
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 19 POS#2 RIGHT FEMUR LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

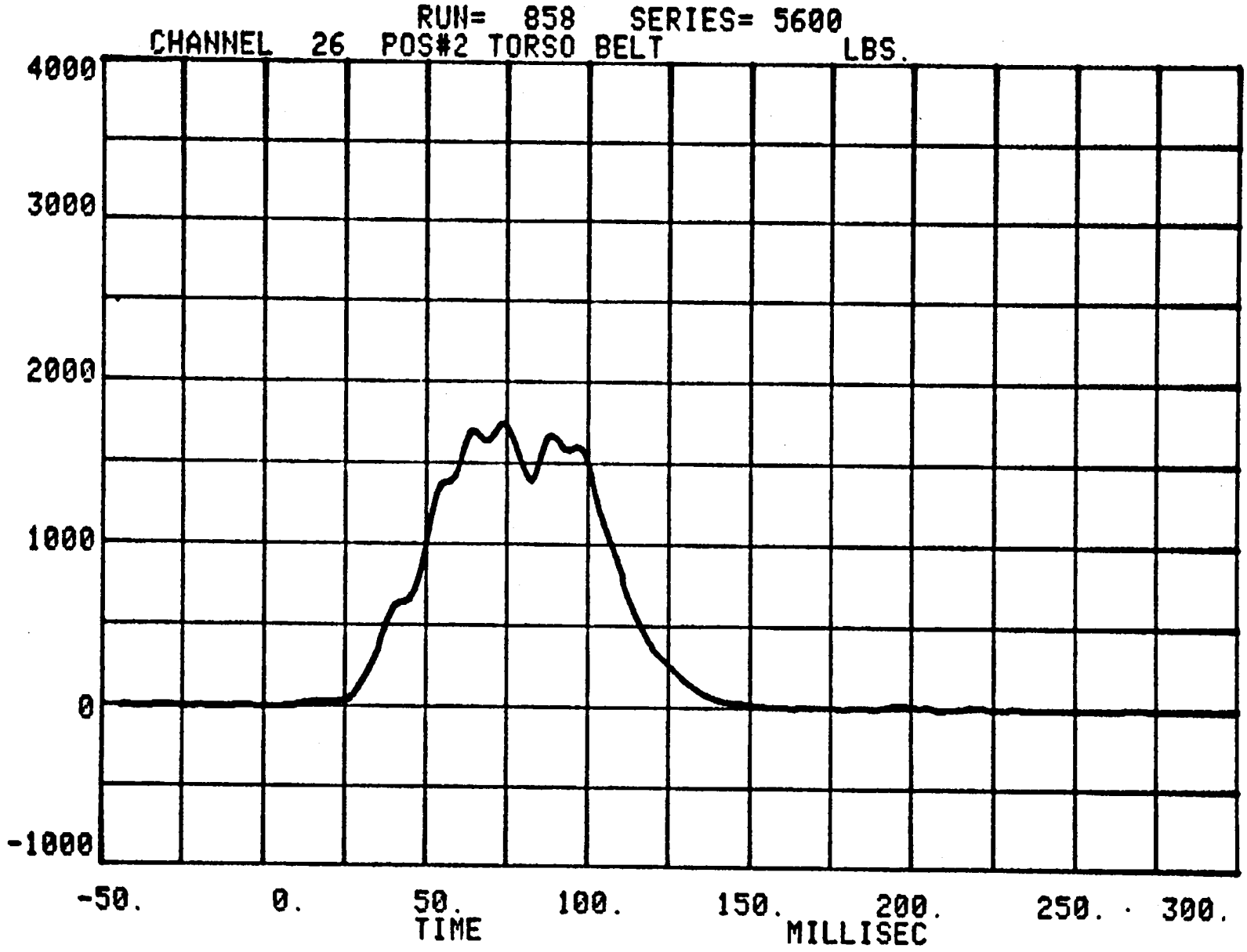
7689-3

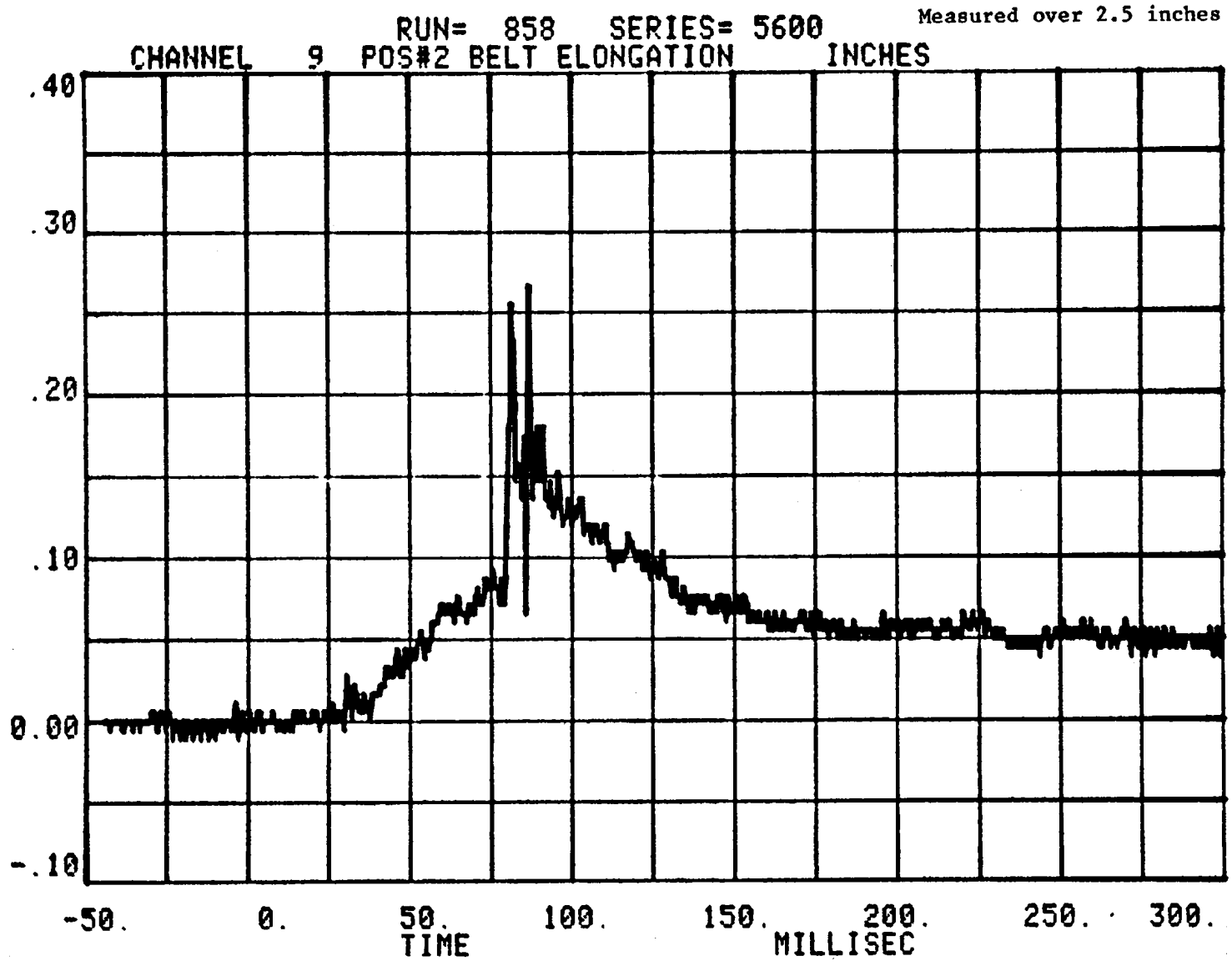

RUN= 858 SERIES= 5600
CHANNEL 20 POS#2 LEFT FEMUR
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
CHANNEL 24 POS#2 RIGHT BELT LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

B-96

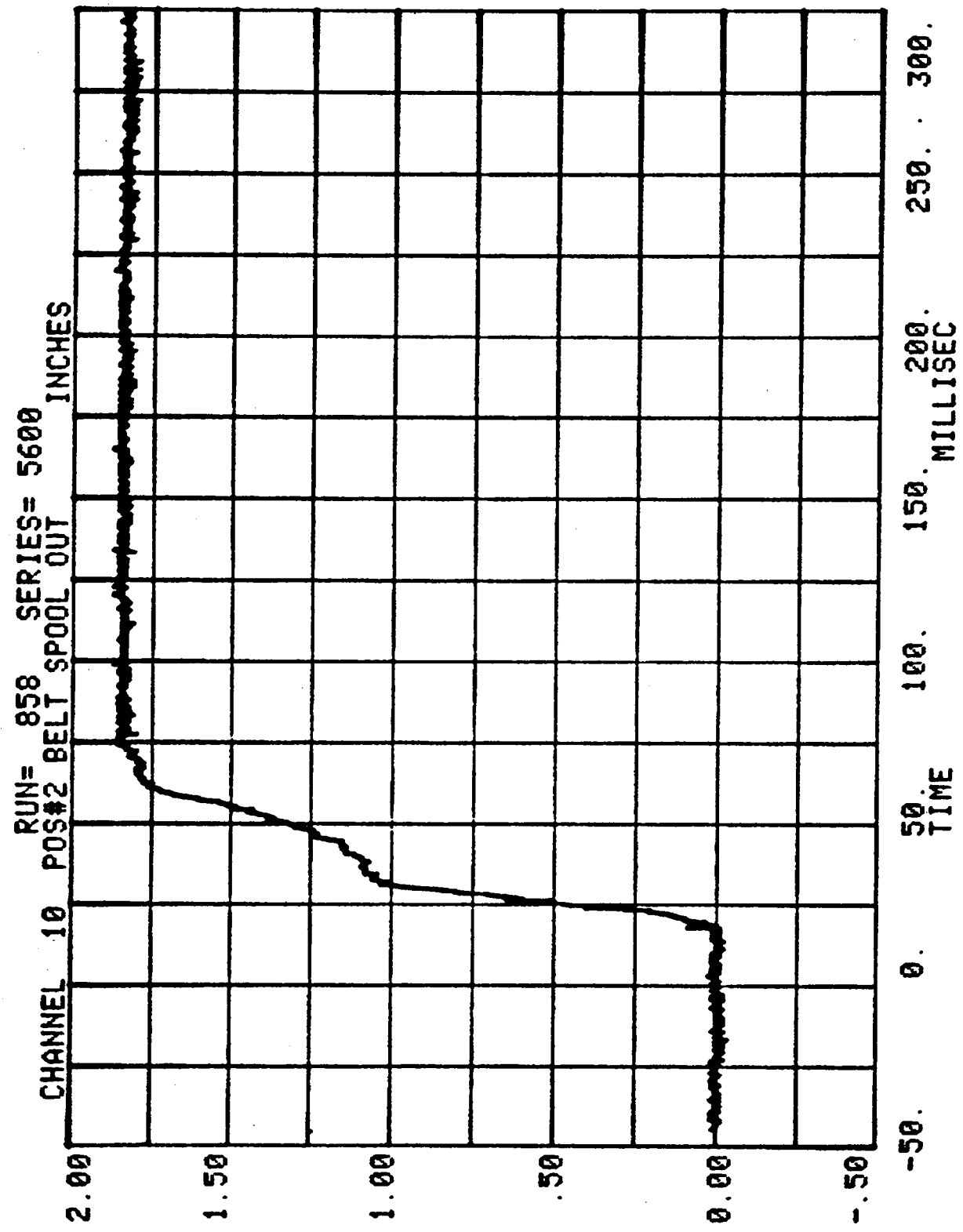
7689-3


RUN= 858 SERIES= 5600
CHANNEL 26 POS#2 TORSO BELT LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 858 SERIES= 5600
Measured over 2.5 inches
CHANNEL 9 POS#2 BELT ELONGATION INCHES
.40
.30
.20
.10
0.00
-.10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

B-98

7689-3


RUN= 858 SERIES= 5600
CHANNEL 10 POS#2 BELT SPOOL OUT
INCHES
2.00
1.50
1.00
.50
0.00
-.50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7689-3

Appendix C

DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropometric test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, 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.

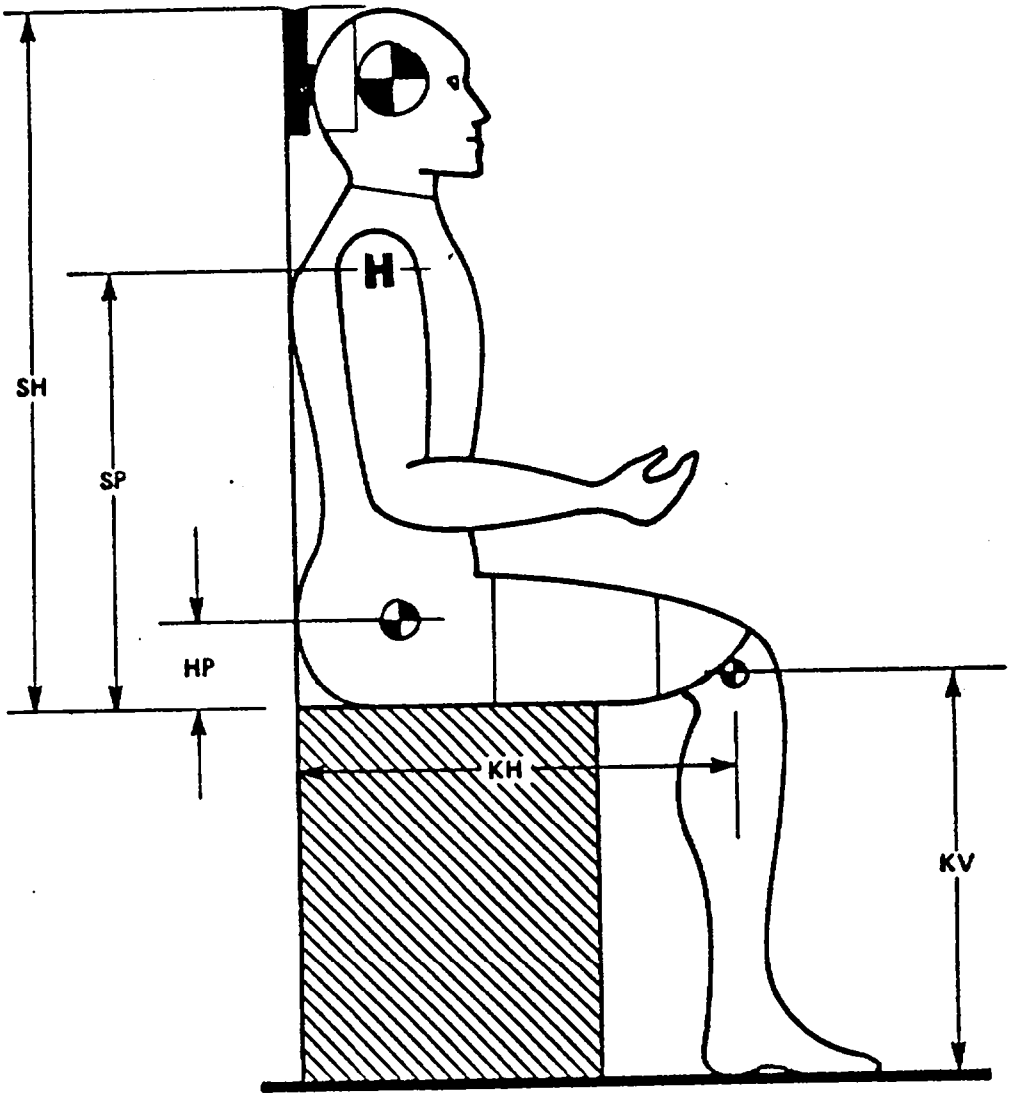
Dummy serial numbers and certification dates are:

Serial No.	Completion Date
1020	9/20/88
1021	10/19/88

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.: 1020

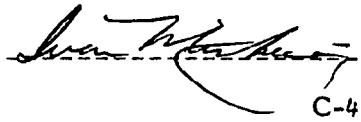
I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	9-20-88	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	1	
SH - Seated Height	35.6 to 35.8"	35.6 "	
SP - Shoulder Pivot Height	21.8 to 22.4"	21.9 "	
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"	19.8 "	
SW - Shoulder Width	17.8 to 18.4"	18.1 "	
HW - Hip Width	14.0 to 15.4"	14.8 "	

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		9-20-88	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		1	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		70-71 deg	
VERIFICATION LAB HUMIDITY (10 TO 70 %)		40-54 %	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	244 G's	
b. peak lateral accel.	<= 10 G's	9.9 G's	
c. Time above 100 G's	0.9 to 1.5 ms.	1.15 ms	

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

TECHNICIAN'S NAME: 

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1020

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	21.7 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.	25.2 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	25.7 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	4.4 ms	
g. Max. Head Rotation		63 to 73 deg.	70 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.	27.9 ms	
	Displ.	2.1 to 3.1"	2.65 "	
60 deg.	Time	40.3 to 51.7 ms.	42.1 ms	
	Displ.	4.3 to 5.3"	4.8 "	
Maximum (70 deg)	Time	53.2 to 66.8 ms.	56.5 ms	
	Displ.	5.0 to 6.0"	5.6 "	
60 deg.	Time	67.0 to 83.0 ms.	73 ms	
	Displ.	4.3 to 5.3"	4.8 "	
30 deg.	Time	85.4 to 104.6 ms.	90.5 ms	
	Displ.	2.1 to 3.1"	2.35 "	
0 deg.	Time	101.0 - 123.0 ms.	105 ms	
	Displ.	-.5 to 0.5"	0.0 "	

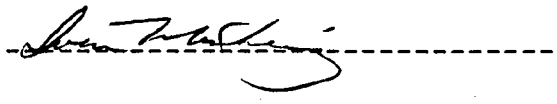
TECHNICIANS NAME: [signature]

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1020

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.	25.5 lbs	
b. Force @ 0.75"	36 to 50 lbs.	38.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	52 lbs	
d. Force @ 1.3"	73 to 88 lbs.	74 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	25 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	37 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	48 lbs	
d. Return Angle	12 deg. maximum	11 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	1.56 "	
(3) Peak Resistive Force	2250 lbs maximum	1991 lbs	
(4) Internal Hysteresis	50 to 70%	52.3 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	1.08 "	
(3) Peak Resistive Force	1450 lbs maximum	1242 lbs	
(4) Internal Hysteresis	50 to 70%	51.5 %	

TECHNICIAN'S NAME: 

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1020

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	2020 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.8 ms	
B. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	6.9 fps	
(2) Maximum Force	1850 to 2500 lbs	2015 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	

REMARKS:

TECHNICIAN'S NAME:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER ___1020_____

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CS75	9-88	3-89
HY LATERAL--	ENDEVCO	CY89	9-88	3-89
HZ VERTICAL--	ENDEVCO	CE76	9-88	3-89
2. CHEST ACCELEROMETER-				
CX LONGITUDINAL--	CEC	A150	7-88	1-89
CY LATERAL--	ENDEVCO	FK83	9-88	3-89
CZ VERTICAL--	CEC	A151	7-88	1-89
3. FEMUR LOAD CELLS				
RIGHT SIDE	GSE	548	5-88	11-88
LEFT SIDE	GSE	549	5-88	11-88
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A144	6-88	12-88
2. TEST PROBE ACCELEROMETER--	CEC	A142	6-88	12-88
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS-DUCER INC	20051	5-88	11-88
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	5-88	11-88
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	5-88	11-88

NHTSA DUMMY I.D. NUMBER.: 1021

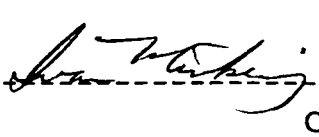
I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	10-19-88	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	1	
SH - Seated Height	35.6 to 35.8"	35.7 "	
SP - Shoulder Pivot Height	21.8 to 22.4"	21.9 "	
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"	19.8 "	
SW - Shoulder Width	17.8 to 18.4"	18.3 "	
HW - Hip Width	14.0 to 15.4"	14.9 "	

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		10-19-88	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		6	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		70-72 deg	
VERIFICATION LAB HUMIDITY (10 TO 70 %)		37-44 %	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	210 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: 

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1021

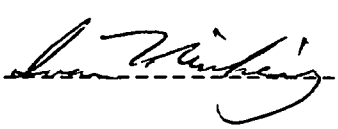
TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	21.9 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	24 G's	
c. Peak Resultant Head Acceleration		26 G's max.	25.1 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	1.8 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	26.8 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	2 ms	
g. Max. Head Rotation		63 to 73 deg.	72 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.	26.9 ms	
	Displ.	2.1 to 3.1"	2.6 "	
60 deg.	Time	40.3 to 51.7 ms.	41 ms	
	Displ.	4.3 to 5.3"	4.6 "	
Maximum (72 deg)	Time	53.2 to 66.8 ms.	54.3 ms	
	Displ.	5.0 to 6.0"	5.45 "	
60 deg.	Time	67.0 to 83.0 ms.	74.4 ms	
	Displ.	4.3 to 5.3"	4.6 "	
30 deg.	Time	85.4 to 104.6 ms.	90 ms	
	Displ.	2.1 to 3.1"	2.35 "	
0 deg.	Time	101.0 - 123.0 ms.	104.6 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: [signature]

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.	27 lbs	
b. Force @ 0.75"	36 to 50 lbs.	42 lbs	
c. Force @ 1.0"	50 to 63 lbs.	59.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	88 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	26.5 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	38 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	48 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	1.6 "	
(3) Peak Resistive Force	2250 lbs maximum	2147 lbs	
(4) Internal Hysteresis	50 to 70%	57 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	1.07 "	
(3) Peak Resistive Force	1450 lbs maximum	1315 lbs	
(4) Internal Hysteresis	50 to 70%	62.9 %	

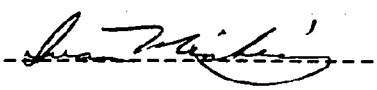
TECHNICIAN'S NAME: 

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	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2050 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	2.0 ms	
B. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2200 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.9 ms	

REMARKS:

TECHNICIAN'S NAME: 

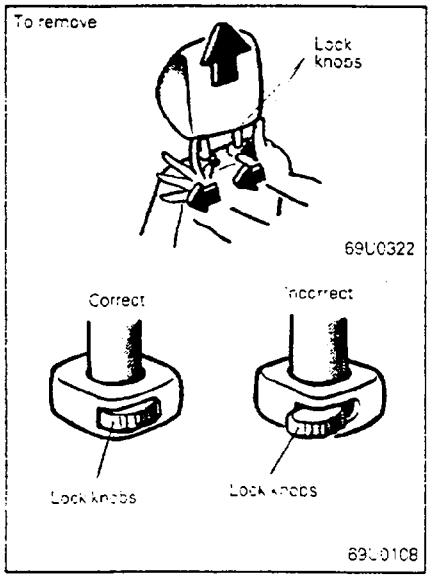
INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER ____1021_____

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CJ22	9-88	3-89
HY LATERAL--	ENDEVCO	CS41	9-88	3-89
HZ VERTICAL--	ENDEVCO	CH31	9-88	3-89
2. CHEST ACCELEROMETER-				
CX LONGITUDINAL--	CEC	A73	9-88	3-89
CY LATERAL--	ENDEVCO	CE06	9-88	3-89
CZ VERTICAL--	CEC	A44	9-88	3-89
3. FEMUR LOAD CELLS				
RIGHT SIDE	GSE	552	5-88	11-88
LEFT SIDE	GSE	551	5-88	11-88
CALIBRATION LABORATORY INSRUTMENTS--				
1. PENDULUM ACC.--	CEC	A144	6-88	12-88
2. TEST PROBE ACCELEROMETER--	CEC	A142	6-88	12-88
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS-DUCER INC	20051	5-88	11-88
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	5-88	11-88
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	5-88	11-88

APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS



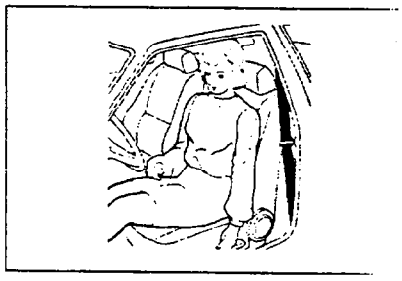
Removal of the Head Restraints ND058-Ab

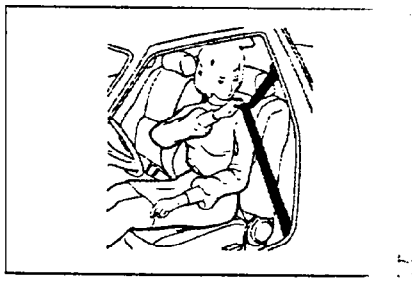
To remove the head restraints, press the lock knobs in the direction indicated by the arrows and pull the head restraints up.

To remount the head restraints, first confirm that they are facing the correct direction, and then insert them into the seatback and push down until they lock. Confirm that the lock knobs are correct as shown in the illustration, and also pull the head restraints up to confirm that they do not come out of the seatback.

CAUTION

Driving with the head restraints removed is dangerous; always have them mounted when operating the car.





Seat Belts ND16A-A

Seat belts are installed in your car for the protection of the driver and passengers. Use the seat belts. In the event of an accident, injury to the driver and passengers may be reduced if seat belts are properly used.

The following pages contain the recommended procedure for fastening, adjusting, and wearing the belts for comfort and safety.

Seat Unibelt Restraint System ND065 B

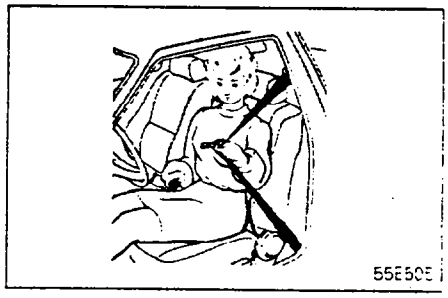
Front seats and both sides of the rear seat are equipped with a UNIBELT system which uses a single belt and an emergency locking retractor.

This system is designed to provide comfort and safety by permitting full extension and automatic retraction of the belts during normal vehicle operation. A sensing device inside the belt retractor is designed to lock the retractor in the event of an abrupt change in vehicle motion.

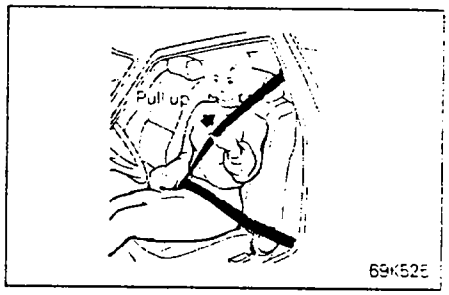
Unibelt Instructions ND065A-B

1. Get in the car and sit in the normal correct posture.

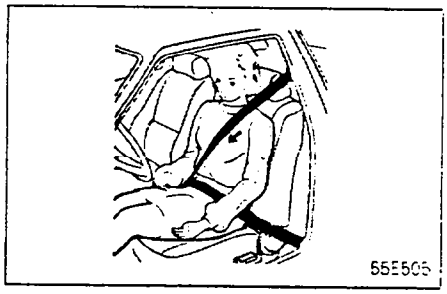
2. Grasp the movable latch plate and slide it up the webbing as far as necessary so that it will be easy to pull across your body.
   After a couple of tries this will become an automatic one-handed operation.



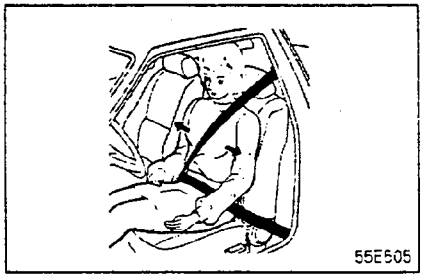
3. Pull the webbing, and move the movable latch plate toward the buckle. This system will not lock up if you stop or hesitate, so relax and continue to "buckle-up".
   Push the latch plate into the buckle until a "click" is heard.

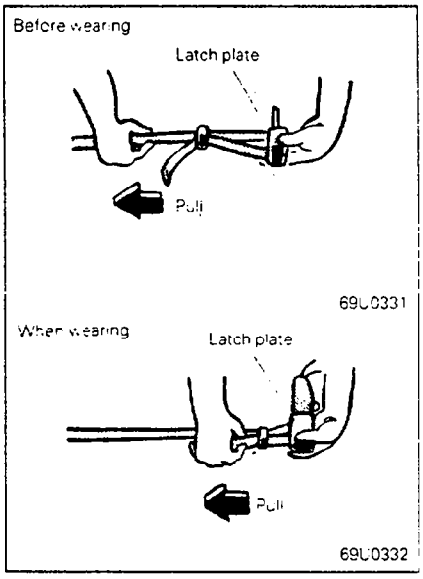


4. Pull up on the shoulder belt to insure that there is no slack in the lap belt. The lap belt will not tighten during use; therefore, you can set it once for safe, comfortable snugness.



5. Check the belt slackness. The belt will retain the small amount of slack necessary for comfort when you return to your normal seating position. If the belt is still too tight, pull out 6" or 8" of webbing, let it return to your chest, and repeat the above motion.





6. The shoulder belt will allow unrestricted movement under normal conditions. The belt will lock in the event of an accident.
To release the belt, push the button on the buckle. To return the belt to its stowed position, pull the shoulder belt down slightly and release immediately.

Rear Seat Lap Belt ND06C-Cb

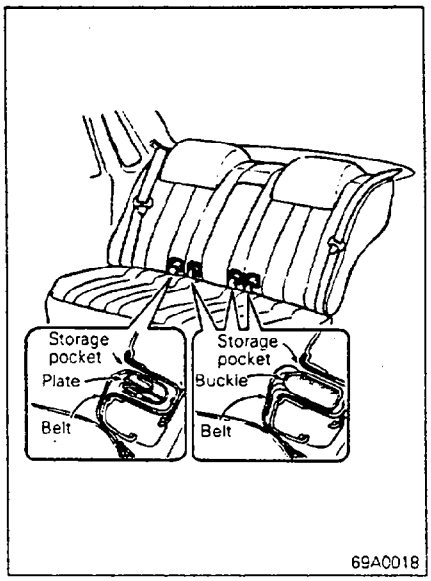
CENTER BELT

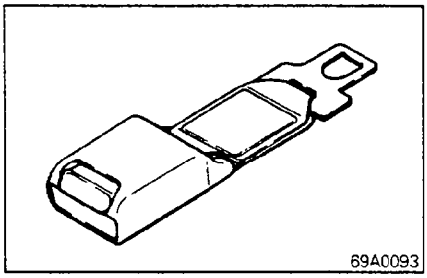
The center belt should be adjusted by holding the belt and latch plate at right angles to each other, and then pulling the belt as illustrated above to a snug fit around the occupant.

NEVER USE THE SAME LAP BELT ON MORE THAN ONE PERSON AT A TIME.

NOTE

The buckle and plate of the center lap belt are marked with "CENTER". Be sure to check the marking before wearing the center lap belt.





Rear Seat Belt Pocket (if so equipped)

When the seat belt is not in use, store it in the storage pocket. For compact storage of the plate side seat belt, coil it around the plate.

Seat Belt Extender (for Unibelt)

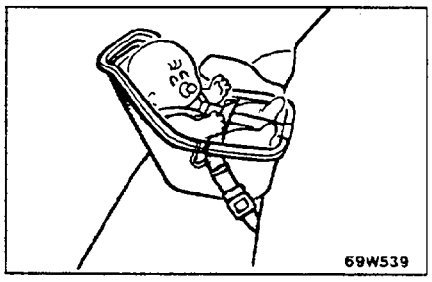
If the seat belt is too short, even when fully extended, a seat belt extender can be purchased from your dealer.
This extender should only be used if the existing belt is not long enough. When not required, it must be removed and stowed because the use of the extender when not required may deactivate the seat belt locking mechanism.

Child Restraint

When transporting children in your car, some type of restraint system should be used regardless of the size of the child. This is required by law in most states.
The child restraint system is most effective when installed in the rear center seat. It may be installed either in the front and/or in the rear outer seats by using a locking clip and following the instructions. See your authorized dealer to obtain a locking clip. However, according to accident statistics, children are safer when properly restrained in the rear seating positions rather than the front. Holding a child in your arms is no substitute for a restraint system. Failure to use a proper restraint system can result in severe or fatal injury to your child.

Infants and Small Children

For babies weighing up to approximately 9 kg (20 lbs.), a good infant carrier should be used. For small children over 9 kg (20 lbs.), a good child seat should be used. Before purchasing a restraint system, make sure that it has a label certifying that it meets applicable Federal Motor Vehicle Safety Standards.
The restraint system should be appropriate for your child's weight and height. This information can be found on the restraints system's label or instructions. 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.
When not in use, keep your child or infant seat secured with the seat belt or remove it from the car in order to prevent injury to occupants in the event of a sudden stop.



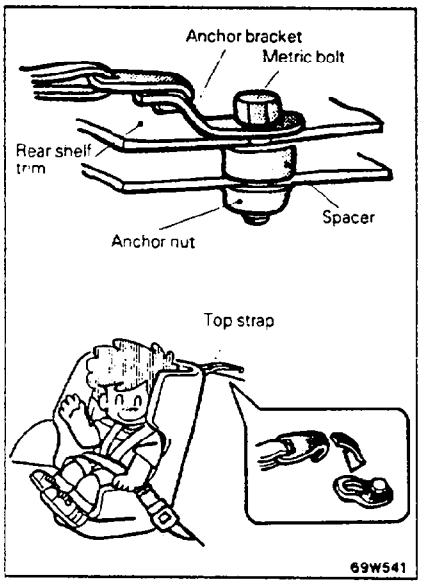
INFANT CARRIER

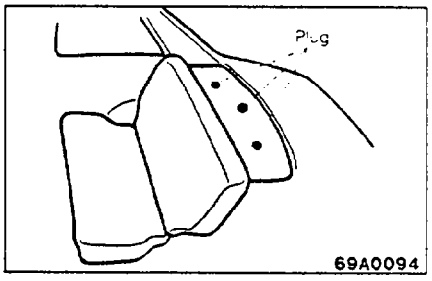
This type of carrier is recommended if the child is unable to sit up alone. The child is securely restrained facing in a rearward direction so that in the event of a forward collision the child is adequately supported.

USE THE SEAT BELT AT THE CENTER OF THE REAR SEAT TO INSTALL THE INFANT CARRIER AS ILLUSTRATED.

After installation of the infant carrier, shake the carrier back and forth, and side to side to see that it is positively secured with the seat belt.

If the infant carrier moves, readjust the length of the seat belt.





CHILD SEAT

The child seat aids in distributing loads that might be exerted on a child more widely over the child's body.

USE THE SEAT BELT AT THE CENTER OF THE REAR SEAT TO INSTALL THE CHILD SEAT.

Your car is provided with an anchor bracket mounting nut to secure the top strap of the child seat. If your child seat has a top strap, observe the following.

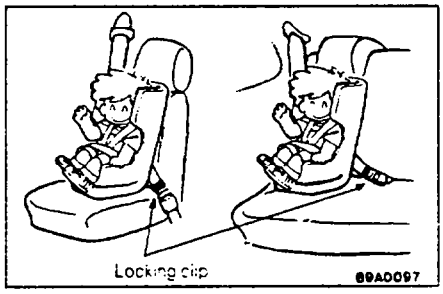
The anchor nuts are welded to the back of the sheet metal of the rear shelf and concealed by the plugs on the rear shelf trim.

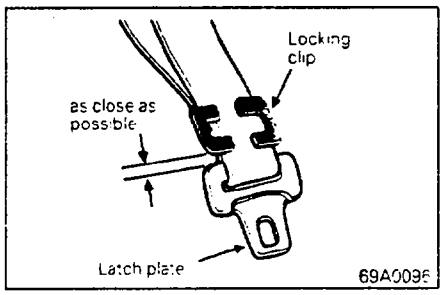
A metric bolt and spacer are required to install the anchor bracket. Please note that the bolt attached to the child restraint system may not be a metric type.
Purchase the following parts at your authorized dealer and have the child seat installed.

1 Anchor bracket
2 Metric bolt
3 Spacer

Hook the top strap to the anchor bracket and tighten the top strap.

Seat Belt Locking Clip
A seat belt locking clip must be used with your child restraint system when used in the front and rear outer seating positions. If a locking clip has not been supplied with your child restraint system, it may be purchased from your authorized 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 restraint system according to the instruction that come with the child restraint system locking clip.
Make sure that the seat belt is snug on the child restraint system.
Do not allow the latch plate to slide along the webbing.





Installation
1. Place the child restraint system on the seating position as shown in the illustration.
2. Fasten the seat belt around or through the child restraint system according to manufacturer's instructions.
3. Buckle the seat belt and keep all slack out of the lap portion of the belt.
4. Grasp the lap and shoulder portions of the seat belt as close to the latch plate as possible and unbuckle the seat belt.
5. Install a locking clip as shown in the illustration.
6. Buckle the seat belt again and check that seat belt is snug against the child restraint system.

CAUTION
To help lessen the severity of injury in an accident, the locking clip must be removed from the seat belt webbing when the seat belt is to be used for normal restraint.

Children too Large for Child Seats
Children too large for child seats can use the combination lap shoulder belt (unibelt).
If the shoulder belt crosses the face or neck, place the child closer to the center of car or use lap belt at the center of the rear seat.
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.

CAUTION
A child should never be left unattended in your car.

Pregnant Woman Restraint ND06G-B

Mitsubishi Motor Sales of America, Inc. recommends that pregnant women use the available seat 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.

Maintenance and Inspection of Seat Belts ND06H-A

The webbing used in belts may be cleaned with a hydrocarbon dry cleaner or with soap or detergent in water. Do not attempt to bleach or re-dye belts. The resulting color may rub off and webbing strength could be affected.
Regularly check lap belt buckles and release mechanisms for positive action and automatic locking retractors for positive engagement.
Check that the anchor mounting bolts are tight. If the seat belt webbing shows obvious cuts, protruding broken fibers causing a local increase in webbing thickness, or severe fading which indicates weakening by exposure to sunlight, the seat belt should be replaced.