REPORT NO. CAL-87-N15

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

Chrysler Corporation
1987 Plymouth Sundance
4 Door Hatchback

NHTSA NO. MH0302
CALSPAN TEST NO. 7556-15

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225

May 21, 1987

FINAL REPORT

Prepared for:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
400 SEVENTH STREET, S.W.
ROOM NO. 5313 (NRM-22)
WASHINGTON, DC 20590

This Final Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-87-C-02012. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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AUG 10 1987

Date of Report Acceptance

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
CAL-87-N15		

4. Title and Subtitle	5. Report Date
NHTSA New Car Assessment Program (NCAP) Frontal Barrier Impact on 1987 Plymouth Sundance 4-door Hatchback	May 21, 1987
	6. Performing Organization Code: CAL
7. Author(s): Walter E. Levan, Project Engineer; Donald A. Alianello, Program Manager	8. Performing Organization Report No.: 7556-15
9. Performing Organization Name and Address: Calspan Advanced Technology Center, P.O. Box 400, Buffalo, NY 14225	10. Work Unit No.: 229-15-777
	11. Contract or Grant No.: DTNH22-87-C-02012
12. Sponsoring Agency Name and Address: U.S. Department of Transportation, National Highway Traffic Safety Administration, Office of Market Incentives (NRM-20), 400 Seventh Street, S.W., Washington, D.C. 20590	13. Type of Report and Period Covered: Final Report, June - July
	14. Sponsoring Agency Code: DOT/NHTSA/RM/OMI
15. Supplementary Notes	

16. Abstract

A Frontal Load Cell Barrier Test of a 1987 Plymouth Sundance 4-door Hatchback was performed at the Calspan Corporation, Advanced Technology Center Crash Test Facility in Buffalo, New York on May 21, 1987.

Impact speed was 34.6 mph and the ambient temperature at the Barrier face at the time of impact was 68°F. The maximum post-test vehicle crush was 28.5 inches.

Type of Restraint System: 3-point continuous manual belt system.

17. Key Words	18. Distribution Statement
35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)	Copies of this report are available from: Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 400 Seventh St., S.W., Washington, DC 20590

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified		

Form DOT F 1700.7 (8-69)

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Section 1
PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 87 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 MH0302

A load cell barrier consisting of 36 load cells was impacted by a 1987 Plymouth Sundance 4-door Hatchback at a velocity of 34.6 mph. The test was performed at the Calspan Corporation Advanced Technology Center on May 21, 1987. 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 873. The maximum chest deceleration over 3 milliseconds was 52 g's and femur loads were 832 and 717 pounds.

The right front passenger rotated outward and the left side of his head struck the dash panel, shorting out the accelerometer signal cables. The Head Y signal was lost at 124 milliseconds and Head Z signal at 86 milliseconds after impact. The HIC value was not calculated for the passenger. The maximum chest decelerations over 3 milliseconds was 41 g's and femur loads were 540 and 467 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1987 Plymouth Sundance 4-Door Hatchback

NHTSA NO.: MH0302 VIN.: 1P3-BS48D3HN-361951

BODY COLOR: Gray DATE OF MANUFACTURE: 11/86

Engine: 4 cylinders; 135 C.I.D.; 2.2 Liters; - CC
x Gas; - Diesel; - Turbocharged
- Longitudinal; x Transverse

Transmission: 5 Speed x Manual; - Automatic; - Overdrive
Final Drive: x Front Wheel; - Rear Wheel; - Four Wheel

Date Received: 2/27/87 Odometer Reading: 26
- A/C; x P/S; x P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint: 3 Point Continuous Belt

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

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

Recommended Tire Size: P185/70R14

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

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

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. Knot

Vehicle Capacity Weight (VCW) = 865 lbs. (A)

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

Rated Cargo and Luggage Weight (RCLW) A-B = 115 lbs.

GVWR 3610 lbs. GAWR: Front 1922 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 = 780 lbs. Right Rear = 490 lbs.

Left Front = 790 lbs. Left Rear = 520 lbs.

TOTAL FRONT WEIGHT = 1570 lbs. (60.9 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1010 lbs. (39.1 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 2580 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2580 lbs.)

VCW = Vehicle Capacity Weight (865 lbs.)

DSC = Designated Seating Capacity (5)

RCLW = VCW - 150 (DSC) = 115 lbs.

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

Target Test Weight = 3023 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 142 POUNDS CARGO:

Right Front = 820 lbs. Right Rear = 690 lbs.

Left Front = 850 lbs. Left Rear = 690 lbs.

TOTAL FRONT WEIGHT = 1670 lbs. (54.8 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1380 lbs. (45.2 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3050 lbs.

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

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 26.5 LF 26.7 RR 26.2 LR 26.2

Test Attitude: RF 25.5 LF 26.0 RR 24.2 LR 24.3

Wheel Base: 97.0 in.; C.G. = 43.9 in. rearward of front wheel C/L

Remarks: 13.0 gallons of solvent in fuel tank.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0 °

Date of Test: 5/21/87 Time of Test: 1150

Ambient Temperature: 68 °F at impact area

Temperature in Occupant Compartment: 72 °F.

Windshield Molding Temperature: 77 °F.

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 34.6 mph, secondary = 34.6 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	168.0	C_L	171.7	L	168.2
	Post-test	= R	142.4	C_L	143.2	L	142.5
	Crush	= R	25.6	C_L	28.5	L	25.7

Distance from front of test vehicle to point of impact:

R 20.7 C/L 20.7 L 19.7

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Steering Wheel Rim and Hub	Dash
Chest	Steering Rim	No contact
Abdomen	Steering Rim	No contact
Left Knee	Dash	Glove box/dash
Right Knee	Dash	Glove box/dash

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

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

Section 3

OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

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

II. OVR DATA

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

Table 2

DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-160	-38	52	164	-47	-21	-25	52
DUMMY (2)	-70	*** 52	**** 32	-	-34	36	-15	41
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	832	717
DUMMY (2)	540	467
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)	1687	-	927
DUMMY (2)	1392	1075	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	36 Millisecond Max. t_1 (SEC)	t_2 (SEC)	AVE. ACC. (g) t_1 TO t_2
DUMMY (1)	873	.07410	.10072	64.0
DUMMY (2)	HIC NUMBER WAS NOT CALCULATED			
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

***SIGNAL SHORTED OUT AFTER 124 MILLISECONDS

****SIGNAL SHORTED OUT AFTER 86 MILLI-SECONDS

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

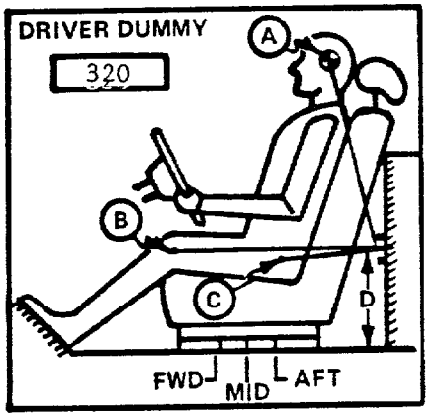
TEST NO.: MH0302

VEHICLE: 1987 Plymouth Sundance 4-dr Hatch.

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

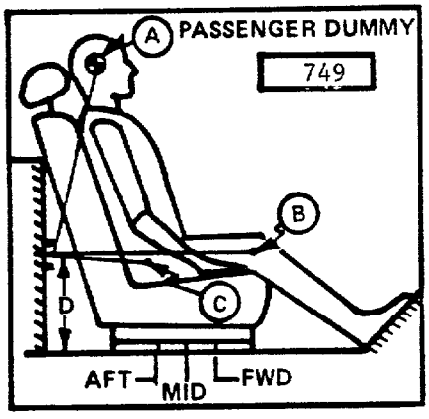
ADJUSTER TYPE:
- x Manual
- ____ Power

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

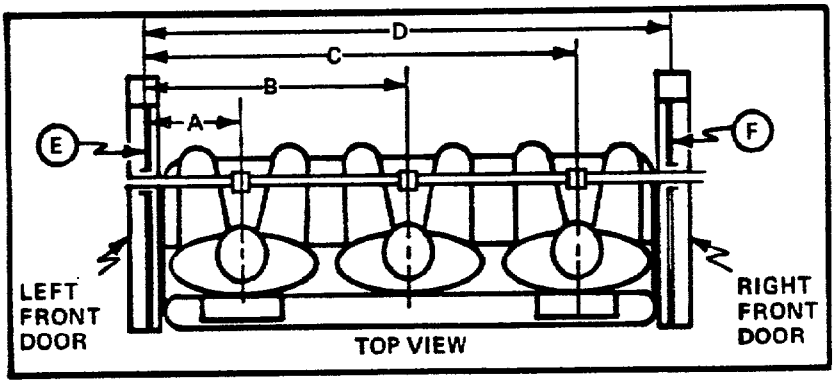


MEASUREMENT LOCATION

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



A =	20.5	in.	5	Degrees	A =	21.4	in.	0	Degrees
B =	23.1	in.	103	Degrees	B =	23.6	in.	100	Degrees
C =	9	in.	138	Degrees	C =	9.5	in.	129	Degrees
D =	15.1	in.			D =	15.3	in.		



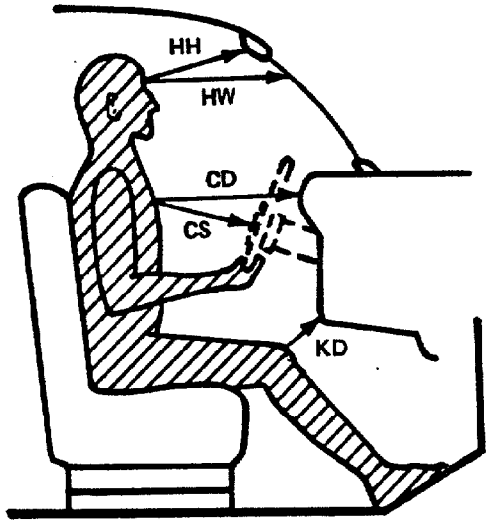
DUMMY ID

		320	749
A	=	Left Door to Driver Centerline	12.6 in.
B	=	Left Door to Center Passenger Centerline	- in.
C	=	Left Door to Right Passenger Centerline	38.0 in.
D	=	Left Door to Right Door	51.1 in.
E, F	=	Window Glass Height (Right and Left Must Be Equal)	11.5 in.

Figure 2

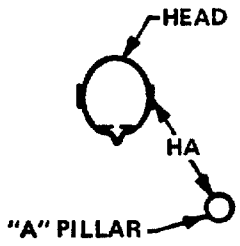
OCCUPANT CLEARANCE DIMENSIONS

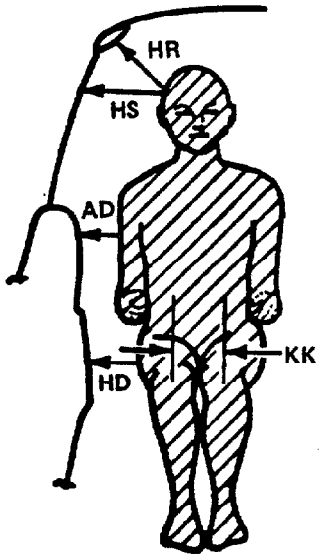
	DRIVER	PASSENGER
HH	14.5	14.2
HW	18.9	18.2
CD	19.7	19.8
CS	11.4	-
KDL	6.5	5.7
KDR	6.7	5.6
SA	24°	23°
TA	22°	22°



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

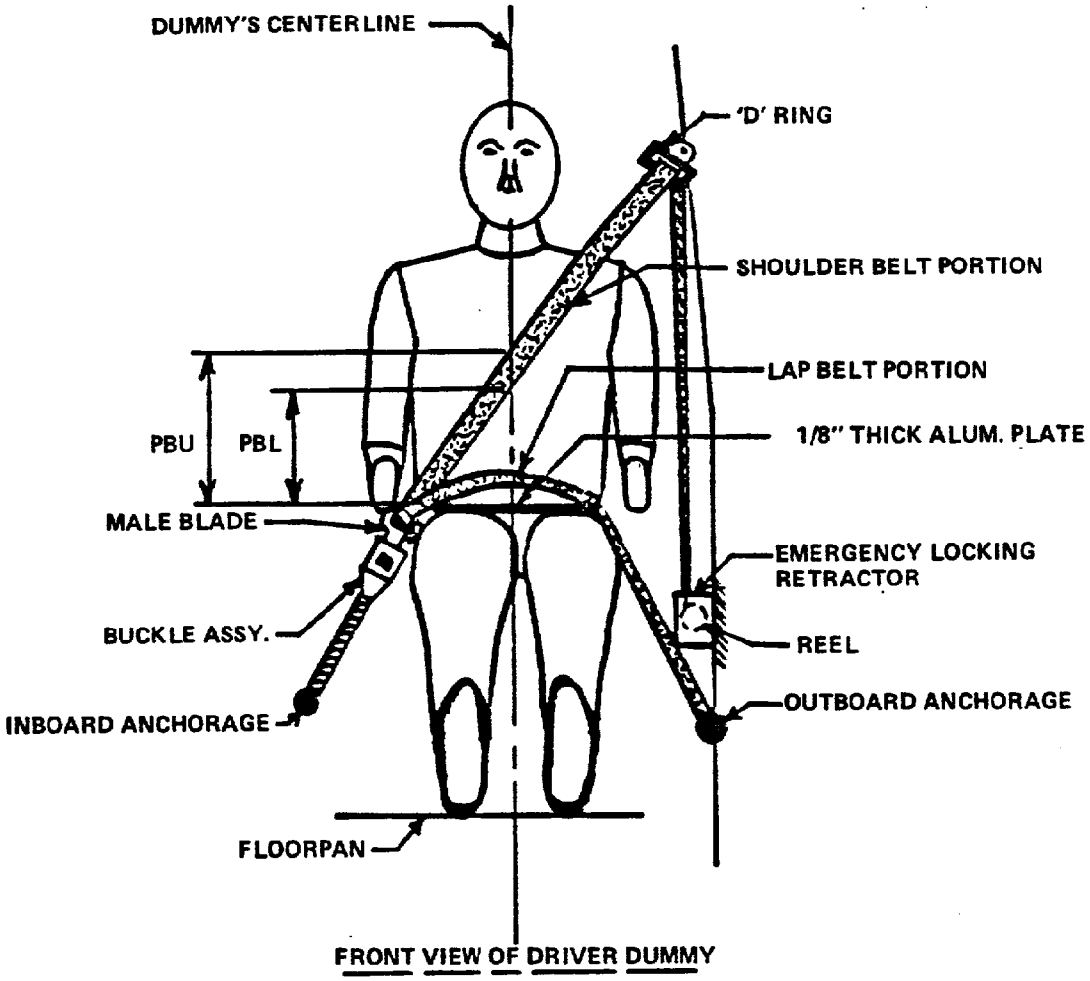




	DRIVER	PASSENGER
HR	5.7	5.7
HS	9.3	10.0
AD	4.6	5.4
HD	7.1	7.7
KK	10.5	8.5
HA	19.0	18.2

Figure 3

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	13.0"	13.5"
PBL -- Top surface of alum. plate to belt lower edge	10.0	10.5
LAP BELT TENSION	-	-
SHOULDER BELT TENSION	1.5	1.5

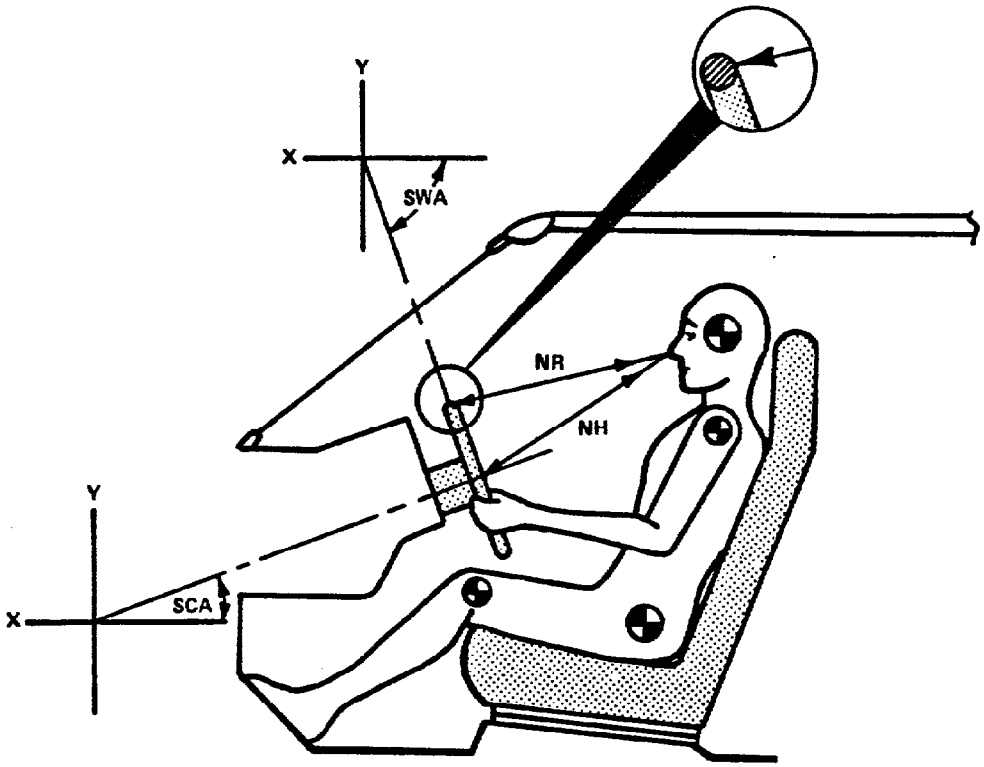
Table 3

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.	80.5	81
Should belt length as measured on Part 572 Dummy.	32.5	32.5
Lap belt length as measured on Part 572 Dummy.	28.5	29.0
BELT SPOOL-OFF DATA:		
As determined by film analysis.	2.0	2.5
As determined mechanically.	1.7	2.5
As determined electronically.	2.0	2.6
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	1.2 in per ft	.6 in per ft
Measured Mechanically	0	0

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	17.0	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	18.6	Inches
SCA -- Angle of steering column relative to the horizontal X axis	24	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-66	Degrees

NOTE: Camera Information Shown on Table 4

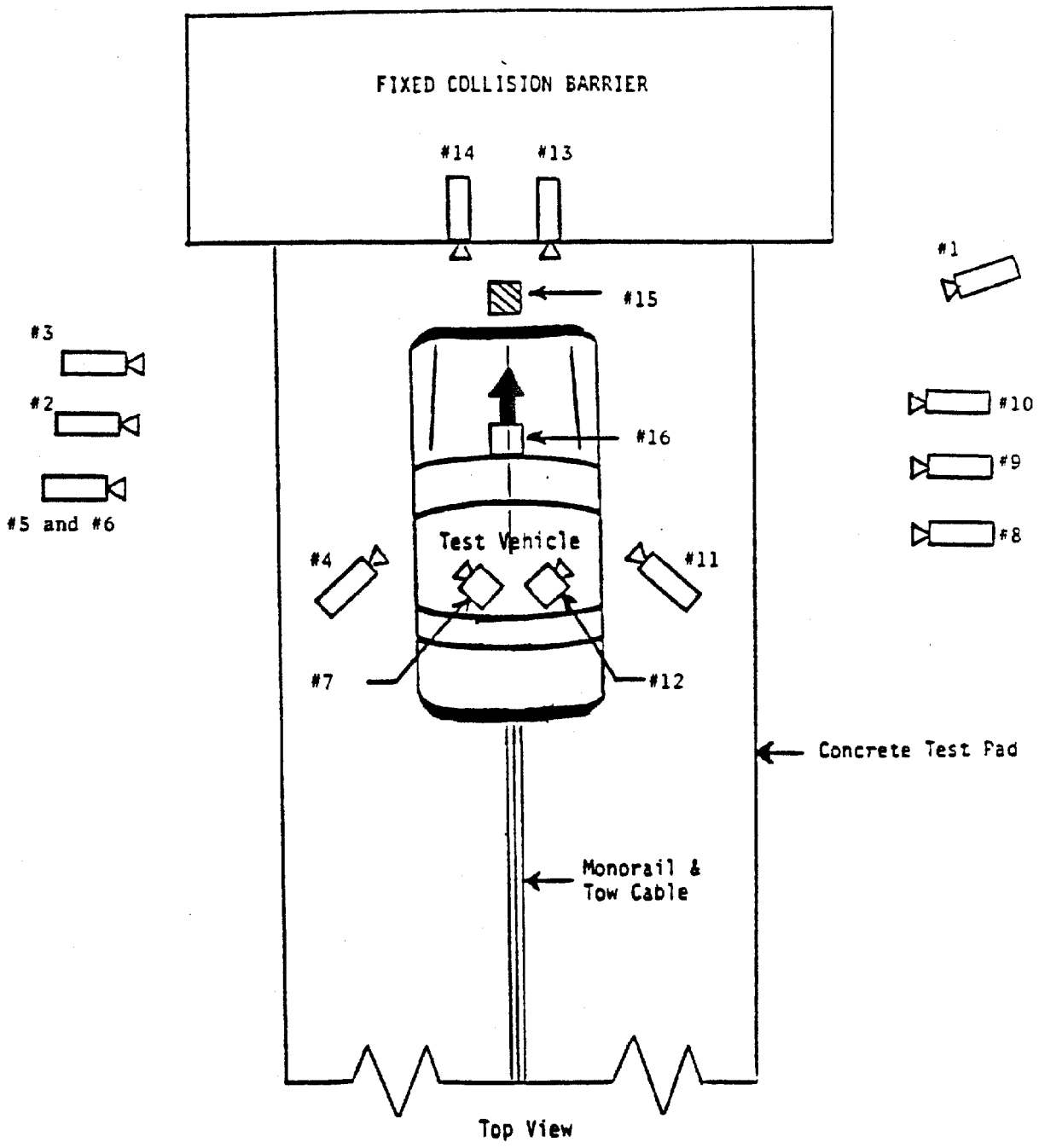


Figure 5 CAMERA POSITION FOR FRONTAL IMPACTS

Table 4

HIGH-SPEED CAMERA LOCATIONS

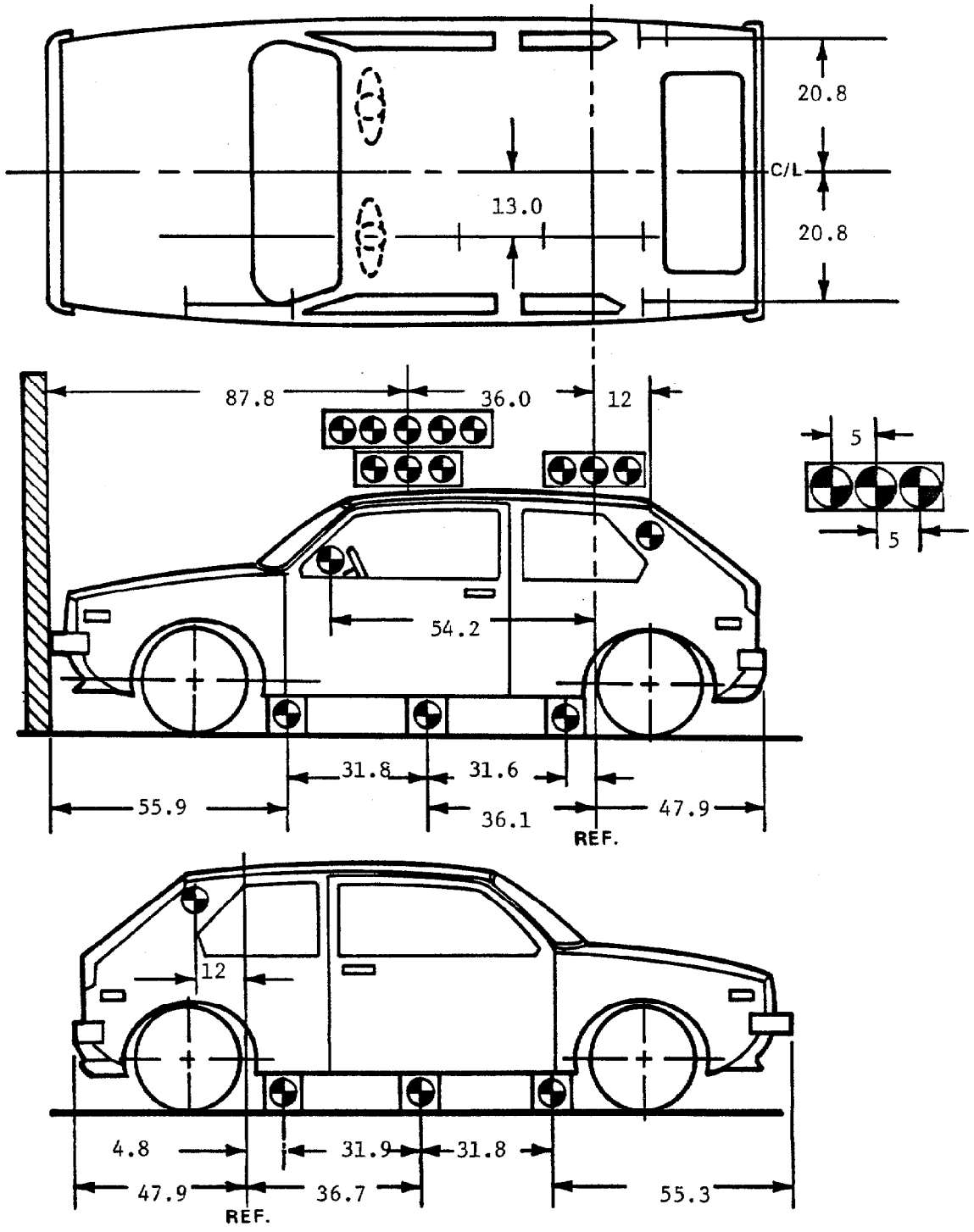
Test No. MH0302 Vehicle 1987 Plymouth Sundance 4-Door Hatc

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	262	45	42	0	-	13	525
3	Left Side View	251	40	43	-5	-	25	525
4	Driver & Interior View	104	114	70	-15	-	13	675
5	Steering Column (Bottom)	240	78	52	-5	224	25	540
6	Steering Column (Top)	240	78	77	-11	224	25	550
7	Left Belt	-	-	-	-	-	8	765
8	Overall Right Side	246	47	43	-1	-	13	790
9	Right Side View	260	70	44	-4	-	25	750
10	Right Passenger View	275	86	42	-3	259	35	700
11	Passenger & Interior View	87	101	66	-15	-	25	590
12	Right Belt	-	-	-	-	-	8	690
13	Passenger Front View	24	0	72	-40	-	13	550
14	Driver Front View	24	0	72	-40	-	13	570
15	Windshield View	0	0	126	-55	-	13	540
16	Pit View of Engine	0	32	-120	90	-	13	725
17								

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

Figure 6

VEHICLE TARGET LOCATIONS



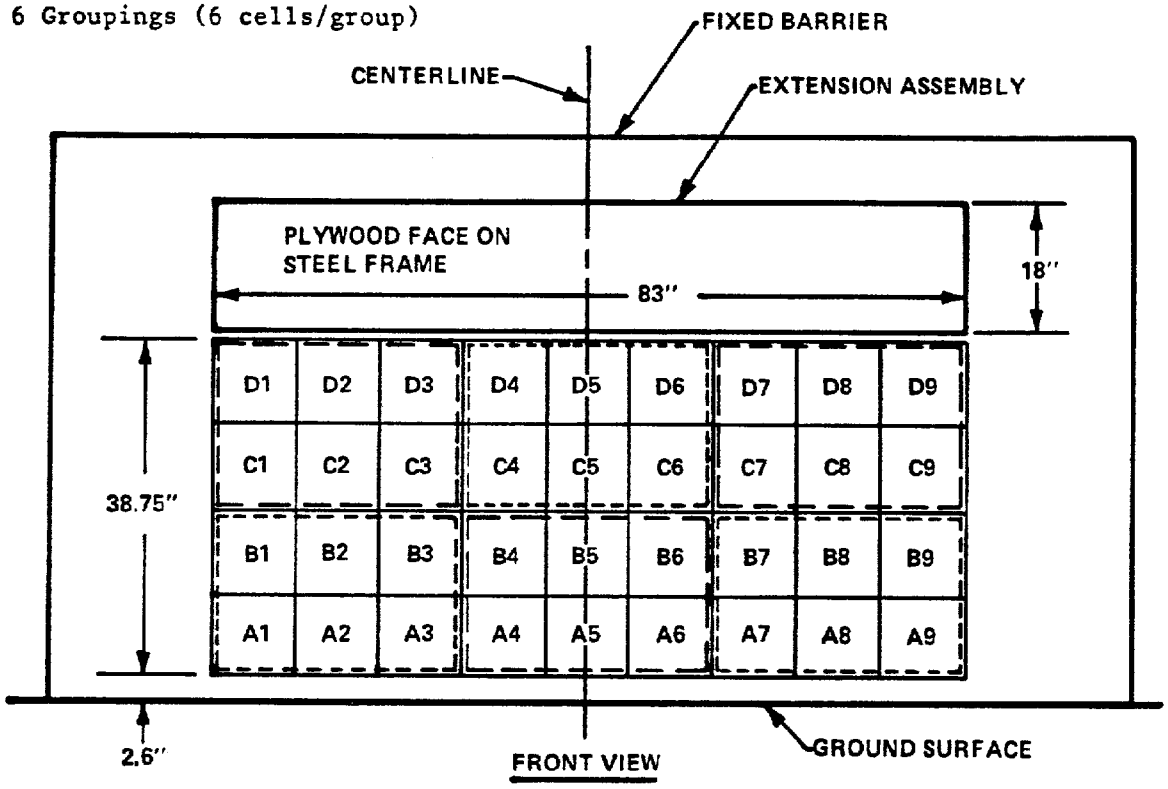
(DIMENSIONS IN INCHES)

7556-15

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

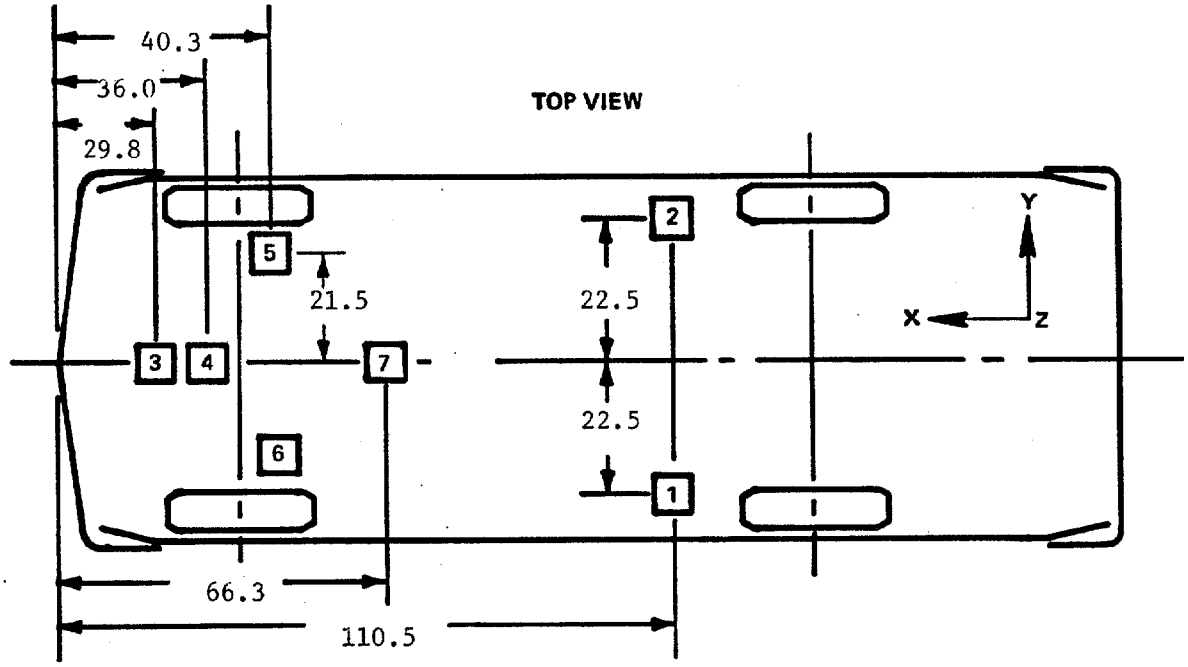
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

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 11

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	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 8

TEST VEHICLE MEASUREMENTS

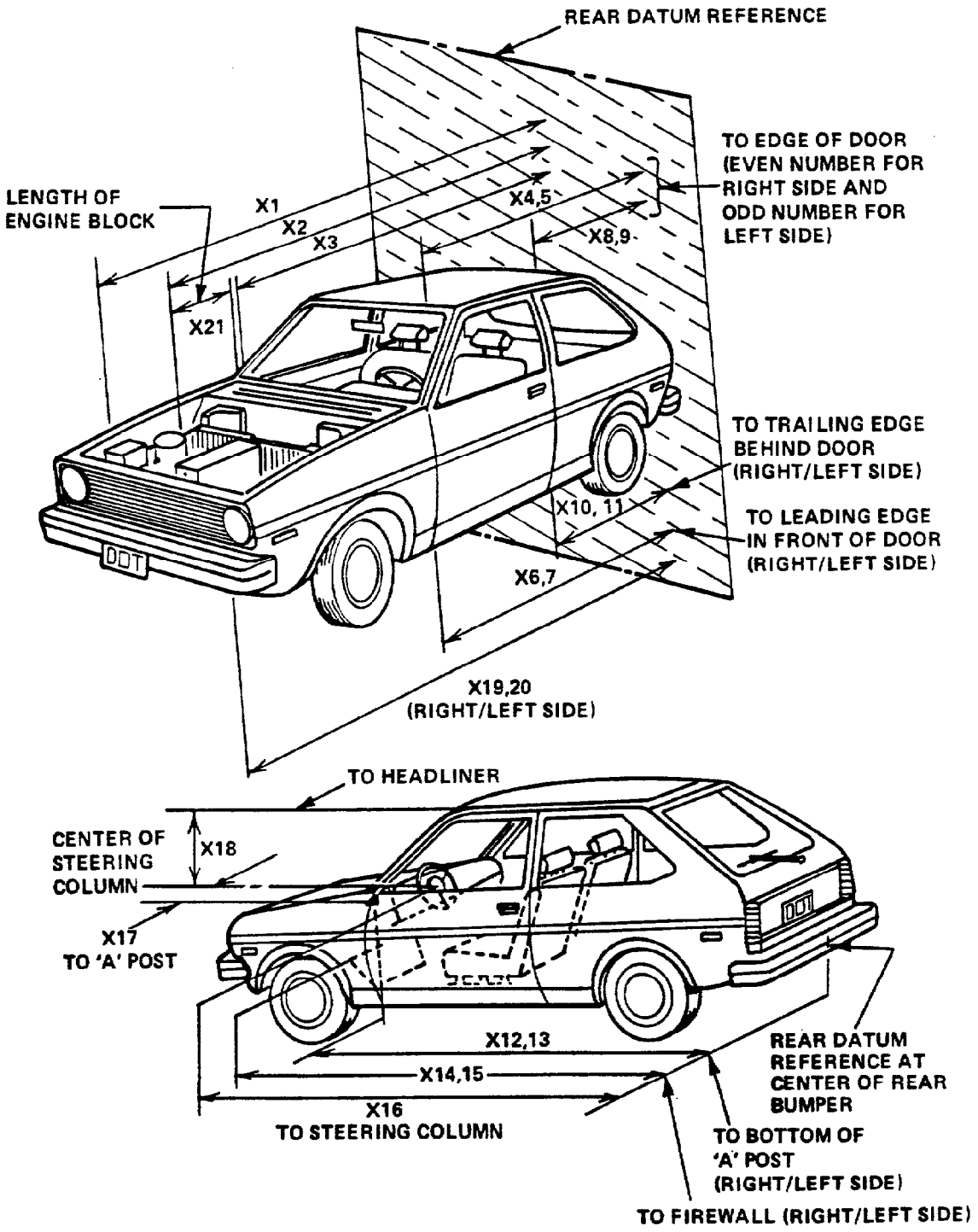


Table 5

VEHICLE MEASUREMENTS

All Dimensions in Inches

No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	171.7	143.2	28.5
X2	Rear Surface of Vehicle to Front of Engine	142.5	133.0	9.5
X3	Rear Surface of Vehicle to Firewall	127.1	117.9	9.2
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	114.2	113.0	1.2
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	114.0	113.2	.8
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	113.0	112.1	.9
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	113.5	113.0	.5
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	74.5	73.5	1.0
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	74.5	73.5	1.0
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	74.3	73.5	.8
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	75.1	73.4	1.7
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	113.1	111.5	1.6
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	113.5	112.2	1.3
X14	Rear Surface of Vehicle to Firewall, Right Side	123.4	115.5	7.9
X15	Rear Surface of Vehicle to Firewall, Left Side	124.5	113.1	11.4
X16	Rear Surface of Vehicle to Steering Column	94.5	93.9	.6
X17	Center of Steering Column to "A" Post	16.6	16.0	.6
X18	Center of Steering Column to Headliner	17.1	15.0	2.1
X19	Rear Surface of Vehicle to Right Side of Front Bumper	168.0	142.4	25.6
X20	Rear Surface of Vehicle to Left Side of Front Bumper	168.2	142.5	25.7
X21	Length of Engine Block	17.5	17.5	0.0

Note: Measurements are not done in the same location as Accident Investigation measurements. Therefore, measurements may not be equal.

Appendix A

PHOTOGRAPHS

Figure A-1 PRE-TEST FRONT VIEW

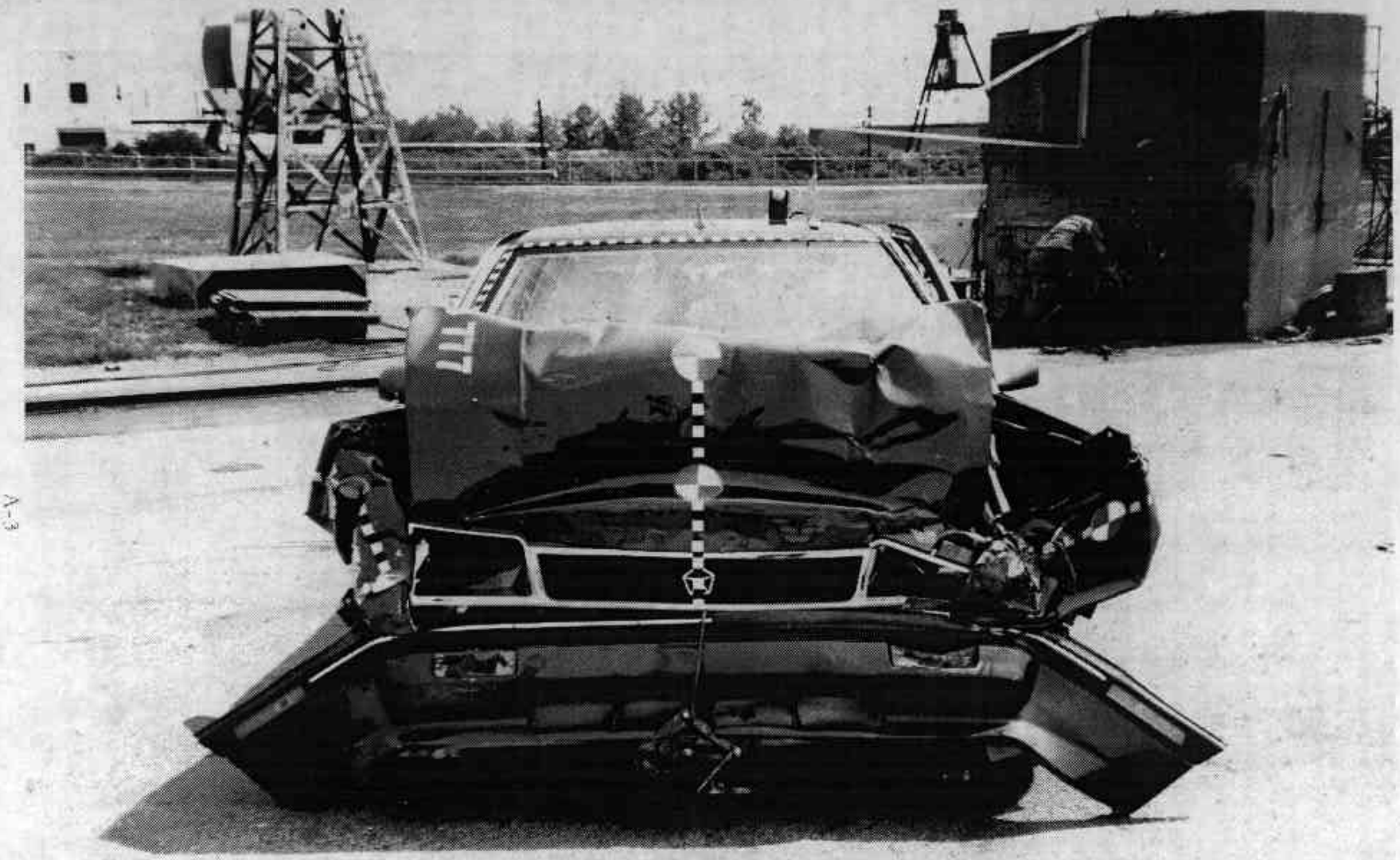


Figure A-2 POST-TEST FRONT VIEW

Figure A-3 PRE-TEST LEFT SIDE VIEW

Figure A-4 POST-TEST LEFT SIDE VEIW

Figure A-5 PRE-TEST RIGHT SIDE VIEW

Figure A-5 POST-TEST RIGHT SIDE VIEW

7556-15

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

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

7556-15

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

A-11

7956-85

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

Figure A-11 PRE-TEST WINDSHIELD VIEW

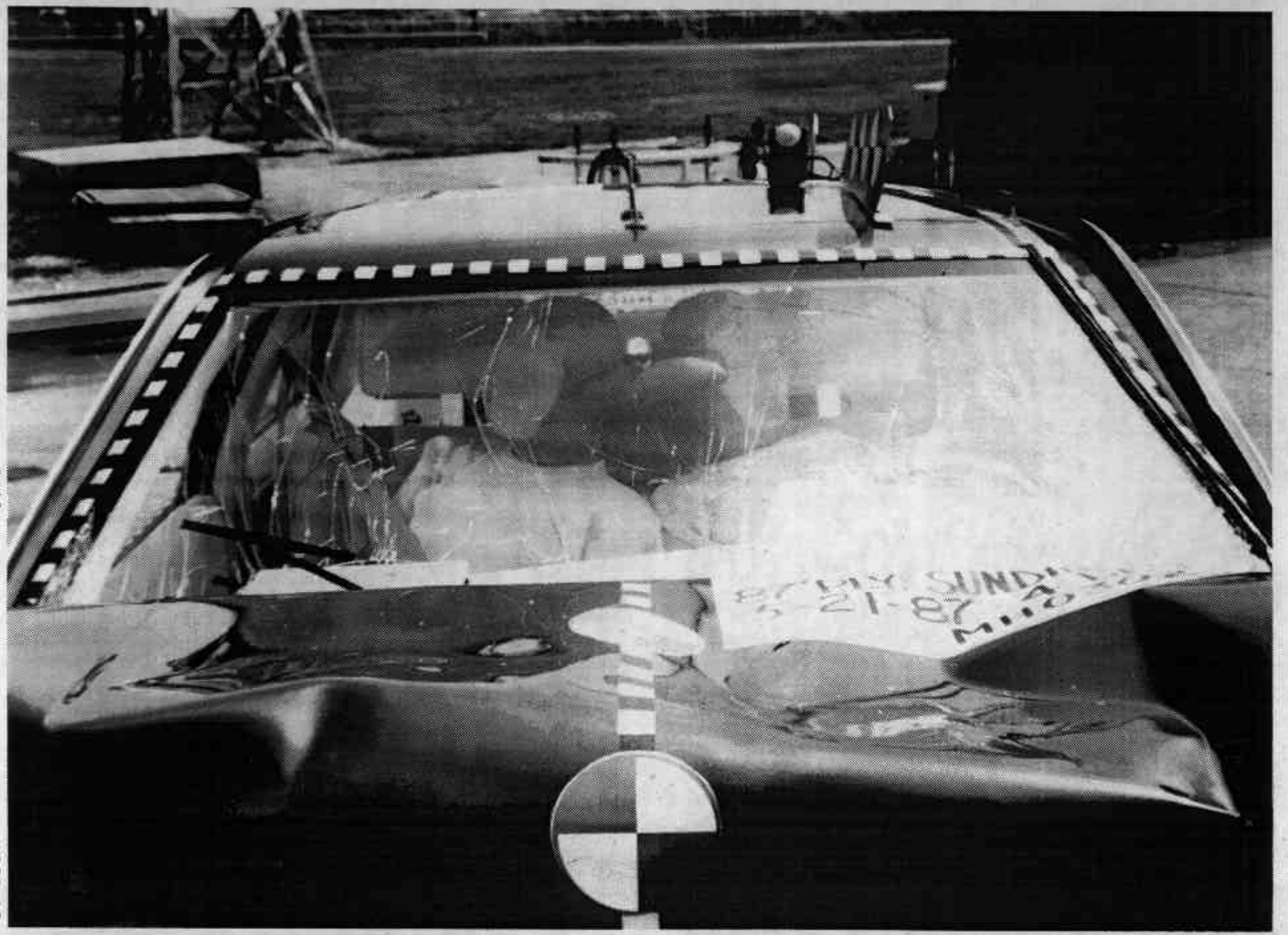


Figure A-12 POST-TEST WINDSHIELD VIEW

Figure A-13 PRE-TEST ENGINE COMPARTMENT VIEW

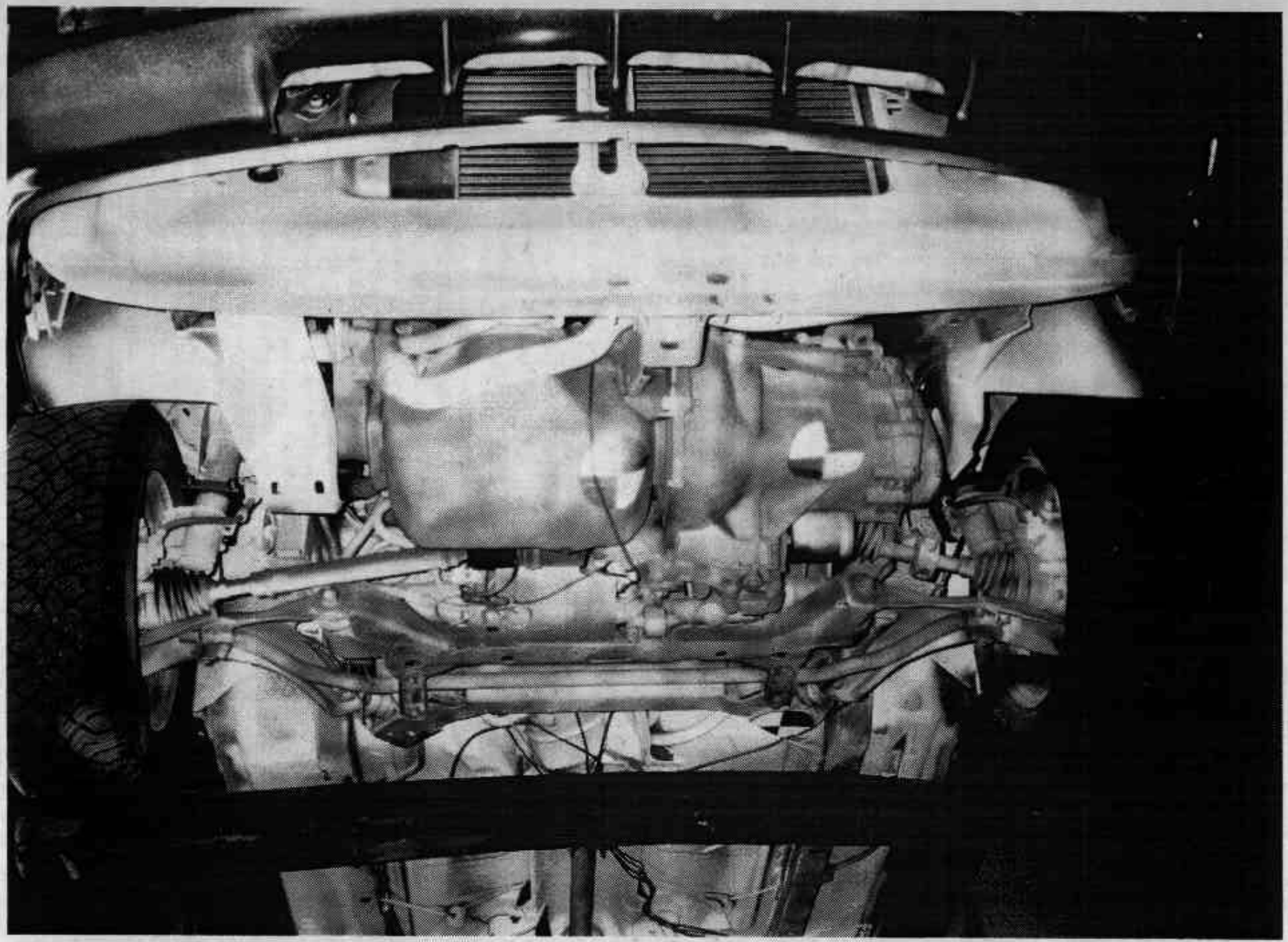


Figure A-14 PRE-TEST FRONT UNDERBODY VIEW

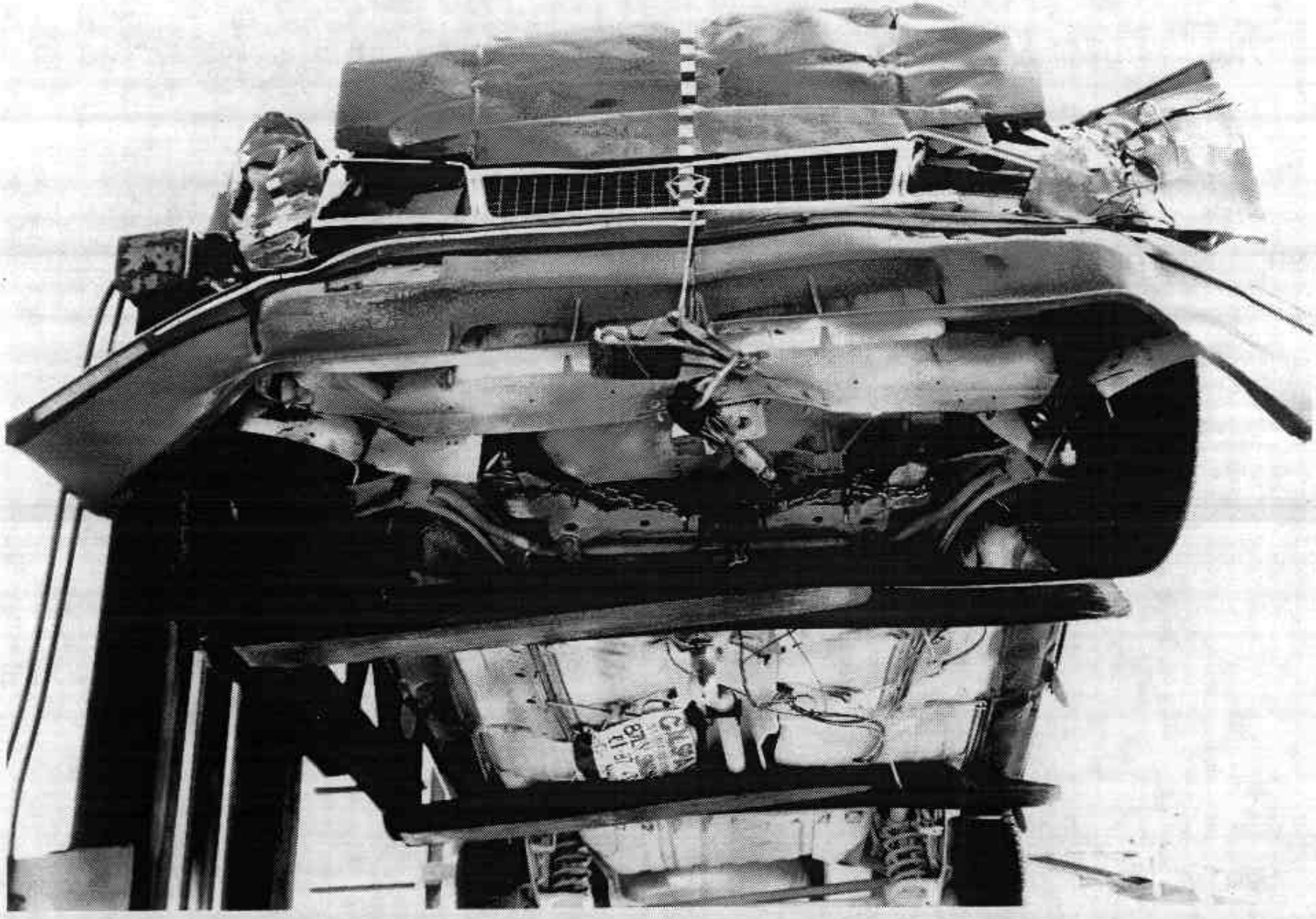


Figure A-15 POST-TEST FRONT UNDERBODY VIEW

7556-15

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

7556-15

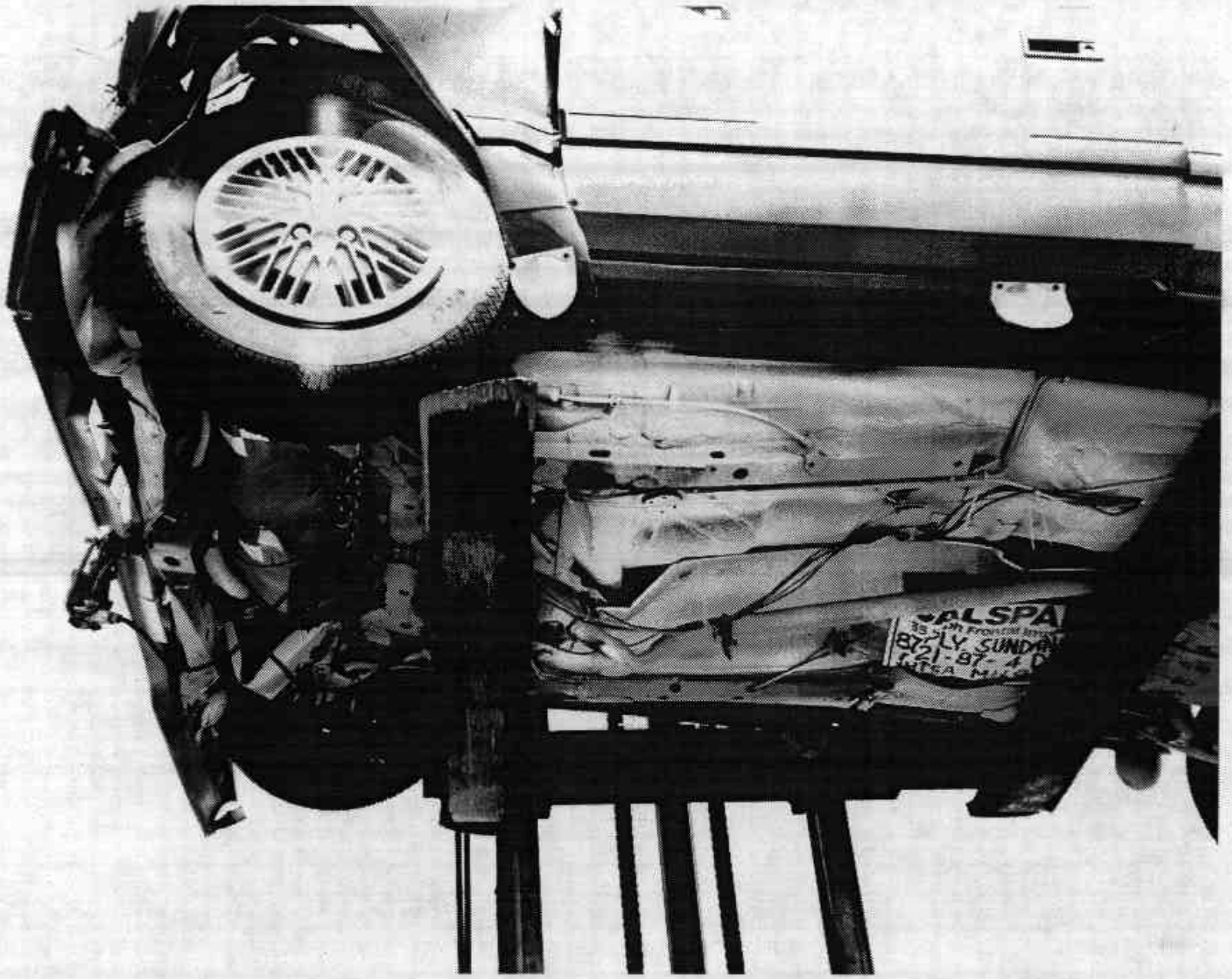


Figure A-17 POST-TEST FRONT-SIDE UNDERBODY VIEW

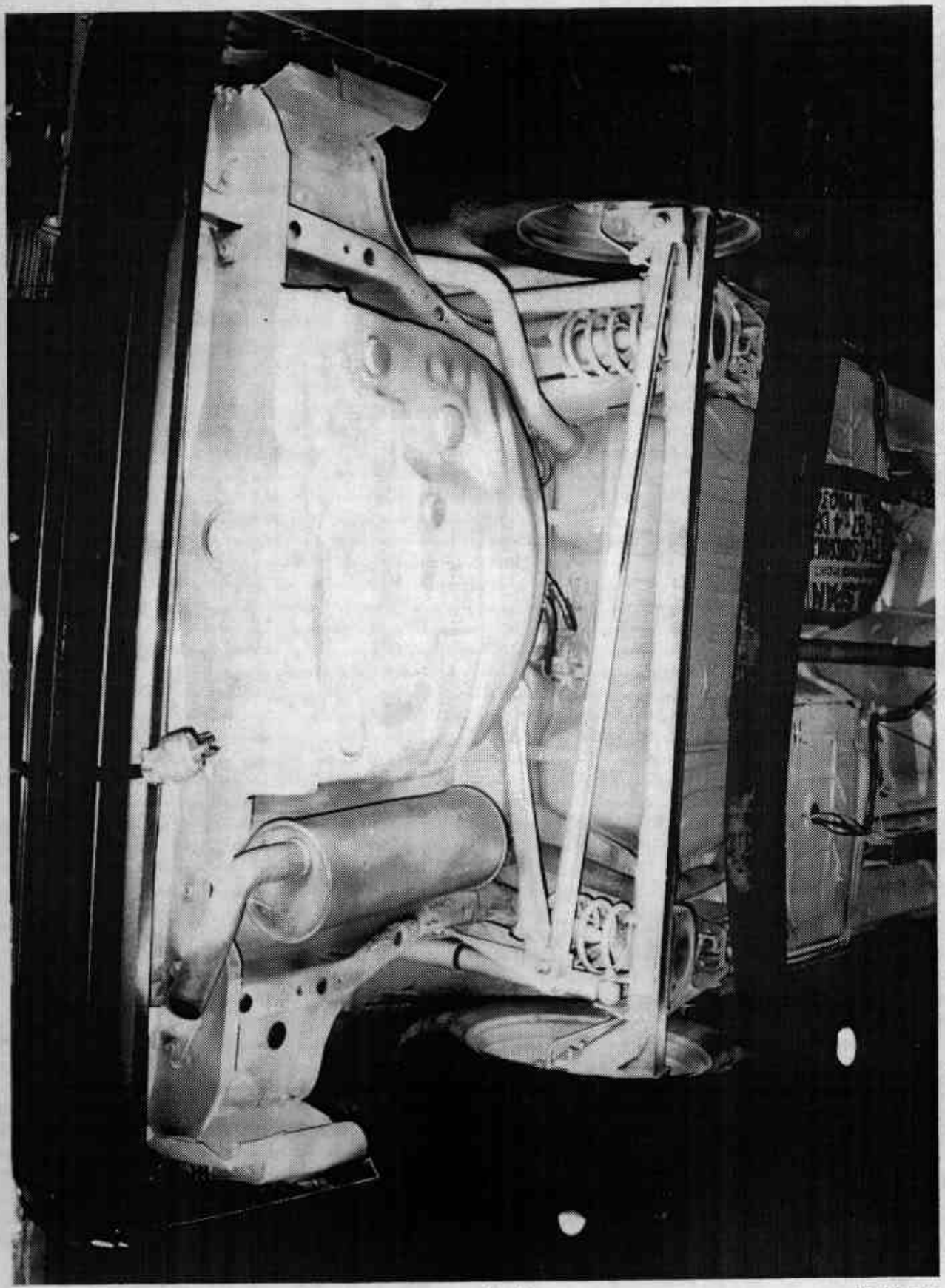


Figure A-18 PRE-TEST REAR UNDERBODY VIEW

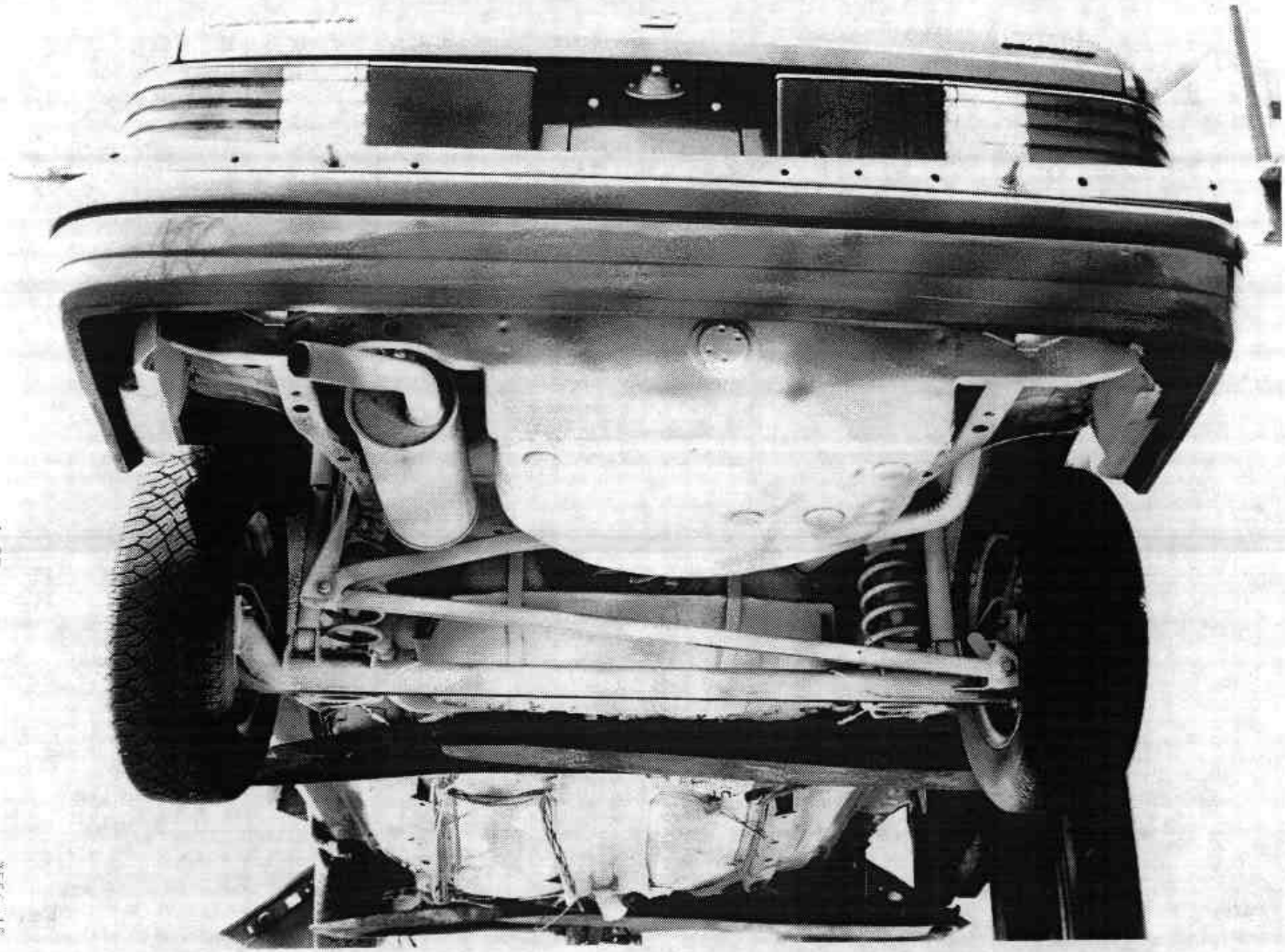


Figure A-19 POST-TEST REAR UNDERBODY VIEW

Figure A-20 PRE-TEST DRIVER POSITION VIEW

Figure A-21 POST-TEST DRIVER POSITION VIEW

Figure A-22 PRE-TEST PASSENGER POSITION VIEW

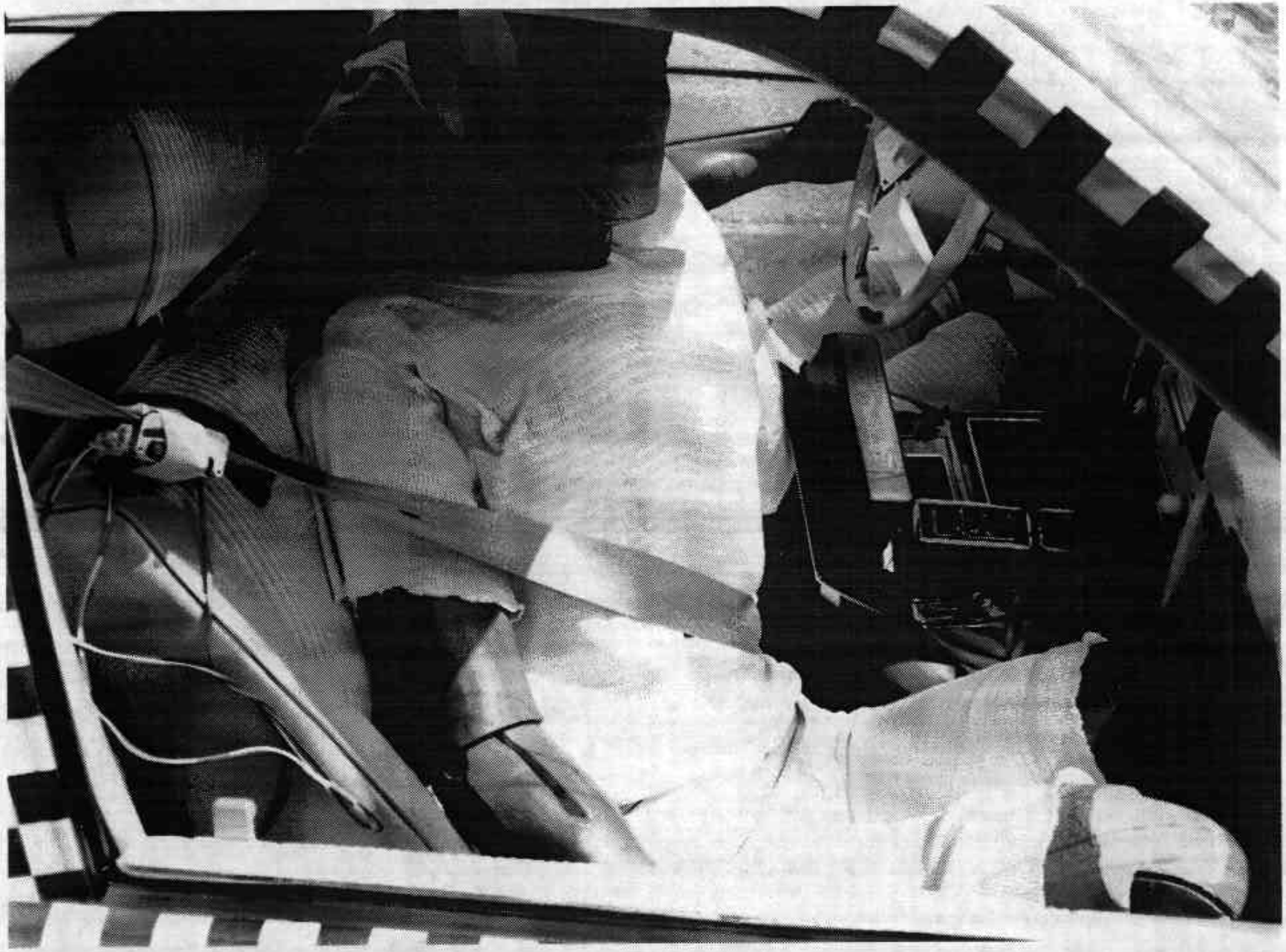


Figure A-23 POST-TEST PASSENGER POSITION VIEW

Figure A-24 PRE-TEST DRIVER AND INTERIOR VIEW

A-26

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Figure A-25 POST-TEST DRIVER AND INTERIOR VIEW

Figure A-26 PRE-TEST PASSENGER AND INTERIOR VIEW

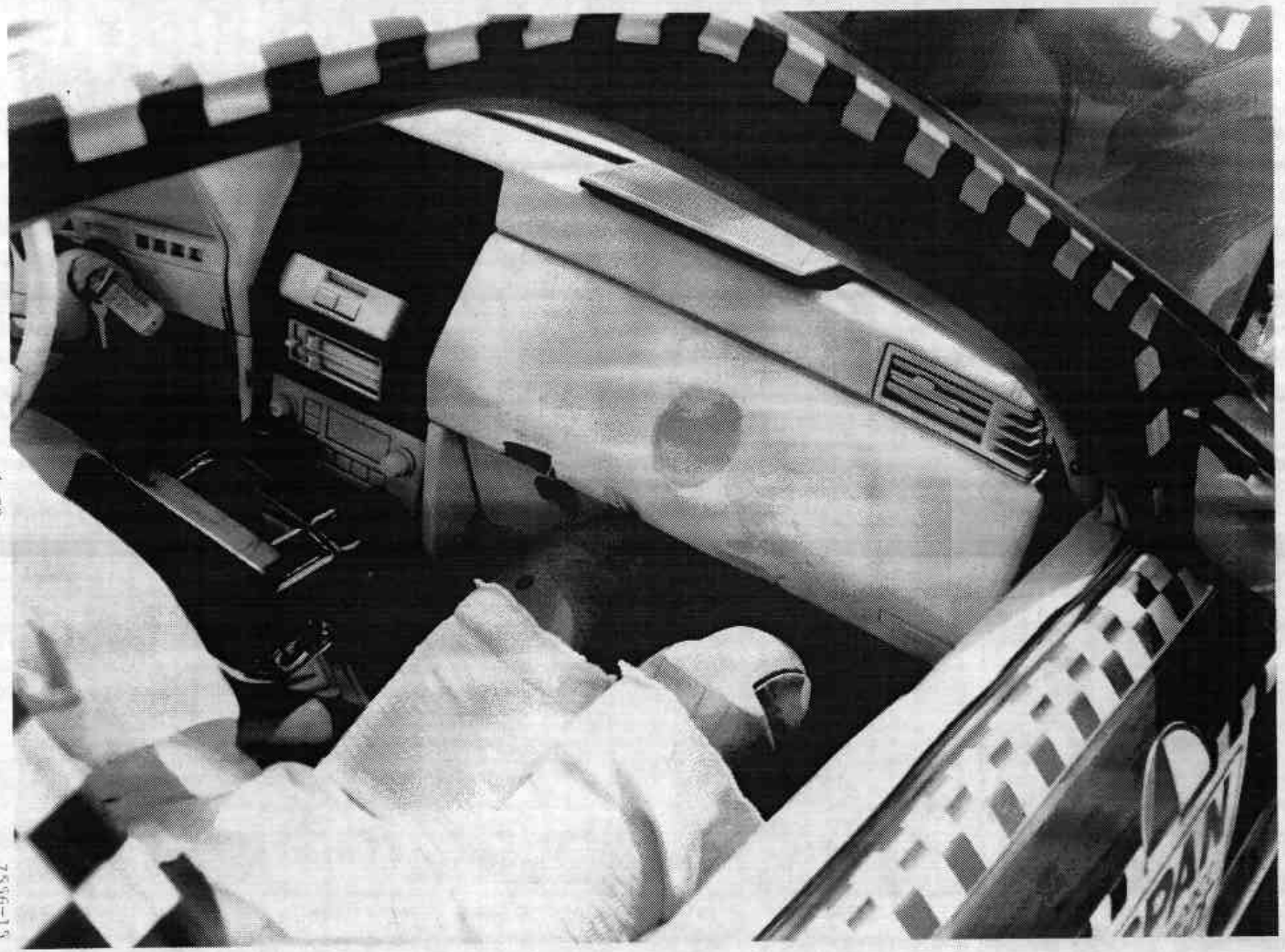


Figure A-27 POST-TEST PASSENGER AND INTERIOR VIEW

Appendix B

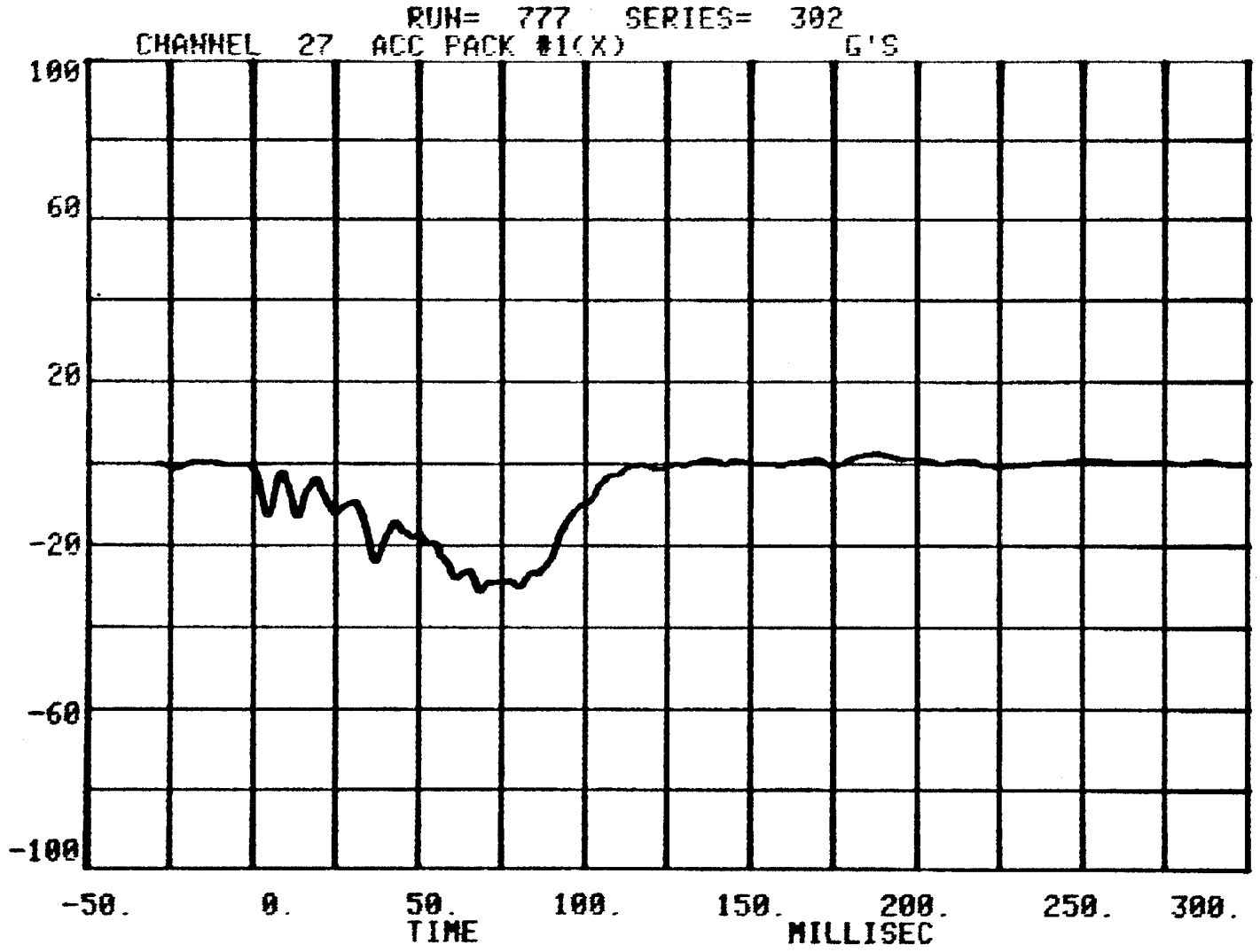
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

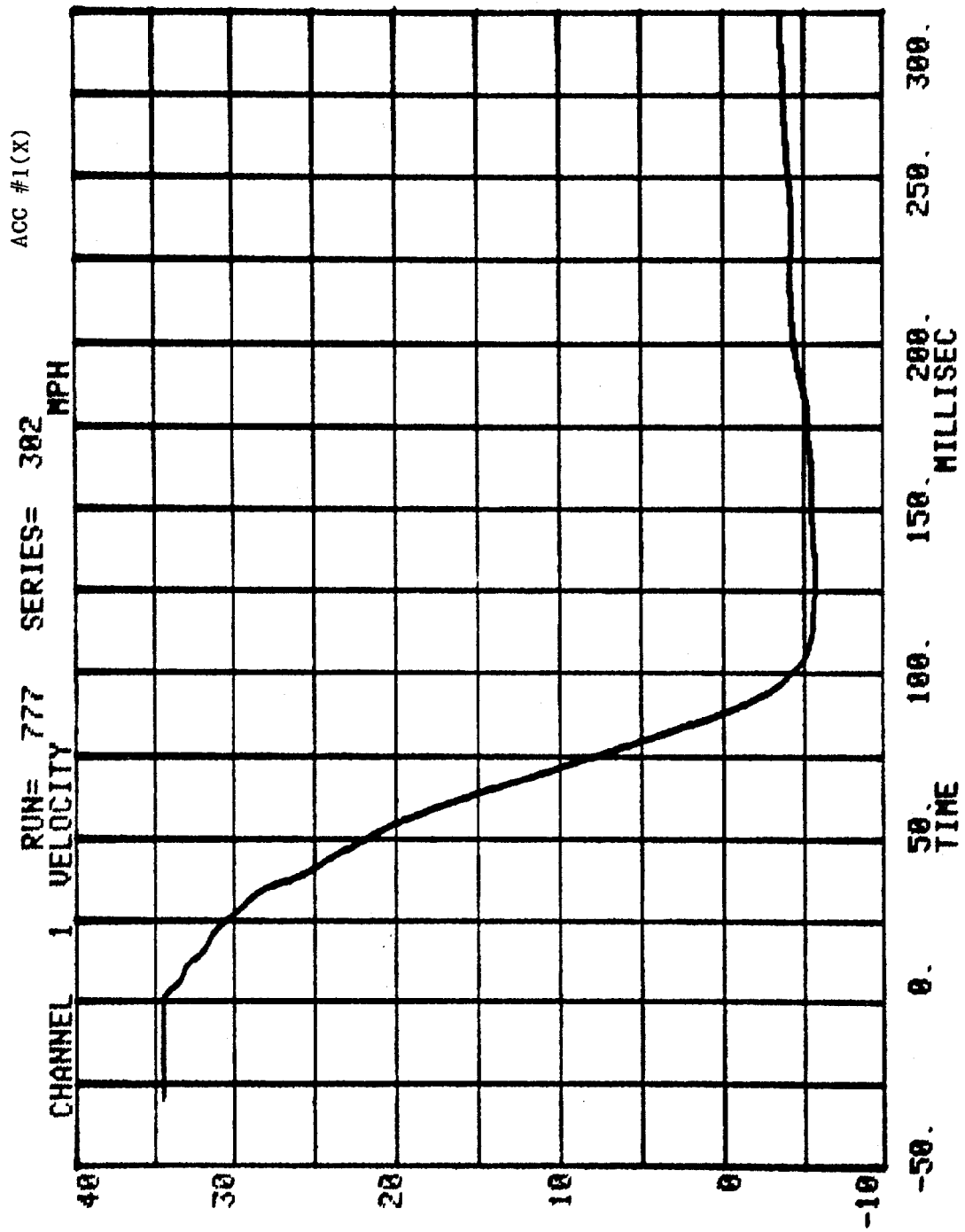
TEST NO. MH0302

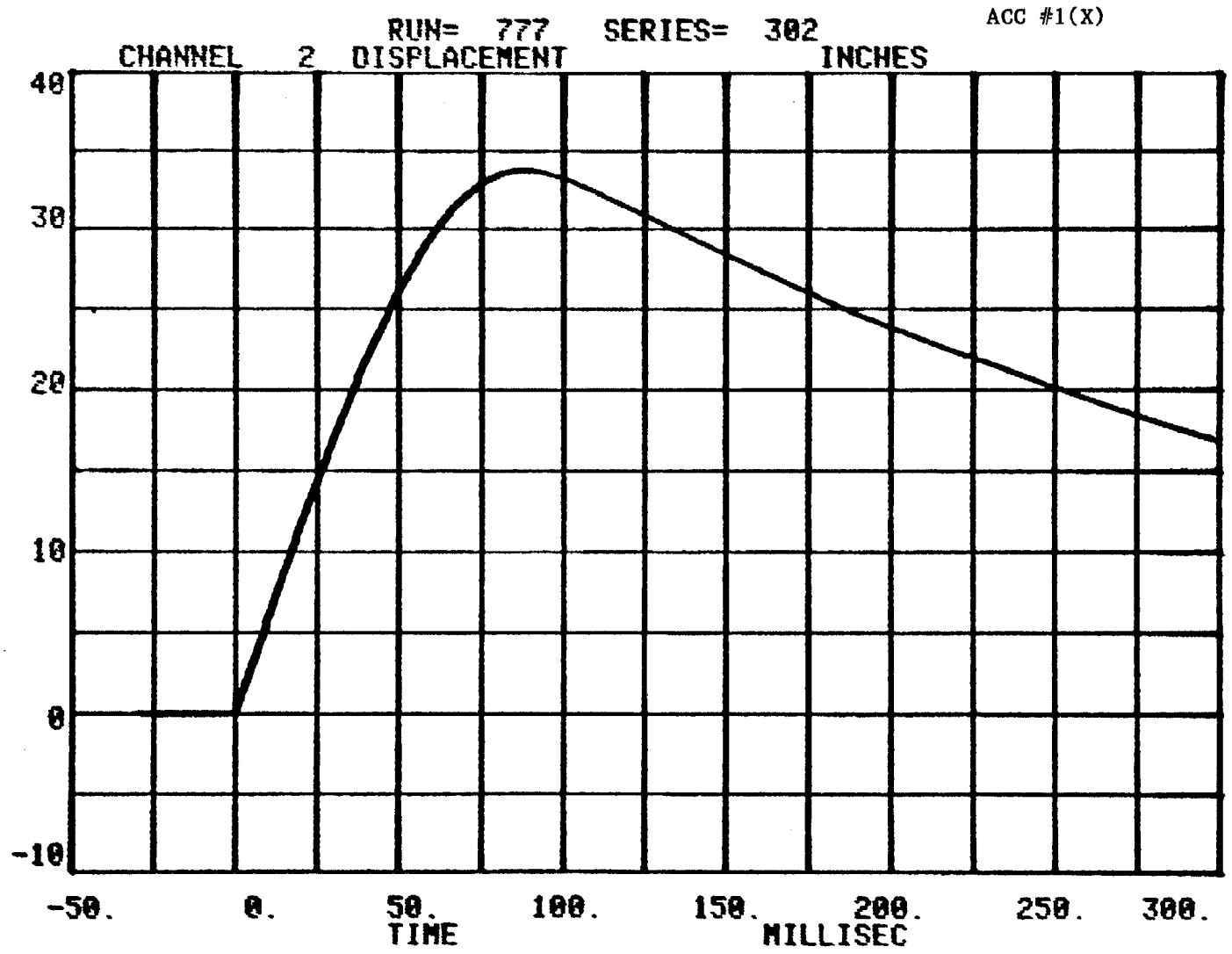
VEHICLE DATA

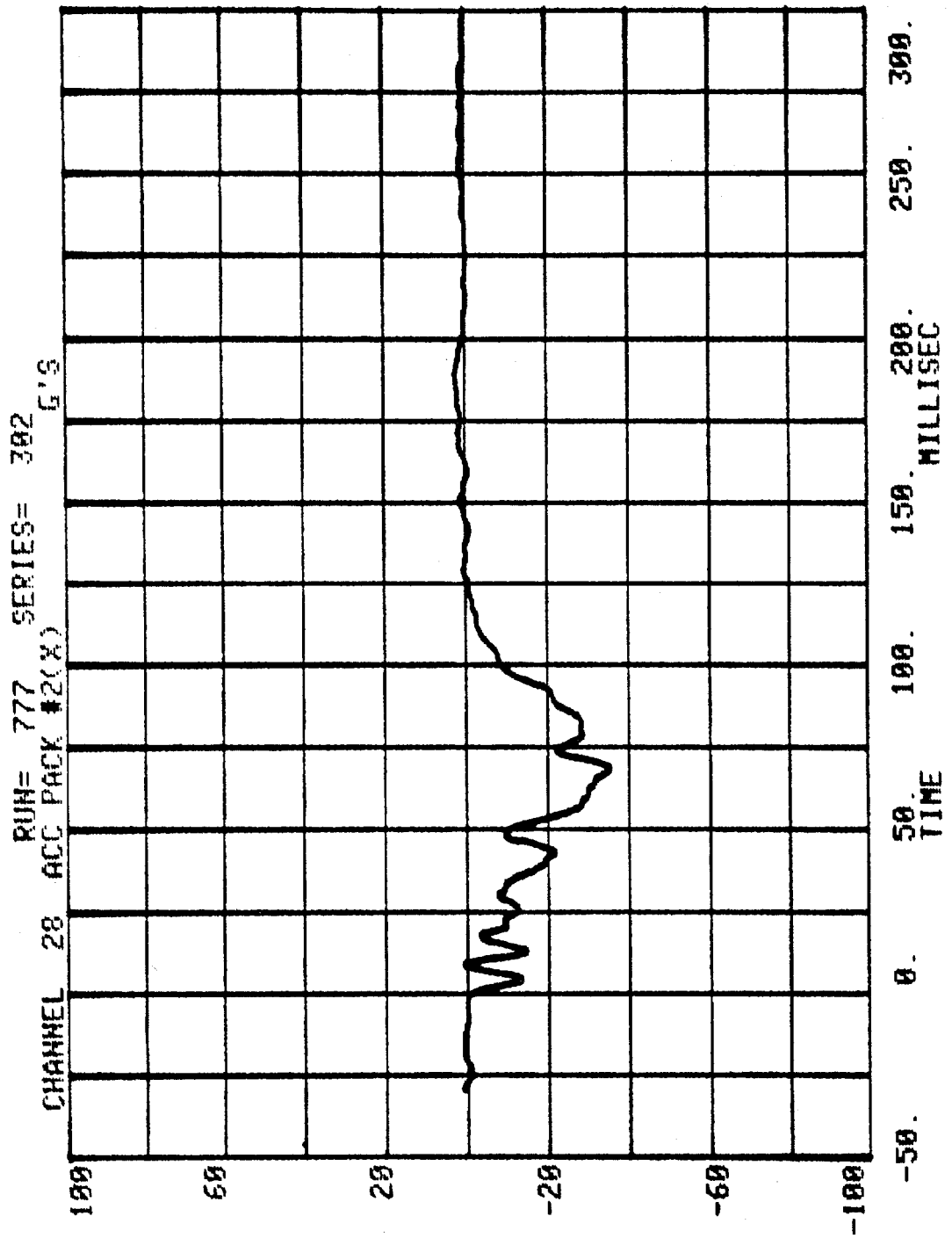
FILTER CHANNEL CLASS

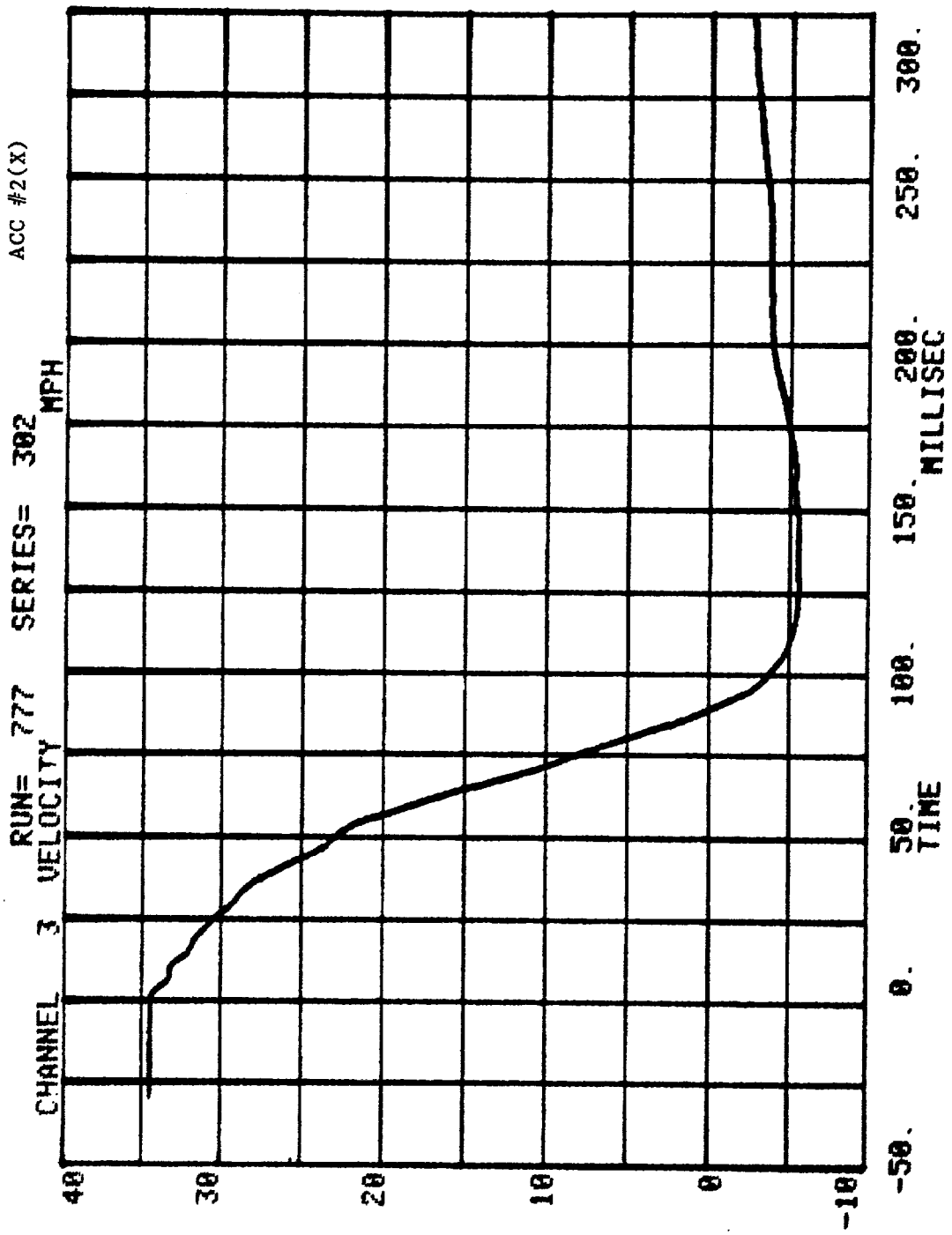
60

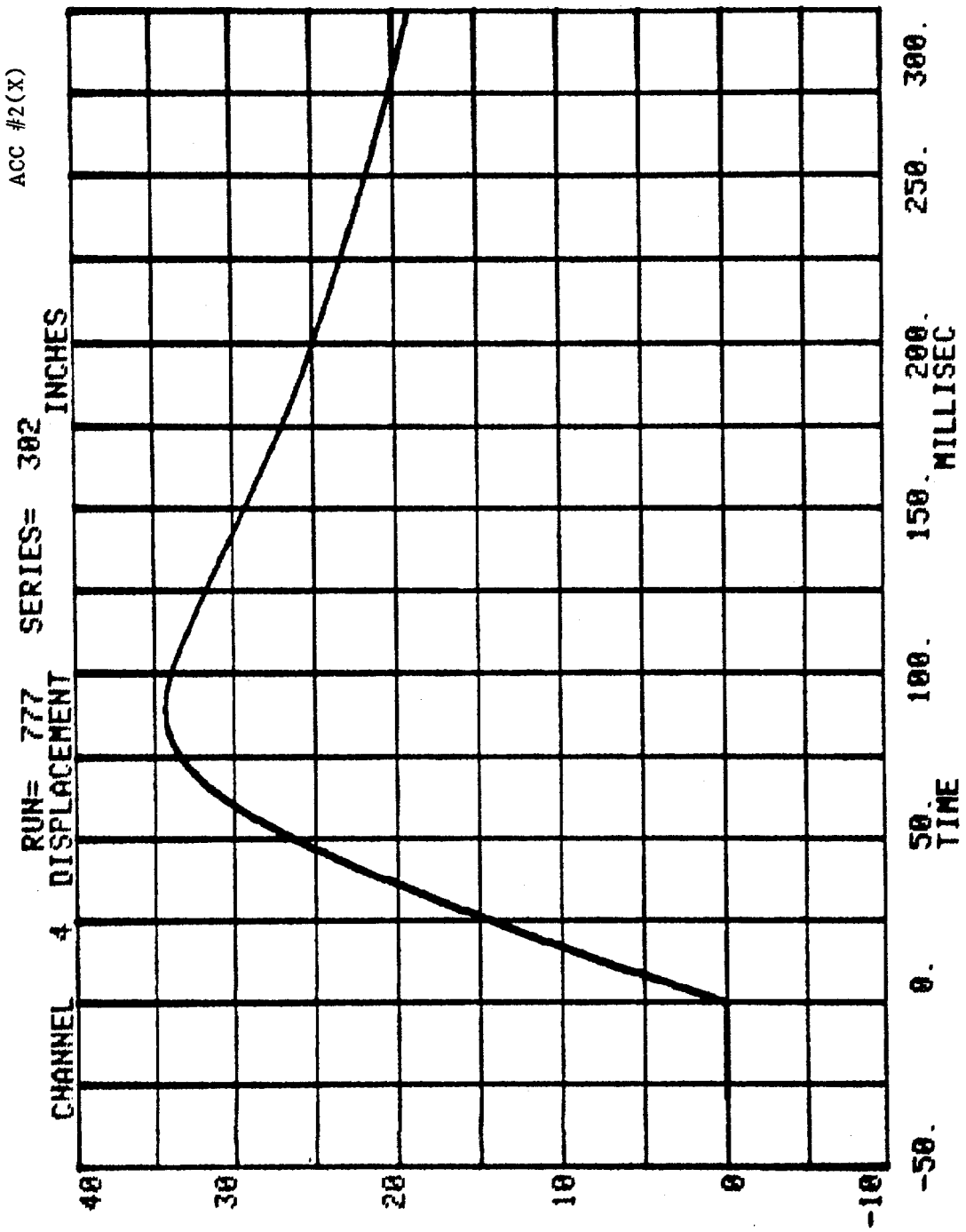

RUN= 777 SERIES= 302
CHANNEL 27 ACC PACK #1(X)
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

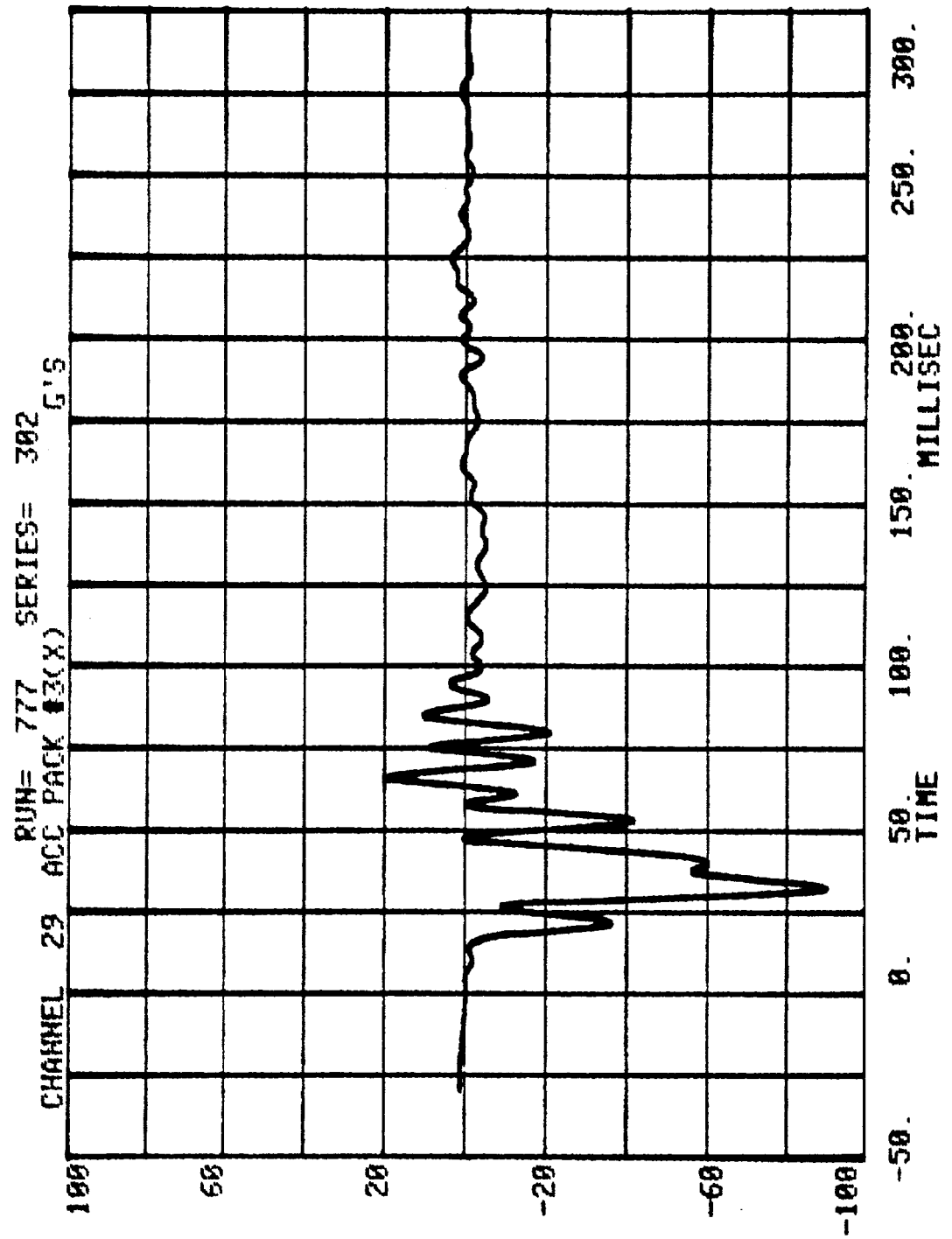

ACC #1(X)
CHANNEL 1 VELOCITY
RUN= 777 SERIES= 302 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

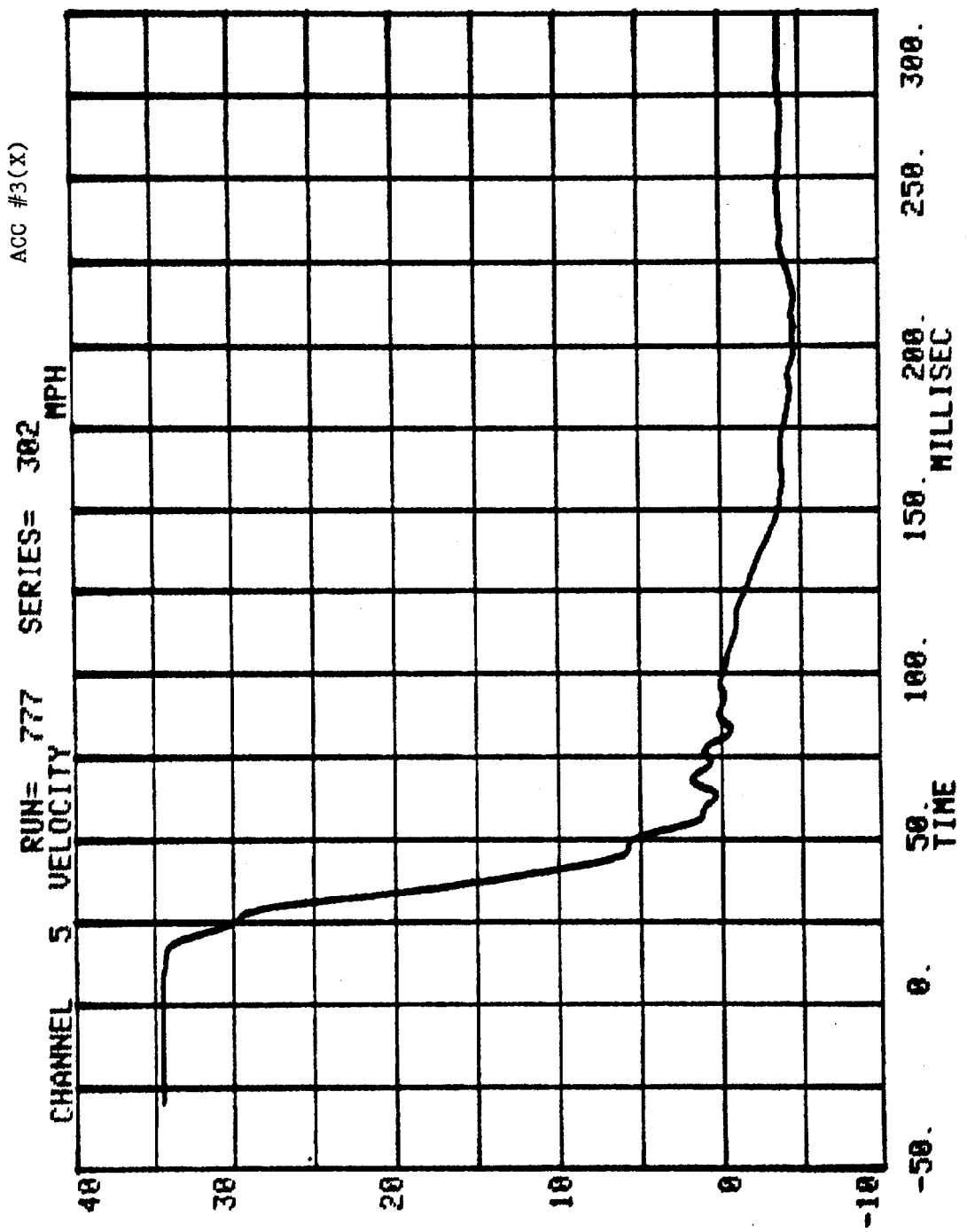

RUN= 777 SERIES= 302
ACC #1(X)
CHANNEL 2 DISPLACEMENT INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

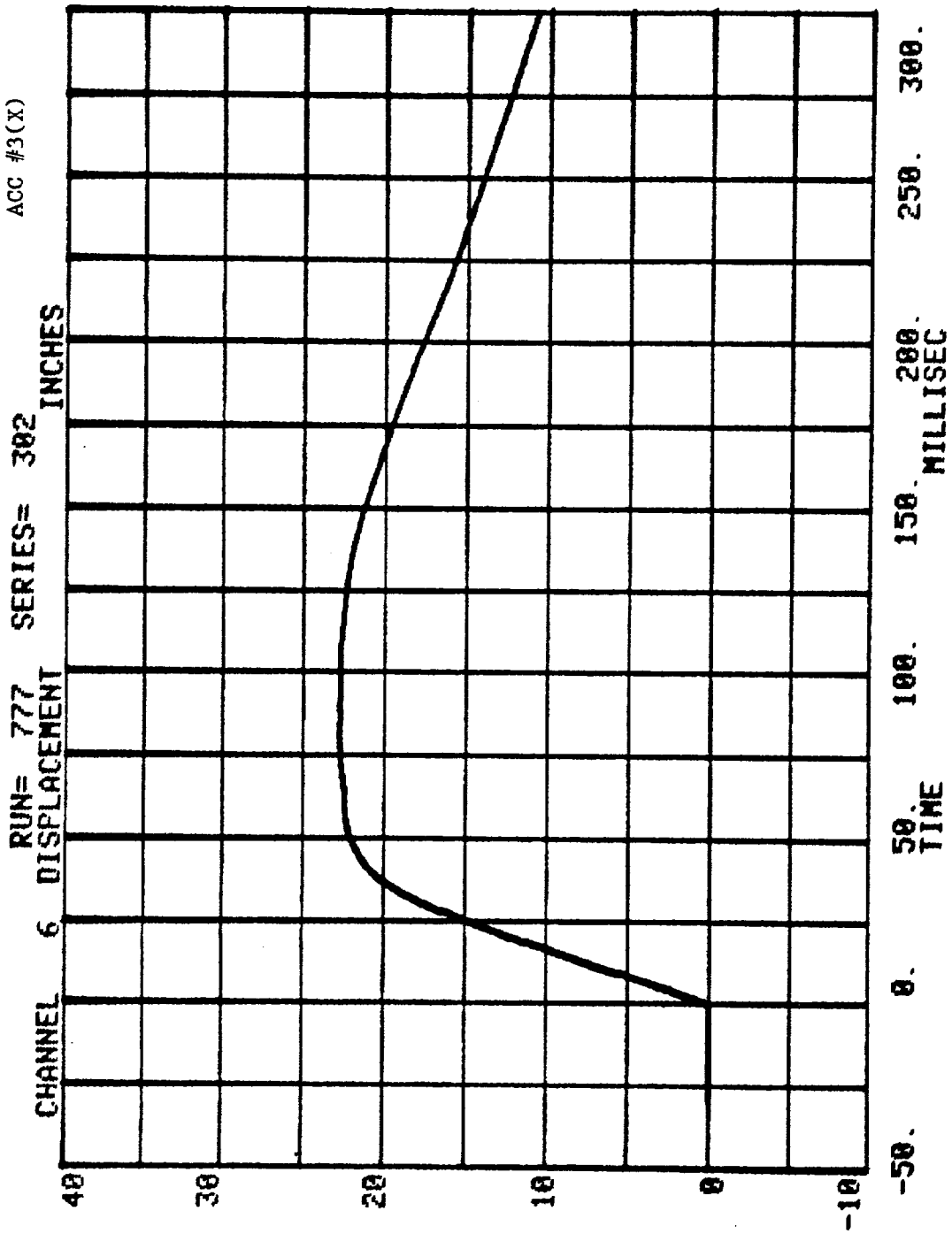

CHANNEL 28 ACC PACK #2(X)
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

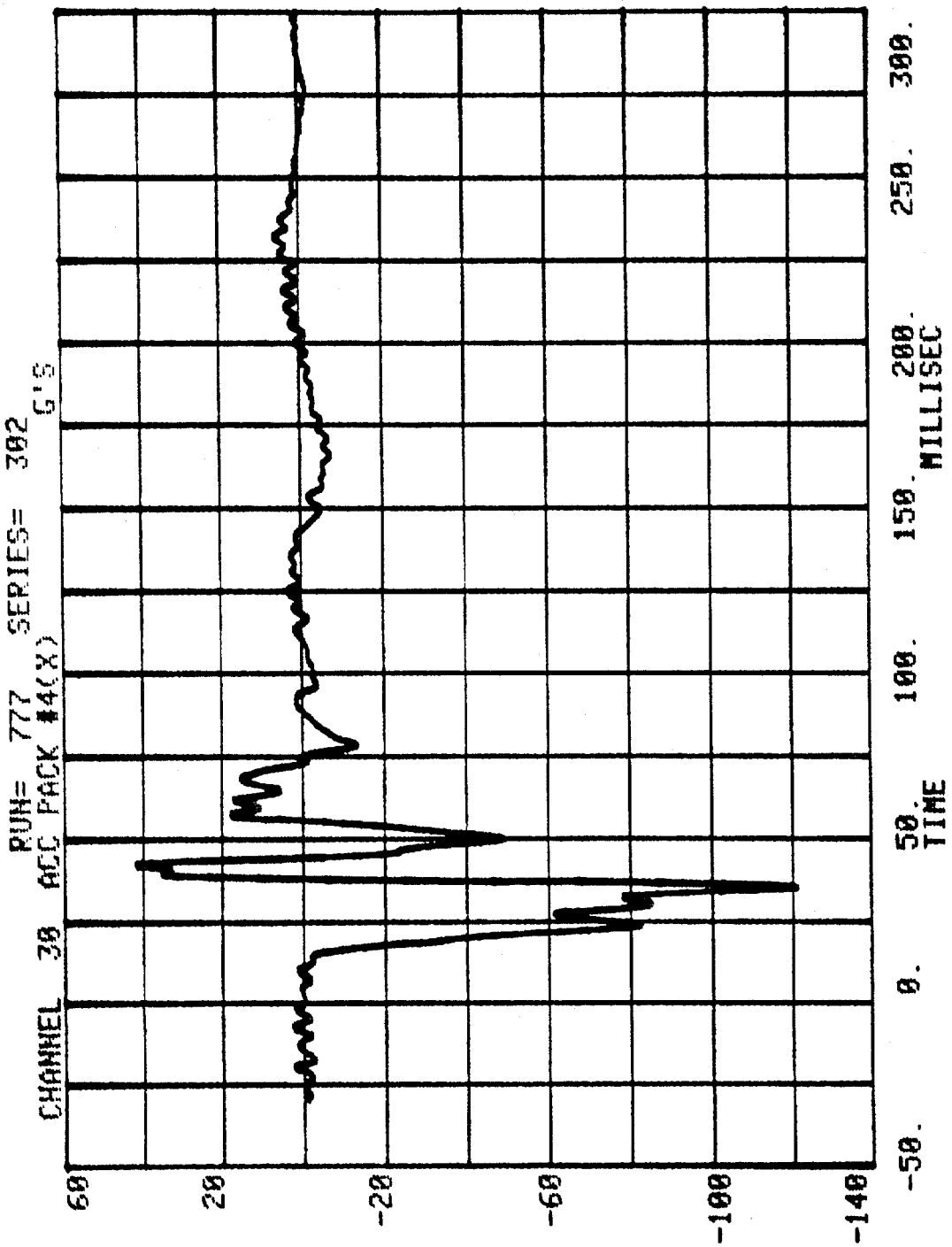

ACC #2(X)
CHANNEL 3 VELOCITY
RUN= 777 SERIES= 302 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

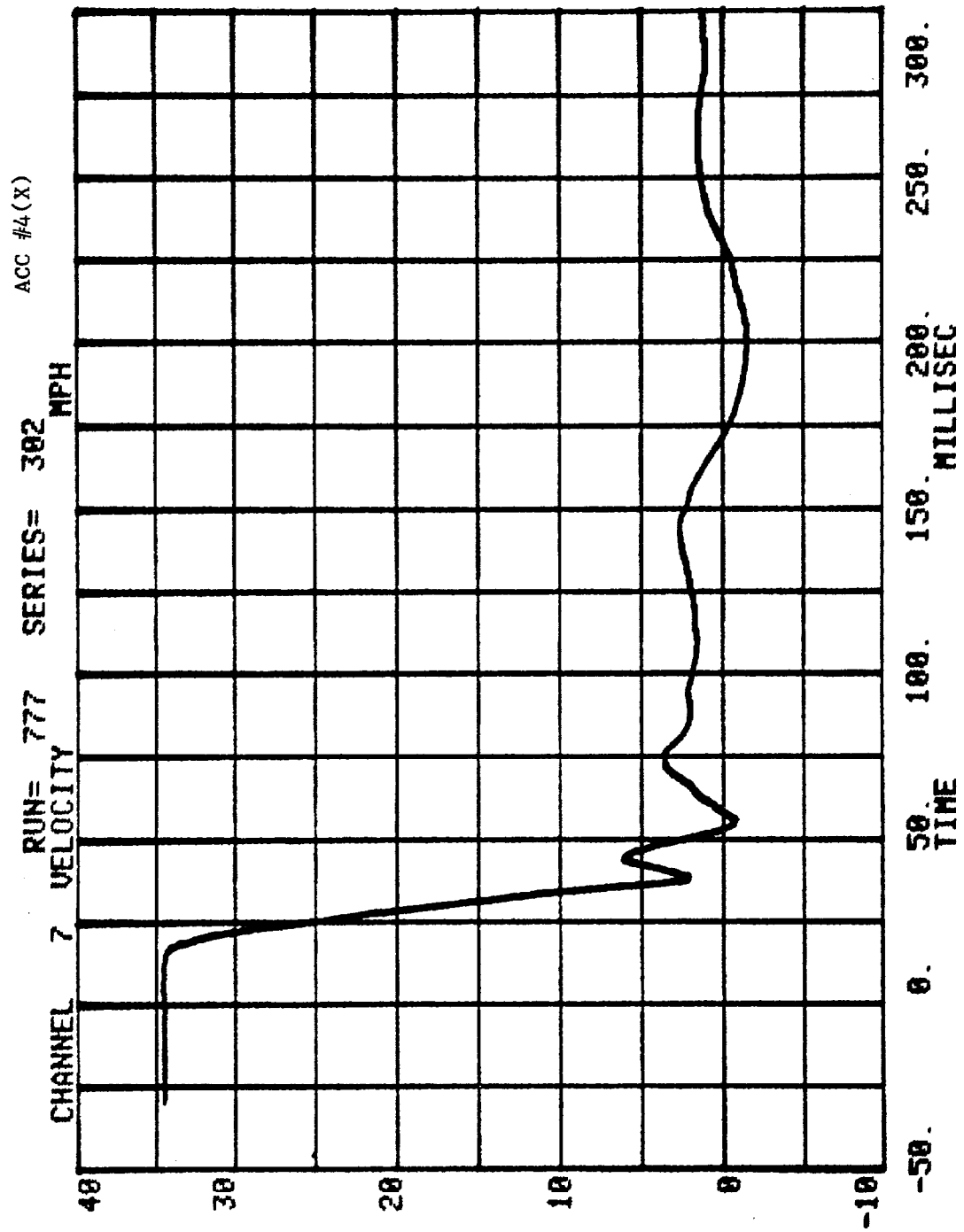

ACC #2(X)
CHANNEL 4 RUN= 777 SERIES= 302
DISPLACEMENT INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

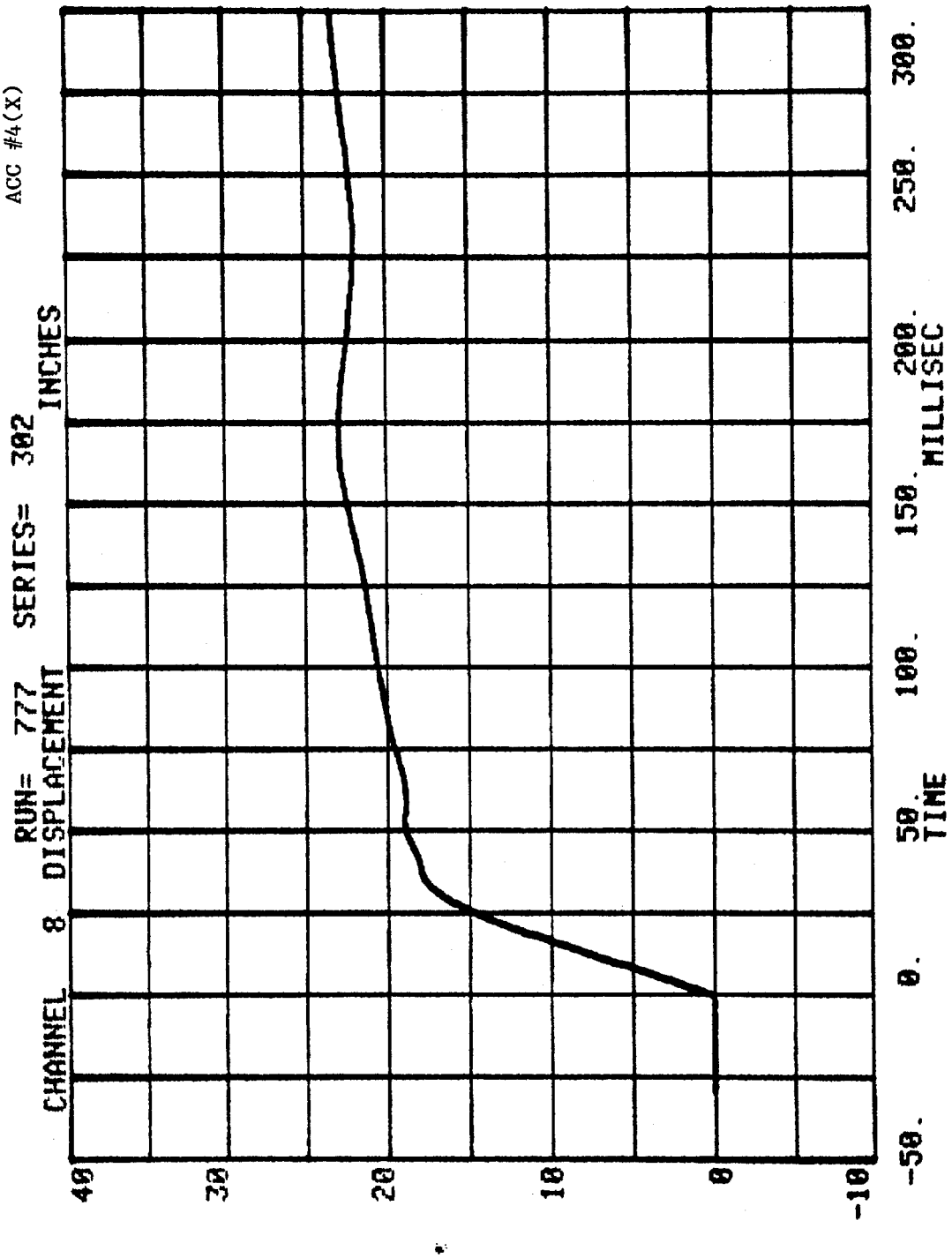

CHANNEL 29
RUN= 777
ACC PACK #3(X)
SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

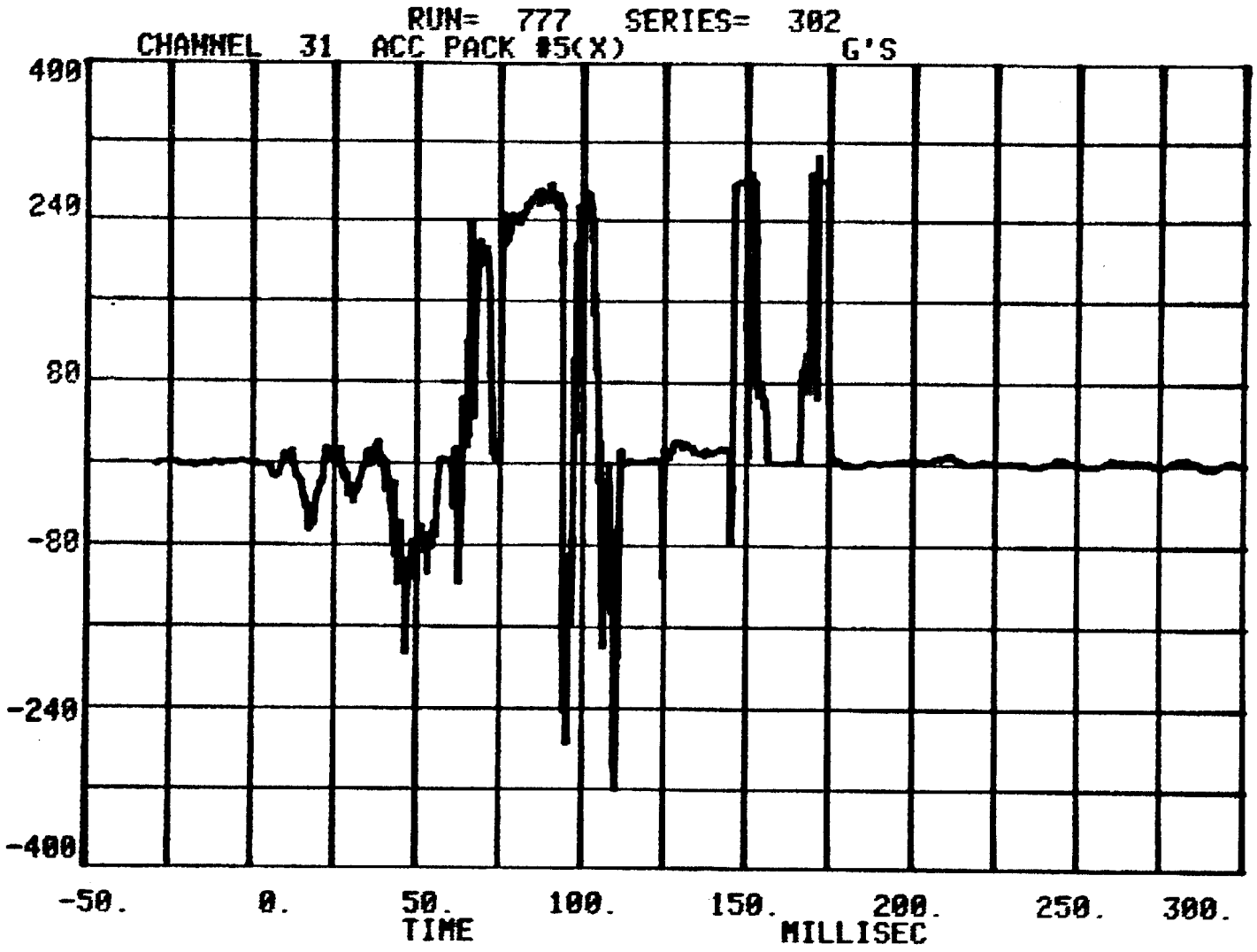

ACC #3(X)
CHANNEL 5 VELOCITY
RUN= 777 SERIES= 302 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

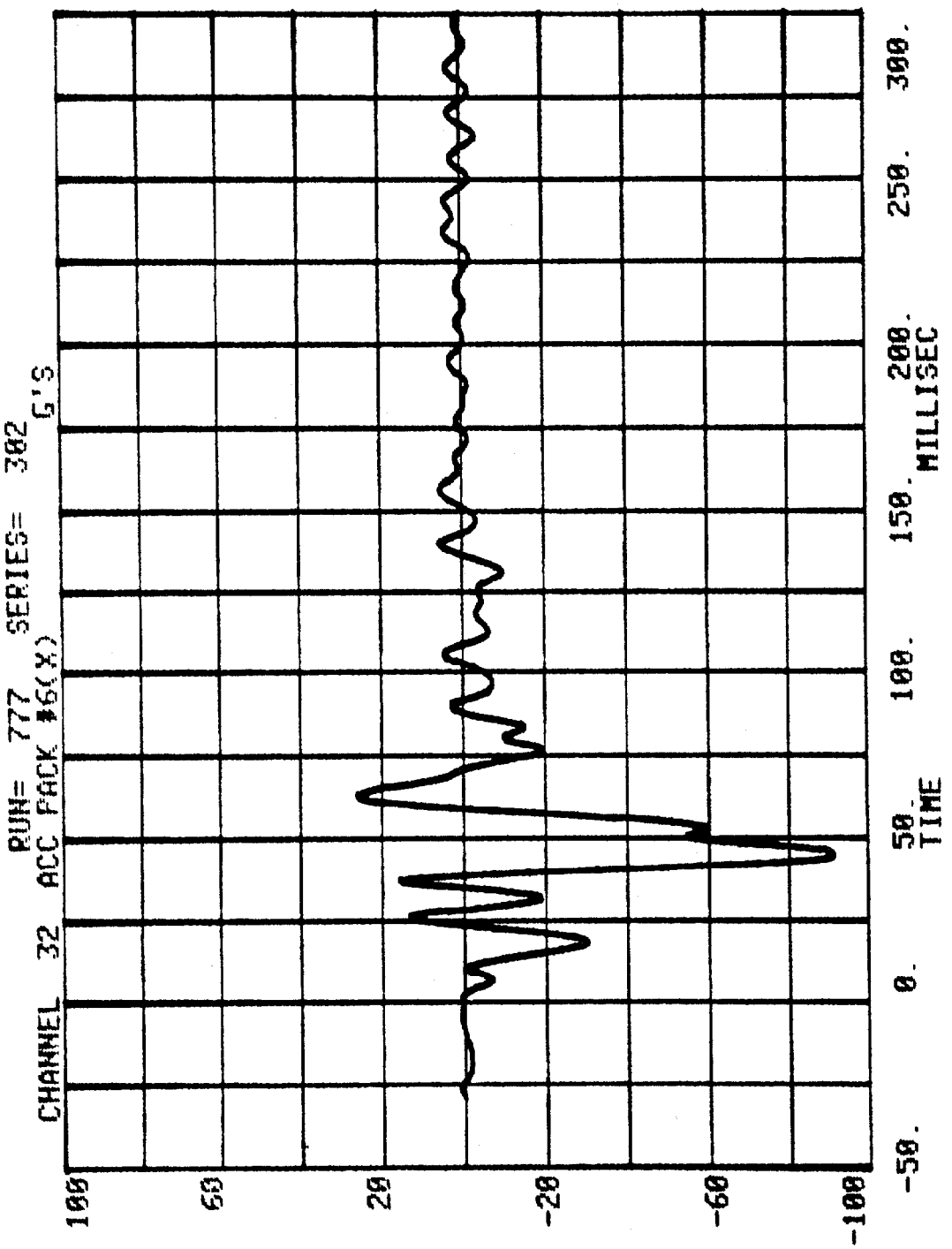

ACC #3(X)
CHANNEL 6 DISPLACEMENT
RUN= 777 SERIES= 302 INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

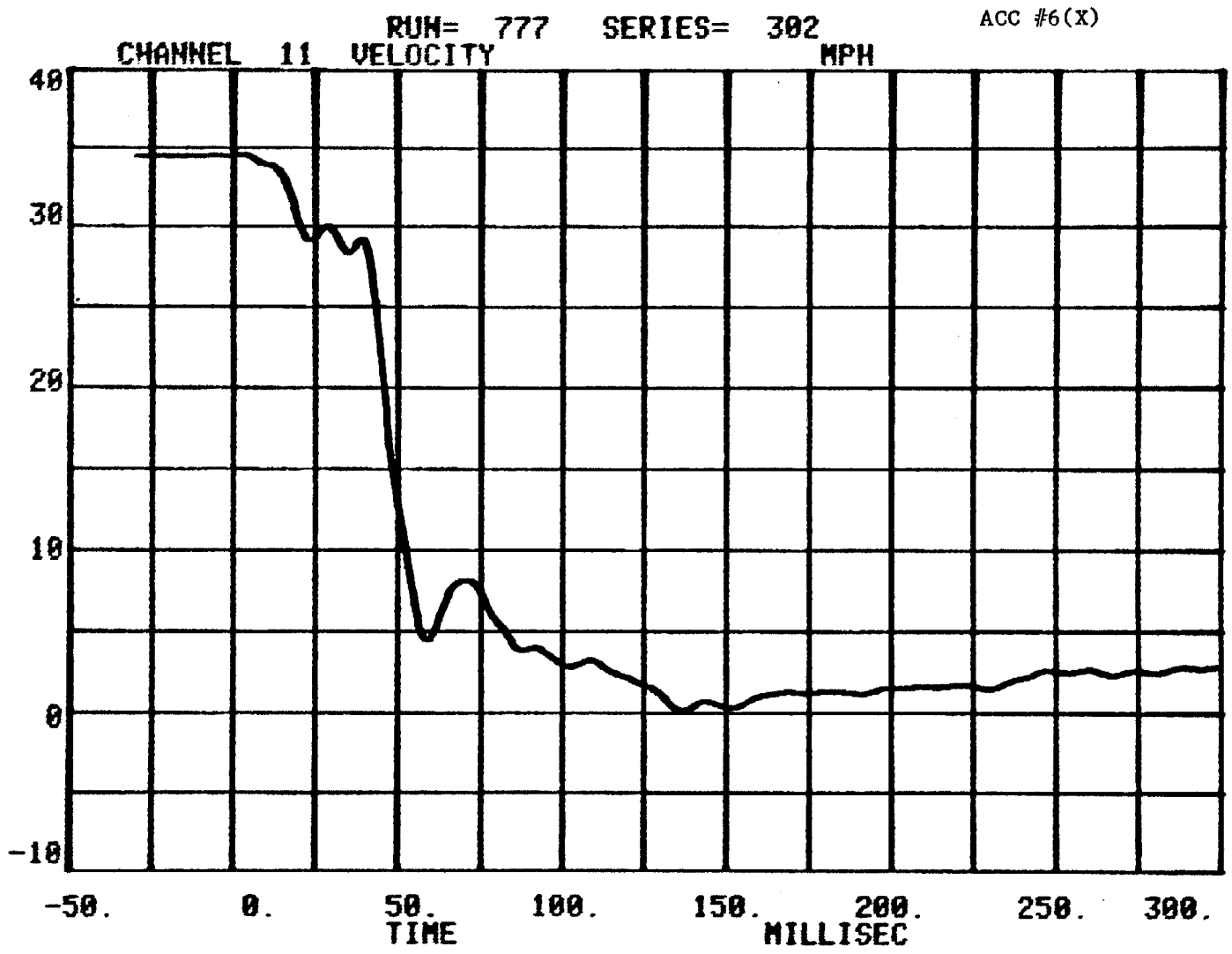

CHANNEL 30 ACC PACK #4(X)
RUN= 777 SERIES= 302
G'S
60
20
-20
-60
-100
-140
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

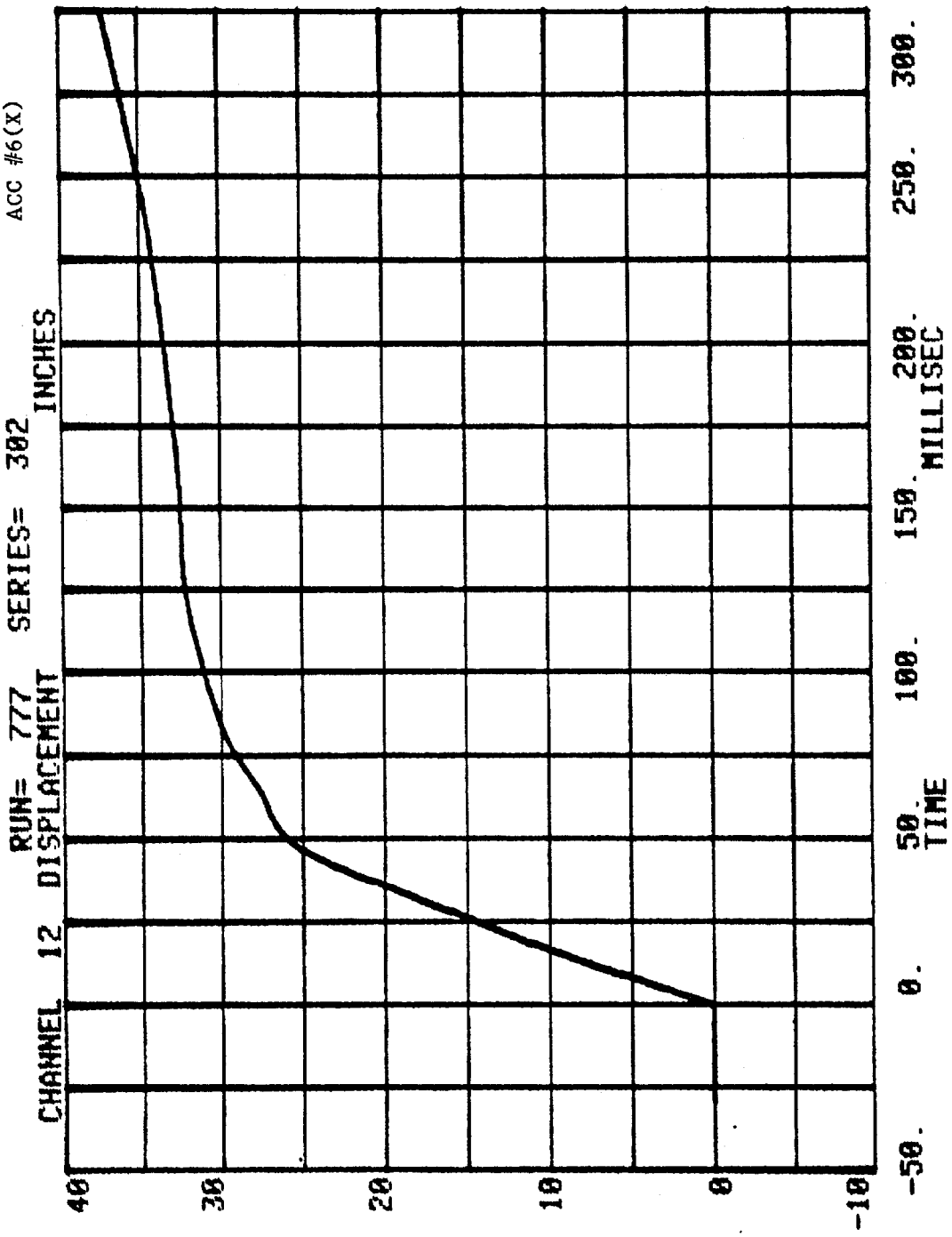

ACC #4(X)
CHANNEL 7 VELOCITY
RUN= 777 SERIES= 302 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

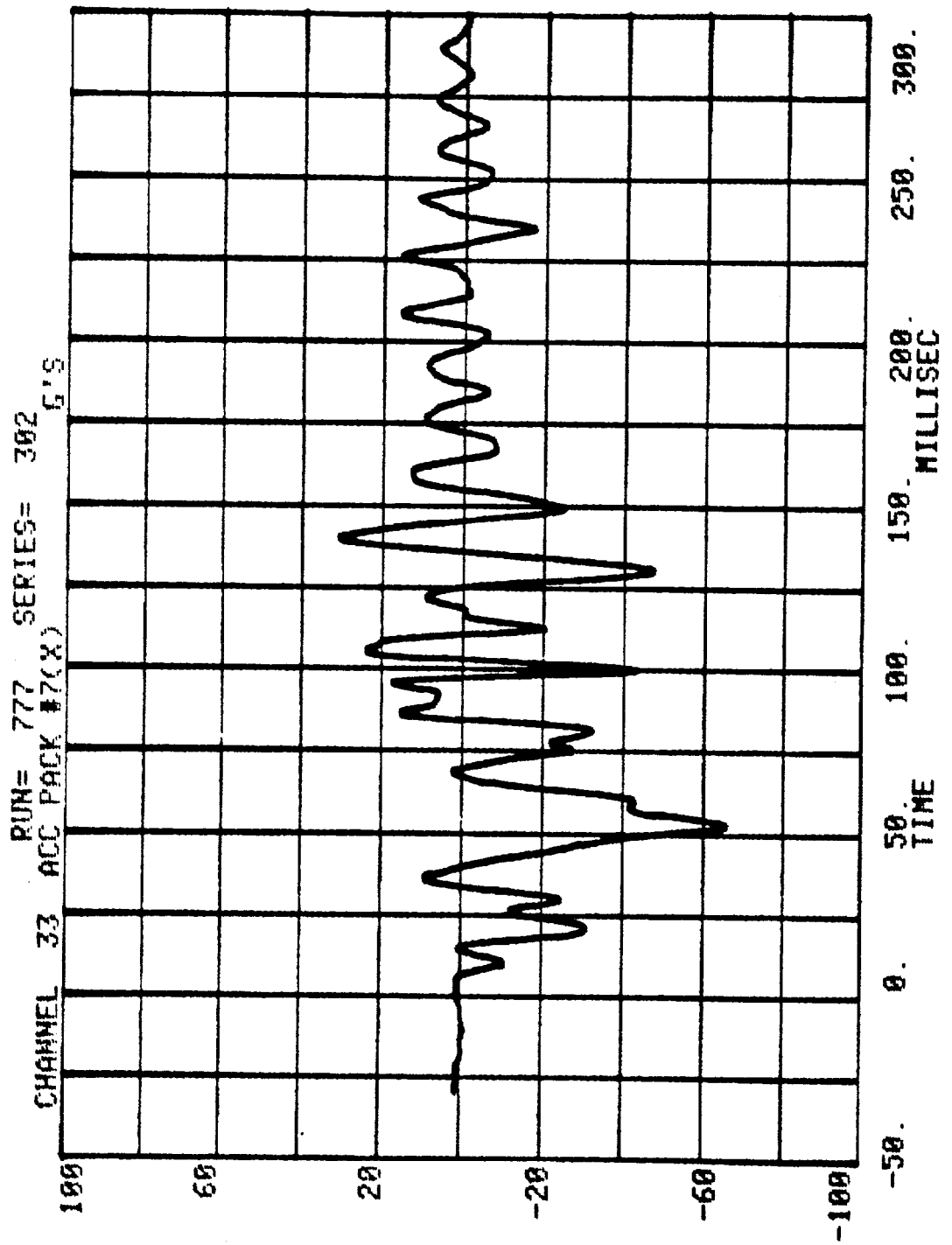

ACC #4(X)
CHANNEL 8 DISPLACEMENT
RUN= 777 SERIES= 302
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 31 ACC PACK #5(X)
G'S
400
240
80
-80
-240
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

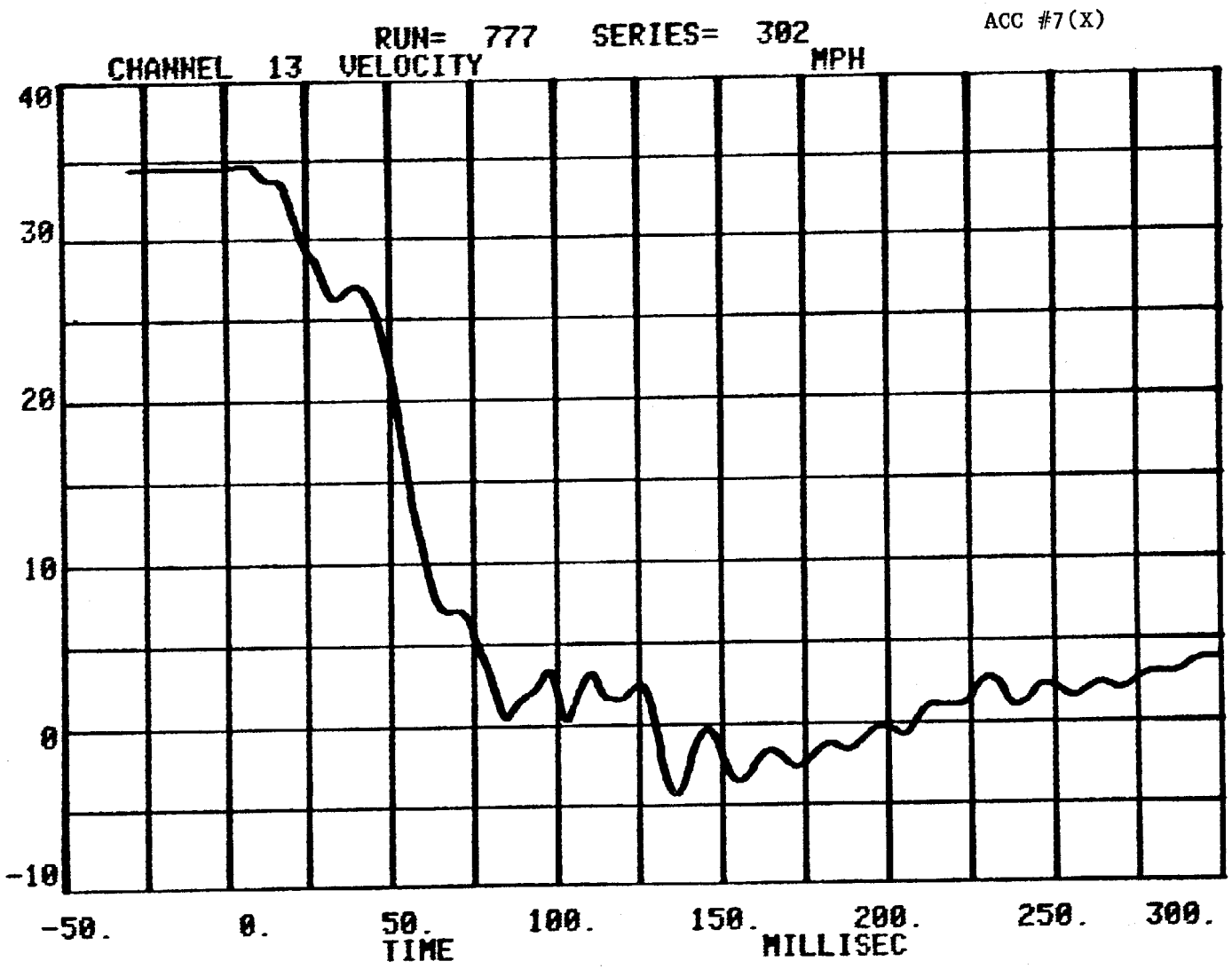

CHANNEL 32 ACC PACK #6(X)
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

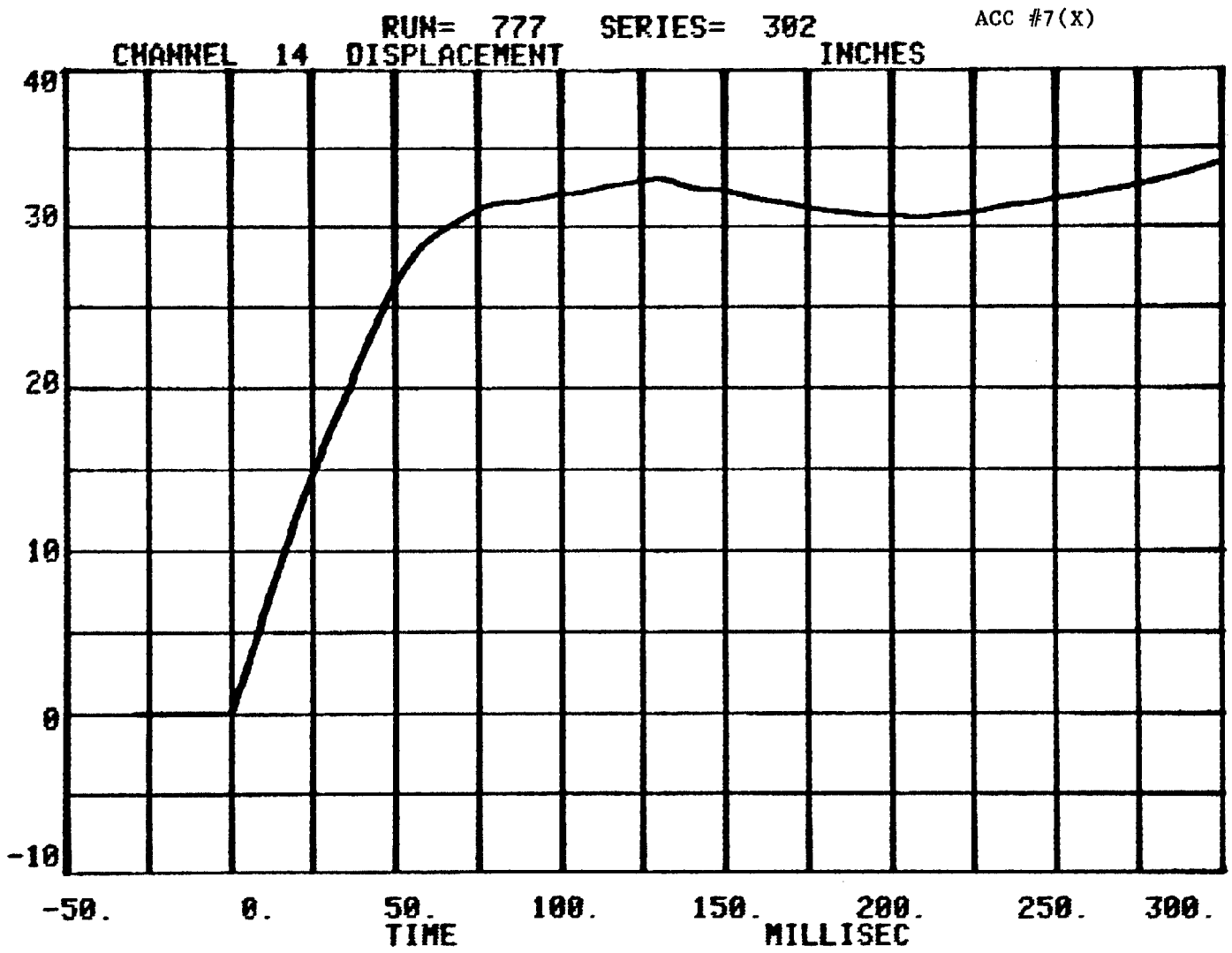

RUN= 777 SERIES= 302
ACC #6(X)
CHANNEL 11 VELOCITY
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACC #6(X)
CHANNEL 12 DISPLACEMENT
RUN= 777 SERIES= 302 INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 33 ACC PACK #7(X)
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-15


RUN= 777 SERIES= 302
ACC #7(X)
CHANNEL 13 VELOCITY
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

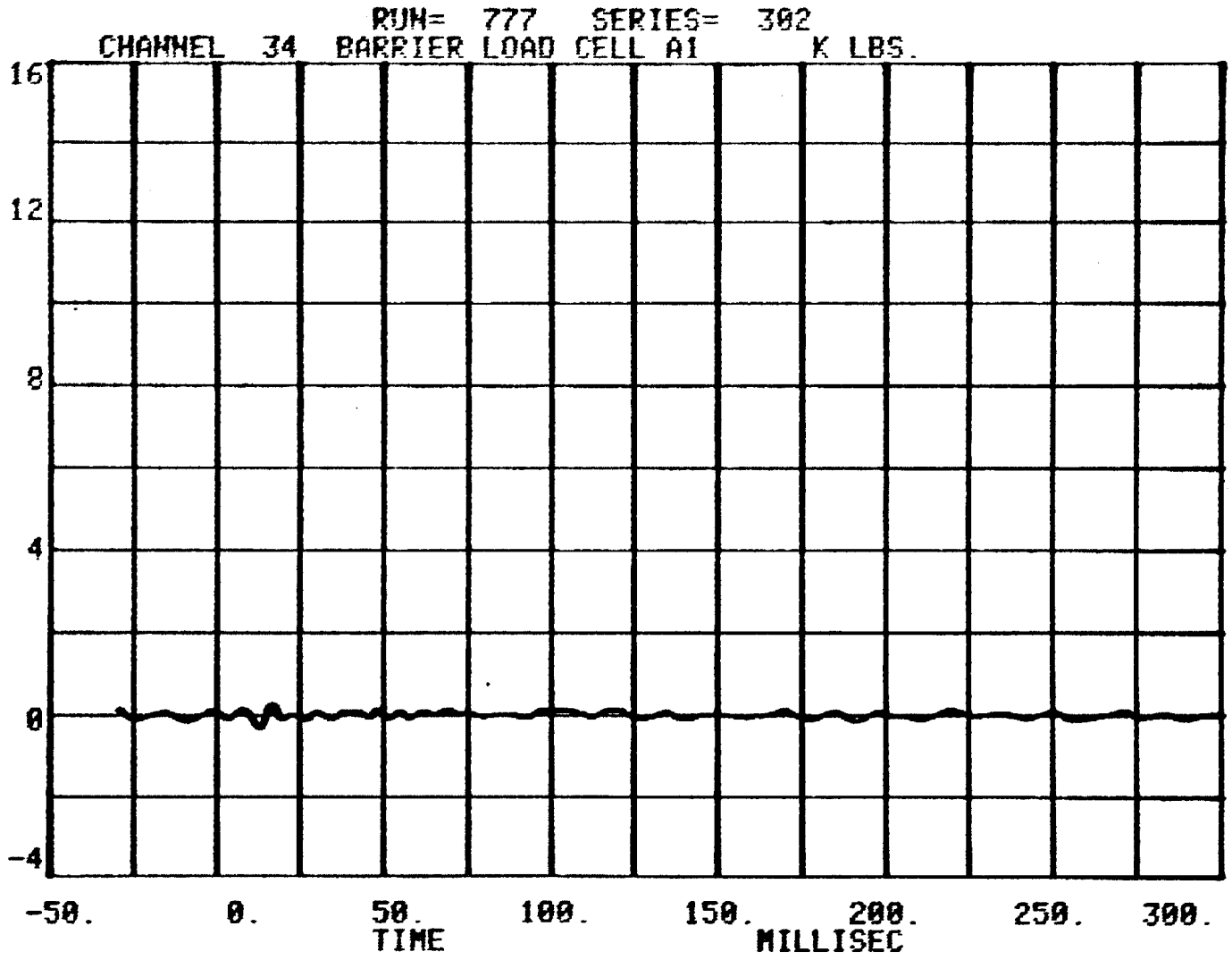

RUN= 777 SERIES= 302
ACC #7(X)
CHANNEL 14 DISPLACEMENT
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

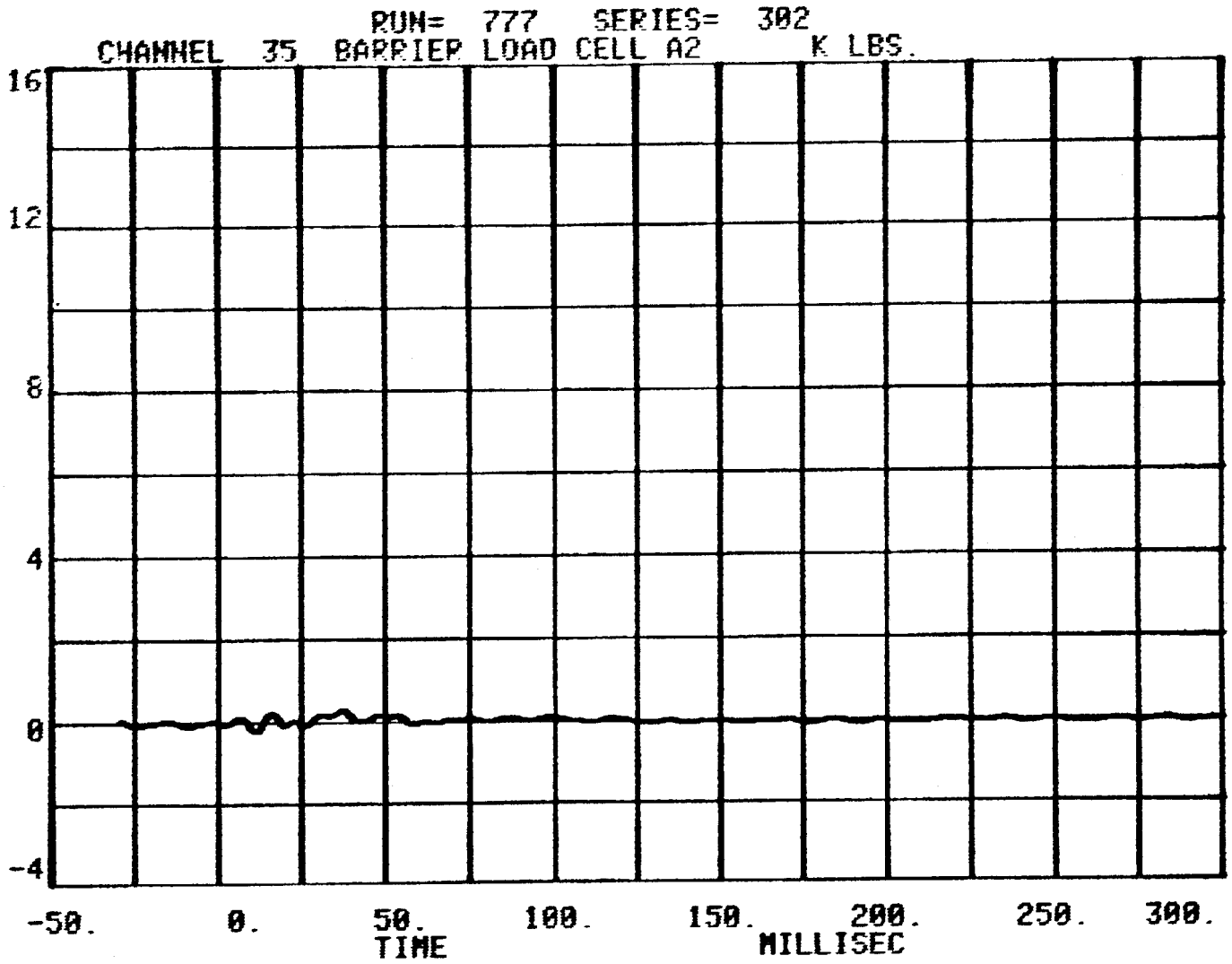
TEST NO. MH0302

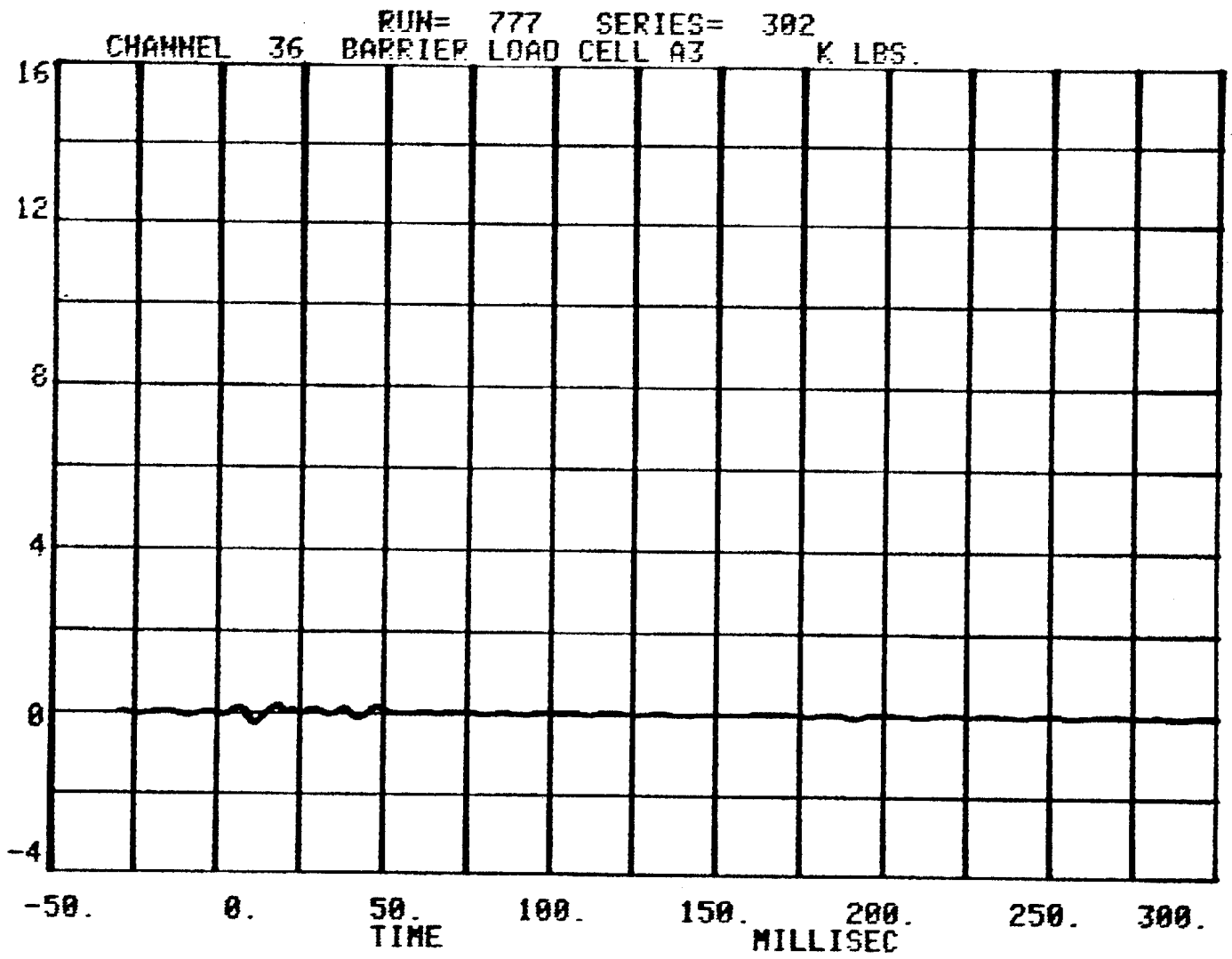
LOAD CELL BARRIER DATA

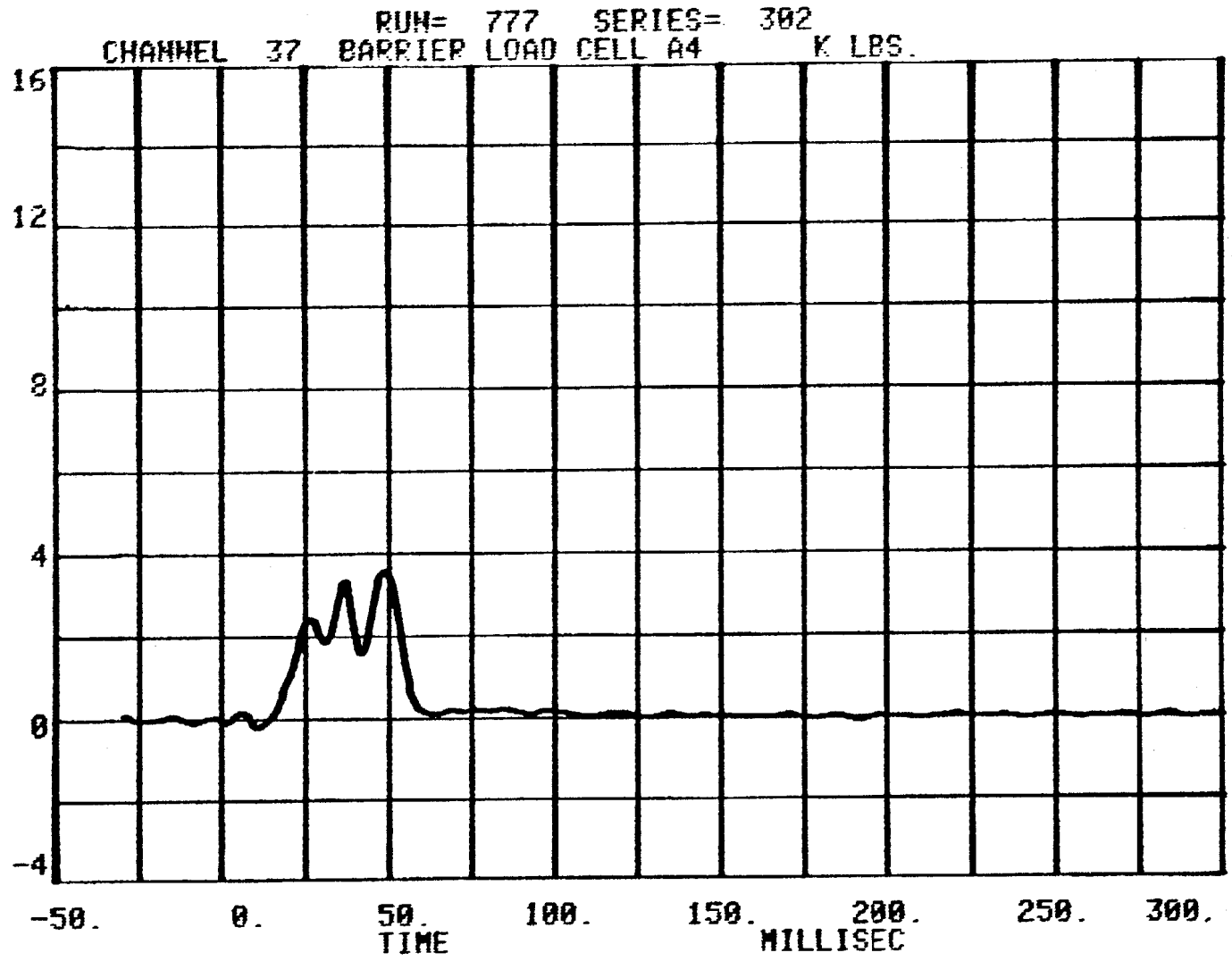
FILTER CHANNEL CLASS

60

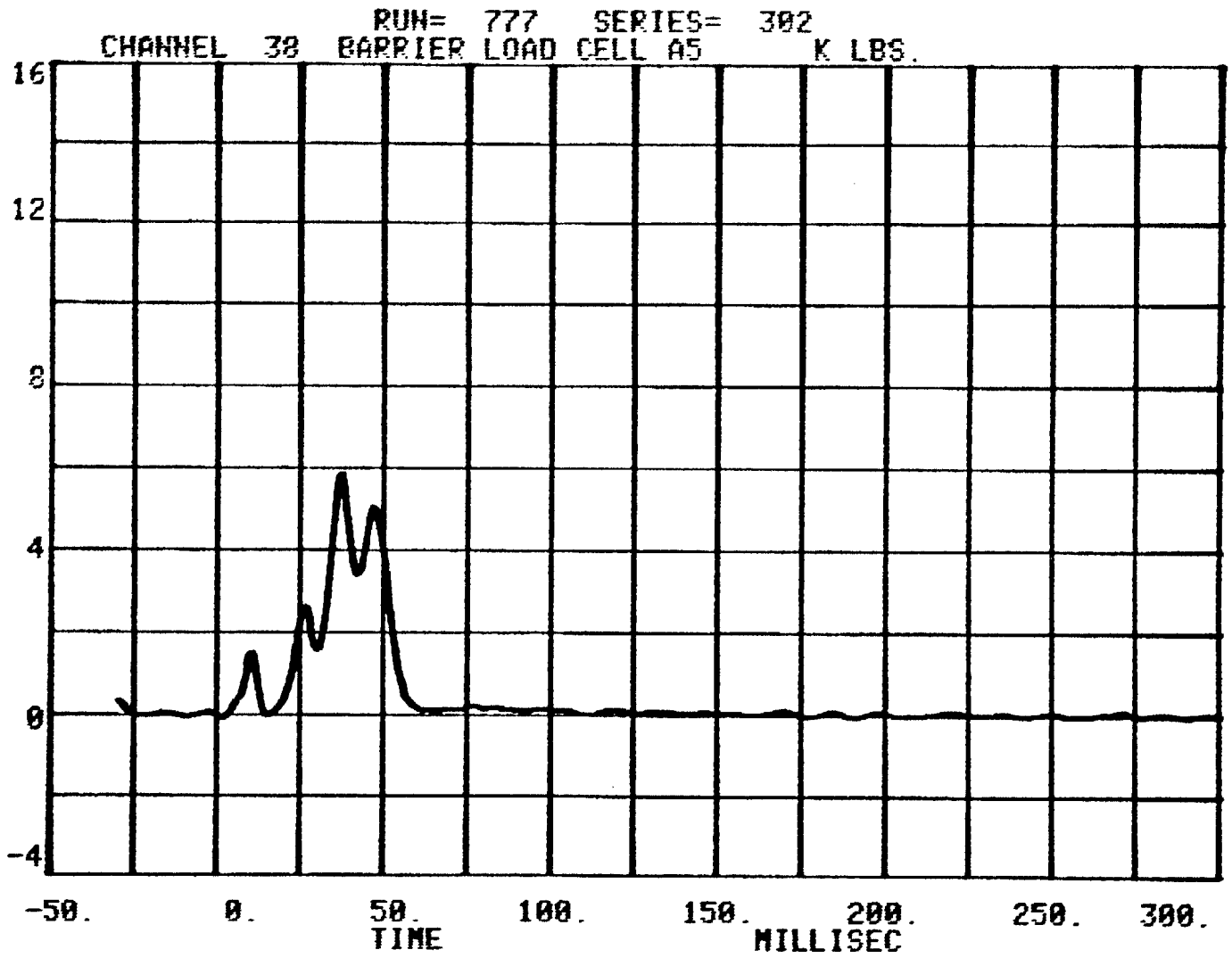

RUN= 777 SERIES= 302
CHANNEL 34 BARRIER LOAD CELL A1 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

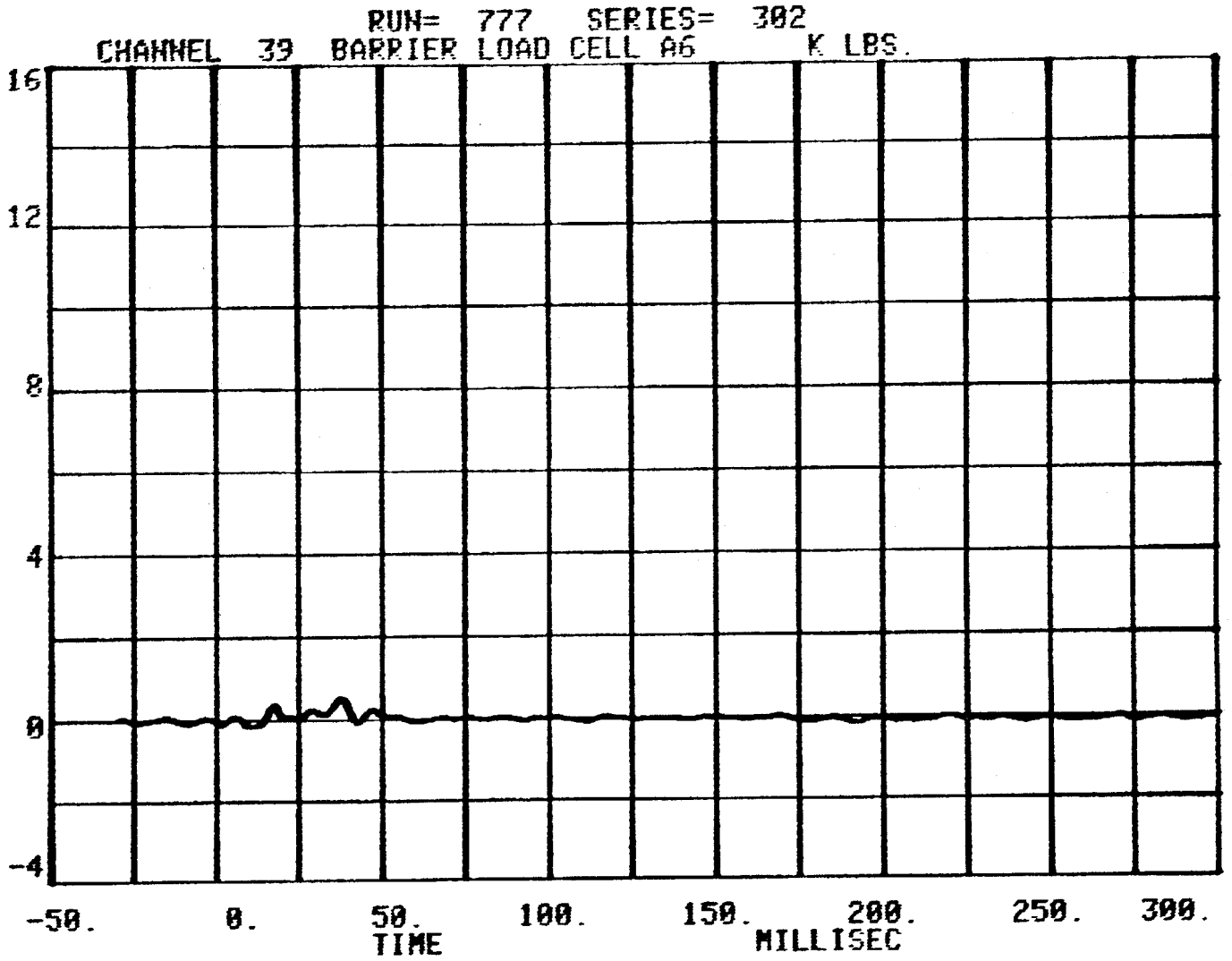

RUN= 777 SERIES= 302
CHANNEL 35 BARRIER LOAD CELL A2
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

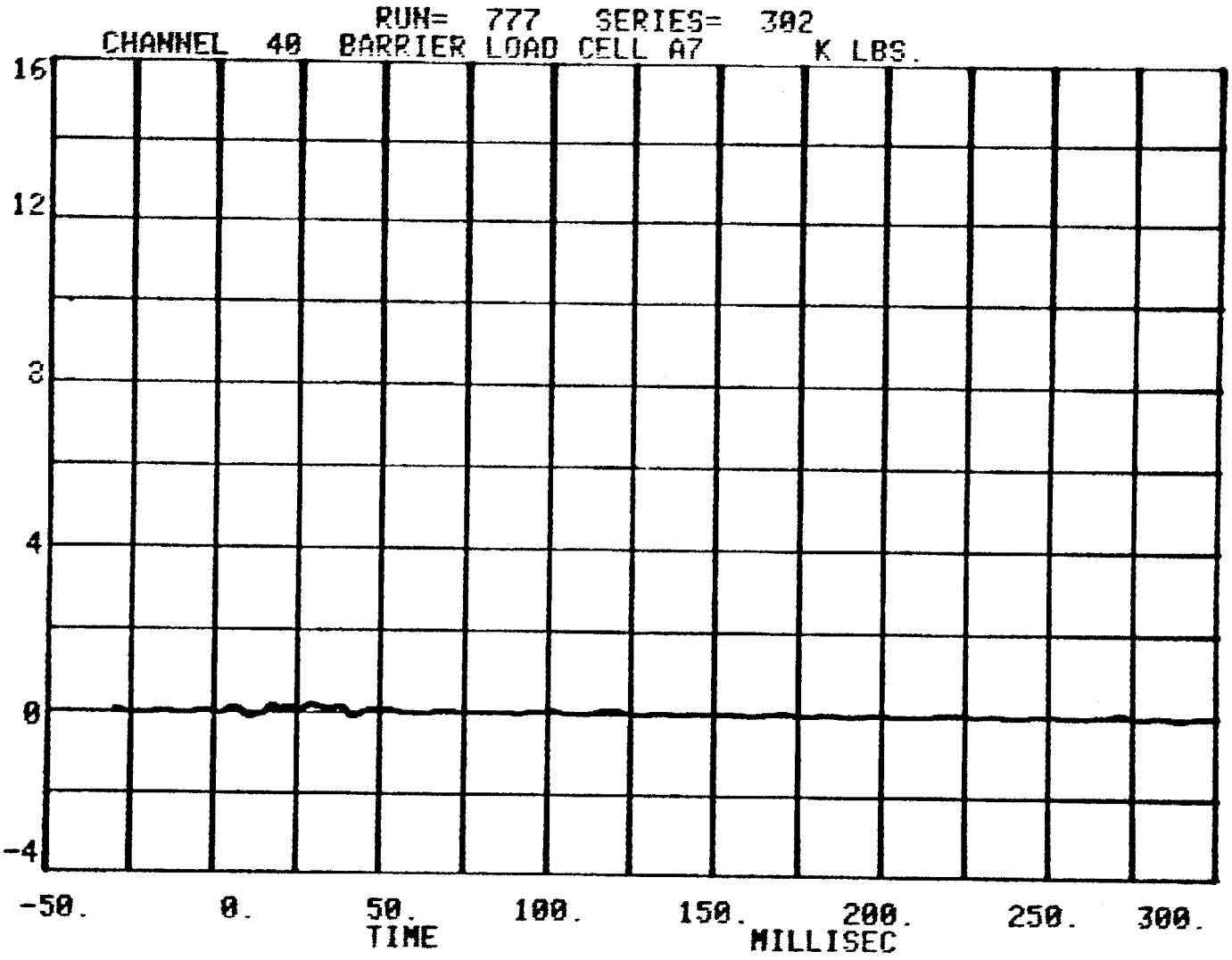

RUN= 777 SERIES= 302
CHANNEL 36 BARRIER LOAD CELL A3
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

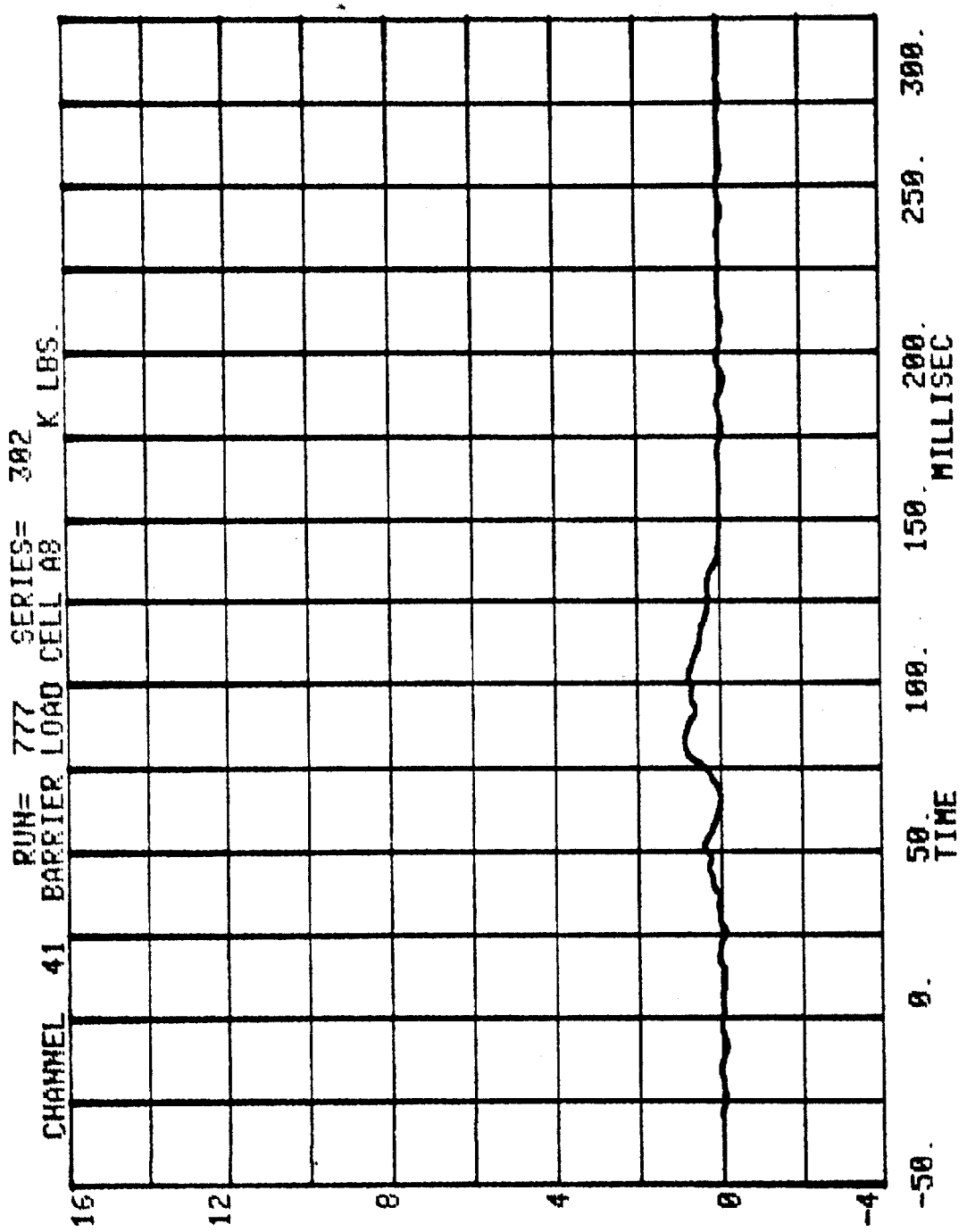

RUN= 777 SERIES= 302
CHANNEL 37 BARRIER LOAD CELL A4
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

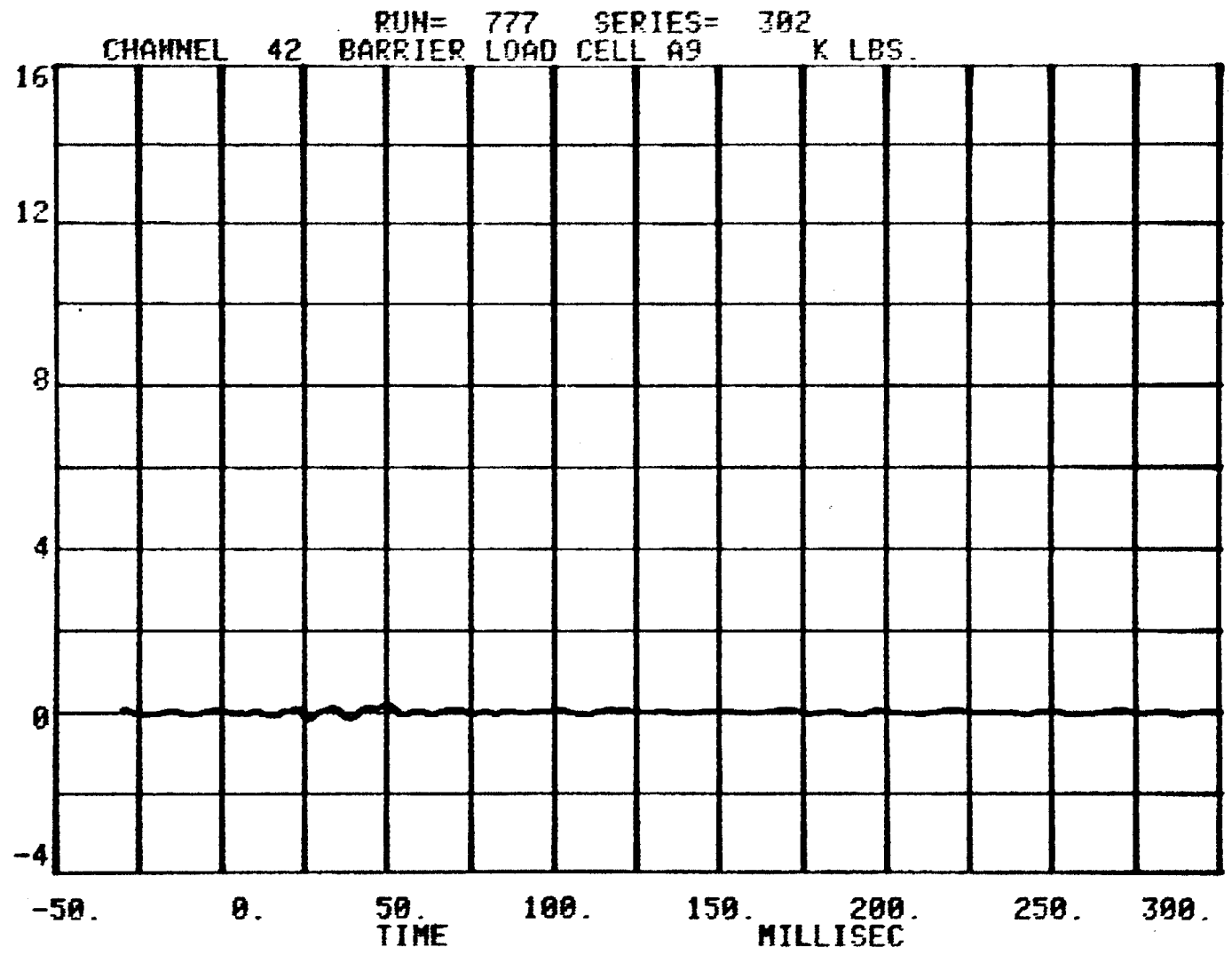
7556-15

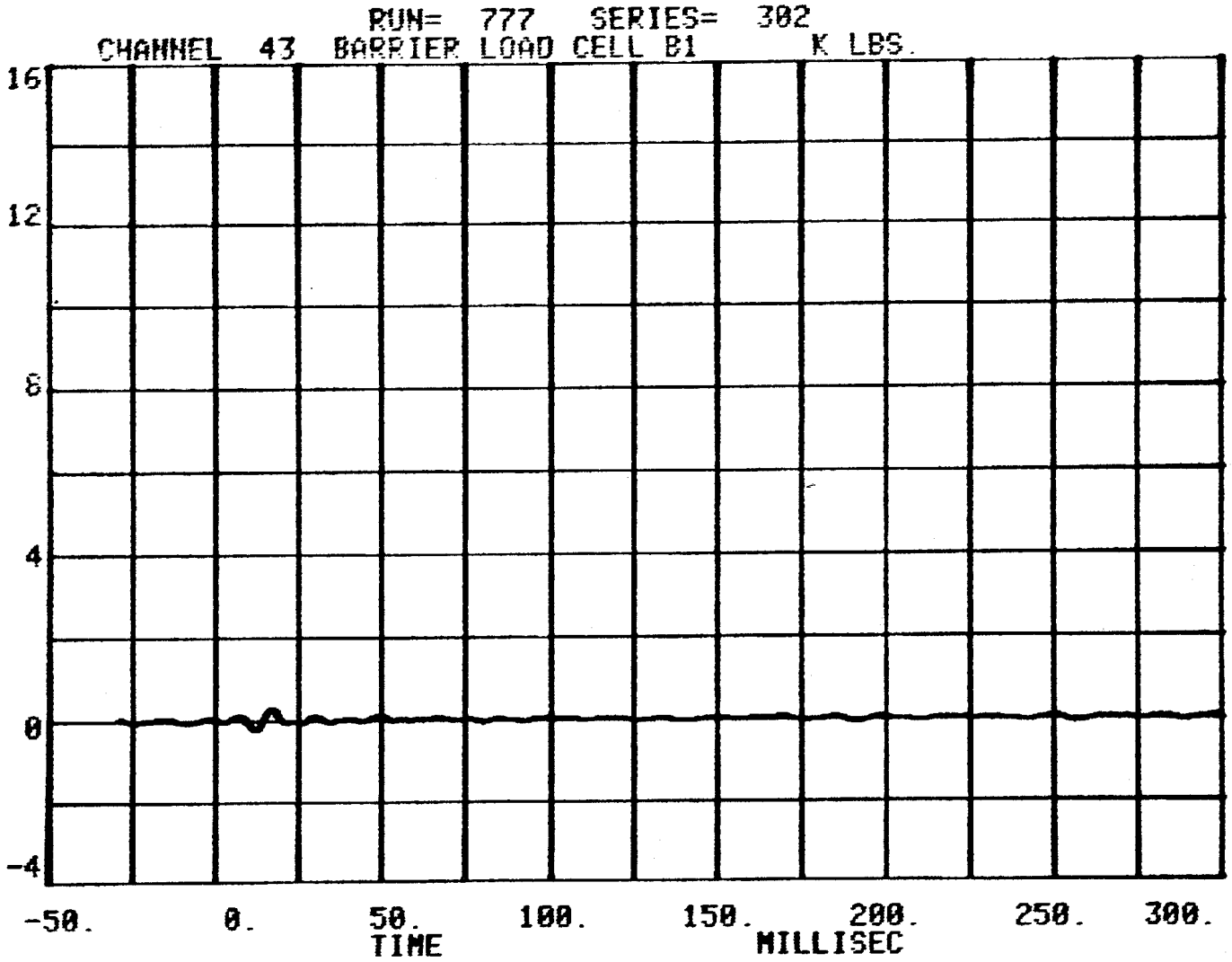

RUN= 777 SERIES= 302
CHANNEL 38 BARRIER LOAD CELL A5
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

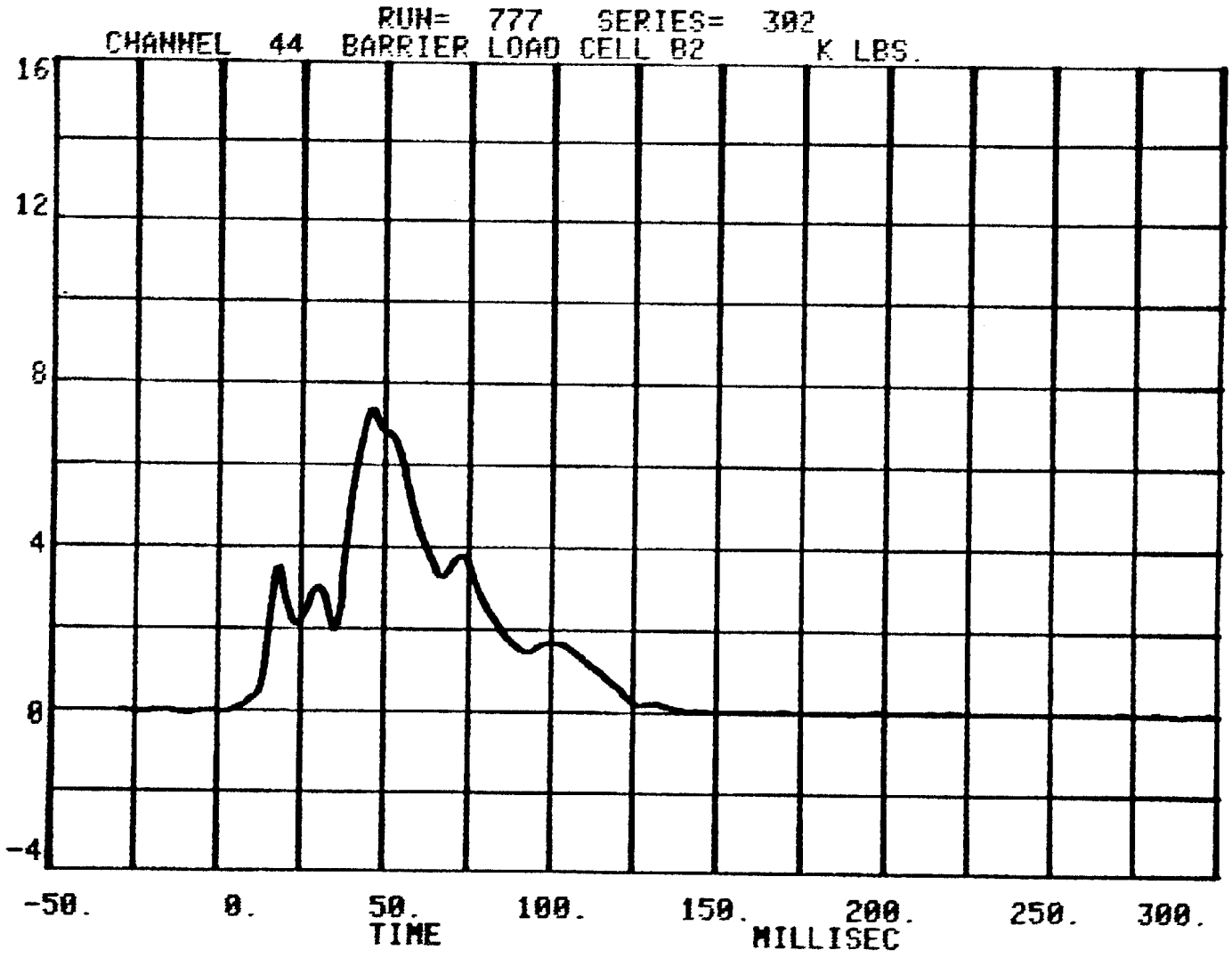

RUN= 777 SERIES= 302
CHANNEL 39 BARRIER LOAD CELL A6
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

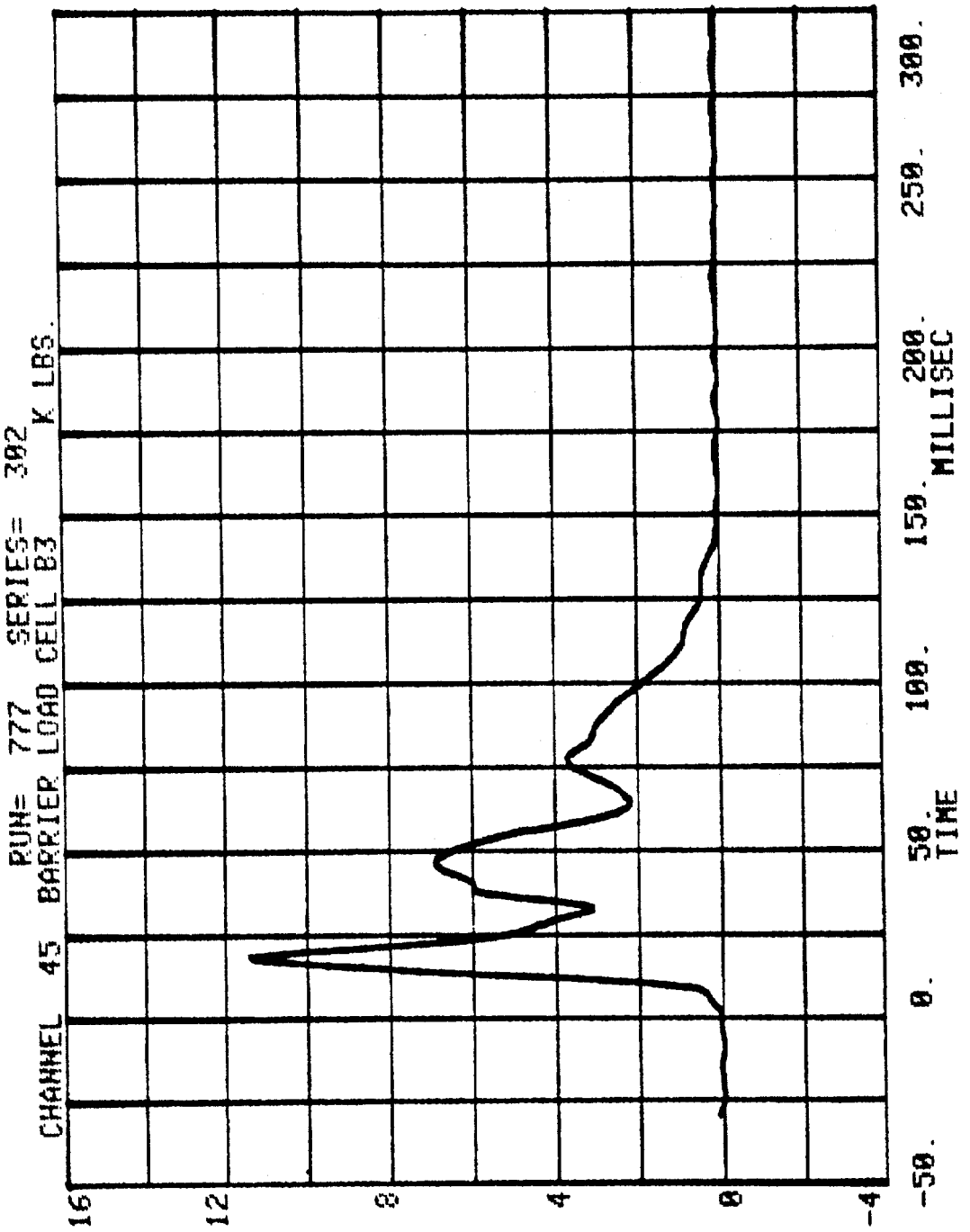

RUN= 777 SERIES= 302
CHANNEL 40 BARRIER LOAD CELL A7
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

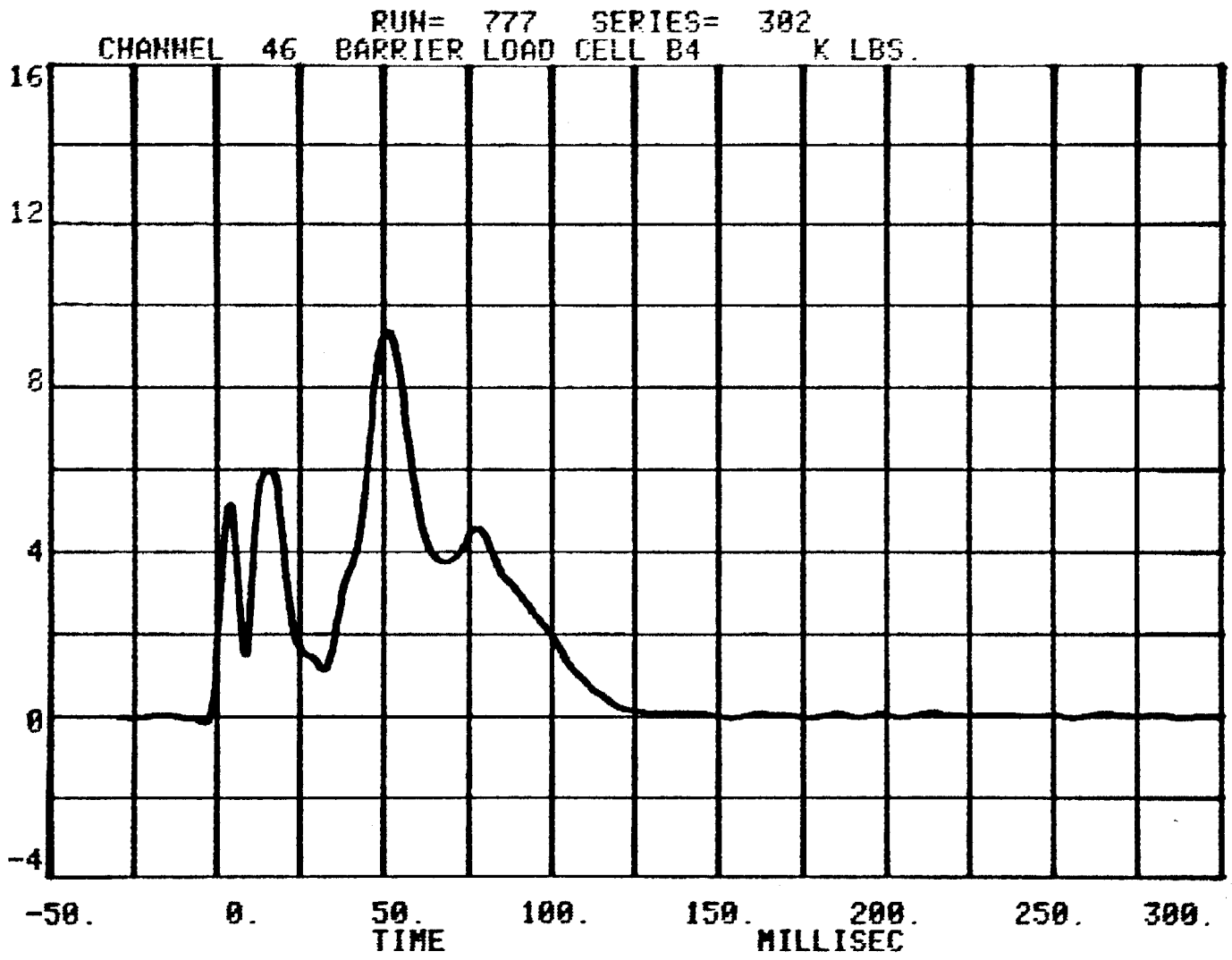

CHANNEL 41
RUN= 777
BARRIER LOAD
SERIES= 302
CELL A8
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

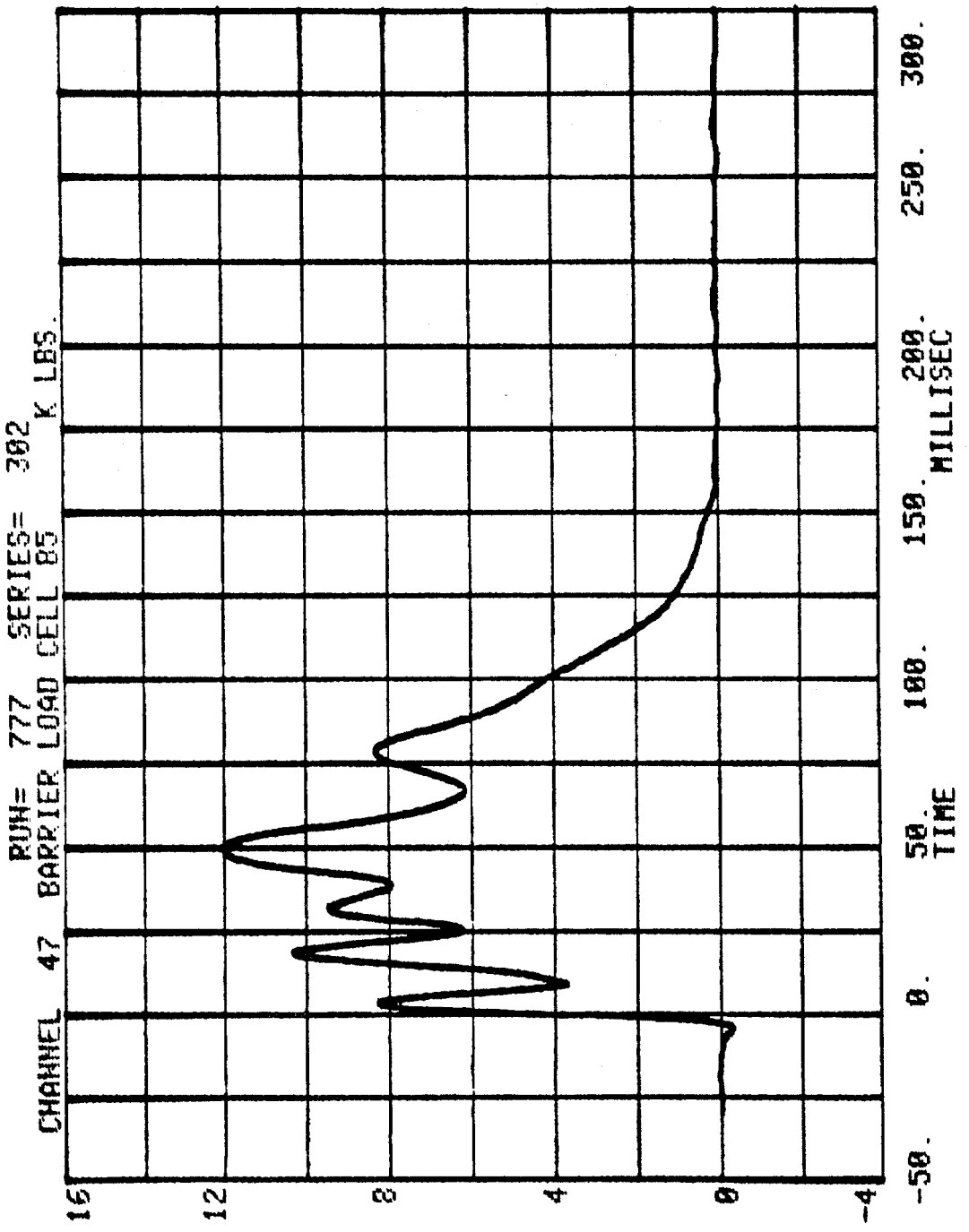

RUN= 777 SERIES= 302
CHANNEL 42 BARRIER LOAD CELL A9 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

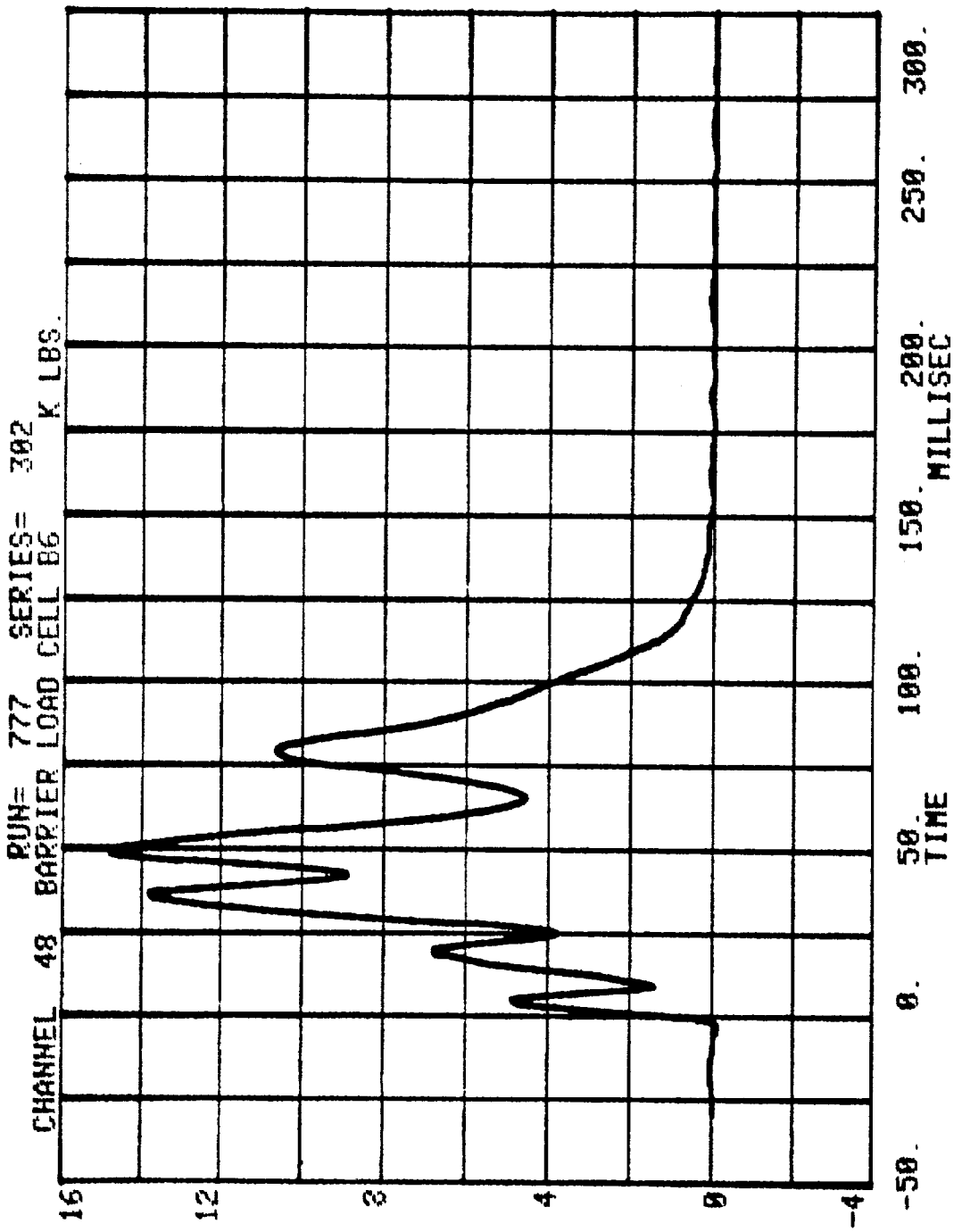

RUN= 777 SERIES= 302
CHANNEL 43 BARRIER LOAD CELL B1
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

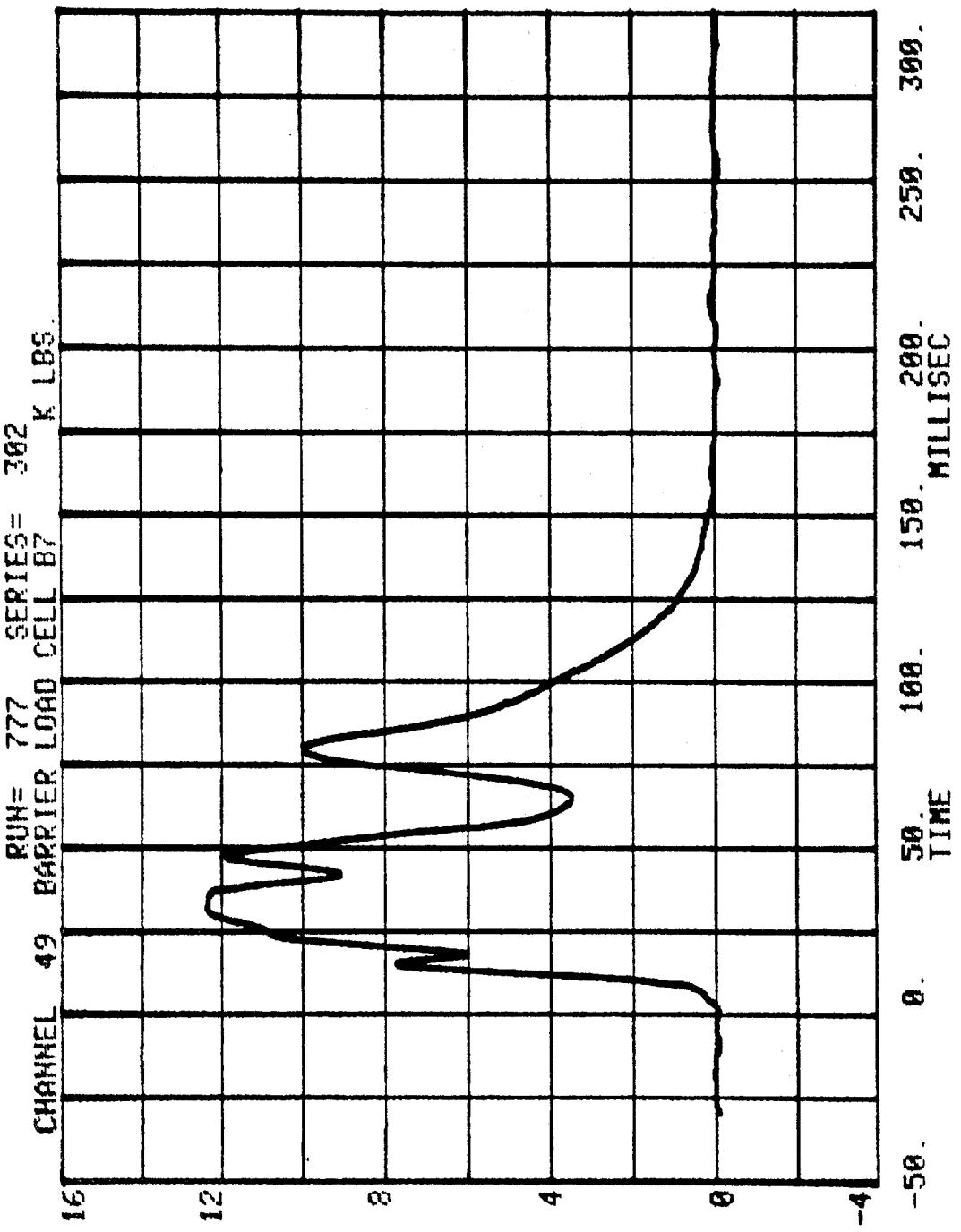

RUN= 777 SERIES= 302
CHANNEL 44 BARRIER LOAD CELL B2
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

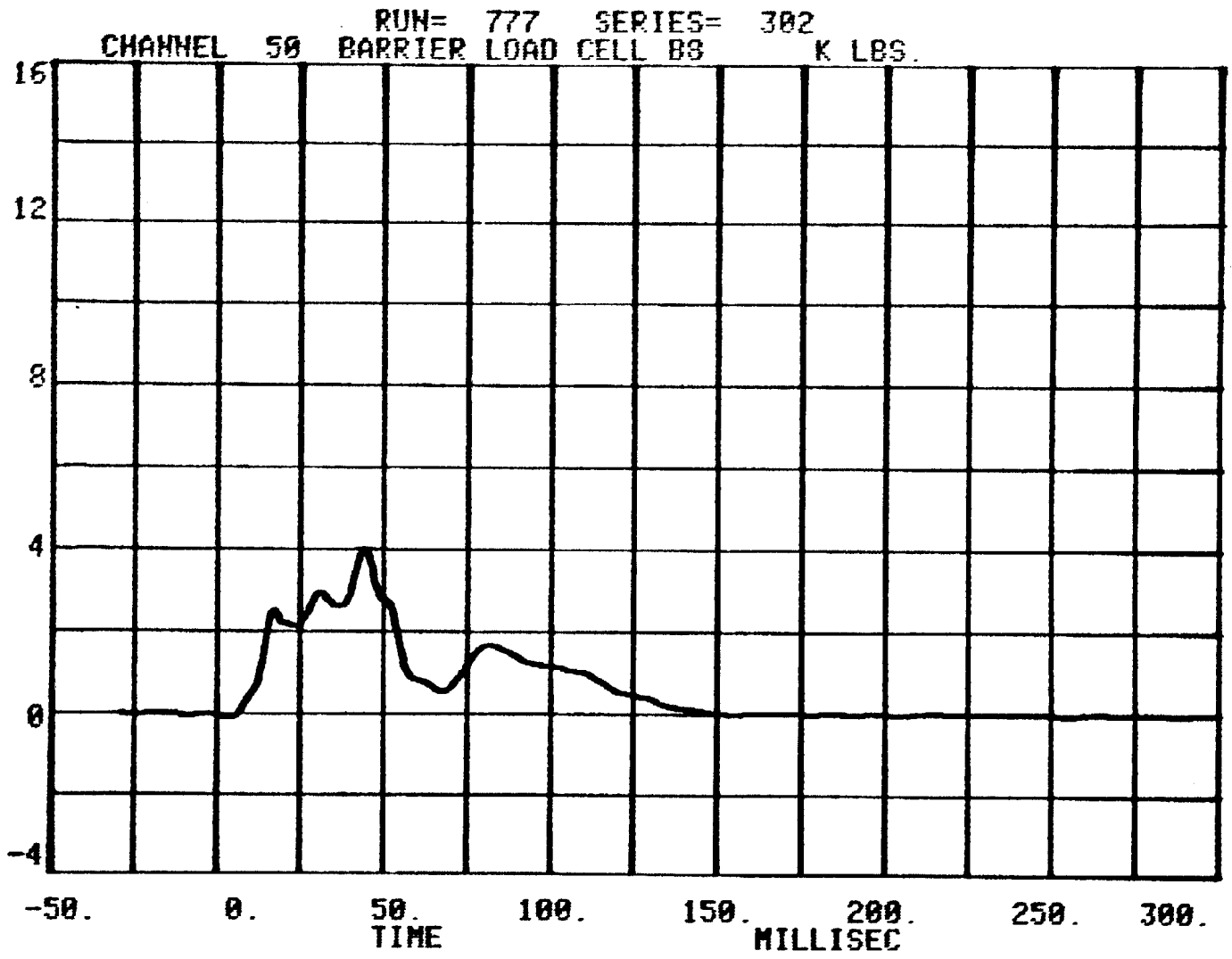

CHANNEL 45 BARRIER LOAD CELL B3
RUN= 777 SERIES= 302
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

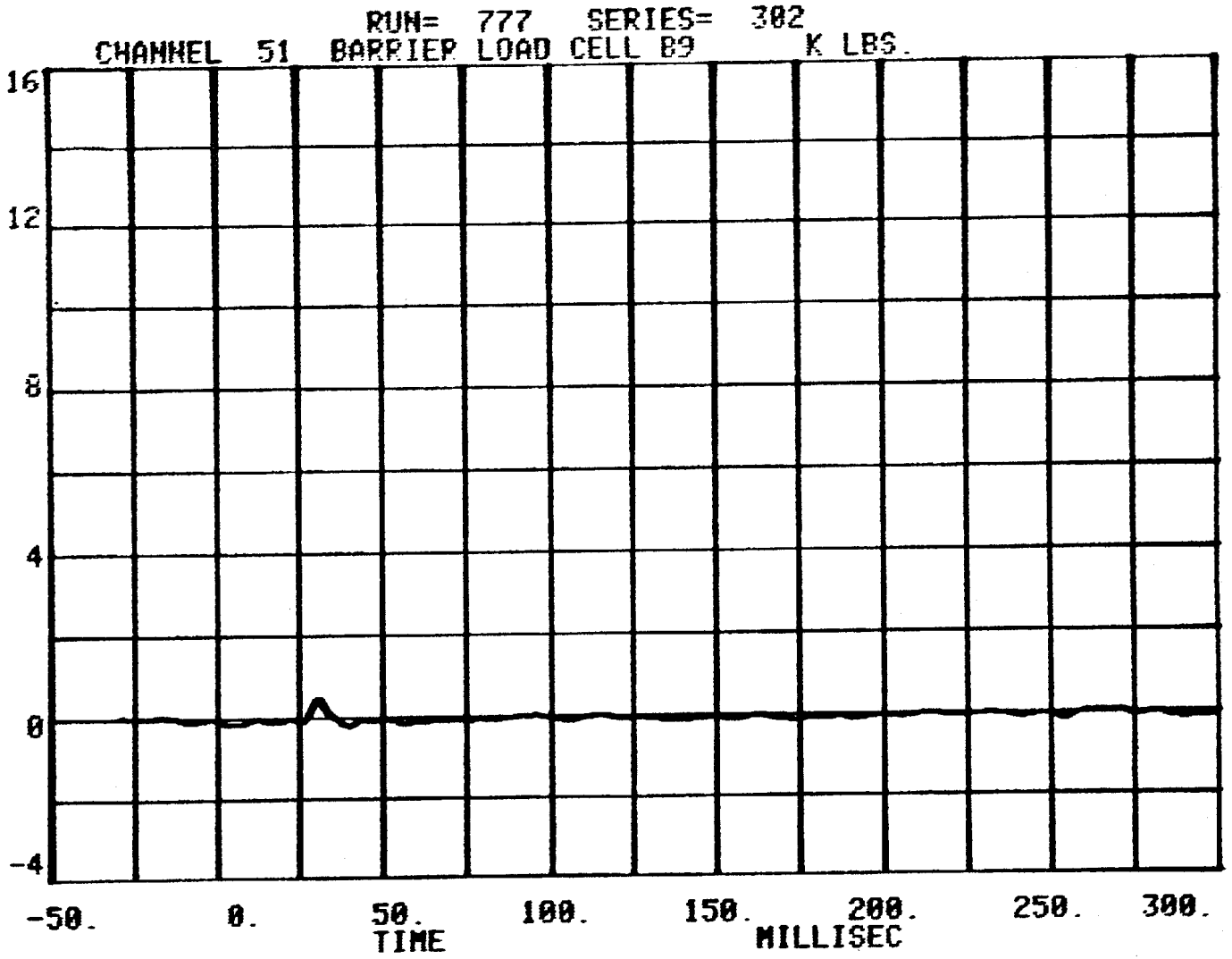

RUN= 777 SERIES= 302
CHANNEL 46 BARRIER LOAD CELL B4 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

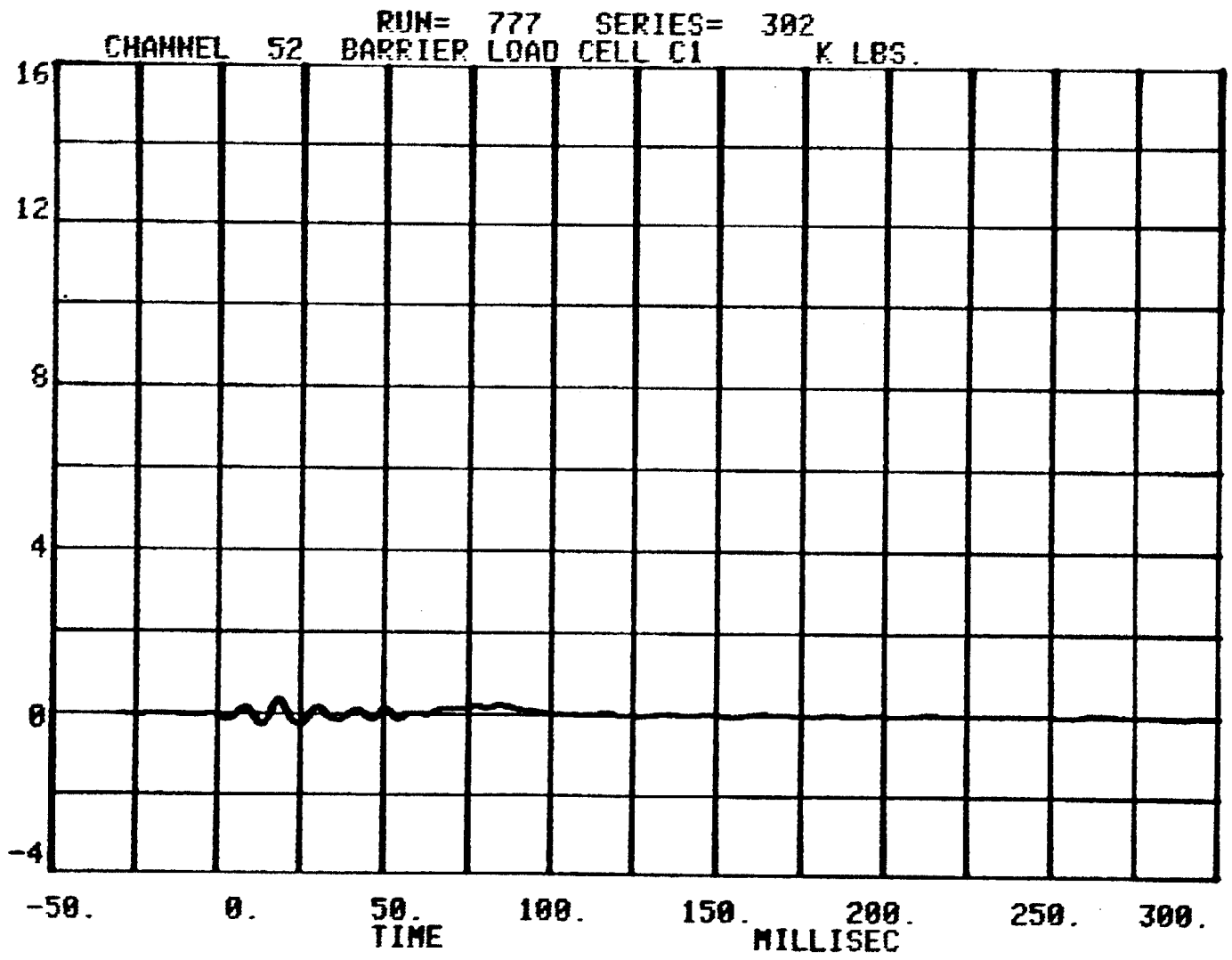

CHANNEL 47
RUN= 777
BARRIER LOAD CELL 85
SERIES= 302
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

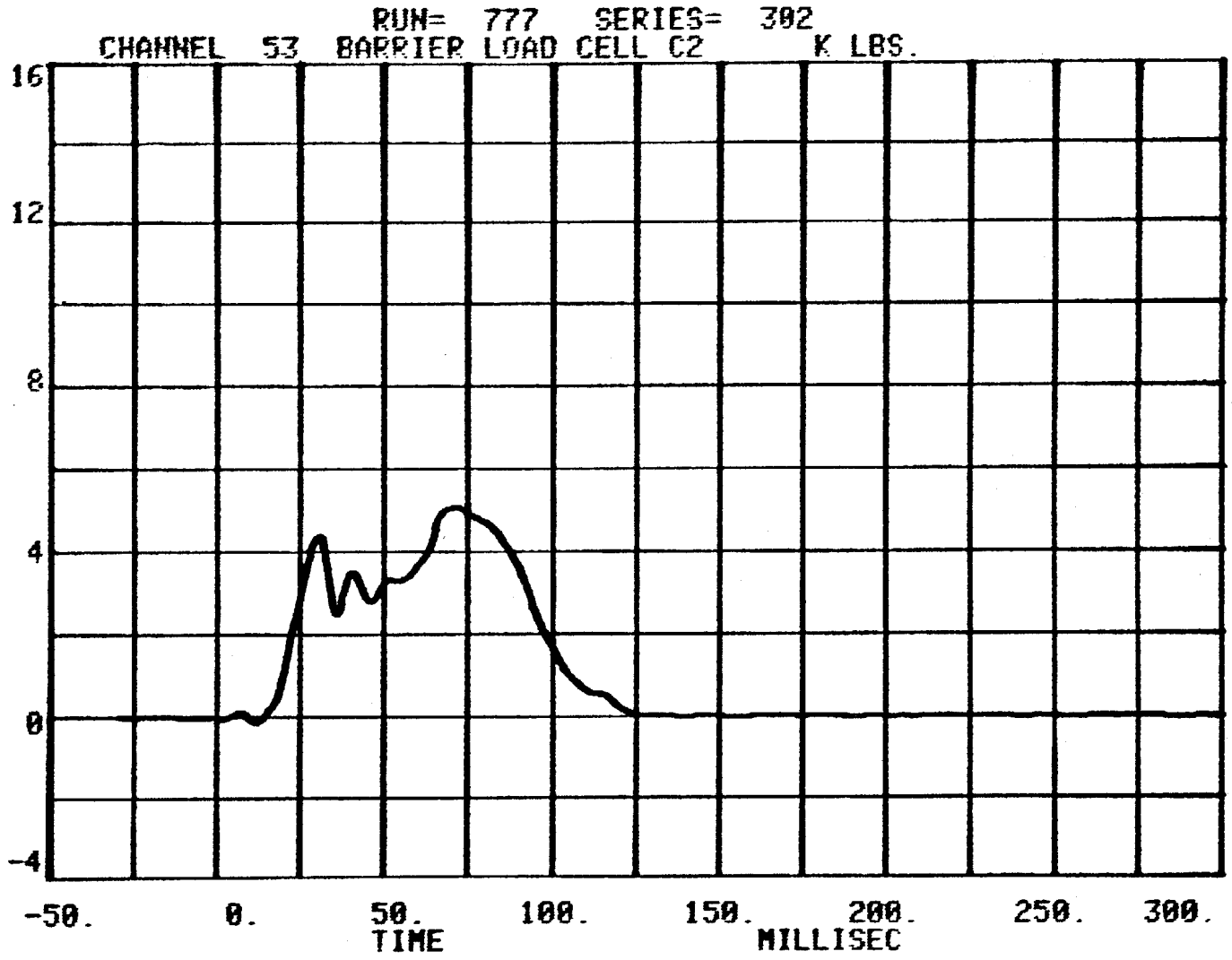

CHANNEL 48
RUN= 777
BARRIER LOAD CELL 86
SERIES= 302
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

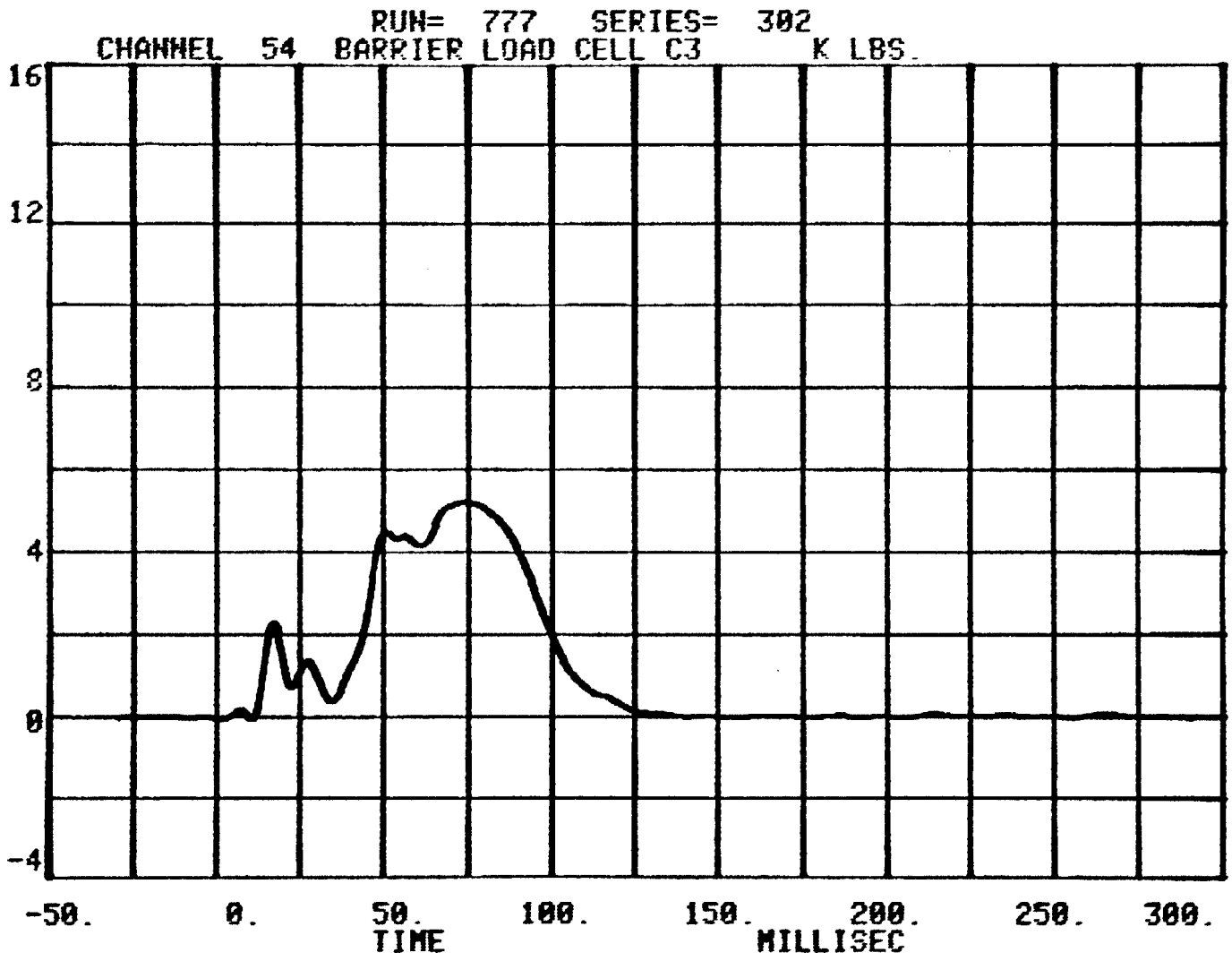

CHANNEL 49
RUN= 777
BARRIER LOAD CELL B7
SERIES= 302
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 50 BARRIER LOAD CELL B8 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

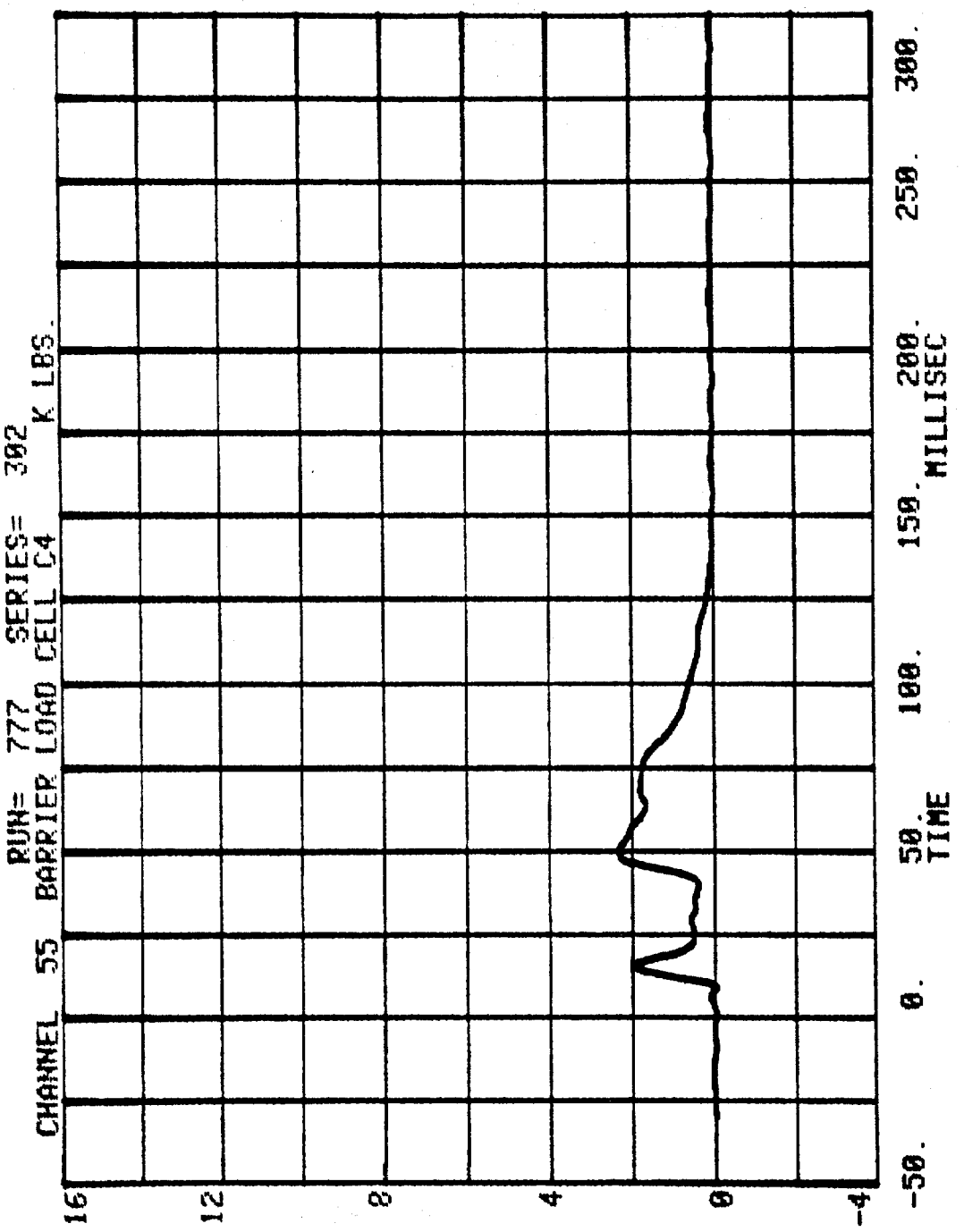

RUN= 777 SERIES= 302
CHANNEL 51 BARRIER LOAD CELL B9
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

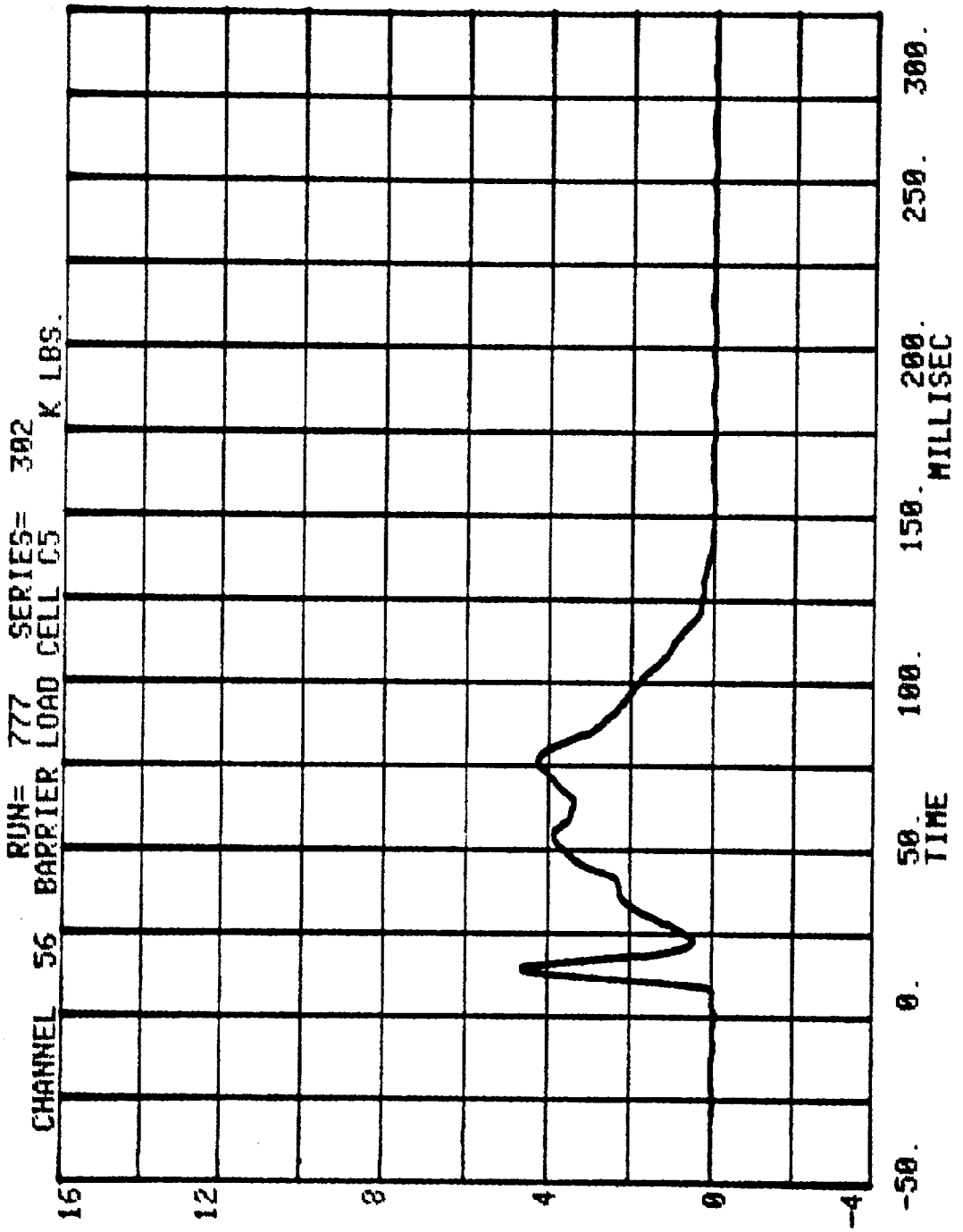

RUN= 777 SERIES= 302
CHANNEL 52 BARRIER LOAD CELL C1 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 53 BARRIER LOAD CELL C2 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

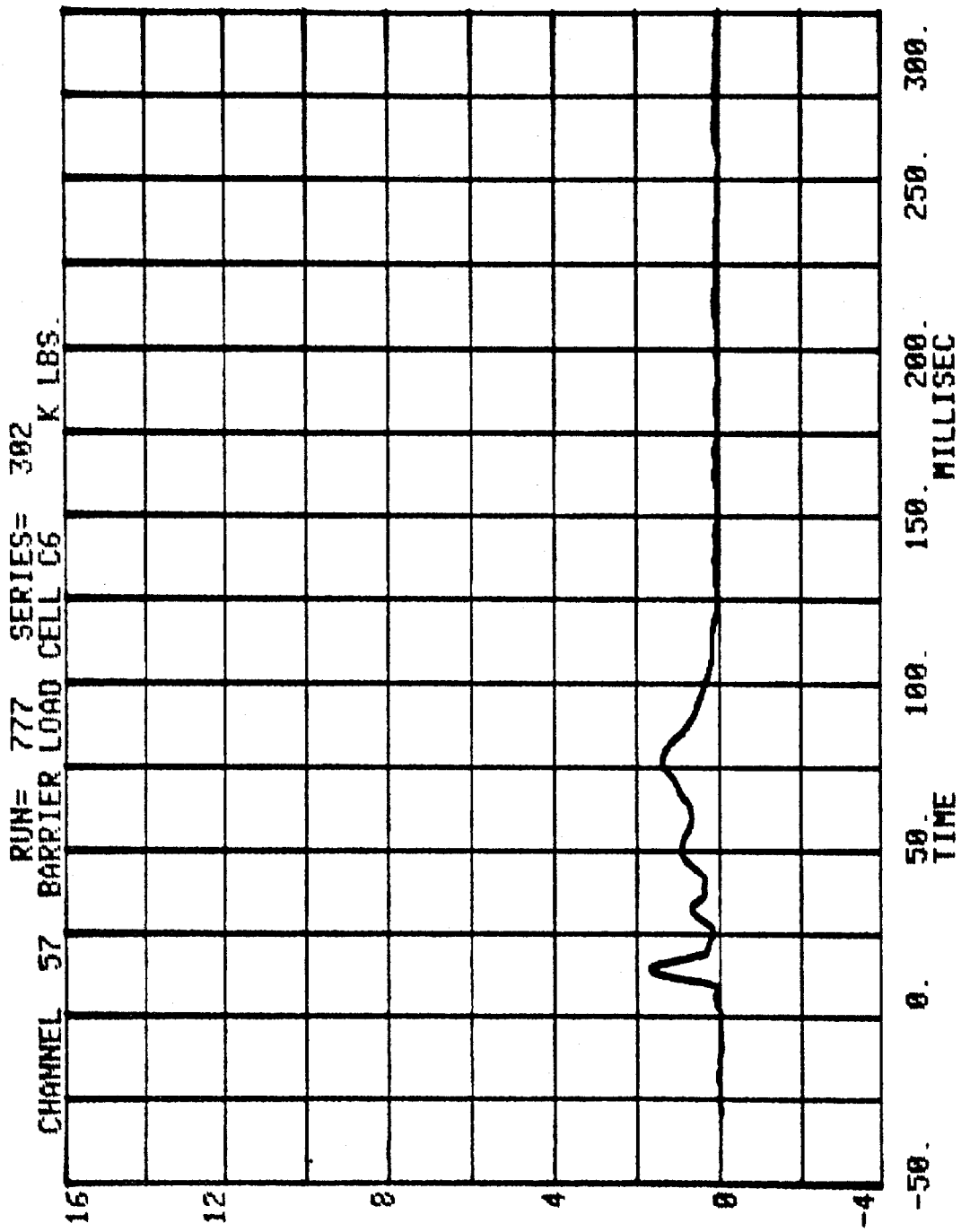

RUN= 777 SERIES= 302
CHANNEL 54 BARRIER LOAD CELL C3 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

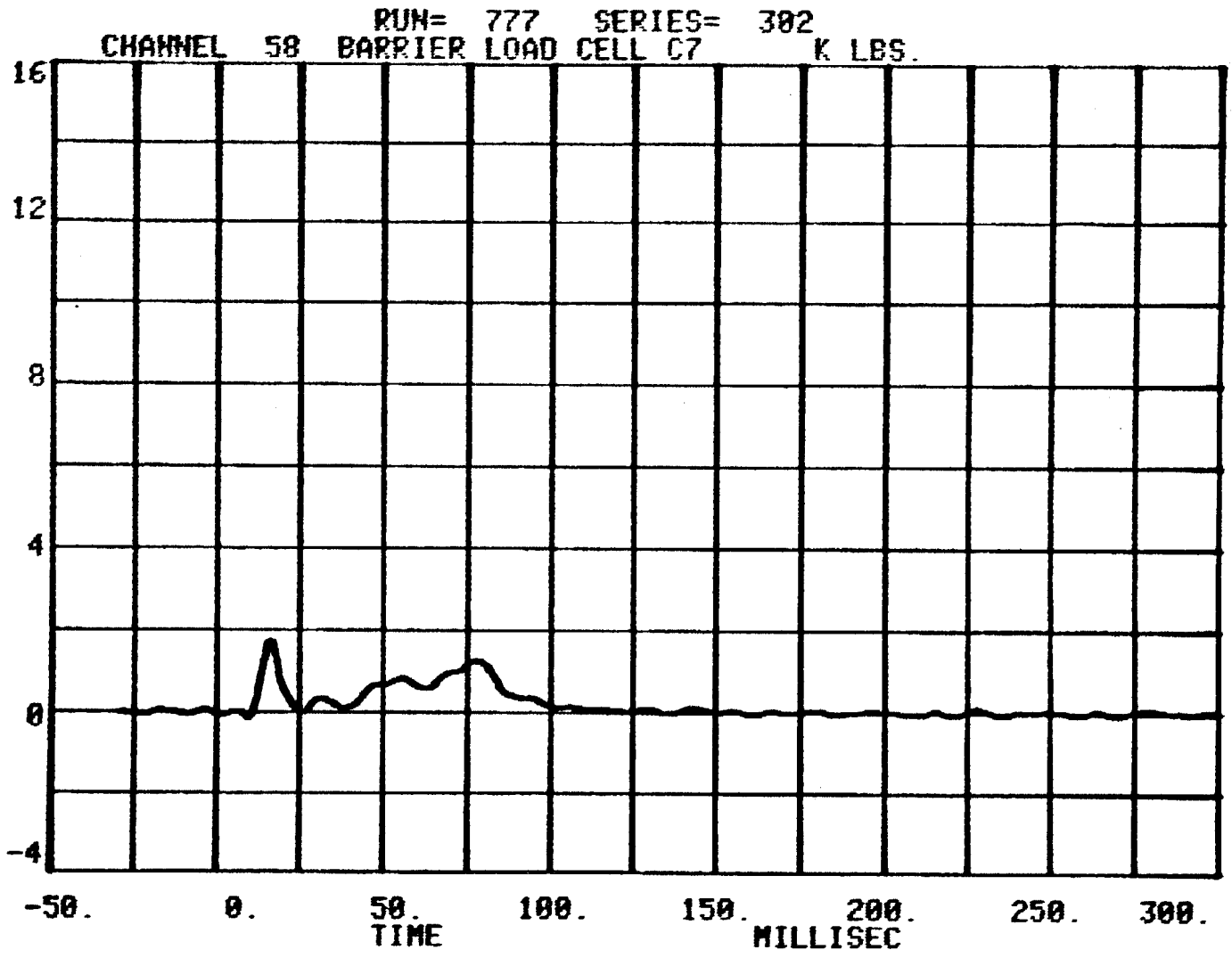
7556-15

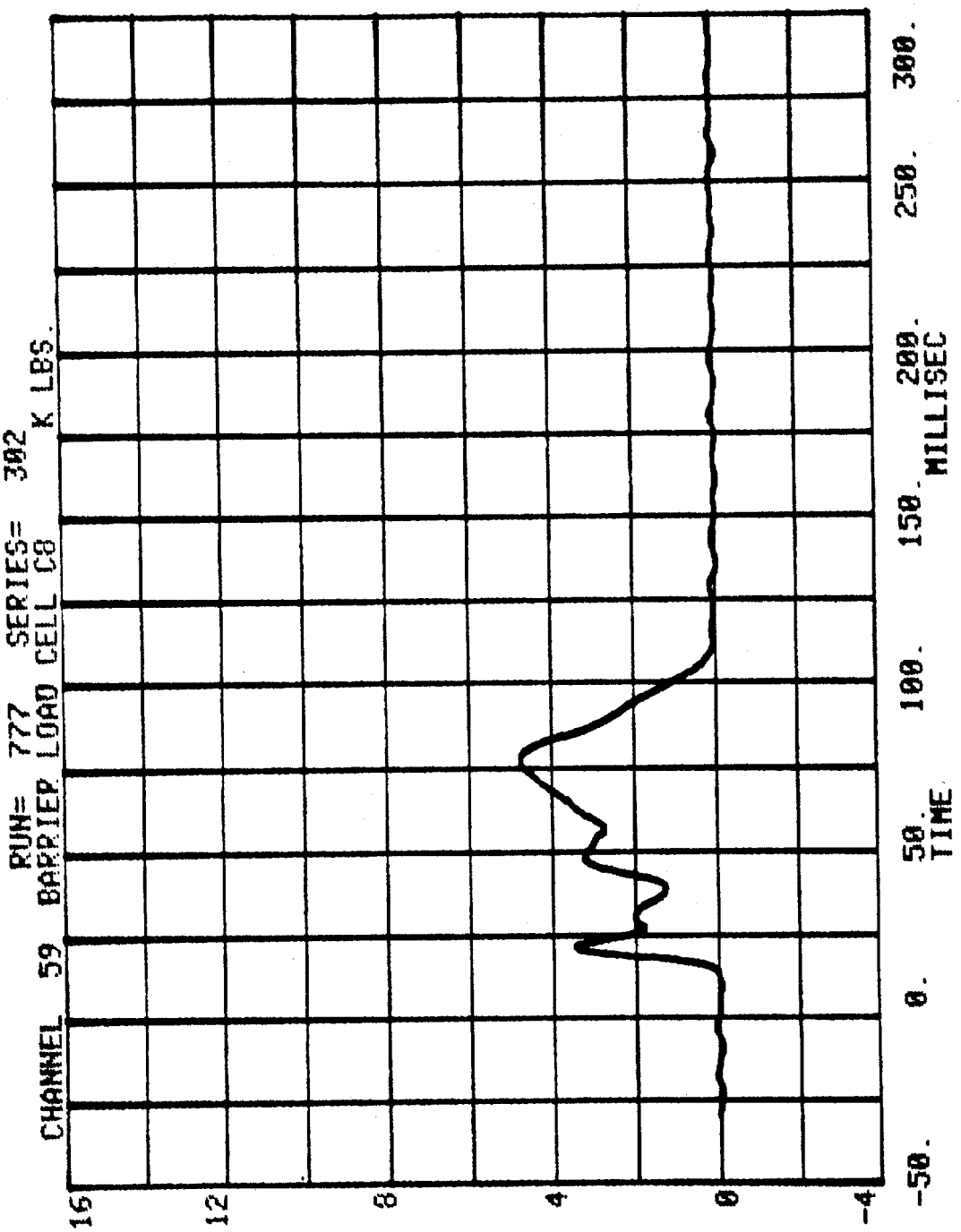

CHANNEL 55 RUN= 777 SERIES= 302
BARRIER LOAD CELL C4
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

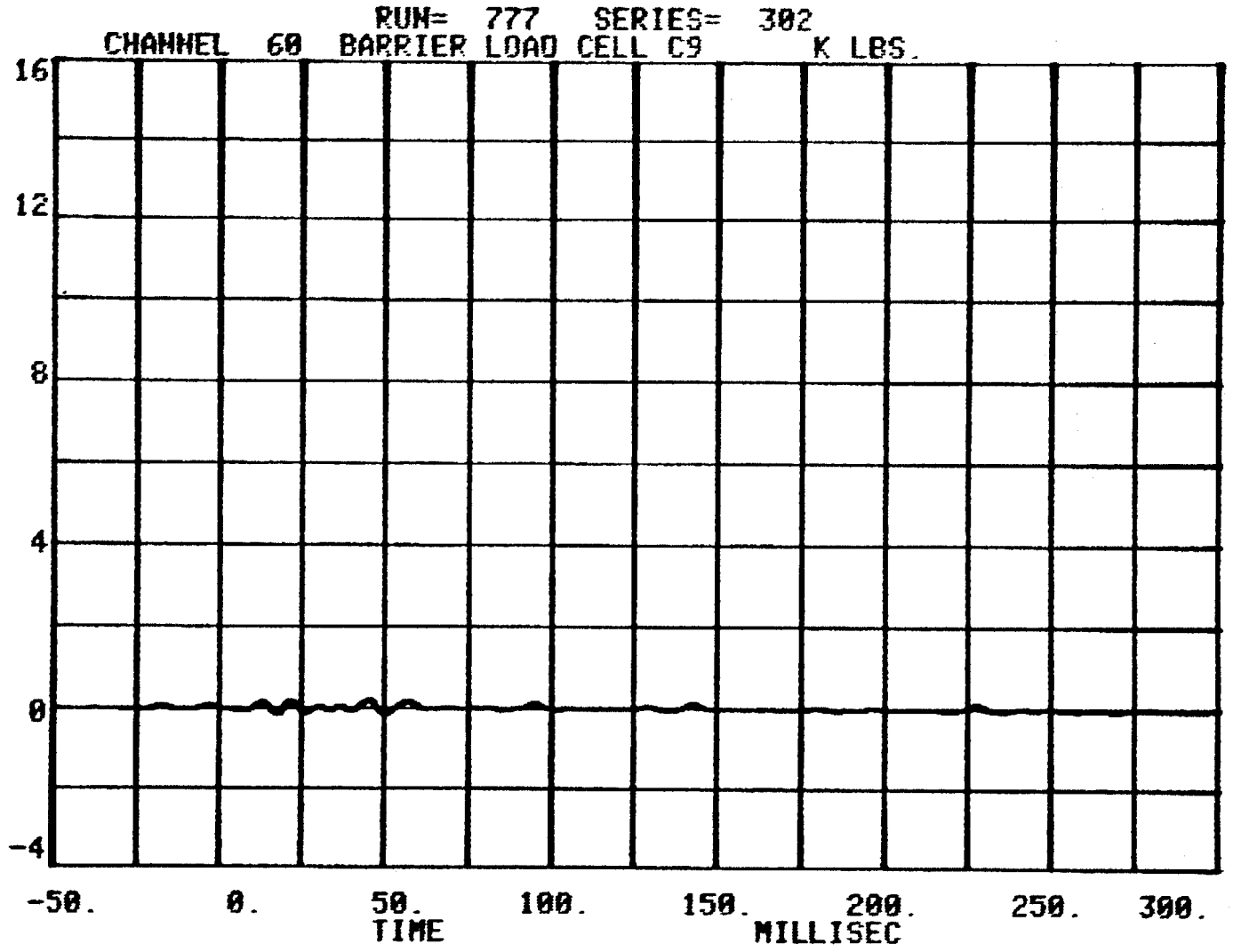

CHANNEL 56
RUN= 777
BARRIER LOAD CELL
SERIES= 302
C5
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

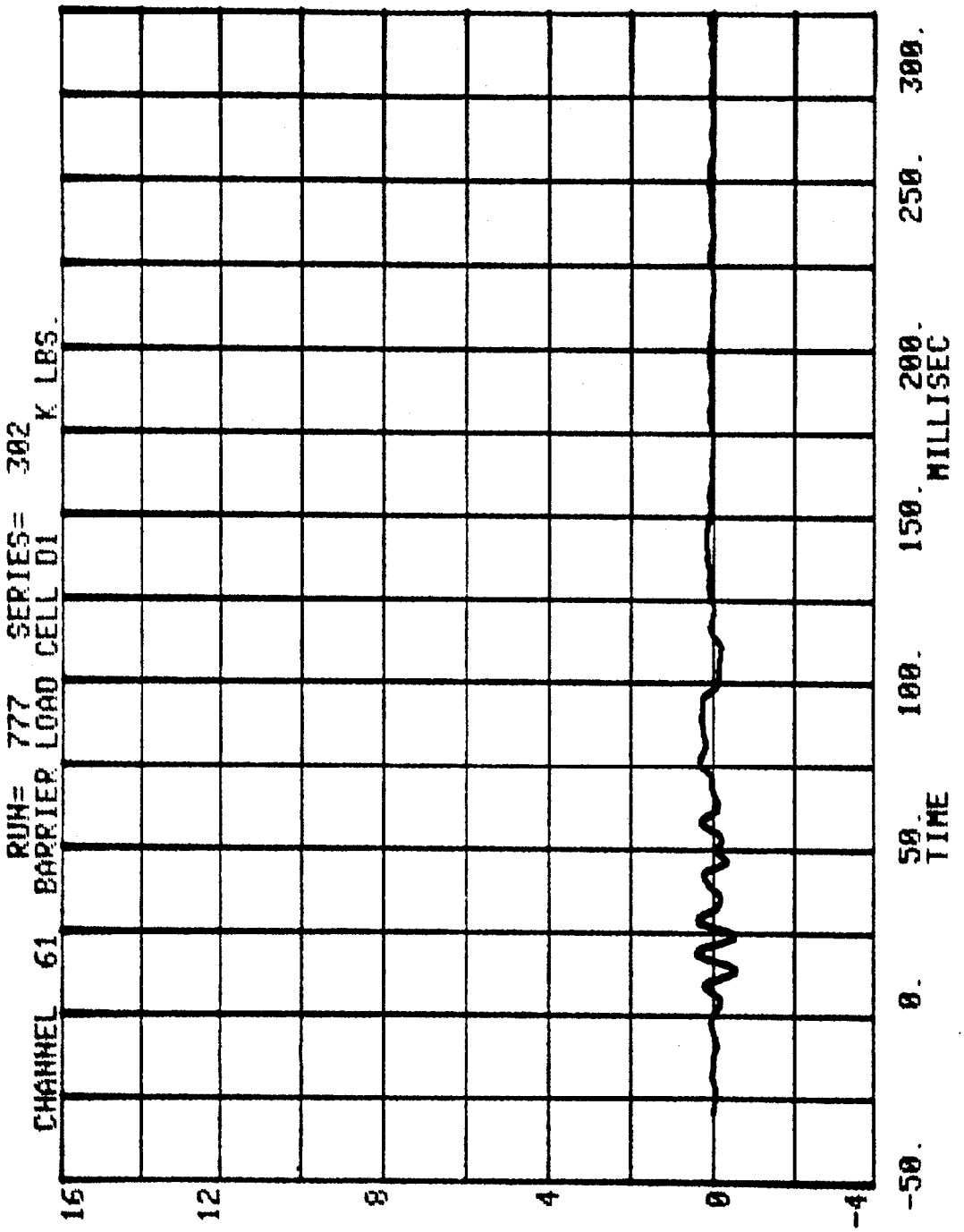
7556-15

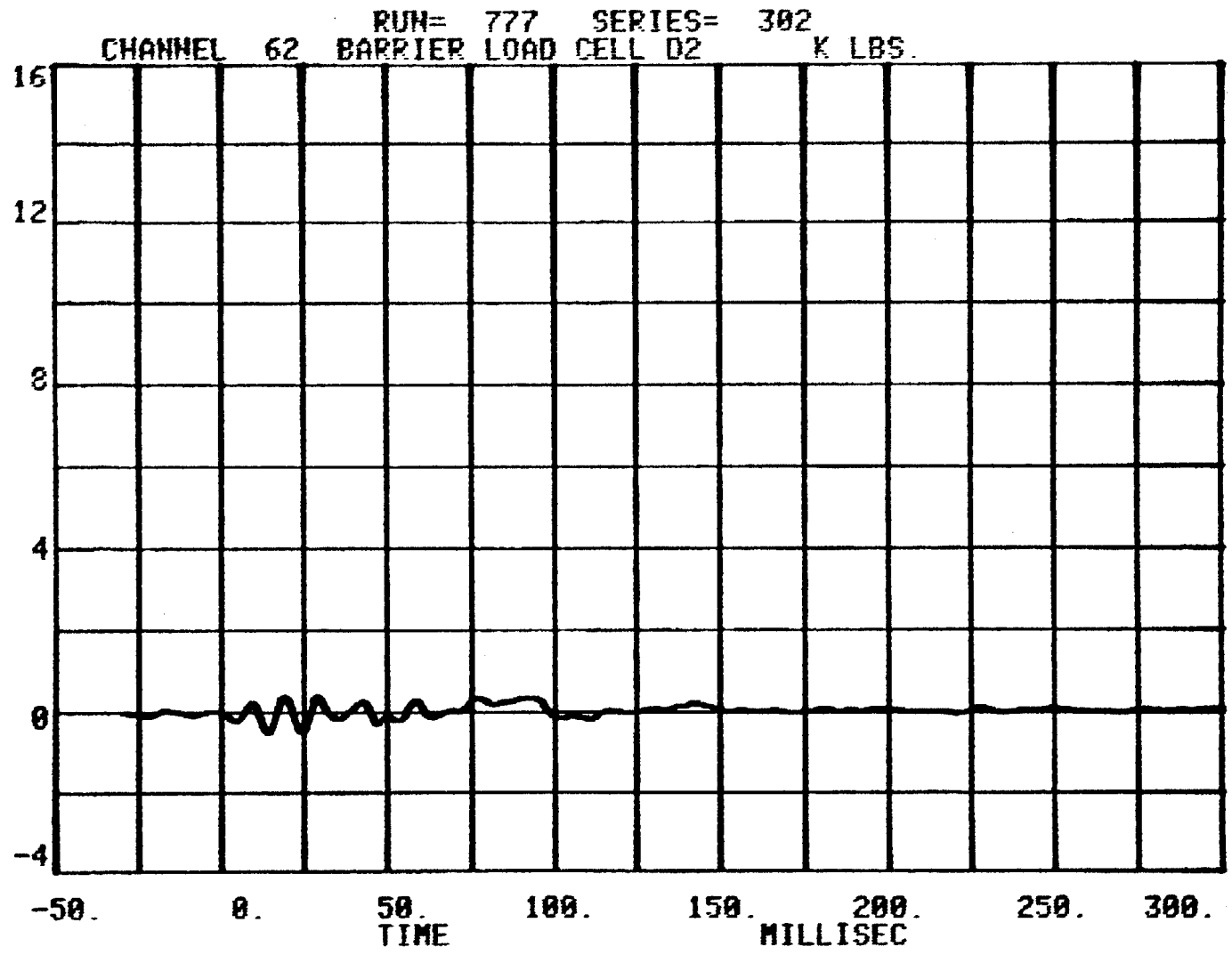

CHANNEL 57 BARRIER LOAD CELL C6
RUN= 777 SERIES= 302
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

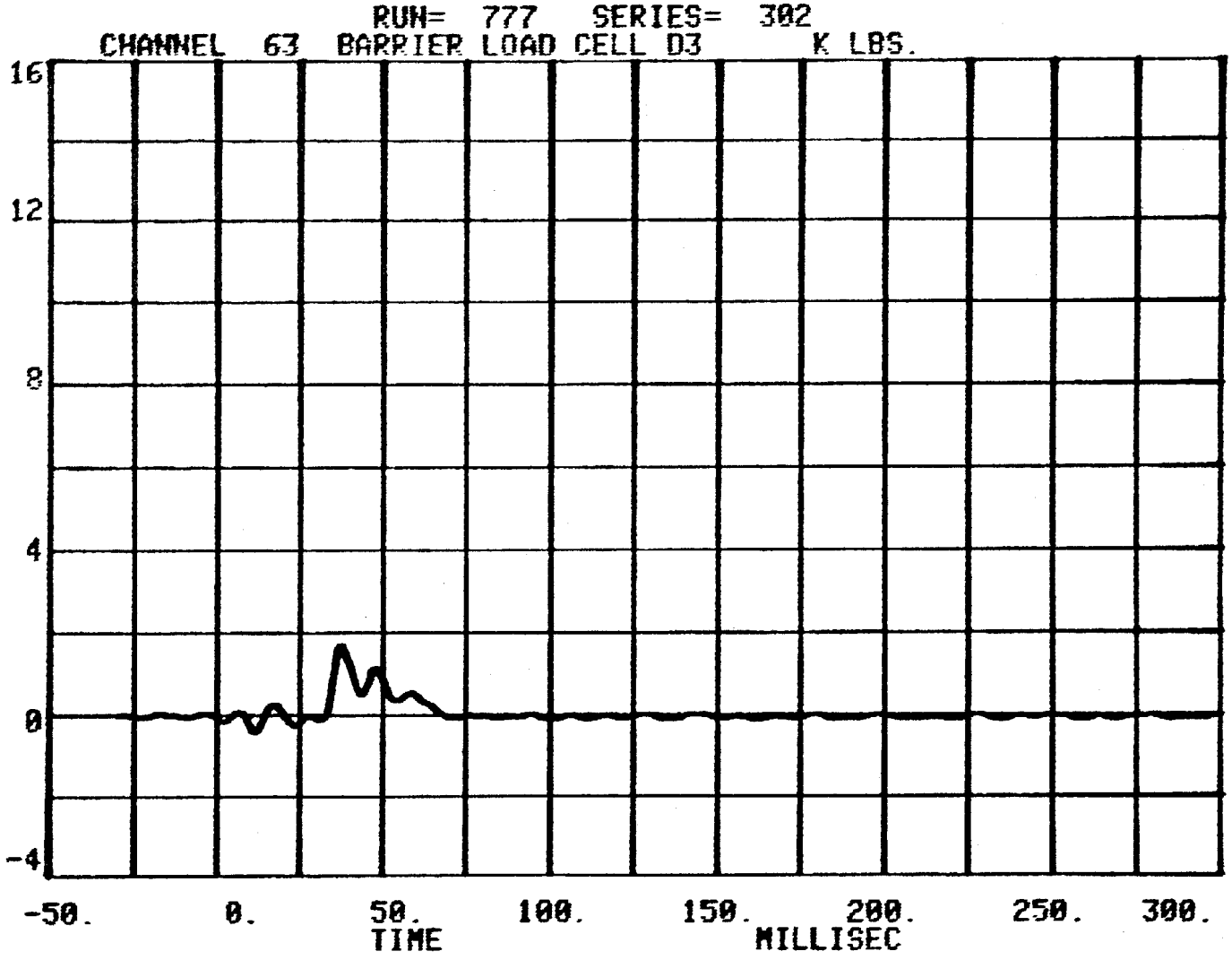

RUN= 777 SERIES= 302
CHANNEL 58 BARRIER LOAD CELL C7 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

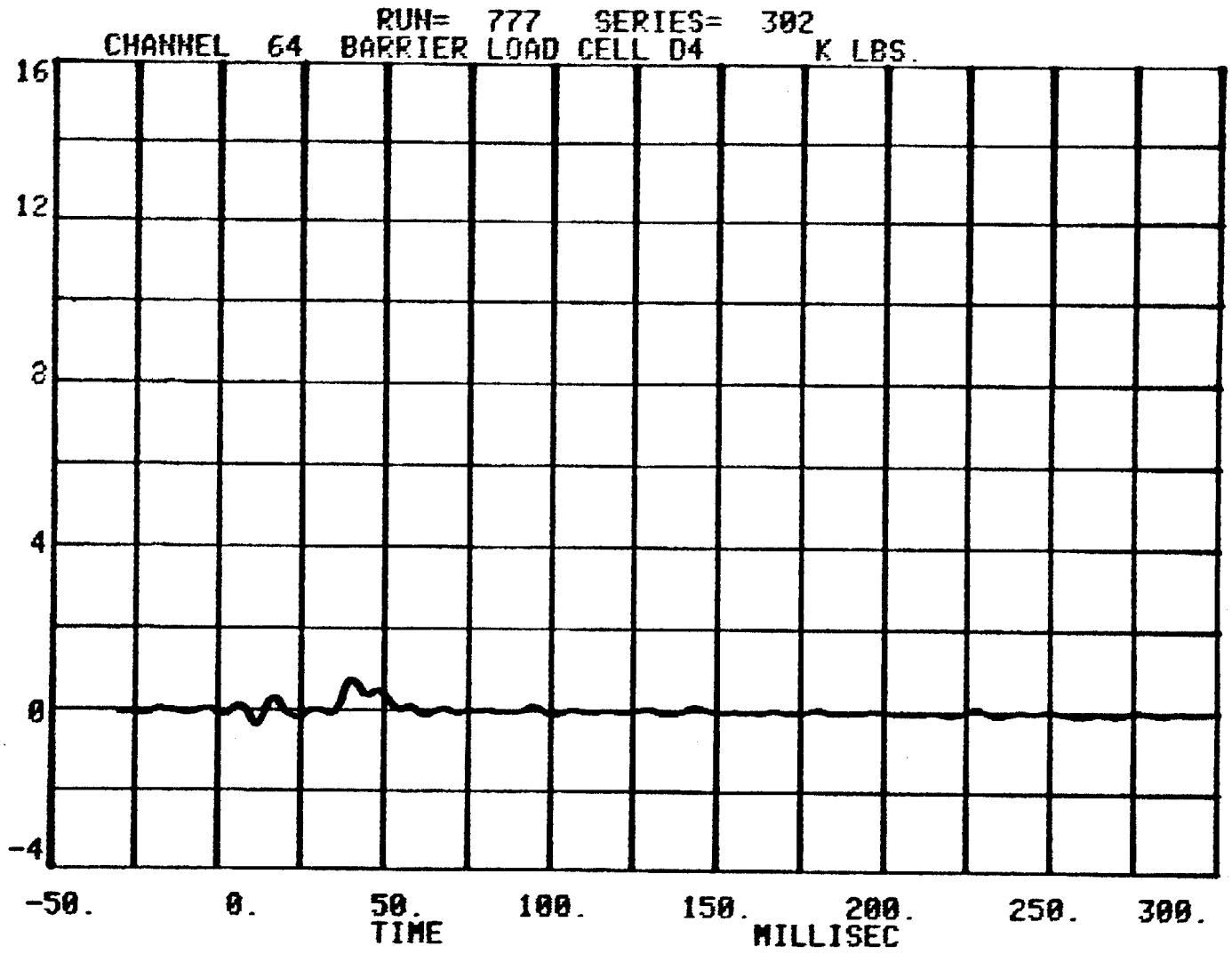

CHANNEL 59
RUN= 777
BARRIER LOAD CELL C8
SERIES= 302
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

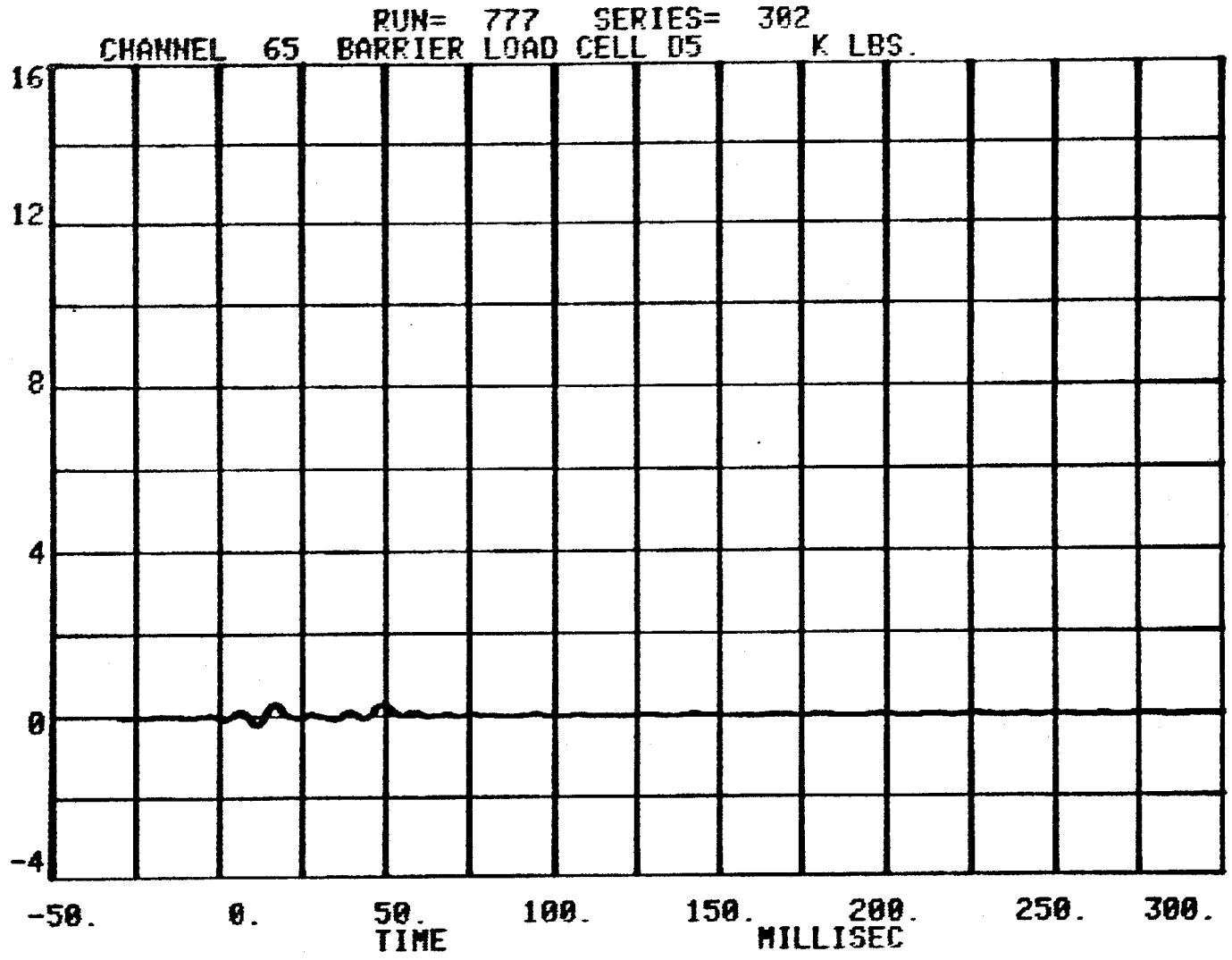

RUN= 777 SERIES= 302
CHANNEL 60 BARRIER LOAD CELL C9 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

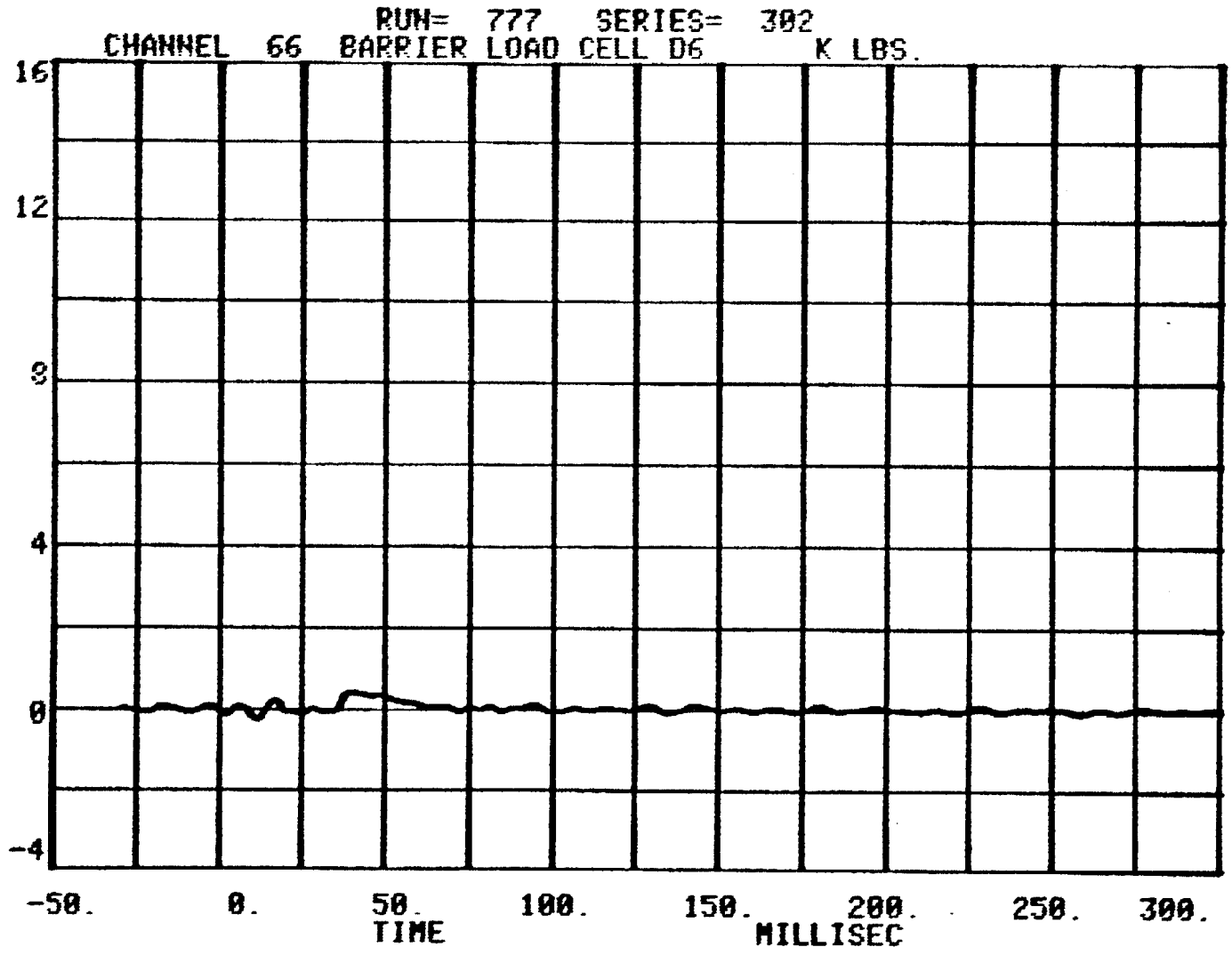

CHANNEL 61 RUN= 777 SERIES= 302
BARRIER LOAD CELL 01 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

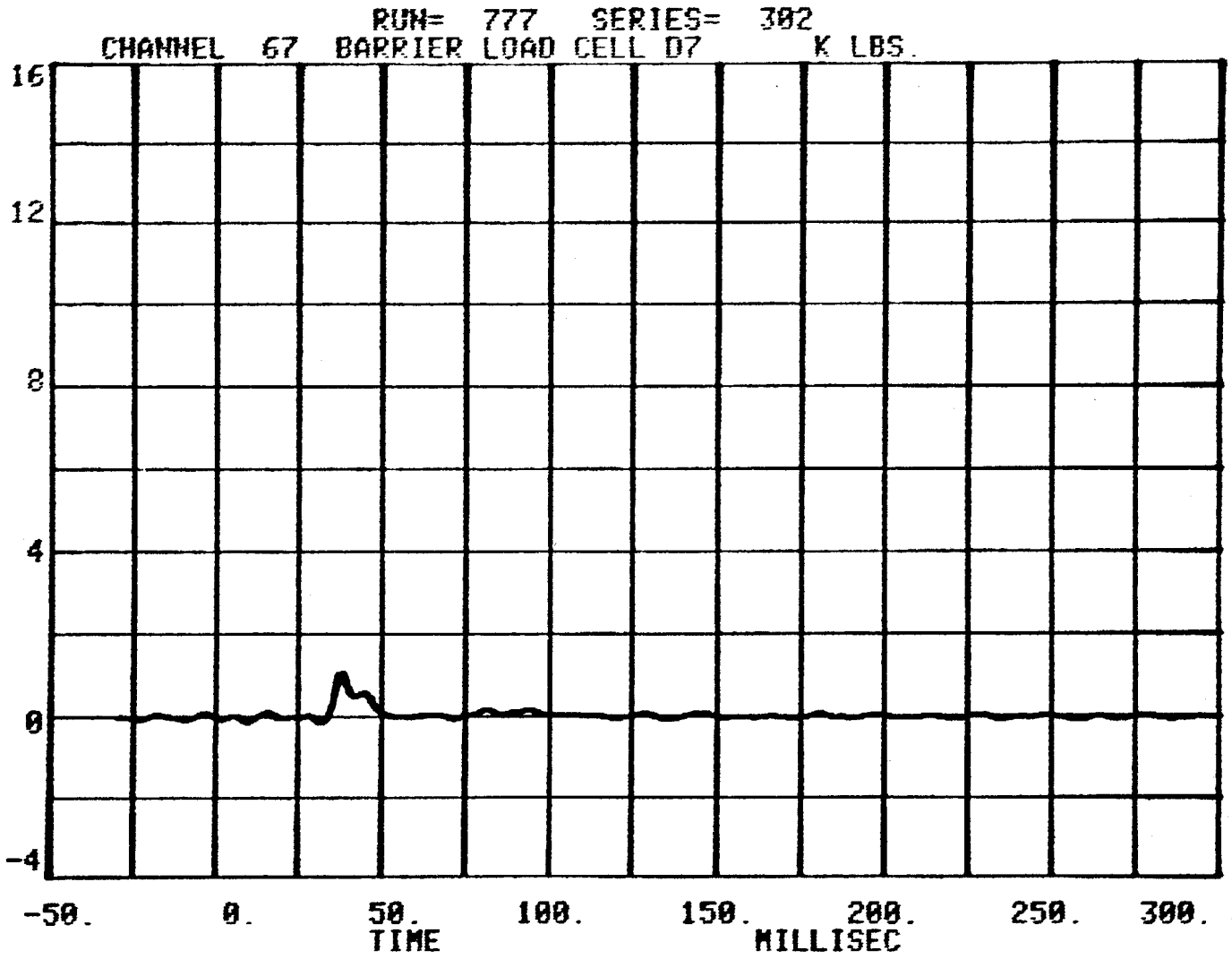

RUN= 777 SERIES= 302
CHANNEL 62 BARRIER LOAD CELL D2
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

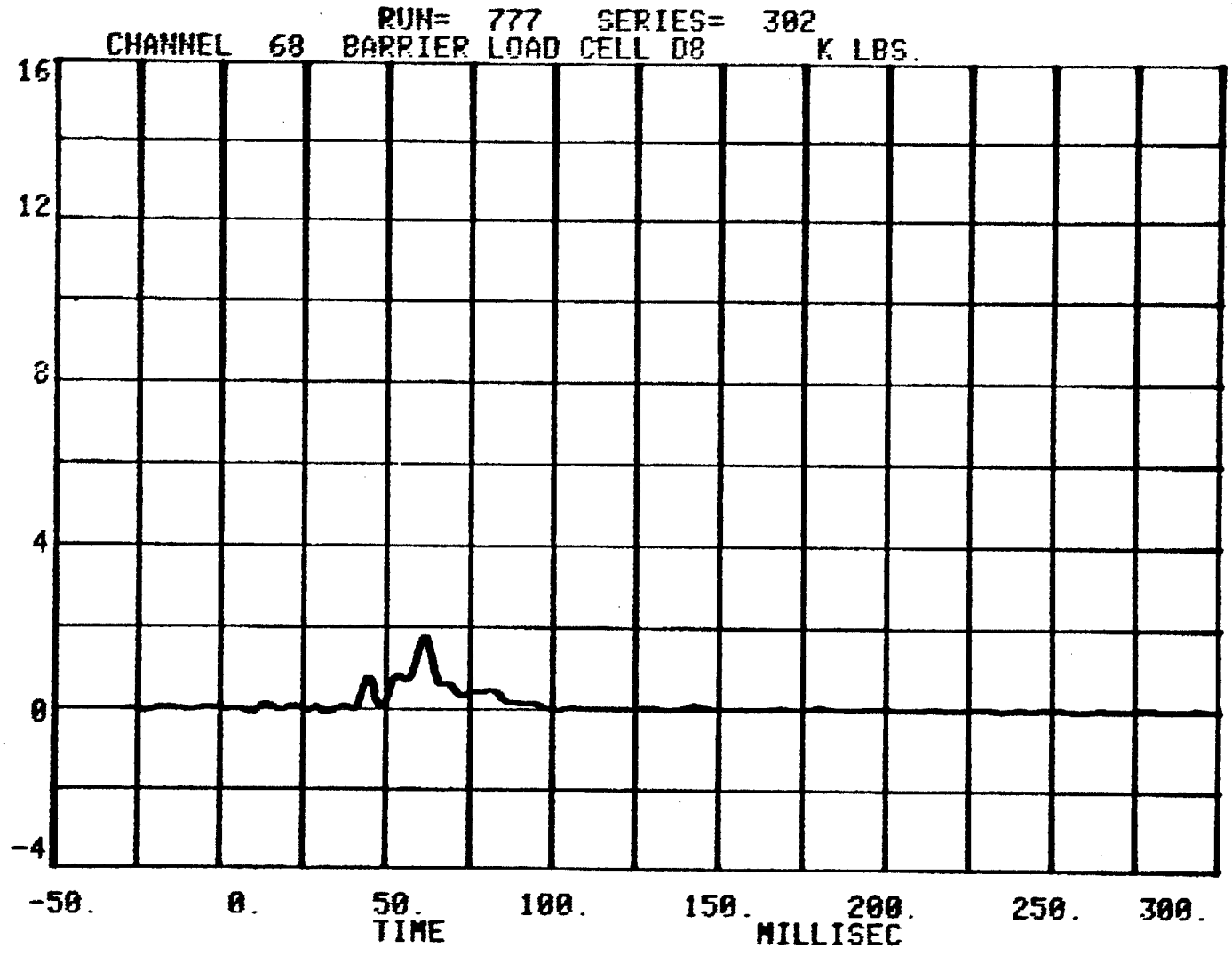

RUN= 777 SERIES= 302
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

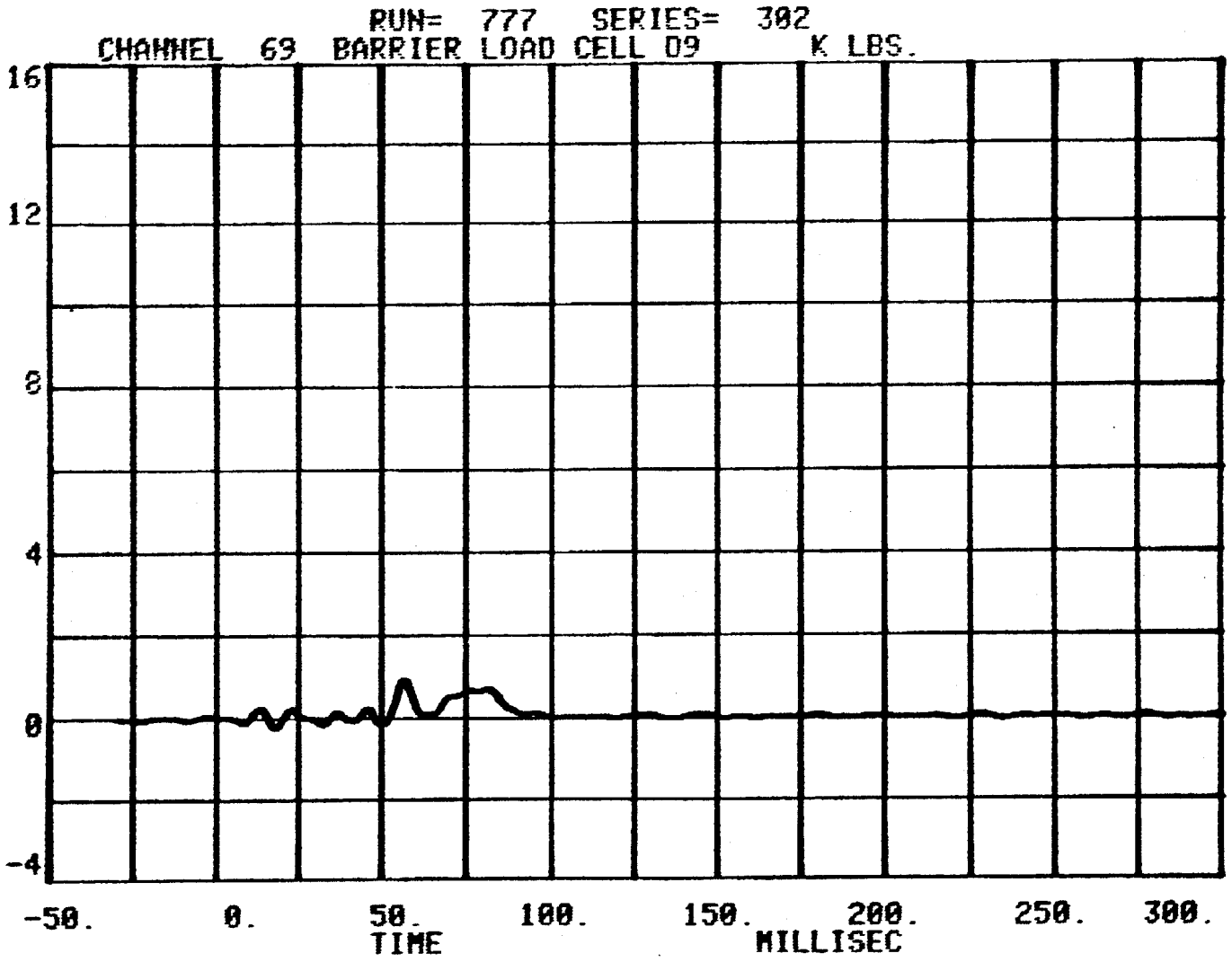

RUN= 777 SERIES= 302
CHANNEL 64 BARRIER LOAD CELL D4
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 65 BARRIER LOAD CELL D5 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 66 BARRIER LOAD CELL D6 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 67 BARRIER LOAD CELL D7
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

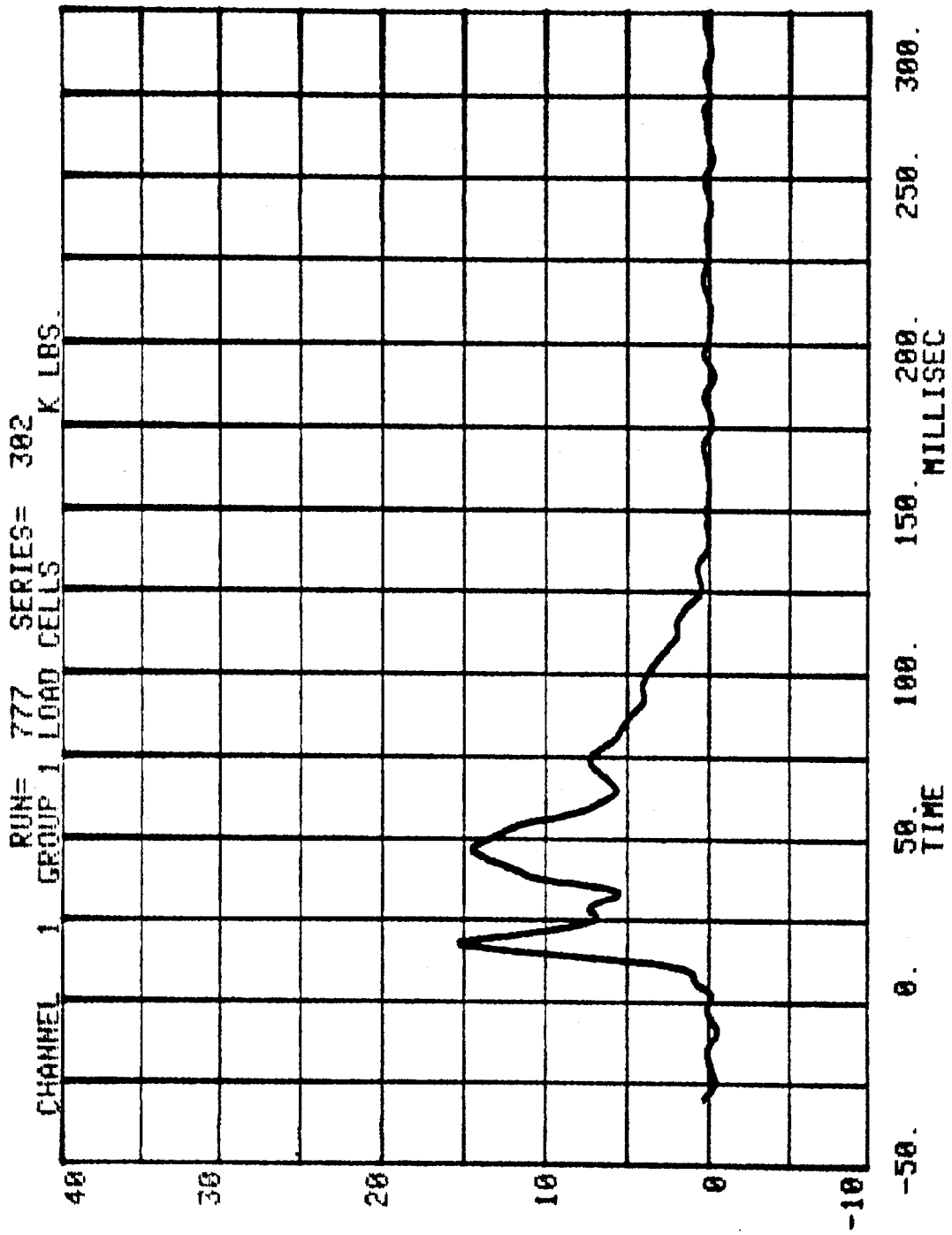

RUN= 777 SERIES= 302
CHANNEL 68 BARRIER LOAD CELL D8
K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 69 BARRIER LOAD CELL 09 K LBS.
16
12
8
4
0
-4
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

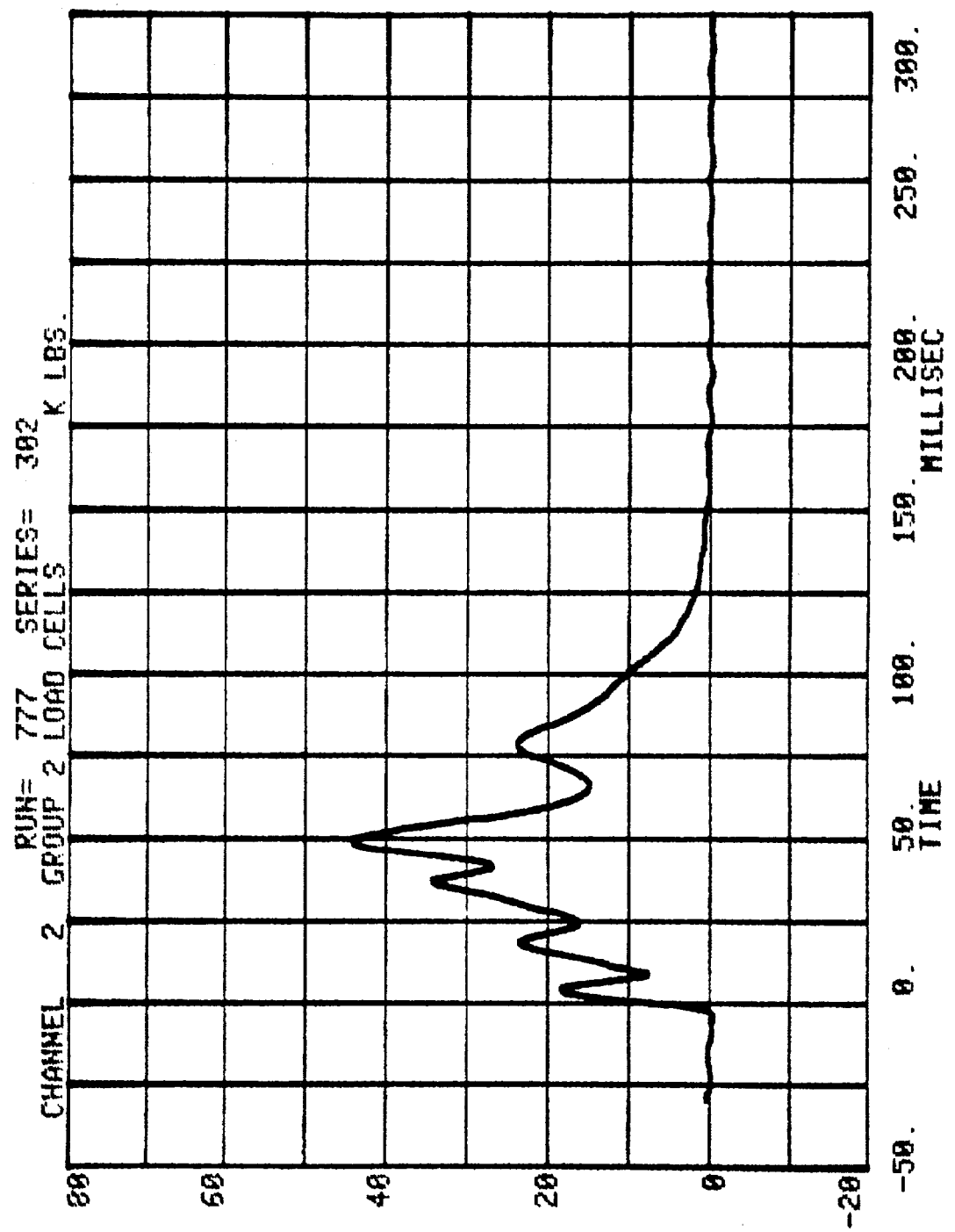
NEW CAR ASSESSMENT BARRIER TESTS - 1987

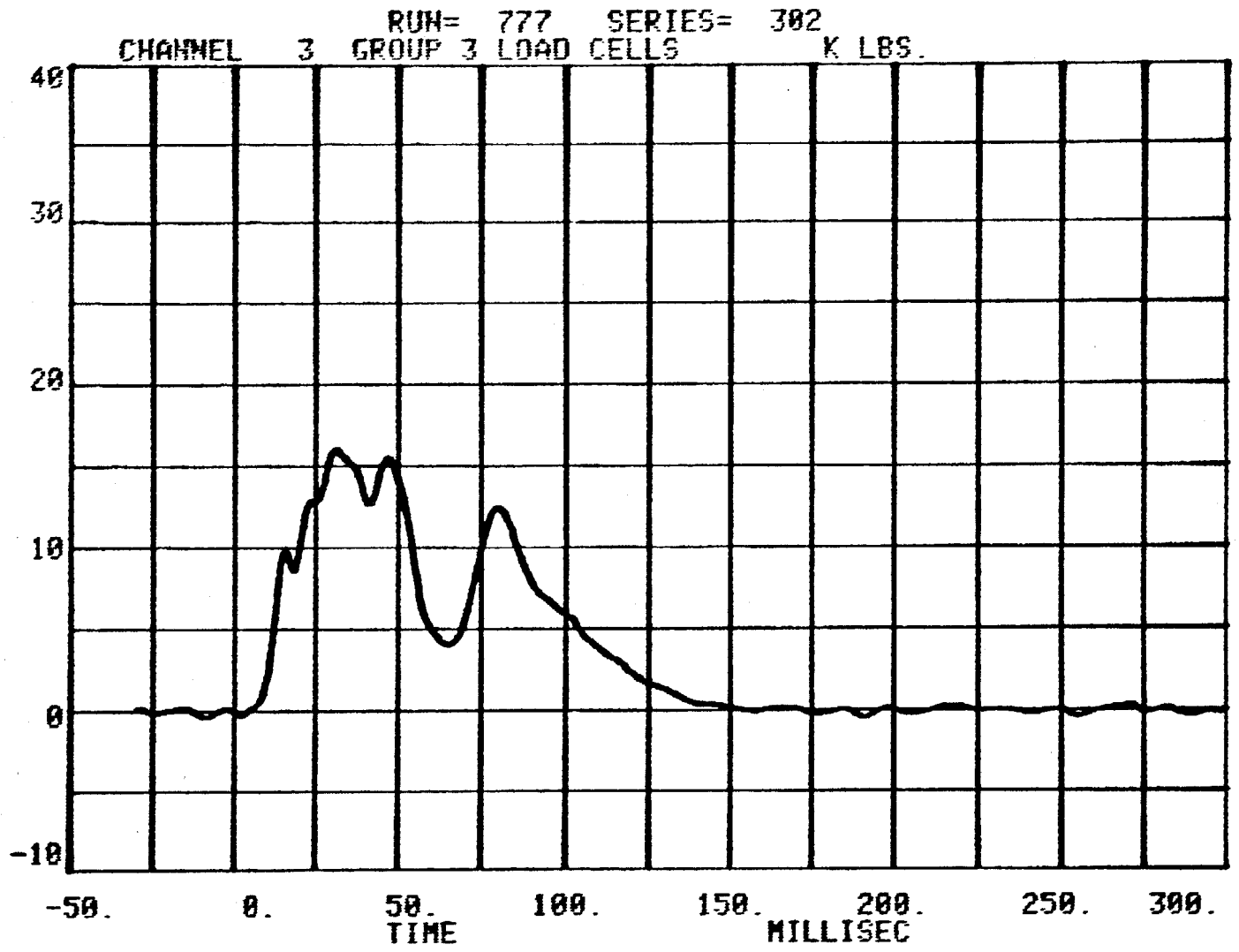
RUN # 777 SERIES # 302

CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	-.374	15.450 K LBS.
2	GROUP 2 LOAD CELLS	-.399	44.153 K LBS.
3	GROUP 3 LOAD CELLS	-.426	16.042 K LBS.
4	GROUP 4 LOAD CELLS	-1.092	10.938 K LBS.
5	GROUP 5 LOAD CELLS	-.399	8.462 K LBS.
6	GROUP 6 LOAD CELLS	-.531	7.186 K LBS.
7	TOTAL LOAD CELL SUM	-1.773	93.188 K LBS.

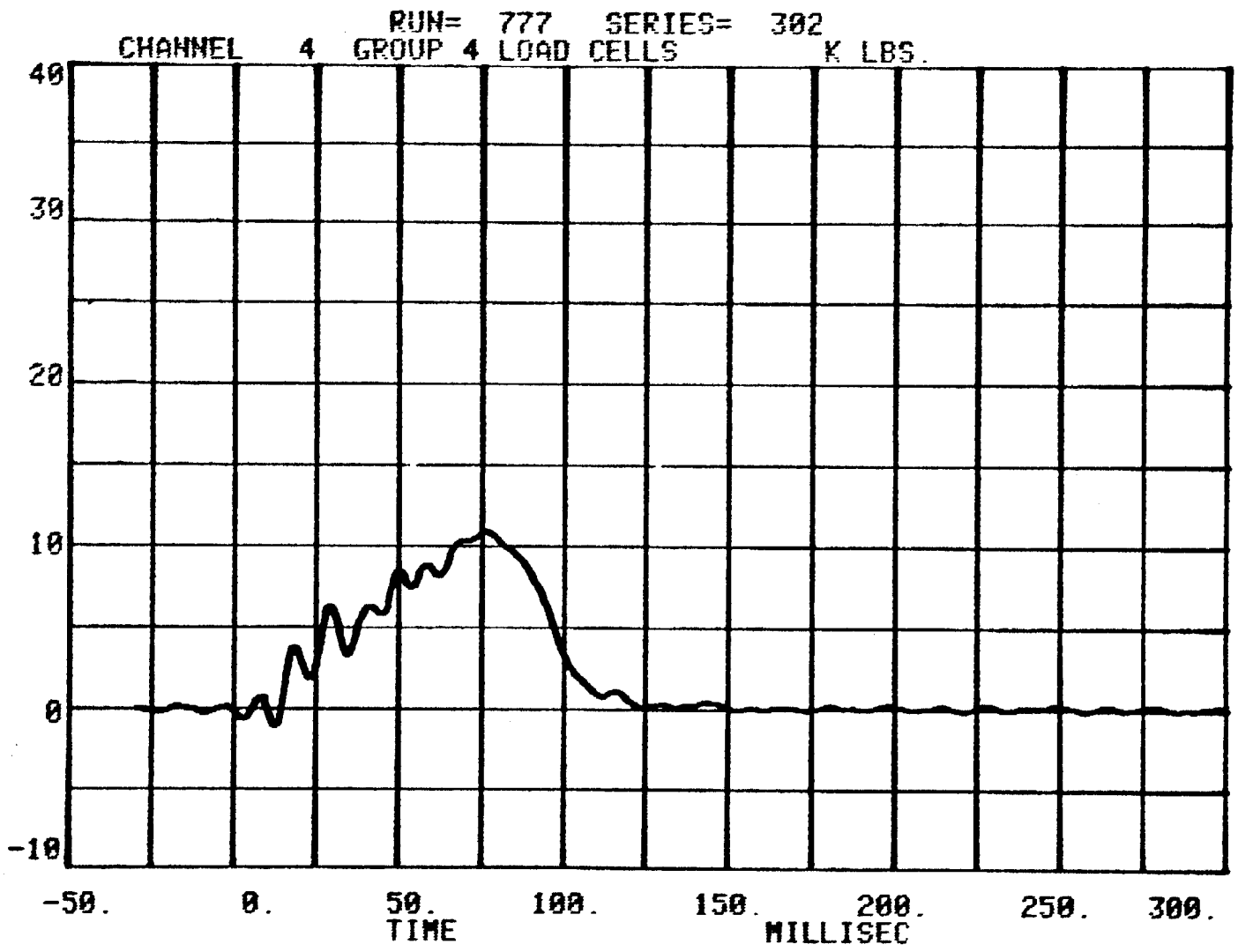

CHANNEL 1
RUN= 777
GROUP 1 LOAD CELLS
SERIES= 302
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

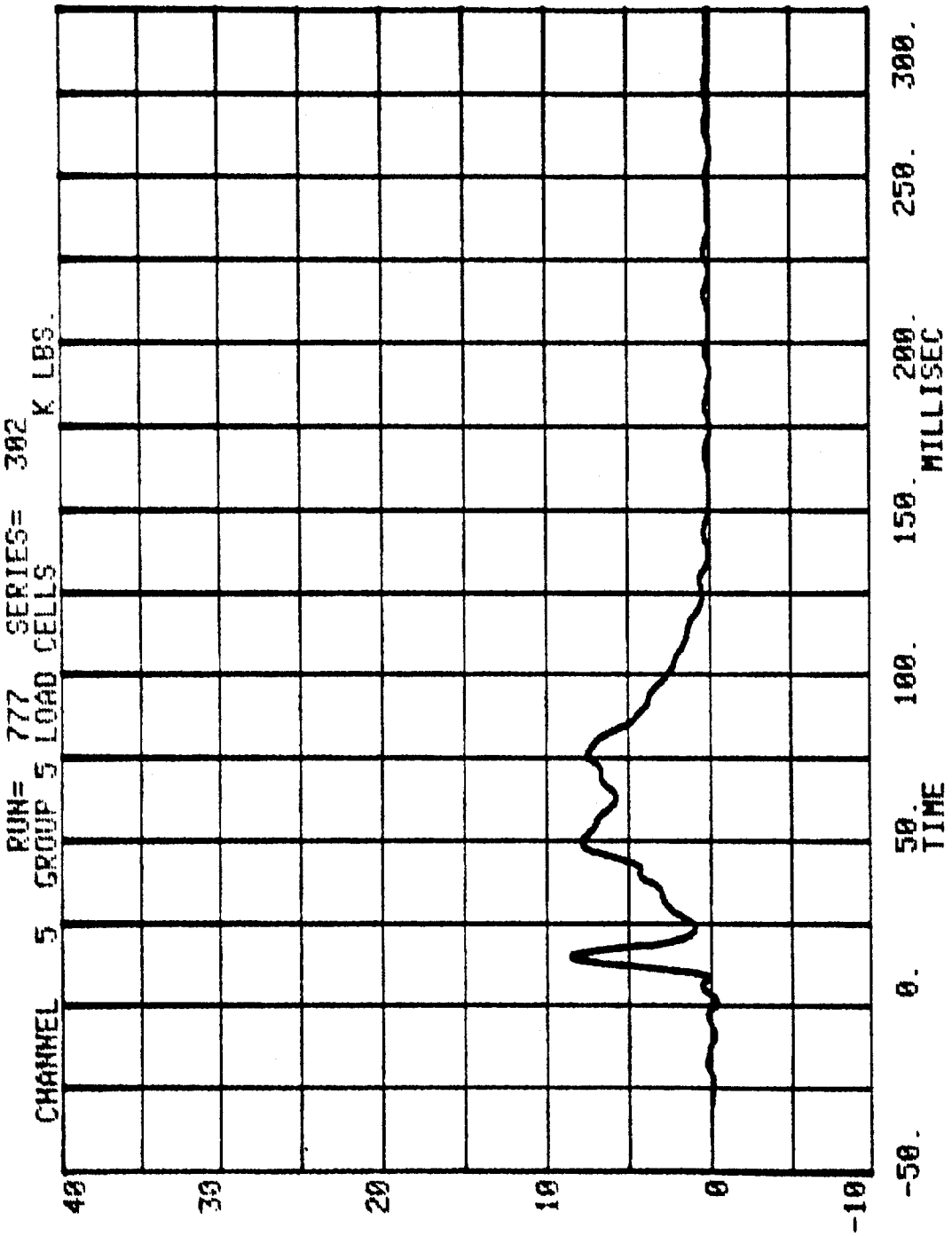
7556-15

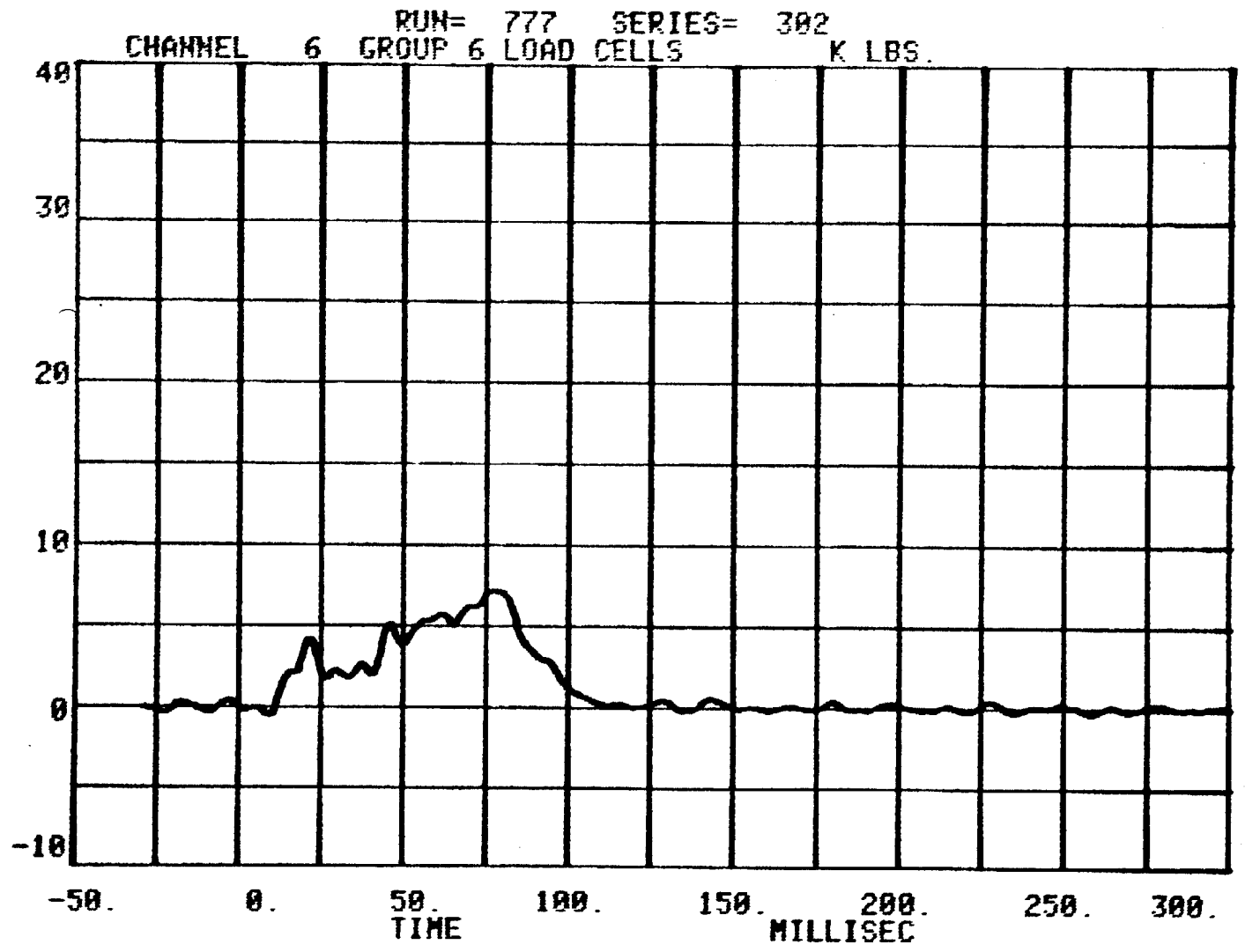

CHANNEL 2
GROUP 2
RUN= 777
LOAD CELLS
SERIES= 302
K LBS.
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

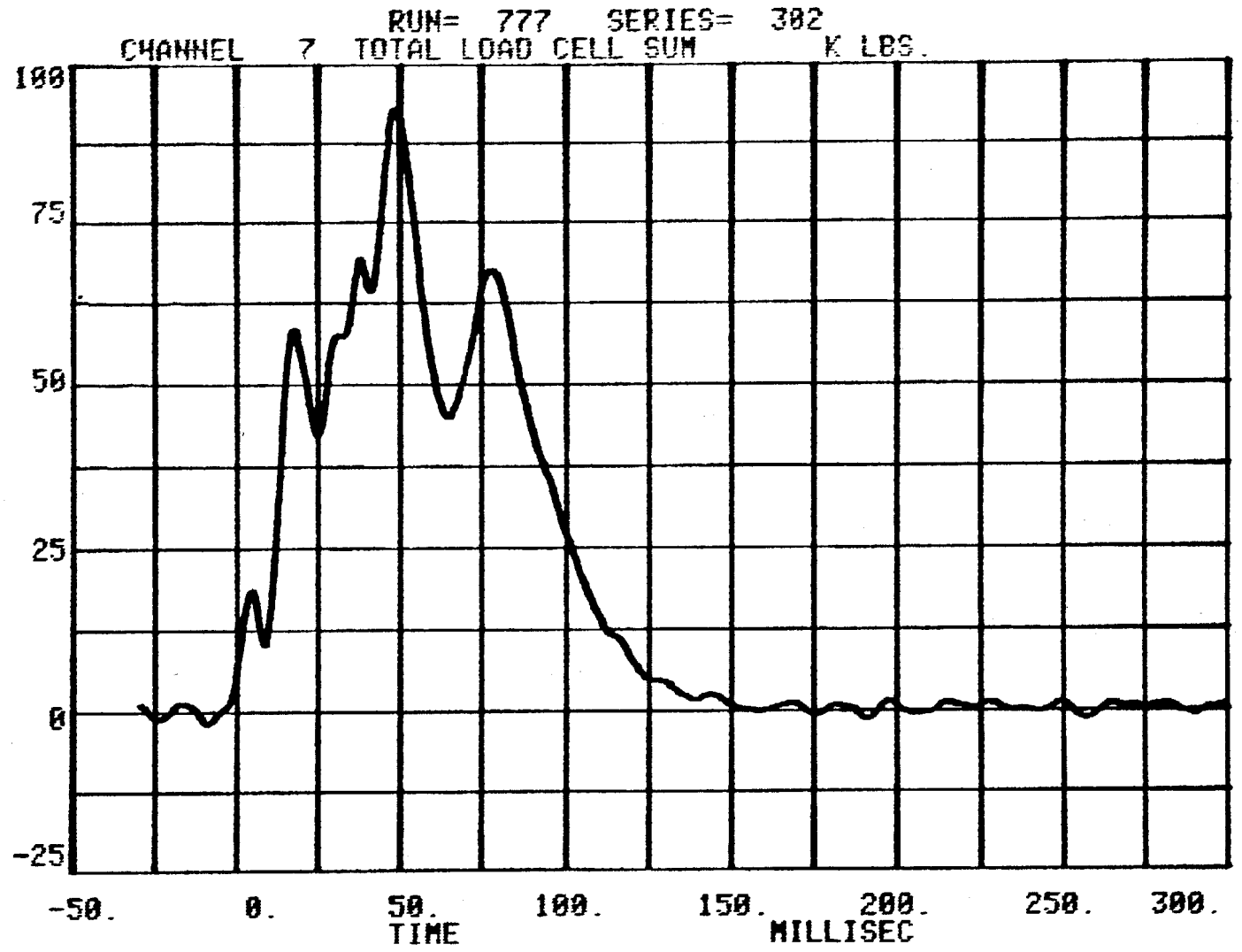

RUN= 777 SERIES= 302
CHANNEL 3 GROUP 3 LOAD CELLS K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-15


RUN= 777 SERIES= 302
CHANNEL 4 GROUP 4 LOAD CELLS K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 5 GROUP 5 LOAD CELLS
RUN= 777 SERIES= 302
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
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= 777 SERIES= 302
CHANNEL 7 TOTAL LOAD CELL SUM K LBS.
100
75
50
25
0
-25
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

TEST NO. MH0302

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NEW CAR ASSESSMENT BARRIER TESTS - 1987

RUN= 777

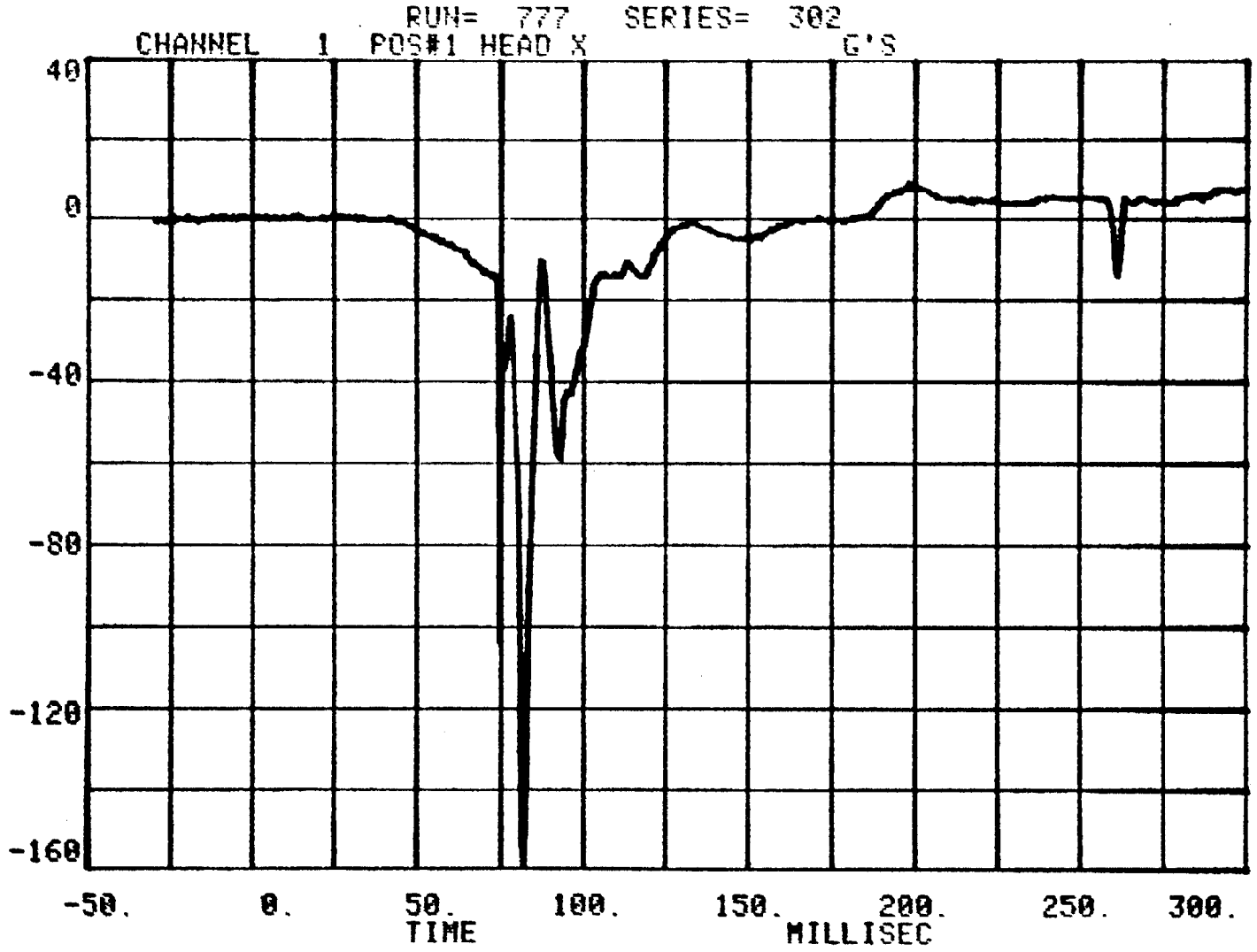
POS#1 HEAD R

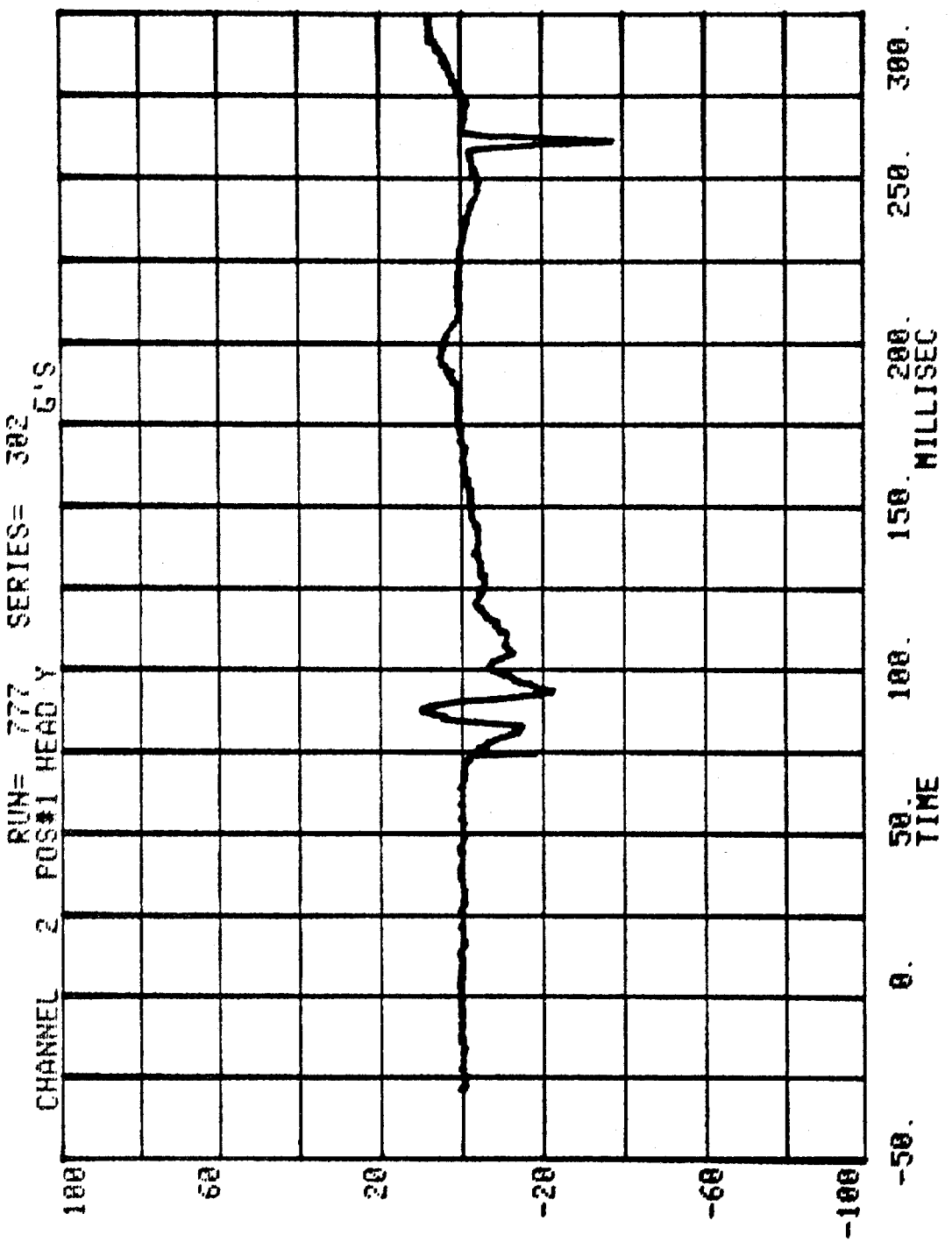
HIC= 873.4 FROM T1= .07410 TO T2= .10072

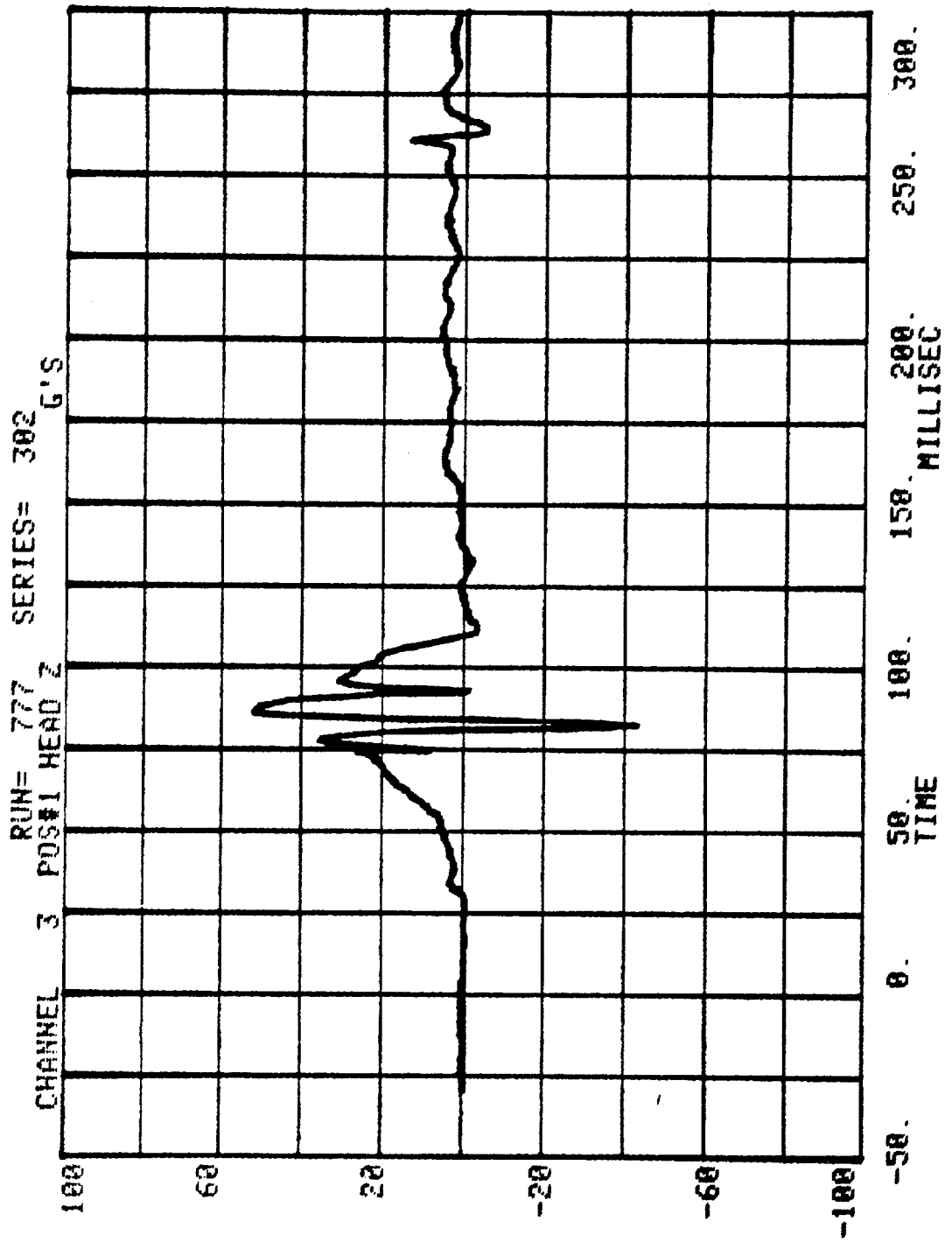
AVERAGE ACCELERATION BETWEEN T1 AND T2= 64.0G'S

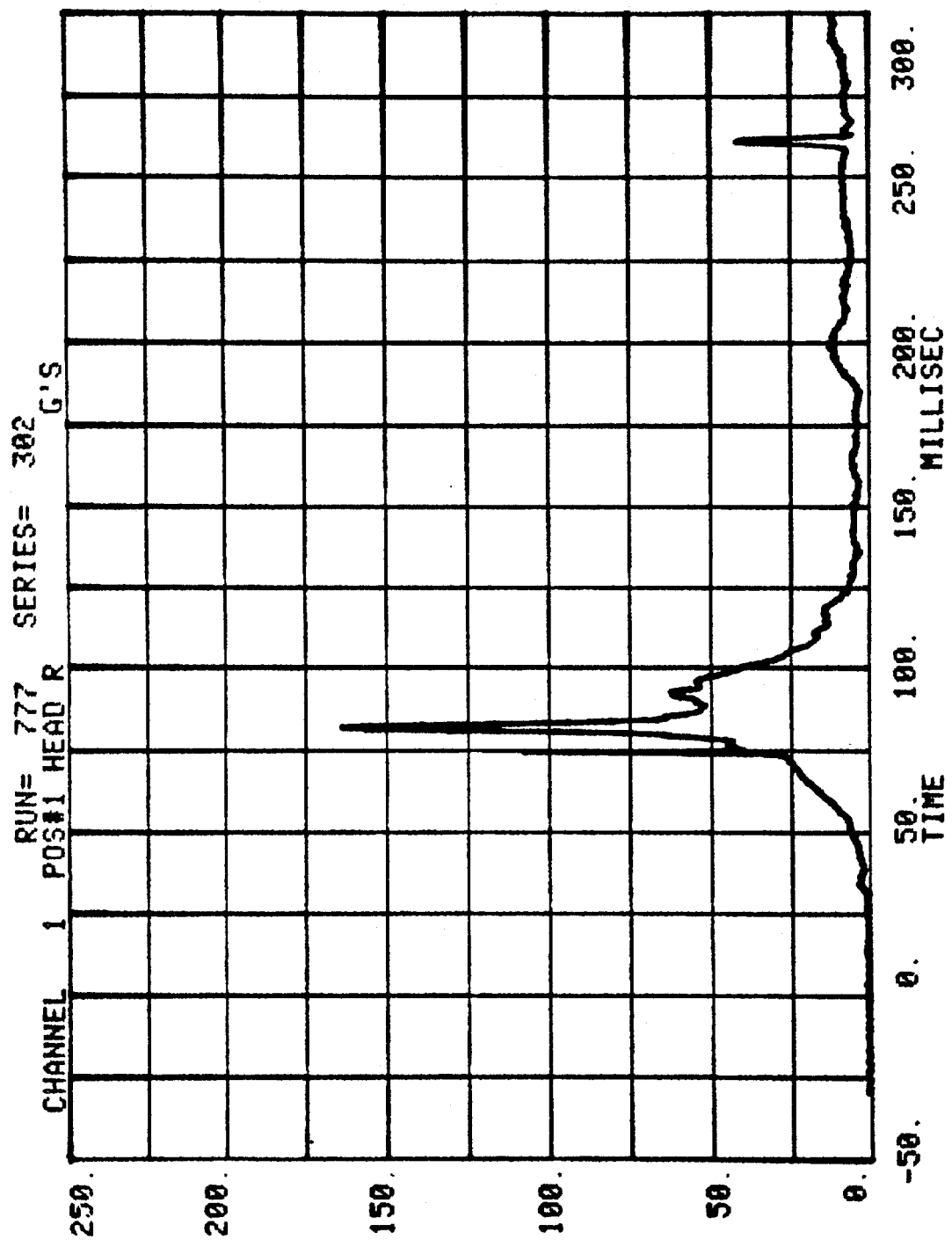
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=1347.0

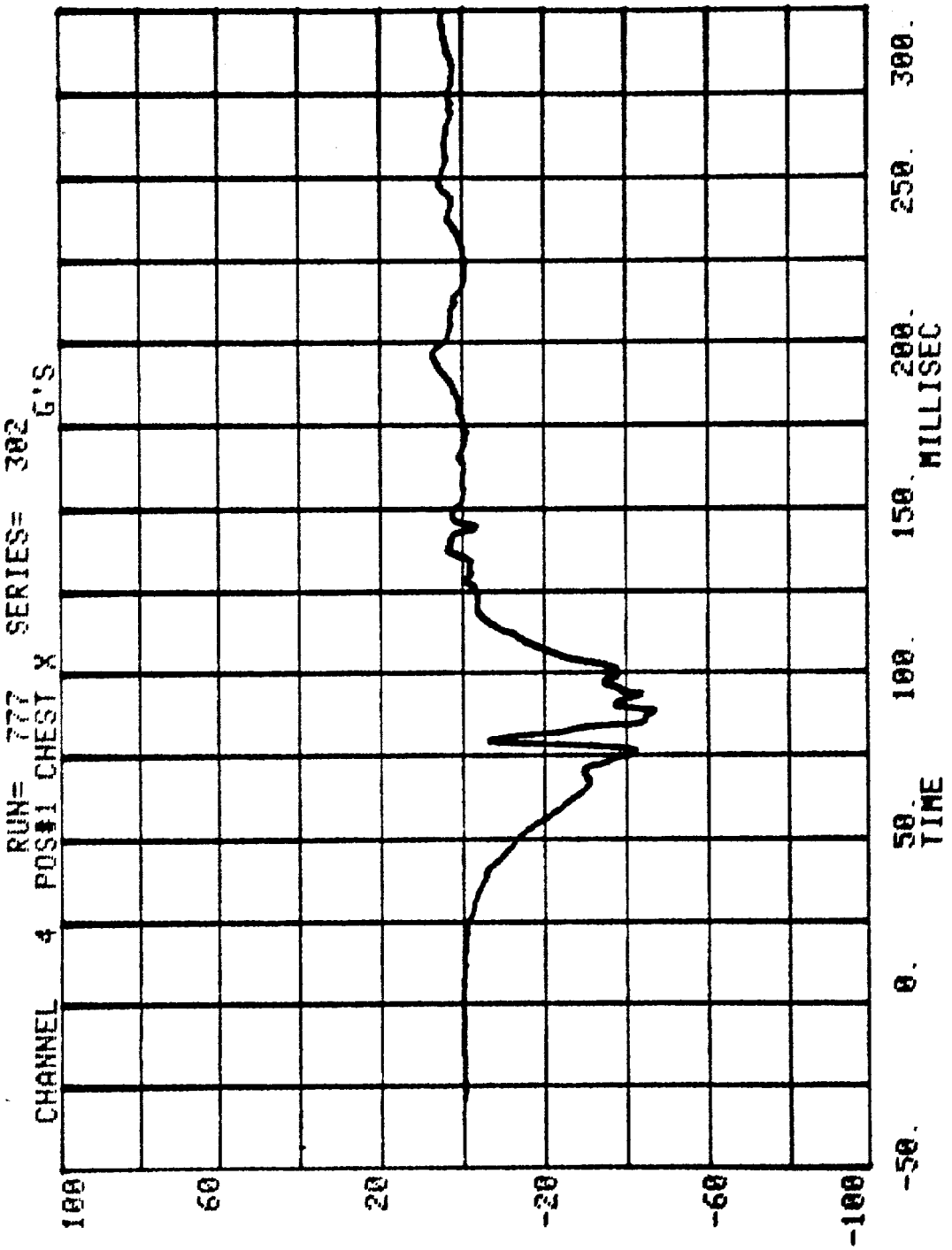

RUN= 777 SERIES= 302
CHANNEL 1 POS#1 HEAD X
G'S
40
0
-40
-80
-120
-160
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

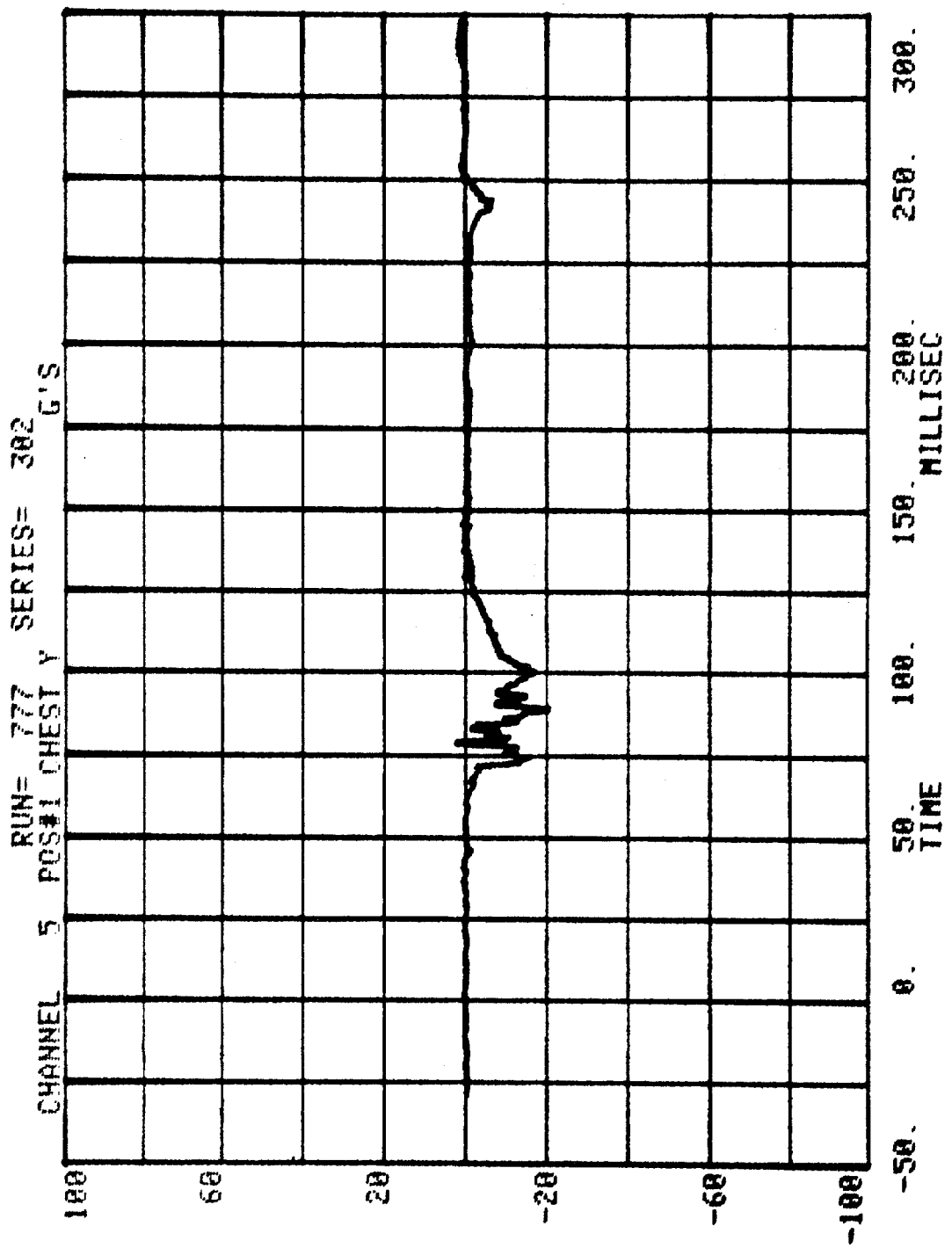

CHANNEL 2 POS#1 HEAD Y
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 3 RUN= 777 SERIES= 302
POS#1 HEAD 2
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

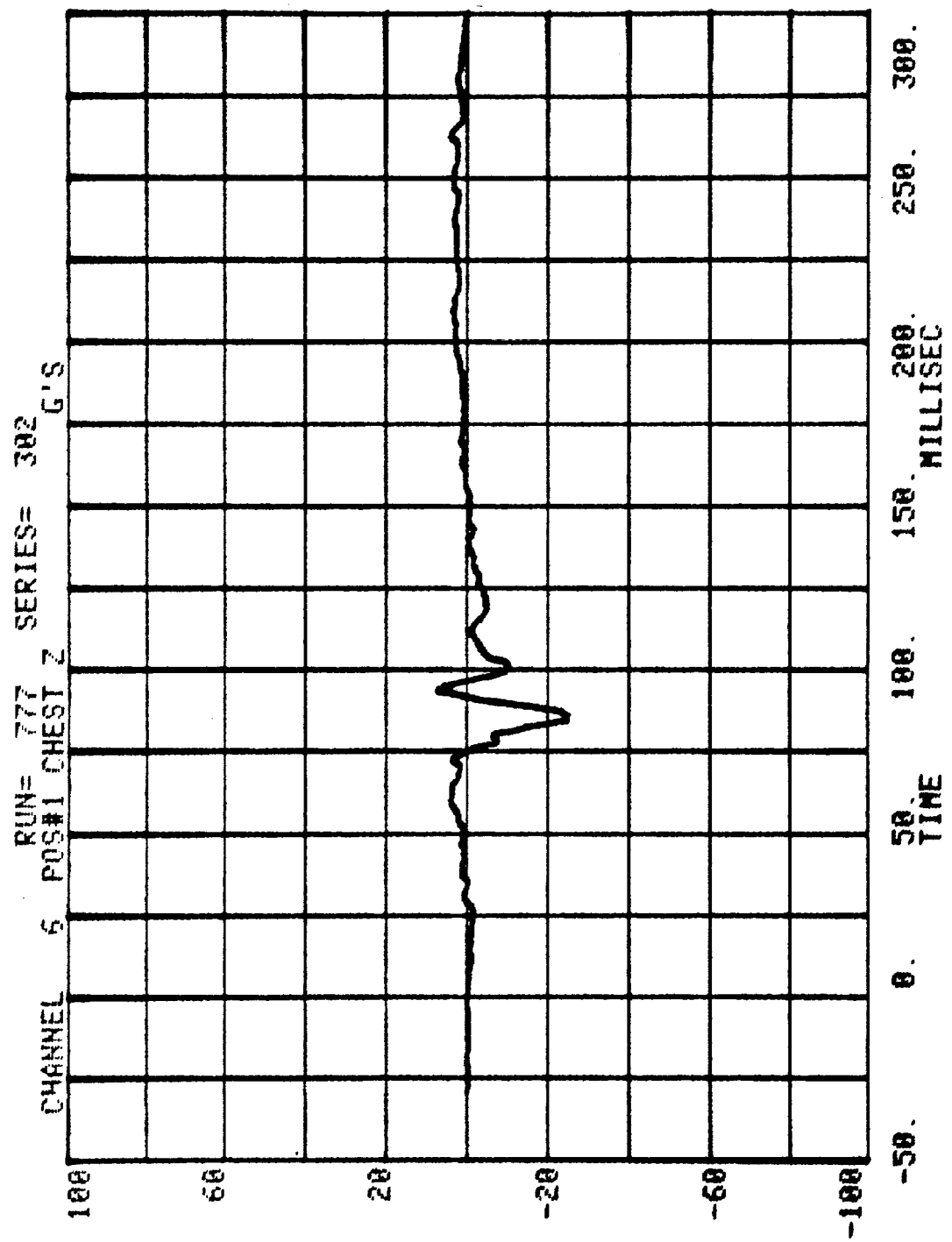

CHANNEL 1 POS#1 HEAD R
RUN= 777 SERIES= 302
G'S
250.
200.
150.
100.
50.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

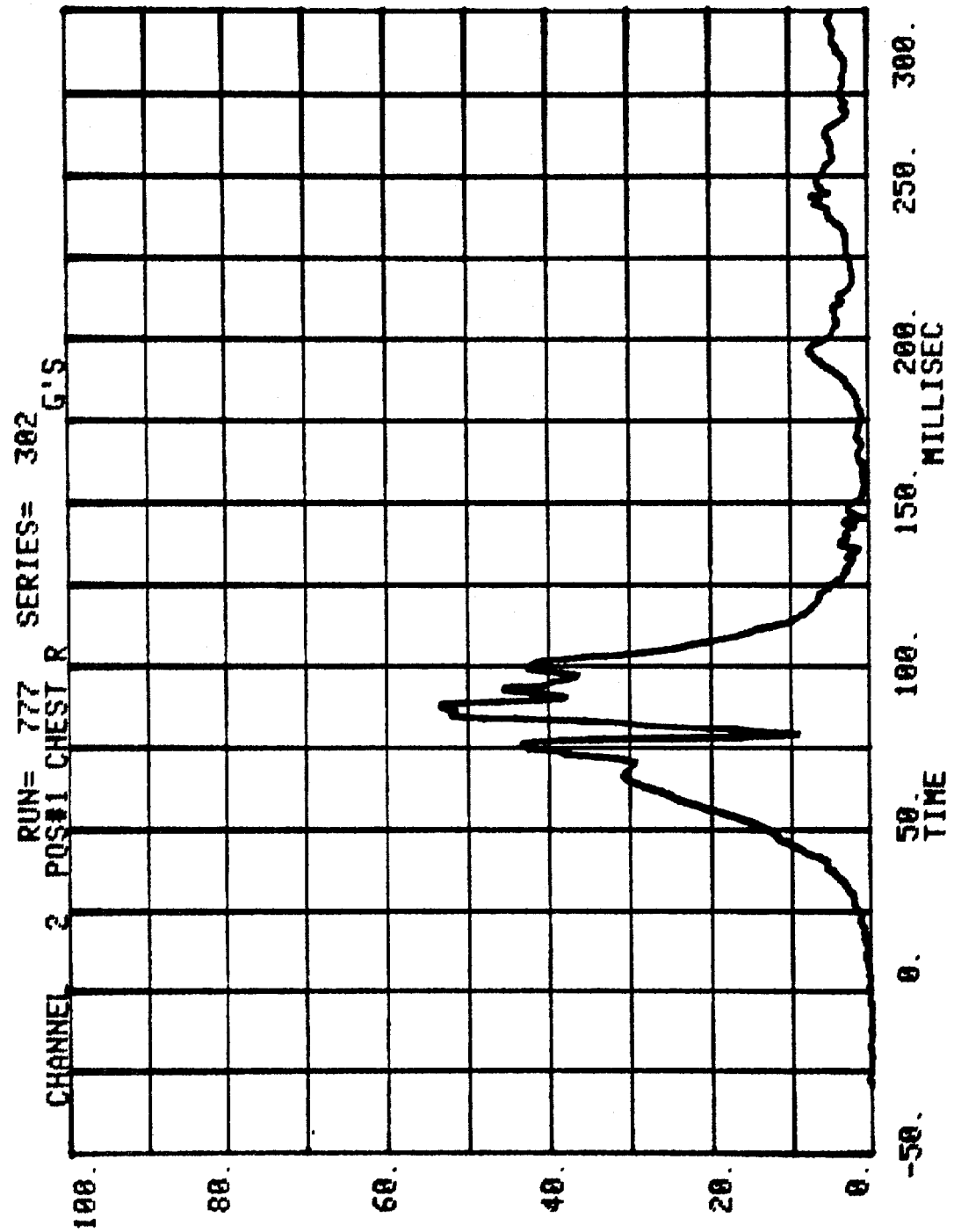
7556-15

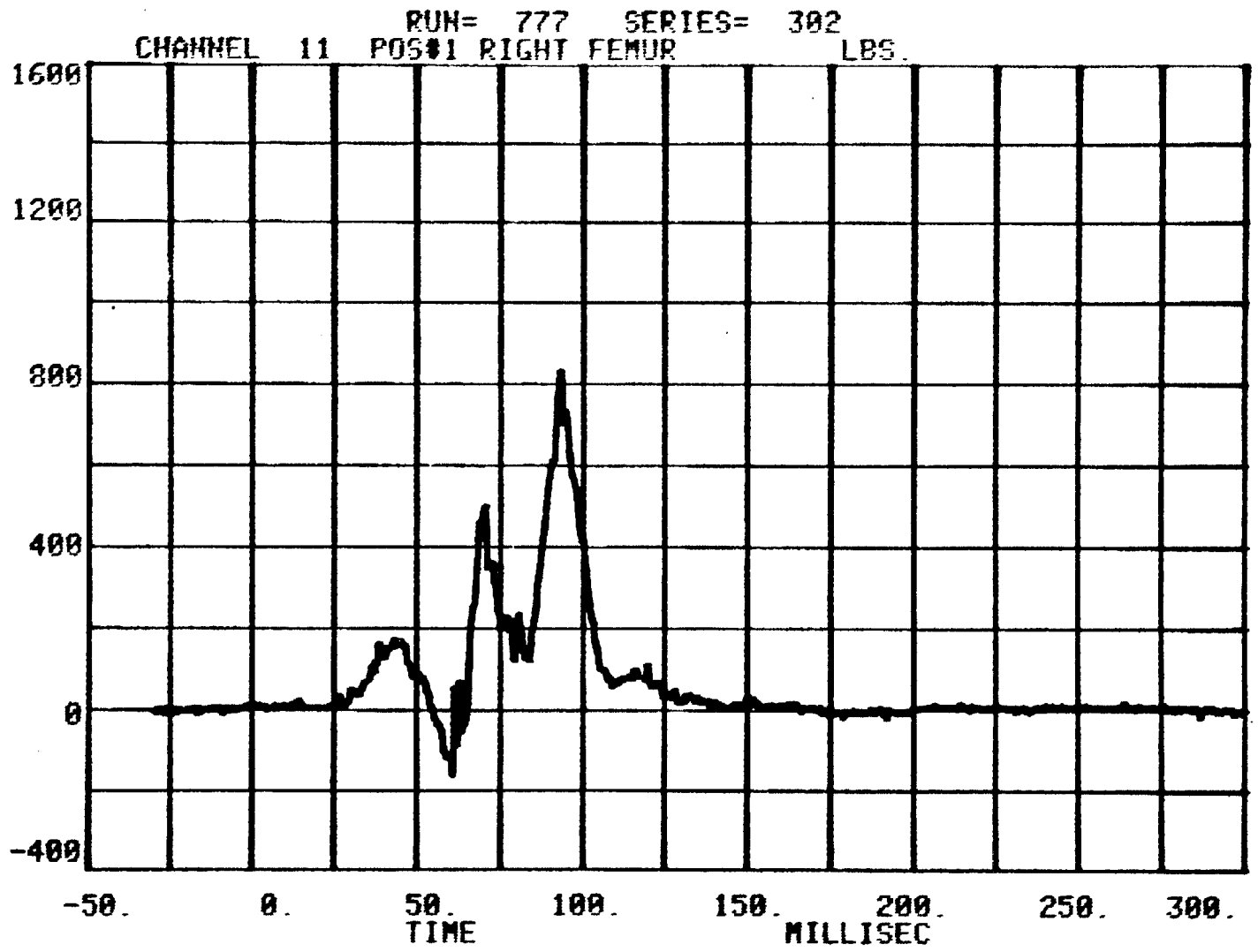

CHANNEL 4 POS#1 CHEST X
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

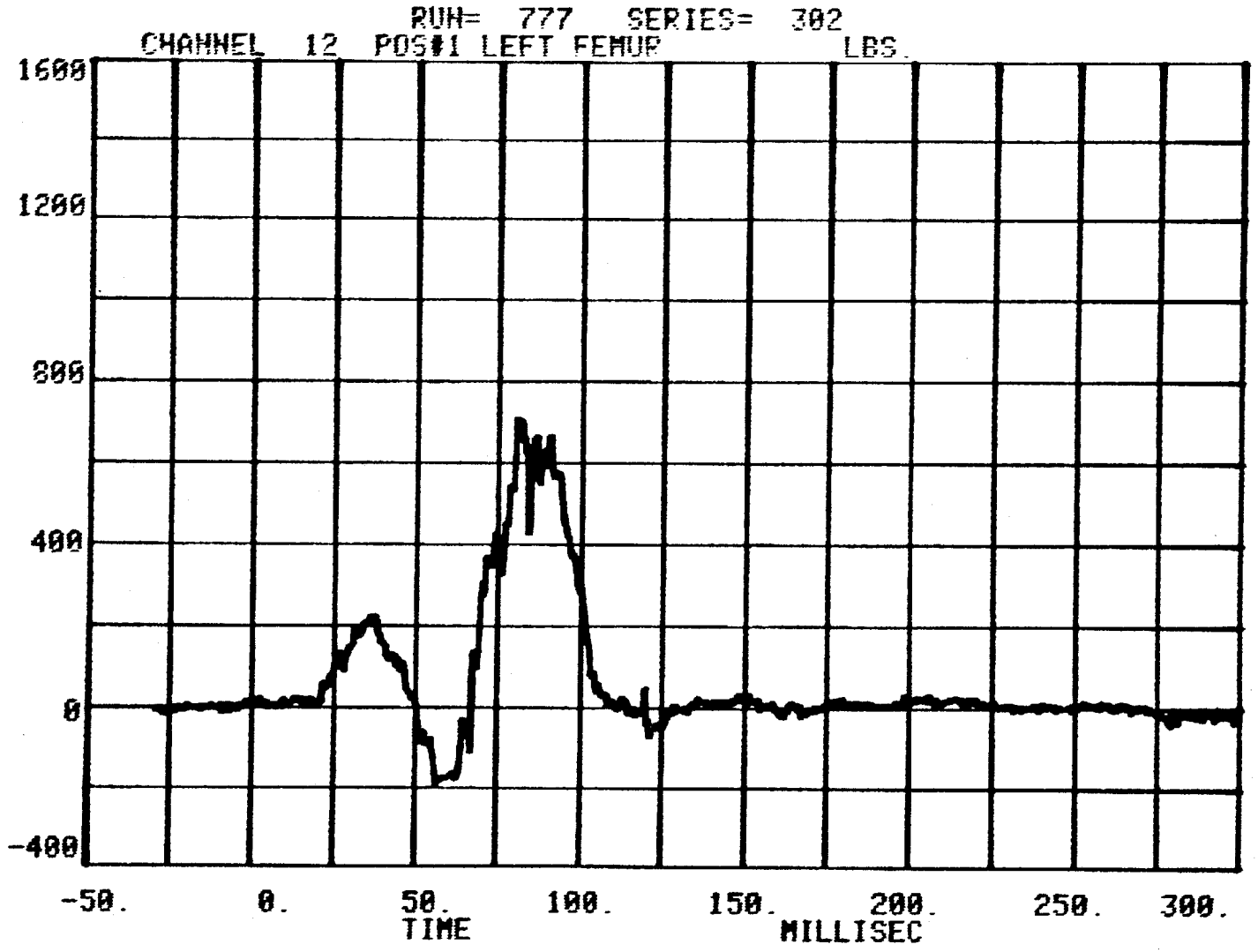

CHANNEL 5 POS#1 CHEST Y
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-15

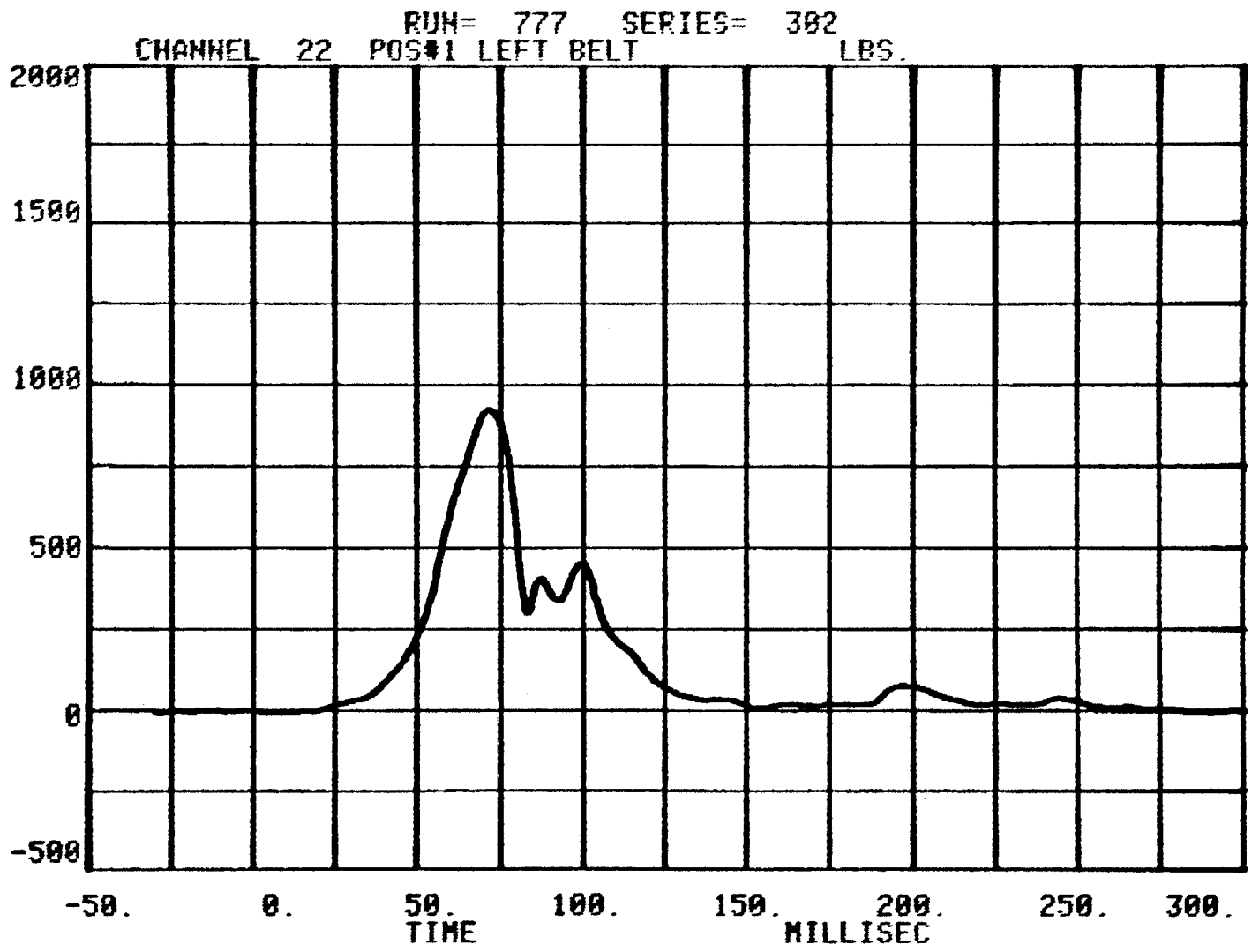

CHANNEL 5 POS#1 CHEST Z
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

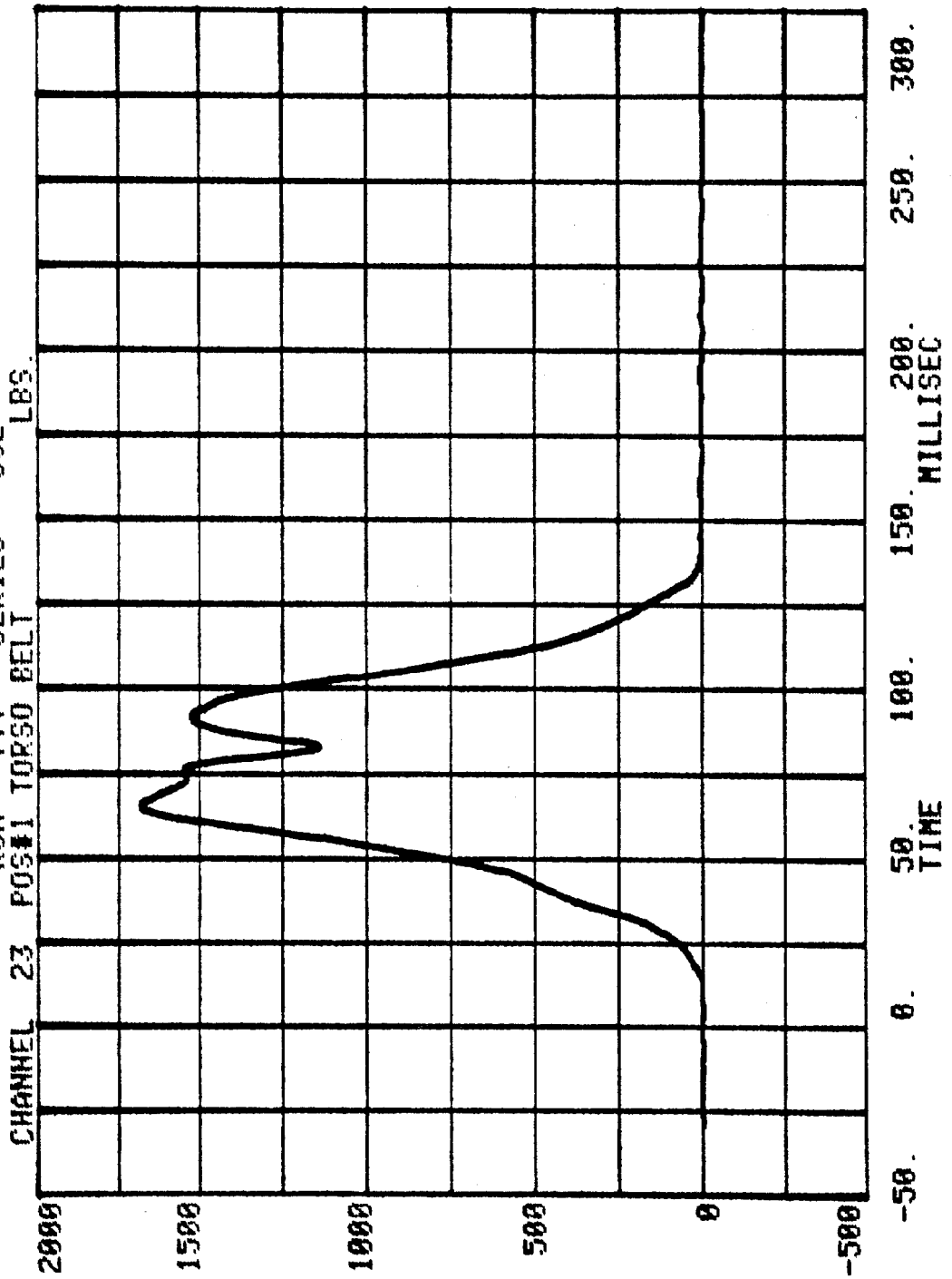

CHANNEL 2 POS#1 CHEST R
RUN= 777 SERIES= 302
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

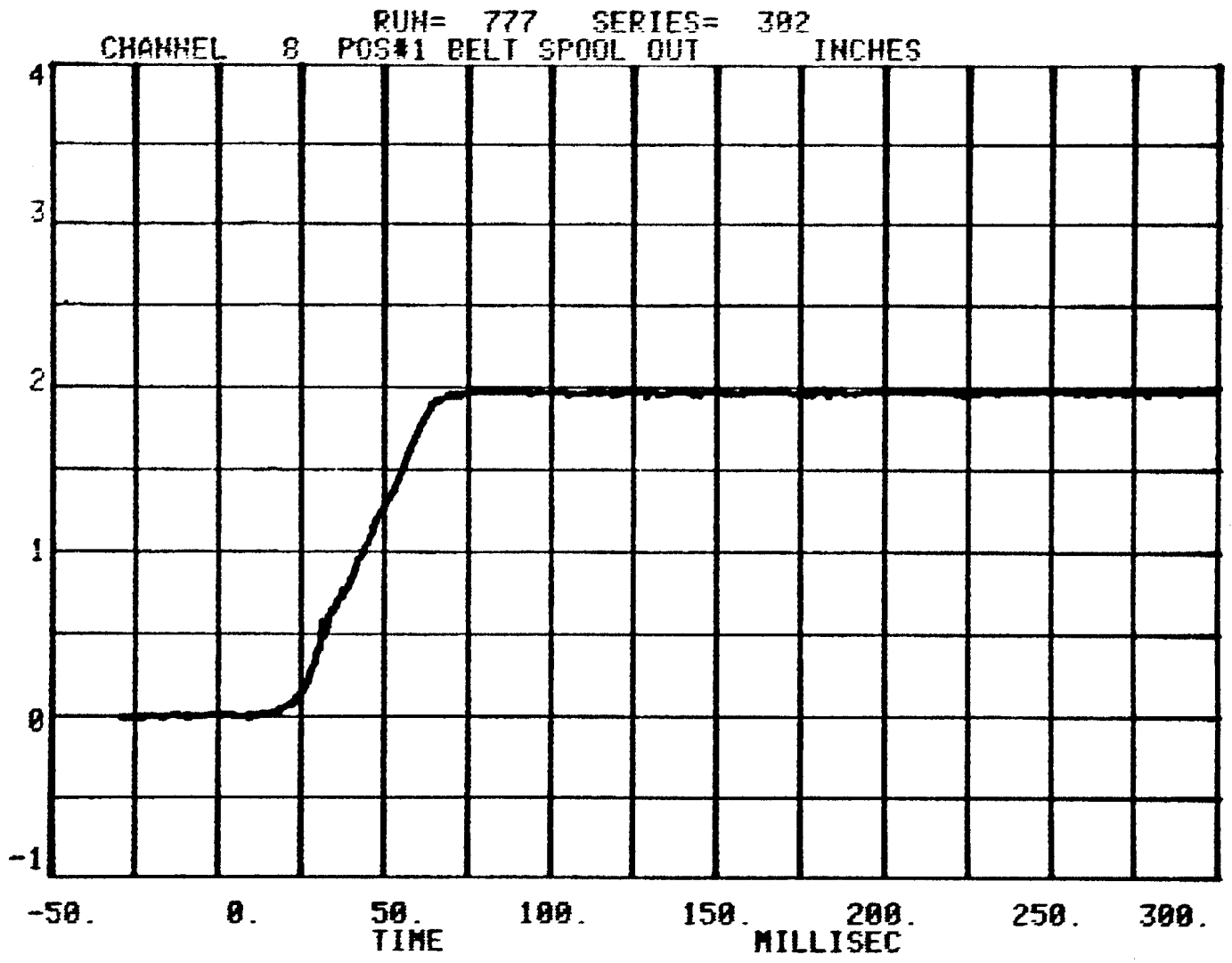

RUN= 777 SERIES= 302
CHANNEL 11 POS#1 RIGHT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

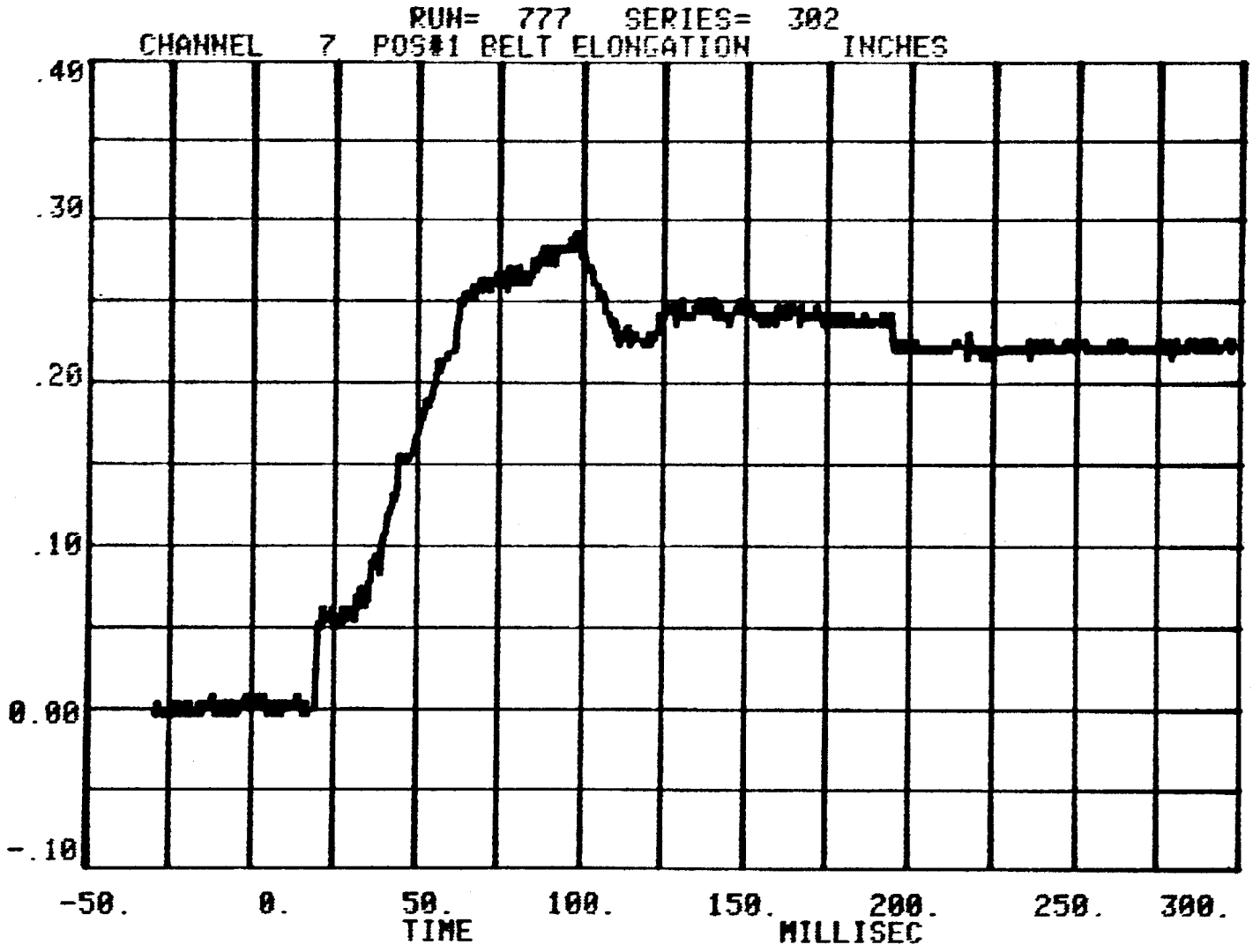

RUN= 777 SERIES= 302
CHANNEL 12 POS#1 LEFT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

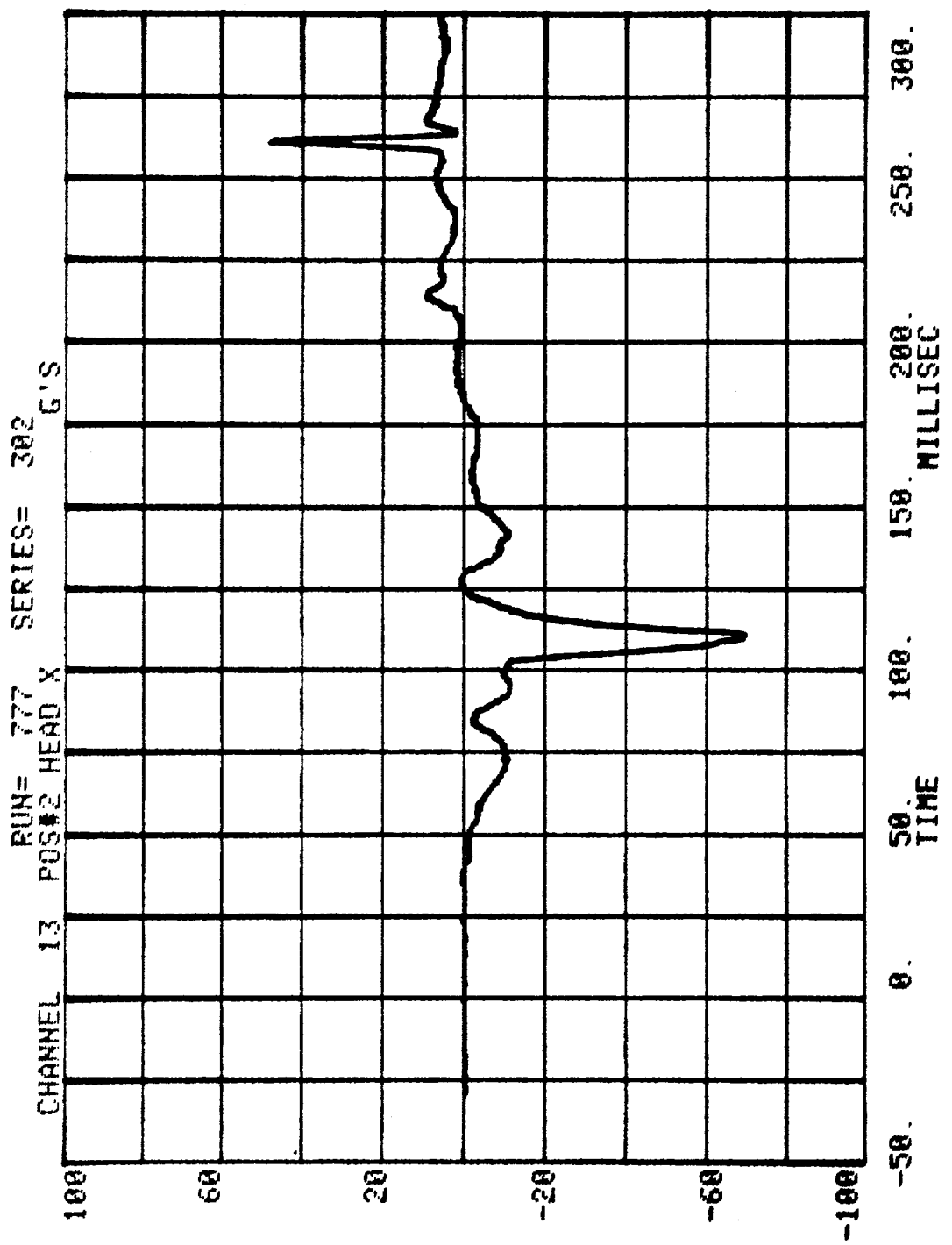
7556-15

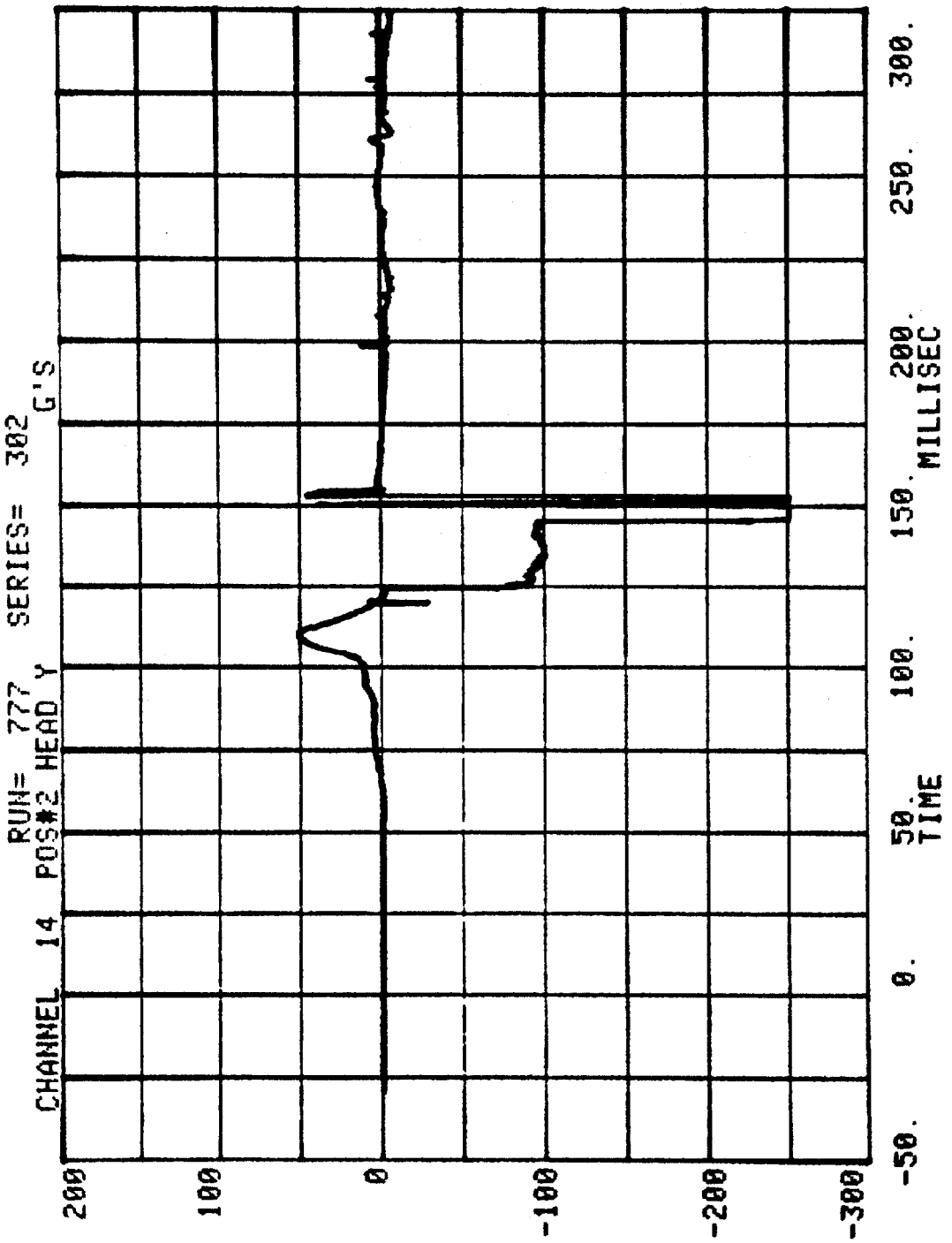

RUN= 777 SERIES= 302
CHANNEL 22 POS#1 LEFT BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

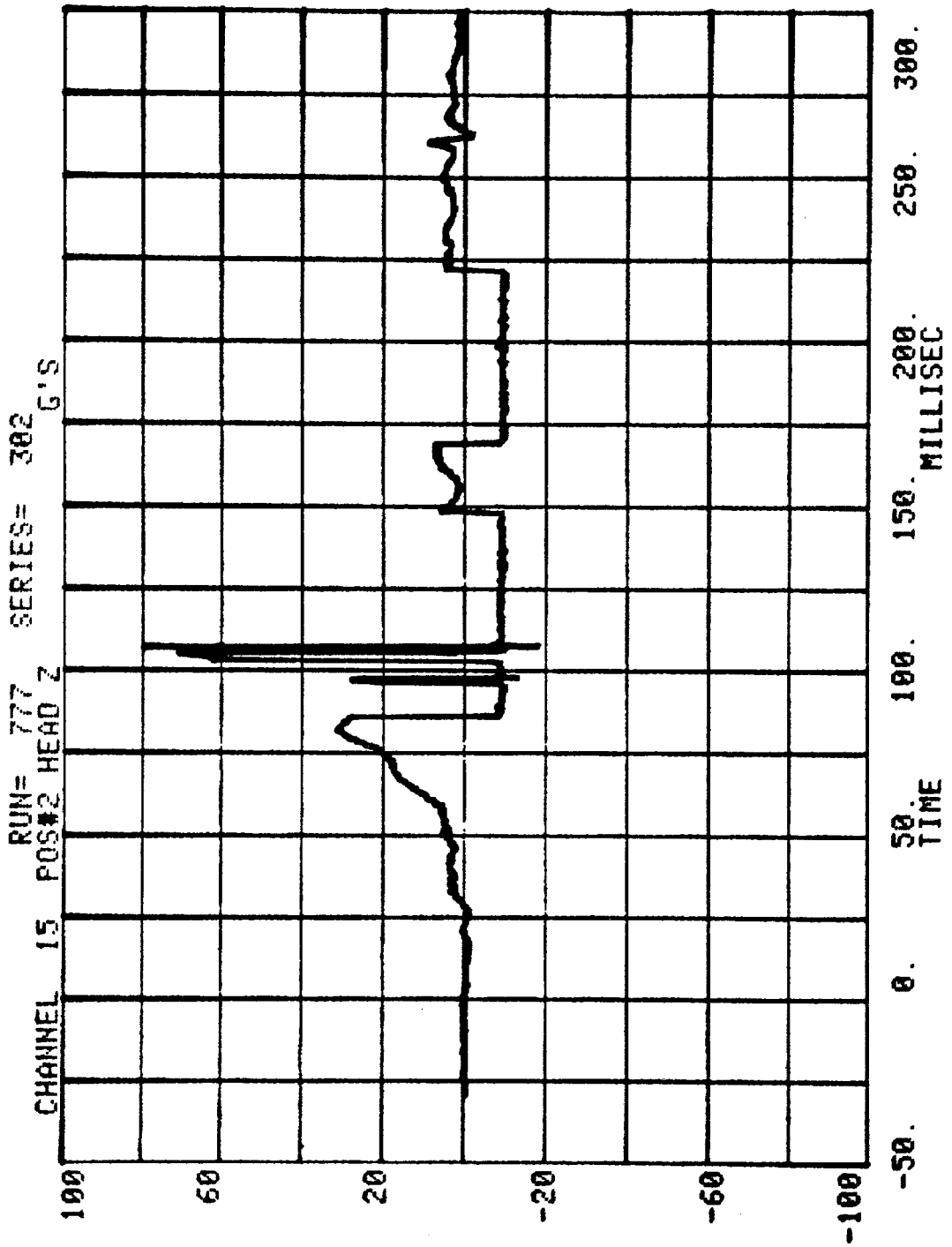

CHANNEL 23
RUN= 777
POS#1 TORSO BELT
SERIES= 302
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 8 POS#1 BELT SPOOL OUT INCHES
4
3
2
1
0
-1
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

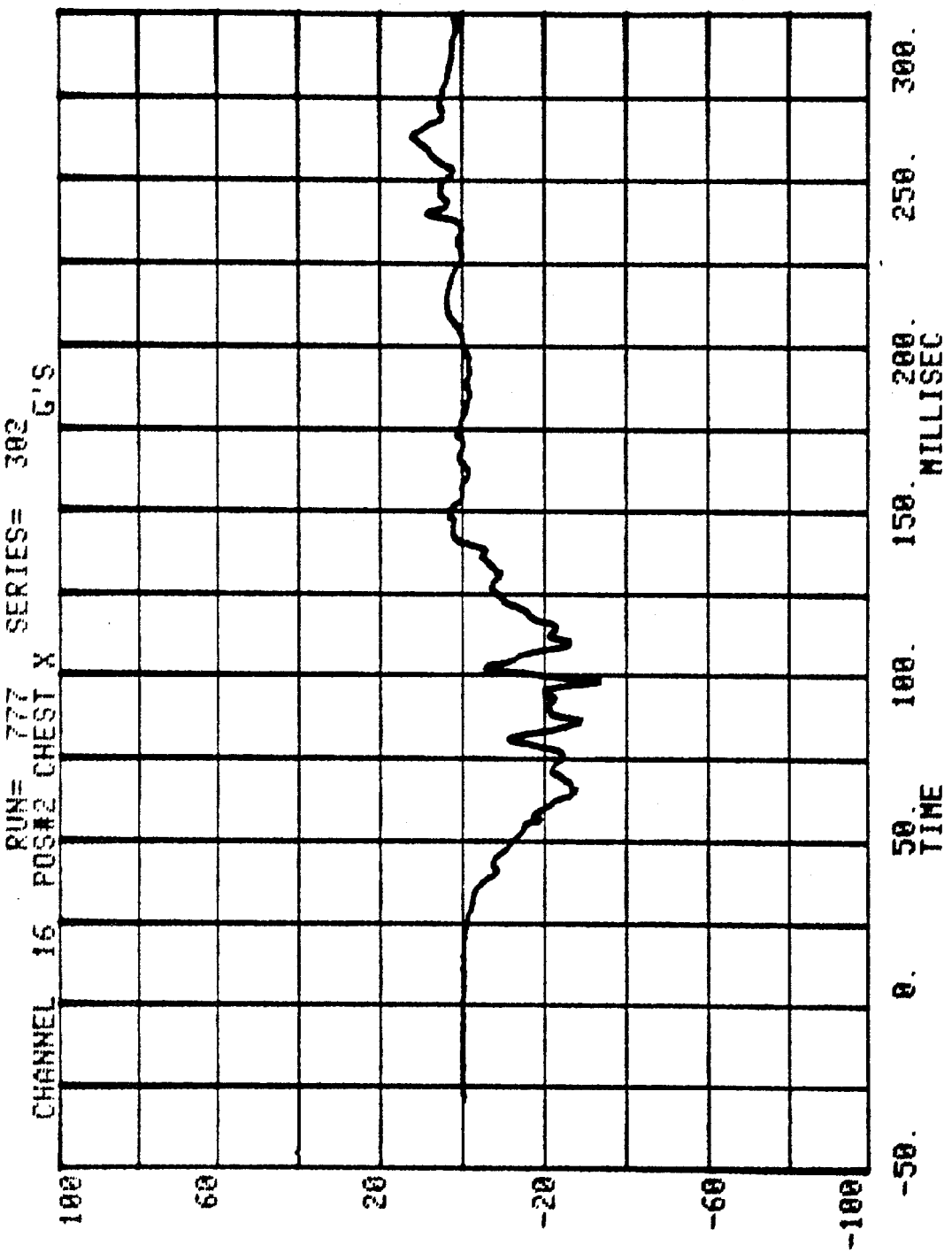

RUN= 777 SERIES= 302
CHANNEL 7 POS#1 BELT ELONGATION INCHES
.40
.30
.20
.10
0.00
-.10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 13 POS#2 HEAD X
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

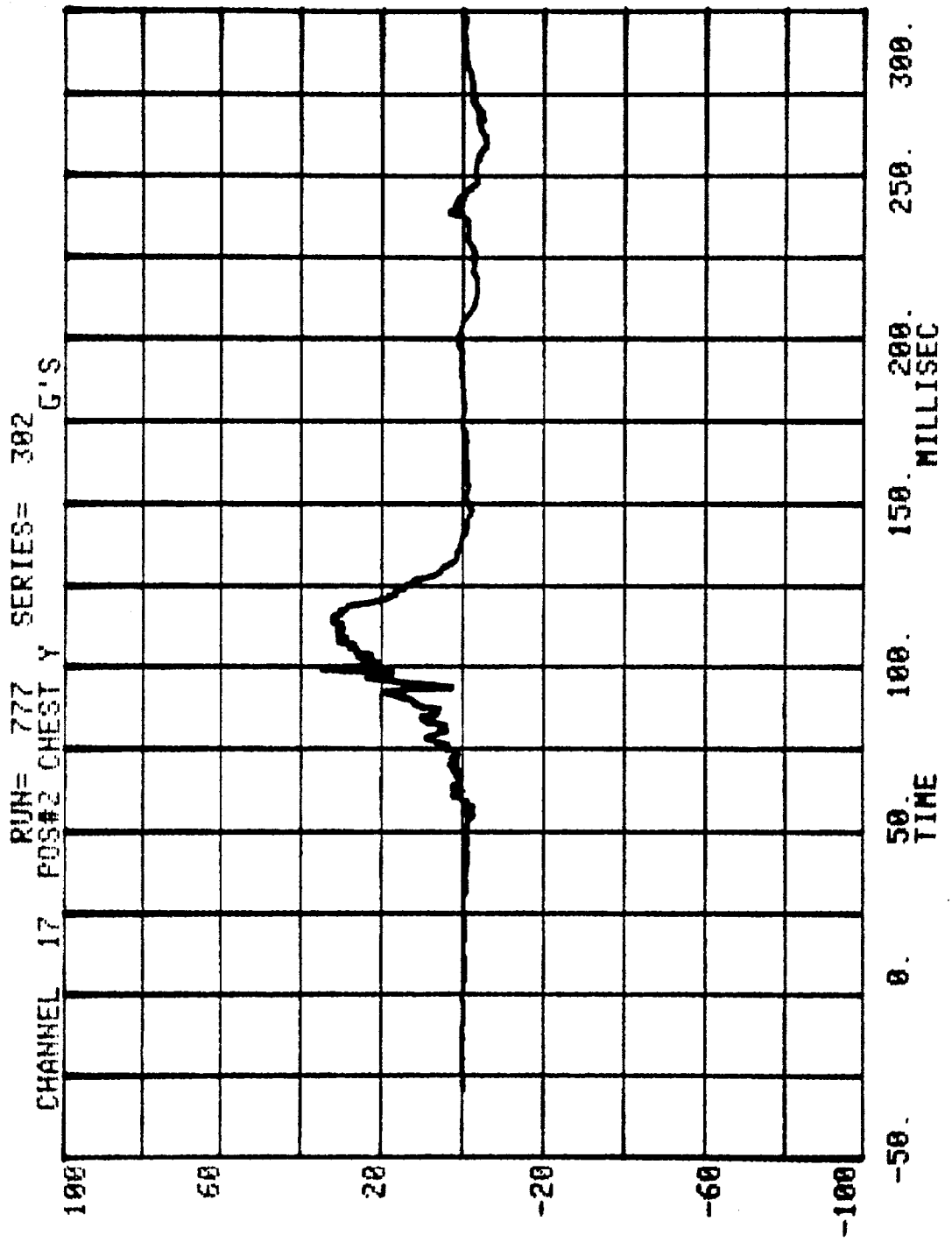

CHANNEL 14 POS#2 HEAD Y
RUN= 777 SERIES= 302 G'S
200
100
0
-100
-200
-300
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

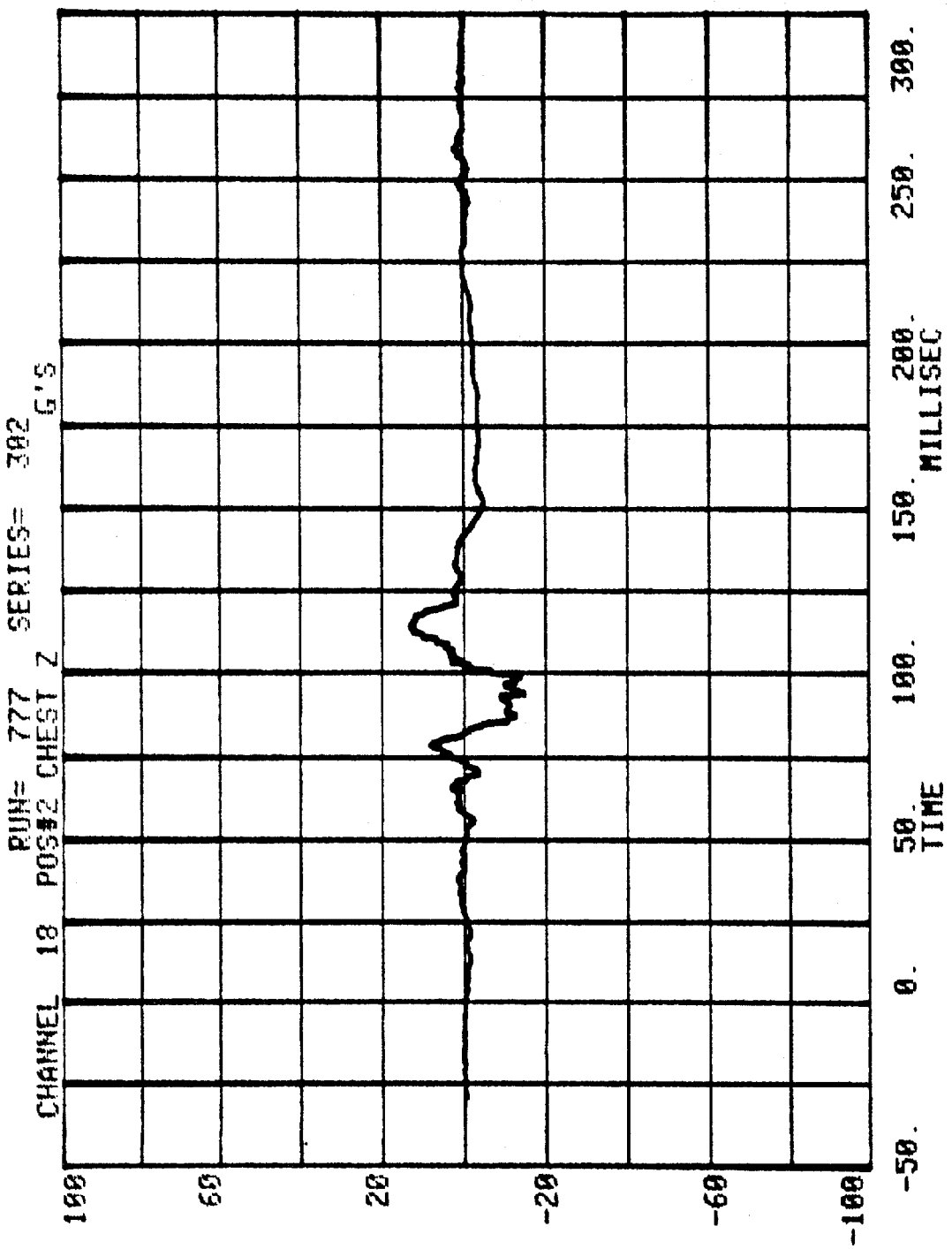

CHANNEL 15 POS#2 HEAD Z
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-15

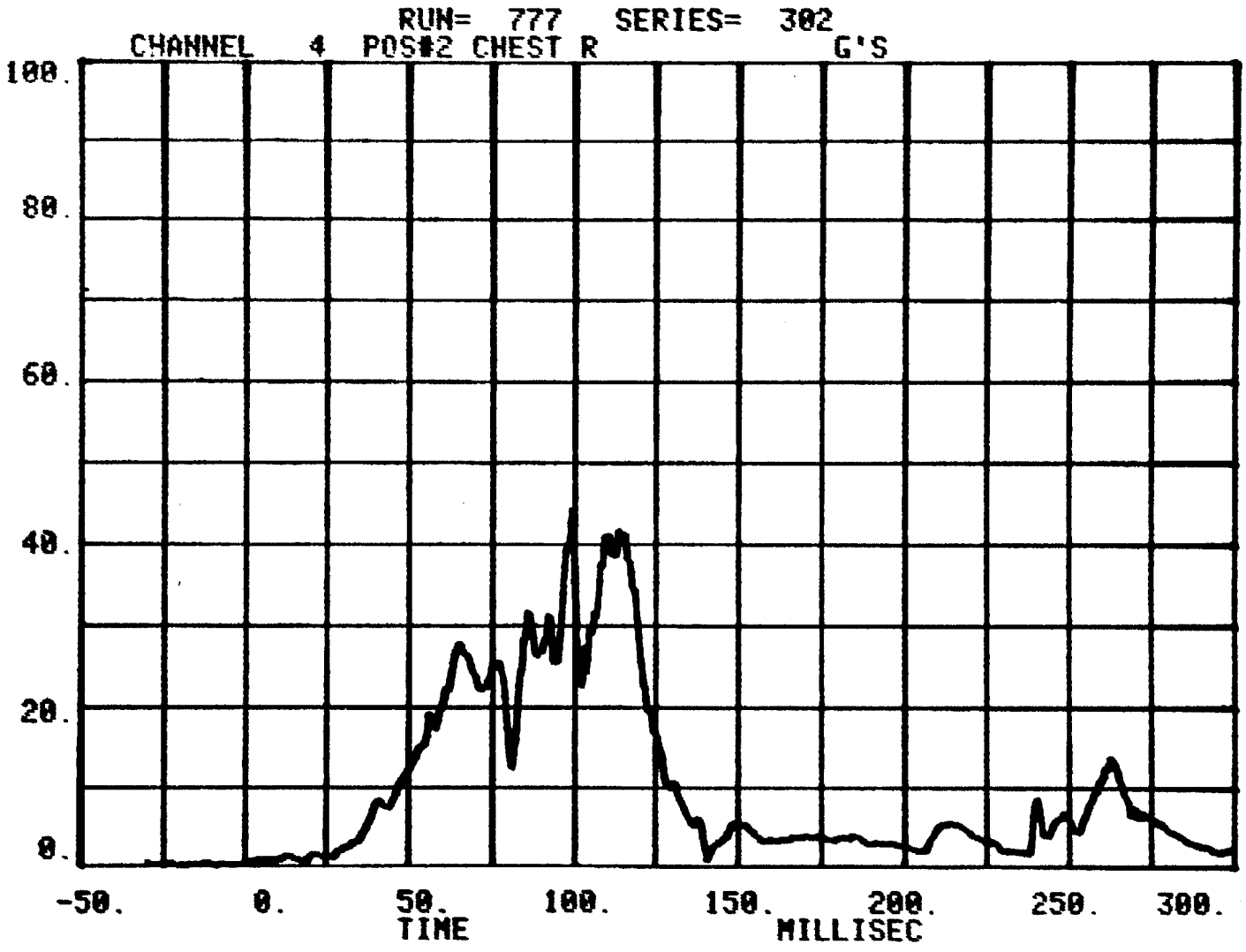

CHANNEL 16 POS#2 CHEST X
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

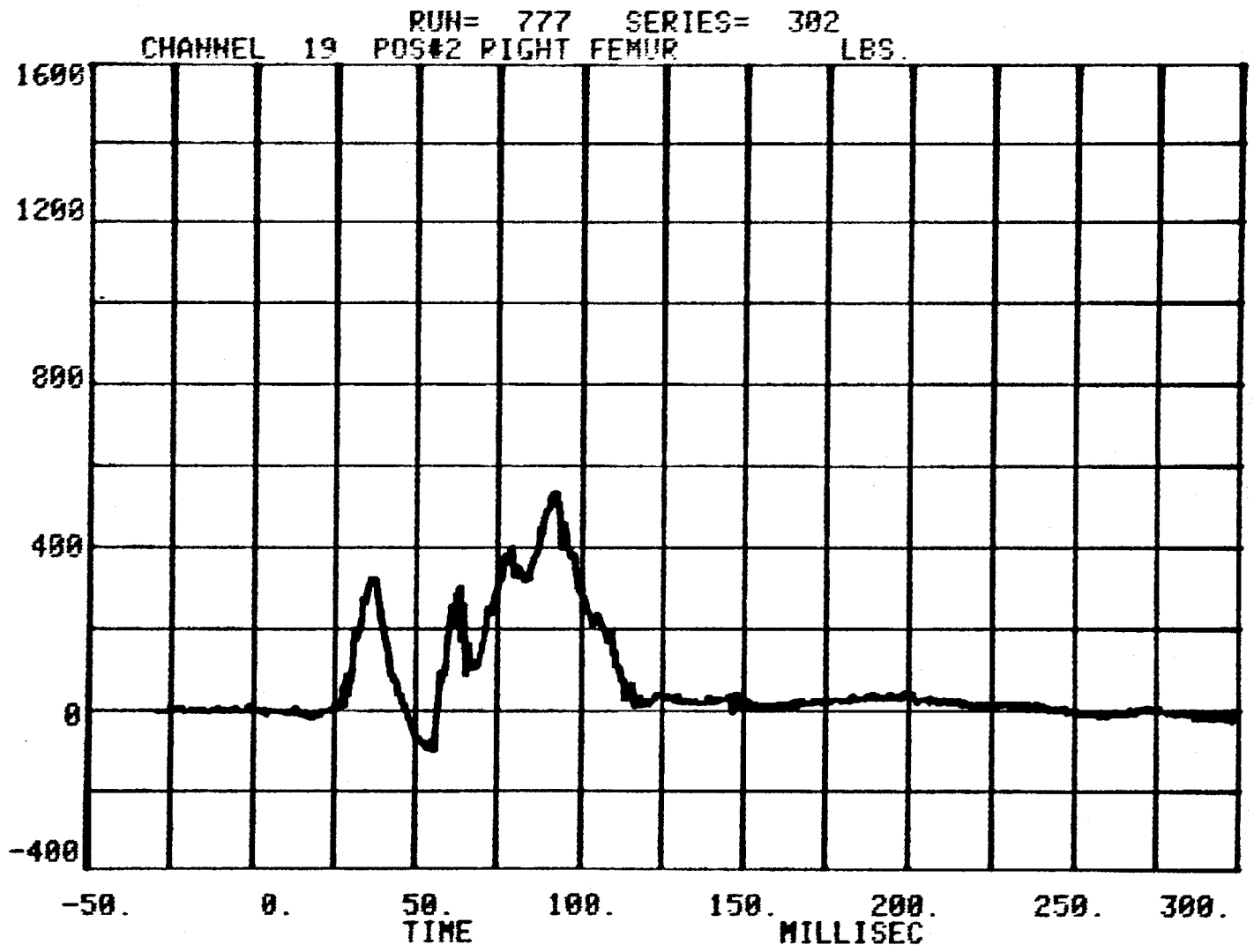
7556-15

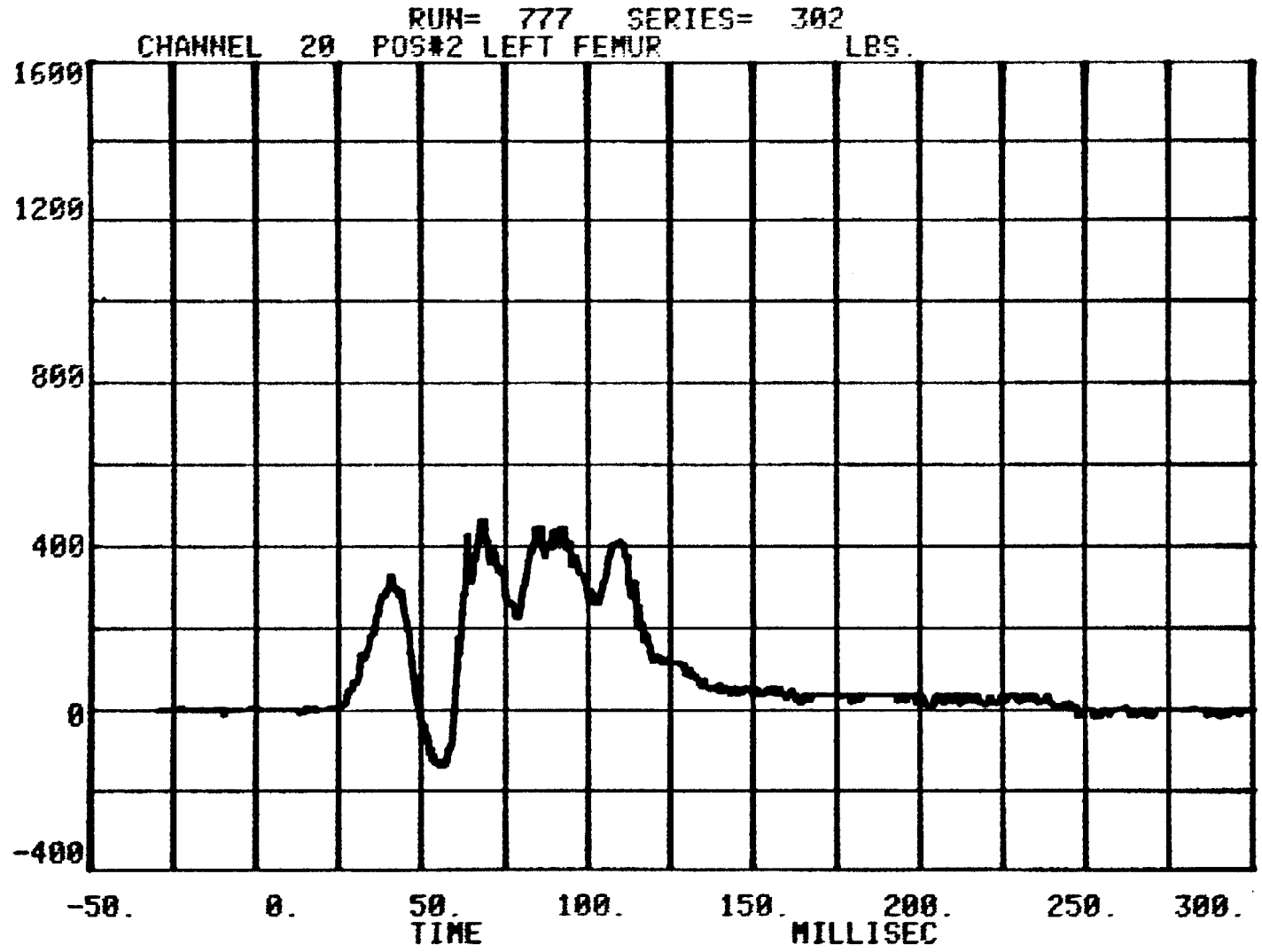

CHANNEL 17 POS#2 CHEST Y
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

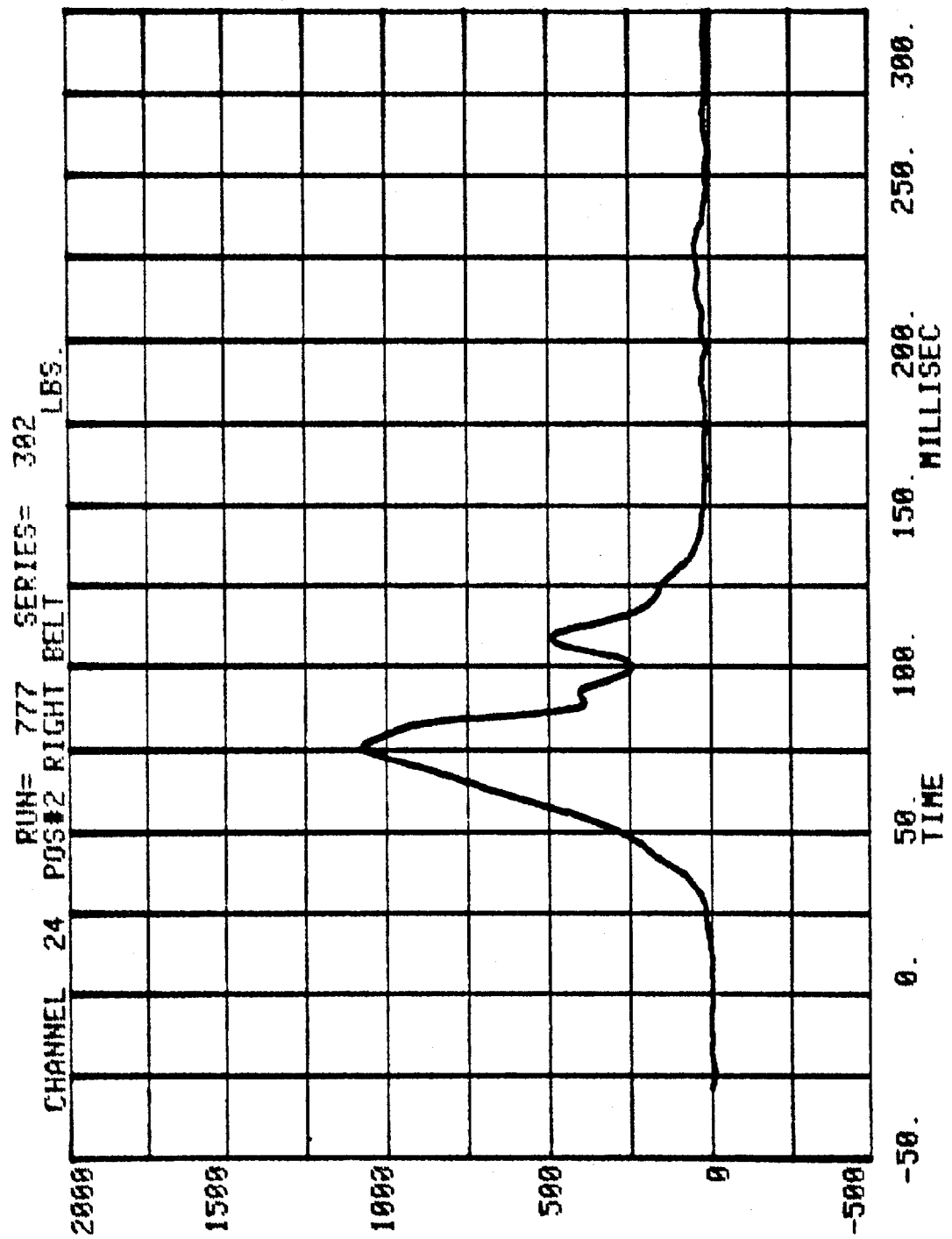

CHANNEL 18 POS#2 CHEST Z
RUN= 777 SERIES= 302
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

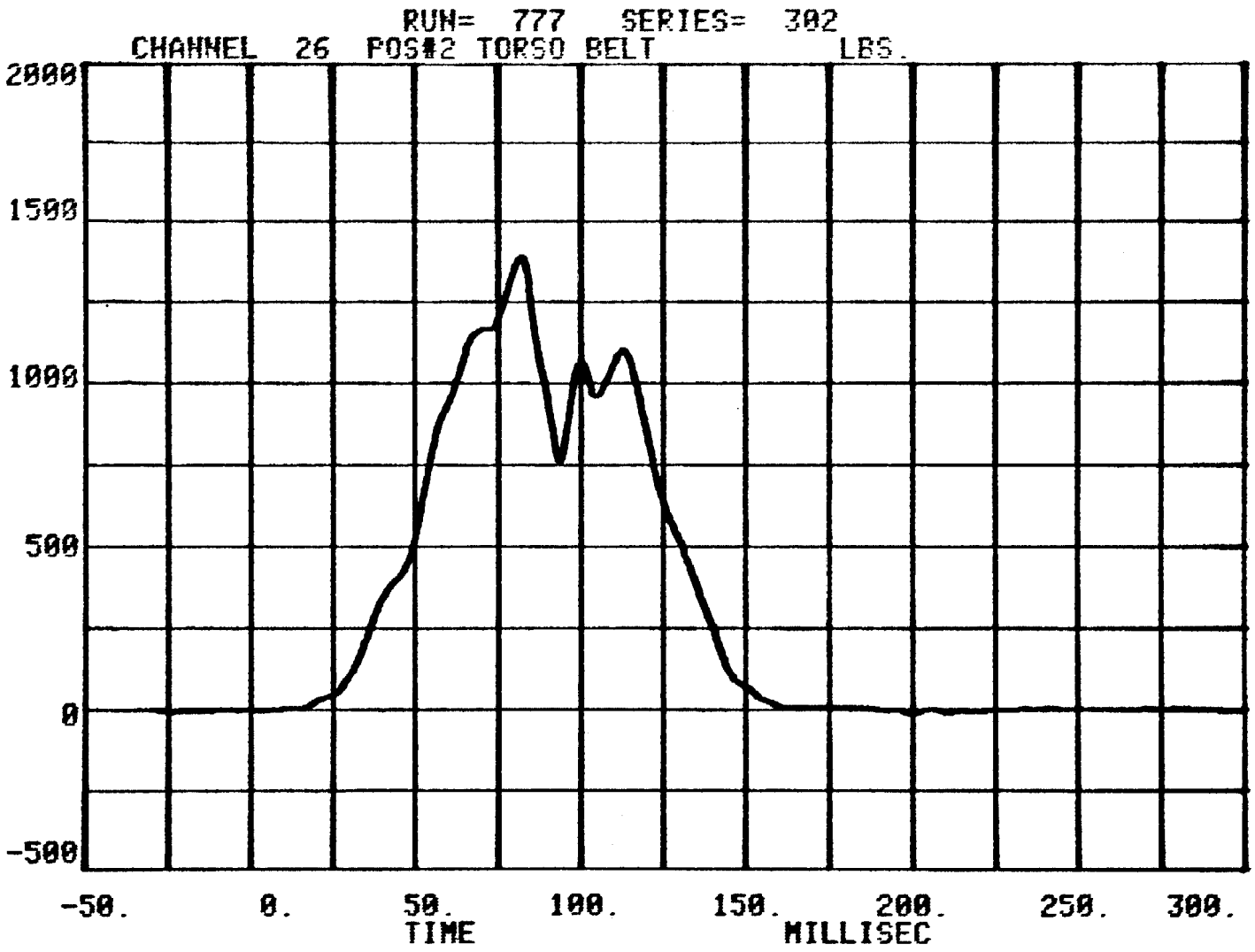
7556-15

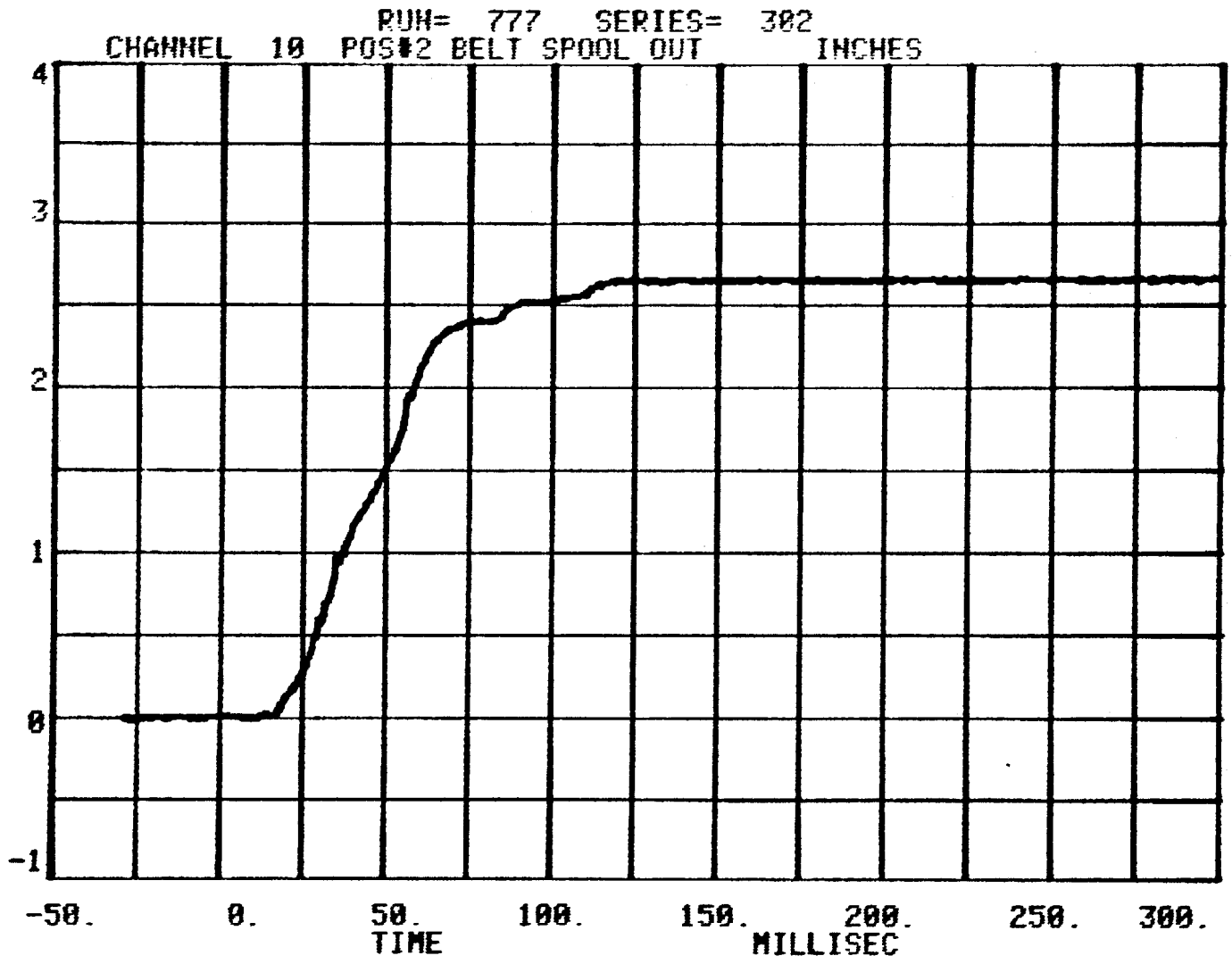

RUN= 777 SERIES= 302
CHANNEL 4 POS#2 CHEST R
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 19 POS#2 RIGHT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

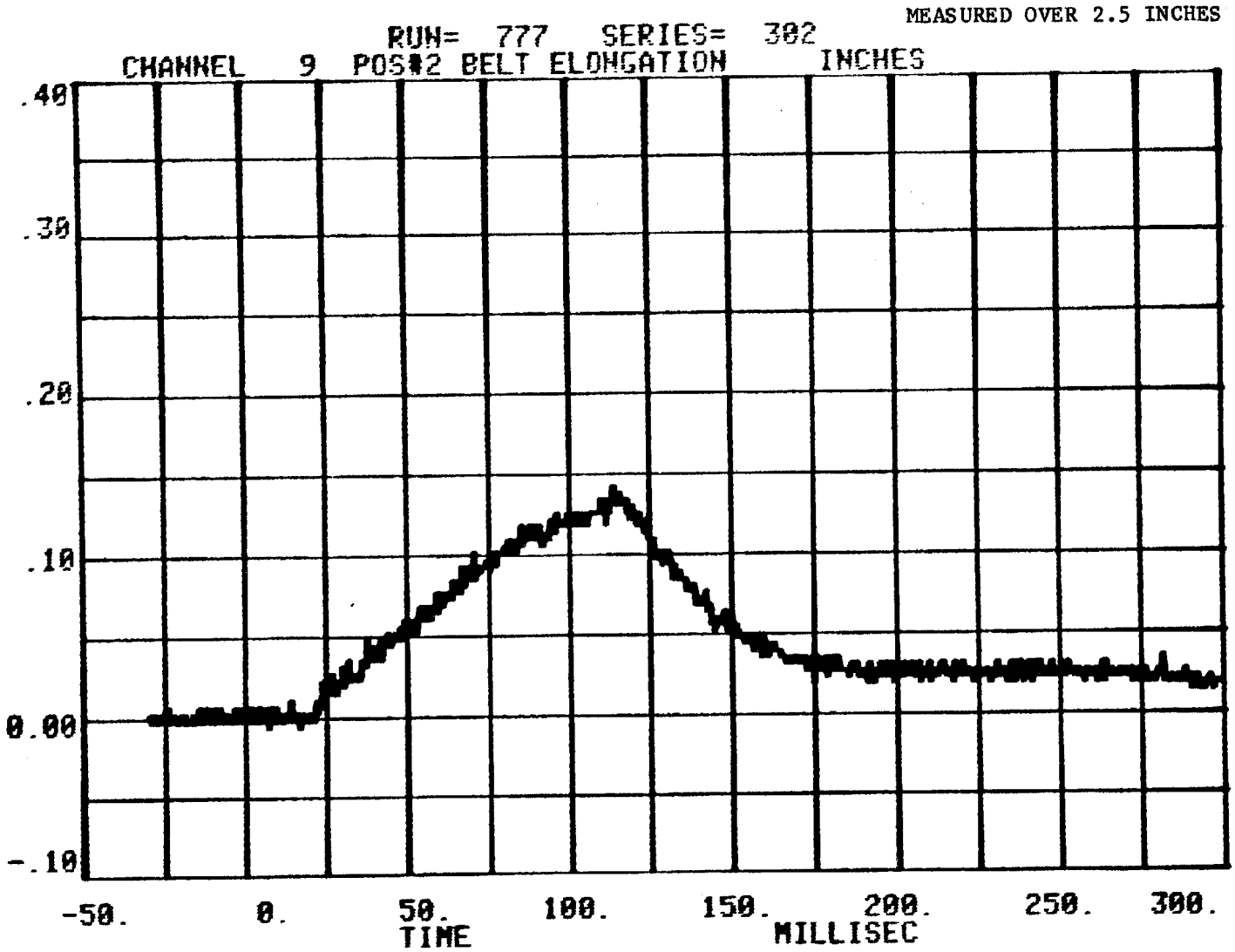

RUN= 777 SERIES= 302
CHANNEL 20 POS#2 LEFT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 24 POS#2 RIGHT BELT
RUN= 777 SERIES= 302
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 26 POS#2 TORSO BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 777 SERIES= 302
CHANNEL 10 POS#2 BELT SPOOL OUT INCHES
4
3
2
1
0
-1
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-15


MEASURED OVER 2.5 INCHES
RUN= 777 SERIES= 302
CHANNEL 9 POS#2 BELT ELONGATION 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 the Appendix.

Dummy serial numbers and certification dates are:

Serial No.	Completion Date
320	5/18/87
749	5/18/87

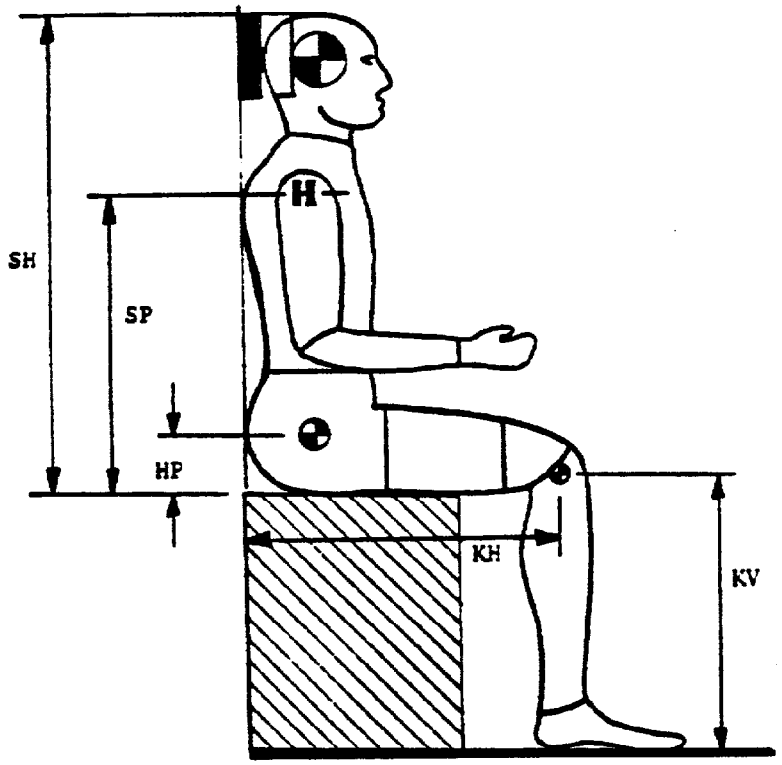
Electronic Test Equipment

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.

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 320

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		5/18/87	
VERIFICATION NUMBER FOR DUMMY*		3	
SH - Seated Height- - - - - - - -	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height- - - -	21.8 to 22.4"	22.0"	
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"	19.5"	
SW - Shoulder Width - - - - - - -	17.8 to 18.4"	18.1"	
HW - Hip Width- - - - - - - - - -	14.0 to 15.4"	14.7"	

TECHNICIAN'S NAME: D. W. Hess

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

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA: NHTSA DUMMY I.D. NO.: 320

TECHNICIAN'S NAME: D. W. Hess

			PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------			5/18/87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*------			3	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			70-78 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			37-43 %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-		210 to 260G	245 g	
b. Peak Lateral Accel.- -		≤ - 10G	6 g	
c. Time above 100G- - - -		0.9 to 1.5ms	1.1 ms	
2. NECK BENDING TEST--				
a. Pendulum Speed - - - -		21.5 to 25.5 fps	23.46 fps	
b. Pend. Avg. Decel. over $t_3 - t_2$		20 to 24G	23 g	
c. Peak Resultant Head Acceleration - - - - -		26G max.	25.5 g	
d. Pendulum Decel.(t_2-t_1)		≤ - 3ms	2 ms	
e. Pendulum Decel.(t_3-t_2)		25 to 30 ms	27.5 ms	
f. Pendulum Decel.(t_4-t_3)		≤ - 10ms	3 ms	
g. Max. Head Rotation - -		63 to 73°	71°	
h. Chordal Displacement--				
Head Rotation Angle-				
0°	Time- -	-2 to 2 ms	0 ms	
	Displ.-	-.5 to .5"	0.0"	
30°	Time- -	25.6 to 34.4ms	28 ms	
	Displ.-	2.1 to 3.1"	2.5"	
60°	Time- -	40.3 to 51.7ms	41 ms	
	Displ.-	4.3 to 5.3"	4.7"	
Maximum (71°)	Time- -	53.2 to 66.8ms	57.5 ms	
	Displ.-	5.0 to 6.0"	5.5"	

*beginning with "1" at the start of each fiscal year's crash test program

II. PERFORMANCE VERIFICATION DATA (Continued) NHTSA DUMMY I.D. NO.: 320

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER		SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. NECK BENDING TEST.... Continued:				
h. Chordal Displacement:				
Head Rotation Angle--				
60°	Time	67.0 to 83.0 ms	72 ms	
	Displ.	4.3 to 5.3 in.	4.5"	
30°	Time	85.4 to 104.6 ms	88 ms	
	Displ.	2.1 to 3.1 in.	2.1"	
0°	Time	101.0 to 123.0 ms	101.5 ms	
	Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5" - - - - -		23 to 36 lbs.	25 lbs.	
b. Force @ .75" - - - - -		36 to 50 lbs.	39.5 lbs.	
c. Force @ 1.0" - - - - -		50 to 63 lbs.	59 lbs.	
d. Force @ 1.3" - - - - -		73 to 88 lbs.	87 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	29.5 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	42 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	53 lbs.	
d. Return Angle - - - - -		12° maximum	3°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - -		21.78-22.22 fps	22.09 fps	
(2) Peak Deflection-		1.7" maximum	1.56"	
(3) Peak Resistive Force- - - - - -		2250 lbs. maximum	2132 lbs.	
(4) Internal Hysteresis - - -		50 to 70%	61.7%	
b. Low Speed				
(1) Probe Speed- - -		13.86-14.14 fps	14.07 fps	
(2) Peak Deflection-		1.1" maximum	.92"	
(3) Peak Resistive Force- - - - - -		1450 lbs. maximum	1274 lbs.	
(4) Internal Hyster.		50 to 70%	57.5%	

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA (Continued) NHTSA DUMMY I.D. NO.: 320

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER	SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
6. KNEE IMPACT TESTS:			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.83 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2110 lbs.	
(3) Time Above 1000#-	1.7 ms minimum	1.76 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.80 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1990 lbs.	
(3) Time Above 1000#-	1.7 ms minimum	1.84 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

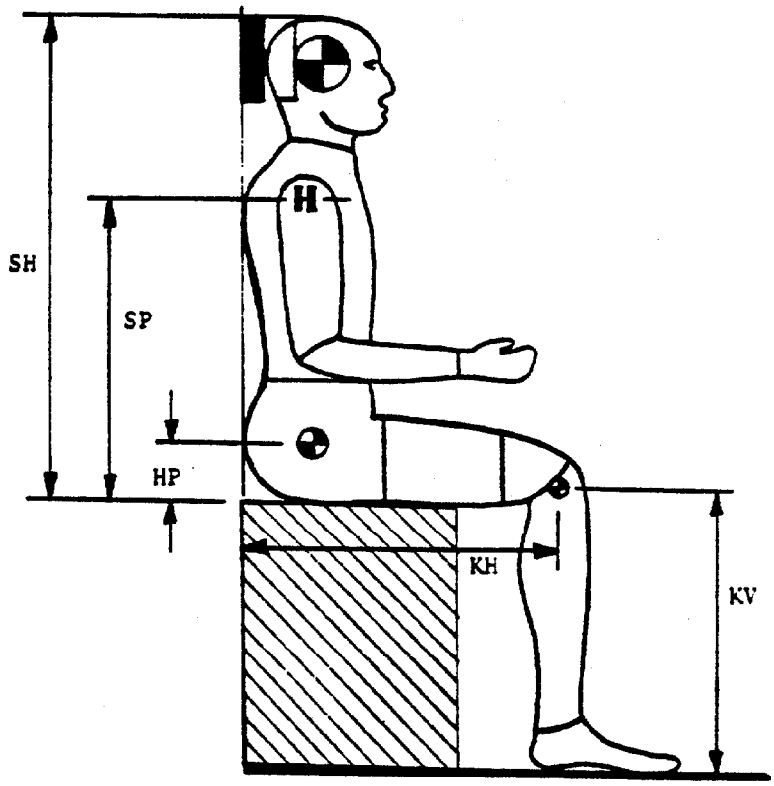
NHTSA DUMMY ID NO. 320 CALIB. SEQ. NOS. FOR DUMMY: 3

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS:				
1. Head Accelerometers --	NA	------	------	------
a. Triaxial unit - - - - -				
b. Uniaxial units				
(1) Longitudinal (A_x) -	Endevco	CJ22	2-87	8-87
(2) Lateral (A_y) - - -		CS41		
(3) Vertical (A_z) - - -		CH31		
2. Chest Accelerometers -- (Vehicle Crash Test Usage)	NA			
a. Triaxial unit - - - - -				
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A73		
(2) Lateral (A_y) - - -	Endevco	CE06		
(3) Vertical (A_z) - - -	CEC	A44		
3. Chest Potentiometer - - -	NA	------	-------	------
4. Femur Load Cells --				
a. Right Side - - - - - -	GSE	549	2-87	8-87
b. Left Side - - - - - -	"	548	2-87	8-87
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - - -	CED	18259	2-87	8-87
2. Test Probe Accelerometer - - -	"	17815	2-87	8-87
3. Lumbar Flexion Test Push Force Gauge - - - - - - - - -	Transducer Inc.	20051	2-87	8-87
4. Abdominal Compression Test Force Gauge - - - - - - - - -	BLH	72952	2-87	8-87
5. Abdominal Compression Test Displacement Gauge - - - - -	CIC	567-11	2-87	8-87

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 749

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		5/18/87	
VERIFICATION NUMBER FOR DUMMY*		3	
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"	20.3"	
KV - Knee Pivot from floor- - - -	19.3 to 19.9"	19.5"	
SW - Shoulder Width - - - - - - -	17.8 to 18.4"	18.1"	
HW - Hip Width- - - - - - - - - -	14.0 to 15.4"	14.4"	

TECHNICIAN'S NAME: D. W. Hess

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

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA: NHTSA DUMMY I.D. NO.: 749

TECHNICIAN'S NAME: D. W. Hess

			PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------			5/18/87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*------			3	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			70-78 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			37-43 %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-		210 to 260G	228 g	
b. Peak Lateral Accel.- -		≤ - 10G	4 g	
c. Time above 100G- - - -		0.9 to 1.5ms	1.08 ms	
2. NECK BENDING TEST--				
a. Pendulum Speed - - - -		21.5 to 25.5 fps	22.82 fps	
b. Pend. Avg. Decel. over $t_3 - t_2$		20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - - -		26G max.	23.5 g	
d. Pendulum Decel.(t_2-t_1)		≤ - 3ms	2 ms	
e. Pendulum Decel.(t_3-t_2)		25 to 30 ms	28 ms	
f. Pendulum Decel.(t_4-t_3)		≤ - 10ms	4.7 ms	
g. Max. Head Rotation - -		63 to 73°	71°	
h. Chordal Displacement-- Head Rotation Angle-				
0°	Time- -	-2 to 2 ms	0.0 ms	
	Displ.-	-.5 to .5"	0.0"	
30°	Time- -	25.6 to 34.4ms	30 ms	
	Displ.-	2.1 to 3.1"	3.0"	
60°	Time- -	40.3 to 51.7ms	46 ms	
	Displ.-	4.3 to 5.3"	5.1"	
Maximum (71°)	Time- -	53.2 to 66.8ms	63 ms	
	Displ.-	5.0 to 6.0"	5.8"	

*beginning with "1" at the start of each fiscal year's crash test program

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA (Continued) NHTSA DUMMY I.D. NO.: 749

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER		SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. NECK BENDING TEST.... Continued:				
h. Chordal Displacement:				
Head Rotation Angle--				
60°	Time	67.0 to 83.0 ms	78 ms	
	Displ.	4.3 to 5.3 in.	4.8"	
30°	Time	85.4 to 104.6 ms	96.5 ms	
	Displ.	2.1 to 3.1 in.	2.4"	
0°	Time	101.0 to 123.0 ms	111.5 ms	
	Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5" - - - - -		23 to 36 lbs.	26 lbs.	
b. Force @ .75" - - - - -		36 to 50 lbs.	39 lbs.	
c. Force @ 1.0" - - - - -		50 to 63 lbs.	55 lbs.	
d. Force @ 1.3" - - - - -		73 to 88 lbs.	80 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20°- - - - - -		22 to 34 lbs.	33.5 lbs.	
b. Force @ 30°- - - - - -		34 to 46 lbs.	45 lbs.	
c. Force @ 40°- - - - - -		46 to 58 lbs.	55 lbs.	
d. Return Angle - - - - -		12° maximum	8°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - -		21.78-22.22 fps	22.18 fps	
(2) Peak Deflection-		1.7" maximum	1.28"	
(3) Peak Resistive Force- - - - - -		2250 lbs. maximum	2132 lbs.	
(4) Internal Hysteresis - - - -		50 to 70%	67.0%	
b. Low Speed				
(1) Probe Speed- - -		13.86-14.14 fps	14.07 fps	
(2) Peak Deflection-		1.1" maximum	.92"	
(3) Peak Resistive Force- - - - - -		1450 lbs. maximum	1300 lbs.	
(4) Internal Hyster. -		50 to 70%	68.4%	

II. PERFORMANCE VERIFICATION DATA (Continued) NHTSA DUMMY I.D. NO.: 749

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER	SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
6. KNEE IMPACT TESTS:			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.02 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2290 lbs.	
(3) Time Above 1000#-	1.7 ms minimum	1.84 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.03 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2320 lbs.	
(3) Time Above 1000#-	1.7 ms minimum	1.8 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 749 CALIB. SEQ. NOS. FOR DUMMY: 3

	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	2-87	8-87
(2) Lateral (A_y) - - -	"	CK78	2-87	8-87
(3) Vertical (A_z) - - -	"	CD75	2-87	8-87
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	------	------	------
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A52	2-87	8-87
(2) Lateral (A_y) - - -	Endevco	CL65	2-87	8-87
(3) Vertical (A_z) - - -	CEC	A90	2-87	8-87
3. Chest Potentiometer - - -	NA	------	------	------
4. Femur Load Cells --				
a. Right Side - - - - - -	GSE	77	2-87	8-87
b. Left Side - - - - - -	"	76	2-87	8-87
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - - -	CED	18259	2-87	8-87
2. Test Probe Accelerometer - - -	"	17815	2-87	8-87
3. Lumbar Flexion Test Push Force Gauge - - - - - - - - -	Transducer Inc.	20051	2-87	8-87
4. Abdominal Compression Test Force Gauge - - - - - - - - -	BLH	72952	2-87	8-87
5. Abdominal Compression Test Displacement Gauge - - - - -	CIC	567-11	2-87	8-87

APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

SAFETY BELTS

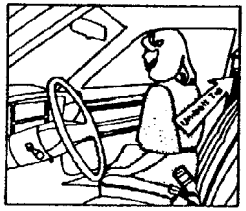
Always use the safety belts. The chance of a serious injury is greatly reduced when the belts are properly used.

Safety belts provide protection against being thrown from the vehicle as well as reducing the risk of an injury caused by striking the interior of the vehicle.

Front Seats

The "UNIBELT", or single continuous-belt restraint system, is installed for the driver and front seat passenger. The unibelt system incorporates an inertia sensitive belt webbing retractor which is designed to lock (i.e., prevent belt travel) *only during very sudden stops or impacts.* This feature allows the shoulder belt to move freely with the wearer under normal conditions. *The retractor will not lock by jerking or pulling the webbing rapidly by hand.*

UNIBELT OPERATING INSTRUCTIONS



1

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

2. Grasp the metal tip and slide it up the webbing as far as necessary to go around your lap as you pull out the webbing. A couple of tries and this will become an automatic one handed operation.

2

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

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

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

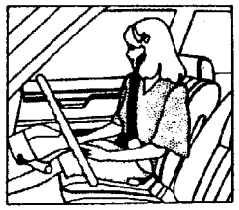
3

4. Position the lap belt with the upper edge of the belt drawn across the thighs and snug against the hips. Slack will automatically be removed due to tension created by the retractor. If a snug fit in the lap belt portion is desired, pull up on the shoulder belt as shown. *A snug belt reduces the risk of sliding under the belt in a collision.*

4

5. On 2-Door models only, if the shoulder belt feels too tight, move your shoulder forward slightly, or withdraw an inch or less of webbing by giving a slight tug on the belt.

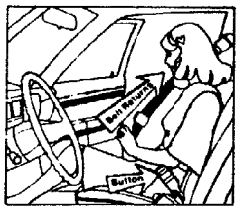
The belt will retain the small amount of slack necessary for comfort when you return to your normal seating position. If the belt is still too tight, pull out 6 to 8 inches of webbing, let it return to your chest and repeat the above motion.



5

CAUTION: *The amount of slack in the shoulder belt should be kept to a minimum. Too much slack could reduce the amount of protection because the belt may not be able to properly restrain you in an accident.*

The shoulder belt will allow unrestricted movement of the upper body under normal conditions. Extreme movements will probably require resetting the slack in the shoulder belt. The belt will lock in the event of an accident.



6

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

If needed, slide the tip down the webbing to allow the belt to fully retract.