DOT 1010

REPORT NO. CAL-87-N04

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST
CHRYSLER CORPORATION
1987 DODGE DAKOTA
2-DOOR PICKUP

NHTSA NO. MH0303

CALSPAN TEST NO. 7556-4

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

MARCH 18, 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)
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Prepared: Walter E. Levan
Walter E. Levan, Project Engineer

Approved: Donald A Alianello
Donald A. Alianello, Program Manager
Transportation Research/
Physical Sciences Department

FINAL REPORT ACCEPTED BY:

C. R. Juarles
Manager, New Car Assessment Program (NCAP)

JUN 11 1987
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NHTSA New Car Assessment Program (NCAP) Frontal Barrier Impact Test on 1987 Dodge Dakota 2-Door Pickup to Indicant Requirements of FMVSS 212, 219 (Partial) and 301-75.	March 18, 1987
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16. Abstract

A frontal load cell barrier test of a 1987 Dodge Dakota 2-Door Pickup was performed at the Calspan Corporation, Advanced Technology Center crash test facility in Buffalo, New York, on March 18, 1987.

Impact speed was 35.0 mph, and the ambient temperature at the barrier face at the time of impact was 47°F. The maximum post-test vehicle crush was 25.3 inches.

The test vehicle appeared to comply with the indicant requirements of the following Federal Motor Vehicle Safety Standard.

1. FMVSS No. 212, "Windshield Mounting"
2. FMVSS No. 219 (Partial), "Windshield Zone Intrusion"
3. FMVSS No. 301-75, "Fuel System Integrity"

Type of Restraint System - 3-point continuous webbing manual system at each front outboard seating position.

17. Key Words	18. Distribution Statement
35 mph Frontal Barrier Impact Test **New Car Assessment Program (NCAP)** **FMVSS 212 Indicant Testing** **FMVSS 219 (Partial) Indicant Testing** **FMVSS 301-75 Indicant Testing**	**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**

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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 FMVSS 212/219/301-75 requirements.

The 35 mph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test Procedure. Standards Enforcement Indicant Test Program data for FMVSS No. 212, "Windshield Mounting," FMVSS No. 219 (Partial), "Windshield Zone Intrusion," FMVSS No. 301-75, "Fuel System Integrity," as well as occupant performance data are provided herein.

Section 2

SUMMARY OF TEST NUMBER MH0303

A load cell barrier consisting of 36 load cells was impacted by a 1987 Dodge Dakota 2-Door Pickup at a velocity of 35.0 mph. A test was performed at the Calspan Corporation Advanced Technology Center on March 18, 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 16 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. The Right Front Passenger ATD (Serial 1020) had been used in two previous tests (MH0502 and MH0200) and the Injury Criteria Values were not exceeded in these tests. The Driver ATD (Serial 1019) was certified prior to the test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 67 channels of data were recorded in 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 985. The maximum chest deceleration over 3 milliseconds was 44 g's and femur loads were 213 and 324 pounds.

The right-front passenger HIC was 754 and maximum chest deceleration over 3 milliseconds was 41 g's. Femur loads were 460 and 442 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1987 Dodge Dakota Pickup

NHTSA NO.: MH0303 VIN.: 1B7EN14C5HS429863

BODY COLOR: RED DATE OF MANUFACTURE: 2-87

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

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

Date Received: 3/2/87 Odometer Reading: 17
- A/C; X P/S; - P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint: 3-point continuous manual belt system

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

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

Recommended Tire Size: P185/75R-14

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

Tires on Vehicle: P195/75R-14 ; Manufacturer: Goodyear

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

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

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

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

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

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

GVWR 3790 lbs. GAWR: Front 2050 lbs. Rear 2050 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 = 800 lbs. Right Rear = 690 lbs.

Left Front = 810 lbs. Left Rear = 710 lbs.

TOTAL FRONT WEIGHT = 1610 lbs. (53.5 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1400 lbs. (46.5 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 3010 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (3010 lbs.)

VCW = Vehicle Capacity Weight (- lbs.)

DSC = Designated Seating Capacity (3)

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

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

Target Test Weight = 3638 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 102 POUNDS CARGO:

Right Front = 880 lbs. Right Rear = 940 lbs.

Left Front = 880 lbs. Left Rear = 940 lbs.

TOTAL FRONT WEIGHT = 1760 lbs. (48.4 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1880 lbs. (51.6 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3640 lbs.

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

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude:	RF	30.7	LF	31.0	RR	32.5	LR	32.2
Test Attitude:	RF	30.1	LF	30.3	RR	31.1	LR	30.7

Wheel Base: 111.7 in.; C.G. = 57.7 in. rearward of front wheel C/L

Remarks: Vehicle was delivered without owner's manual, warranty or consumer information papers.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier **Impact Angle:** 0 °

Date of Test: 3/18/87 **Time of Test:** 1225

Ambient Temperature: 47 °F at impact area

Temperature in Occupant Compartment: 71 °F.

Windshield Molding Temperature: 69 °F.

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 35.0 mph, secondary = 34.9 mph

Distance From Front Bumper to Barrier Face When Entering Speed Trap: 52 inches; **Exiting Speed Trap:** 40 inches

VEHICLE REBOUND AND CRUSH (inches):

		R	C_L	L
Vehicle Length:	**Pre-test** =	181.7	184.3	181.5
	Post-test =	159.6	159.0	158.7
	Crush =	22.1	25.3	22.8

Distance from front of test vehicle to point of impact:

R 9.3 **C/L** 7.7 **L** 9.4

VISIBLE DUMMY CONTACT POINTS:

	Driver	**Passenger**
Head	Upper Rim and Hub	Slight Right Knee Contact
Chest	None	None
Abdomen	None	None
Left Knee	Dash Panel	Glove Box Door
Right Knee	Dash Panel	Glove Box Door

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front	
	Left	Right
Door Opening	Not Operable	Not Operable

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

Section 3

SUMMARY OF RESULTS OF FMVSS NOS. 212, 219 AND 301-75

- o "Windshield Mounting," FMVSS No. 212 Data
- o "Windshield Zone Intrusion," FMVSS No. 219 (Partial) Data
- o "Fuel System Integrity," FMVSS No. 301-75

Figure 1

FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

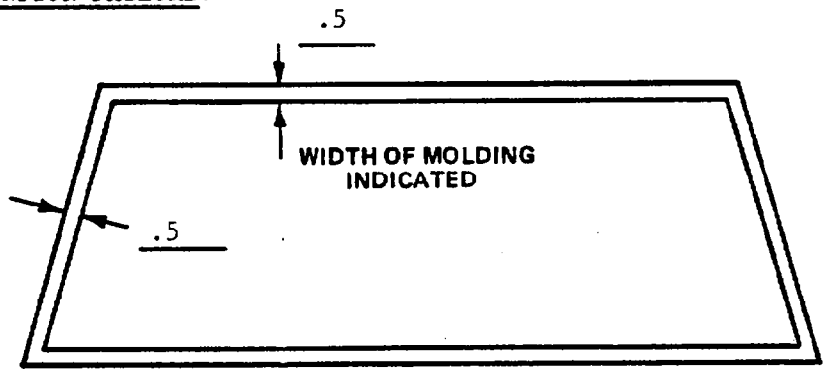
Windshield is bonded in place and has a half-inch plastic molding along the top and sides

FMVSS 212 REQUIREMENTS: **The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery mesurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.**

FMVSS 212 TEST DATA:

	WINDSHIELD PREIPHERY		
	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	81.0	81.0	100%
LEFT SIDE	81.0	81.0	100%
TOTAL	162.0	162.0	100%

AREA OF RETENTION FAILURE:



FRONT VIEW

FAILURE DETAILS:

NONE

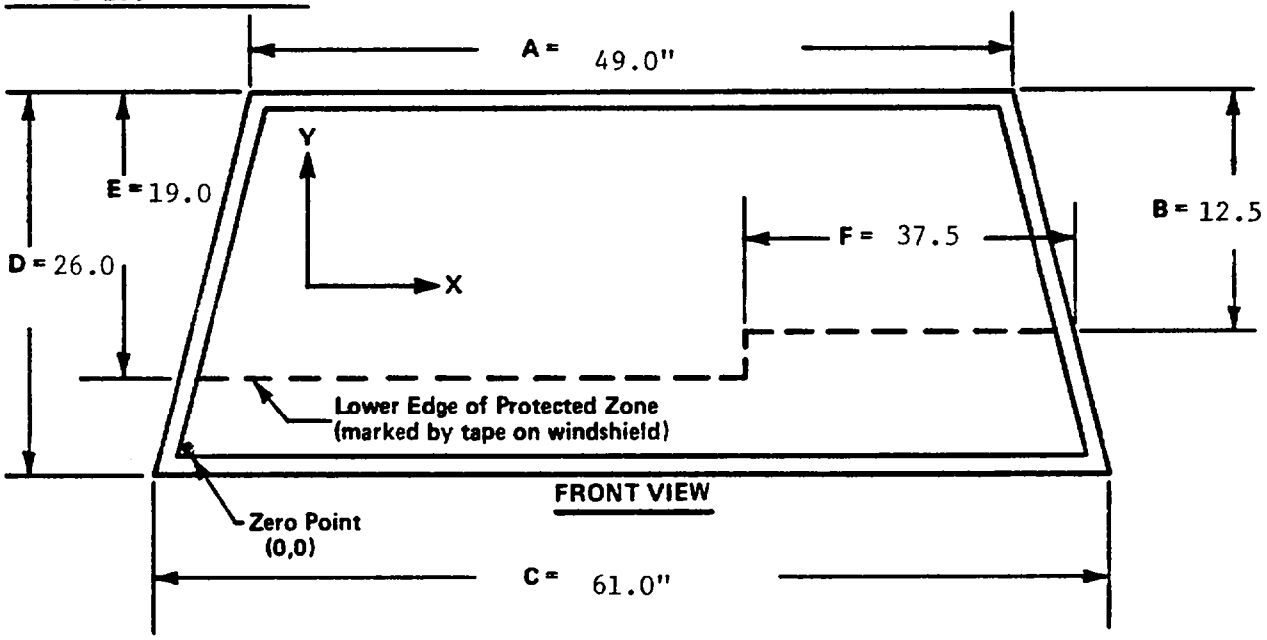
Figure 2

FMVSS NO. 219, (PARTIAL) "WINDSHIELD ZONE INTRUSION," DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 TEST DATA:



DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":
(Show location of penetration on above sketch)

NONE

	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

Figure 3

FMVSS NO. 301-75, "FUEL SYSTEM INTEGRITY," DATA SHEETS

TEST VEHICLE NHTSA NO.: MH0303 ; TEST DATE: 3/18/87

VEHICLE MAKE/MODEL/BODY STYLE: 1987 Dodge Dakota 2-Door Pickup

USABLE CAPACITY OF VEHICLE'S FUEL TANK: 15 Gallons (figure furnished by vehicle manufacturer)

Engine Operated Fuel Pump

TEST REQUIREMENTS:

Test vehicle's engine operated to "run dry" condition, and then a small amount of Stoddard solvent which has been dyed RED shall be added to the vehicle's fuel tank. Operate the fuel pump enough to completely fill the fuel system ahead of the fuel tank, and add 92 to 94% of the stated USABLE CAPACITY to the fuel tank.

AMOUNT OF STODDARD SOLVENT ADDED TO VEHICLE'S FUEL TANK:

13.8 Gallons which is 92 % of the Stated USABLE CAPACITY.

SOLVENT SPILLAGE MEASUREMENT AFTER 35 MPH FRONTAL BARRIER IMPACT TEST:

	Actual	Maximum Allowable
From impact until vehicle motion ceases	0	1 oz.
For 5 min. period after vehicle motion ceases.	0	5 oz.
For next 25 minutes at barrier face.....	0	1 oz./1 minute

SOLVENT SPILLAGE DETAILS:

NONE

STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 minutes)

Time reqd. for machine to rotate 90°	=	2 minutes,	56 seconds
FMVSS 301-75 Position Hold Time	=	5 minutes,	seconds
TOTAL	=	7 minutes,	56 seconds
Next Whole Minute Interval....	=	8 minutes	

Figure 3

FMVSS NO. 301-75 TEST DATA....Continued:

VEHICLE STATIC ROLLOVER DATA:

	First 5 Minutes FROM ONSET OF ROTATION	6th. Minute	7th. Minute	8th. Minute
Maximum Allowable Solvent Spillage.....	5 oz.	1 oz.	1 oz.	1 oz.
0 to 90° (filler cap down).	0	0	0	0
90 to 180°	0	0	0	0
180 to 270°.....	0	0	0	0
270 to 360°.....	0	0	0	0

SOLVENT SPILLAGE LOCATION(S):

NONE

Section 4

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)	-203	-83	69	221	-58	-35	16	44
DUMMY (2)	-37	47	61	77	-32	54	-36	41
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	213	324
DUMMY (2)	460	442
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)	1666	-	1570
DUMMY (2)	1484	1394	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
		36 MILLISEC MAX.		AVE. ACC. (g)
	HIC	t_1 (SEC)	t_2 (SEC)	t_1 TO t_2
DUMMY (1)	985	.07687	.10402	66.7
DUMMY (2)	754	.09135	.12735	53.5
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Figure 4

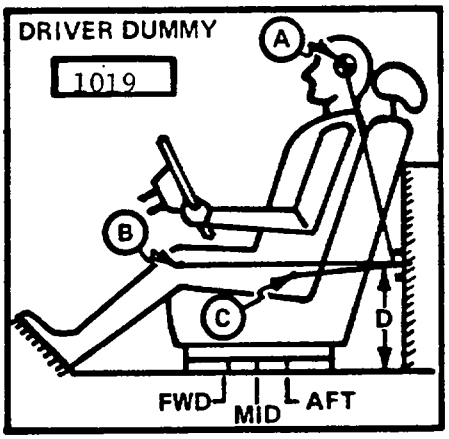
PART 572 DUMMY IN-VEHICLE POSITION

TEST NO.: MH0303 **VEHICLE:** 1987 Dodge Dakota 2-Door Pickup

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

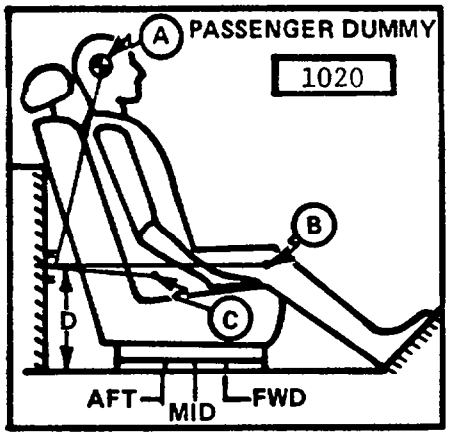
ADJUSTER TYPE:
- x Manual
- ____ Power

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

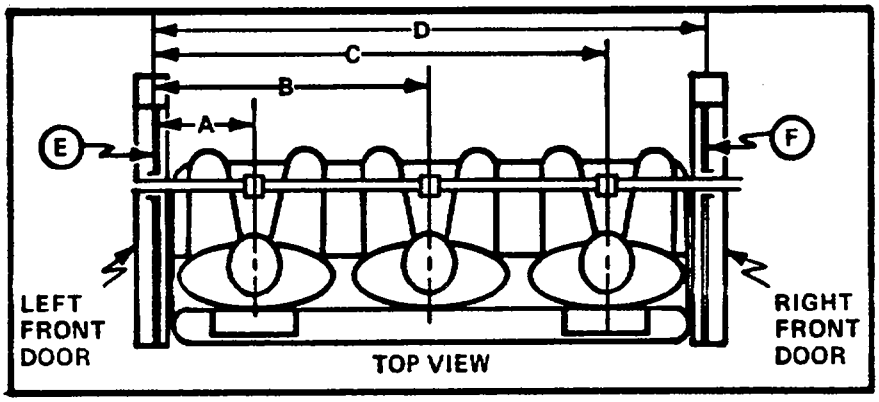


MEASUREMENT LOCATION

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



A =	20.4	in.	17	Degrees	A =	20.8	in.	14	Degrees
B =	27.4	in.	101	Degrees	B =	28.0	in.	97	Degrees
C =	12.8	in.	125	Degrees	C =	13.4	in.	117	Degrees
D =	20.1	in.			D =	20.1	in.		



DUMMY ID

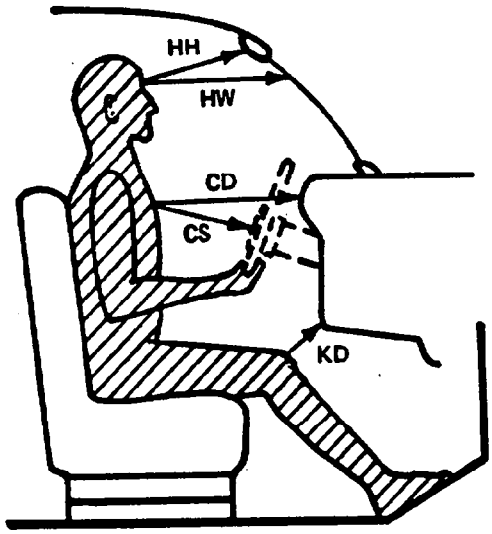
1019 1020

			1019	1020
A	=	Left Door to Driver Centerline	12.6 in.	
B	=	Left Door to Center Passenger Centerline	- in.	
C	=	Left Door to Right Passenger Centerline	42.2 in.	
D	=	Left Door to Right Door	54.5 in.	
E, F	=	Window Glass Height (Right and Left Must Be Equal)	11.7 in.	

Figure 5

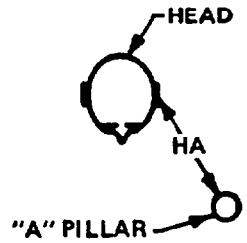
OCCUPANT CLEARANCE DIMENSIONS

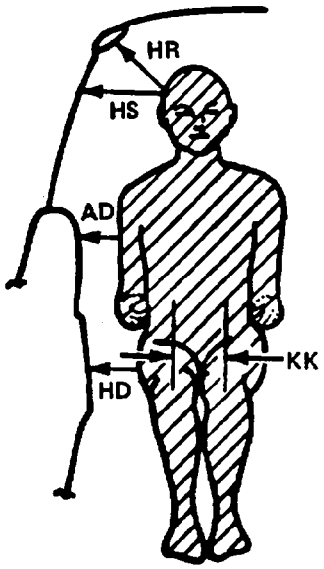
	DRIVER	PASSENGER
HH	18.6	18.2
HW	23.0	22.7
CD	20.9	23.3
CS	14.3	--
KDL	7.6	5.1
KDR	7.5	5.1
SA	Fixed	Fixed
TA	25°	25°



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

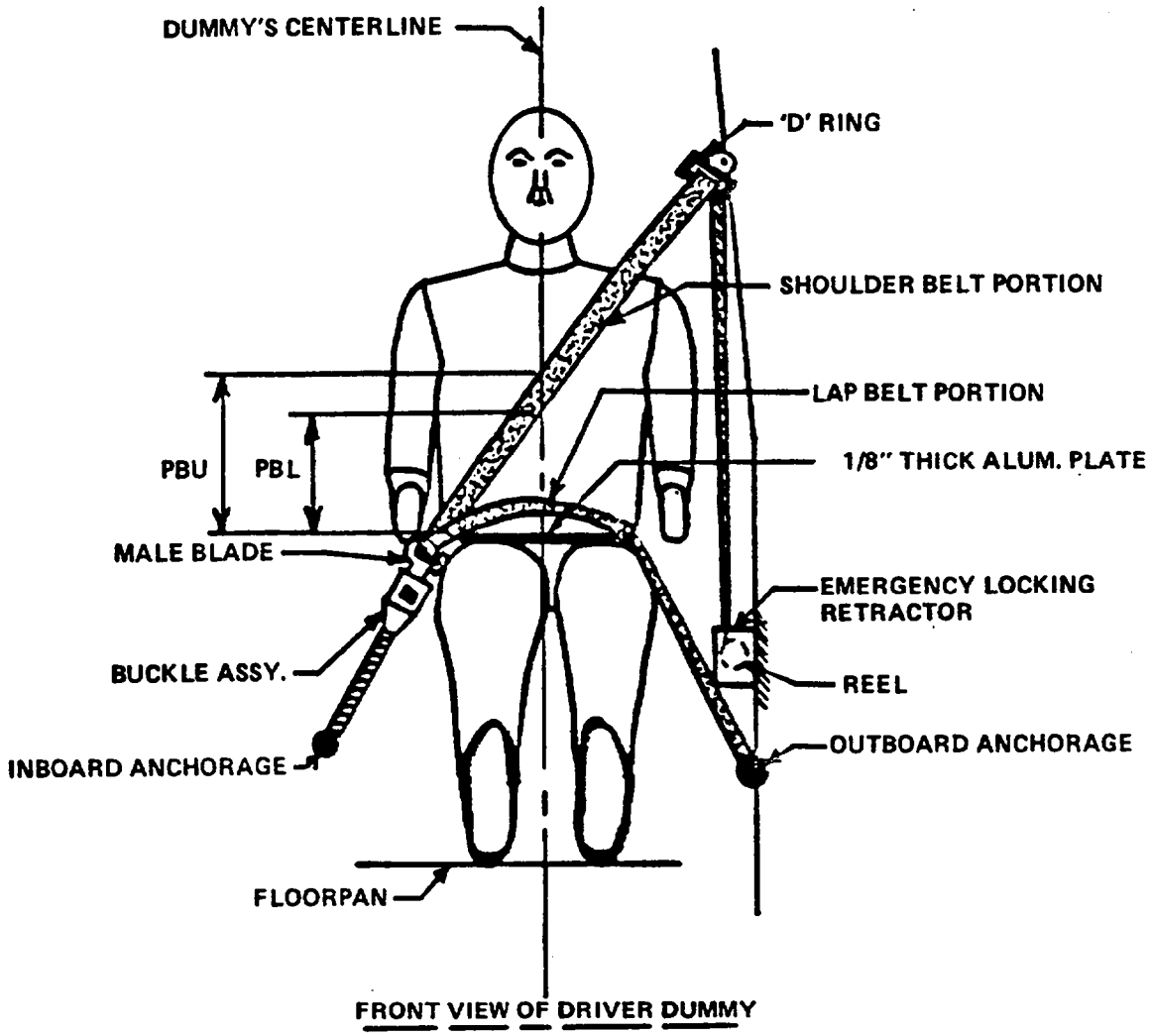




	DRIVER	PASSENGER
HR	7.0	6.9
HS	9.7	9.5
AD	4.9	5.4
HD	6.4	5.9
KK	9.5	7.3
HA	23.3	21.8

Figure 6

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	15.0	15.5
PBL -- Top surface of alum. plate to belt lower edge	11.6	12.0
LAP BELT TENSION	--	--
SHOULDER BELT TENSION	2.0	2.0

7556-4

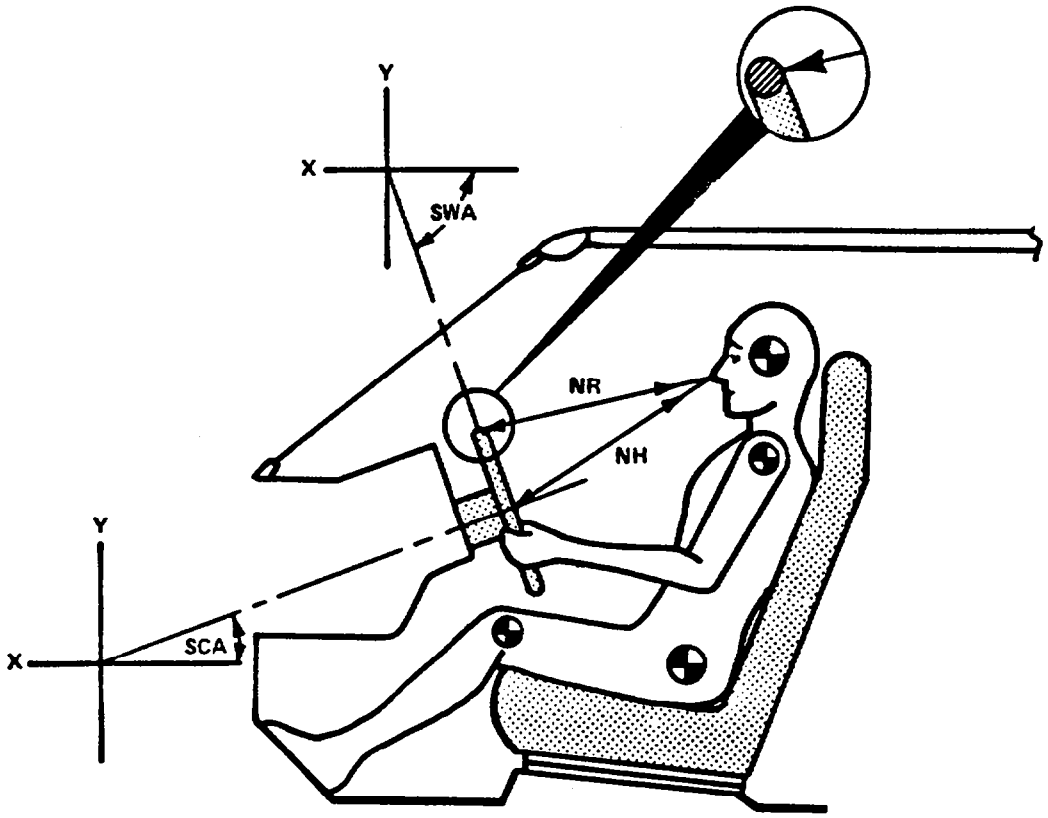
Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

	Driver	Passenger
BELT LENGTH DATA:		
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	97.5	96.5
Should belt length as measured on Part 572 Dummy.	35.0	34.5
Lap belt length as measured on Part 572 Dummy.	35.5	35.0
BELT SPOOL-OFF DATA:		
As determined by film analysis.	3.0	3.0
As determined mechanically.	2.3	2.3
As determined electronically.	2.7	2.7
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	.7 in. per ft.	1.2 in. per ft.
Measured Mechanically	0	0

Figure 7

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	18.2	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	20.2	Inches
SCA -- Angle of steering column relative to the horizontal X axis	-64	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	26	Degrees

NOTE: Camera Information Shown on Table 4

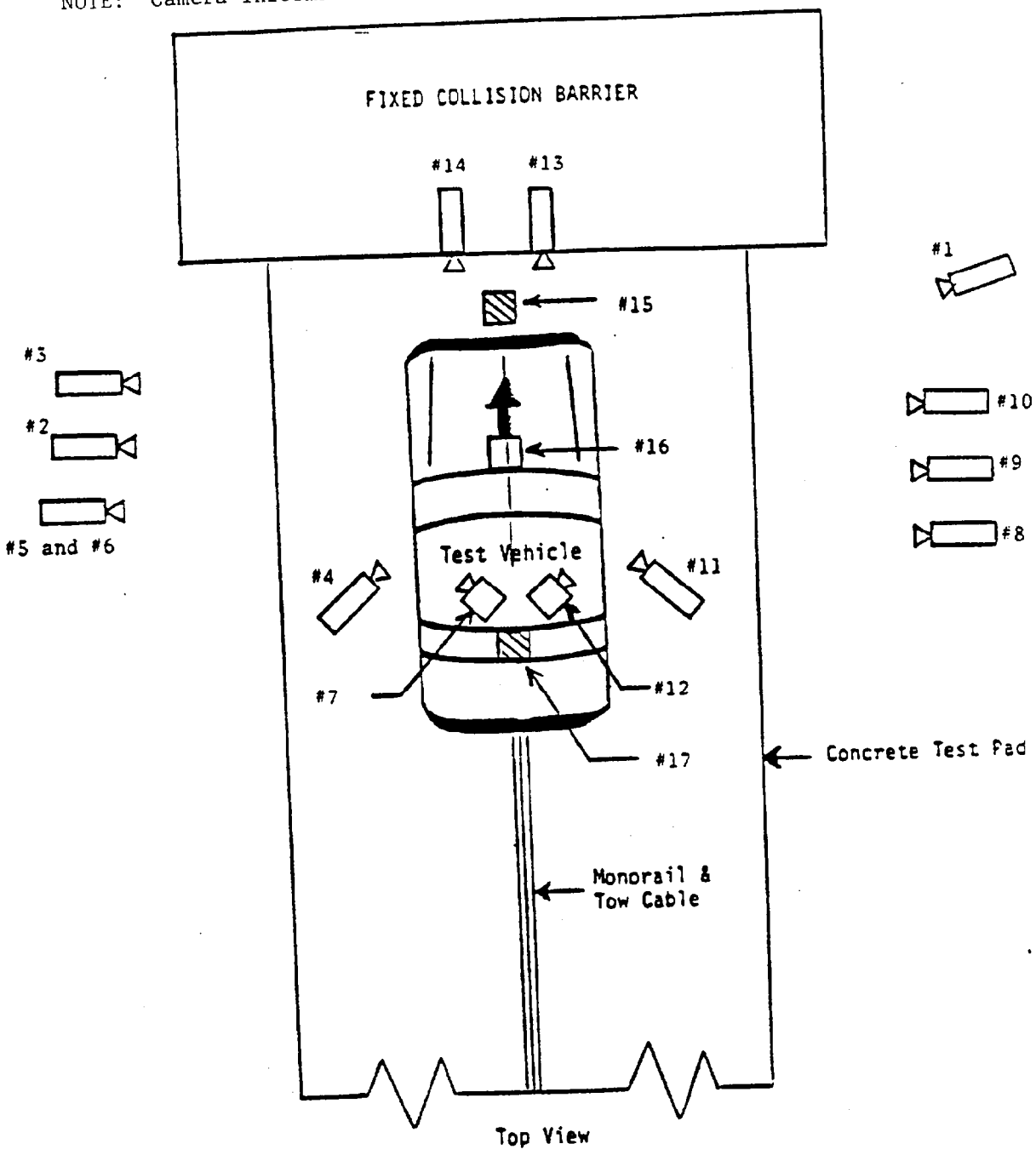


Figure 8

CAMERA POSITIONS FOR FRONTAL IMPACTS

Table 4
HIGH-SPEED CAMERA LOCATIONS

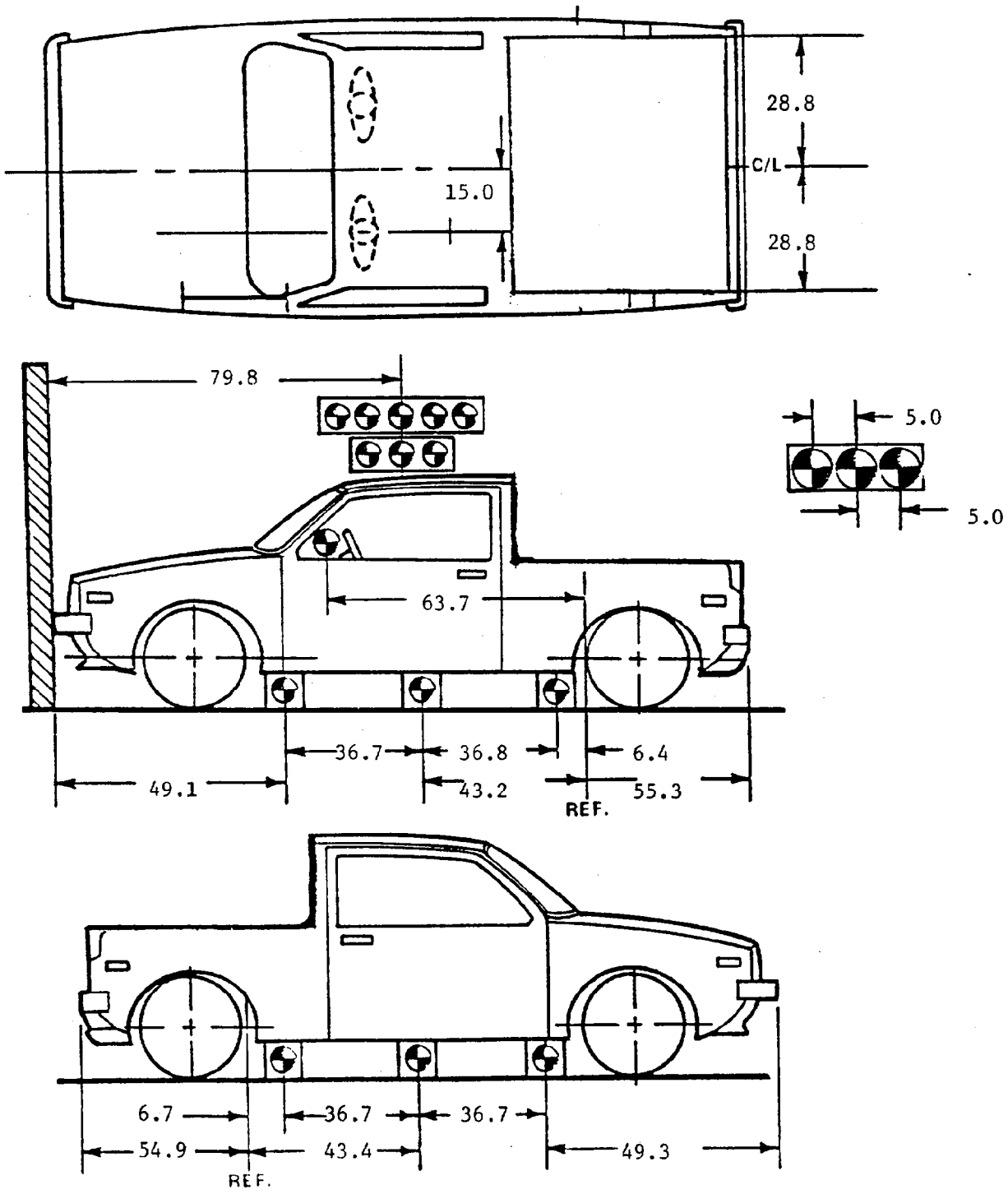
Test No. MH0303 **Vehicle** 1987 Dodge Dakota 2-Door Pickup

CAMERA NO.	VIEW	CAMERA POSITIONS (in)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	262	45	42	-2	-	13	525
3	Left Side View	251	40	43	-5	-	25	540
4	Driver & Interior View	105	114	70	-16	-	13	700
5	Steering Column (Bottom)	240	78	52	-6	220	25	550
6	Steering Column (Top)	240	78	77	-13	220	25	510
7	Left Belt	-	-	-	-	-	8	575
8	Overall Right Side	246	47	43	-1	-	13	800
9	Right Side View	260	70	44	-4	-	25	850
10	Right Passenger View	-	-	Film	Broke	In Camera	-	-
11	Passenger & Interior View	87	101	66	-15	-	25	590
12	Right Belt	-	-	-	-	-	8	840
13	Passenger Front View	24	0	72	-40	-	13	550
14	Driver Front View	24	0	72	-40	-	13	590
15	Windshield View	0	0	126	-55	-	13	550
16	Pit View of Engine	0	32	-120	90	-	13	820
17	Pit View of Fuel Tank	0	66	-120	90	-	13	790

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

Figure 9

VEHICLE TARGET LOCATIONS



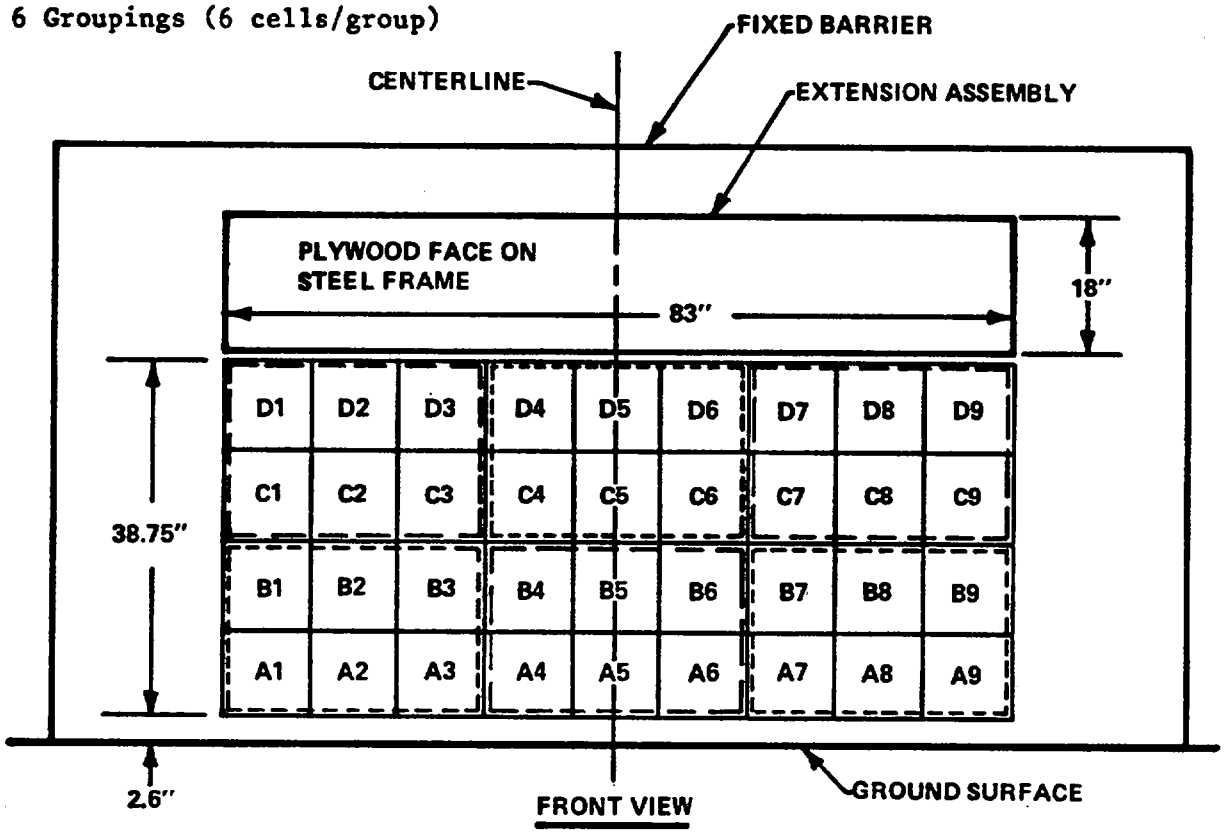
(DIMENSIONS IN INCHES)

7556-4

Figure 10

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

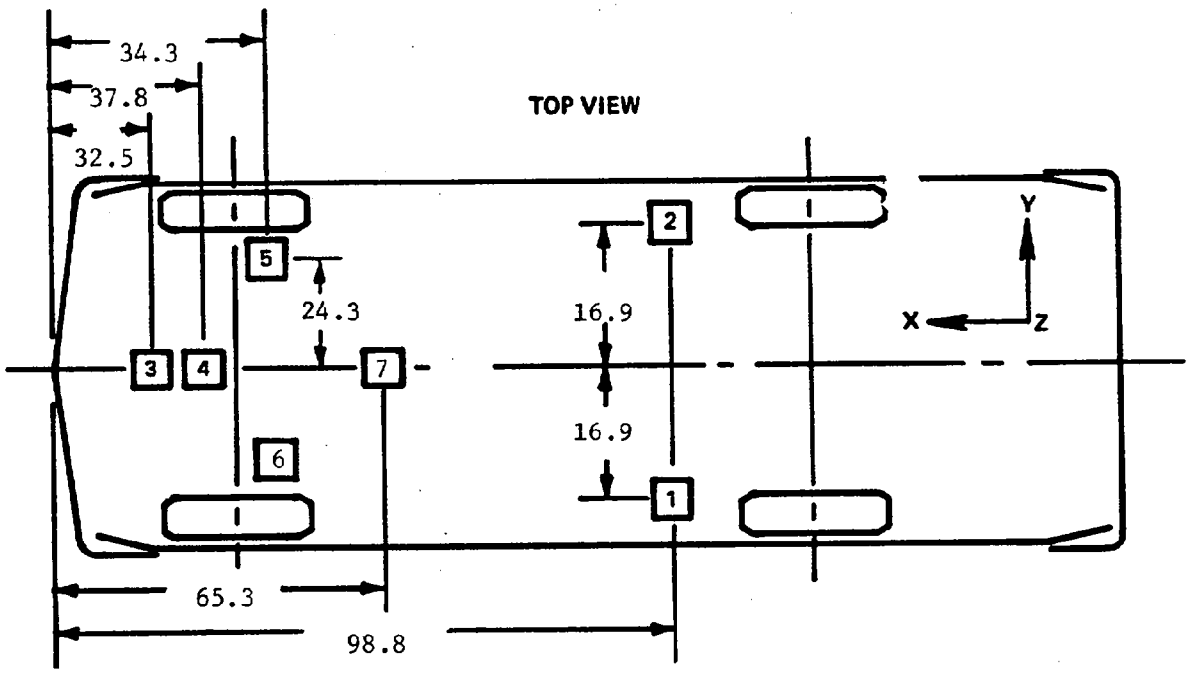
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

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 12

TEST VEHICLE MEASUREMENTS

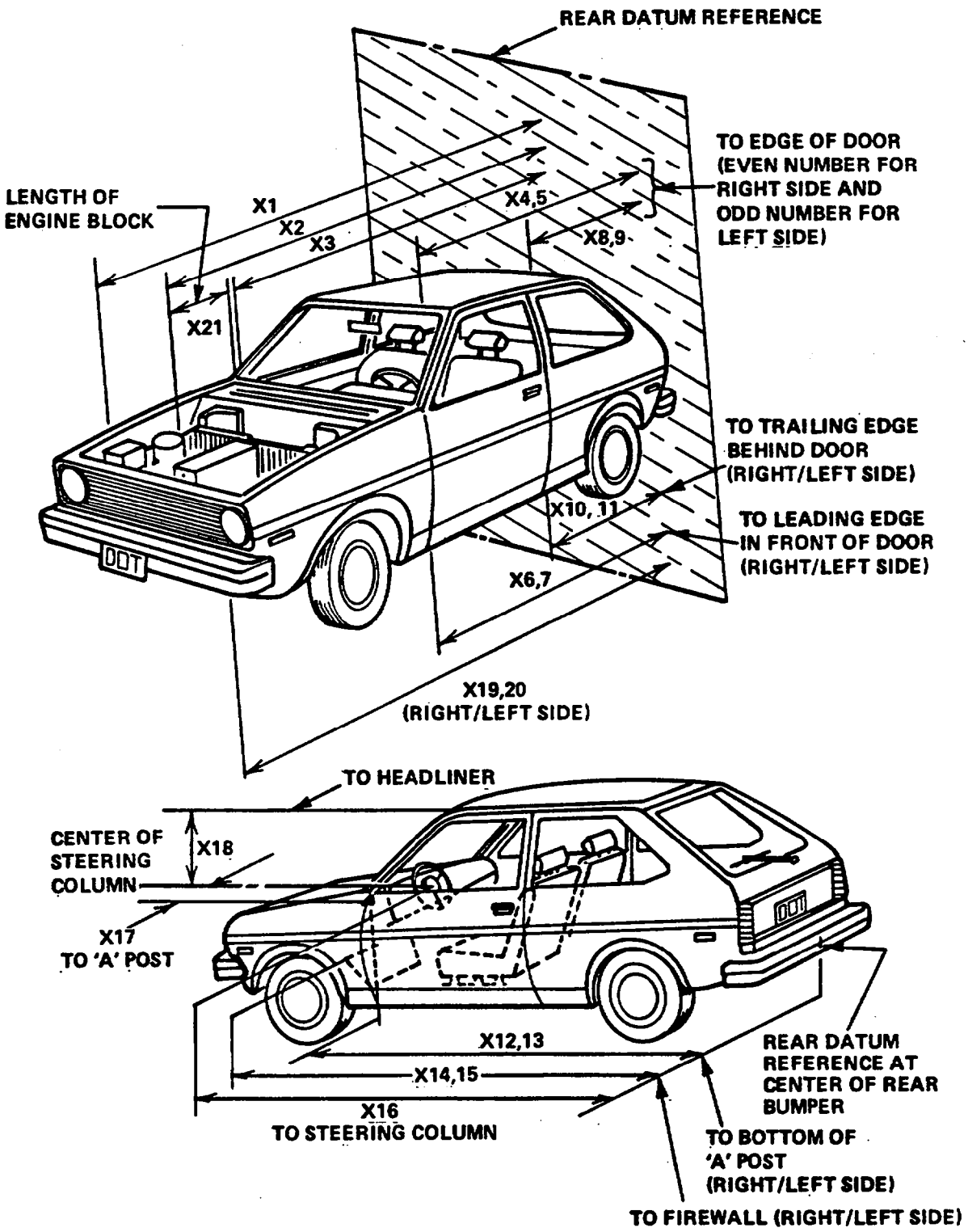


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	184.3	159.0	25.3
X2	Rear Surface of Vehicle to Front of Engine	160.7	153.6	7.1
X3	Rear Surface of Vehicle to Firewall	141.2	139.8	1.4
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	130.1	130.0	.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	130.0	129.0	1.0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	129.8	128.5	1.3
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	130.0	127.5	2.5
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	86.7	87.4	-.7
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	87.5	86.0	1.5
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	86.8	85.7	1.1
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	86.7	85.0	1.7
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	129.8	128.5	1.3
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	130.0	128.0	2.0
X14	Rear Surface of Vehicle to Firewall, Right Side	137.0	134.0	3.0
X15	Rear Surface of Vehicle to Firewall, Left Side	139.5	137.2	2.3
X16	Rear Surface of Vehicle to Steering Column	113.6	110.0	3.6
X17	Center of Steering Column to "A" Post	16.4	18.0	-1.6
X18	Center of Steering Column to Headliner	18.9	21.0	-2.1
X19	Rear Surface of Vehicle to Right Side of Front Bumper	181.7	159.6	22.1
X20	Rear Surface of Vehicle to Left Side of Front Bumper	181.5	158.7	22.8
X21	Length of Engine Block	16.2	16.2	0

Appendix A

PHOTOGRAPHS

Figure A-1 PRE-TEST FRONT VIEW

Figure A-2 POST-TEST FRONT VIEW

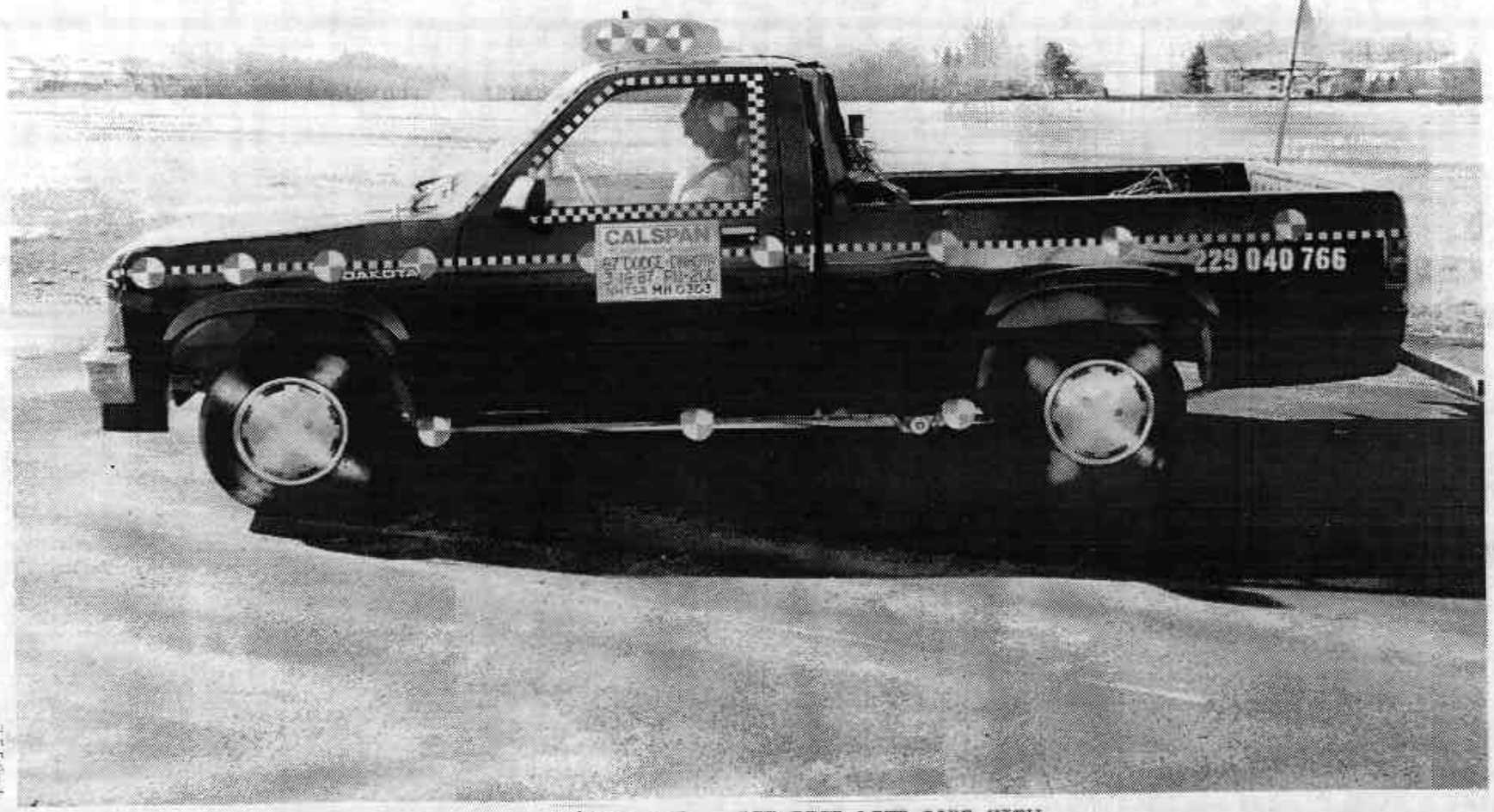


Figure A-3 PRE-TEST LEFT SIDE VIEW

Figure A-4 POST-TEST LEFT SIDE VIEW

7556-4

Figure A-5 PRE-TEST RIGHT SIDE VIEW

Figure A-6 POST-TEST RIGHT SIDE VIEW

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

7556-4

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

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

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

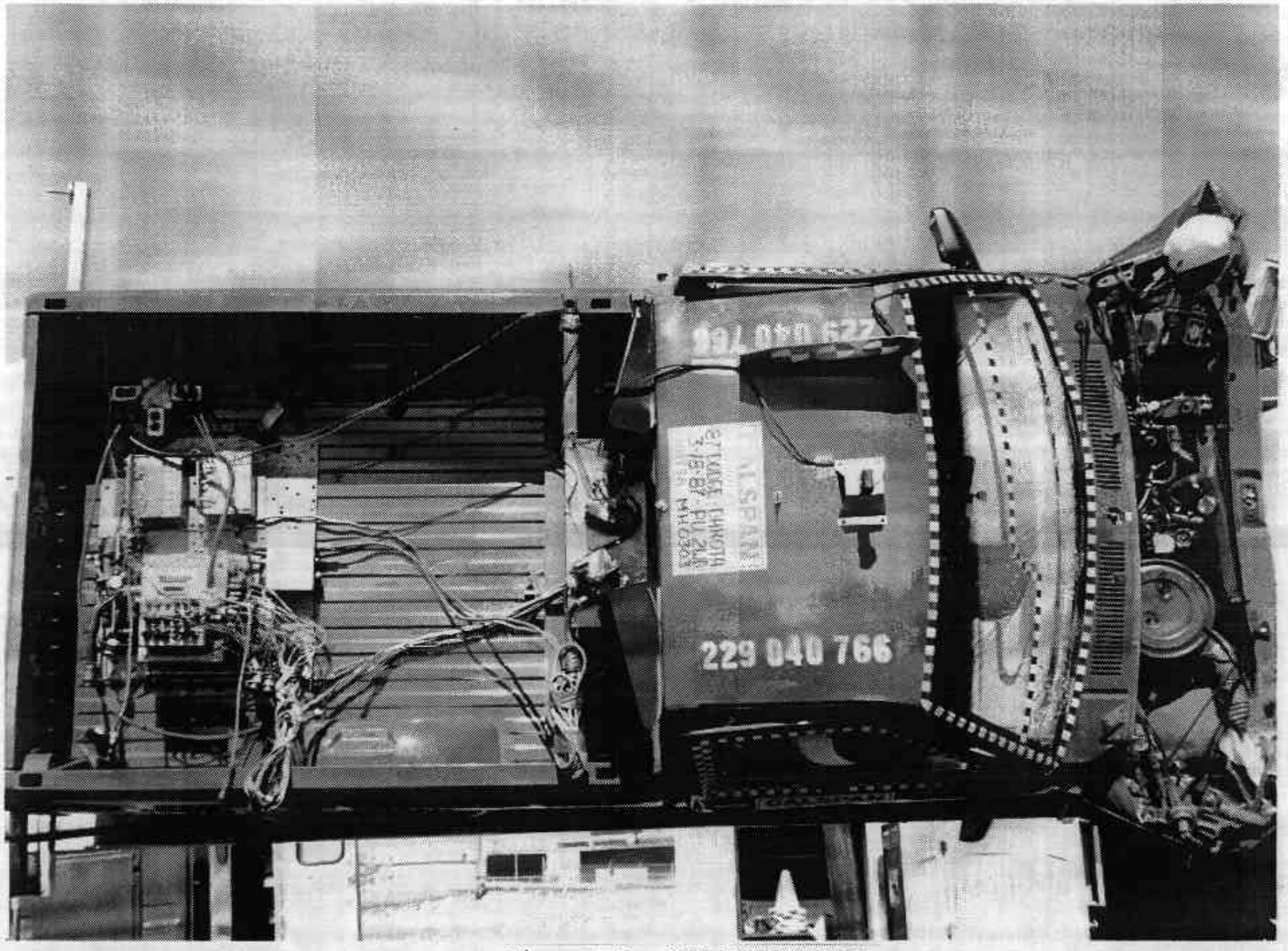


Figure A-11 POST-TEST TOP VIEW

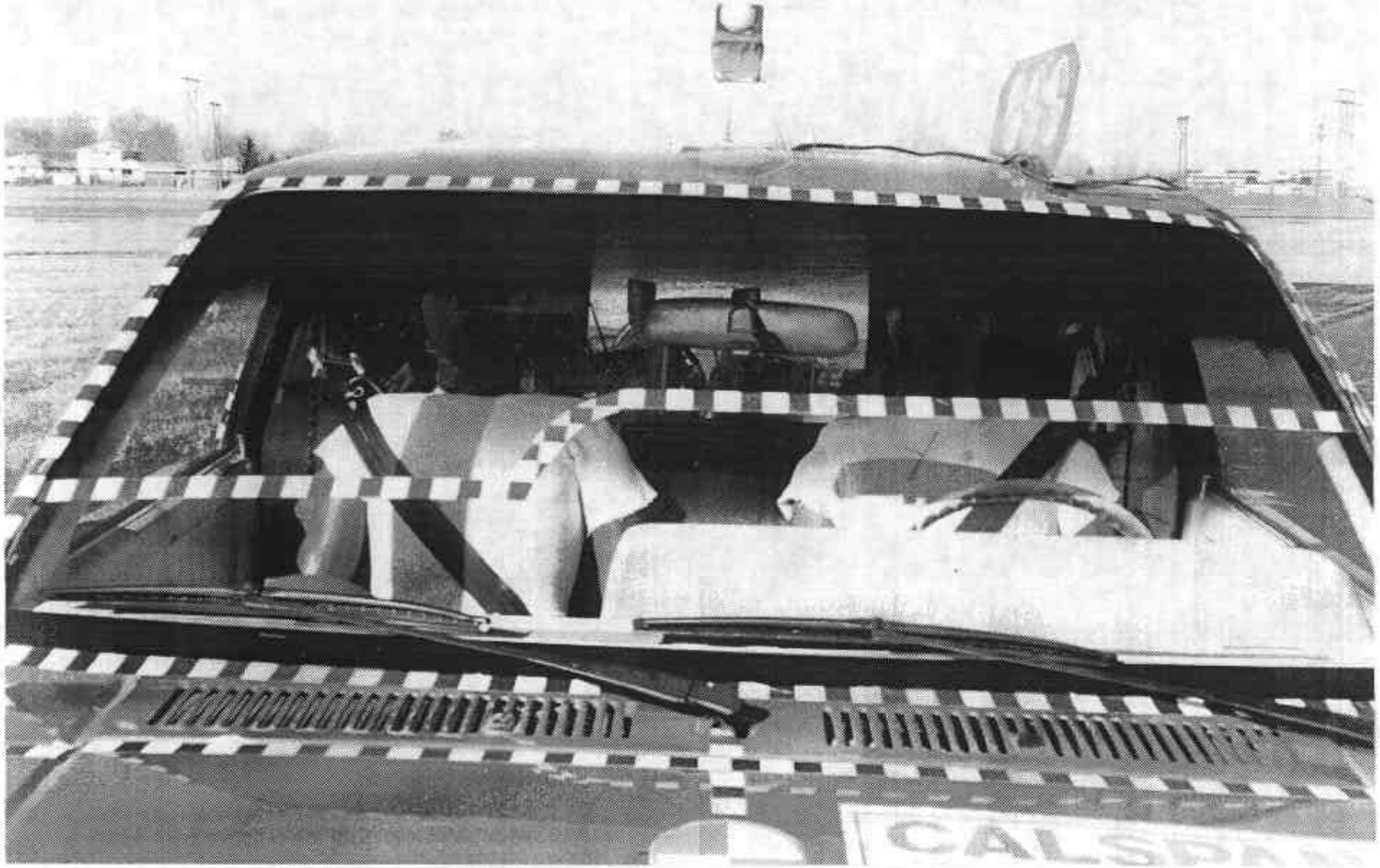
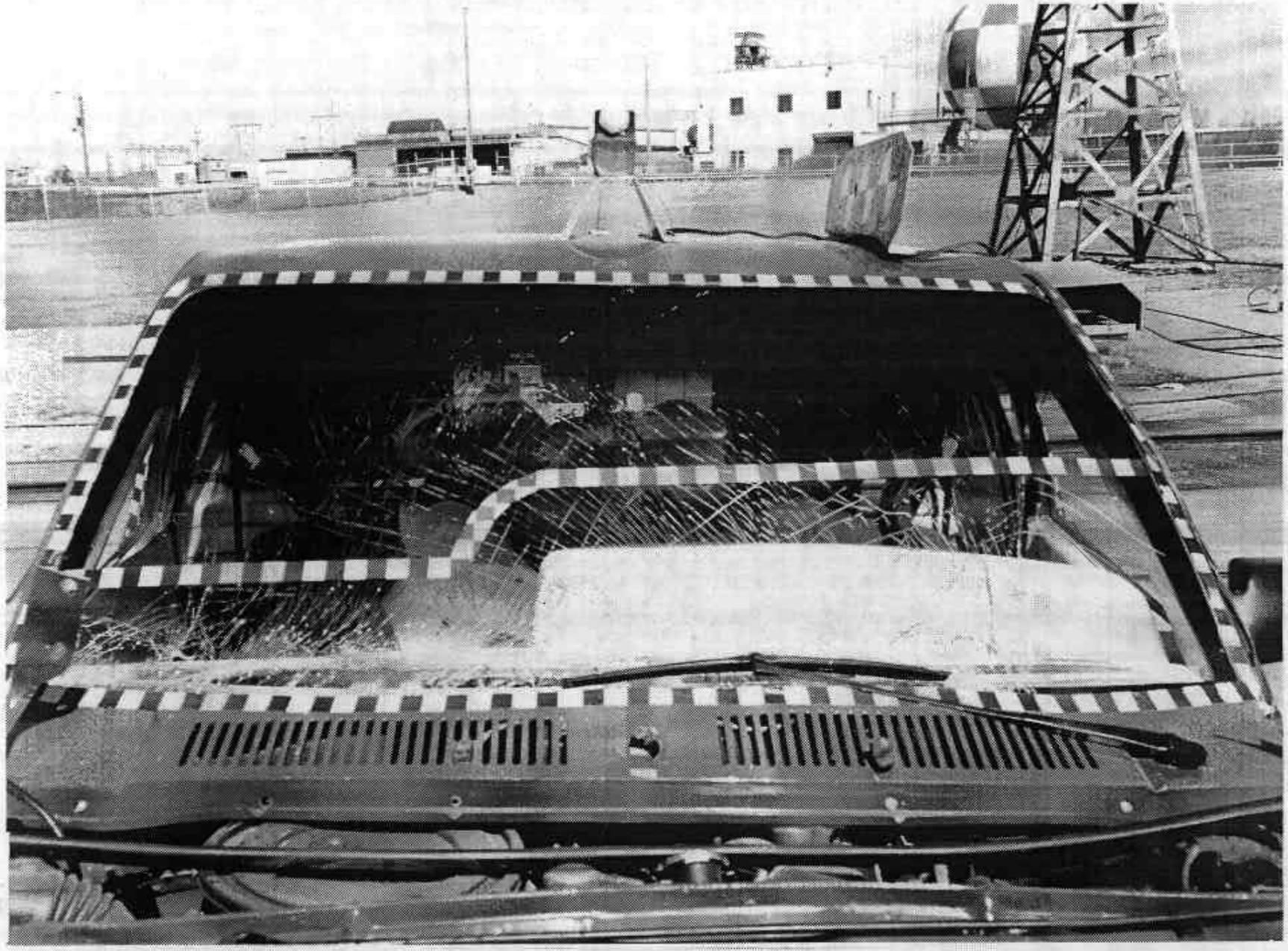


Figure A-12 PRE-TEST WINDSHIELD VIEW



A-14

7556-4

Figure A-13 POST-TEST WINDSHIELD VIEW

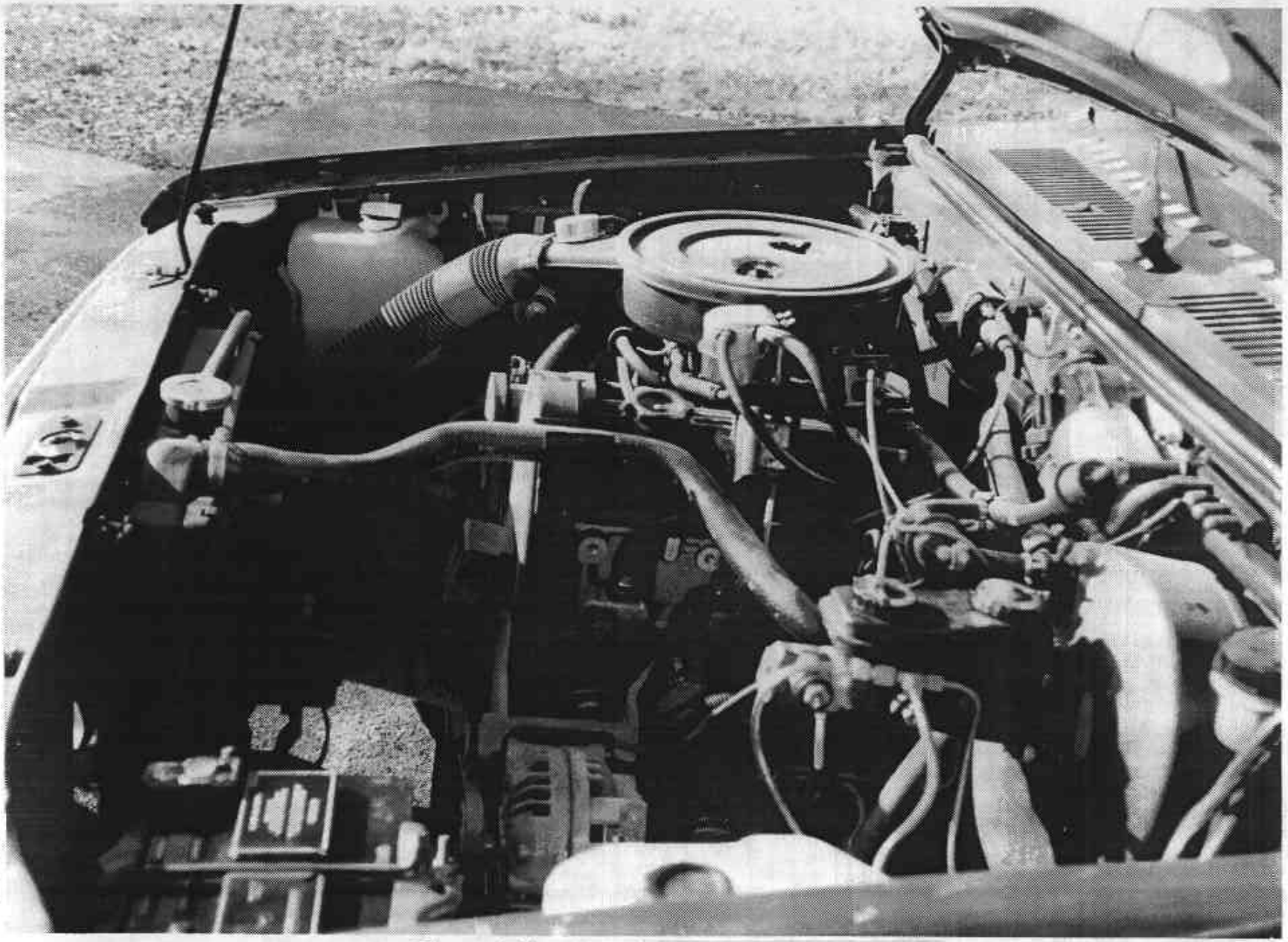


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

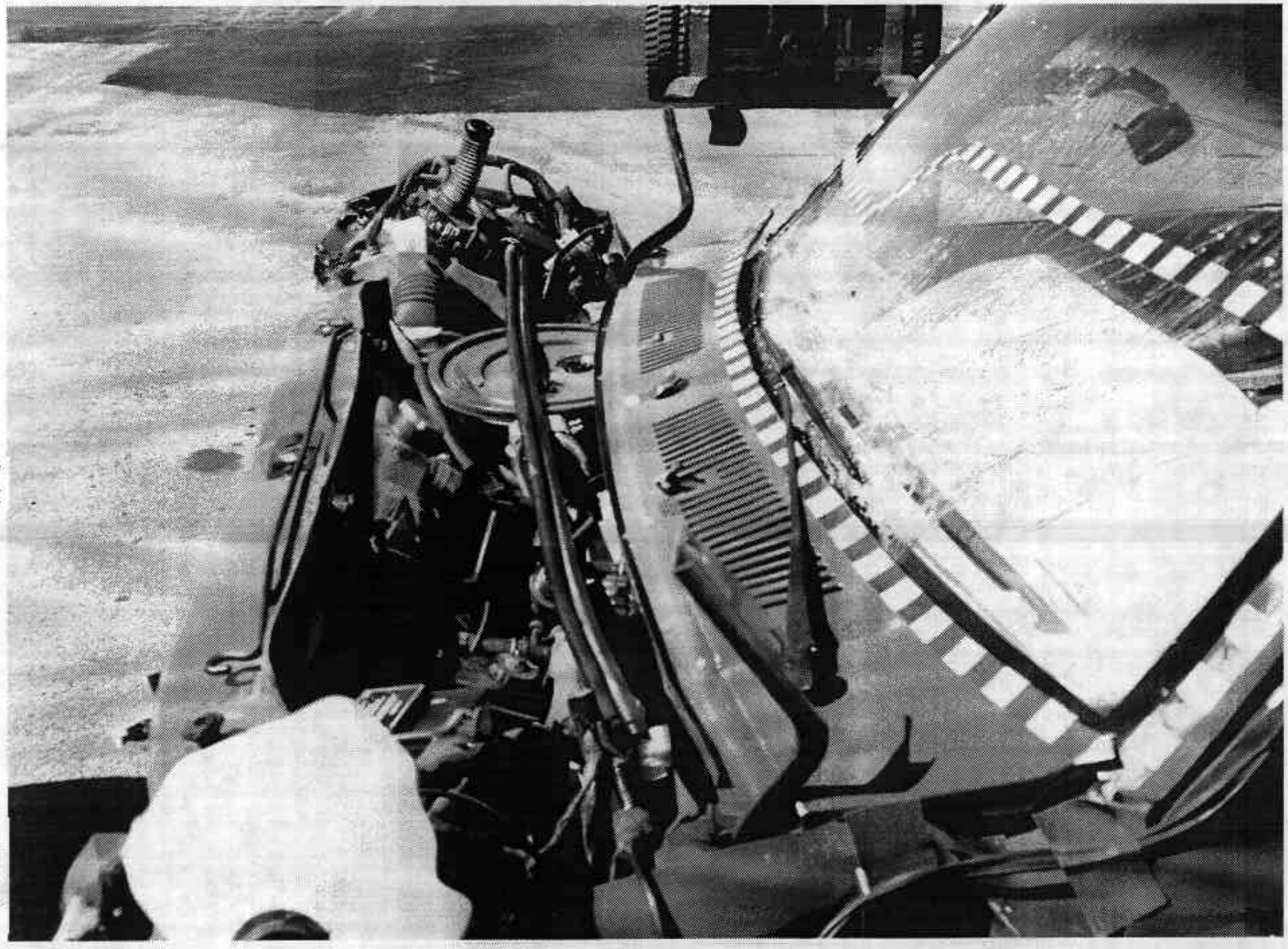


Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

7556-4

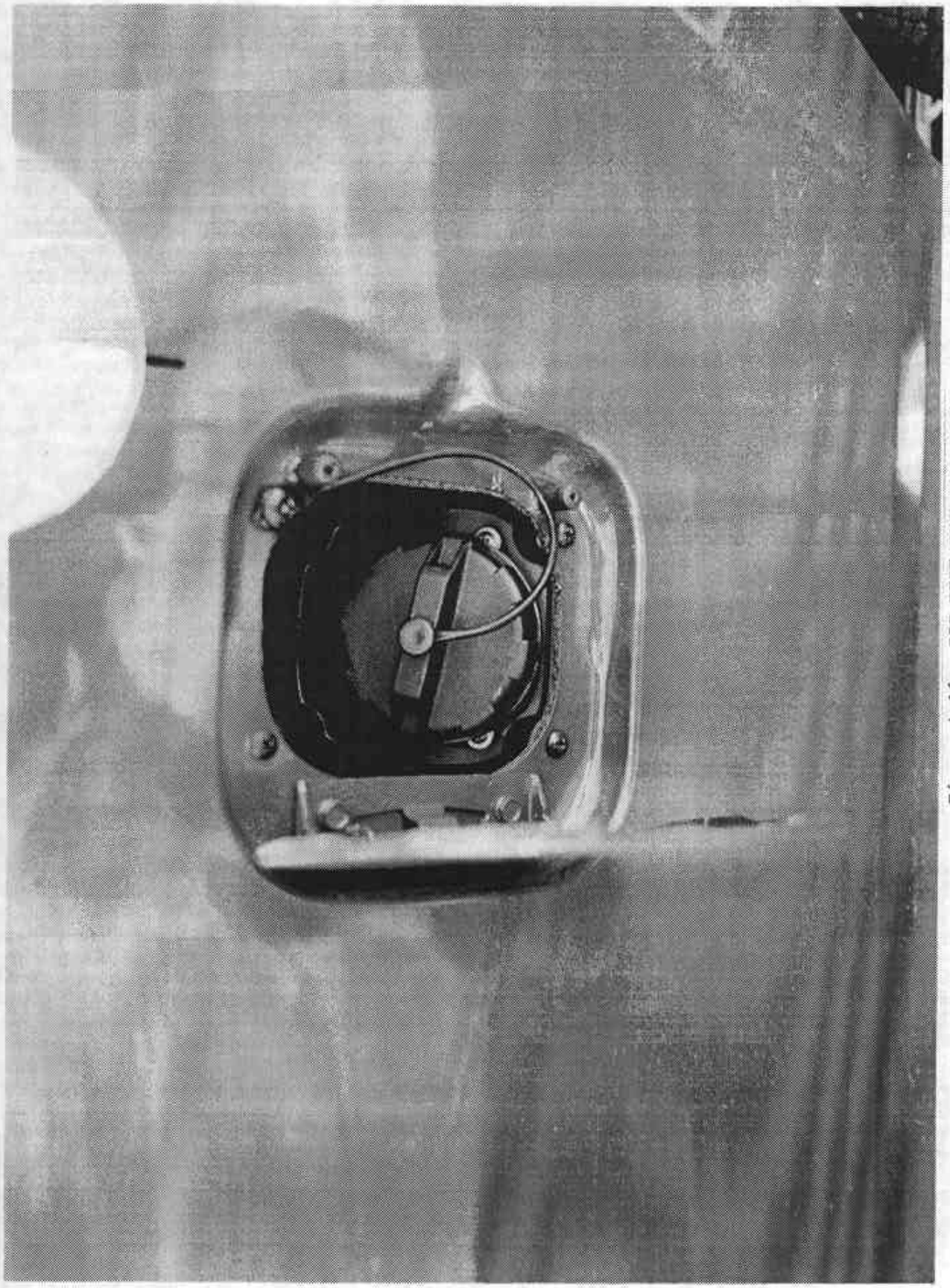


Figure A-16 PRE-TEST FUEL CAP VIEW

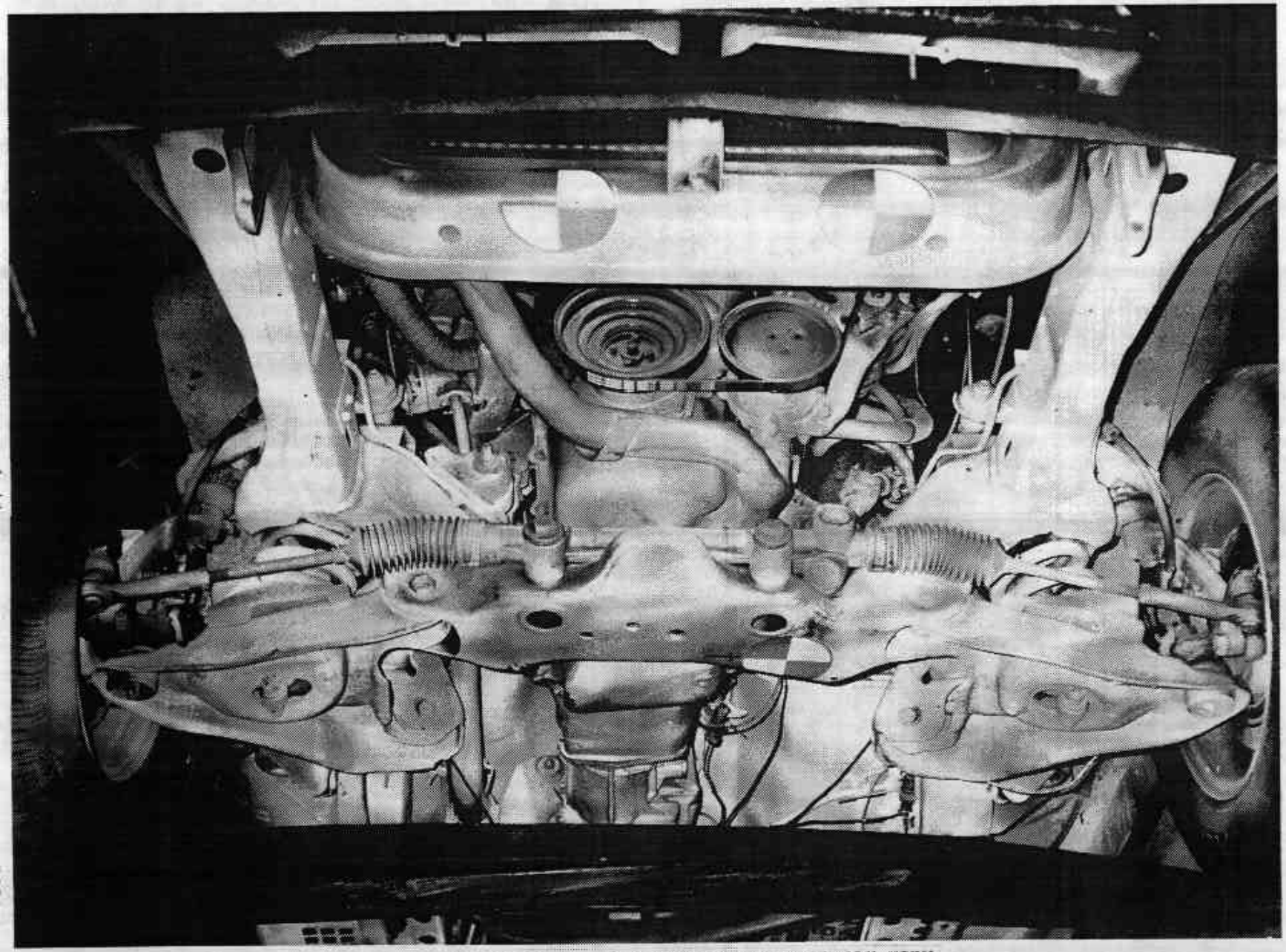


Figure A-17 PRE-TEST FRONT-UNDERBODY VIEW

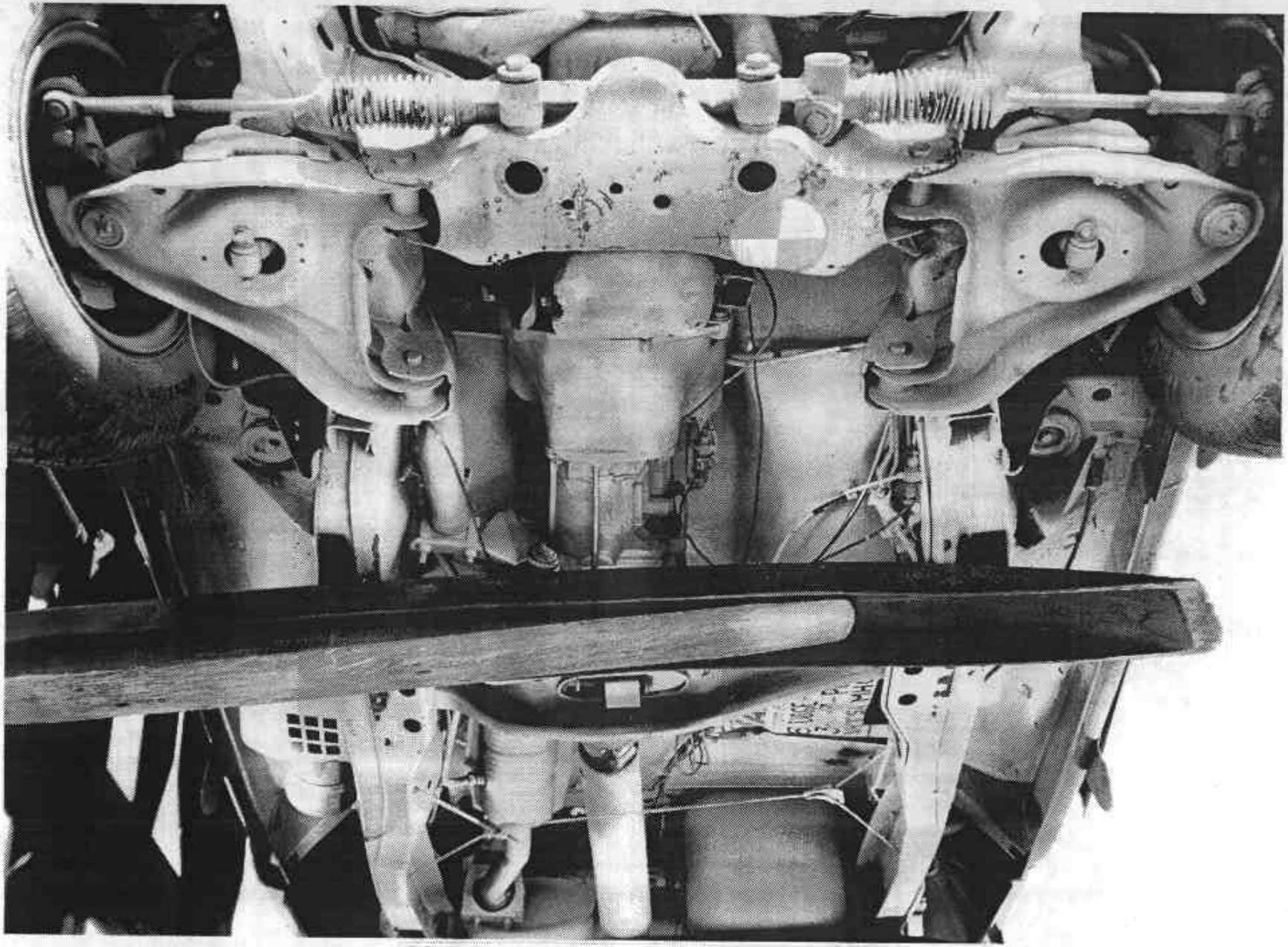


Figure A-18 POST-TEST FRONT-UNDERBODY VIEW

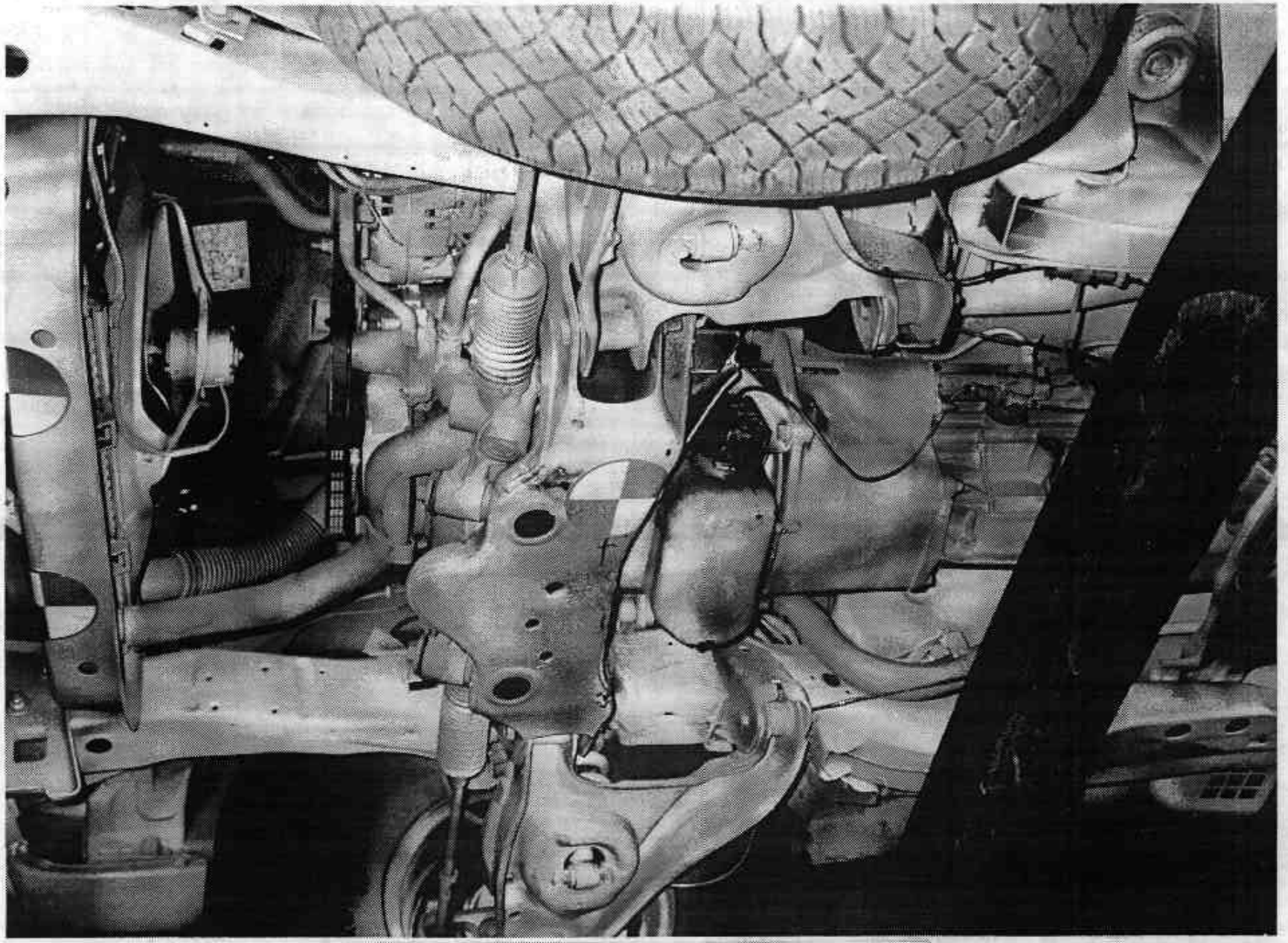


Figure A-19 PRE-TEST FRONT SIDE UNDERBODY VIEW

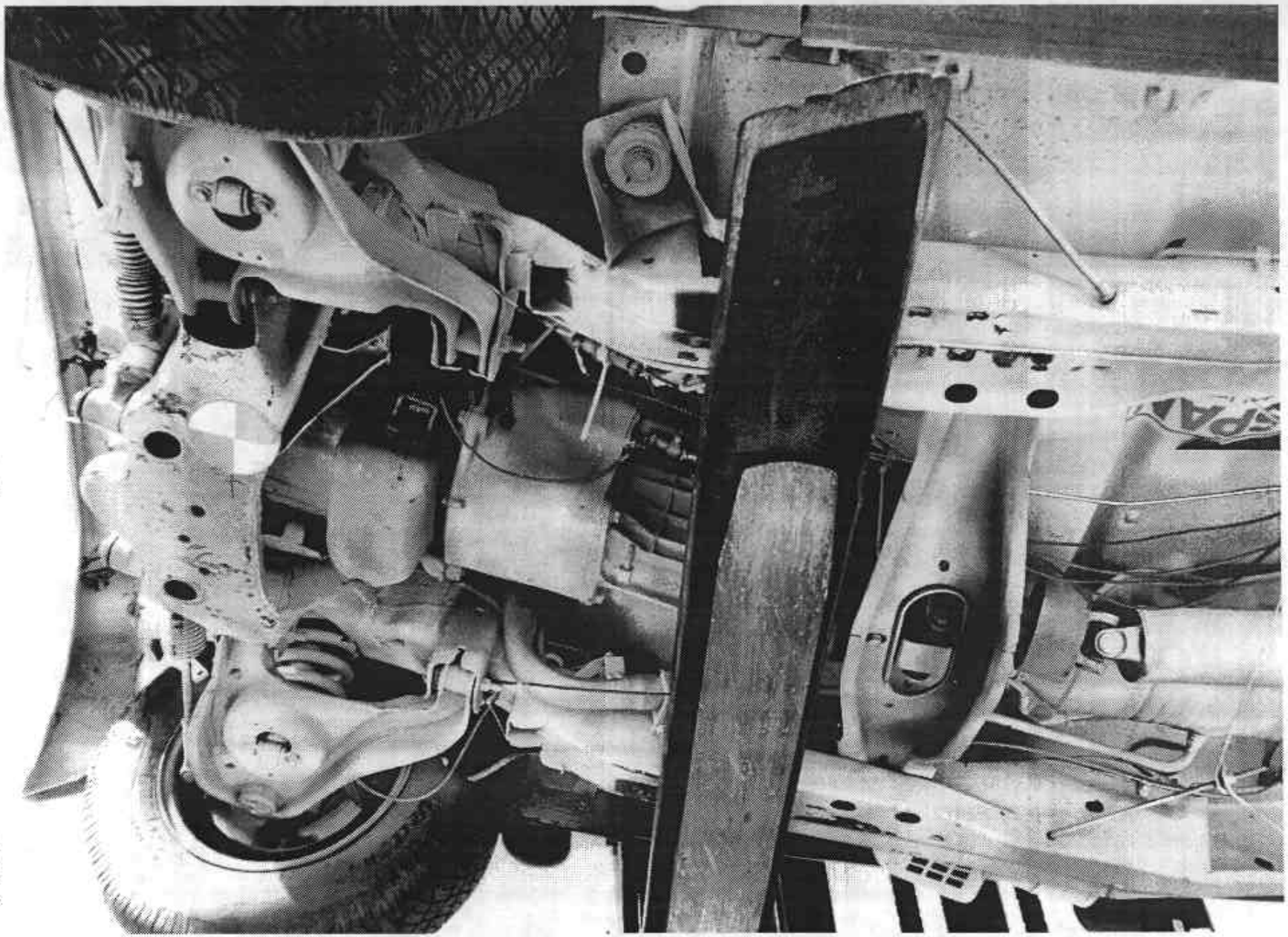


Figure A-20 POST-TEST FRONT SIDE UNDERBODY VIEW

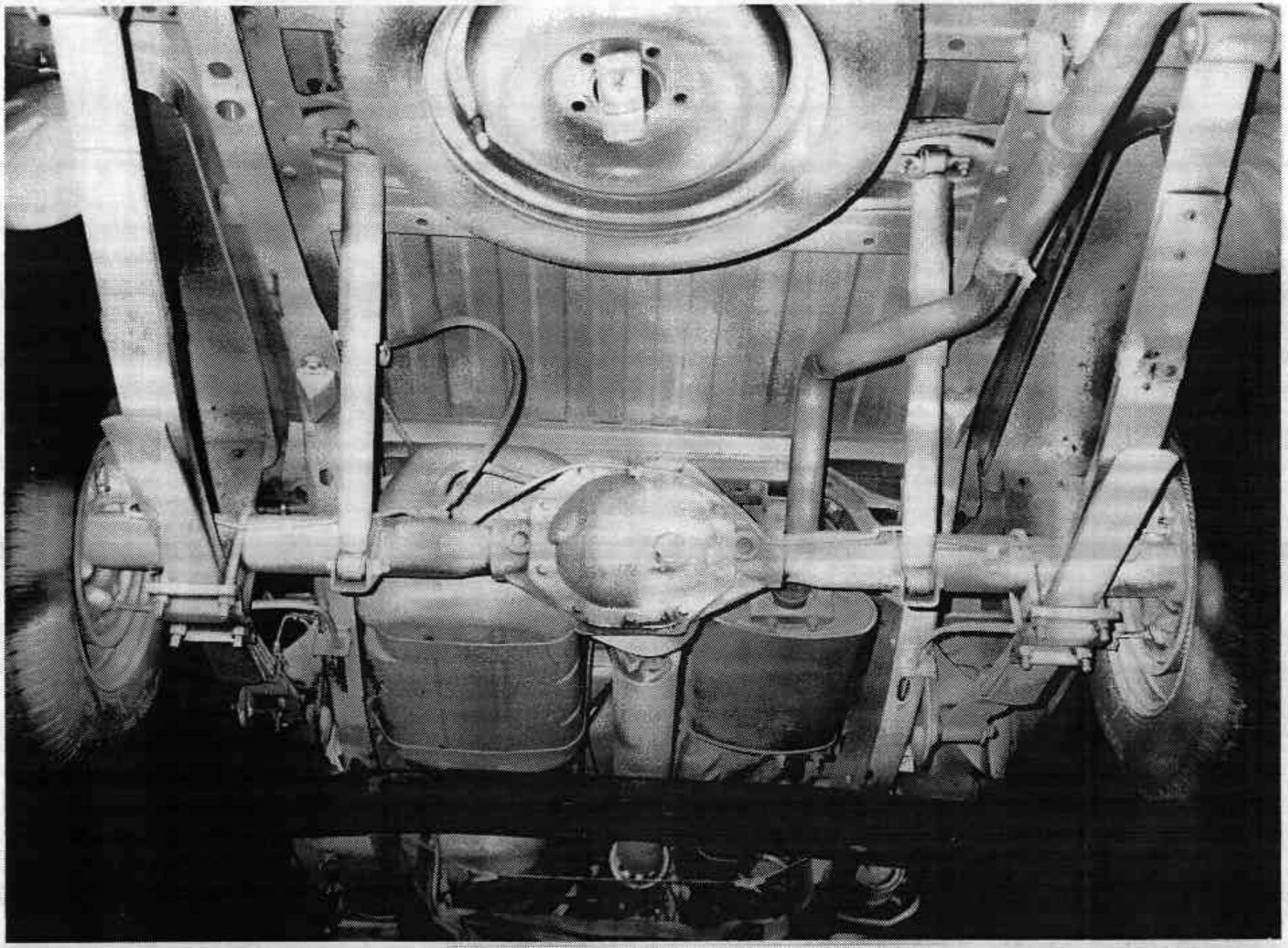


Figure A-21 PRE-TEST REAR UNDERBODY VIEW

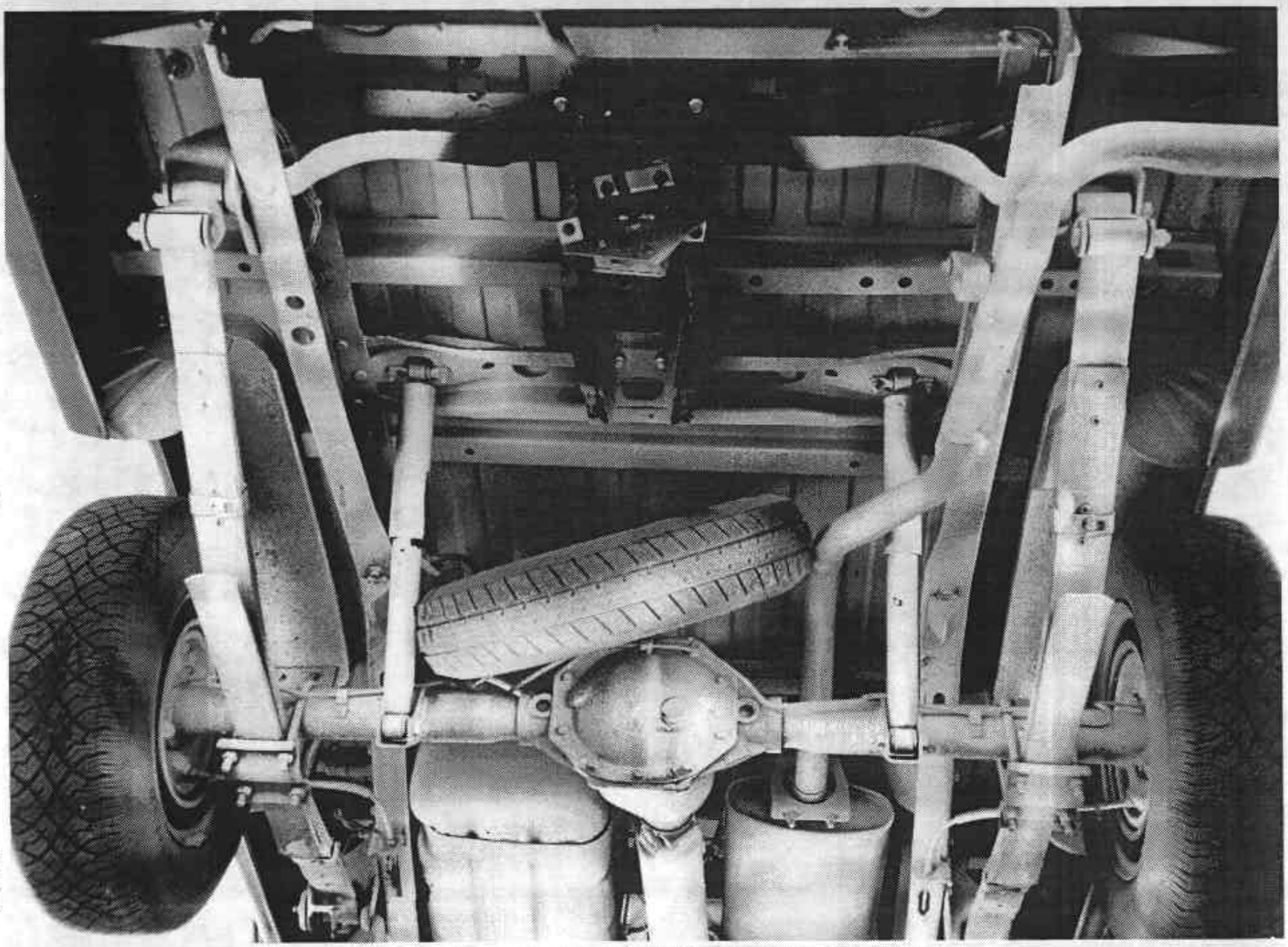


Figure A-22 POST-TEST REAR UNDERBODY VIEW

Figure A-23 PRE-TEST DRIVER POSITION VIEW

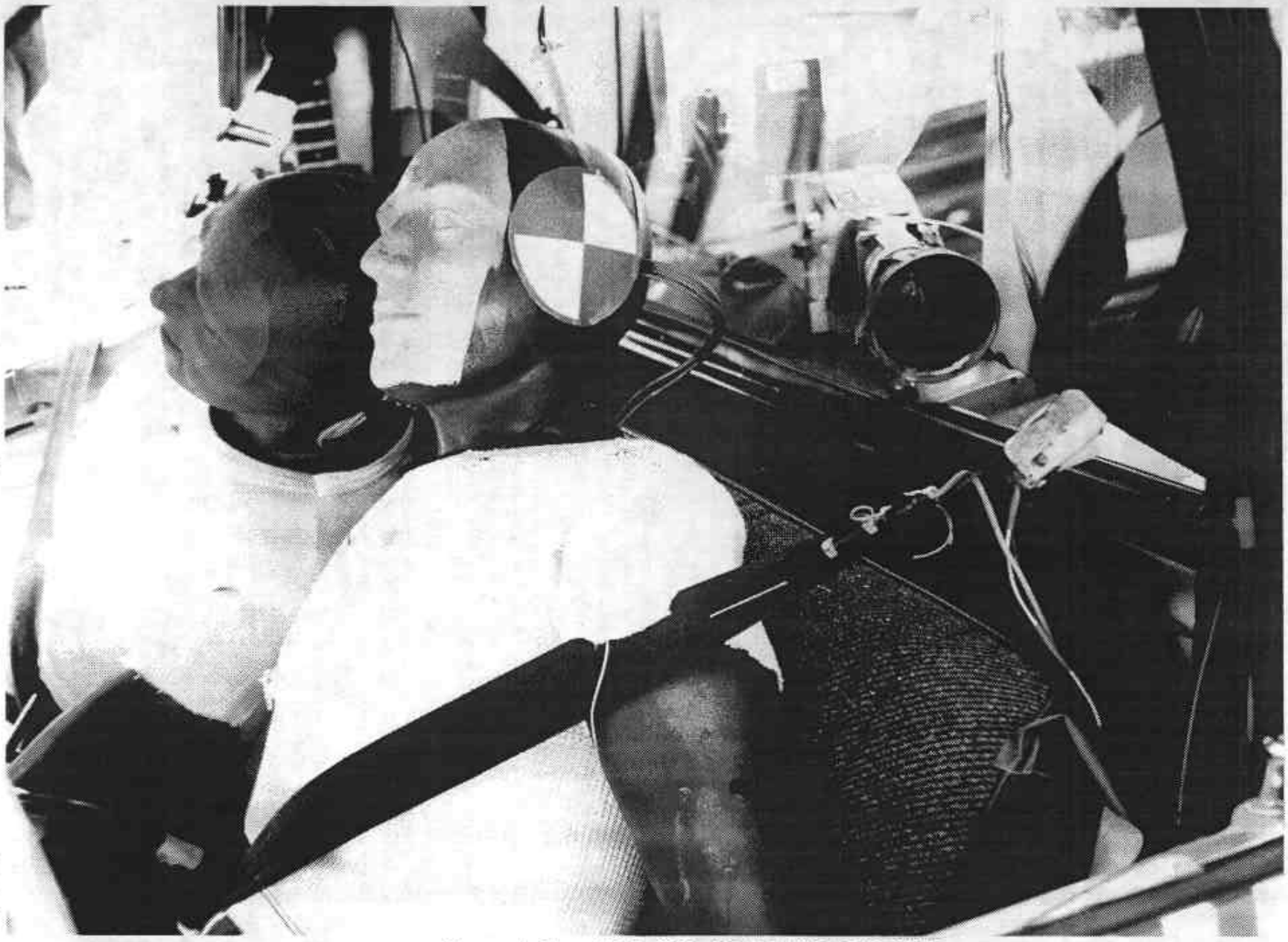


Figure A-24 POST-TEST DRIVER POSITION VIEW

Figure A-25 PRE-TEST PASSENGER POSITION VIEW

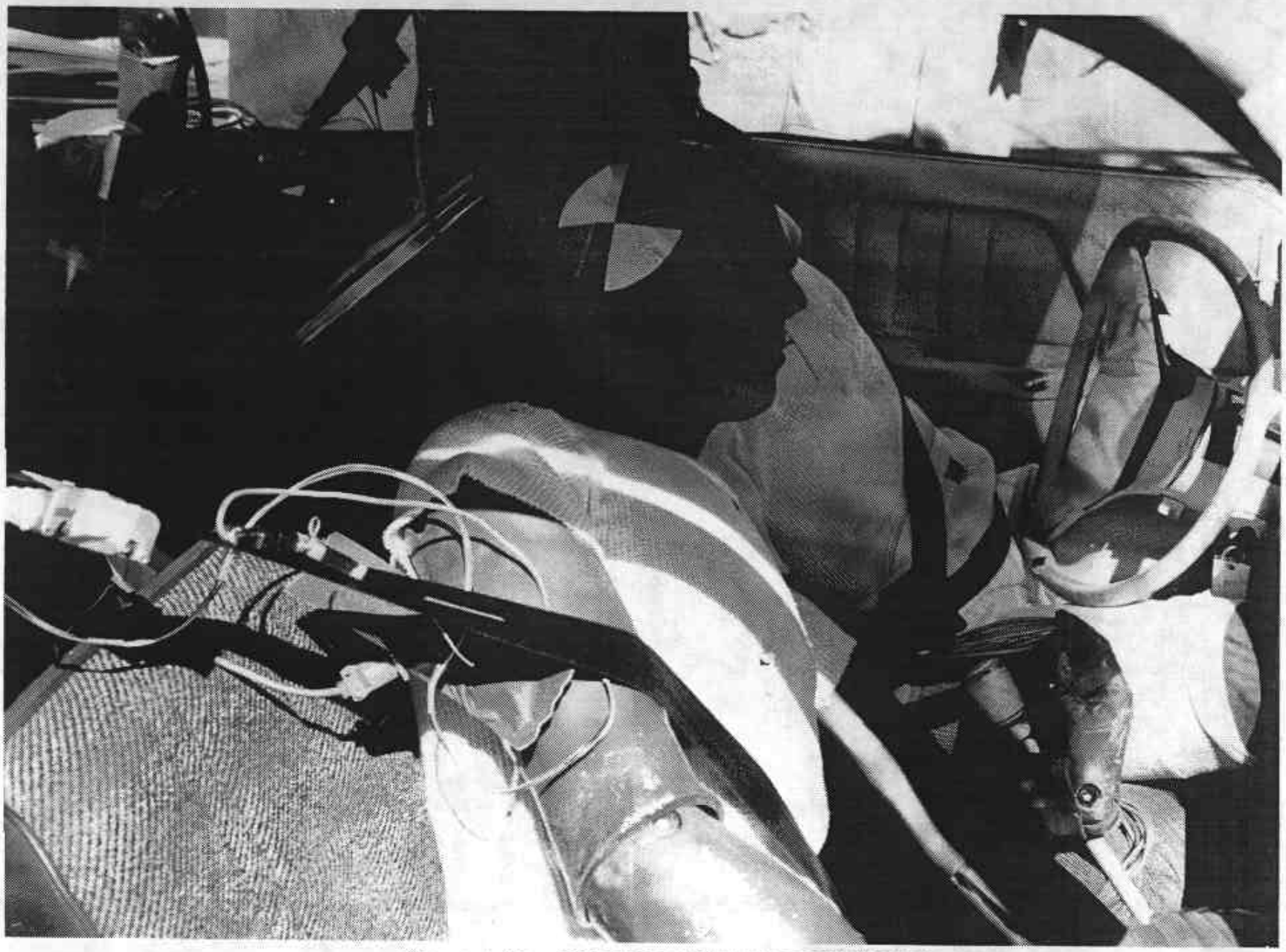


Figure A-26 POST-TEST PASSENGER POSITION VIEW

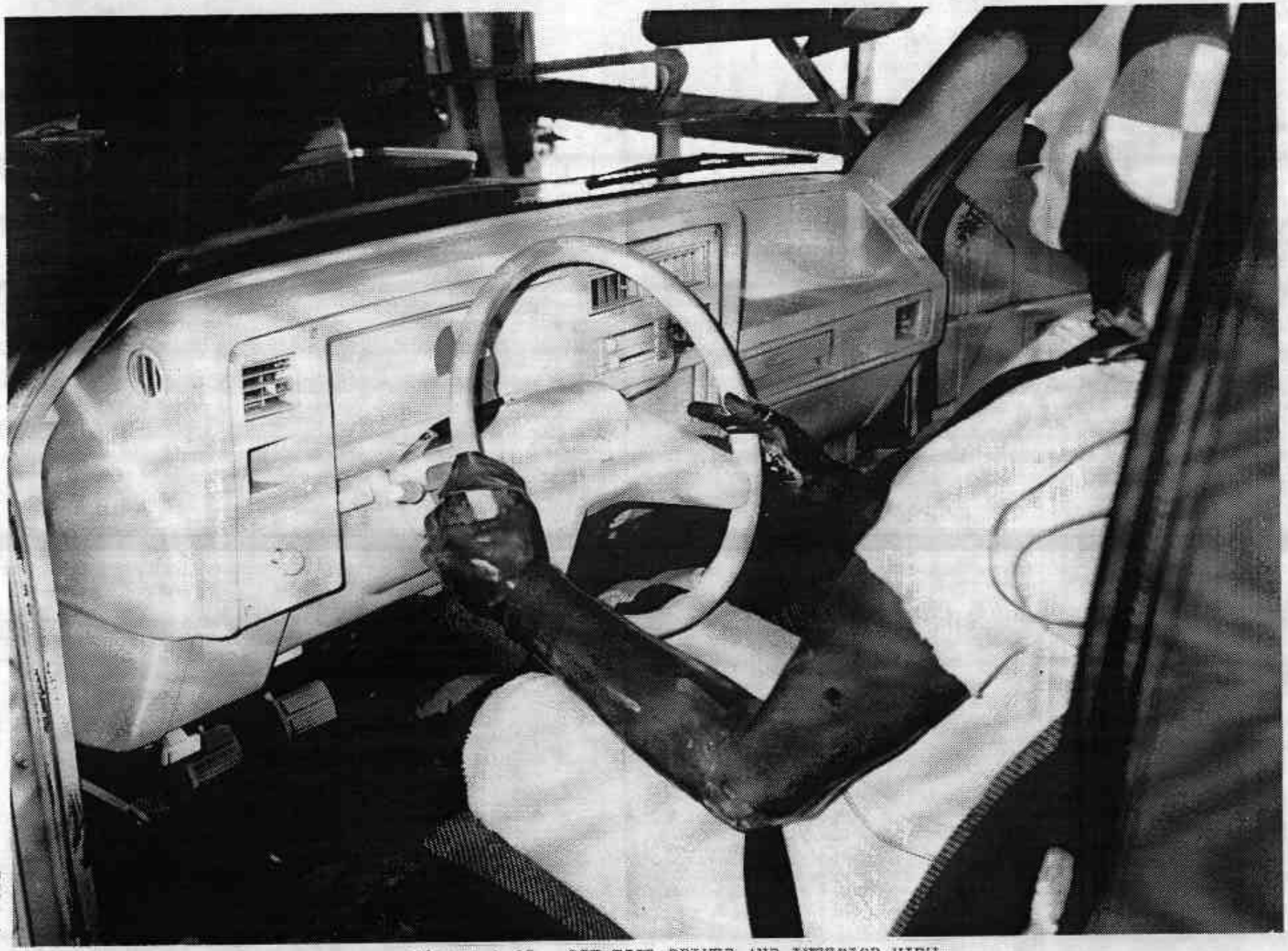


Figure A-27 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-28 POST-TEST DRIVER AND INTERIOR VIEW

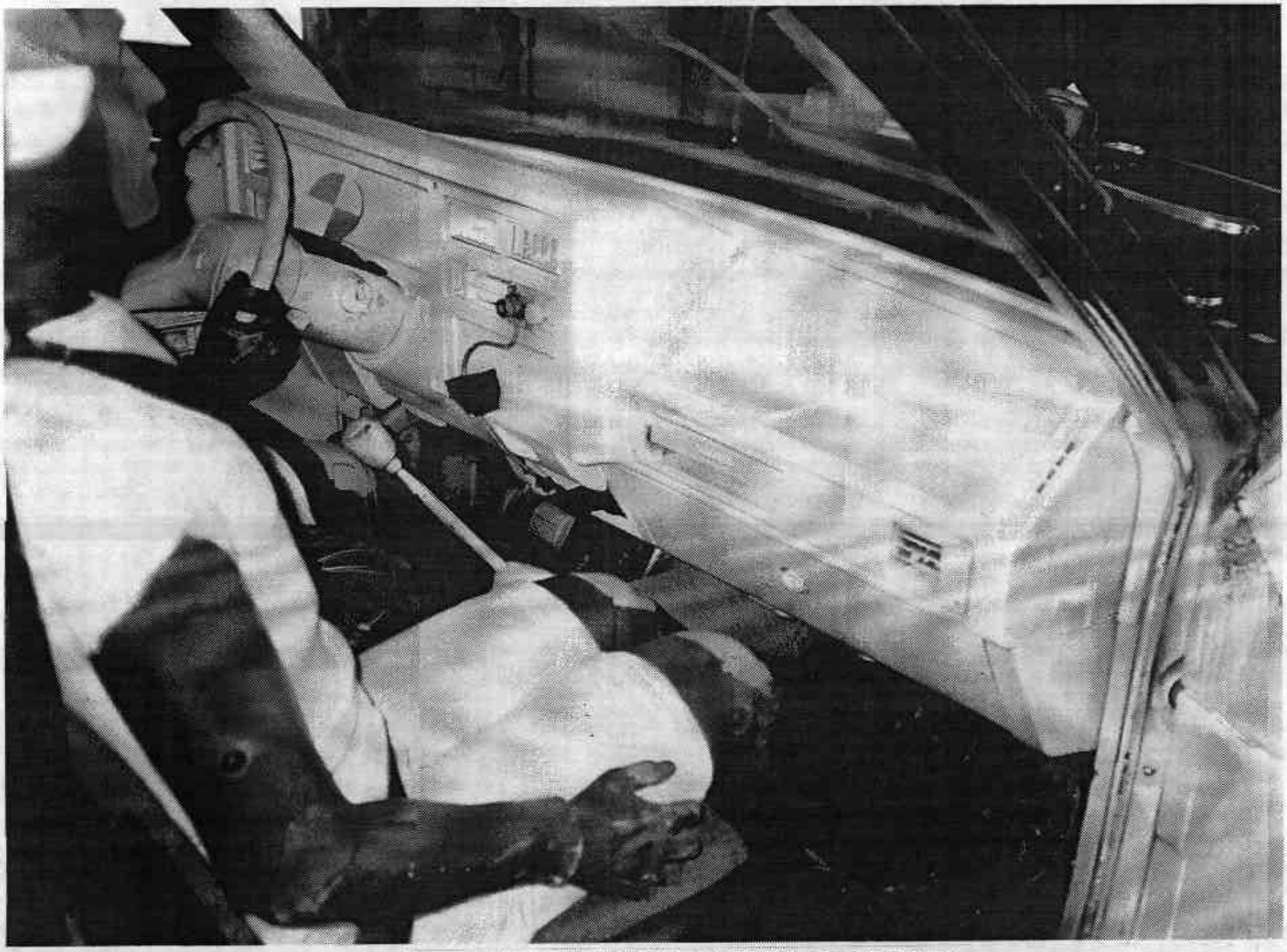


Figure A-29 PRE-TEST PASSENGER AND INTERIOR VIEW

Figure A-30 POST-TEST PASSENGER AND INTERIOR VIEW

Appendix B

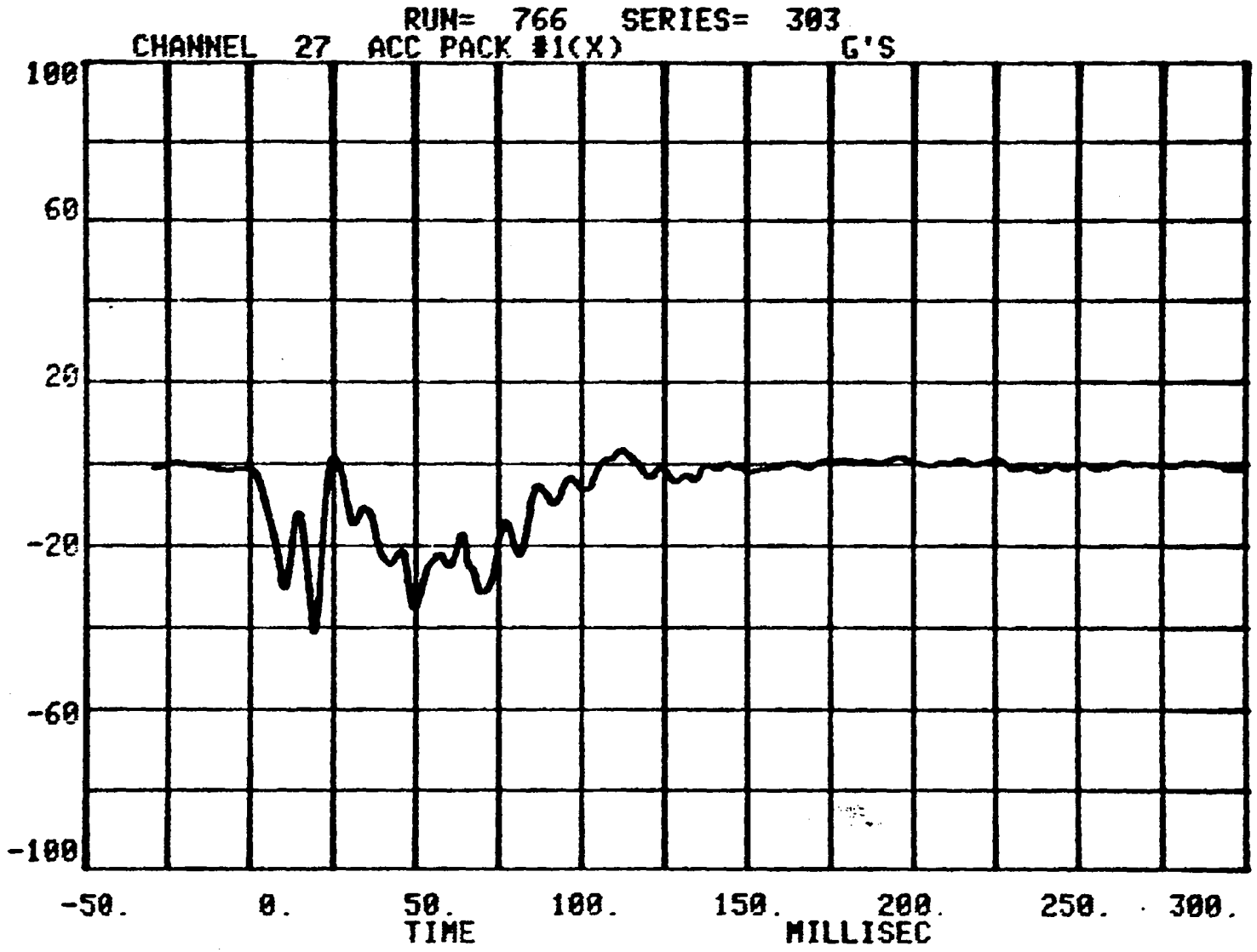
VEHICLE, LOADCELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MHO 303

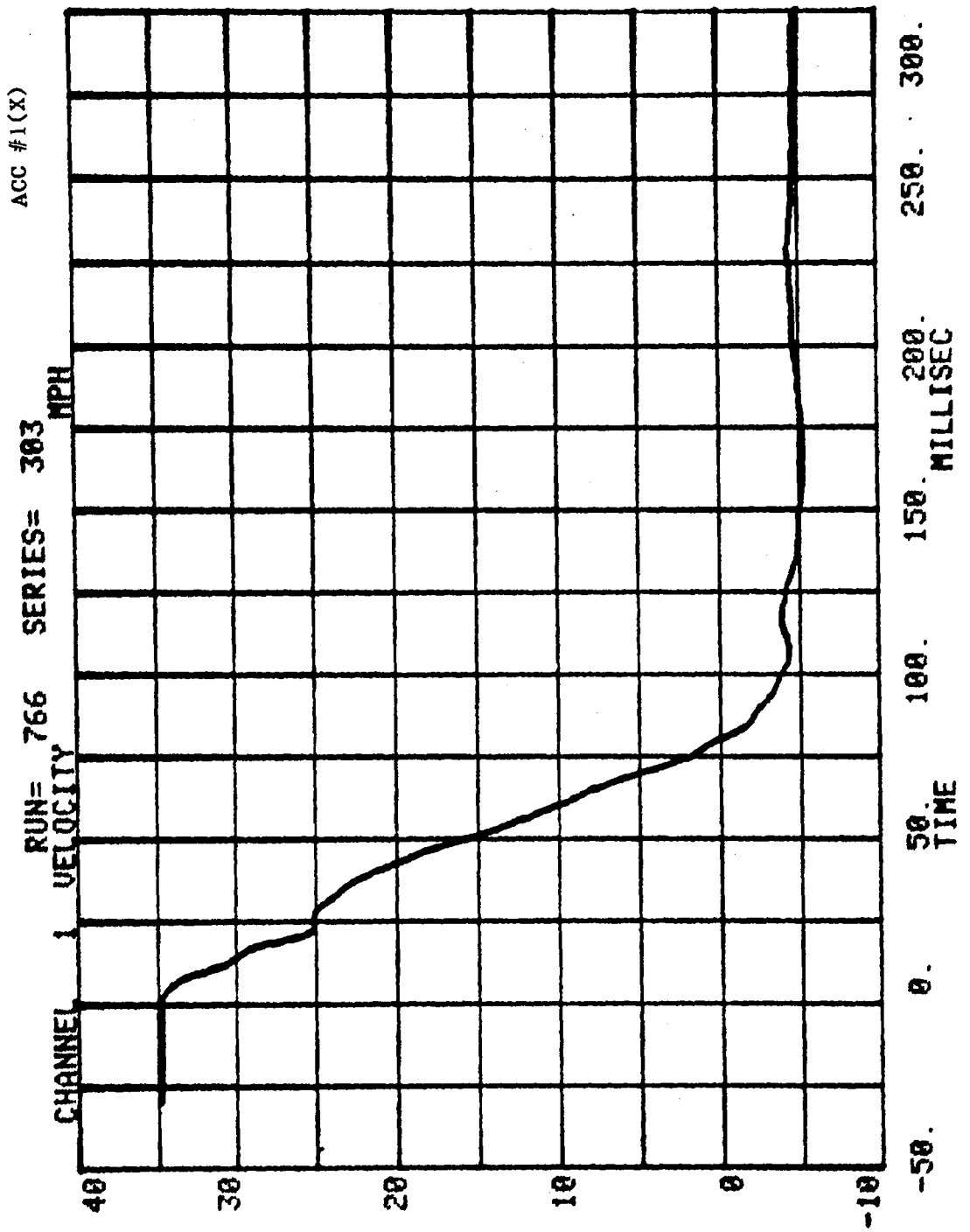
VEHICLE DATA

FILTER CHANNEL CLASS

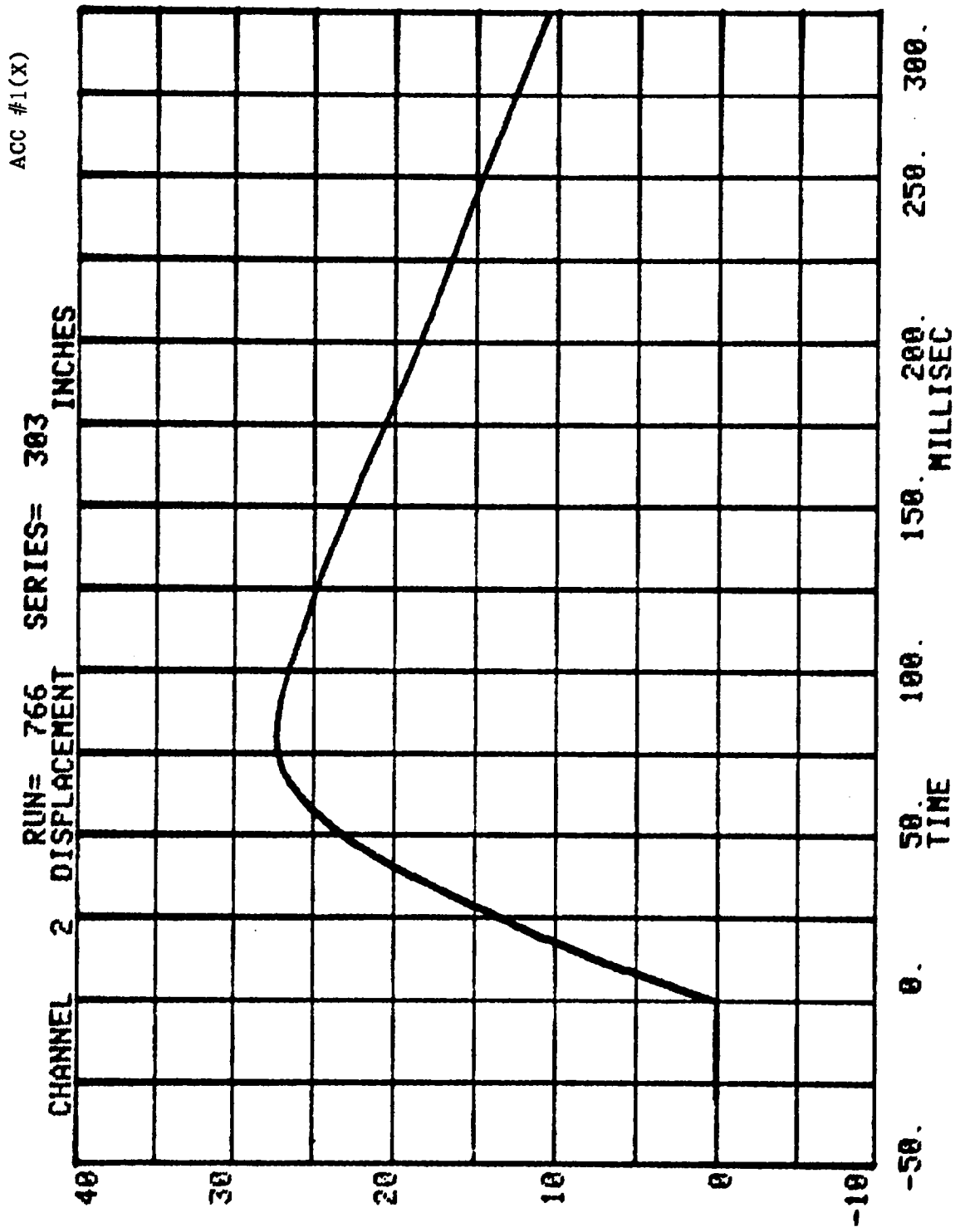
60


RUN= 766 SERIES= 303
CHANNEL 27 ACC PACK #1(X) G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

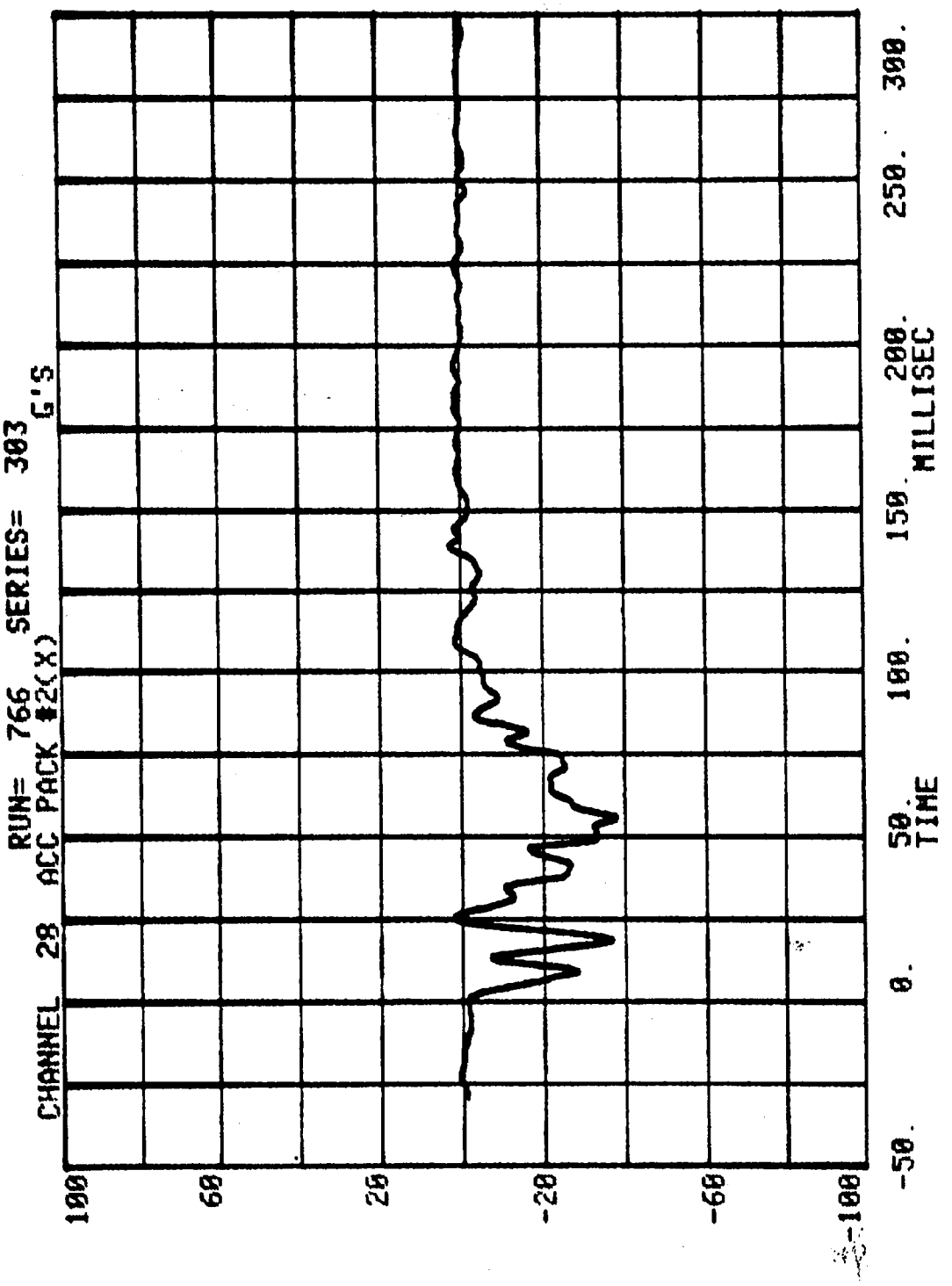
7556-4


ACC #1(X)
CHANNEL 1 VELOCITY
RUN= 766 SERIES= 303 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

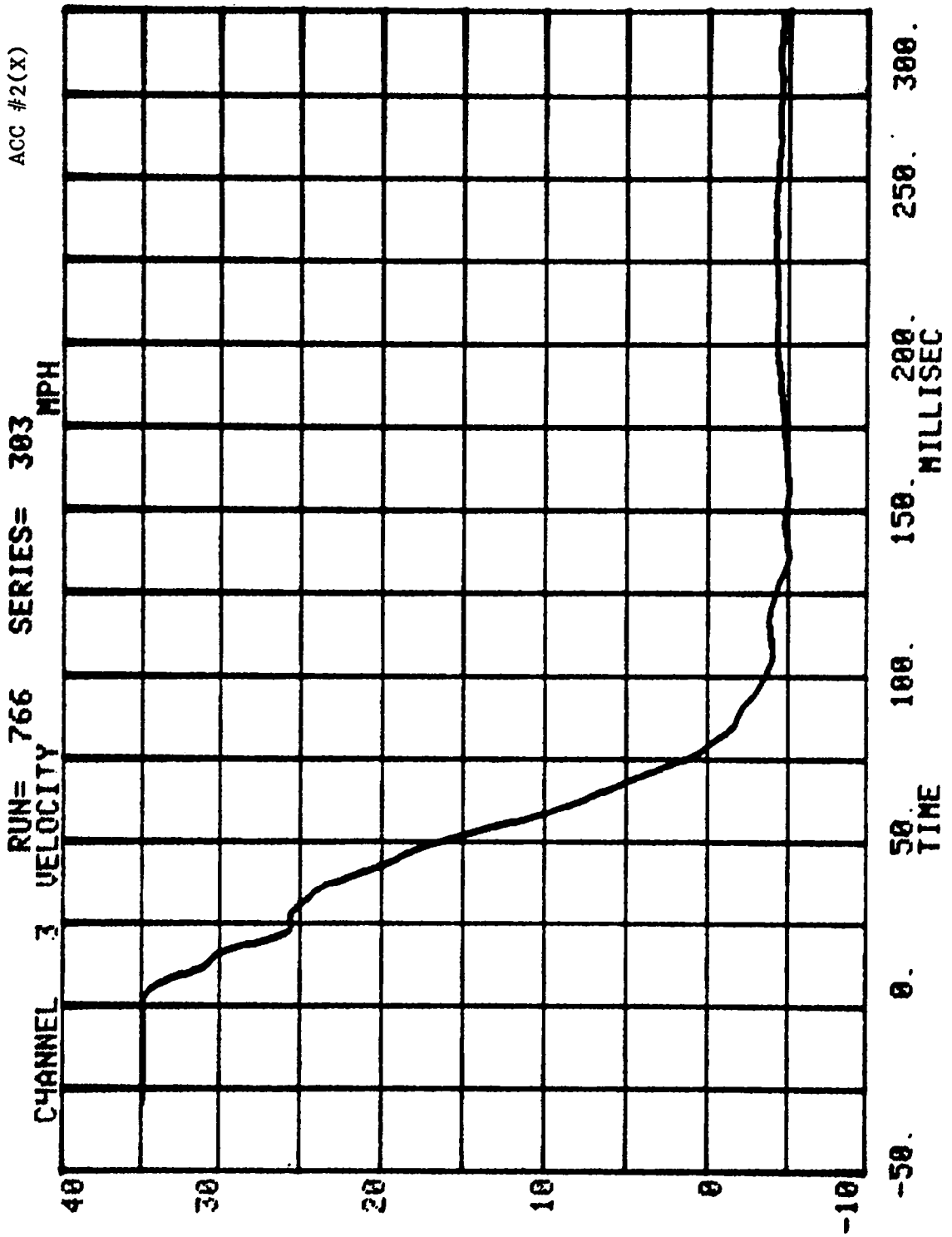
7556-4

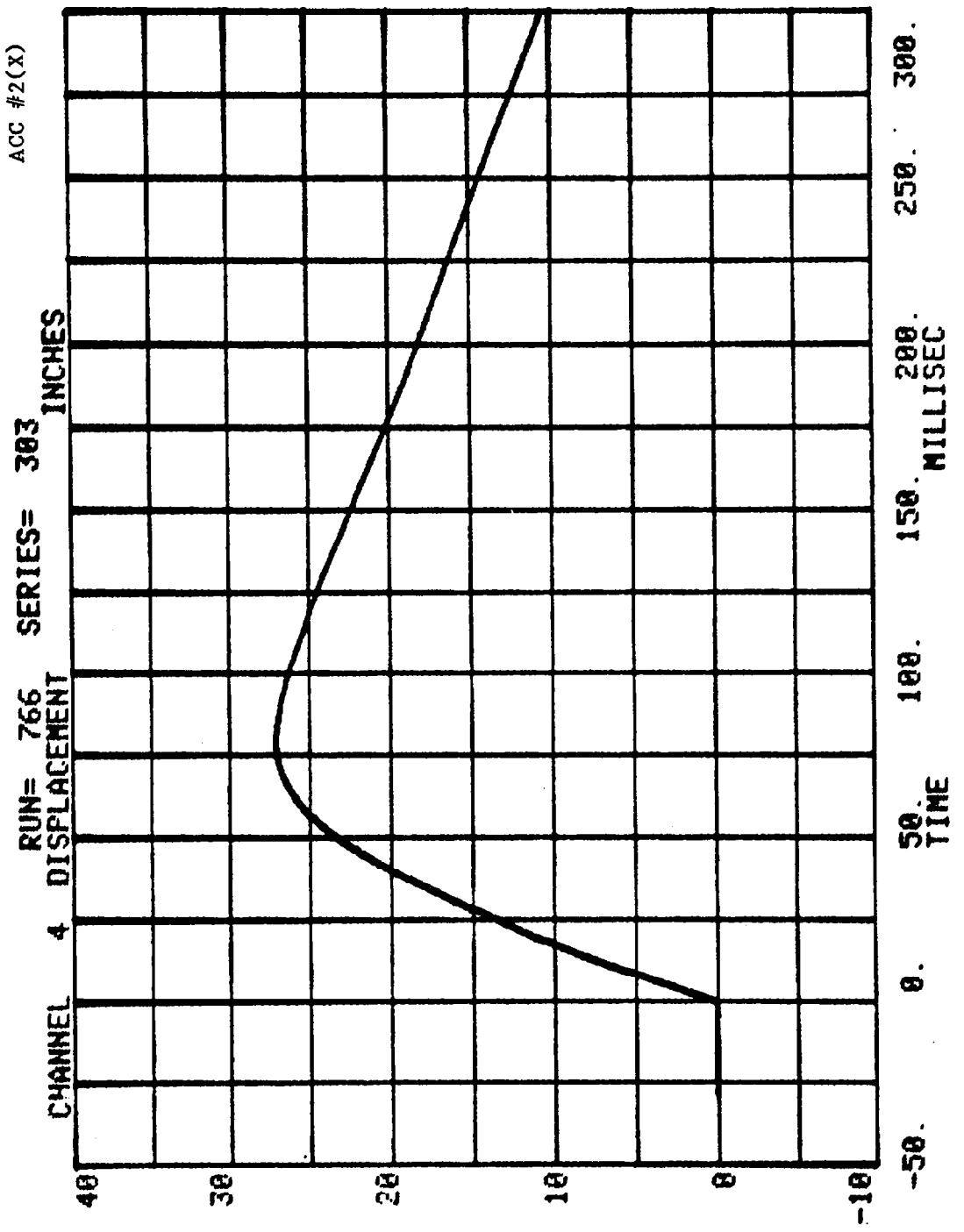

ACC #1(X)
CHANNEL 2 DISPLACEMENT
RUN= 766 SERIES= 303
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


CHANNEL 28 ACC PACK #2(X)
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


ACC #2(X)
CHANNEL 3 VELOCITY
RUN= 766 SERIES= 303
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACC #2(X)
CHANNEL 4 DISPLACEMENT
RUN= 766 SERIES= 303
INCHES
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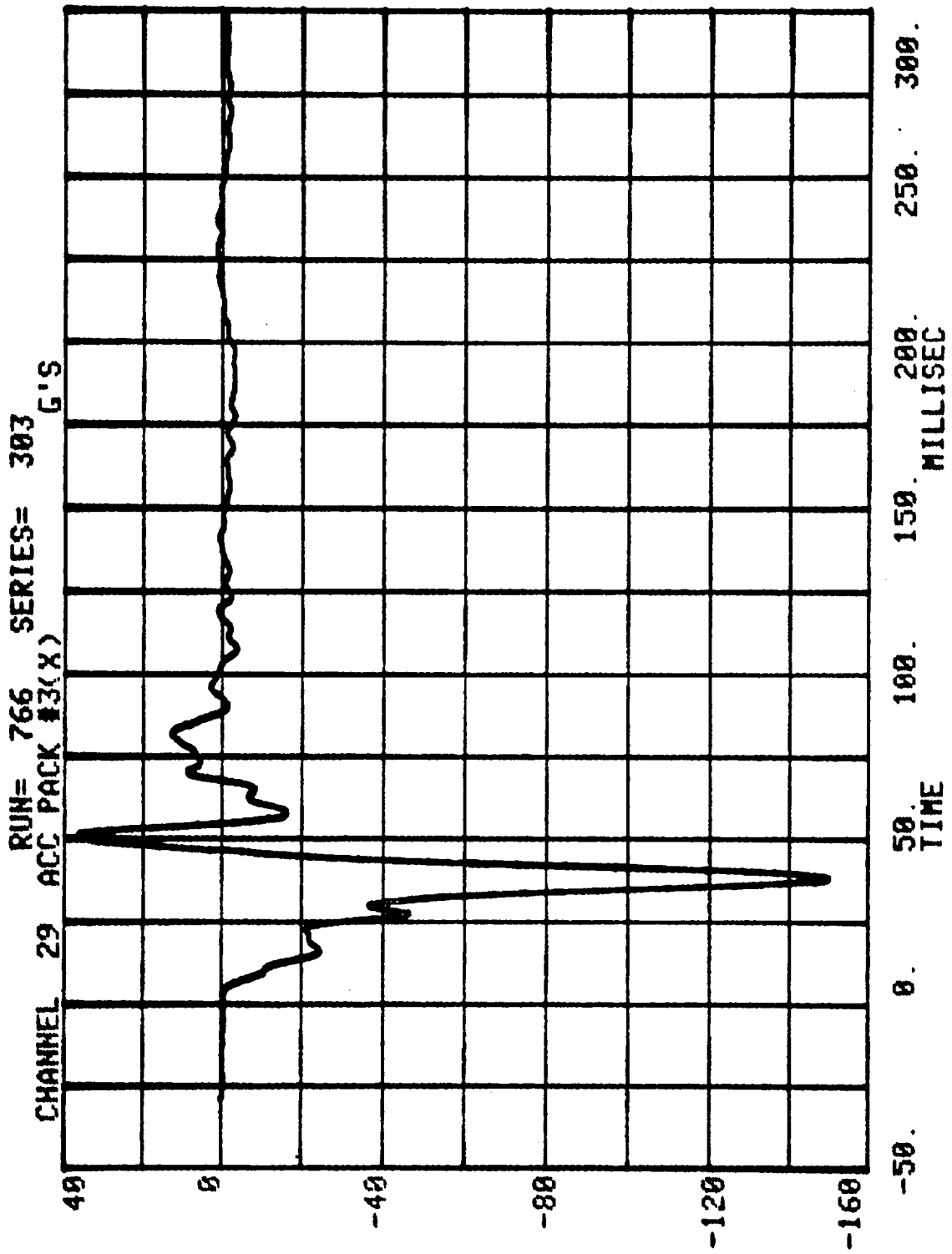
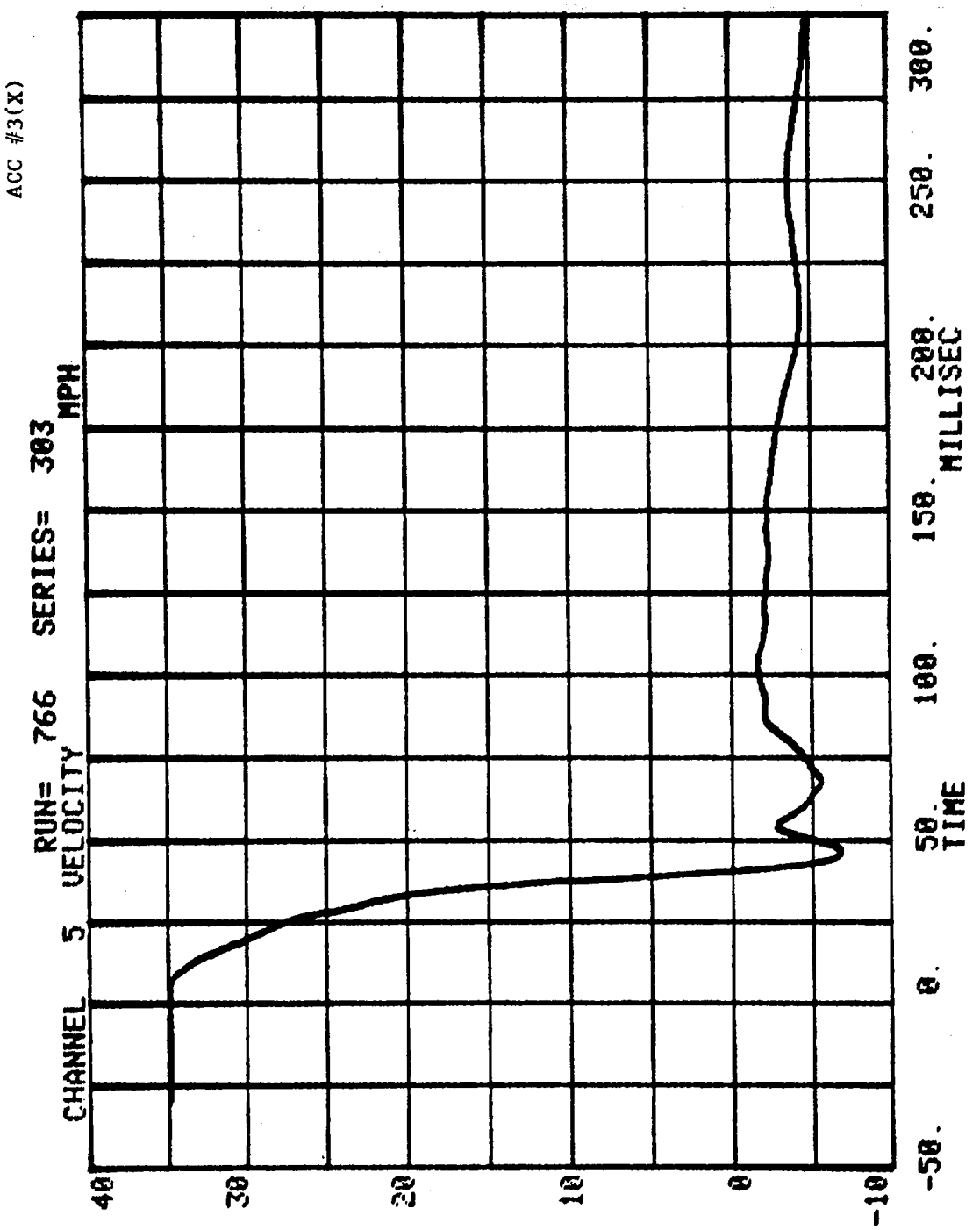
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

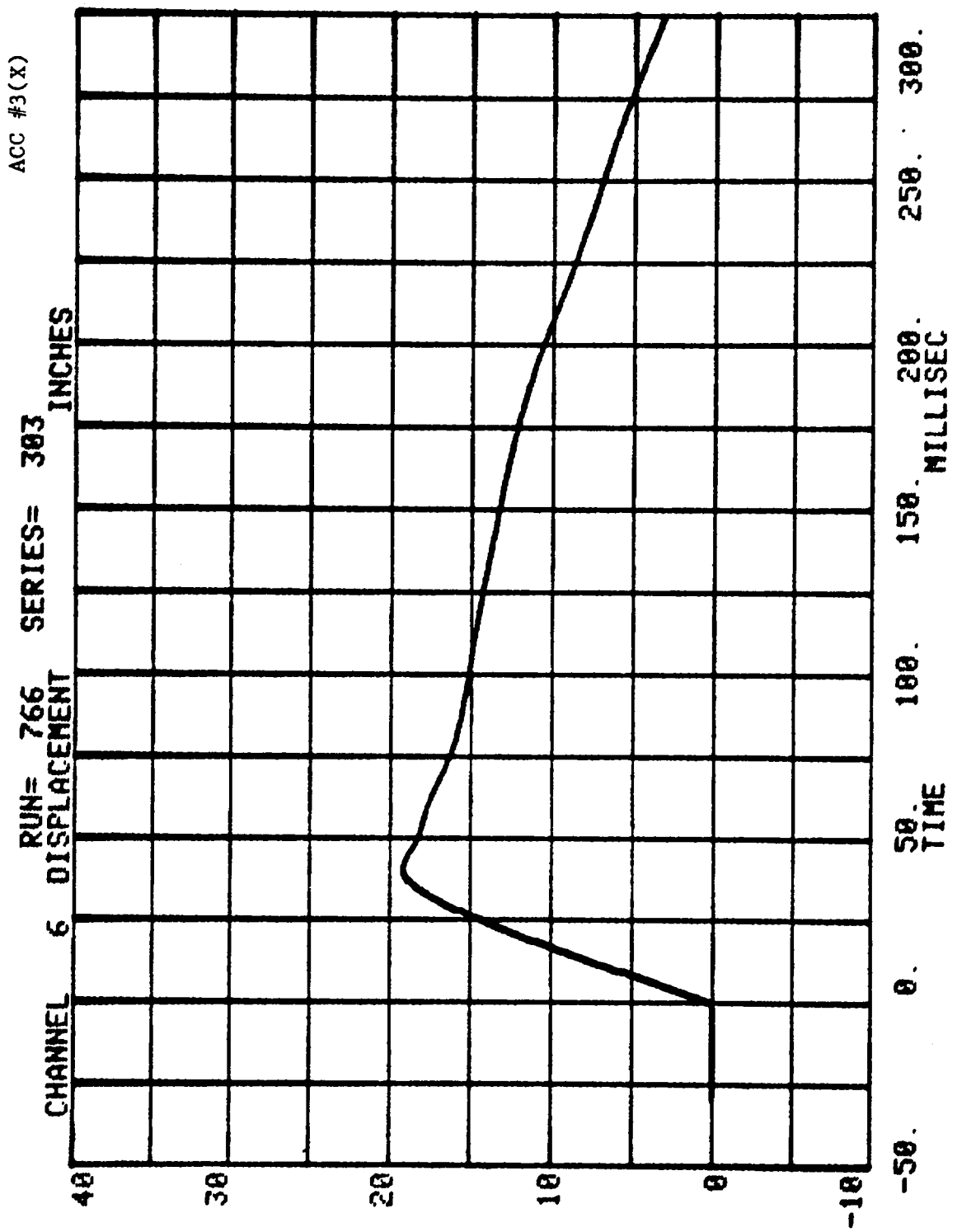
7556-4


CHANNEL 29 ACC PACK #3(X)
RUN= 766 SERIES= 303
G'S
40
0
-40
-80
-120
-160
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

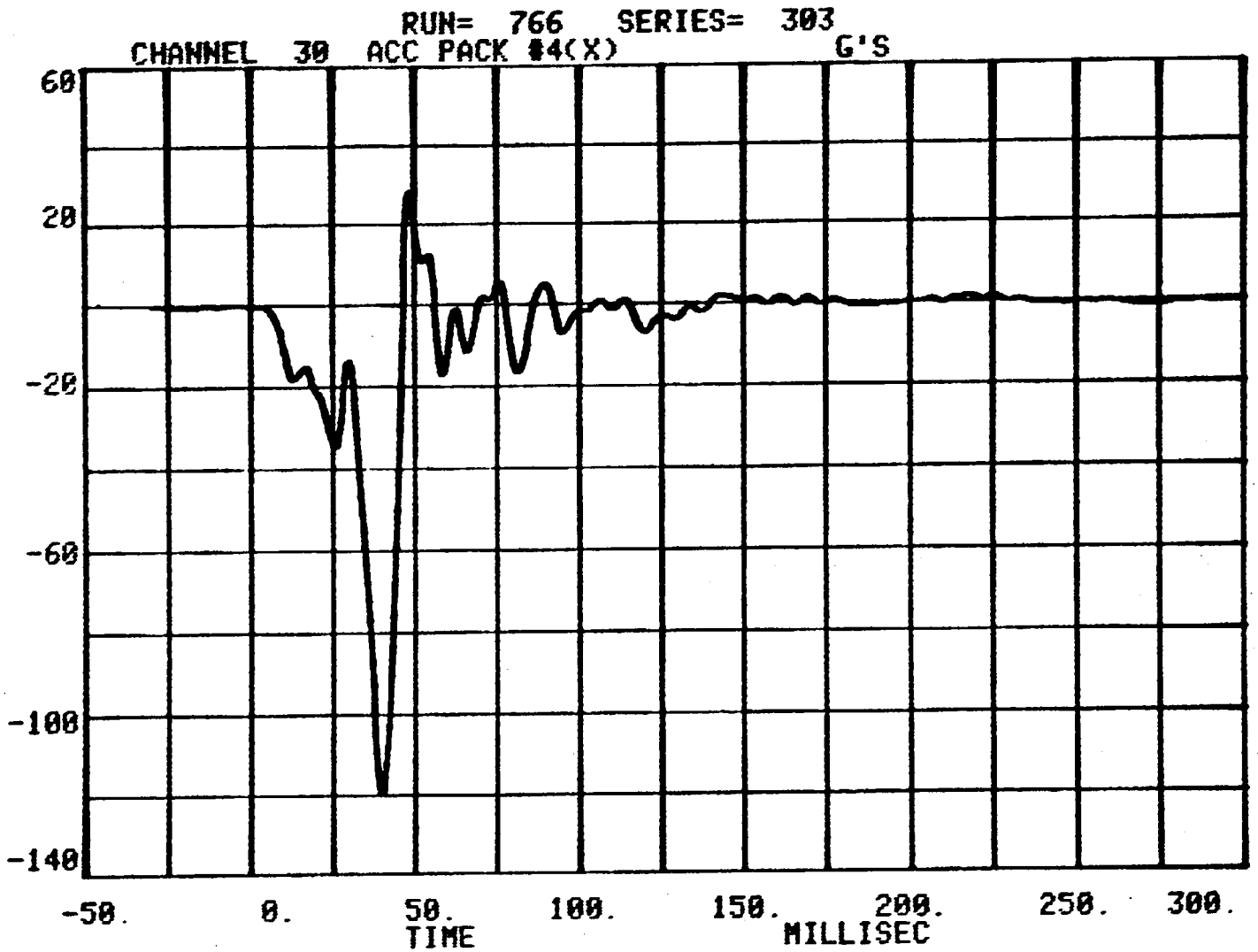
7556-4

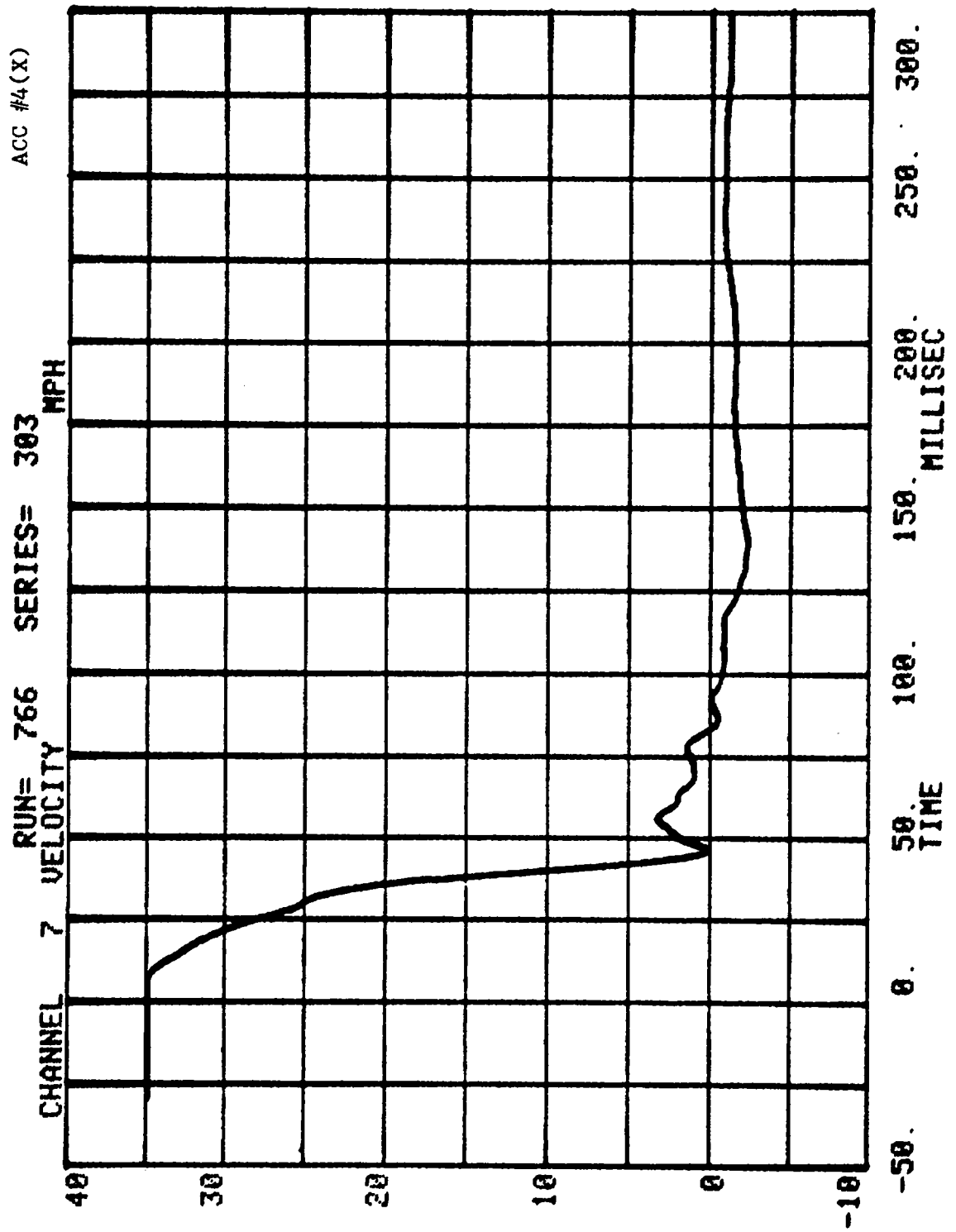

ACC #3(X)
CHANNEL 5 VELOCITY
RUN= 766 SERIES= 303 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


ACC #3(X)
CHANNEL 6 DISPLACEMENT
RUN= 766 SERIES= 303
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


RUN= 766 SERIES= 303
CHANNEL 30 ACC PACK #4(X)
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= 766 SERIES= 303
MPH
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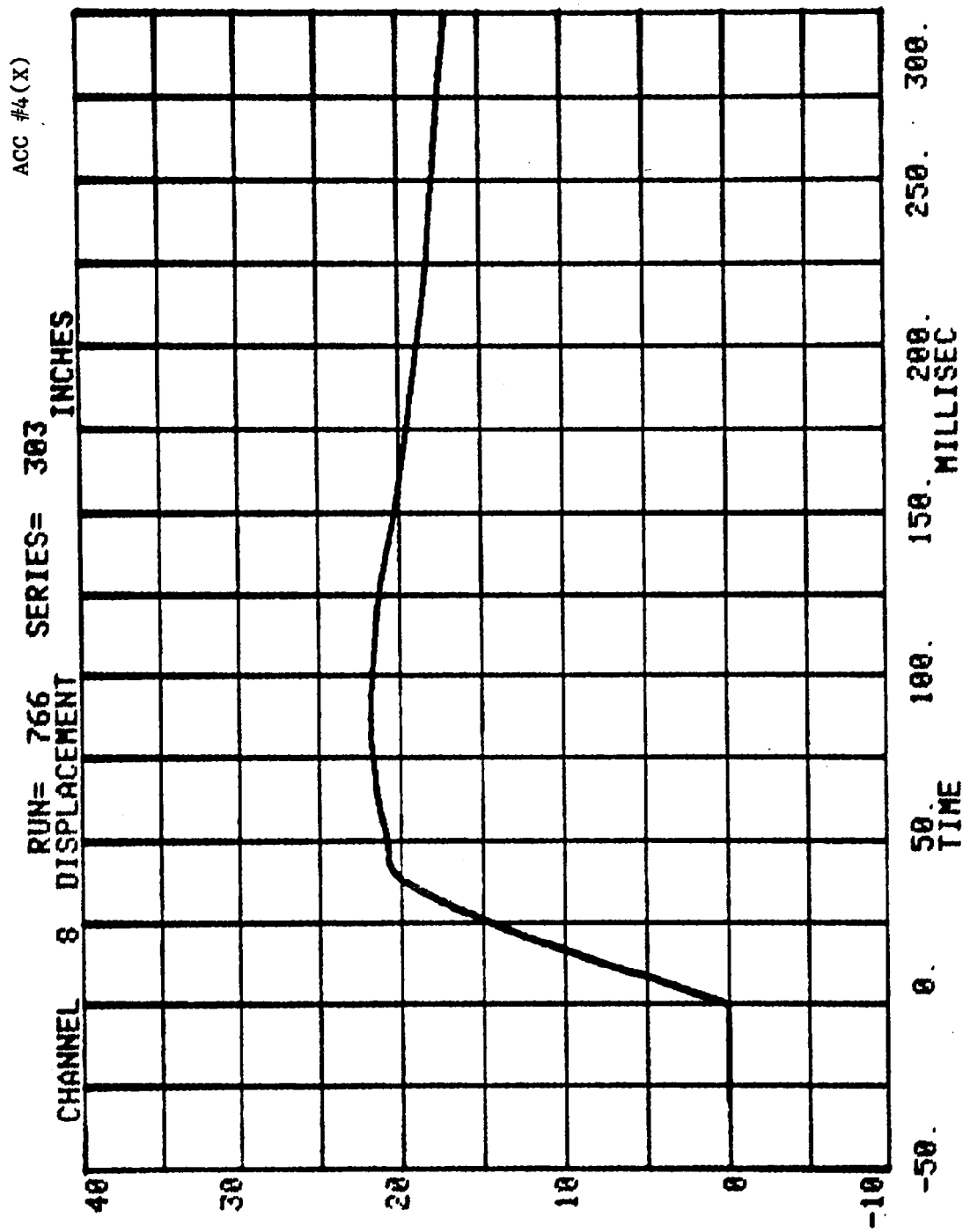
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


ACC #4(X)
CHANNEL 8 DISPLACEMENT
RUN= 766 SERIES= 303
INCHES
40
30
20
10
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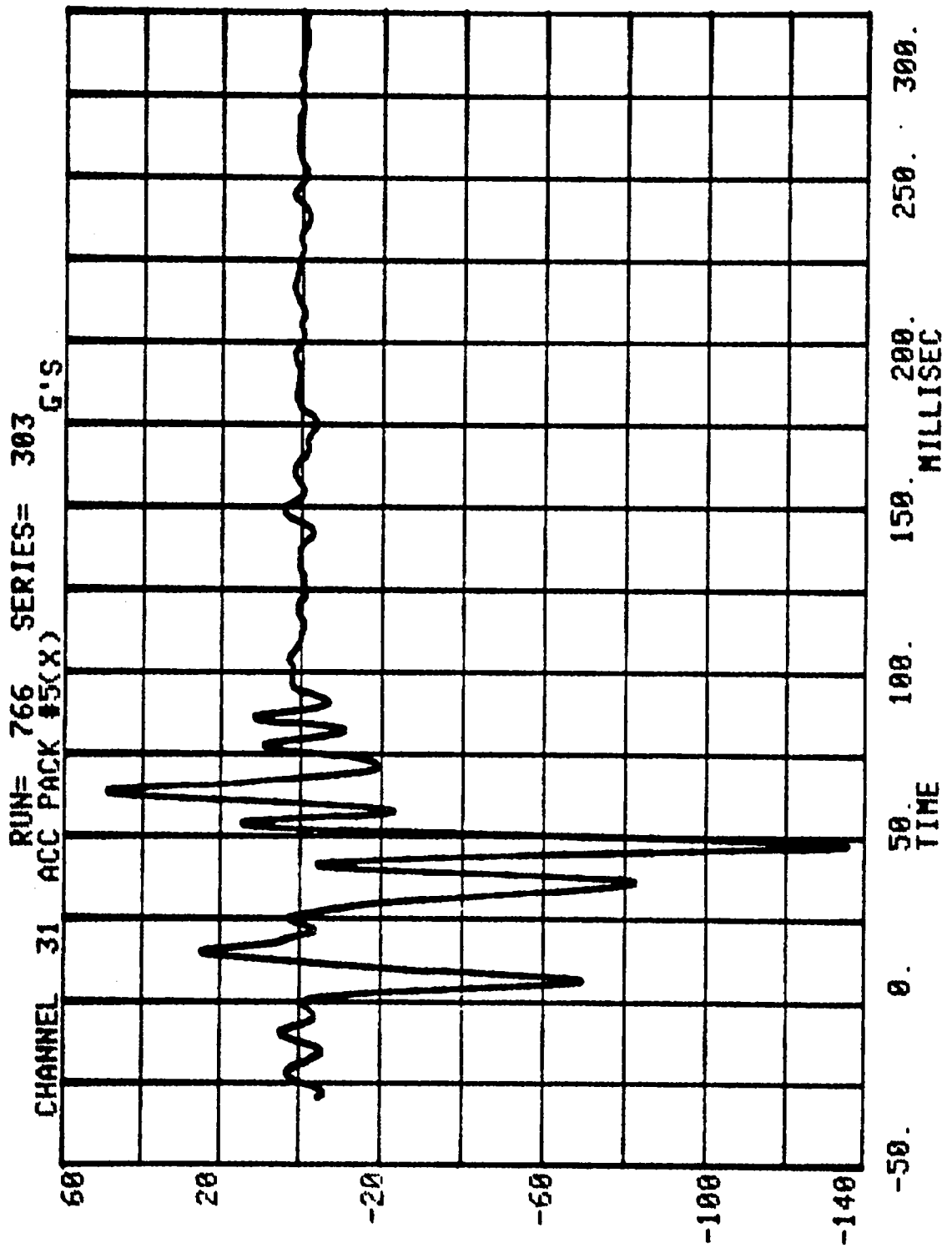
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


CHANNEL 31 ACC PACK #5(X)
RUN= 766 SERIES= 303
G'S
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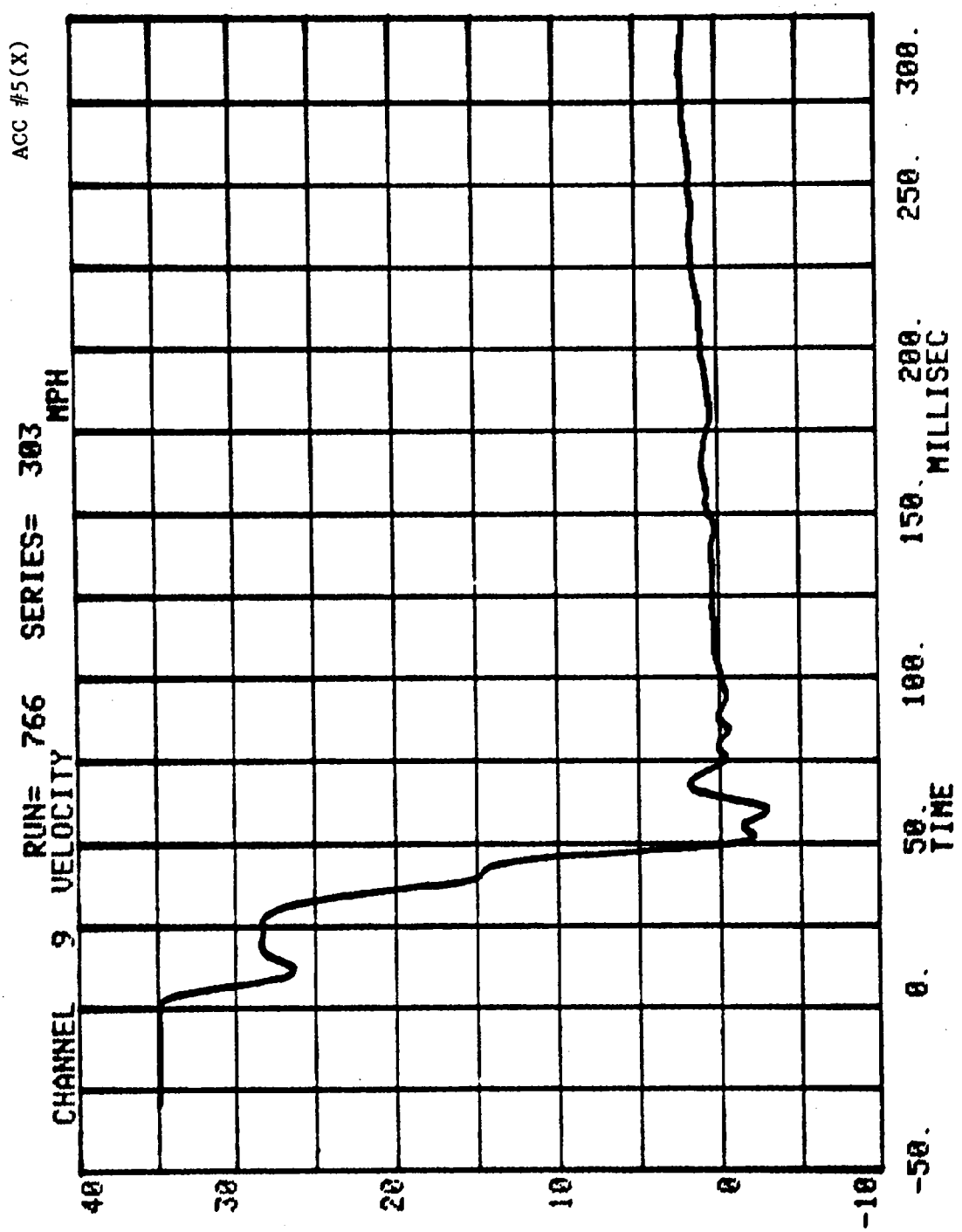
20
-20
-60
-100
-140
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


ACC #5(X)
CHANNEL 9 VELOCITY
RUN= 766 SERIES= 303 MPH
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30
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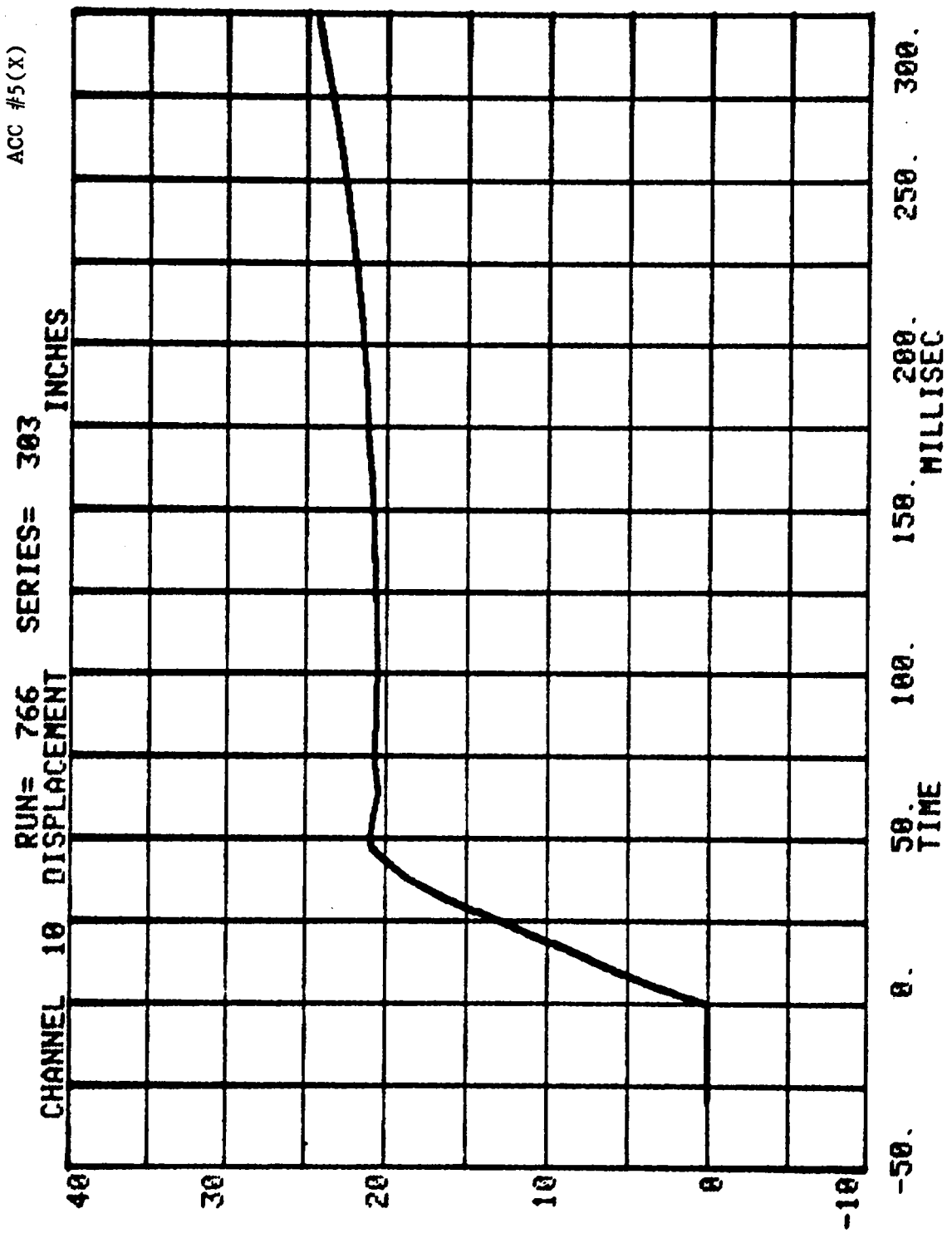
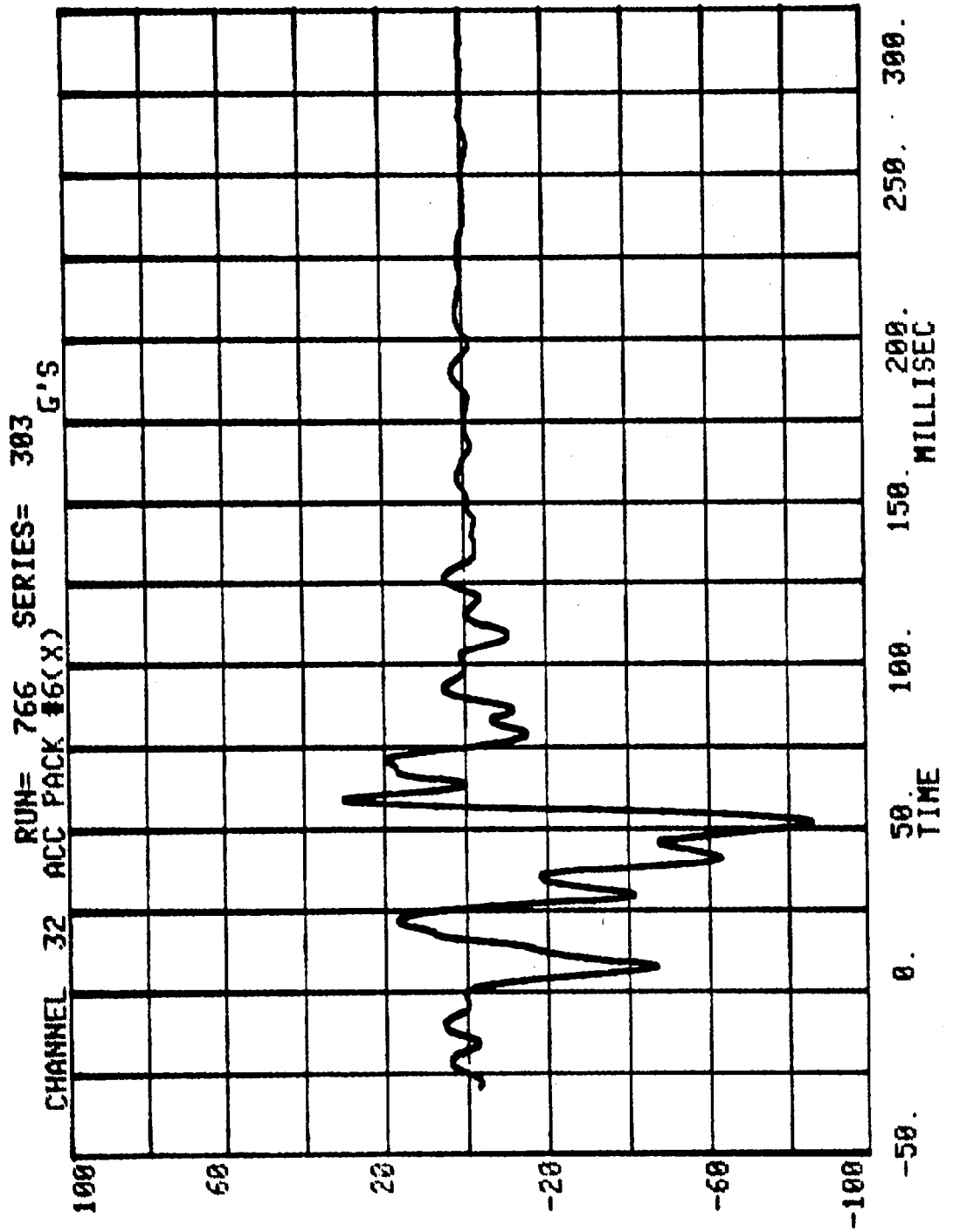
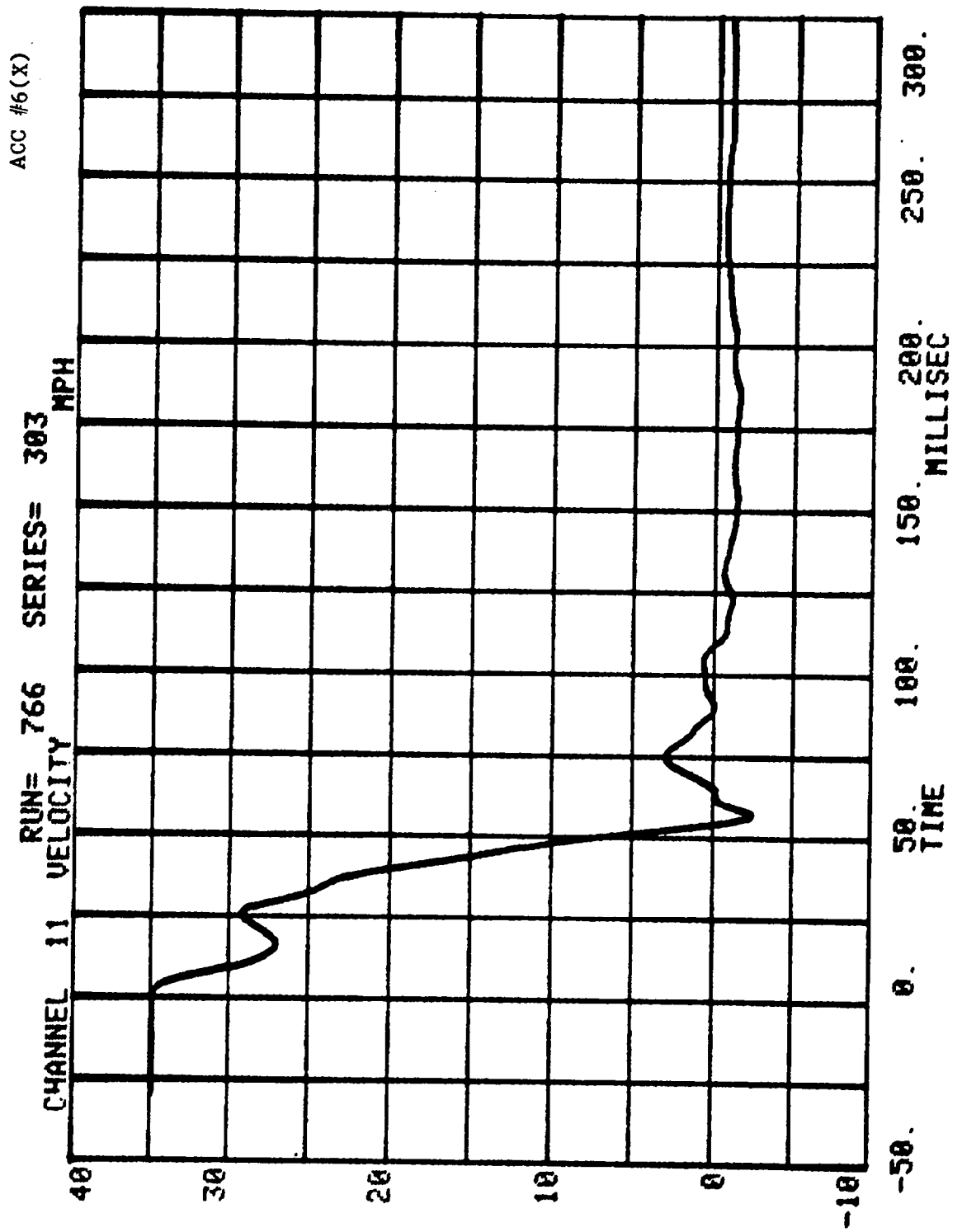
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

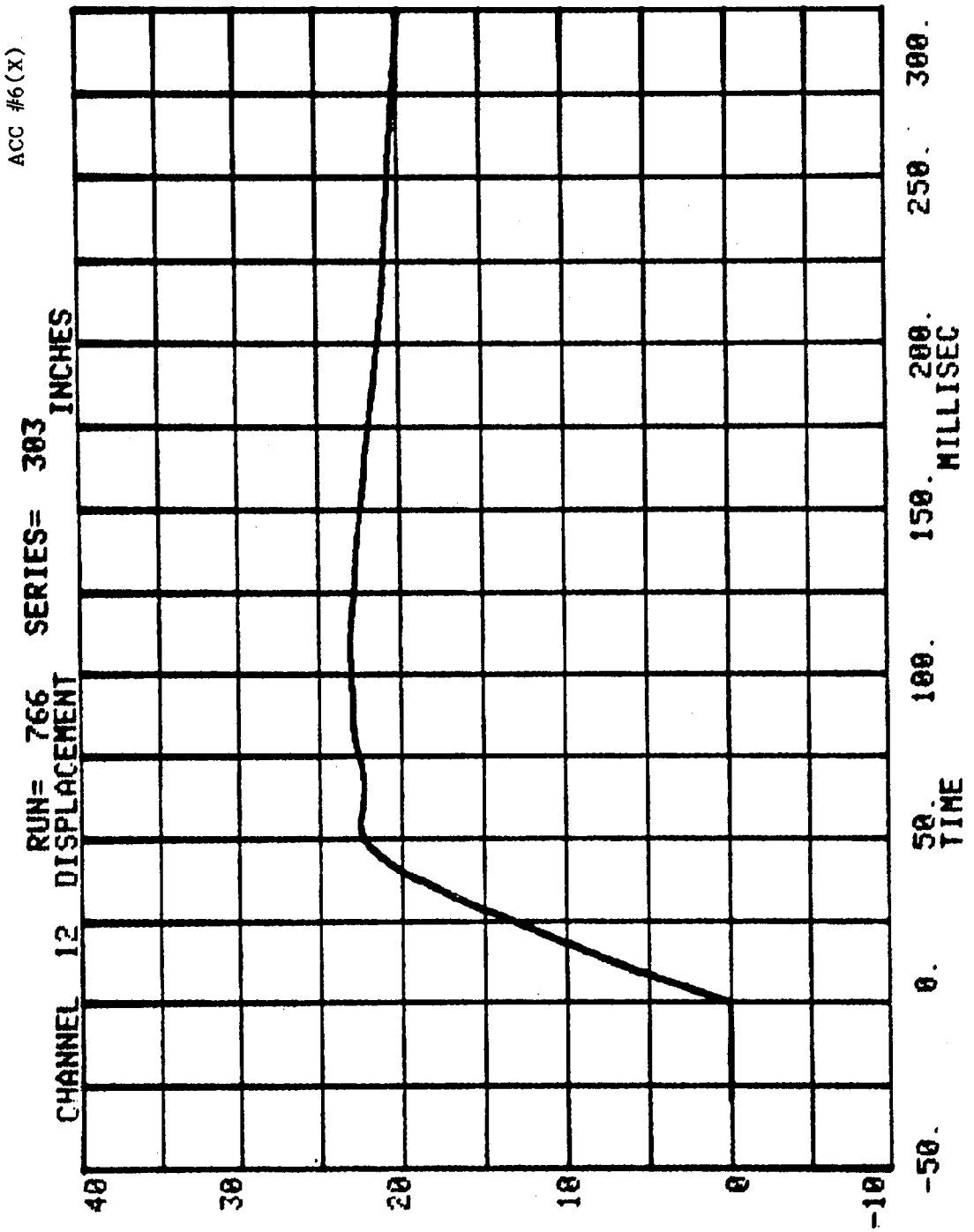

ACC #5(X)
CHANNEL 10 DISPLACEMENT
RUN= 766 SERIES= 303
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 32 ACC PACK #6(X)
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

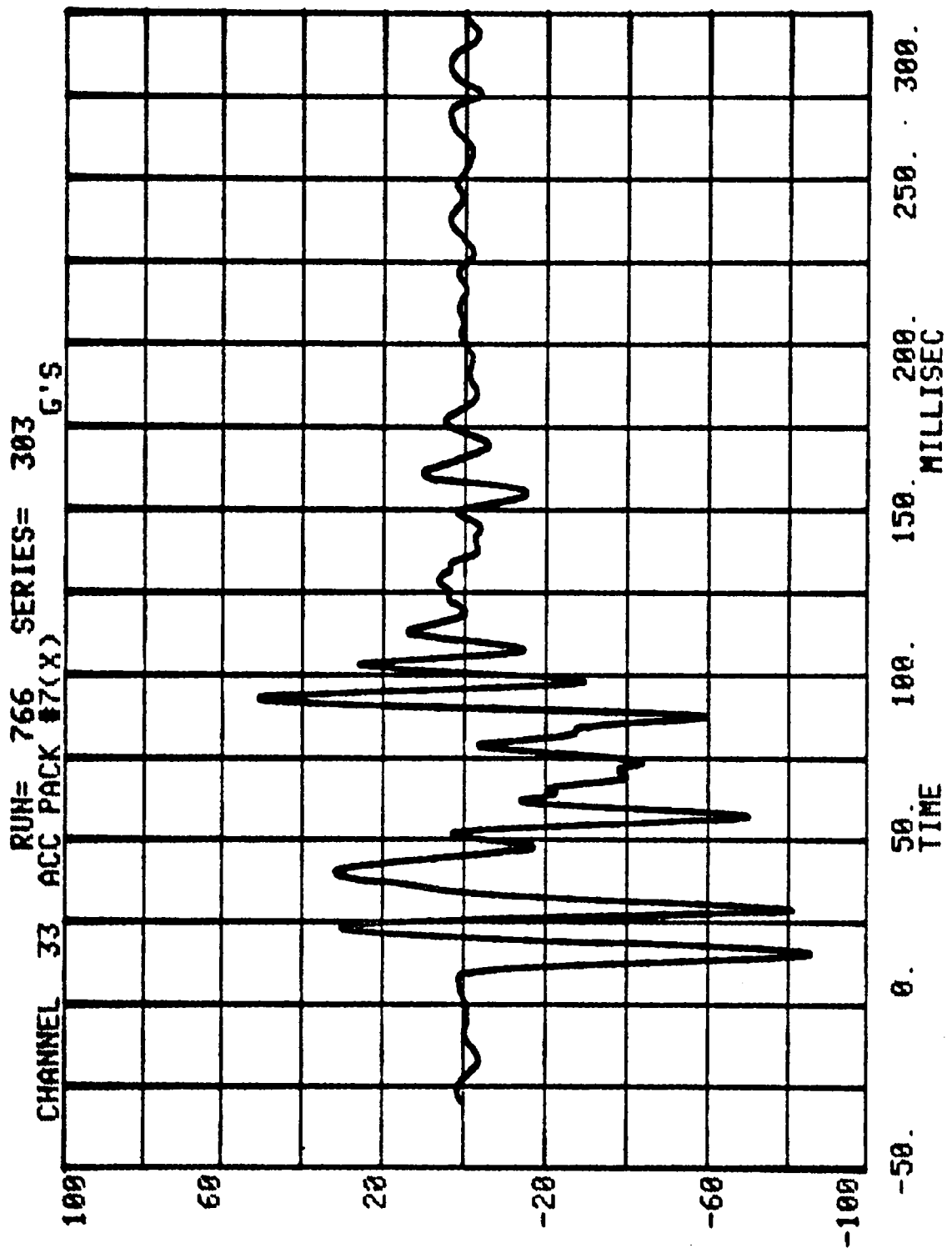
7556-4


ACC #6(X)
CHANNEL 11 VELOCITY
RUN= 766 SERIES= 303
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


ACC #6(X)
CHANNEL 12 DISPLACEMENT
RUN= 766 SERIES= 303
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


CHANNEL 33 ACC PACK #7(X)
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
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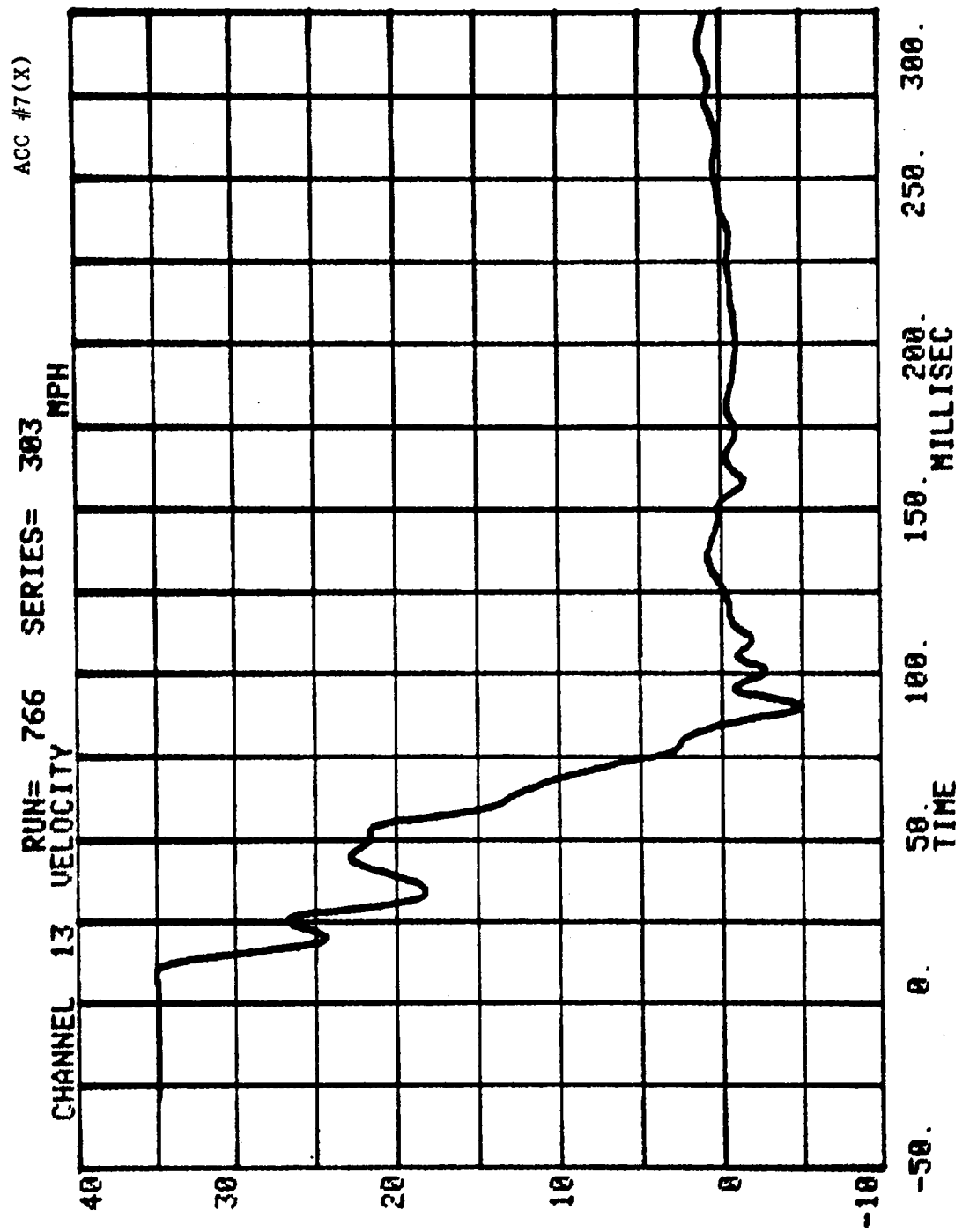
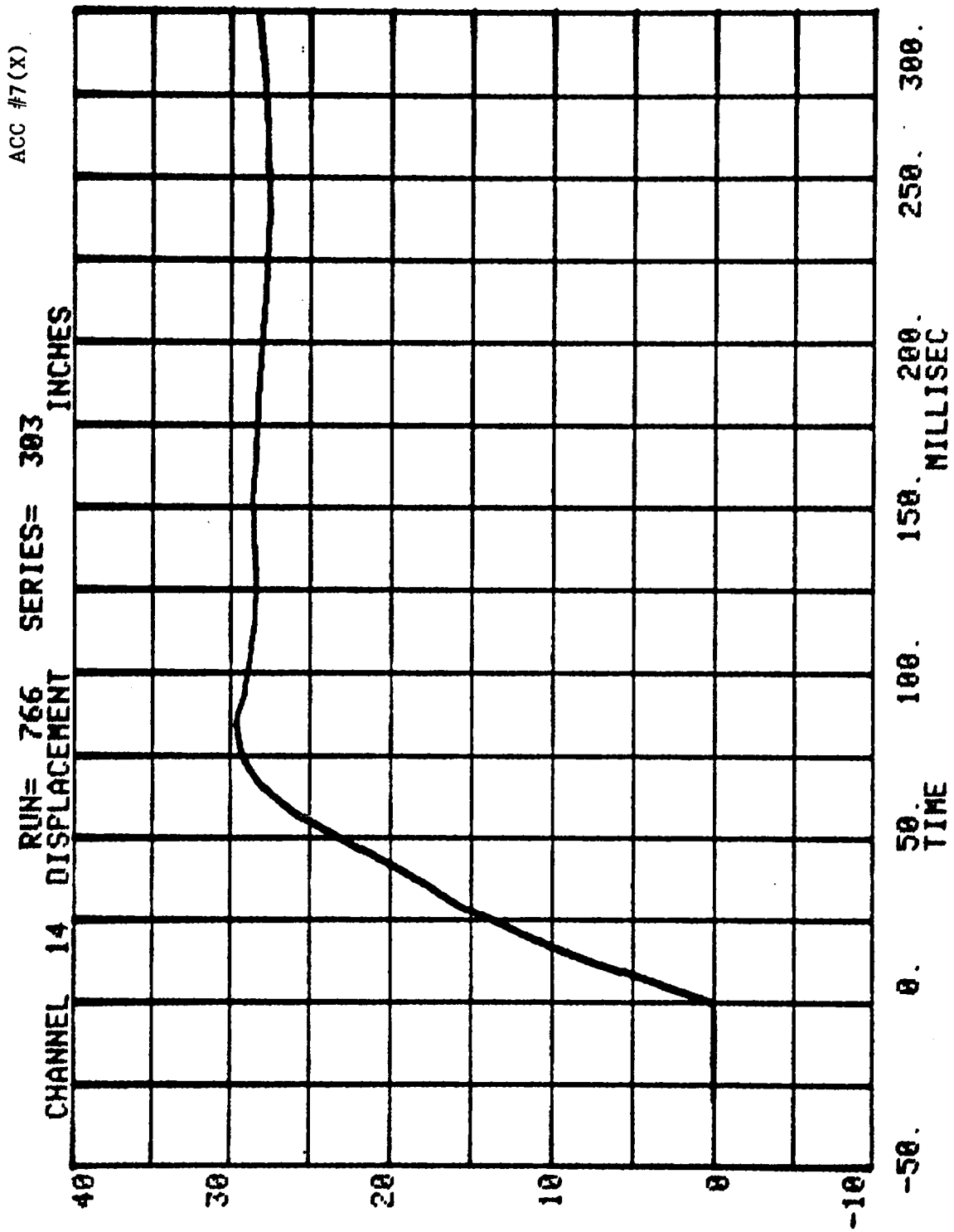
150.
200.
250.
300.
TIME
MILLISEC

7556-4


ACC #7(X)
CHANNEL 13 VELOCITY
RUN= 766 SERIES= 303 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


ACC #7(X)
CHANNEL 14 DISPLACEMENT
RUN= 766 SERIES= 303
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

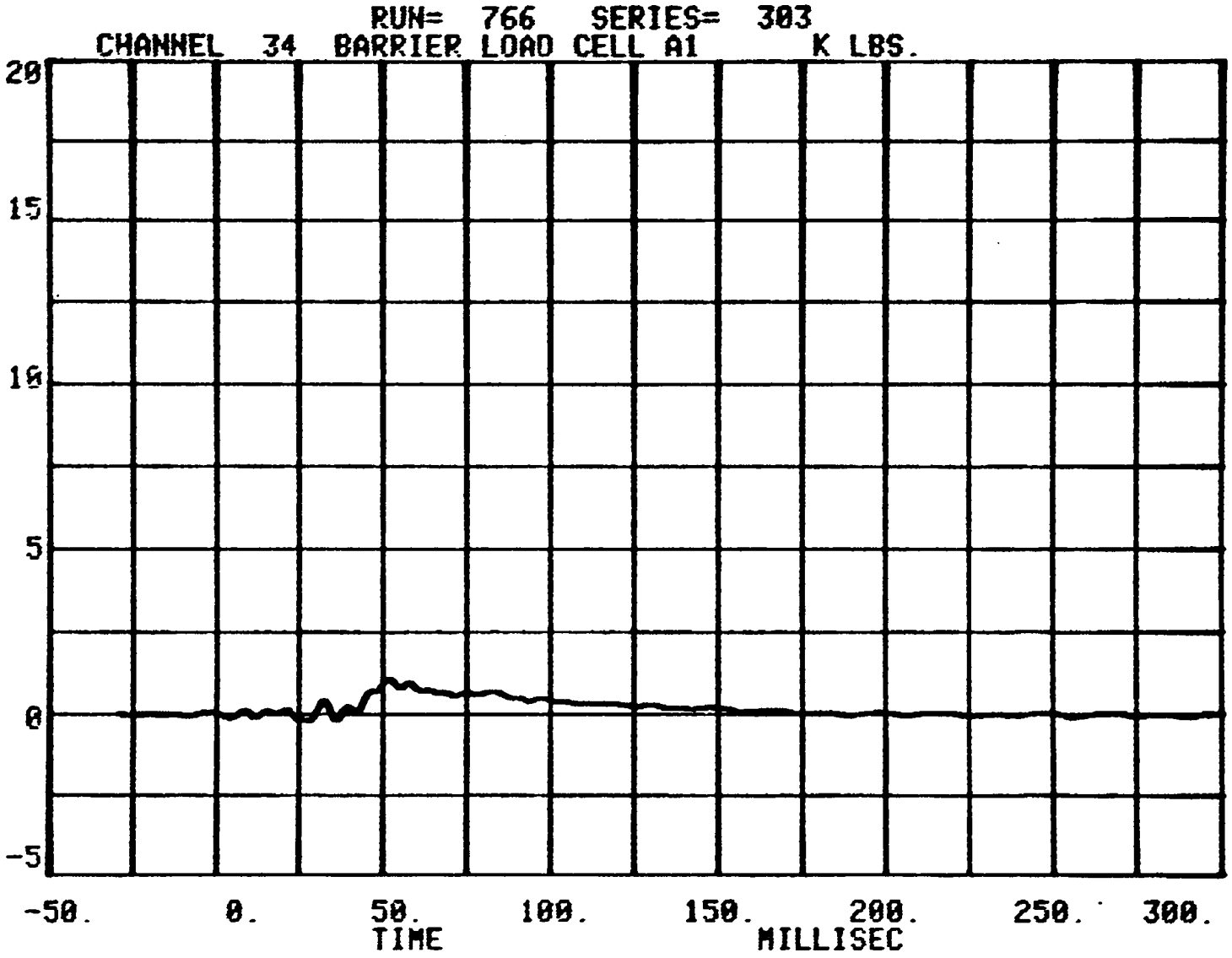
7556-4

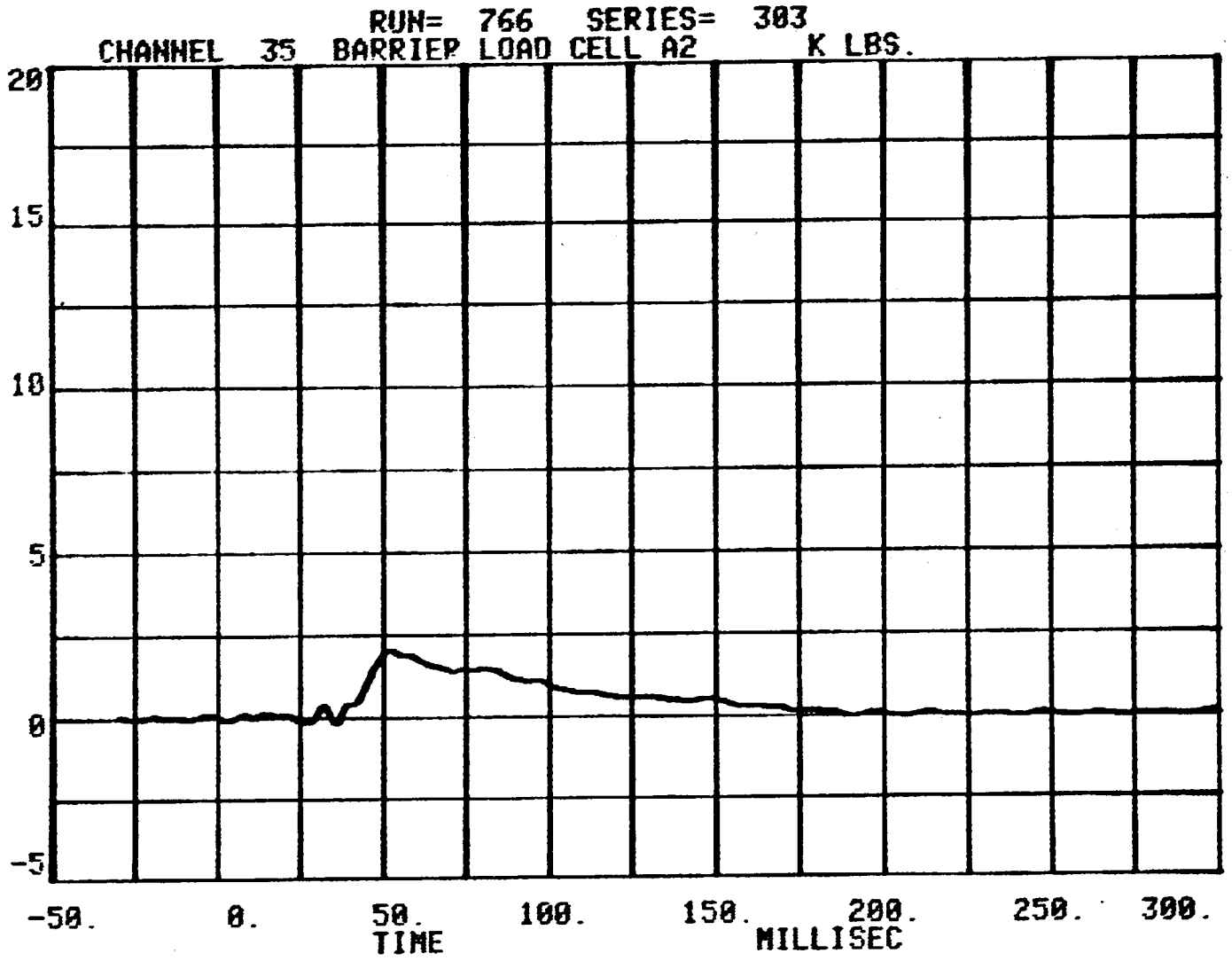
TEST NO. MHO 303

LOAD CELL BARRIER DATA

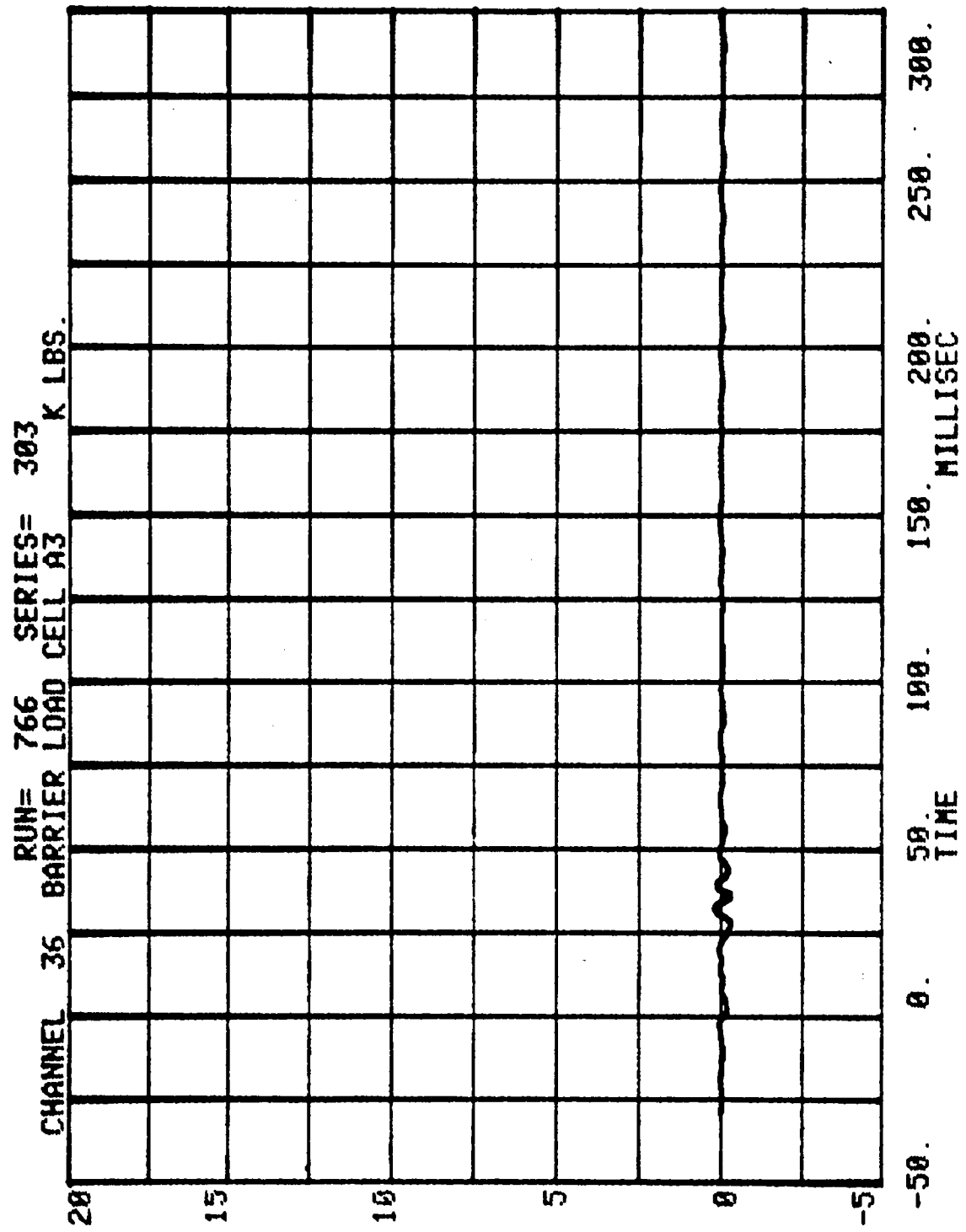
FILTER CHANNEL CLASS

60

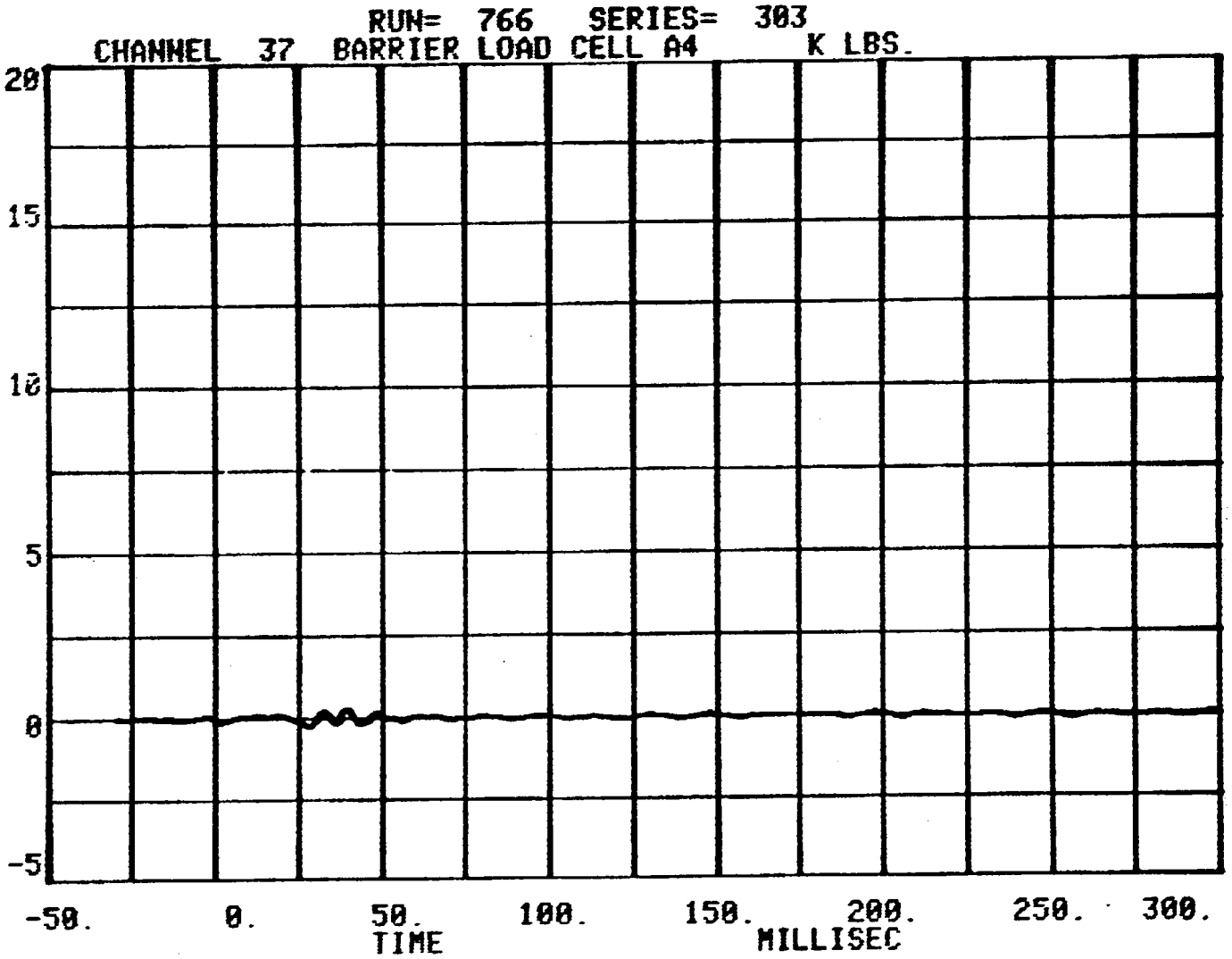

RUN= 766 SERIES= 303
CHANNEL 34 BARRIER LOAD CELL A1 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

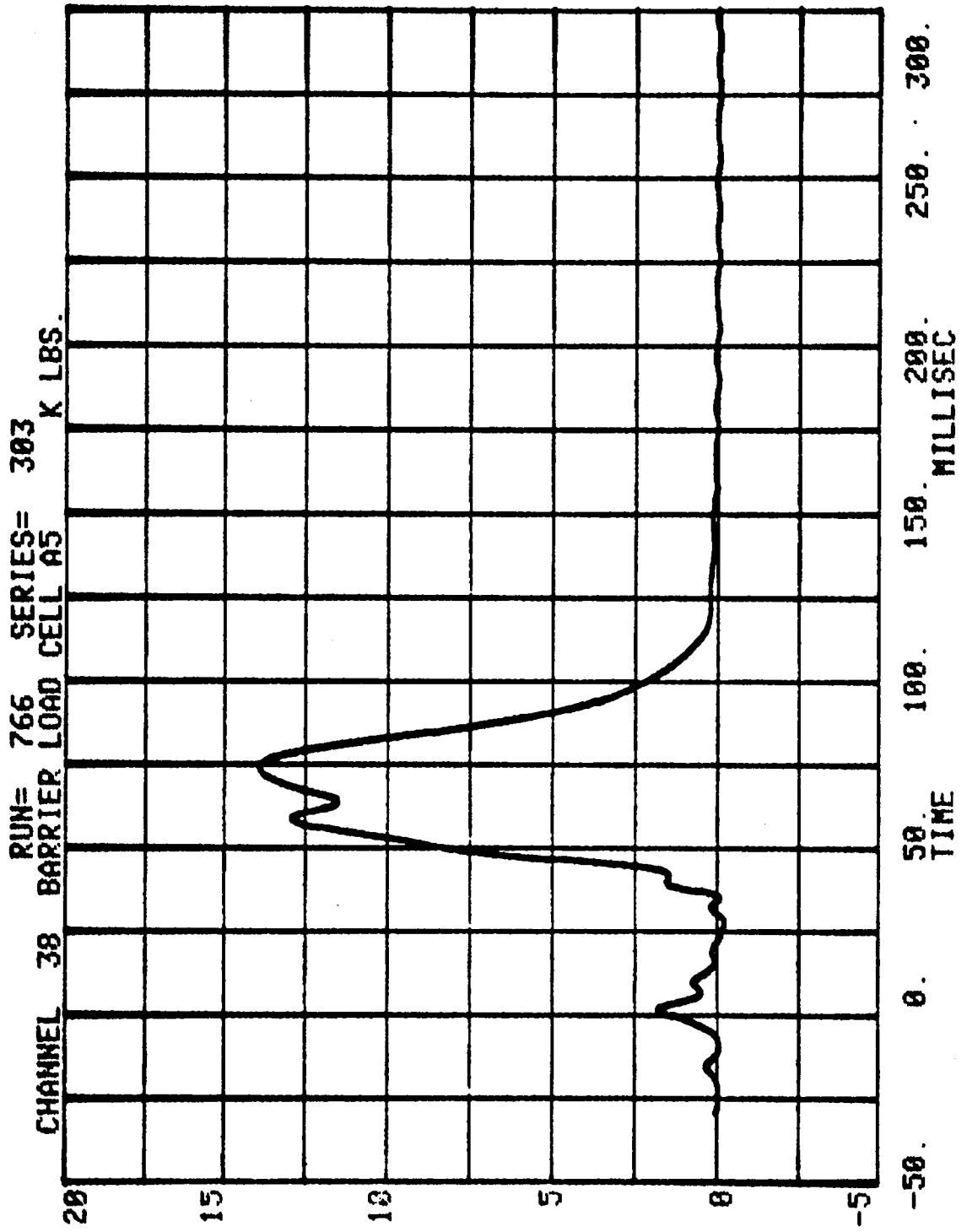

RUN= 766 SERIES= 303
CHANNEL 35 BARRIER LOAD CELL A2 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

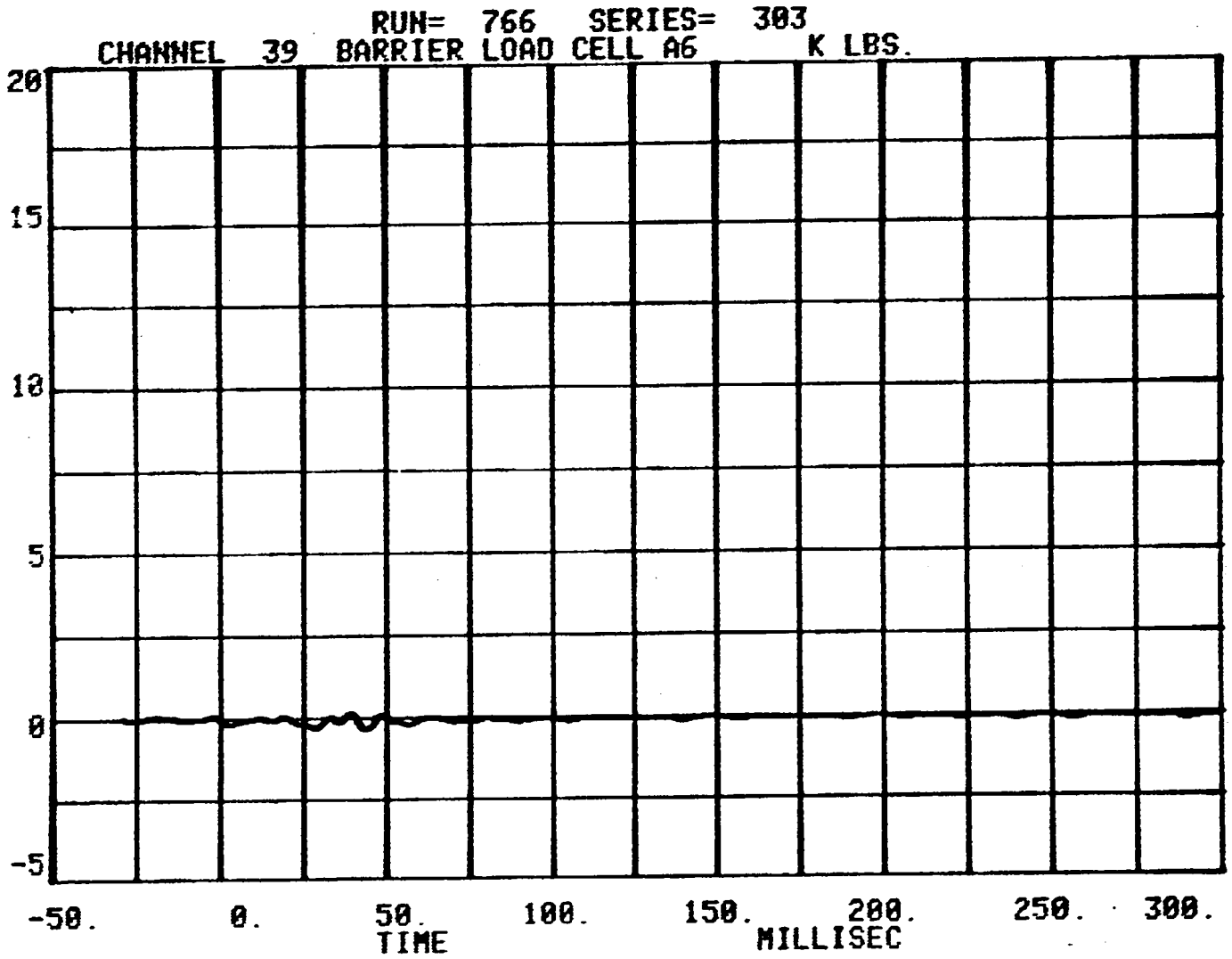

CHANNEL 36 RUN= 766 SERIES= 303
BARRIER LOAD CELL A3
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

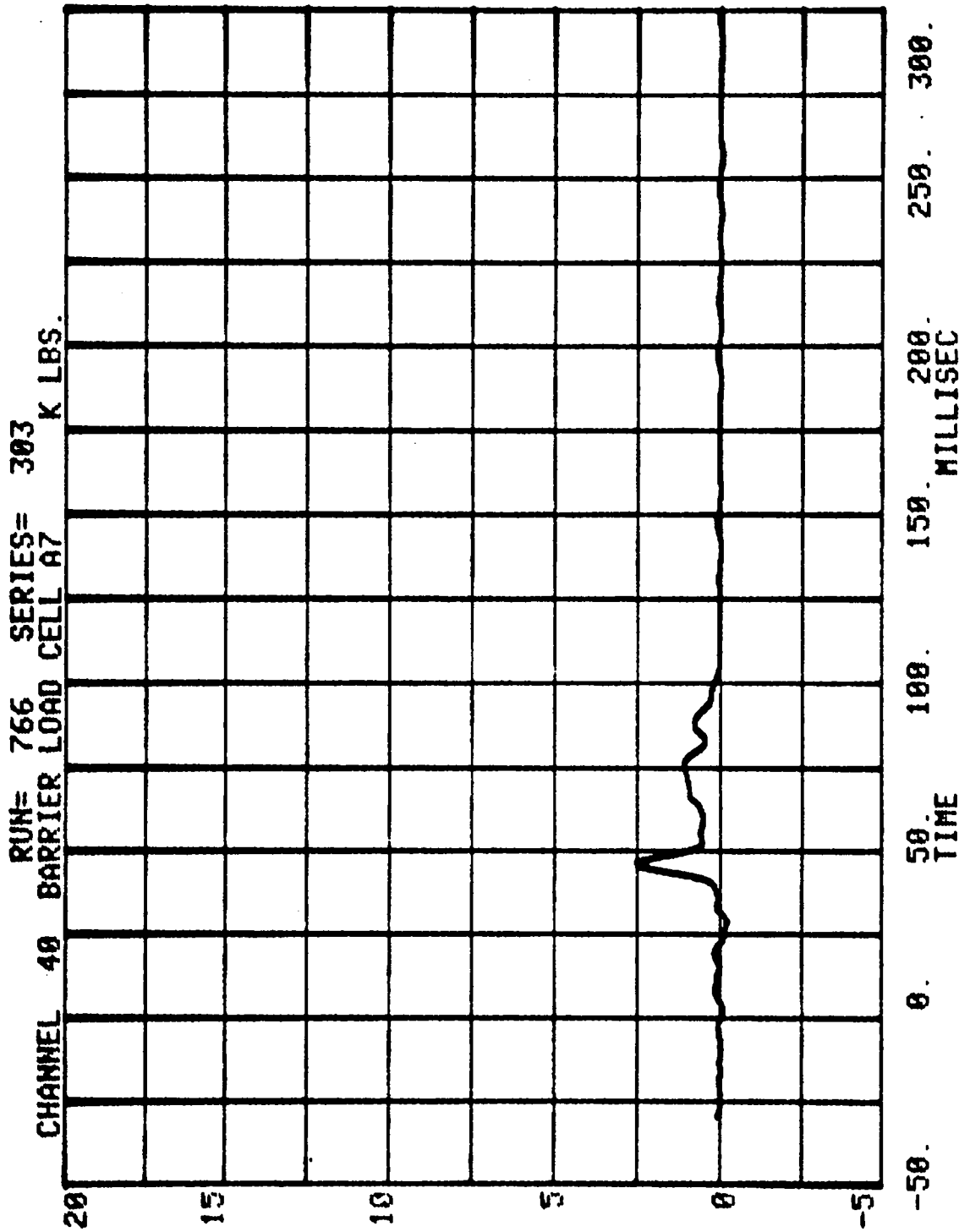

RUN= 766 SERIES= 303
CHANNEL 37 BARRIER LOAD CELL A4
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 38 RUN= 766 SERIES= 303
BARRIER LOAD CELL A5 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

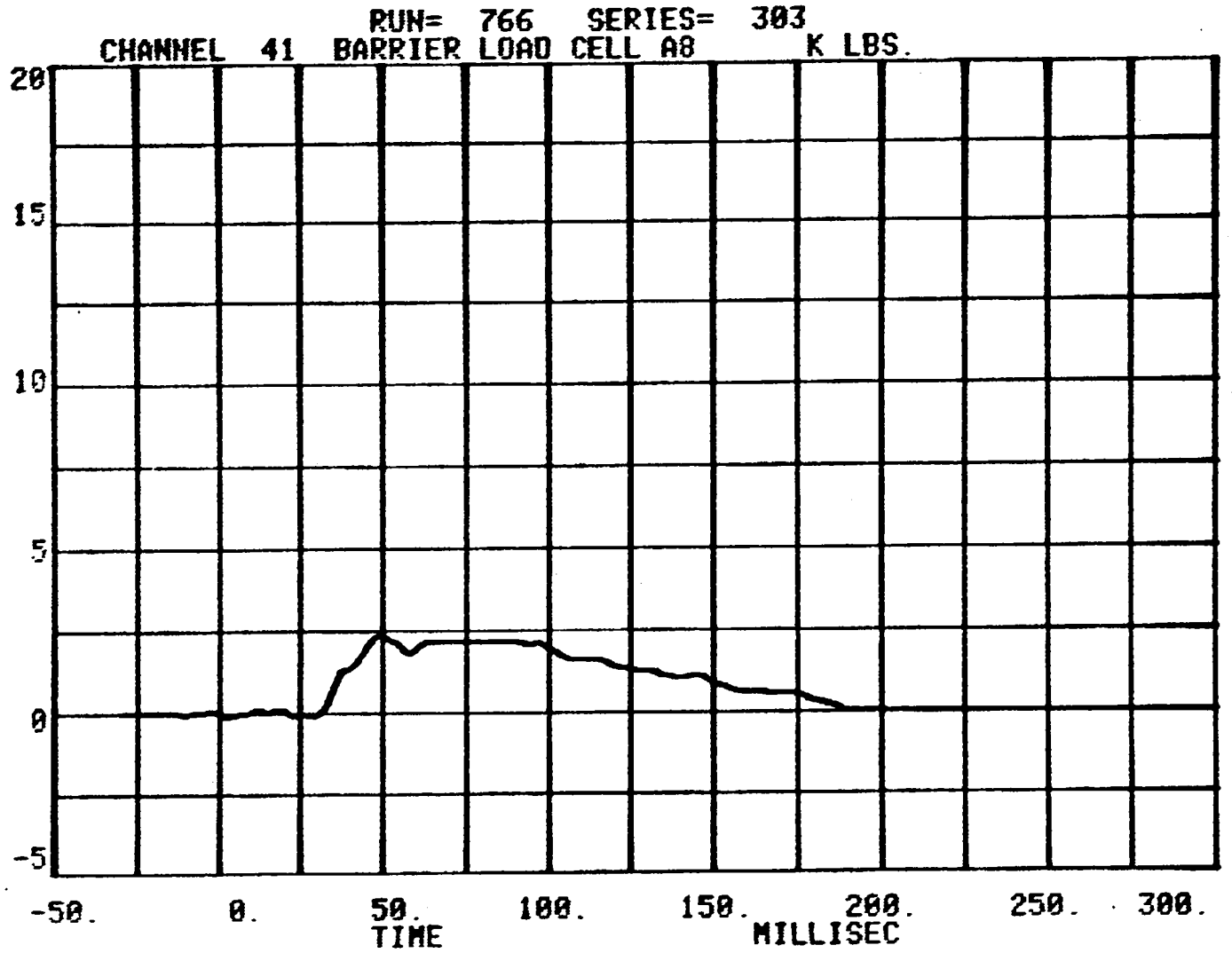
7556-4

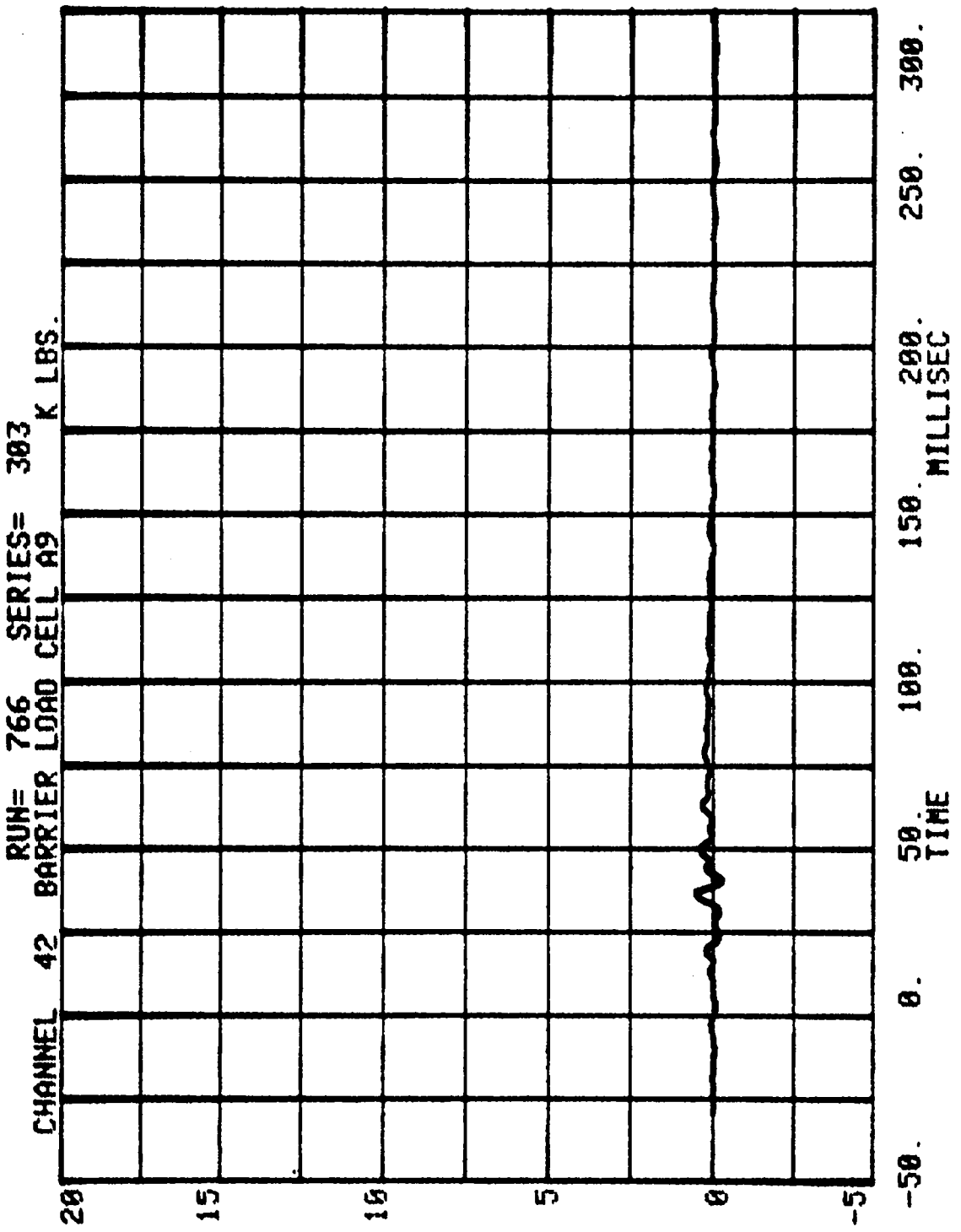

RUN= 766 SERIES= 303
CHANNEL 39 BARRIER LOAD CELL A6 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

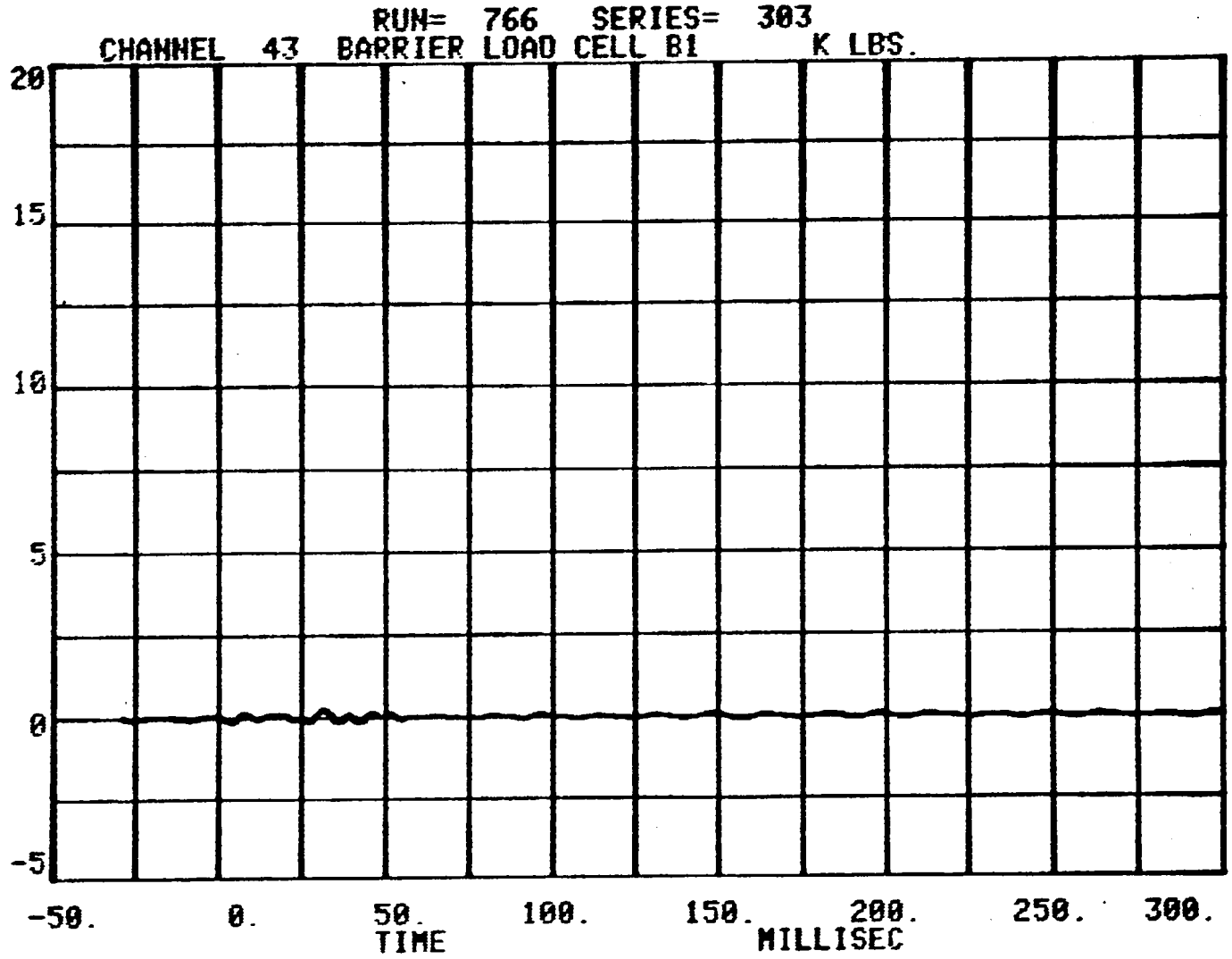

CHANNEL 40 BARRIER LOAD CELL A7
RUN= 766 SERIES= 303
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

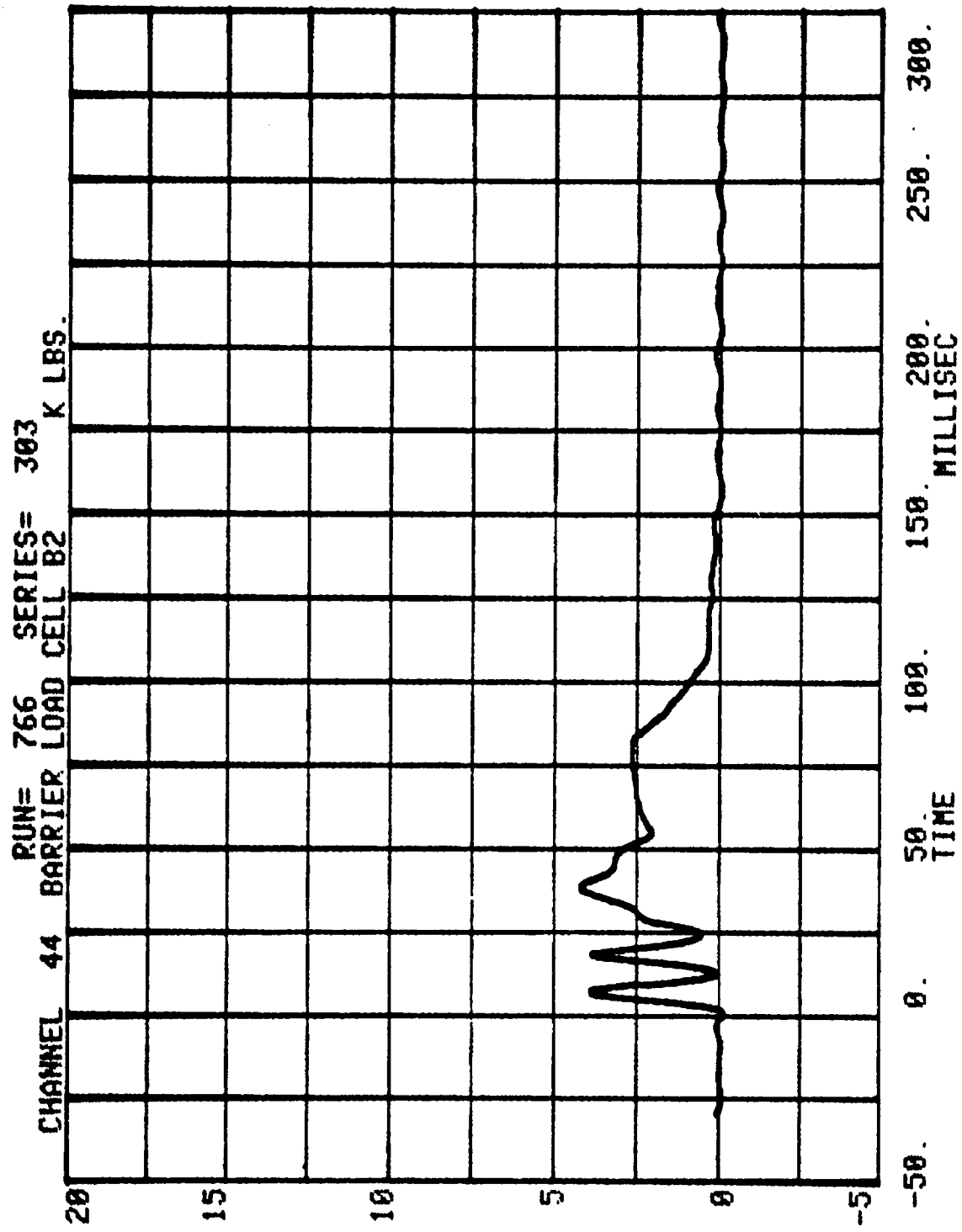
7556-4


RUN= 766 SERIES= 303
CHANNEL 41 BARRIER LOAD CELL A8 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

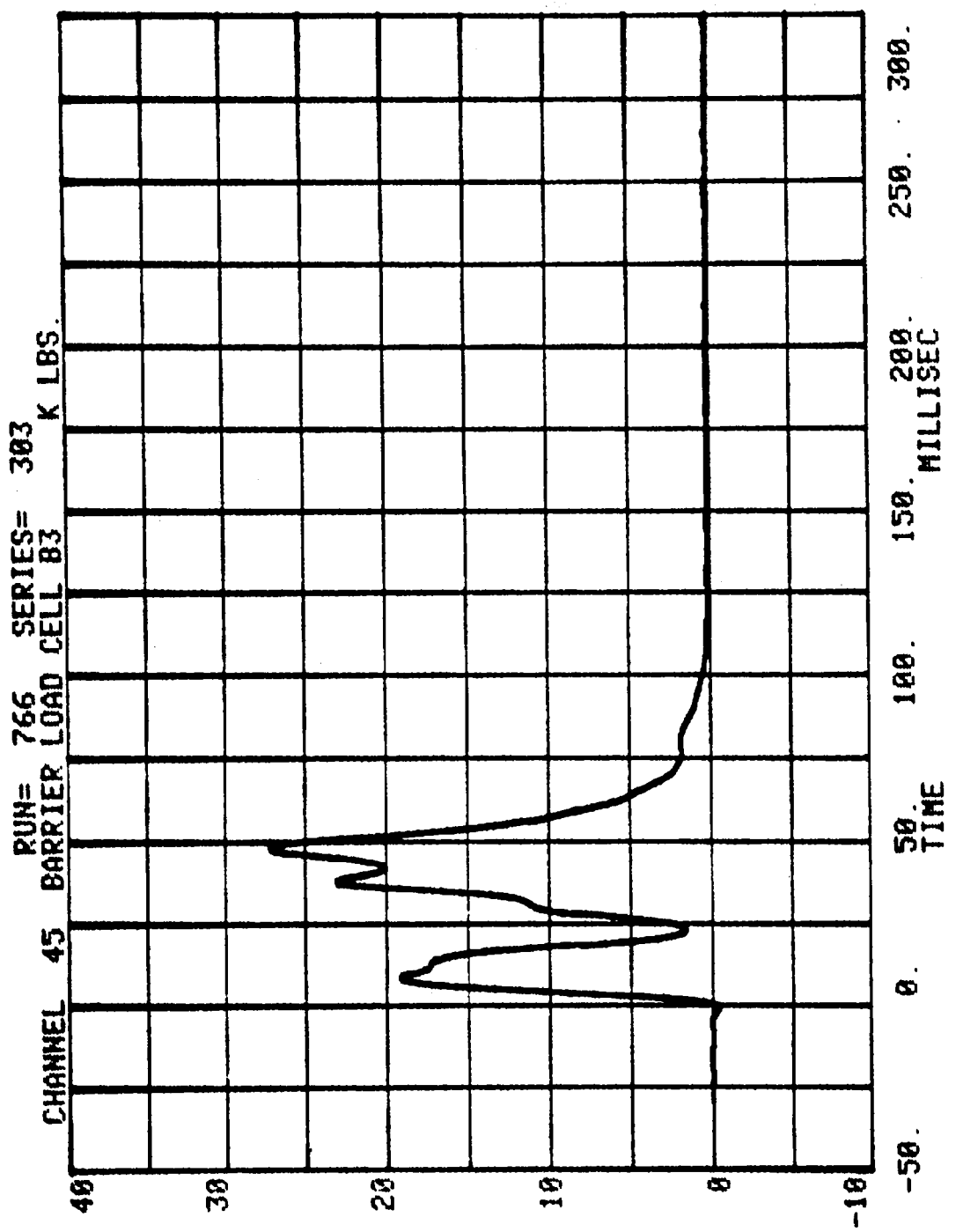

CHANNEL 42
RUN= 766 SERIES= 303
BARRIER LOAD CELL A9
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

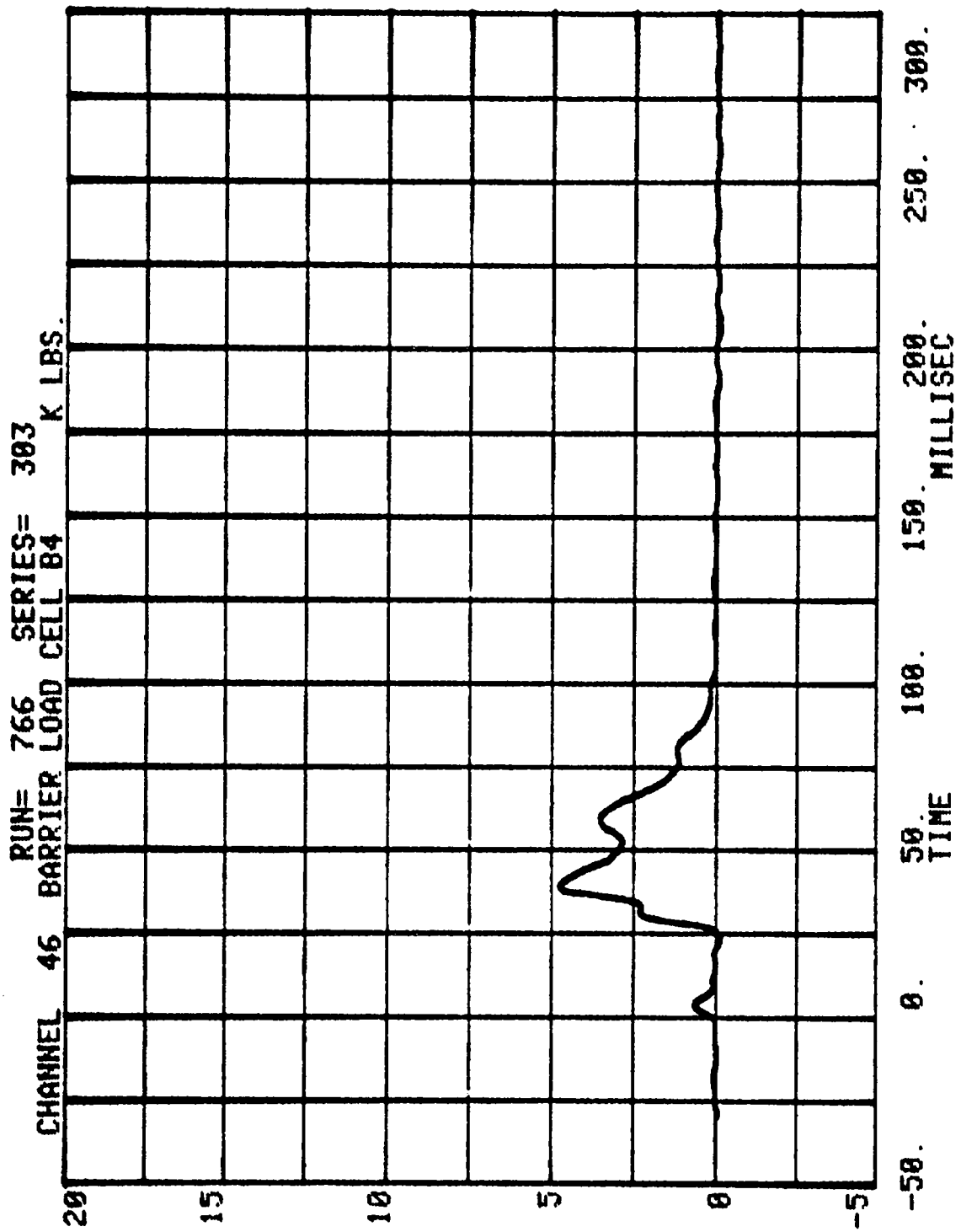

RUN= 766 SERIES= 303
CHANNEL 43 BARRIER LOAD CELL B1
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 44 BARRIER LOAD CELL B2
RUN= 766 SERIES= 303
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

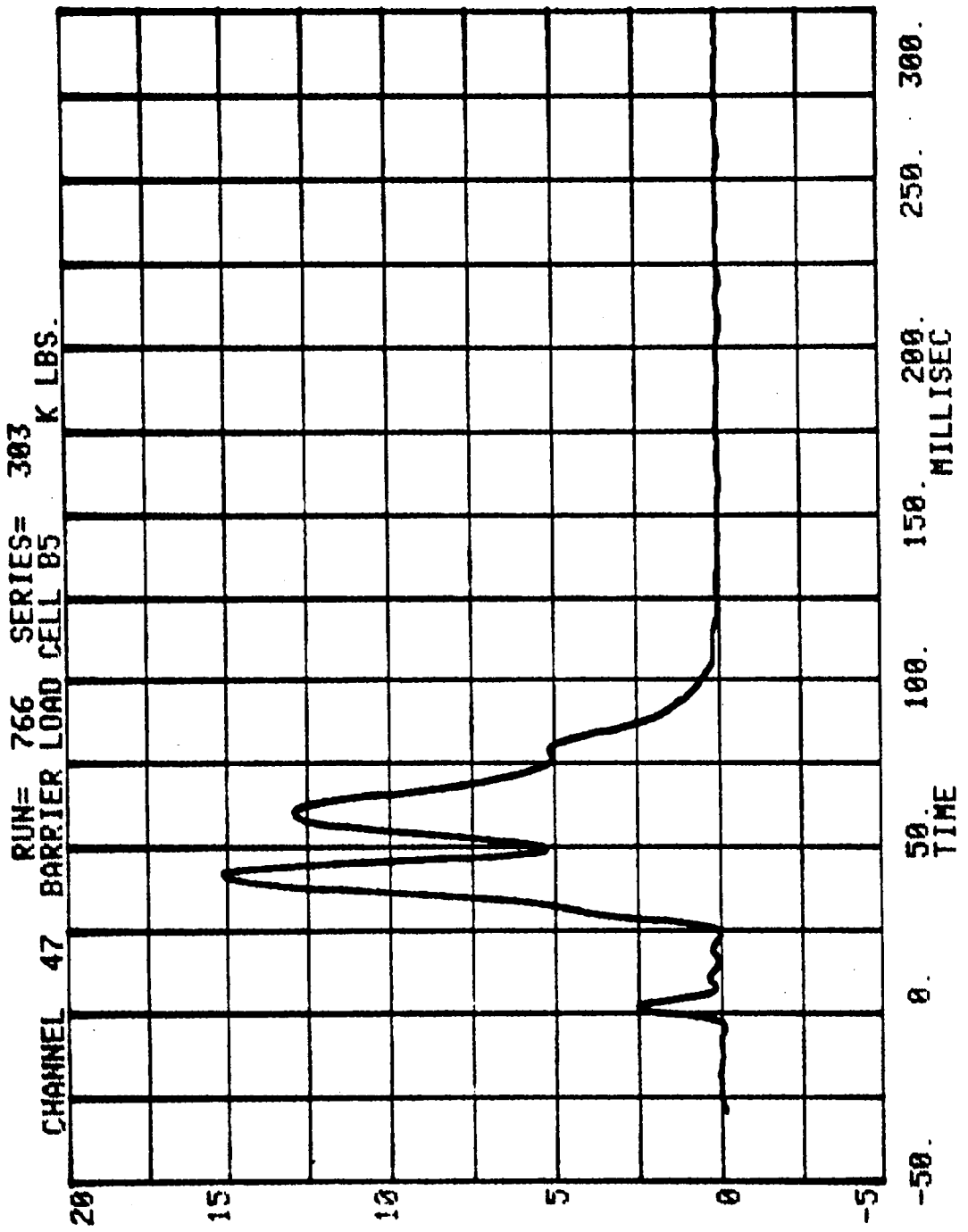
7556-4


CHANNEL 45 BARRIER LOAD CELL B3
RUN= 766 SERIES= 303 K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

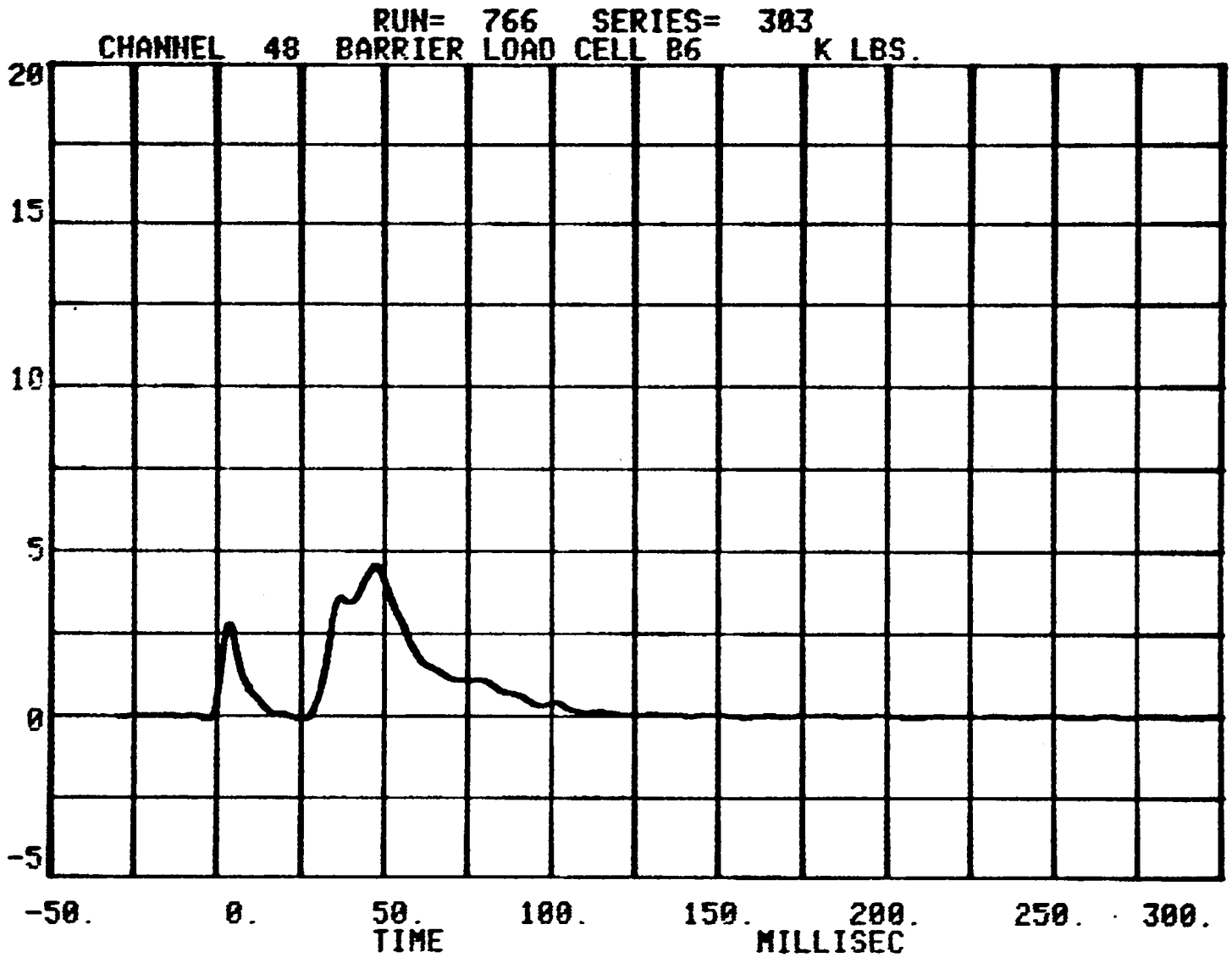
7556-4


CHANNEL 46 BARRIER LOAD CELL B4
RUN= 766 SERIES= 303
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

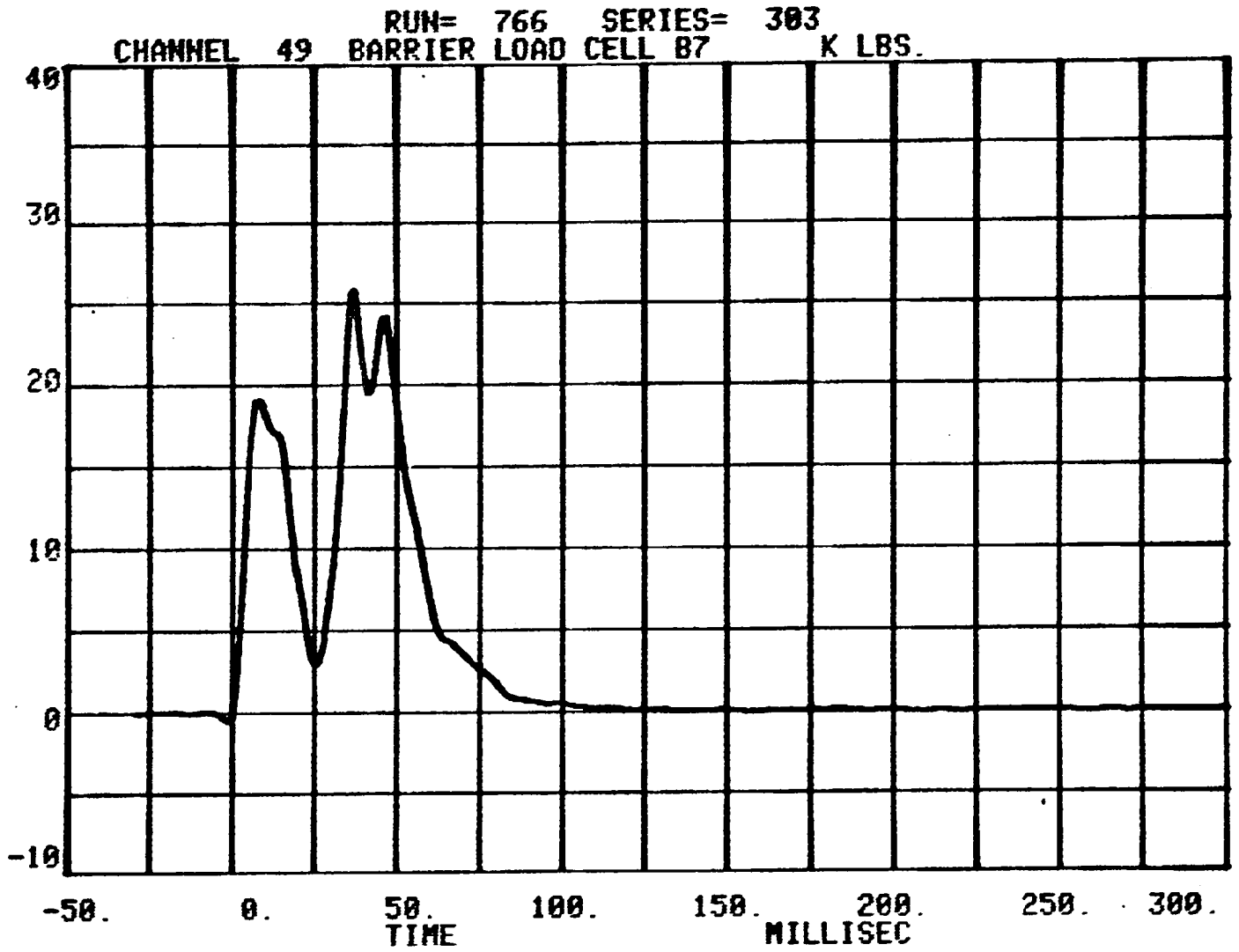
7556-4


CHANNEL 47
RUN= 766 SERIES= 303
BARRIER LOAD CELL 85
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

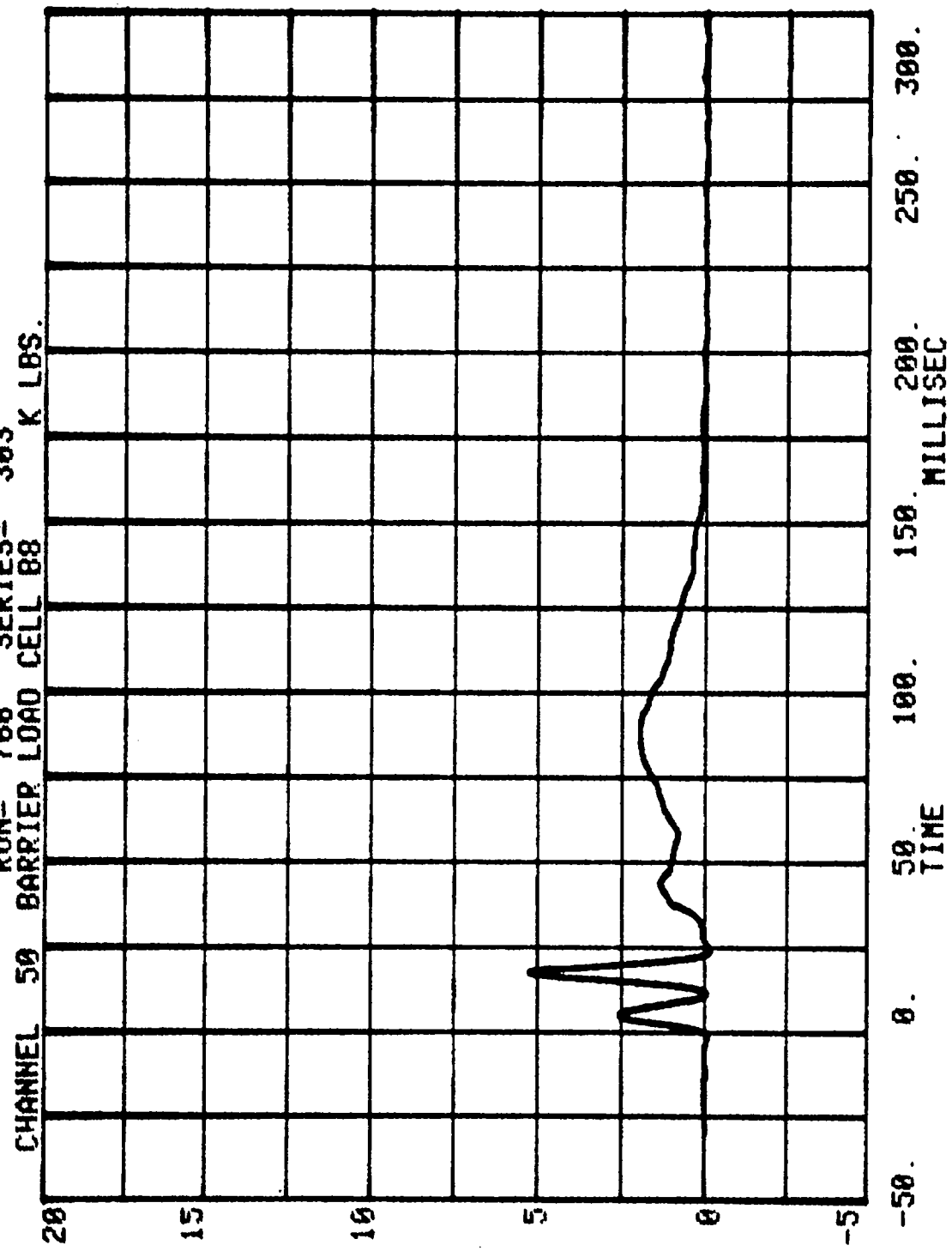
7556-4


RUN= 766 SERIES= 303
CHANNEL 48 BARRIER LOAD CELL B6 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

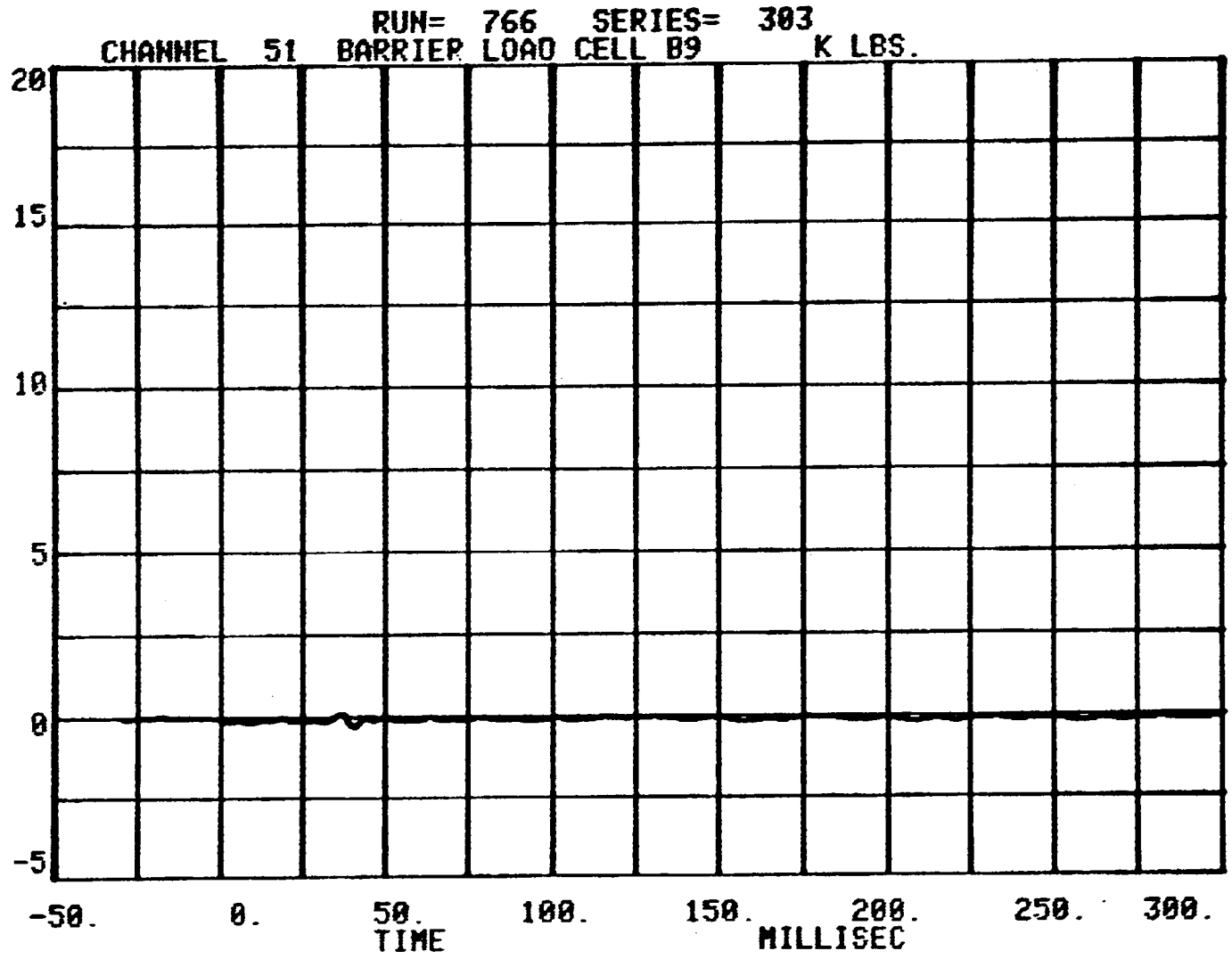
7556-4


RUN= 766 SERIES= 303
CHANNEL 49 BARRIER LOAD CELL B7 K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

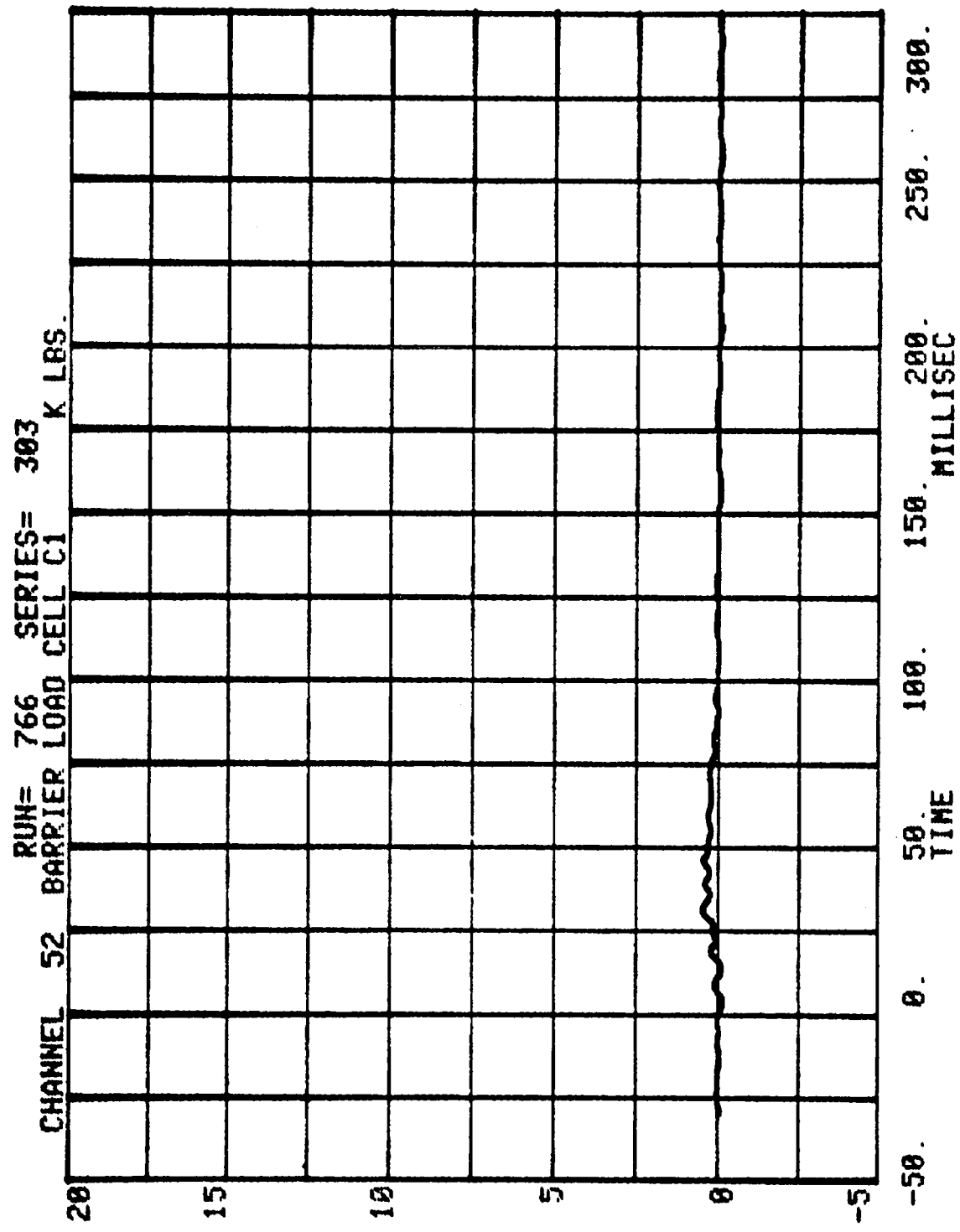
7556-5


CHANNEL 50 RUN= 766 SERIES= 303
BARRIER LOAD CELL 88 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

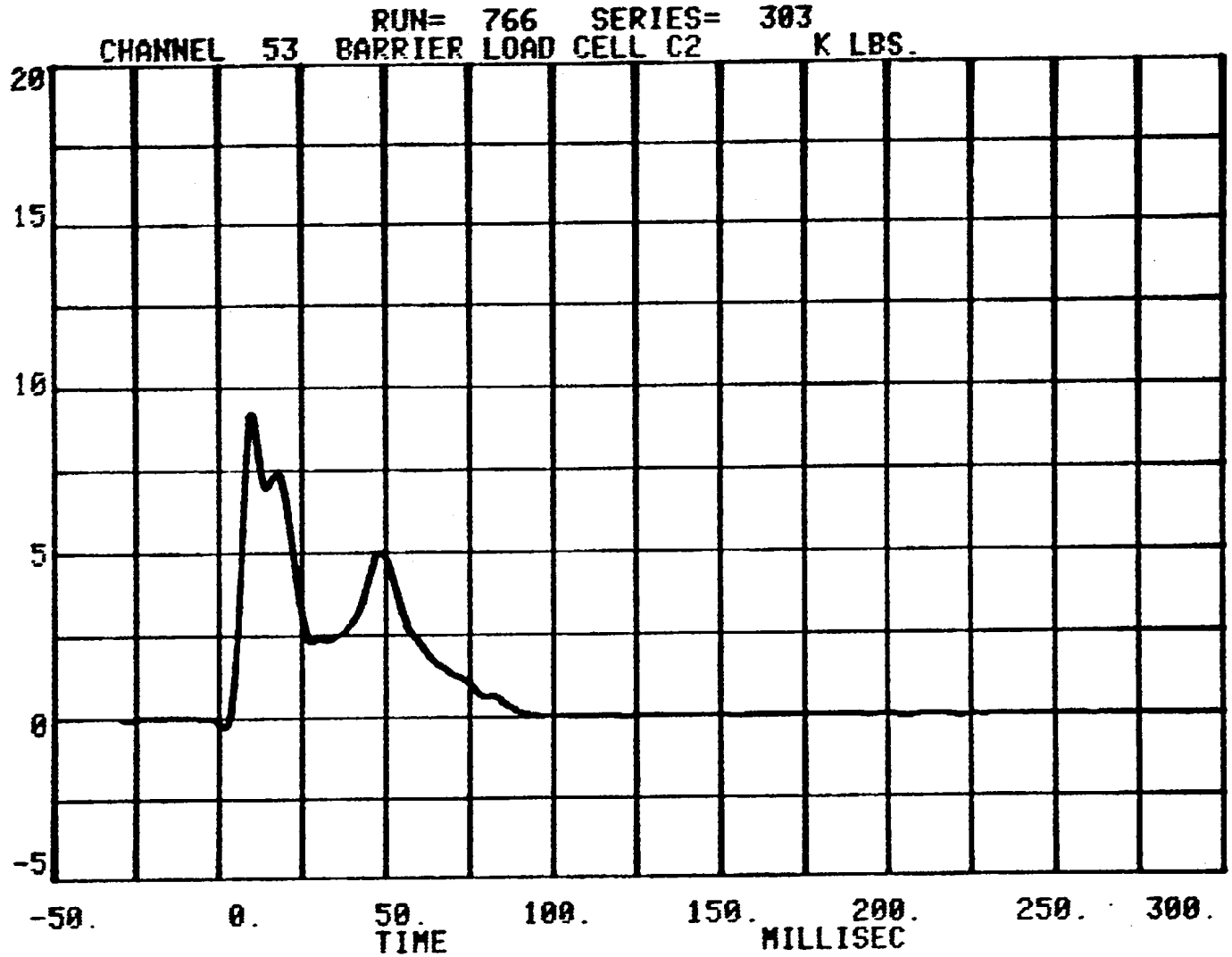
7556-4

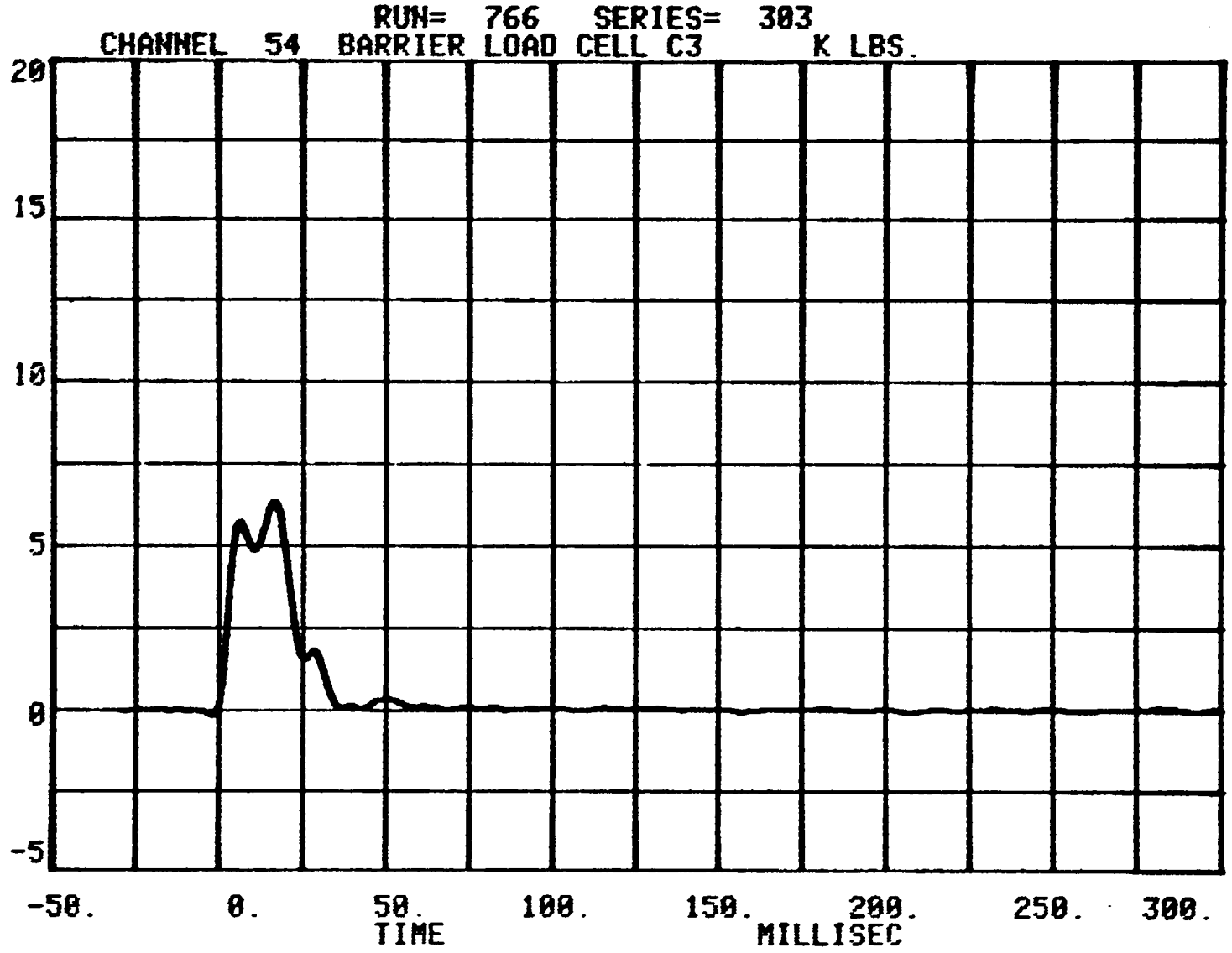

RUN= 766 SERIES= 303
CHANNEL 51 BARRIER LOAD CELL B9
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

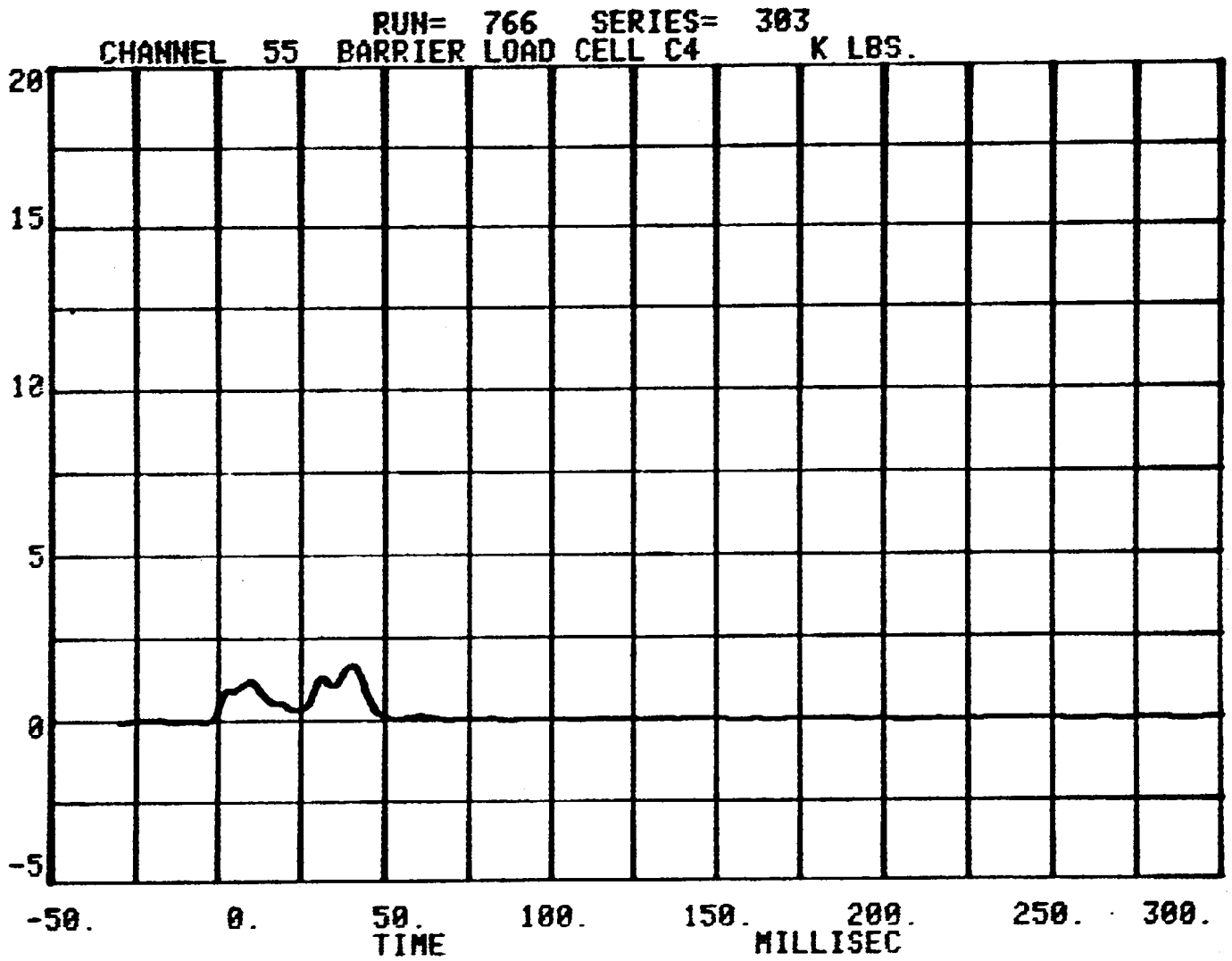
7556-4


CHANNEL 52 BARRIER LOAD CELL C1
RUN= 766 SERIES= 303
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

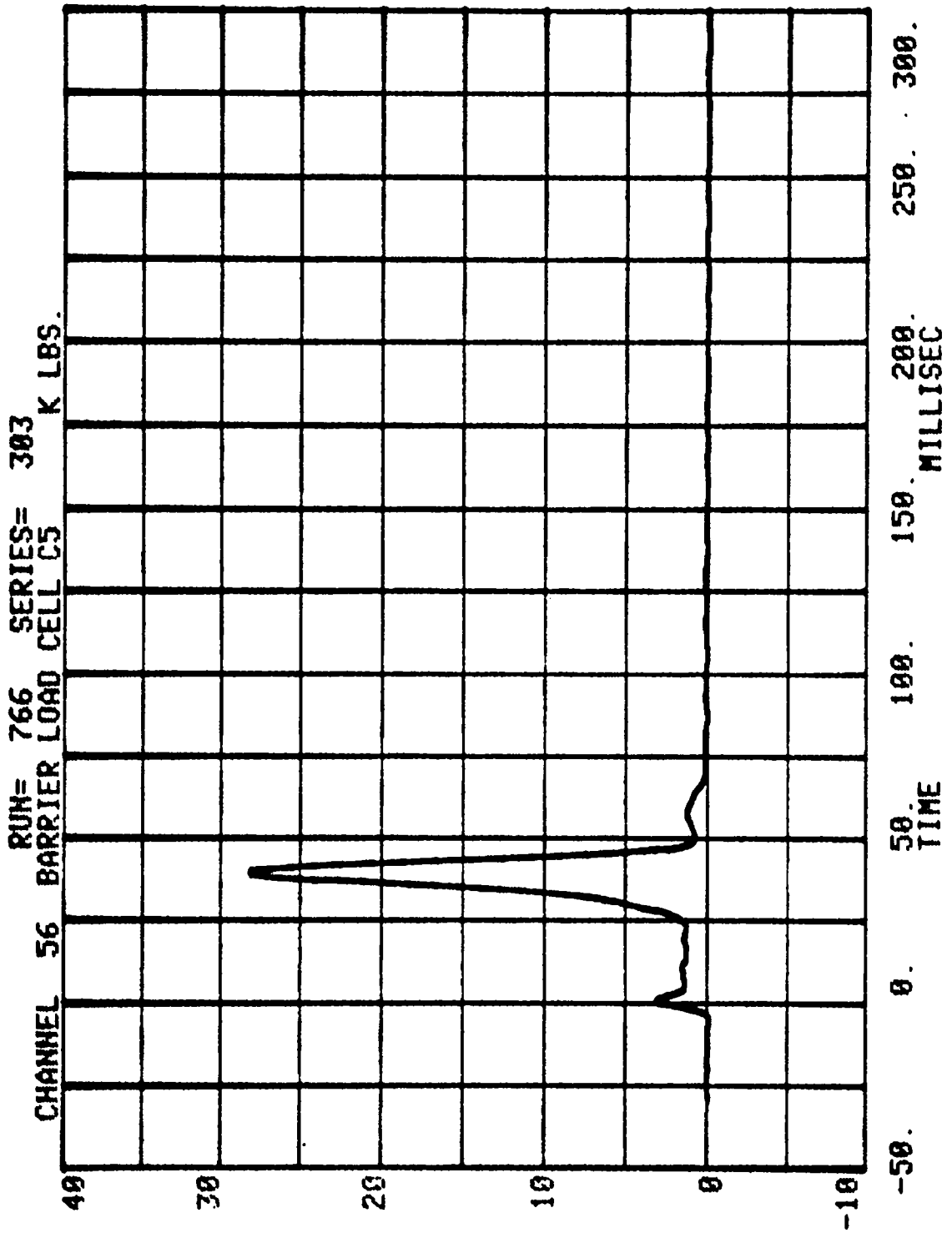
7556-4


RUN= 766 SERIES= 303
CHANNEL 53 BARRIER LOAD CELL C2 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

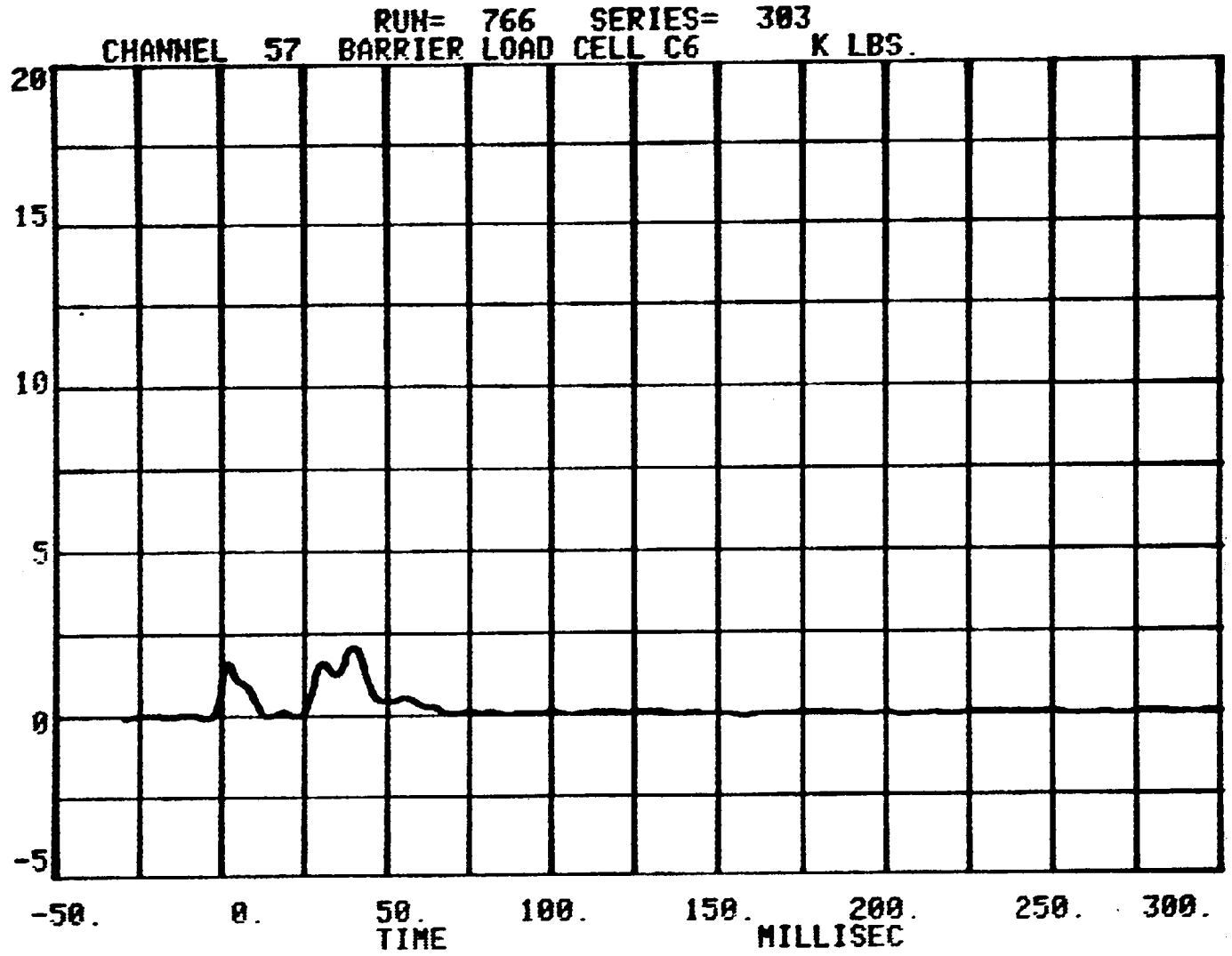

RUN= 766 SERIES= 303
CHANNEL 54 BARRIER LOAD CELL C3 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 766 SERIES= 303
CHANNEL 55 BARRIER LOAD CELL C4 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

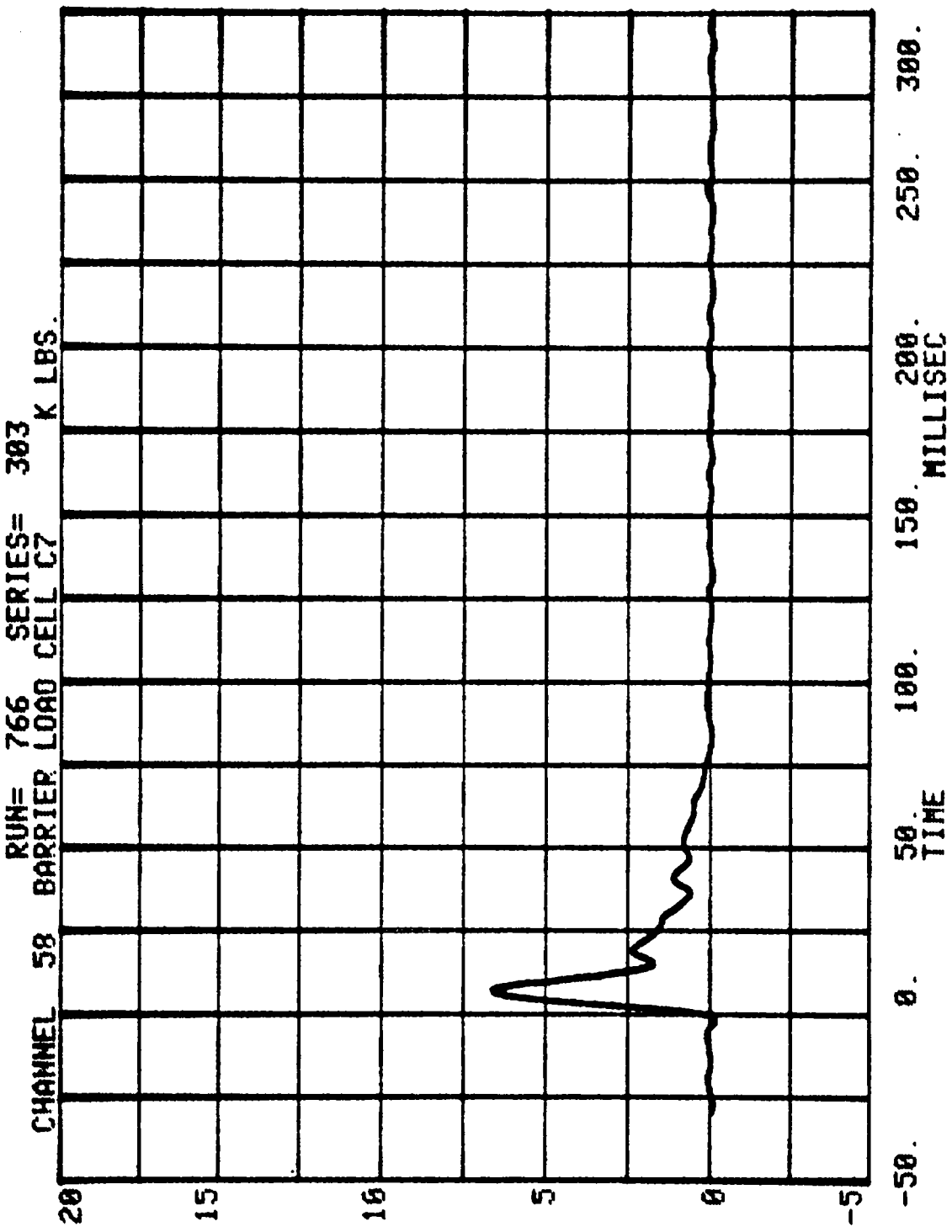
7556-4


CHANNEL 56 BARRIER LOAD CELL C5
RUN= 766 SERIES= 303
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

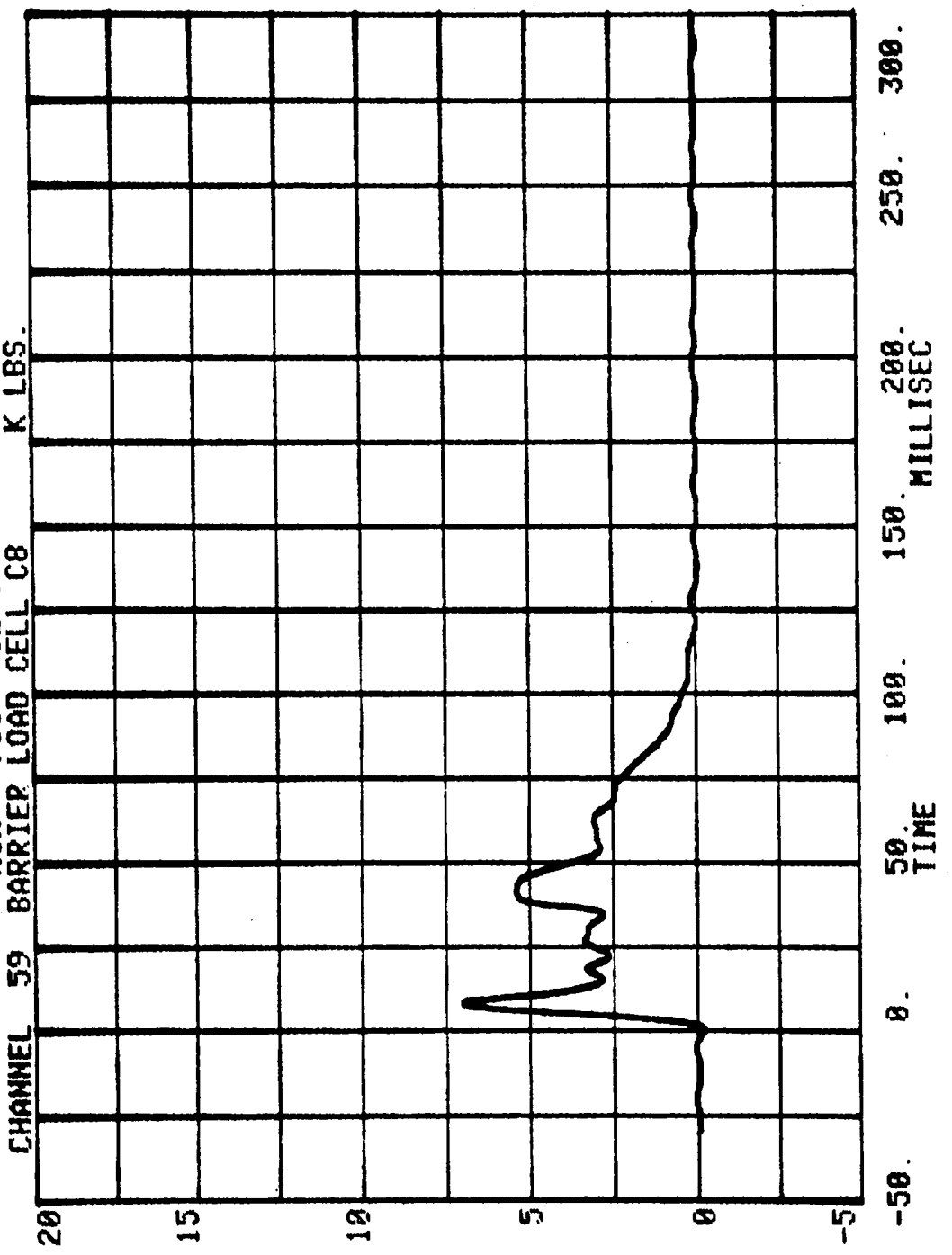
7556-4


RUN= 766 SERIES= 303
CHANNEL 57 BARRIER LOAD CELL C6 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

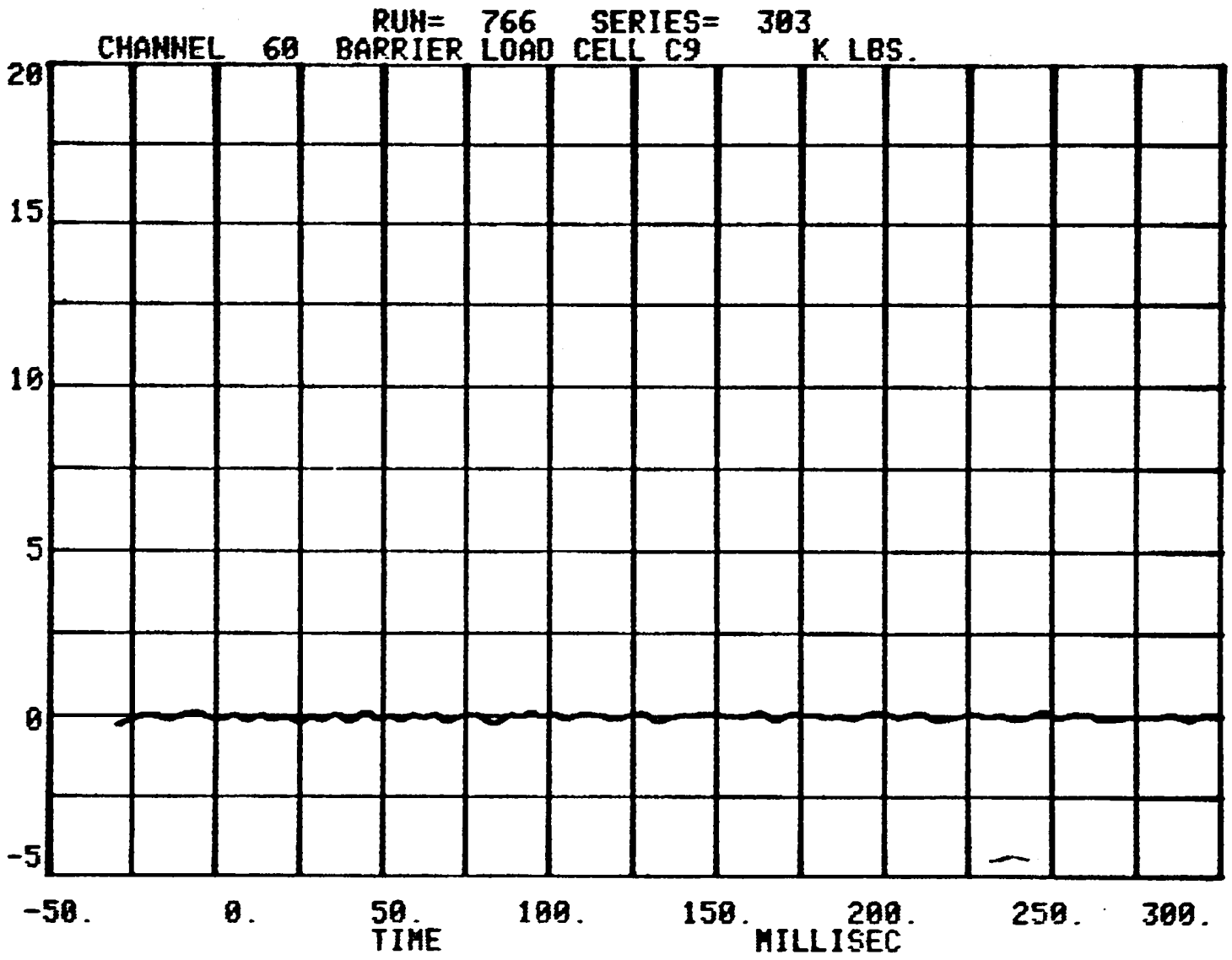
7556-4

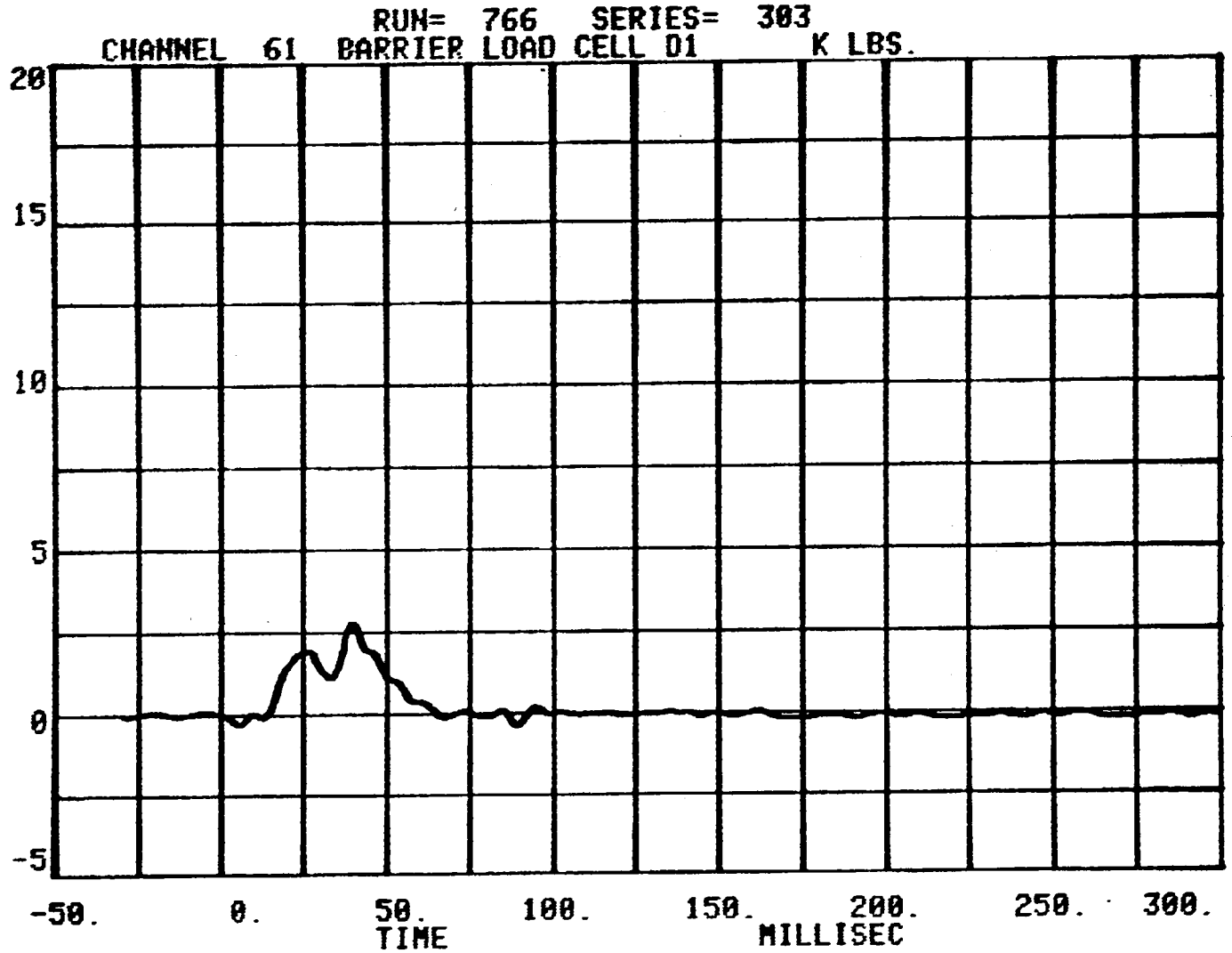

CHANNEL 58
RUN= 766 SERIES= 303
BARRIER LOAD CELL C7
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

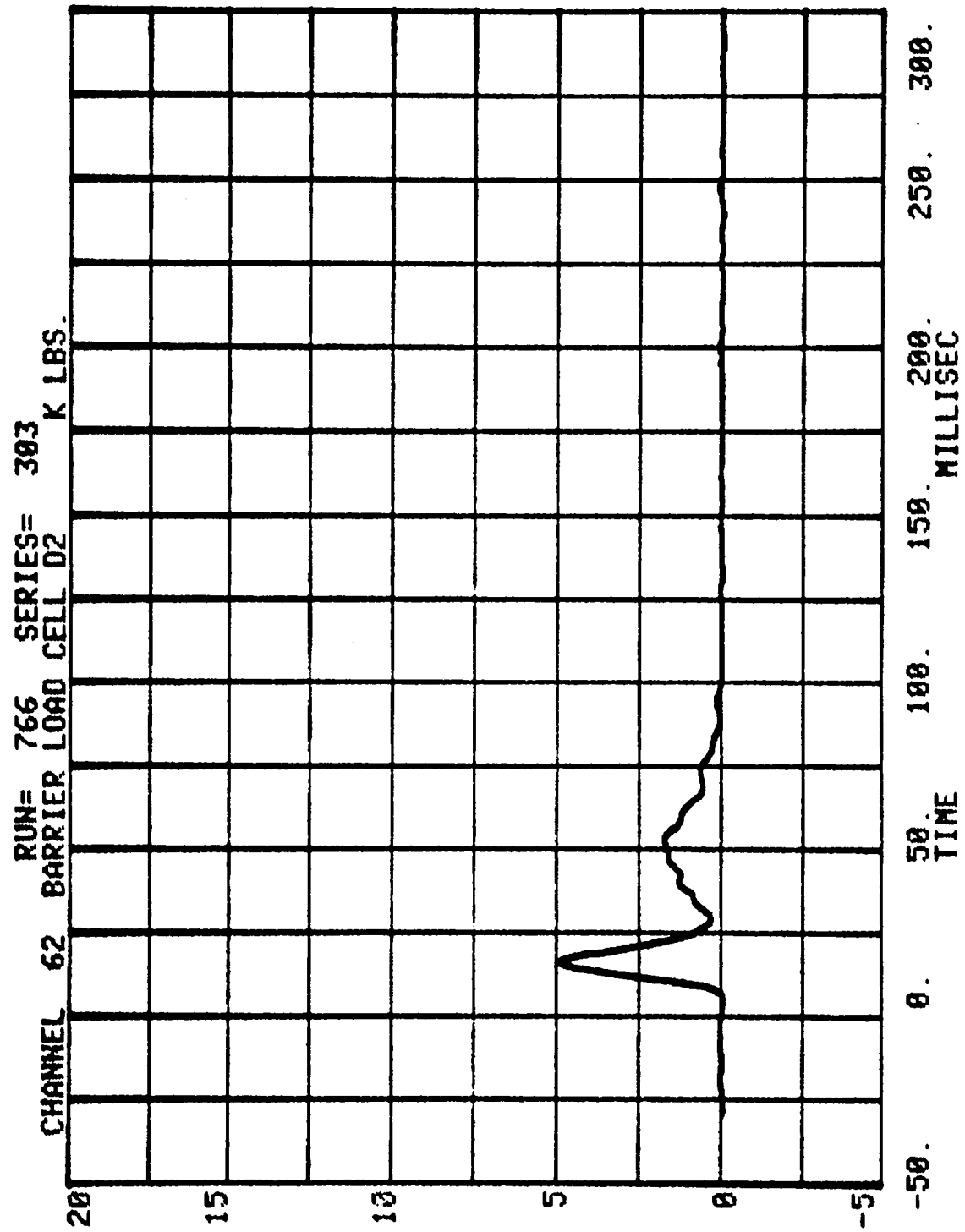

CHANNEL 59 BARRIER LOAD CELL C8
RUN= 766 SERIES= 303 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

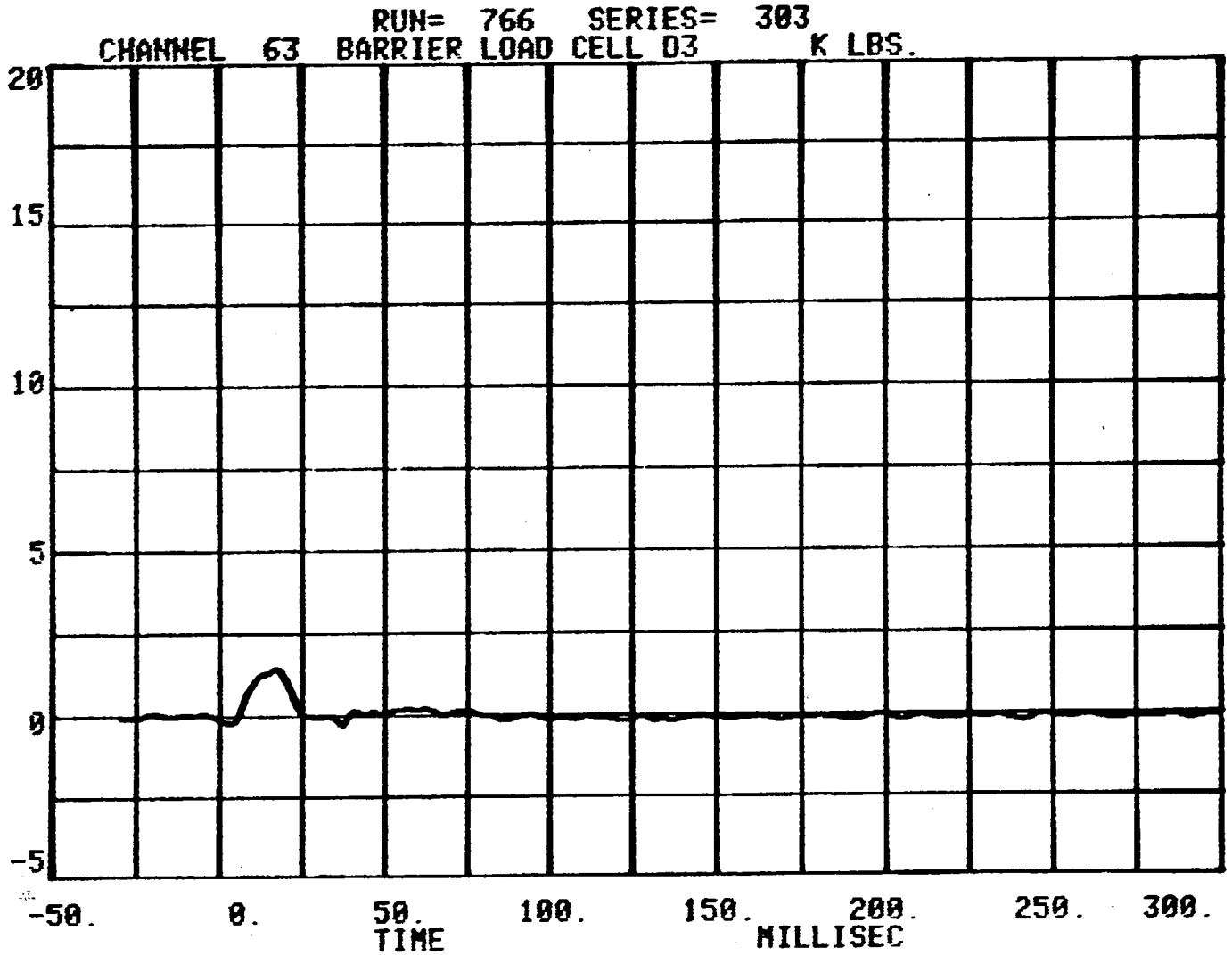

RUN= 766 SERIES= 303
CHANNEL 60 BARRIER LOAD CELL C9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 766 SERIES= 303
CHANNEL 61 BARRIER LOAD CELL 01
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

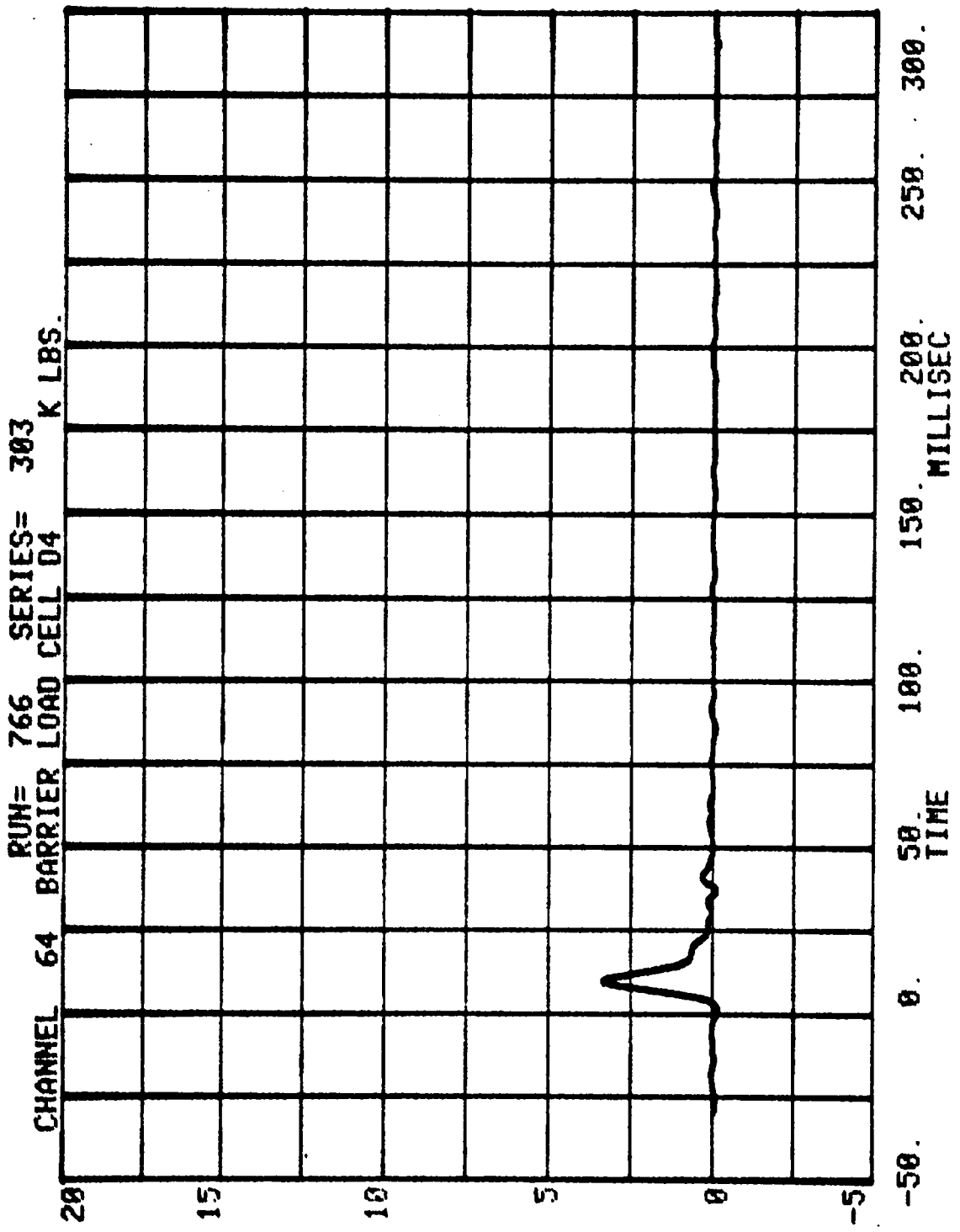
7556-4


CHANNEL 62 BARRIER LOAD CELL D2
RUN= 766 SERIES= 303
K LBS.
20
15
13
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

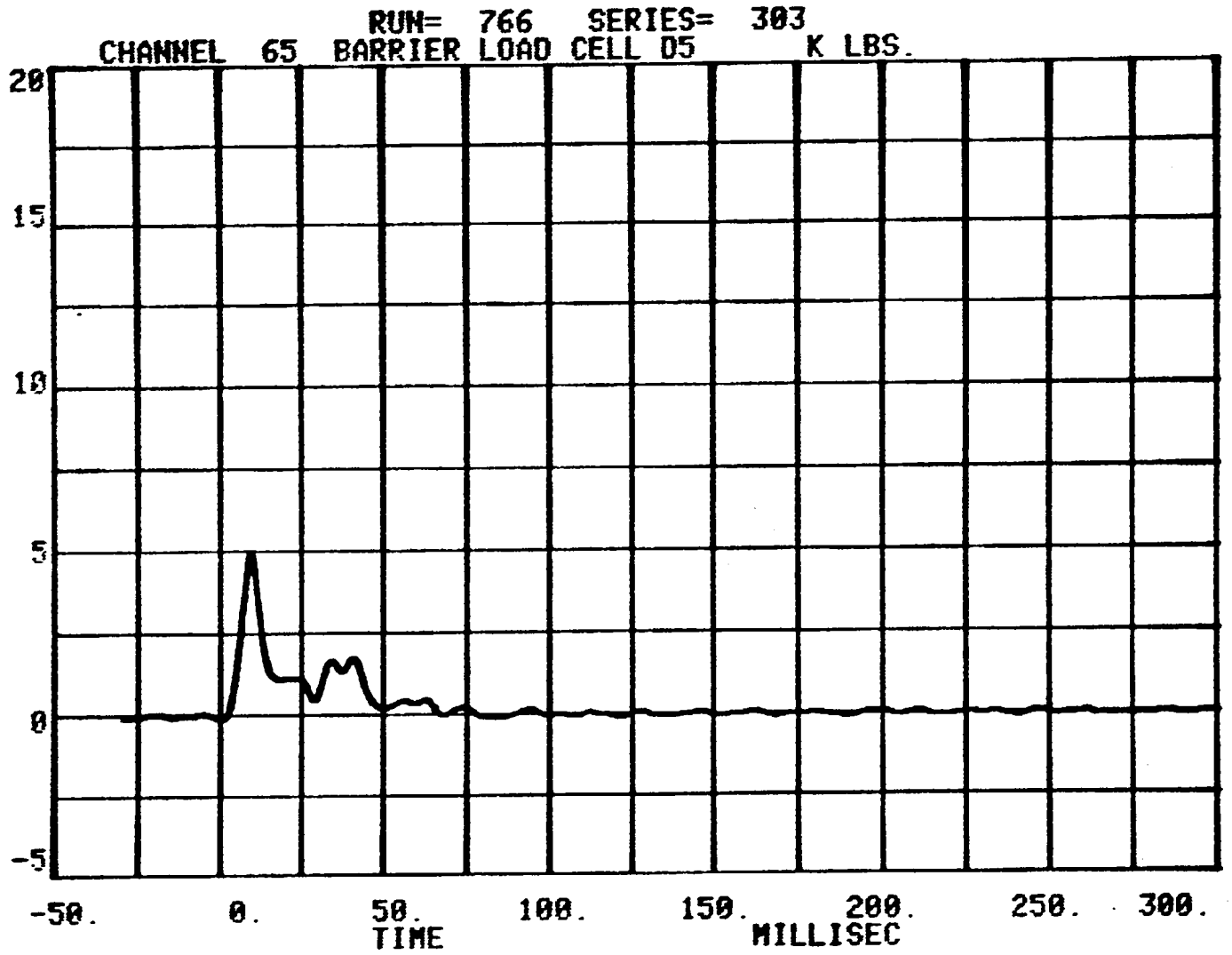
7556-4


RUN= 766 SERIES= 303
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

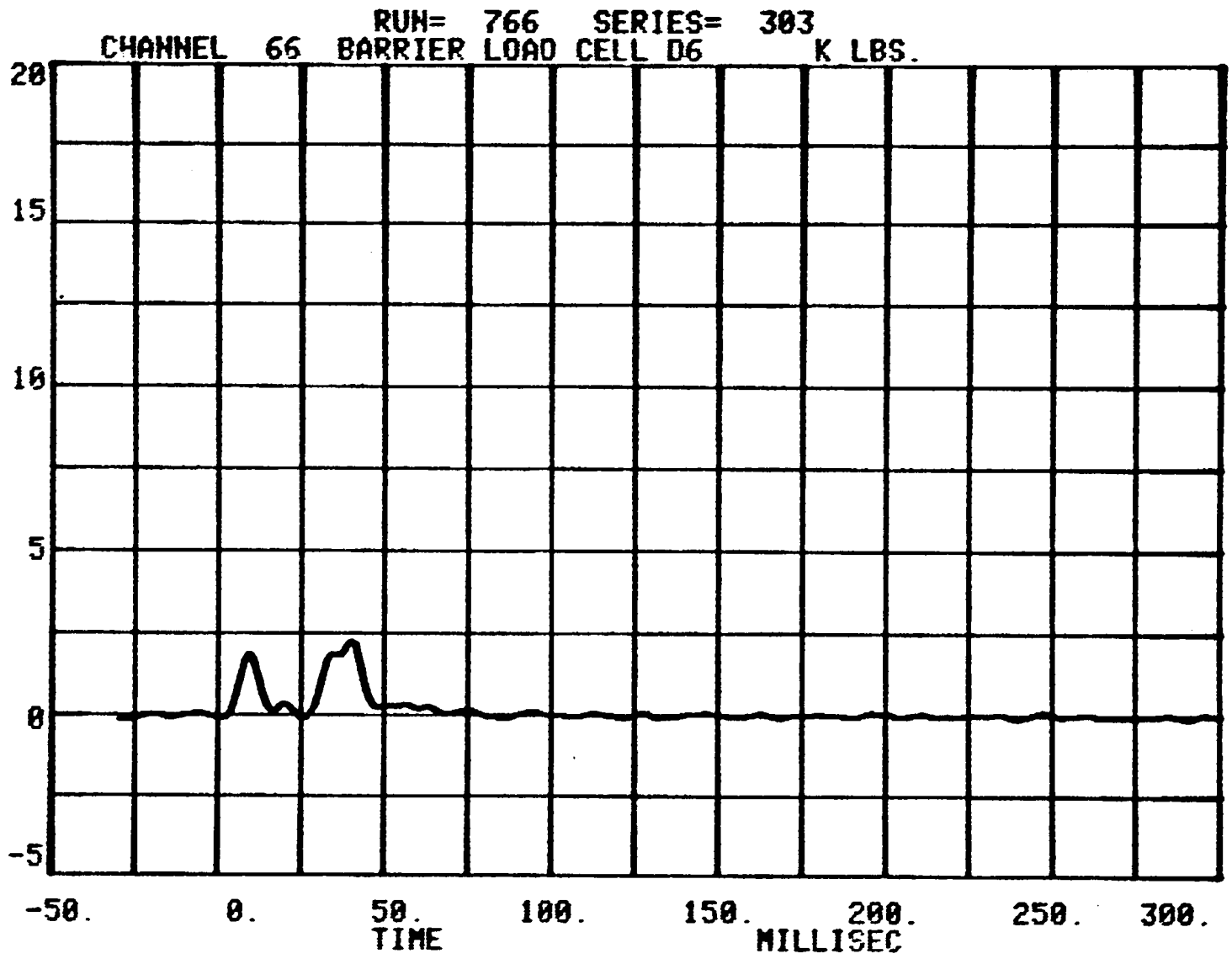
7556-4

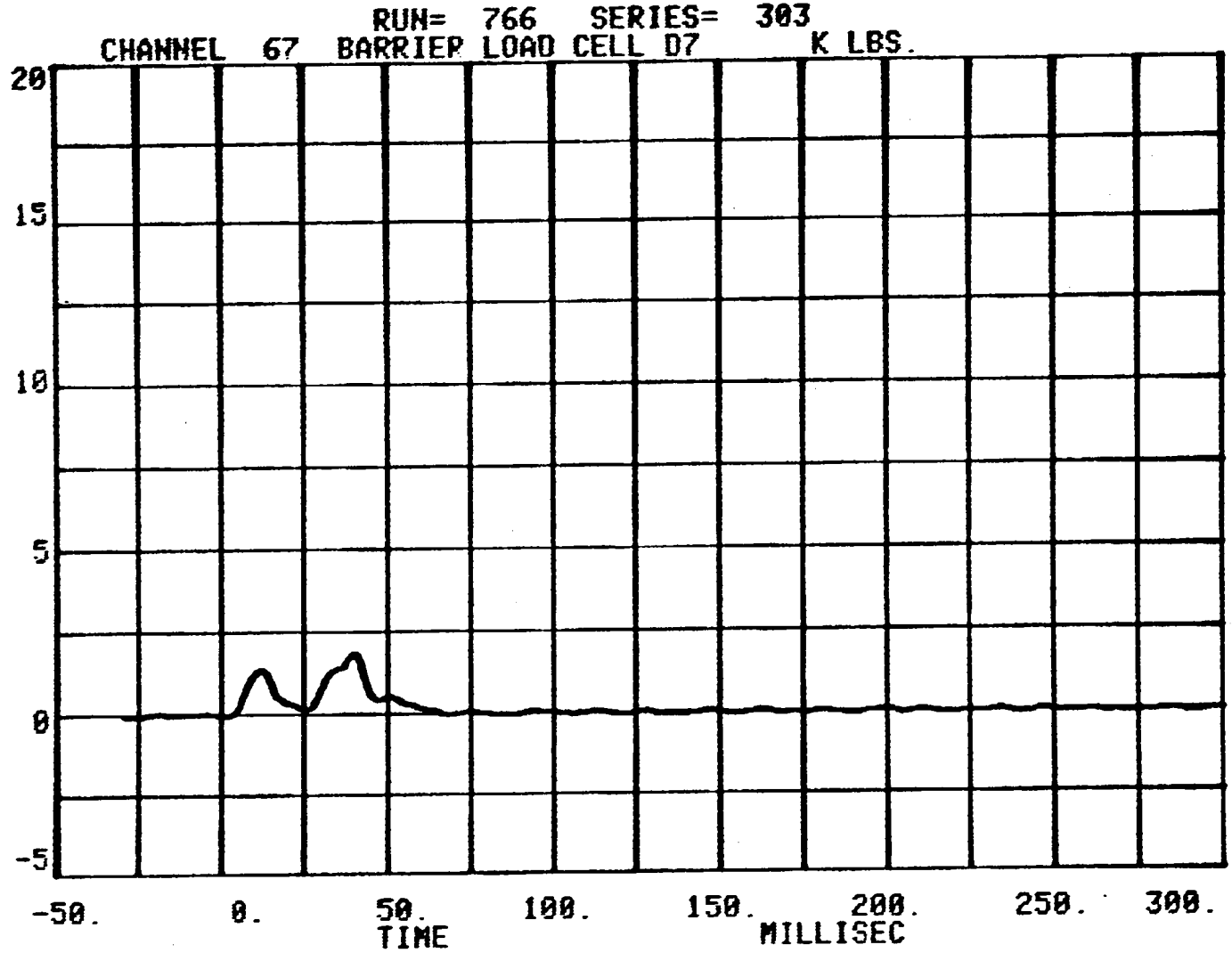

CHANNEL 64 BARRIER LOAD CELL 04
RUN= 766 SERIES= 303
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

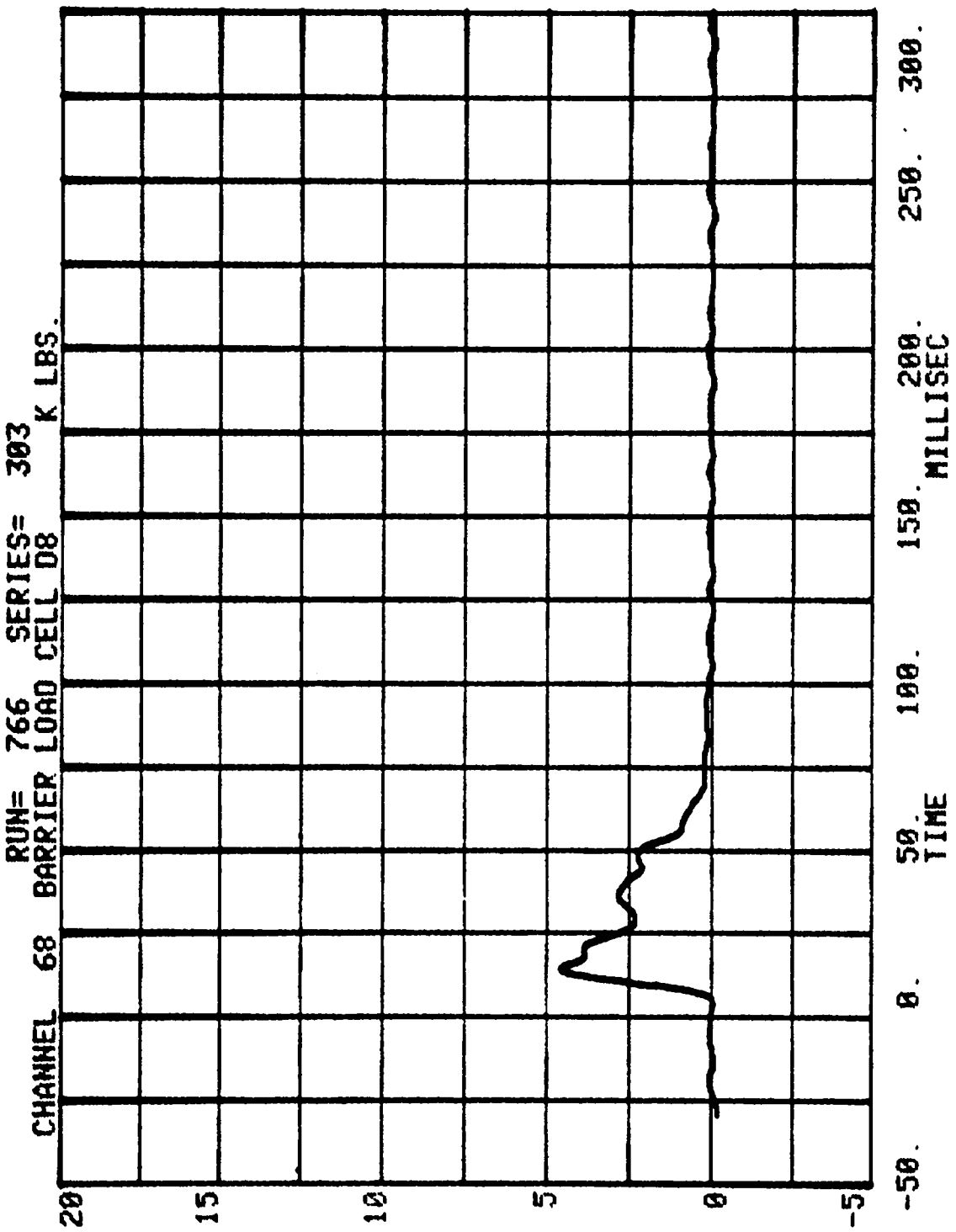

RUN= 766 SERIES= 303
CHANNEL 65 BARRIER LOAD CELL D5 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

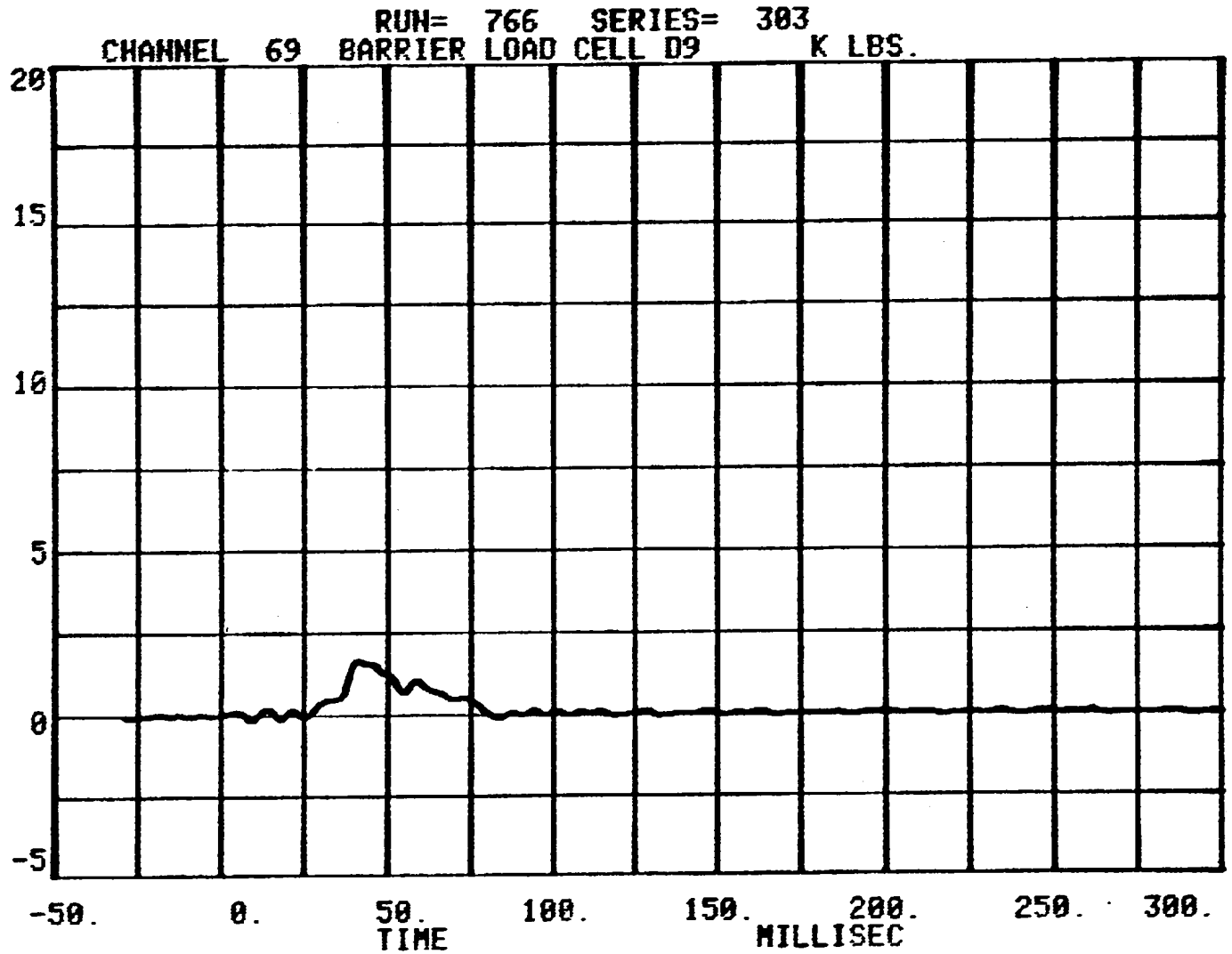

RUN= 766 SERIES= 303
CHANNEL 66 BARRIER LOAD CELL D6 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 766 SERIES= 303
CHANNEL 67 BARRIER LOAD CELL D7
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


CHANNEL 68 BARRIER LOAD CELL D8
RUN= 766 SERIES= 303
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

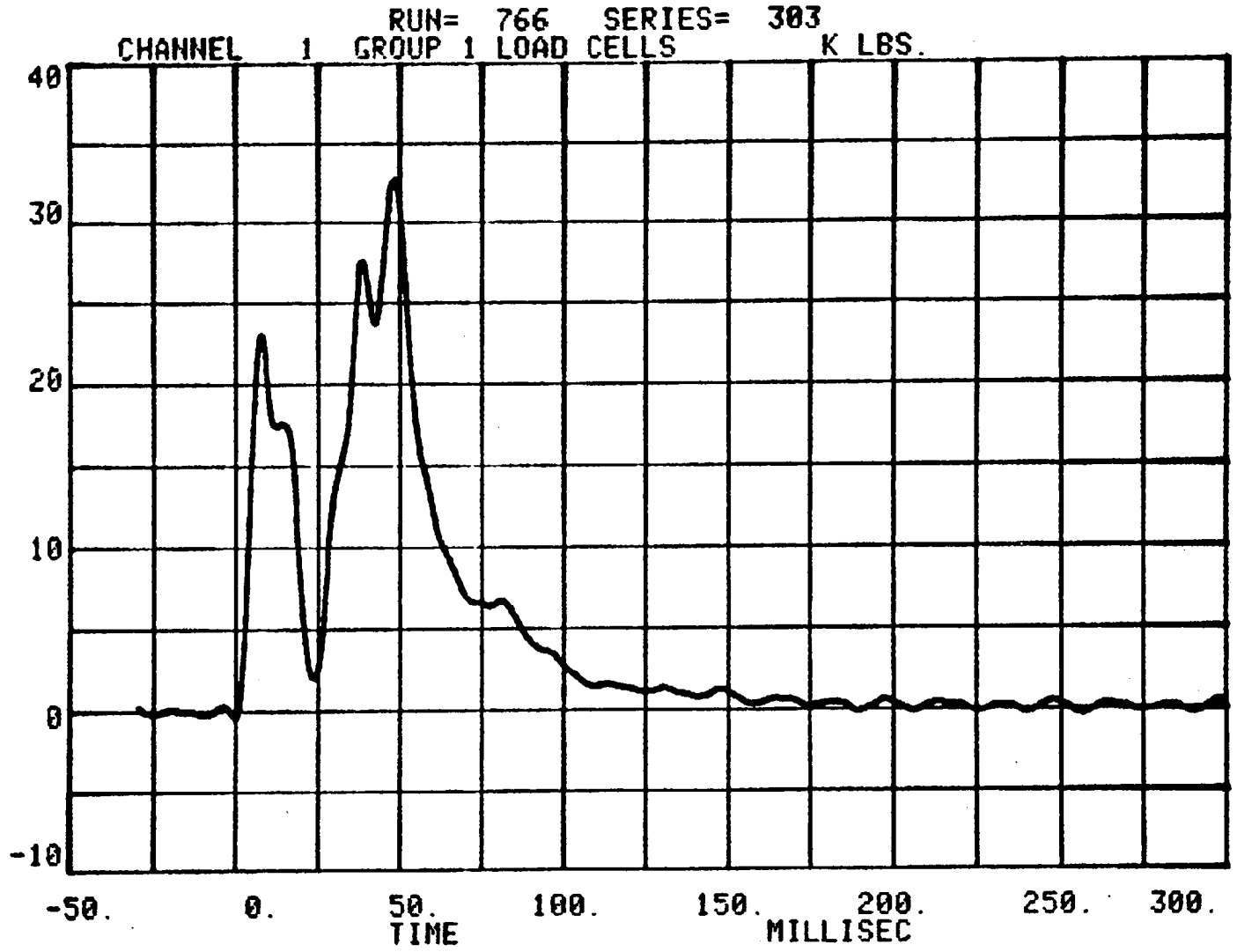

RUN= 766 SERIES= 303
CHANNEL 69 BARRIER LOAD CELL D9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

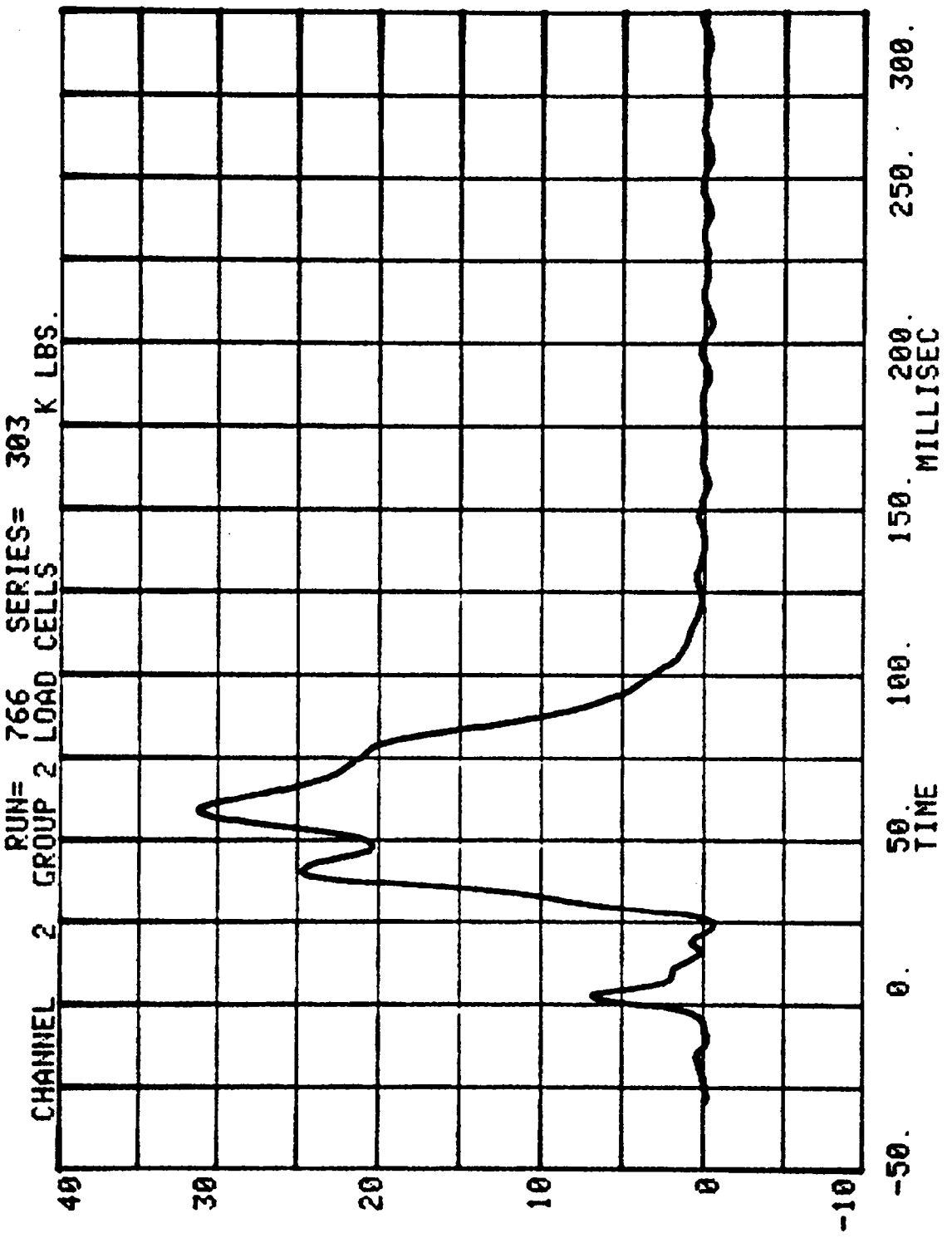
NEW CAR ASSESSMENT BARRIER TESTS - 1987

RUN # 766 SERIES # 303

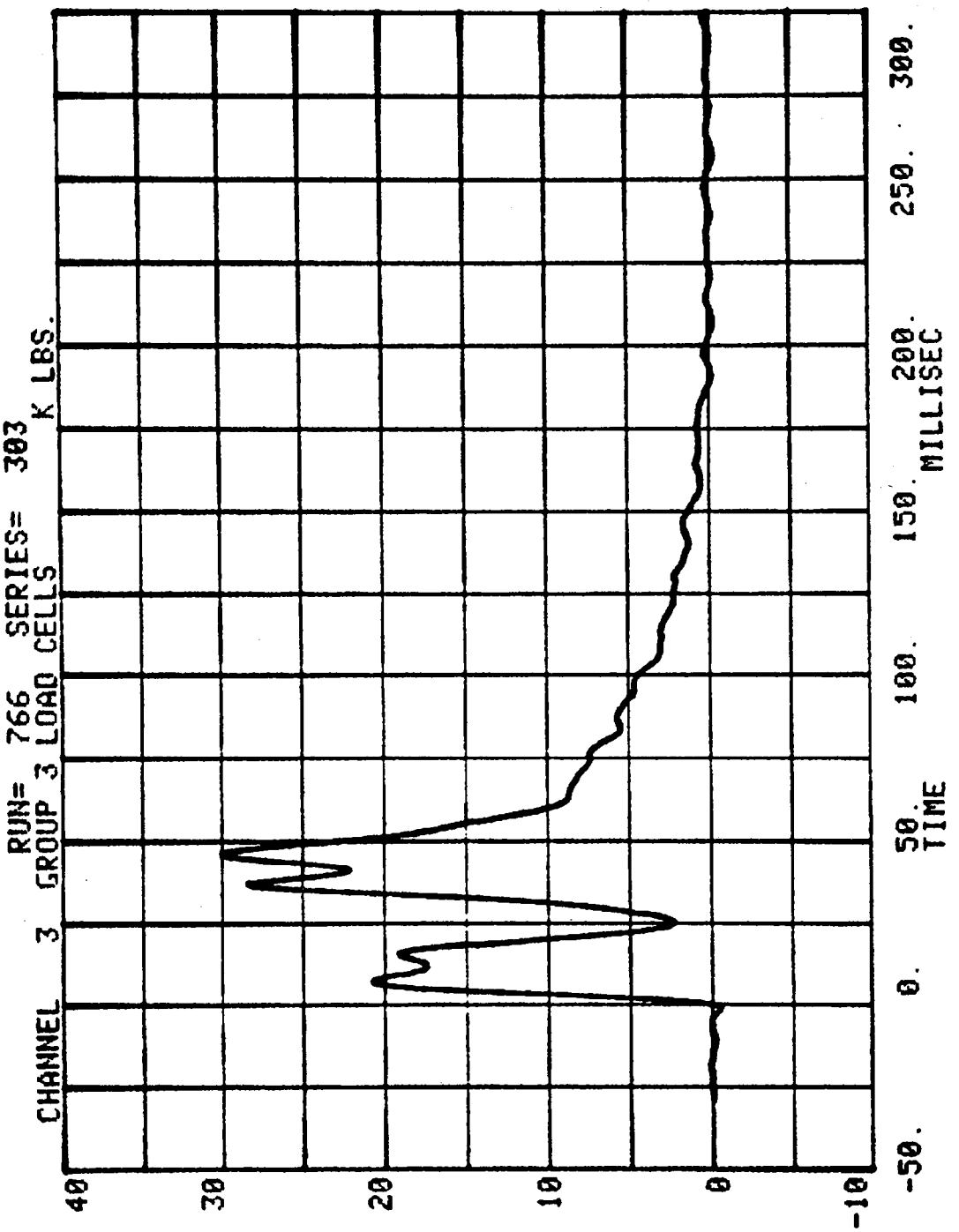
CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	-.435	32.807 K LBS.
2	GROUP 2 LOAD CELLS	-.594	31.281 K LBS.
3	GROUP 3 LOAD CELLS	-.515	30.103 K LBS.
4	GROUP 4 LOAD CELLS	-.505	20.615 K LBS.
5	GROUP 5 LOAD CELLS	-.427	36.087 K LBS.
6	GROUP 6 LOAD CELLS	-.650	14.873 K LBS.
7	TOTAL LOAD CELL SUM	-1.852	130.665 K LBS.


RUN= 766 SERIES= 303
CHANNEL 1 GROUP 1 LOAD CELLS K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

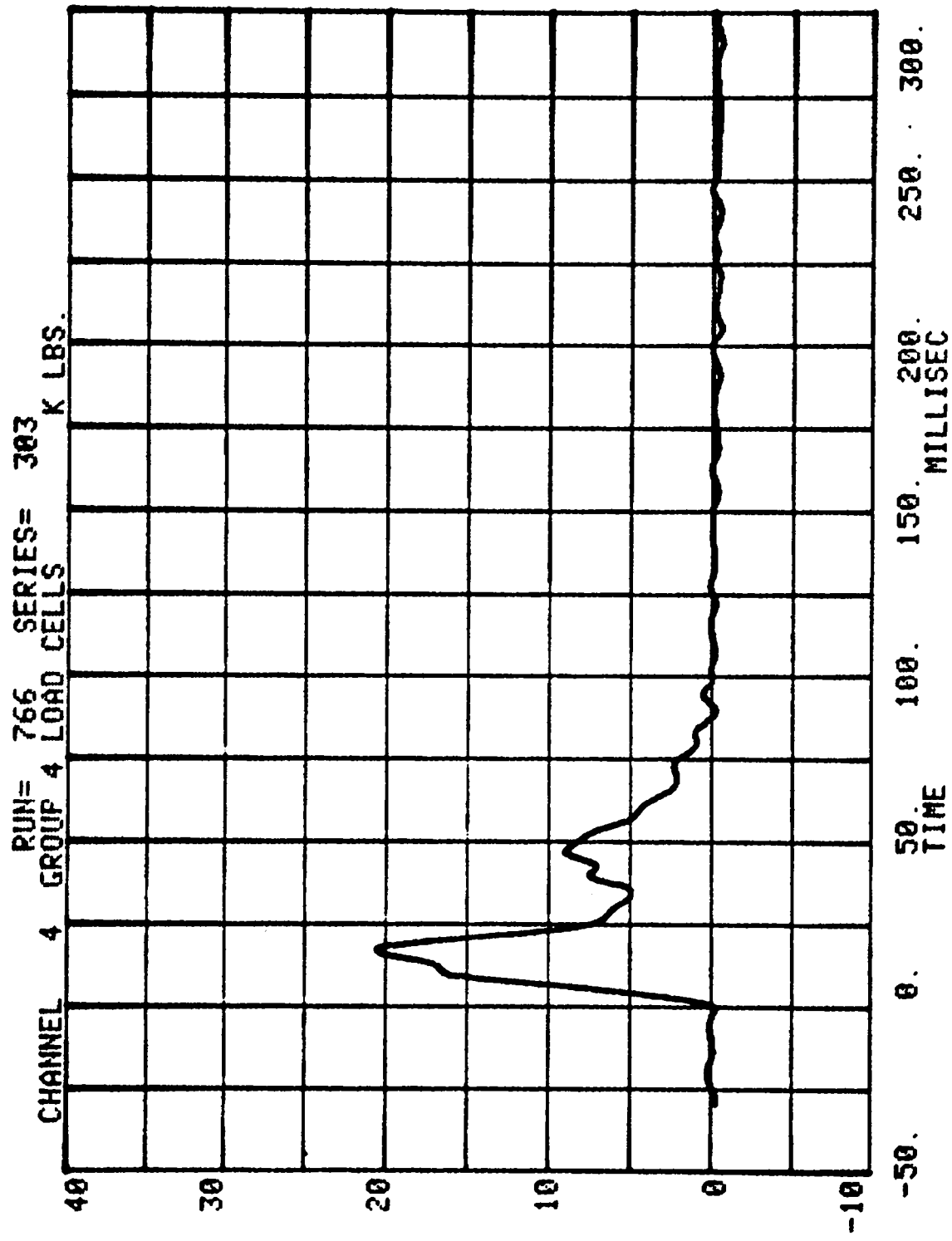
7556-4


CHANNEL 2 RUN= 766 SERIES= 303
GROUP 2 LOAD CELLS
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

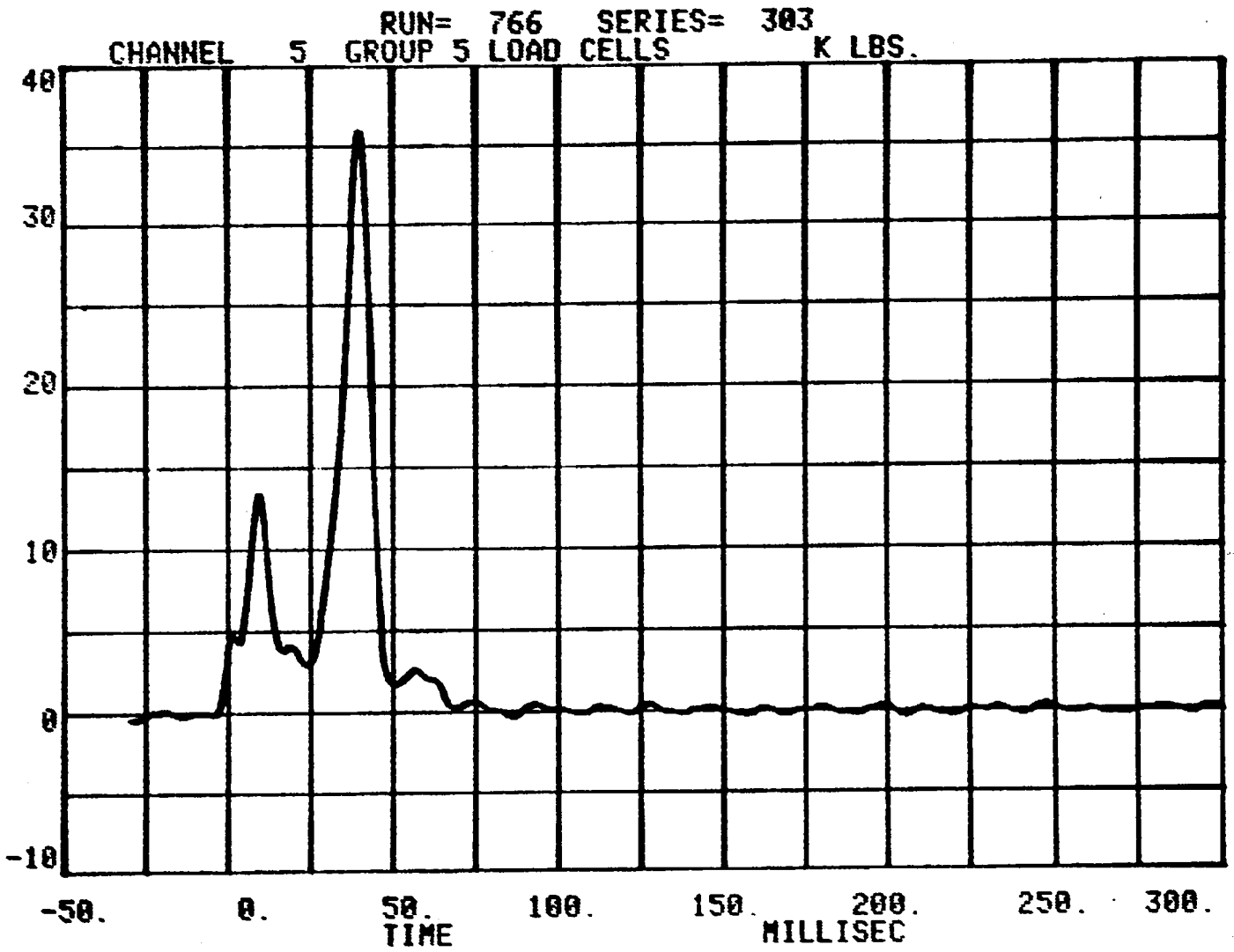
7556-4


CHANNEL 3 RUN= 766 SERIES= 303
GROUP 3 LOAD CELLS K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

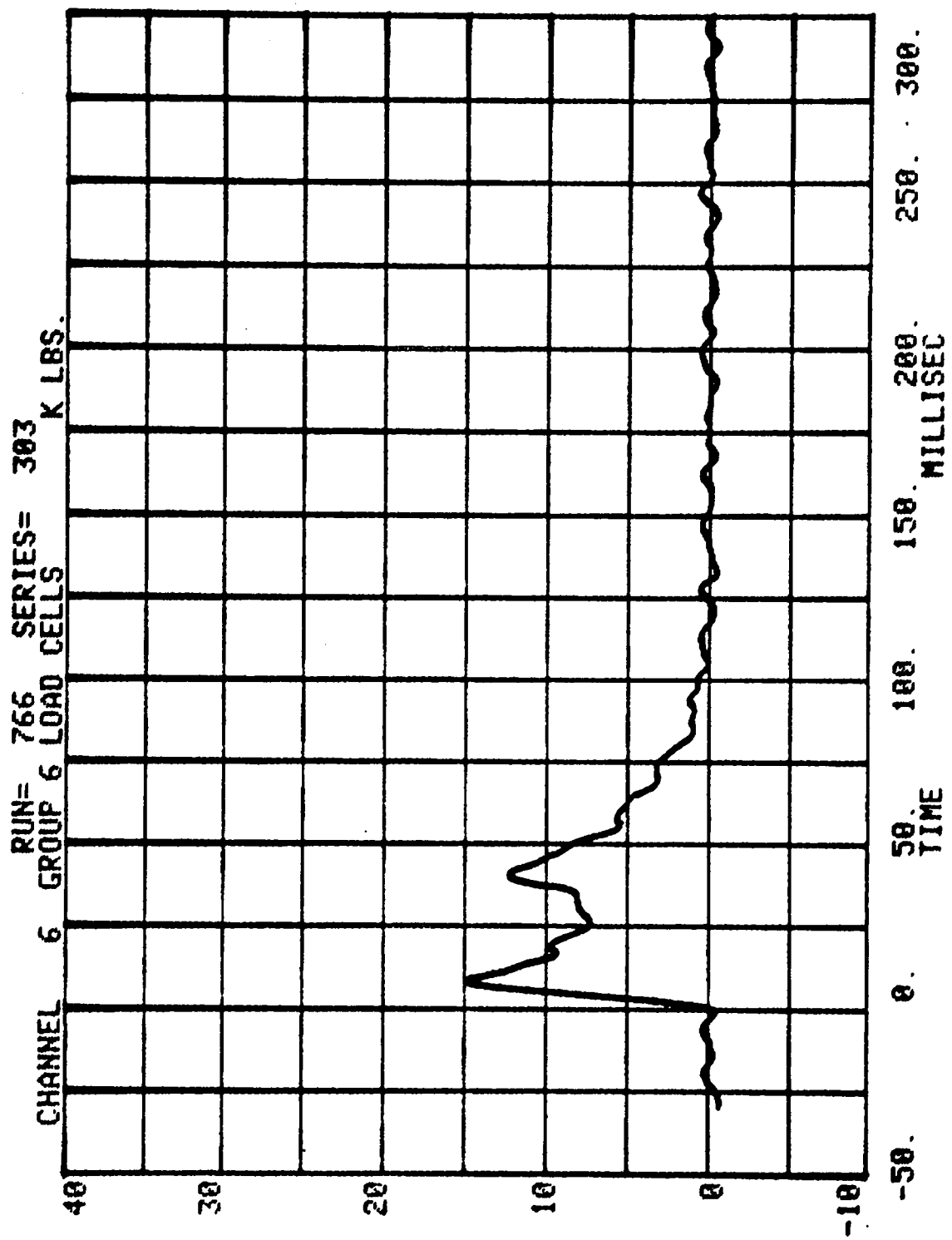
7556-4


CHANNEL 4 GROUP 4 LOAD CELLS
RUN= 766 SERIES= 303
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

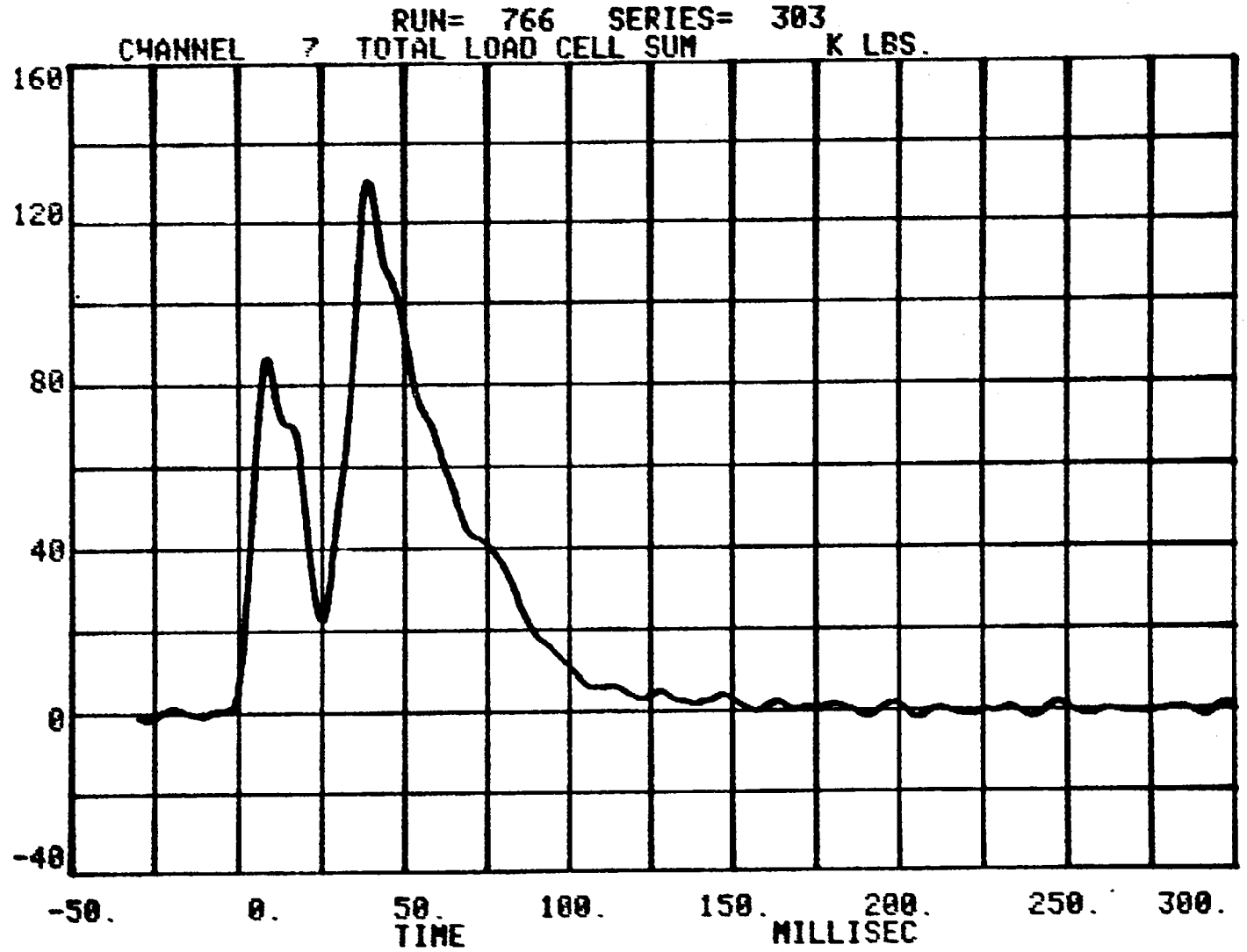
7556-4


RUN= 766 SERIES= 303
CHANNEL 5 GROUP 5 LOAD CELLS
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


CHANNEL 6 GROUP 6 LOAD CELLS
RUN= 766 SERIES= 303
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


RUN= 766 SERIES= 303
CHANNEL 7 TOTAL LOAD CELL SUM K LBS.
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

TEST NO. MHO 303

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= 766

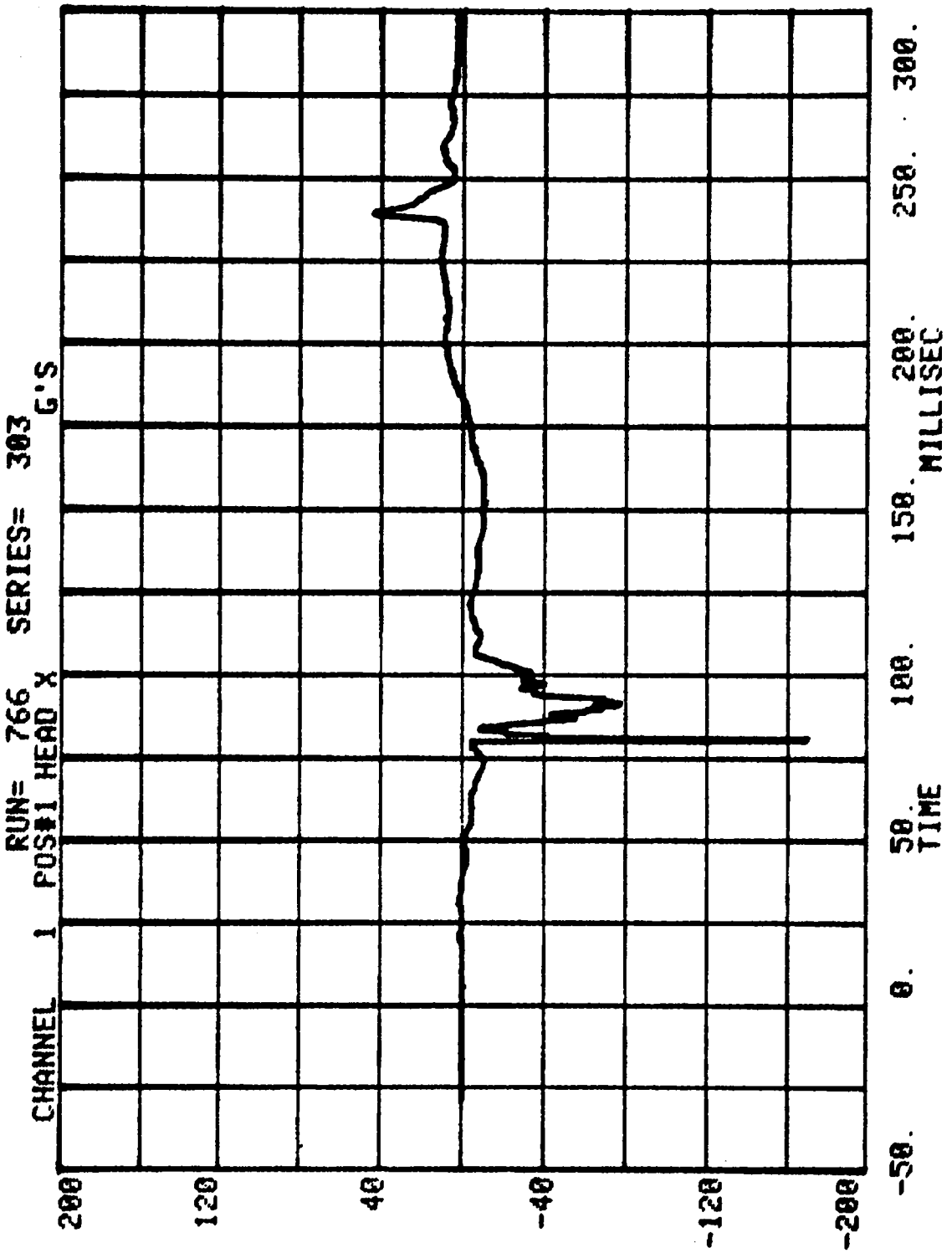
POS#1 HEAD R

HIC= 985.3 FROM T1= .07687 TO T2= .10402

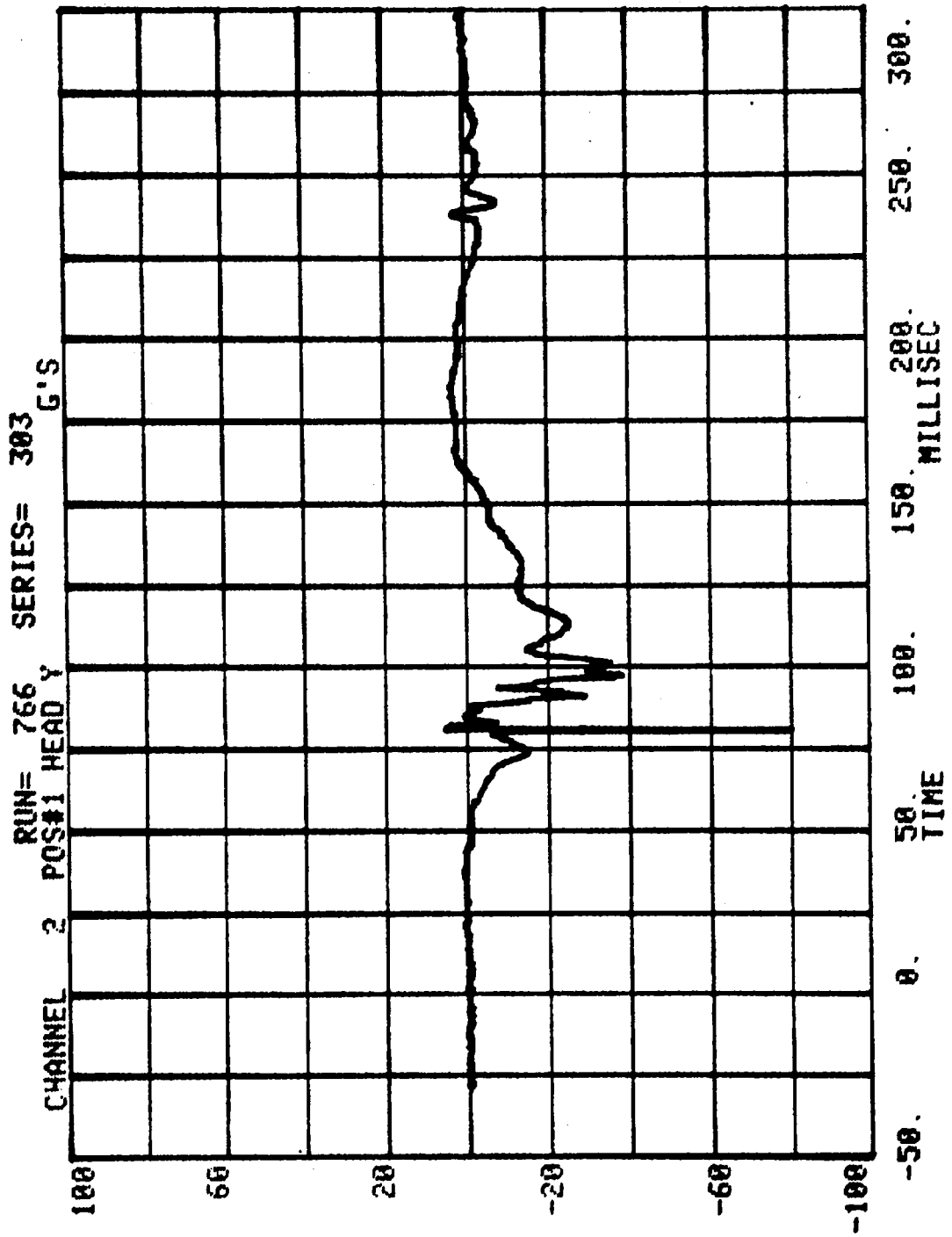
AVERAGE ACCELERATION BETWEEN T1 AND T2= 66.7G'S

EVENT TIME= 300.0 MSEC

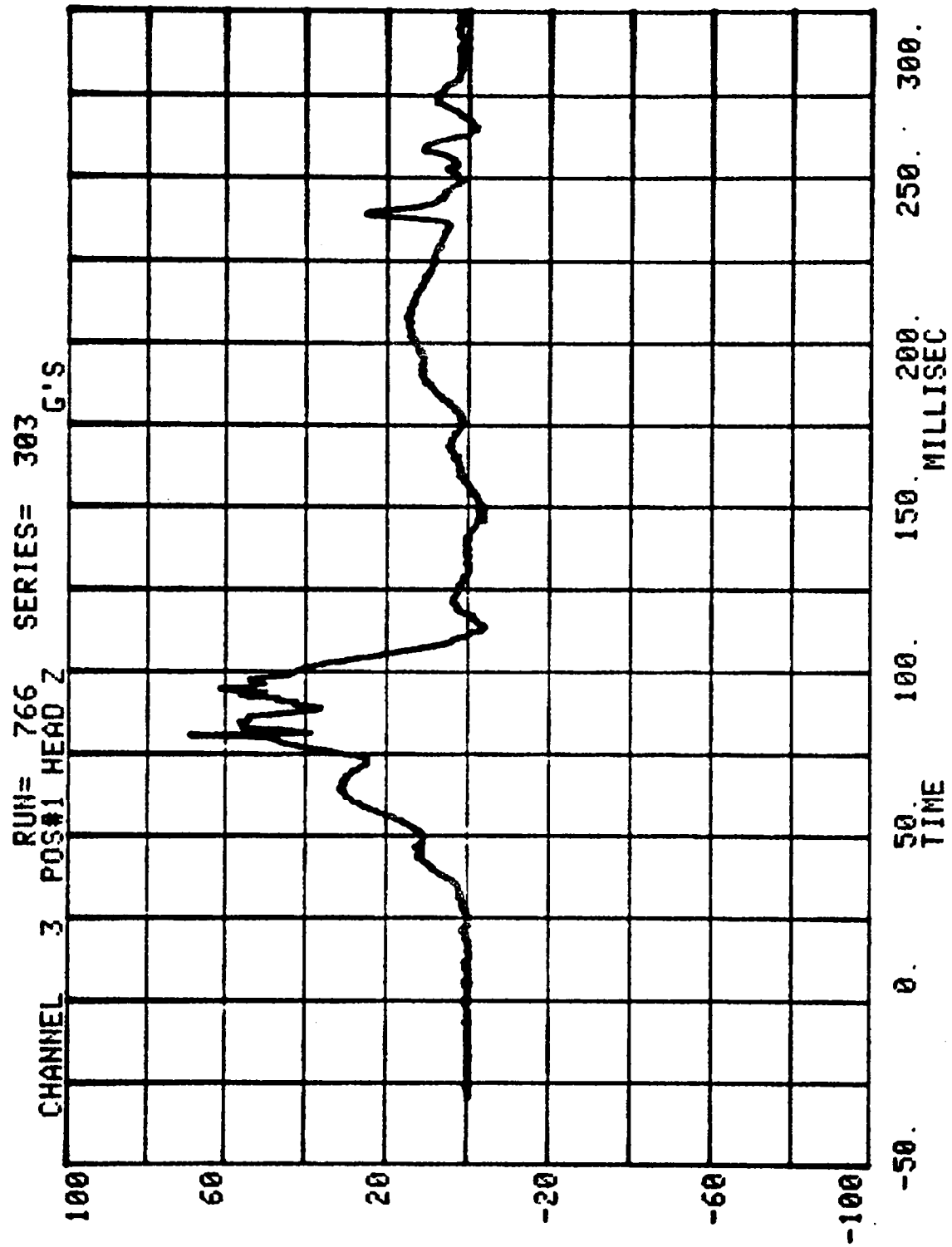
SEVERITY INDEX=1525.0


CHANNEL 1 POS#1 HEAD X
RUN= 766 SERIES= 303
G'S
200
120
40
-40
-120
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

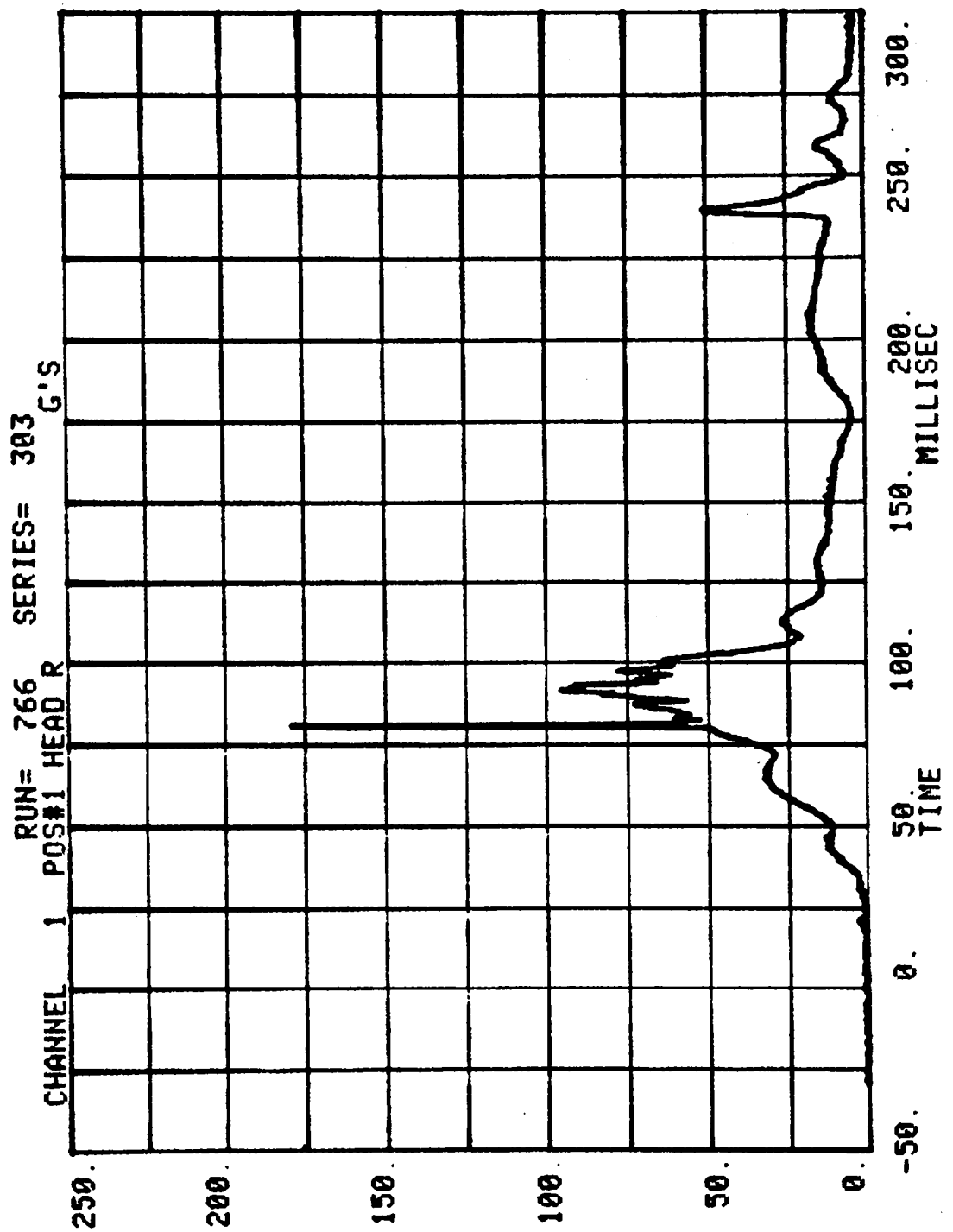
7556-4


CHANNEL 2 POS#1 HEAD Y
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

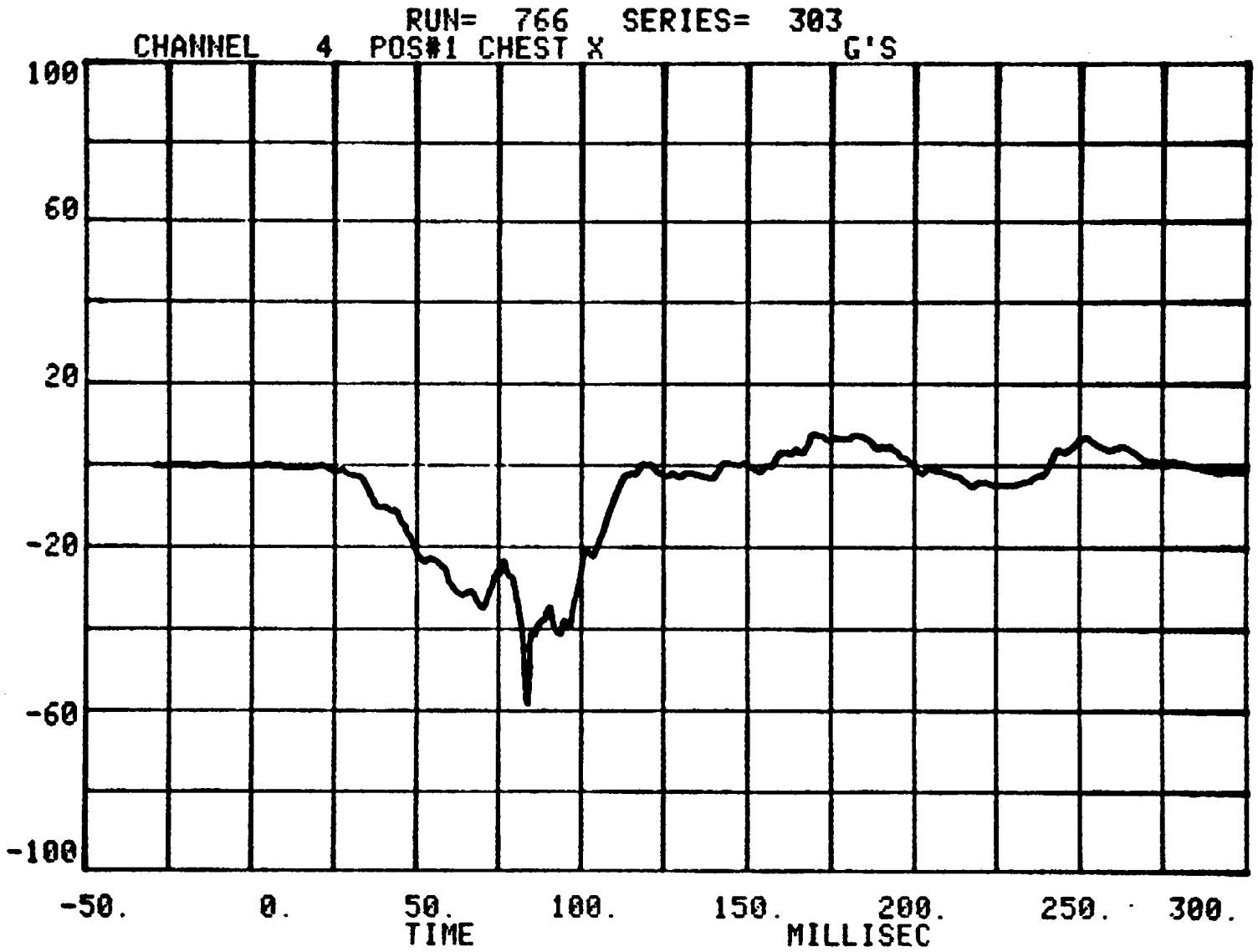
7556-4

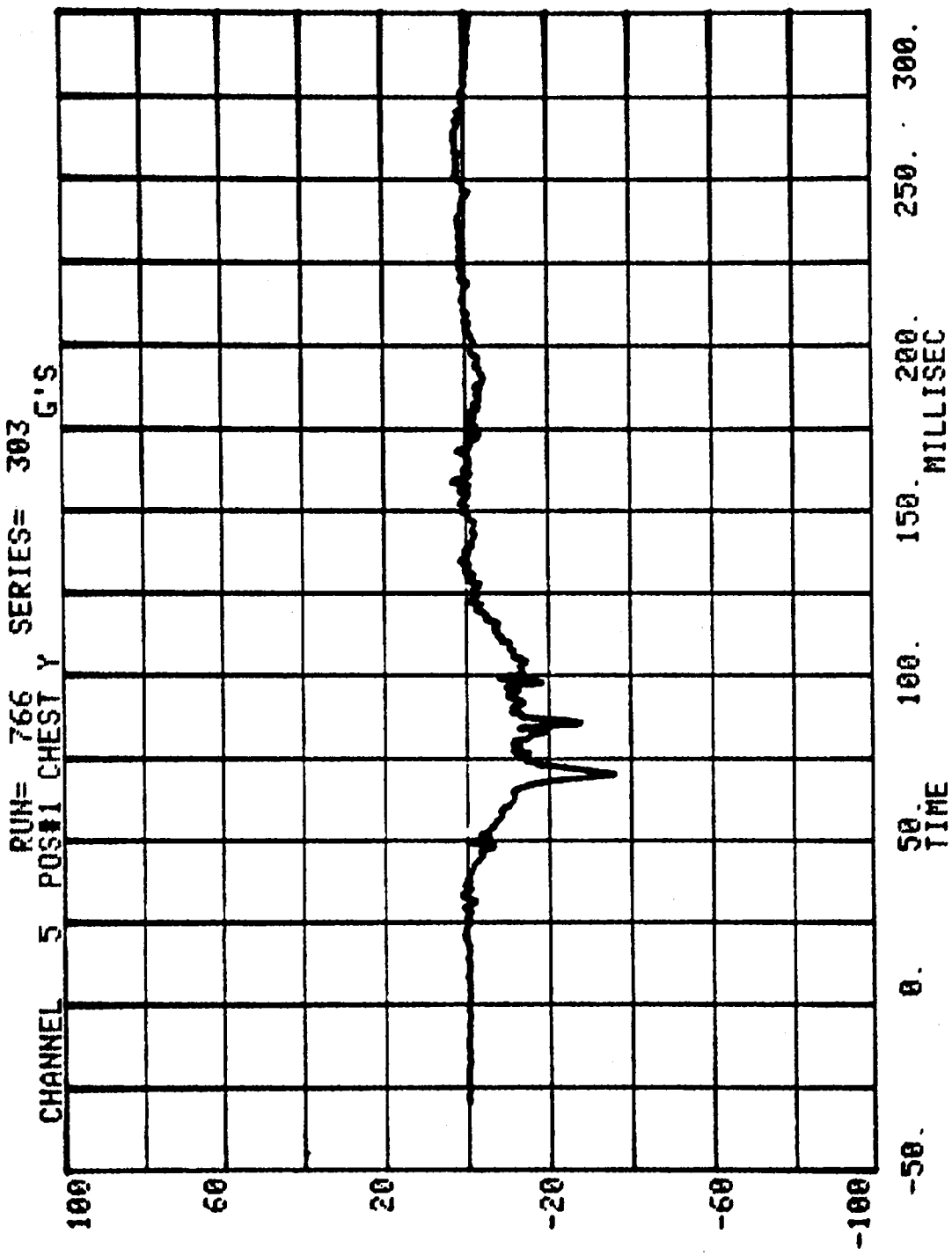

CHANNEL 3 POS#1 HEAD 2
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

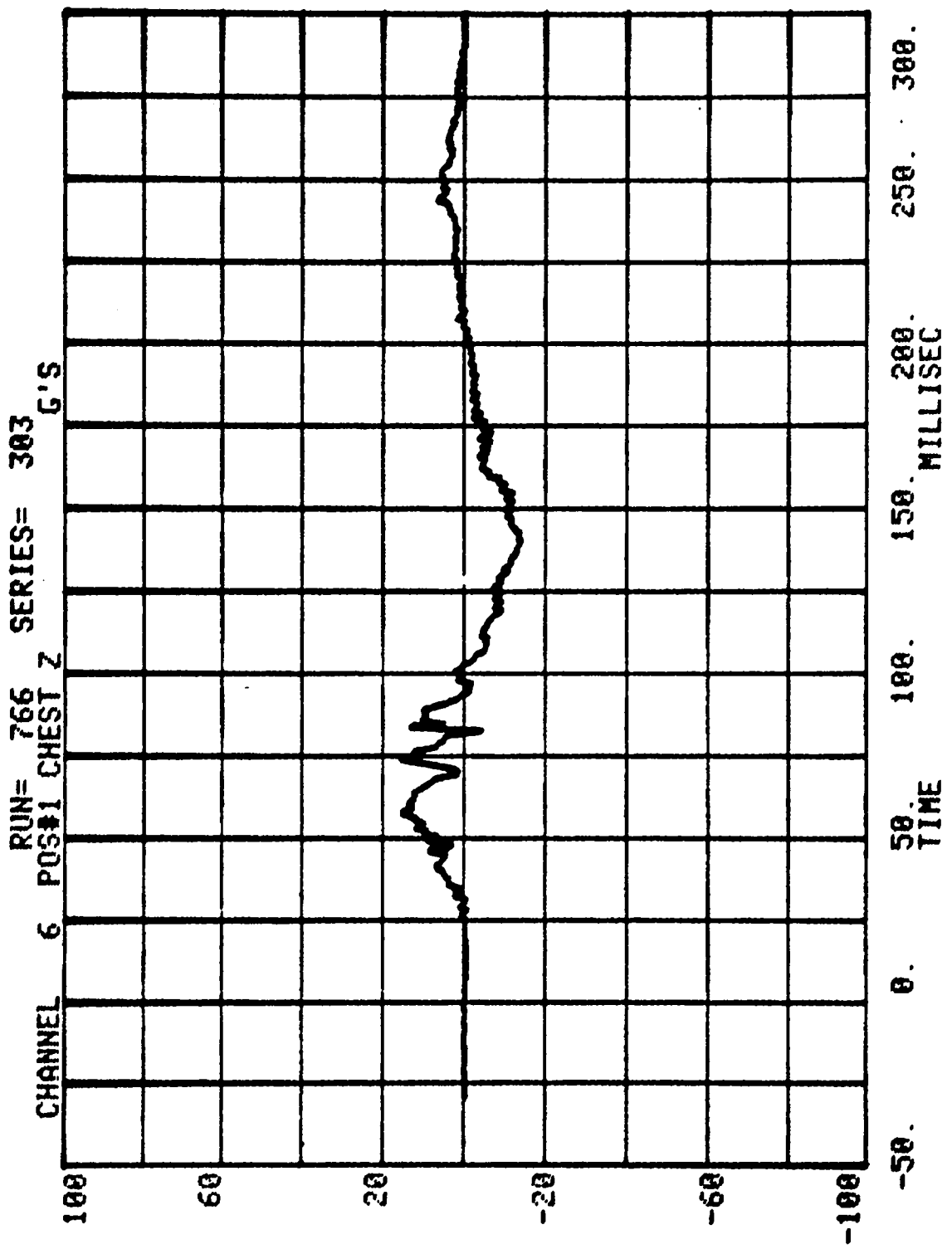
7556-4

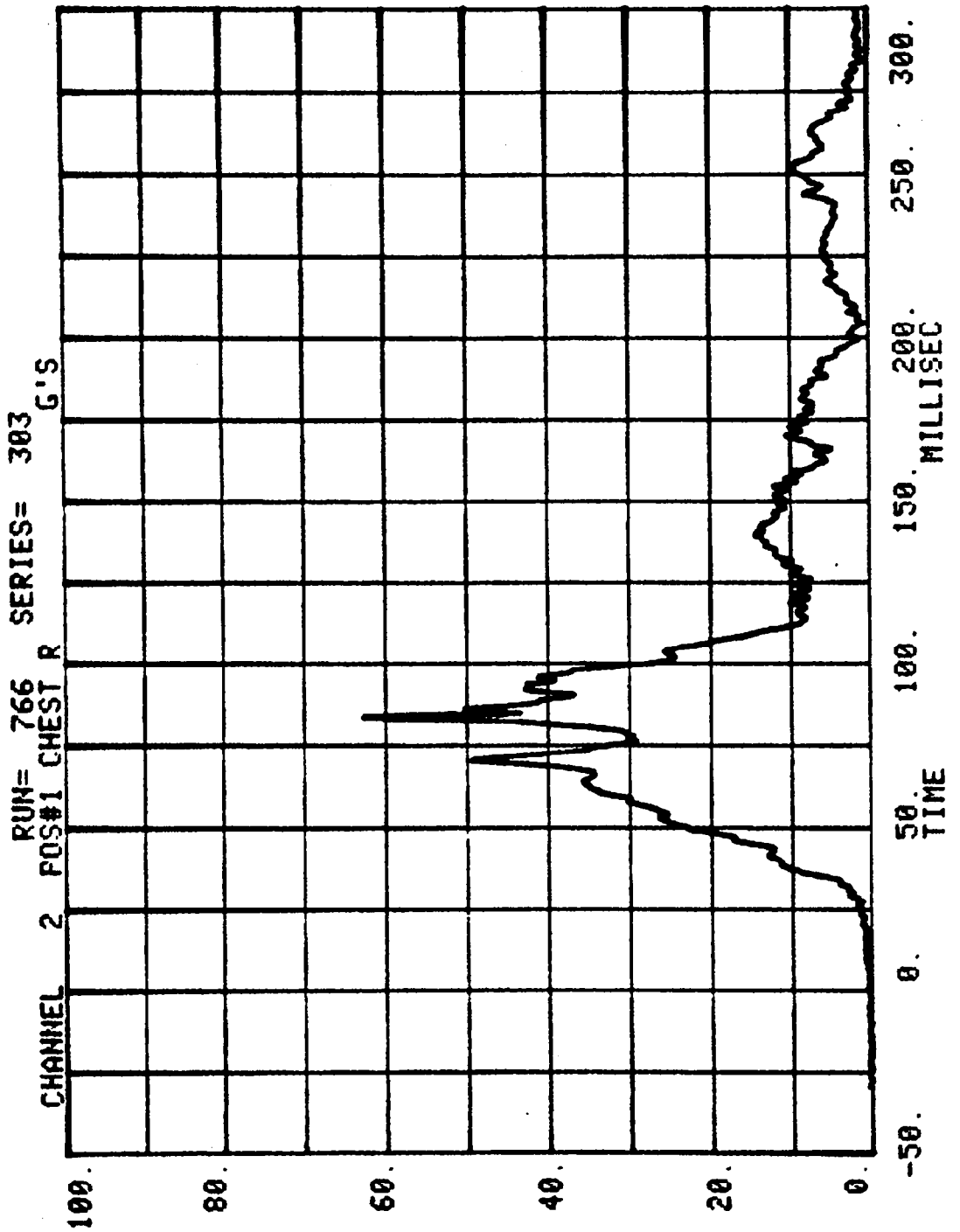

CHANNEL 1 POS#1 HEAD R
RUN= 766 SERIES= 303
G'S
250.
200.
150.
100.
50.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

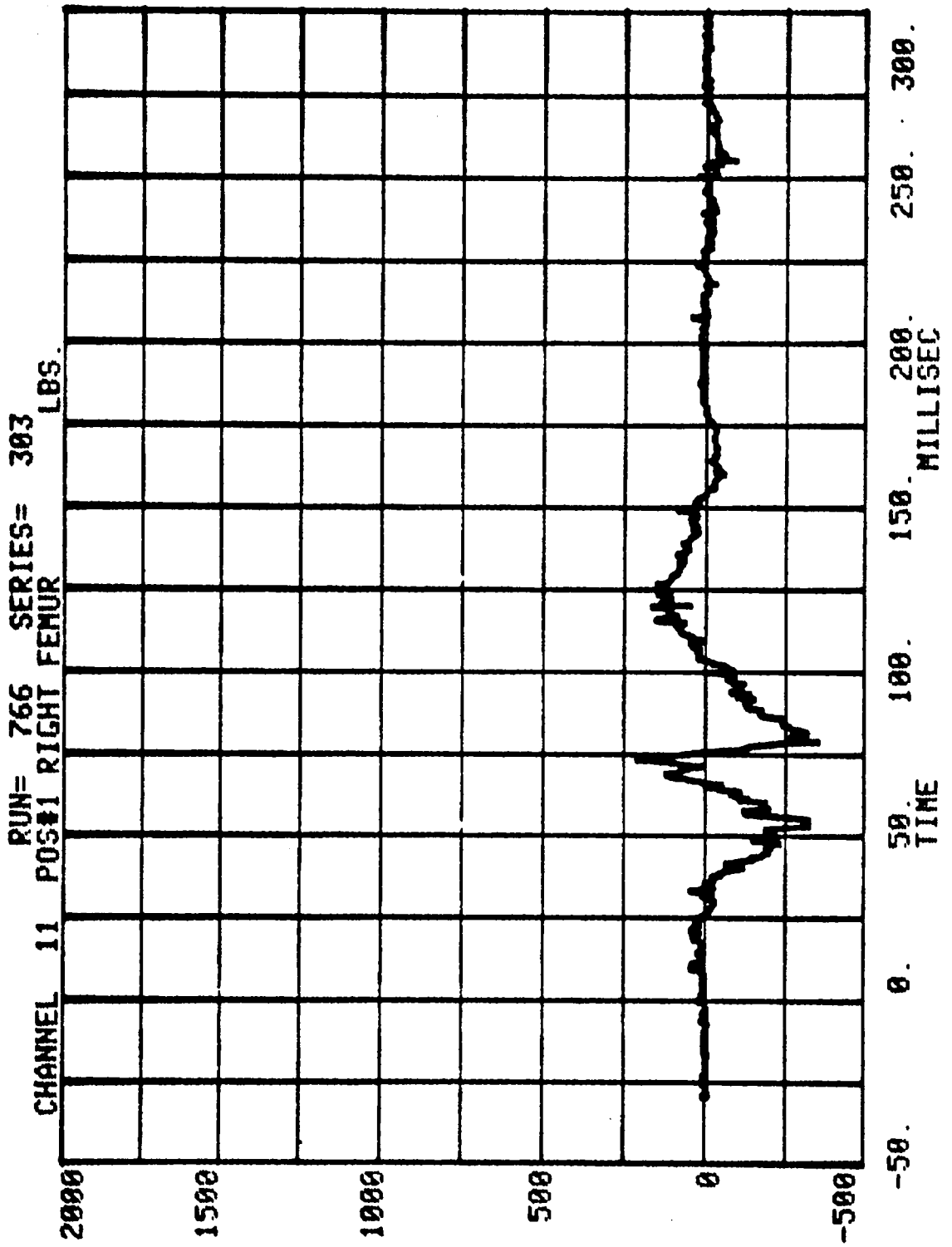

RUN= 766 SERIES= 303
CHANNEL 4 POS#1 CHEST X
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

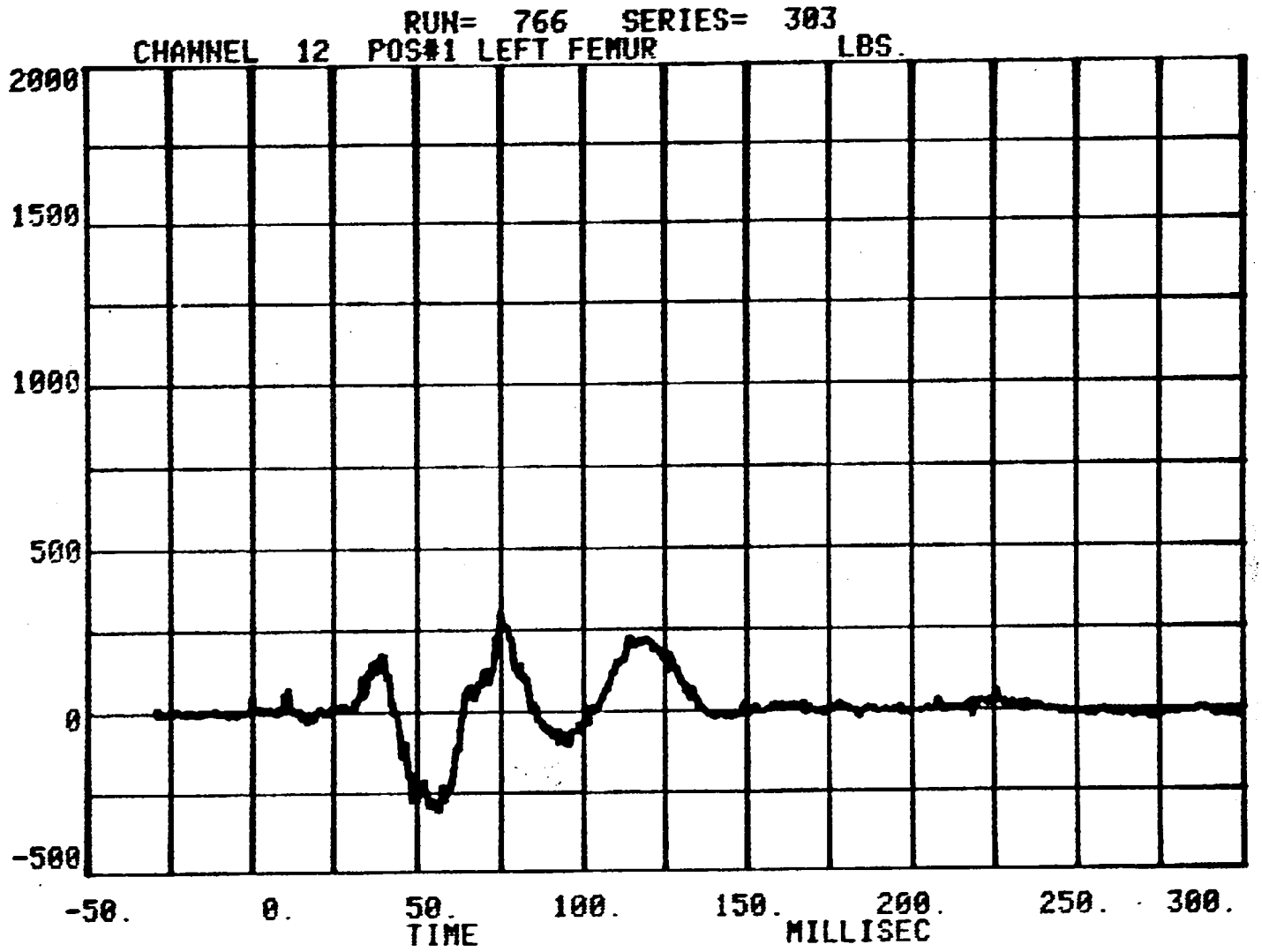

CHANNEL 5 POS#1 CHEST Y
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 6 POS#1 CHEST Z
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

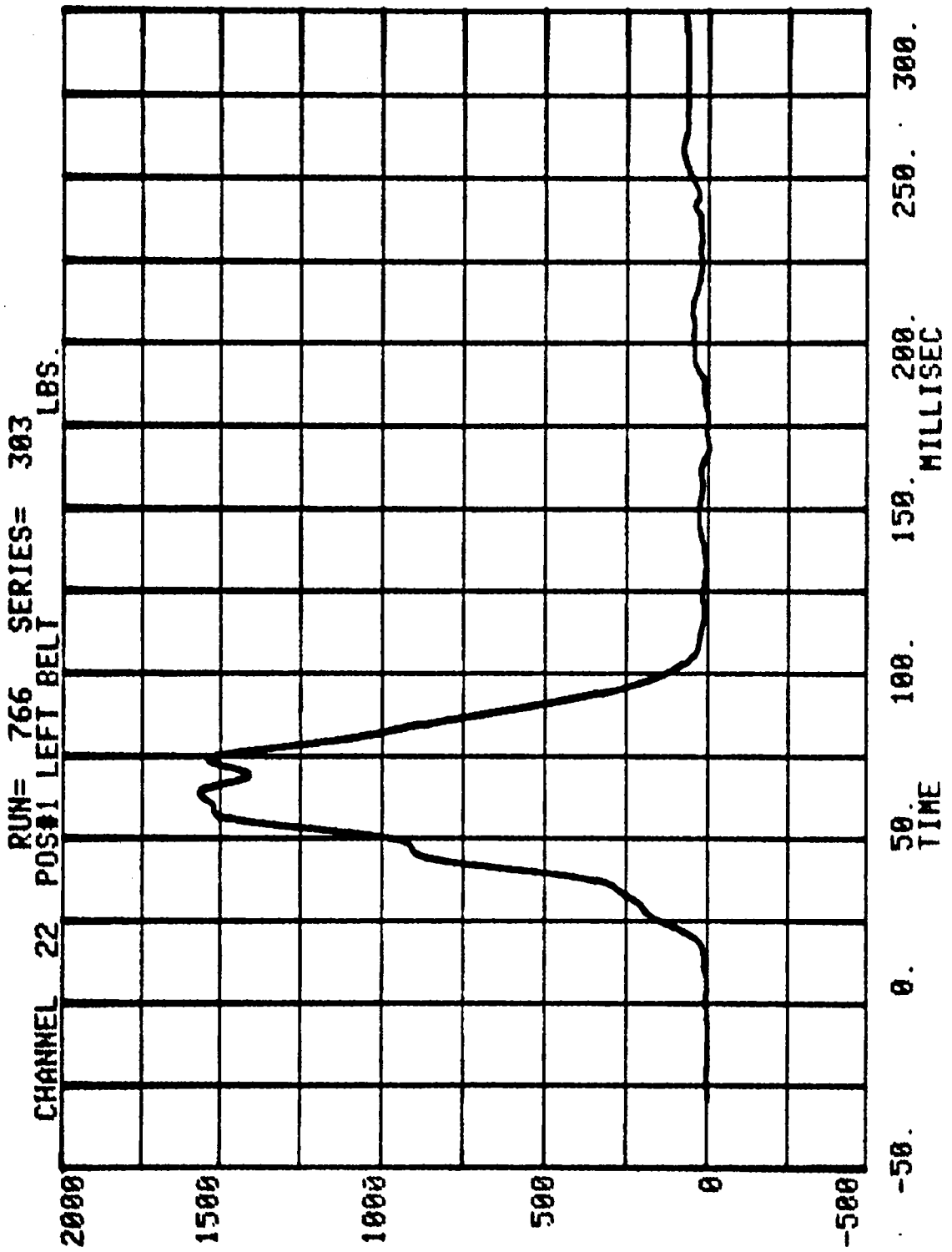

CHANNEL 2 POS#1 CHEST R
RUN= 766 SERIES= 303
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

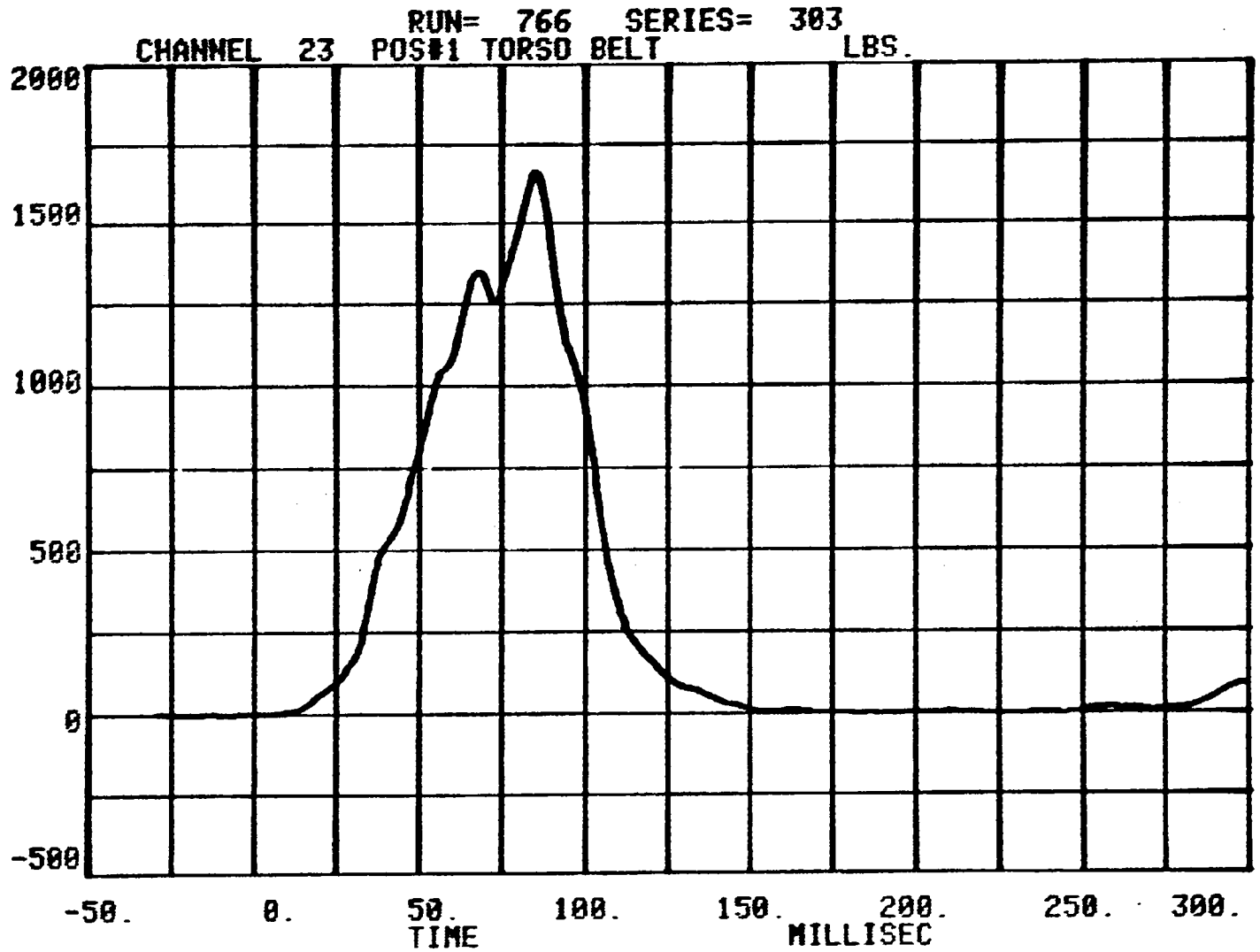

CHANNEL 11 POS#1 RIGHT FEMUR
RUN= 766 SERIES= 303
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

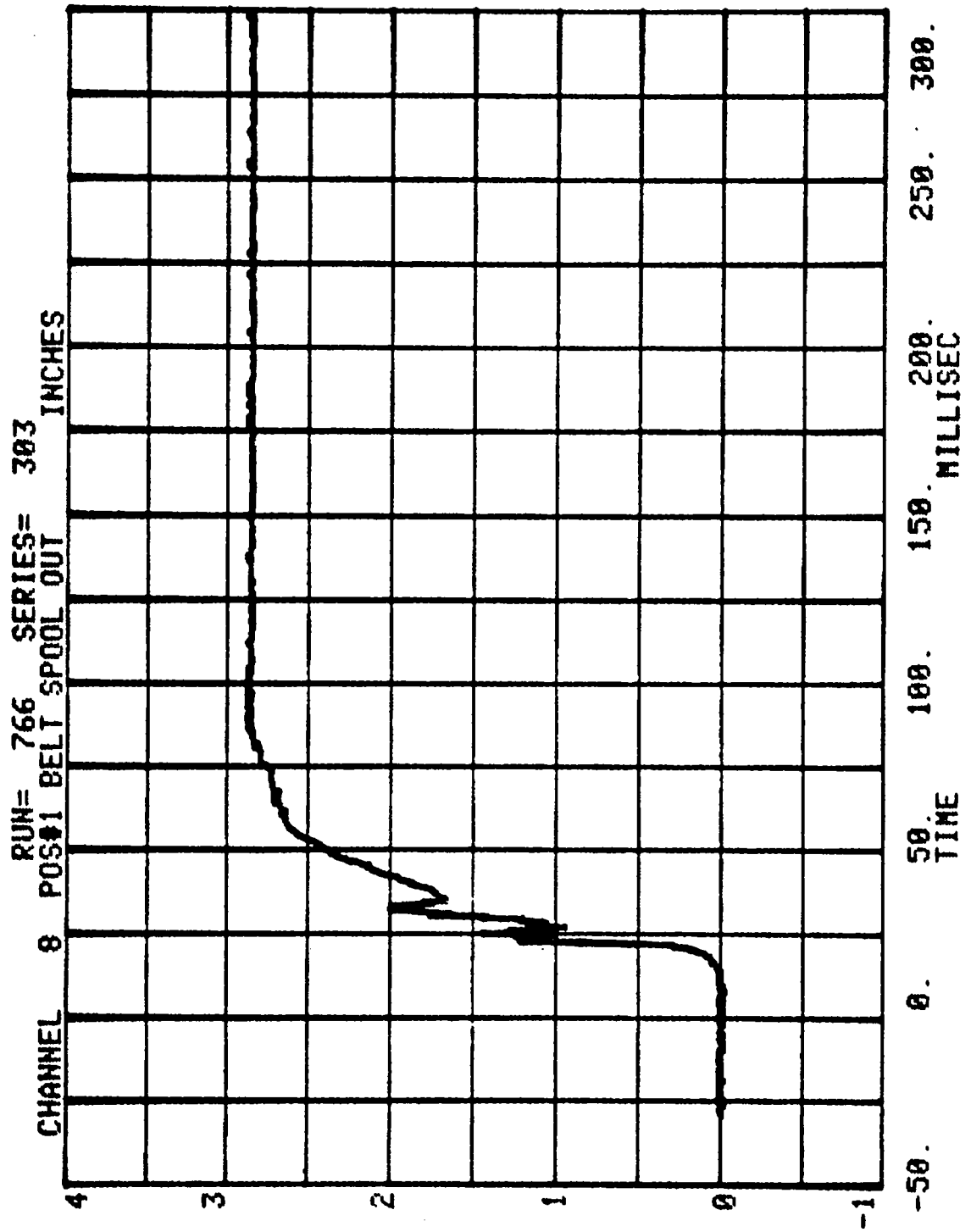

RUN= 766 SERIES= 303
CHANNEL 12 POS#1 LEFT FEMUR LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

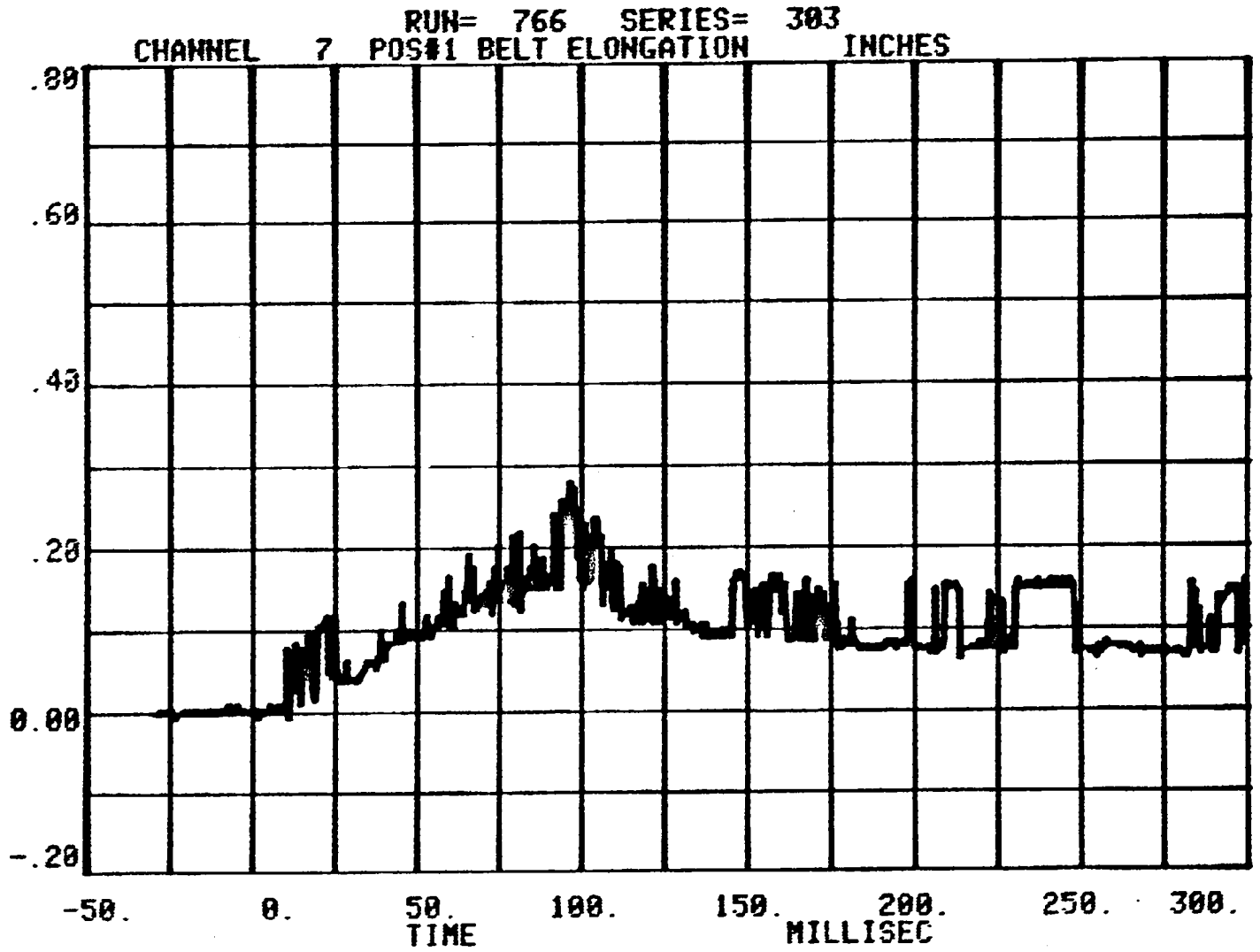
7556-4


CHANNEL 22 POS#1 LEFT BELT
RUN= 766 SERIES= 303
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


RUN= 766 SERIES= 303
CHANNEL 23 POS#1 TORSO BELT
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 8 RUN= 766 SERIES= 303
POS#1 BELT SPOOL OUT
INCHES
4
3
2
1
0
-1
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 766 SERIES= 303
CHANNEL 7 POS#1 BELT ELONGATION INCHES
.80
.60
.40
.20
0.00
-.20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NEW CAR ASSESSMENT BARRIER TESTS - 1987

RUN= 766

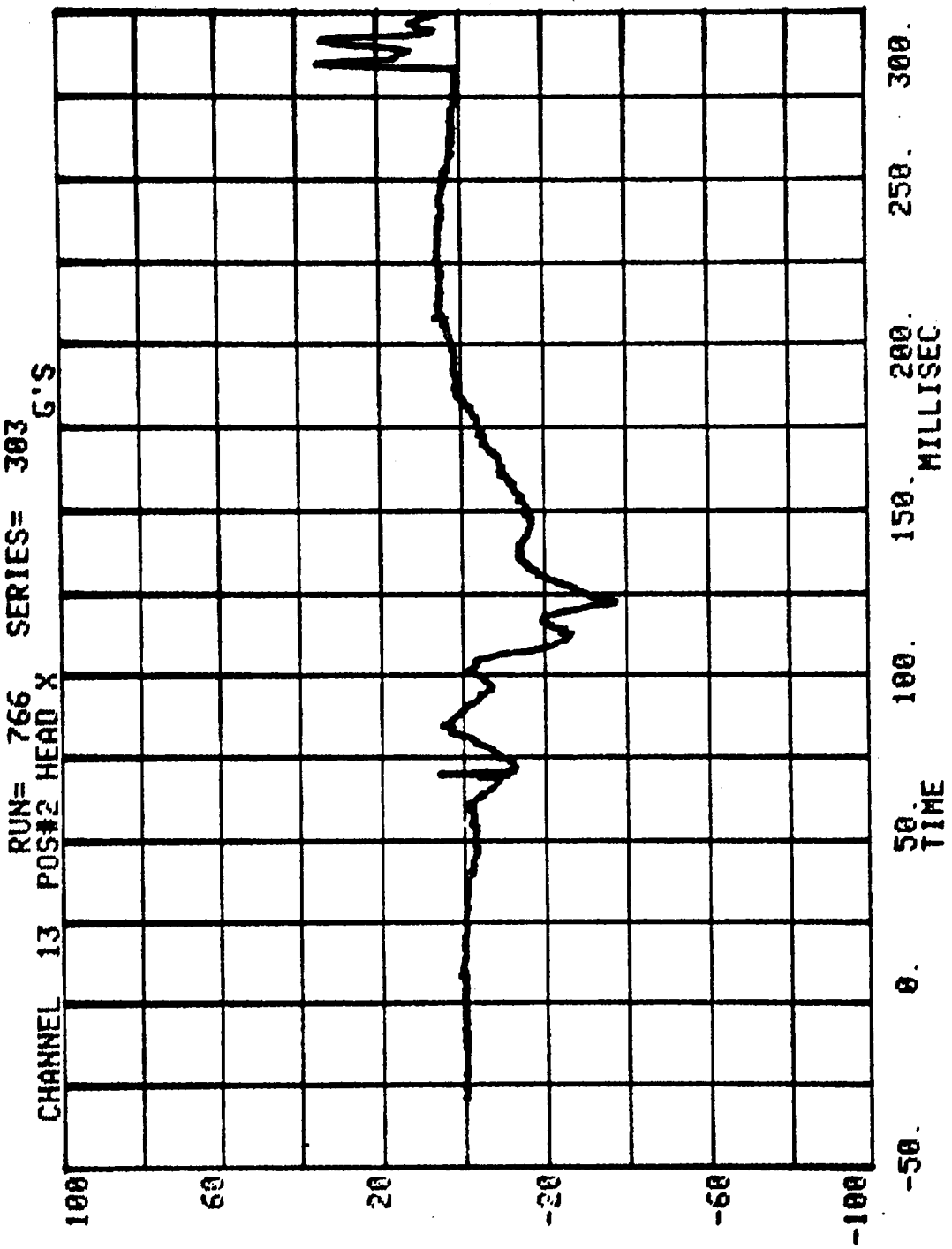
POS#2 HEAD R

HIC= 753.9 FROM T1= .09135 TO T2= .12735

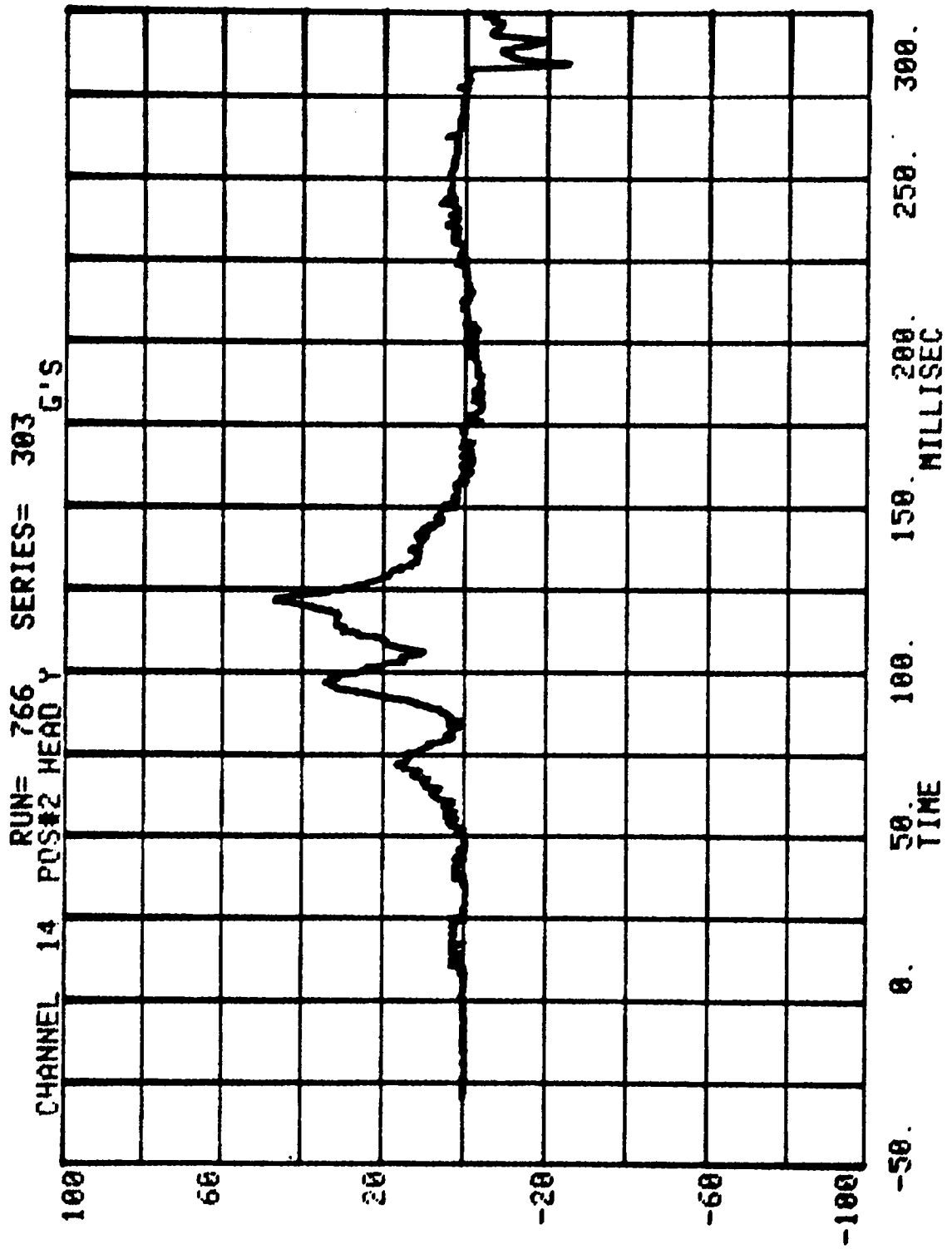
AVERAGE ACCELERATION BETWEEN T1 AND T2= 53.5G'S

EVENT TIME= 300.0 MSEC

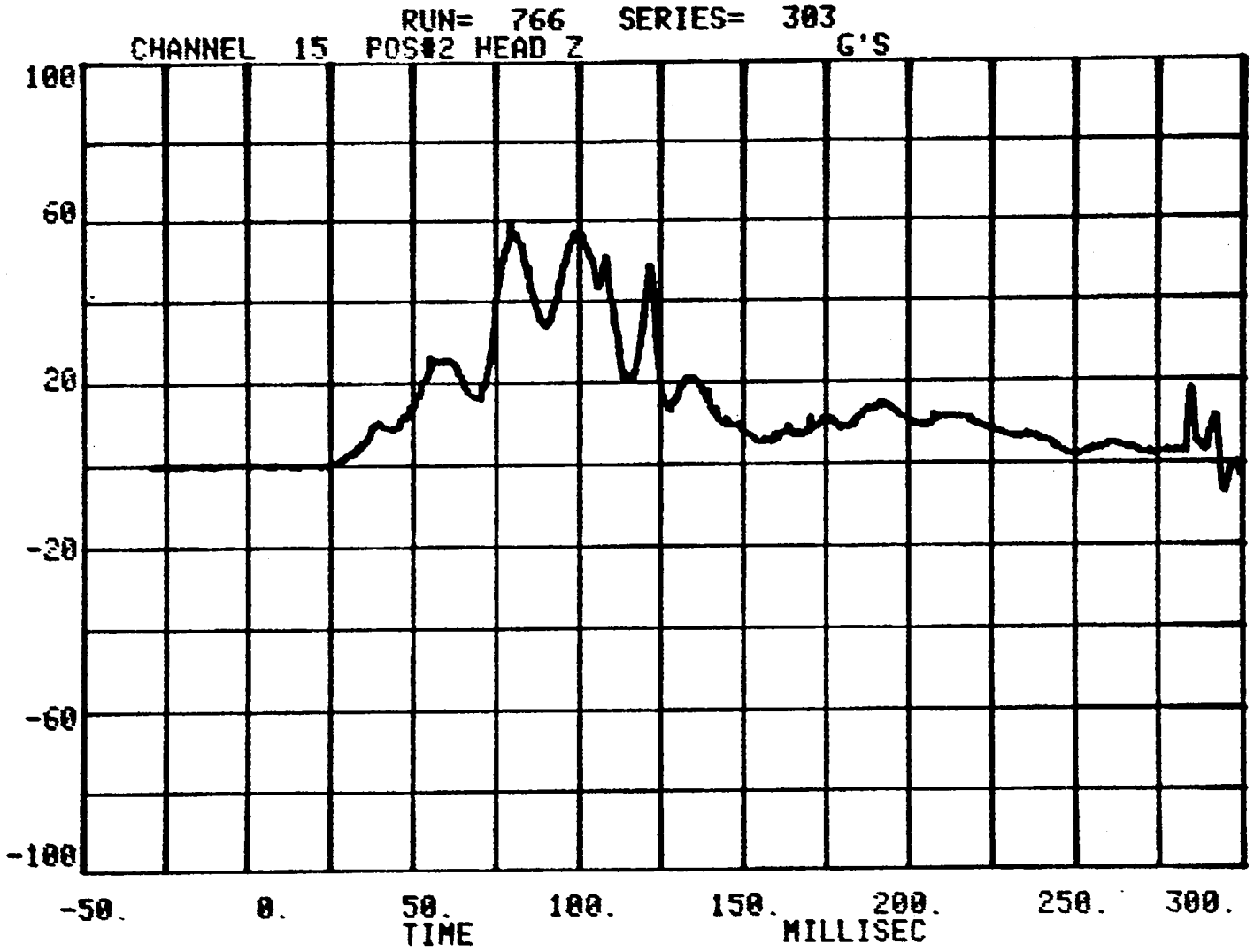
SEVERITY INDEX=1326.9


CHANNEL 13 POS#2 HEAD X
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

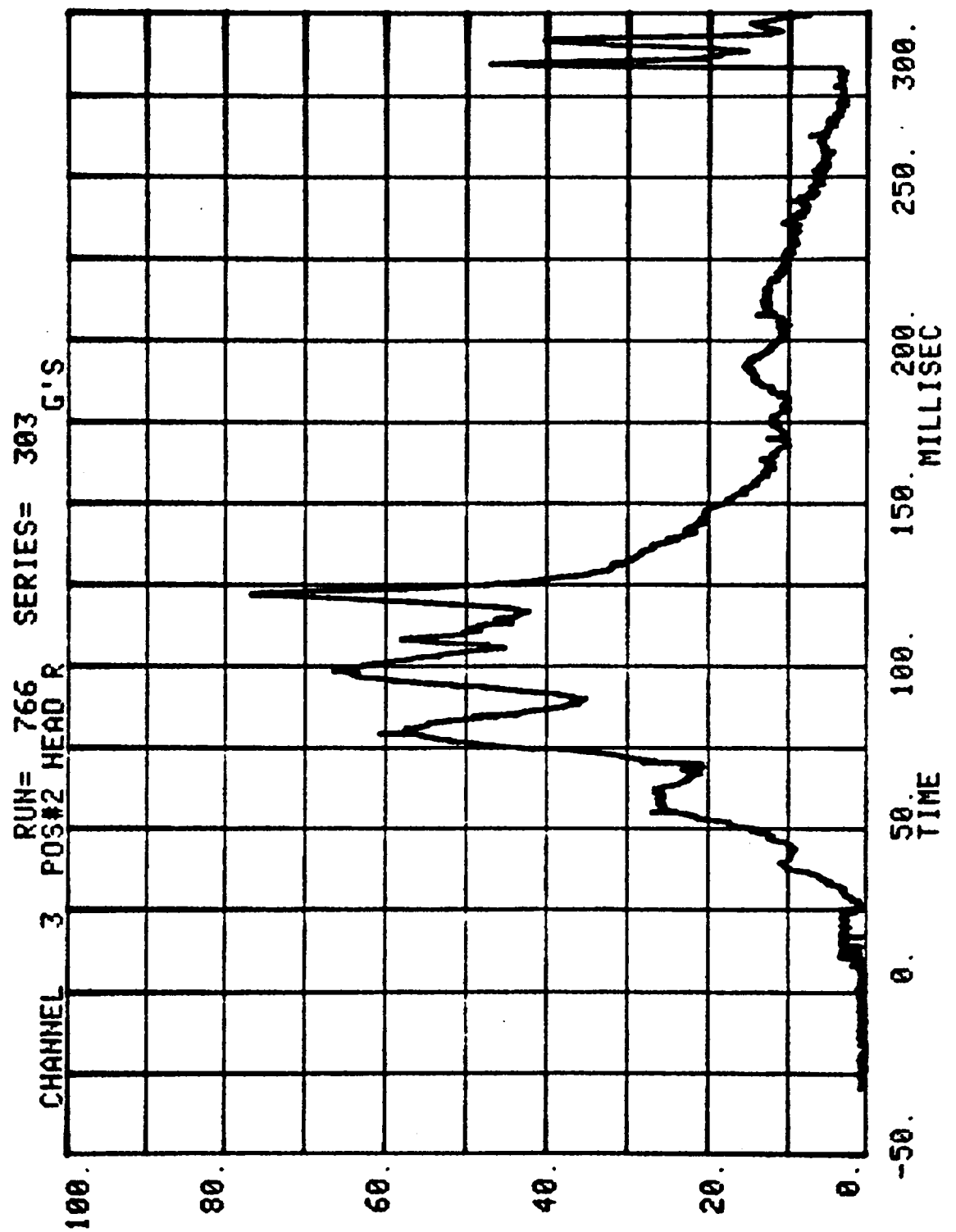

CHANNEL 14 POS#2 HEAD Y
RUN= 766 SERIES= 303
G'S
100
66
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

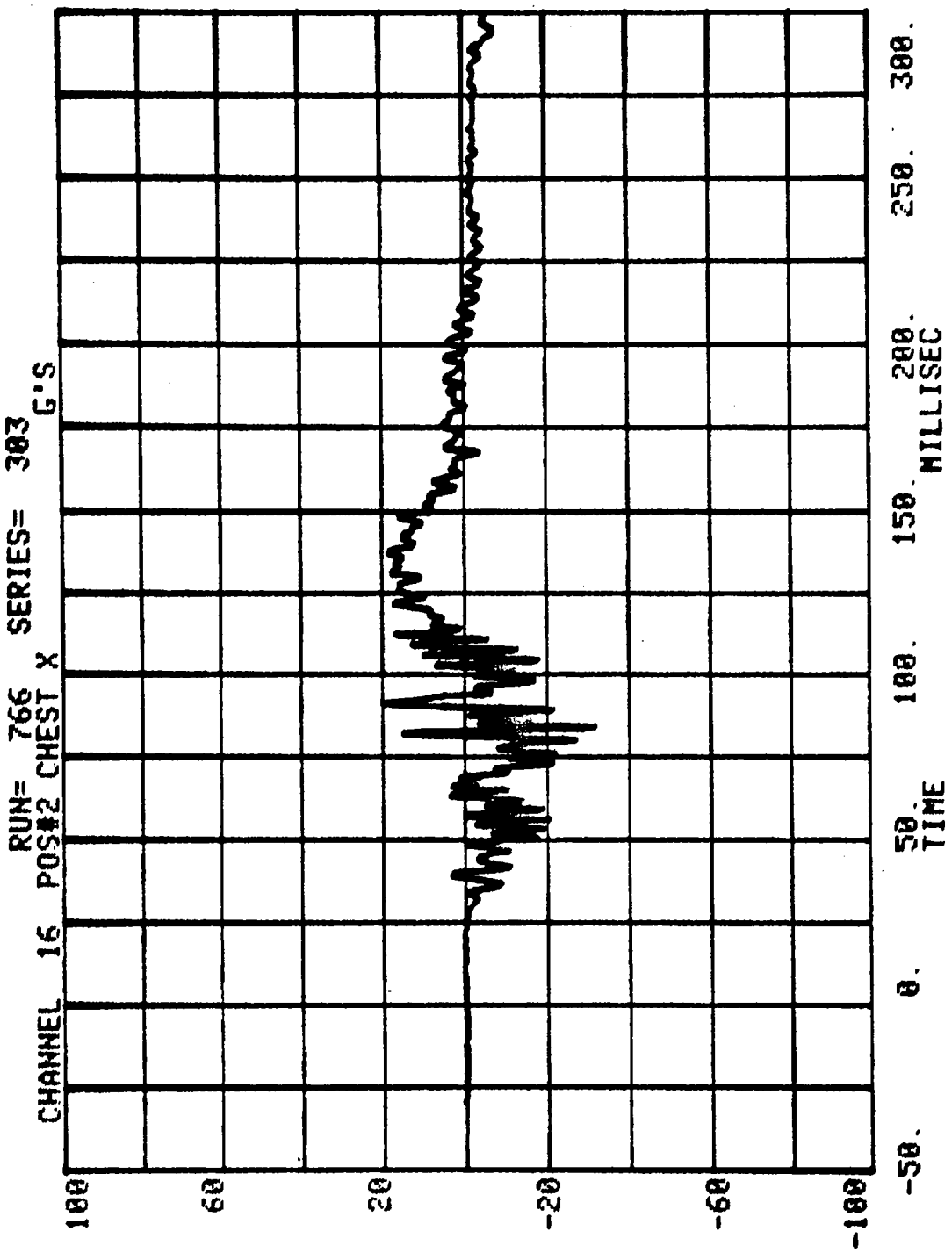

RUN= 766 SERIES= 303
CHANNEL 15 POS#2 HEAD Z
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

B-88

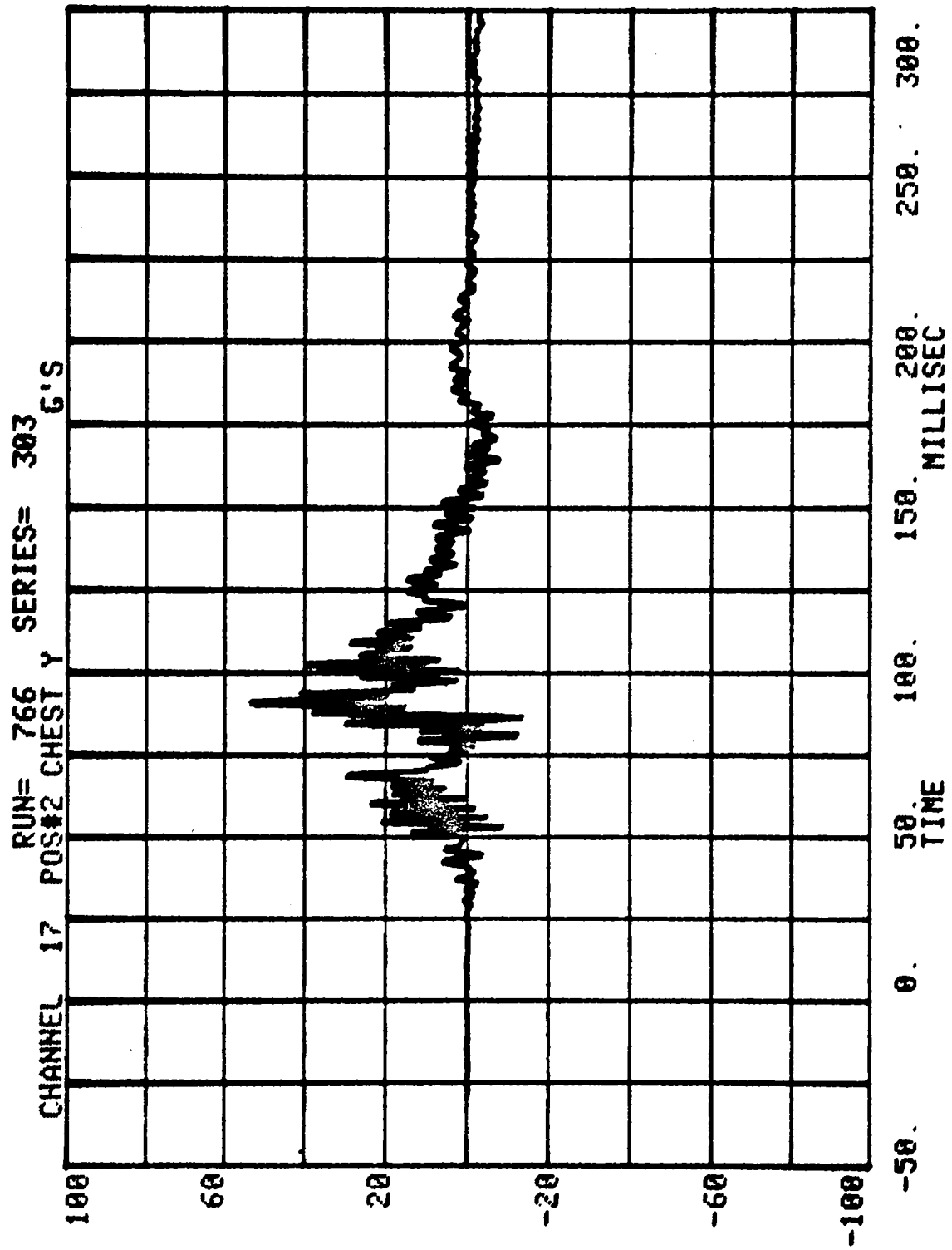
7556-4


CHANNEL 3 POS#2 HEAD R
RUN= 766 SERIES= 303
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

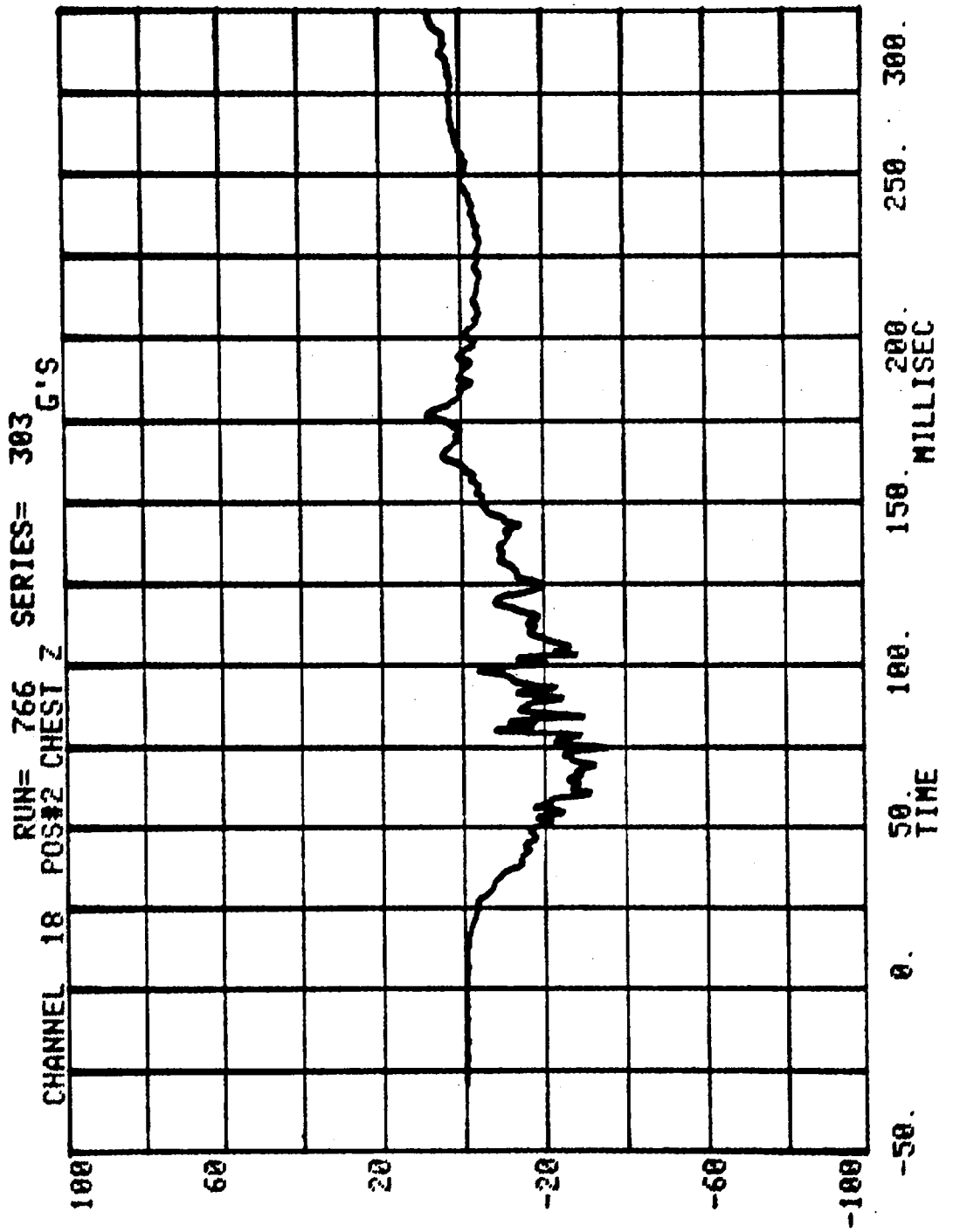
7556-4

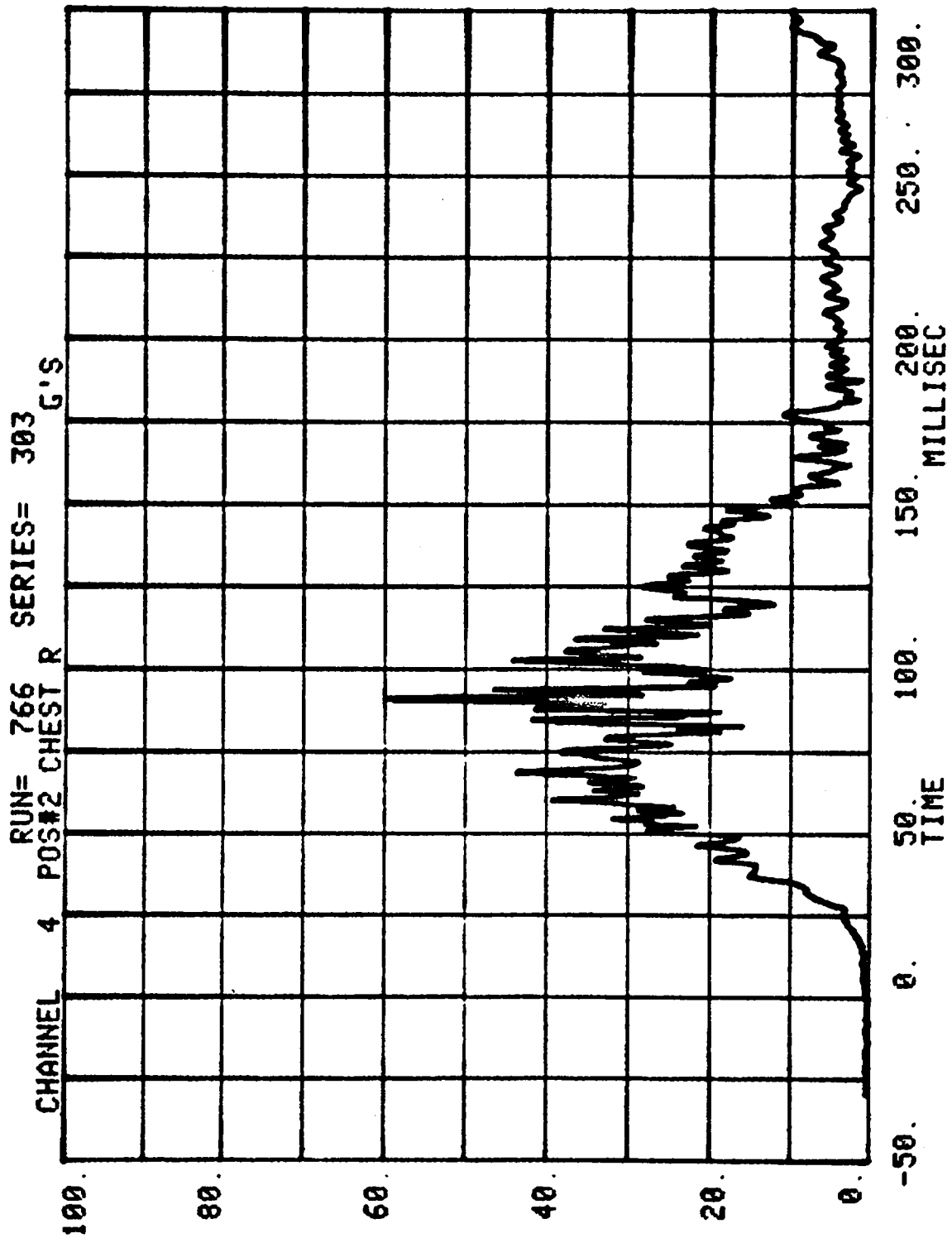

CHANNEL 16 POS#2 CHEST X
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

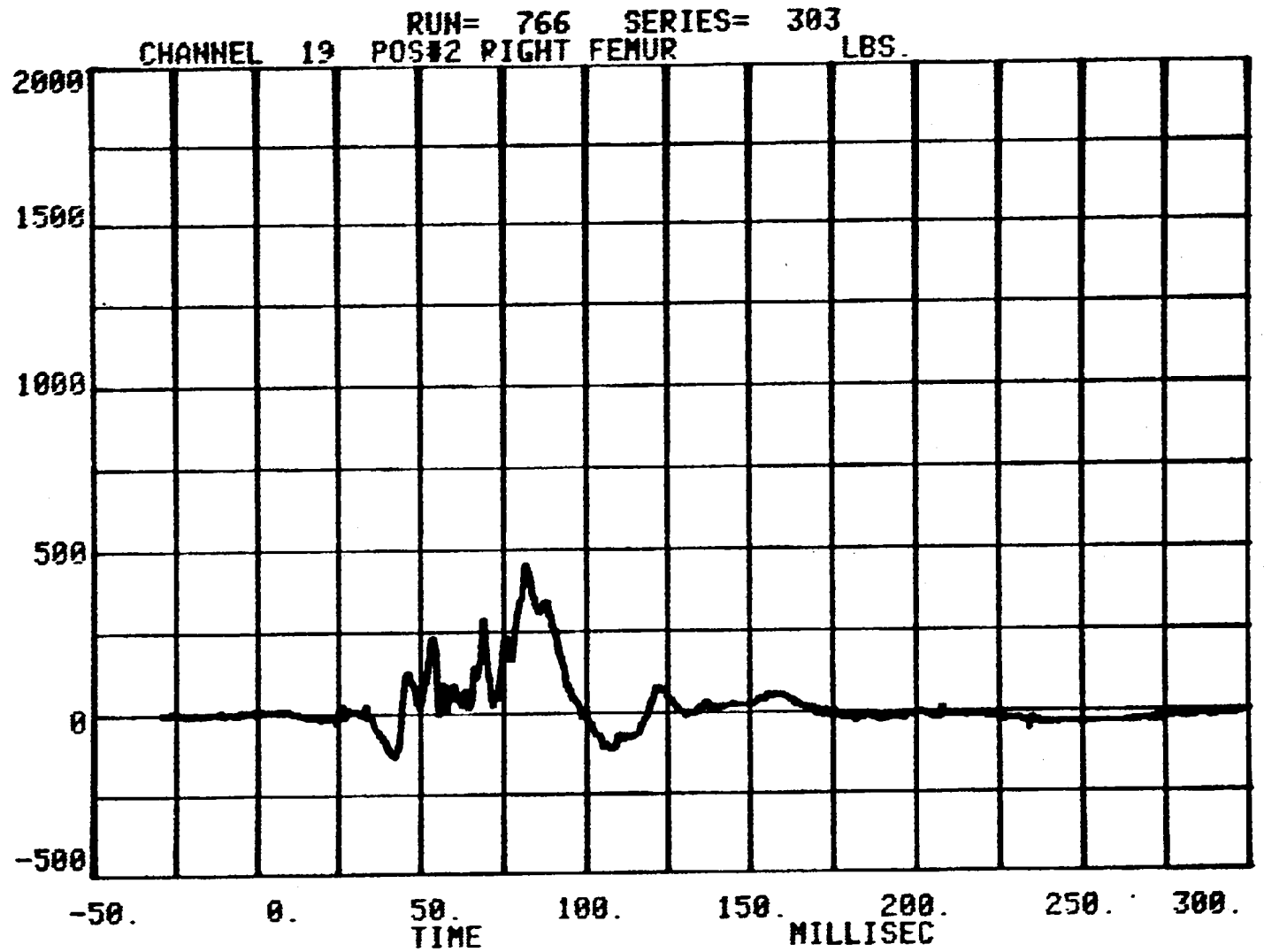

CHANNEL 17 POS#2 CHEST Y
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

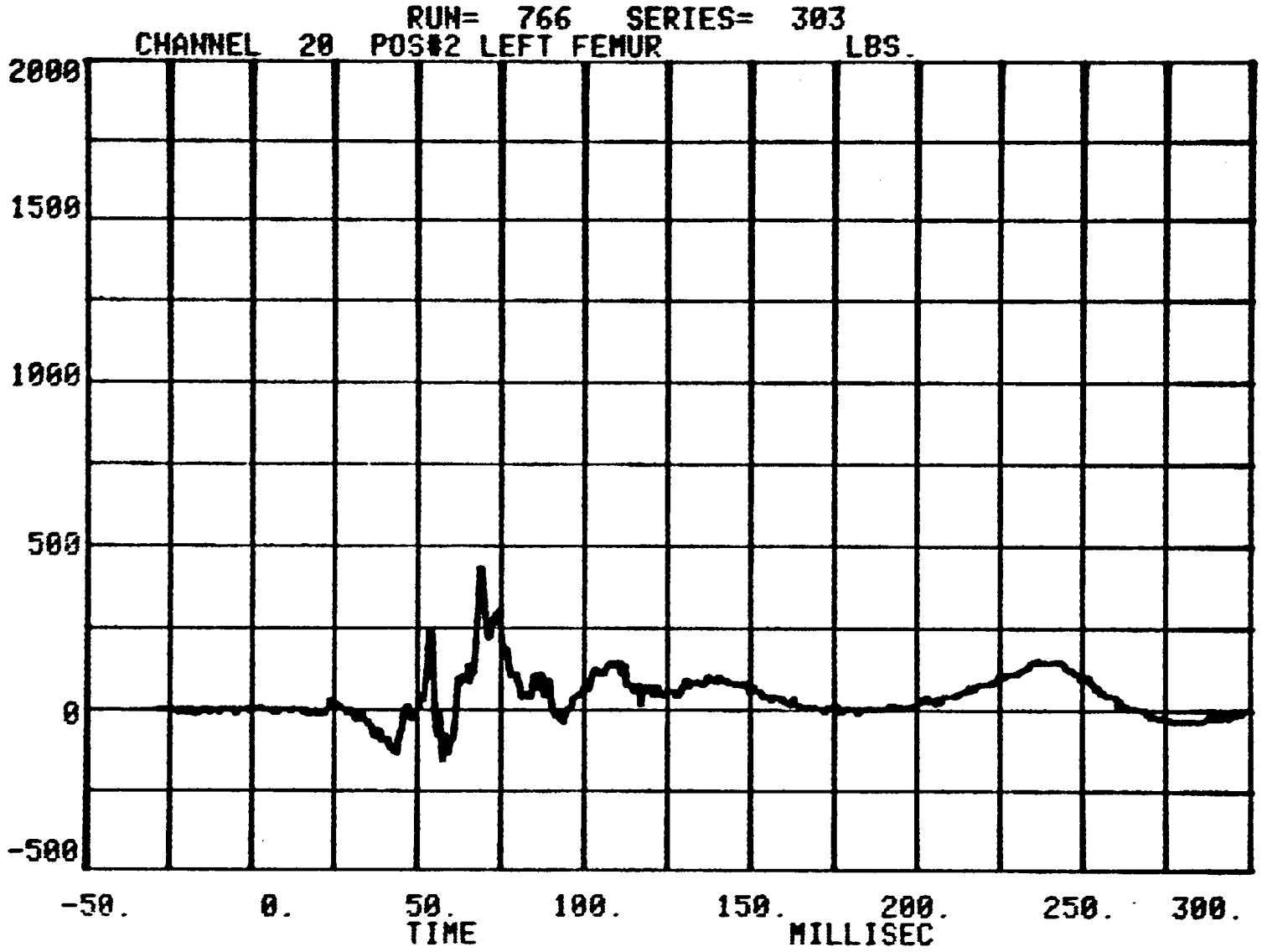

CHANNEL 18 POS#2 CHEST Z
RUN= 766 SERIES= 303
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

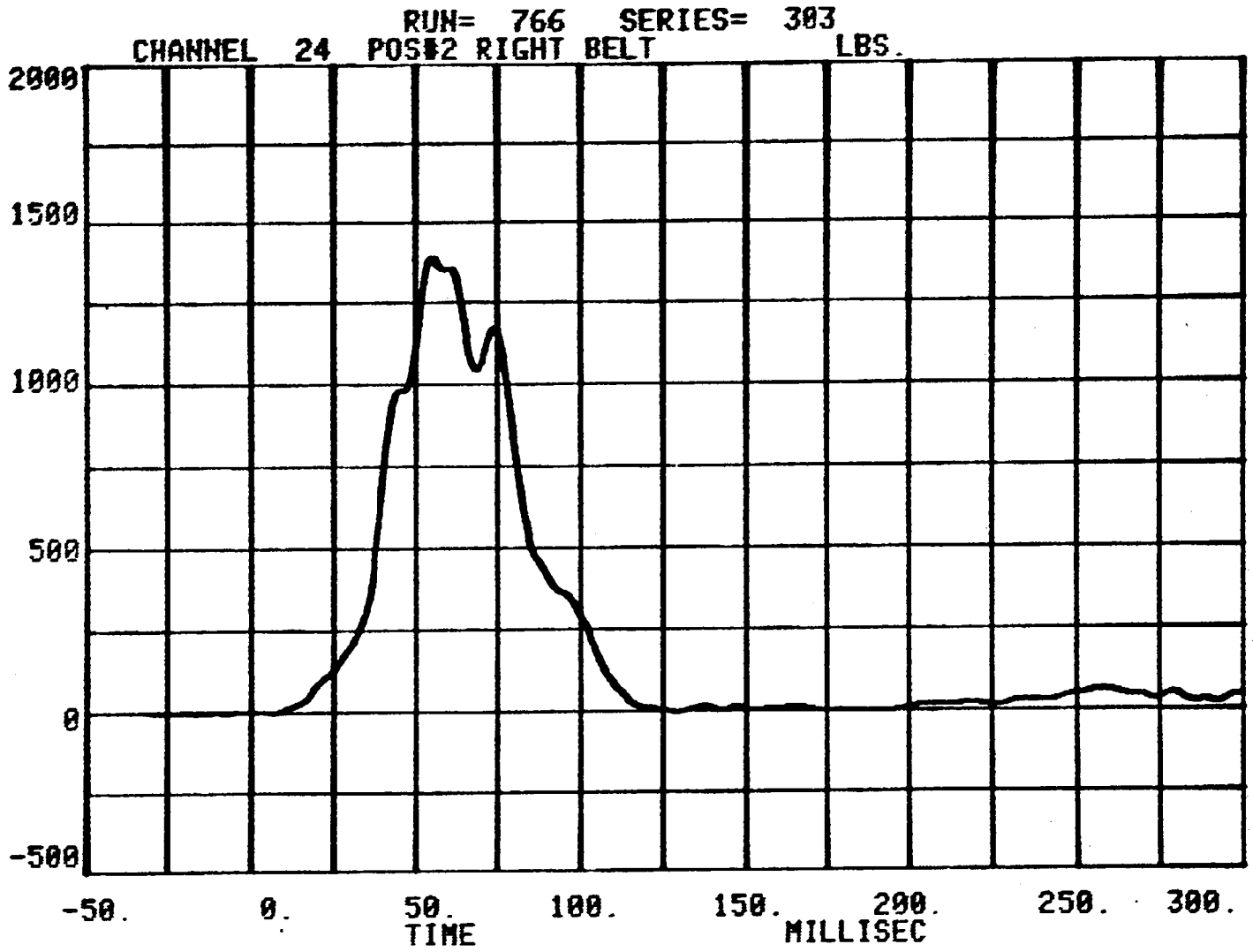

CHANNEL 4 POS#2 CHEST R
RUN= 766 SERIES= 303
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4

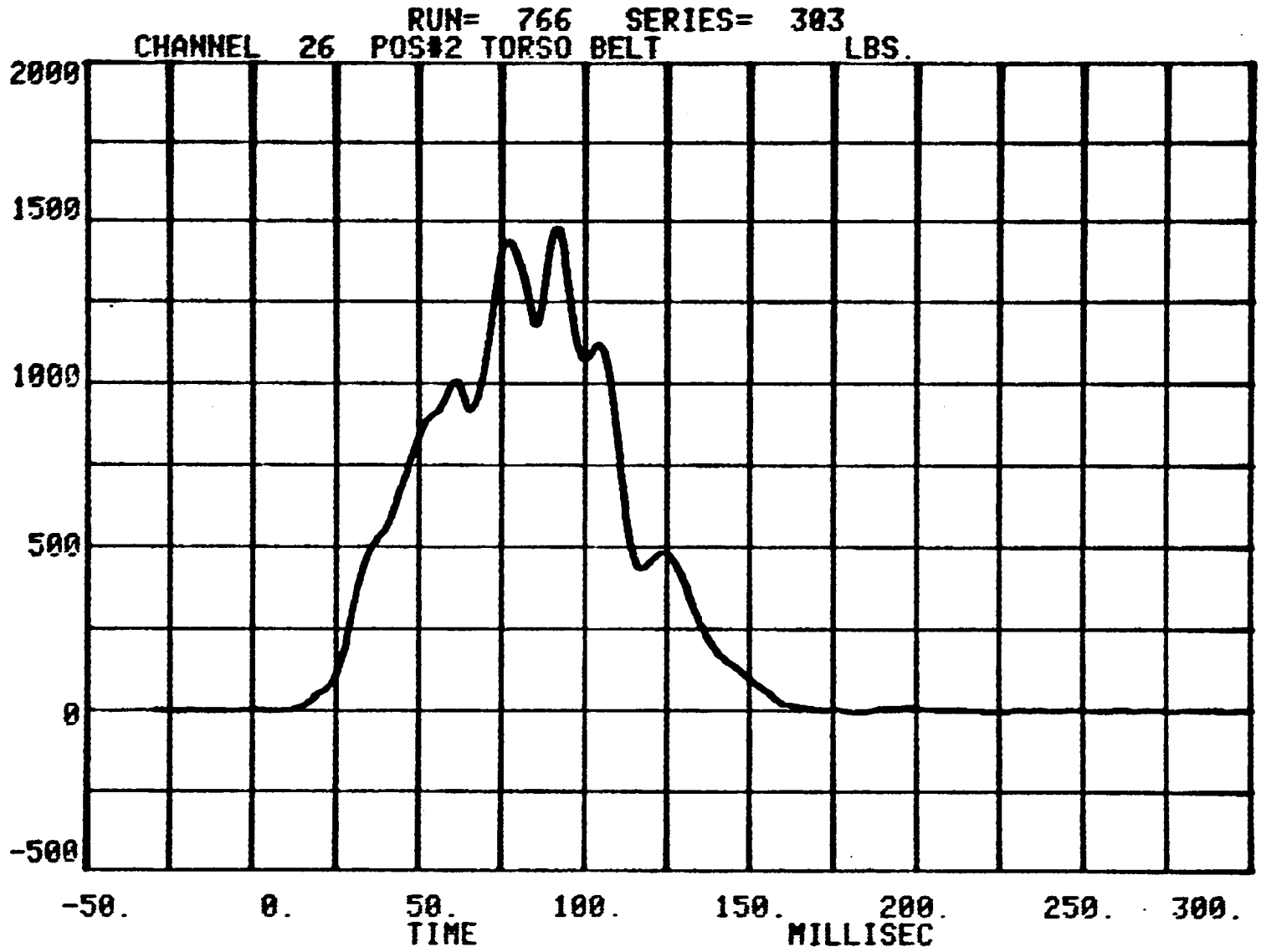

RUN= 766 SERIES= 303
CHANNEL 19 POS#2 RIGHT FEMUR
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

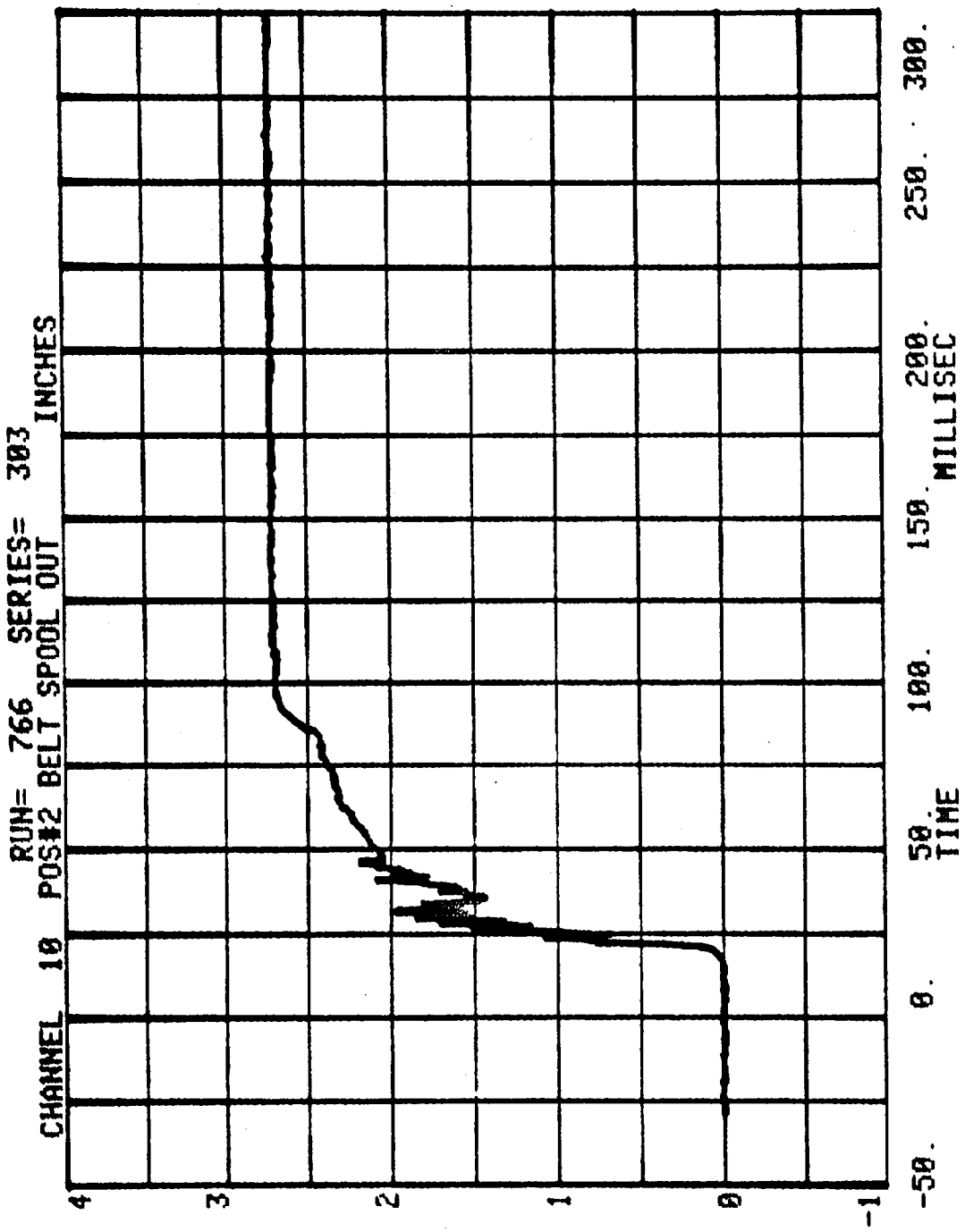
7556-4


RUN= 766 SERIES= 303
CHANNEL 20 POS#2 LEFT FEMUR LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

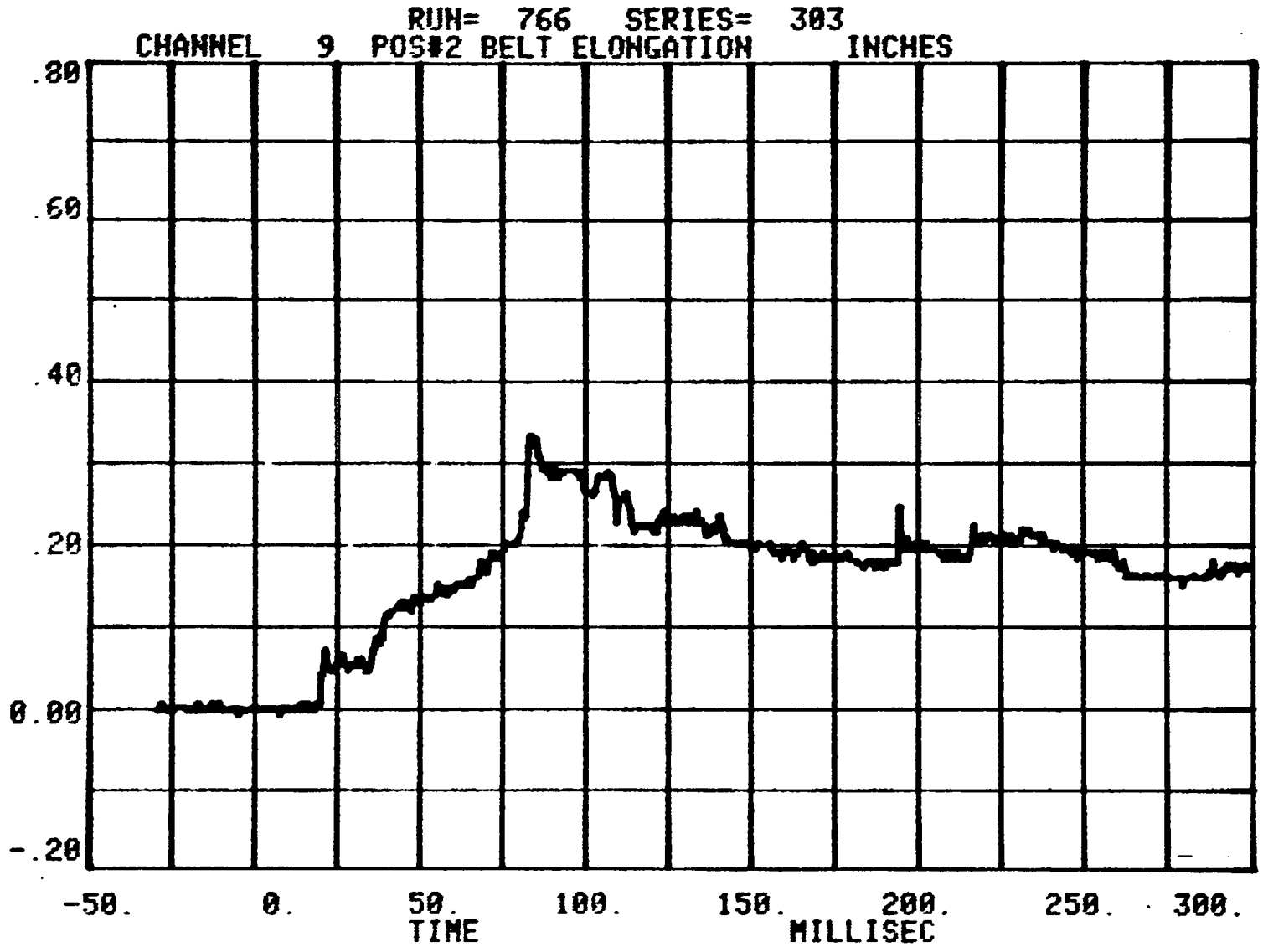

RUN= 766 SERIES= 303
CHANNEL 24 POS#2 RIGHT BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


RUN= 766 SERIES= 303
CHANNEL 26 POS#2 TORSO BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 10 POS#2 BELT SPOOL OUT
RUN= 766 SERIES= 303
INCHES
4
3
2
1
0
-1
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7556-4


RUN= 766 SERIES= 303
CHANNEL 9 POS#2 BELT ELONGATION INCHES
.80
.60
.40
.20
0.00
-.20
-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
1019	3/18/87
1020	2/24/87

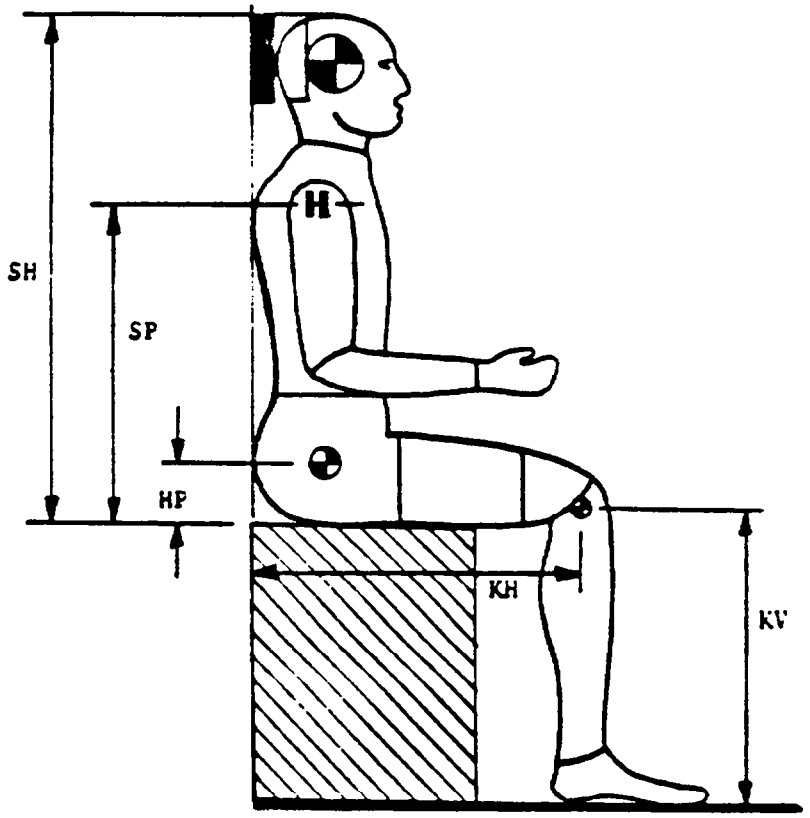
Electronic Test Equipment

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.: 1019

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		3/18/87	
VERIFICATION NUMBER FOR DUMMY*		2	
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"	19.6"	
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.: 1019

TECHNICIAN'S NAME: D. W. Hess

			PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------			3/18/87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*------			2	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			70-73 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			24-42 %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-		210 to 260G	260 g	
b. Peak Lateral Accel.- -		≤ - 10G	4 g	
c. Time above 100G- - - -		0.9 to 1.5ms	1.09 ms	
2. NECK BENDING TEST--				
a. Pendulum Speed - - - -		21.5 to 25.5 fps	22.9 fps	
b. Pend. Avg. Decel. over $t_3 - t_2$		20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - - -		26G max.	24 g	
d. Pendulum Decel. (t_2-t_1)		≤ - 3ms	2.2 ms	
e. Pendulum Decel. (t_3-t_2)		25 to 30 ms	25.5 ms	
f. Pendulum Decel. (t_4-t_3)		≤ - 10ms	2 ms	
g. Max. Head Rotation - -		63 to 73°	72°	
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	27 ms	
	Displ.-	2.1 to 3.1"	2.9"	
60°	Time- -	40.3 to 51.7ms	41.5 ms	
	Displ.-	4.3 to 5.3"	4.9"	
Maximum (72°)	Time- -	53.2 to 66.8ms	57 ms	
	Displ.-	5.0 to 6.0"	5.7"	

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

INSTRUMENT CALIBRATION INFORMATION

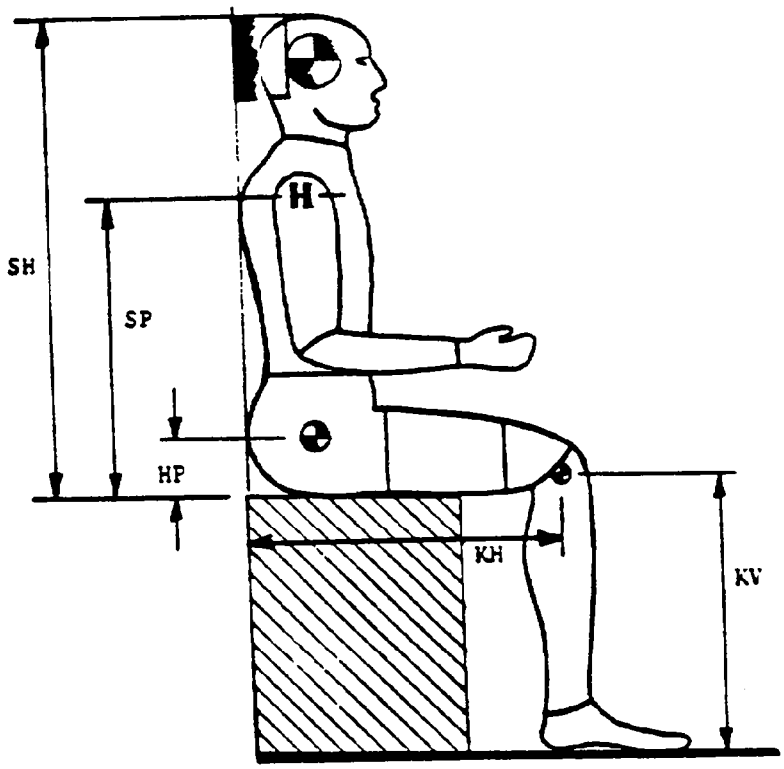
NHTSA DUMMY ID NO. 1019 CALIB. SEQ. NOS. FOR DUMMY: 2 & _____

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS:				
1. Head Accelerometers --				
a. Triaxial unit - - - - -	NA	------	------	------
b. Uniaxial units				
(1) Longitudinal (A_x) -	Endevco	CL60	2-87	8-87
(2) Lateral (A_y) - - -	"	CG34	2-87	8-87
(3) Vertical (A_z) - - -	"	CN24	2-87	8-87
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	------	------	------
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A129	2-87	8-87
(2) Lateral (A_y) - - -	Endevco	CN64	2-87	8-87
(3) Vertical (A_z) - - -	CEC	A56	2-87	8-87
3. Chest Potentiometer - - -	NA	------	------	------
4. Femur Load Cells --				
a. Right Side - - - - - -	GSE	311	2-87	8-87
b. Left Side - - - - - -	GSE	312	2-87	8-87
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - - -	CED	18259	2-87	8-87
2. Test Probe Accelerometer - - -	CED	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.: 1020

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		2-24-87	
VERIFICATION NUMBER FOR DUMMY*		1	
SH - Seated Height- - - - - - - -	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height- - - -	21.8 to 22.4"	22.1"	
HP - Hip Pivot Height - - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.4"	
KV - Knee Pivot from floor- - - -	19.3 to 19.9"	19.6"	
SW - Shoulder Width - - - - - - -	17.8 to 18.4"	18.1"	
HW - Hip Width- - - - - - - - - -	14.0 to 15.4"	14.6"	

TECHNICIAN'S NAME: D. W. Hess

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

DUMMY CONFIG. 6 PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA (Continued) NHTSA DUMMY I.D. NO.: 1019

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	74.5 ms	
	Displ.	4.3 to 5.3 in.	4.6"	
30°	Time	85.4 to 104.6 ms	91 ms	
	Displ.	2.1 to 3.1 in.	2.1"	
0°	Time	101.0 to 123.0 ms	106 ms	
	Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5"		23 to 36 lbs.	28.5 lbs.	
b. Force @ .75"		36 to 50 lbs.	41.5 lbs.	
c. Force @ 1.0"		50 to 63 lbs.	58.5 lbs.	
d. Force @ 1.3"		73 to 88 lbs.	83.5 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20°		22 to 34 lbs.	26 lbs.	
b. Force @ 30°		34 to 46 lbs.	36.5 lbs.	
c. Force @ 40°		46 to 58 lbs.	47.5 lbs.	
d. Return Angle		12° maximum	8°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed		21.78-22.22 fps	21.89 fps	
(2) Peak Deflection		1.7" maximum	1.59"	
(3) Peak Resistive Force		2250 lbs. maximum	2028 lbs.	
(4) Internal Hysteresis		50 to 70%	55.3%	
b. Low Speed				
(1) Probe Speed		13.86-14.14 fps	13.94 fps	
(2) Peak Deflection		1.1" maximum	1.01"	
(3) Peak Resistive Force		1450 lbs. maximum	1170 lbs.	
(4) Internal Hyster.		50 to 70%	51.6%	

II. PERFORMANCE VERIFICATION DATA (Continued) NHTSA DUMMY I.D. NO.: 1019

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	7.04 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2200 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.7 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.92 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1950 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.92 ms.	

REMARKS:

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

II. PERFORMANCE VERIFICATION DATA: — NHTSA DUMMY I.D. NO.: 1020

TECHNICIAN'S NAME: D. W. Hess

			PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------			2-24-87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*------			1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			66-72 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			22-28 %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-		210 to 260G	258 g	
b. Peak Lateral Accel.- -		≤ - 10G	6 g	
c. Time above 100G- - - -		0.9 to 1.5ms	1.04 ms	
2. NECK BENDING TEST--				
a. Pendulum Speed - - - -		21.5 to 25.5 fps	23.0 fps	
b. Pend. Avg. Decel. over $t_3 - t_2$		20 to 24G	24 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	28 ms	
f. Pendulum Decel. (t_4-t_3)		≤ - 10ms	9 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	29 ms	
	Displ.-	2.1 to 3.1"	2.5"	
60°	Time- -	40.3 to 51.7ms	44.5 ms	
	Displ.-	4.3 to 5.3"	5.3"	
Maximum (71 °)	Time- -	53.2 to 66.8ms	60 ms	
	Displ.-	5.0 to 6.0"	5.9"	

*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.: 1020

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	75 ms	
	Displ.	4.3 to 5.3 in.	4.9"	
30°	Time	85.4 to 104.6 ms	91.5 ms	
	Displ.	2.1 to 3.1 in.	2.1"	
0°	Time	101.0 to 123.0 ms	106 ms	
	Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5" - - - - -		23 to 36 lbs.	24.5 lbs.	
b. Force @ .75" - - - - -		36 to 50 lbs.	38 lbs.	
c. Force @ 1.0" - - - - -		50 to 63 lbs.	52.5 lbs.	
d. Force @ 1.5" - - - - -		73 to 88 lbs.	77.5 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	28.5 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	40.5 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	53.5 lbs.	
d. Return Angle - - - - -		12° maximum	7°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - -		21.78-22.22 fps	21.85 fps	
(2) Peak Deflection-		1.7" maximum	1.58"	
(3) Peak Resistive Force- - - - - -		2250 lbs. maximum	2080 lbs.	
(4) Internal Hysteresis - - -		50 to 70%	52.4%	
b. Low Speed				
(1) Probe Speed- - -		13.86-14.14 fps	14.10 fps	
(2) Peak Deflection-		1.1" maximum	.96"	
(3) Peak Resistive Force- - - - - -		1450 lbs. maximum	1274 lbs.	
(4) Internal Hyster.		50 to 70%	60.9%	

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

II. PERFORMANCE VERIFICATION DATA (Continued) NHTSA DUMMY I.D. NO.: 1020

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	6.97 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1900 lbs.	
(3) Time Above 1000#-	1.7 ms minimum	2.08 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.01 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2400 lbs.	
(3) Time Above 1000#-	1.7 ms minimum	1.76 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1020 CALIB. SEQ. NOS. FOR DUMMY: 1 & _____

	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	CS70	2-87	8-87
(2) Lateral (A_y) - - -	"	CH35	2-87	8-87
(3) Vertical (A_z) - - -	"	CU88	2-87	8-87
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	------	------	------
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A84	2-87	8-87
(2) Lateral (A_y) - - -	Endevco	CY71	2-87	8-87
(3) Vertical (A_z) - - -	CEC	A86	2-87	8-87
3. Chest Potentiometer - - -	NA	------	------	------
4. Femur Load Cells --				
a. Right Side - - - - - -	GSE	551	2-87	8-87
b. Left Side - - - - - -	GSE	552	2-87	8-87
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - - -	CED	18259	2-87	8-87
2. Test Probe Accelerometer - - -	CED	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