REPORT NUMBER: CAL-90-N22

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

FUJI HEAVY INDUSTRIES, LTD.
1990 SUBARU LEGACY
4-DOOR SEDAN

NHTSA NUMBER: ML5502

CALSPAN TEST NUMBER: 7776-22

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

May 24, 1990

FINAL REPORT

PREPARED FOR:

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

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15. Supplementary Notes

16. Abstract

A frontal load cell barrier test of a 1990 Subaru Legacy 4-Door Sedan was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on May 24, 1990.

The impact speed was 35.1 mph and the ambient temperature at the barrier face at the time of impact was 72°F. The maximum post-test vehicle crush was 21.4 inches. The test vehicle was equipped with a manual lap belt and an automatic shoulder belt at each of the front outboard seating positions.

With regard to FMVSS 208-"Occupant Crash Protection," injury criteria, the driver dummy appears to exceed the maximum head injury criteria.

17. Key Words	18. Distribution Statement
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Section I

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 90 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-87-D-02012. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph requirements.

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

Section 2

SUMMARY OF TEST NUMBER ML5502

A load cell barrier consisting of 36 load cells was impacted by a 1990 Subaru Legacy 4-Door Sedan at a velocity of 35.1 mph. The test was performed at the Calspan Corporation Advanced Technology Center on May 24, 1990. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 13 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

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

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 320) and the right-front passenger ATD (Serial No. 1019) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 65 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. Load cell C4 did not record accurately. This load cell was not used in the load cell sum calculations.

The driver's head struck the steering wheel rim and hub; the HIC was 1007.0. The maximum chest deceleration over 3 milliseconds was 51.5 g's and femur loads were 1956.9 and 1899.5 pounds.

The right front passenger's HIC was 675.5 and maximum chest deceleration over 3 milliseconds was 43.7 g's. Femur loads were 841.7 and 1121.5 pounds.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1990 Subaru Legacy 4-Door Sedan

NHTSA No.: ML5502 VIN.: JF1BC6220 LB618998

Body Color: Blue Date Of Manufacture: June 1989

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: X Front Wheel; – Rear Wheel; – Four Wheel

Date Received: 4-23-90 Odometer Reading: 178 miles

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

Type of Occupant Restraint: Manual Lap Belt, Automatic Shoulder Belt

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 30 psi, Rear 29 psi

Recommended Tire Size: P175/70R14

Recommended Cold Tire Pressure: Front 30 psi, Rear 29 psi

Tires on Vehicle: P175/70R14 ; Manufacturer: Yokohama

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

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

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

Vehicle Capacity Weight (VCW) = 810 lbs. (A)

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

Rated Cargo and Luggage
Weight (RCLW) A-B = 60 lbs.

GVWR 3930 lbs. GAWR: Front 2065 lbs. Rear 1865 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 = 740 lbs. Right Rear = 590 lbs.

Left Front = 780 lbs. Left Rear = 530 lbs.

TOTAL FRONT WEIGHT = 1520 lbs. (58 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1120 lbs. (42 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 2640 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2640 lbs.)

VCW = Vehicle Capacity Weight (810 lbs.)

DSC = Designated Seating Capacity (5)

RCLW = VCW - 150 (DSC) = 60 lbs.

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

Target Test Weight = 3028 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 112 POUNDS CARGO:

Right Front = 820 lbs. Right Rear = 715 lbs.

Left Front = 880 lbs. Left Rear = 665 lbs.

TOTAL FRONT WEIGHT = 1700 lbs. (55 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1380 lbs. (45 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3080 lbs.

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

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 26.4 LF 26.5 RR 25.2 LR 25.1

Test Attitude: RF 26.2 LF 26.3 RR 23.9 LR 24.1

Wheel Base: 101.7 in.; C.G. = 47.8 in. rearward of front wheel C/L

Remarks: 14.8 gallons of stoddard solution were placed in the fuel tank.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°

Date of Test: May 24, 1990 Time of Test: 12:30

Ambient Temperature: 72 °F at impact area

Temperature in Occupant Compartment: 72 °F

Windshield Molding Temperature: 72 °F

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 35.1 mph, secondary = 35.1 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	174.7	C_L	177.6	L 174.8
	Post-test	= R	153.5	C_L	156.2	L 155.5
	Crush	= R	21.2	C_L	21.4	L 19.3

Distance from front of test vehicle to point of impact:

R 17.5" C_L 16.8" L 17.0"

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Upper Steering Rim and Steering Hub	No Contact
Chest	No Contact	No Contact
Abdomen	Lower Steering Rim	No Contact
Left Knee	Dash Panel	Dash Panel
Right Knee	Dash Panel	Dash Panel

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

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

Glazing Damage

Backlight/Windshield: Windshield sustained cracks, but remained intact.

Section 3

OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

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

II. OVR DATA

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

Table 2

DUMMY INJURY CRITERIA VALUES

NHTSA No.: ML5502 Vehicle: 1990 Subaru Legacy 4-Door Sedan

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-87.8	-13.7	52.4	95.5
Position #2 - Passenger	-22.1	22.4	64.1	68.5

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	- 52.2	-24.0	52.0	51.5
Position #2 - Passenger	-44.1	35.7	26.7	43.7

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

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	1956.9	1899.5
Position #2 - Passenger	841.7	1121.5

	MAXIMUM FORCE - SEAT BELT LOADS (lbs.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	2127.9	-	450.3
Position #2 - Passenger	2132.8	729.7	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t_1 (SEC)	t_2 (SEC)	Average Acceleration t_1 TO t_2
Position #1 - Driver	1007.0	.06607	.10020	61.4
Position #2 - Passenger	675.5	.06315	.09915	51.7

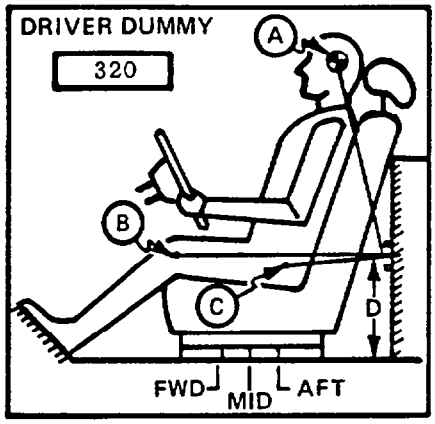
HIC is as defined in FMVSS 208. The maximum time interval from t_1 to t_2 is 36 milliseconds.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

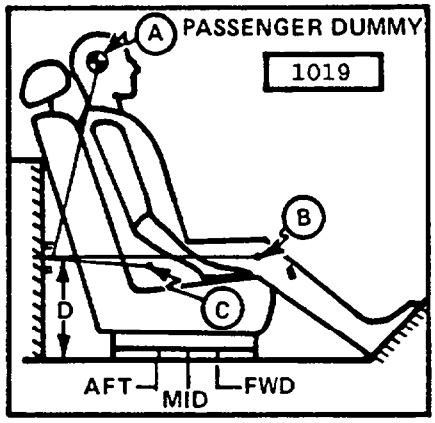
Test No.: ML5502 Vehicle: 1990 Subaru Legacy 4-Door Sedan

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

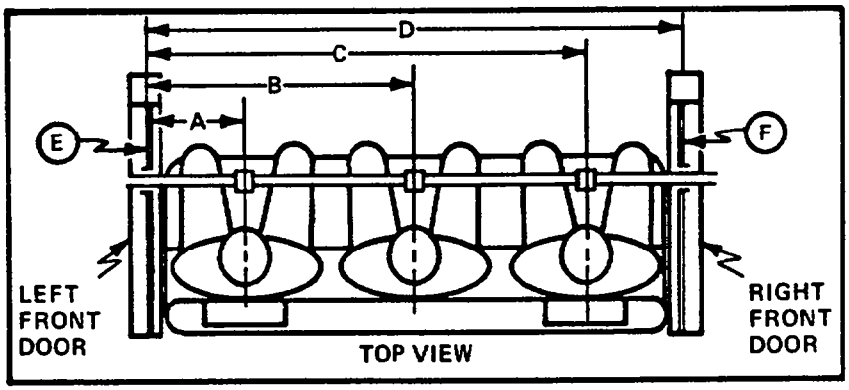


MEASUREMENT LOCATION

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



A =	22.3 in.	4 Degrees	A =	21.8 in.	3 Degrees
B =	20.0 in.	96 Degrees	B =	21.3 in.	93 Degrees
C =	5.8 in.	131 Degrees	C =	6.4 in.	131 Degrees
D =	13.7 in.		D =	13.7 in.	



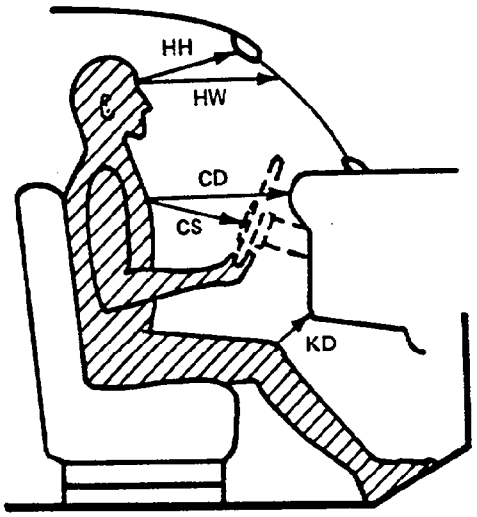
DUMMY ID

	320	1019
A = Left Door to Driver Centerline		11.3 in.
B = Left Door to Center Passenger Centerline		– in.
C = Left Door to Right Passenger Centerline		38.7 in.
D = Left Door to Right Door		50.3 in.
E,F = Window Glass Height (Right and Left Must Be Equal)		11.0 in.

Figure 2

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	15.4	15.4
HW	21.2	21.6
CD	22.0	23.5
CS	15.6	-
KDL	5.7	6.5
KDR	5.6	6.0
SA	See Note	See Note
TA	25°	25°



HH = Head to Windshield Header

HW = Head to Windshield

CD = Chest to Dash

CS = Chest to Steering Wheel

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

SA = Seat Back Angle

TA = Torso Angle

HA = Head Target to "A" Pillar

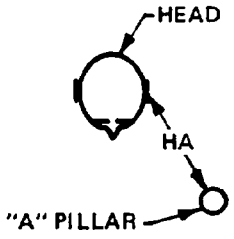
HR = Head to Side Roof

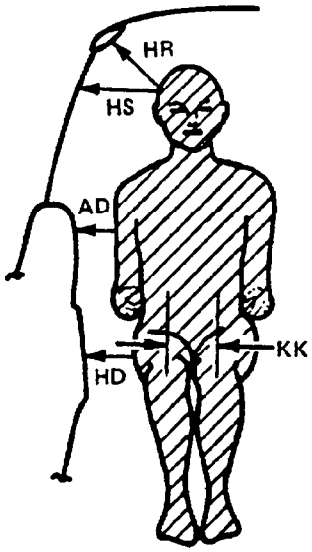
HS = Head to Side Window

AD = Arm to Door

HD = Hip to Door

KK = Knee to Knee



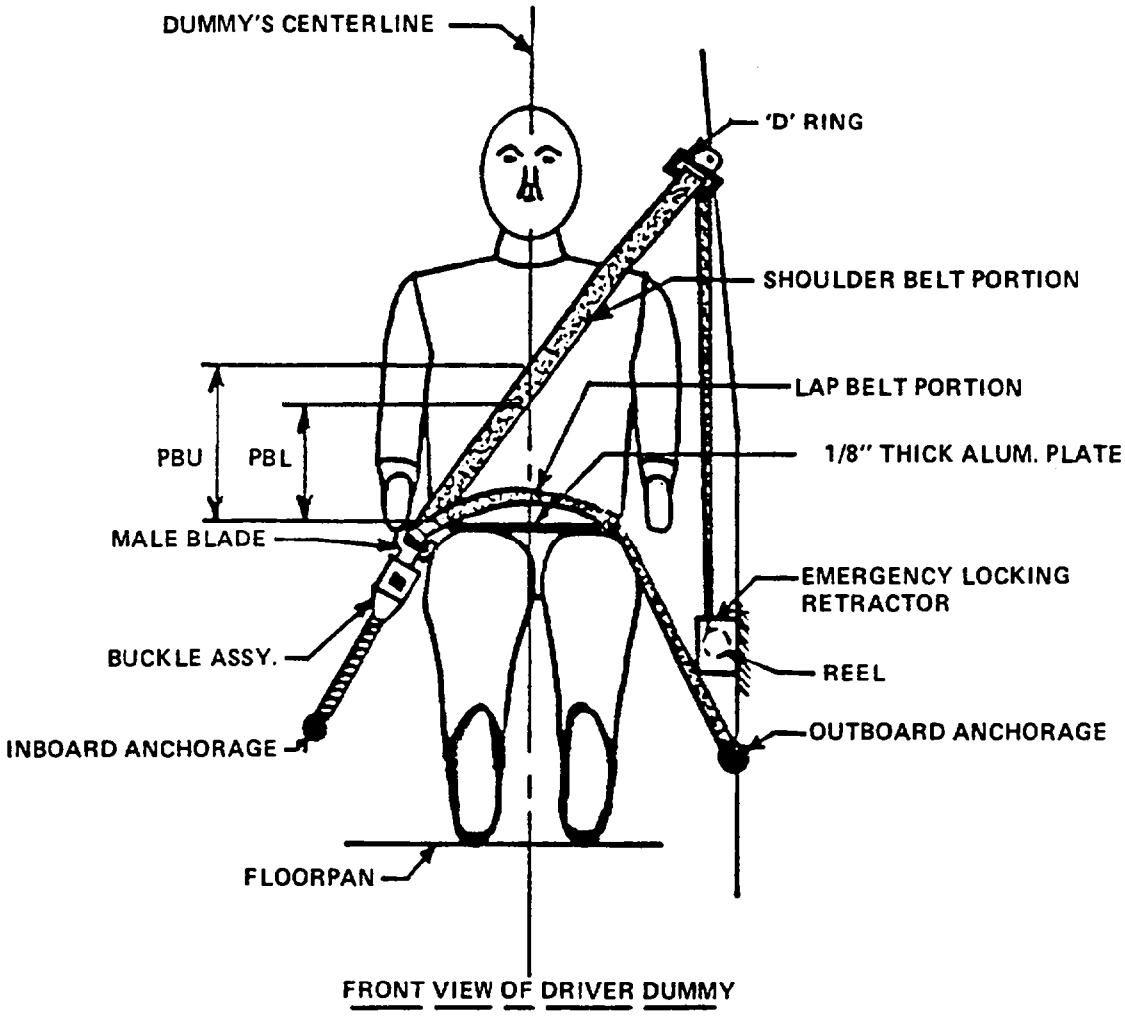


	DRIVER	PASSENGER
HR	4.4	4.2
HS	8.4	8.4
AD	4.5	4.5
HD	7.5	7.1
KK	9.0	7.1
HA	20.5	20.1

Note: Seat was positioned as recommended by manufacturer. Seat was placed in 4th detent rearward.

Figure 3

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	13.0	13.0
PBL -- Top surface of alum. plate to belt lower edge	10.0	10.0
LAP BELT TENSION	2 lbs.	2 lbs.
SHOULDER BELT TENSION	-	-

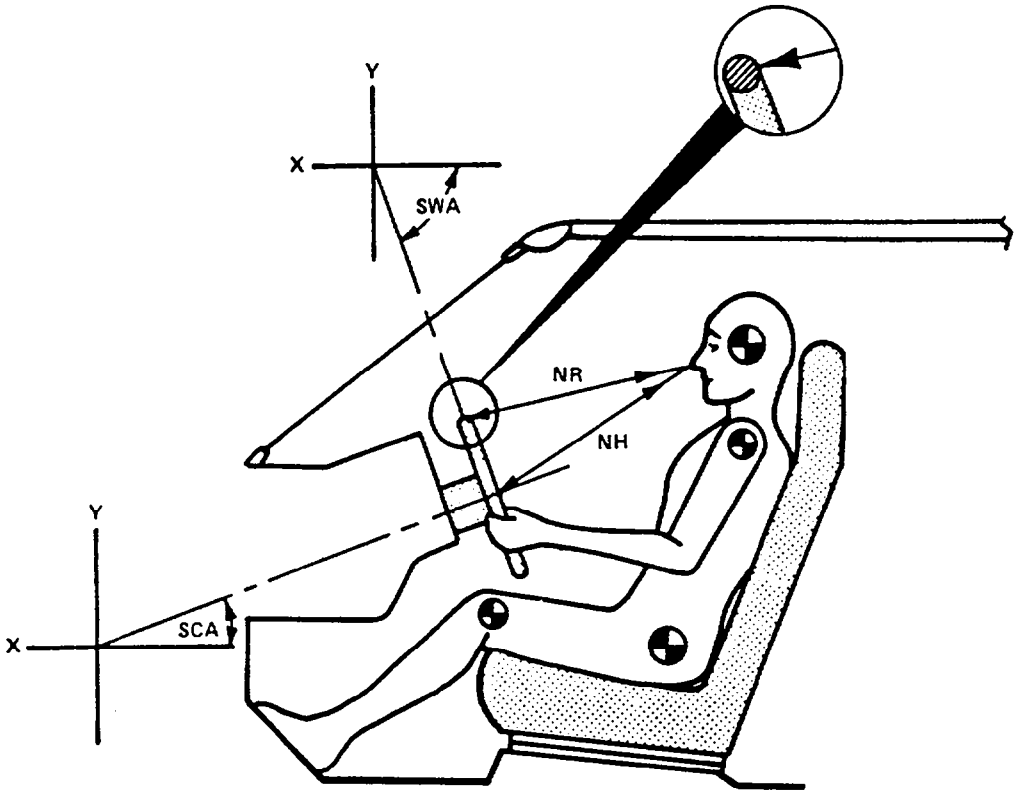
Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger
Shoulder belt length as measured on Part 572 Dummy.	36.0"	36.0"
Lap belt length as measured on Part 572 Dummy.	32.0"	32.0"
SHOULDER BELT SPOOL-OFF DATA:		
As determined mechanically.	2.0"	2.5"
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	1.8 in/ft	1.9 in/ft
Measured mechanically	1.0 in/ft	0.0 in/ft

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



LEFT SIDE VIEW

	MEASUREMENTS	
NR -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	20.0	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	21.3	Inches
SCA -- Angle of steering column relative to the horizontal X axis	22.0	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-68.0	Degrees

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

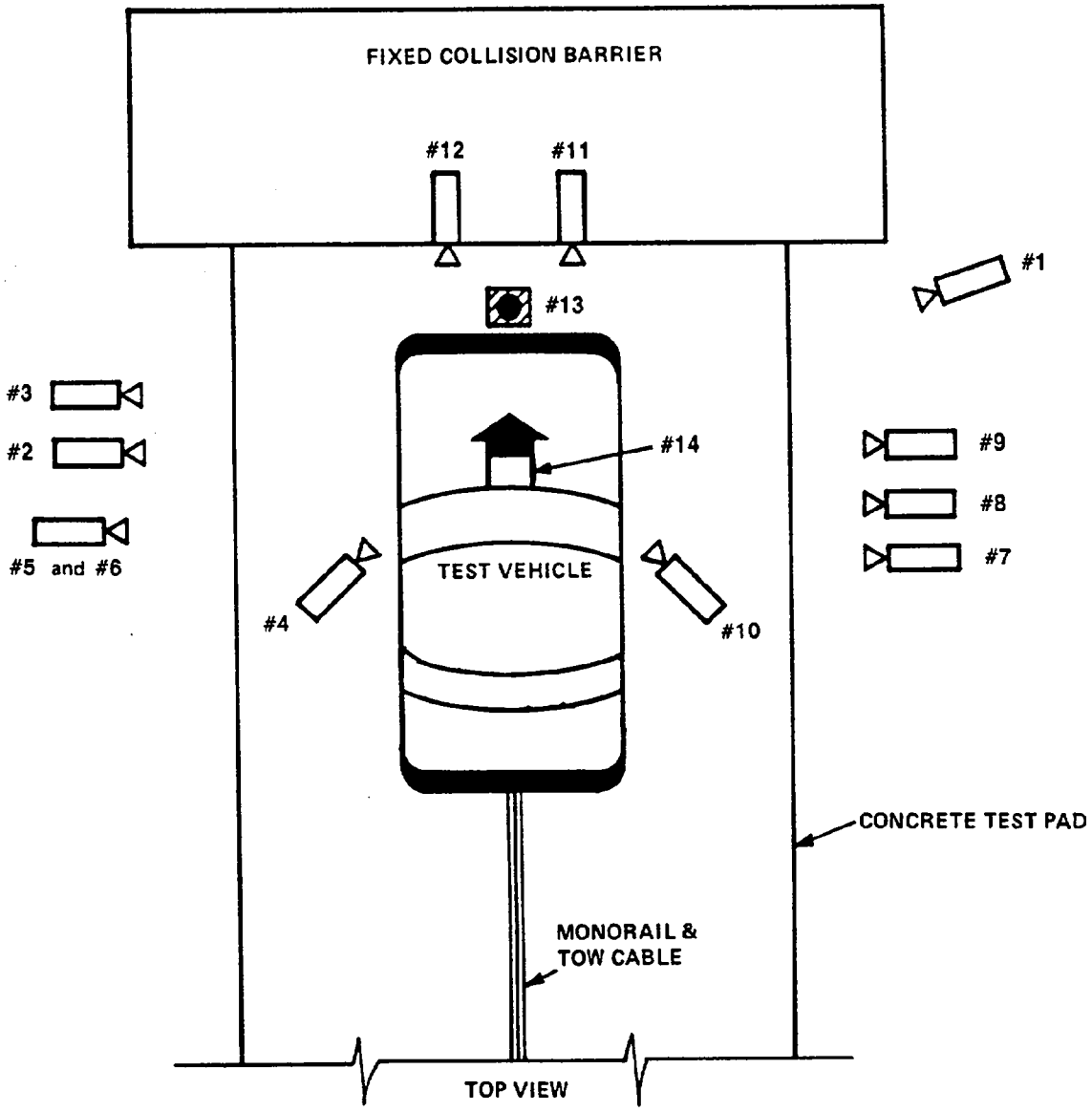


Table 4

HIGH-SPEED CAMERA LOCATIONS

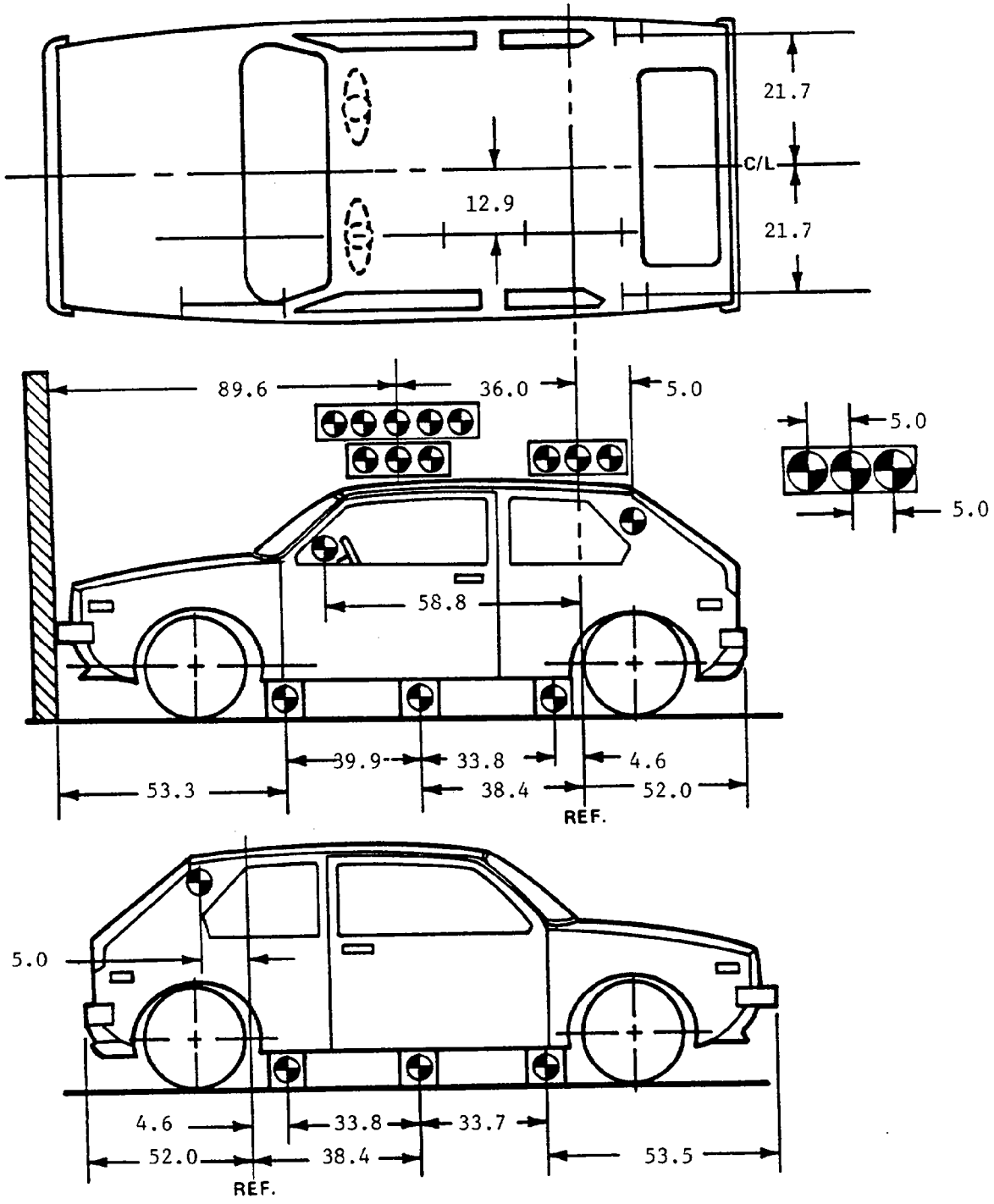
Test No. ML5502 Vehicle: 1990 Subaru Legacy 4-Door Sedan

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	226	60	41	-2	209	13	535
3	Left Side View	302	35	41	-3	285	25	535
4	Driver and Interior View	109	101	78	-21	82	13	615
5	Steering Column (Bottom)	289	77	46	-4	272	25	565
6	Steering Column (Top)	289	77	70	-10	272	25	560
7	Overall Right Side	234	36	42	-2	217	13	790
8	Right Side View	299	59	41	-3	282	25	745
9	Right Passenger View	297	55	58	-5	280	35	680
10	Passenger and Interior View	110	93	75	-21	93	25	650
11	Passenger Front View	24	-5	73	-39	–	13	535
12	Driver Front View	24	-5	73	-38	–	13	535
13	Windshield View	0	0	126	-45	–	13	500
14	Pit View of Engine	0	32	-120	90	–	13	800

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

Figure 6

VEHICLE TARGET LOCATIONS

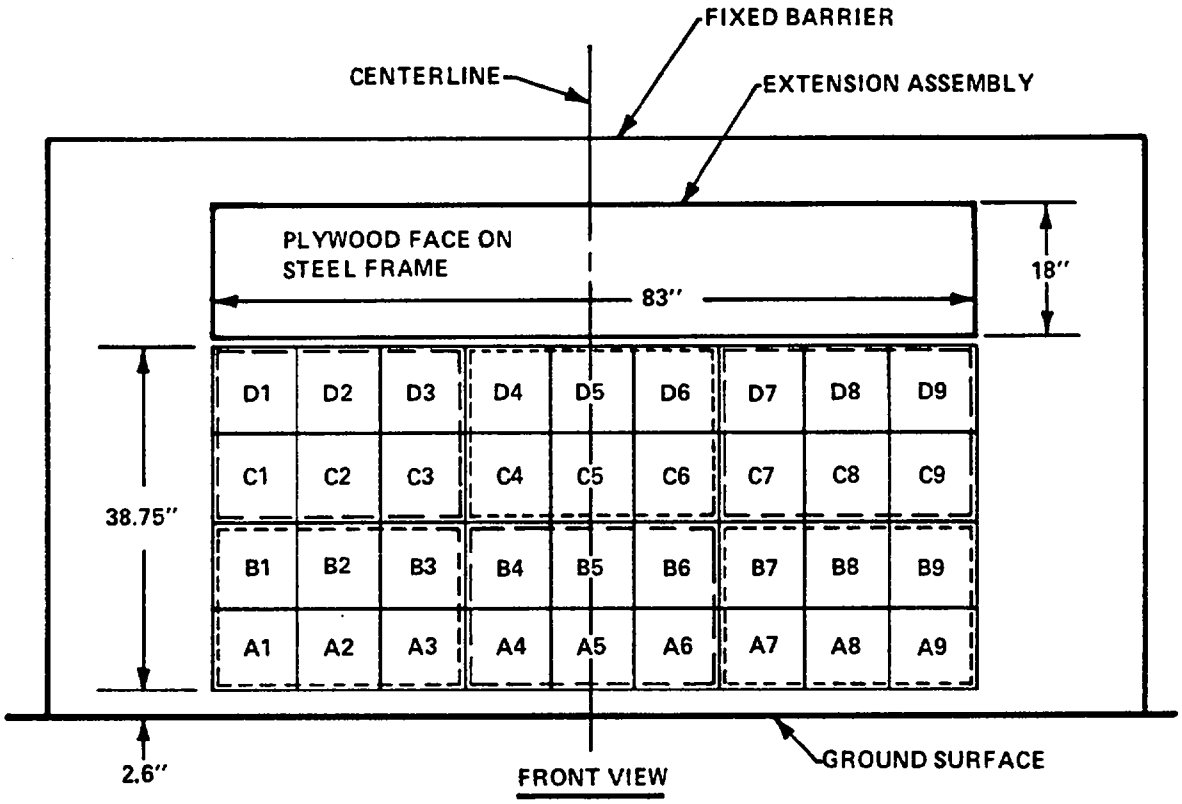


(DIMENSIONS IN INCHES)

Figure 7

LOAD CELL LOCATIONS ON FIXED BARRIER

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



6 GROUPS OF 6 LOAD CELLS EACH

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

The following data is presented in Appendix B:

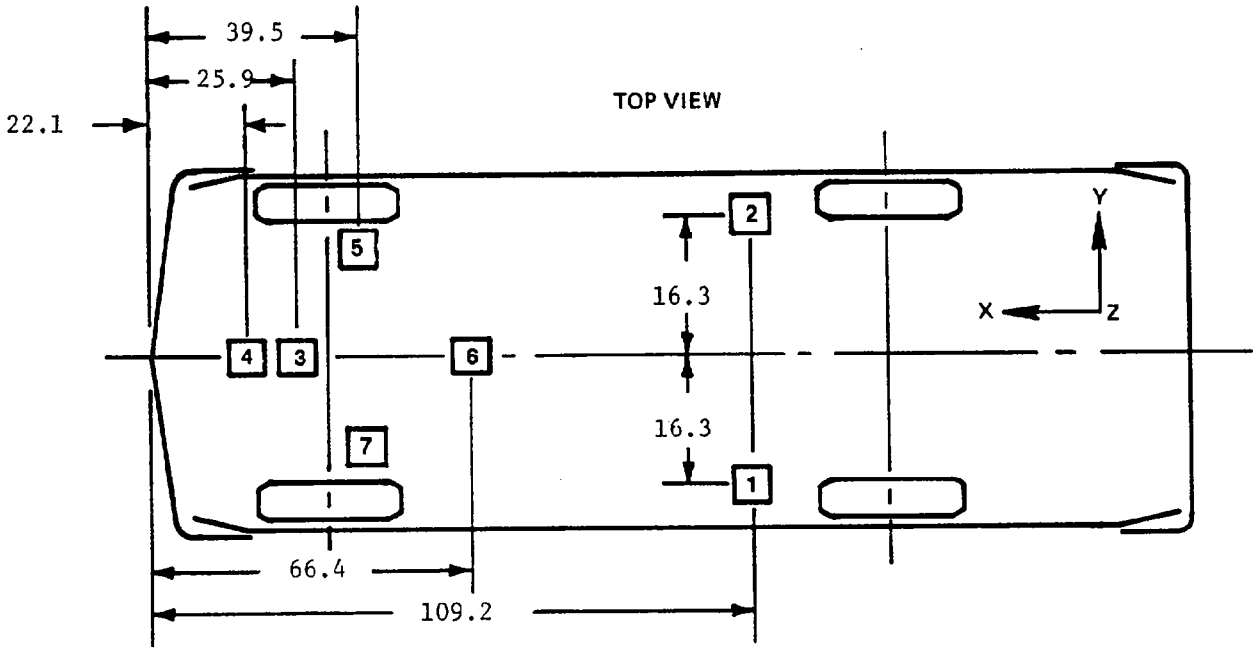
(1) Data from 36 individual load cells

(2) Total or Sum of 36 individual load cells

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

Figure 8

VEHICLE ACCELEROMETER LOCATIONS



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

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

Figure 9

TEST VEHICLE MEASUREMENTS

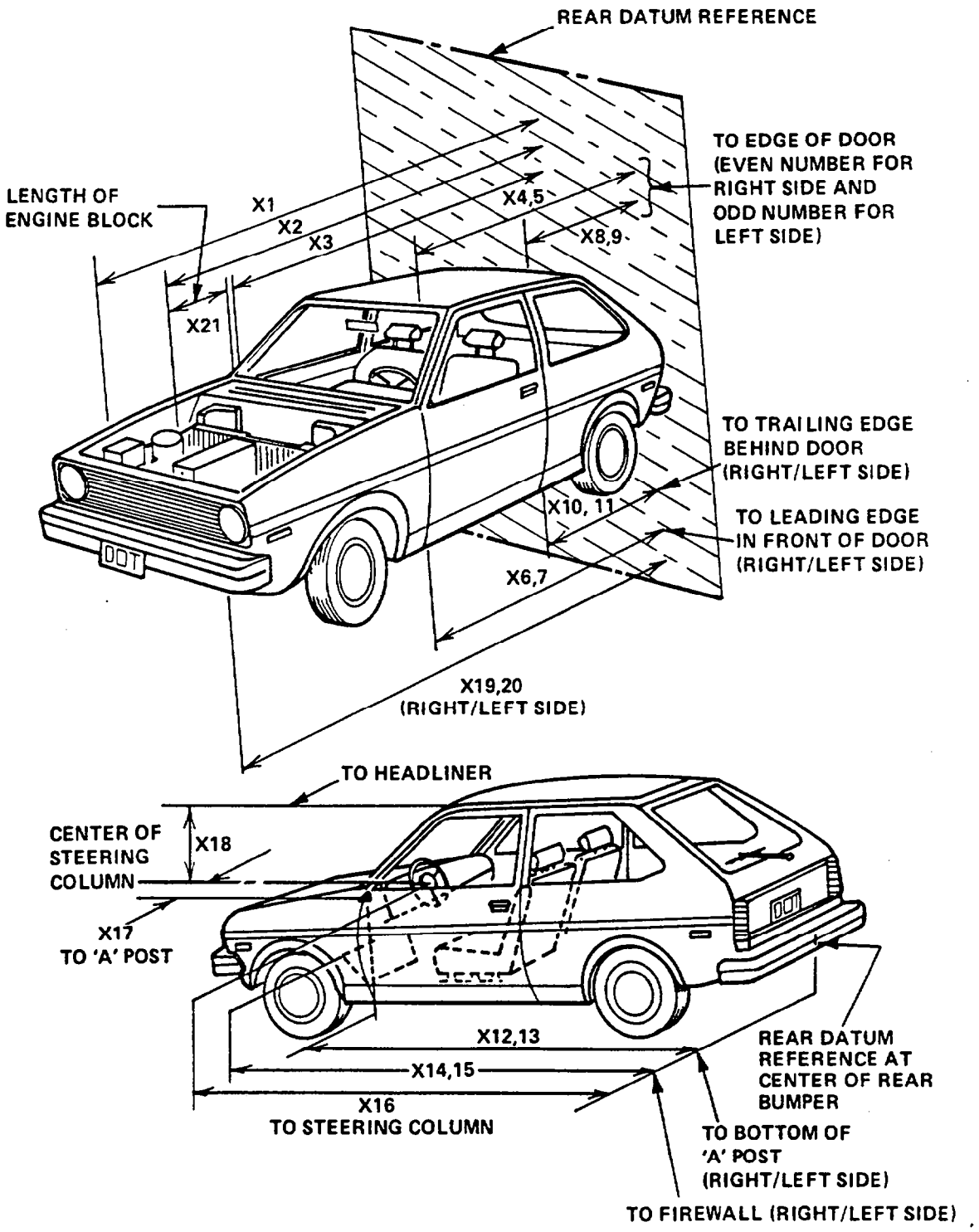


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	177.6	156.2	21.4
X2	Rear Surface of Vehicle to Front of Engine	159.5	147.1	12.4
X3	Rear Surface of Vehicle to Firewall	135.5	132.5	3.0
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	121.5	121.2	0.3
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	121.5	121.5	0.0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	122.4	121.7	0.7
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	122.0	121.6	0.4
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	83.0	82.3	0.7
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	82.4	82.2	0.2
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	82.5	81.9	0.6
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	82.2	81.8	0.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	122.0	121.8	0.2
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	121.6	121.8	-0.2
X14	Rear Surface of Vehicle to Firewall, Right Side	131.8	129.9	1.9
X15	Rear Surface of Vehicle to Firewall, Left Side	133.2	130.0	3.2
X16	Rear Surface of Vehicle to Steering Column	107.2	102.4	4.8
X17	Center of Steering Column to "A" Post	15.2	13.5	1.7
X18	Center of Steering Column to Headliner	17.9	19.2	-1.3
X19	Rear Surface of Vehicle to Right Side of Front Bumper	174.7	153.5	21.2
X20	Rear Surface of Vehicle to Left Side of Front Bumper	174.8	155.5	19.3
X21	Length of Engine Block	13.0	13.0	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	113.5	111.9	1.6
CD	Rear Surface of Vehicle to Center of Dash Panel	111.8	110.0	1.8
LD	Rear Surface of Vehicle to Left Side of Dash Panel	113.0	110.5	2.5

Appendix A

PHOTOGRAPHS

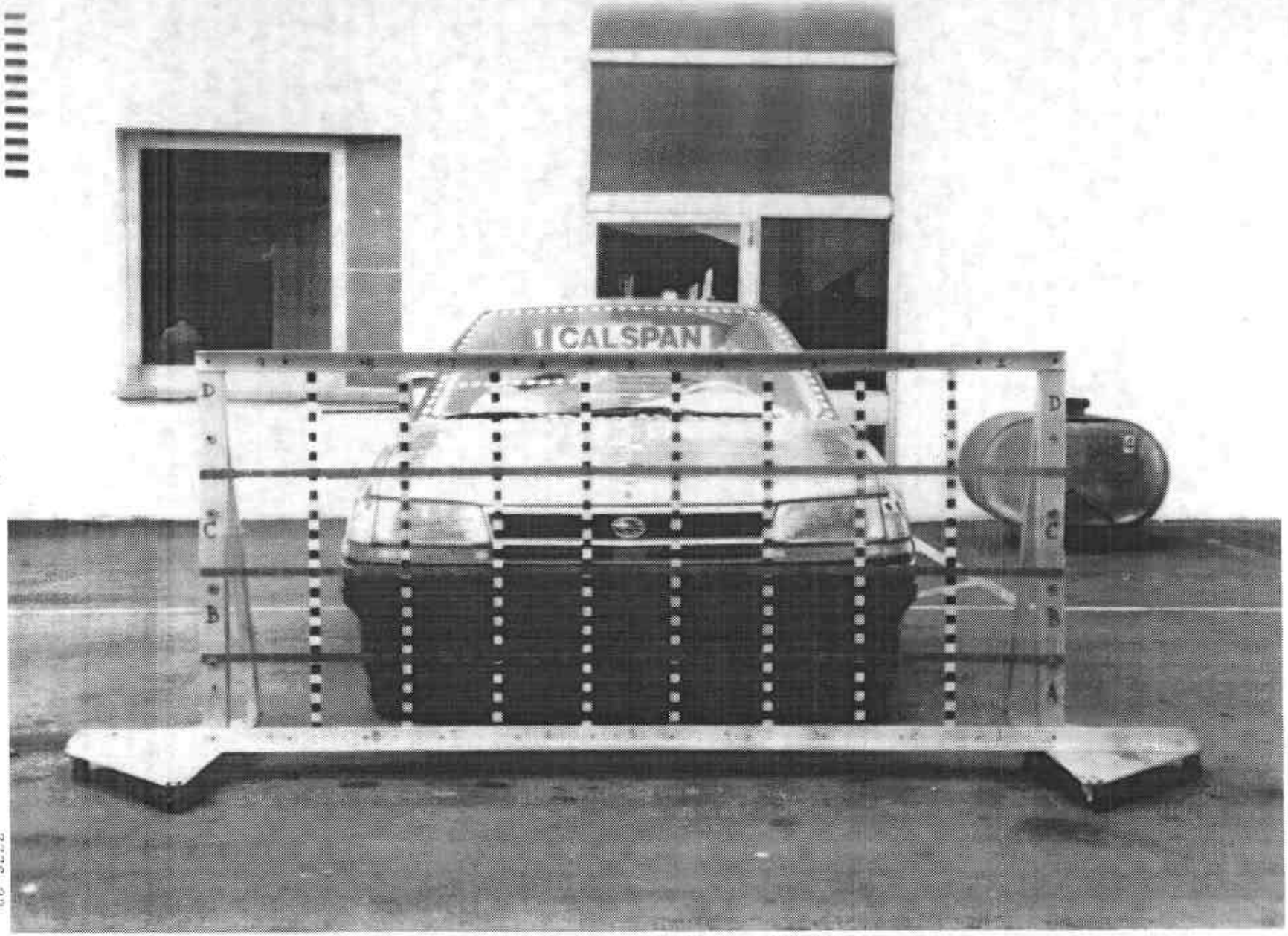


Figure A-1 LOAD CELL LOCATIONS

Figure A-2 PRE-TEST FRONT VIEW

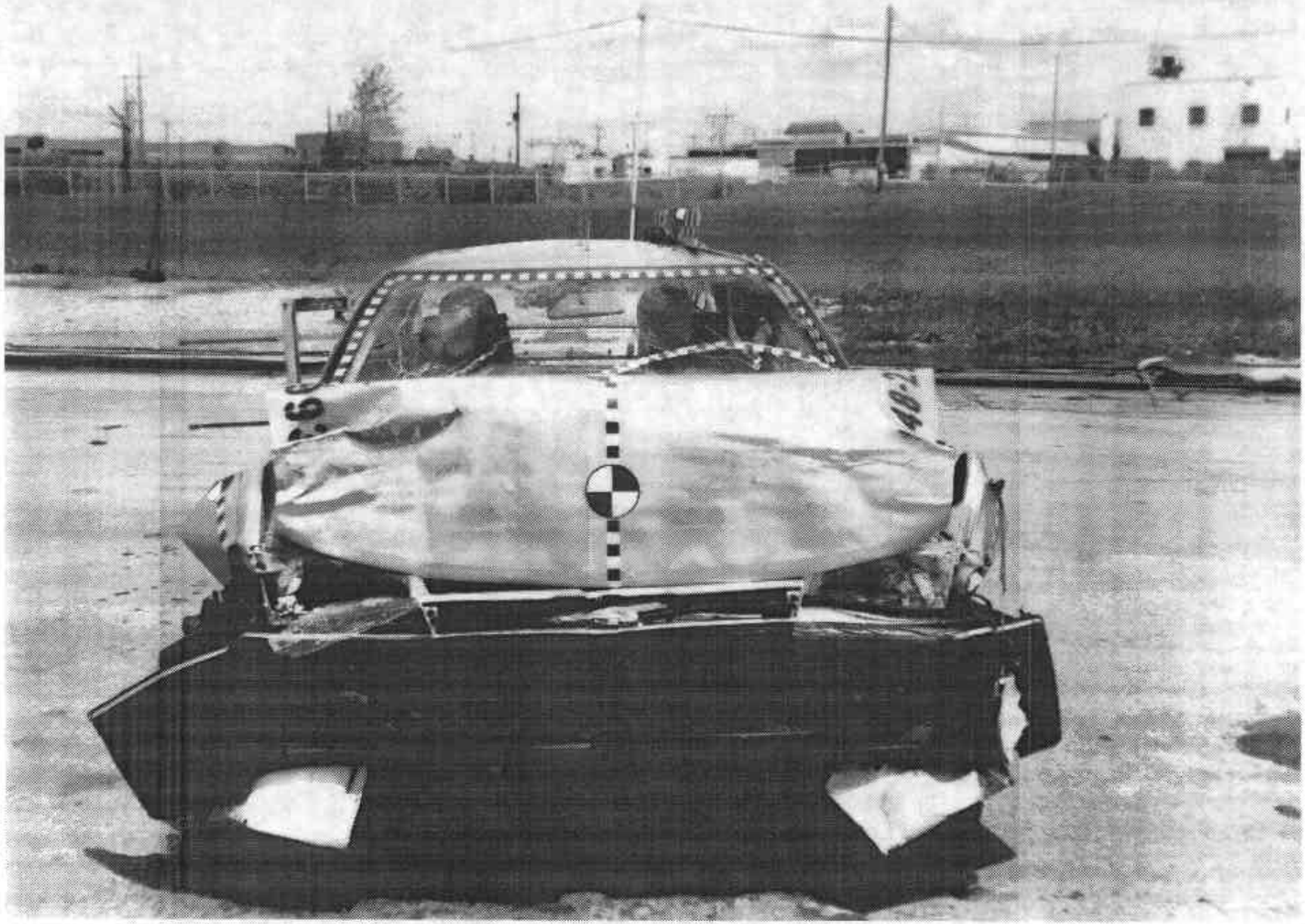


Figure A-3 POST TEST FRONT VIEW

Figure A-4 PRE-TEST LEFT SIDE VIEW

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Figure A-5 POST TEST LEFT SIDE VIEW

Figure A-6 PRE-TEST RIGHT SIDE VIEW

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7716-22

Figure A-7 POST-TEST RIGHT SIDE VIEW

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

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

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

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

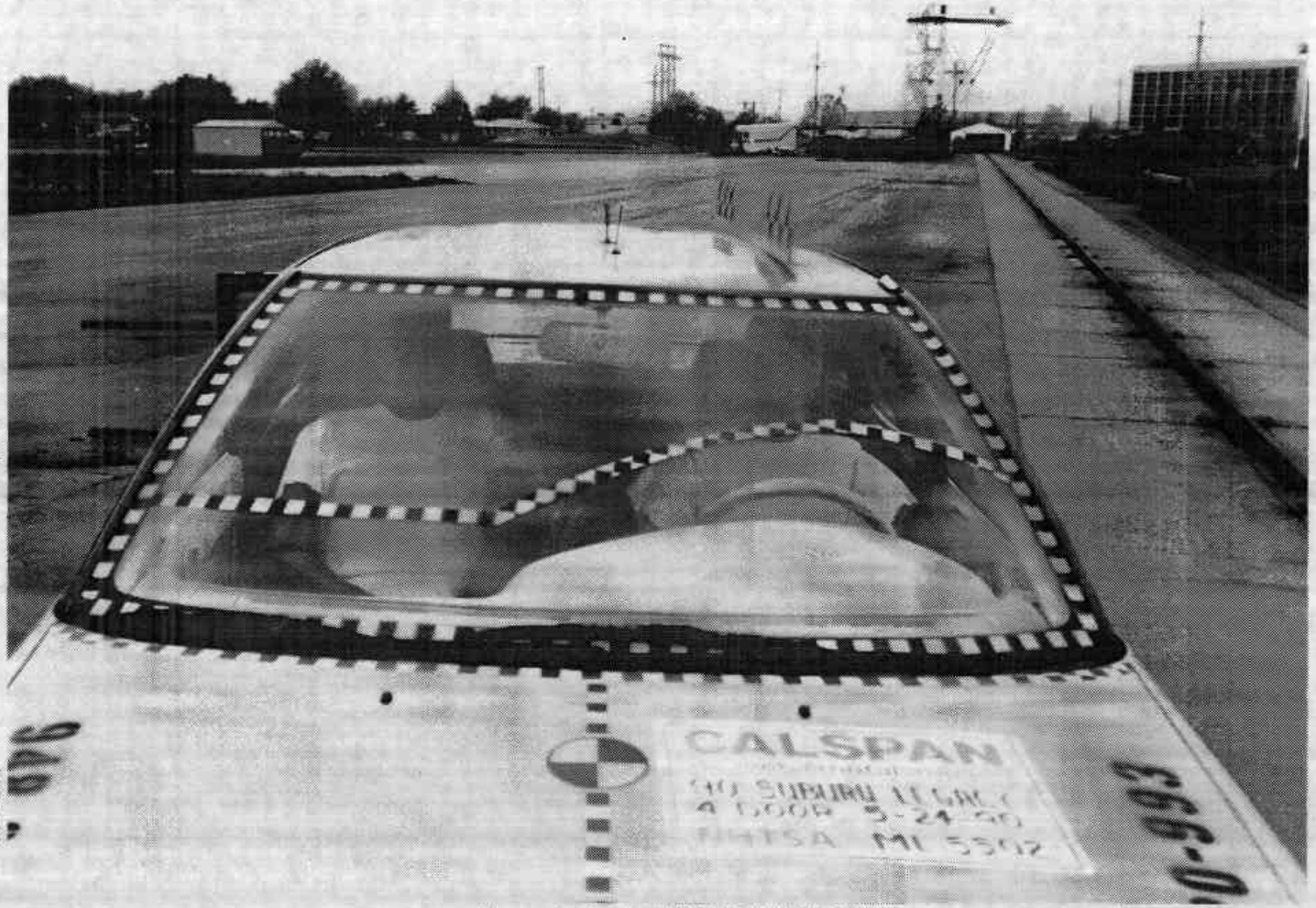


Figure A-12 PRE-TEST WINDSHIELD VIEW

Figure A-13 POST-TEST WINDSHIELD VIEW

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

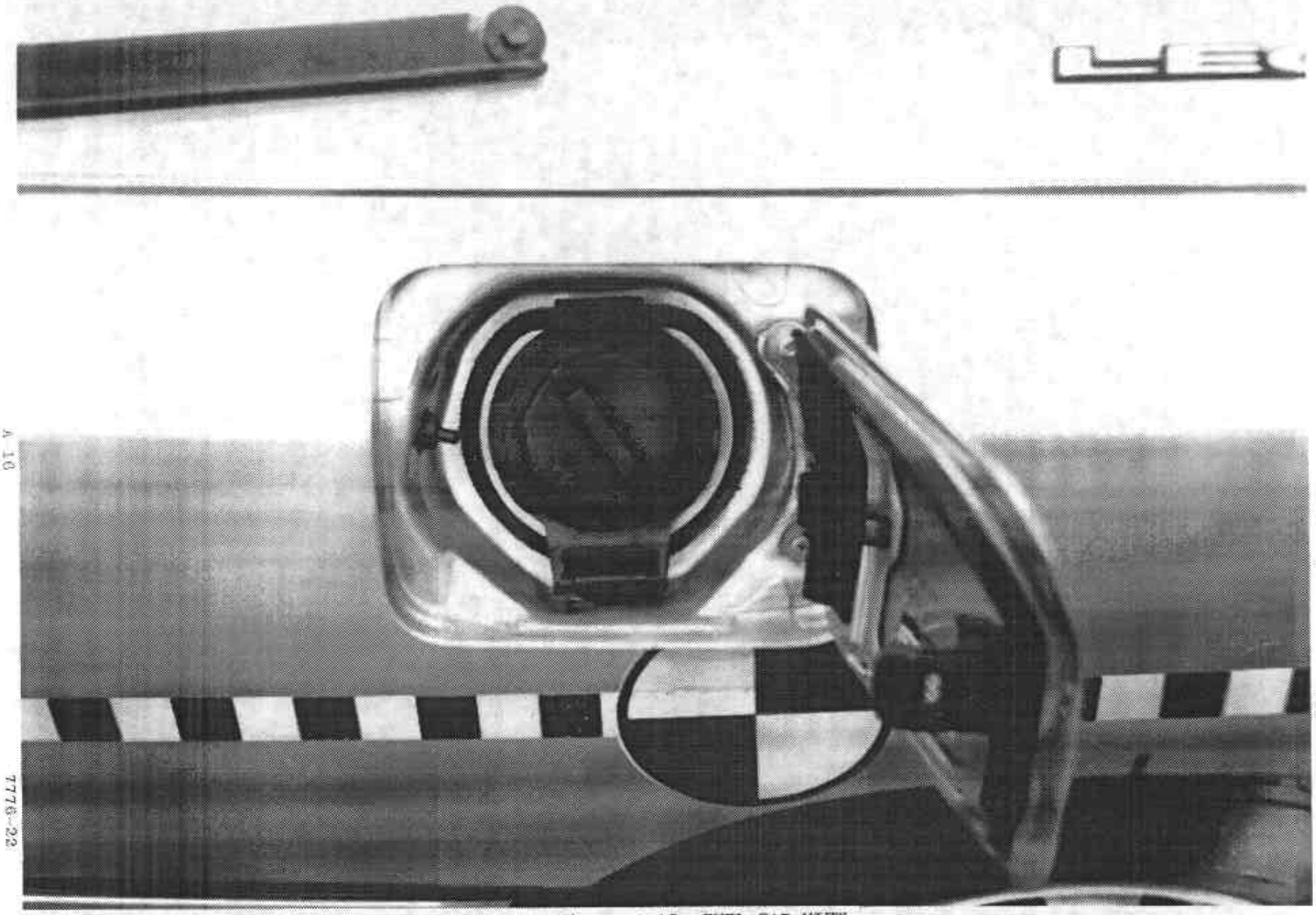


Figure A-15 FUEL CAP VIEW

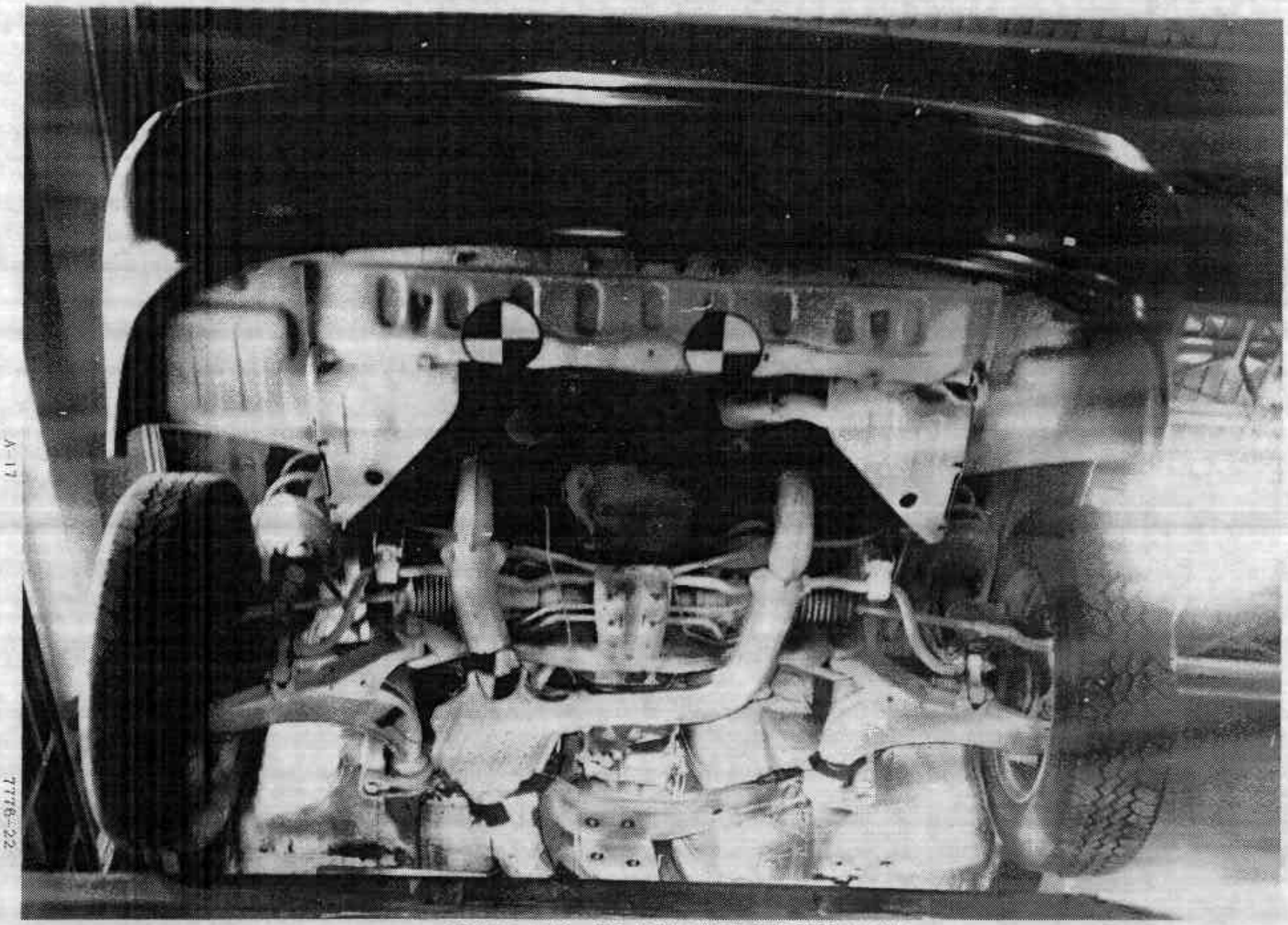


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

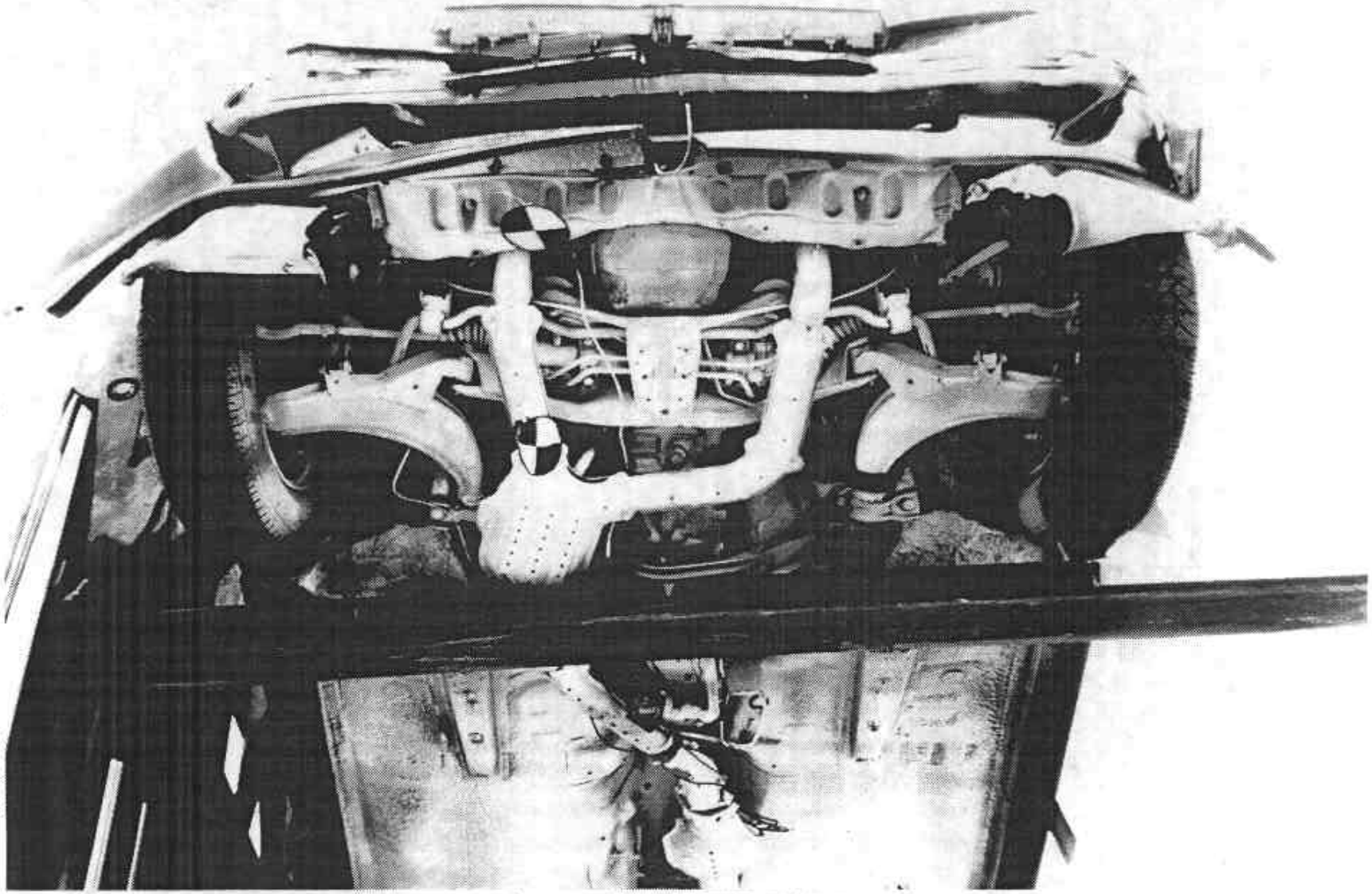


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

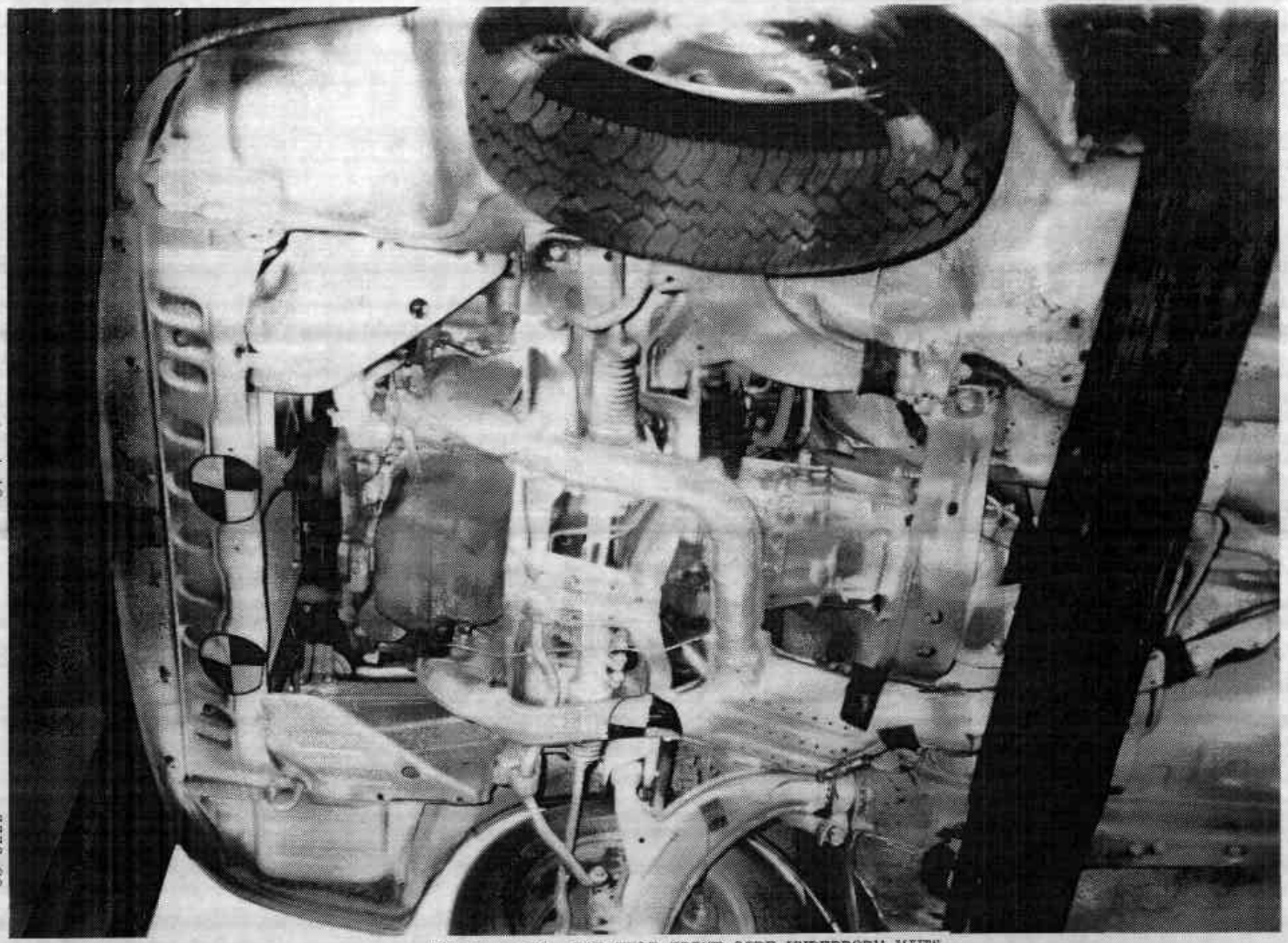


Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

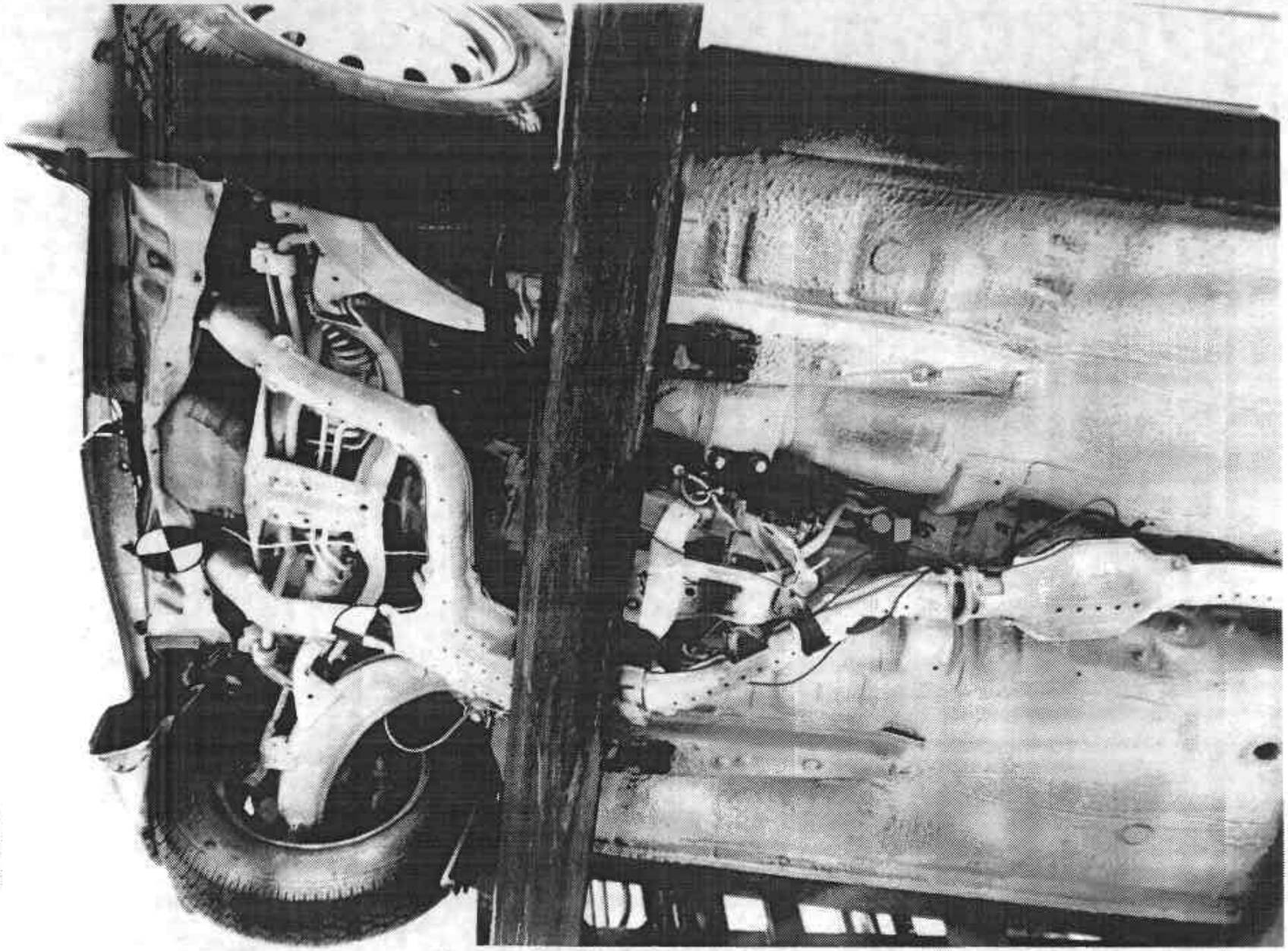


Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

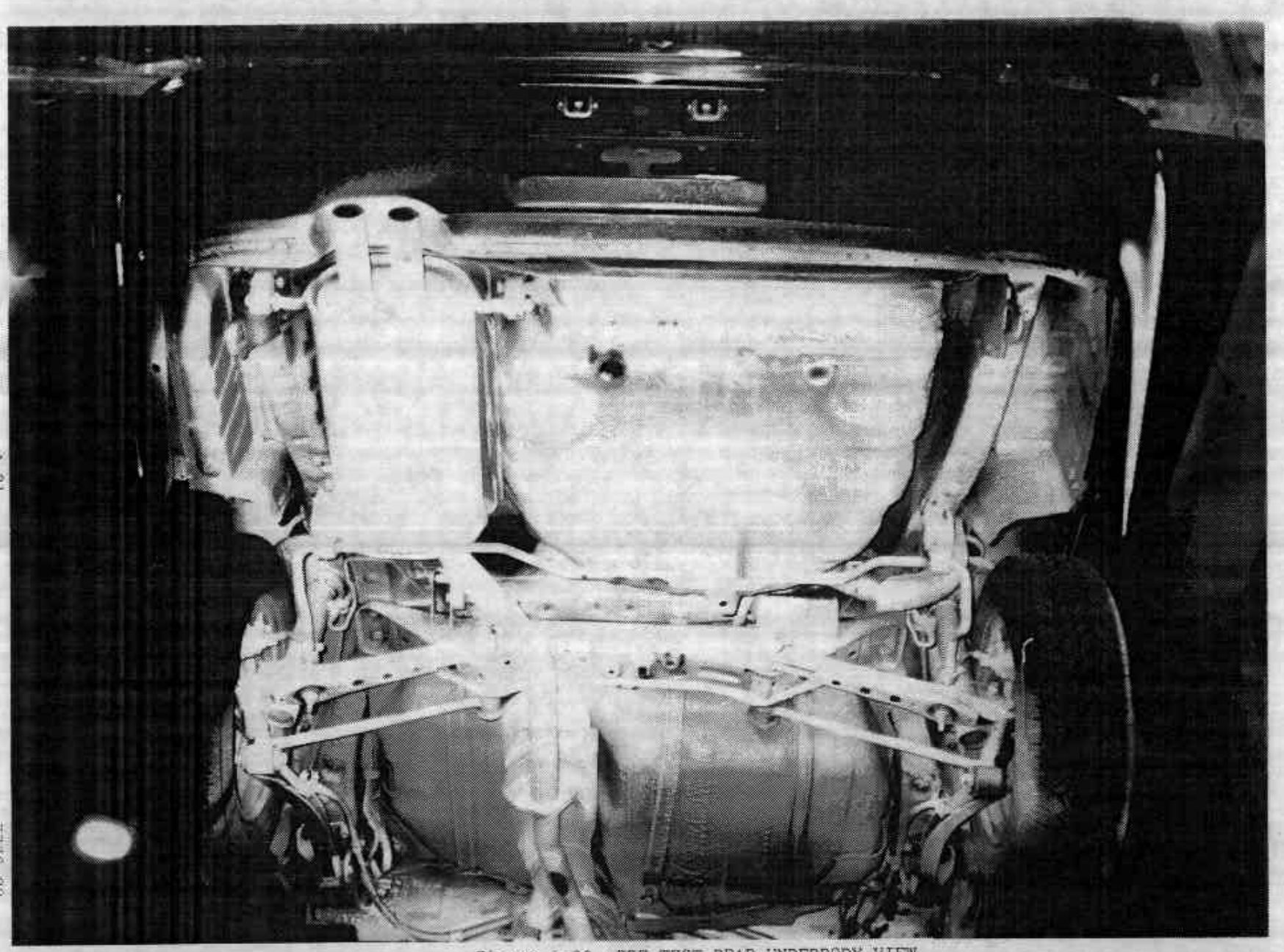


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

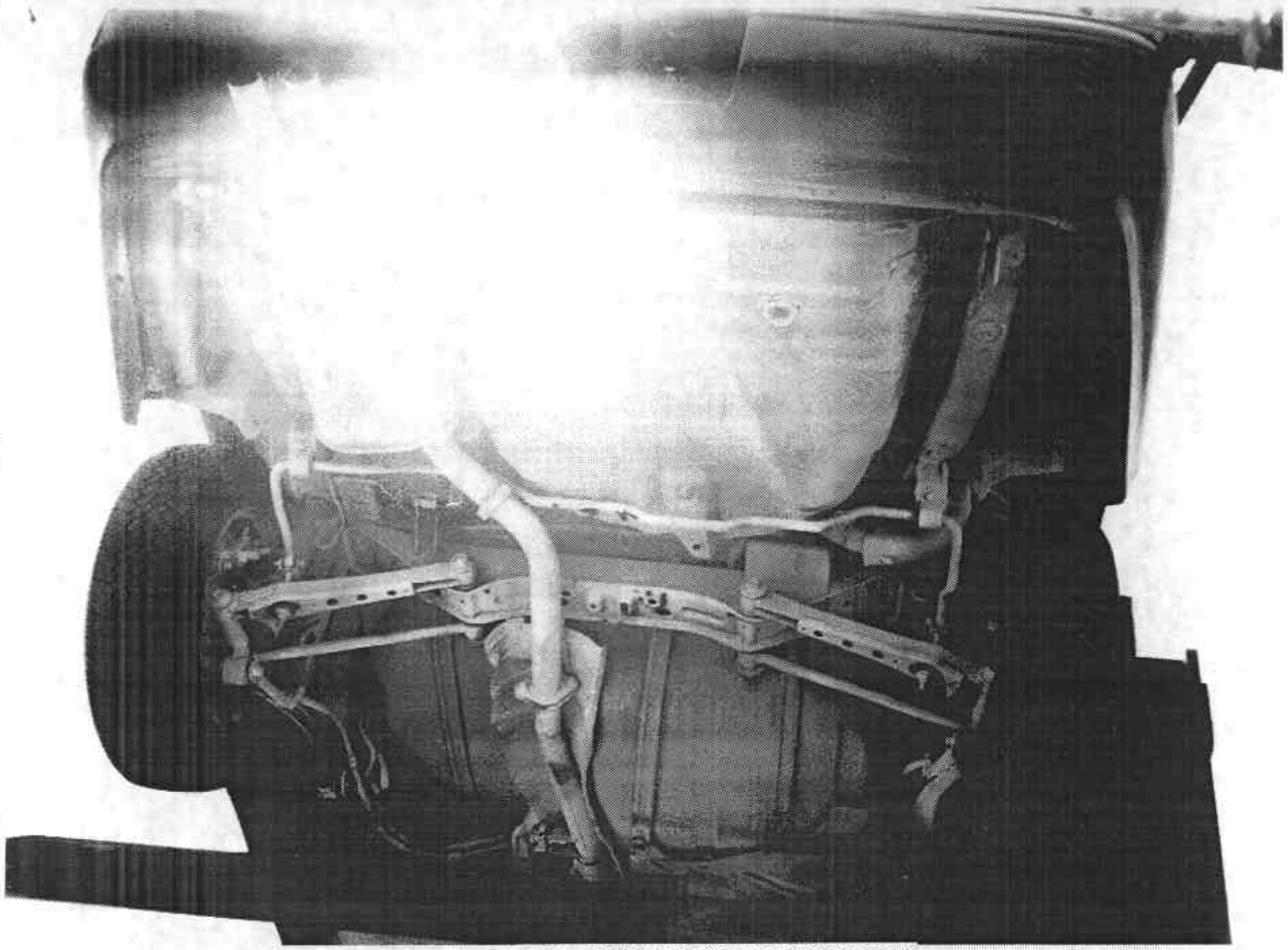
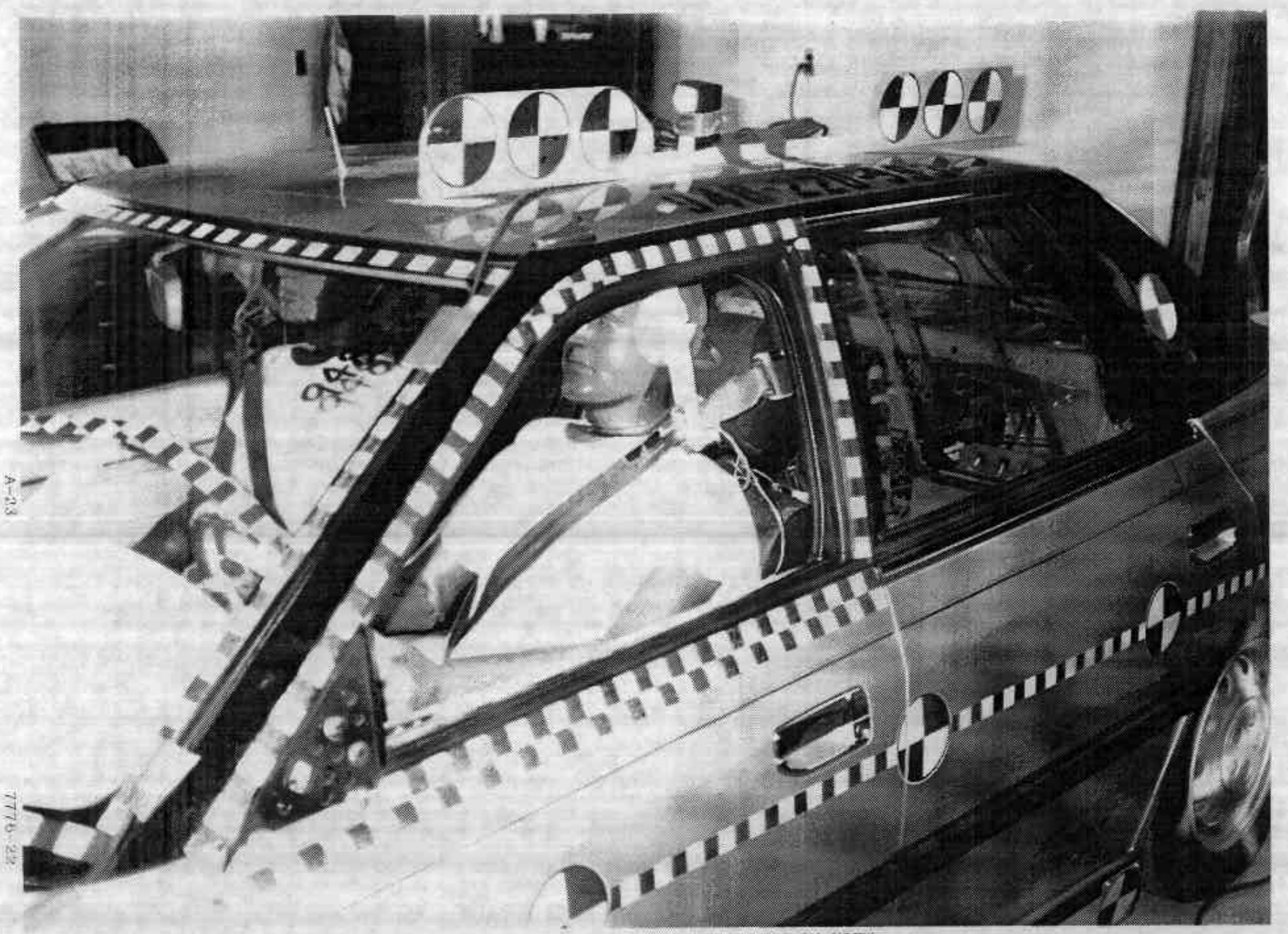


Figure A-21 POST-TEST REAR UNDERBODY VIEW



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7776-22

Figure A-22 PRE-TEST DRIVER POSITION VIEW

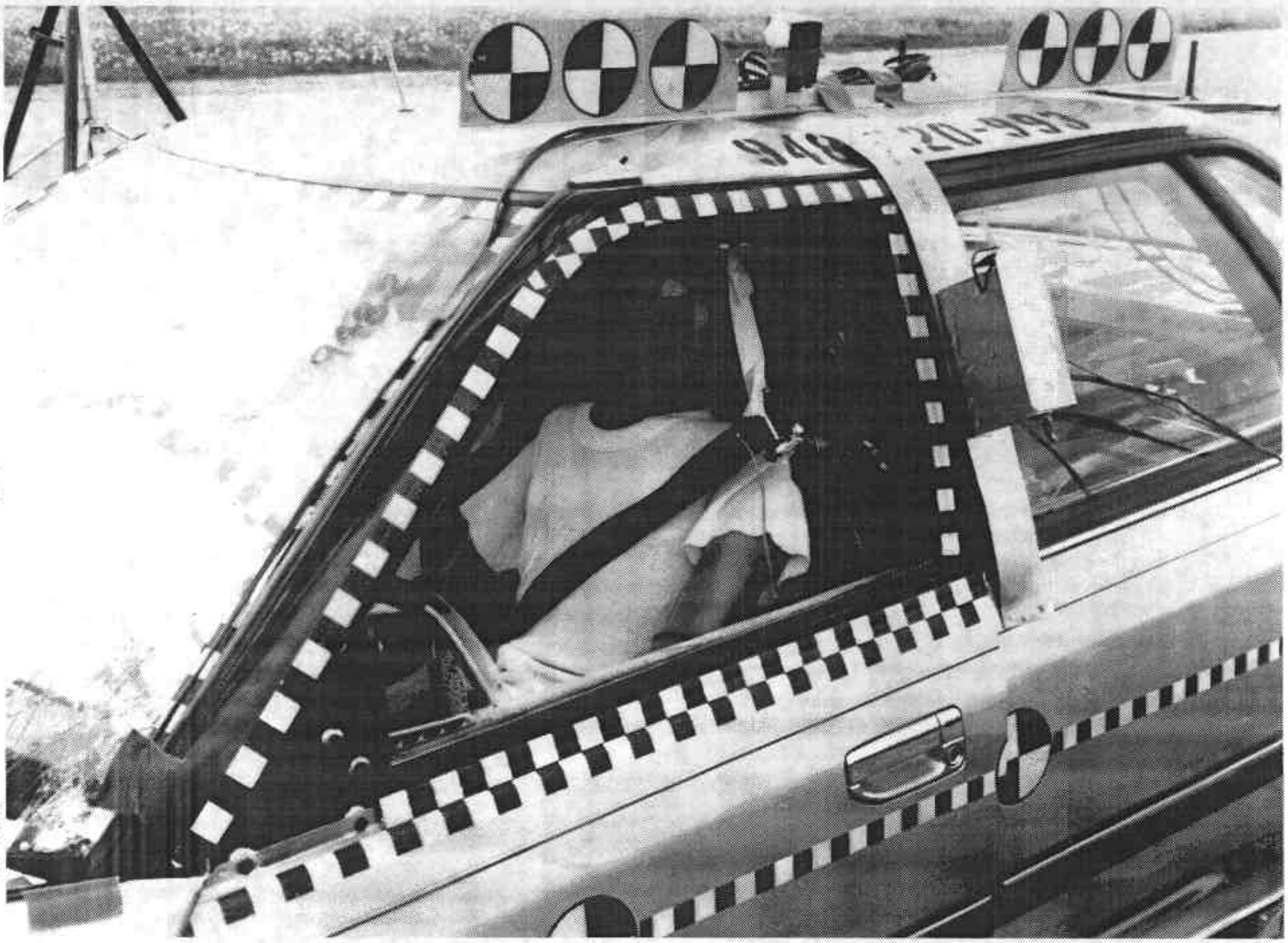


Figure A-23 POST-TEST DRIVER POSITION VIEW

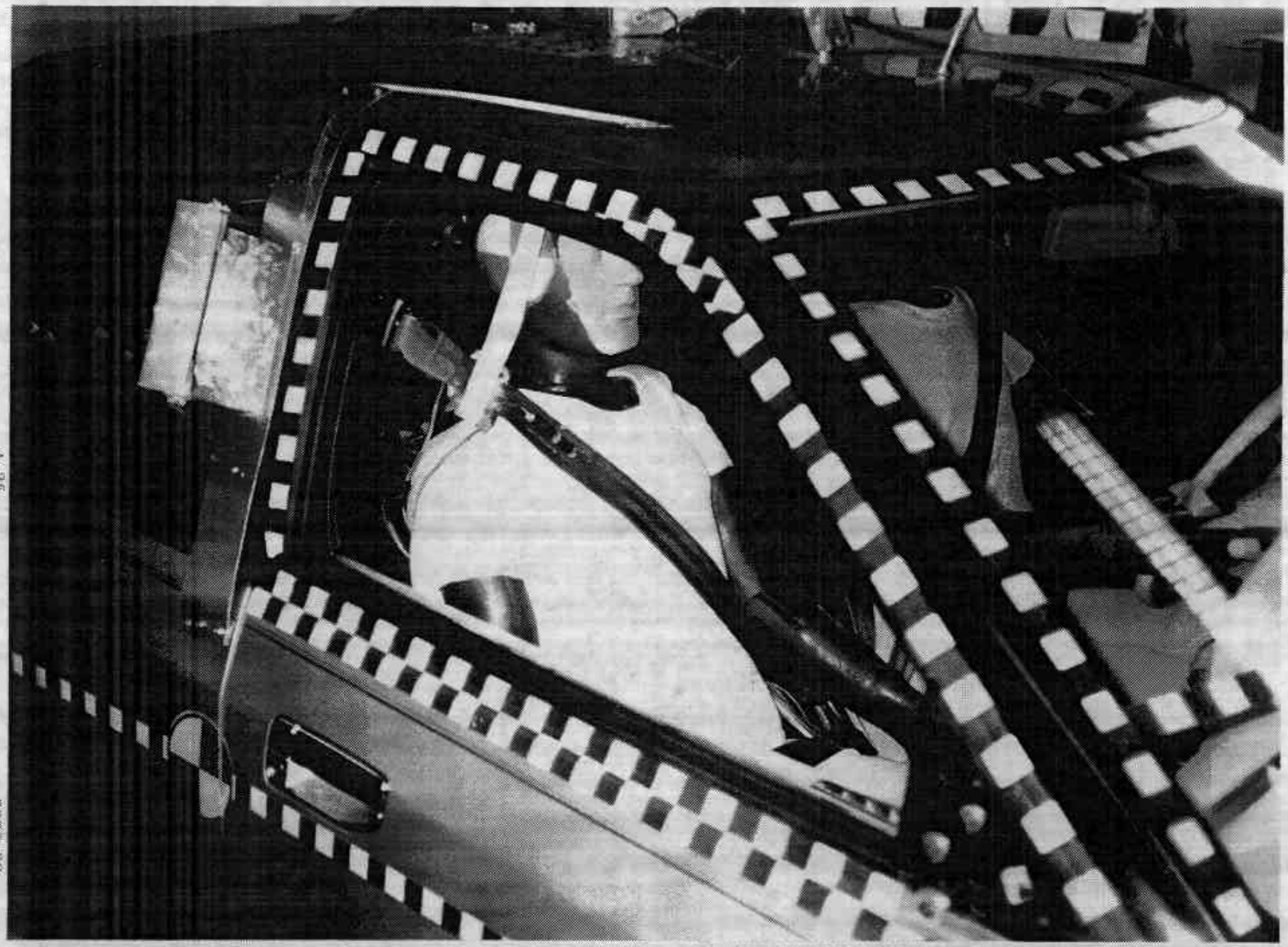
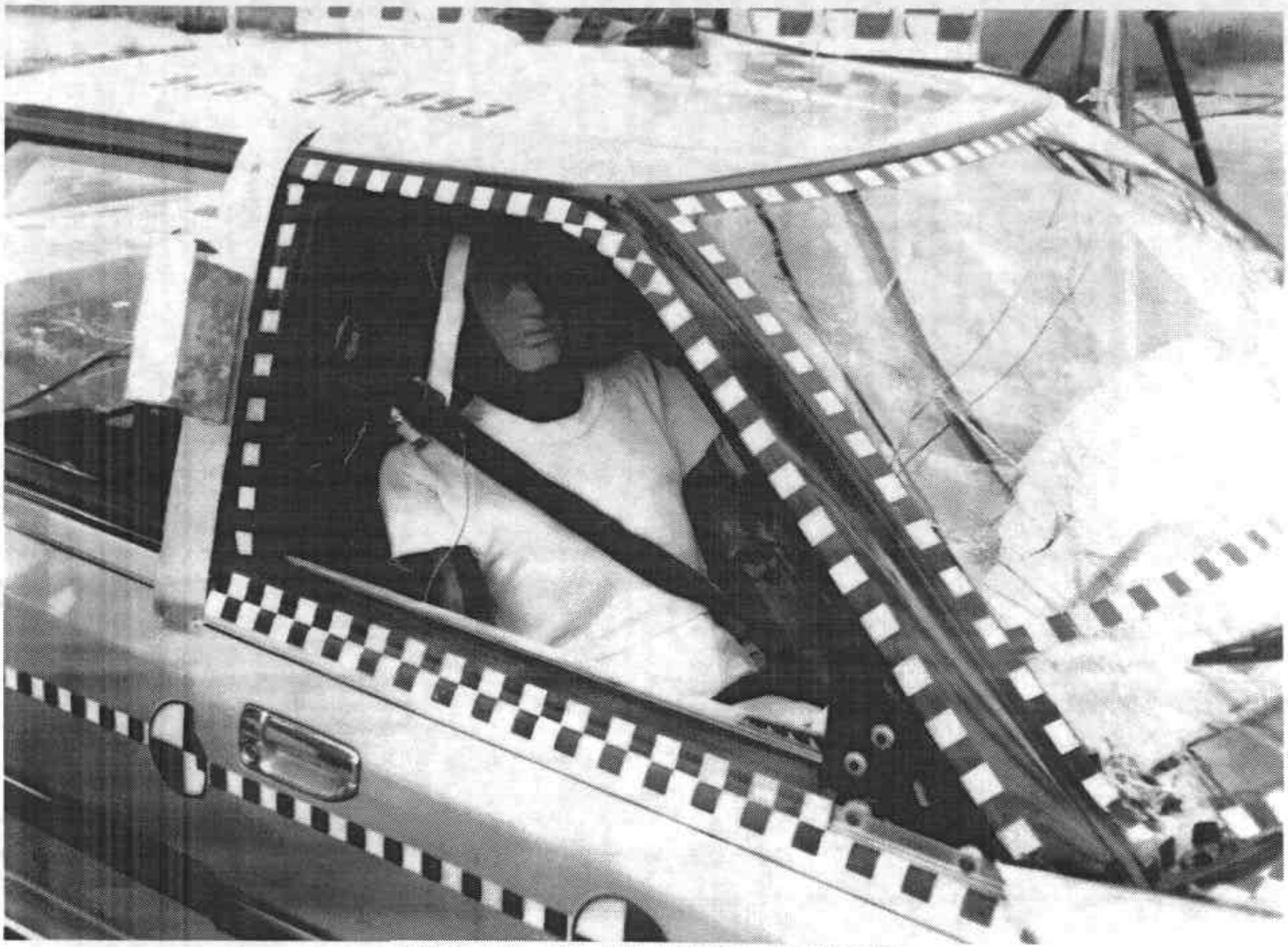


Figure A-24 PRE-TEST PASSENGER POSITION VIEW



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7776-22

Figure A-25 POST-TEST PASSENGER POSITION VIEW

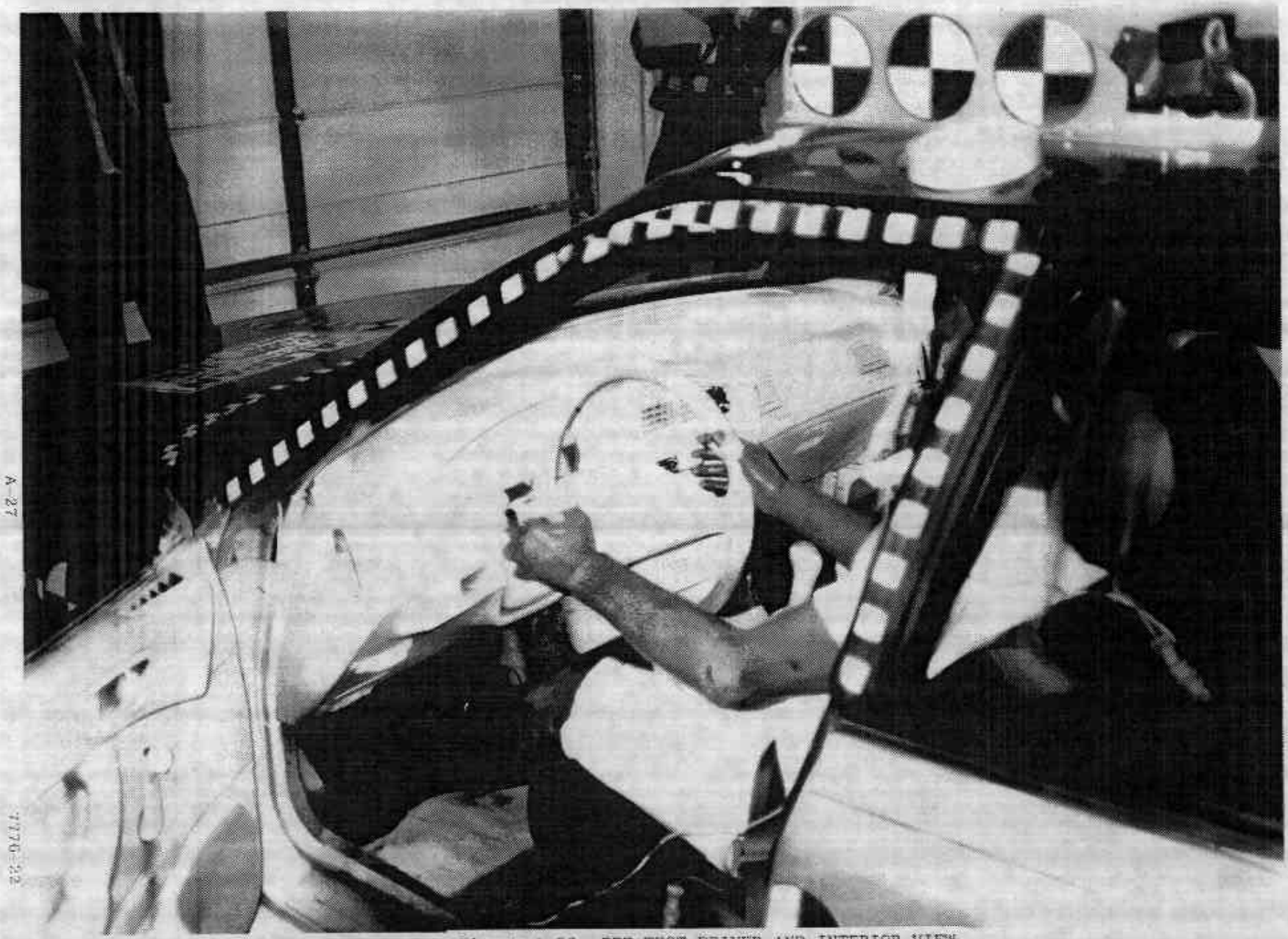


Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

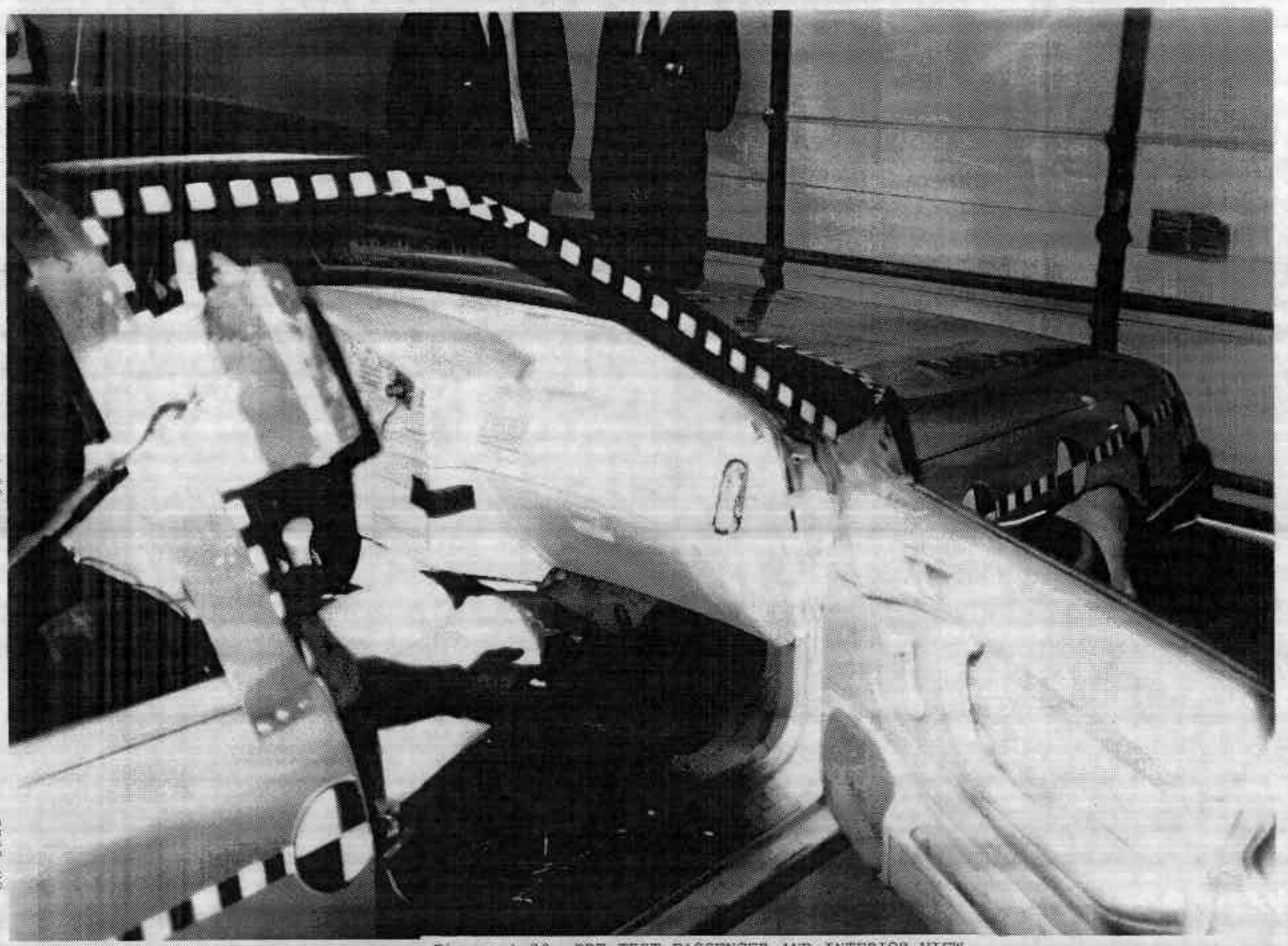


Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

Figure A-30 IMPACT VIEW

Appendix B

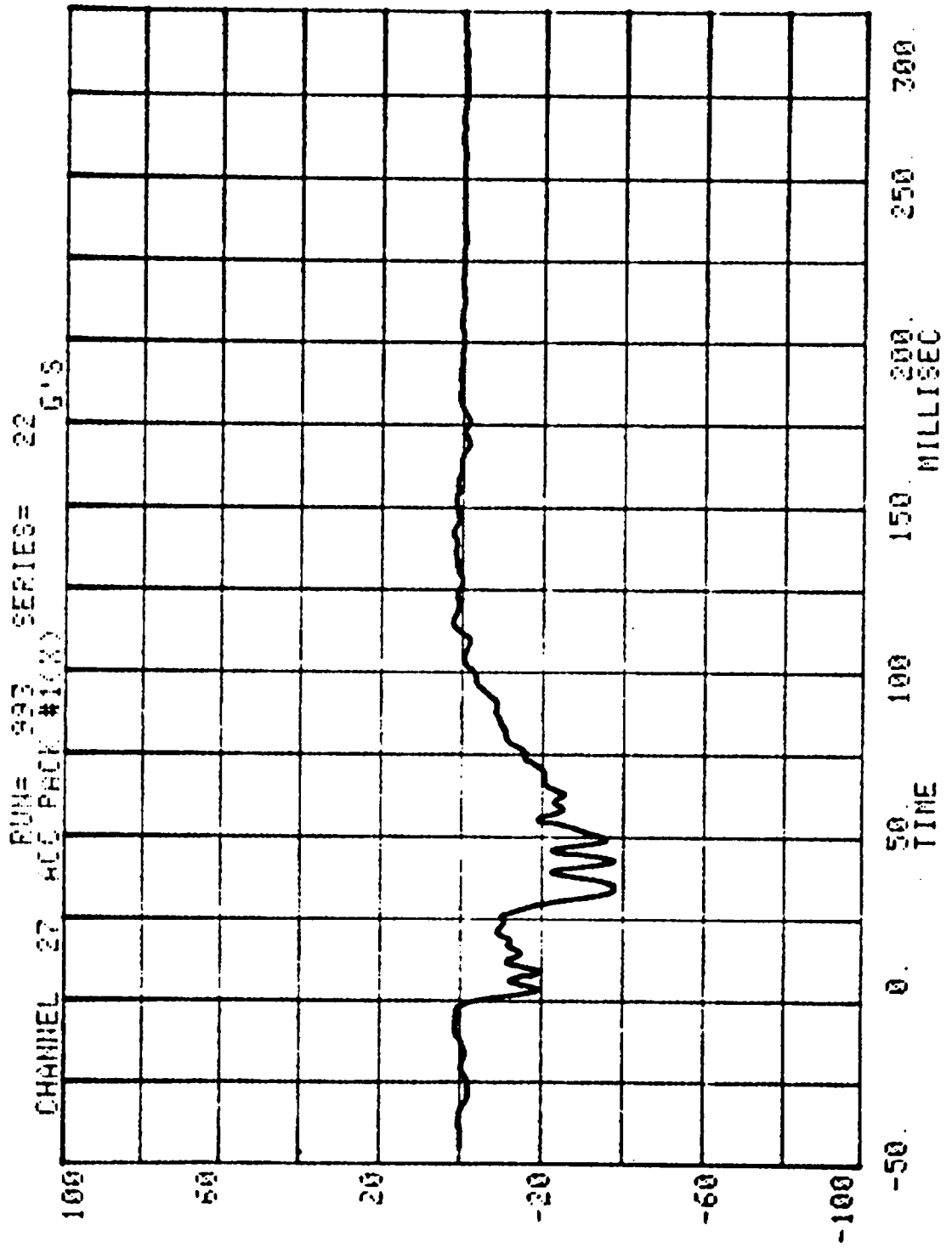
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. ML5502

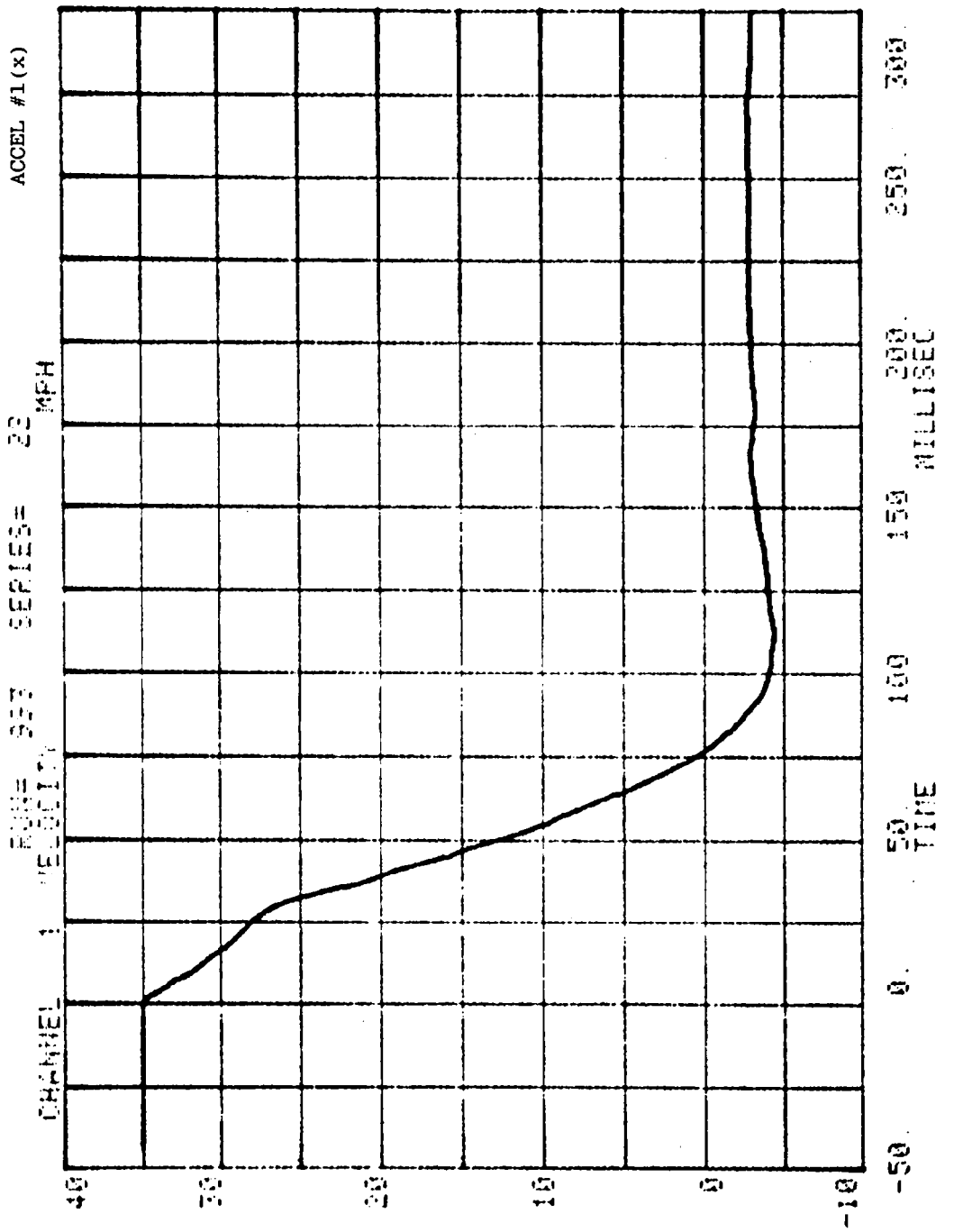
VEHICLE DATA

FILTER CHANNEL CLASS

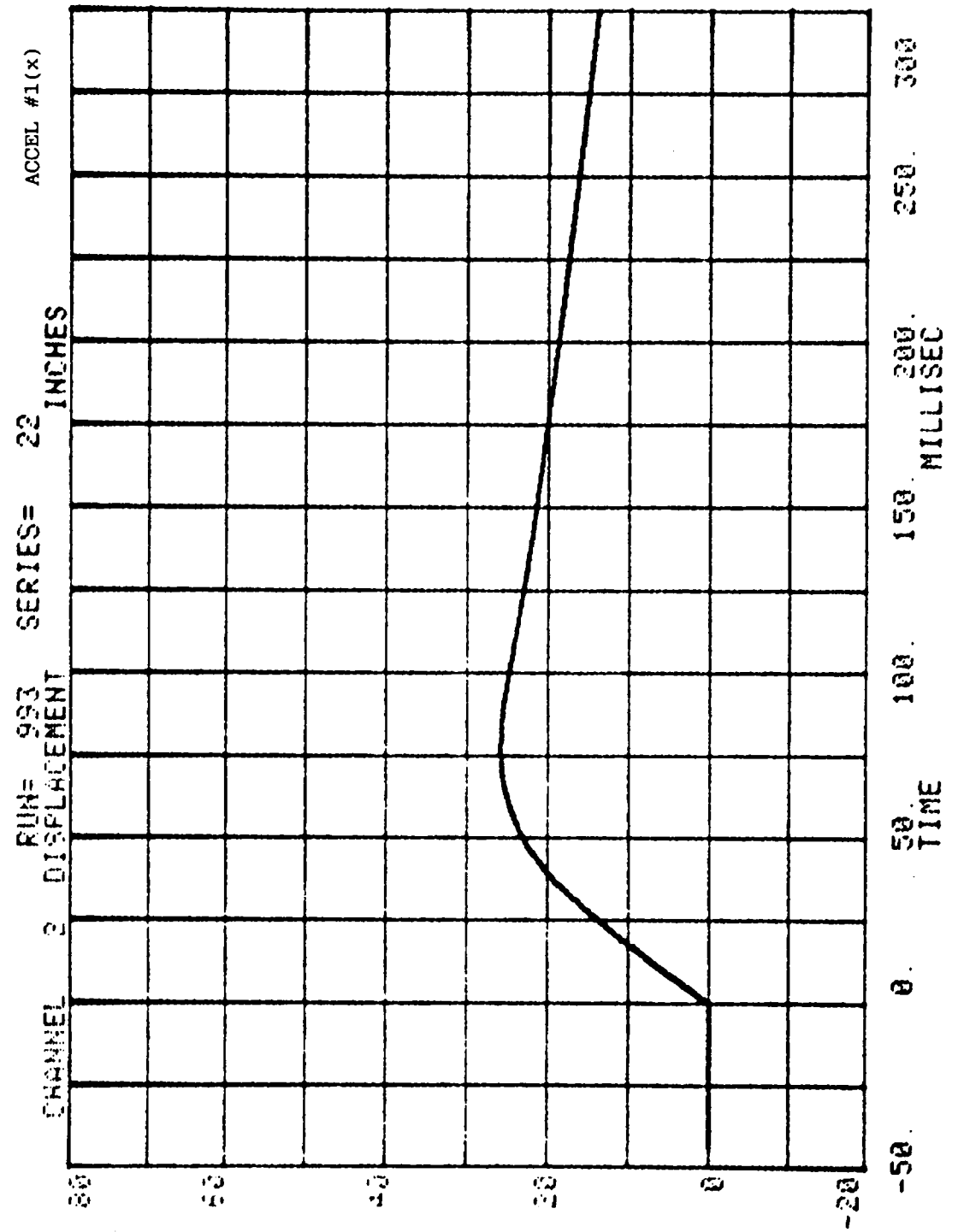
60

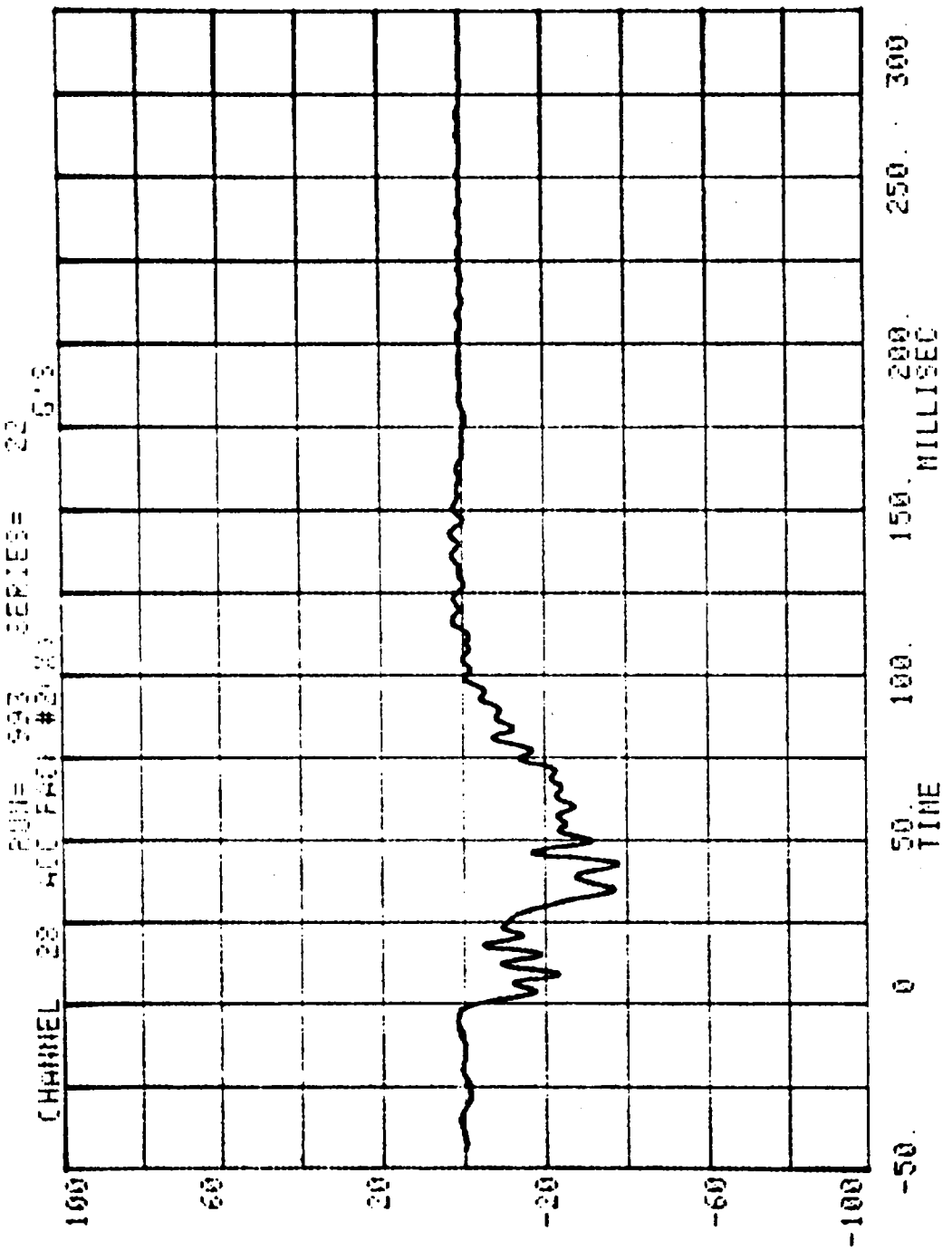

CHANNEL 27
RUN= 333 SERIES= 22 G'S
100
50
20
-20
-60
-100
-50.
0.
50.
100
150
200.
250
300
TIME
MILLISEC

7776-22

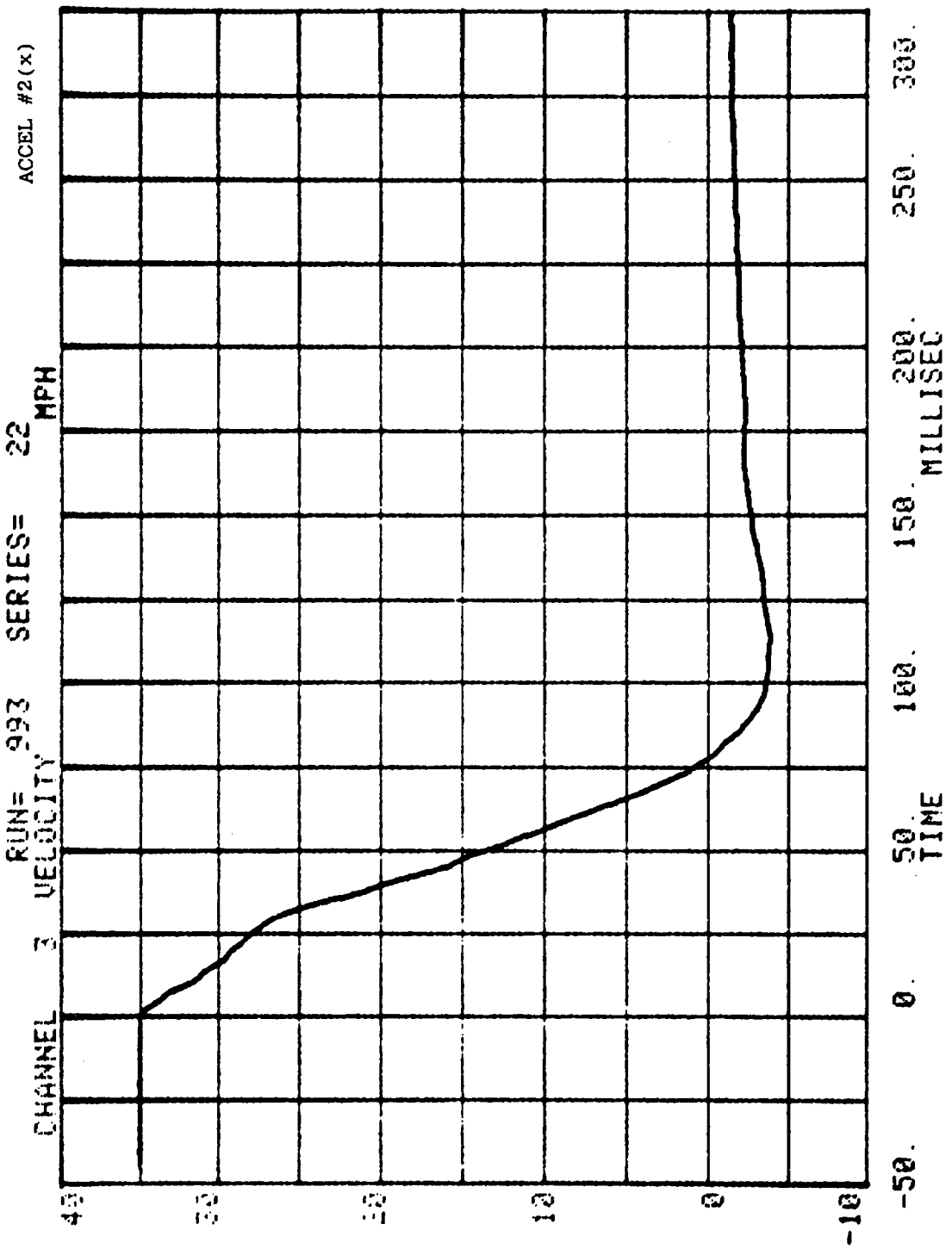

ACCEL #1(x)
CHANNEL 1
SERIES= 22
MPH
50
TIME
MILLISEC
-50
0.
50
100
150
200
250
300
40
30
20
10
0
-10

7776-22

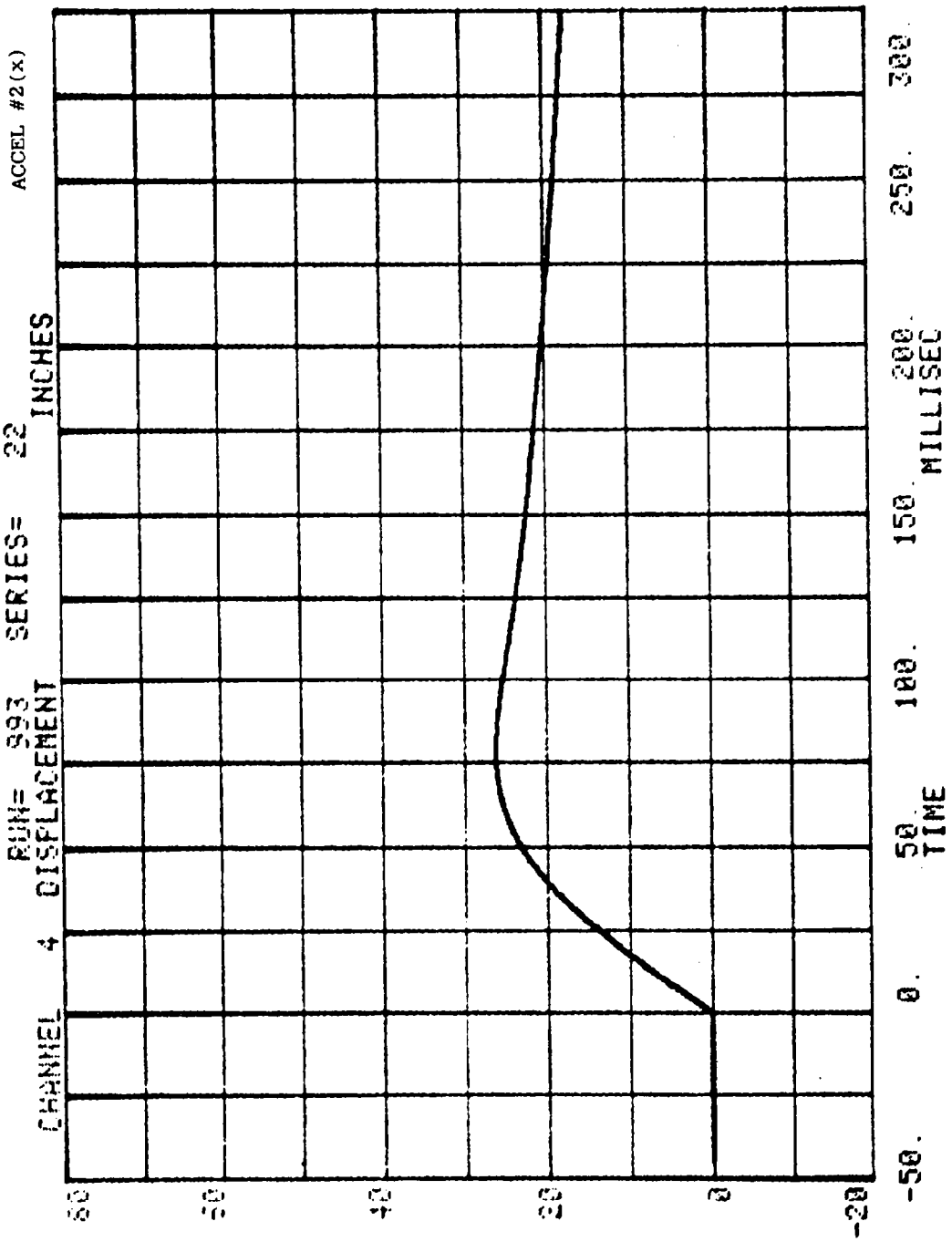

ACCEL #1(x)
CHANNEL 2 DISPLACEMENT
RUN= 993 SERIES= 22
INCHES
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

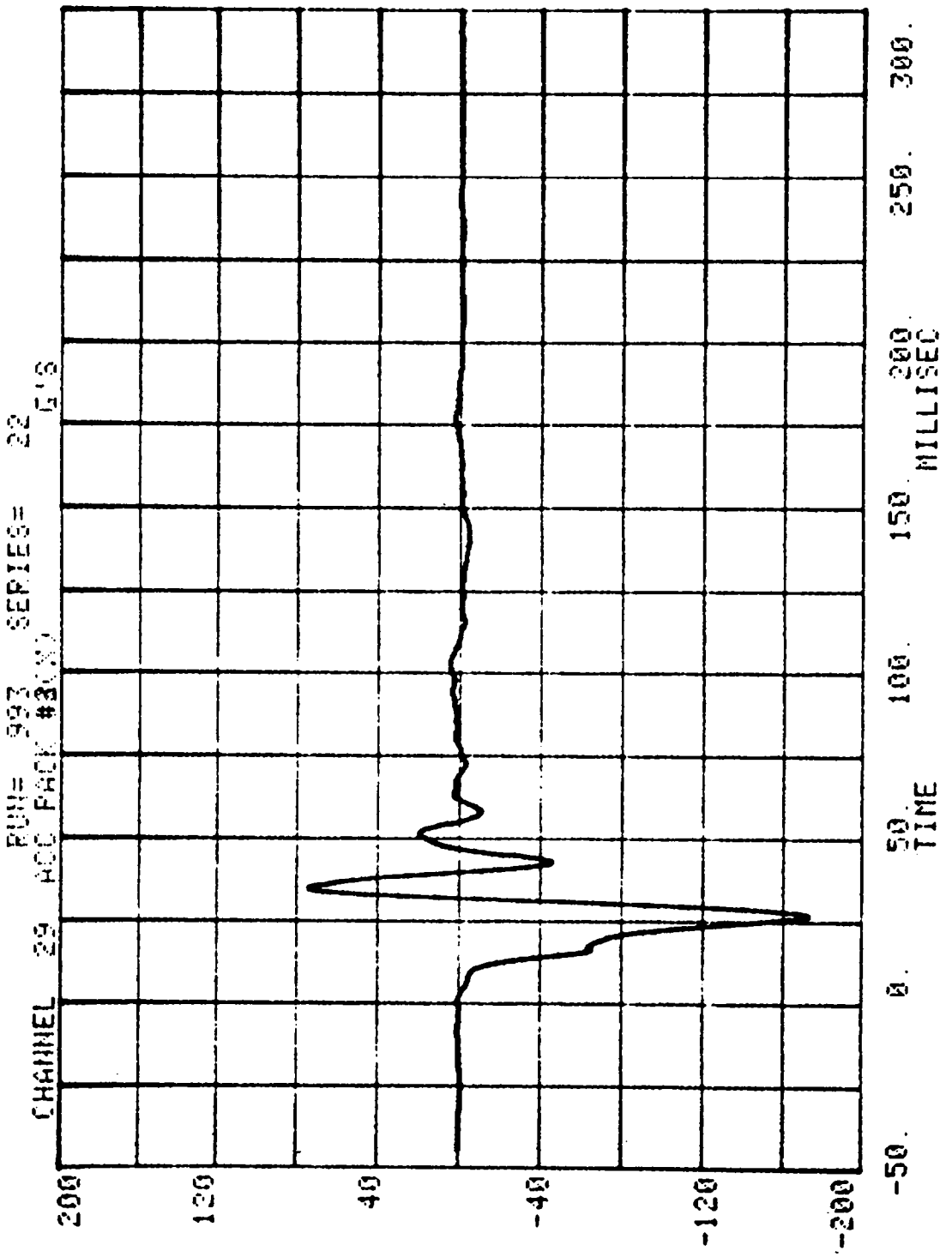


7776-22

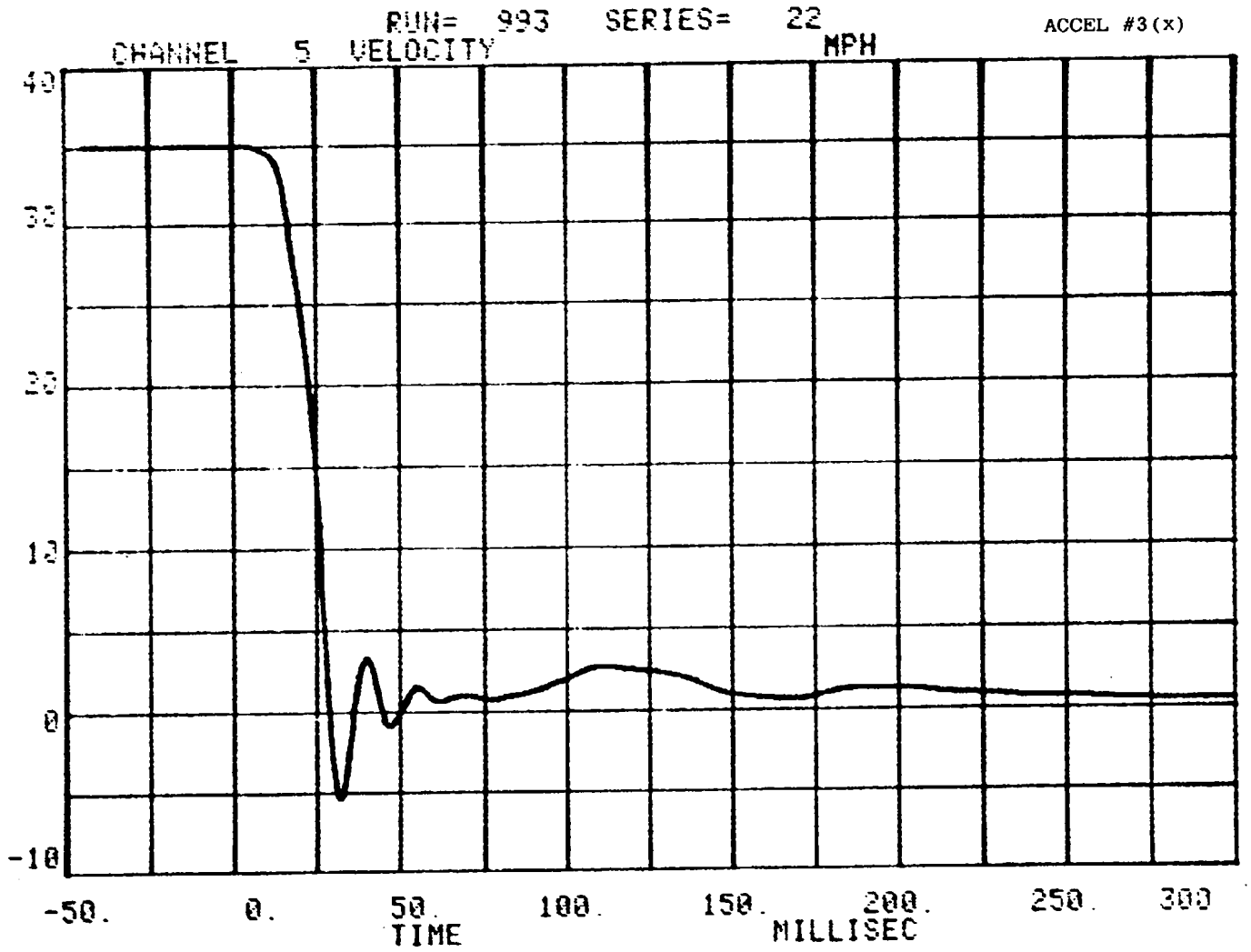

ACCEL #2(x)
CHANNEL 3 VELOCITY
RUN= 993 SERIES= 22 MPH
45
32
19
12
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

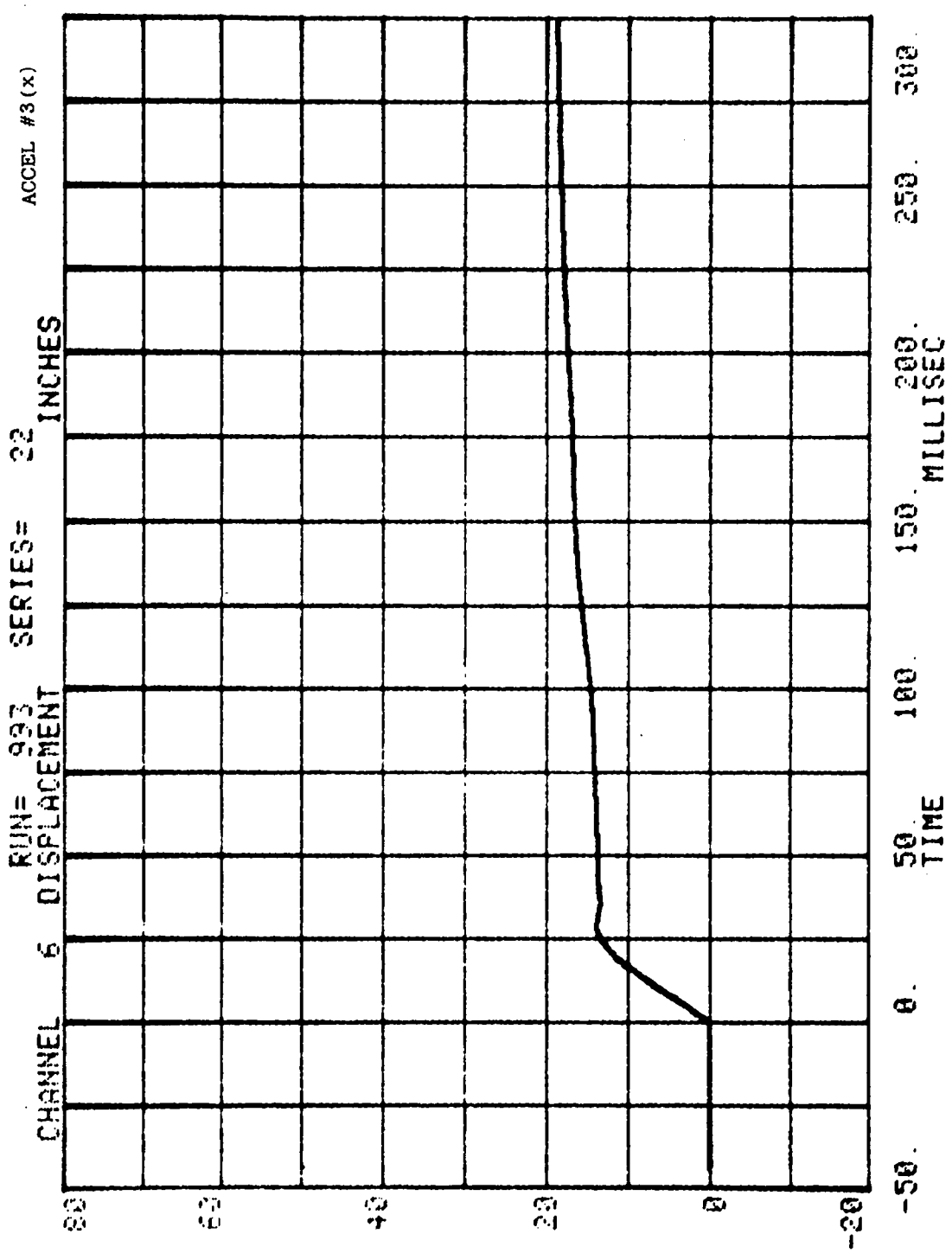
7776-22

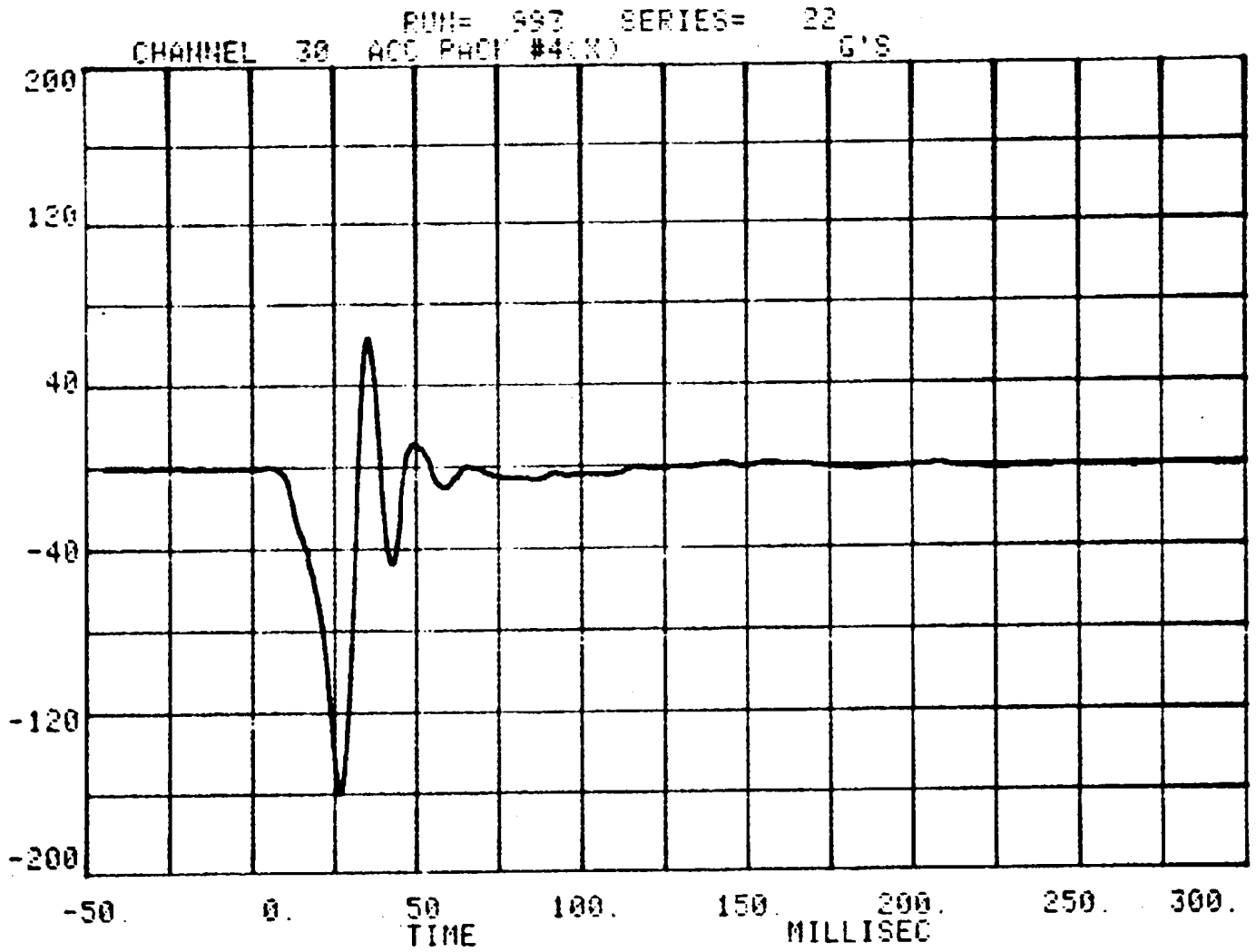

ACCEL #2(x)
CHANNEL 4 DISPLACEMENT
RUN= 993 SERIES= 22
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 22 ACC PACK #3(X)
RUN= 993 SERIES= 22
G'S
200
120
40
-40
-120
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

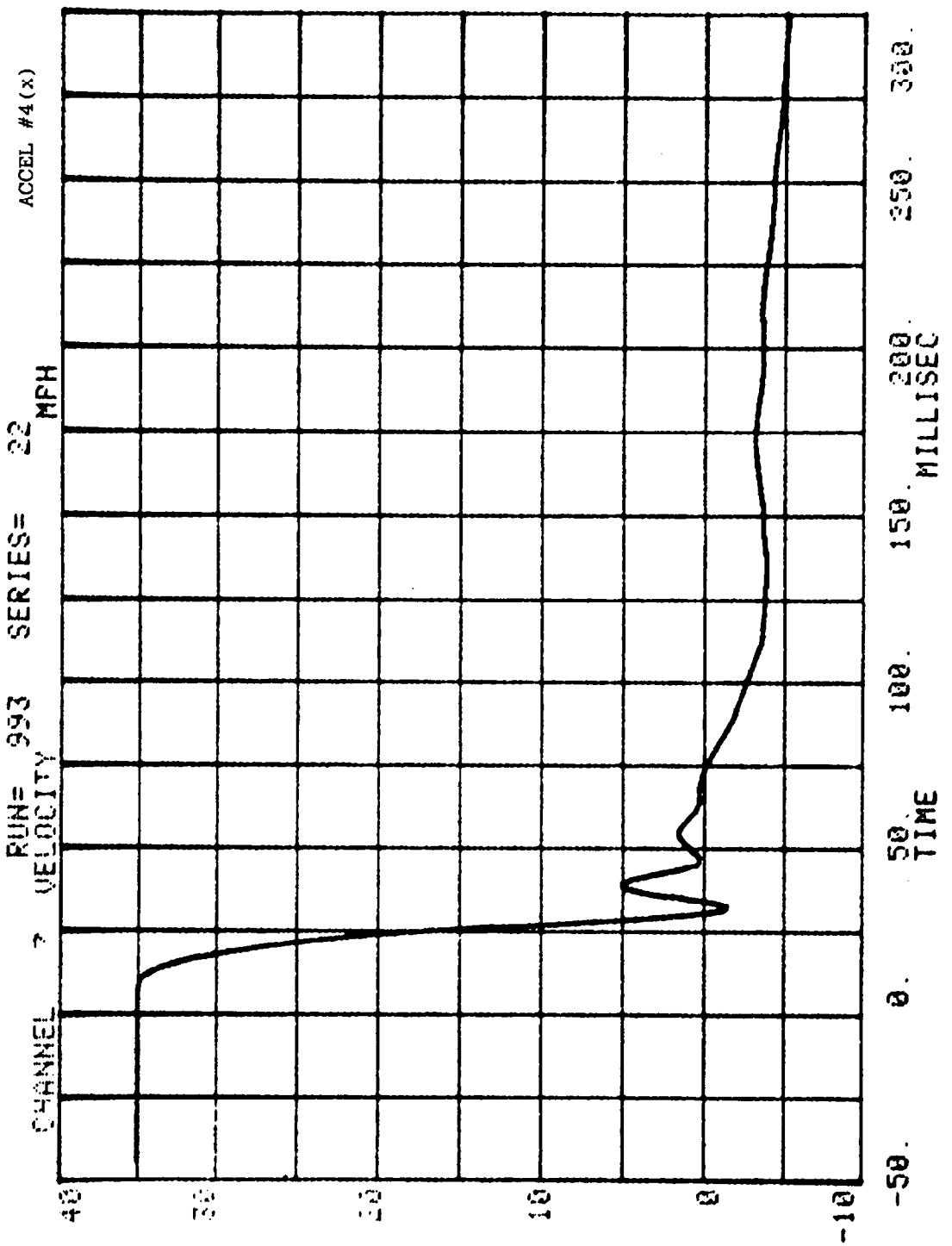
7776-22

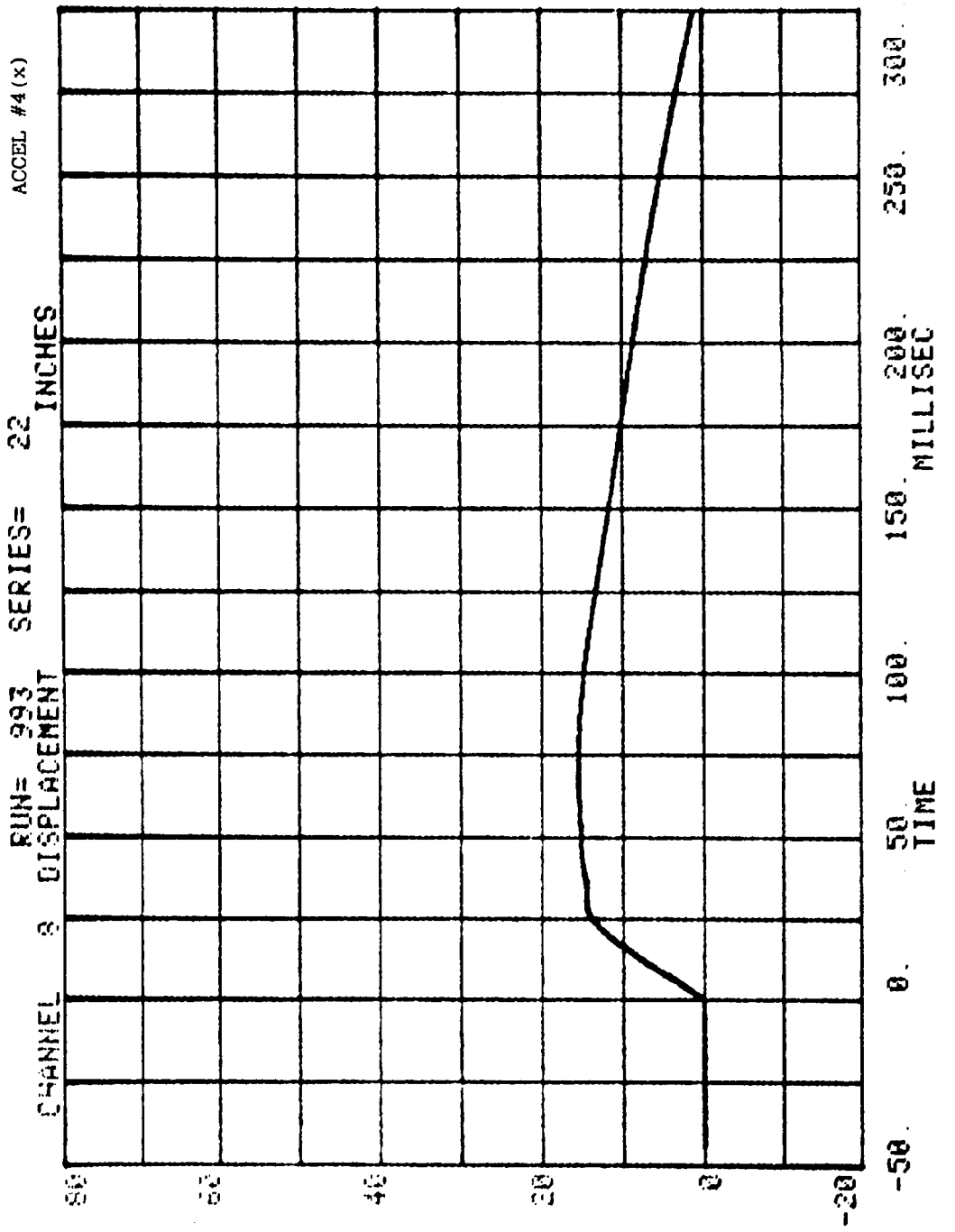

RUN= 993 SERIES= 22
ACCEL #3(x)
CHANNEL 5 VELOCITY
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300
TIME
MILLISEC


ACCEL #3(x)
CHANNEL 6 DISPLACEMENT
RUN= 993 SERIES= 22
INCHES
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

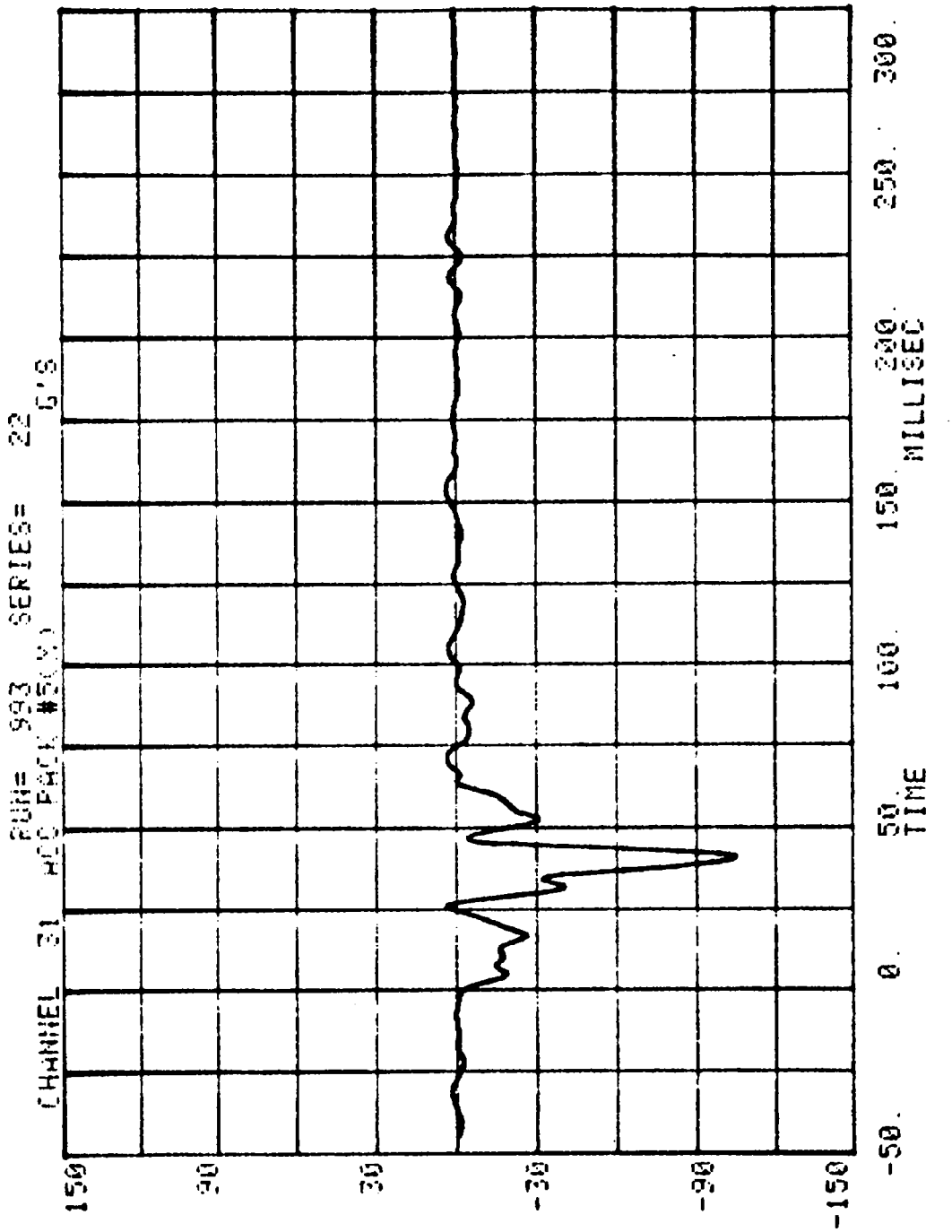

RUN= 993 SERIES= 22
CHANNEL 30 ACC PHOT #4(X)
G'S
200
120
40
-40
-120
-200
-50.
0.
50
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

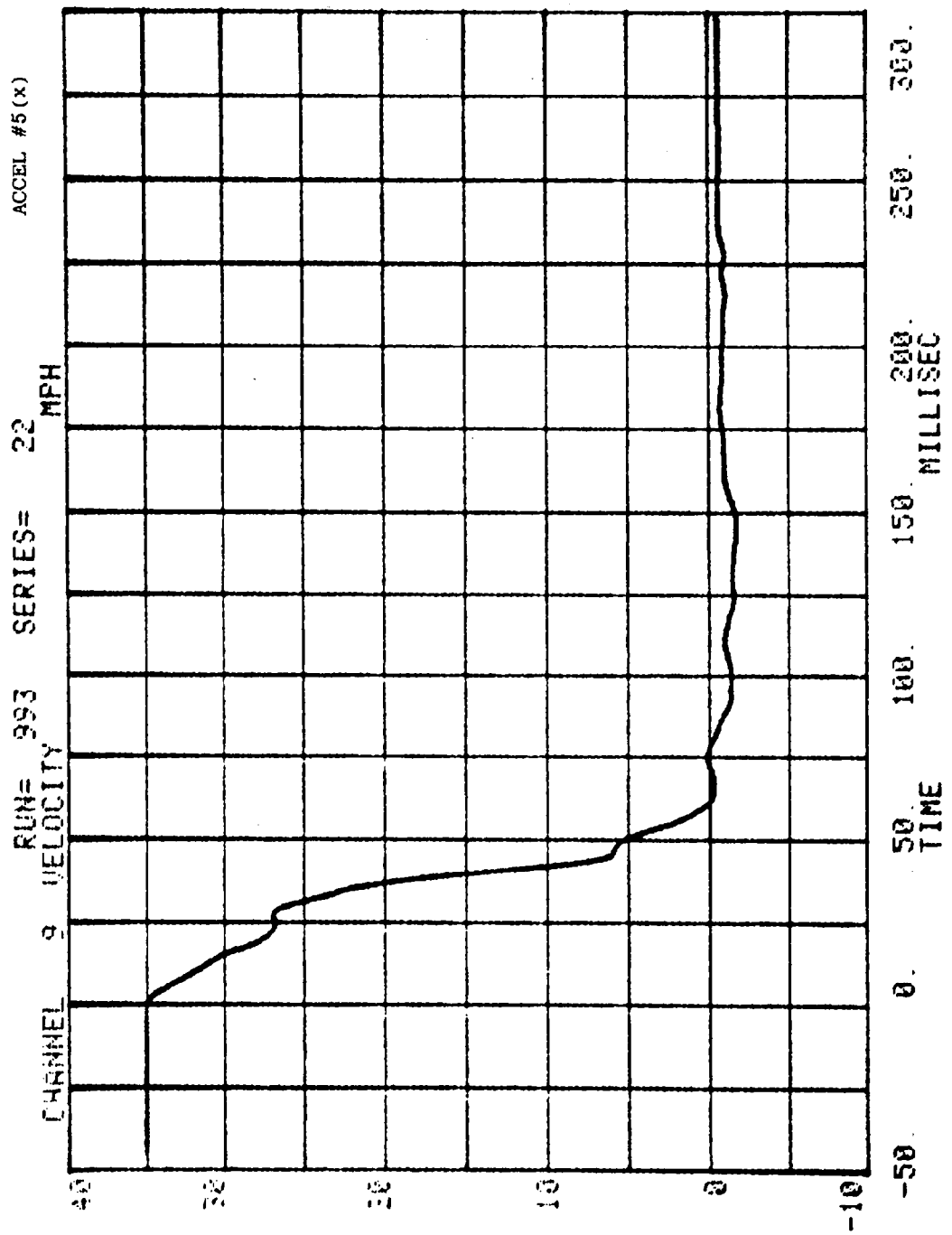

ACCEL #4(x)
RUN= 993 SERIES= 22
CHANNEL 2 VELOCITY
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACCEL #4(x)
CHANNEL 3 DISPLACEMENT
RUN= 993 SERIES= 22
INCHES
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

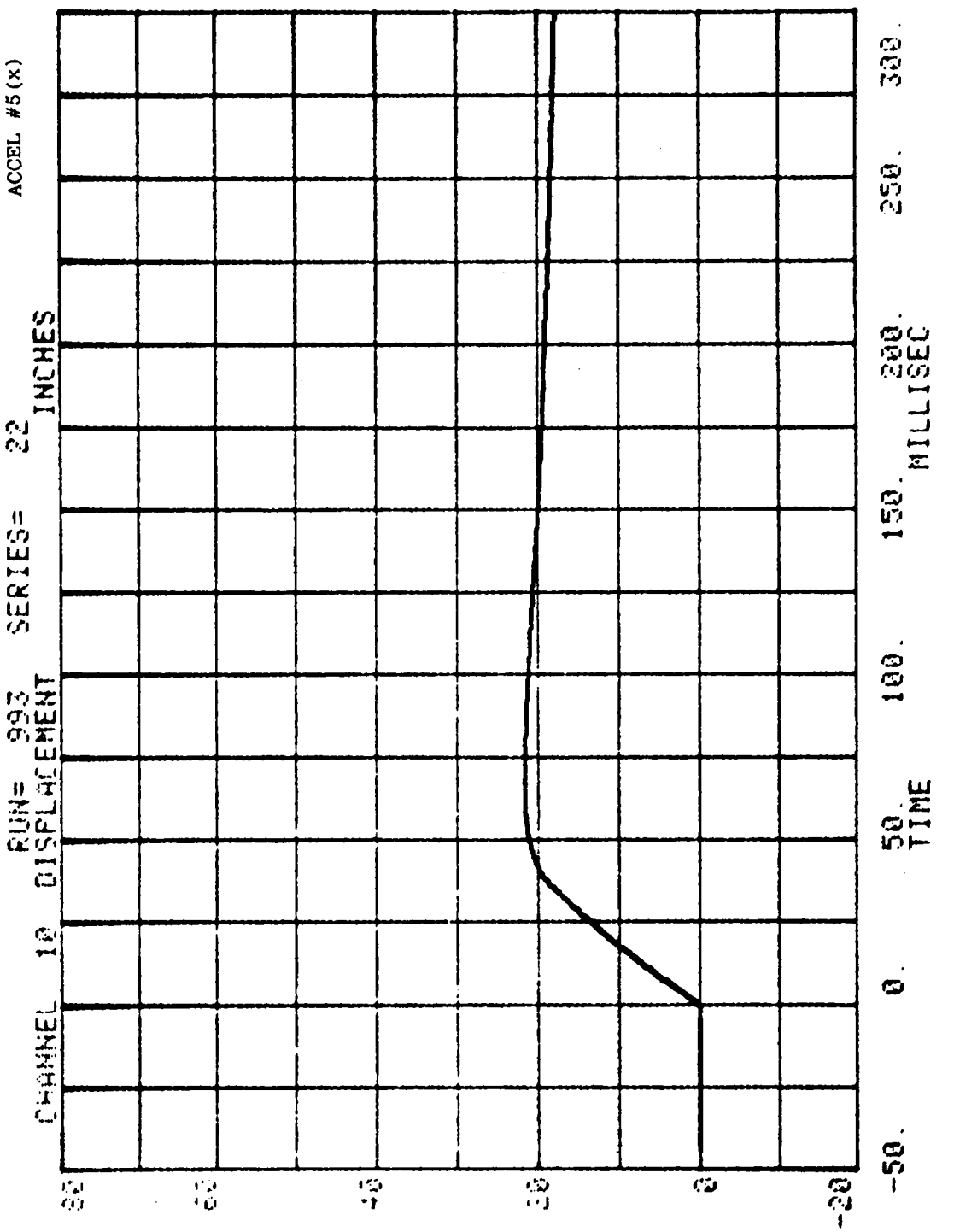
7776-22

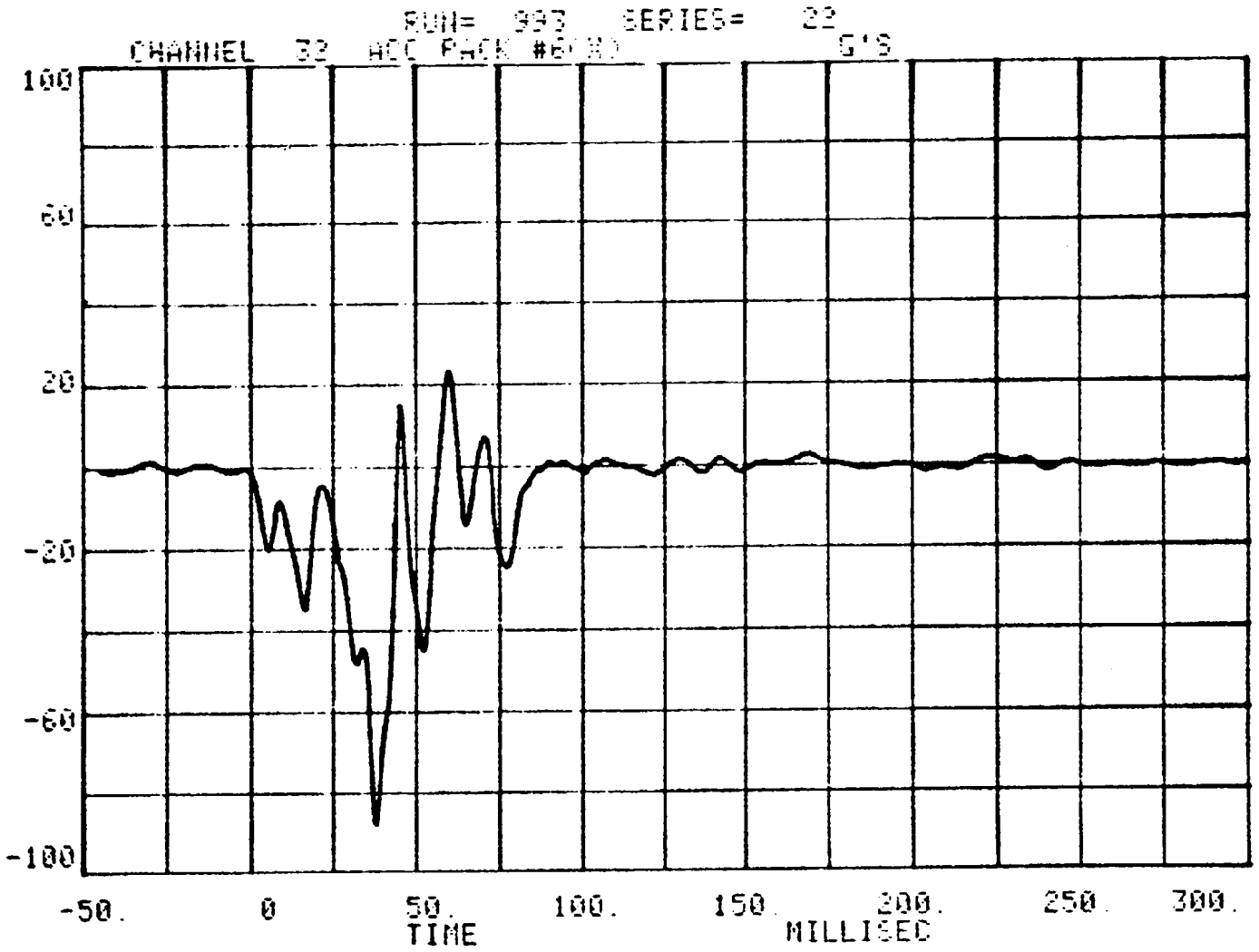

CHANNEL 31
RUN= 993 SERIES= 22
G'S
150
90
30
-30
-90
-150
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

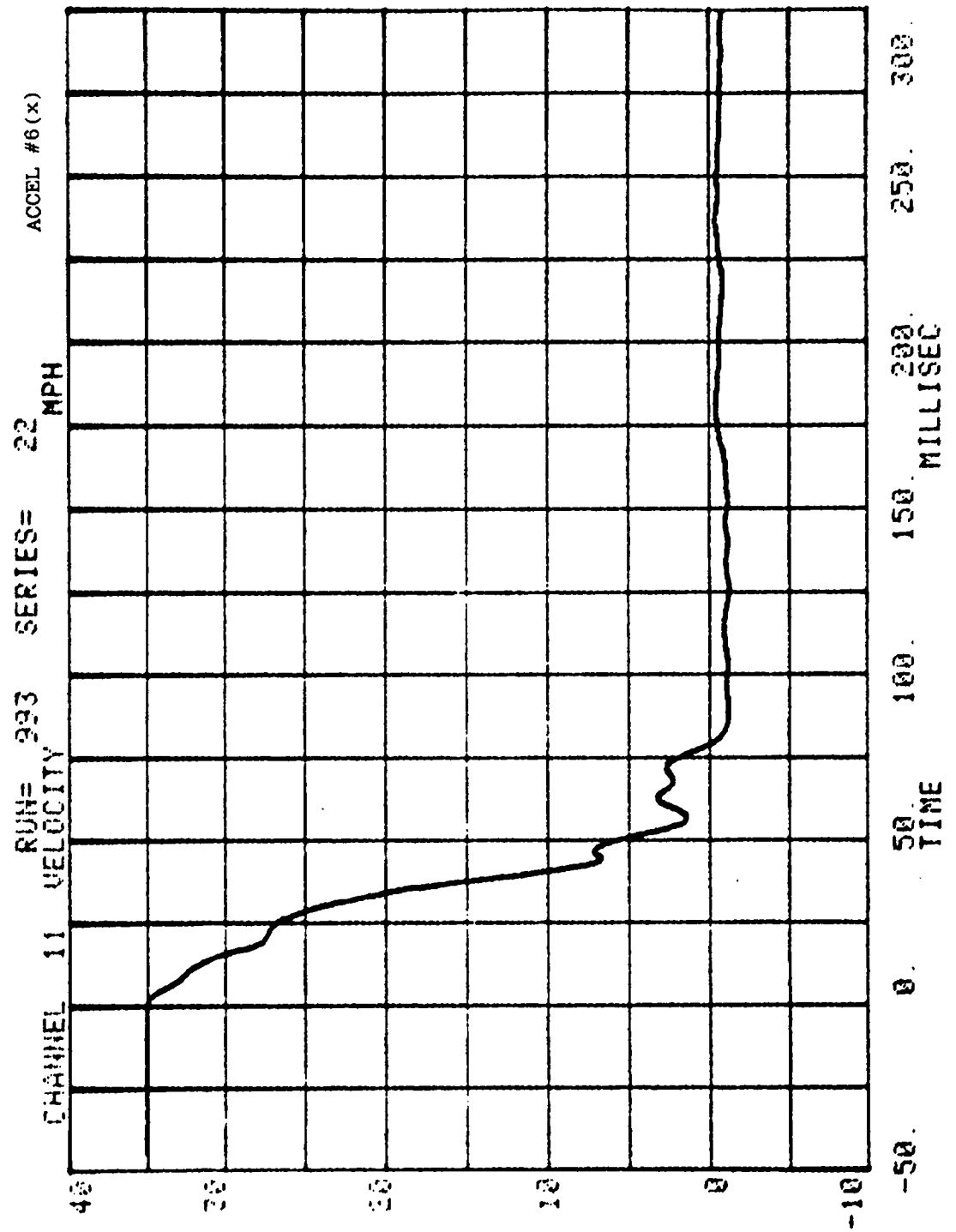

ACCEL #5(x)
CHANNEL 9 VELOCITY
RUN= 993 SERIES= 22 MPH
40
30
20
10
0
-10
-50
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

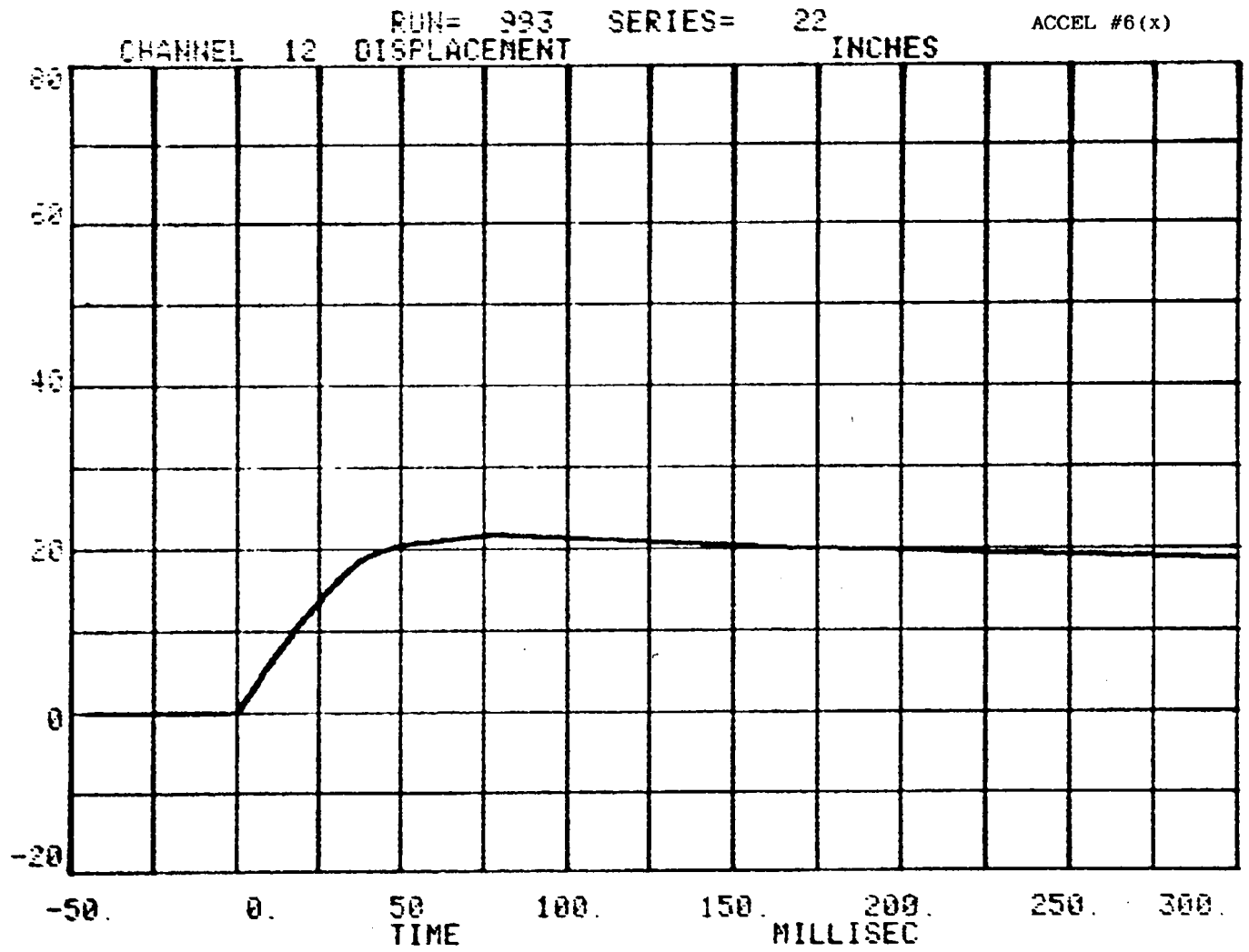

ACCEL #5(x)
CHANNEL 10 DISPLACEMENT
RUN= 993 SERIES= 22
INCHES
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC
-20
0
20
40
60
80


RUN= 993 SERIES= 22
CHANNEL 32 ACC PACK #6 (X)
G'S
100
60
20
-20
-60
-100
-50.
0
50.
100.
150
200.
250
300.
TIME
MILLISEC

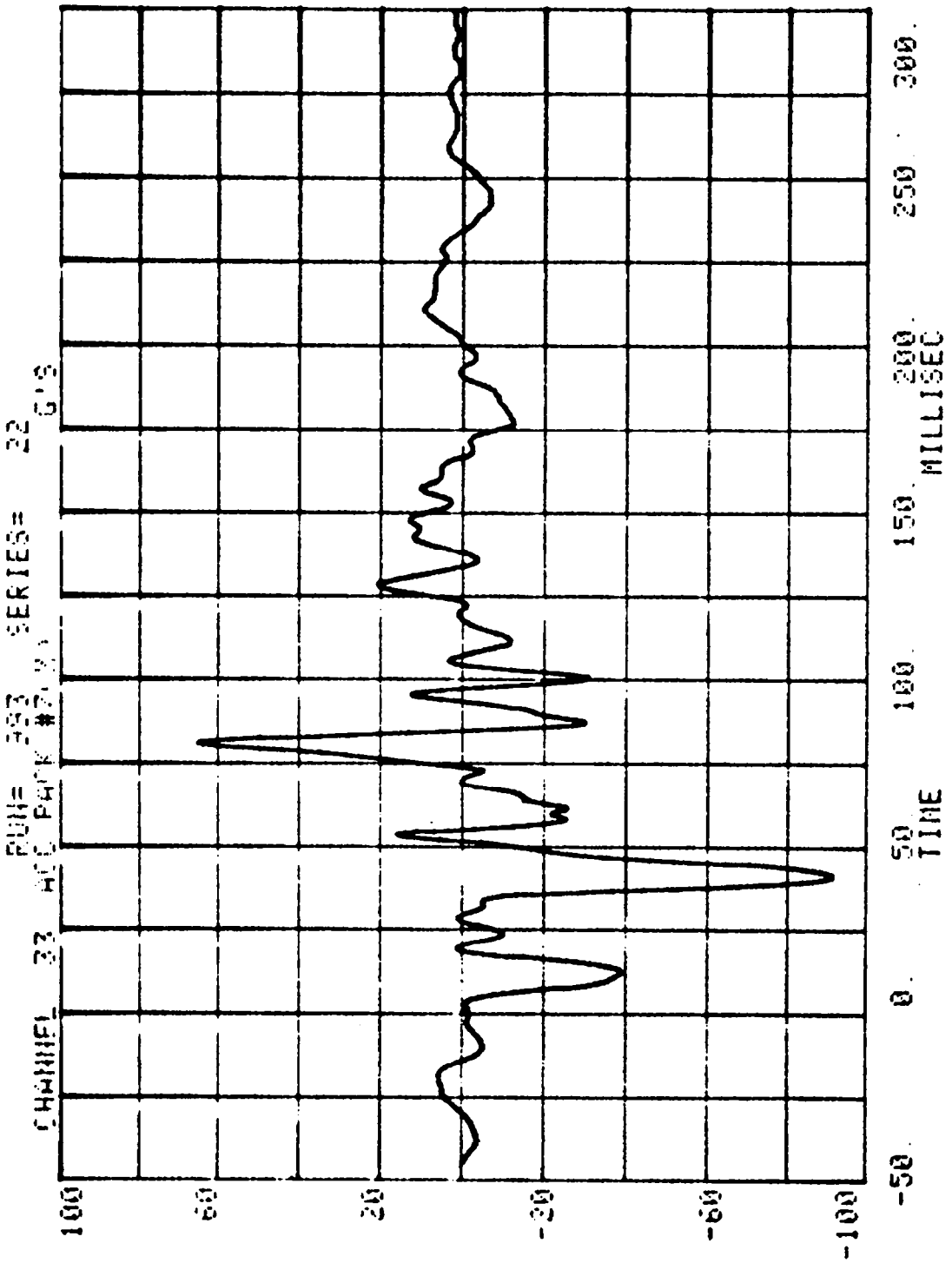
7776-22

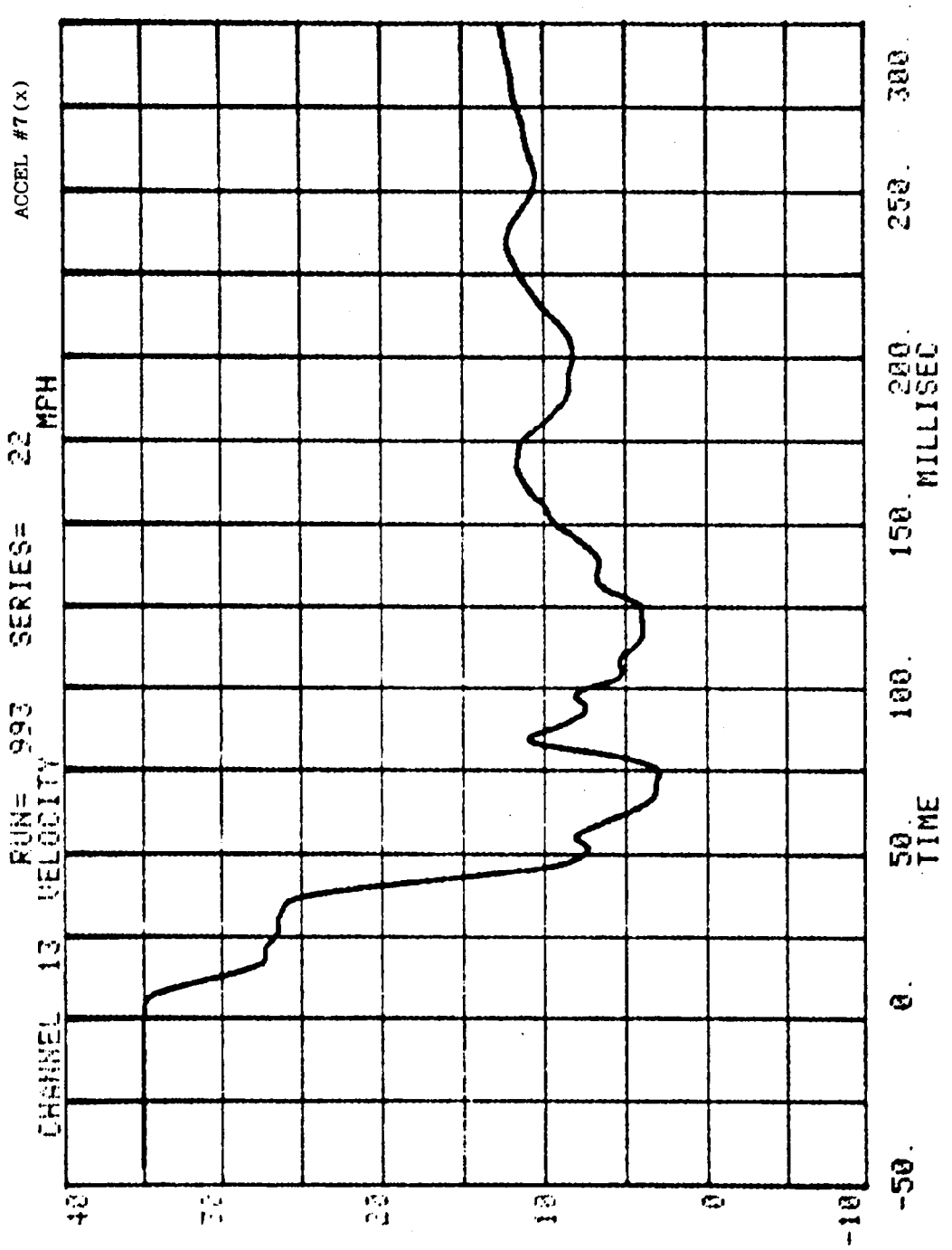

ACCEL #6(x)
CHANNEL 11 VELOCITY
RUN= 393 SERIES= 22 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

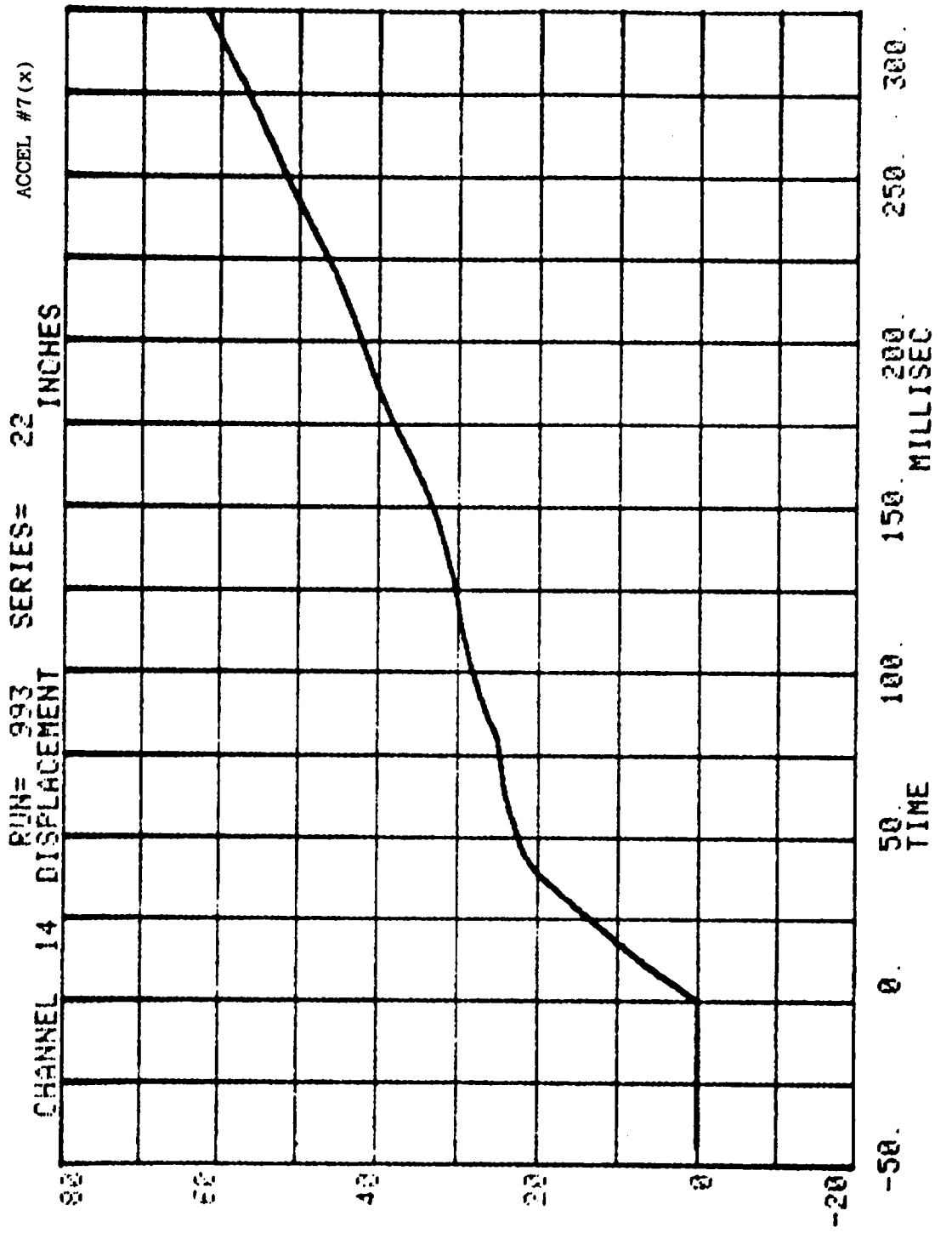
7776-22


RUN= 933 SERIES= 22
ACCEL #6(x)
CHANNEL 12 DISPLACEMENT
INCHES
60
40
20
0
-20
-50.
0.
50
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22


CHANNEL 33
SERIES= 22
G'S
100
60
20
-20
-60
-100
-50
0.
50
100
150.
200.
250.
300.
TIME
MILLISEC


ACCEL #7(x)
CHANNEL 13 VELOCITY
RUN= 993 SERIES= 22 MPH
40
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

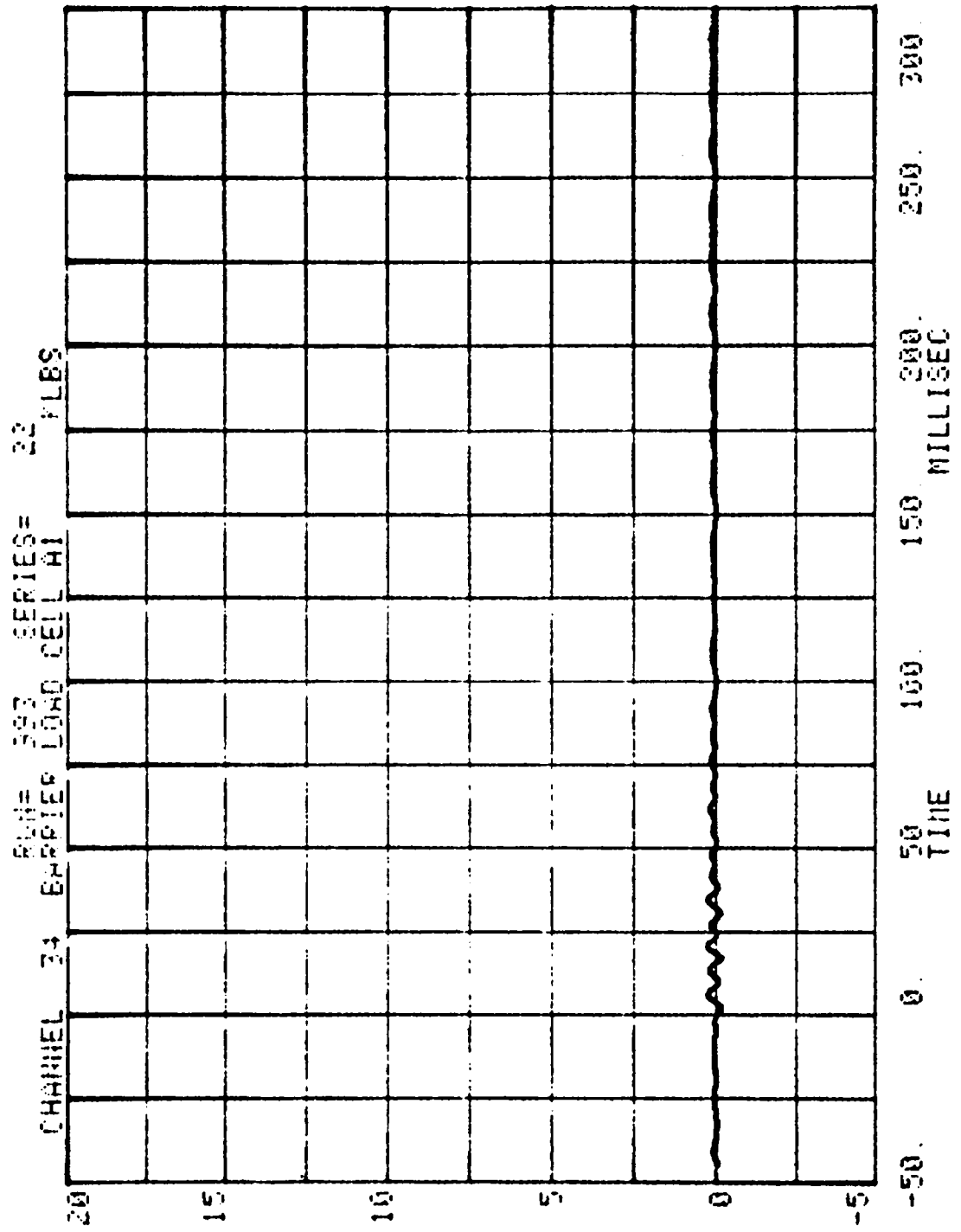

ACCEL #7(x)
CHANNEL 14 DISPLACEMENT
RUN= 993 SERIES= 22
INCHES
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

TEST NO. ML5502

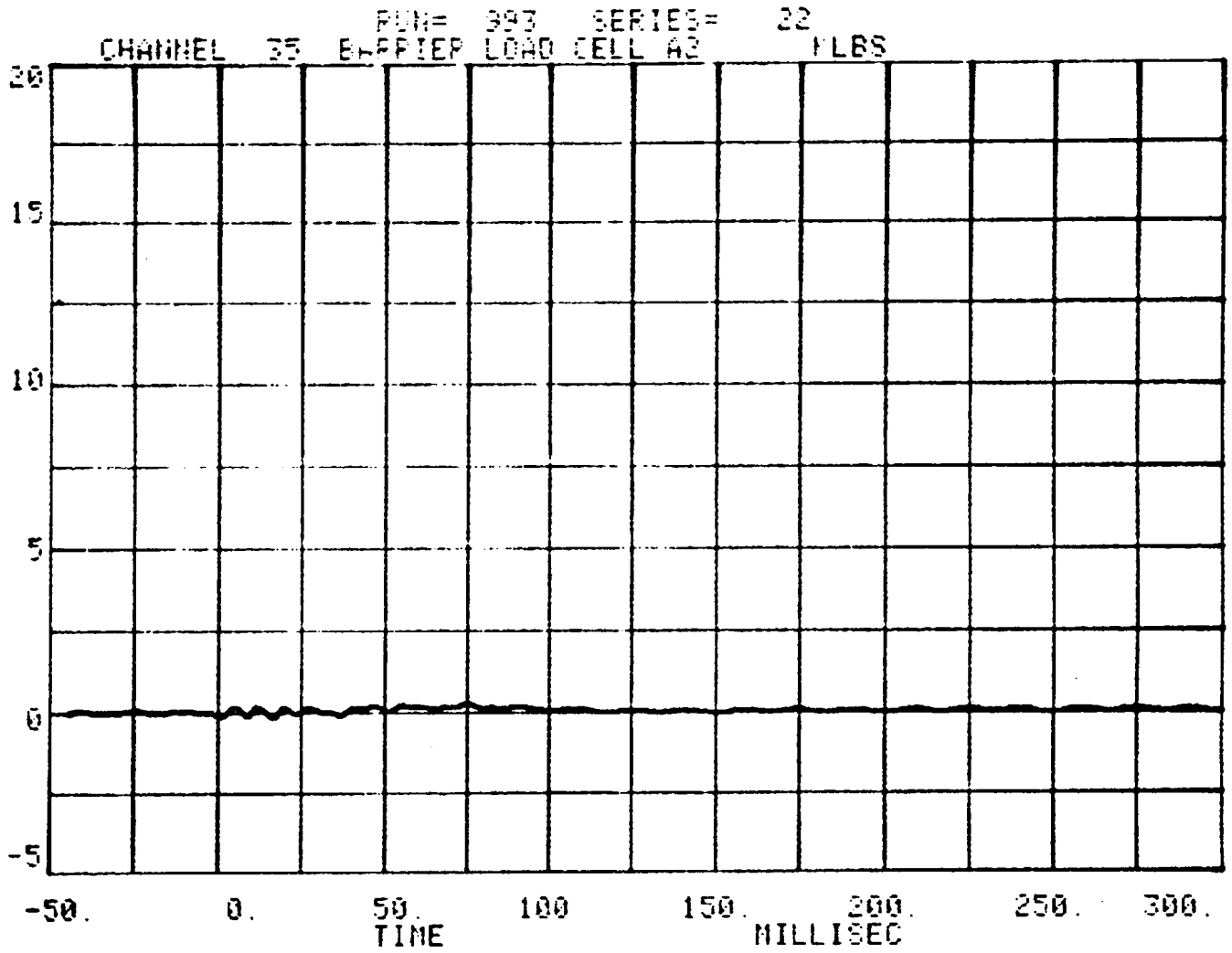
LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

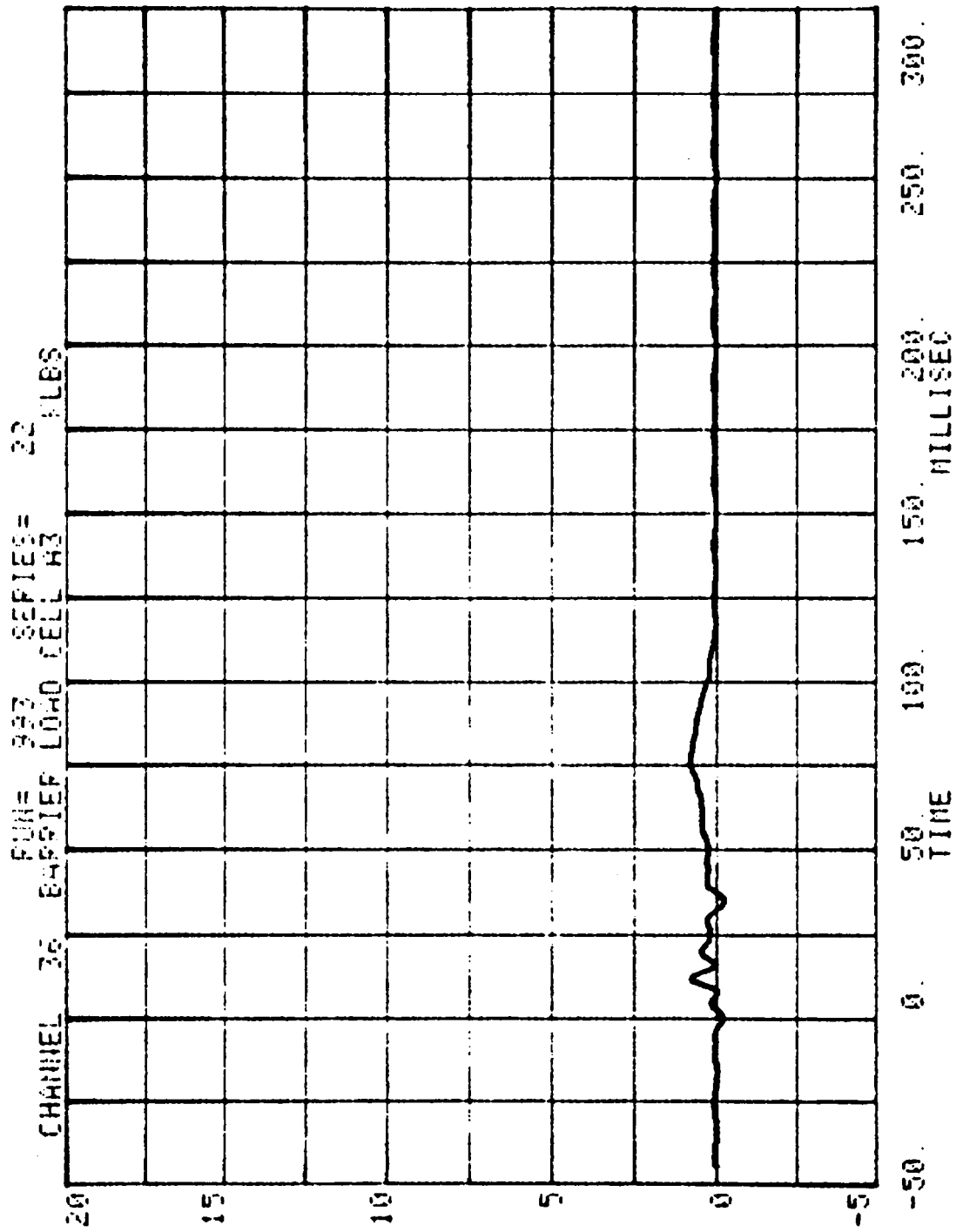
60


CHANNEL 34
BLADE 3 SERIES= 33
EARTHED LOAD CELL HI
FLES
20
15
10
5
0
-5
-50.
0.
50
TIME
100.
150
200.
MILLISEC
250.
300

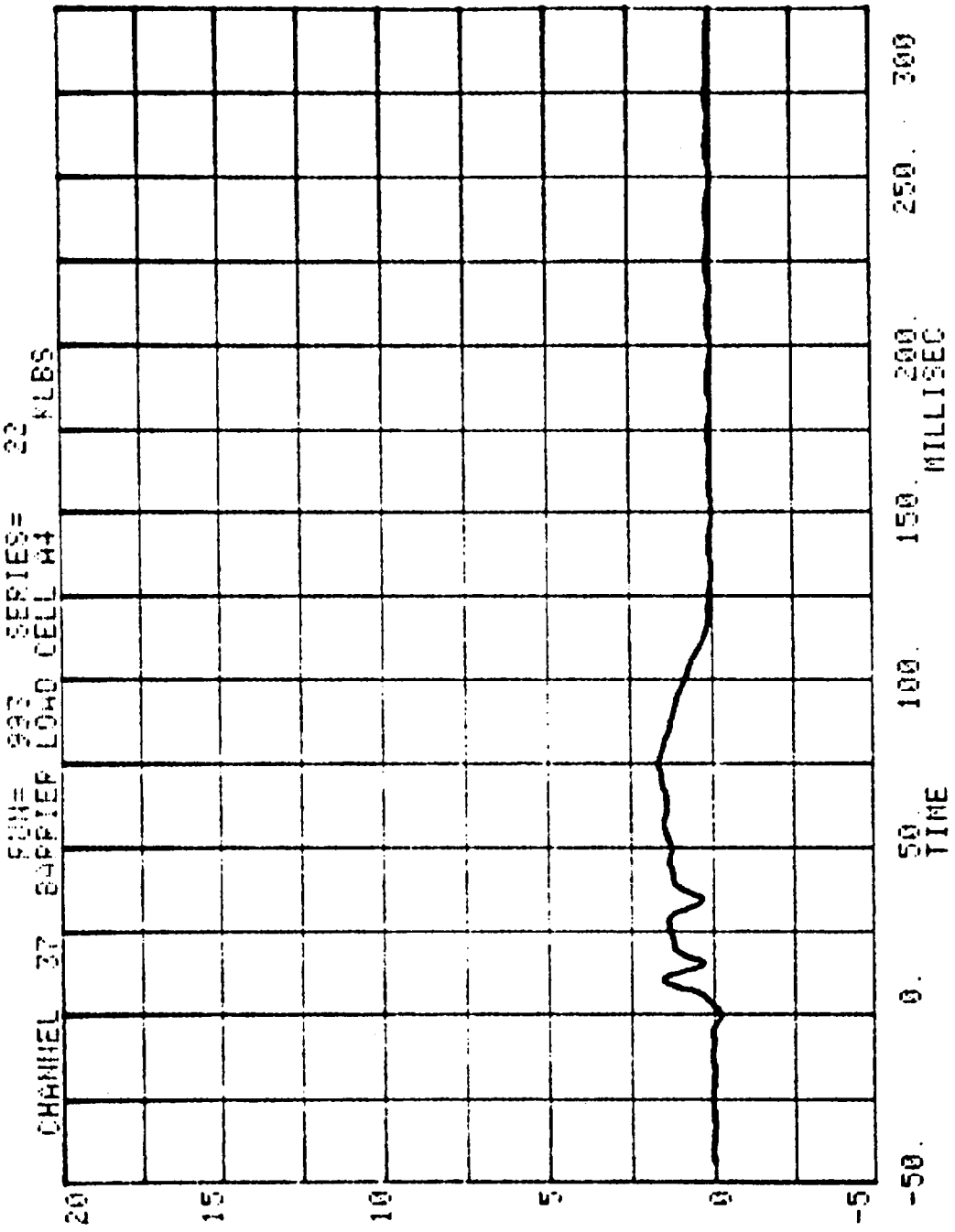
7776-22

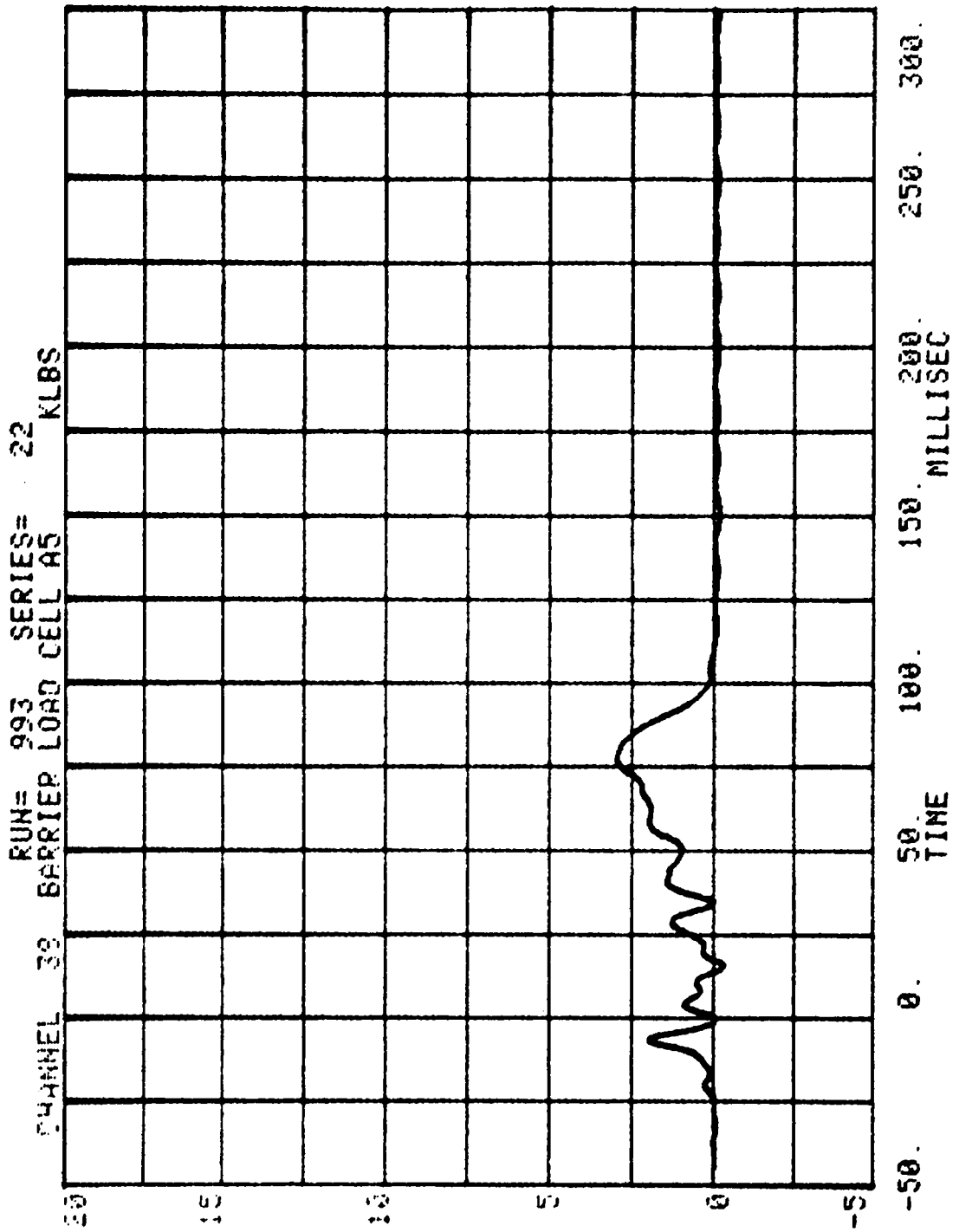

RUN= 393 SERIES= 22
CHANNEL 35 BARRIER LOAD CELL A2 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100
150.
200.
250.
300.
TIME
MILLISEC

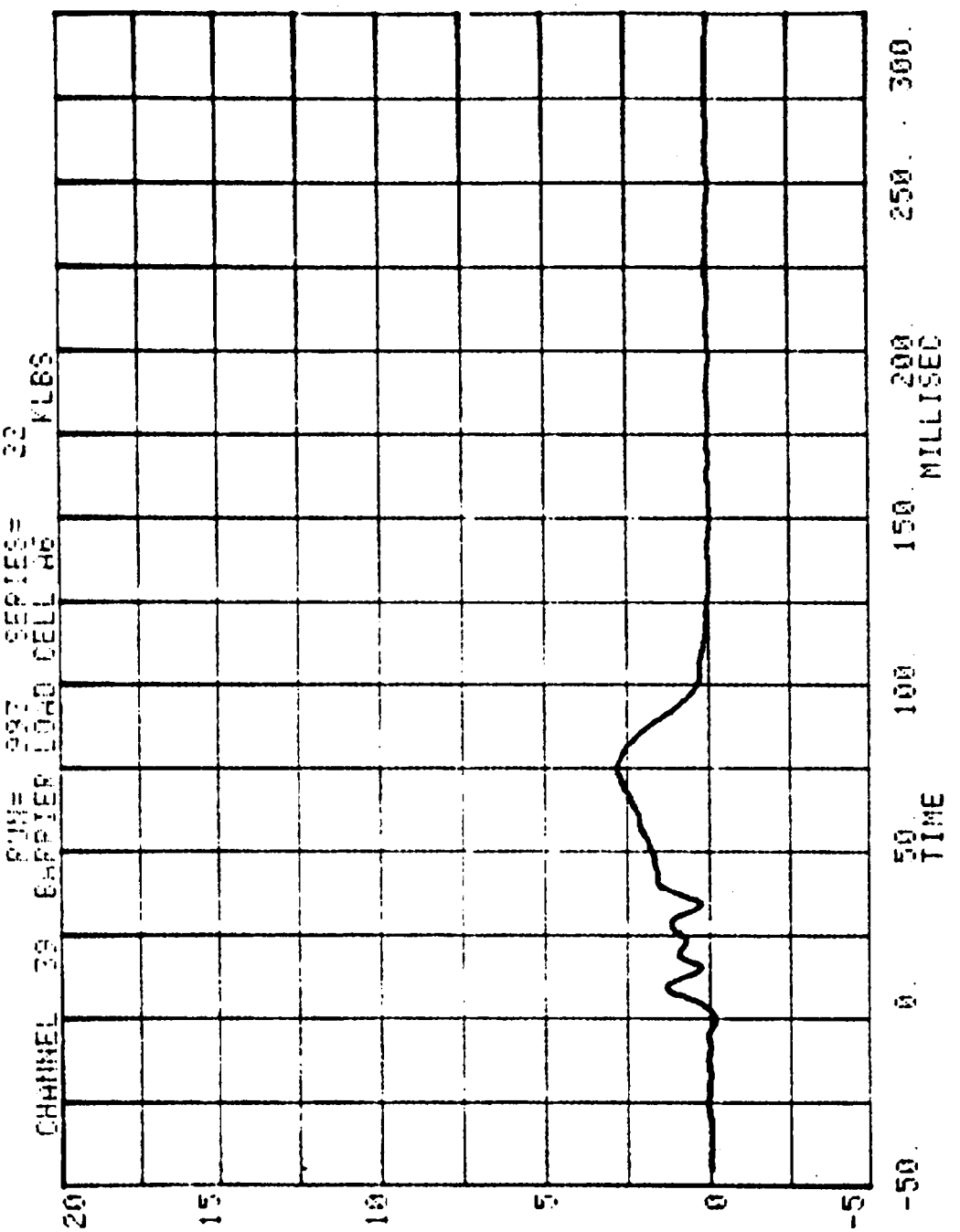
7776-22

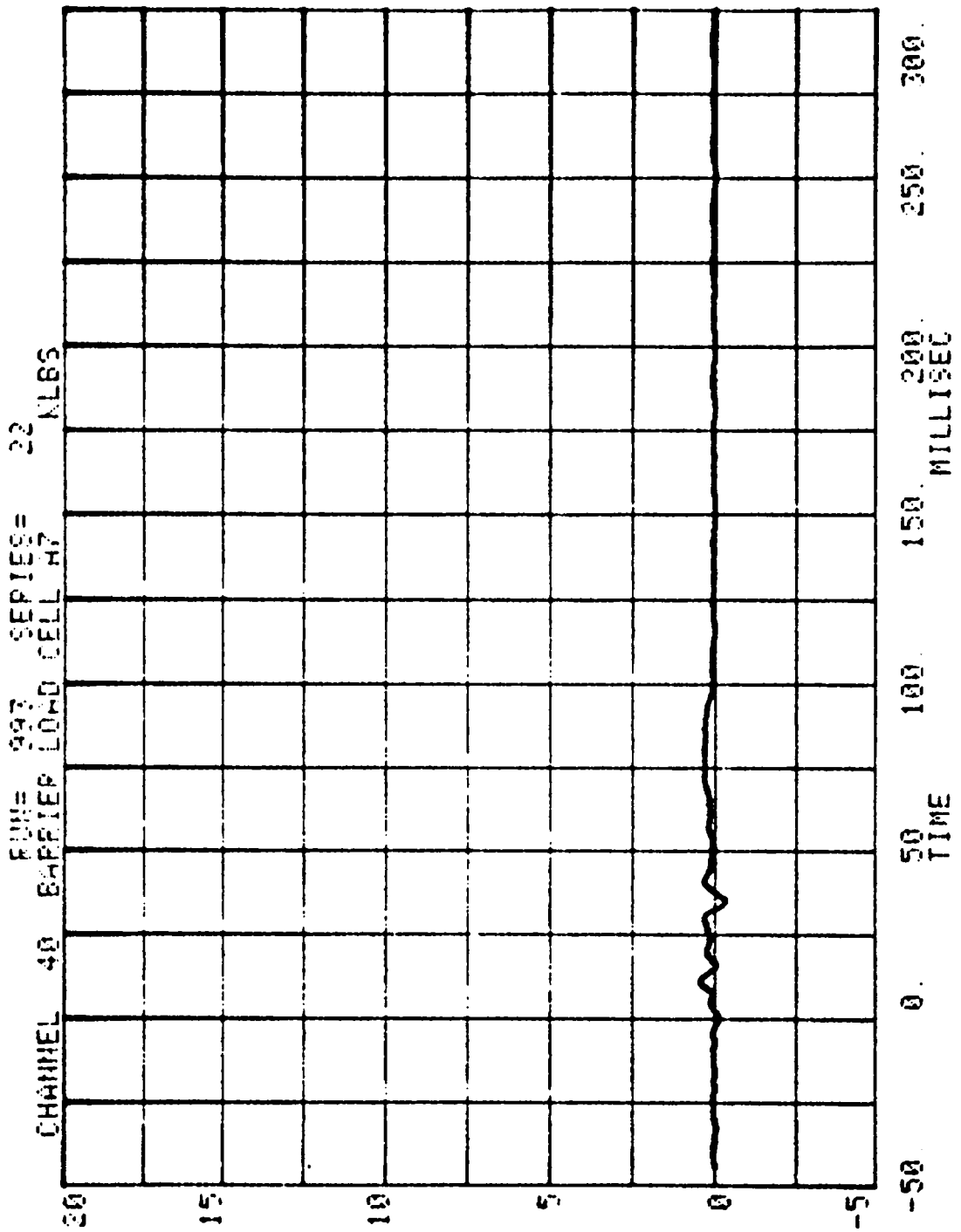

CHANNEL 36 EASTERN LOAD CELL #3
RUN= 333 SERIES= 22 FILES
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

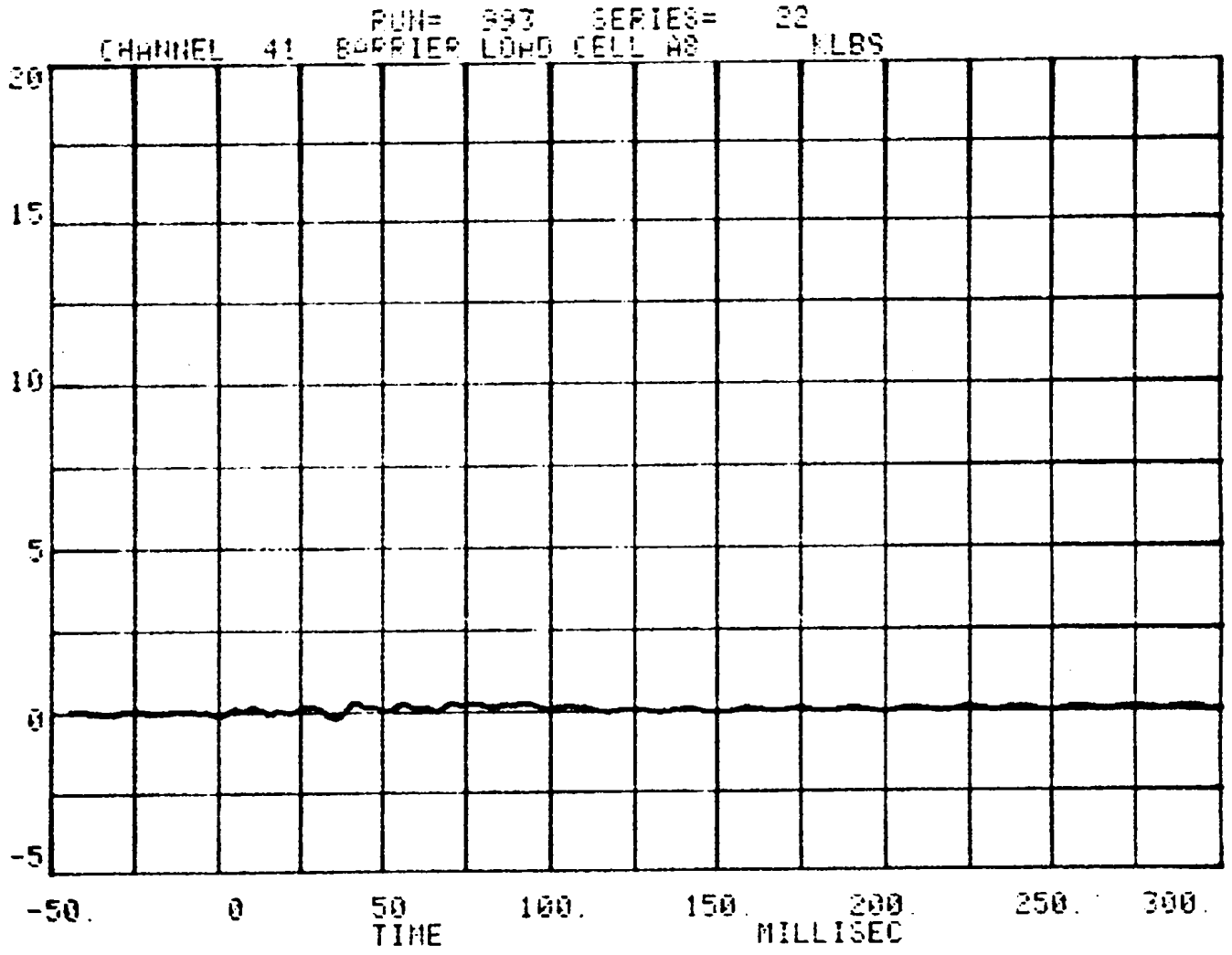
7776-22

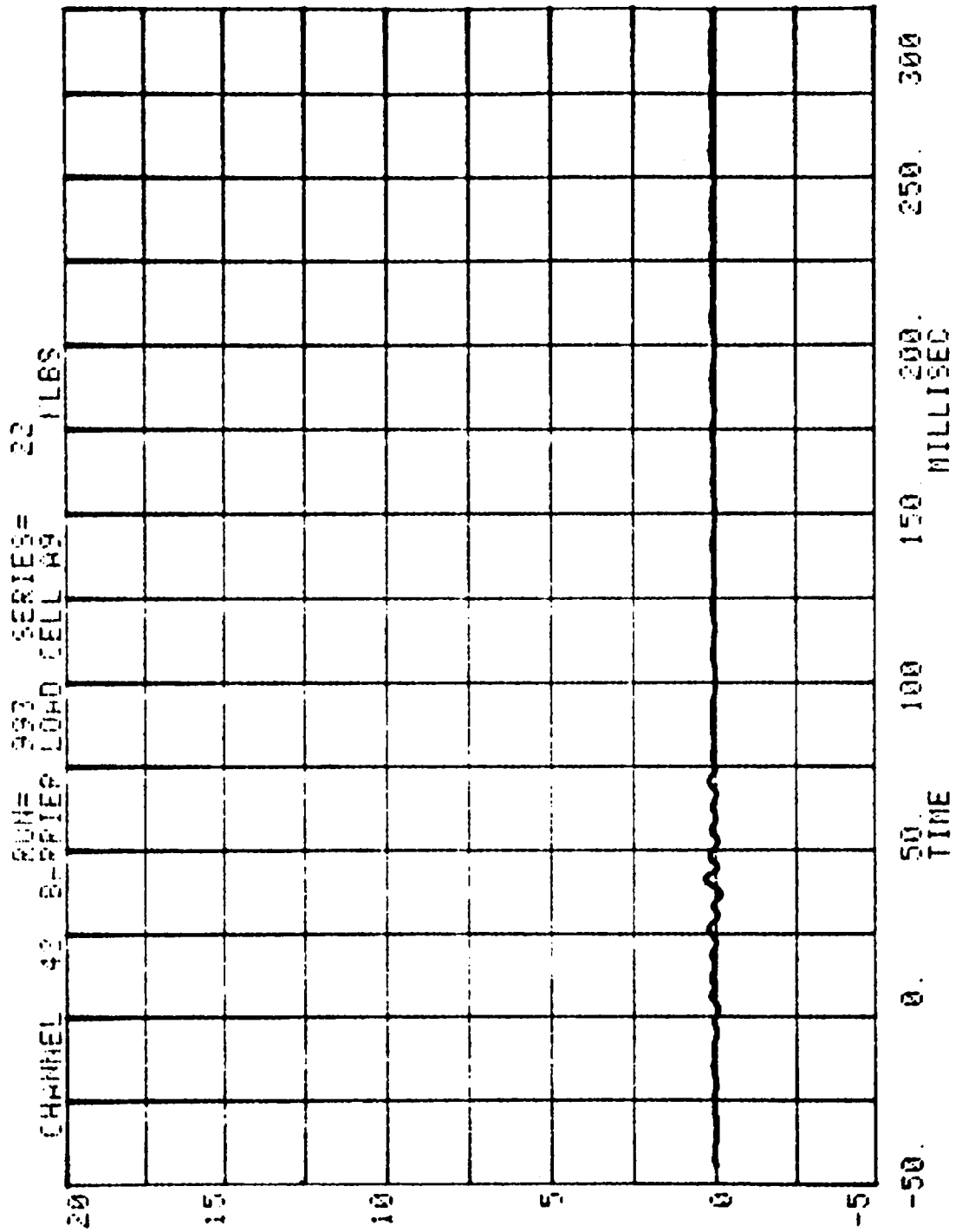

CHANNEL 37 SERIES= 22
SCALE= 993 KLBS
CARRIER LOAD CELL #4
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300
TIME
MILLISEC


CHANNEL 32
RUN= 993 SERIES= 22
BARRIER LOAD CELL A5
KLBS
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC
-5
0
5
10
15
20

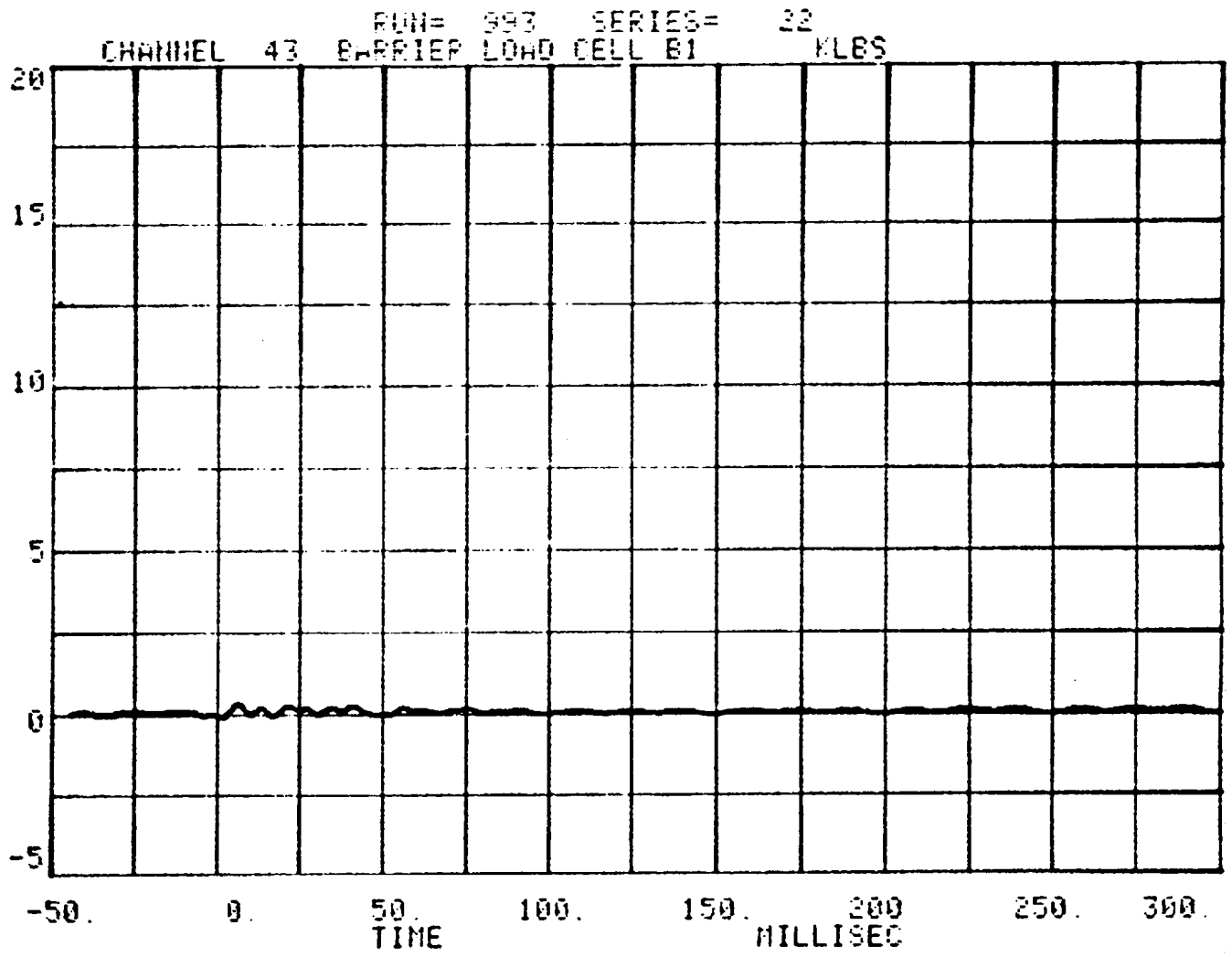

CHANNEL 38
RUN= 997 SERIES= 32
20
15
10
5
0
-5
-50
0
50
100
150
200
250
300
TIME
MILLISEC
KLBS


CHANNEL 40 RUN= 997 SERIES= 22
BARRIER LOAD CELL #7 KLBS
20
15
10
5
0
-5
-50
0.
50
100
150
200
250
300
TIME
MILLISEC


RUN= 993 SERIES= 22
CHANNEL 41 BARRIER LOAD CELL A8 KLBS
20
15
10
5
0
-5
-50.
0
50
100.
150.
200.
250.
300.
TIME
MILLISEC

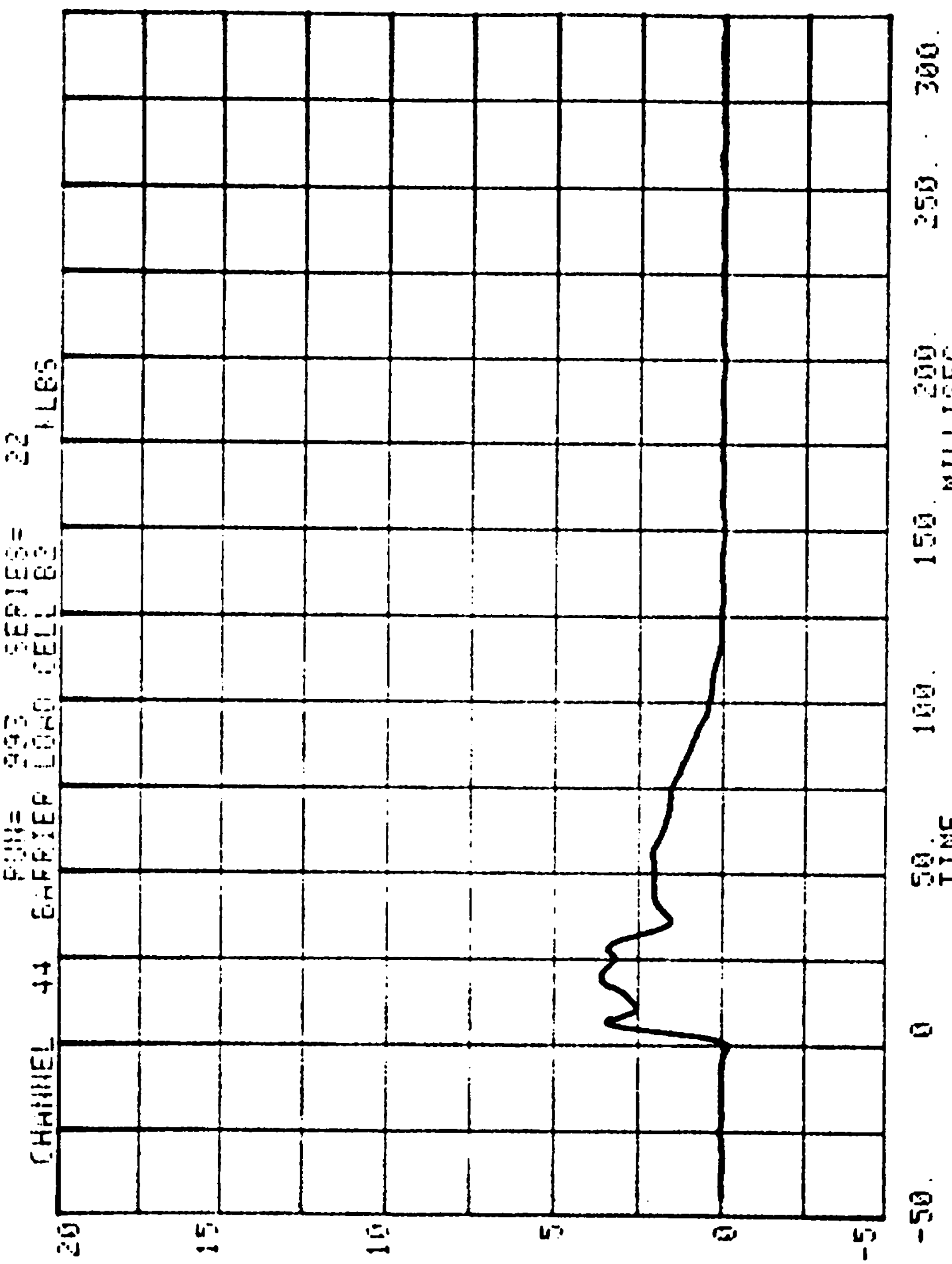

CHANNEL 42 B-PRIEP LOAD CELL A9
RUN= 393 SERIES= 22
LBS
20
15
10
5
0
-5
-50.
0.
50.
100
150
200.
250.
300
TIME
MILLISEC

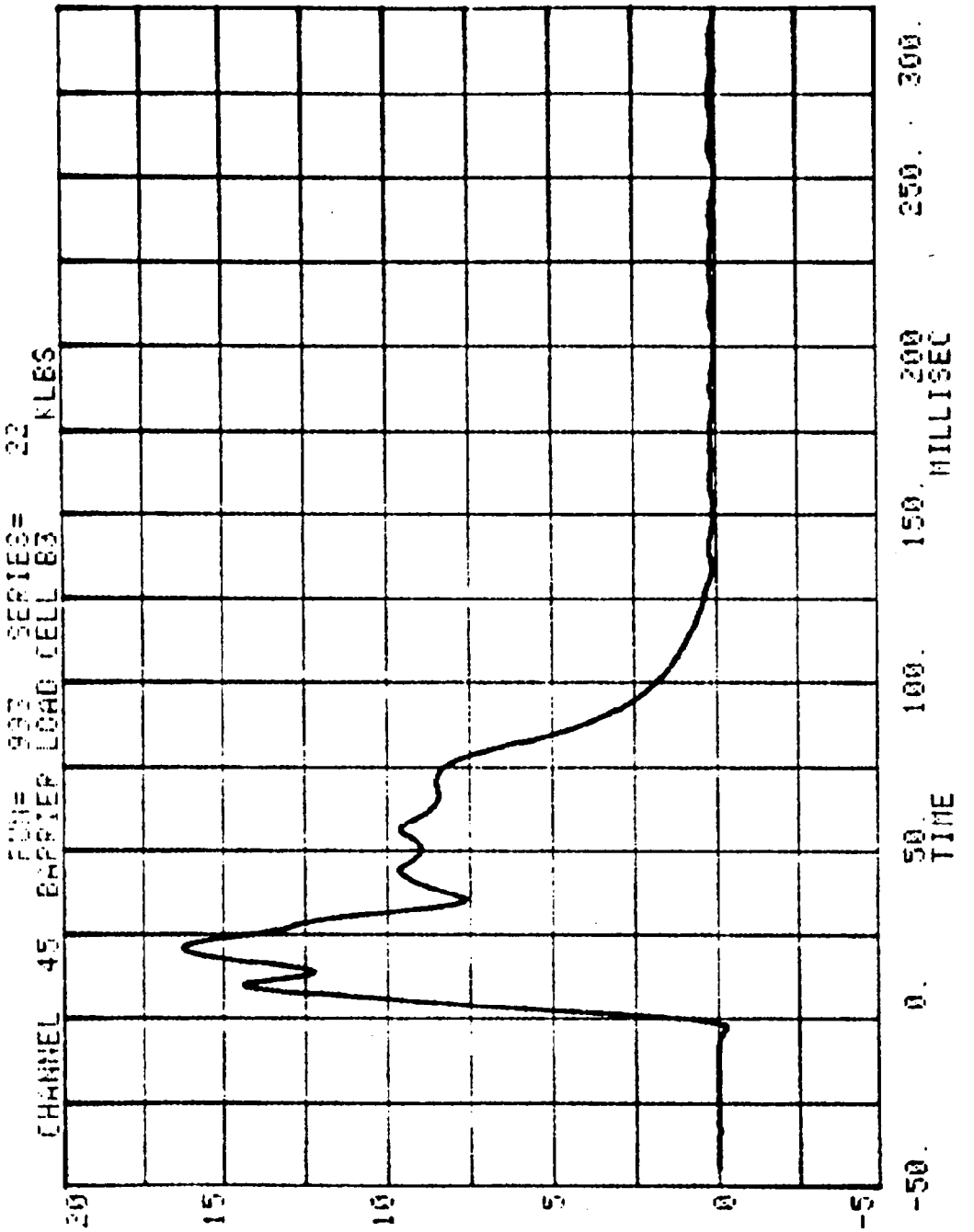
7776-22

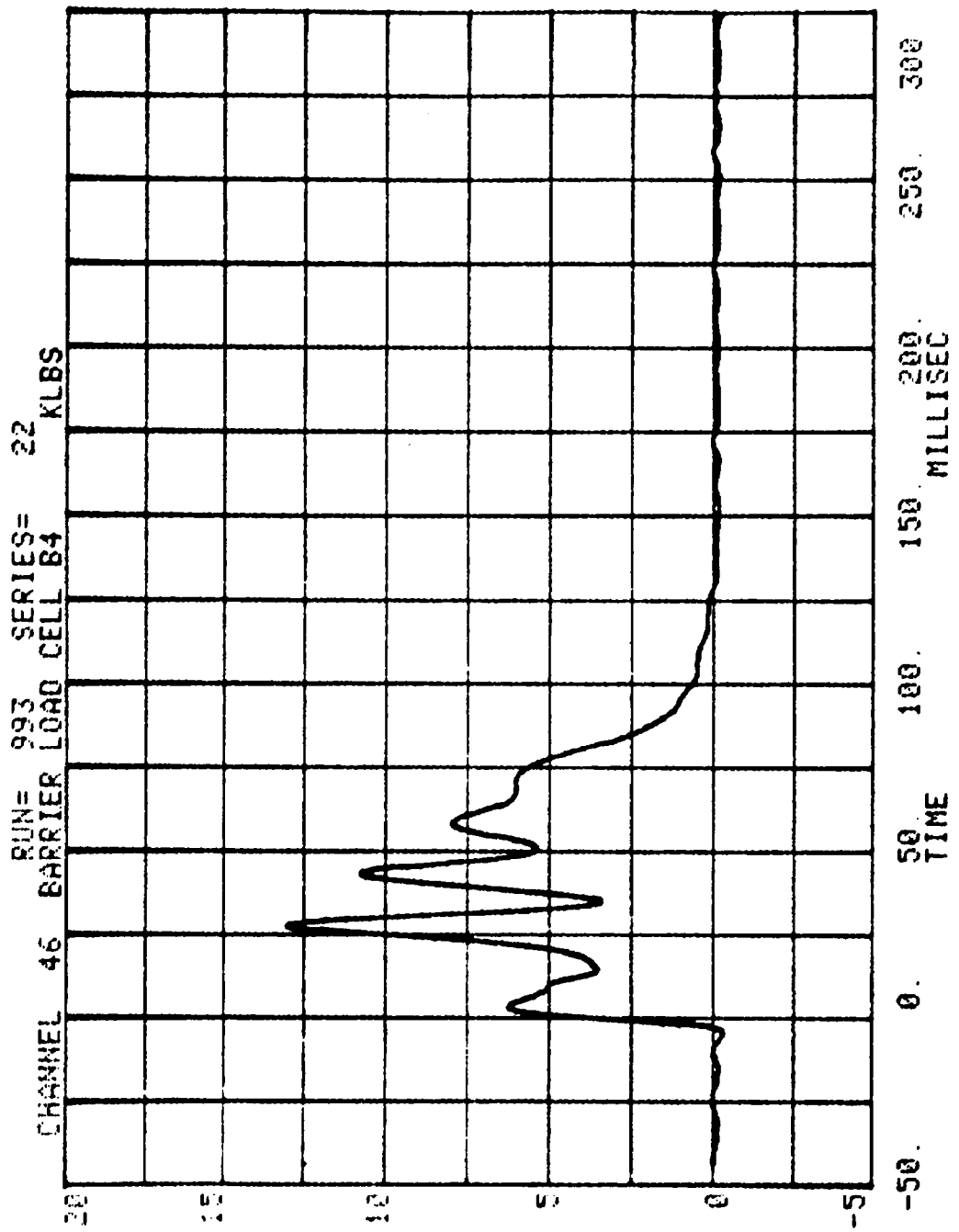

RUN= 993 SERIES= 32
CHANNEL 43 BARRIER LOAD CELL B1 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200
250.
300.
TIME
MILLISEC

B-34

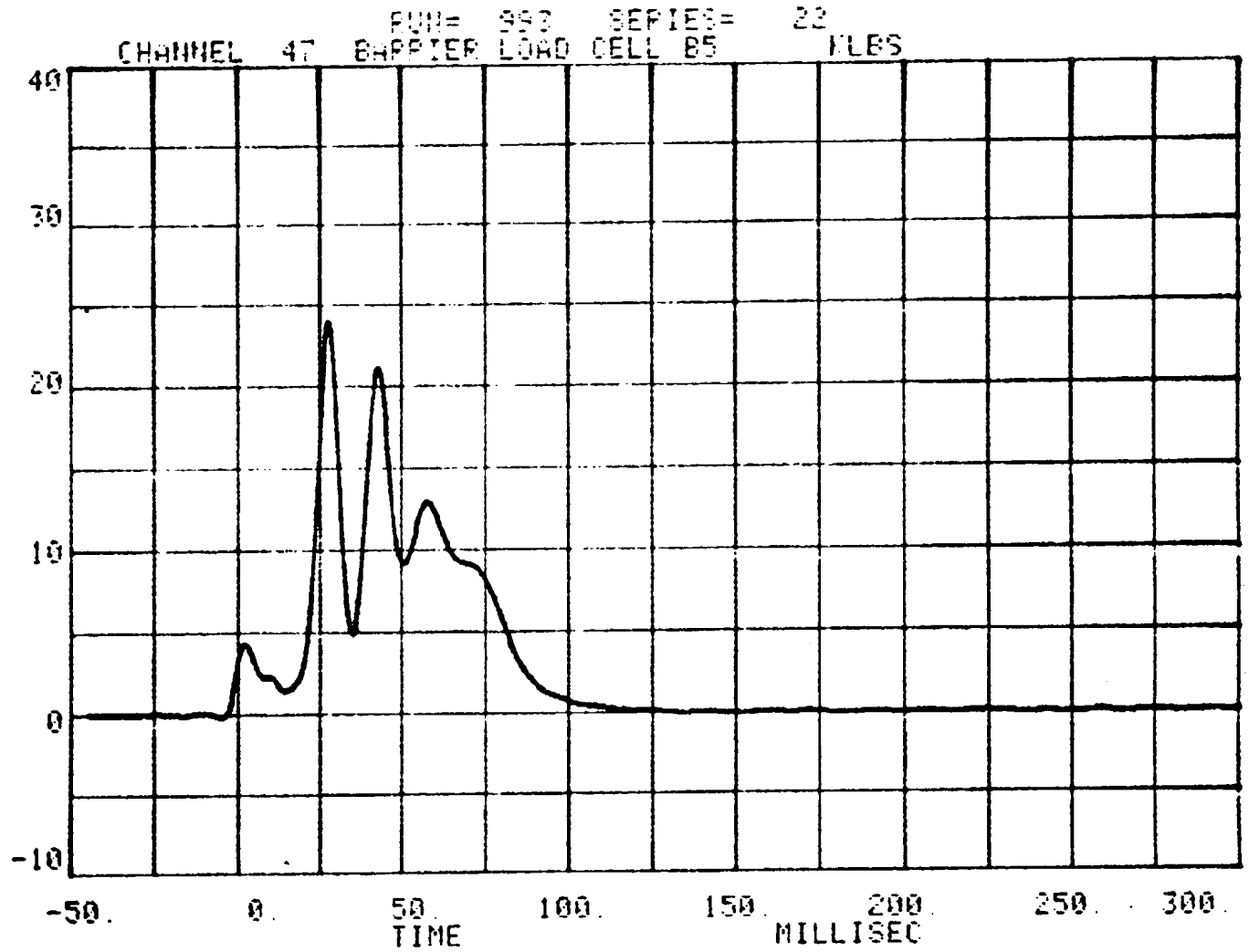
7776-22


CHANNEL 44 RUN= 993 SERIES= 22
CARRIER LOAD CELL B2 LBS
20
15
10
5
0
-5
-50.
0
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

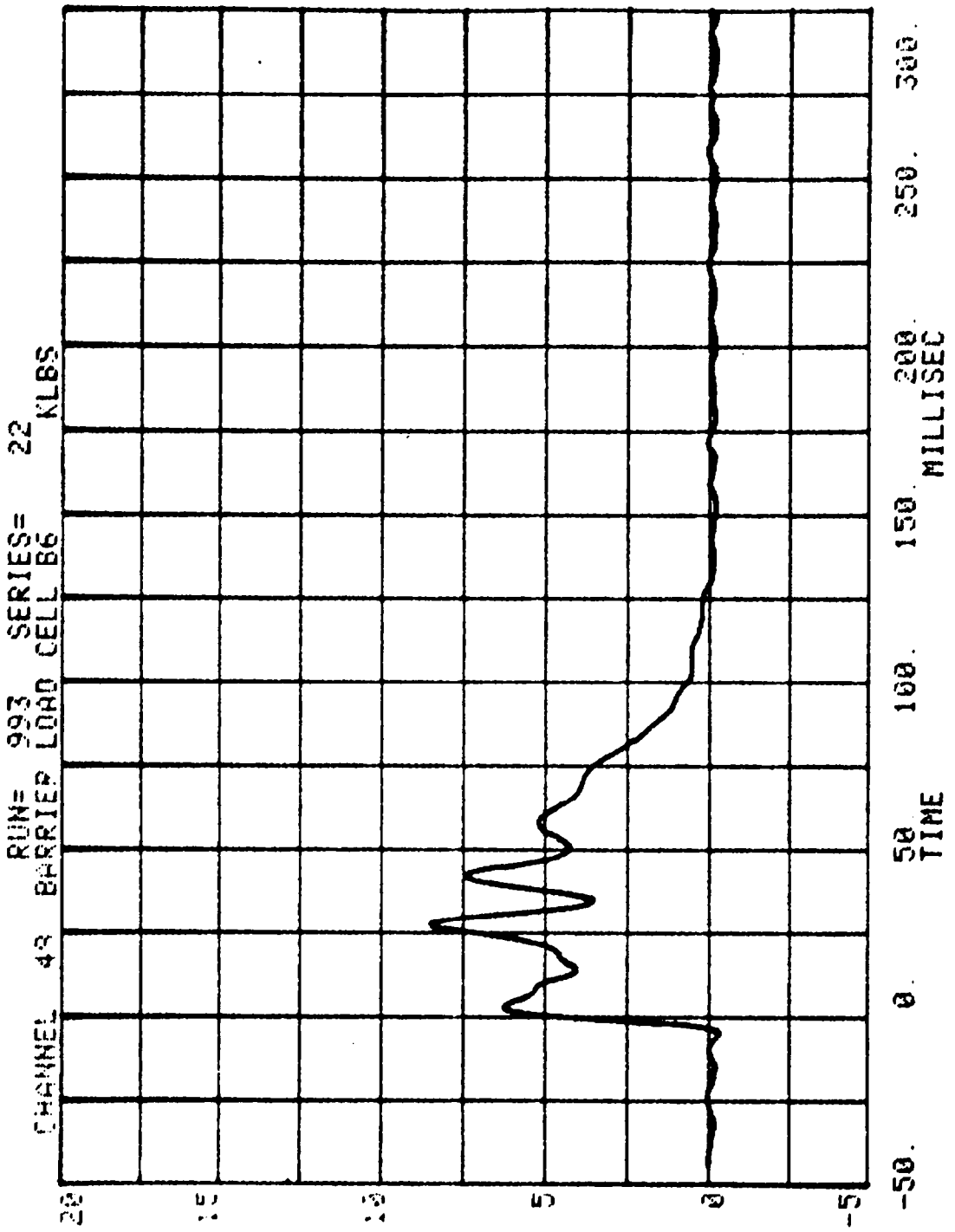

CHANNEL 45 BARRIER LOAD CELL B3
FILE= 933 SERIES= 22
KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200
250.
300.
TIME
MILLISEC


CHANNEL 46 BARRIER LOAD CELL B4
RUN= 993 SERIES= 22 KLBS
-50. 0. 50. 100. 150. 200. 250. 300
TIME MILLISEC
-5 0 5 10 15 20

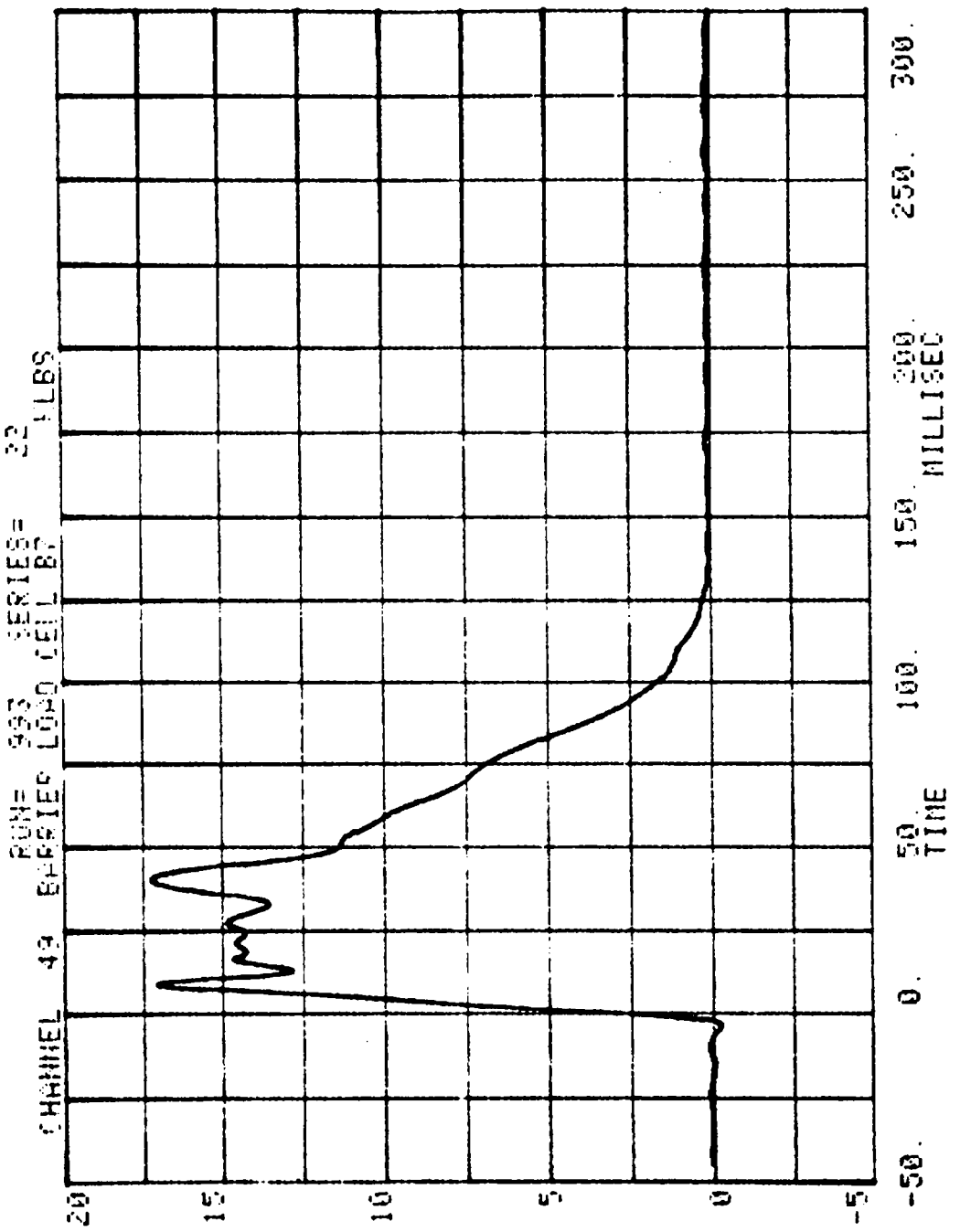
7776-22

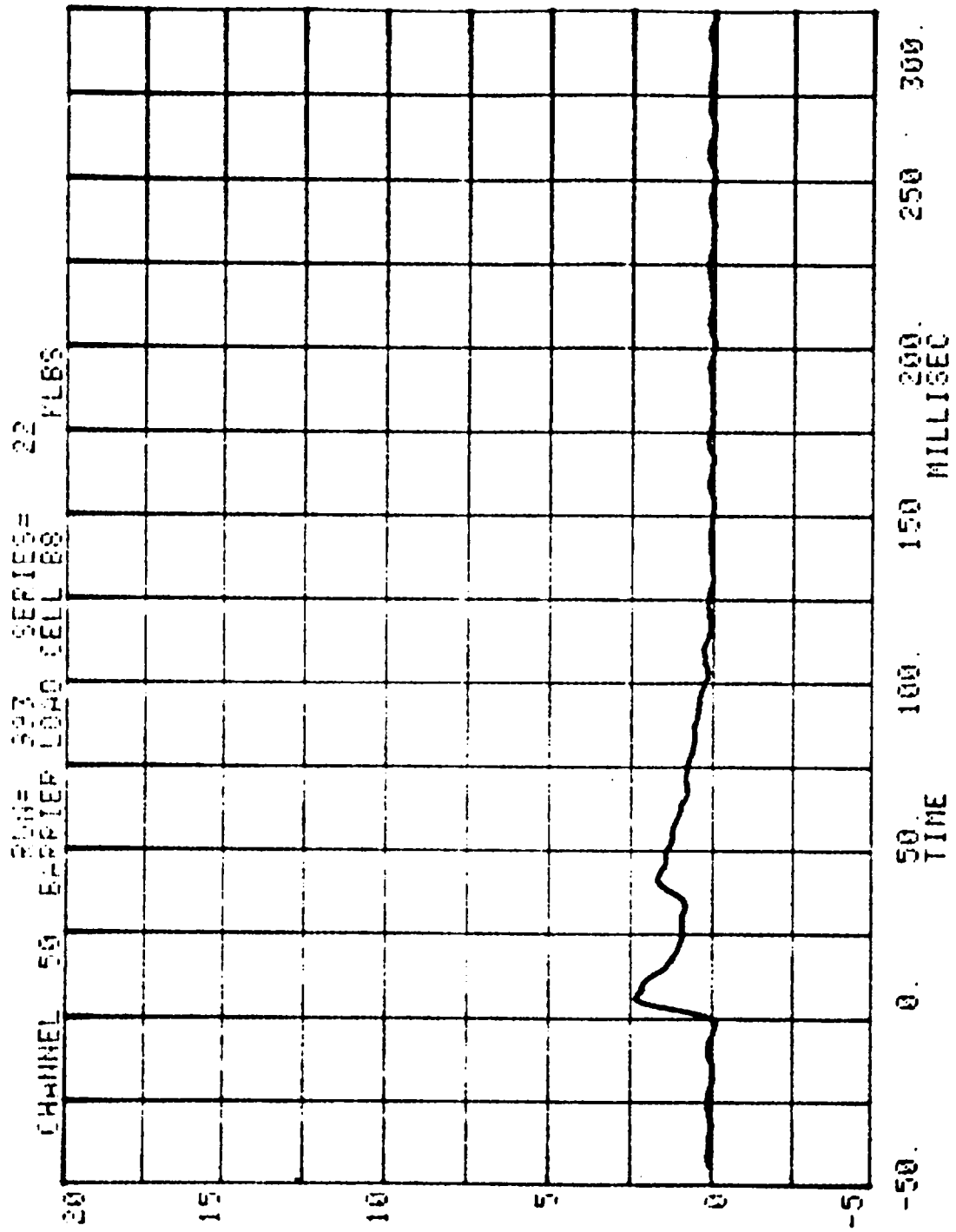

RUN= 993 SERIES= 22
CHANNEL 47 BARRIER LOAD CELL B5 KLBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

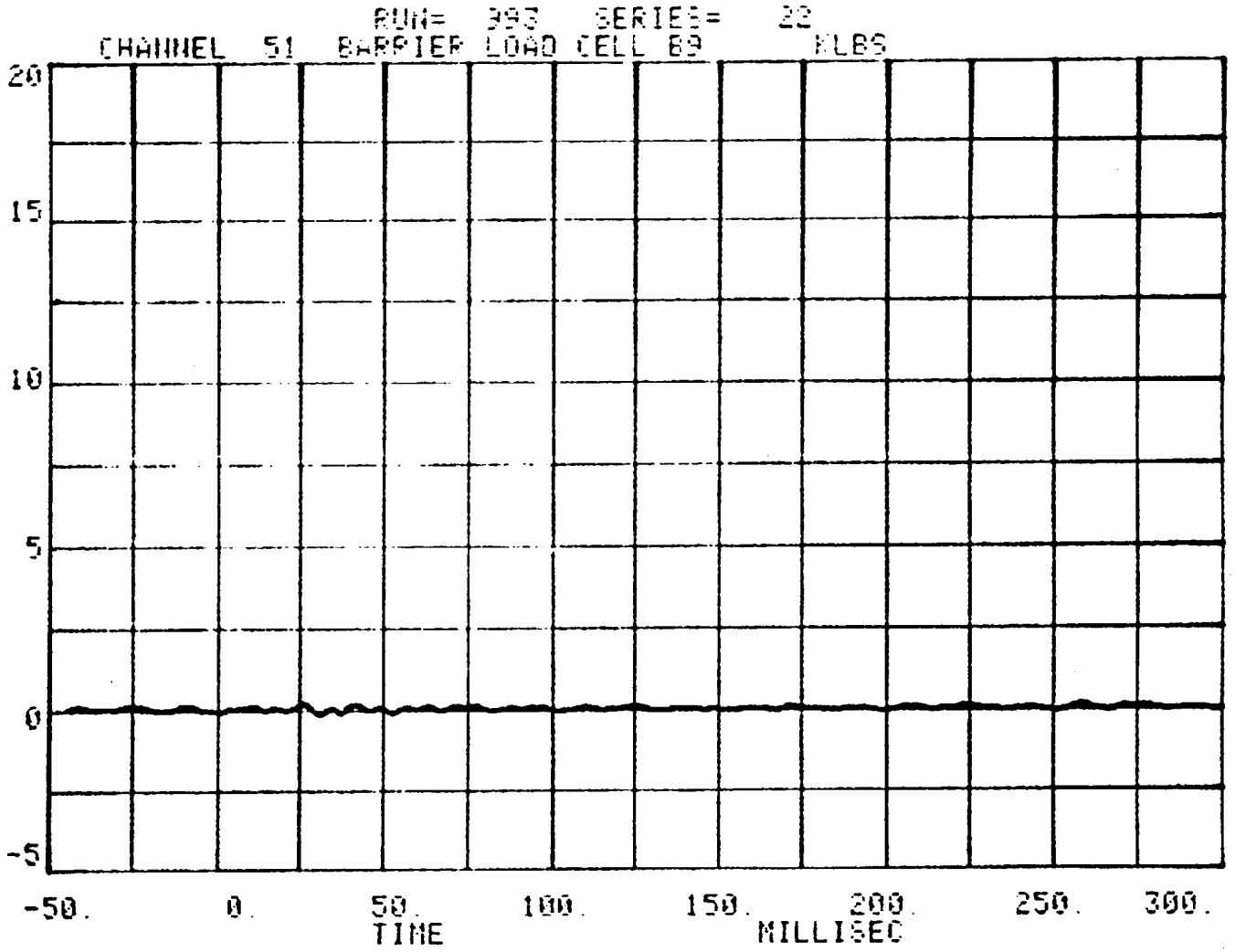

CHANNEL 43 BARRIER LOAD CELL B6
RUN= 993 SERIES= 22 KLBS
-50. 0. 50 100. 150 200. 250. 300.
TIME MILLISEC
-5 0 5

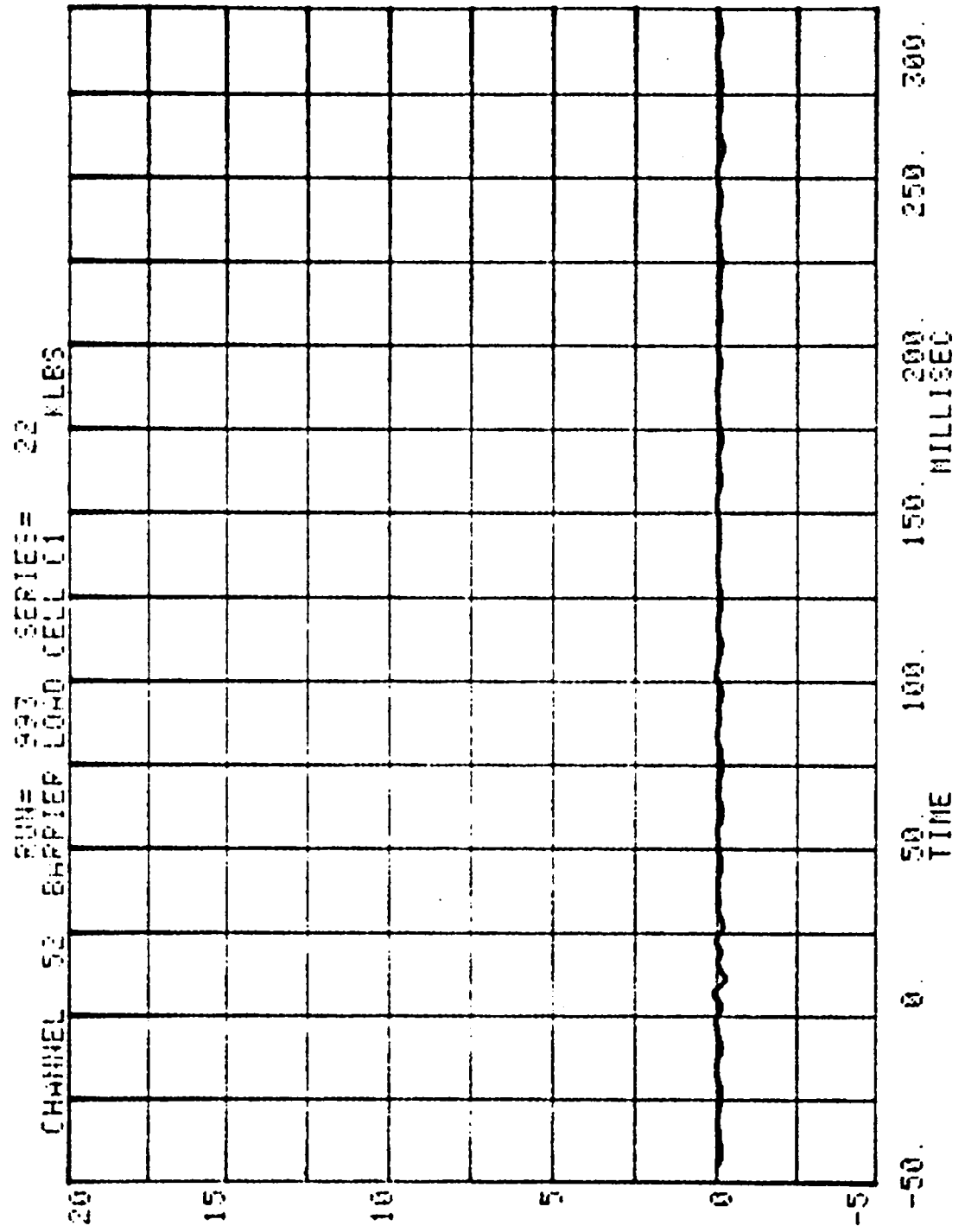
7776-22


CHANNEL 42 BATTERY RUN= 993 SERIES= 32
LOAD CELL LBS
LBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

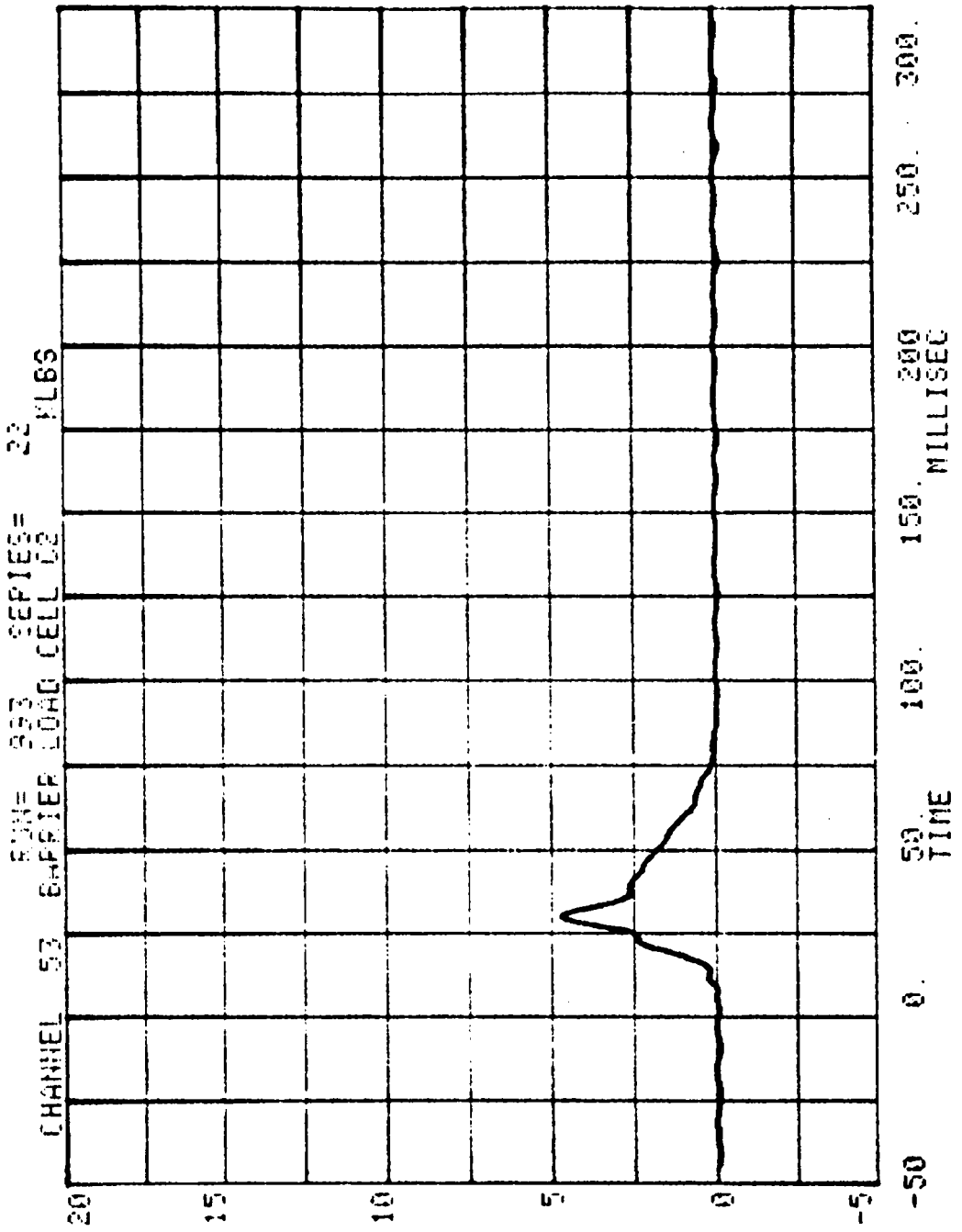

CHANNEL 55 BARRIER LOAD CELL 88
SERIES= 22 KLBS
-50. 0. 50. 100. 150 200. 250 300.
MILLISEC
TIME
30 15 10 5 0 -5

7776-22

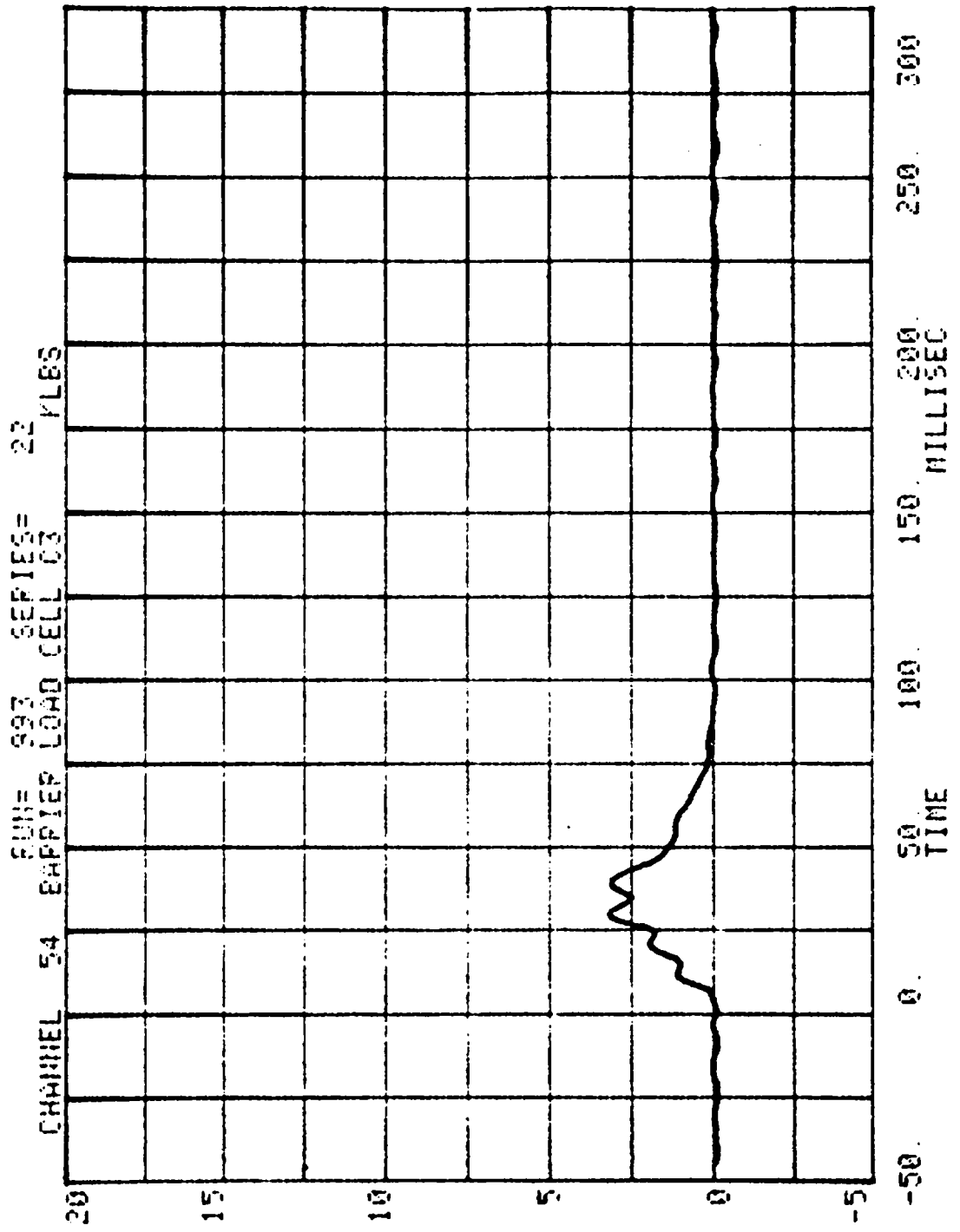

RUN= 393 SERIES= 22
CHANNEL 51 BARRIER LOAD CELL 89 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 52 SHAPED LOAD CELL 01
RUN= 992 SERIES= 22
KLBS
20
15
10
5
0
-5
-50.
0
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

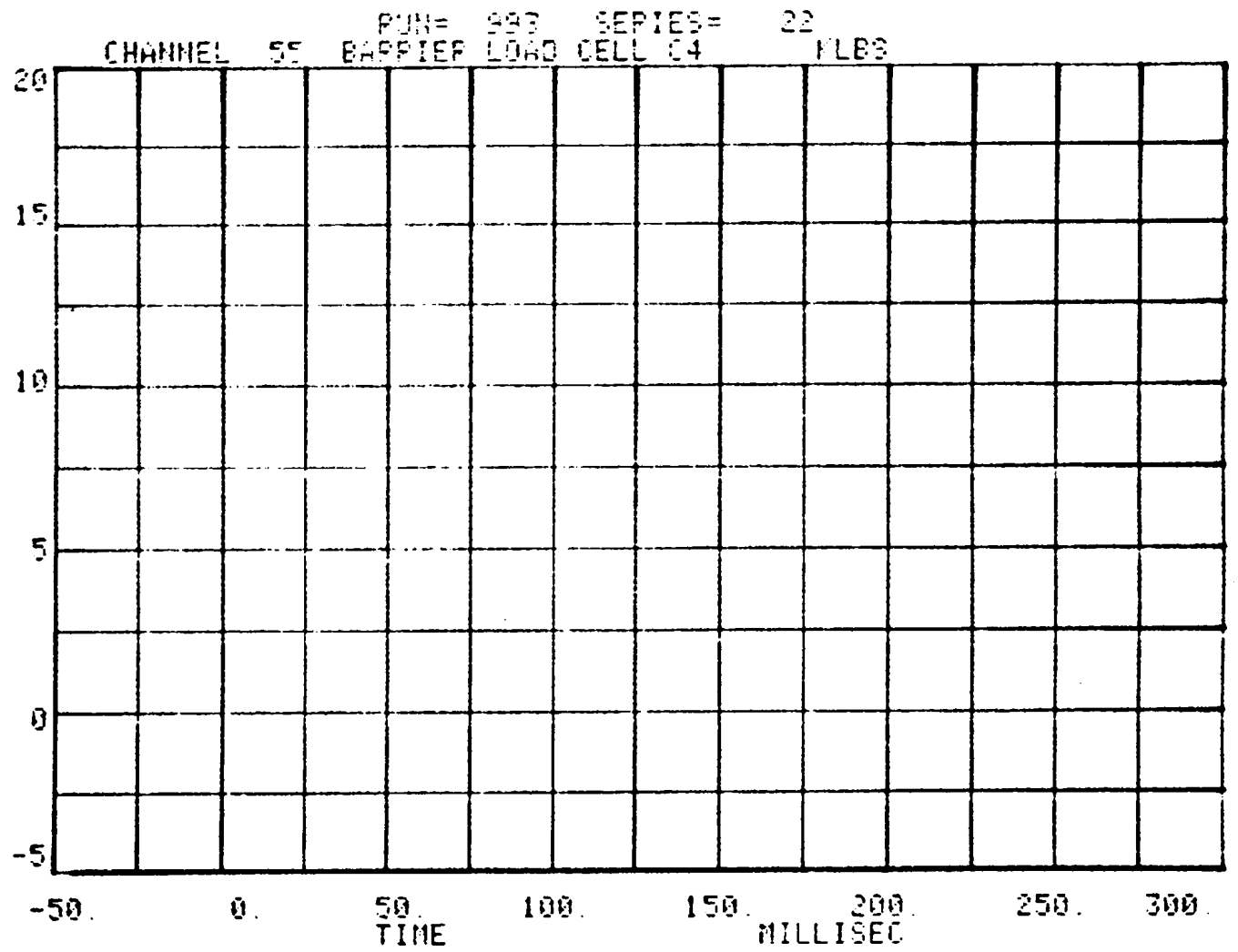
7776-22

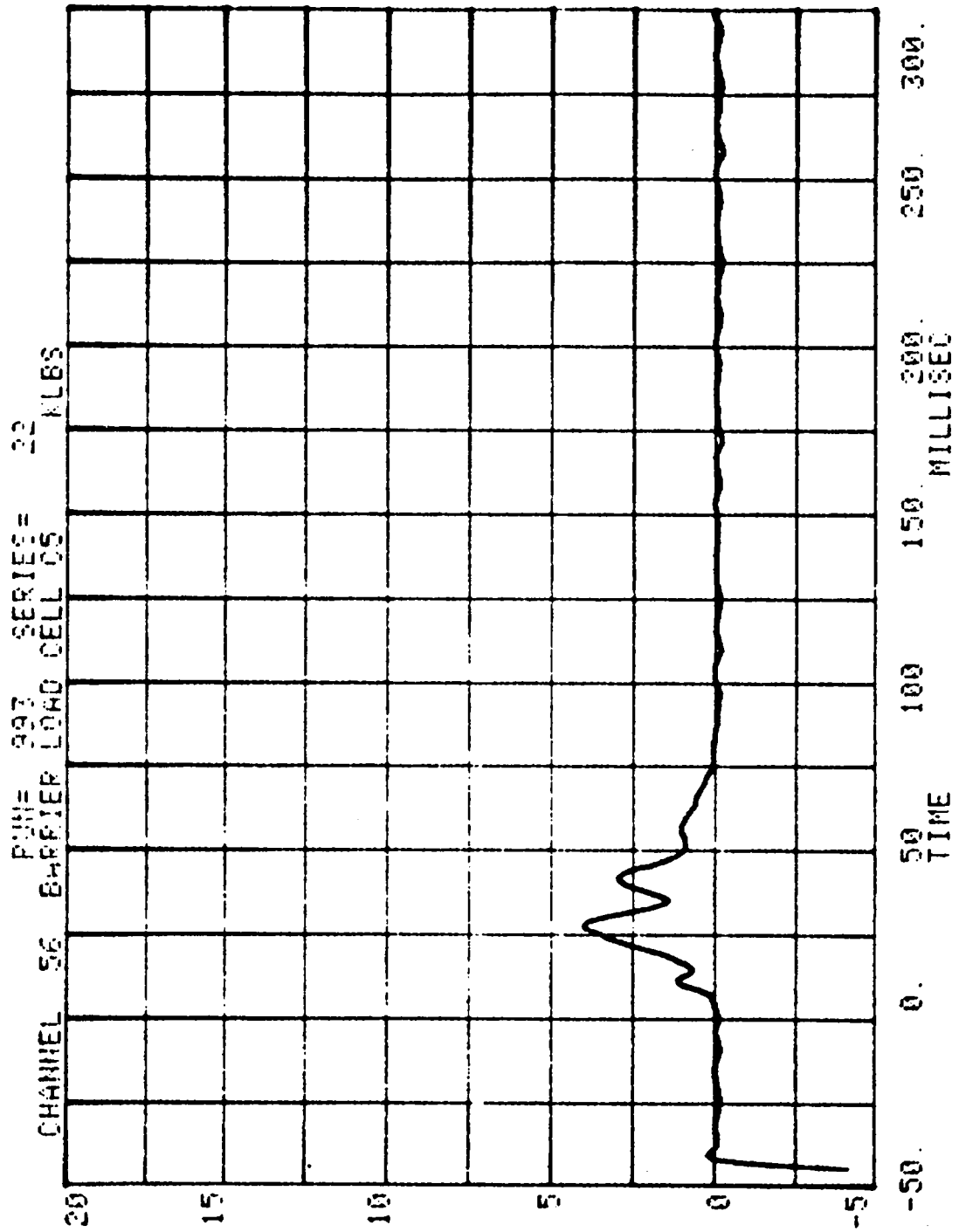

CHANNEL 53 BARRIER LOAD CELL L2
RUN= 333 SERIES= 22
KLBS
20
15
10
5
0
-5
-50
0.
50.
TIME
100.
150.
200
MILLISEC
250.
300.

7776-22

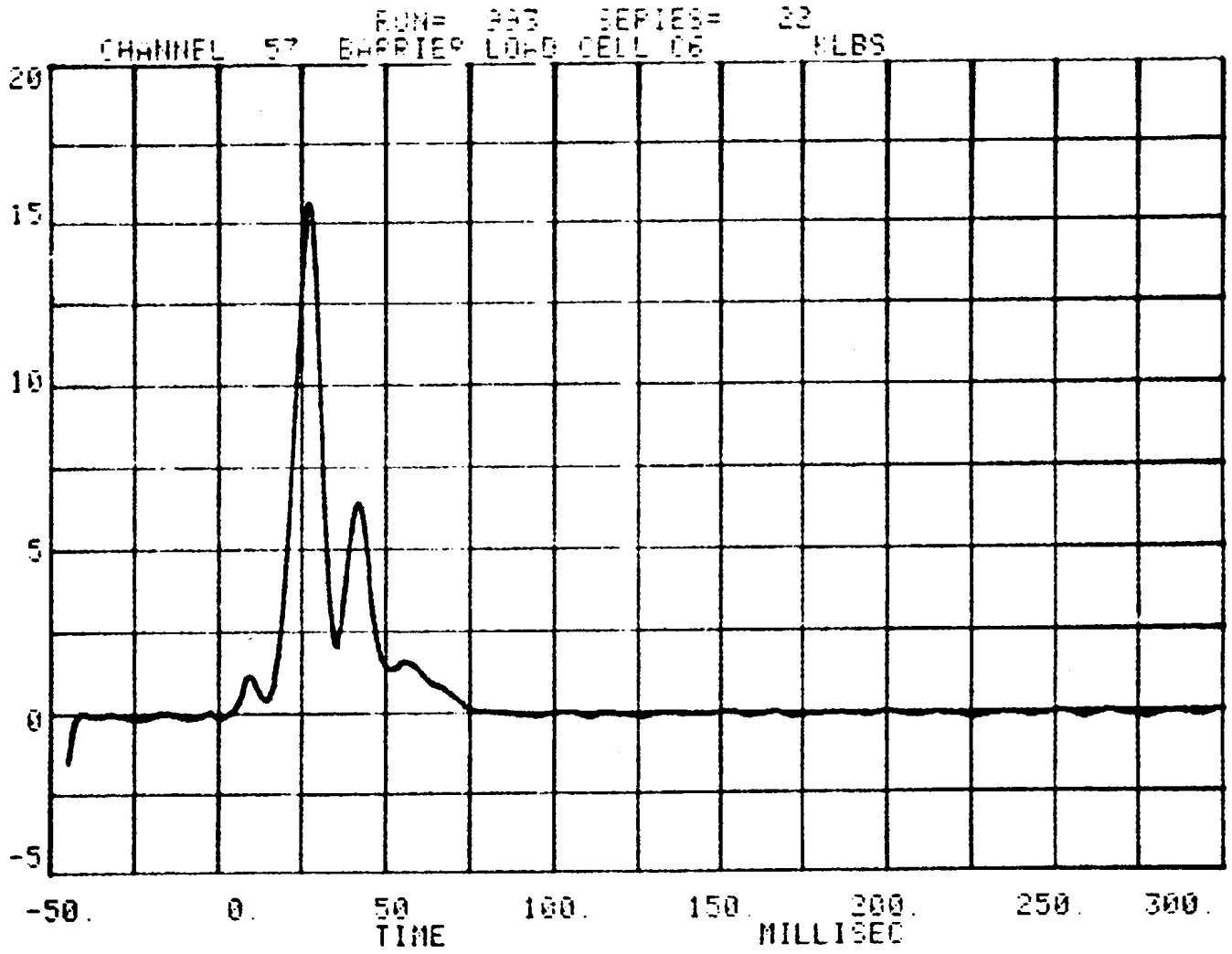

CHANNEL 54 RUN= 993 SERIES= 22
EMPTIES LOAD CELL 03 FILES
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

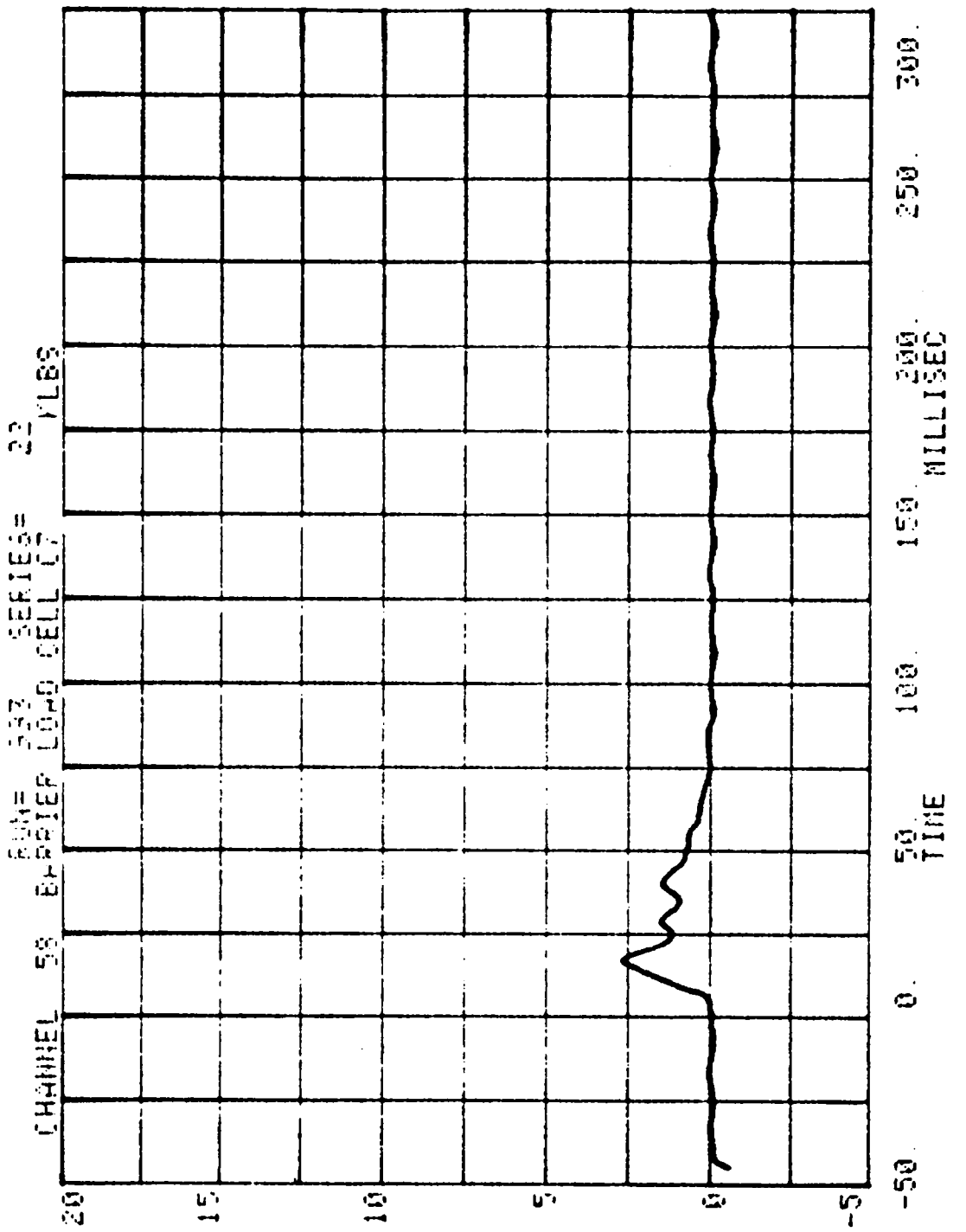

RUN= 993 SERIES= 22
CHANNEL 55 BARRIER LOAD CELL C4 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

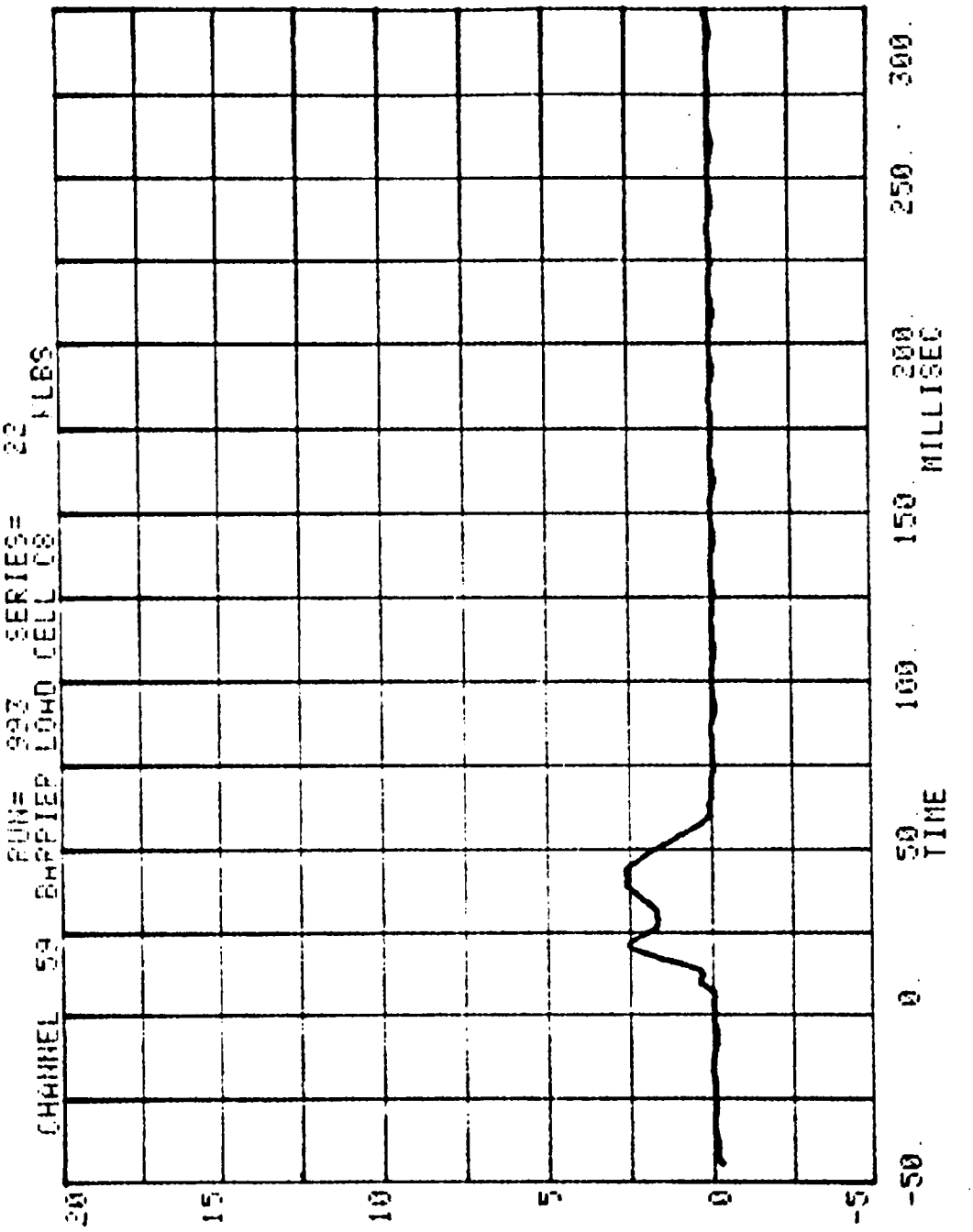

CHANNEL 56 BARRIER LOAD CELL CS
RUN= 393 SERIES= 32 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100
150
200.
250.
300.
TIME
MILLISEC

7776-22

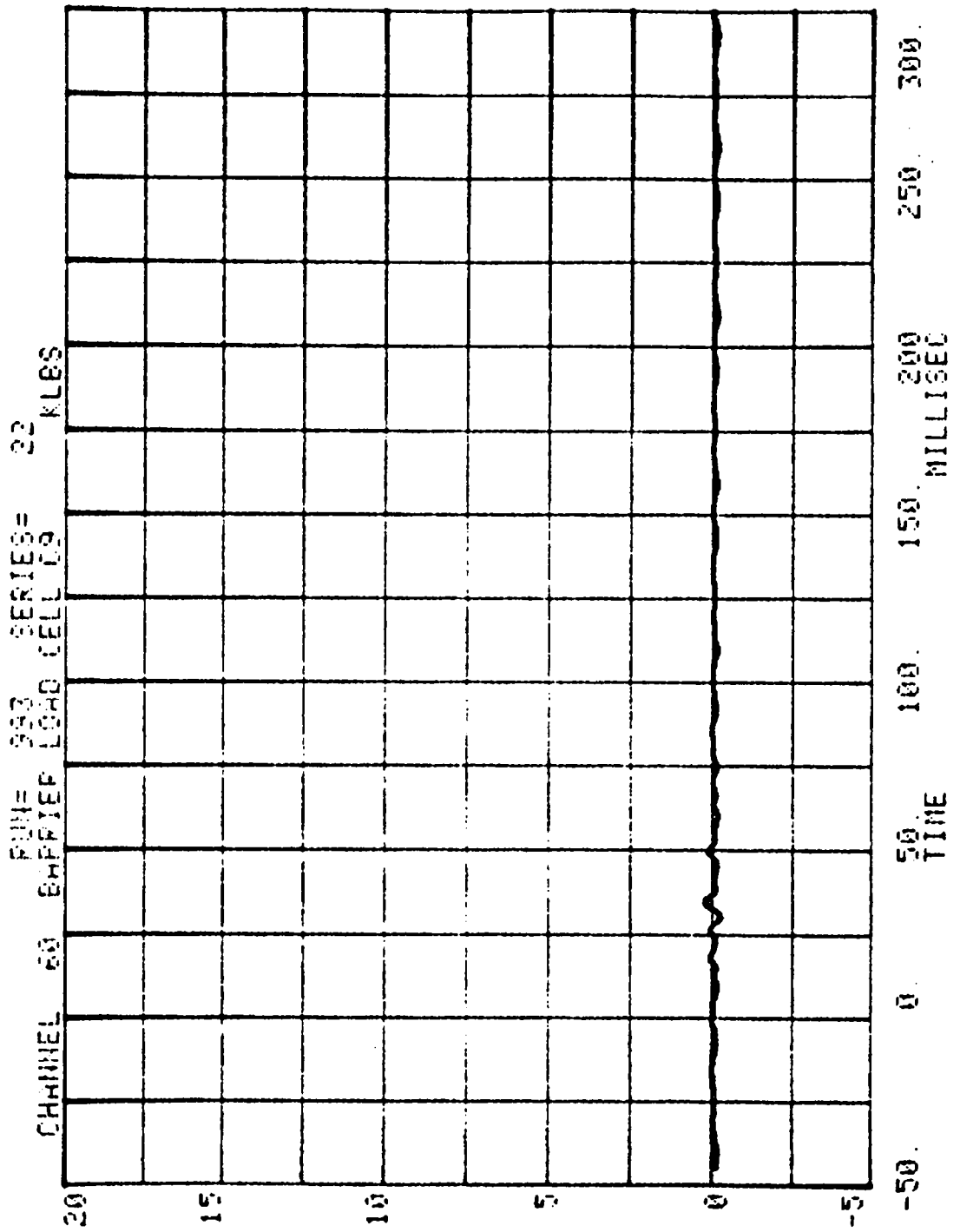

RUN= 343 SERIES= 22
CHANNEL 57 BARRIER LOAD CELL 06 KLBS
20
15
10
5
0
-5
-50.
0.
50
100.
150
200.
250
300.
TIME
MILLISEC

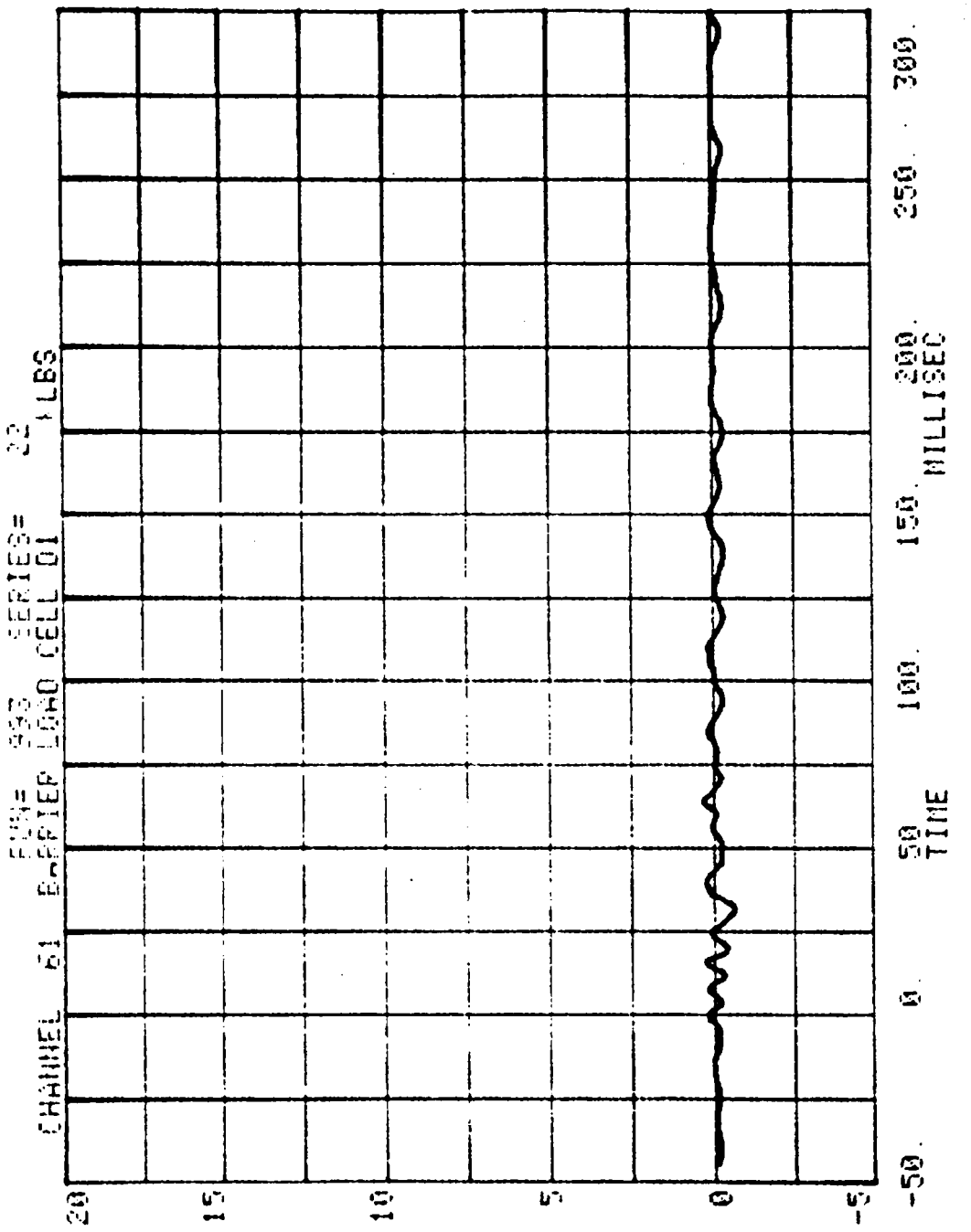
7776-22


CHANNEL 58 BARRIER LOAD CELL LC
RUN= 332 SERIES= 33
KLBS
20
15
10
5
0
-5
-50
0.
50
TIME
100
150
200
MILLISEC
250
300

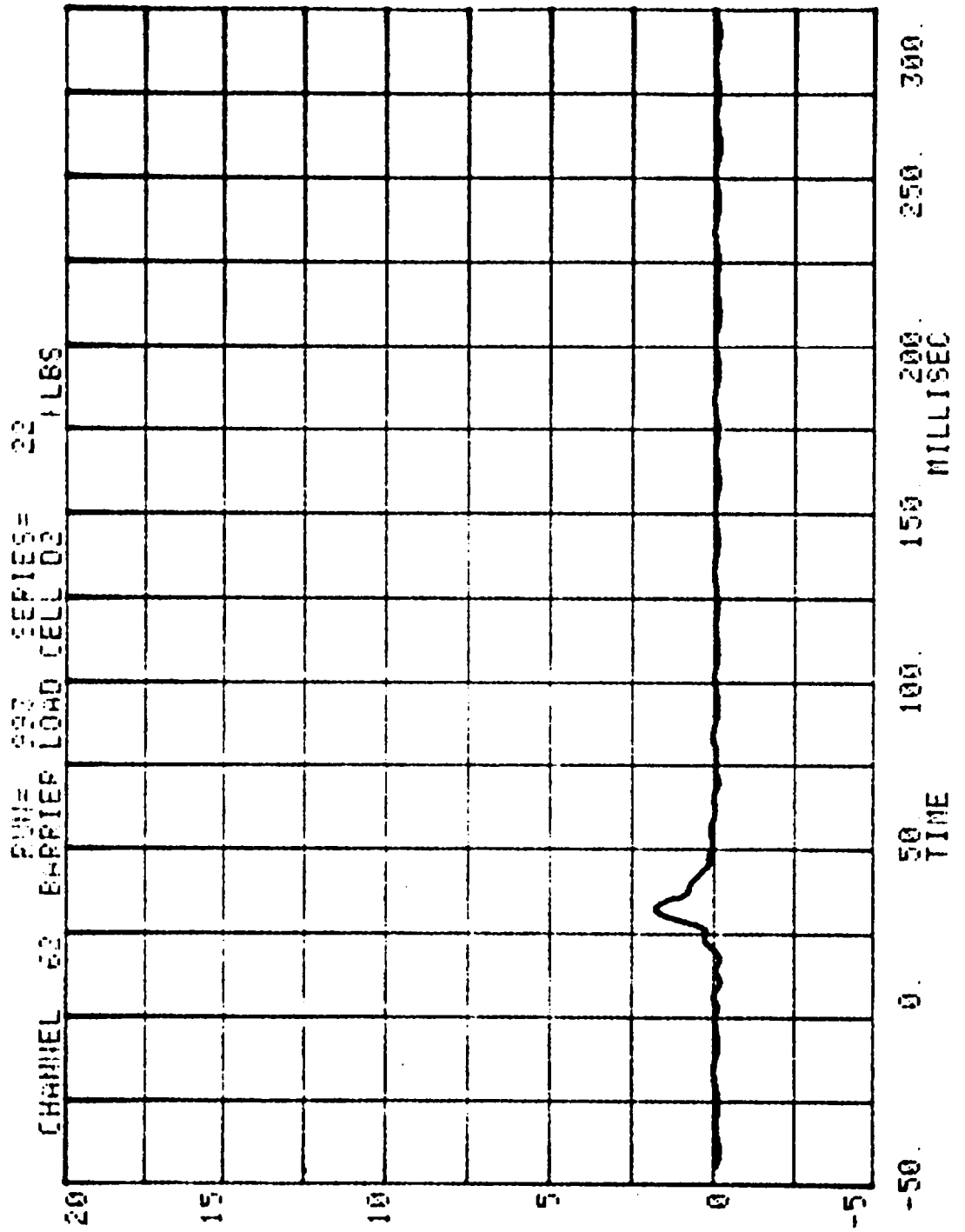

CHANNEL 59
RUN= 993 SERIES= 22
BARRIER LOAD CELL 08
20
15
10
5
0
-5
-50
0
50
100
150
200
250
300
TIME
MILLISEC
LBS

7776-22

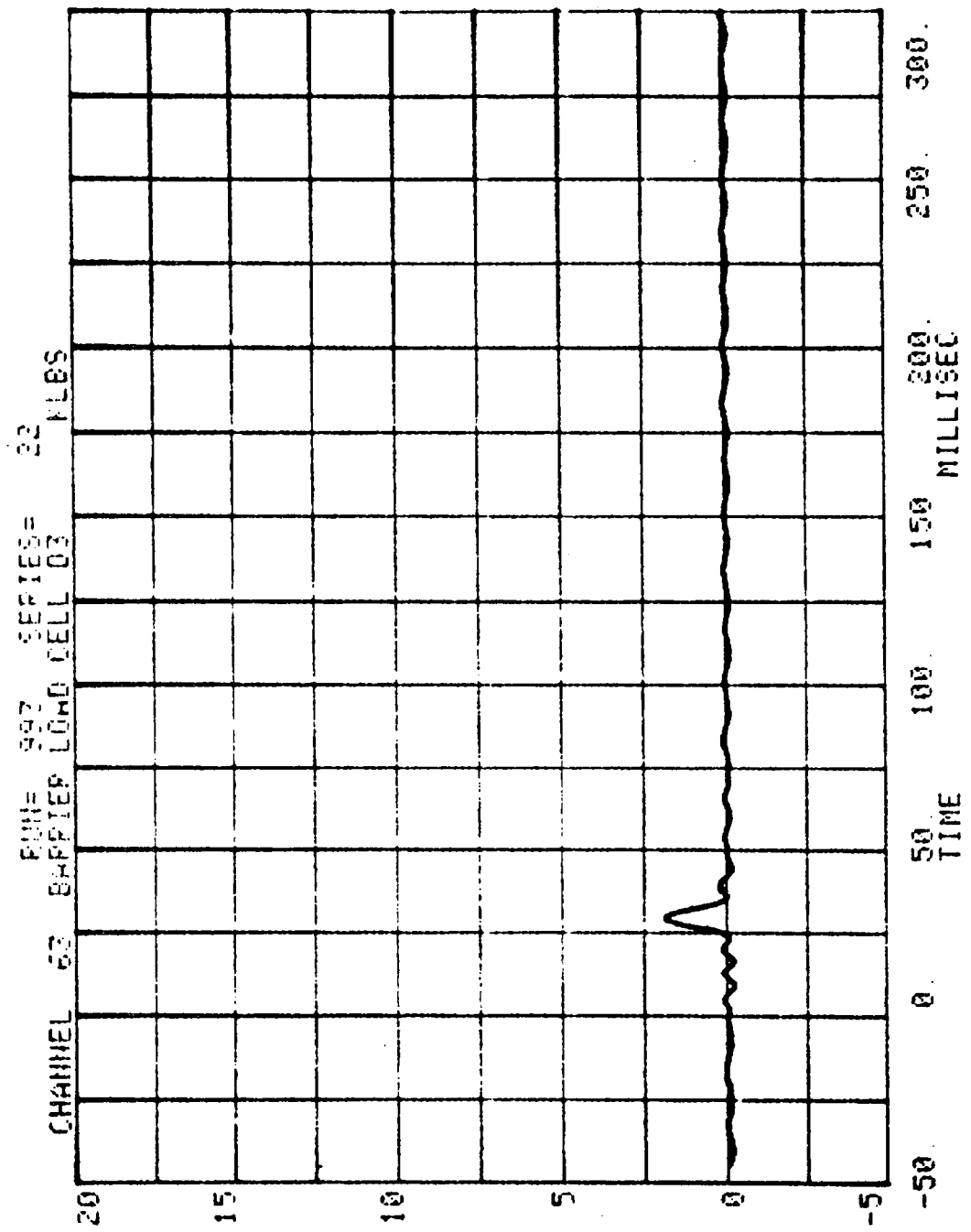

CHANNEL 60 SHAFTER
RUN= 333 LOAD CELL C9
SERIES= 22
KLBS
20
15
10
5
0
-5
-50.
0
50.
100.
150.
200
250.
300.
TIME
MILLISEC


CHANNEL 61
RUN= 333 SERIES= 22
RECEIVER LOAD CELL 01
LBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

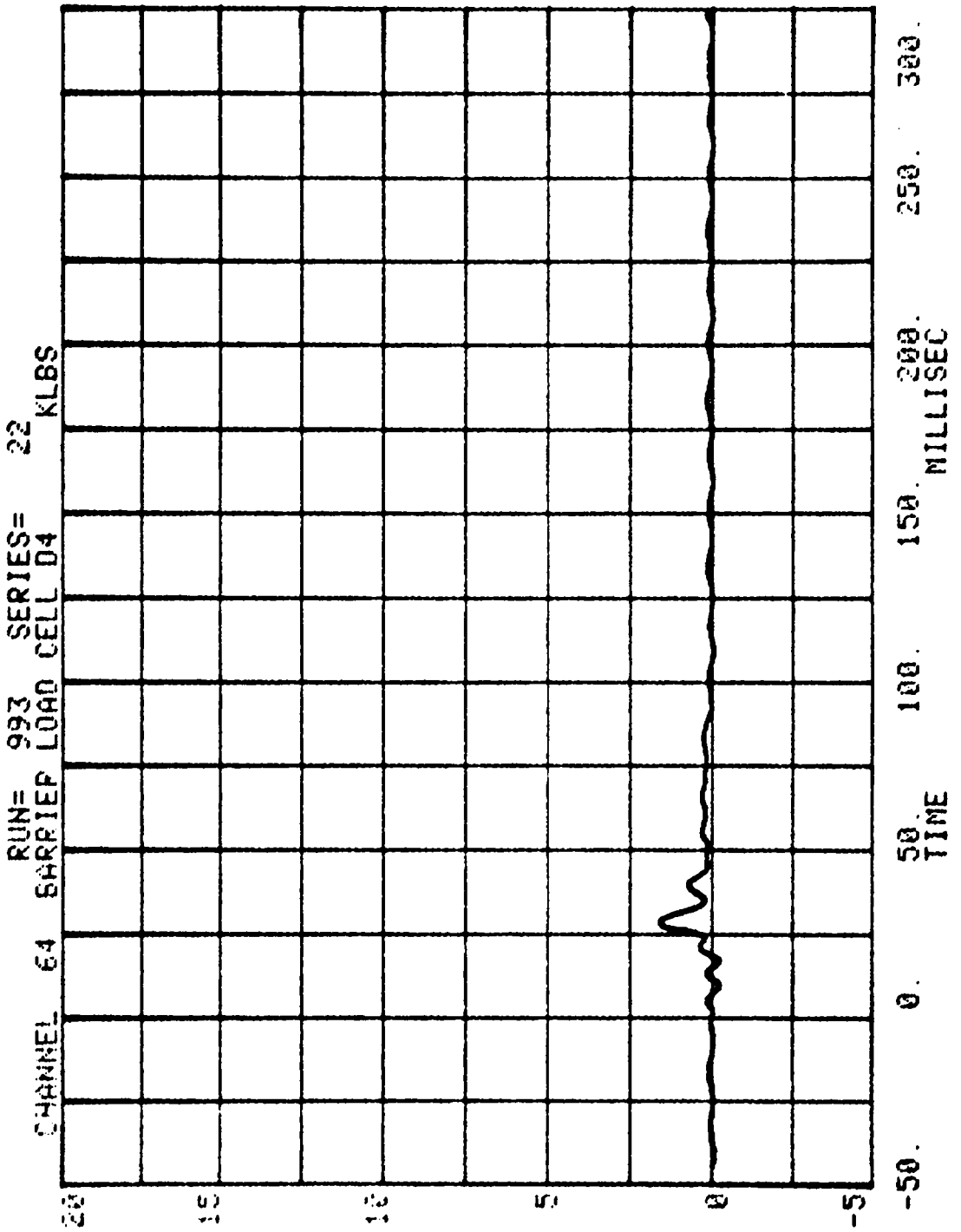
7776-22

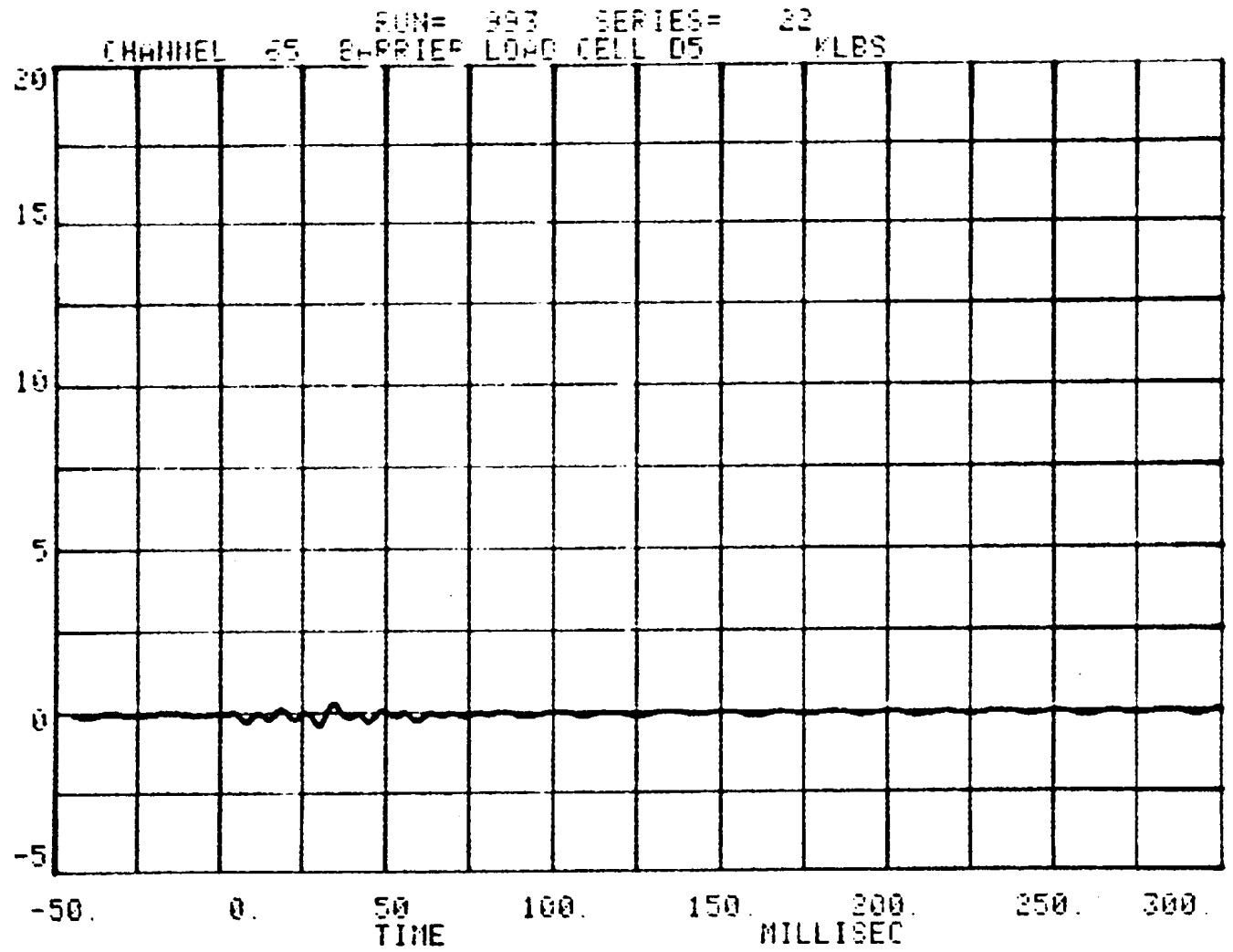

CHANNEL 02 BARRIER LOAD CELL 02
RUN= 999 SERIES= 22
LBS
20
15
10
5
0
-5
-50
0.
50
100
150
200
250
300
TIME
MILLISEC

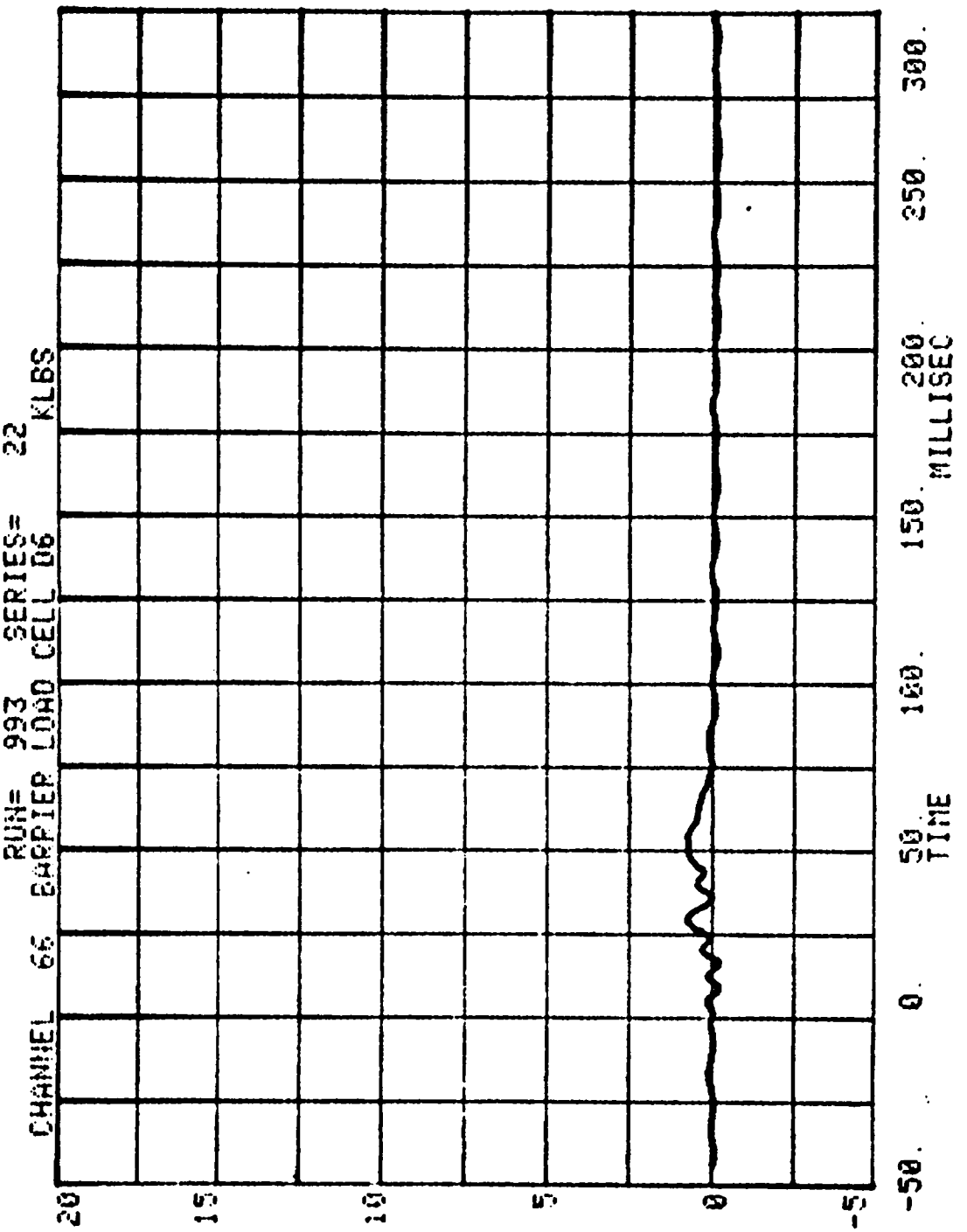
7776-22


CHANNEL 62 BAFFLED LOAD CELL 03
RUN= 997 SERIES= 22
20
15
10
5
0
-5
-50
0
50
100
150
200.
250.
300.
TIME
MILLISEC
NLBS

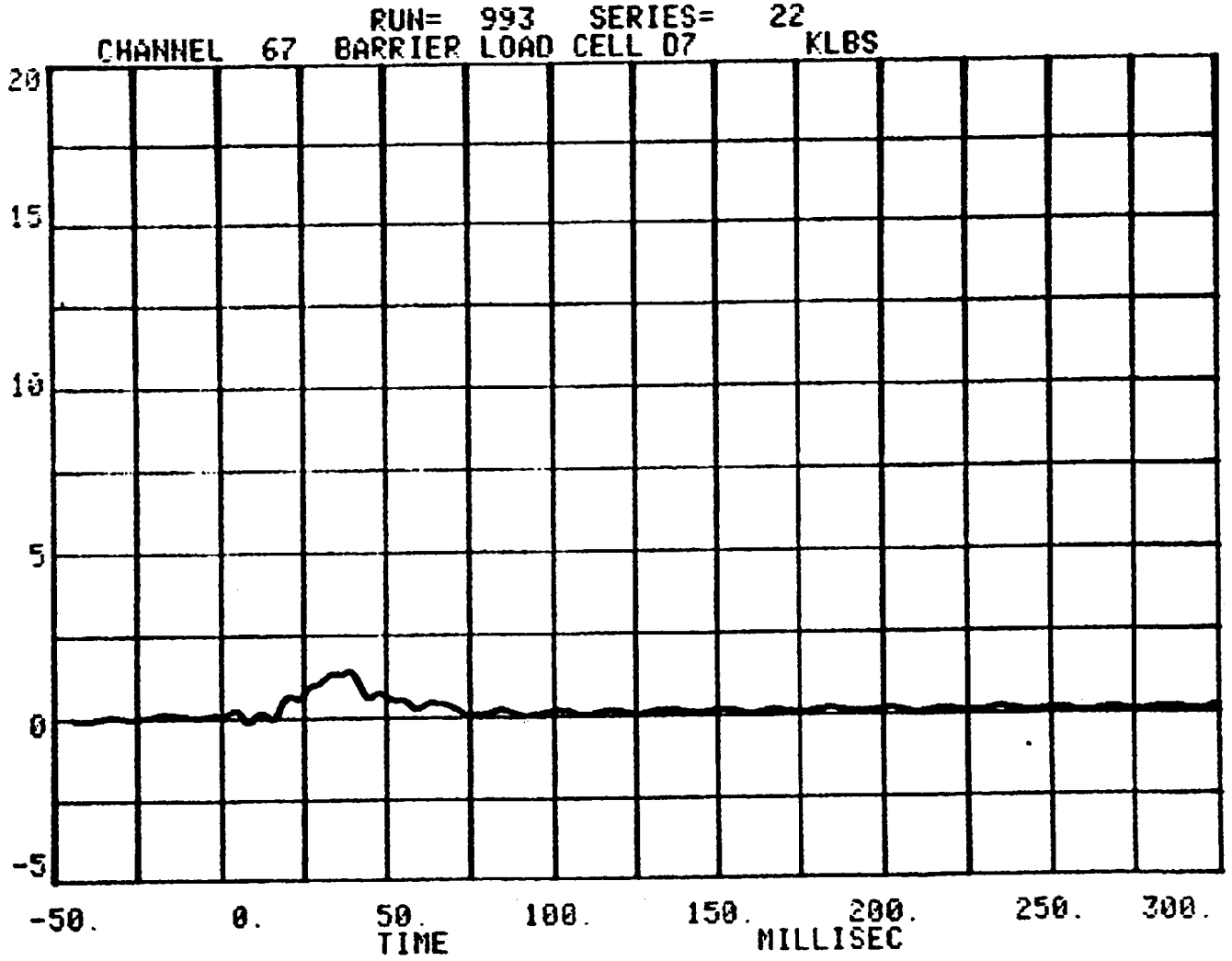
7776-22


CHANNEL 64 SARRIEP RUN= 993 SERIES= 22
LOAD CELL D4 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

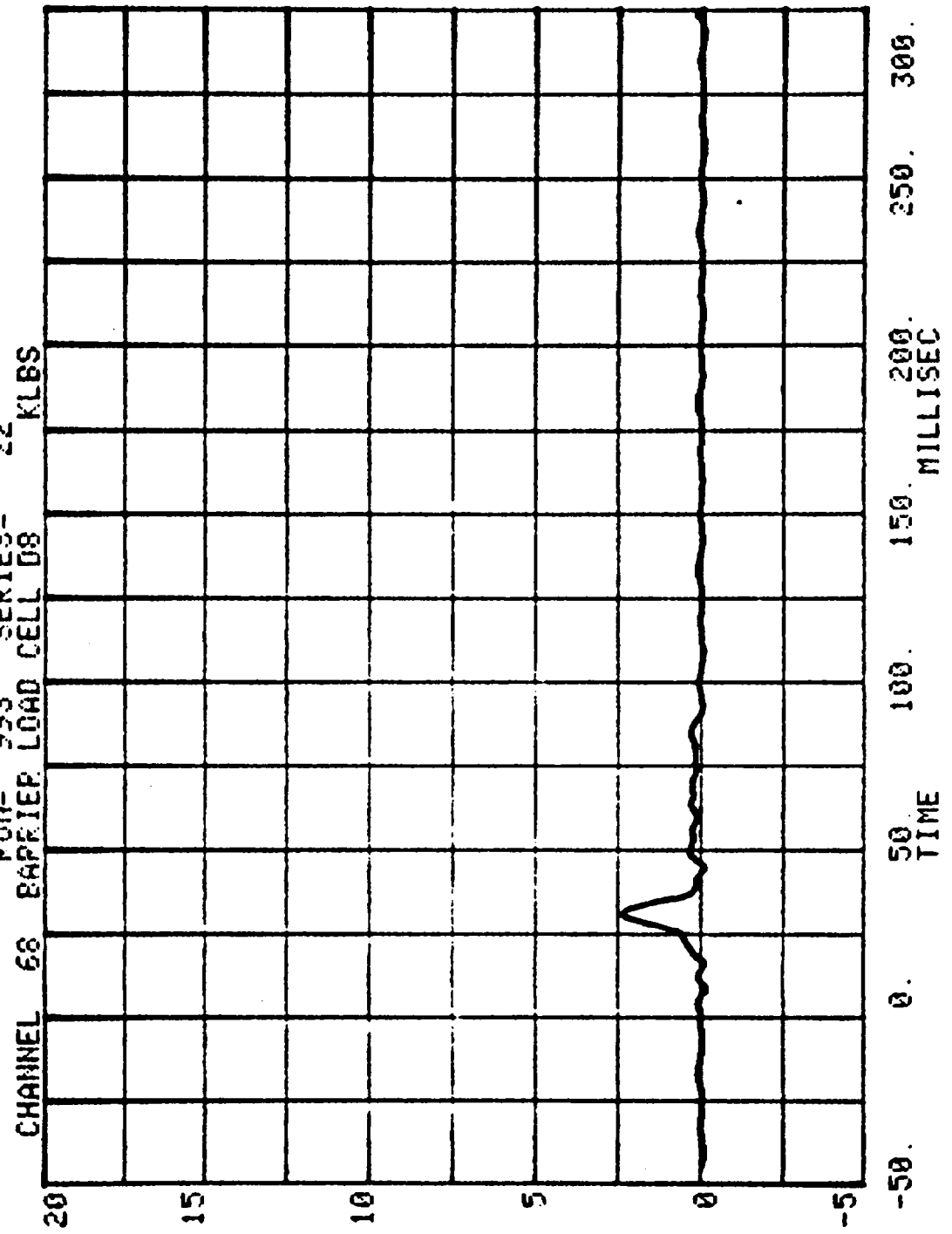

RUN= 383 SERIES= 22
CHANNEL 65 S-SERIES LOAD CELL 05 KLBS
20
15
10
5
0
-5
-50.
0.
50
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 66 RUN= 993 SERIES= 22
DROPTEP LOAD CELL 06 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

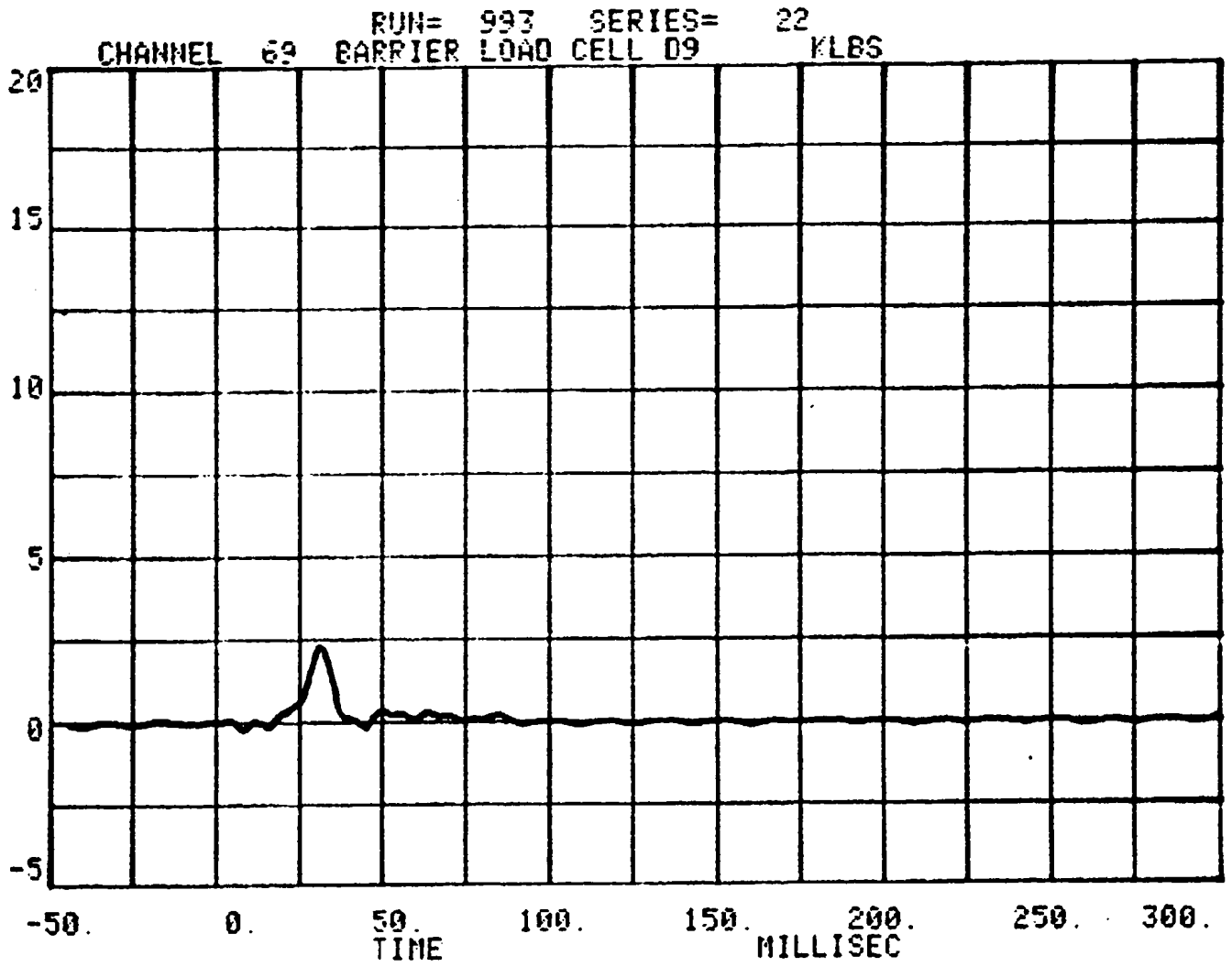
7776-22


RUN= 993 SERIES= 22
CHANNEL 67 BARRIER LOAD CELL 07 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22


CHANNEL 68 BARRIER LOAD CELL 08
RUN= 933 SERIES= 22 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

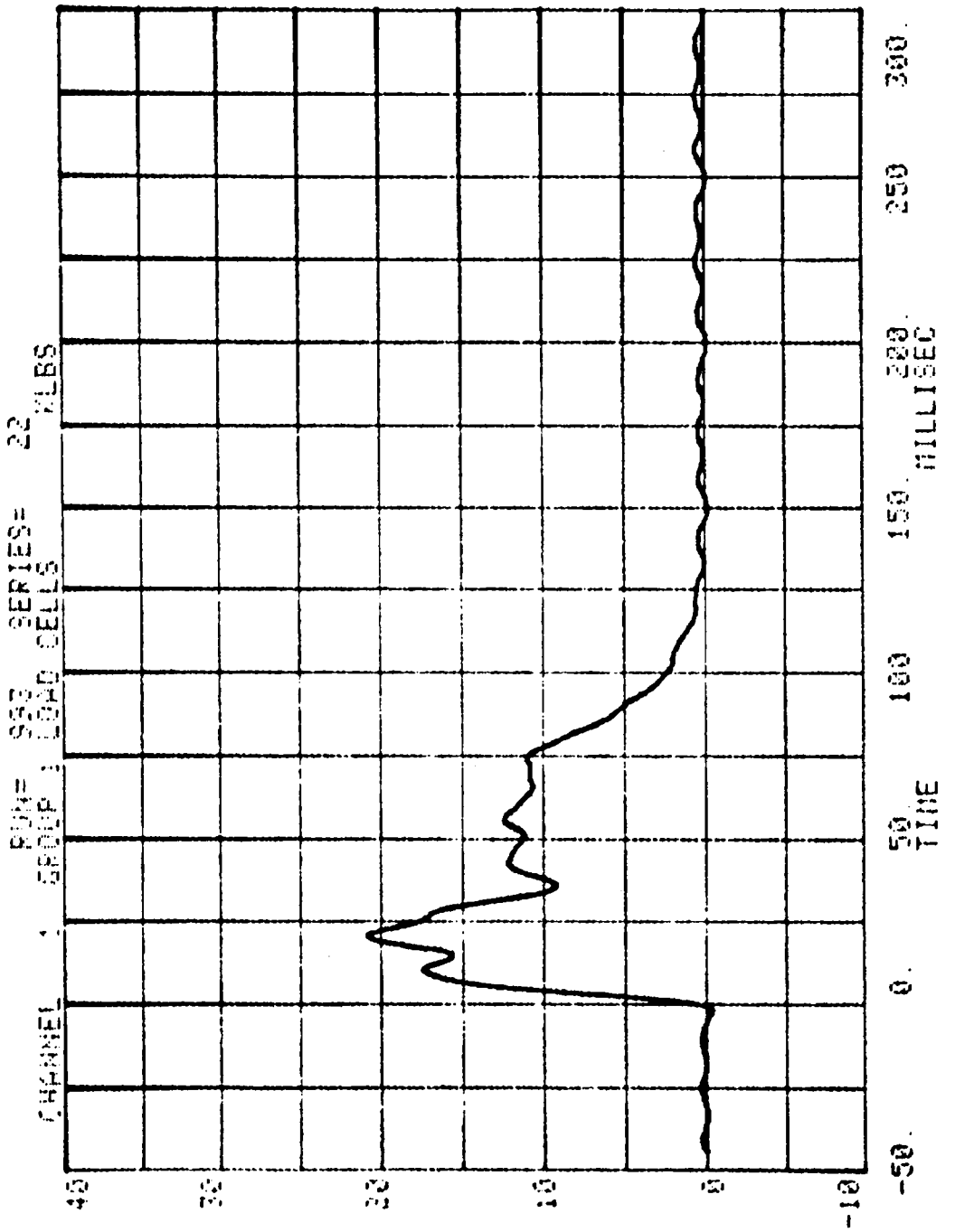

RUN= 993 SERIES= 22
CHANNEL 69 BARRIER LOAD CELL 09 KLBS
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

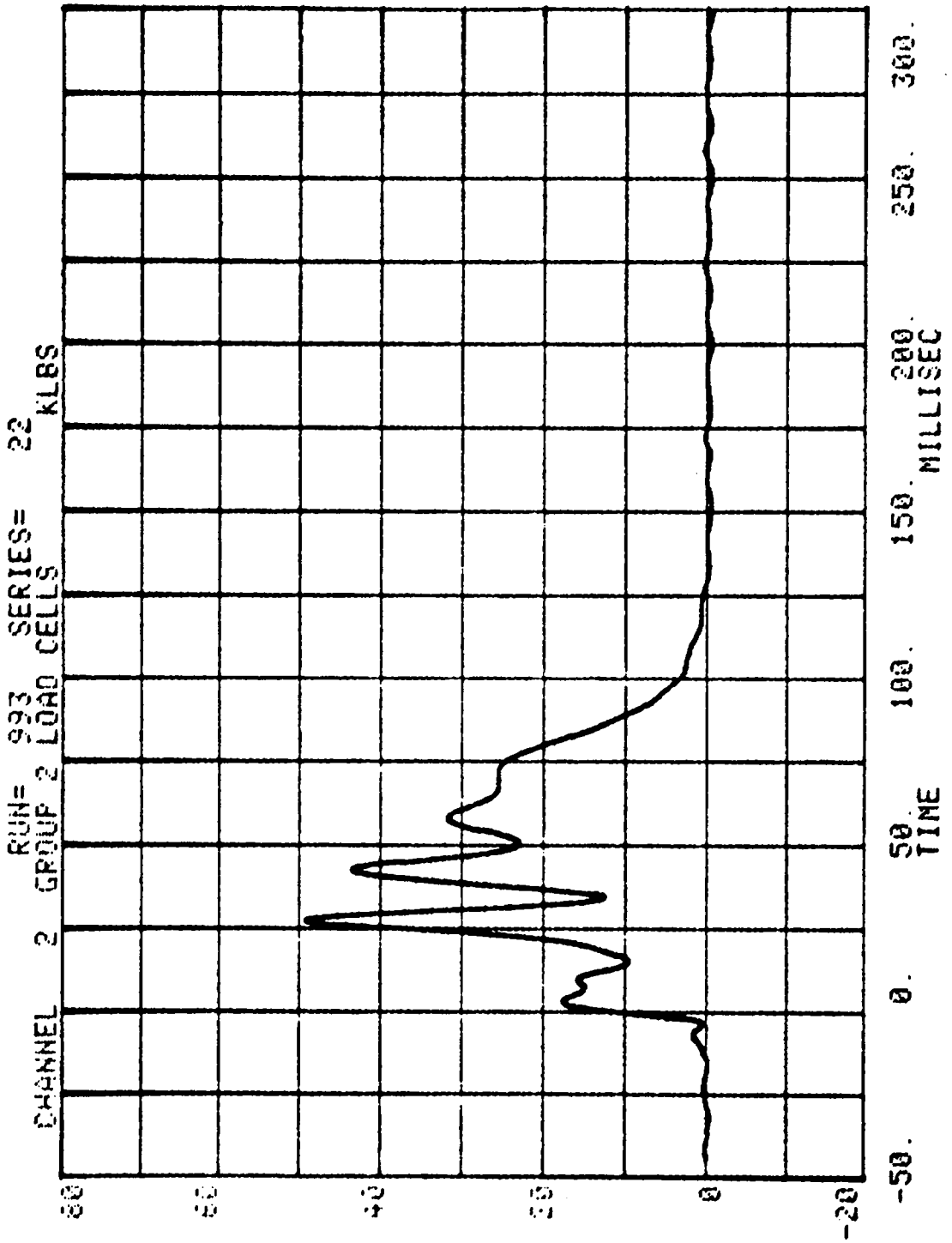
NCAP #22

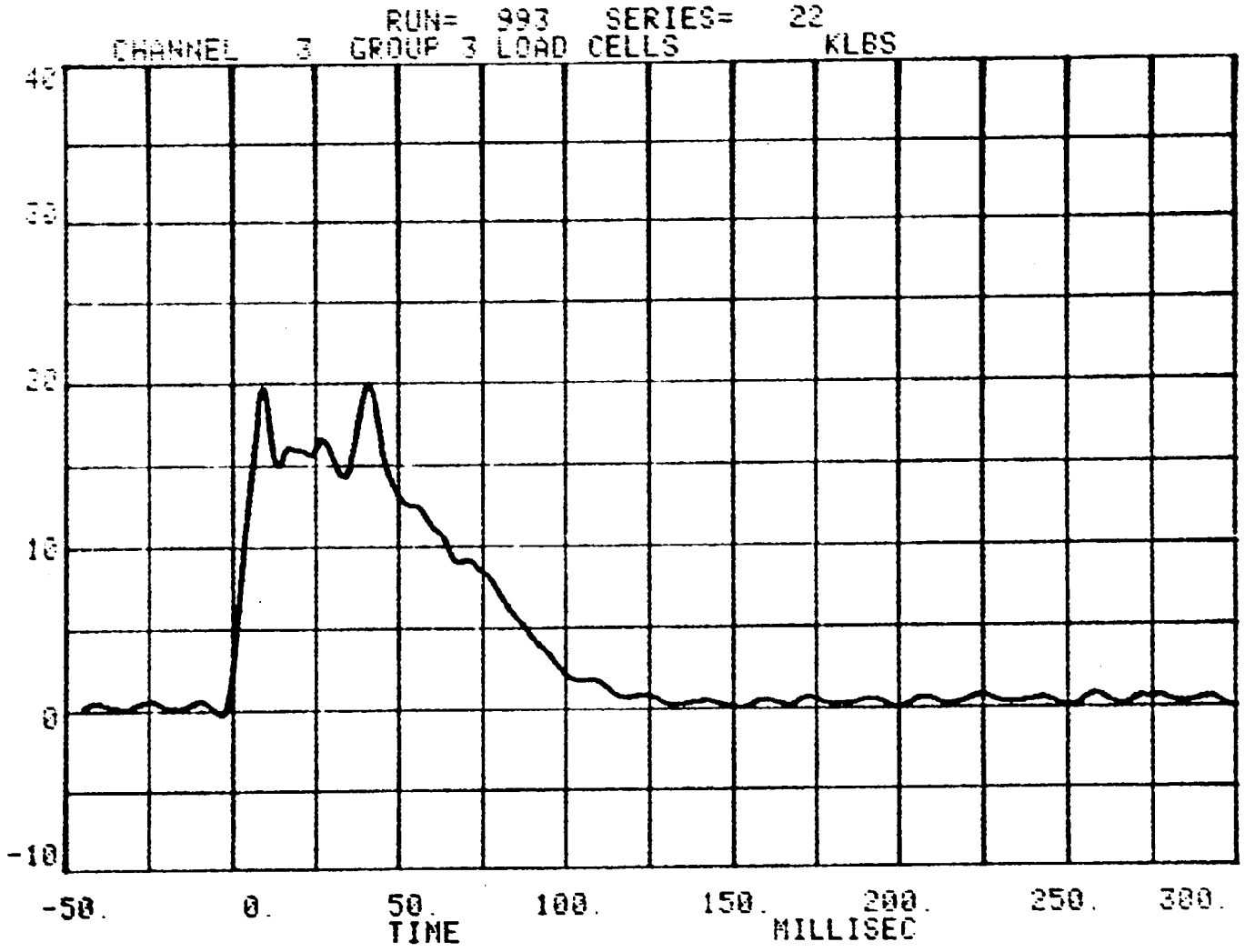
RUN # 993 SERIES # 22

CHAN	TITLE	MINIMUM/MAXIMUM	AT TIME
1	GROUP 1 LOAD CELLS	- 375 KLBS	-1.80 MS.
		20 949 KLBS	20.85 MS
2	GROUP 2 LOAD CELLS	- 597 KLBS	300.00 MS.
		49 776 KLBS	27.75 MS.
3	GROUP 3 LOAD CELLS	- 174 KLBS	-3.37 MS.
		20 814 KLBS	41.10 MS.
4	GROUP 4 LOAD CELLS	- 897 KLBS	259.12 MS.
		10 515 KLBS	30.22 MS.
5	GROUP 5 LOAD CELLS	-6 833 KLBS	-45.00 MS
		21 547 KLBS	27.67 MS
6	GROUP 6 LOAD CELLS	-1 223 KLBS	-45.00 MS.
		8 402 KLBS	31.27 MS.
7	TOTAL LOAD CELL SUM	-8 037 KLBS	-45.00 MS.
		119 279 KLBS	27.97 MS.

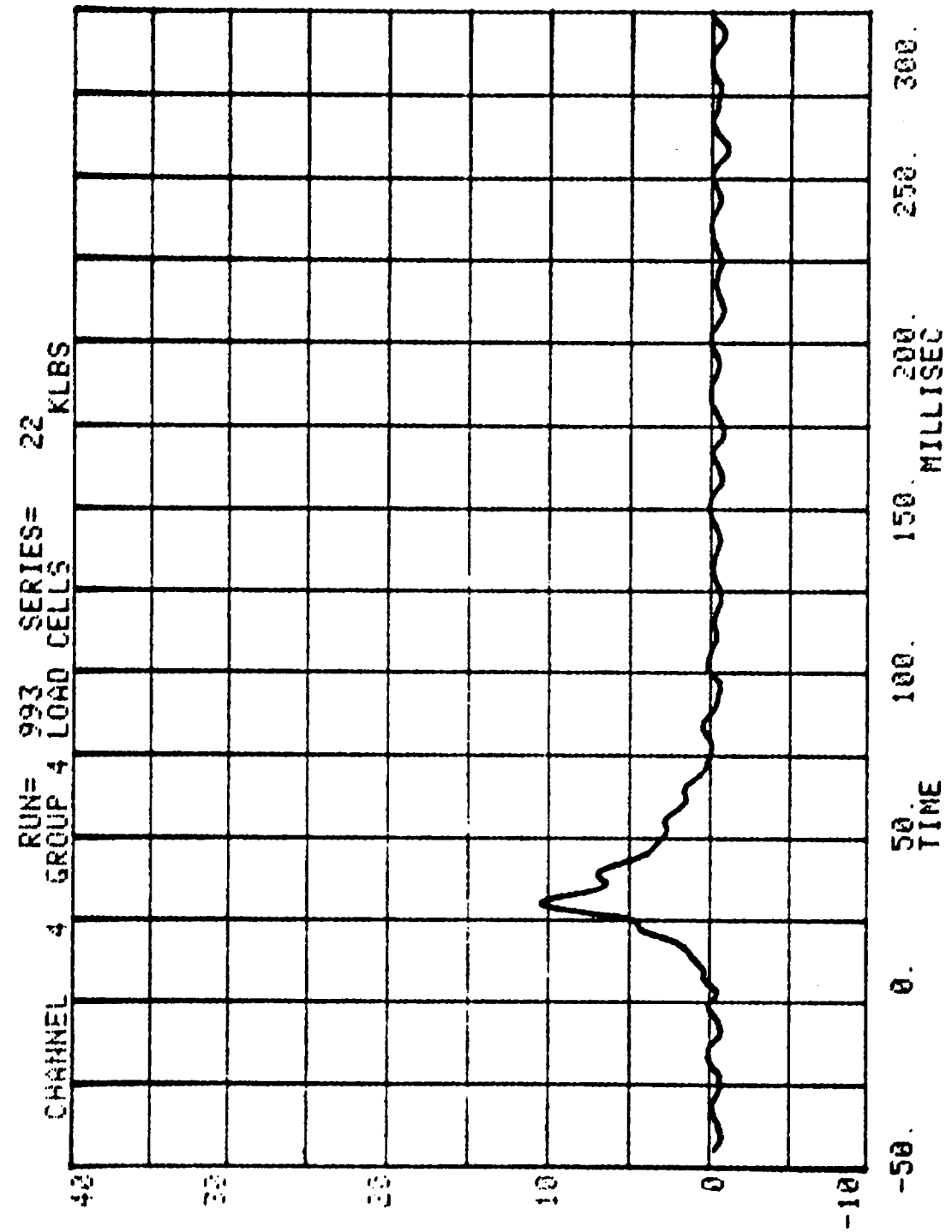

RUN= 533 SERIES= 22
GROUP 1 LOAD CELLS
CHANNEL 1
LBS
40
30
20
10
0
-10
-50.
0.
50
100
150
200
250
300
TIME
MILLISEC

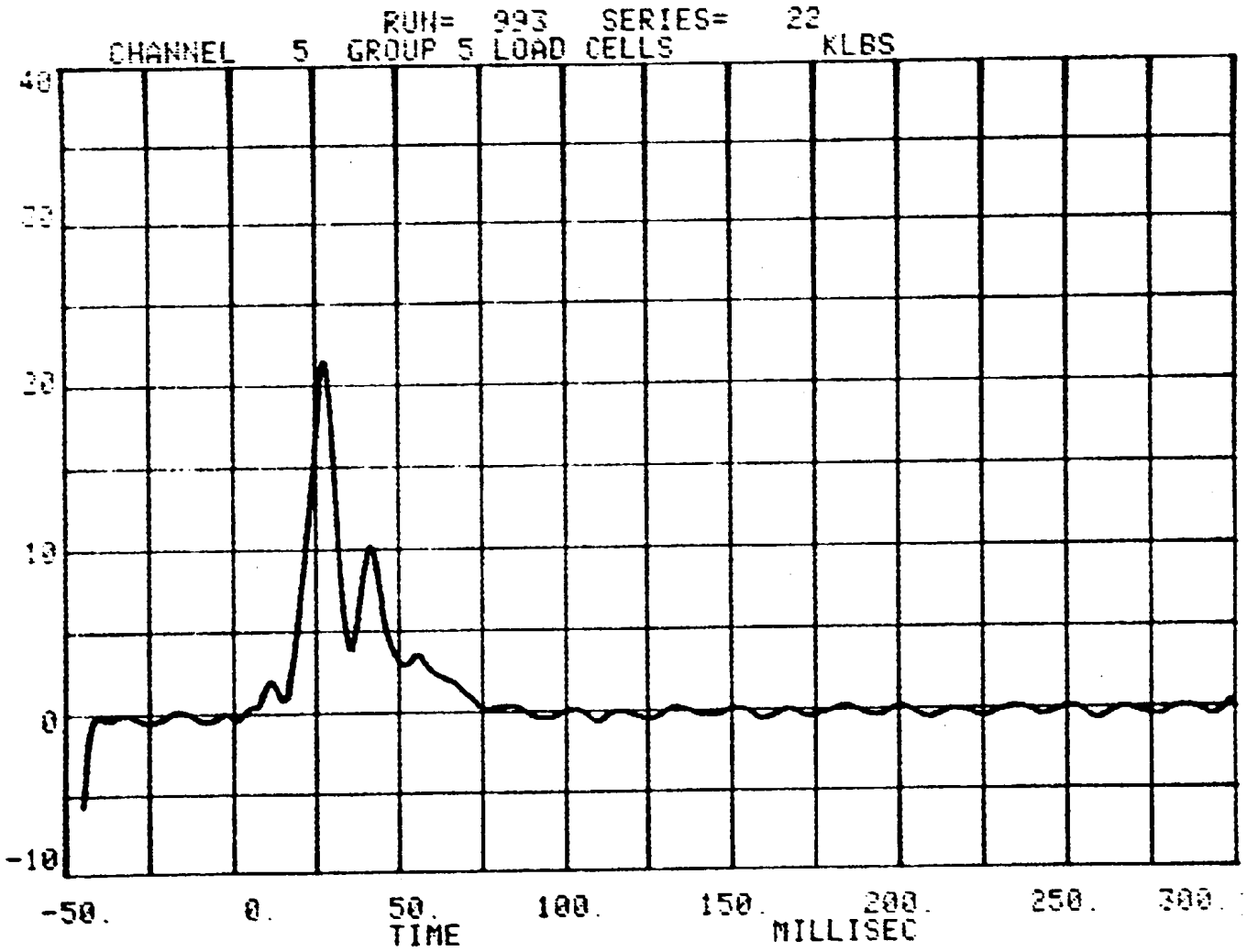
7776-22


CHANNEL 2 GROUP 2 LOAD CELLS
RUN= 993 SERIES= 22
KLBS
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

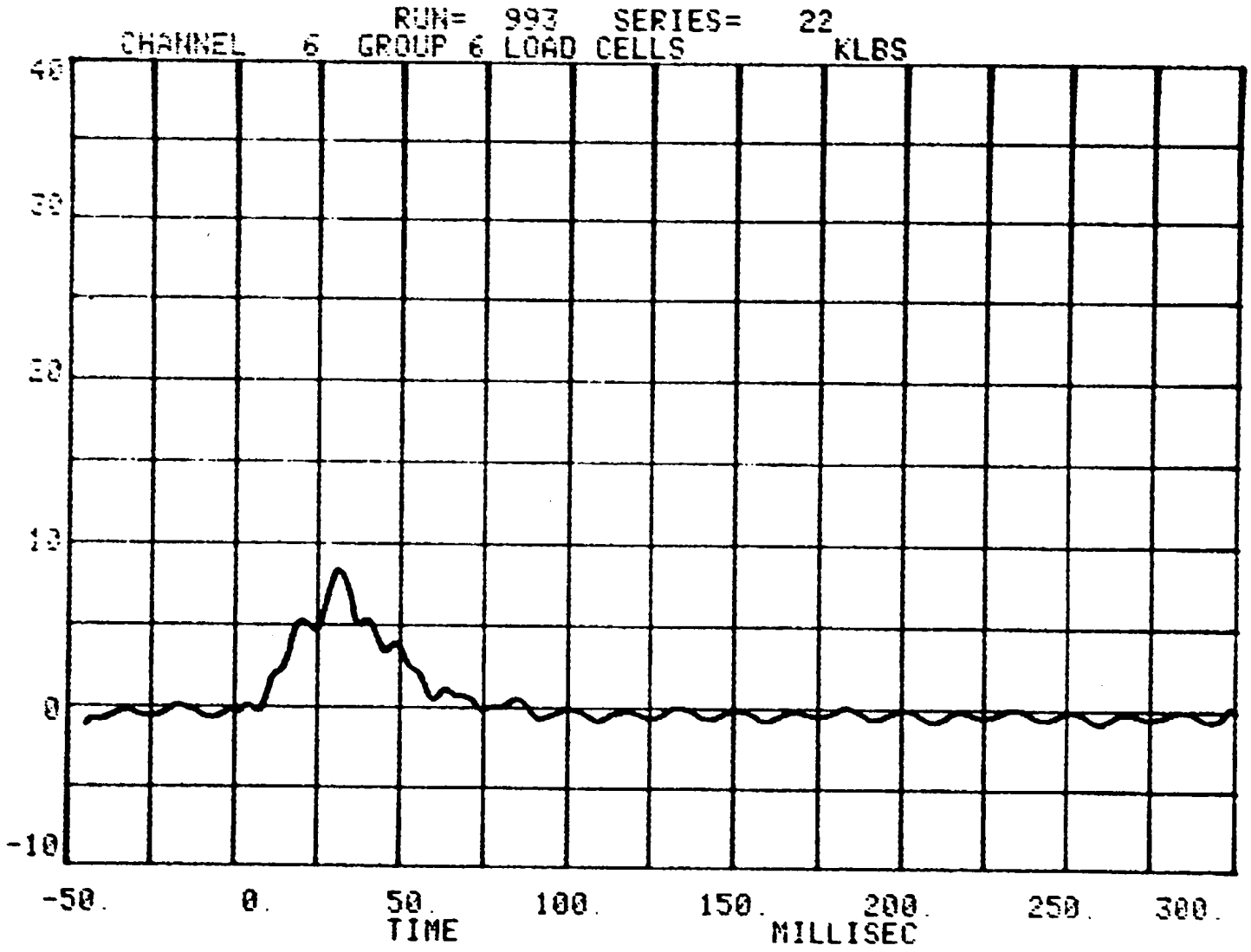

RUN= 993 SERIES= 22
CHANNEL 3 GROUP 3 LOAD CELLS
KLBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

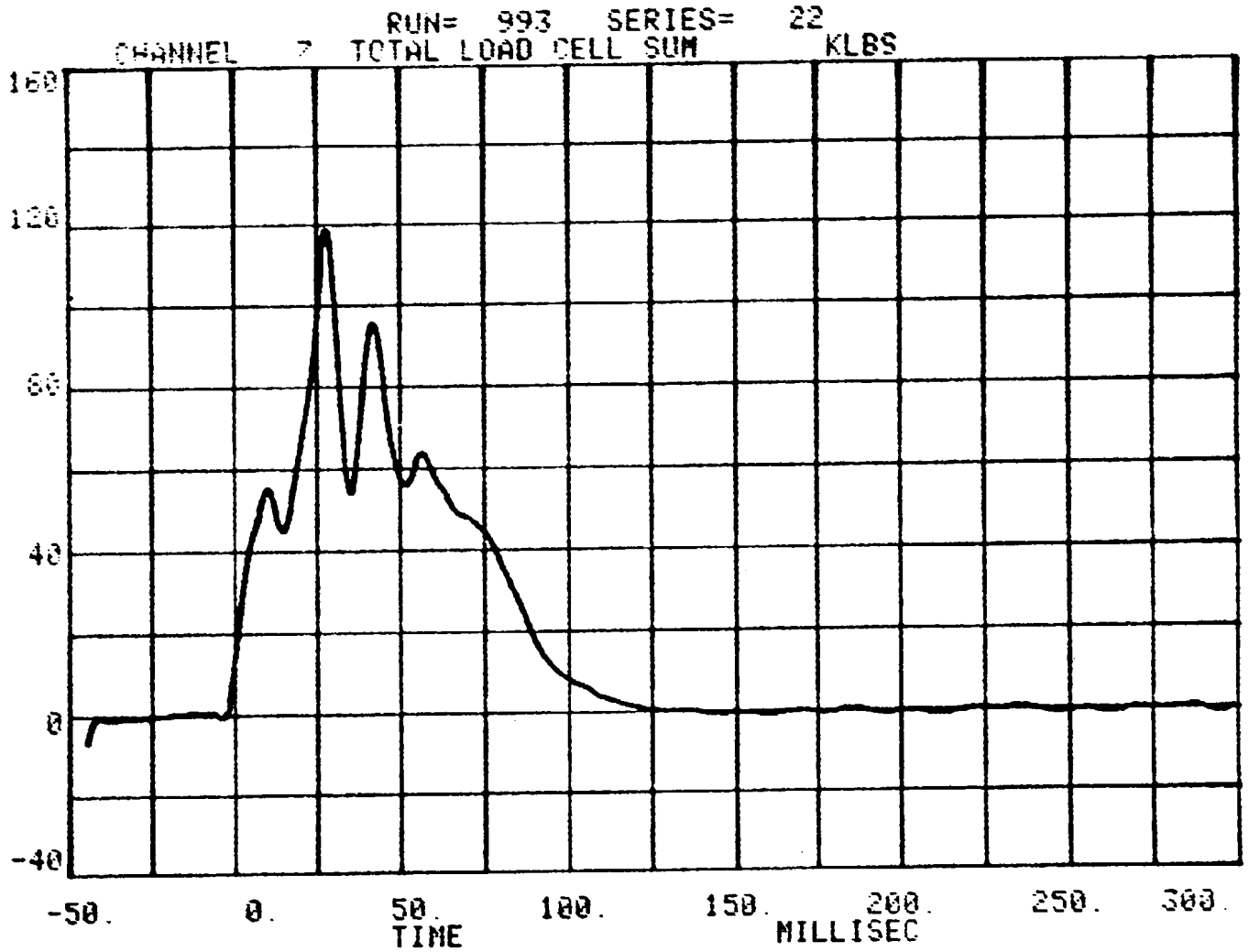
7776-22


CHANNEL 4 GROUP 4 LOAD CELLS
RUN= 993 SERIES= 22 KLBS
42
33
23
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 993 SERIES= 22
CHANNEL 5 GROUP 5 LOAD CELLS
KLBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22


RUN= 993 SERIES= 22
CHANNEL 6 GROUP 6 LOAD CELLS
KLBS
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 993 SERIES= 22
CHANNEL 7 TOTAL LOAD CELL SUM KLBS
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

TEST NO. ML5502

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
3MS MAXIMUM DURATION

NCAP #22

RUN= 393

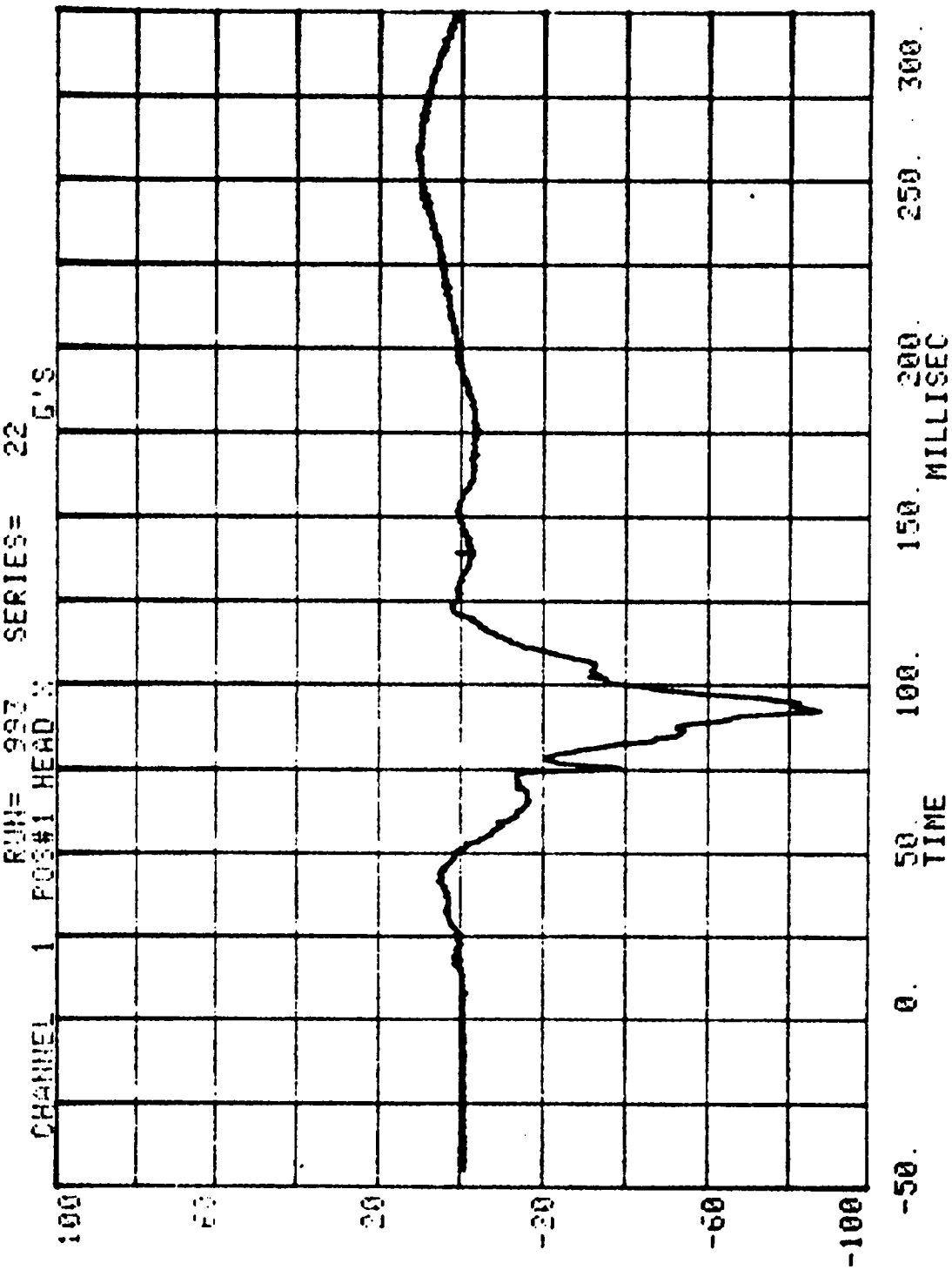
POS#1 HEAD RESULTANT

HIC=1007.0 FROM T1= 06607 TO T2= 10020

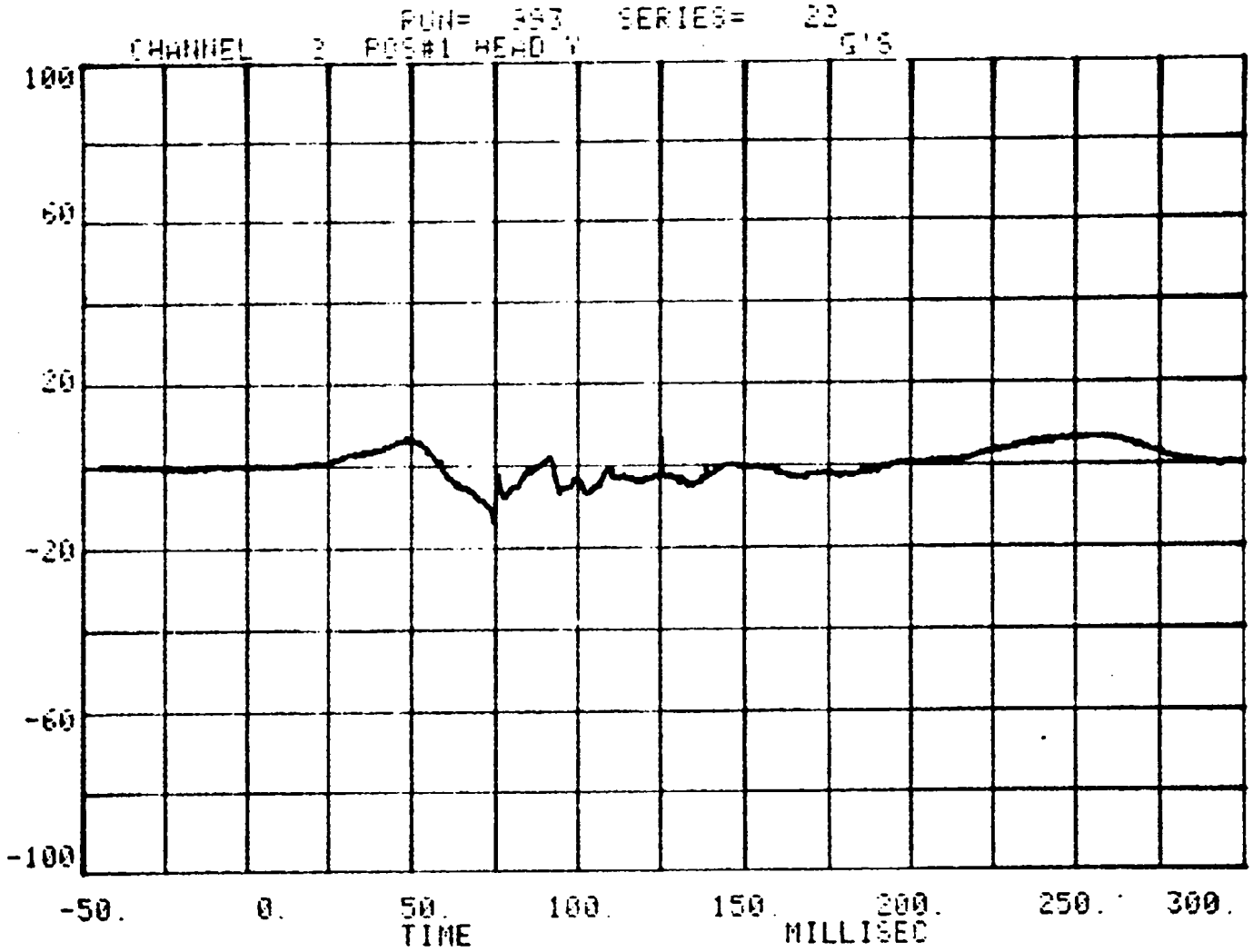
AVERAGE ACCELERATION BETWEEN T1 AND T2= 61.4G'S

EVENT TIME= 300.0 MSEC

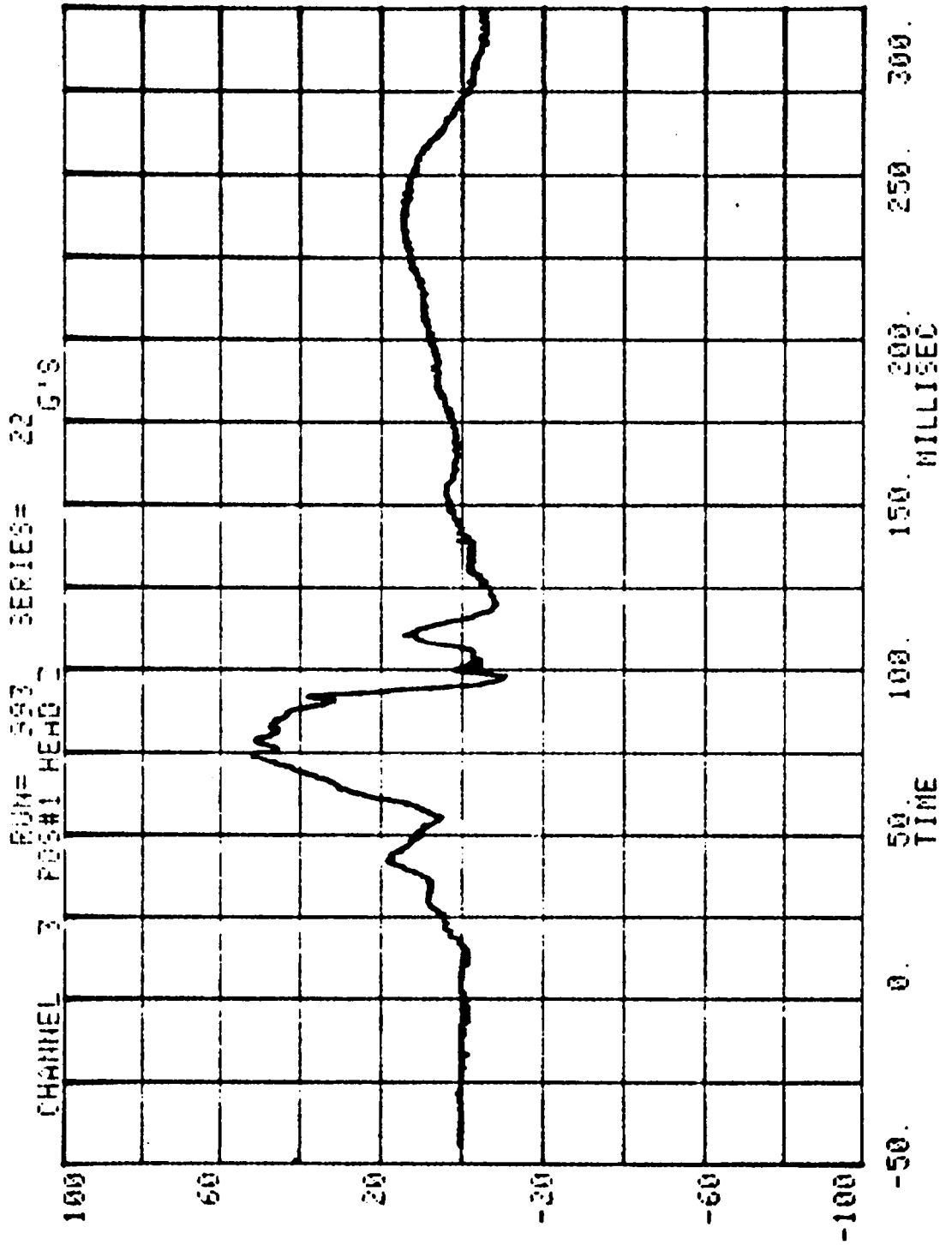
SEVERITY INDEX=1293.0


CHANNEL 1 POS#1 HEAD #
RUN= 997 SERIES= 22 G'S
100
50
0
-50
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

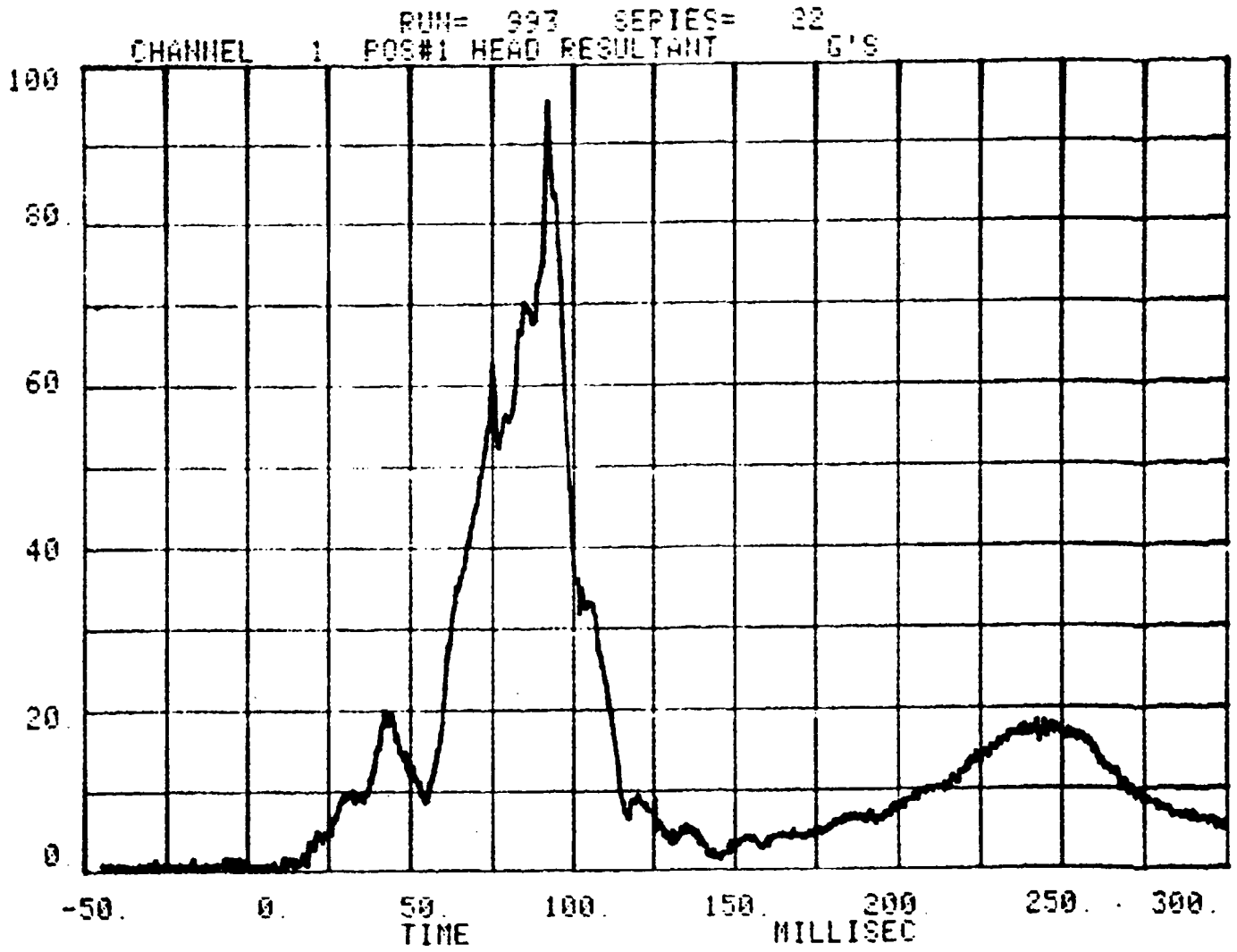
7776-22

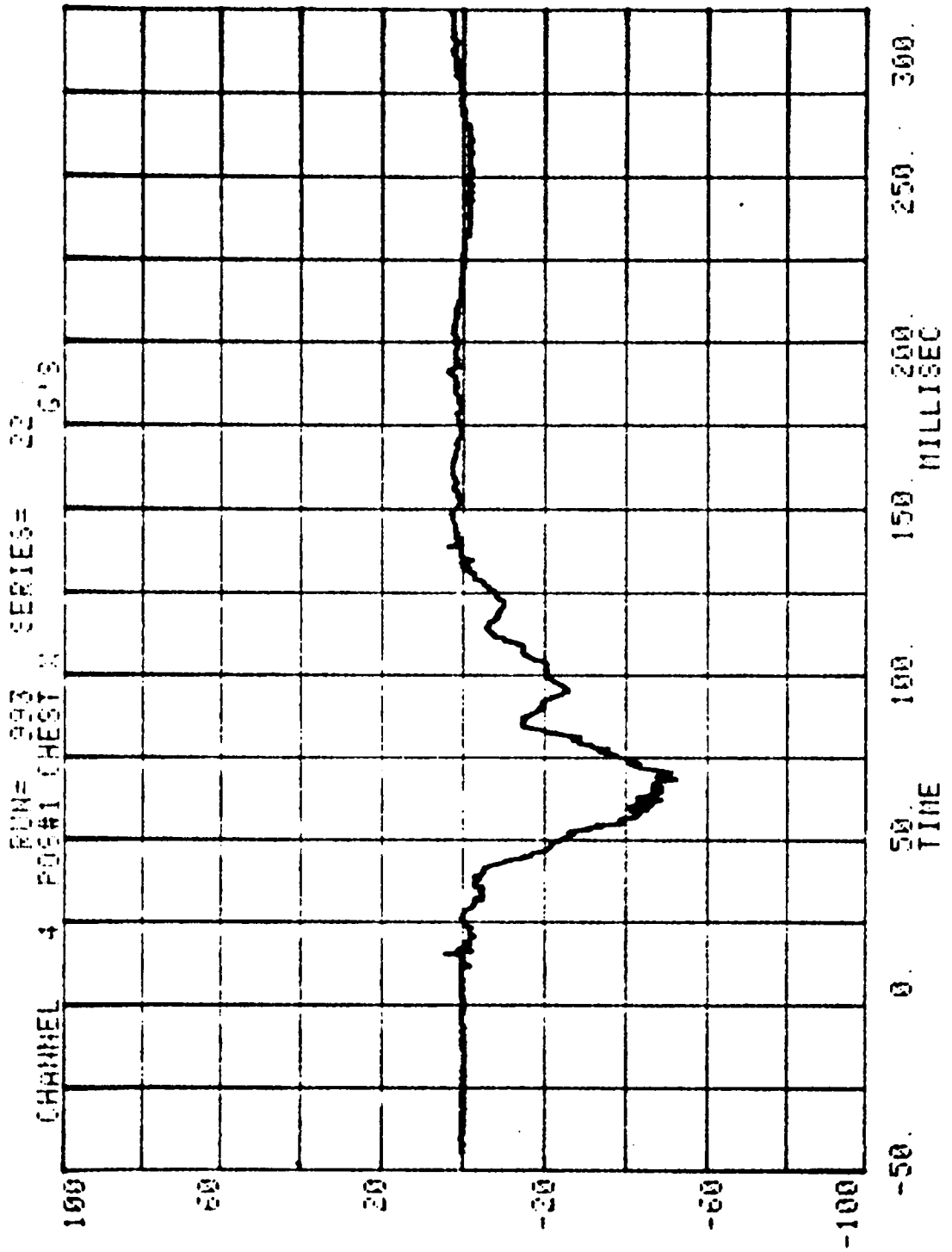

RUN= 353 SERIES= 22
CHANNEL 2 POS#1 HEAD Y G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

7776-22

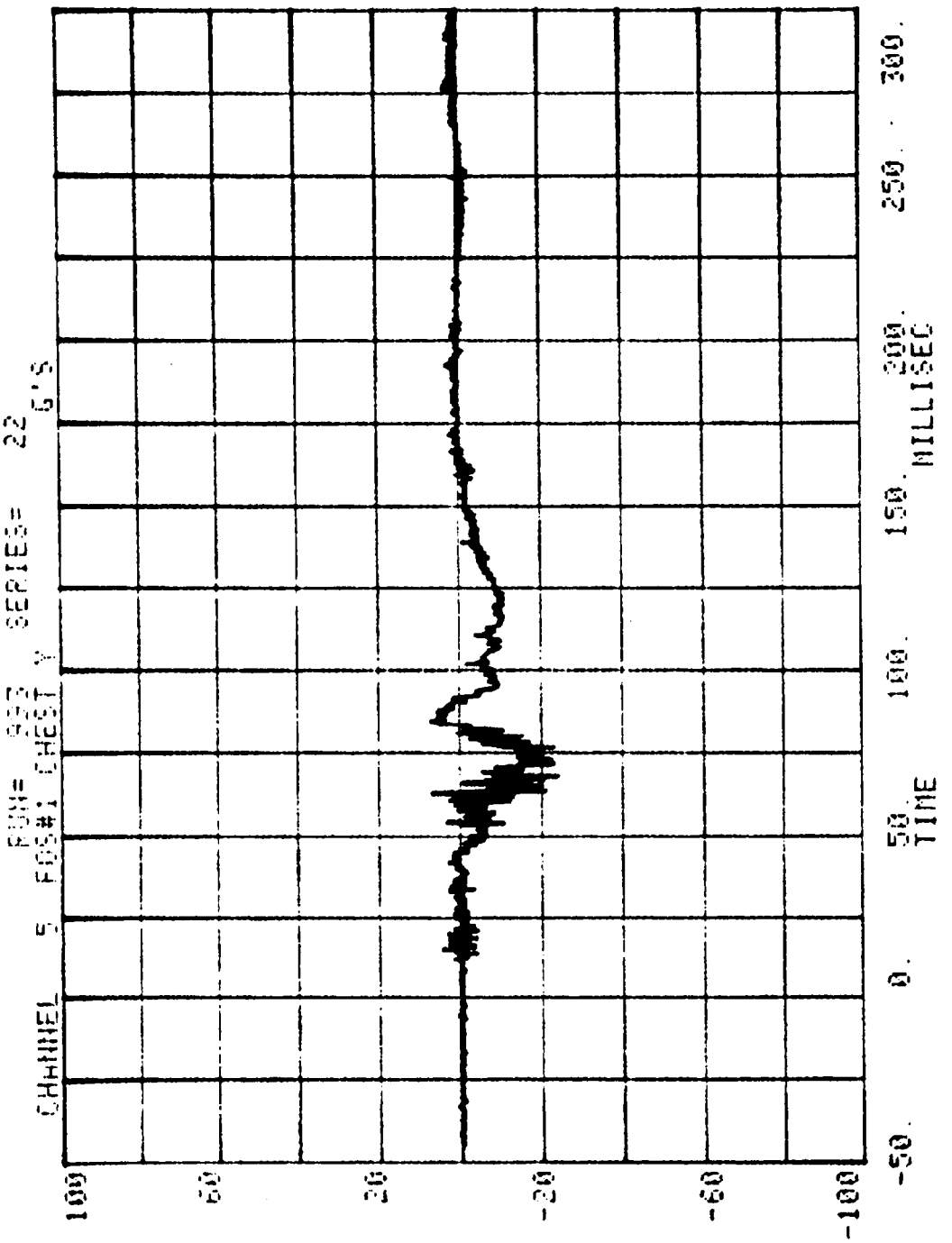

CHANNEL 3 POS#1 HEAD -
RUN= 593 SERIES= 22
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

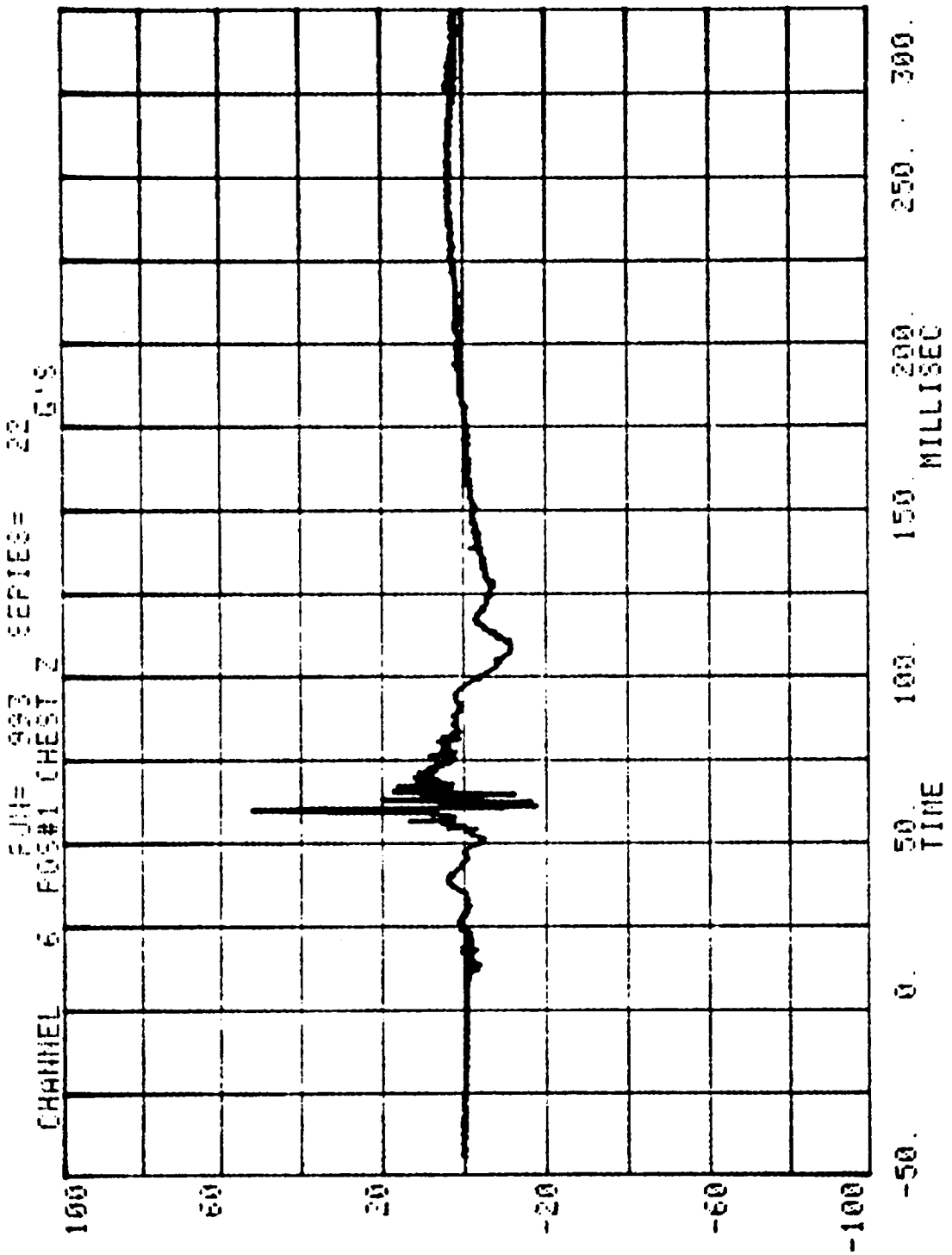

RUN= 993 SERIES= 22
CHANNEL 1 POS#1 HEAD RESULTANT G'S
100
80.
60
40
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 4 FOAM#1 CHEST X
RUN= 393 SERIES= 22
6'8
100
50
0
-50
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

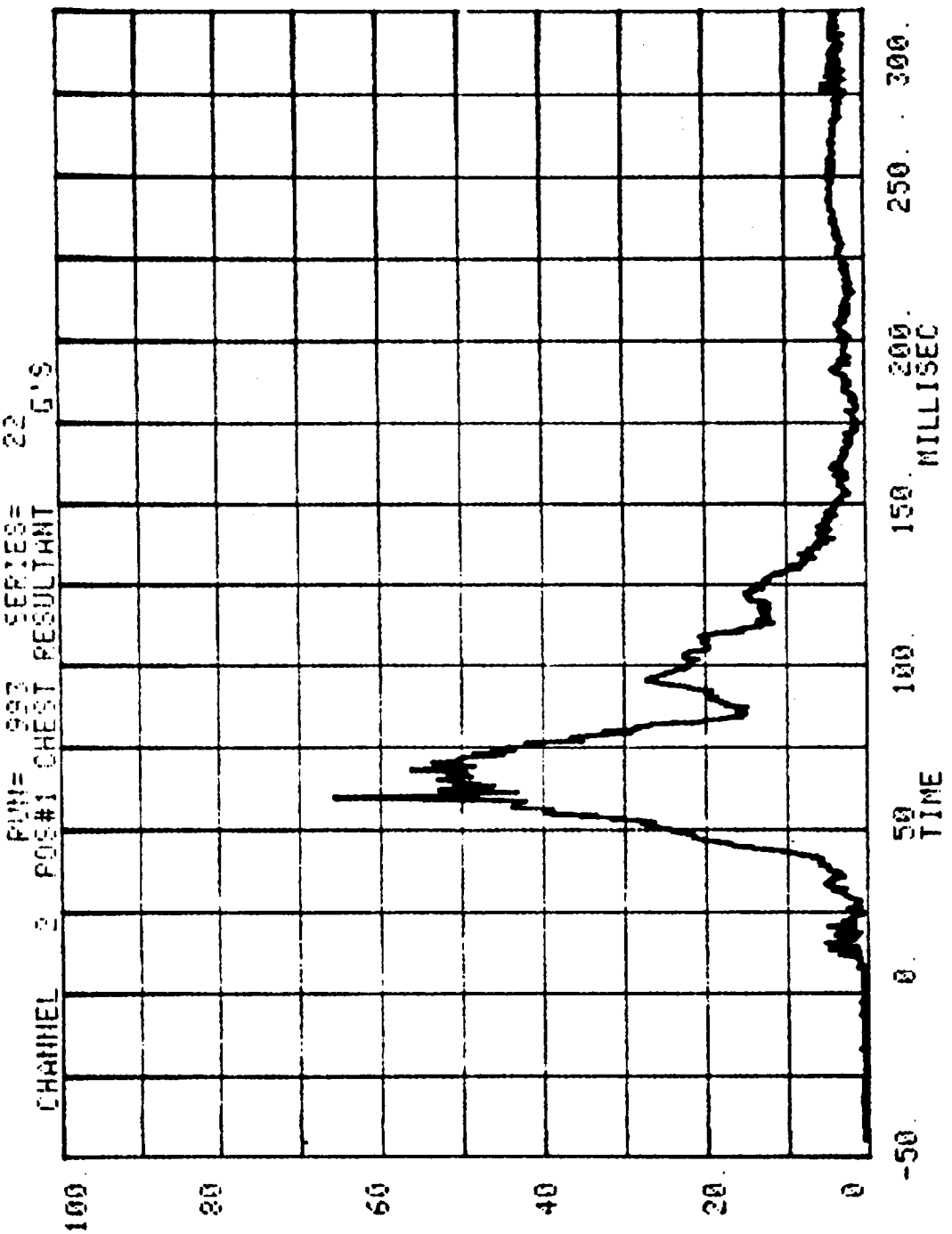
7776-22


CHANNEL 5 FDS#1 CHEST Y
RUN= 999 SERIES= 22 G'S
100
50
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

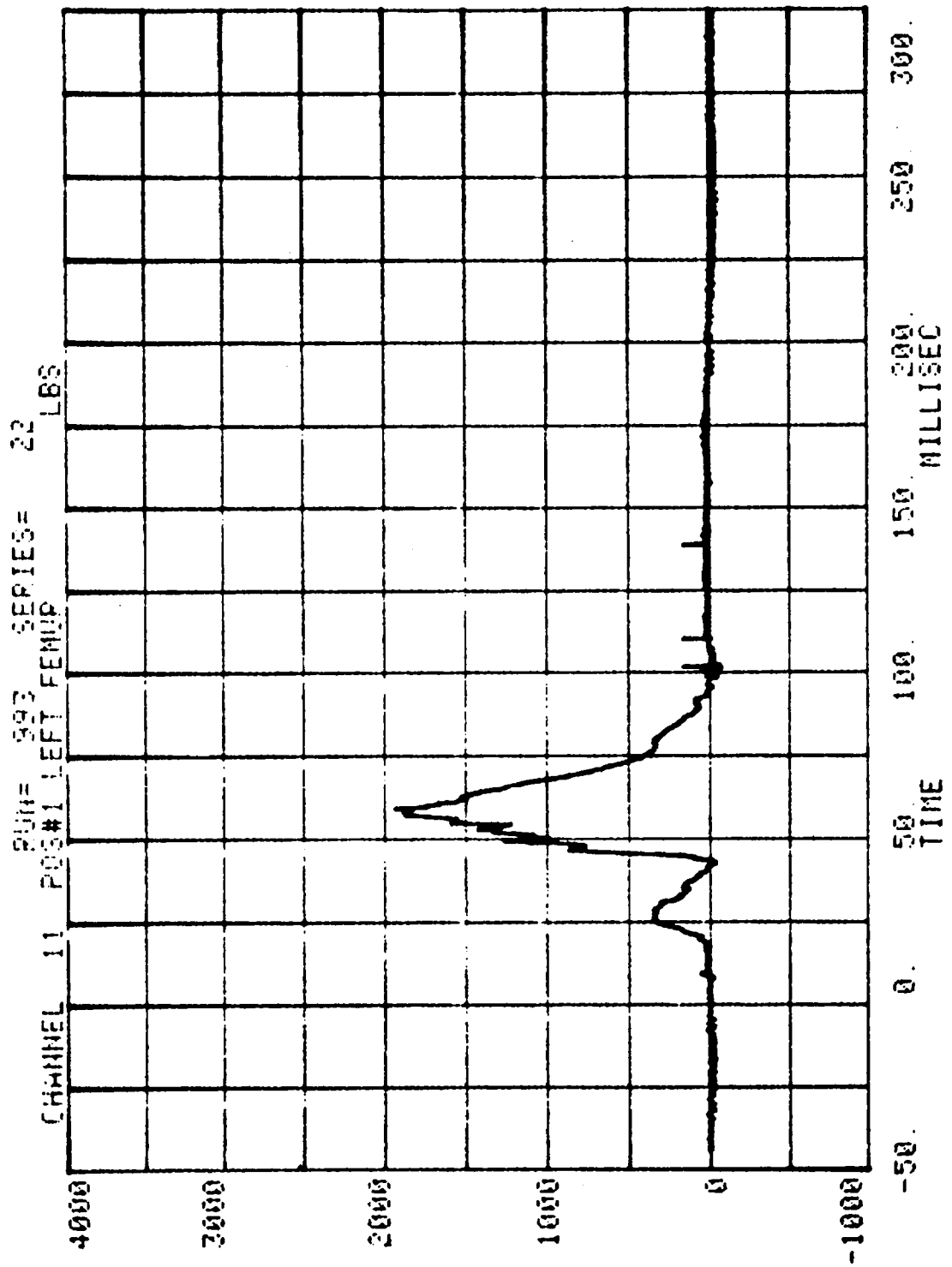
7776-22


CHANNEL 6 FOS#1 CHEST Z
FUN= 933 SERIES= 22
G'S
100.
60.
20.
-20.
-60.
-100.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

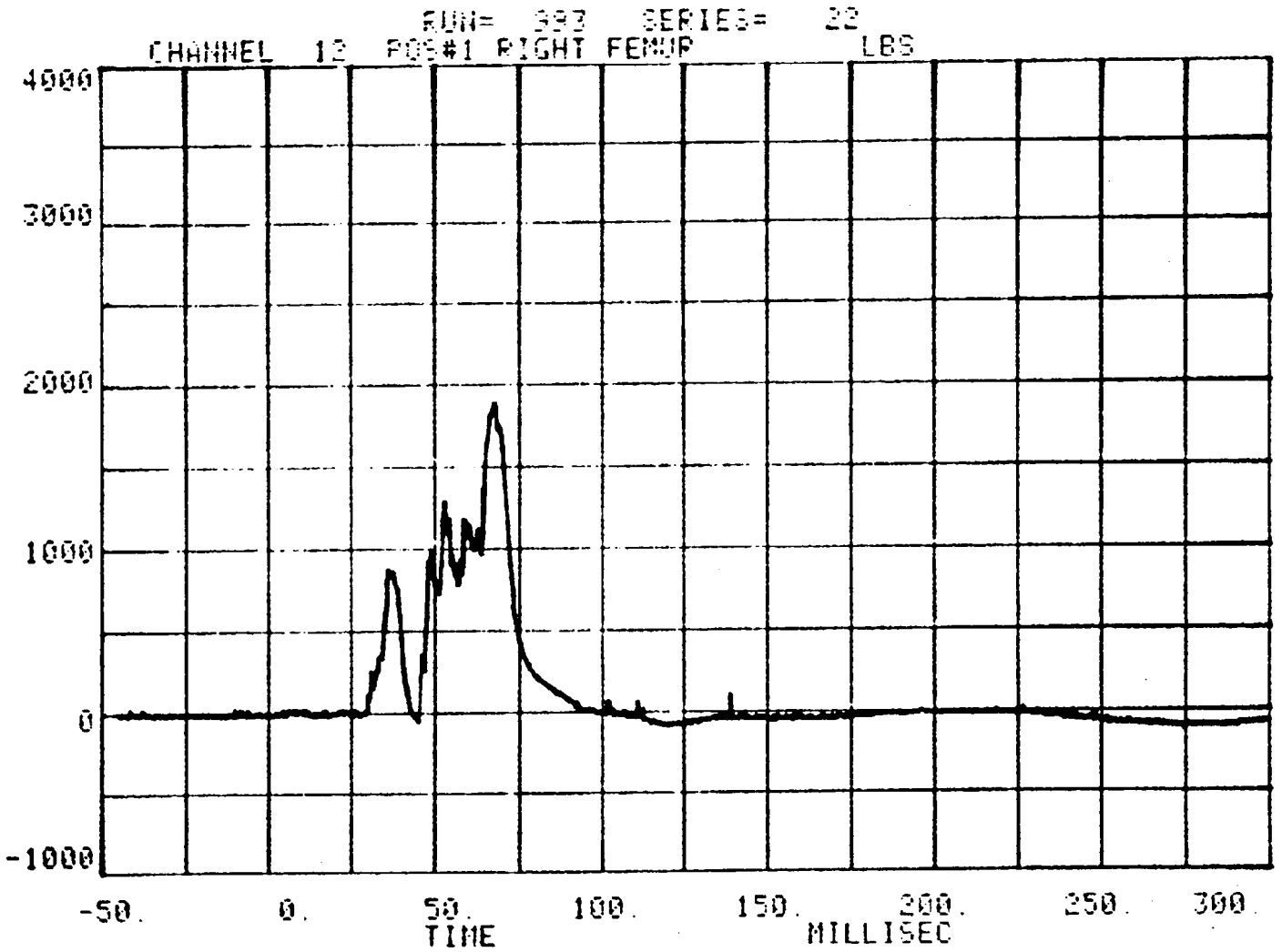
7776-22


CHANNEL 2 POS#1 CHEST RESULTANT
PUN= 883 SERIES= 22
G'S
100.
80.
60.
40.
20.
0
-50.
0
50
TIME
100
150.
200.
250.
300.
MILLISEC

7776-22

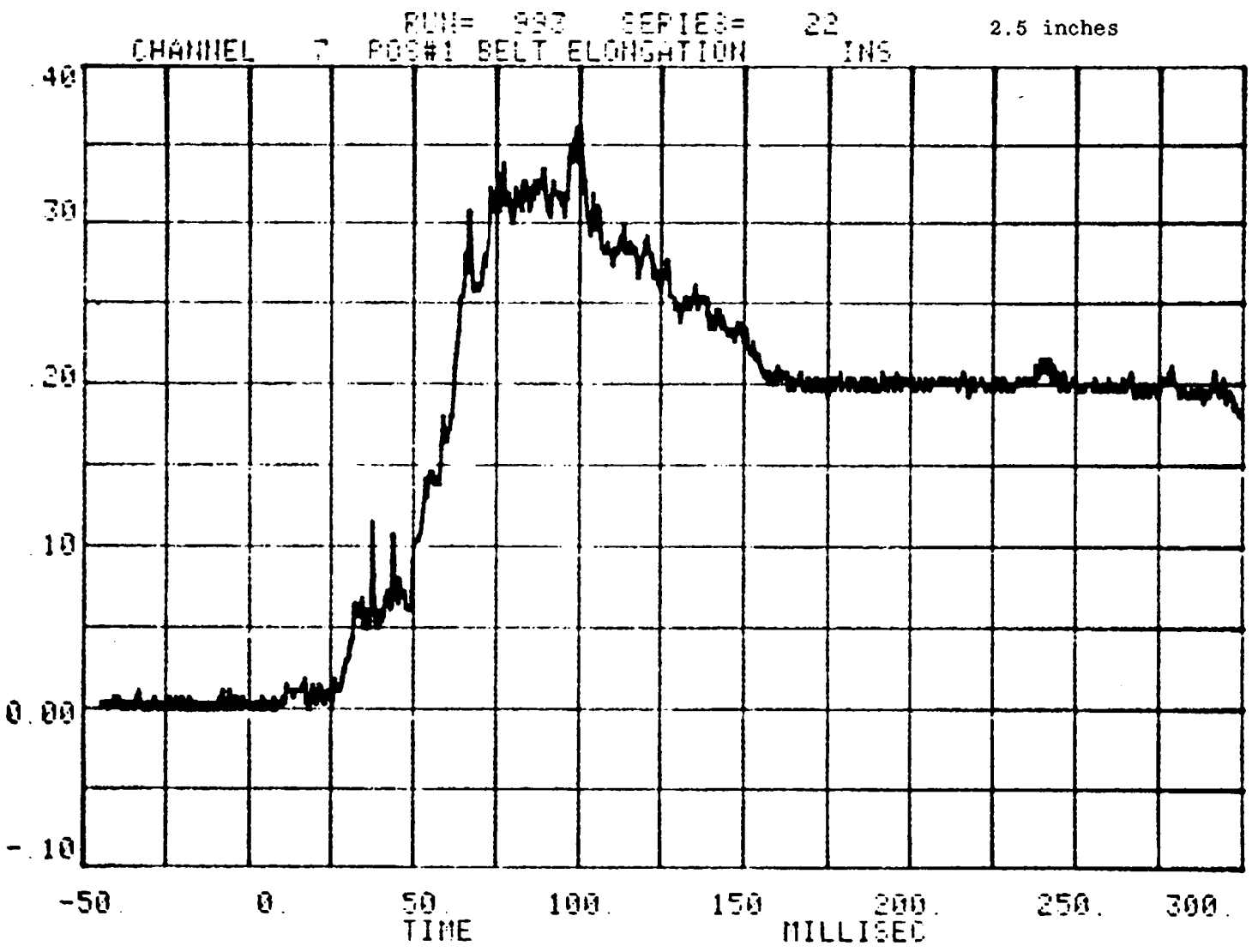

CHANNEL 11 POS#1 LEFT FEMUR
SUM= 993 SERIES= 22
LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50
100
150
200
250
300.
TIME
MILLISEC

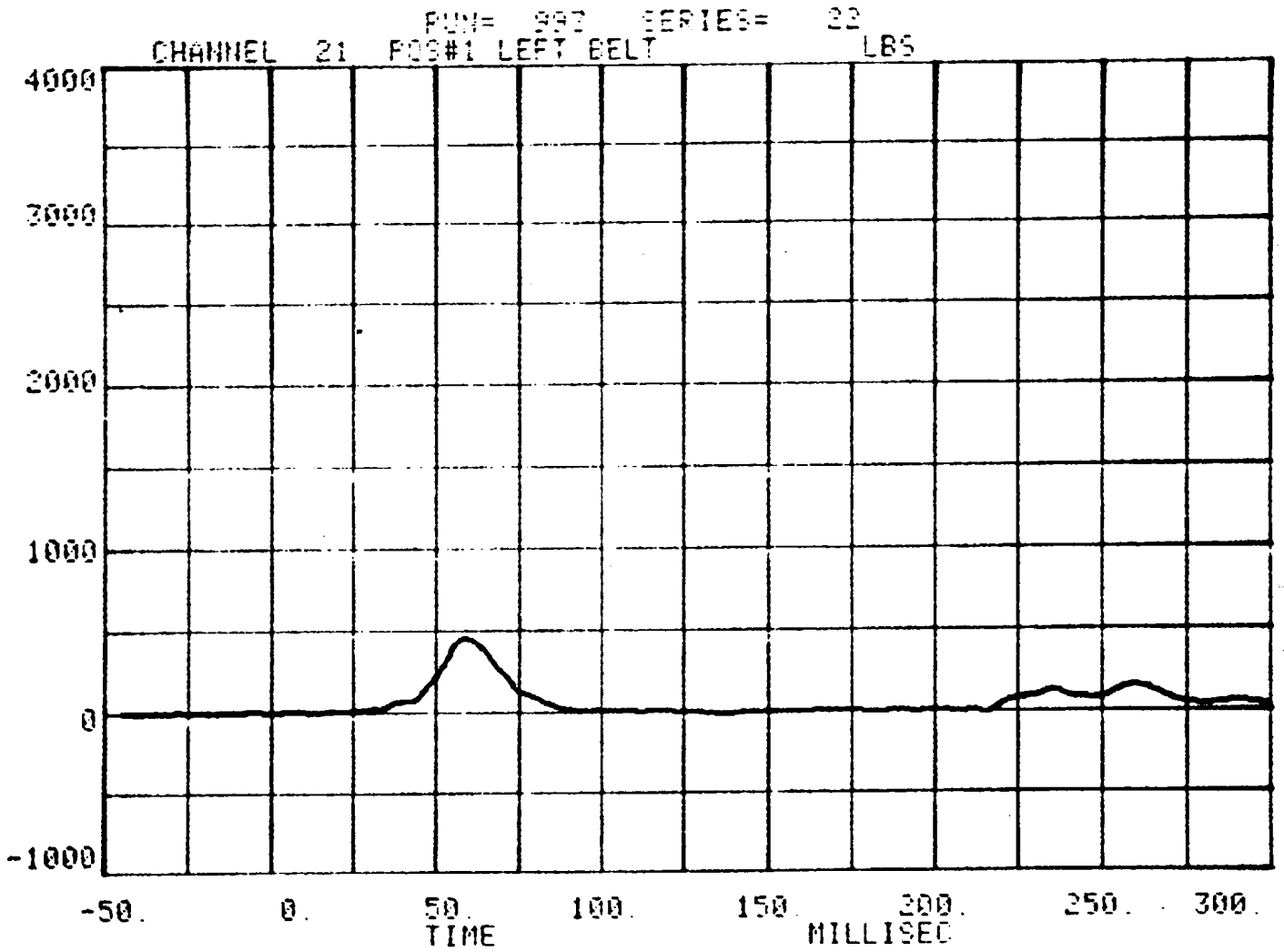
7776-22


RUN= 393 SERIES= 22
CHANNEL 12 POS#1 RIGHT FEMUR LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

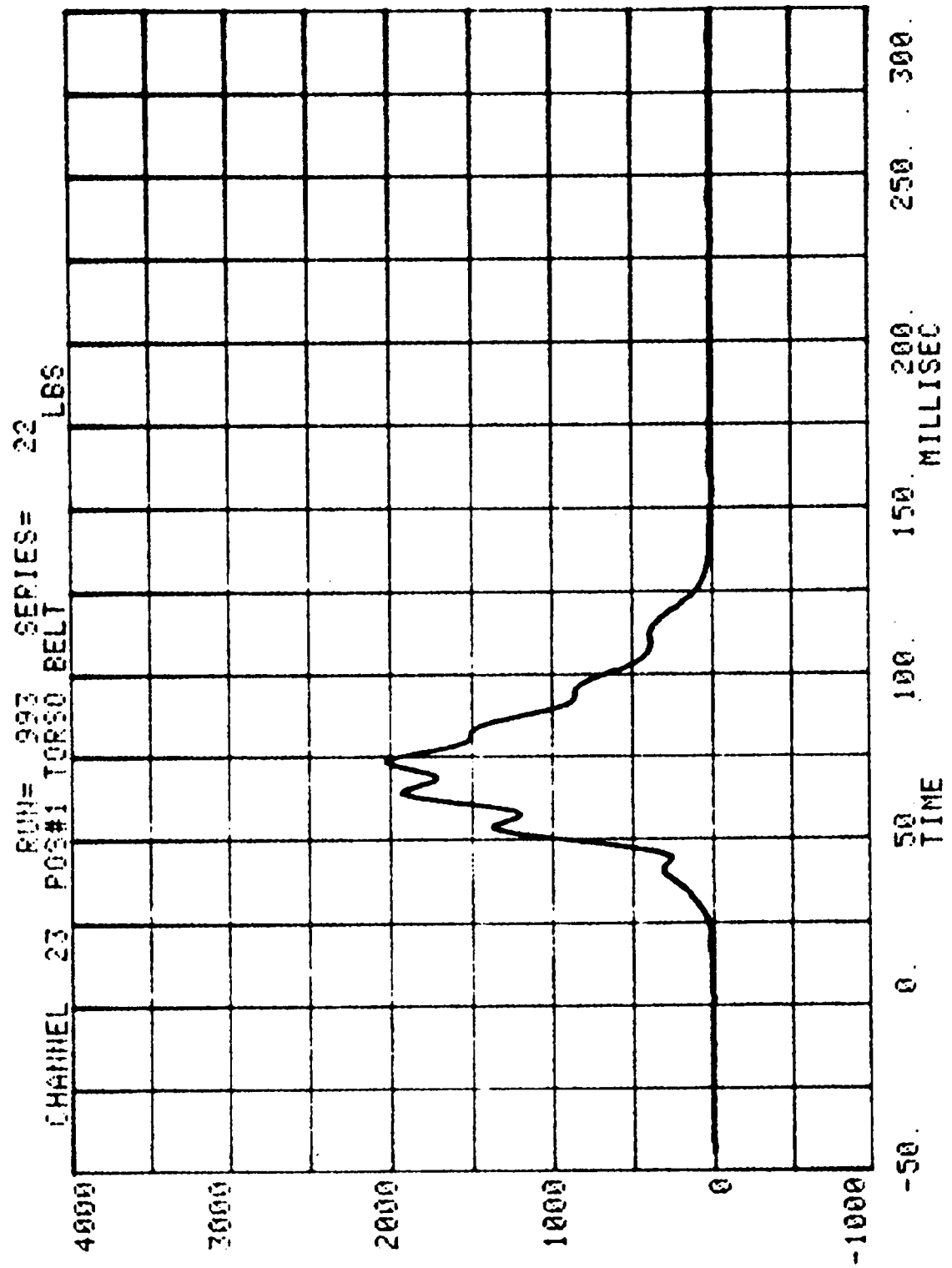
Measured over

2.5 inches




RUN= 997 SERIES= 22
CHANNEL 21 POS#1 LEFT BELT LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150
200.
250.
300.
TIME
MILLISEC

7776-22


CHANNEL 23 POS#1 TORSO BELT
RUN= 993 SERIES= 22
LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NCAP TEST #22

RUN= 993

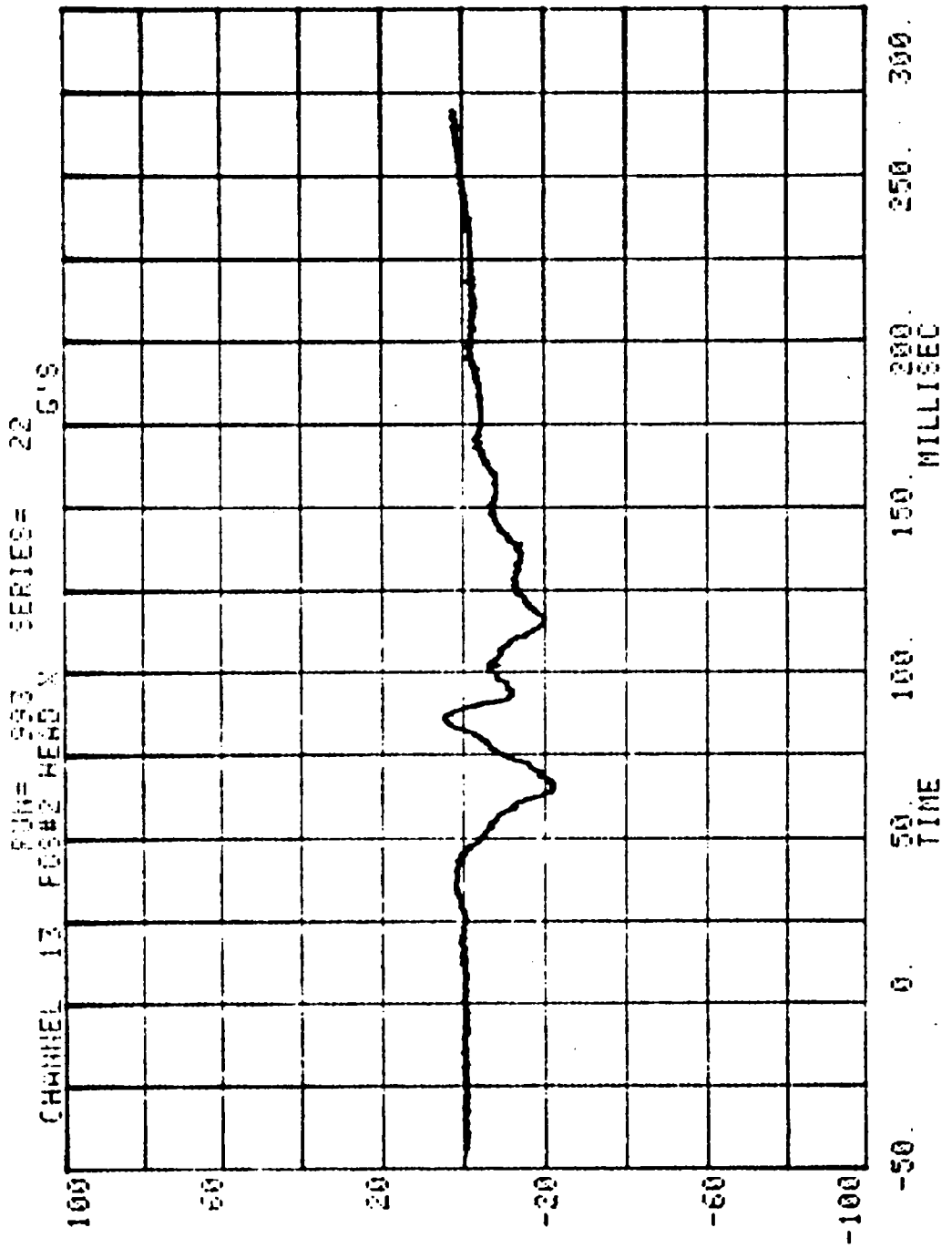
POS#2 HEAD R

HIC= 675.5 FROM T1= .06315 TO T2= .09915

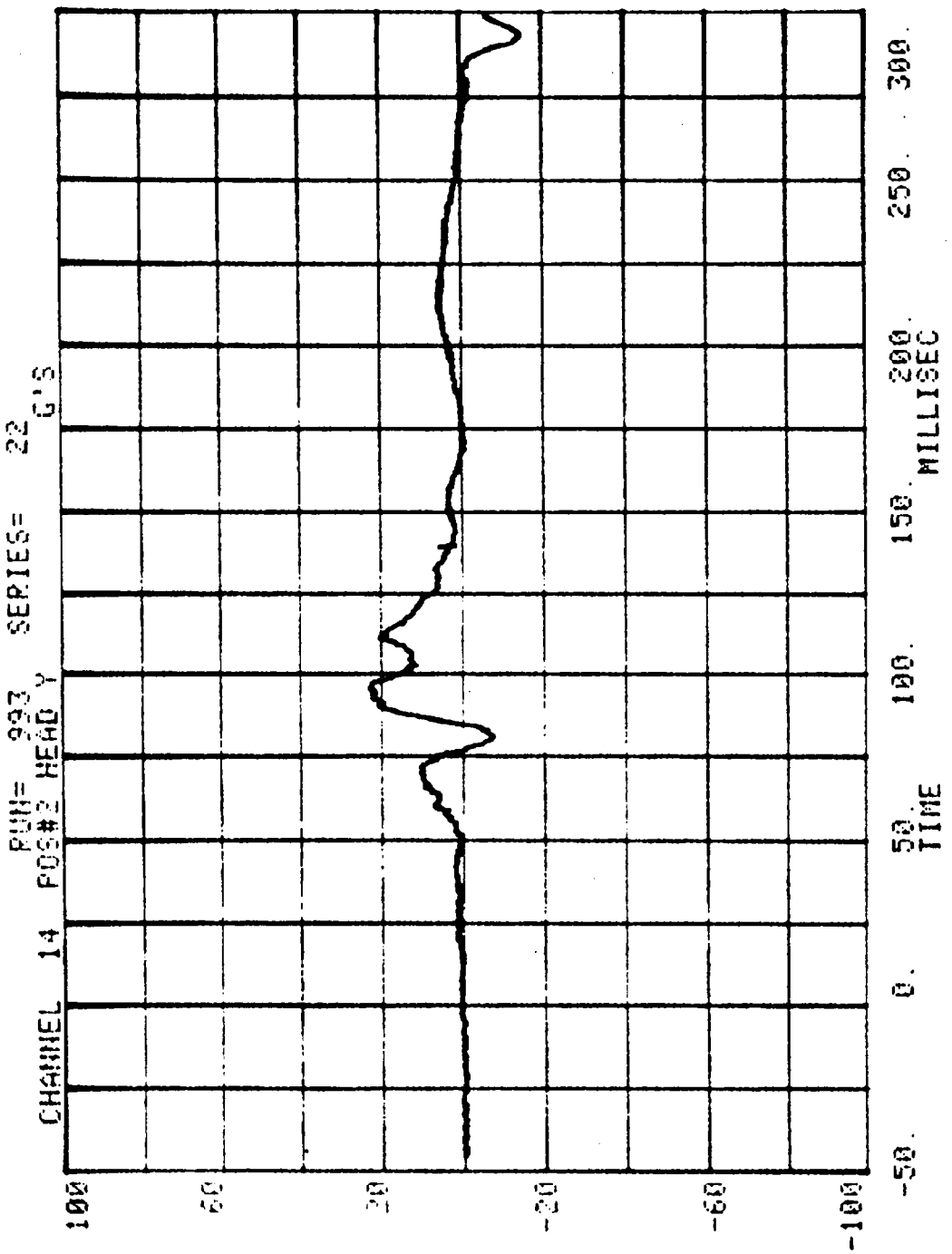
AVERAGE ACCELERATION BETWEEN T1 AND T2= 51.2G'S

EVENT TIME= 300.0 MSEC

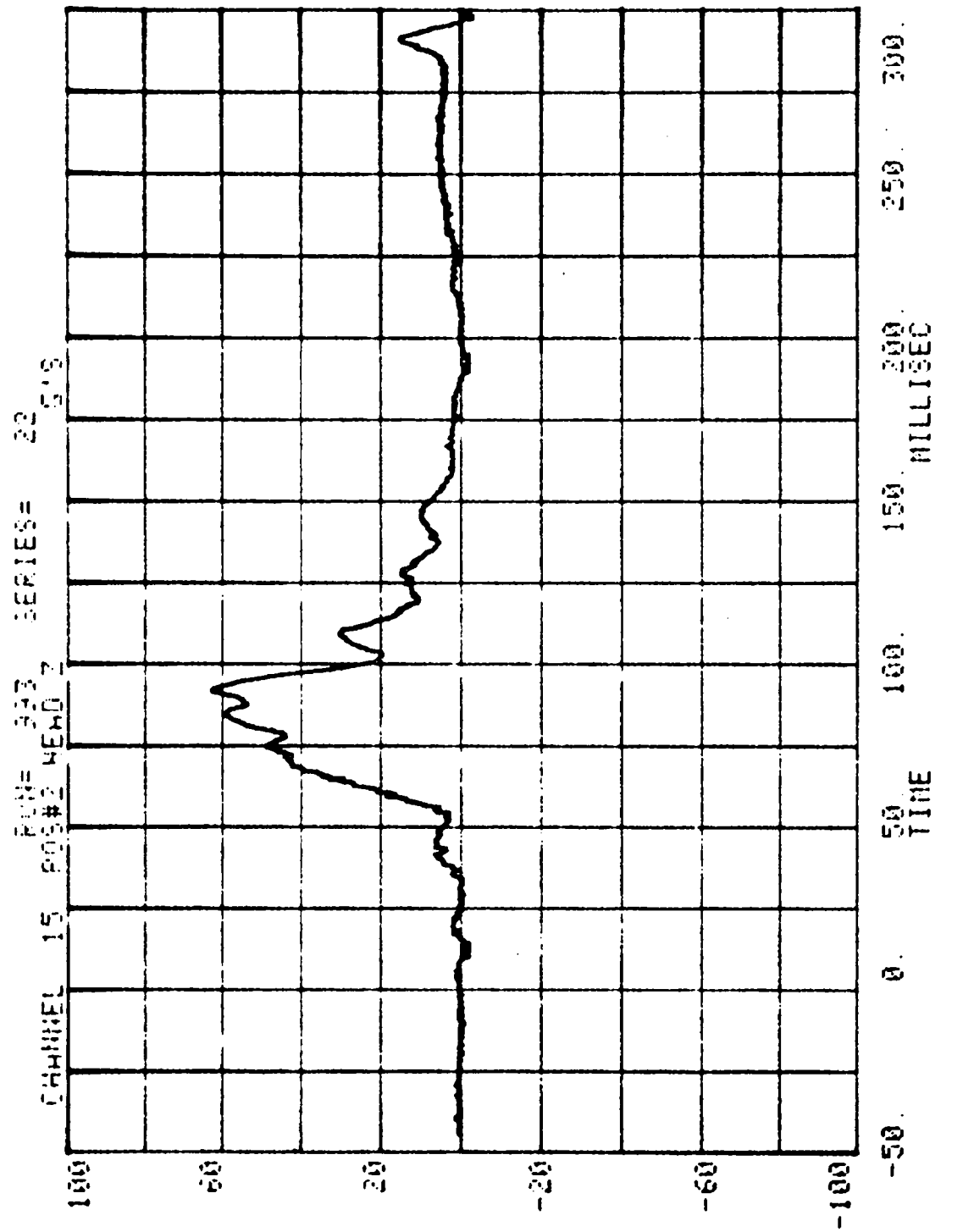
SEVERITY INDEX= 897.8


CHANNEL 13 FOS#2 HEAD X
RUN= 993 SERIES= 22
100
50
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC
G'S

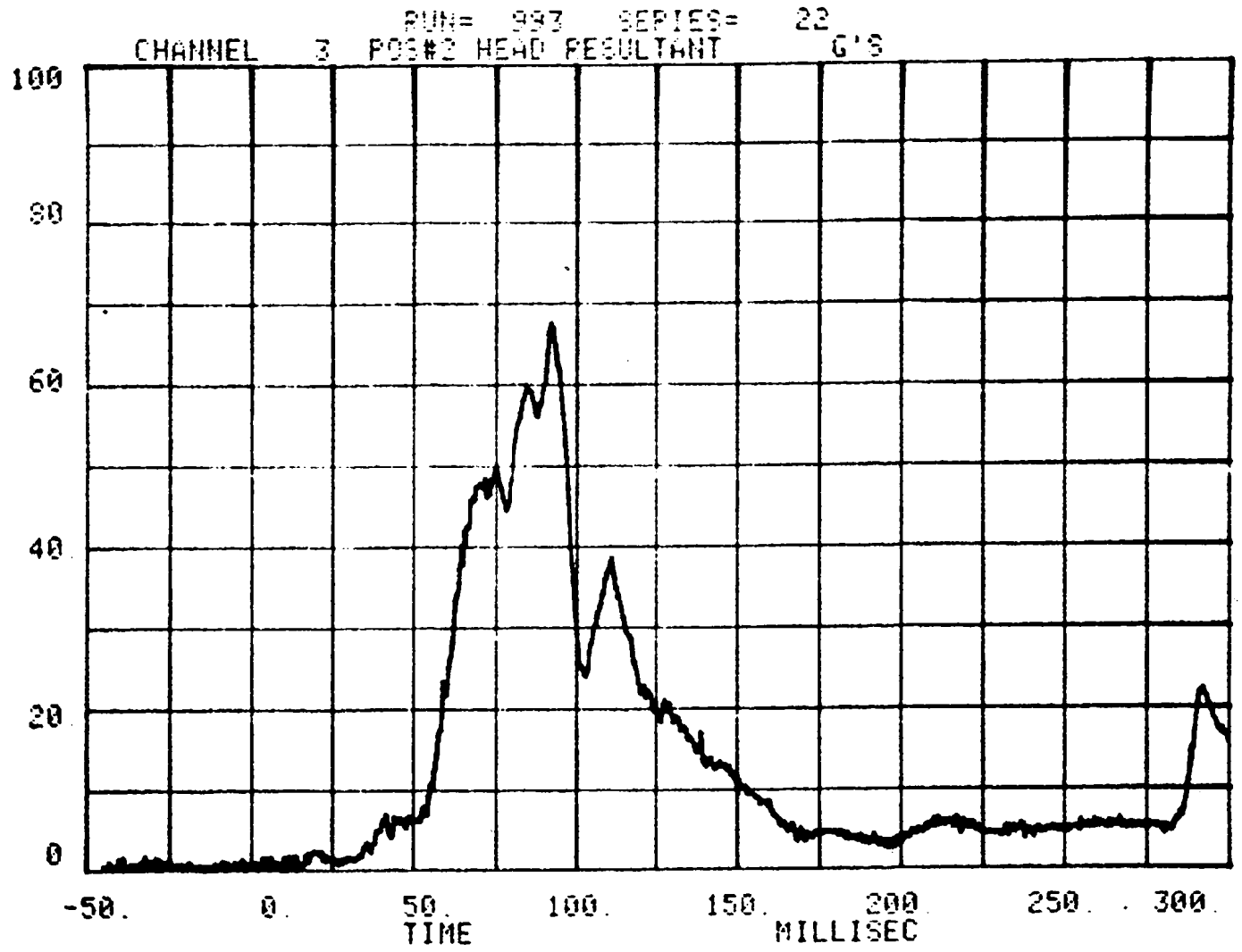
7776-22


CHANNEL 14 POS#2 HEAD Y
RUN= 993 SERIES= 22
G'S
100
50
0
-50
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

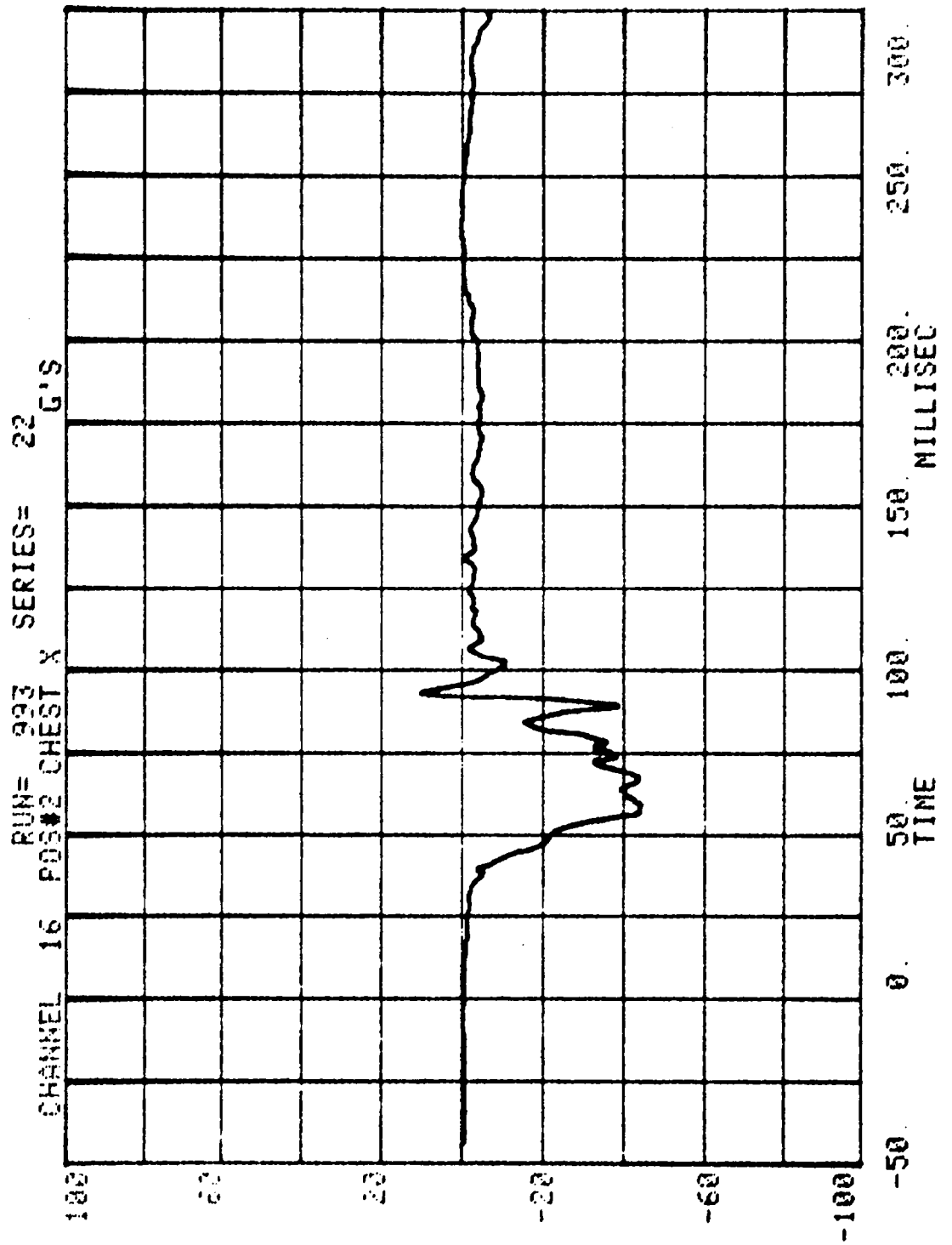
7776-22


CHANNEL 15
SERIES= 22
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

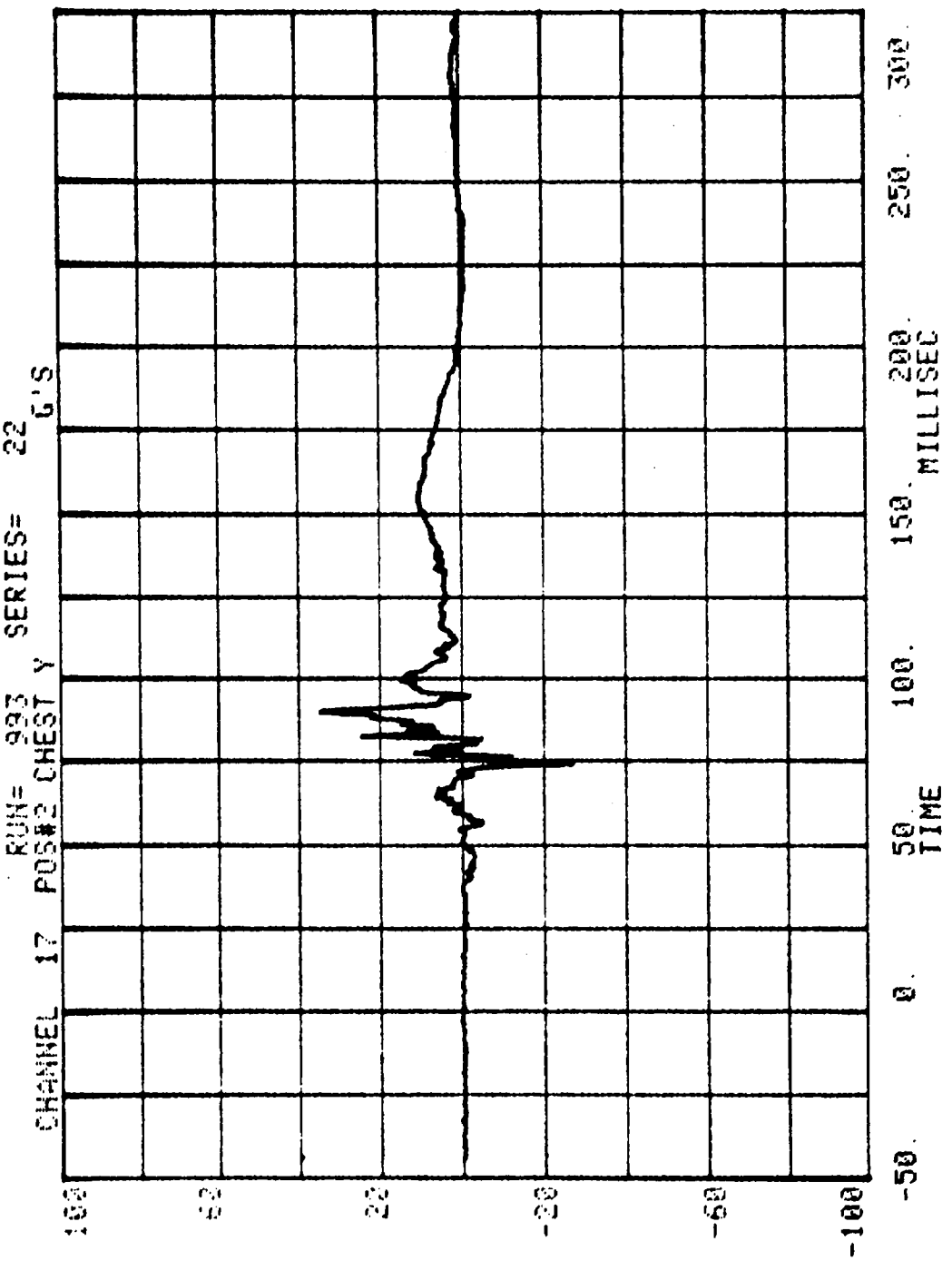
7776-22


RUN= 993 SERIES= 22
CHANNEL 3 POS#2 HEAD RESULTANT G'S
100
80
60
40
20
0
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

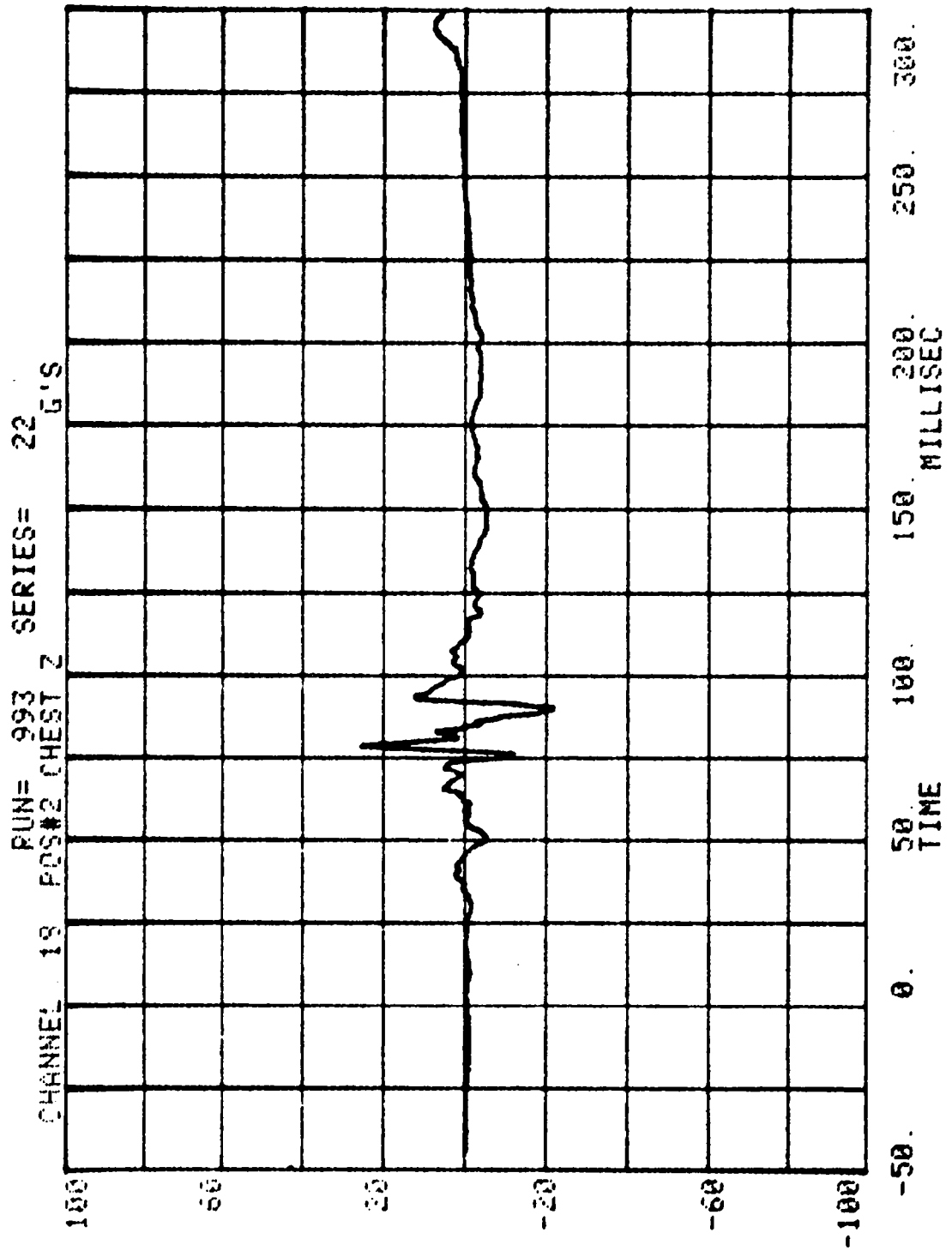
7776-22

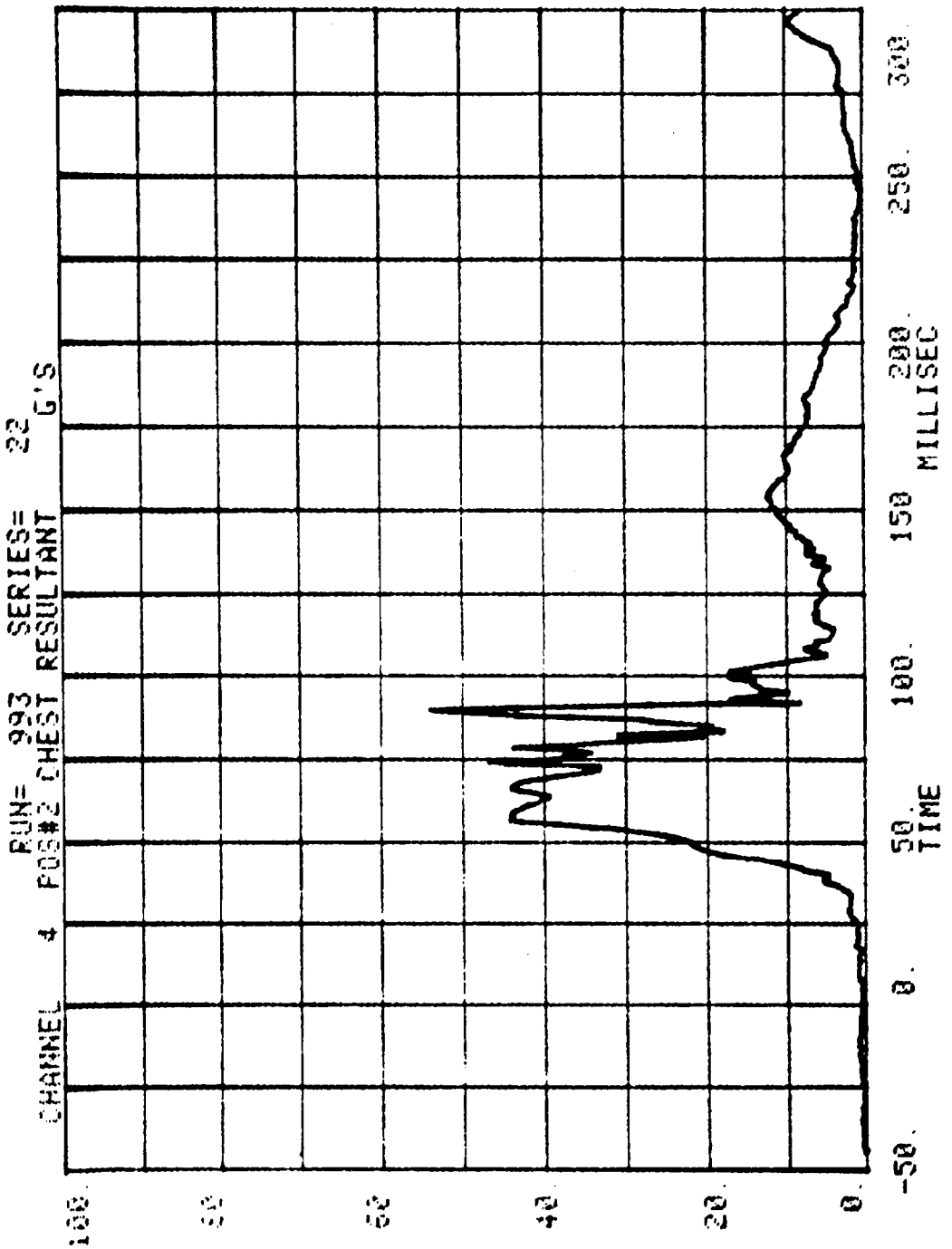

CHANNEL 16 POS#2 CHEST X
RUN= 993 SERIES= 22
G'S
100
50
0
-50
-100
-50
0
50
100
150
200.
250.
300.
TIME
MILLISEC

7776-22

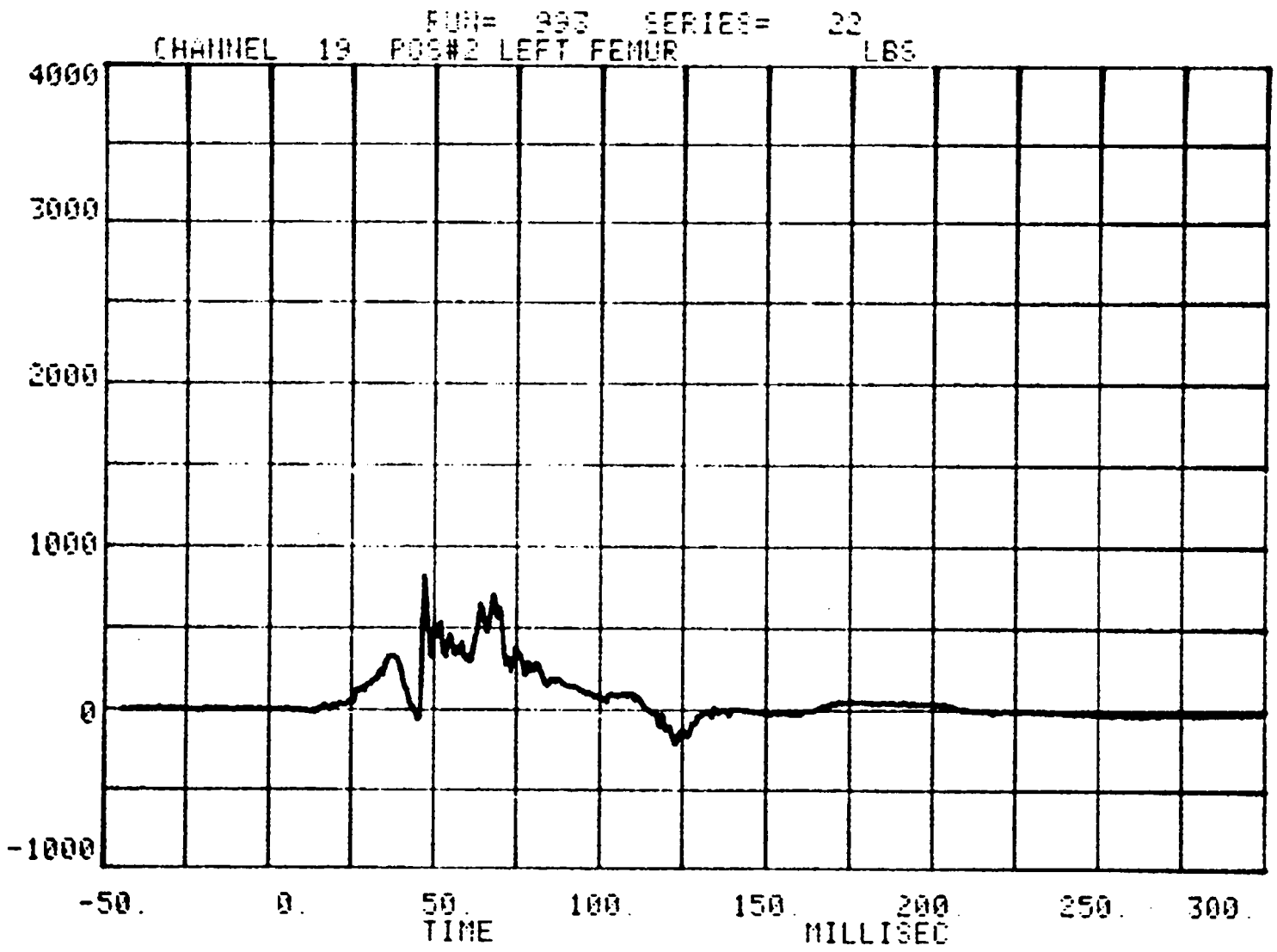

CHANNEL 17 RUN= 993 SERIES= 22
POS#2 CHEST Y
G'S
100.
50.
0.
-50.
-100.
-60.
-20.
20.
60.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

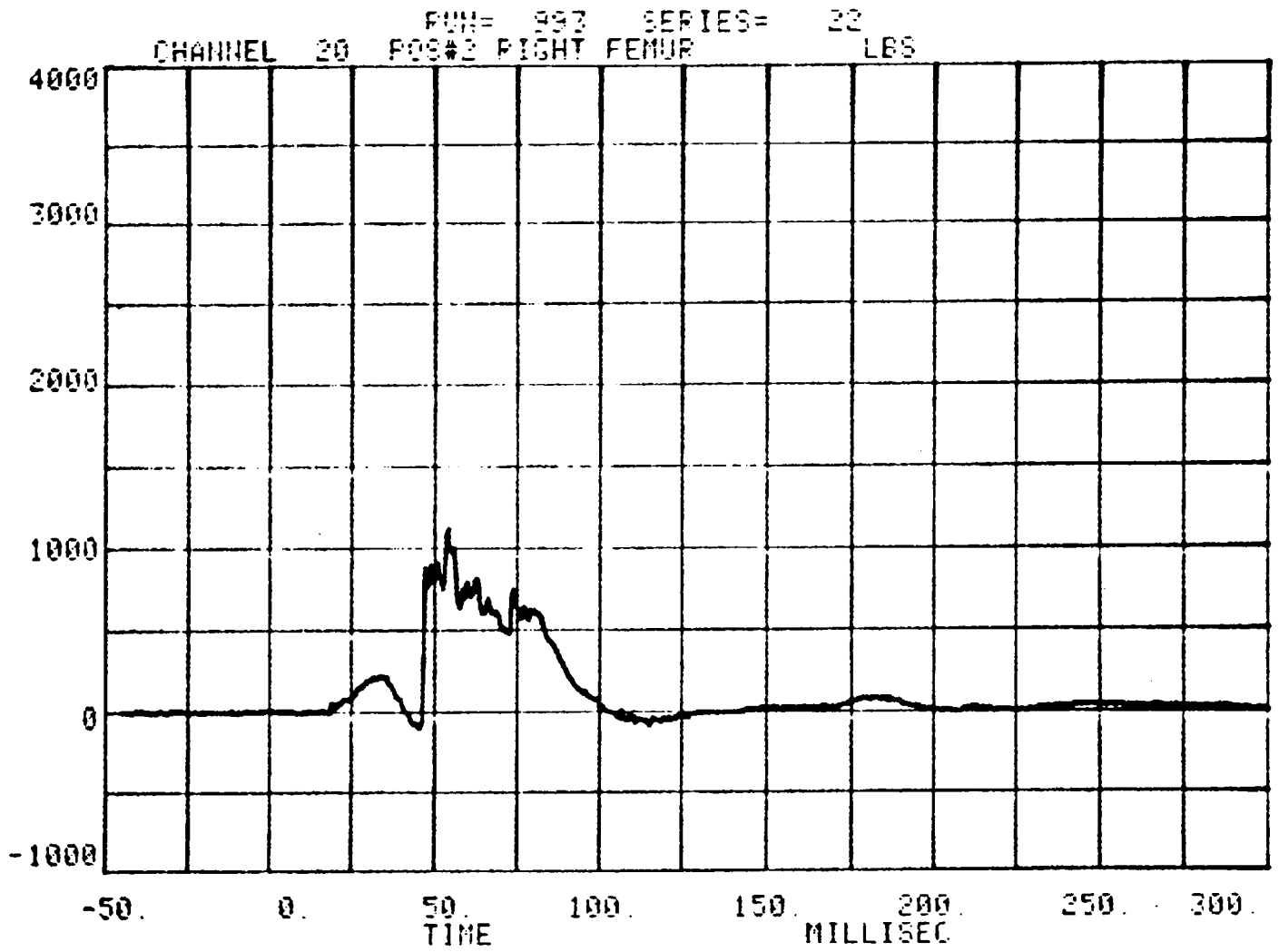
7776-22


CHANNEL 18 POS#2 CHEST Z
RUN= 993 SERIES= 22
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 4 POS#2 CHEST RESULTANT
RUN= 993 SERIES= 22
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150
200.
250.
300
TIME
MILLISEC

7776-22


RUN= 993 SERIES= 22
CHANNEL 19 POS#2 LEFT FEMUR LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

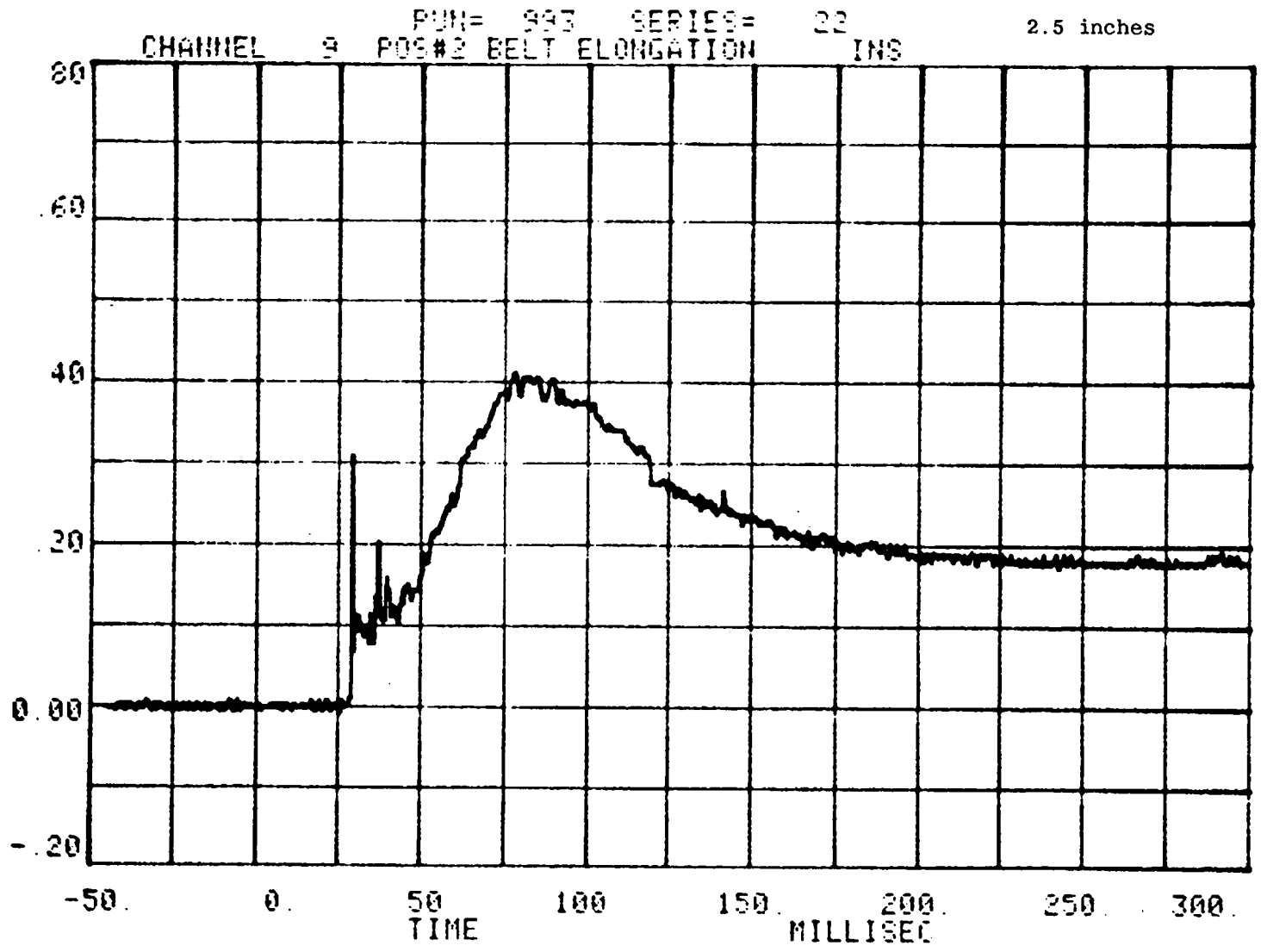

RUN= 997 SERIES= 22
CHANNEL 20 POS#2 RIGHT FEMUR LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

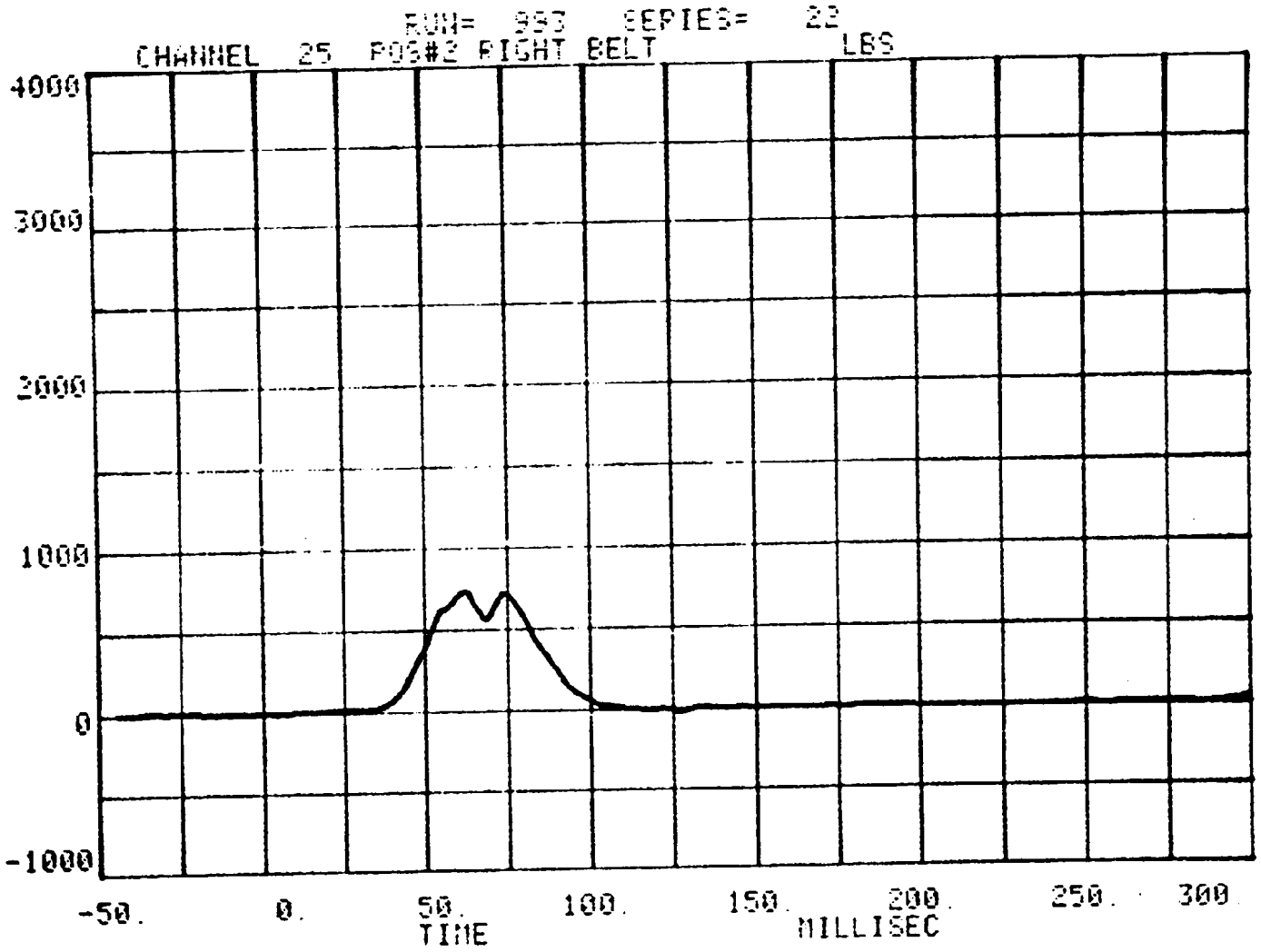
B-94

7776-22

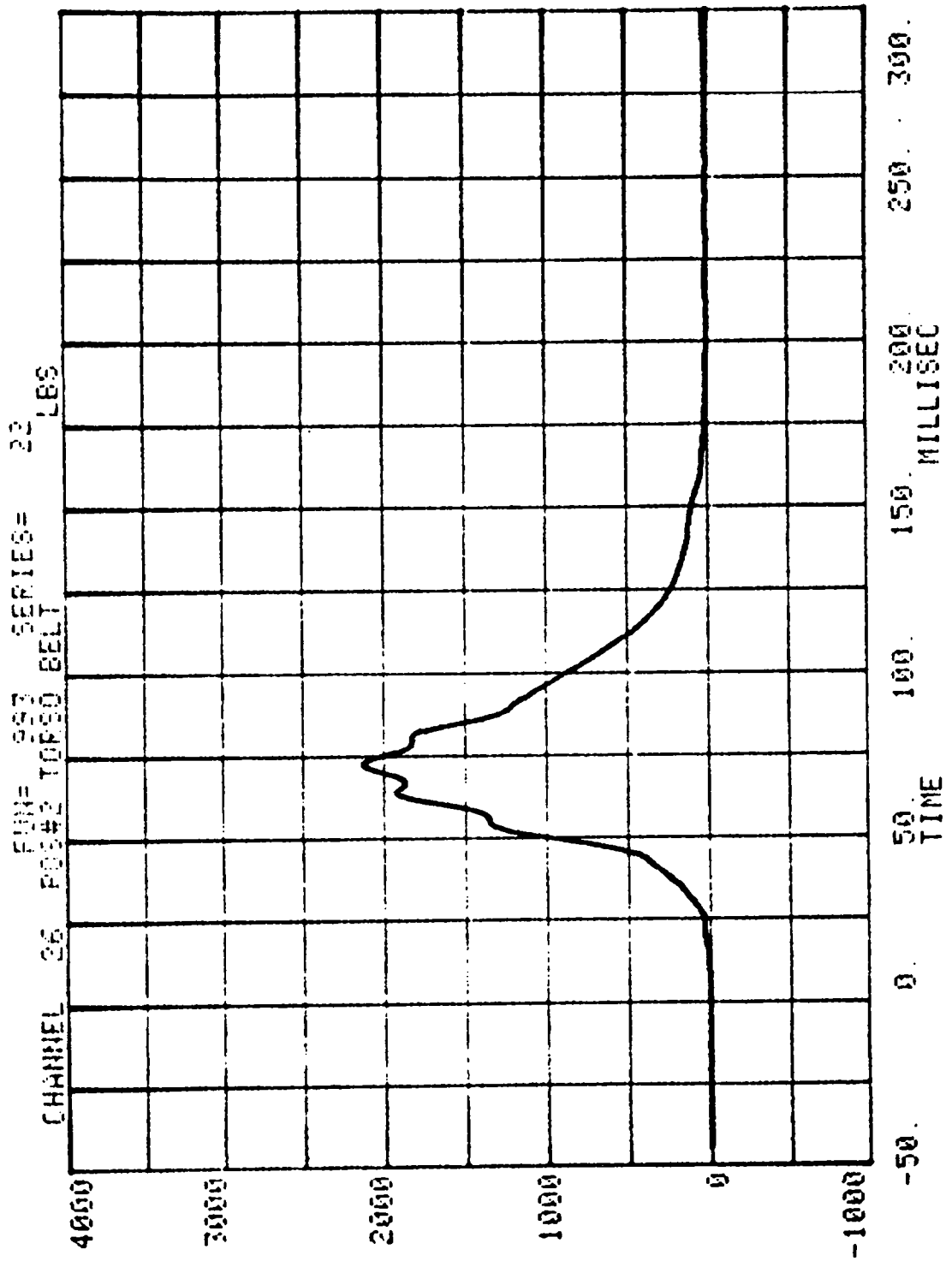
Measured over

2.5 inches




RUN= 993 SERIES= 22
CHANNEL 25 POS#2 RIGHT BELT
LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22


CHANNEL 26 FILM= 883 SERIES= 22
P8342 TOP80 BELT
LBS
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7776-22

Appendix C

DUMMY CERTIFICATION TESTS

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

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

Dummy serial numbers and certification dates are:

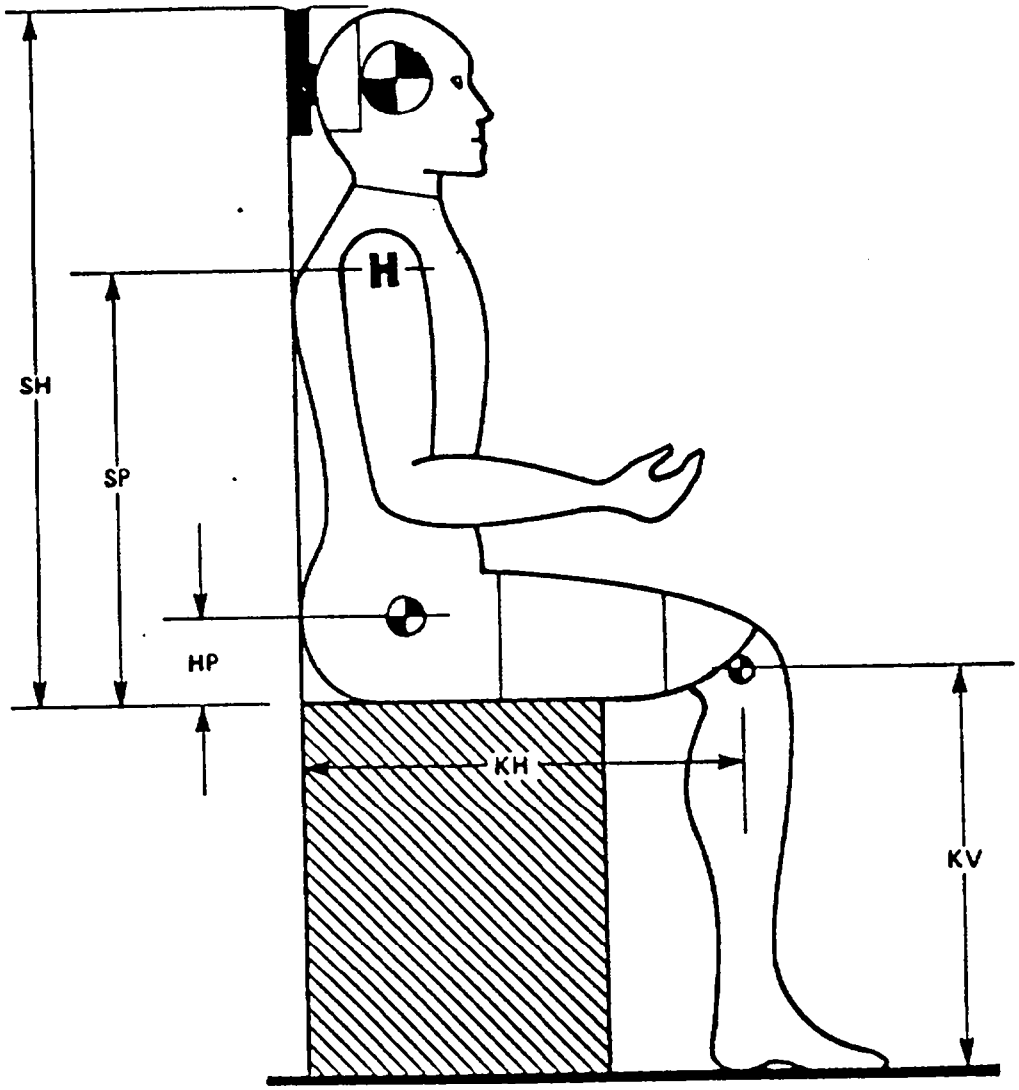
Serial No.	Completion Data
320	05-01-90
1019	05-01-90

Electronic Test Equipment

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

Figure 10

DUMMY CONFIGURATION DIMENSIONS



PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 320

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXX	5-1-90	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXX	1	
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"	14.8 "	"

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		5-1-90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		1	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		70-72 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		40-48 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	220.5 G's	G's
b. peak lateral accel.	<= 10 G's	1.8 G's	G's
c. Time above 100 G's	0.9 to 1.5 ms.	1.25 ms	ms

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

TECHNICIAN'S NAME: IVAN MINKEWICZ

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 320

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	23.2 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.8 G's	
c. Peak Resultant Head Acceleration		26 G's max.	25.94 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.36 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	27.16 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	4.34 ms	
g. Max. Head Rotation		63 to 73 deg.	72.16 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	28.03 ms	
	Displ.	2.1 to 3.1"	2.84 "	
60 deg.	Time	40.3 to 51.7 ms.	41.42 ms	
	Displ.	4.3 to 5.3"	5.07 "	
Maximum	Time	53.2 to 66.8 ms.	54.19 ms	
	Displ.	5.0 to 6.0"	5.94 "	
60 deg.	Time	67.0 to 83.0 ms.	74.03 ms	
	Displ.	4.3 to 5.3"	4.76 "	
30 deg.	Time	85.4 to 104.6 ms.	89.29 ms	
	Displ.	2.1 to 3.1"	2.15 "	
0 deg.	Time	101.0 - 123.0 ms.	104.66 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: IVAN MINKEWICZ

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 320

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required
3. ABDOMINAL COMPRESSION			
TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	24 lbs	
b. Force @ 0.75"	36 to 50 lbs.	38.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	56 lbs	
d. Force @ 1.3"	73 to 88 lbs.	83.5 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	29 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	41 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	55 lbs	
d. Return Angle	12 deg. maximum	6 deg	
5. CHEST IMPACT TESTS:			
A.High Speed			
(1) Probe Speed	21.78-22.22 fps.	22.0 fps	
(2) Peak Deflection	1.7" maximum	1.69 "	
(3) Peak Resistive Force	2250 lbs maximum	2142 lbs	
(4) Internal Hysteresis	50 to 70%	58.6 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	1.09 "	
(3) Peak Resistive Force	1450 lbs maximum	1228 lbs	
(4) Internal Hysteresis	50 to 70%	54.7 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 320

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
6. KNEE IMPACT TEST			
A. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2150 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.75 ms	
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2269 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	

REMARKS:

TECHNICIAN'S NAME: IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER _____320_____

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	GE25	1-90	7-90
HY LATERAL--	ENDEVCO	FL12	1-90	7-90
HZ VERTICAL--	ENDEVCO	FP90	1-90	7-90
2. CHEST ACCELEROMETER-				
CX LONGITUDINAL--	CEC	A147	3-90	9-90
CY LATERAL--	ENDEVCO	CJ54	3-90	9-90
CZ VERTICAL--	CEC	A148	3-90	9-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	954	12-89	6-90
RIGHT SIDE	GSE	955	12-89	6-90
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A160	1-90	7-90
2. TEST PROBE ACCELEROMETER--	CEC	A161	1-90	7-90
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS-DUCER INC	20051	2-90	8-90
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	2-90	8-90
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	2-90	8-90

NHTSA DUMMY I.D. NUMBER.: 1019

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	5-1-90	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	2	
SH - Seated Height	35.6 to 35.8"	35.8 "	"
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"	19.5 "	"
SW - Shoulder Width	17.8 to 18.4"	18.3 "	"
HW - Hip Width	14.0 to 15.4"	14.9 "	"

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		5-1-90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		2	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-72 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		40-50 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	243.9 G's	G's
b. peak lateral accel.	<= 10 G's	1.9 G's	G's
c. Time above 100 G's	0.9 to 1.5 ms.	1.13 ms	ms

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

TECHNICIAN'S NAME: IVAN MINKEWICZ

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	23.0 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.8 G's	
c. Peak Resultant Head Acceleration		26 G's max.	25.6 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.36 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	27.78 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	4.46 ms	
g. Max. Head Rotation		63 to 73 deg.	72.68 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	28.4 ms	
	Displ.	2.1 to 3.1"	2.92 "	
60 deg.	Time	40.3 to 51.7 ms.	42.29 ms	
	Displ.	4.3 to 5.3"	5.13 "	
Maximum	Time	53.2 to 66.8 ms.	55.18 ms	
	Displ.	5.0 to 6.0"	5.93 "	
60 deg.	Time	67.0 to 83.0 ms.	73.54 ms	
	Displ.	4.3 to 5.3"	4.99 "	
30 deg.	Time	85.4 to 104.6 ms.	90.65 ms	
	Displ.	2.1 to 3.1"	2.12 "	
0 deg.	Time	101.0 - 123.0 ms.	105.28 ms	
	Displ.	-.5 to 0.5"	0.0 "	

TECHNICIANS NAME: IVAN MINKEWICZ

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
3. ABDOMINAL COMPRESSION TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	29 lbs	
b. Force @ 0.75"	36 to 50 lbs.	44.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	53.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	83.5 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	28.5 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	39.5 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	50.5 lbs	
d. Return Angle	12 deg. maximum	11 deg	
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	22.1 fps	
(2) Peak Deflection	1.7" maximum	1.68 "	
(3) Peak Resistive Force	2250 lbs maximum	2091 lbs	
(4) Internal Hysteresis	50 to 70%	59.4 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	1.09 "	
(3) Peak Resistive Force	1450 lbs maximum	1216 lbs	
(4) Internal Hysteresis	50 to 70%	50.1 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 1019

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
6. KNEE IMPACT TEST			
A. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2004 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.75 ms	
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2243 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	

REMARKS:

TECHNICIAN'S NAME: IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER ____1019_____

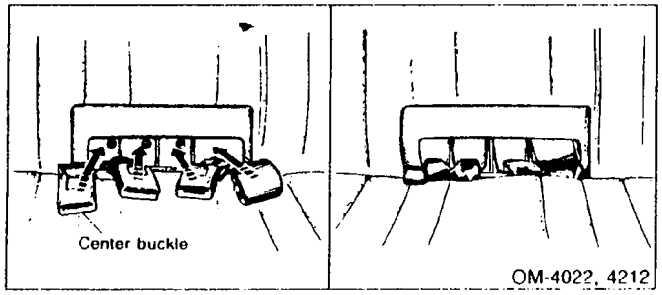
DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	FY05	4-90	11-90
HY LATERAL--	ENDEVCO	GD98	1-90	7-90
HZ VERTICAL--	ENDEVCO	CD75	1-90	7-90
2. CHEST ACCELEROMETER-				
CX LONGITUDINAL--	CEC	A115	1-90	7-90
CY LATERAL--	ENDEVCO	CS09	1-90	7-90
CZ VERTICAL--	CEC	A29	1-90	7-90
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	951	12-89	6-90
RIGHT SIDE	GSE	952	12-89	6-90
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A160	1-90	7-90
2. TEST PROBE ACCELEROMETER--	CEC	A161	1-90	7-90
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS-DUCER INC	20051	2-90	8-90
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	2-90	8-90
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	2-90	8-90

Appendix D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

WARNING!
- **Never stack luggage or other cargo higher than the top of the seatback because it could tumble forward and injure passengers in the event of a sudden stop or an accident.**
- **Firmly secure skis and other long items in position to prevent them from shooting forward during a sudden stop and causing injury.**
- **Never permit anyone to ride in the cargo area of the wagon because this area is designed only for carrying luggage and other miscellaneous items.**

CAUTION:
- ***Do not place luggage or other articles on the floor under the seat cushion.***
- ***When folding down the back seat in a wagon, put the seat belts in the seat belt pocket to prevent them from falling beneath the seat cushion.***



To return the rear seat to its original position, raise the seatback and push it till it locks. Then pull the rear cushion down to its normal position. Move the seat back and forth to confirm that it is securely locked in position. Place the head restraints (if so equipped) back in their normal position.

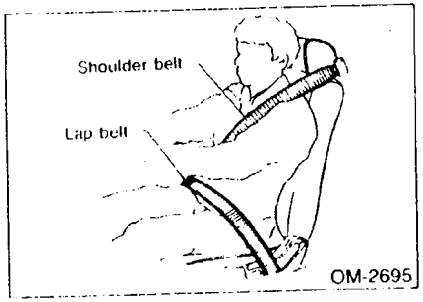
WARNING!
- **After returning the rear seatback to its upright position, make sure the seat belts and seat conversion strap are properly located on top of the rear seat cushion.**
- **Also make certain that the shoulder belts are in front of rather than behind the rear seatback.**

Front Seat Belts (Automatic Belts)

Some models have an automatic shoulder belt and a manual lap belt for both front seats. The automatic shoulder belt restrains the upper torso.

When the ignition switch is turned "ON", the shoulder belt responds automatically to the opening and closing of the door to allow easy entry into and egress from the vehicle.

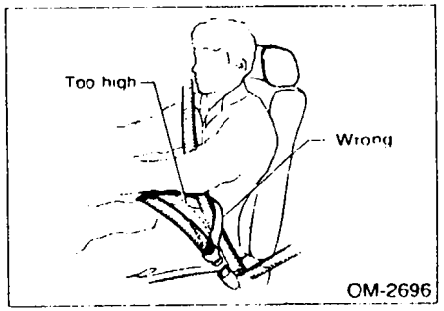
A knee panel is also located below the instrument panel to restrain the lower torso.



WARNING:
- **All passengers must wear the manual lap belts for full restraint. Shoulder belts alone are not sufficient.**
- **Never open the door while the vehicle is moving as this will cause the automatic shoulder belt to move forward and away from you.**

To use your automatic shoulder belt, first close the door and adjust the seat. When the ignition switch is turned "ON", the shoulder belt automatically restrains the upper half of your body.
The shoulder belt moves freely to allow normal body movement but automatically locks during a sudden stop or impact.
When the door is opened, the shoulder belt moves forward, allowing you to get out easily.
If the ignition switch is turned "OFF", the seat belt will move forward only when the door is opened for the first time. If the door is closed again, the seat belt will remain in its current position and will not move until the ignition is again turned "ON".
If the ignition is turned "ON" while the seat belt is moving backward, turning the ignition "OFF" will cause the seat belt to stop.
If the seat belt is moving forward while the ignition is turned "OFF", closing the door will cause the seat belt to stop at its current position.
A seat belt which stops under any of these conditions moves normally again when the ignition switch is turned "ON" or when the door is opened.

If the shoulder belt slide anchor becomes stuck or cannot be moved, see the section entitled "In Case of Emergency".

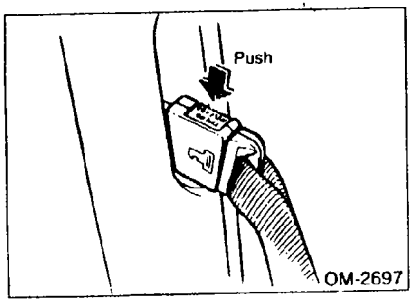


WARNING!
- **Never touch the automatic restraint system while it is moving.**
- **For correct placement of the shoulder belt, keep your body still and your arms down while the system is operating.**
- **Never use a belt that is twisted or reversed. In an accident, this can increase the risk or severity of injury.**
- **Never position the shoulder belt under you arm. In an accident, this can increase the risk or severity of injury.**
- **Let the shoulder belt position itself around you first before fastening the manual lap belt. Fastening the lap belt first may cause the shoulder belt to get caught beneath the lap belt.**
- **To eliminate the risk of sliding under the seat belt in a collision, the front seats should not be reclined more than four notches from the upright position. Seat belts restrain the body most effectively when the occupant sits well back and upright in the seat.**

☐ How to release the shoulder belt in an emergency

The shoulder belt may be unfastened manually in an emergency by simply pushing the release button on the shoulder belt slide anchor buckle. The shoulder belt will drop free and allow you to quickly leave the vehicle.

If the emergency release is disconnected accidently or is not fastened securely, a warning light will go on and a chime will sound.

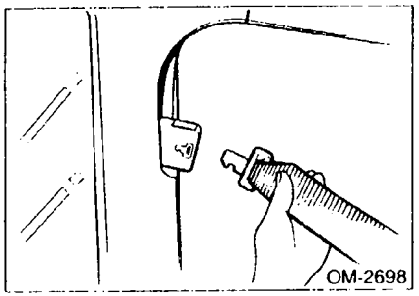


☐ How to reset the emergency release buckle

1. Close the front door and turn the ignition switch to "ON" to allow the shoulder belt slide anchor to move to the rearmost position.

2. Draw the shoulder belt across your body, making sure that the caution label attached to the webbing faces you and the belt is not twisted.

3. Insert the tongue of the shoulder belt into the slide anchor until it snaps.



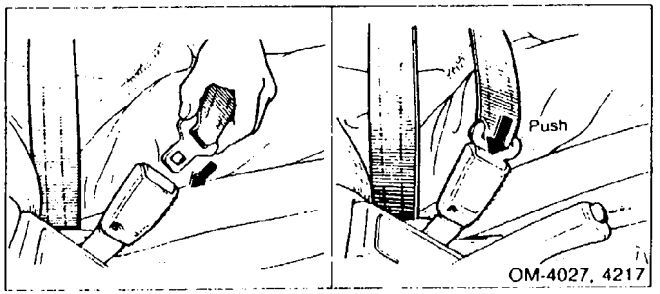
☐ Manual lap belt (front seats)

Your lap belt has an emergency locking retractor. To fasten the manual lap belt, pull it from the retractor and insert the tongue into the buckle until it snaps.

The manual lap belt moves freely to allow normal body movement but locks automatically during a sudden stop or impact.

This system can not be made to lock by jerking on the belt.

To unfasten the belt, push the button on the buckle.



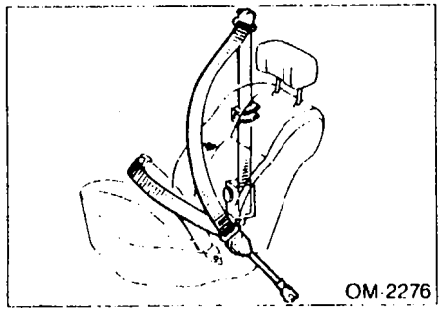
Be sure to fasten the lap belt after the automatic shoulder belt is in place. Fastening the lap belt first may cause the shoulder belt to get caught beneath the lap belt.

WARNING!
- **Never use a belt that is twisted or reversed. In an accident, this can increase the risk or severity of injury.**
- **The lap belt has a loop of webbing under the caution label. If the stitching of webbing has been torn or "REPLACE BELT" on the webbing is appeared, replace to new belt.**

DUCE

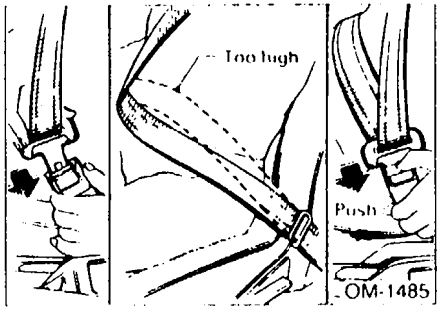
Front Seat Belts (Manual Belts)

Three-point type front seat belts with an emergency locking retractor are provided.



Before fastening the front seat belt, adjust the seat to the desired position and sit well back and upright in the seat.
To fasten the front seat belt, pull the belt out of the retractor and insert the tongue into the buckle until it snaps.

The front seat belt moves freely to allow normal body movement but locks automatically during a sudden stop or impact.
This system can not be made to lock by jerking on the belt.
To unfasten the belt, push the button on the buckle.

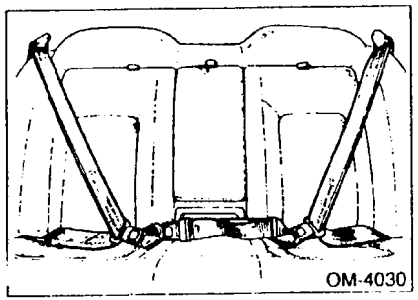


WARNING!
- **Never use a belt that is twisted or reversed. In an accident, this can increase the risk or severity of injury.**
- **Never position the shoulder belt under the arm. If an accident occurs, this can increase the risk or severity of injury.**
- **To eliminate the risk of sliding under the seat belt in a collision, the front seatbacks should not be reclined more than four notches from the upright position. Seat belts provide maximum restraint when the occupant sits well back and upright in the seat.**

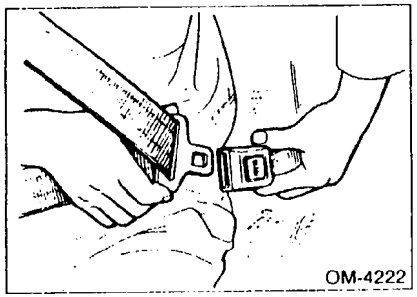
D14EE

Rear Seat Belts

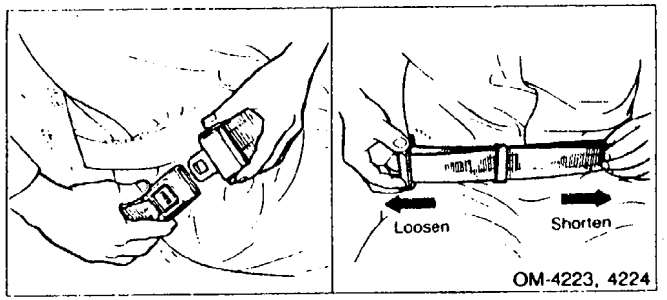
Two sets of three-point type rear seat belts with an emergency locking retractor and one set of two-point type rear seat belts with a manual adjustment device are provided.


OM-4030

To fasten the three-point type seat belt, pull it out continuously from the retractor, insert the tongue into the buckle until it snaps, then pull the belt tight.
The three-point type seat belt moves freely to allow normal body movement but locks automatically during a sudden stop or impact.
To unfasten the belt, push the button on the buckle.


OM-4222

To fasten the two-point type seat belt, hold the tongue at a right angle to the belt and pull it to the desired length. Keeping the belt untwisted, push the tongue into the buckle until it snaps. Take up the slack in the belt so that it fits snugly over your hip bone.
To unfasten the belt, push the button on the buckle.
The center seat belt buckle has been designed to engage only with the center seat belt tongue. The outboard seat belt buckle and center seat belt tongue are not compatible and will not engage with one another.



OM-4223, 4224

WARNING!
Never use a belt that is twisted or reversed. In an accident, this can increase the risk or severity of injury.

CAUTION:
When folding down the back seat in a wagon, put the seat belts in the seat belt pocket to prevent them from falling beneath the seat cushion.

D158E

Seat Belt Safety Tips

- To help reduce the risk and severity of injury in the event of an accident, all persons in the vehicle should wear seat belts.
- All vehicle occupants, including the driver, should fasten their seat belts BEFORE the vehicle is started.
- Never use a single belt for more than one person. In an accident, two people in the same belt will increase the risk and severity of injury.
- The lap belt should be as low as possible on the hips. This spreads the force of the lap belt over the stronger hip bones instead of across the weaker abdomen.
- Never let any foreign object get in the buckle or retractor because that may prevent them from working properly.
- All belts should fit snugly in order to provide full restraint. Loose fitting belts are not as effective in preventing or reducing injury.
- **Children.** As with an adult, a child should never be allowed to ride unrestrained. Generally, it is best for children to sit in the rear seats and, of course, wear seat belts. If the shoulder portion of the belt covers the neck or face of the child, he or she must use a child restraint to avoid the risk of serious bodily injury. Never allow a child to stand up or kneel on the seat.
- **Infant or small child.** Use a child safety seating system which is suitable for your vehicle. See information on "Child Restraint System" in this section.
- **Expectant mothers.** Expectant mothers need to use seat belts. They should consult their doctor for specific recommendations. The lap belt should be worn securely and as low as possible over the hips, not over the waist.

D159E

Seat Belt Extenders

If the front seat belts are not long enough to permit the metal tongue to engage with the seat belt buckle, optional seat belt extenders are available from your SUBARU dealer.

WARNING!
Be sure to observe the following guidelines when using seat belt extenders:
- **The extenders are for use only with the front seat lap-shoulder harness combination. EXTENDERS SHOULD NEVER BE USED WITH REAR SEAT BELTS.**
- **Never use an extender when the belt itself is long enough to permit it to be buckled properly. USE OF AN EXTENDER WHEN IT IS NOT NEEDED COULD REDUCE THE EFFECTIVENESS OF THE SEAT BELT AND RESULT IN MORE SERIOUS INJURY IN THE EVENT OF A COLLISION. If removal of heavy clothing is all that is needed to permit the seat belt to be buckled properly, REMOVE THE HEAVY CLOTHING AND DO NOT USE AN EXTENDER.**
- **If the buckle of an extender is over the abdomen, THE EXTENDER SHOULD NOT BE USED. Use of an extender with the buckle over the abdomen may result in serious abdominal injury in the event of a collision. It could also reduce the effectiveness of the shoulder portion of the belt.**
- **A seat belt extender should not be used by a pregnant passenger without the approval of her doctor.**
- **Make certain that the extender you purchase is the correct one for your particular vehicle. Several different types of extenders are available to match various varieties of front seat belt designs.**