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CAL REPORT NO. 7581-5
CRASHWORTHINESS TESTING AND ANALYSIS
35 MPH FRONTAL BARRIER IMPACT

1987 Hyundai Excel GSL
4-Door Hatchback

CALSPAN TEST NO. Y23-4-797

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NOVEMBER 4, 1987



FINAL REPORT

Prepared for:
U. S. DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
TRANSPORTATION SYSTEMS CENTER
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Rec'd
2/22/88
GJK

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1. Report No. 7581-5	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Crashworthiness Testing & Analysis, 35 mph Frontal Barrier Impact of a 1987 Hyundai GLS 4-Door Hatchback		5. Report Date November 4, 1987	6. Performing Organization Code CAL
		8. Performing Organization Report No. 7581-5	
7. Author(s) David J. Travale, Project Engineer Walter E. Levan, Program Manager		10. Work Unit No. Y23-040-797	
9. Performing Organization Name and Address Calspan Advanced Technology Center P.O. Box 400 Buffalo, NY 14225		11. Contract or Grant No. DTRS57-87-C-00047	
		13. Type of Report and Period Covered Final November 1987	
12. Sponsoring Agency Name and Address U. S. Department of Transportation Research and Special Programs Administration Transportation Systems Center Kendall Square, Cambridge, MA 02142		14. Sponsoring Agency Code DOT/NHTSA/NRD	
15. Supplementary Notes			
16. Abstract A frontal load cell barrier test of a 1987 Hyundai Excel GLS 4-Door Hatchback was performed at the Calspan Corporation, Advanced Technology Center Crash Test Facility in Buffalo, New York, on November 4, 1987. Impact speed was 34.8 mph and the ambient temperature at the barrier face at the time of impact was 60°F. An unrestrained Hybrid III dummy was used for the test.			
17. Key Words 35 mph Frontal Barrier Impact Test Crashworthiness		18. Distribution Statement Copies of this report are available from: Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 400 Seventh St., S.W., Washington, DC 20590	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages	22. Price

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Section 1
PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Crashworthiness Testing and Analysis Program sponsored by the Research and Special Programs Administration under Contract No. DTRS57-87-C-00047. The purpose of this test is to obtain and analyze responses from vehicles and unrestrained Hybrid III dummies during a frontal car-to-barrier crash.

Section 2
SUMMARY OF TEST

A load cell barrier was impacted by a 1987 Hyundai Excel GLS 4-Door Hatchback at a velocity of 34.8 mph. The test was performed at the Calspan Corporation Advanced Technology Center on November 4, 1987. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact was documented by one real-time camera and 11 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

The load cell barrier consisted of 36 load cells. The outermost column of load cells (see figure 6) on either side of the barrier was not used leaving a total of 28 cells from which readings were obtained.

One Hybrid III 50th percentile unrestrained male anthropomorphic test device (ATDs) was placed in the driver seating position, according to dummy placement instructions specified in Laboratory Indicant Test Procedure.

The ATD was fully instrumented with head and chest triaxial accelerometers, upper and lower 6-axis force transducers in the neck, chest potentiometer, abdominal pressure transducer, right/left femur load cells, right/left tibia load cells, and right/left knee shear transducers.

The 92 channels of data were recorded on eight 14-channel FM tape recorders. Appendix B contains the vehicle, load cell barrier, and dummy response data traces. For reasons unknown, the data from channel 30, lower neck (M(z), did not record correctly

The driver's head struck the steering wheel rim and dashboard. The driver's HIC was 1424. The maximum chest deceleration over 3 milliseconds was 78.2 g's and femur loads were 1676 and 2583 pounds. The Laceration Index (TLI) equaled 6.31. The ATD's right ankle was broken during the impact; a post-test photograph of the lower legs can be found in Appendix A.

Table 1

GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style 1987 Hyundai Excel GLS 4 Dr. HatchbackNHTSA No. Y23-040-797 VIN. KMHL A31J7HUI 55387Body Color Silver Date of Manufacture 1-87Engine: 4 cylinders; 89.6 C.I.D.; 1.5 Liters; - CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X TransverseTransmission 5 Speed X Manual - Automatic - Overdrive
Final Drive; X Front Wheel; - Rear Wheel; - Four WheelX A/C; - P/S; X P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise ControlType of Occupant Restraint 3 Pt Continuous Belt (Driver unrestrained for test)DATA RECORDED FROM VEHICLE'S TIRE PLACARD:Tire Pressure (at capacity): Front 30 psi, Rear 30 psiRecommended Tire Size: P155-80R13 P175-70R13Recommended Cold Tire Pressure: Front 30 psi, Rear 30 psiTires on Vehicle: P155-80R13; Manufacture: GoodyearNumber of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 TOTALType of Front Seats: X Bucket; - Bench; - Split BenchType of Front Seat Back: - Fixed; X Adj. With X Lever - Rot. KnobVehicle Capacity Weight (VCW) = 816 lbs. (A)No. of Occupants x 150 lbs. = 750 lbs. (B)Rated Cargo and Luggage
Weight (RCLW) A-B = 66 lbs.GVWR 3185 lbs. GAWR: Front 1653 lbs. Rear 1587 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 = 710 lbs. Right Rear = 450 lbs.

Left Front = 710 lbs. Left Rear = 440 lbs.

TOTAL FRONT WEIGHT = 1420 lbs. (61 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 890 lbs. (39 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 2310 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMY

Right Front = 710 lbs. Right Rear = 580 lbs.

Left Front = 730 lbs. Left Rear = 630 lbs.

TOTAL FRONT WEIGHT = 1440 lbs. (54 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1210 lbs. (46 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 2650 lbs.

Table 1
GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA

35 mph Frontal
Type of Test Barrier Impact Angle 0
Date of Test 11/4/87 Time of Test 14:25
Ambient Temperature 60 °F. at impact area
Temperature in Occupant Compartment 70 °F.
Windshield Molding Temperature - °F.
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: primary = 34.8 mph, secondary 34.8 mph
Distance From Front Bumper to Barrier Face When Entering Speed Trap 52
inches; Exiting Speed Trap 12 inches

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>dash, steering wheel</u>	<u>N/A</u>
Chest	<u>steering wheel</u>	<u></u>
Abdomen	<u>steering wheel</u>	<u></u>
Left Knee	<u>dash</u>	<u></u>
Right Knee	<u>dash</u>	<u></u>

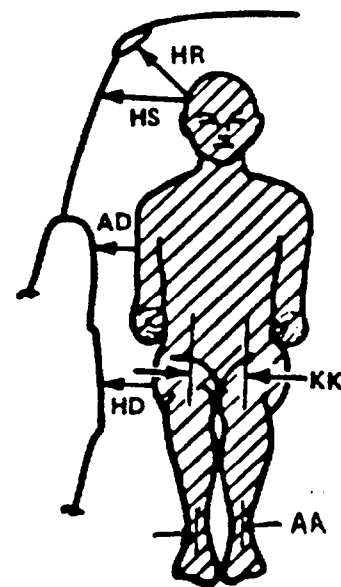
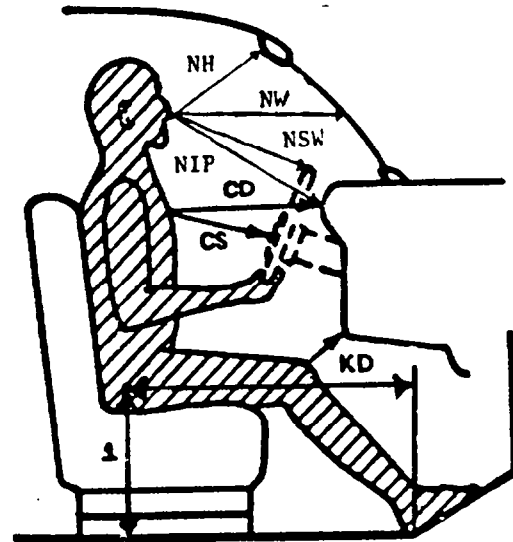
Table 1
GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u> Non operable	<u>Right</u> Non operable	<u>Left</u> operable	<u>Right</u> operable
Door Opening				
	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Movement				
Seat Back Failure	None	N/A	N/A	N/A
Seat Shift (in.)	None	N/A	N/A	N/A

FIGURE 1 OCCUPANT CLEARANCE DIMENSTIONS

	DRIVER	PASSENGER
NH	11.0	
NW	20.4	
CD	18.9	
CS	11.9	
KDL	5.6	
KDR	5.5	
SA	23°	
TA	22°	
NIP	20.3	
NSW	15.4	
1	10.9	
2	36.0	
ULA	105°	
LLA	232°	

NH = Nose to Windshield Header
 NW = Nose 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
 NIP = Nose to Instrument Panel
 NSW = Nose to Steering Wheel
 1 = H-Point to toeboard/floorboard intersection vertical
 2 = H-Point to toeboard/floorboard intersection horizontal
 ULA = Upper leg angle
 LLA = Lower leg angle



All angles are taken relative to the vertical

HR = Head to Side Roof
 HS = Head to Side Window
 AD = Arm to Door
 HD = Hip to Door
 KK = Knee to Knee
 AA = Ankle to Ankle
 DT = Dummy Temperature °F

	DRIVER	PASSENGER
HR	5.0	
HS	8.0	
AD	4.5	
HD	7.2	
KK	9.4	
AA	8.1	
DT	71.0°	

Table 2
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R *
DUMMY (1)	-130	18	59	134	-86	10	-17	78.2
DUMMY (2)								
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1675.9	2583.1
DUMMY (2)		
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)	N/A	N/A	N/A
DUMMY (2)			
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂
DUMMY (1)	1424	0.07418	0.08992	96.1
DUMMY (2)				
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Table 3 LACERATION INDEX VALUES

Record of cuts through leathers and in PVC skull cap.

Y23-040-797

Cuts Through Leathers				Cuts in PVC		
Outer Leather		Inner Leather		No. of Cuts (N)	Length (S) (mm)	Depth (d) (mm)
No. of Cuts (N)	Length (S) (mm)	NS ²	No. of Cuts (N)			
0			1 1 1 1	0	4.0 9.0 19.0 60.0	16 81 361 3600
A = 0		B = 4058		C = 0		

$$TLI = 1 + \log_{10} \left[1 + 1.16 (A) + 50.8 (B) + 16500 (C) \right] = 6.31$$

$$(AF) \sum N_1 S^2$$

$$(BF) \sum N_2 S^2$$

$$(CF) \sum N_3 S^2 d^3$$

Note: If there are no lacerations through the outer layer

of leather, the laceration index is assigned as follows:

TLI = 0 if there is no damage to outer leather

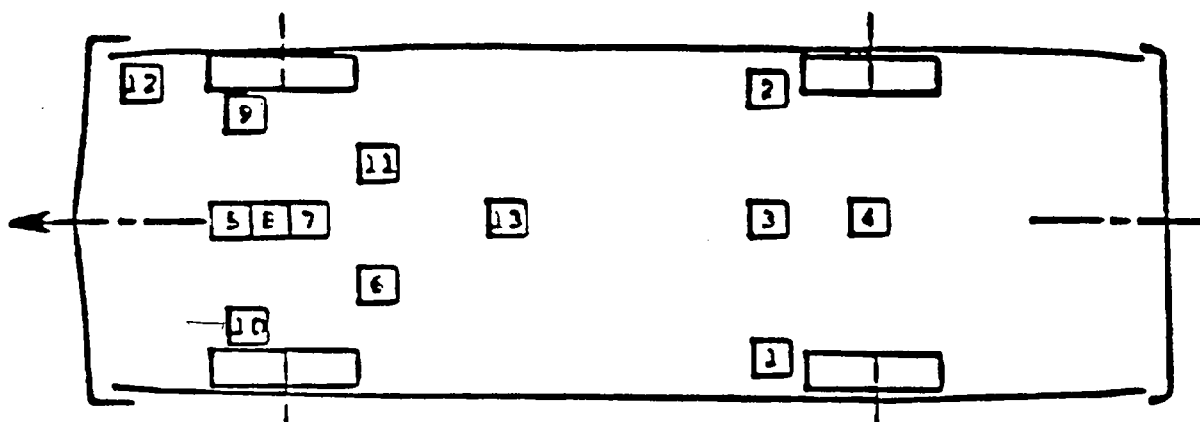
TLI = 1 if there are abrasions but no penetrating laceration to outer leather

* Length of cut(s) completely through leather to nearest mm.

** Length of cut(s) in PVC to nearest mm.

*** Depth of cut(s) in PVC to nearest mm.

Figure 2 SUMMARY OF VEHICLE ACCELEROMETER DATA



Vehicle: 1987 Hyundai Excel GLS 4-door Hatchback

Loc. No.	Description	Direction	Maximum Value (G's)	
			"-"	"+"
1	Rear seat X-member - left side primary	X	-33.0	2.1
1*	Rear seat X-member - left side redundant	X	-36.3	2.4
2	Rear seat X-member - right side primary	X	-33.4	3.0
2*	Rear seat X-member - right side redundant	X	-34.6	3.3
3	Rear seat X-member - centerline	X	-38.8	2.5
3	Rear seat X-member - centerline	Y	-3.1	1.9
3	Rear seat X-member - centerline	Z	-26.5	18.8
4	Rear axle centerline	X	-37.5	3.8
4	Rear axle centerline	Z	-10.8	21.1
5	Top of engine block	X	-149.4	60.7
5	Top of engine block	Z	-20.6	16.5
6	Steering wheel hub	X	-123.1	23.6
6	Steering wheel hub	Z	-145.5	50.9
7	Front suspension X-member	X	-130.6	16.6
7	Front suspension X-member	Z	-104.2	18.1
8	Bottom of engine	X	-128.8	12.0
9	Right front brake caliper	X	-72.7	41.3
10	Left front brake caliper	X	-71.4	39.8
11	Instrument panel	Y	-98.3	49.9
11	Instrument panel	Z	-65.2	36.9

*Mounted on rubber isolation pad.

Figure 3

**PRE- AND POST-TEST POSITION OF TEST VEHICLE
ACCELEROMETER MOUNTING LOCATIONS**

Test Description: 35 mph Frontal Barrier

Test Vehicle: 1987 Hyundai Excel GLS 4-door Hatchback

Reference Plane: Vertical plane at rear bumper

Accelerometer Description	Longitudinal Location		
	Pre-Test	Post-Test	Change
Rear seat X-member - left side primary	57.5	57.5	0.0
Rear seat X-member - left side redundant	57.5	57.5	0.0
Rear seat X-member - right side primary	57.5	57.5	0.0
Rear seat X-member - right side redundant	57.5	57.5	0.0
Rear seat X-member - centerline	54.5	54.5	0.0
Rear axle centerline	59.7	59.7	0.0
Top of engine block	136.6	126.7	9.9
Steering wheel hub	91.9	91.2	0.7
Front suspension X-member	120.2	113.1	7.1
Bottom of engine	134.1	124.8	9.3
Right front brake caliper	125.8	119.1	6.7
Left front brake caliper	125.8	118.9	6.9
Instrument panel	102.6	99.8	2.8

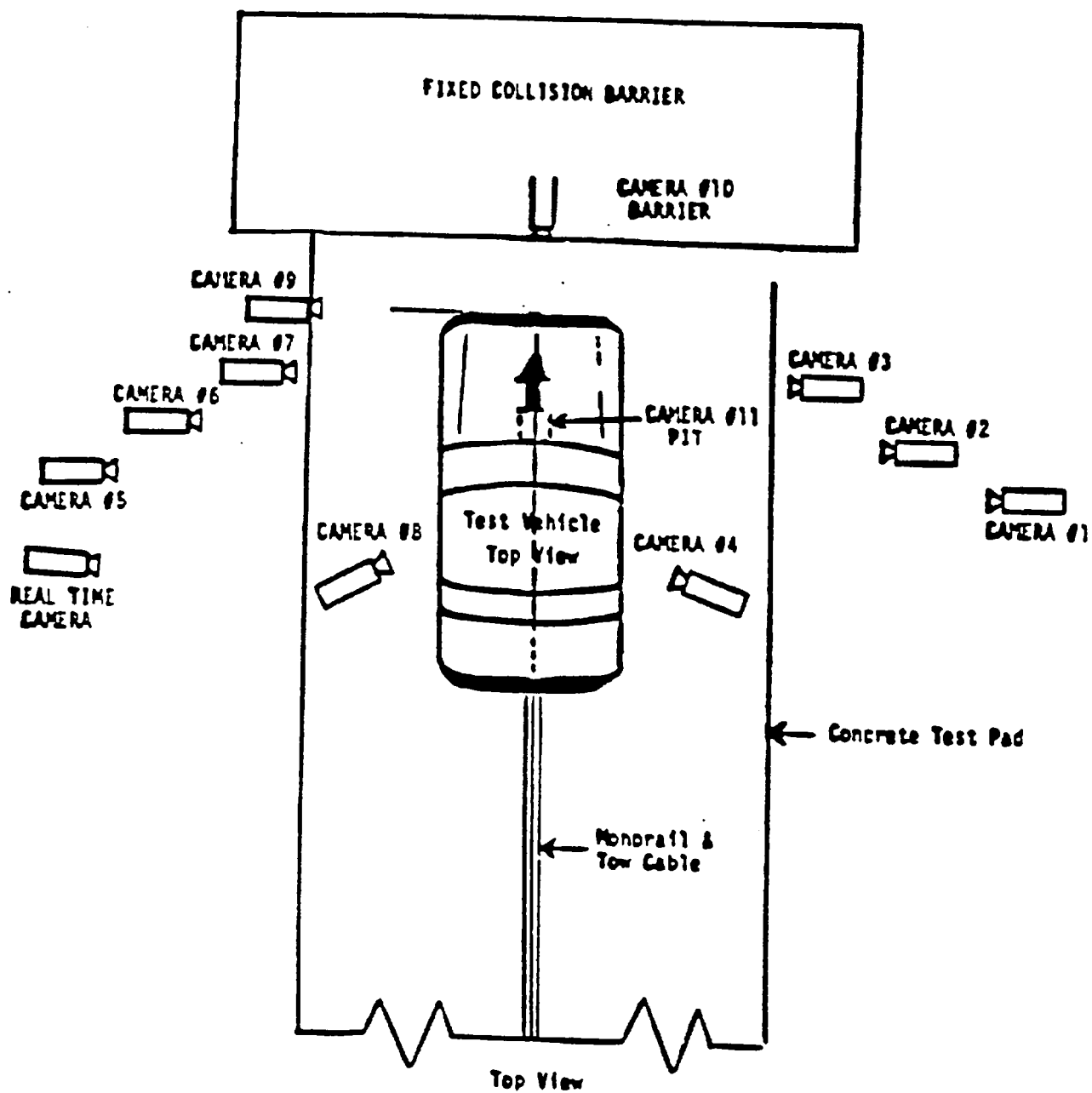


Figure 4 CAMERA POSITIONS FOR FRONTAL IMPACTS

Table 4 HIGH-SPEED CAMERA LOCATIONS

Vehicle 1987 Hyundai Excel GLS 4-door Hatchback

Test No. Y23-040-797

CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)
		X	Y	Z	
1	Vehicle and Barrier Right	226.0	62.0	47.5	2
2	Vehicle Front Half Right	269.5	49.0	48.0	2
3	Right Front Passenger	244.0	38.0	41.0	2
4	Right Front Passenger	96.0	93.0	69.0	16
5	Vehicle and Barrier Left	392.0	60.0	51.0	5
6	Vehicle Front Half Left	281.0	35.5	43.5	5
7	Driver	199.5	13.0	41.0	6
8	Driver	103.0	97.0	71.5	17
9	Vehicle Bumper and Pole	27.0	-5.0	72.0	32
10	Front View (Barrier)	0	28.0	223.0	-90
11	Front Underbody (Pit)	0	25.0	-85.0	90

* X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

** = referenced to horizontal plane

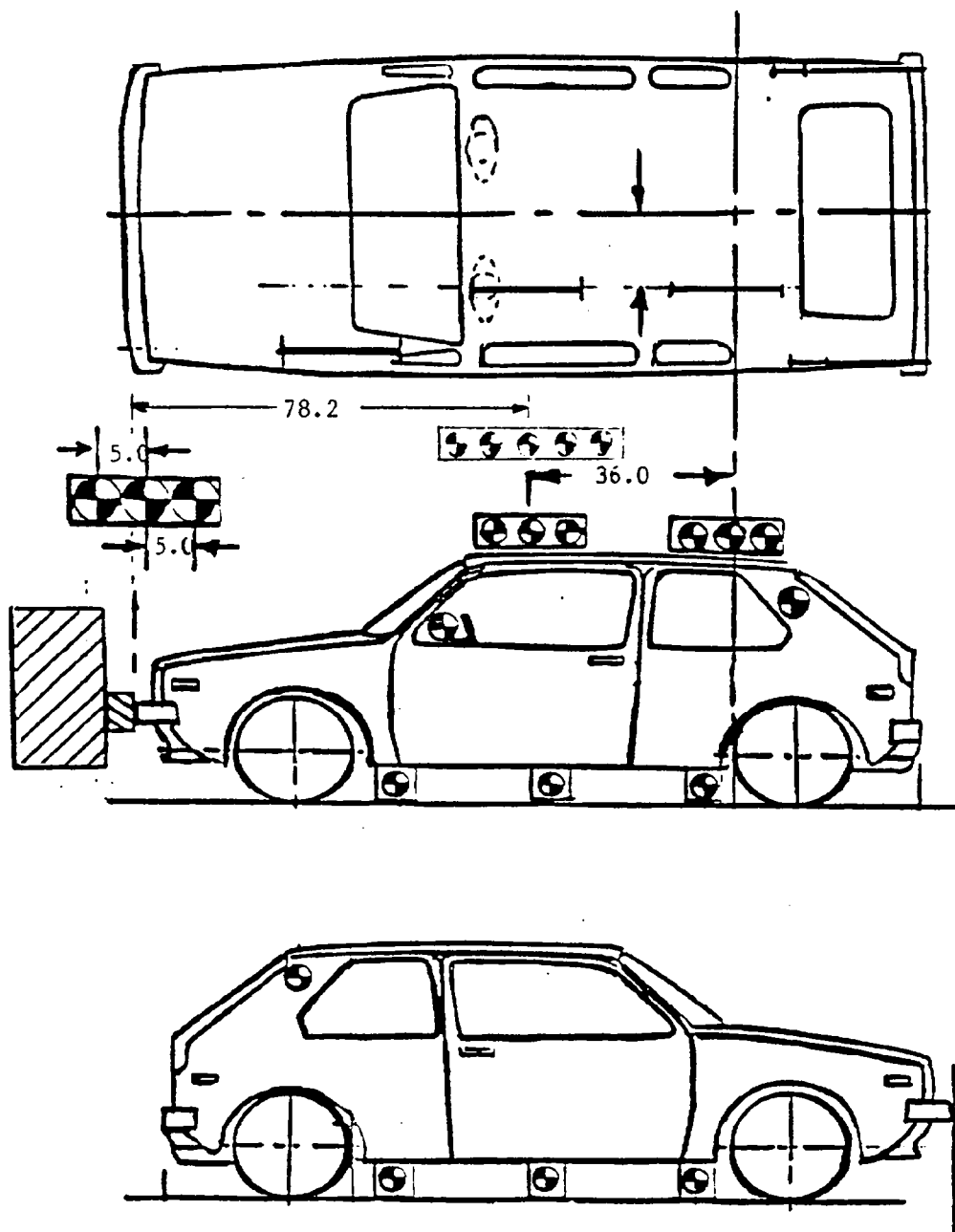


FIGURE 5 VEHICLE TARGET LOCATIONS

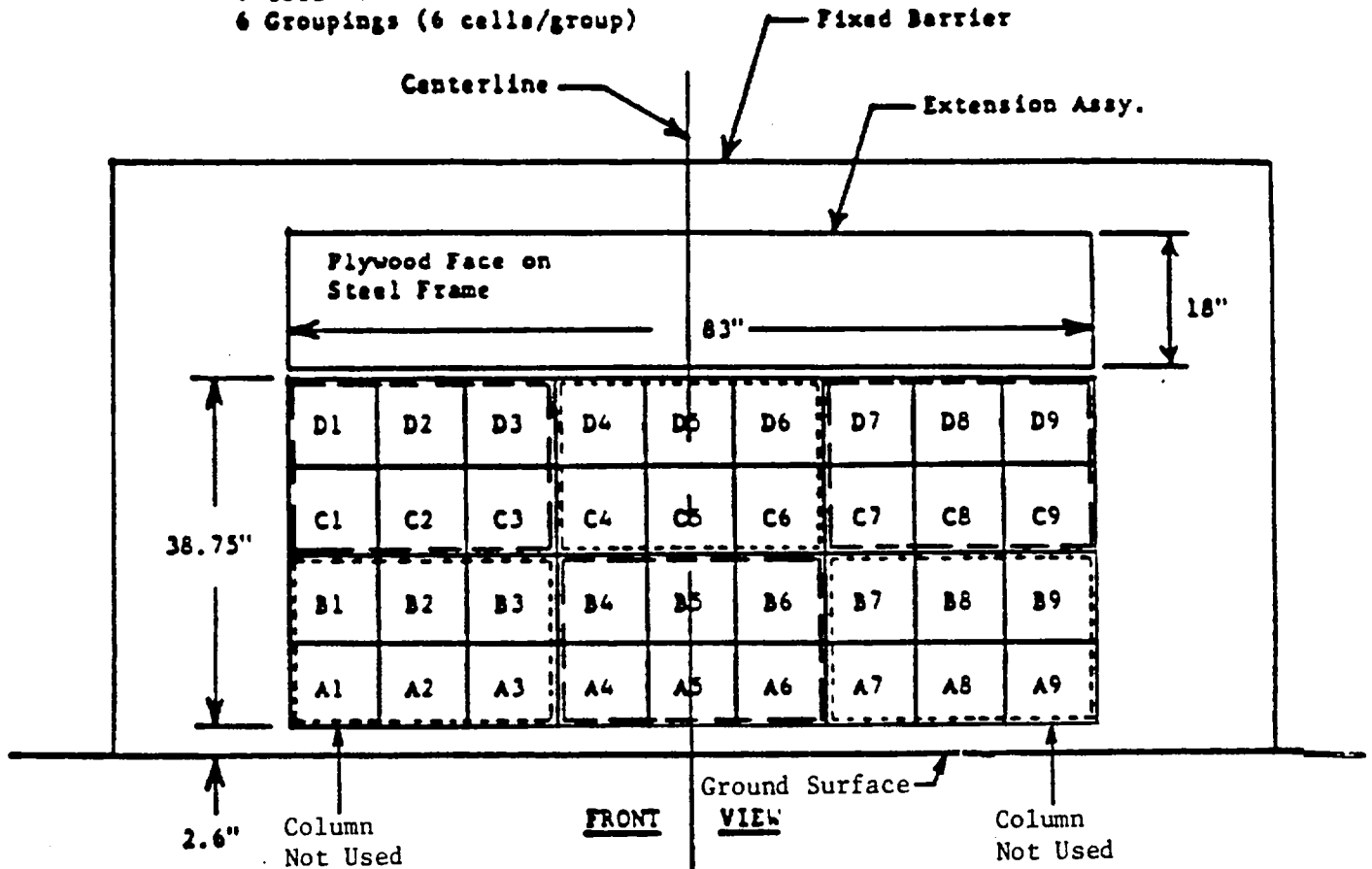
Figure 6 LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells

4 Rows

9 Columns

6 Groupings (6 cells/group)



6 GROUPINGS 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)

Table 5 TEST VEHICLE FRONTAL PROFILE DATA

X-axis: measurements referenced to the front bumper centerline. Y-axis measurements are in inches left and right of the vehicle centerline. Z-axis (height) measurements are from the ground.

MAKE/MODEL: Hyundai Excel GLS
4 door Hatchback

YEAR: 1987 VIN: KMHLA31J7HU155387
vehicle width = 56.5"

TEST#: Y23-040-
797

PRE-TEST

Y-axis Position--->		Vehicle Left				Vehicle Right		
Profile Level	:	27.65	16.65	5.65	0	5.65	16.65	27.65
Top of front bumper	X Z 19.0	3.3	0.9	0.1	0.0	0.1	0.9	3.3
Center of grille	X Z 25.0	7.9	5.3	5.1	5.0	5.1	5.3	7.9
Front of hood	X Z 28.0	9.2	6.4	5.7	5.6	5.7	6.4	9.2

POST-TEST

Y-axis Position--->		Vehicle Left				Vehicle Right		
Profile Level	:	27.65	16.65	5.65	0	5.65	16.65	27.65
Top of front bumper	X Z 21.5	22.6	21.0	20.7	20.7	20.9	21.5	23.4
Center of grille	X Z 26.0	24.2	23.5	23.3	23.3	23.4	24.0	25.7
Front of hood	X Z 29.5	23.3	23.7	23.8	24.2	24.9	24.3	25.1

CHANGE

Y-axis Position--->		Vehicle Left				Vehicle Right		
Profile Level	:	0.0	0.0	0.0	0	0.0	0.0	0.0
Top of front bumper	X Z -2.5	-19.3	-20.1	-20.6	-20.7	-20.8	-20.6	-20.1
Center of grille	X Z -1.0	-16.3	-18.2	-18.2	-18.3	-18.3	-18.7	-17.8
Front of hood	X Z -1.5	-14.1	-17.3	-18.1	-18.6	-19.2	-17.9	-15.9

Figure 7 PRE-TEST AND POST-TEST MEASUREMENT POINTS

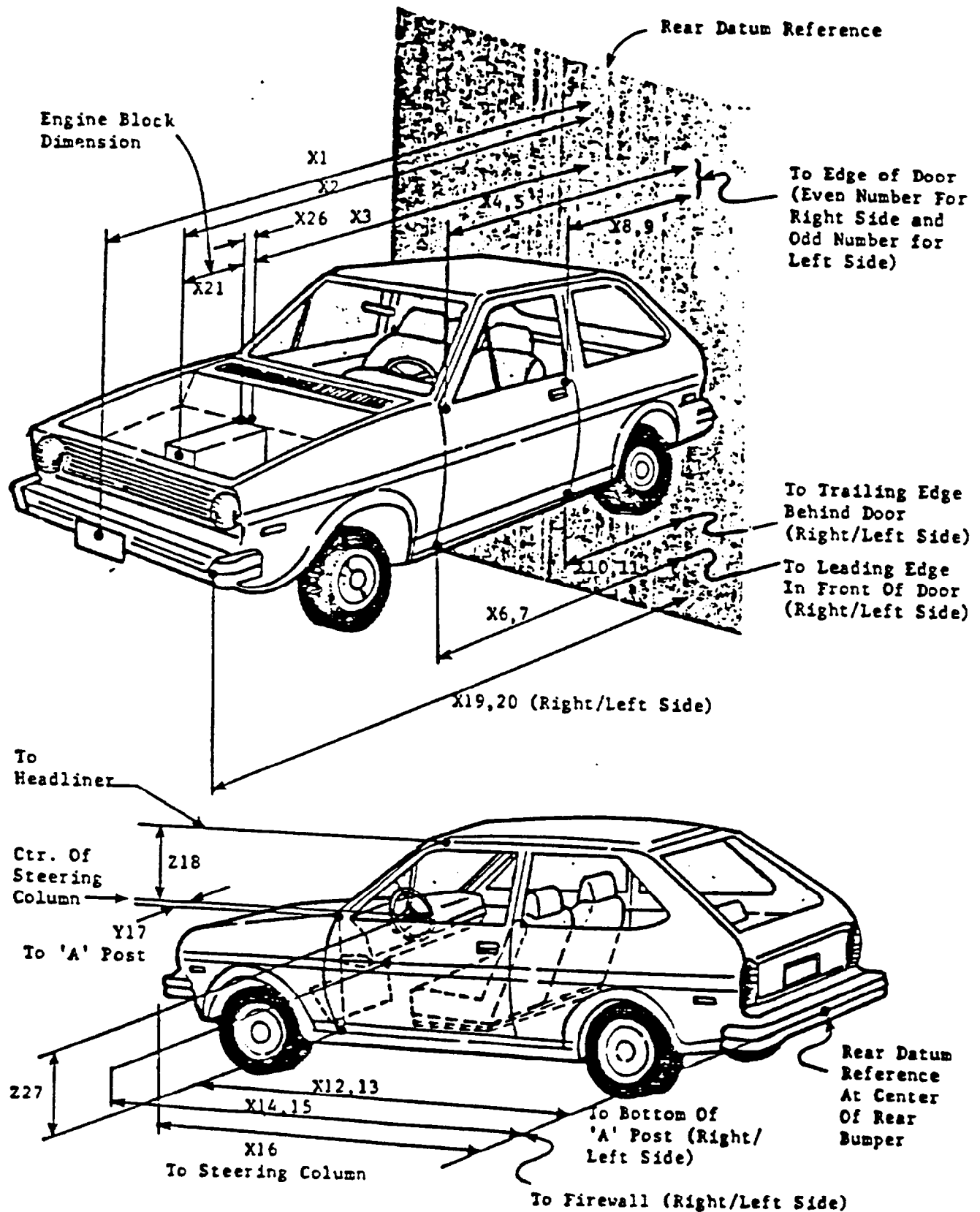


Figure 7 (cont'd)

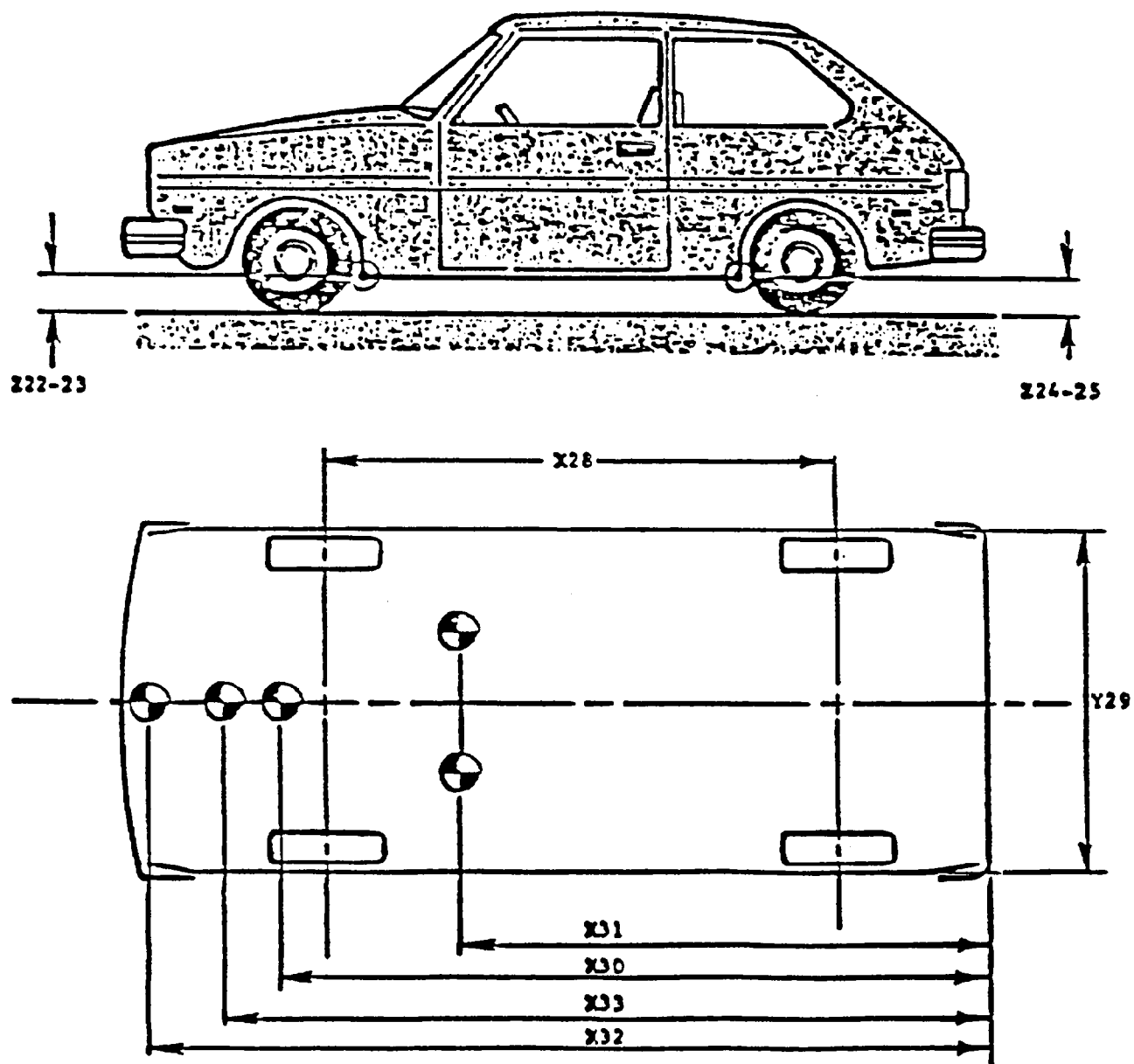


Figure 7 (cont'd)

**PARTNER VEHICLE
IMPACTED VEHICLE MEASUREMENTS**

VEHICLE MAKE/MODEL Hyundai Excel GLS **TEST NUMBER** Y23-040-797
4-door Hatchback

		DIMENSIONS IN INCHES	
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST
X 1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	160.2	139.5
X 2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	137.6	126.2
X 3	REAR SURFACE OF VEHICLE TO FIREWALL	119.1	115.6
X 4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	109.2	108.5
X 5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	109.5	109.1
X 6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	107.9	107.2
X 7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	107.5	107.4
X 8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	70.6	69.2
X 9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	71.0	70.2
X 10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	71.3	71.3
X 11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	71.4	71.4
X 12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST OF RIGHT SIDE	107.9	107.2
X 13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST OF LEFT SIDE	107.5	107.4
X 14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	118.7	108.2
X 15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	119.2	108.7
X 16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	91.9	91.2
Y 17	STEERING COLUMN TO "A" POST	15.5	13.2

Figure 7 (cont'd)

**PARTNER VEHICLE
IMPACTED VEHICLE MEASUREMENTS CONTD**

VEHICLE MAKE/MODEL Hyundai Excel GLS TEST NUMBER Y23-040-797
4-Door Hatchback

		DIMENSIONS IN INCHES	
NO	TYPE OF MEASUREMENT	PRE TEST	POST TEST
Z18	REAR OF WINDSHIELD HEADER TO STEERING WHEEL CENTER	17.7	16.4
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	158.6	138.2
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	158.7	138.5
X21	WIDTH OF ENGINE BLOCK	15.5	15.5
Z22	RIGHT FRONT SILL TO GROUND PLANE	11.7	10.8
Z23	LEFT FRONT SILL TO GROUND PLANE	11.7	11.6
Z24	RIGHT REAR SILL TO GROUND PLANE	11.7	11.1
Z25	LEFT REAR SILL TO GROUND PLANE	11.7	11.6
X26	FIREWALL TO ENGINE OR TRANSAXLE	12.2	6.1
Z27	VERTICAL DIMENSION FROM DOOR SILL TO CENTERLINE OF STEERING COLUMN	21.8	23.5
X28	WHEELBASE OF VEHICLE	93.7	88.1
Y29	WIDTH OF VEHICLE AT MAXIMUM WIDTH POINT	62.8	62.8
X30	REAR SURFACE OF VEHICLE TO ENGINE TARGET	134.1	124.8
X31	REAR SURFACE OF VEHICLE TO COMPARTMENT TARGET	82.0	82.0
X32	REAR SURFACE OF VEHICLE TO BUMPER TARGER	151.5	133.5
X33	REAR SURFACE OF VEHICLE TO FRAME CROSSMEMBER	120.2	113.1

Table 6 OCCUPANT COMPARTMENT GEOMETRIC MEASUREMENTS RECORDING FORM

Test #: Y23-040-797

VIN: KMHLA31J7HUI55387

Model Year: 1987

Make: Hyundai Model: Excel GLS

Body Style: 4 door Hatchback

All Dimensions in Inches

No.		Pre-Test	Post-Test	Diff.
1A	C.L. of Front Wheel to Reference Plane (X)	126.9	121.5	5.4
1B		126.9	120.8	6.1
2	Ref. Plane to Toeboard/Floorpan Intersection	114.4	111.0	3.4
3A	Length of Seat Back W/O Headrest	21.5	-	-
3B	Length of Seat Back W/ Headrest	31.3	-	-
4	Angle of Seat Back W.R.T. Horizontal	112°	-	-
5	Top of Seat Back to Floor	28.5	-	-
6	Top of Seat Back to Reference Plane	68.0	-	-
7	Length of Seat Cushion	18.9	-	-
8	Angle of Seat Cushion W.R.T. Horizontal	14°	-	-
8A	Top of the Seat Cushion to the Floor	11.5	-	-
8B	Length of Seat Base	22.1	-	-
9	Rearmost Point of Upper Surface of Seat Cushion to Floor	7.5	-	-
10	Rearmost Point of Upper Surface of Seat Cushion to Ref. Plane	72.6	-	-
11	Angle of Steering Column W.R.T. Horizontal	150	140°	10°
12	Length of Windshield	27	-	-
13	Angle of Windshield W.R.T. Horizontal	149°	147°	2°
14	Length of Header	.8	.8	0
15	Angle of Header W.R.T. Horizontal	225	225	0
16A	Deleted			
16B	Deleted			

- indicates measurement not required

Table 6 OCCUPANT COMPARTMENT GEOMETRIC MEASUREMENTS RECORDING FORM (cont.)

All Dimensions in Inches				
No.		Pre-Test	Post-Test	Diff.
17	Steering Wheel Pivot Point to Floor	23.5	26.0	-2.5
18	Steering Wheel Pivot Point to Reference Plane	94.5	93.2	1.3
19A	Deleted			
19B	Deleted			
20A	Deleted			
20B	Deleted			
21	Foremost Point of Header to Floor	41.9	42.0	-0.1
22	Foremost Point of Header to Reference Plane	90.6	90.0	0.6
23	Foremost Point of Windshield to Floor	28.7	29.4	-0.7
24	Foremost Point of Windshield to Reference Plane	111.3	109.3	2.0
25	Steering Wheel Angle (indicate tilt standard)	63°	109°	-46°
26	Steering Wheel Pivot Point to C.L. of Rim	+2.8	-6.2	9.0
27	Steering Wheel Pivot Point to Rearmost Face of Hub	2.6	1.5	1.1
28	Radius of Steering Wheel	7.5	6.8	0.7
29	Fire Wall to Shear Capsule	10.0	5.9	4.1
30	Steering Wheel Pivot Point to Shear Capsule	17.8	17.3	0.5
31	Deleted			
32A	Distance (X) from Top Edge of Inst. Panel to Ref. Plane (Driver)	99.2	98.0	1.2
32B	Distance (X) from Midpoint of Inst. Panel to Ref. Plane (Driver)	102.3	101.2	1.1
32C	Distance (X) from Lower Edge of Inst. Panel to Ref. Plane (Driver)	105.4	104.9	0.5
32D	Distance (Y) from Top Edge of Instrument Panel to Floor (Driver)	29.3	32.5	-3.2

Table 6 OCCUPANT COMPARTMENT GEOMETRIC MEASUREMENTS RECORDING FORM (cont.)

All Dimensions in Inches				
No.		Pre-Test	Post-Test	Diff.
32E	Distance (Y) from Midpoint of Instrument Panel to Floor (Driver)	20.5	20.6	-0.1
32F	Distance (Y) from Lower Edge of Inst. Panel to Floor (Driver)	12.1	12.9	-0.8
32G	Angle of Instrument Panel Top Surface (Driver)	350°	325°	25°
32H	Angle of Instrument Panel Mid Surface (Driver)	95°	90°	5°
32I	Angle of Instrument Panel Lower Surface (Driver)	127°	127°	0
32J	Distance (X) from Top Edge of Inst. Panel to Ref. Plane (Pass.)	103.4	100.2	3.2
32K	Distance (X) from Midpoint of Inst. Panel to Ref. Plane (Pass.)	102.2	98.5	3.7
32L	Distance (X) from Lower Edge of Inst. Panel to Ref. Plane (Pass.)	105.6	92.6	13.0
32M	Distance (Y) from Top Edge of Inst. Panel to Floor (Pass.)	26.5	28.1	-1.6
32N	Distance (Y) from Midpoint of Inst. Panel to Floor (Pass.)	17.2	18.6	-1.4
32O	Distance (Y) from Lower Edge of Inst. Panel to Floor (Pass.)	12.0	12.7	-0.7
32P	Angle of Instrument Panel Top Surface (Pass.)	358°	353°	5°
32Q	Angle of Instrument Panel Mid Surface (Pass.)	94°	74°	20°
32R	Angle of Instrument Panel Lower Surface (Pass.)	123°	155°	-22°
33	D - Ring Anchor to C.L. of Occupant	10.4	-	-
34	Torso Spool to C.L. of Occupant	13.8	-	-
35	Outboard Lap Belt Anchor to C.L. of Occupant	11.1	-	-
36	Inboard Lap Belt Anchor to C.L. of Occupant	10.0	-	-
37	D - Ring Anchor to Floor	34.9	-	-
38	Torso Spool to Floor	12.1	-	-
39	Outboard Lap Belt Anchor to Floor	3.0	-	-

Table 6 OCCUPANT COMPARTMENT GEOMETRIC MEASUREMENTS RECORDING FORM (cont.)

All Dimensions In Inches		Pre-Test	Post-Test	Diff.
No.				
40	Inboard Lap Belt Anchor to Floor	3.0	-	-
41	Reference Plane to D - Ring Anchor	69	-	-
42	Reference Plane to Torso Spool	71.4	-	-
43	Reference Plane to Inboard Lap Belt Anchor	73.3	-	-
44	Reference Plane to Outboard Lap Belt Anchor	70.6	-	-
45A	Length of Belt - Torso	34.5	-	-
45B	Length of Belt - Lap	36.8	-	-
45C	Length of Belt - Total	71.3	-	-
46	Measurement #10 with Seat in Rearmost Position	69.3	-	-
47	Measurement #10 with Seat in Foremost Position	76.6	-	-
48	Increment in Measurement #10 between Single Seat Stops	.73	-	-
49	Number of Retractors in Restraint System (Driver)	1.0	-	-
50	Type of Buckle Tongue: Fixed or Slip (Driver)	slip	-	-
51A	Extension on Inboard Lap Belt Buckle (Yes) or (No)	yes	-	-
51B	If Yes, Give Length and Material of Construction	Table 6.5	-	-
52A	Extension of D - Ring? (Yes) or (No)	No	-	-
52B	If Yes, Give Length and Material of Construction	N/A	-	-
53	Weight of Steering Column (lbs.)	-	7.14	-
54	Weight of Steering Wheel (lbs.)	-	4.06	-
55A	H - Point Position X Seat in Rearmost Position	75.4	-	-
55B	H - Point Position Y	11.0	-	-

(cont.)

All Dimensions In Inches

[illegible]

APPENDIX A

PHOTOGRAPHS

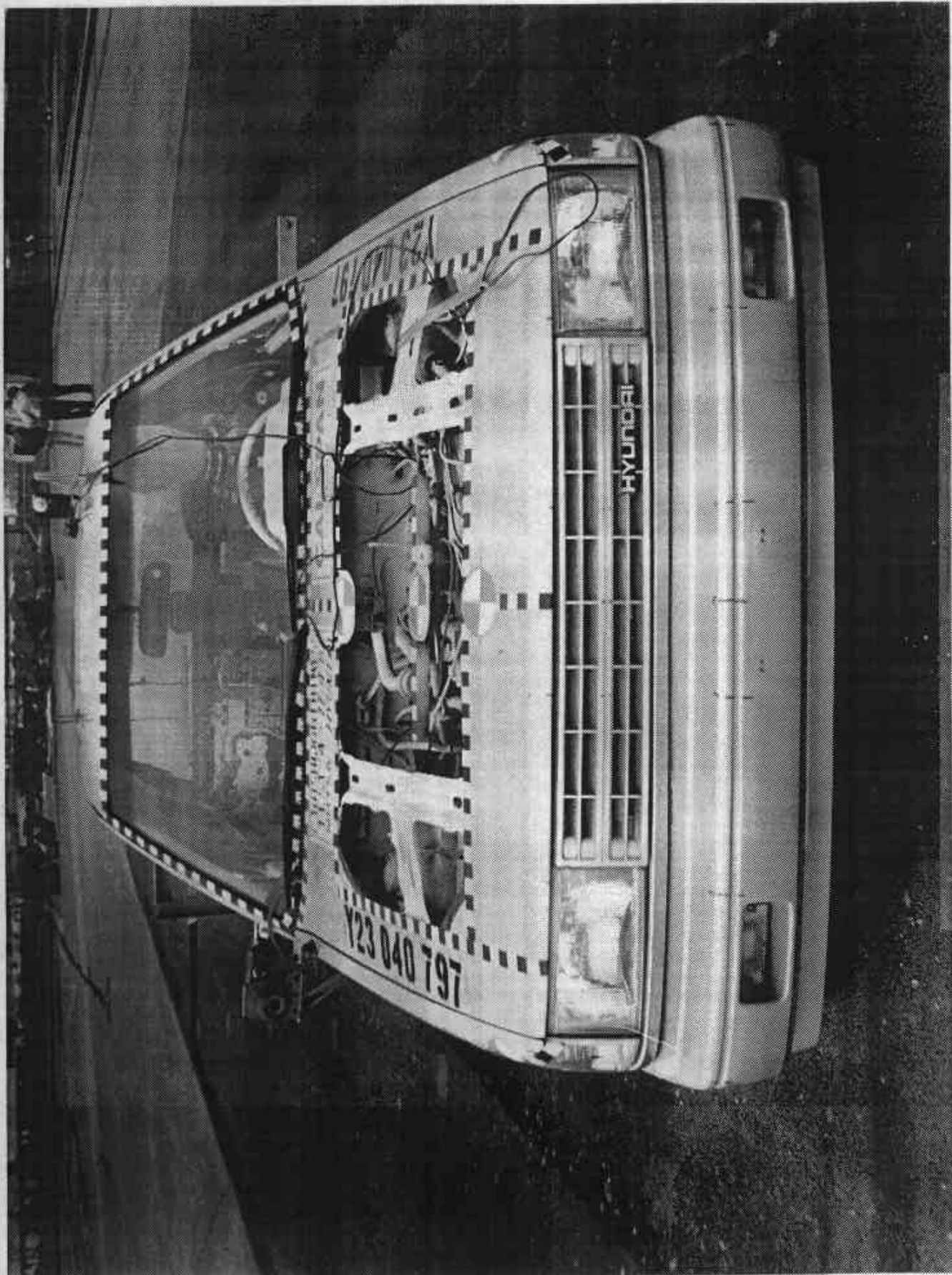


Figure A-1 PRE-TEST FRONT VIEW

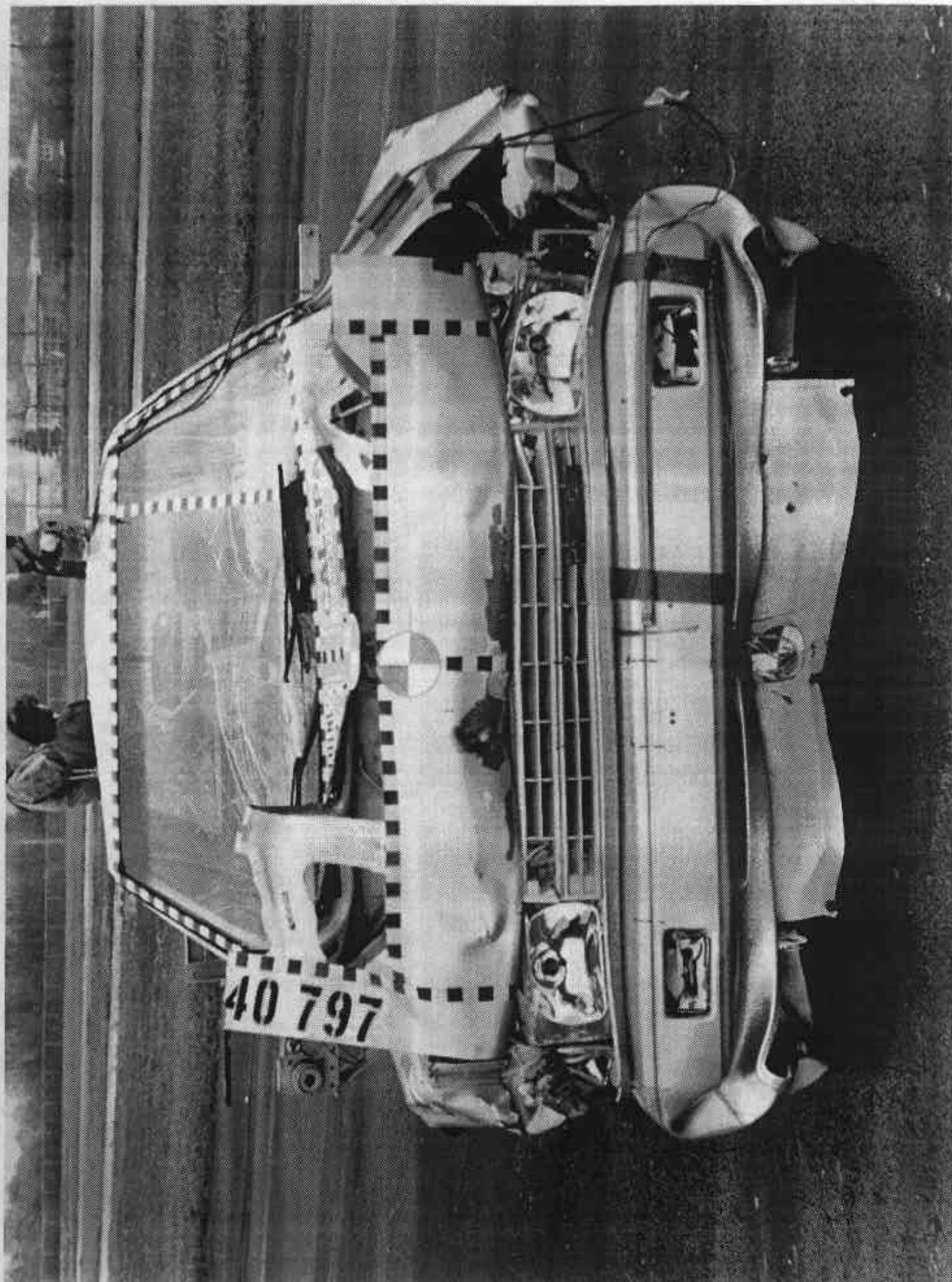


Figure A-2 POST-TEST FRONT VIEW

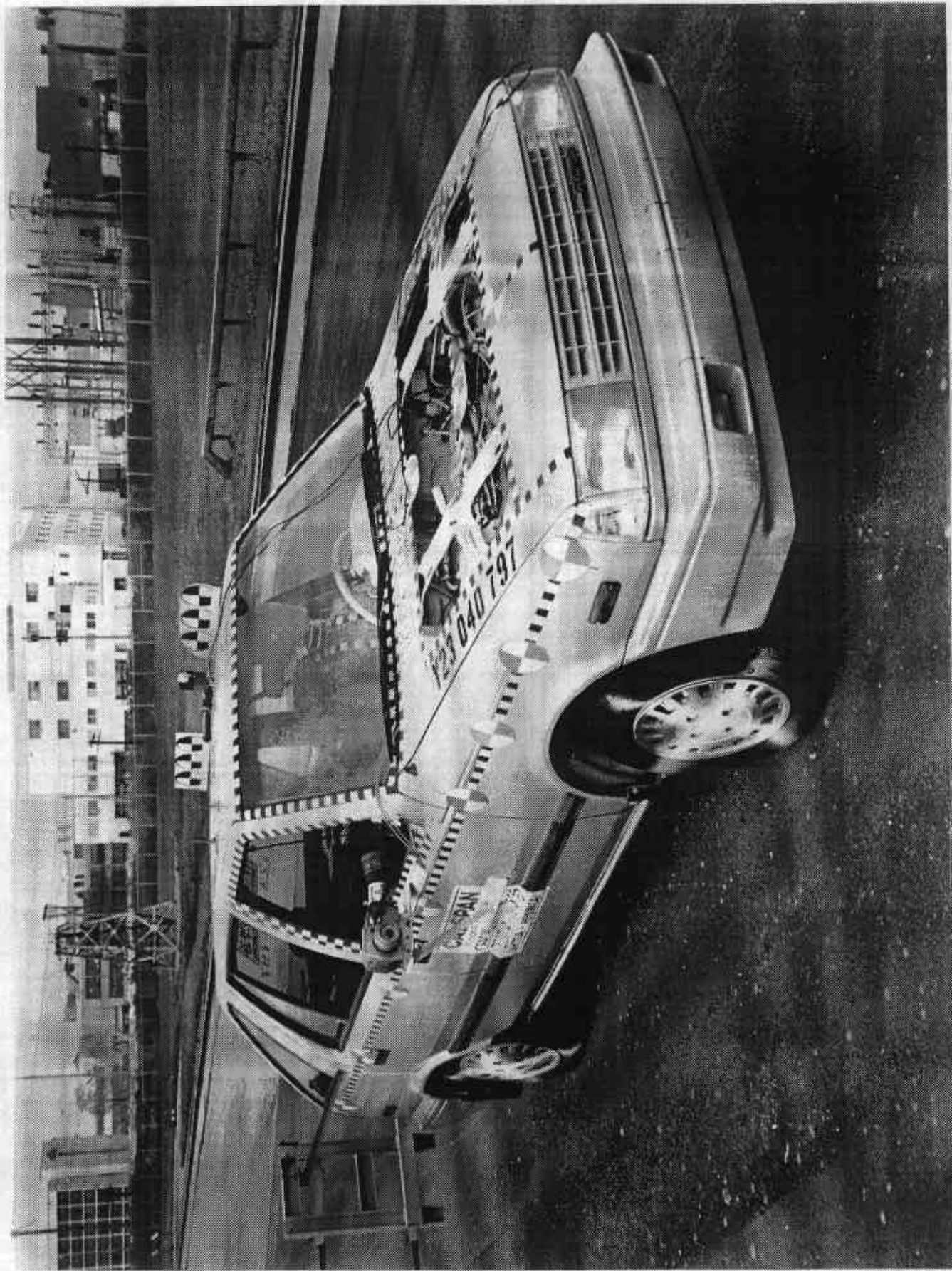


Figure A-3 PRE-TEST FRONT THREE-QUARTER VIEW

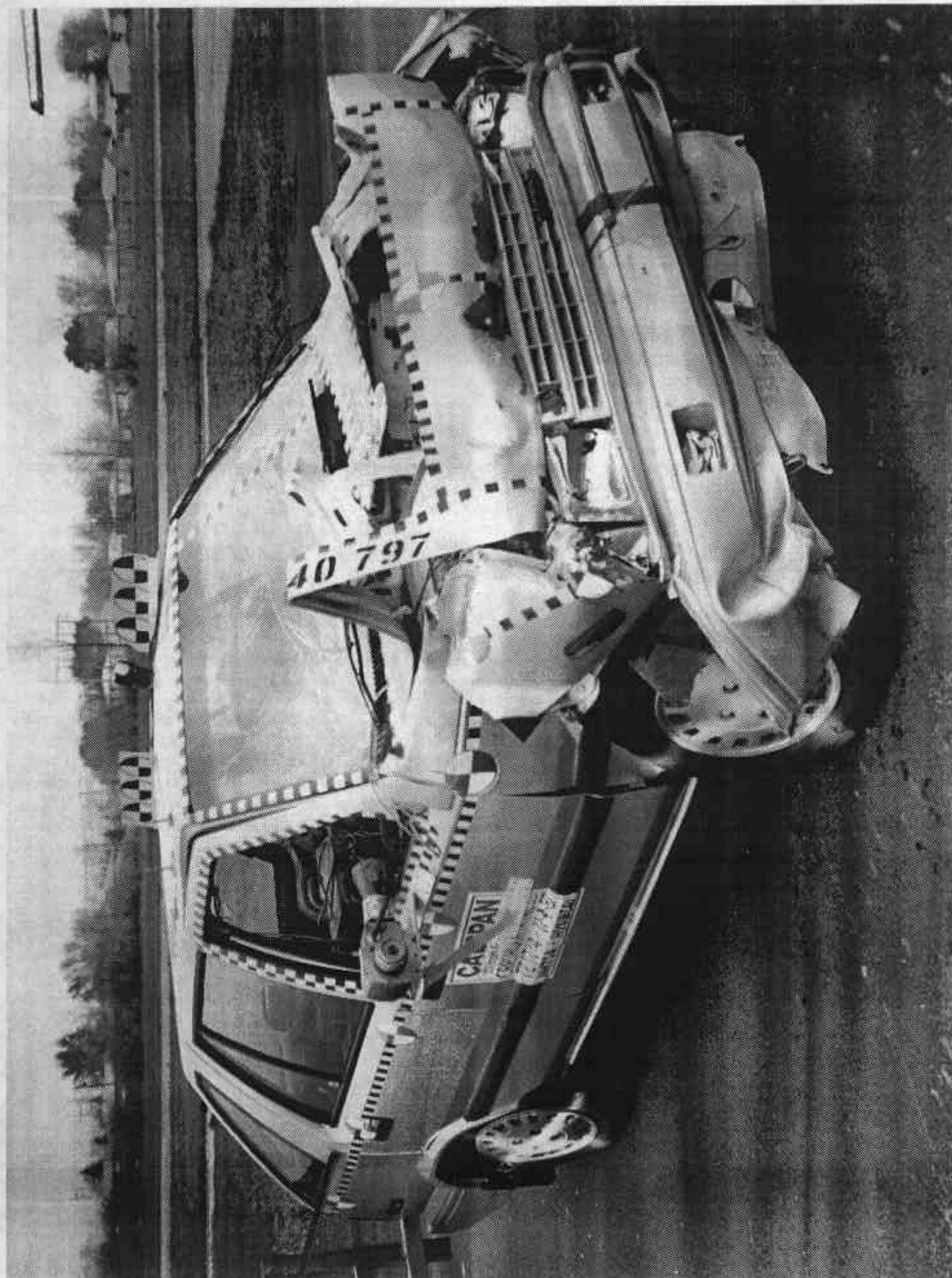


Figure A-4 POST-TEST FRONT THREE-QUARTER VIEW

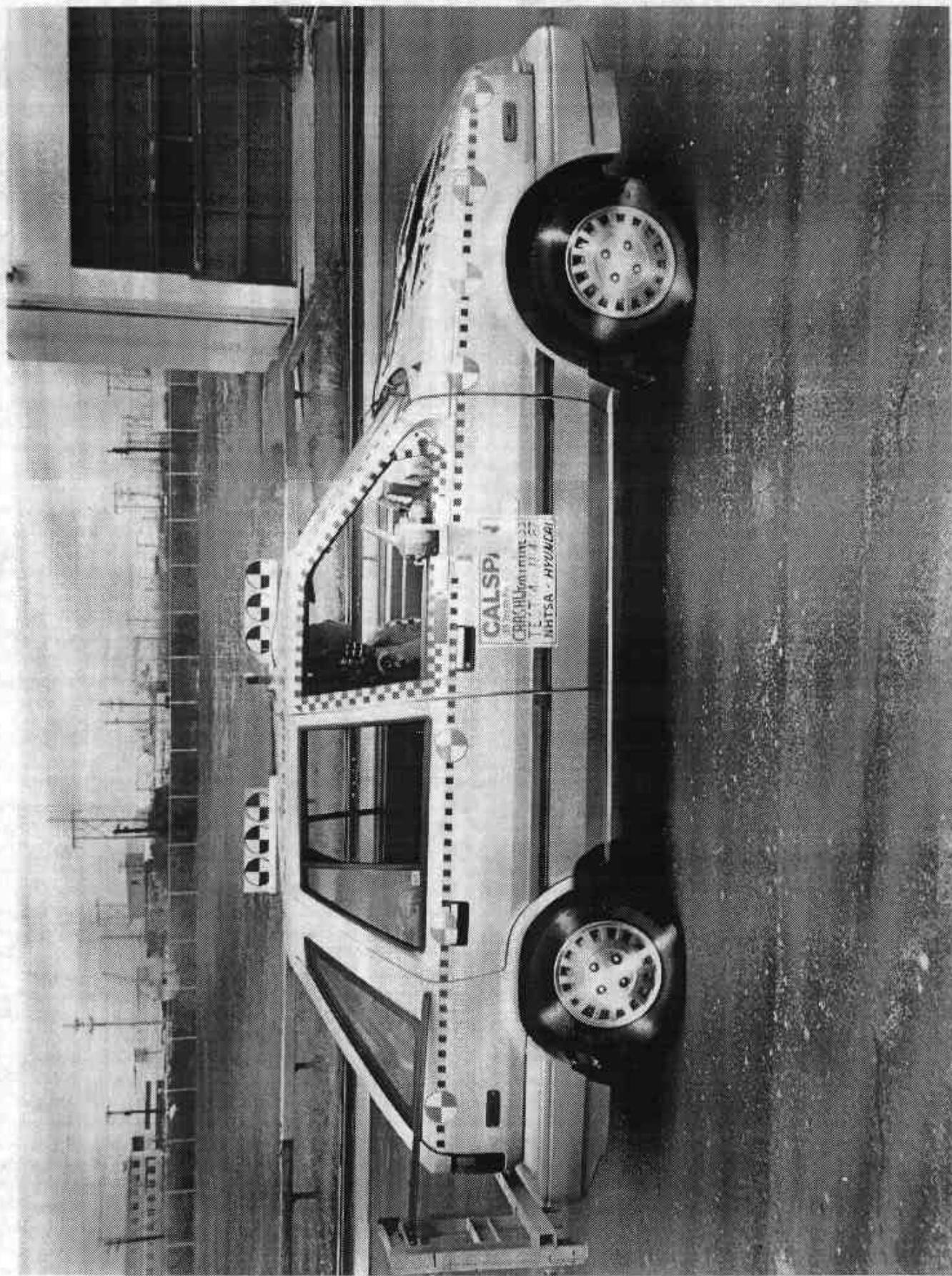


FIGURE A-5 PRE-TEST RIGHT SIDE VIEW

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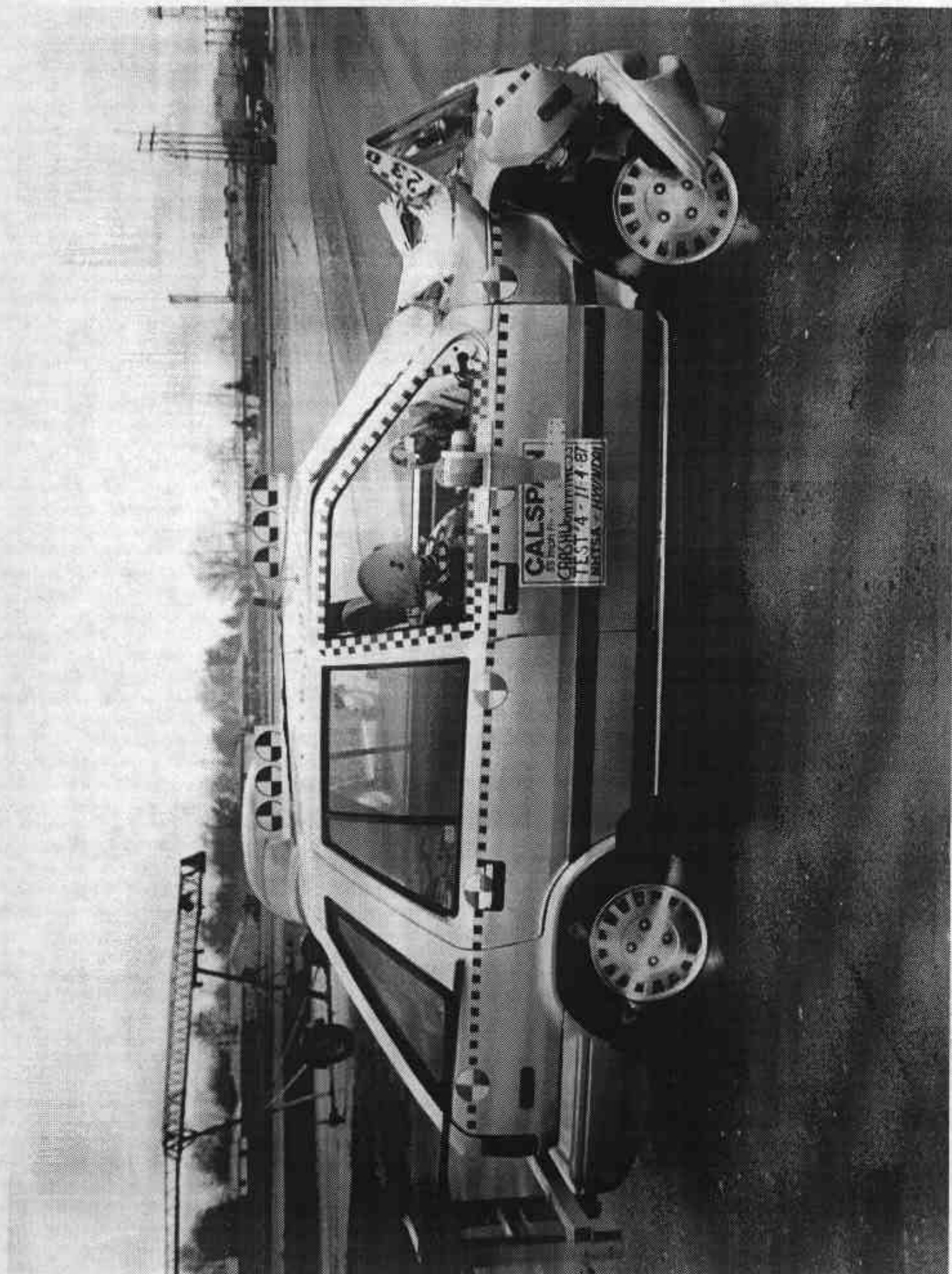


Figure A-6 POST-TEST RIGHT SIDE VIEW



Figure A-7 FRP-TEST REAR THREE-QUARTER VIEW

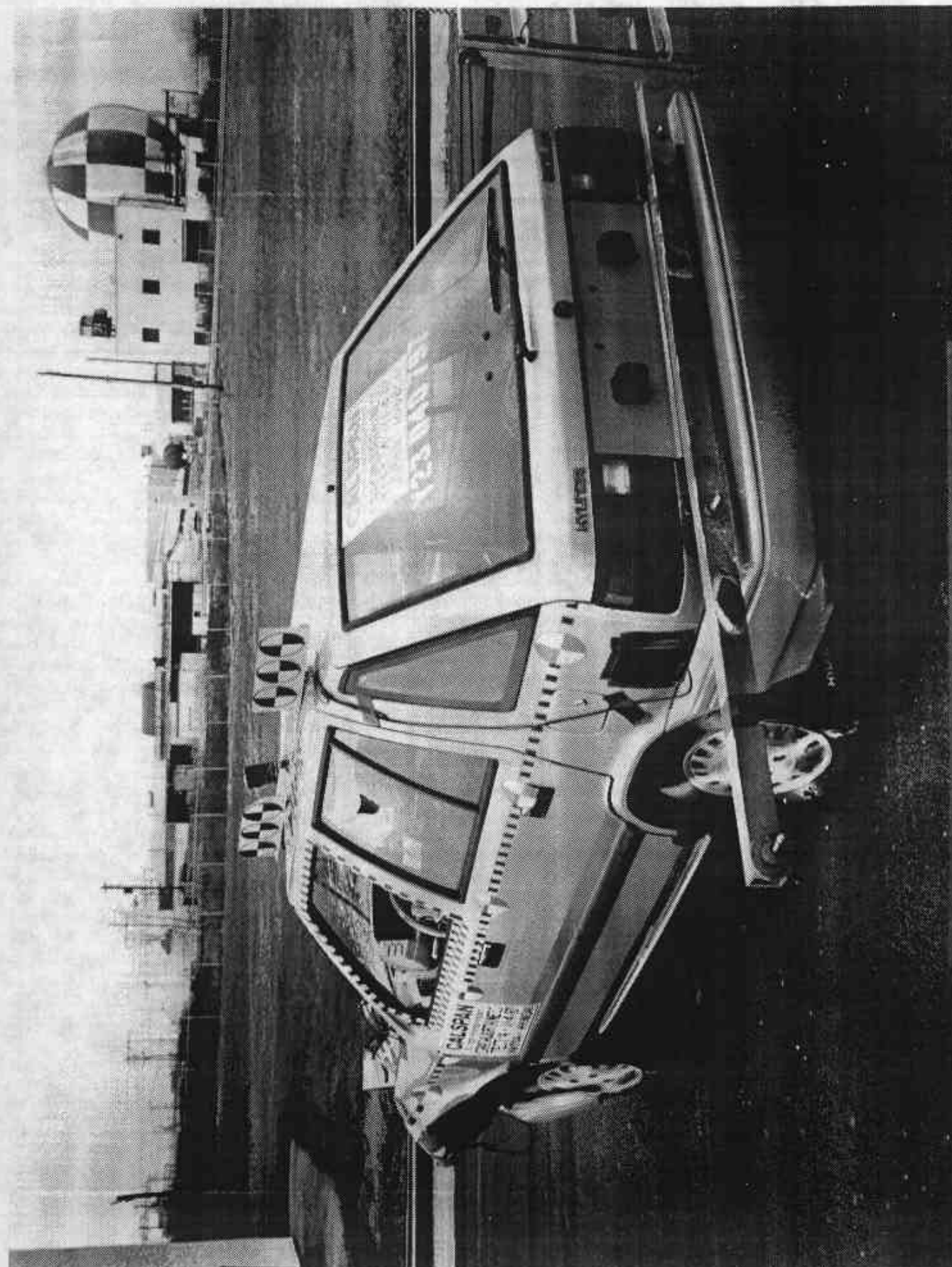


Figure A-8 POST-TEST REAR THREE-QUARTER VIEW

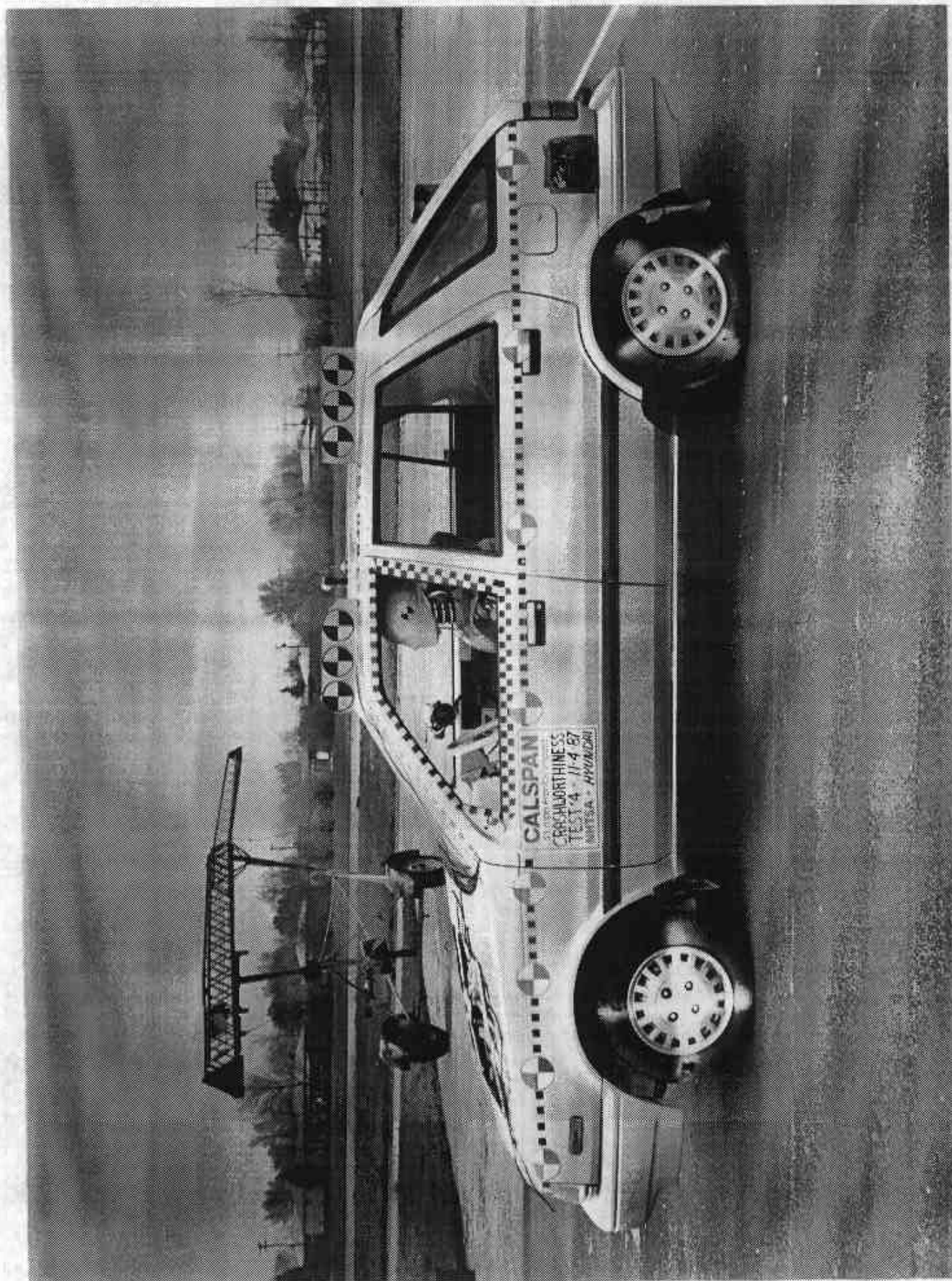


Figure A-9 PRE-TEST LEFT SIDE VIEW

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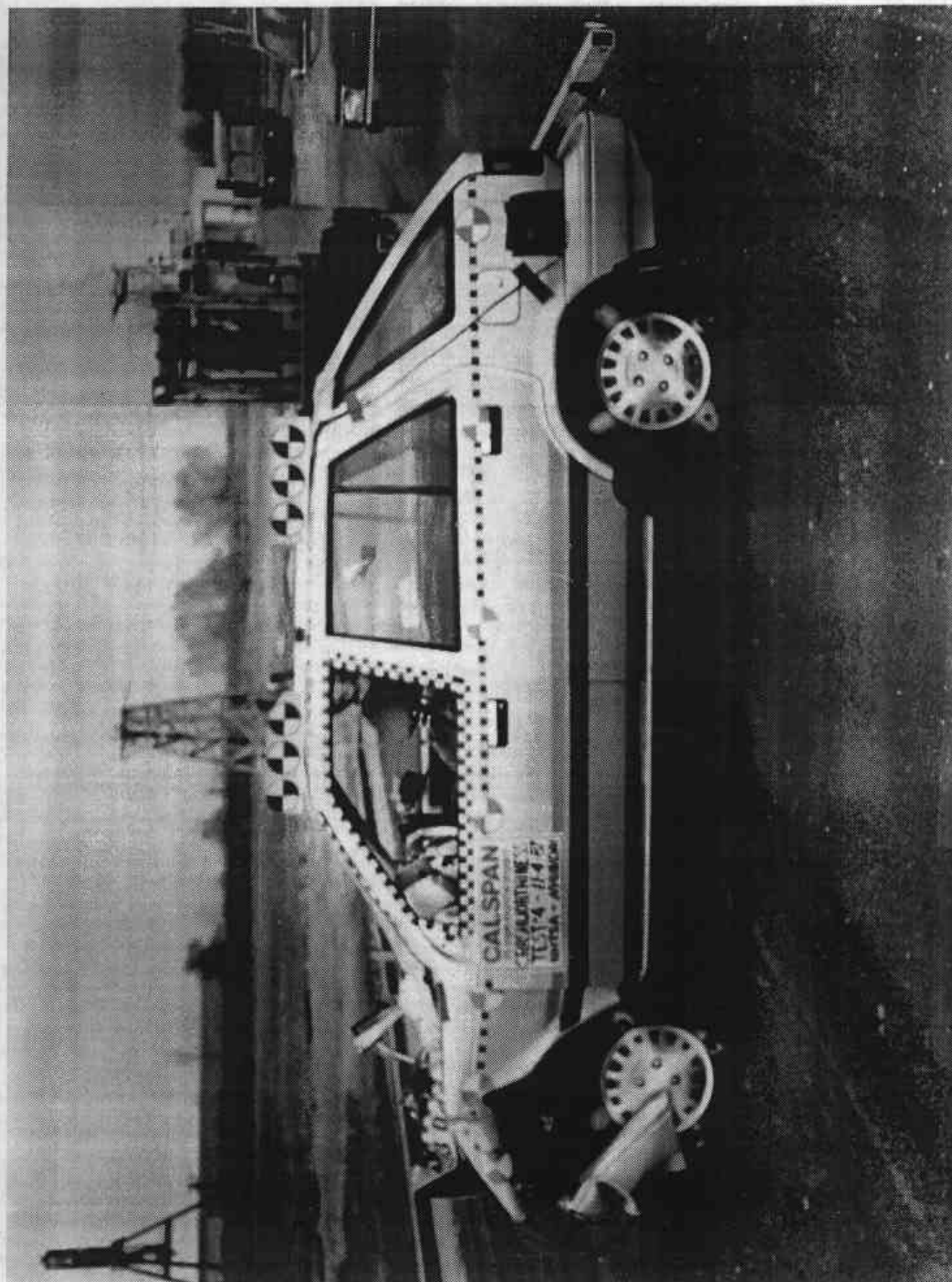


Figure A-10 POST-TEST LEFT SIDE VIEW

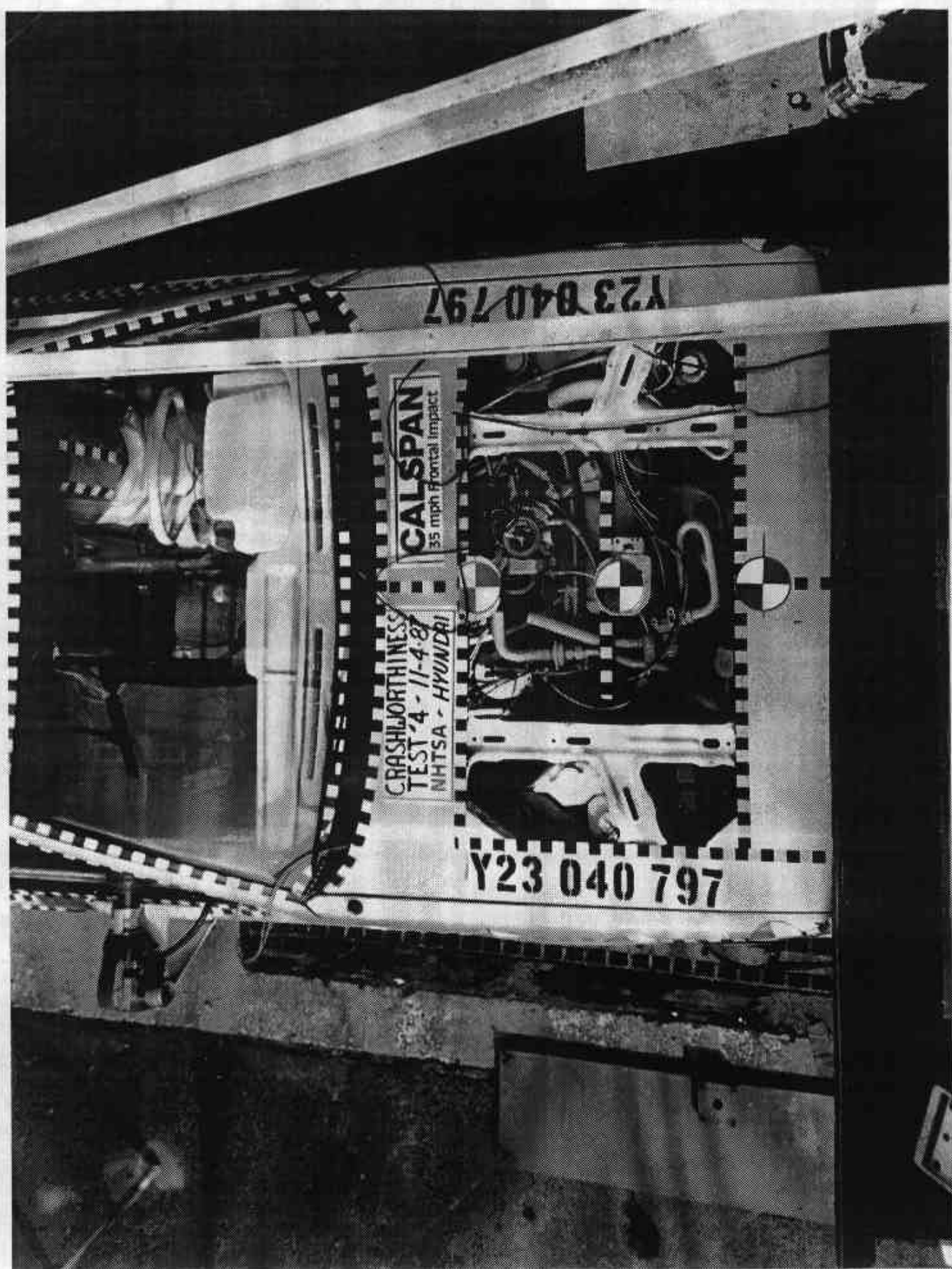


Figure A-11 PRE-TEST TOP VIEW ENGINE COMPARTMENT

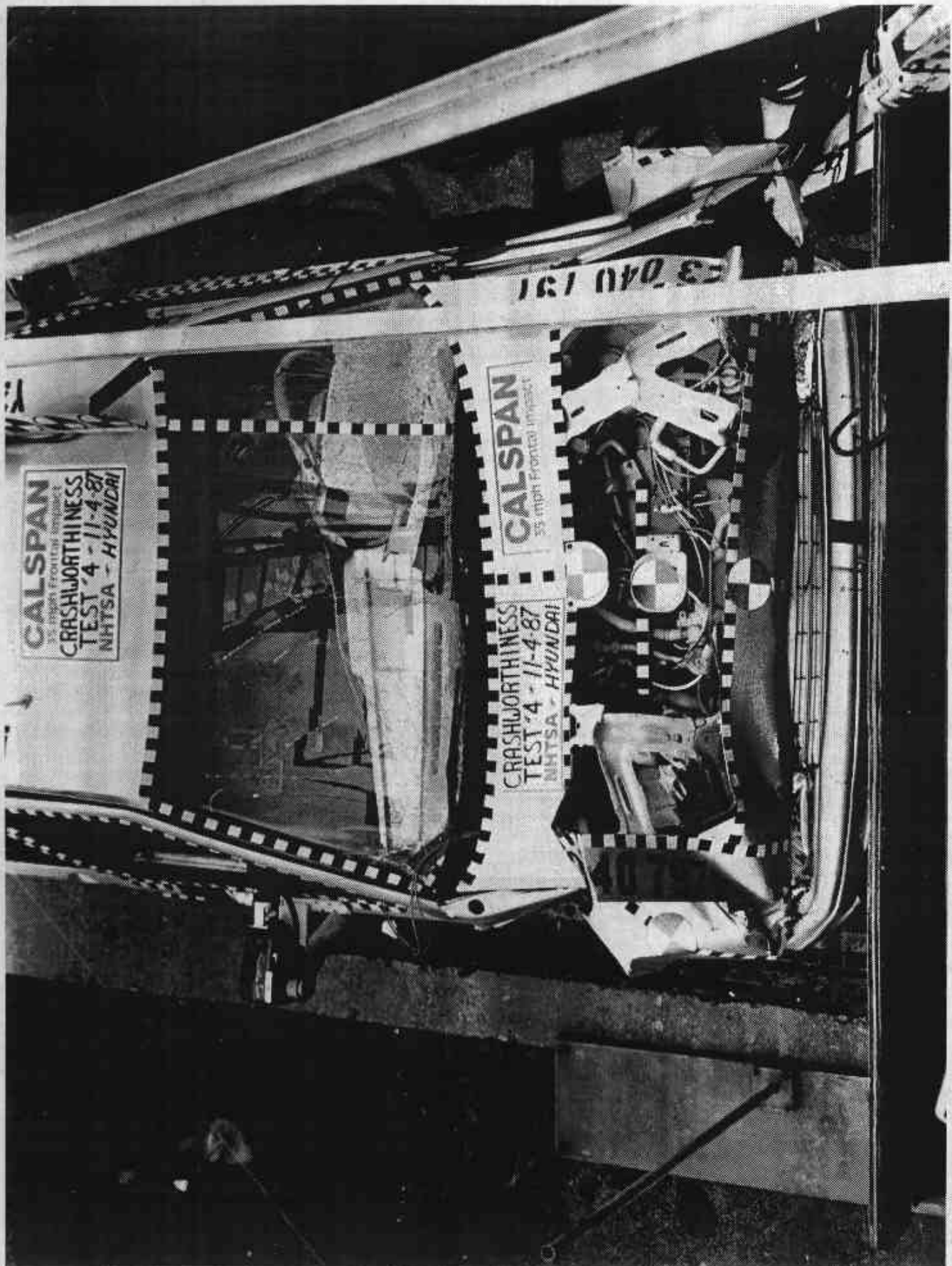


Figure A-14 POST-TEST TOP VIEW ENGINE COMPARTMENT

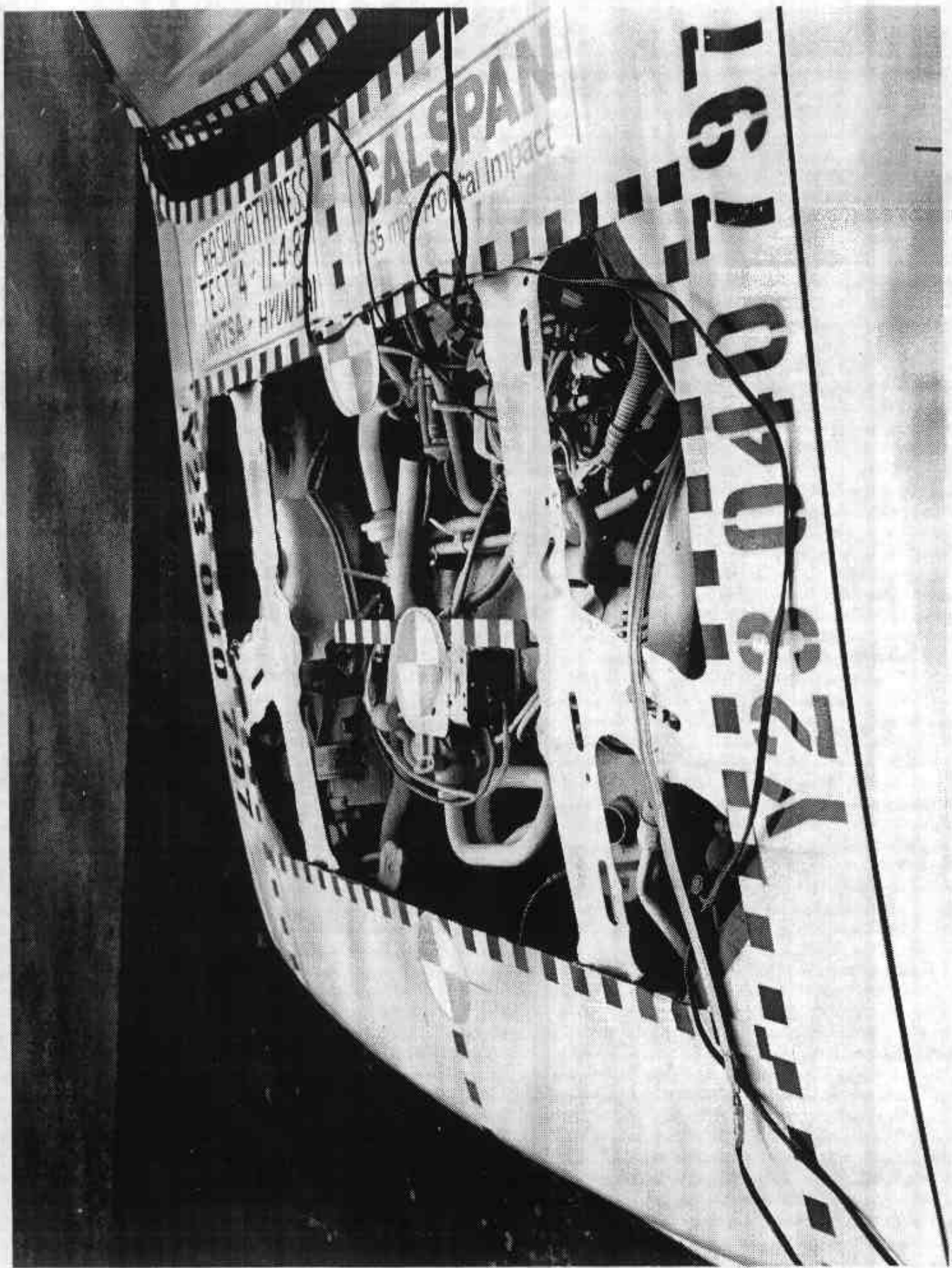


Figure A-13 PRE-TEST SIDE VIEW ENGINE COMPARTMENT

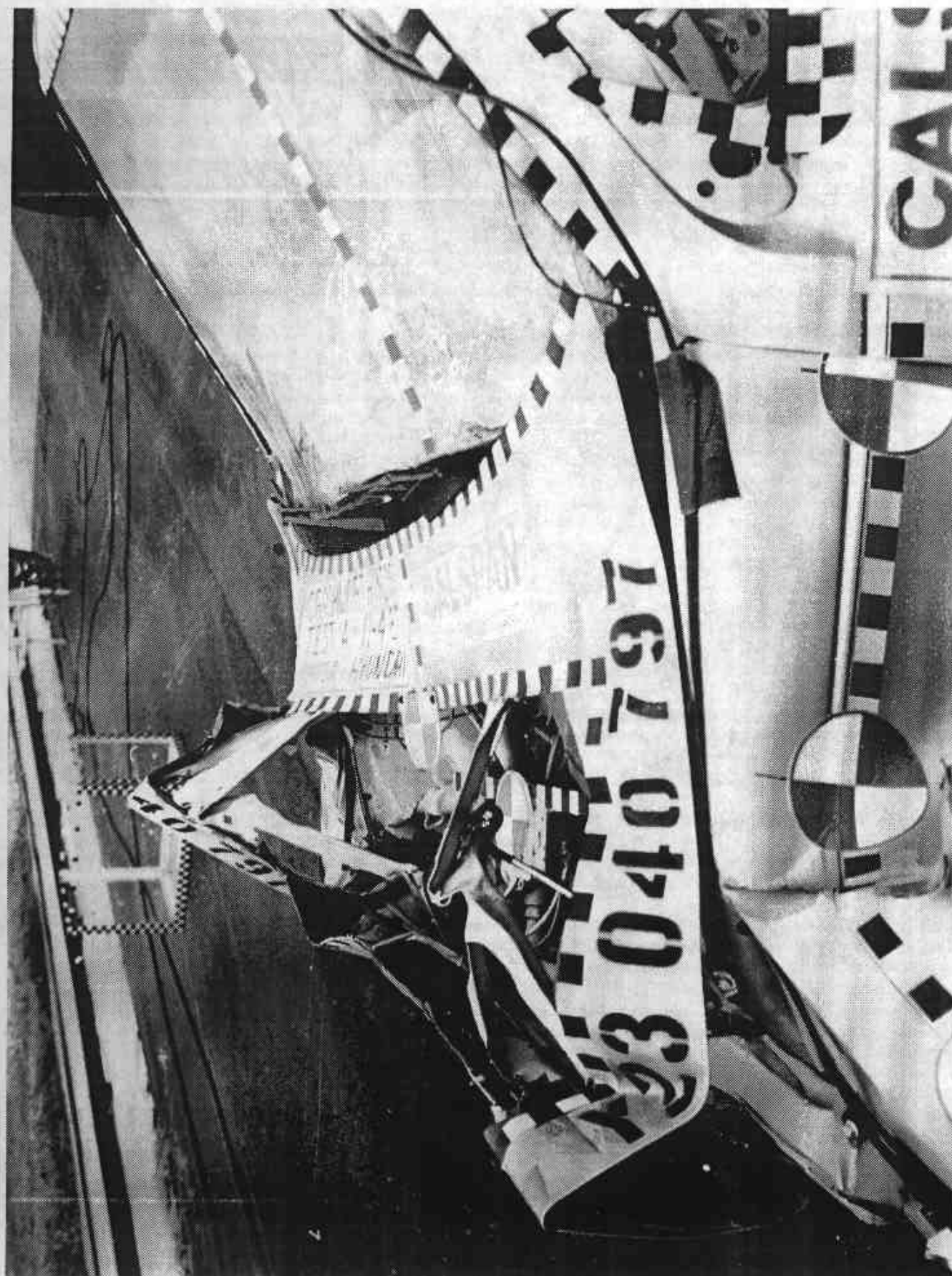


Figure A-14. POST-TEST SIDE VIEW ENGINE COMPARTMENT



Figure A-15 PRE-TEST TOP VIEW COMPLETE VEHICLE

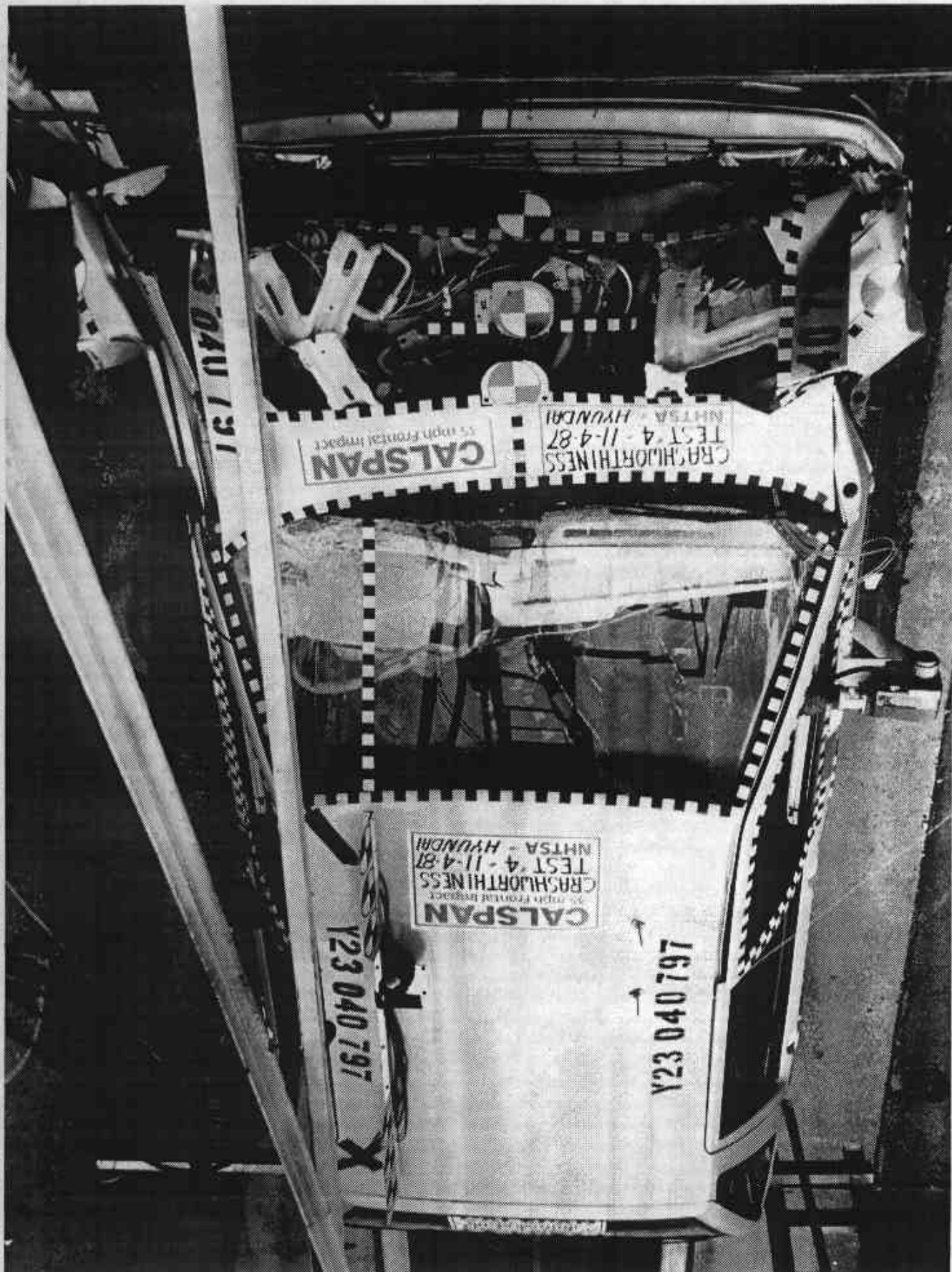


FIGURE A-16 POST-TEST TOP VIEW COMPLETE VEHICLE

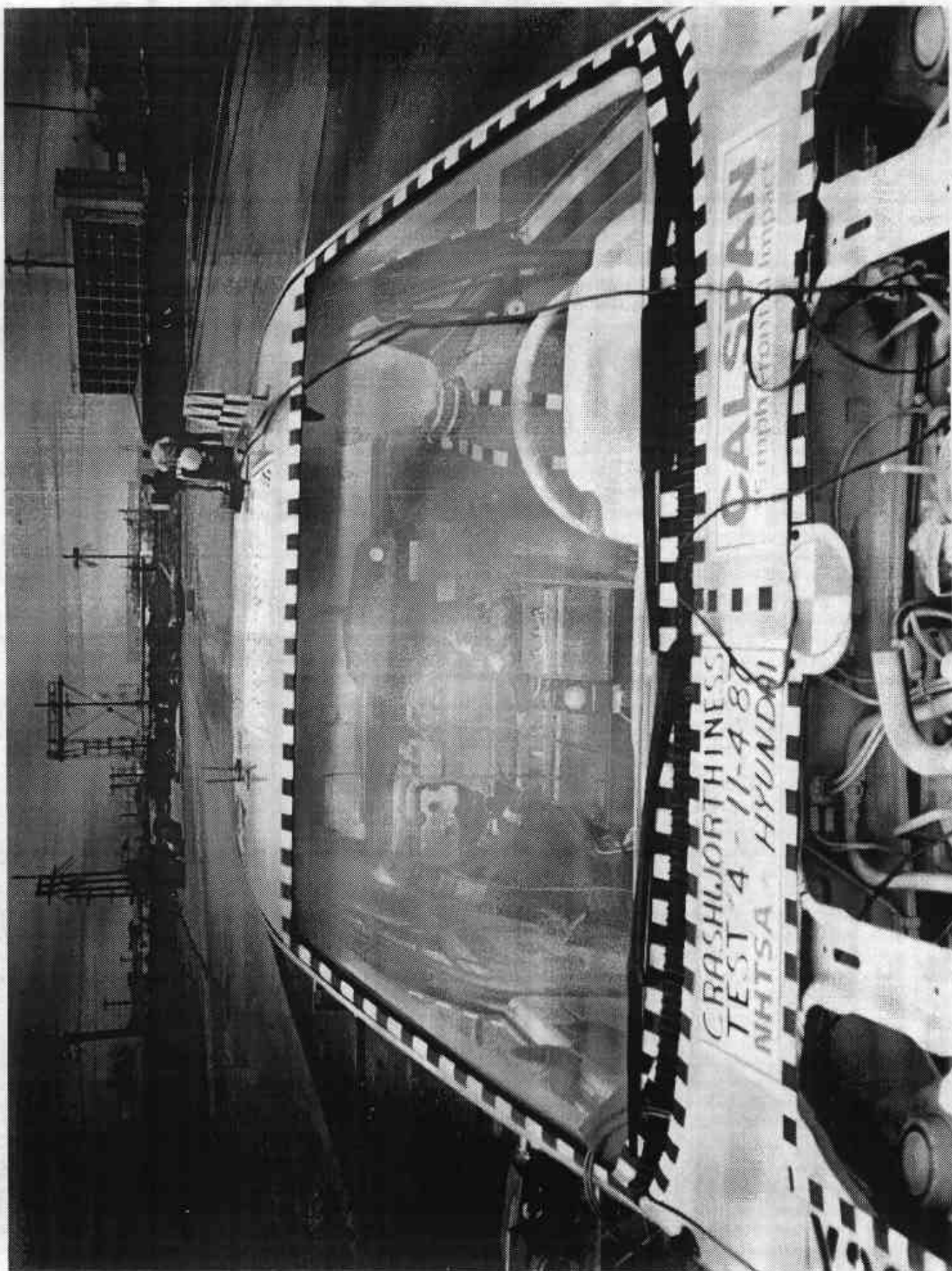


Figure A-17 PRE-TEST FRONT VIEW WINDSHIELD

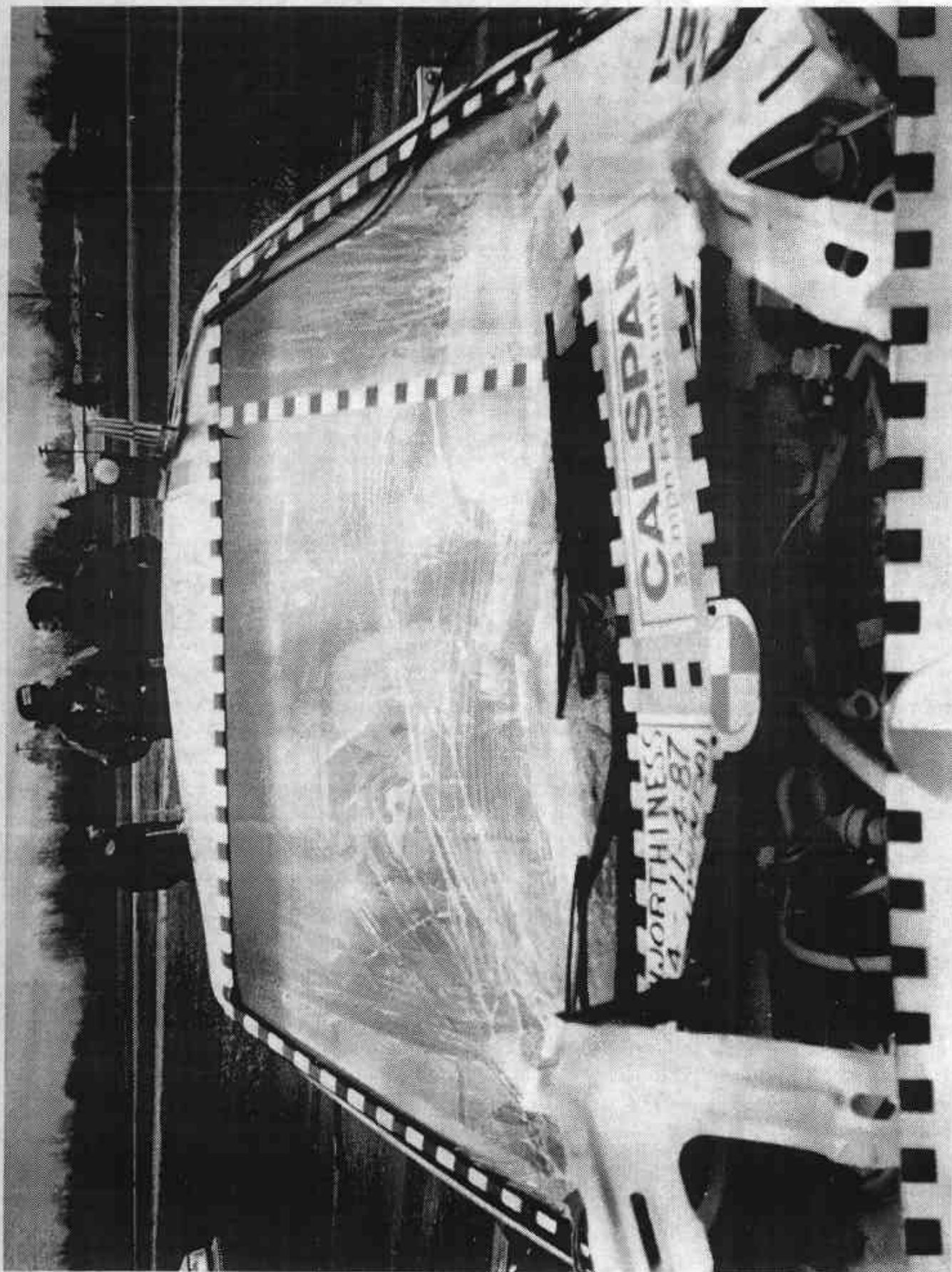


Figure A-16 POST-TEST FRONT VIEW WINDSHIELD

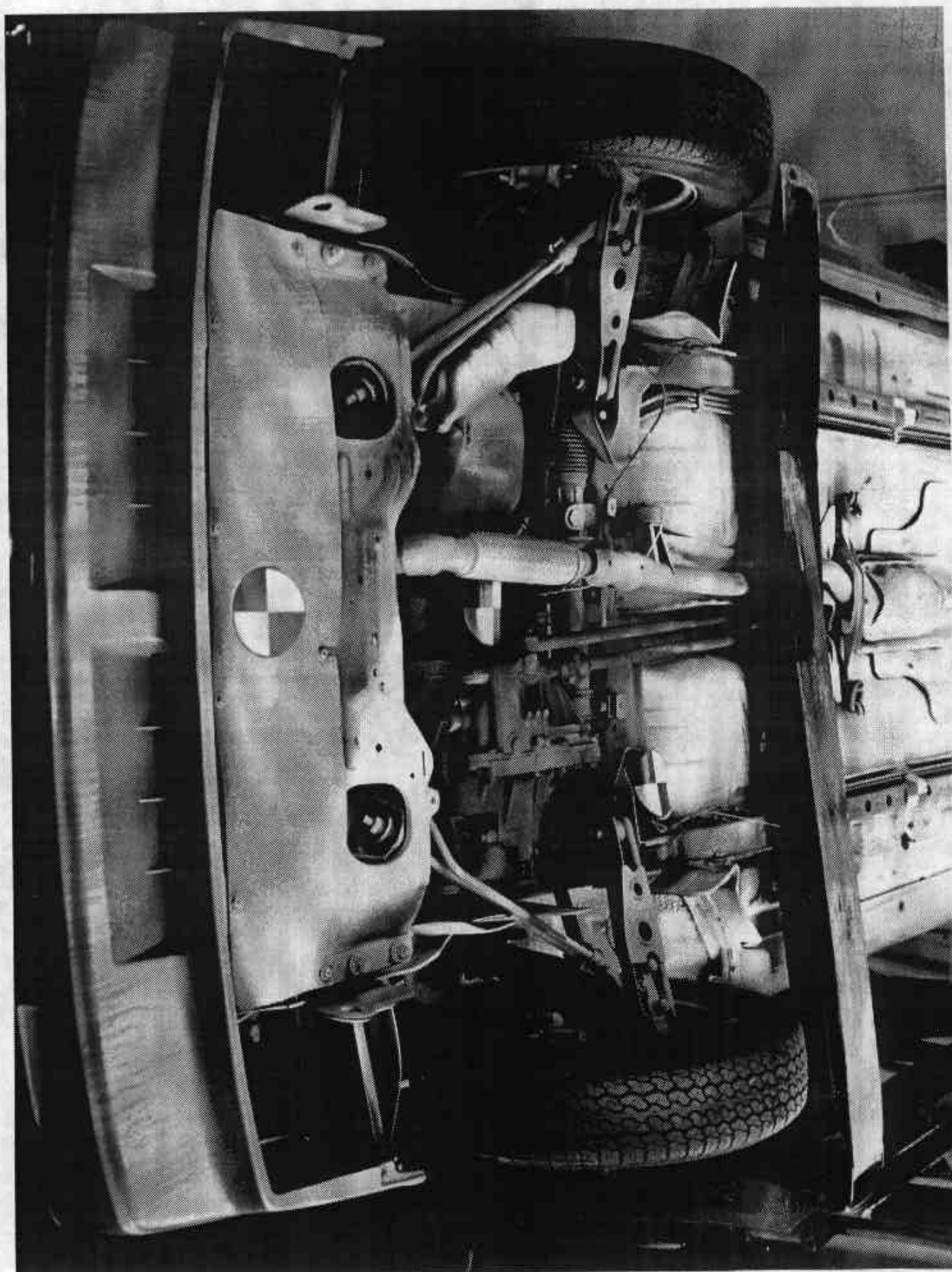


Figure A-19 PRE-TEST FRONT VIEW ENGINE UNDERBODY

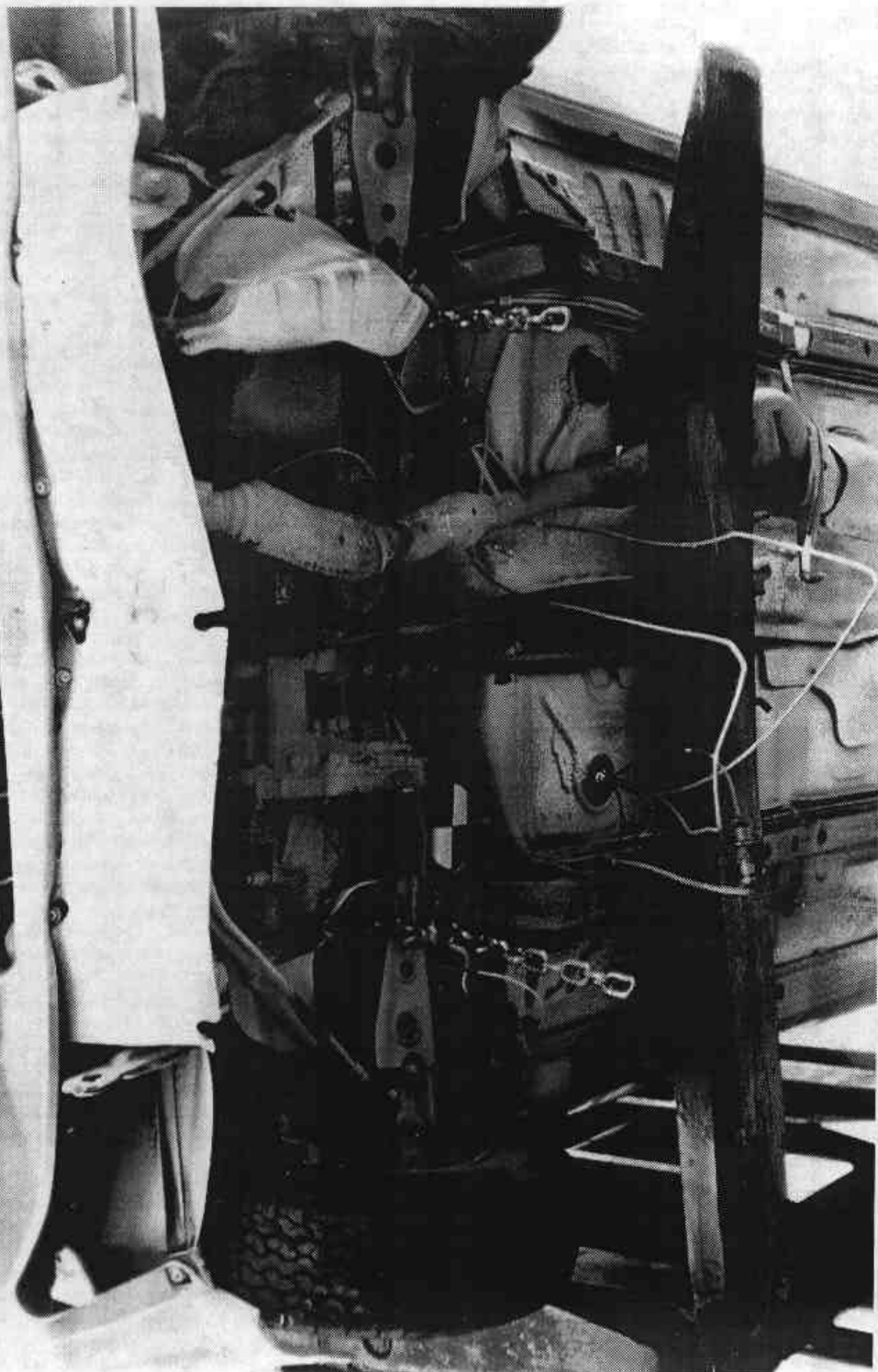


Figure A-20 POST-TEST FRONT VIEW: ENGINE UNDERBODY

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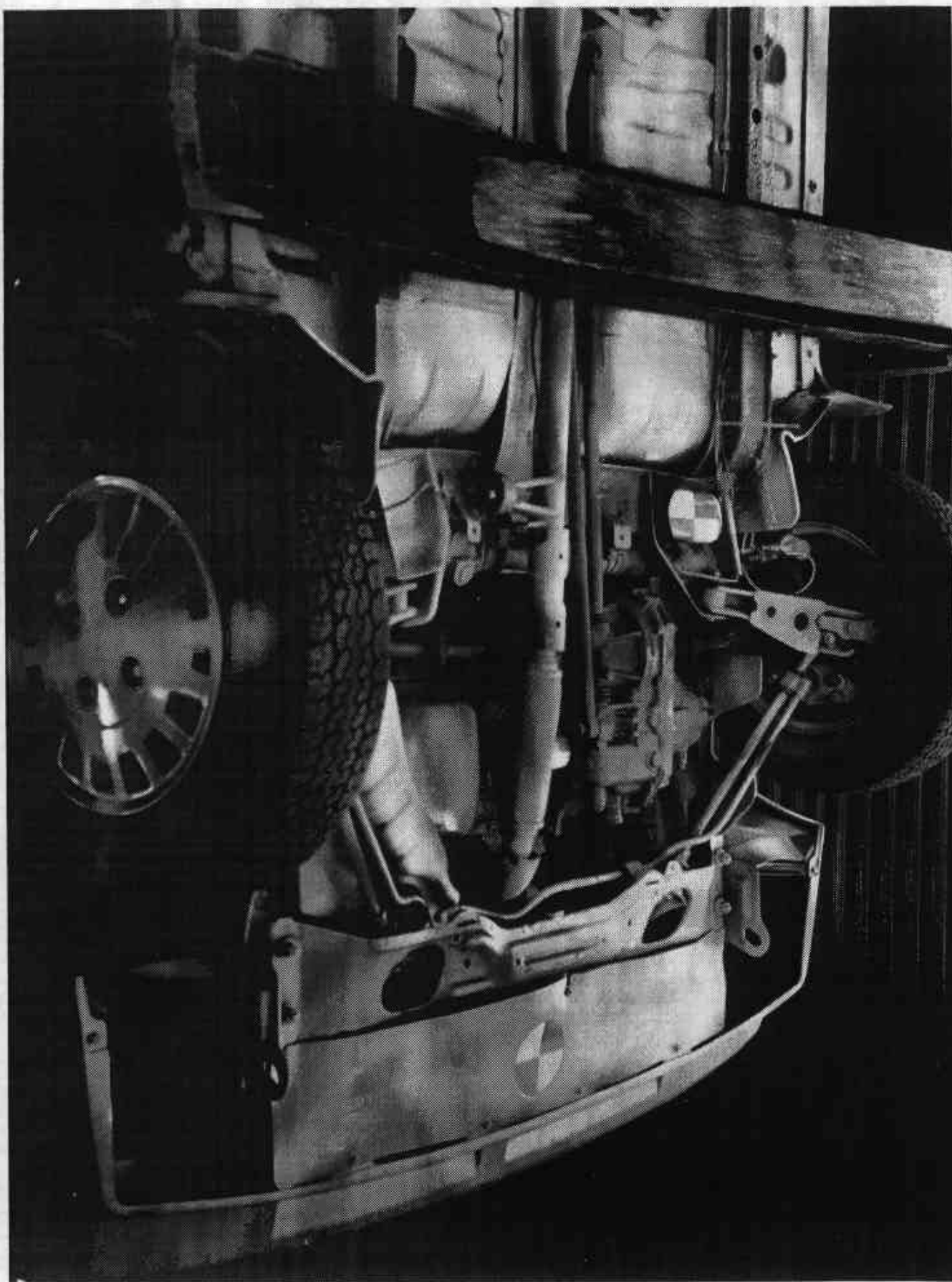


Figure A-21 PRE-TEST SIDE VIEW ENGINE UNDERBODY

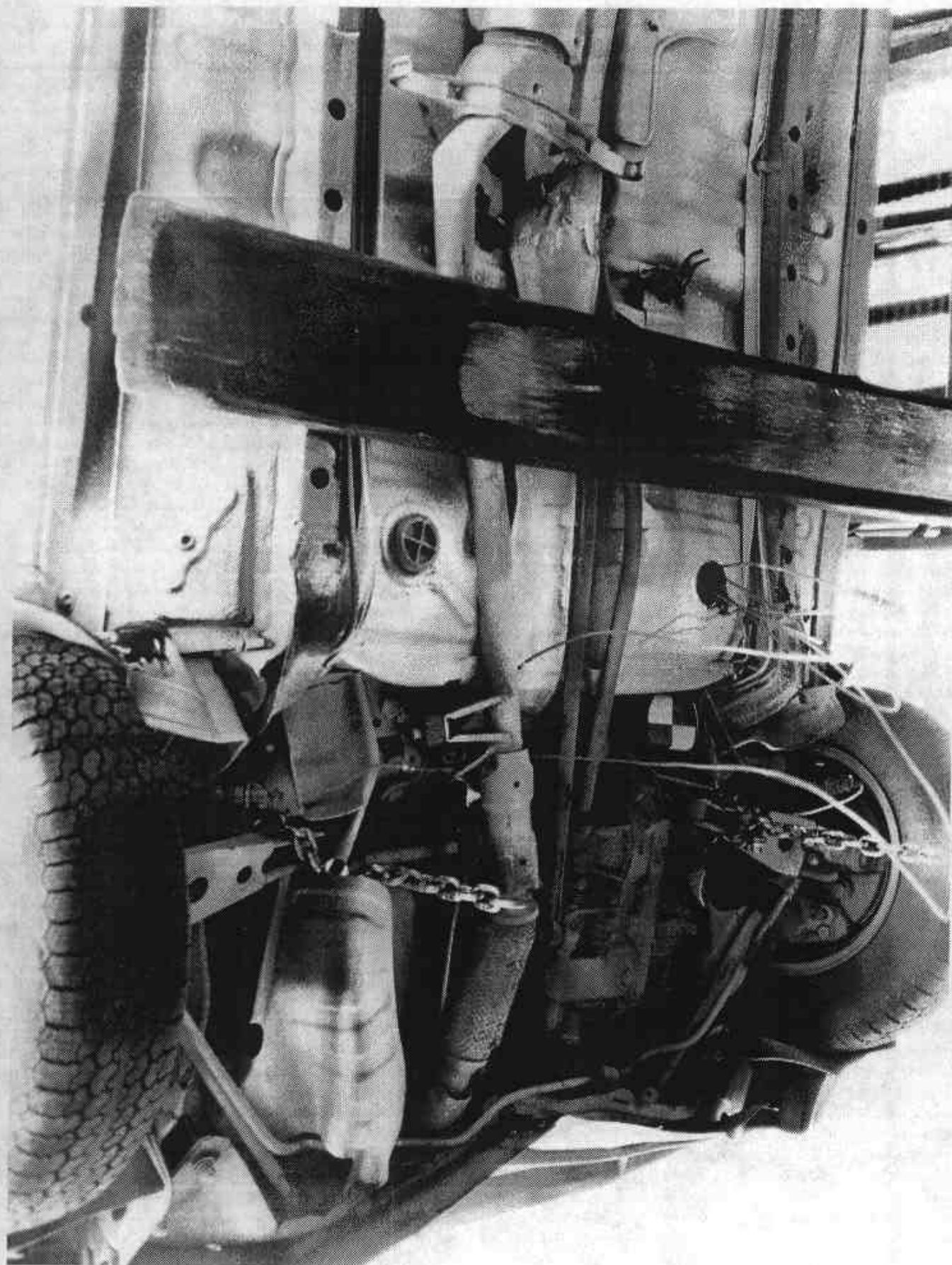


Figure A-22 POST-TEST SIDE VIEW ENGINE UNDERBODY

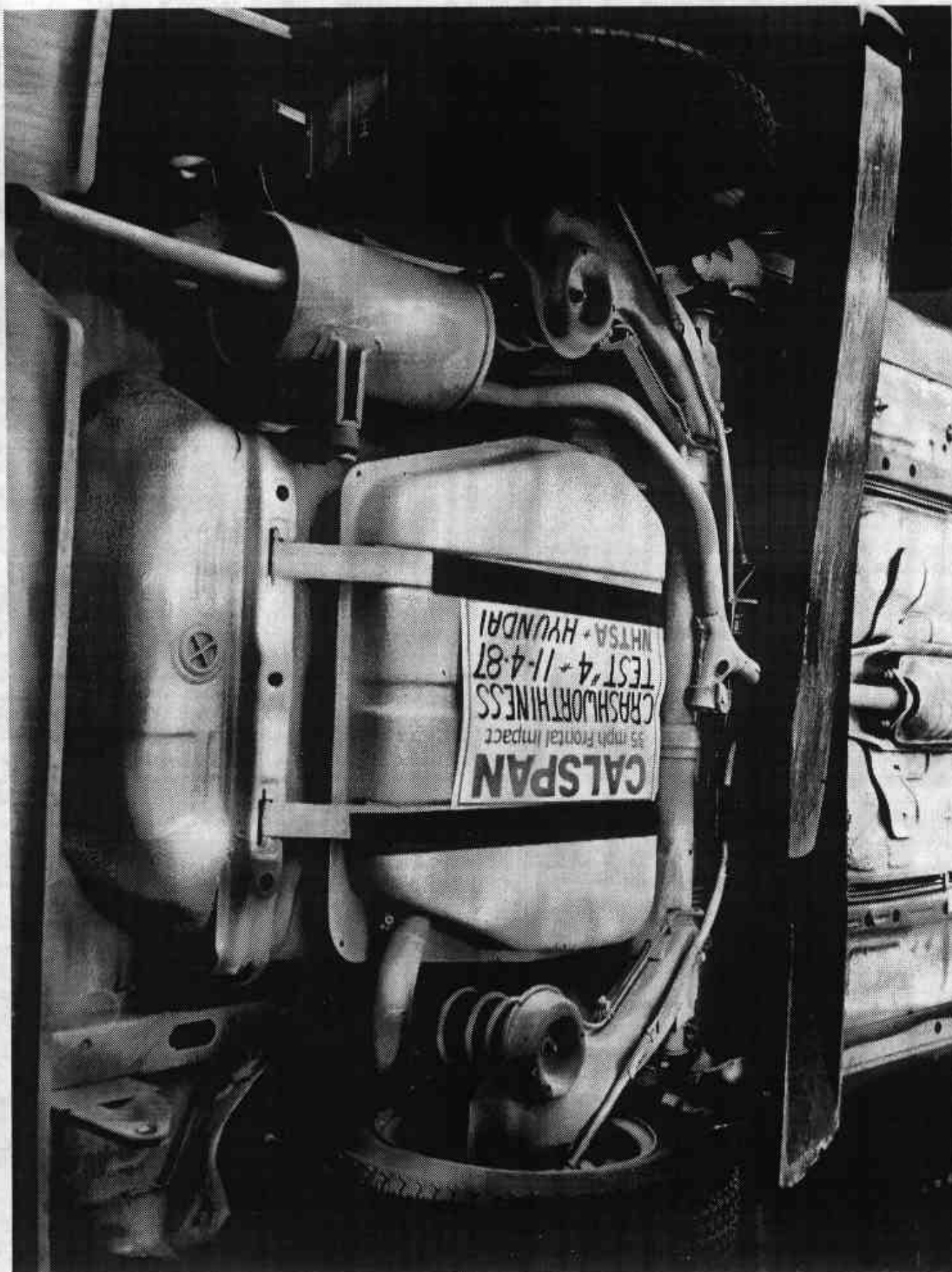


Figure A-23 PRE-TEST REAR VIEW VEHICLE UNDERBODY



Figure A-24 POST-TEST REAR VIEW VEHICLE UNDERBODY

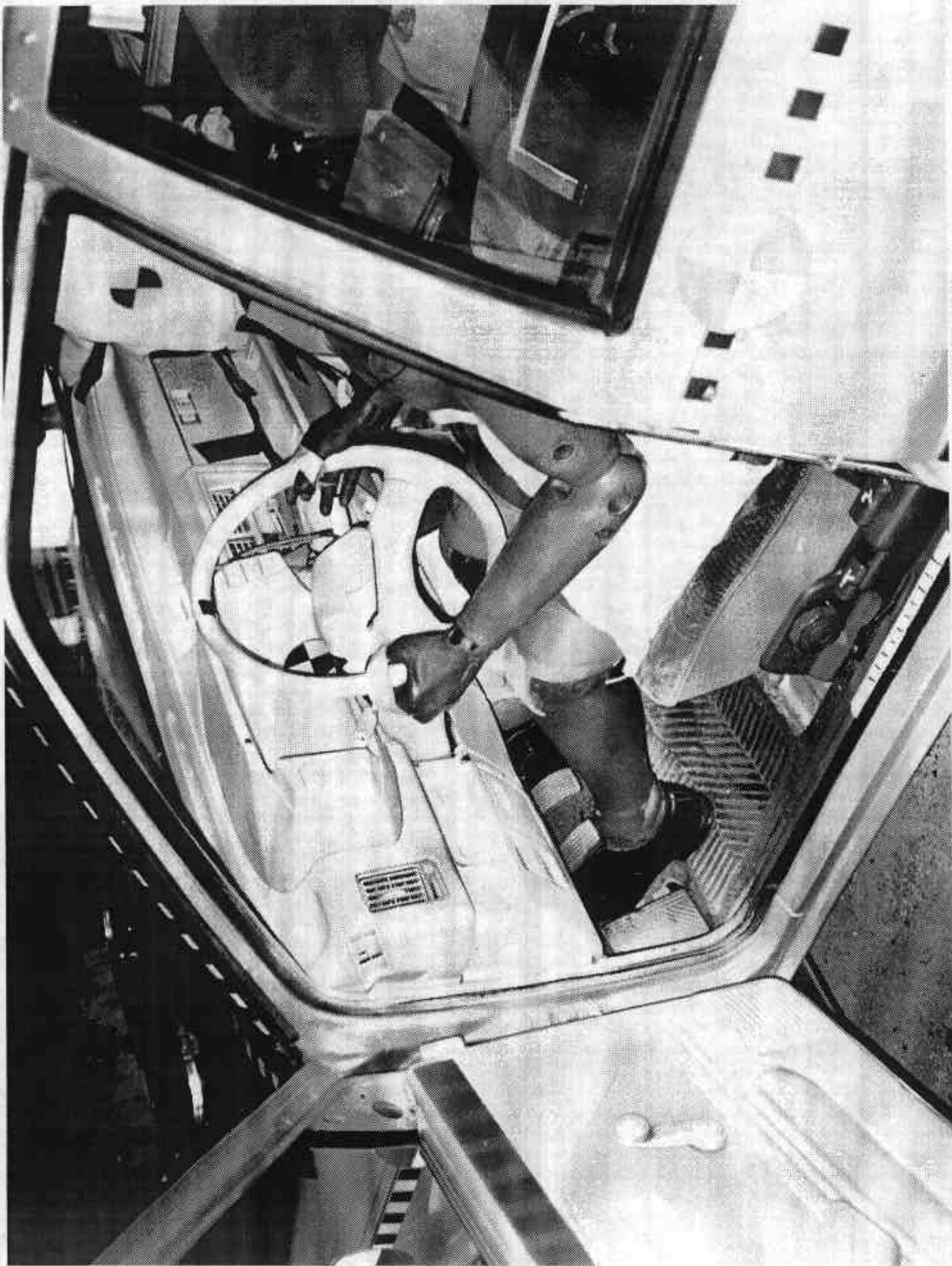


Figure A-25 PRE-TEST LEFT SIDE VIEW VEHICLE INTERIOR AND OCCUPANT POSITION

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Figure A-26 POST-TEST LEFT SIDE VIEW VEHICLE INTERIOR AND OCCUPANT POSITION

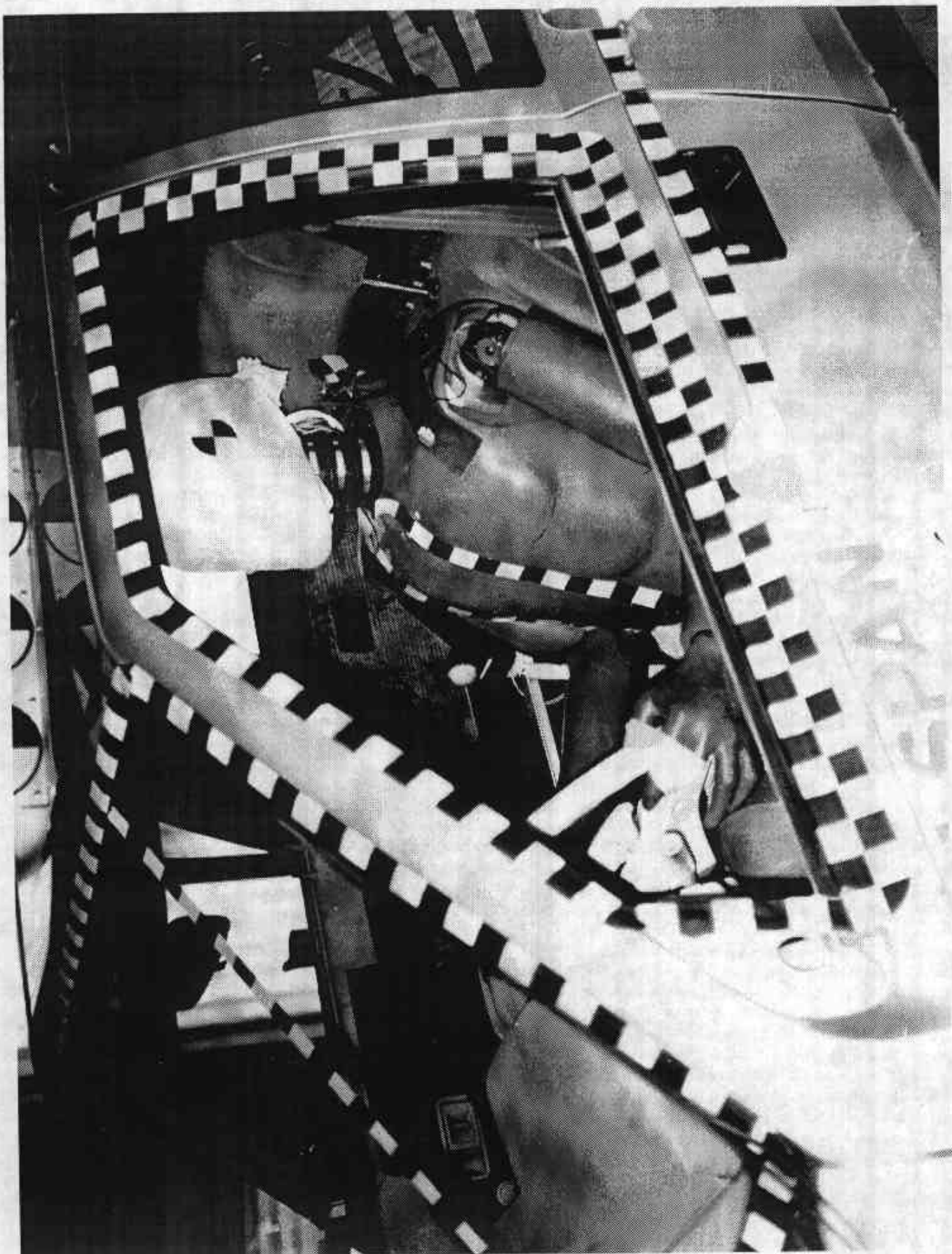


FIGURE A-27 PRE-TEST LEFT SIDE VIEW OCCUPANT POSITION

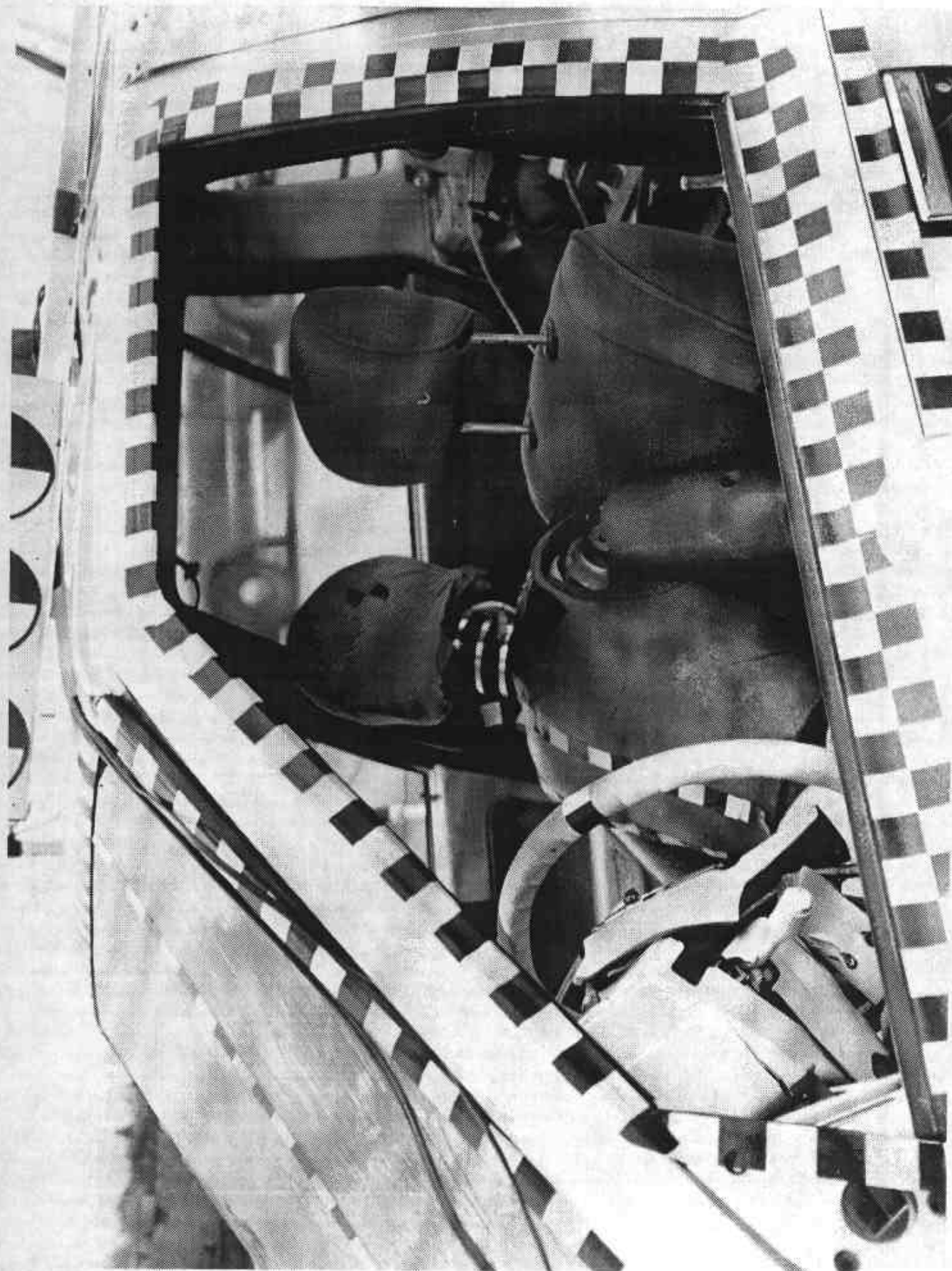


Figure A-28 POST-TEST LEFT SIDE VIEW OCCUPANT POSITION

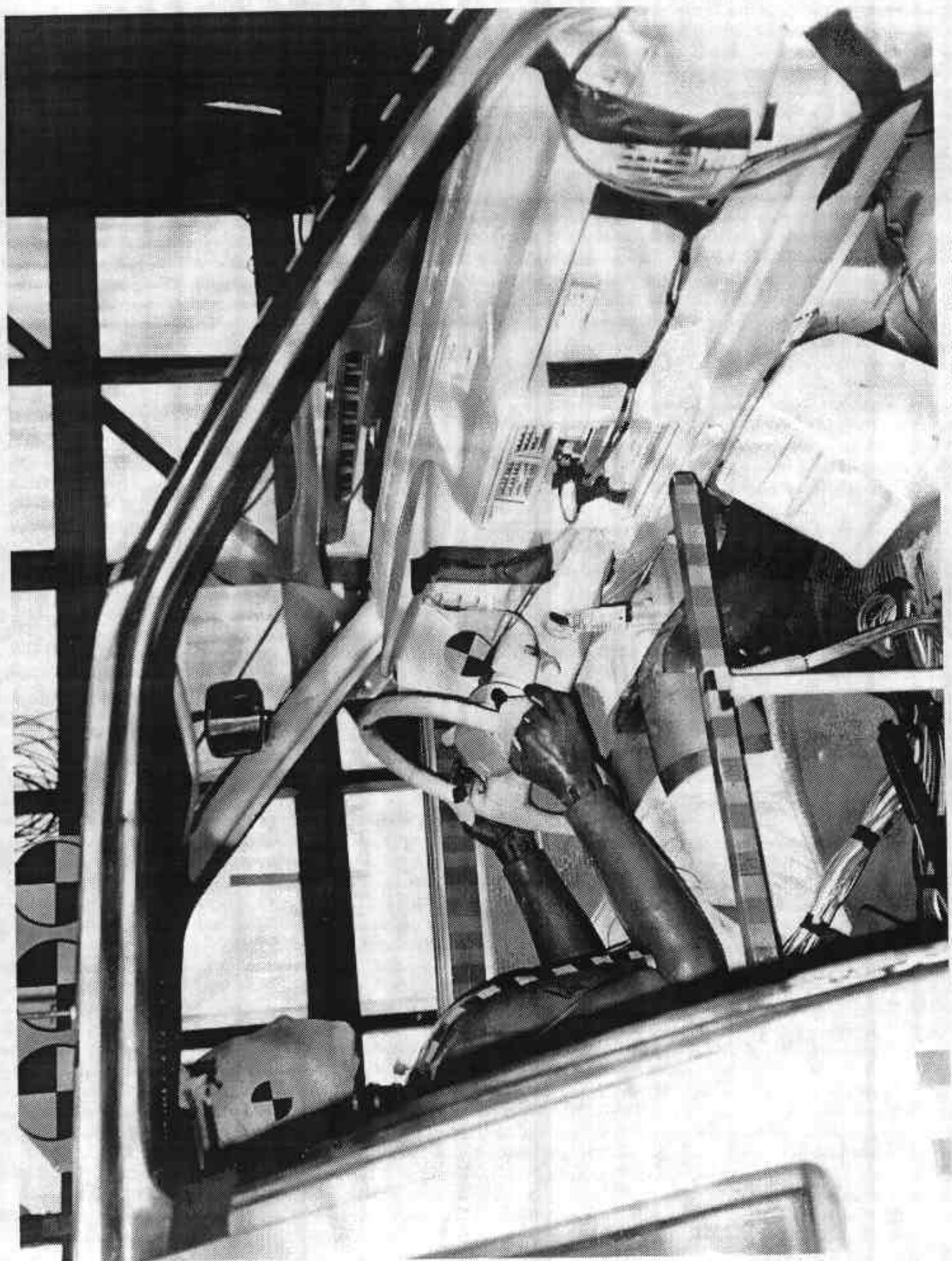


Figure A-29 PRE-TEST RIGHT SIDE VIEW VEHICLE INTERIOR AND OCCUPANT POSITION

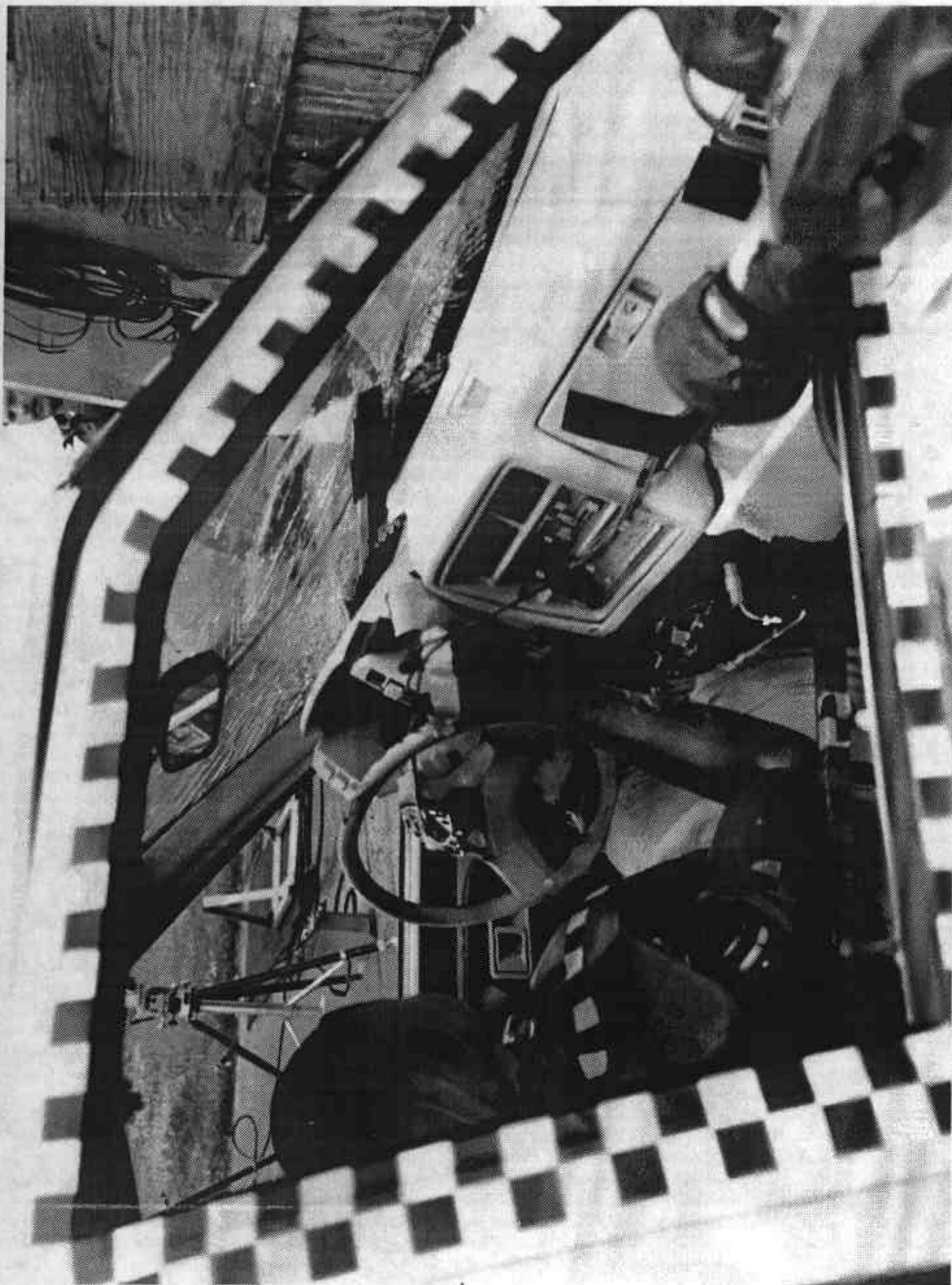


Figure A-30 POST-TEST RIGHT SIDE VIEW VEHICLE INTERIOR AND OCCUPANT POSITION

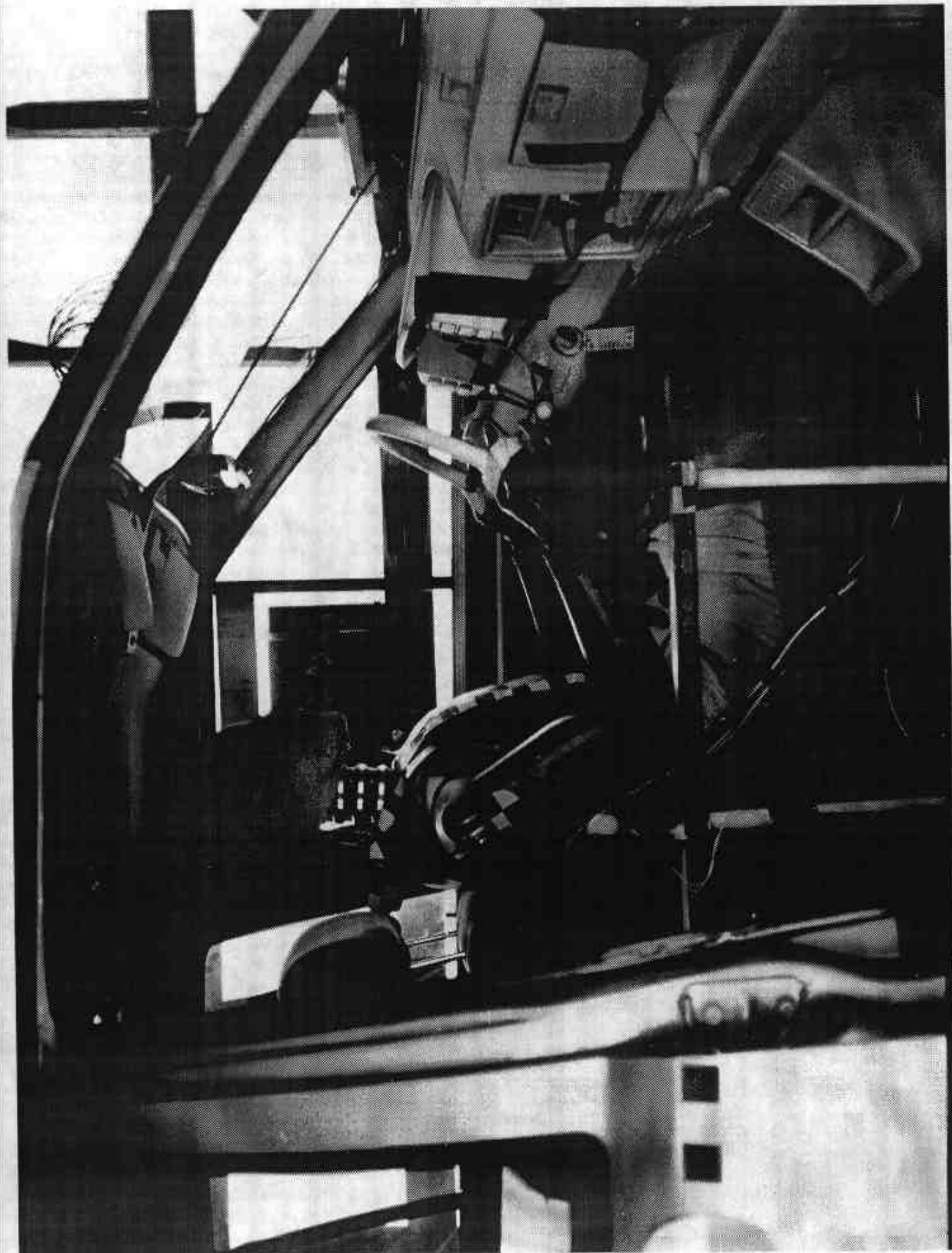


Figure A-31 PRE-TEST RIGHT SIDE VIEW OCCUPANT POSITION

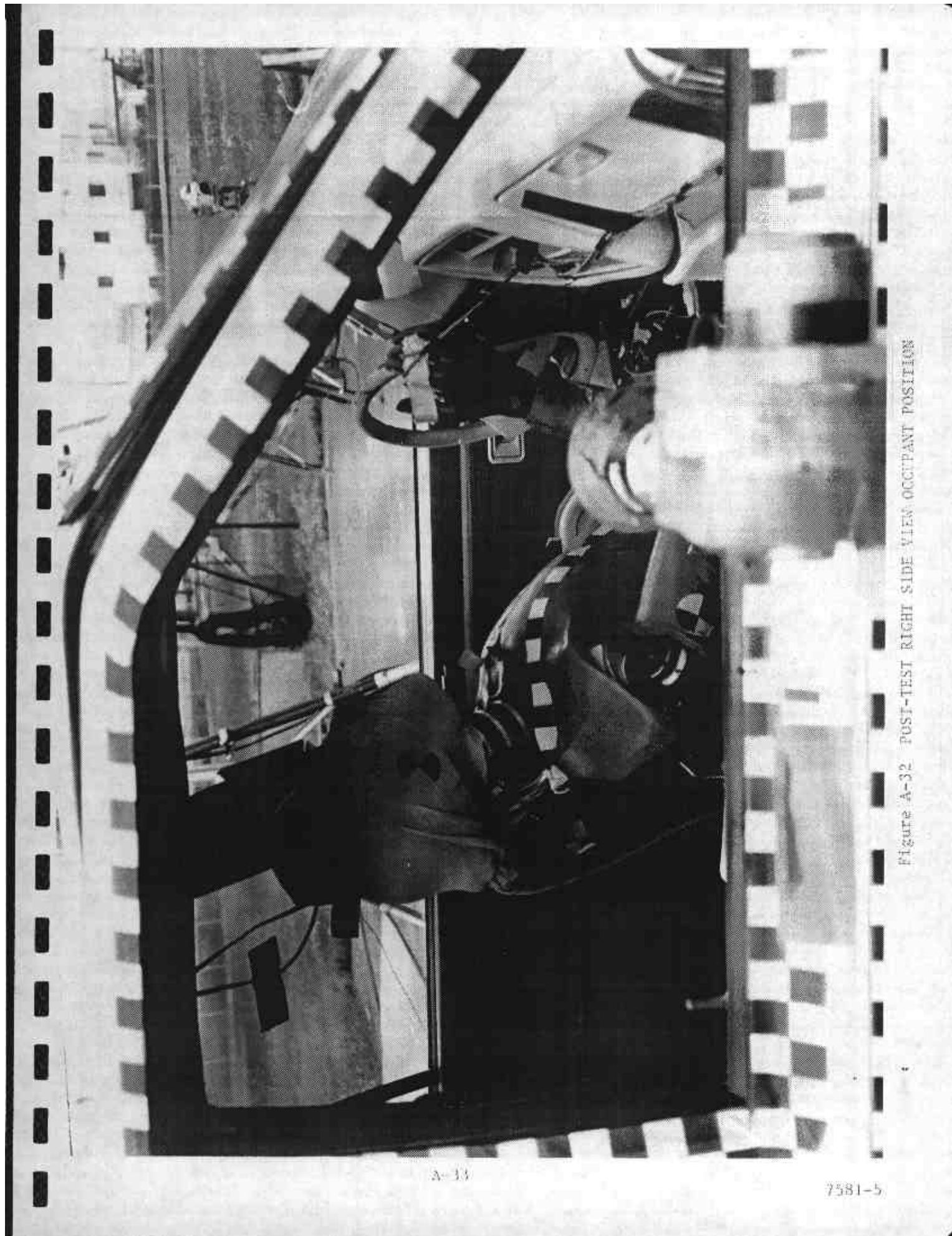


Figure A-32 POST-TEST RIGHT SIDE VIEW OCCUPANT POSITION



Figure A-33 POST-TEST OCCUPANT LOWER LEG POSITION

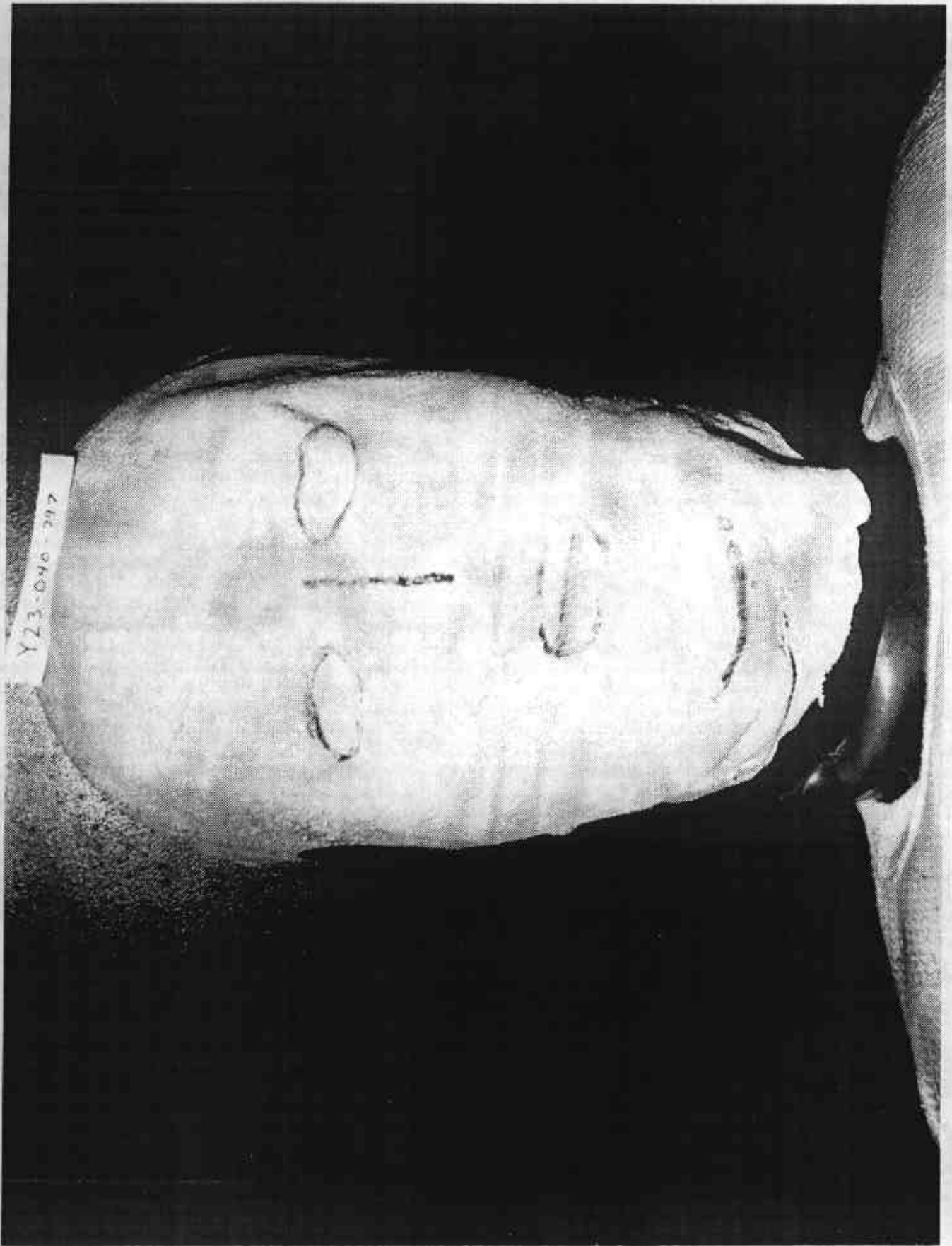


Figure A-34 POST-TEST OCCUPANT OUTER FACIAL CHANNELS

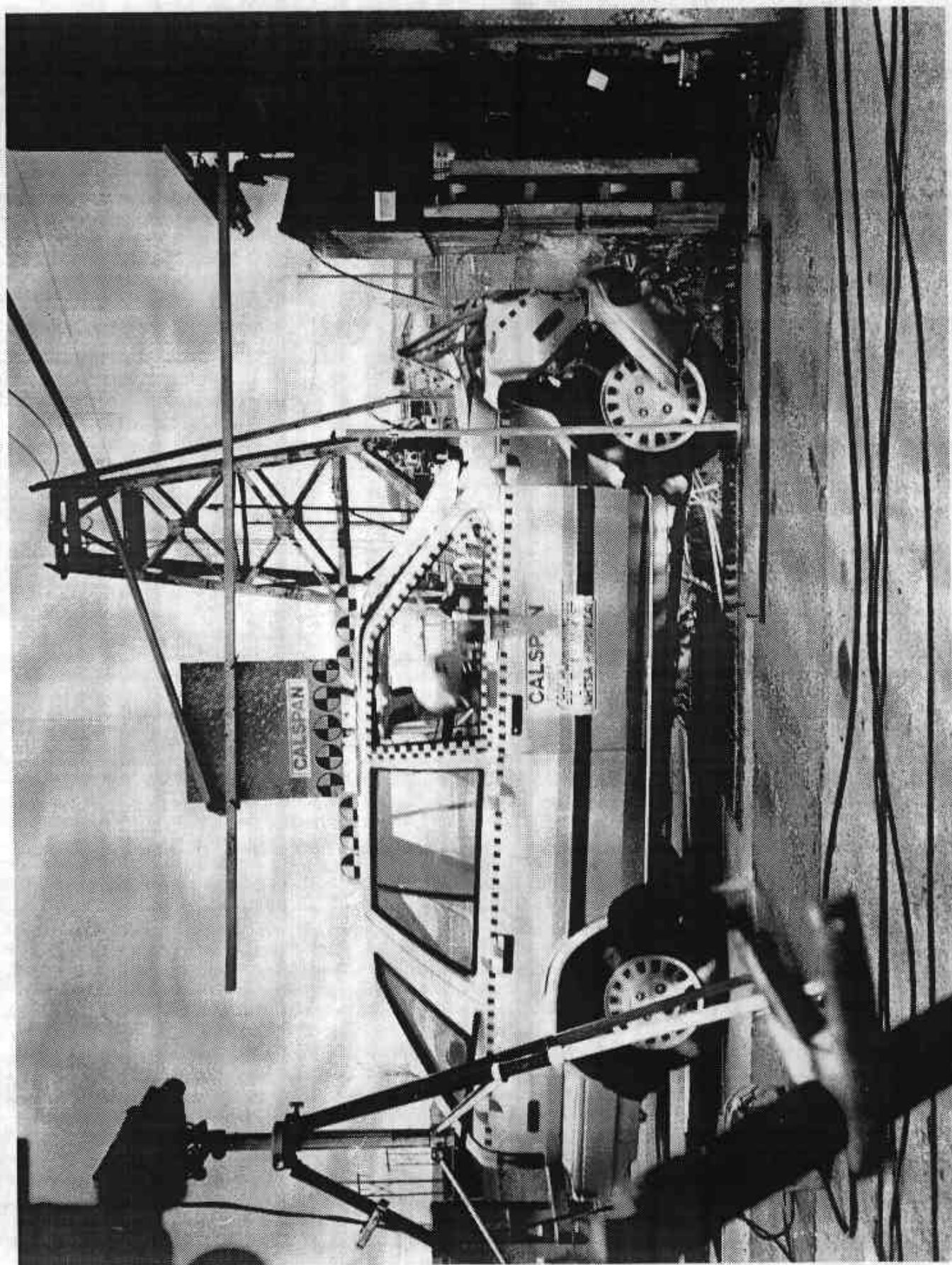


Figure A-35 VEHICLE IMPACT

APPENDIX B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

CRASHWORTHINESS BARRIER TEST

RUN # 797		SERIES # 4	
CHAN	TITLE	MINIMUM	MAXIMUM
1 POS#1 HEAD X		-130.143	8.840 G'S
2 POS#1 HEAD Y		-9.878	17.521 G'S
3 POS#1 HEAD Z		-53.378	59.078 G'S
4 POS#1 HD1XG		-126.783	45.534 G'S
5 POS#1 HD1ZG		-49.894	54.638 G'S
6 POS#1 HD2YG		-12.481	20.997 G'S
7 POS#1 HD2ZG		-67.648	38.491 G'S
8 POS#1 HD3XG		-185.947	15.979 G'S
9 POS#1 HD3YG		-17.274	29.534 G'S
10 POS#1 CHEST X		-86.203	5.293 G'S
11 POS#1 CHEST Y		-7.758	10.015 G'S
12 POS#1 CHEST Z		-16.515	6.382 G'S

CRASHWORTHINESS BARRIER TEST

CHAN	RUN #	TITLE	SERIES #	MINIMUM	MAXIMUM	
	797		4			
13	POS#1	UPPER STERNUM X		-495.385	477.040	G'S
14	POS#1	LOWER STERNUM X		-263.365	505.751	G'S
15	POS#1	CHEST POT		-1.221	.023	INCHES
16	POS#1	ABDOMINAL PRESS.		-.335	2.004	PSI (1.69 Inches of deflection)
17	POS#1	RIGHT FEMUR LOAD		-226.708	1675.852	LBS.
18	POS#1	LEFT FEMUR LOAD		-138.454	2583.130	LBS.
19	POS#1	UPPER NECK F(X)		-133.766	594.036	LBS.
20	POS#1	UPPER NECK F(Y)		-83.918	83.768	LBS.
21	POS#1	UPPER NECK F(Z)		-121.373	1296.494	LBS.
22	POS#1	UPPER NECK M(X)		-269.670	553.695	IN-LBS.
23	POS#1	UPPER NECK M(Y)		-1006.596	116.390	IN-LBS.
24	POS#1	UPPER NECK M(Z)		-272.972	421.384	IN-LBS.

CRASHWORTHINESS BARRIER TEST

RUN # 797		SERIES # 4	
CHAN	TITLE	MINIMUM	MAXIMUM
25 POS#1	LOWER NECK F(X)	-280.532	213.557 LBS.
26 POS#1	LOWER NECK F(Y)	-184.905	143.410 LBS.
27 POS#1	LOWER NECK F(Z)	-388.616	480.773 LBS.
28 POS#1	LOWER NECK M(X)	-150.053	1077.762 IN-LBS.
29 POS#1	LOWER NECK M(Y)	-928.037	355.147 IN-LBS.
30 POS#1	LOWER NECK M(Z)	0.000	0.000 IN-LBS.
31 POS#1	R. LOWER TIBIA M(X)	-1048.276	328.221 IN-LBS.
32 POS#1	R. LOWER TIBIA F(Y)	-147.553	99.113 LBS.
33 POS#1	R. LOWER TIBIA F(Z)	-808.629	421.903 LBS.
34 POS#1	R. UPPER TIBIA M(X)	-212.070	633.488 IN-LBS.
35 POS#1	R. UPPER TIBIA M(Y)	-1140.280	1958.479 IN-LBS.
36 POS#1	R. KNEE SHEAR RIGHT	-498.158	204.775 LBS.

CRASHWORTHINESS BARRIER TEST

FUN # 797		SERIES # 4	
CHAN	TITLE	MINIMUM	MAXIMUM
37 POS#1	R.KNEE SHEAR LEFT	-489.526	146.865 LBS.
38 POS#1	L.LOWER TIBIA M(X)	-844.139	4475.098 IN-LBS.
39 POS#1	L.LOWER TIBIA F(Y)	-140.228	73.729 LBS.
40 POS#1	L.LOWER TIBIA F(Z)	-127.094	909.757 LBS.
41 POS#1	L.UPPER TIBIA M(X)	-332.347	431.529 IN-LBS.
42 POS#1	L.UPPER TIBIA M(Y)	-104.543	1209.036 IN-LBS.
43 POS#1	L.KNEE SHEAR RIGHT	-330.079	73.268 LBS.
44 POS#1	L.KNEE SHEAR LEFT	-410.808	70.034 LBS.
* 45 ACC	PACK #11(X)	-98.250	49.923 G'S
* 46 ACC	PACK #11(Z)	-65.203	36.922 G'S
* 47 ACC	PACK #1(X)	-33.018	2.090 G'S
* 48 ACC	PACK #1(X)R	-36.271	2.370 G'S

* Accelerometer location may be found from
Figure 2, Page 3-8.

CRASHWORTHINESS BARRIER TEST

RUN # 797		SERIES # 4	
CHAN	TITLE	MINIMUM	MAXIMUM
* 49	ACC PACK #2(X)	-33.393	2.964 G'S
* 50	ACC PACK #2(X)R	-34.581	3.266 G'S
* 51	ACC PACK #3(X)	-39.784	2.543 G'S
* 52	ACC PACK #3(Y)	-3.145	1.926 G'S
* 53	ACC PACK #3(Z)	-26.509	18.797 G'S
* 54	ACC PACK #4(X)	-37.529	3.788 G'S
* 55	ACC PACK #4(Z)	-10.756	21.107 G'S
* 56	ACC PACK #5(X)	-149.410	60.692 G'S
* 57	ACC PACK #5(Z)	-20.642	16.500 G'S
* 58	ACC PACK #6(X)	-123.102	23.609 G'S
* 59	ACC PACK #6(Z)	-145.488	50.860 G'S
* 60	ACC PACK #7(X)	-130.618	16.585 G'S

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*-Accelerometer location may be found from Figure 2, page 3-8.

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CRASHWORTHINESS BARRIER TEST

CHAN	TITLE	MINIMUM	MAXIMUM
* 61	ACC PACK #7(Z)	-104.164	18.120 G'S
* 62	ACC PACK #8(X)	-128.767	12.018 G'S
* 63	ACC PACK #9(X)	-72.654	41.292 G'S
* 64	ACC PACK #10(X)	-71.400	39.797 G'S
65	BARRIER LOAD CELL A2	-.336	.154 K LBS.
66	BARRIER LOAD CELL A3	-.099	2.512 K LBS.
67	BARRIER LOAD CELL A4	-.243	3.191 K LBS.
68	BARRIER LOAD CELL A5	-.155	4.429 K LBS.
69	BARRIER LOAD CELL A6	-.188	1.227 K LBS.
70	BARRIER LOAD CELL A7	-.159	2.177 K LBS.
71	BARRIER LOAD CELL A8	-.208	.122 K LBS.
72	BARRIER LOAD CELL B2	-.101	4.627 K LBS.

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*-Accelerometer location may be found from Figure 2, page 3-8.

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CRASHWORTHINESS BARRIER TEST

PUN # 797		SERIES # 4	
CHAN	TITLE	MINIMUM	MAXIMUM
73	BARRIER LOAD CELL B3	-.045	16.038 K LBS.
74	BARRIER LOAD CELL B4	-.100	10.380 K LBS.
75	BARRIER LOAD CELL B5	-.029	12.102 K LBS.
76	BARRIER LOAD CELL B6	-.058	9.609 K LBS.
77	BARRIER LOAD CELL B7	-.070	12.659 K LBS.
78	BARRIER LOAD CELL B8	-.076	4.083 K LBS.
79	BARRIER LOAD CELL C2	-.149	4.010 K LBS.
80	BARRIER LOAD CELL C3	-.095	7.203 K LBS.
81	BARRIER LOAD CELL C4	-.116	8.124 K LBS.
82	BARRIER LOAD CELL C5	-.222	8.036 K LBS.
83	BARRIER LOAD CELL C6	-.081	3.491 K LBS.
84	BARRIER LOAD CELL C7	-.065	4.088 K LBS.

CRASHWORTHINESS BARRIER TEST

CHAN	PUN # 797	TITLE	SERIES # 4	MINIMUM	MAXIMUM
85	BARRIER	LOAD CELL C8		-.115	4.627 K LBS.
86	BARRIER	LOAD CELL D2		-.130	.749 K LBS.
87	BARRIER	LOAD CELL D3		-.071	.301 K LBS.
88	BARRIER	LOAD CELL D4		-.084	.267 K LBS.
89	BARRIER	LOAD CELL D5		-.073	.387 K LBS.
90	BARRIER	LOAD CELL D6		-.037	.164 K LBS.
91	BARRIER	LOAD CELL D7		-.079	.193 K LBS.
92	BARRIER	LOAD CELL D8		-.166	1.125 K LBS.

TEST NO. Y23-4-797

VEHICLE DATA

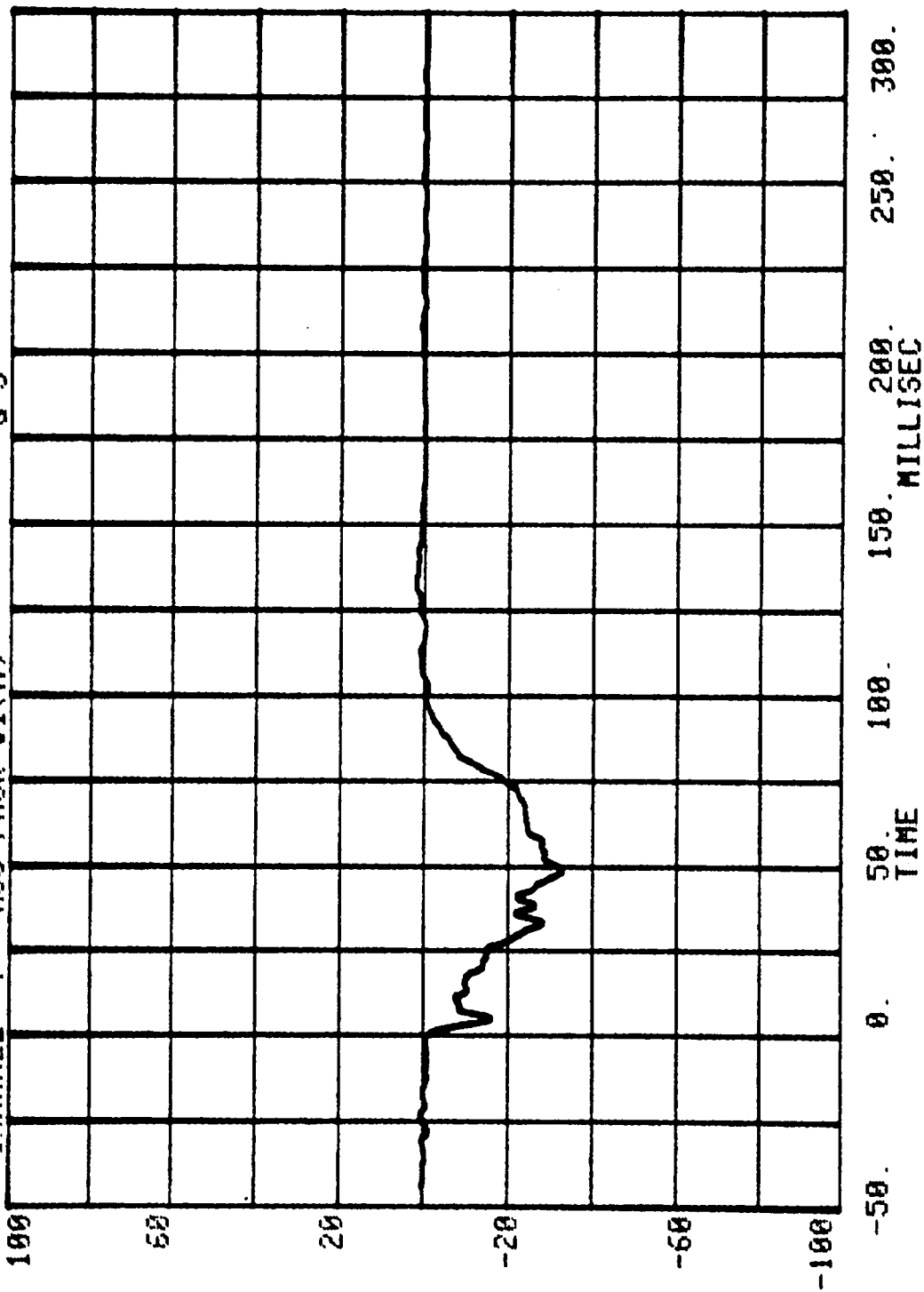
FILTER CHANNEL CLASS

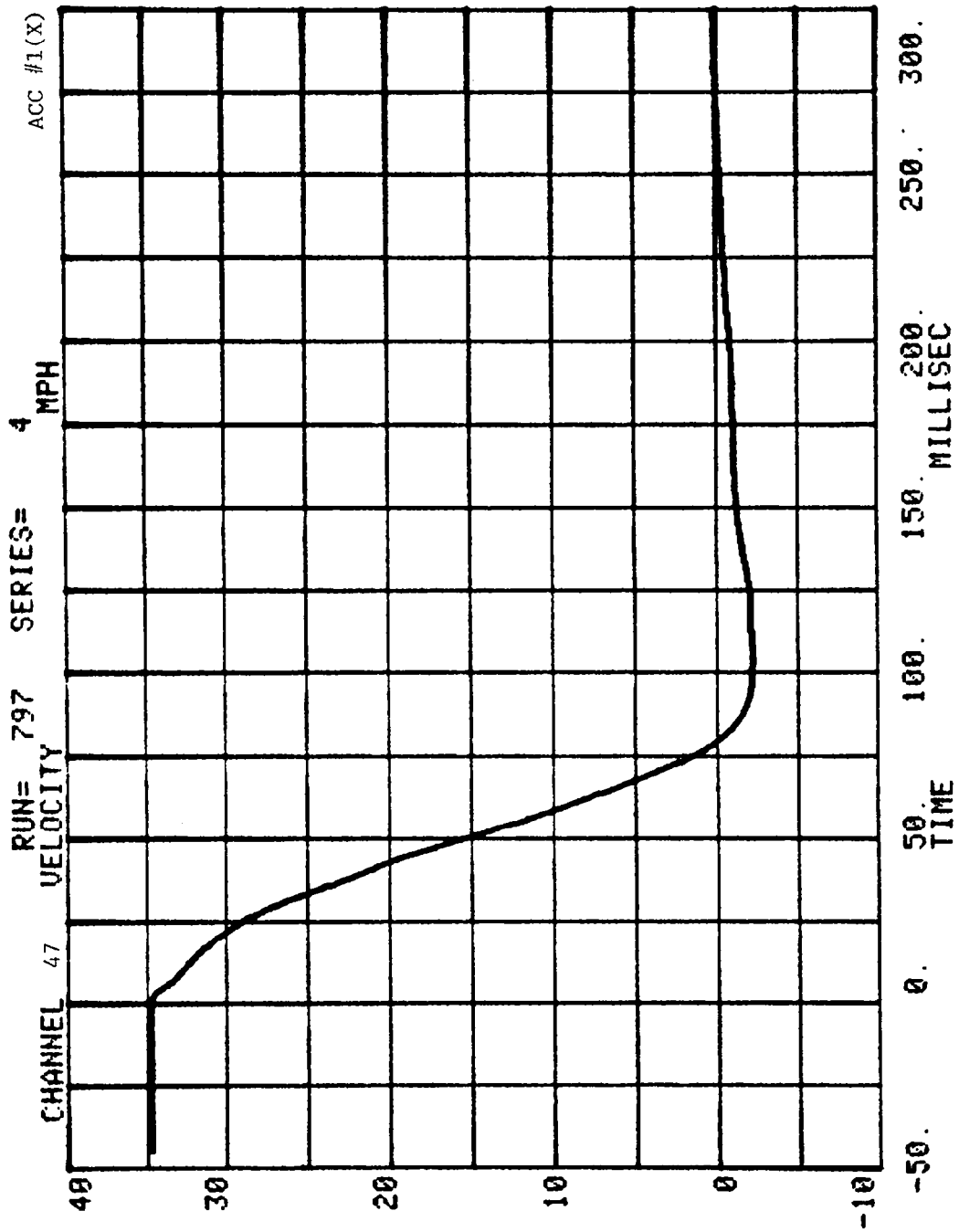
60

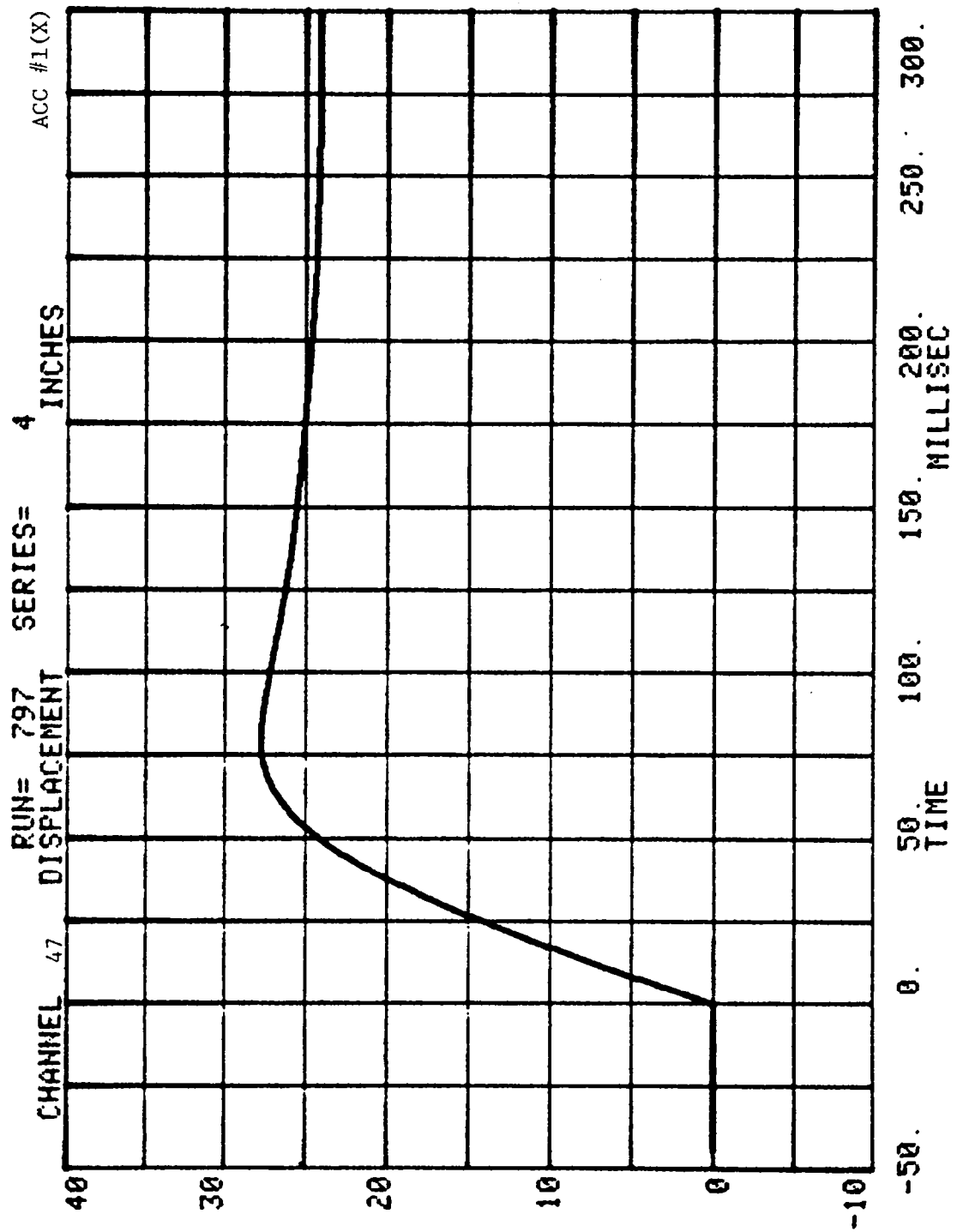
B-10

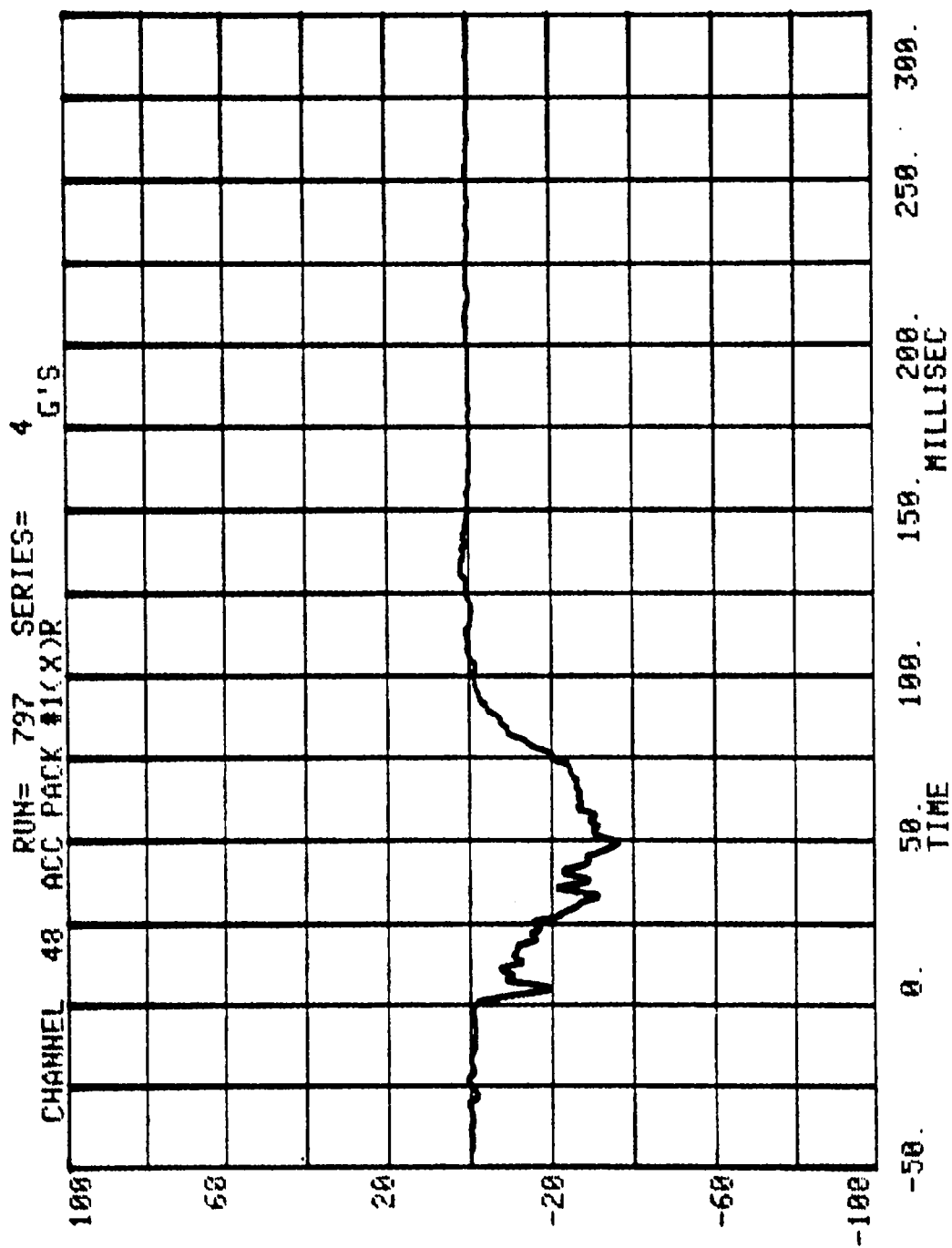
7581-5

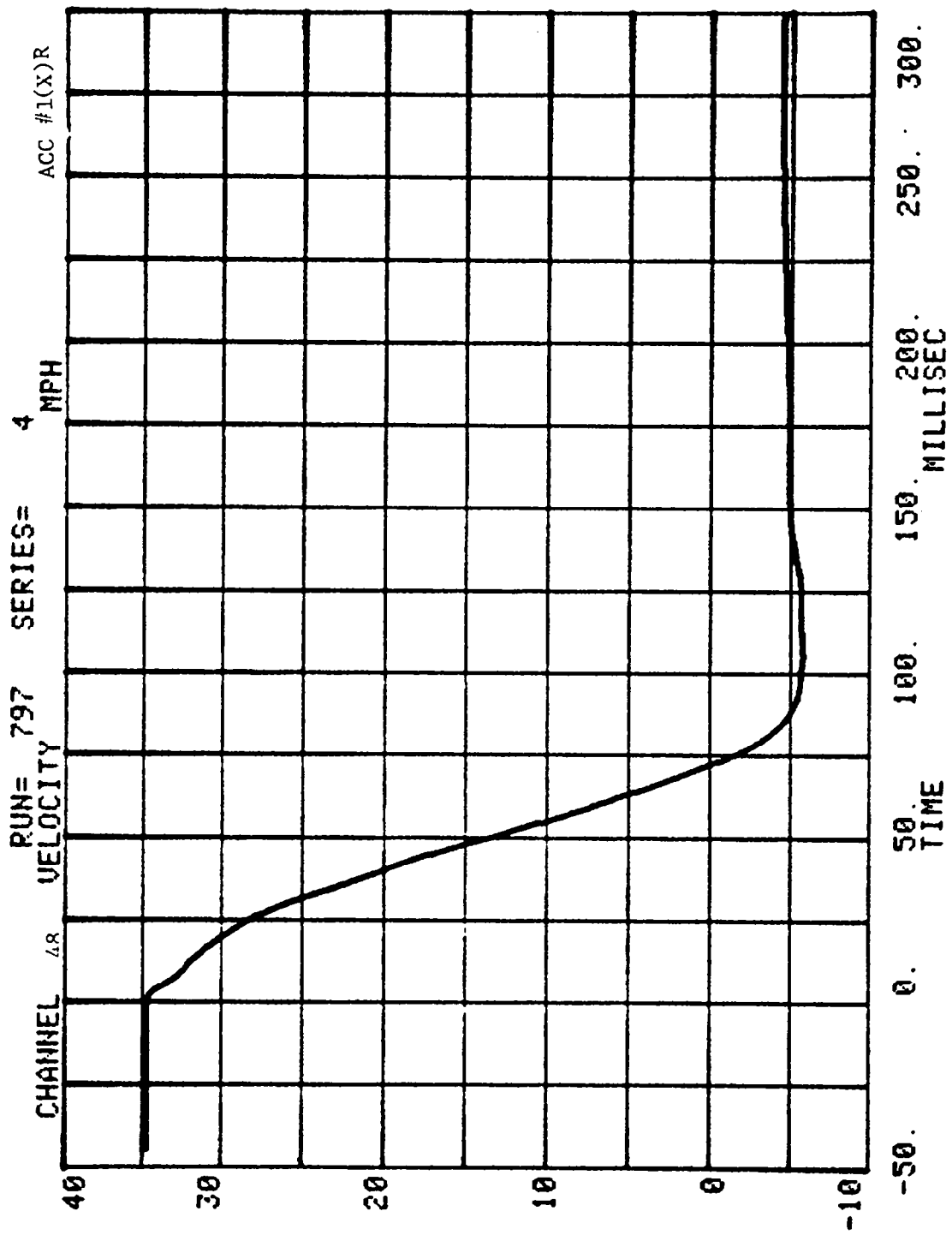
RUN= 797 SERIES= 4
CHANNEL 47 ACC PACK #1(X) G'S

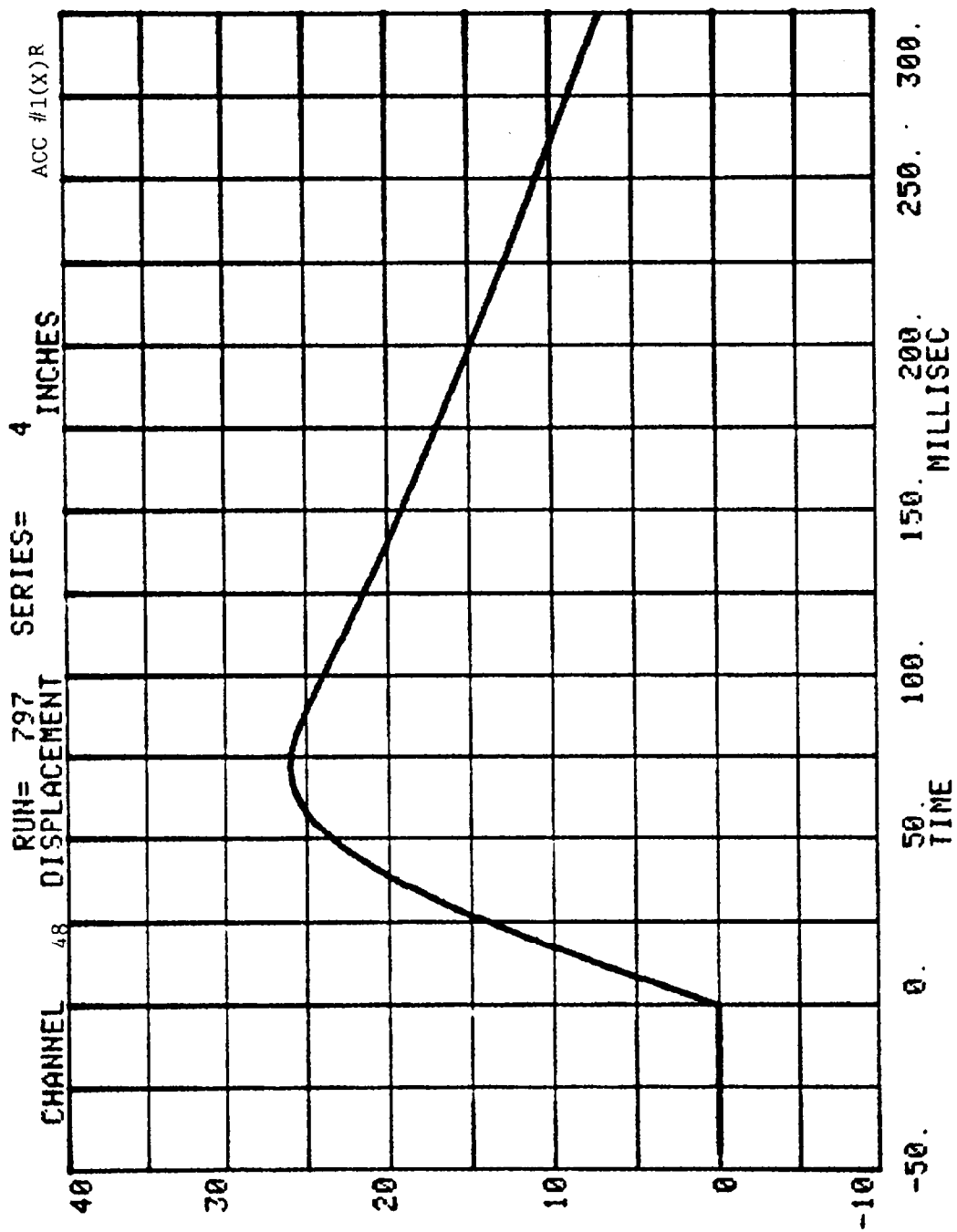




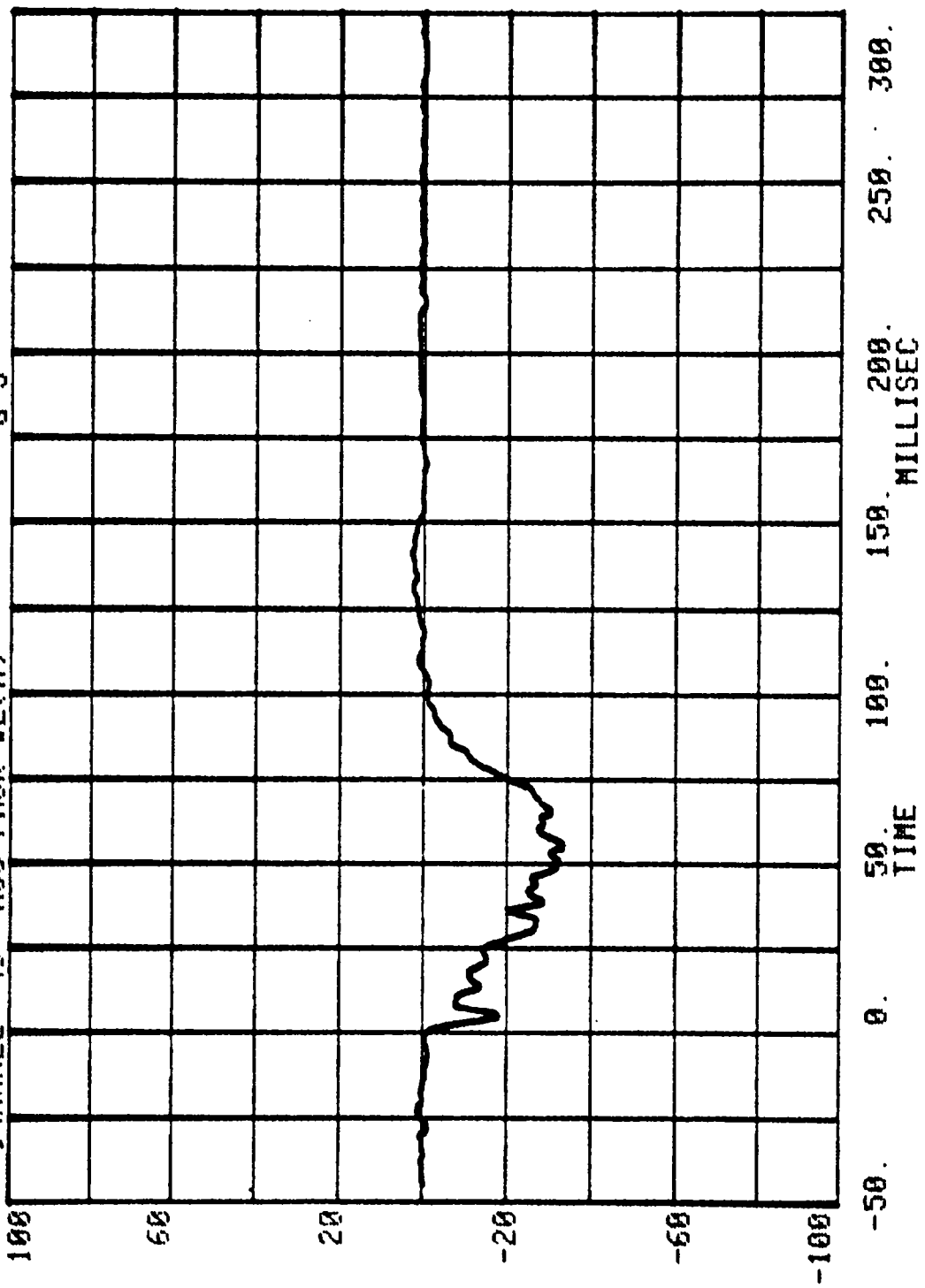


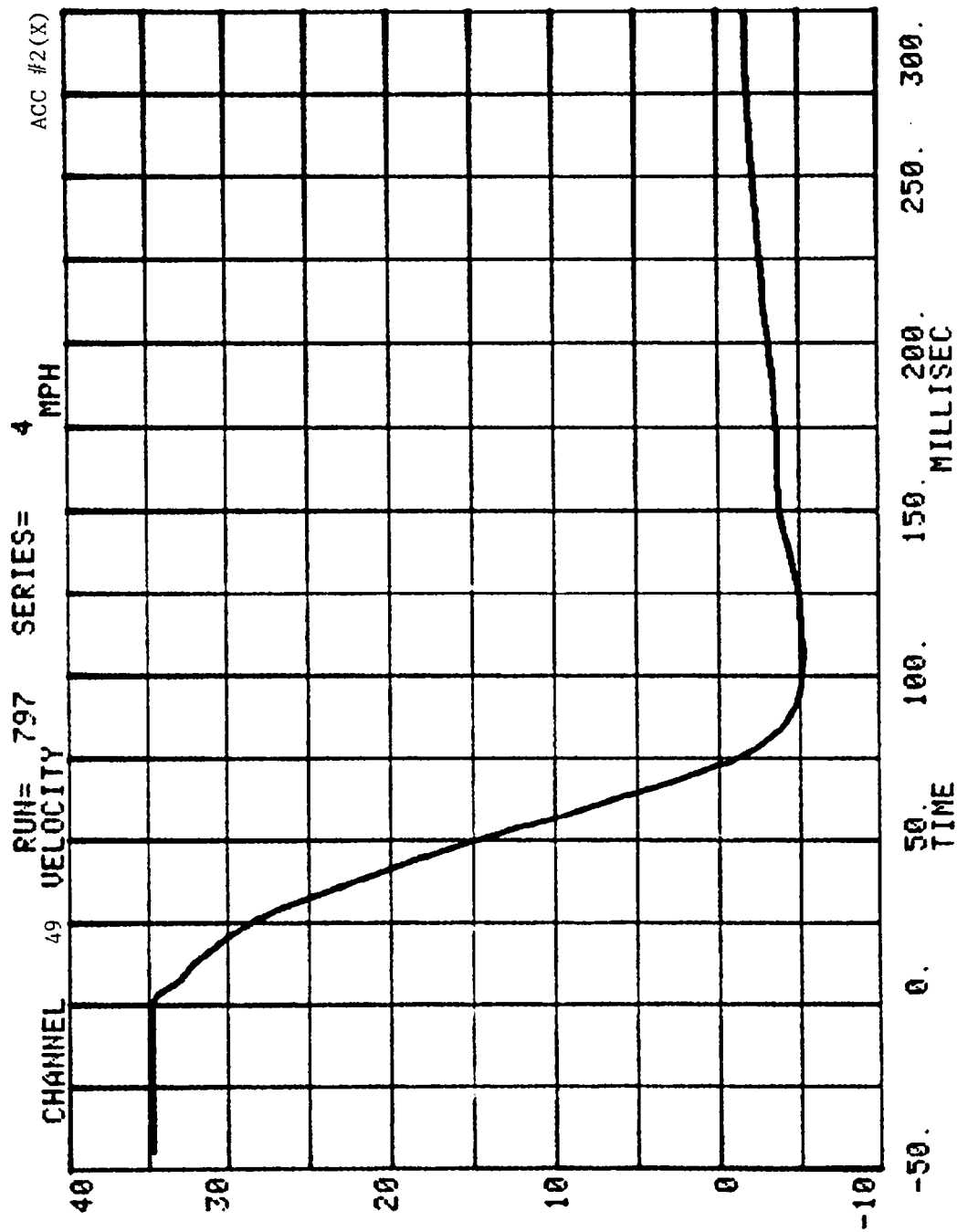


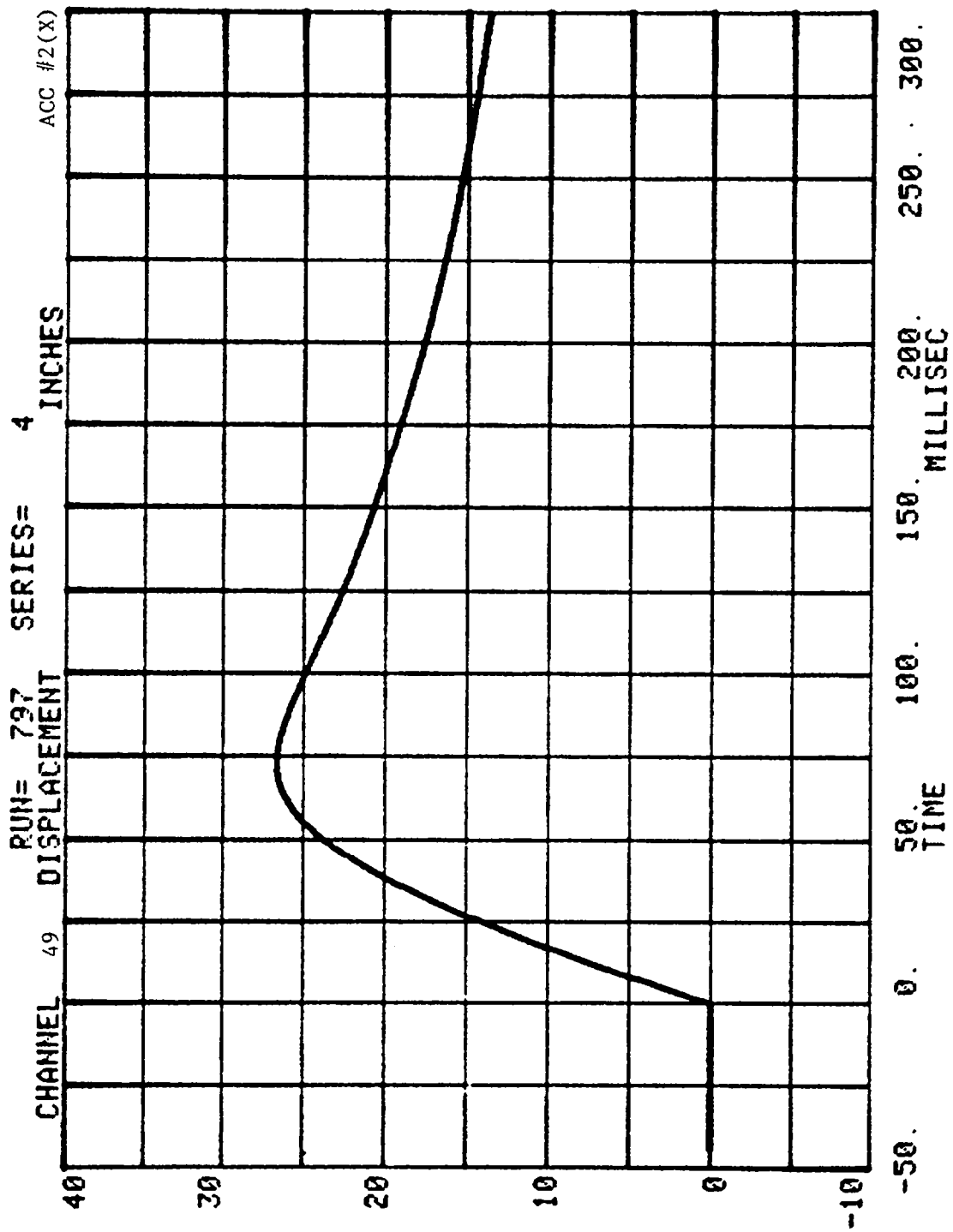




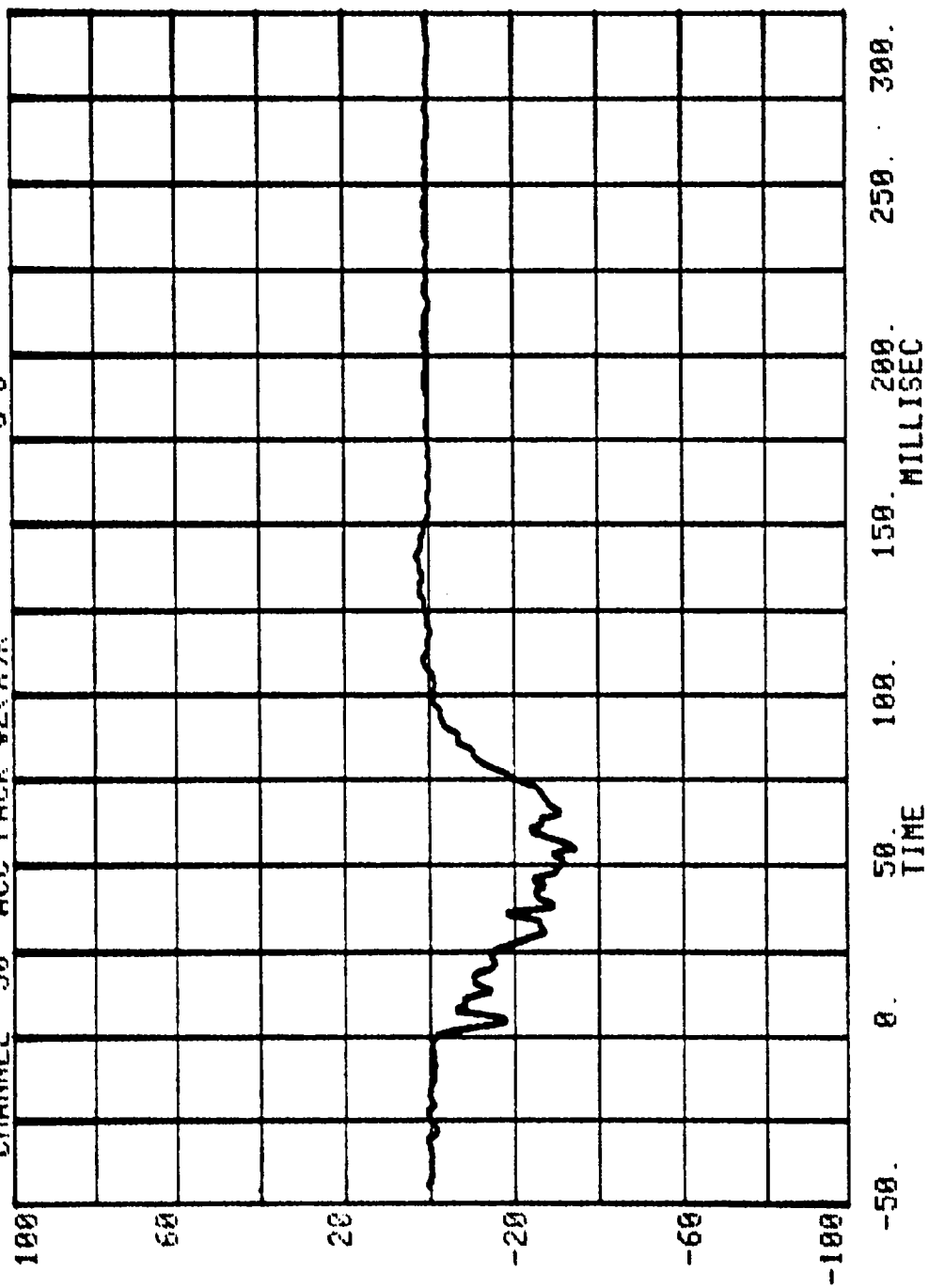
CHANNEL 49 ACC PACK #2(X) RUN= 797 SERIES= 4 G'S

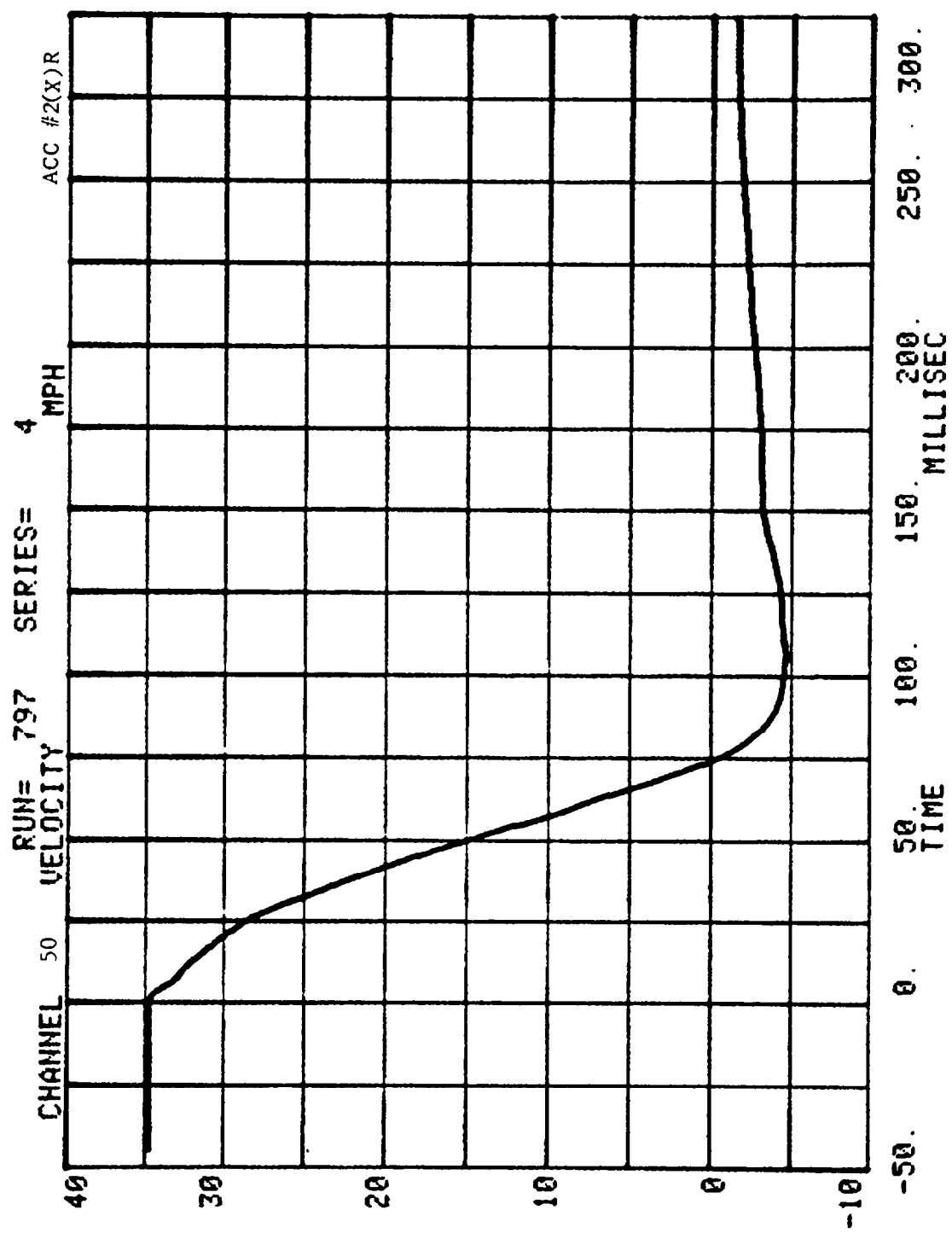


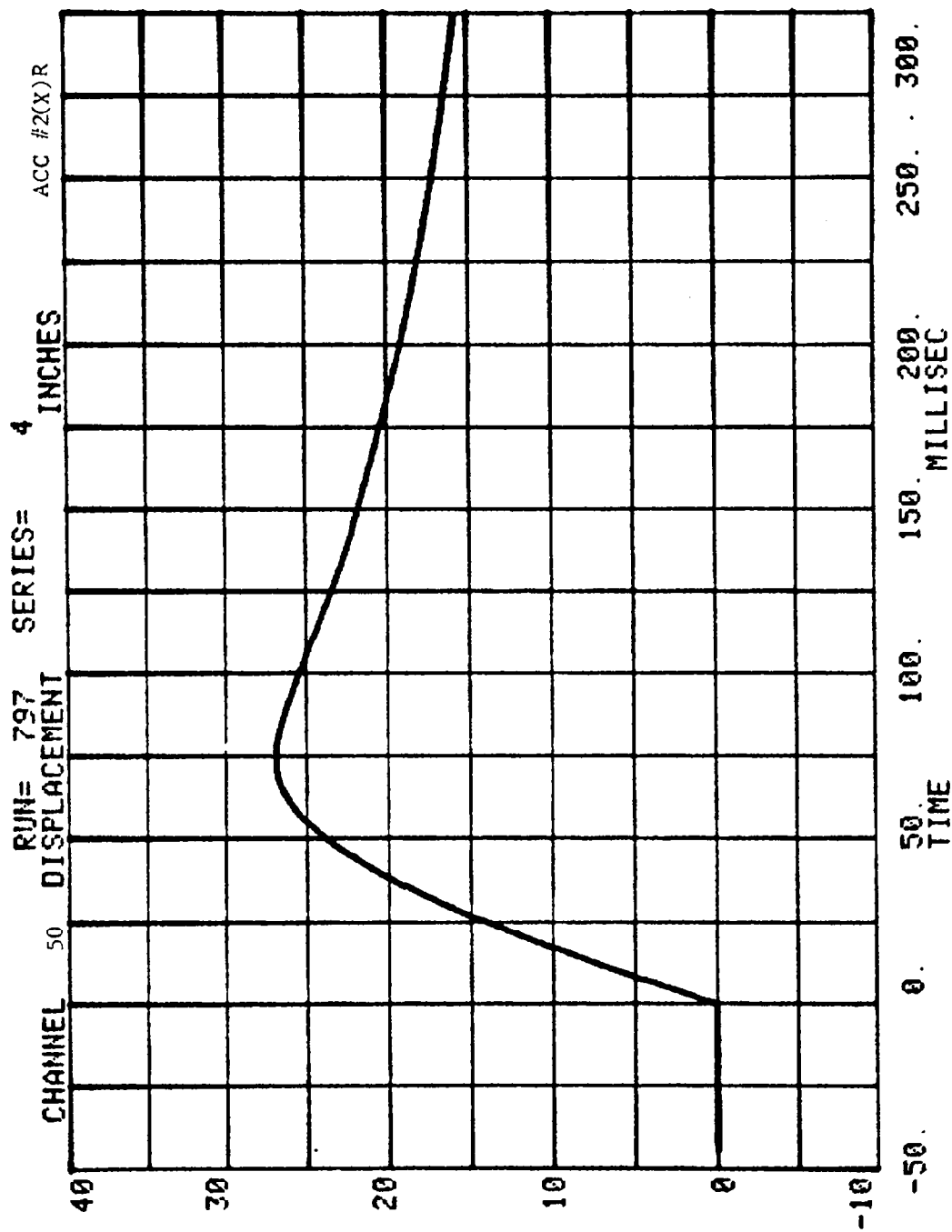




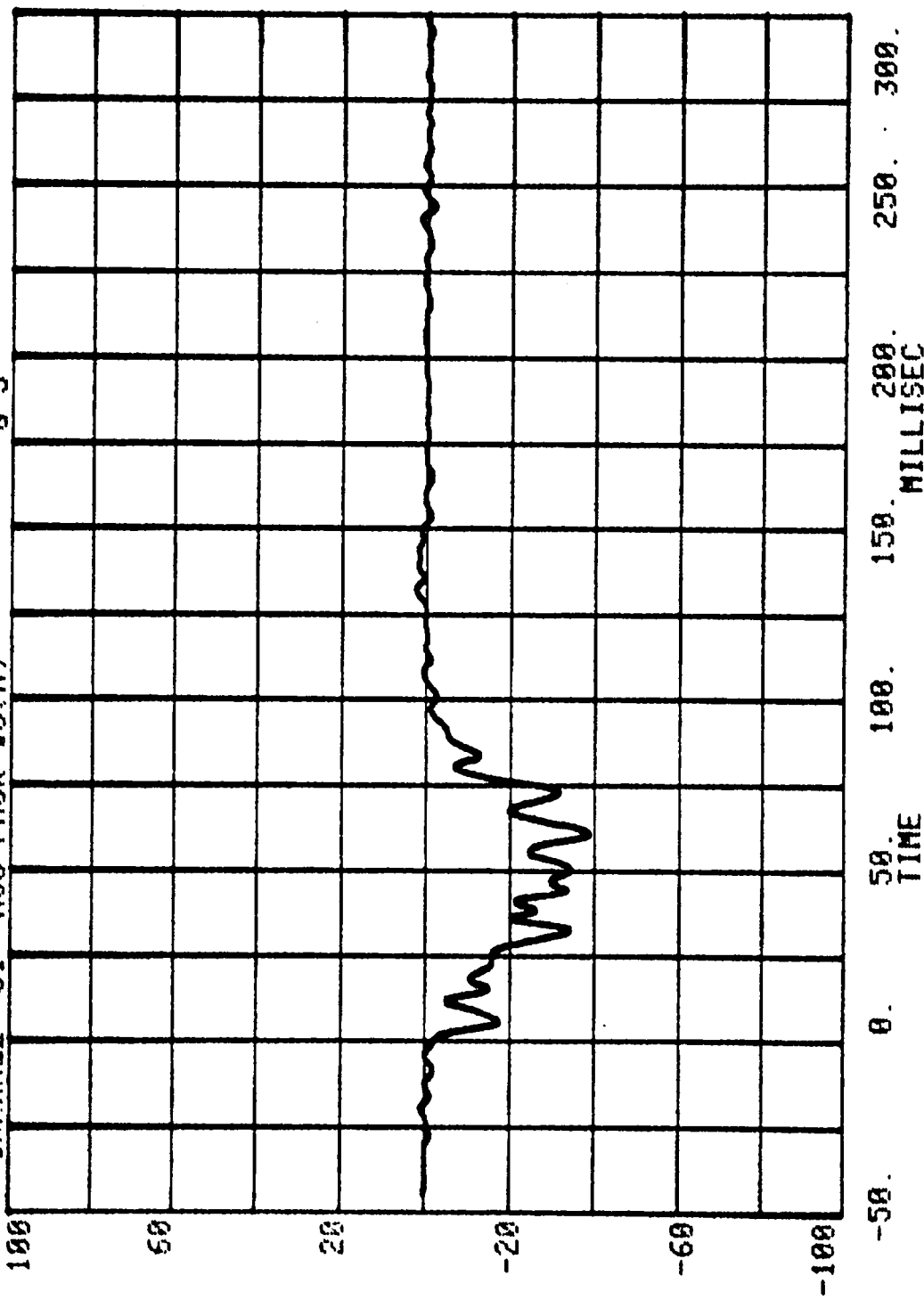
CHANNEL 50 ACC PACK #2(X)R RUN= 797 SERIES= 4 G'S

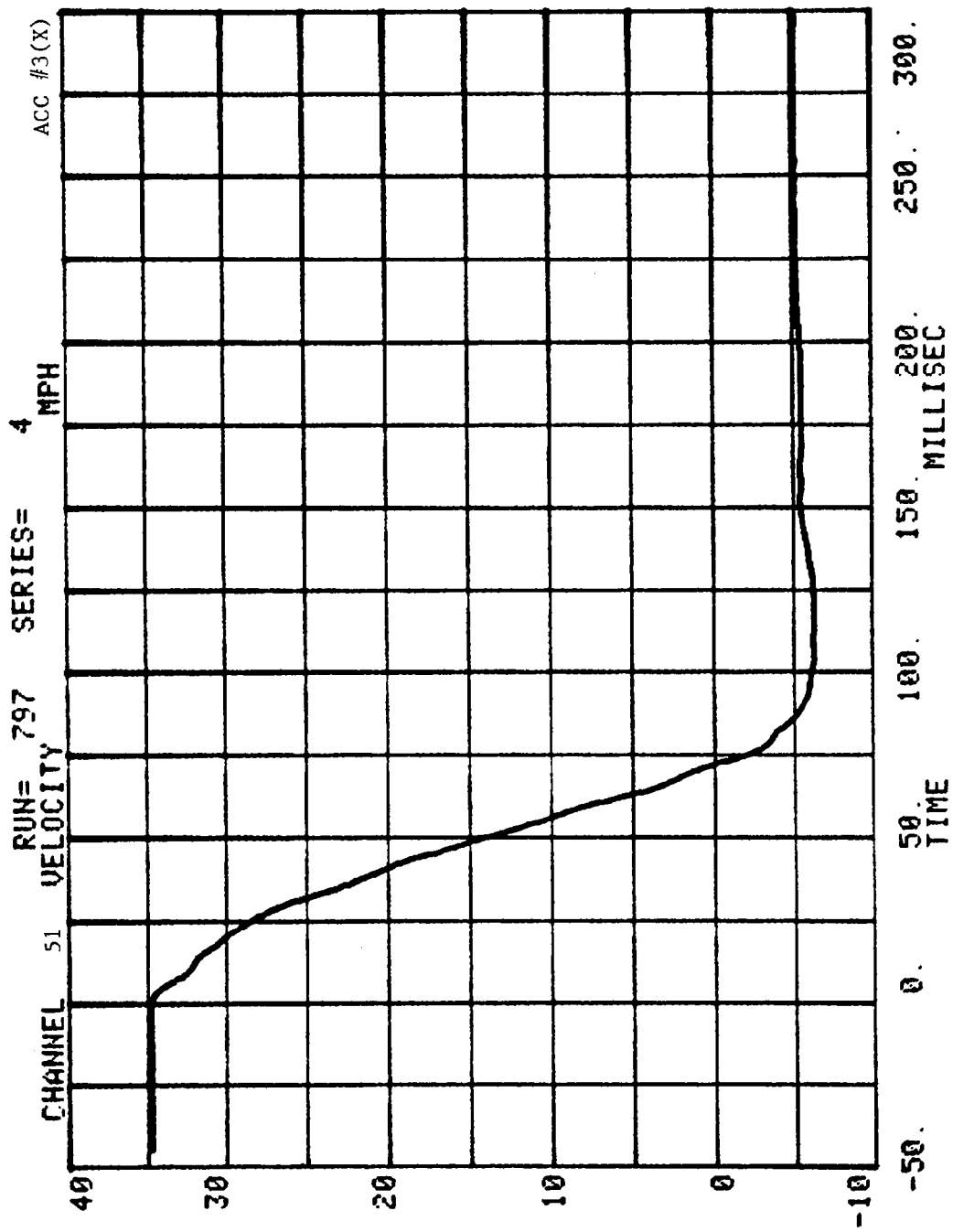


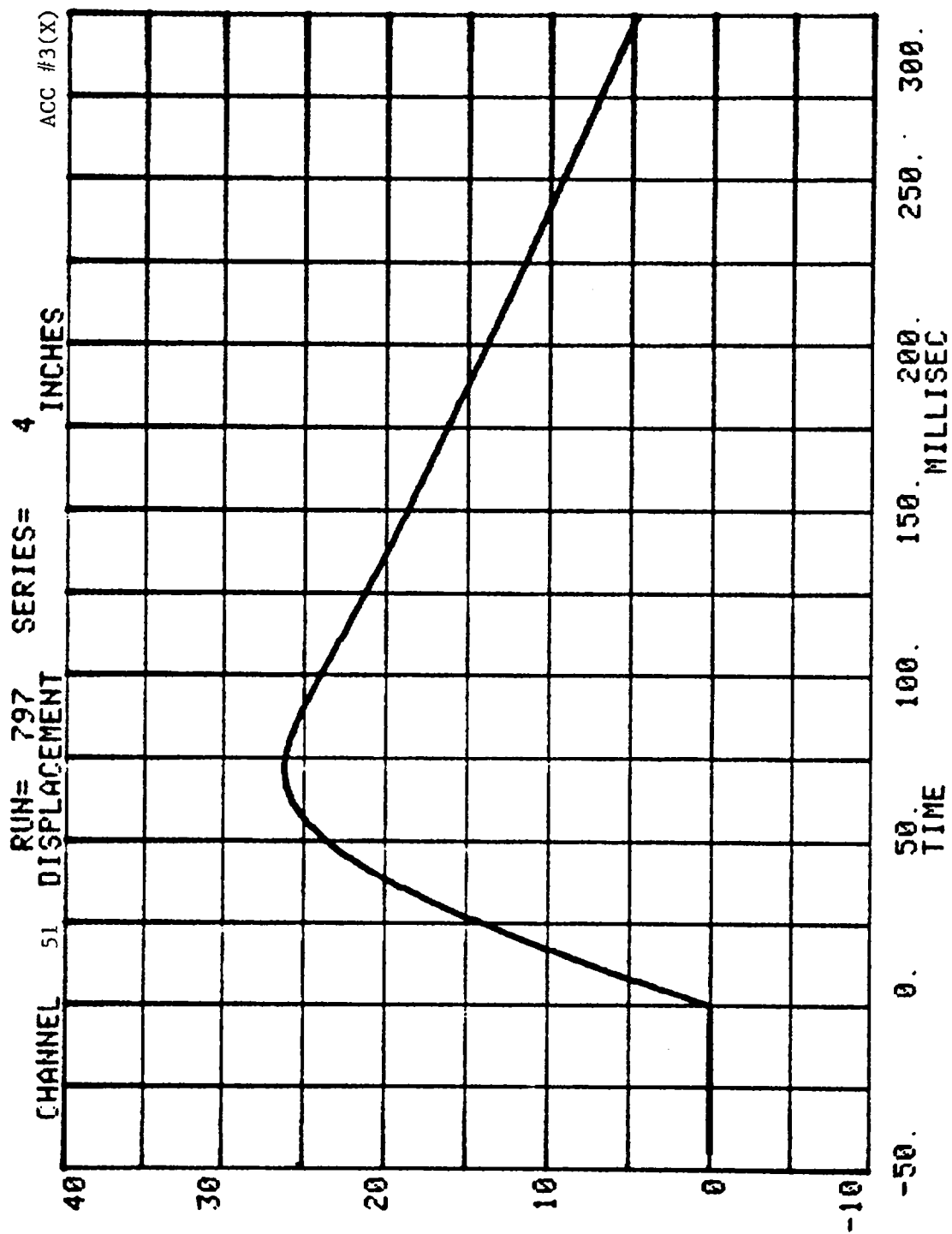


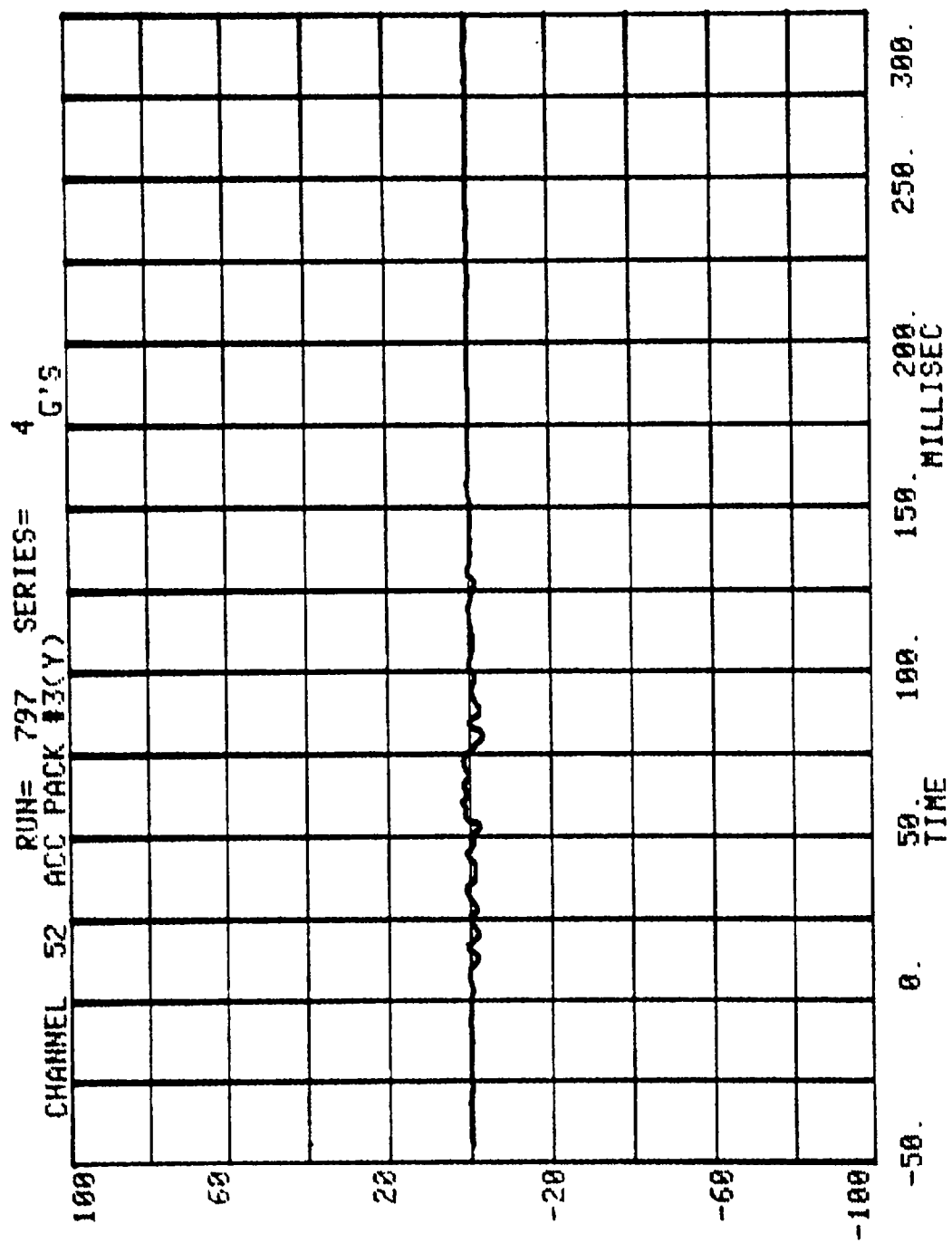


CHANNEL 51 ACC PACK #3(X) RUN= 797 SERIES= 4 G'S

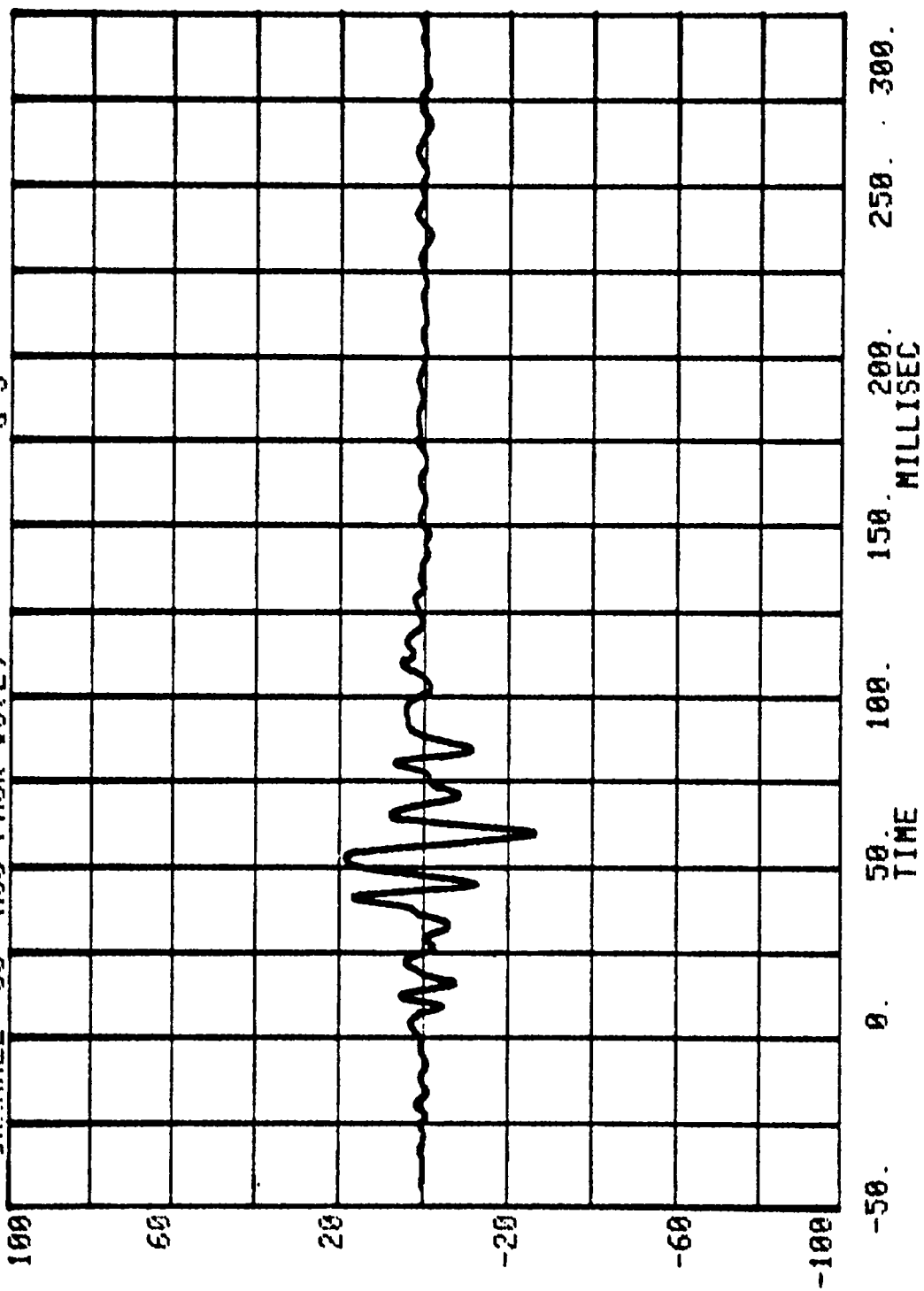


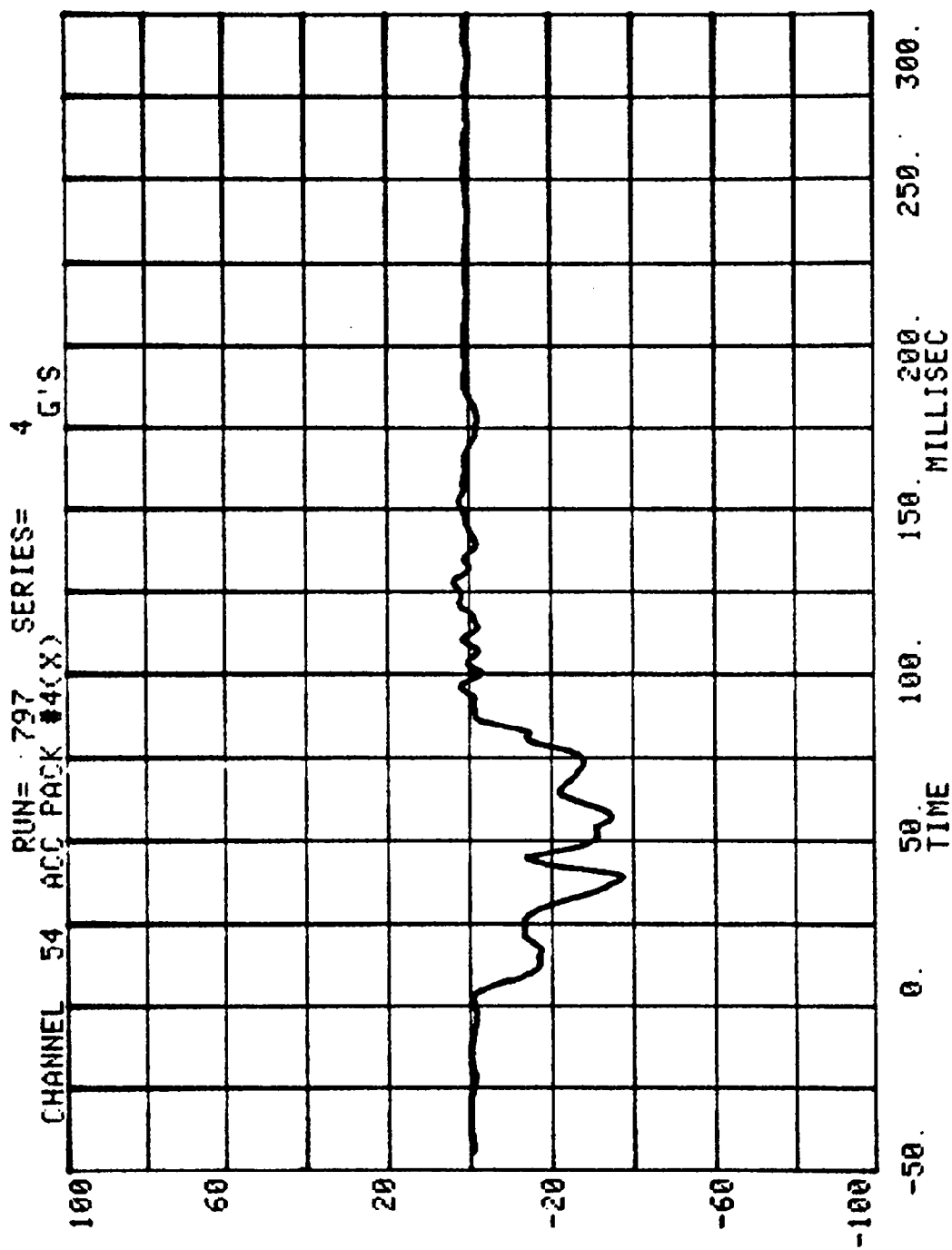


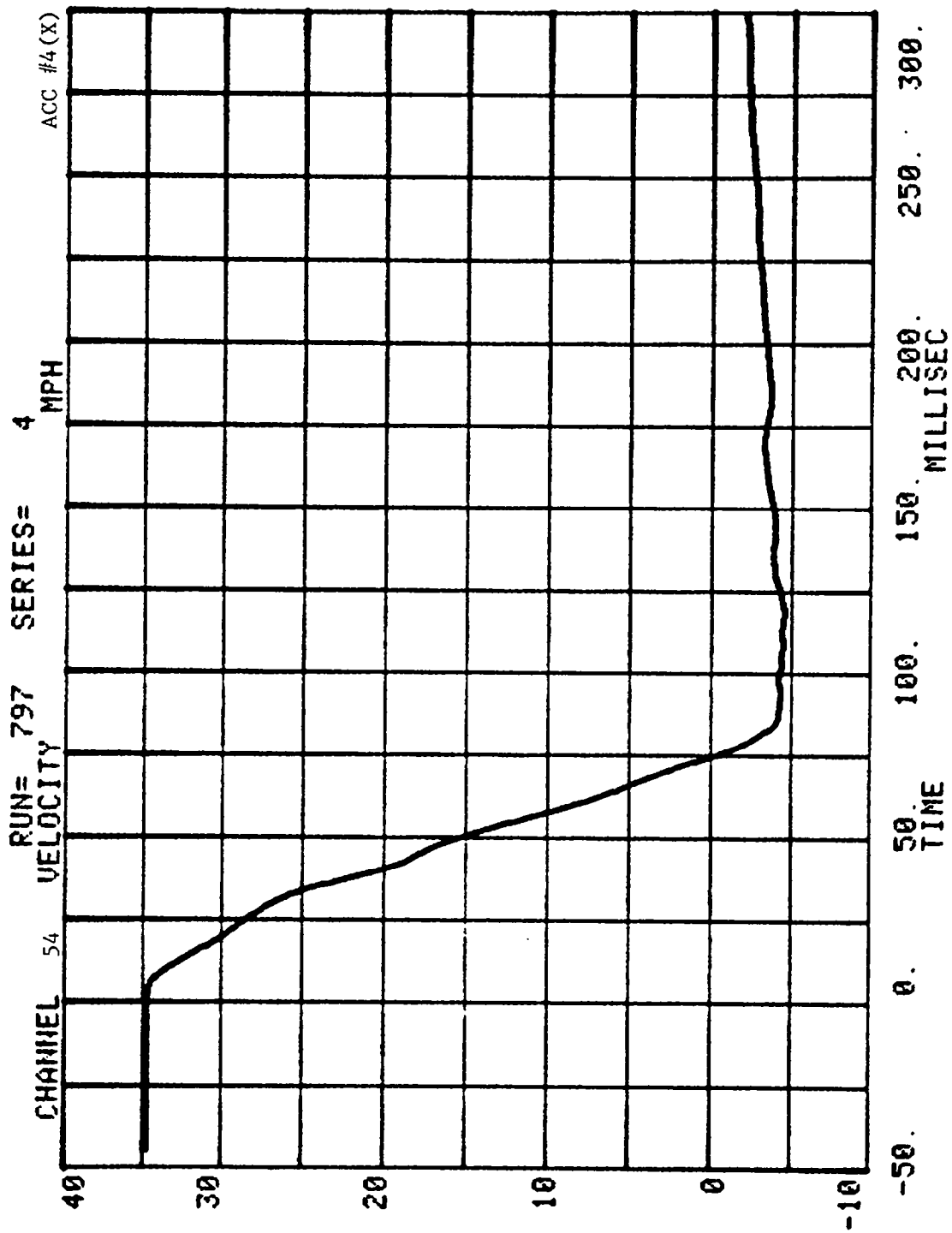


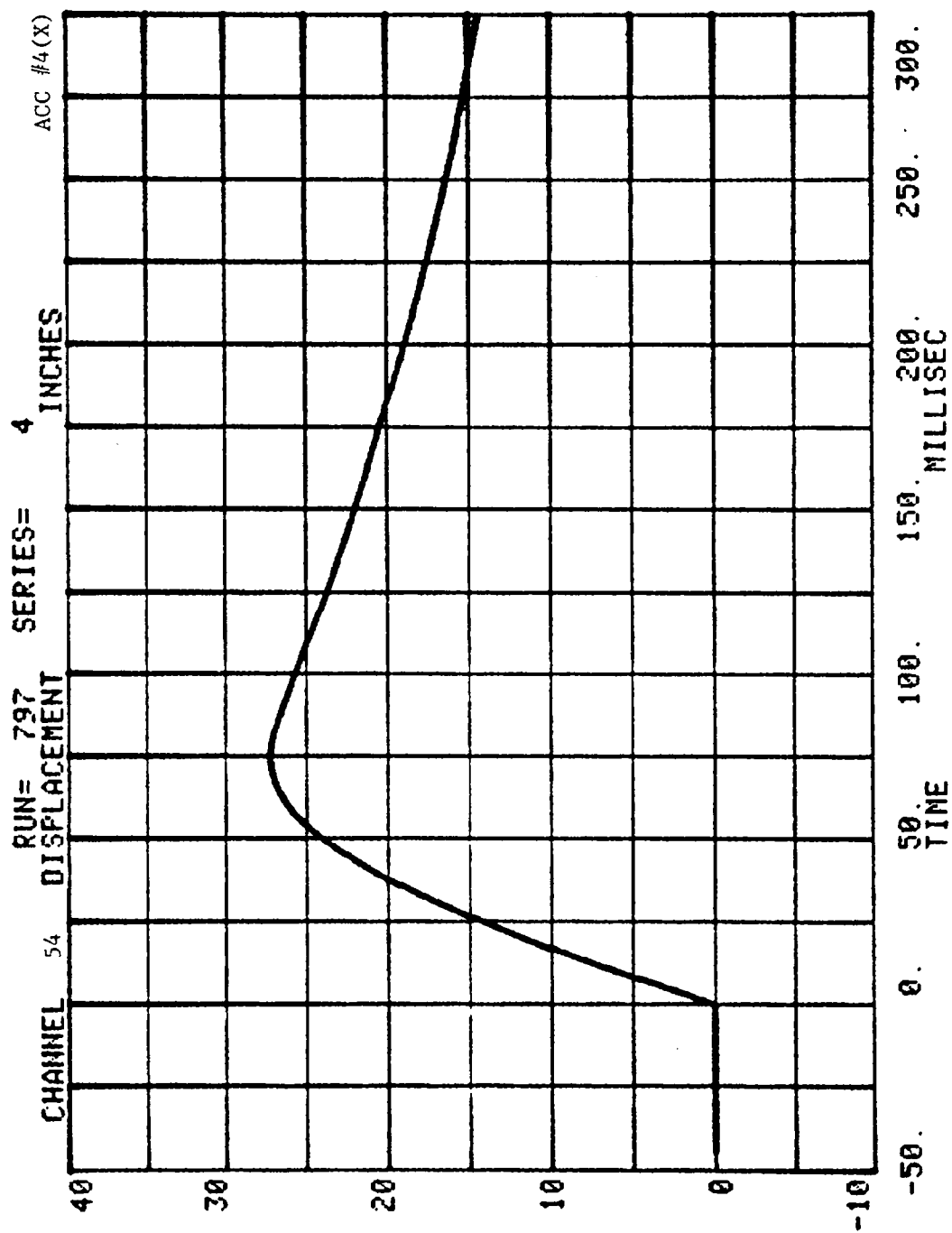


CHANNEL 53 ACC PACK #3(Z) RUN= 797 SERIES= 4 G'S

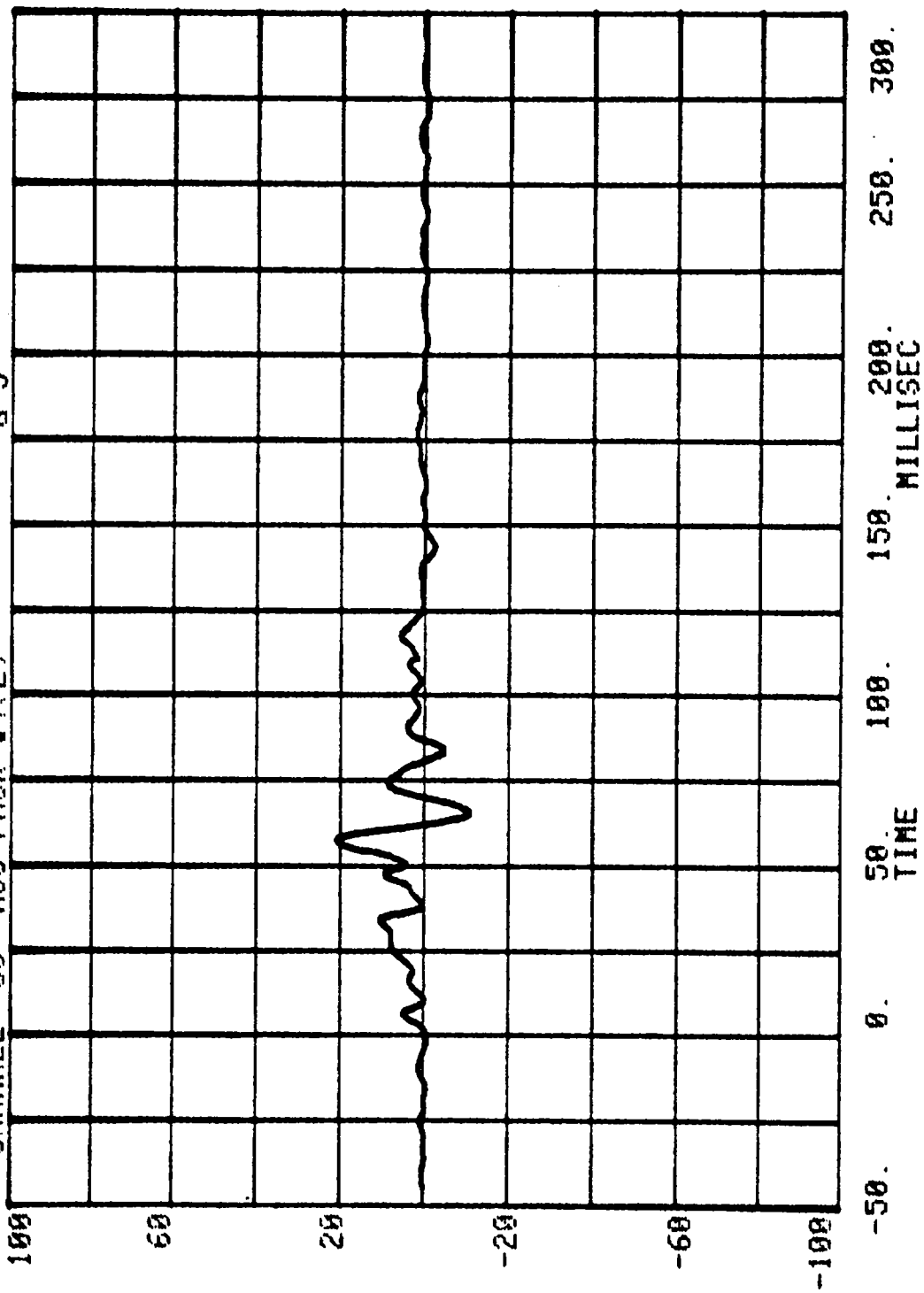


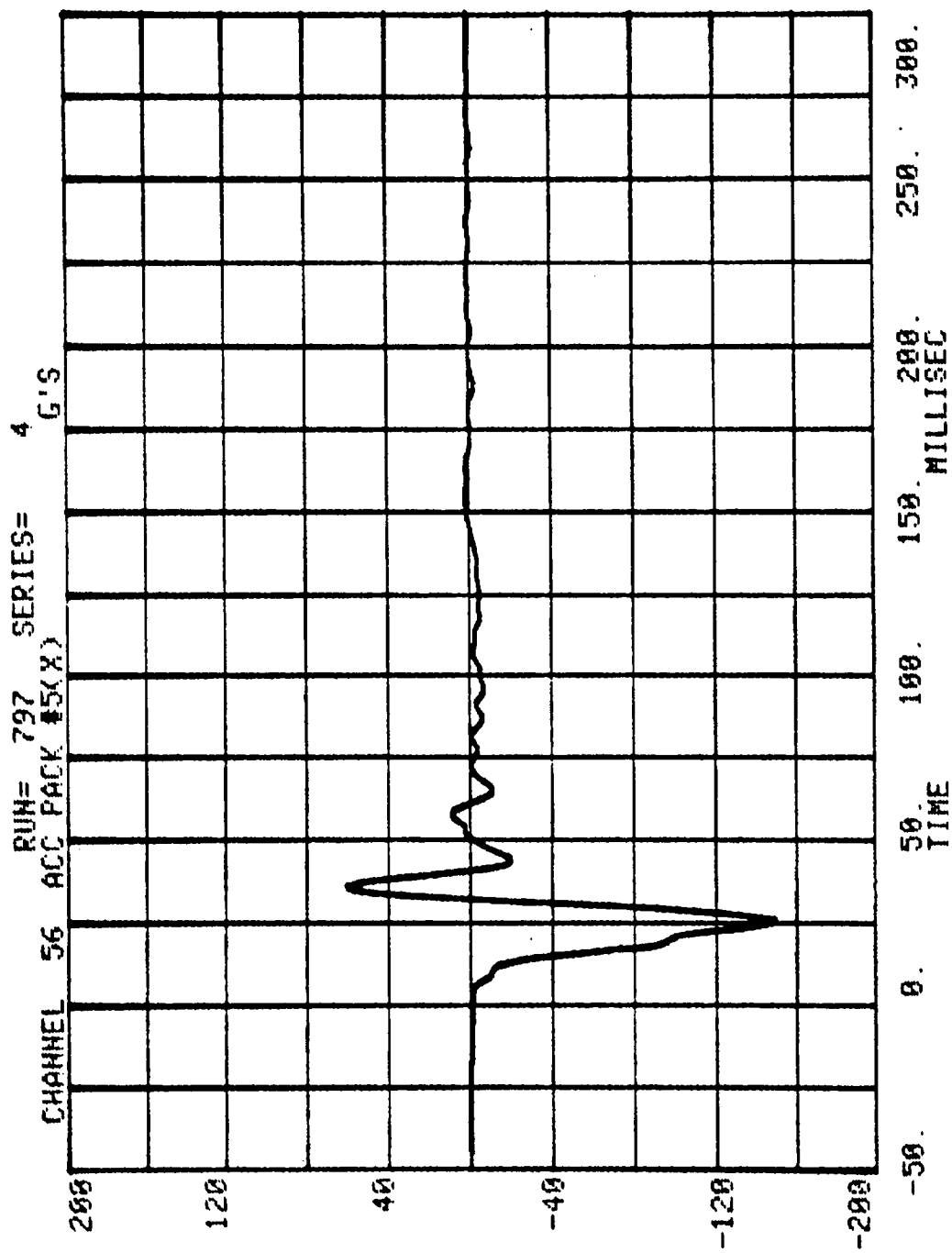


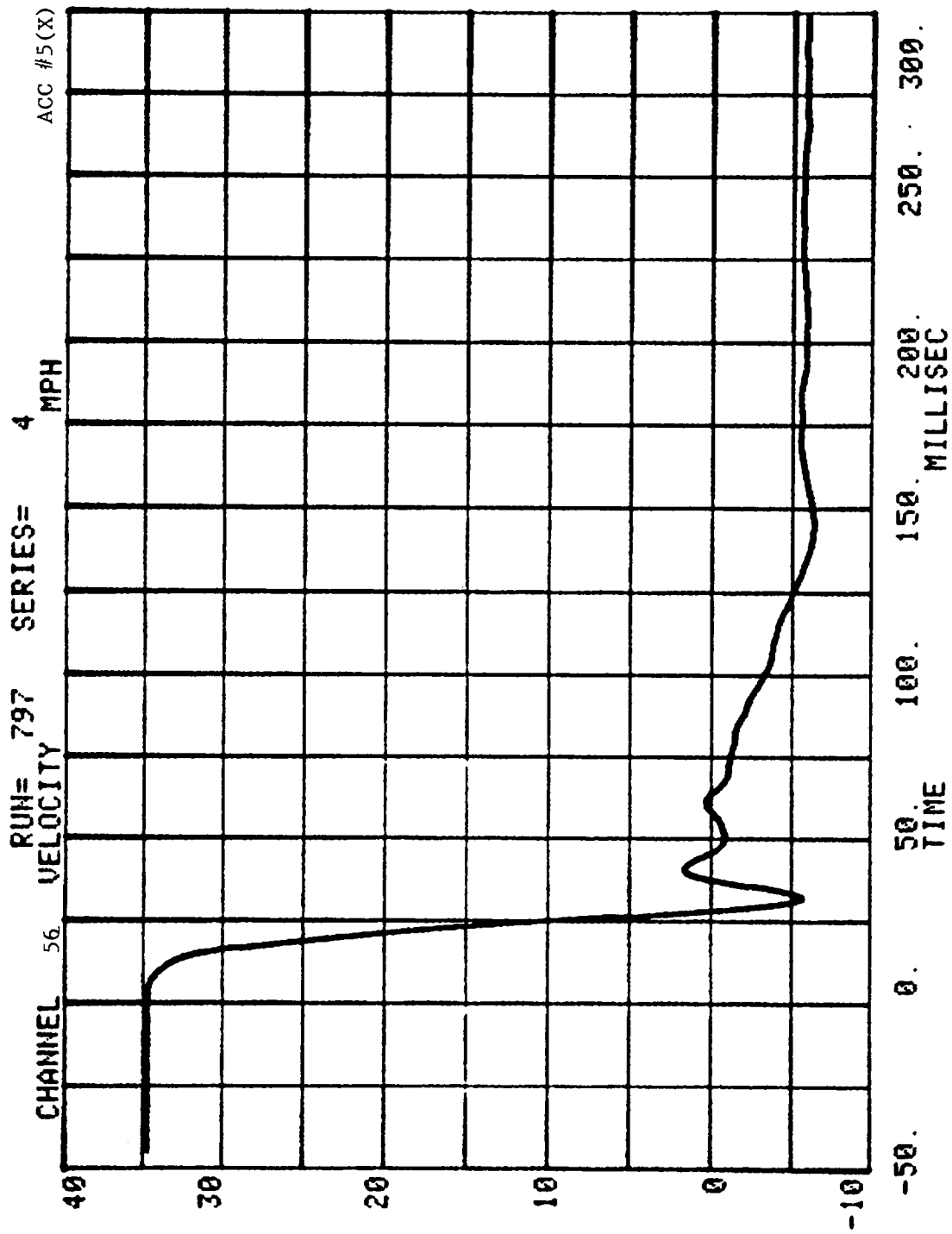


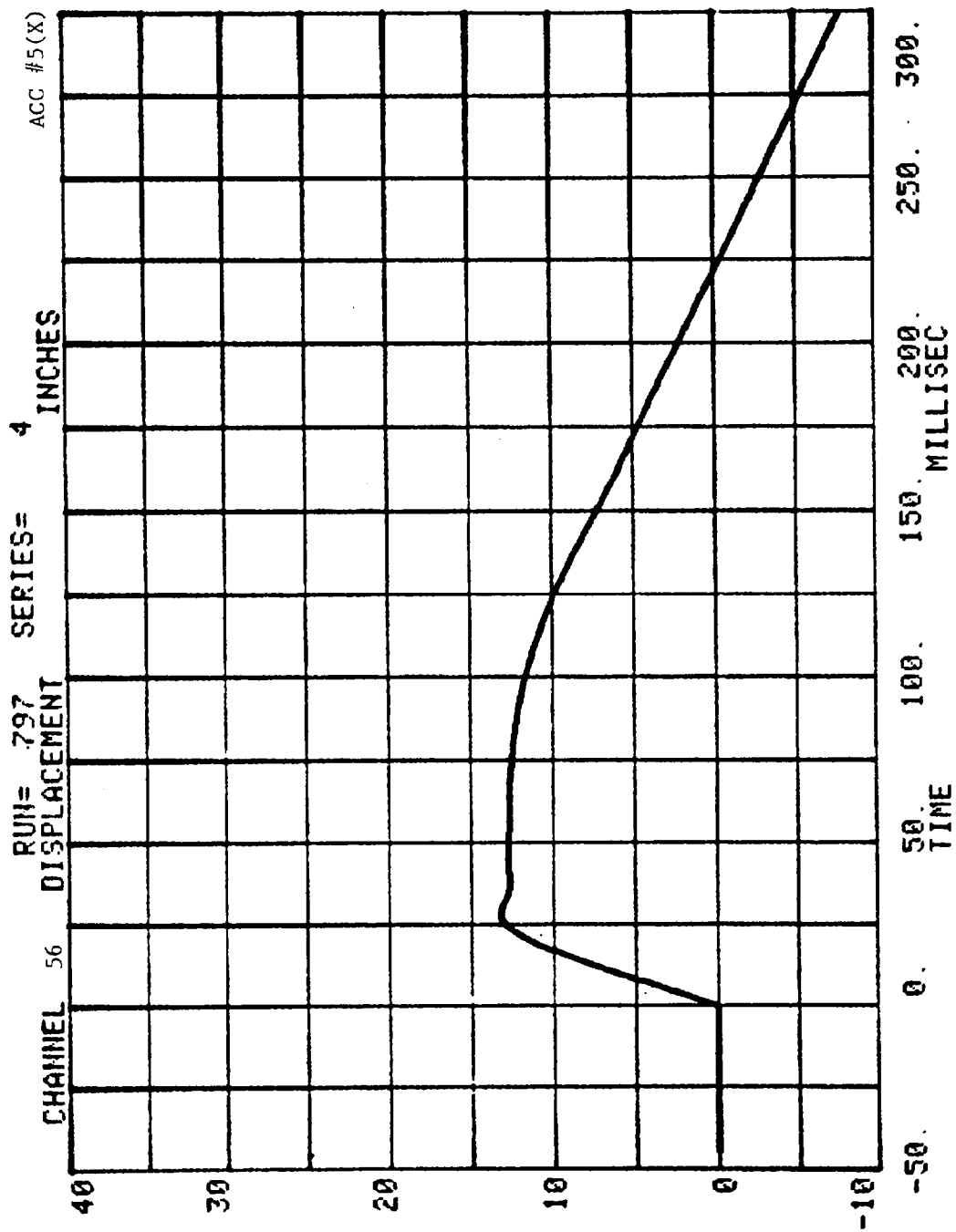


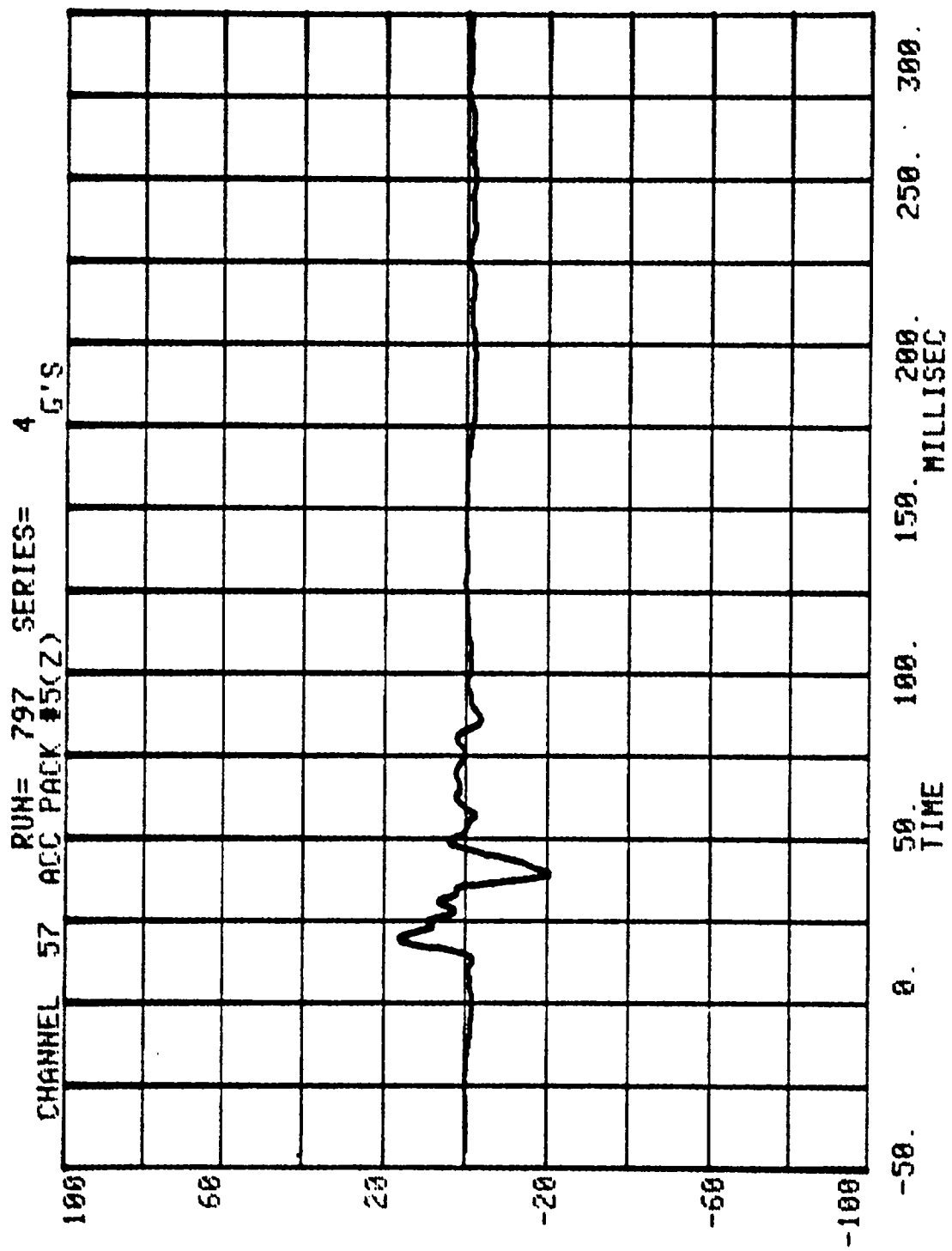
RUN= 797 SERIES= 4
CHANNEL 55 ACC PACK #4(Z) G'S

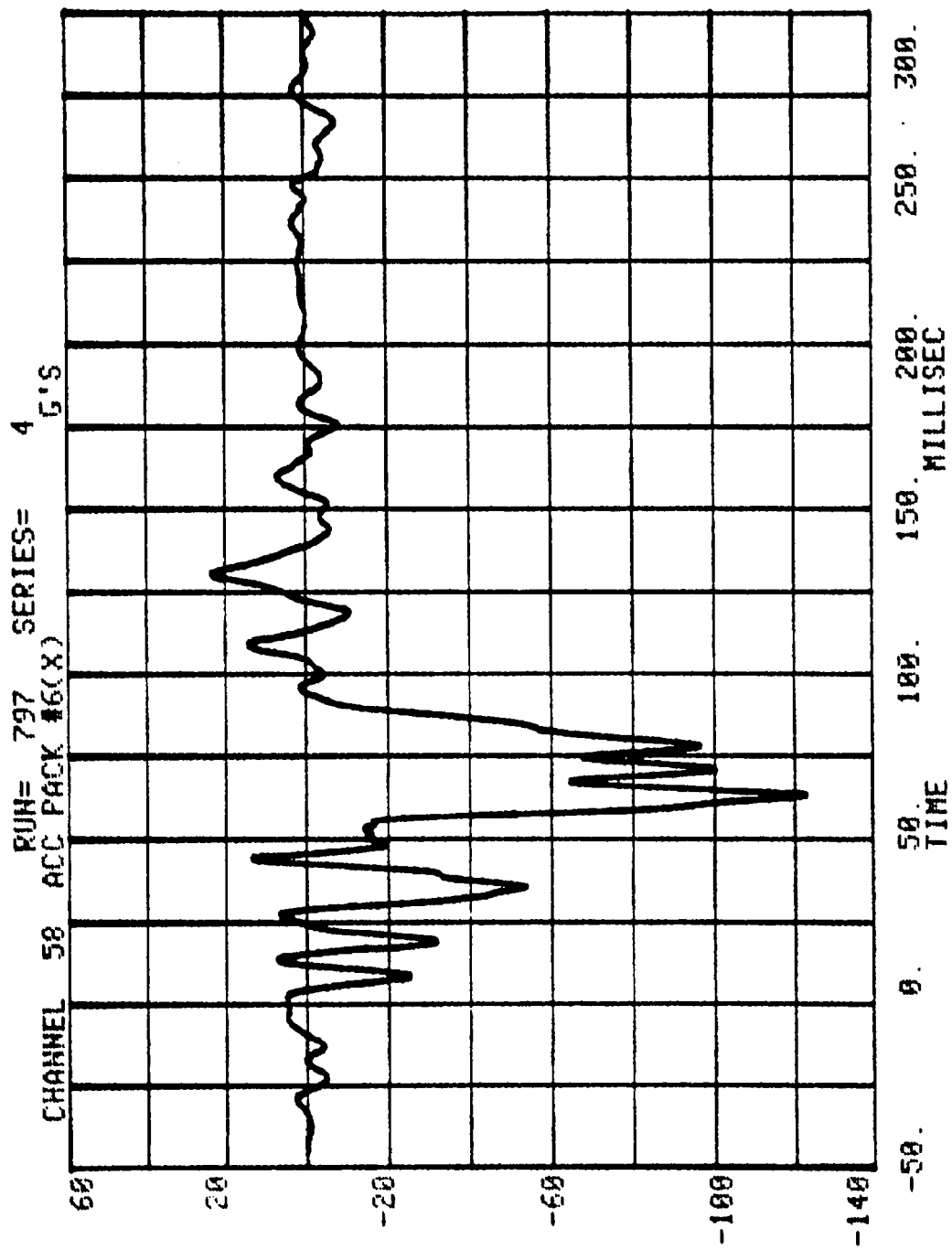


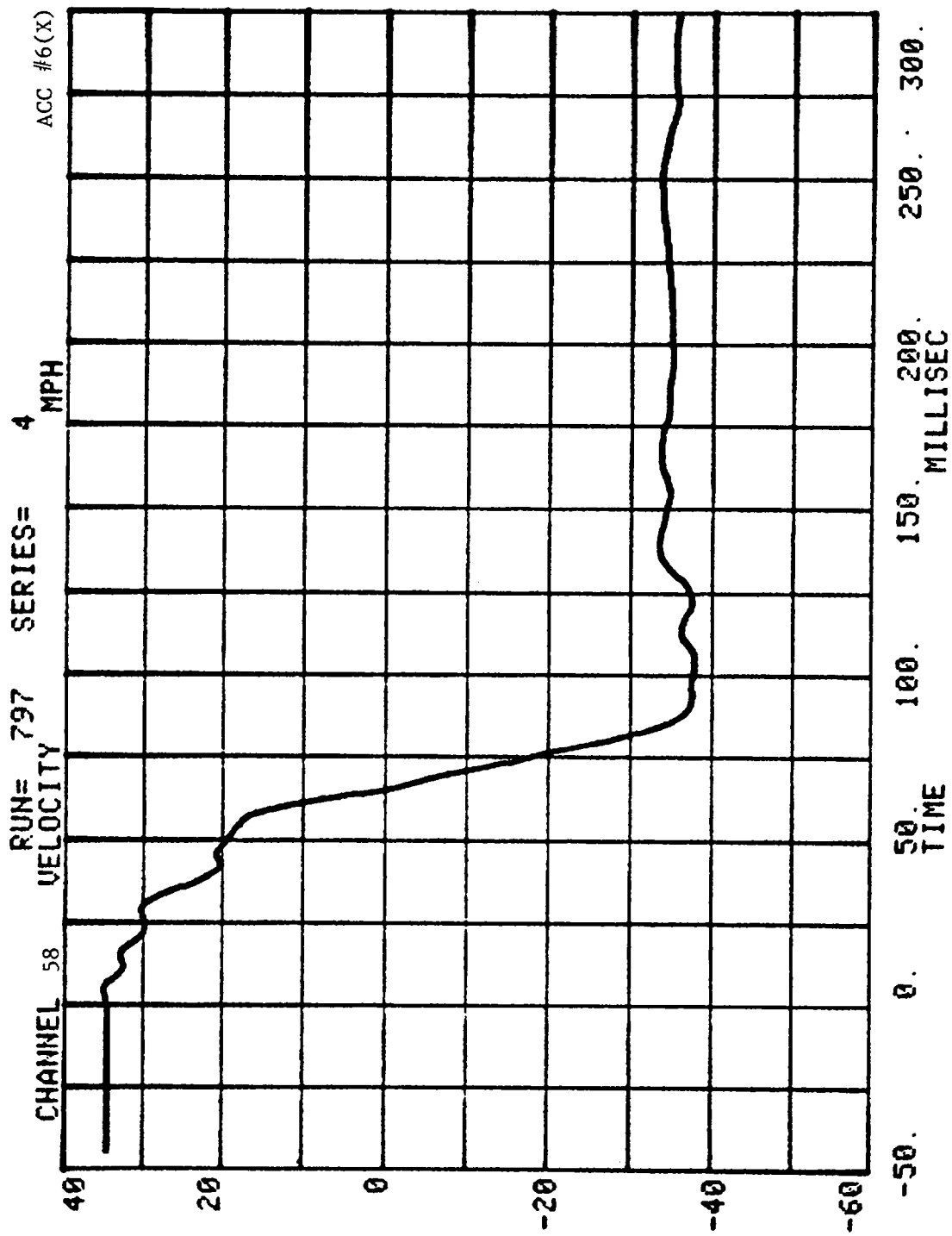


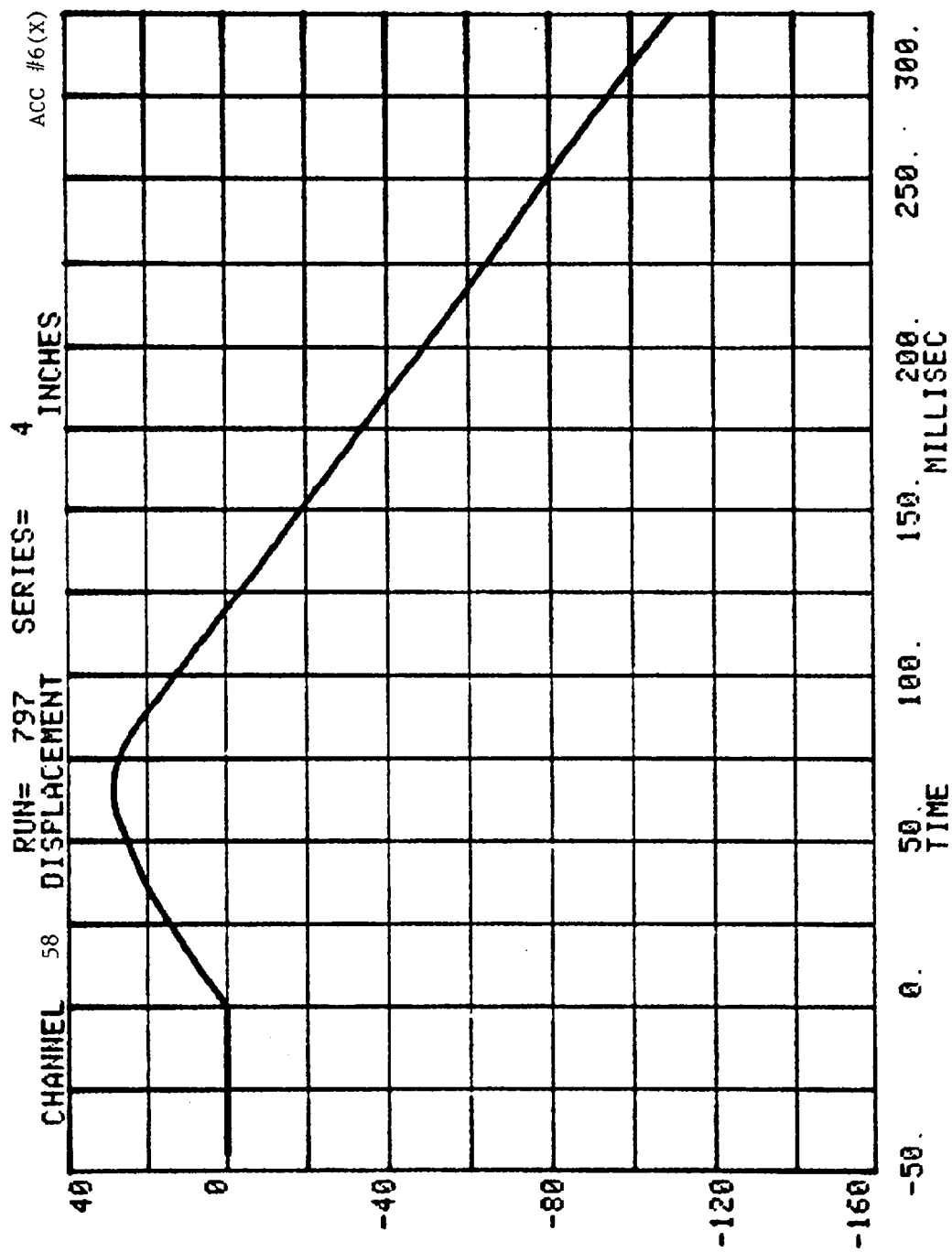


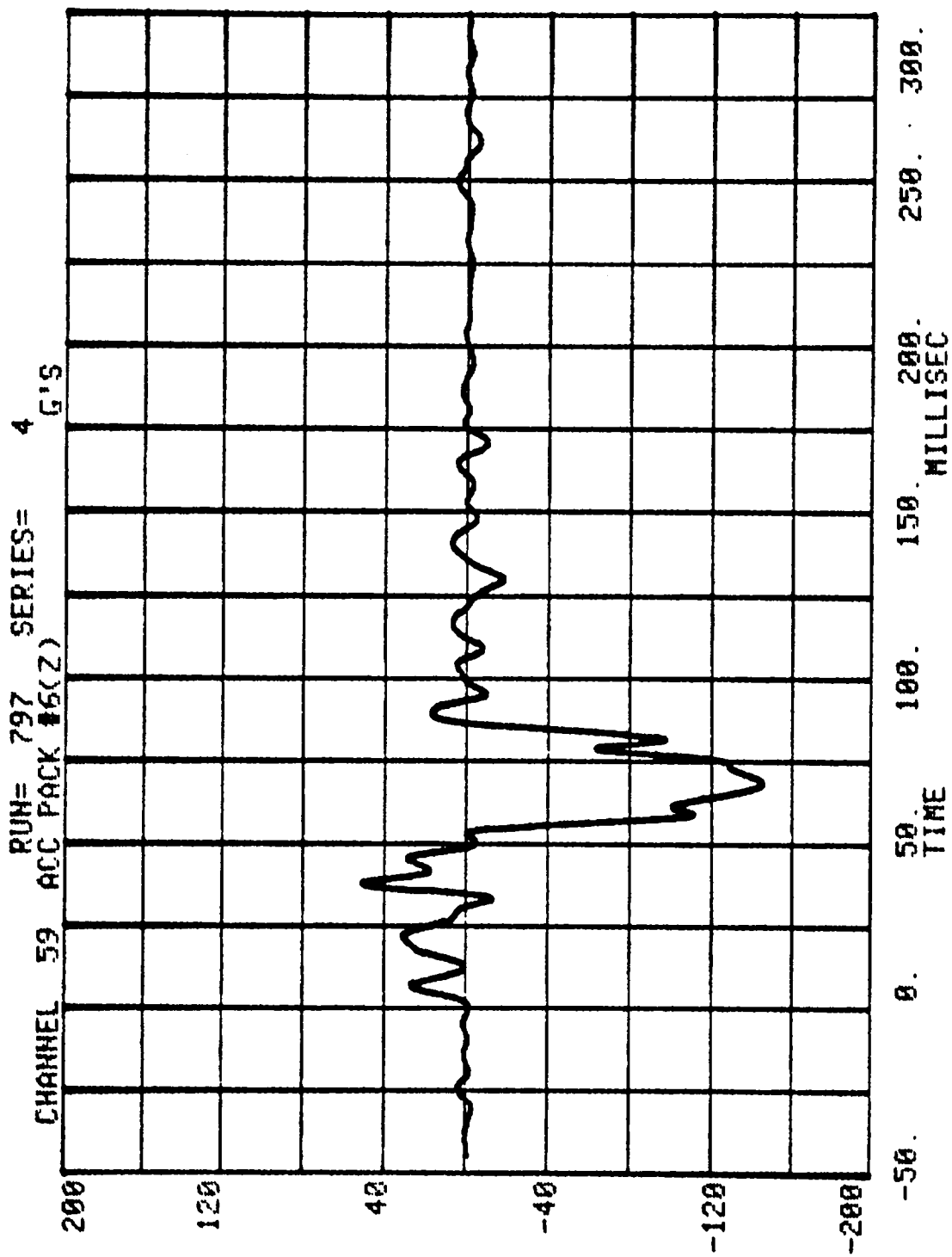


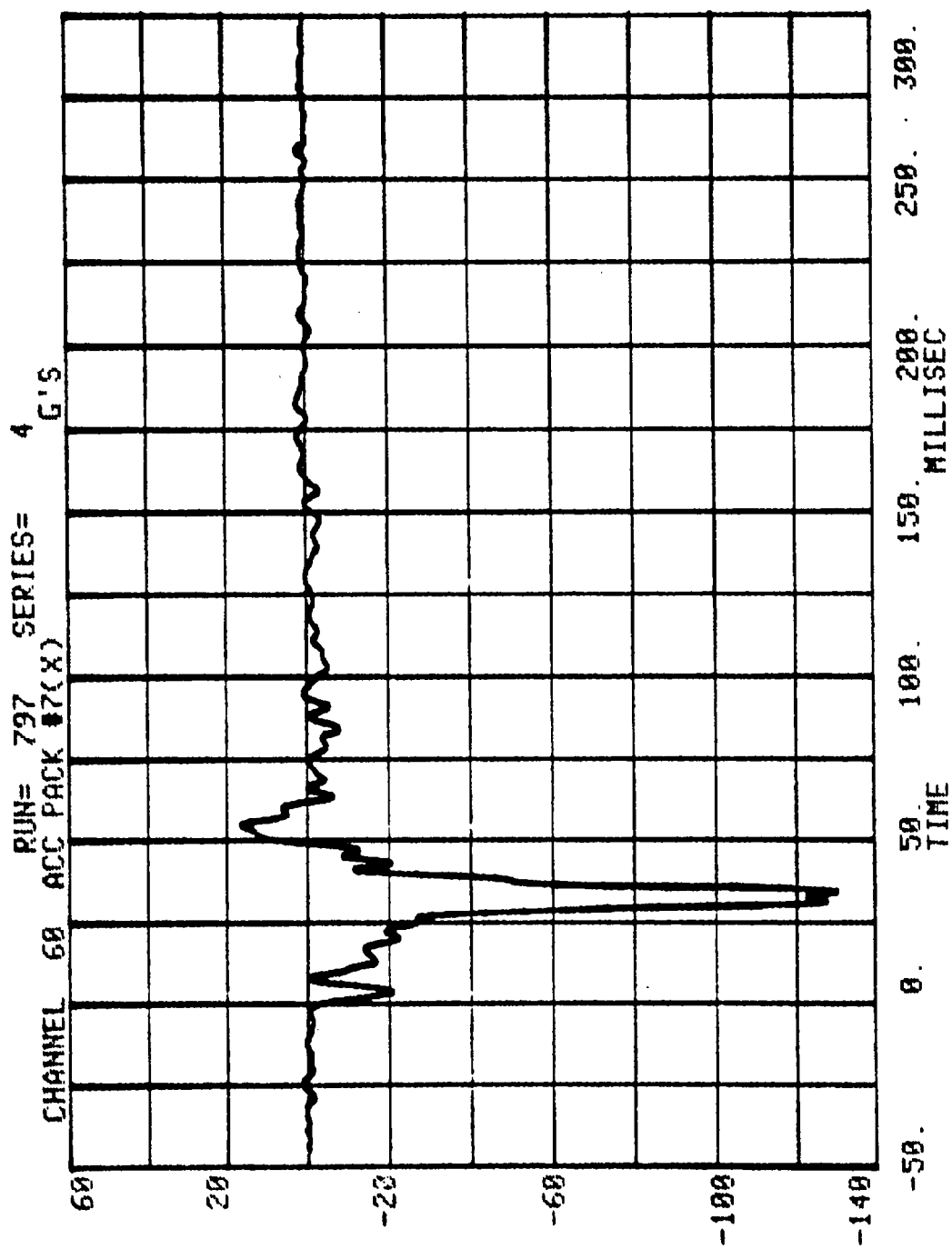


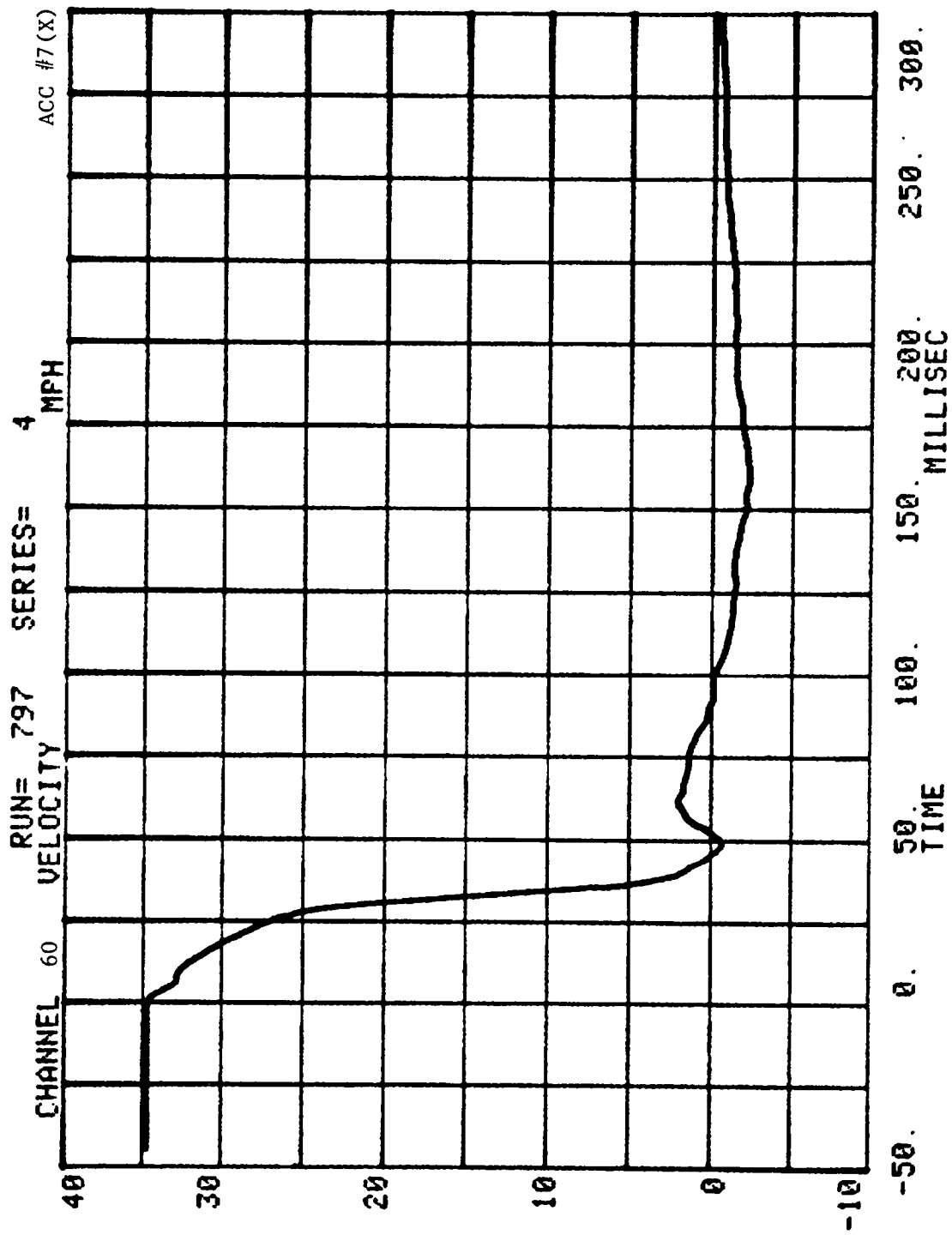


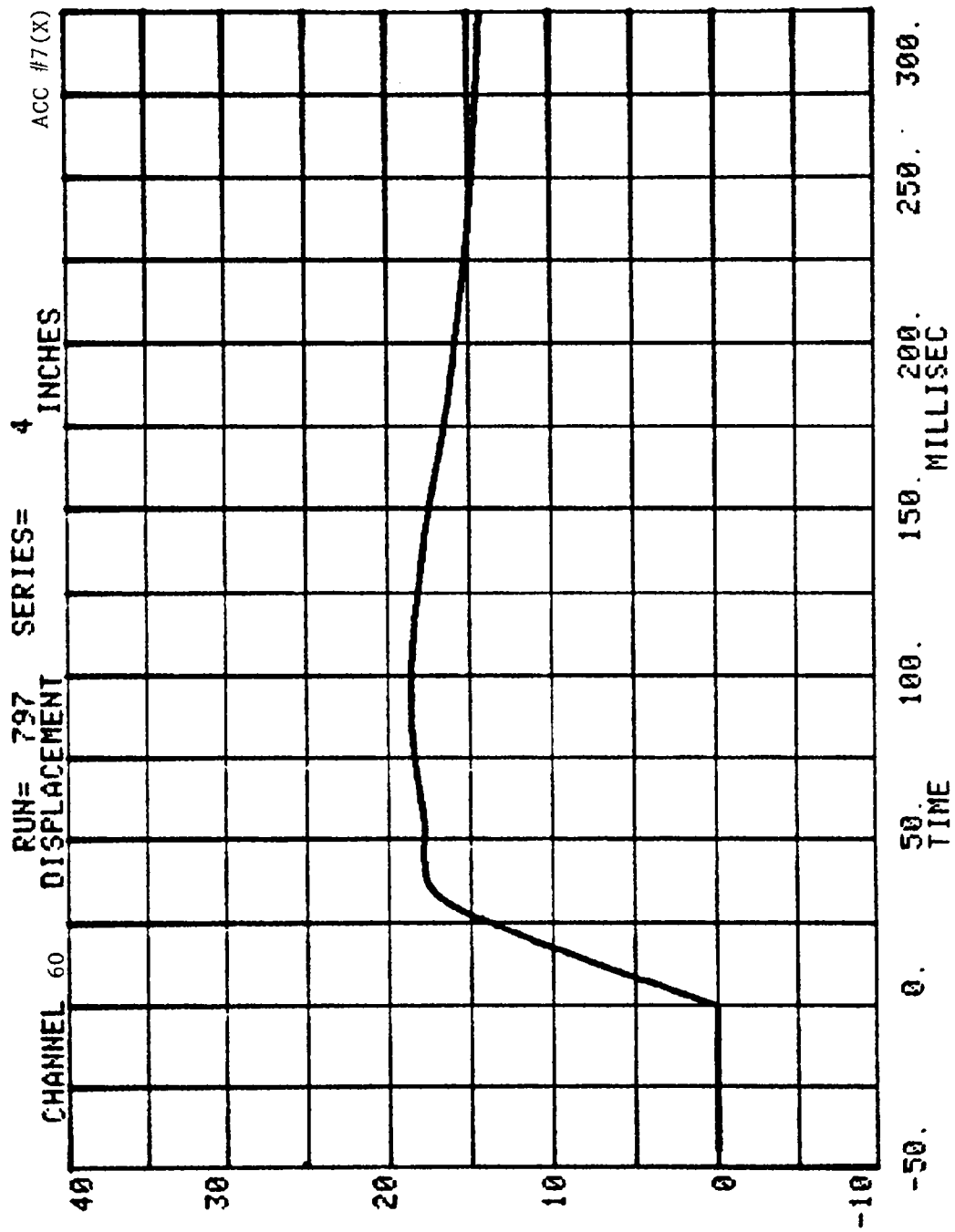




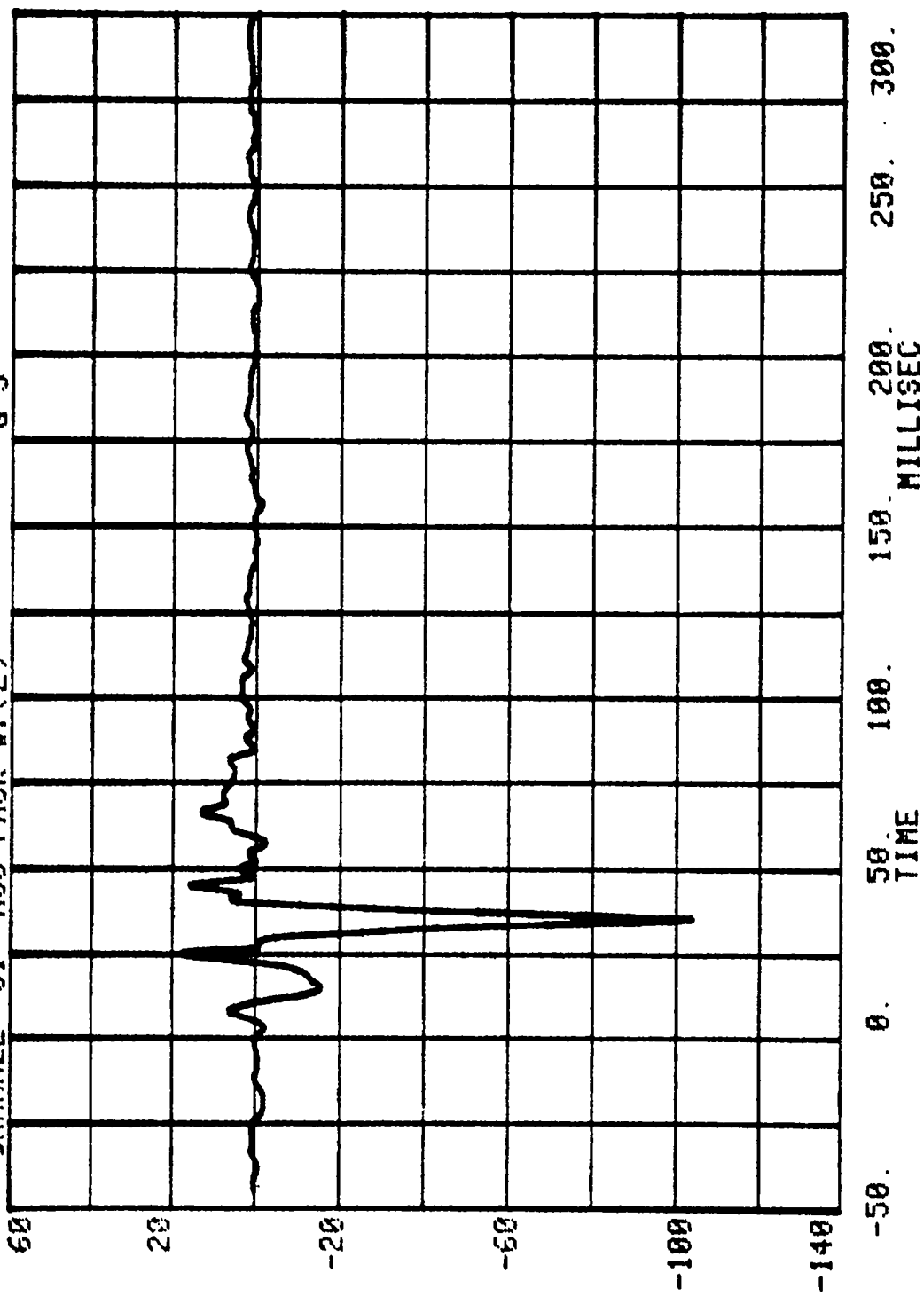


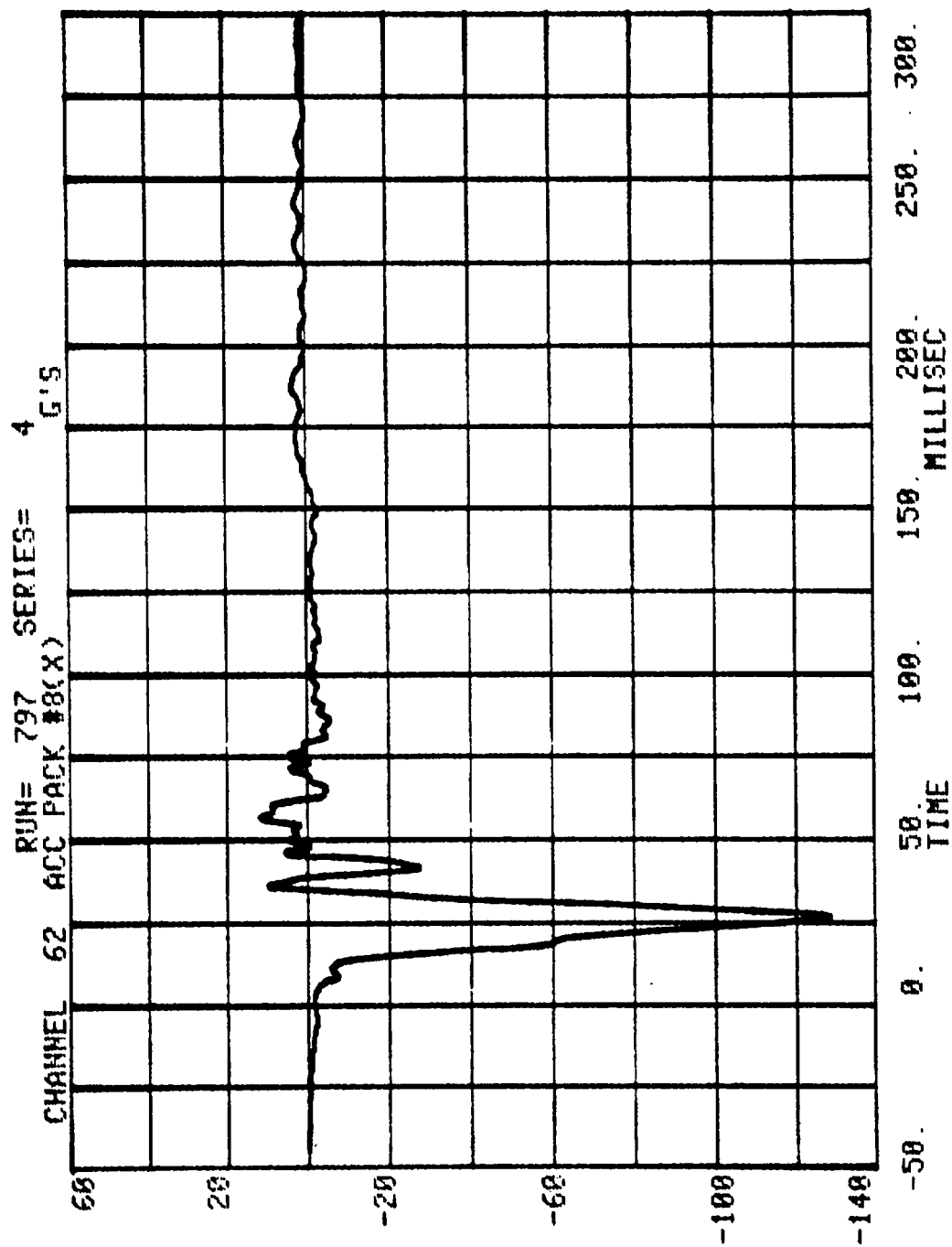


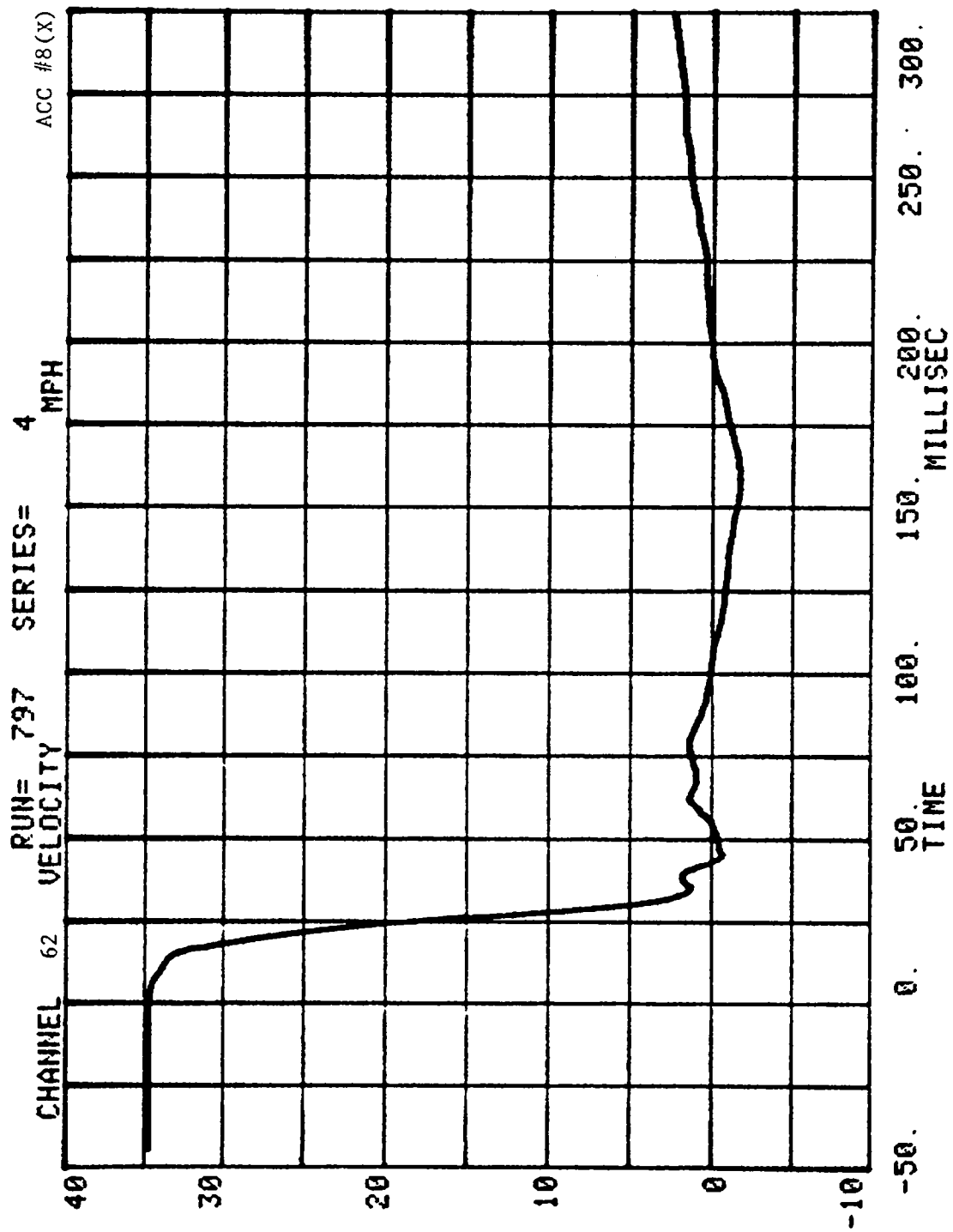




RUN= 797 SERIES= 4
CHANNEL 61 ACC PACK #7(Z) G'S

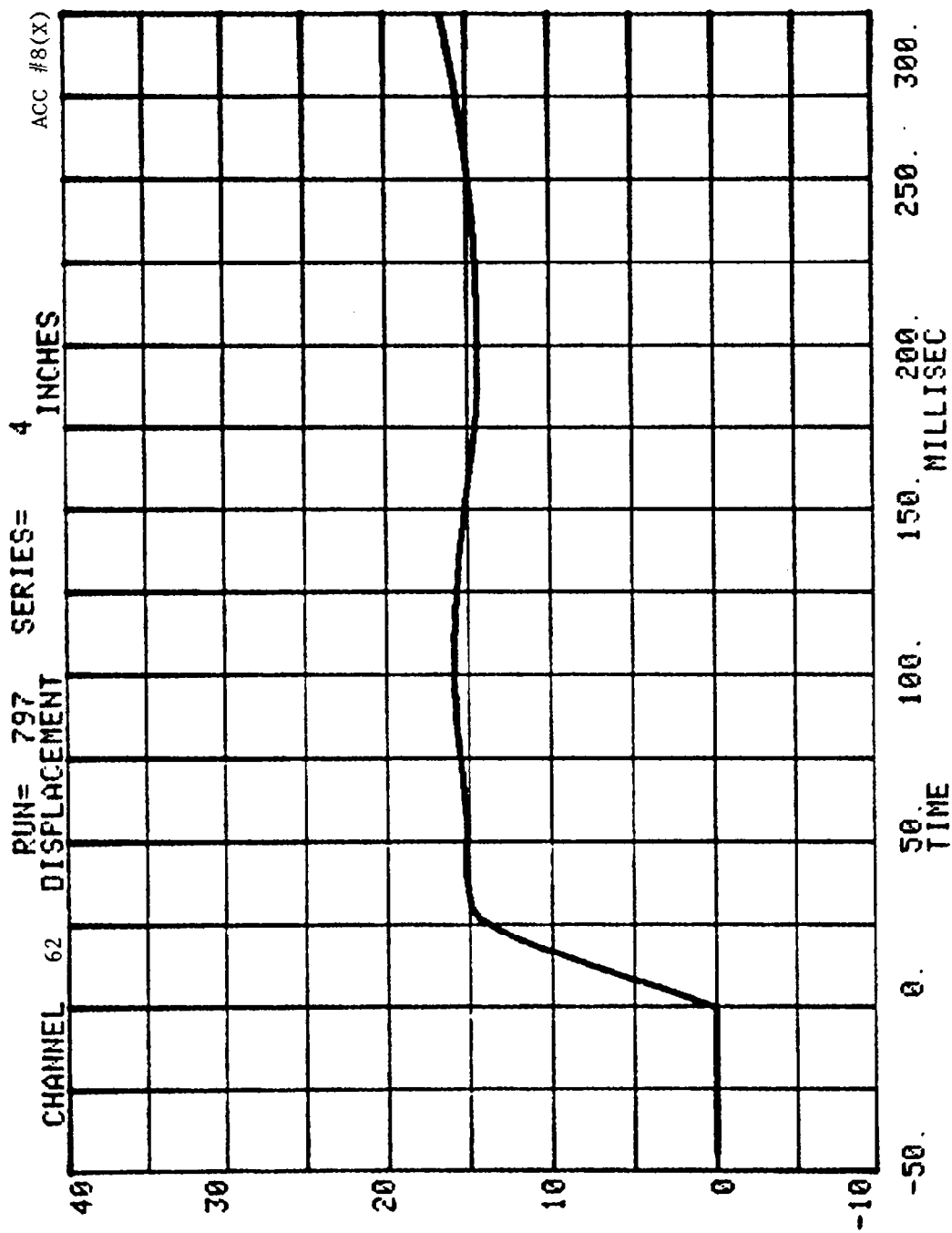


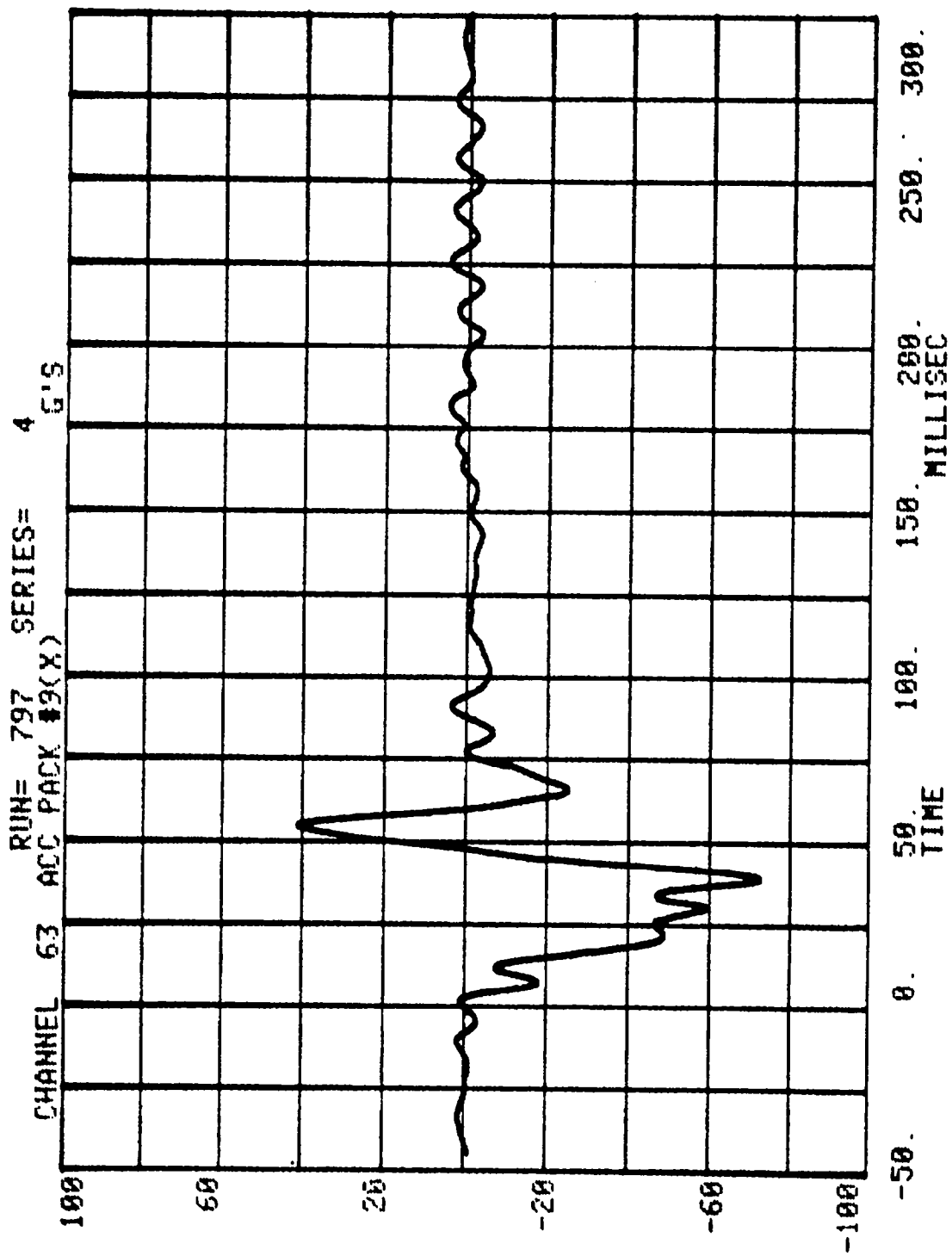


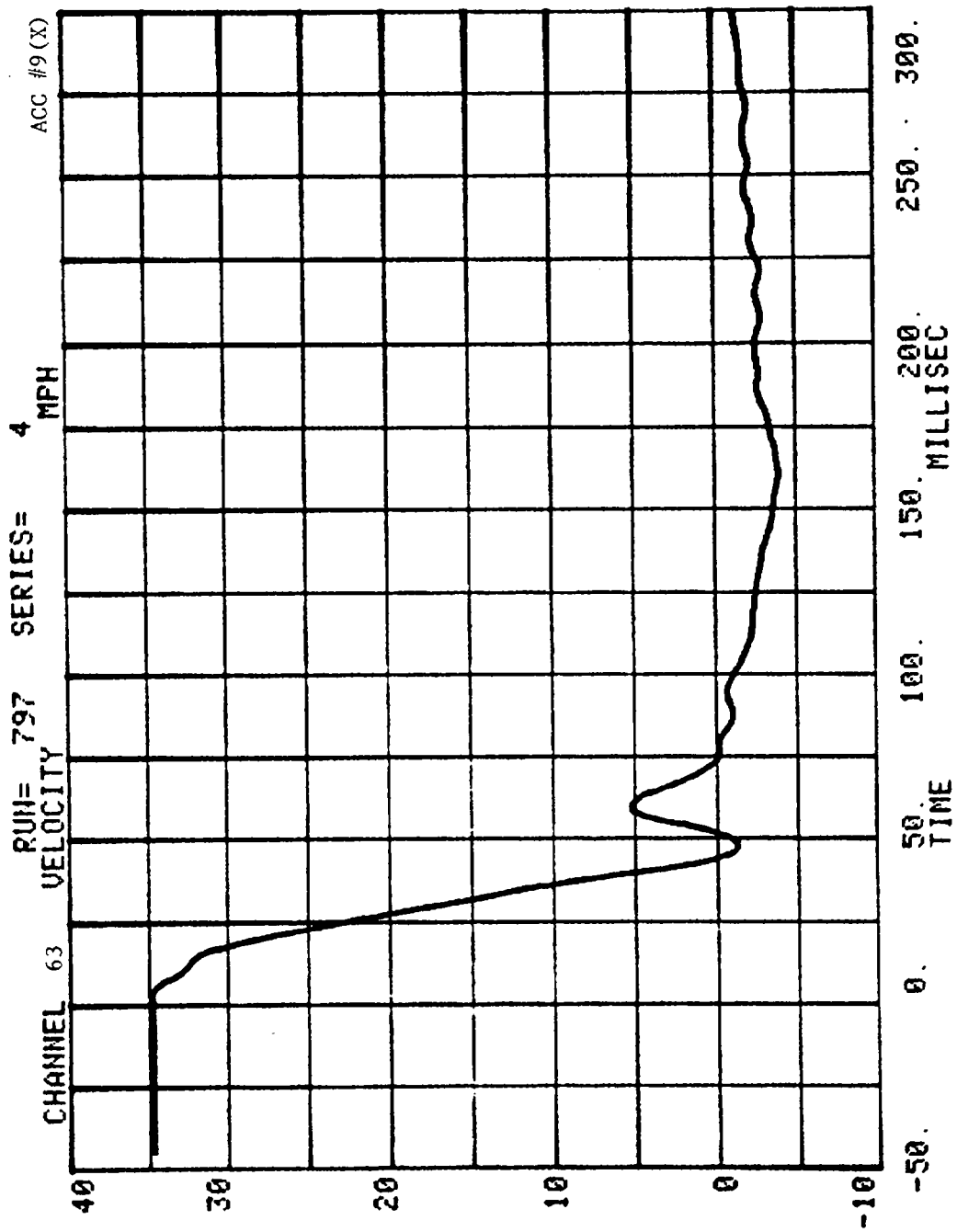


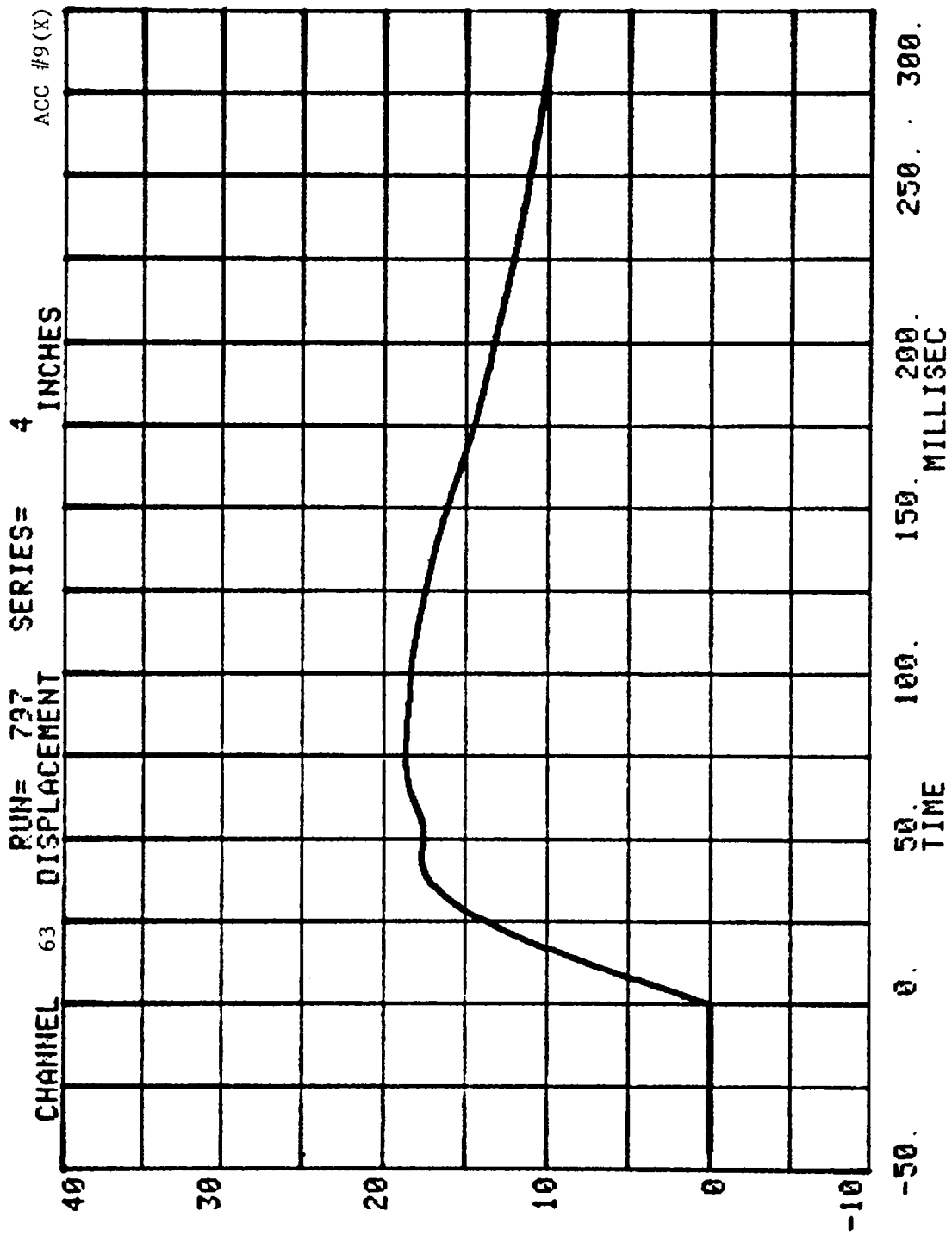
B-45

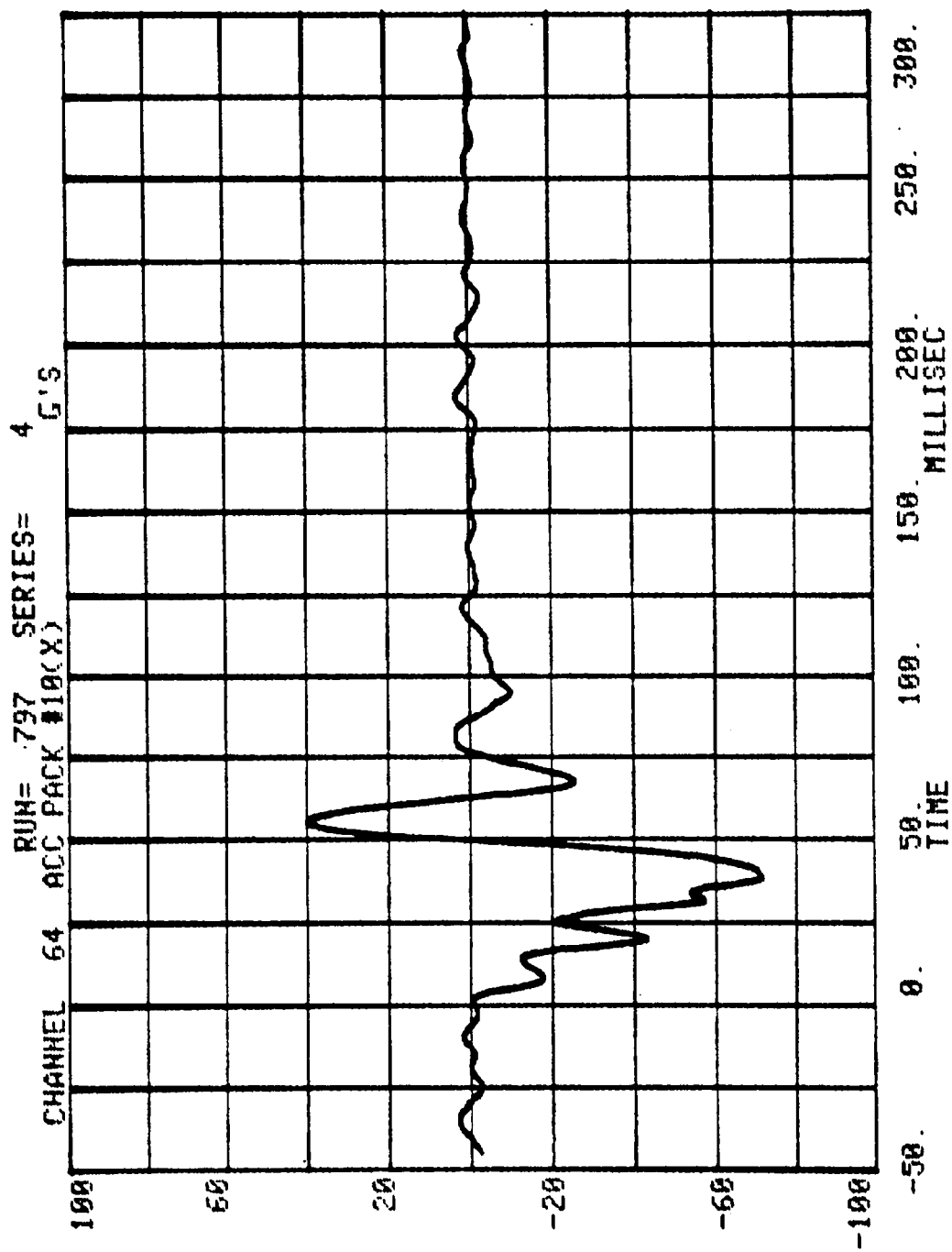
7581-5

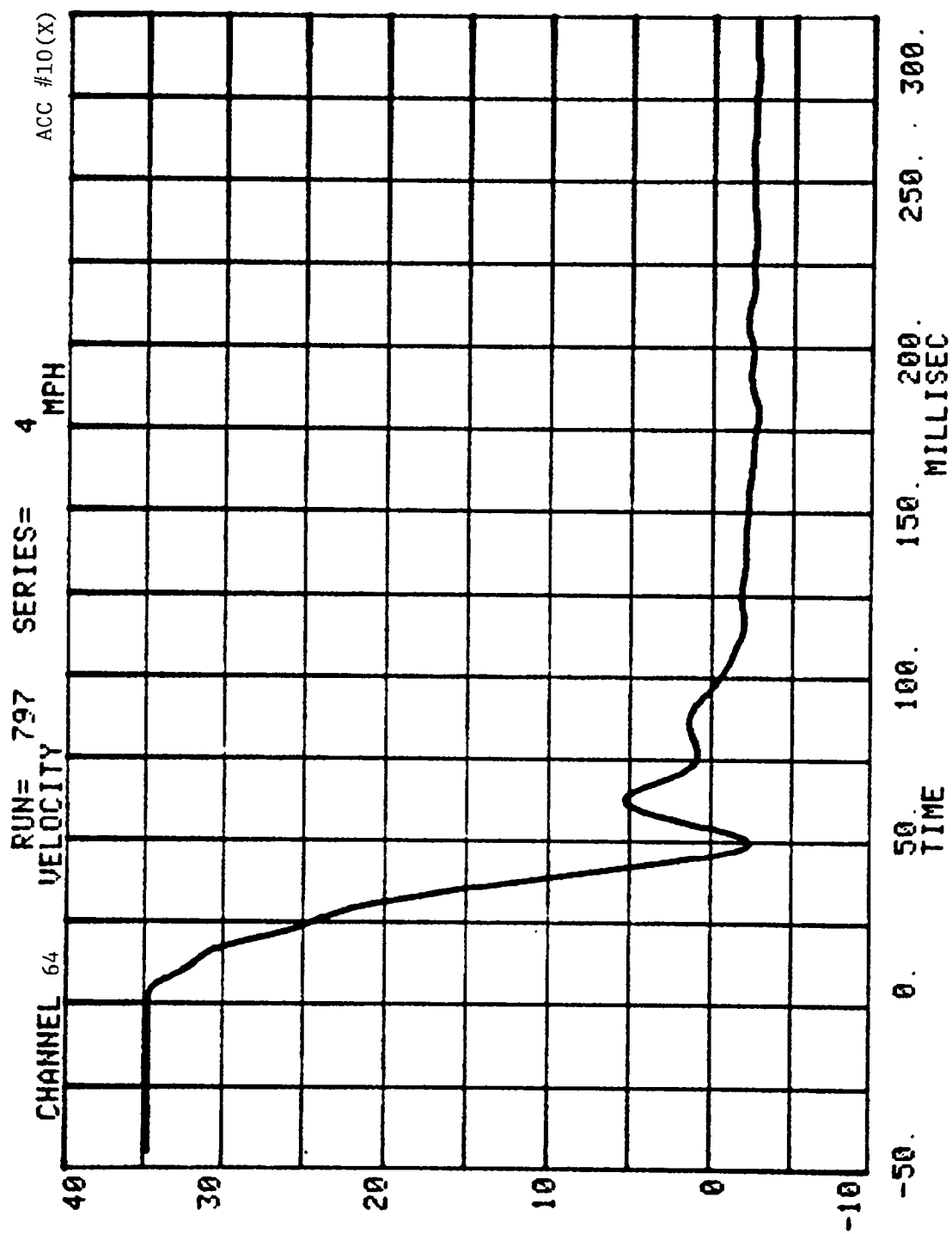


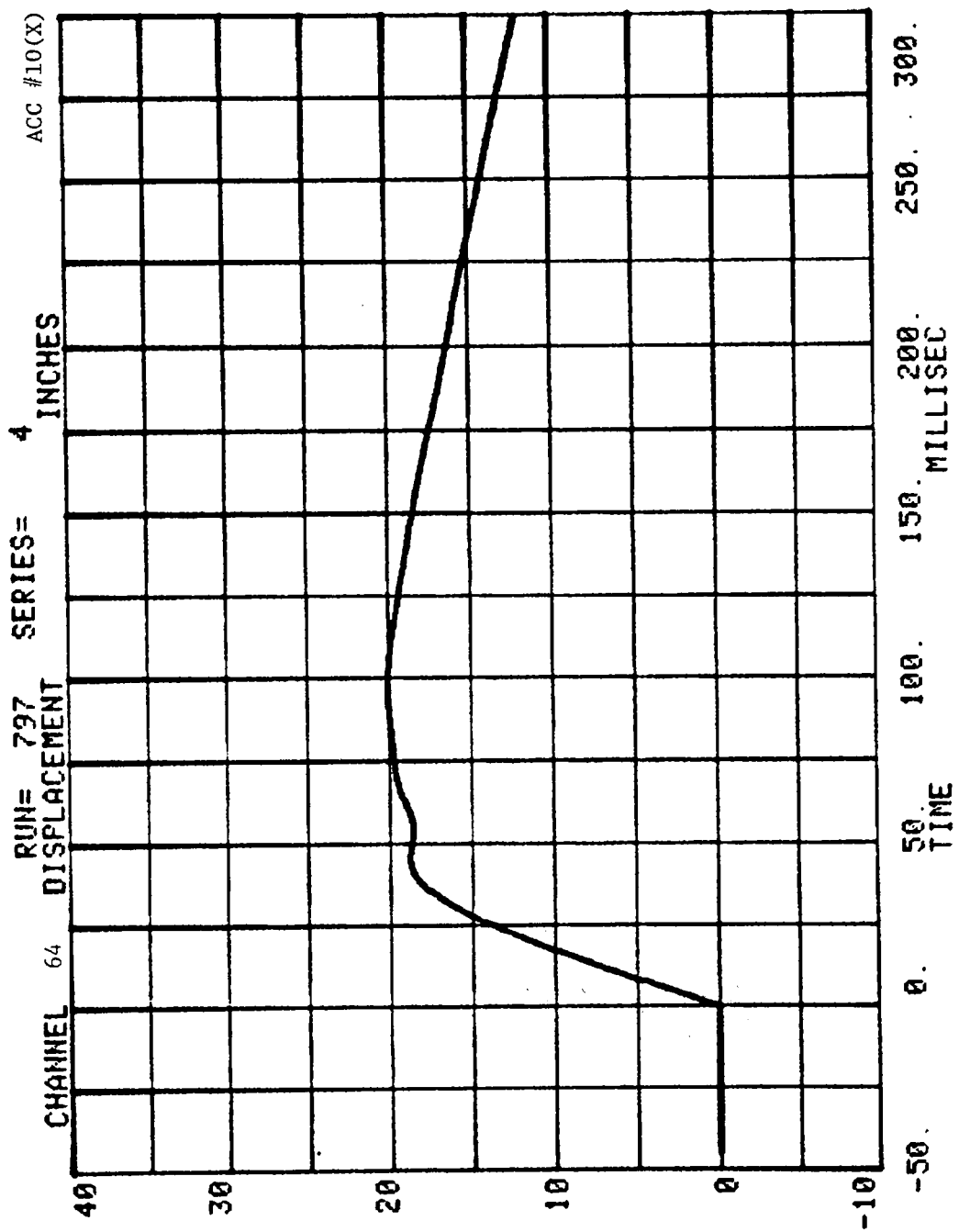


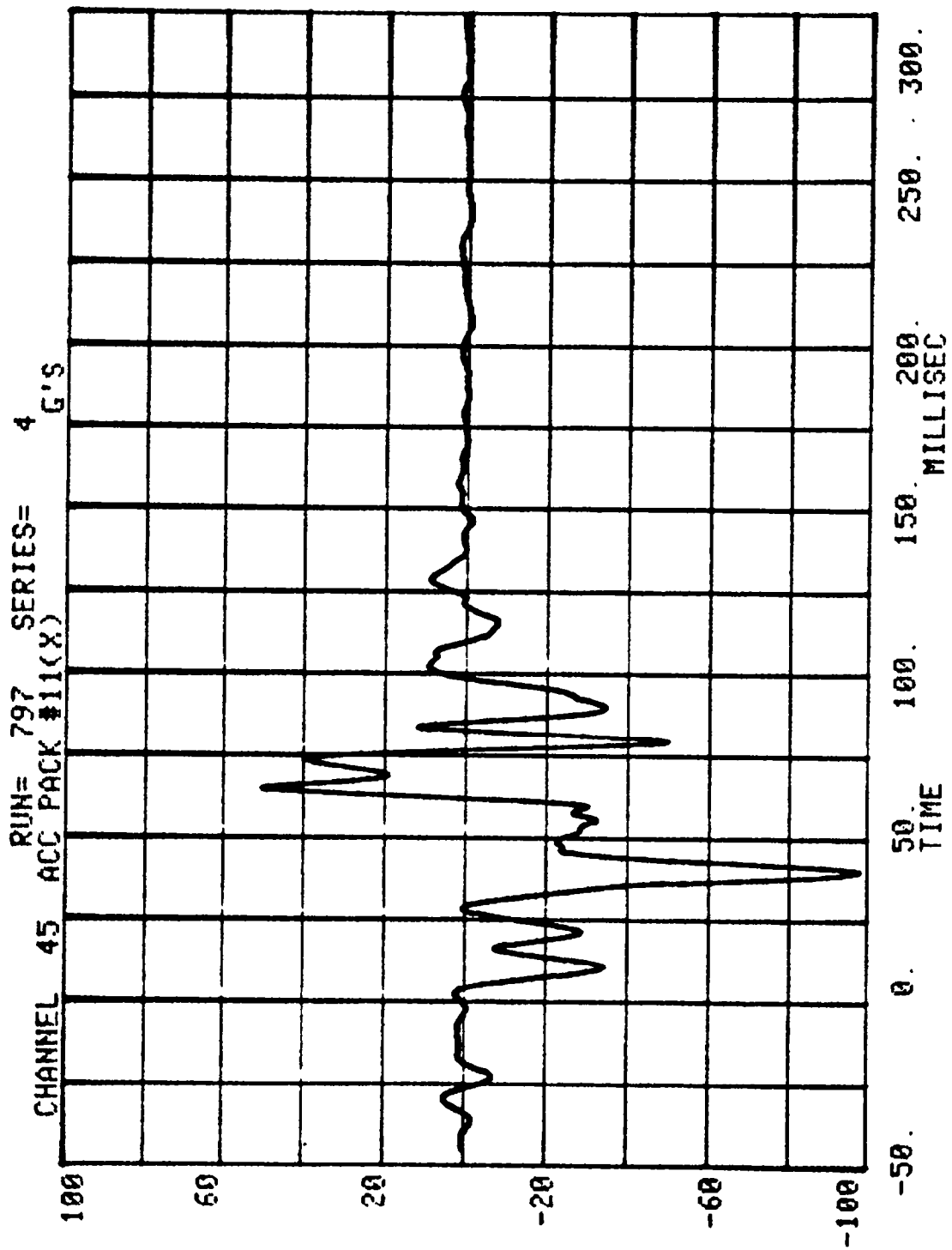


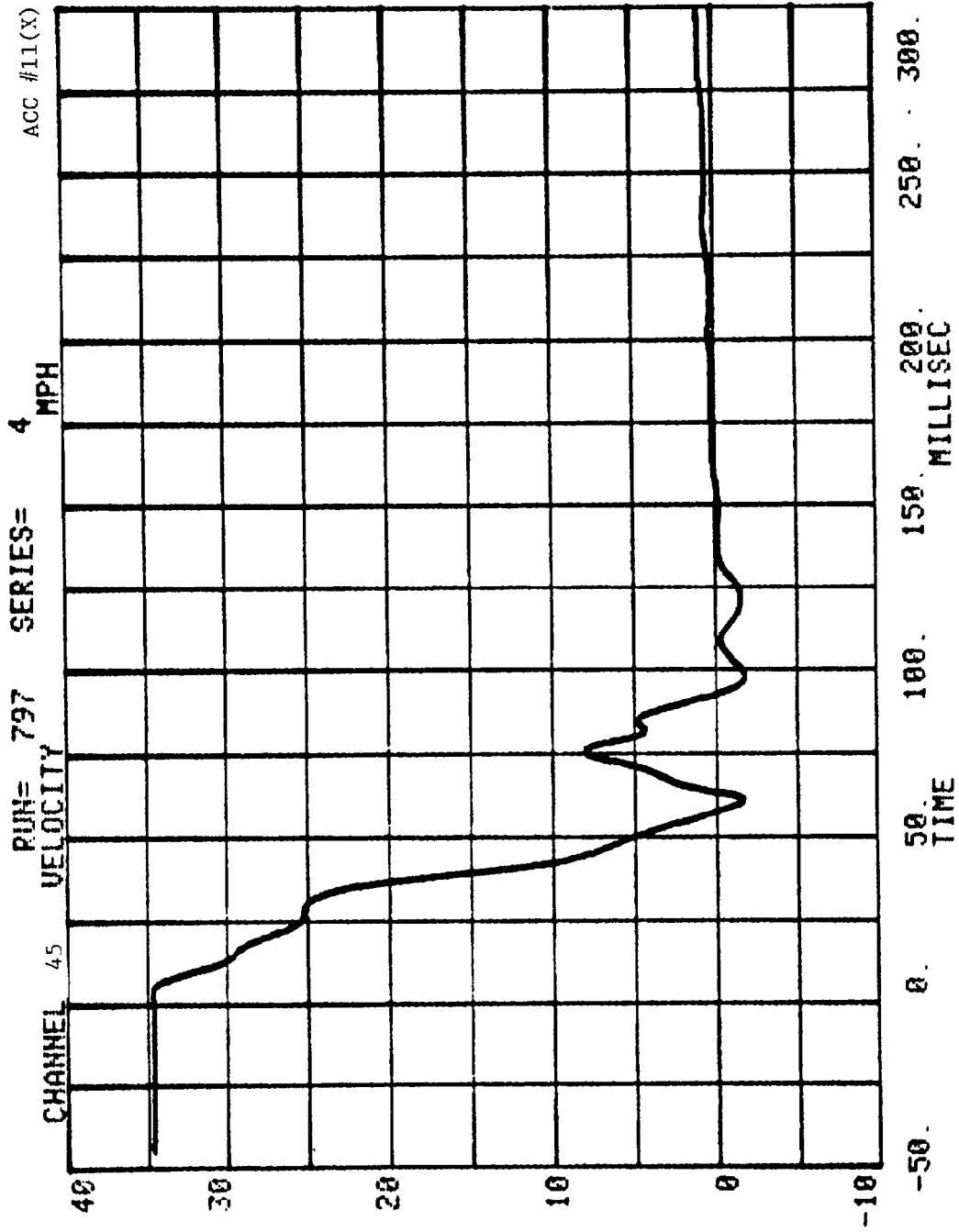


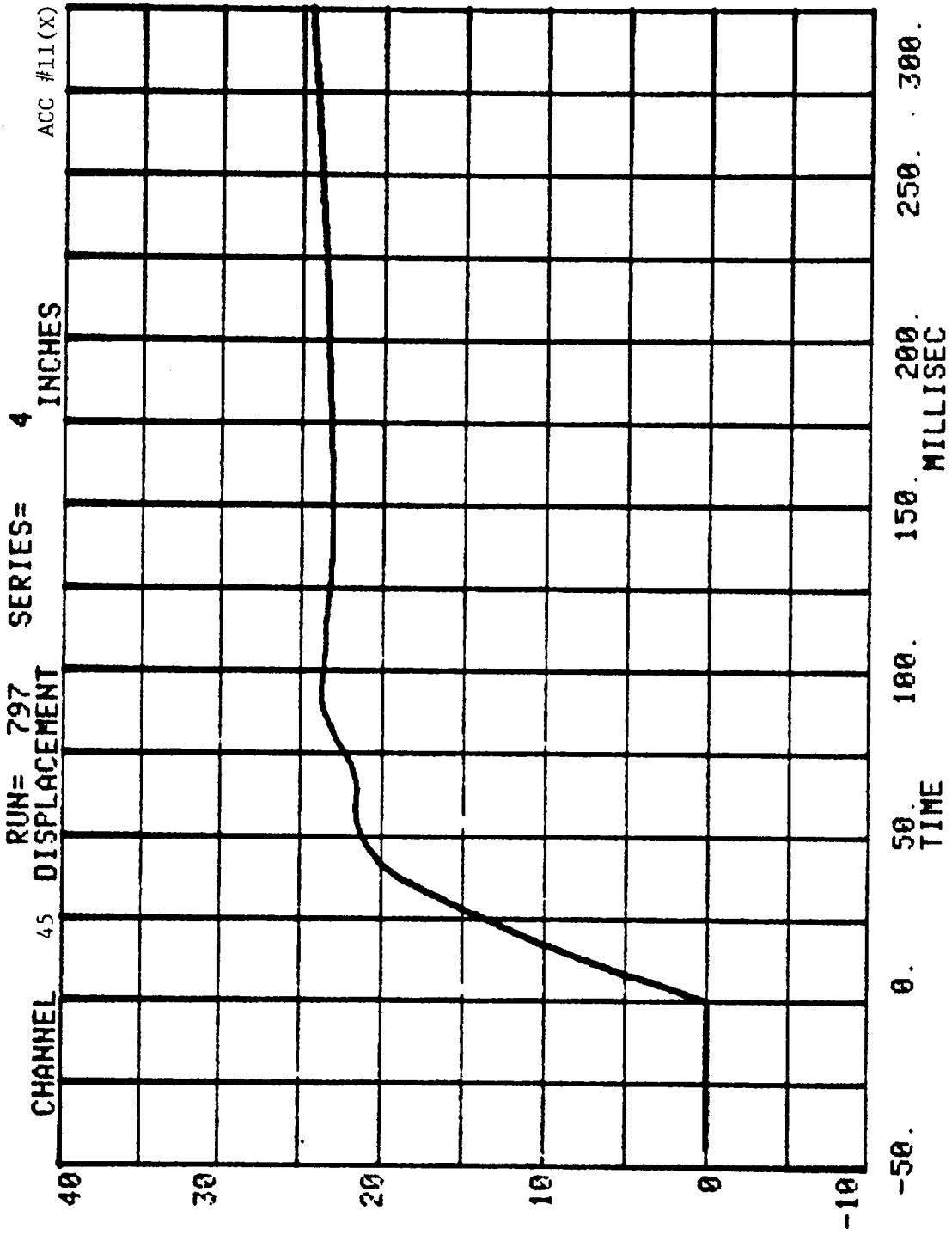


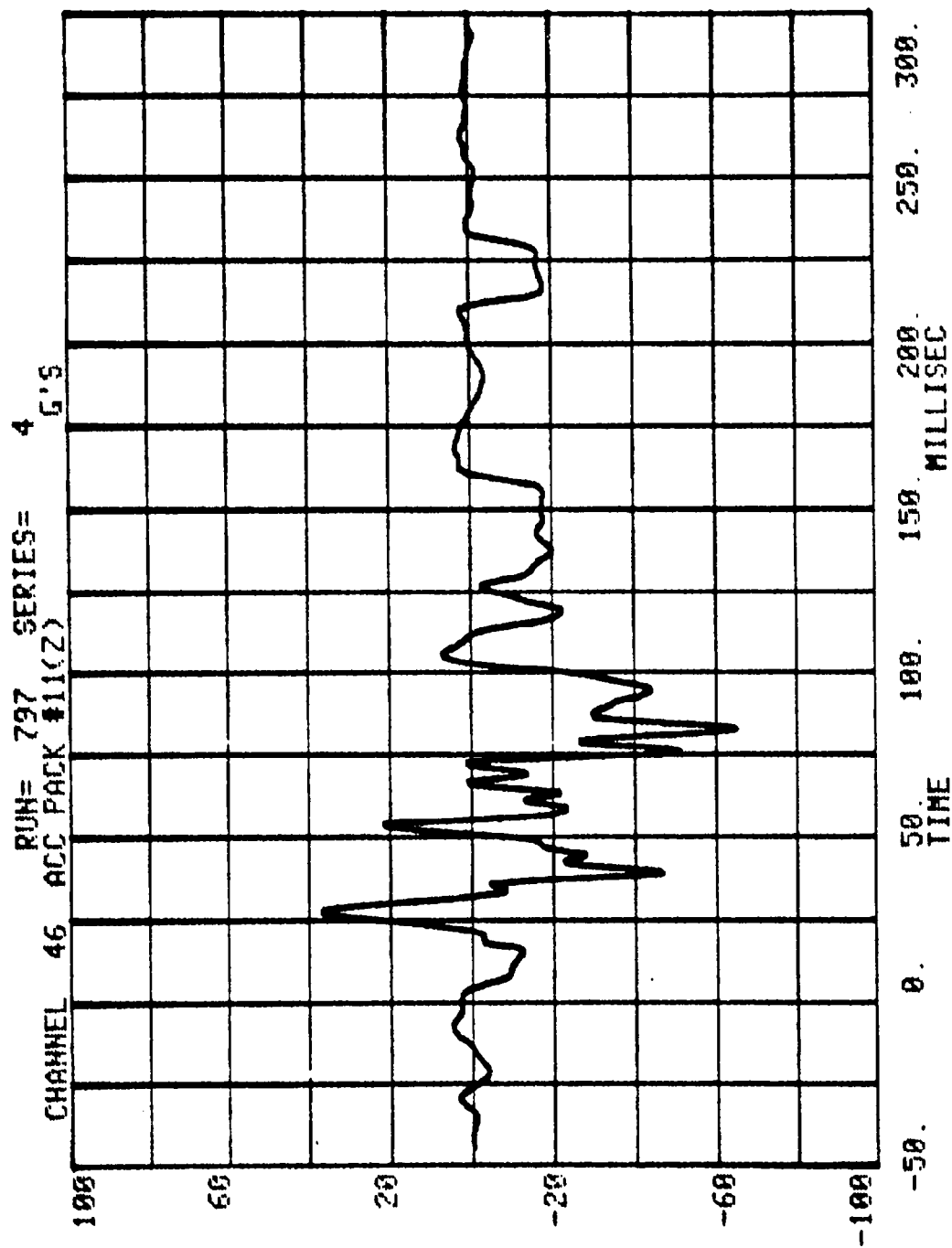












TEST NO. Y23-040-797

LOAD CELL BARRIER DATA

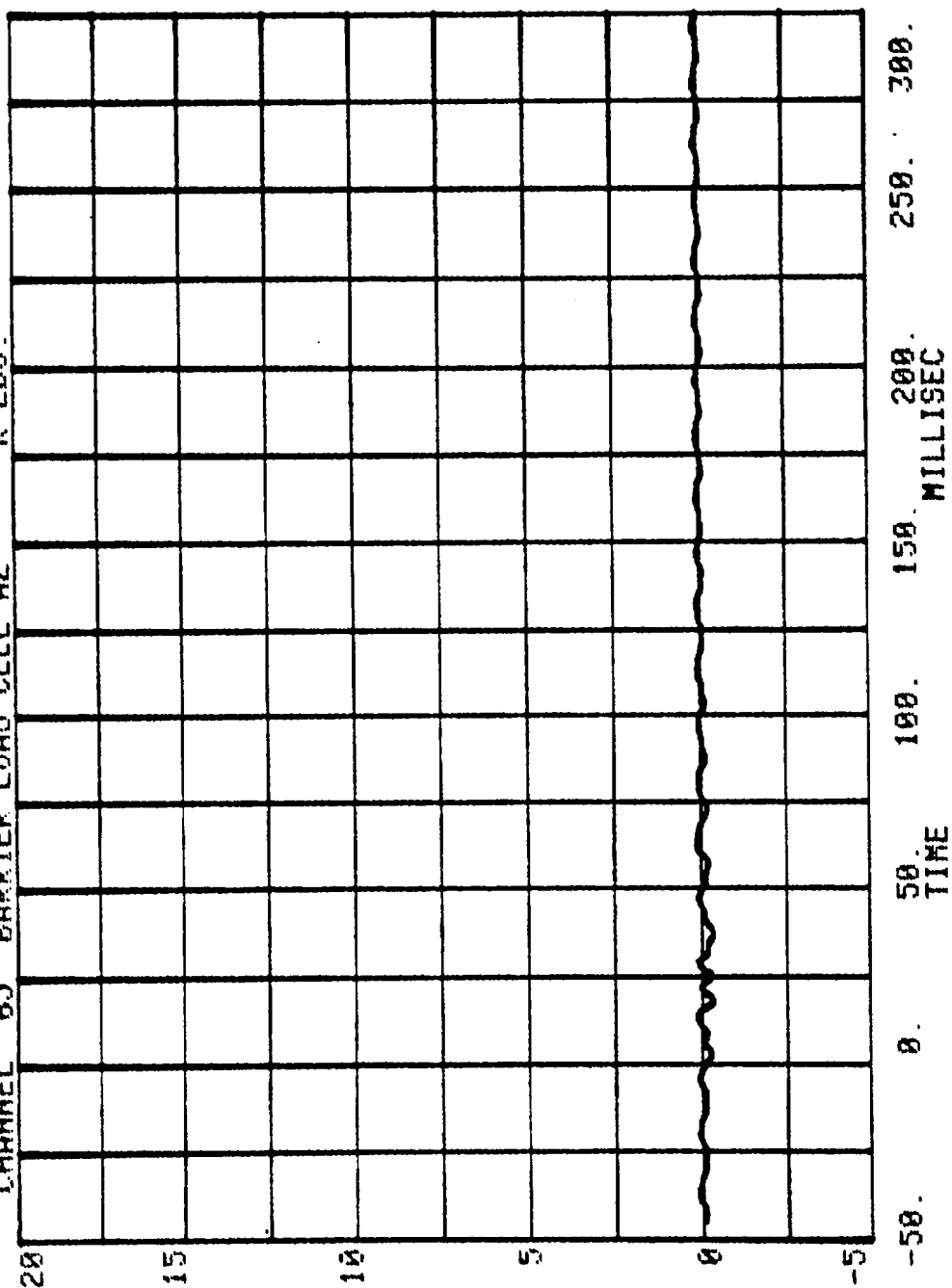
FILTER CHANNEL CLASS

60

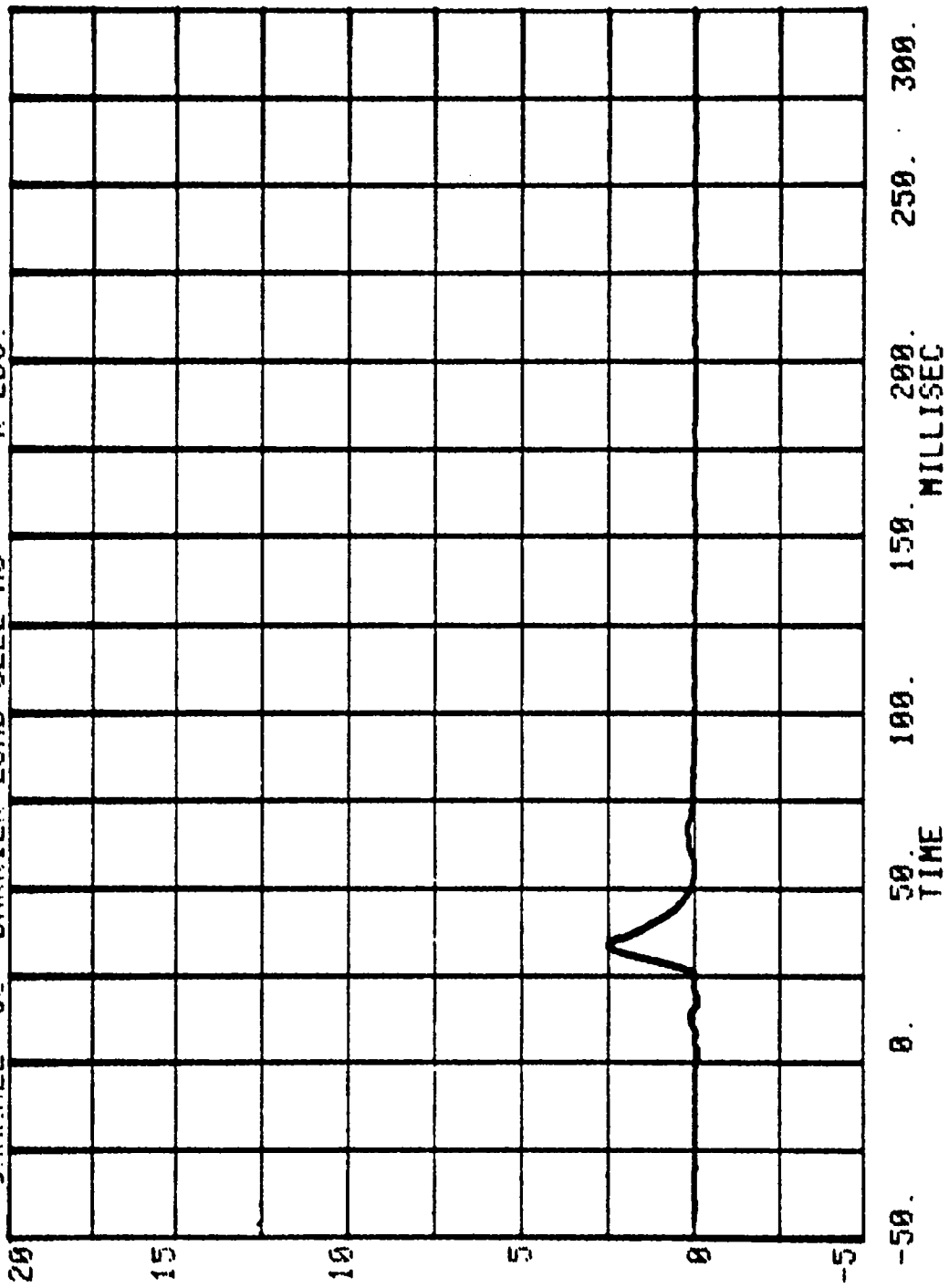
B-57

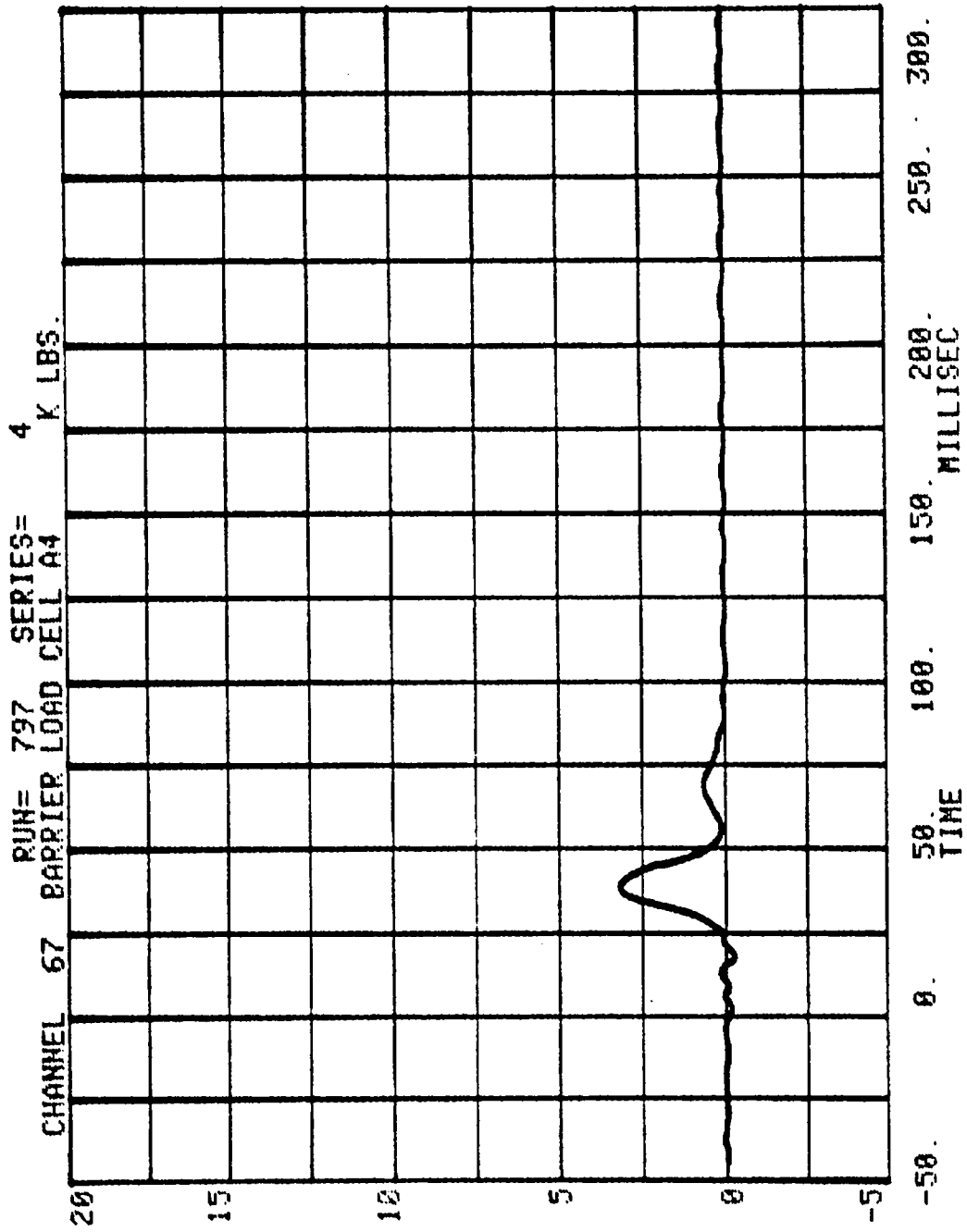
7581-5

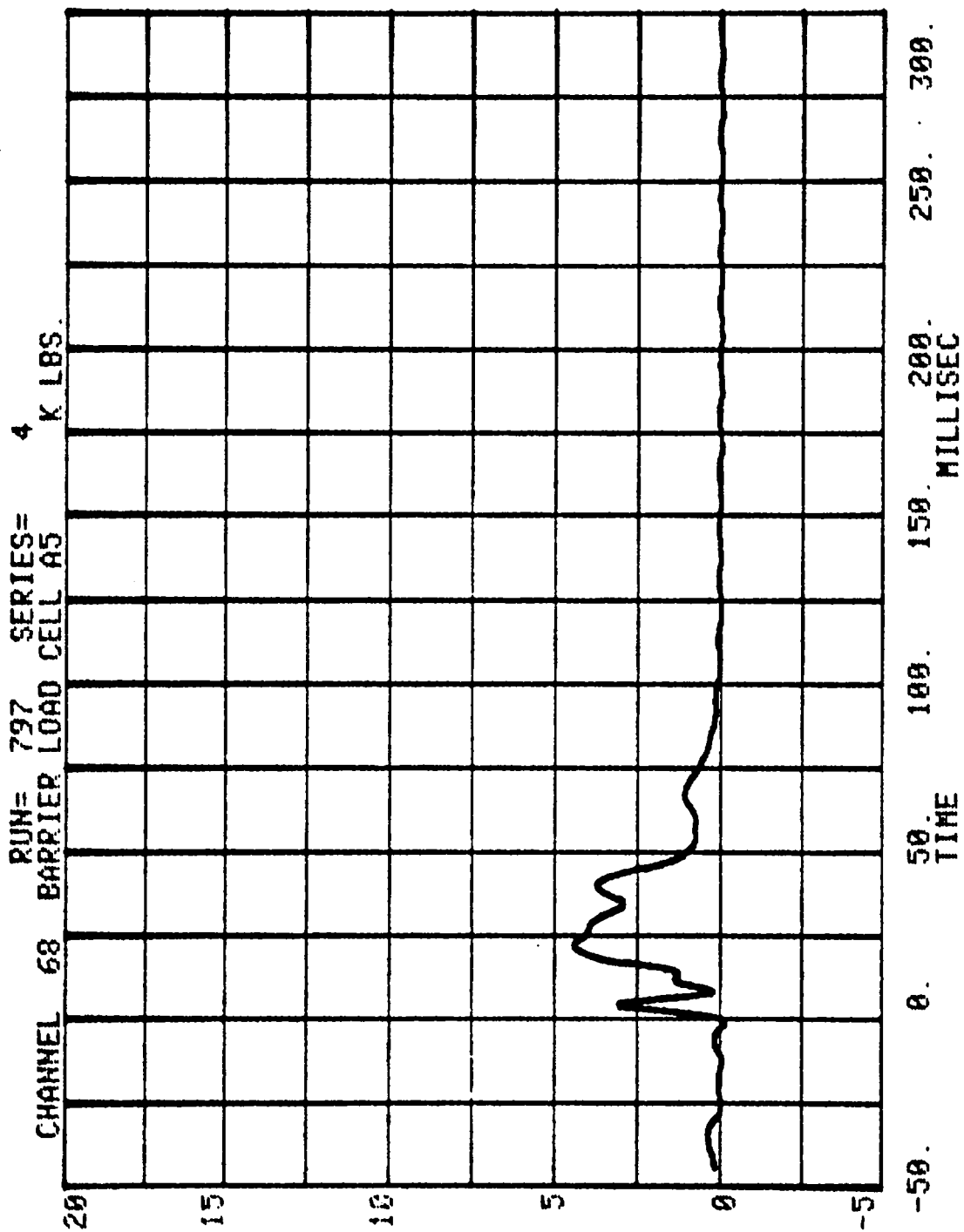
CHANNEL 65 BARRIER LOAD CELL A2 RUN= 797 SERIES= 4 K LBS.



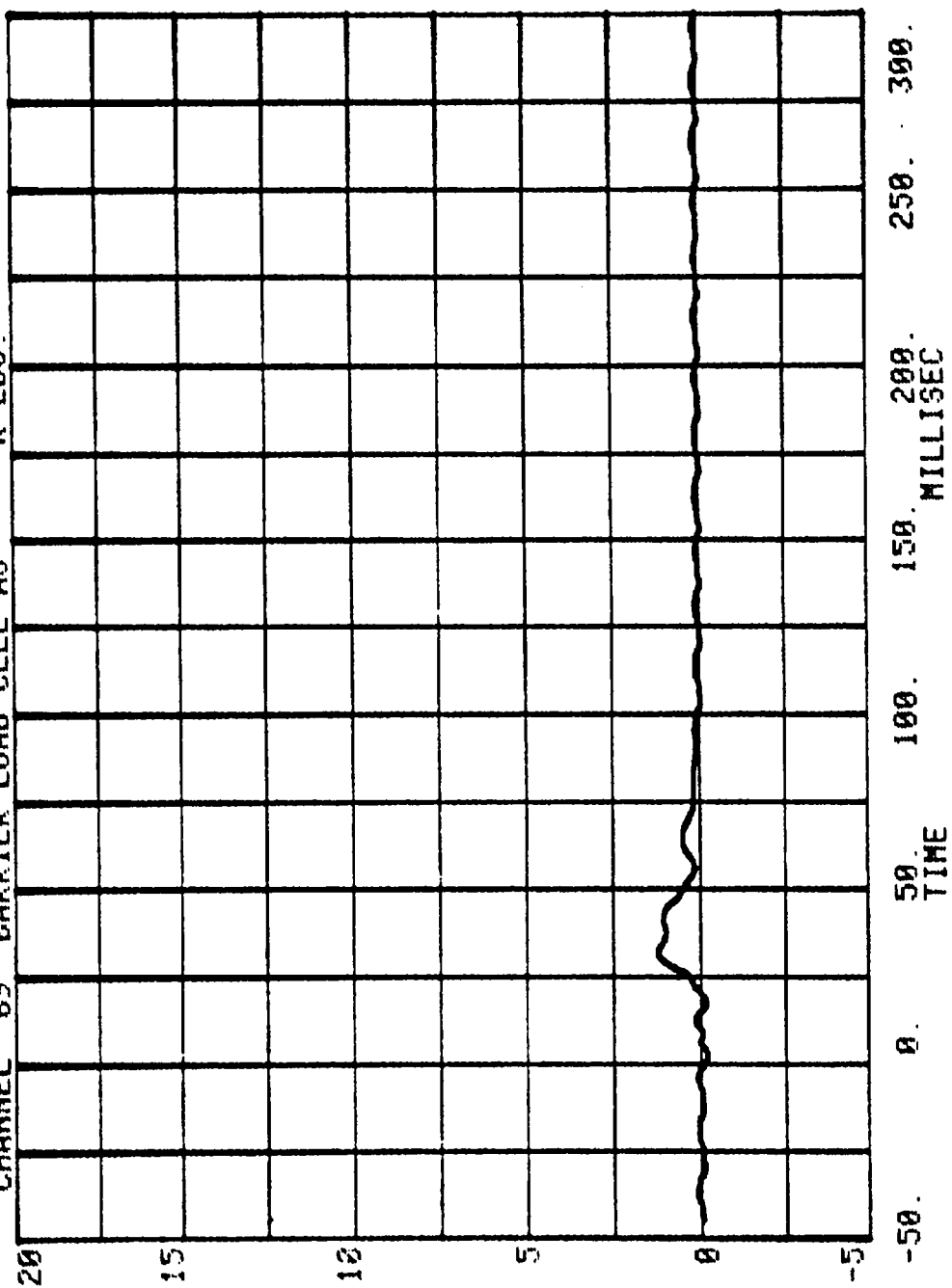
RUN= 797 SERIES= 4
CHANNEL 66 BARRIER LOAD CELL A3 K LBS.







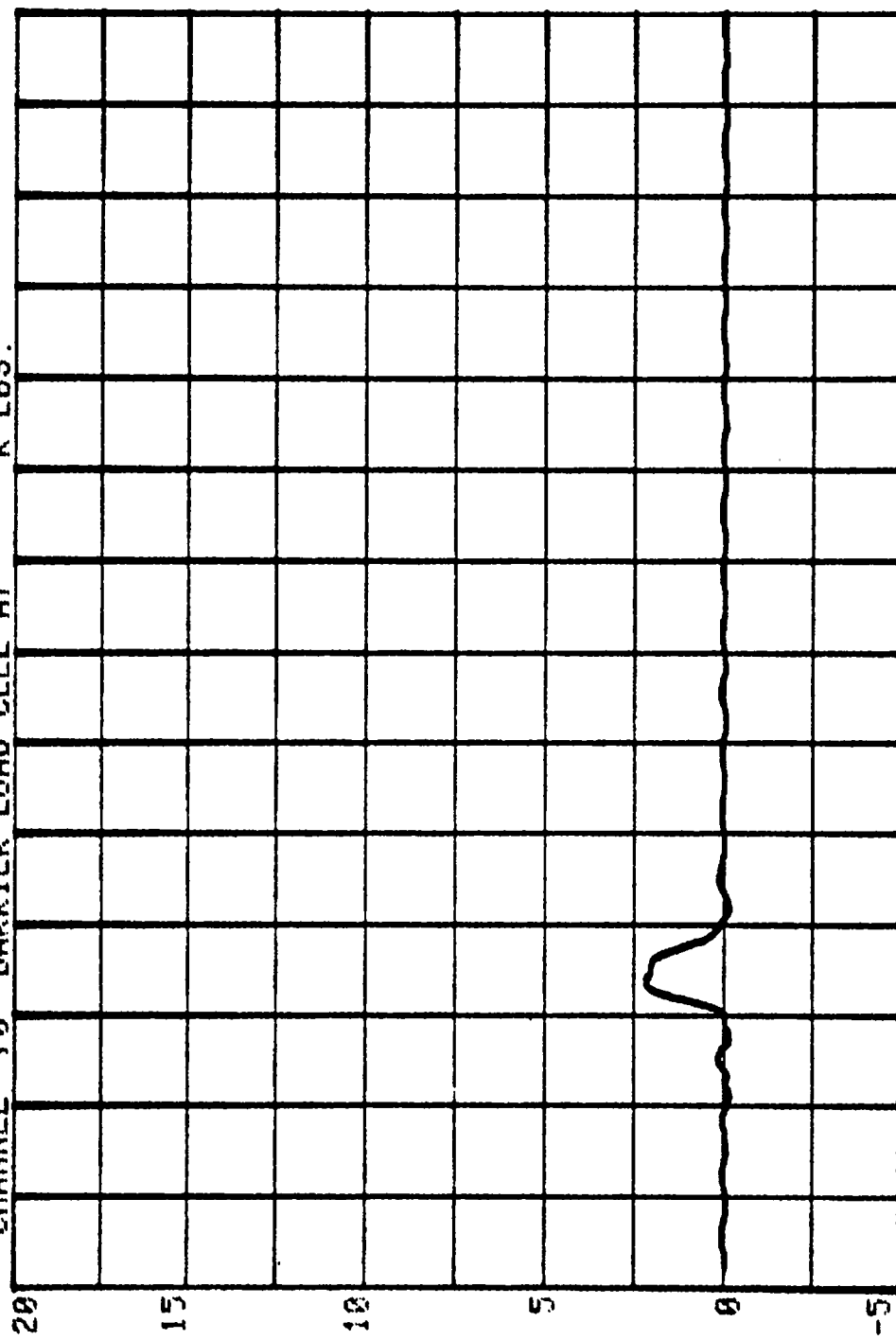
CHANNEL 69 BARRIER LOAD CELL A6 RUN= 797 SERIES= 4 K LBS.



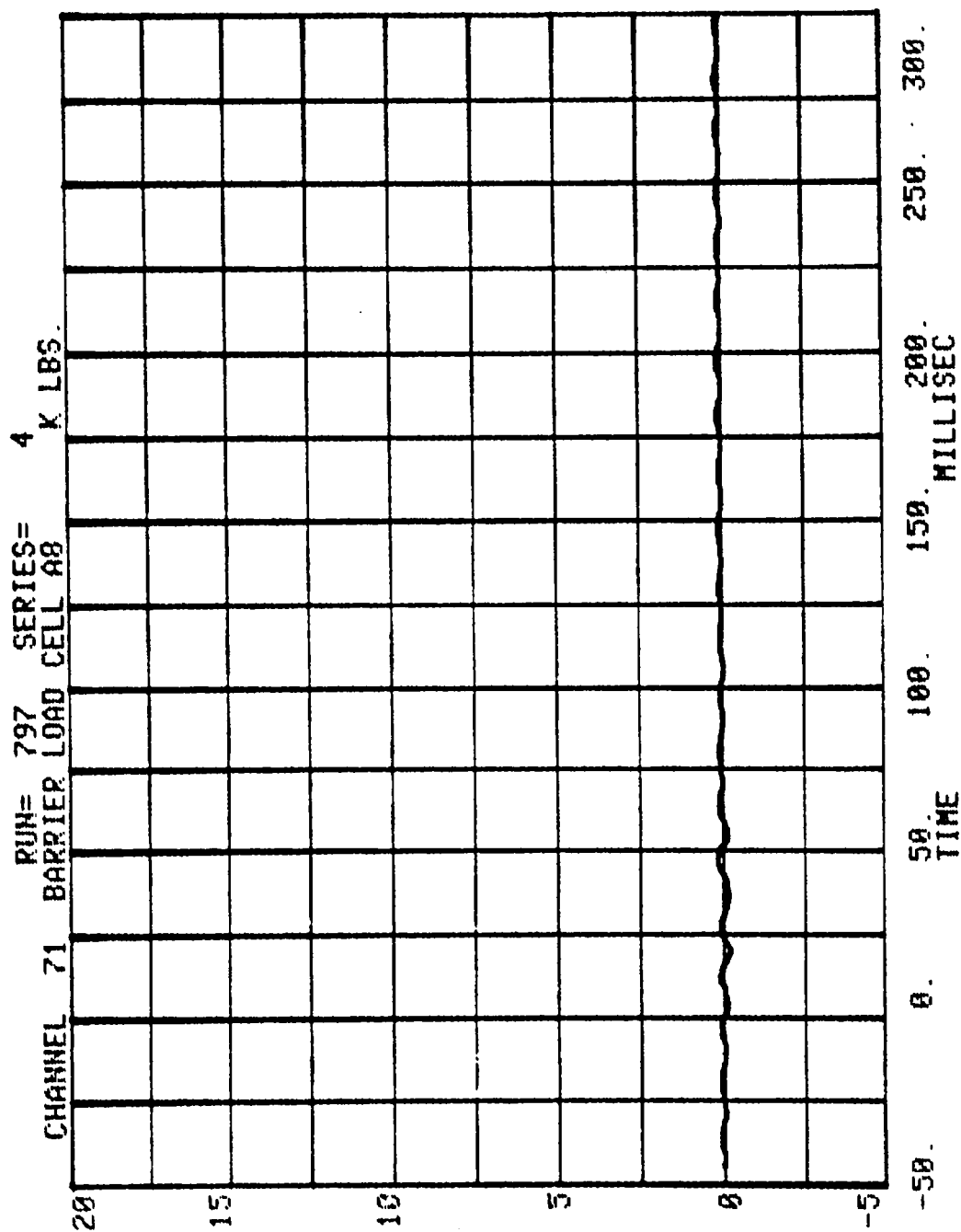
CHANNEL 70 BARRIER LOAD CELL A7

RUN= 797 SERIES= 4

K LBS.



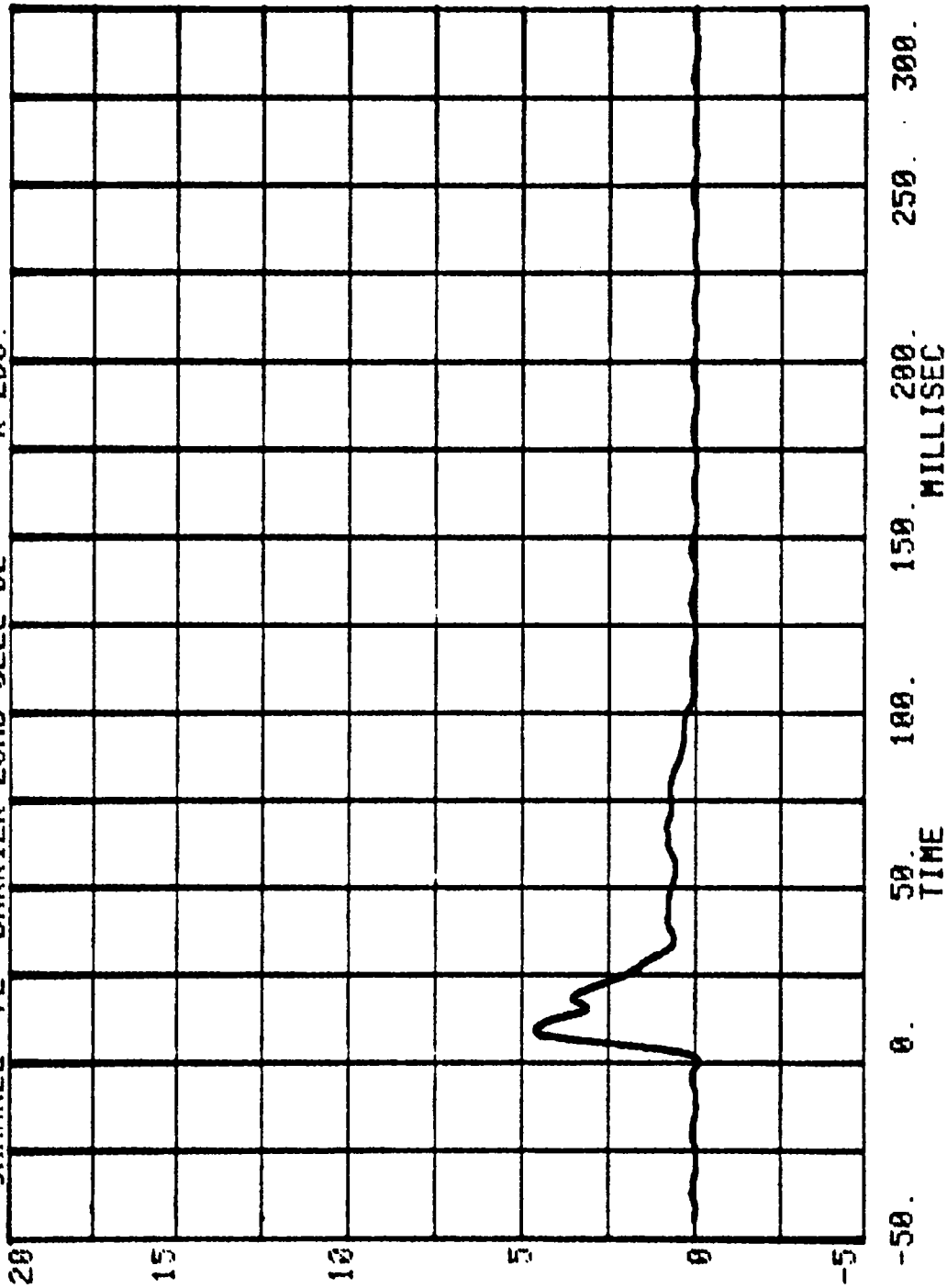
TIME
-50. 0. 50. 100. 150. 200. 250. 300.
MILLISEC

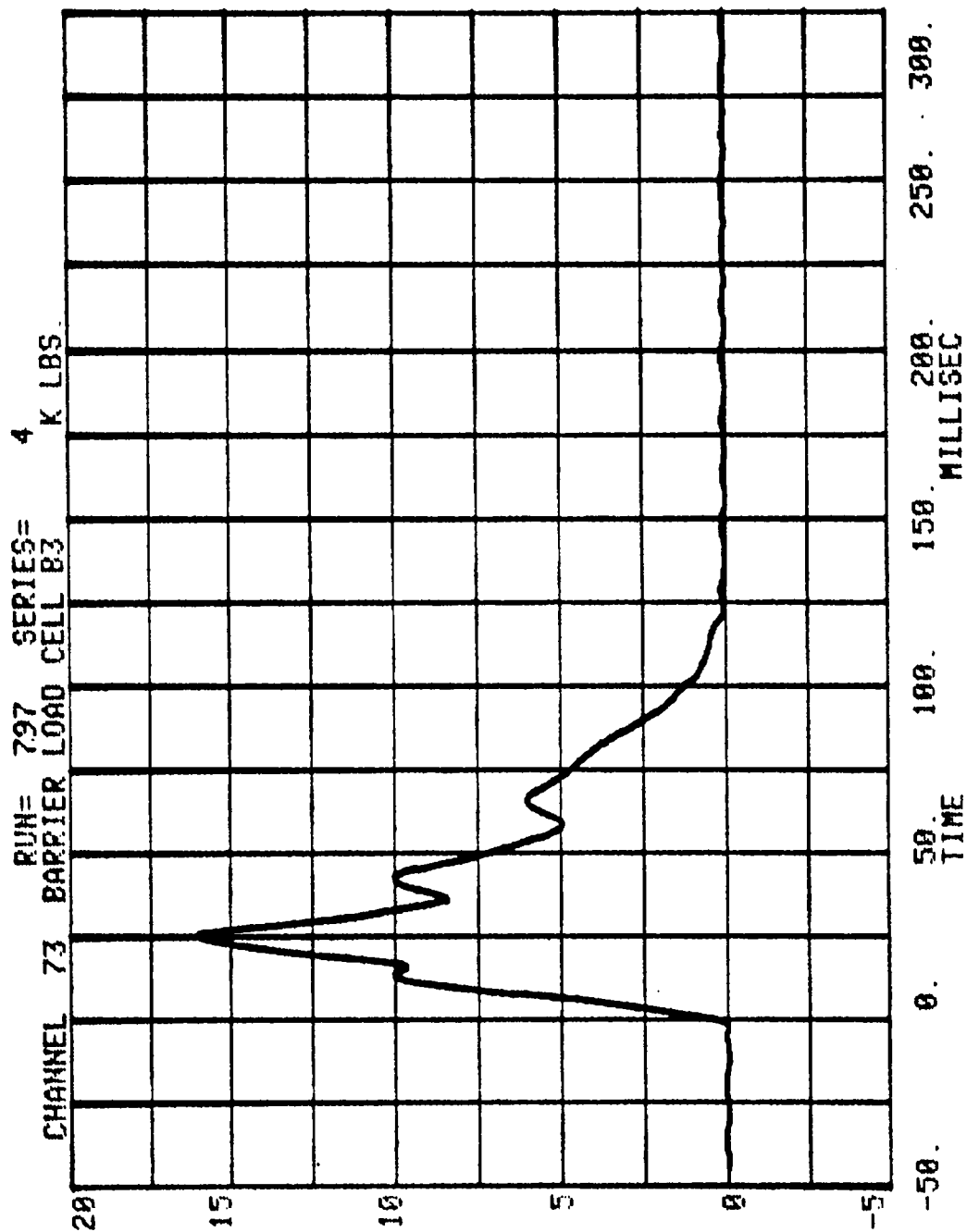


CHANNEL 72 BARRIER LOAD CELL B2

RUN= 797 SERIES= 4

K LBS.





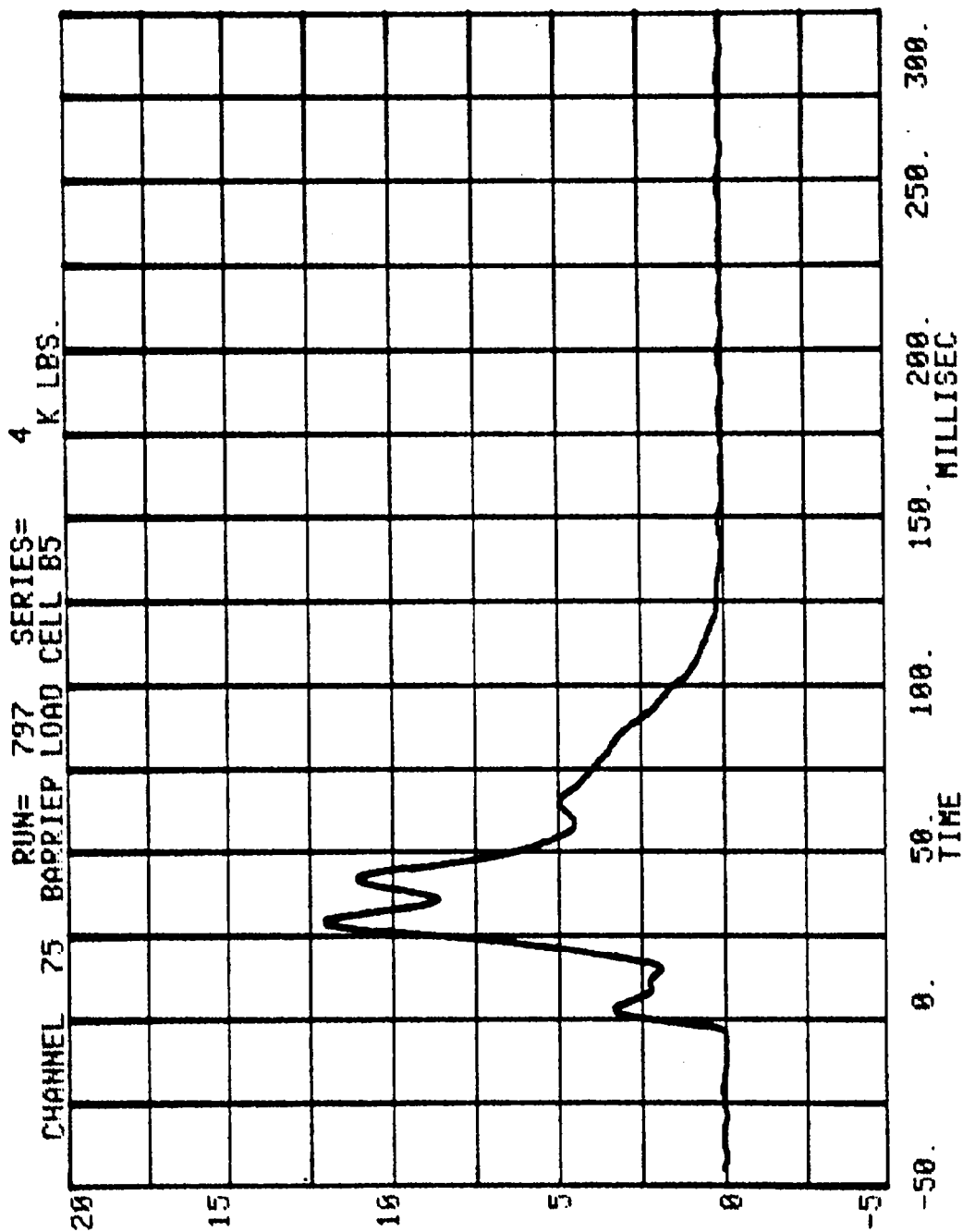
CHANNEL 74 BARRIER LOAD CELL B4

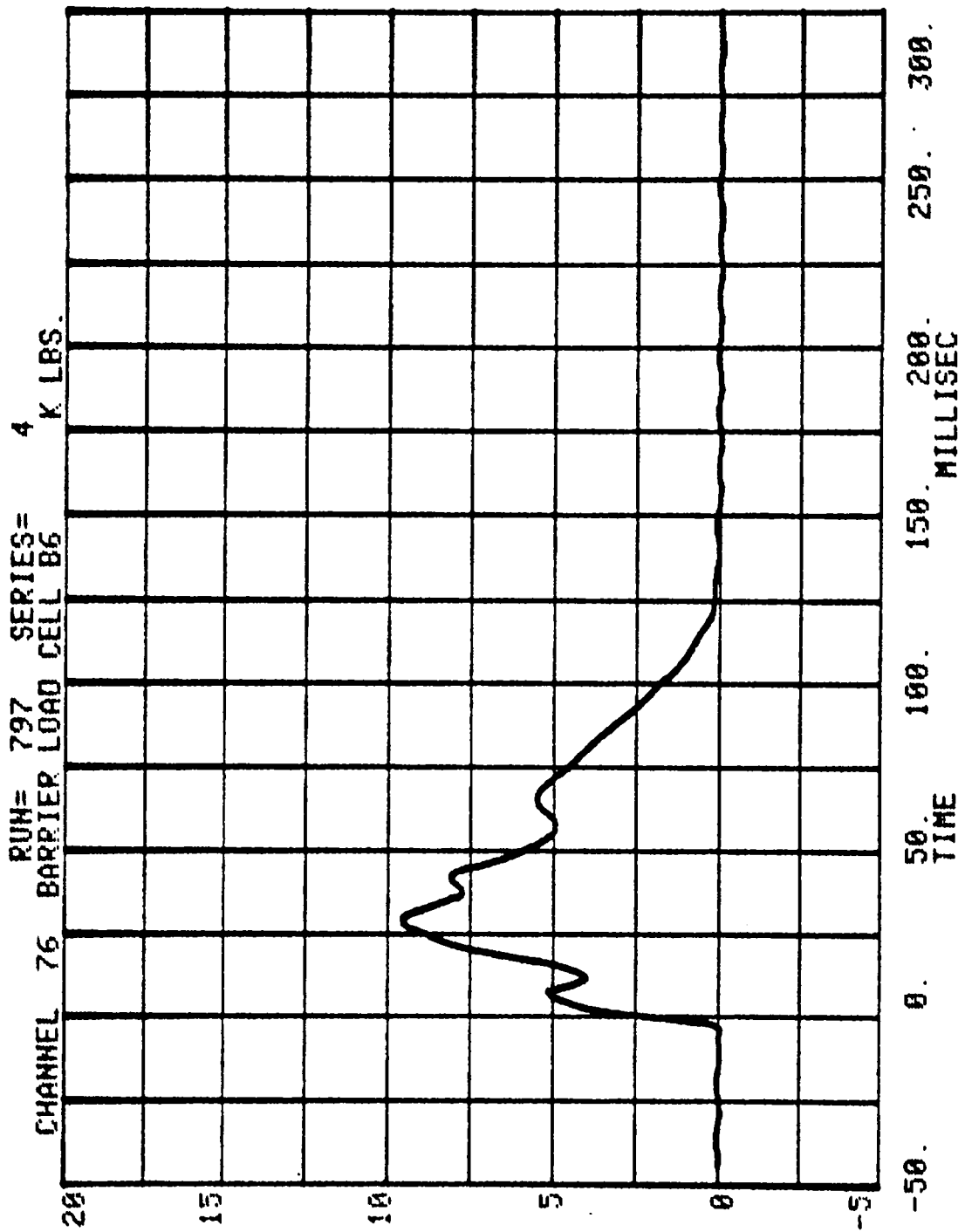
RUN= 797 SERIES= 4

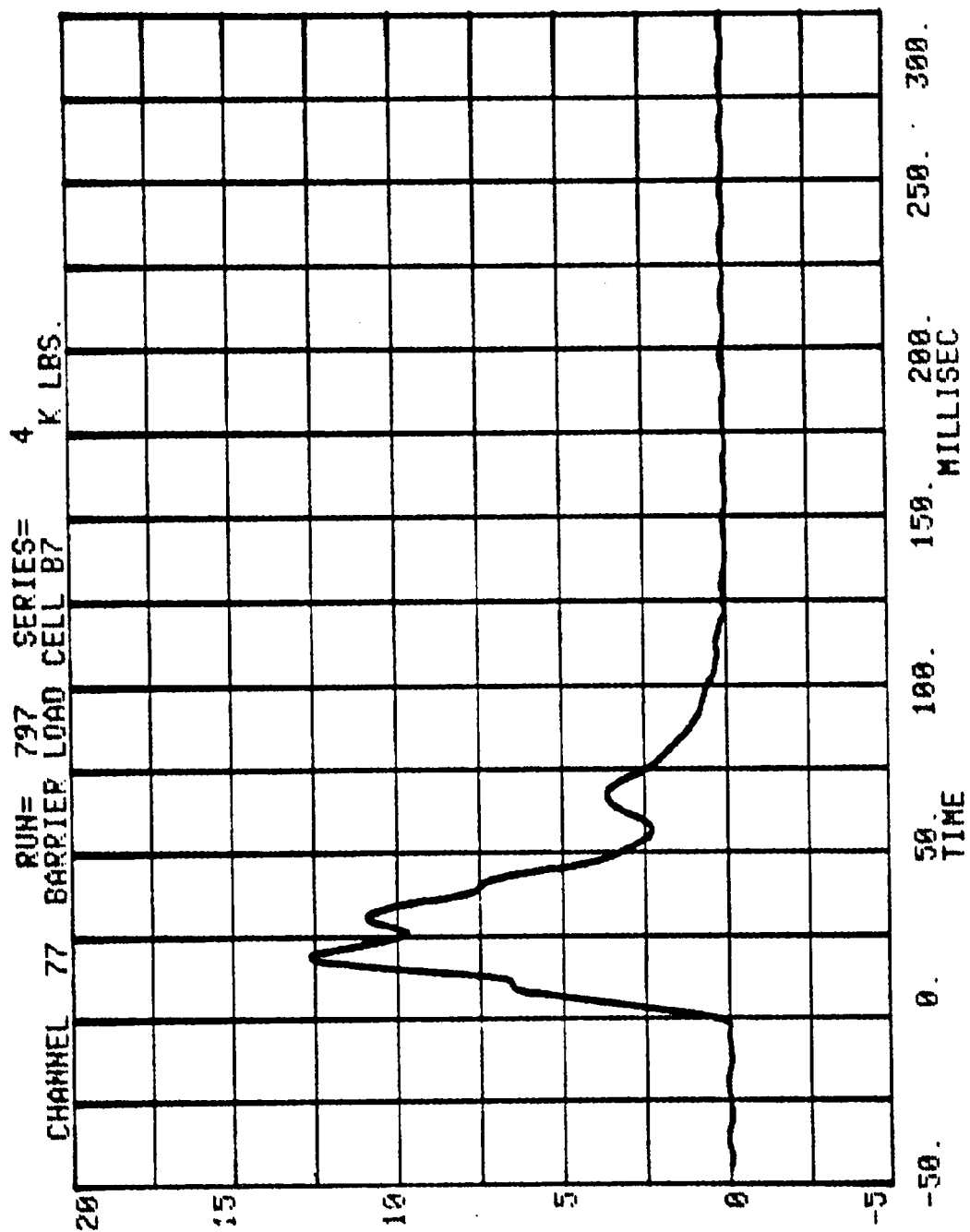
K LBS.

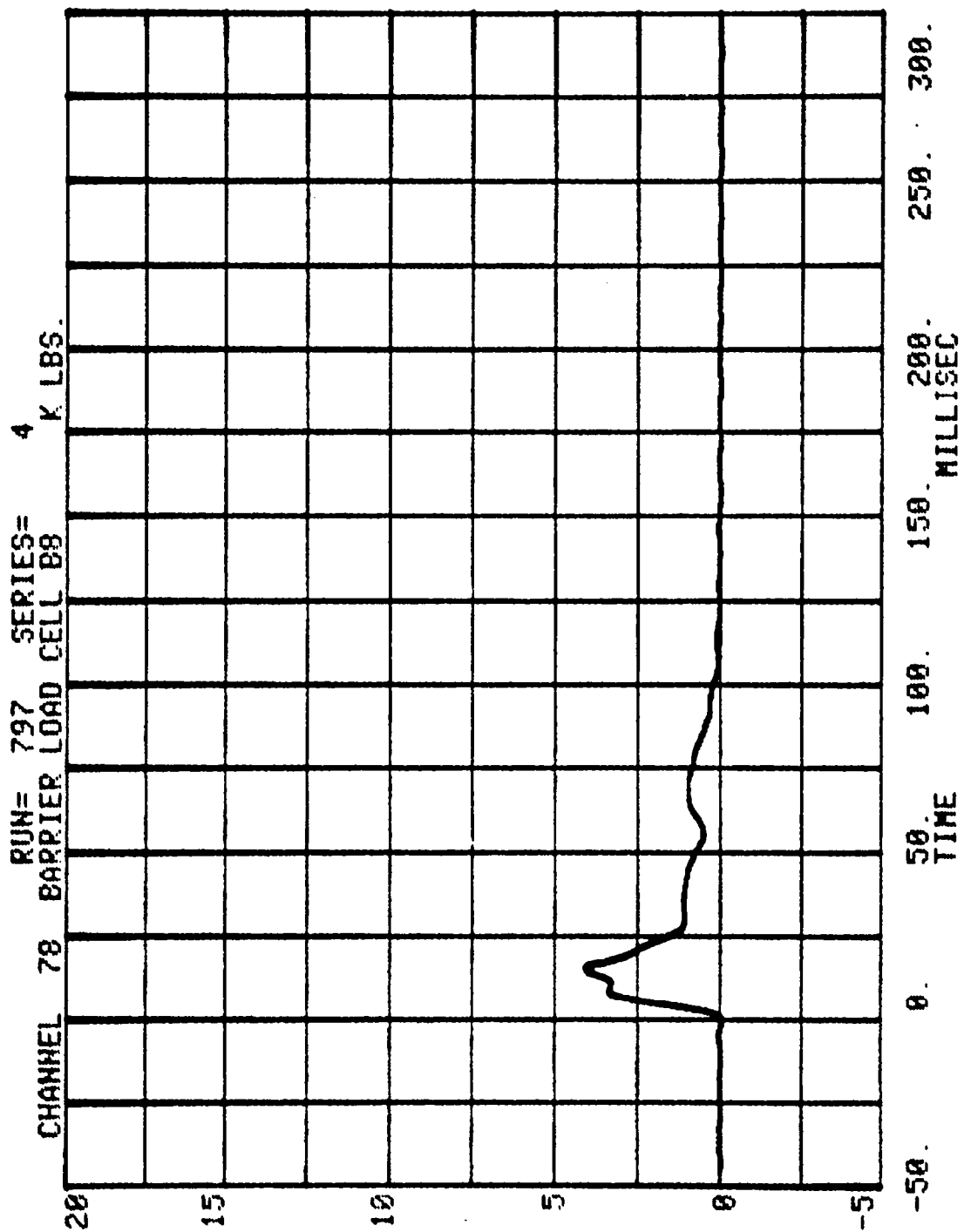


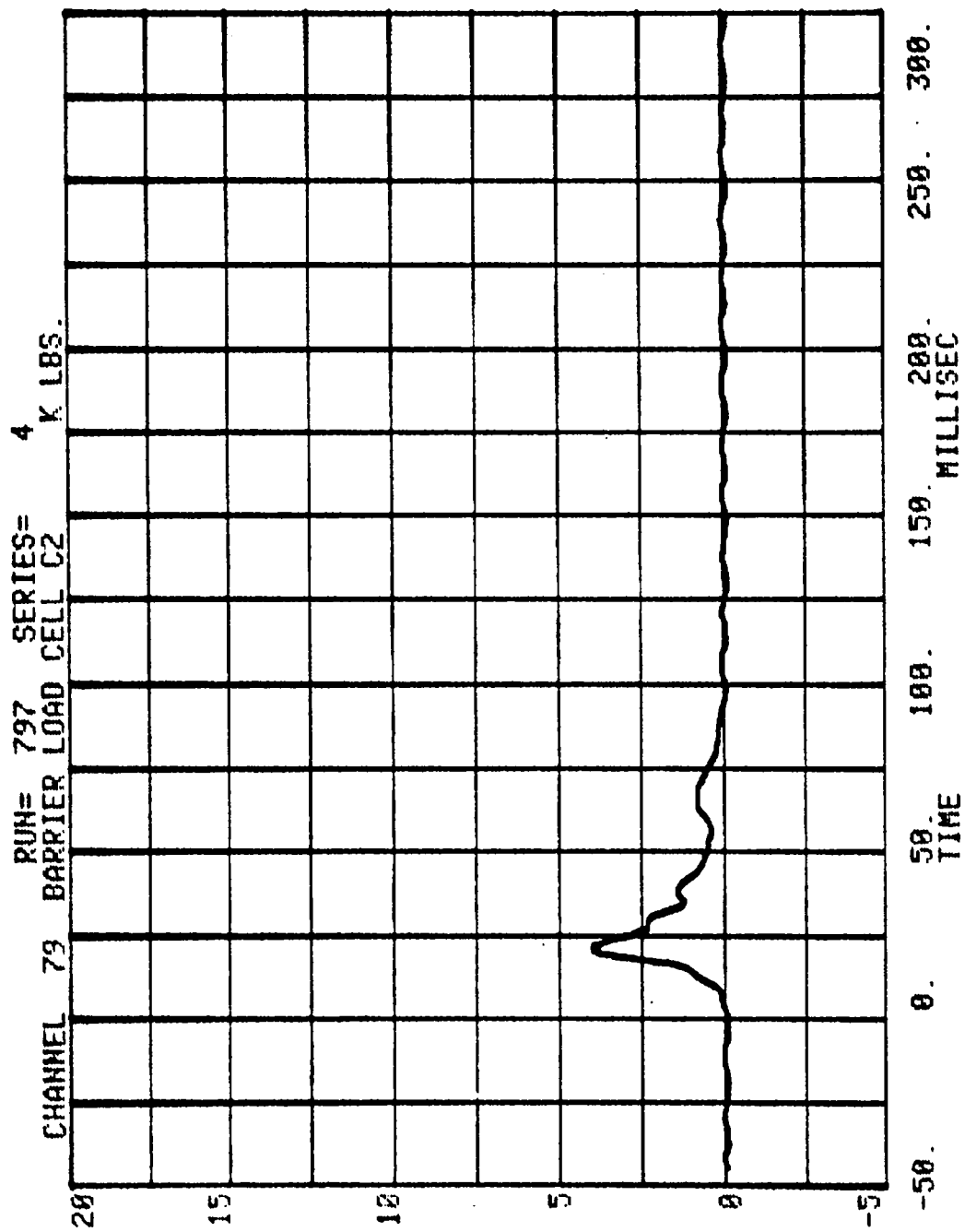
TIME
-50. 0. 50. 100. 150. 200. 250. 300.







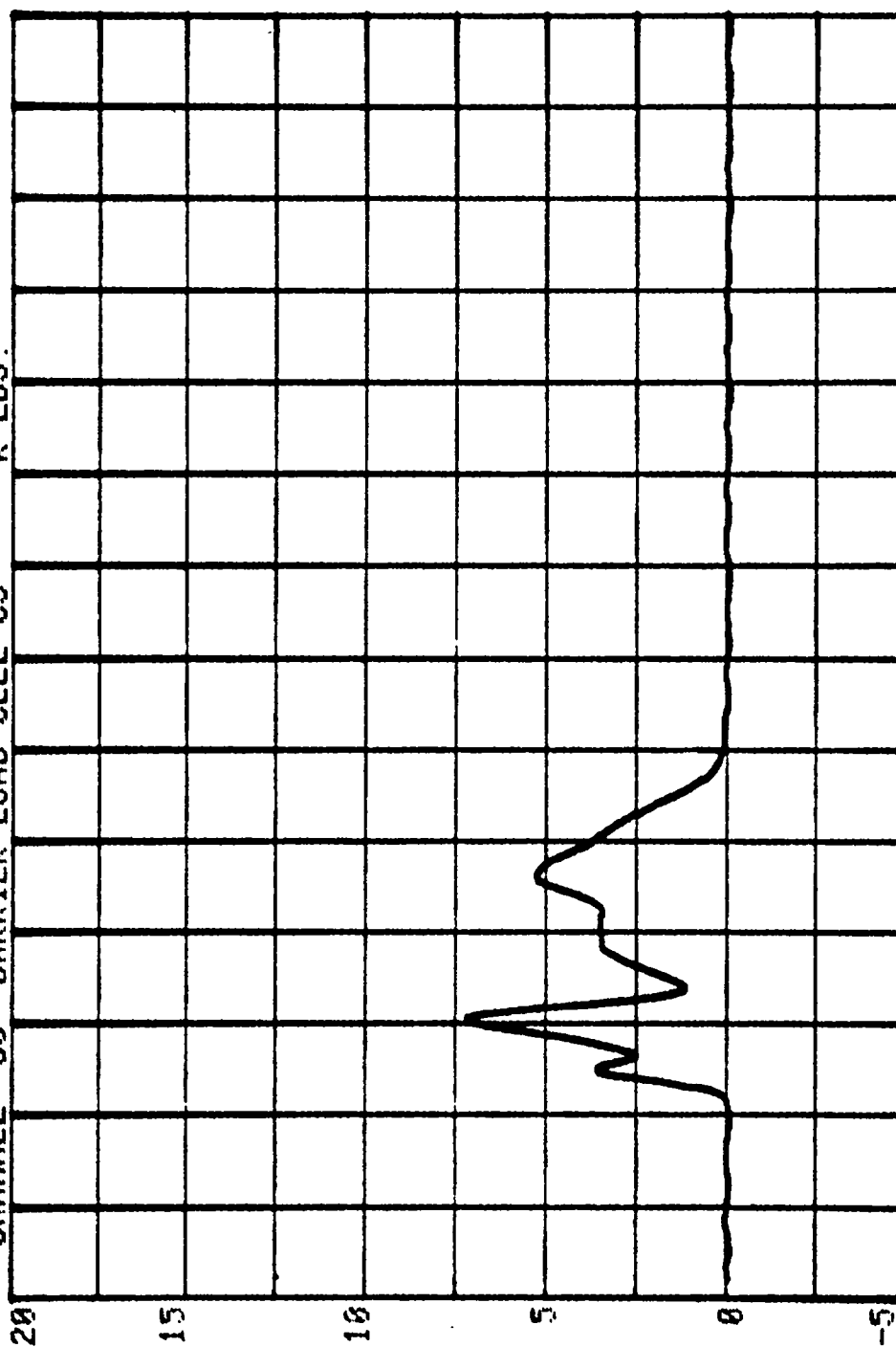




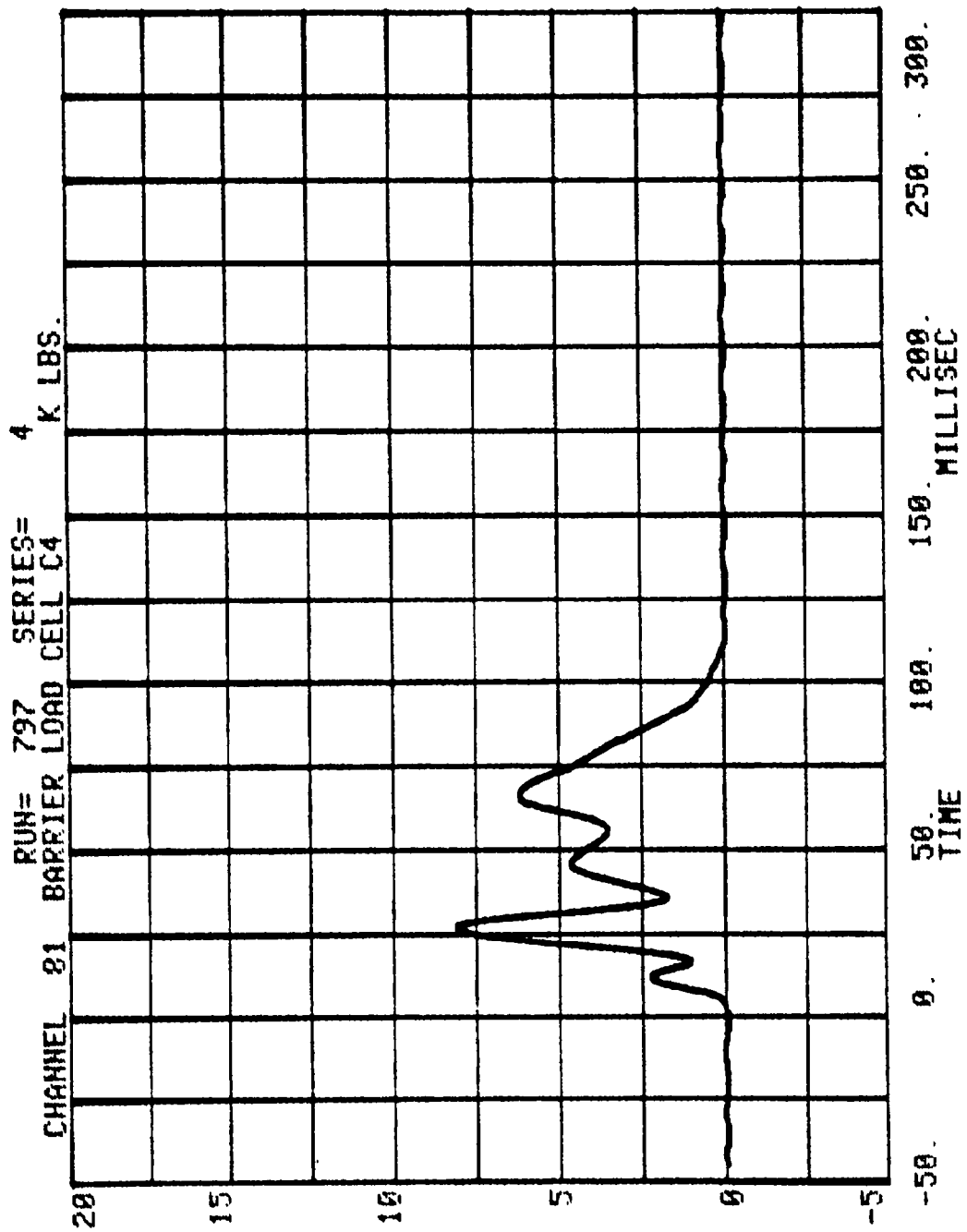
CHANNEL 80 BARRIER LOAD CELL C3

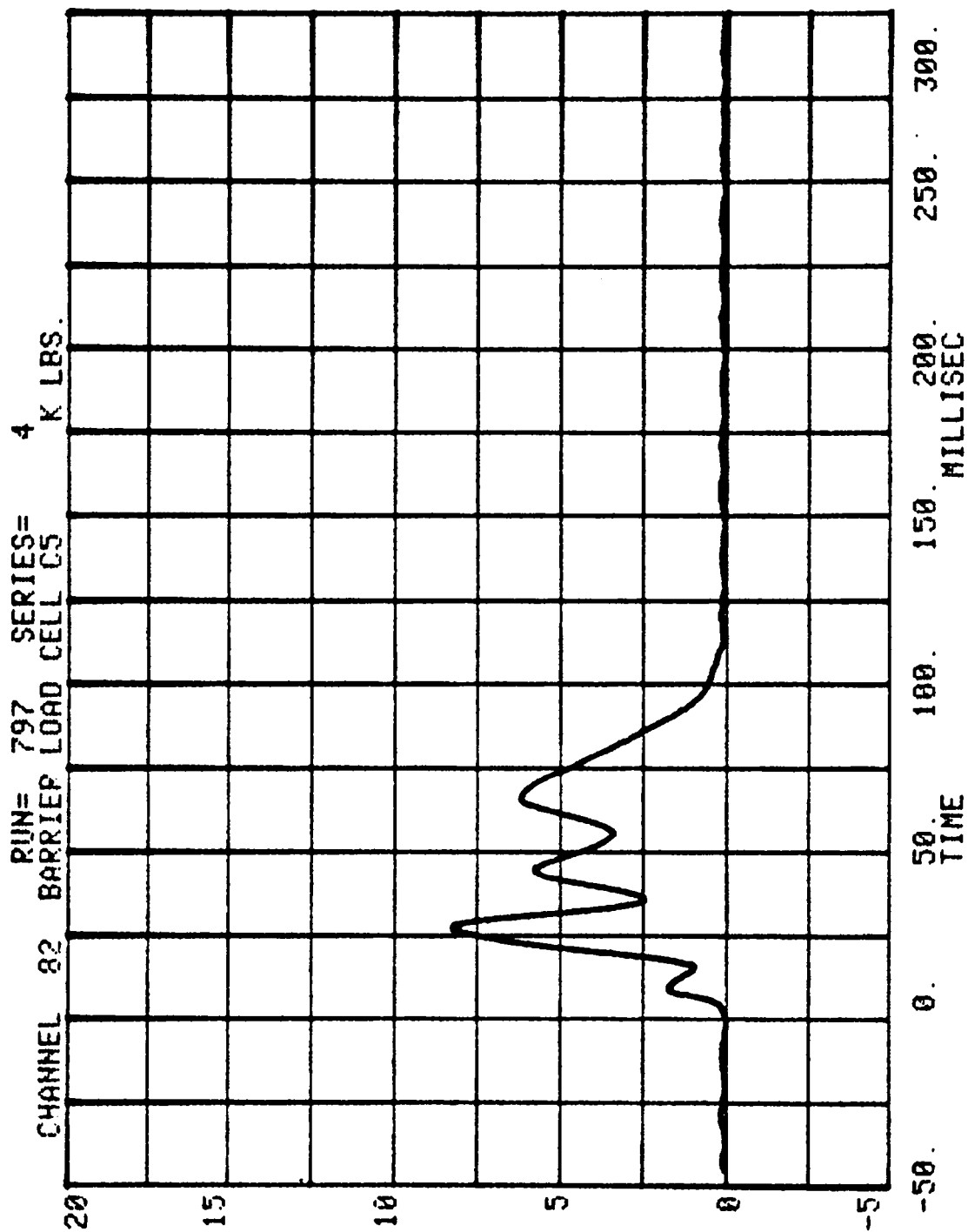
RUN= 797 SERIES= 4

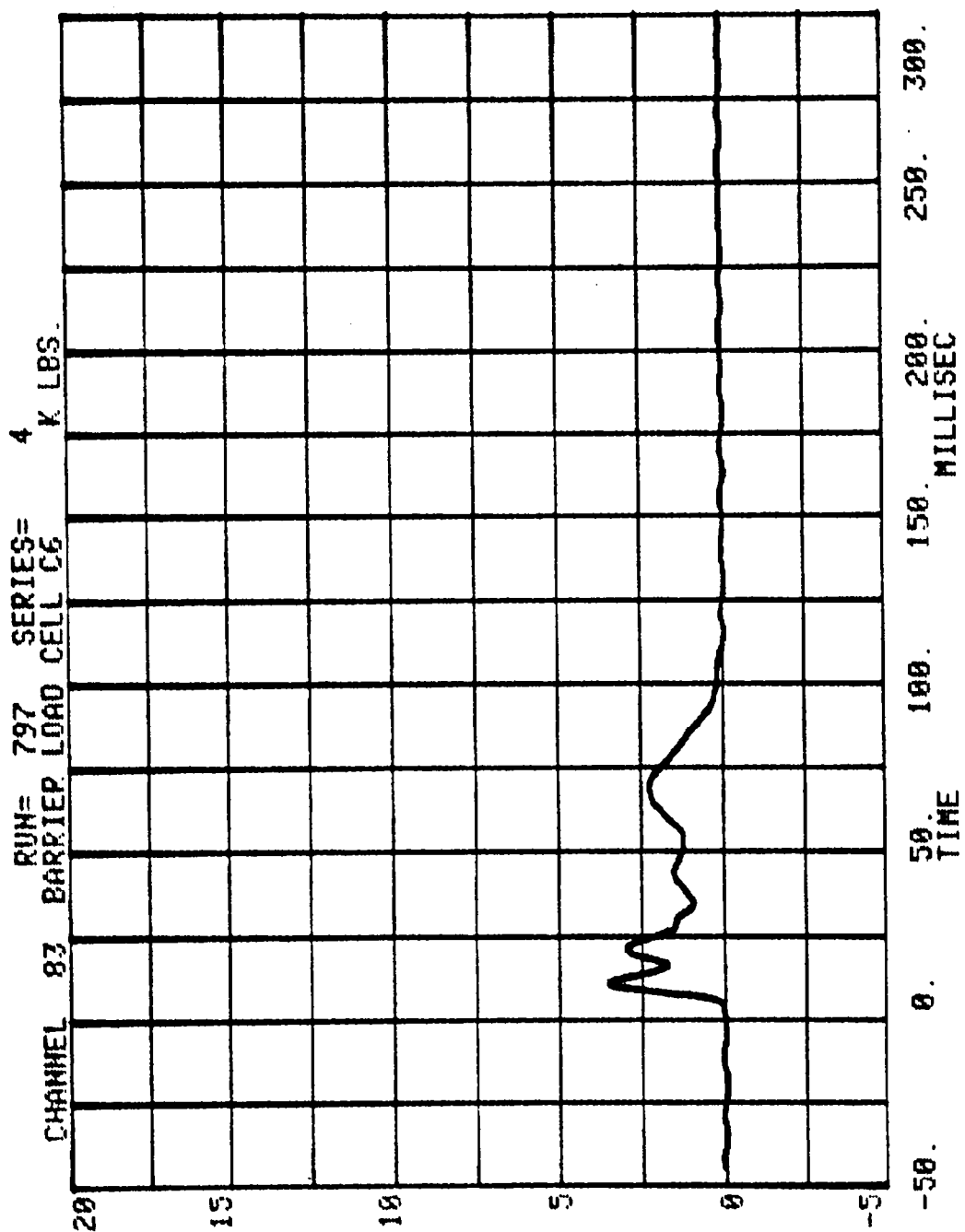
K LBS.



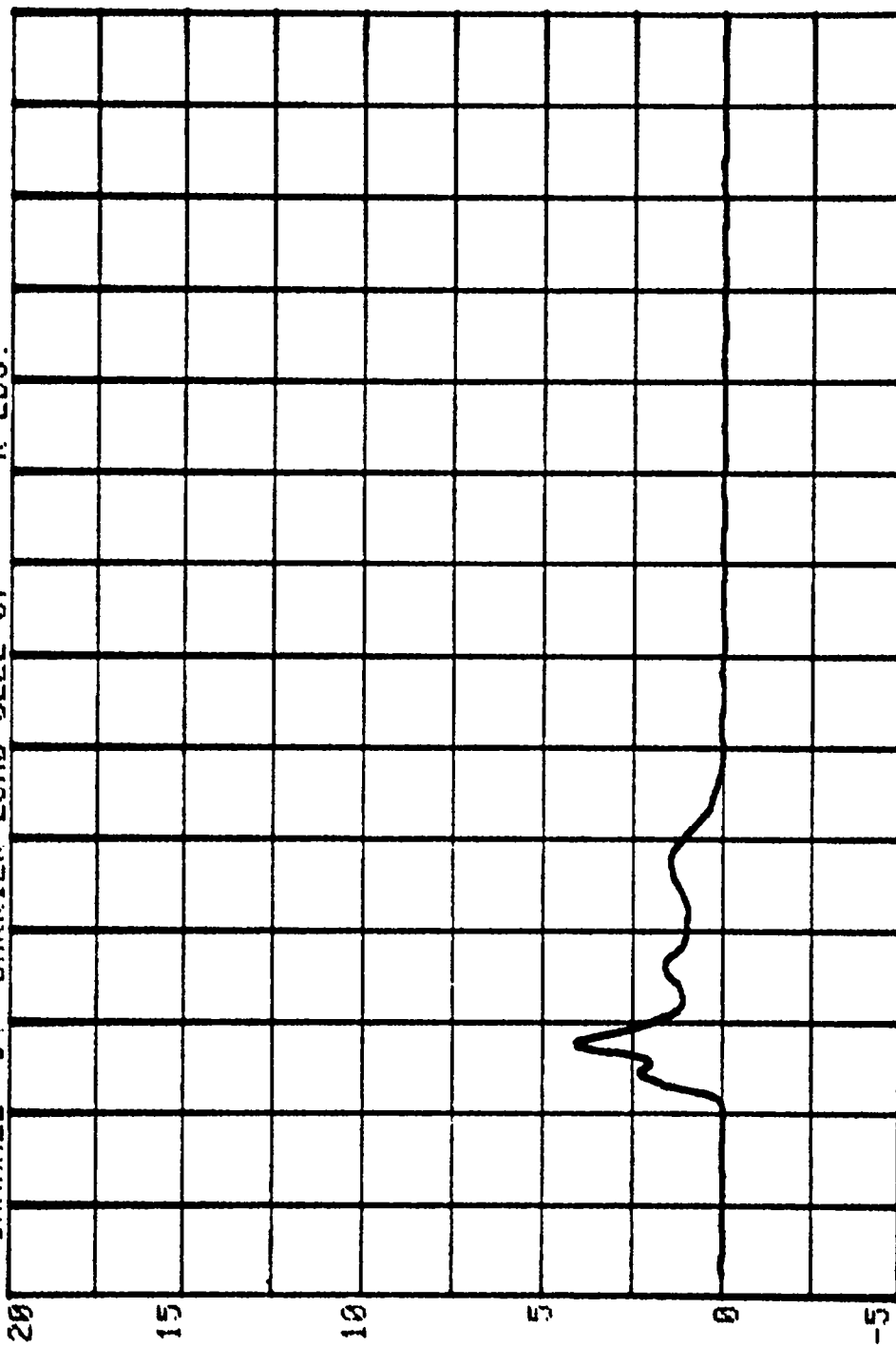
TIME
-50. 0. 50. 100. 150. 200. 250. 300.
MILLISEC



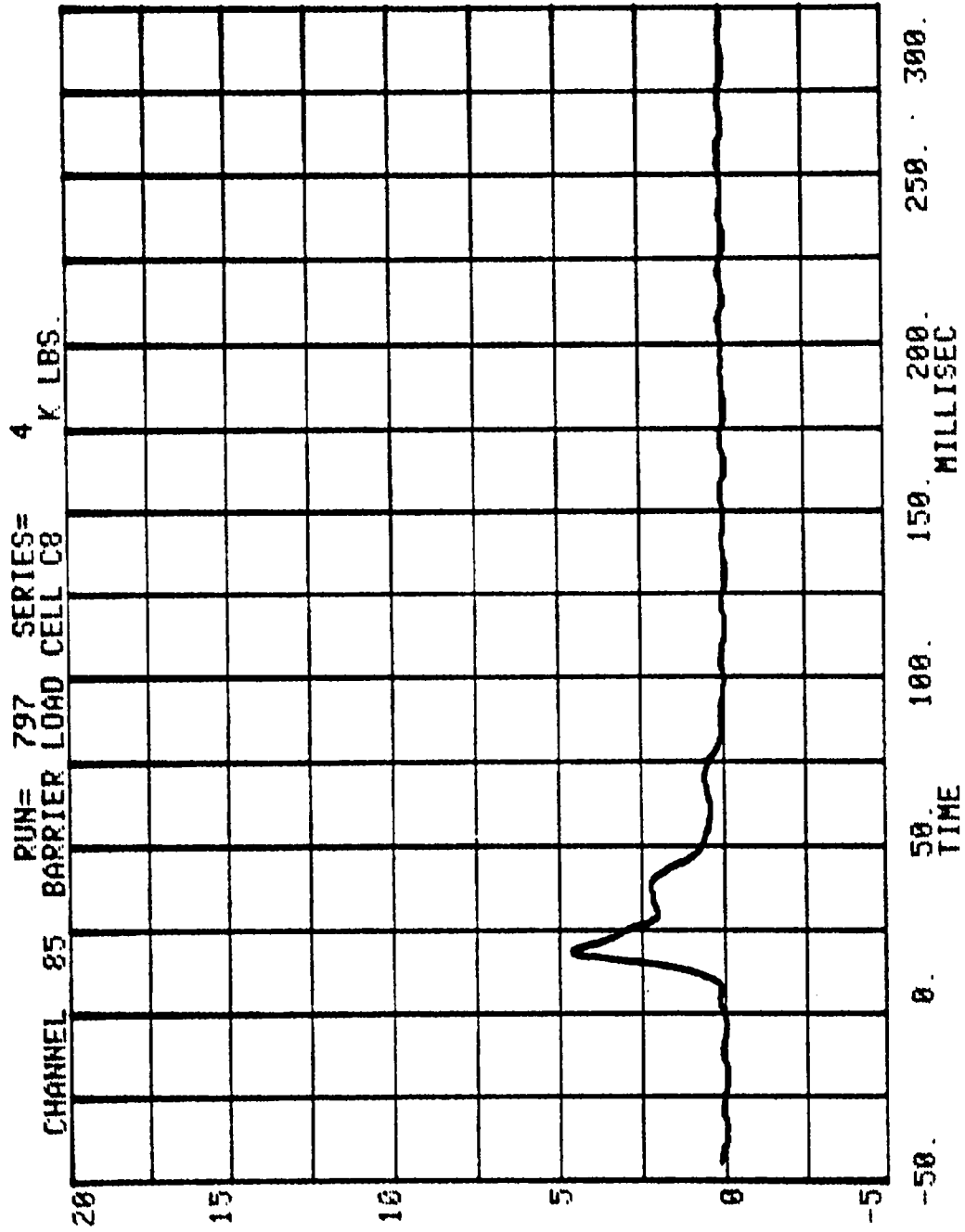


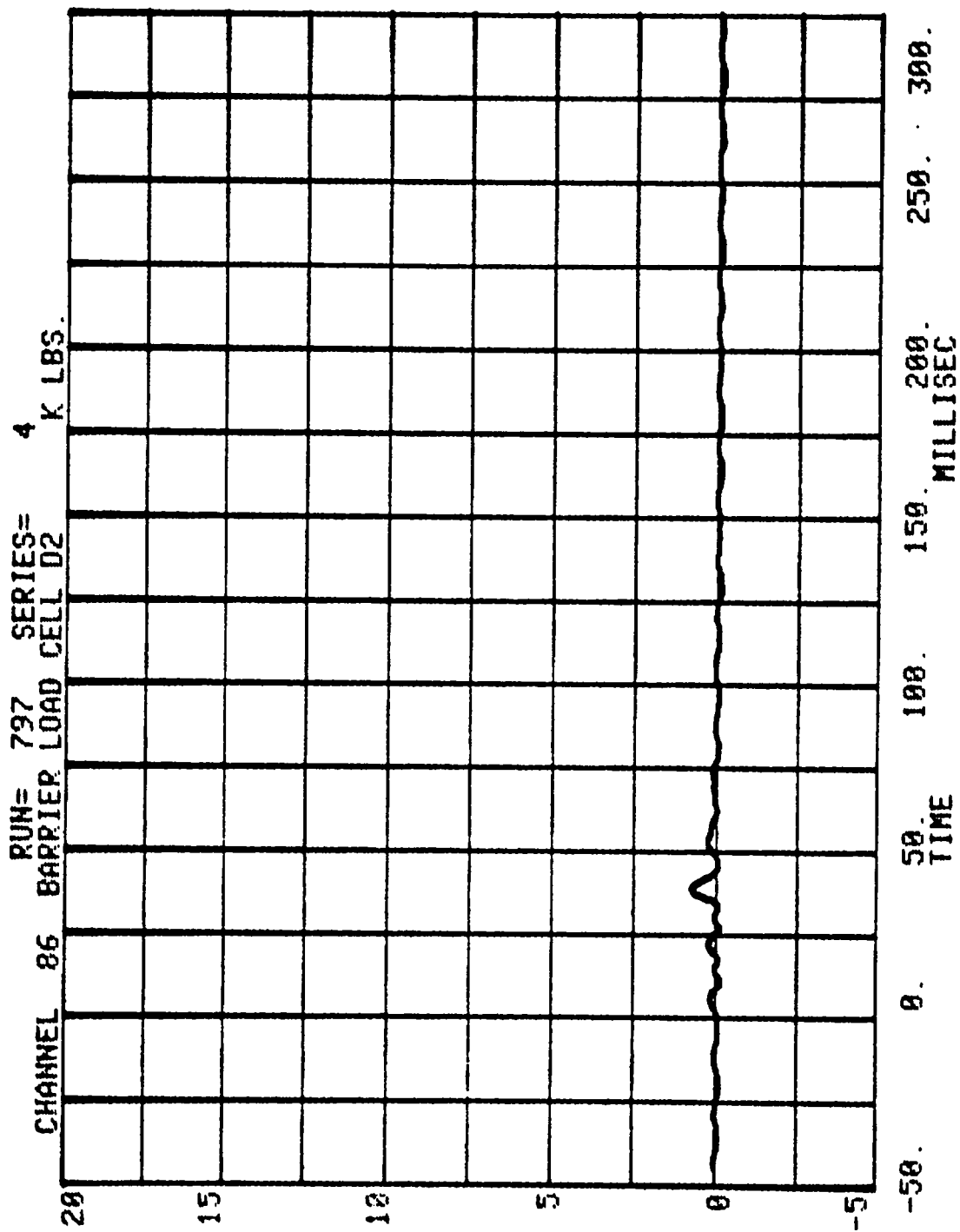


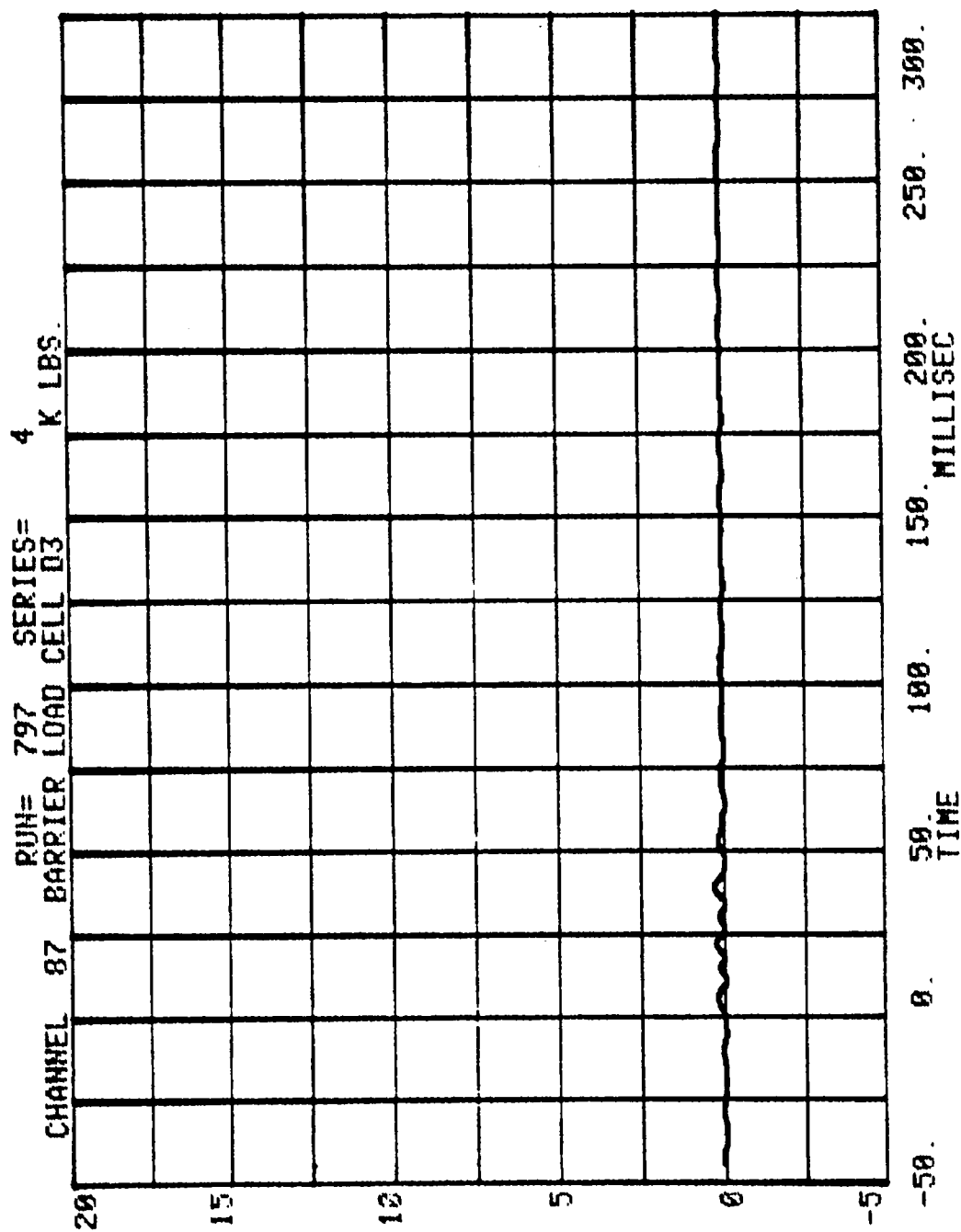
CHANNEL 84 BARRIER LOAD CELL C7 RUN= 797 SERIES= 4 K LBS.



-50. 0. 50. 100. 150. 200. 250. 300.
TIME
MILLISEC





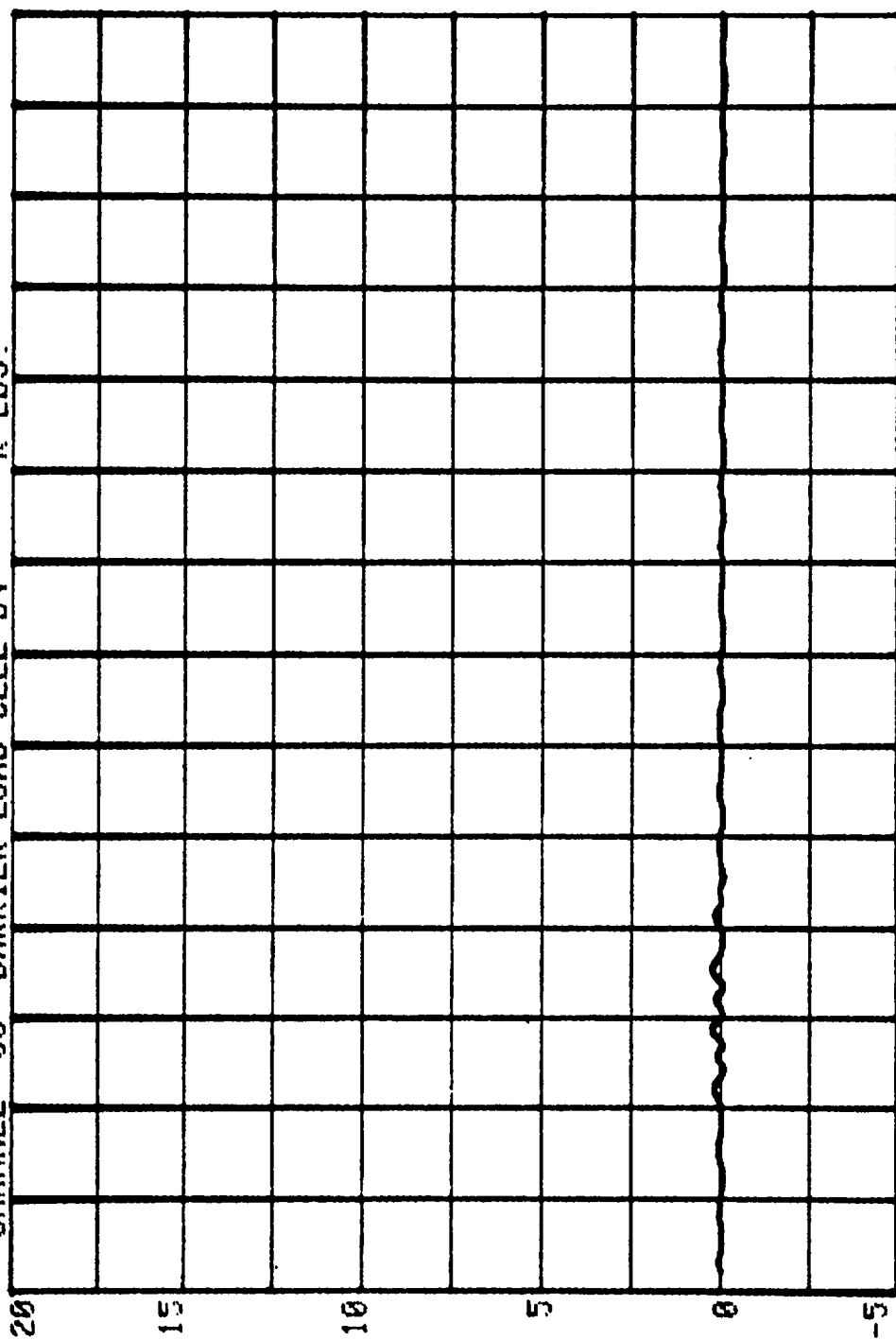


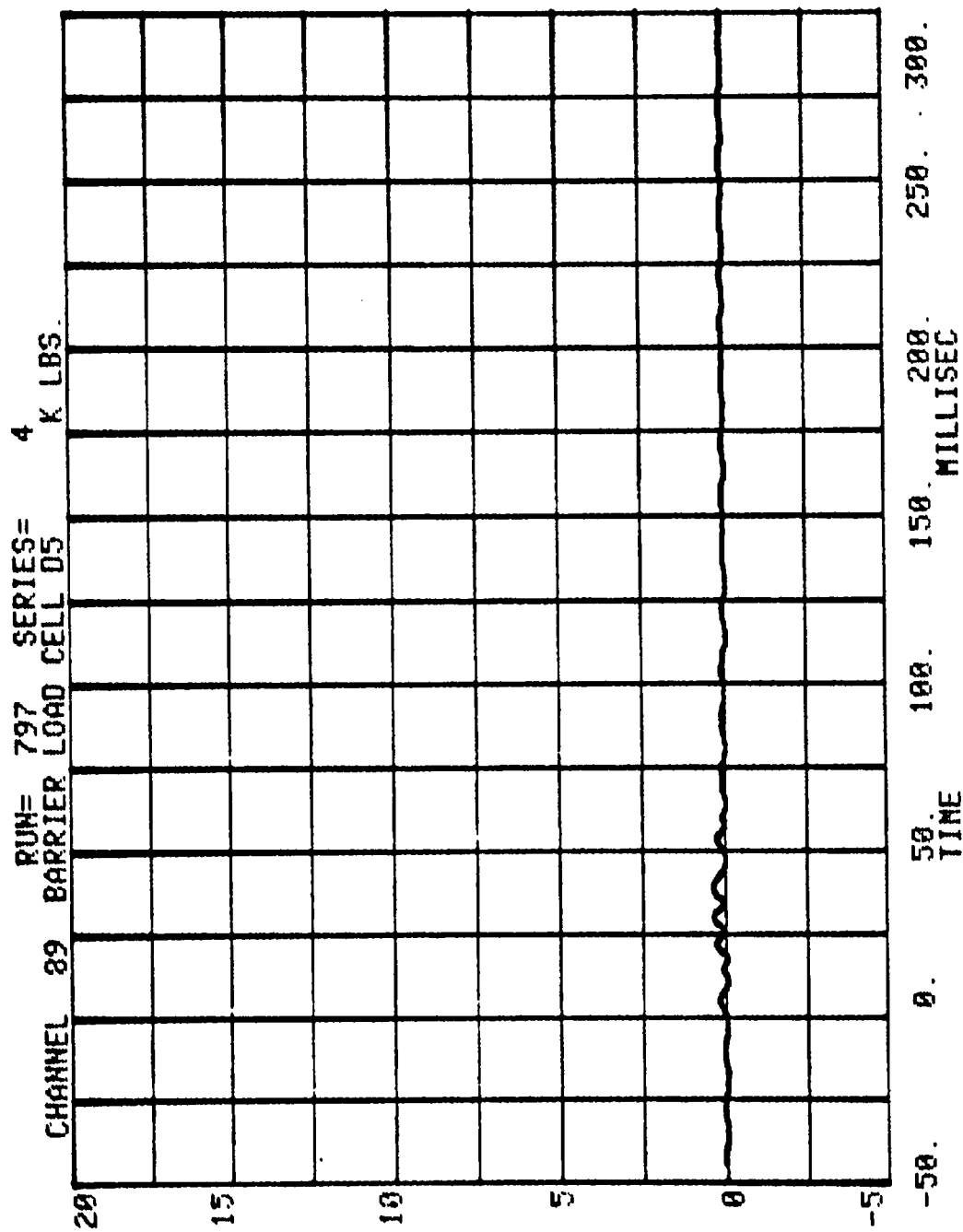
CHANNEL 88 BARRIER LOAD CELL 04

RUN= 797 SERIES=

4

K LBS.



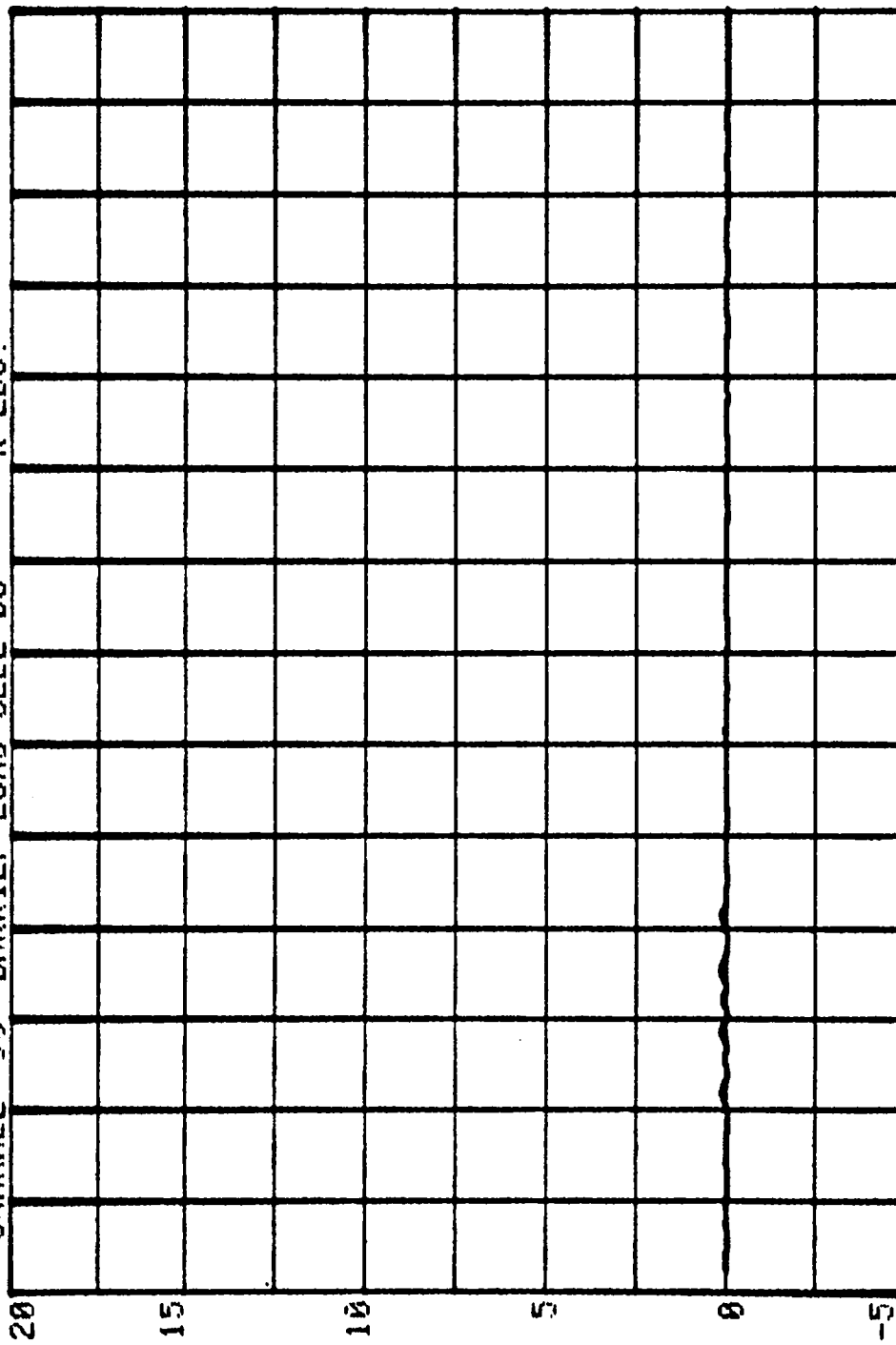


CHANNEL 99 BARRIER LOAD CELL D6

RUN= 797 SERIES=

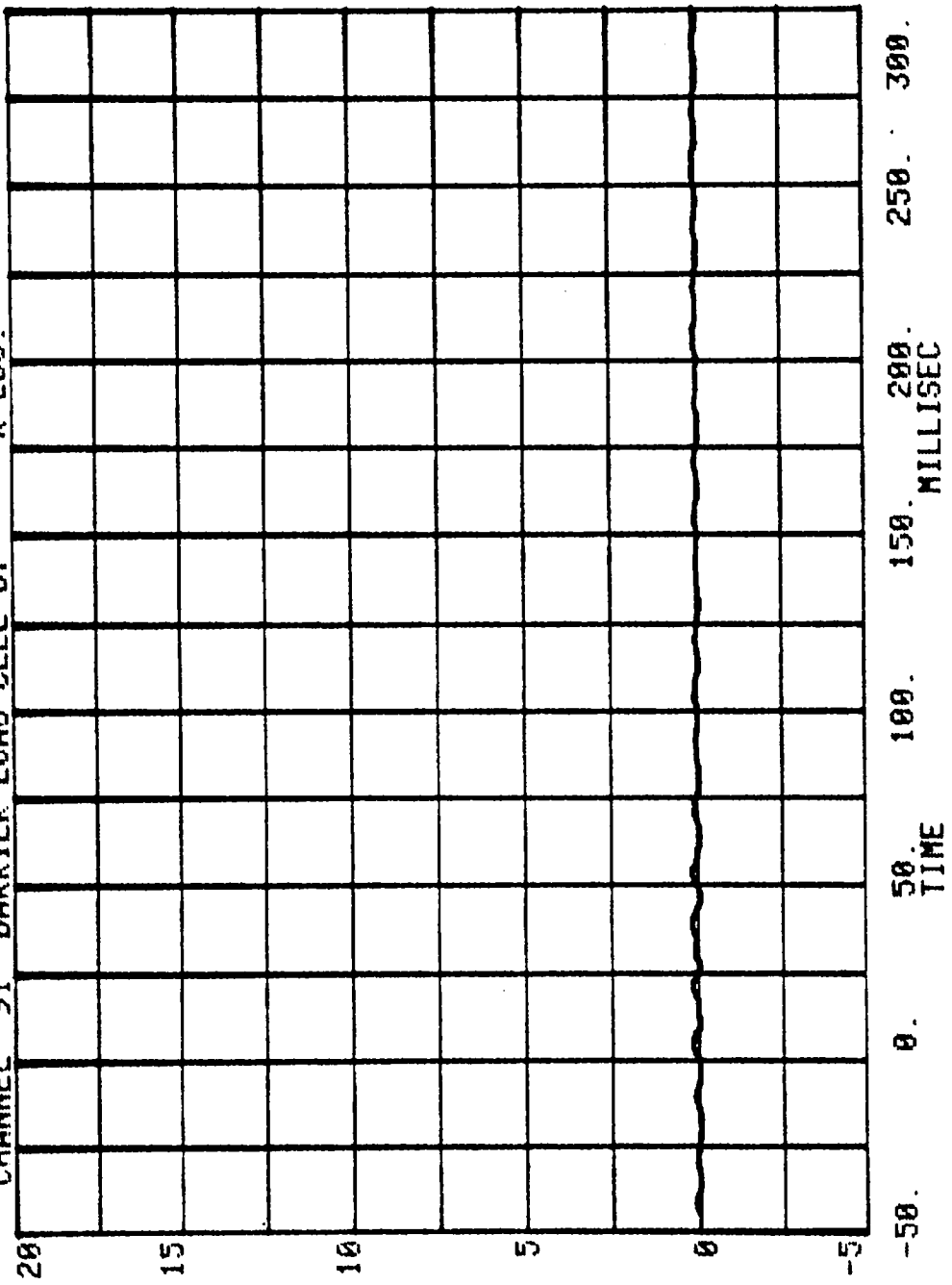
4

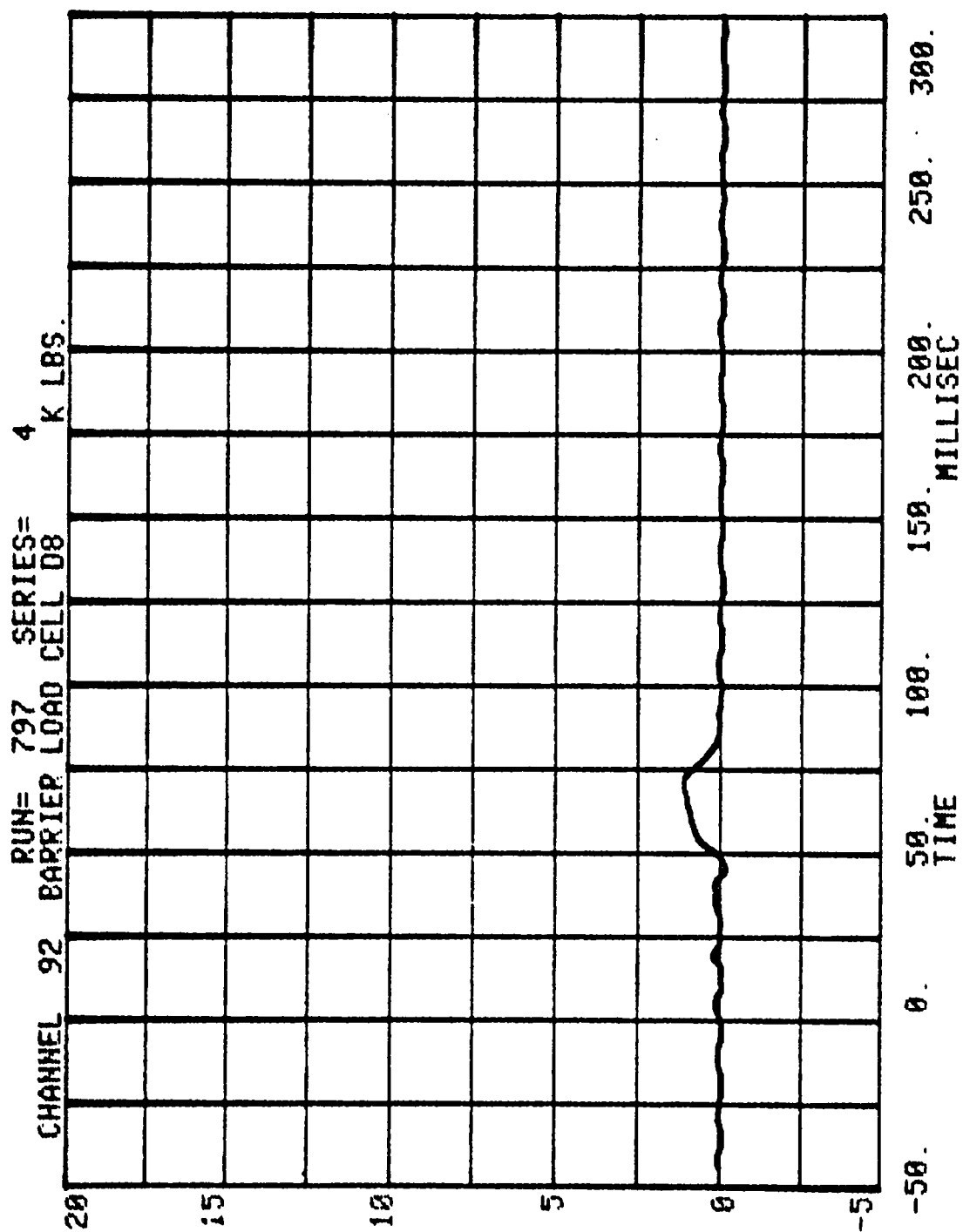
K LBS.



-50. 0. 50. 100. 150. 200. 250. 300.
TIME
MILLISEC

CHANNEL 91 RUN= 797 SERIES= 4
BARRIER LOAD CELL 07 K LBS.





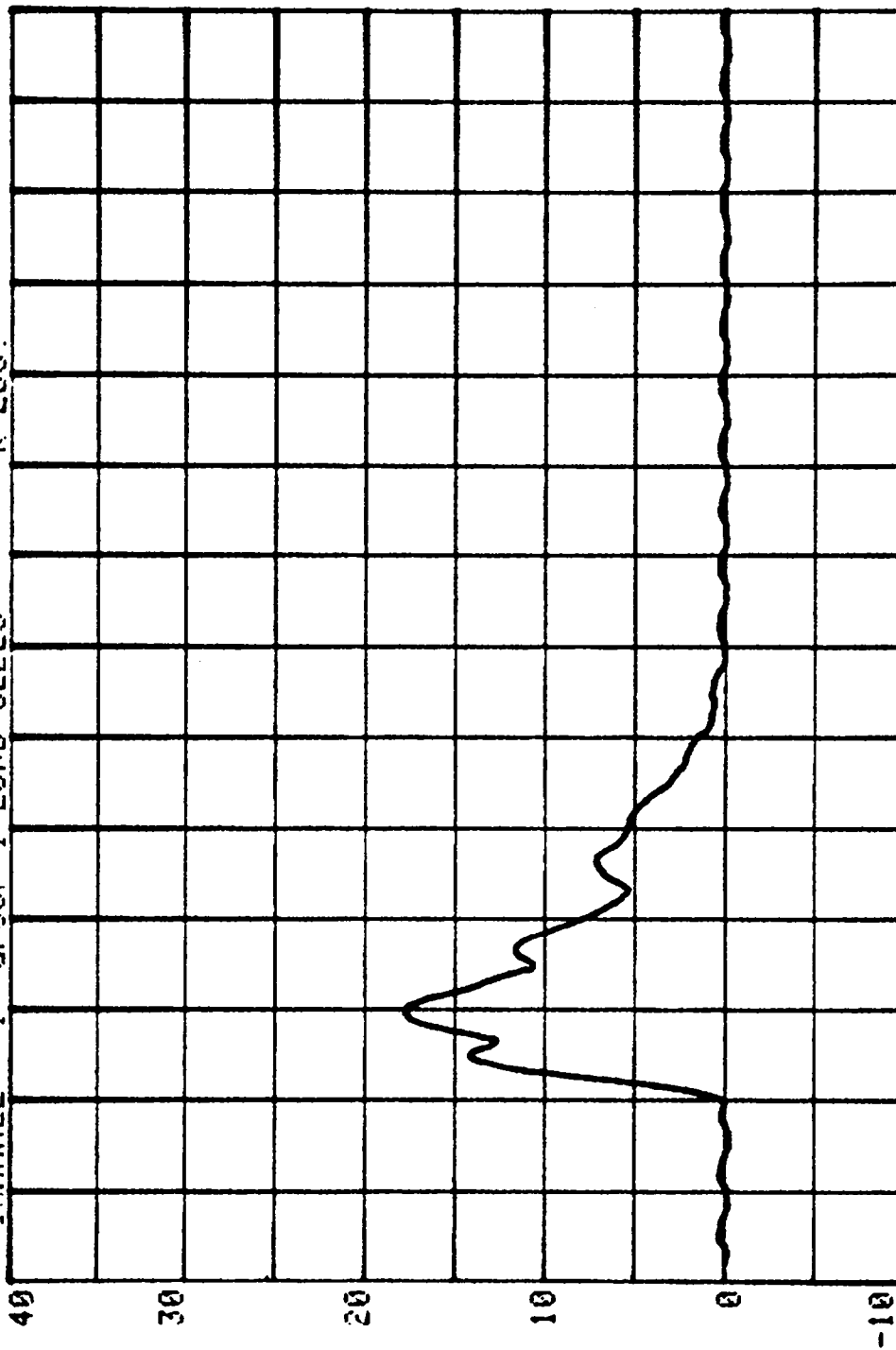
CRASHWORTHINESS BARRIER TEST

CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	- .207	17.746 K LBS.
2	GROUP 2 LOAD CELLS	- .312	37.463 K LBS.
3	GROUP 3 LOAD CELLS	- .192	15.556 K LBS.
4	GROUP 4 LOAD CELLS	- .412	10.087 K LBS.
5	GROUP 5 LOAD CELLS	- .426	17.891 K LBS.
6	GROUP 6 LOAD CELLS	- .361	8.941 K LBS.
7	TOTAL LOAD CELL SUM	- .269	95.366 K LBS.

CHANNEL 1 GROUP 1 LOAD CELLS

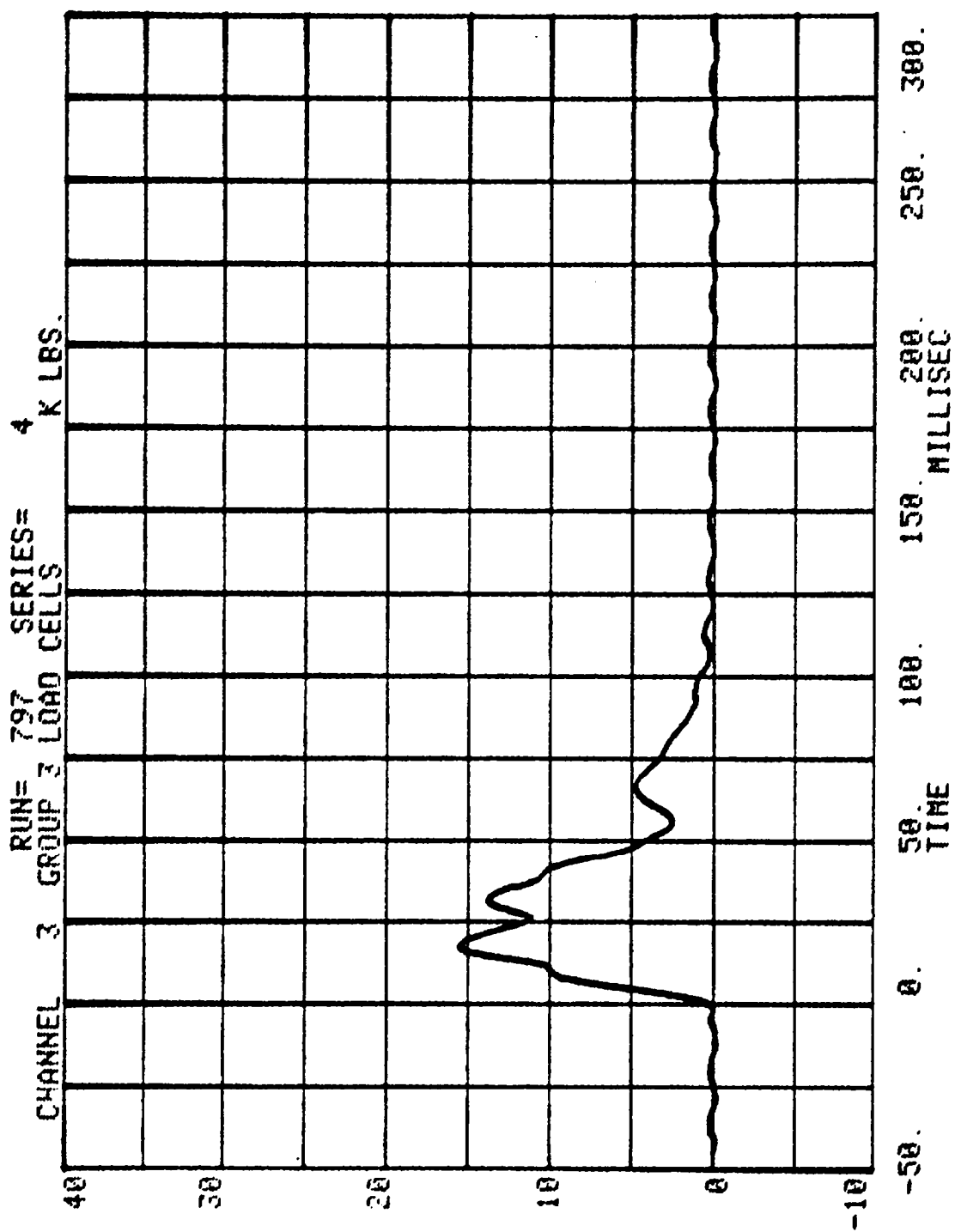
RUN= 797 SERIES= 4

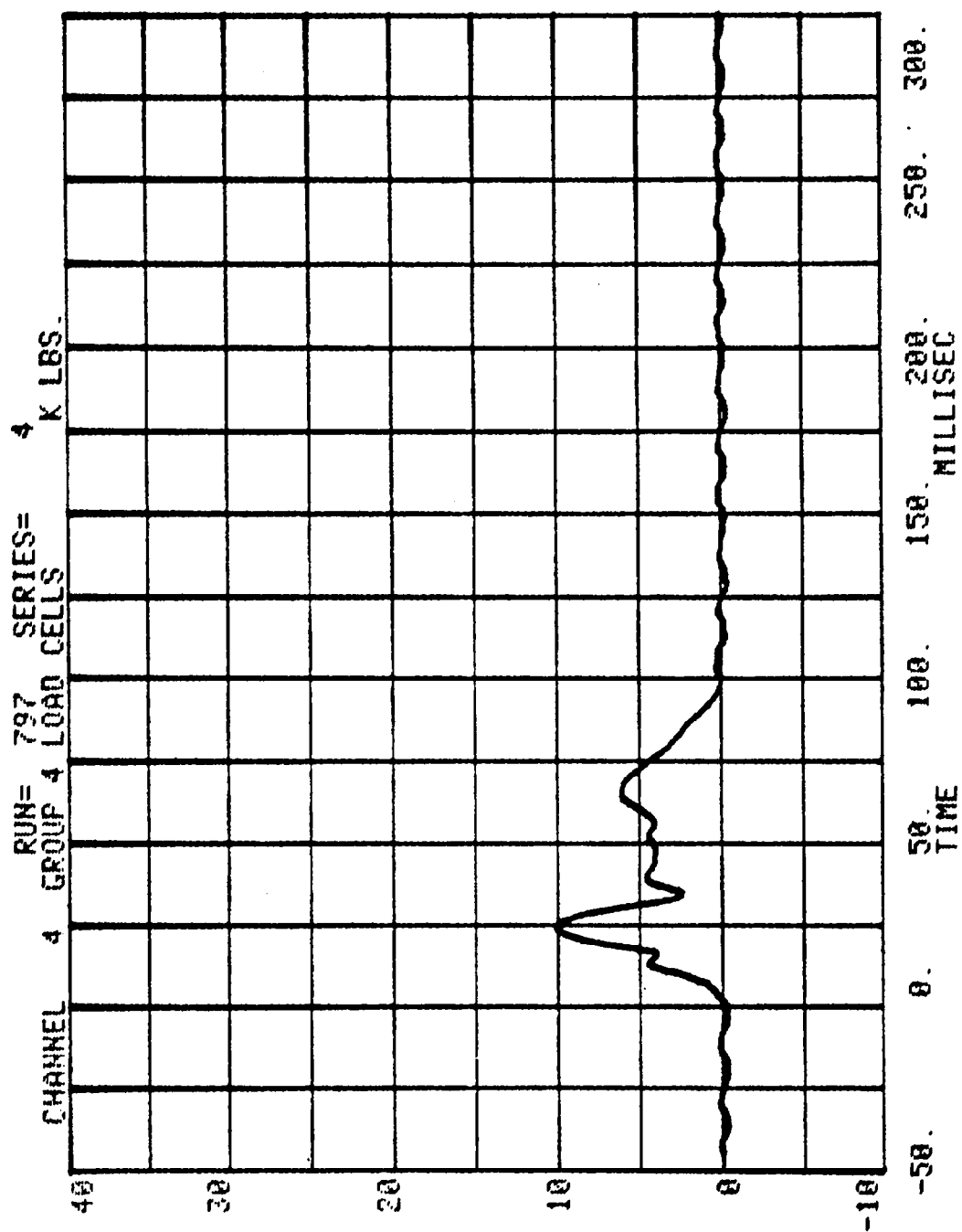
K LBS.



-50. 0. 50. 100. 150. 200. 250. 300.

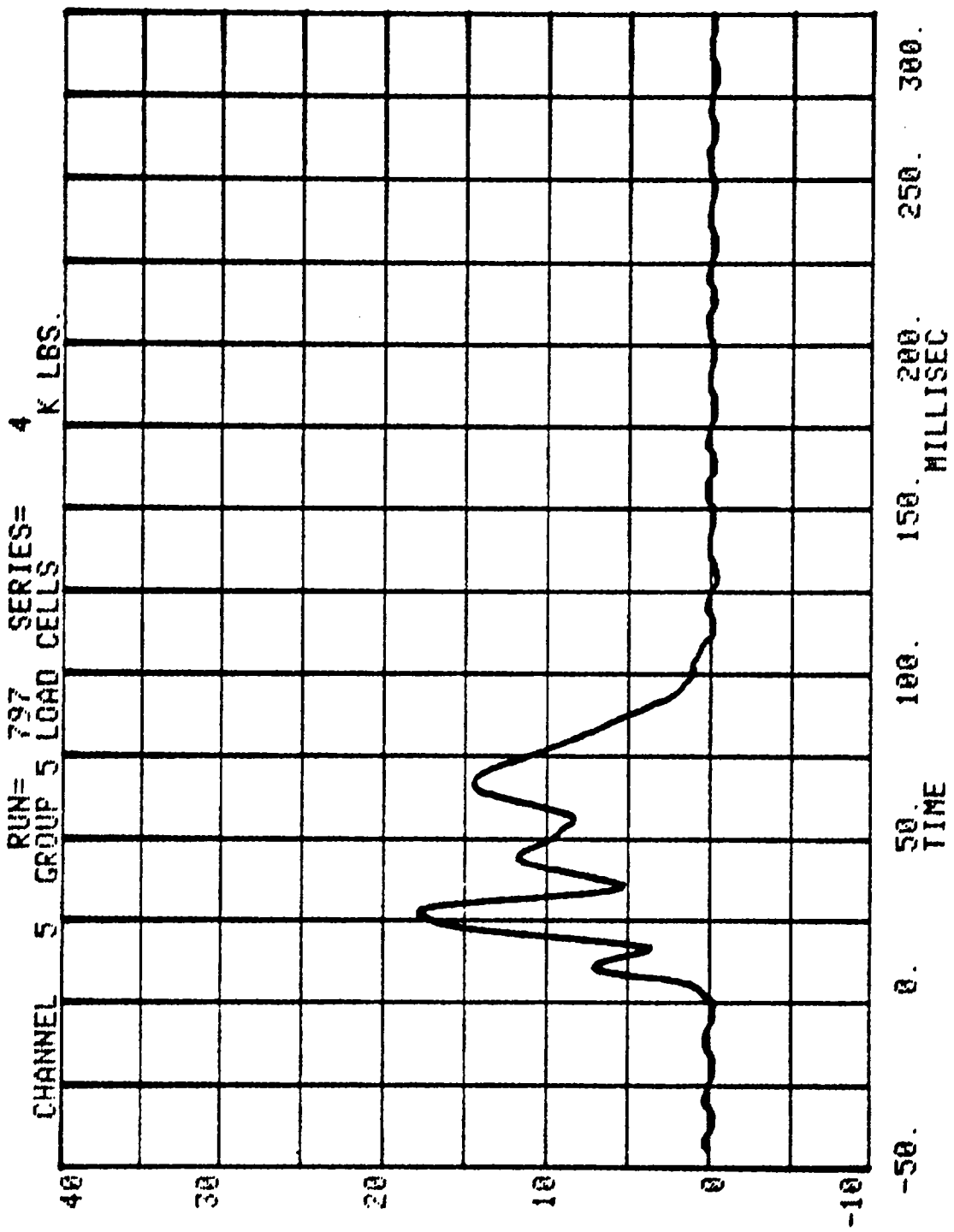
TIME





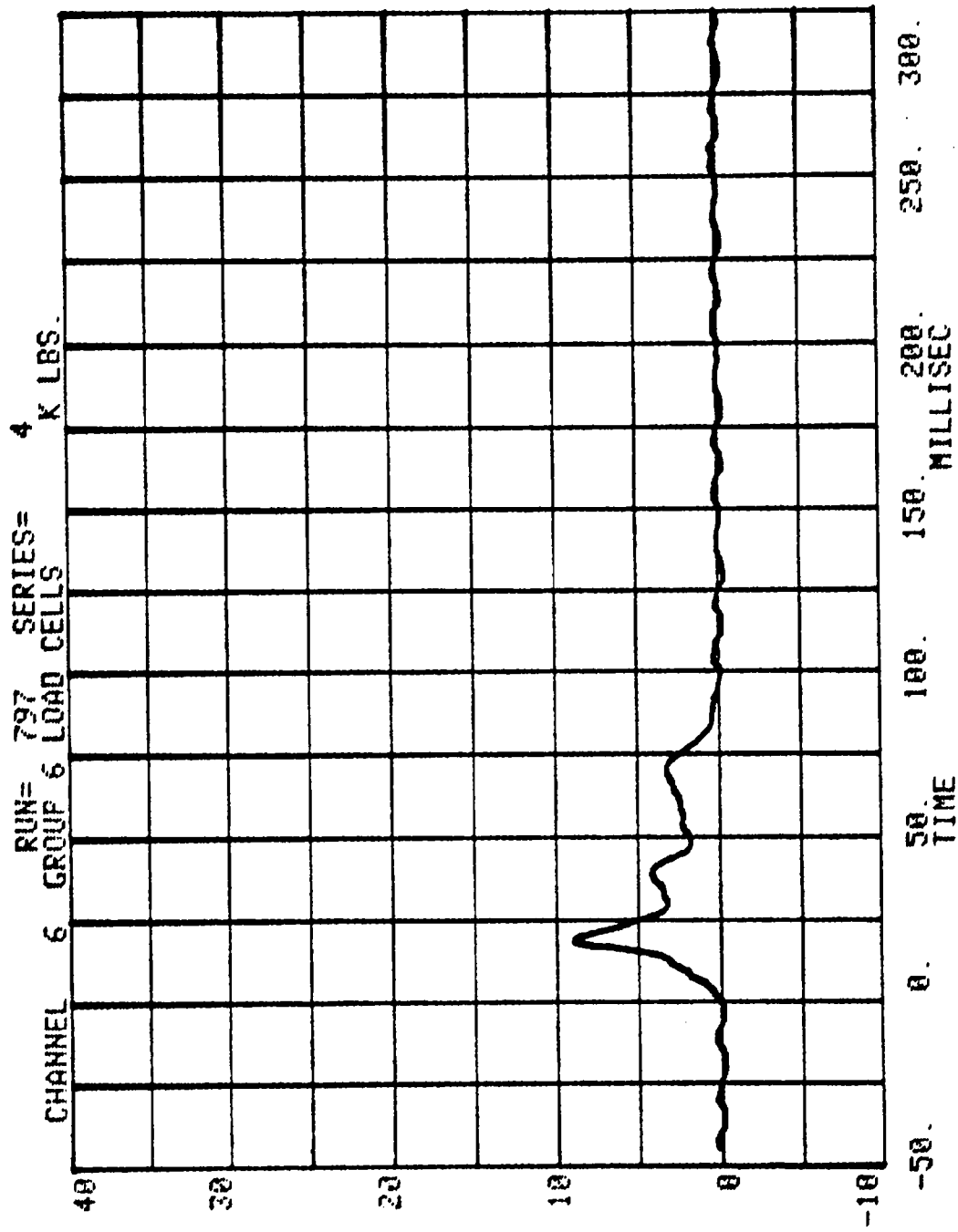
B-90

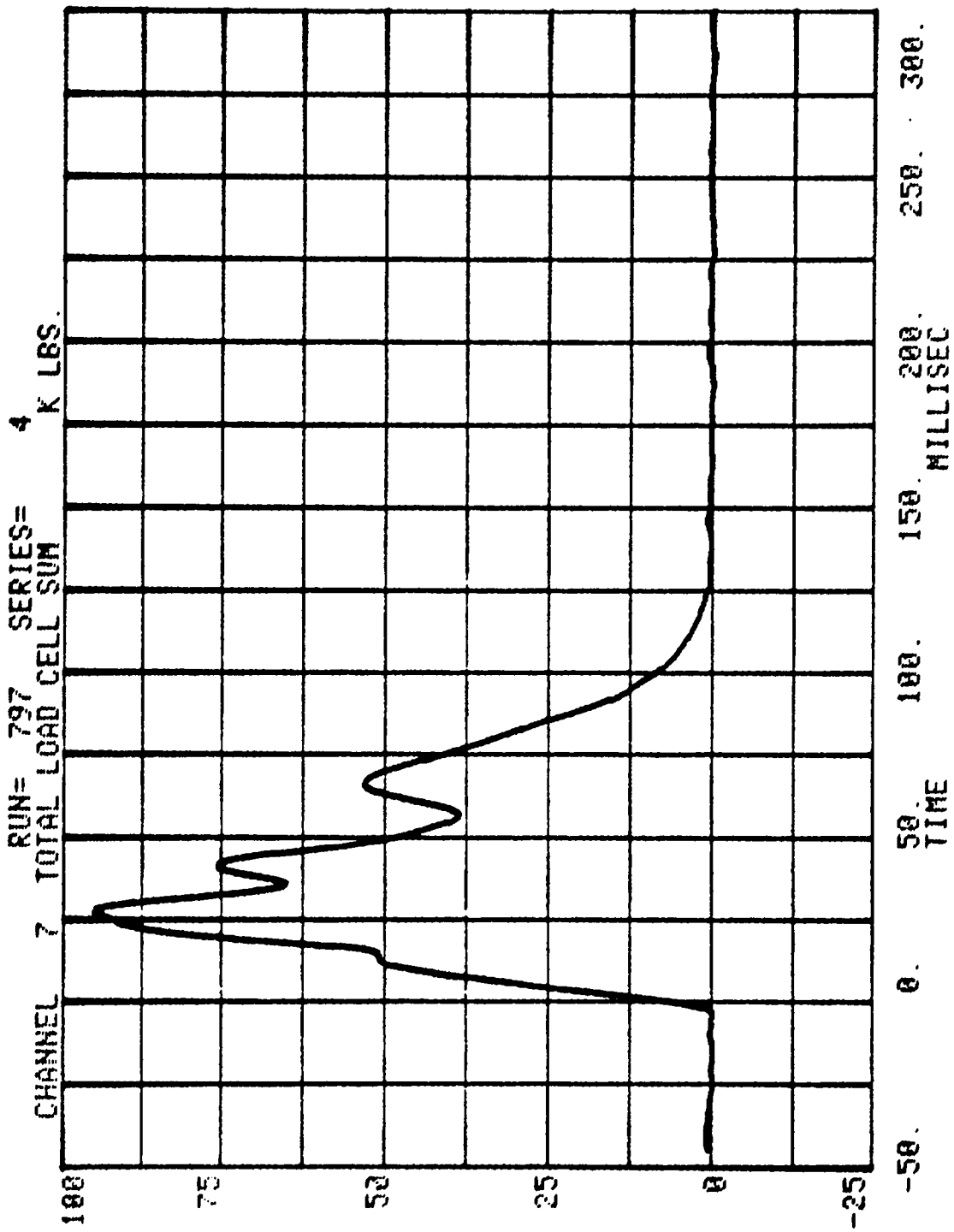
7581-5



B-91

7581-5





TEST NO. Y23-040-797

DUMMY DATA

	FILTER CHANNEL CLASS
HEAD ACCELERATIONS	1000
CHEST ACCELERATIONS	180
FEMUR FORCES	600

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

CRASHWORTHINESS BARRIER TEST

RUN= 797

POS#1 HEAD R

HIC=1424.4 FROM T1= .07418 TO T2= .08992

AVERAGE ACCELERATION BETWEEN T1 AND T2= 96.1G'S

EVENT TIME= 300.0 MSEC

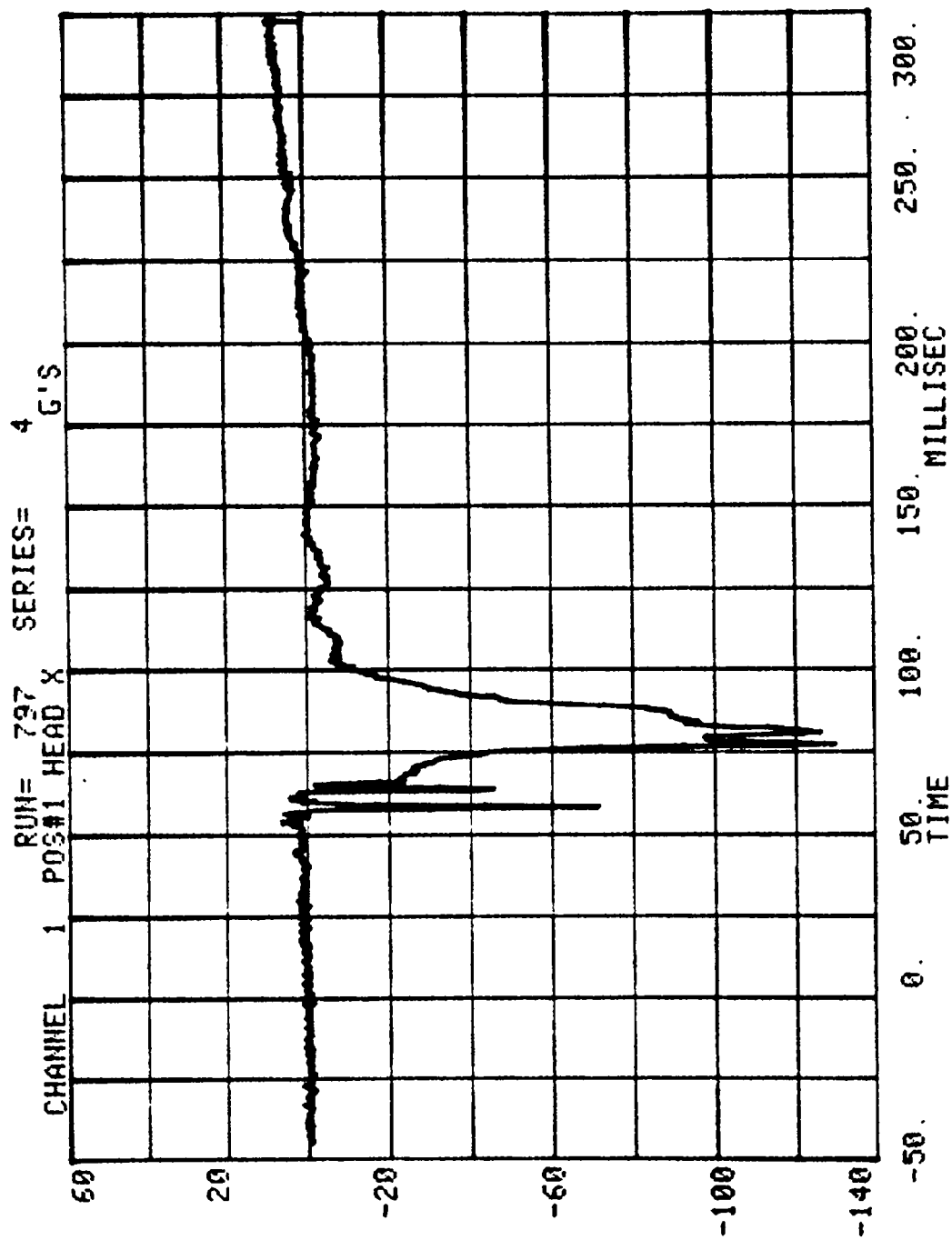
SEVERITY INDEX=1765.3

CRASHWORTHINESS BARRIER TEST

RUN #	797	SERIES #	4
CHANNEL	TITLE		3 MS. CLIPPED PEAK
2	POS#1 CHEST R		78.169 G'S

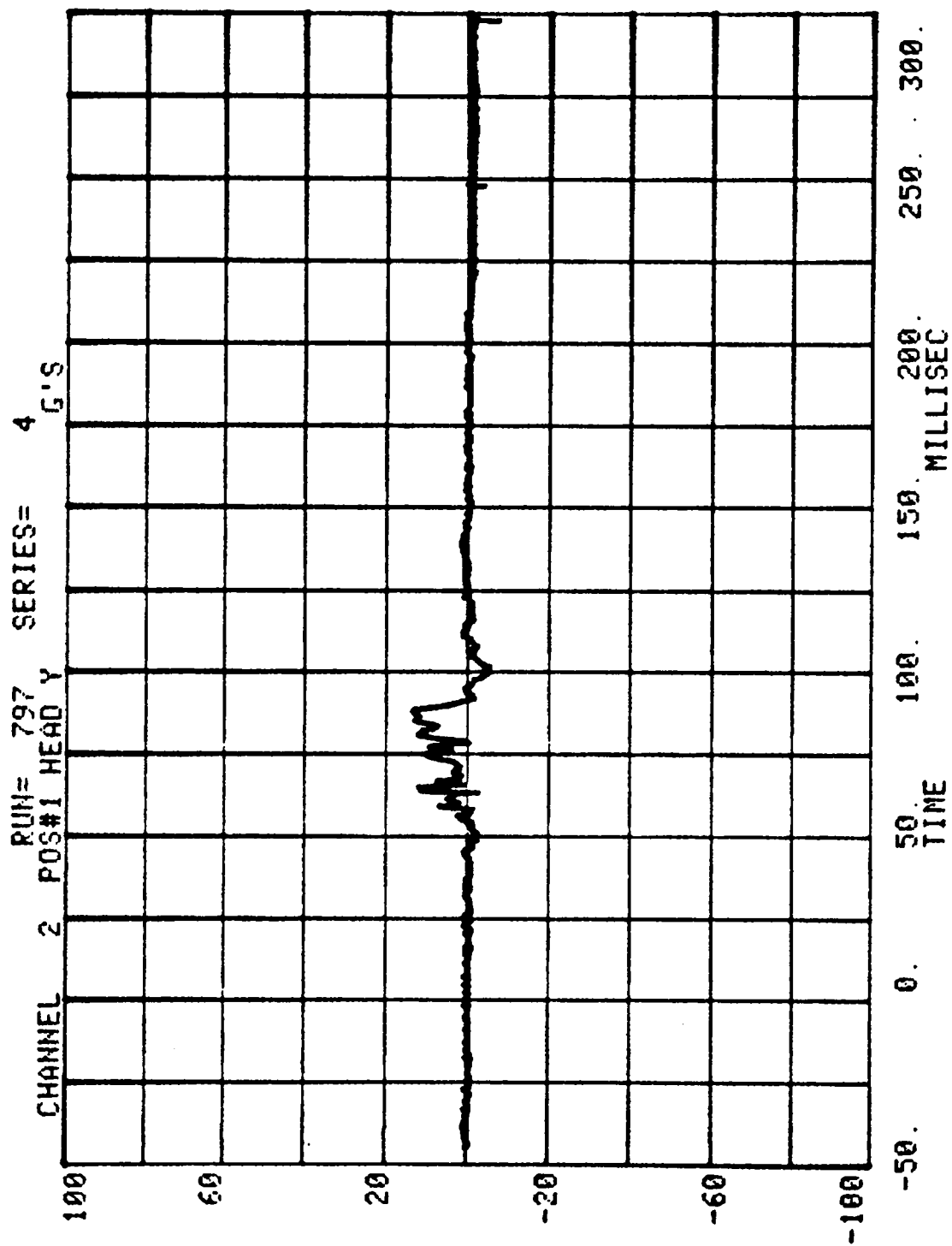
CRASHWORTHINESS BARRIER TEST

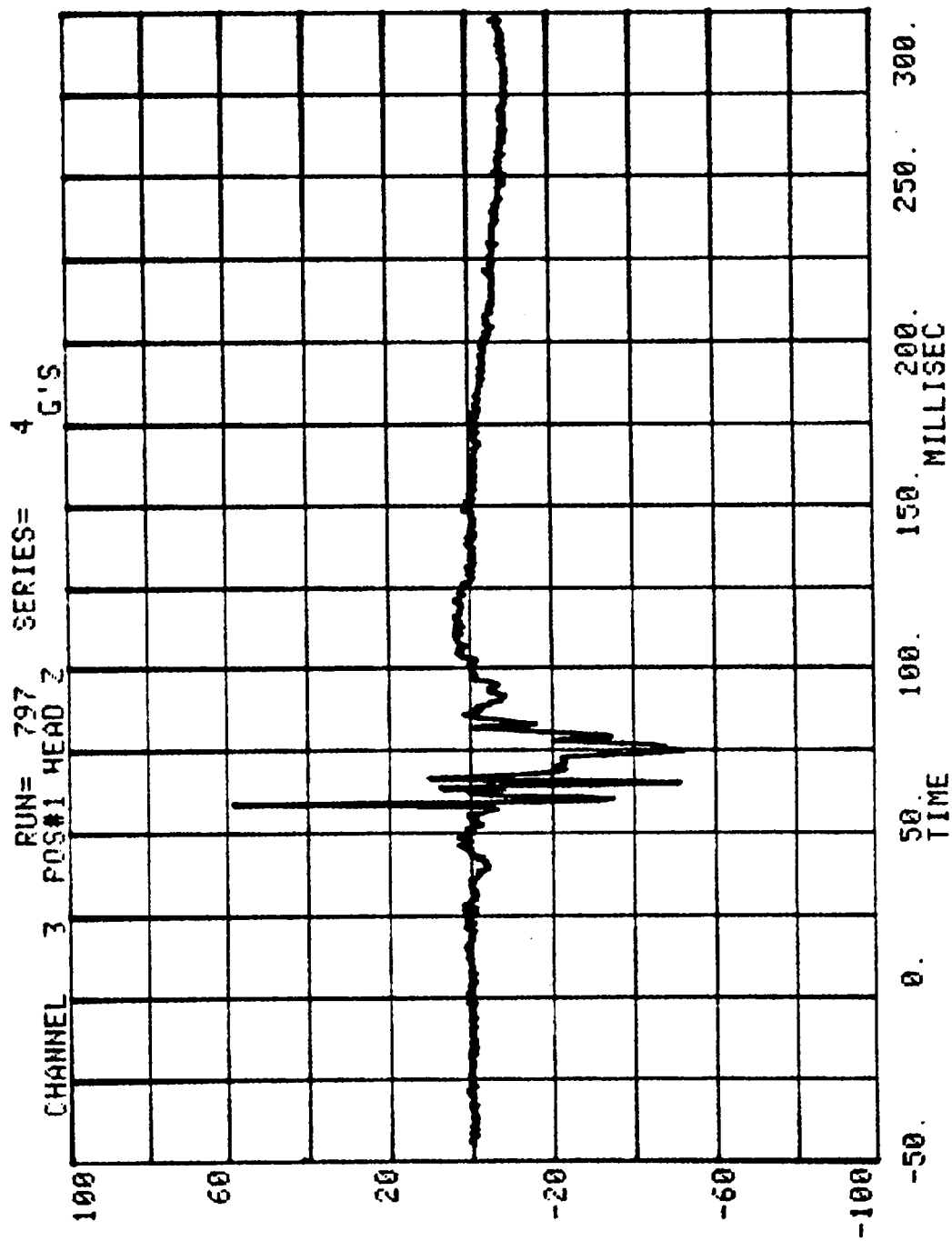
CHAN	RUN #	TITLE	SERIES #	4	MINIMUM	MAXIMUM
1	POS#1	HEAD R	.137		133.917	G'S
2	POS#1	CHEST R	.024		86.250	G'S



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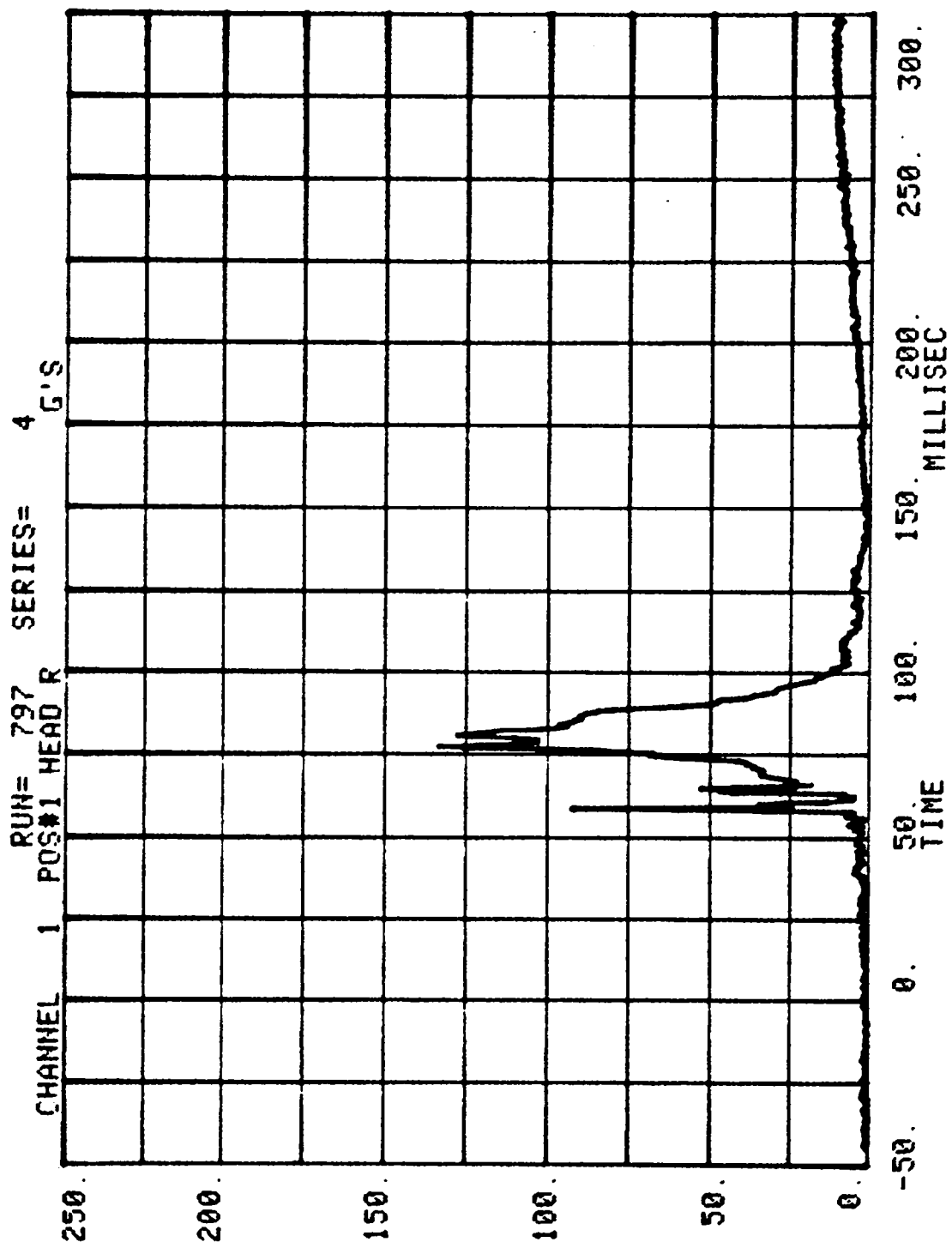
7581-5

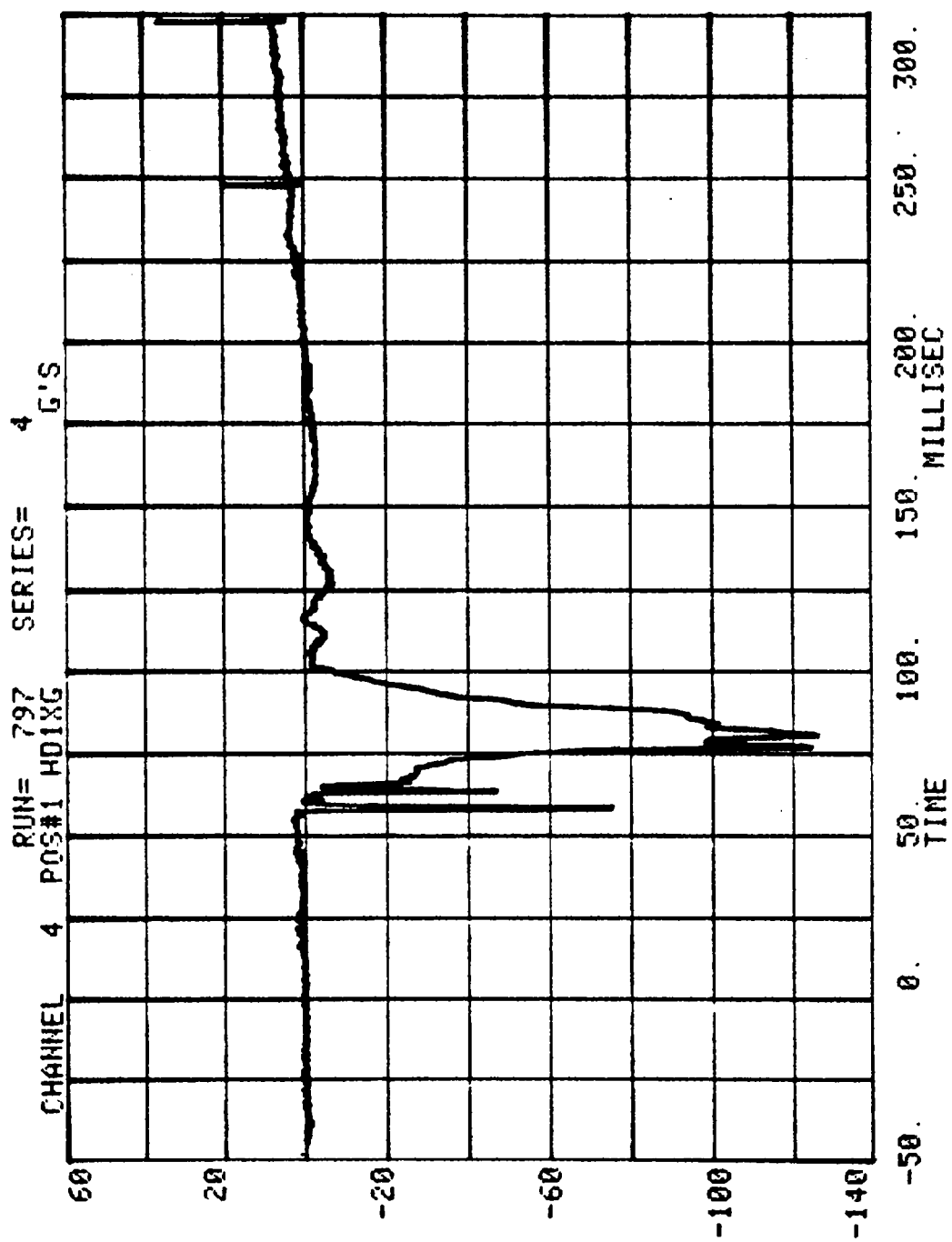


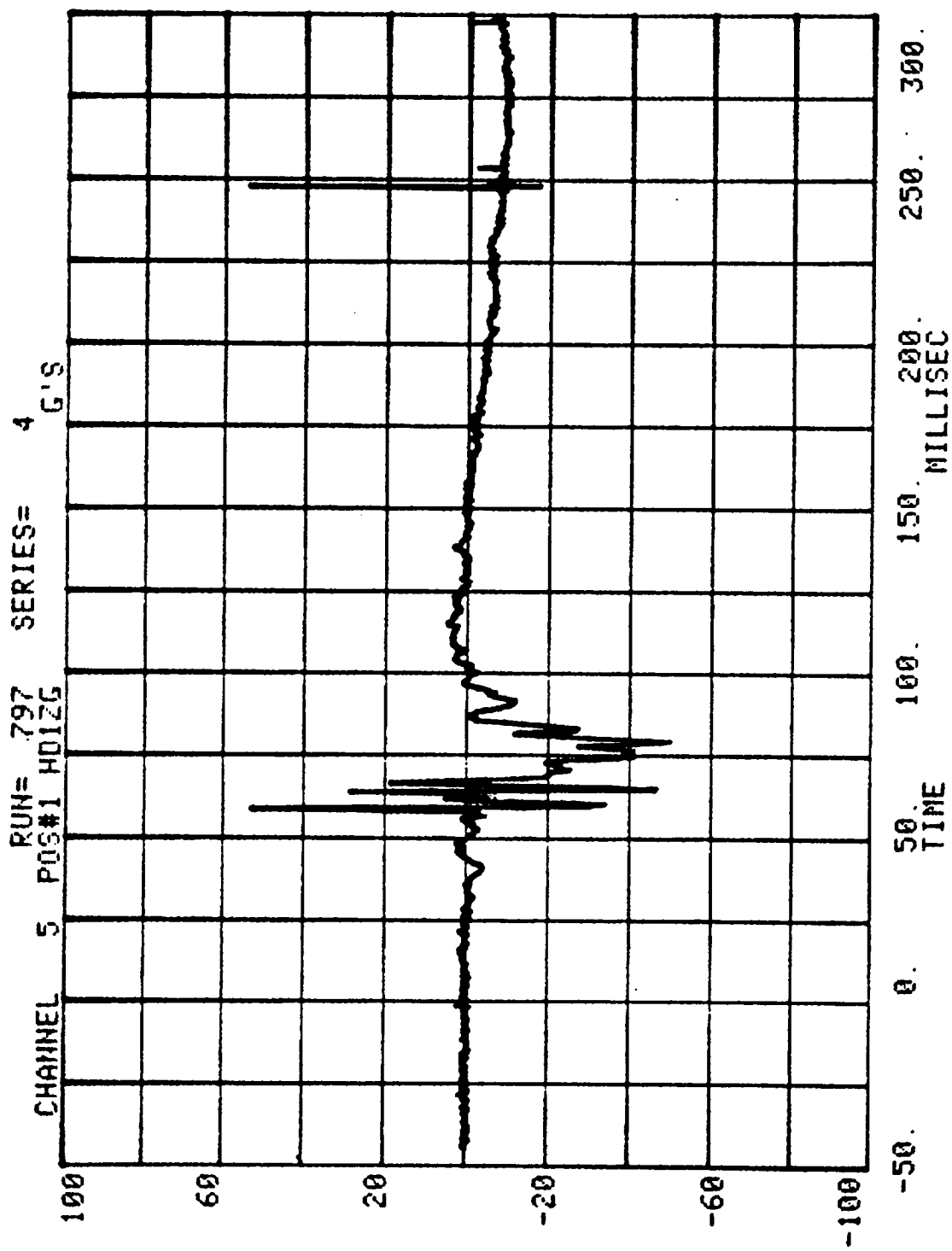


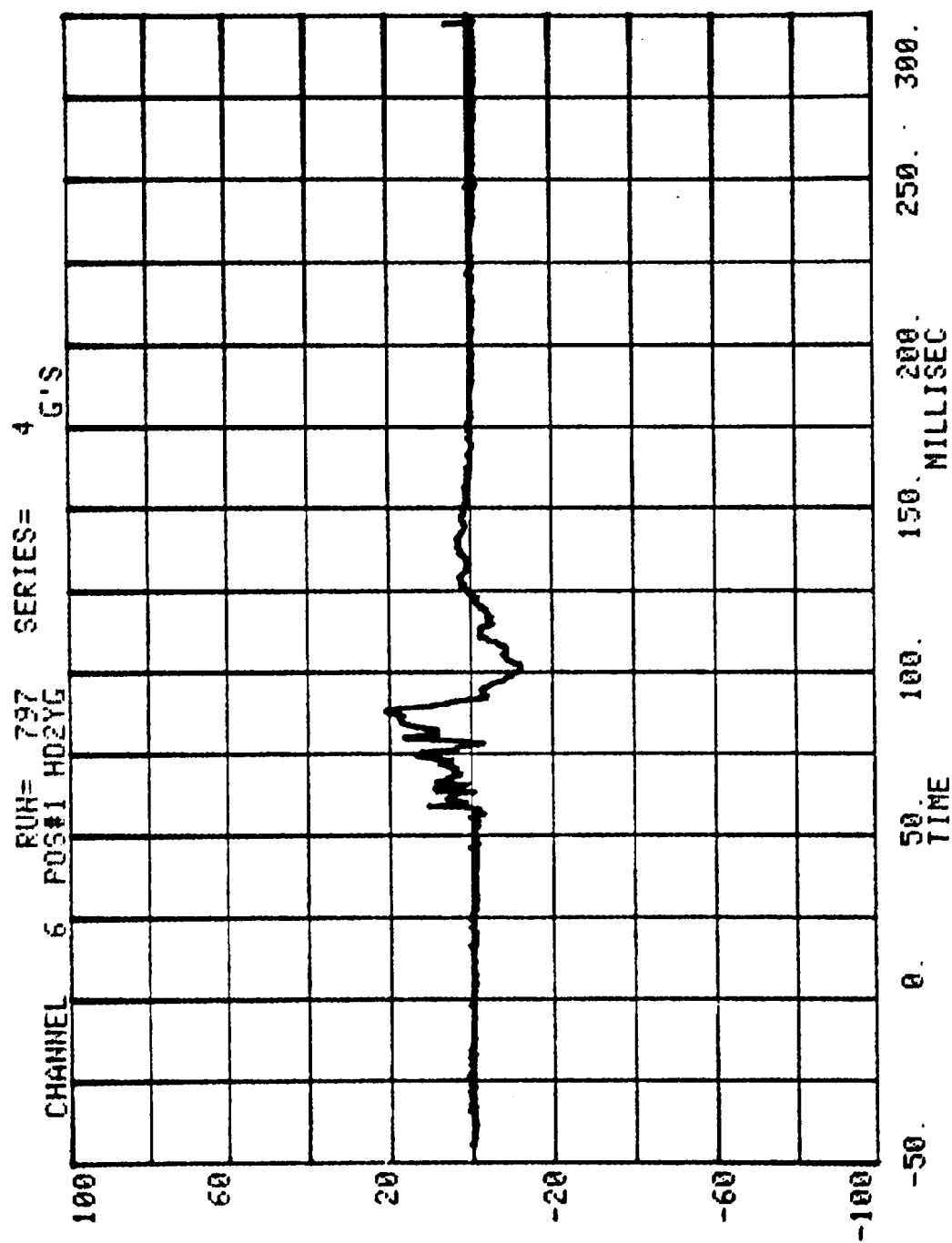
B-100

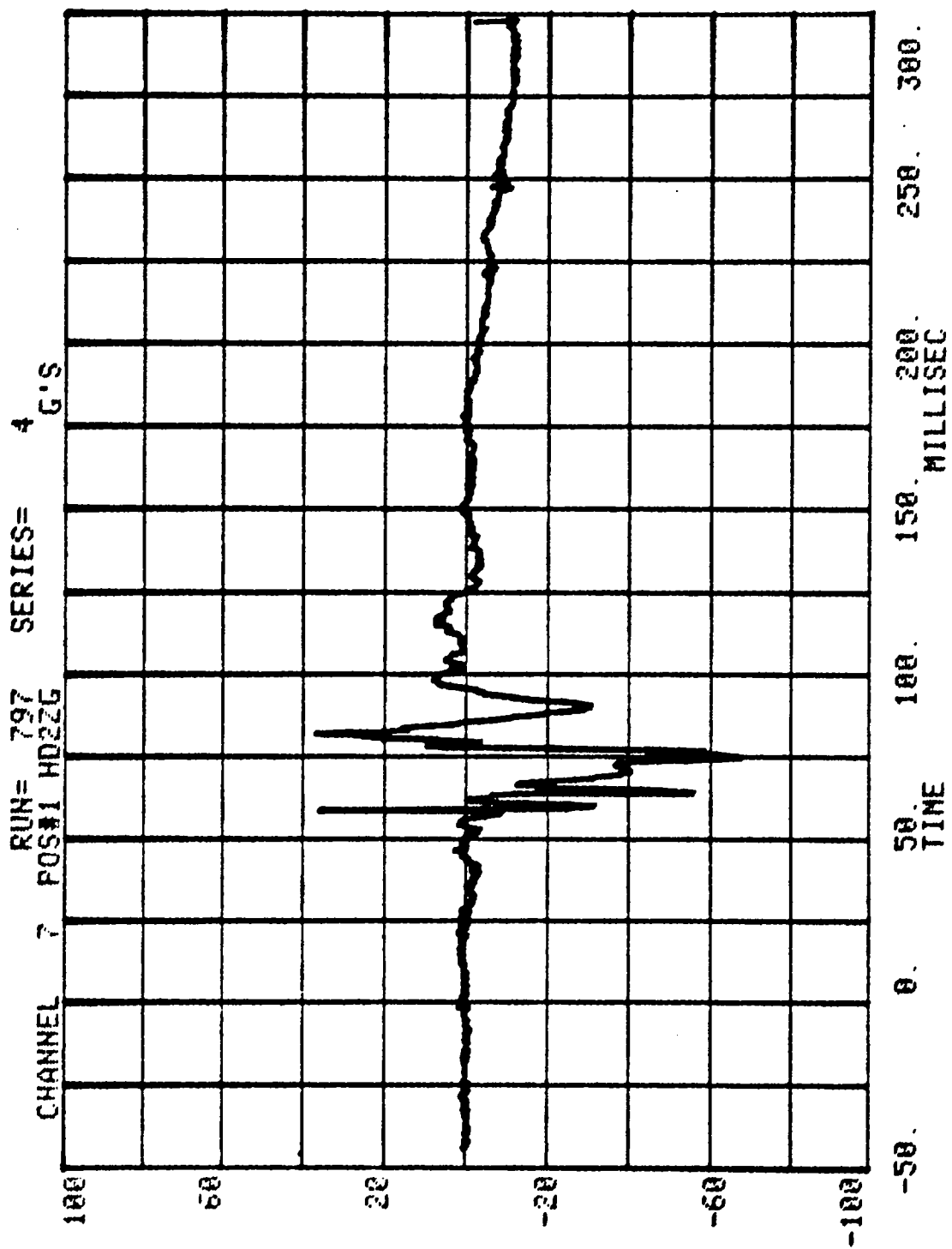
7581-5

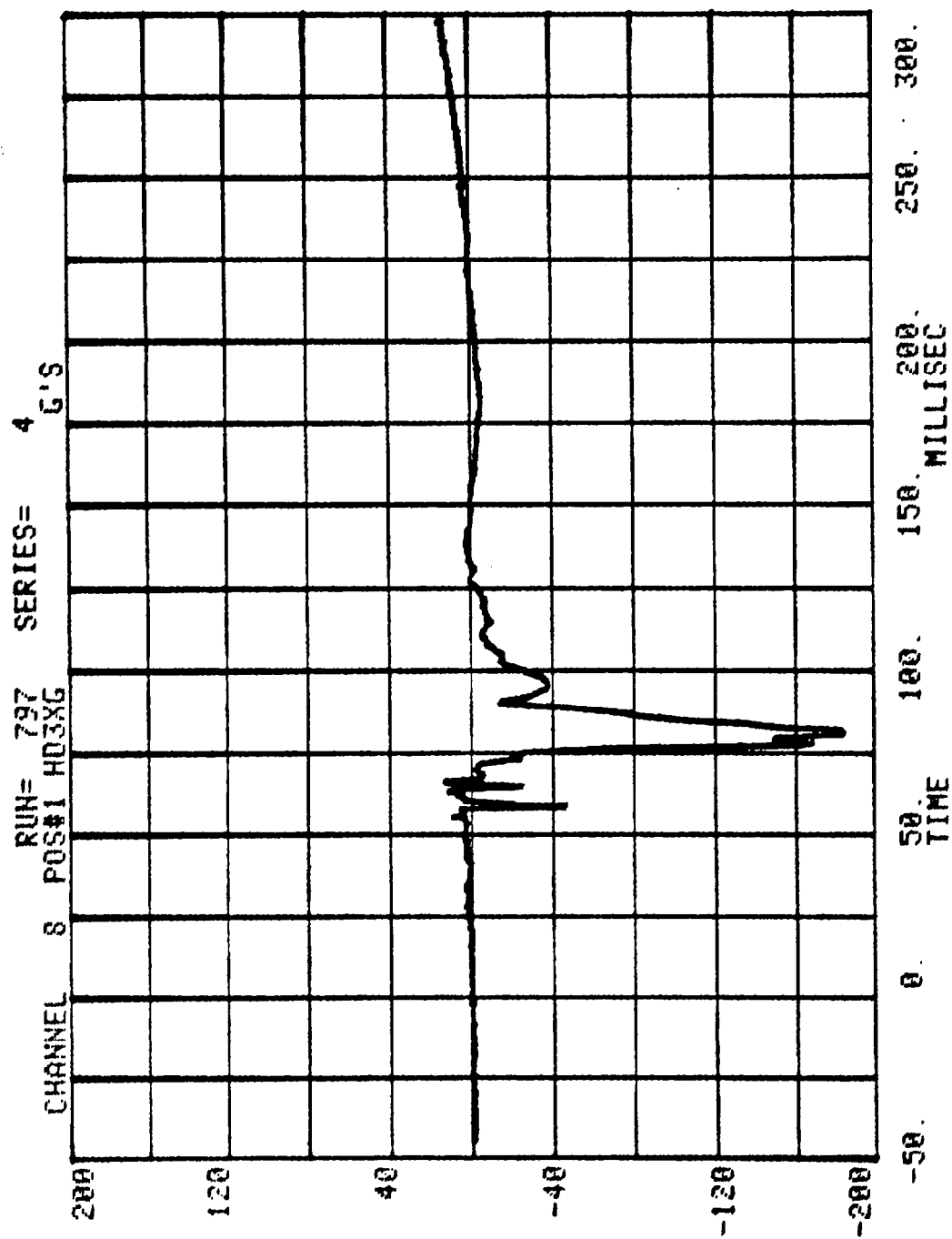


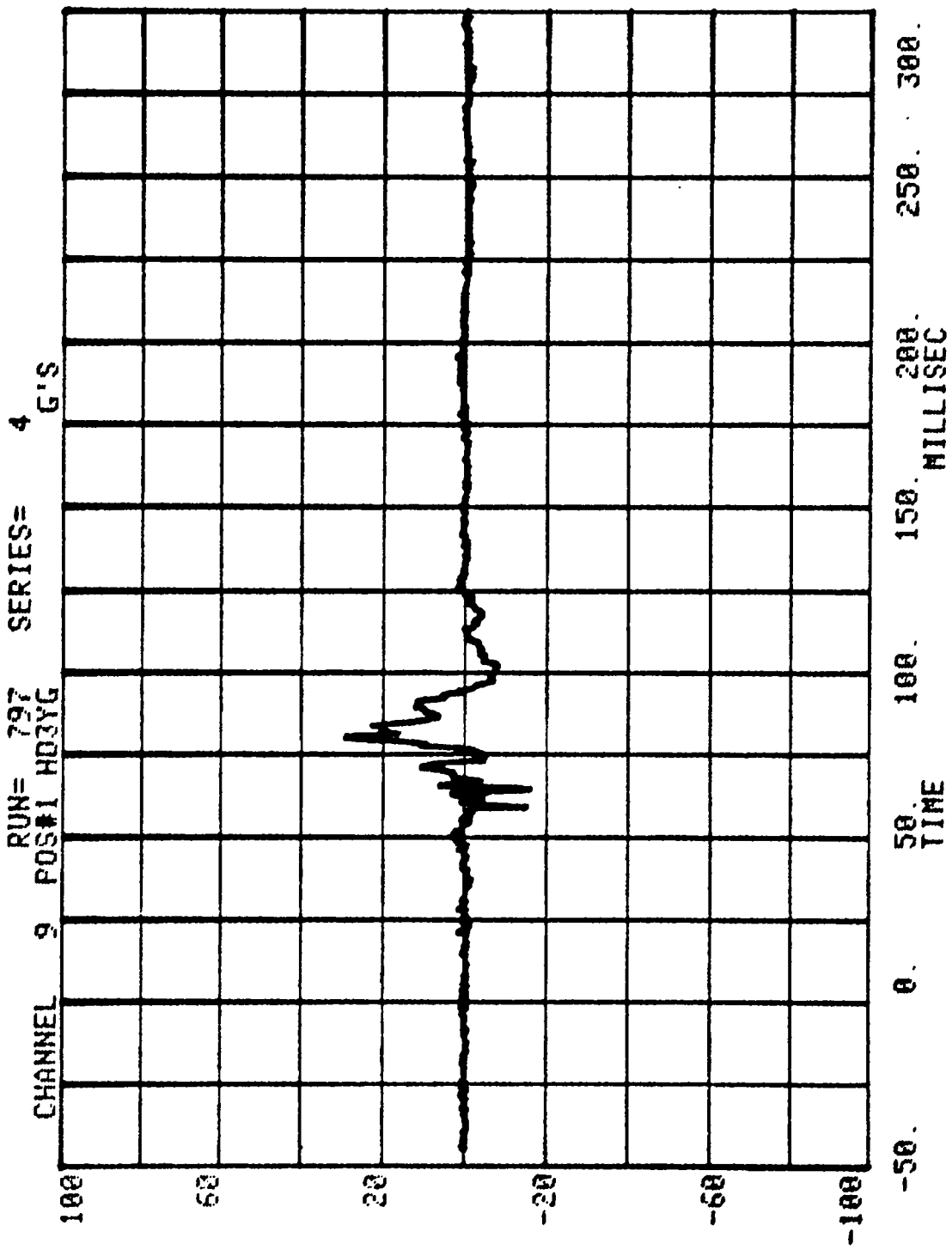


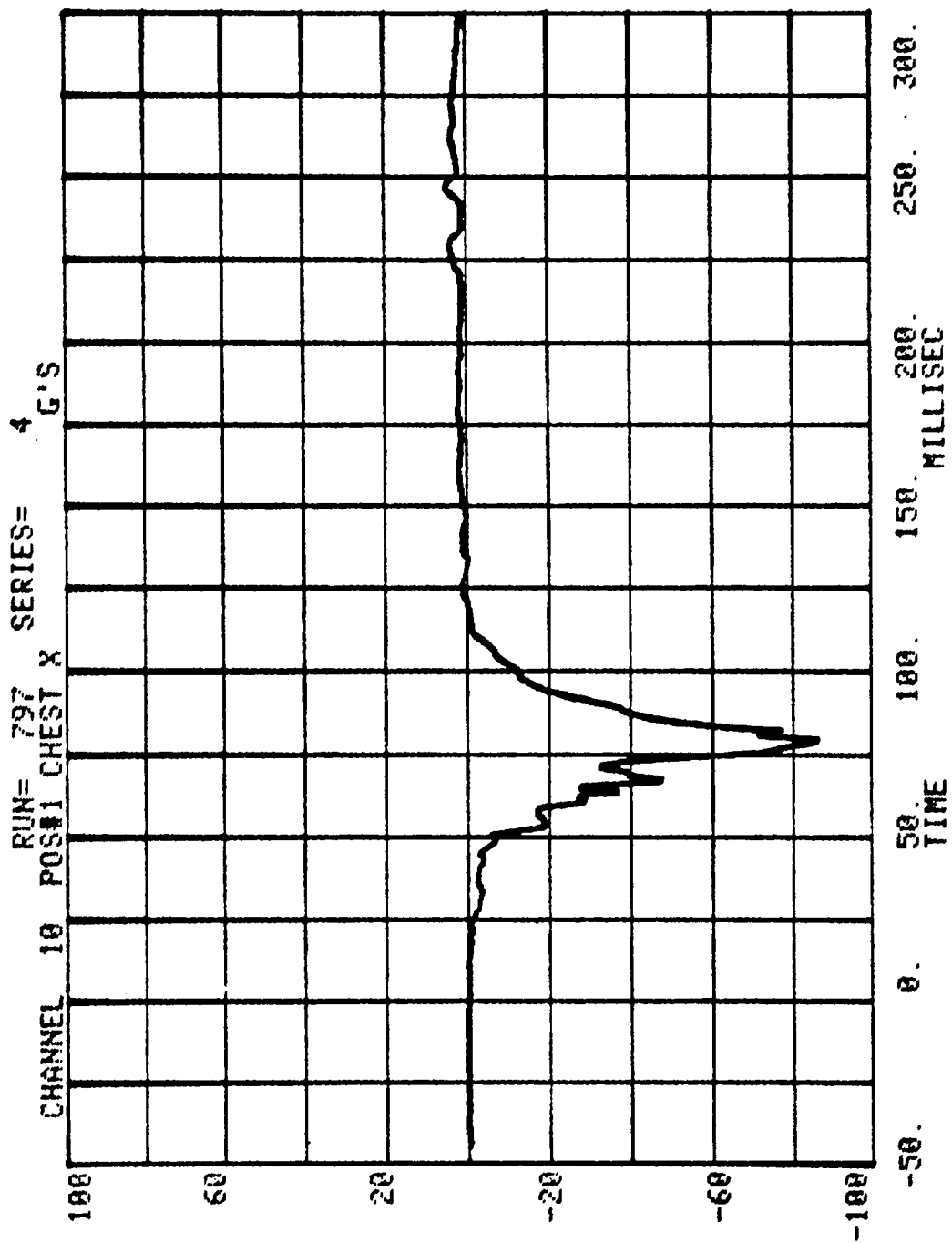












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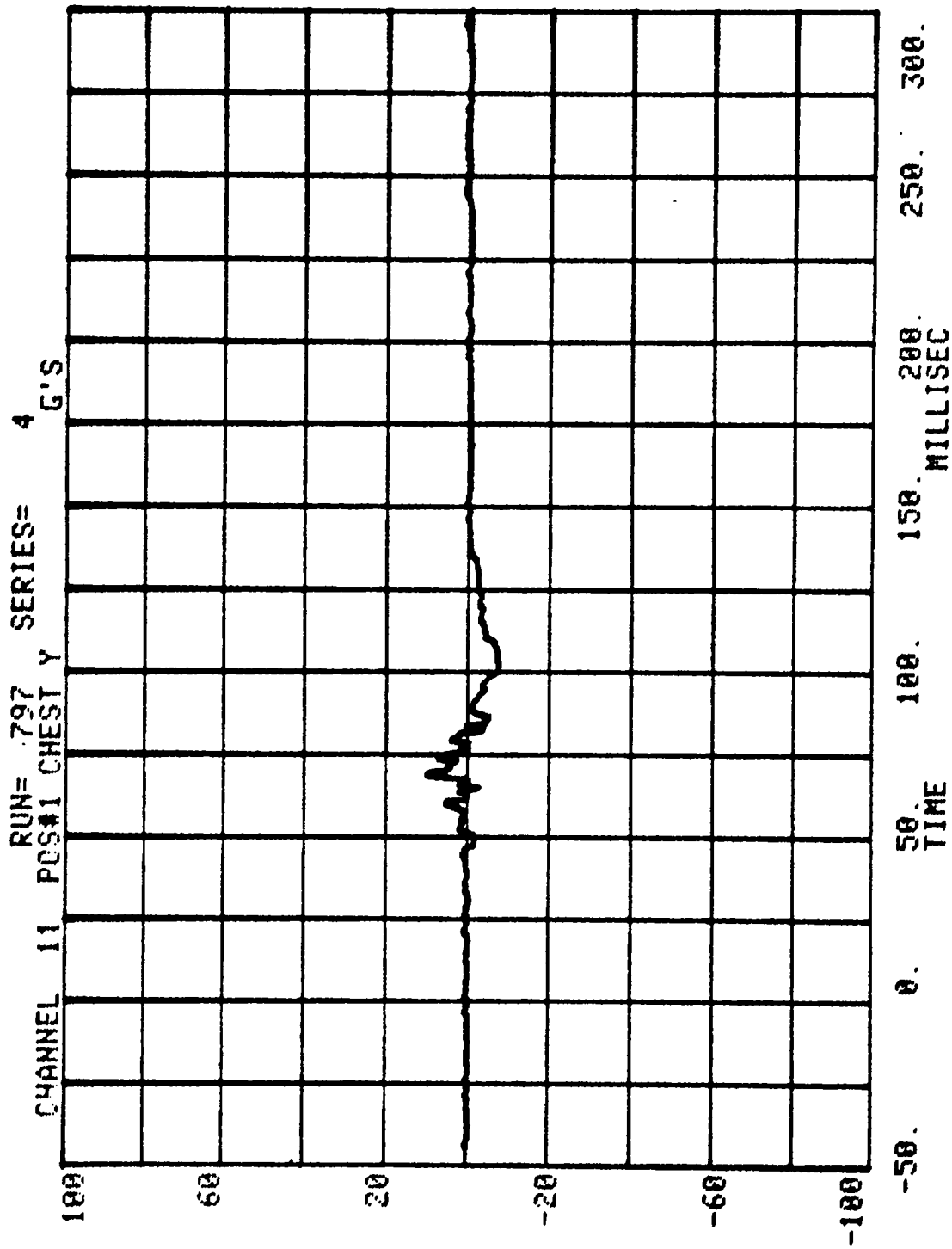
7581-5

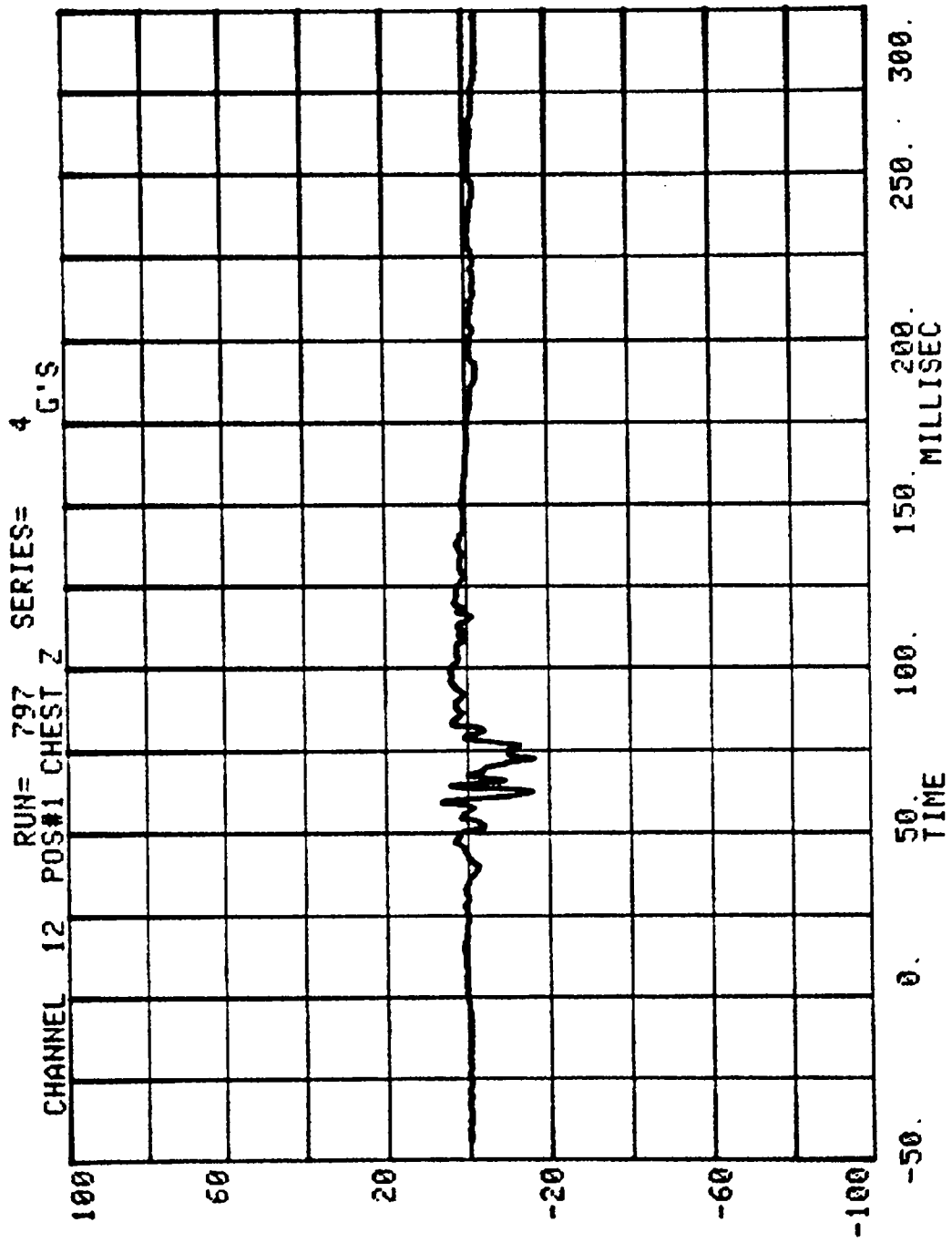
CHANNEL 11 POS#1 CHEST Y

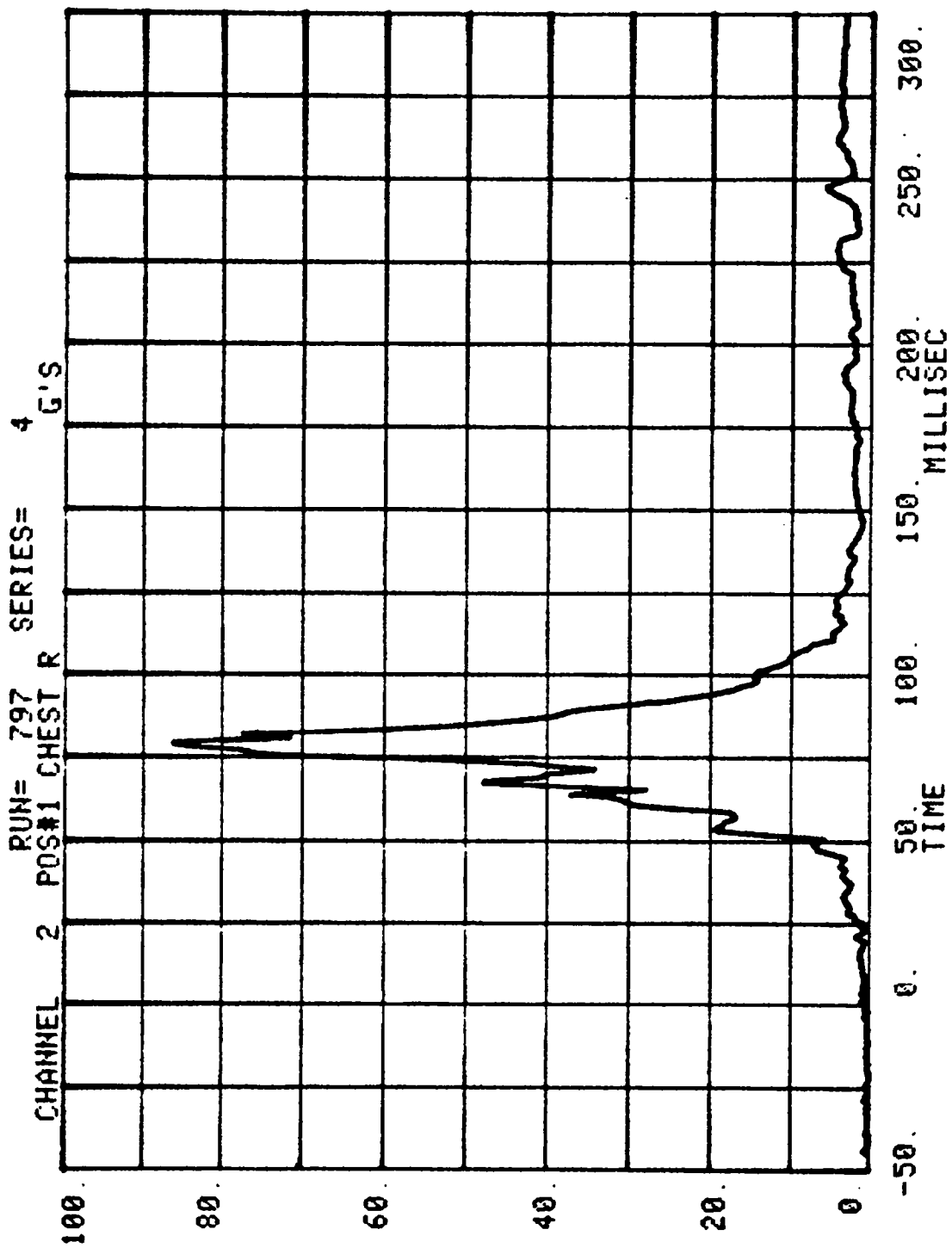
SERIES=

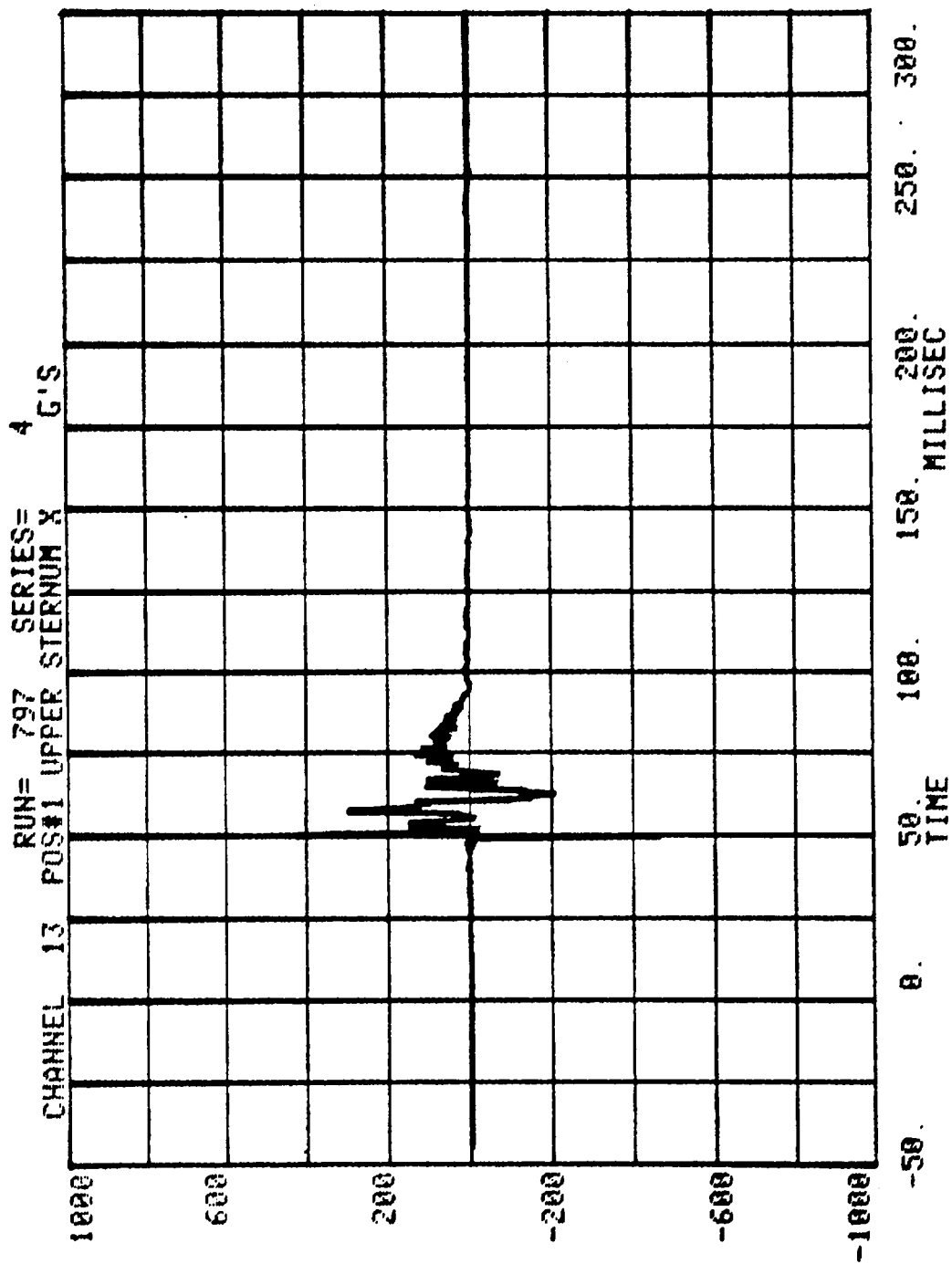
4

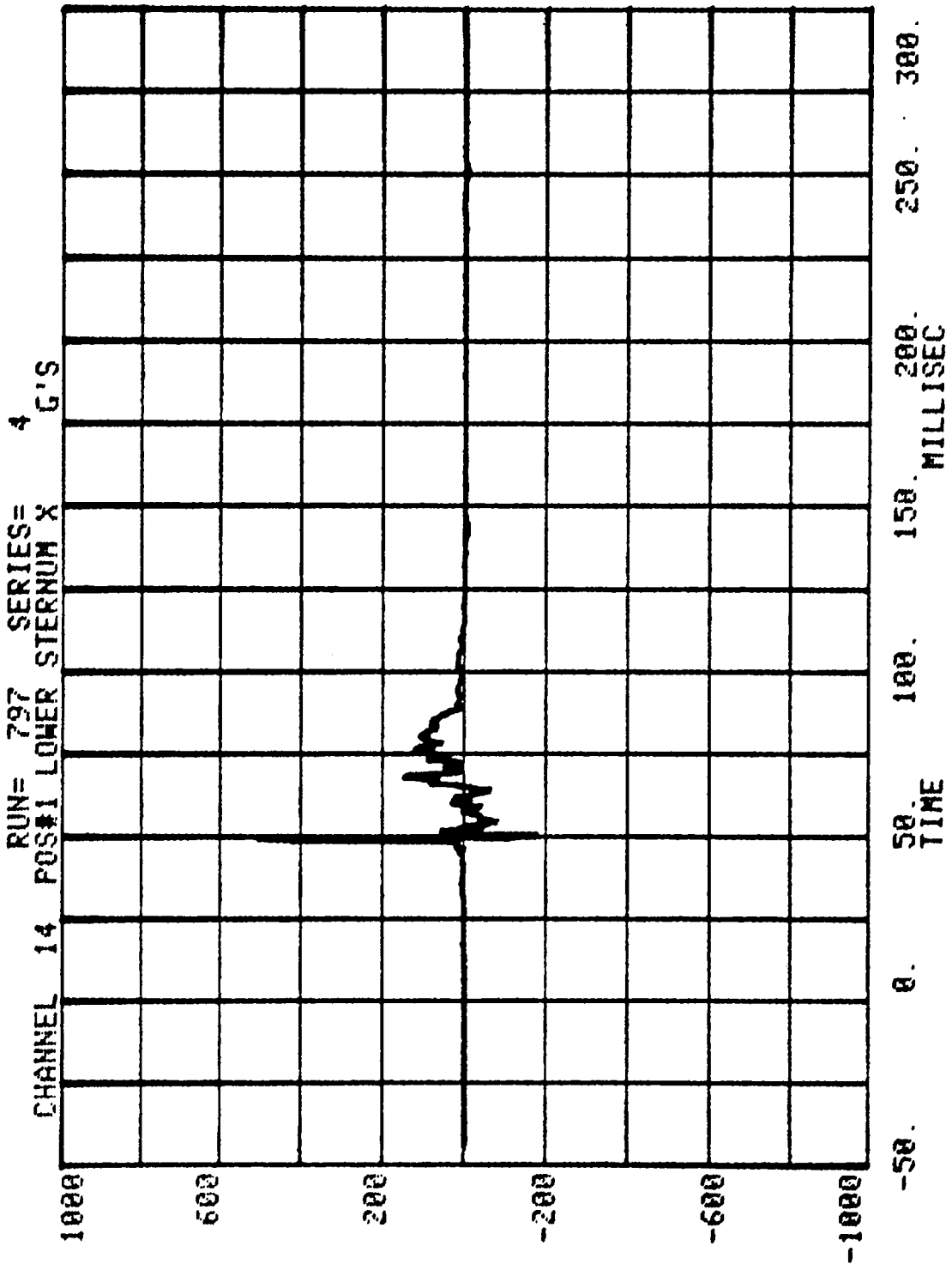
G'S

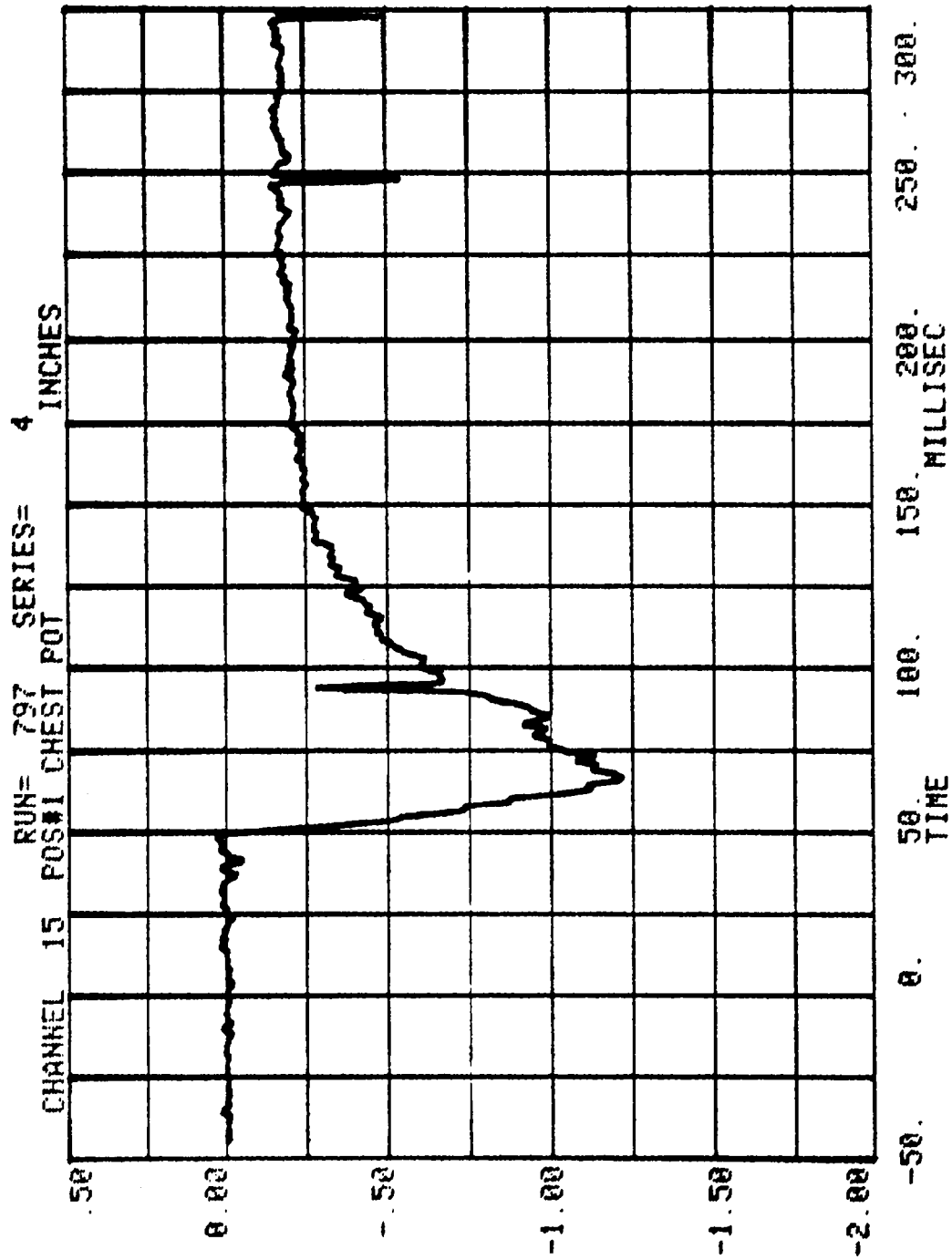


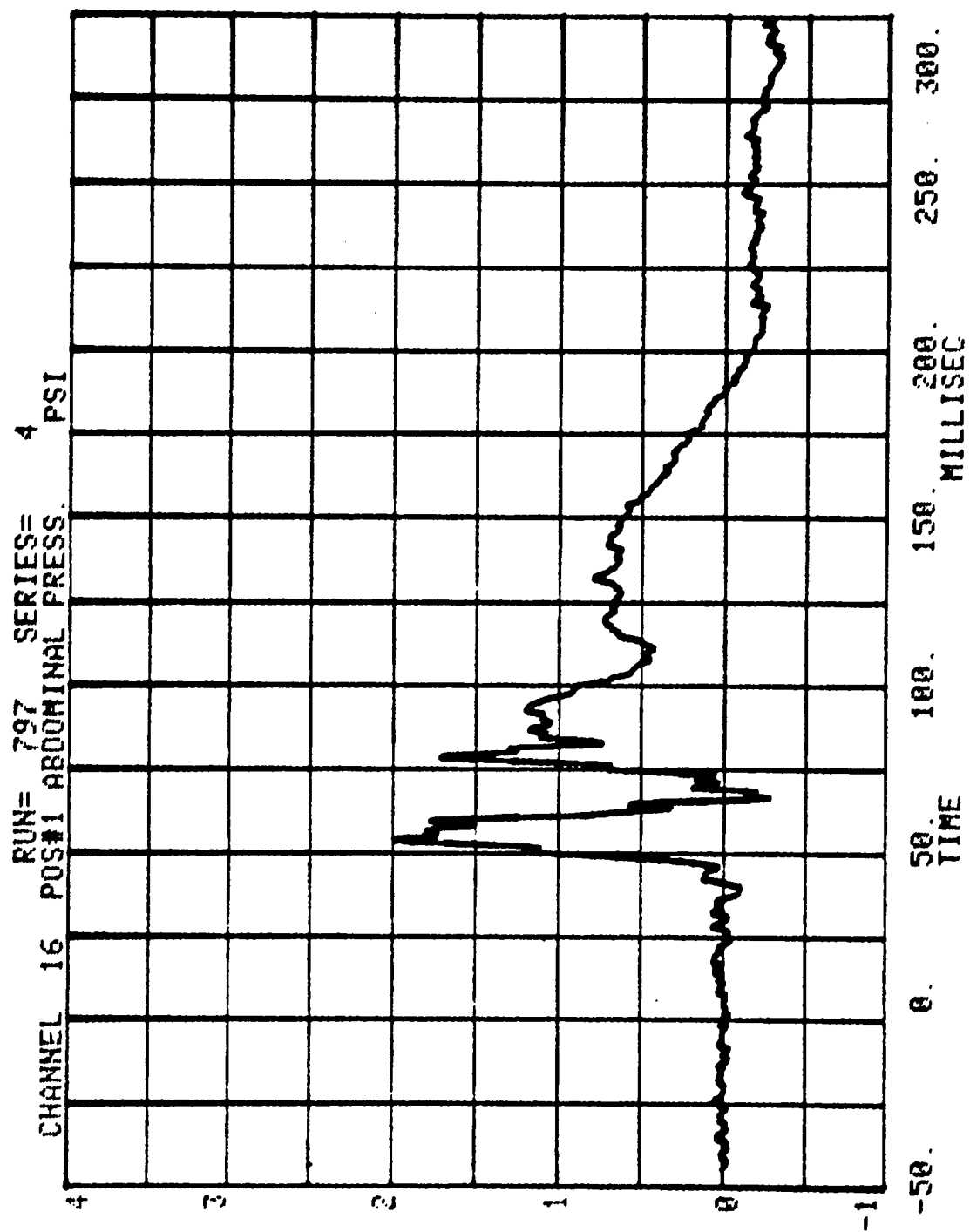






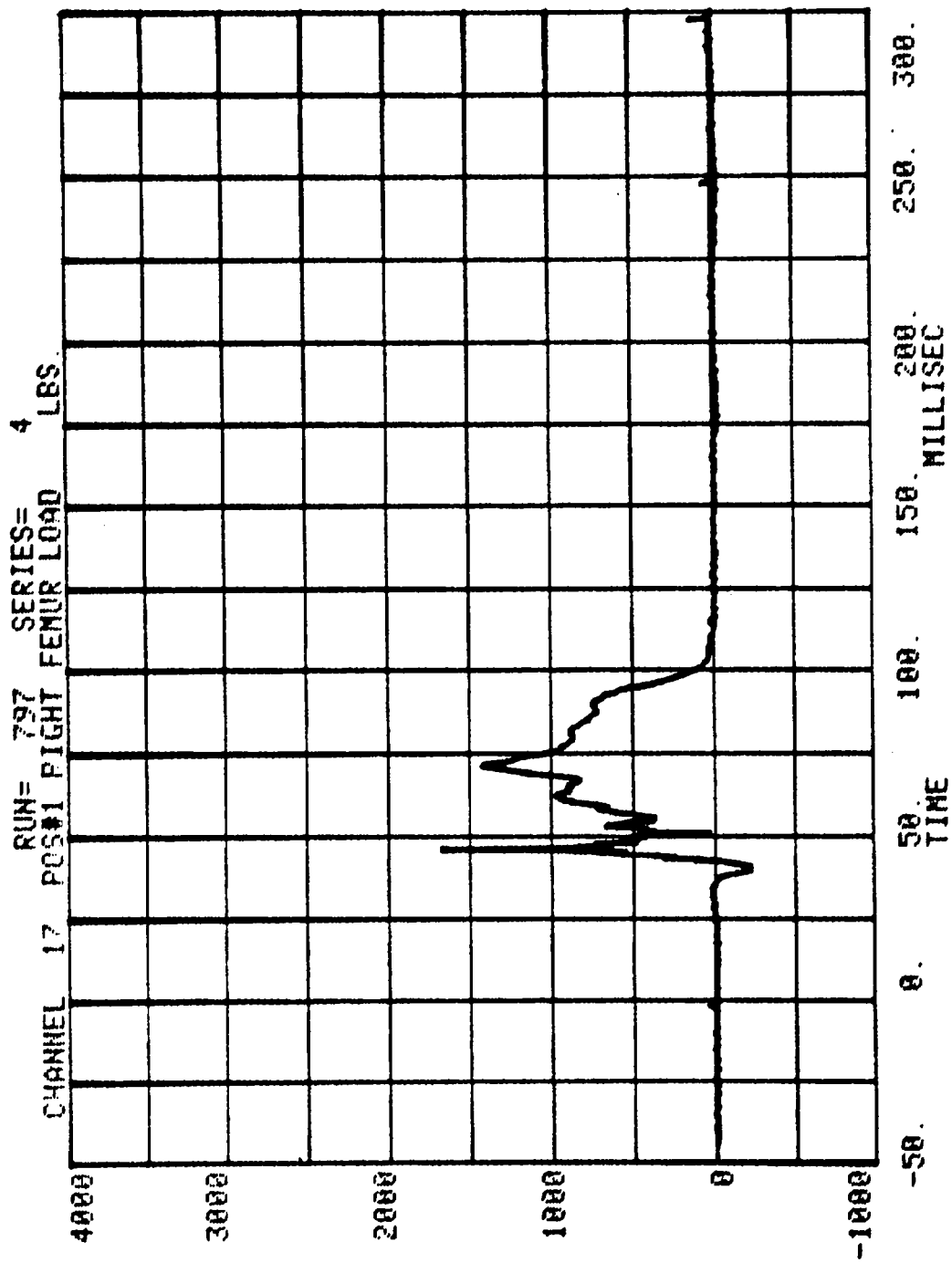


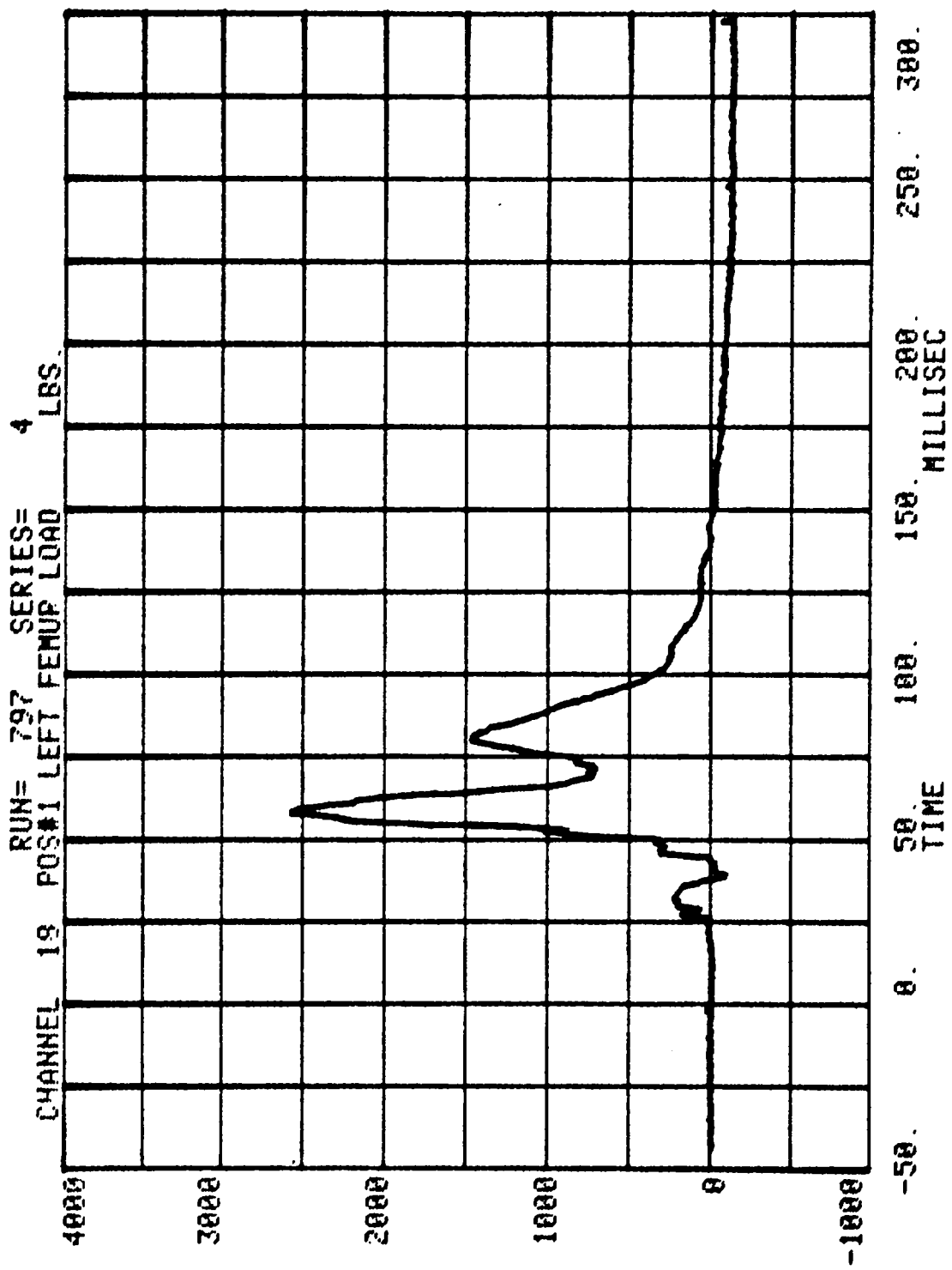


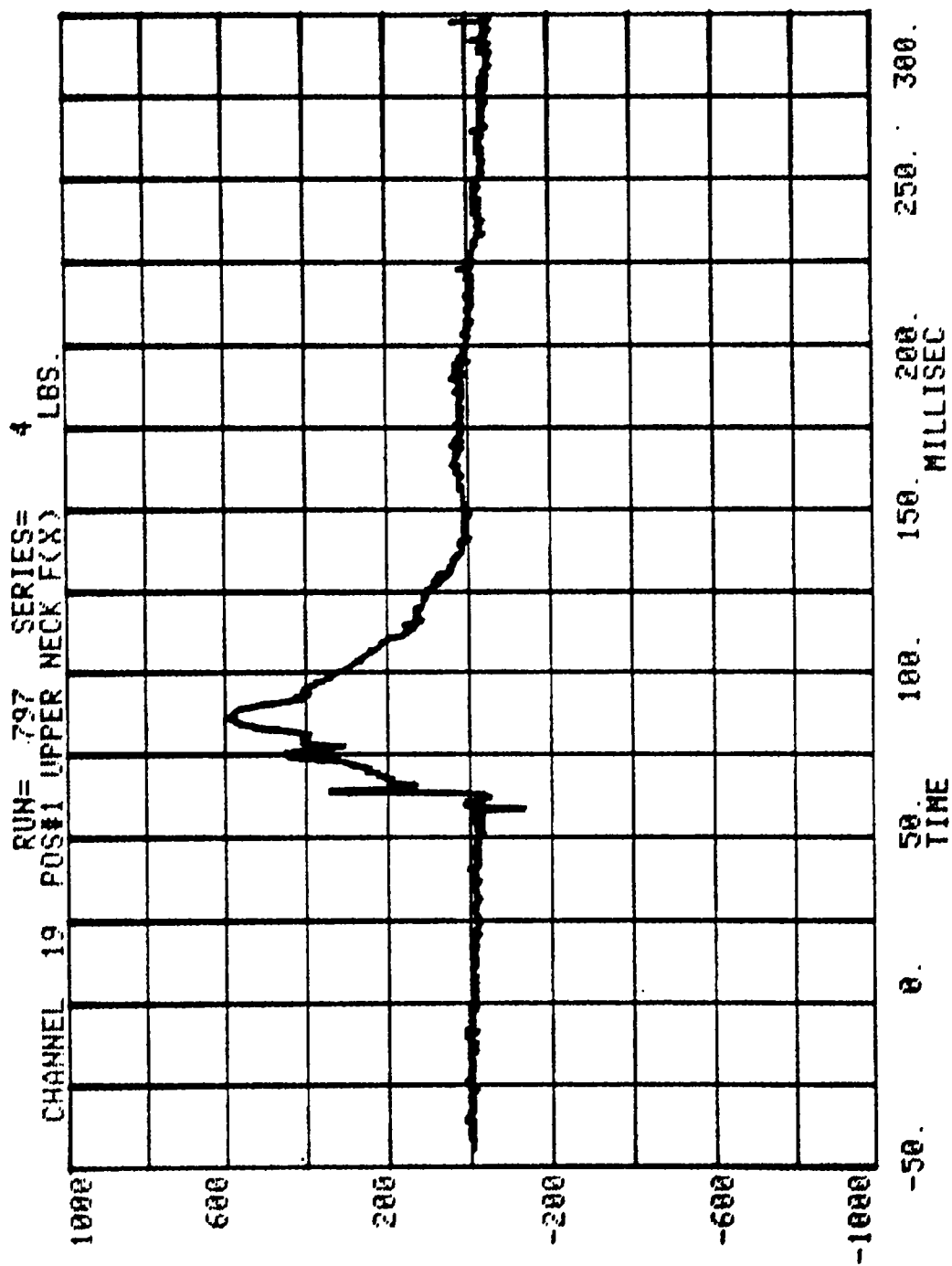


B-115

7581-5

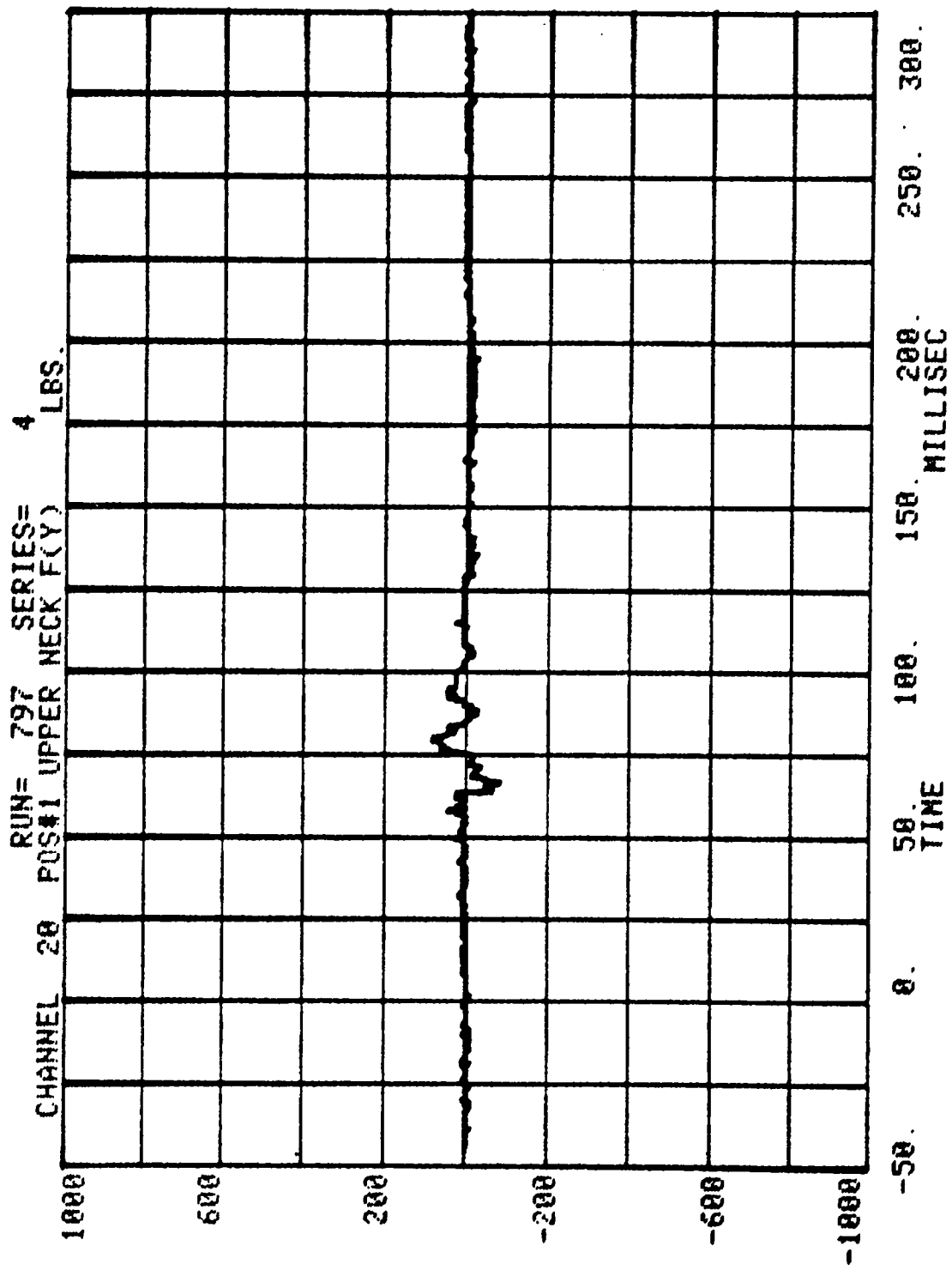


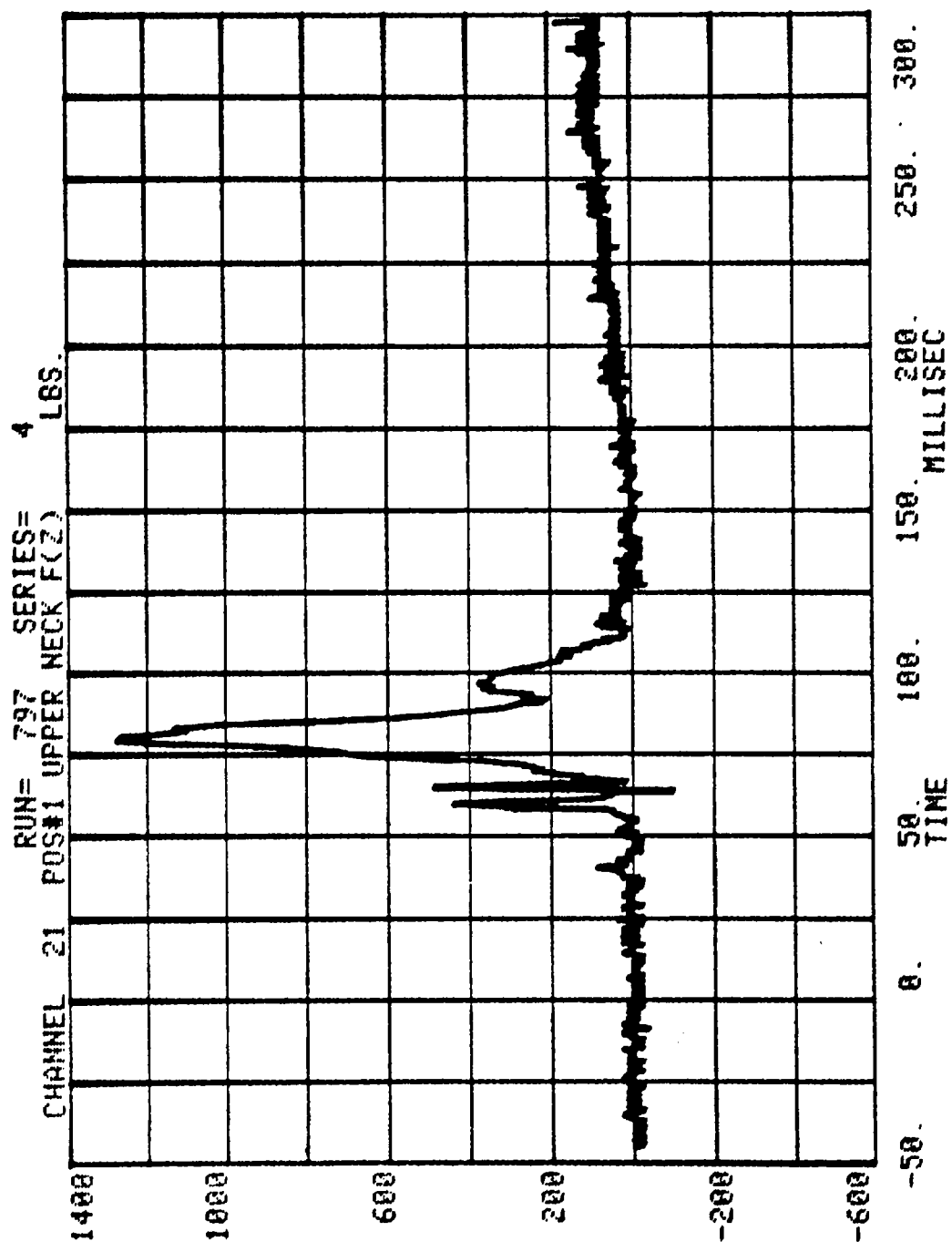


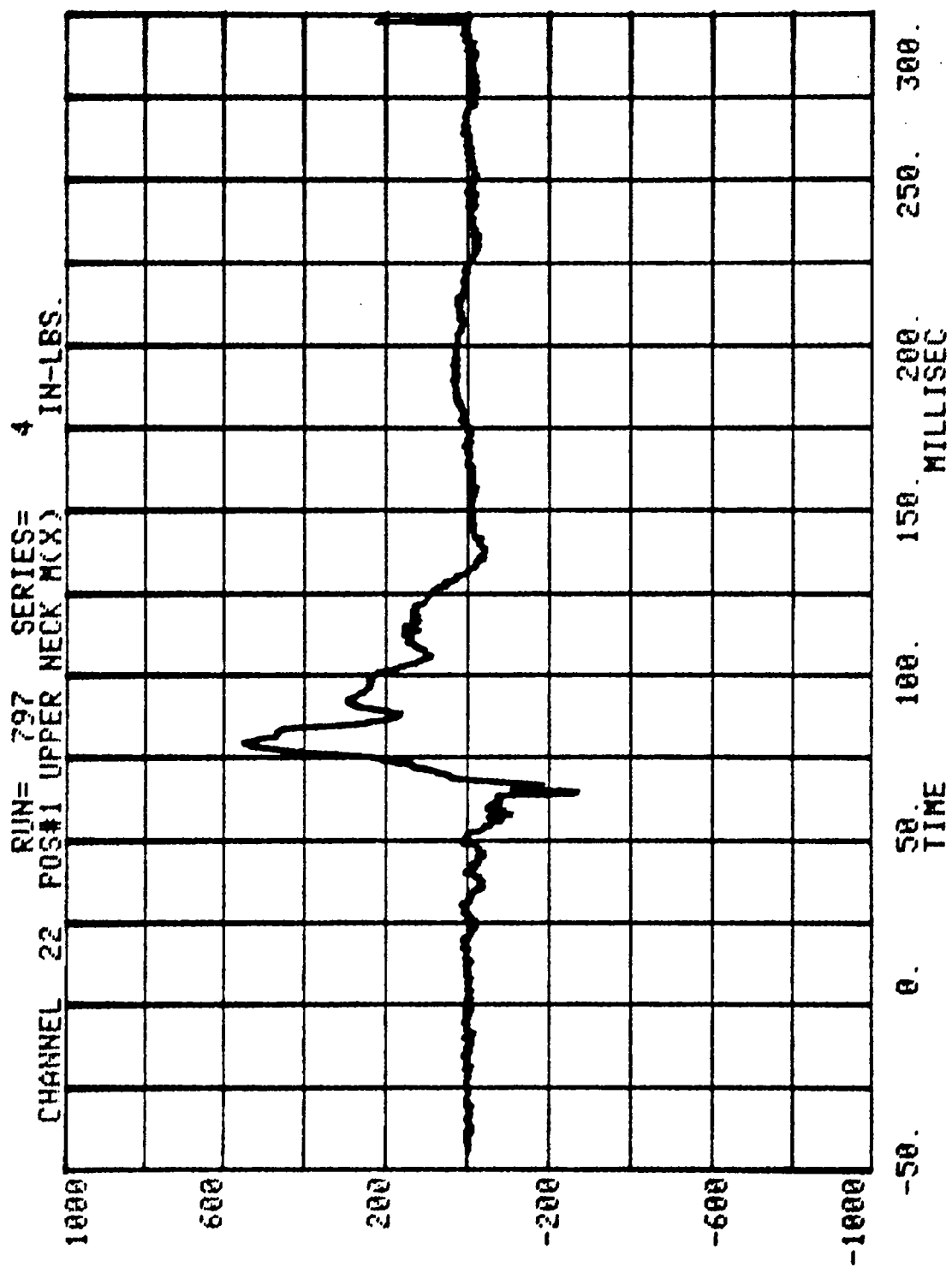


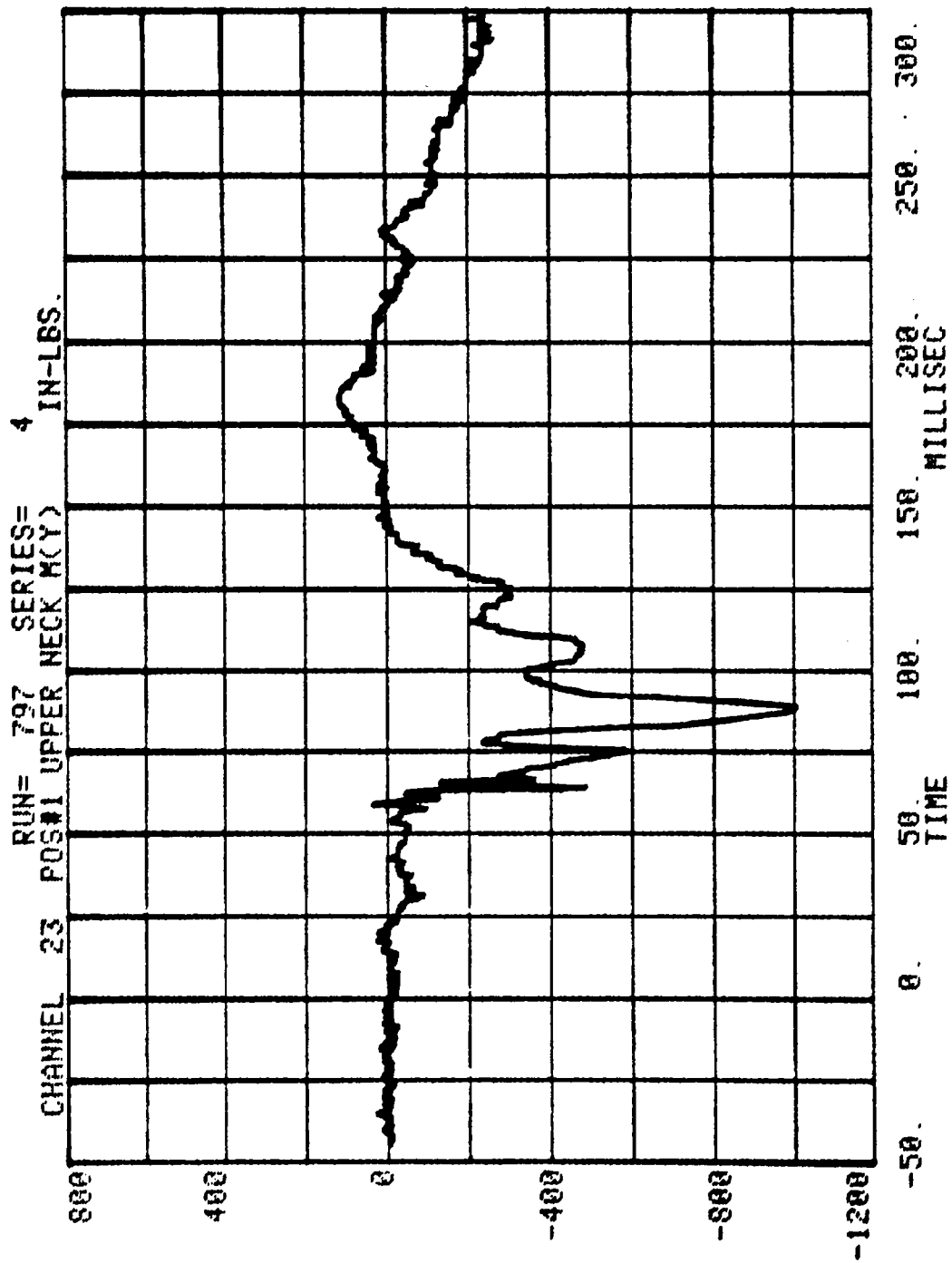
B-118

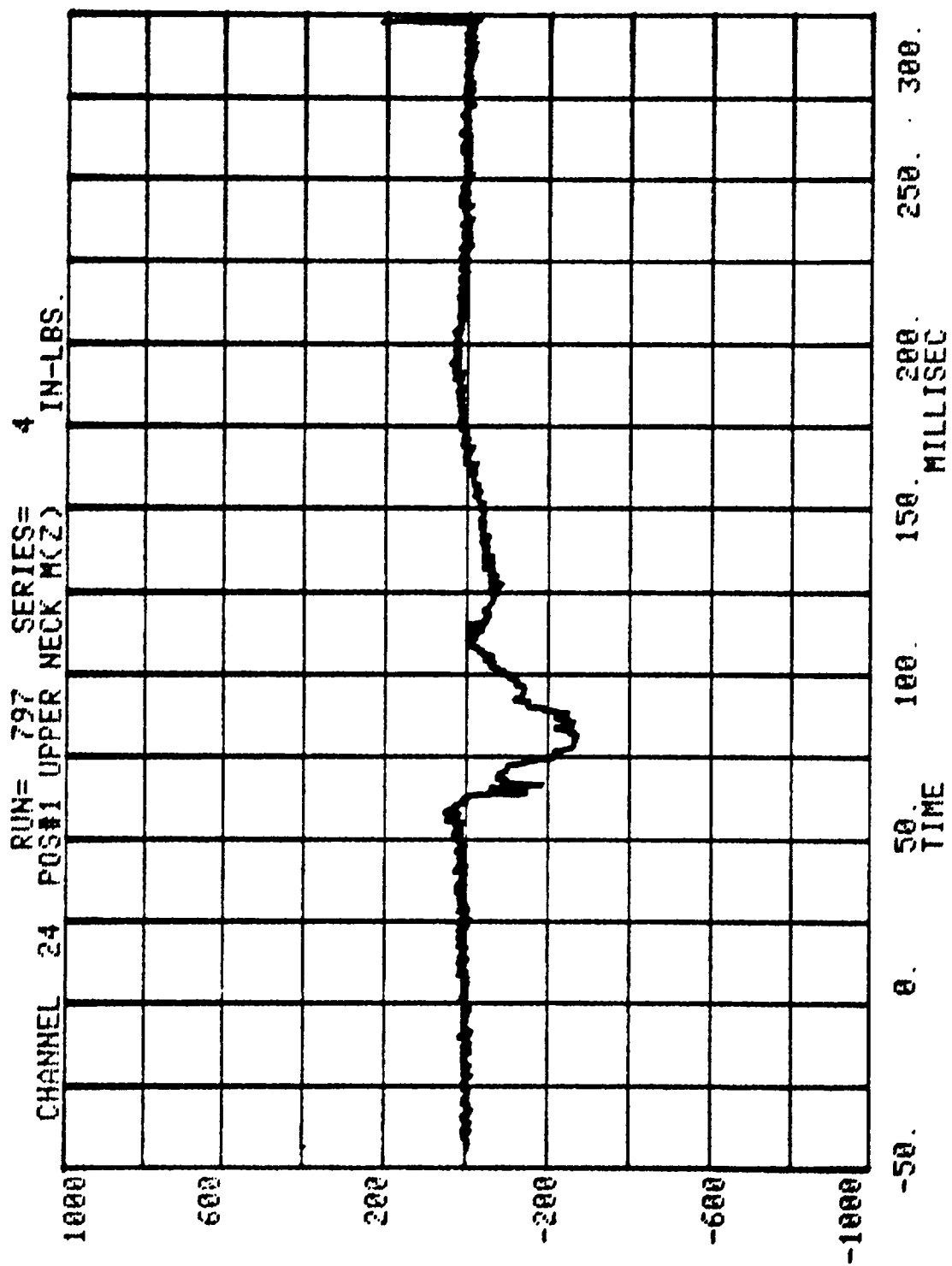
7581-5

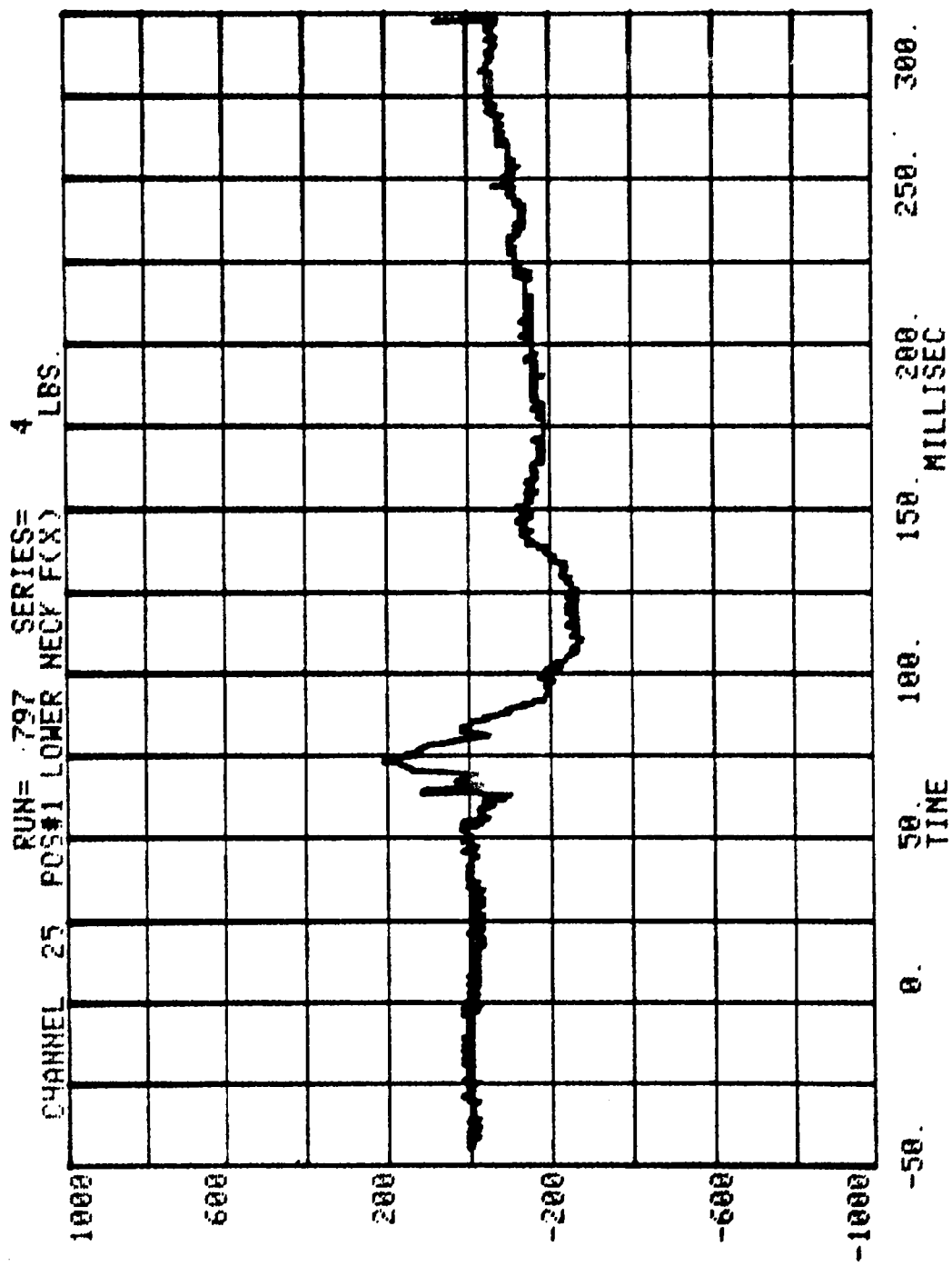






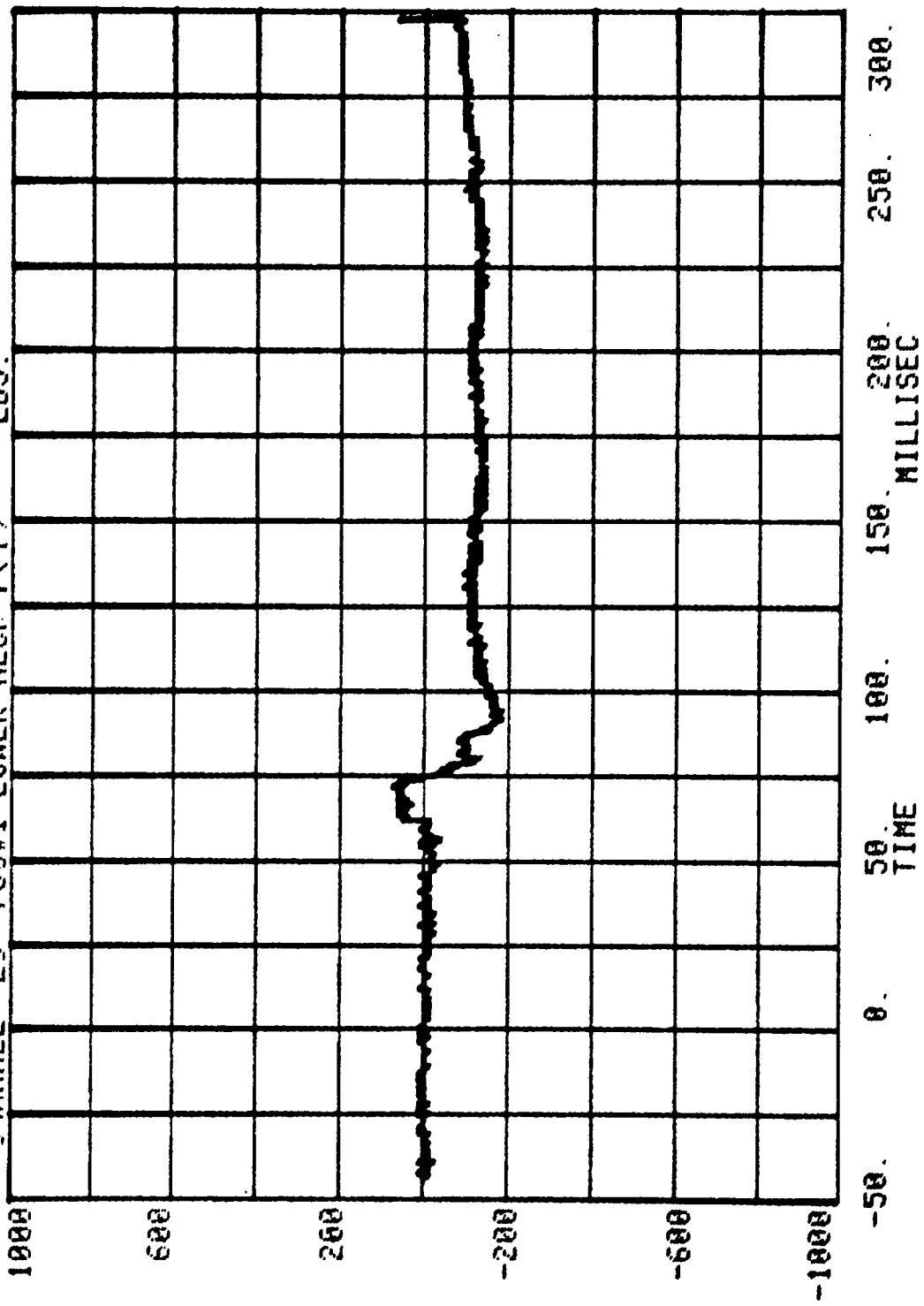


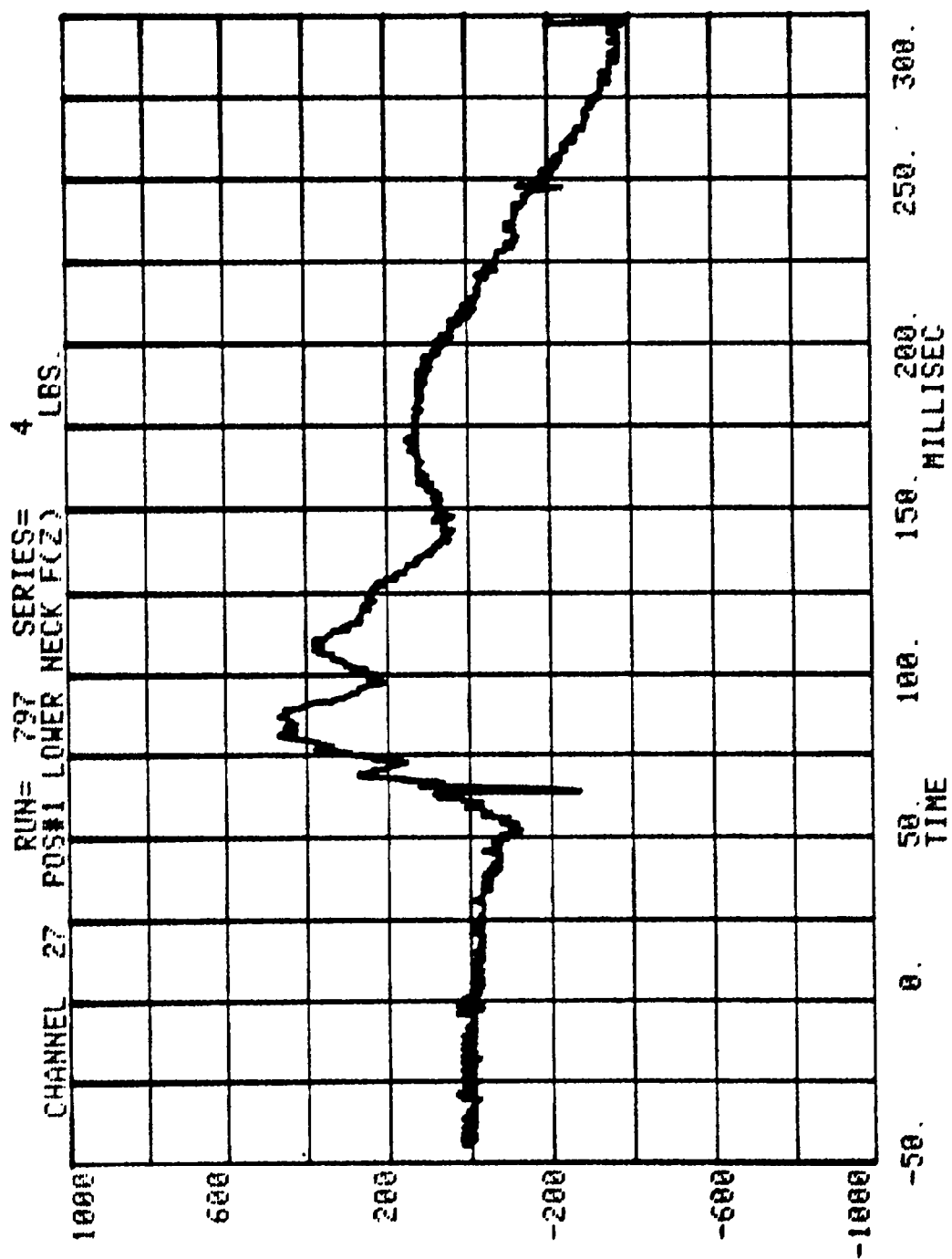


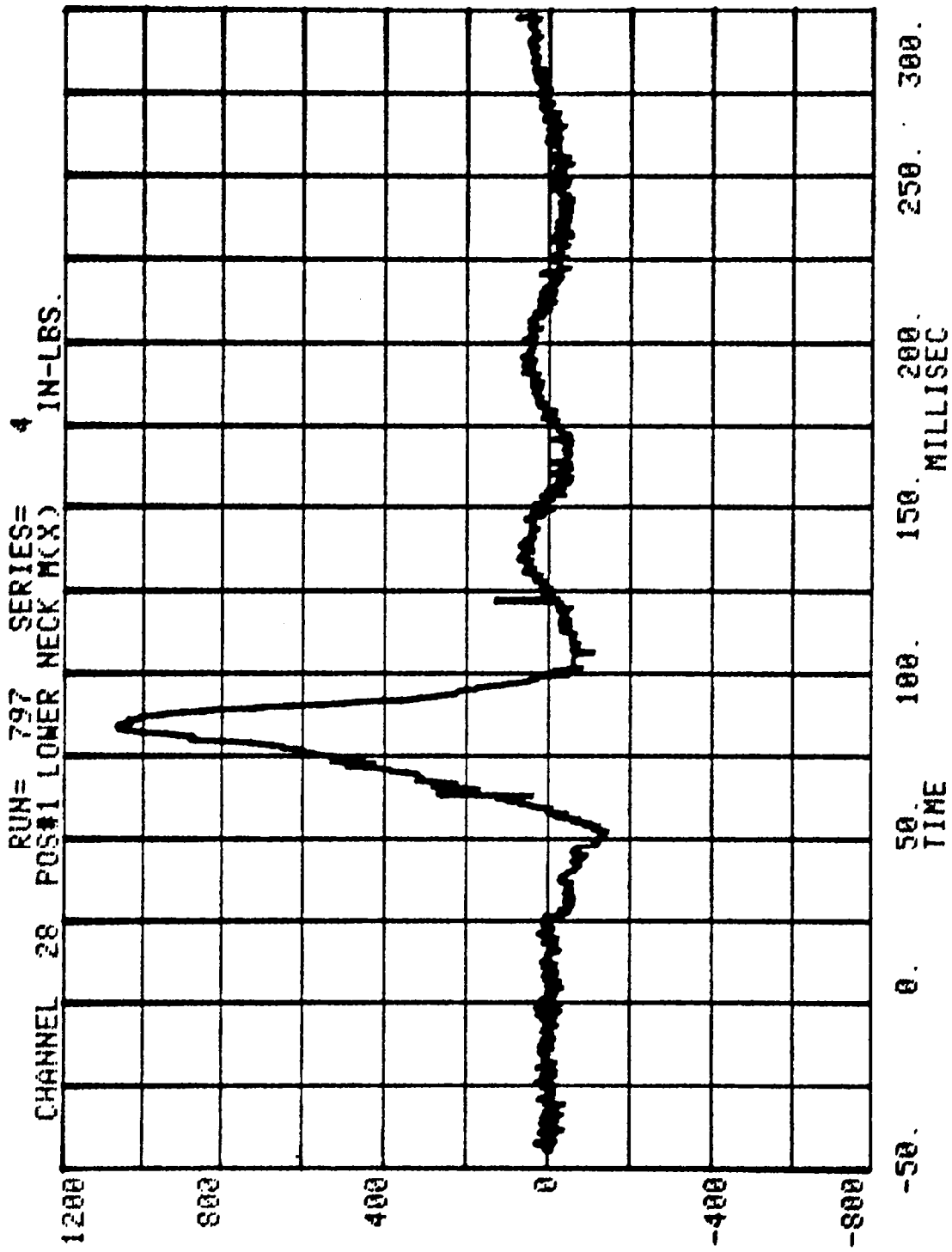


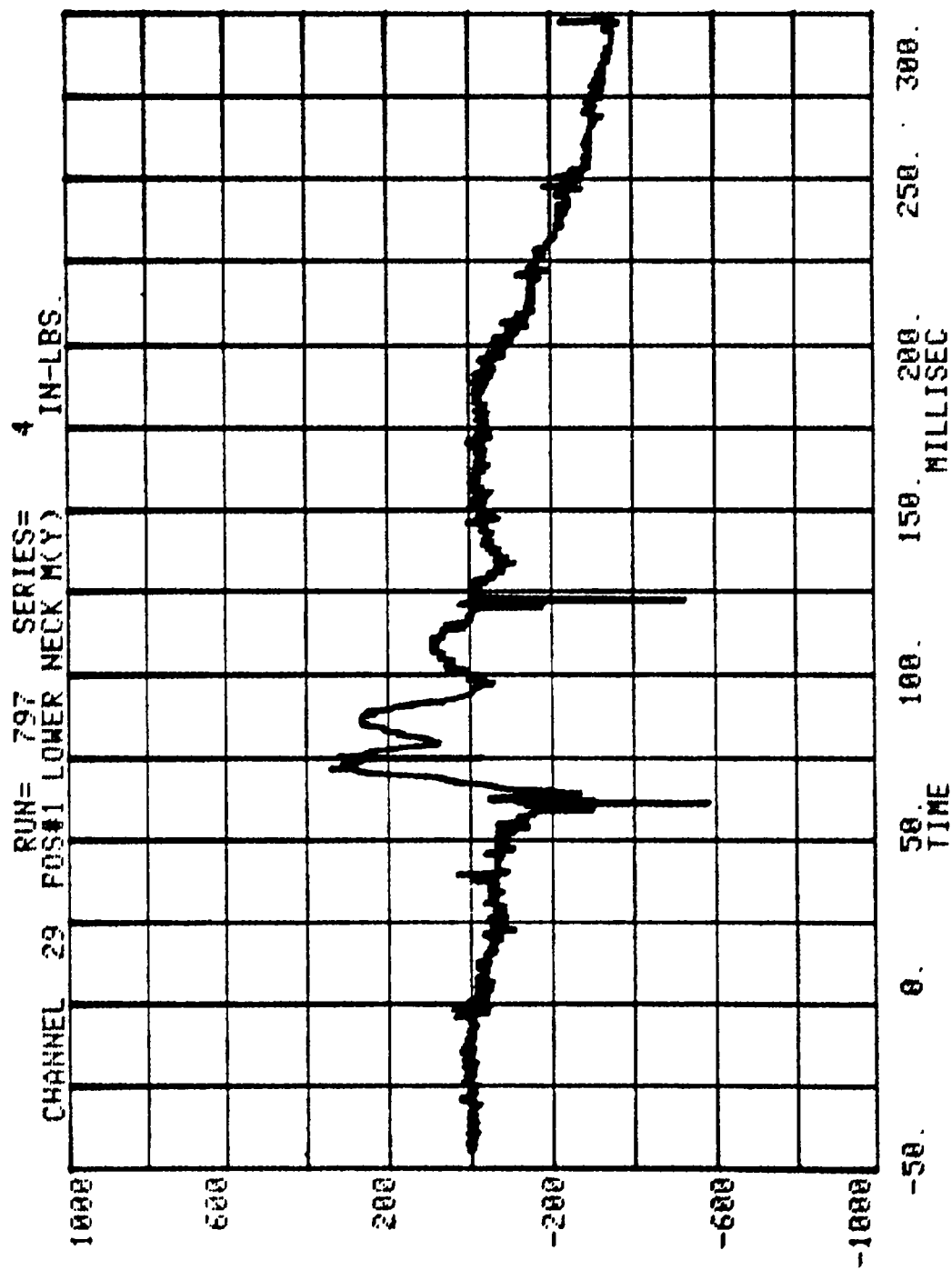
CHANNEL 25 POS#1 LOWER NECK F(Y) LBS.

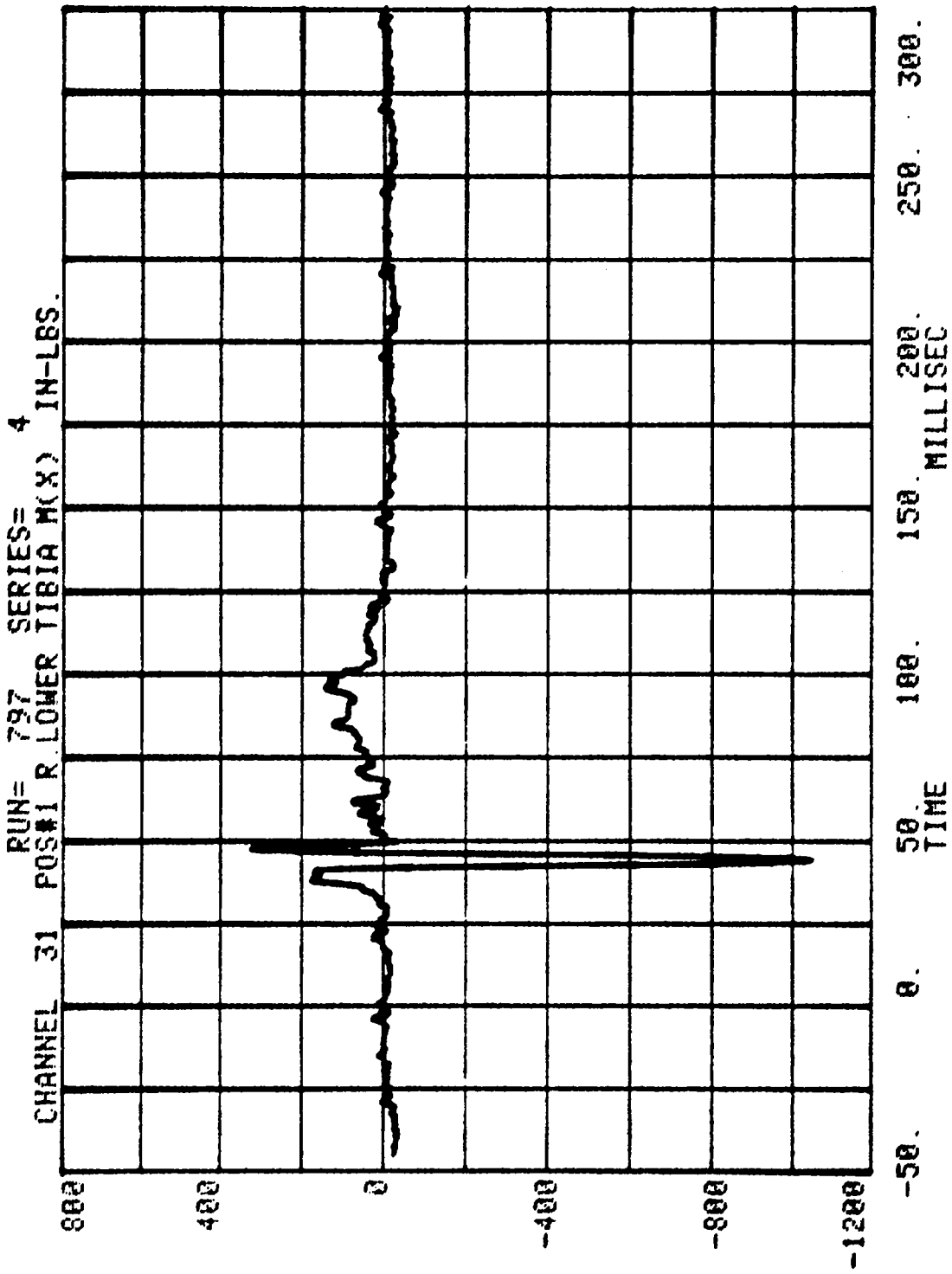
RUN= 797 SERIES= 4

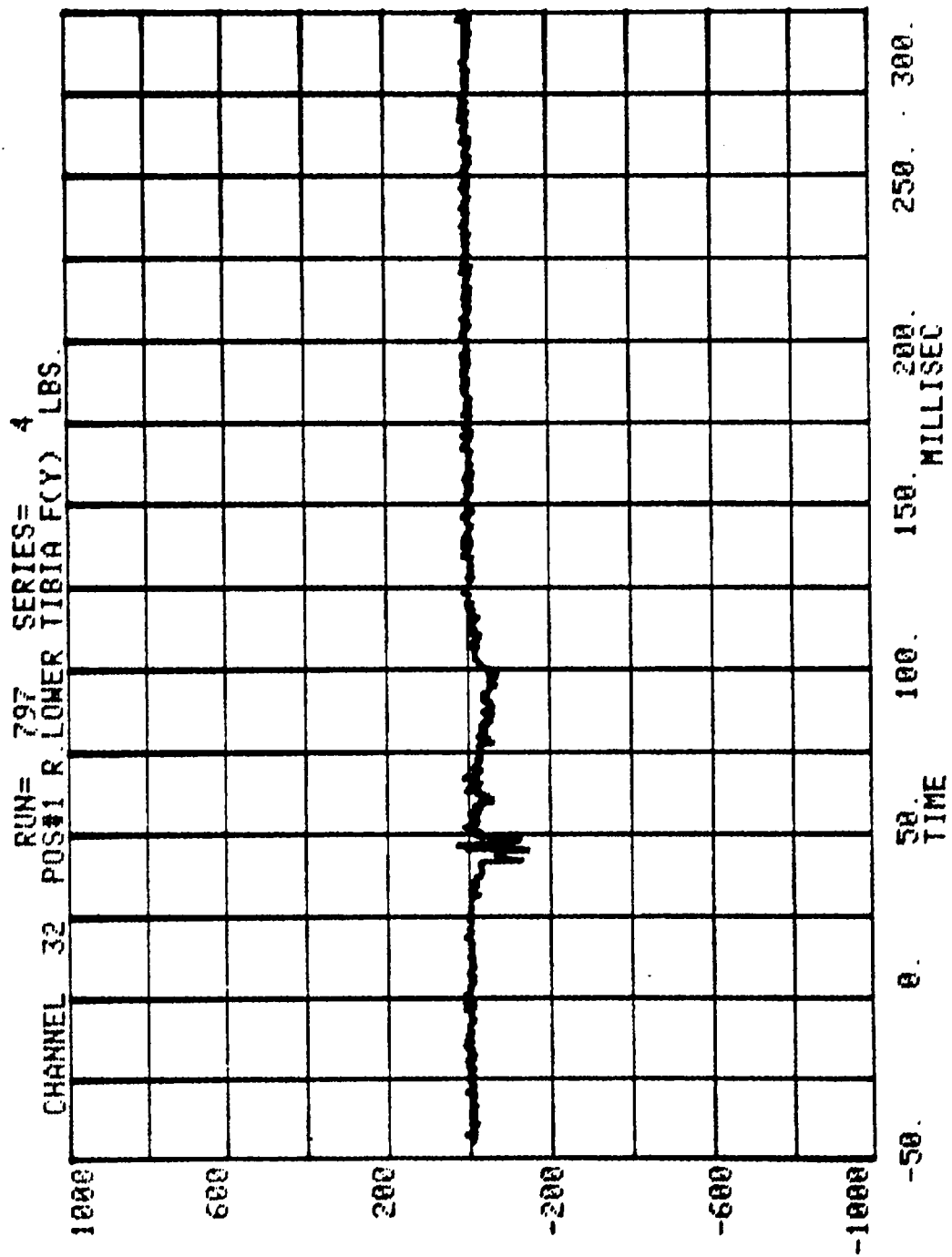






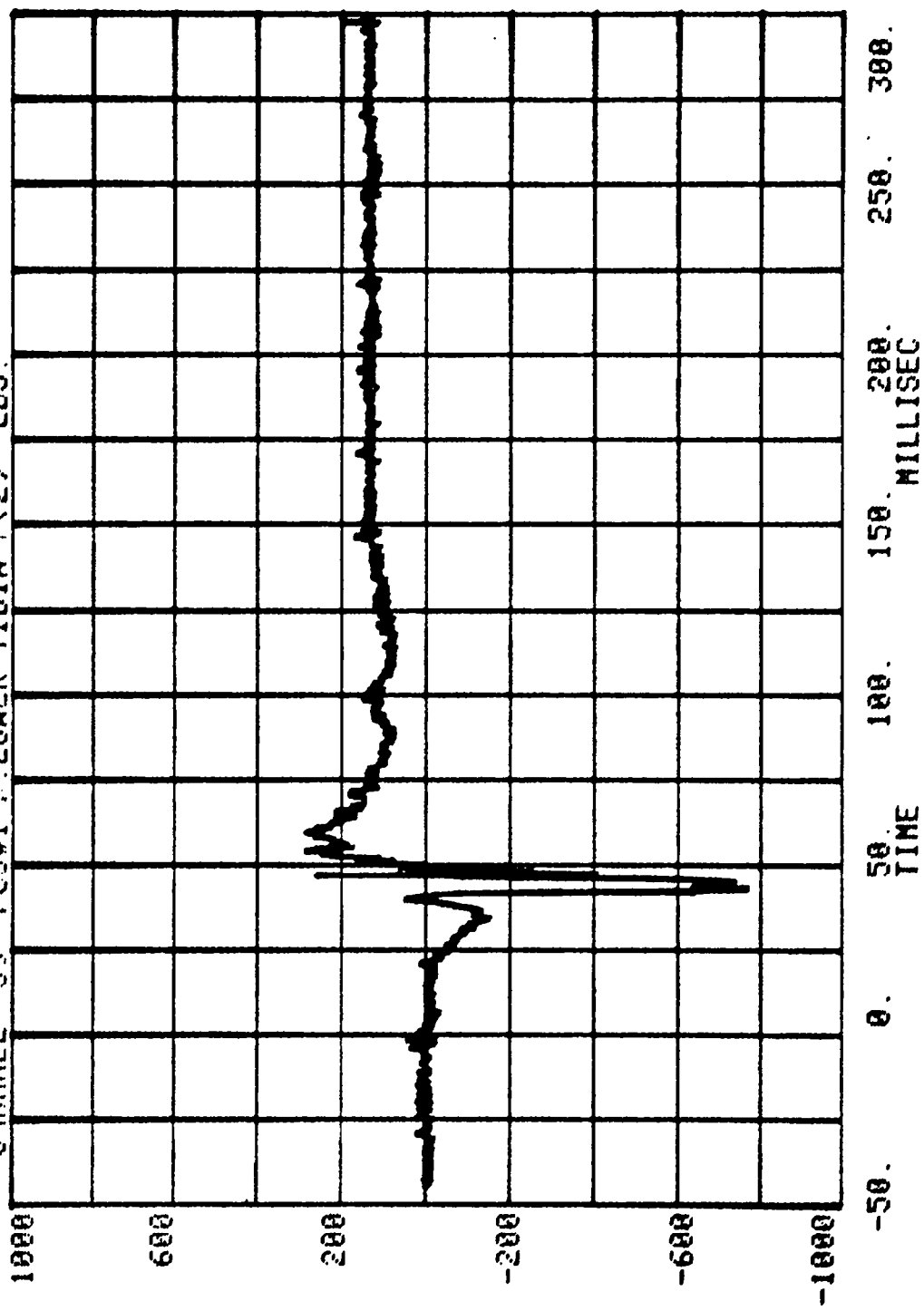


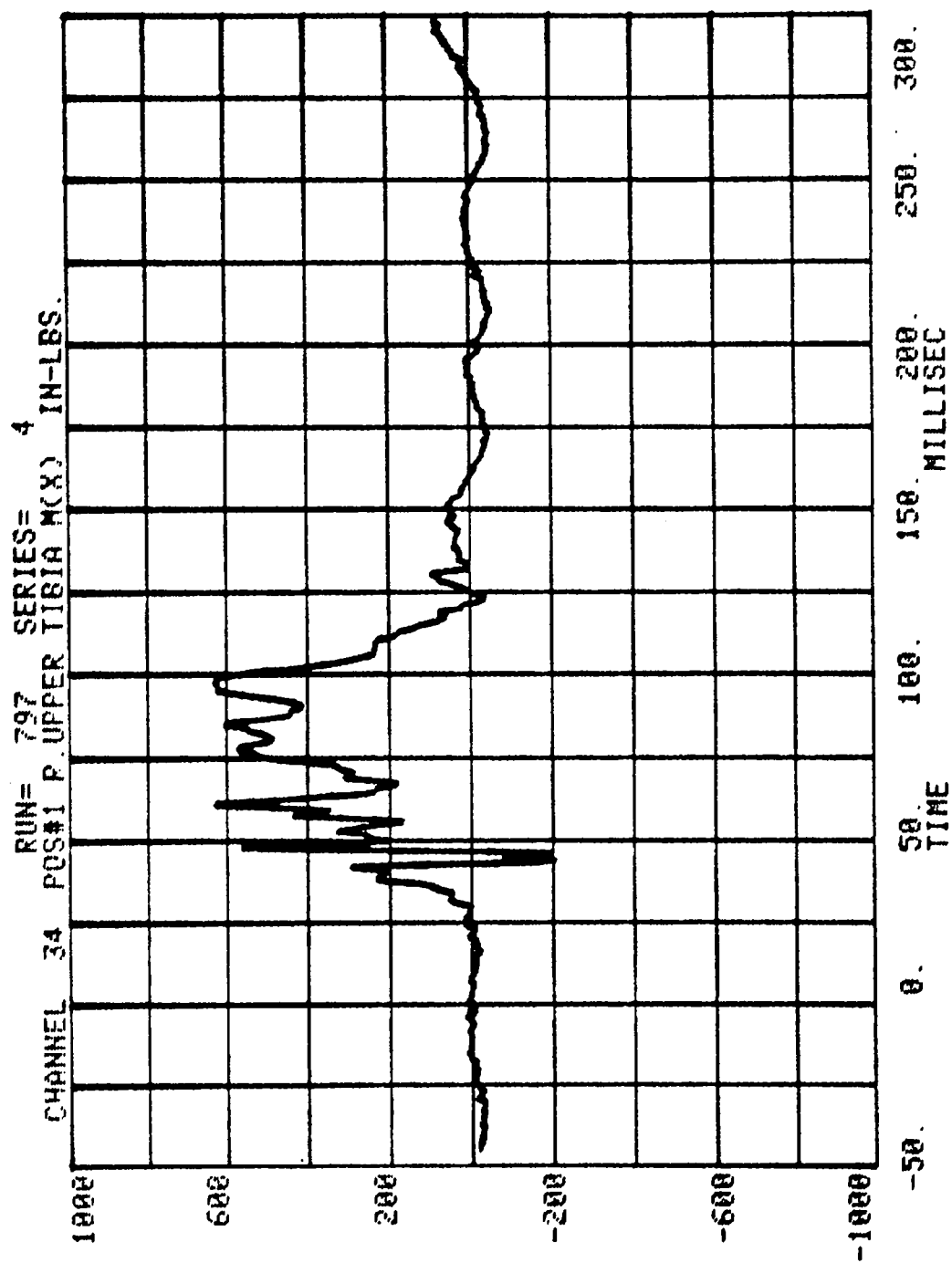




CHANNEL 33 POS#1 P. LOWER TIBIA F(Z) LBS.

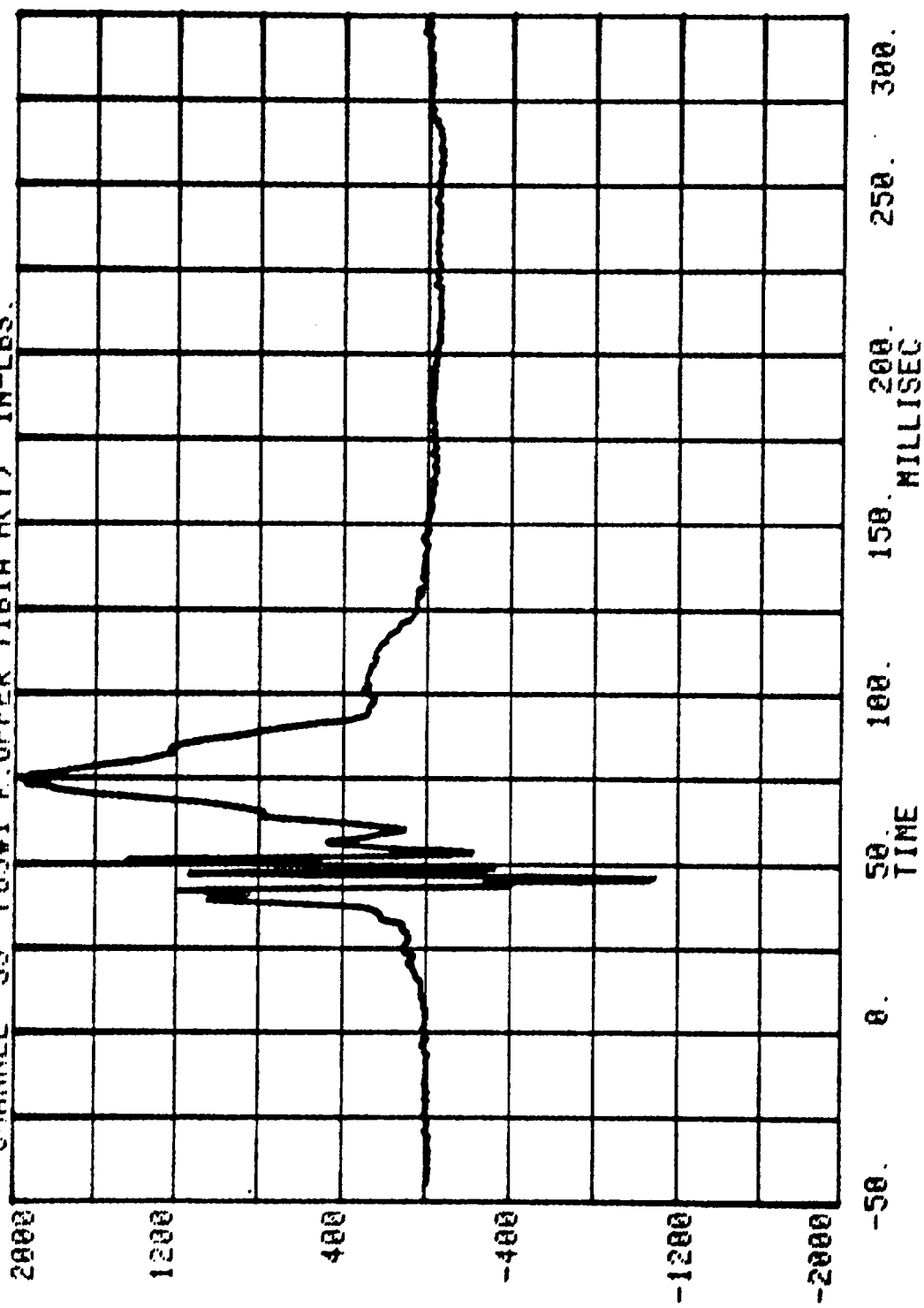
RUN= 797 SERIES= 4



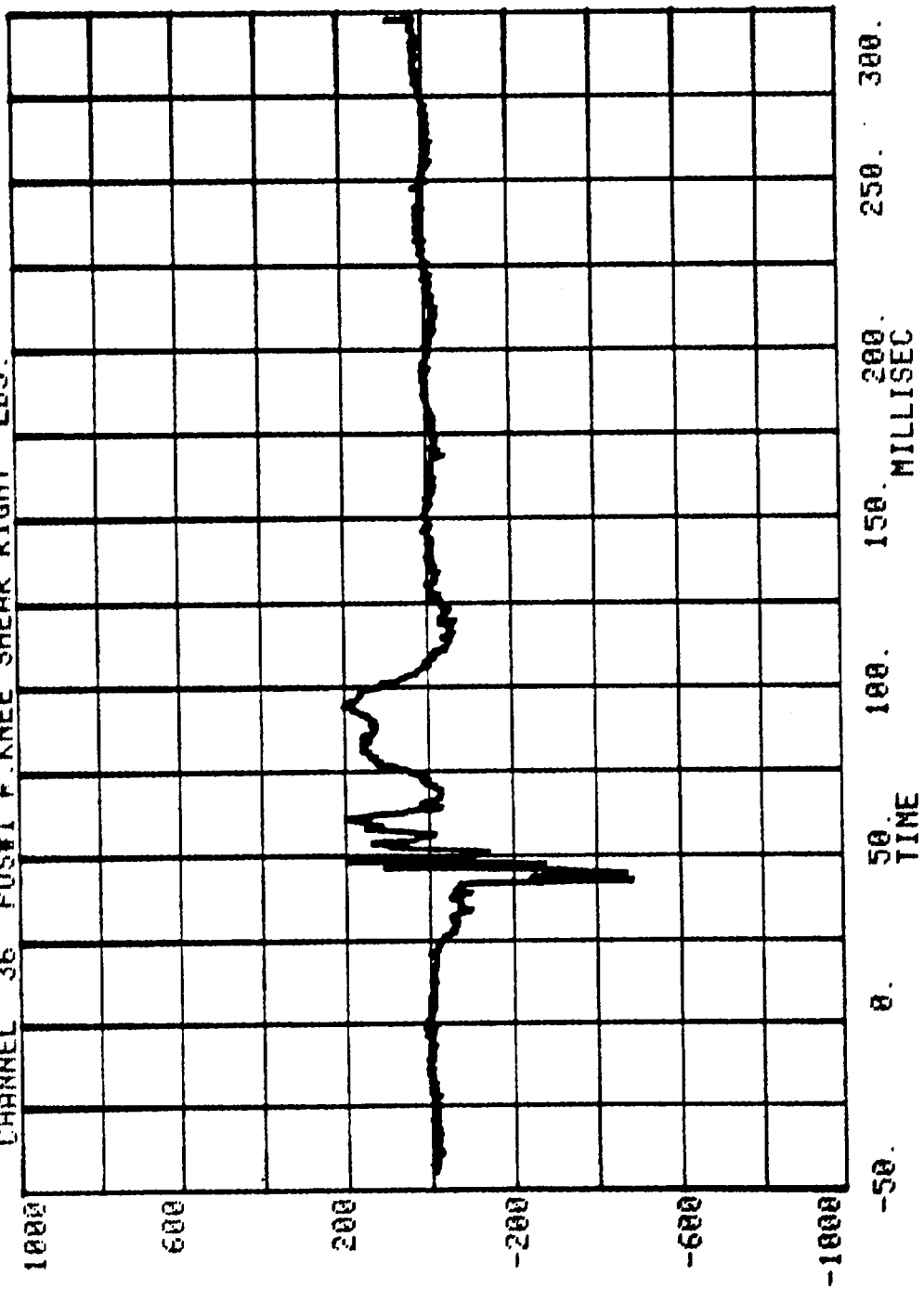


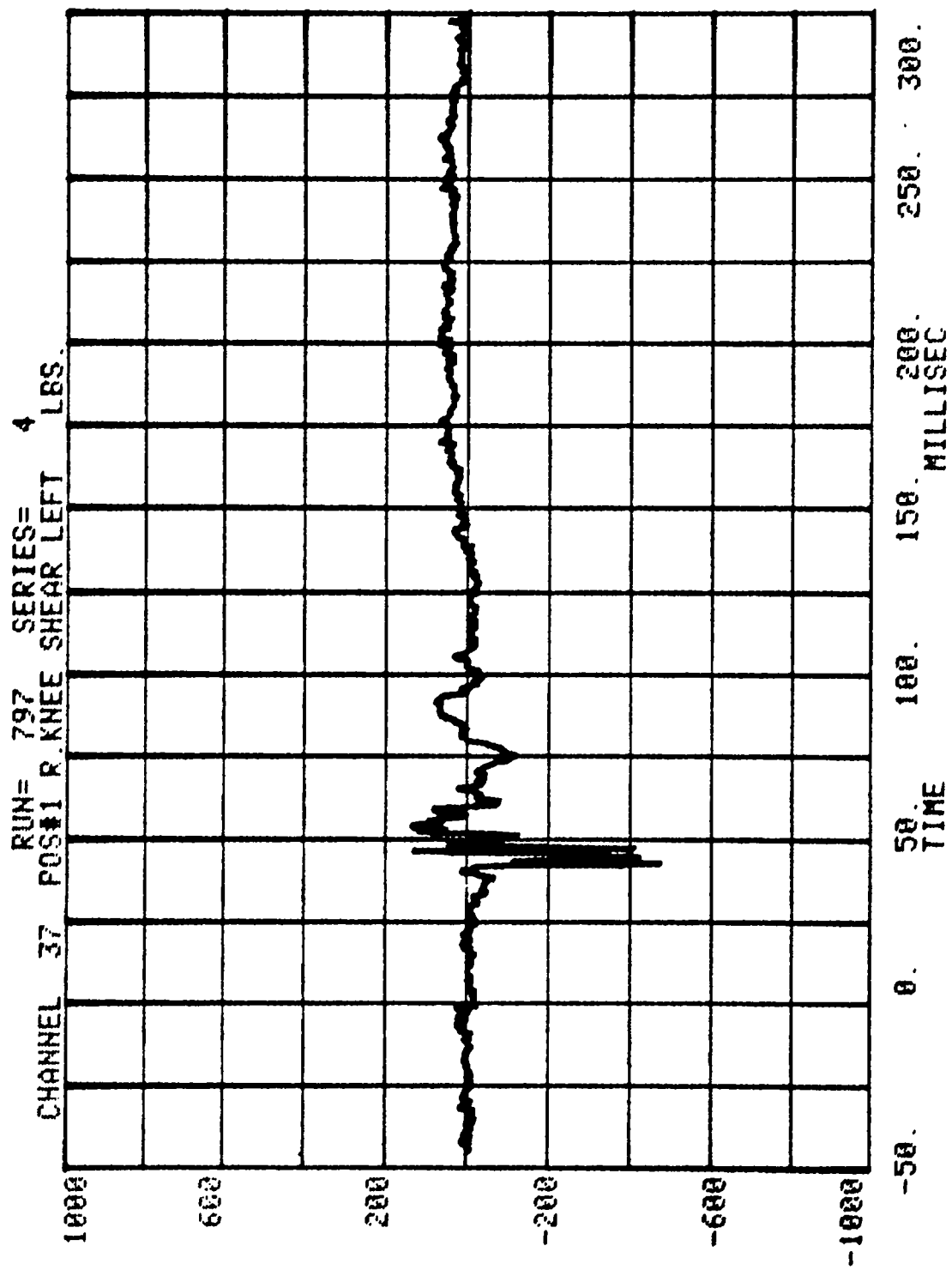
CHANNEL 35 POS#1 P. UPPER TIBIA M(Y) IN-LBS.

RUN= 797 SERIES= 4

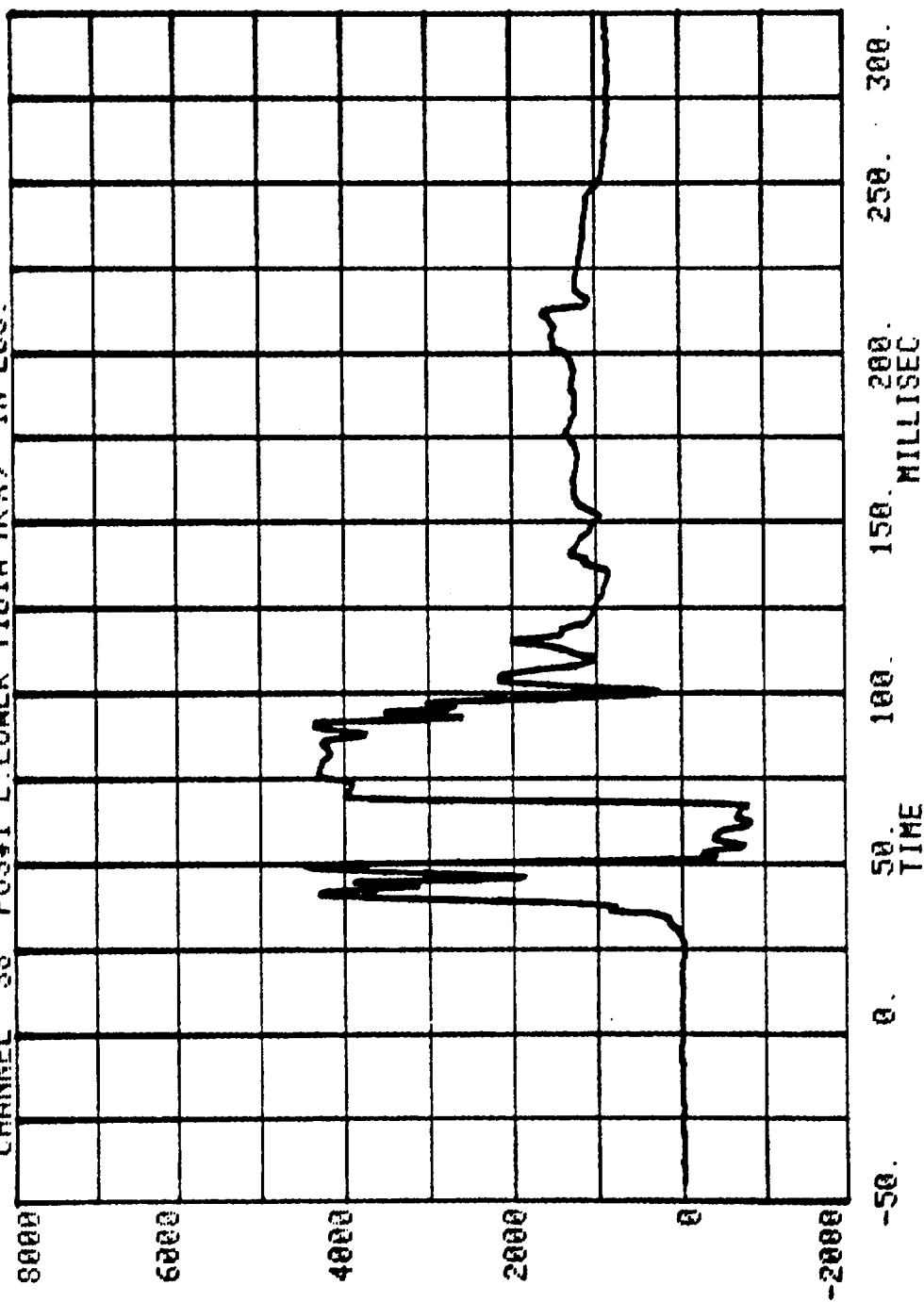


RUN= 797 SERIES= 4
CHANNEL 36 POS#1 P.KNEE SHEAR RIGHT LBS.

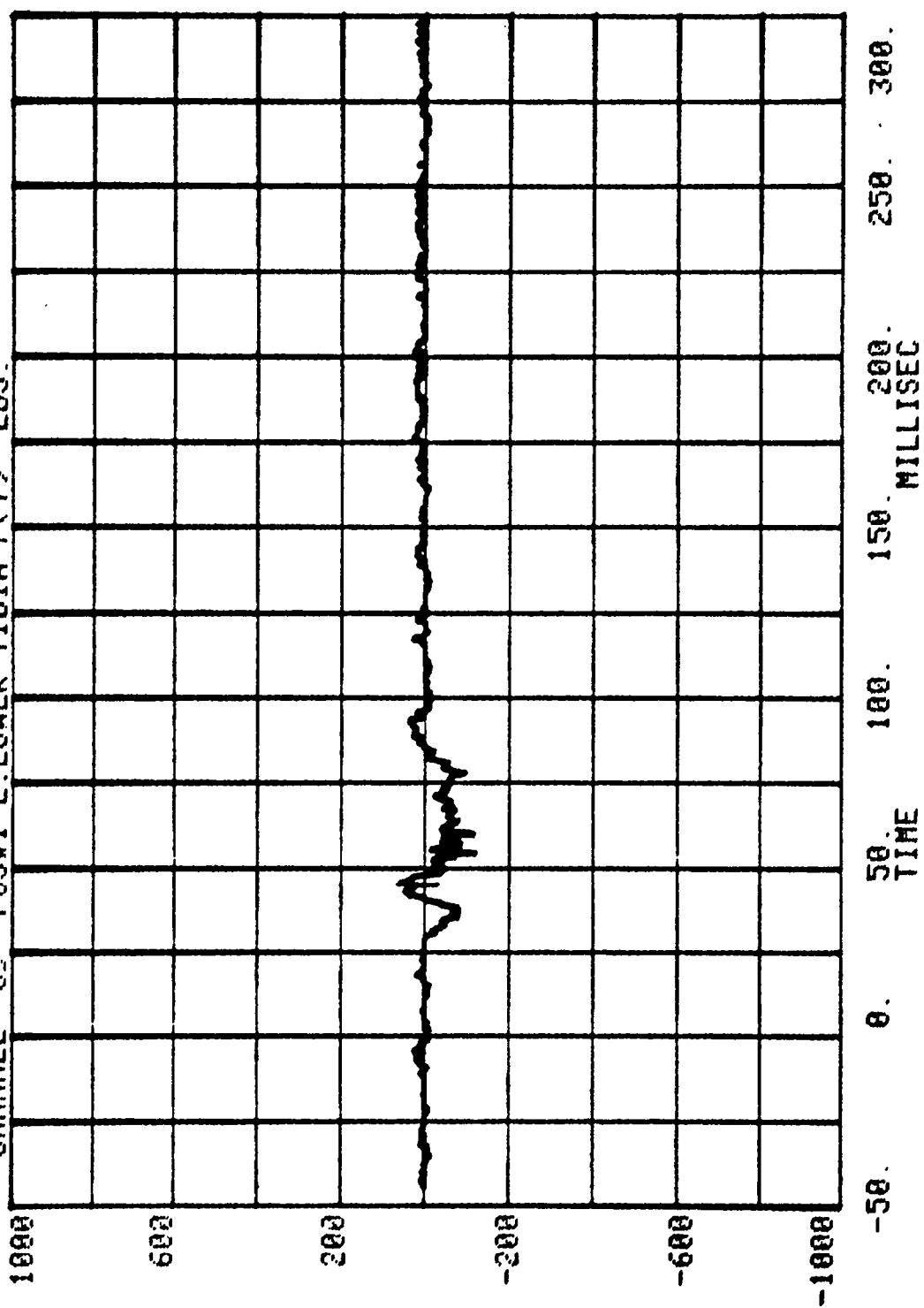


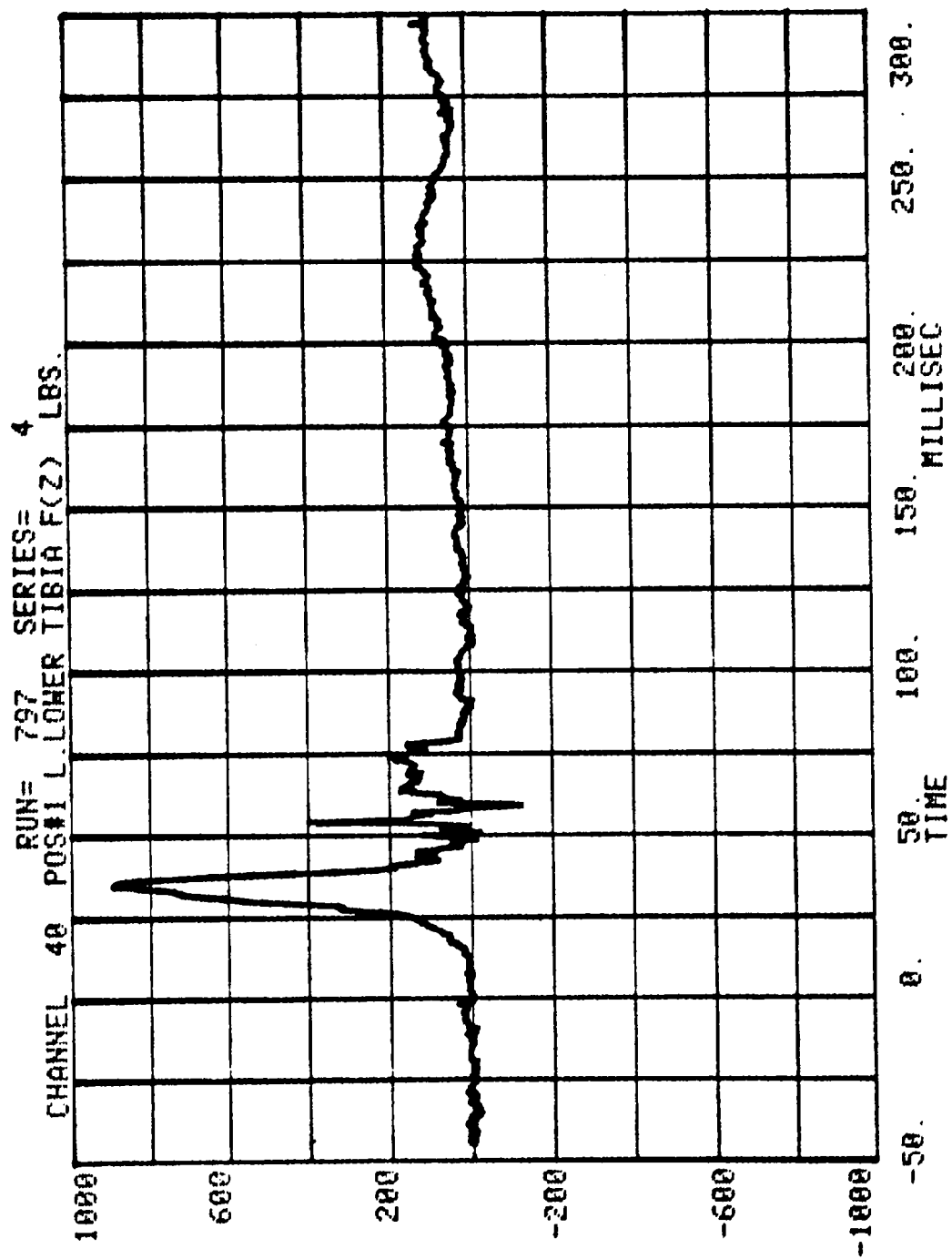


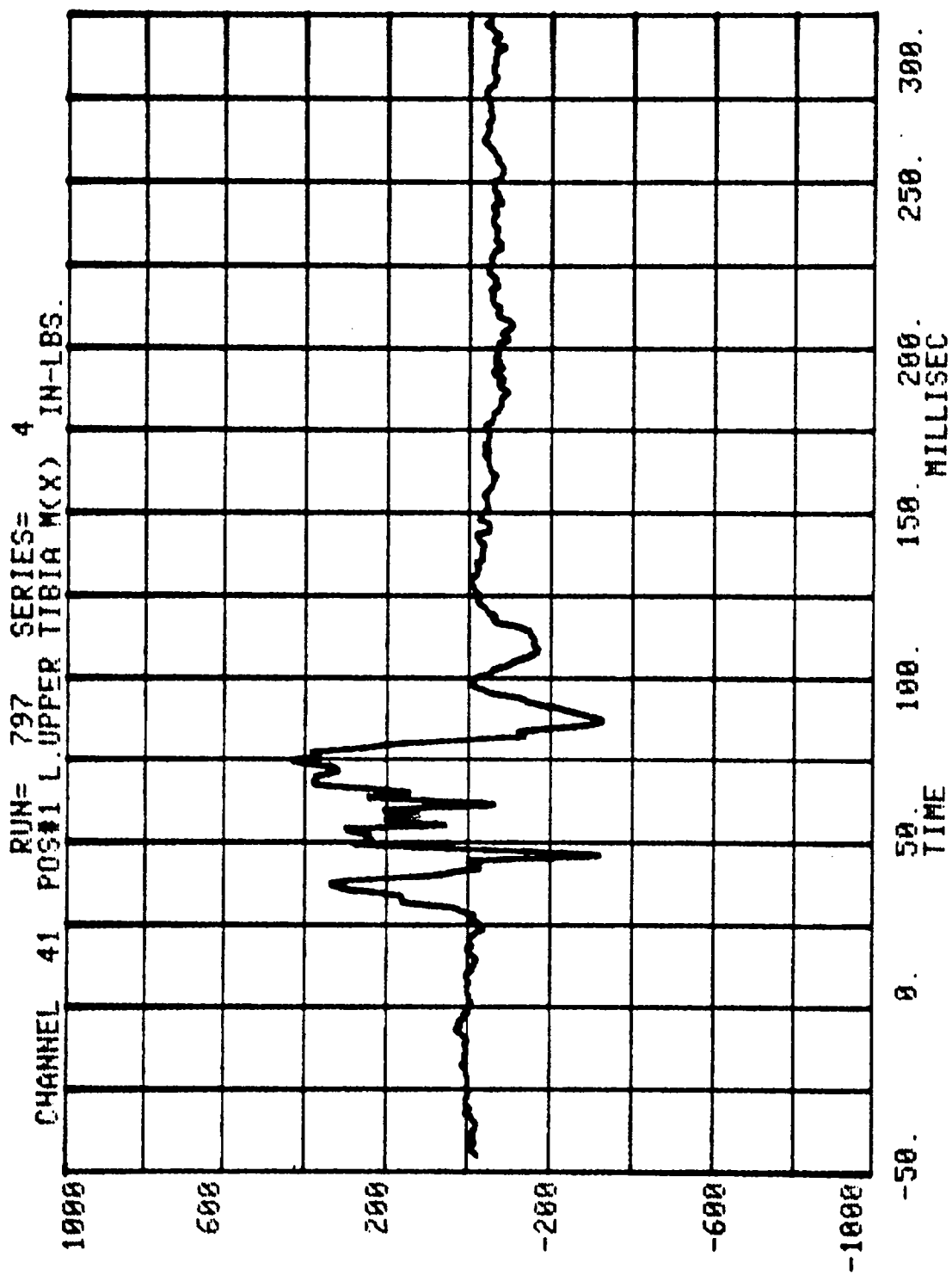
CHANNEL 38 POS#1 L. LOWER TIBIA M(X) IN-LBS.
RUN= 797 SERIES= 4

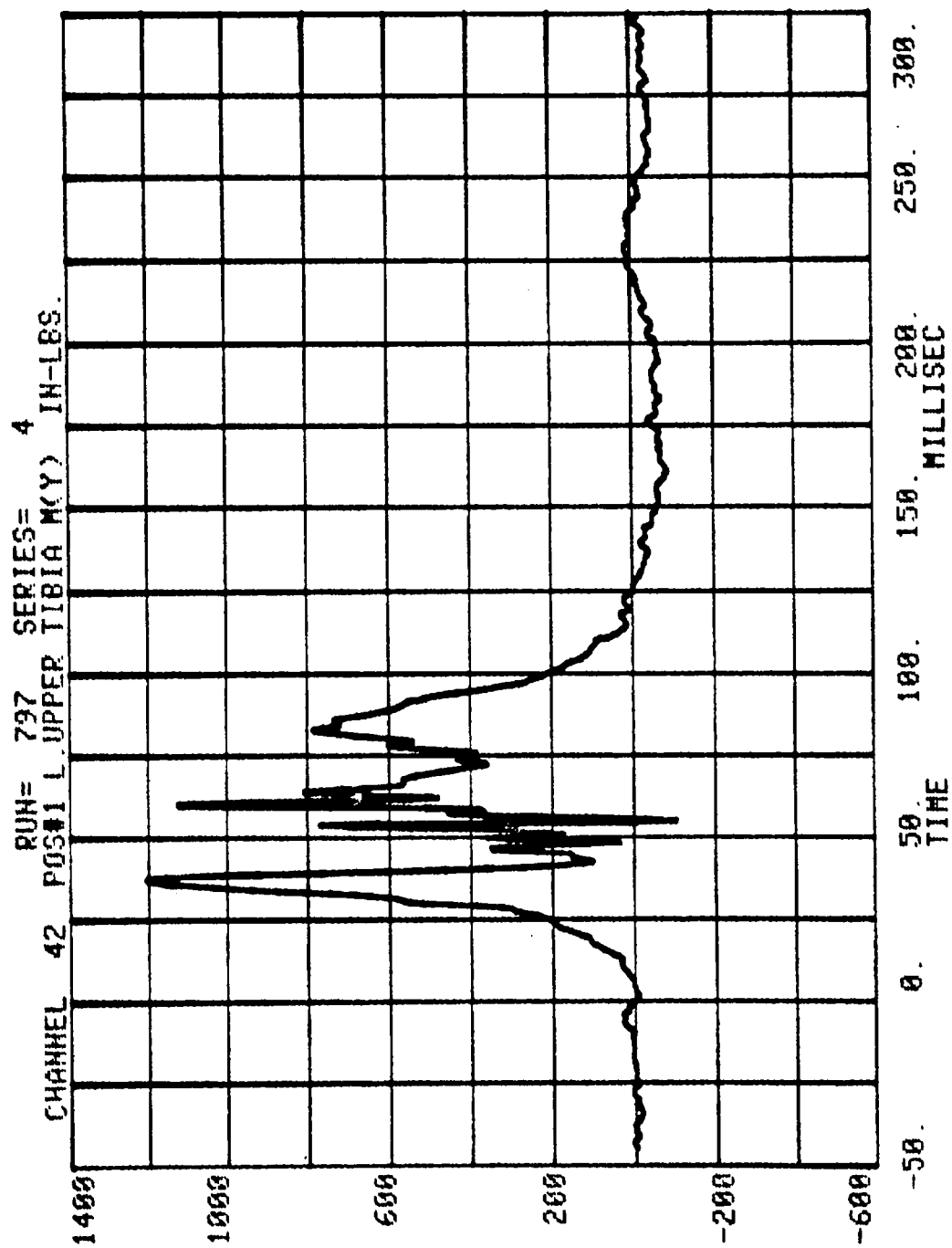


RUN= 797 SERIES= 4
CHANNEL 39 POS#1 L.LOWER TIBIA F(Y) LBS.









B-140

7581-5

RUN= 797 SERIES= 4
CHANNEL 43 POS#1 L.KNEE SHEAR RIGHT LBS.

